WOOD BUFFALO
ENVIRONMENTAL ASSOCIATION

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Wood Buffalo Environmental Association

DECEMBER 2023

MONTHLY CALIBRATION REPORT

CONTINUOUS MONITORING

January 31, 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

DECEMBER 2023

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

January 31, 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:	December 13, 2023	Last Cal Date:	November 1, 2023
Start time (MST):	10:15	End time (MST):	13:16
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:	0.999167	0.998738	Backgd or Offset:	19.8	20.0
Calibration intercept:	-0.353461	-0.153291	Coeff or Slope:	0.887	0.887

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.2	----
as found span	4918	81.3	800.3	794.7	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.5	----
high point	4918	81.3	800.3	799.6	1.001
second point	4959	40.7	400.6	399.1	1.004
third point	4979	20.3	199.8	199.1	1.004
as left zero	5000	0.0	0.0	0.5	----
as left span	4918	81.3	800.3	799.0	1.002
				Average Correction Factor	1.003

Baseline Corr As found:	794.50	Previous response	799.25	*% change	-0.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

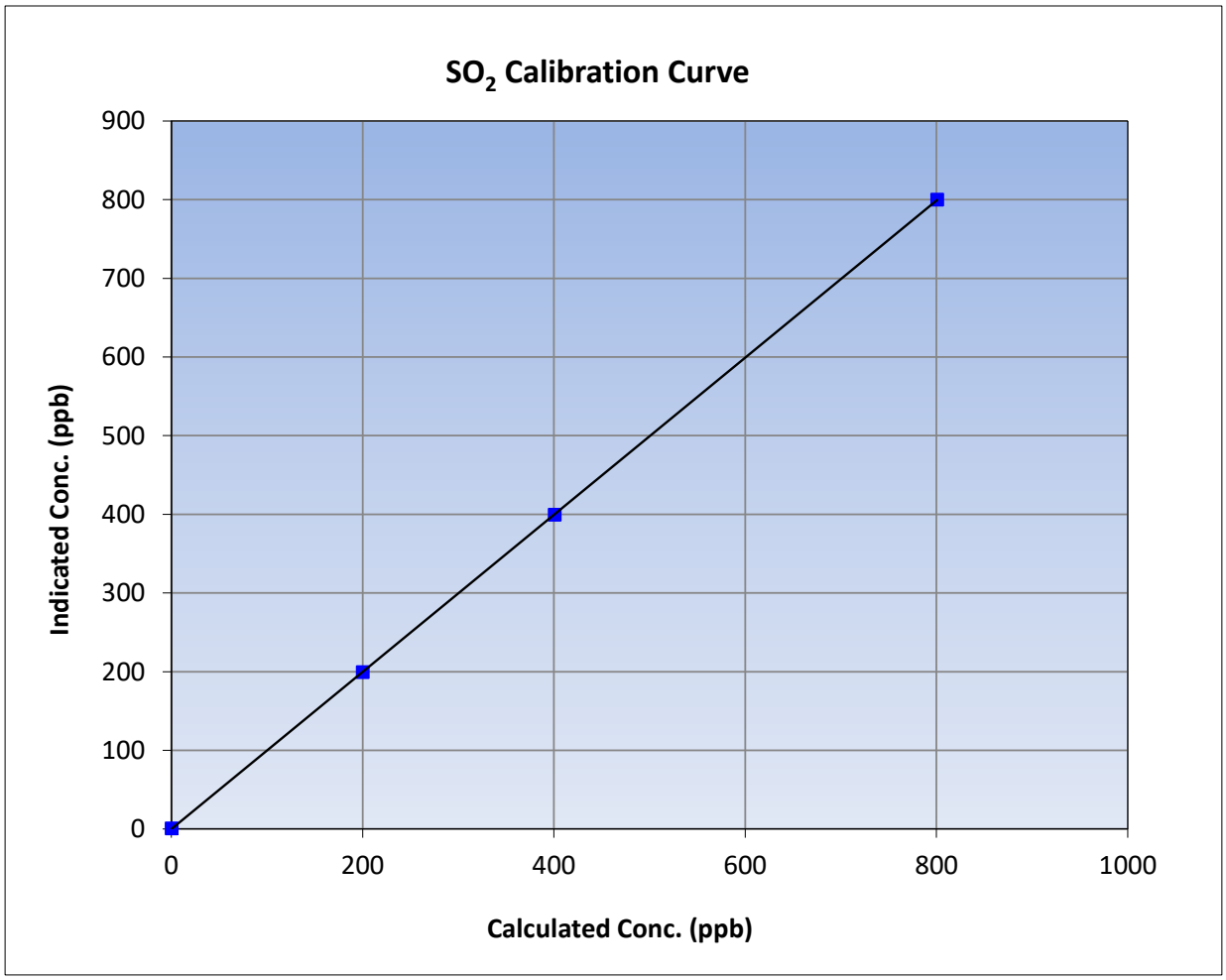
Station Information

Calibration Date:	December 13, 2023	Previous Calibration:	November 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:15	End Time (MST):	13:16
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301448

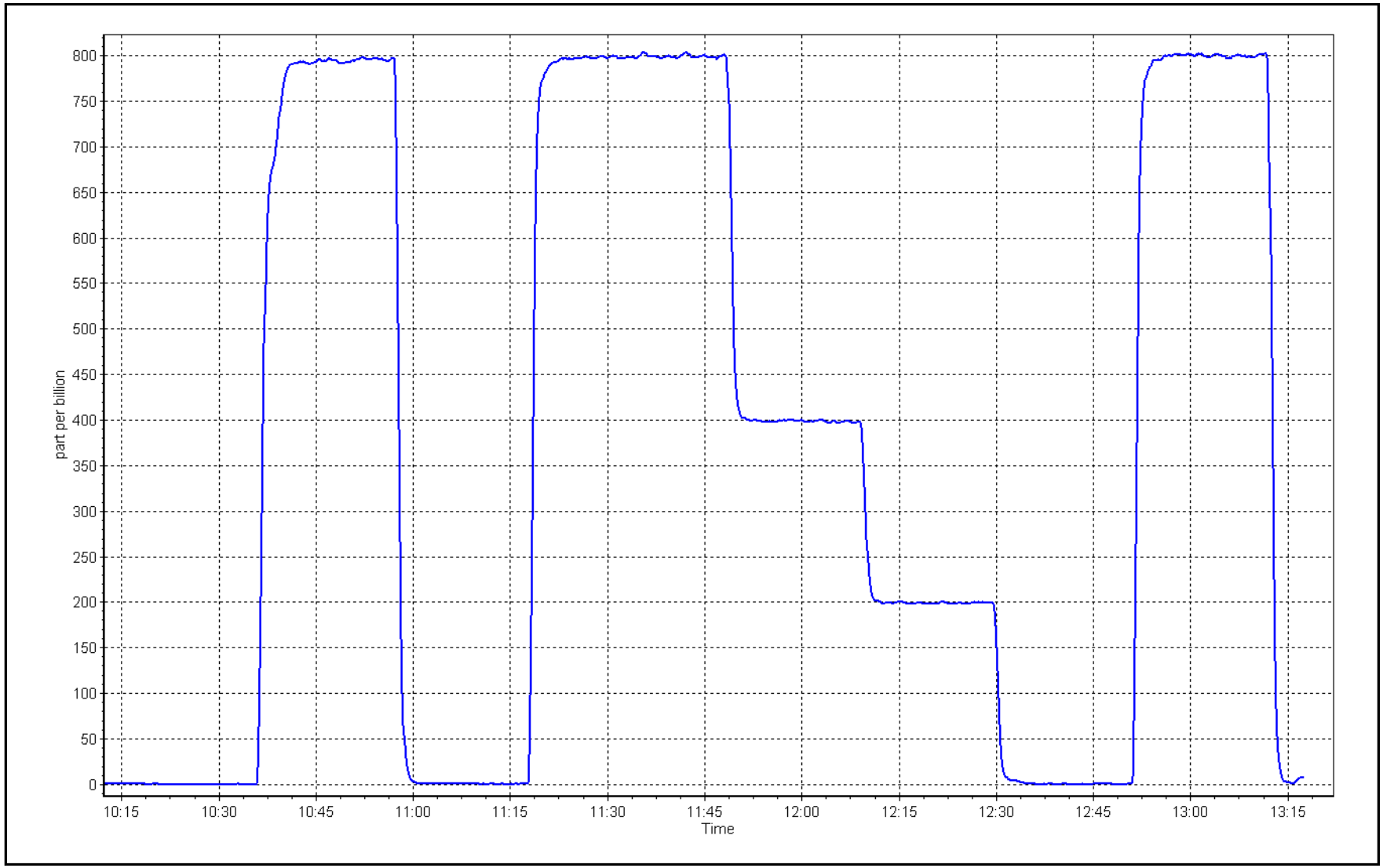
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
800.3	799.6	1.0008
400.6	399.1	1.0037
199.8	199.1	1.0036

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	0.998738	*0.90 - 1.10*
Intercept	-0.153291	*+/-30*



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



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	December 12, 2023	Last Cal Date:	November 6, 2023
Start time (MST):	11:23	End time (MST):	17:24
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:	0.997792	0.999507	Backgd or Offset:	2.28	2.25
Calibration intercept:	0.180000	0.219996	Coeff or Slope:	0.914	0.904

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.2	----
as found span	4921	78.4	80.0	81.4	0.985
as found 2nd point	4960	39.2	40.0	40.9	0.983
as found 3rd point	4980	19.6	20.0	20.4	0.990
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4921	78.4	80.0	80.1	0.999
second point	4960	39.2	40.0	40.4	0.990
third point	4980	19.6	20.0	20.1	0.995
as left zero	5000	0.0	0.0	0.4	----
as left span	4921	78.4	80.0	80.2	0.997
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:	81.2	Prev response:	80.00	*% change:	1.5%
Baseline Corr 2nd AF pt:	40.7	AF Slope:	1.015651	AF Intercept:	0.179998
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999995		

* = > +/-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

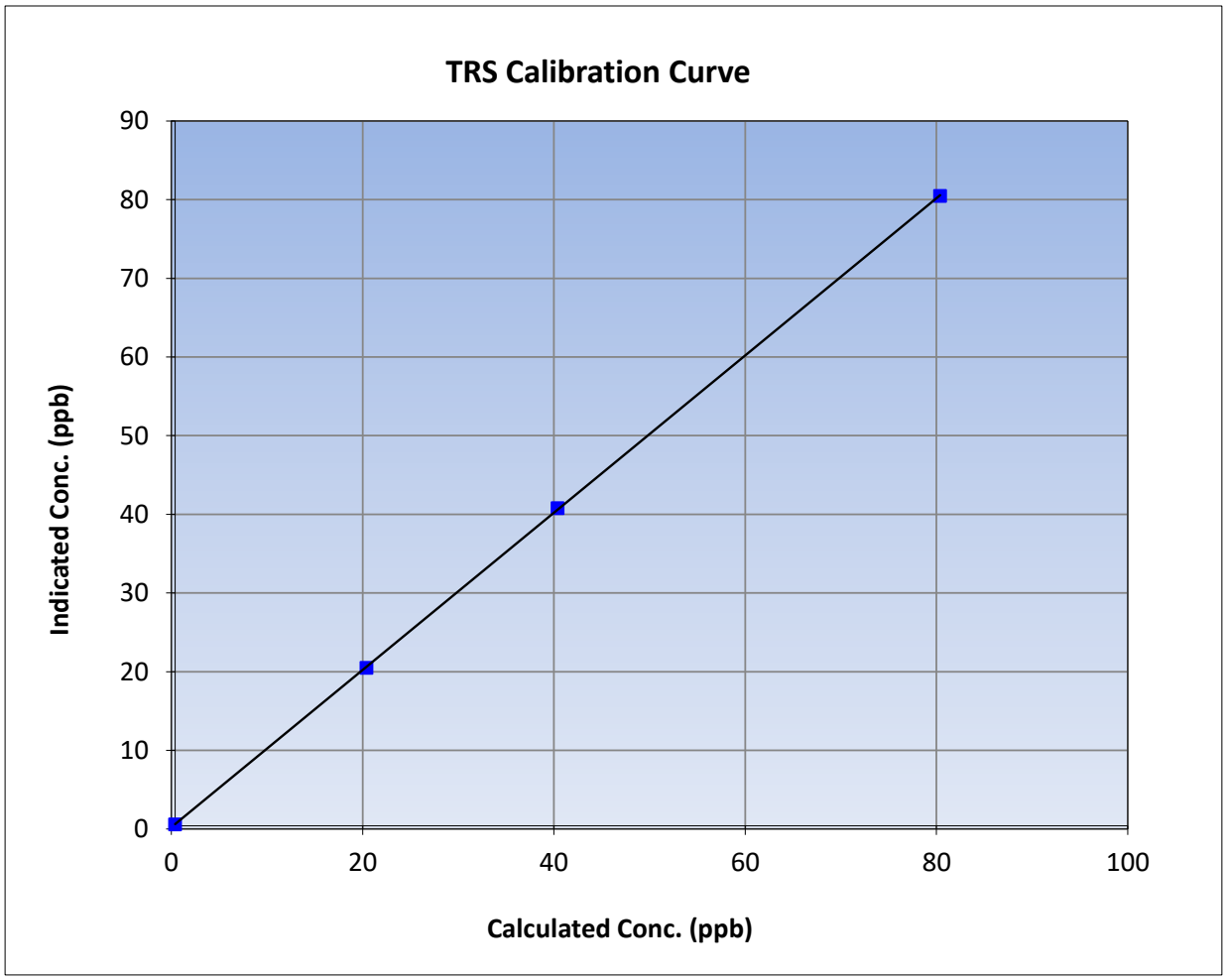
Station Information

Calibration Date:	December 12, 2023	Previous Calibration:	November 6, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:23	End Time (MST):	17:24
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153461

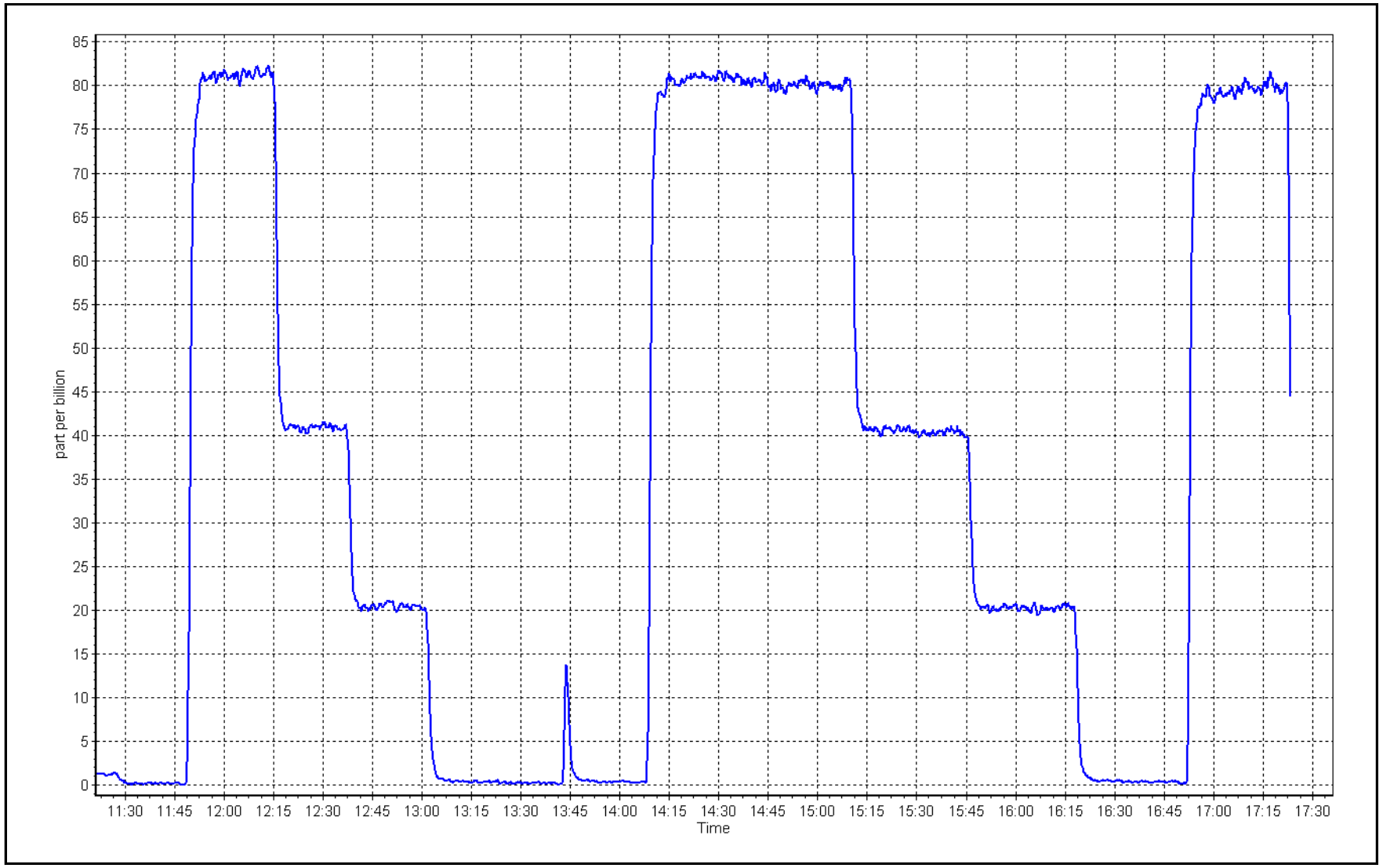
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	80.1	0.9987
40.0	40.4	0.9901
20.0	20.1	0.9949

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999983	*≥0.995*
Slope	0.999507	*0.90 - 1.10*
Intercept	0.219996	*+/-3*



TRS Calibration Plot Date: December 12, 2023 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	December 12, 2023	Last Cal Date:	November 6, 2023
Start time (MST):	11:23	End time (MST):	17:24
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:	Thermo Converter		Converter serial #:	N/A	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.995140	0.985566	Backgd or Offset:	1.73	1.72
Calibration intercept:	0.276804	0.536834	Coeff or Slope:	1.009	1.009

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.2	----
as found span	4922	78.4	80.0	78.7	1.019
as found 2nd point	4960	39.2	40.0	40.0	1.005
as found 3rd point	4980	19.6	20.0	20.1	1.005
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.5	----
high point	4922	78.4	80.0	79.3	1.009
second point	4960	39.2	40.0	40.1	0.997
third point	4980	19.6	20.0	20.2	0.990
as left zero	5000	0.0	0.0	1.1	----
as left span	4922	78.4	80.0	76.7	1.043
SO2 Scrubber Check	4919	81.3	813.0	-0.1	----
Date of last scrubber change:		March 21, 2022		Ave Corr Factor	0.999
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.5	Prev response:	79.85	*% change:	-1.7%
Baseline Corr 2nd AF pt:	39.8	AF Slope:	0.981329	AF Intercept:	0.416826
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999940		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

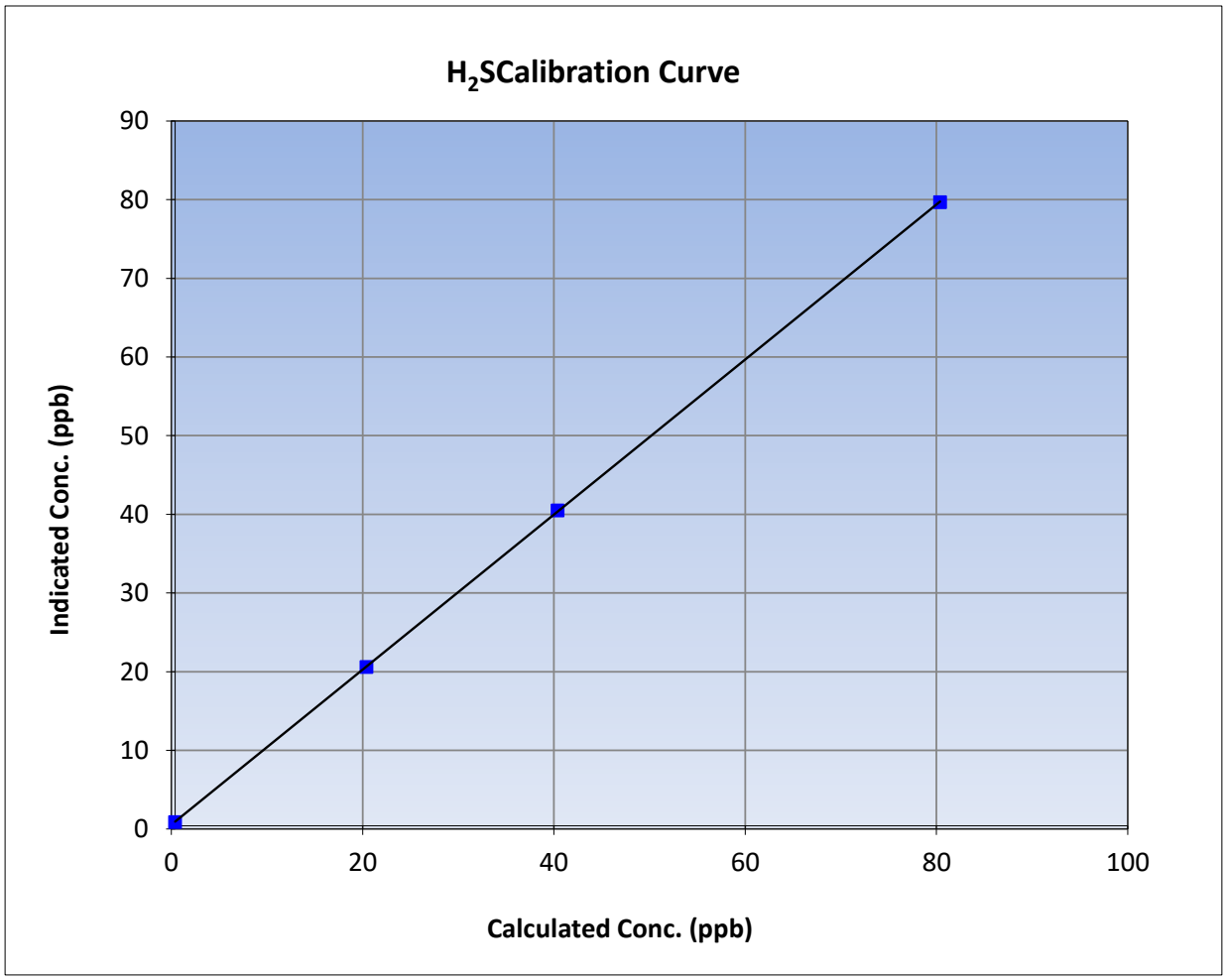
Station Information

Calibration Date:	December 12, 2023	Previous Calibration:	November 6, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:23	End Time (MST):	17:24
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1200326167

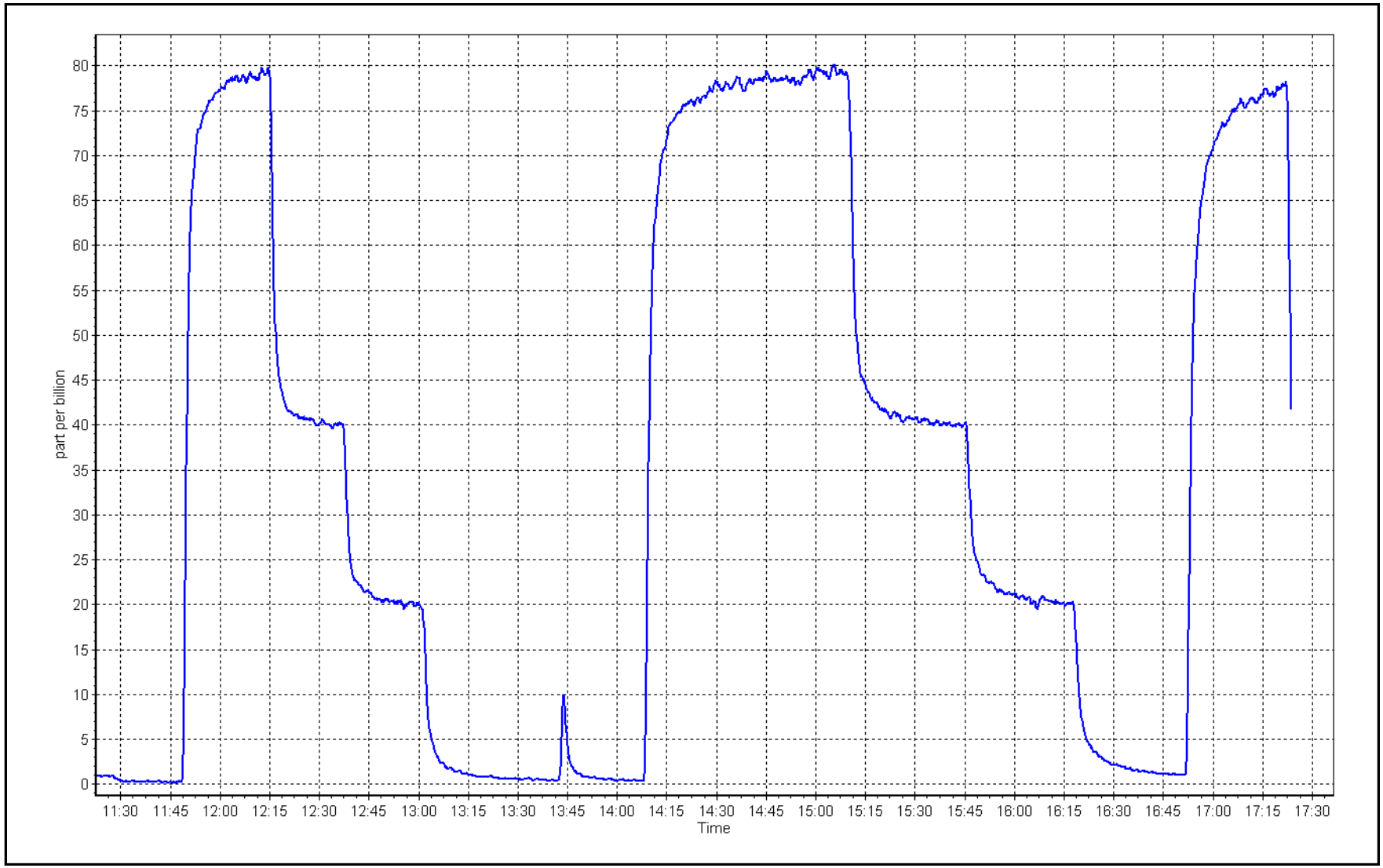
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
80.0	79.3	1.0085
40.0	40.1	0.9975
20.0	20.2	0.9900

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	0.985566	*0.90 - 1.10*
Intercept	0.536834	*+/-3*



H_2S Calibration Plot Date: December 12, 2023 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:	December 13, 2023	Last Cal Date:	November 1, 2023
Start time (MST):	10:15	End time (MST):	13:16
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:	3.01E-04	3.04E-04	NMHC SP Ratio:	6.84E-05	7.01E-05
CH4 Retention time:	14.6	14.6	NMHC Peak Area:	134289	131151
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	17.14	1.008
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	17.22	1.003
second point	4959	40.7	8.64	8.46	1.021
third point	4980	20.3	4.31	4.21	1.024
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	17.27	17.24	1.001
				Average Correction Factor	1.016
Baseline Corr AF:	17.14	Prev response	17.19	*% change	-0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4918	81.3	9.18	9.08	1.011
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	9.13	1.006
second point	4959	40.7	4.60	4.55	1.011
third point	4980	20.3	2.29	2.28	1.006
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	9.18	9.17	1.001
				Average Correction Factor	1.007
Baseline Corr AF:	9.08	Prev response	9.15	*% 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	4918	81.3	8.09	8.05	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4918	81.3	8.09	8.09	1.000
second point	4959	40.7	4.05	3.91	1.034
third point	4980	20.3	2.02	1.93	1.045
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	8.09	8.07	1.002
				Average Correction Factor	1.026
Baseline Corr AF:	8.05	Prev response	8.05	*% change	0.0%
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:	1.000035	0.997839
THC Cal Offset:	-0.073775	-0.066185
CH4 Cal Slope:	1.002522	1.002253
CH4 Cal Offset:	-0.057596	-0.062393
NMHC Cal Slope:	0.998093	0.994150
NMHC Cal Offset:	-0.016179	-0.004590

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

THC Calibration Summary

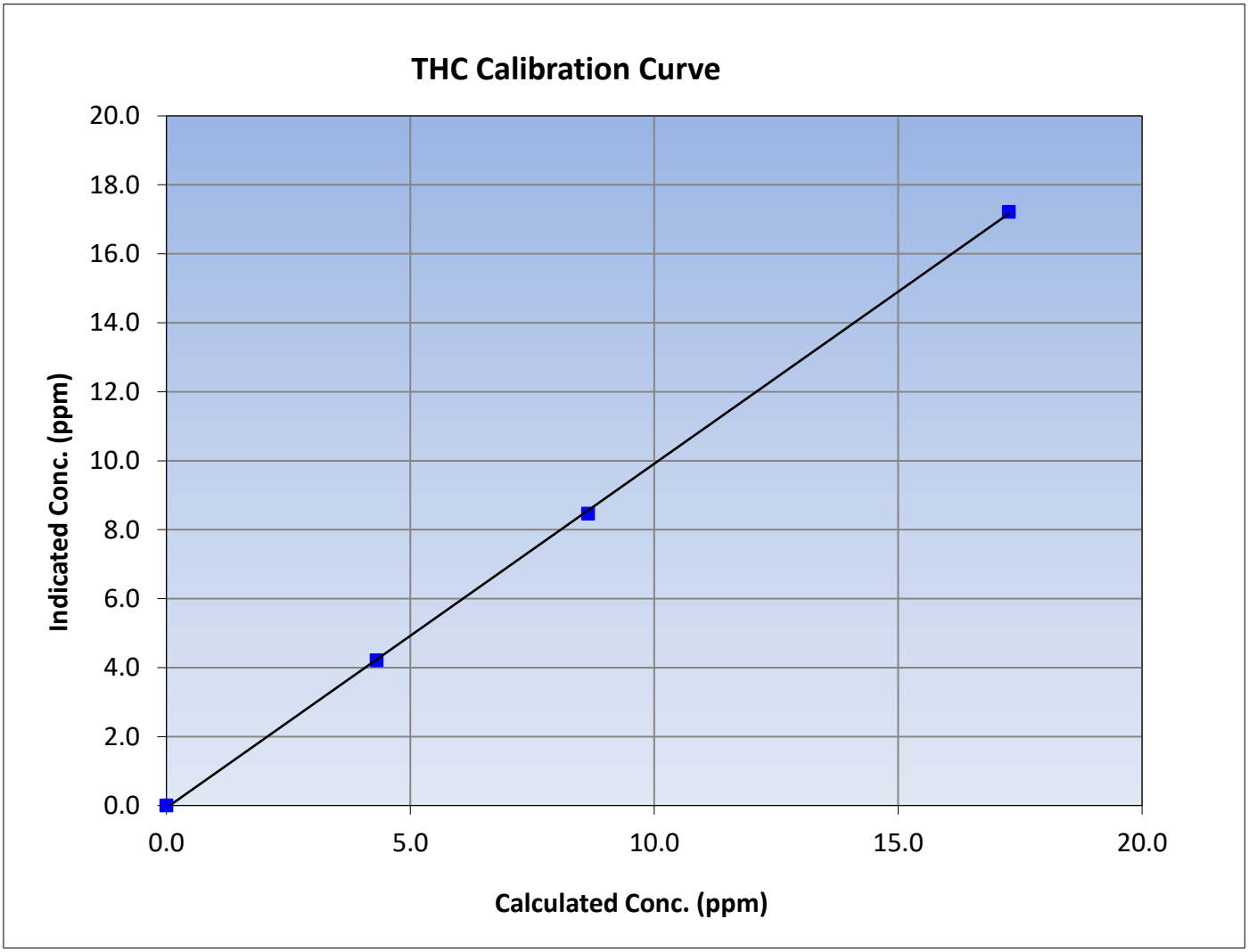
Version-06-2022

Station Information

Calibration Date:	December 13, 2023	Previous Calibration:	November 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:15	End Time (MST):	13:16
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	0.999896	≥0.995
17.27	17.22	1.0029			
8.64	8.46	1.0212	Slope	0.997839	0.90 - 1.10
4.31	4.21	1.0239			
			Intercept	-0.066185	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

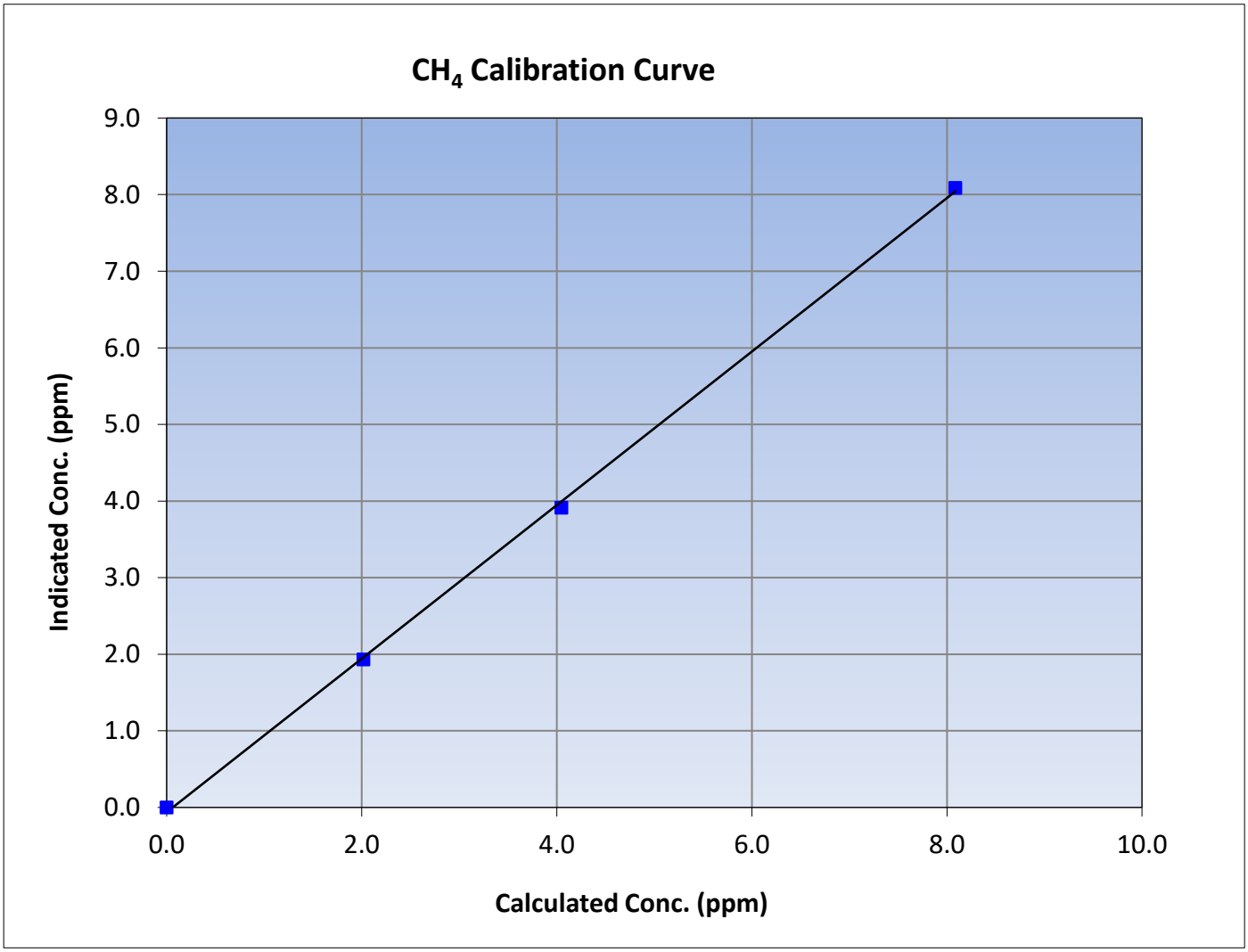
Version-06-2022

Station Information

Calibration Date:	December 13, 2023	Previous Calibration:	November 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:15	End Time (MST):	13:16
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	0.999625	*≥0.995*
8.09	8.09	0.9996			
4.05	3.91	1.0341	Slope	1.002253	*0.90 - 1.10*
2.02	1.93	1.0454			
			Intercept	-0.062393	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

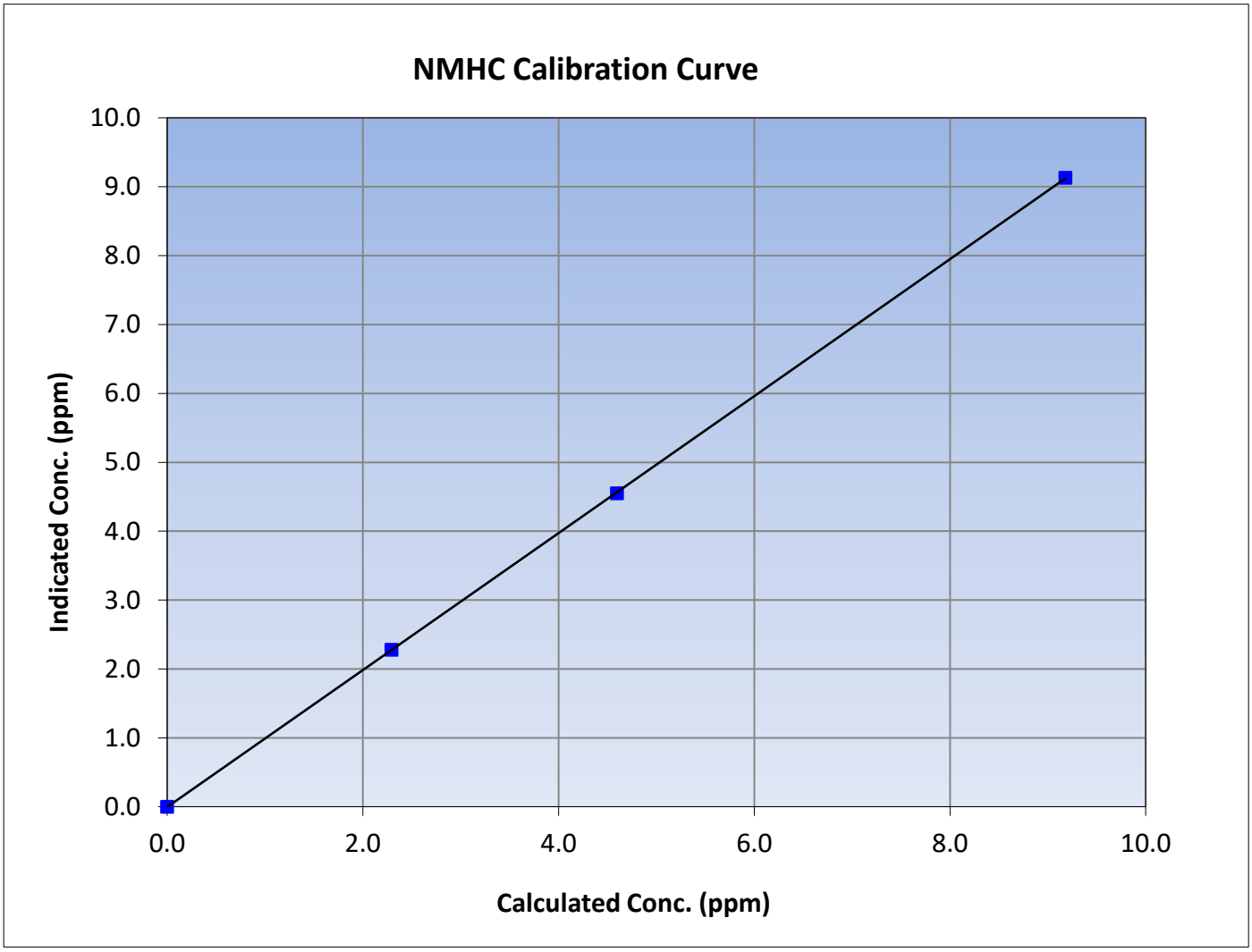
Version-06-2022

Station Information

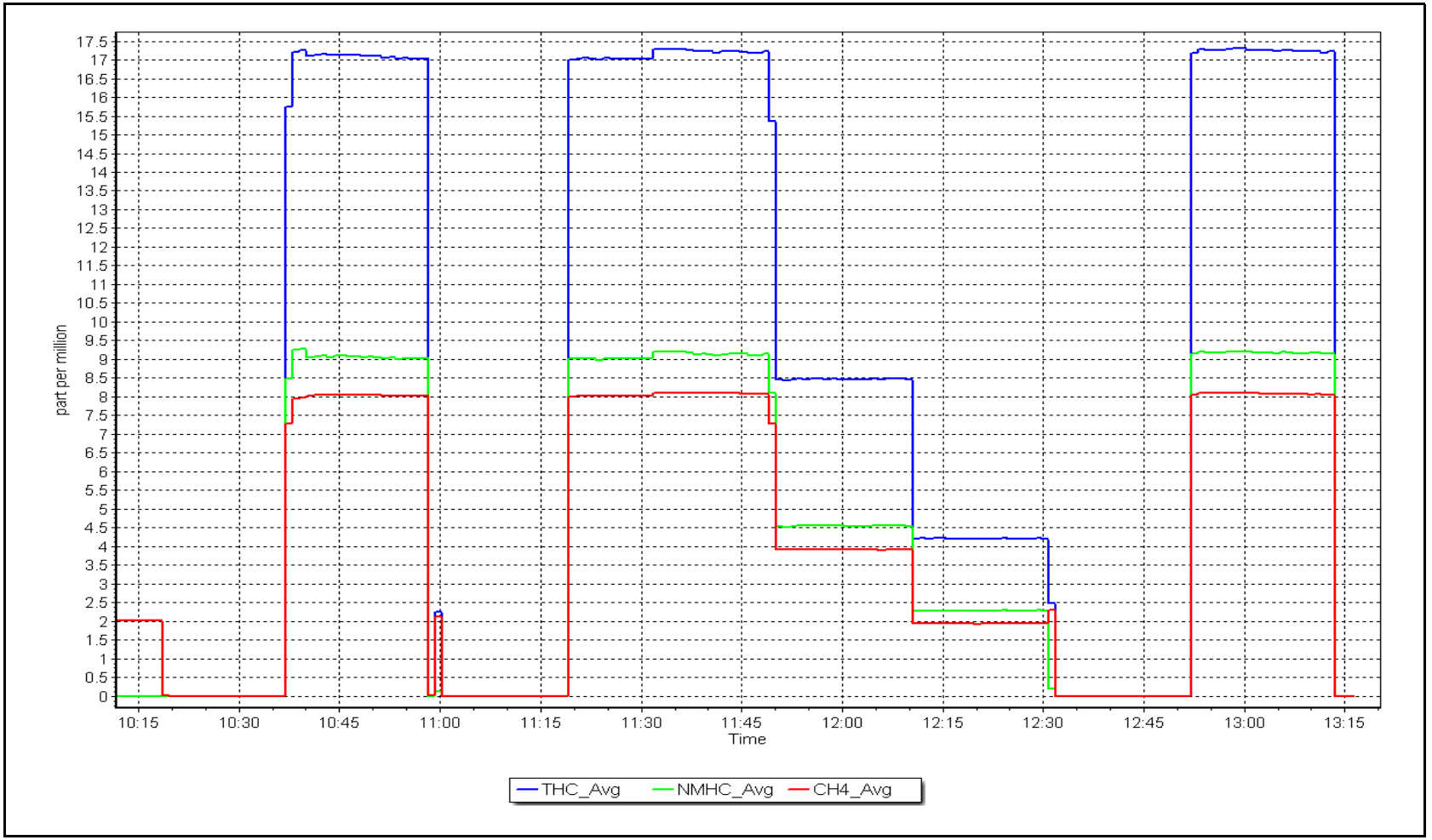
Calibration Date:	December 13, 2023	Previous Calibration:	November 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:15	End Time (MST):	13:16
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320040

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999992	≥0.995
9.18	9.13	1.0056			
4.60	4.55	1.0105	Slope	0.994150	0.90 - 1.10
2.29	2.28	1.0058			
			Intercept	-0.004590	+/-0.5



NMHC Calibration Plot Date: December 13, 2023 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	December 4, 2023	Last Cal Date:	November 3, 2023
Start time (MST):	10:26	End time (MST):	14:50
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2Y1P9L		Cal Gas Expiry Date:	December 11, 2023	
NOX Cal Gas Conc:	50.84	ppm	NO Cal Gas Conc:	50.04	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	50.84	ppm	Removed Gas NO Conc:	50.04	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	3565	
ZAG make/model:	Teledyne API T701		Serial Number:	4890	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1218153357	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.411	1.431	NO bkgnd or offset:	7.2	7.3
NOX coeff or slope:	0.991	0.989	NOX bkgnd or offset:	7.9	8.0
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	194.2	194.8

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999719	1.000323
NO_X Cal Offset:	-0.780000	-0.720000
NO Cal Slope:	0.998701	1.001285
NO Cal Offset:	-1.300000	-1.280000
NO_2 Cal Slope:	1.003579	1.001111
NO_2 Cal Offset:	0.884749	-0.531962

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	80.0	813.4	800.6	12.8	804.7	788.7	16.1	1.0109	1.0151
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	4920	80.0	813.4	800.6	12.8	813.4	801.1	12.3	1.0000	0.9994
second point	4960	40.0	406.7	400.3	6.4	405.7	398.8	6.9	1.0025	1.0038
third point	4980	20.0	203.4	200.2	3.2	201.9	197.8	4.1	1.0072	1.0119
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
as left span	4920	80.0	813.4	396.5	416.9	810.9	393.8	417.0	1.0031	1.0070
								Average Correction Factor	1.0033	1.0051

Corrected As found	NO_X = 804.6 ppb	NO = 788.6 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-1.0%
Previous Response	NO_X = 812.4 ppb	NO = 798.3 ppb		*Percent Change	NO =	-1.2%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.2	393.1	416.9	417.1	0.9995	100.0%
2nd GPT point (200 ppb O3)	797.2	596.1	213.9	213.4	1.0023	99.8%
3rd GPT point (100 ppb O3)	797.2	695.6	114.4	113.4	1.0088	99.1%
				Average Correction Factor	1.0036	99.6%

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

NO_X Calibration Summary

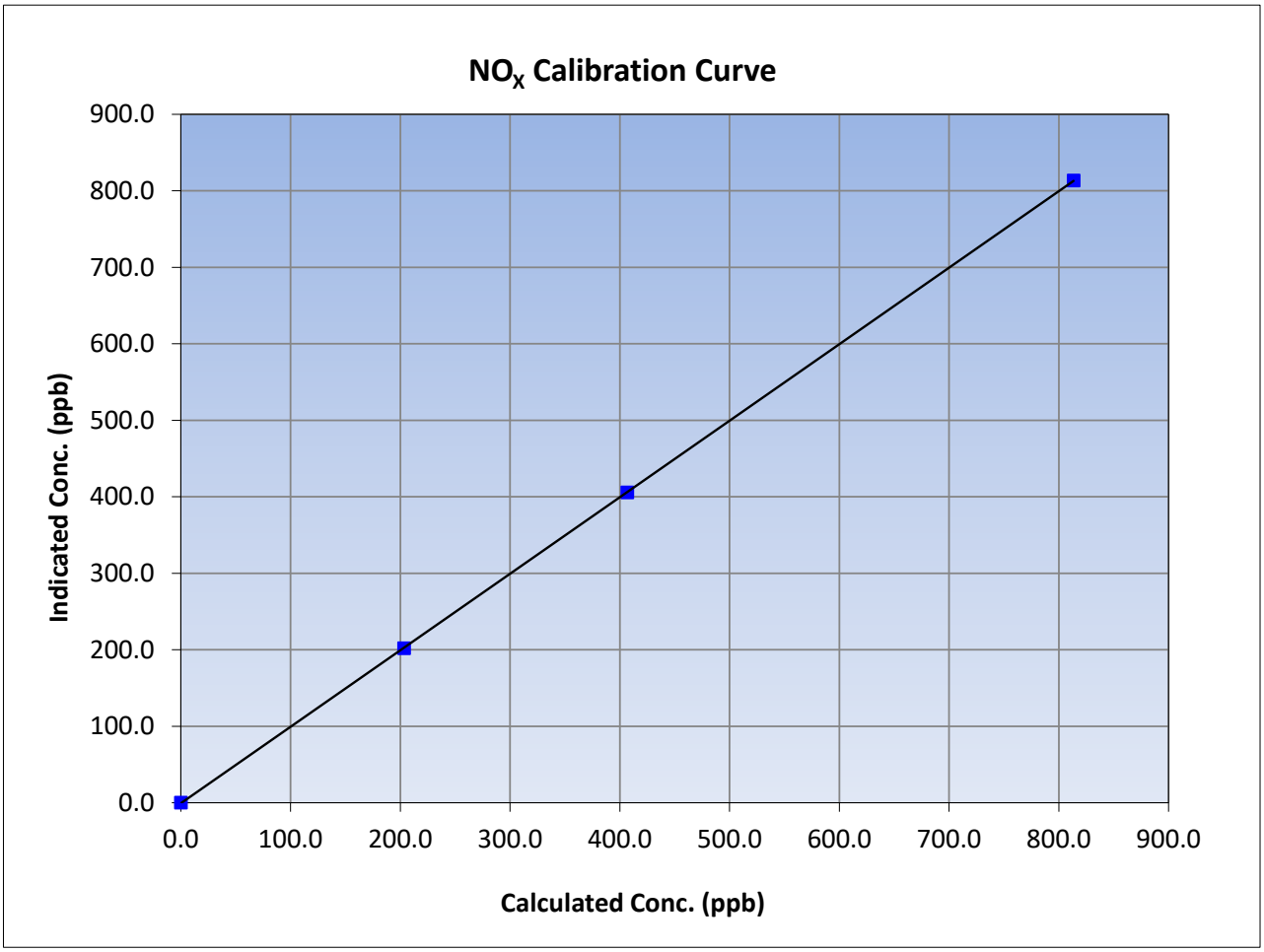
Version-04-2020

Station Information

Calibration Date:	December 4, 2023	Previous Calibration:	November 3, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:26	End Time (MST):	14:50
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999995	≥0.995
813.4	813.4	1.0000			
406.7	405.7	1.0025	Slope	1.000323	0.90 - 1.10
203.4	201.9	1.0072			
			Intercept	-0.720000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

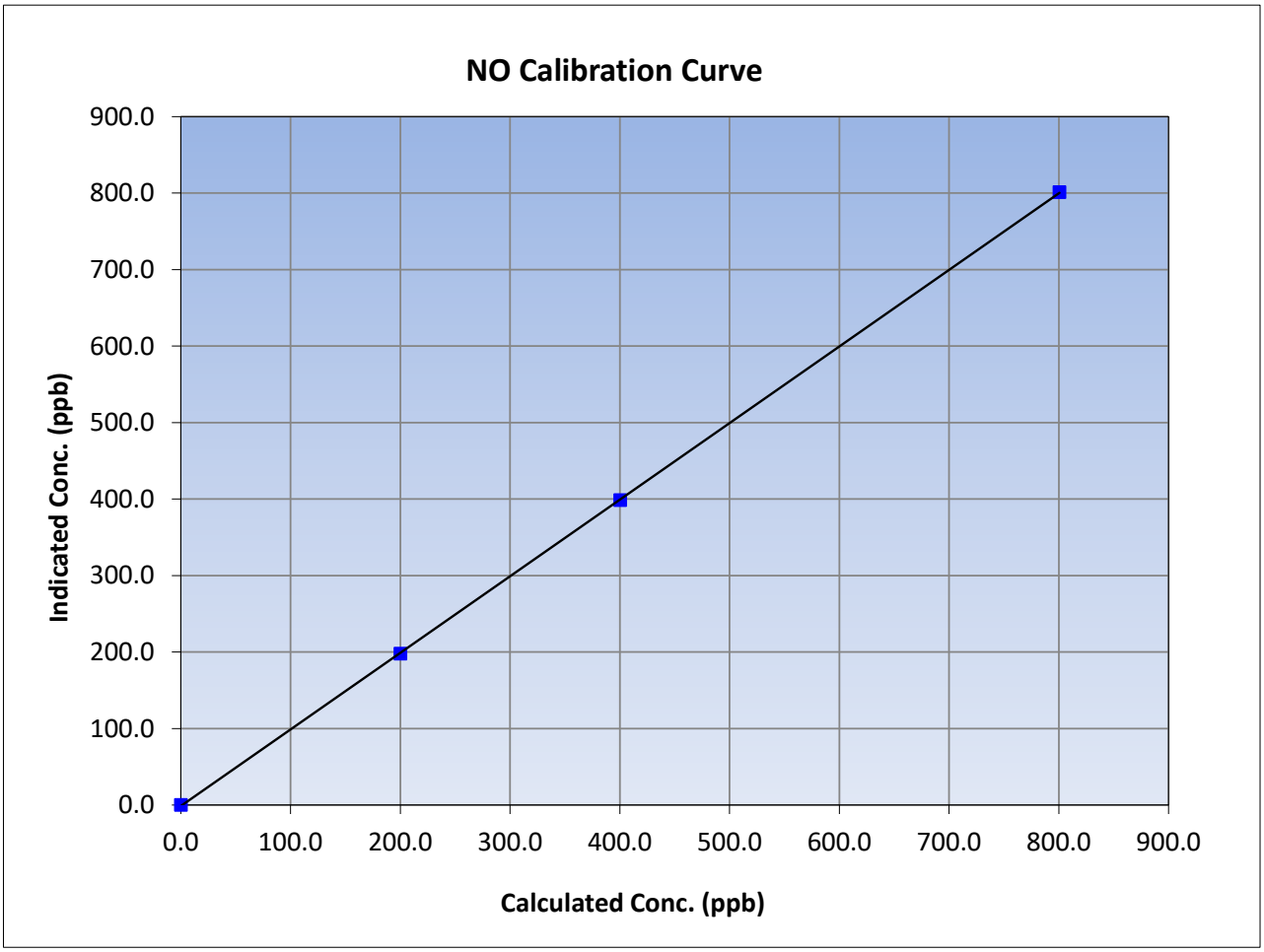
Version-04-2020

Station Information

Calibration Date:	December 4, 2023	Previous Calibration:	November 3, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:26	End Time (MST):	14:50
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999986	≥0.995
800.6	801.1	0.9994			
400.3	398.8	1.0038	Slope	1.001285	0.90 - 1.10
200.2	197.8	1.0119			
			Intercept	-1.280000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

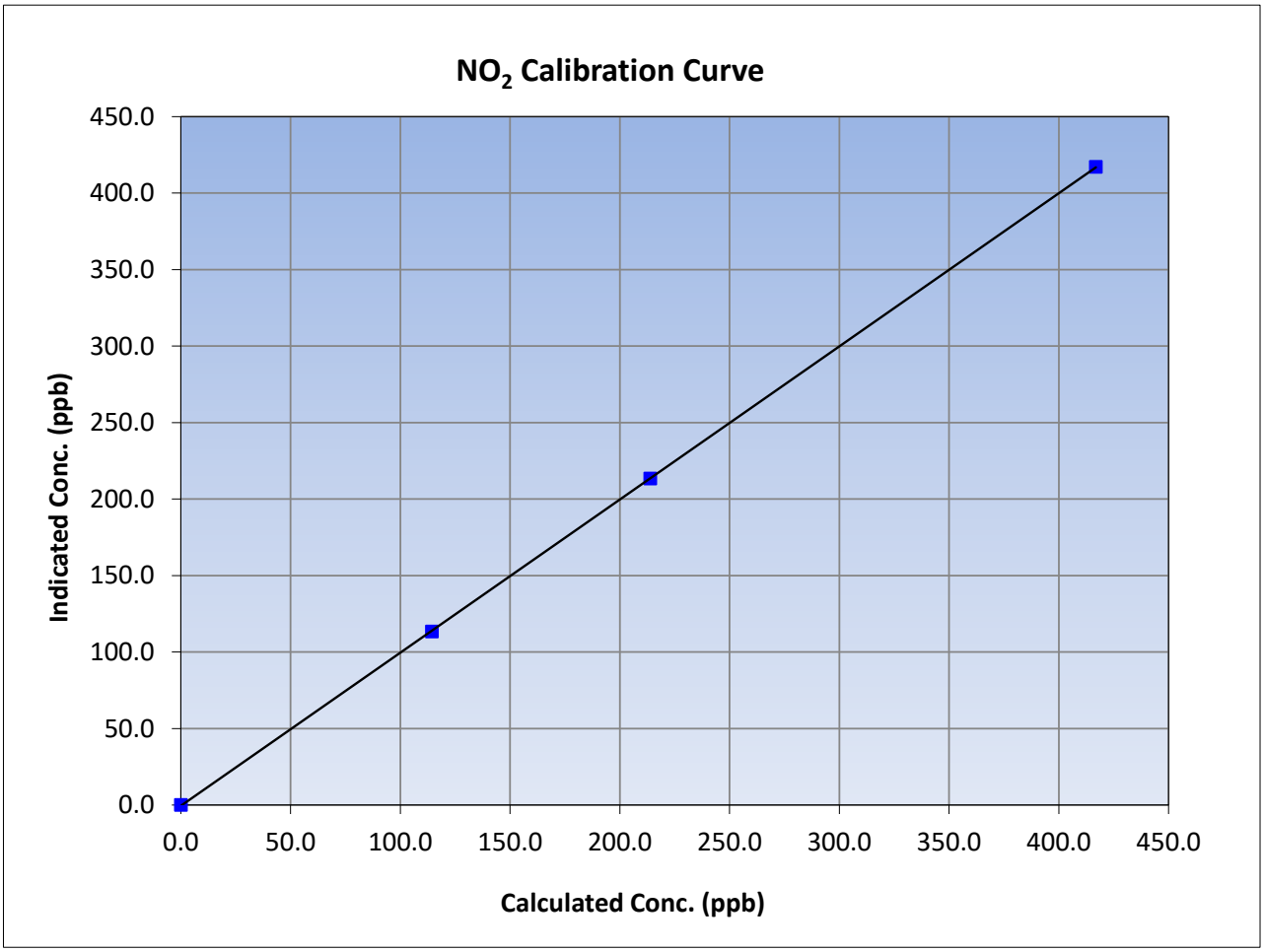
Version-04-2020

Station Information

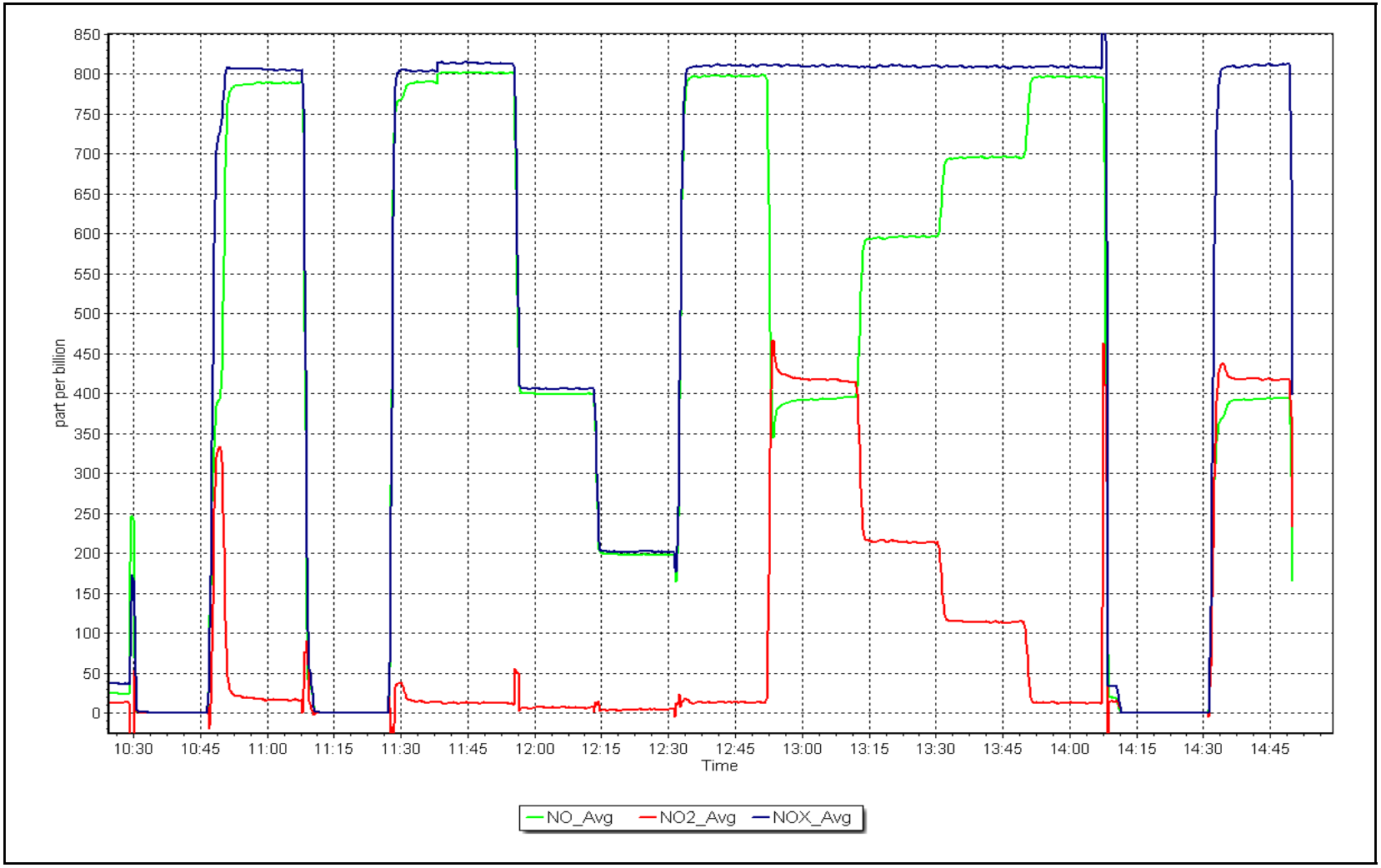
Calibration Date:	December 4, 2023	Previous Calibration:	November 3, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:26	End Time (MST):	14:50
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999992	≥0.995
416.9	417.1	0.9995			
213.9	213.4	1.0023	Slope	1.001111	0.90 - 1.10
114.4	113.4	1.0088			
			Intercept	-0.531962	+/-20



NO_X Calibration Plot Date: December 4, 2023 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	December 1, 2023	Last Cal Date:	November 2, 2023
Start time (MST):	11:07	End time (MST):	13:41
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:	1.000714	1.004914	Backgd or Offset:	3.8	3.8
Calibration intercept:	0.200000	0.040000	Coeff or Slope:	1.010	1.012

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	863.1	400.0	400.5	0.999
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	863.1	400.0	401.9	0.995
second point	5000	742.5	200.0	201.2	0.994
third point	5000	651.7	100.0	100.6	0.994
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	863.1	400.0	405.3	0.987
				Average Correction Factor	0.994

Baseline Corr As found:	400.7	Previous response	400.5	*% change	0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

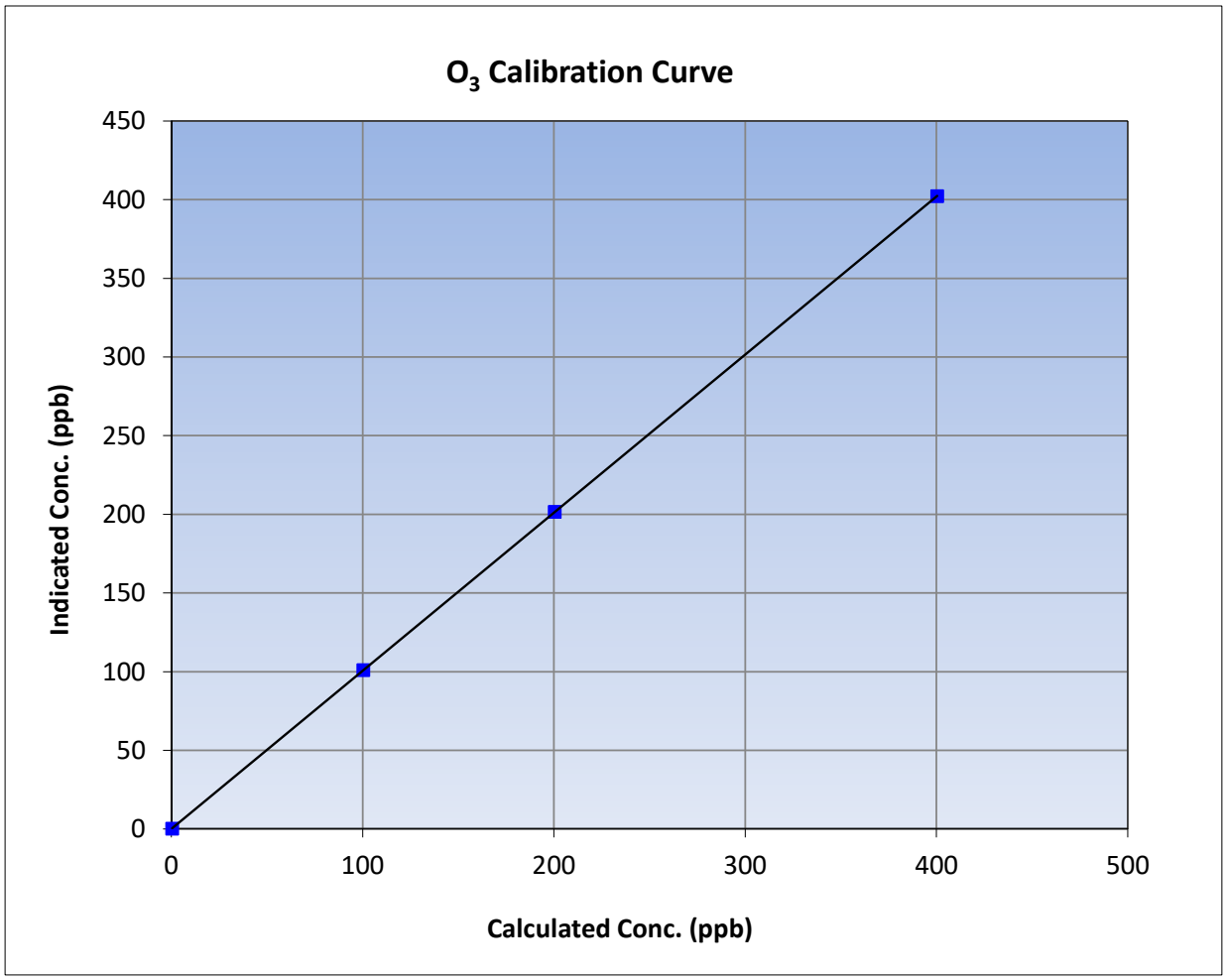
Station Information

Calibration Date:	December 1, 2023	Previous Calibration:	November 2, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:07	End Time (MST):	13:41
Analyzer make:	Teledyne API T400	Analyzer serial #:	1107

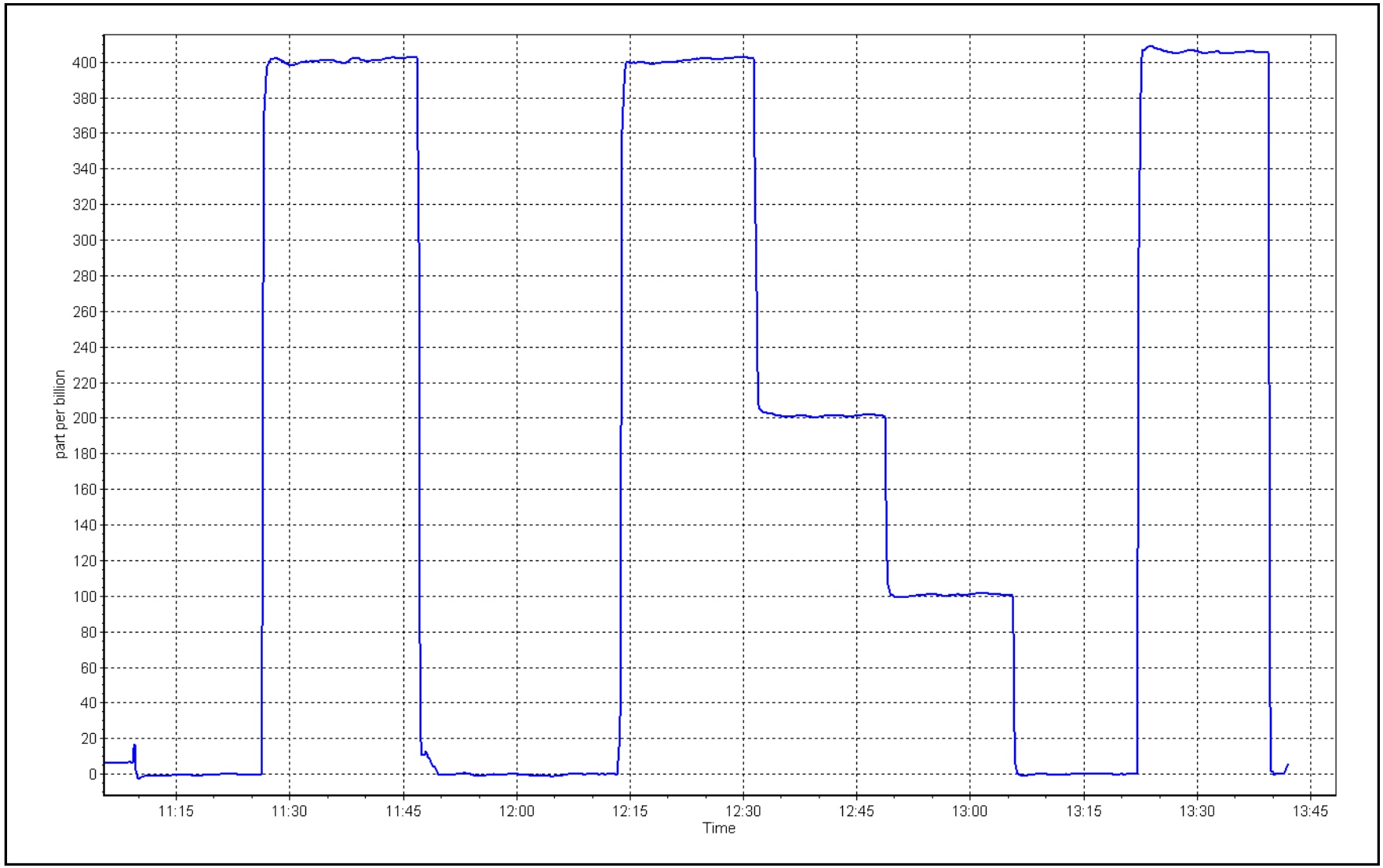
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
400.0	401.9	0.9953
200.0	201.2	0.9940
100.0	100.6	0.9940

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	1.004914	*0.90 - 1.10*
Intercept	0.040000	*+/- 5*



O_3 Calibration Plot Date: December 1, 2023 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Fort McKay - Bertha Ganter	Station number:	AMS 01
Calibration Date:	December 12, 2023	Last Cal Date:	November 14, 2023
Start time (MST):	13:14	End time (MST):	14:09
Analyzer Make:	Teledyne API T640	S/N:	324
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	1450
Temp/RH standard:	Delta Cal	S/N:	1450

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-7.7	-8.4	-7.7	☐	+/- 2 °C
P (mmHg)	734.1	729.2	734.1	☐	+/- 10 mmHg
flow (LPM)	5.01	4.96	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: December 12, 2023 Last Cal Date: November 14, 2023

PM w/o HEPA: 7.8 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: October 19, 2023 <0.2 ug/m3

Disposable Filter Changed: October 19, 2023

Annual Maintenance

Date Sample Tube Cleaned: September 14, 2023

Date RH/T Sensor Cleaned: October 19, 2023

Notes: Flow, temperature, and pressure all within limits. Leak check passed.

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:	December 11, 2023	Last Cal Date:	November 8, 2023
Start time (MST):	10:16	End time (MST):	13:07
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:	1.001848	1.001201	Backgd or Offset:	-0.013	-0.013
Calibration intercept:	0.149849	0.203827	Coeff or Slope:	0.990	0.989

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4933	66.7	40.6	40.8	0.994
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	0.997
second point	4966	33.3	20.2	20.8	0.976
third point	4983	16.7	10.2	10.4	0.978
as left zero	5000	0.0	0.0	0.1	----
as left span	2960	40.0	40.5	40.2	1.008
				Average Correction Factor	0.984

Baseline Corr As found:	40.73	Prev response:	40.78	*% change:	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

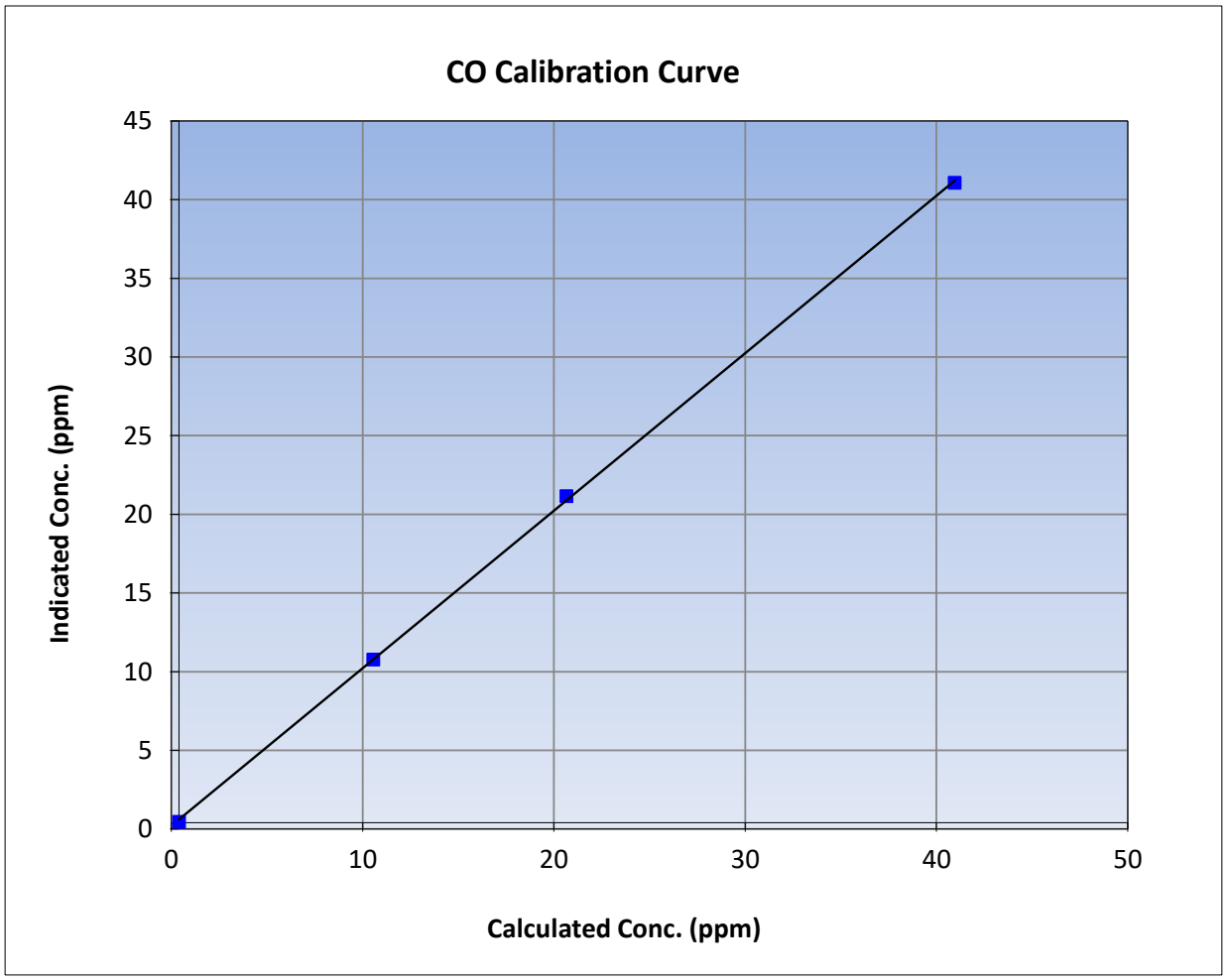
Station Information

Calibration Date:	December 11, 2023	Previous Calibration:	November 8, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:16	End Time (MST):	13:07
Analyzer make:	Teledyne API T300	Analyzer serial #:	3520

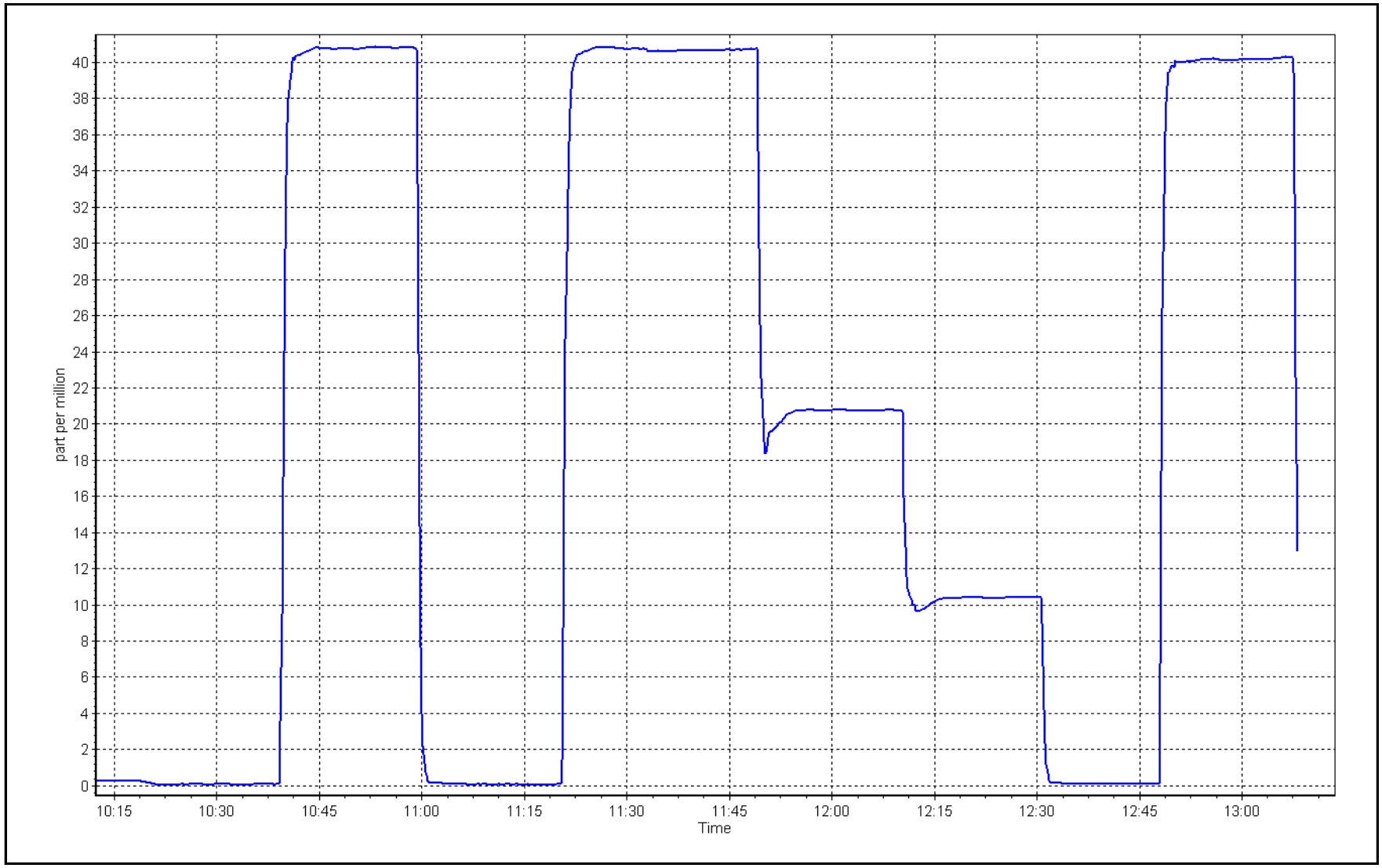
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
40.6	40.7	0.9972
20.2	20.8	0.9759
10.2	10.4	0.9782

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999873	*≥0.995*
Slope	1.001201	*0.90 - 1.10*
Intercept	0.203827	*+/-1.5*



CO Calibration Plot Date: December 11, 2023 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

CO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	December 8, 2023	Last Cal Date:	November 7, 2023
Start time (MST):	10:50	End time (MST):	14:09
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:	1.001056	1.000878	Backgd or Offset:	0.045	0.045
Calibration intercept:	-6.100000	-5.800000	Coeff or Slope:	0.874	0.875

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	1593.9	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	0.0	----
high point	2920	80.0	1605.3	1604.0	1.001
second point	2960	40.0	802.7	794.2	1.011
third point	2980	20.0	401.3	390.4	1.028
as left zero	3000	0.0	0.0	-0.1	----
as left span	2960	40.0	802.7	783.6	1.024
				Average Correction Factor	1.013

Baseline Corr As found:	1594.10	Prev response:	1600.93	*% change:	-0.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

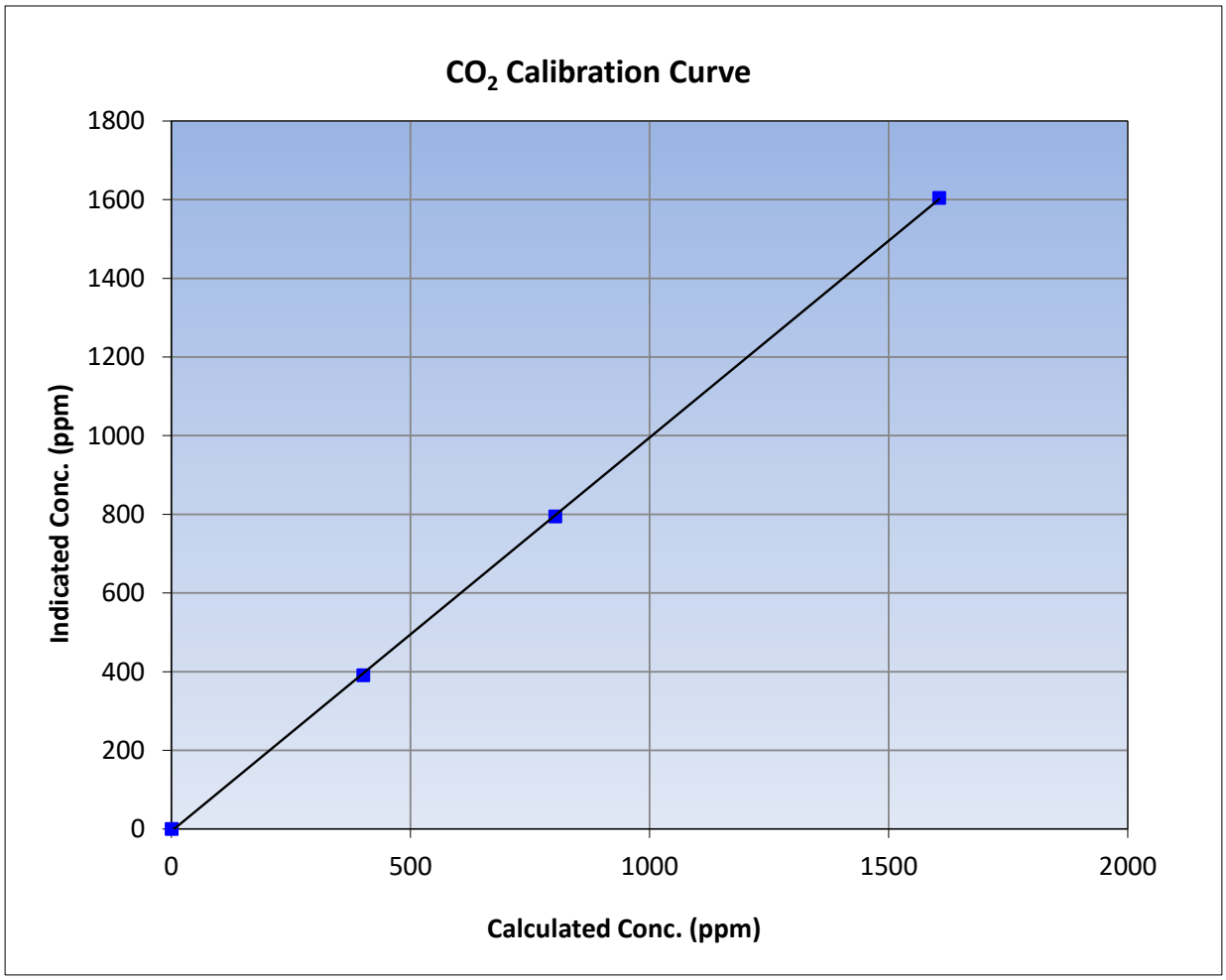
Station Information

Calibration Date	December 8, 2023	Previous Calibration	November 7, 2023
Station Name	Bertha Ganter-Fort McKay	Station Number	AMS01
Start Time (MST)	10:50	End Time (MST)	14:09
Analyzer make	Teledyne API 360	Analyzer serial #	442

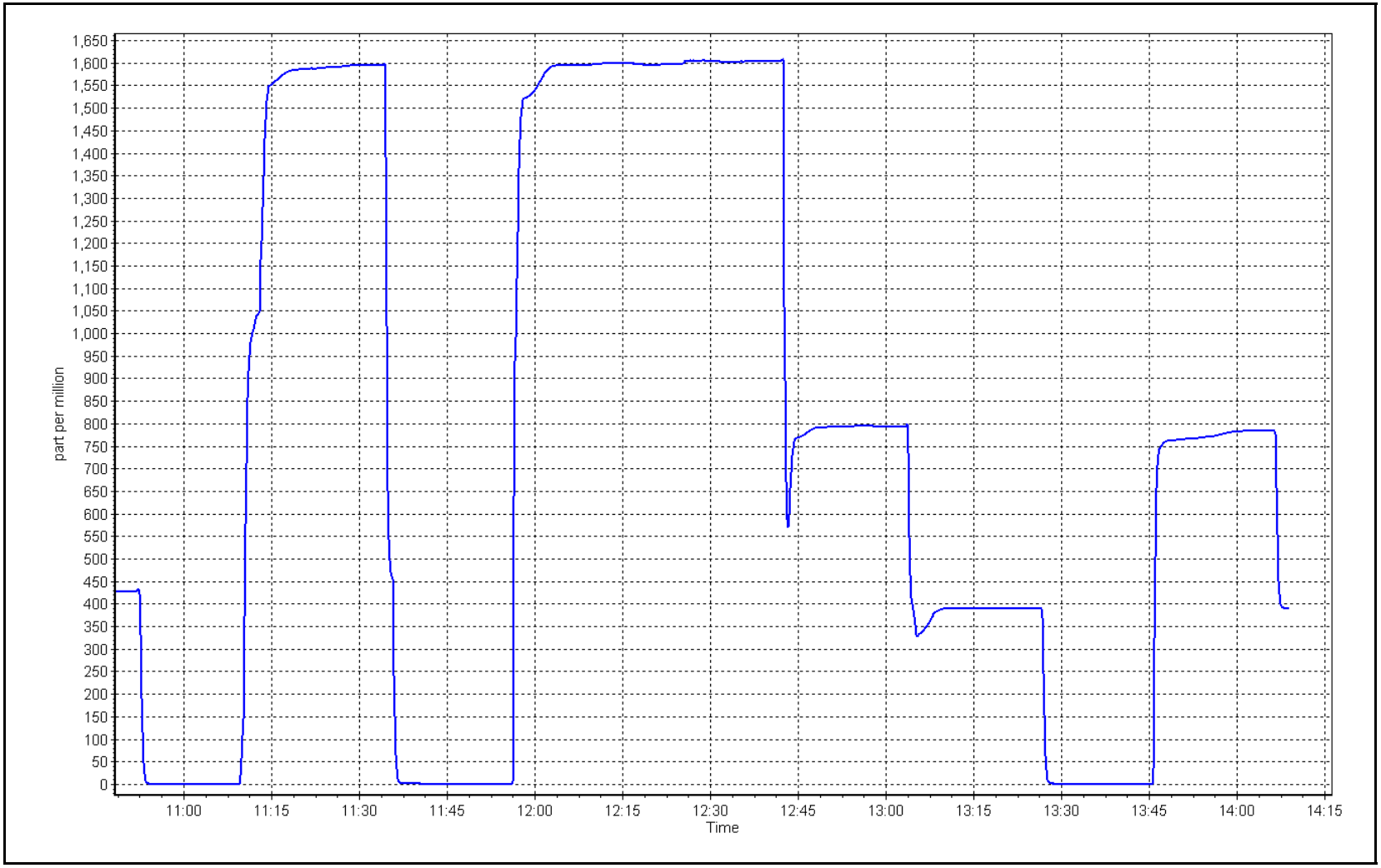
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
1605.3	1604.0	1.0008
802.7	794.2	1.0107
401.3	390.4	1.0280

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999940	*≥0.995*
Slope	1.000878	*0.90 - 1.10*
Intercept	-5.800000	*+/-10*



CO_2 Calibration Plot Date: December 8, 2023 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

TN - NO_X - NH_3 Calibration Report

Version-05-2023

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
NOX Cal Date:	December 6, 2023	Last Cal Date:	November 14, 2023
Start time (MST):	11:12	End time (MST):	15:35
NH3 Cal Date:	December 7, 2023	Last Cal Date:	November 15, 2023
Start time (MST):	11:30	End time (MST):	14:36
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:	5.20
NOX Range (ppb):	0 - 1000 ppb	Sample Flow:	534

	Start	*Finish*		*Start*	*Finish*
NO coefficient:	0.987	0.987	TN coefficient:	0.989	0.989
NOX coefficient:	0.989	0.989	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:	0.999888	1.004707
NO_X Cal Offset:	-1.540000	-2.480000
NO Cal Slope:	0.999686	1.004525
NO Cal Offset:	-2.120000	-3.440000
NO_2 Cal Slope:	0.998244	0.995838
NO_2 Cal Offset:	-0.546307	-1.454892
NH3 Cal Slope:	1.000230	1.001746
NH3 Cal Offset:	-2.765159	-2.214411
TN Cal Slope:	1.002817	1.004330
TN Cal Offset:	-2.497861	-1.994595

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	-0.3	-0.3	0.0	----	----
as found NO	4920	80.0	813.4	813.4	----	815.9	818.0	-2.1	0.997	----
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
high NO point	4920	80.0	813.4	813.4	----	816.9	816.7	0.4	0.996	----
NO/O3 point	4920	80.0	813.4	813.4	----	813.1	812.2	1.0	1.000	----
as found NH3	3416	84.1	1840.1	----	1840.1	1808.0	----	1803.1	1.018	1.021
new NH3 cyl rp							----			
first NH3	3418	82.2	1798.5	----	1798.5	1808.0	----	1803.1	0.995	0.997
second NH3	3454	45.7	1000.0	----	1000.0	994.9	----	992.3	1.005	1.008
third NH3	3477	22.8	498.9	----	498.9	500.7	----	498.9	0.996	1.000
								Average Correction Factor	0.9981	1.0017

Corrected As found TN = 816.2 ppb NO_X = 818.3 ppb NH3 = 1803.1 ppb

Previous Response TN = 813.2 ppb NO_X = 811.8 ppb NH3 = 1837.8 ppb

*Percent Change TN = 0.4%

*Percent Change NO_X = 0.8%

*Percent Change NH3 = -1.9%

* = > +/-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	-0.2	0.0	-0.8	----	----
as found span	4920	80.0	813.4	800.6	813.4	816.4	799.4	816.4	0.9964	1.0016
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.4	0.1	----	----
high point	4920	80.0	813.4	800.6	813.4	816.7	803.4	816.9	0.9960	0.9966
second point	4960	40.0	406.7	400.3	406.7	403.0	394.8	403.7	1.0092	1.0140
third point	4980	20.0	203.4	200.2	203.4	200.5	195.1	200.5	1.0143	1.0259
								Average Correction Factor	1.0065	1.0122

Baseline Corr As fnd	TN =	817.2 ppb	NO_X =	816.6 ppb	NO =	799.4 ppb	*Percent Change	TN = 0.5%
Previous Response	TN =	813.2 ppb	NO_X =	811.8 ppb	NO =	798.3 ppb	*Percent Change	NO_X = 0.6%
							*Percent Change	NO = 0.1%

* = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found zero	----	----	0.0	-0.2	----	----
calibration zero	----	----	0.0	-0.3	----	----
1st GPT point (400 ppb O3)	798.6	386.3	425.1	422.6	1.0059	99.4%
2nd GPT point (200 ppb O3)	798.6	591.9	219.5	216.3	1.0148	98.5%
3rd GPT point (100 ppb O3)	798.6	691.8	119.6	116.6	1.0257	97.5%
				Average Correction Factor	1.0155	98.5%

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TN Calibration Summary

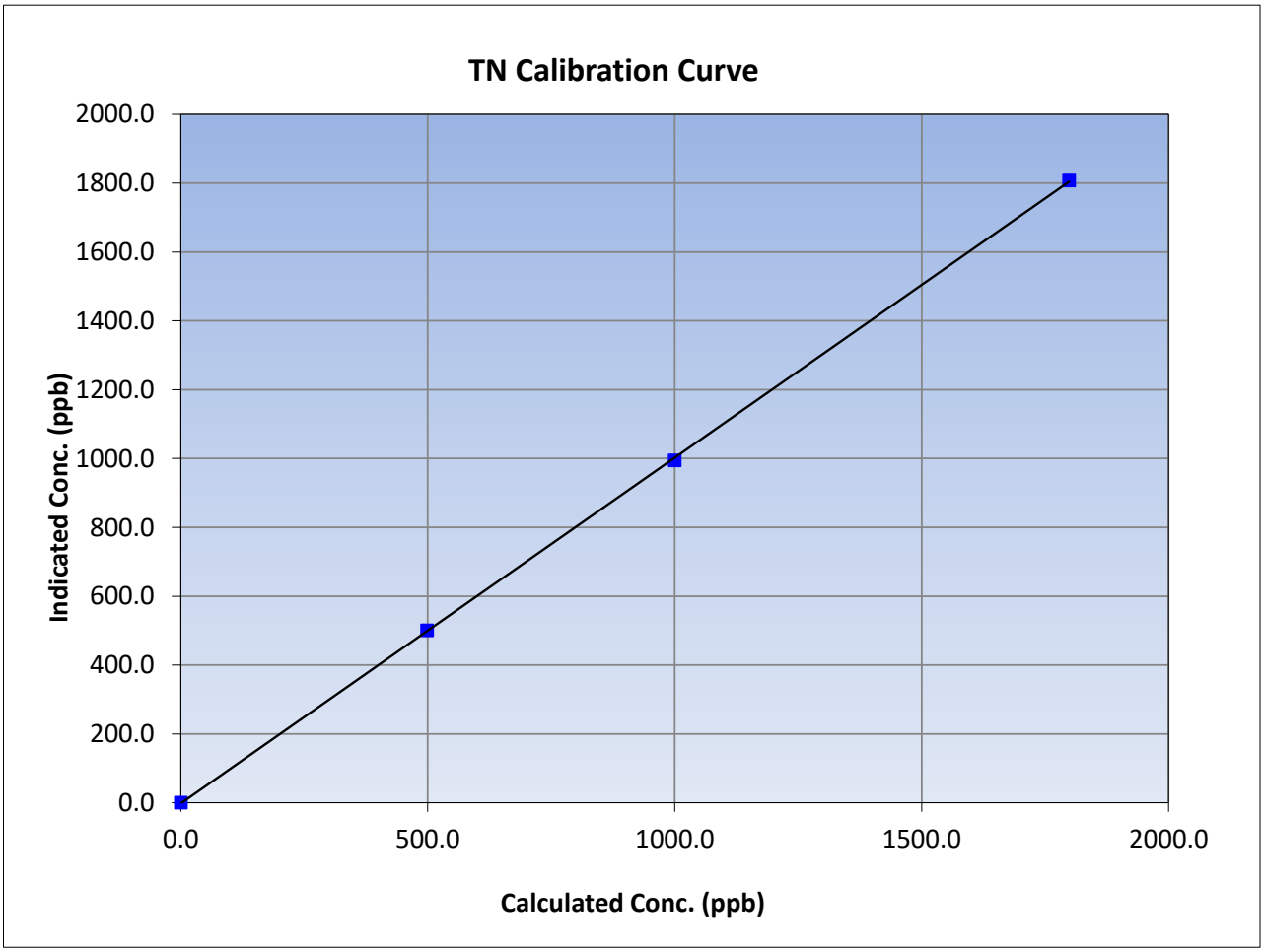
Version-05-2023

Station Information

Calibration Date:	December 7, 2023	Previous Calibration:	November 14, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:12	End Time (MST):	15:35
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	0.999957	≥0.995
1798.5	1808.0	0.9948			
1000.0	994.9	1.0051	Slope	1.004330	0.90 - 1.10
498.9	500.7	0.9963			
			Intercept	-1.994595	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

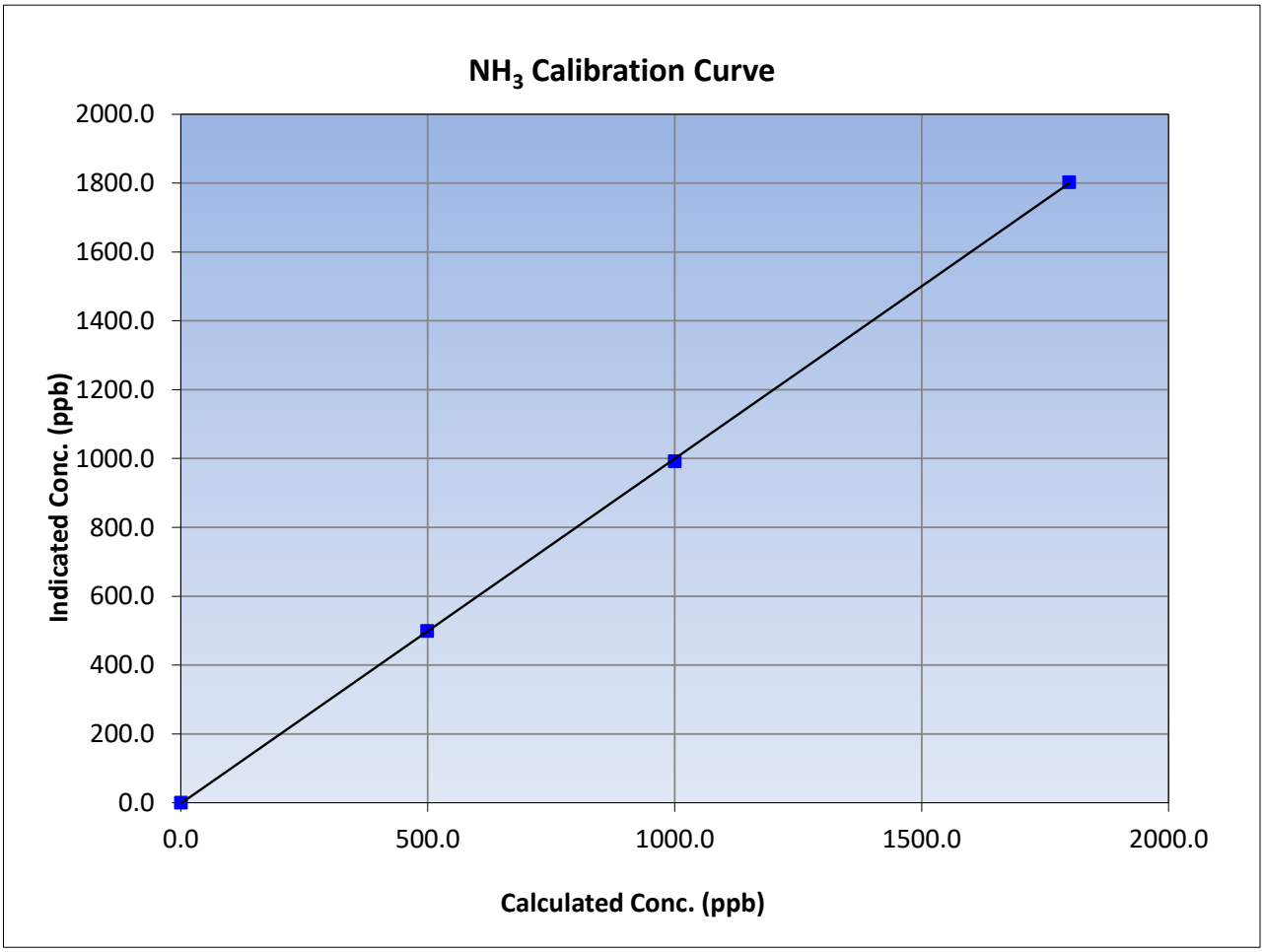
Version-05-2023

Station Information

Calibration Date:	December 7, 2023	Previous Calibration:	November 14, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:12	End Time (MST):	15:35
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999959	≥0.995
1798.5	1803.1	0.9975			
1000.0	992.3	1.0078	Slope	1.001746	0.90 - 1.10
498.9	498.9	0.9999			
			Intercept	-2.214411	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

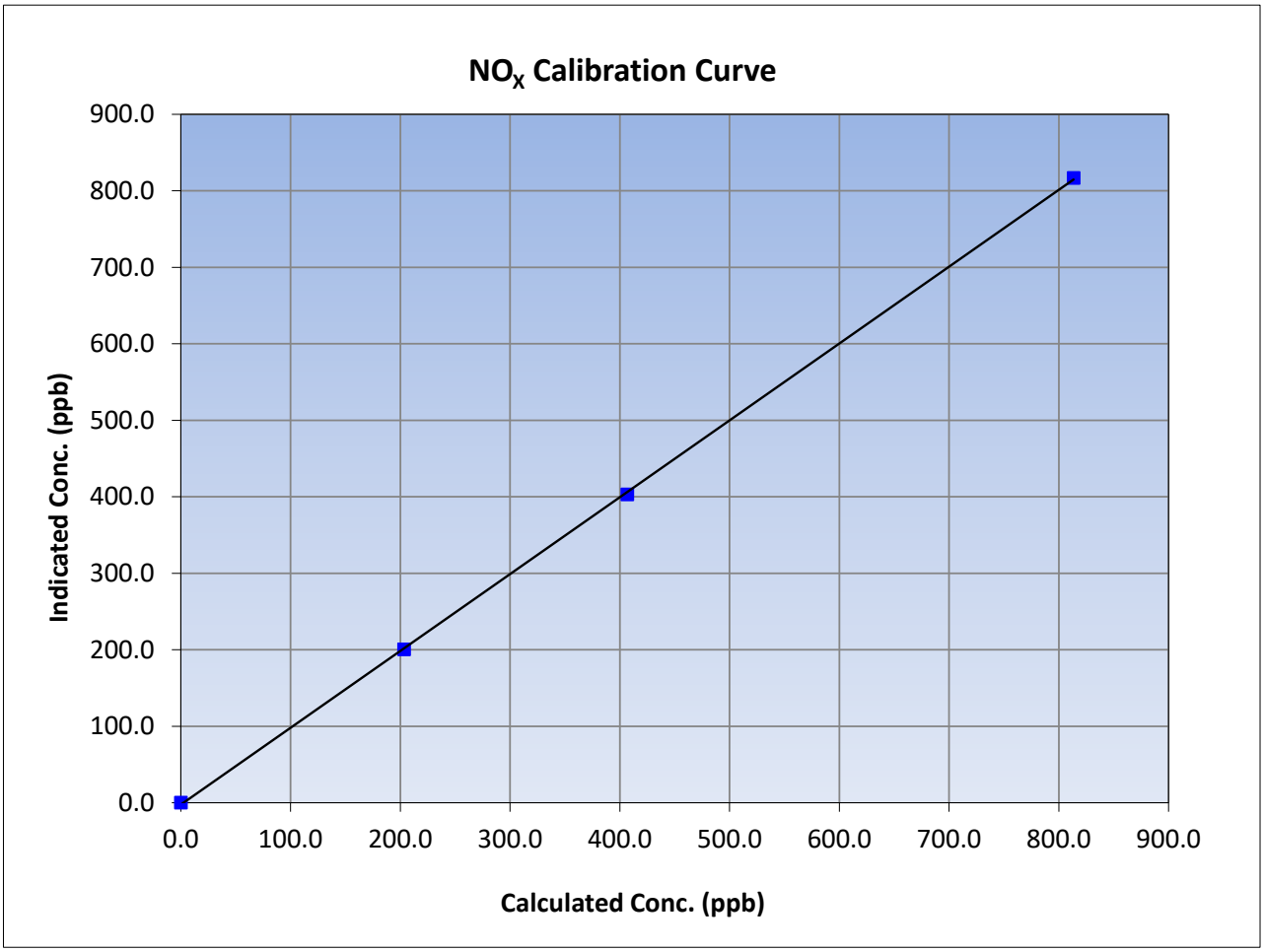
Version-05-2023

Station Information

Calibration Date:	December 6, 2023	Previous Calibration:	November 14, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:12	End Time (MST):	15:35
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	0.999940	≥0.995
813.4	816.7	0.9960			
406.7	403.0	1.0092	Slope	1.004707	0.90 - 1.10
203.4	200.5	1.0143			
			Intercept	-2.480000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

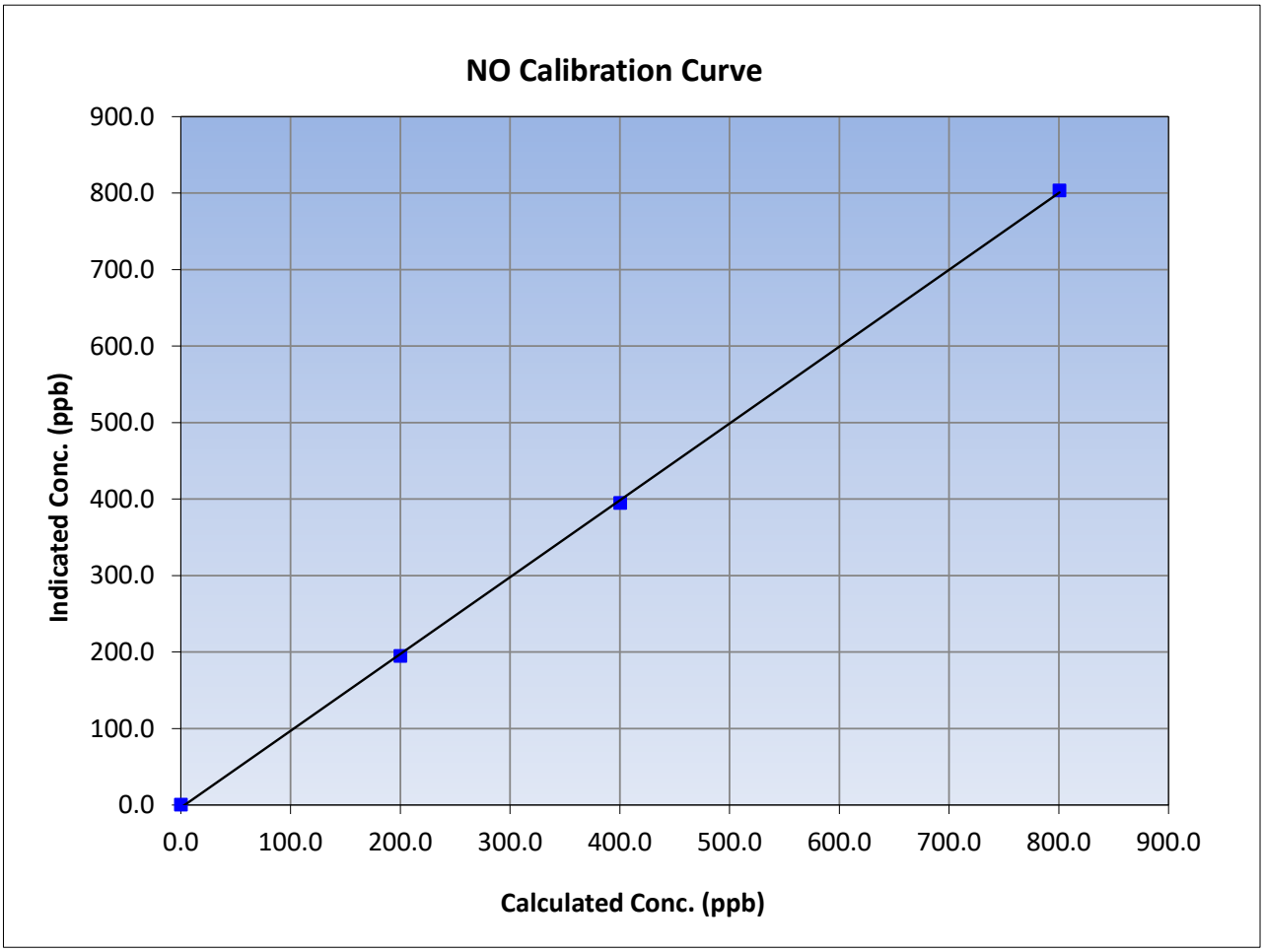
Version-05-2023

Station Information

Calibration Date:	December 6, 2023	Previous Calibration:	November 14, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:12	End Time (MST):	15:35
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	0.4	----	Correlation Coefficient	0.999879	≥0.995
800.6	803.4	0.9966			
400.3	394.8	1.0140	Slope	1.004525	0.90 - 1.10
200.2	195.1	1.0259			
			Intercept	-3.440000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

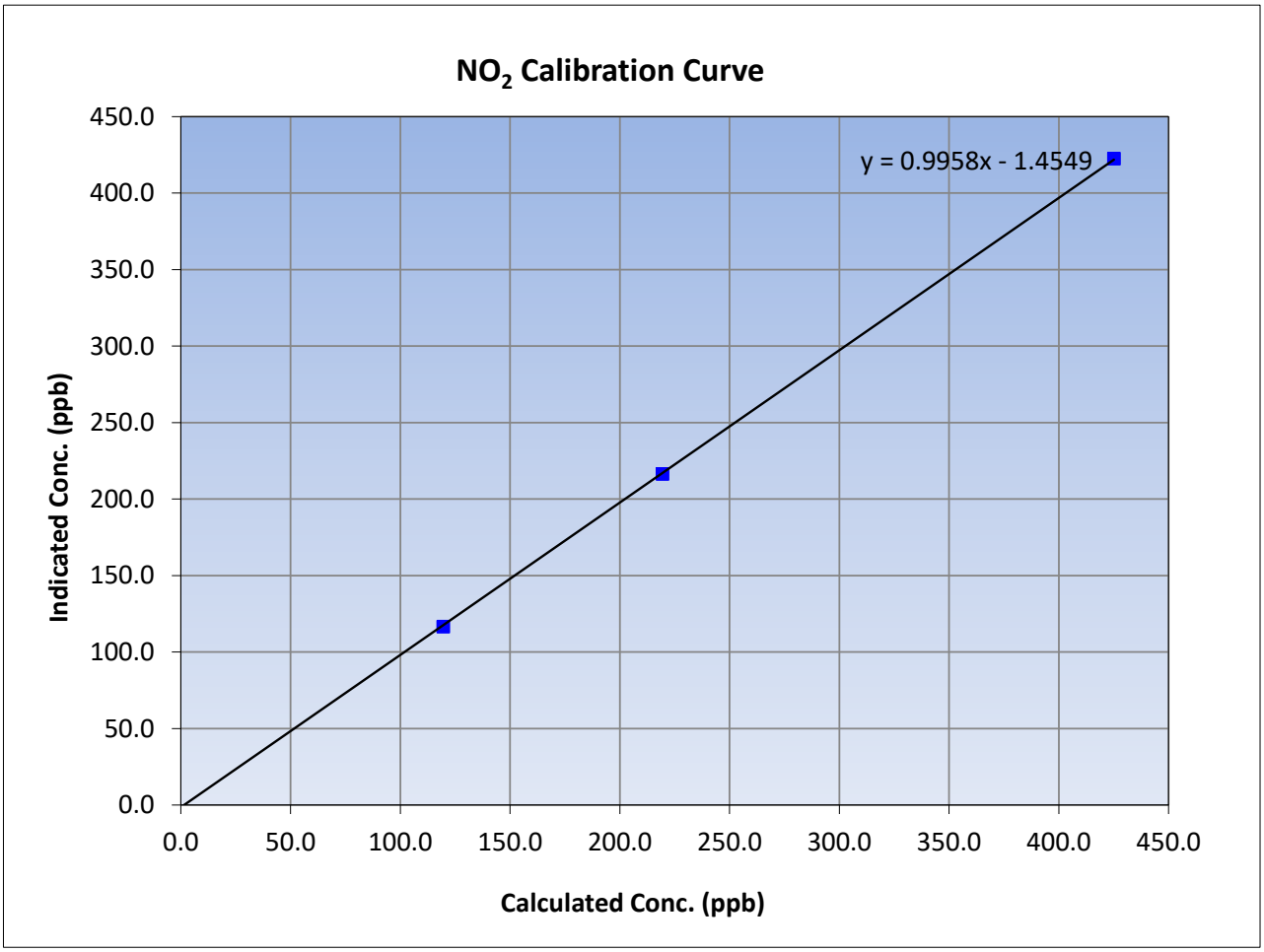
Version-05-2023

Station Information

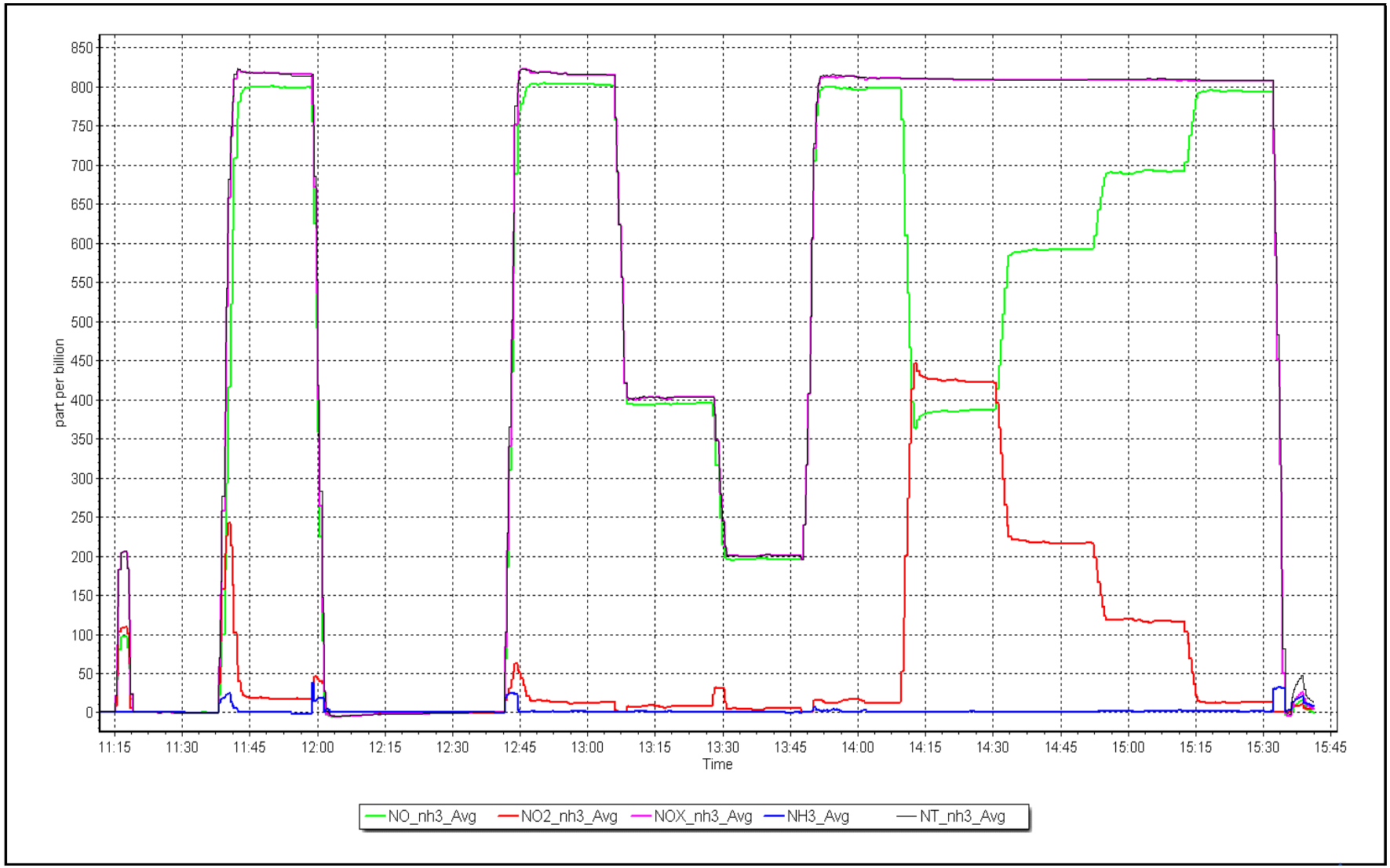
Calibration Date:	December 6, 2023	Previous Calibration:	November 14, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:12	End Time (MST):	15:35
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

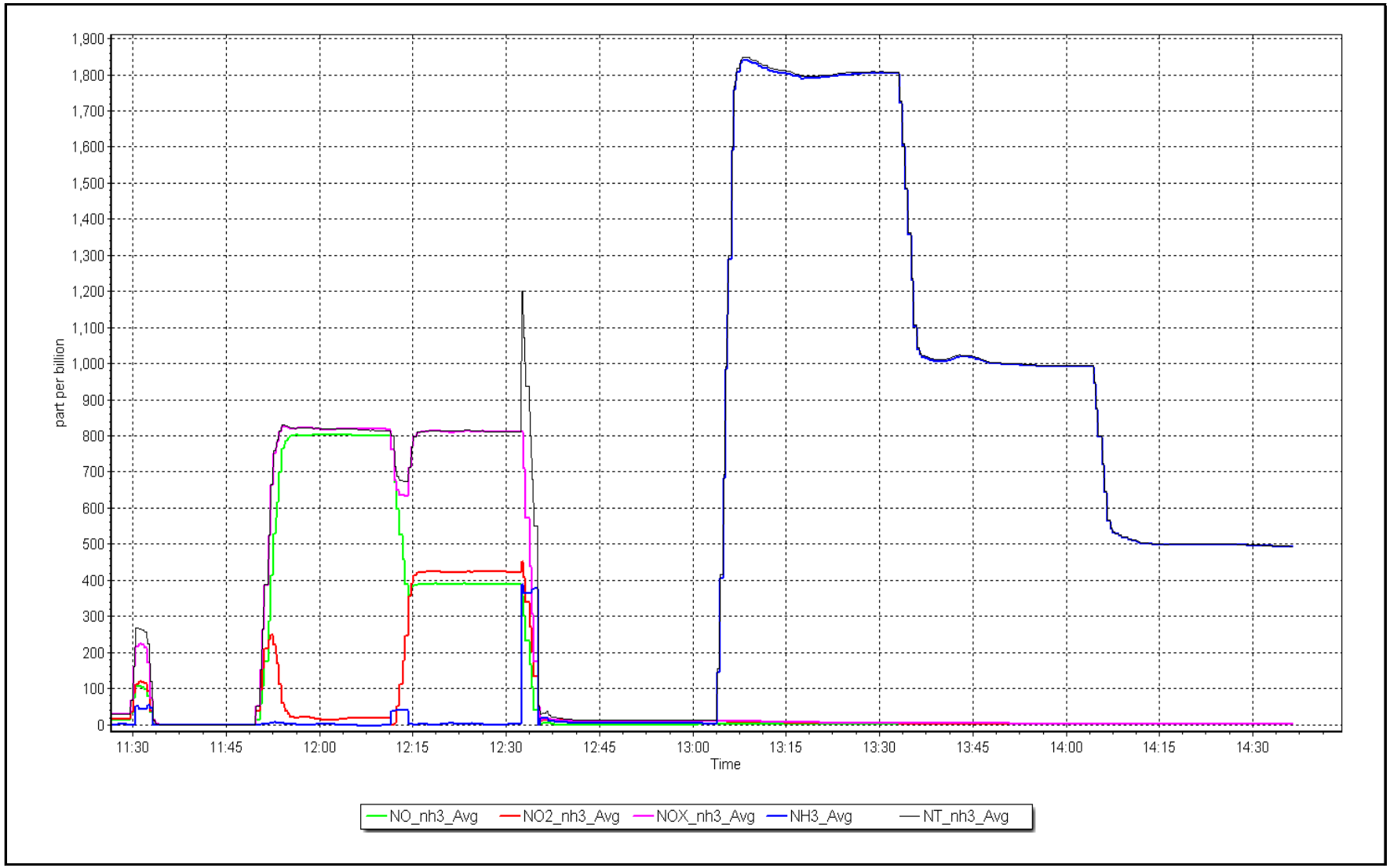
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.3	----	Correlation Coefficient	0.999962	≥0.995
425.1	422.6	1.0059			
219.5	216.3	1.0148	Slope	0.995838	0.90 - 1.10
119.6	116.6	1.0257			
			Intercept	-1.454892	+/-20



NO_X Calibration Plot Date: December 6, 2023 Location: Bertha Ganter-Fort McKay



NH_3 Calibration Plot Date: December 7, 2023 Location: Bertha Ganter-Fort McKay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS02
MILDRED LAKE
DECEMBER 2023

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

January 31, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Mildred Lake	Station number:	AMS02
Calibration Date:	December 8, 2023	Last Cal Date:	November 23, 2023
Start time (MST):	10:14	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:	0.996481	1.000671	Backgd or Offset:	20.6	18.6
Calibration intercept:	-0.365997	-0.784833	Coeff or Slope:	0.763	0.775

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-2.4	----
as found span	4920	80.2	801.6	779.6	1.028
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4920	80.2	801.6	802.0	1.000
second point	4960	40.1	400.8	399.2	1.004
third point	4980	20.0	199.9	199.1	1.004
as left zero	5000	0.0	0.0	0.1	----
as left span	4920	80.2	801.6	800.0	1.002
				Average Correction Factor	1.003

Baseline Corr As found:	782.00	Previous response	798.46	*% 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

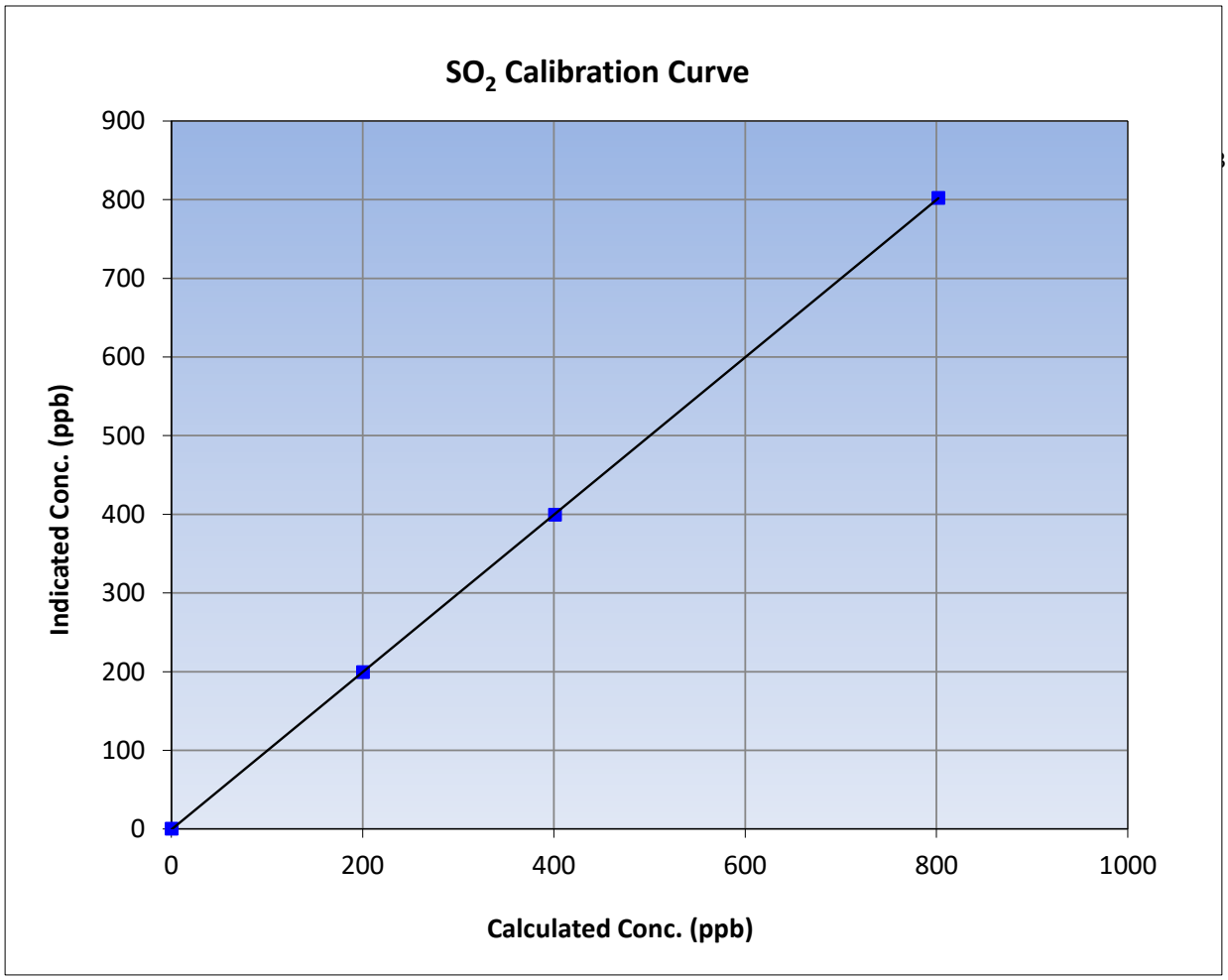
Station Information

Calibration Date:	December 8, 2023	Previous Calibration:	November 23, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:14	End Time (MST):	14:47
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1404901075

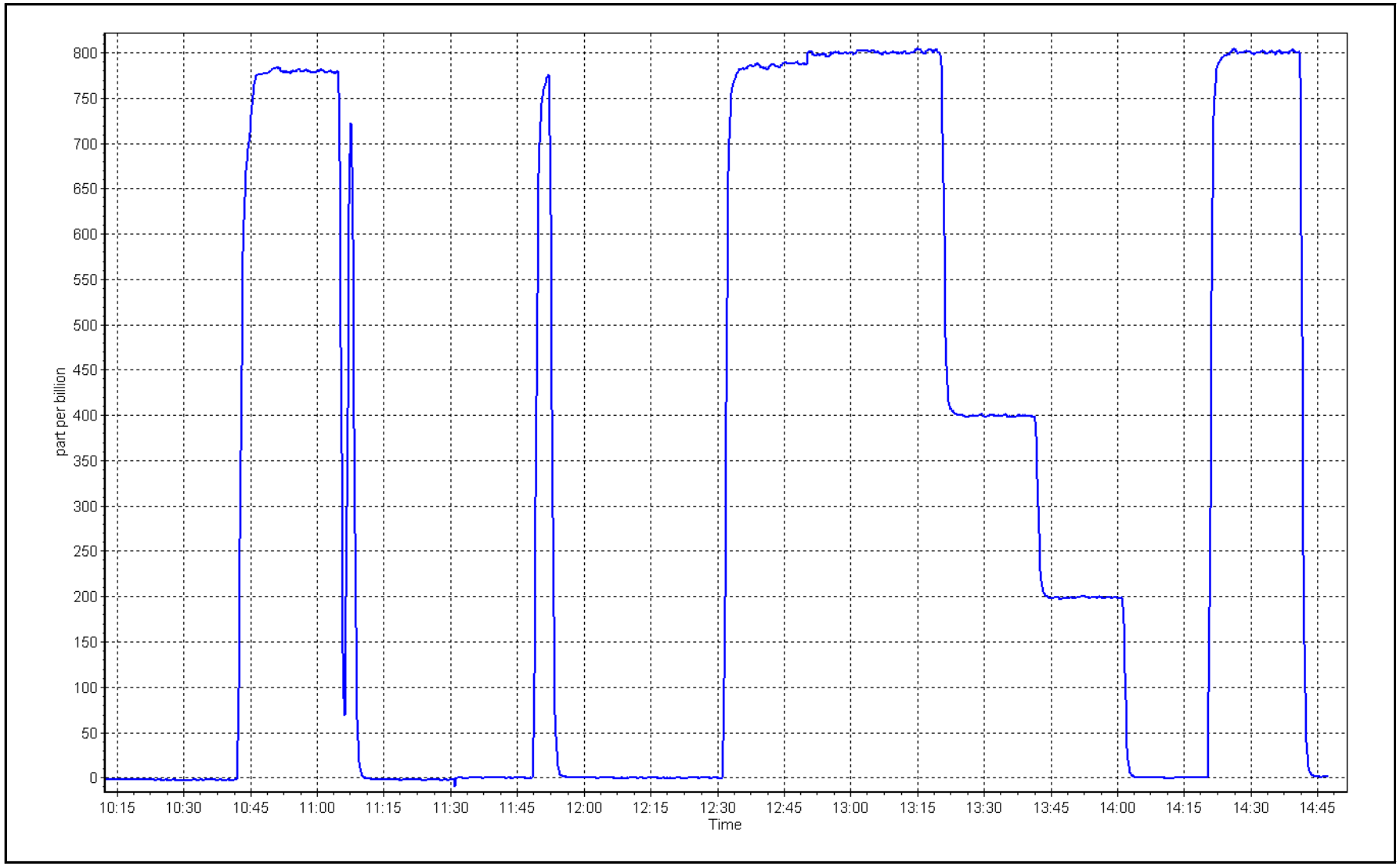
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
801.6	802.0	0.9996
400.8	399.2	1.0041
199.9	199.1	1.0041

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999994	*≥0.995*
Slope	1.000671	*0.90 - 1.10*
Intercept	-0.784833	*+/-30*



SO2 Calibration Plot Date: December 8, 2023 Location: Mildred Lake



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Mildred Lake	Station number:	AMS02
Calibration Date:	December 18, 2023	Last Cal Date:	November 24, 2023
Start time (MST):	10:53	End time (MST):	15:46
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:	1.010680	1.008965	Backgd or Offset:	1.72	1.70
Calibration intercept:	-0.019191	-0.059195	Coeff or Slope:	0.754	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	0.1	----
as found span	4924	75.6	80.0	82.2	0.974
as found 2nd point	4962	37.8	40.0	40.9	0.980
as found 3rd point	4981	18.9	20.0	20.3	0.990
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	80.7	0.991
second point	4962	37.8	40.0	40.3	0.992
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	80.3	0.996
SO2 Scrubber Check	4920	80.2	802.0	0.0	----
Date of last scrubber change:		20-Sep-23		Ave Corr Factor	0.996
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	82.1	Prev response:	80.83	*% change:	1.6%
Baseline Corr 2nd AF pt:	40.8	AF Slope:	1.027396	AF Intercept:	-0.079182
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999978		

* = > +/-5% change initiates investigation

Notes: Scrubber check done after cal zero, passed. Adjusted span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

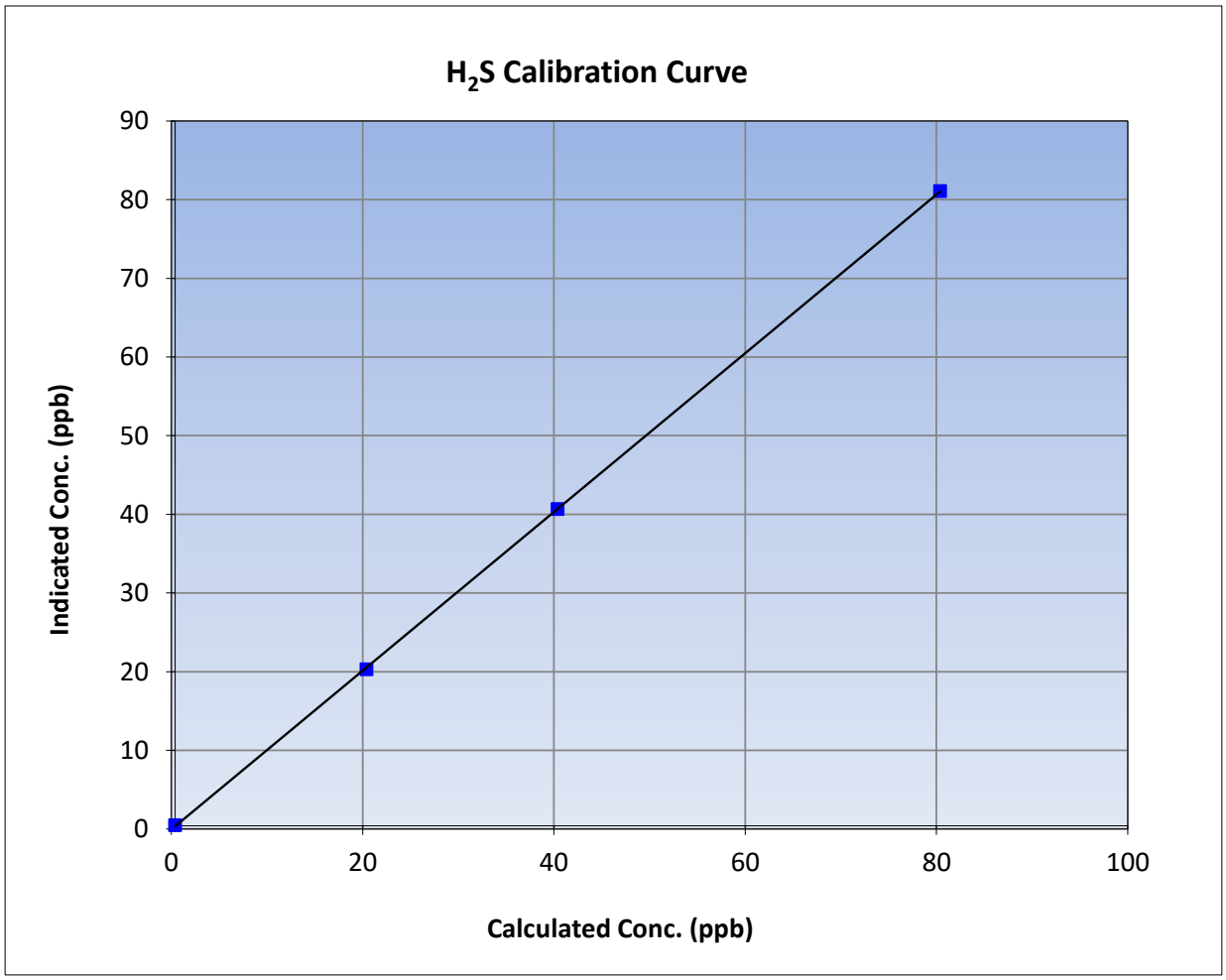
Station Information

Calibration Date:	December 18, 2023	Previous Calibration:	November 24, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:53	End Time (MST):	15:46
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	12113311966

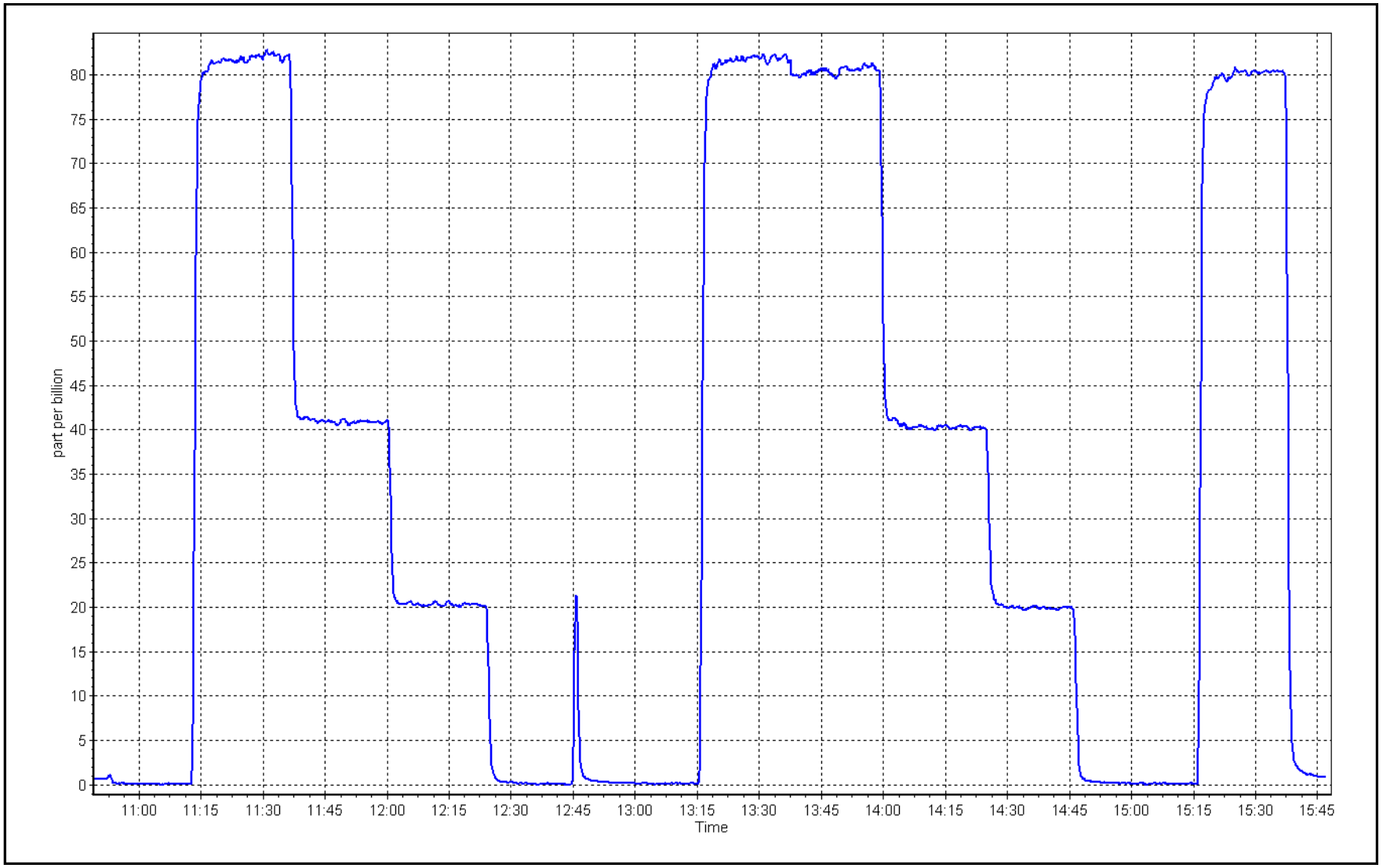
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.7	0.9912
40.0	40.3	0.9924
20.0	19.9	1.0049

Statistical Evaluation		Limits
Correlation Coefficient	0.999979	≥0.995
Slope	1.008965	0.90 - 1.10
Intercept	-0.059195	+/-3



H_2S Calibration Plot Date: December 18, 2023 Location: Mildred Lake



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Mildred Lake	Station number:	AMS02
Calibration Date:	December 8, 2023	Last Cal Date:	November 22, 2023
Start time (MST):	10:14	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 #:	1180320038	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.07E-04	3.11E-04	NMHC SP Ratio:	4.52E-05	4.57E-05
CH4 Retention time:	15.0	15.2	NMHC Peak Area:	194477	192457
Zero Chromatogram:	ON	ON	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	16.82	16.65	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	80.2	16.82	16.81	1.000
second point	4960	40.1	8.41	8.38	1.003
third point	4980	20.0	4.19	4.17	1.006
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	16.82	16.83	0.999
				Average Correction Factor	1.003

Baseline Corr AF:	16.65	Prev response	16.78	*% 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	4920	80.2	8.80	8.73	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	8.80	8.80	0.999
second point	4960	40.1	4.40	4.39	1.001
third point	4980	20.0	2.19	2.19	1.000
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.80	8.81	0.998
				Average Correction Factor	1.000
Baseline Corr AF:	8.73	Prev response	8.79	*% 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	4920	80.2	8.02	7.92	1.014
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	8.02	8.01	1.002
second point	4960	40.1	4.01	3.98	1.007
third point	4980	20.0	2.00	1.98	1.012
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.02	8.02	1.000
				Average Correction Factor	1.007
Baseline Corr AF:	7.92	Prev response	7.98	*% change	-0.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.998545	0.999782
THC Cal Offset:	-0.015916	-0.013512
CH4 Cal Slope:	0.997280	0.998946
CH4 Cal Offset:	-0.020258	-0.012854
NMHC Cal Slope:	0.999088	1.000492
NMHC Cal Offset:	0.003941	-0.001458

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

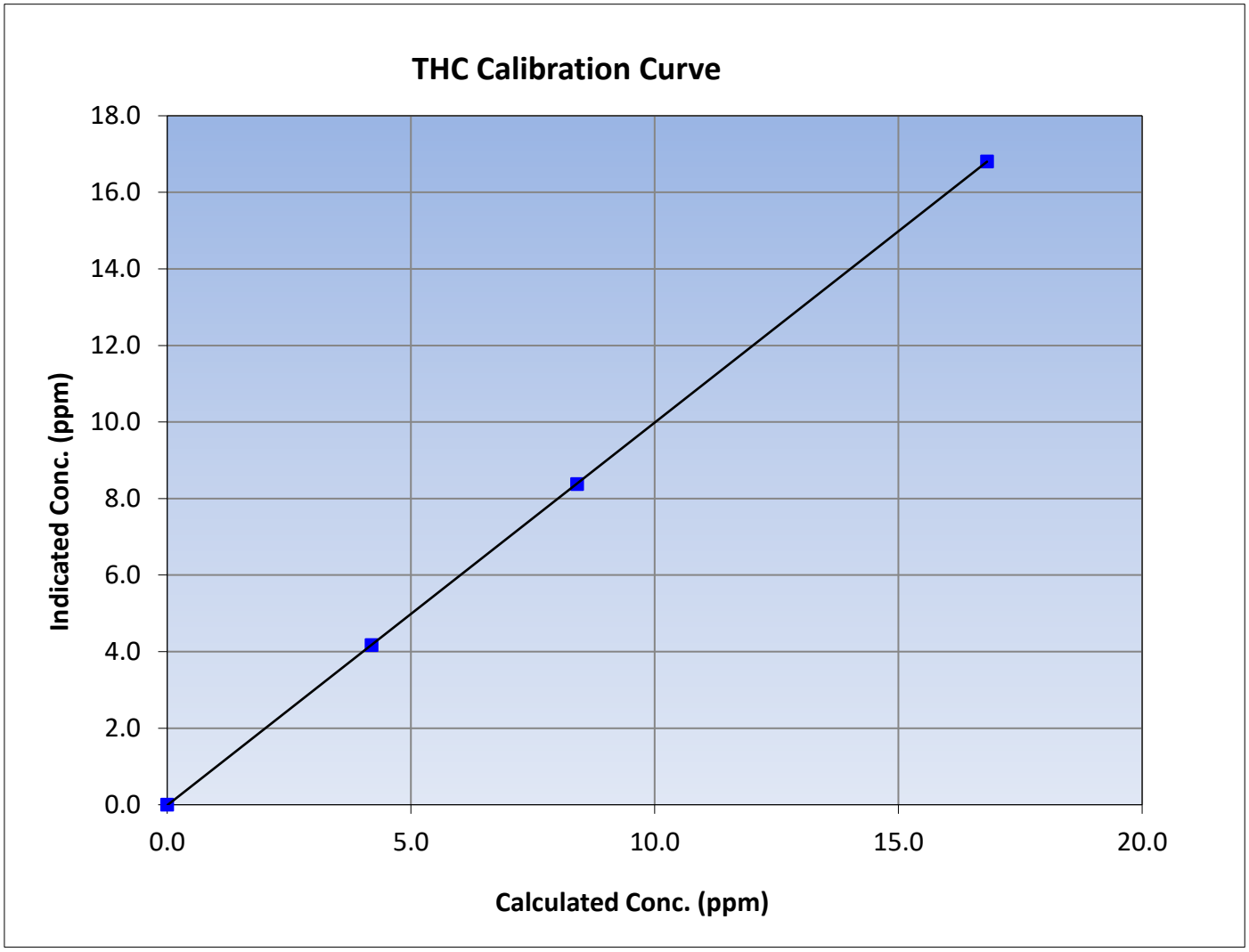
Version-06-2022

Station Information

Calibration Date:	December 8, 2023	Previous Calibration:	November 22, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:14	End Time (MST):	14:47
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320038

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999997	≥0.995
16.82	16.81	1.0005			
8.41	8.38	1.0035	Slope	0.999782	0.90 - 1.10
4.19	4.17	1.0056			
			Intercept	-0.013512	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

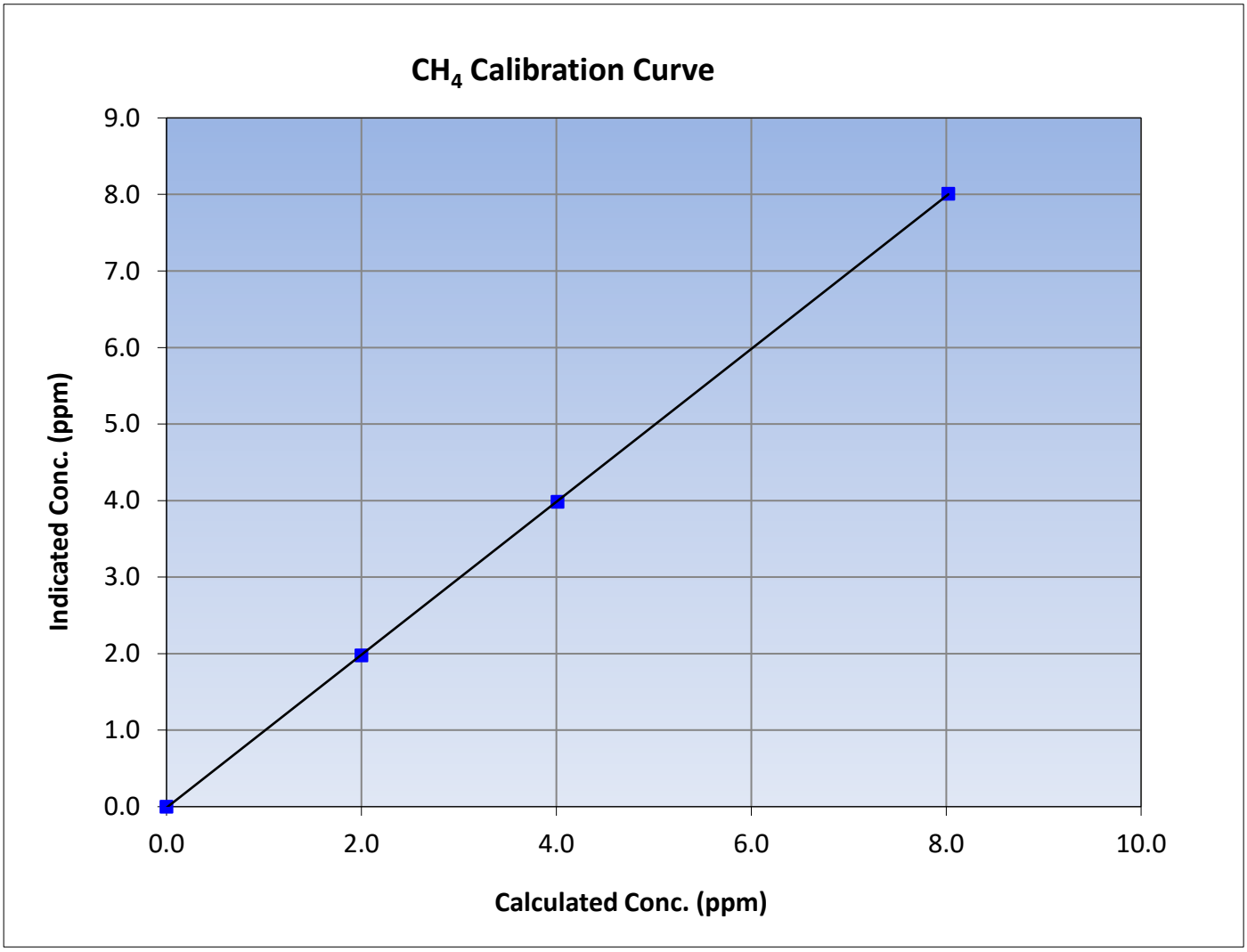
Version-06-2022

Station Information

Calibration Date:	December 8, 2023	Previous Calibration:	November 22, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:14	End Time (MST):	14:47
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320038

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999987	*≥0.995*
8.02	8.01	1.0016			
4.01	3.98	1.0074	Slope	0.998946	*0.90 - 1.10*
2.00	1.98	1.0120			
			Intercept	-0.012854	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

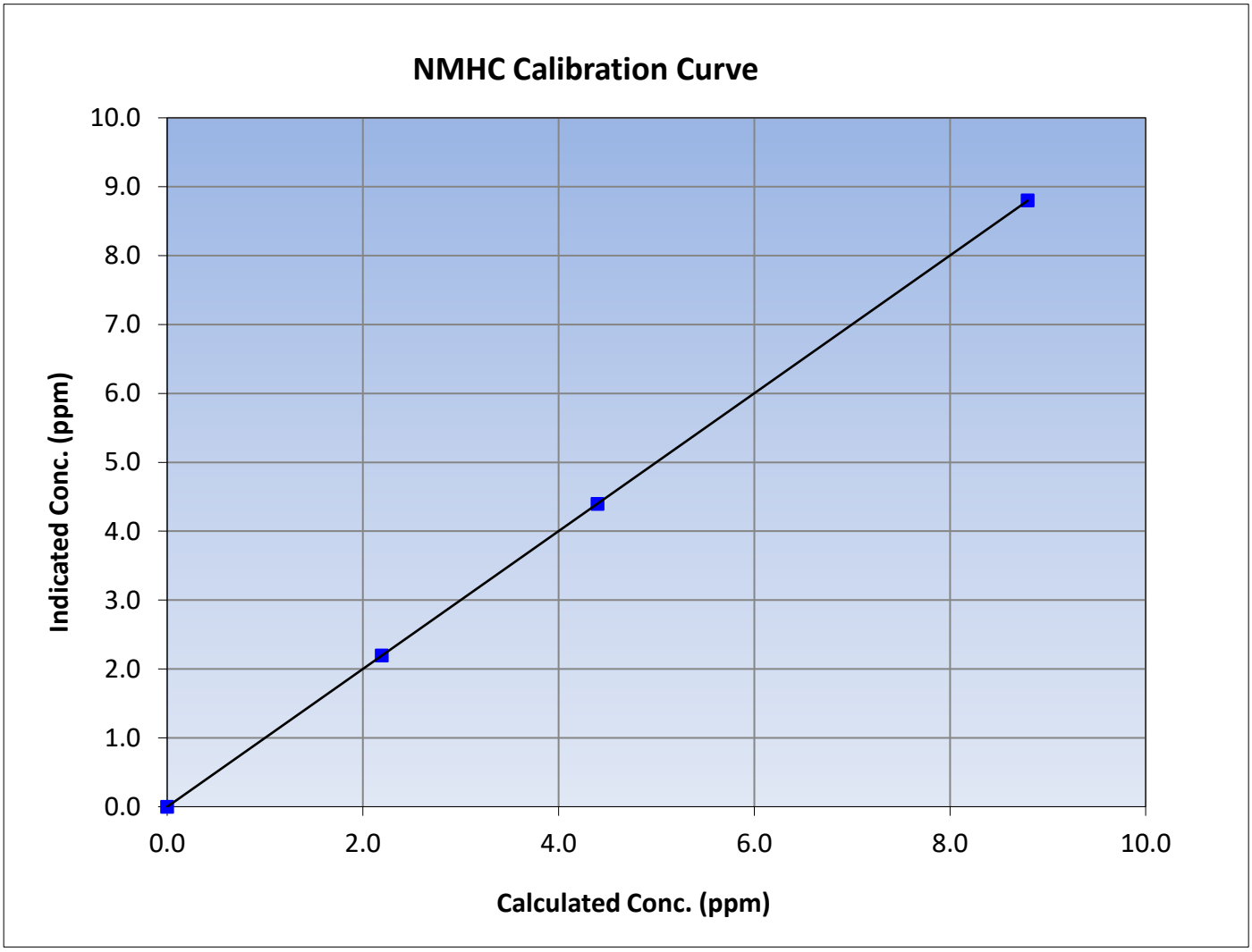
Version-06-2022

Station Information

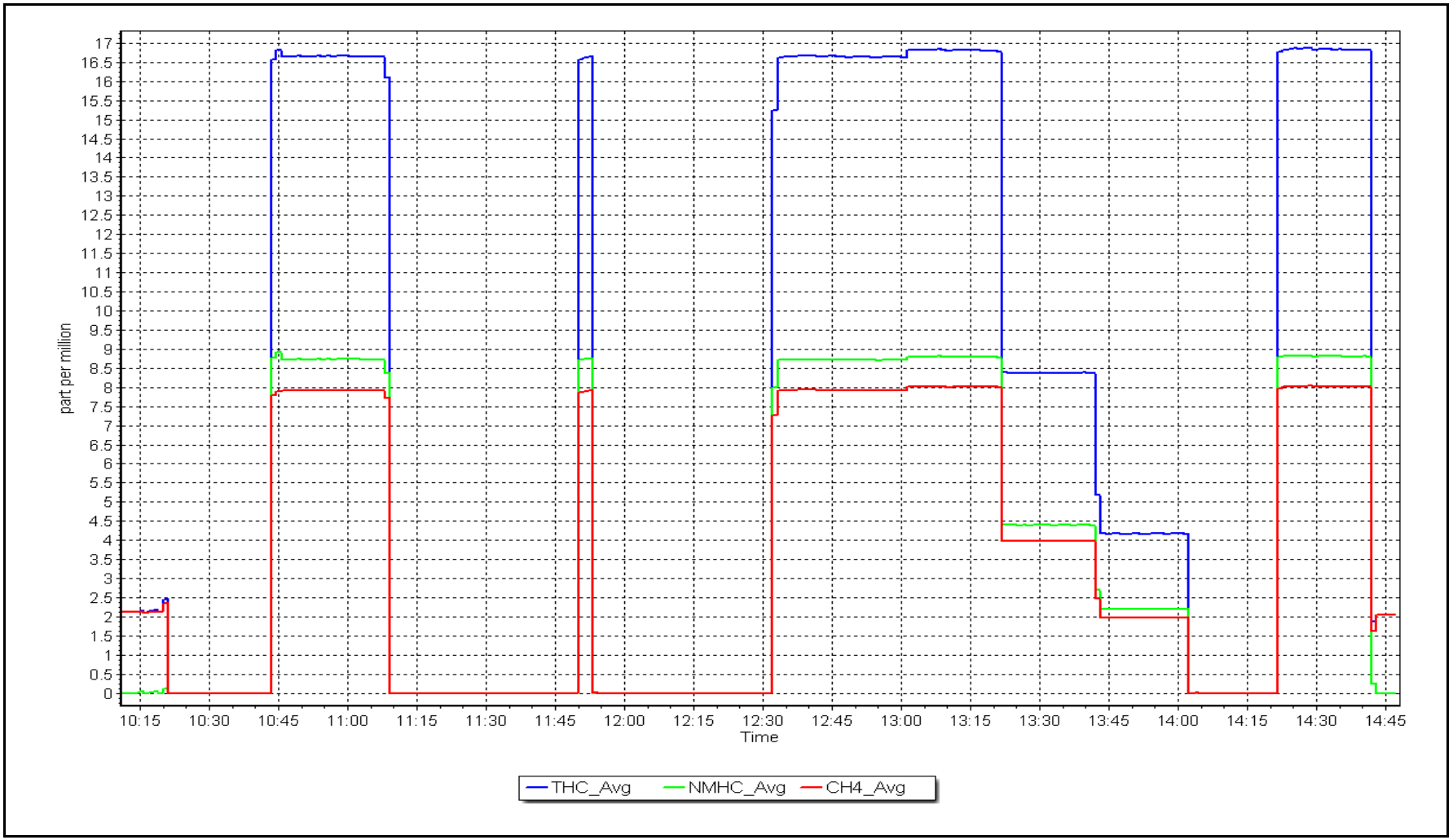
Calibration Date:	December 8, 2023	Previous Calibration:	November 22, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:14	End Time (MST):	14:47
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320038

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999999	≥0.995
8.80	8.80	0.9995			
4.40	4.39	1.0008	Slope	1.000492	0.90 - 1.10
2.19	2.19	0.9997			
			Intercept	-0.001458	+/-0.5



NMHC Calibration Plot Date: December 8, 2023 Location: Mildred Lake



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Mildred Lake	Station number:	AMS02
Calibration Date:	December 21, 2023	Last Cal Date:	December 8, 2023
Start time (MST):	13:11	End time (MST):	15:46
Reason:	Install		

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:		2.69E-04	NMHC SP Ratio:		6.67E-05
CH4 Retention time:		15.7	NMHC Peak Area:		131964
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	80.2	16.82	16.81	1.001
second point	4960	40.1	8.41	8.44	0.997
third point	4980	20.0	4.19	4.29	0.977
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	16.82	16.98	0.990
				Average Correction Factor	0.992

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	80.2	8.80	8.78	1.001
second point	4960	40.1	4.40	4.42	0.995
third point	4980	20.0	2.19	2.27	0.968
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.80	9.00	0.978
				Average Correction Factor	0.988
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	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	2.03	0.988
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	0.995
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:		0.997589
THC Cal Offset:		0.046113
CH4 Cal Slope:		0.998643
CH4 Cal Offset:		0.011958
NMHC Cal Slope:		0.996030
NMHC Cal Offset:		0.035954

Notes: Install Calibration. Adjusted span.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

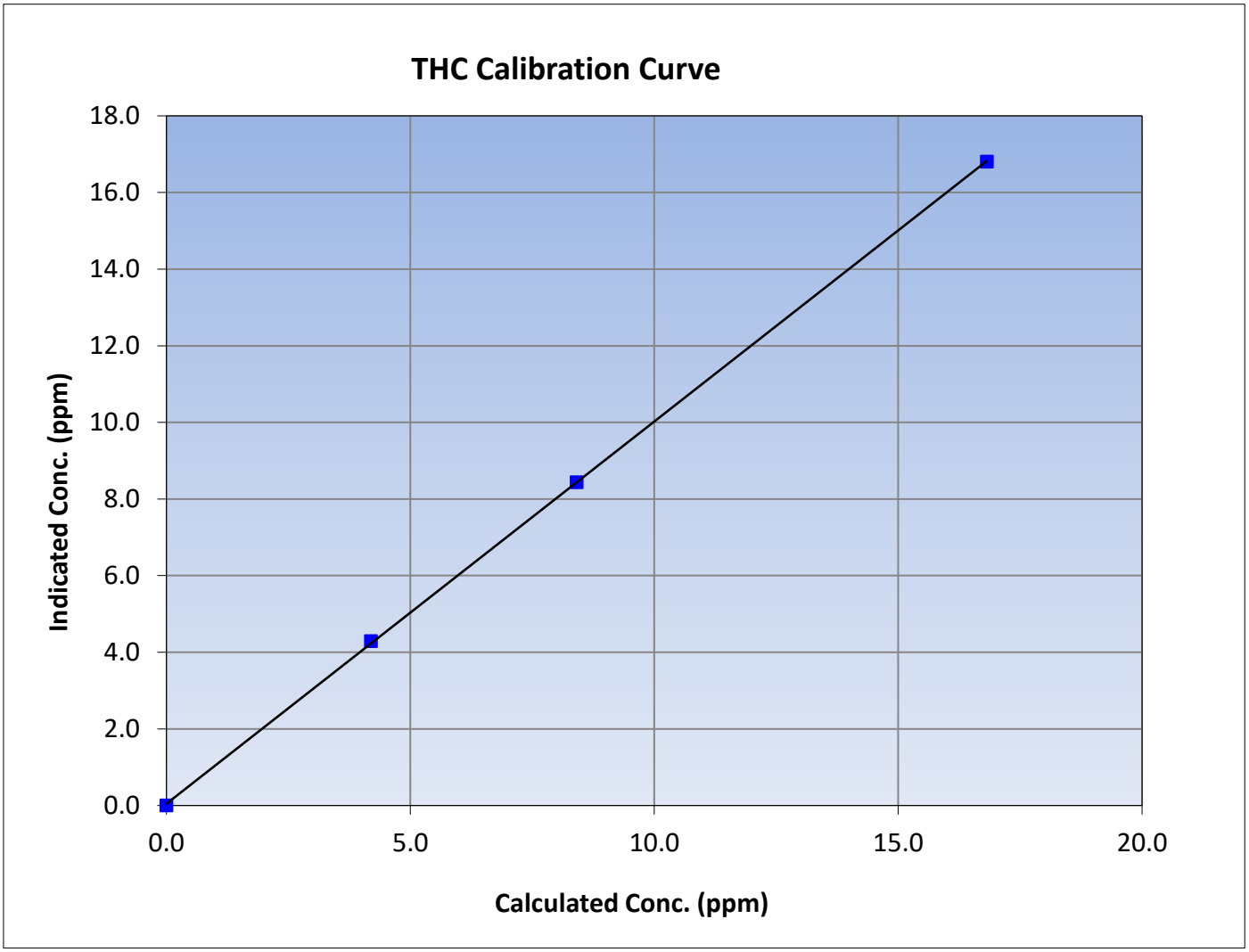
Version-06-2022

Station Information

Calibration Date:	December 21, 2023	Previous Calibration:	December 8, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	13:11	End Time (MST):	15:46
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	0.999961	*≥0.995*
16.82	16.81	1.0006			
8.41	8.44	0.9968	Slope	0.997589	*0.90 - 1.10*
4.19	4.29	0.9774			
			Intercept	0.046113	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

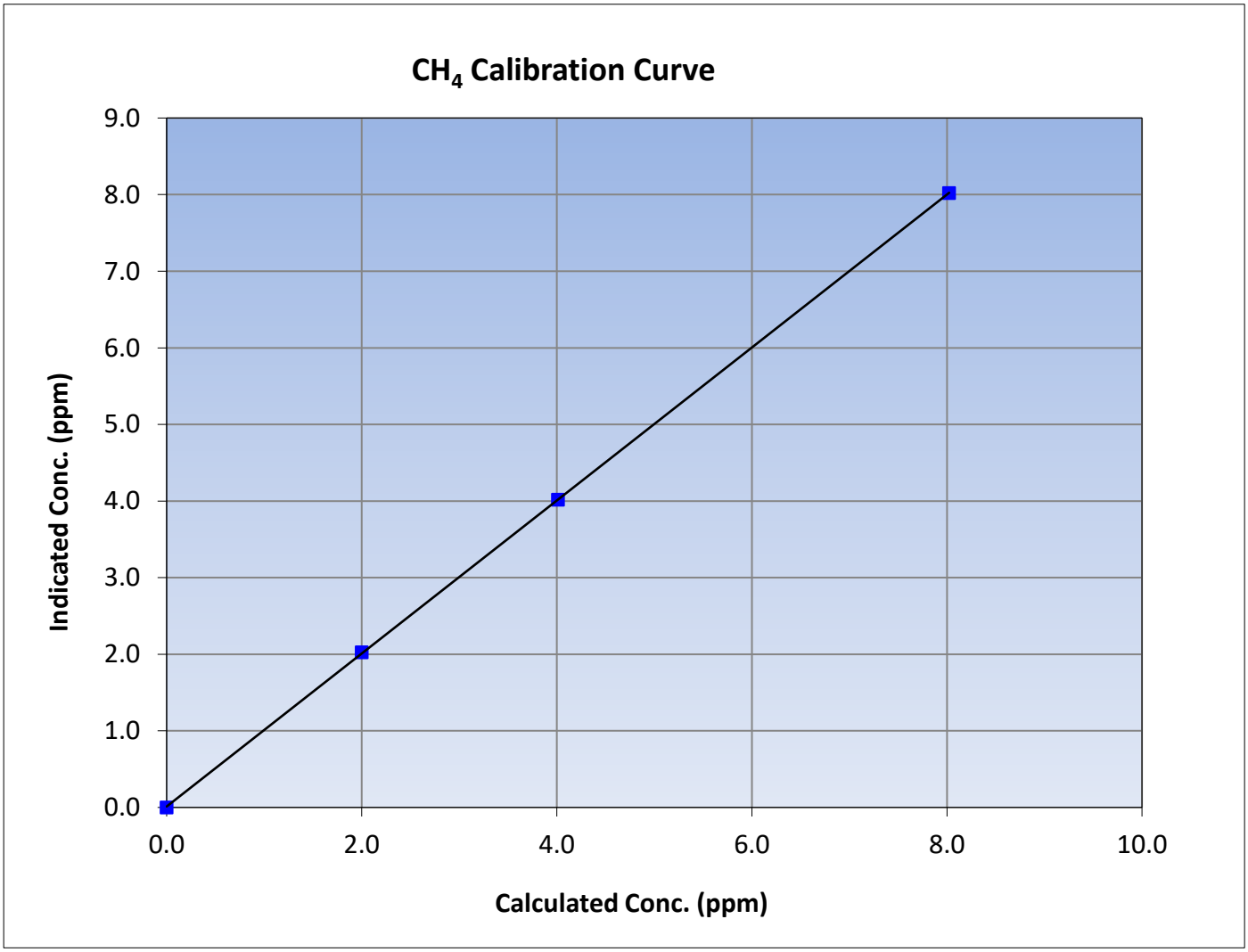
Version-06-2022

Station Information

Calibration Date:	December 21, 2023	Previous Calibration:	December 8, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	13:11	End Time (MST):	15:46
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	0.999988	*≥0.995*
8.02	8.02	1.0004			
4.01	4.02	0.9984	Slope	0.998643	*0.90 - 1.10*
2.00	2.03	0.9876			
			Intercept	0.011958	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

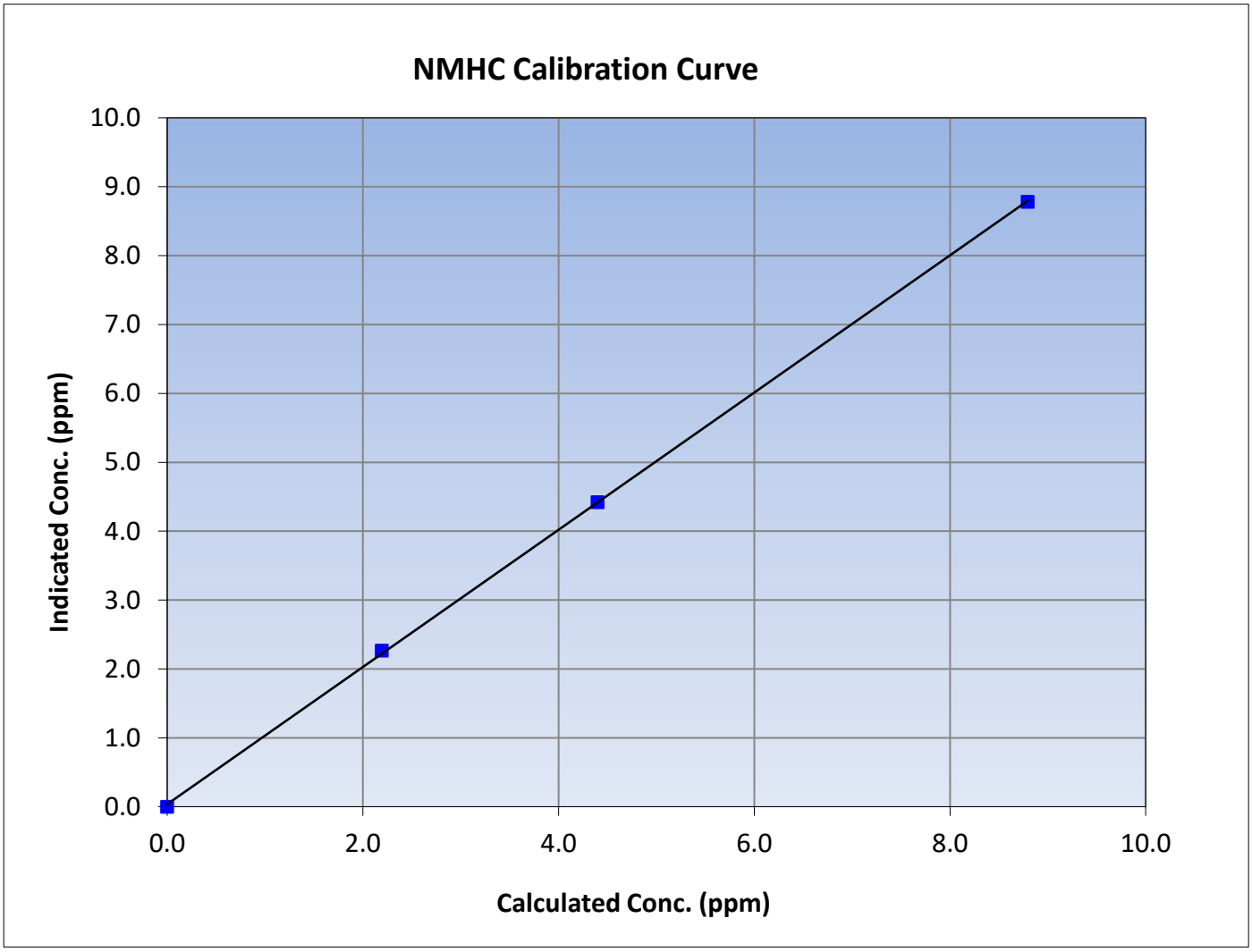
Version-06-2022

Station Information

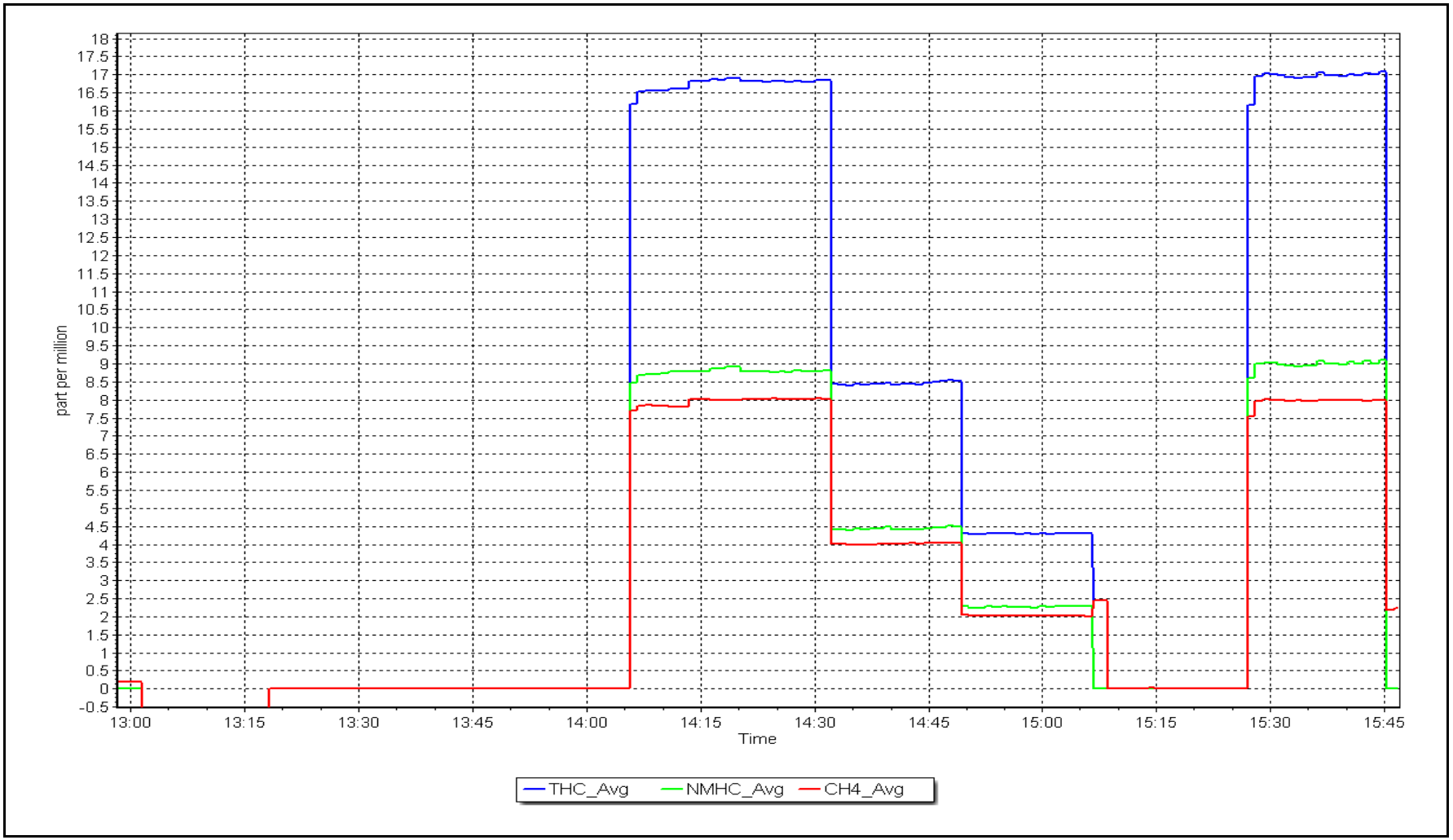
Calibration Date:	December 21, 2023	Previous Calibration:	December 8, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	13:11	End Time (MST):	15:46
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999916	*≥0.995*
8.80	8.78	1.0014			
4.40	4.42	0.9950	Slope	0.996030	*0.90 - 1.10*
2.19	2.27	0.9680			
			Intercept	0.035954	*+/-0.5*



NMHC Calibration Plot Date: December 21, 2023 Location: Mildred Lake



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Mildred Lake	Station number:	AMS02
Calibration Date:	December 23, 2023	Last Cal Date:	December 21, 2023
Start time (MST):	12:26	End time (MST):	15:13
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:	2.69E-04	2.63E-04	NMHC SP Ratio:	6.67E-05	6.75E-05
CH4 Retention time:	15.7	15.5	NMHC Peak Area:	131964	130400
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	17.08	0.985
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	16.82	16.82	1.000
second point	4960	40.1	8.41	8.46	0.994
third point	4980	20.0	4.19	4.22	0.994
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	16.82	17.07	0.985
				Average Correction Factor	0.996

Baseline Corr AF:	17.08	Prev response	16.82	*% change	1.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	8.80	8.91	0.987
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	8.81	0.998
second point	4960	40.1	4.40	4.46	0.985
third point	4980	20.0	2.19	2.23	0.983
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.80	9.08	0.969
				Average Correction Factor	0.989
Baseline Corr AF:	8.91	Prev response	8.80	*% 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	4920	80.2	8.02	8.16	0.983
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	8.01	1.002
second point	4960	40.1	4.01	4.00	1.003
third point	4980	20.0	2.00	1.99	1.007
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.02	7.99	1.004
				Average Correction Factor	1.004
Baseline Corr AF:	8.16	Prev response	8.02	*% change	1.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.997589	1.000046
THC Cal Offset:	0.046113	0.020295
CH4 Cal Slope:	0.998643	0.998148
CH4 Cal Offset:	0.011958	-0.004054
NMHC Cal Slope:	0.996030	1.001244
NMHC Cal Offset:	0.035954	0.025148

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

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

THC Calibration Summary

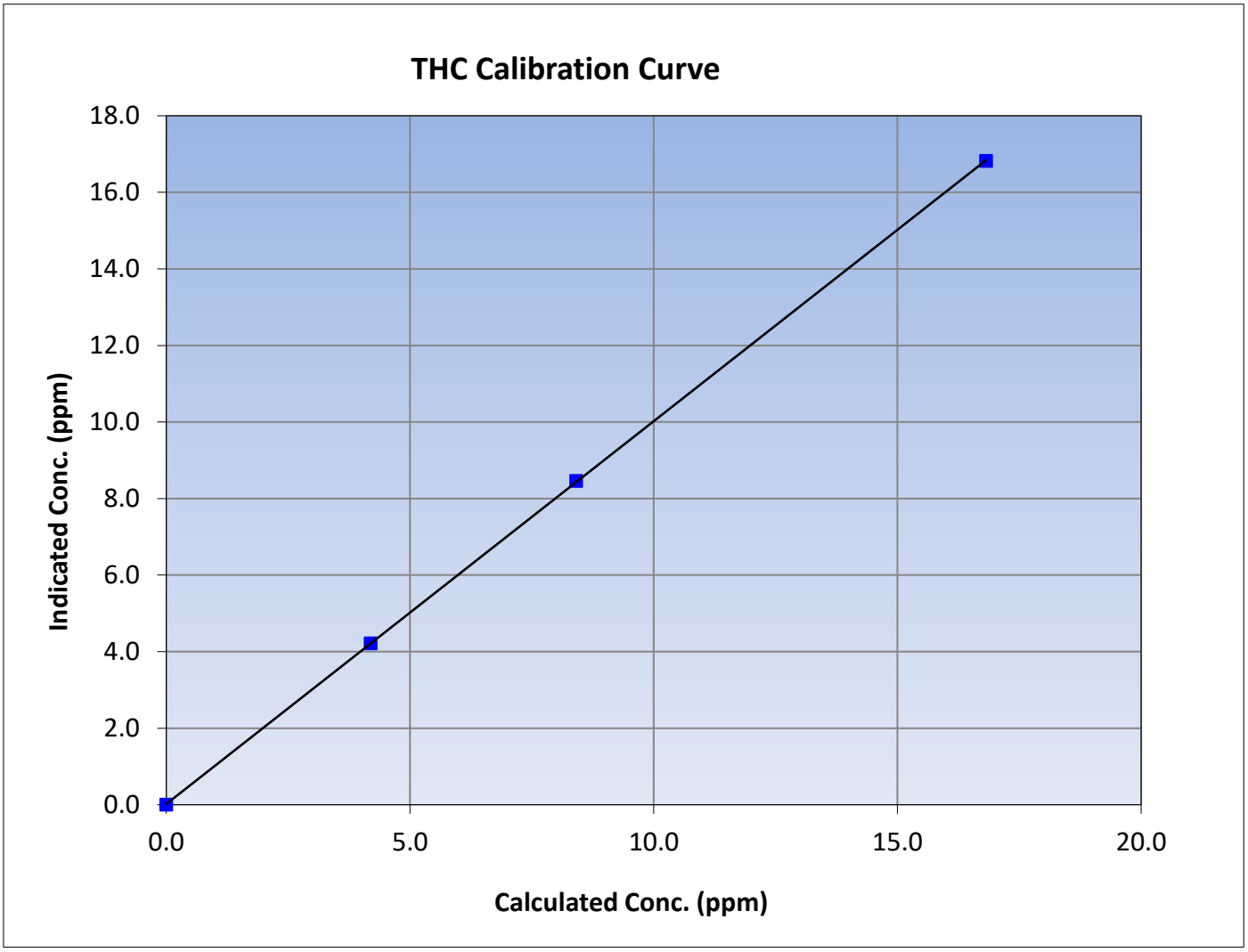
Version-06-2022

Station Information

Calibration Date:	December 23, 2023	Previous Calibration:	December 21, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	12:26	End Time (MST):	15:13
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	0.999988	*≥0.995*
16.82	16.82	0.9998			
8.41	8.46	0.9935	Slope	1.000046	*0.90 - 1.10*
4.19	4.22	0.9941			
			Intercept	0.020295	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

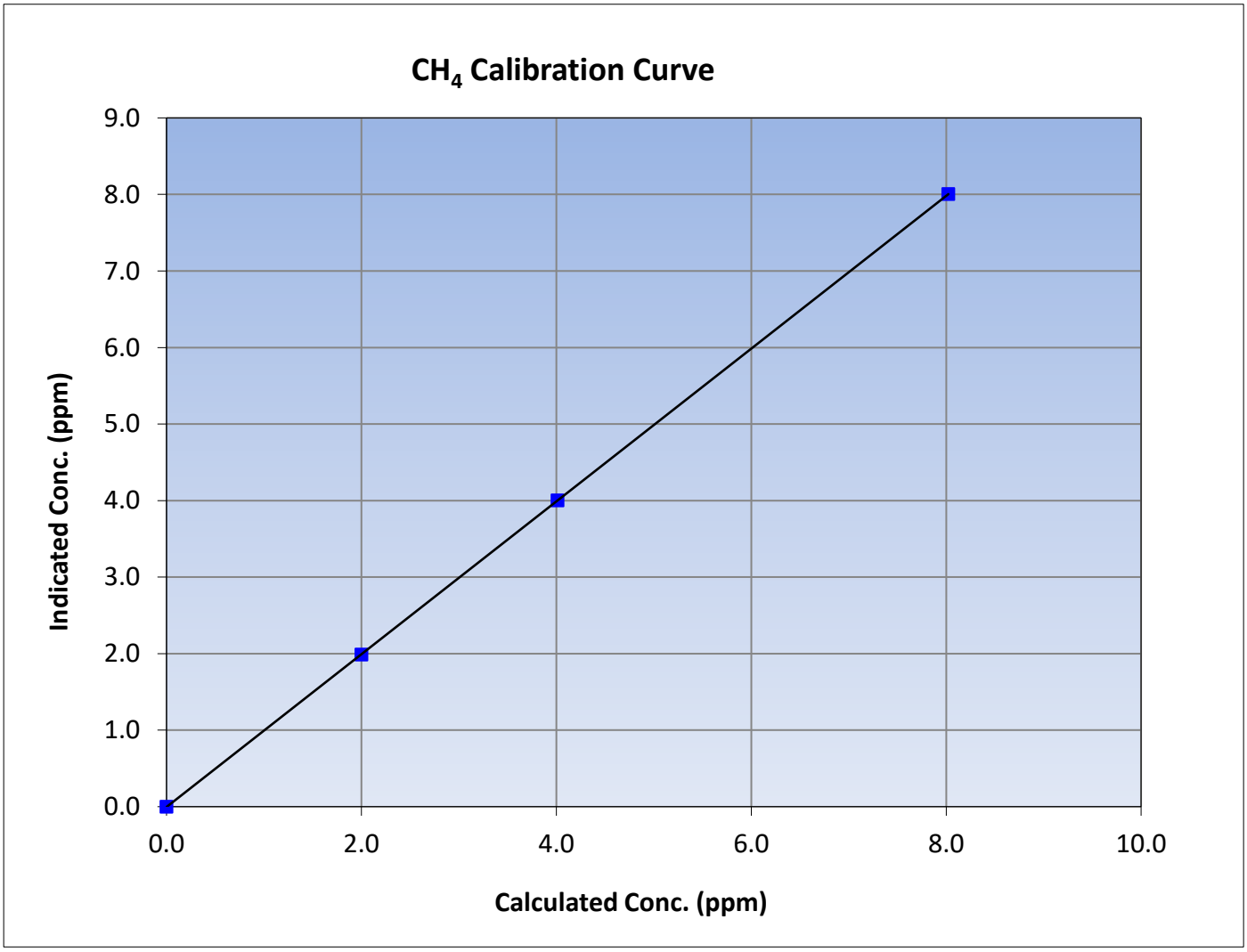
Version-06-2022

Station Information

Calibration Date:	December 23, 2023	Previous Calibration:	December 21, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	12:26	End Time (MST):	15:13
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	0.999998	*≥0.995*
8.02	8.01	1.0022			
4.01	4.00	1.0026	Slope	0.998148	*0.90 - 1.10*
2.00	1.99	1.0069			
			Intercept	-0.004054	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

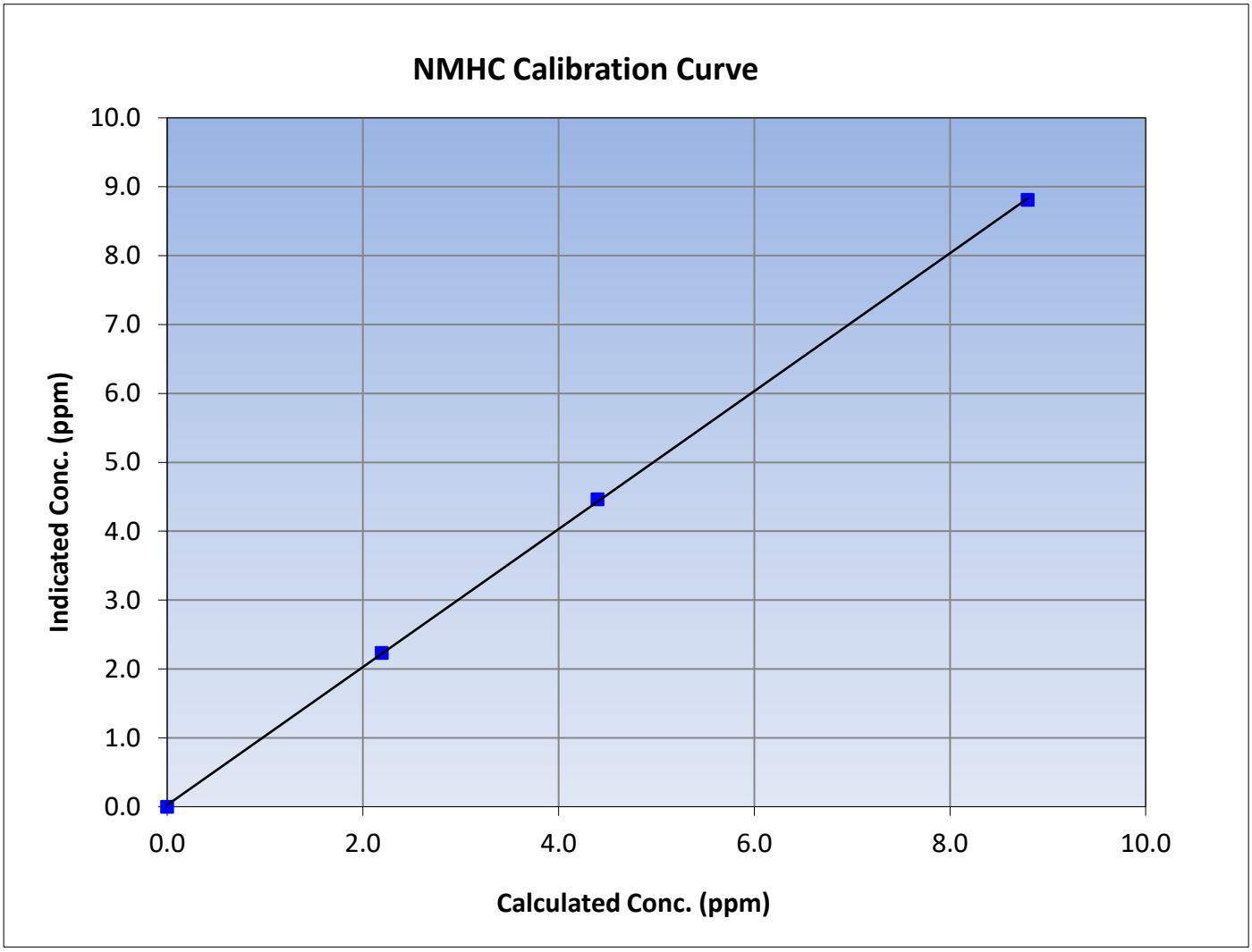
Version-06-2022

Station Information

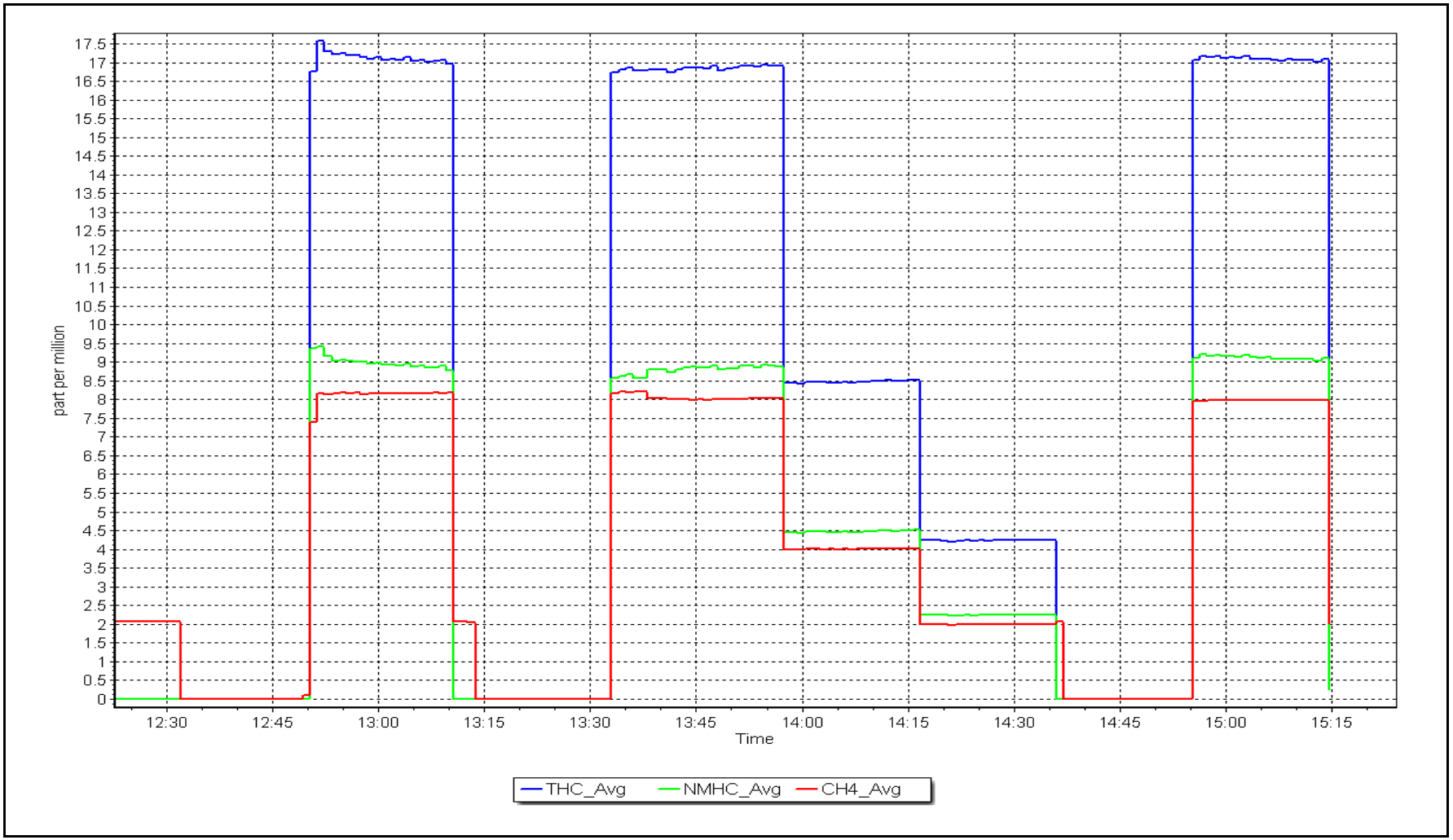
Calibration Date:	December 23, 2023	Previous Calibration:	December 21, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	12:26	End Time (MST):	15:13
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999943	≥0.995
8.80	8.81	0.9982			
4.40	4.46	0.9851	Slope	1.001244	0.90 - 1.10
2.19	2.23	0.9831			
			Intercept	0.025148	+/-0.5



NMHC Calibration Plot Date: December 23, 2023 Location: Mildred Lake



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS04
BUFFALO VIEWPOINT
DECEMBER 2023

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

January 31, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	December 14, 2023	Last Cal Date:	November 28, 2023
Start time (MST):	7:35	End time (MST):	10:28
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001971	0.998629	Backgd or Offset:	24.1	24.1
Calibration intercept:	1.315277	0.434228	Coeff or Slope:	0.873	0.873

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	799.4	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4921	78.6	799.7	798.5	1.002
second point	4961	39.3	399.8	401.1	0.997
third point	4980	19.6	199.4	199.1	1.002
as left zero	5000	0.0	0.0	0.3	----
as left span	4921	78.6	799.7	803.2	0.996
				Average Correction Factor	1.000

Baseline Corr As found:	799.30	Previous response	802.63	*% 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: No maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

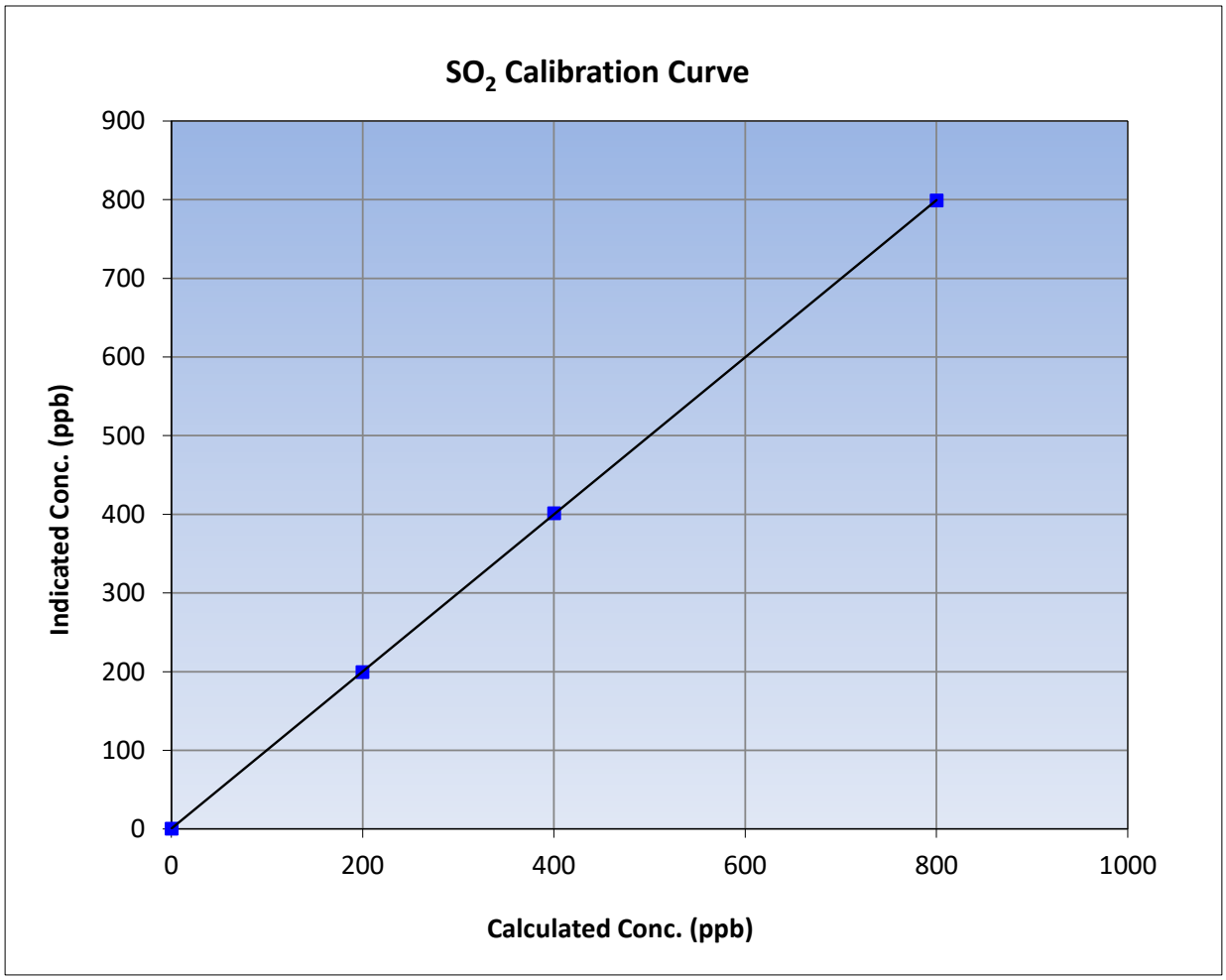
Station Information

Calibration Date:	December 14, 2023	Previous Calibration:	November 28, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:35	End Time (MST):	10:28
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1327300932

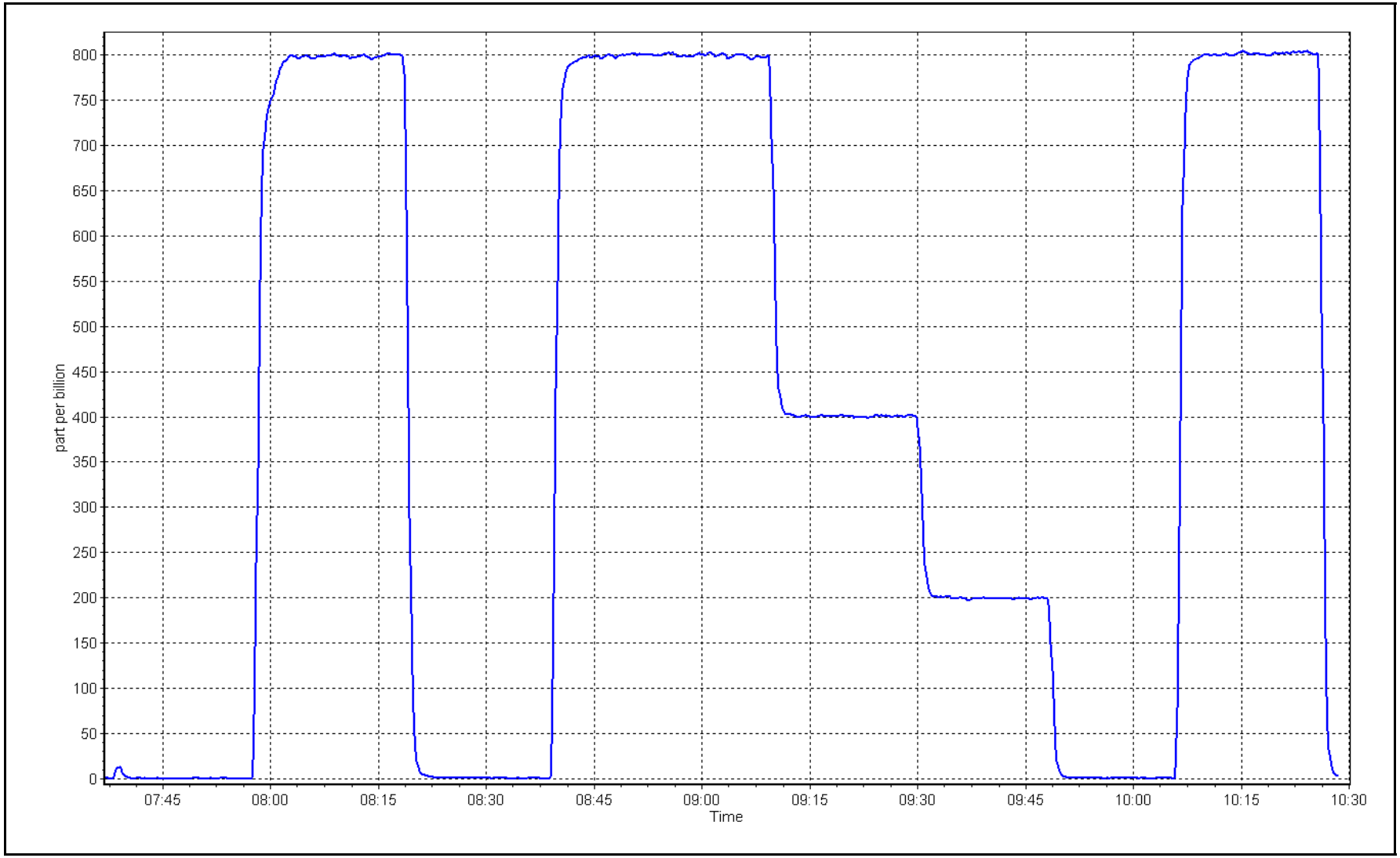
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
799.7	798.5	1.0016
399.8	401.1	0.9968
199.4	199.1	1.0016

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	0.998629	*0.90 - 1.10*
Intercept	0.434228	*+/-30*



SO2 Calibration Plot Date: December 14, 2023 Location: Buffalo Viewpoint



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	December 8, 2023	Last Cal Date:	November 1, 2023
Start time (MST):	8:50	End time (MST):	12:40
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i-LTE		Analyzer serial #:	1008841400	
Converter make:	Global		Converter serial #:	2022-200	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998493	1.000346	Backgd or Offset:	1.8	1.8
Calibration intercept:	0.082213	0.042159	Coeff or Slope:	1.115	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	0.0	----
as found span	4926	74.1	80.3	80.9	0.993
as found 2nd point	4963	37.0	40.1	40.5	0.990
as found 3rd point	4982	18.5	20.1	19.9	1.008
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4926	74.1	80.3	80.4	0.999
second point	4963	37.0	40.1	40.2	0.998
third point	4982	18.5	20.1	20.0	1.003
as left zero	5000	0.0	0.0	0.1	----
as left span	4926	74.1	80.3	79.9	1.005
SO2 Scrubber Check	4920	80.0	800.0	0.0	----
Date of last scrubber change:		16-May-23		Ave Corr Factor	1.000
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.9	Prev response:	80.28	*% change:	0.8%
Baseline Corr 2nd AF pt:	40.5	AF Slope:	1.008597	AF Intercept:	-0.097636
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999977		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

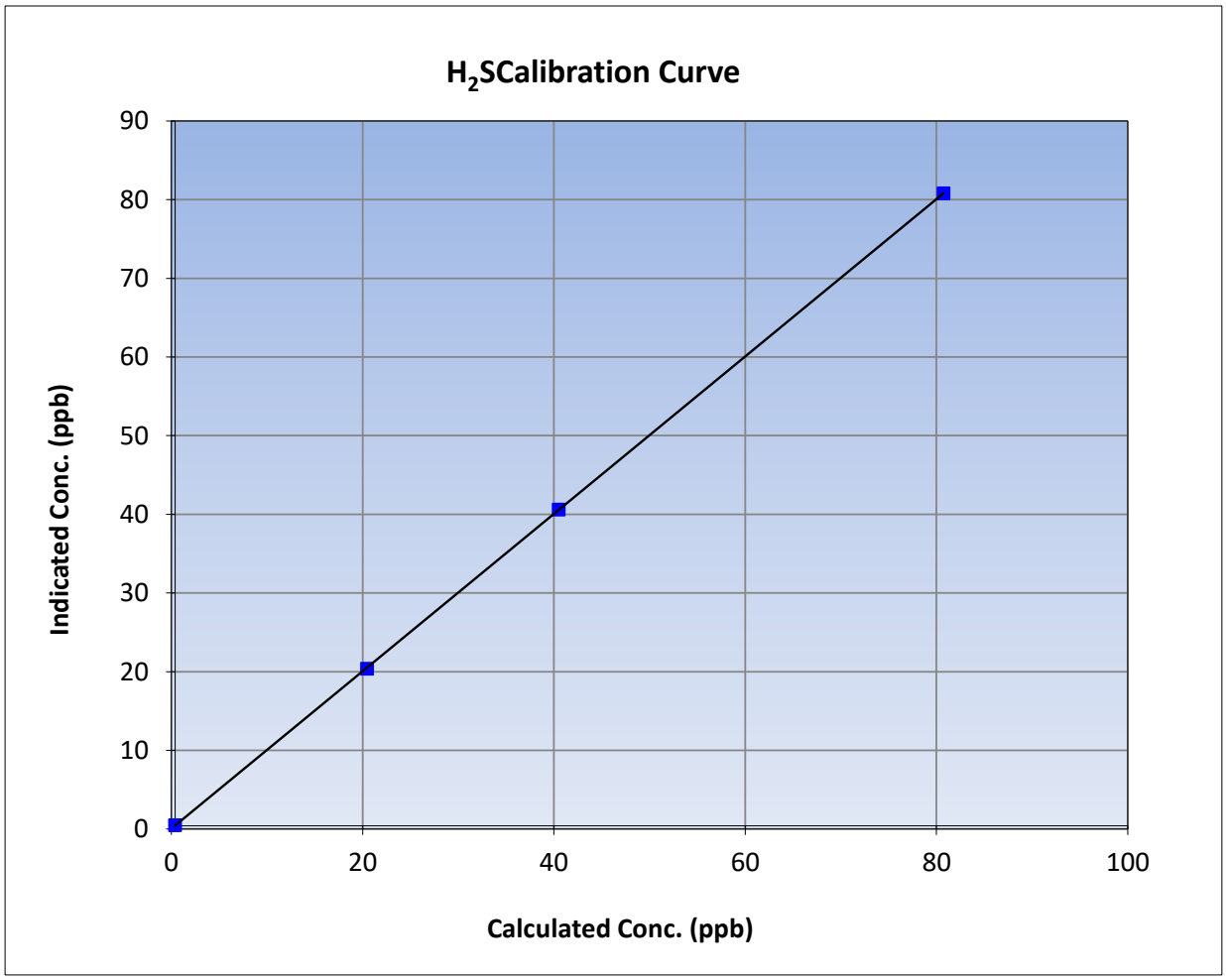
Station Information

Calibration Date:	December 8, 2023	Previous Calibration:	November 1, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:50	End Time (MST):	12:40
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1008841400

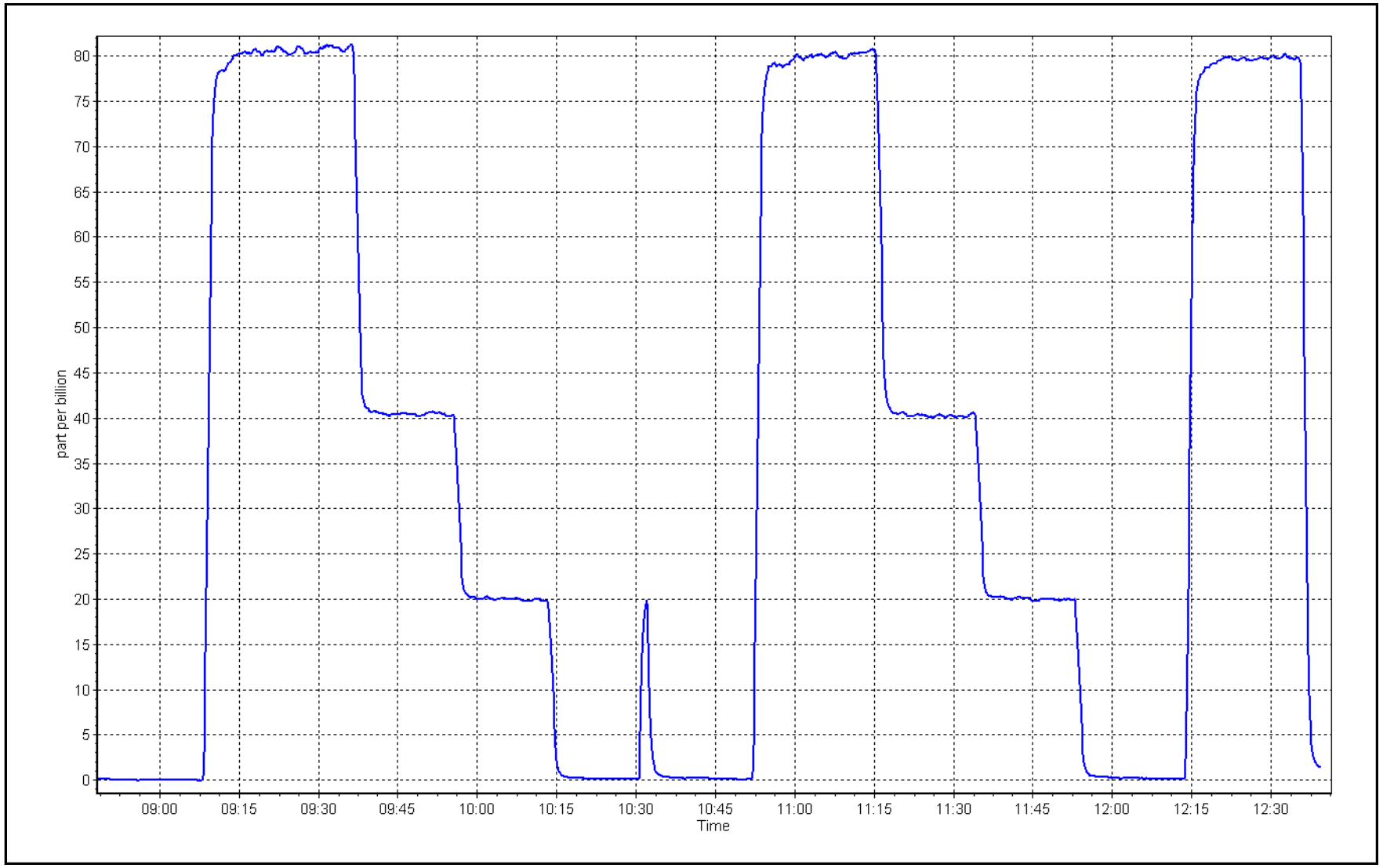
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.3	80.4	0.9990
40.1	40.2	0.9977
20.1	20.0	1.0026

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	1.000346	*0.90 - 1.10*
Intercept	0.042159	*+/-3*



H_2S Calibration Plot Date: December 8, 2023 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:	December 8, 2023	Last Cal Date:	November 28, 2023
Start time (MST):	7:35	End time (MST):	8:51
Reason:	Cylinder Change	Hydrogen and Nitrogen 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:	2.00E-04	2.00E-04	NMHC SP Ratio:	4.38E-05	4.38E-05
CH4 Retention time:	11.8	11.8	NMHC Peak Area:	201200	201200
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	16.46	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	78.6	16.64	16.34	1.018
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.018
Baseline Corr AF:	16.46	Prev response	16.58	*% change	-0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-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	8.76	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	78.6	8.82	8.71	1.013
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.013
Baseline Corr AF:	8.76	Prev response	8.79	*% change	-0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	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	7.63	1.024
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.024
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	

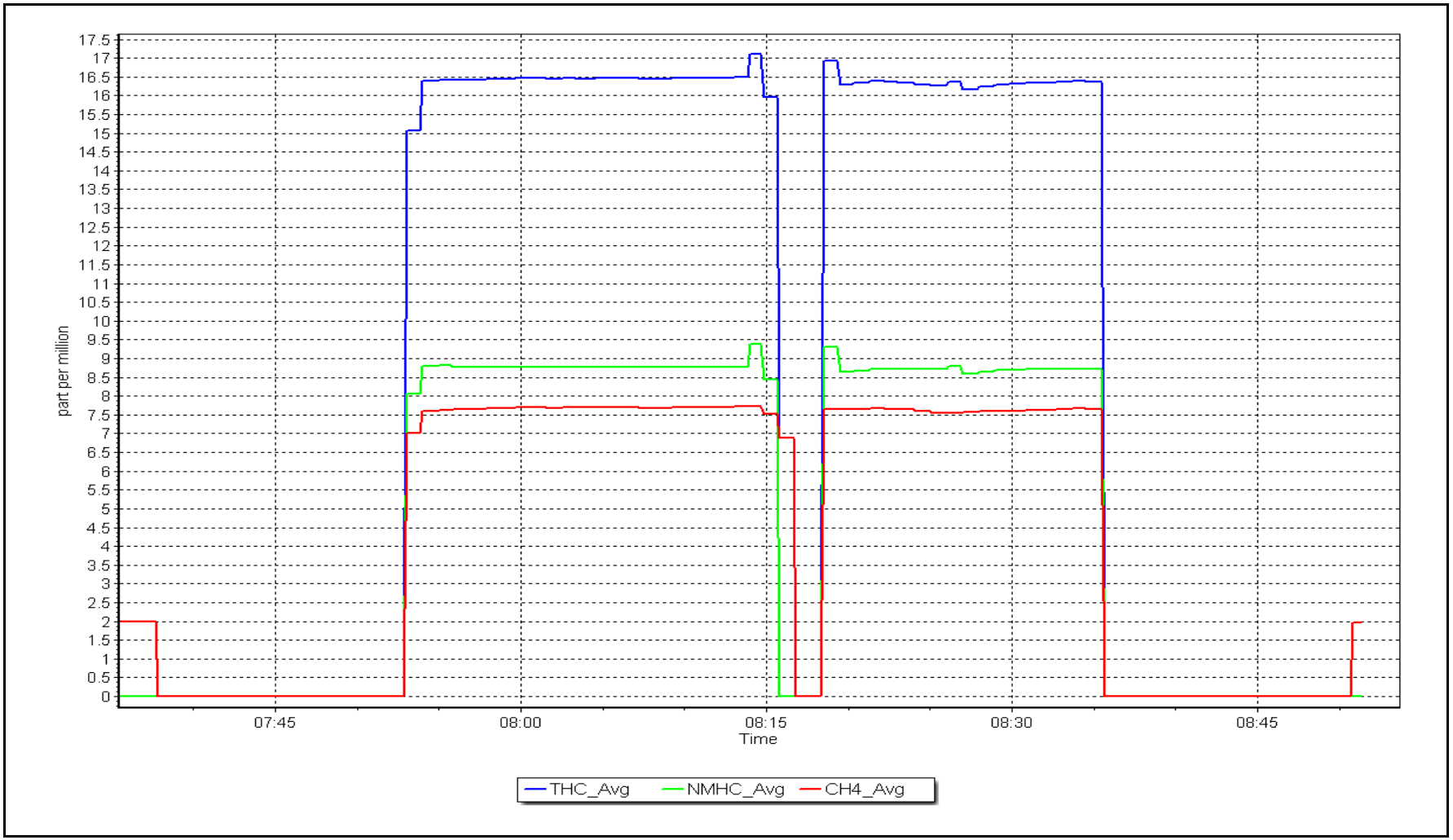
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999538	0.982193
THC Cal Offset:	-0.049557	0.000000
CH4 Cal Slope:	1.000446	0.976127
CH4 Cal Offset:	-0.029913	0.000000
NMHC Cal Slope:	0.998967	0.987570
NMHC Cal Offset:	-0.020044	0.000000

Notes: Hydrogen and Nitrogen Cylinder Changed.

Calibration Performed By: Melissa Lemay

NMHC Calibration Plot Date: December 8, 2023 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:	December 14, 2023	Last Cal Date:	November 28, 2023
Start time (MST):	7:35	End time (MST):	10:27
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:	2.00E-04	2.03E-04	NMHC SP Ratio:	4.38E-05	4.45E-05
CH4 Retention time:	11.8	11.8	NMHC Peak Area:	201200	198327
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	16.37	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	16.64	16.63	1.000
second point	4961	39.3	8.32	8.23	1.011
third point	4980	19.6	4.15	4.05	1.024
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	78.6	16.64	16.61	1.002
				Average Correction Factor	1.012
Baseline Corr AF:	16.37	Prev response	16.58	*% 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	4921	78.6	8.82	8.68	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	8.82	8.81	1.001
second point	4961	39.3	4.41	4.38	1.007
third point	4980	19.6	2.20	2.16	1.018
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	78.6	8.82	8.79	1.003
				Average Correction Factor	1.009
Baseline Corr AF:	8.68	Prev response	8.79	*% change	-1.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	78.6	7.82	7.69	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	7.82	1.000
second point	4961	39.3	3.91	3.85	1.015
third point	4980	19.6	1.95	1.89	1.031
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	78.6	7.82	7.82	1.000
				Average Correction Factor	1.015
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:	0.999538	1.001050
THC Cal Offset:	-0.049557	-0.055556
CH4 Cal Slope:	1.000446	1.002202
CH4 Cal Offset:	-0.029913	-0.035913
NMHC Cal Slope:	0.998967	1.000029
NMHC Cal Offset:	-0.020044	-0.019643

Notes: No maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

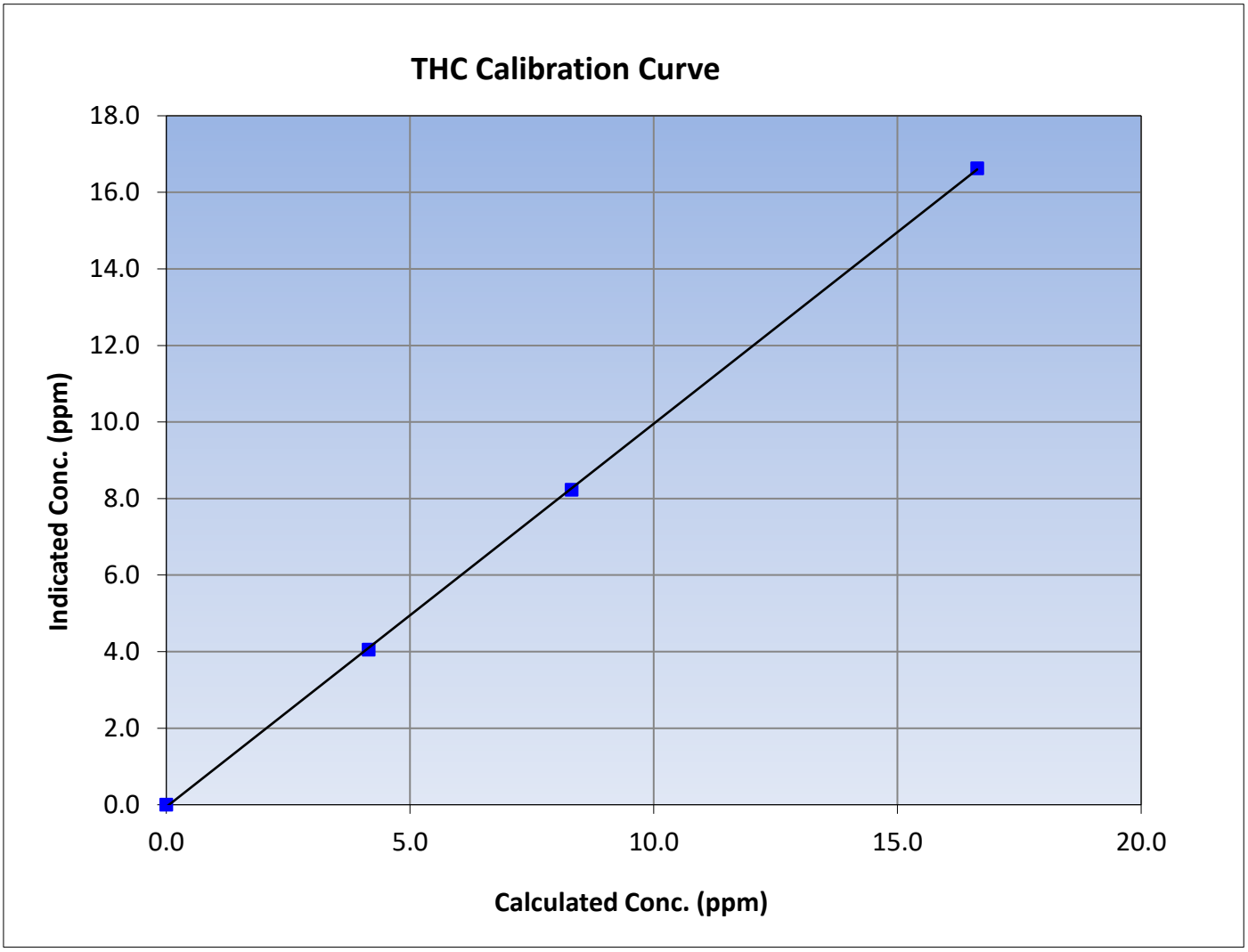
Version-06-2022

Station Information

Calibration Date:	December 14, 2023	Previous Calibration:	November 28, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:35	End Time (MST):	10:27
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	0.999948	≥0.995
16.64	16.63	1.0004			
8.32	8.23	1.0106	Slope	1.001050	0.90 - 1.10
4.15	4.05	1.0243			
			Intercept	-0.055556	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

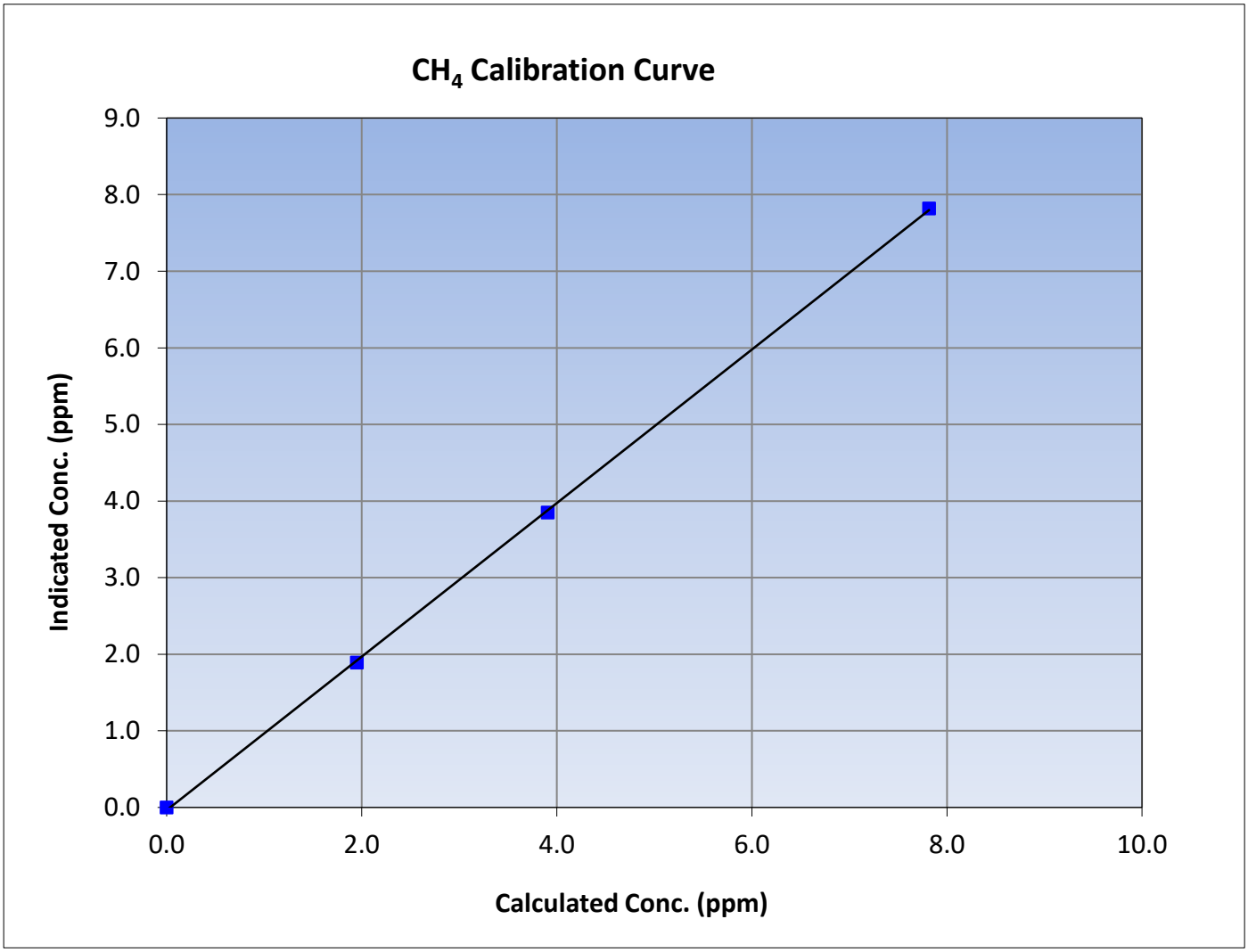
Version-06-2022

Station Information

Calibration Date:	December 14, 2023	Previous Calibration:	November 28, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:35	End Time (MST):	10:27
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	0.999897	≥0.995
7.82	7.82	0.9996			
3.91	3.85	1.0150	Slope	1.002202	0.90 - 1.10
1.95	1.89	1.0313			
			Intercept	-0.035913	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

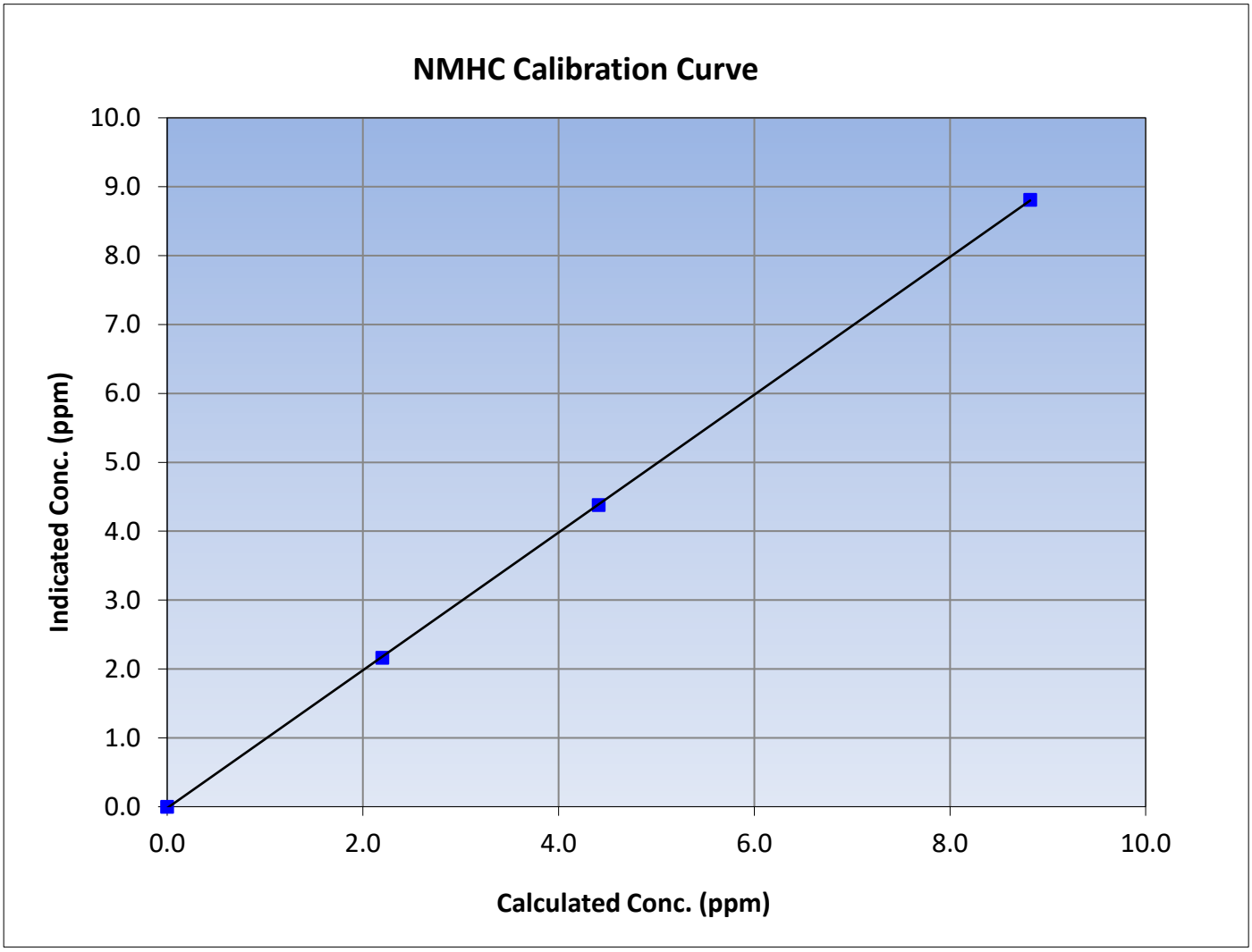
Version-06-2022

Station Information

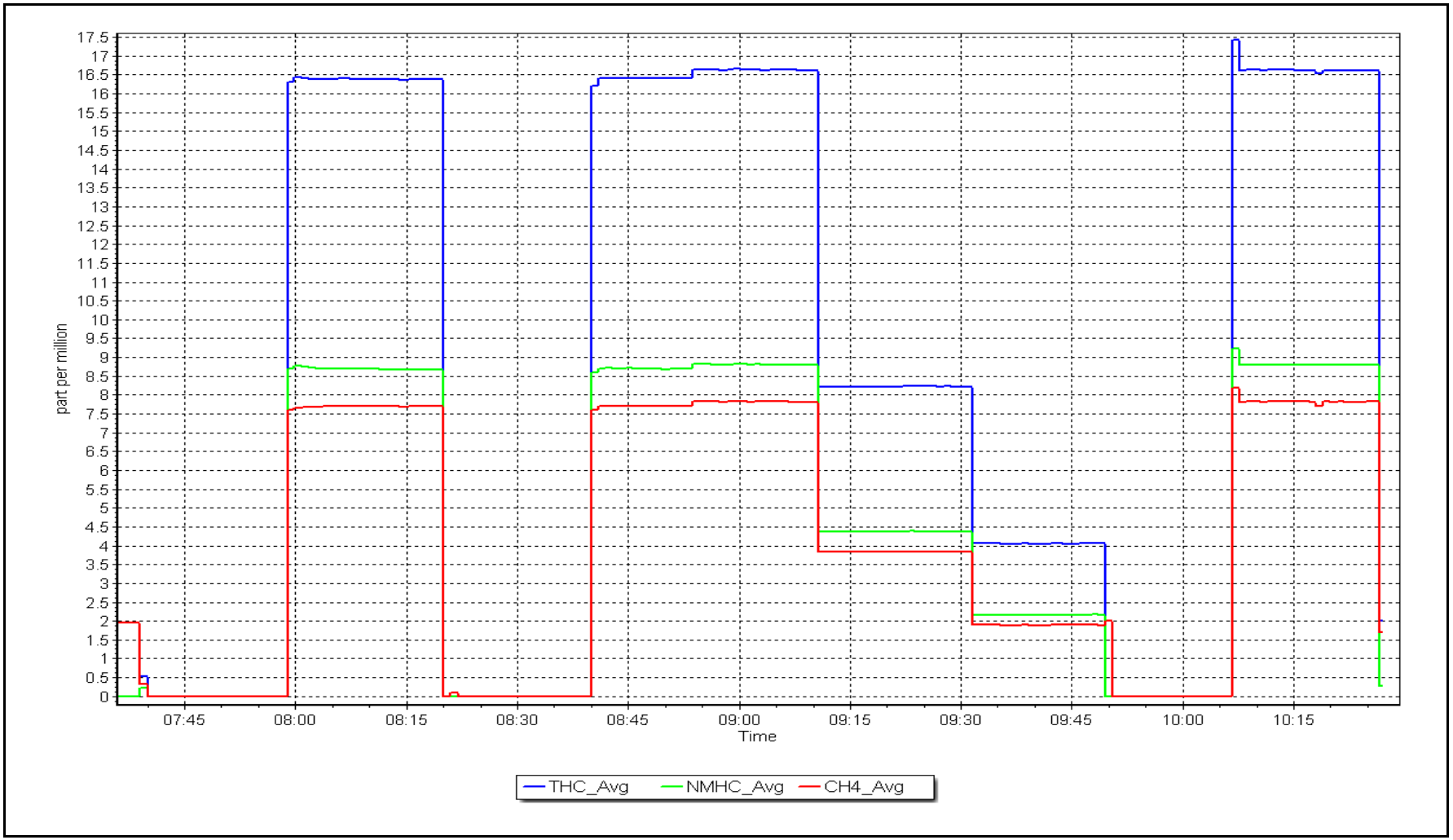
Calibration Date:	December 14, 2023	Previous Calibration:	November 28, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:35	End Time (MST):	10:27
Analyzer make:	Thermo 55i	Analyzer serial #:	1222762077

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999977	≥0.995
8.82	8.81	1.0011			
4.41	4.38	1.0067	Slope	1.000029	0.90 - 1.10
2.20	2.16	1.0182			
			Intercept	-0.019643	+/-0.5



NMHC Calibration Plot Date: December 14, 2023 Location: Buffalo Viewpoint



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	December 11, 2023	Last Cal Date:	November 6, 2023
Start time (MST):	8:07	End time (MST):	13:11
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	CC324979		Cal Gas Expiry Date:	November 3, 2032	
NOX Cal Gas Conc:	48.90	ppm	NO Cal Gas Conc:	48.80	ppm
Removed Cylinder #:	T36RH1F		Removed Gas Exp Date:	August 18, 2023	
Removed Gas NOX Conc:	51.16	ppm	Removed Gas NO Conc:	50.91	ppm
NOX gas Diff:	6.3%		NO gas Diff:	5.7%	
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:	1.185	1.163	NO bkgnd or offset:	-0.6	-0.6
NOX coeff or slope:	1.181	1.148	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:	1.001677	1.000893
NO_X Cal Offset:	-0.753866	-0.273094
NO Cal Slope:	0.998936	1.000600
NO Cal Offset:	-1.613678	-1.154426
NO_2 Cal Slope:	0.999002	0.986885
NO_2 Cal Offset:	0.854730	-0.475922

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.3	0.2	0.1	----	----
as found span	4922	78.1	799.1	795.2	3.9	778.3	769.4	9.1	1.0267	1.0335
as found 2nd										
as found 3rd										
new cyl resp	4918	81.8	800.0	798.4	1.6	830.0	817.5	12.5	0.9639	0.9766
calibrator zero	5000	0.0	0.0	0.0	0.0	0.5	0.9	-0.3	----	----
high point	4918	81.8	800.0	798.4	1.6	801.2	798.9	2.4	0.9985	0.9994
second point	4959	40.9	400.0	399.2	0.8	398.7	396.8	1.9	1.0033	1.0060
third point	4980	20.4	199.5	199.1	0.4	199.3	196.3	3.0	1.0010	1.0142
as left zero	5000	0.0	0.0	0.0	0.0	0.7	1.1	-0.4	----	----
as left span	4918	81.8	800.0	398.7	401.3	797.8	396.7	400.9	1.0028	1.0050
								Average Correction Factor	1.0009	1.0065

Corrected As found	NO_X = 778.0 ppb	NO = 769.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-2.8%
Previous Response	NO_X = 799.7 ppb	NO = 792.7 ppb		*Percent Change	NO =	-3.1%
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)	796.6	396.9	401.3	396.1	1.0132	98.7%
2nd GPT point (200 ppb O3)	796.6	597.1	201.1	196.7	1.0226	97.8%
3rd GPT point (100 ppb O3)	796.6	698.9	99.3	98.2	1.0116	98.9%
				Average Correction Factor	1.0158	98.4%

Notes: Nox calibration Gas cylinder Changed. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

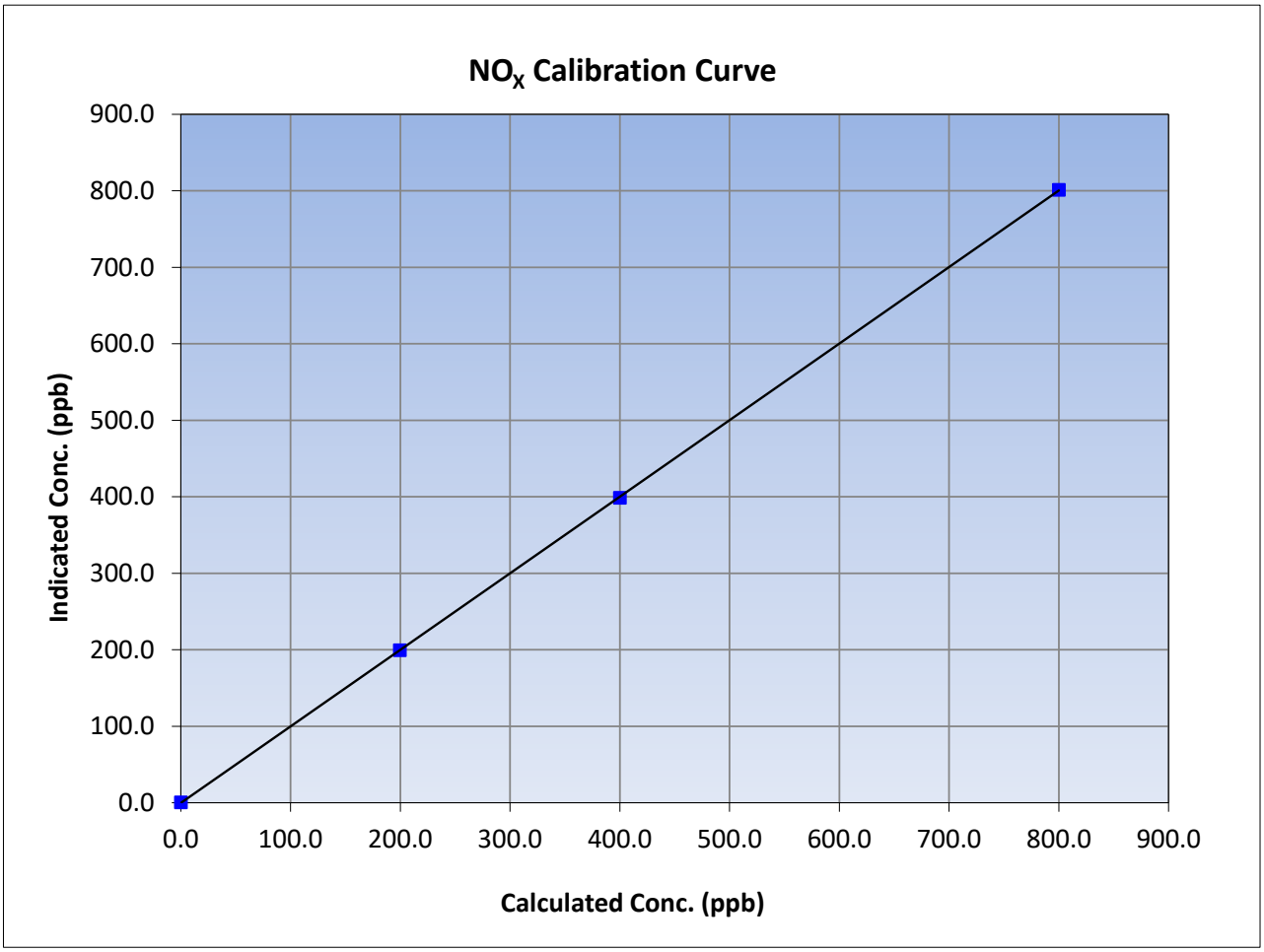
Version-04-2020

Station Information

Calibration Date:	December 11, 2023	Previous Calibration:	November 6, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:07	End Time (MST):	13:11
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	0.999991	≥0.995
800.0	801.2	0.9985			
400.0	398.7	1.0033	Slope	1.000893	0.90 - 1.10
199.5	199.3	1.0010			
			Intercept	-0.273094	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

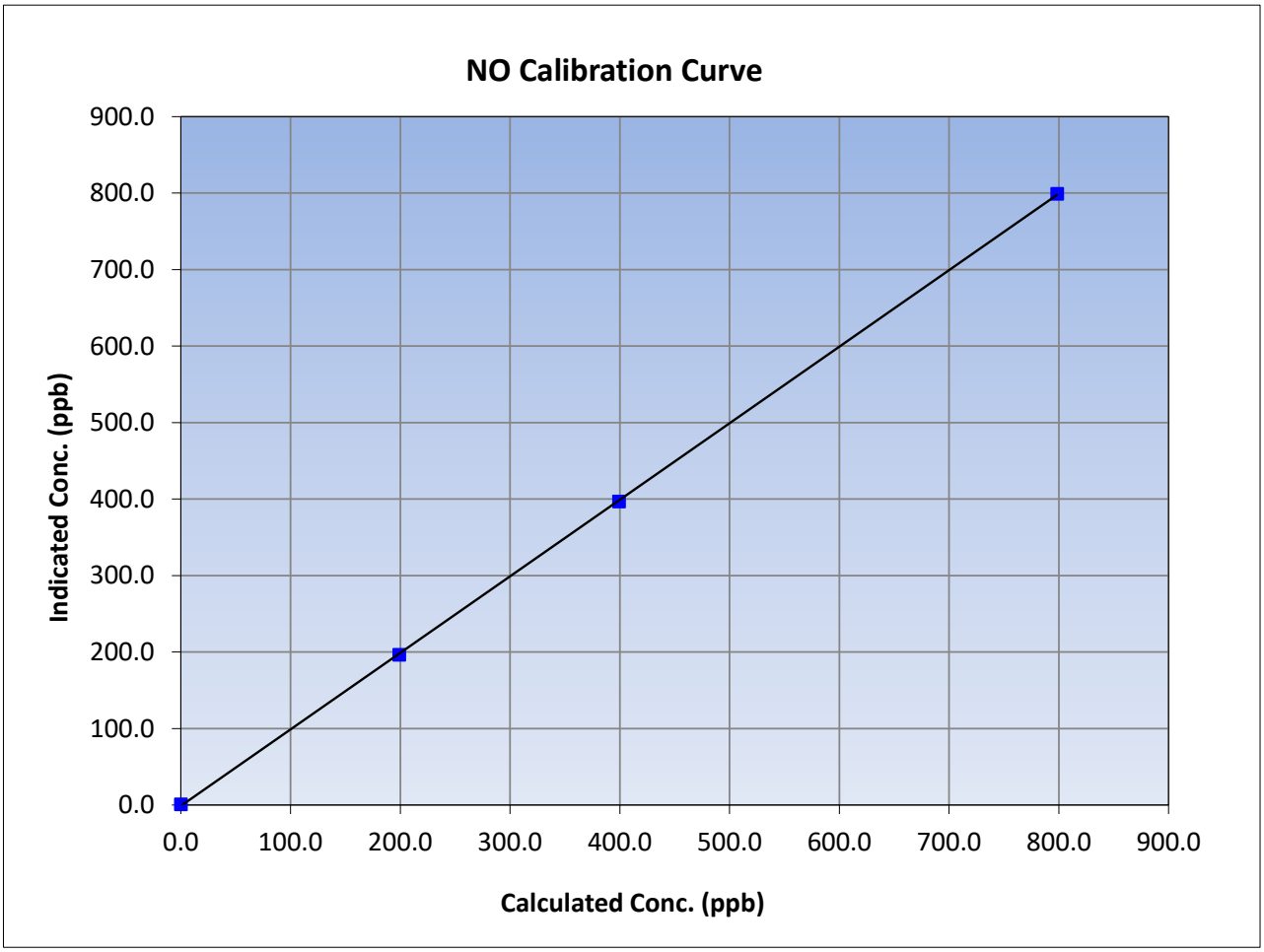
Version-04-2020

Station Information

Calibration Date:	December 11, 2023	Previous Calibration:	November 6, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:07	End Time (MST):	13:11
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	0.9	----	Correlation Coefficient	0.999969	≥0.995
798.4	798.9	0.9994			
399.2	396.8	1.0060	Slope	1.000600	0.90 - 1.10
199.1	196.3	1.0142			
			Intercept	-1.154426	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

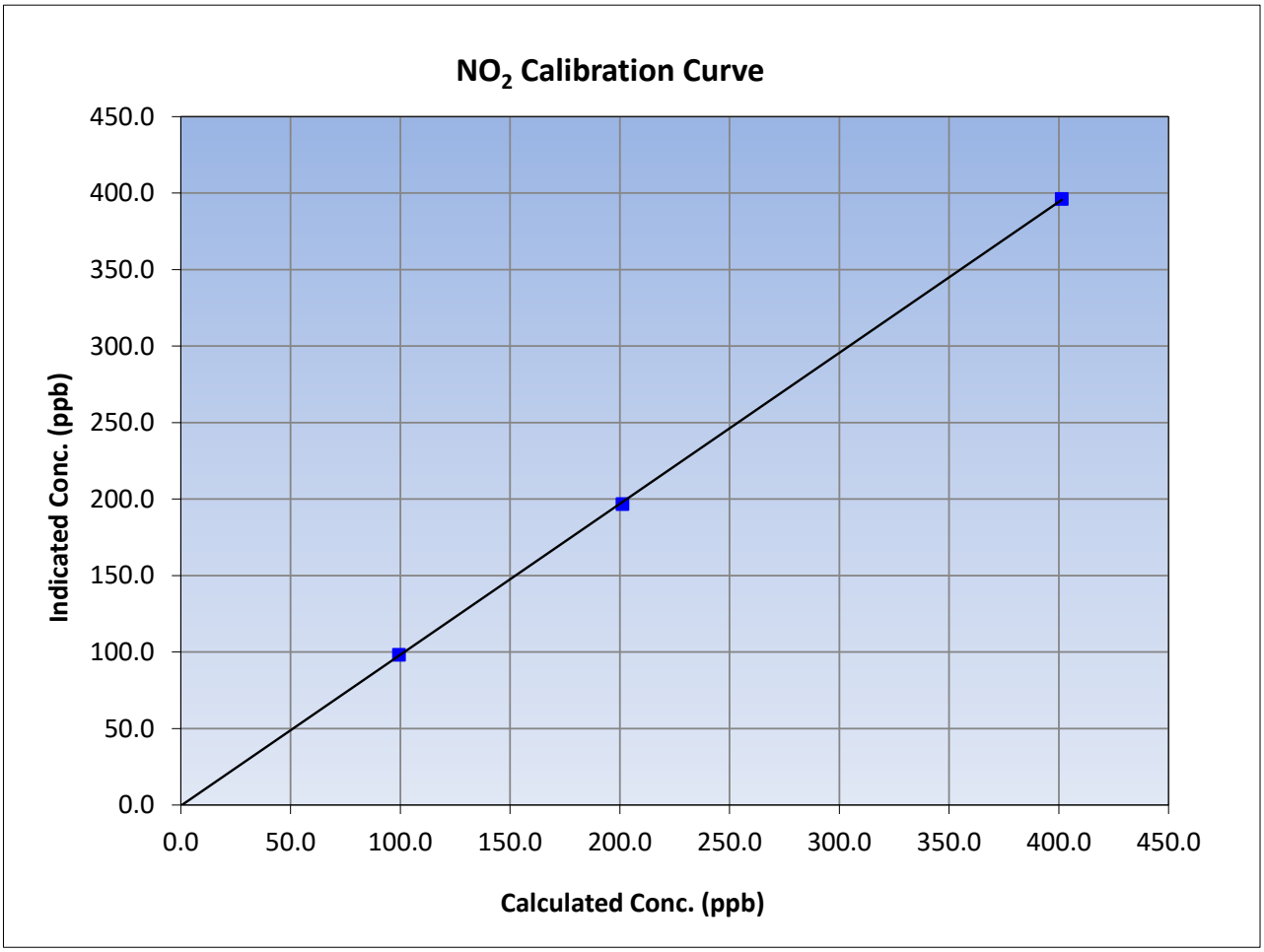
Version-04-2020

Station Information

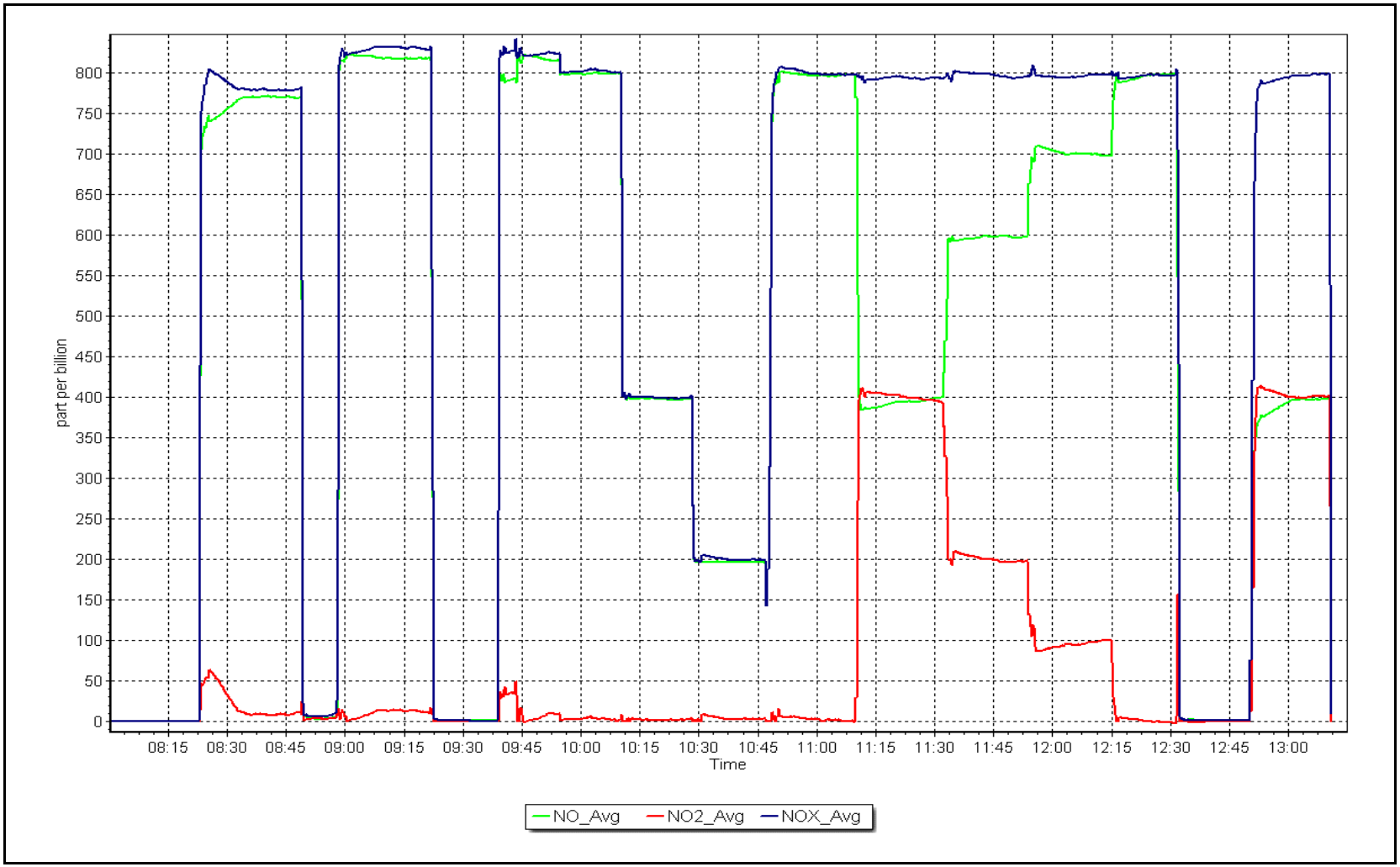
Calibration Date:	December 11, 2023	Previous Calibration:	November 6, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:07	End Time (MST):	13:11
Analyzer make:	API T200	Analyzer serial #:	721

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.3	----	Correlation Coefficient	0.999972	≥0.995
401.3	396.1	1.0132			
201.1	196.7	1.0226	Slope	0.986885	0.90 - 1.10
99.3	98.2	1.0116			
			Intercept	-0.475922	+/-20



NO_X Calibration Plot Date: December 11, 2023 Location: Buffalo Viewpoint



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	December 12, 2023	Last Cal Date:	November 22, 2023
Start time (MST):	9:00	End time (MST):	10:21
Reason:	Removal		

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 #:	7045
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005543		Backgd or Offset:	-1.4	-1.4
Calibration intercept:	0.680000		Coeff or Slope:	1.022	1.022

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.8	----
as found span	5000	982.6	400.0	408.7	0.979
as found 2nd point	5000	813.3	200.0	204.9	0.976
as found 3rd point	5000	701.4	100.0	104.2	0.960
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	

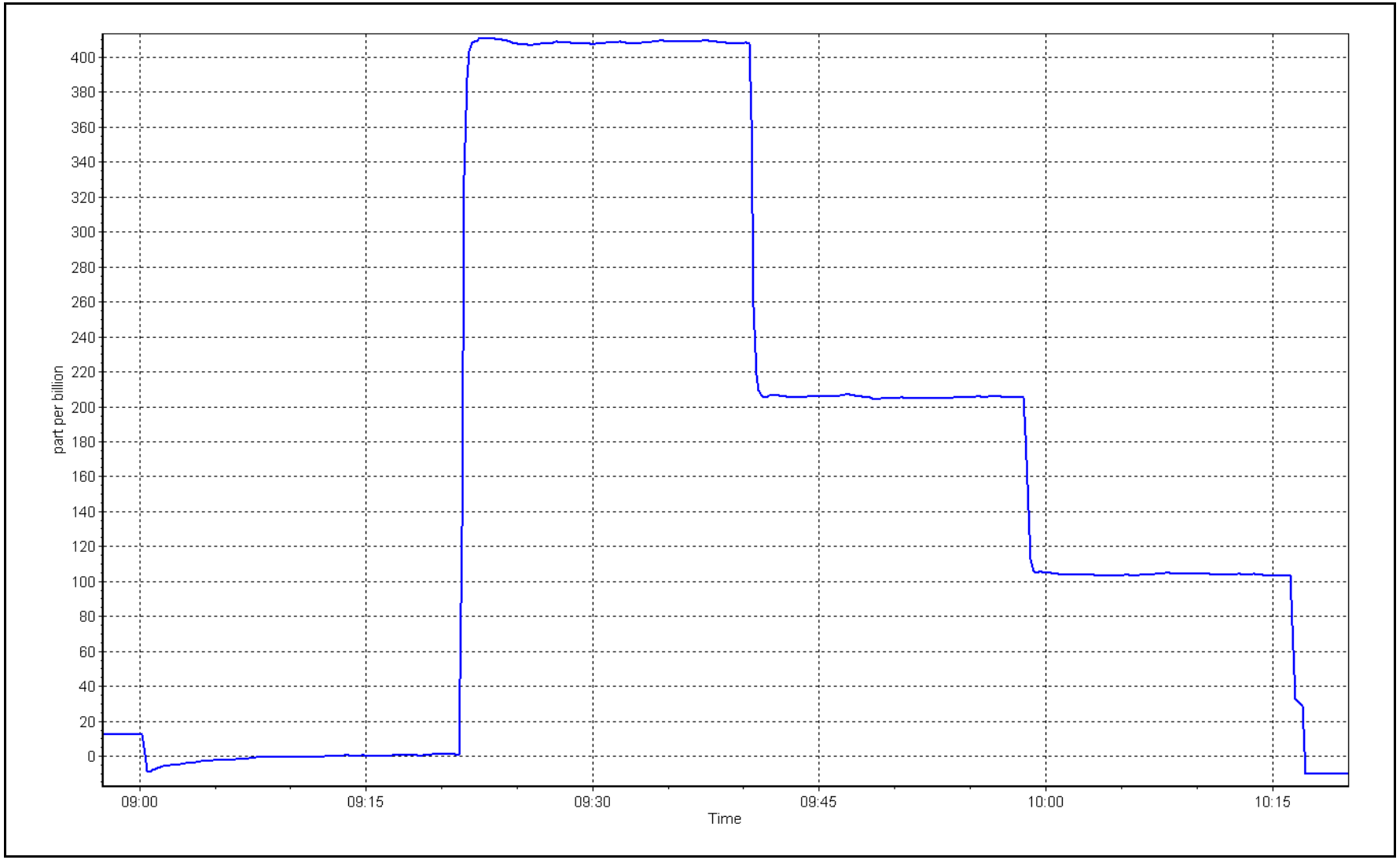
Baseline Corr As found:	407.9	Previous response	402.9	*% change	1.2%
Baseline Corr 2nd AF pt:	-203.8	AF Slope:	1.018571	AF Intercept:	1.400000
Baseline Corr 3rd AF pt:	-100.7	AF Correlation:	0.999986		

* = > +/-5% change initiates investigation

Notes: Removed to put original analyzer back in.

Calibration Performed By: Melissa Lemay

O_3 Calibration Plot Date: December 12, 2023 Location: Buffalo Viewpoint



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	December 12, 2023	Last Cal Date:	
Start time (MST):	10:25	End time (MST):	12:27
Reason:	Install		

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	Backgd or Offset:		-3.5
Calibration intercept:		0.760000	Coeff or Slope:		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					
as found span					
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	985.4	400.0	401.0	0.998
second point	5000	813.9	200.0	201.2	0.994
third point	5000	703.2	100.0	101.5	0.985
as left zero	5000	0.0	0.0	1.4	----
as left span	5000	985.1	400.0	402.0	0.995
				Average Correction Factor	0.992

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

* = > +/-5% change initiates investigation

Notes: Install of original O3 analyzer back into station. Zero and Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

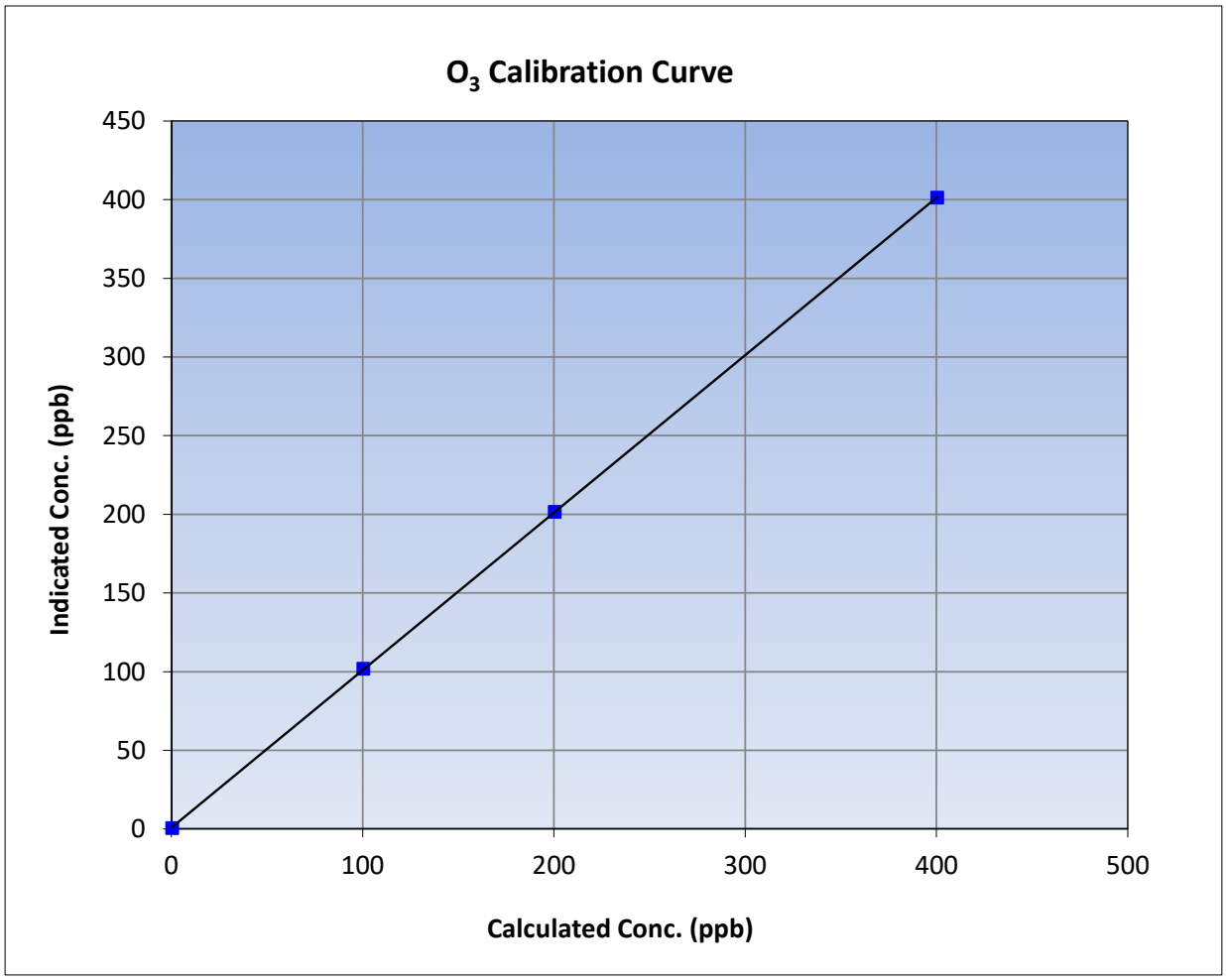
Station Information

Calibration Date:	December 12, 2023	Previous Calibration:	
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	10:25	End Time (MST):	12:27
Analyzer make:	API T400	Analyzer serial #:	2961

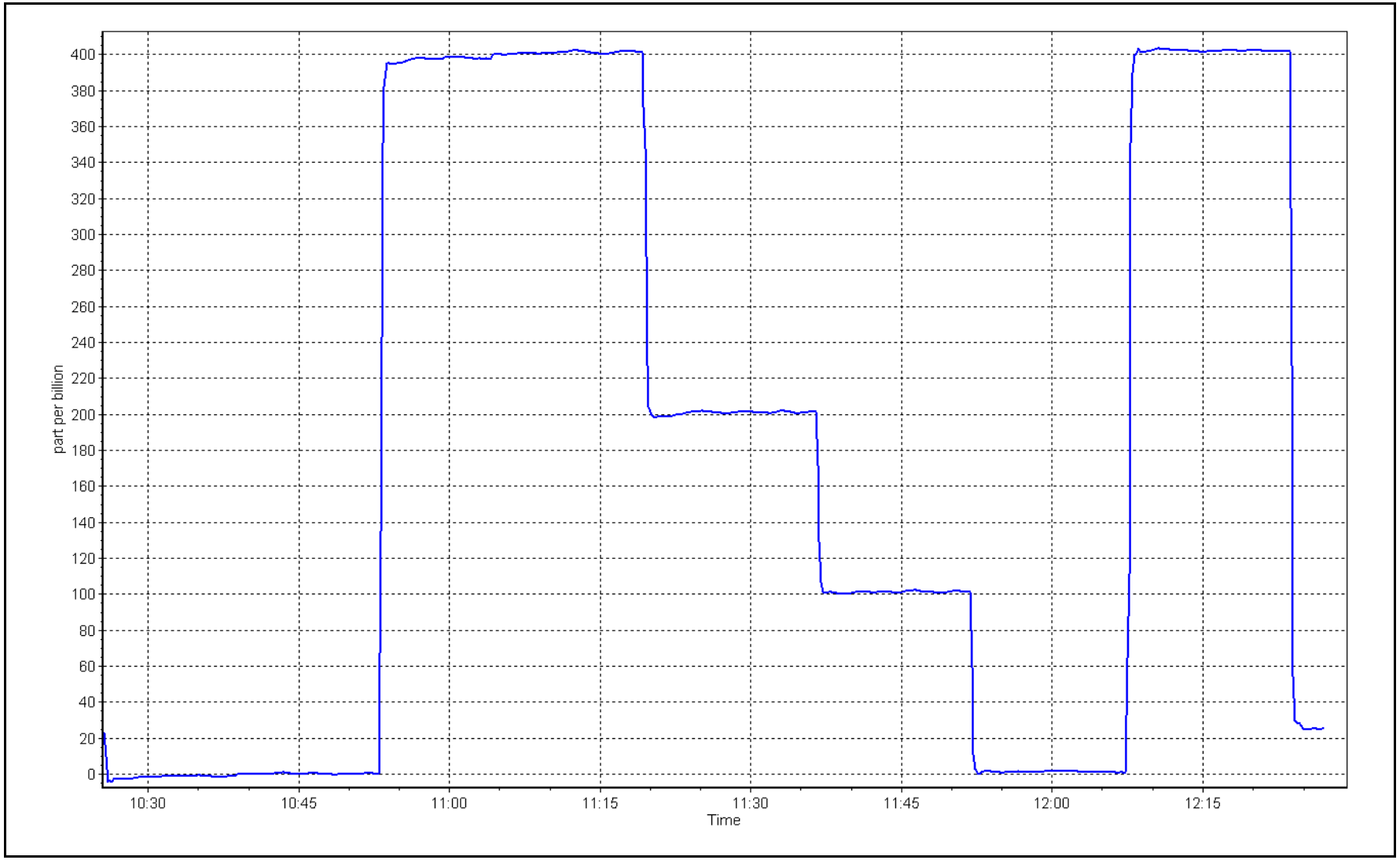
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
400.0	401.0	0.9975
200.0	201.2	0.9940
100.0	101.5	0.9852

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999991	*≥0.995*
Slope	1.001229	*0.90 - 1.10*
Intercept	0.760000	*+/- 5*



O_3 Calibration Plot Date: December 12, 2023 Location: Buffalo Viewpoint



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS 04
Calibration Date:	December 14, 2023	Last Cal Date:	November 28, 2023
Start time (MST):	10:29	End time (MST):	10:53
Analyzer Make:	API T640	S/N:	322
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Deltacal	S/N:	1451
Temp/RH standard:	Deltacal	S/N:	1451

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	1.3	1	1.3	☐	+/- 2 °C
P (mmHg)	730.1	731.5	730.1	☐	+/- 10 mmHg
flow (LPM)	5.00	4.93	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: December 14, 2023 Last Cal Date: November 28, 2023

PM w/o HEPA: 8.6 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

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

Disposable Filter Changed: November 28, 2023

Annual Maintenance

Date Sample Tube Cleaned: November 28, 2023

Date RH/T Sensor Cleaned: May 23, 2023

Notes: Leak check Passed. No adjustments done. Head Cleaned.

Calibration by: Melissa Lemay

Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS 04
Calibration Date:	December 21, 2023	Last Cal Date:	December 14, 2023
Start time (MST):	10:00	End time (MST):	10:25
Analyzer Make:	API T640	S/N:	322
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Deltacal	S/N:	1451
Temp/RH standard:	Deltacal	S/N:	1451

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-3.1	-3.3	-3.1	☐	+/- 2 °C
P (mmHg)	725.1	726.4	725.1	☐	+/- 10 mmHg
flow (LPM)	5.00	4.90	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: December 21, 2023 Last Cal Date: December 14, 2023

PM w/o HEPA: 5 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	11	11		☐	10.9 +/- 0.5

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

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

Disposable Filter Changed: November 28, 2023

Annual Maintenance

Date Sample Tube Cleaned: November 28, 2023

Date RH/T Sensor Cleaned: May 23, 2023

Notes: Removal due to not being able to update software

Calibration by: Melissa Lemay

Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS 04
Calibration Date:	December 21, 2023	Last Cal Date:	
Start time (MST):	10:25	End time (MST):	10:50
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)	-3	-3.3	-3	☐	+/- 2 °C
P (mmHg)	725.2	726.4	725.2	☐	+/- 10 mmHg
flow (LPM)	5.00	5.10	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: December 21, 2023 Last Cal Date: _____

PM w/o HEPA: 1.5 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	11.2	11.2	11.2	☐	10.9 +/- 0.5

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

Date Optical Chamber Cleaned: _____

Disposable Filter Changed: _____

Annual Maintenance

Date Sample Tube Cleaned: November 28, 2023

Date RH/T Sensor Cleaned: May 23, 2023

Notes: Installed due to old T640 not updating software. No adjustments done. Leak check passed.

Calibration by: Melissa Lemay

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS05
MANNIX
DECEMBER 2023

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

January 31, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	December 8, 2023	Last Cal Date:	November 6, 2023
Start time (MST):	10:09	End time (MST):	13:00
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:	1.001714	1.007440	Backgd or Offset:	9.1	9.1
Calibration intercept:	-0.140000	0.280000	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	0.5	----
as found span	4920	80.0	800.3	806.2	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.8	----
high point	4920	80.0	800.3	806.6	0.992
second point	4960	40.0	400.2	403.8	0.991
third point	4980	20.0	200.1	200.9	0.996
as left zero	5000	0.0	0.0	0.7	----
as left span	4920	80.0	800.3	810.0	0.988
				Average Correction Factor	0.993

Baseline Corr As found:	805.70	Previous response	801.55	*% 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 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

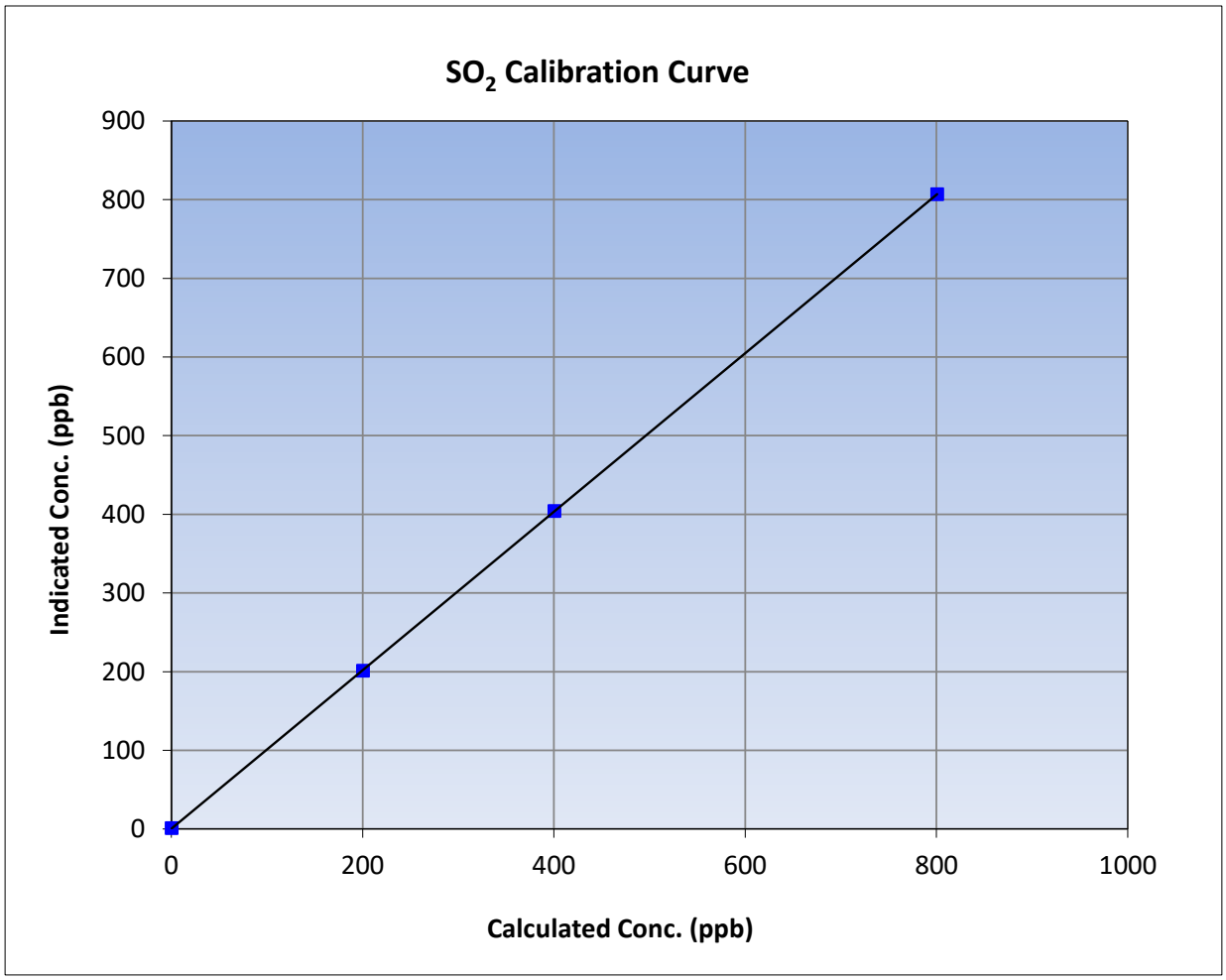
Station Information

Calibration Date:	December 8, 2023	Previous Calibration:	November 6, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	10:09	End Time (MST):	13:00
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841399

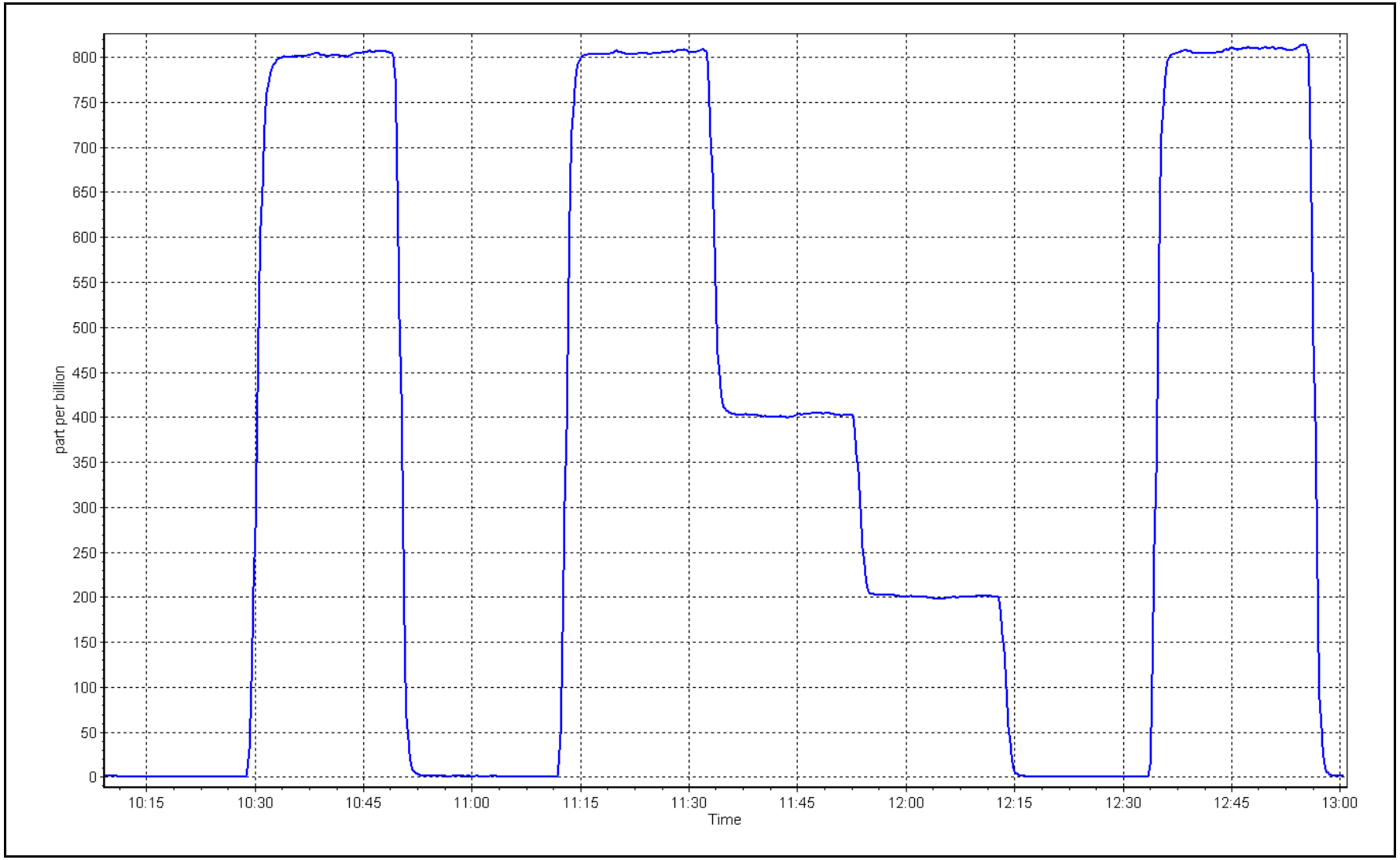
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.8	----
800.3	806.6	0.9922
400.2	403.8	0.9910
200.1	200.9	0.9959

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	1.007440	*0.90 - 1.10*
Intercept	0.280000	*+/-30*



SO2 Calibration Plot Date: December 8, 2023 Location: Mannix



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	December 12, 2023	Last Cal Date:	November 14, 2023
Start time (MST):	9:50	End time (MST):	15:47
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43iQTL		Analyzer serial #:	1203169745	
Converter make:	Global		Converter serial #:	2022-196	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.993603	0.988046	Backgd or Offset:	2.18	2.18
Calibration intercept:	0.221019	0.440521	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	80.6	0.995
as found 2nd point	4960	40.7	40.0	40.5	0.994
as found 3rd point	4980	20.3	20.0	20.2	0.999
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	0.6	----
high point	4919	81.3	80.0	79.5	1.006
second point	4960	40.7	40.0	40.1	0.999
third point	4980	20.3	20.0	19.9	1.004
as left zero	5000	0.0	0.0	0.8	----
as left span	4919	81.3	80.0	77.5	1.032
SO2 Scrubber Check	4920	80.0	800.0	-0.1	----
Date of last scrubber change:				Ave Corr Factor	1.003
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.4	Prev response:	79.70	*% change:	0.9%
Baseline Corr 2nd AF pt:	40.3	AF Slope:	1.005471	AF Intercept:	0.180602
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999998		

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. Ran a SO2 scrubber check after calibrator zero. No adjustments made. Random spikes during points, diagnostics are all good. Problem could be due to the H2S gas as its running low. Further info on docit note.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

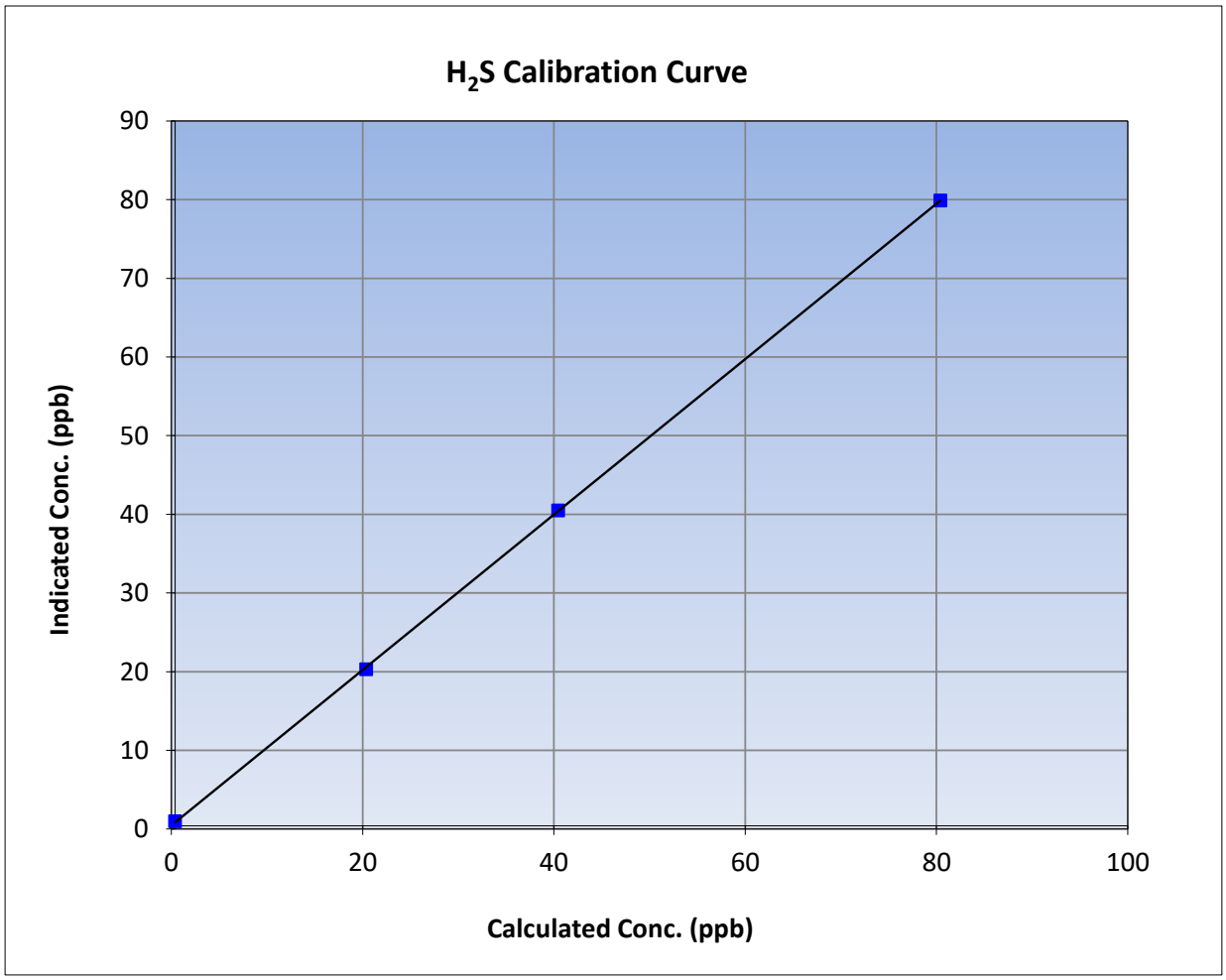
Station Information

Calibration Date:	December 12, 2023	Previous Calibration:	November 14, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	9:50	End Time (MST):	15:47
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1203169745

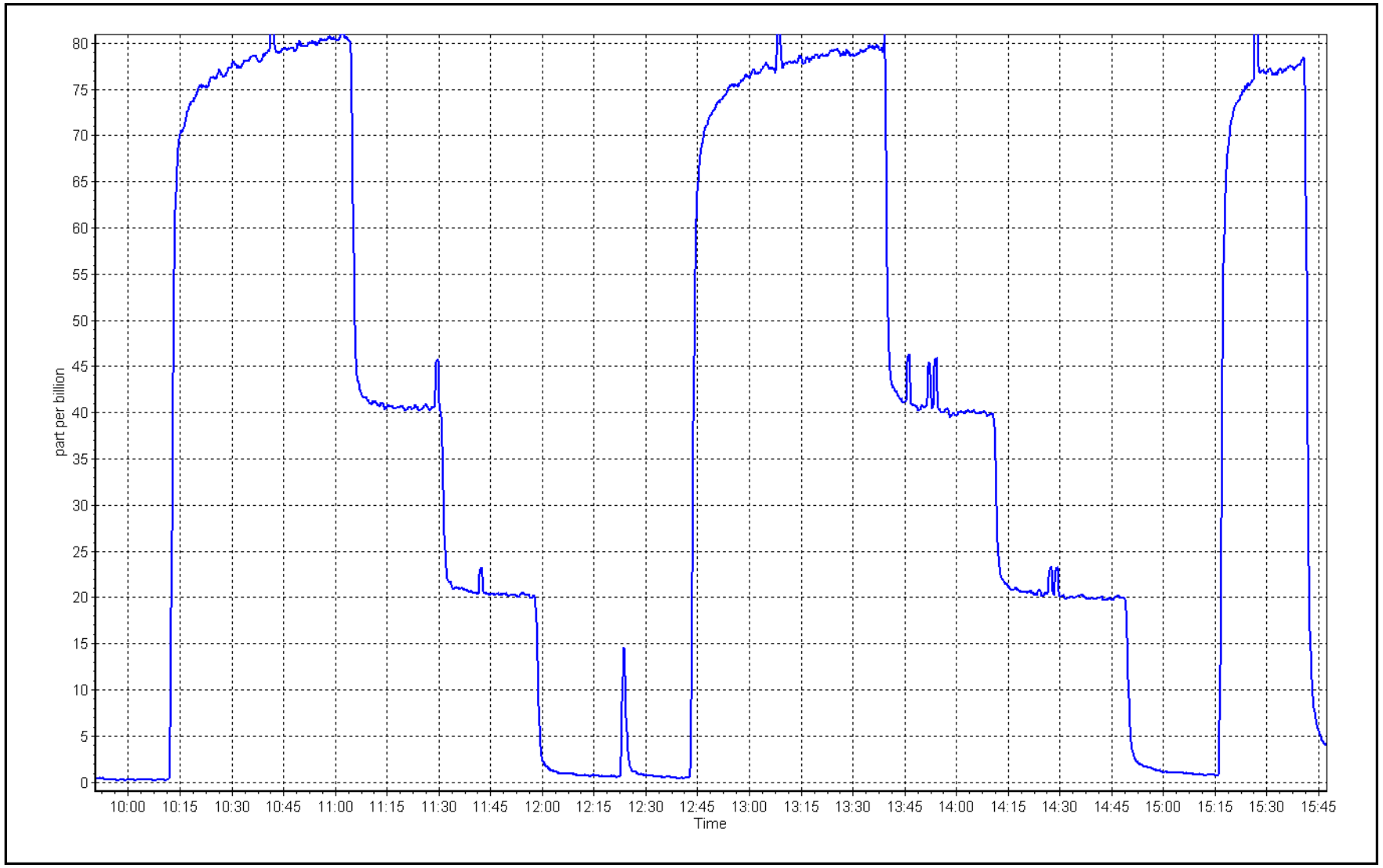
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.6	----
80.0	79.5	1.0062
40.0	40.1	0.9986
20.0	19.9	1.0037

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999968	*≥0.995*
Slope	0.988046	*0.90 - 1.10*
Intercept	0.440521	*+/-3*



H_2S Calibration Plot Date: December 12, 2023 Location: Mannix



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Mannix	Station number:	AMS 05
Calibration Date:	December 8, 2023	Last Cal Date:	November 6, 2023
Start time (MST):	10:08	End time (MST):	13:01
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	2.61E-05	NMHC SP Ratio:	4.48E-05	4.48E-05
CH4 Retention time:	15.00	15.00	NMHC Peak Area:	204322	204322
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	17.26	0.998
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	17.21	1.001
second point	4960	40.0	8.61	8.60	1.002
third point	4980	20.0	4.31	4.30	1.002
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	17.23	17.29	0.997
				Average Correction Factor	1.001
Baseline Corr AF:	17.26	Prev response	17.24	*% change	0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-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	9.20	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	80.0	9.15	9.19	0.996
second point	4960	40.0	4.57	4.59	0.996
third point	4980	20.0	2.29	2.30	0.993
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	9.15	9.24	0.990
				Average Correction Factor	0.995
Baseline Corr AF:	9.20	Prev response	9.17	*% change	0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	8.08	8.07	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	8.08	8.03	1.007
second point	4960	40.0	4.04	4.00	1.009
third point	4980	20.0	2.02	2.00	1.011
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	8.08	8.05	1.004
				Average Correction Factor	1.009
Baseline Corr AF:	8.07	Prev response	8.07	*% change	-0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.001390	0.999274
THC Cal Offset:	-0.005600	-0.003400
CH4 Cal Slope:	1.000679	0.993789
CH4 Cal Offset:	-0.010200	-0.005600
NMHC Cal Slope:	1.001993	1.003992
NMHC Cal Offset:	0.004200	0.002200

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

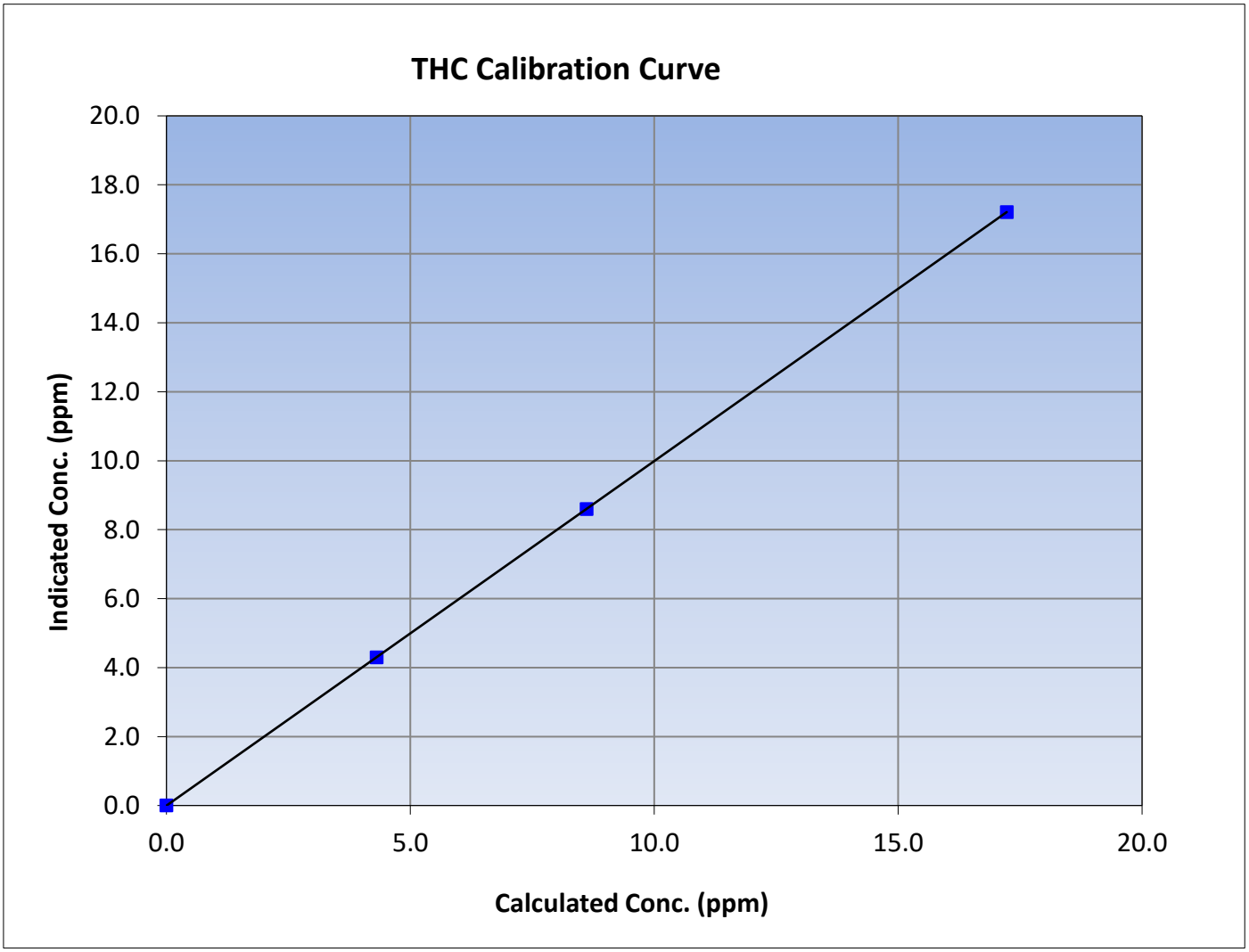
Version-06-2022

Station Information

Calibration Date:	December 8, 2023	Previous Calibration:	November 6, 2023
Station Name:	Mannix	Station Number:	AMS 05
Start Time (MST):	10:08	End Time (MST):	13:01
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	1.000000	*≥0.995*
17.23	17.21	1.0008			
8.61	8.60	1.0017	Slope	0.999274	*0.90 - 1.10*
4.31	4.30	1.0017			
			Intercept	-0.003400	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

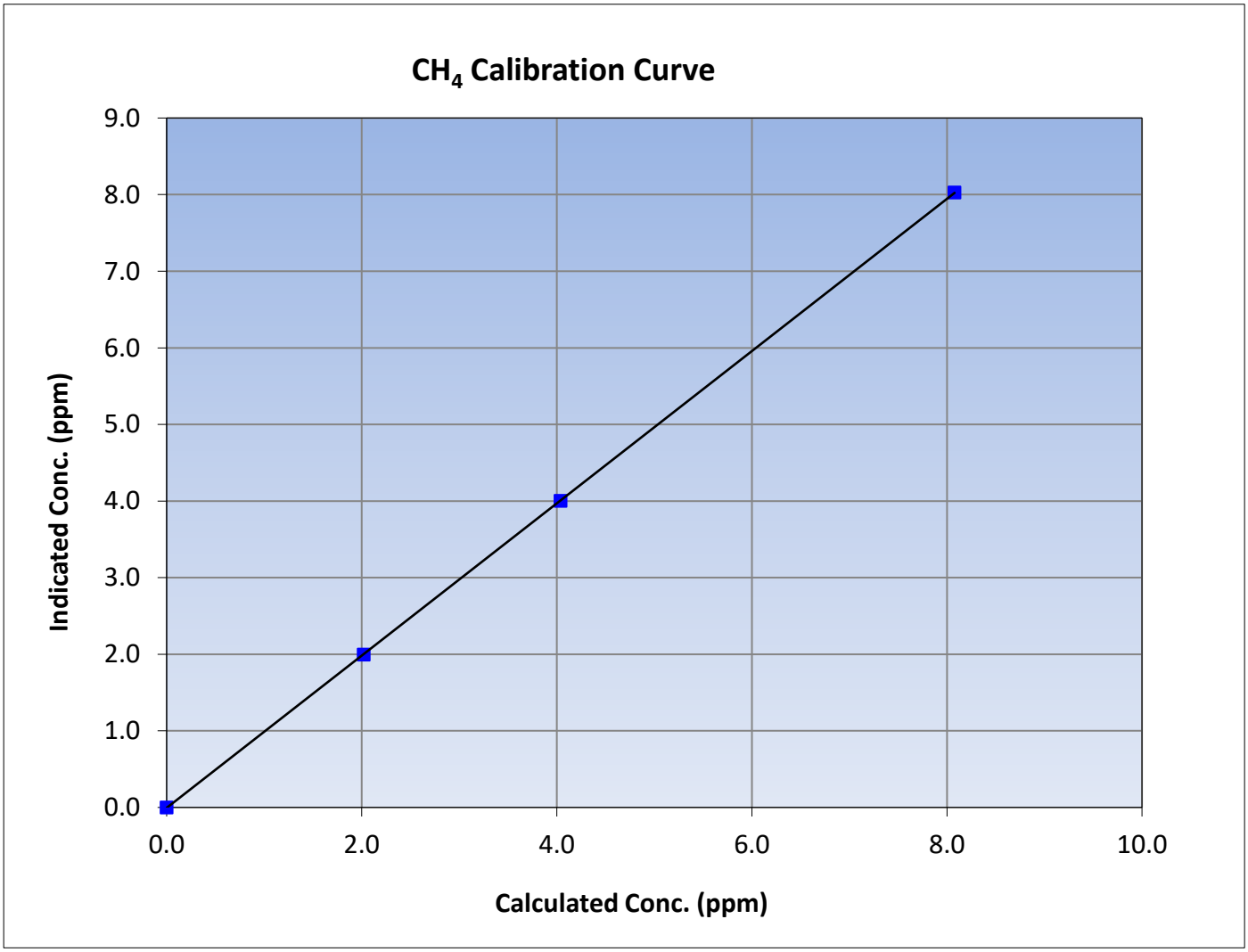
Version-06-2022

Station Information

Calibration Date:	December 8, 2023	Previous Calibration:	November 6, 2023
Station Name:	Mannix	Station Number:	AMS 05
Start Time (MST):	10:08	End Time (MST):	13:01
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	0.999998	*≥0.995*
8.08	8.03	1.0065			
4.04	4.00	1.0088	Slope	0.993789	*0.90 - 1.10*
2.02	2.00	1.0113			
			Intercept	-0.005600	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

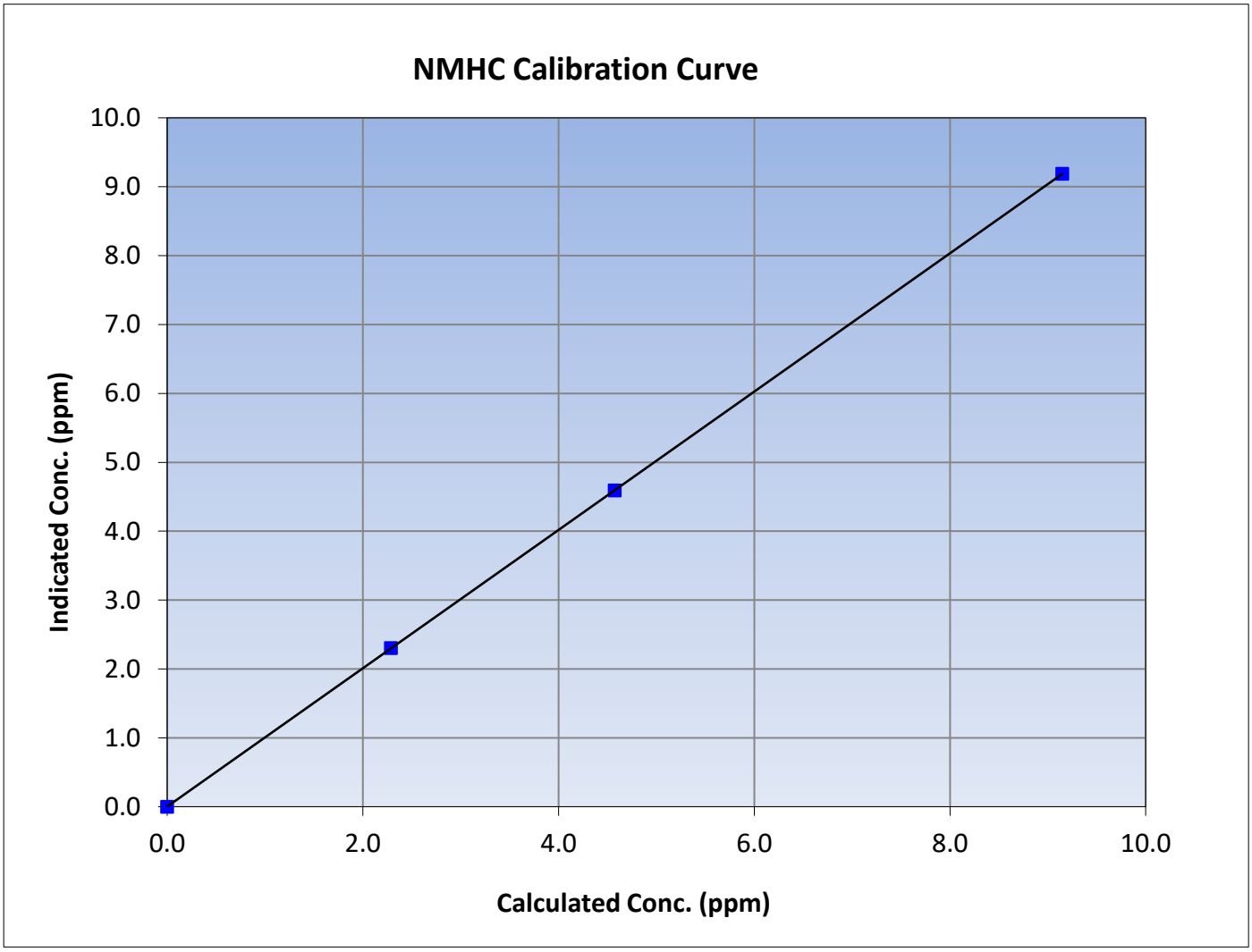
Version-06-2022

Station Information

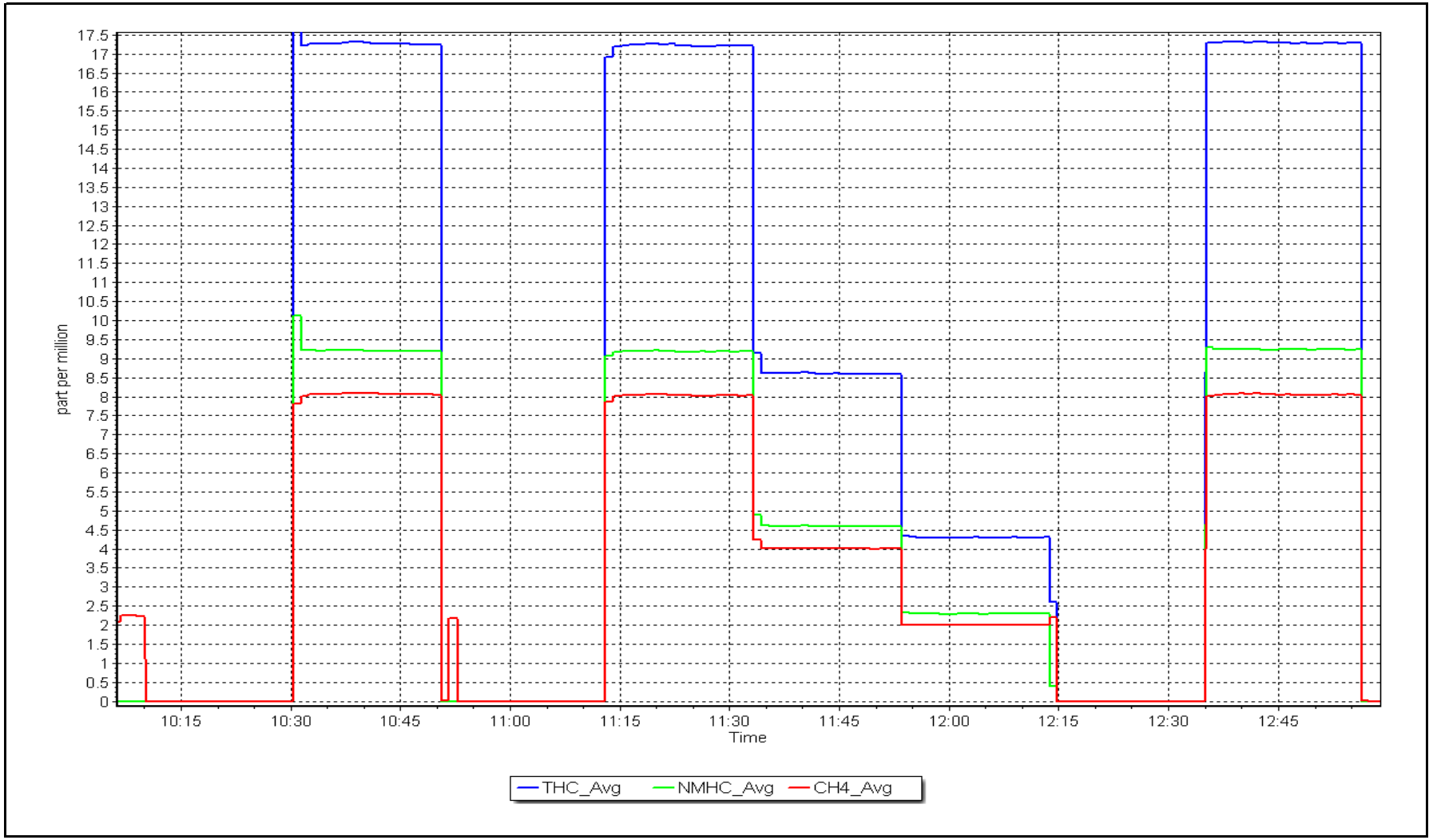
Calibration Date:	December 8, 2023	Previous Calibration:	November 6, 2023
Station Name:	Mannix	Station Number:	AMS 05
Start Time (MST):	10:08	End Time (MST):	13:01
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	1.000000	≥0.995
9.15	9.19	0.9958			
4.57	4.59	0.9958	Slope	1.003992	0.90 - 1.10
2.29	2.30	0.9934			
			Intercept	0.002200	+/-0.5



NMHC Calibration Plot Date: December 8, 2023 Location: Mannix



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS06
PATRICIA MCINNES
DECEMBER 2023

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

January 31, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	December 13, 2023	Last Cal Date:	November 17, 2023
Start time (MST):	10:07	End time (MST):	13:25
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:	0.990369	1.003106	Backgd or Offset:	17.4	17.7
Calibration intercept:	2.041893	1.659655	Coeff or Slope:	0.911	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	790.4	1.011
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4920	80.3	799.5	803.0	0.996
second point	4960	40.2	400.2	403.4	0.992
third point	4980	20.1	200.1	204.3	0.980
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	80.3	799.5	801.7	0.997
				Average Correction Factor	0.989

Baseline Corr As found:	790.50	Previous response	793.81	*% change	-0.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

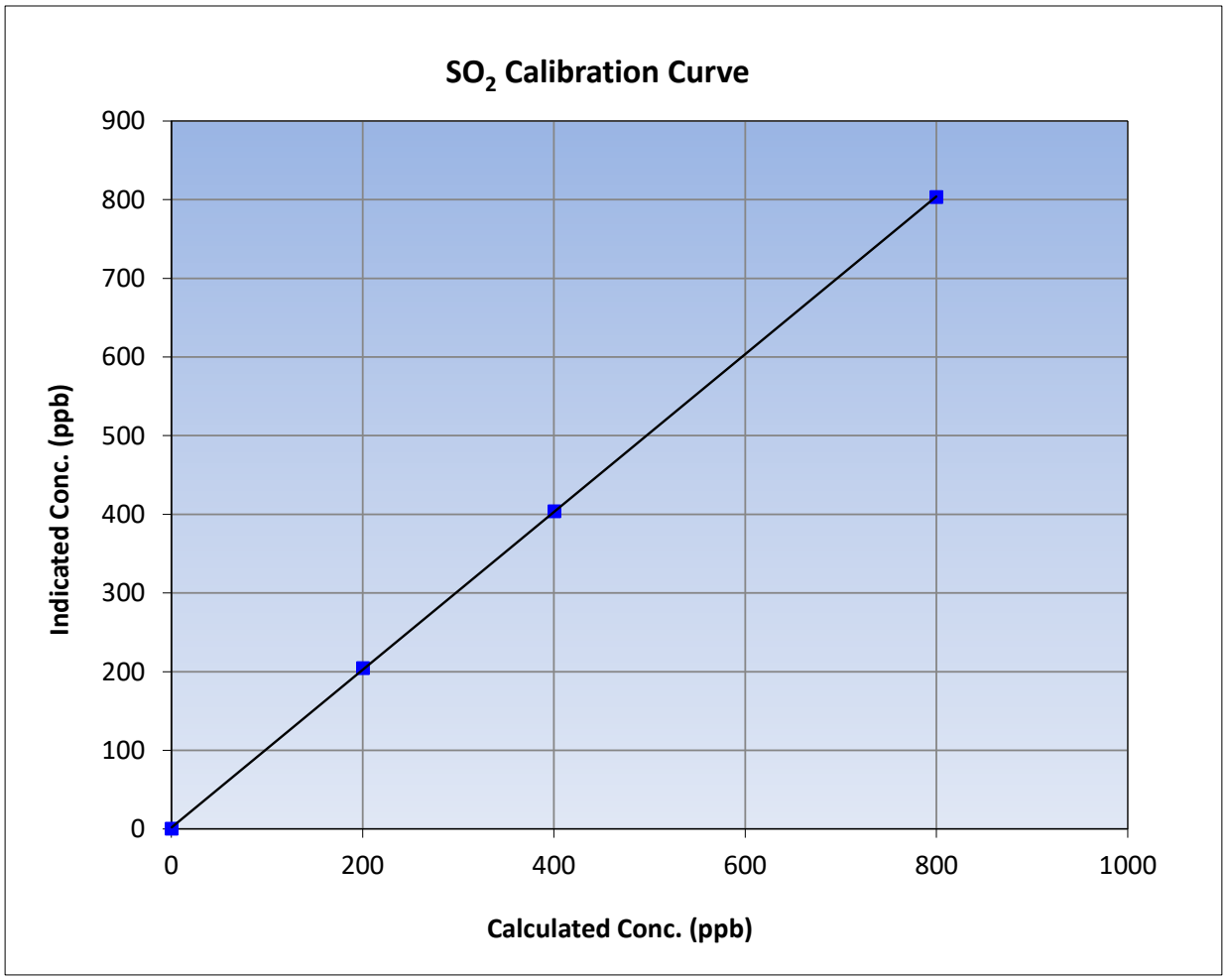
Station Information

Calibration Date:	December 13, 2023	Previous Calibration:	November 17, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	10:07	End Time (MST):	13:25
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290013

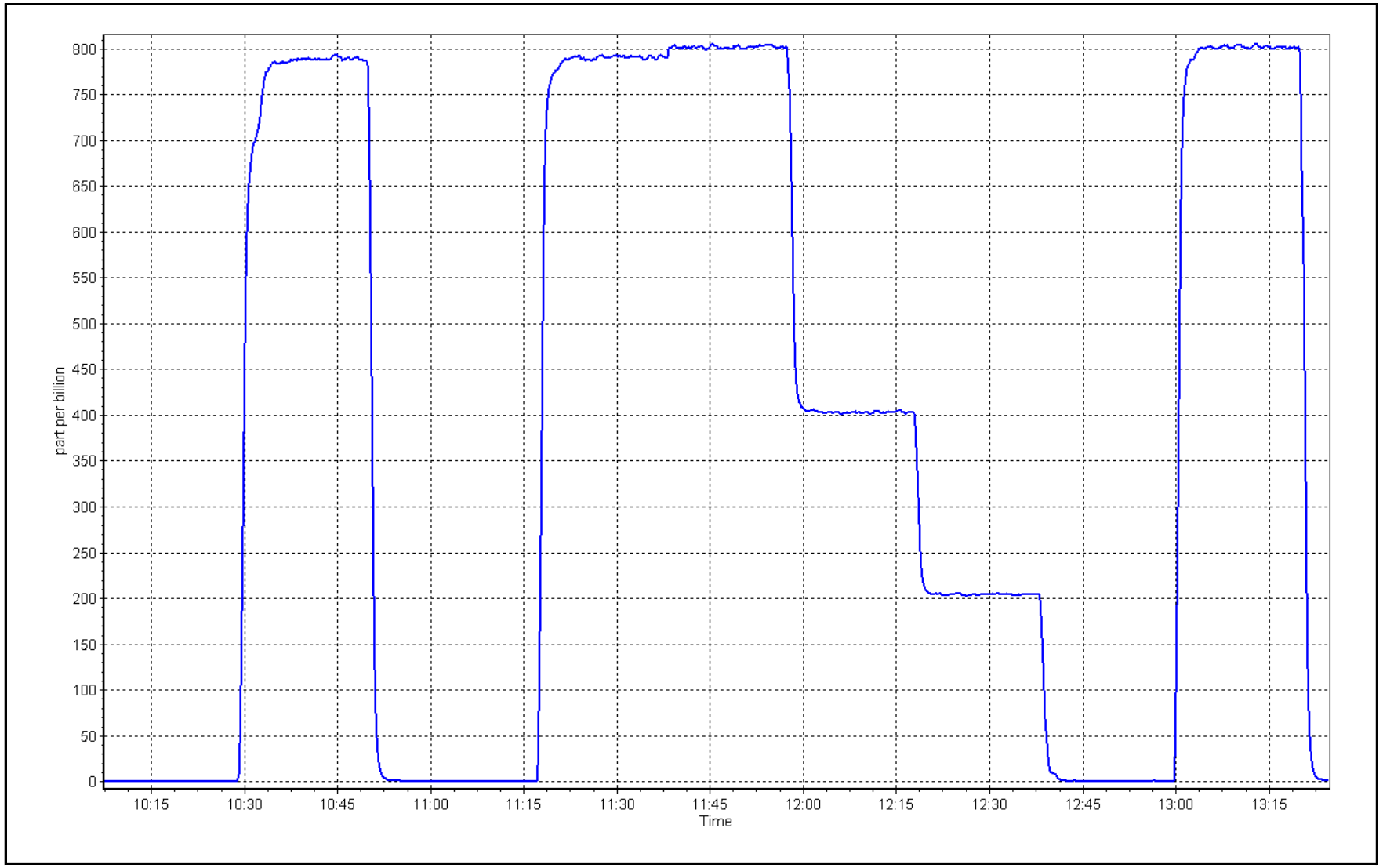
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
799.5	803.0	0.9956
400.2	403.4	0.9921
200.1	204.3	0.9795

Statistical Evaluation		Limits
Correlation Coefficient	0.999982	≥0.995
Slope	1.003106	0.90 - 1.10
Intercept	1.659655	+/-30



SO2 Calibration Plot Date: December 13, 2023 Location: Patricia McInnes



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
Calibration Date:	December 7, 2023	Last Cal Date:	November 15, 2023
Start time (MST):	9:44	End time (MST):	13:42
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:	1.002314	0.991885	Backgd or Offset:	2.01	2.01
Calibration intercept:	0.340228	0.580307	Coeff or Slope:	1.168	1.168

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	79.4	1.009
as found 2nd point	4963	37.5	40.0	40.0	1.001
as found 3rd point	4981	18.8	20.0	20.3	0.992
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	79.7	1.004
second point	4963	37.5	40.0	40.6	0.984
third point	4981	18.8	20.0	20.7	0.968
as left zero	5000	0.0	0.0	0.2	----
as left span	4925	75.1	80.0	81.2	0.986
SO2 Scrubber Check	4920	80.3	803.0	0.0	----
Date of last scrubber change:		December 20, 2021		Ave Corr Factor	0.985
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.3	Prev response:	80.55	*% change:	-1.6%
Baseline Corr 2nd AF pt:	39.9	AF Slope:	0.989888	AF Intercept:	0.300193
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999970		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

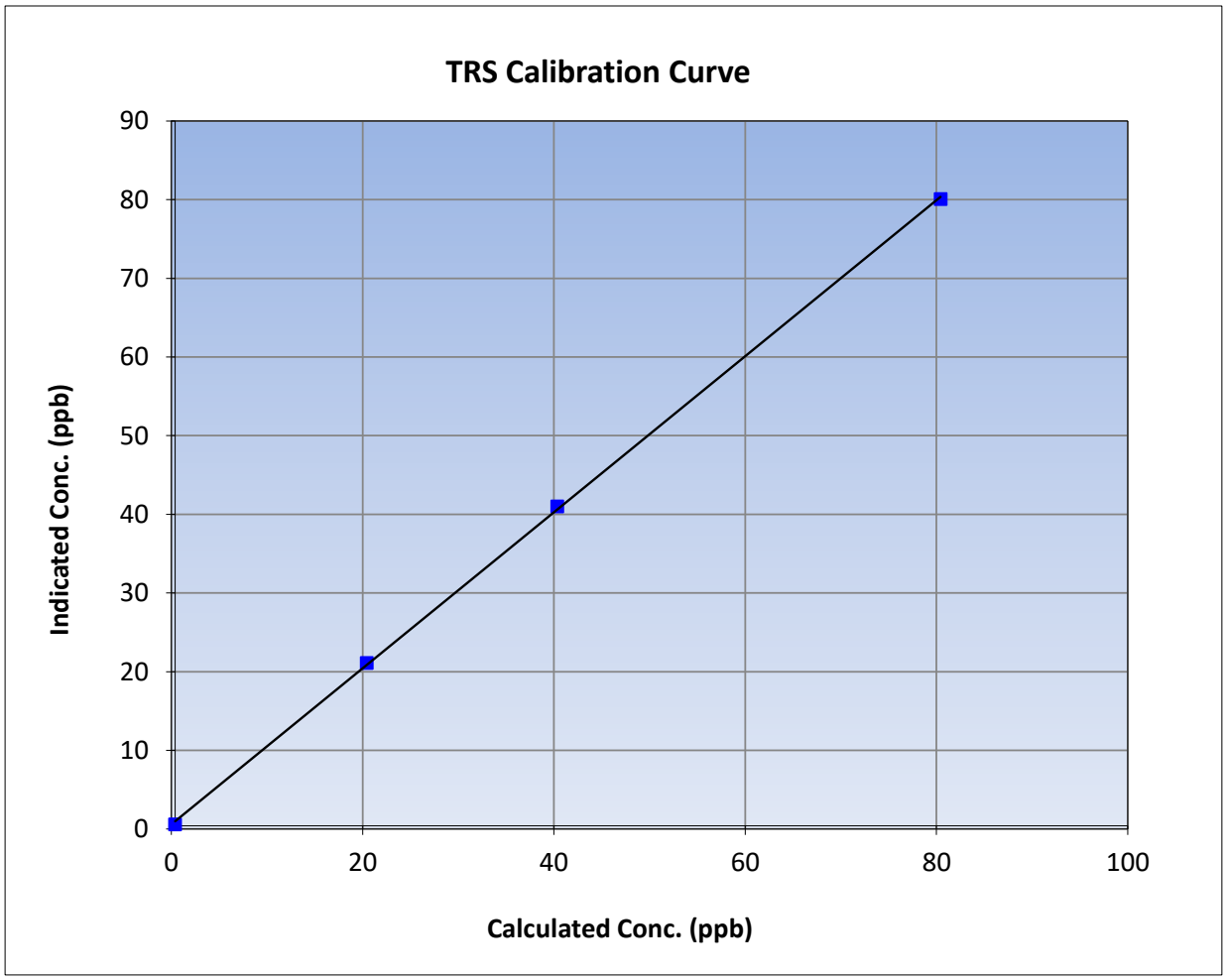
Station Information

Calibration Date:	December 7, 2023	Previous Calibration:	November 15, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:44	End Time (MST):	13:42
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1218153358

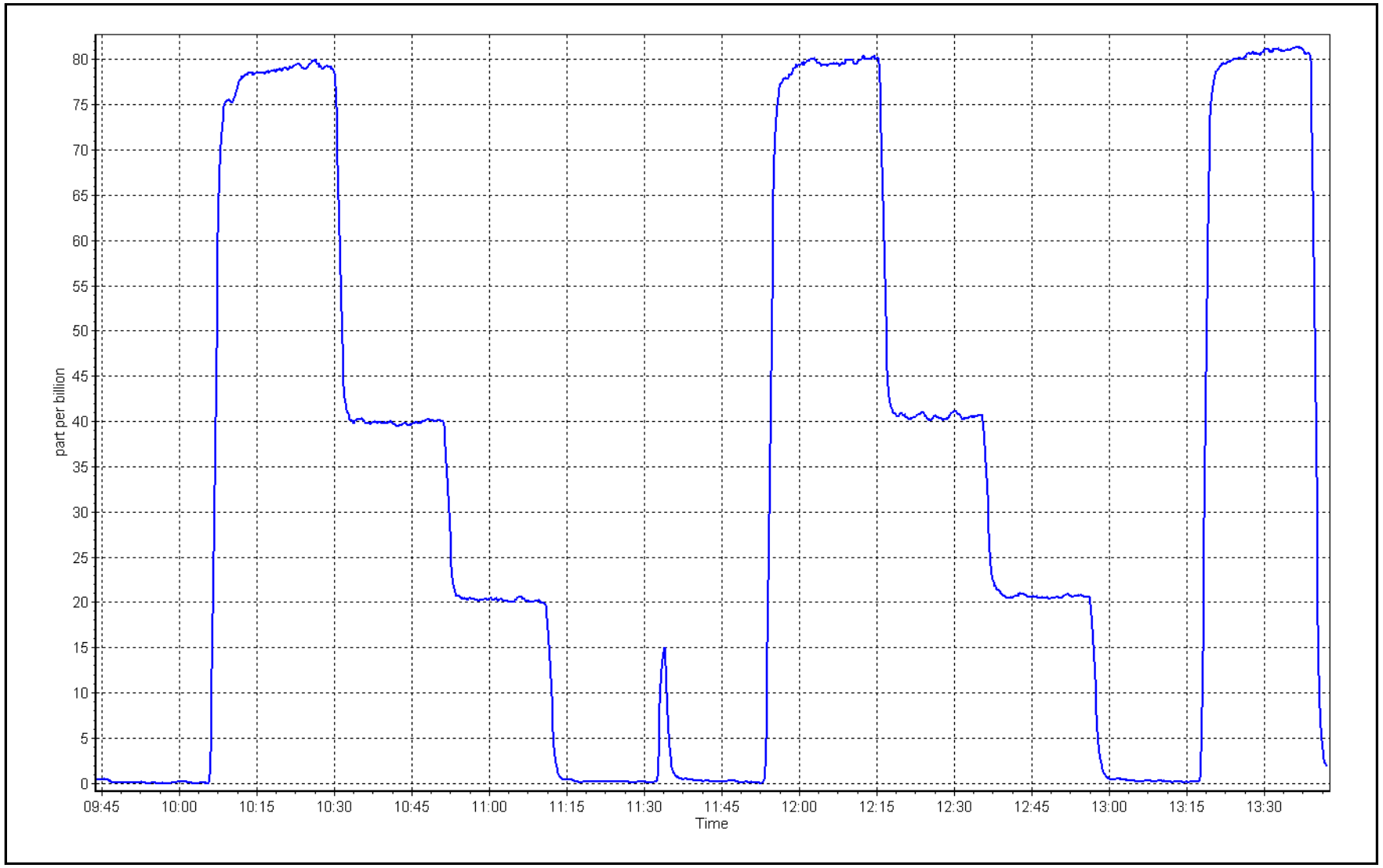
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	79.7	1.0041
40.0	40.6	0.9841
20.0	20.7	0.9678

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999877	*≥0.995*
Slope	0.991885	*0.90 - 1.10*
Intercept	0.580307	*+/-3*



TRS Calibration Plot Date: December 7, 2023 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:	December 13, 2023	Last Cal Date:	November 17, 2023
Start time (MST):	10:07	End time (MST):	13:23
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:	2.15E-04	2.17E-04	NMHC SP Ratio:	4.87E-05	4.91E-05
CH4 Retention time:	14.0	14.0	NMHC Peak Area:	186260	184991
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	17.09	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	17.12	17.17	0.997
second point	4960	40.2	8.57	8.62	0.994
third point	4980	20.1	4.29	4.37	0.981
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.12	17.18	0.997
				Average Correction Factor	0.991
Baseline Corr AF:	17.09	Prev response	17.22	*% 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	0.01	----
as found span	4919.7	80.3	9.07	9.08	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919.7	80.3	9.07	9.12	0.995
second point	4960	40.2	4.54	4.59	0.988
third point	4980	20.1	2.27	2.34	0.971
as left zero	5000	0.0	0.00	0.00	----
as left span	4919.7	80.3	9.07	9.12	0.994
				Average Correction Factor	0.984
Baseline Corr AF:	9.08	Prev response	9.15	*% 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	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	8.06	1.000
second point	4960	40.2	4.03	4.03	1.002
third point	4980	20.1	2.02	2.03	0.993
as left zero	5000	0.0	0.00	0.00	----
as left span	4919.7	80.3	8.06	8.06	1.000
				Average Correction Factor	0.998
Baseline Corr AF:	8.01	Prev response	8.09	*% change	-1.0%
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:	1.004841	1.001451
THC Cal Offset:	0.018616	0.034020
CH4 Cal Slope:	1.003960	0.999322
CH4 Cal Offset:	-0.002161	0.004445
NMHC Cal Slope:	1.006556	1.003545
NMHC Cal Offset:	0.019576	0.028776

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

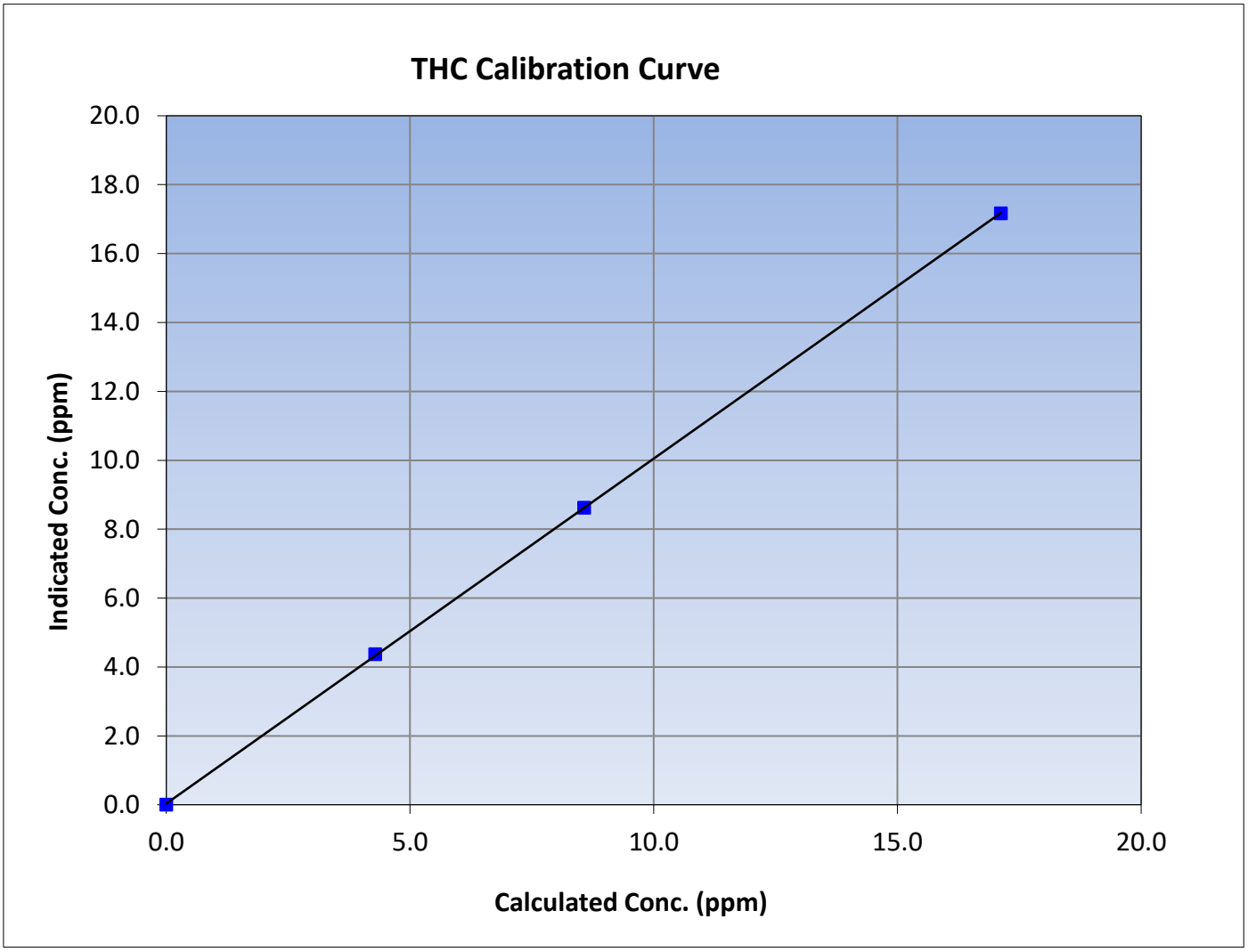
Version-06-2022

Station Information

Calibration Date:	December 13, 2023	Previous Calibration:	November 17, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	10:07	End Time (MST):	13:23
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	0.999980	*≥0.995*
17.12	17.17	0.9973			
8.57	8.62	0.9942	Slope	1.001451	*0.90 - 1.10*
4.29	4.37	0.9810			
			Intercept	0.034020	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

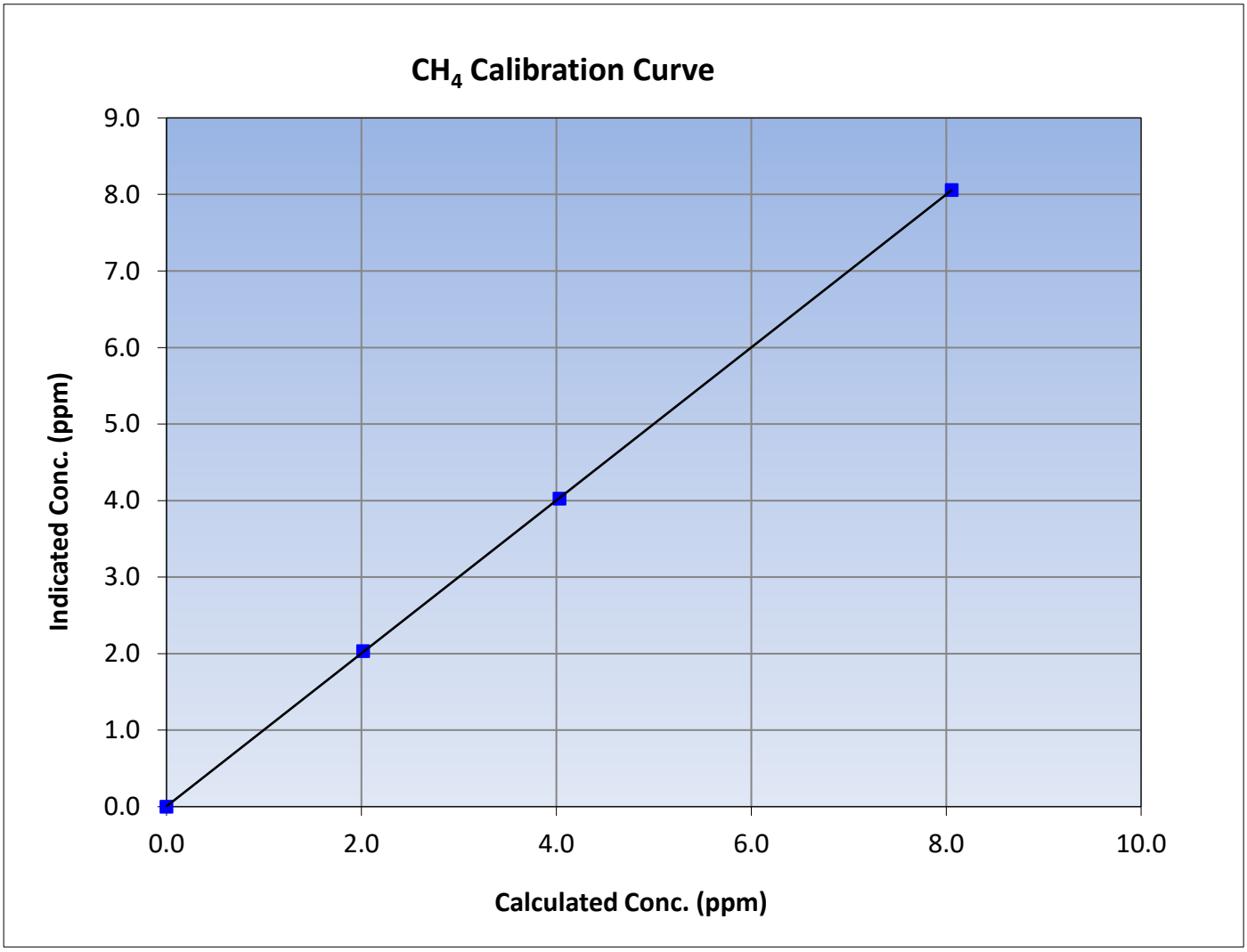
Version-06-2022

Station Information

Calibration Date:	December 13, 2023	Previous Calibration:	November 17, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	10:07	End Time (MST):	13:23
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	0.999994	≥0.995
8.06	8.06	1.0000			
4.03	4.03	1.0017	Slope	0.999322	0.90 - 1.10
2.02	2.03	0.9928			
			Intercept	0.004445	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

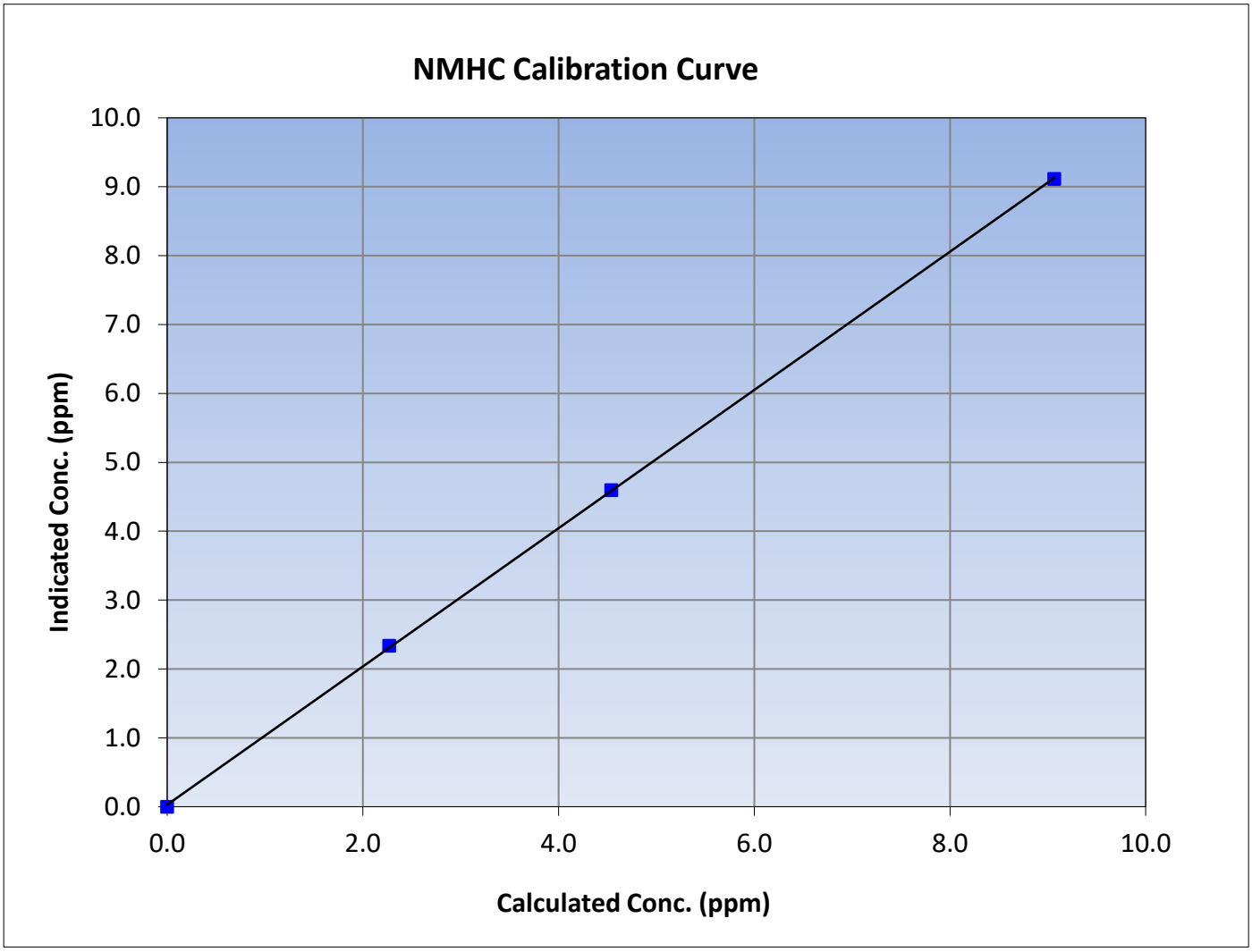
Version-06-2022

Station Information

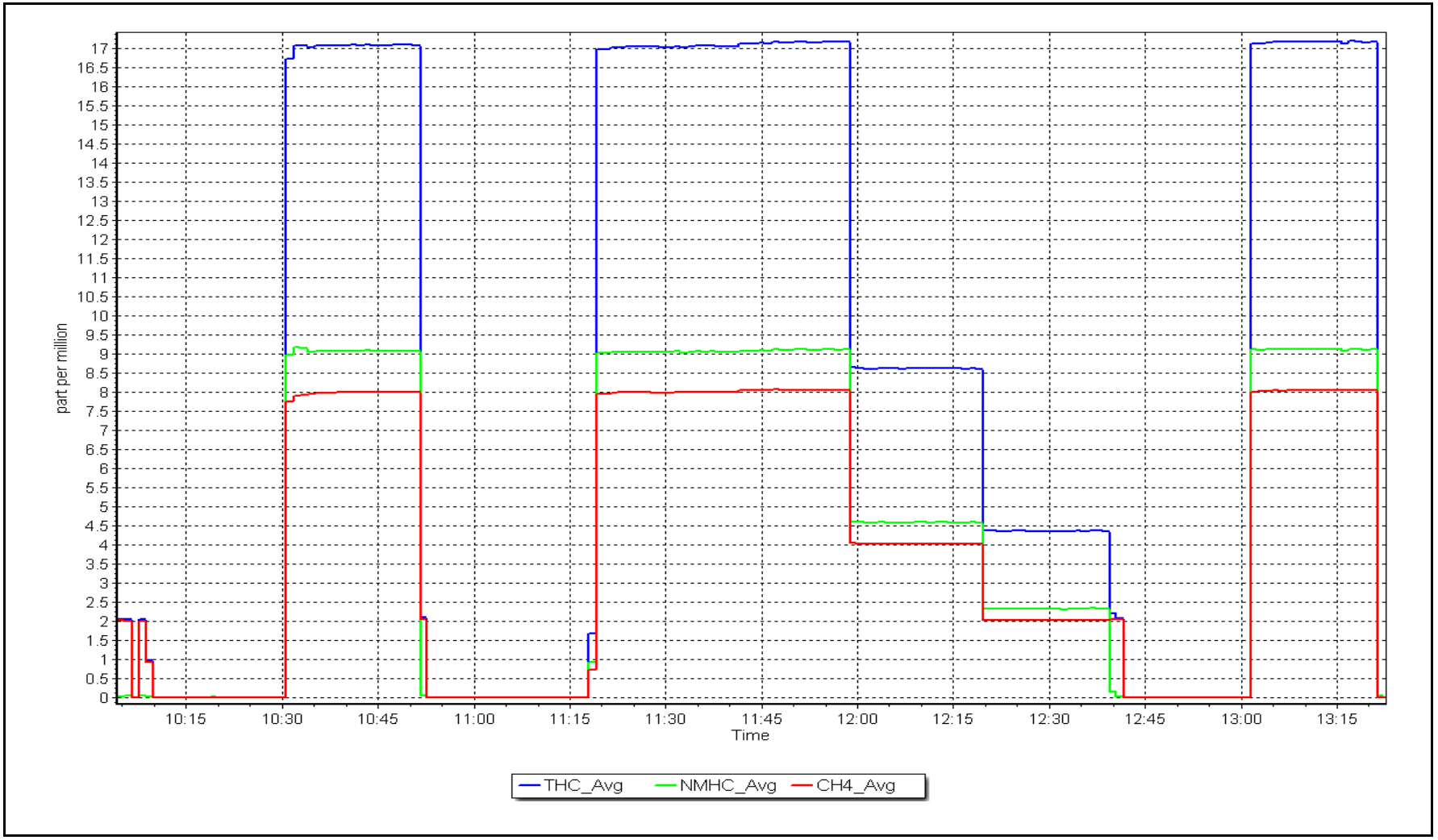
Calibration Date:	December 13, 2023	Previous Calibration:	November 17, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	10:07	End Time (MST):	13:23
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999954	*≥0.995*
9.07	9.12	0.9947			
4.54	4.59	0.9880	Slope	1.003545	*0.90 - 1.10*
2.27	2.34	0.9707			
			Intercept	0.028776	*+/-0.5*



NMHC Calibration Plot Date: December 13, 2023 Location: Patricia McInnes



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	December 4, 2023	Last Cal Date:	November 7, 2023
Start time (MST):	9:56	End time (MST):	14:47
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:	0.988764	0.992028
NO_X Cal Offset:	2.638018	2.457352
NO Cal Slope:	0.990325	0.993713
NO Cal Offset:	1.304636	1.244073
NO_2 Cal Slope:	0.998490	0.998330
NO_2 Cal Offset:	0.166835	-0.223314

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	0.4	0.2	----	----
as found span	4914	86.2	826.5	799.7	26.7	821.1	793.7	27.6	1.0065	1.0076
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.6	0.4	0.2	----	----
high point	4914	86.2	826.5	799.7	26.7	821.4	795.5	26.0	1.0062	1.0053
second point	4957	43.1	413.2	399.9	13.4	413.3	399.1	14.2	0.9998	1.0019
third point	4978	21.6	207.1	200.4	6.7	209.8	201.2	8.6	0.9872	0.9961
as left zero	5000	0.0	0.0	0.0	0.0	0.3	0.4	0.0	----	----
as left span	4914	86.2	826.5	403.9	422.5	819.2	398.9	420.3	1.0089	1.0126
								Average Correction Factor	0.9977	1.0011

Corrected As found	NO_X = 820.5 ppb	NO = 793.3 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = 0.1%
Previous Response	NO_X = 819.8 ppb	NO = 793.3 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)	793.6	397.8	422.5	421.9	1.0015	99.9%
2nd GPT point (200 ppb O3)	793.6	602.6	217.7	216.7	1.0047	99.5%
3rd GPT point (100 ppb O3)	793.6	700.4	119.9	119.2	1.0060	99.4%
				Average Correction Factor	1.0041	99.6%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

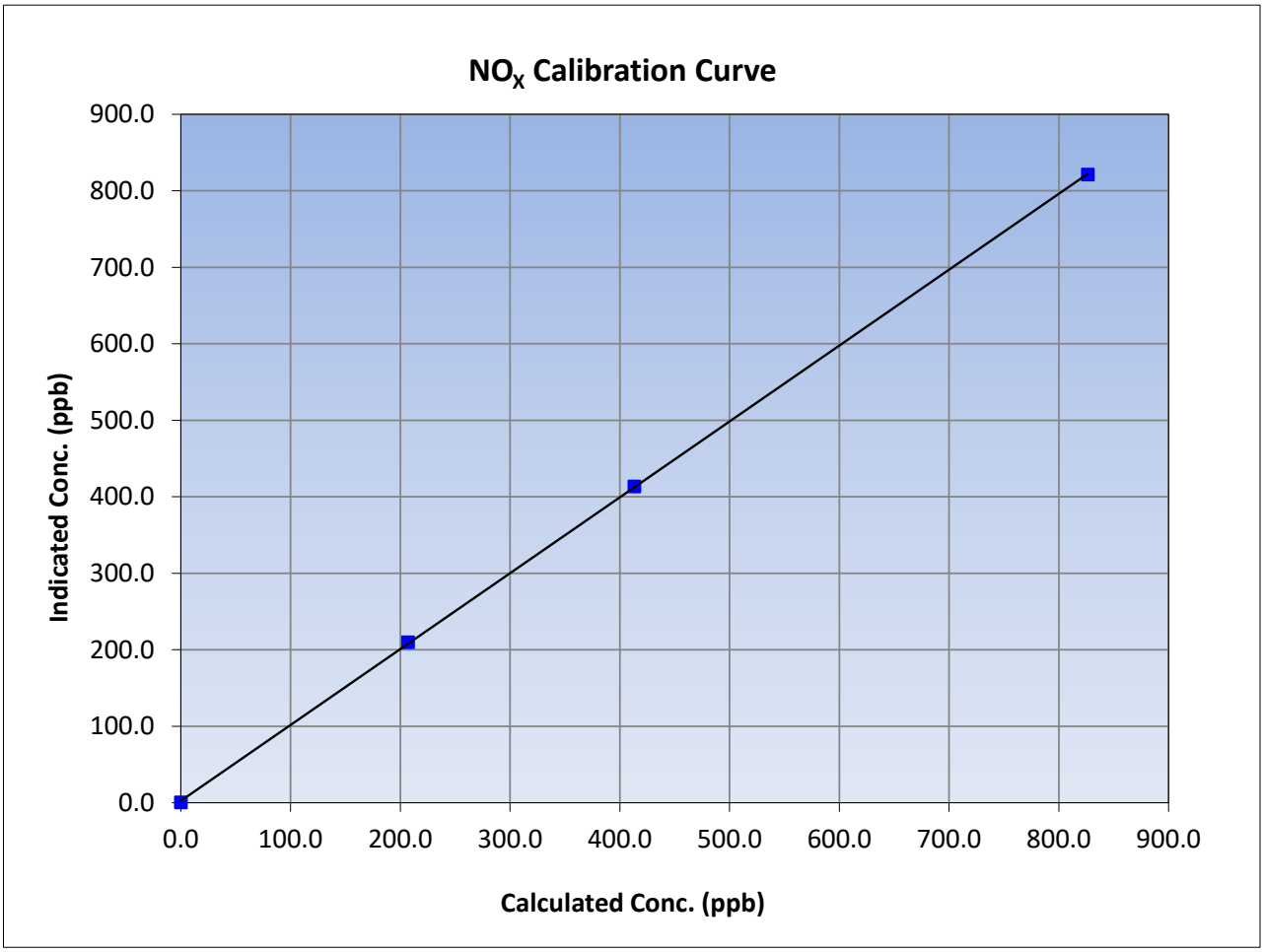
Version-04-2020

Station Information

Calibration Date:	December 4, 2023	Previous Calibration:	November 7, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:56	End Time (MST):	14:47
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	0.6	----	Correlation Coefficient	0.999977	≥0.995
826.5	821.4	1.0062			
413.2	413.3	0.9998	Slope	0.992028	0.90 - 1.10
207.1	209.8	0.9872			
			Intercept	2.457352	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

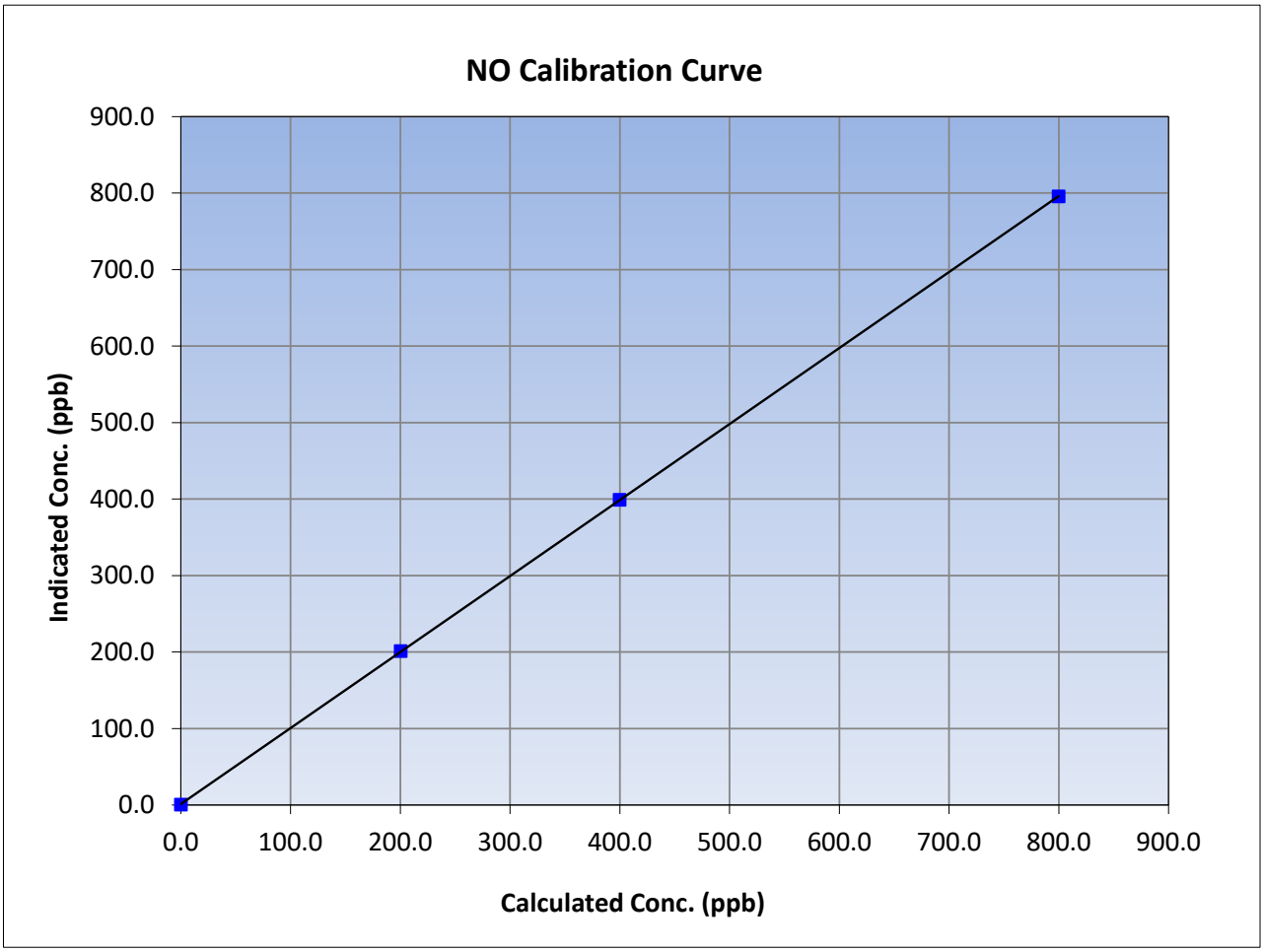
Version-04-2020

Station Information

Calibration Date:	December 4, 2023	Previous Calibration:	November 7, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:56	End Time (MST):	14:47
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	0.999995	*≥0.995*
799.7	795.5	1.0053			
399.9	399.1	1.0019	Slope	0.993713	*0.90 - 1.10*
200.4	201.2	0.9961			
			Intercept	1.244073	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

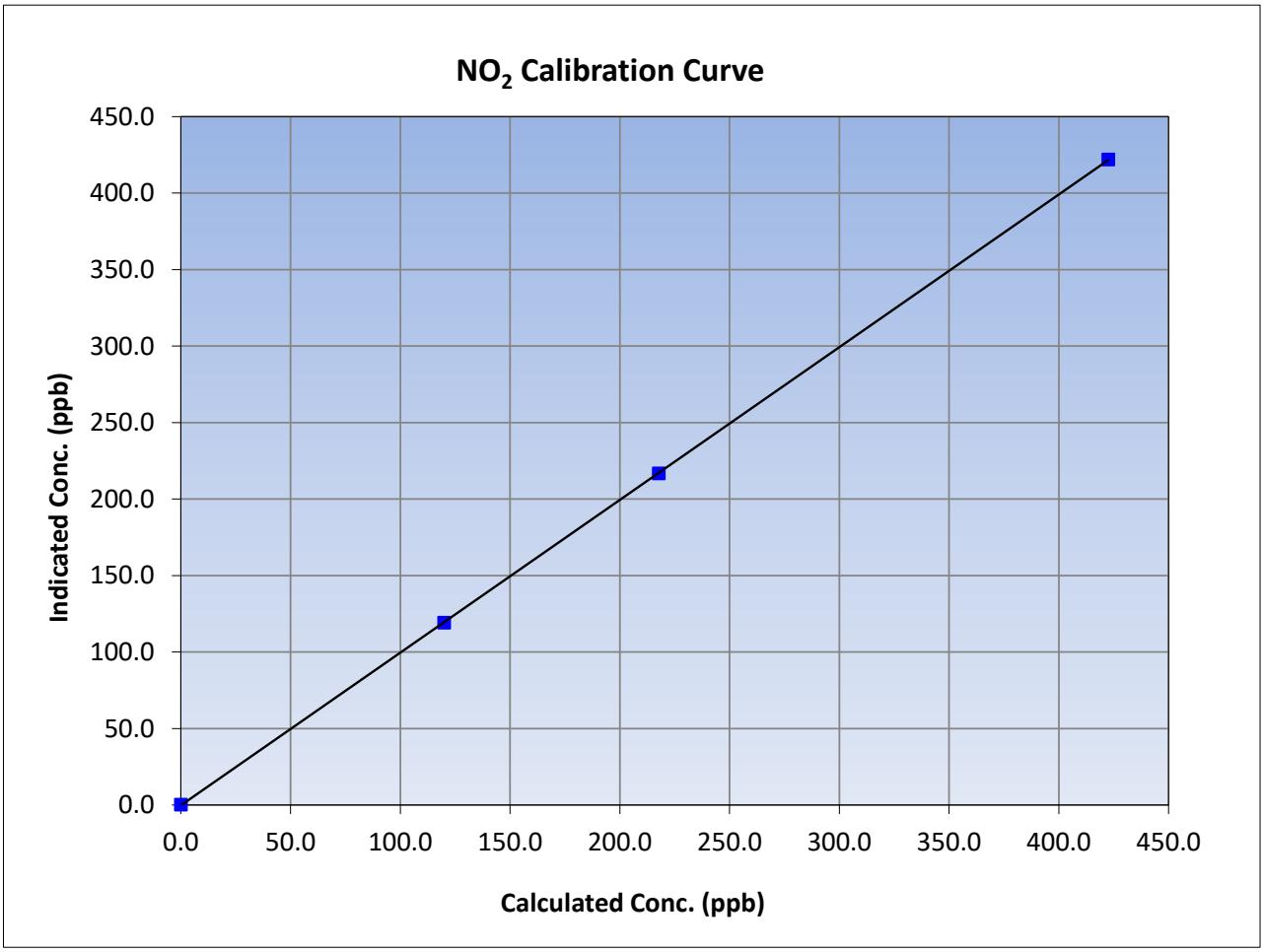
Version-04-2020

Station Information

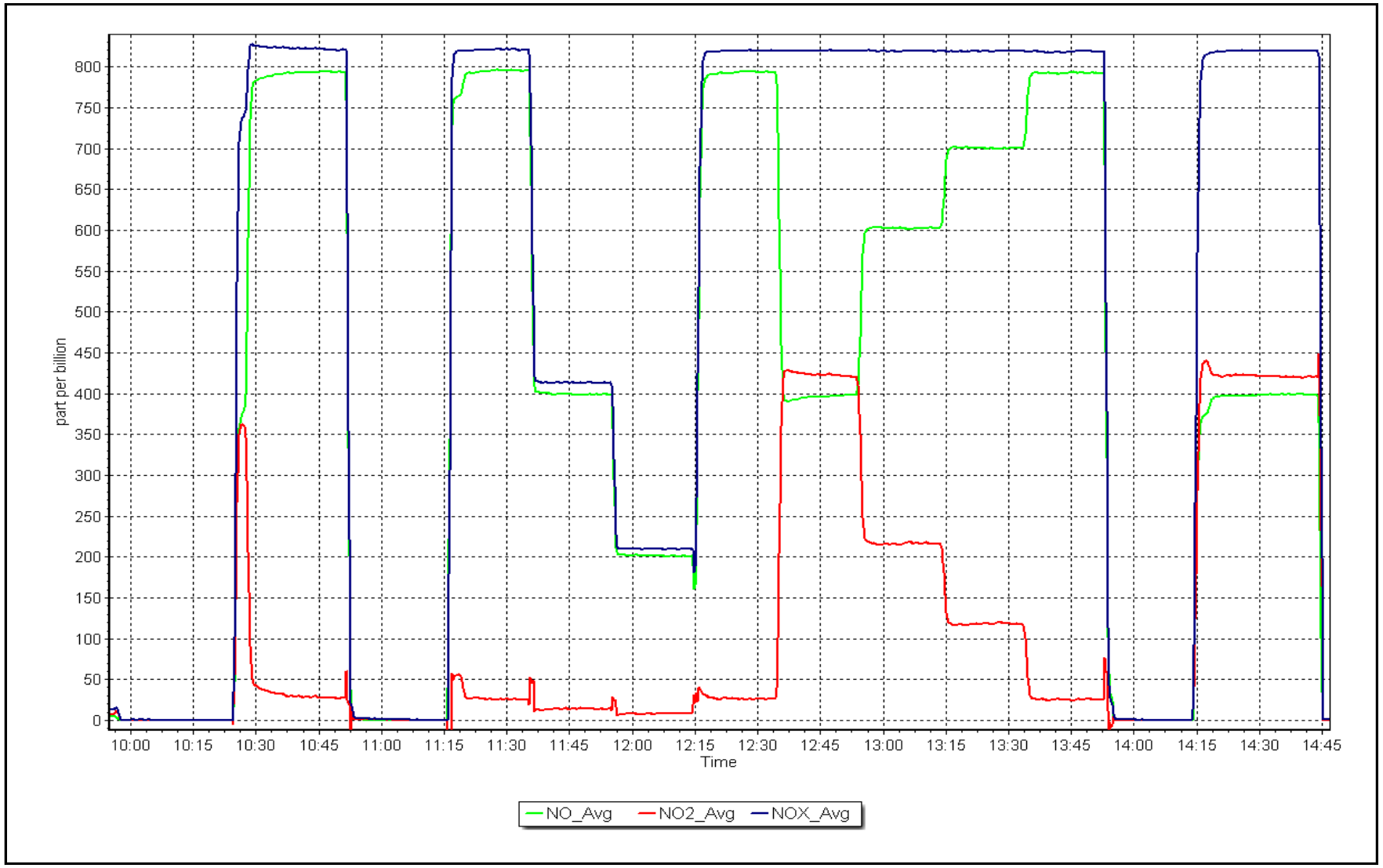
Calibration Date:	December 4, 2023	Previous Calibration:	November 7, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:56	End Time (MST):	14:47
Analyzer make:	Thermo 42i	Analyzer serial #:	1172750022

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.2	----	Correlation Coefficient	0.999994	*≥0.995*
422.5	421.9	1.0015			
217.7	216.7	1.0047	Slope	0.998330	*0.90 - 1.10*
119.9	119.2	1.0060			
			Intercept	-0.223314	*+/-20*



NO_X Calibration Plot Date: December 4, 2023 Location: Patricia McInnes



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	December 18, 2023	Last Cal Date:	November 10, 2023
Start time (MST):	10:38	End time (MST):	13:35
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005971	1.007657	Backgd or Offset:	-0.2	-0.2
Calibration intercept:	-1.720000	-1.340000	Coeff or Slope:	1.039	1.039

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	0.0	----
as found span	5000	1303.0	400.0	402.2	0.995
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	-0.1	----
high point	5000	1303.0	400.0	402.2	0.995
second point	5000	966.5	200.0	200.0	1.000
third point	5000	794.3	100.0	97.9	1.021
as left zero	5000	800.0	0.0	-0.1	----
as left span	5000	1303.0	400.0	406.3	0.984
				Average Correction Factor	1.005

Baseline Corr As found:	402.2	Previous response	400.7	*% change	0.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

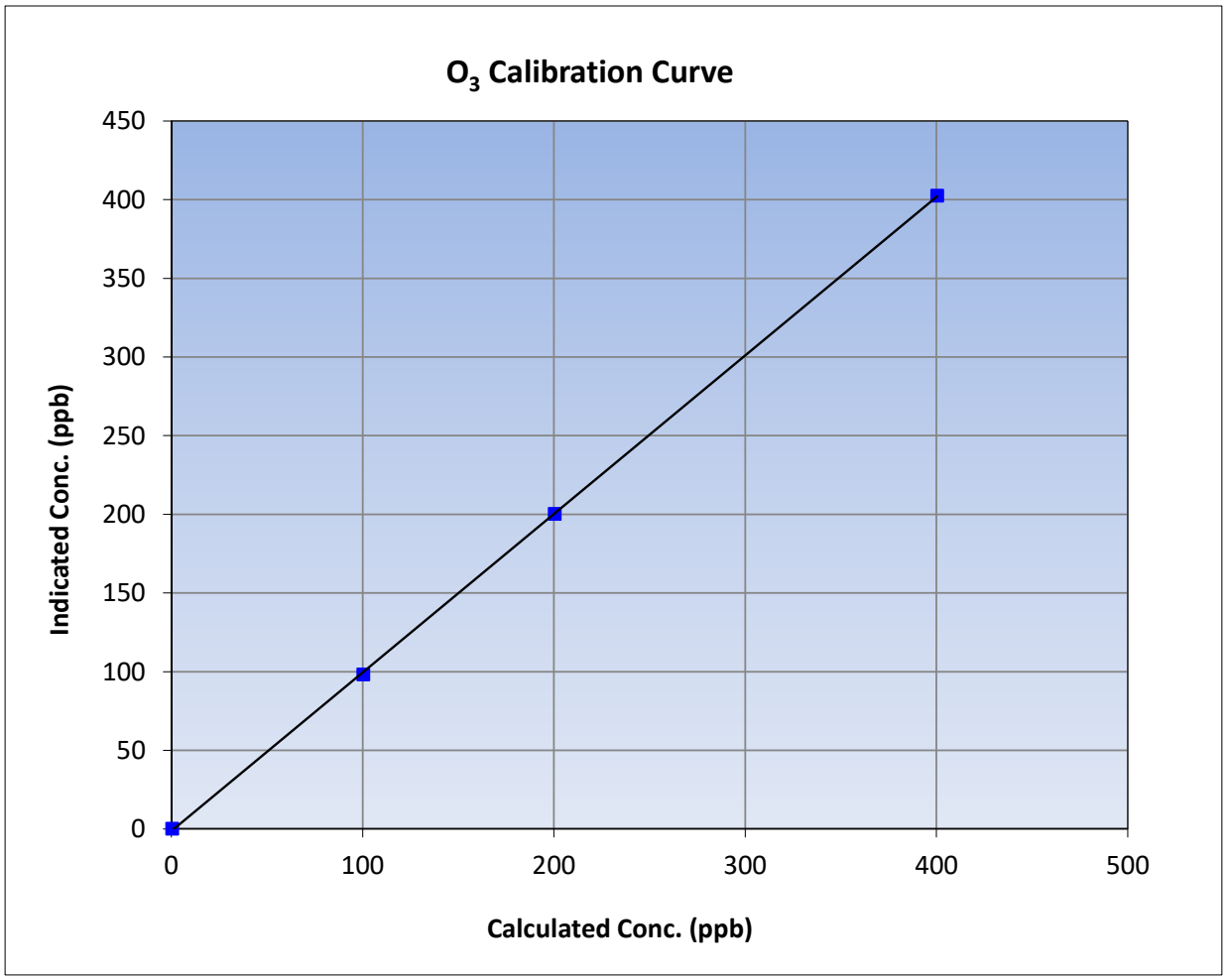
Station Information

Calibration Date:	December 18, 2023	Previous Calibration:	November 10, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	10:38	End Time (MST):	13:35
Analyzer make:	Thermo 49i	Analyzer serial #:	1300156234

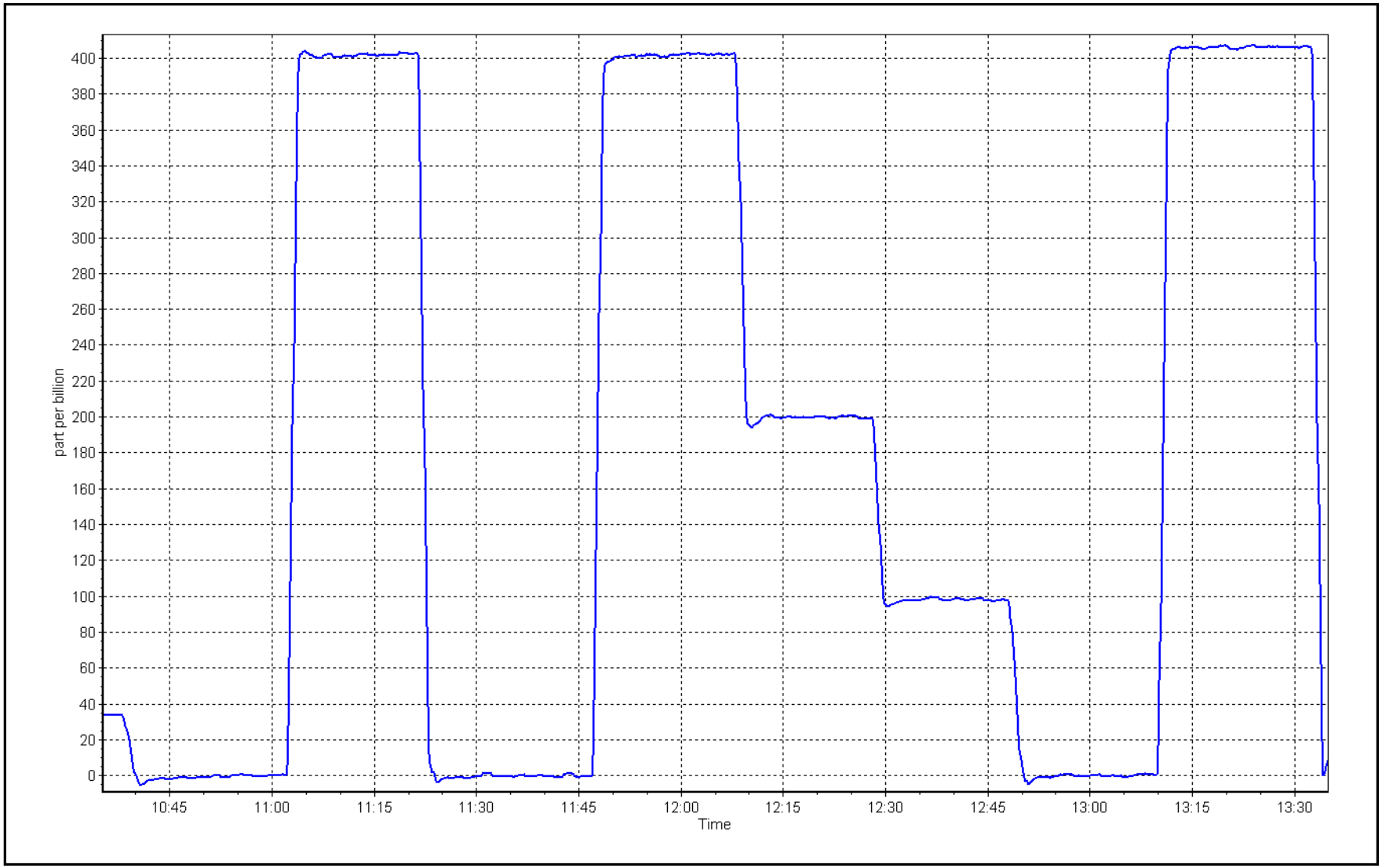
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
400.0	402.2	0.9945
200.0	200.0	1.0000
100.0	97.9	1.0215

Statistical Evaluation		Limits
Correlation Coefficient	0.999954	≥0.995
Slope	1.007657	0.90 - 1.10
Intercept	-1.340000	+/- 5



O_3 Calibration Plot Date: December 18, 2023 Location: Patricia McInnes



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
Calibration Date:	December 1, 2023	Last Cal Date:	November 17, 2023
Start time (MST):	9:23	End time (MST):	10:43
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)	-13.2	-13.0	-13.2	☐	+/- 2 °C
P (mmHg)	717.9	717.7	717.9	☐	+/- 10 mmHg
flow (LPM)	4.97	4.79	4.97	☐	+/- 0.25 LPM

Leak Test: Date of check: December 1, 2023 Last Cal Date: November 17, 2023

PM w/o HEPA: 7.7 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	10.0	10.0	11.0	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 15.6 w/ HEPA: 0 <0.2 ug/m3

Date Optical Chamber Cleaned: December 1, 2023

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 . Leak check passed, adjusted the PMT peak.

Calibration by: Max Farrell

Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
Calibration Date:	December 14, 2023	Last Cal Date:	December 1, 2023
Start time (MST):	11:11	End time (MST):	11:30
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)	2.7	2.2	N/A	☐	+/- 2 °C
P (mmHg)	728.8	729.3	N/A	☐	+/- 10 mmHg
flow (LPM)	5.01	5.15	N/A	☐	+/- 0.25 LPM

Leak Test: Date of check: December 14, 2023 Last Cal Date: December 1, 2023

PM w/o HEPA: 7.7 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: Removal calibration, replacing the instrument because cant turn the data alignment factor on.

Calibration by: Max Farrell

Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
Calibration Date:	December 14, 2023	Last Cal Date:	N/A
Start time (MST):	12:10	End time (MST):	12:56
Analyzer Make:	API T640	S/N:	871
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)	N/A	2.8	3.4	☐	+/- 2 °C
P (mmHg)	N/A	729	728	☐	+/- 10 mmHg
flow (LPM)	N/A	5.12	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: December 14, 2023 Last Cal Date: N/A

PM w/o HEPA: 3.1 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	N/A	11.1	11.1	☐	10.9 +/- 0.5

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

Date Optical Chamber Cleaned: December 14, 2023 <0.2 ug/m3

Disposable Filter Changed: December 14, 2023

Annual Maintenance

Date Sample Tube Cleaned: April 13, 2023

Date RH/T Sensor Cleaned: April 13, 2023

Notes: Install calibration. No adjustments made, completed quarterly maintenance. Leak check passed.

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:	December 6, 2023	Last Cal Date:	November 2, 2023
Start time (MST):	9:33	End time (MST):	14:26
NH3 Cal Date:	December 6, 2023	Last Cal Date:	November 2, 2023
Start time (MST):	14:35	End time (MST):	16:34
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:	0.870	0.854	TN coefficient:	0.858	0.849
NOX coefficient:	0.860	0.848	NO bkgrnd:	-0.985	-0.985
NO2 coefficient:	1.000	1.000	NOX bkgrnd:	-0.562	-0.562
NH3 coefficient:	0.871	0.891	TN bkgrnd:	5.018	5.018

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	0.996853	0.997270
NO_X Cal Offset:	-0.762741	0.936426
NO Cal Slope:	1.000156	0.997858
NO Cal Offset:	-0.936161	0.443186
NO_2 Cal Slope:	1.003217	1.001189
NO_2 Cal Offset:	-0.787714	-1.443145
NH3 Cal Slope:	1.025836	1.005013
NH3 Cal Offset:	3.642287	3.755107
TN Cal Slope:	1.030917	1.011495
TN Cal Offset:	3.830269	4.256407

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	-1.1	0.9	-2.0	----	----
as found NO	4914	86.2	826.5	826.5	----	833.2	833.6	-0.6	0.992	----
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.9	0.0	-0.9	----	----
high NO point	4914	86.2	826.5	826.5	----	827.0	825.0	1.9	0.999	----
NO/O3 point	4914	86.2	826.5	826.5	----	825.0	822.6	2.3	1.002	----
as found NH3	3417	82.6	1800.6	----	1800.6	1849.7	----	1837.6	0.973	0.980
new NH3 cyl rp	3417	82.6	1800.6	----	1800.6		----			
first NH3	3417	82.6	1800.6	----	1800.6	1822.0	----	1810.1	0.988	0.995
second NH3	3454	45.9	1000.5	----	1000.5	1020.5	----	1013.3	0.980	0.987
third NH3	3477	22.9	499.2	----	499.2	513.7	----	509.4	0.972	0.980
								Average Correction Factor	1.0005	0.9874

Corrected As found TN = 834.3 ppb NO_X = 832.7 ppb NH3 = 1839.6 ppb

Previous Response TN = 855.8 ppb NO_X = 823.1 ppb NH3 = 1850.8 ppb

*Percent Change TN = -2.6%

*Percent Change NO_X = 1.2%

*Percent Change NH3 = -0.6%

* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 87.1%

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	0.9	0.2	-1.1	----	----
as found span	4914	86.2	826.5	799.7	826.5	833.6	806.3	833.2	0.9914	0.9919
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.2	-0.9	----	----
high point	4914	86.2	826.5	799.7	826.5	825.0	798.7	827.0	1.0018	1.0013
second point	4957	43.1	413.2	399.9	413.2	412.5	398.5	415.2	1.0018	1.0034
third point	4978	21.6	207.1	200.4	207.1	209.1	201.4	209.2	0.9905	0.9951
								Average Correction Factor	0.9980	1.0000

Baseline Corr As fnd	TN =	834.3 ppb	NO_X =	832.7 ppb	NO =	806.1 ppb	*Percent Change TN = -2.6%
Previous Response	TN =	855.8 ppb	NO_X =	823.1 ppb	NO =	798.9 ppb	*Percent Change NO_X = 1.2%
							*Percent Change NO = 0.9%

* = > +/-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	0.7	----	----
calibration zero	----	----	0.0	-0.2	----	----
1st GPT point (400 ppb O3)	796.0	401.3	421.4	421.3	1.0003	100.0%
2nd GPT point (200 ppb O3)	796.0	602.8	219.9	217.8	1.0097	99.0%
3rd GPT point (100 ppb O3)	796.0	698.7	124.0	121.6	1.0199	98.0%
				Average Correction Factor	1.0100	99.0%

Notes: Changed the inlet filter after as founds. Adjusted both NOX and NH3 spans.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TN Calibration Summary

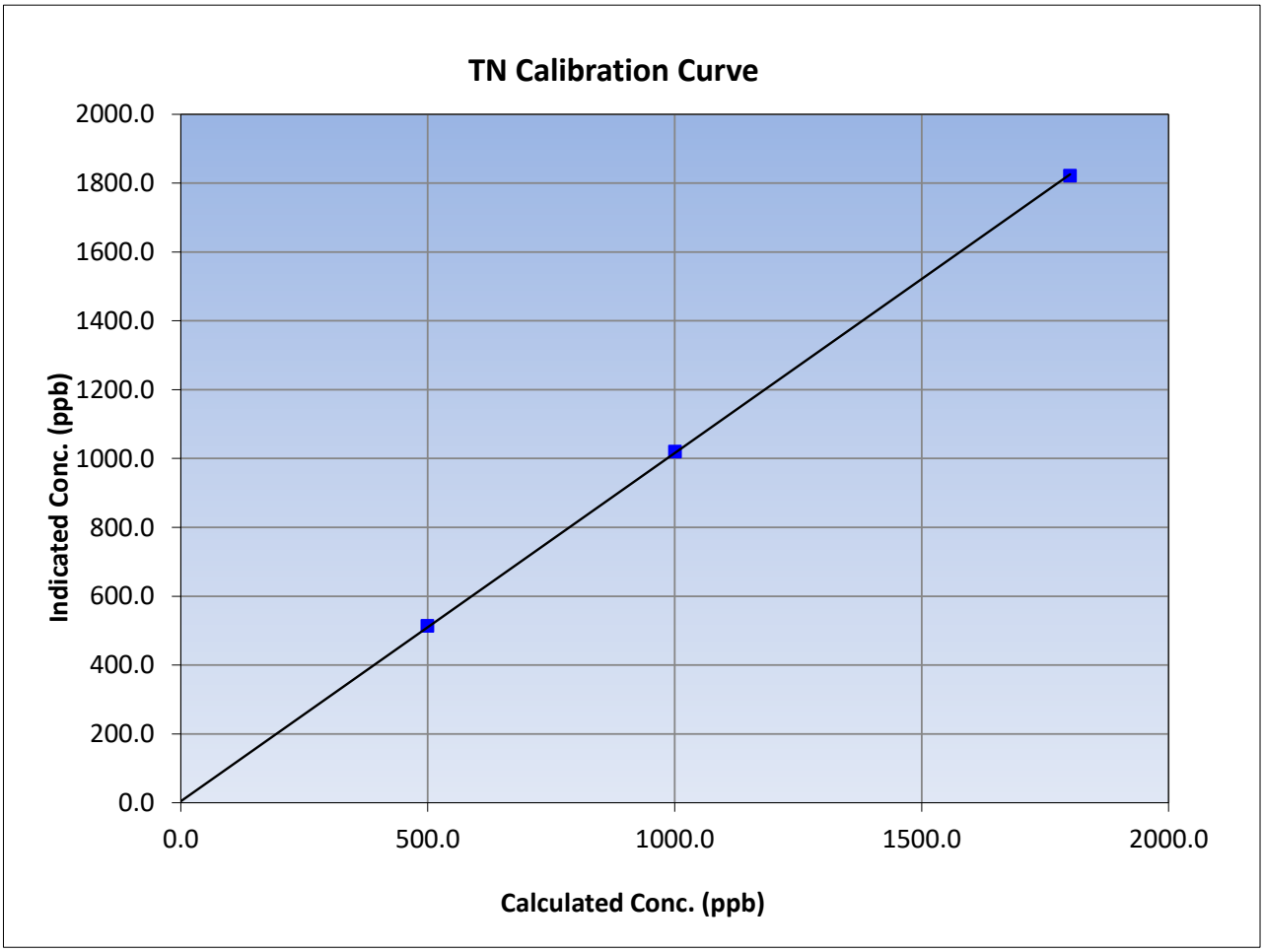
Version-05-2023

Station Information

Calibration Date:	December 6, 2023	Previous Calibration:	November 2, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:33	End Time (MST):	14:26
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	-0.9	----	Correlation Coefficient	0.999957	≥0.995
1800.6	1822.0	0.9883			
1000.5	1020.5	0.9804	Slope	1.011495	0.90 - 1.10
499.2	513.7	0.9717			
			Intercept	4.256407	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

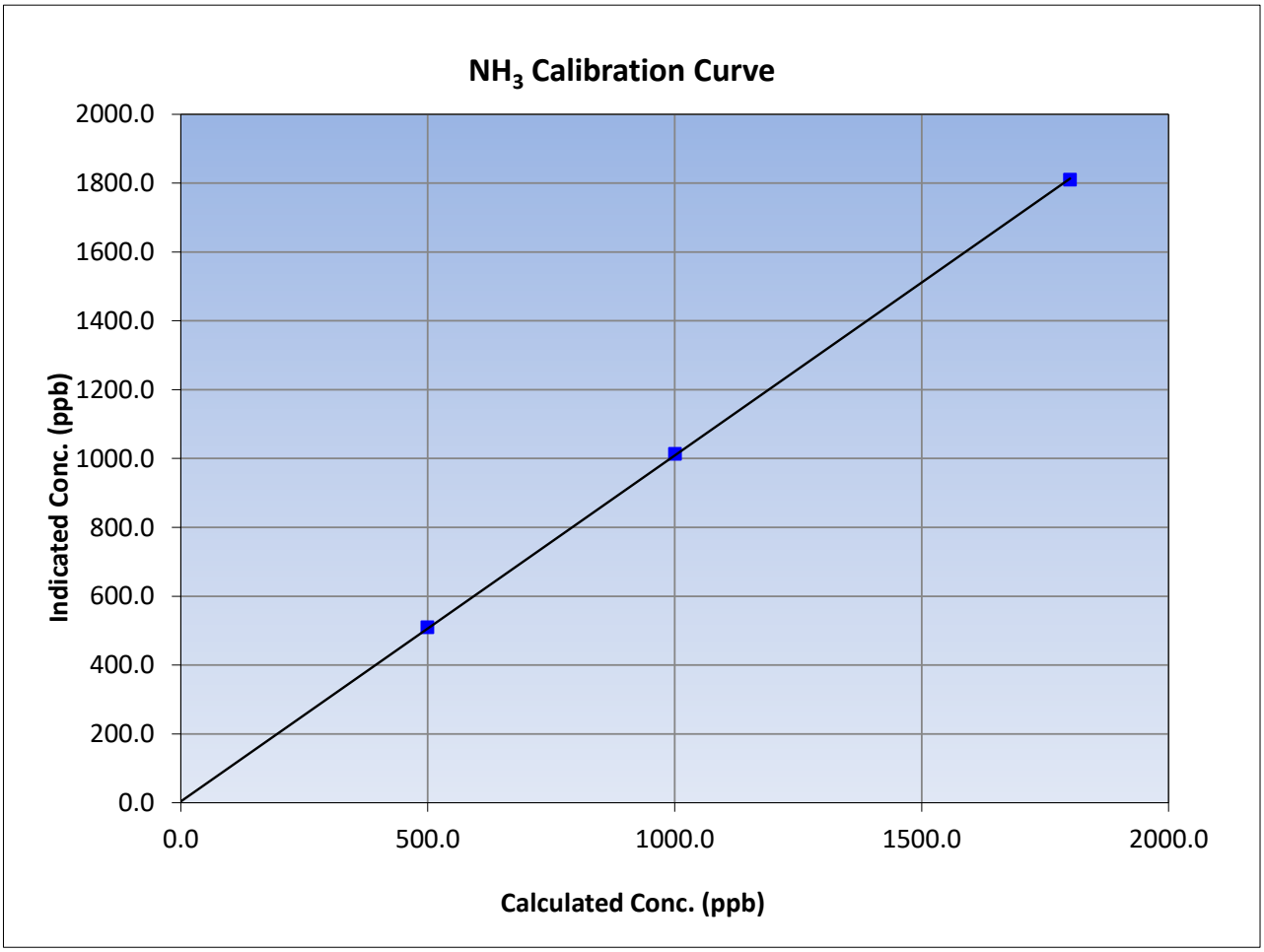
Version-05-2023

Station Information

Calibration Date:	December 6, 2023	Previous Calibration:	November 2, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:33	End Time (MST):	14:26
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	-0.9	----	Correlation Coefficient	0.999964	≥0.995
1800.6	1810.1	0.9948			
1000.5	1013.3	0.9874	Slope	1.005013	0.90 - 1.10
499.2	509.4	0.9799			
			Intercept	3.755107	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

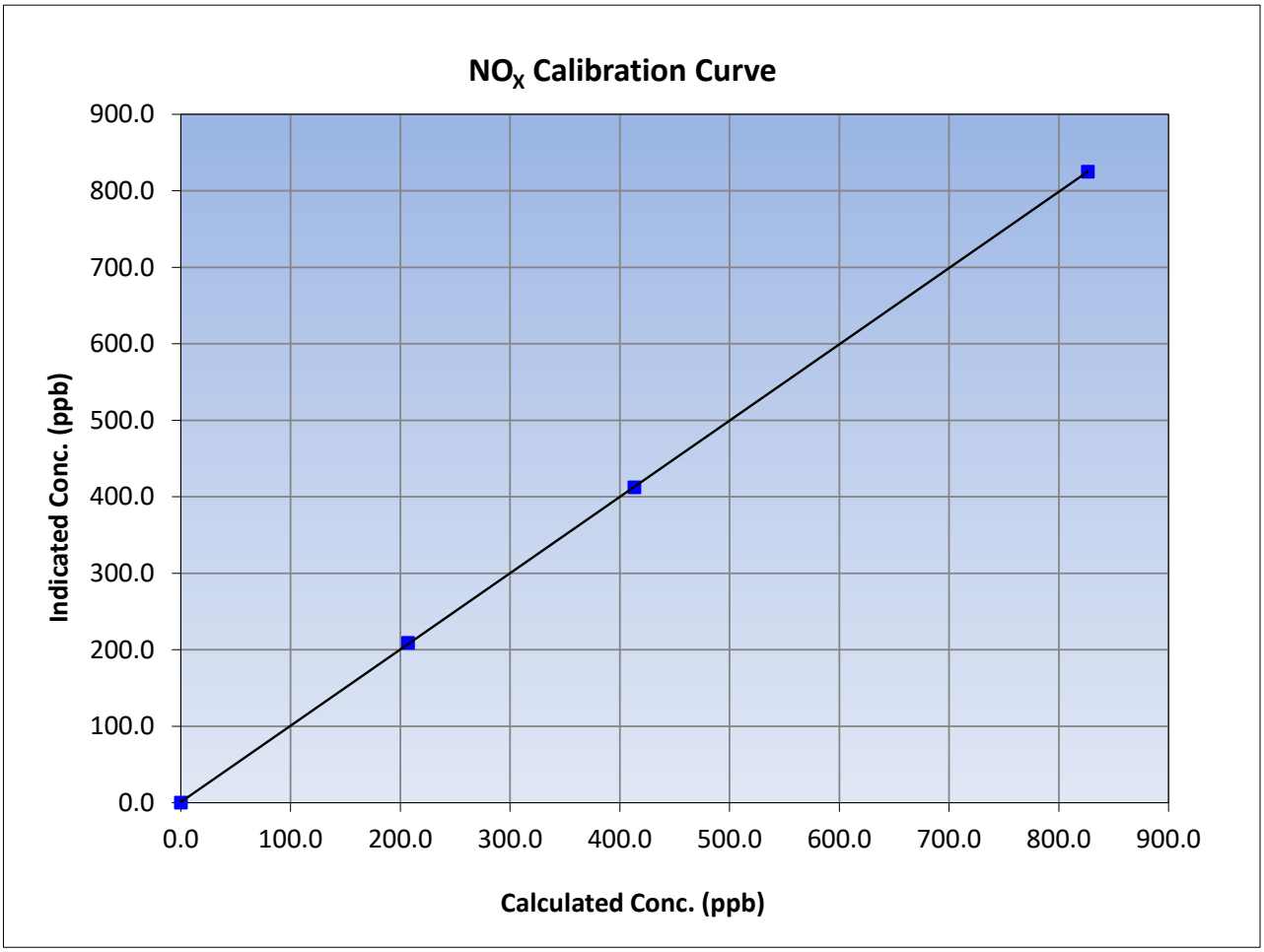
Version-05-2023

Station Information

Calibration Date:	December 6, 2023	Previous Calibration:	November 2, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:33	End Time (MST):	14:26
Analyzer make:	Teledyne API T201	Analyzer serial #:	808

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999990	≥0.995
826.5	825.0	1.0018			
413.2	412.5	1.0018	Slope	0.997270	0.90 - 1.10
207.1	209.1	0.9905			
			Intercept	0.936426	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

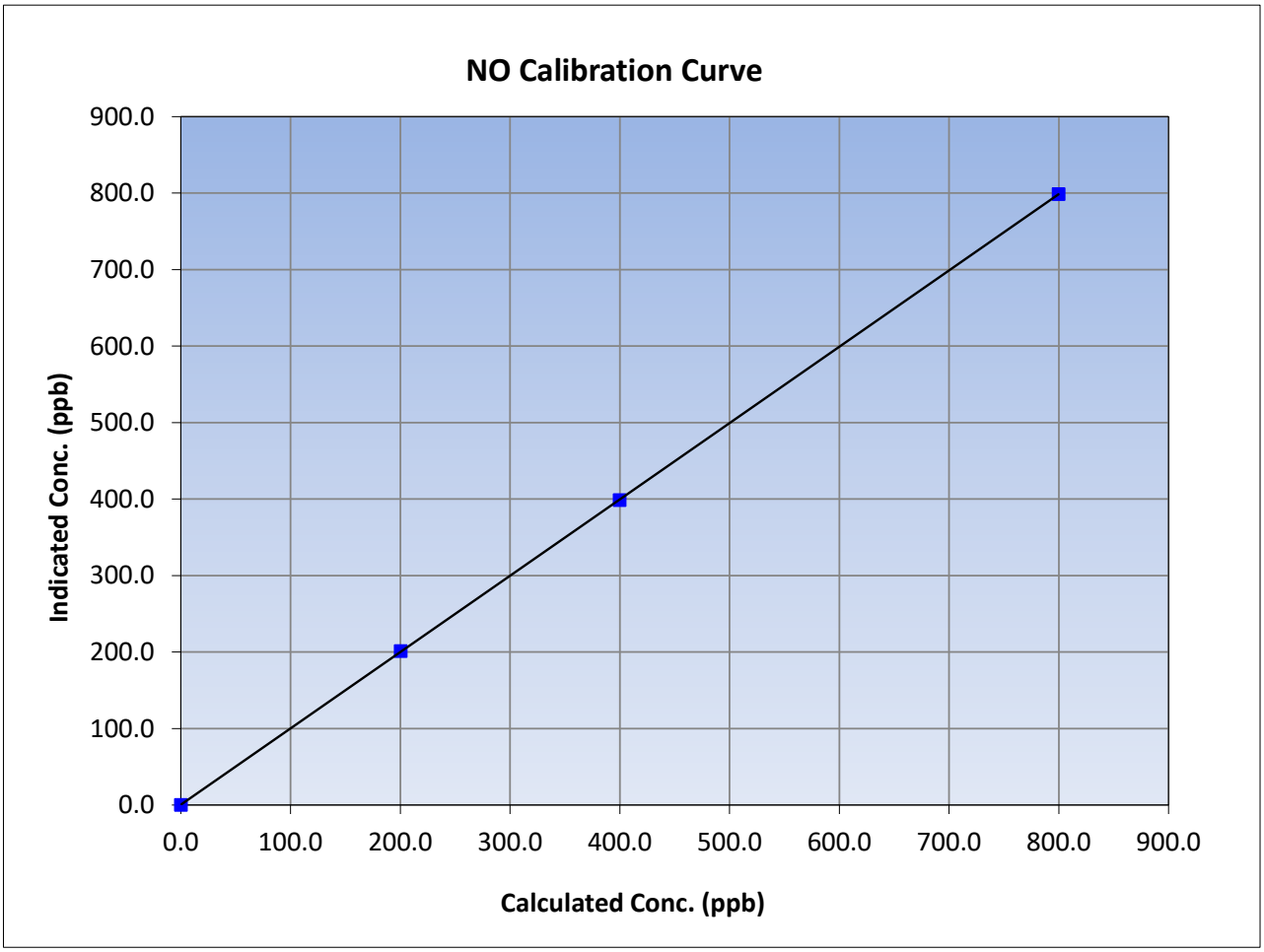
Version-05-2023

Station Information

Calibration Date:	December 6, 2023	Previous Calibration:	November 2, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:33	End Time (MST):	14:26
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	0.999994	*≥0.995*
799.7	798.7	1.0013			
399.9	398.5	1.0034	Slope	0.997858	*0.90 - 1.10*
200.4	201.4	0.9951			
			Intercept	0.443186	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

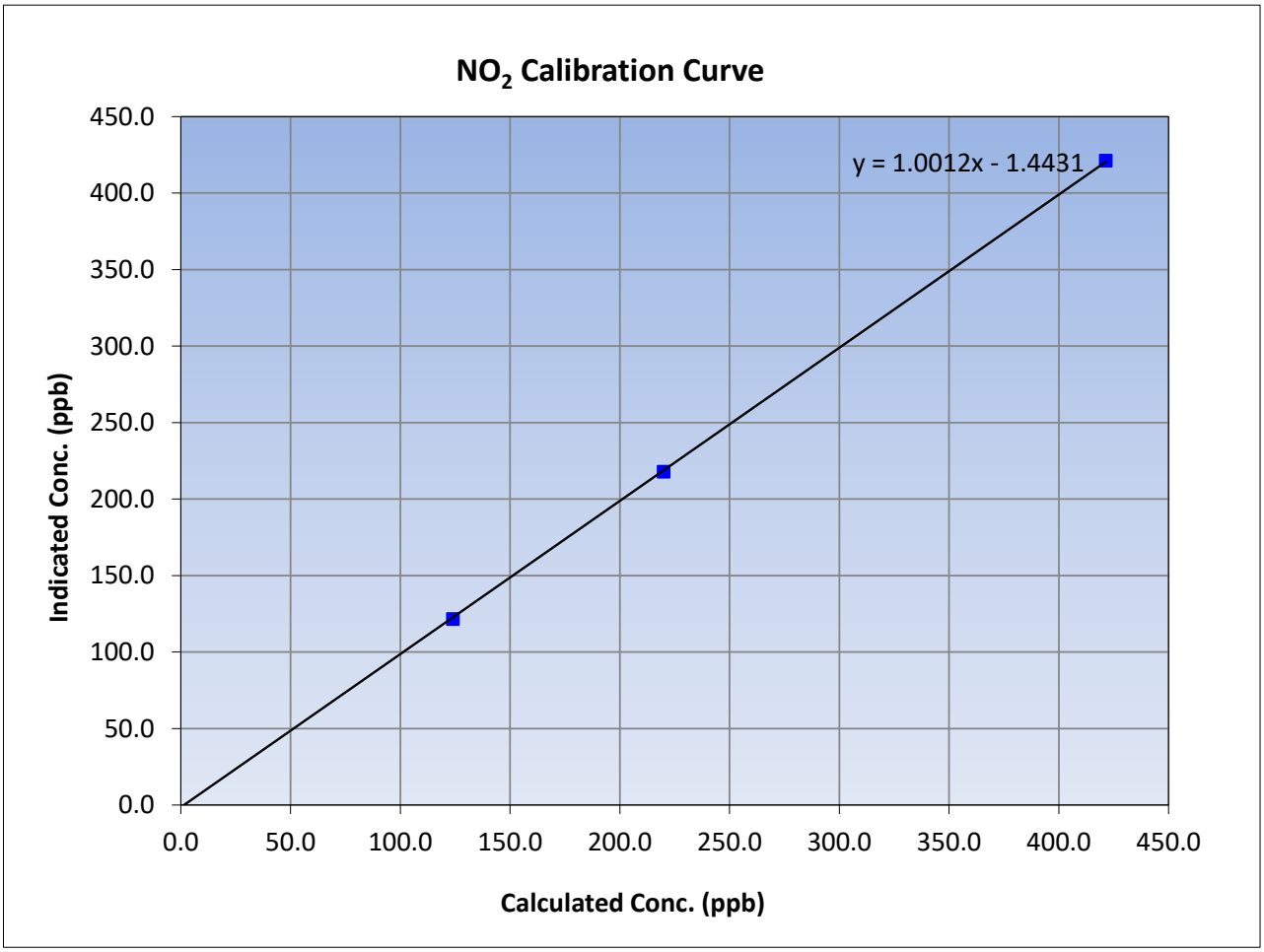
Version-05-2023

Station Information

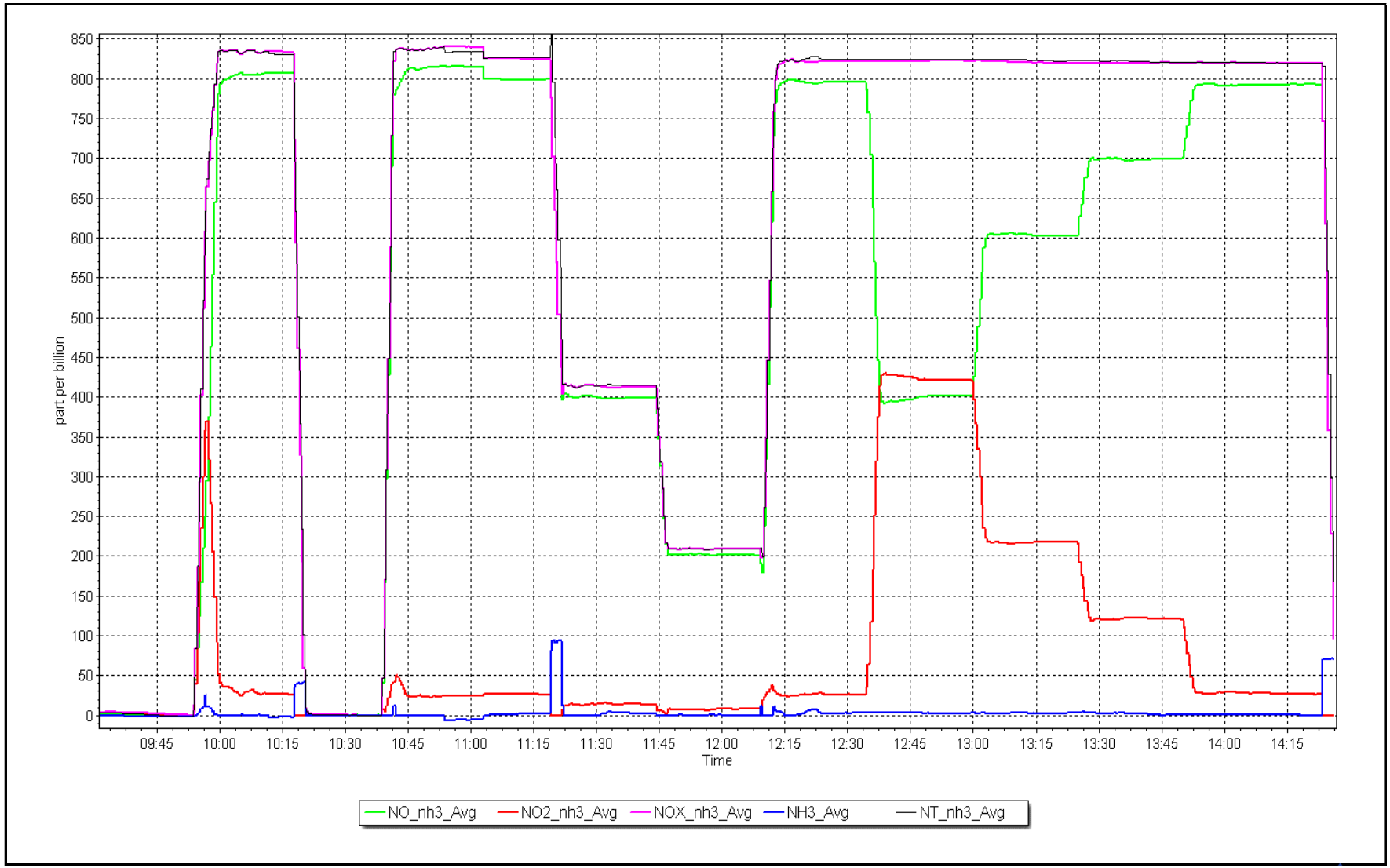
Calibration Date:	December 6, 2023	Previous Calibration:	November 2, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:33	End Time (MST):	14:26
Analyzer make:	Teledyne API T201	Analyzer serial #:	808

Calibration Data

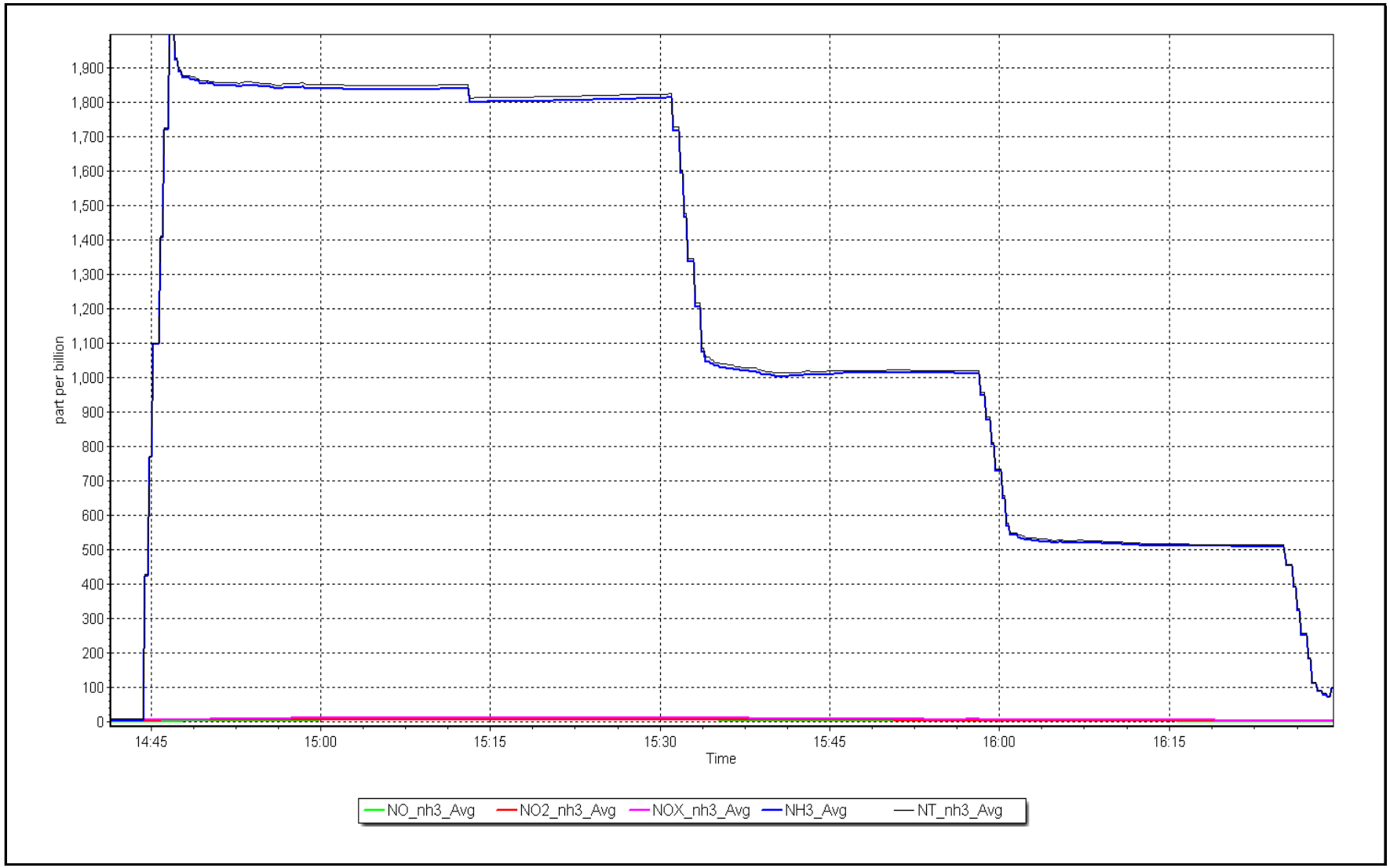
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.2	----	Correlation Coefficient	0.999954	*≥0.995*
421.4	421.3	1.0003			
219.9	217.8	1.0097	Slope	1.001189	*0.90 - 1.10*
124.0	121.6	1.0199			
			Intercept	-1.443145	*+/-20*



NO_X Calibration Plot Date: December 6, 2023 Location: Patricia McInnes



NH_3 Calibration Plot Date: December 6, 2023 Location: Patricia McInnes



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS07
ATHABASCA VALLEY
DECEMBER 2023

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

January 31, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	December 15, 2023	Last Cal Date:	November 20, 2023
Start time (MST):	10:14	End time (MST):	13:40
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001046	0.998820	Backgd or Offset:	2.59	2.59
Calibration intercept:	2.304446	2.284124	Coeff or Slope:	0.834	0.834

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	----
as found span	4921	79.2	800.2	799.2	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4921	79.3	801.2	800.9	1.000
second point	4960	39.6	400.2	404.8	0.989
third point	4980	19.8	200.1	203.0	0.986
as left zero	5000	0.0	0.0	0.2	----
as left span	4921	79.2	800.2	802.1	0.998
				Average Correction Factor	0.991

Baseline Corr As found:	799.20	Previous response	803.35	*% 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

SO_2 Calibration Summary

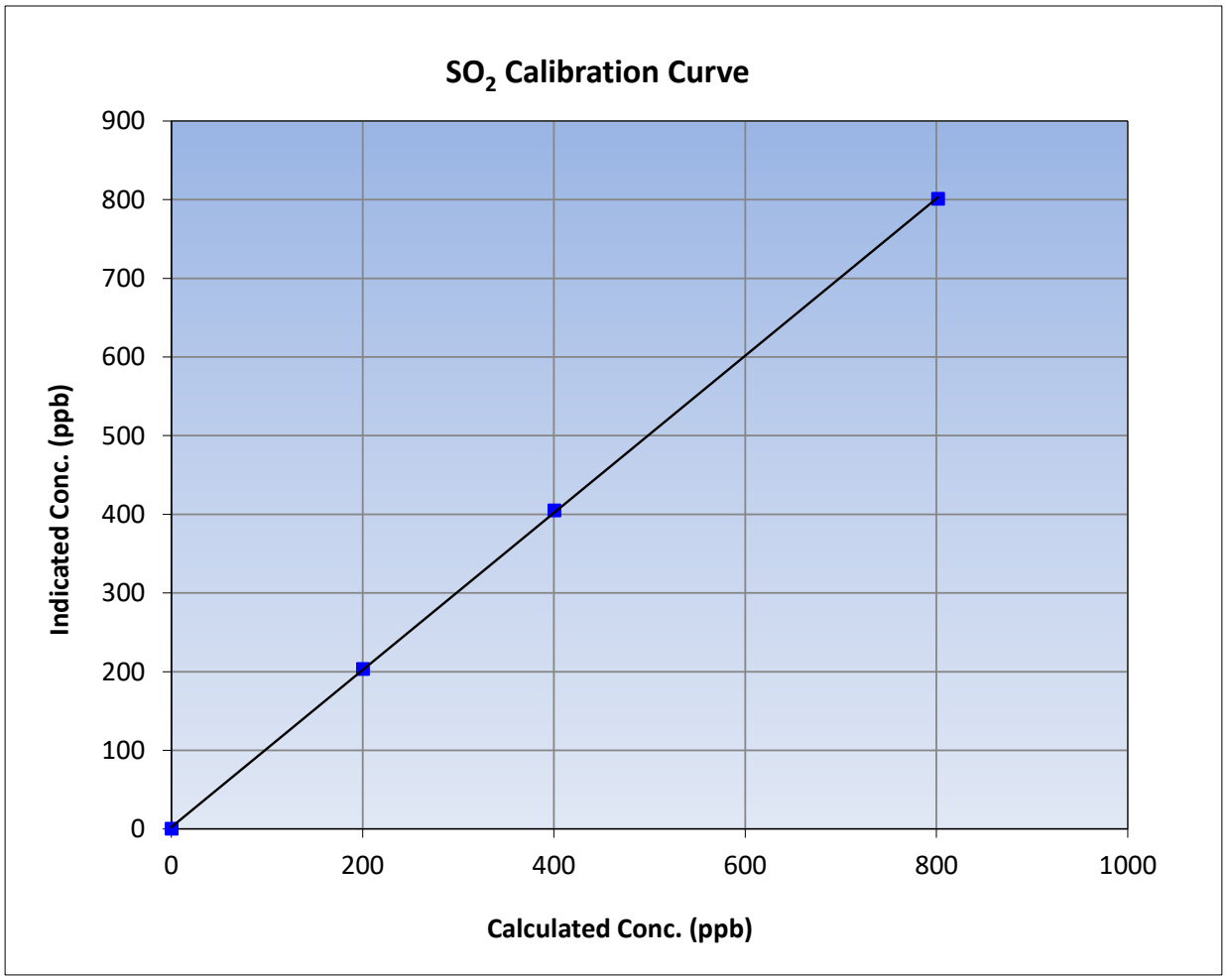
Version-01-2020

Station Information

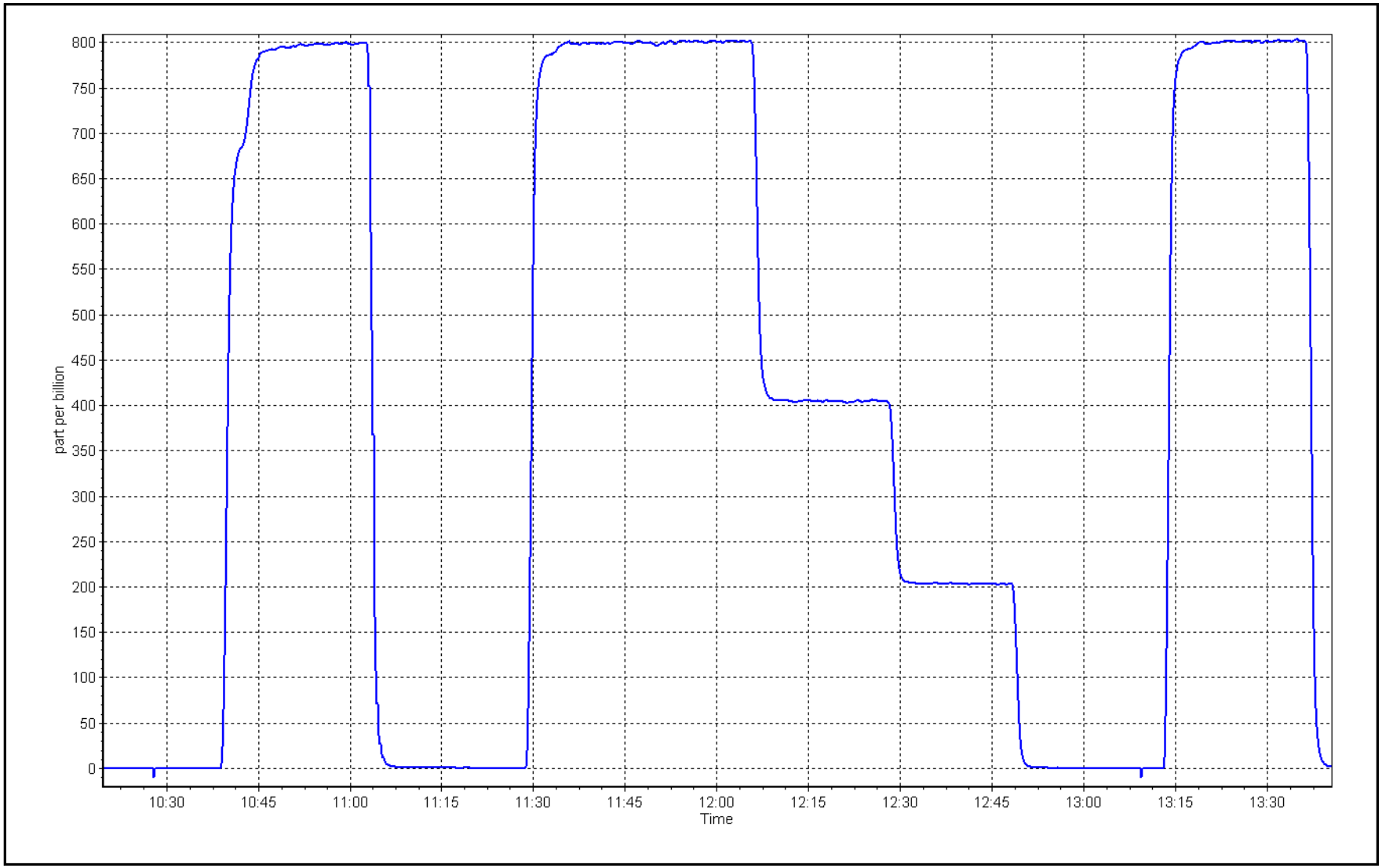
Calibration Date:	December 15, 2023	Previous Calibration:	November 20, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:14	End Time (MST):	13:40
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1507864683

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.2	----	Correlation Coefficient	0.999955	*≥0.995*
801.2	800.9	1.0004			
400.2	404.8	0.9885	Slope	0.998820	*0.90 - 1.10*
200.1	203.0	0.9856			
			Intercept	2.284124	*+/-30*



SO2 Calibration Plot Date: December 15, 2023 Location: Athabasca Valley



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	December 19, 2023	Last Cal Date:	November 15, 2023
Start time (MST):	10:43	End time (MST):	17:04
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:	1.017229	1.003385	Backgd or Offset:	2.40	2.60
Calibration intercept:	0.057461	0.237769	Coeff or Slope:	0.893	0.983

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	4925	75.5	79.3	79.5	0.997
as found 2nd point	4962	37.7	39.6	39.8	0.995
as found 3rd point	4981	18.9	19.8	20.0	0.992
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	79.8	0.994
second point	4962	37.7	39.6	40.0	0.990
third point	4981	18.9	19.9	20.2	0.983
as left zero	5000	0.0	0.0	0.5	----
as left span	4925	75.5	79.3	80.0	0.991
SO2 Scrubber Check	4921	79.2	800.2	0.0	----
Date of last scrubber change:		25-Feb-22		Ave Corr Factor	0.989
Date of last converter efficiency test:		April 22, 2022		92.6%	efficiency

Baseline Corr As found:	79.5	Prev response:	80.69	*% change:	-1.5%
Baseline Corr 2nd AF pt:	39.8	AF Slope:	1.002661	AF Intercept:	0.057785
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999997		

* = > +/-5% change initiates investigation

Notes: Scrubber failed. Scrubber changed out, span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

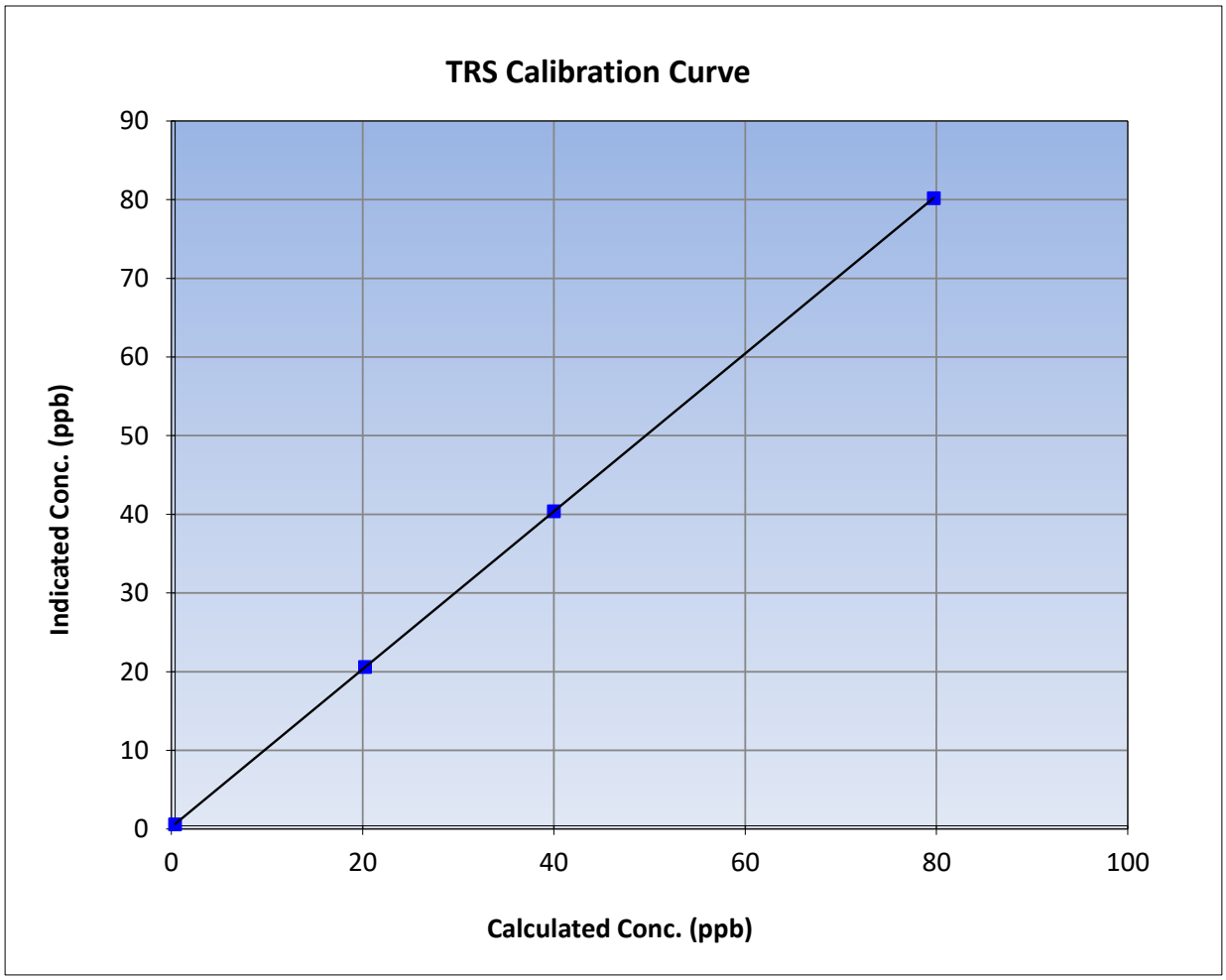
Station Information

Calibration Date:	December 19, 2023	Previous Calibration:	November 15, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:43	End Time (MST):	17:04
Analyzer make:	CDN-101	Analyzer serial #:	551

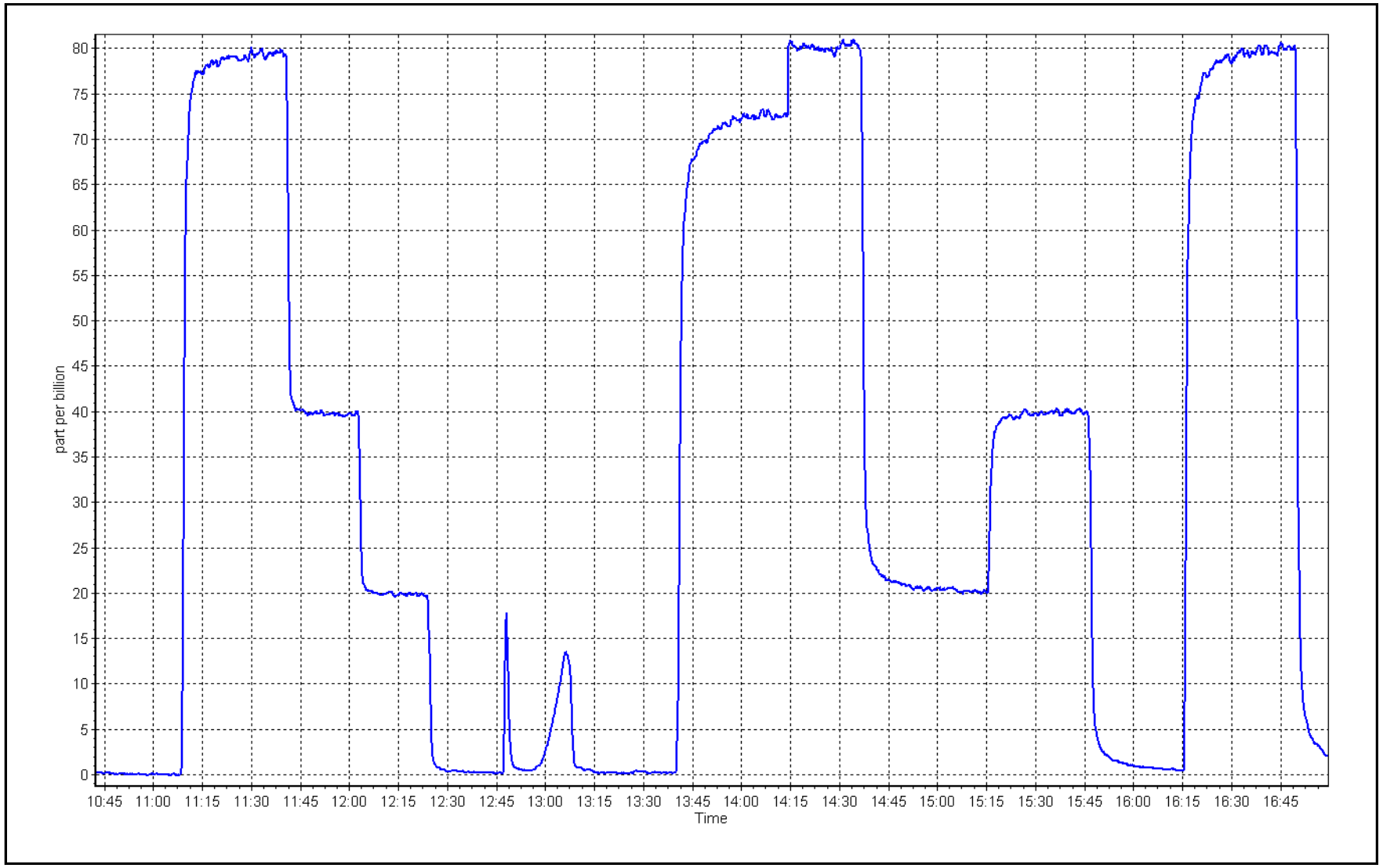
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
79.3	79.8	0.9939
39.6	40.0	0.9902
19.9	20.2	0.9830

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	1.003385	*0.90 - 1.10*
Intercept	0.237769	*+/-3*



TRS Calibration Plot Date: December 19, 2023 Location: Athabasca Valley



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	December 31, 2023	Last Cal Date:	December 19, 2023
Start time (MST):	10:26	End time (MST):	14:53
Reason:	Maintenance		

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:	1.003385	1.012033	Backgd or Offset:	2.60	2.35
Calibration intercept:	0.237769	-0.062267	Coeff or Slope:	0.983	0.893

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	4925	75.5	79.3	88.4	0.897
as found 2nd point	4962	37.7	39.6	44.0	0.900
as found 3rd point	4981	18.9	19.8	21.9	0.906
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4925	75.5	79.3	80.3	0.988
second point	4962	37.7	39.6	39.9	0.993
third point	4981	18.9	19.9	19.9	0.998
as left zero	5000	0.0	0.0	0.2	----
as left span	4925	75.5	79.3	79.4	0.999

SO2 Scrubber Check

Date of last scrubber change:	25-Feb-22	Ave Corr Factor	0.993
Date of last converter efficiency test:	April 22, 2022	92.6%	efficiency

Baseline Corr As found:	88.4	Prev response:	79.77	*% change:	9.8%
Baseline Corr 2nd AF pt:	44.0	AF Slope:	1.116006	AF Intercept:	-0.122467
Baseline Corr 3rd AF pt:	21.9	AF Correlation:	0.999991		

* = > +/-5% change initiates investigation

Notes: Calibrating due to drift.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

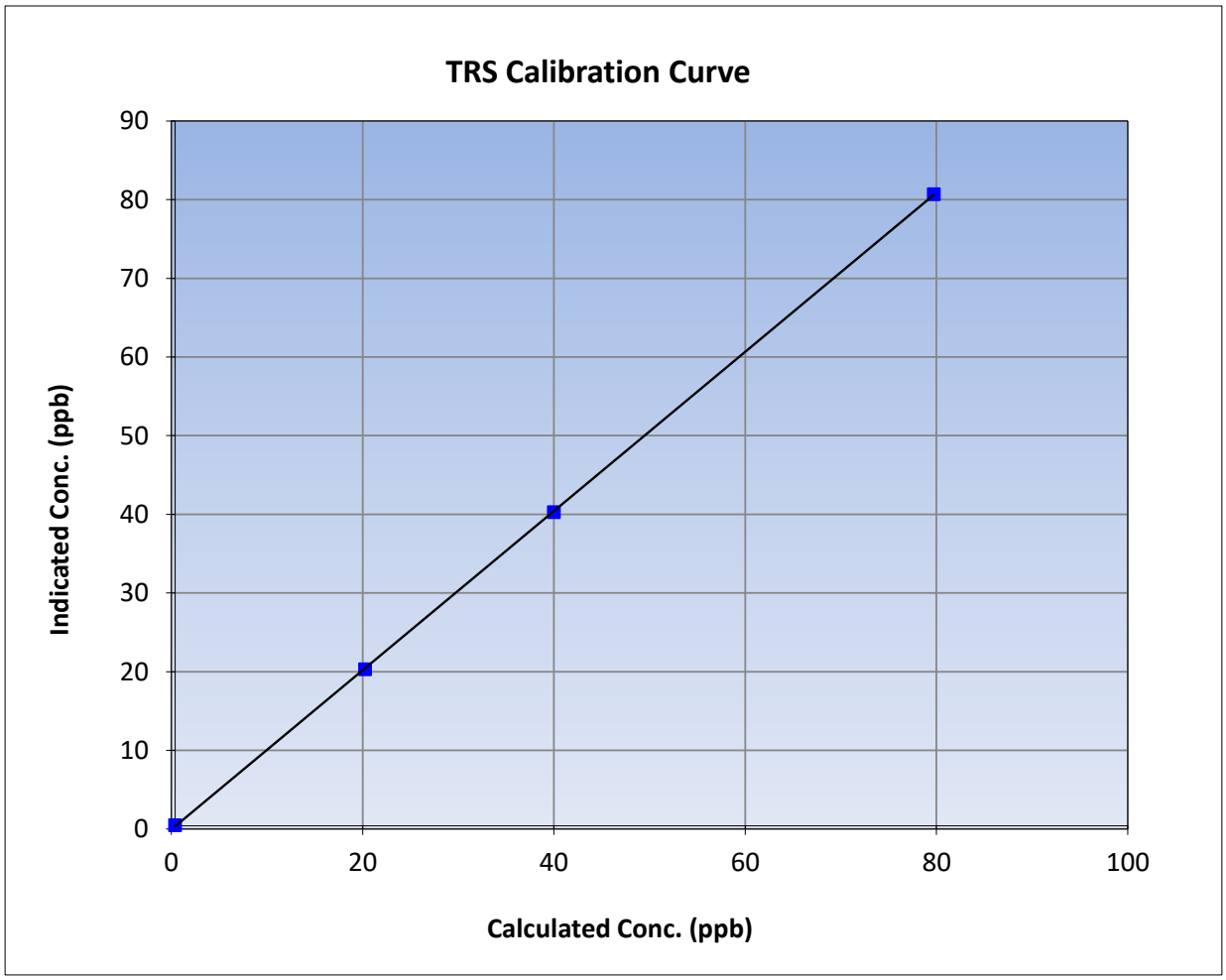
Station Information

Calibration Date:	December 31, 2023	Previous Calibration:	December 19, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:26	End Time (MST):	14:53
Analyzer make:	CDN-101	Analyzer serial #:	551

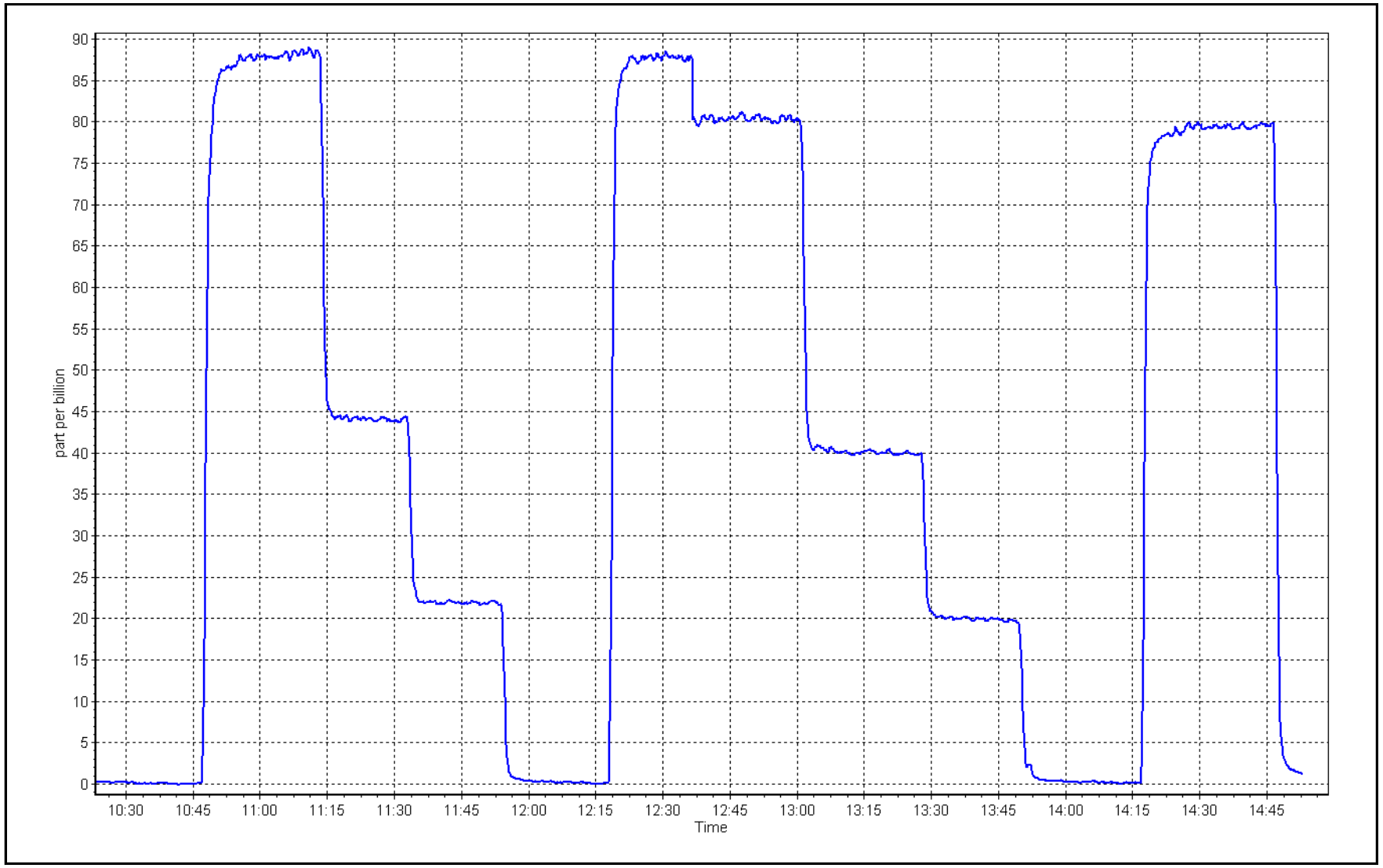
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
79.3	80.3	0.9877
39.6	39.9	0.9927
19.9	19.9	0.9978

Statistical Evaluation		Limits
Correlation Coefficient	0.999980	≥0.995
Slope	1.012033	0.90 - 1.10
Intercept	-0.062267	+/-3



TRS Calibration Plot Date: December 31, 2023 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:	December 15, 2023	Last Cal Date:	November 20, 2023
Start time (MST):	10:14	End time (MST):	13:40
Reason:			

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1152430012	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	0.000245	0.000251	NMHC SP Ratio:	4.27E-05	4.42E-05
CH4 Retention time:	13.8	13.8	NMHC Peak Area:	213790	205554
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	16.56	1.028
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	17.14	0.993
second point	4960	39.6	8.52	8.57	0.994
third point	4980	19.8	4.26	4.29	0.992
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	17.08	0.997
				Average Correction Factor	0.993
Baseline Corr AF:	16.56	Prev response	17.03	*% change	-2.8%
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	4921	79.2	9.09	8.81	1.032
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	9.09	9.17	0.992
second point	4960	39.6	4.55	4.61	0.986
third point	4980	19.8	2.27	2.34	0.973
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	9.09	9.14	0.995
				Average Correction Factor	0.983
Baseline Corr AF:	8.81	Prev response	9.11	*% change	-3.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	7.94	7.76	1.023
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	7.94	7.98	0.995
second point	4960	39.6	3.97	3.95	1.005
third point	4980	19.8	1.98	1.95	1.016
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.94	7.94	1.000
				Average Correction Factor	1.005
Baseline Corr AF:	7.76	Prev response	7.92	*% change	-2.1%
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:	0.999689	1.006595
THC Cal Offset:	0.010659	0.000457
CH4 Cal Slope:	1.001158	1.005894
CH4 Cal Offset:	-0.026358	-0.023559
NMHC Cal Slope:	0.998306	1.006942
NMHC Cal Offset:	0.037416	0.023816

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

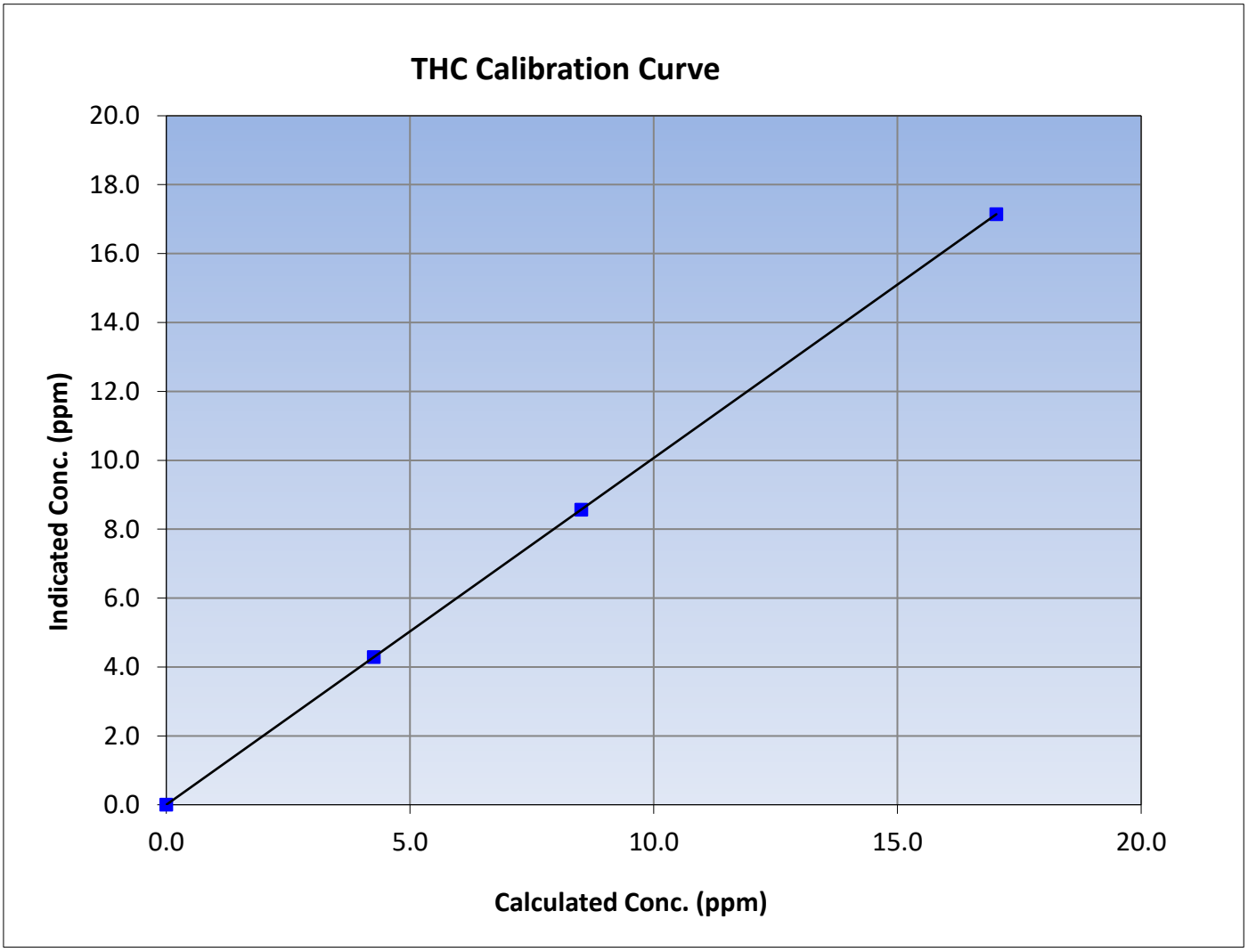
Version-06-2022

Station Information

Calibration Date:	December 15, 2023	Previous Calibration:	November 20, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:14	End Time (MST):	13:40
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*
17.03	17.14	0.9933			
8.52	8.57	0.9941	Slope	1.006595	*0.90 - 1.10*
4.26	4.29	0.9922			
			Intercept	0.000457	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

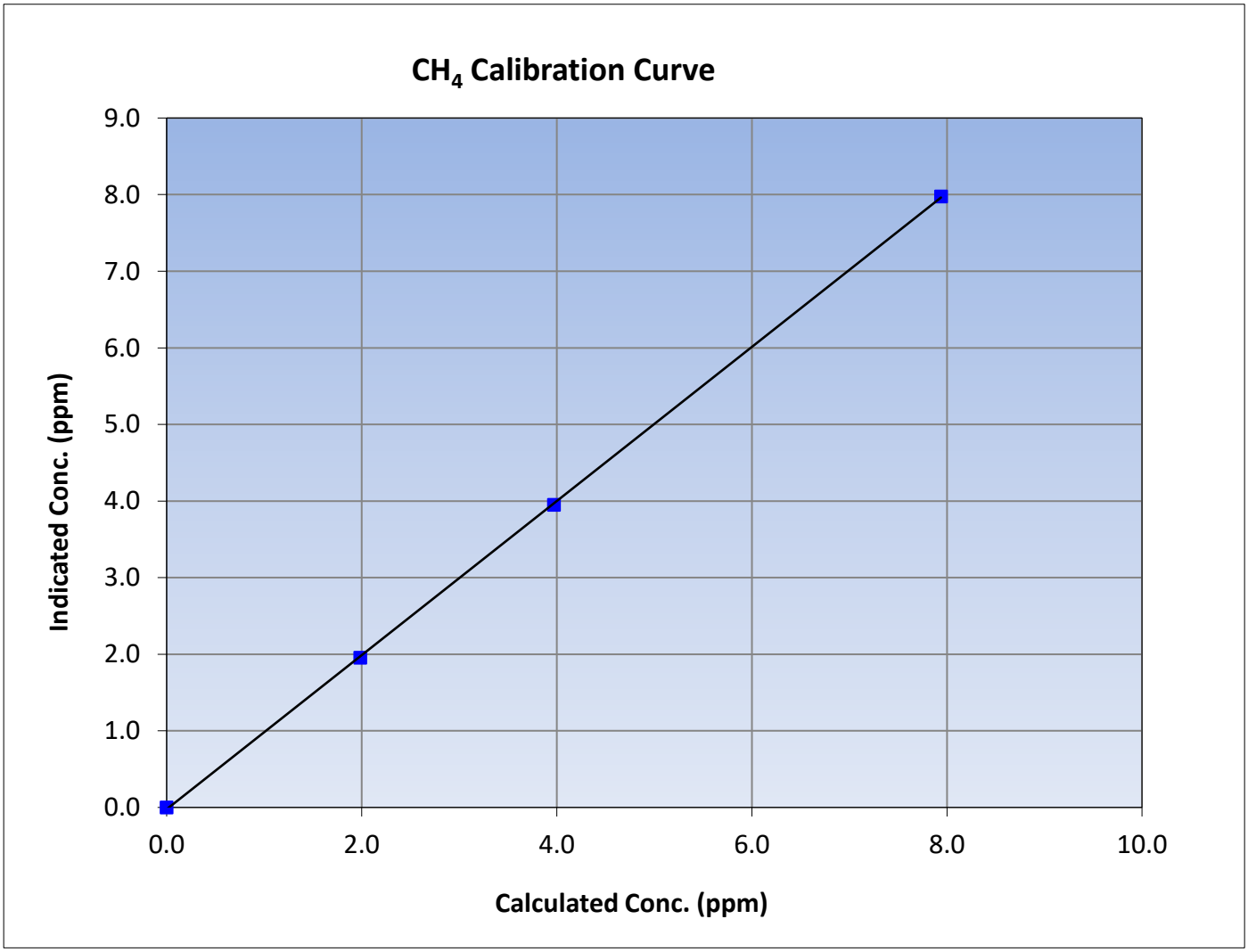
Version-06-2022

Station Information

Calibration Date:	December 15, 2023	Previous Calibration:	November 20, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:14	End Time (MST):	13:40
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	0.999958	*≥0.995*
7.94	7.98	0.9953			
3.97	3.95	1.0048	Slope	1.005894	*0.90 - 1.10*
1.98	1.95	1.0158			
			Intercept	-0.023559	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

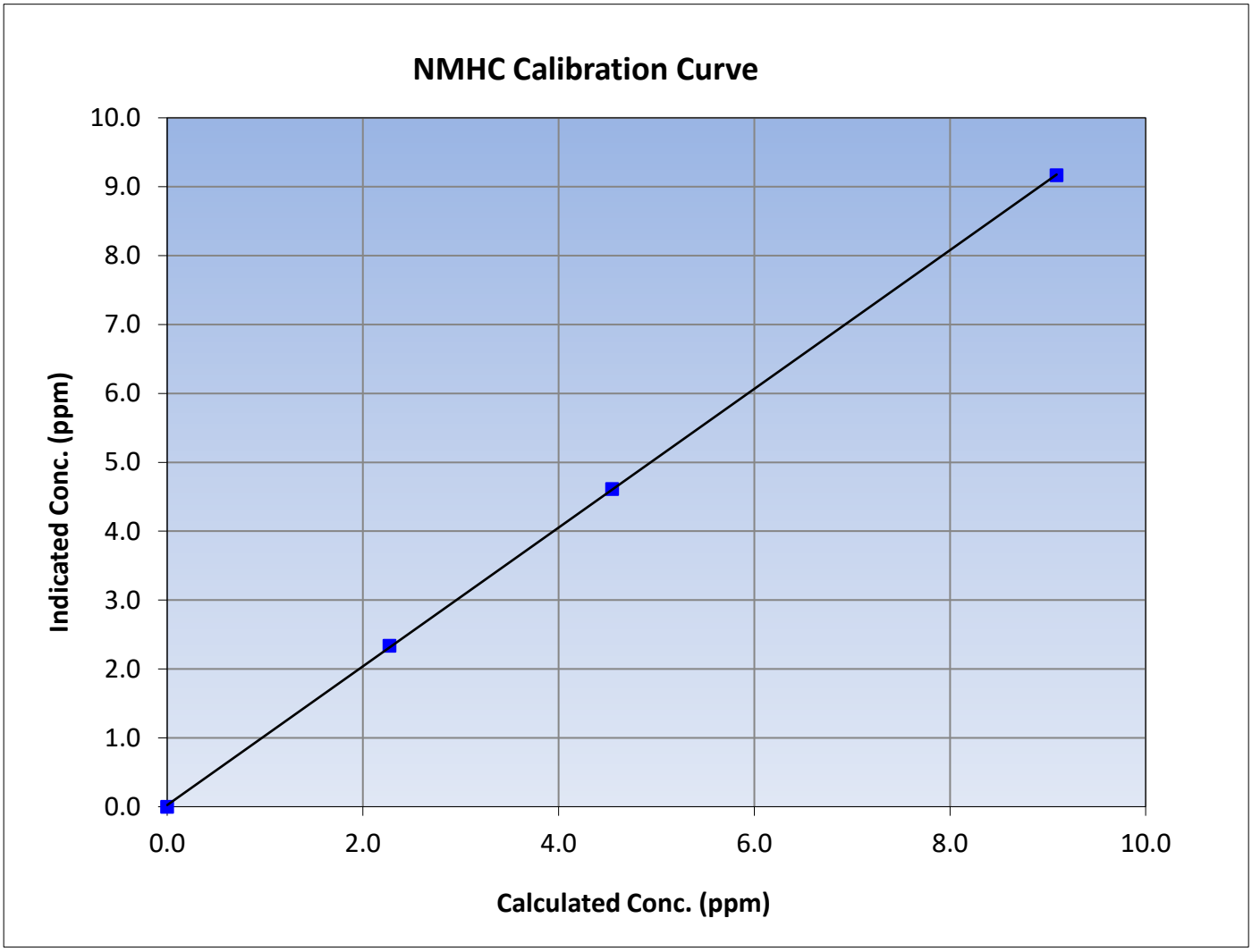
Version-06-2022

Station Information

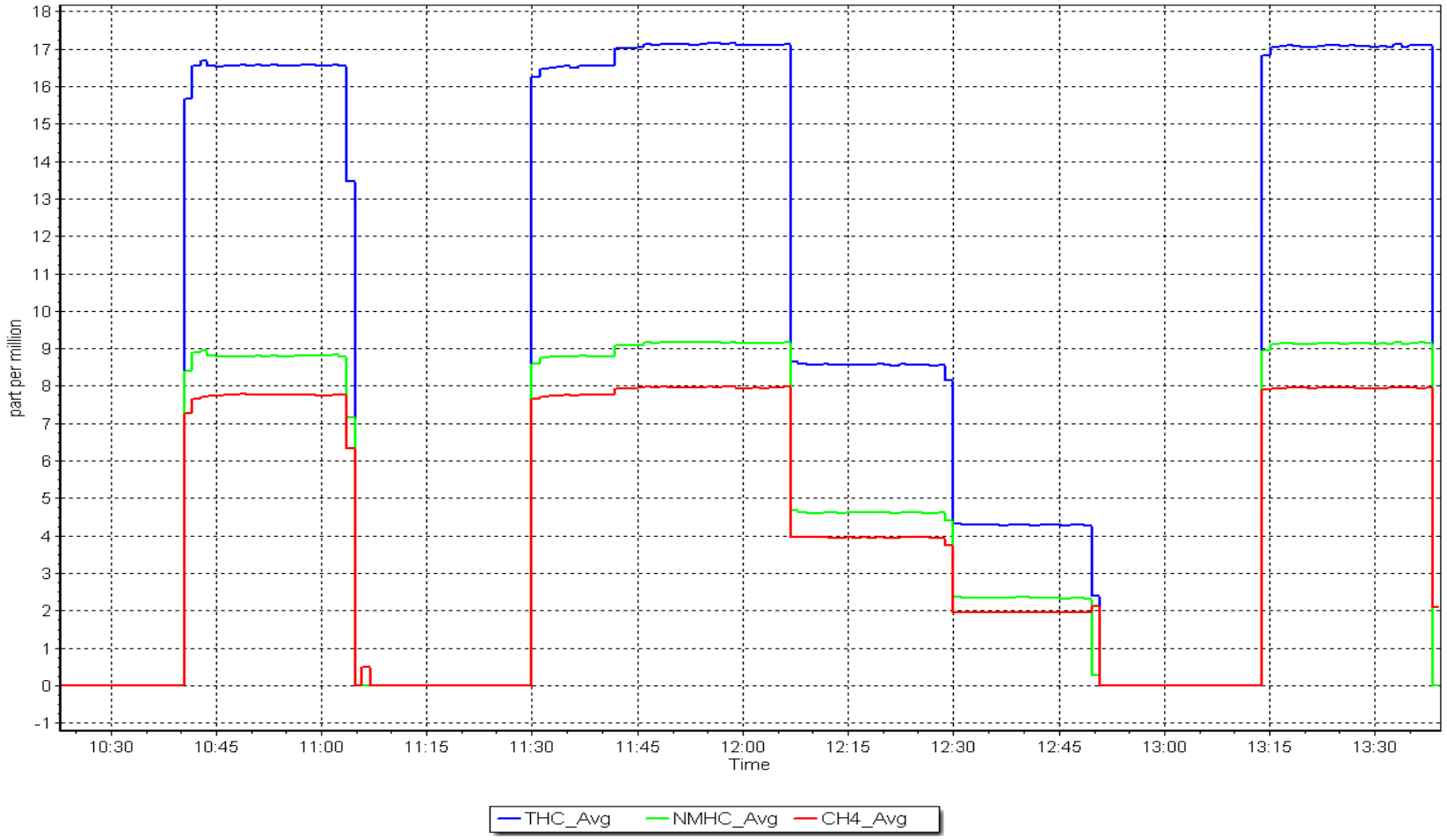
Calibration Date:	December 15, 2023	Previous Calibration:	November 20, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:14	End Time (MST):	13:40
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999969	*≥0.995*
9.09	9.17	0.9918			
4.55	4.61	0.9857	Slope	1.006942	*0.90 - 1.10*
2.27	2.34	0.9725			
			Intercept	0.023816	*+/-0.5*



NMHC Calibration Plot Date: December 15, 2023 Location: Athabasca Valley



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	December 13, 2023	Last Cal Date:	November 1, 2023
Start time (MST):	10:04	End time (MST):	15:34
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:	1.083	1.095	NO bkgnd or offset:	7.6	7.7
NOX coeff or slope:	0.993	0.994	NOX bkgnd or offset:	7.8	7.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	212.3	212.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.998915	0.999335
NO_X Cal Offset:	1.318809	1.718942
NO Cal Slope:	1.001602	1.000317
NO Cal Offset:	1.035305	1.435177
NO_2 Cal Slope:	0.997138	0.998685
NO_2 Cal Offset:	0.710095	0.269234

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	0.1	----	----
as found span	4920	80.2	816.7	800.7	16.0	808.0	792.1	16.1	1.0108	1.0108
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
high point	4920	80.2	816.7	800.7	16.0	816.6	801.2	15.3	1.0002	0.9994
second point	4960	40.1	408.4	400.4	8.0	412.1	404.0	8.1	0.9909	0.9910
third point	4980	20.0	203.7	199.7	4.0	205.9	201.7	4.2	0.9892	0.9900
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.2	----	----
as left span	4920	80.2	816.7	396.3	420.4	821.2	399.3	421.9	0.9945	0.9924
								Average Correction Factor	0.9934	0.9934

Corrected As found	NO_X = 808.0 ppb	NO = 792.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-1.1%
Previous Response	NO_X = 817.2 ppb	NO = 803.0 ppb		*Percent Change	NO =	-1.4%
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)	800.2	395.8	420.4	419.8	1.0015	99.8%
2nd GPT point (200 ppb O3)	800.2	598.3	217.9	218.8	0.9961	100.4%
3rd GPT point (100 ppb O3)	800.2	697.9	118.3	118.1	1.0020	99.8%
				Average Correction Factor	0.9999	100.0%

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

NO_X Calibration Summary

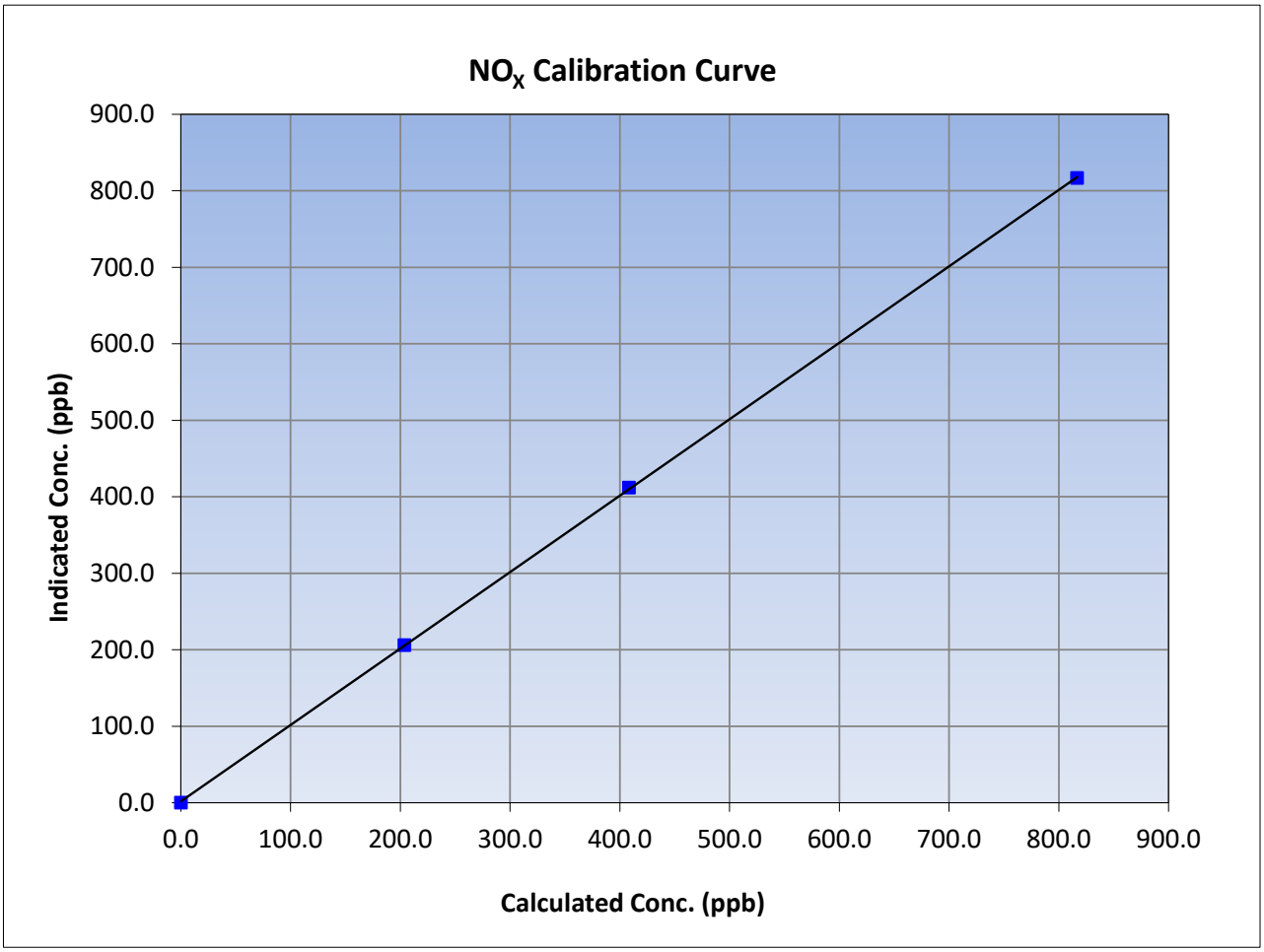
Version-04-2020

Station Information

Calibration Date:	December 13, 2023	Previous Calibration:	November 1, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:04	End Time (MST):	15:34
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999973	≥0.995
816.7	816.6	1.0002			
408.4	412.1	0.9909	Slope	0.999335	0.90 - 1.10
203.7	205.9	0.9892			
			Intercept	1.718942	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

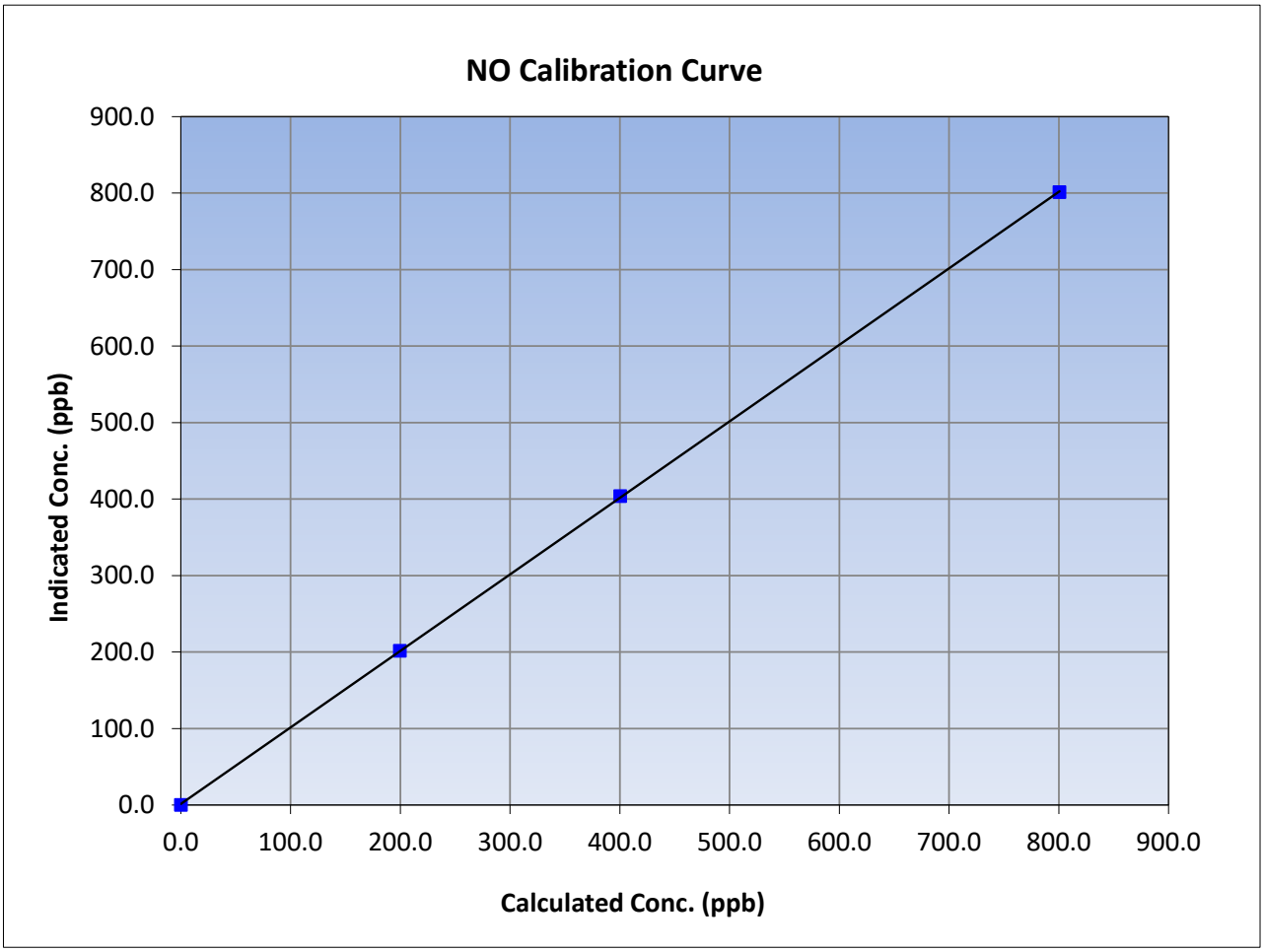
Version-04-2020

Station Information

Calibration Date:	December 13, 2023	Previous Calibration:	November 1, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:04	End Time (MST):	15:34
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	0.999977	≥0.995
800.7	801.2	0.9994			
400.4	404.0	0.9910	Slope	1.000317	0.90 - 1.10
199.7	201.7	0.9900			
			Intercept	1.435177	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

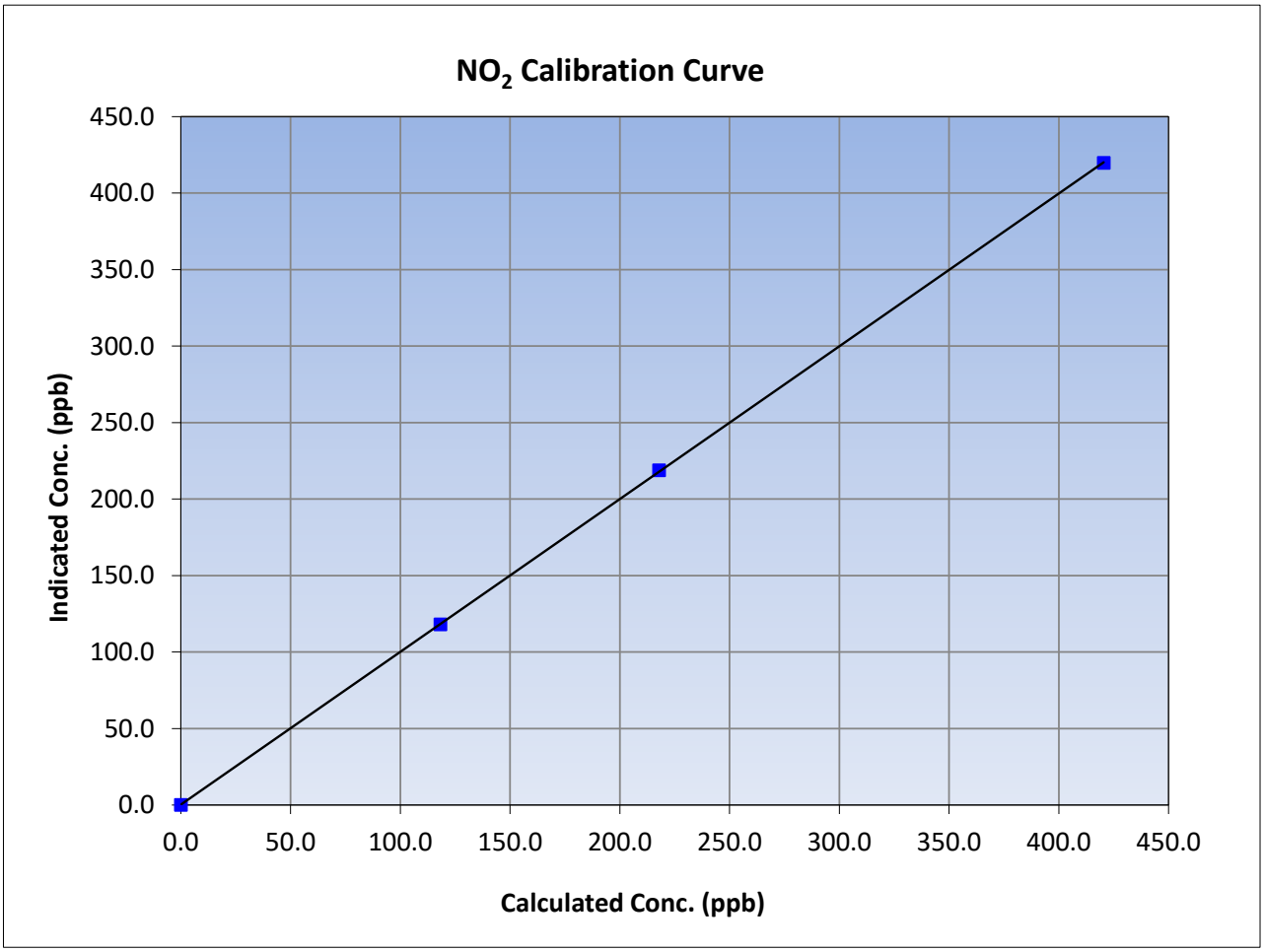
Version-04-2020

Station Information

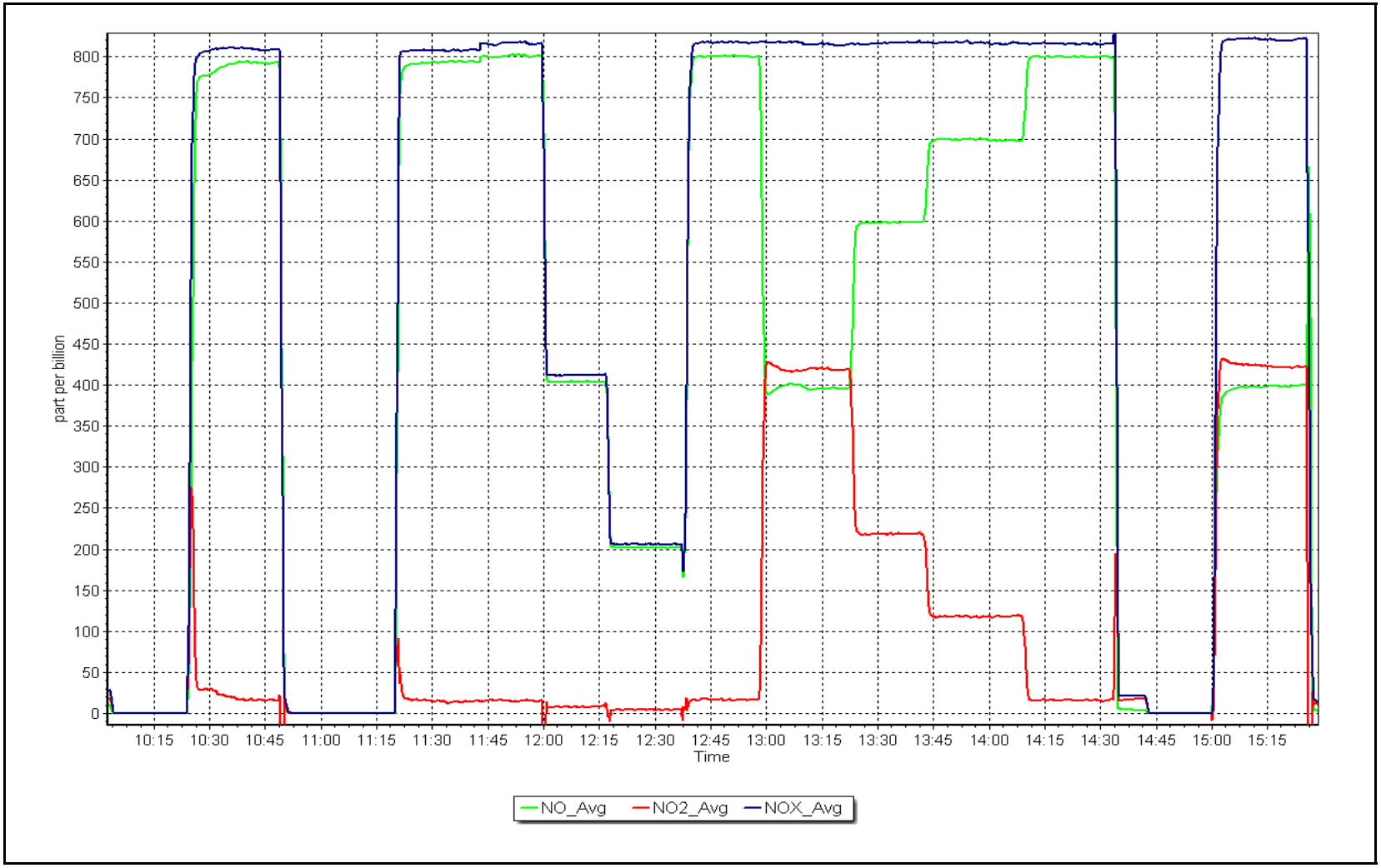
Calibration Date:	December 13, 2023	Previous Calibration:	November 1, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:04	End Time (MST):	15:34
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.1	----	Correlation Coefficient	0.999989	*≥0.995*
420.4	419.8	1.0015			
217.9	218.8	0.9961	Slope	0.998685	*0.90 - 1.10*
118.3	118.1	1.0020			
			Intercept	0.269234	*+/-20*



NO_X Calibration Plot Date: December 13, 2023 Location: Athabasca Valley



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	December 14, 2023	Last Cal Date:	November 14, 2023
Start time (MST):	10:41	End time (MST):	14:27
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	Finish		Start	Finish
Calibration slope:	1.003886	0.994743	Backgd or Offset:	-2.7	-2.7
Calibration intercept:	0.320000	0.420000	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	-1.8	----
as found span	5000	1414.8	400.0	396.5	1.009
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.7	----
high point	5000	1415.7	400.0	397.9	1.005
second point	5000	1039.9	200.0	199.5	1.003
third point	5000	856.2	100.0	101.3	0.987
as left zero	5000	0.0	0.0	-0.2	----
as left span	5000	1416.0	400.0	401.6	0.996
				Average Correction Factor	0.998

Baseline Corr As found:	398.3	Previous response	401.9	*% 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: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

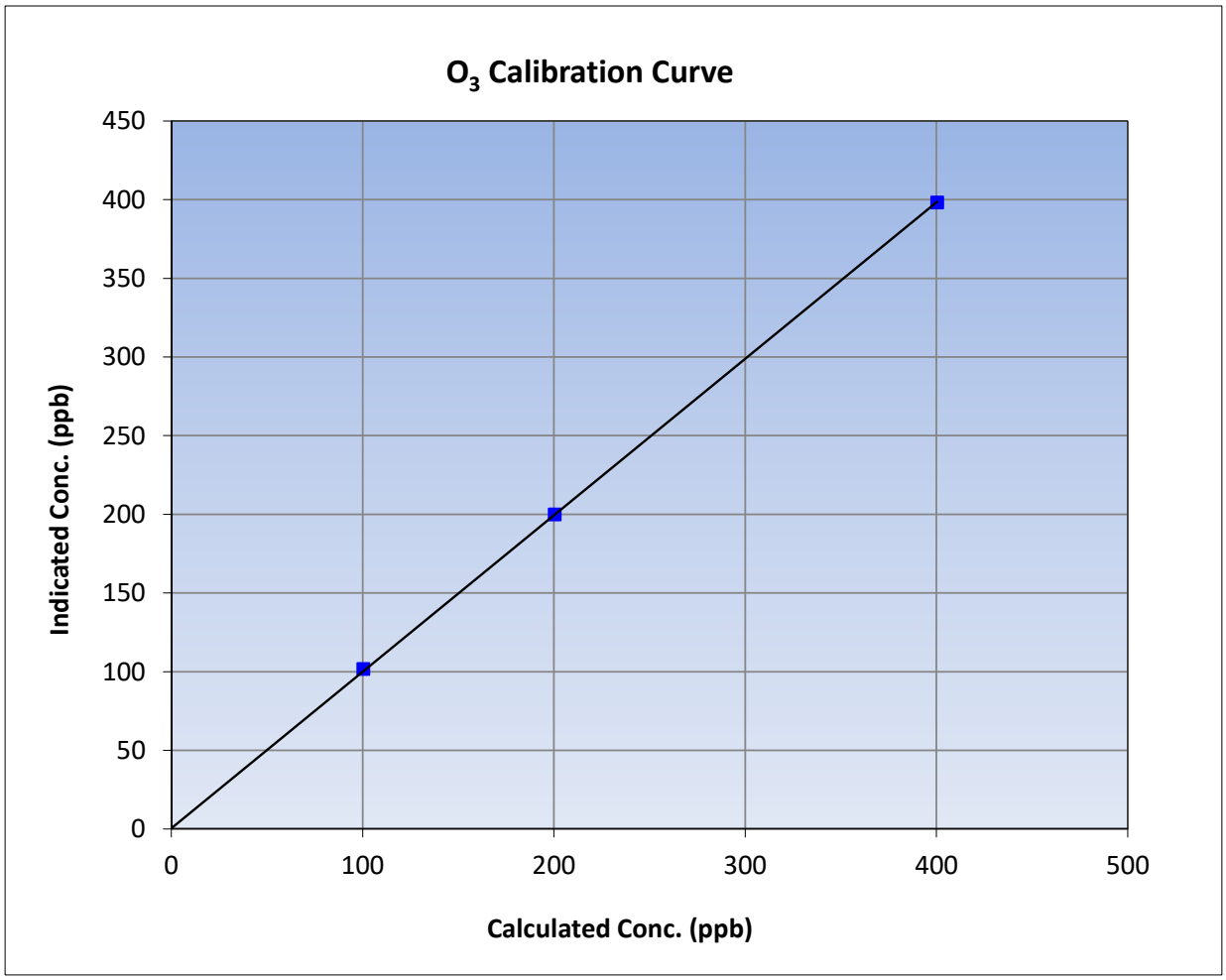
Station Information

Calibration Date:	December 14, 2023	Previous Calibration:	November 14, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:41	End Time (MST):	14:27
Analyzer make:	Thermo 49i	Analyzer serial #:	1152220023

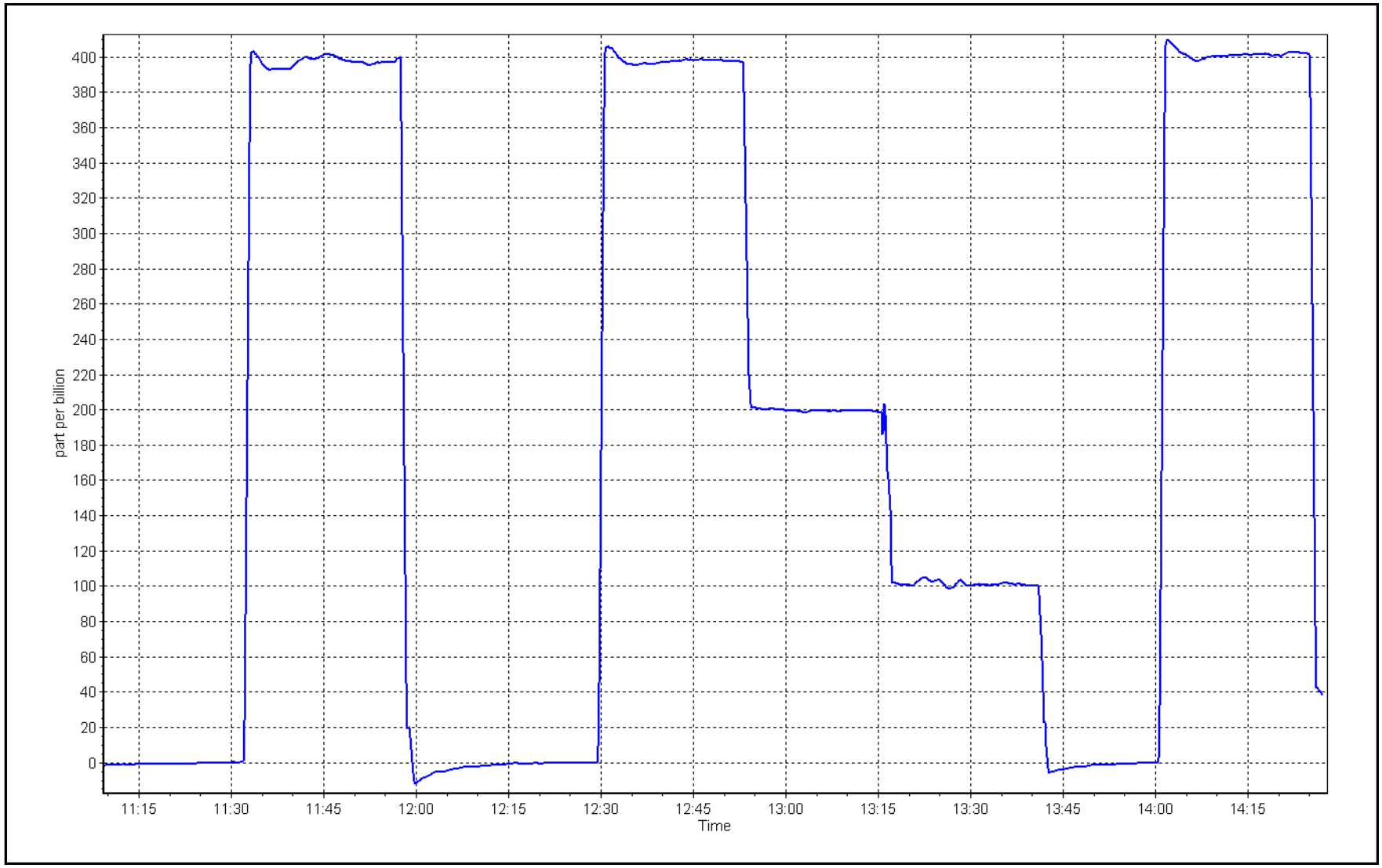
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.7	----
400.0	397.9	1.0053
200.0	199.5	1.0025
100.0	101.3	0.9872

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999960	*≥0.995*
Slope	0.994743	*0.90 - 1.10*
Intercept	0.420000	*+/- 5*



O_3 Calibration Plot Date: December 14, 2023 Location: Athabasca Valley



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Athabasca Valley	Station number:	AMS 07
Calibration Date:	December 13, 2023	Last Cal Date:	November 10, 2023
Start time (MST):	10:35	End time (MST):	NA
Analyzer Make:	API T640	S/N:	871
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 (^{o}C)	-2.4	-2.9	N/A	☐	+/- 2 ^{o}C
P (mmHg)	725.6	728.45	N/A	☐	+/- 10 mmHg
flow (LPM)	4.98	5.50	N/A	☐	+/- 0.25 LPM

Leak Test: Date of check: December 13, 2023 Last Cal Date: November 10, 2023

PM w/o HEPA: 4.1 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: November 10, 2023 <0.2 ug/m3

Disposable Filter Changed: November 10, 2023

Annual Maintenance

Date Sample Tube Cleaned: December 5, 2022

Date RH/T Sensor Cleaned: December 5, 2022

Notes: Temp, flow and pressure checked. Leak check done before removal of the instrument. This instrument is being removed to be replaced by an AMU unit.

Calibration by: Aswin Sasi Kumar

Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Athabasca Valley	Station number:	AMS 07
Calibration Date:	December 13, 2023	Last Cal Date:	N/A
Start time (MST):	12:48	End time (MST):	14:33
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)	-1.6	-1.1	-1.6	☐	+/- 2 °C
P (mmHg)	728.8	728.45	728.8	☐	+/- 10 mmHg
flow (LPM)	4.94	5.48	4.99	☑	+/- 0.25 LPM

Leak Test: Date of check: December 13, 2023 Last Cal Date: N/A

PM w/o HEPA: 3.9 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	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: Install calibration. 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:	December 8, 2023	Last Cal Date:	November 24, 2023
Start time (MST):	10:00	End time (MST):	13:00
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:	1.000228	1.000200	Backgd or Offset:	4.331	4.331
Calibration intercept:	0.080550	0.158544	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	0.1	----
high point	4933	66.7	40.0	40.1	0.997
second point	4967	33.3	20.0	20.3	0.987
third point	4983	16.7	10.0	10.2	0.982
as left zero	5000	0.0	0.0	0.1	----
as left span	4933	66.7	40.0	40.1	0.998
				Average Correction Factor	0.989

Baseline Corr As found:	40.02	Prev response:	40.11	*% change:	-0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments made.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

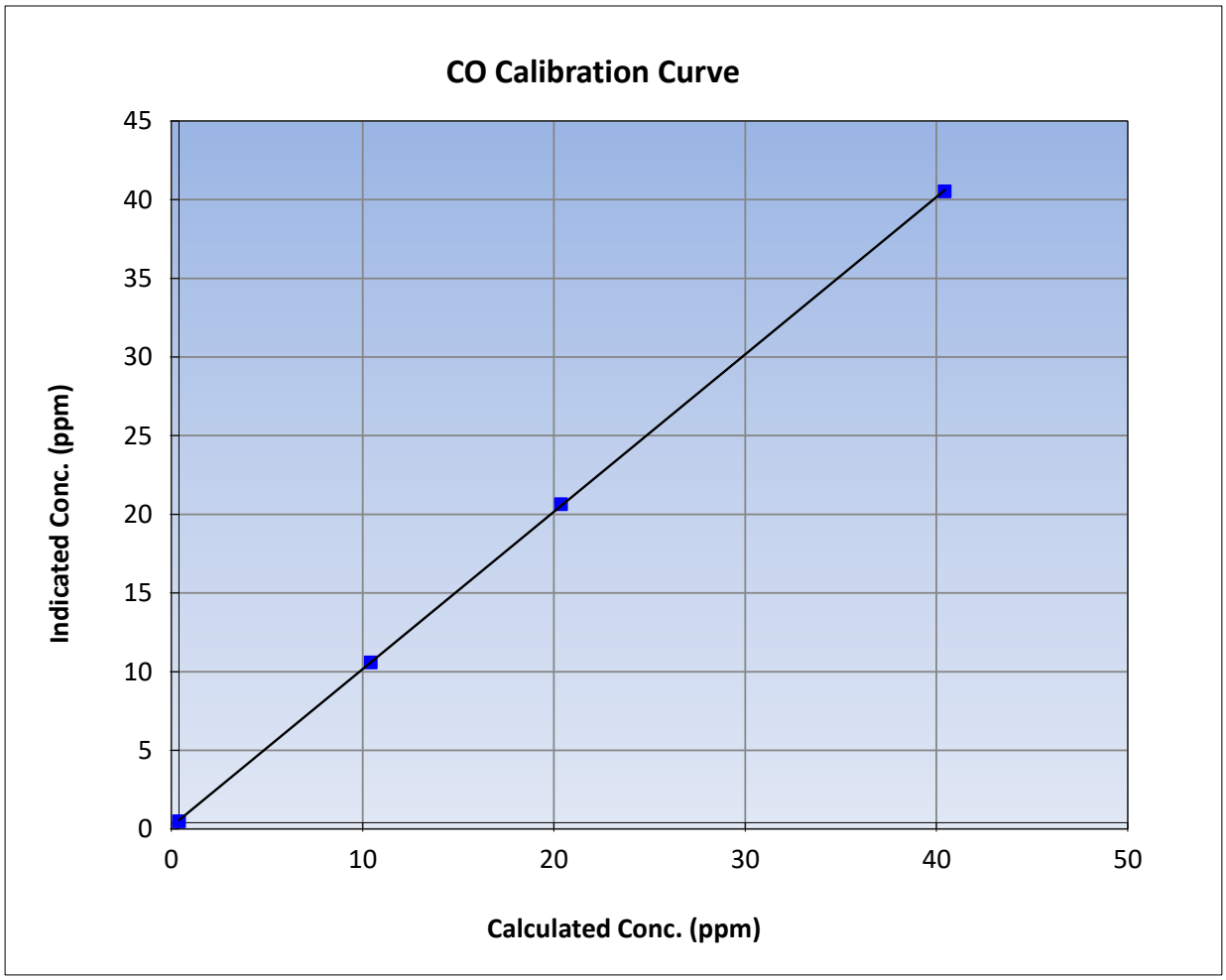
Station Information

Calibration Date:	December 8, 2023	Previous Calibration:	November 24, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:00	End Time (MST):	13:00
Analyzer make:	Thermo 48i-LTE	Analyzer serial #:	1408761381

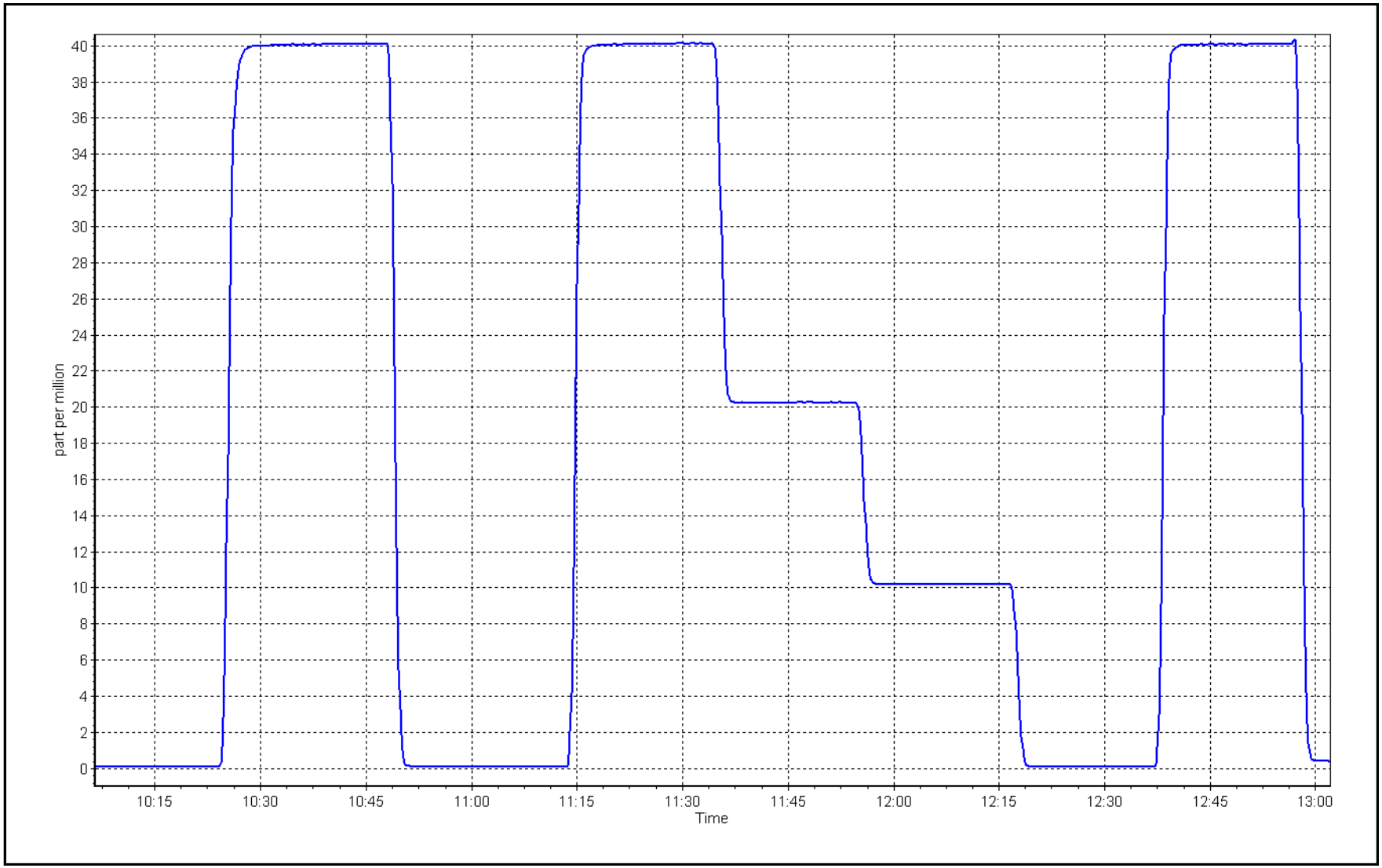
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
40.0	40.1	0.9973
20.0	20.3	0.9866
10.0	10.2	0.9824

Statistical Evaluation		Limits
Correlation Coefficient	0.999977	≥0.995
Slope	1.000200	0.90 - 1.10
Intercept	0.158544	+/-1.5



CO Calibration Plot Date: December 8, 2023 Location: Athabasca Valley



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS08
FORT CHIPEWYAN
DECEMBER 2023

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

January 31, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	December 13, 2023	Last Cal Date:	November 8, 2023
Start time (MST):	10:03	End time (MST):	12:56
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:	1.000960	0.988680	Backgd or Offset:	4.61	4.62
Calibration intercept:	-1.244570	-0.942140	Coeff or Slope:	0.965	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	-3.1	----
as found span	4920	80.3	800.4	790.6	1.012
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	790.1	1.013
second point	4960	40.2	400.7	394.3	1.016
third point	4980	20.1	200.4	200.1	1.001
as left zero	5000	0.0	0.0	-2.7	----
as left span	4920	80.3	800.4	792.4	1.010
				Average Correction Factor	1.010

Baseline Corr As found: 793.70 Previous response 799.91 *% change -0.8%

* = > +/-5% change initiates investigation

Notes: changed inlet filters after as founds.

Calibration Performed By: Matthew C

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

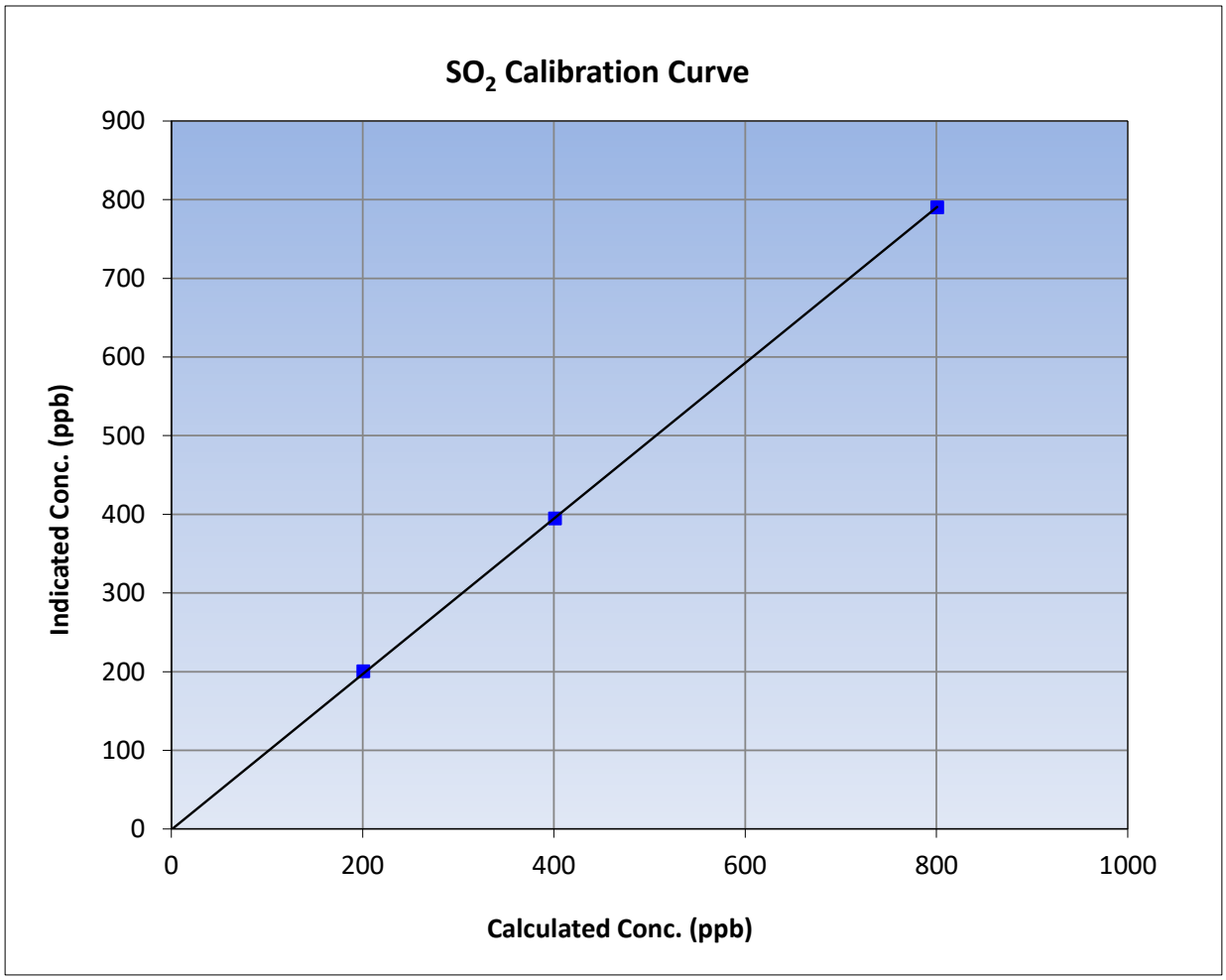
Station Information

Calibration Date:	December 13, 2023	Previous Calibration:	November 8, 2023
Station Name:	December 13, 2023	Station Number:	Fort Chipewyan
Start Time (MST):	10:03	End Time (MST):	12:56
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1136451241

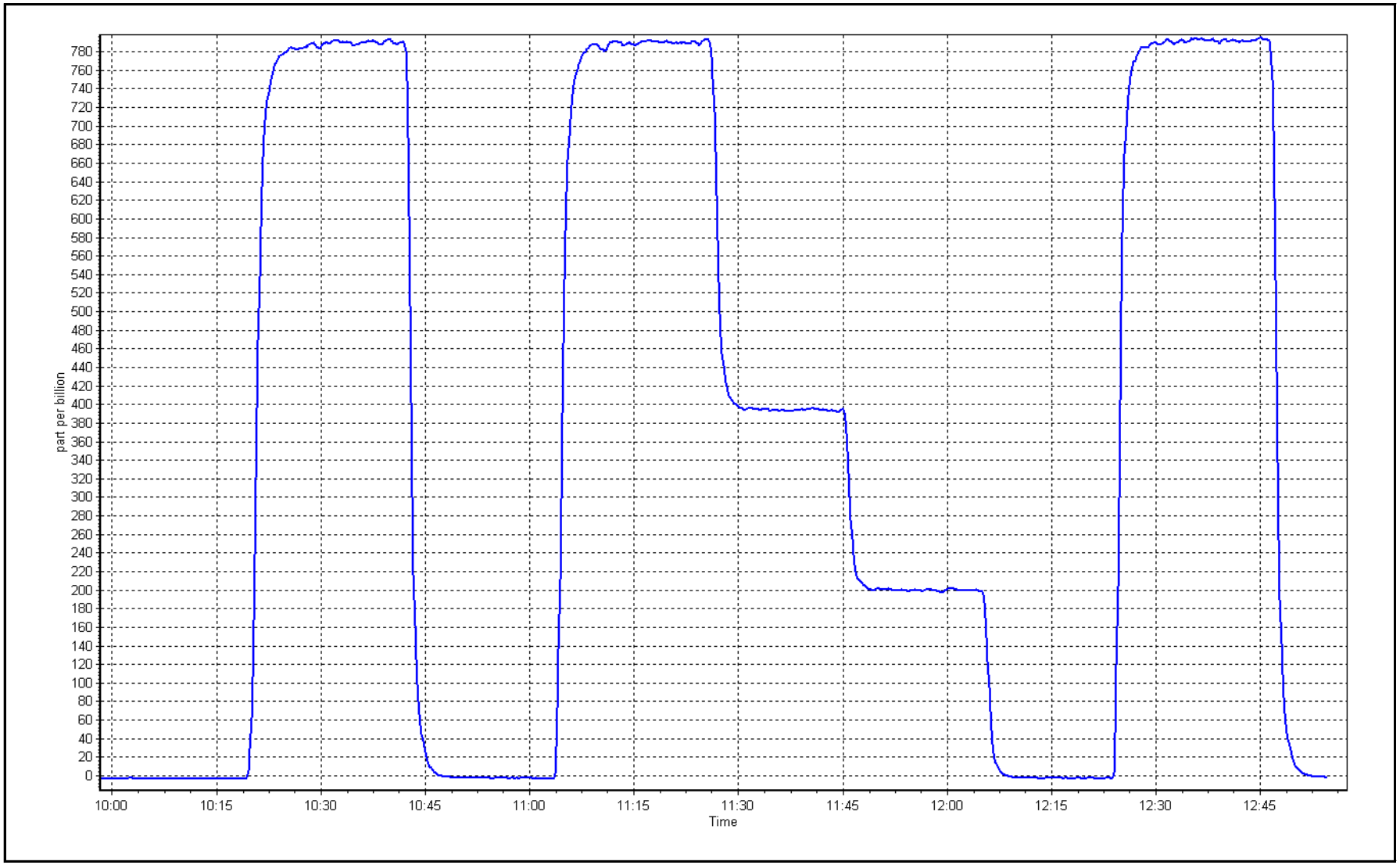
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-2.7	----
800.4	790.1	1.0130
400.7	394.3	1.0162
200.4	200.1	1.0013

Statistical Evaluation		Limits
Correlation Coefficient	0.999963	≥0.995
Slope	0.988680	0.90 - 1.10
Intercept	-0.942140	+/-30



SO2 Calibration Plot Date: December 13, 2023 Location: Fort Chipewyan



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	December 15, 2023	Last Cal Date:	November 8, 2023
Start time (MST):	13:38	End time (MST):	17:30
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:	0.995282	0.988139	Backgd or Offset:	0.98	0.99
Calibration intercept:	0.578775	0.678668	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	40.2	1.006
as found 3rd point	4980	20.1	20.0	20.6	0.994
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	40.4	0.989
third point	4980	20.1	20.0	20.5	0.975
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	0.0	----
Date of last scrubber change:		March 7, 2022		Ave Corr Factor	0.990
Date of last converter efficiency test:		March 15, 2022		100.7%	efficiency

Baseline Corr As found:	78.9	Prev response:	80.21	*% change:	-1.7%
Baseline Corr 2nd AF pt:	39.7	AF Slope:	0.984855	AF Intercept:	0.718584
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999965		

* = > +/-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

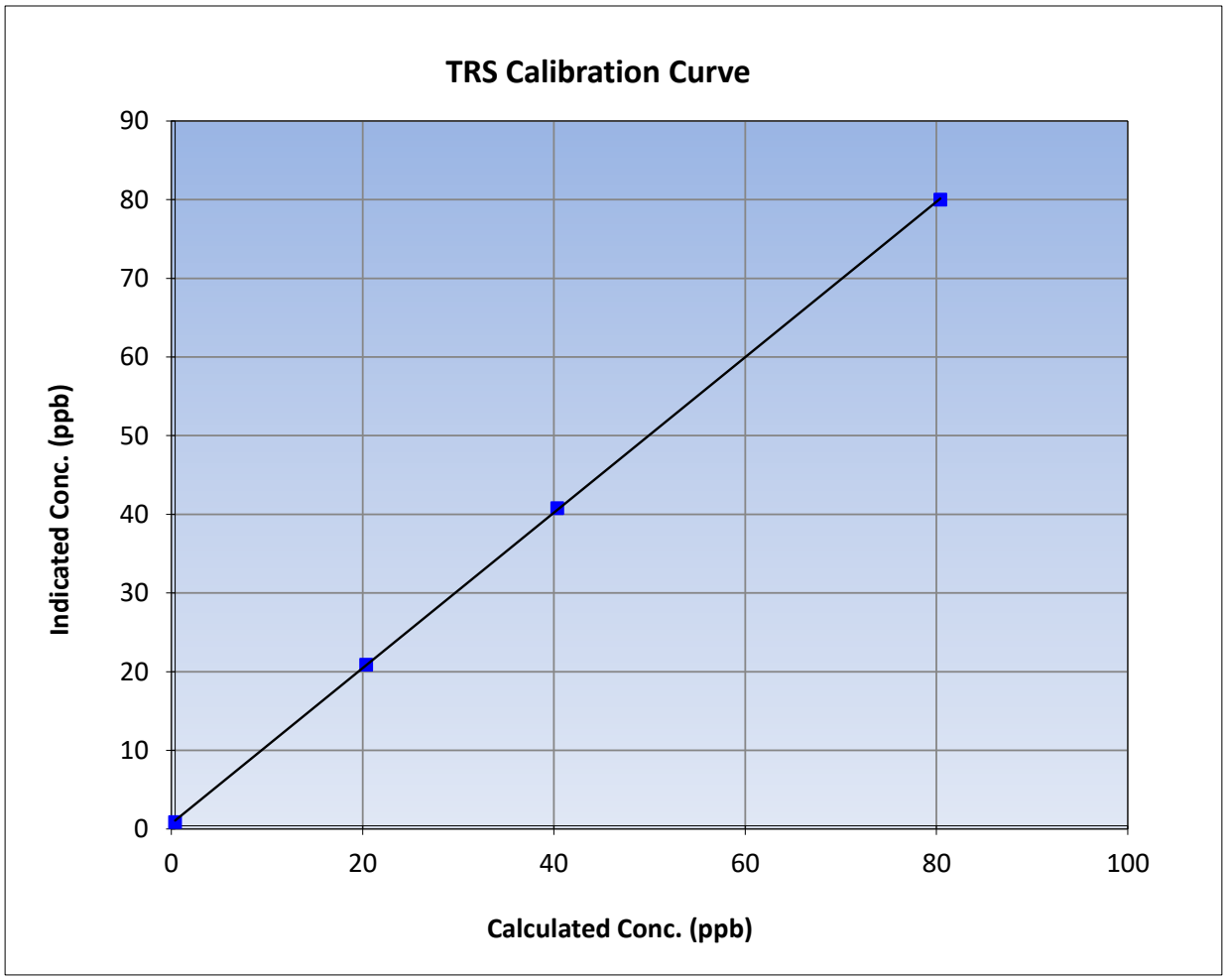
Station Information

Calibration Date:	December 15, 2023	Previous Calibration:	November 8, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	13:38	End Time (MST):	17:30
Analyzer make:	Thermo 43iQ-TL	Analyzer serial #:	1203169744

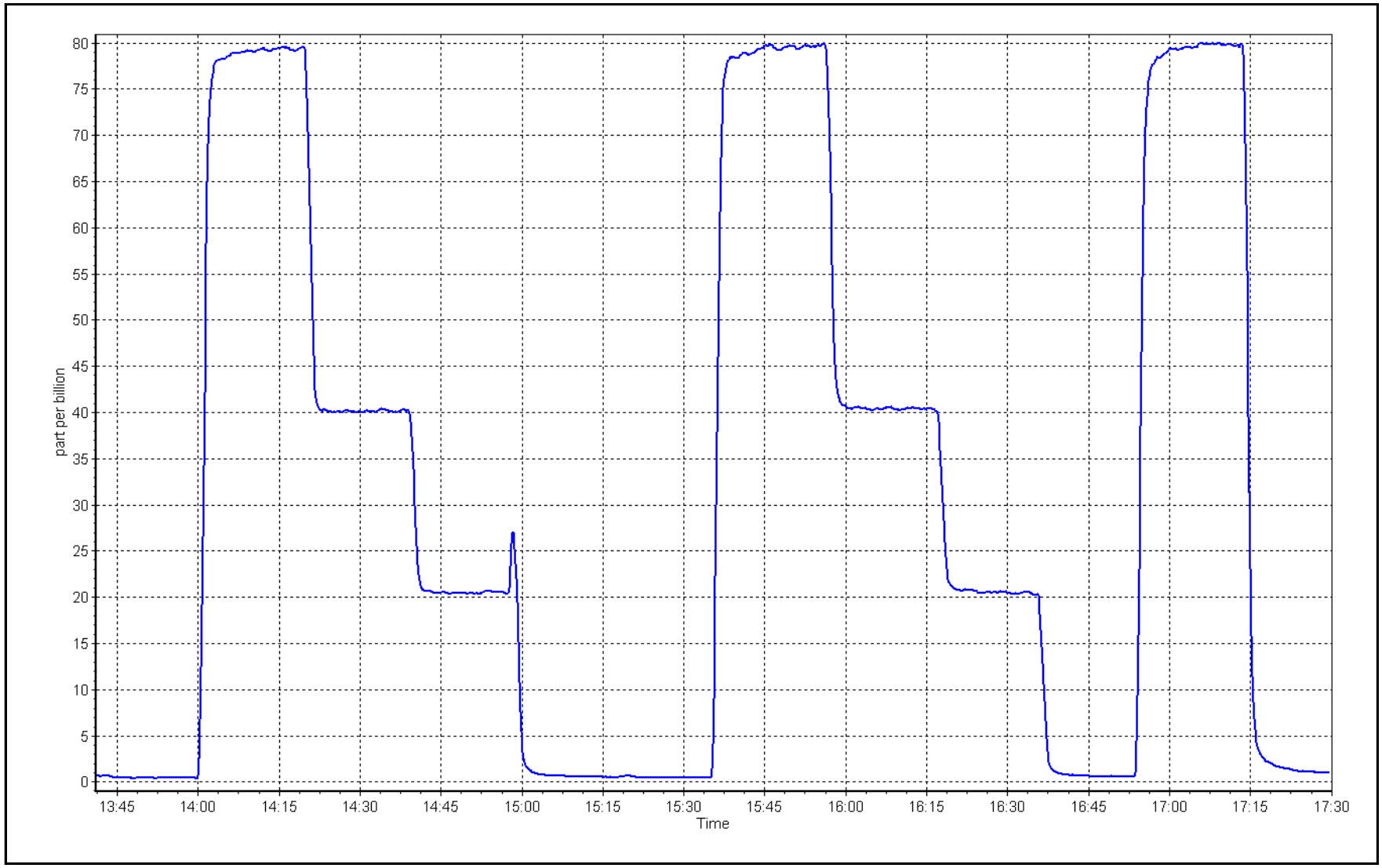
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
80.0	79.6	1.0051
40.0	40.4	0.9890
20.0	20.5	0.9746

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999967	*≥0.995*
Slope	0.988139	*0.90 - 1.10*
Intercept	0.678668	*+/-3*



TRS Calibration Plot Date: December 15, 2023 Location: Fort Chipewyan



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	December 7, 2023	Last Cal Date:	November 7, 2023
Start time (MST):	13:14	End time (MST):	17:16
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.101	1.138	NO bkgnd or offset:	10.4	10.4
NOX coeff or slope:	0.994	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:	0.999072	0.993574
NO_X Cal Offset:	1.260000	-0.140000
NO Cal Slope:	0.997544	0.992303
NO Cal Offset:	0.920000	-0.220000
NO_2 Cal Slope:	0.999622	0.994878
NO_2 Cal Offset:	-0.784149	0.734900

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	-0.7	-0.9	----	----
as found span	4918	82.0	800.3	800.3	0.0	798.2	794.6	3.6	1.0027	1.0072
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-1.4	-0.5	-0.9	----	----
high point	4918	82.0	800.3	800.3	0.0	794.5	793.8	0.7	1.0073	1.0082
second point	4959	41.0	400.2	400.2	0.0	397.8	397.0	0.4	1.0059	1.0080
third point	4980	20.5	200.1	200.1	0.0	200.1	198.6	1.5	0.9999	1.0075
as left zero	5000	0.0	0.0	0.0	0.0	-1.4	-0.5	-0.9	----	----
as left span	4918	82.0	800.3	400.6	399.7	789.3	397.9	391.4	1.0140	1.0068
								Average Correction Factor	1.0044	1.0079

Corrected As found	NO_X = 799.8 ppb	NO = 795.3 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-0.1%
Previous Response	NO_X = 800.8 ppb	NO = 799.3 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)	795.9	396.2	399.7	398.1	1.0040	99.6%
2nd GPT point (200 ppb O3)	795.9	598.1	197.8	196.9	1.0046	99.5%
3rd GPT point (100 ppb O3)	795.9	702.4	93.5	96.3	0.9709	103.0%
				Average Correction Factor	0.9932	100.7%

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

Calibration Performed By: Matthew C

Wood Buffalo Environmental Association

NO_X Calibration Summary

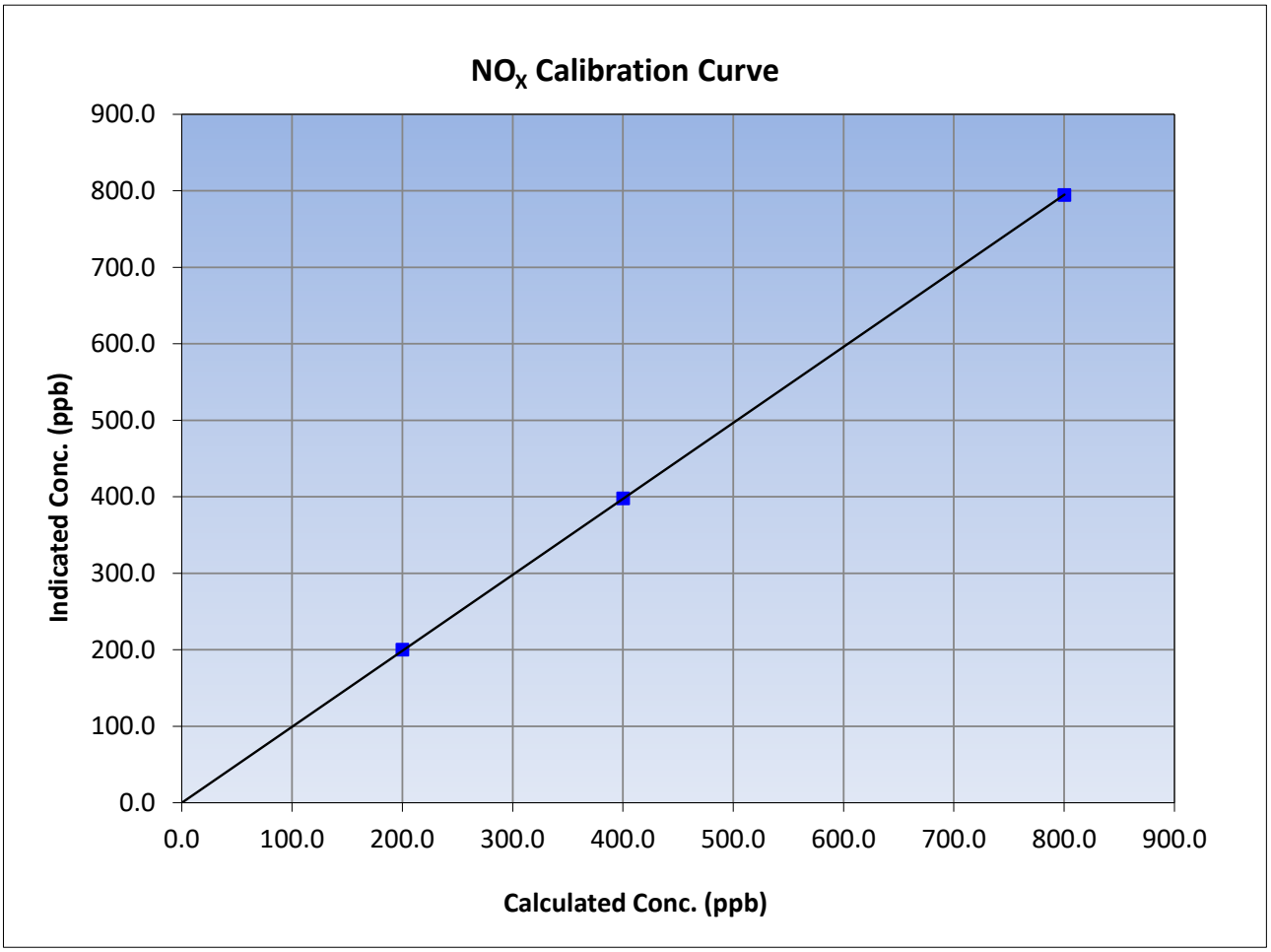
Version-04-2020

Station Information

Calibration Date:	December 7, 2023	Previous Calibration:	November 7, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	13:14	End Time (MST):	17:16
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	-1.4	----	Correlation Coefficient	0.999988	≥0.995
800.3	794.5	1.0073			
400.2	397.8	1.0059	Slope	0.993574	0.90 - 1.10
200.1	200.1	0.9999			
			Intercept	-0.140000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

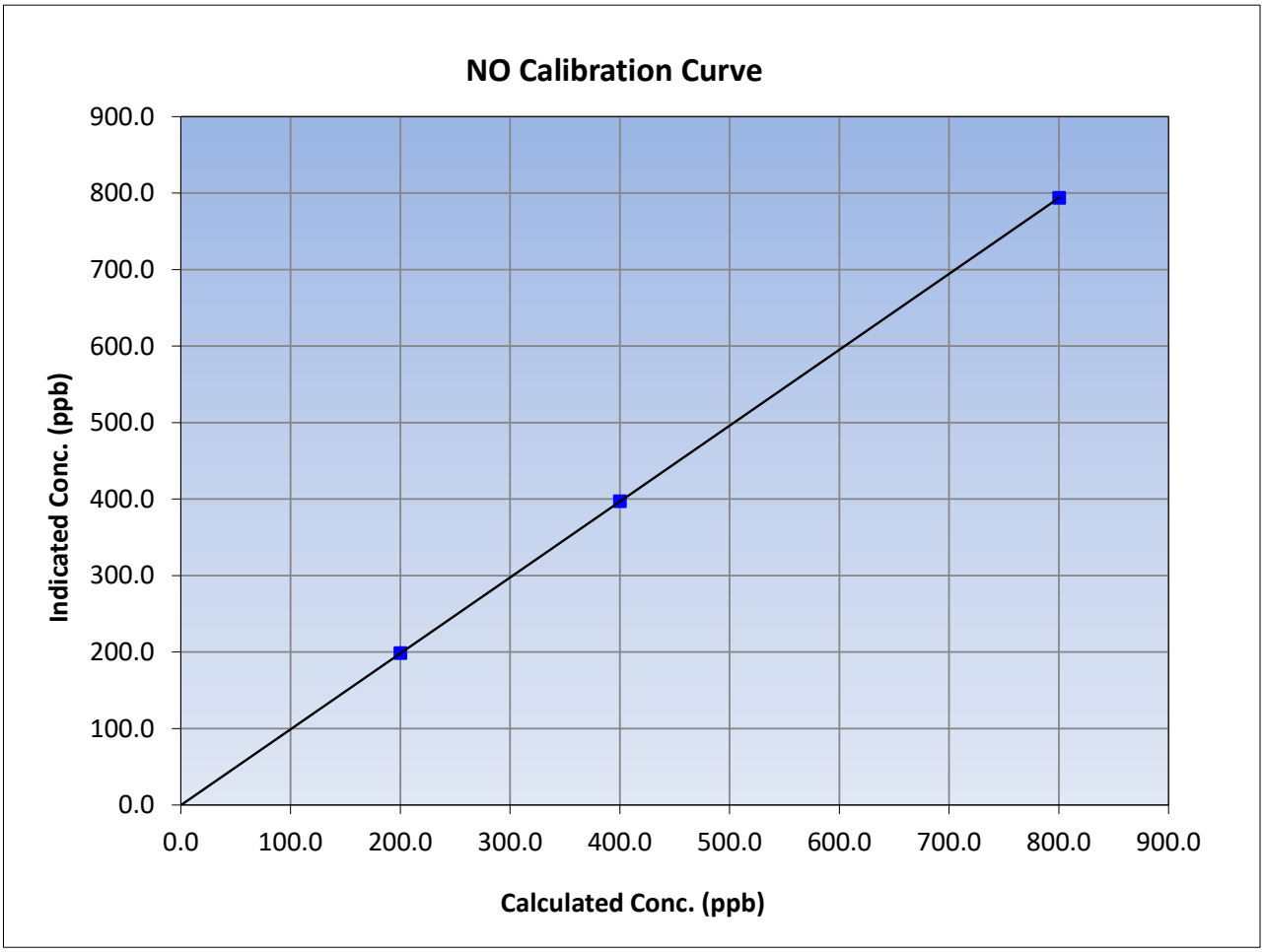
Version-04-2020

Station Information

Calibration Date:	December 7, 2023	Previous Calibration:	November 7, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	13:14	End Time (MST):	17:16
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	-0.5	----	Correlation Coefficient	0.999999	≥0.995
800.3	793.8	1.0082			
400.2	397.0	1.0080	Slope	0.992303	0.90 - 1.10
200.1	198.6	1.0075			
			Intercept	-0.220000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

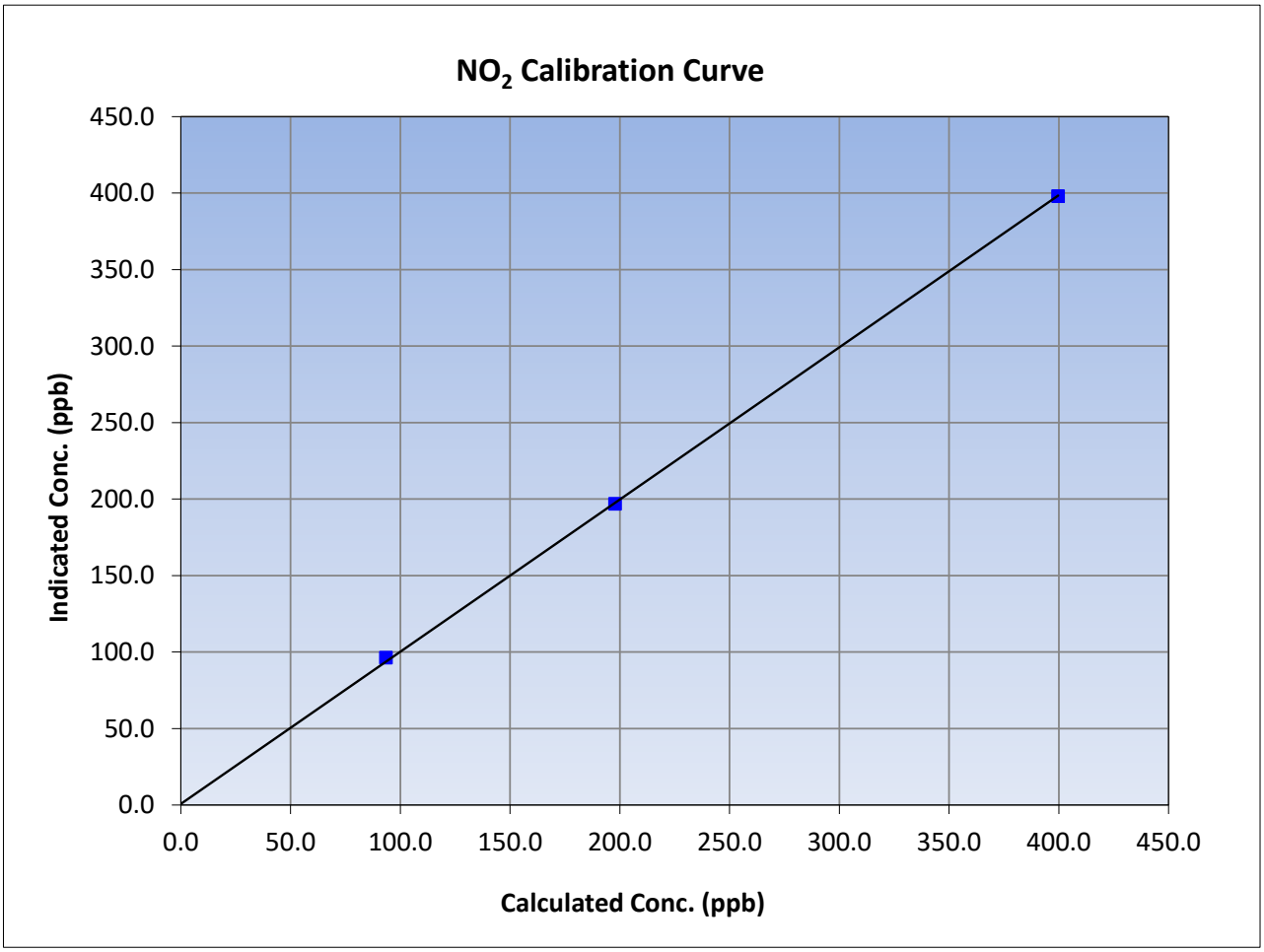
Version-04-2020

Station Information

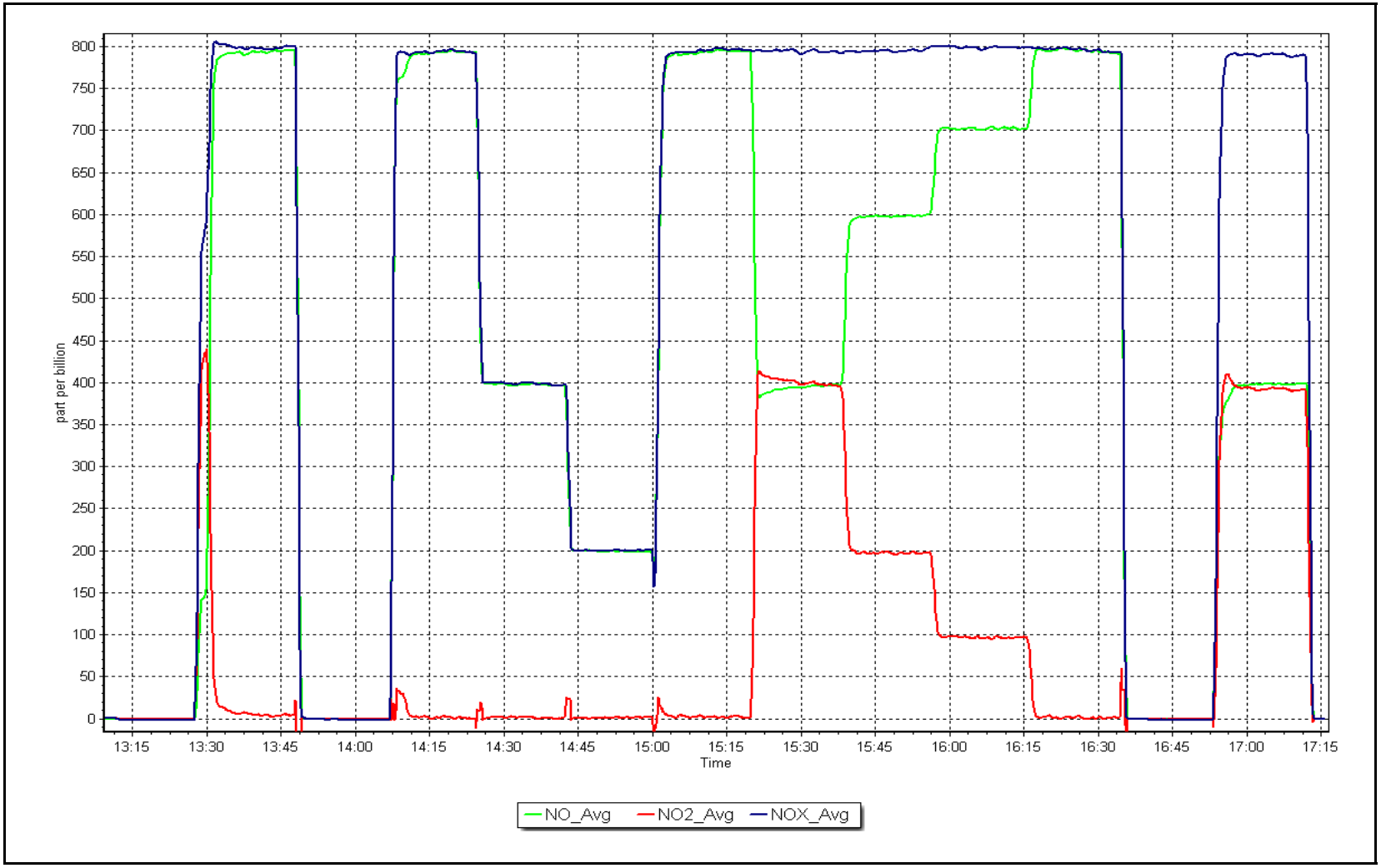
Calibration Date:	December 7, 2023	Previous Calibration:	November 7, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	13:14	End Time (MST):	17:16
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.9	----	Correlation Coefficient	0.999890	≥0.995
399.7	398.1	1.0040			
197.8	196.9	1.0046	Slope	0.994878	0.90 - 1.10
93.5	96.3	0.9709			
			Intercept	0.734900	+/-20



NO_X Calibration Plot Date: December 7, 2023 Location: Fort Chipewyan



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	December 7, 2023	Last Cal Date:	November 7, 2023
Start time (MST):	10:36	End time (MST):	13:09
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.996657	0.969000	Backgd or Offset:	-2.0	-2.0
Calibration intercept:	-0.240000	0.700000	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	0.9	----
as found span	5000	913.0	400.0	391.6	1.021
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	1.4	----
high point	5000	914.7	400.0	388.5	1.030
second point	5000	786.4	200.0	194.6	1.028
third point	5000	701.3	100.0	96.6	1.035
as left zero	5000	0.0	0.0	1.3	----
as left span	5000	963.3	400.0	388.3	1.030
				Average Correction Factor	1.031

Baseline Corr As found:	390.7	Previous response	398.4	*% change	-2.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: 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

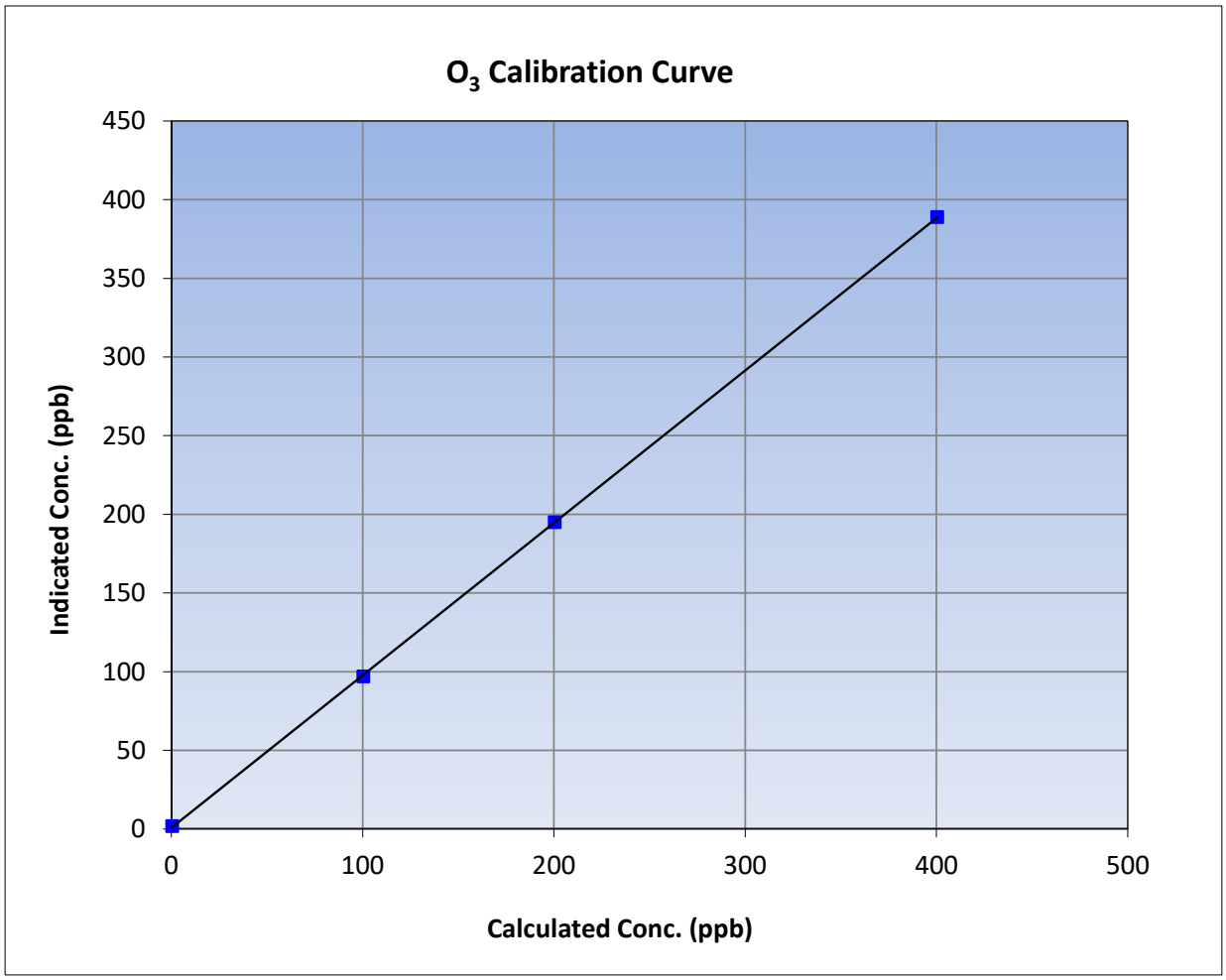
Station Information

Calibration Date:	December 7, 2023	Previous Calibration:	November 7, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	10:36	End Time (MST):	13:09
Analyzer make:	Teledyne API T400	Analyzer serial #:	3872

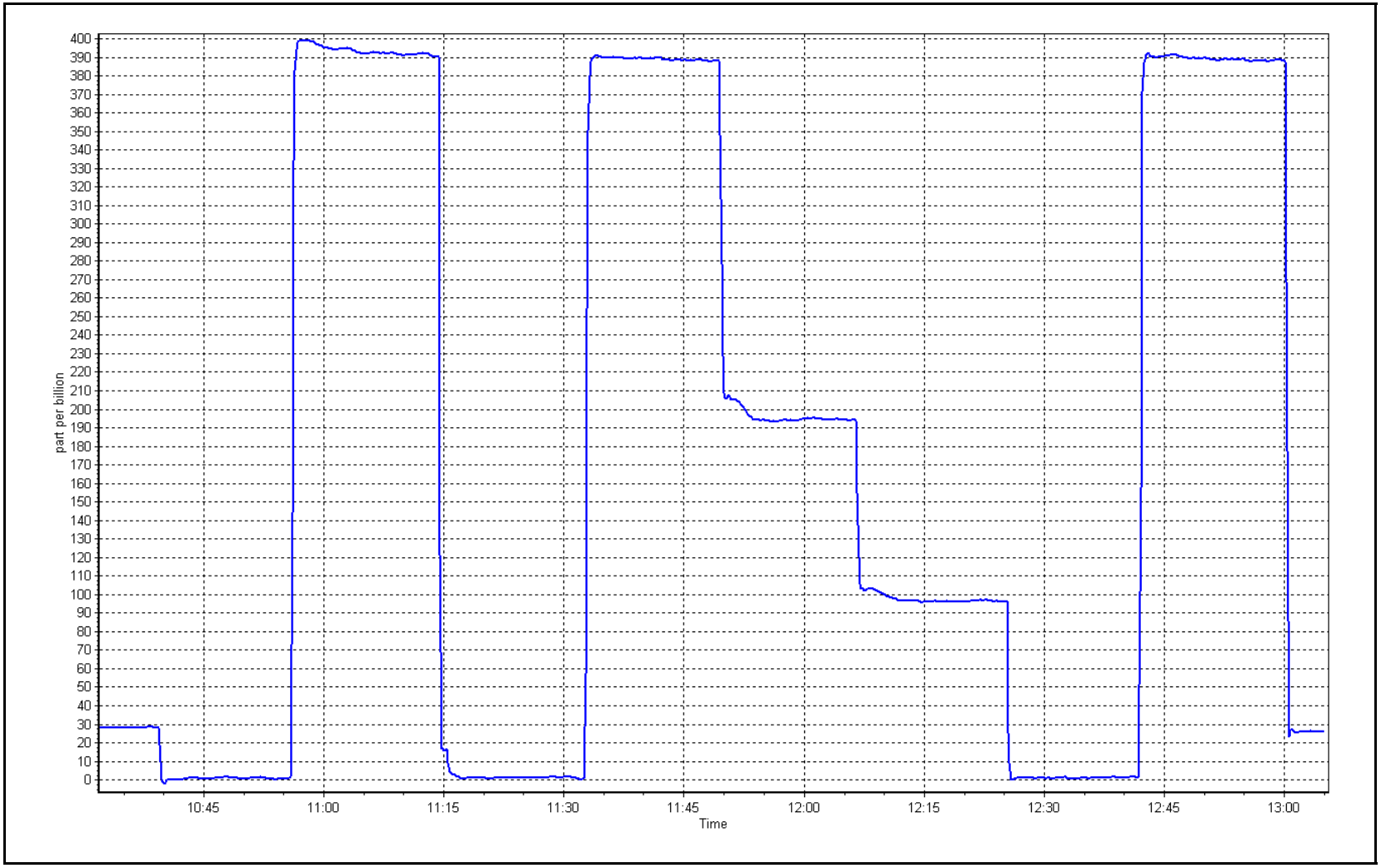
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	1.4	----
400.0	388.5	1.0296
200.0	194.6	1.0277
100.0	96.6	1.0352

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999981	*≥0.995*
Slope	0.969000	*0.90 - 1.10*
Intercept	0.700000	*+/- 5*



O_3 Calibration Plot Date: December 7, 2023 Location: Fort Chipewyan



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS 08
Calibration Date:	December 15,2023	Last Cal Date:	November 24,2023
Start time (MST):	11:31	End time (MST):	11:54
Analyzer Make:	Teledyne API T640	S/N:	216
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	FP-25	S/N:	388747
Temp/RH standard:	FP-25	S/N:	388747

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	0.8	1.0		☐	+/- 2 °C
P (mmHg)	733.3	735.6		☐	+/- 10 mmHg
flow (LPM)	5.01	5.01		☐	+/- 0.25 LPM

Leak Test: Date of check: November 24, 2023 Last Cal Date: November 24, 2023

PM w/o HEPA: 4.98 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

Post-maintenance leak check: PM w/o HEPA: 24.5 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: July 25, 2023

Disposable Filter Changed: July 25, 2023

Annual Maintenance

Date Sample Tube Cleaned: July 25, 2023

Date RH/T Sensor Cleaned: July 25, 2023

Notes: Analyzer removed from service.

Calibration by: Matthew C

Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS 08
Calibration Date:	December 15, 2023	Last Cal Date:	November 15,2023
Start time (MST):	13:05	End time (MST):	13:35
Analyzer Make:	Teledyne API T640	S/N:	319
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	FP-25	S/N:	388747
Temp/RH standard:	FP-25	S/N:	388747

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	(Limits)
T (°C)	2.8	2.7	2.8	☐	+/- 2 °C
P (mmHg)	733.8	734.1	733.8	☐	+/- 10 mmHg
flow (LPM)	5.01	4.99	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: December 15, 2023 Last Cal Date: December 15, 2023

PM w/o HEPA: 4.99 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

Post-maintenance leak check: PM w/o HEPA: 4.99 w/ HEPA: 0.0

Date Optical Chamber Cleaned: December 15, 2023 <0.2 ug/m3

Disposable Filter Changed: December 15, 2023

Annual Maintenance

Date Sample Tube Cleaned: July 25, 2023

Date RH/T Sensor Cleaned: July 25, 2023

Notes: Install audit

Calibration by: Matthew C

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	December 26, 2023	Last Cal Date:	November 10, 2023
Start time (MST):	13:14	End time (MST):	16:20
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:	1.003222	0.994764	Backgd or Offset:	-0.014	-0.014
Calibration intercept:	0.146903	0.168931	Coeff or Slope:	1.006	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	0.33	----
as found span	4933	66.7	40.4	41.4	0.977
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4934	66.7	40.4	40.3	1.003
second point	4967	33.3	20.2	20.4	0.990
third point	4983	16.7	10.1	10.3	0.983
as left zero	5000	0.0	0.0	0.1	----
as left span	2960	40.0	40.4	40.1	1.007
				Average Correction Factor	0.992

Baseline Corr As found:	41.06	Prev response:	40.70	*% change:	0.9%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after as founds. Adjustments made to Zero and span point.

Calibration Performed By: Matthew C

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

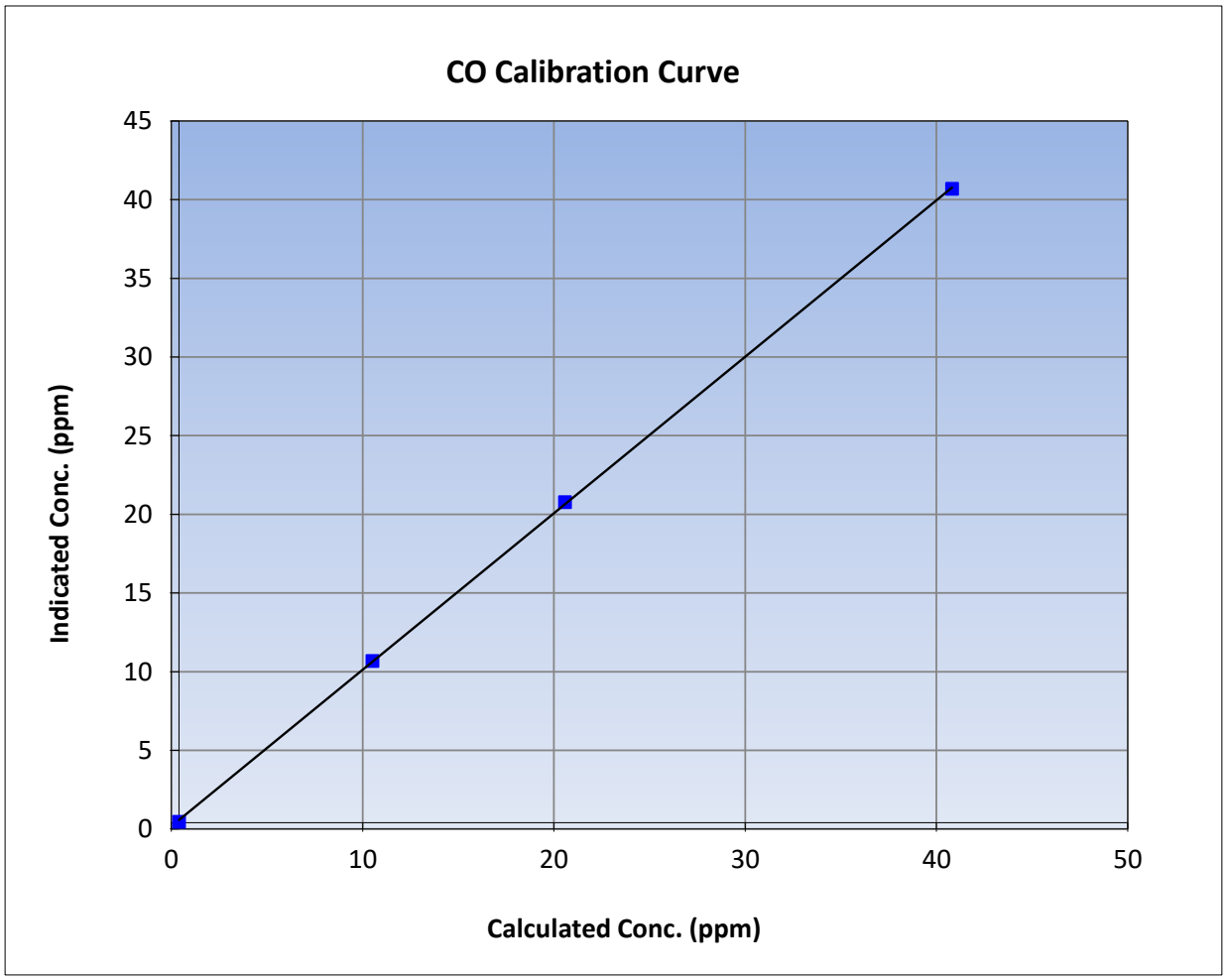
Station Information

Calibration Date:	December 26, 2023	Previous Calibration:	November 10, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	13:14	End Time (MST):	16:20
Analyzer make:	API T300	Analyzer serial #:	3505

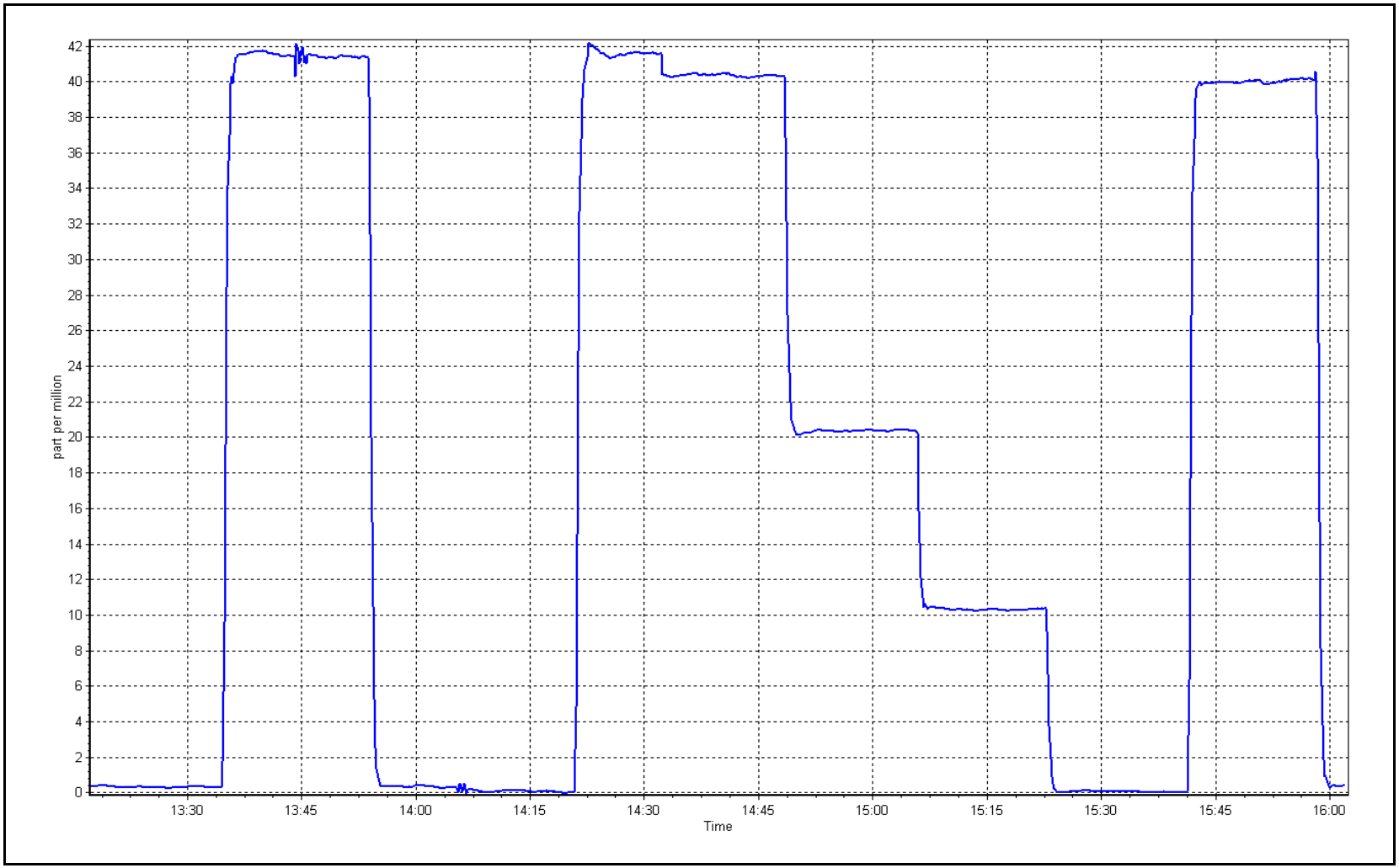
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
40.4	40.3	1.0031
20.2	20.4	0.9902
10.1	10.3	0.9835

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999954	*≥0.995*
Slope	0.994764	*0.90 - 1.10*
Intercept	0.168931	*+/-1.5*



CO Calibration Plot Date: December 26, 2023 Location: Fort Chipewyan



Wood Buffalo Environmental Association

CO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	December 26, 2023	Last Cal Date:	November 10, 2023
Start time (MST):	16:20	End time (MST):	20:56
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:	0.982170	1.001204	Backgd or Offset:	0.008	-0.063
Calibration intercept:	4.560000	-16.666667	Coeff or Slope:	1.019	1.087

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	3.8	----
as found span	2920	80.0	1605.9	1616.8	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	-2.4	----
high point	2920	80.0	1605.9	1605.4	1.000
second point	2960	40.0	802.9	758.7	1.058
third point					
as left zero					
as left span					
				Average Correction Factor	1.029

Baseline Corr As found:	1613.00	Prev response:	1581.79	*% change:	1.9%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after as found. Made adjustments to linearity on second and third points.

Calibration Performed By: Matthew C

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

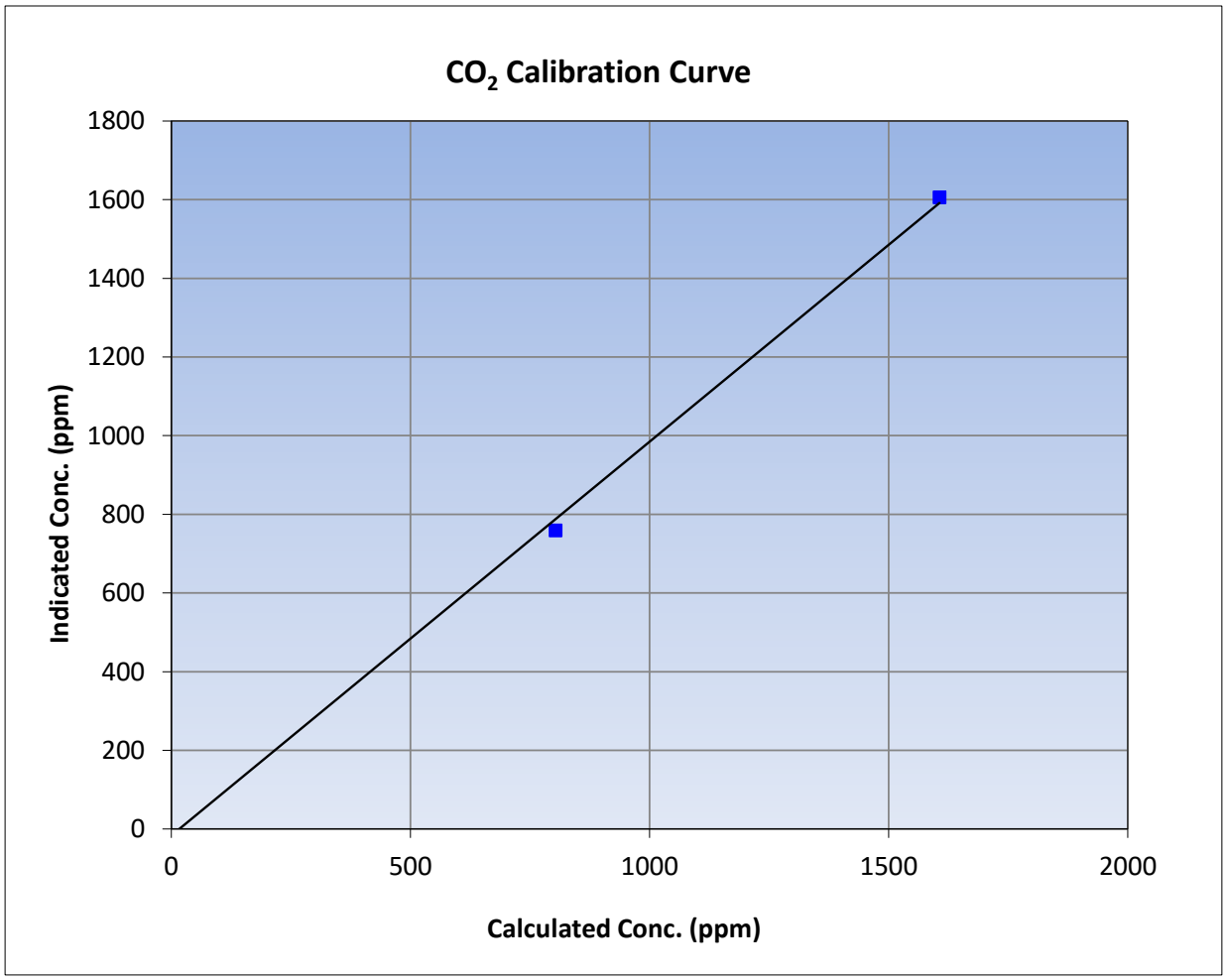
Station Information

Calibration Date	December 26, 2023	Previous Calibration	November 10, 2023
Station Name	Fort Chipewyan	Station Number	AMS08
Start Time (MST)	16:20	End Time (MST)	20:56
Analyzer make	Teledyne API T360	Analyzer serial #	289

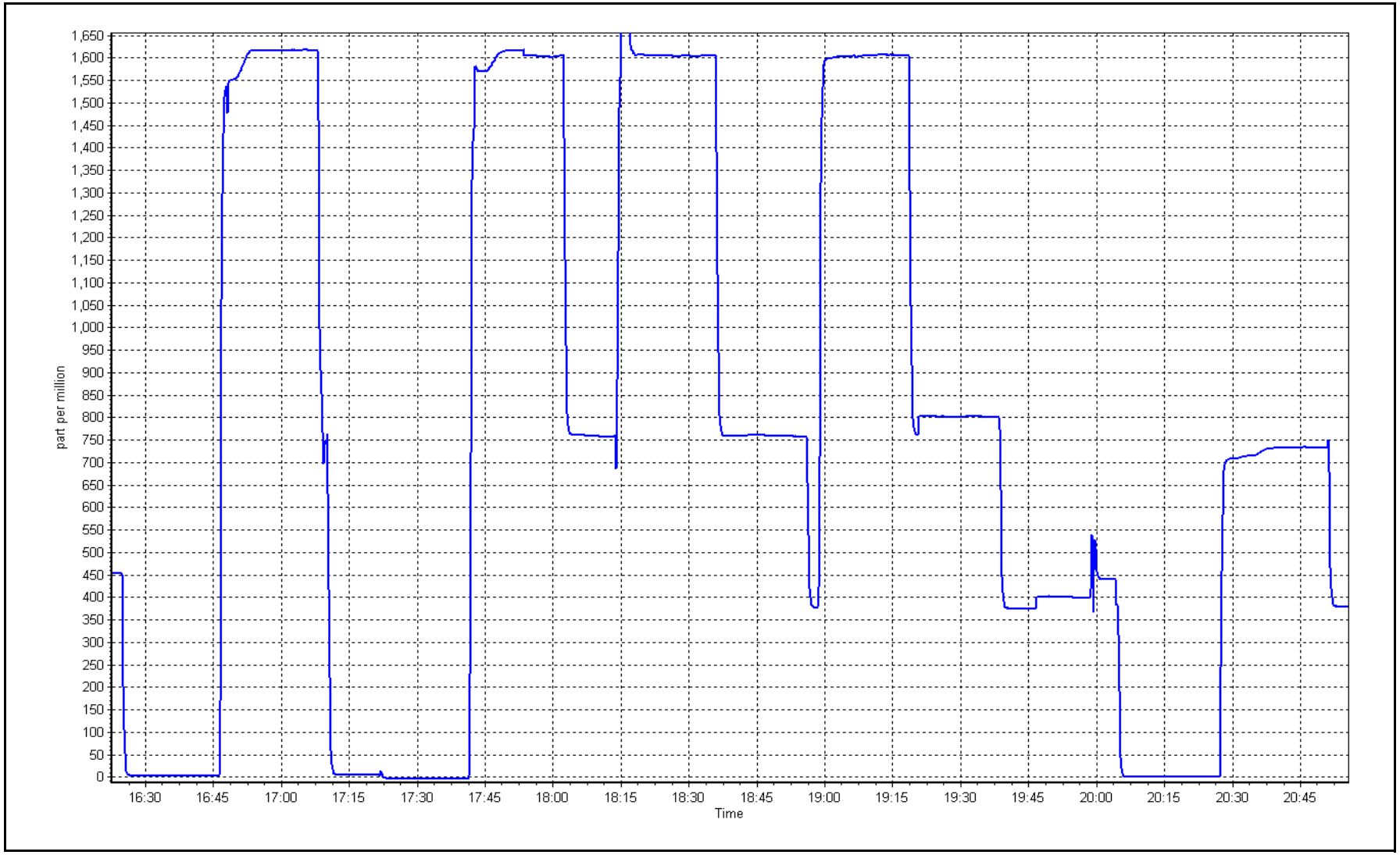
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	-2.4	----
1605.9	1605.4	1.0003
802.9	758.7	1.0583

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999056	*≥0.995*
Slope	1.001204	*0.90 - 1.10*
Intercept	-16.666667	*+/-20*



CO_2 Calibration Plot Date: December 26, 2023 Location: Fort Chipewyan



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS09
BARGE LANDING
DECEMBER 2023

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

January 31, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	December 8, 2023	Last Cal Date:	November 10, 2023
Start time (MST):	10:06	End time (MST):	13:10
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.002594	0.995778	Backgd or Offset:	10.3	10.2
Calibration intercept:	-0.728669	0.410488	Coeff or Slope:	0.970	0.962

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	806.3	0.994
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	798.6	1.004
second point	4959	40.1	400.8	399.0	1.004
third point	4980	20.0	199.8	200.0	0.999
as left zero	5000	0.0	0.0	0.2	----
as left span	4919	80.2	801.5	801.0	1.001
				Average Correction Factor	1.002

Baseline Corr As found:	806.40	Previous response	802.84	*% change	0.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

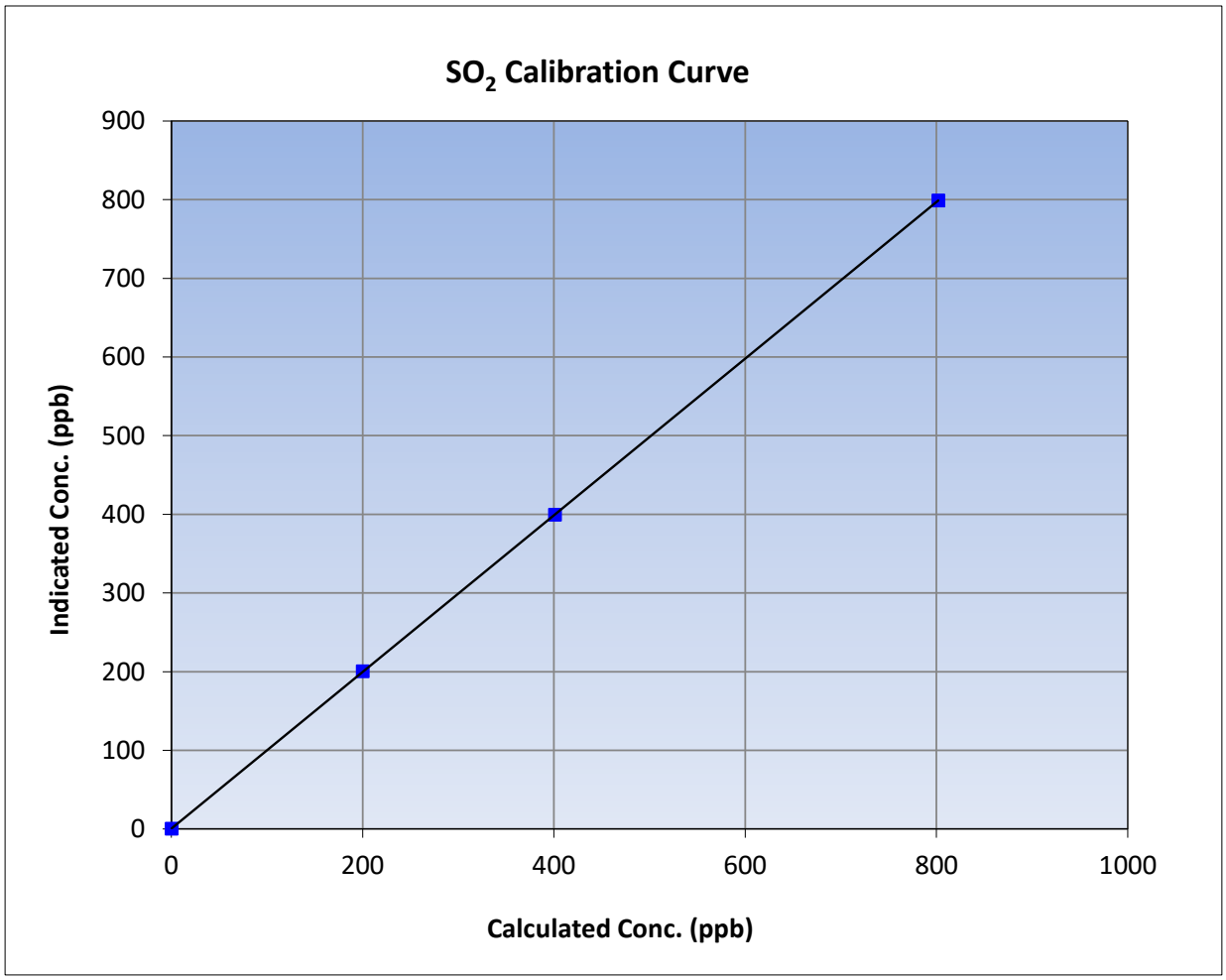
Station Information

Calibration Date:	December 8, 2023	Previous Calibration:	November 10, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:06	End Time (MST):	13:10
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148498

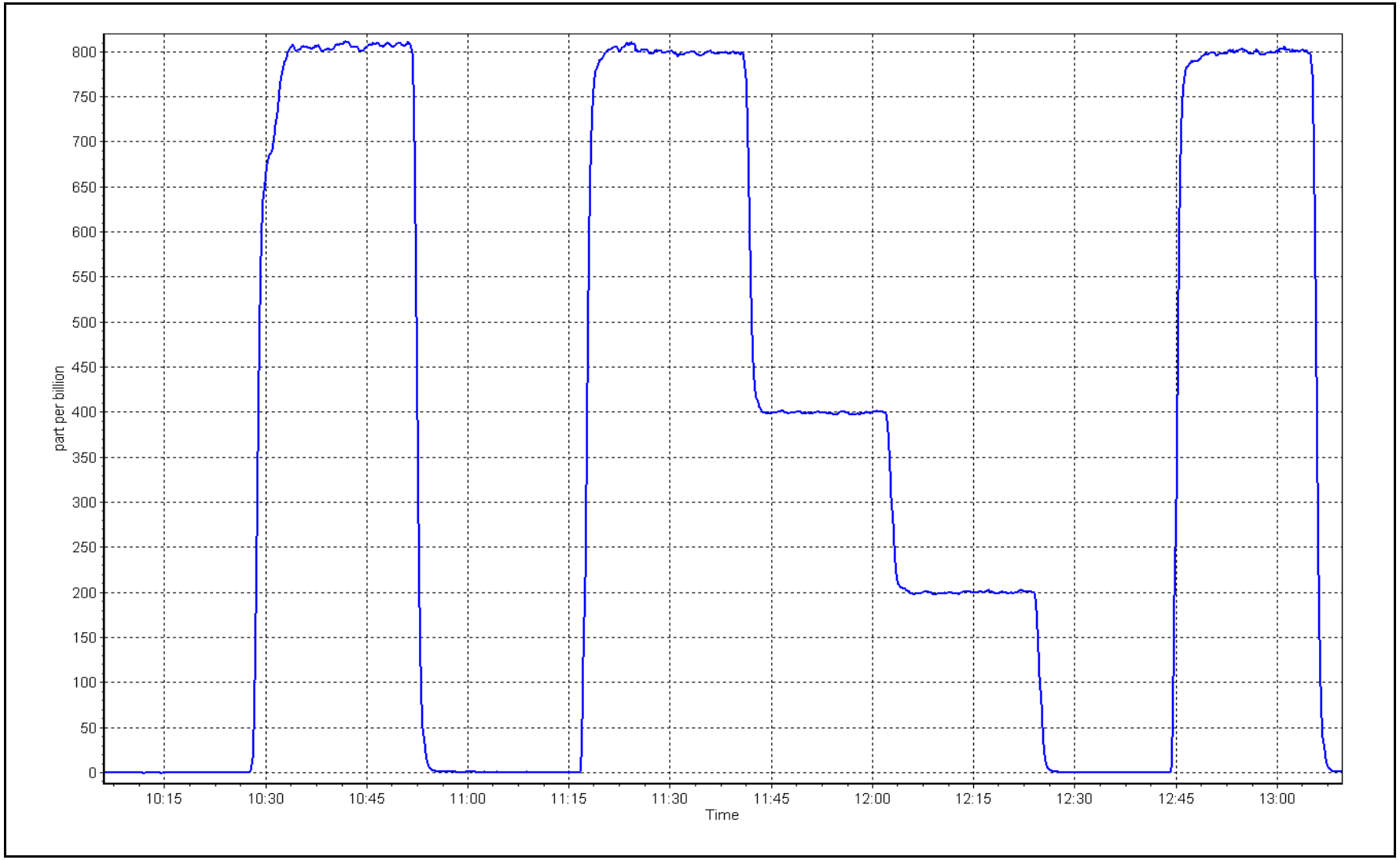
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
801.5	798.6	1.0036
400.8	399.0	1.0044
199.8	200.0	0.9992

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	0.995778	*0.90 - 1.10*
Intercept	0.410488	*+/-30*



SO2 Calibration Plot Date: December 8, 2023 Location: Barge Landing



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	December 4, 2023	Last Cal Date:	November 1, 2023
Start time (MST):	10:15	End time (MST):	14:12
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:	1.009543	1.006260	Backgd or Offset:	2.91	2.88
Calibration intercept:	0.059575	0.099474	Coeff or Slope:	1.200	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	0.0	----
as found span	4923	77.4	80.0	81.2	0.986
as found 2nd point	4961	38.7	40.0	40.6	0.986
as found 3rd point	4981	18.8	19.4	20.2	0.963
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	80.6	0.993
second point	4961	38.7	40.0	40.5	0.988
third point	4981	19.3	20.0	20.1	0.993
as left zero	5000	0.0	0.0	0.0	----
as left span	4923	77.4	80.0	80.7	0.992
SO2 Scrubber Check	4920	80.2	802.0	-0.1	----
Date of last scrubber change:		28-Feb-23		Ave Corr Factor	0.991
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.2	Prev response:	80.86	*% change:	0.4%
Baseline Corr 2nd AF pt:	40.6	AF Slope:	1.012395	AF Intercept:	0.190094
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999957		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

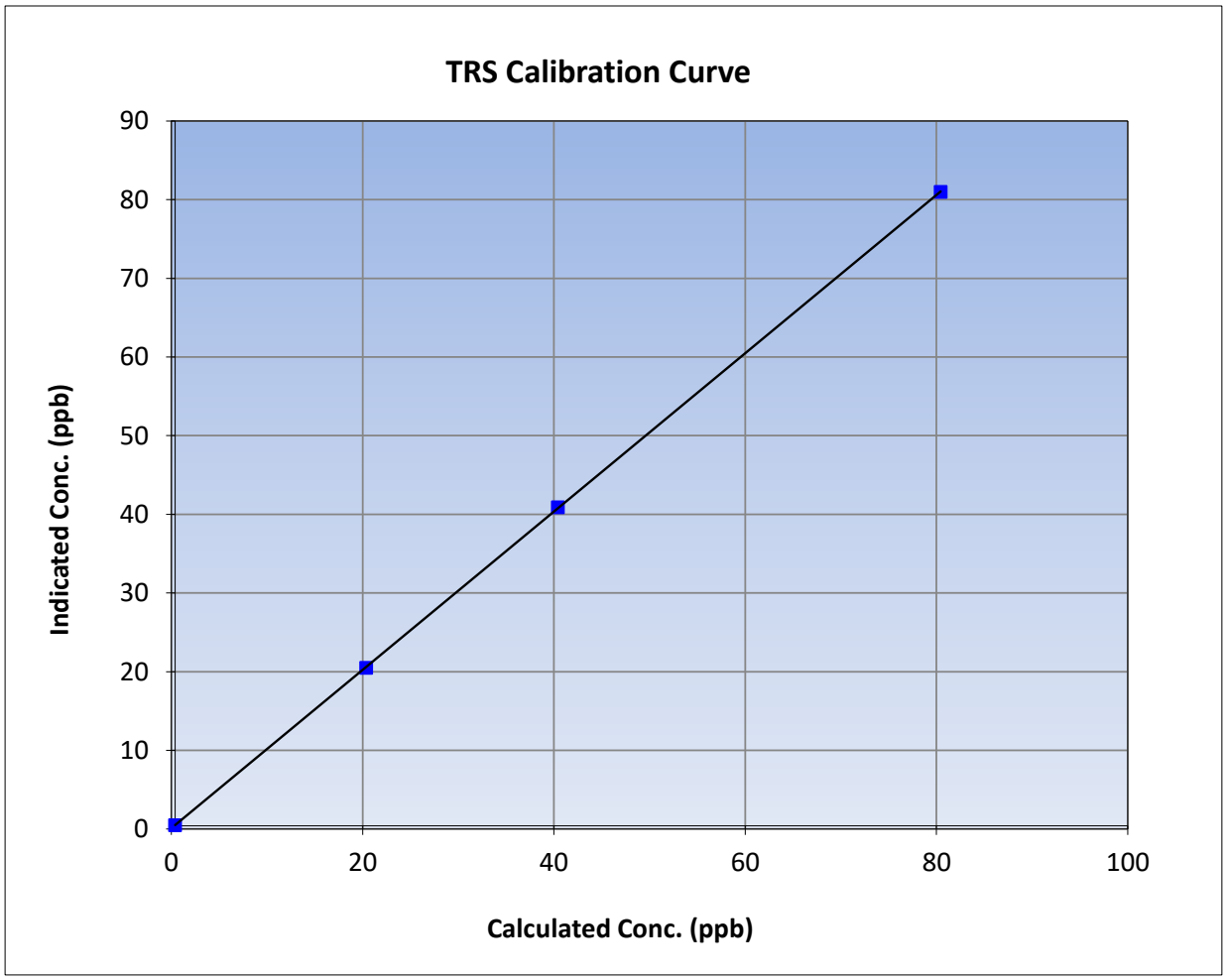
Station Information

Calibration Date:	December 4, 2023	Previous Calibration:	November 1, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:15	End Time (MST):	14:12
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1331259320

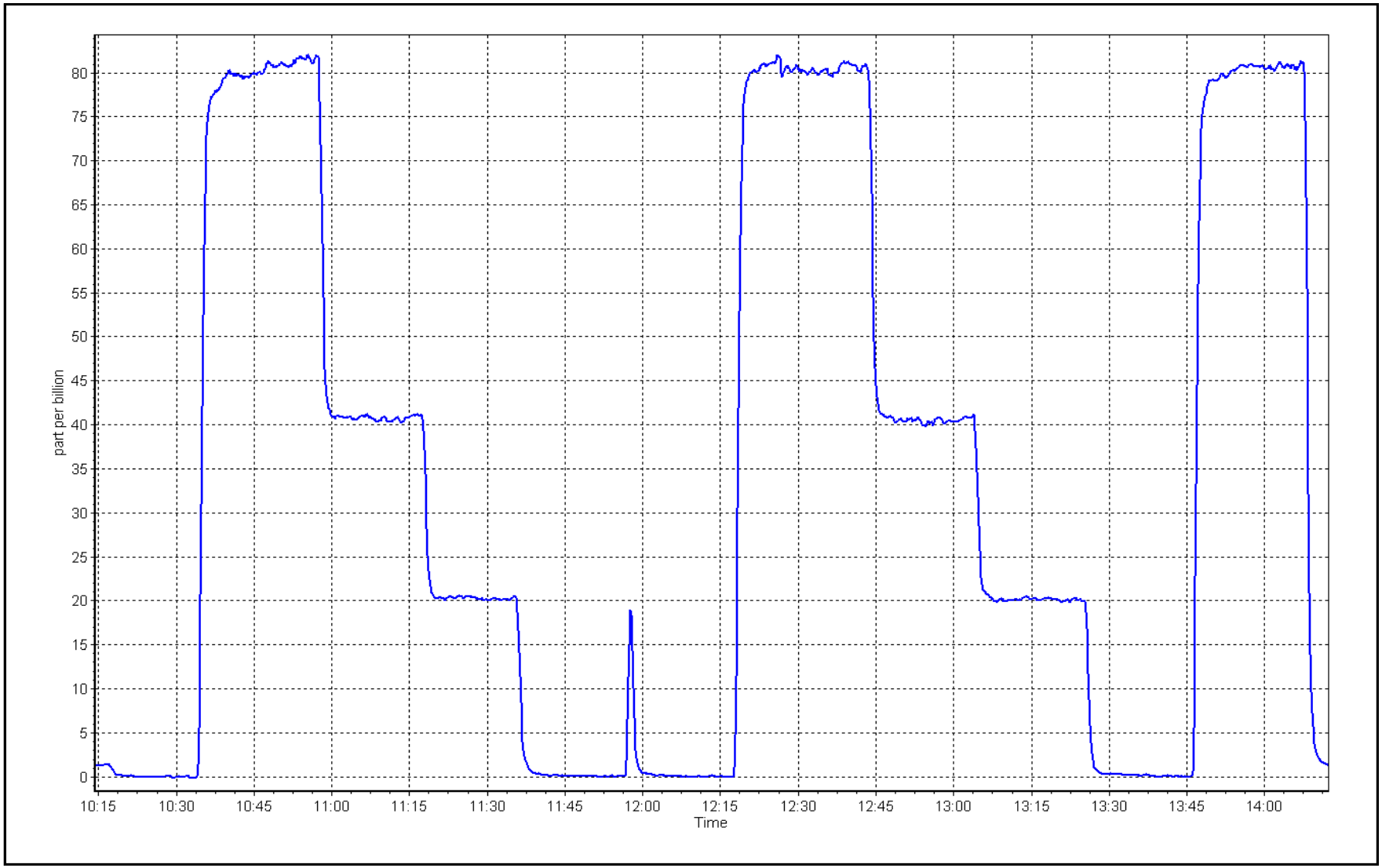
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.6	0.9931
40.0	40.5	0.9883
20.0	20.1	0.9930

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999993	*≥0.995*
Slope	1.006260	*0.90 - 1.10*
Intercept	0.099474	*+/-3*



TRS Calibration Plot Date: December 4, 2023 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:	December 8, 2023	Last Cal Date:	November 17, 2023
Start time (MST):	10:06	End time (MST):	13:10
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	2.53E-04	NMHC SP Ratio:	4.34E-05	4.34E-05
CH4 Retention time:	15.00	15.00	NMHC Peak Area:	210777	210777
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	17.11	1.000
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	17.11	1.000
second point	4960	40.1	8.56	8.55	1.001
third point	4980	20.0	4.27	4.27	0.999
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	17.12	17.12	1.000
				ge Correction Factor	1.000
Baseline Corr AF:	17.11	Prev response	17.17	*% change	-0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	80.2	9.14	9.18	0.995
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	9.14	9.18	0.995
second point	4960	40.1	4.57	4.58	0.997
third point	4980	20.0	2.28	2.29	0.995
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	9.14	9.19	0.994
				Average Correction Factor	0.996
Baseline Corr AF:	9.18	Prev response	9.18	*% 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	80.2	7.98	7.93	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	7.98	7.93	1.007
second point	4960	40.1	3.99	3.96	1.007
third point	4980	20.0	1.99	1.98	1.004
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	7.98	7.93	1.006
				Average Correction Factor	1.006
Baseline Corr AF:	7.93	Prev response	7.99	*% change	-0.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.003147	0.999422
THC Cal Offset:	-0.002334	0.000050
CH4 Cal Slope:	1.001123	0.993236
CH4 Cal Offset:	-0.001135	0.001649
NMHC Cal Slope:	1.005040	1.004440
NMHC Cal Offset:	-0.001199	-0.000799

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

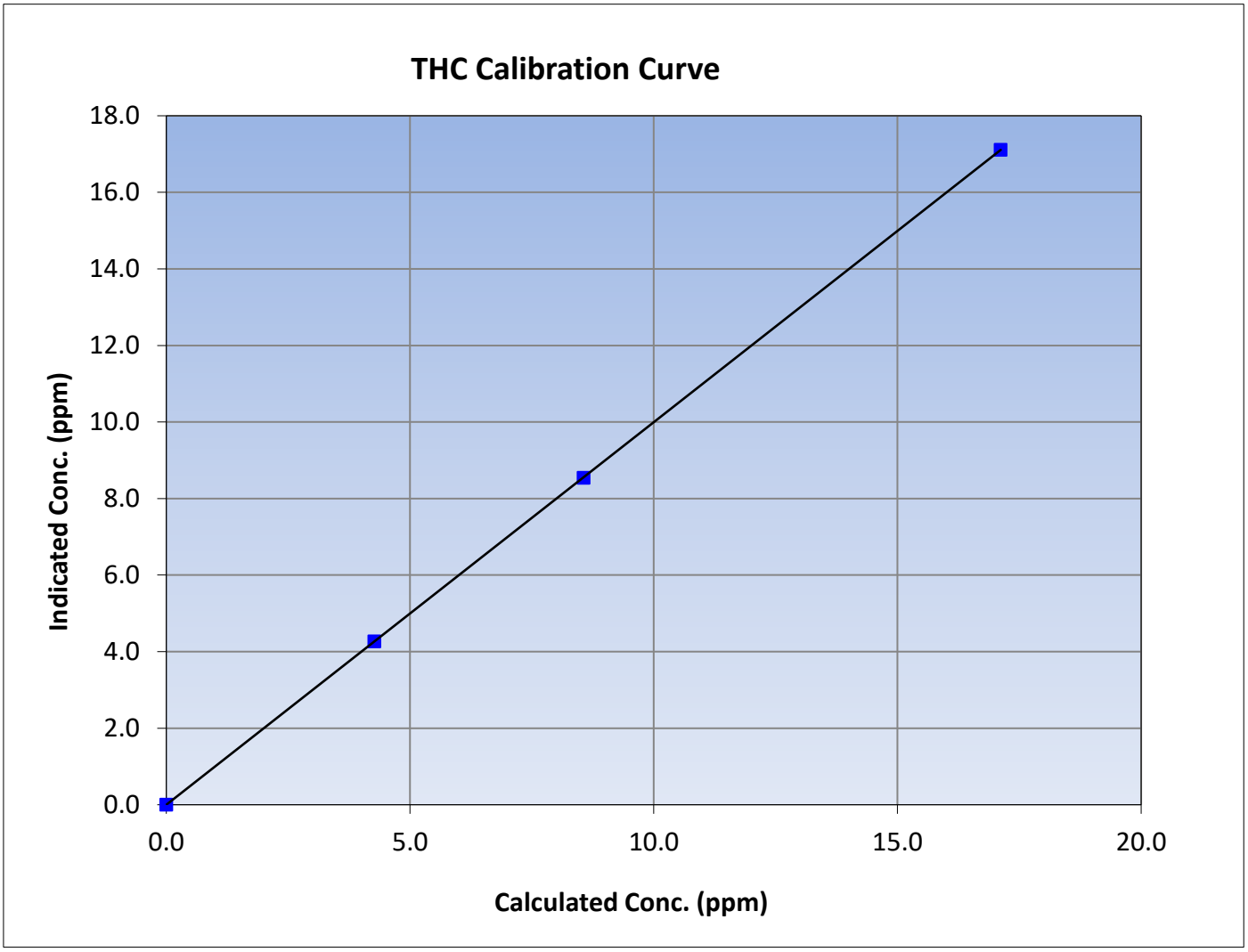
Version-06-2022

Station Information

Calibration Date:	December 8, 2023	Previous Calibration:	November 17, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:06	End Time (MST):	13:10
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	17.11	1.0004			
8.56	8.55	1.0014	Slope	0.999422	*0.90 - 1.10*
4.27	4.27	0.9994			
			Intercept	0.000050	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

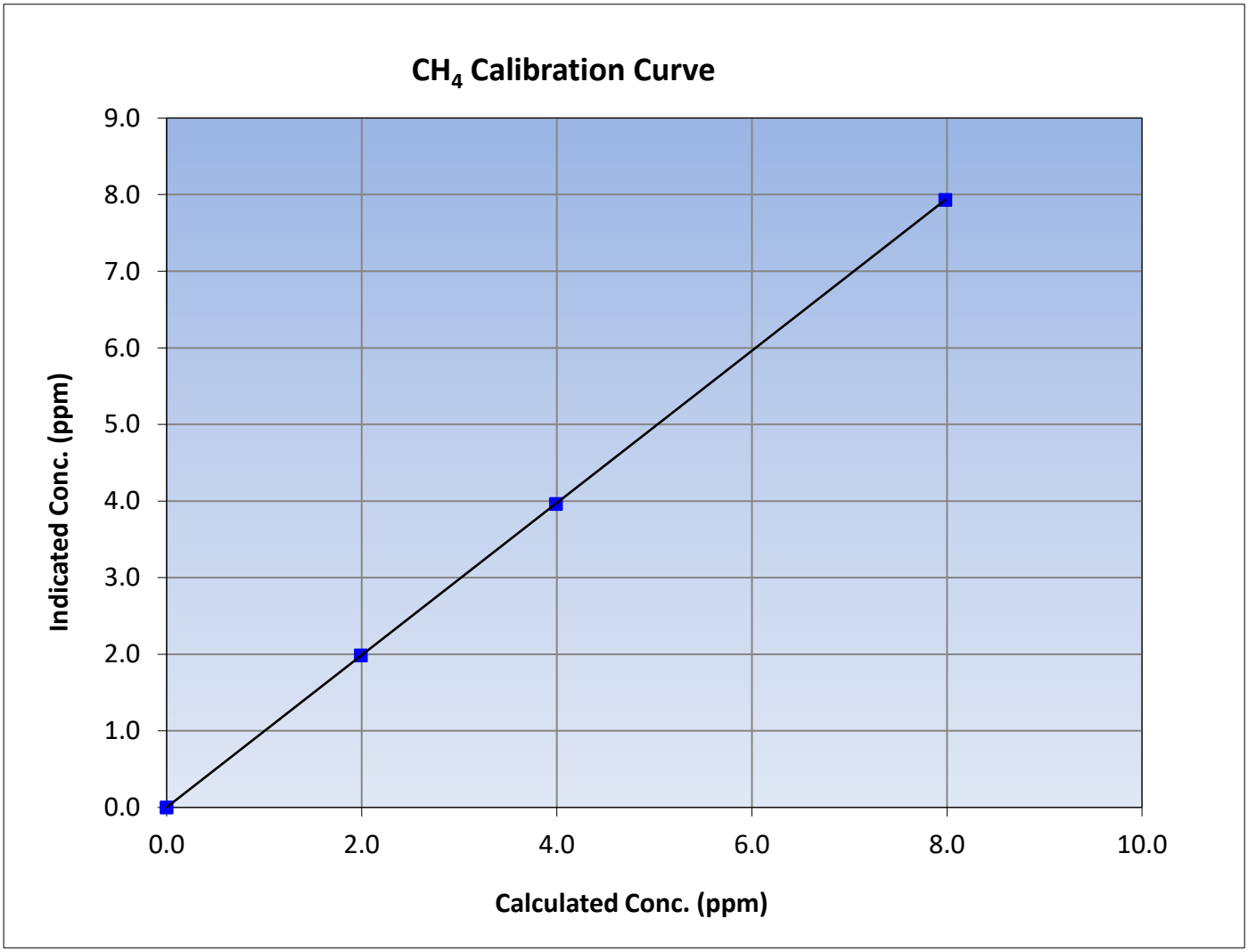
Version-06-2022

Station Information

Calibration Date:	December 8, 2023	Previous Calibration:	November 17, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:06	End Time (MST):	13:10
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*
7.98	7.93	1.0065			
3.99	3.96	1.0072	Slope	0.993236	*0.90 - 1.10*
1.99	1.98	1.0037			
			Intercept	0.001649	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

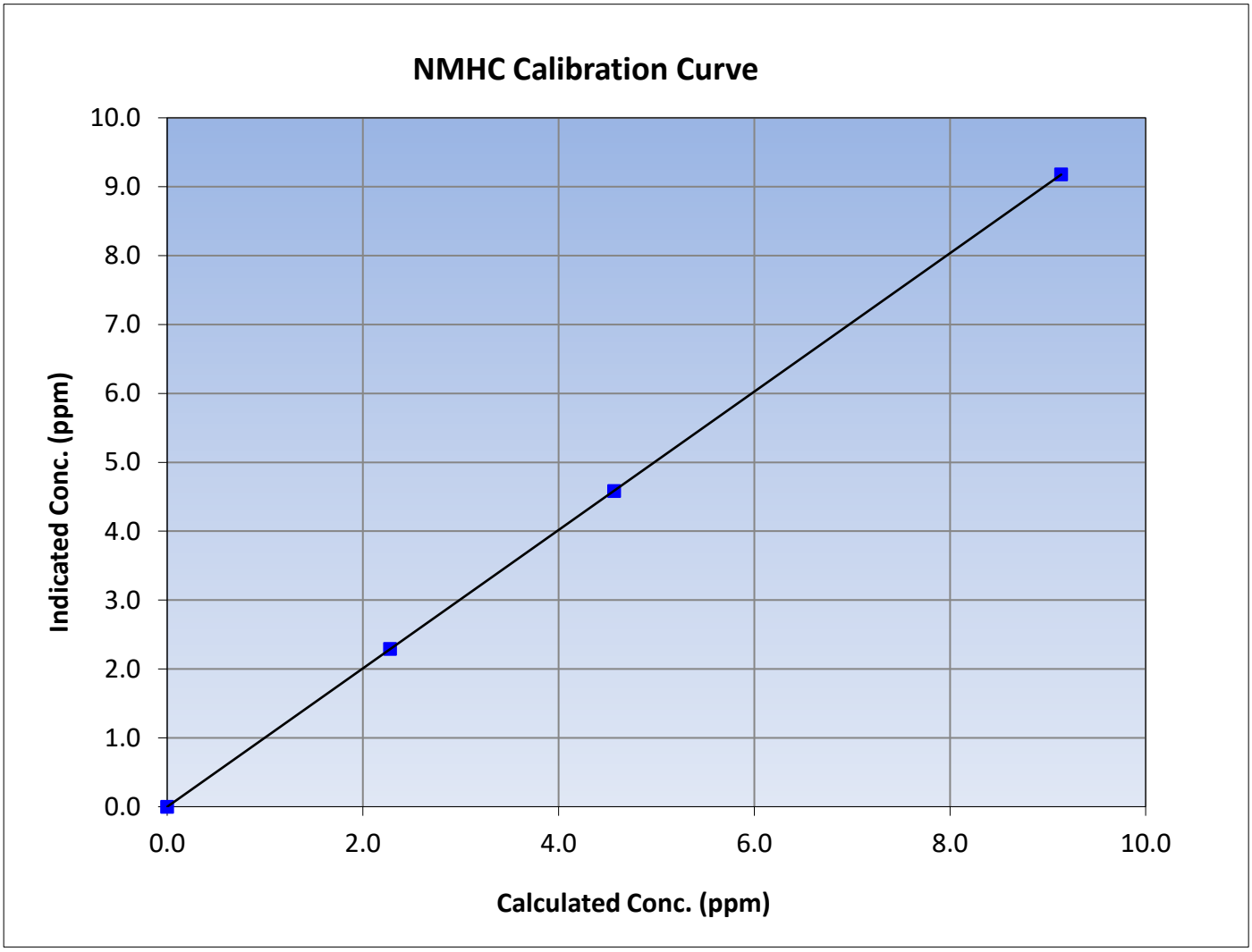
Version-06-2022

Station Information

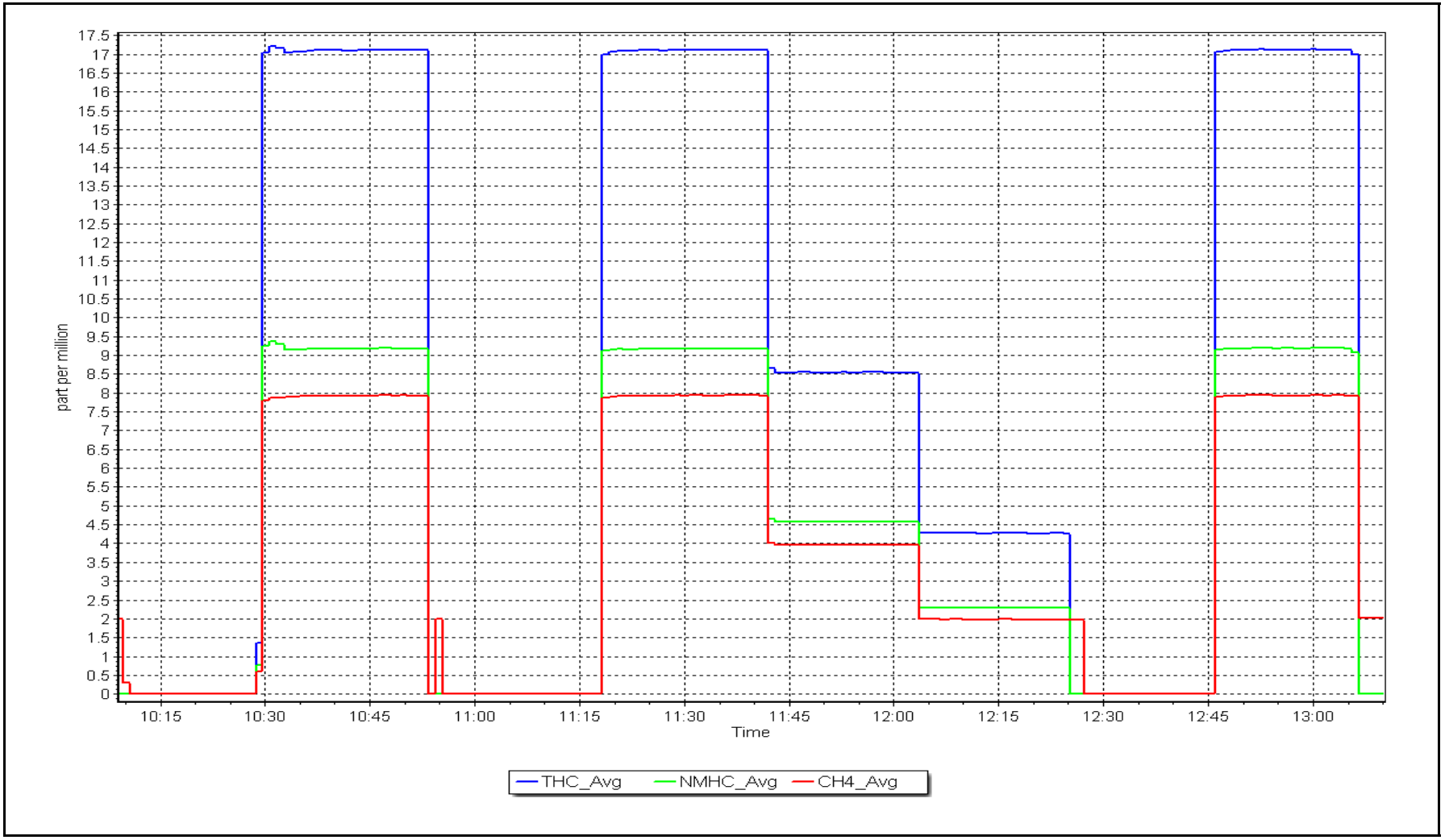
Calibration Date:	December 8, 2023	Previous Calibration:	November 17, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:06	End Time (MST):	13:10
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	1.000000	*≥0.995*
9.14	9.18	0.9955			
4.57	4.58	0.9966	Slope	1.004440	*0.90 - 1.10*
2.28	2.29	0.9952			
			Intercept	-0.000799	*+/-0.5*



NMHC Calibration Plot Date: December 8, 2023 Location: Barge Landing



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	December 5, 2023	Last Cal Date:	November 22, 2023
Start time (MST):	11:14	End time (MST):	15:42
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.128	1.151	NO bkgnd or offset:	10.3	10.5
NOX coeff or slope:	0.992	0.992	NOX bkgnd or offset:	10.6	10.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	173.1	173.4

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.998965	0.999604
NO_X Cal Offset:	0.368958	0.568998
NO Cal Slope:	0.999327	1.000613
NO Cal Offset:	-0.472648	-0.472474
NO_2 Cal Slope:	1.001499	1.001041
NO_2 Cal Offset:	0.067768	-0.216477

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	-0.2	0.0	----	----
as found span	4919	80.5	805.1	800.3	4.8	791.9	783.0	8.9	1.017	1.022
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	4919	80.5	805.1	800.3	4.8	805.0	800.5	4.6	1.000	1.000
second point	4959	40.2	402.1	399.7	2.4	402.9	399.2	3.8	0.998	1.001
third point	4979	20.1	201.0	199.8	1.2	202.0	199.0	2.9	0.995	1.004
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as left span	4919	80.5	805.1	458.0	347.1	803.0	455.6	347.4	1.003	1.005
								Average Correction Factor	0.998	1.002

Corrected As found	NO_X = 792.1 ppb	NO = 783.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -1.6%
Previous Response	NO_X = 804.6 ppb	NO = 799.2 ppb		*Percent Change	NO = -2.0%
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)	797.2	454.9	347.1	347.3	1.000	100.0%
2nd GPT point (200 ppb O3)	797.2	668.2	133.8	134.0	0.999	100.1%
3rd GPT point (100 ppb O3)	797.2	731.4	70.6	69.9	1.010	99.0%
				Average Correction Factor	1.003	99.7%

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

NO_X Calibration Summary

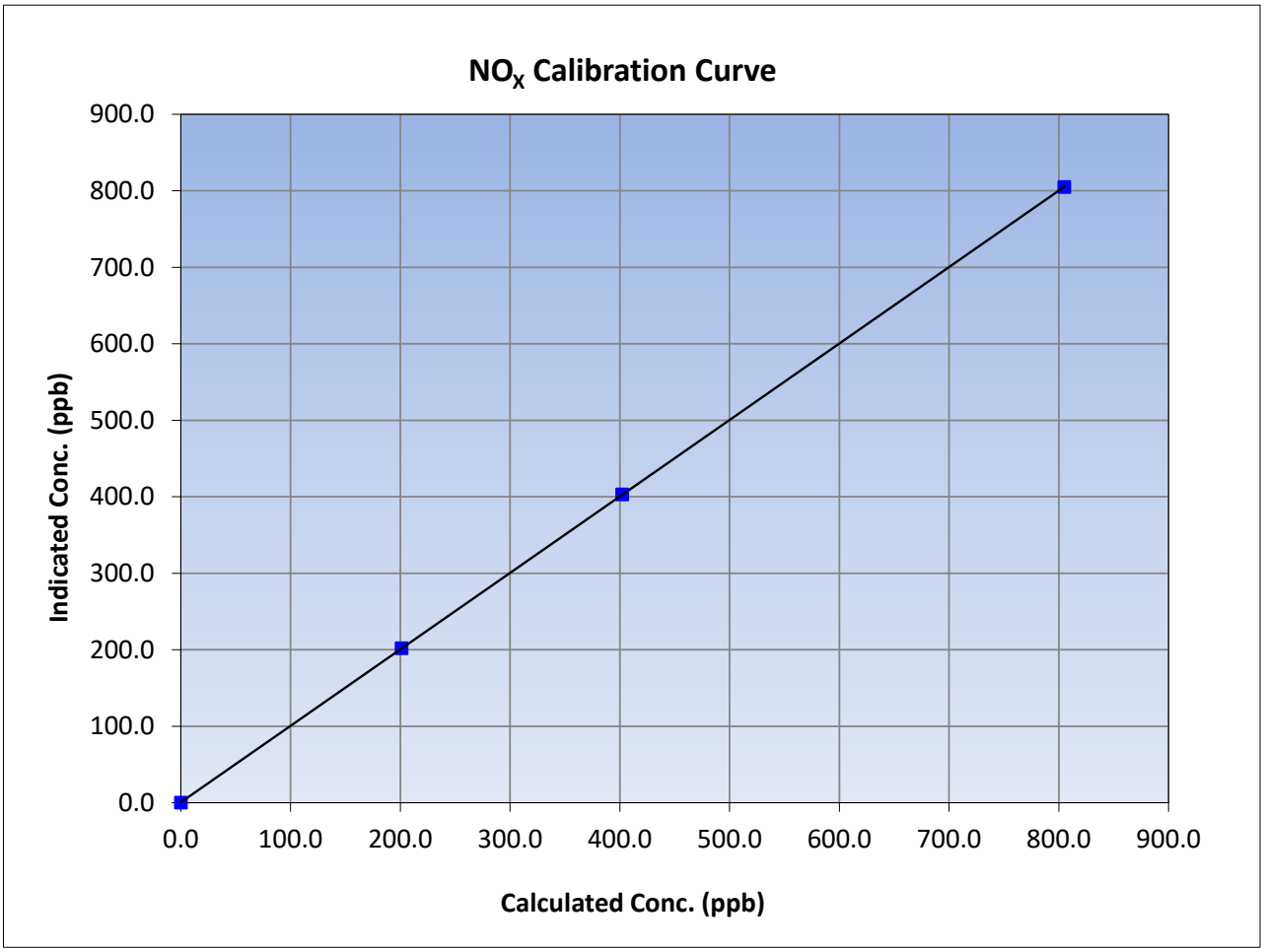
Version-04-2020

Station Information

Calibration Date:	December 5, 2023	Previous Calibration:	November 22, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	11:14	End Time (MST):	15:42
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999998	≥0.995
805.1	805.0	1.0001			
402.1	402.9	0.9979	Slope	0.999604	0.90 - 1.10
201.0	202.0	0.9952			
			Intercept	0.568998	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

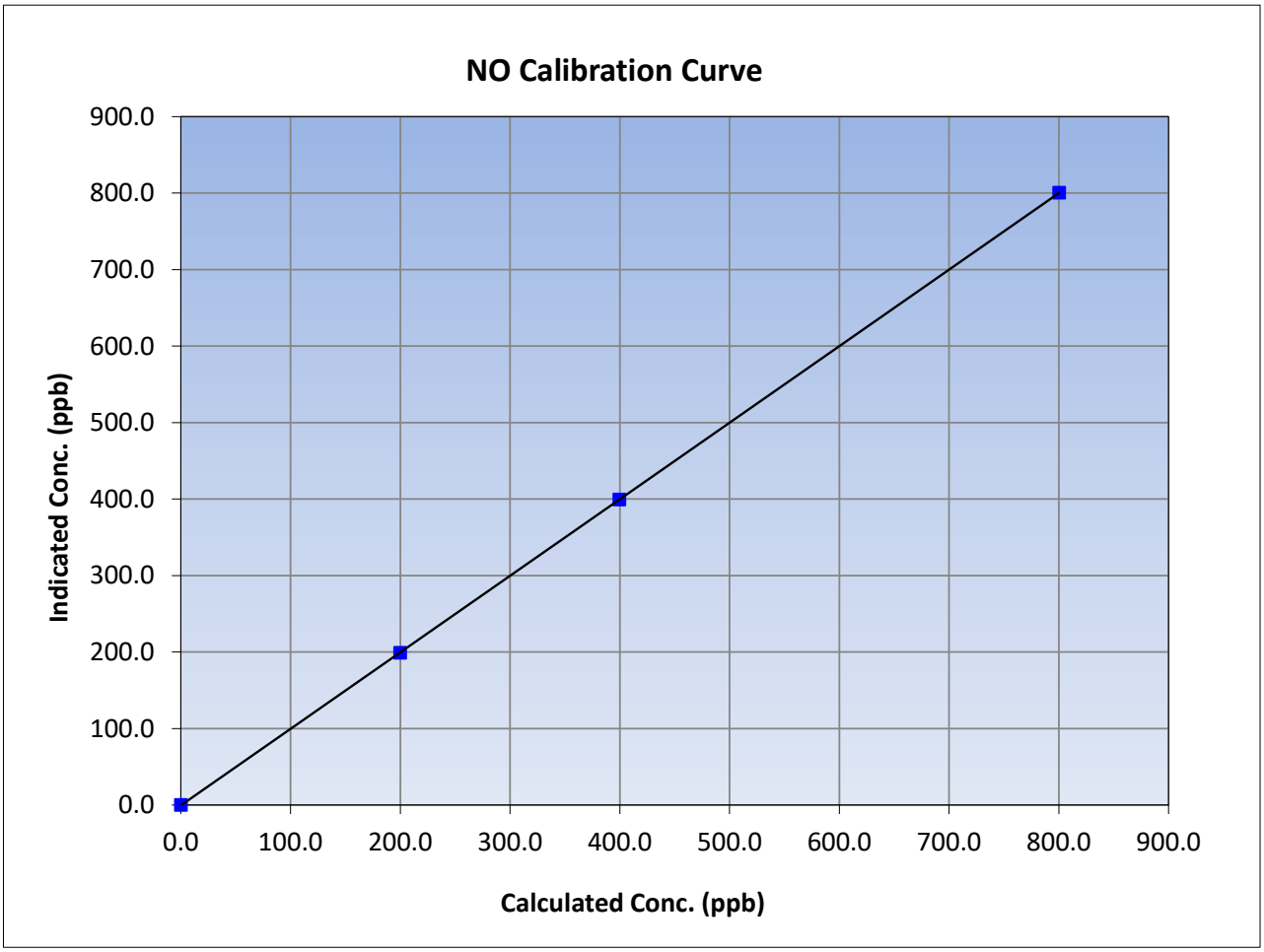
Version-04-2020

Station Information

Calibration Date:	December 5, 2023	Previous Calibration:	November 22, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	11:14	End Time (MST):	15:42
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999998	*≥0.995*
800.3	800.5	0.9997			
399.7	399.2	1.0011	Slope	1.000613	*0.90 - 1.10*
199.8	199.0	1.0042			
			Intercept	-0.472474	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

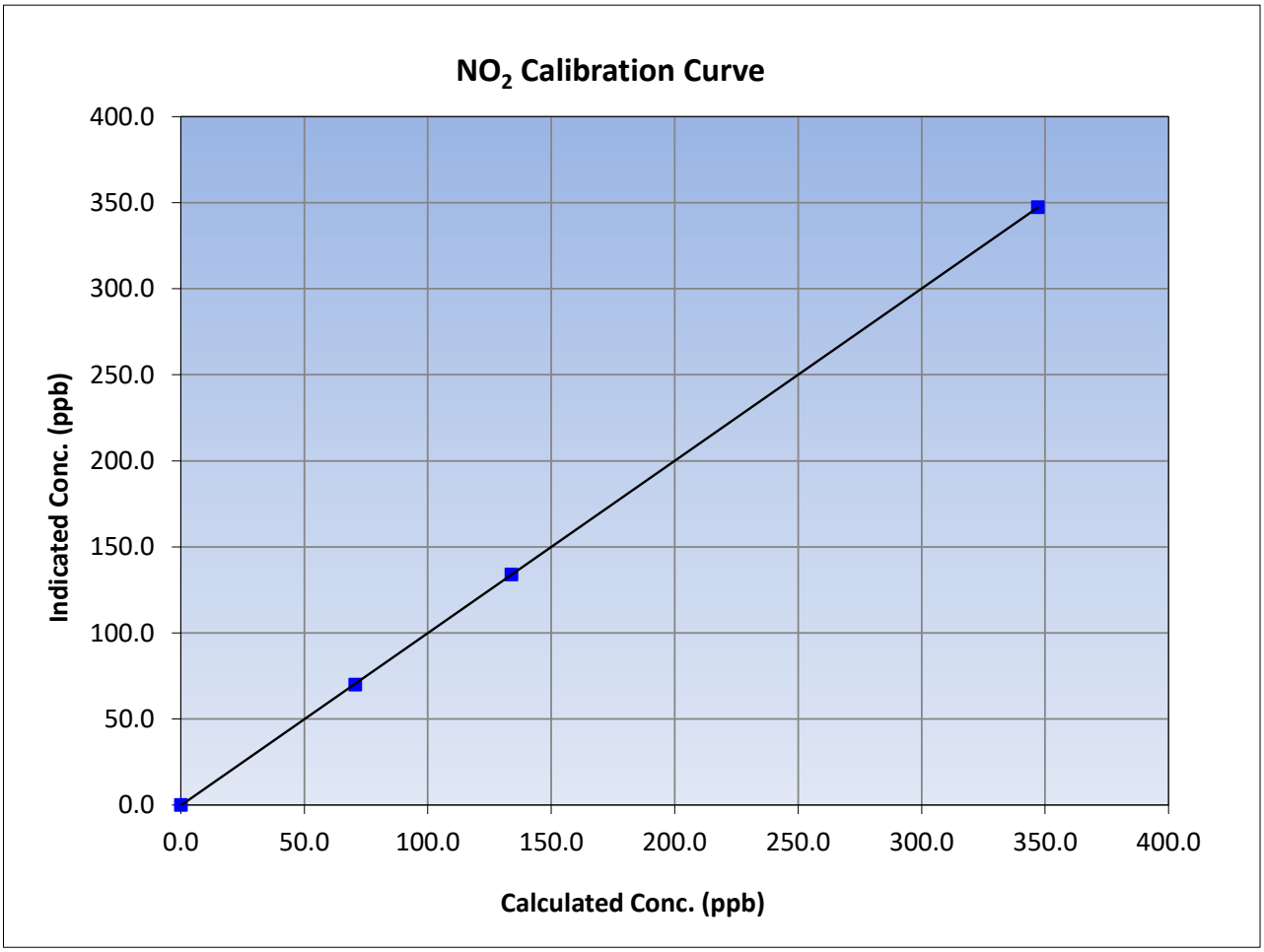
Version-04-2020

Station Information

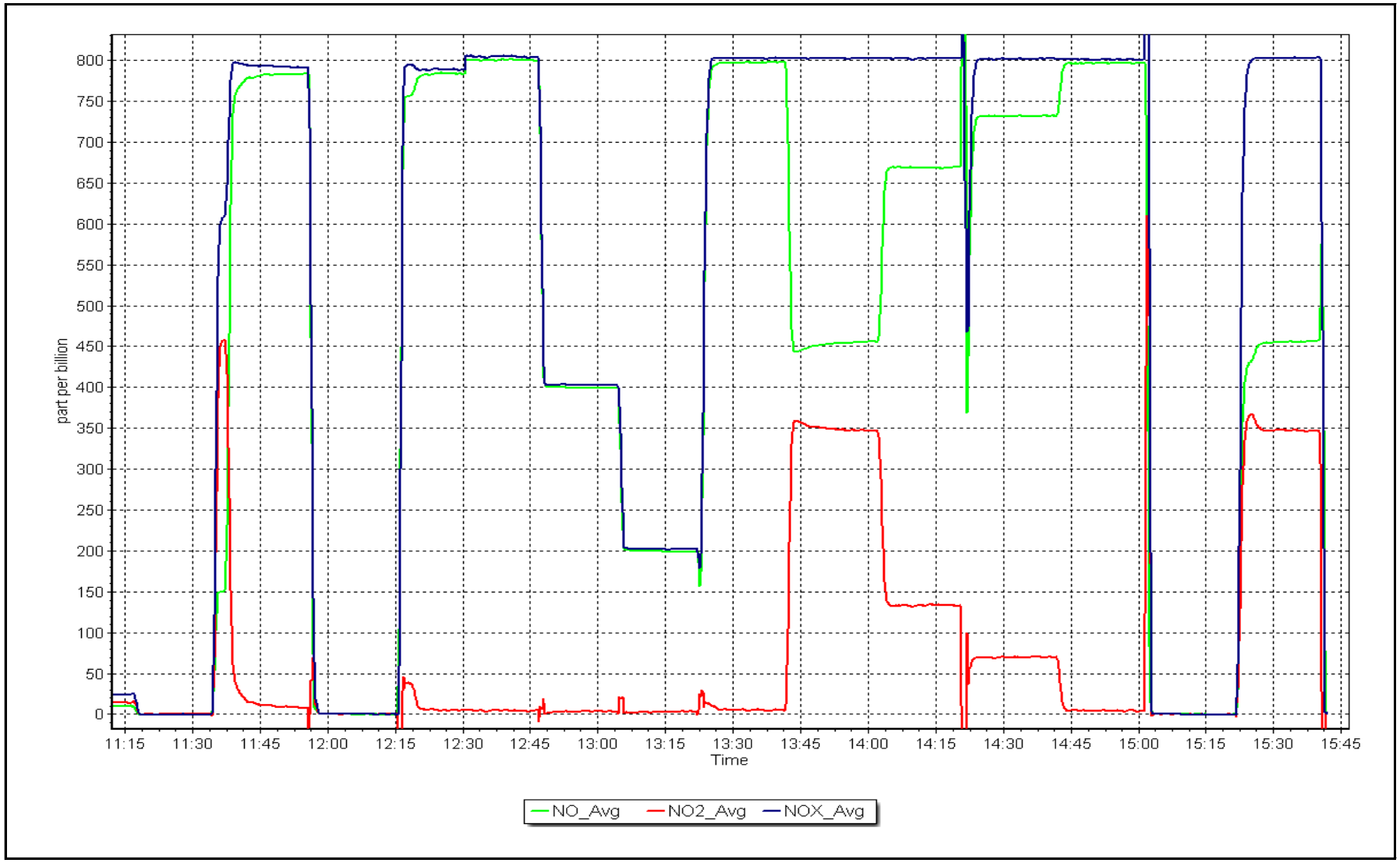
Calibration Date:	December 5, 2023	Previous Calibration:	November 22, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	11:14	End Time (MST):	15:42
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999992	≥0.995
347.1	347.3	0.9995			
133.8	134.0	0.9987	Slope	1.001041	0.90 - 1.10
70.6	69.9	1.0105			
			Intercept	-0.216477	+/-20



NO_X Calibration Plot Date: December 5, 2023 Location: Barge Landing



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Barge Landing	Station number:	AMS 09
Calibration Date:	December 8, 2023	Last Cal Date:	November 22, 2023
Start time (MST):	13:12	End time (MST):	13:26
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)	-4.40	-4.71	-4.40	☐	+/- 2 °C
P (mmHg)	727.30	734.42	727.30	☐	+/- 10 mmHg
flow (LPM)	5.01	4.90	5.01	☐	+/- 0.25 LPM

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

PM w/o HEPA: 3.0 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: October 19, 2023 <0.2 ug/m3

Disposable Filter Changed: October 19, 2023

Annual Maintenance

Date Sample Tube Cleaned: August 23, 2023

Date RH/T Sensor Cleaned: August 23, 2023

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

Calibration by: Sean Bala

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS11
LOWER CAMP

DECEMBER 2023

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

January 31, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Lower Camp	Station number:	AMS11
Calibration Date:	December 19, 2023	Last Cal Date:	November 22, 2023
Start time (MST):	10:24	End time (MST):	14:04
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:	0.997987	0.998200	Backgd or Offset:	14.5	14.6
Calibration intercept:	0.750571	0.350846	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	0.5	----
as found span	4919	81.3	800.8	796.5	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.8	----
high point	4919	81.3	800.8	800.1	1.001
second point	4959	40.7	400.9	399.7	1.003
third point	4980	20.3	199.9	199.9	1.000
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:	796.00	Previous response	799.90	*% change	-0.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

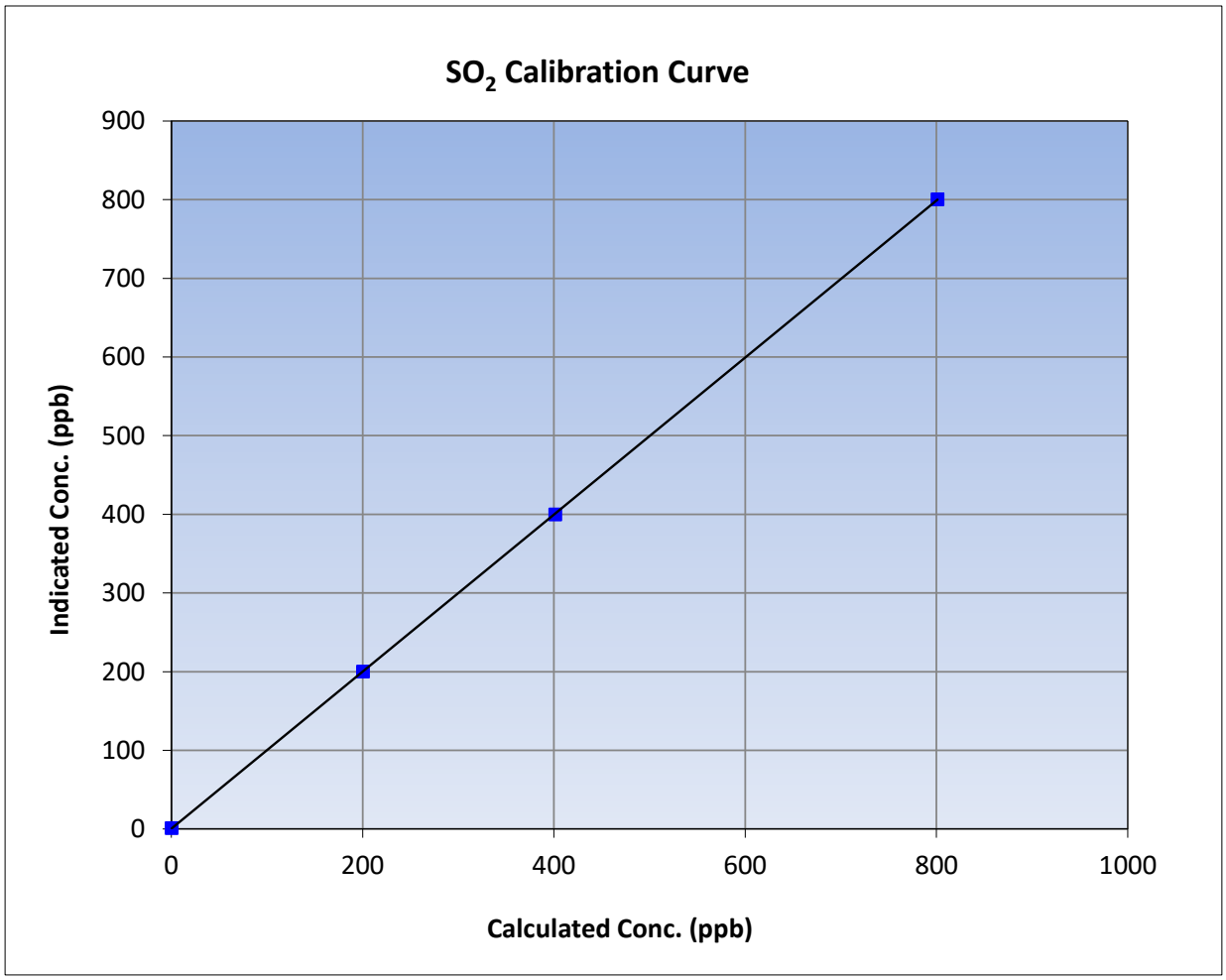
Station Information

Calibration Date:	December 19, 2023	Previous Calibration:	November 22, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:24	End Time (MST):	14:04
Analyzer make:	Thermo 43i	Analyzer serial #:	100841398

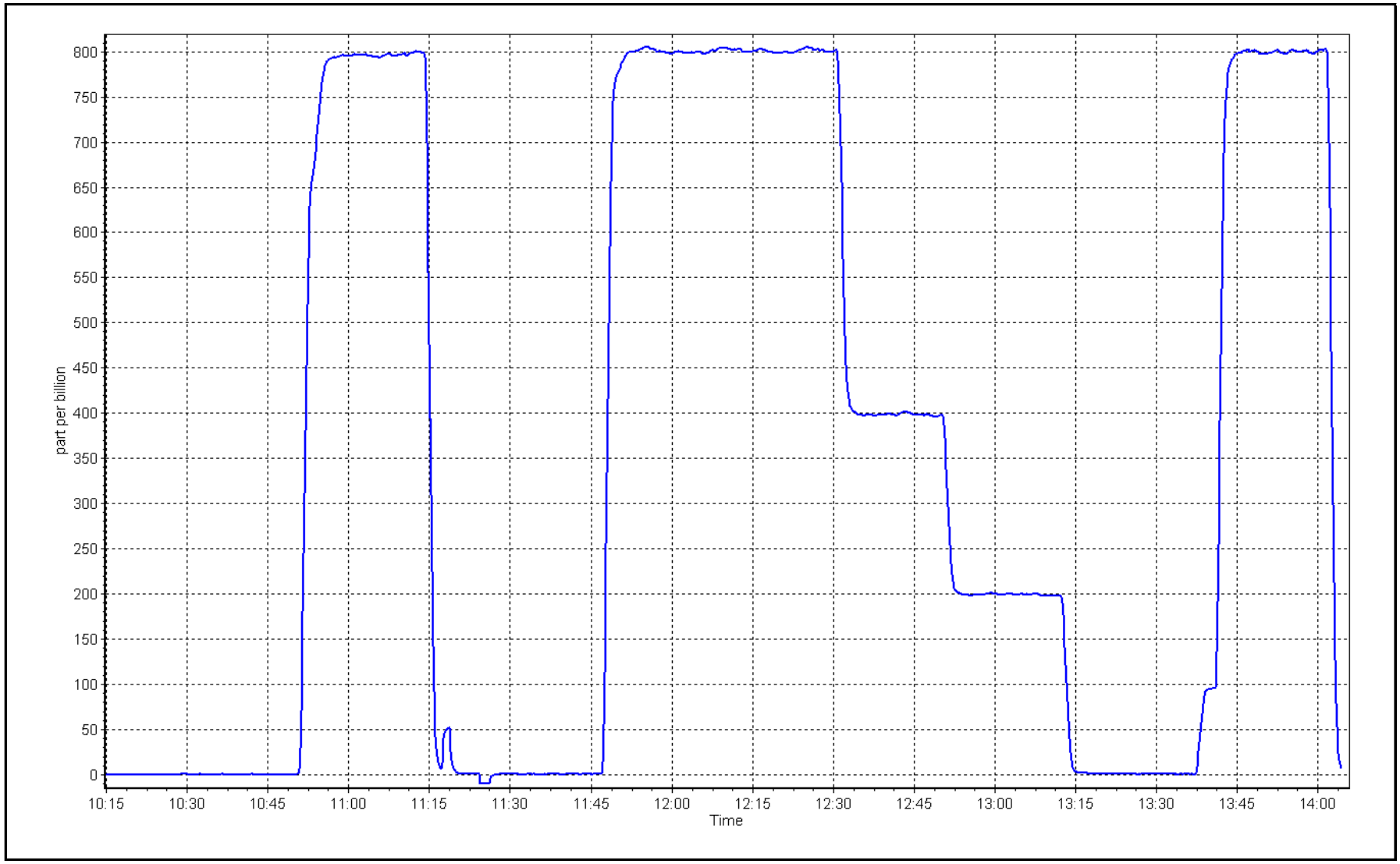
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.8	----
800.8	800.1	1.0008
400.9	399.7	1.0030
199.9	199.9	1.0002

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999997	*≥0.995*
Slope	0.998200	*0.90 - 1.10*
Intercept	0.350846	*+/-30*



SO2 Calibration Plot Date: December 19, 2023 Location: Lower Camp



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Lower Camp	Station number:	AMS11
Calibration Date:	December 20, 2023	Last Cal Date:	November 30, 2023
Start time (MST):	10:48	End time (MST):	14:49
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:	1.012622	1.009917	Backgd or Offset:	14.2	14.8
Calibration intercept:	0.214550	0.234284	Coeff or Slope:	1.001	1.001

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.7	----
as found span	4926	73.6	79.9	80.8	0.998
as found 2nd point	4963	36.8	40.0	40.9	0.994
as found 3rd point	4982	18.6	20.2	20.8	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	0.2	----
high point	4926	73.6	79.9	80.9	0.988
second point	4963	36.8	40.0	40.7	0.982
third point	4982	18.6	20.2	20.6	0.980
as left zero	5000	0.0	0.0	0.4	----
as left span	4926	73.6	79.9	80.8	0.989
SO2 Scrubber Check	4919	81.1	811.0	-0.1	----
Date of last scrubber change:				Ave Corr Factor	0.983
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.1	Prev response:	81.14	*% change:	-1.3%
Baseline Corr 2nd AF pt:	40.2	AF Slope:	1.003040	AF Intercept:	0.675086
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999989		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter and performed a power cycle on the analyzer after as founds. Completed SO2 scrubber check after calibrator zero. Adjusted zero only.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

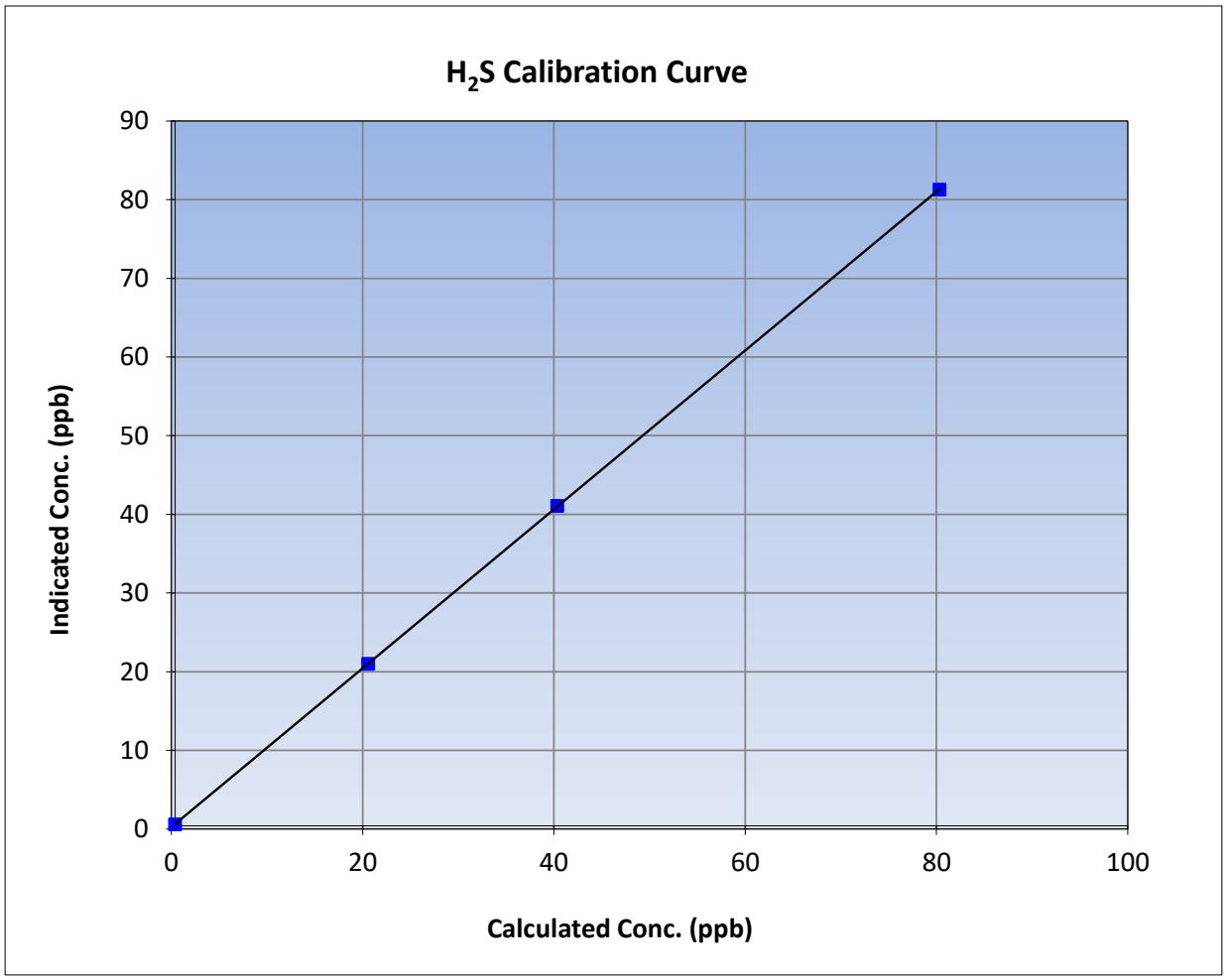
Station Information

Calibration Date:	December 20, 2023	Previous Calibration:	November 30, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:48	End Time (MST):	14:49
Analyzer make:	Thermo 450iQ	Analyzer serial #:	CM20080003

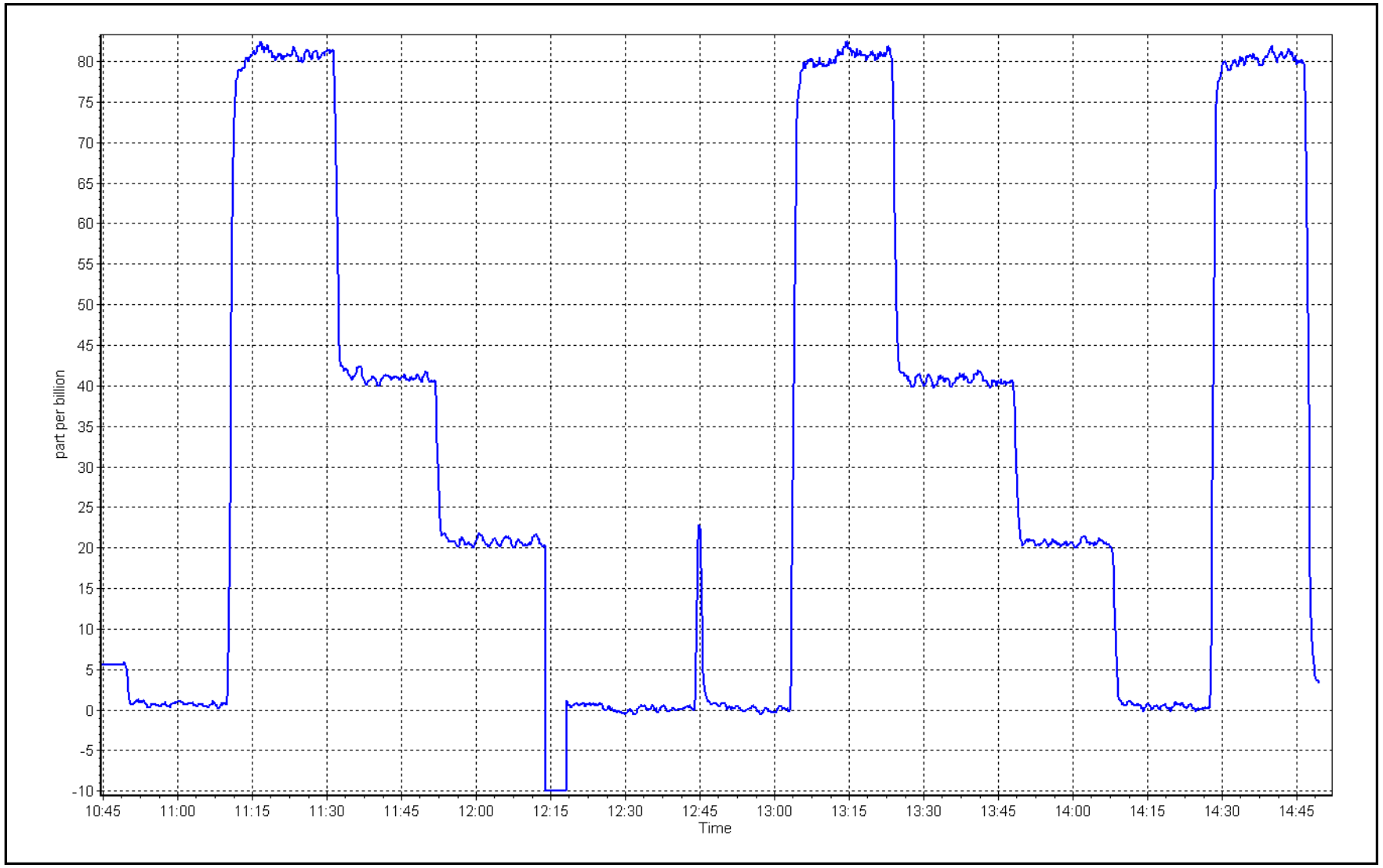
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
79.9	80.9	0.9879
40.0	40.7	0.9818
20.2	20.6	0.9803

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.009917	*0.90 - 1.10*
Intercept	0.234284	*+/-3*



H_2S Calibration Plot Date: December 20, 2023 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:	December 19, 2023	Last Cal Date:	November 22, 2023
Start time (MST):	10:24	End time (MST):	14:04
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1505164381	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.99E-04	3.00E-04	NMHC SP Ratio:	5.79E-05	5.77E-05
CH4 Retention time:	14.0	14.2	NMHC Peak Area:	158468	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	17.28	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	17.38	0.998
second point	4959	40.7	8.69	8.63	1.006
third point	4980	20.3	4.33	4.31	1.004
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	17.37	*% change	-0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-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	9.18	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.3	9.19	9.23	0.996
second point	4959	40.7	4.60	4.57	1.007
third point	4980	20.3	2.29	2.29	1.004
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	1.002
Baseline Corr AF:	9.18	Prev response	9.22	*% change	-0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	8.16	8.11	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.3	8.16	8.15	1.001
second point	4959	40.7	4.09	4.06	1.006
third point	4980	20.3	2.04	2.03	1.004
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	1.004
Baseline Corr AF:	8.11	Prev response	8.15	*% change	-0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.001857	1.001730
THC Cal Offset:	-0.011999	-0.022785
CH4 Cal Slope:	0.998980	0.998587
CH4 Cal Offset:	-0.005496	-0.005091
NMHC Cal Slope:	1.004102	1.004174
NMHC Cal Offset:	-0.005505	-0.017294

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

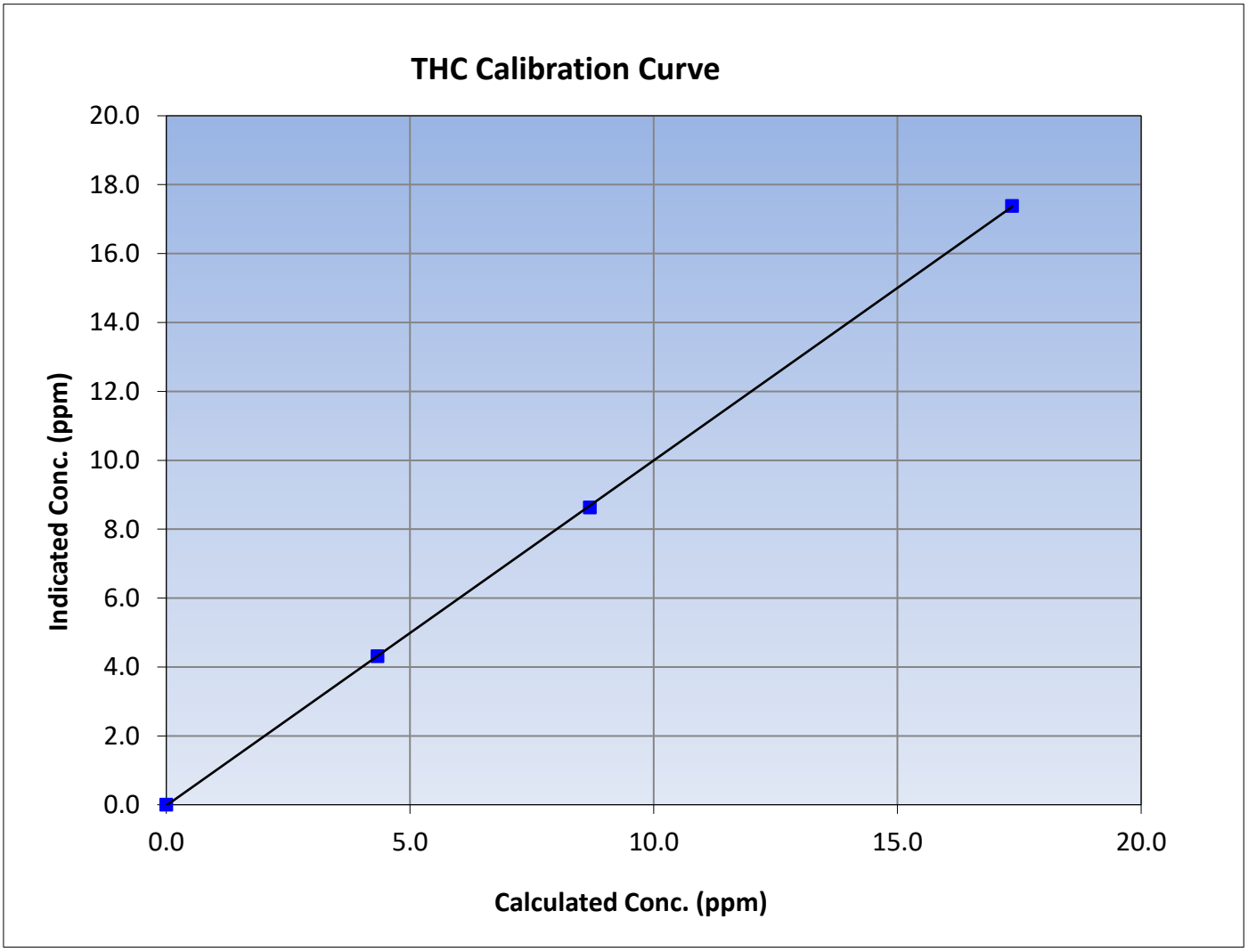
Version-06-2022

Station Information

Calibration Date:	December 19, 2023	Previous Calibration:	November 22, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:24	End Time (MST):	14:04
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	0.999981	≥0.995
17.35	17.38	0.9982			
8.69	8.63	1.0061	Slope	1.001730	0.90 - 1.10
4.33	4.31	1.0042			
			Intercept	-0.022785	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

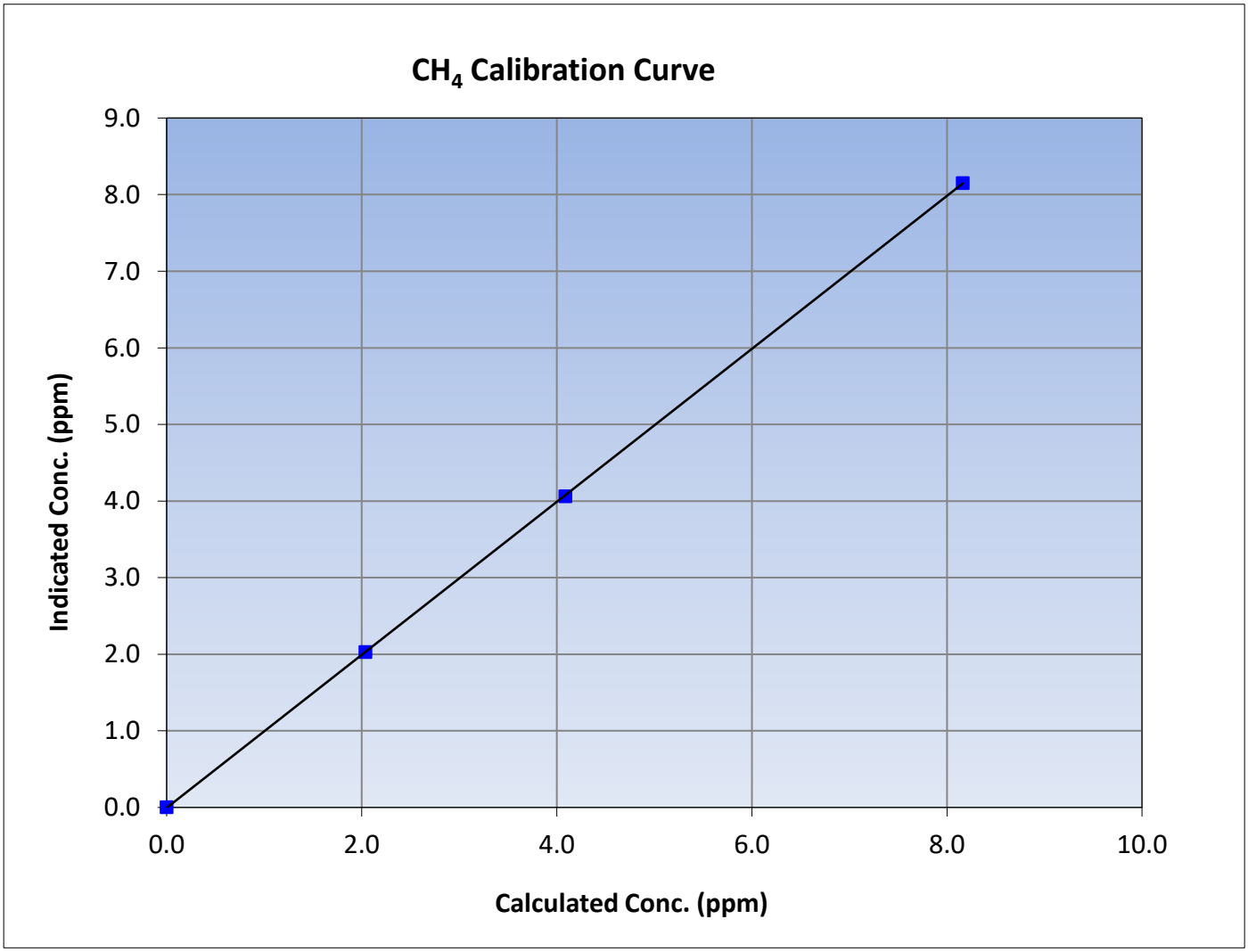
Version-06-2022

Station Information

Calibration Date:	December 19, 2023	Previous Calibration:	November 22, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:24	End Time (MST):	14:04
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	0.999993	*≥0.995*
8.16	8.15	1.0012			
4.09	4.06	1.0058	Slope	0.998587	*0.90 - 1.10*
2.04	2.03	1.0044			
			Intercept	-0.005091	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

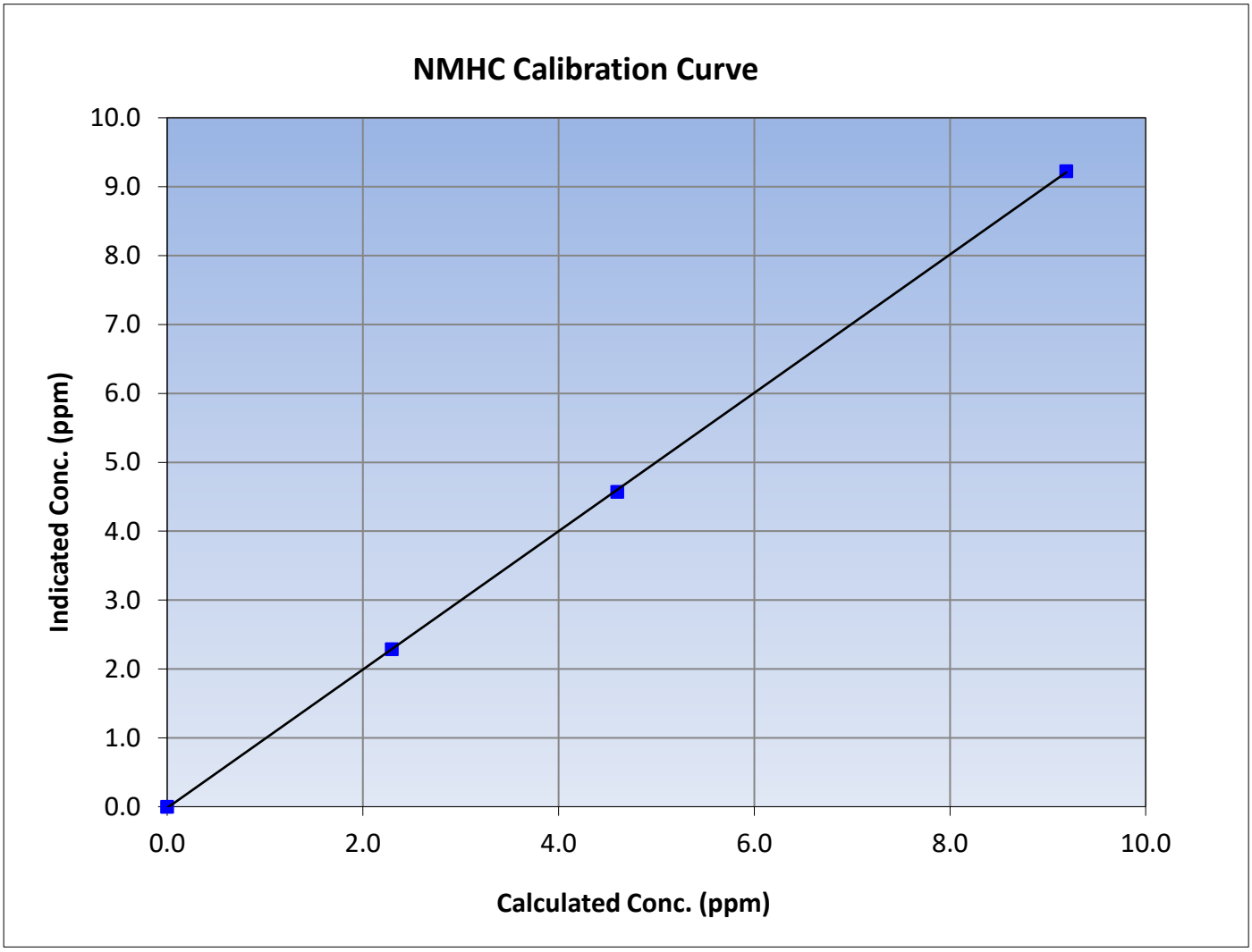
Version-06-2022

Station Information

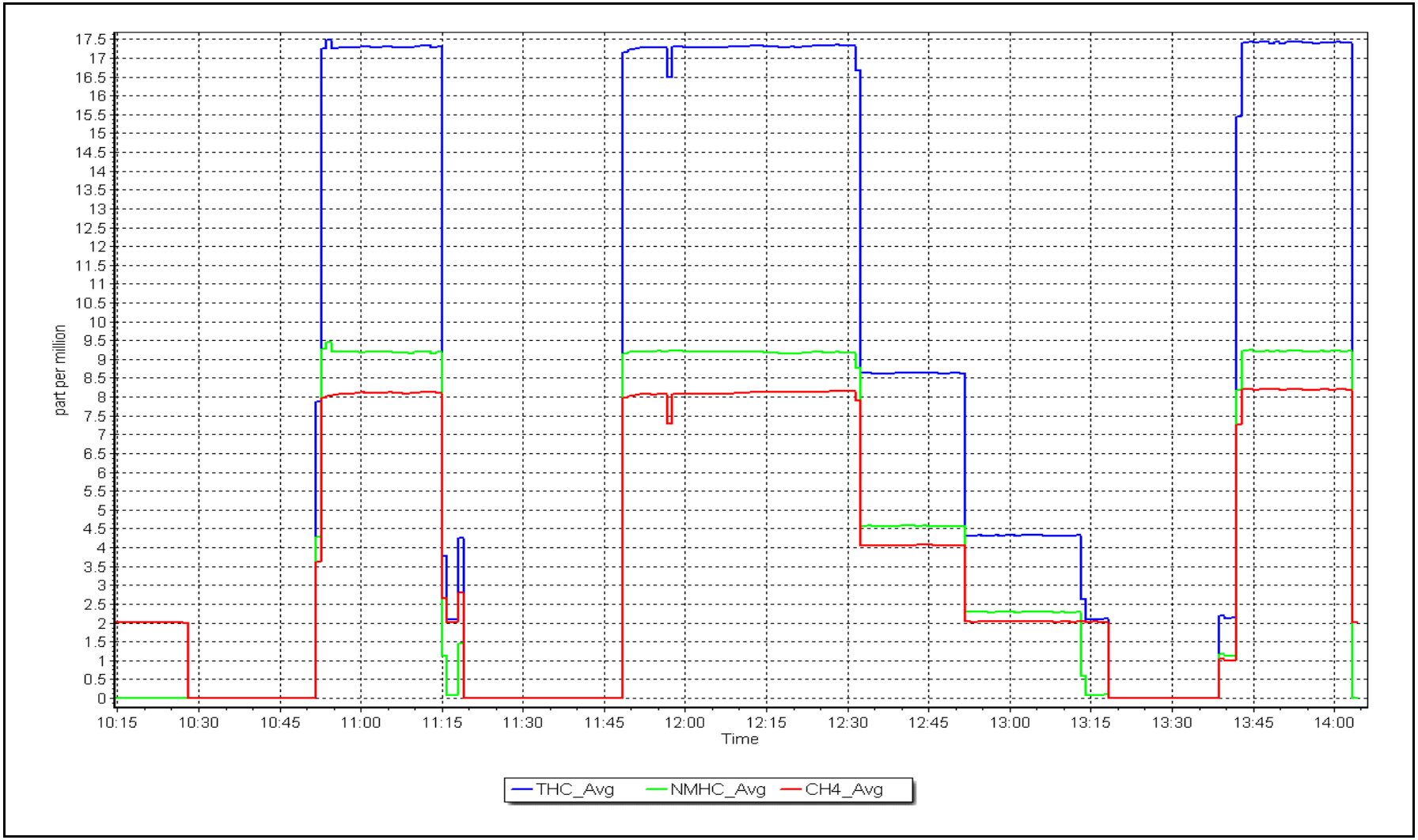
Calibration Date:	December 19, 2023	Previous Calibration:	November 22, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:24	End Time (MST):	14:04
Analyzer make:	Thermo 55i	Analyzer serial #:	1505164381

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999965	*≥0.995*
9.19	9.23	0.9959			
4.60	4.57	1.0067	Slope	1.004174	*0.90 - 1.10*
2.29	2.29	1.0041			
			Intercept	-0.017294	*+/-0.5*



NMHC Calibration Plot Date: ################ Location: Lower Camp



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS13
FORT MCKAY SOUTH

DECEMBER 2023

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

January 31, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	December 18, 2023	Last Cal Date:	November 6, 2023
Start time (MST):	10:31	End time (MST):	13:52
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:	1.002128	1.000755	Backgd or Offset:	91.1	91.1
Calibration intercept:	-3.438386	-2.857974	Coeff or Slope:	0.709	0.709

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.4	----
as found span	4921	79.1	799.7	796.4	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.3	----
high point	4921	79.1	799.7	798.5	1.001
second point	4961	39.5	399.3	396.1	1.008
third point	4980	19.8	200.2	194.5	1.029
as left zero	5000	0.0	0.0	-0.3	----
as left span	4921	79.1	799.7	797.1	1.003
				Average Correction Factor	1.013

Baseline Corr As found:	796.80	Previous response	797.95	*% change	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

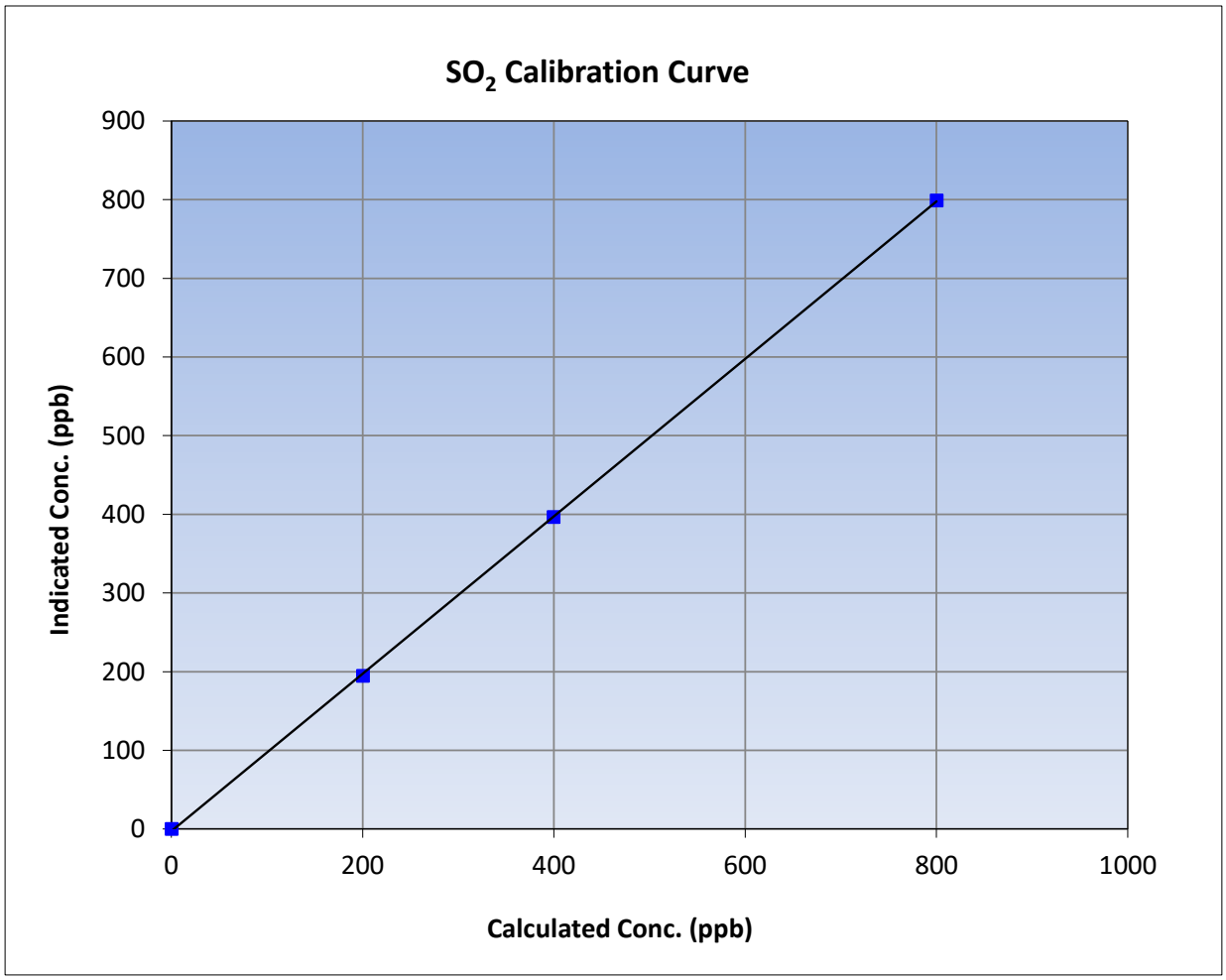
Station Information

Calibration Date:	December 18, 2023	Previous Calibration:	November 6, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:31	End Time (MST):	13:52
Analyzer make:	API T100	Analyzer serial #:	599

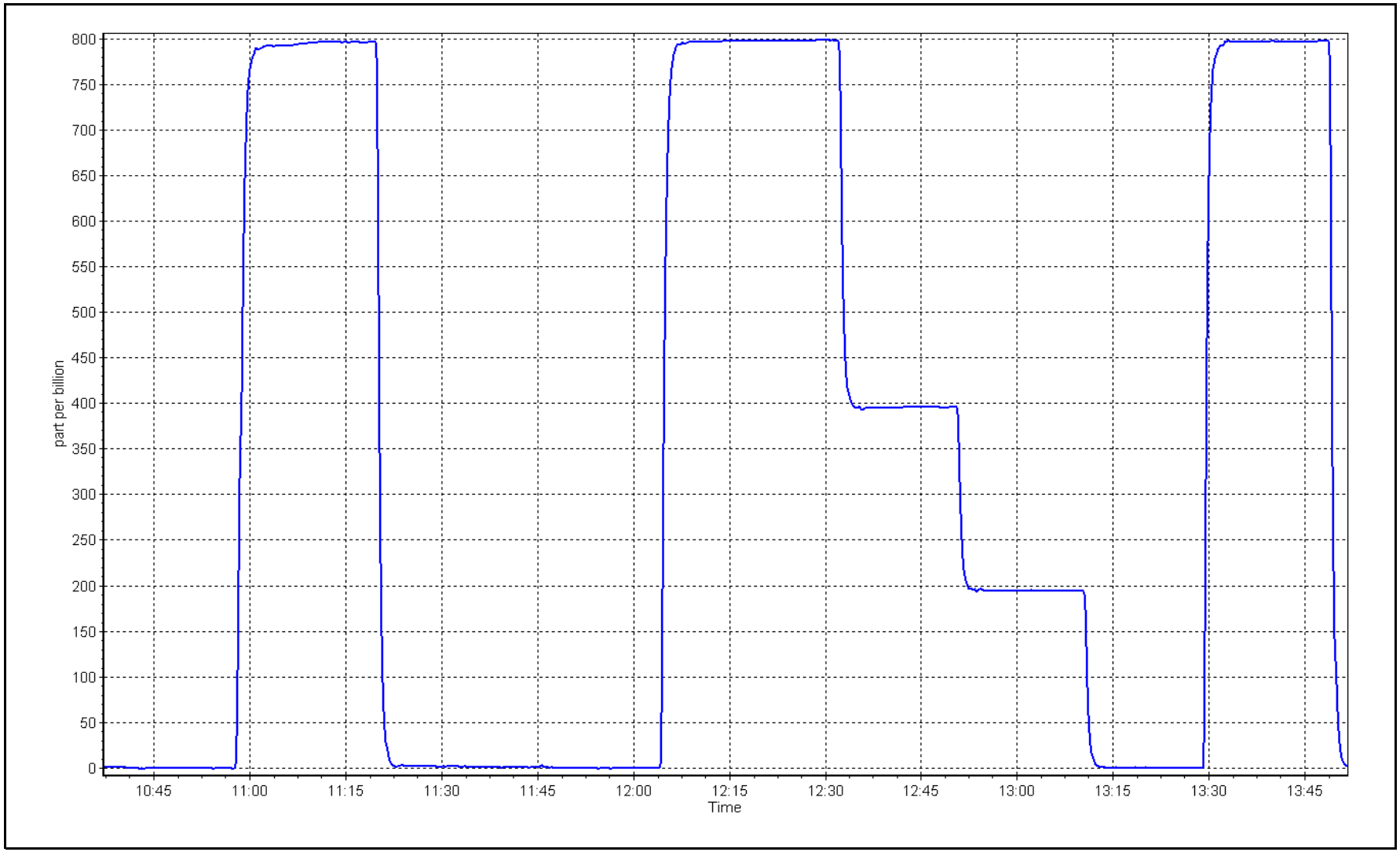
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
799.7	798.5	1.0015
399.3	396.1	1.0081
200.2	194.5	1.0292

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999951	*≥0.995*
Slope	1.000755	*0.90 - 1.10*
Intercept	-2.857974	*+/-30*



SO2 Calibration Plot Date: December 18, 2023 Location: Fort McKay South



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	December 5, 2023	Last Cal Date:	November 23, 2023
Start time (MST):	9:45	End time (MST):	13:44
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:	1.003766	0.997103	Backgd or Offset:	3.77	3.77
Calibration intercept:	-0.102198	-0.142201	Coeff or Slope:	1.130	1.130

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4925	75.5	80.6	81.0	0.995
as found 2nd point	4962	37.7	40.3	40.4	0.997
as found 3rd point	4981	18.9	20.2	19.7	1.025
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	4925	75.5	80.6	80.3	1.004
second point	4962	37.7	40.3	40.0	1.007
third point	4981	18.9	20.2	19.8	1.019
as left zero	5000	0.0	0.0	0.2	----
as left span	4925	75.5	80.6	79.9	1.009
SO2 Scrubber Check	4921	79.1	791.0	0.1	----
Date of last scrubber change:		20-Mar-20		Ave Corr Factor	1.010
Date of last converter efficiency test:		NA			efficiency

Baseline Corr As found:	81.0	Prev response:	80.83	*% change:	0.2%
Baseline Corr 2nd AF pt:	40.4	AF Slope:	1.007024	AF Intercept:	-0.242118
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999939		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

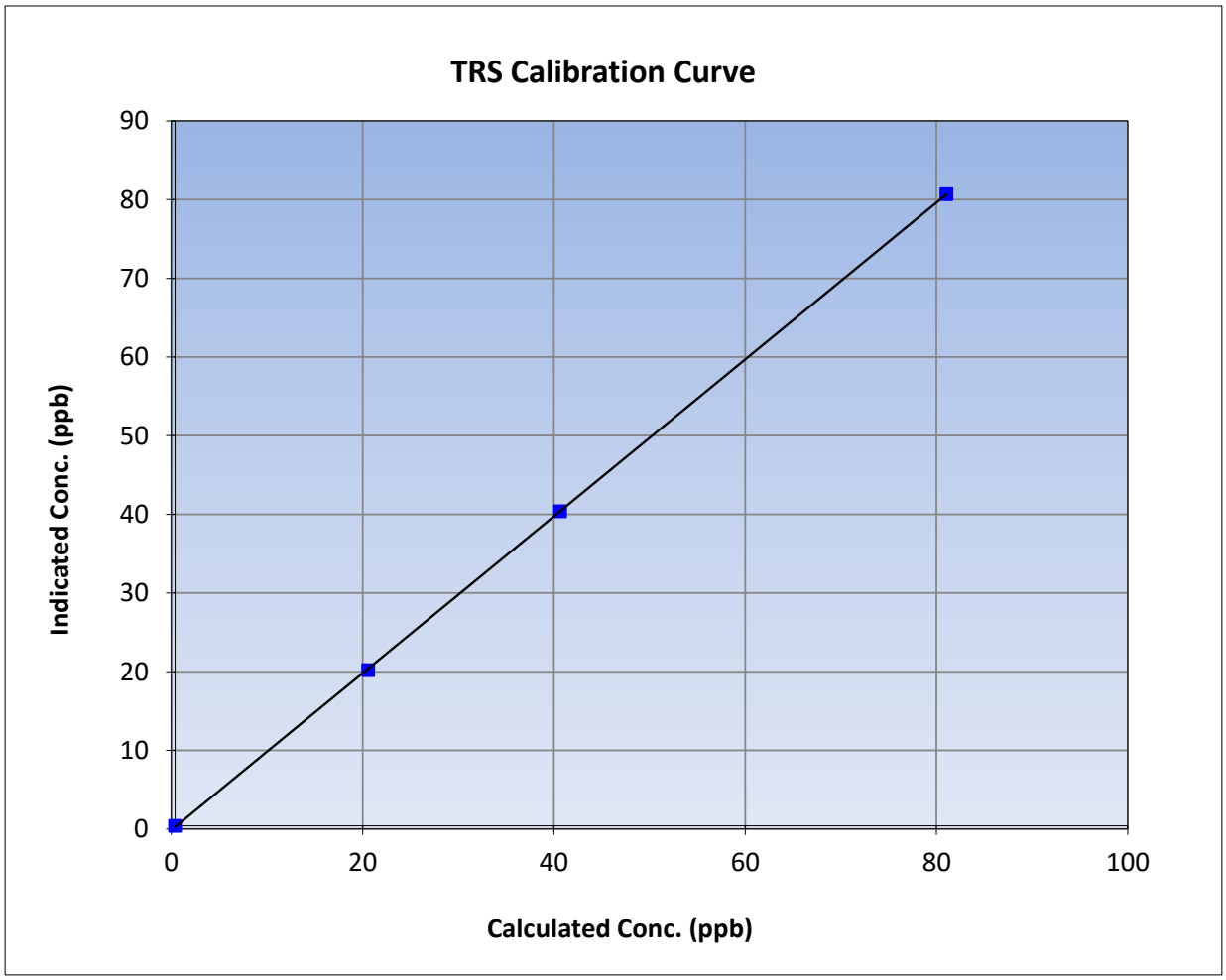
Station Information

Calibration Date:	December 5, 2023	Previous Calibration:	November 23, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	9:45	End Time (MST):	13:44
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1180540017

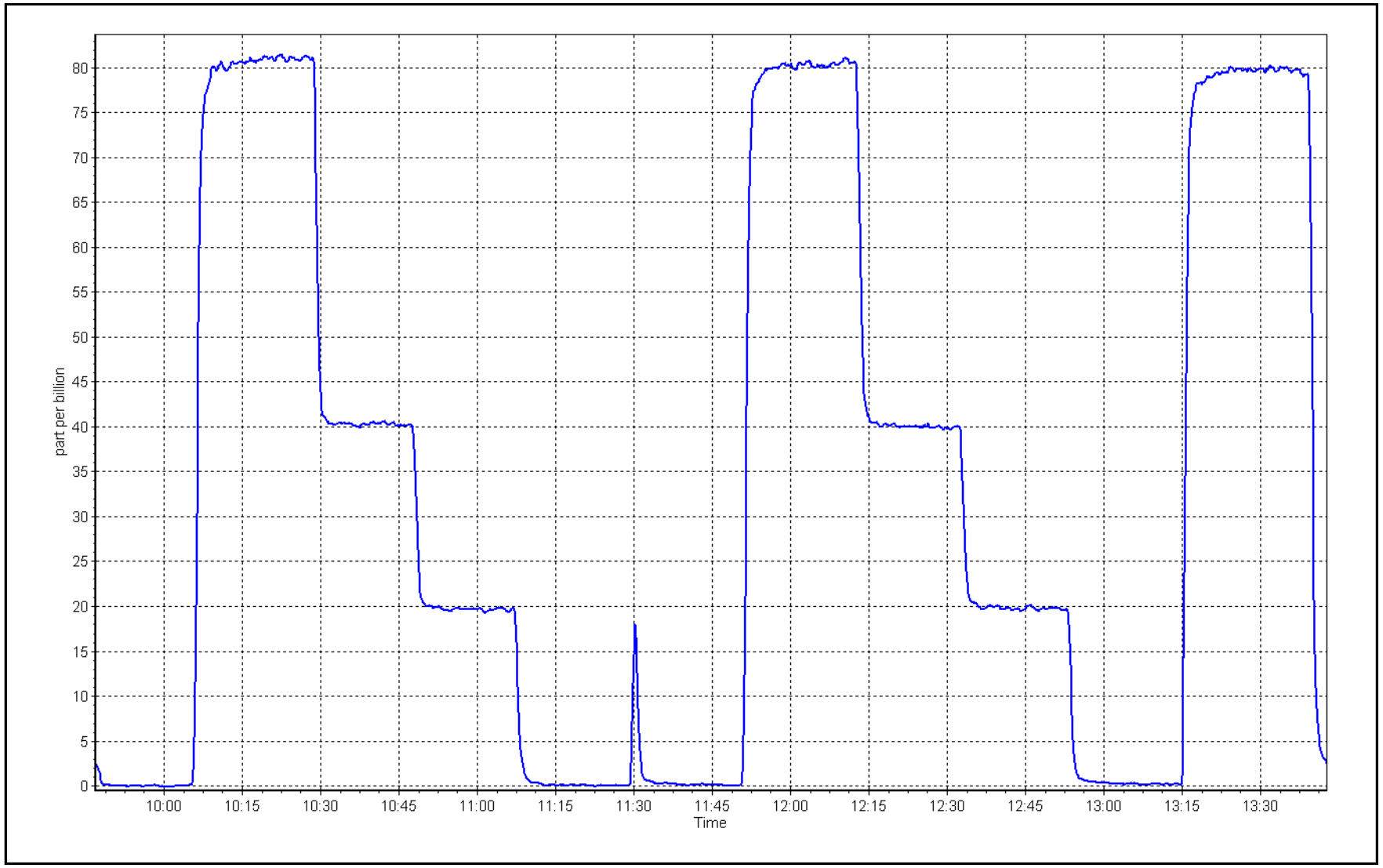
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.6	80.3	1.0041
40.3	40.0	1.0067
20.2	19.8	1.0195

Statistical Evaluation		Limits
Correlation Coefficient	0.999984	≥0.995
Slope	0.997103	0.90 - 1.10
Intercept	-0.142201	+/-3



TRS Calibration Plot Date: December 5, 2023 Location: Fort McKay South



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	December 18, 2023	Last Cal Date:	November 21, 2023
Start time (MST):	10:37	End time (MST):	13:52
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:	2.76E-04	2.80E-04	NMHC SP Ratio:	4.61E-05	4.70E-05
CH4 Retention time:	15.00	14.80	NMHC Peak Area:	197092	193260
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	79.1	17.05	16.82	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	79.1	17.05	17.08	0.998
second point	4961	39.5	8.51	8.45	1.008
third point	4980	19.8	4.27	4.14	1.030
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	17.05	16.81	1.014
				Average Correction Factor	1.012
Baseline Corr AF:	16.82	Prev response	17.12	*% change	-1.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-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	8.90	1.020
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	9.10	0.998
second point	4961	39.5	4.53	4.50	1.007
third point	4980	19.8	2.27	2.20	1.033
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	9.08	8.93	1.017
				Average Correction Factor	1.013
Baseline Corr AF:	8.90	Prev response	9.05	*% change	-1.7%
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	4921	79.1	7.97	7.92	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.1	7.97	7.98	0.998
second point	4961	39.5	3.98	3.94	1.009
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	7.88	1.011
				Average Correction Factor	1.011
Baseline Corr AF:	7.92	Prev response	8.06	*% change	-1.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.008301	1.003916
THC Cal Offset:	-0.071364	-0.069164
CH4 Cal Slope:	1.016730	1.003456
CH4 Cal Offset:	-0.036593	-0.030586
NMHC Cal Slope:	1.000565	1.004193
NMHC Cal Offset:	-0.034171	-0.038578

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

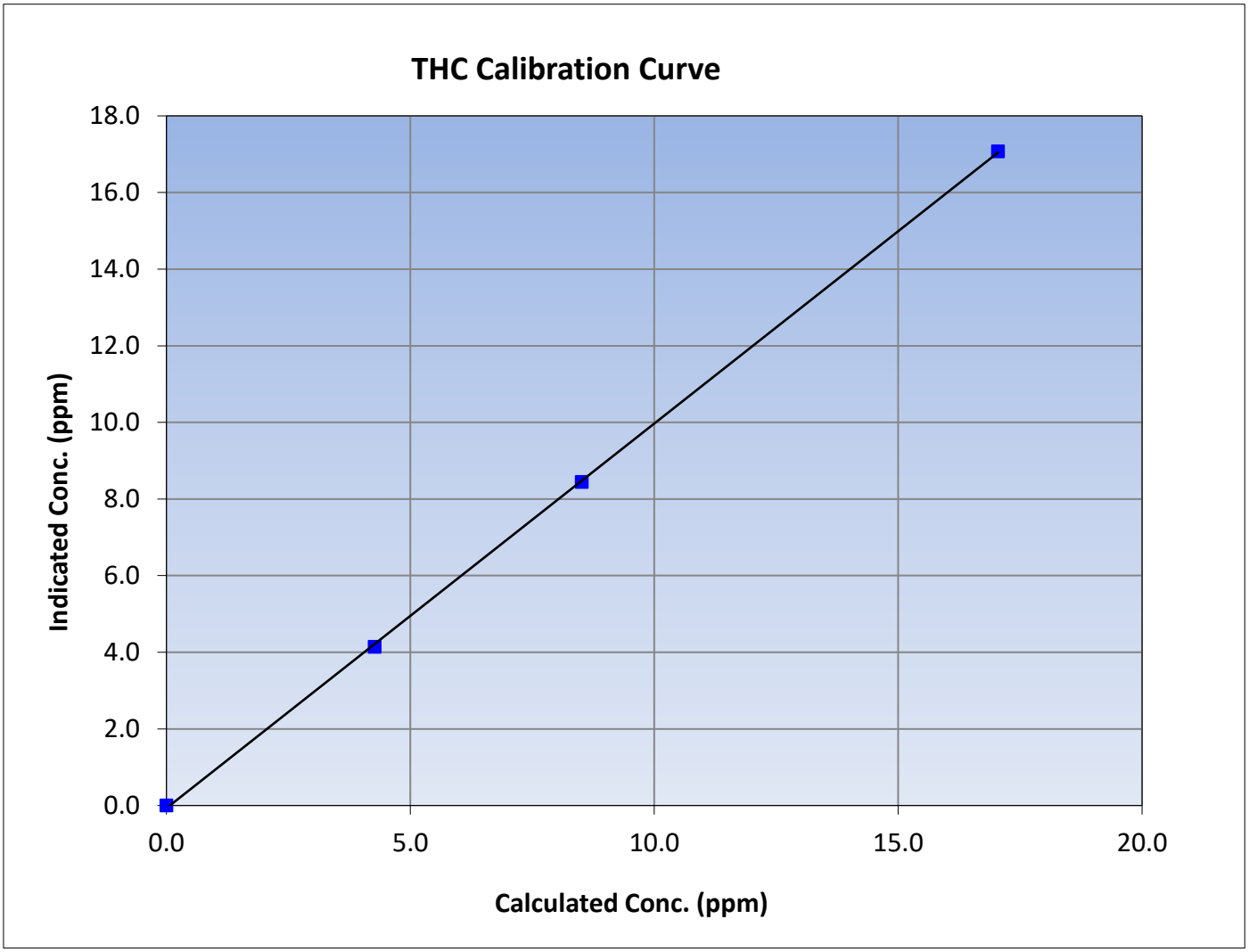
Version-06-2022

Station Information

Calibration Date:	December 18, 2023	Previous Calibration:	November 21, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:37	End Time (MST):	13:52
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	0.999925	≥0.995
17.05	17.08	0.9982			
8.51	8.45	1.0079	Slope	1.003916	0.90 - 1.10
4.27	4.14	1.0300			
			Intercept	-0.069164	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

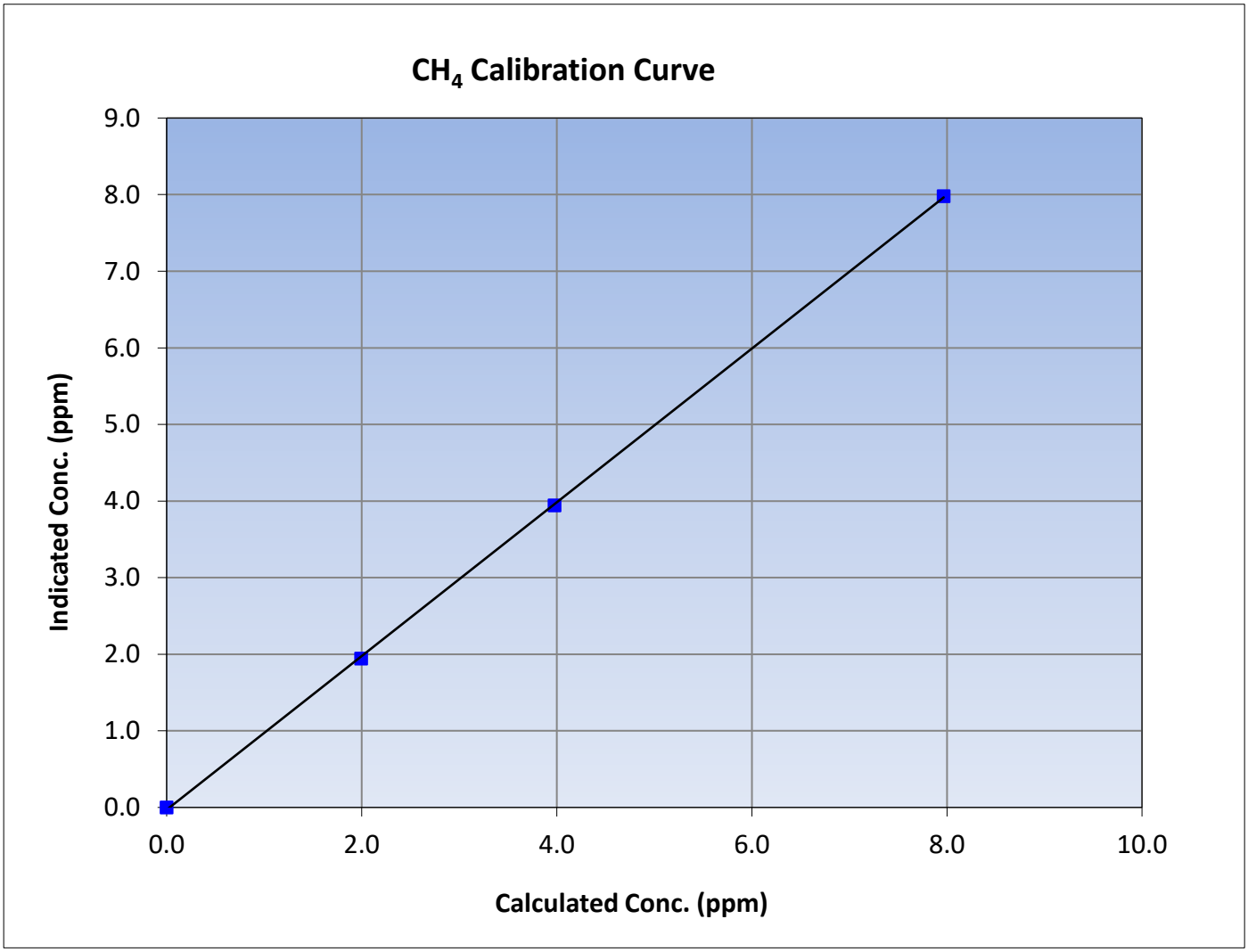
Version-06-2022

Station Information

Calibration Date:	December 18, 2023	Previous Calibration:	November 21, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:37	End Time (MST):	13:52
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	0.999933	*≥0.995*
7.97	7.98	0.9983			
3.98	3.94	1.0089	Slope	1.003456	*0.90 - 1.10*
1.99	1.94	1.0269			
			Intercept	-0.030586	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

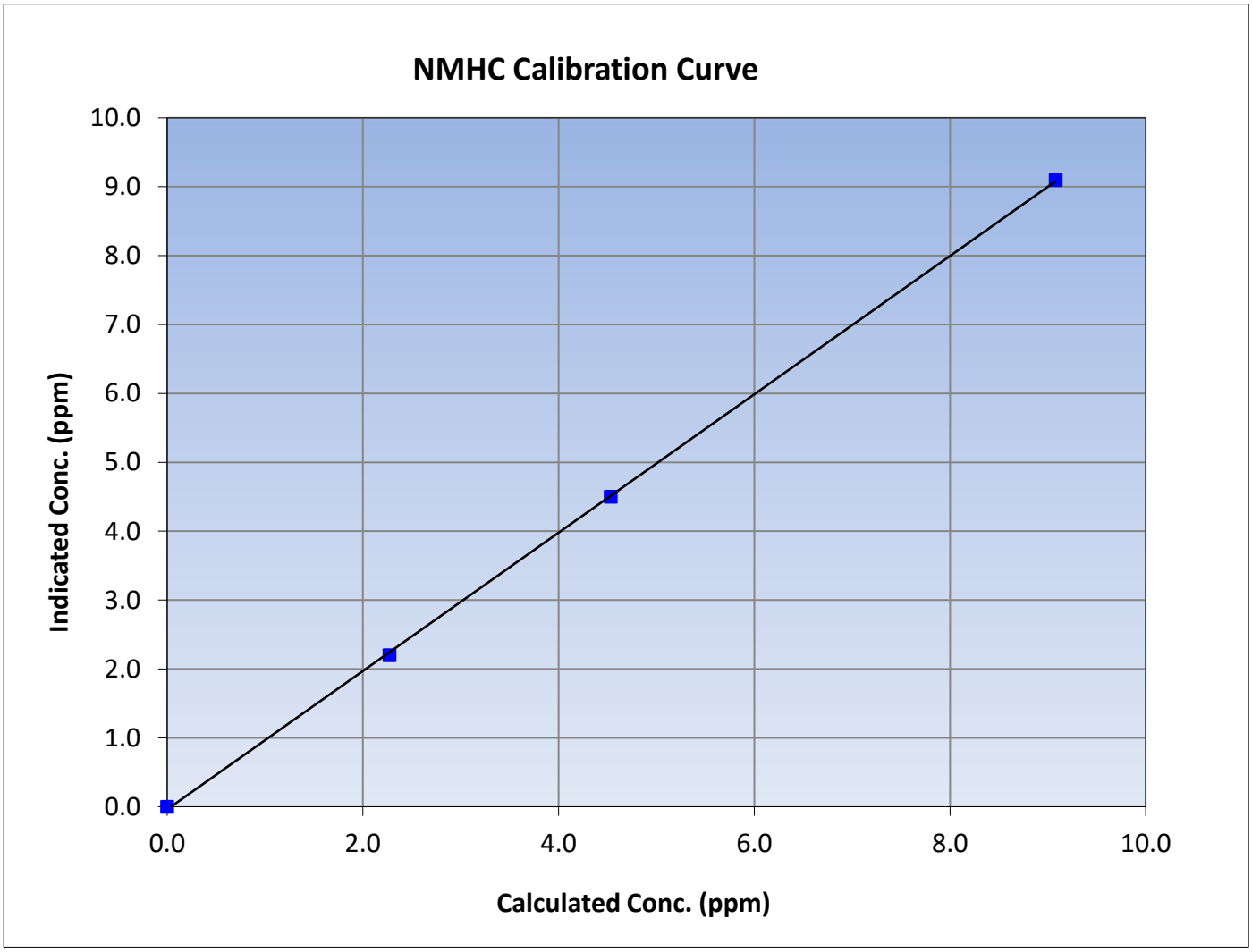
Version-06-2022

Station Information

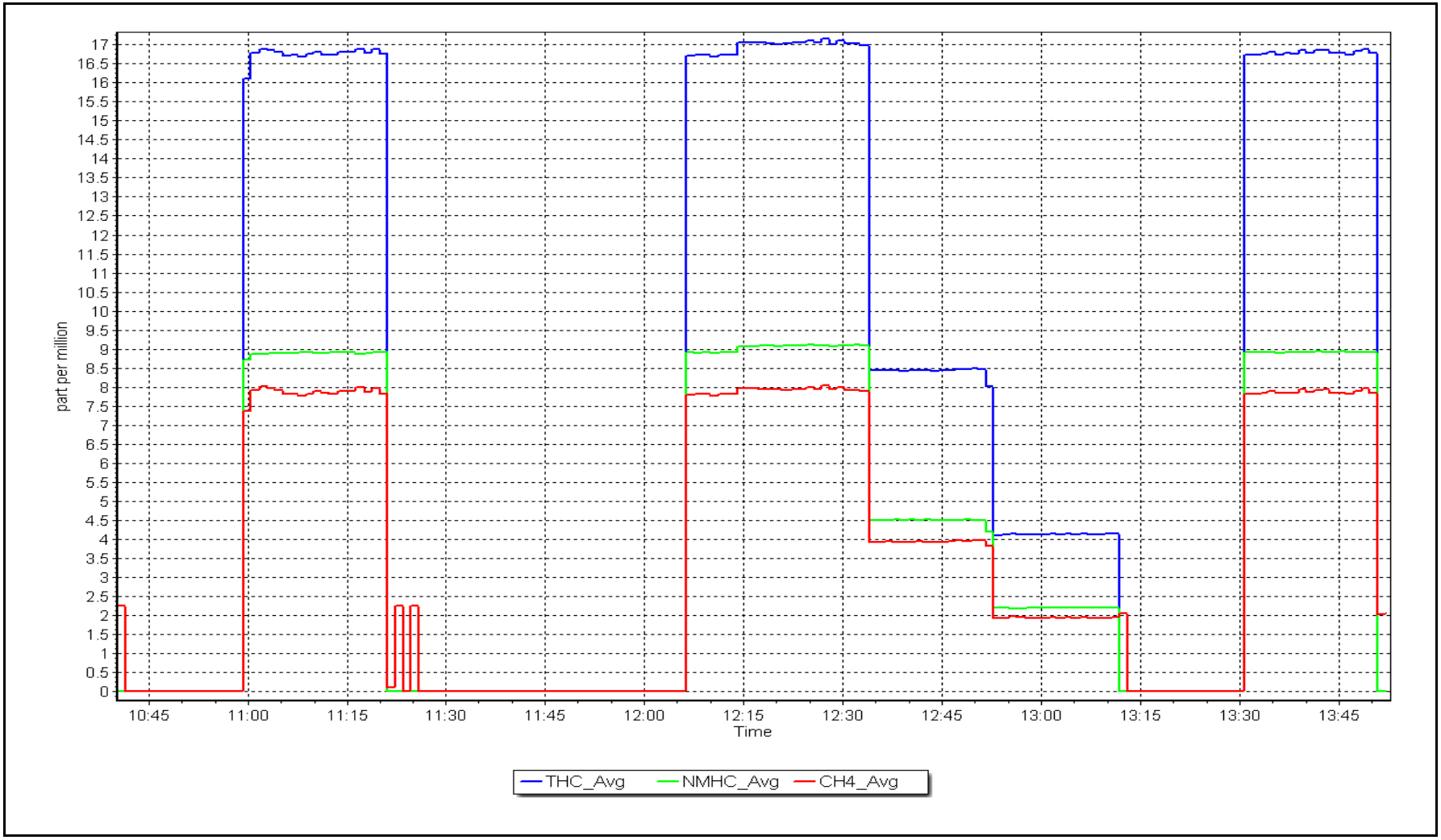
Calibration Date:	December 18, 2023	Previous Calibration:	November 21, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:37	End Time (MST):	13:52
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750023

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999917	≥0.995
9.08	9.10	0.9982			
4.53	4.50	1.0072	Slope	1.004193	0.90 - 1.10
2.27	2.20	1.0326			
			Intercept	-0.038578	+/-0.5



NMHC Calibration Plot Date: December 18, 2023 Location: Fort McKay South



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS 13
Calibration Date:	December 19, 2023	Last Cal Date:	November 24, 2023
Start time (MST):	9:35	End time (MST):	14:10
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.129	1.136	NO bkgnd or offset:	10.4	12.0
NOX coeff or slope:	0.991	0.989	NOX bkgnd or offset:	10.5	12.0
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	160.2	160.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999580	1.000174
NO_X Cal Offset:	-1.911243	-2.251490
NO Cal Slope:	1.001676	1.004205
NO Cal Offset:	-2.864919	-3.125534
NO_2 Cal Slope:	1.000024	1.001643
NO_2 Cal Offset:	-0.523265	-0.703923

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	1.1	1.2	-0.1	----	----
as found span	4919	81.1	826.9	800.0	26.9	827.1	798.9	28.2	0.9997	1.0013
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.1	----	----
high point	4919	81.1	826.9	800.0	26.9	825.7	801.6	23.9	1.0014	0.9979
second point	4960	40.6	413.9	400.4	13.5	411.1	397.8	13.3	1.0068	1.0066
third point	4980	20.3	207.0	200.2	6.7	202.3	194.7	7.7	1.0231	1.0284
as left zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.5	0.0	----	----
as left span	4919	81.1	826.9	383.9	443.0	829.4	382.0	447.4	0.9970	1.0049
								Average Correction Factor	1.0104	1.0110

Corrected As found	NO_X = 826.0 ppb	NO = 797.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.2%
Previous Response	NO_X = 824.6 ppb	NO = 798.4 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)	795.7	379.6	443.0	443.4	0.9992	100.1%
2nd GPT point (200 ppb O3)	795.7	582.2	240.4	240.1	1.0014	99.9%
3rd GPT point (100 ppb O3)	795.7	689.3	133.3	131.7	1.0123	98.8%
				Average Correction Factor	1.0043	99.6%

Notes: Changed inlet filter after as founds. Adjusted zero and span. Used 2nd NO reference point due to drift.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

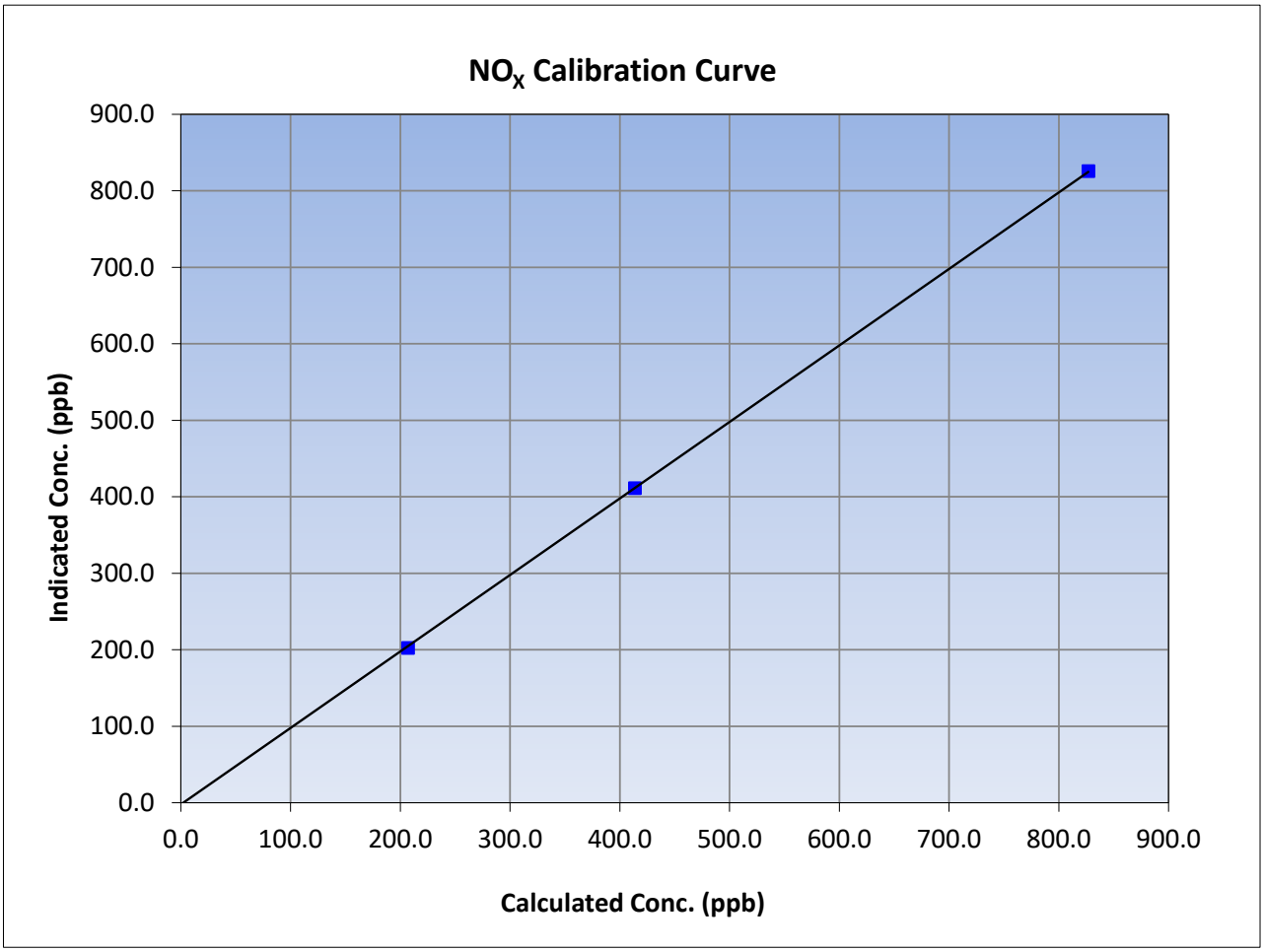
Version-04-2020

Station Information

Calibration Date:	December 19, 2023	Previous Calibration:	November 24, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	9:35	End Time (MST):	14:10
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	0.999968	≥0.995
826.9	825.7	1.0014			
413.9	411.1	1.0068	Slope	1.000174	0.90 - 1.10
207.0	202.3	1.0231			
			Intercept	-2.251490	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

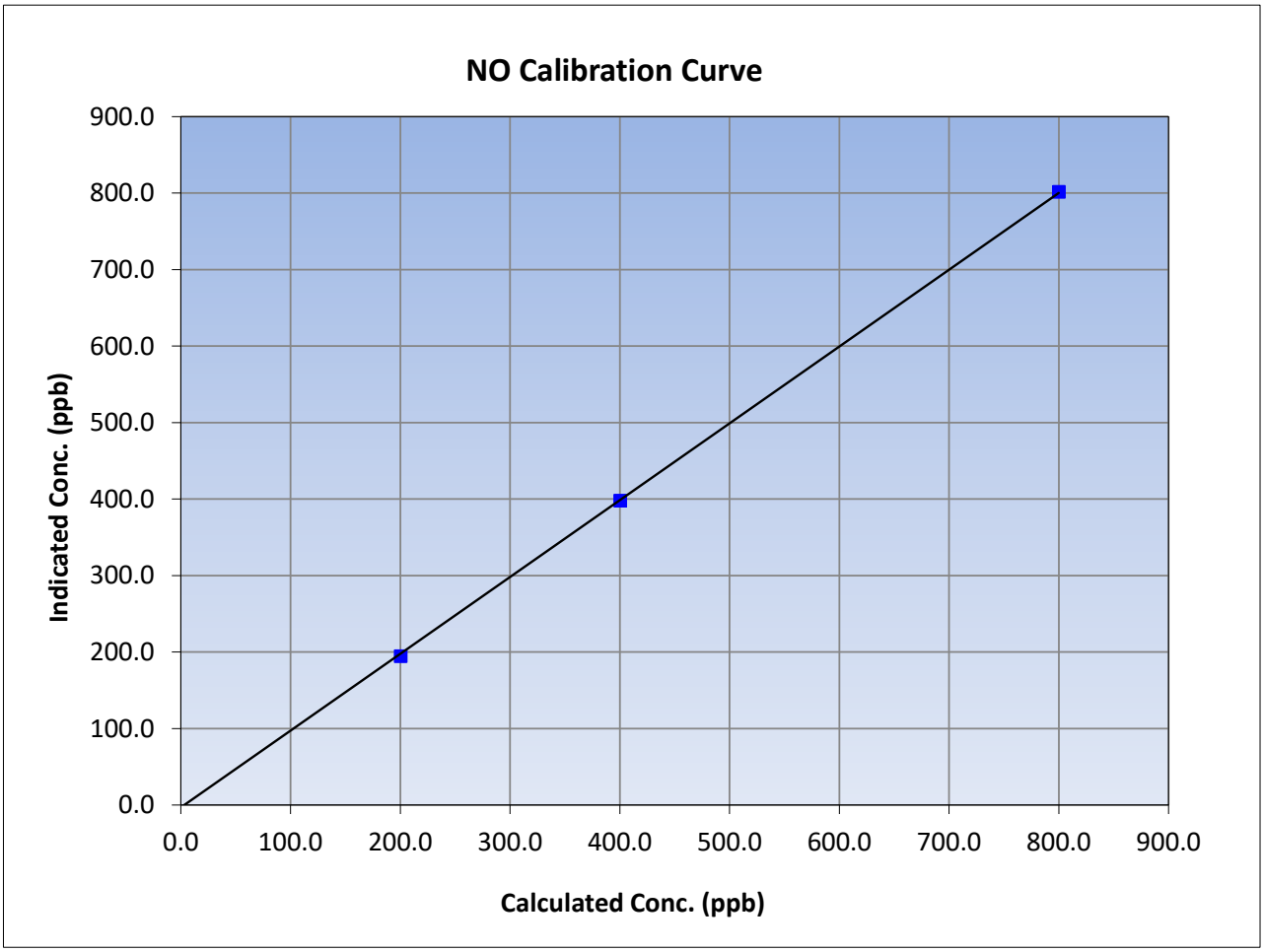
Version-04-2020

Station Information

Calibration Date:	December 19, 2023	Previous Calibration:	November 24, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	9:35	End Time (MST):	14:10
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	0.999935	≥0.995
800.0	801.6	0.9979			
400.4	397.8	1.0066	Slope	1.004205	0.90 - 1.10
200.2	194.7	1.0284			
			Intercept	-3.125534	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

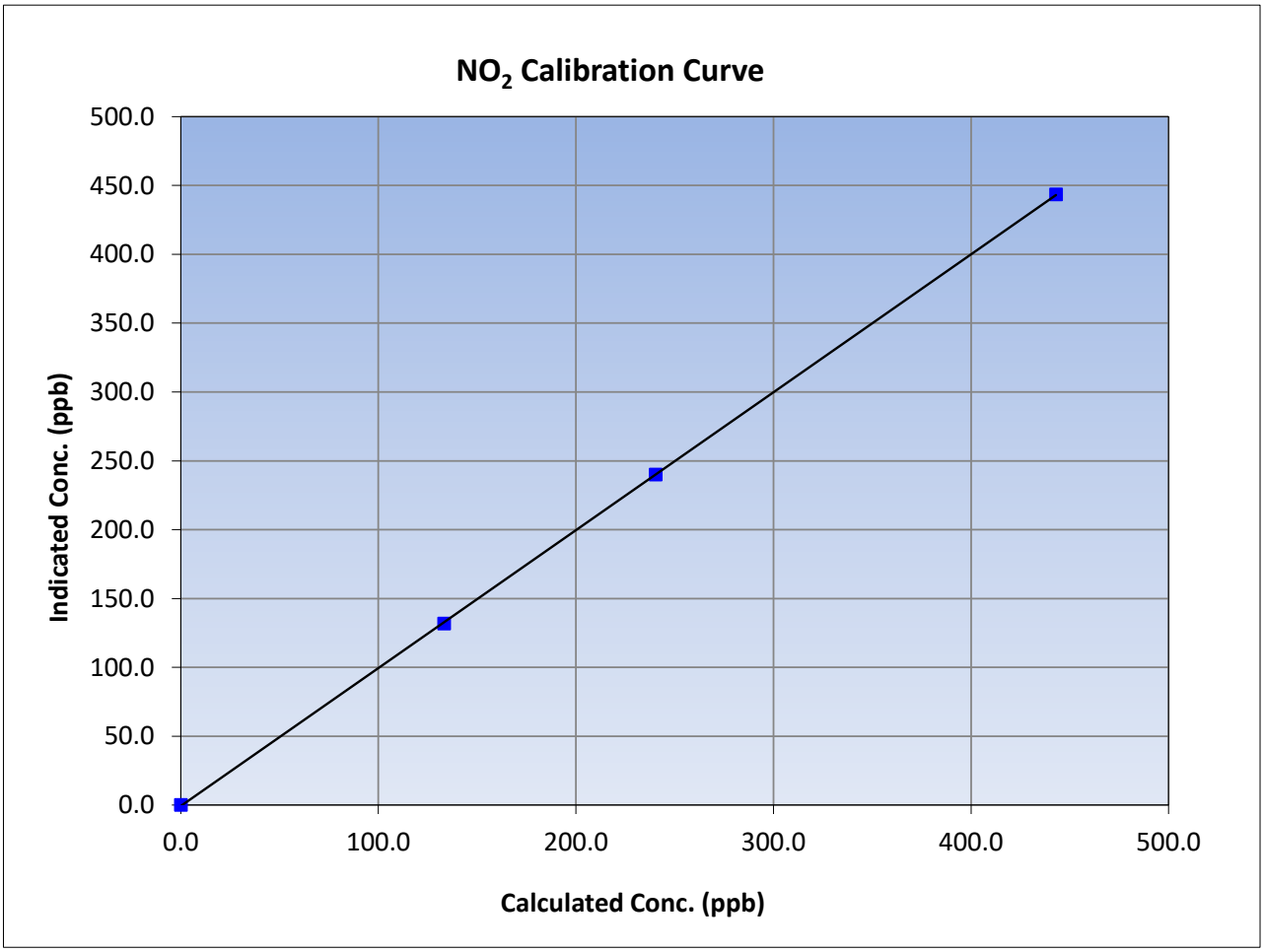
Version-04-2020

Station Information

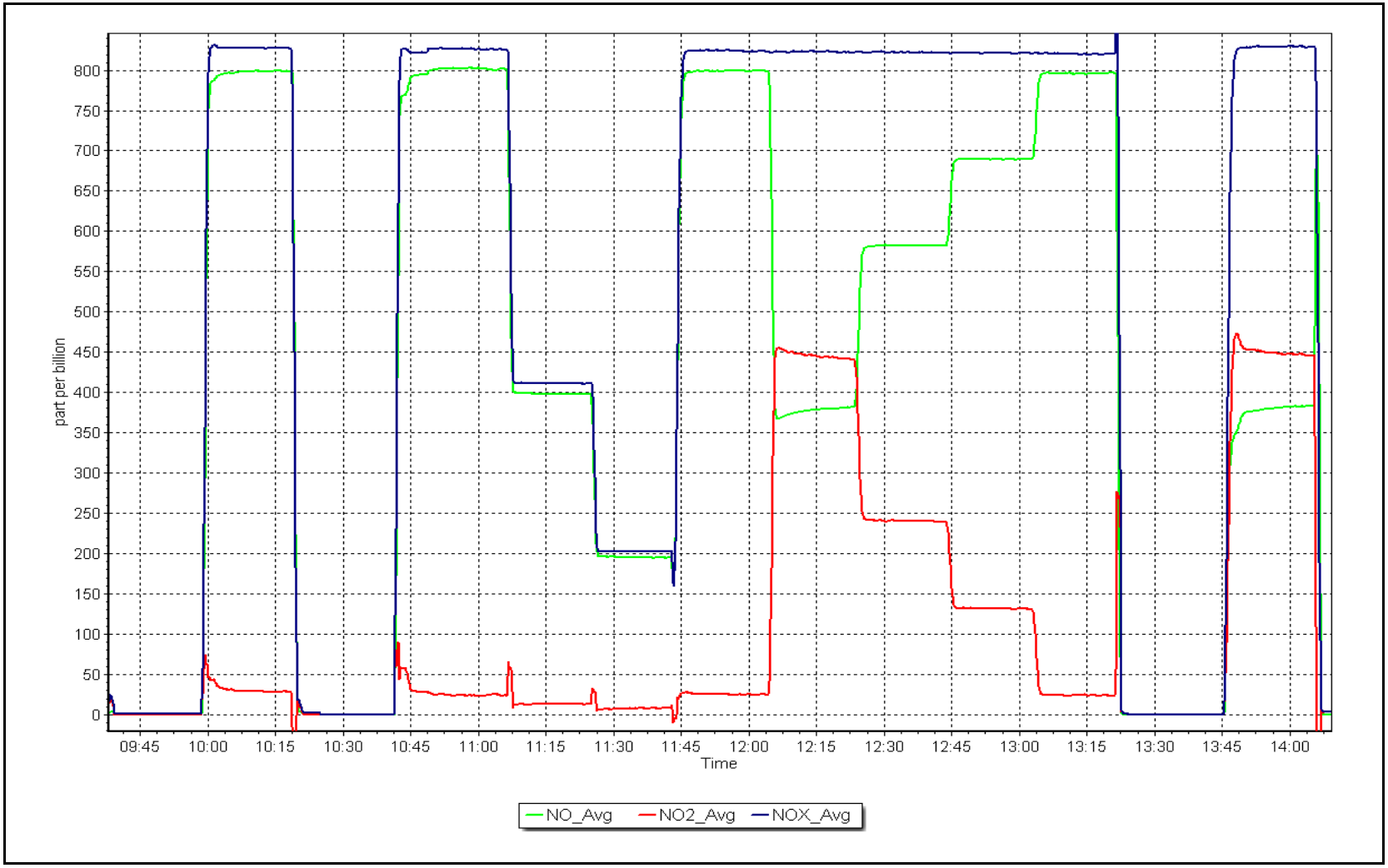
Calibration Date:	December 19, 2023	Previous Calibration:	November 24, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	9:35	End Time (MST):	14:10
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999980	≥0.995
443.0	443.4	0.9992			
240.4	240.1	1.0014	Slope	1.001643	0.90 - 1.10
133.3	131.7	1.0123			
			Intercept	-0.703923	+/-20



NO_X Calibration Plot Date: December 19, 2023 Location: Fort McKay South



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	December 11, 2023	Last Cal Date:	November 20, 2023
Start time (MST):	9:53	End time (MST):	12:17
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997971		Backgd or Offset:	2.4	2.4
Calibration intercept:	0.780000		Coeff or Slope:	0.967	0.967

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	-0.1	----
as found span	5000	977.0	400.0	402.3	0.994
as found 2nd point	5000	838.0	200.0	202.2	0.989
as found 3rd point	5000	735.9	100.0	102.2	0.978
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	

Baseline Corr As found:	402.4	Previous response	400.0	*% change	0.6%
Baseline Corr 2nd AF pt:	-200.1	AF Slope:	1.004857	AF Intercept:	0.800000
Baseline Corr 3rd AF pt:	-100.0	AF Correlation:	0.999977		

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after multi-points as founds and UV source lamp. Troubleshooting will be continue for tomorrow.

Calibration Performed By: Sean Bala

O_3 Calibration Plot Date: December 11, 2023 Location: Fort McKay South

Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	December 12, 2023	Last Cal Date:	December 11, 2023
Start time (MST):	11:30	End time (MST):	13:25
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:	1.002057	1.002029	Backgd or Offset:	2.4	3.9
Calibration intercept:	0.840000	0.420000	Coeff or Slope:	0.967	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					
as found span					
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	989.8	400.0	401.0	0.998
second point	5000	849.9	200.0	201.1	0.995
third point	5000	745.1	100.0	101.0	0.990
as left zero	5000	0.0	0.0	-0.1	----
as left span	5000	977.0	400.0	402.2	0.995
				Average Correction Factor	0.994

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: Multi point As Founds carried out yesterday. Lamp changed and optimized, left to warm up for 30 minutes.

Calibration Performed By: Ryan Power

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

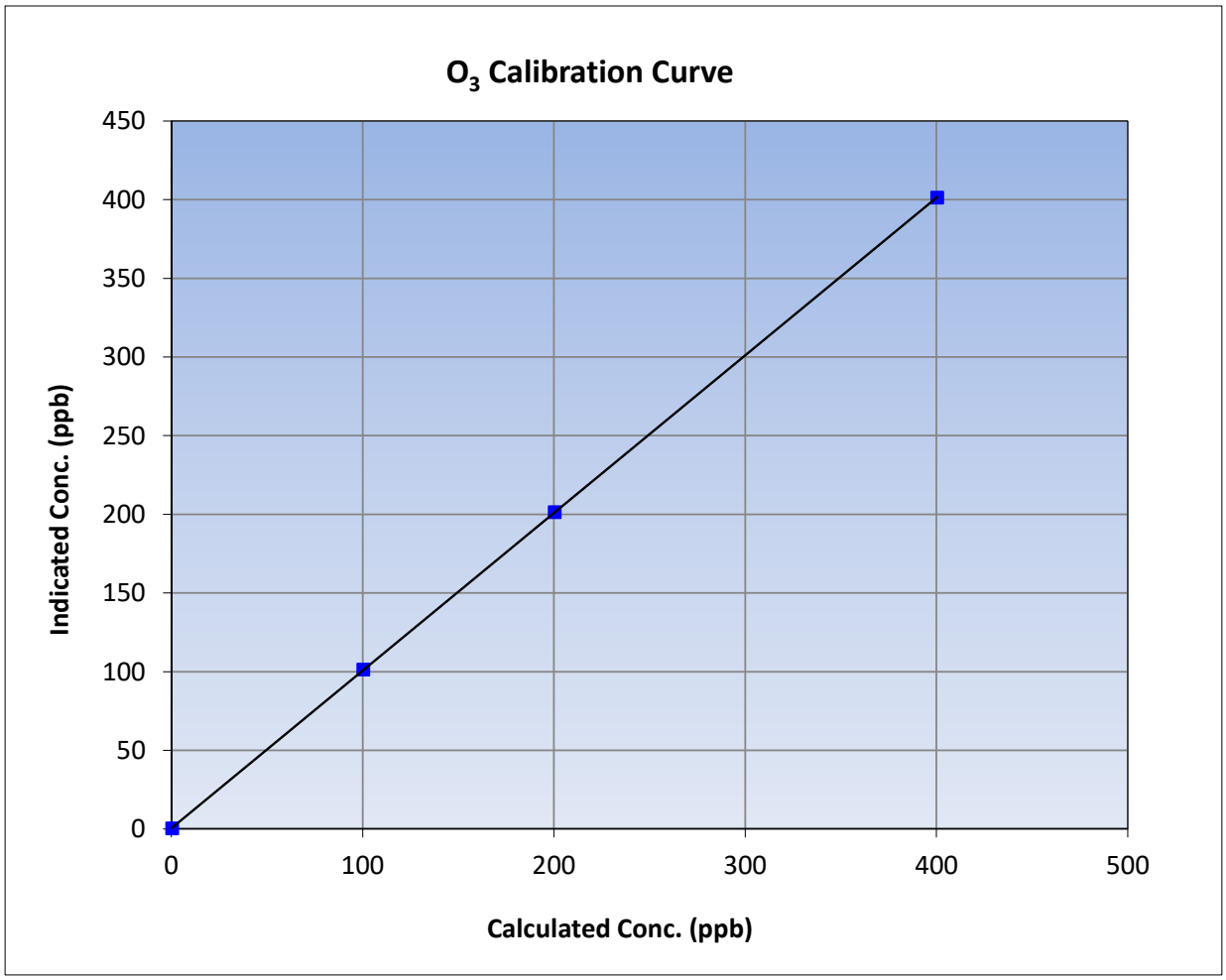
Station Information

Calibration Date:	December 12, 2023	Previous Calibration:	December 11, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	11:30	End Time (MST):	13:25
Analyzer make:	Teledyne API T400	Analyzer serial #:	3871

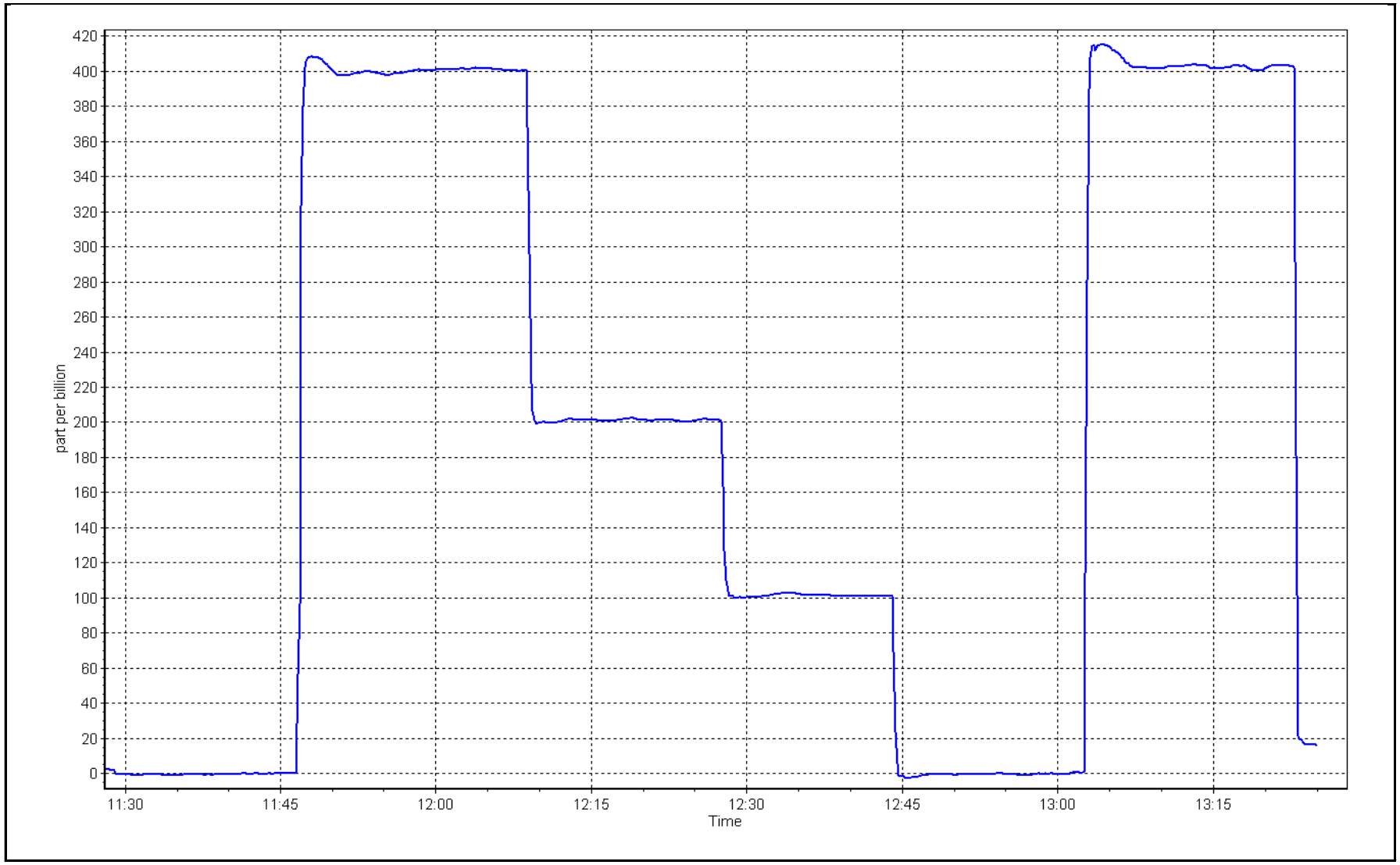
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
400.0	401.0	0.9975
200.0	201.1	0.9945
100.0	101.0	0.9901

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.002029	*0.90 - 1.10*
Intercept	0.420000	*+/- 5*



O_3 Calibration Plot Date: December 12, 2023 Location: Fort McKay South



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	December 13, 2023	Last Cal Date:	December 12, 2023
Start time (MST):	10:15	End time (MST):	11:28
Reason:	Maintenance		

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:	1.002029	1.007857	Backgd or Offset:	3.9	3.9
Calibration intercept:	0.420000	0.000000	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					
as found span					
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.9	----
high point	5000	989.8	400.0	402.7	0.993
second point	5000	849.9	200.0	202.0	0.990
third point	5000	745.1	100.0	101.7	0.983
as left zero					
as left span					
				Average Correction Factor	0.989

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: Lamp change from yesterday was not settled. O3 ref raised to 5100 mv yesterday evening and readings halted. Adjusted lamp pot to 4600 mv and confirmed linearity.

Calibration Performed By: Ryan Power

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

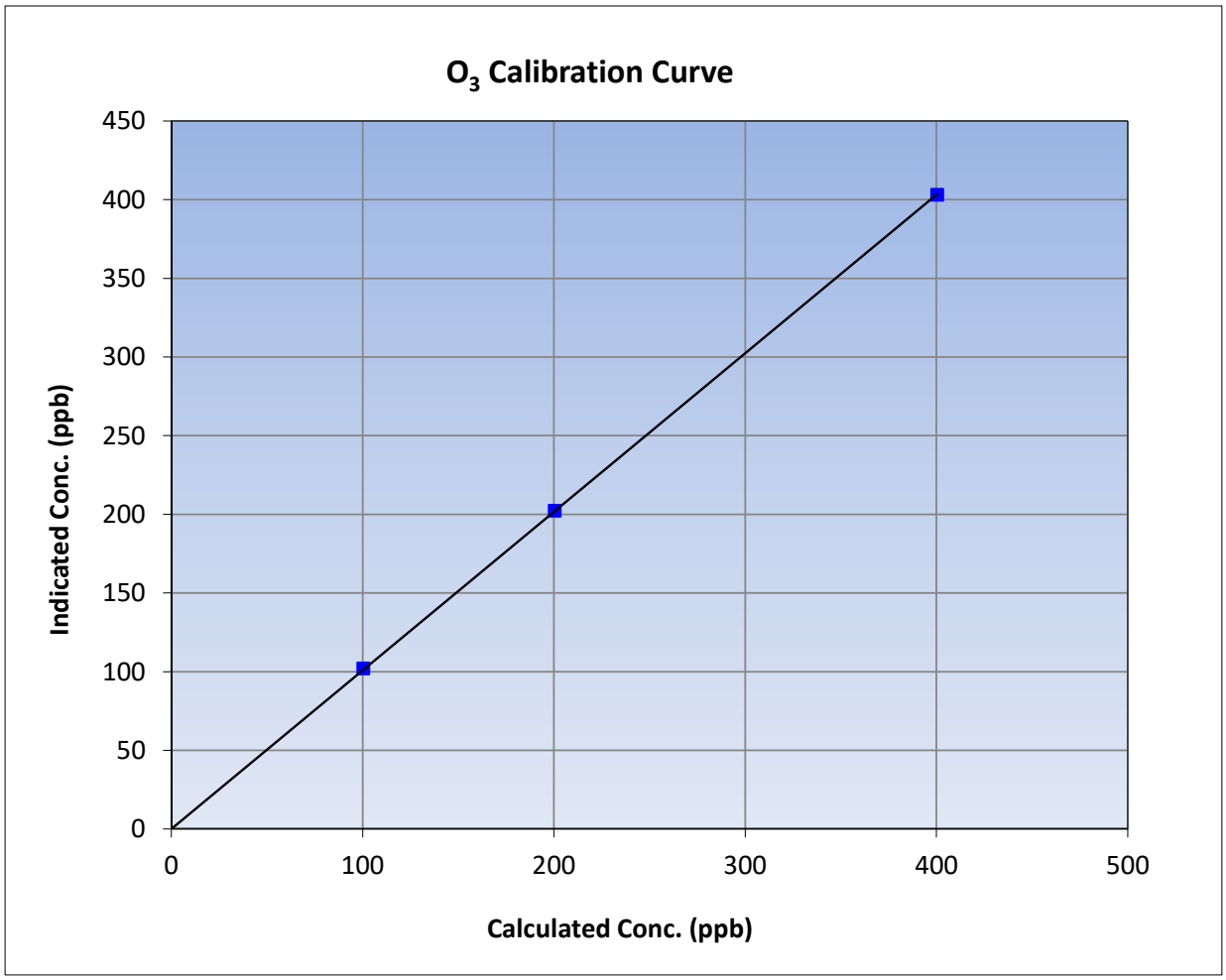
Station Information

Calibration Date:	December 13, 2023	Previous Calibration:	December 12, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:15	End Time (MST):	11:28
Analyzer make:	Teledyne API T400	Analyzer serial #:	3871

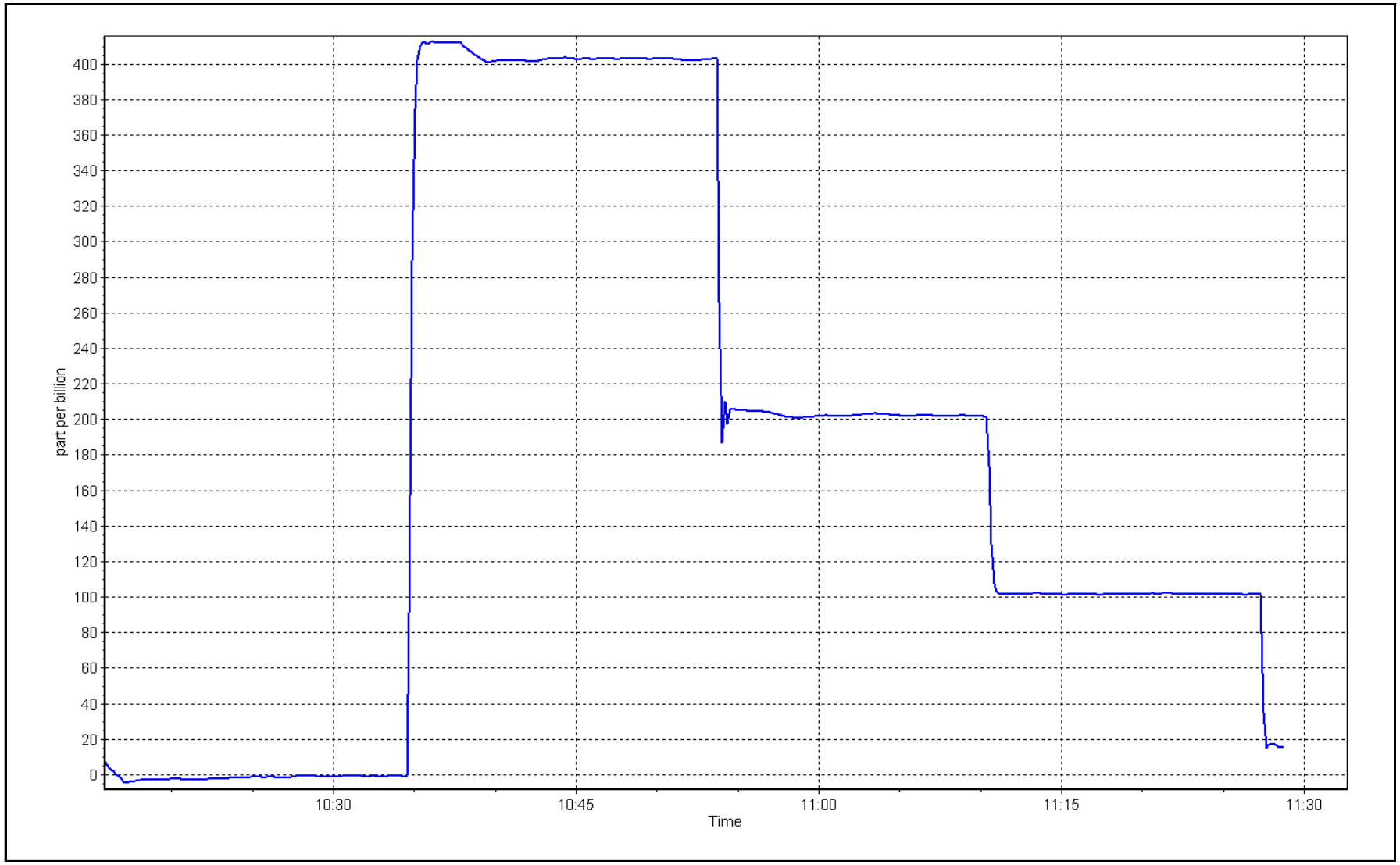
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.9	----
400.0	402.7	0.9933
200.0	202.0	0.9901
100.0	101.7	0.9833

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999977	*≥0.995*
Slope	1.007857	*0.90 - 1.10*
Intercept	0.000000	*+/- 5*



O_3 Calibration Plot Date: December 13, 2023 Location: Fort McKay South



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Fort McKay South	Station number:	AMS 13
Calibration Date:	December 19, 2023	Last Cal Date:	November 24, 2023
Start time (MST):	11:06	End time (MST):	11:28
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 (^{o}C)	-11.30	-11.67	-11.30	☐	+/- 2 ^{o}C
P (mmHg)	737.00	738.99	737.00	☐	+/- 10 mmHg
flow (LPM)	4.92	4.80	4.92	☐	+/- 0.25 LPM

Leak Test: Date of check: December 19, 2023 Last Cal Date: November 24, 2023

PM w/o HEPA: 4.5 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				☐	10.9 +/- 0.5

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

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

Disposable Filter Changed: October 24, 2023

Annual Maintenance

Date Sample Tube Cleaned: June 29, 2023

Date RH/T Sensor Cleaned: June 29, 2023

No adjustment made. Leak check passed.

Notes:

Calibration by: Sean Bala

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS14
ANZAC

DECEMBER 2023

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

January 31, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	December 7, 2023	Last Cal Date:	November 7, 2023
Start time (MST):	11:14	End time (MST):	14:35
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:	0.994980	0.984326	Backgd or Offset:	25.3	25.3
Calibration intercept:	-1.917407	-1.112464	Coeff or Slope:	0.798	0.798

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.6	----
as found span	4938	80.3	799.3	786.4	1.016
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	1.0	----
high point	4938	80.3	799.3	786.9	1.016
second point	4979	40.2	400.1	391.0	1.023
third point	4998	20.2	201.1	195.1	1.031
as left zero	5000	0.0	0.0	1.1	----
as left span	4938	80.3	799.3	790.2	1.011
				Average Correction Factor	1.023

Baseline Corr As found:	785.80	Previous response	793.34	*% change	-1.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

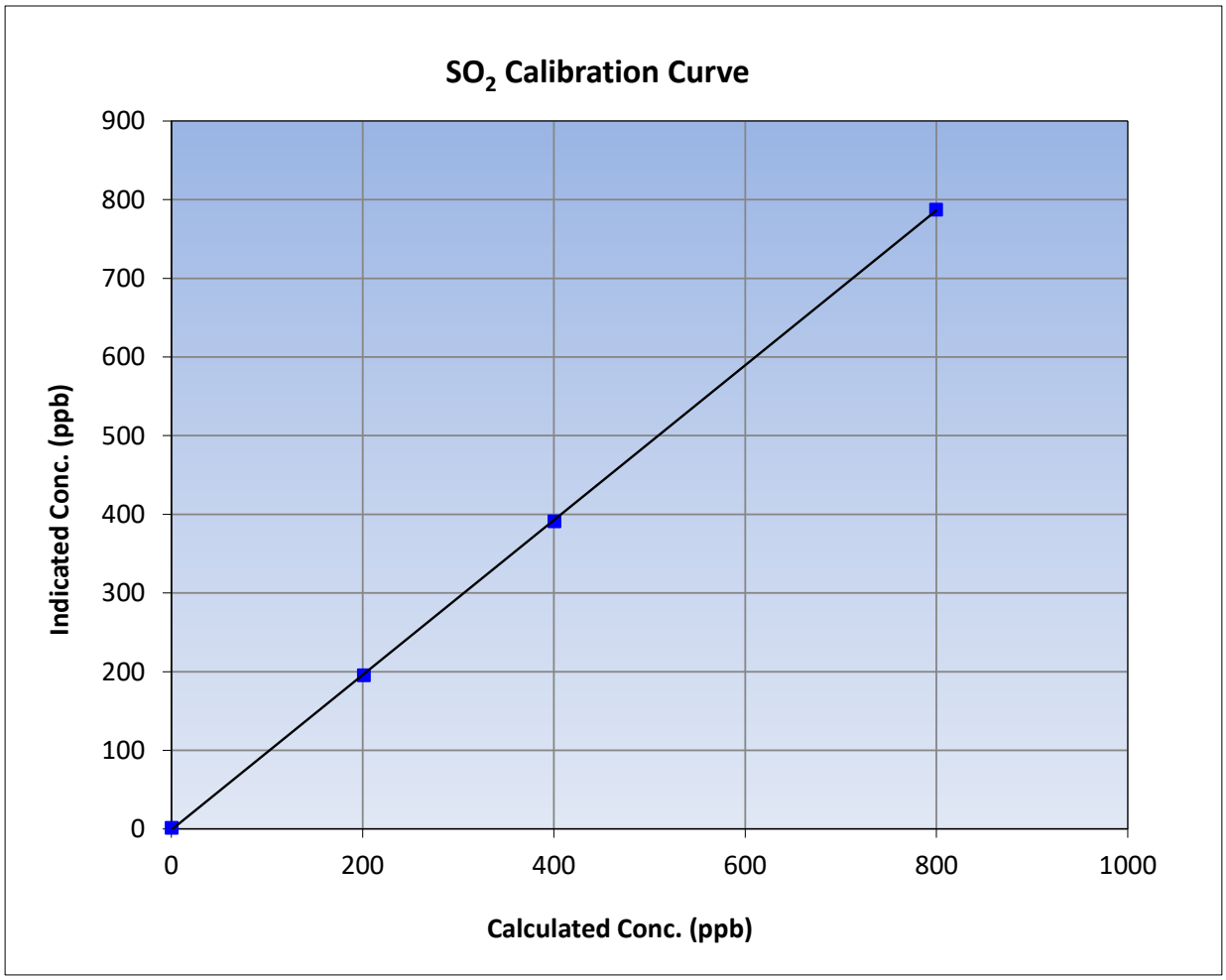
Station Information

Calibration Date:	December 7, 2023	Previous Calibration:	November 7, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	11:14	End Time (MST):	14:35
Analyzer make:	Thermo 43i	Analyzer serial #:	0710321322

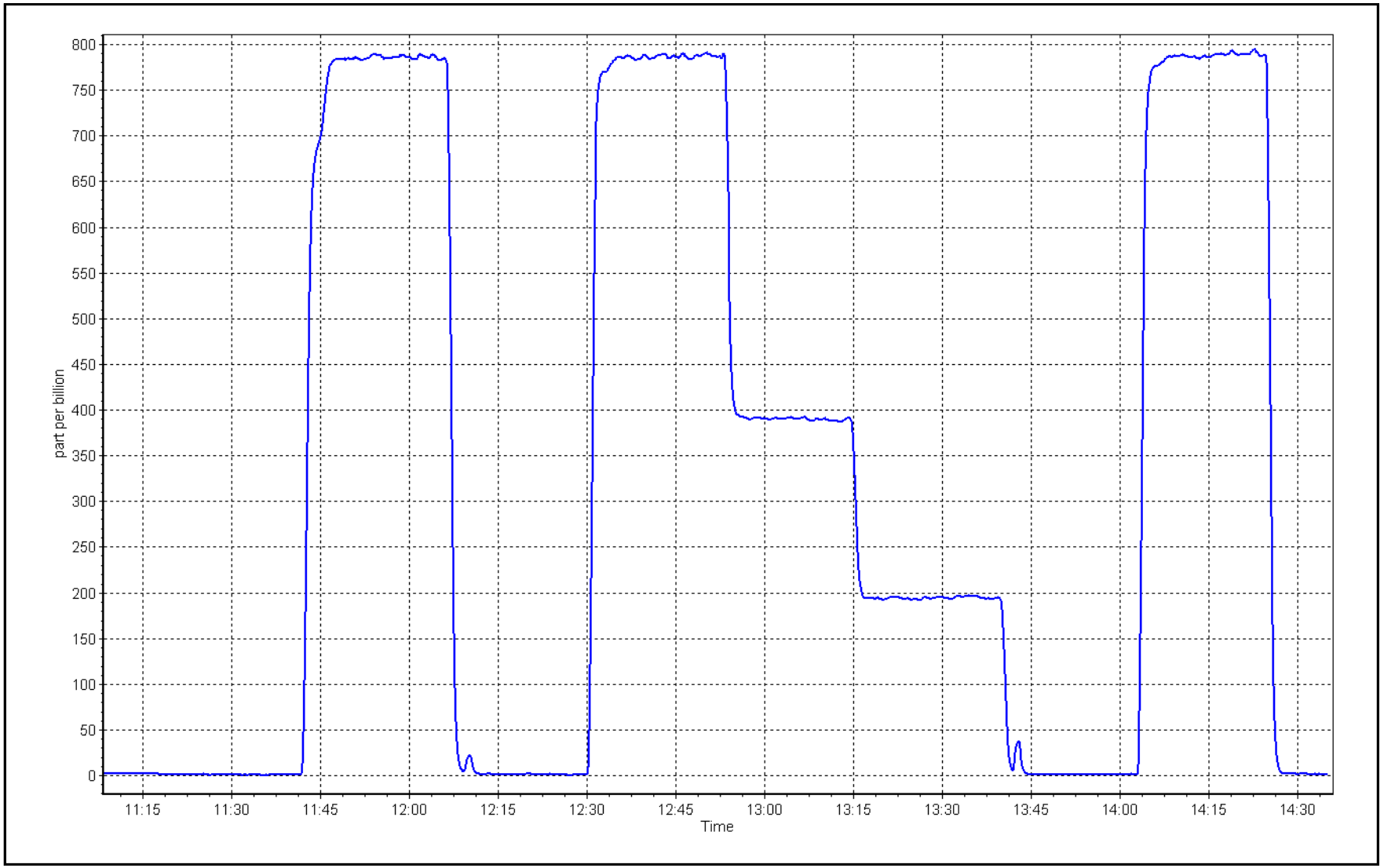
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	1.0	----
799.3	786.9	1.0157
400.1	391.0	1.0232
201.1	195.1	1.0306

Statistical Evaluation		Limits
Correlation Coefficient	0.999965	≥0.995
Slope	0.984326	0.90 - 1.10
Intercept	-1.112464	+/-30



SO2 Calibration Plot Date: December 7, 2023 Location: Anzac



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	December 5, 2023	Last Cal Date:	November 1, 2023
Start time (MST):	10:13	End time (MST):	15:03
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:	1.008310	1.011740	Backgd or Offset:	2.31	2.33
Calibration intercept:	-0.045461	-0.265448	Coeff or Slope:	0.992	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	-0.2	----
as found span	4938	77.9	80.0	81.1	0.984
as found 2nd point	4973	38.9	40.0	40.5	0.982
as found 3rd point	4997	19.5	20.0	20.2	0.981
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	80.7	0.991
second point	4973	38.9	40.0	40.1	0.996
third point	4997	19.5	20.0	19.8	1.011
as left zero	5000	0.0	0.0	-0.1	----
as left span	4938	77.9	80.0	78.9	1.013
SO2 Scrubber Check	4936	80.3	800.4	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.999
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.3	Prev response:	80.60	*% change:	0.9%
Baseline Corr 2nd AF pt:	40.7	AF Slope:	1.016350	AF Intercept:	-0.165503
Baseline Corr 3rd AF pt:	20.4	AF Correlation:	0.999999		

* = > +/-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

TRS Calibration Summary

Version-11-2021

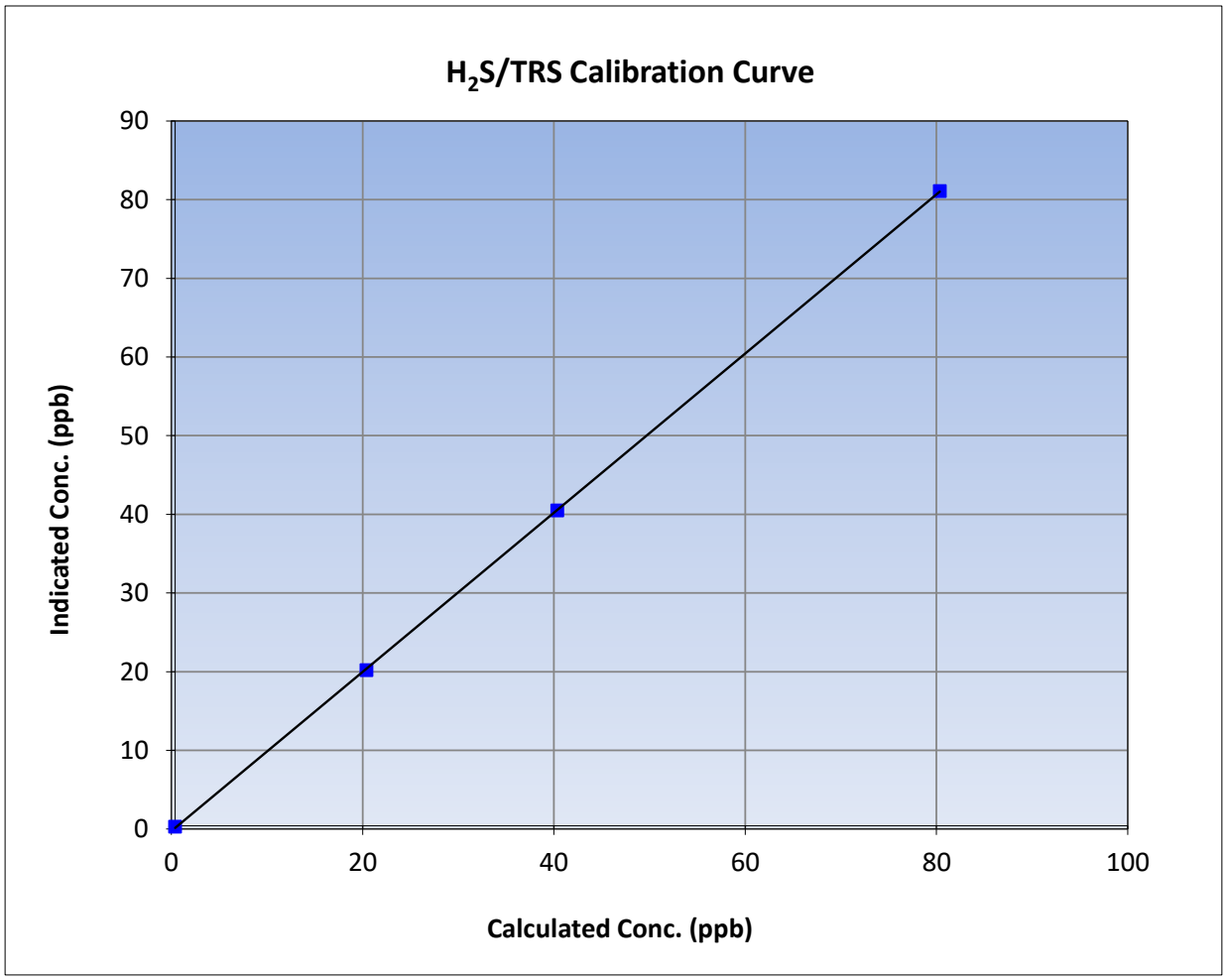
Station Information

Calibration Date:	December 5, 2023	Previous Calibration:	November 1, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	10:13	End Time (MST):	15:03
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153582

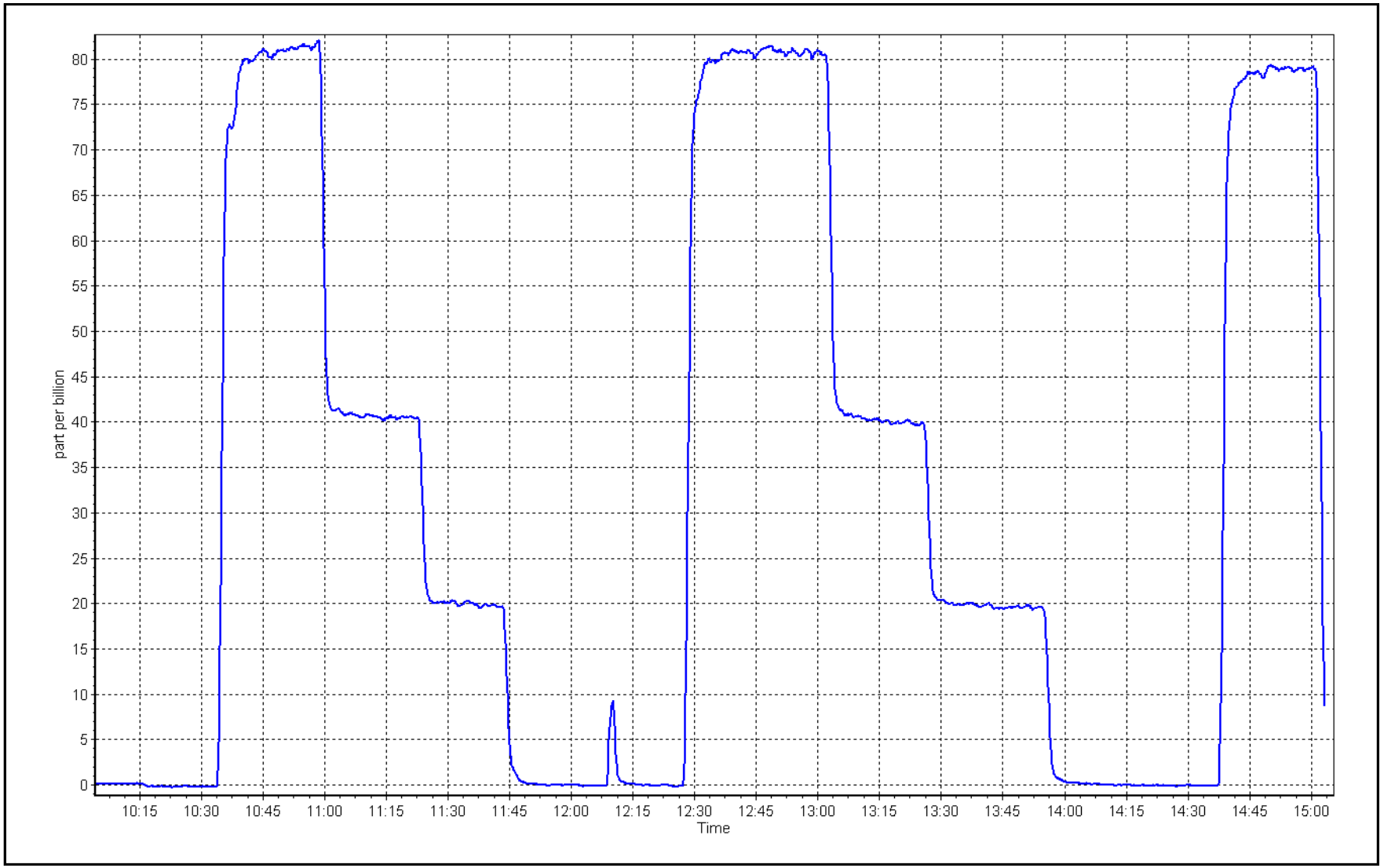
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.7	0.9907
40.0	40.1	0.9964
20.0	19.8	1.0107

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999981	*≥0.995*
Slope	1.011740	*0.90 - 1.10*
Intercept	-0.265448	*+/-3*



TRS Calibration Plot Date: December 5, 2023 Location: Anzac



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	December 7, 2023	Last Cal Date:	November 7, 2023
Start time (MST):	11:14	End time (MST):	14:35
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	3.72E-04	NMHC SP Ratio:	4.60E-05	4.60E-05
CH4 Retention time:	12.20	12.20	NMHC Peak Area:	198214	198214

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	17.10	17.21	0.994
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	8.56	1.001
third point	4998	20.2	4.30	4.25	1.012
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	17.10	17.16	0.997
				Average Correction Factor	1.002

Baseline Corr AF:	17.21	Prev response	17.11	*% 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-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	9.11	9.29	0.981
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	4.61	0.989
third point	4998	20.2	2.29	2.28	1.004
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	9.11	9.26	0.984
				Average Correction Factor	0.991
Baseline Corr AF:	9.29	Prev response	9.13	*% change	1.8%
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	4938	80.3	7.99	7.92	1.009
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	3.94	1.015
third point	4998	20.2	2.01	1.97	1.022
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	7.99	7.90	1.011
				Average Correction Factor	1.015
Baseline Corr AF:	7.92	Prev response	7.99	*% change	-0.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.002761	1.007099
THC Cal Offset:	-0.036088	-0.042334
CH4 Cal Slope:	1.001781	0.992465
CH4 Cal Offset:	-0.016831	-0.015977
NMHC Cal Slope:	1.003445	1.019691
NMHC Cal Offset:	-0.019055	-0.026156

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

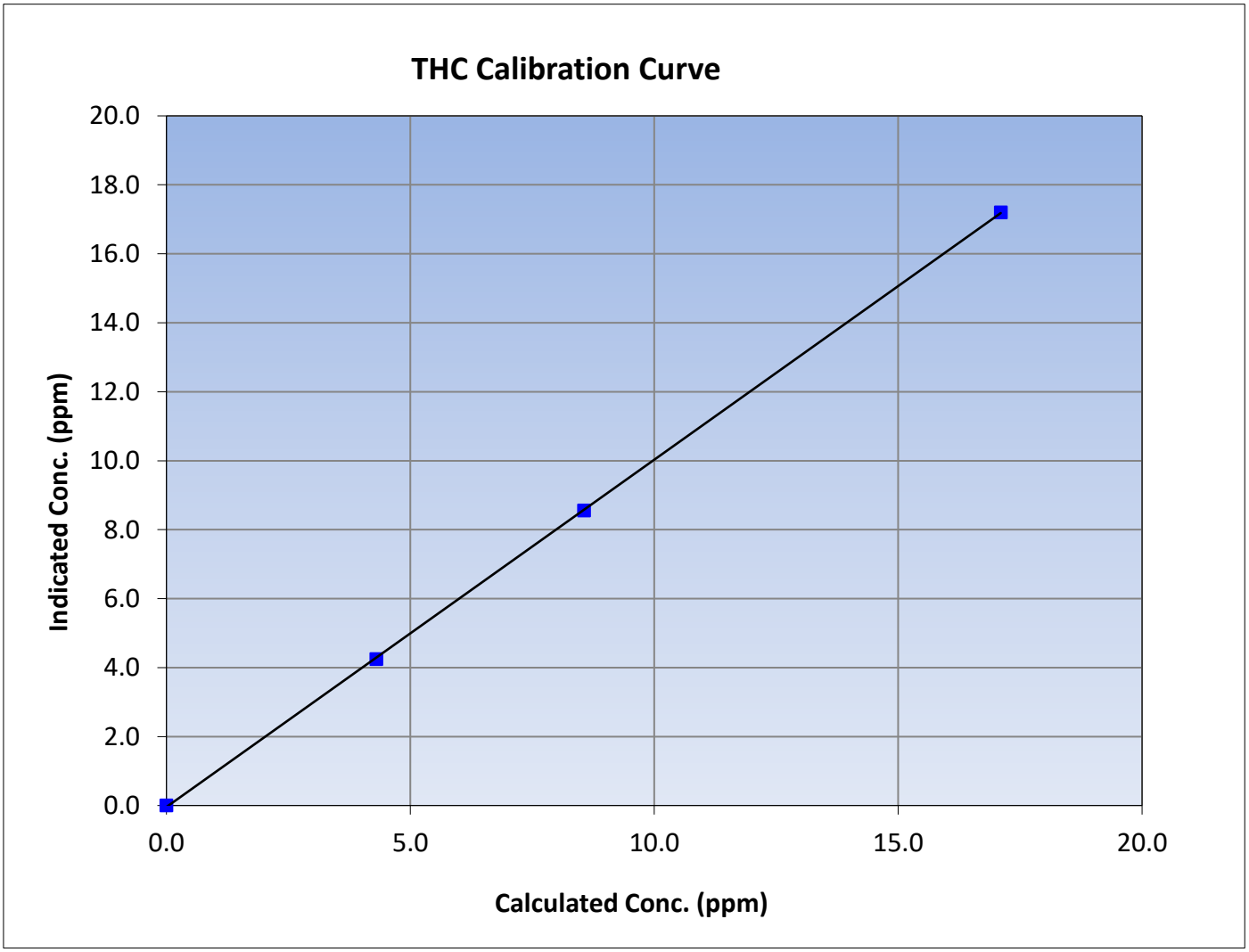
Version-01-2020

Station Information

Calibration Date:	December 7, 2023	Previous Calibration:	November 7, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	11:14	End Time (MST):	14:35
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	0.999972	≥0.995
17.10	17.20	0.9941			
8.56	8.56	1.0006	Slope	1.007099	0.90 - 1.10
4.30	4.25	1.0123			
			Intercept	-0.042334	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

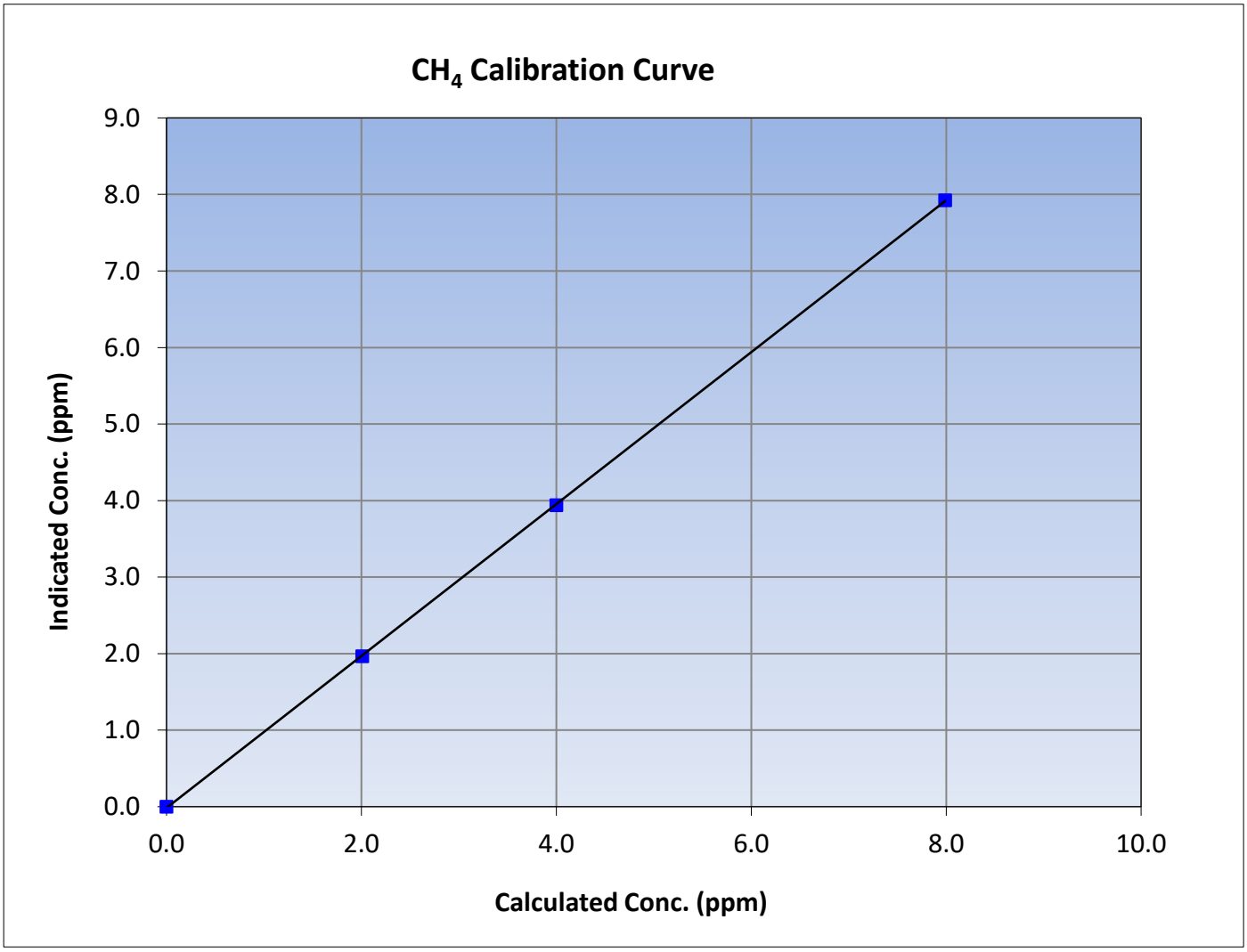
Version-01-2020

Station Information

Calibration Date:	December 7, 2023	Previous Calibration:	November 7, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	11:14	End Time (MST):	14:35
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	0.999980	*≥0.995*
7.99	7.92	1.0084			
4.00	3.94	1.0150	Slope	0.992465	*0.90 - 1.10*
2.01	1.97	1.0223			
			Intercept	-0.015977	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

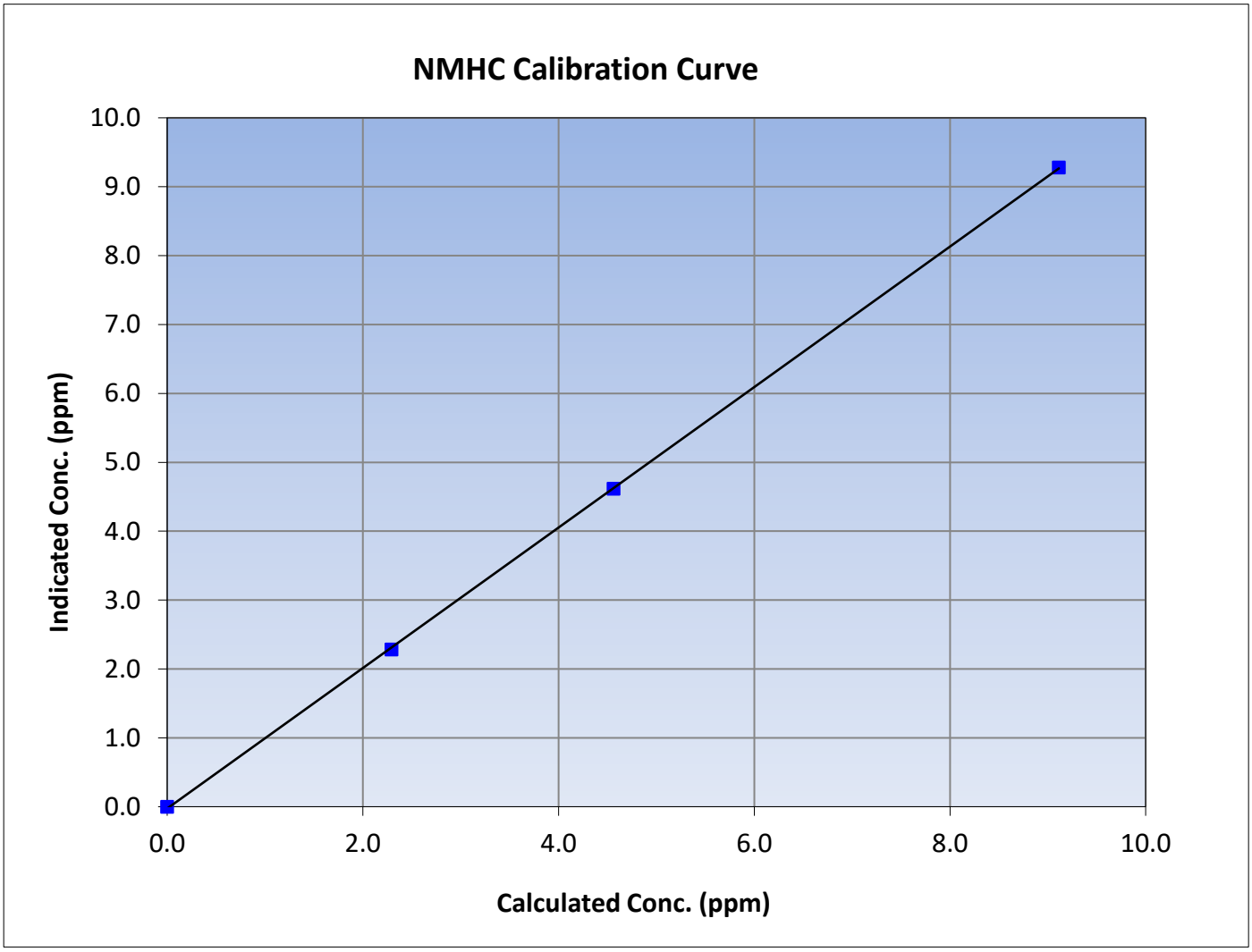
Version-01-2020

Station Information

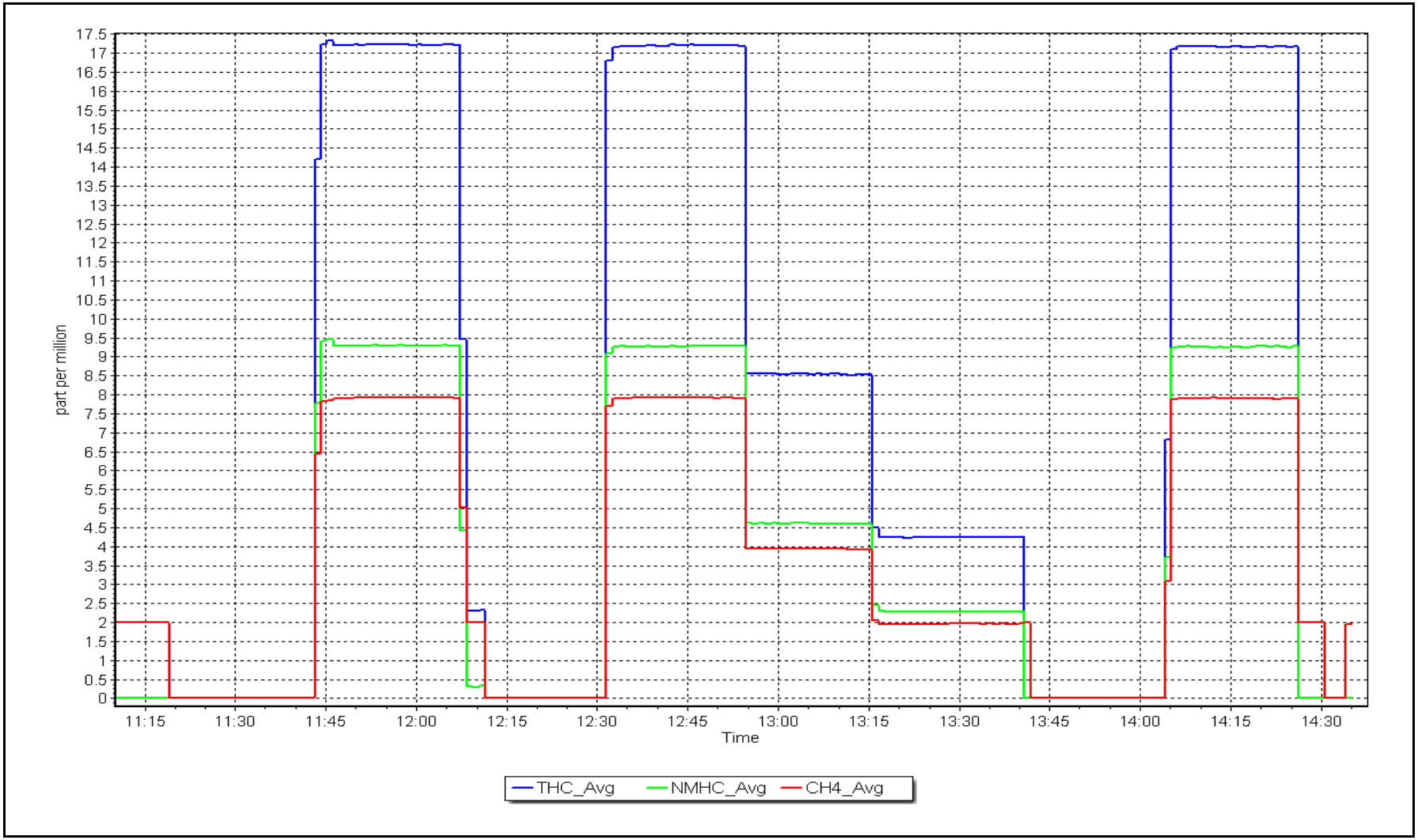
Calibration Date:	December 7, 2023	Previous Calibration:	November 7, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	11:14	End Time (MST):	14:35
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

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	9.28	0.9821			
4.56	4.61	0.9886	Slope	1.019691	0.90 - 1.10
2.29	2.28	1.0037			
			Intercept	-0.026156	+/-0.5



NMHC Calibration Plot Date: December 7, 2023 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:	December 21, 2023	Last Cal Date:	December 7, 2023
Start time (MST):	10:02	End time (MST):	11:41
Reason:	Cylinder Change		

Calibration Standards

Gas Cert Reference:		CC279389	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
C3H8 Cal Gas Conc.	207.1	ppm			
Removed Gas Cert:			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 #:	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:	3.72E-04	3.72E-04	NMHC SP Ratio:	4.60E-05	4.60E-05
CH4 Retention time:	12.2	12.2	NMHC Peak Area:	198214	198214
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	17.18	0.996
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	17.15	0.997
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.997
Baseline Corr AF:	17.18	Prev response	17.18	*% change	0.0%
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	4938	80.3	9.11	9.35	0.975
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	9.33	0.976
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.976
Baseline Corr AF:	9.35	Prev response	9.27	*% change	0.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	7.99	7.83	1.021
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	7.82	1.022
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.022
Baseline Corr AF:	7.83	Prev response	7.91	*% change	-1.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

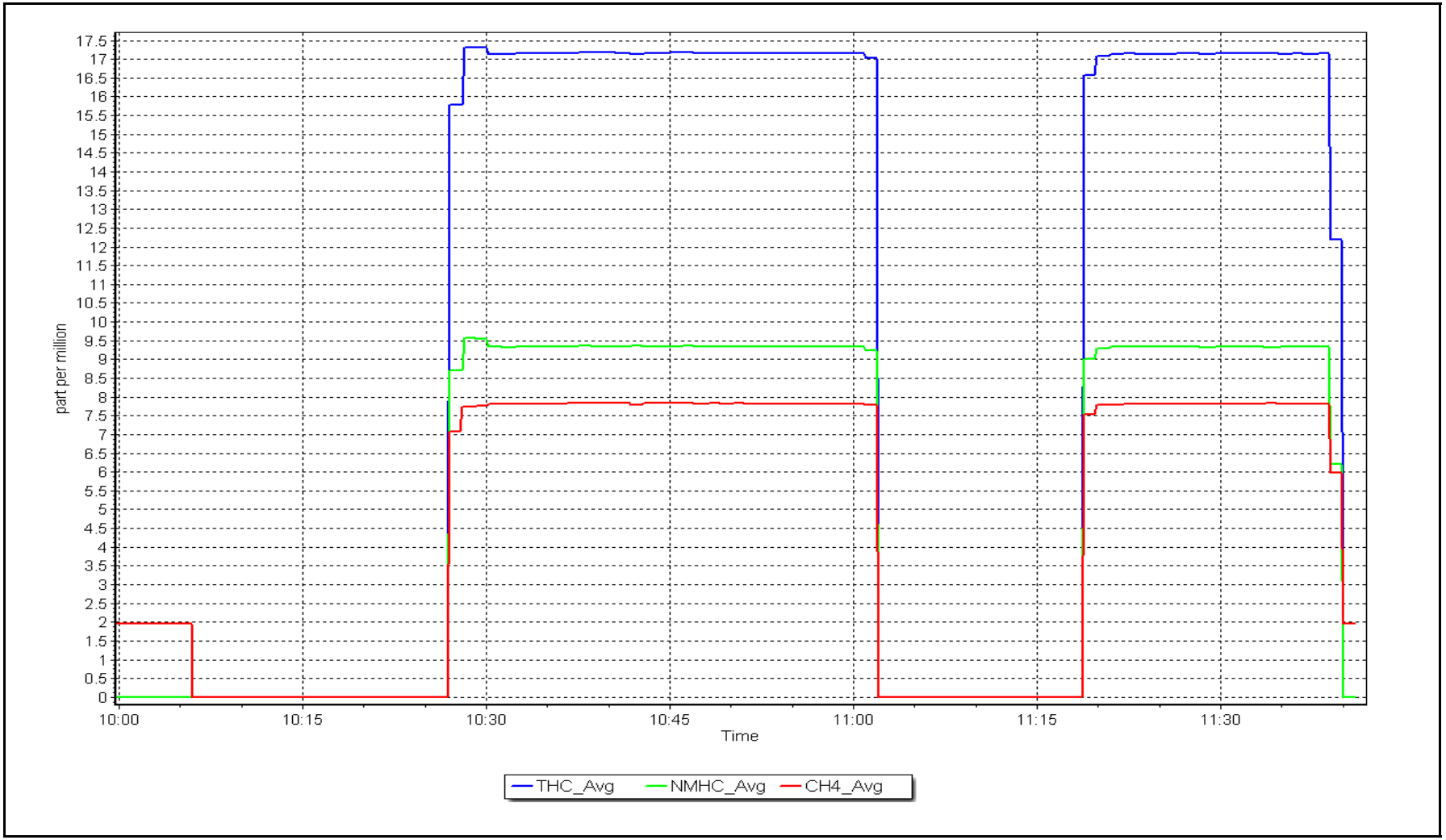
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.007099	1.002822
THC Cal Offset:	-0.042334	0.000000
CH4 Cal Slope:	0.992465	0.978407
CH4 Cal Offset:	-0.015977	0.000000
NMHC Cal Slope:	1.019691	1.024117
NMHC Cal Offset:	-0.026156	0.000000

Notes: Swapped Hydrogen cylinder.

Calibration Performed By: Mohammed Kashif

NMHC Calibration Plot Date: December 21, 2023 Location: Anzac



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	December 4, 2023	Last Cal Date:	November 2, 2023
Start time (MST):	10:31	End time (MST):	14:54
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2Y1P8D		Cal Gas Expiry Date:	December 11, 2023	
NOX Cal Gas Conc:	50.92	ppm	NO Cal Gas Conc:	50.05	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	50.92	ppm	Removed Gas NO Conc:	50.05	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	3060	
ZAG make/model:	Teledyne API 701H		Serial Number:	357	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1426262592	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.411	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:	160.3	158.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.002002	1.001131
NO_X Cal Offset:	-0.728718	-0.568562
NO Cal Slope:	1.002134	1.001791
NO Cal Offset:	-2.326785	-2.406556
NO_2 Cal Slope:	1.004193	1.001950
NO_2 Cal Offset:	0.821549	0.975434

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	-0.2	0.4	----	----
as found span	4936	80.2	814.1	800.2	13.9	817.6	799.2	18.5	0.9957	1.0013
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.3	-0.1	0.3	----	----
high point	4936	80.2	814.1	800.2	13.9	814.8	800.4	14.2	0.9992	0.9998
second point	4979	40.1	406.8	399.9	7.0	406.6	397.0	9.7	1.0006	1.0072
third point	4999	20.1	203.9	200.4	3.5	202.5	196.1	6.4	1.0070	1.0221
as left zero	5000	0.0	0.0	0.0	0.0	0.3	0.1	0.3	----	----
as left span	4936	80.2	814.1	419.7	394.4	814.3	417.4	396.9	0.9998	1.0055
								Average Correction Factor	1.0022	1.0097

Corrected As found	NO_X = 817.4 ppb	NO = 799.4 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = 0.3%		
Previous Response	NO_X = 815.0 ppb	NO = 799.6 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)	796.1	415.6	394.4	395.7	0.9967	100.3%
2nd GPT point (200 ppb O3)	796.1	609.6	200.4	202.4	0.9902	101.0%
3rd GPT point (100 ppb O3)	796.1	702.9	107.1	108.8	0.9845	101.6%
				Average Correction Factor	0.9905	101.0%

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

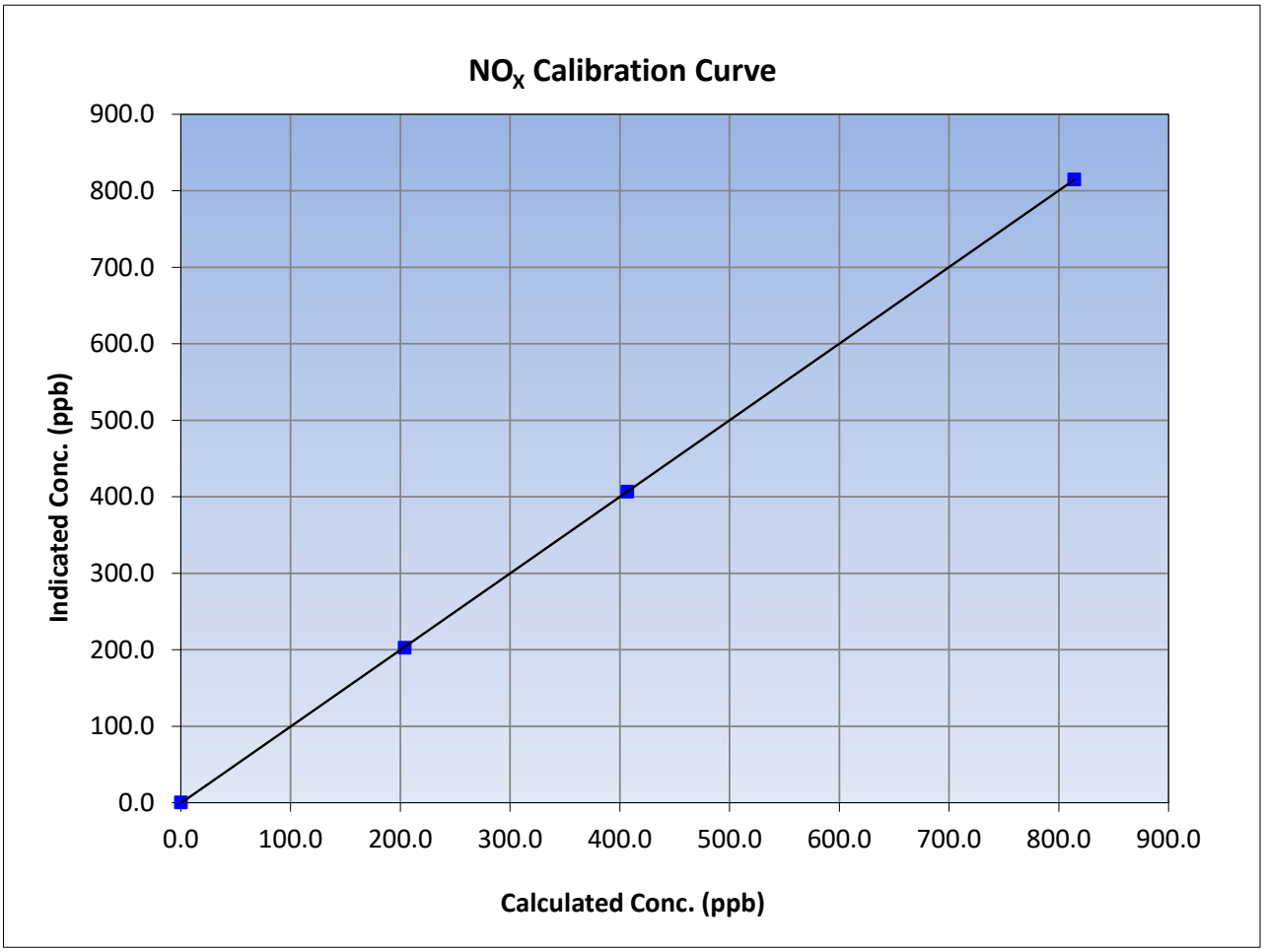
Version-04-2020

Station Information

Calibration Date:	December 4, 2023	Previous Calibration:	November 2, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	10:31	End Time (MST):	14:54
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	0.3	----	Correlation Coefficient	0.999994	*≥0.995*
814.1	814.8	0.9992			
406.8	406.6	1.0006	Slope	1.001131	*0.90 - 1.10*
203.9	202.5	1.0070			
			Intercept	-0.568562	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

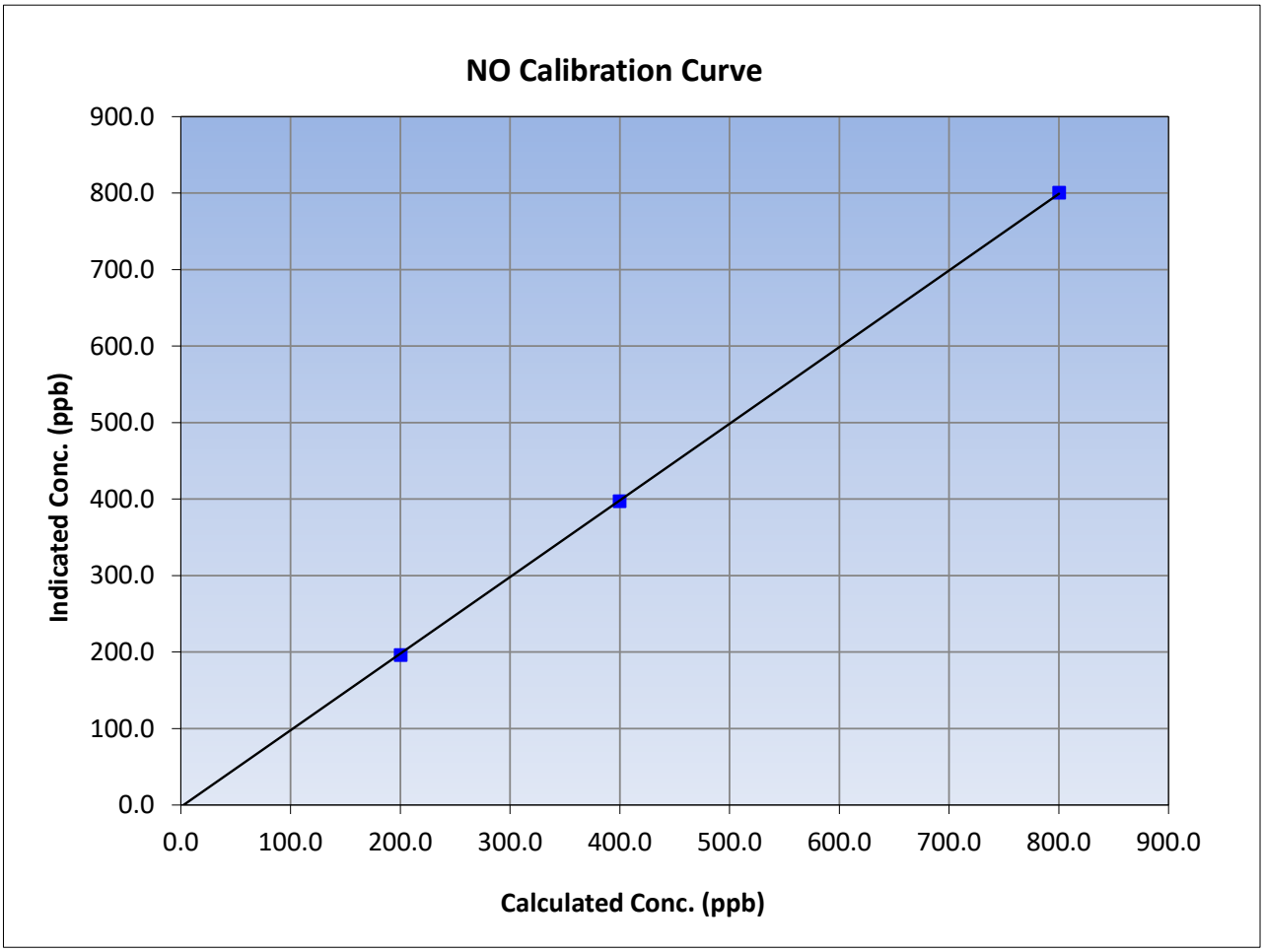
Version-04-2020

Station Information

Calibration Date:	December 4, 2023	Previous Calibration:	November 2, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	10:31	End Time (MST):	14:54
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	0.999962	≥0.995
800.2	800.4	0.9998			
399.9	397.0	1.0072	Slope	1.001791	0.90 - 1.10
200.4	196.1	1.0221			
			Intercept	-2.406556	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

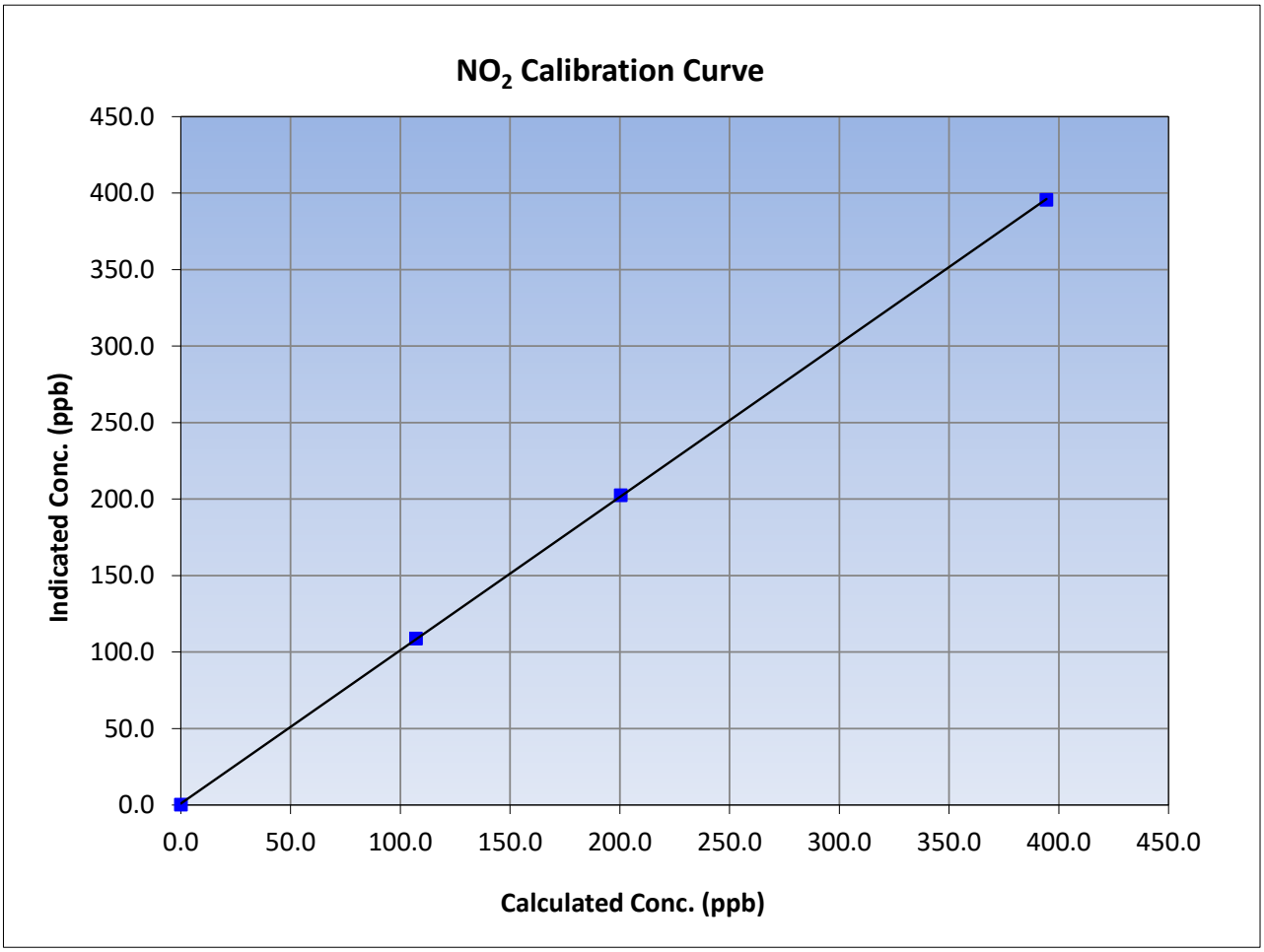
Version-04-2020

Station Information

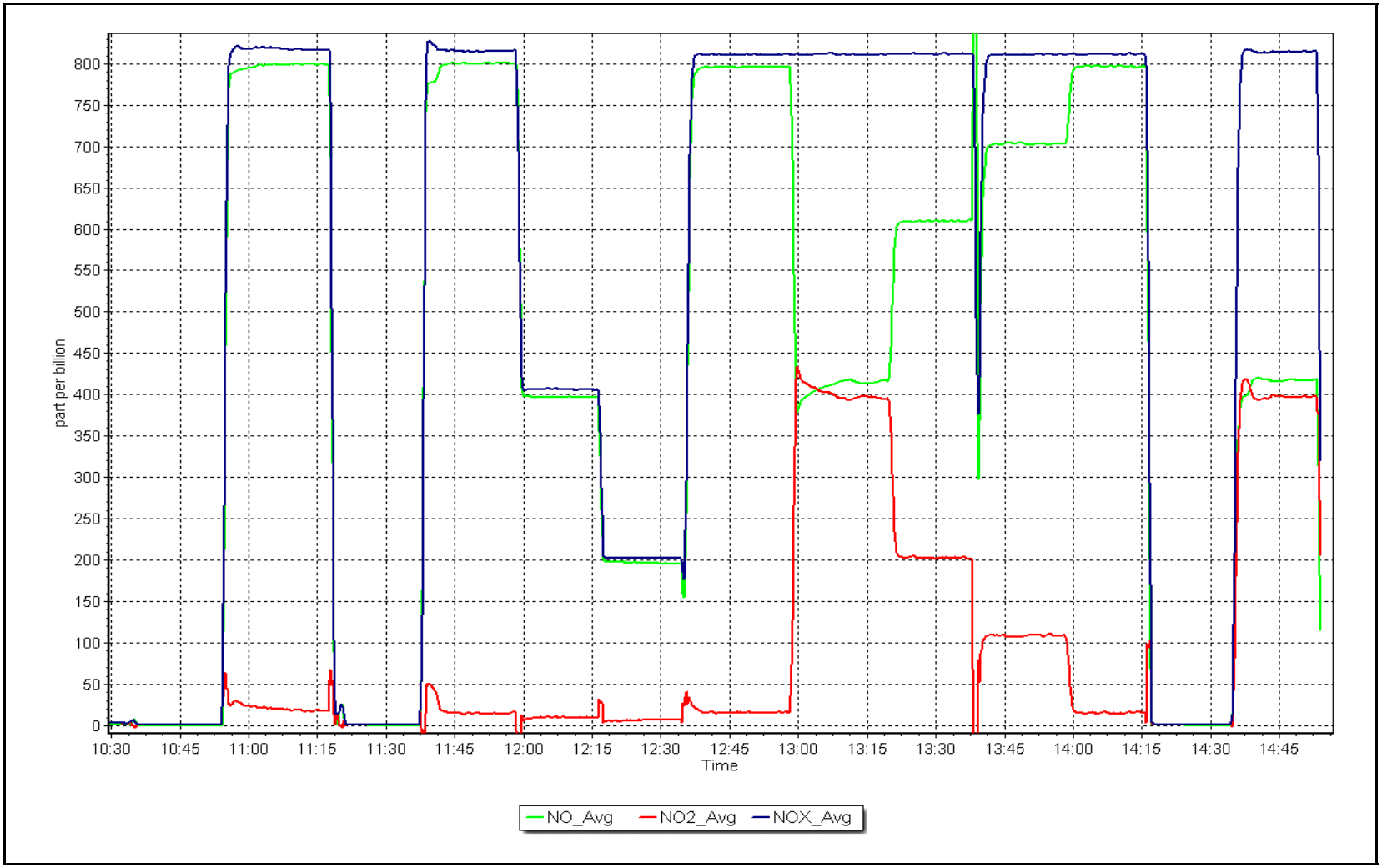
Calibration Date:	December 4, 2023	Previous Calibration:	November 2, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	10:31	End Time (MST):	14:54
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.3	----	Correlation Coefficient	0.999984	≥0.995
394.4	395.7	0.9967			
200.4	202.4	0.9902	Slope	1.001950	0.90 - 1.10
107.1	108.8	0.9845			
			Intercept	0.975434	+/-20



NO_X Calibration Plot Date: December 4, 2023 Location: Anzac



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	December 6, 2023	Last Cal Date:	November 21, 2023
Start time (MST):	11:05	End time (MST):	14:20
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:	1.002171	1.002086	Backgd or Offset:	1.4	1.4
Calibration intercept:	-0.580000	-0.040000	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	0.4	----
as found span	5000	918.8	400.0	401.5	0.996
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.3	----
high point	5000	918.8	400.0	400.9	0.998
second point	5000	803.8	200.0	200.4	0.998
third point	5000	709.8	100.0	99.7	1.003
as left zero	5000	0.0	0.0	0.4	----
as left span	5000	918.8	400.0	406.5	0.984
				Average Correction Factor	1.000

Baseline Corr As found:	401.1	Previous response	400.3	*% change	0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

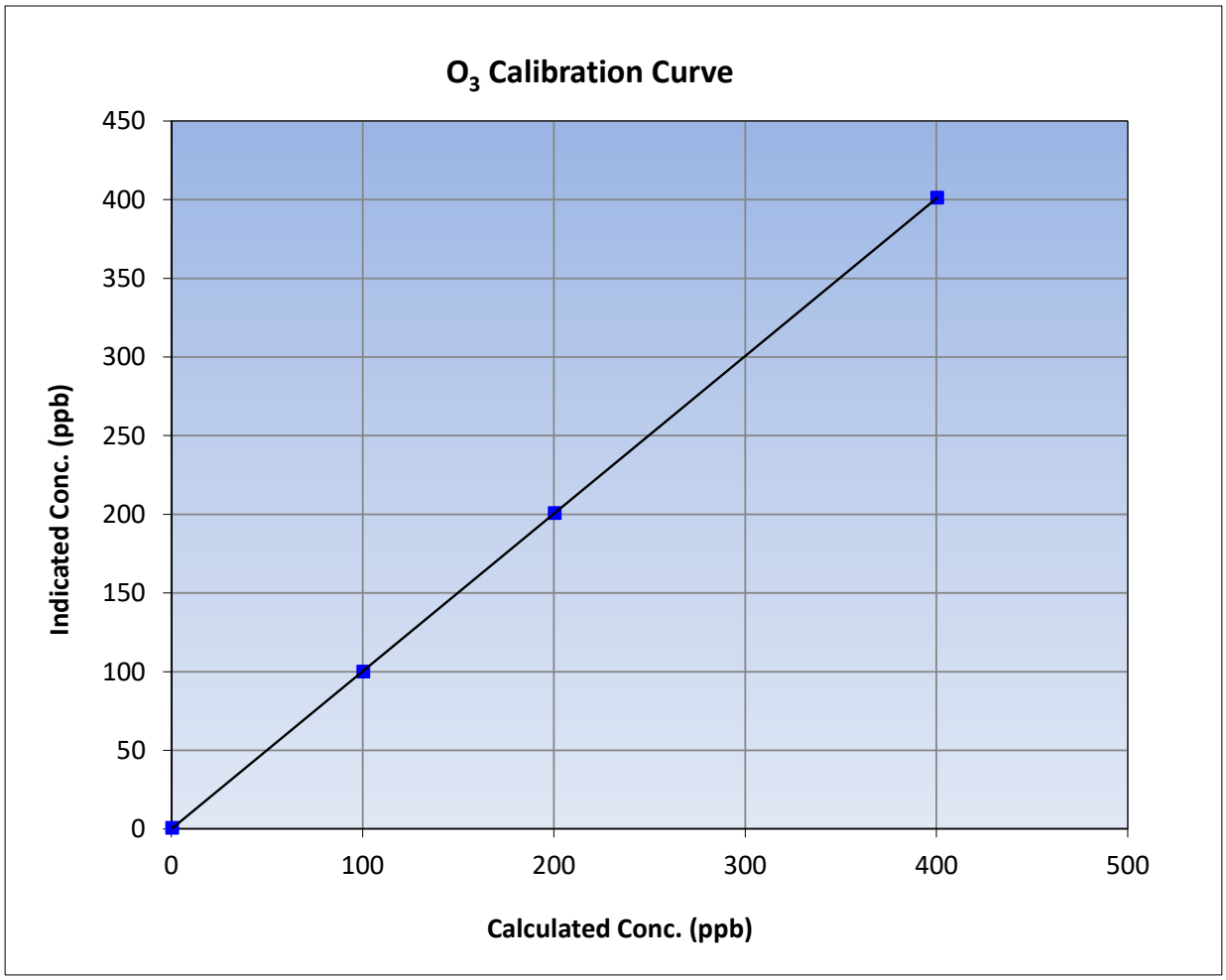
Station Information

Calibration Date:	December 6, 2023	Previous Calibration:	November 21, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	11:05	End Time (MST):	14:20
Analyzer make:	Thermo 49i	Analyzer serial #:	1426262595

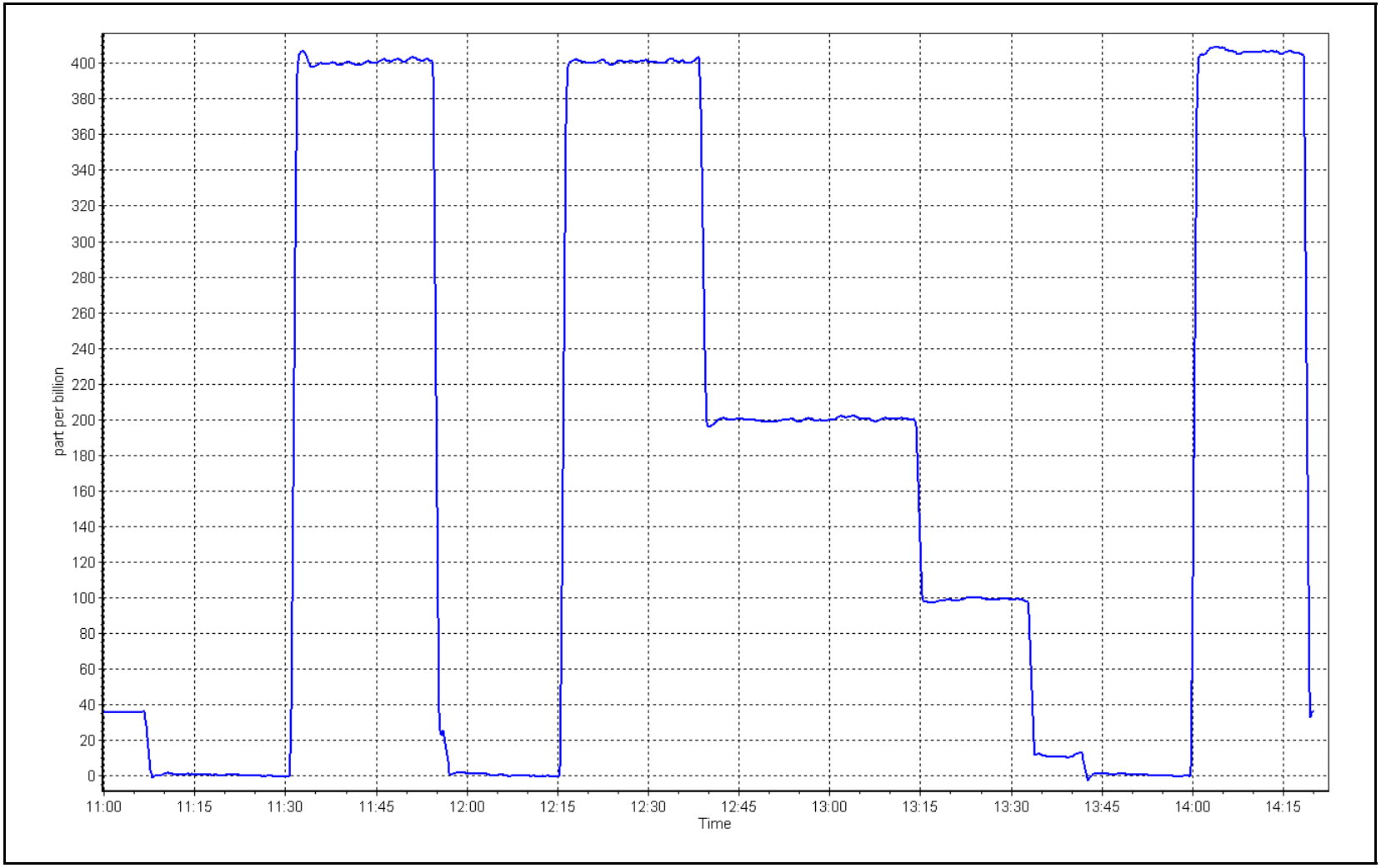
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
400.0	400.9	0.9978
200.0	200.4	0.9980
100.0	99.7	1.0030

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	1.002086	*0.90 - 1.10*
Intercept	-0.040000	*+/- 5*



O_3 Calibration Plot Date: December 6, 2023 Location: Anzac



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	December 6, 2023	Last Cal Date:	November 7, 2023
Start time (MST):	14:29	End time (MST):	15:28
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)	6.1	5.4	6.1	☐	+/- 2 °C
P (mmHg)	706.6	707.6	706.6	☐	+/- 10 mmHg
flow (LPM)	5.00	4.97	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: December 6, 2023 Last Cal Date: November 7, 2023

PM w/o HEPA: 2.9 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	10.8	10.9	10.8	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 2.1 w/ HEPA: 0

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: Replaced sample pump due to 80% drive alarm and completed quarterly maintenance (chamber cleaning and PMT check).

Calibration by: Mohammed Kashif

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS17
WAPASU

DECEMBER 2023

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

January 31, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	December 4, 2023	Last Cal Date:	November 6, 2023
Start time (MST):	11:11	End time (MST):	15:11
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:	1.000367	1.003981	Backgd or Offset:	12.6	13.4
Calibration intercept:	-1.259622	-2.098863	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	0.4	----
as found span	4921	79.4	800.0	803.5	0.996
as found 2nd point	4960	39.7	400.0	399.2	1.002
as found 3rd point	4980	19.8	199.5	197.8	1.009
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.3	----
high point	4921	79.4	800.0	802.4	0.997
second point	4960	39.7	400.0	397.3	1.007
third point	4980	19.8	199.5	197.3	1.011
as left zero	5000	0.0	0.0	0.2	----
as left span	4920	79.4	800.1	800.0	1.000
				Average Correction Factor	1.005

Baseline Corr As found:	803.10	Previous response	799.00	*% change	0.5%
Baseline Corr 2nd AF pt:	398.80	AF Slope:	1.004753	AF Intercept:	-1.318978
Baseline Corr 3rd AF pt:	197.40	AF Correlation:	0.999978		

* = > +/-5% change initiates investigation

Notes: Pump changed out for preventative maintenance. Zero adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

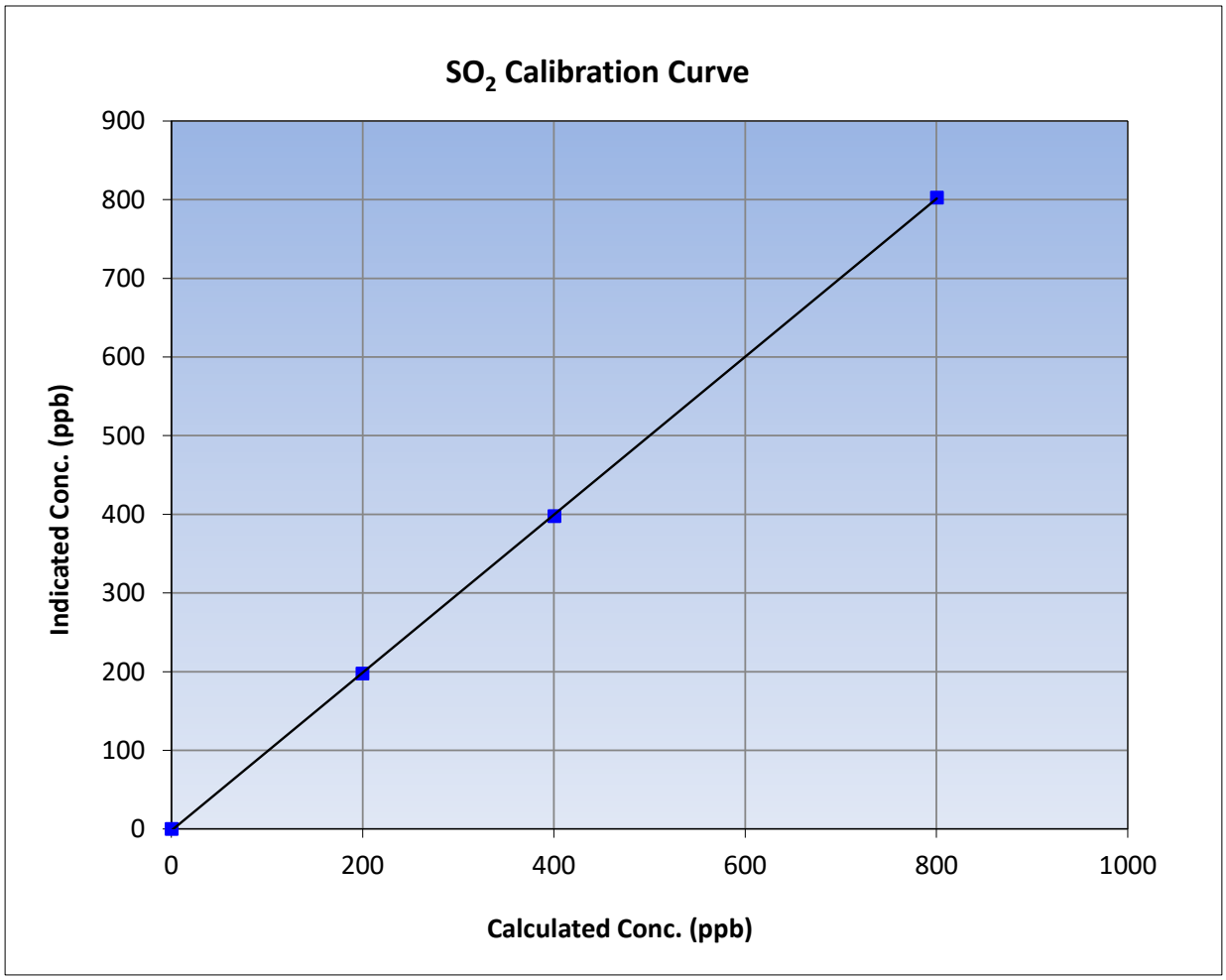
Station Information

Calibration Date:	December 4, 2023	Previous Calibration:	November 6, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:11	End Time (MST):	15:11
Analyzer make:	Thermo 43i	Analyzer serial #:	1218153459

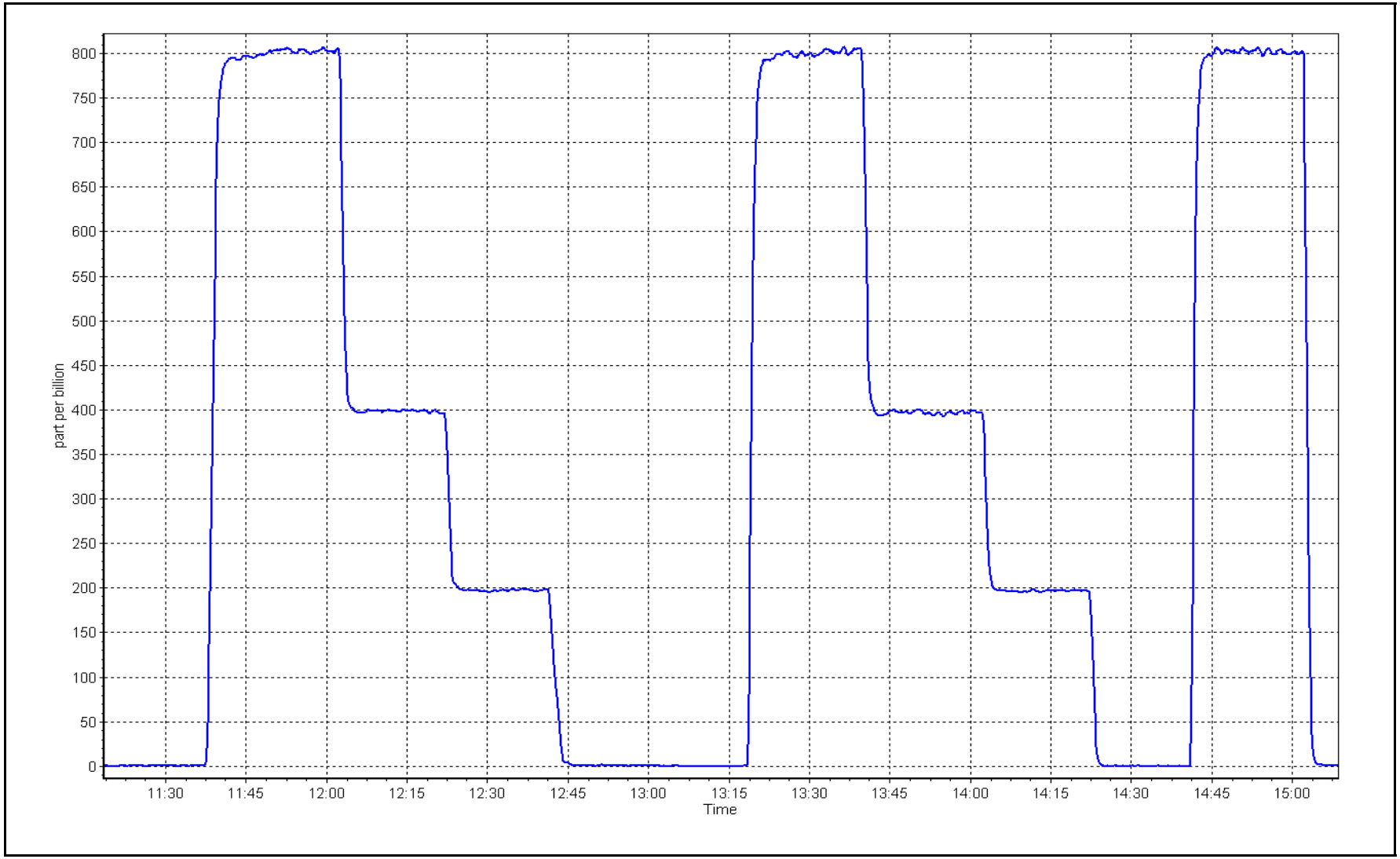
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
800.0	802.4	0.9970
400.0	397.3	1.0069
199.5	197.3	1.0112

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999969	*≥0.995*
Slope	1.003981	*0.90 - 1.10*
Intercept	-2.098863	*+/-30*



SO2 Calibration Plot Date: December 4, 2023 Location: Wapasu



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	December 5, 2023	Last Cal Date:	November 28, 2023
Start time (MST):	10:38	End time (MST):	15:30
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:	1.001426	1.005283	Backgd or Offset:	12.2	12.2
Calibration intercept:	0.000779	0.040787	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	0.0	----
as found span	4921	78.8	80.0	82.4	0.971
as found 2nd point	4961	39.4	40.0	40.9	0.978
as found 3rd point	4980	19.7	20.0	20.2	0.990
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4921	78.8	80.0	80.6	0.993
second point	4961	39.4	40.0	39.9	1.002
third point	4980	19.7	20.0	20.3	0.985
as left zero	5000	0.0	0.0	0.7	----
as left span	4921	78.8	80.0	79.1	1.011
SO2 Scrubber Check	4921	79.4	800.0	0.4	----
Date of last scrubber change:		n/a		Ave Corr Factor	0.993
Date of last converter efficiency test:		n/a			efficiency

Baseline Corr As found:	82.4	Prev response:	80.12	*% change:	2.8%
Baseline Corr 2nd AF pt:	40.9	AF Slope:	1.031282	AF Intercept:	-0.219180
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999968		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

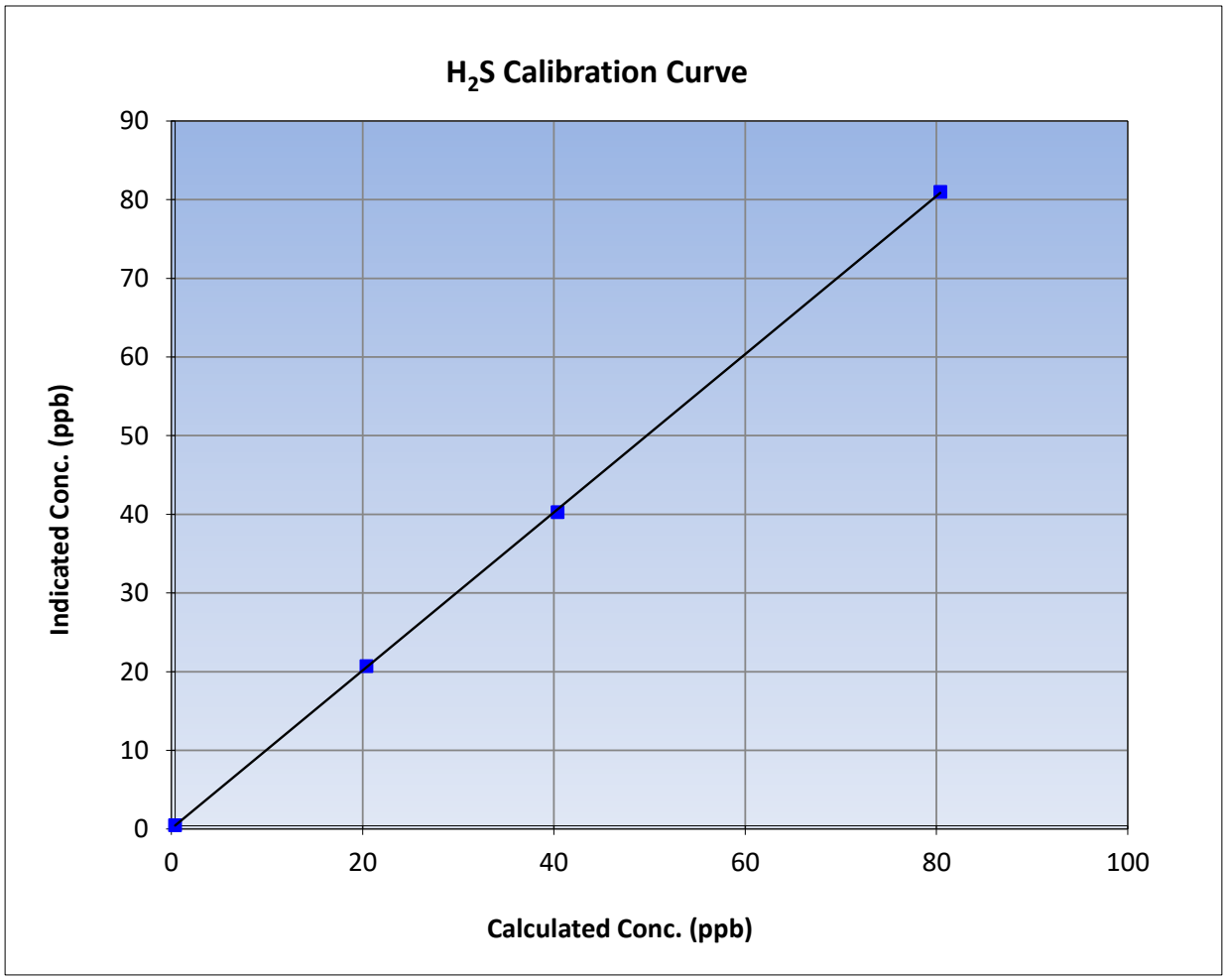
Station Information

Calibration Date:	December 5, 2023	Previous Calibration:	November 28, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:38	End Time (MST):	15:30
Analyzer make:	Thermo 450i	Analyzer serial #:	1218153583

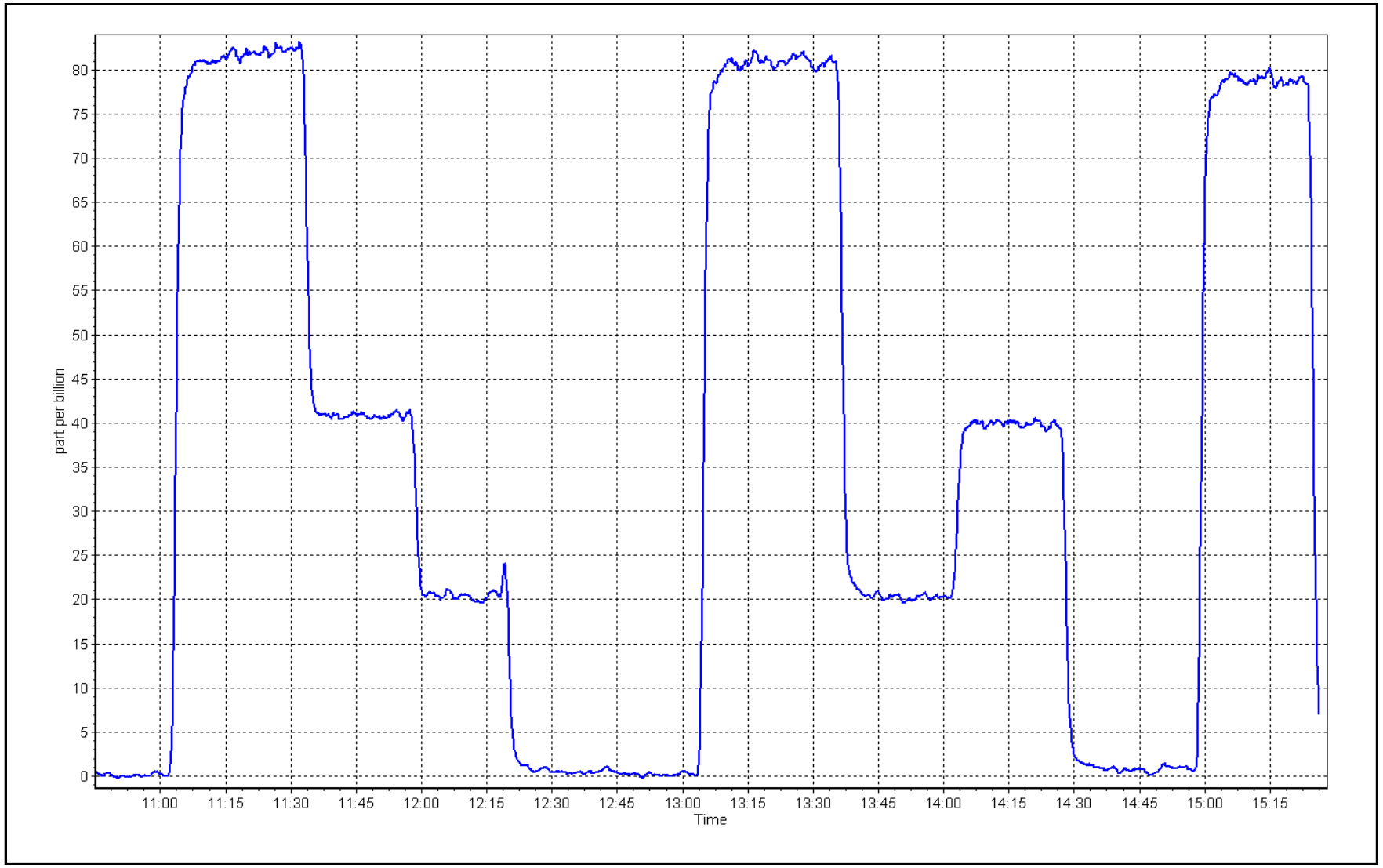
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.6	0.9926
40.0	39.9	1.0024
20.0	20.3	0.9853

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999953	*≥0.995*
Slope	1.005283	*0.90 - 1.10*
Intercept	0.040787	*+/-3*



H_2S Calibration Plot Date: December 5, 2023 Location: Wapasu



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	December 4, 2023	Last Cal Date:	November 6, 2023
Start time (MST):	11:11	End time (MST):	13:11
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:	1.004169	1.000963	Background:	3.300	3.300
Calibration intercept:	-0.126321	-0.028353	Coefficient:	4.460	4.460

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	-0.04	----
as found span	4921	79.4	17.09	17.11	0.999
as found 2nd point	4960	39.7	8.55	8.46	1.010
as found 3rd point	4980	19.8	4.26	4.20	1.016
new cylinder response					
calibrator zero	5000	0.0	0.00	0.04	----
high point	4921	79.4	17.09	17.12	0.998
second point	4960	39.7	8.55	8.47	1.010
third point	4980	19.8	4.26	4.19	1.016
as left zero	5000	0.0	0.00	-0.01	----
as left span	4920	79.4	17.09	17.20	0.994
				Average Correction Factor	1.008

Baseline Corr As found:	17.15	Previous response	17.04	*% change	0.6%
Baseline Corr 2nd AF pt:	8.49	AF Slope:	1.003541	AF Intercept:	-0.069128
Baseline Corr 3rd AF pt:	4.23	AF Correlation:	0.999972		

* = > +/-5% change initiates investigation

Notes: No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

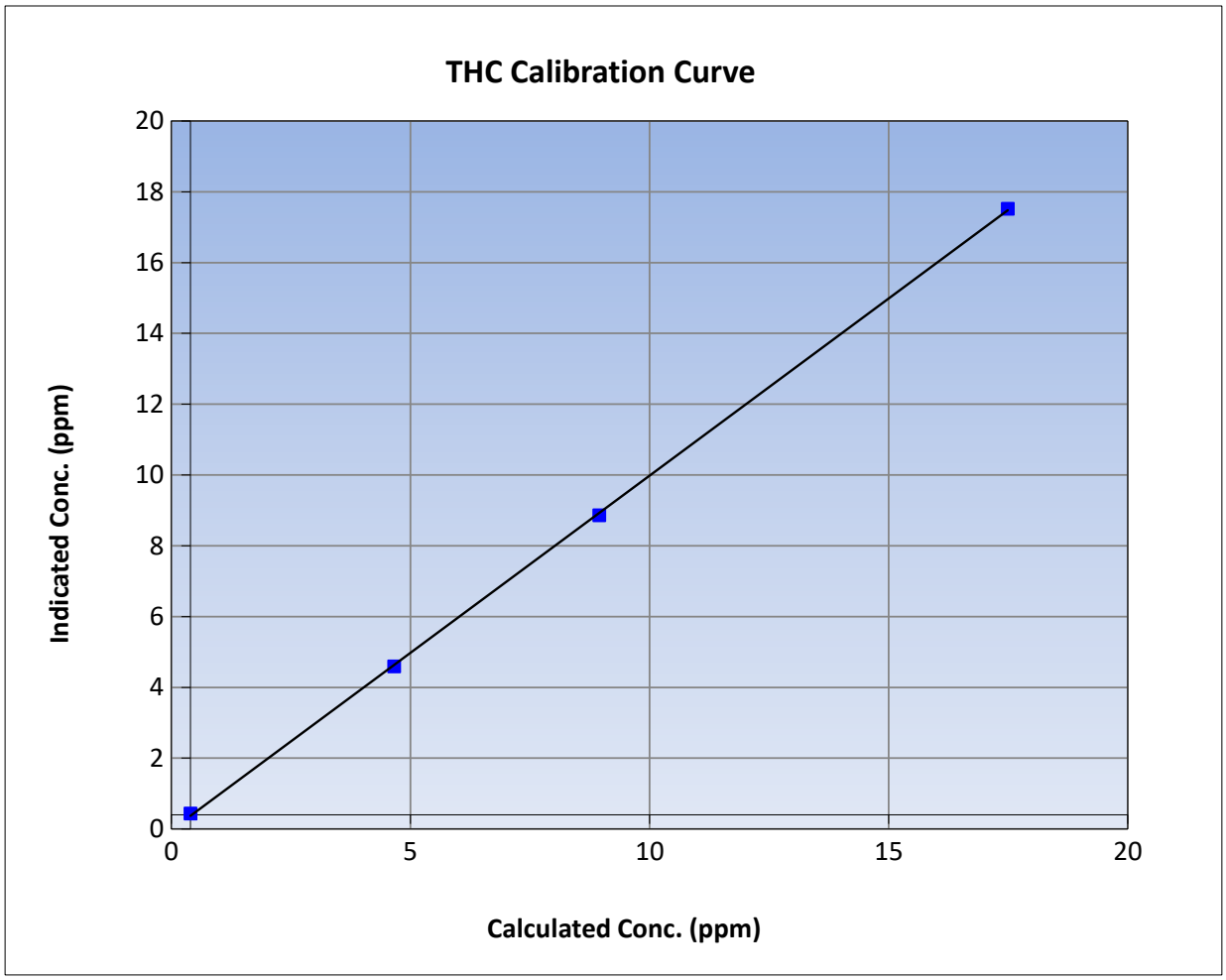
Station Information

Calibration Date:	December 4, 2023	Previous Calibration:	November 6, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:11	End Time (MST):	13:11
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1218153352

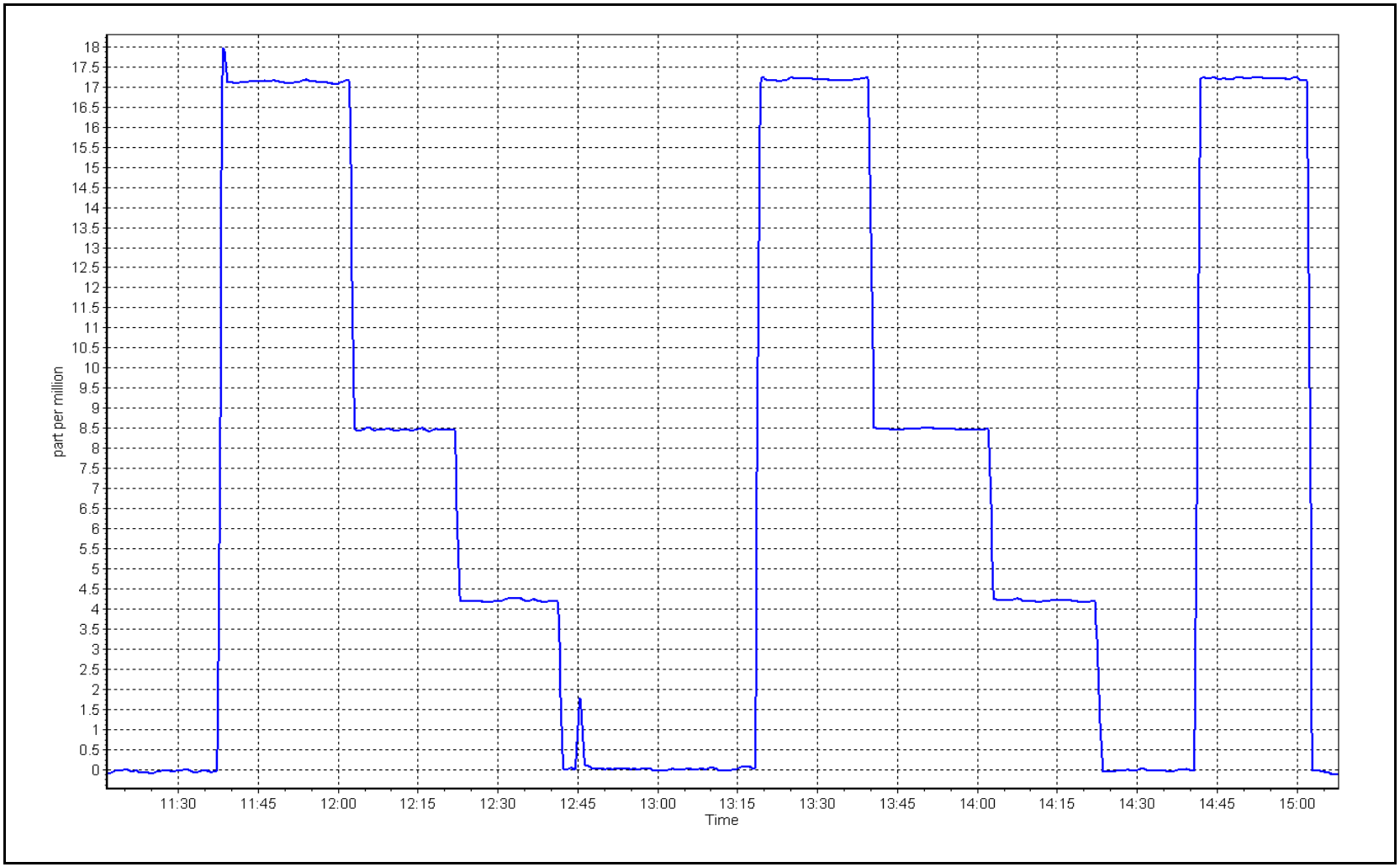
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.04	----
17.09	17.12	0.9983
8.55	8.47	1.0095
4.26	4.19	1.0163

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999929	*≥0.995*
Slope	1.000963	*0.90 - 1.10*
Intercept	-0.028353	*+/-1.5*



THC Calibration Plot Date: December 4, 2023 Location: Wapasu



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	December 21, 2023	Last Cal Date:	December 4, 2023
Start time (MST):	11:36	End time (MST):	15:00
Reason:	Maintenance		

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:	1.000963	1.011452	Background:	3.300	3.300
Calibration intercept:	-0.028353	-0.239261	Coefficient:	4.460	4.451

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	4921	79.4	17.09	17.34	0.985
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.24	----
high point	4921	79.4	17.09	17.08	1.001
second point	4960	39.7	8.55	8.31	1.028
third point	4980	19.8	4.26	4.13	1.032
as left zero	5000	0.0	0.00	-0.14	----
as left span	4921	79.4	17.09	17.07	1.001
				Average Correction Factor	1.020

Baseline Corr As found:	17.22	Previous response	17.08	*% change	0.8%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filters and Hydrogen cylinder after as founds. Adjusted span only.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

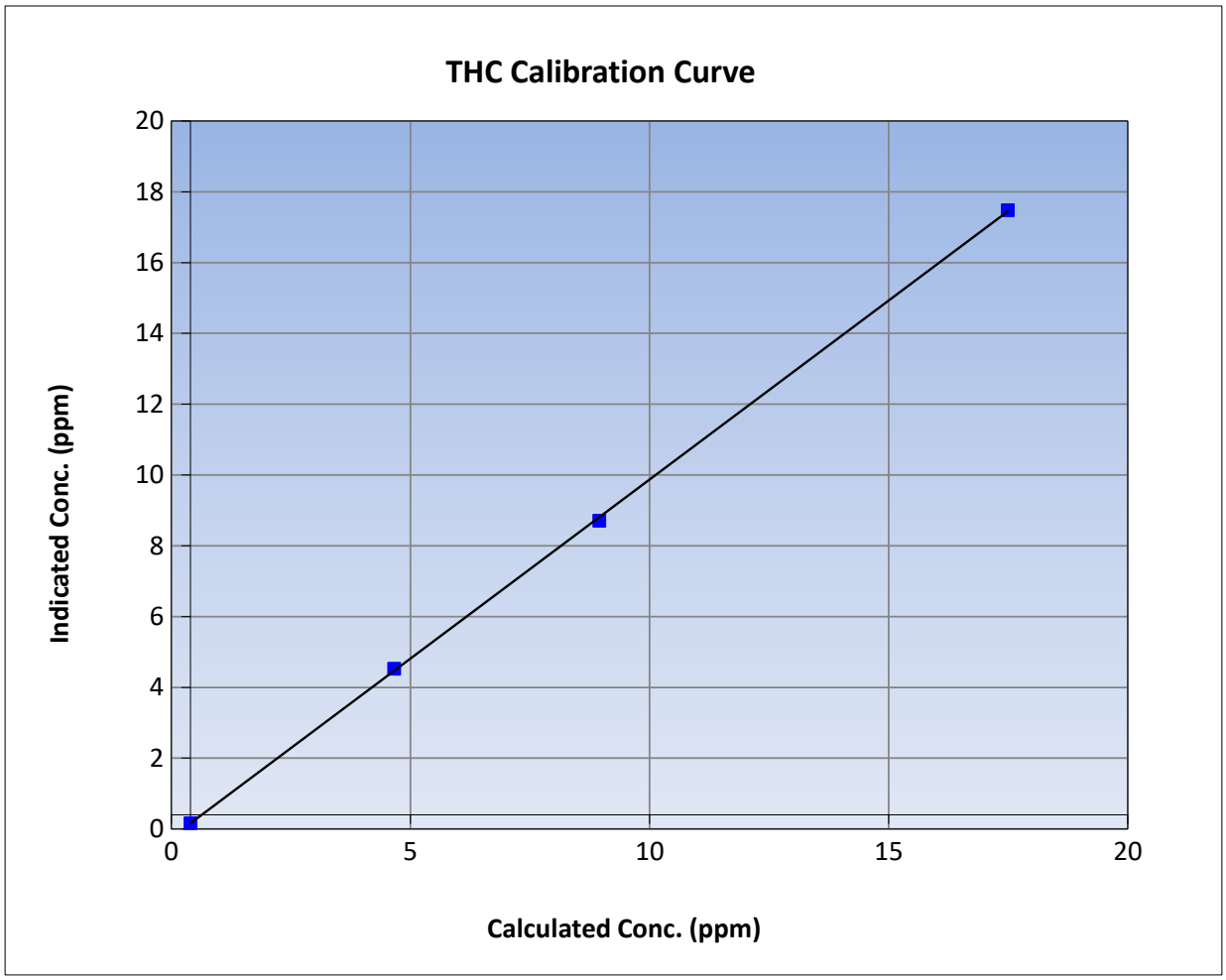
Station Information

Calibration Date:	December 21, 2023	Previous Calibration:	December 4, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:36	End Time (MST):	15:00
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1218153352

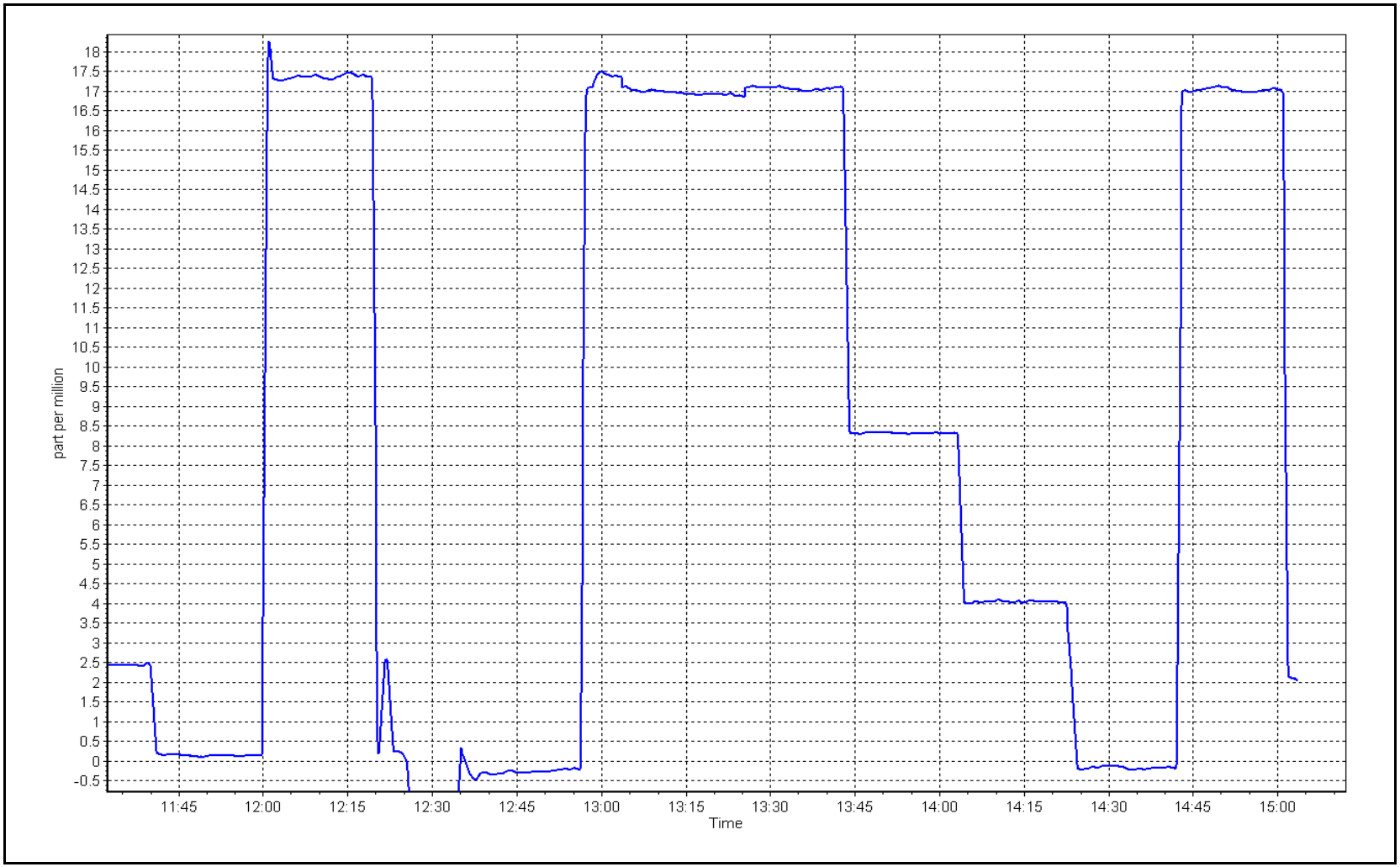
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.24	----
17.09	17.08	1.0006
8.55	8.31	1.0285
4.26	4.13	1.0318

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999917	*≥0.995*
Slope	1.011452	*0.90 - 1.10*
Intercept	-0.239261	*+/-1.5*



THC Calibration Plot Date: December 21, 2023 Location: Wapasu



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	December 7, 2023	Last Cal Date:	November 21, 2023
Start time (MST):	10:55	End time (MST):	15:53
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:	1.280	1.264	NO bkgnd or offset:	8.4	8.1
NOX coeff or slope:	0.986	0.989	NOX bkgnd or offset:	8.4	8.1
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	341.2	326.0

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.003061	0.999676
NO_X Cal Offset:	-4.540000	-3.080000
NO Cal Slope:	1.006988	1.000330
NO Cal Offset:	-5.320000	-2.740000
NO_2 Cal Slope:	0.997809	1.004002
NO_2 Cal Offset:	0.732274	-0.063828

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	4917	83.2	817.2	799.9	17.3	823.9	809.5	14.5	0.9919	0.9881
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high point	4917	83.2	817.2	799.9	17.3	816.7	800.4	16.3	1.0006	0.9994
second point	4958	41.6	408.6	399.9	8.7	399.8	391.0	8.8	1.0220	1.0229
third point	4979	20.8	204.3	200.0	4.3	200.9	198.0	2.9	1.0169	1.0100
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.2	0.0	----	----
as left span	4917	83.2	817.2	393.8	423.4	815.9	388.6	427.3	1.0015	1.0133
								Average Correction Factor	1.0132	1.0107

Corrected As found	NO_X = 824.1 ppb	NO = 809.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	1.1%
Previous Response	NO_X = 815.2 ppb	NO = 800.2 ppb		*Percent Change	NO =	1.2%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	798.5	392.4	423.4	425.0	0.9962	100.4%
2nd GPT point (200 ppb O3)	798.5	595.3	220.5	221.5	0.9955	100.5%
3rd GPT point (100 ppb O3)	798.5	700.4	115.4	115.6	0.9983	100.2%
				Average Correction Factor	0.9967	100.3%

Notes: Change filters after as founds. Adjusted span only.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

NO_X Calibration Summary

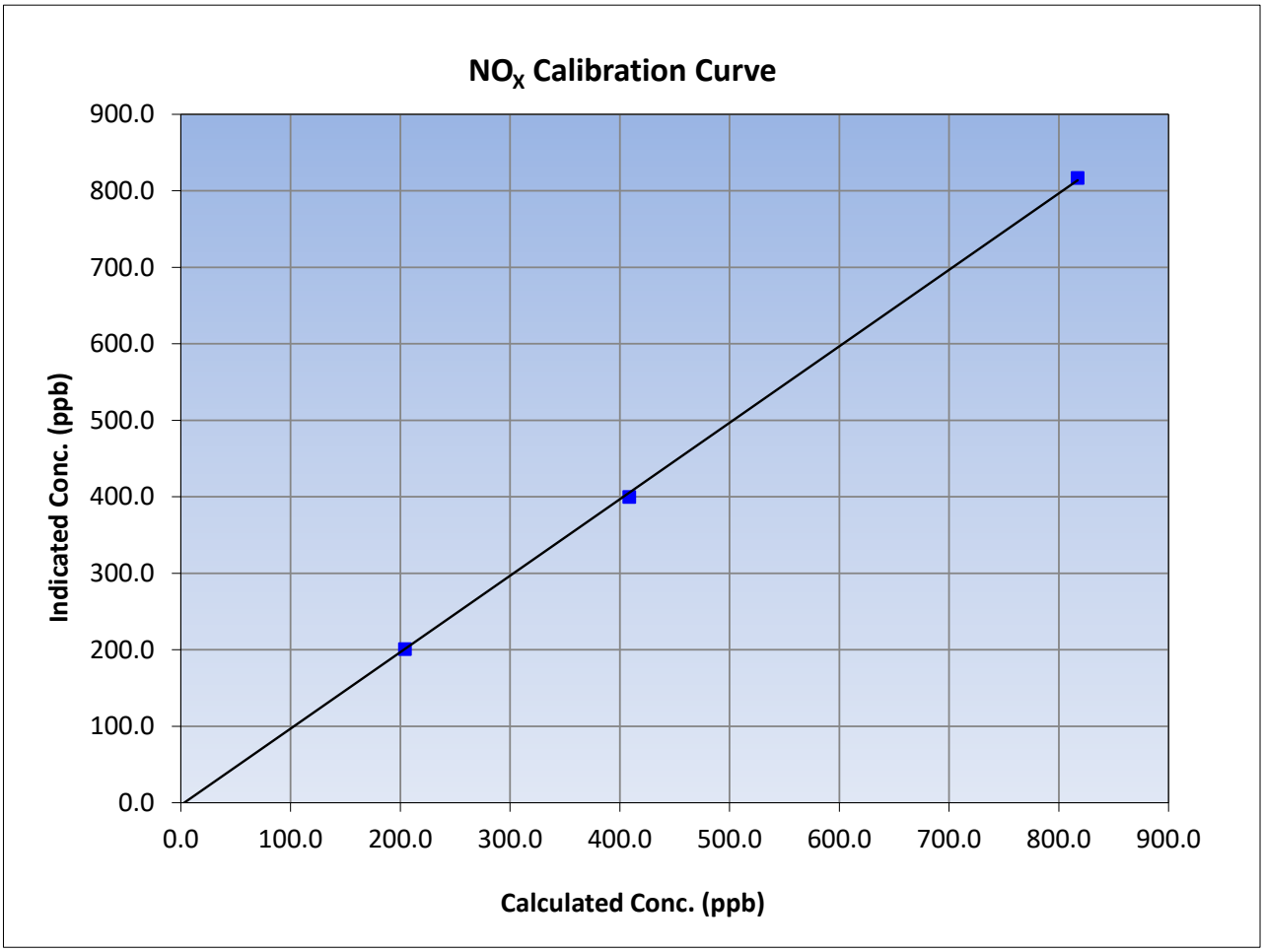
Version-04-2020

Station Information

Calibration Date:	December 7, 2023	Previous Calibration:	November 21, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:55	End Time (MST):	15:53
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	0.999868	≥0.995
817.2	816.7	1.0006			
408.6	399.8	1.0220	Slope	0.999676	0.90 - 1.10
204.3	200.9	1.0169			
			Intercept	-3.080000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

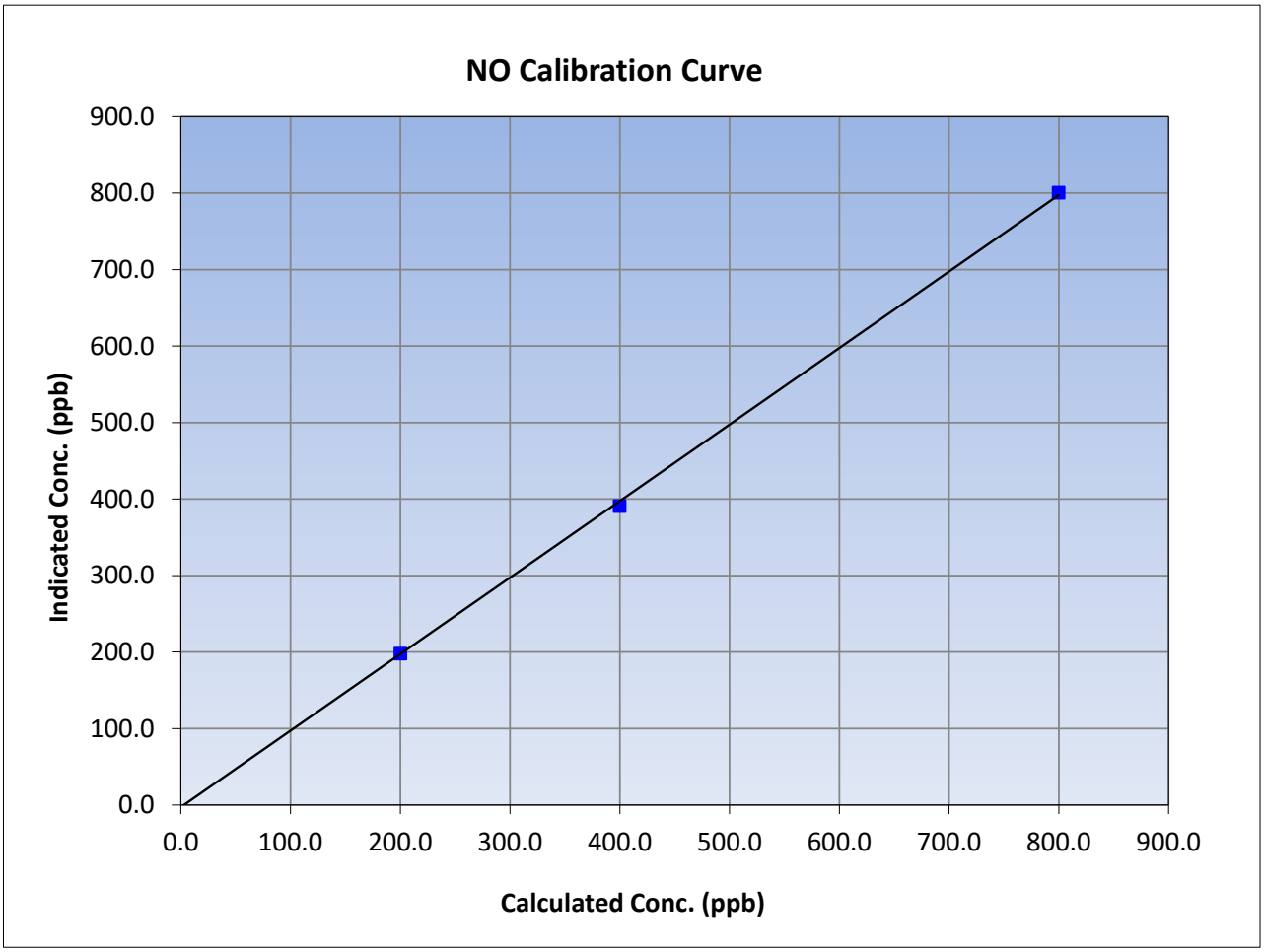
Version-04-2020

Station Information

Calibration Date:	December 7, 2023	Previous Calibration:	November 21, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:55	End Time (MST):	15:53
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	0.999839	*≥0.995*
799.9	800.4	0.9994			
399.9	391.0	1.0229	Slope	1.000330	*0.90 - 1.10*
200.0	198.0	1.0100			
			Intercept	-2.740000	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

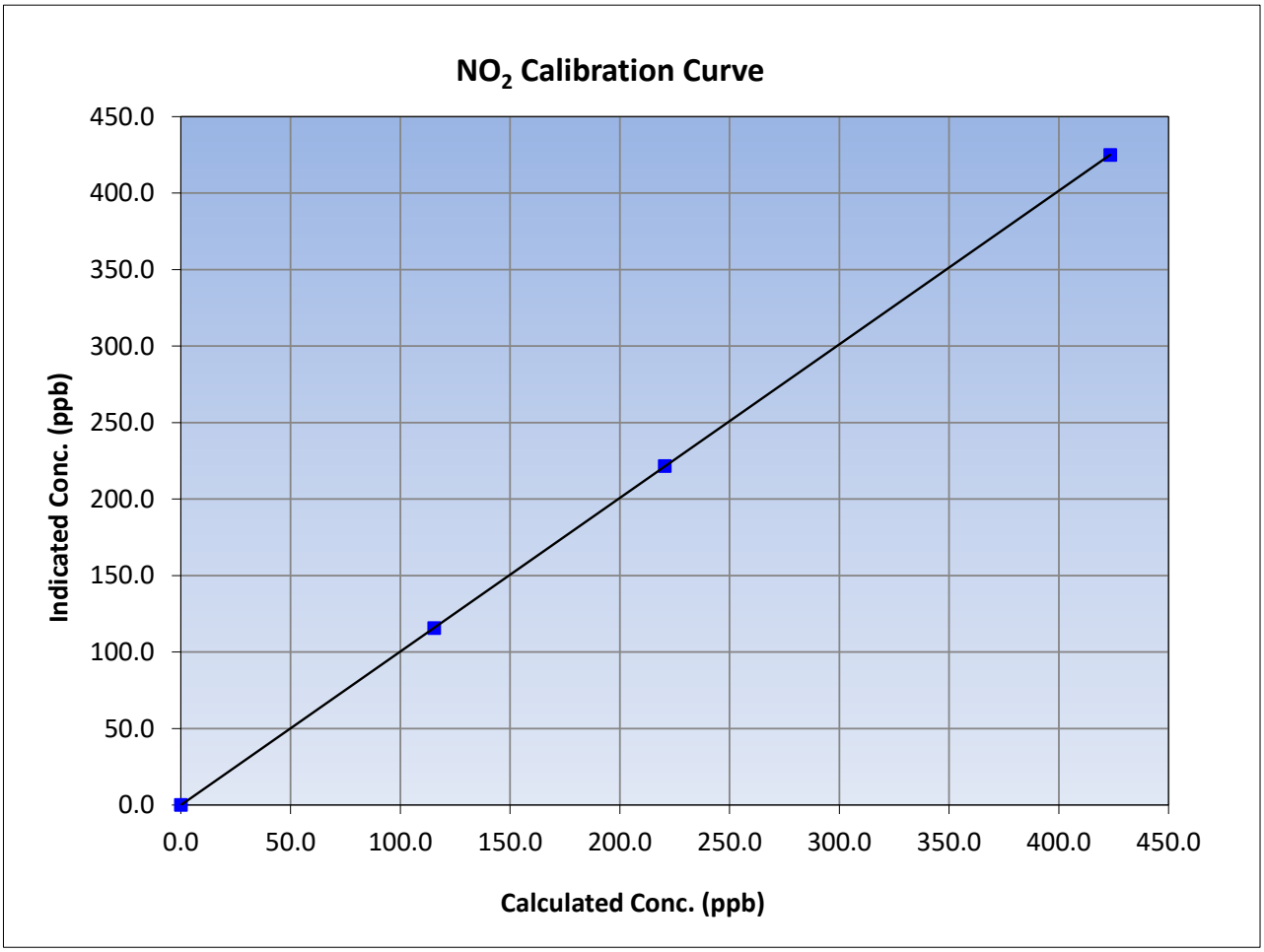
Version-04-2020

Station Information

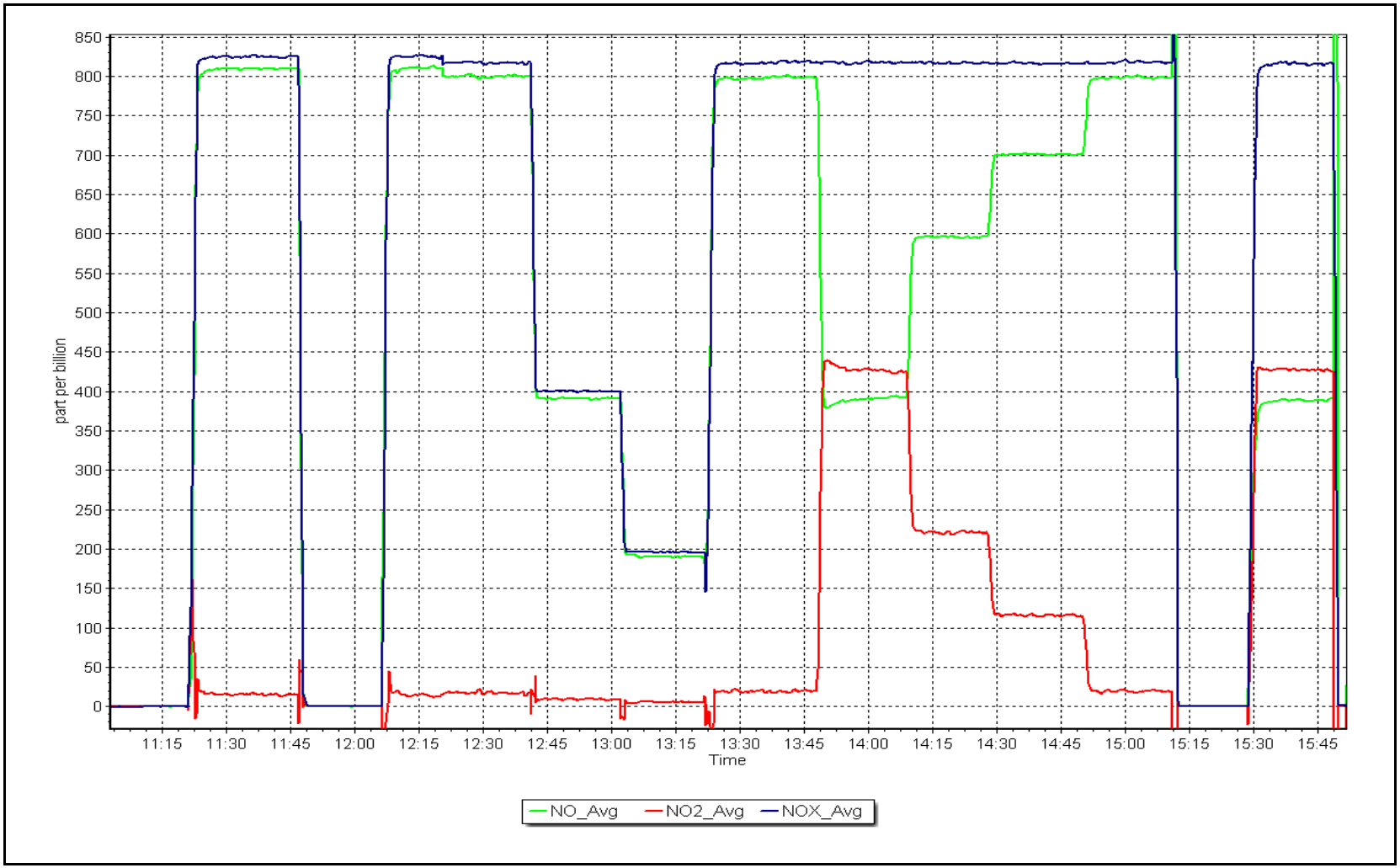
Calibration Date:	December 7, 2023	Previous Calibration:	November 21, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:55	End Time (MST):	15:53
Analyzer make:	Thermo Scientific 42iQ	Analyzer serial #:	12300522720

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999999	*≥0.995*
423.4	425.0	0.9962			
220.5	221.5	0.9955	Slope	1.004002	*0.90 - 1.10*
115.4	115.6	0.9983			
			Intercept	-0.063828	*+/-20*



NO_X Calibration Plot Date: December 7, 2023 Location: Wapasu



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	December 6, 2023	Last Cal Date:	November 2, 2023
Start time (MST):	10:30	End time (MST):	14:10
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:	1.003143	1.002943	Backgd or Offset:	-1.8	-1.8
Calibration intercept:	-0.400000	-0.540000	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	0.3	----
as found span	5000	1077.3	400.0	399.2	1.002
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	1077.3	400.0	400.9	0.998
second point	5000	900.3	200.0	199.8	1.001
third point	5000	789.5	100.0	99.2	1.008
as left zero	5000	0.0	0.0	0.6	----
as left span	5000	1077.3	400.0	405.6	0.986
				Average Correction Factor	1.002

Baseline Corr As found:	398.9	Previous response	400.9	*% 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

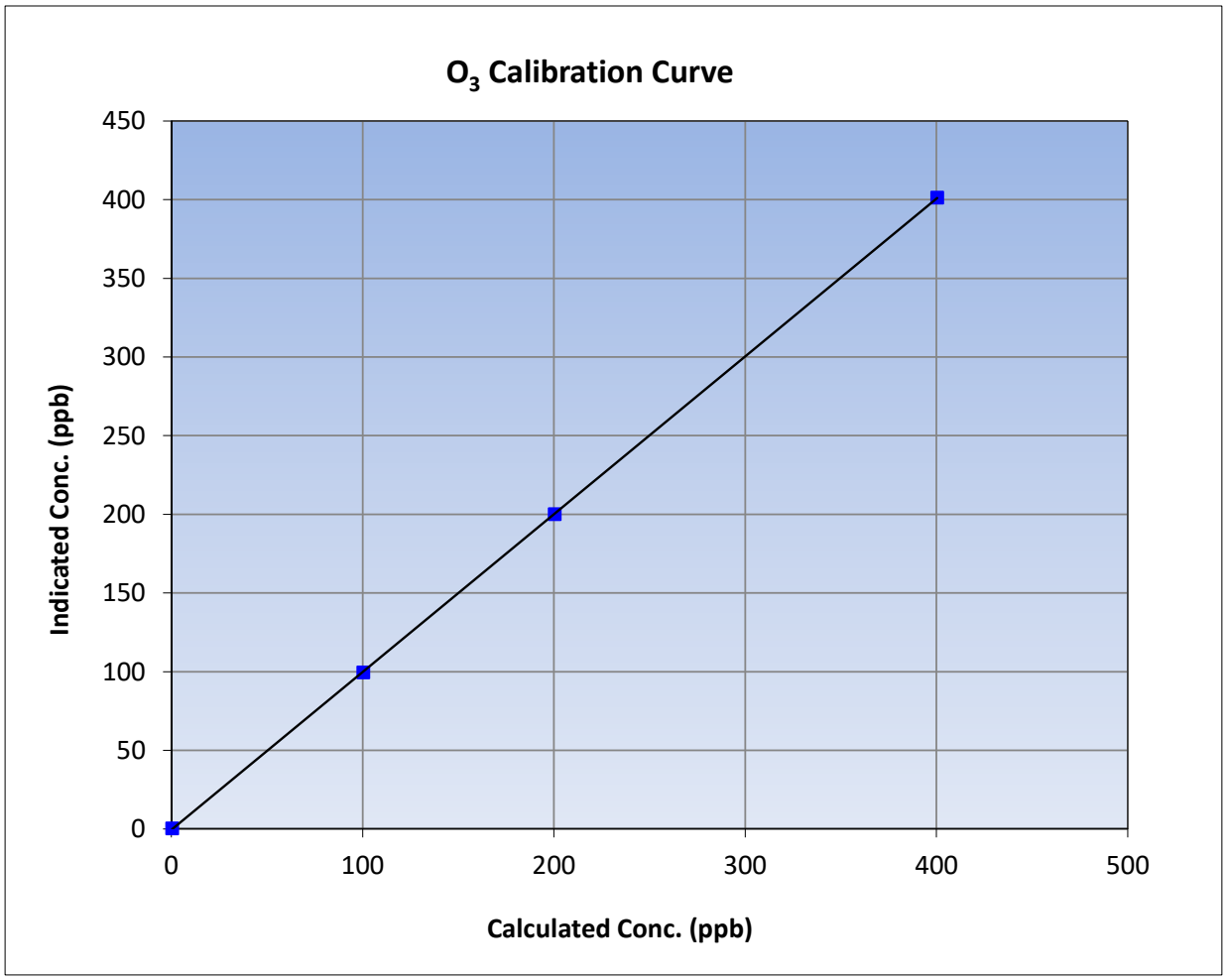
Station Information

Calibration Date:	December 6, 2023	Previous Calibration:	November 2, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:30	End Time (MST):	14:10
Analyzer make:	API T400	Analyzer serial #:	3870

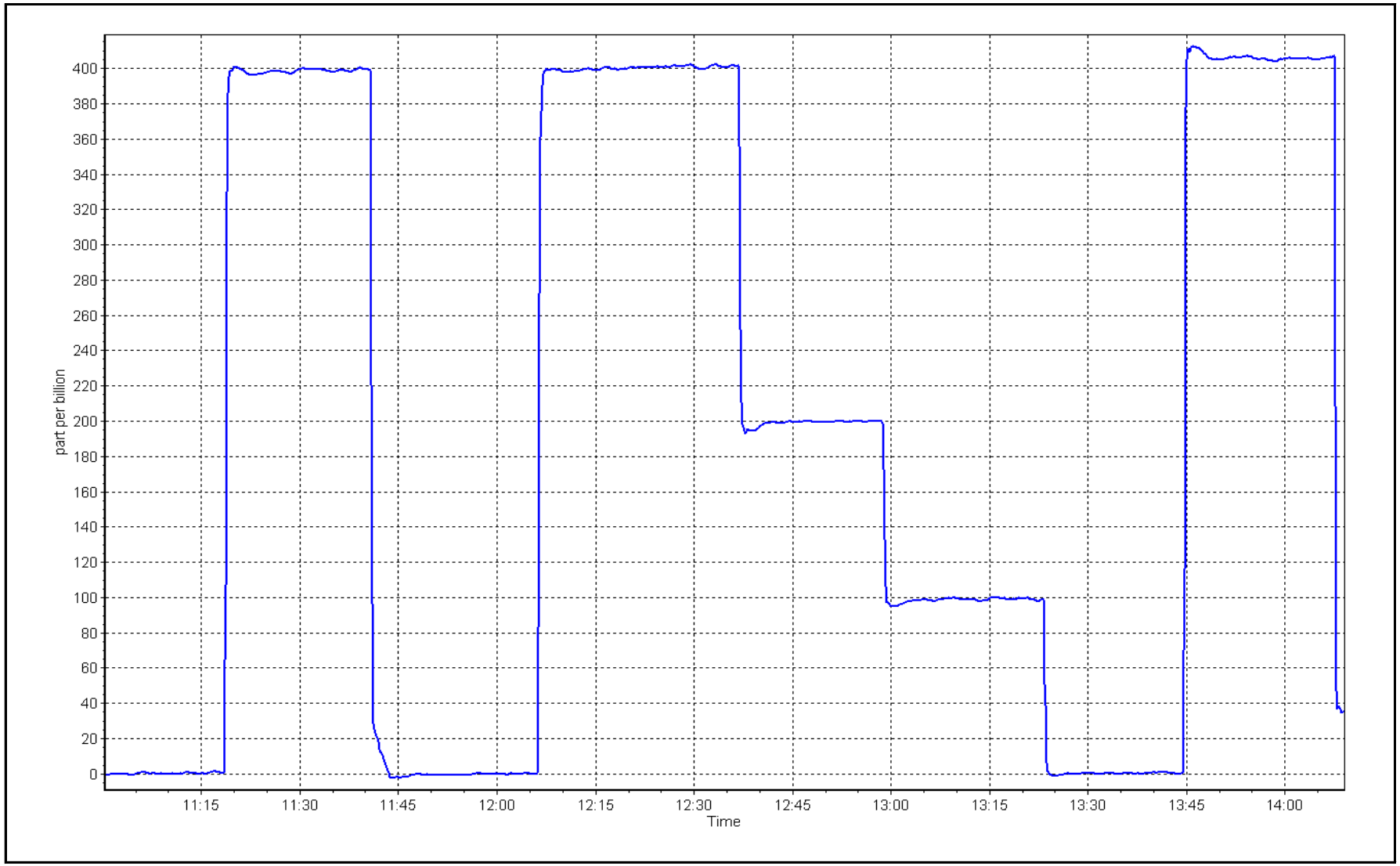
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
400.0	400.9	0.9978
200.0	199.8	1.0010
100.0	99.2	1.0081

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	1.002943	*0.90 - 1.10*
Intercept	-0.540000	*+/- 5*



O_3 Calibration Plot Date: December 6, 2023 Location: Wapasu



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Wapasu	Station number:	AMS 17
Calibration Date:	December 7, 2023	Last Cal Date:	November 28, 2023
Start time (MST):	14:41	End time (MST):	15:20
Analyzer Make:	API T640	S/N:	1183
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388748
Temp/RH standard:	Alicat FP-25BT	S/N:	388748

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-1.2	-1.8	-1.2	☐	+/- 2 °C
P (mmHg)	705.3	704.2	705.3	☐	+/- 10 mmHg
flow (LPM)	4.93	4.92	4.93	☐	+/- 0.25 LPM

Leak Test: Date of check: December 7, 2023 Last Cal Date: November 28, 2023

PM w/o HEPA: 5.4 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

DECEMBER 2023

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

January 31, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	December 19, 2023	Last Cal Date:	November 7, 2023
Start time (MST):	10:50	End time (MST):	14:55
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.40	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC463851			
Removed Cal Gas Conc:	49.40	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	2658
ZAG Make/Model:	Teledyne API 701H		Serial Number:	360

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: JC1501301453

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003346	0.998520	Backgd or Offset:	22.6	22.4
Calibration intercept:	-0.163010	-0.124003	Coeff or Slope:	0.803	0.803

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	796.4	1.005
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	799.1	1.001
second point	4959	40.5	400.2	399.8	1.001
third point	4979	20.2	199.6	198.0	1.008
as left zero	5000	0.0	0.0	0.2	----
as left span	4919	81.0	800.3	799.3	1.001
				Average Correction Factor	1.004

Baseline Corr As found:	795.90	Previous response	802.79	*% 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. No adjustments made.

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

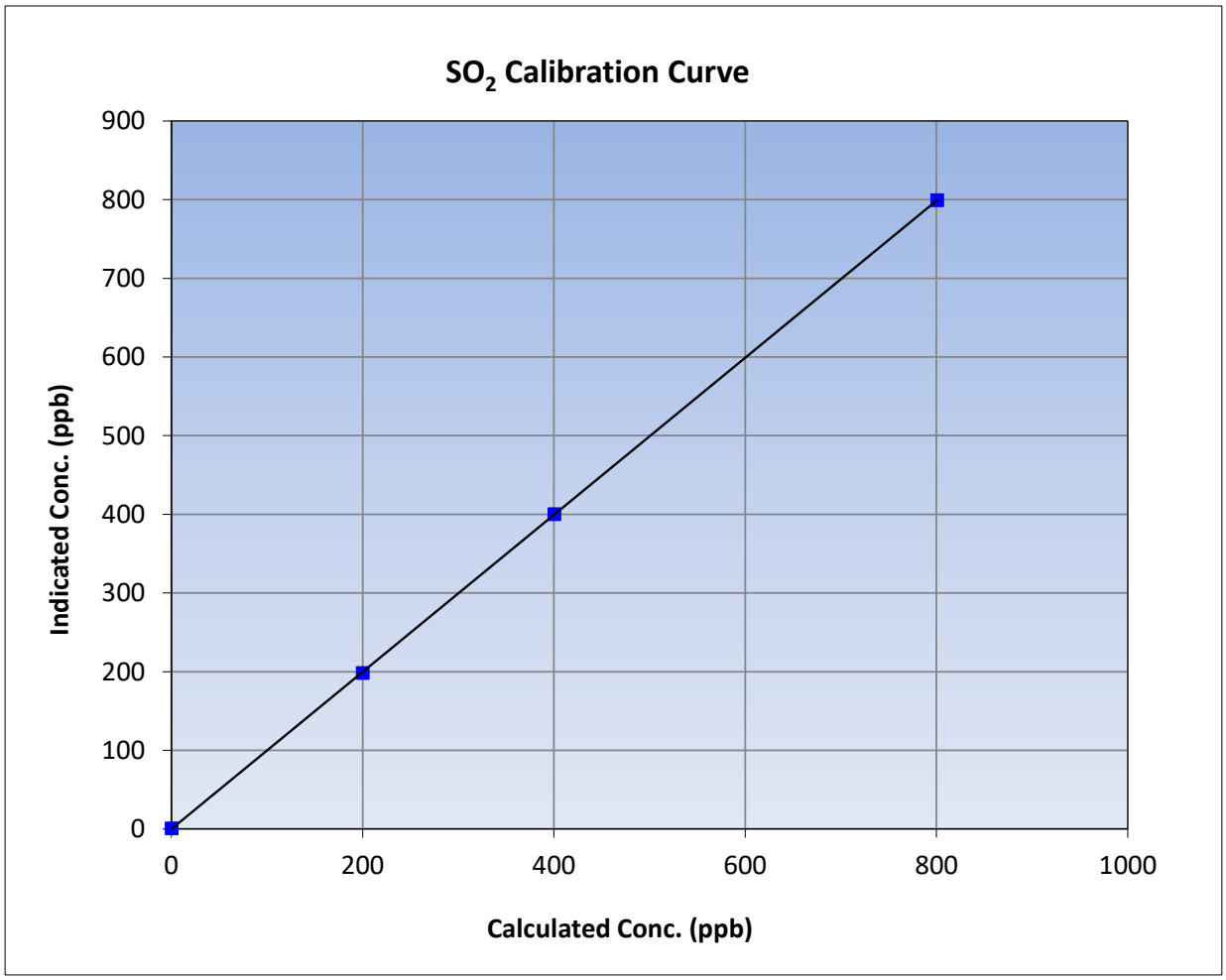
Station Information

Calibration Date:	December 19, 2023	Previous Calibration:	November 7, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:50	End Time (MST):	14:55
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301453

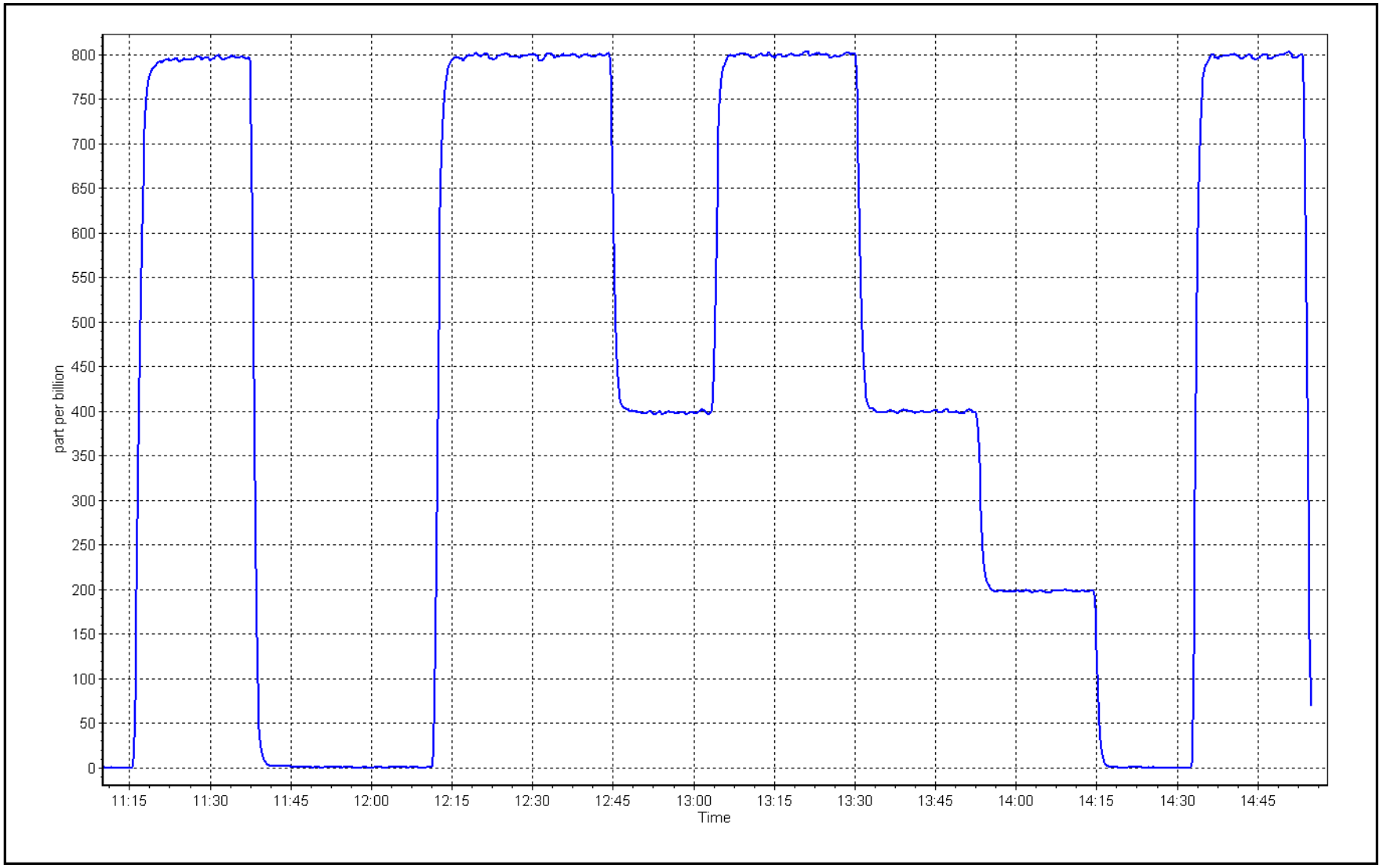
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.6	----
800.3	799.1	1.0015
400.2	399.8	1.0010
199.6	198.0	1.0081

Statistical Evaluation		Limits
Correlation Coefficient	0.999994	≥0.995
Slope	0.998520	0.90 - 1.10
Intercept	-0.124003	+/-30



SO2 Calibration Plot Date: December 19, 2023 Location: Stony Mountain



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Stony Mountain	Station number:	AMS18
Calibration Date:	December 21, 2023	Last Cal Date:	November 29, 2023
Start time (MST):	11:30	End time (MST):	17:07
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:	1.000731	1.000015	Backgd or Offset:	2.66	2.66
Calibration intercept:	0.240905	0.540982	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	82.3	0.974
as found 2nd point	4964	36.5	40.0	41.3	0.973
as found 3rd point	4983	18.3	20.0	20.5	0.988
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	41.0	0.975
third point	4983	18.3	20.0	20.6	0.973
as left zero	5000	0.0	0.0	0.3	----
as left span	4927	73.0	80.0	79.9	1.001
SO2 Scrubber Check	4923	77.1	771.0	0.0	----
Date of last scrubber change:		17-Dec-21		Ave Corr Factor	0.982
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	82.1	Prev response:	80.29	*% change:	2.2%
Baseline Corr 2nd AF pt:	41.1	AF Slope:	1.027592	AF Intercept:	0.100548
Baseline Corr 3rd AF pt:	20.3	AF Correlation:	0.999983		

* = > +/-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

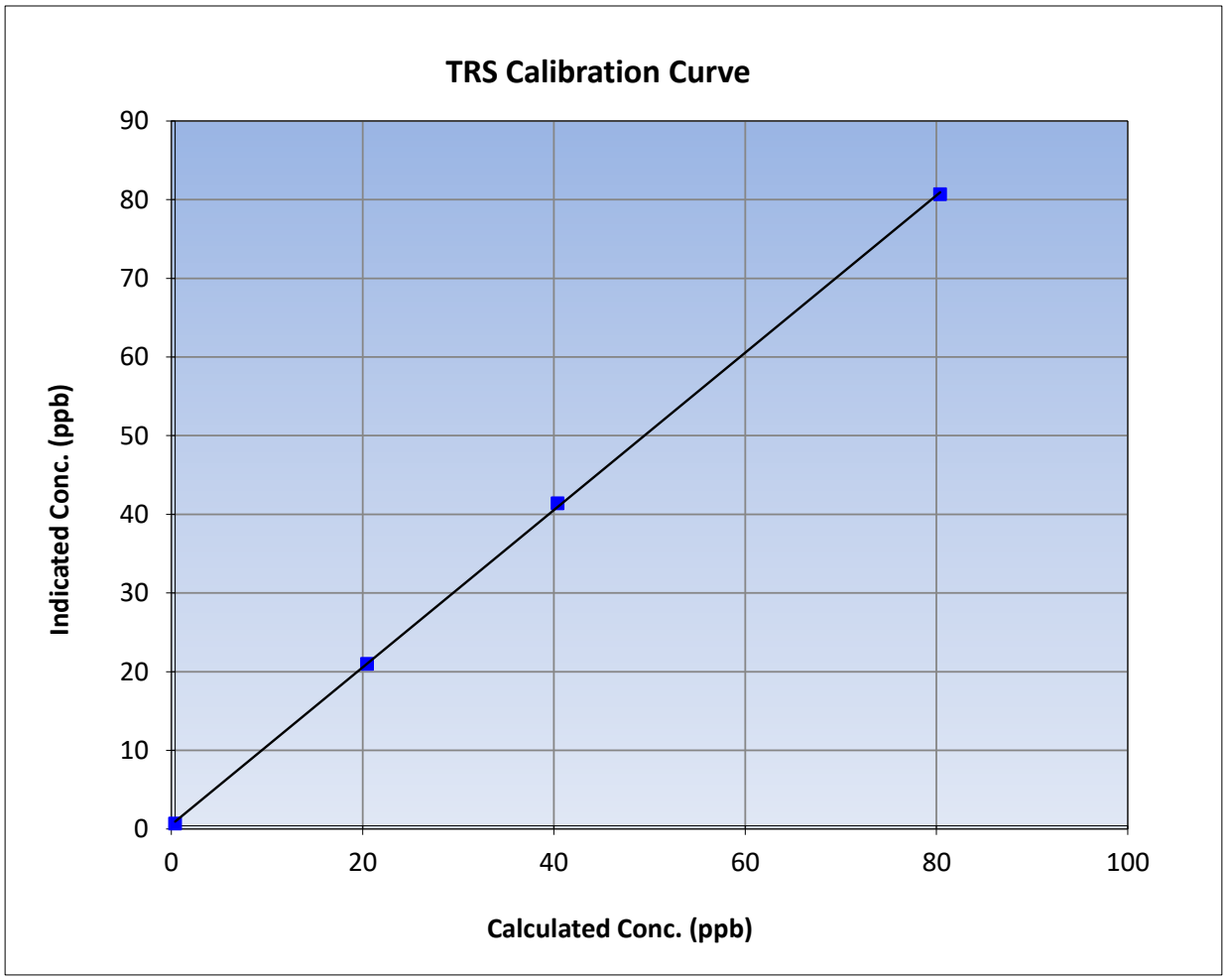
Station Information

Calibration Date:	December 21, 2023	Previous Calibration:	November 29, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	11:30	End Time (MST):	17:07
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153359

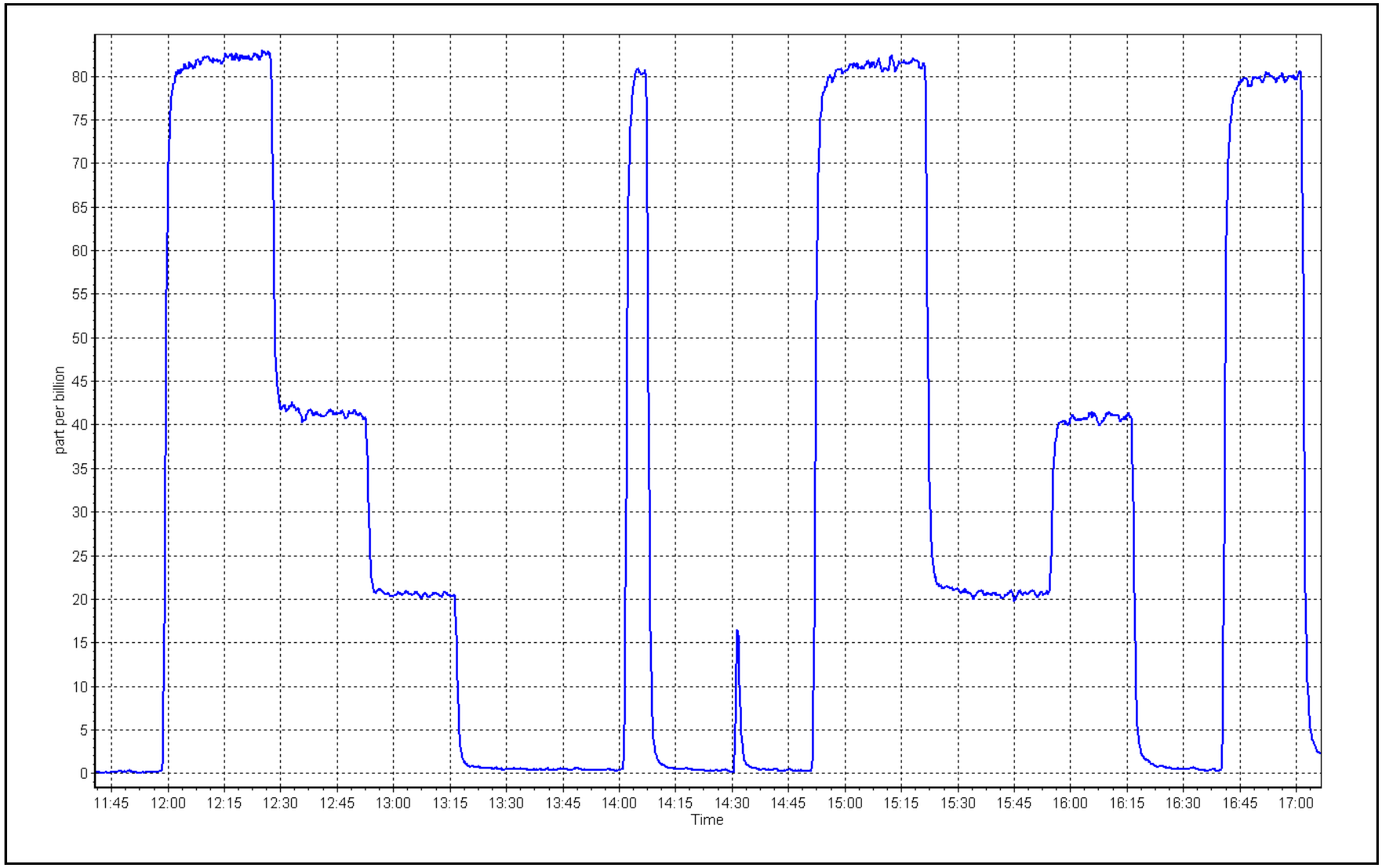
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
80.0	80.3	0.9962
40.0	41.0	0.9754
20.0	20.6	0.9732

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999906	*≥0.995*
Slope	1.000015	*0.90 - 1.10*
Intercept	0.540982	*+/-3*



TRS Calibration Plot Date: December 21, 2023 Location: Stony Mountain



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	December 19, 2023	Last Cal Date:	November 7, 2023
Start time (MST):	10:50	End time (MST):	14:55
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:	2.25E-04	2.24E-04	NMHC SP Ratio:	5.10E-05	5.04E-05
CH4 Retention time:	12.7	12.7	NMHC Peak Area:	179849	181790
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	17.39	0.994
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	17.34	0.997
second point	4959	40.5	8.64	8.64	1.000
third point	4979	20.2	4.31	4.27	1.010
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	17.28	17.44	0.991
				Average Correction Factor	1.002

Baseline Corr AF:	17.39	Prev response	17.23	*% change	0.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	9.17	9.23	0.993
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	9.16	1.001
second point	4959	40.5	4.58	4.60	0.996
third point	4979	20.2	2.29	2.30	0.995
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	0.997
Baseline Corr AF:	9.23	Prev response	9.16	*% change	0.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	8.11	8.15	0.995
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.0	8.11	8.18	0.992
second point	4959	40.5	4.06	4.04	1.003
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	8.20	0.990
				Average Correction Factor	1.007
Baseline Corr AF:	8.15	Prev response	8.07	*% change	1.0%
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:	0.999178	1.004329
THC Cal Offset:	-0.036603	-0.027780
CH4 Cal Slope:	0.999274	1.010541
CH4 Cal Offset:	-0.034024	-0.037005
NMHC Cal Slope:	0.999119	0.998956
NMHC Cal Offset:	-0.002179	0.009225

Notes: Inlet filter and H2 cylinder changed after as founds. Span adjusted.

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

THC Calibration Summary

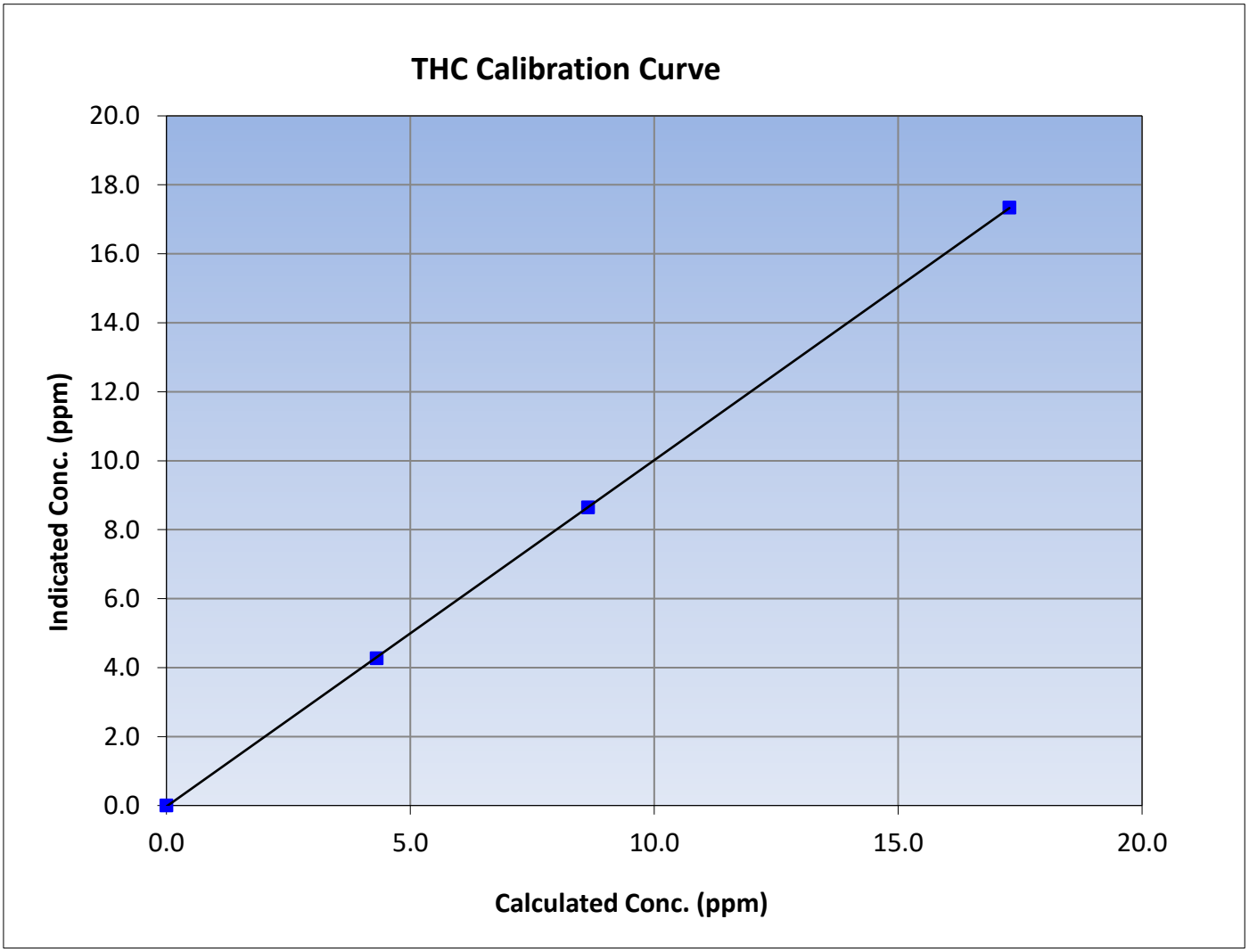
Version-06-2022

Station Information

Calibration Date:	December 19, 2023	Previous Calibration:	November 7, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:50	End Time (MST):	14:55
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	0.999988	≥0.995
17.28	17.34	0.9966			
8.64	8.64	0.9997	Slope	1.004329	0.90 - 1.10
4.31	4.27	1.0097			
			Intercept	-0.027780	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

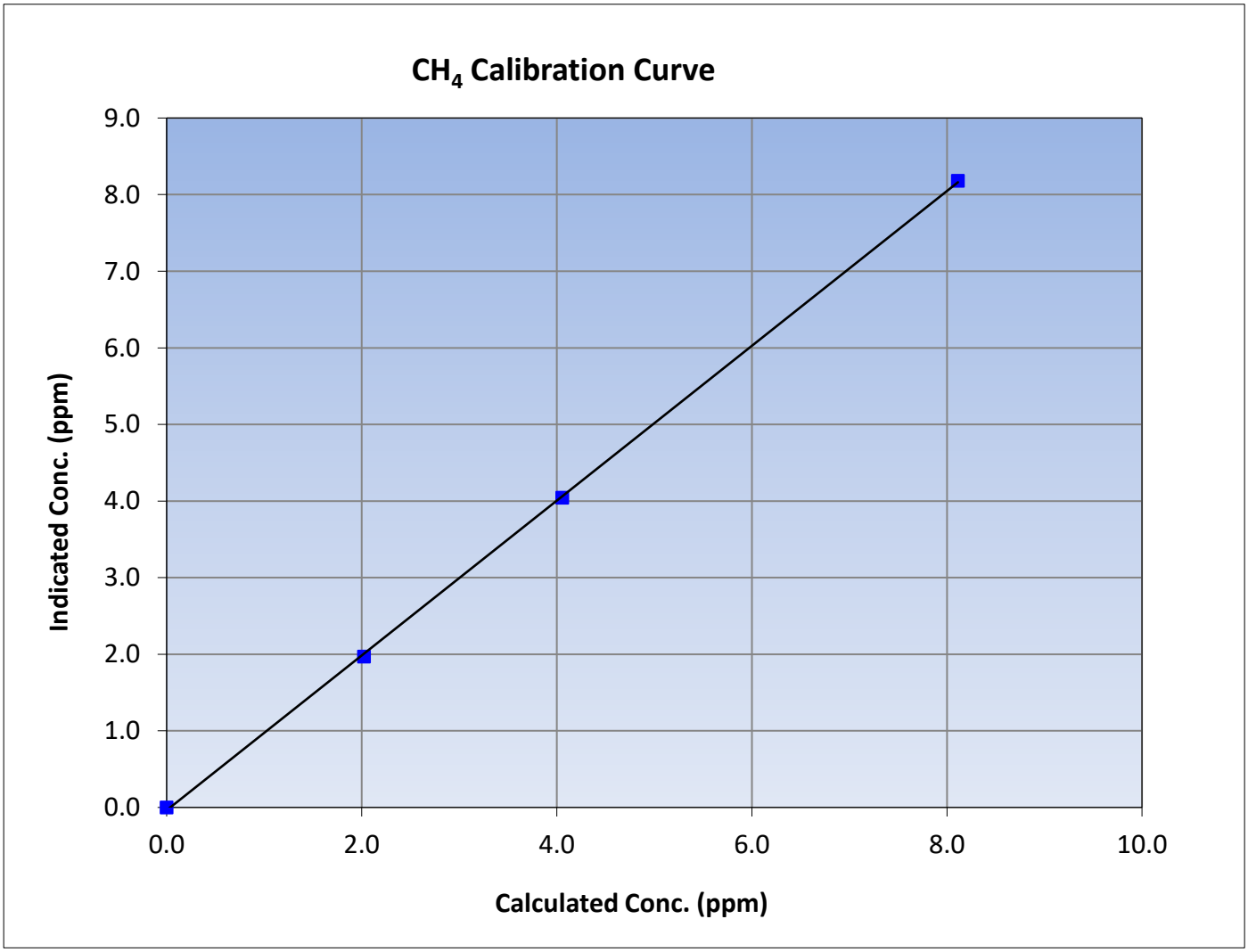
Version-06-2022

Station Information

Calibration Date:	December 19, 2023	Previous Calibration:	November 7, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:50	End Time (MST):	14:55
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	0.999907	*≥0.995*
8.11	8.18	0.9918			
4.06	4.04	1.0032	Slope	1.010541	*0.90 - 1.10*
2.02	1.97	1.0267			
			Intercept	-0.037005	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

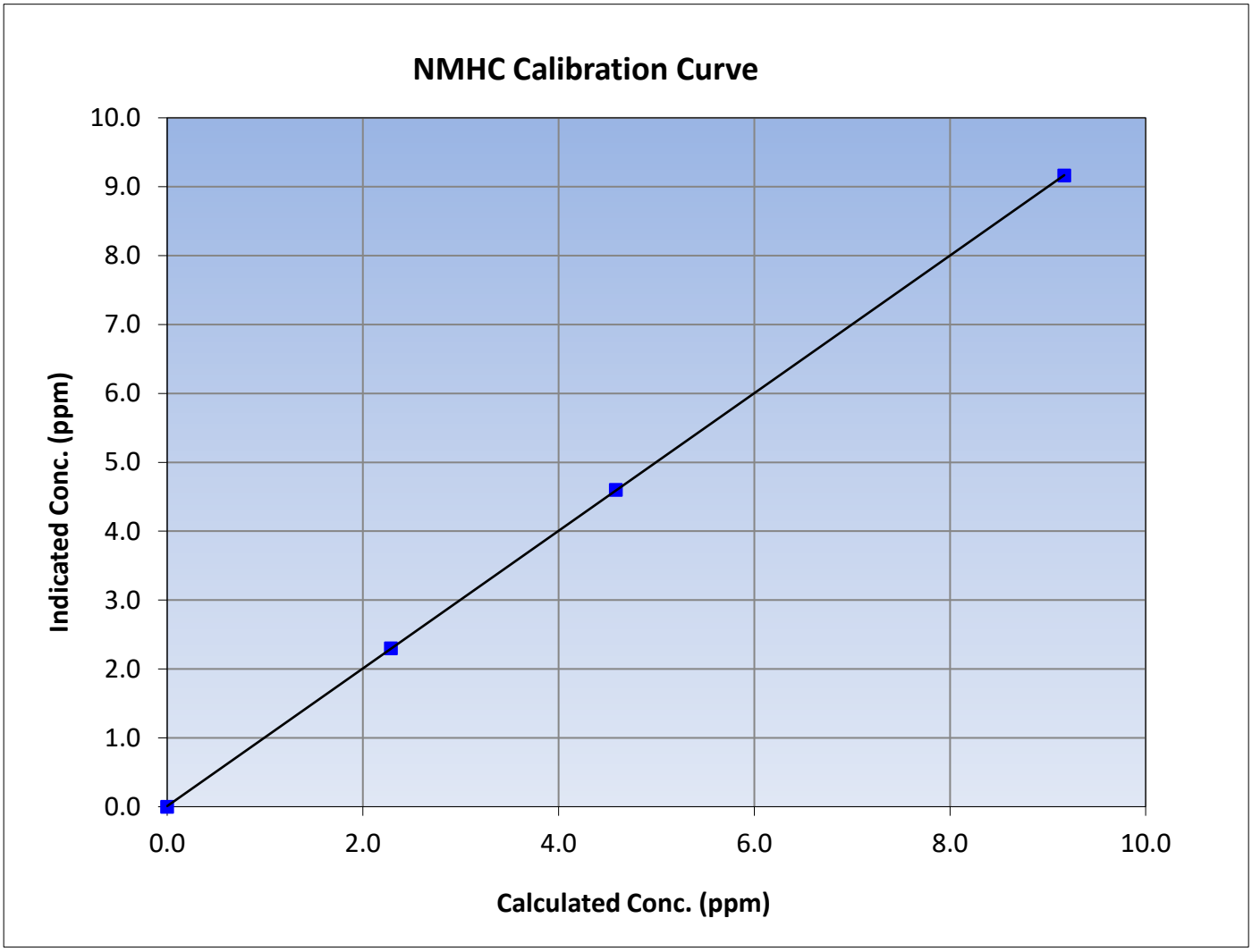
Version-06-2022

Station Information

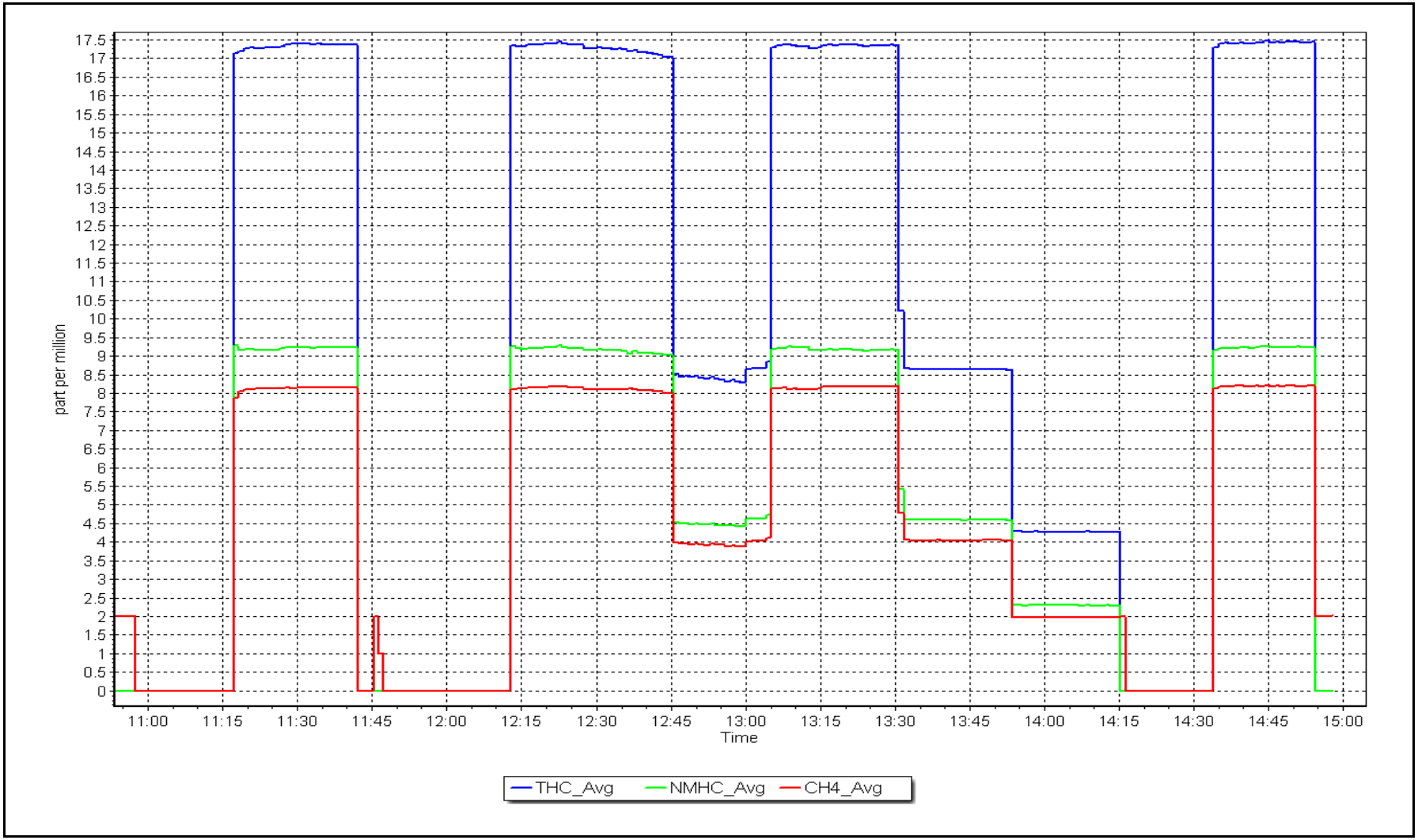
Calibration Date:	December 19, 2023	Previous Calibration:	November 7, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:50	End Time (MST):	14:55
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999994	≥0.995
9.17	9.16	1.0008			
4.58	4.60	0.9964	Slope	0.998956	0.90 - 1.10
2.29	2.30	0.9951			
			Intercept	0.009225	+/-0.5



NMHC Calibration Plot Date: December 19, 2023 Location: Stony Mountain



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	December 21, 2023	Last Cal Date:	November 30, 2023
Start time (MST):	11:45	End time (MST):	17:21
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2XX7ME		Cal Gas Expiry Date:	January 14, 2024	
NOX Cal Gas Conc:	50.48	ppm	NO Cal Gas Conc:	49.22	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	50.48	ppm	Removed Gas NO Conc:	49.22	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T750		Serial Number:	282	
ZAG make/model:	Teledyne API T751H		Serial Number:	321	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1336160088	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.087	1.076	NO bkgnd or offset:	3.1	3.0
NOX coeff or slope:	0.985	0.988	NOX bkgnd or offset:	3.1	3.0
NO2 coeff or slope:	0.999	0.999	Reaction cell Press:	248.8	249.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001069	0.997071
NO_X Cal Offset:	-0.390046	1.071123
NO Cal Slope:	1.001210	0.998008
NO Cal Offset:	-1.489996	0.231259
NO_2 Cal Slope:	1.001477	1.005966
NO_2 Cal Offset:	1.056533	0.956250

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	0.1	----	----
as found span	4919	81.3	820.8	800.3	20.5	832.0	810.0	21.7	0.9865	0.9880
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.3	0.0	0.3	----	----
high point	4919	81.3	820.8	800.3	20.5	819.5	799.2	20.3	1.0015	1.0013
second point	4959	40.7	410.9	400.7	10.3	409.8	399.0	10.8	1.0028	1.0042
third point	4980	20.3	204.9	199.8	5.1	207.1	200.7	6.4	0.9896	0.9956
as left zero	5000	0.0	0.0	0.0	0.0	0.1	-0.1	0.2	----	----
as left span	4919	81.3	820.8	420.6	400.2	812.0	352.6	459.2	1.0108	1.1928
								Average Correction Factor	0.9979	1.0004

Corrected As found	NO_X = 832.0 ppb	NO = 810.1 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	1.3%
Previous Response	NO_X = 821.2 ppb	NO = 799.7 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)	796.0	416.3	400.2	403.0	0.9930	100.7%
2nd GPT point (200 ppb O3)	796.0	606.8	209.7	212.7	0.9858	101.4%
3rd GPT point (100 ppb O3)	796.0	703.0	113.5	115.5	0.9826	101.8%
				Average Correction Factor	0.9871	101.3%

Notes: Portable calibrator used for calibration. Sample inlet filter changed after as founds. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

NO_X Calibration Summary

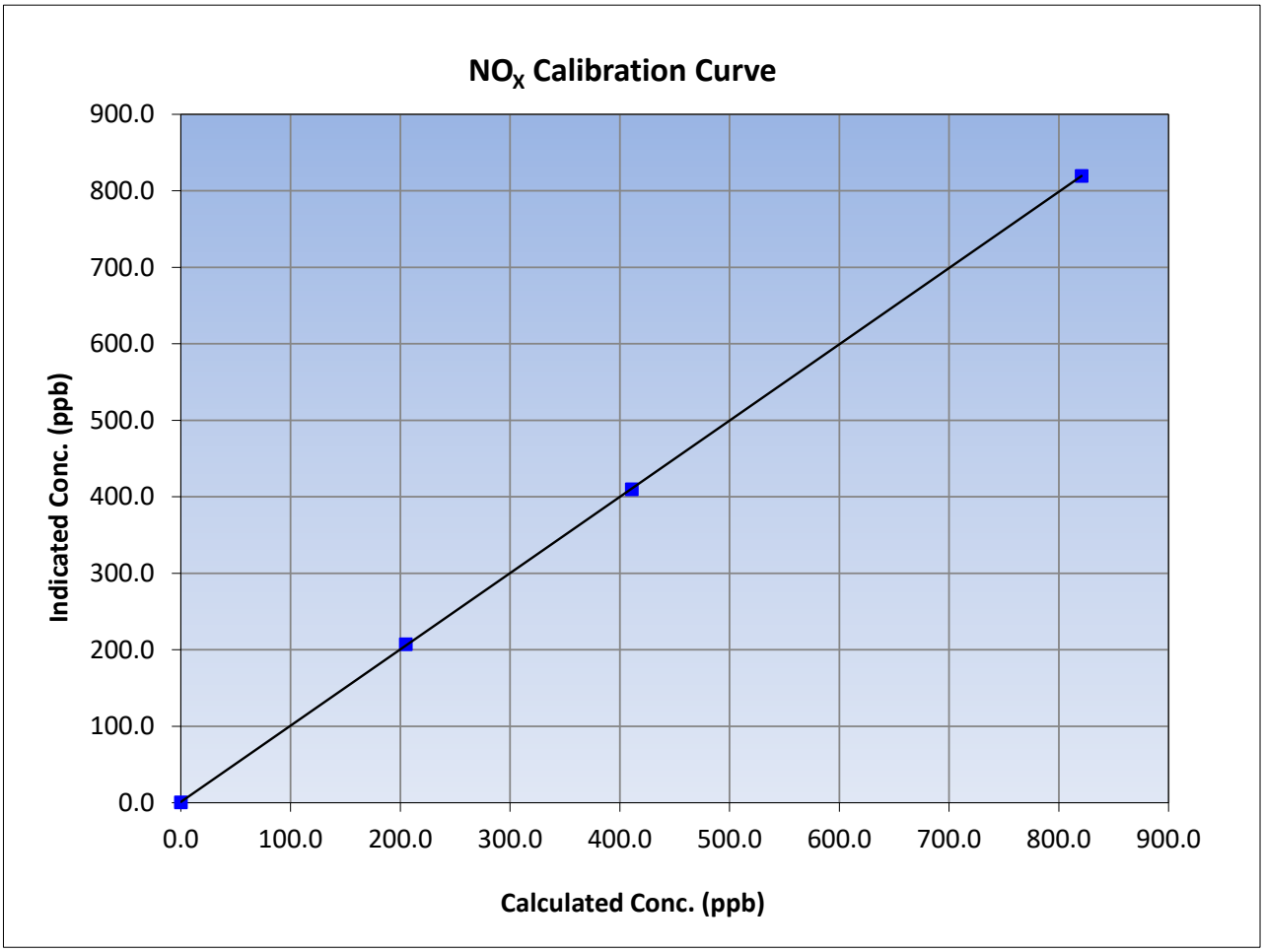
Version-04-2020

Station Information

Calibration Date:	December 21, 2023	Previous Calibration:	November 30, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:45	End Time (MST):	17:21
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	0.999988	≥0.995
820.8	819.5	1.0015			
410.9	409.8	1.0028	Slope	0.997071	0.90 - 1.10
204.9	207.1	0.9896			
			Intercept	1.071123	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

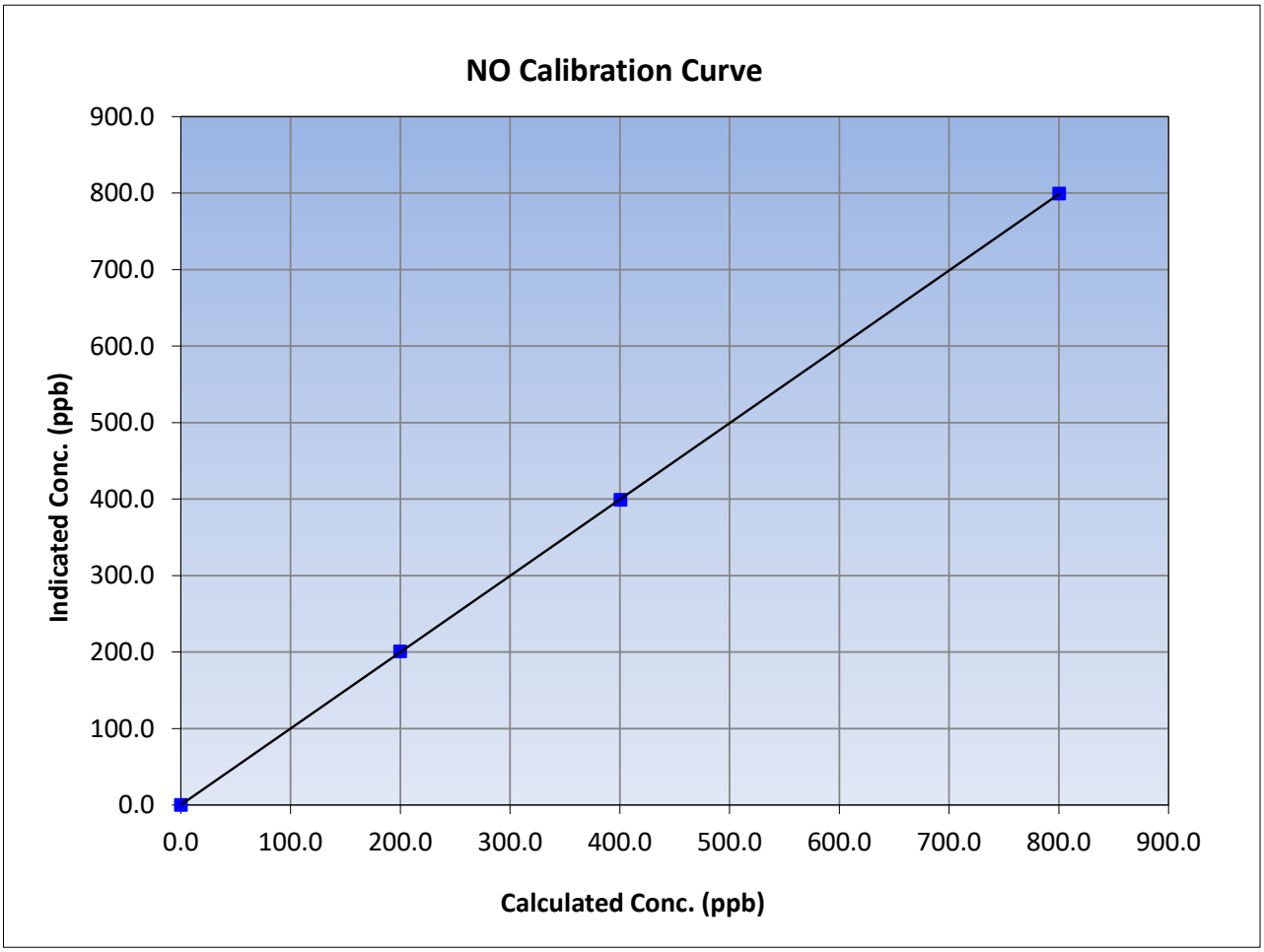
Version-04-2020

Station Information

Calibration Date:	December 21, 2023	Previous Calibration:	November 30, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:45	End Time (MST):	17:21
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999993	≥0.995
800.3	799.2	1.0013			
400.7	399.0	1.0042	Slope	0.998008	0.90 - 1.10
199.8	200.7	0.9956			
			Intercept	0.231259	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

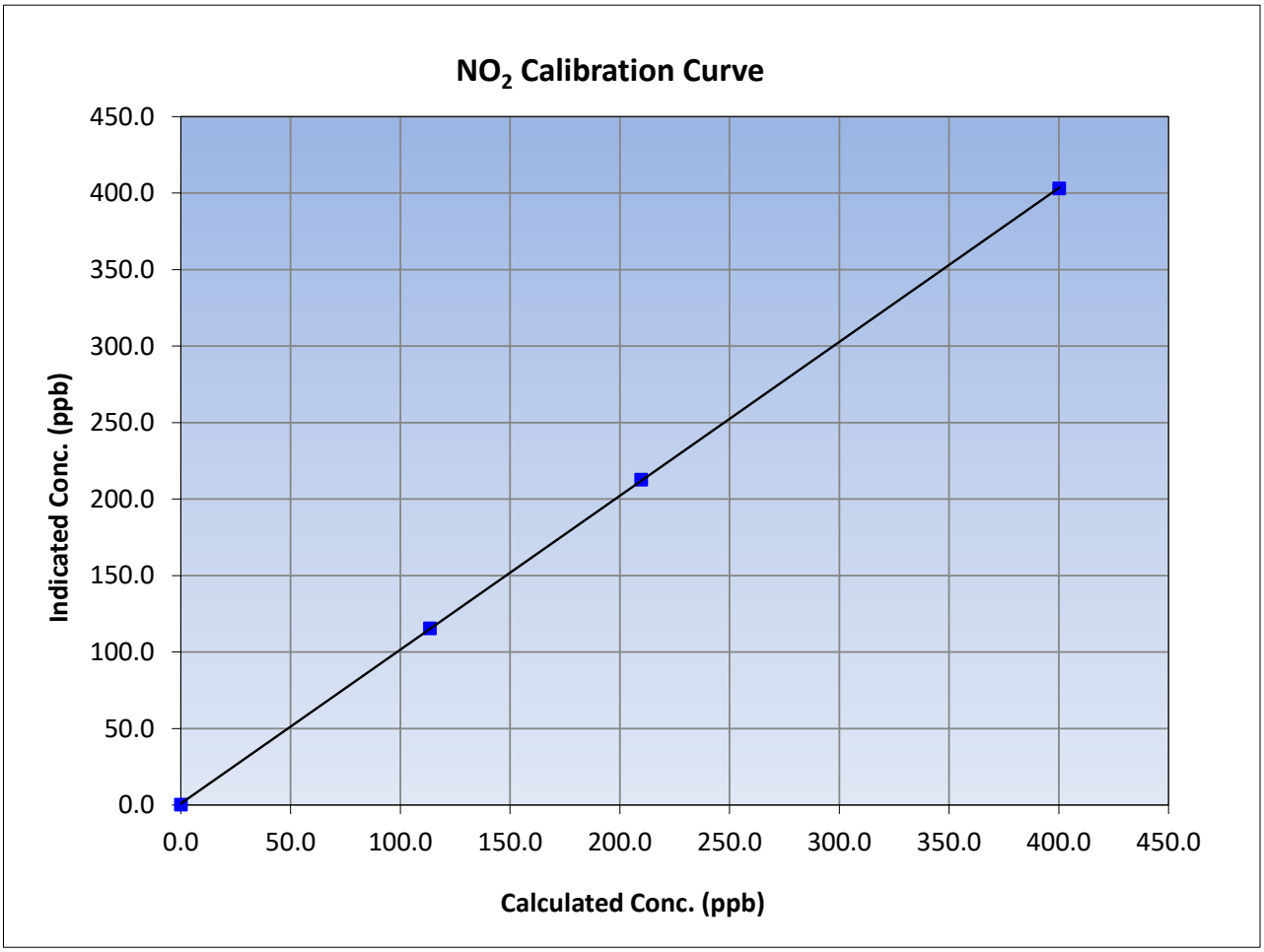
Version-04-2020

Station Information

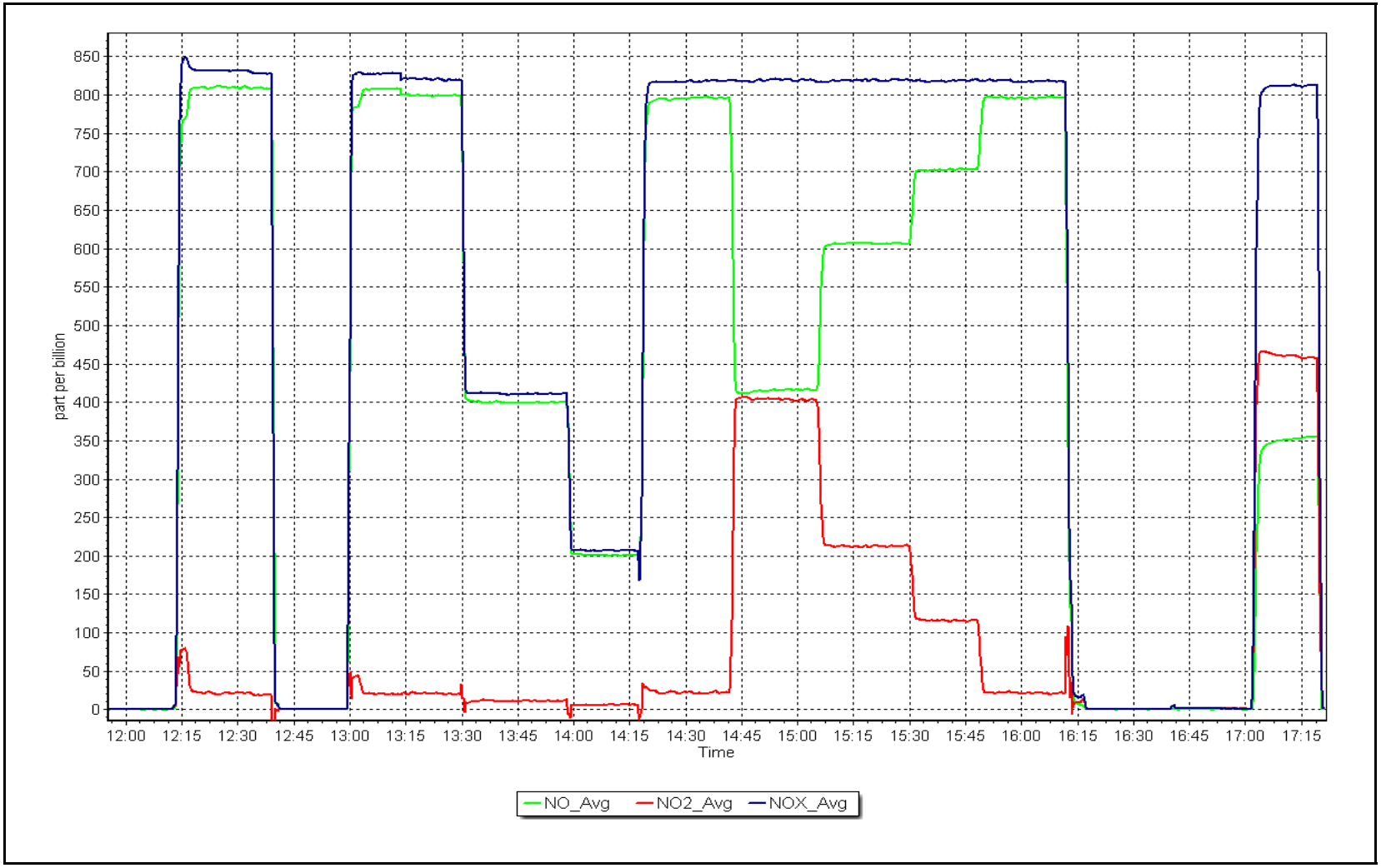
Calibration Date:	December 21, 2023	Previous Calibration:	November 30, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:45	End Time (MST):	17:21
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.3	----	Correlation Coefficient	0.999983	≥0.995
400.2	403.0	0.9930			
209.7	212.7	0.9858	Slope	1.005966	0.90 - 1.10
113.5	115.5	0.9826			
			Intercept	0.956250	+/-20



NO_X Calibration Plot Date: December 21, 2023 Location: Stony Mountain



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS18
Calibration Date:	December 12, 2023	Last Cal Date:	November 23, 2023
Start time (MST):	11:50	End time (MST):	14:40
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:	1.001400	1.002257	Backgd or Offset:	2.4	2.4
Calibration intercept:	-0.220000	-1.420000	Coeff or Slope:	0.978	0.978

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	-1.3	----
as found span	4888	1141.9	400.0	399.7	1.001
as found 2nd point					
as found 3rd point					
calibrator zero	5000	NA	0.0	-1.0	----
high point	4888	1138.1	400.0	399.5	1.001
second point	4888	884.5	200.0	199.4	1.003
third point	4888	741.4	100.0	98.0	1.020
as left zero	5000	NA	0.0	-1.4	----
as left span	4812	1097.9	400.0	402.2	0.995
				Average Correction Factor	1.008

Baseline Corr As found:	401.0	Previous response	400.3	*% change	0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments performed.

Calibration Performed By: Kelly Baragar

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

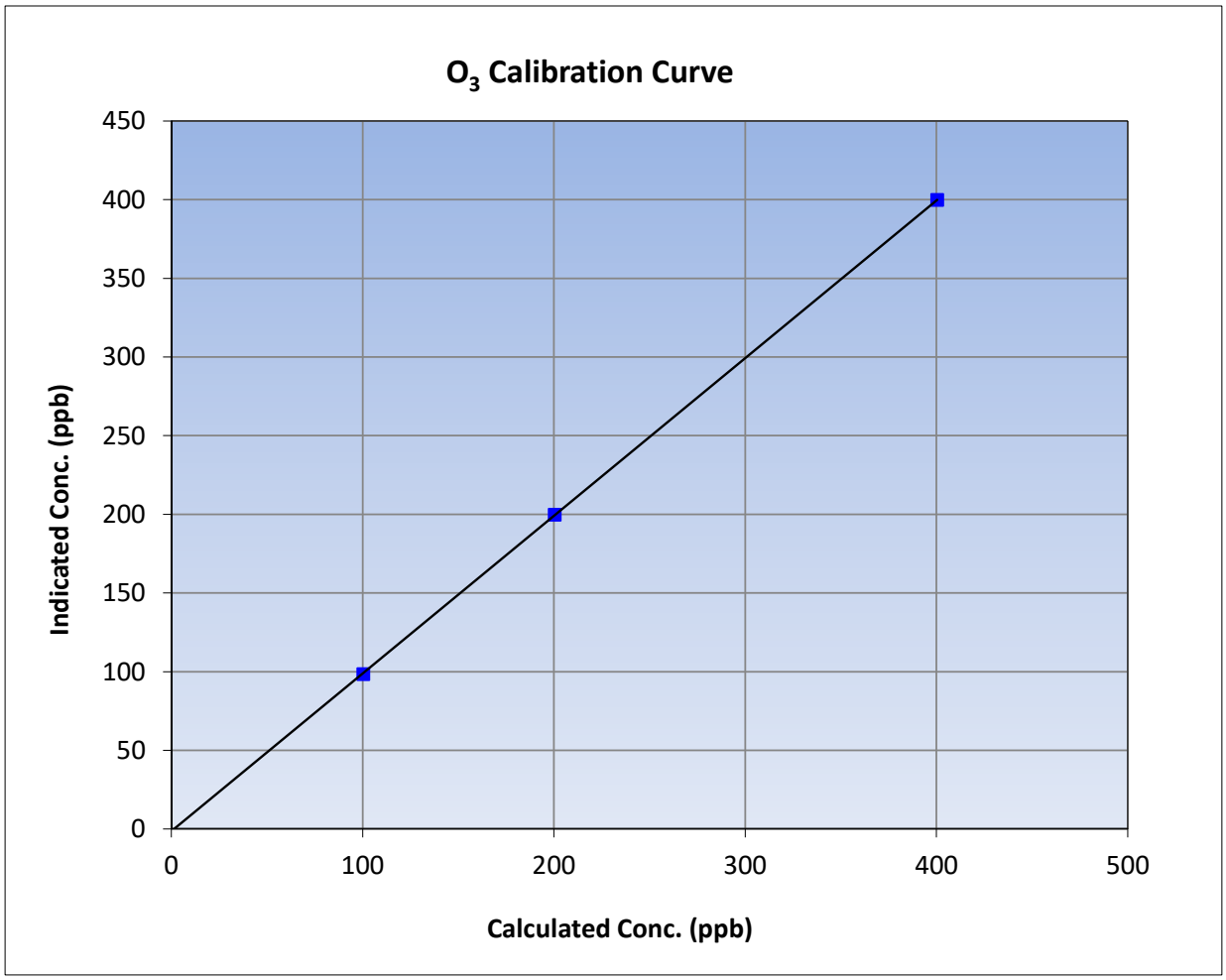
Station Information

Calibration Date:	December 12, 2023	Previous Calibration:	November 23, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	11:50	End Time (MST):	14:40
Analyzer make:	API T400	Analyzer serial #:	825

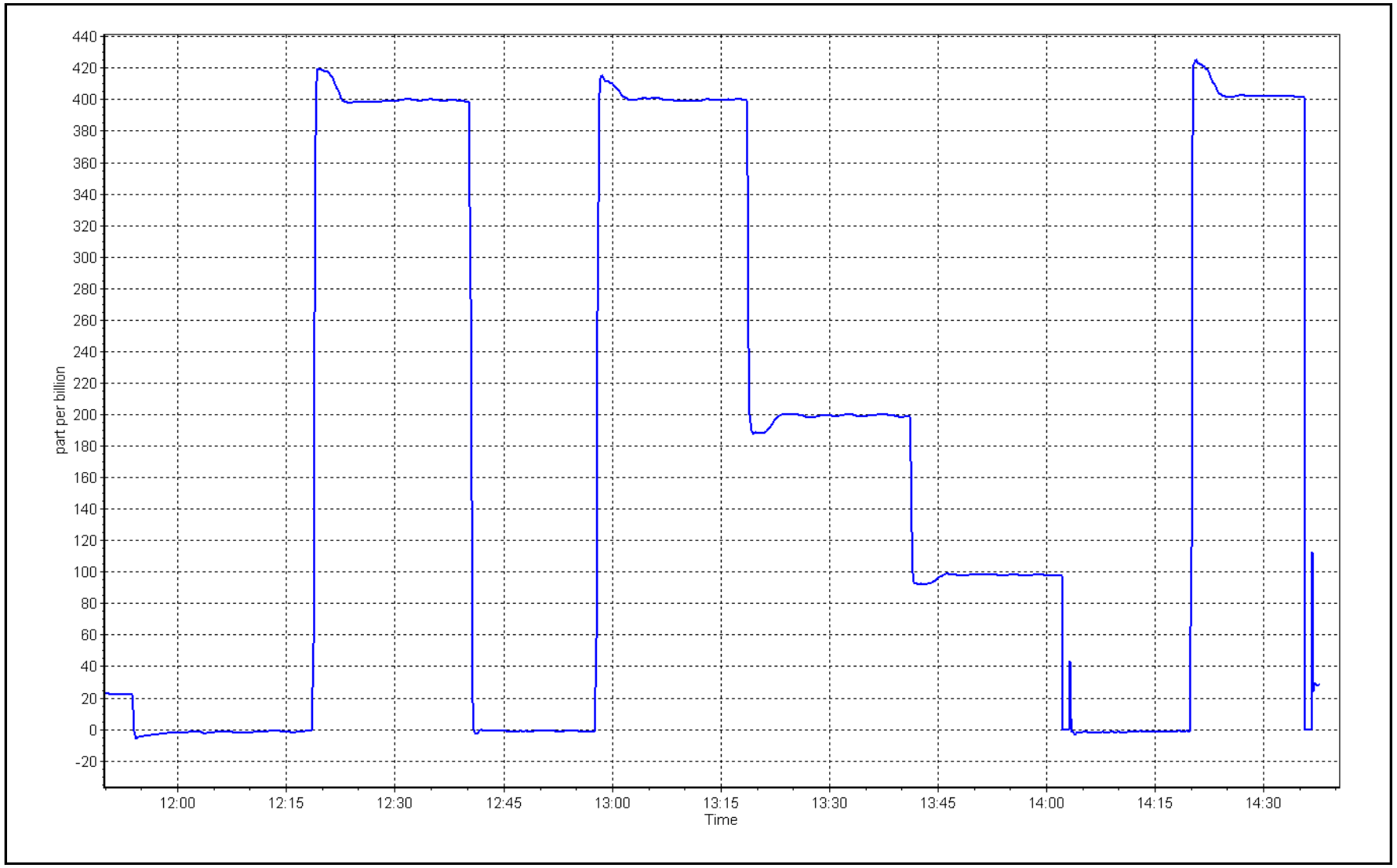
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-1.0	----
400.0	399.5	1.0013
200.0	199.4	1.0030
100.0	98.0	1.0204

Statistical Evaluation		Limits
Correlation Coefficient	0.999989	≥0.995
Slope	1.002257	0.90 - 1.10
Intercept	-1.420000	+/- 5



O_3 Calibration Plot Date: December 12, 2023 Location: Stony Mountain



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	December 20, 2023	Last Cal Date:	November 30, 2023
Start time (MST):	12:30	End time (MST):	13:25
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 (^{o}C)	-5.1	-5.5	-5.1	☐	+/- 2 ^{o}C
P (mmHg)	694.1	698.3	694.1	☐	+/- 10 mmHg
flow (LPM)	0.0	4.99	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: December 20, 2023 Last Cal Date: November 30, 2023

PM w/o HEPA: 10.4 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	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: Pump was DOA, pump swapped. No adjustments needed.

Calibration by: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	December 12, 2023	Last Cal Date:	November 8, 2023
Start time (MST):	11:50	End time (MST):	15:06
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 T750		Serial Number:	281
ZAG Make/Model:	Teledyne API T751		Serial Number:	321

Analyzer Information

Analyzer make: API T300 — Analyzer serial #: 3504

Analyzer Range: 0 - 50 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998397	0.992948	Backgd or Offset:	-0.010	-0.010
Calibration intercept:	0.047809	0.219785	Coeff or Slope:	0.906	0.906

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4933	66.7	40.7	40.6	1.003
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	40.7	40.5	1.004
second point	4966	33.3	20.3	20.6	0.986
third point	4983	16.7	10.2	10.4	0.982
as left zero	5000	0.0	0.0	0.1	----
as left span	4933	66.7	40.7	40.9	0.995
				Average Correction Factor	0.991

Baseline Corr As found:	40.50	Prev response:	40.67	*% 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: No adjustments performed.

Calibration Performed By: Kelly Baragar

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

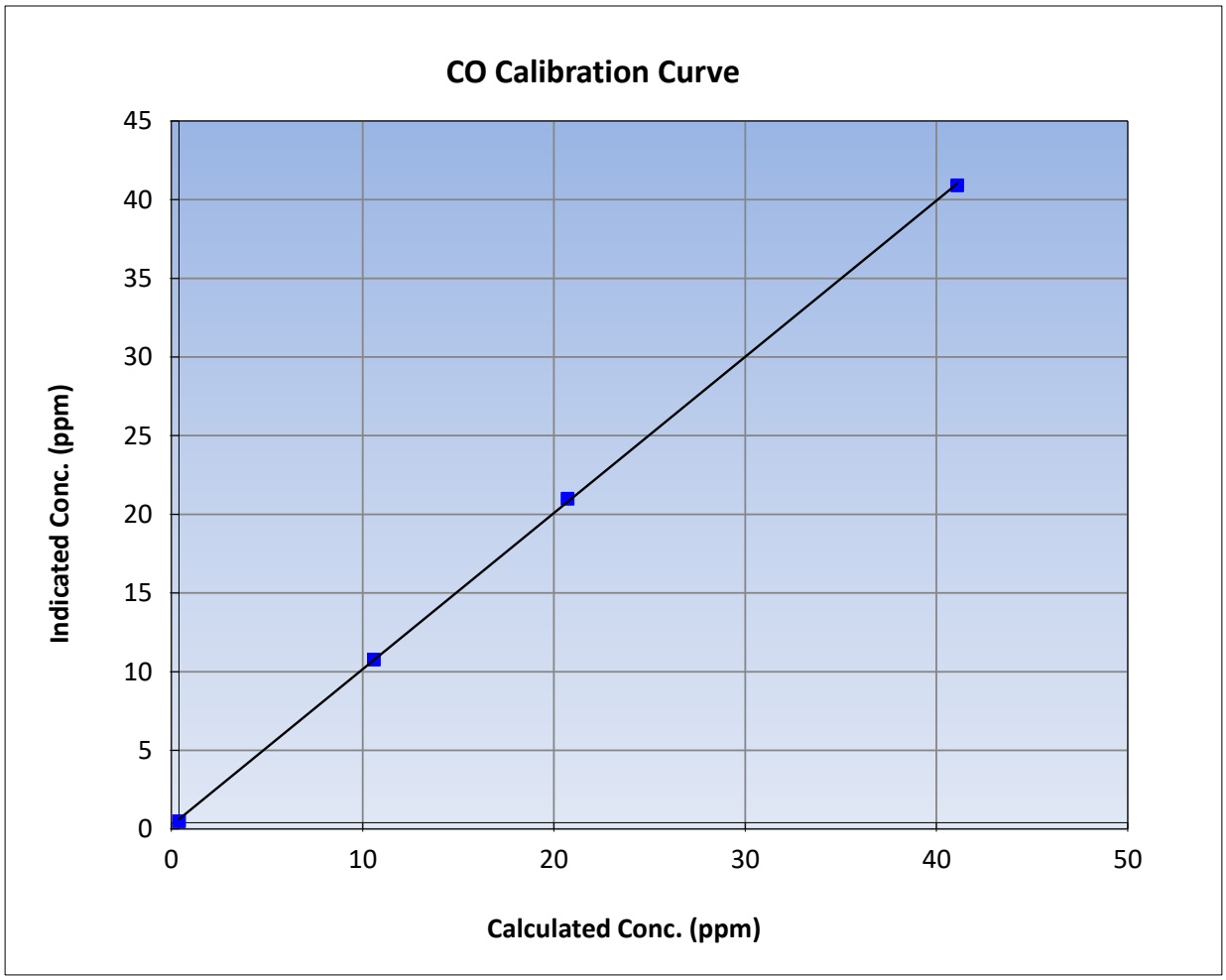
Station Information

Calibration Date:	December 12, 2023	Previous Calibration:	November 8, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:50	End Time (MST):	15:06
Analyzer make:	API T300	Analyzer serial #:	3504

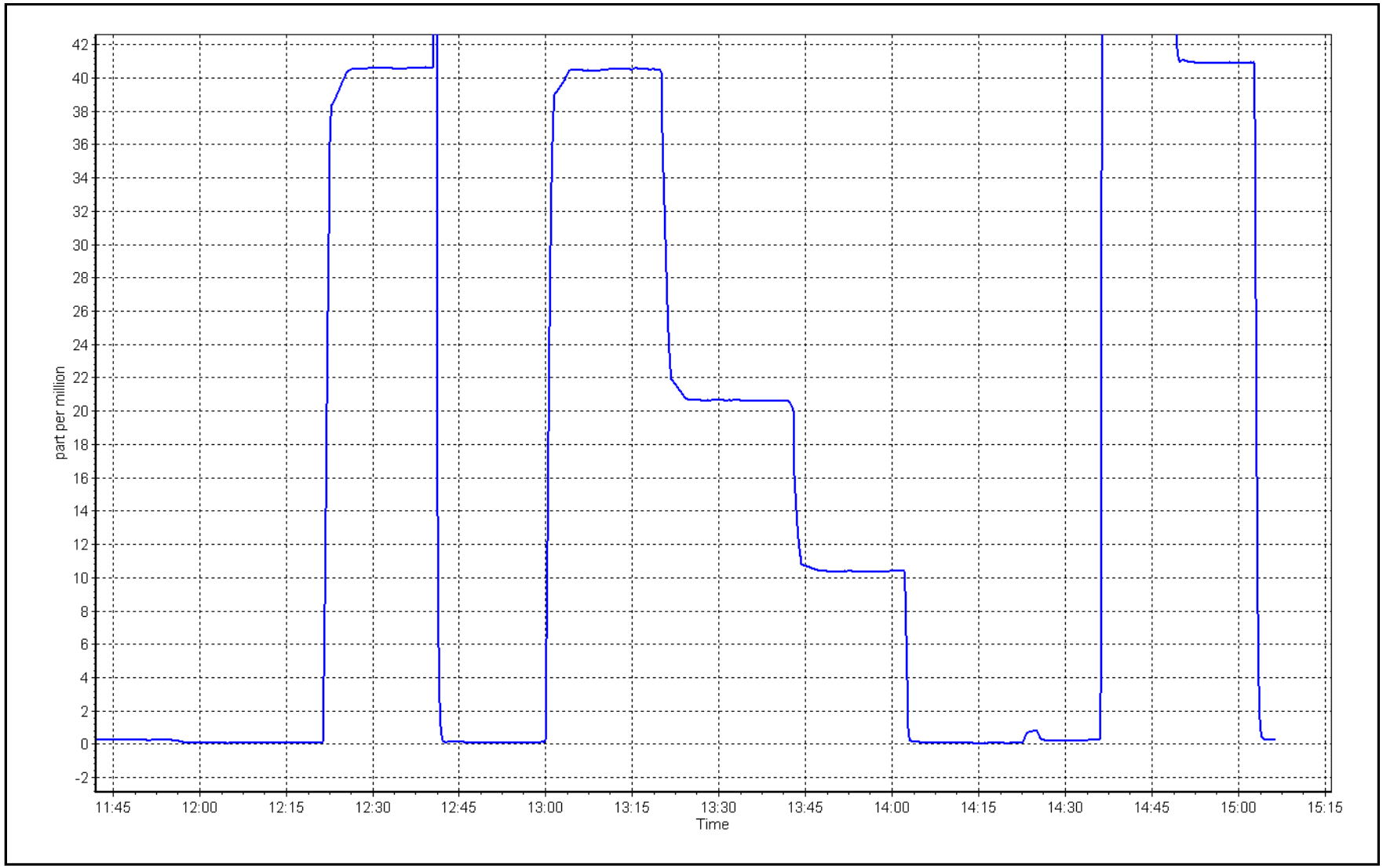
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
40.7	40.5	1.0044
20.3	20.6	0.9862
10.2	10.4	0.9824

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999917	*≥0.995*
Slope	0.992948	*0.90 - 1.10*
Intercept	0.219785	*+/-1.5*



CO Calibration Plot Date: December 12, 2023 Location: Stony Mountain



Wood Buffalo Environmental Association

CO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	December 20, 2023	Last Cal Date:	November 16, 2023
Start time (MST):	10:46	End time (MST):	13:40
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:	1.002631	0.999080	Backgd or Offset:	-0.037	-0.037
Calibration intercept:	-3.040000	-2.620000	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	1604.6	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	0.6	----
high point	2920	80.0	1605.9	1605.0	1.001
second point	2960	40.0	802.9	793.1	1.012
third point	2980	20.0	401.5	398.5	1.007
as left zero	3000	0.0	0.0	0.3	----
as left span	2930	80.0	1600.5	1601.6	0.999
				Average Correction Factor	1.007

Baseline Corr As found:	1604.40	Prev response:	1607.05	*% change:	-0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

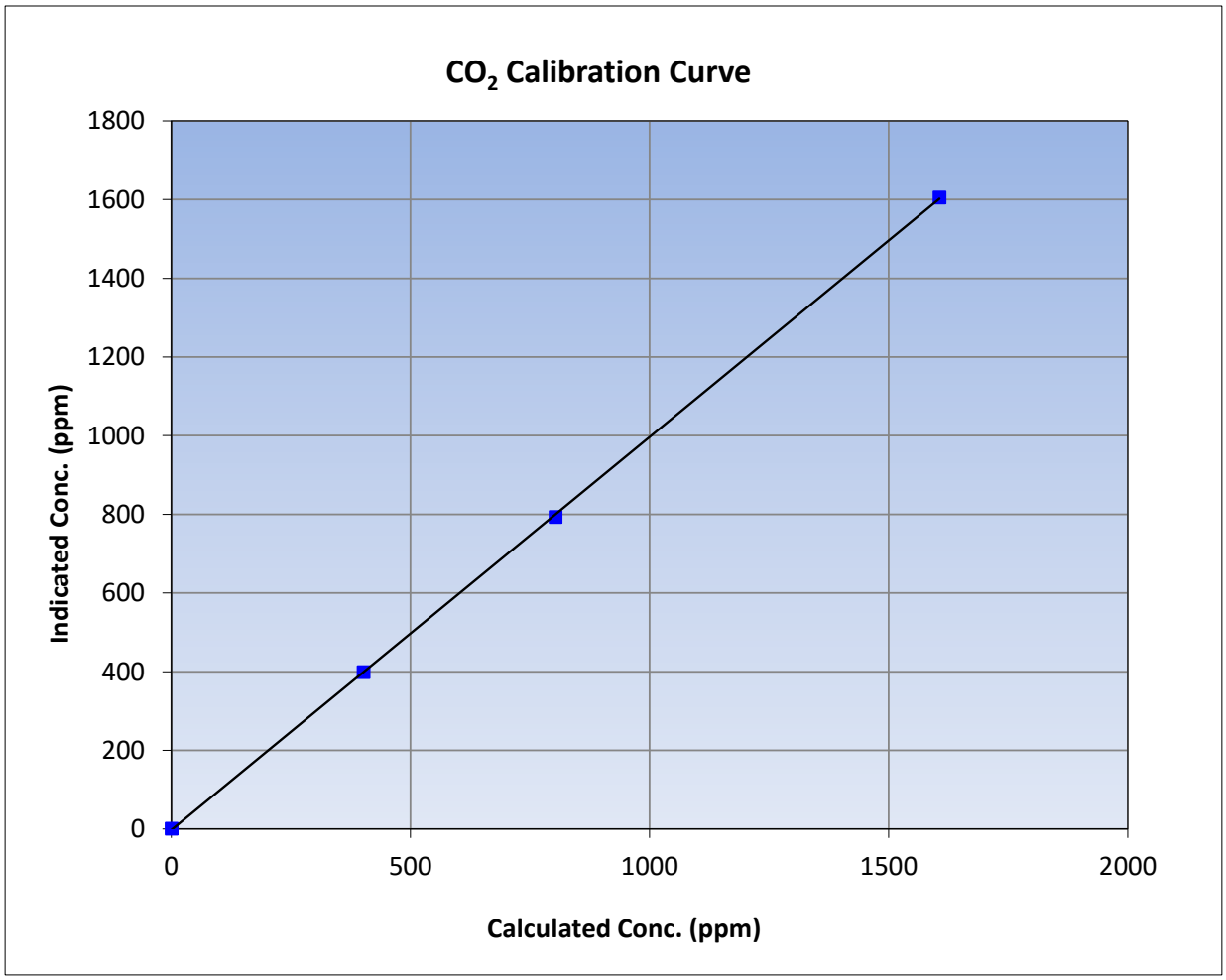
Station Information

Calibration Date	December 20, 2023	Previous Calibration	November 16, 2023
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:46	End Time (MST)	13:40
Analyzer make	API T360	Analyzer serial #	489

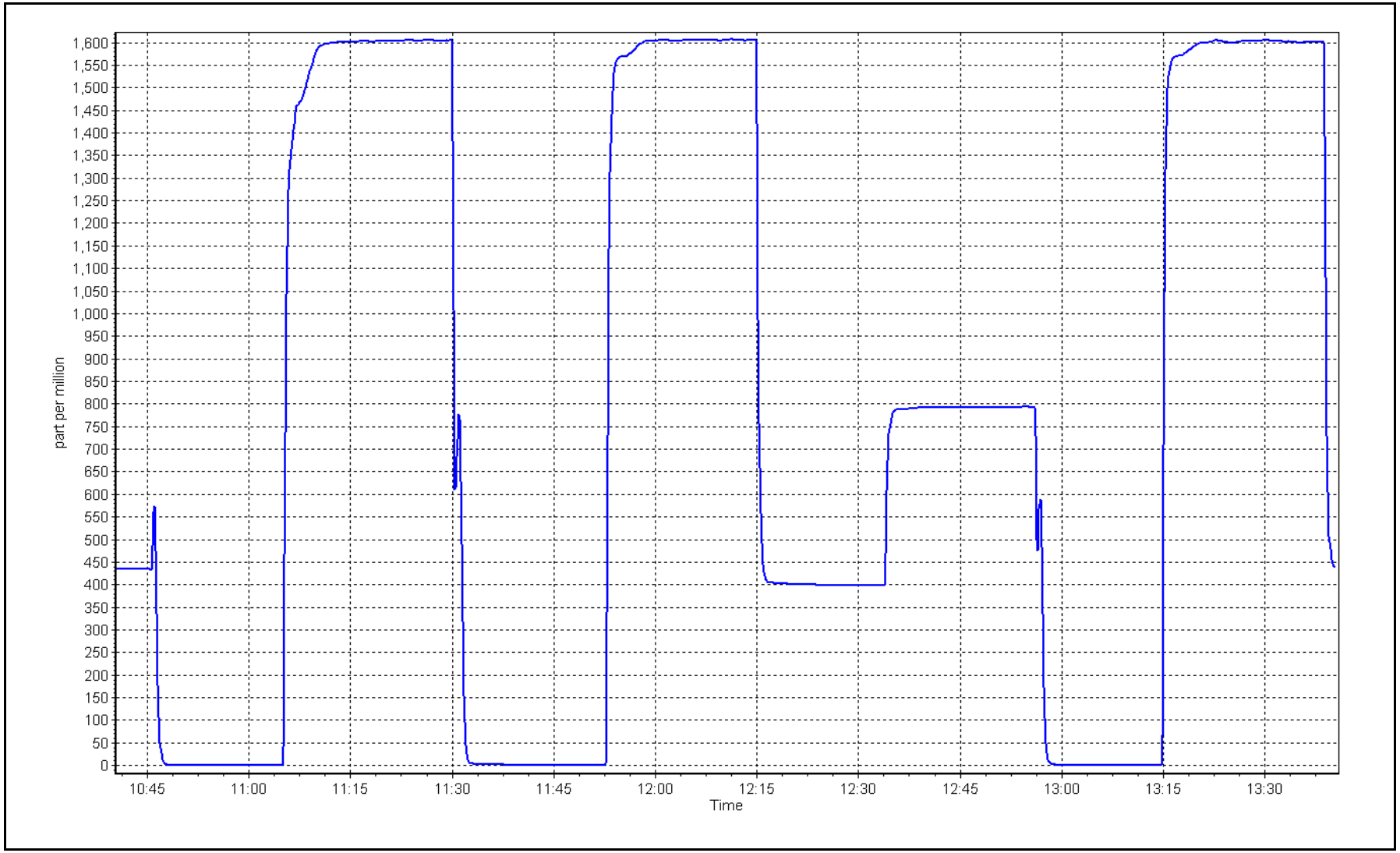
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.6	----
1605.9	1605.0	1.0005
802.9	793.1	1.0124
401.5	398.5	1.0074

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999955	*≥0.995*
Slope	0.999080	*0.90 - 1.10*
Intercept	-2.620000	*+/-10*



CO_2 Calibration Plot Date: December 20, 2023 Location: Stony Mountain



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS19
FIREBAG

DECEMBER 2023

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

January 31, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	December 13, 2023	Last Cal Date:	November 29, 2023
Start time (MST):	11:29	End time (MST):	15:26
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:	1.000607	1.005909	Backgd or Offset:	9.9	10.6
Calibration intercept:	1.477490	-0.303040	Coeff or Slope:	0.975	0.993

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	0.4	----
as found span	4919	81.1	799.5	796.0	1.004
as found 2nd point	4959	40.6	400.3	398.5	1.004
as found 3rd point	4980	20.3	200.1	200.9	0.996
new cylinder response					
calibrator zero	4999	0.0	0.0	-0.1	----
high point	4919	81.1	799.5	804.0	0.994
second point	4959	40.6	400.3	402.2	0.995
third point	4980	20.3	200.1	200.8	0.997
as left zero	4999	0.0	0.0	-0.1	----
as left span	4919	81.1	799.5	804.0	0.994
				Average Correction Factor	0.995

Baseline Corr As found:	795.60	Previous response	801.43	*% change	-0.7%
Baseline Corr 2nd AF pt:	398.10	AF Slope:	0.994545	AF Intercept:	0.899164
Baseline Corr 3rd AF pt:	200.50	AF Correlation:	0.999996		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

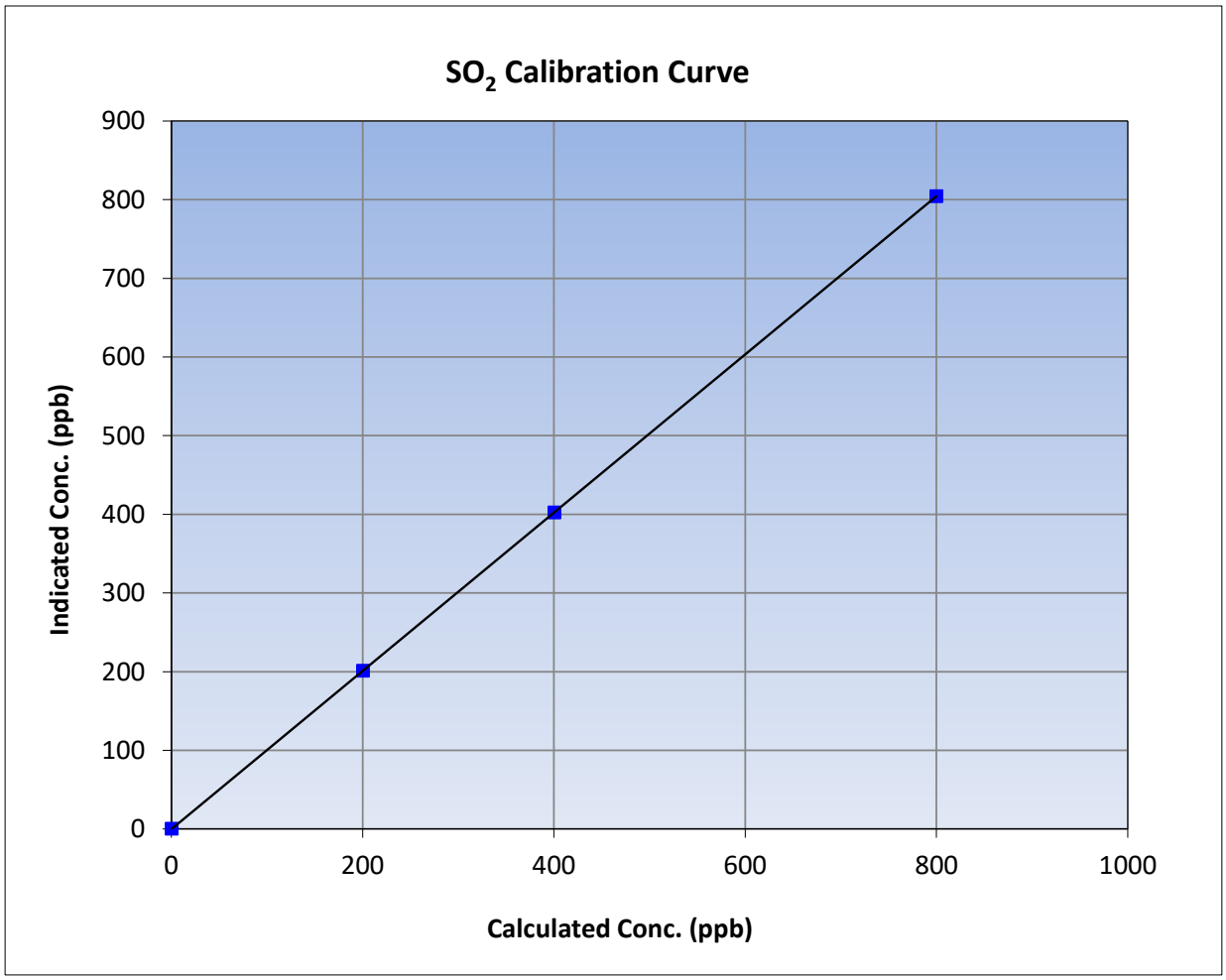
Station Information

Calibration Date:	December 13, 2023	Previous Calibration:	November 29, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	11:29	End Time (MST):	15:26
Analyzer make:	Thermo 43i	Analyzer serial #:	1410661308

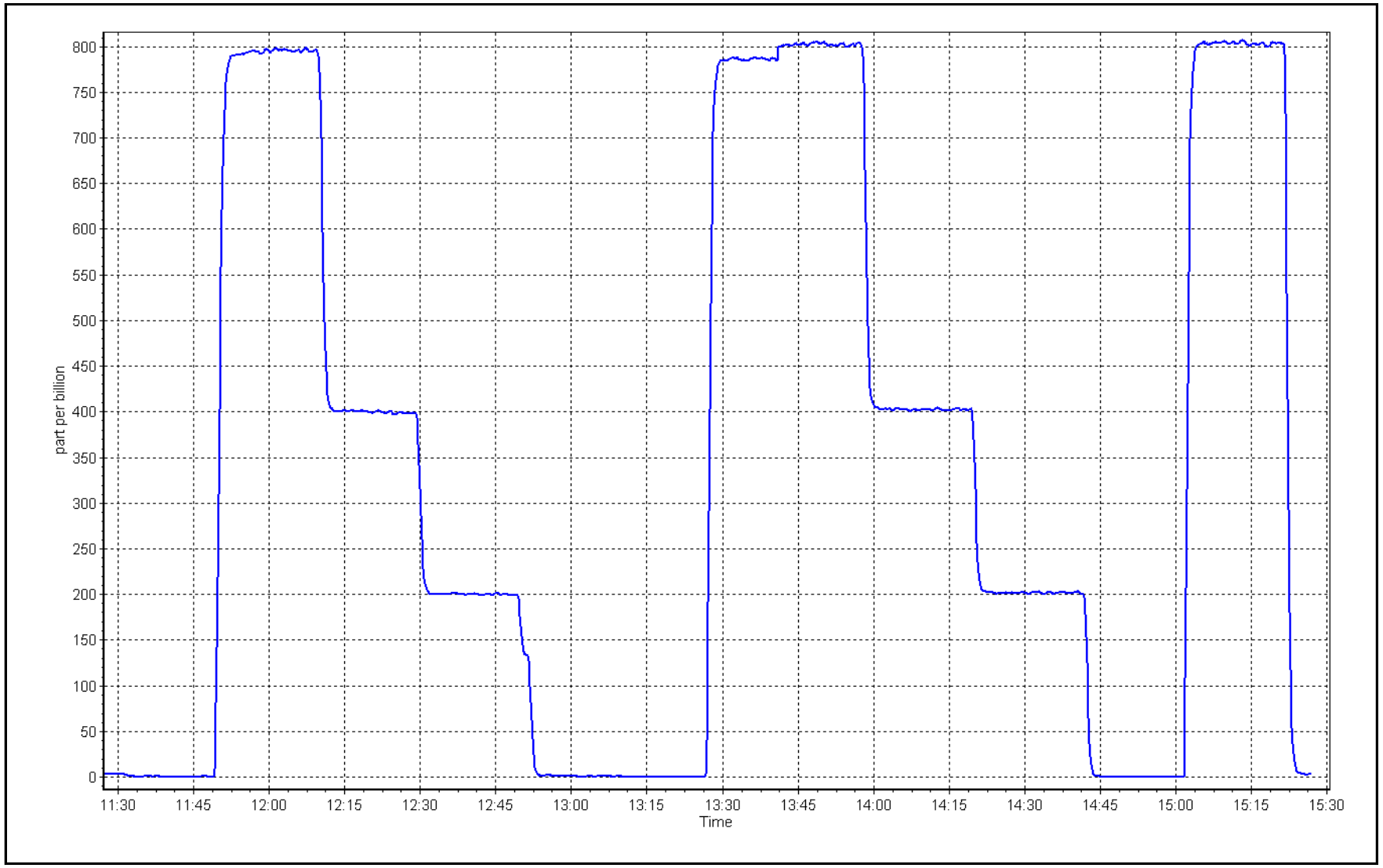
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
799.5	804.0	0.9944
400.3	402.2	0.9952
200.1	200.8	0.9965

Statistical Evaluation		*Limits*
Correlation Coefficient	1.000000	*≥0.995*
Slope	1.005909	*0.90 - 1.10*
Intercept	-0.303040	*+/-30*



SO2 Calibration Plot Date: December 13, 2023 Location: Firebag



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Firebag	Station number:	AMS19
Calibration Date:	December 11, 2023	Last Cal Date:	November 21, 2023
Start time (MST):	10:48	End time (MST):	16:40
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.114	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517427			
Removed Cal Gas Conc:	5.114	ppm	Rem Gas Exp Date:	n/a
Removed Gas Cyl #:	n/a		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	1607
ZAG Make/Model:	Teledyne API T701		Serial Number:	1118

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1151680032	
Converter make:	Global		Converter serial #:	2022-222	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.995764	1.000196	Backgd or Offset:	2.62	2.82
Calibration intercept:	0.018558	-0.061587	Coeff or Slope:	1.164	1.176

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	78.2	80.0	80.3	0.997
as found 2nd point	4961	39.1	40.0	40.3	0.995
as found 3rd point	4980	19.6	20.0	20.2	0.997
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4922	78.2	80.0	79.9	1.001
second point	4961	39.1	40.0	40.0	1.000
third point	4980	19.6	20.0	20.0	1.002
as left zero	5000	0.0	0.0	0.1	----
as left span	4922	78.2	80.0	78.9	1.014
SO2 Scrubber Check	4922	78.3	800.2	0.1	----
Date of last scrubber change:		January 18, 2023		Ave Corr Factor	1.001
Date of last converter efficiency test:		n/a			efficiency

Baseline Corr As found:	80.2	Prev response:	79.66	*% change:	0.7%
Baseline Corr 2nd AF pt:	40.2	AF Slope:	1.002911	AF Intercept:	0.118373
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999998		

* = > +/-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

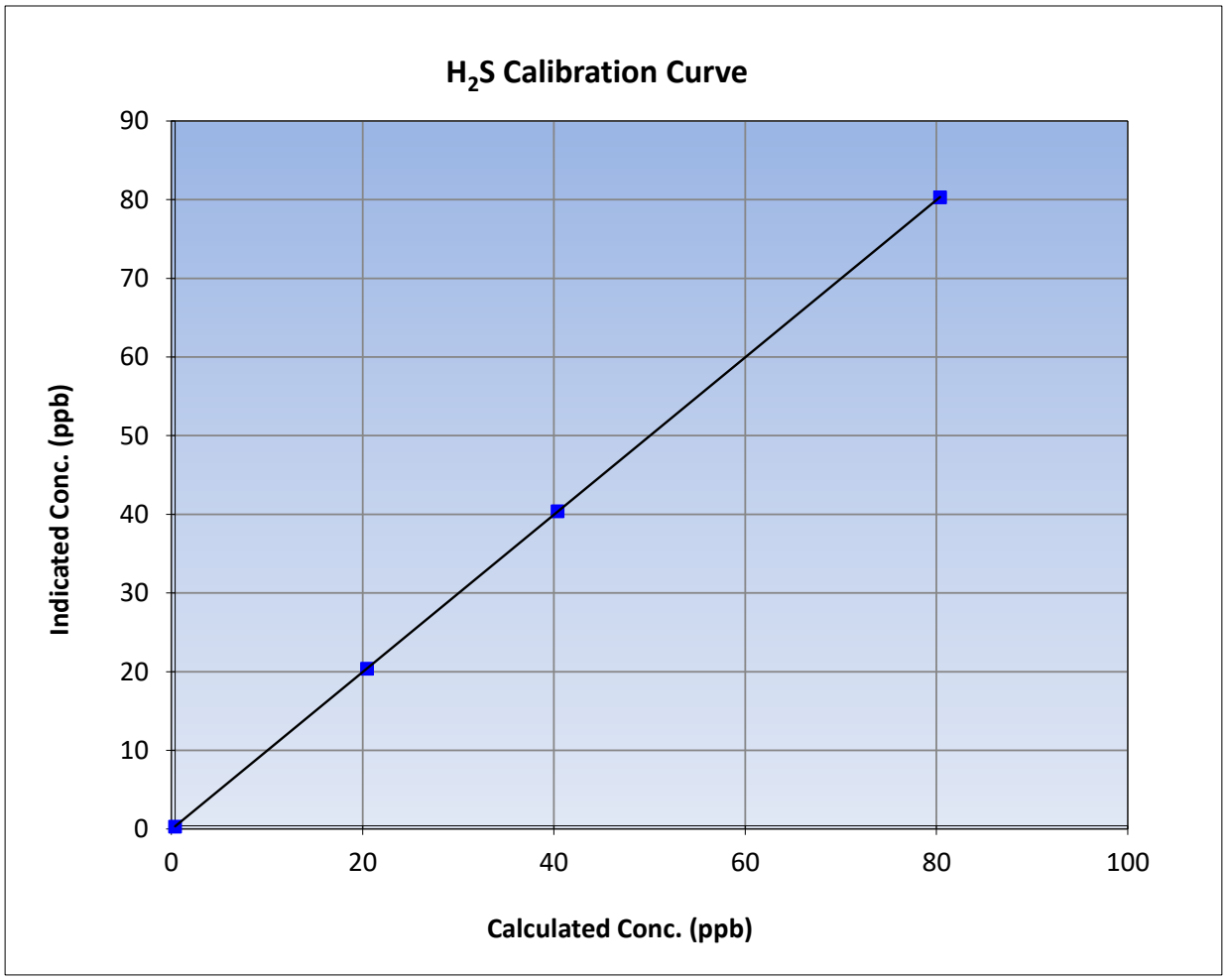
Station Information

Calibration Date:	December 11, 2023	Previous Calibration:	November 21, 2023
Station Name:	Firebag	Station Number:	AMS19
Start Time (MST):	10:48	End Time (MST):	16:40
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1151680032

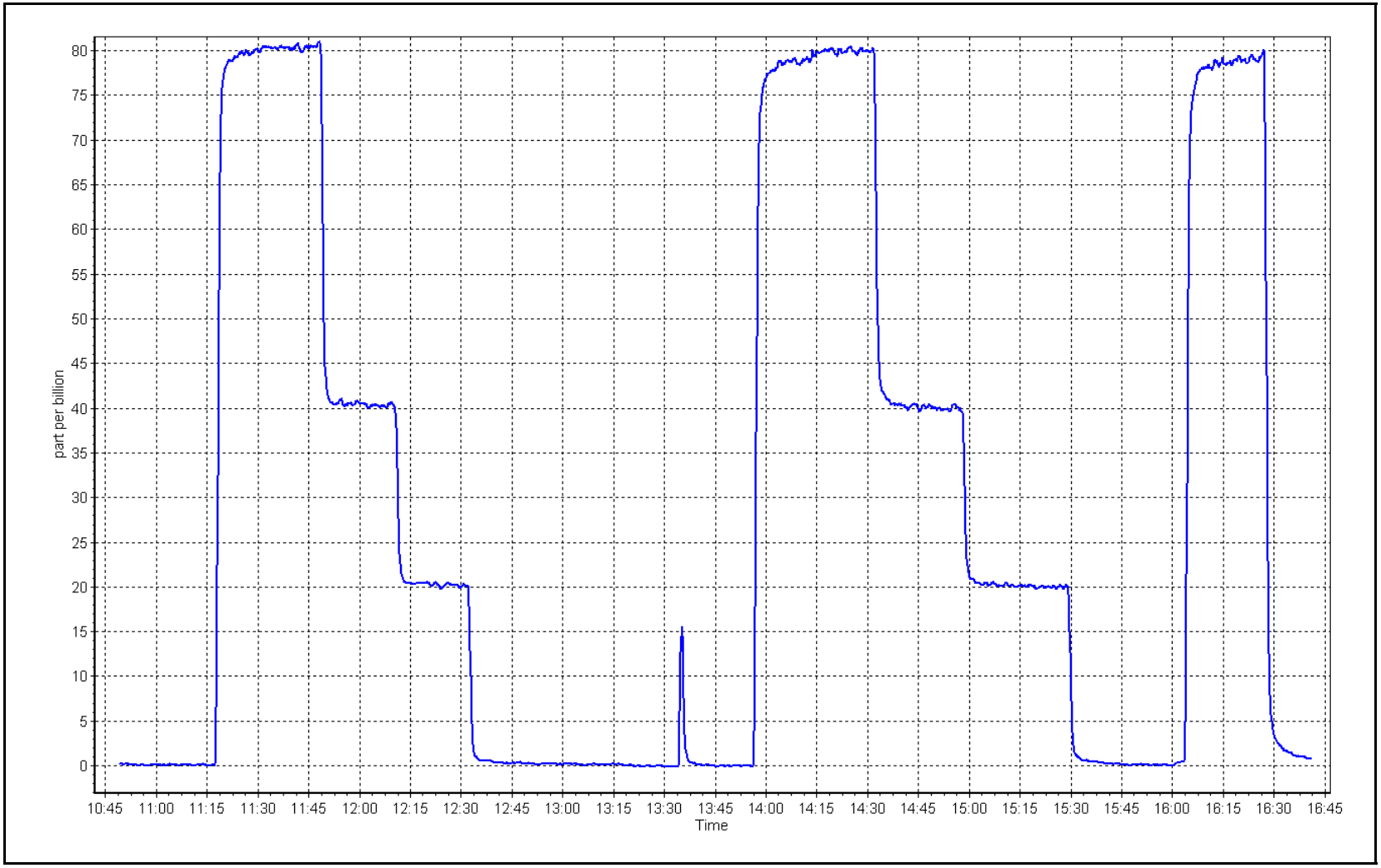
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	79.9	1.0010
40.0	40.0	0.9998
20.0	20.0	1.0024

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.000196	*0.90 - 1.10*
Intercept	-0.061587	*+/-3*



H_2S Calibration Plot Date: December 11, 2023 Location: Firebag



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	December 13, 2023	Last Cal Date:	November 29, 2023
Start time (MST):	11:29	End time (MST):	15:26
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:	1.002039	0.998011	Background:	2.04	2.04
Calibration intercept:	-0.092137	0.042876	Coefficient:	3.793	3.793

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	0.05	----
as found span	4919	81.1	17.31	17.48	0.990
as found 2nd point	4959	40.6	8.66	8.73	0.992
as found 3rd point	4980	20.3	4.33	4.37	0.991
new cylinder response					
calibrator zero	4999	0.0	0.00	0.08	----
high point	4919	81.1	17.31	17.35	0.997
second point	4959	40.6	8.66	8.62	1.005
third point	4980	20.3	4.33	4.36	0.993
as left zero	5000	0.0	0.00	0.08	----
as left span	4919	81.1	17.31	17.42	0.993
				Average Correction Factor	0.999

Baseline Corr As found:	17.43	Previous response	17.25	*% change	1.0%
Baseline Corr 2nd AF pt:	8.68	AF Slope:	1.007749	AF Intercept:	0.023612
Baseline Corr 3rd AF pt:	4.32	AF Correlation:	0.999988		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

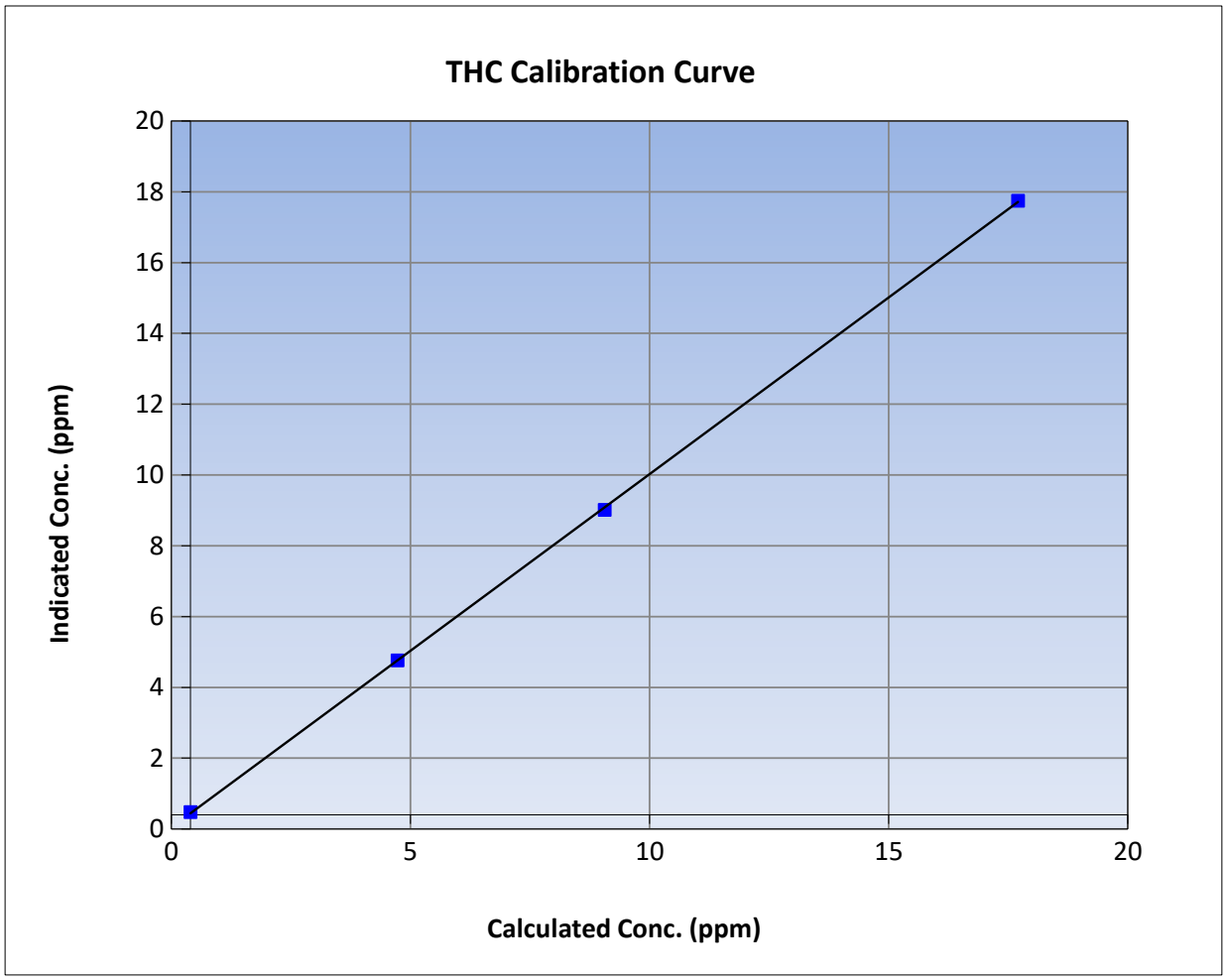
Station Information

Calibration Date:	December 13, 2023	Previous Calibration:	November 29, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	11:29	End Time (MST):	15:26
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1336160089

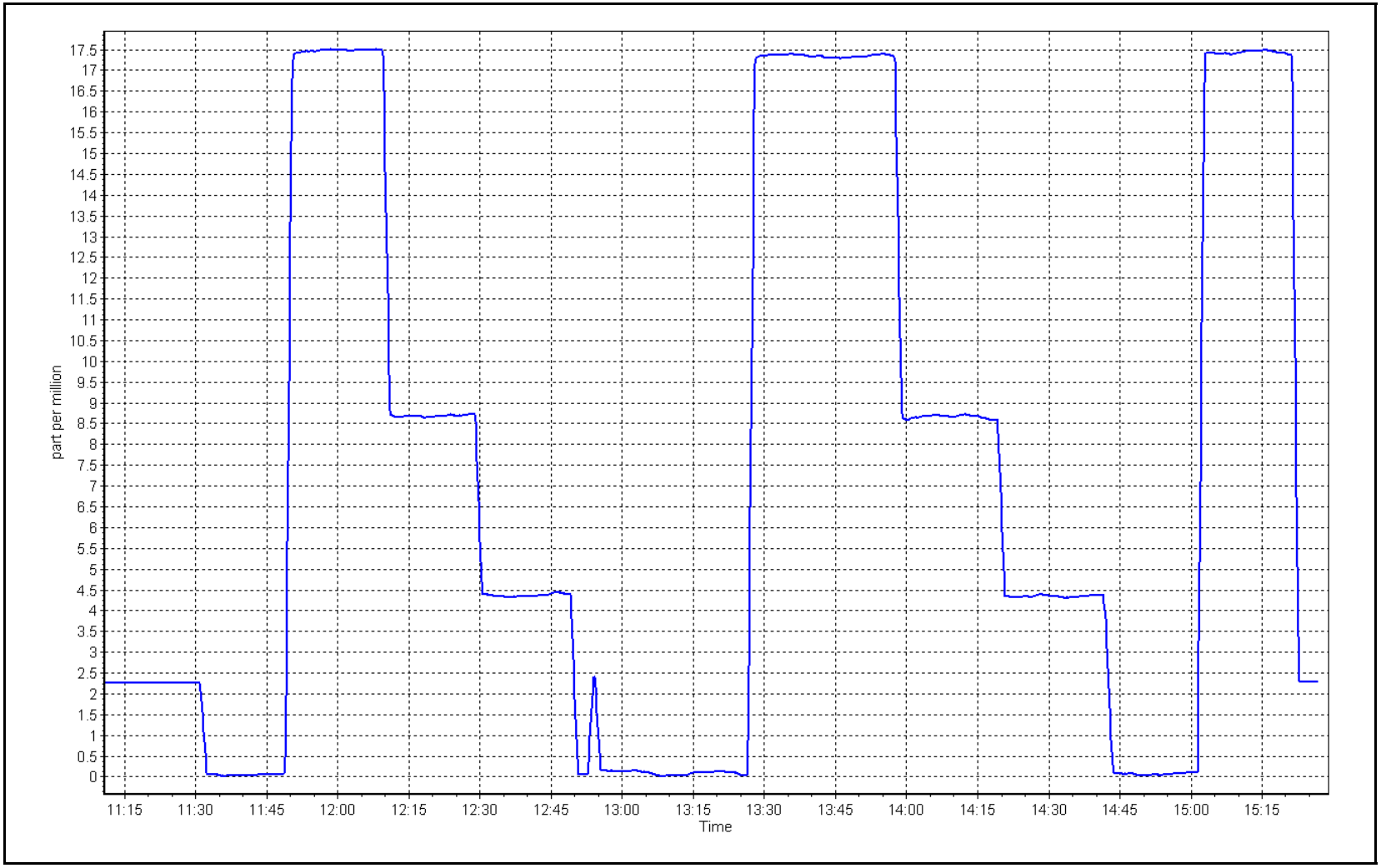
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.08	----
17.31	17.35	0.9974
8.66	8.62	1.0051
4.33	4.36	0.9935

Statistical Evaluation		Limits
Correlation Coefficient	0.999952	≥0.995
Slope	0.998011	0.90 - 1.10
Intercept	0.042876	+/-1.5



THC Calibration Plot Date: December 13, 2023 Location: Firebag



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	December 12, 2023	Last Cal Date:	November 17, 2023
Start time (MST):	10:42	End time (MST):	16:23
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 #:	T2Y1K63		Removed Gas Exp Date:	November 30, 2023	
Removed Gas NOX Conc:	51.12	ppm	Removed Gas NO Conc:	49.40	ppm
NOX gas Diff:	0.5%		NO gas Diff:	0.6%	
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:	1.091	1.089	NO bkgnd or offset:	7.6	7.6
NOX coeff or slope:	0.992	0.993	NOX bkgnd or offset:	7.7	7.7
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	212.4	215.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.998263	1.005184
NO_X Cal Offset:	0.656194	0.260458
NO Cal Slope:	1.002153	1.007037
NO Cal Offset:	0.109347	-0.099613
NO_2 Cal Slope:	1.003810	0.999988
NO_2 Cal Offset:	-1.268713	-1.617748

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	-0.4	-0.3	-0.1	----	----
as found span	4919	81.0	828.1	800.3	27.9	828.0	801.0	26.5	1.0002	0.9991
as found 2nd										
as found 3rd										
new cyl resp	4919	81.5	797.1	793.8	3.3	800.8	799.3	1.6	0.9953	0.9931
calibrator zero	4999	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1	----	----
high point	4919	81.5	797.1	793.8	3.3	801.0	799.1	1.7	0.9951	0.9934
second point	4959	40.7	398.0	396.4	1.6	401.3	399.7	1.5	0.9919	0.9918
third point	4980	20.4	199.5	198.7	0.8	200.8	199.6	1.1	0.9936	0.9955
as left zero	4999	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
as left span	4919	81.0	792.2	360.5	431.7	798.2	366.5	431.7	0.9925	0.9837
								Average Correction Factor	0.9935	0.9935

Corrected As found	NO_X = 828.4 ppb	NO = 801.3 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.1%
Previous Response	NO_X = 827.4 ppb	NO = 802.1 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)	793.9	365.5	431.7	430.6	1.0025	99.8%
2nd GPT point (200 ppb O3)	793.9	578.7	218.5	216.7	1.0081	99.2%
3rd GPT point (100 ppb O3)	793.9	687.7	109.5	105.9	1.0336	96.7%
				Average Correction Factor	1.0147	98.6%

Notes: Replaced NO cylinder #T2Y1K63 with #DT0044018. Adjusted span. Second high GPT point used for GPT calibration formulas.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

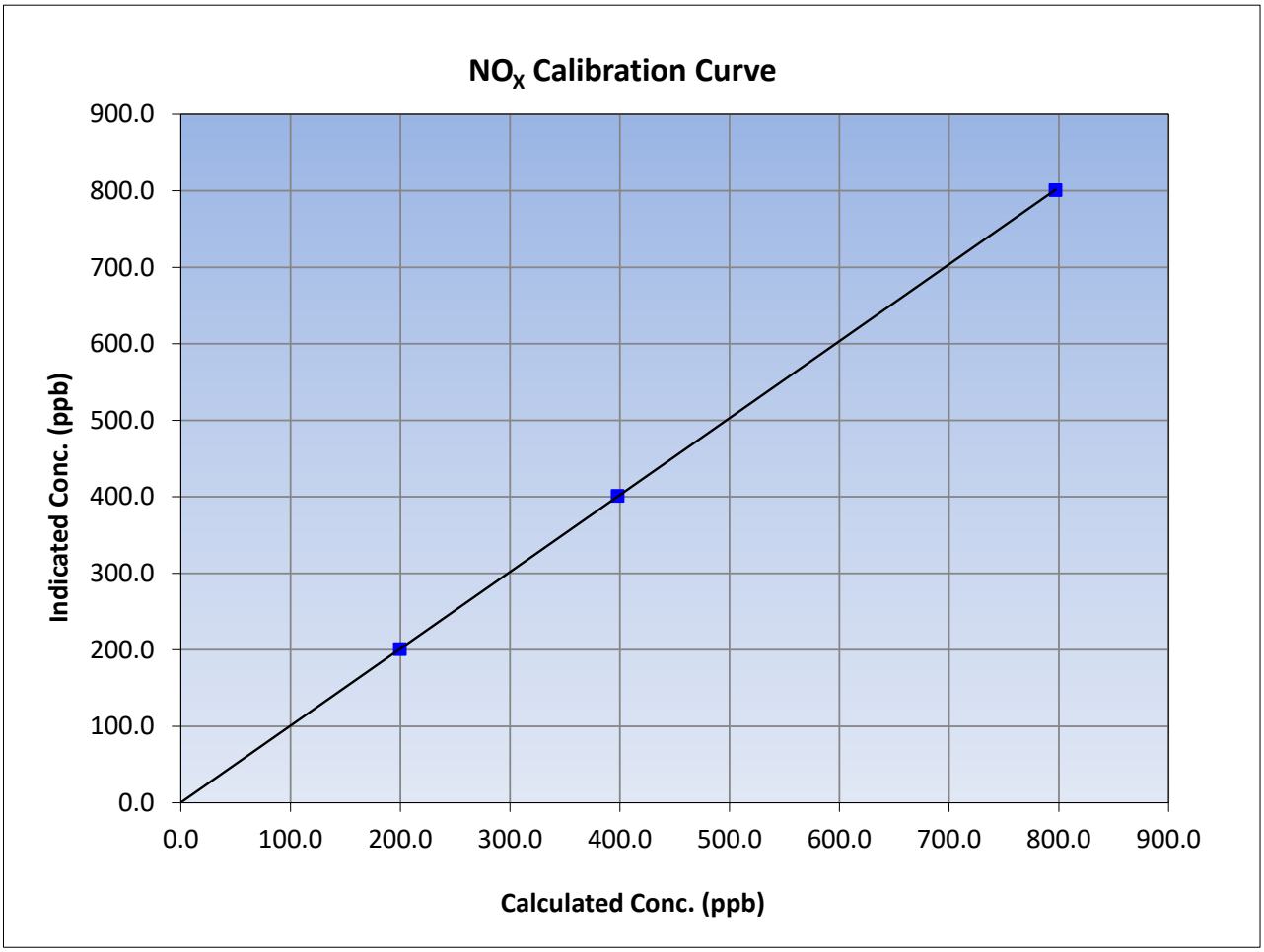
Version-04-2020

Station Information

Calibration Date:	December 12, 2023	Previous Calibration:	November 17, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:42	End Time (MST):	16:23
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999996	≥0.995
797.1	801.0	0.9951			
398.0	401.3	0.9919	Slope	1.005184	0.90 - 1.10
199.5	200.8	0.9936			
			Intercept	0.260458	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

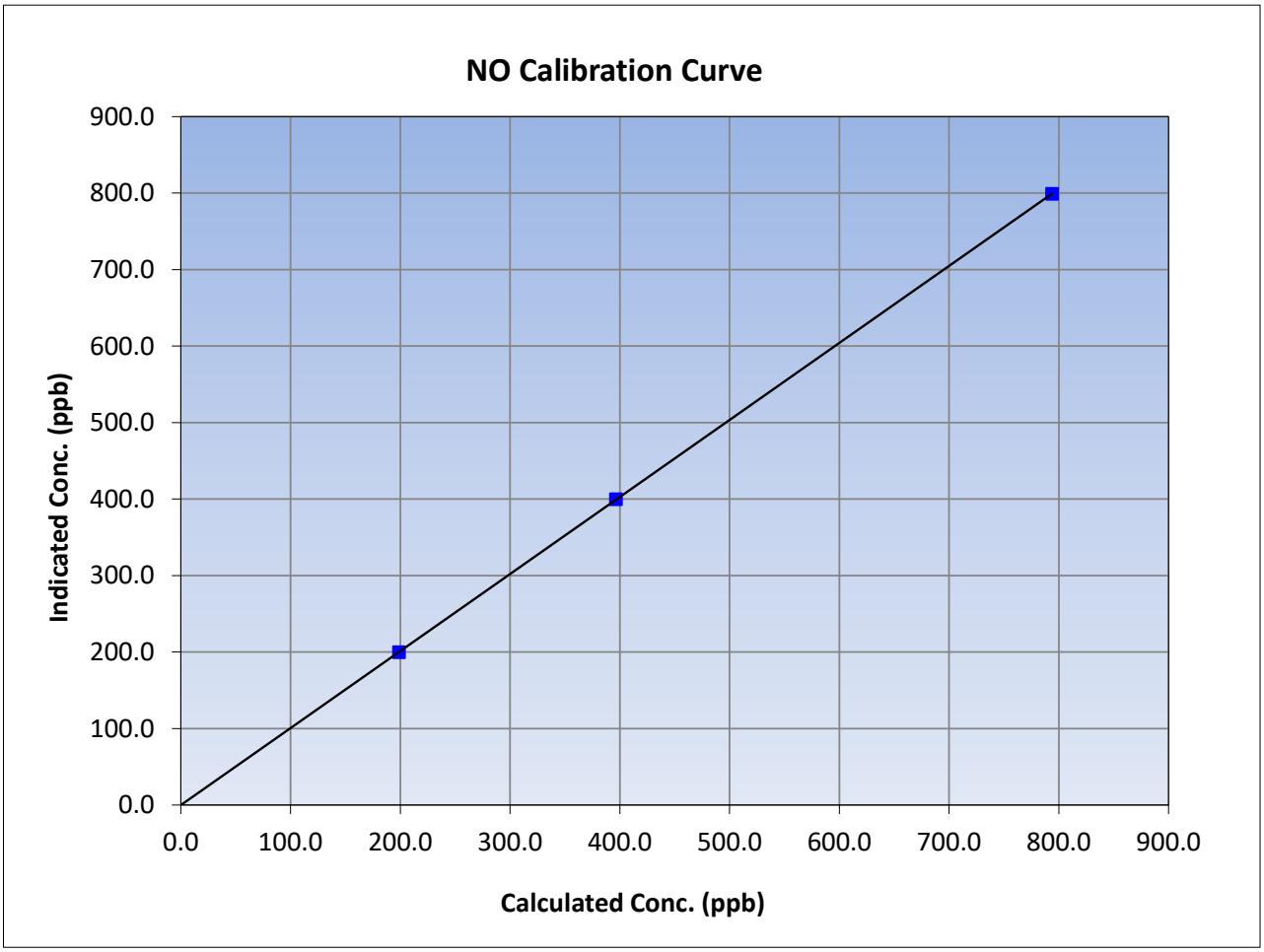
Version-04-2020

Station Information

Calibration Date:	December 12, 2023	Previous Calibration:	November 17, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:42	End Time (MST):	16:23
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
793.8	799.1	0.9934			
396.4	399.7	0.9918	Slope	1.007037	0.90 - 1.10
198.7	199.6	0.9955			
			Intercept	-0.099613	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

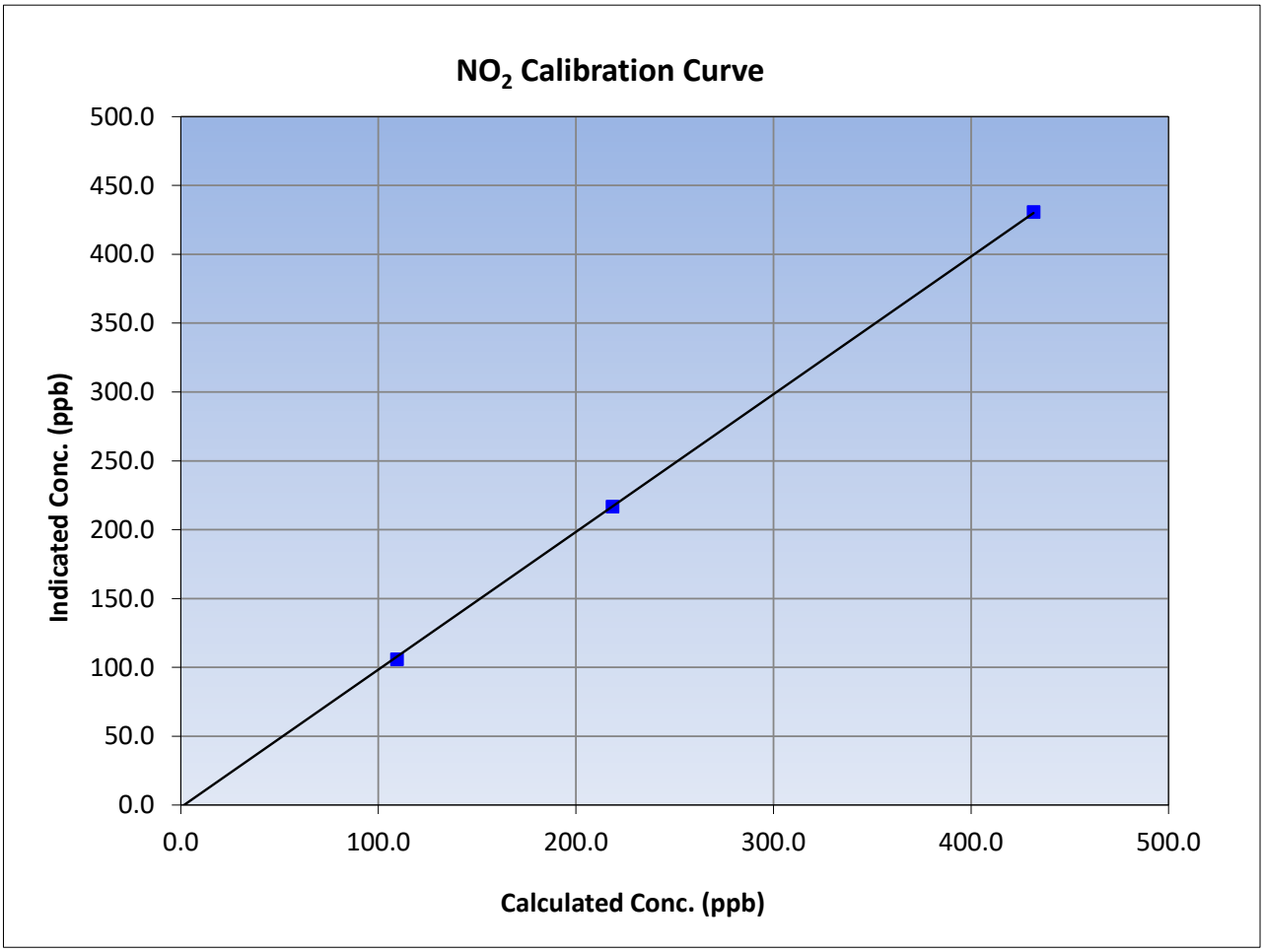
Version-04-2020

Station Information

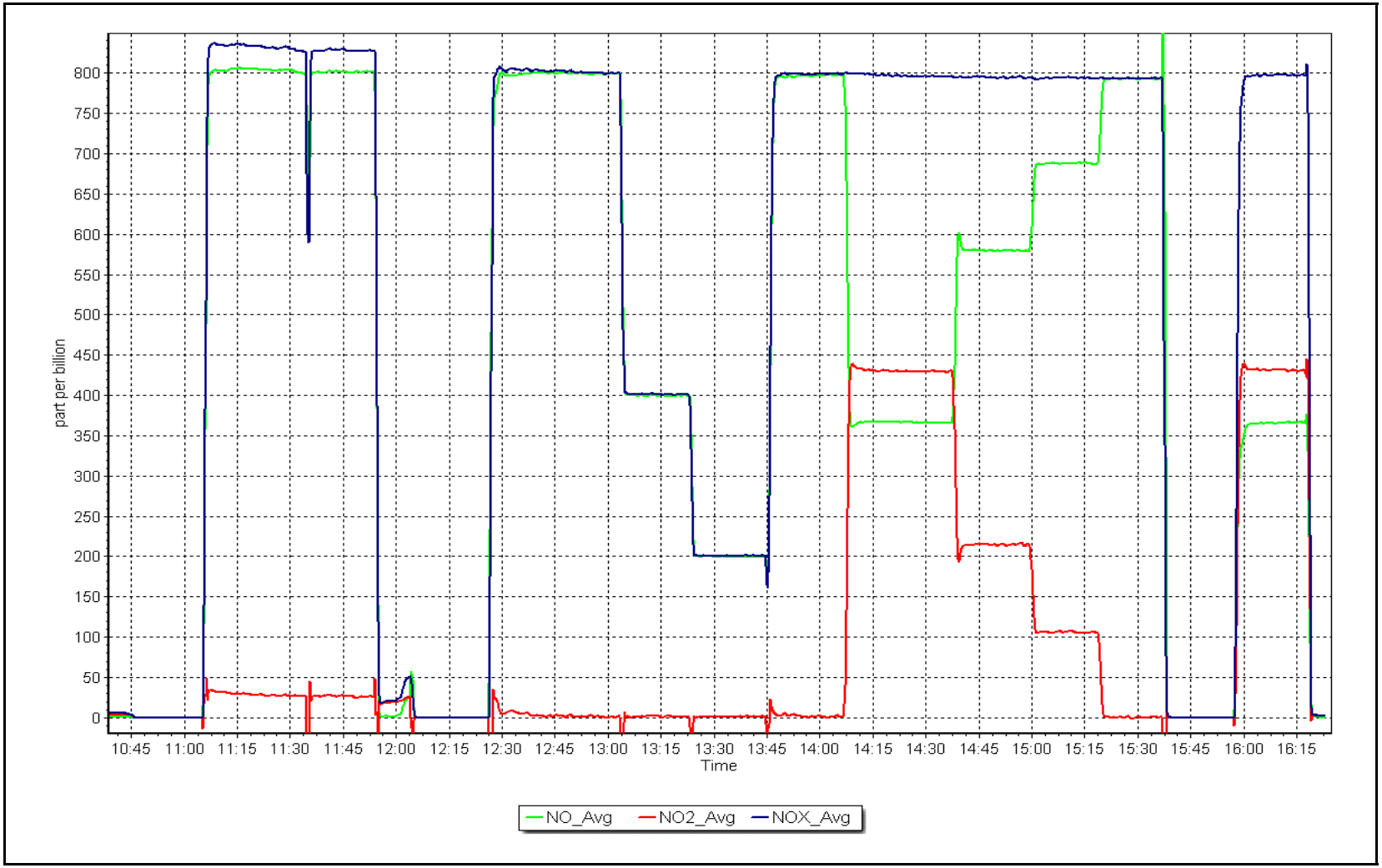
Calibration Date:	December 12, 2023	Previous Calibration:	November 17, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:42	End Time (MST):	16:23
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999937	≥0.995
431.7	430.6	1.0025			
218.5	216.7	1.0081	Slope	0.999988	0.90 - 1.10
109.5	105.9	1.0336			
			Intercept	-1.617748	+/-20



NO_X Calibration Plot Date: December 12, 2023 Location: Firebag



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS20
MACKAY RIVER

DECEMBER 2023

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

January 31, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	December 4, 2023	Last Cal Date:	November 17, 2023
Start time (MST):	8:55	End time (MST):	11:41
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:	0.990612	0.991883	Backgd or Offset:	18.7	18.7
Calibration intercept:	2.671171	3.051032	Coeff or Slope:	0.945	0.945

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	----
as found span	4919	81.3	800.3	798.0	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	----
high point	4919	81.3	800.3	795.8	1.006
second point	4959	40.7	400.7	400.9	0.999
third point	4980	20.3	199.8	204.5	0.977
as left zero	5000	0.0	0.0	0.4	----
as left span	4919	81.3	800.3	793.8	1.008
				Average Correction Factor	0.994

Baseline Corr As found:	798.00	Previous response	795.43	*% 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 or maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

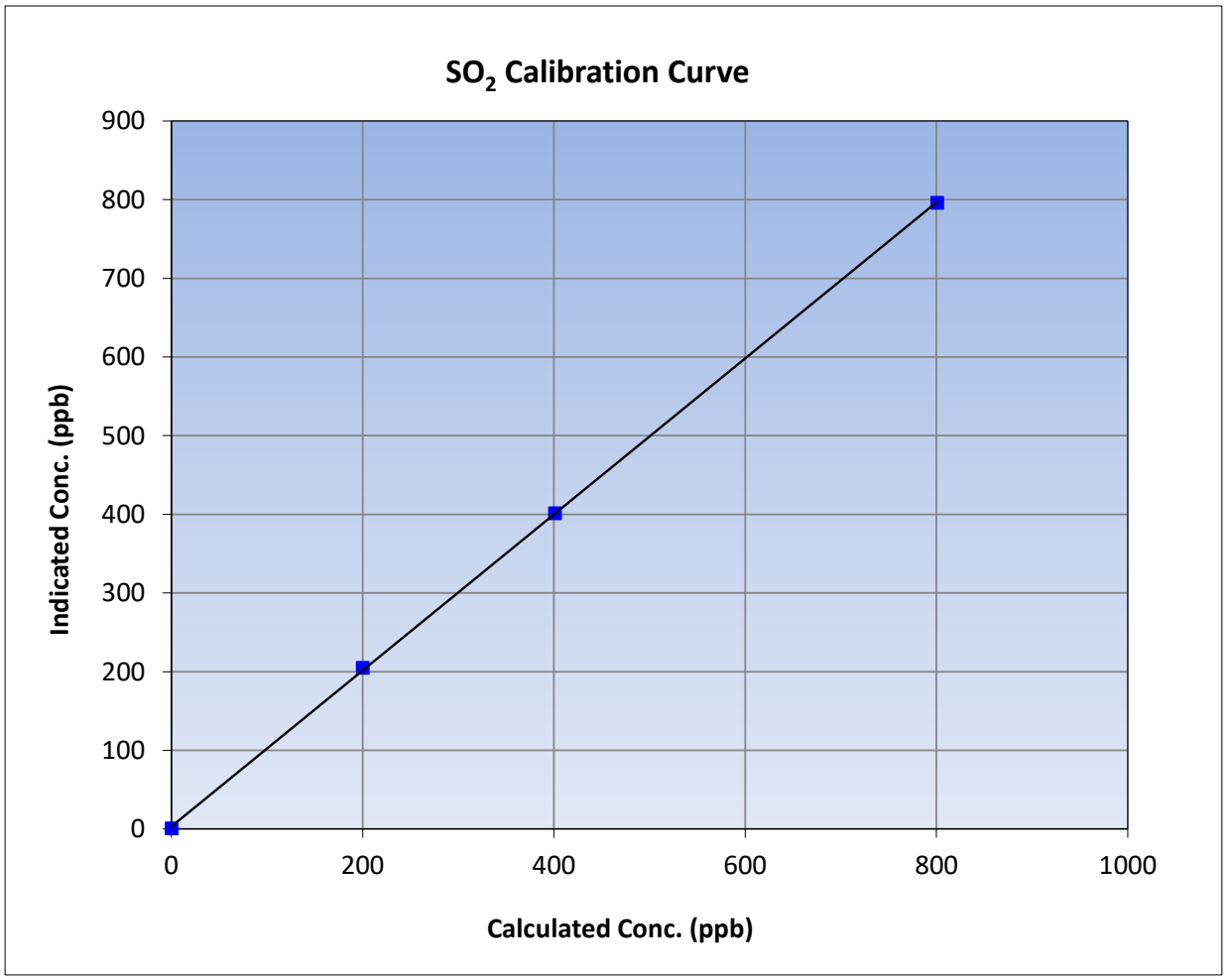
Station Information

Calibration Date:	December 4, 2023	Previous Calibration:	November 17, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	8:55	End Time (MST):	11:41
Analyzer make:	Thermo 43i	Analyzer serial #:	1501301450

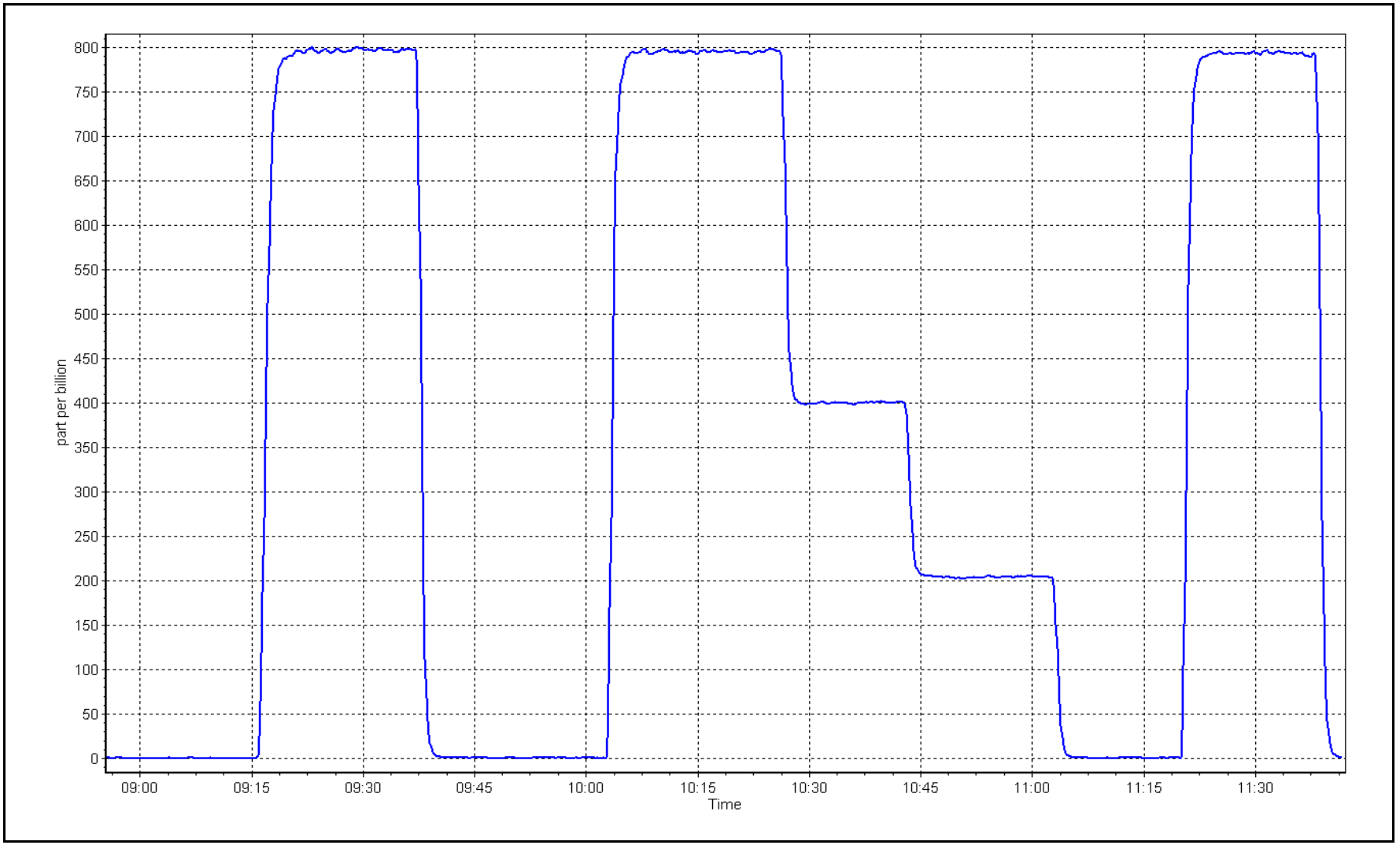
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
800.3	795.8	1.0056
400.7	400.9	0.9994
199.8	204.5	0.9771

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999945	*≥0.995*
Slope	0.991883	*0.90 - 1.10*
Intercept	3.051032	*+/-30*



SO2 Calibration Plot Date: December 4, 2023 Location: MacKay River



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	December 5, 2023	Last Cal Date:	November 9, 2023
Start time (MST):	8:35	End time (MST):	12:54
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:	0.980821	0.996103	Backgd or Offset:	3.07	3.19
Calibration intercept:	0.499202	0.439357	Coeff or Slope:	1.083	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	78.7	1.017
as found 2nd point	4961	39.0	39.9	39.5	1.014
as found 3rd point	4980	19.5	20.0	20.1	0.998
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4922	78.1	80.0	80.1	0.999
second point	4961	39.0	40.0	40.2	0.994
third point	4980	19.5	20.0	20.7	0.965
as left zero	5000	0.0	0.0	0.2	----
as left span	4922	78.1	80.0	78.9	1.014
SO2 Scrubber Check	4982	81.3	802.8	-0.1	----
Date of last scrubber change:		May 25, 2023		Ave Corr Factor	0.986
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.6	Prev response:	78.94	*% change:	-0.4%
Baseline Corr 2nd AF pt:	39.4	AF Slope:	0.981448	AF Intercept:	0.279067
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999974		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

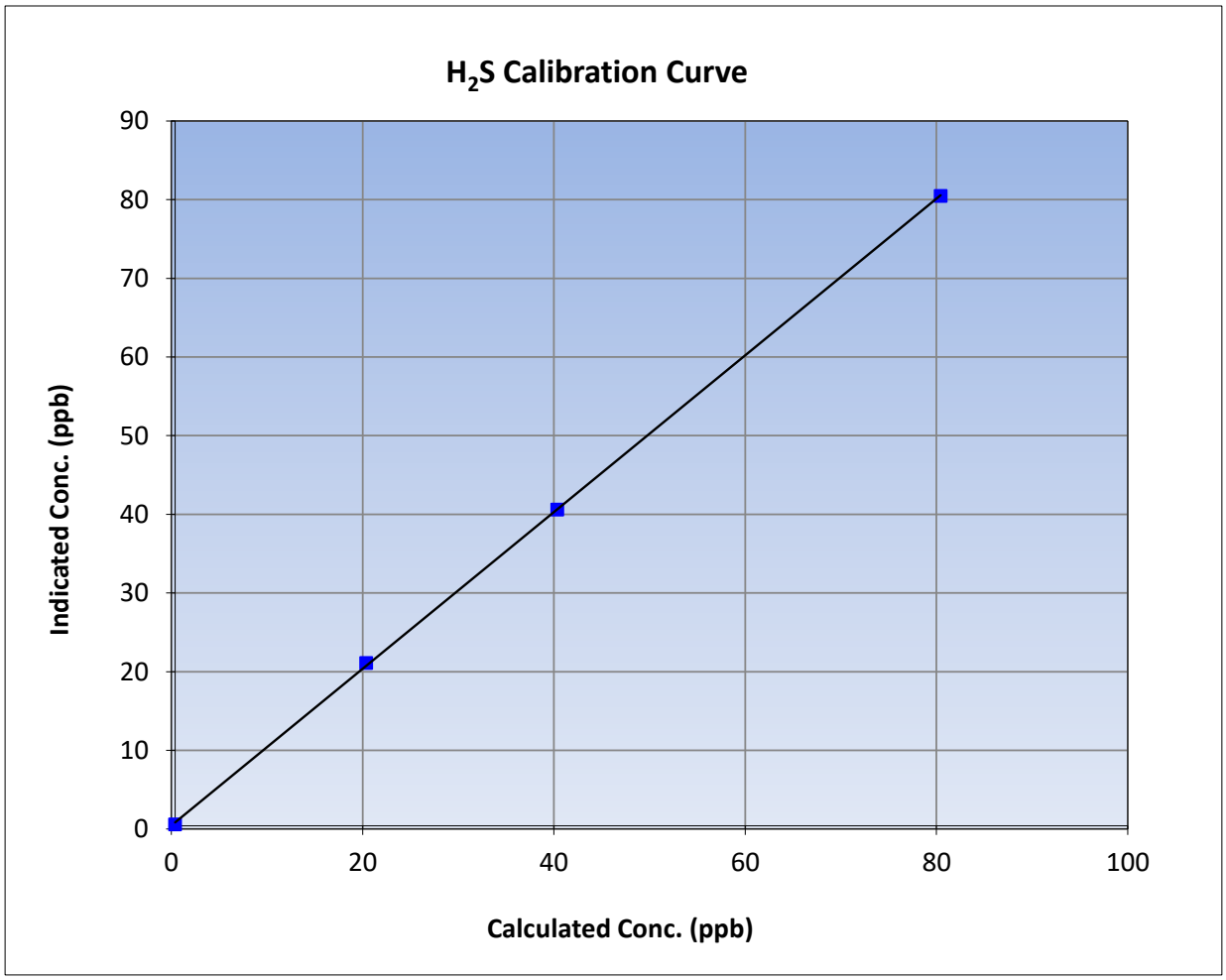
Station Information

Calibration Date:	December 5, 2023	Previous Calibration:	November 9, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	8:35	End Time (MST):	12:54
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1236656117

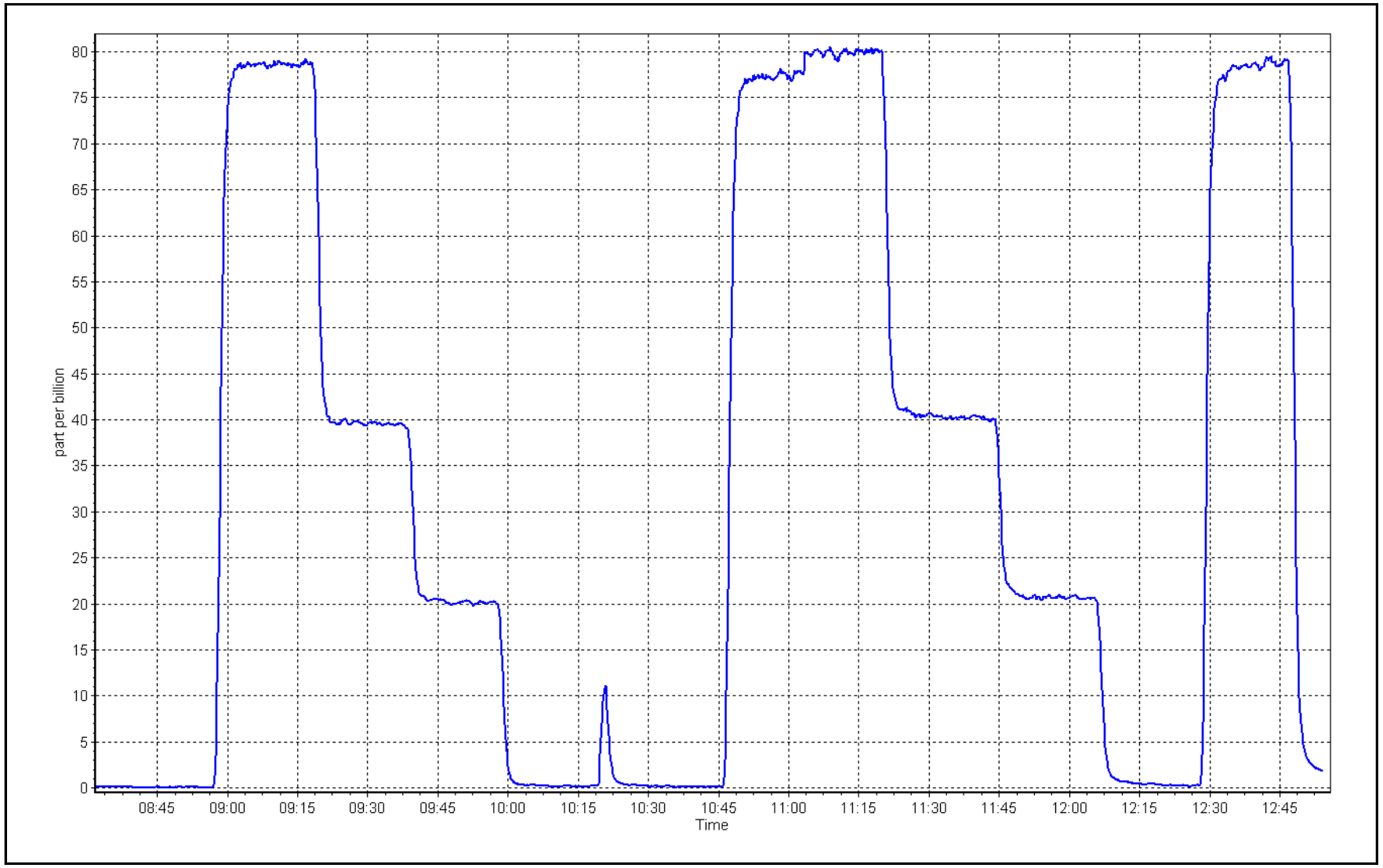
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	80.1	0.9992
40.0	40.2	0.9942
20.0	20.7	0.9655

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999946	*≥0.995*
Slope	0.996103	*0.90 - 1.10*
Intercept	0.439357	*+/-3*



H_2S Calibration Plot Date: December 5, 2023 Location: MacKay River



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	December 4, 2023	Last Cal Date:	November 17, 2023
Start time (MST):	8:55	End time (MST):	11:41
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:	0.998693	0.997735	Background:	2.970	3.110
Calibration intercept:	0.059818	0.026586	Coefficient:	5.605	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	0.43	----
as found span	4919	81.3	17.34	17.85	0.971
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	17.34	17.31	1.002
second point	4959	40.7	8.68	8.71	0.997
third point	4980	20.3	4.33	4.37	0.991
as left zero	5000	0.0	0.00	-0.10	----
as left span	4919	81.3	17.34	17.18	1.009
				Average Correction Factor	0.996

Baseline Corr As found:	17.43	Previous response	17.38	*% 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: Hydrogen Cylinder changed. Zero and Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

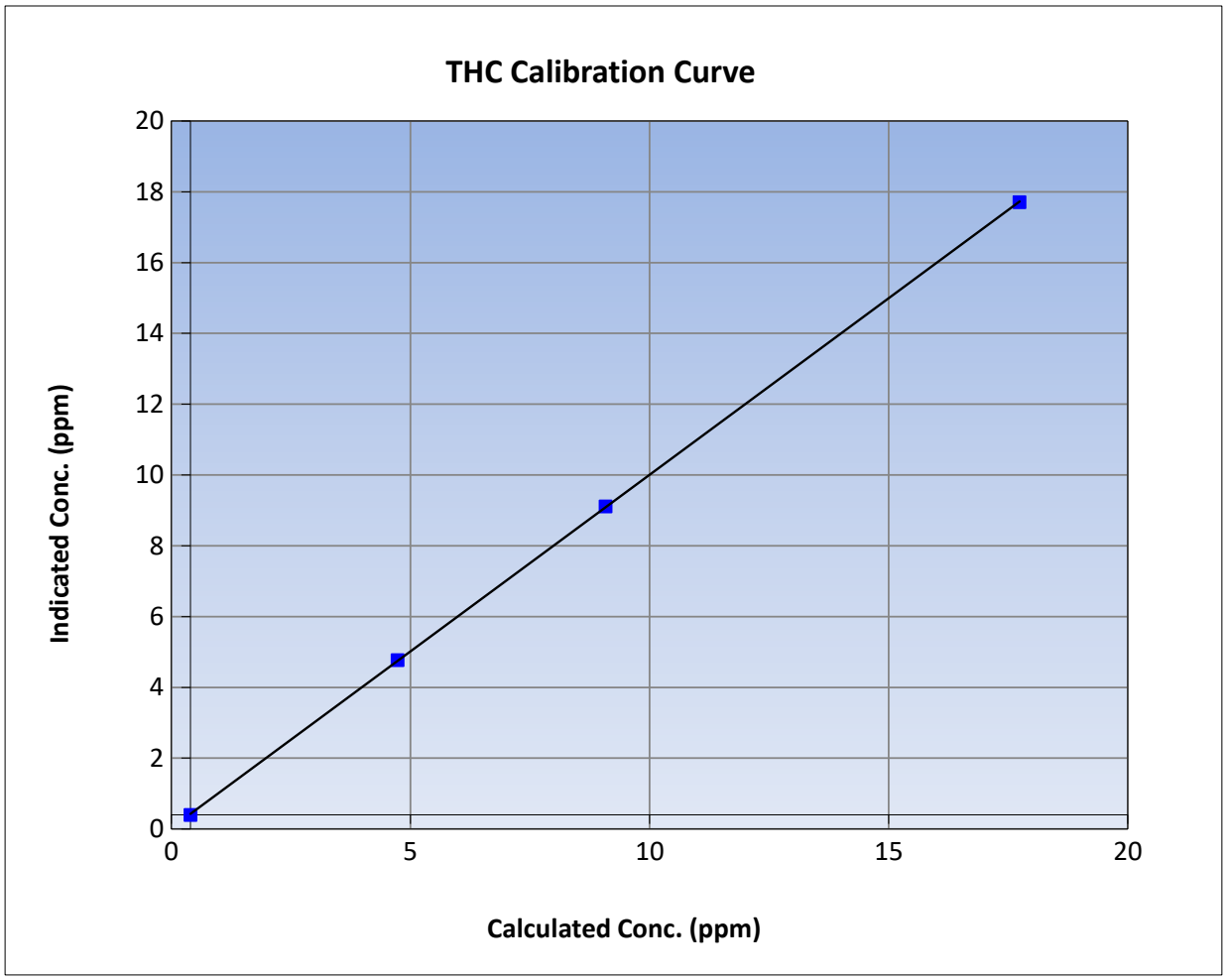
Station Information

Calibration Date:	December 4, 2023	Previous Calibration:	November 17, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	8:55	End Time (MST):	11:41
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1501663727

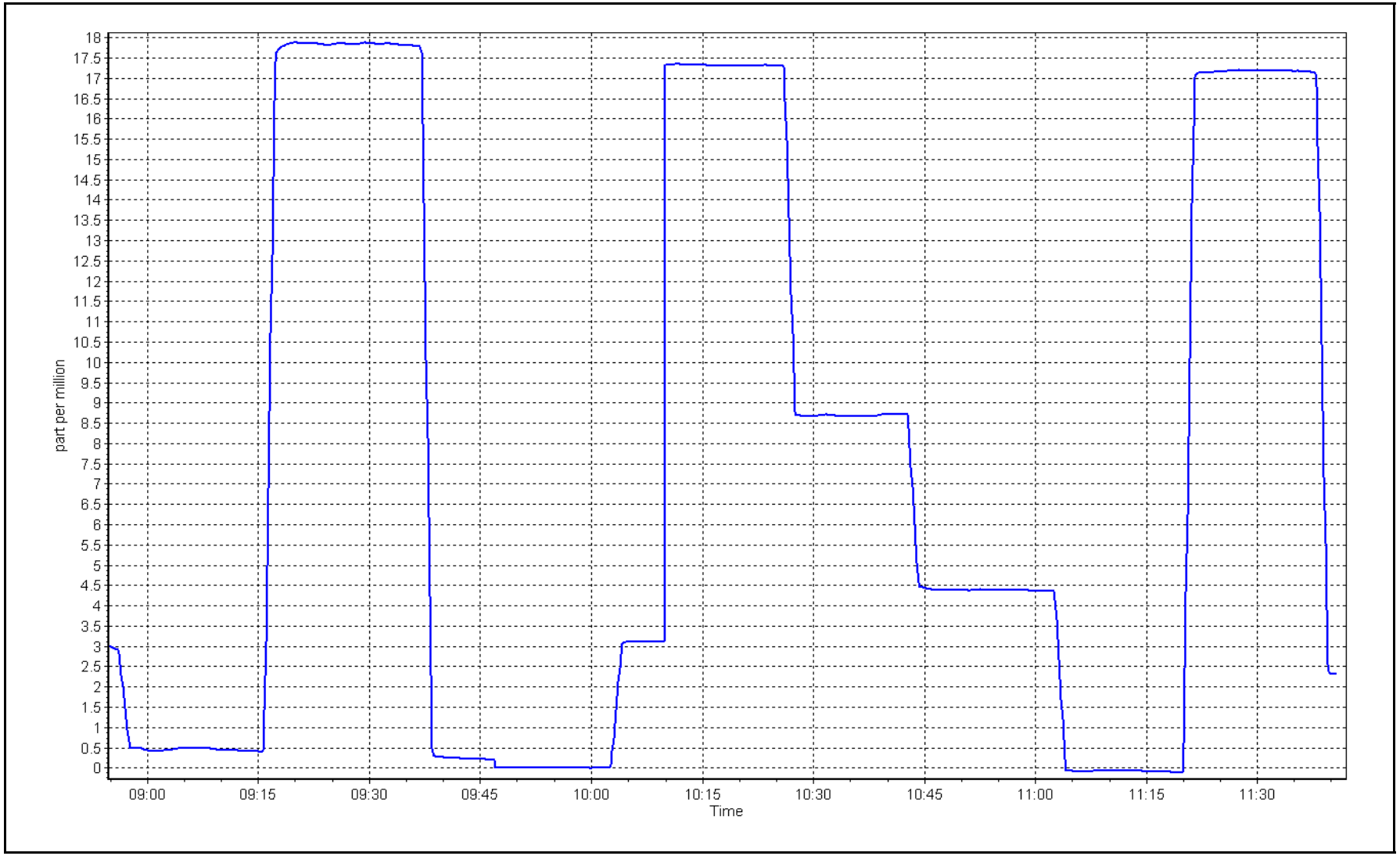
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.00	----
17.34	17.31	1.0017
8.68	8.71	0.9967
4.33	4.37	0.9907

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999987	*≥0.995*
Slope	0.997735	*0.90 - 1.10*
Intercept	0.026586	*+/-1.5*



THC Calibration Plot Date: December 4, 2023 Location: MacKay River



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	November 30, 2023	Last Cal Date:	November 8, 2023
Start time (MST):	8:00	End time (MST):	10:49
Reason:	As Found	Pump and Charcoal Change	

Calibration Standards

NO Gas Cylinder #:	T376265		Cal Gas Expiry Date:	April 13, 2025	
NOX Cal Gas Conc:	49.19	ppm	NO Cal Gas Conc:	48.04	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	49.19	ppm	Removed Gas NO Conc:	48.04	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	1220	
ZAG make/model:	Teledyne API 701		Serial Number:	4522	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1505164379	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.539	1.539	NO bkgnd or offset:	4.3	
NOX coeff or slope:	0.994	0.994	NOX bkgnd or offset:	4.3	
NO2 coeff or slope:	0.995	0.995	Reaction cell Press:	194.7	

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.996982	
NO_X Cal Offset:	2.850185	
NO Cal Slope:	0.997804	
NO Cal Offset:	1.471555	
NO_2 Cal Slope:	1.001029	
NO_2 Cal Offset:	-0.990724	

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	4917	83.3	819.5	800.3	19.2	830.7	808.7	22.0	0.9865	0.9896
as found 2nd	4956	41.7	410.4	400.8	9.6	417.0	404.9	12.1	0.9843	0.9900
as found 3rd	4979	20.8	204.6	199.9	4.8	212.7	205.2	7.5	0.9621	0.9739
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 = 830.8 ppb	NO = 808.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	1.3%
Previous Response	NO_X = 819.8 ppb	NO = 800.0 ppb		*Percent Change	NO =	1.1%
Baseline Corr 2nd pt	NO_X = 417.1 ppb	NO = 405.0 ppb	As found	NO_X r^2: 0.999953	Nx Sl: 1.011748	Nx Int: 2.230
Baseline Corr 3rd pt	NO_X = 212.8 ppb	NO = 205.3 ppb	As found	NO r^2: 0.999978	NO Sl: 1.009183	NO Int: 1.211
			As found	NO_2 r^2: 0.999944	NO2 Sl: 1.004982	NO_2 Int: -1.156

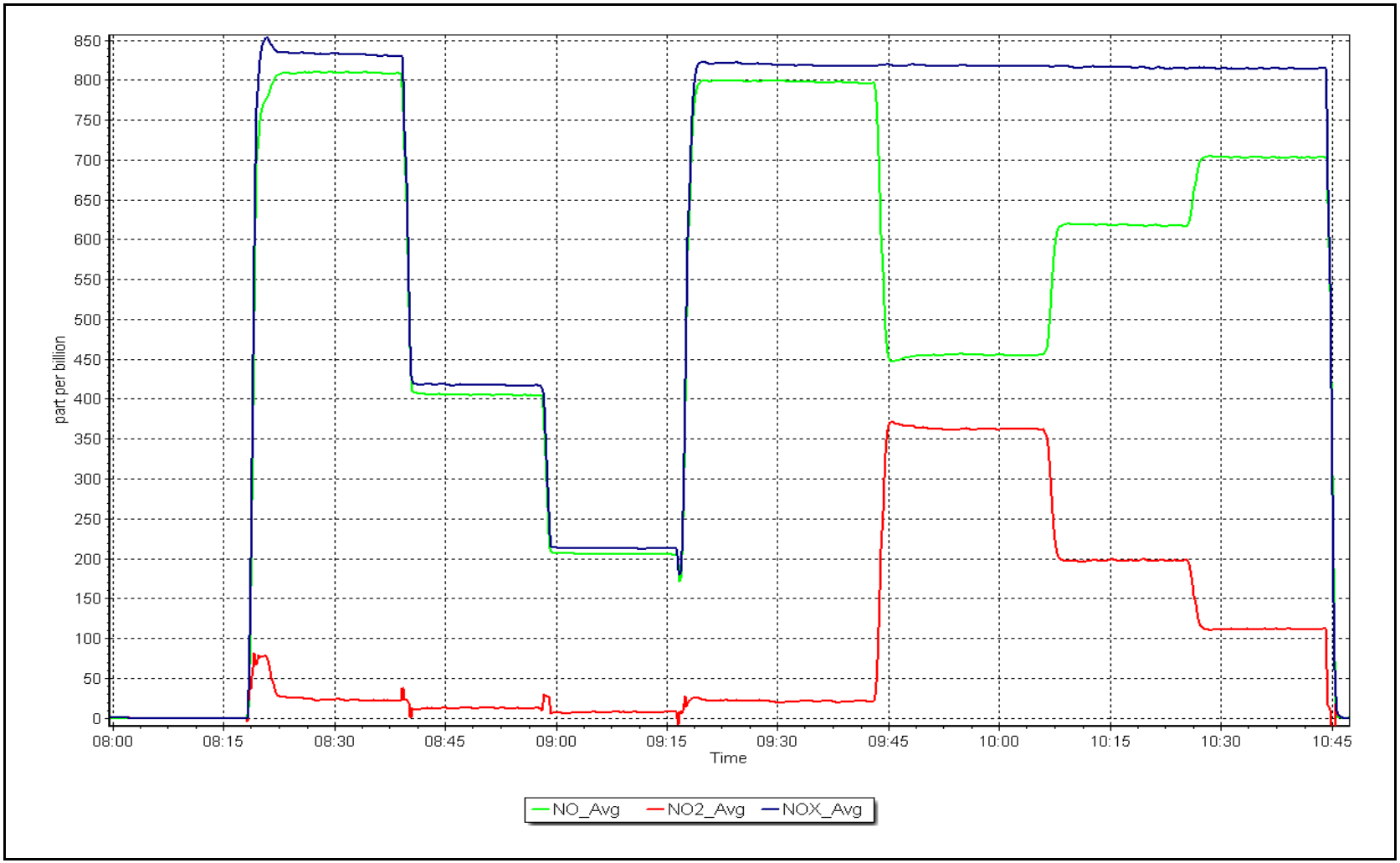
GPT Calibration Data

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)	796.8	454.7	361.3	362.7	0.9960	100.4%
as found GPT point (200 ppb NO2)	796.8	617.5	198.5	197.5	1.0048	99.5%
as found GPT point (100 ppb NO2)	796.8	702.9	113.1	111.3	1.0158	98.4%
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 change the Pump and Charcoal.

Calibration Performed By: Melissa Lemay

NO_x Calibration Plot Date: November 30, 2023 Location: MacKay River



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	December 1, 2023	Last Cal Date:	November 30, 2023
Start time (MST):	8:02	End time (MST):	12:14
Reason:	Routine	Pump and Charcoal Change, PMT adjusted	

Calibration Standards

NO Gas Cylinder #:	T376265		Cal Gas Expiry Date:	April 13, 2025	
NOX Cal Gas Conc:	49.19	ppm	NO Cal Gas Conc:	48.04	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	49.19	ppm	Removed Gas NO Conc:	48.04	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	1220	
ZAG make/model:	Teledyne API 701		Serial Number:	4522	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1505164379	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.005	0.981	NO bkgnd or offset:	4.4	4.0
NOX coeff or slope:	0.994	0.997	NOX bkgnd or offset:	4.5	4.1
NO2 coeff or slope:	1.006	0.995	Reaction cell Press:	190.6	190.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.996982	1.007887
NO_X Cal Offset:	2.850185	2.589374
NO Cal Slope:	0.997804	0.995492
NO Cal Offset:	1.471555	1.631214
NO_2 Cal Slope:	1.001029	1.005354
NO_2 Cal Offset:	-0.990724	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										
as found span										
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
high point	4917	83.3	819.5	800.3	19.2	827.6	797.9	29.7	0.9902	1.0030
second point	4956	41.7	410.4	400.8	9.6	416.4	400.4	16.0	0.9857	1.0011
third point	4979	20.8	204.6	199.9	4.8	212.2	202.8	9.4	0.9644	0.9855
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.2	0.0	----	----
as left span	4917	83.3	819.5	456.5	363.0	819.7	456.2	363.4	0.9997	1.0007
								Average Correction Factor	0.9801	0.9965

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)	795.1	451.3	363.0	365.6	0.9928	100.7%
2nd GPT point (200 ppb O3)	795.1	611.0	203.3	204.0	0.9964	100.4%
3rd GPT point (100 ppb O3)	795.1	697.0	117.3	120.5	0.9731	102.8%
				Average Correction Factor	0.9874	101.3%

Notes: Calibration from Pump and Charcoal changed, and PMT adjusted November 30,2023. Zero and Span adjusted. Due to drifting during the GPT the 2nd NO ref point used.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

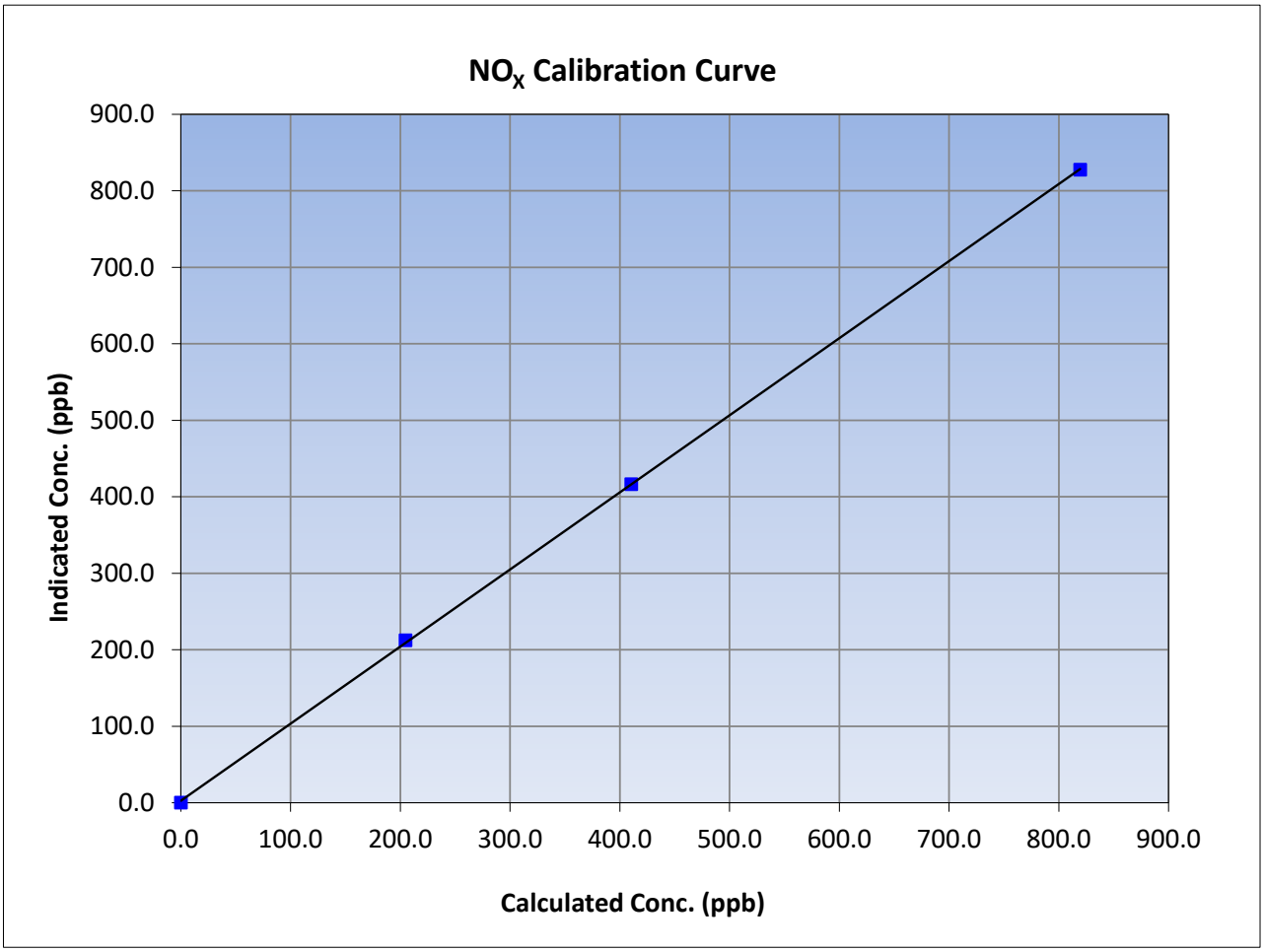
Version-04-2020

Station Information

Calibration Date:	December 1, 2023	Previous Calibration:	November 30, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	8:02	End Time (MST):	12:14
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	0.999950	≥0.995
819.5	827.6	0.9902			
410.4	416.4	0.9857	Slope	1.007887	0.90 - 1.10
204.6	212.2	0.9644			
			Intercept	2.589374	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

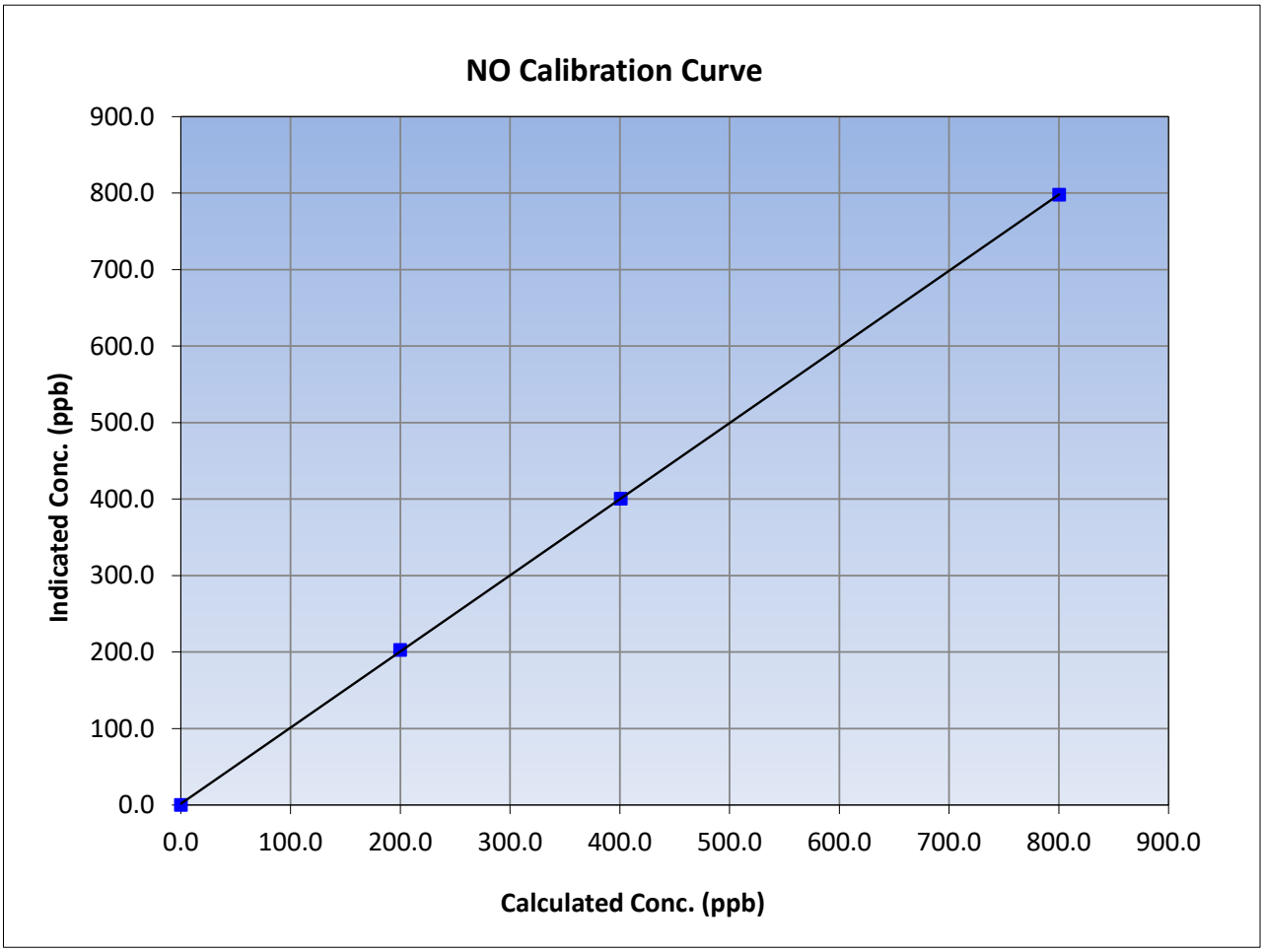
Version-04-2020

Station Information

Calibration Date:	December 1, 2023	Previous Calibration:	November 30, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	8:02	End Time (MST):	12:14
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	0.999978	≥0.995
800.3	797.9	1.0030			
400.8	400.4	1.0011	Slope	0.995492	0.90 - 1.10
199.9	202.8	0.9855			
			Intercept	1.631214	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

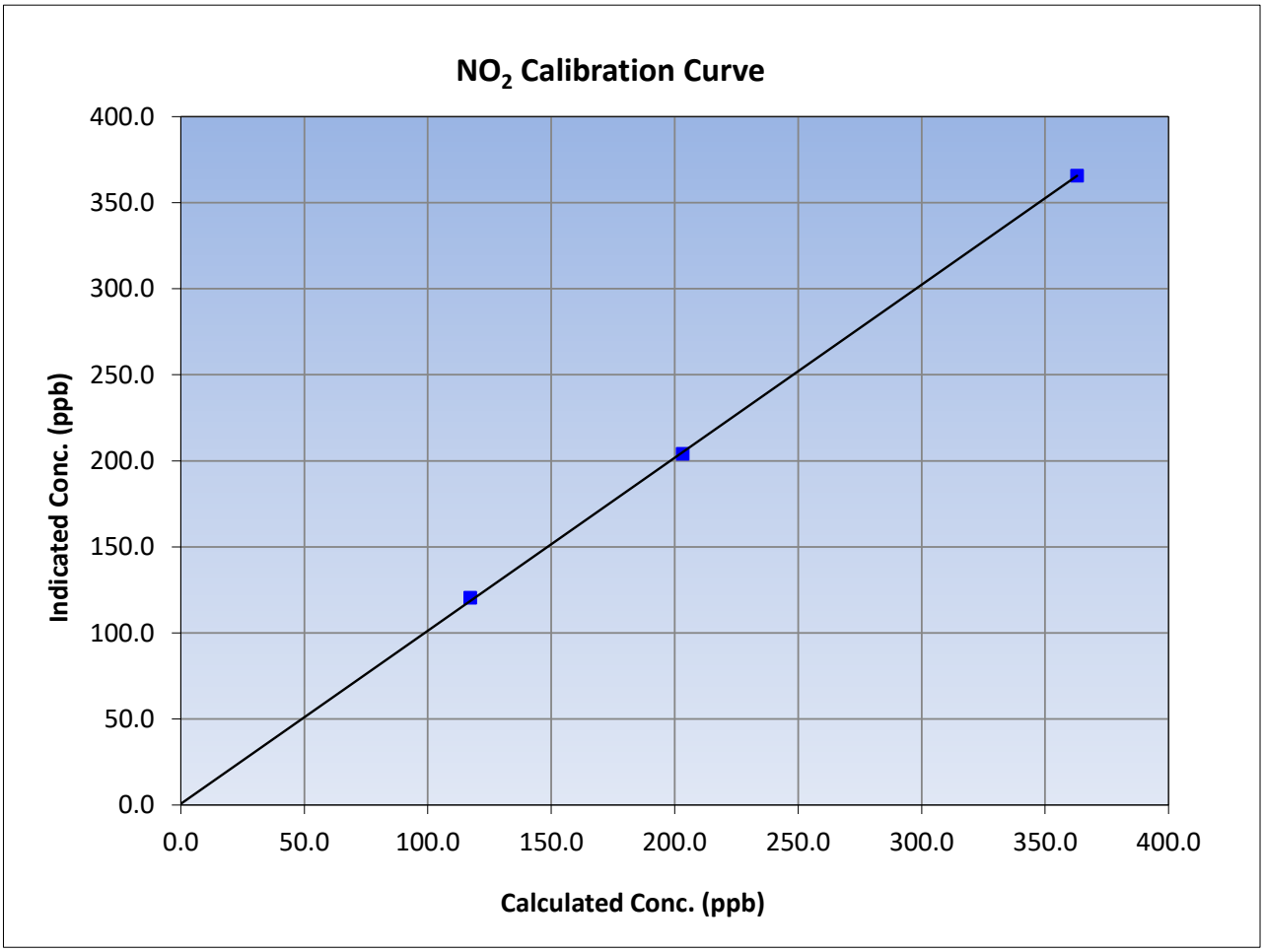
Version-04-2020

Station Information

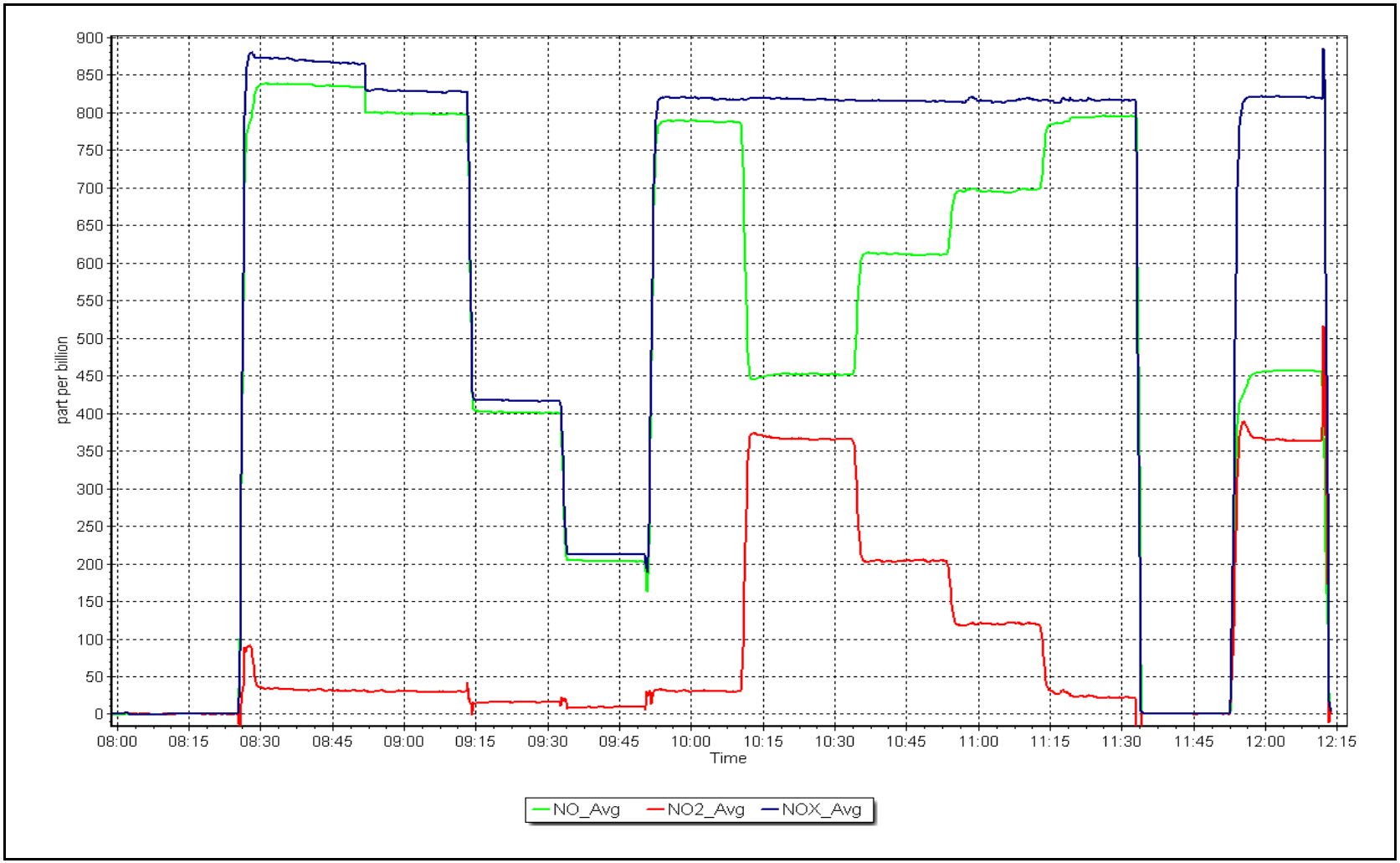
Calibration Date:	December 1, 2023	Previous Calibration:	November 30, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	8:02	End Time (MST):	12:14
Analyzer make:	Thermo 42i	Analyzer serial #:	1505164379

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999924	≥0.995
363.0	365.6	0.9928			
203.3	204.0	0.9964	Slope	1.005354	0.90 - 1.10
117.3	120.5	0.9731			
			Intercept	0.716865	+/-20



NO_X Calibration Plot Date: December 1, 2023 Location: MacKay River



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS21
CONKLIN

DECEMBER 2023

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

January 31, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	December 4, 2023	Last Cal Date:	November 30, 2023
Start time (MST):	11:30	End time (MST):	14:46
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:	0.998475	0.995935	Backgd or Offset:	27.7	28.6
Calibration intercept:	1.835846	0.975766	Coeff or Slope:	0.904	0.904

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	0.4	----
as found span	4920	80.2	800.8	796.8	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5005	0.0	0.0	-0.1	----
high point	4920	80.2	800.8	798.2	1.003
second point	4960	40.1	400.4	399.8	1.002
third point	4980	20.0	200.1	201.7	0.992
as left zero	5005	0.0	0.0	-0.1	----
as left span	4920	80.2	800.8	798.9	1.002
				Average Correction Factor	0.999

Baseline Corr As found:	796.40	Previous response	801.46	*% 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: Jan Castro

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

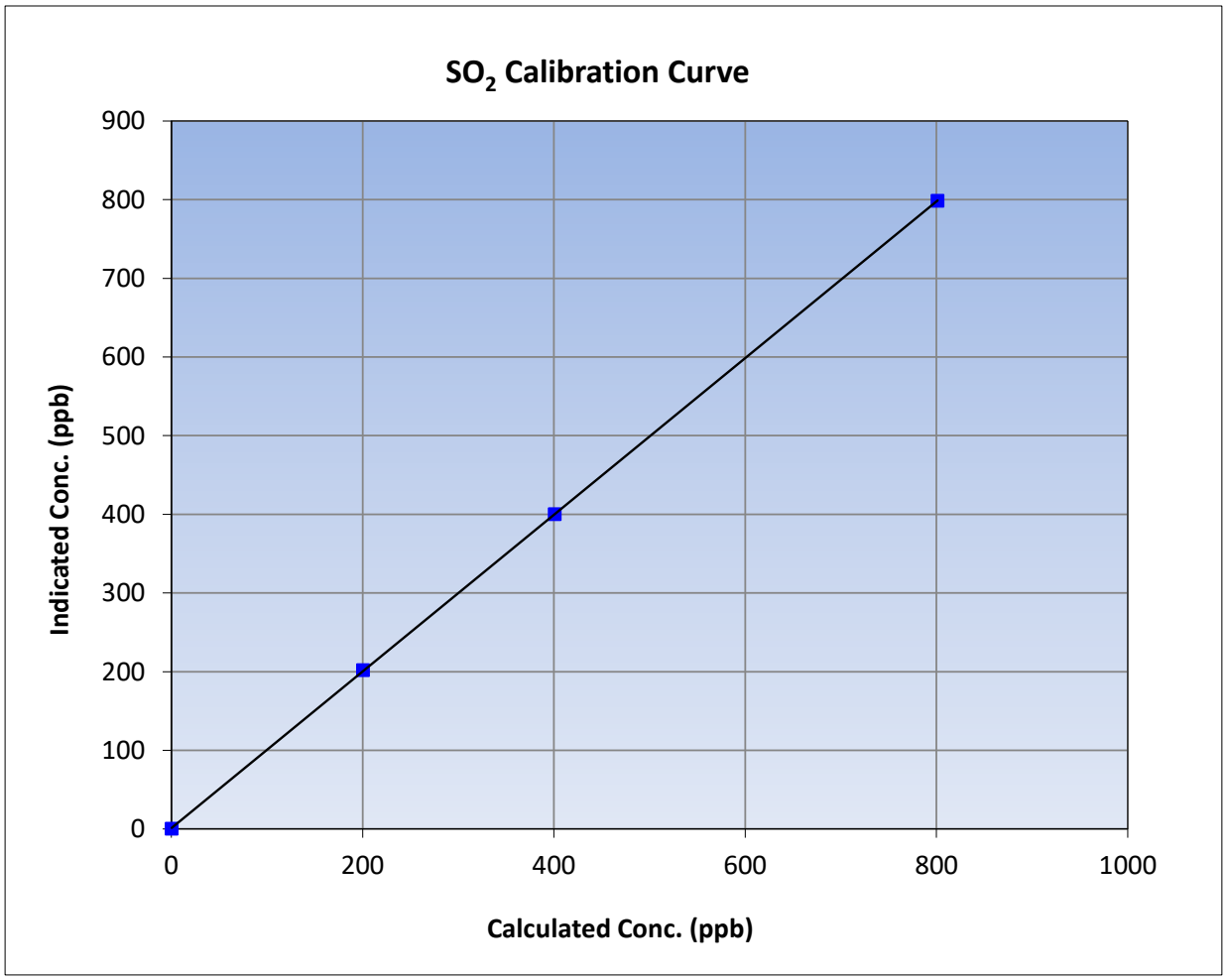
Station Information

Calibration Date:	December 4, 2023	Previous Calibration:	November 30, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:30	End Time (MST):	14:46
Analyzer make:	Thermo 43i	Analyzer serial #:	1428701363

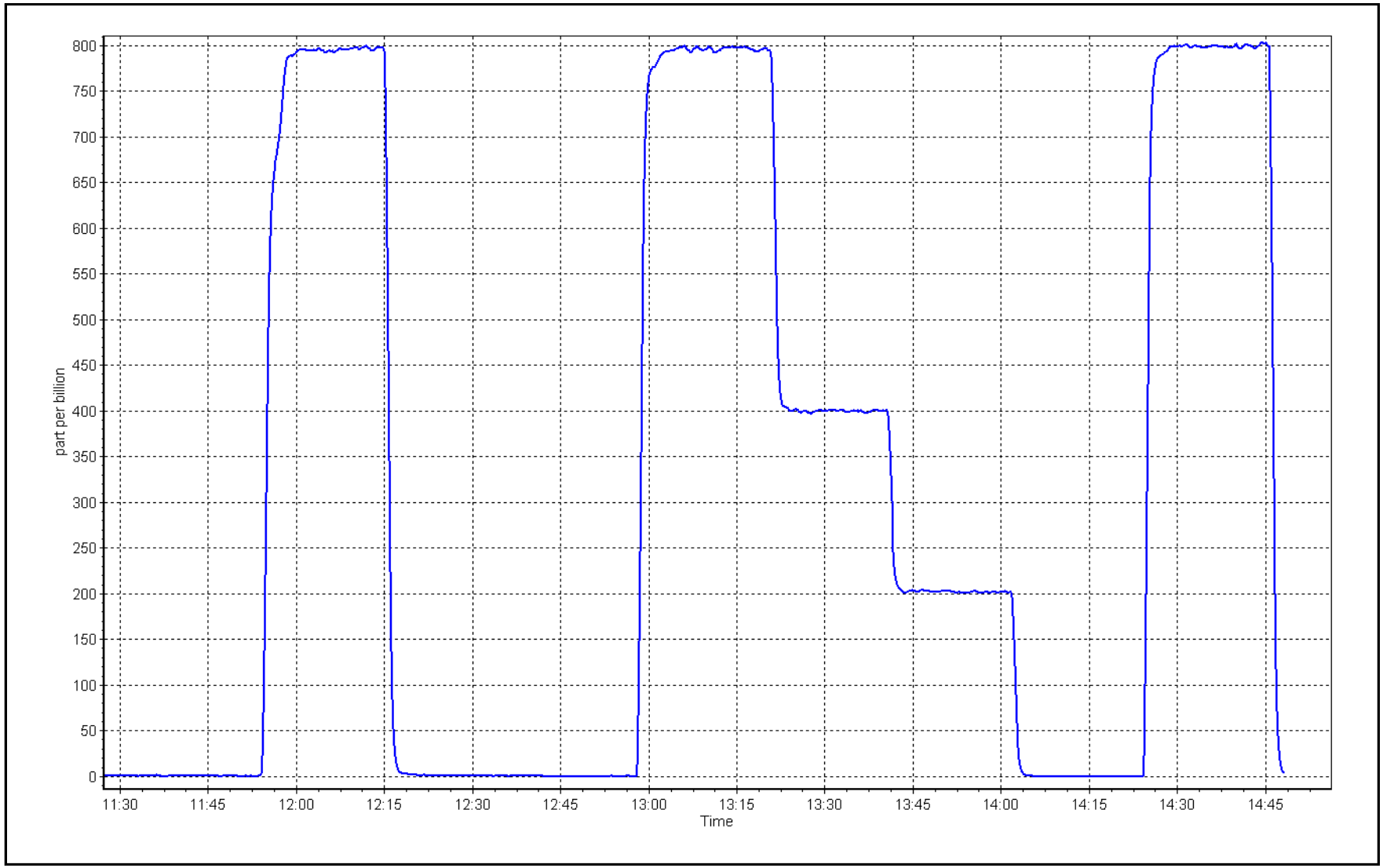
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
800.8	798.2	1.0033
400.4	399.8	1.0016
200.1	201.7	0.9922

Statistical Evaluation		Limits
Correlation Coefficient	0.999990	≥0.995
Slope	0.995935	0.90 - 1.10
Intercept	0.975766	+/-30



SO2 Calibration Plot Date: December 4, 2023 Location: Conklin



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	December 7, 2023	Last Cal Date:	November 28, 2023
Start time (MST):	11:15	End time (MST):	15:27
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:	0.997143	0.995286	Backgd or Offset:	2.4	2.38
Calibration intercept:	0.200000	0.240000	Coeff or Slope:	0.963	0.963

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	80.0	1.000
as found 2nd point	4960	40.0	40.0	40.1	0.998
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	0.1	----
high point	4920	80.0	80.0	79.8	1.003
second point	4960	40.0	40.0	40.1	0.998
third point	4980	20.0	20.0	20.3	0.985
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	80.0	80.0	79.8	1.003
SO2 Scrubber Check	4920	80.2	802.0	0.1	----
Date of last scrubber change:				Ave Corr Factor	0.995
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.0	Prev response:	79.97	*% change:	0.0%
Baseline Corr 2nd AF pt:	40.1	AF Slope:	0.998857	AF Intercept:	0.140000
Baseline Corr 3rd AF pt:	20.3	AF Correlation:	0.999984		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds.Scrubber check done after calibrator zero and it passed. No adjustment made.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

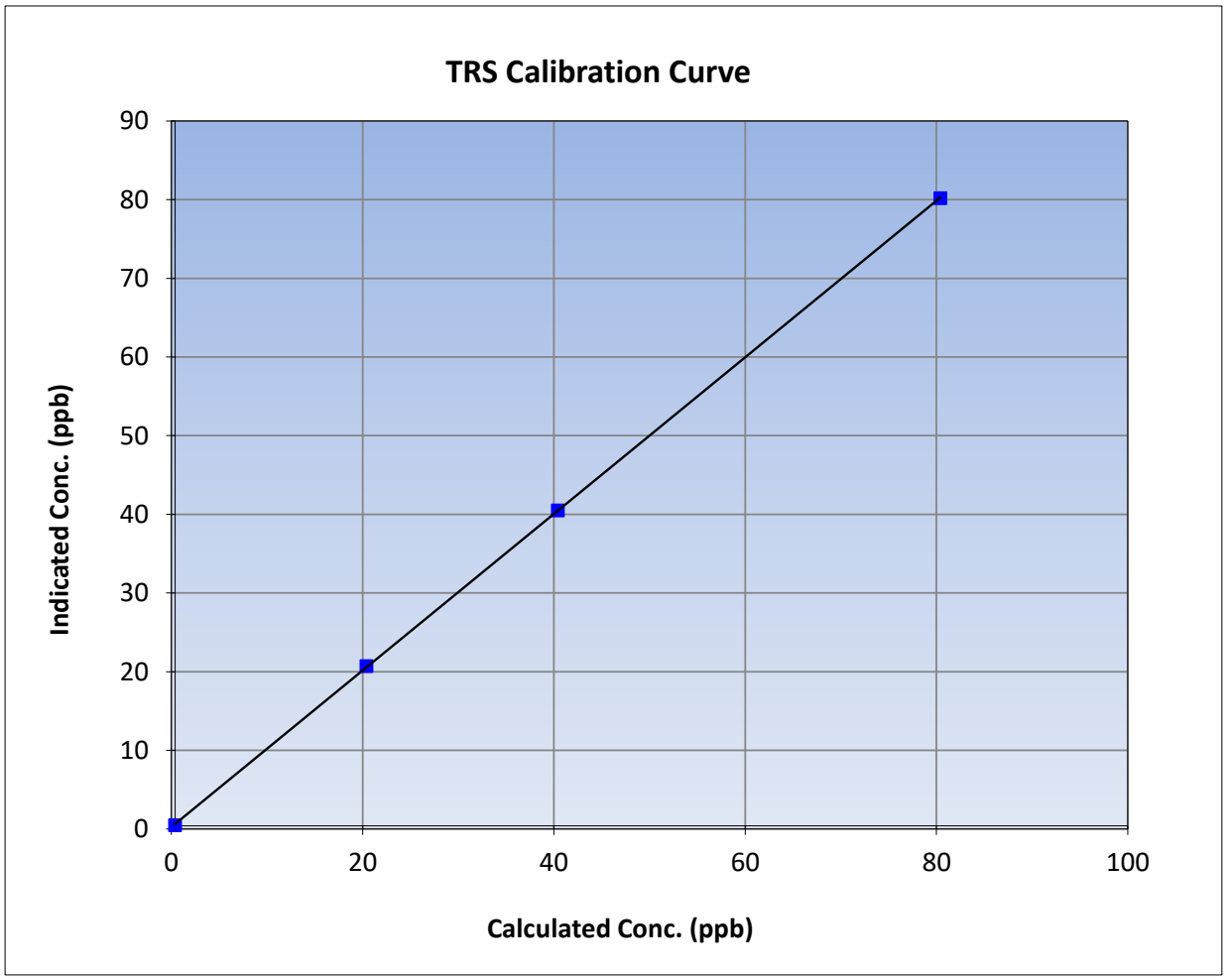
Station Information

Calibration Date:	December 7, 2023	Previous Calibration:	November 28, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:15	End Time (MST):	15:27
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1236656116

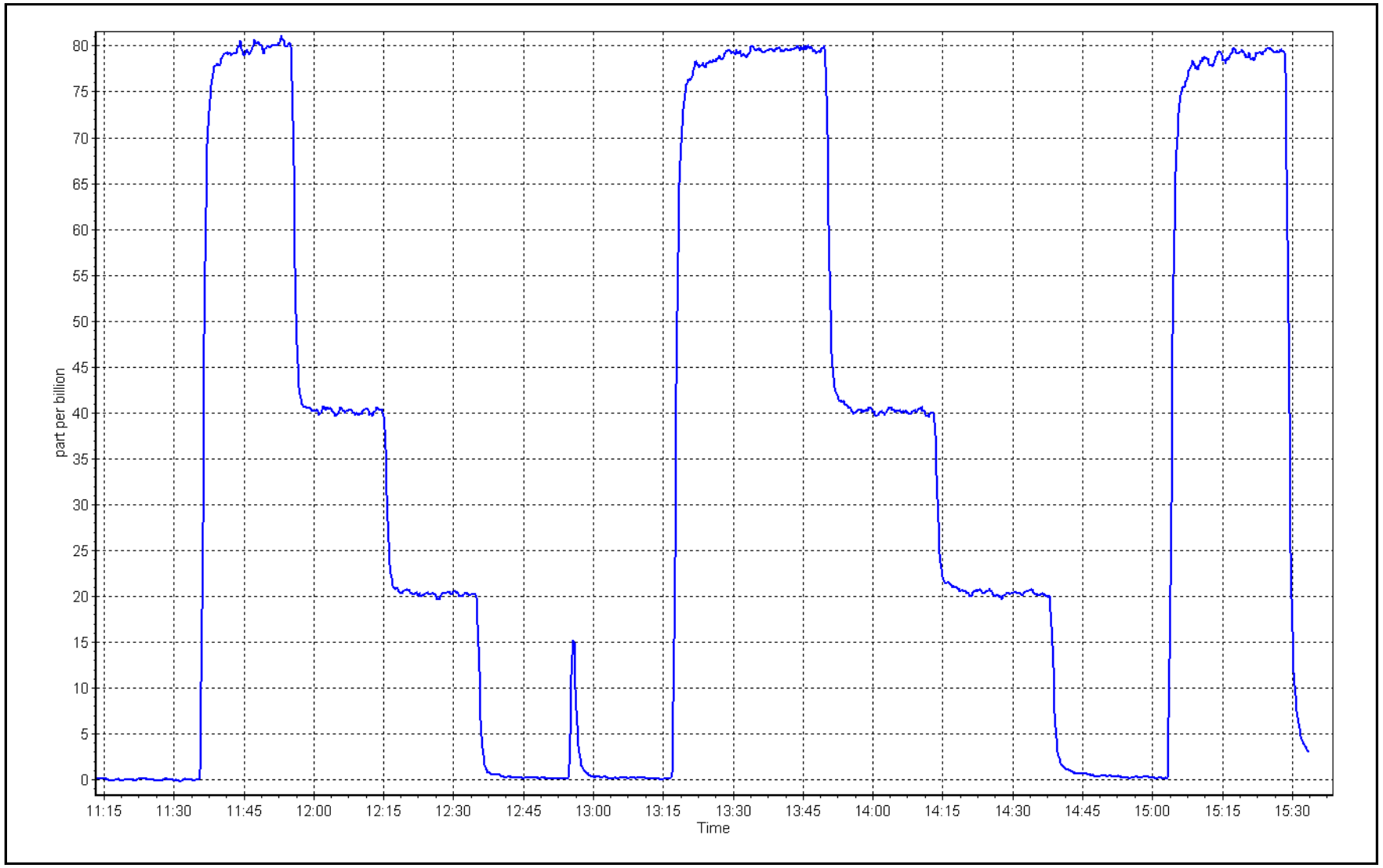
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	79.8	1.0025
40.0	40.1	0.9975
20.0	20.3	0.9852

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999986	*≥0.995*
Slope	0.995286	*0.90 - 1.10*
Intercept	0.240000	*+/-3*



TRS Calibration Plot Date: December 7, 2023 Location: Conklin



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	December 4, 2023	Last Cal Date:	November 30, 2023
Start time (MST):	11:30	End time (MST):	14:46
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 #:	1426262594	
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:	3.82E-04	3.82E-04	NMHC SP Ratio:	9.44E-05	9.44E-05
CH4 Retention time:	14.2	14.2	NMHC Peak Area:	96823	96823
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	17.23	0.994
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	17.13	17.16	0.998
second point	4960	40.1	8.56	8.59	0.996
third point	4980	20.0	4.28	4.38	0.976
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	17.13	17.10	1.002
				Average Correction Factor	0.990

Baseline Corr AF:	17.23	Prev response	17.11	*% change	0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-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	9.24	0.989
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	9.14	9.19	0.994
second point	4960	40.1	4.57	4.59	0.995
third point	4980	20.0	2.28	2.33	0.978
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	9.14	9.17	0.997
				Average Correction Factor	0.989
Baseline Corr AF:	9.24	Prev response	9.14	*% change	1.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	7.99	7.99	0.999
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	7.99	7.97	1.003
second point	4960	40.1	3.99	4.00	0.999
third point	4980	20.0	2.00	2.05	0.974
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	7.99	7.93	1.007
				Average Correction Factor	0.992
Baseline Corr AF:	7.99	Prev response	7.97	*% change	0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.997585	1.000220
THC Cal Offset:	0.030767	0.040771
CH4 Cal Slope:	0.995028	0.995229
CH4 Cal Offset:	0.026958	0.025758
NMHC Cal Slope:	0.999806	1.004132
NMHC Cal Offset:	0.003609	0.014813

Notes: Changed the inlet filter and N2 cylinder after as founds. No adjustment made.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

THC Calibration Summary

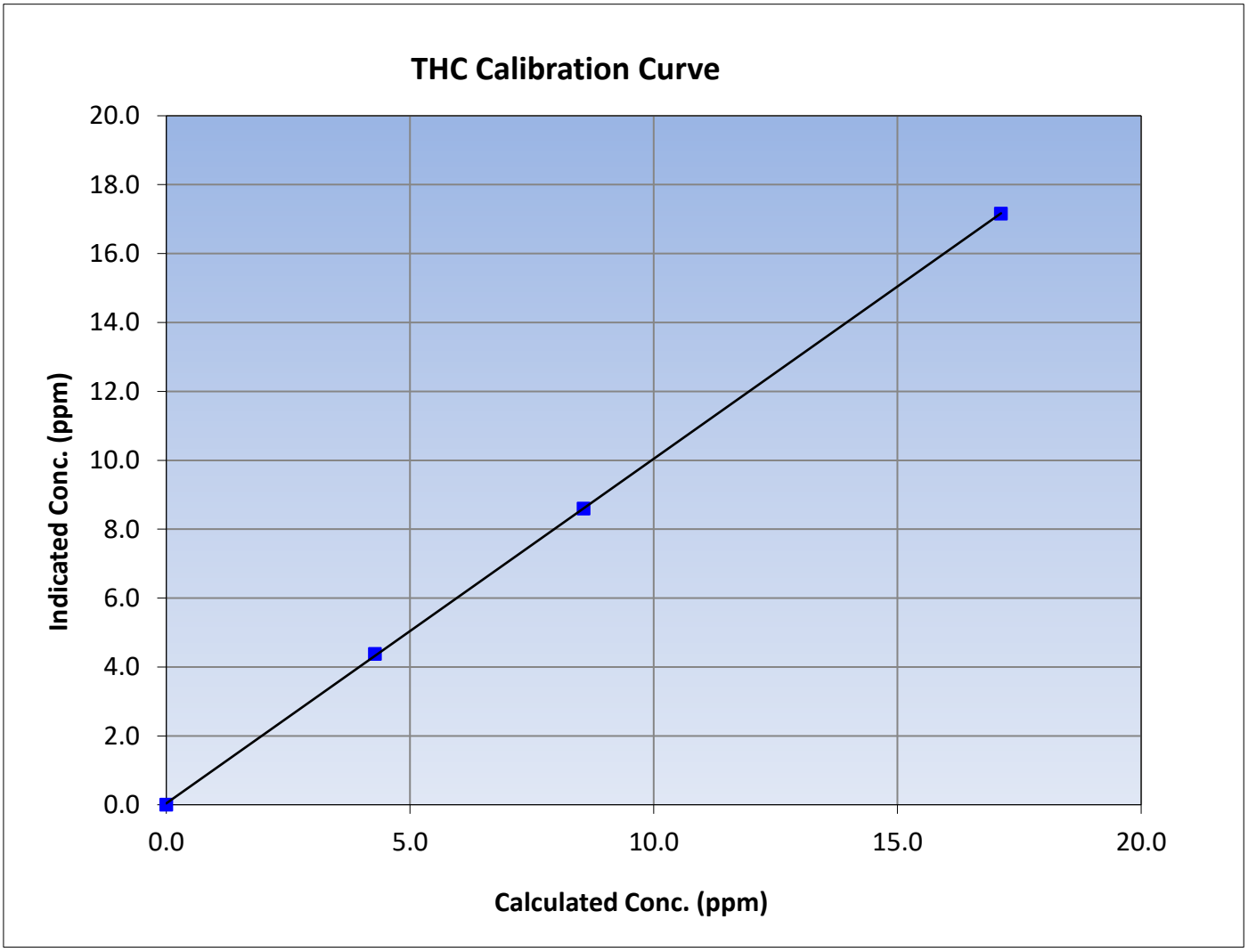
Version-06-2022

Station Information

Calibration Date:	December 4, 2023	Previous Calibration:	November 30, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:30	End Time (MST):	14:46
Analyzer make:	Thermo 55i	Analyzer serial #:	1426262594

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
17.13	17.16	0.9980			
8.56	8.59	0.9964	Slope	1.000220	0.90 - 1.10
4.28	4.38	0.9763			
			Intercept	0.040771	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

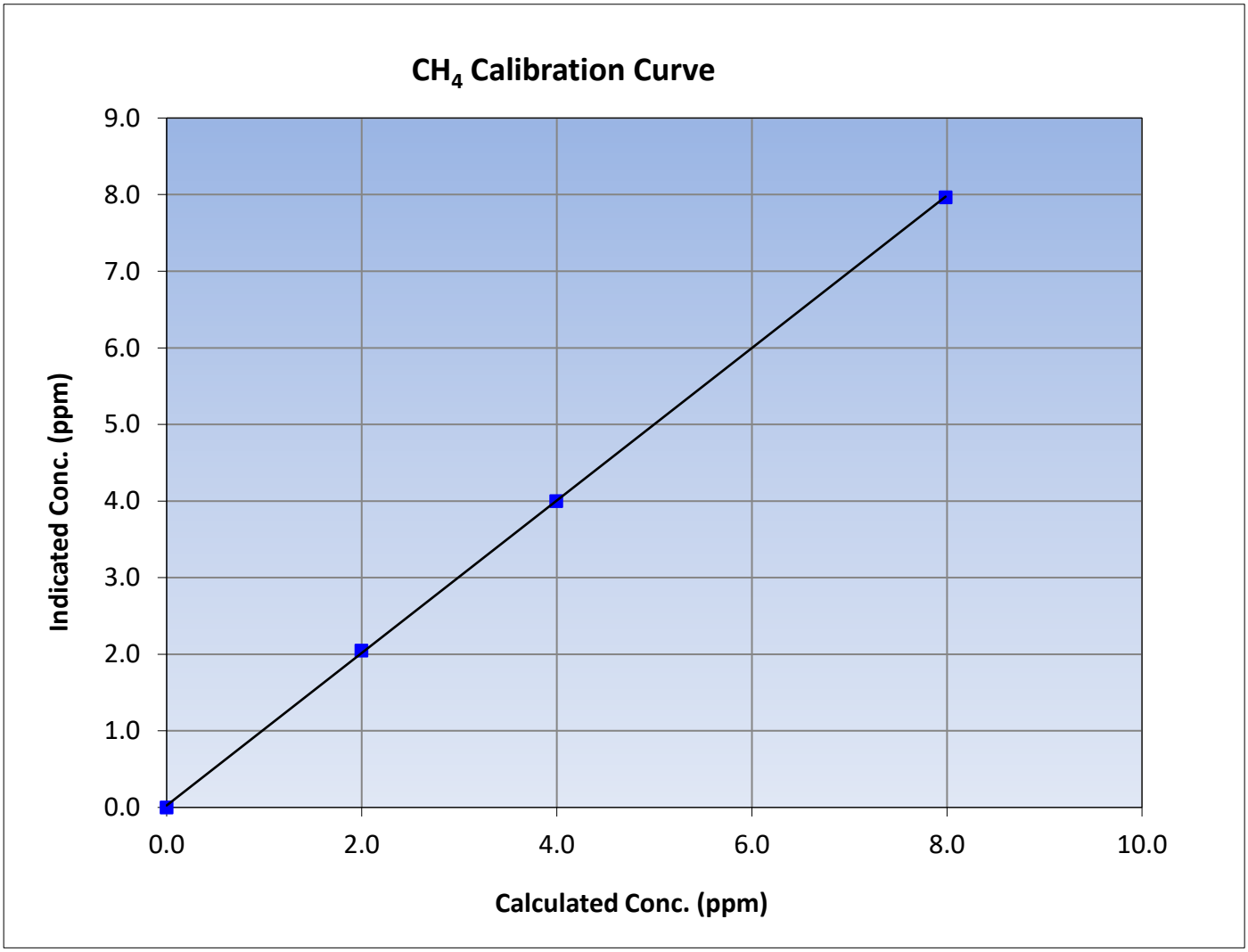
Version-06-2022

Station Information

Calibration Date:	December 4, 2023	Previous Calibration:	November 30, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:30	End Time (MST):	14:46
Analyzer make:	Thermo 55i	Analyzer serial #:	1426262594

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999941	*≥0.995*
7.99	7.97	1.0025			
3.99	4.00	0.9990	Slope	0.995229	*0.90 - 1.10*
2.00	2.05	0.9744			
			Intercept	0.025758	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

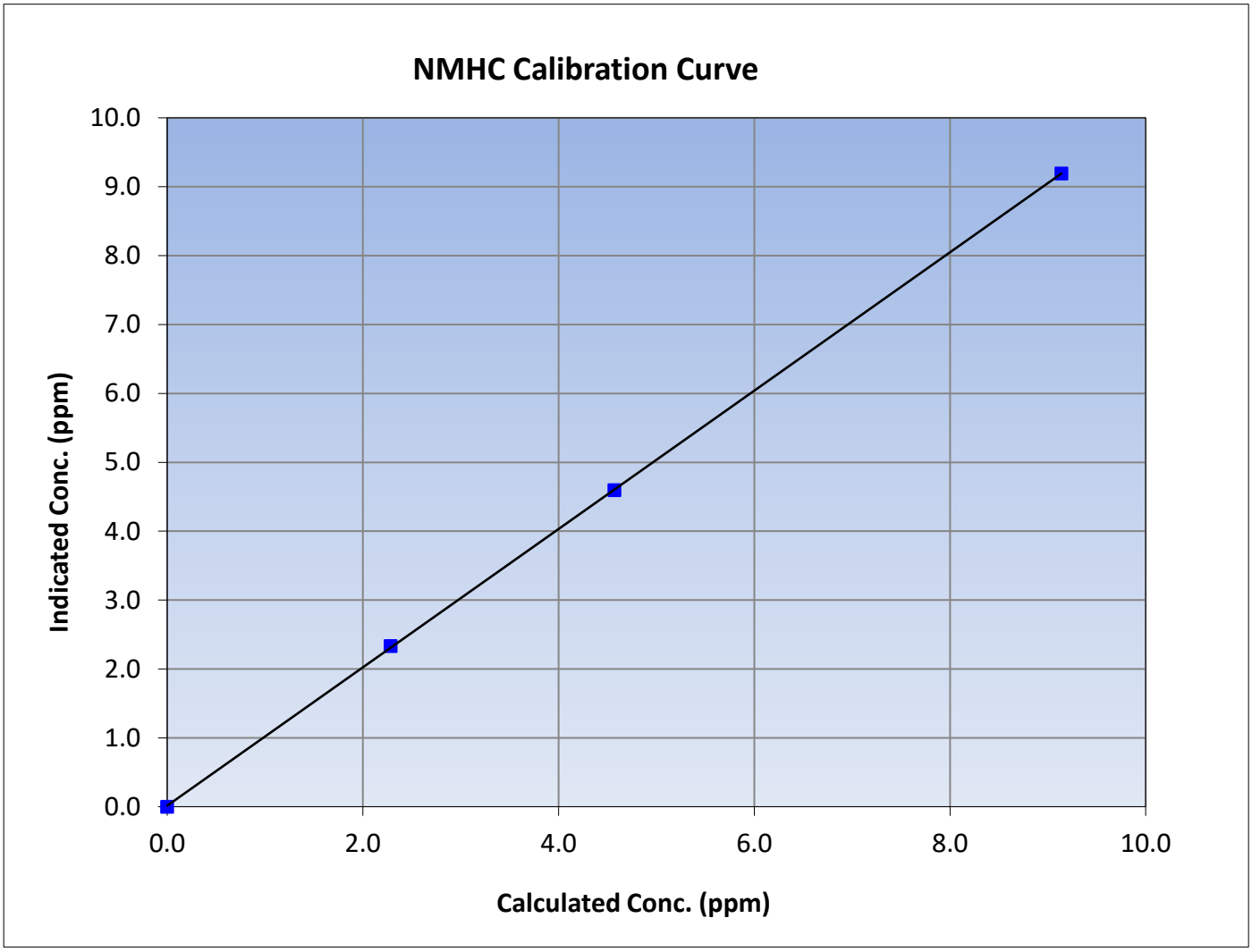
Version-06-2022

Station Information

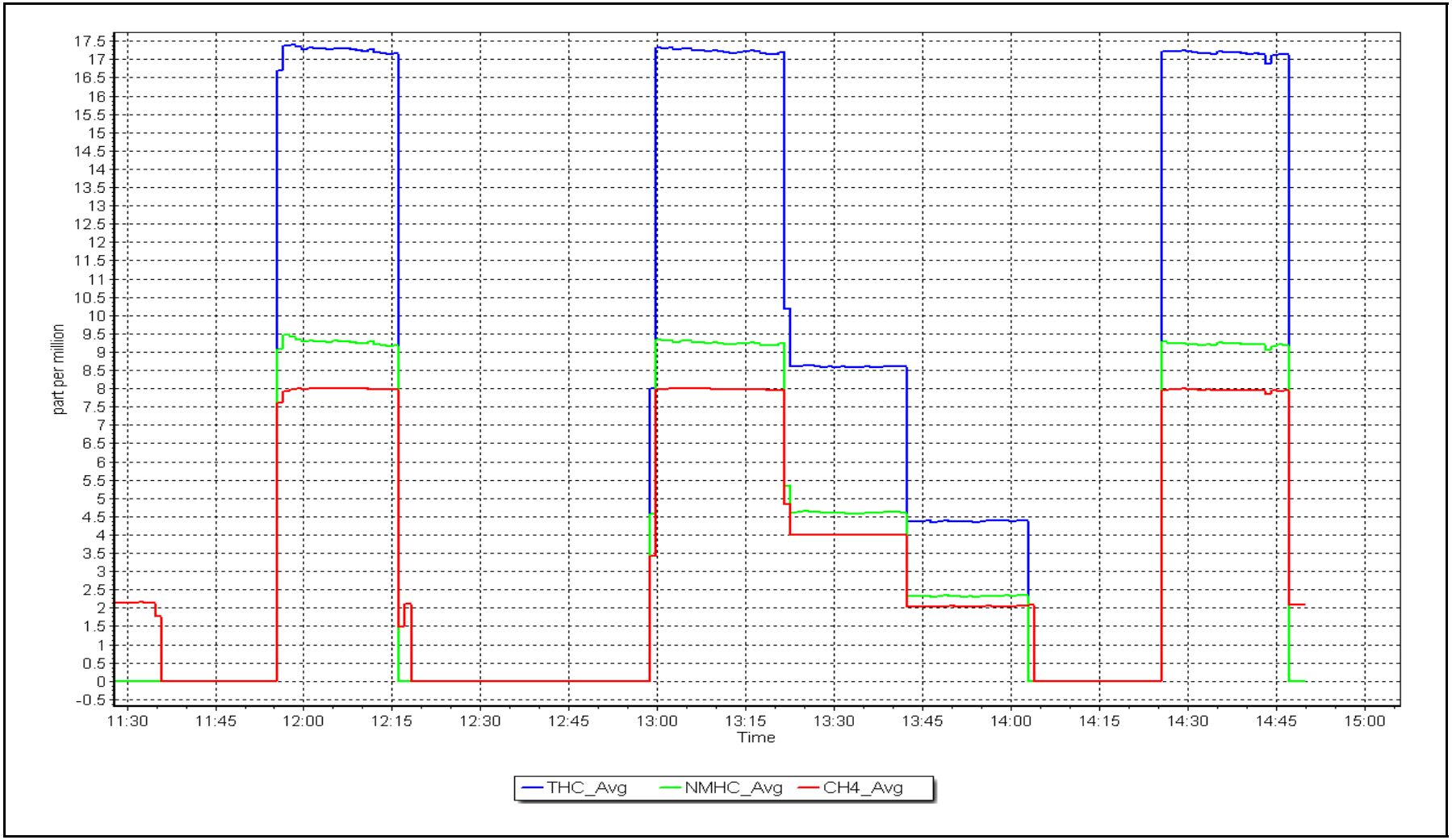
Calibration Date:	December 4, 2023	Previous Calibration:	November 30, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:30	End Time (MST):	14:46
Analyzer make:	Thermo 55i	Analyzer serial #:	1426262594

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999979	≥0.995
9.14	9.19	0.9945			
4.57	4.59	0.9947	Slope	1.004132	0.90 - 1.10
2.28	2.33	0.9785			
			Intercept	0.014813	+/-0.5



NMHC Calibration Plot Date: December 4, 2023 Location: Conklin



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	December 8, 2023	Last Cal Date:	December 4, 2023
Start time (MST):	10:36	End time (MST):	13:44
Reason:	Maintenance		

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 #:	1426262594	
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:	3.82E-04	4.00E-03	NMHC SP Ratio:	9.44E-05	9.39E-05
CH4 Retention time:	14.2	14.6	NMHC Peak Area:	96823	97339
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	16.61	1.031
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	17.03	1.006
second point	4960	40.1	8.56	8.51	1.007
third point	4980	20.0	4.28	4.35	0.984
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	17.13	17.04	1.005
				Average Correction Factor	0.999
Baseline Corr AF:	16.61	Prev response	17.17	*% change	-3.4%
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	9.15	0.999
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	9.14	9.08	1.007
second point	4960	40.1	4.57	4.52	1.012
third point	4980	20.0	2.28	2.28	1.003
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	1.007
Baseline Corr AF:	9.15	Prev response	9.19	*% change	-0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	7.99	7.46	1.070
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	7.95	1.005
second point	4960	40.1	3.99	3.99	1.002
third point	4980	20.0	2.00	2.07	0.963
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	7.99	7.94	1.006
				Average Correction Factor	0.990
Baseline Corr AF:	7.46	Prev response	7.97	*% change	-6.9%
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:	1.000220	0.992179
THC Cal Offset:	0.040771	0.036766
CH4 Cal Slope:	0.995229	0.991837
CH4 Cal Offset:	0.025758	0.036359
NMHC Cal Slope:	1.004132	0.992553
NMHC Cal Offset:	0.014813	-0.000393

Notes: Did not change filter; filter changed last December 4, 2023. Span adjusted.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

THC Calibration Summary

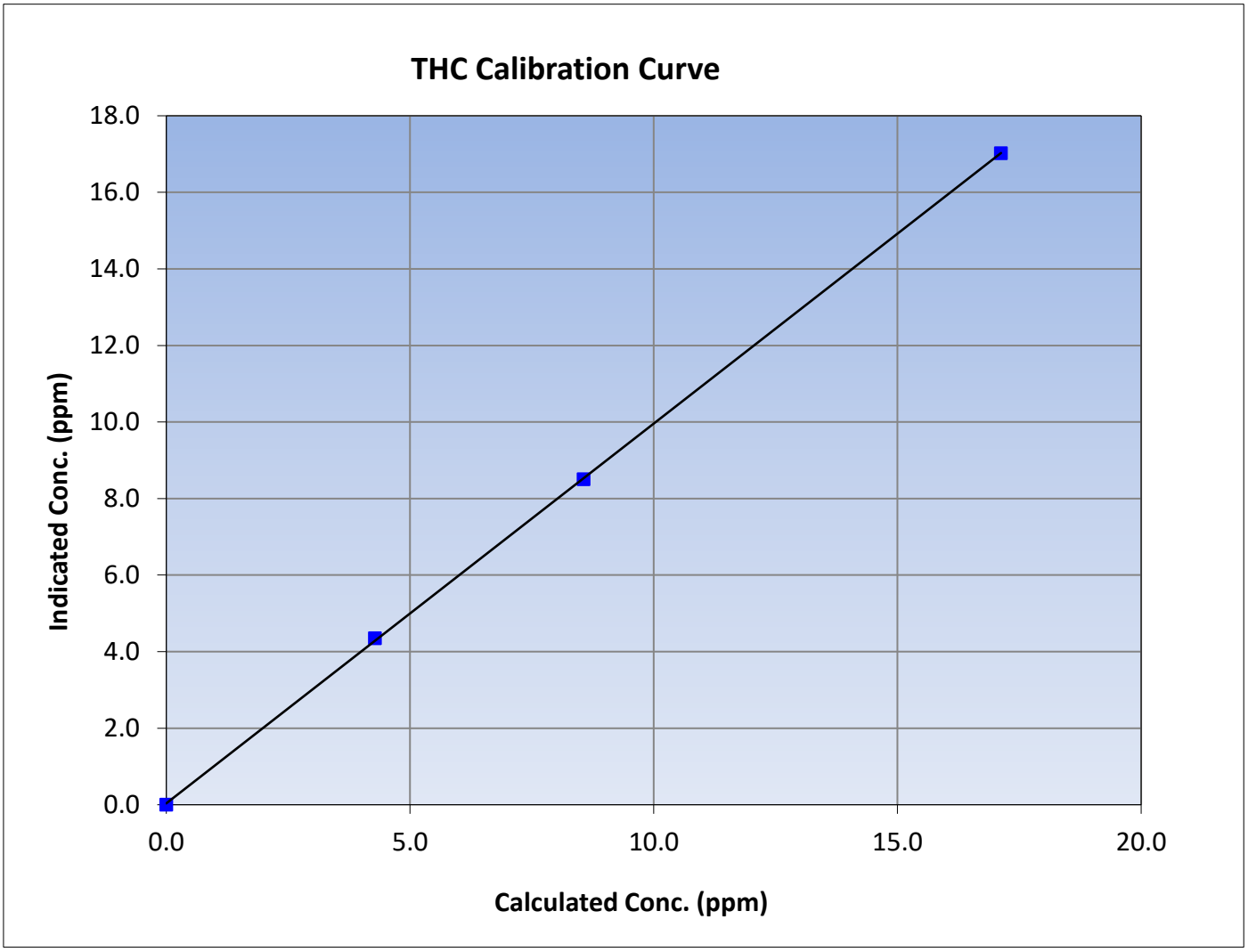
Version-06-2022

Station Information

Calibration Date:	December 8, 2023	Previous Calibration:	December 4, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:36	End Time (MST):	13:44
Analyzer make:	Thermo 55i	Analyzer serial #:	1426262594

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999958	≥0.995
17.13	17.03	1.0059			
8.56	8.51	1.0068	Slope	0.992179	0.90 - 1.10
4.28	4.35	0.9837			
			Intercept	0.036766	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

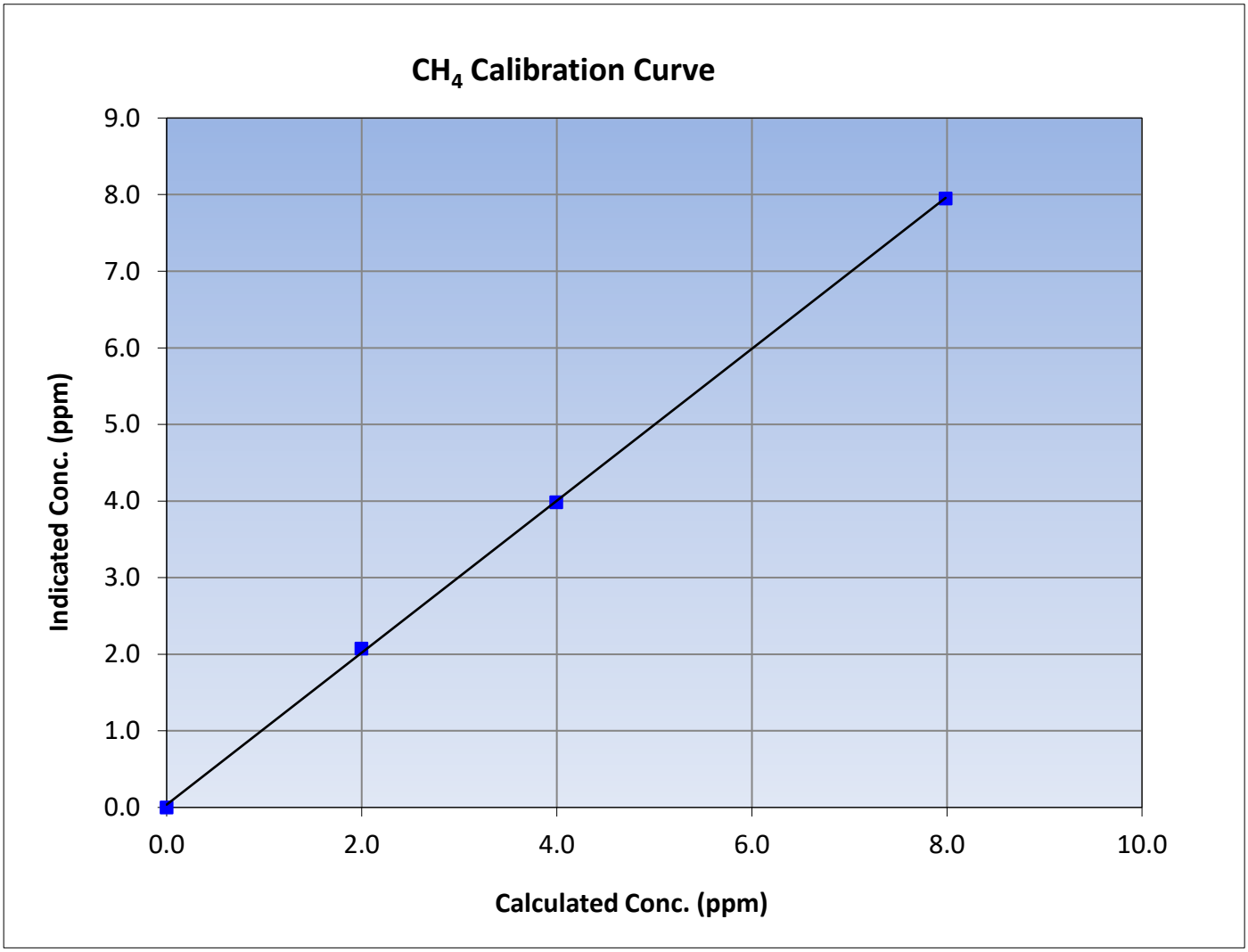
Version-06-2022

Station Information

Calibration Date:	December 8, 2023	Previous Calibration:	December 4, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:36	End Time (MST):	13:44
Analyzer make:	Thermo 55i	Analyzer serial #:	1426262594

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999863	*≥0.995*
7.99	7.95	1.0047			
3.99	3.99	1.0020	Slope	0.991837	*0.90 - 1.10*
2.00	2.07	0.9631			
			Intercept	0.036359	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

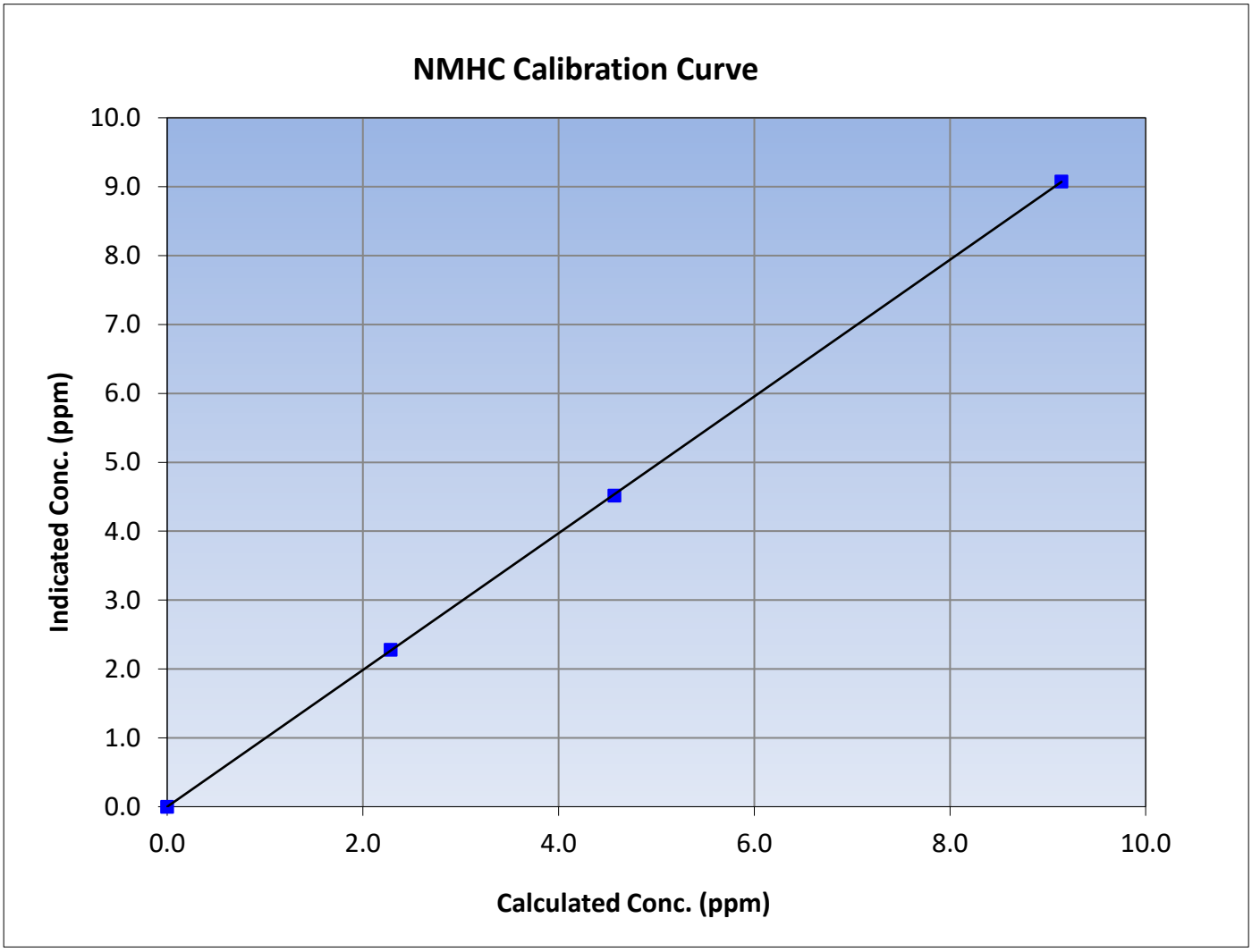
Version-06-2022

Station Information

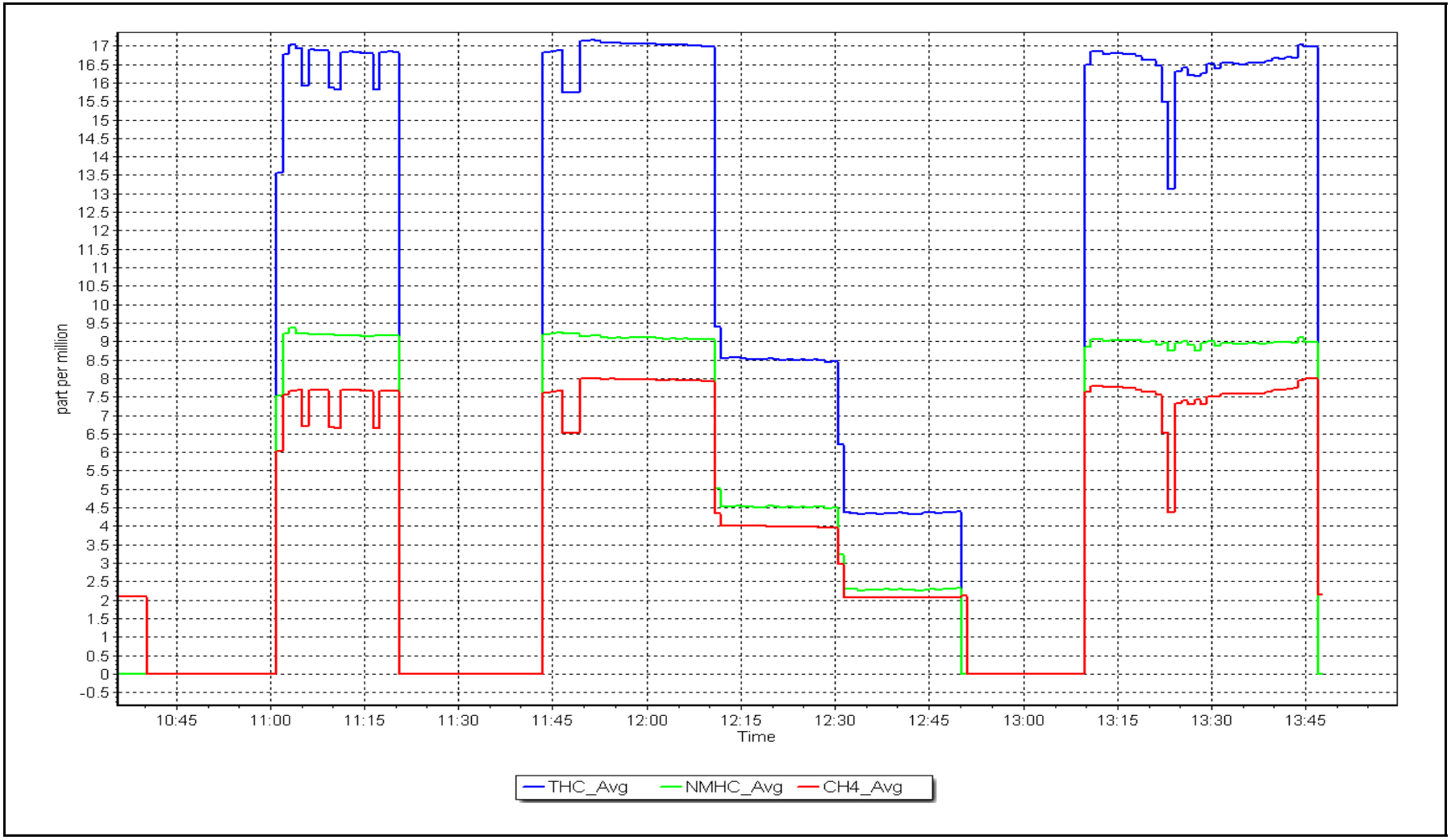
Calibration Date:	December 8, 2023	Previous Calibration:	December 4, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:36	End Time (MST):	13:44
Analyzer make:	Thermo 55i	Analyzer serial #:	1426262594

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
9.14	9.08	1.0069			
4.57	4.52	1.0117	Slope	0.992553	0.90 - 1.10
2.28	2.28	1.0025			
			Intercept	-0.000393	+/-0.5



NMHC Calibration Plot Date: December 8, 2023 Location: Conklin



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	December 11, 2023	Last Cal Date:	December 4, 2023
Start time (MST):	11:28	End time (MST):	12:53
Reason:	Removal		

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 #:	1426262594	
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:	3.82E-04	N/A	NMHC SP Ratio:	9.44E-05	N/A
CH4 Retention time:	14.2	N/A	NMHC Peak Area:	96823	N/A
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	16.79	1.020
as found 2nd point	4960	40.1	8.56	8.43	1.016
as found 3rd point	4980	20.0	4.27	4.32	0.988
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	

Baseline Corr AF:	16.79	Prev response	17.17	*% change	-2.3%
Baseline Corr 2nd AF:	8.4	AF Slope:	0.977974	AF Intercept:	0.060517
Baseline Corr 3rd AF:	4.3	AF Correlation:	0.999928	* = > +/-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	4960	40.1	4.57	4.53	1.009
as found 3rd point	4980	20.0	2.28	2.28	1.001
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	9.11	Prev response	9.19	*% change	-0.9%
Baseline Corr 2nd AF:	4.5	AF Slope:	0.996321	AF Intercept:	-0.003579
Baseline Corr 3rd AF:	2.3	AF Correlation:	0.999988	* = > +/-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	7.68	1.040
as found 2nd point	4960	40.1	3.99	3.90	1.025
as found 3rd point	4980	20.0	1.99	2.05	0.974
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	7.68	Prev response	7.97	*% change	-3.8%
Baseline Corr 2nd AF:	3.90	AF Slope:	0.956920	AF Intercept:	0.063297
Baseline Corr 3rd AF:	2.05	AF Correlation:	0.999669	* = > +/-5% change initiates investigation	

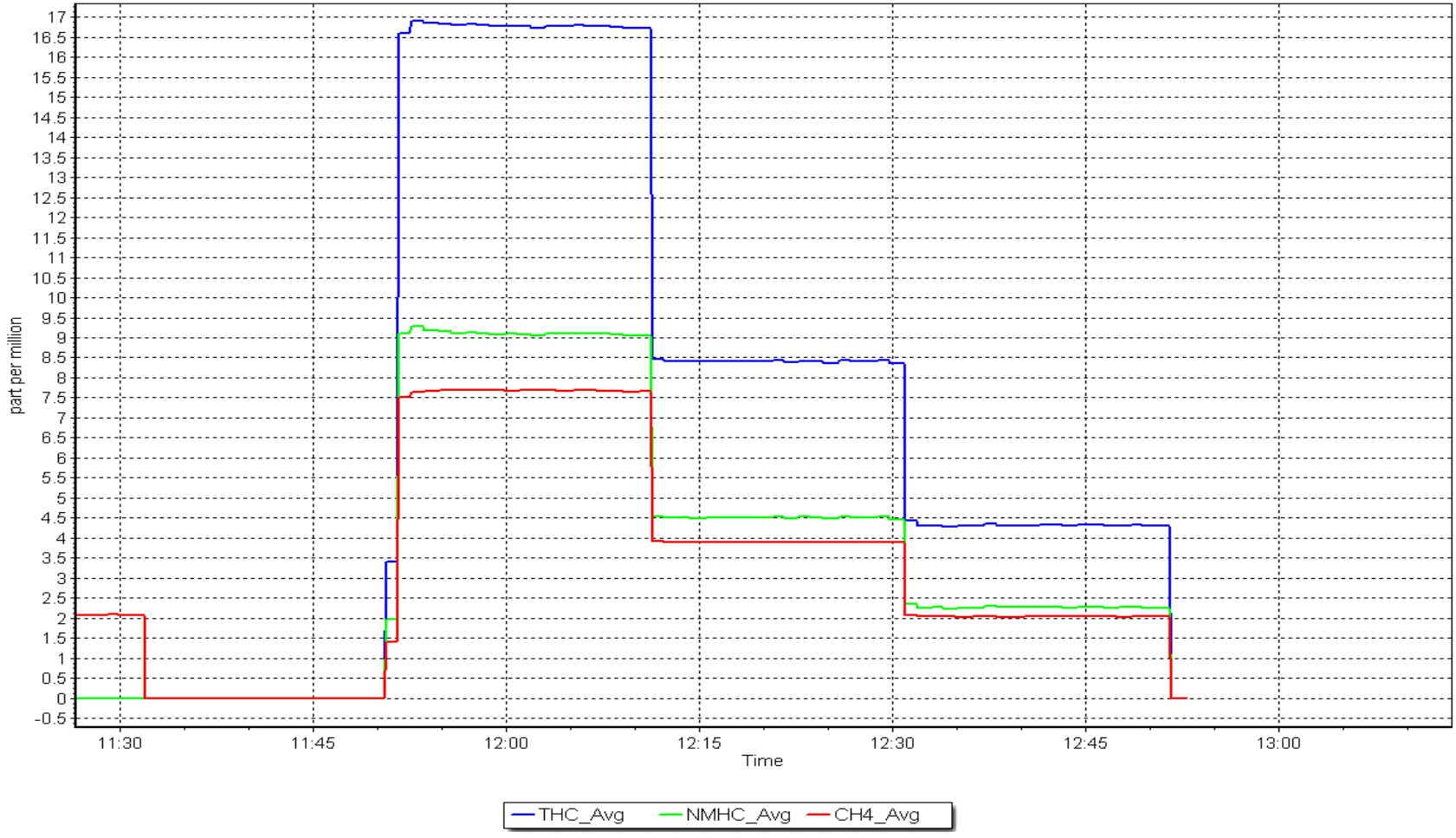
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000220	N/A
THC Cal Offset:	0.040771	N/A
CH4 Cal Slope:	0.995229	N/A
CH4 Cal Offset:	0.025758	N/A
NMHC Cal Slope:	1.004132	N/A
NMHC Cal Offset:	0.014813	N/A

Notes: Baseline dipping during daily system checks. Removing instrument for further troubleshooting in the shop.

Calibration Performed By: Jan Castro

NMHC Calibration Plot Date: December 11, 2023 Location: Conklin



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	December 11, 2023	Last Cal Date:	N/A
Start time (MST):	13:20	End time (MST):	16:00
Reason:	Install		

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:	N/A	4.00E-03	NMHC SP Ratio:	N/A	9.39E-05
CH4 Retention time:	N/A	14.6	NMHC Peak Area:	N/A	97339
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					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	17.13	17.12	1.000
second point	4960	40.1	8.56	8.50	1.007
third point	4980	20.0	4.28	4.30	0.996
as left zero	5000	0.0	0.00	0.02	----
as left span	4920	80.2	17.13	16.71	1.025
				Average Correction Factor	1.001

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	80.2	9.14	9.13	1.001
second point	4960	40.1	4.57	4.57	1.001
third point	4980	20.0	2.28	2.30	0.992
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	9.14	8.96	1.020
				Average Correction Factor	0.998
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	80.2	7.99	7.99	1.000
second point	4960	40.1	3.99	3.93	1.016
third point	4980	20.0	2.00	2.00	1.000
as left zero	5000	0.0	0.00	0.02	----
as left span	4920	80.2	7.99	7.75	1.031
				Average Correction Factor	1.005
Baseline Corr AF:	NA	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	N/A	0.998913
THC Cal Offset:	N/A	-0.004433
CH4 Cal Slope:	N/A	0.999250
CH4 Cal Offset:	N/A	-0.013042
NMHC Cal Slope:	N/A	0.998205
NMHC Cal Offset:	N/A	0.009009

Notes: Installation Calibration. Span adjusted.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

THC Calibration Summary

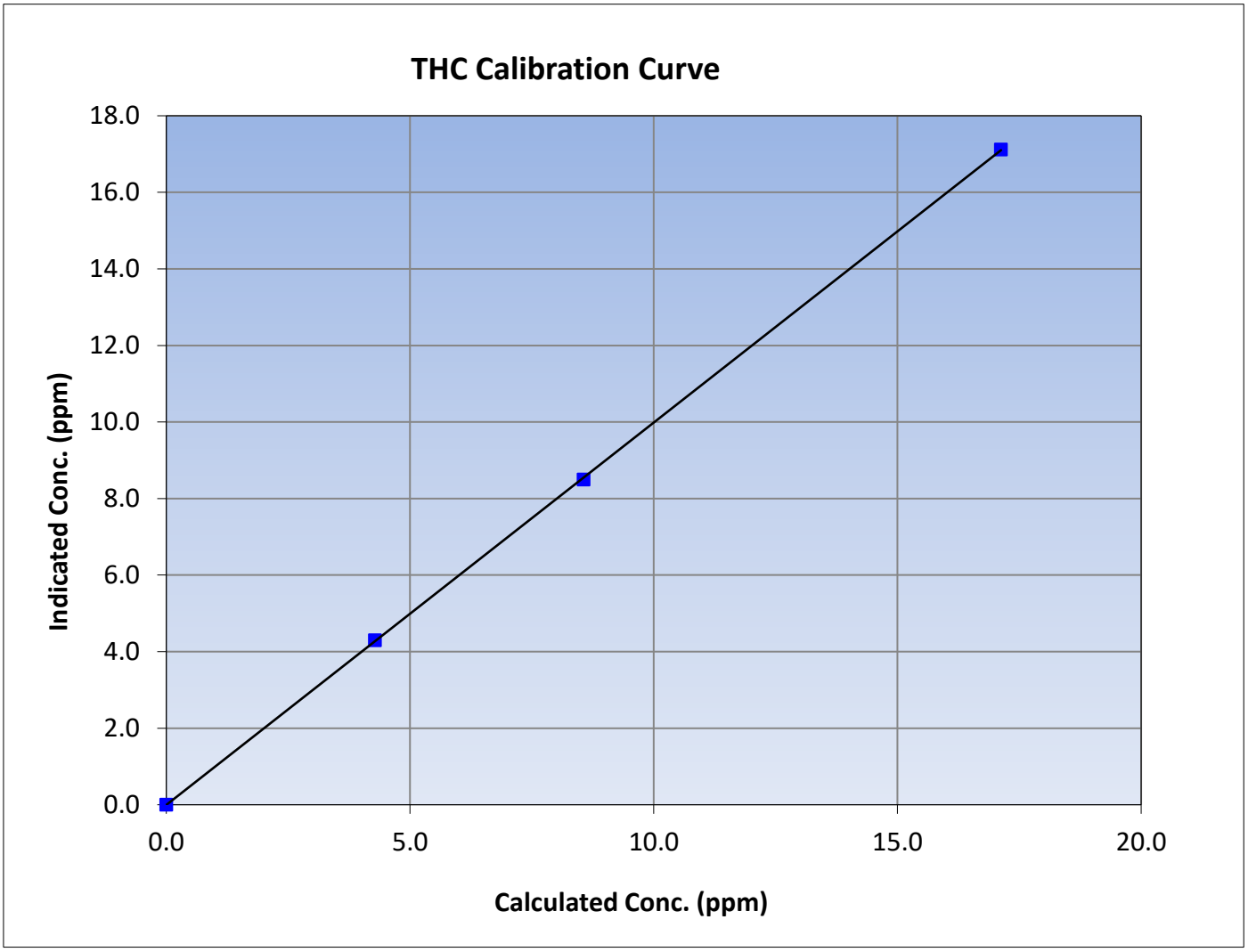
Version-06-2022

Station Information

Calibration Date:	December 11, 2023	Previous Calibration:	N/A
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	13:20	End Time (MST):	16:00
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	0.999978	*≥0.995*
17.13	17.12	1.0003			
8.56	8.50	1.0074	Slope	0.998913	*0.90 - 1.10*
4.28	4.30	0.9959			
			Intercept	-0.004433	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

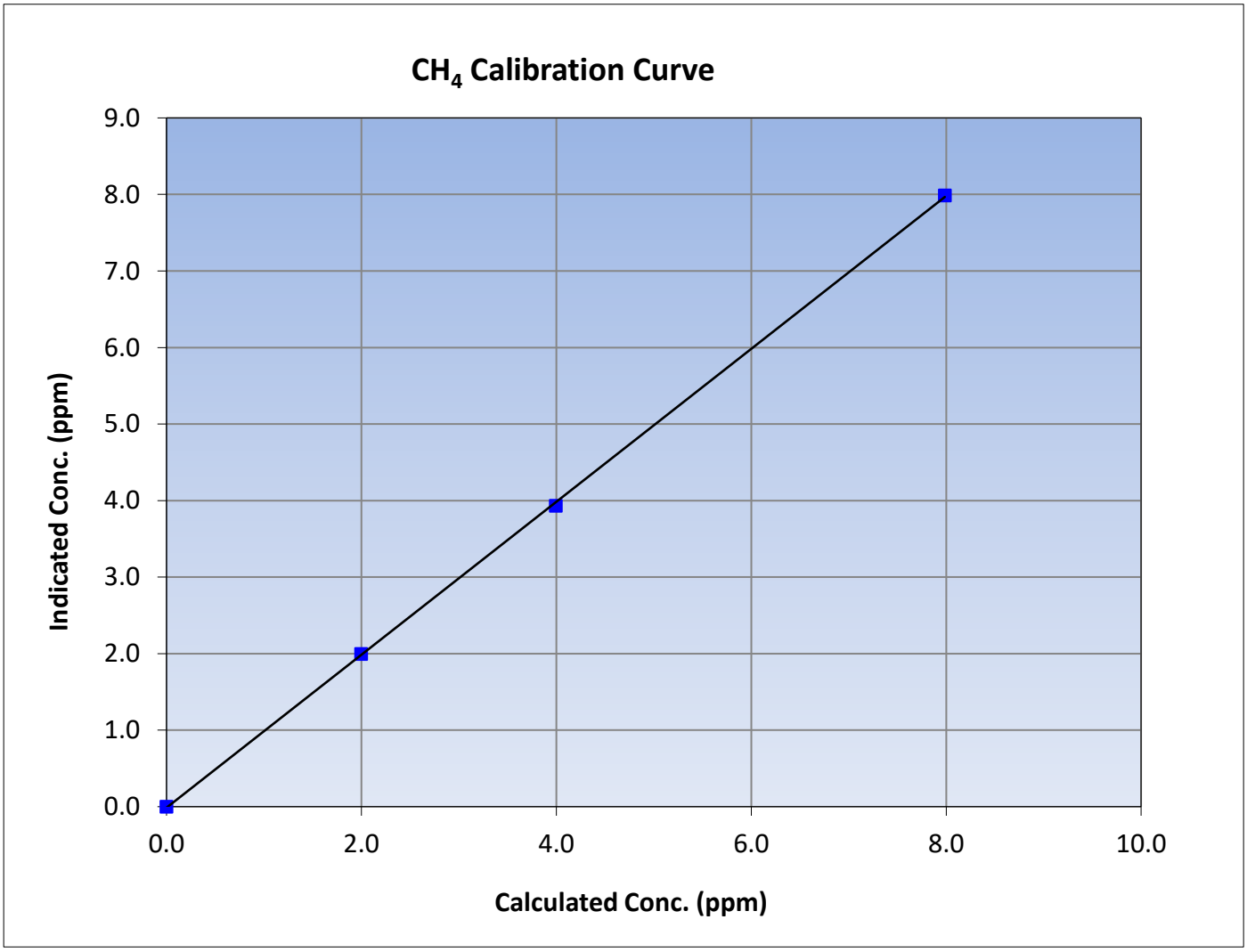
Version-06-2022

Station Information

Calibration Date:	December 11, 2023	Previous Calibration:	N/A
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	13:20	End Time (MST):	16:00
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	0.999914	≥0.995
7.99	7.99	0.9999			
3.99	3.93	1.0161	Slope	0.999250	0.90 - 1.10
2.00	2.00	1.0003			
			Intercept	-0.013042	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

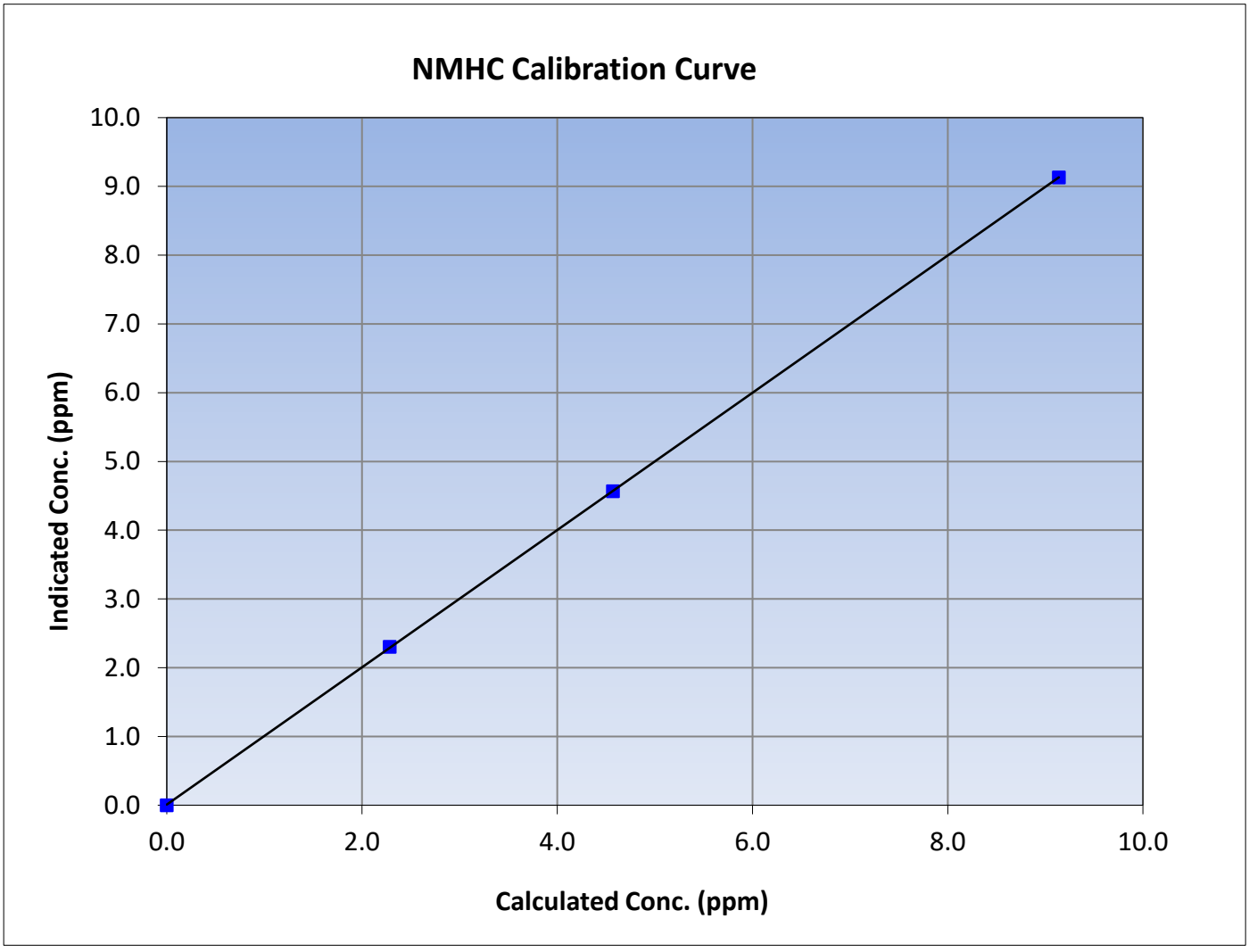
Version-06-2022

Station Information

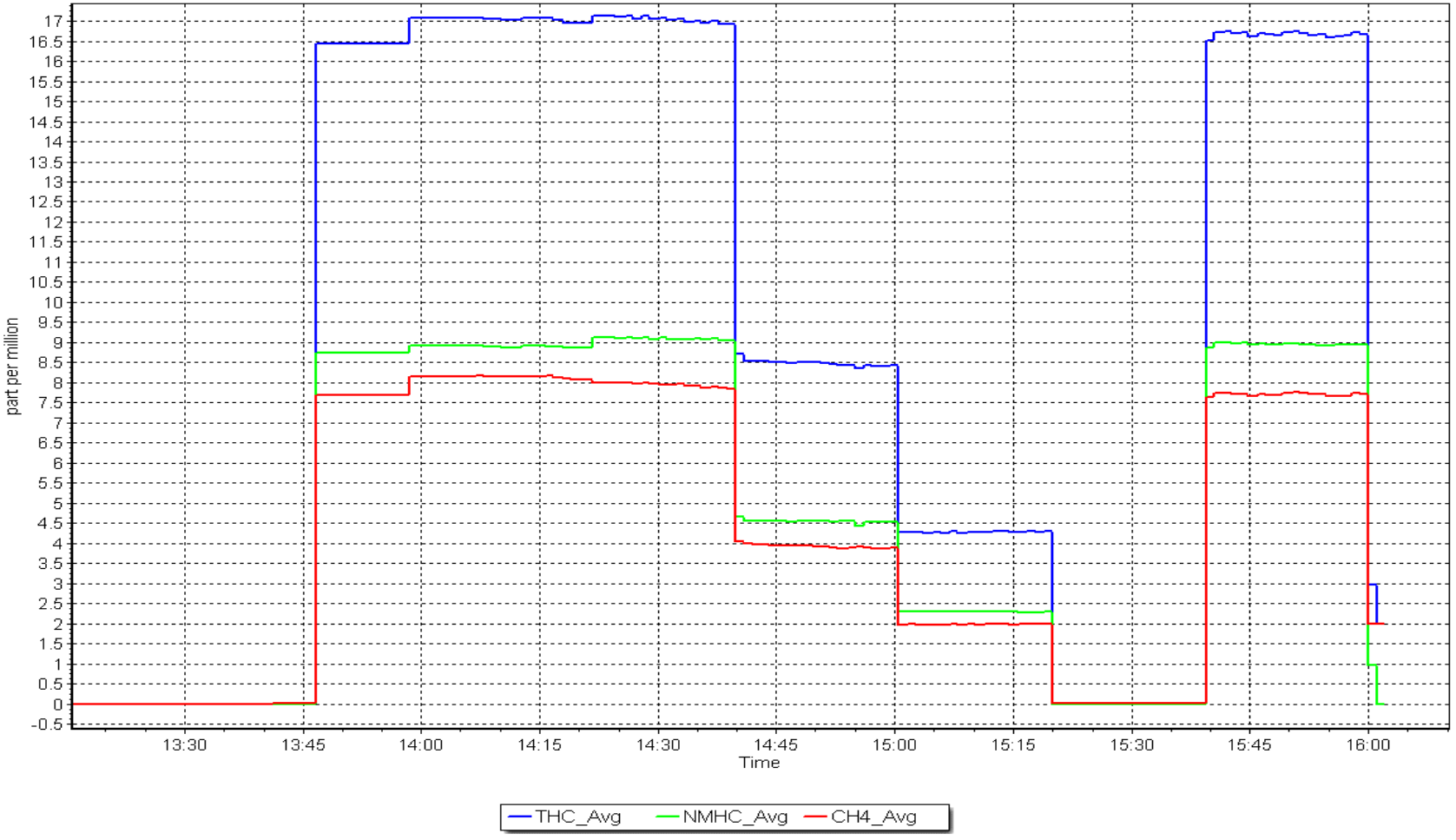
Calibration Date:	December 11, 2023	Previous Calibration:	N/A
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	13:20	End Time (MST):	16:00
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999993	≥0.995
9.14	9.13	1.0010			
4.57	4.57	1.0006	Slope	0.998205	0.90 - 1.10
2.28	2.30	0.9916			
			Intercept	0.009009	+/-0.5



NMHC Calibration Plot Date: December 11, 2023 Location: Conklin



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	December 14, 2023	Last Cal Date:	December 11, 2023
Start time (MST):	10:56	End time (MST):	13:45
Reason:	Maintenance		

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:	4.00E-03	3.69E-04	NMHC SP Ratio:	9.39E-05	7.47E-05
CH4 Retention time:	14.6	17.2	NMHC Peak Area:	97339	122336
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	17.04	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	17.13	17.10	1.001
second point	4960	40.1	8.56	8.57	0.999
third point	4980	20.0	4.28	4.34	0.986
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	17.13	17.16	0.998
				Average Correction Factor	0.996

Baseline Corr AF:	17.04	Prev response	17.10	*% 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	80.2	9.14	8.89	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	9.14	9.14	1.000
second point	4960	40.1	4.57	4.59	0.995
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	9.15	0.999
				Average Correction Factor	0.993
Baseline Corr AF:	8.89	Prev response	9.13	*% change	-2.7%
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	4920	80.2	7.99	8.15	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	80.2	7.99	7.96	1.003
second point	4960	40.1	3.99	3.98	1.003
third point	4980	20.0	2.00	2.02	0.989
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	7.99	8.02	0.996
				Average Correction Factor	0.998
Baseline Corr AF:	8.15	Prev response	7.97	*% change	2.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.998913	0.997358
THC Cal Offset:	-0.004433	0.029967
CH4 Cal Slope:	0.999250	0.995501
CH4 Cal Offset:	-0.013042	0.011557
NMHC Cal Slope:	0.998205	0.998993
NMHC Cal Offset:	0.009009	0.018610

Notes: Changed inlet filters after as founds. Span adjusted.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

THC Calibration Summary

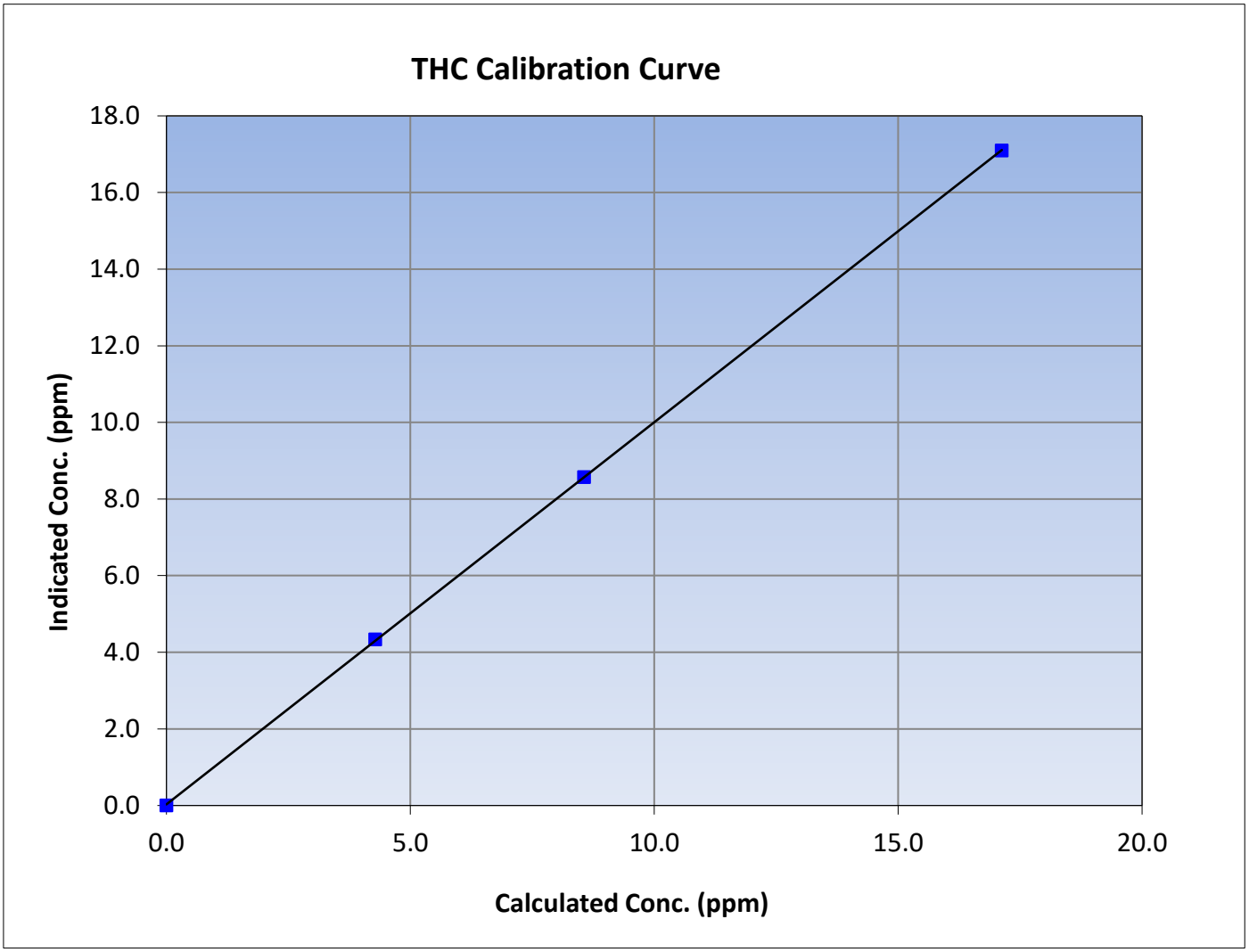
Version-06-2022

Station Information

Calibration Date:	December 14, 2023	Previous Calibration:	December 11, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:56	End Time (MST):	13:45
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	0.999984	*≥0.995*
17.13	17.10	1.0015			
8.56	8.57	0.9992	Slope	0.997358	*0.90 - 1.10*
4.28	4.34	0.9865			
			Intercept	0.029967	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

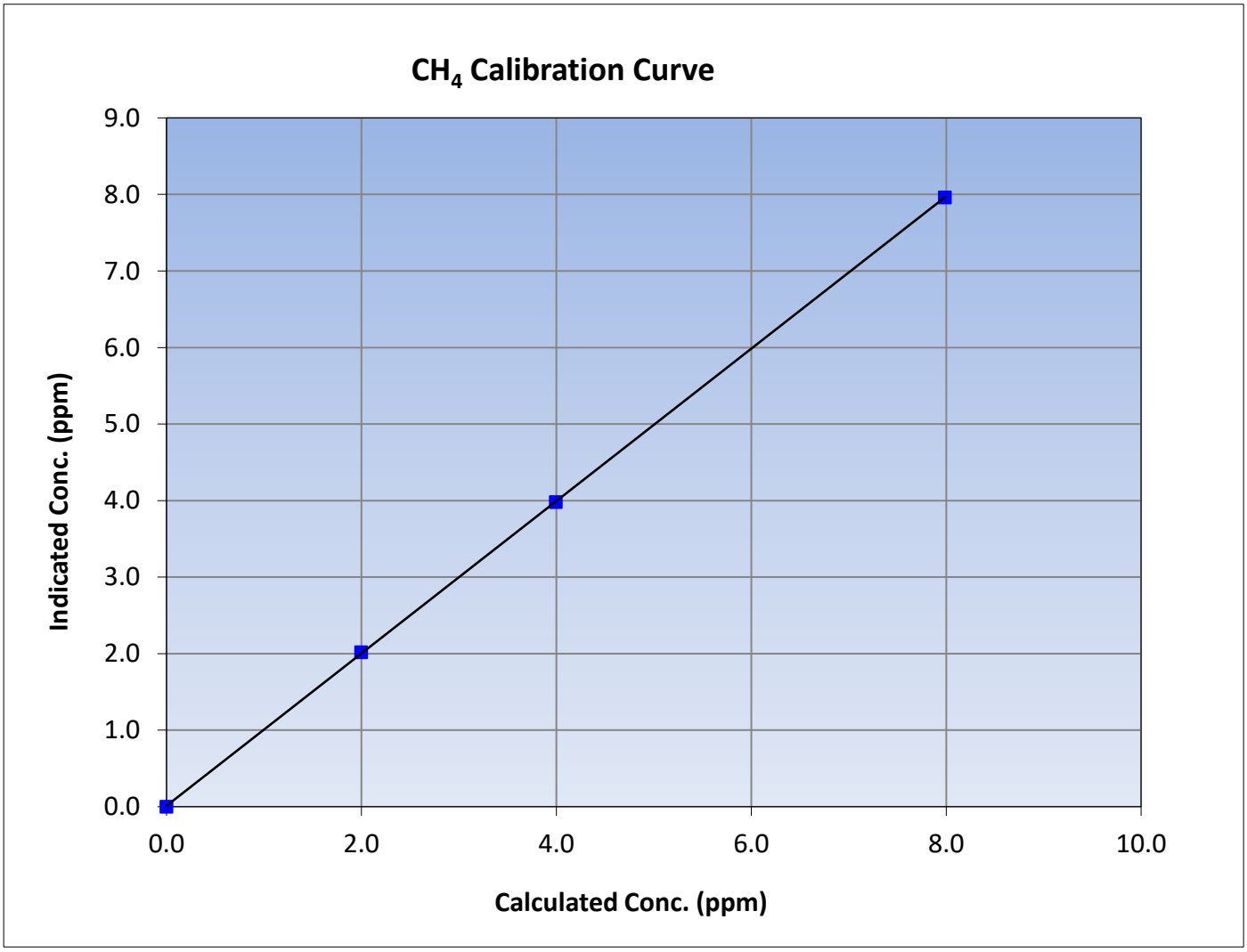
Version-06-2022

Station Information

Calibration Date:	December 14, 2023	Previous Calibration:	December 11, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:56	End Time (MST):	13:45
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	0.999983	*≥0.995*
7.99	7.96	1.0033			
3.99	3.98	1.0033	Slope	0.995501	*0.90 - 1.10*
2.00	2.02	0.9889			
			Intercept	0.011557	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

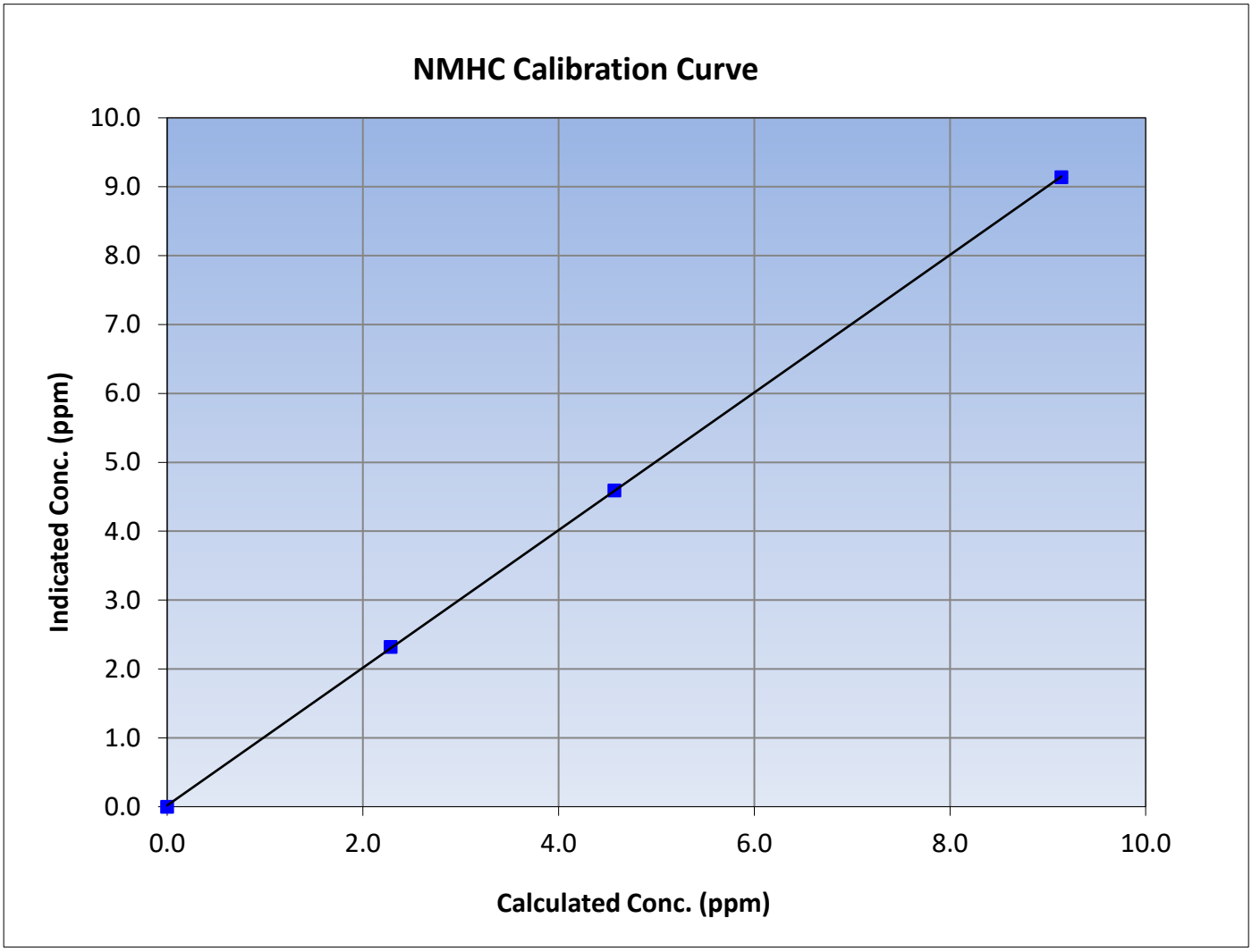
Version-06-2022

Station Information

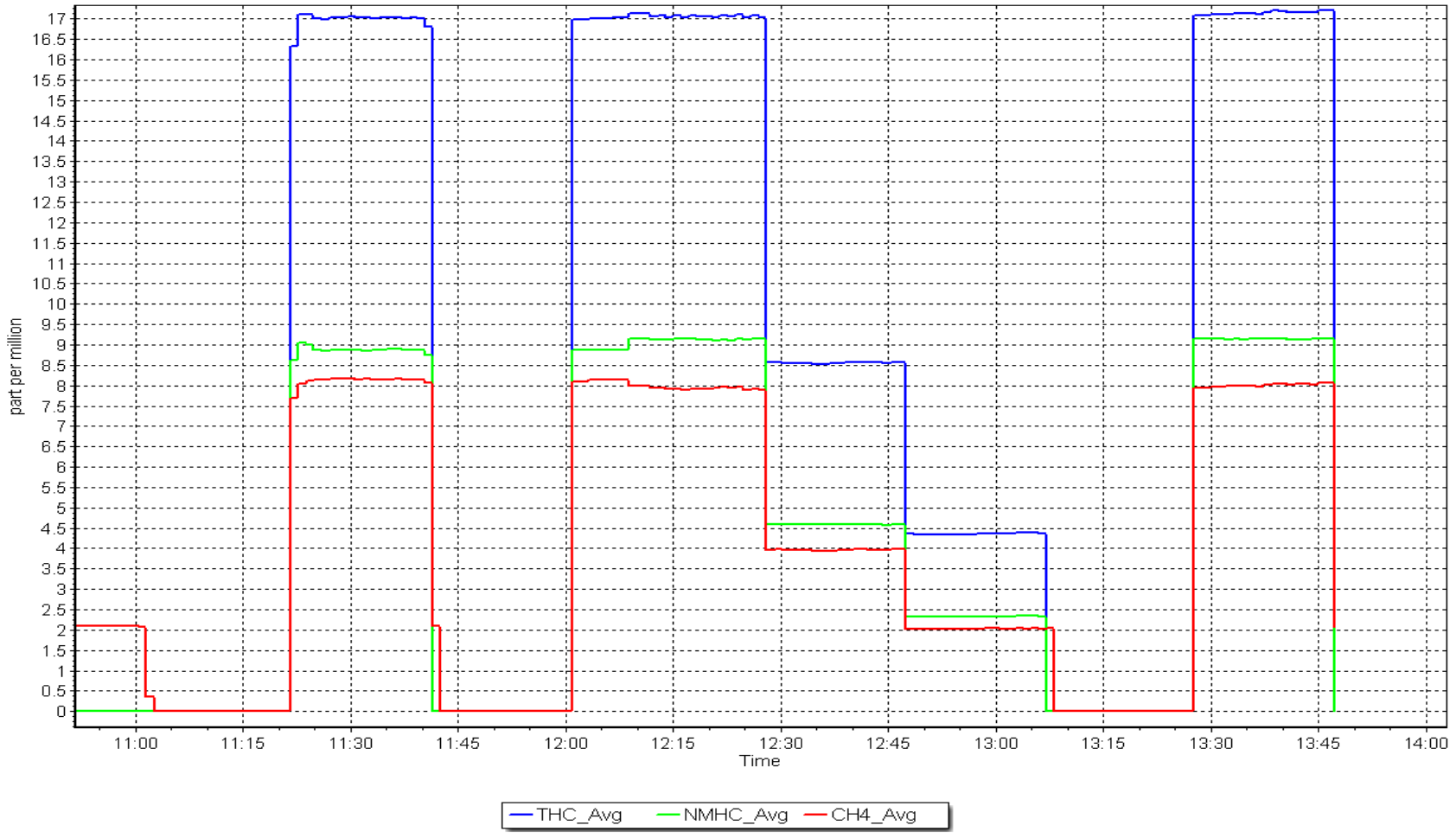
Calibration Date:	December 14, 2023	Previous Calibration:	December 11, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:56	End Time (MST):	13:45
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999981	*≥0.995*
9.14	9.14	0.9999			
4.57	4.59	0.9954	Slope	0.998993	*0.90 - 1.10*
2.28	2.32	0.9844			
			Intercept	0.018610	*+/-0.5*



NMHC Calibration Plot Date: December 14, 2023 Location: Conklin



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	December 6, 2023	Last Cal Date:	November 29, 2023
Start time (MST):	11:35	End time (MST):	16:02
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2Y1P1H		Cal Gas Expiry Date:	December 11, 2023	
NOX Cal Gas Conc:	51.09	ppm	NO Cal Gas Conc:	50.39	ppm
Removed Cylinder #:			Removed Gas Exp Date:		
Removed Gas NOX Conc:	51.09	ppm	Removed Gas NO Conc:	50.39	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	3810	
ZAG make/model:	Teledyne API T701H		Serial Number:	691	

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.094	1.077	NO bkgnd or offset:	10.9	10.8
NOX coeff or slope:	1.000	0.999	NOX bkgnd or offset:	11.1	10.9
NO2 coeff or slope:	0.999	1.000	Reaction cell Press:	167.3	151.8

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.003588	0.992390
NO_X Cal Offset:	2.465024	2.363089
NO Cal Slope:	1.004807	0.994482
NO Cal Offset:	1.242275	1.080383
NO_2 Cal Slope:	1.006340	0.991295
NO_2 Cal Offset:	-0.474448	1.480919

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	-0.4	0.1	----	----
as found span	4921	79.4	811.2	800.1	11.1	822.6	811.4	11.2	0.9862	0.9861
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.3	0.2	----	----
high point	4921	79.4	811.2	800.1	11.1	806.2	796.1	10.1	1.0063	1.0051
second point	4960	39.7	405.7	400.1	5.6	406.1	399.7	6.3	0.9990	1.0011
third point	4980	19.8	202.3	199.6	2.8	205.8	200.9	4.9	0.9831	0.9933
as left zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.4	0.1	----	----
as left span	4921	79.4	811.2	379.0	432.2	807.1	378.1	429.0	1.0051	1.0025
								Average Correction Factor	0.9961	0.9998

Corrected As found	NO_X = 822.9 ppb	NO = 811.8 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	0.8%
Previous Response	NO_X = 816.6 ppb	NO = 805.2 ppb			*Percent Change	NO =	0.8%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl: ;	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	793.5	372.4	432.2	429.6	1.0061	99.4%
2nd GPT point (200 ppb O3)	793.5	585.1	219.5	218.7	1.0037	99.6%
3rd GPT point (100 ppb O3)	793.5	690.2	114.4	116.9	0.9787	102.2%
				Average Correction Factor	0.9962	100.4%

Notes: Changed the inlet filter after as founds. Adjusted Span only. Used the 2nd reference point because of drift.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

NO_X Calibration Summary

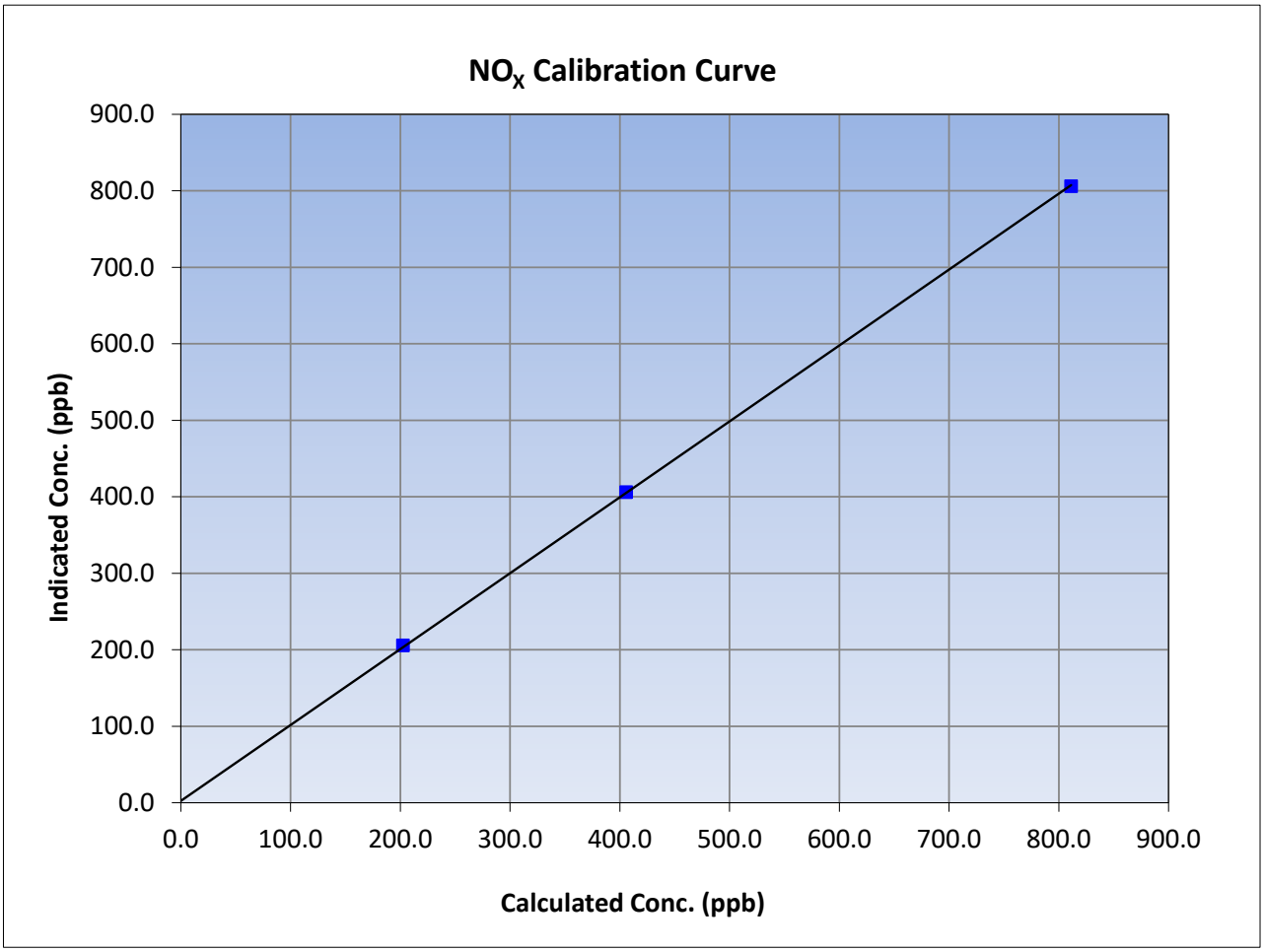
Version-04-2020

Station Information

Calibration Date:	December 6, 2023	Previous Calibration:	November 29, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:35	End Time (MST):	16:02
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	-0.2	----	Correlation Coefficient	0.999954	≥0.995
811.2	806.2	1.0063			
405.7	406.1	0.9990	Slope	0.992390	0.90 - 1.10
202.3	205.8	0.9831			
			Intercept	2.363089	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

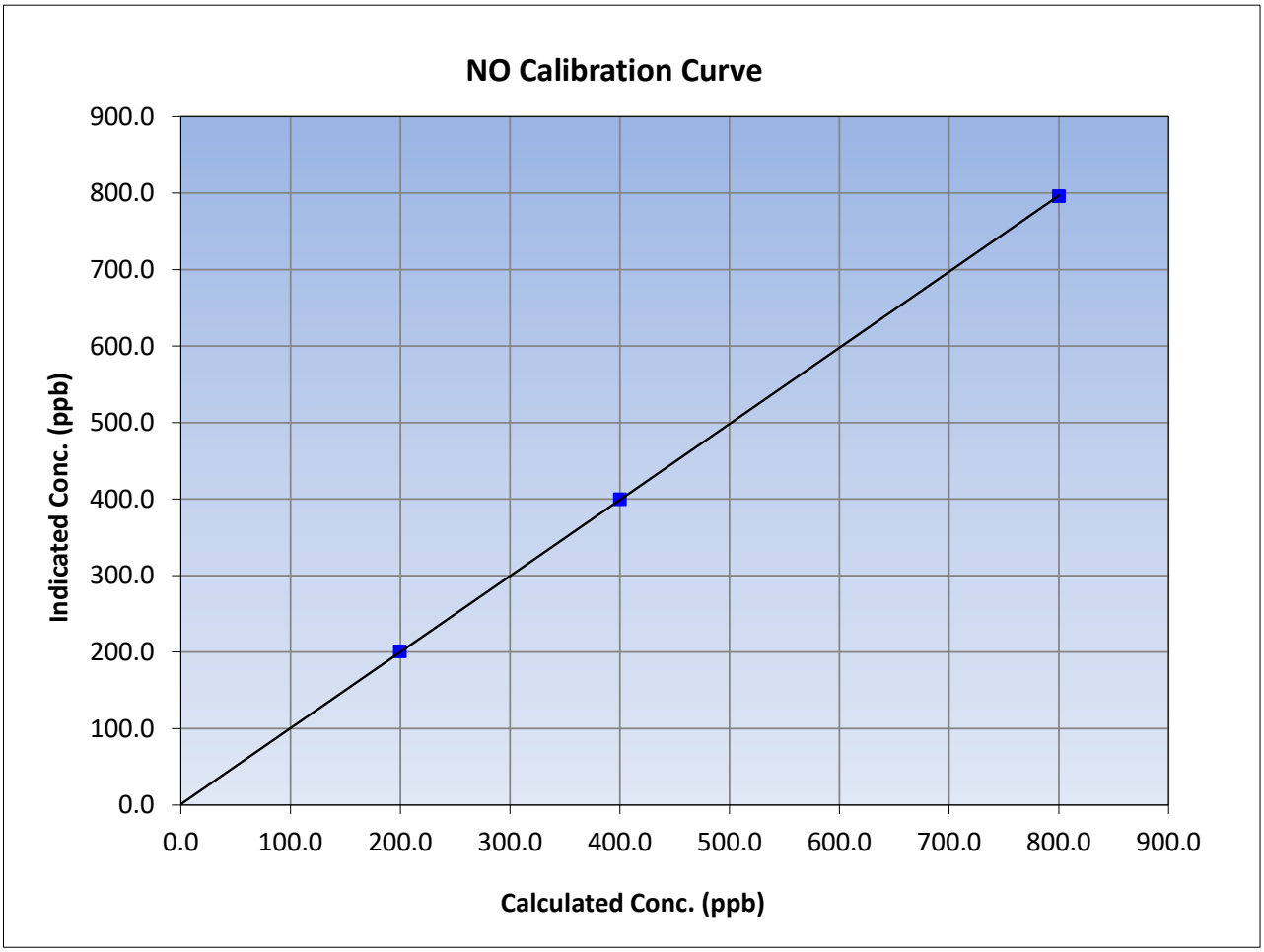
Version-04-2020

Station Information

Calibration Date:	December 6, 2023	Previous Calibration:	November 29, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:35	End Time (MST):	16:02
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	-0.3	----	Correlation Coefficient	0.999986	≥0.995
800.1	796.1	1.0051			
400.1	399.7	1.0011	Slope	0.994482	0.90 - 1.10
199.6	200.9	0.9933			
			Intercept	1.080383	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

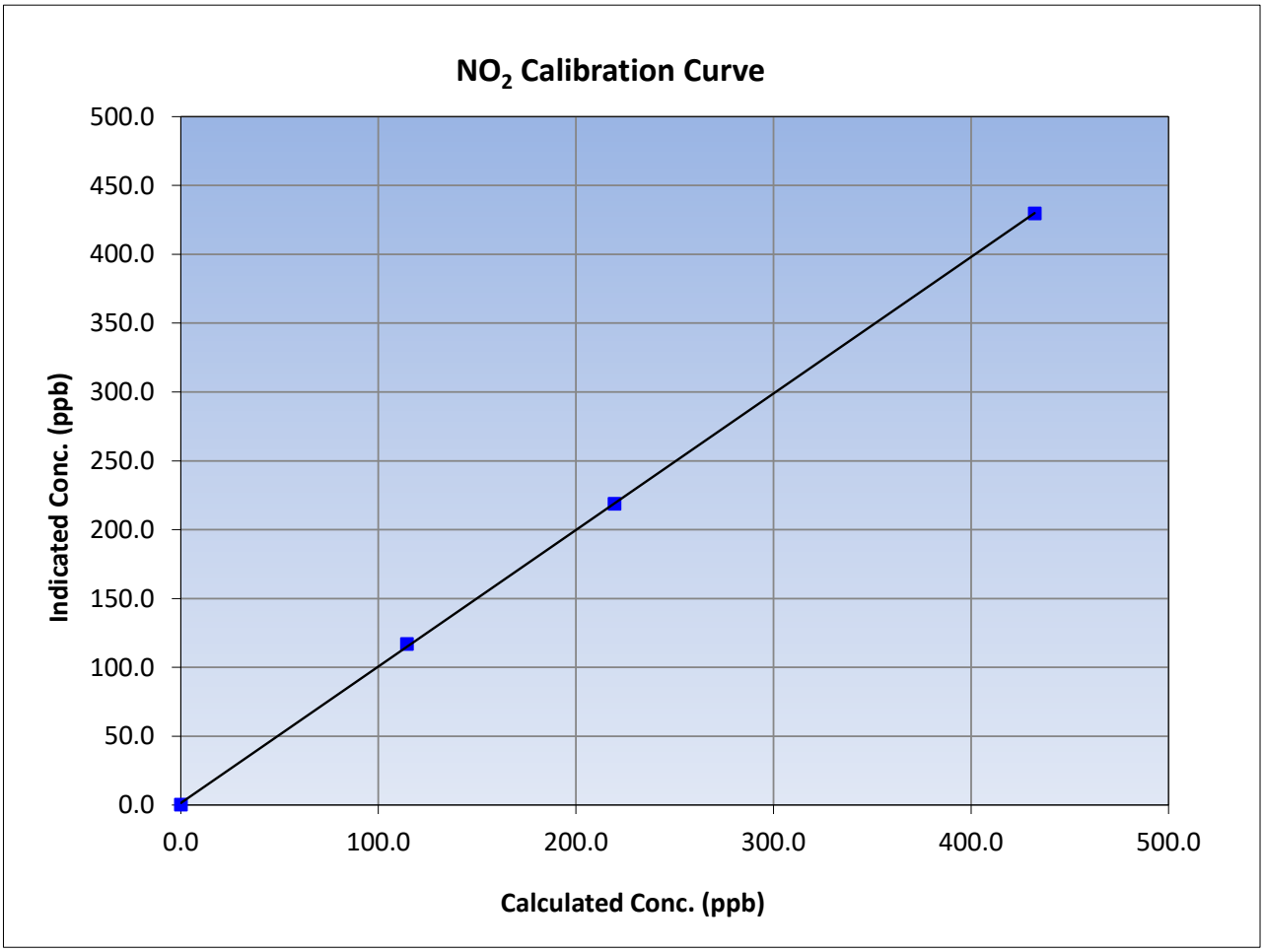
Version-04-2020

Station Information

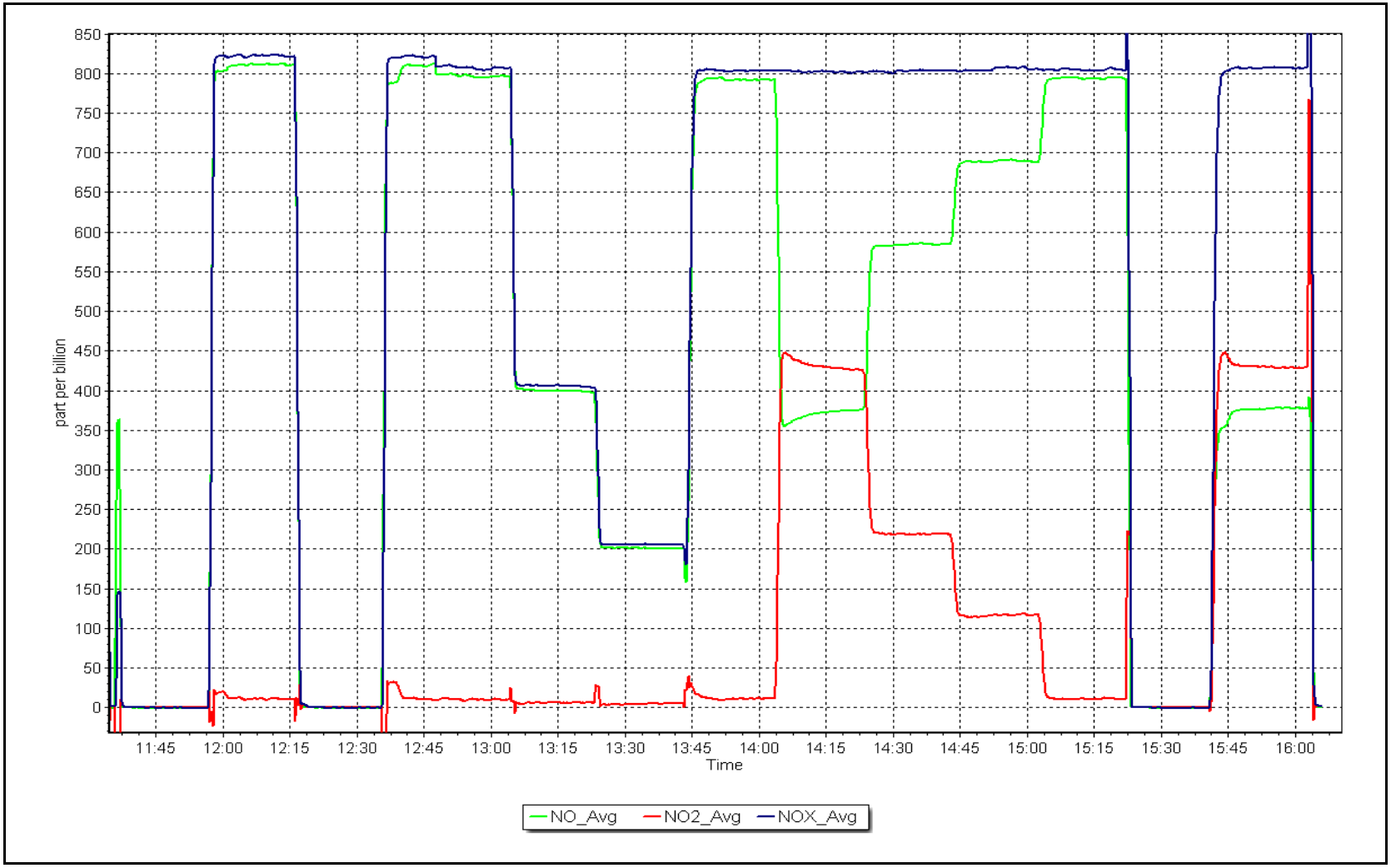
Calibration Date:	December 6, 2023	Previous Calibration:	November 29, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:35	End Time (MST):	16:02
Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999941	≥0.995
432.2	429.6	1.0061			
219.5	218.7	1.0037	Slope	0.991295	0.90 - 1.10
114.4	116.9	0.9787			
			Intercept	1.480919	+/-20



NO_X Calibration Plot Date: December 6, 2023 Location: Conklin



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	December 5, 2023	Last Cal Date:	November 22, 2023
Start time (MST):	11:49	End time (MST):	15:48
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:	1.000543	1.001229	Backgd or Offset:	-1.1	-1.2
Calibration intercept:	0.280000	0.260000	Coeff or Slope:	1.005	0.999

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	0.1	----
as found span	5000	1564.0	400.0	401.8	0.996
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	950.9	400.0	400.4	0.999
second point	5000	804.0	200.0	201.2	0.994
third point	5000	703.6	100.0	100.4	0.996
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	936.0	400.0	401.4	0.997
				Average Correction Factor	0.996

Baseline Corr As found:	401.7	Previous response	400.5	*% change	0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed inlet filters after As Founds. Adjusted span only.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

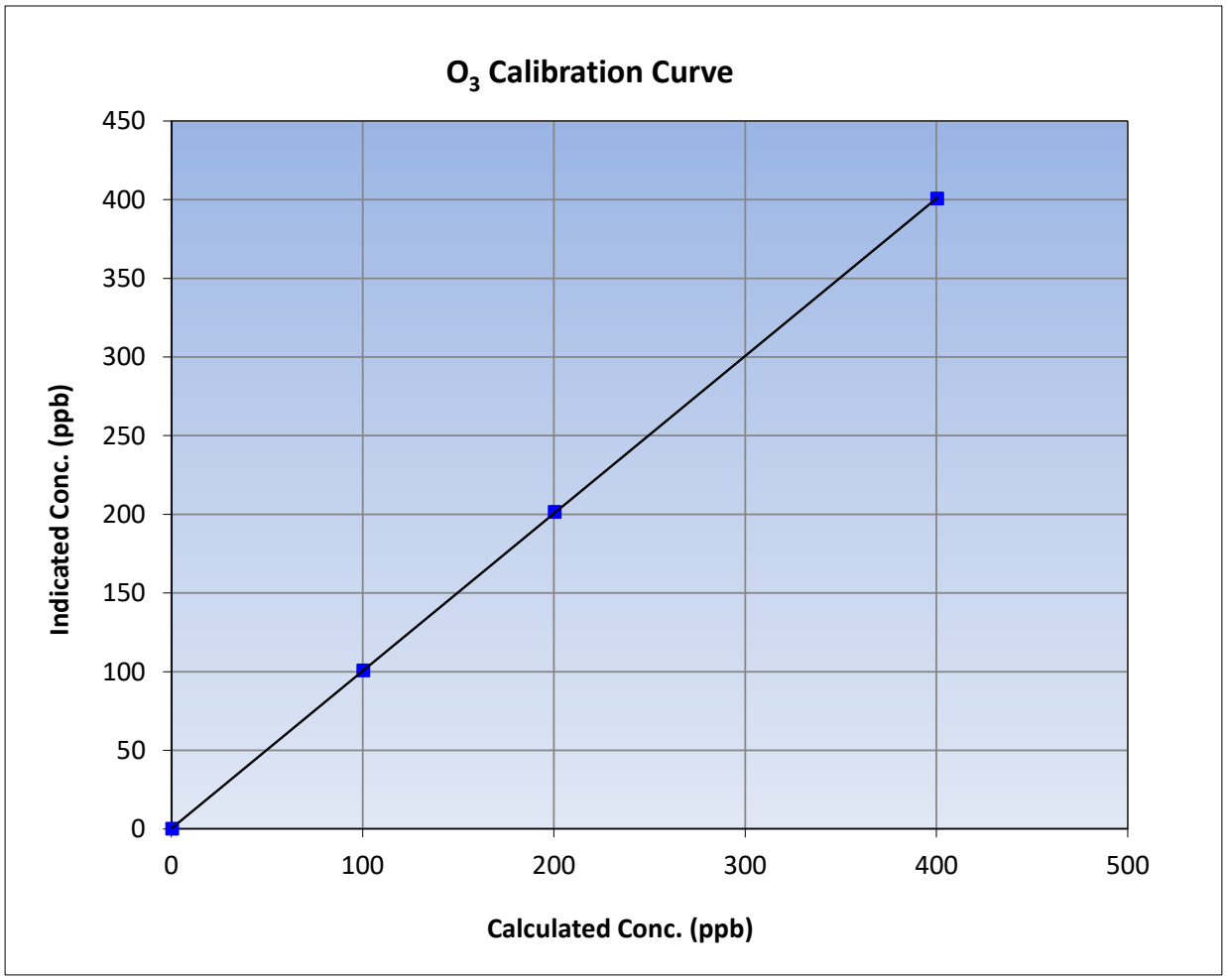
Station Information

Calibration Date:	December 5, 2023	Previous Calibration:	November 22, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:49	End Time (MST):	15:48
Analyzer make:	Thermo 49i	Analyzer serial #:	1501663734

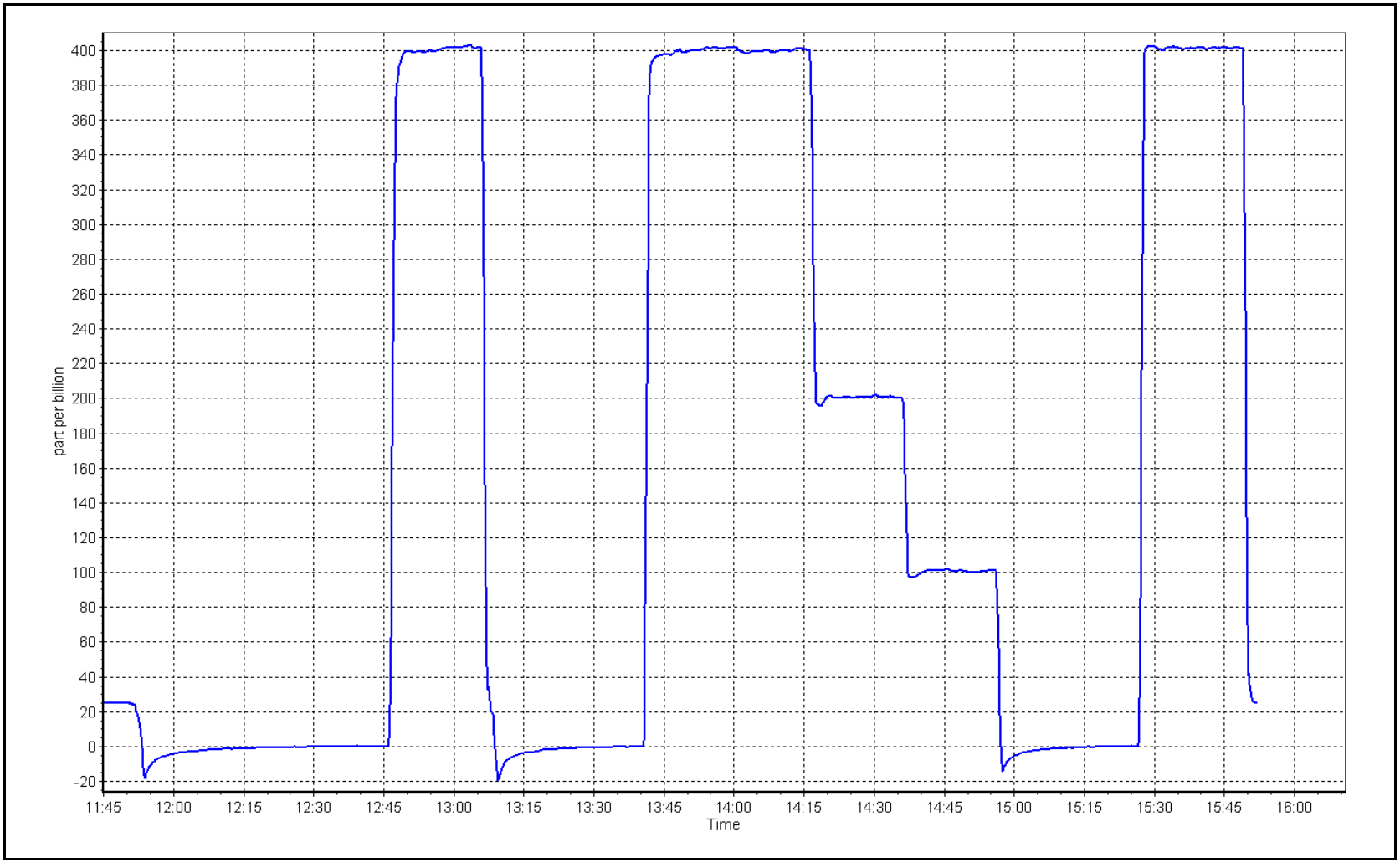
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
400.0	400.4	0.9990
200.0	201.2	0.9940
100.0	100.4	0.9960

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	1.001229	*0.90 - 1.10*
Intercept	0.260000	*+/- 5*



O_3 Calibration Plot Date: December 5, 2023 Location: Conklin



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Conklin	Station number:	AMS 21
Calibration Date:	December 7, 2023	Last Cal Date:	November 30, 2023
Start time (MST):	12:00	End time (MST):	13:54
Analyzer Make:	API T640	S/N:	326
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	ALICAT	S/N:	388751
Temp/RH standard:	ALICAT	S/N:	388751

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (^{o}C)	2	2.48	2	☐	+/- 2 ^{o}C
P (mmHg)	700.7	702.65	700.7	☐	+/- 10 mmHg
flow (LPM)	5.02	5.05	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: December 7, 2023 Last Cal Date: November 30, 2023

PM w/o HEPA: 2.6 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	10.7	10.1	10.7	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 3.3 w/ HEPA: 0

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. PMT adjusted after maintenance.

Calibration by: Jan Castro

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS22
JANVIER

DECEMBER 2023

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

January 31, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	December 5, 2023	Last Cal Date:	November 3, 2023
Start time (MST):	10:44	End time (MST):	15:00
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.11	ppm	Cal Gas Exp Date:	January 18, 2029
Cal Gas Cylinder #:	CC281519			
Removed Cal Gas Conc:	50.11	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3806
ZAG Make/Model:	Teledyne API T701		Serial Number:	4890

Analyzer Information

Analyzer make: Thermo 43i Analyzer serial #: 1152430006

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001365	0.998449	Backgd or Offset:	21.2	23.5
Calibration intercept:	1.843975	0.164515	Coeff or Slope:	0.996	1.015

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	1.9	----
as found span	4920	79.8	799.8	795.6	1.005
as found 2nd point	4960	39.9	399.9	400.7	0.998
as found 3rd point	4980	20.0	200.4	200.6	0.999
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.3	----
high point	4920	79.8	799.8	798.4	1.002
second point	4960	39.9	399.9	399.9	1.000
third point	4980	20.0	200.4	200.6	0.999
as left zero	5000	0.0	0.0	0.1	----
as left span	4920	79.8	799.8	798.9	1.001
				Average Correction Factor	1.000

Baseline Corr As found:	793.70	Previous response	802.72	*% change	-1.1%
Baseline Corr 2nd AF pt:	398.80	AF Slope:	0.992759	AF Intercept:	2.206081
Baseline Corr 3rd AF pt:	198.70	AF Correlation:	0.999991		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

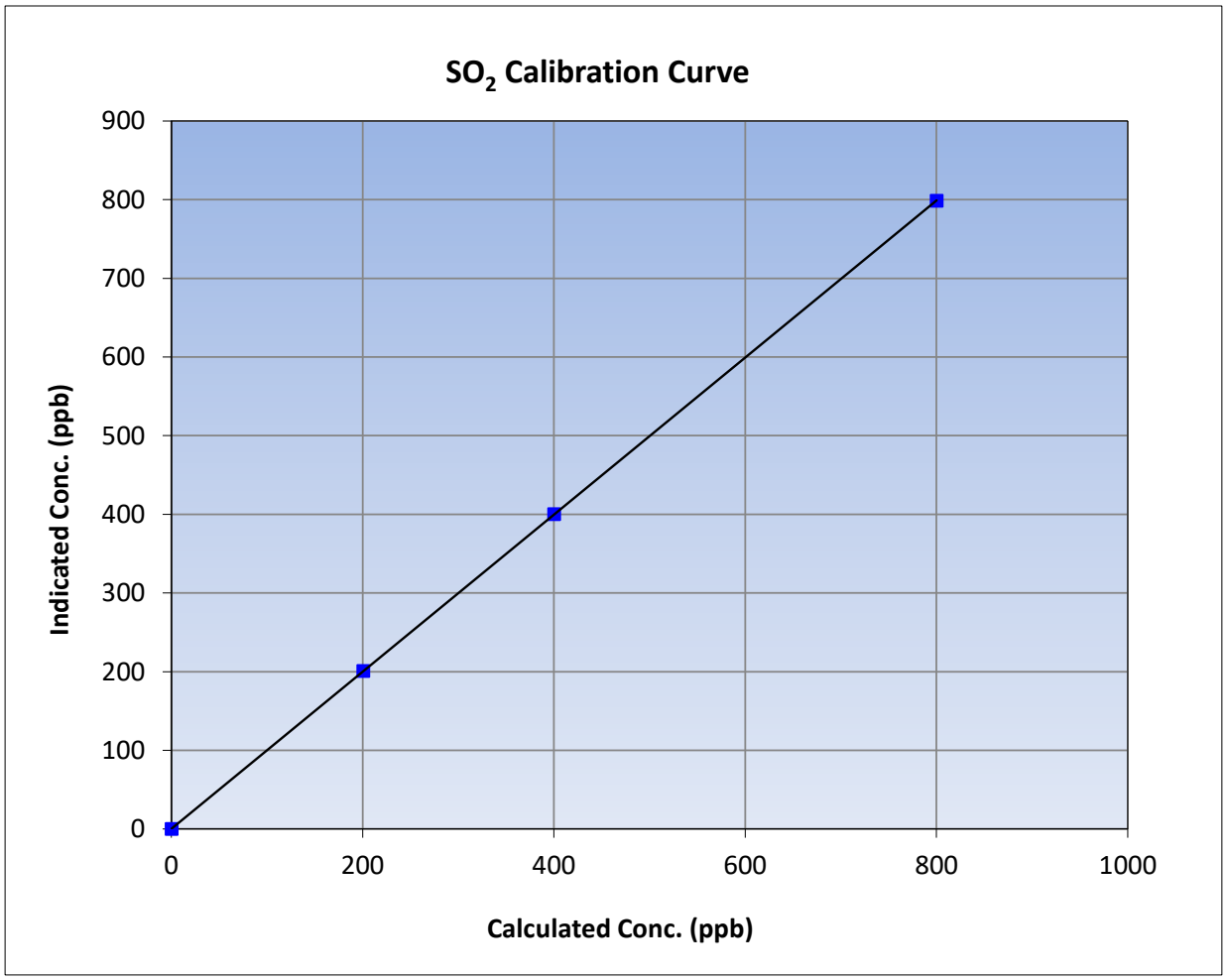
Station Information

Calibration Date:	December 5, 2023	Previous Calibration:	November 3, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:44	End Time (MST):	15:00
Analyzer make:	Thermo 43i	Analyzer serial #:	1152430006

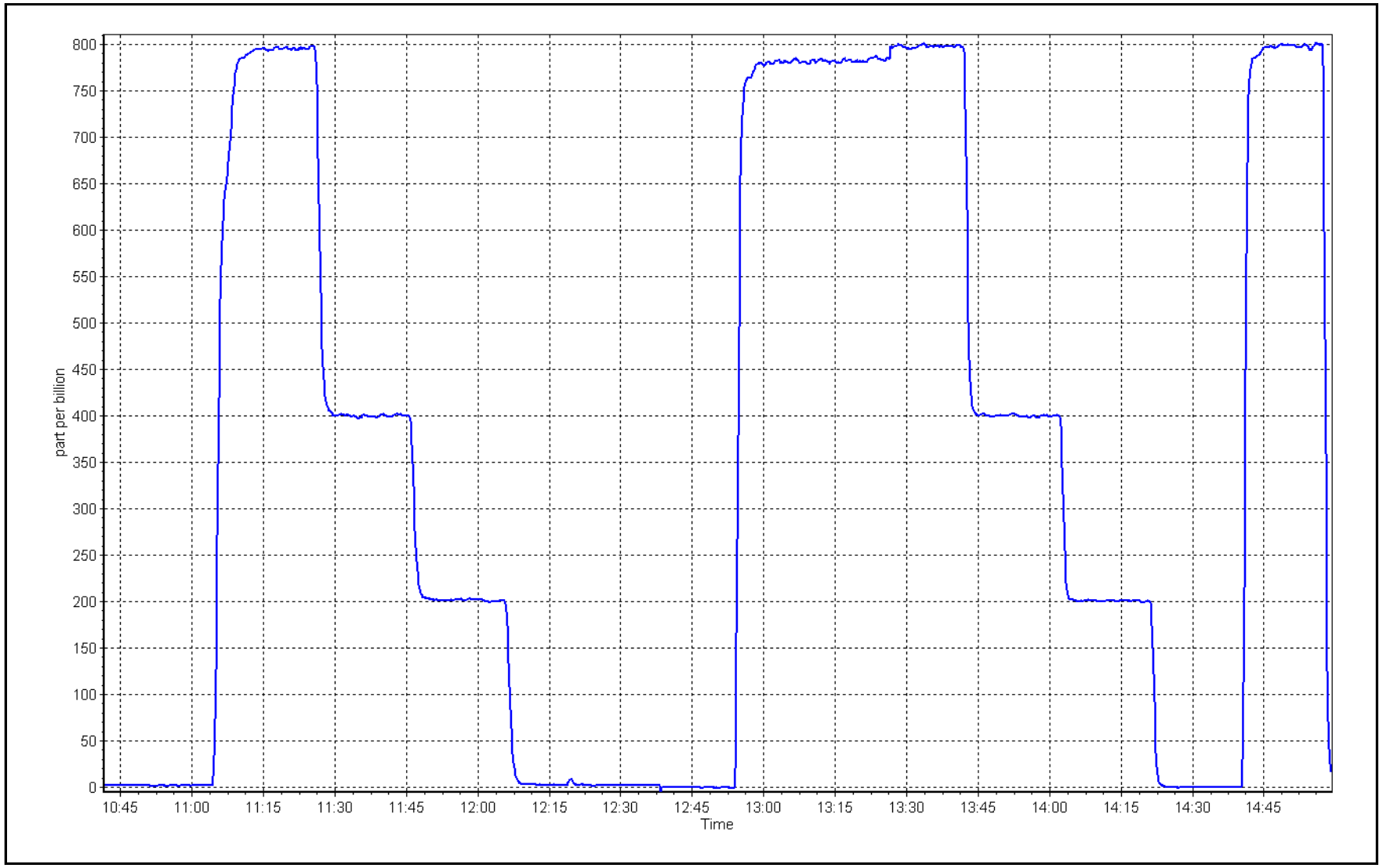
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
799.8	798.4	1.0017
399.9	399.9	1.0000
200.4	200.6	0.9992

Statistical Evaluation		Limits
Correlation Coefficient	0.999998	≥0.995
Slope	0.998449	0.90 - 1.10
Intercept	0.164515	+/-30



SO2 Calibration Plot Date: December 5, 2023 Location: Janvier



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Janvier	Station number:	AMS22
Calibration Date:	December 19, 2023	Last Cal Date:	November 9, 2023
Start time (MST):	10:45	End time (MST):	14:53
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.03	ppm	Cal Gas Exp Date:	April 16, 2022
Cal Gas Cylinder #:	DT0018680			
Removed Cal Gas Conc:	5.03	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3806
ZAG Make/Model:	Teledyne API T701		Serial Number:	4890

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1151680031	
Converter make:	CDN-101		Converter serial #:	587	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.986936	0.997936	Backgd or Offset:	3.04	3.59
Calibration intercept:	0.621094	0.260962	Coeff or Slope:	1.161	1.179

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	79.5	80.0	79.0	1.019
as found 2nd point					
as found 3rd point					
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4920	79.5	80.0	80.0	1.000
second point	4960	39.8	40.0	40.3	0.994
third point	4980	19.9	20.0	20.4	0.981
as left zero	5000	0.0	0.0	0.2	----
as left span	4920	79.5	80.0	79.5	1.006
SO2 Scrubber Check	4920	79.8	798.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.992
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.5	Prev response:	79.56	*% 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: Changed the inlet filter after as founds. Brought a new cal gas cylinder to replace but the new cylinder is leaking, will continue using the old cylinder for now. Ran a SO2 scrubber check after calibrator zero. Adjusted zero and span.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

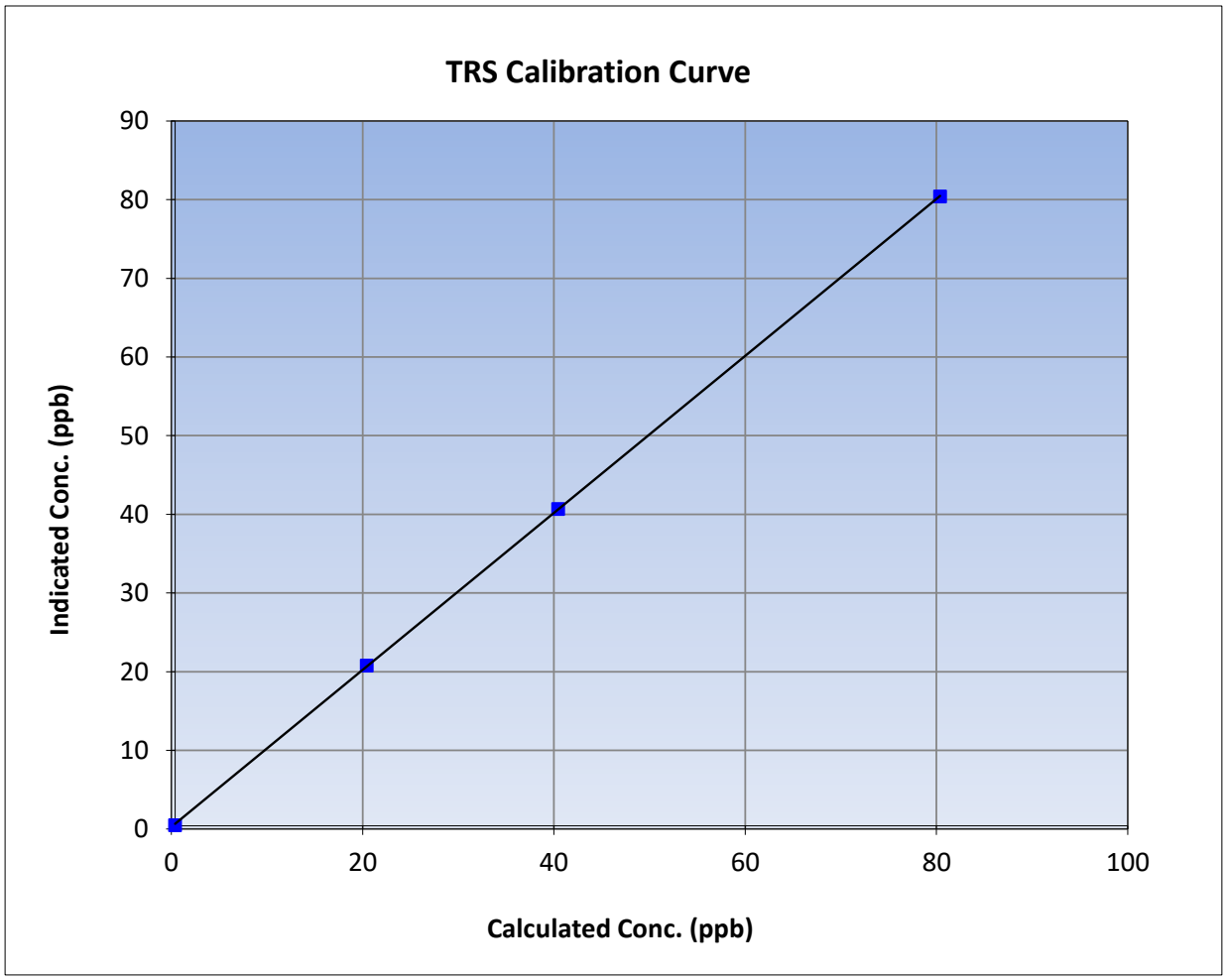
Station Information

Calibration Date:	December 19, 2023	Previous Calibration:	November 9, 2023
Station Name:	Janvier	Station Number:	AMS22
Start Time (MST):	10:45	End Time (MST):	14:53
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1151680031

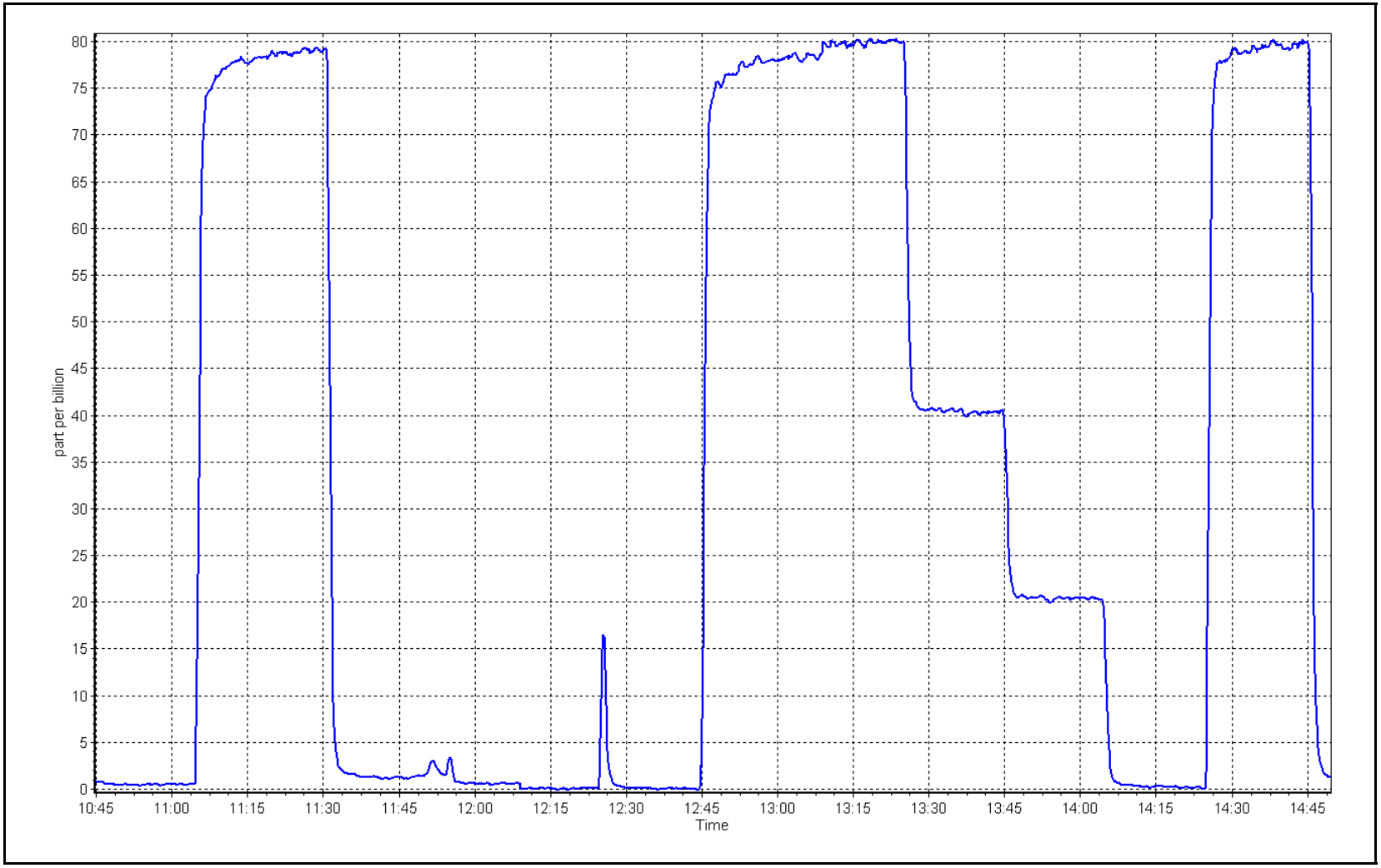
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.0	0.9998
40.0	40.3	0.9936
20.0	20.4	0.9814

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999981	*≥0.995*
Slope	0.997936	*0.90 - 1.10*
Intercept	0.260962	*+/-3*



TRS Calibration Plot Date: December 19, 2023 Location: Janvier



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	December 5, 2023	Last Cal Date:	November 3, 2023
Start time (MST):	10:43	End time (MST):	15:00
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	CC281519		Cal Gas Expiry Date:	January 18, 2029	
CH4 Cal Gas Conc.	502.8	ppm	CH4 Equiv Conc.	1075.9	ppm
C3H8 Cal Gas Conc.	208.4	ppm			
Removed Gas Cert:			Removed Gas Expiry:		
Removed CH4 Conc.	502.8	ppm	CH4 Equiv Conc.	1075.9	ppm
Removed C3H8 Conc.	208.4	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API 700		Serial Number:	3806	
ZAG make/model:	Teledyne API 701		Serial Number:	4890	

Analyzer Information

Analyzer make:	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:	2.470E-04	2.560E-04	NMHC SP Ratio:	4.94E-05	5.17E-05
CH4 Retention time:	15.0	15.2	NMHC Peak Area:	185124	176965
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	16.46	1.043
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	1.001
second point	4960	39.9	8.59	8.60	0.999
third point	4980	20.0	4.30	4.33	0.994
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	17.17	17.18	1.000
				Average Correction Factor	0.998
Baseline Corr AF:	16.46	Prev response	17.12	*% change	-4.0%
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	79.8	9.15	8.76	1.045
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	4.58	0.999
third point	4980	20.0	2.29	2.31	0.992
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	9.15	9.15	1.000
				Average Correction Factor	0.997
Baseline Corr AF:	8.76	Prev response	9.10	*% change	-3.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	79.8	8.03	7.71	1.041
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	4.02	0.999
third point	4980	20.0	2.01	2.02	0.996
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	8.03	8.03	1.000
				Average Correction Factor	0.998
Baseline Corr AF:	7.71	Prev response	8.02	*% change	-4.0%
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:	0.993524	0.998979
THC Cal Offset:	0.058796	0.014795
CH4 Cal Slope:	0.998422	0.998920
CH4 Cal Offset:	0.006635	0.005636
NMHC Cal Slope:	0.989089	0.999269
NMHC Cal Offset:	0.052961	0.008959

Notes: Changed the inlet filter after as founds. Adjusted the span only. Multipoint as found completed for SO2 maintenance.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

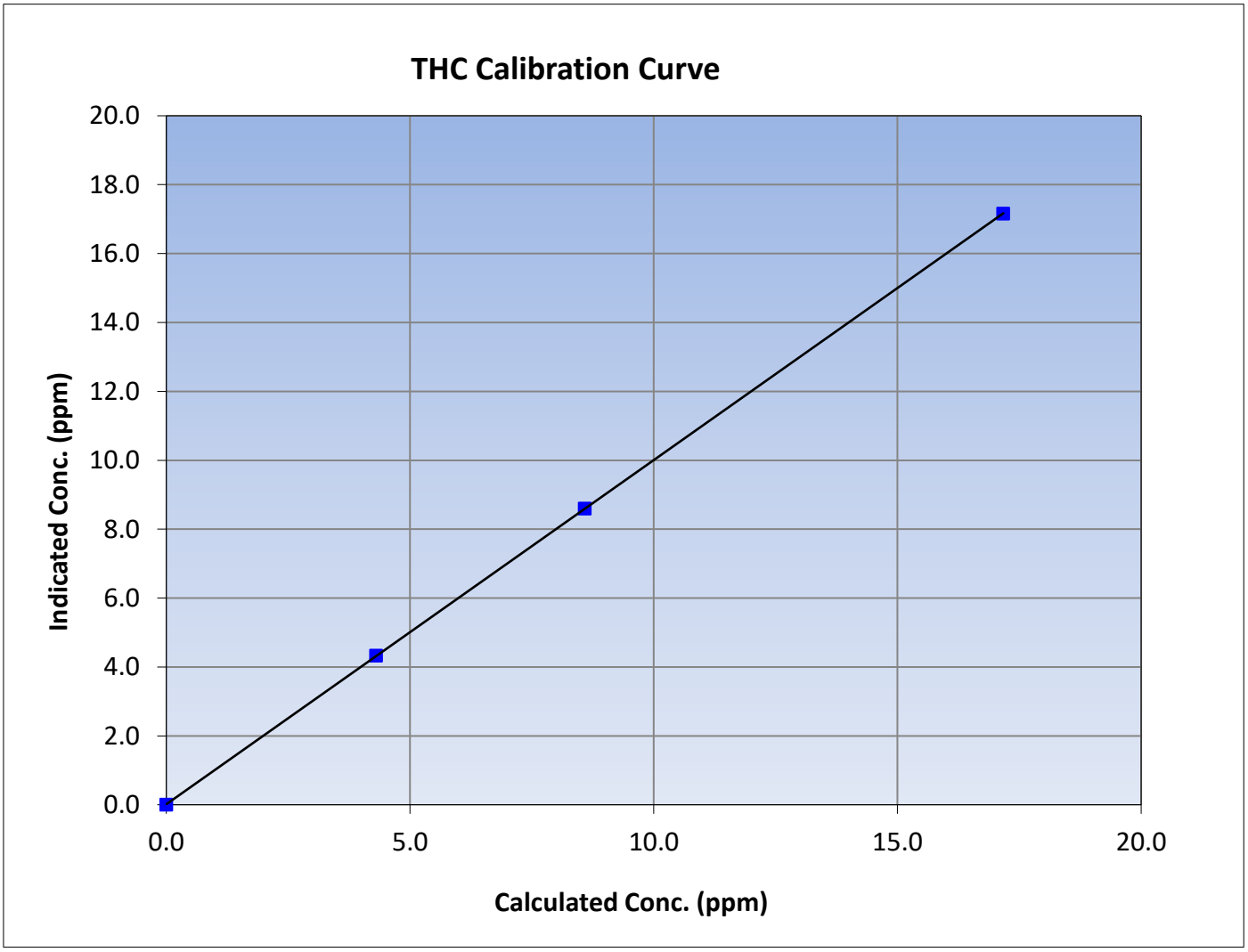
Version-06-2022

Station Information

Calibration Date:	December 5, 2023	Previous Calibration:	November 3, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:43	End Time (MST):	15:00
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	0.999996	≥0.995
17.17	17.16	1.0005			
8.59	8.60	0.9988	Slope	0.998979	0.90 - 1.10
4.30	4.33	0.9937			
			Intercept	0.014795	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

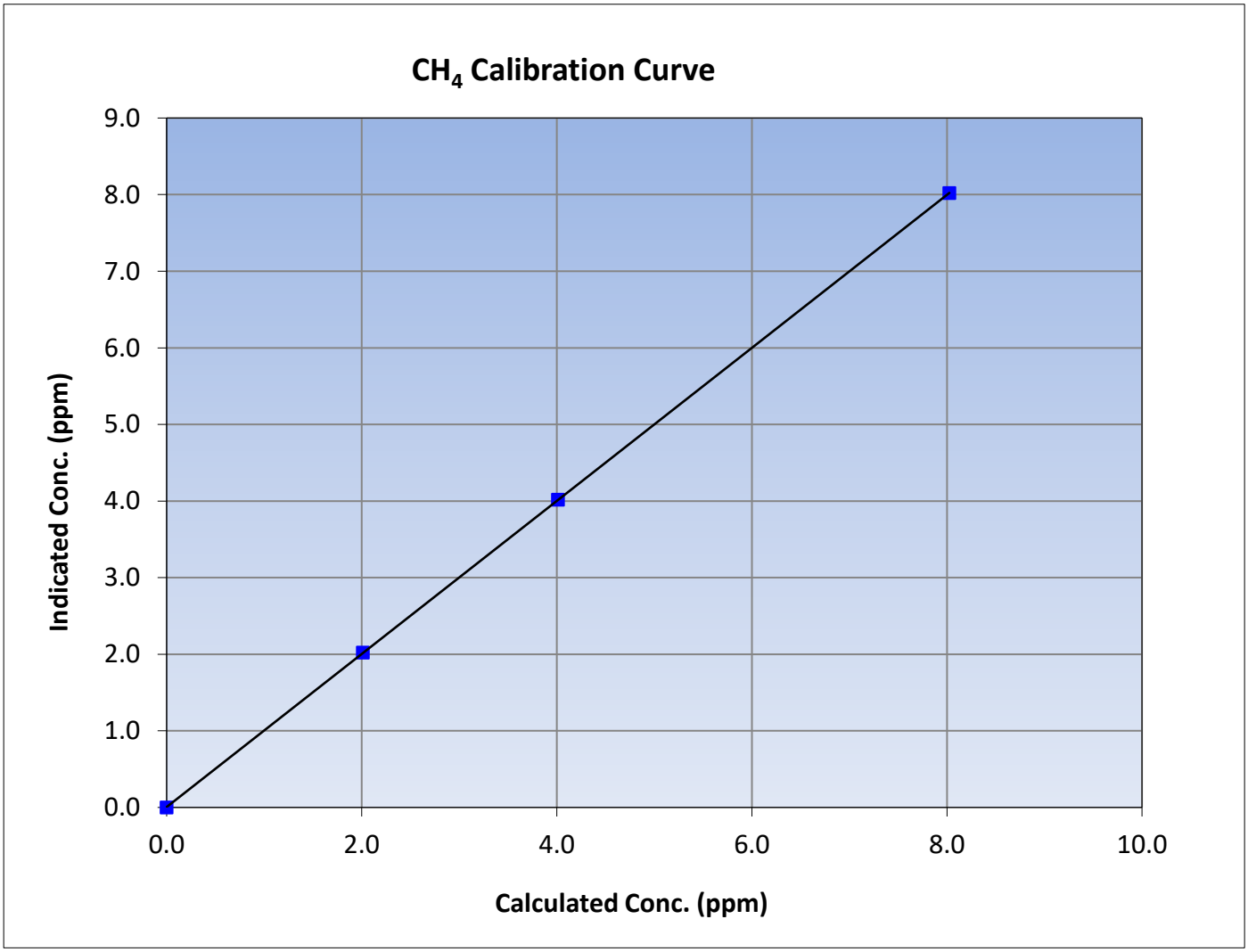
Version-06-2022

Station Information

Calibration Date:	December 5, 2023	Previous Calibration:	November 3, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:43	End Time (MST):	15:00
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	0.999998	*≥0.995*
8.03	8.02	1.0007			
4.01	4.02	0.9989	Slope	0.998920	*0.90 - 1.10*
2.01	2.02	0.9956			
			Intercept	0.005636	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

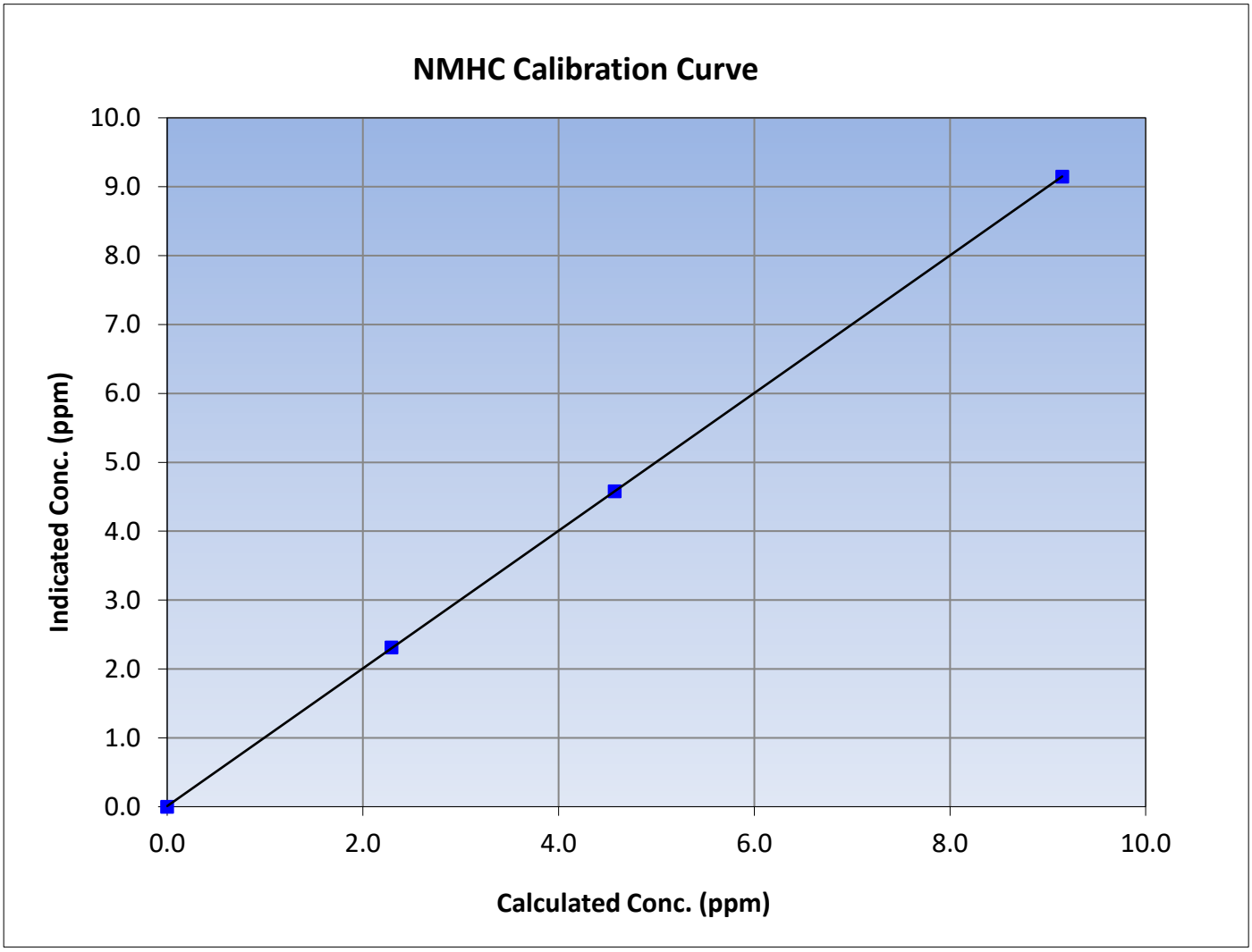
Version-06-2022

Station Information

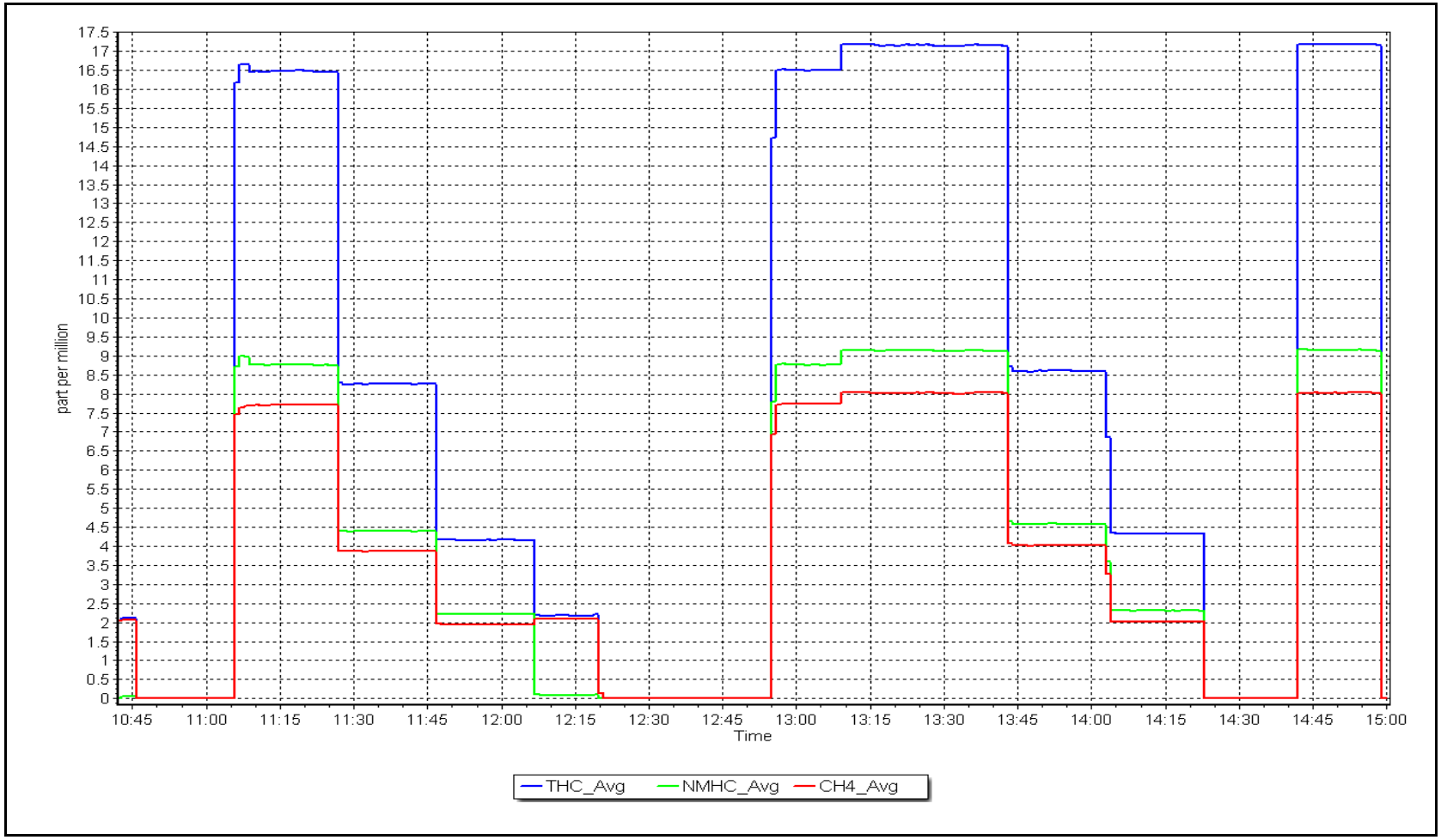
Calibration Date:	December 5, 2023	Previous Calibration:	November 3, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:43	End Time (MST):	15:00
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259520

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999995	*≥0.995*
9.15	9.15	1.0001			
4.57	4.58	0.9986	Slope	0.999269	*0.90 - 1.10*
2.29	2.31	0.9920			
			Intercept	0.008959	*+/-0.5*



NMHC Calibration Plot Date: December 5, 2023 Location: Janvier



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	December 19, 2023	Last Cal Date:	December 5, 2023
Start time (MST):	9:20	End time (MST):	10:43
Reason:	Cylinder Change N2 cylinder change		

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	2.560E-04	NMHC SP Ratio:	5.17E-05	5.17E-05
CH4 Retention time:	15.2	15.2	NMHC Peak Area:	176965	176965
Zero Chromatogram:	OFF	OFF	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	79.8	17.17	17.12	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	79.8	17.17	17.54	0.979
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.979
Baseline Corr AF:	17.12	Prev response	17.17	*% change	-0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	79.8	9.15	9.19	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	79.8	9.15	9.22	0.992
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.992
Baseline Corr AF:	9.19	Prev response	9.15	*% change	0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	79.8	8.03	7.93	1.012
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	8.31	0.966
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.966
Baseline Corr AF:	7.93	Prev response	8.02	*% change	-1.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

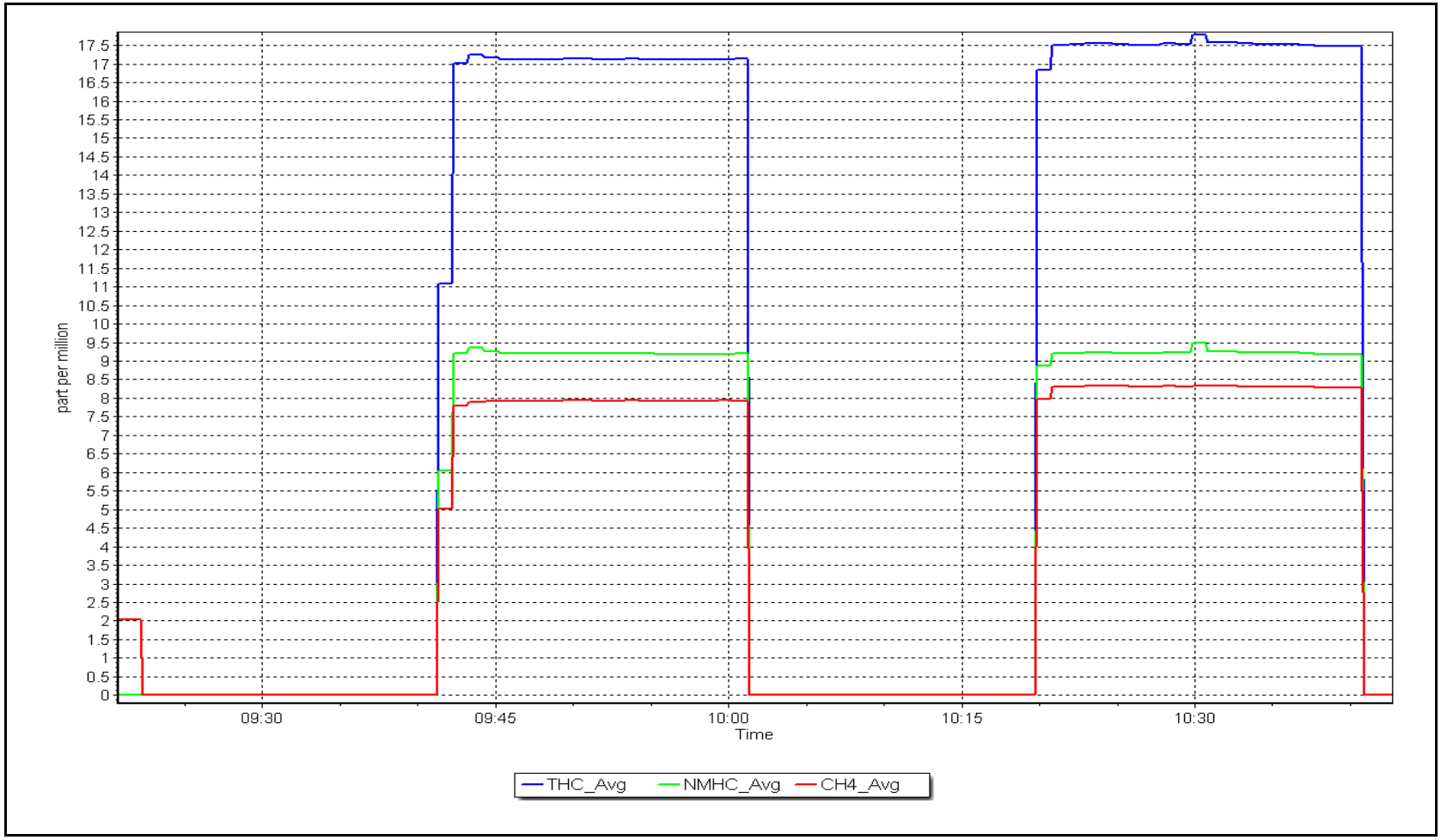
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.998979	1.021427
THC Cal Offset:	0.014795	0.000000
CH4 Cal Slope:	0.998920	1.035513
CH4 Cal Offset:	0.005636	0.000000
NMHC Cal Slope:	0.999269	1.007976
NMHC Cal Offset:	0.008959	0.000000

Notes: Changed the N2 cylinder after as founds.

Calibration Performed By: Max Farrell

NMHC Calibration Plot Date: December 19, 2023 Location: Janvier



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	December 15, 2023	Last Cal Date:	November 8, 2023
Start time (MST):	10:03	End time (MST):	15:20
Reason:	Cylinder Change		

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 #:	CC424183		Removed Gas Exp Date:	April 16, 2023	
Removed Gas NOX Conc:	48.60	ppm	Removed Gas NO Conc:	48.60	ppm
NOX gas Diff:	-0.8%		NO gas Diff:	0.7%	
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:	0.826	0.834	NO bkgnd or offset:	-5.6	-5.6
NOX coeff or slope:	0.815	0.827	NOX bkgnd or offset:	-3.9	-3.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	5.7	5.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.990857	0.994409
NO_X Cal Offset:	2.110476	2.604040
NO Cal Slope:	0.989570	0.998646
NO Cal Offset:	1.211114	1.684010
NO_2 Cal Slope:	1.001094	0.995534
NO_2 Cal Offset:	0.263799	-1.435399

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	2.1	-0.5	----	----
as found span	4918	82.3	799.9	799.9	0.0	789.5	783.3	6.2	1.0132	1.0212
as found 2nd										
as found 3rd										
new cyl resp	4918	82.0	802.0	800.3	1.6	785.5	789.5	-4.0	1.0210	1.0137
calibrator zero	5000	0.0	0.0	0.0	0.0	1.7	2.0	-0.4	----	----
high point	4918	82.0	802.0	800.3	1.6	799.3	800.8	-1.5	1.0033	0.9994
second point	4960	41.0	400.9	400.1	0.8	402.7	401.9	0.8	0.9955	0.9955
third point	4980	20.5	200.5	200.1	0.4	202.2	200.6	1.7	0.9914	0.9973
as left zero	5000	0.0	0.0	0.0	0.0	1.8	2.6	-0.8	----	----
as left span	4918	82.0	802.0	406.8	395.1	797.1	406.4	390.7	1.0061	1.0010
								Average Correction Factor	0.9968	0.9974

Corrected As found NO_X = 787.9 ppb NO = 781.2 ppb

Previous Response NO_X = 794.7 ppb NO = 792.8 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 = -0.9%

*Percent Change NO = -1.5%

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)	798.3	404.8	395.1	392.3	1.0072	99.3%
2nd GPT point (200 ppb O3)	798.3	605.3	194.6	192.3	1.0122	98.8%
3rd GPT point (100 ppb O3)	798.3	700.4	99.5	96.3	1.0336	96.7%
				Average Correction Factor	1.0177	98.3%

Notes: Changed the cal gas cylinder. Adjusted the span.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

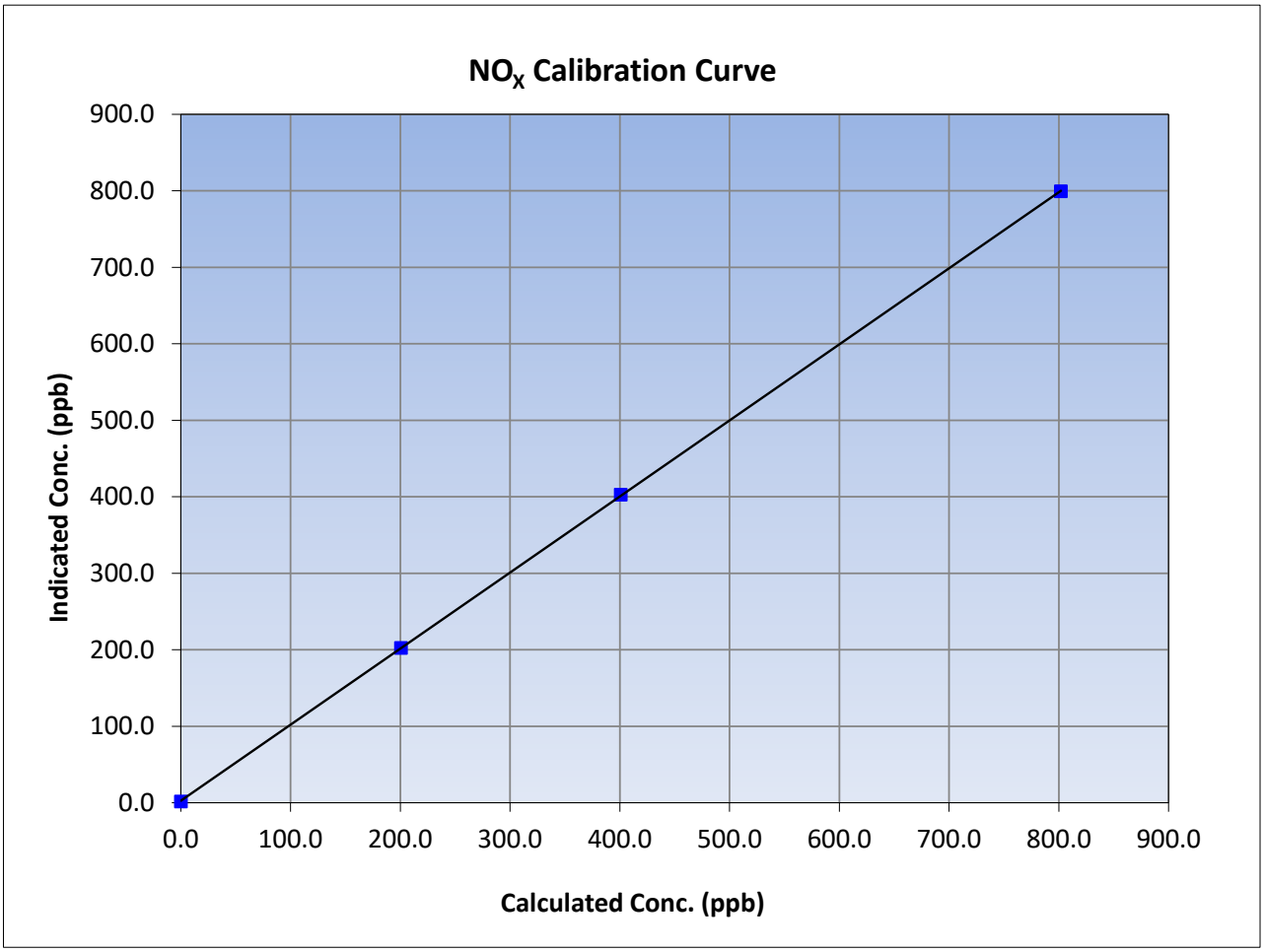
Version-04-2020

Station Information

Calibration Date:	December 15, 2023	Previous Calibration:	November 8, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:03	End Time (MST):	15:20
Analyzer make:		Analyzer serial #:	

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	1.7	----	Correlation Coefficient	0.999990	*≥0.995*
802.0	799.3	1.0033			
400.9	402.7	0.9955	Slope	0.994409	*0.90 - 1.10*
200.5	202.2	0.9914			
			Intercept	2.604040	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

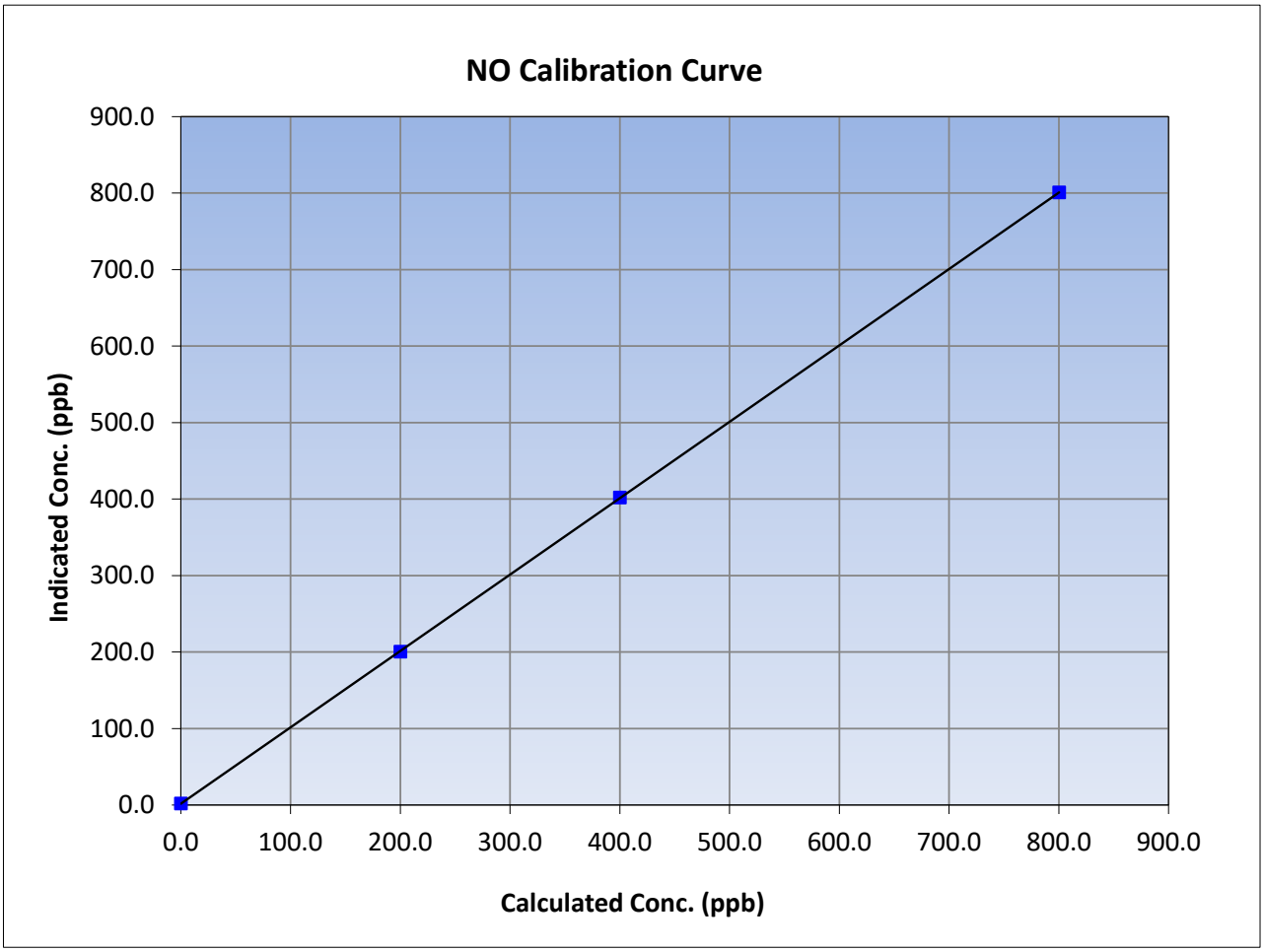
Version-04-2020

Station Information

Calibration Date:	December 15, 2023	Previous Calibration:	November 8, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:03	End Time (MST):	15:20
Analyzer make:		Analyzer serial #:	

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	2.0	----	Correlation Coefficient	0.999996	≥0.995
800.3	800.8	0.9994			
400.1	401.9	0.9955	Slope	0.998646	0.90 - 1.10
200.1	200.6	0.9973			
			Intercept	1.684010	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

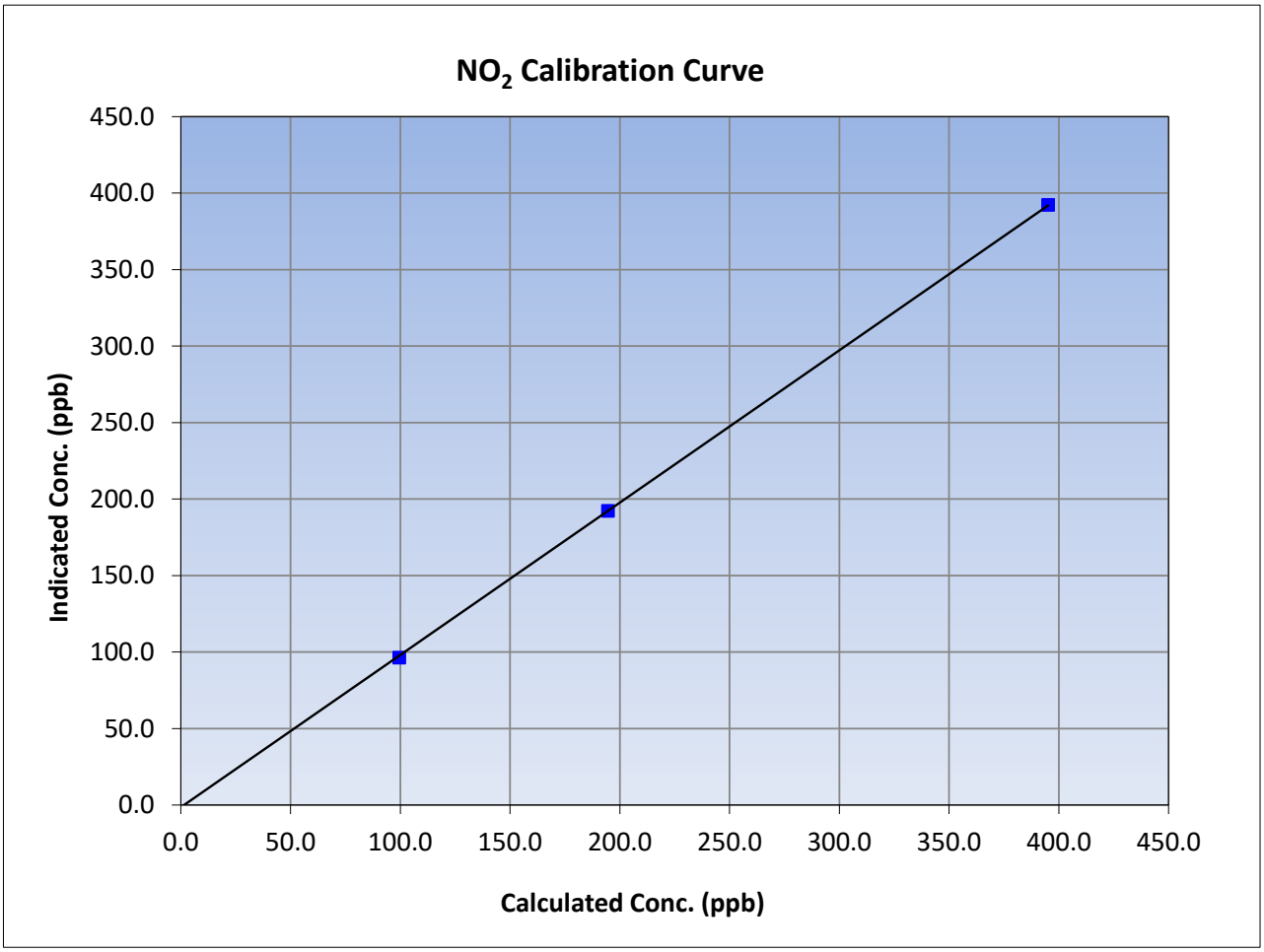
Version-04-2020

Station Information

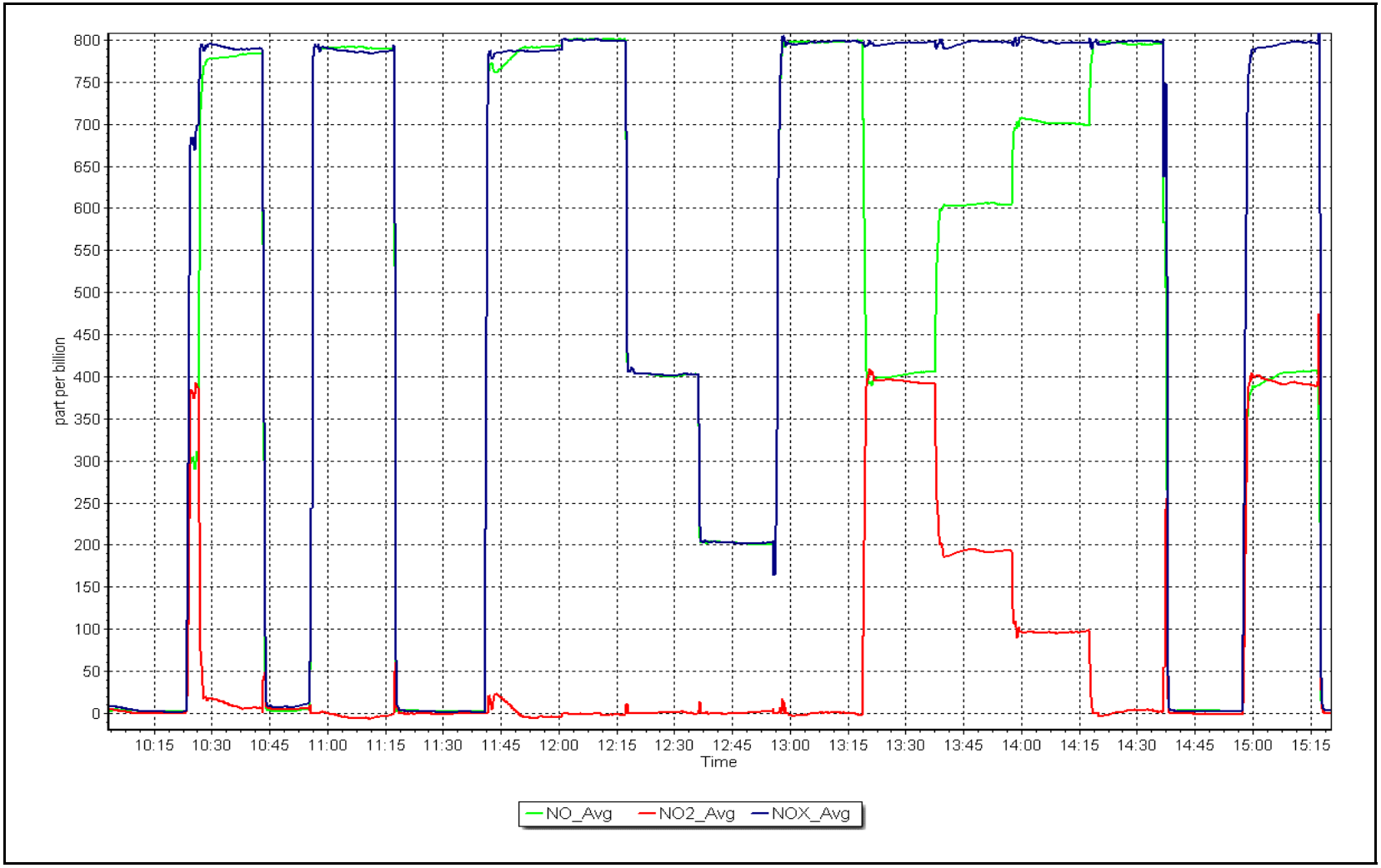
Calibration Date:	December 15, 2023	Previous Calibration:	November 8, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:03	End Time (MST):	15:20
Analyzer make:		Analyzer serial #:	

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.4	----	Correlation Coefficient	0.999964	*≥0.995*
395.1	392.3	1.0072			
194.6	192.3	1.0122	Slope	0.995534	*0.90 - 1.10*
99.5	96.3	1.0336			
			Intercept	-1.435399	*+/-20*



NO_X Calibration Plot Date: December 15, 2023 Location: Janvier



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	December 11, 2023	Last Cal Date:	November 23, 2023
Start time (MST):	10:48	End time (MST):	13:47
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:	1.006114	1.003171	Backgd or Offset:	-0.2	-0.2
Calibration intercept:	0.780000	0.820000	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	1.0	----
as found span	4895	905.3	400.0	403.3	0.992
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	0.6	----
high point	4895	905.3	400.0	401.9	0.995
second point	4895	756.7	200.0	201.8	0.991
third point	4895	656.1	100.0	101.2	0.988
as left zero	5000	800.0	0.0	0.8	----
as left span	4895	904.3	400.0	403.8	0.991
				Average Correction Factor	0.991

Baseline Corr As found:	402.3	Previous response	403.2	*% 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. No adjustments made.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

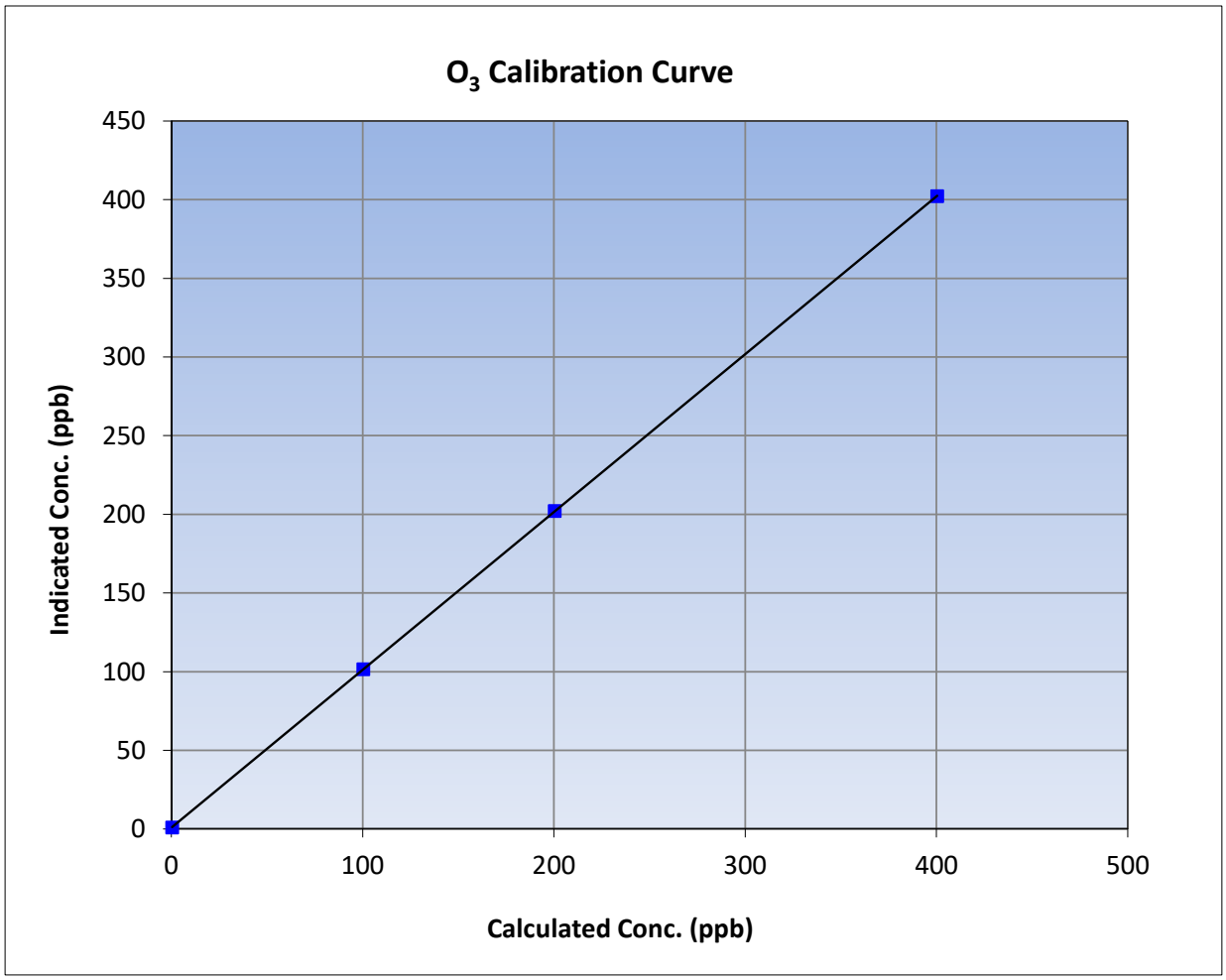
Station Information

Calibration Date:	December 11, 2023	Previous Calibration:	November 23, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:48	End Time (MST):	13:47
Analyzer make:	Teledyne API T400	Analyzer serial #:	7046

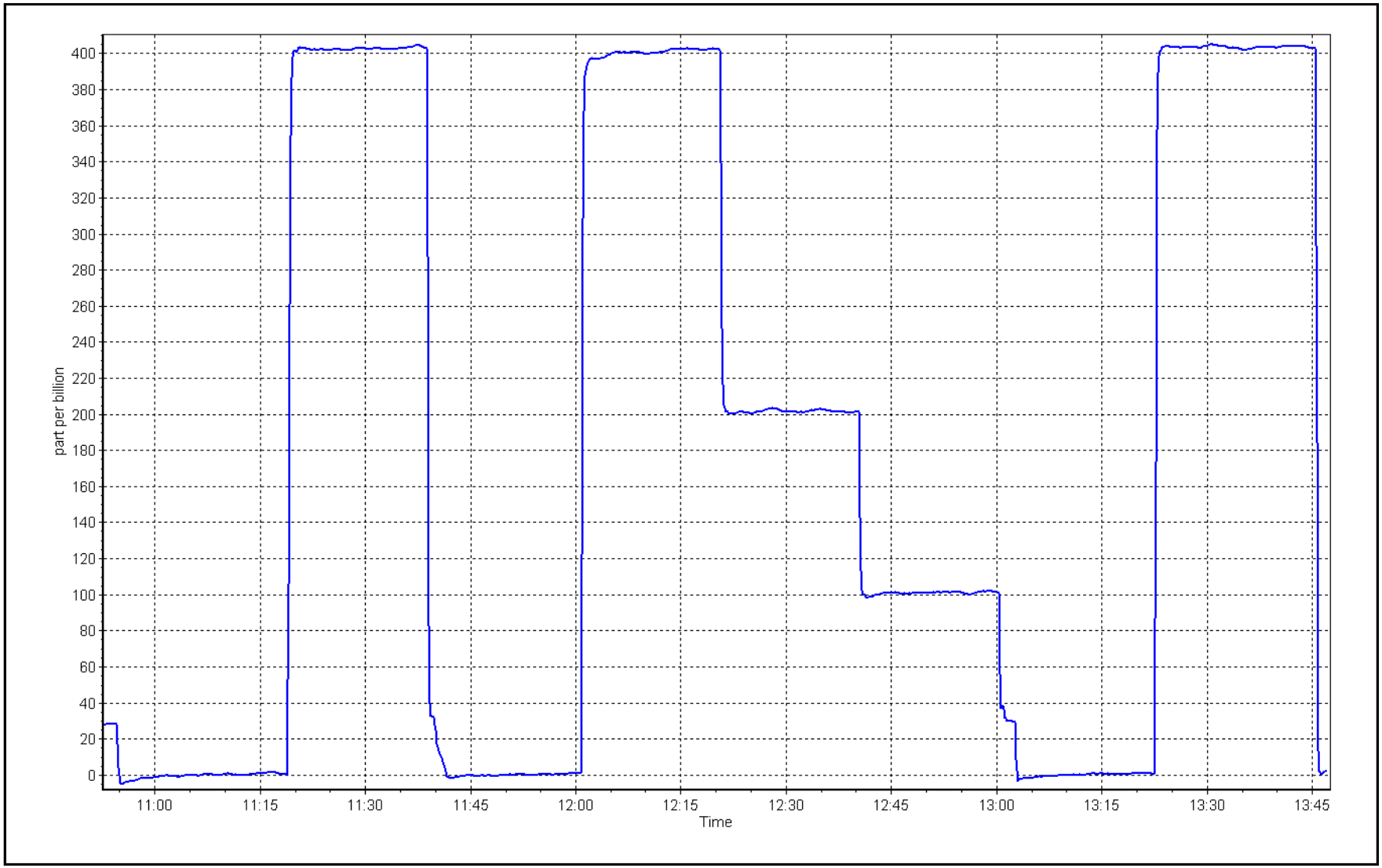
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.6	----
400.0	401.9	0.9953
200.0	201.8	0.9911
100.0	101.2	0.9881

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.003171	*0.90 - 1.10*
Intercept	0.820000	*+/- 5*



O_3 Calibration Plot Date: December 11, 2023 Location: Janvier



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	December 15, 2023	Last Cal Date:	November 23, 2023
Start time (MST):	13:58	End time (MST):	14:18
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)	3.70	3.75	3.70	☐	+/- 2 °C
P (mmHg)	718.6	719.4	718.6	☐	+/- 10 mmHg
flow (LPM)	5.02	5.10	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: December 15, 2023 Last Cal Date: November 23, 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: October 20, 2023 <0.2 ug/m3

Disposable Filter Changed: October 20, 2023

Annual Maintenance

Date Sample Tube Cleaned: July 26, 2023

Date RH/T Sensor Cleaned: July 26, 2023

Notes:

Quarterly calibration was completed in October. No adjustments needed. Leak check passed.

Calibration by: Max Farrell

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS23
FORT HILLS

DECEMBER 2023

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

January 31, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	December 13, 2023	Last Cal Date:	November 20, 2023
Start time (MST):	8:45	End time (MST):	11:28
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:	0.993772	1.001895	Backgd or Offset:	17.8	18.3
Calibration intercept:	-0.642432	-0.683633	Coeff or Slope:	1.040	1.058

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	787.2	1.015
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	----
high point	4920	80.3	799.1	800.5	0.998
second point	4960	40.2	400.1	399.5	1.001
third point	4980	20.1	200.0	198.7	1.007
as left zero	5000	0.0	0.0	0.5	----
as left span	4920	80.3	799.1	800.4	0.998
				Average Correction Factor	1.002

Baseline Corr As found:	786.70	Previous response	793.48	*% 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 maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

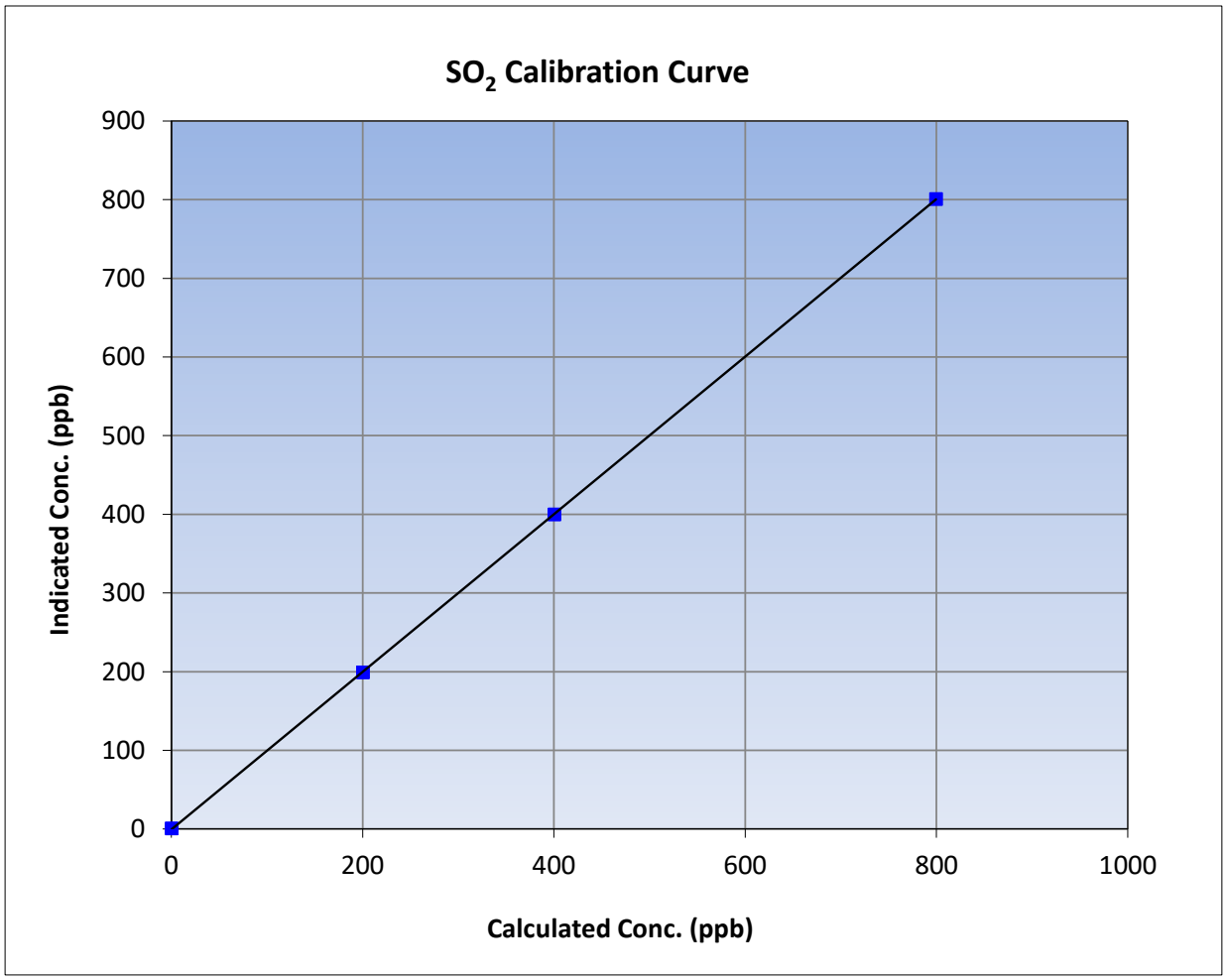
Station Information

Calibration Date:	December 13, 2023	Previous Calibration:	November 20, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:45	End Time (MST):	11:28
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290012

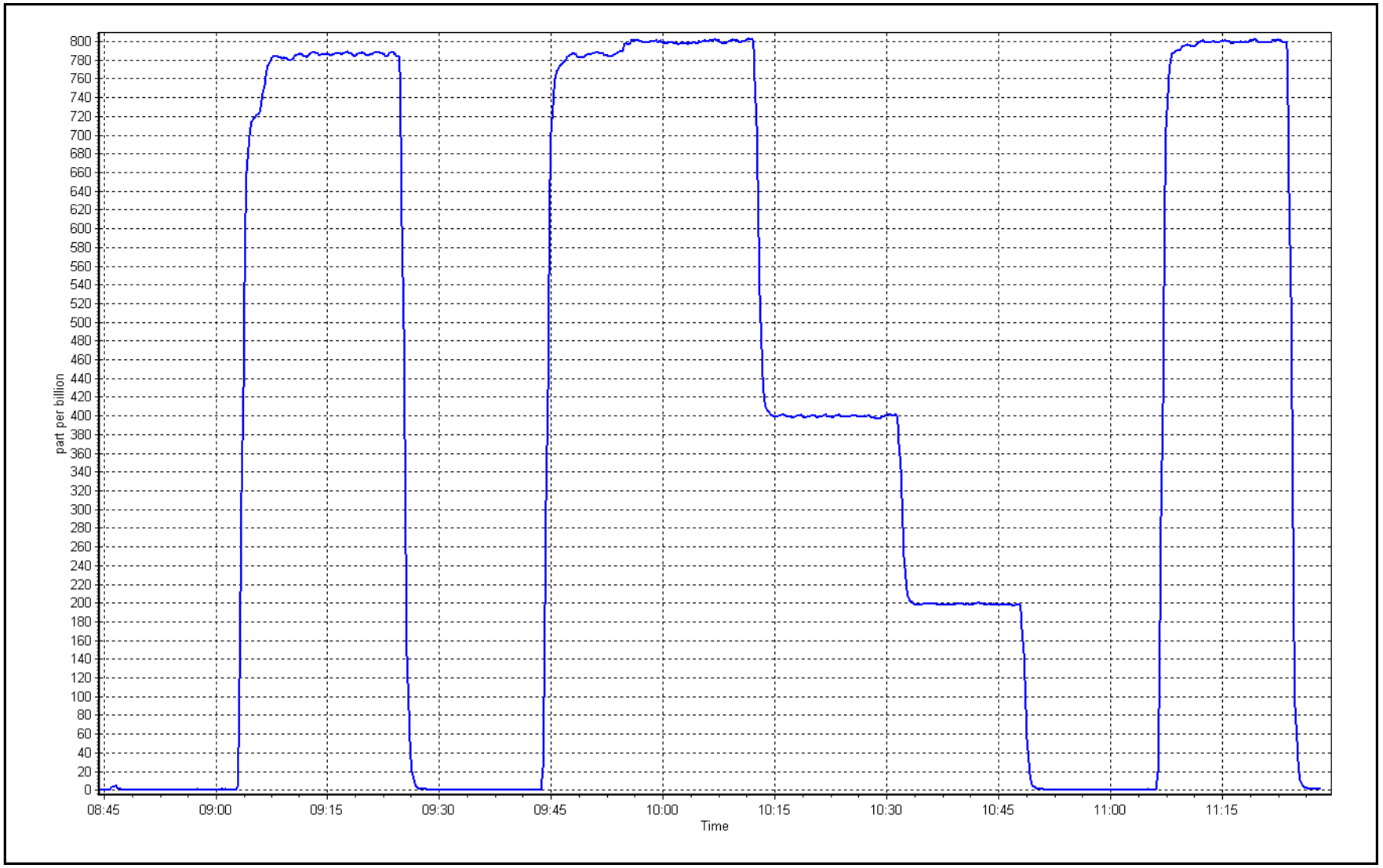
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
799.1	800.5	0.9982
400.1	399.5	1.0014
200.0	198.7	1.0067

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	1.001895	*0.90 - 1.10*
Intercept	-0.683633	*+/-30*



SO2 Calibration Plot Date: December 13, 2023 Location: Fort Hills



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	December 6, 2023	Last Cal Date:	November 15, 2023
Start time (MST):	8:20	End time (MST):	12:18
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.20	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517372			
Removed Cal Gas Conc:	5.20	ppm	Rem Gas Exp Date:	N/A
Removed Gas Cyl #:	N/A		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	451
ZAG Make/Model:	API T701		Serial Number:	5611

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1300156232	
Converter make:	CDN-101		Converter serial #:	594	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000174	0.991033	Backgd or Offset:	1.19	1.19
Calibration intercept:	-0.118216	-0.198385	Coeff or Slope:	1.124	1.124

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4923	77.0	80.0	78.0	1.024
as found 2nd point	4962	38.5	40.0	39.4	1.013
as found 3rd point	4981	19.2	19.9	19.6	1.013
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4923	77.0	80.0	79.1	1.011
second point	4962	38.5	40.0	39.5	1.013
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	79.6	1.005
SO2 Scrubber Check	4920	80.3	803.0	0.2	----
Date of last scrubber change:				Ave Corr Factor	1.017
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.1	Prev response:	79.90	*% change:	-2.3%
Baseline Corr 2nd AF pt:	39.5	AF Slope:	0.975890	AF Intercept:	0.081410
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999958		

* = > +/-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

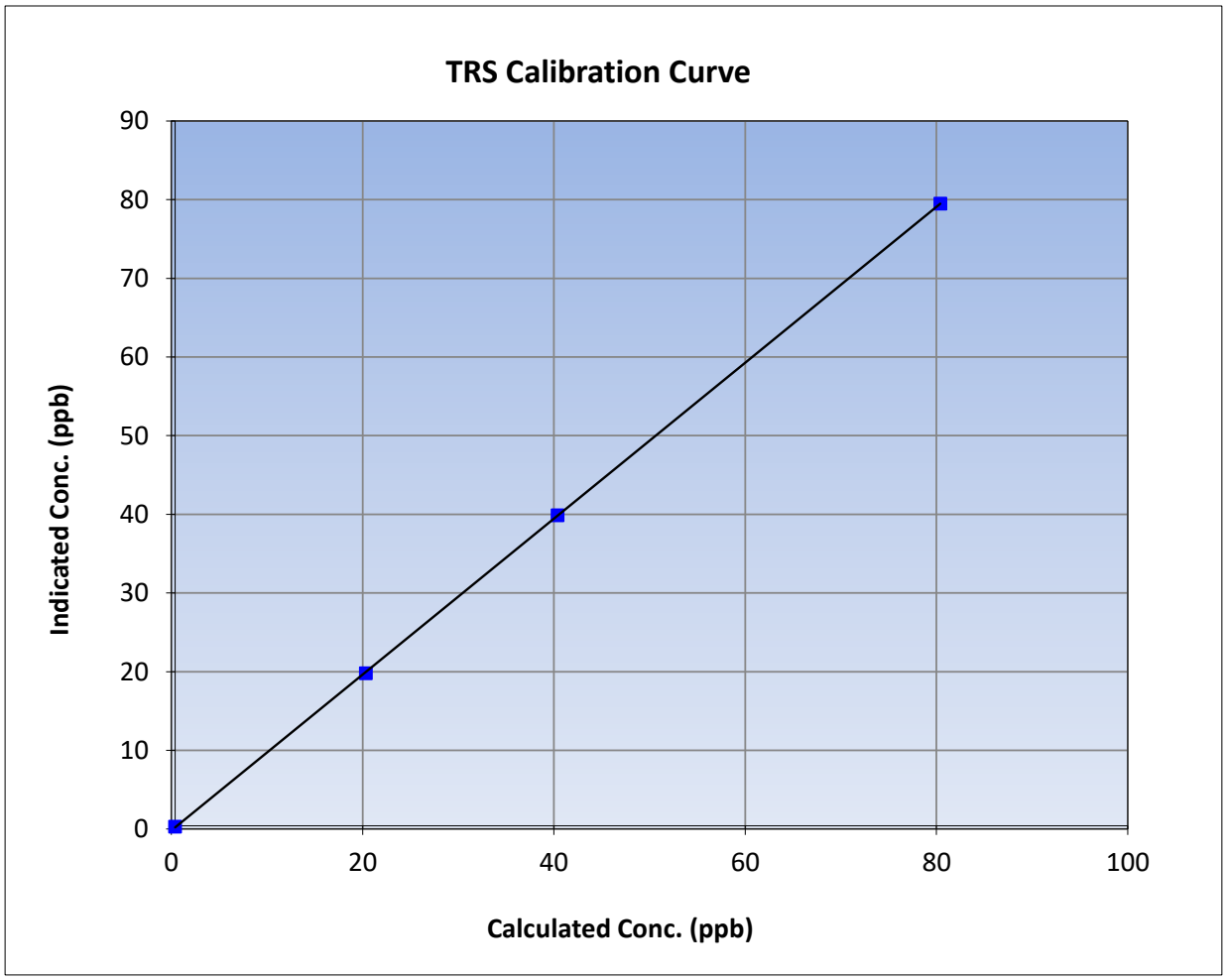
Station Information

Calibration Date:	December 6, 2023	Previous Calibration:	November 15, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:20	End Time (MST):	12:18
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1300156232

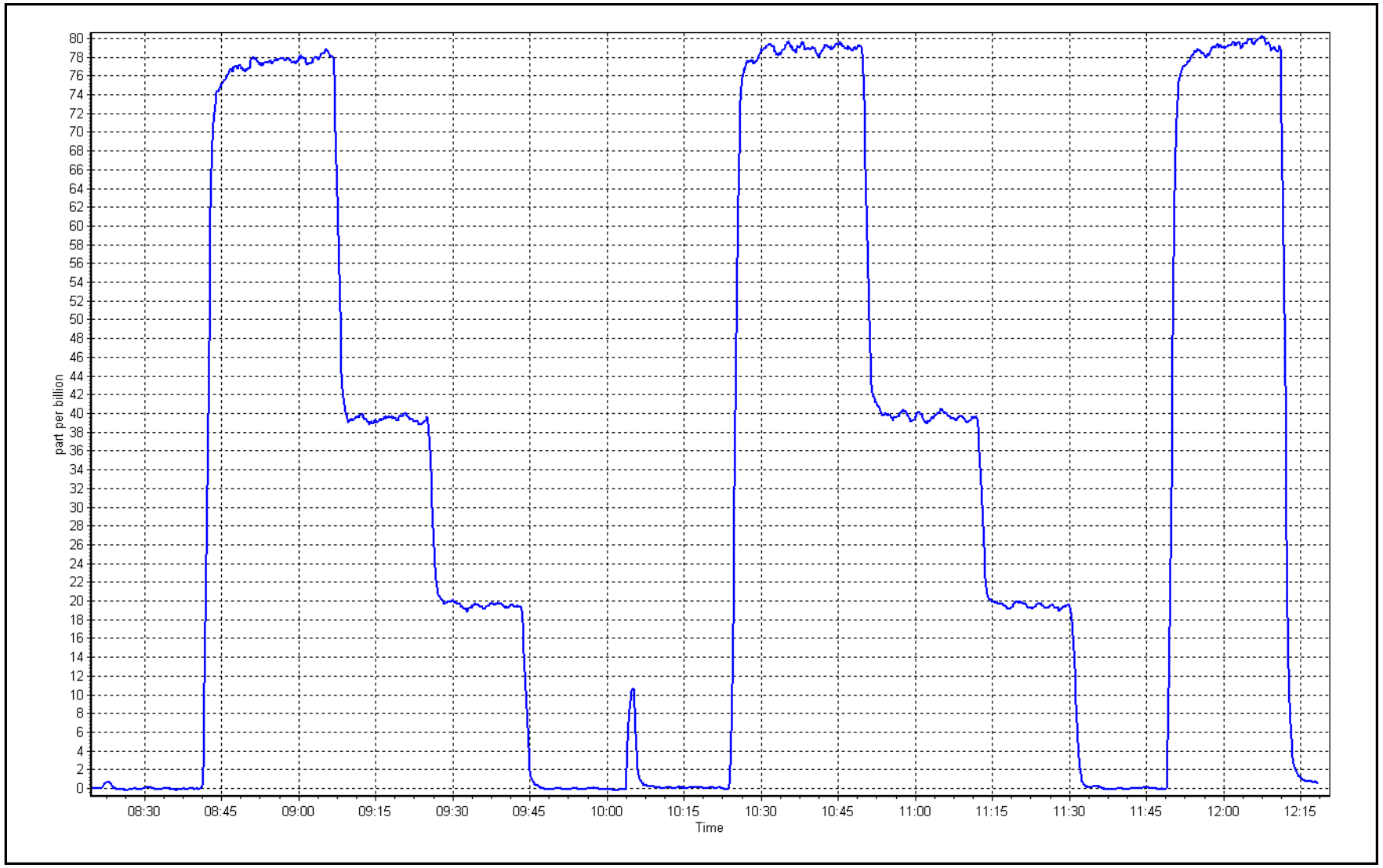
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	79.1	1.0114
40.0	39.5	1.0126
19.9	19.4	1.0282

Statistical Evaluation		Limits
Correlation Coefficient	0.999988	≥0.995
Slope	0.991033	0.90 - 1.10
Intercept	-0.198385	+/-3



TRS Calibration Plot Date: December 6, 2023 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:	December 13, 2023	Last Cal Date:	November 20, 2023
Start time (MST):	8:45	End time (MST):	11:27
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:	2.34E-04	2.36E-04	NMHC SP Ratio:	5.01E-05	5.09E-05
CH4 Retention time:	13.0	13.0	NMHC Peak Area:	183497	180787
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	17.05	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	17.19	17.23	0.998
second point	4960	40.2	8.61	8.64	0.996
third point	4980	20.1	4.30	4.35	0.989
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.19	17.21	0.999
				Average Correction Factor	0.994
Baseline Corr AF:	17.05	Prev response	17.30	*% 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	80.3	9.16	9.07	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	80.3	9.16	9.18	0.998
second point	4960	40.2	4.59	4.63	0.990
third point	4980	20.1	2.29	2.36	0.972
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	9.16	9.17	0.999
				Average Correction Factor	0.987
Baseline Corr AF:	9.07	Prev response	9.24	*% change	-1.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	8.03	7.98	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	8.03	8.06	0.997
second point	4960	40.2	4.02	4.01	1.003
third point	4980	20.1	2.01	1.98	1.016
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	8.03	8.05	0.998
				Average Correction Factor	1.005
Baseline Corr AF:	7.98	Prev response	8.06	*% 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:	1.006220	1.001568
THC Cal Offset:	-0.002409	0.017601
CH4 Cal Slope:	1.005350	1.004639
CH4 Cal Offset:	-0.020045	-0.020048
NMHC Cal Slope:	1.006983	1.000371
NMHC Cal Offset:	0.017636	0.031648

Notes: Span adjusted. No Maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

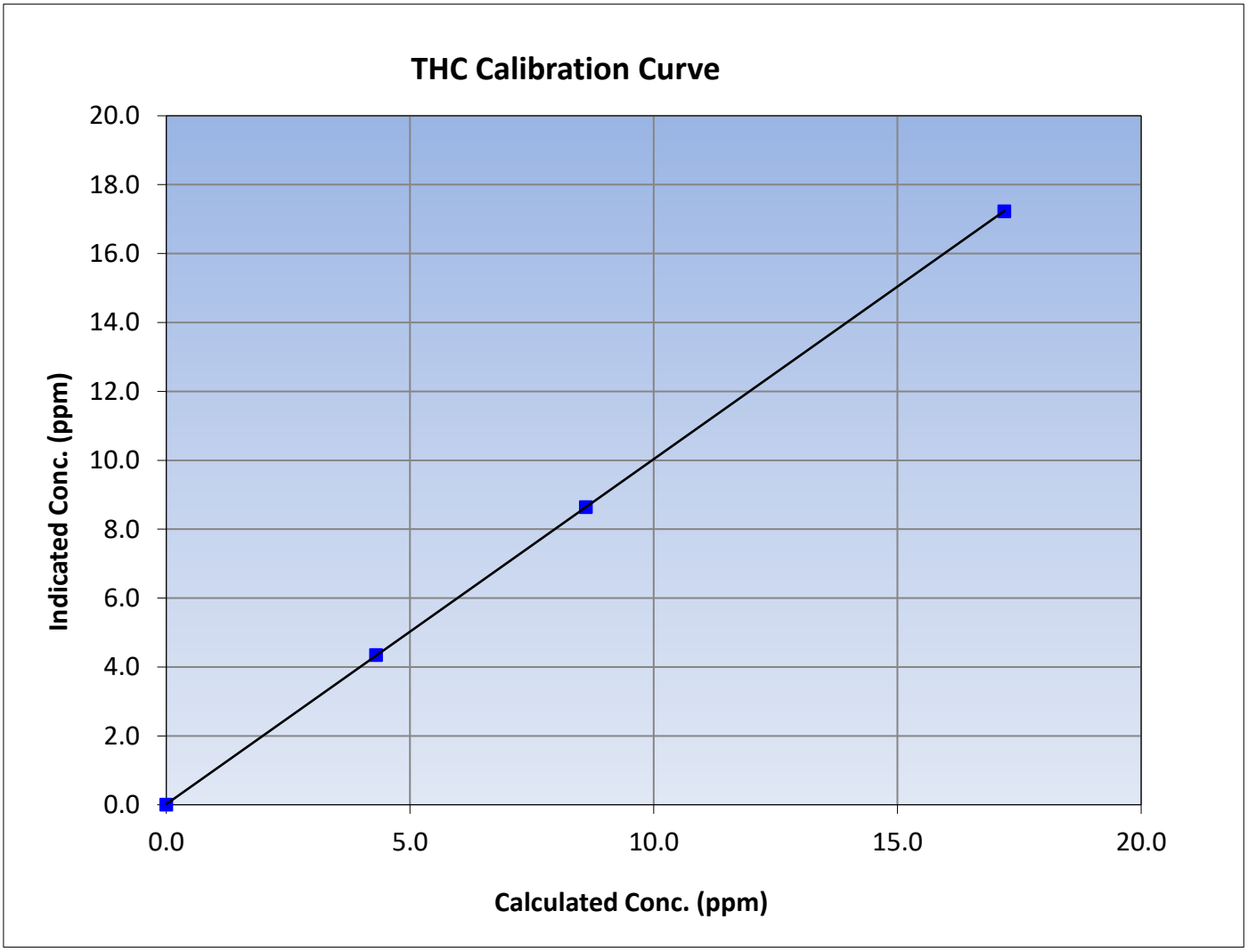
Version-06-2022

Station Information

Calibration Date:	December 13, 2023	Previous Calibration:	November 20, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:45	End Time (MST):	11:27
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585648

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999995	*≥0.995*
17.19	17.23	0.9978			
8.61	8.64	0.9962	Slope	1.001568	*0.90 - 1.10*
4.30	4.35	0.9893			
			Intercept	0.017601	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

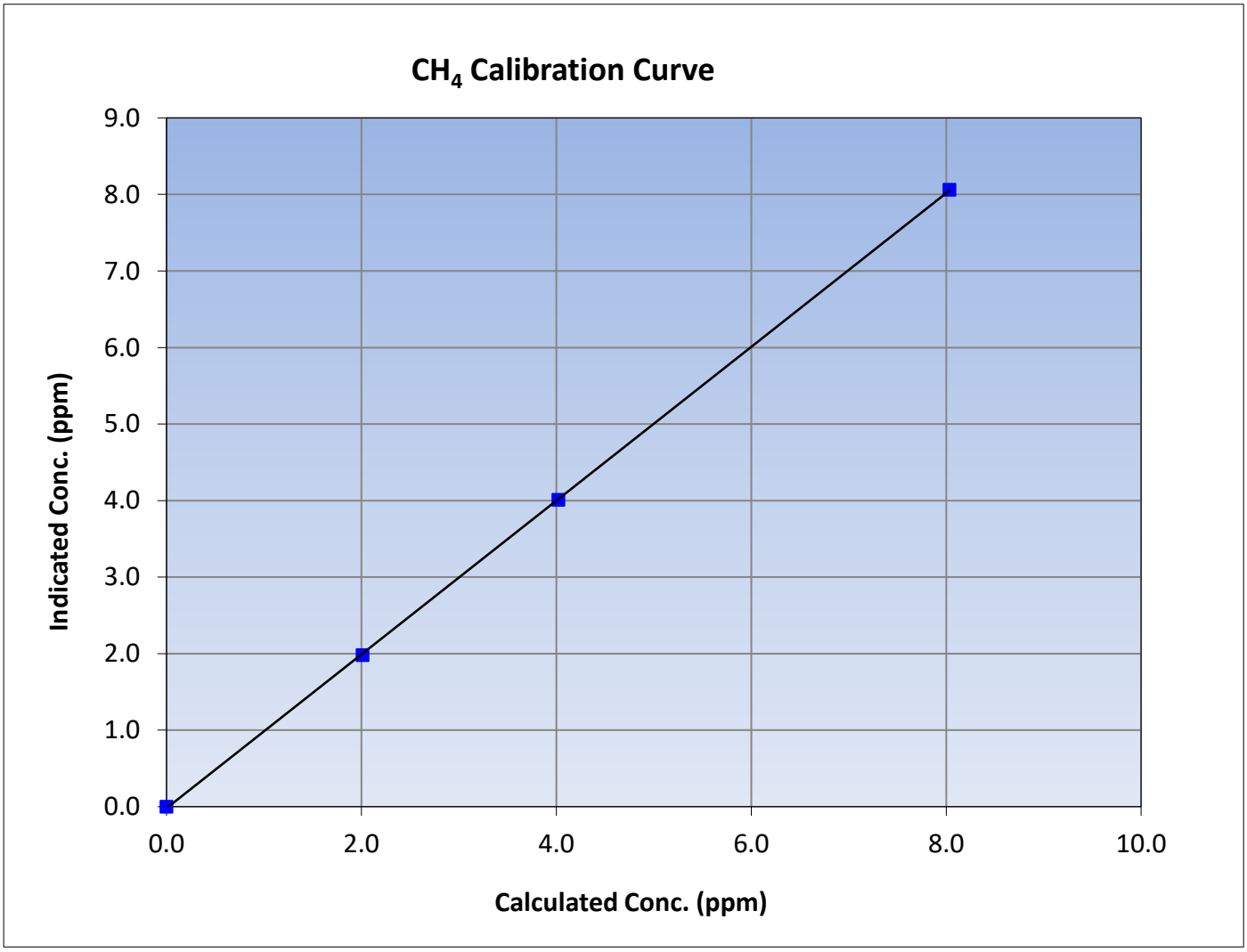
Version-06-2022

Station Information

Calibration Date:	December 13, 2023	Previous Calibration:	November 20, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:45	End Time (MST):	11:27
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	0.999972	*≥0.995*
8.03	8.06	0.9966			
4.02	4.01	1.0029	Slope	1.004639	*0.90 - 1.10*
2.01	1.98	1.0155			
			Intercept	-0.020048	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

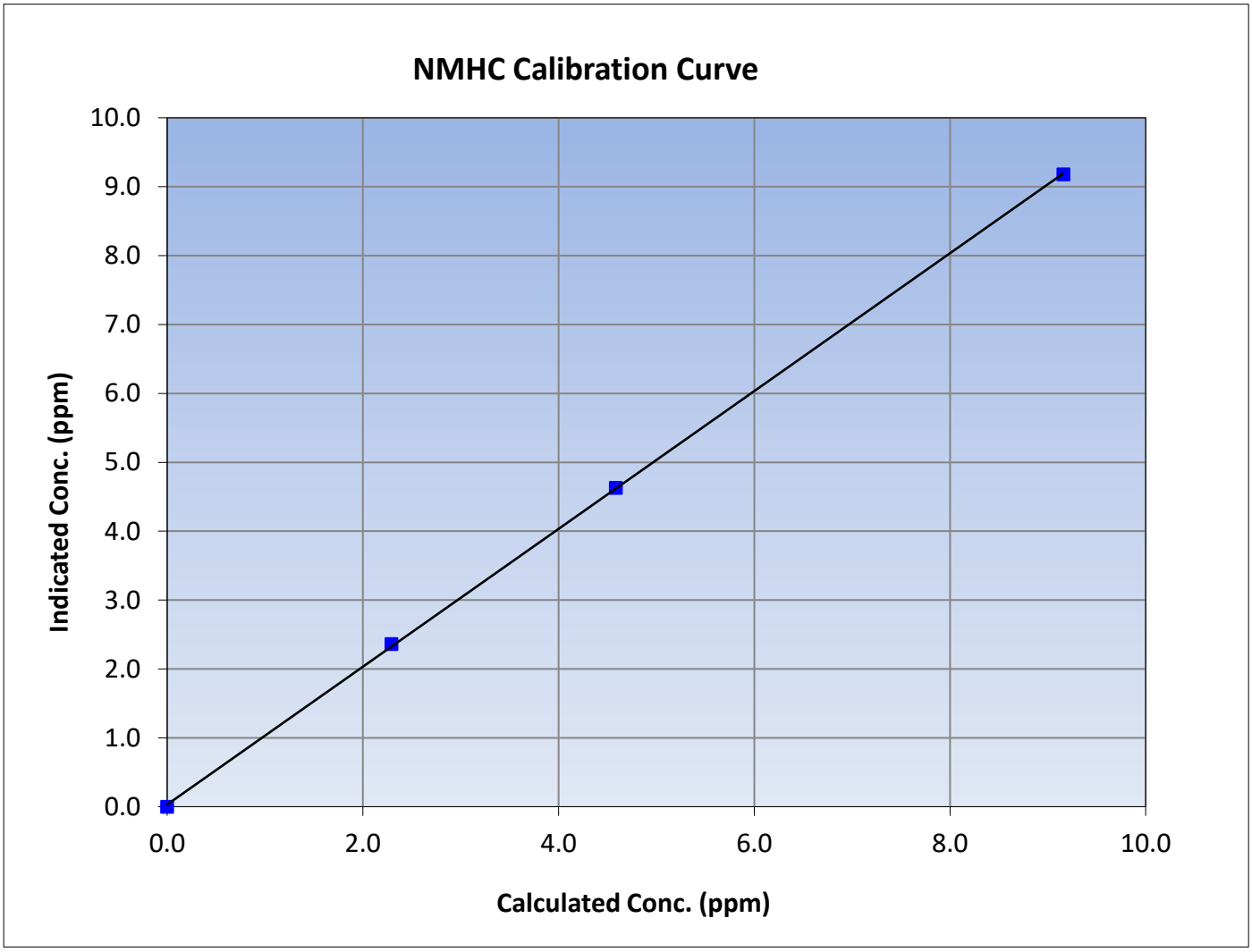
Version-06-2022

Station Information

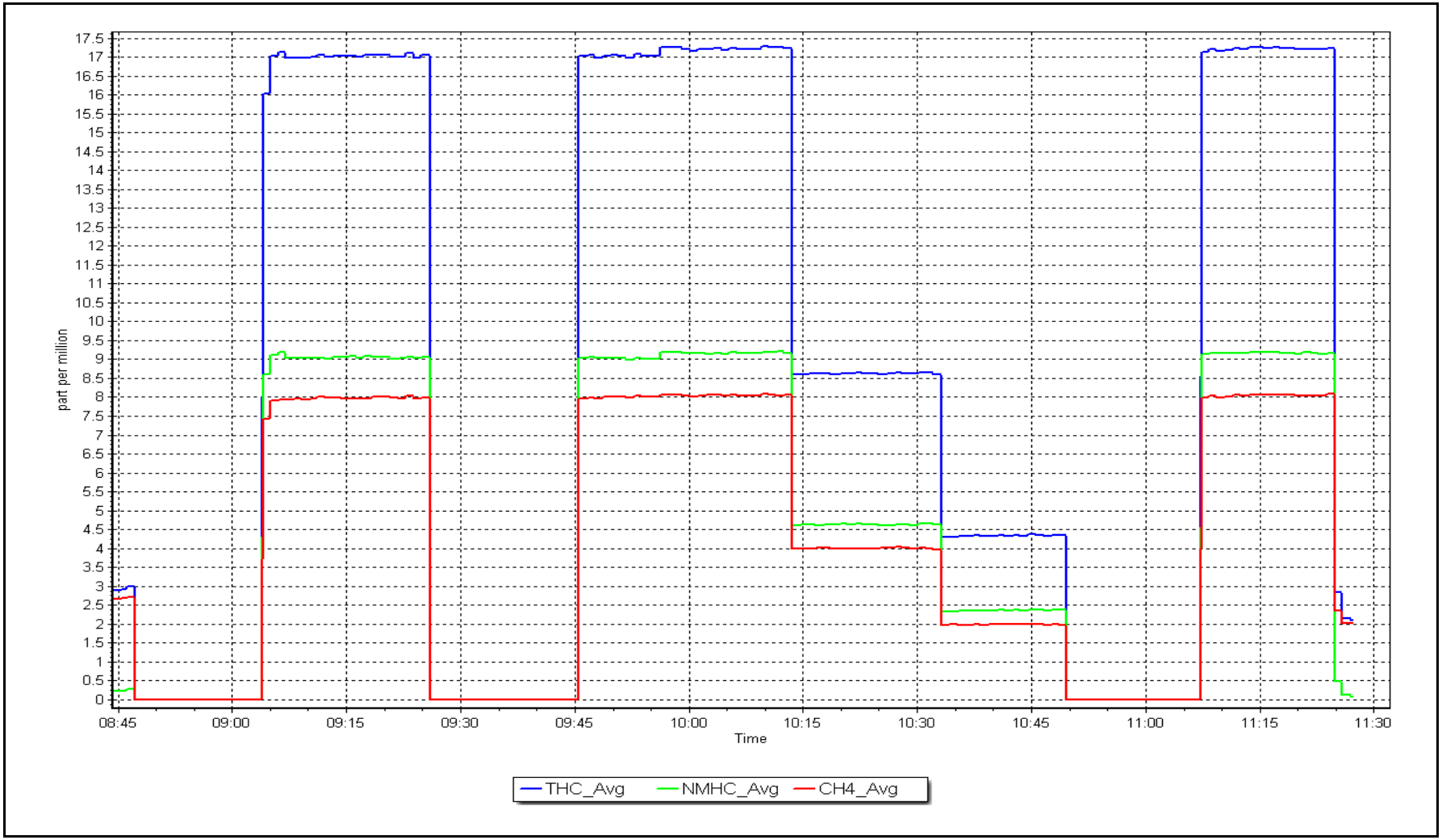
Calibration Date:	December 13, 2023	Previous Calibration:	November 20, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:45	End Time (MST):	11:27
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585648

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
9.16	9.18	0.9977			
4.59	4.63	0.9904	Slope	1.000371	0.90 - 1.10
2.29	2.36	0.9715			
			Intercept	0.031648	+/-0.5



NMHC Calibration Plot Date: December 13, 2023 Location: Fort Hills



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	December 7, 2023	Last Cal Date:	November 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:	1.089	1.081	NO bkgnd or offset:	3	3
NOX coeff or slope:	0.993	0.989	NOX bkgnd or offset:	3.2	3.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	162.0	162

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.003266	0.999822
NO_X Cal Offset:	0.024268	0.304106
NO Cal Slope:	1.001225	1.001566
NO Cal Offset:	-1.036547	-0.455910
NO_2 Cal Slope:	1.003745	1.002916
NO_2 Cal Offset:	0.698395	-0.422416

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	0.0	-0.2	----	----
as found span	4920	80.5	800.2	800.2	0.0	812.9	808.3	4.5	0.984	0.990
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
high point	4920	80.5	800.2	800.2	0.0	799.8	800.8	-1.0	1.000	0.999
second point	4960	40.2	399.6	399.6	0.0	401.0	400.7	0.4	0.996	0.997
third point	4980	20.1	199.8	199.8	0.0	199.8	198.4	1.4	1.000	1.007
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	----	----
as left span	4920	80.5	800.2	448.5	351.7	799.3	447.3	352.1	1.001	1.003
								Average Correction Factor	0.999	1.001

Corrected As found NO_X = 813.1 ppb NO = 808.3 ppb

Previous Response NO_X = 802.8 ppb NO = 800.1 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 = 1.3%

*Percent Change NO = 1.0%

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)	799.1	447.4	351.7	352.8	0.997	100.3%
2nd GPT point (200 ppb O3)	799.1	624.7	174.4	173.3	1.006	99.4%
3rd GPT point (100 ppb O3)	799.1	711.5	87.6	87.8	0.998	100.2%
				Average Correction Factor	1.000	100.0%

Notes: No maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

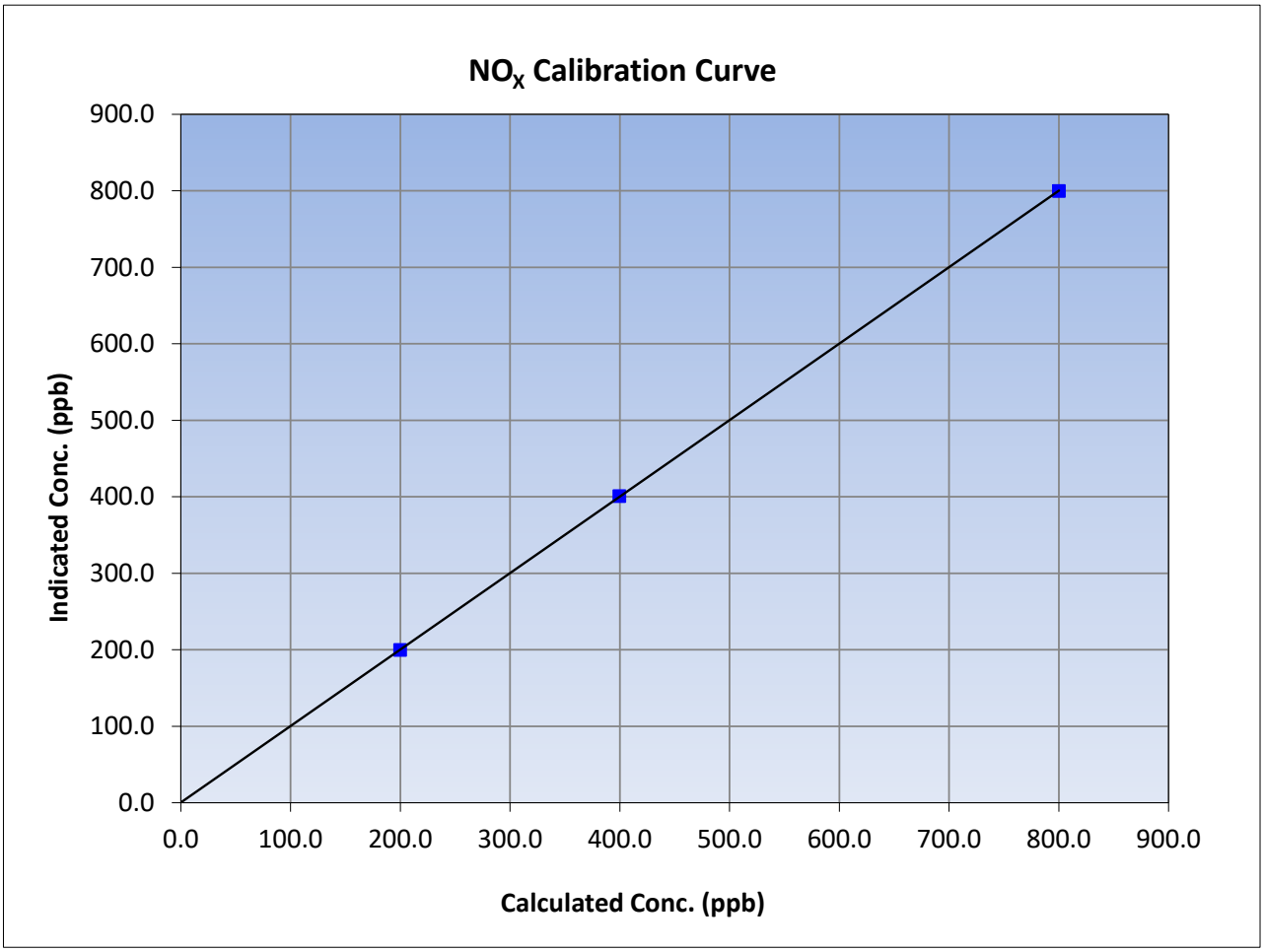
Version-04-2020

Station Information

Calibration Date:	December 7, 2023	Previous Calibration:	November 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	0.999994	*≥0.995*
800.2	799.8	1.0005			
399.6	401.0	0.9964	Slope	0.999822	*0.90 - 1.10*
199.8	199.8	0.9999			
			Intercept	0.304106	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

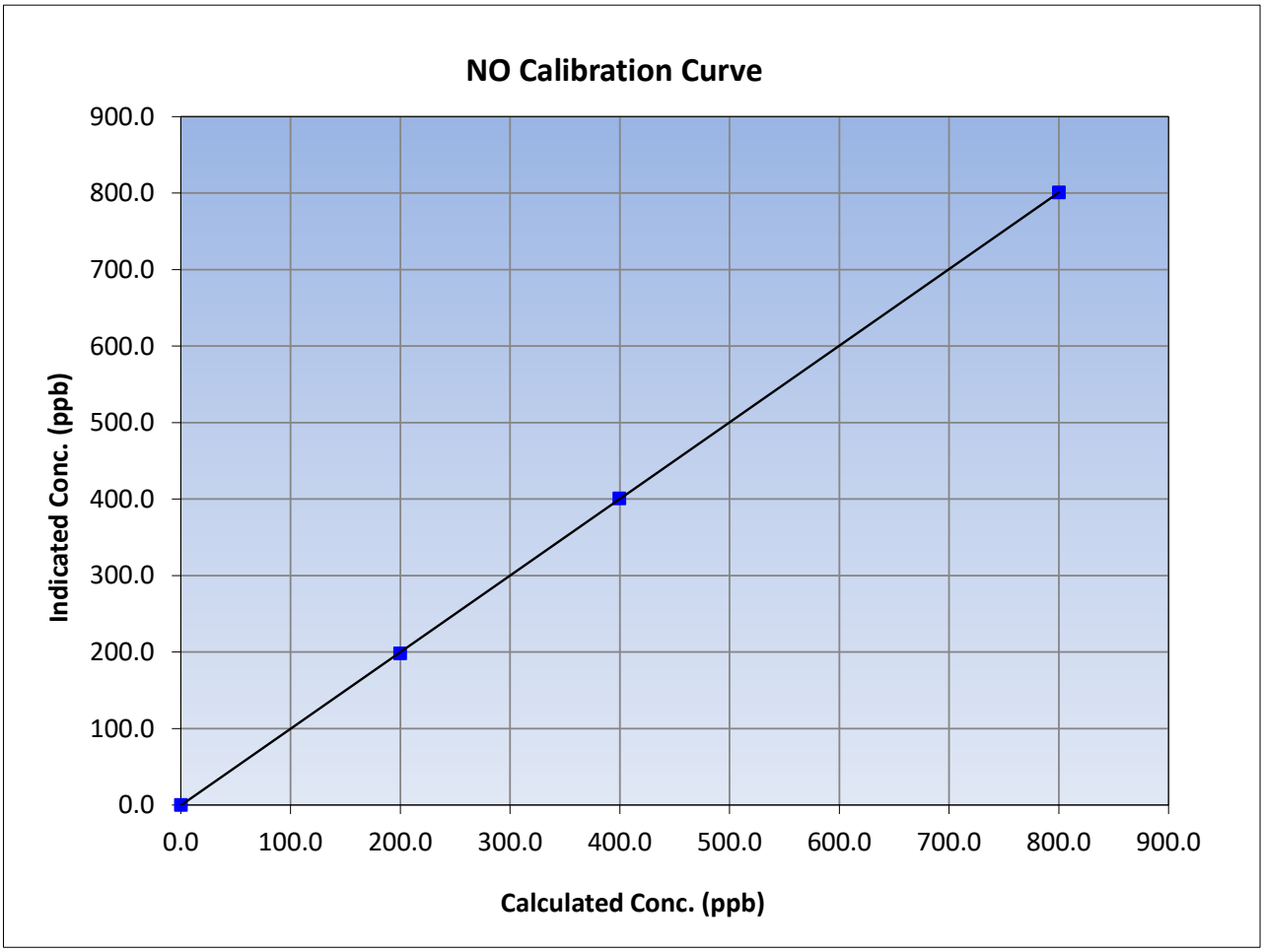
Version-04-2020

Station Information

Calibration Date:	December 7, 2023	Previous Calibration:	November 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	0.0	----	Correlation Coefficient	0.999992	≥0.995
800.2	800.8	0.9992			
399.6	400.7	0.9972	Slope	1.001566	0.90 - 1.10
199.8	198.4	1.0070			
			Intercept	-0.455910	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

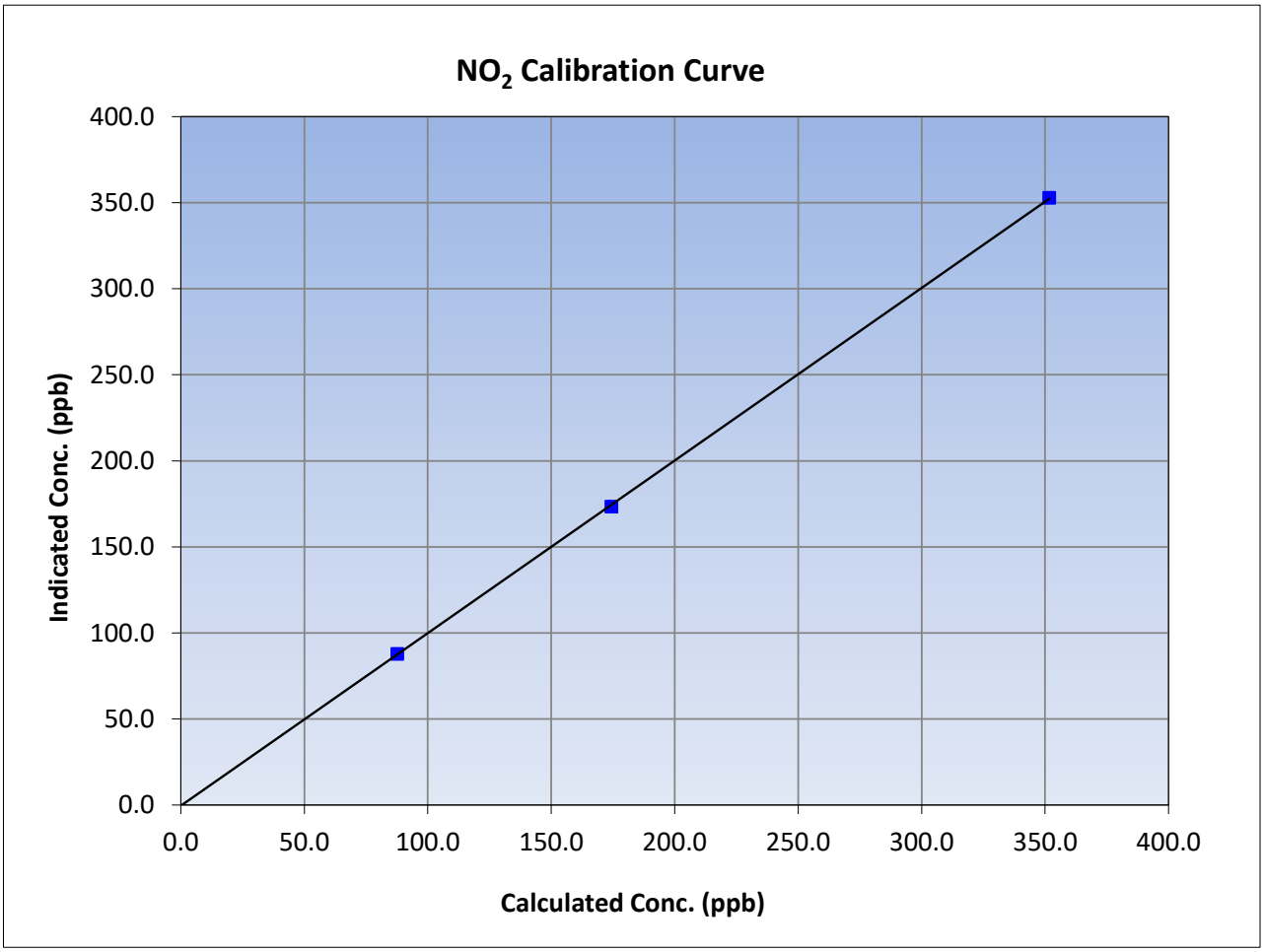
Version-04-2020

Station Information

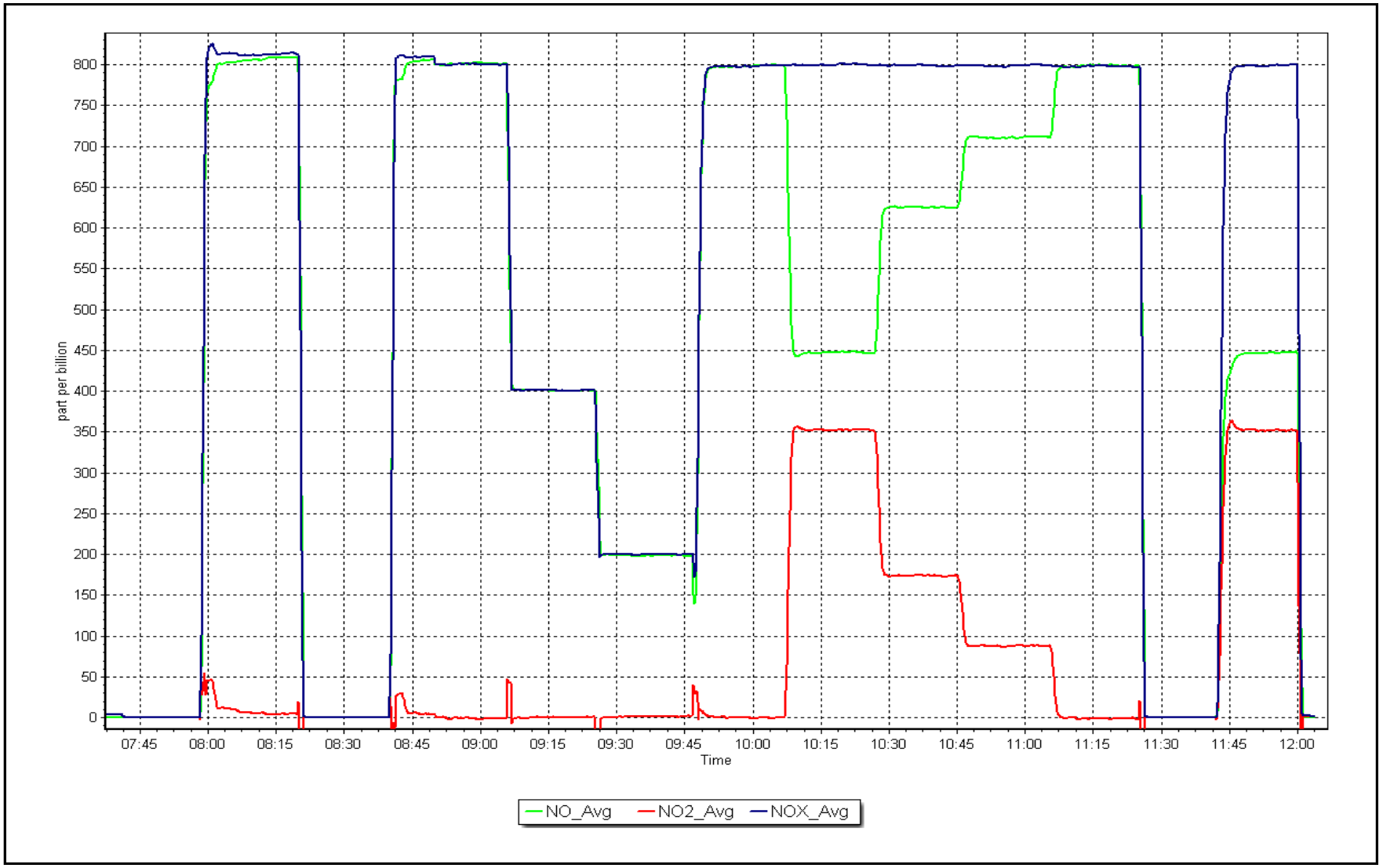
Calibration Date:	December 7, 2023	Previous Calibration:	November 7, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	7:35	End Time (MST):	12:04
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999972	≥0.995
351.7	352.8	0.9969			
174.4	173.3	1.0063	Slope	1.002916	0.90 - 1.10
87.6	87.8	0.9977			
			Intercept	-0.422416	+/-20



NO_X Calibration Plot Date: December 7, 2023 Location: Fort Hills



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Fort Hills	Station number:	AMS 23
Calibration Date:	December 13, 2023	Last Cal Date:	November 20, 2023
Start time (MST):	8:15	End time (MST):	8:44
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)	2.4	2.2	2.4	☐	+/- 2 °C
P (mmHg)	724.8	724.3	724.8	☐	+/- 10 mmHg
flow (LPM)	5.05	5.14	5.05	☐	+/- 0.25 LPM

Leak Test: Date of check: December 13, 2023 Last Cal Date: November 20, 2023

PM w/o HEPA: 2.2 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				☐	10.9 +/- 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

DECEMBER 2023

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

January 31, 2024

CALS_467

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Waskow ohci Pimatisiwin	Station number:	AMS25
Calibration Date:	December 19, 2023	Last Cal Date:	November 20, 2023
Start time (MST):	7:45	End time (MST):	10:52
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:	0.995565	0.999891	Backgd or Offset:	9.9	11.0
Calibration intercept:	0.584063	-0.656026	Coeff or Slope:	1.011	1.020

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	79.2	800.5	794.1	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4921	79.2	800.5	799.7	1.001
second point	4960	39.6	400.3	400.3	1.000
third point	4980	19.8	200.1	198.4	1.009
as left zero	5000	0.0	0.0	-0.2	----
as left span	4921	79.2	800.5	798.8	1.002
				Average Correction Factor	1.003

Baseline Corr As found:	793.40	Previous response	797.56	*% 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

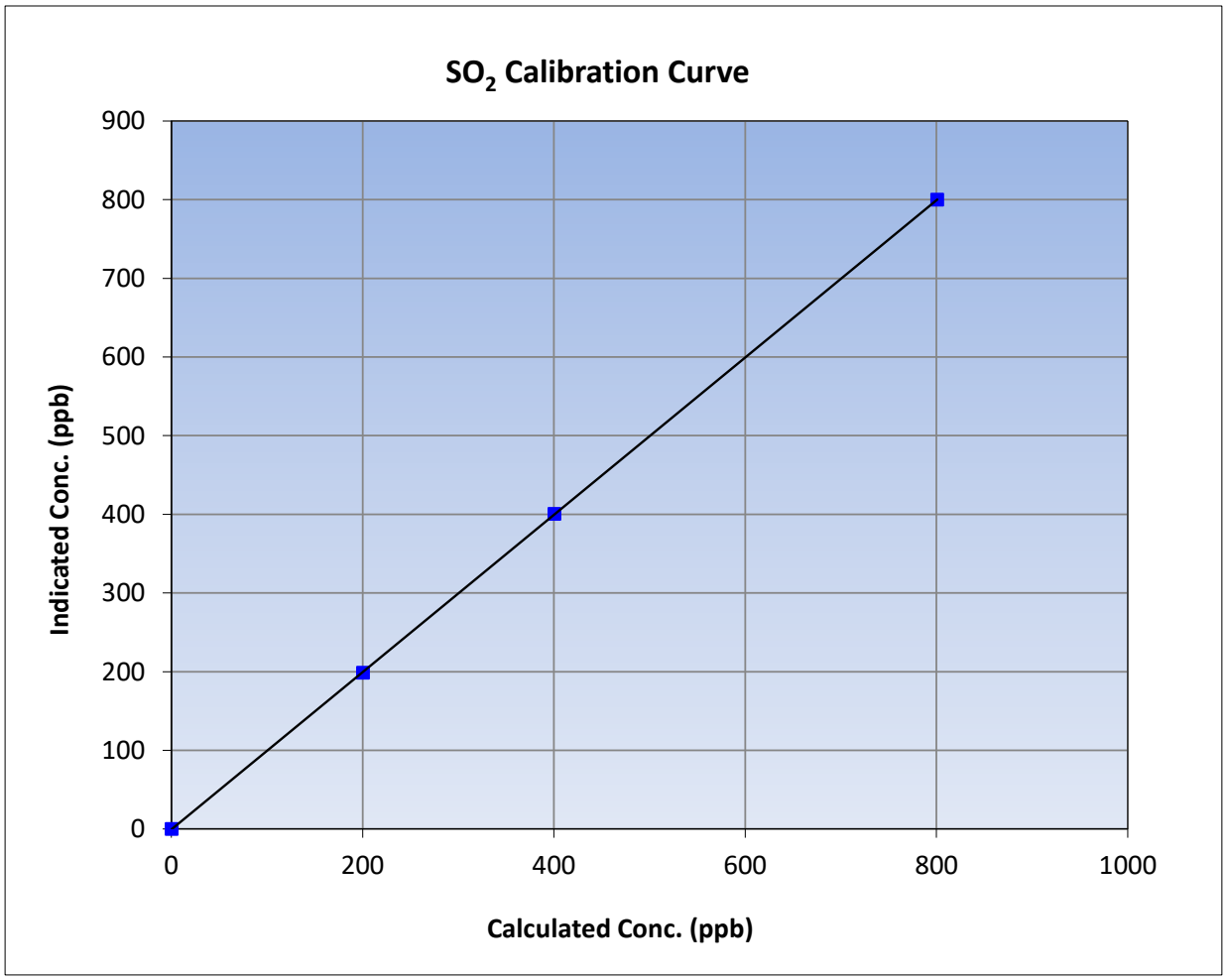
Station Information

Calibration Date:	December 19, 2023	Previous Calibration:	November 20, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	7:45	End Time (MST):	10:52
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148497

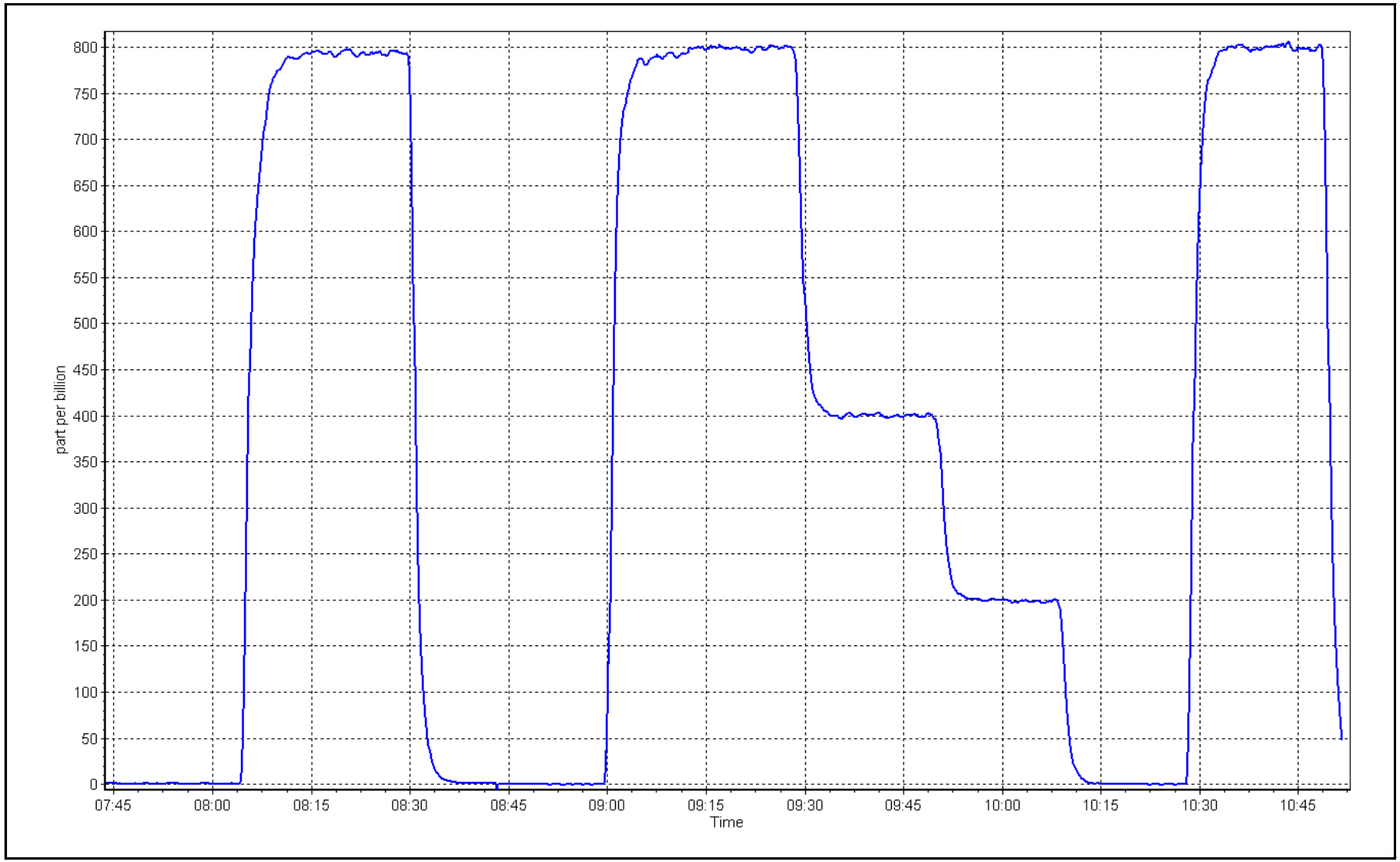
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
800.5	799.7	1.0010
400.3	400.3	1.0000
200.1	198.4	1.0088

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	0.999891	*0.90 - 1.10*
Intercept	-0.656026	*+/-30*



SO2 Calibration Plot Date: December 19, 2023 Location: Waskow ohci Pimatisiwin



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Waskow ohci Pimatisiwin	Station number:	AMS25
Calibration Date:	December 15, 2023	Last Cal Date:	November 24, 2023
Start time (MST):	7:20	End time (MST):	11:43
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	4.97	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC517099			
Removed Cal Gas Conc:	4.97	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	747
ZAG Make/Model:	API T701		Serial Number:	261

Analyzer Information

Analyzer make:	Thermo 43i-LTE		Analyzer serial #:	1170050146	
Converter make:	Global G-150		Converter serial #:	2022-219	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998073	1.003251	Backgd or Offset:	3.30	3.30
Calibration intercept:	0.180000	0.200000	Coeff or Slope:	1.108	1.108

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	79.8	0.997
as found 2nd point	4960	40.0	39.7	40.1	0.993
as found 3rd point	4980	20.0	19.9	20.1	0.993
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4920	80.0	79.5	79.8	0.996
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	801.7	0.998
SO2 Scrubber Check	4921	79.2	800.0	0.1	----
Date of last scrubber change:		20-Jun-23		Ave Corr Factor	0.990
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.7	Prev response:	79.48	*% change:	0.3%
Baseline Corr 2nd AF pt:	40.0	AF Slope:	1.002963	AF Intercept:	0.160000
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999996		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

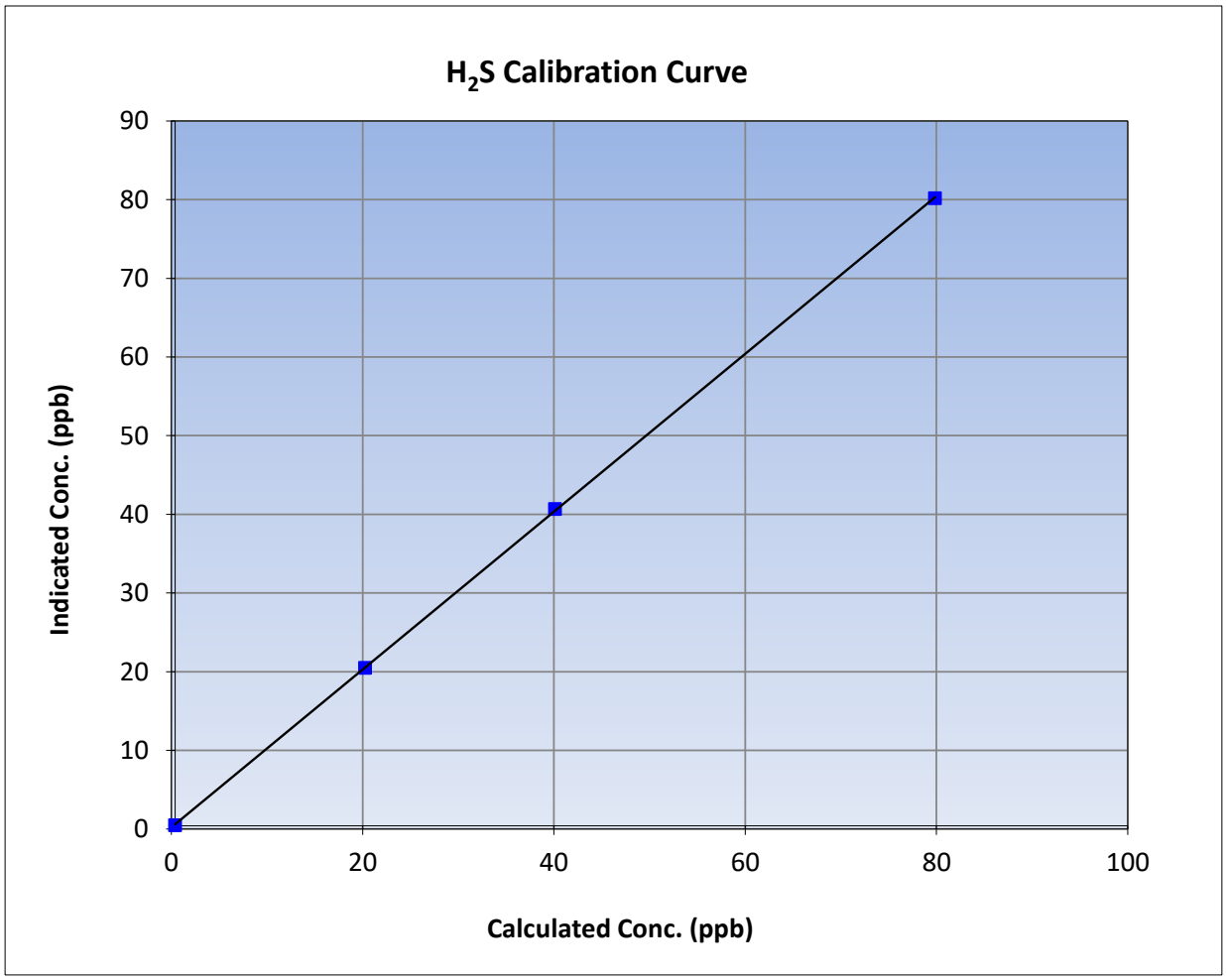
Station Information

Calibration Date:	December 15, 2023	Previous Calibration:	November 24, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	7:20	End Time (MST):	11:43
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1170050146

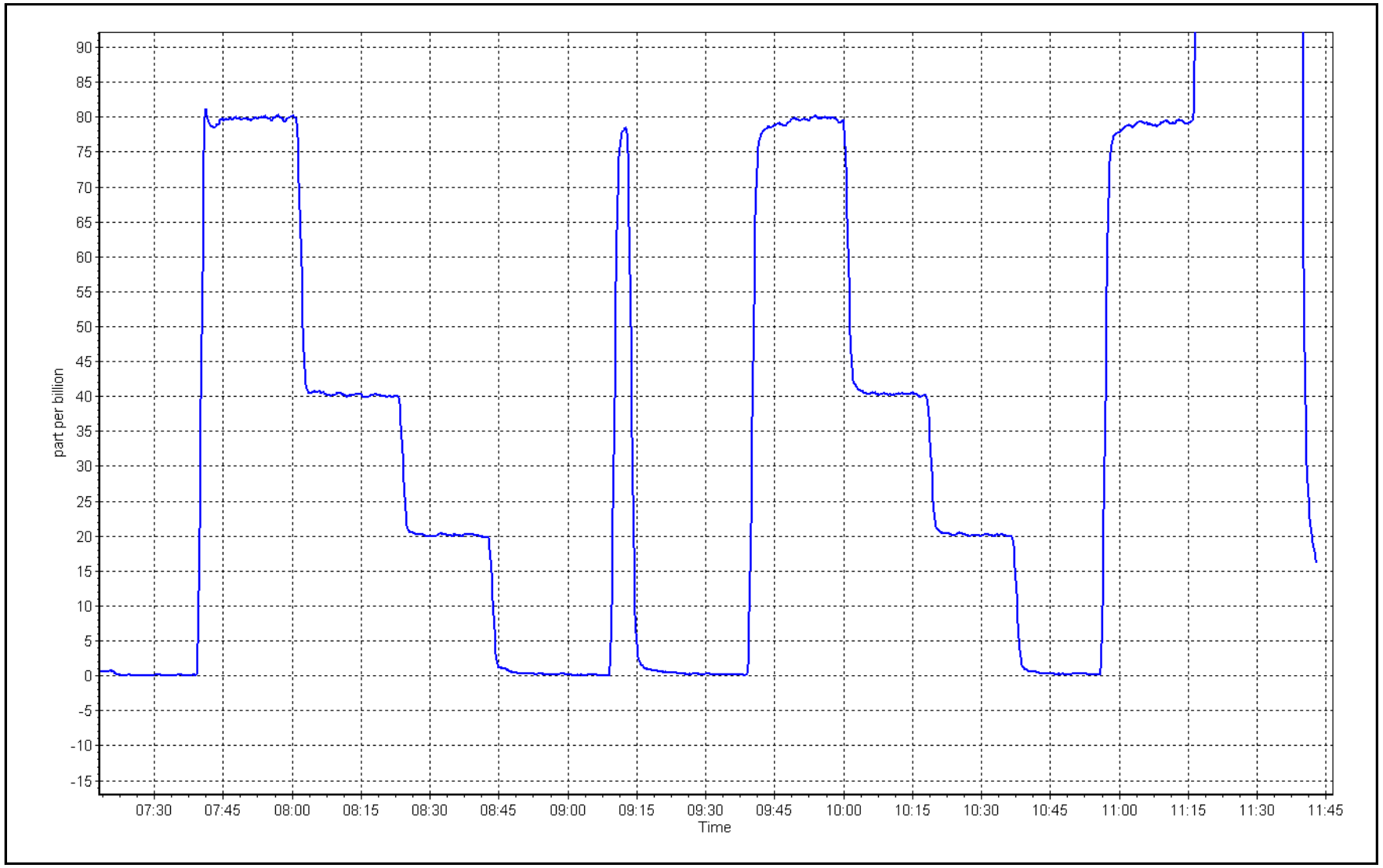
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
79.5	79.8	0.9957
39.7	40.3	0.9858
19.9	20.1	0.9883

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999976	*≥0.995*
Slope	1.003251	*0.90 - 1.10*
Intercept	0.200000	*+/-3*



H_2S Calibration Plot Date: December 15, 2023 Location: Waskow ohci Pimatisiwin



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS26
CHRISTINA LAKE

DECEMBER 2023

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

January 31, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Christina Lake	Station number:	AMS 26
Calibration Date:	December 12, 2023	Last Cal Date:	November 29, 2023
Start time (MST):	14:47	End time (MST):	17:27
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:	0.999235	0.996949	Backgd or Offset:	15.6	15.6
Calibration intercept:	0.269171	0.370507	Coeff or Slope:	0.868	0.874

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	0.9	----
as found span	4931	80.9	800.0	792.1	1.010
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	1.1	----
high point	4931	80.9	800.0	798.3	1.002
second point	4970	40.5	400.6	399.3	1.003
third point	4994	20.4	201.6	200.7	1.005
as left zero	5000	0.0	0.0	1.0	----
as left span	4931	80.9	800.0	799.8	1.000
				Average Correction Factor	1.003

Baseline Corr As found:	791.20	Previous response	799.63	*% change	-1.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

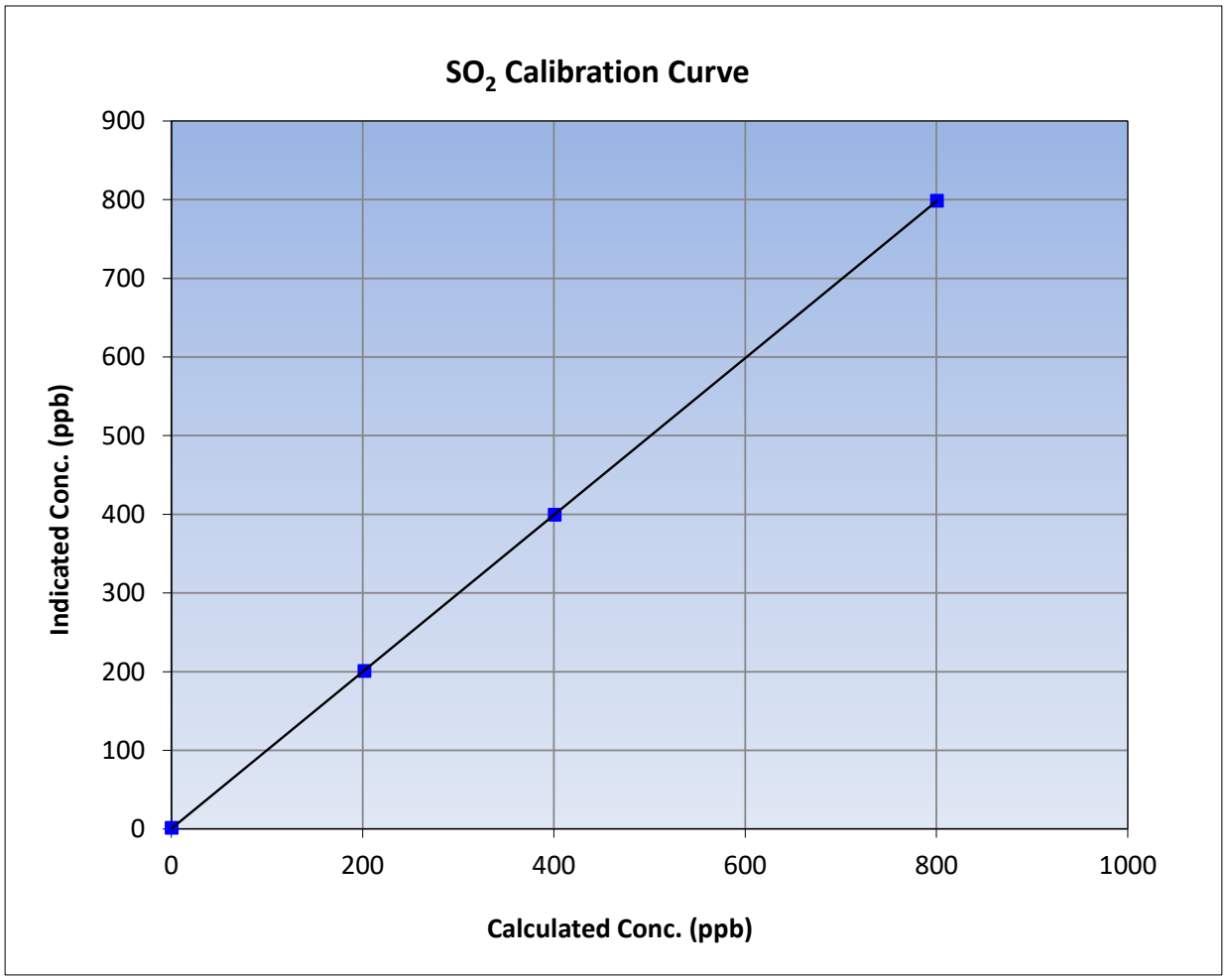
Station Information

Calibration Date:	December 12, 2023	Previous Calibration:	November 29, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	14:47	End Time (MST):	17:27
Analyzer make:	Thermo 43i	Analyzer serial #:	1173410001

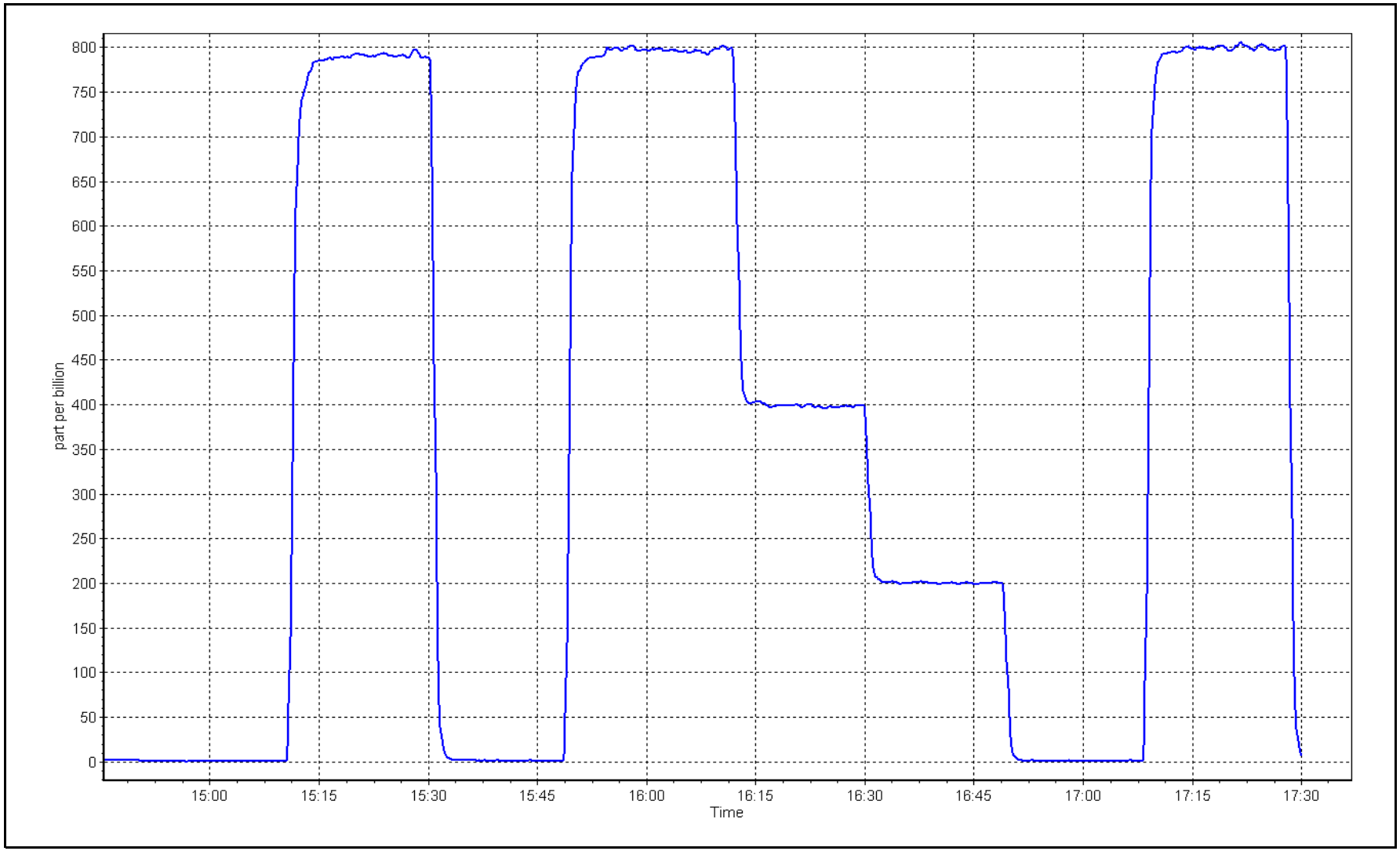
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	1.1	----
800.0	798.3	1.0021
400.6	399.3	1.0032
201.6	200.7	1.0046

Statistical Evaluation		Limits
Correlation Coefficient	0.999996	≥0.995
Slope	0.996949	0.90 - 1.10
Intercept	0.370507	+/-30



SO2 Calibration Plot Date: December 12, 2023 Location: Christina Lake



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Christina Lake	Station number:	AMS26
Calibration Date:	December 12, 2023	Last Cal Date:	November 29, 2023
Start time (MST):	10:57	End time (MST):	14:48
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	4.89	ppm	Cal Gas Exp Date:	February 9, 2024
Cal Gas Cylinder #:	EY0002466			
Removed Cal Gas Conc:	4.89	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	281
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:	1.002002	1.001571	Backgd or Offset:	33.9	33.9
Calibration intercept:	0.607400	0.647458	Coeff or Slope:	1.060	1.060

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	4930	81.9	79.9	81.7	0.980
as found 2nd point	4972	41.0	40.0	41.4	0.971
as found 3rd point	4994	20.6	20.1	21.1	0.961
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	0.6	----
high point	4930	81.9	79.9	80.6	0.991
second point	4972	41.0	40.0	40.9	0.978
third point	4994	20.6	20.1	20.7	0.970
as left zero	5000	0.0	0.0	0.8	----
as left span	4930	81.9	79.9	81.3	0.983
SO2 Scrubber Check	4931	80.9	807.1	0.1	----
Date of last scrubber change:		27-Feb-19		Ave Corr Factor	0.980
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.5	Prev response:	80.68	*% change:	1.0%
Baseline Corr 2nd AF pt:	41.2	AF Slope:	1.018750	AF Intercept:	0.446266
Baseline Corr 3rd AF pt:	20.9	AF Correlation:	0.999955		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after MAF's. Ran scrubber check after calibrator zero passed. No adjustment made.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

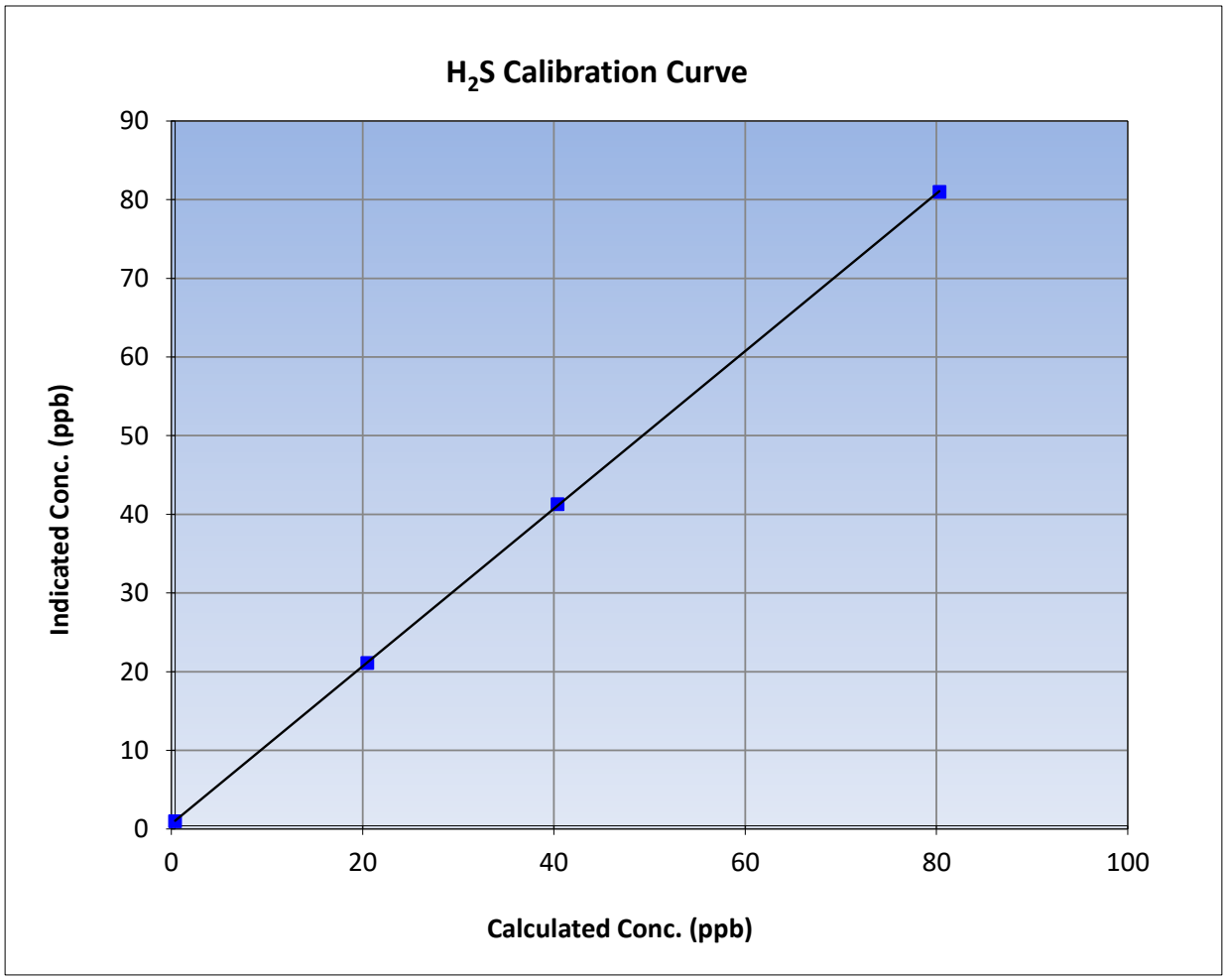
Station Information

Calibration Date:	December 12, 2023	Previous Calibration:	November 29, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	10:57	End Time (MST):	14:48
Analyzer make:	Thermo 450i	Analyzer serial #:	1180030032

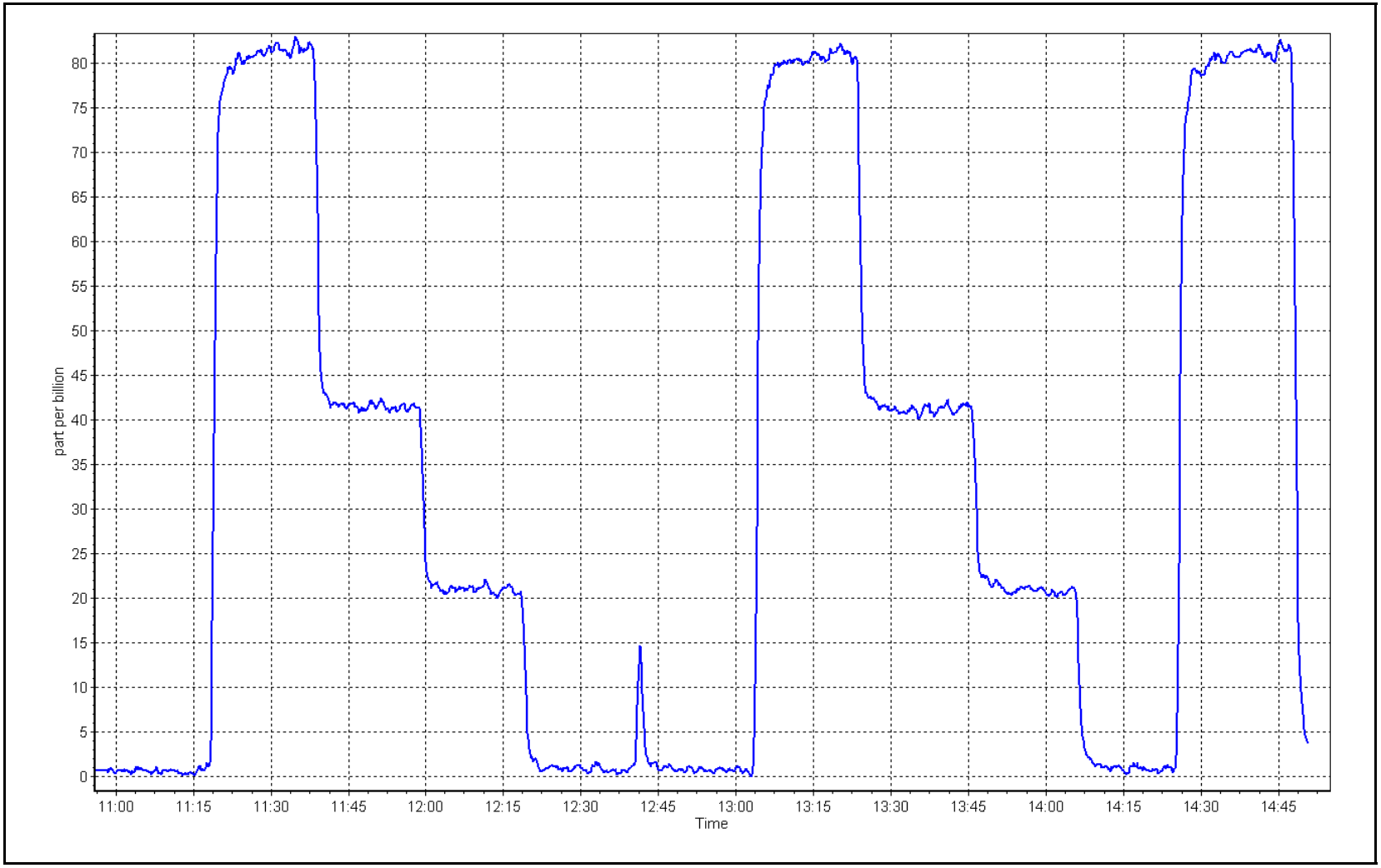
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.6	----
79.9	80.6	0.9914
40.0	40.9	0.9778
20.1	20.7	0.9704

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999985	*≥0.995*
Slope	1.001571	*0.90 - 1.10*
Intercept	0.647458	*+/-3*



H_2S Calibration Plot Date: December 12, 2023 Location: Christina Lake



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Christina Lake	Station number:	AMS26
Calibration Date:	December 19, 2023	Last Cal Date:	December 12, 2023
Start time (MST):	11:06	End time (MST):	15:32
Reason:	Cylinder Change		

Calibration Standards

Cal Gas Concentration:	5.05	ppm	Cal Gas Exp Date:	November 15, 2026
Cal Gas Cylinder #:	DT0014831			
Removed Cal Gas Conc:	4.89	ppm	Rem Gas Exp Date:	February 9, 2024
Removed Gas Cyl #:	EY0002466		Diff between cyl:	-2.7%
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:	1.001571	1.003426	Backgd or Offset:	33.9	36.2
Calibration intercept:	0.647458	-0.141605	Coeff or Slope:	1.060	1.095

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.5	----
as found span	4930	81.9	79.9	81.1	0.991
as found 2nd point					
as found 3rd point					
new cylinder response	4921	79.2	80.0	79.0	1.013

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	4921	79.2	80.0	80.1	0.999
second point	4960	39.6	40.0	39.9	1.002
third point	4980	19.8	20.0	20.2	0.990
as left zero	5000	0.0	0.0	-0.4	----
as left span	4921	79.2	80.0	79.1	1.011
SO2 Scrubber Check	4931	80.9	807.1		----
Date of last scrubber change:		27-Feb-19		Ave Corr Factor	0.997
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.6	Prev response:	80.68	*% change:	-0.1%
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 sample inlet filter and H2S cylinder after as founds. Adjusted zero and span.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

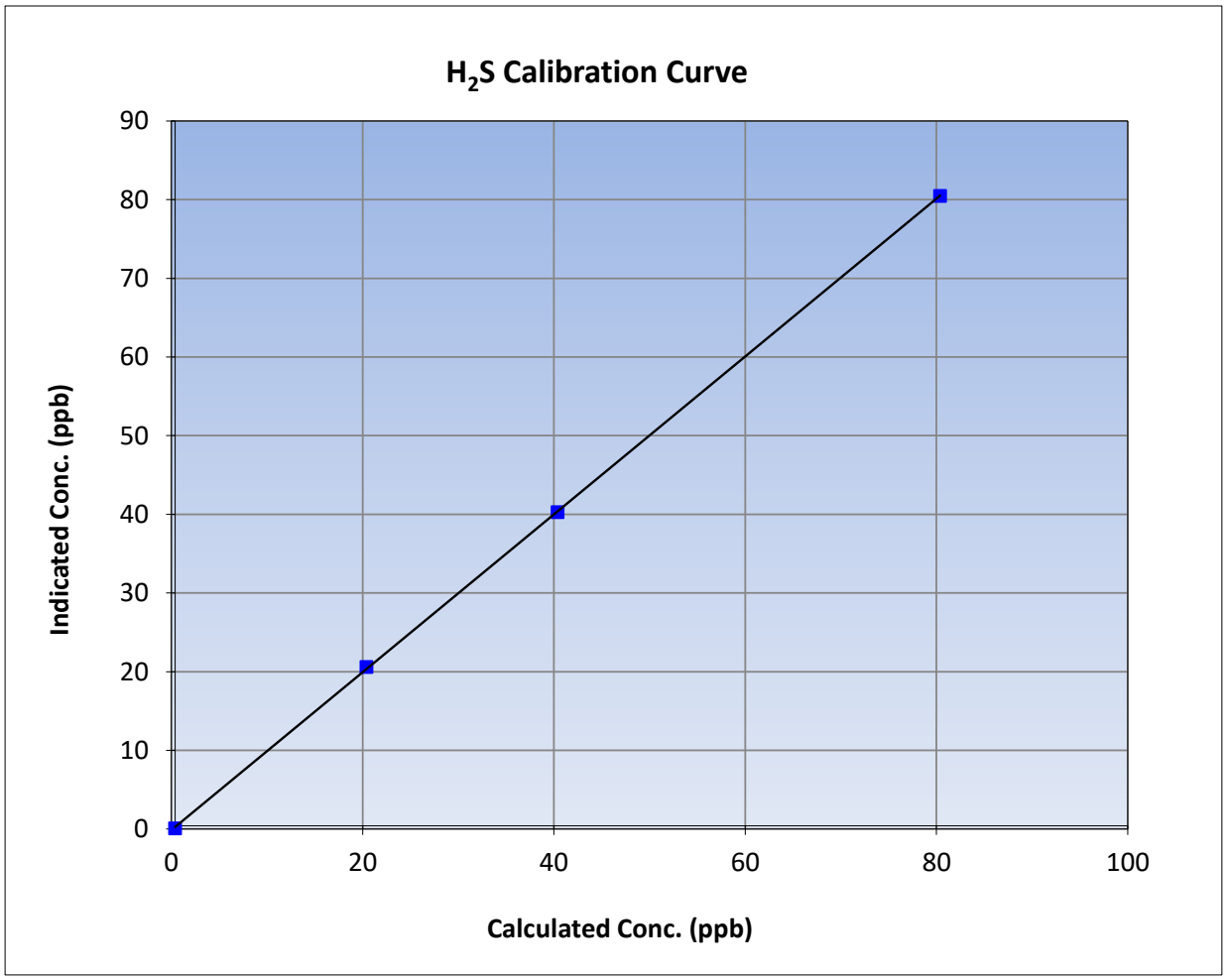
Station Information

Calibration Date:	December 19, 2023	Previous Calibration:	December 12, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	11:06	End Time (MST):	15:32
Analyzer make:	Thermo 450i	Analyzer serial #:	1180030032

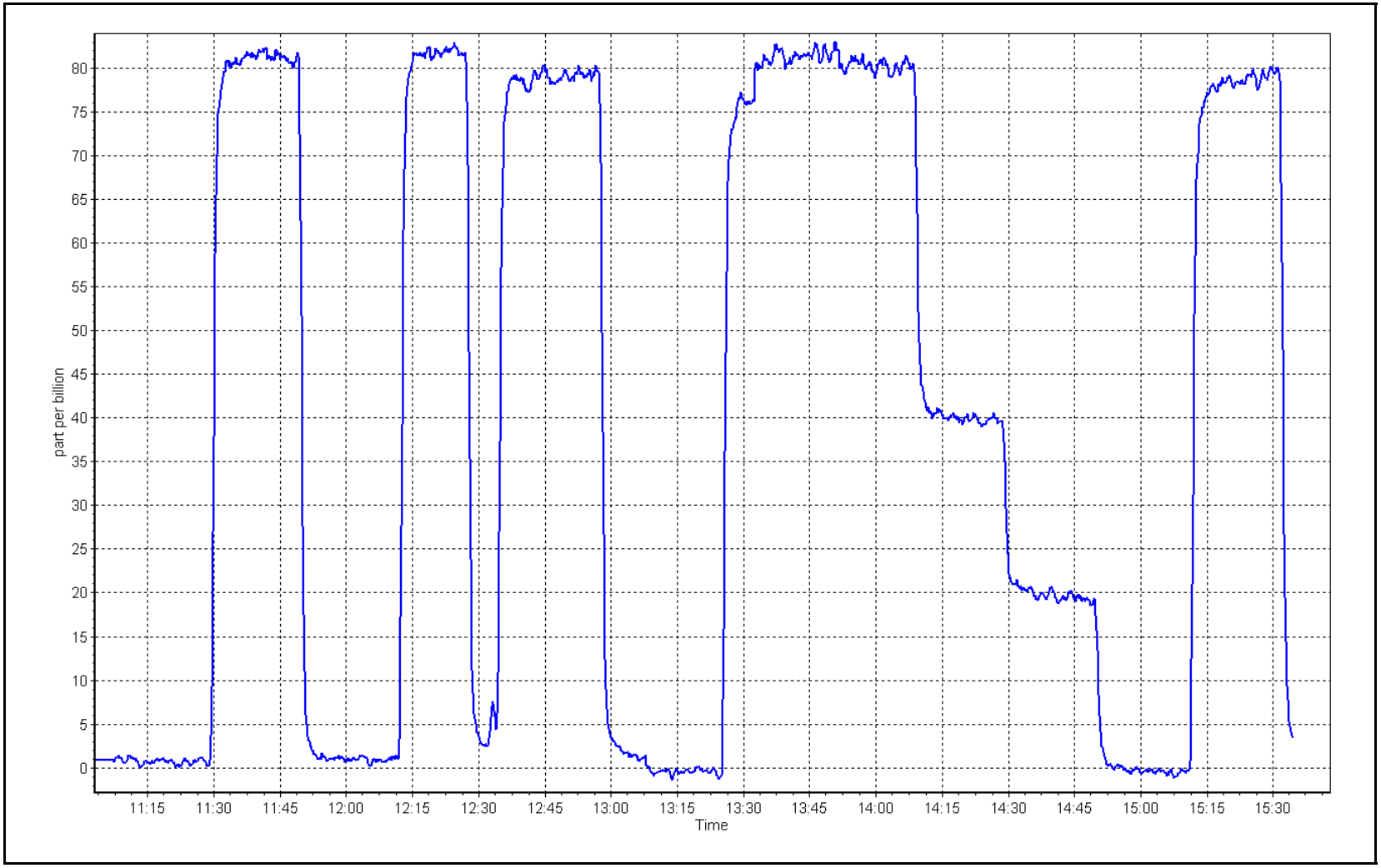
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
80.0	80.1	0.9986
40.0	39.9	1.0025
20.0	20.2	0.9900

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999969	*≥0.995*
Slope	1.003426	*0.90 - 1.10*
Intercept	-0.141605	*+/-3*



H_2S Calibration Plot Date: December 19, 2023 Location: Christina Lake



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Christina Lake	Station number:	AMS26
Calibration Date:	December 13, 2023	Last Cal Date:	November 28, 2023
Start time (MST):	8:27	End time (MST):	12:48
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2Y1P4C		Cal Gas Expiry Date:	November 12, 2023	
NOX Cal Gas Conc:	50.82	ppm	NO Cal Gas Conc:	50.02	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	50.82	ppm	Removed Gas NO Conc:	50.02	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	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	1.300	NO bkgnd or offset:	2.5	2.5
NOX coeff or slope:	0.997	0.997	NOX bkgnd or offset:	3.2	3.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	160.1	160.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.994041	0.996416
NO_X Cal Offset:	0.380000	0.160000
NO Cal Slope:	0.993160	0.995088
NO Cal Offset:	0.280000	0.080000
NO_2 Cal Slope:	1.004527	1.002313
NO_2 Cal Offset:	-0.038830	-0.019410

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.8	-0.1	-0.7	----	----
as found span	4920	80.0	813.1	800.3	12.8	811.5	797.1	14.5	1.0020	1.0040
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.7	0.0	-0.7	----	----
high point	4920	80.0	813.1	800.3	12.8	809.8	796.2	13.6	1.0041	1.0052
second point	4960	40.0	406.6	400.2	6.4	406.1	399.0	7.1	1.0011	1.0029
third point	4980	20.0	203.3	200.1	3.2	203.3	198.8	4.5	0.9999	1.0064
as left zero	5000	0.0	0.0	0.0	0.0	-0.7	0.0	-0.7	----	----
as left span	4920	80.0	813.1	410.6	402.5	808.0	404.2	403.8	1.0063	1.0159
								Average Correction Factor	1.0017	1.0048

Corrected As found	NO_X = 812.3 ppb	NO = 797.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.4%
Previous Response	NO_X = 808.7 ppb	NO = 795.1 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)	794.1	404.4	402.5	403.0	0.9988	100.1%
2nd GPT point (200 ppb O3)	794.1	597.6	209.3	210.2	0.9957	100.4%
3rd GPT point (100 ppb O3)	794.1	693.4	113.5	114.4	0.9921	100.8%
				Average Correction Factor	0.9955	100.4%

Notes: Changed sample inlet filter after as founds. No adjustment made. Used the 2nd reference point.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

NO_X Calibration Summary

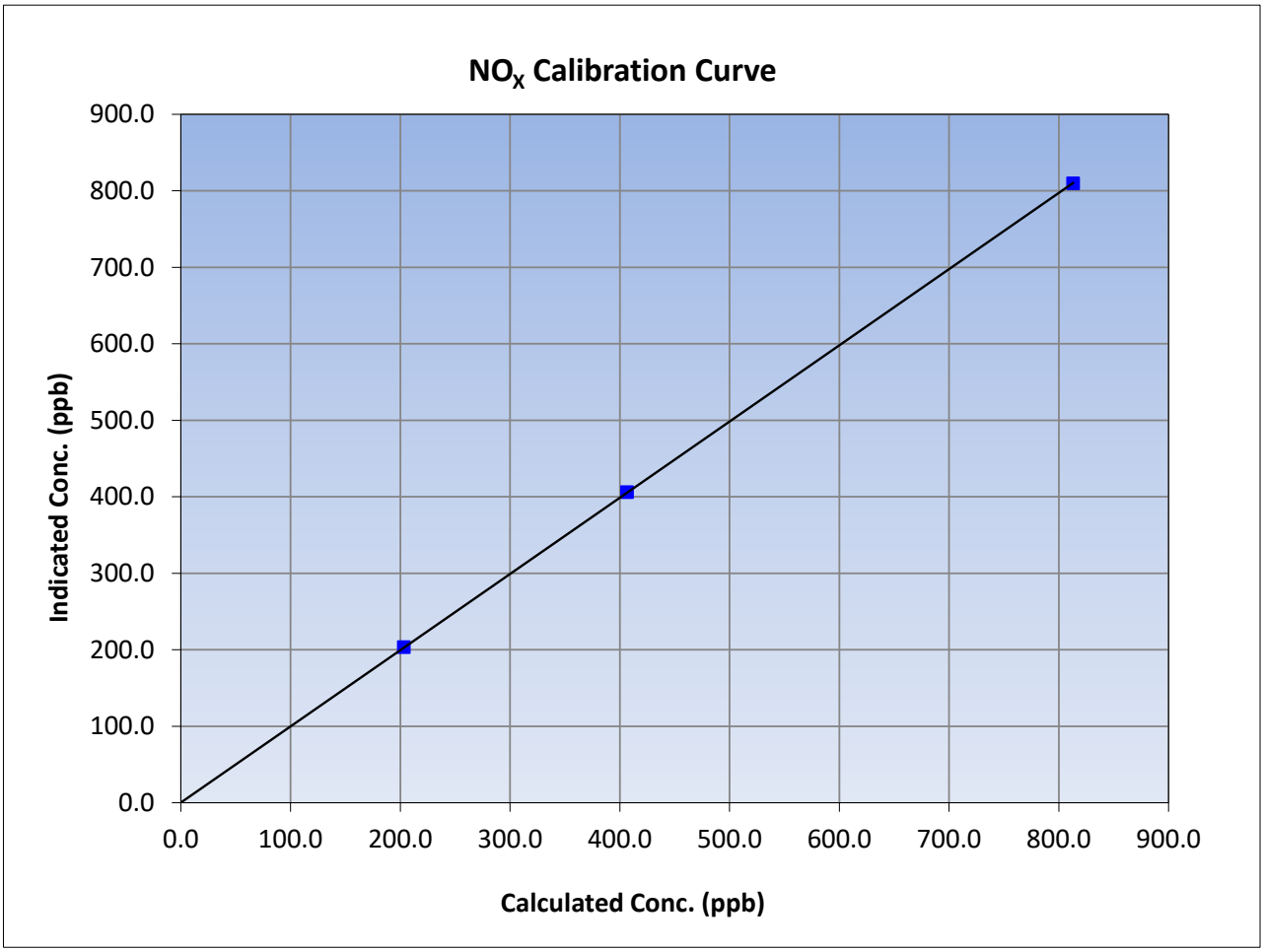
Version-04-2020

Station Information

Calibration Date:	December 13, 2023	Previous Calibration:	November 28, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	8:27	End Time (MST):	12:48
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	0.999994	≥0.995
813.1	809.8	1.0041			
406.6	406.1	1.0011	Slope	0.996416	0.90 - 1.10
203.3	203.3	0.9999			
			Intercept	0.160000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

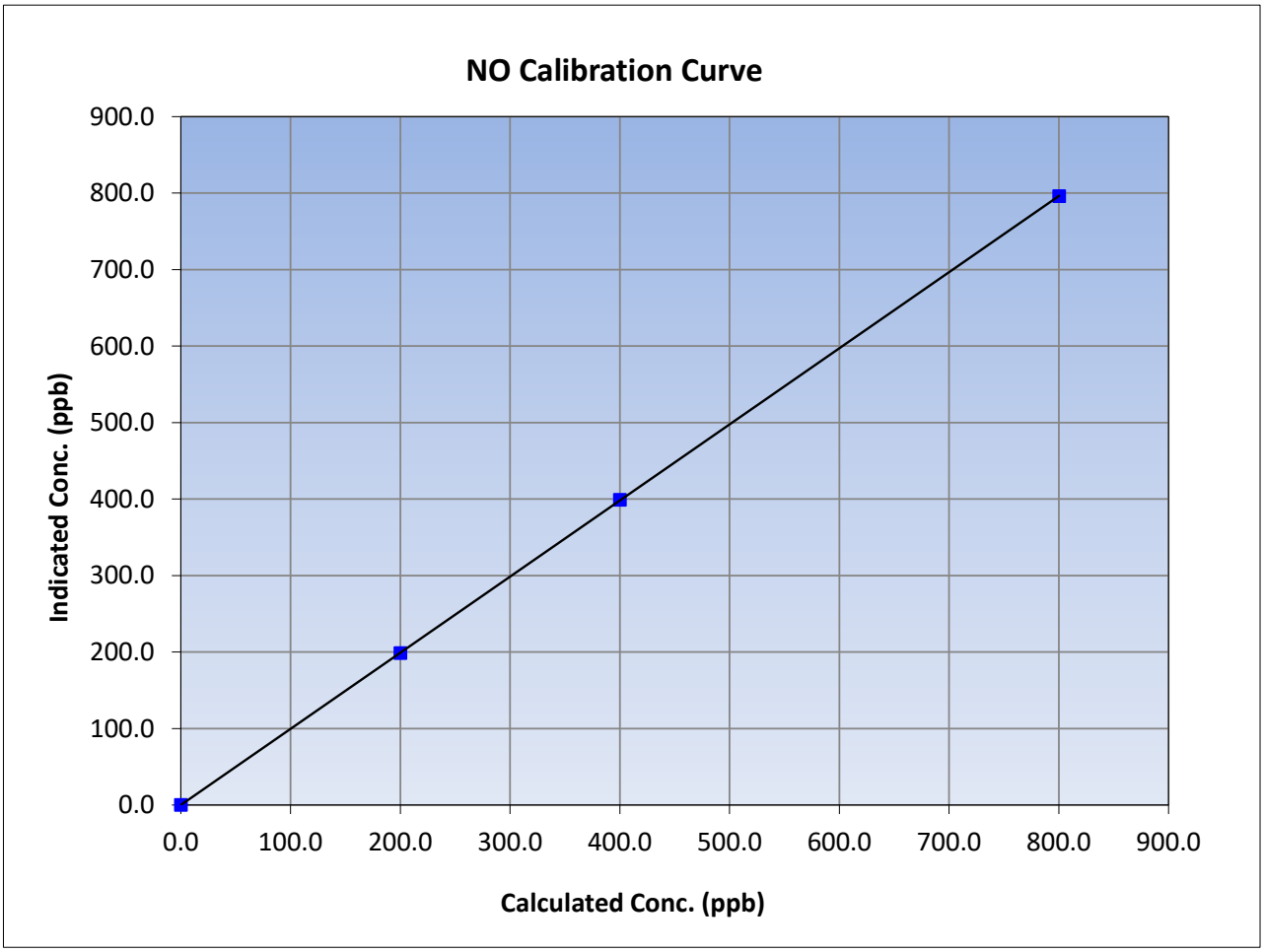
Version-04-2020

Station Information

Calibration Date:	December 13, 2023	Previous Calibration:	November 28, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	8:27	End Time (MST):	12:48
Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999998	≥0.995
800.3	796.2	1.0052			
400.2	399.0	1.0029	Slope	0.995088	0.90 - 1.10
200.1	198.8	1.0064			
			Intercept	0.080000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

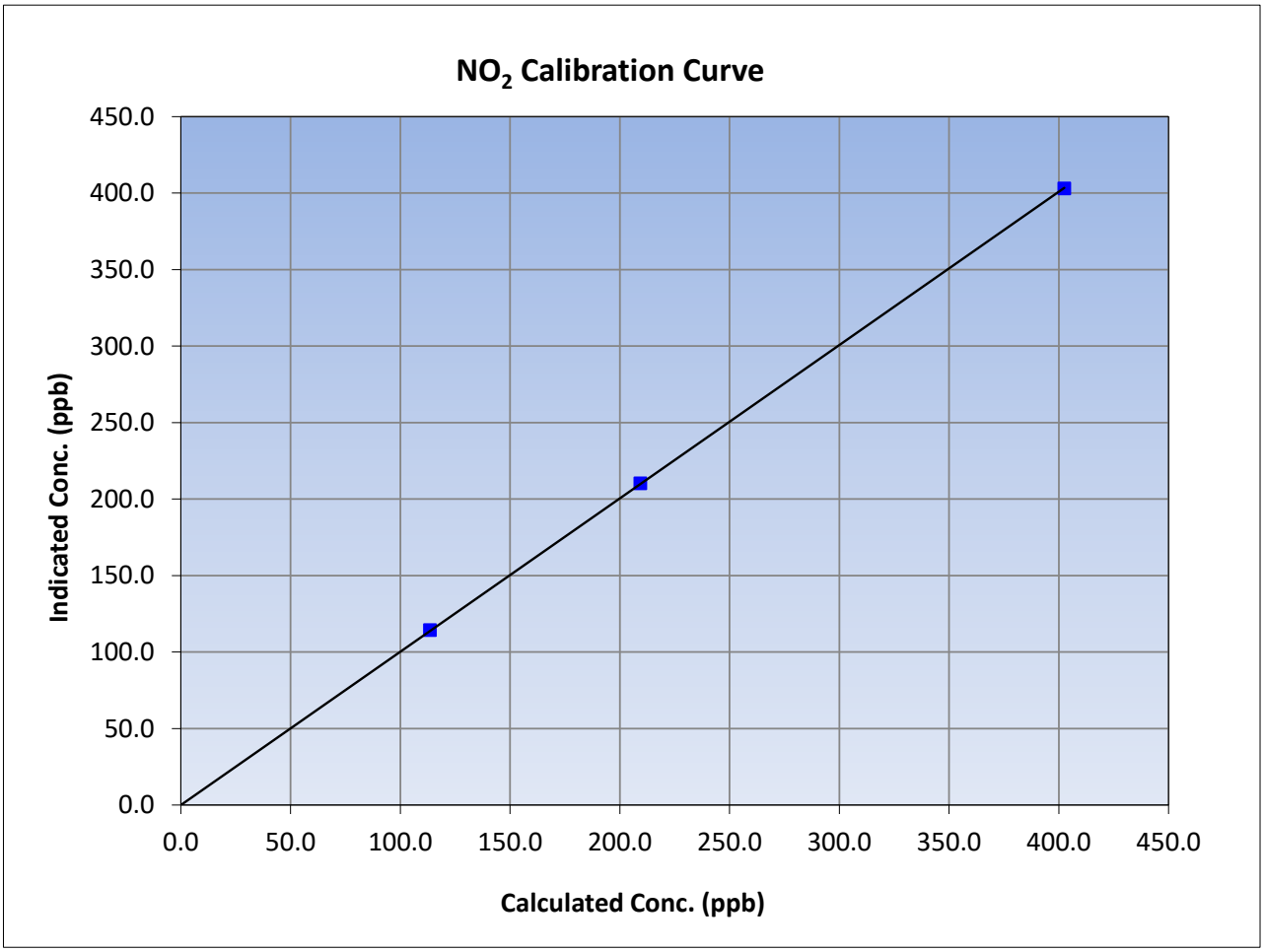
Version-04-2020

Station Information

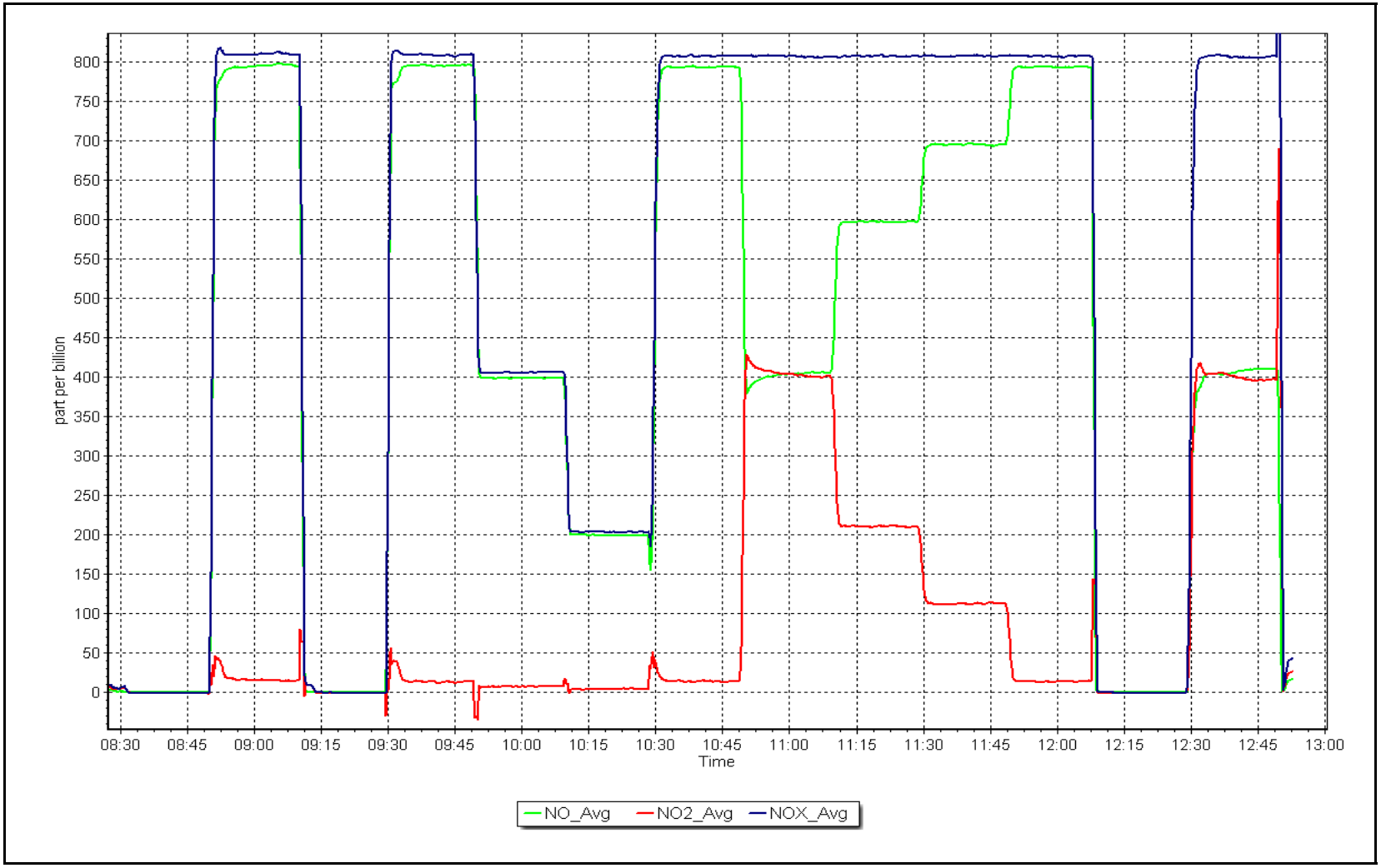
Calibration Date:	December 13, 2023	Previous Calibration:	November 28, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	8:27	End Time (MST):	12:48
Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.7	----	Correlation Coefficient	0.999986	≥0.995
402.5	403.0	0.9988			
209.3	210.2	0.9957	Slope	1.002313	0.90 - 1.10
113.5	114.4	0.9921			
			Intercept	-0.019410	+/-20



NO_X Calibration Plot Date: December 13, 2023 Location: Christina Lake



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS27
JACKFISH 2/3

DECEMBER 2023

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

January 31, 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:	December 12, 2023	Last Cal Date:	November 14, 2023
Start time (MST):	10:02	End time (MST):	12:50
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:	0.999320	0.989063	Backgd or Offset:	7.7	7.6
Calibration intercept:	-2.038541	-2.298638	Coeff or Slope:	0.950	0.950

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	79.1	800.2	787.9	1.016
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4921	79.1	800.2	790.5	1.012
second point	4961	39.5	399.5	391.3	1.021
third point	4980	19.8	200.3	193.4	1.036
as left zero	5000	0.0	0.0	0.4	----
as left span	4921	79.1	800.2	792.5	1.010
				Average Correction Factor	1.023

Baseline Corr As found:	787.70	Previous response	797.58	*% 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 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

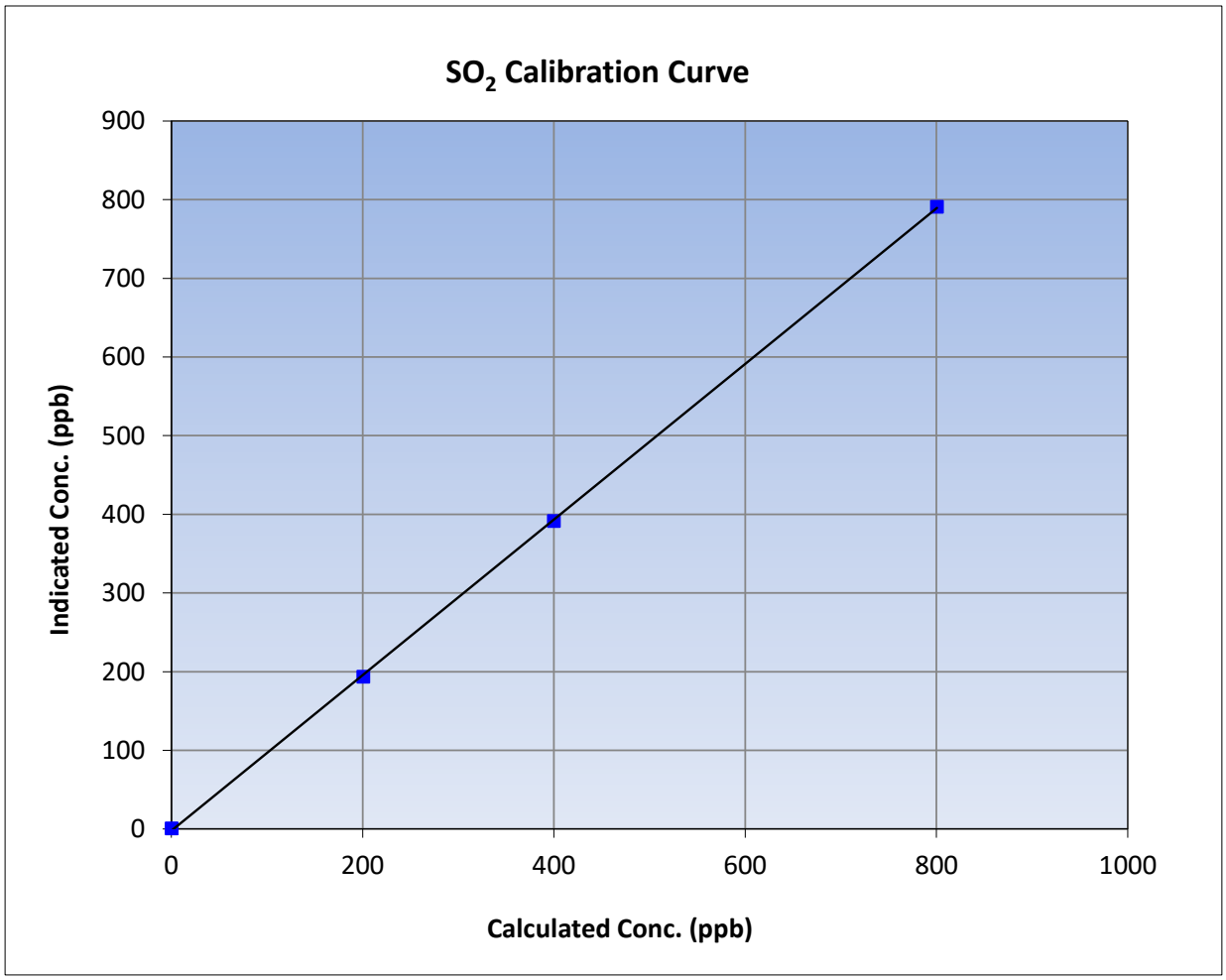
Station Information

Calibration Date:	December 12, 2023	Previous Calibration:	November 14, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS 27
Start Time (MST):	10:02	End Time (MST):	12:50
Analyzer make:	Thermo 43iQ	Analyzer serial #:	12124313138

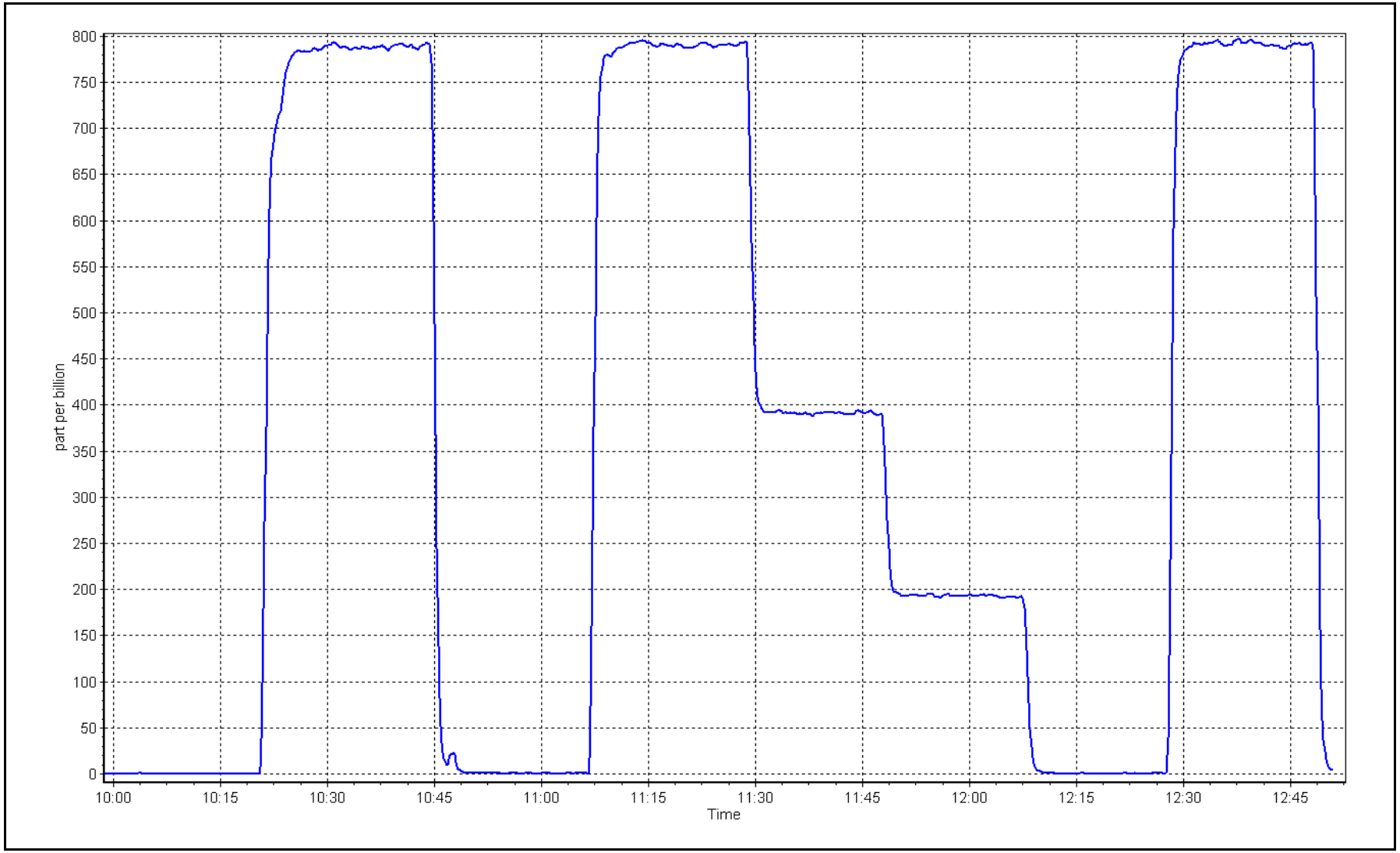
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
800.2	790.5	1.0122
399.5	391.3	1.0211
200.3	193.4	1.0357

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999950	*≥0.995*
Slope	0.989063	*0.90 - 1.10*
Intercept	-2.298638	*+/-30*



SO2 Calibration Plot Date: December 12, 2023 Location: Jackfish 2/3



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Jackfish 2/3	Station number:	AMS27
Calibration Date:	December 11, 2023	Last Cal Date:	November 15, 2023
Start time (MST):	12:47	End time (MST):	17:22
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.41	ppm	Cal Gas Exp Date:	January 4, 2025
Cal Gas Cylinder #:	CC345023			
Removed Cal Gas Conc:	5.41	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3811
ZAG Make/Model:	API 701		Serial Number:	135

Analyzer Information

Analyzer make:	API T101		Analyzer serial #:	621
Converter make:			Converter serial #:	
Analyzer Range	0 - 100 ppb			

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.996209	1.007470	Backgd or Offset:	29.9	29.9
Calibration intercept:	-0.098000	-0.217773	Coeff or Slope:	0.928	0.953

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.2	----
as found span	4926	74.1	80.2	79.3	1.008
as found 2nd point	4963	37.0	40.0	39.4	1.011
as found 3rd point	4982	18.5	20.0	19.0	1.042
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4926	74.1	80.2	80.6	0.995
second point	4963	37.0	40.0	40.3	0.993
third point	4982	18.5	20.0	19.4	1.032
as left zero	5000	0.0	0.0	0.1	----
as left span	4926	74.1	80.2	81.1	0.989
SO2 Scrubber Check	4921	79.1	791.0	0.1	----
Date of last scrubber change:				Ave Corr Factor	1.007
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.5	Prev response:	79.77	*% change:	-0.3%
Baseline Corr 2nd AF pt:	39.6	AF Slope:	0.994215	AF Intercept:	-0.478088
Baseline Corr 3rd AF pt:	19.2	AF Correlation:	0.999924		

* = > +/-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

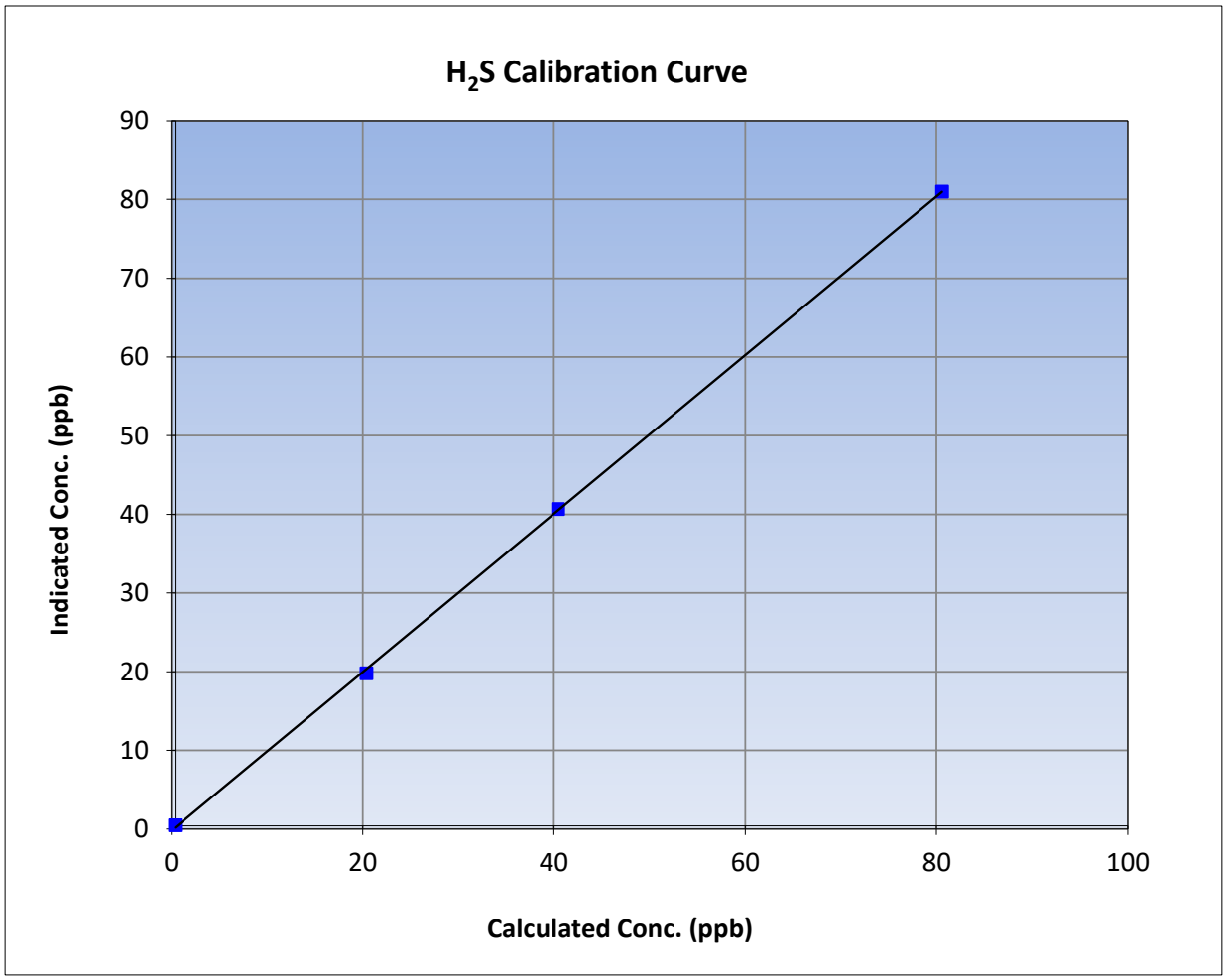
Station Information

Calibration Date:	December 11, 2023	Previous Calibration:	November 15, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	12:47	End Time (MST):	17:22
Analyzer make:	API T101	Analyzer serial #:	621

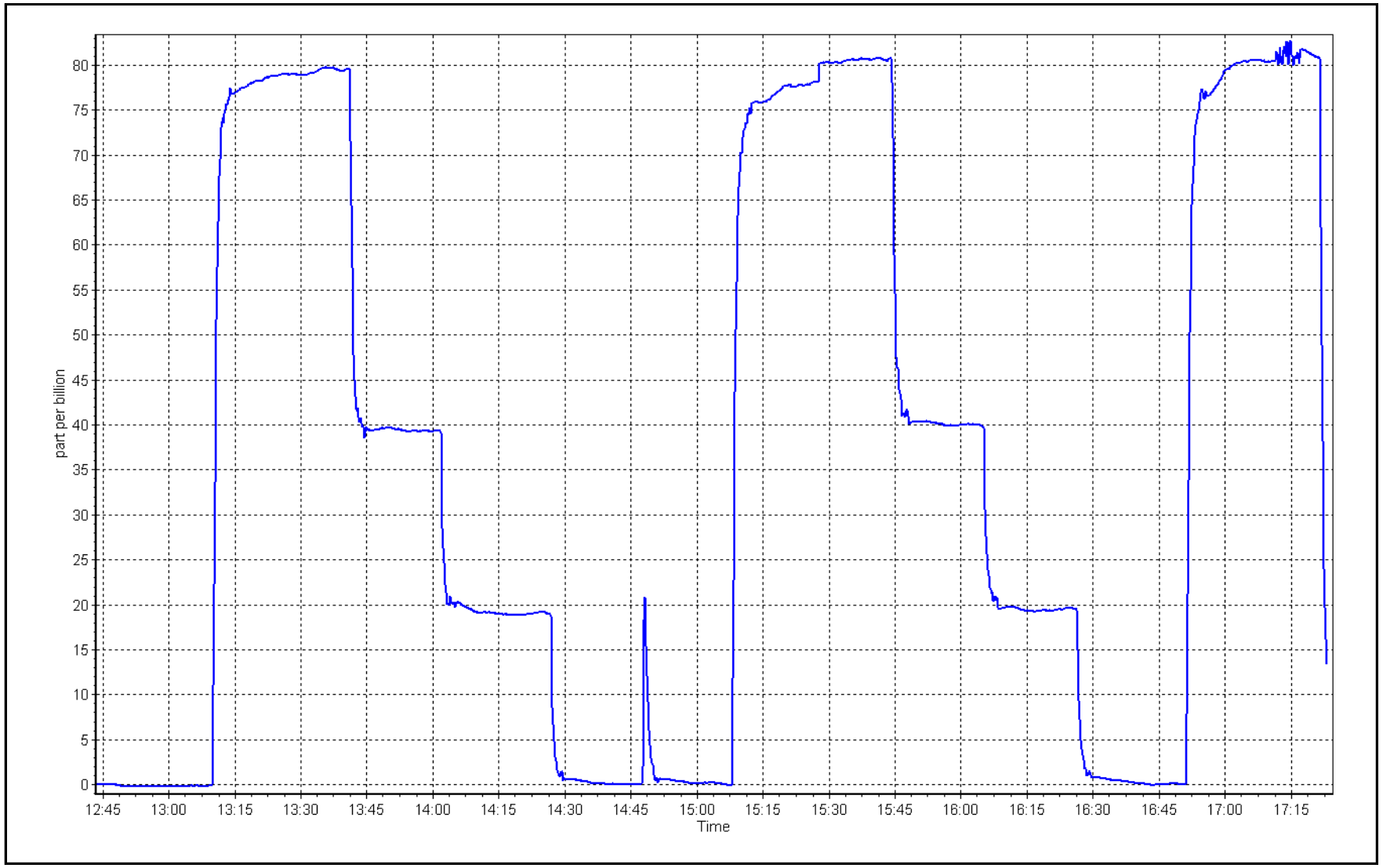
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.2	80.6	0.9947
40.0	40.3	0.9934
20.0	19.4	1.0317

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999878	*≥0.995*
Slope	1.007470	*0.90 - 1.10*
Intercept	-0.217773	*+/-3*



H_2S Calibration Plot Date: December 11, 2023 Location: Jackfish 2/3



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Jackfish 2/3	Station number:	AMS27
Calibration Date:	December 12, 2023	Last Cal Date:	November 9, 2023
Start time (MST):	12:48	End time (MST):	17:59
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:	1.123	1.193	NO bkgnd or offset:	0.3	0.3
NOX coeff or slope:	1.110	1.169	NOX bkgnd or offset:	1.2	1.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	9.2	3.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.005005	0.997956
NO_X Cal Offset:	-2.855689	-3.637422
NO Cal Slope:	1.007782	0.996647
NO Cal Offset:	-2.818947	-3.021240
NO_2 Cal Slope:	0.986277	0.990498
NO_2 Cal Offset:	0.637074	-1.079298

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	0.0	----	----
as found span	4921	79.4	816.8	800.3	16.5	811.4	788.8	22.5	1.0067	1.0146
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	0.3	-0.6	----	----
high point	4921	79.4	816.8	800.3	16.5	813.1	796.3	16.7	1.0046	1.0050
second point	4960	39.7	408.5	400.2	8.3	402.5	394.0	8.4	1.0148	1.0157
third point	4980	19.8	203.7	199.6	4.1	196.2	192.7	3.5	1.0383	1.0358
as left zero	5000	0.0	0.0	0.0	0.0	0.6	1.6	-1.0	----	----
as left span	4921	79.4	816.8	425.4	398.1	810.5	419.2	391.4	1.0078	1.0148
								Average Correction Factor	1.0192	1.0188

Corrected As found	NO_X = 811.5 ppb	NO = 789.0 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -0.8%
Previous Response	NO_X = 818.0 ppb	NO = 803.7 ppb		*Percent Change	NO = -1.9%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	798.5	416.9	398.1	392.9	1.0133	98.7%
2nd GPT point (200 ppb O3)	798.5	627.1	187.9	186.8	1.0060	99.4%
3rd GPT point (100 ppb O3)	798.5	714.4	100.6	96.7	1.0405	96.1%
				Average Correction Factor	1.0199	98.1%

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

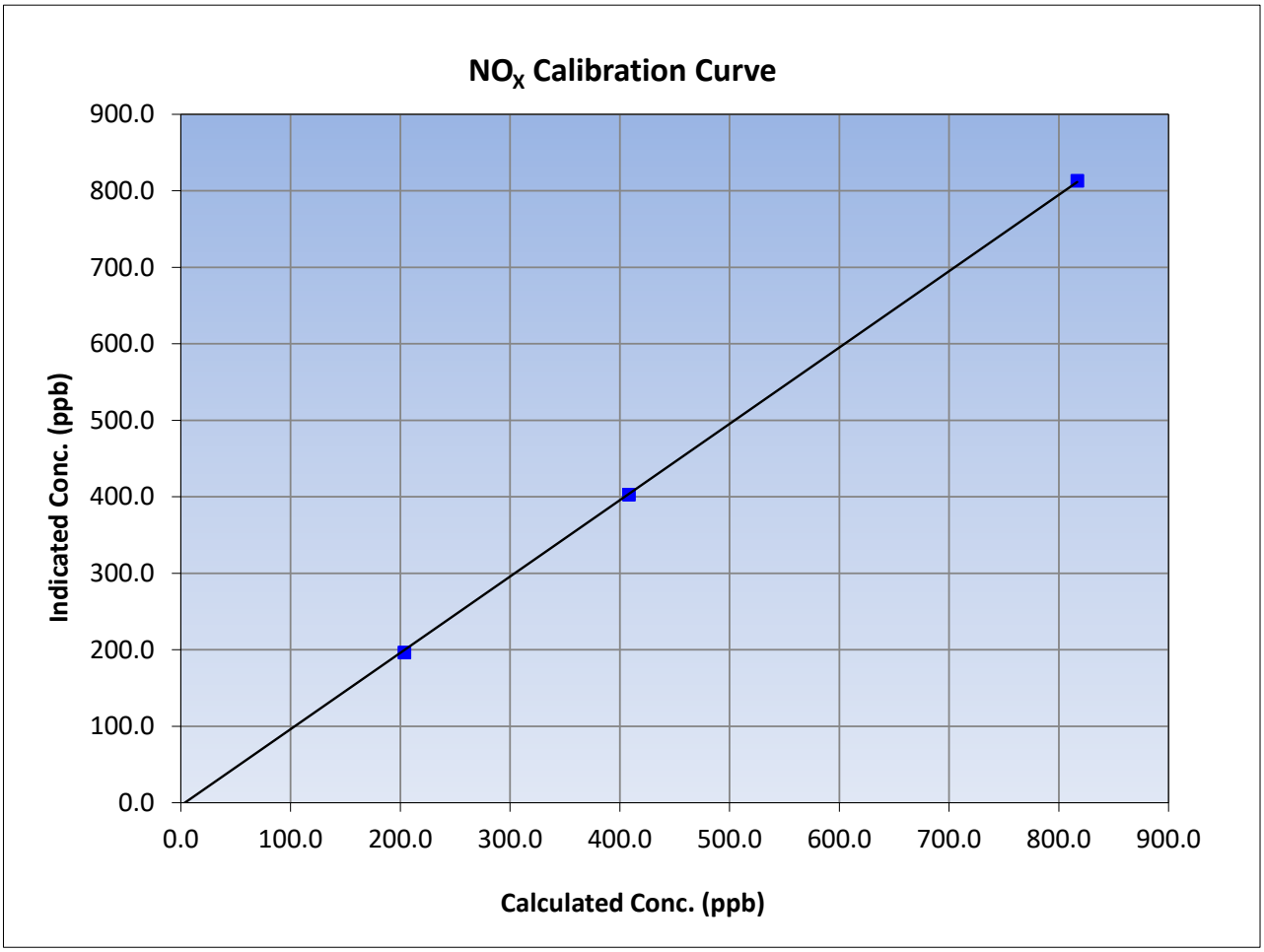
Version-04-2020

Station Information

Calibration Date:	December 12, 2023	Previous Calibration:	November 9, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	12:48	End Time (MST):	17:59
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	-0.3	----	Correlation Coefficient	0.999923	≥0.995
816.8	813.1	1.0046			
408.5	402.5	1.0148	Slope	0.997956	0.90 - 1.10
203.7	196.2	1.0383			
			Intercept	-3.637422	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

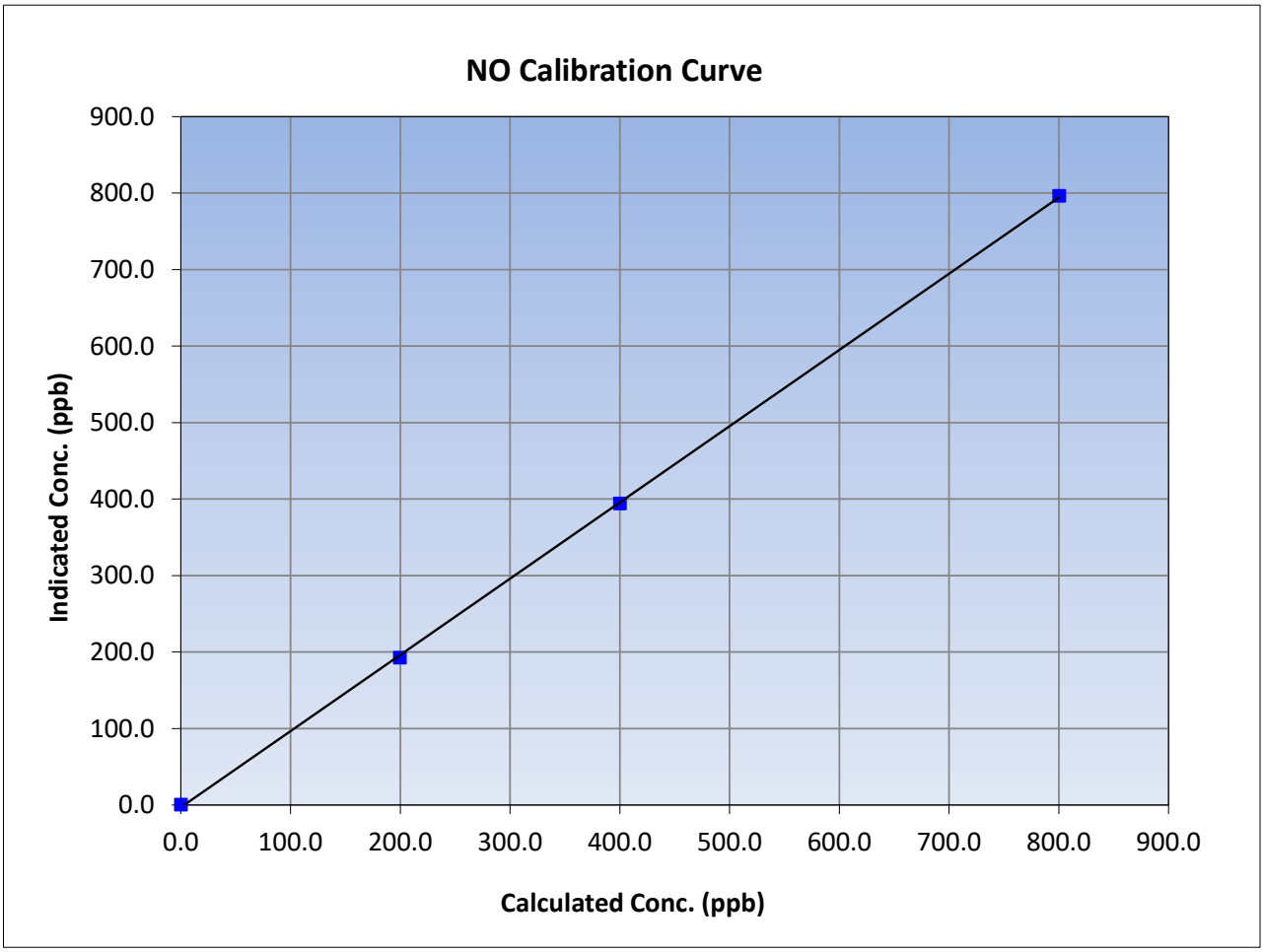
Version-04-2020

Station Information

Calibration Date:	December 12, 2023	Previous Calibration:	November 9, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	12:48	End Time (MST):	17:59
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	0.3	----	Correlation Coefficient	0.999921	≥0.995
800.3	796.3	1.0050			
400.2	394.0	1.0157	Slope	0.996647	0.90 - 1.10
199.6	192.7	1.0358			
			Intercept	-3.021240	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

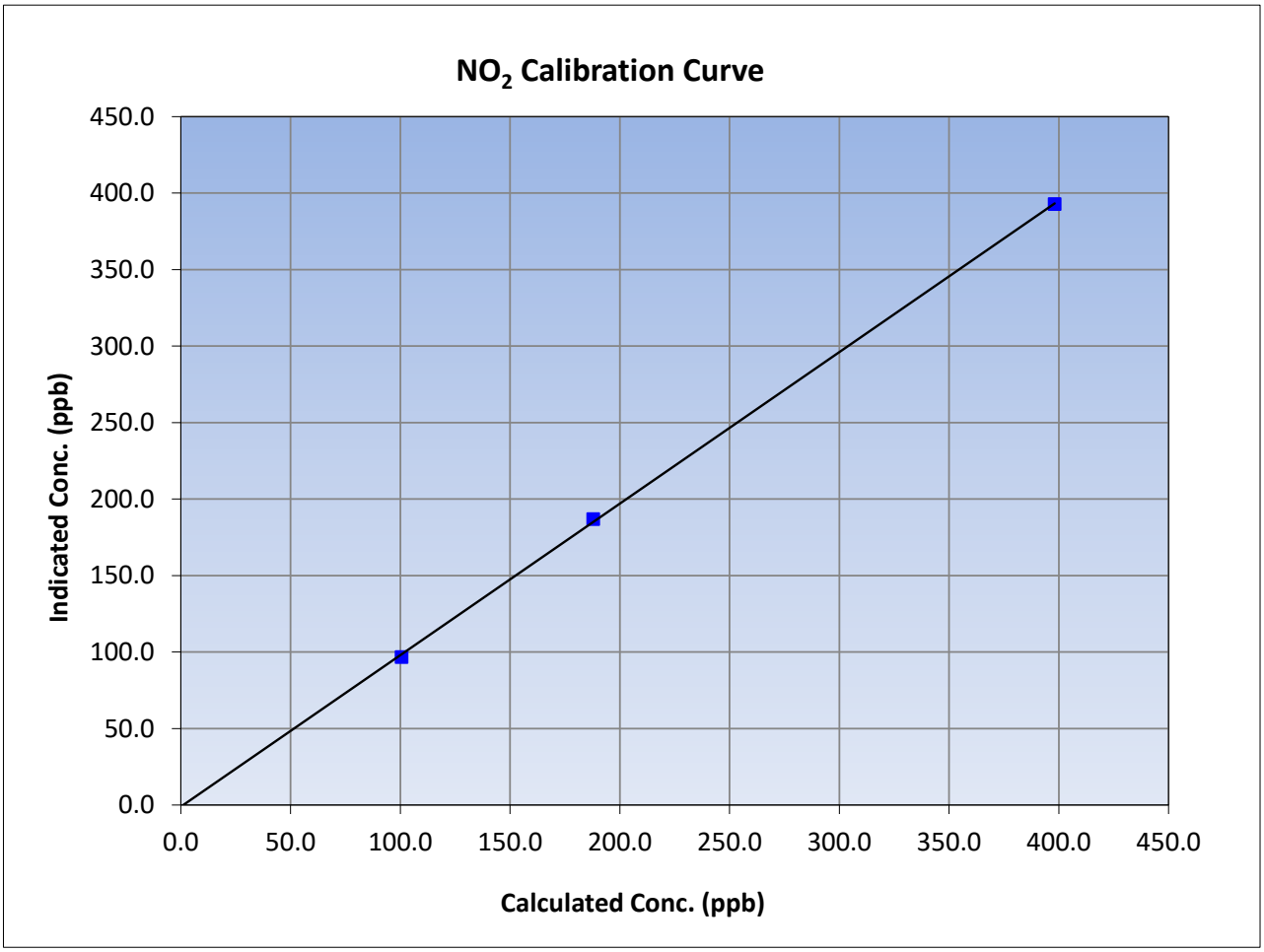
Version-04-2020

Station Information

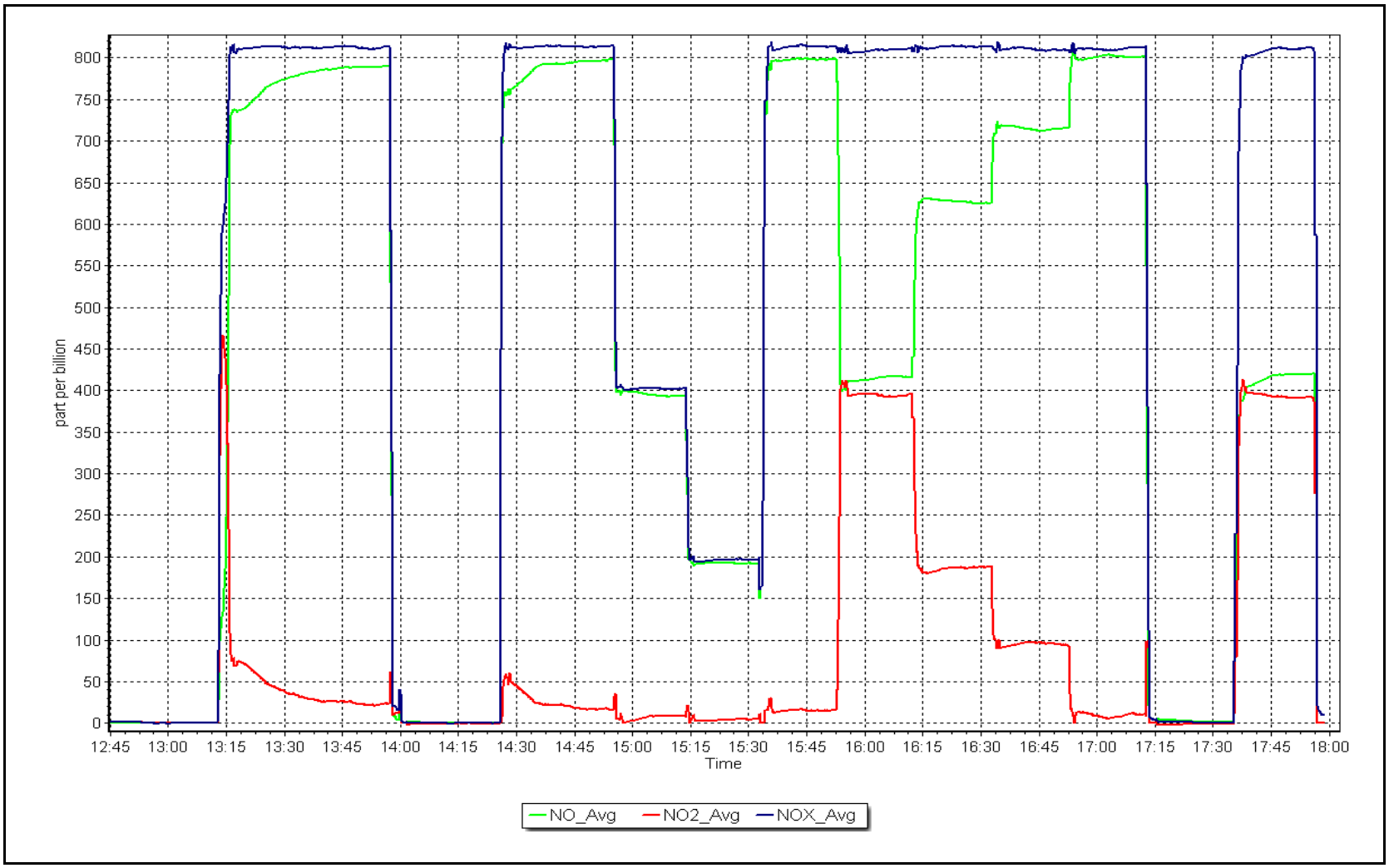
Calibration Date:	December 12, 2023	Previous Calibration:	November 9, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	12:48	End Time (MST):	17:59
Analyzer make:	API T200	Analyzer serial #:	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.6	----	Correlation Coefficient	0.999918	≥0.995
398.1	392.9	1.0133			
187.9	186.8	1.0060	Slope	0.990498	0.90 - 1.10
100.6	96.7	1.0405			
			Intercept	-1.079298	+/-20



NO_X Calibration Plot Date: December 12, 2023 Location: Jackfish 2/3



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS29
SURMONT 2

DECEMBER 2023

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

January 31, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	December 1, 2023	Last Cal Date:	November 16, 2023
Start time (MST):	10:27	End time (MST):	14:04
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:	1.005729	1.006697	Backgd or Offset:	12.5	12.5
Calibration intercept:	-1.086069	-1.824842	Coeff or Slope:	0.937	0.937

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4919	81.3	800.1	801.0	0.999
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4919	81.3	800.1	805.0	0.994
second point	4959	40.7	400.6	399.3	1.003
third point	4979	20.3	199.8	198.2	1.008
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	1.002

Baseline Corr As found:	801.10	Previous response	803.60	*% change	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

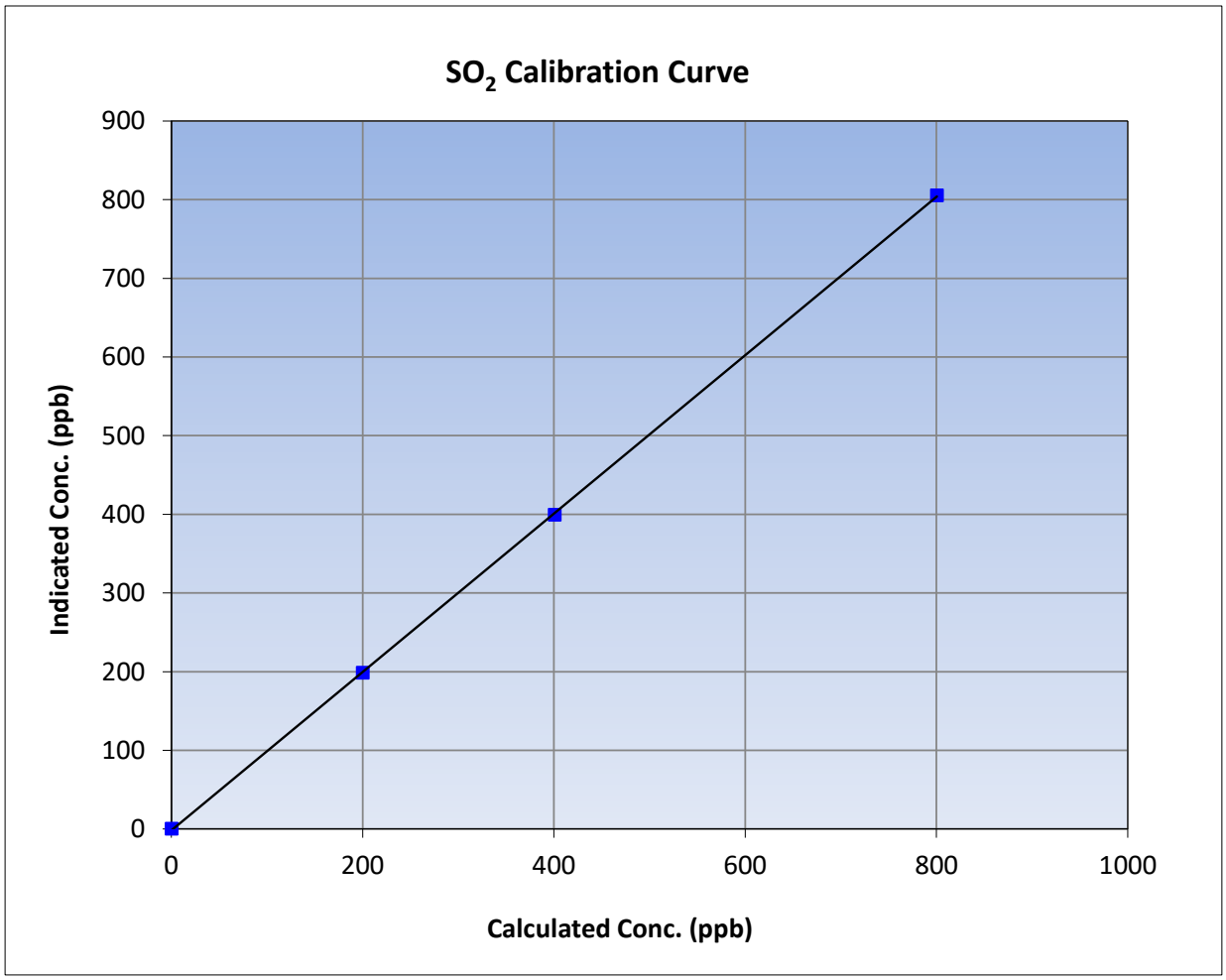
Station Information

Calibration Date:	December 1, 2023	Previous Calibration:	November 16, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:27	End Time (MST):	14:04
Analyzer make:	Thermo 43i	Analyzer serial #:	1170050150

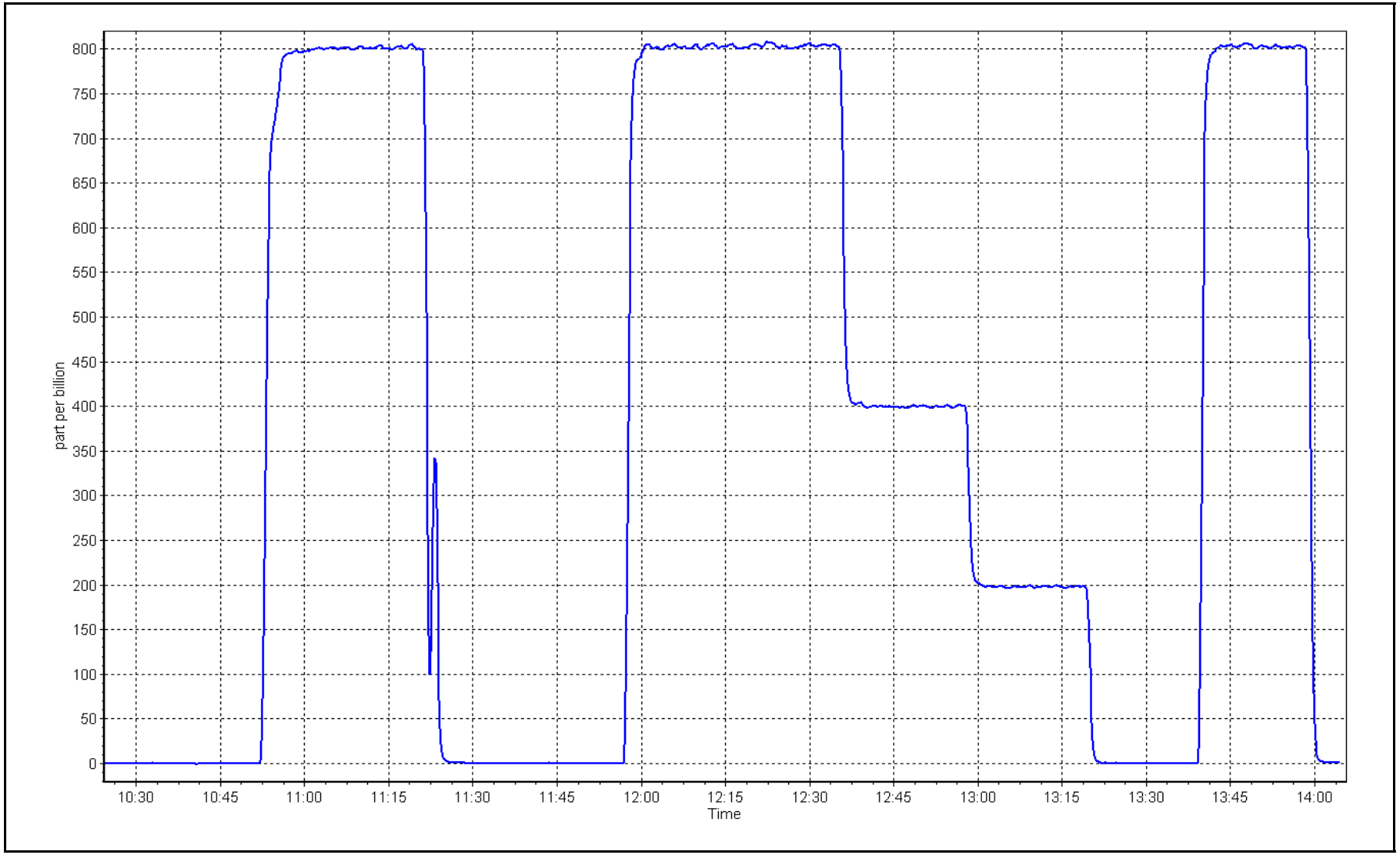
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
800.1	805.0	0.9939
400.6	399.3	1.0032
199.8	198.2	1.0082

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999968	*≥0.995*
Slope	1.006697	*0.90 - 1.10*
Intercept	-1.824842	*+/-30*



SO2 Calibration Plot Date: December 1, 2023 Location: Surmont 2



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	December 4, 2023	Last Cal Date:	November 1, 2023
Start time (MST):	10:43	End time (MST):	15:25
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:	1.001467	1.003331	Backgd or Offset:	0.92	0.92
Calibration intercept:	-0.142608	-0.082920	Coeff or Slope:	1.080	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	80.7	0.990
as found 2nd point	4963	37.2	40.1	40.7	0.983
as found 3rd point	4982	18.6	20.1	20.3	0.983
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4926	74.2	80.0	80.2	0.998
second point	4963	37.2	40.1	40.1	1.000
third point	4982	18.6	20.1	20.1	0.998
as left zero	5000	0.0	0.0	0.0	----
as left span	4926	74.2	80.0	79.9	1.001
SO2 Scrubber Check	4919	81.3	813.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.998
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.8	Prev response:	79.98	*% change:	1.0%
Baseline Corr 2nd AF pt:	40.8	AF Slope:	1.009767	AF Intercept:	0.016561
Baseline Corr 3rd AF pt:	20.4	AF Correlation:	0.999984		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. Adjusted span. Scrubber check done after cal zero, passed.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

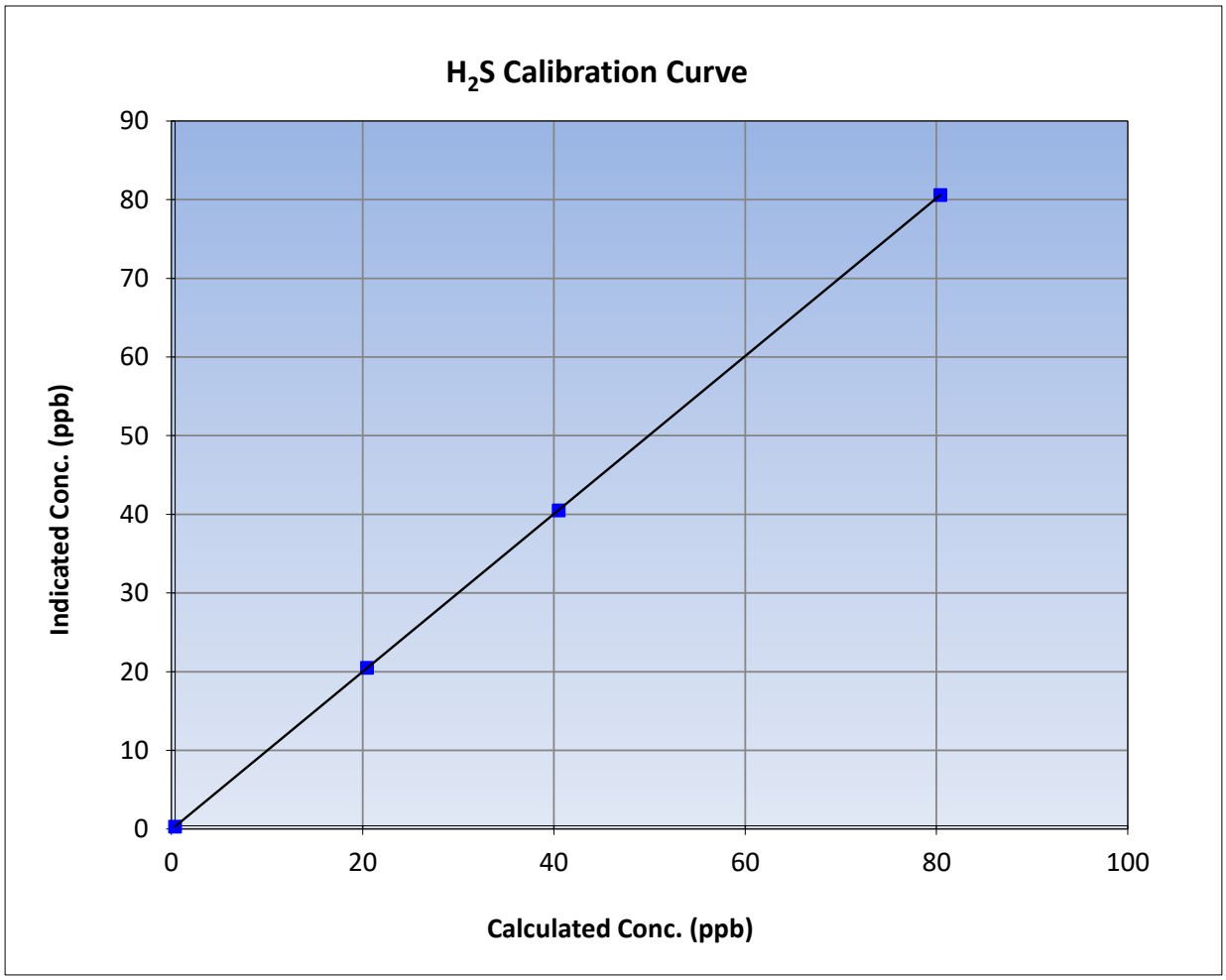
Station Information

Calibration Date:	December 4, 2023	Previous Calibration:	November 1, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:43	End Time (MST):	15:25
Analyzer make:	Thermo 43iQ-TLE	Analyzer serial #:	1200326170

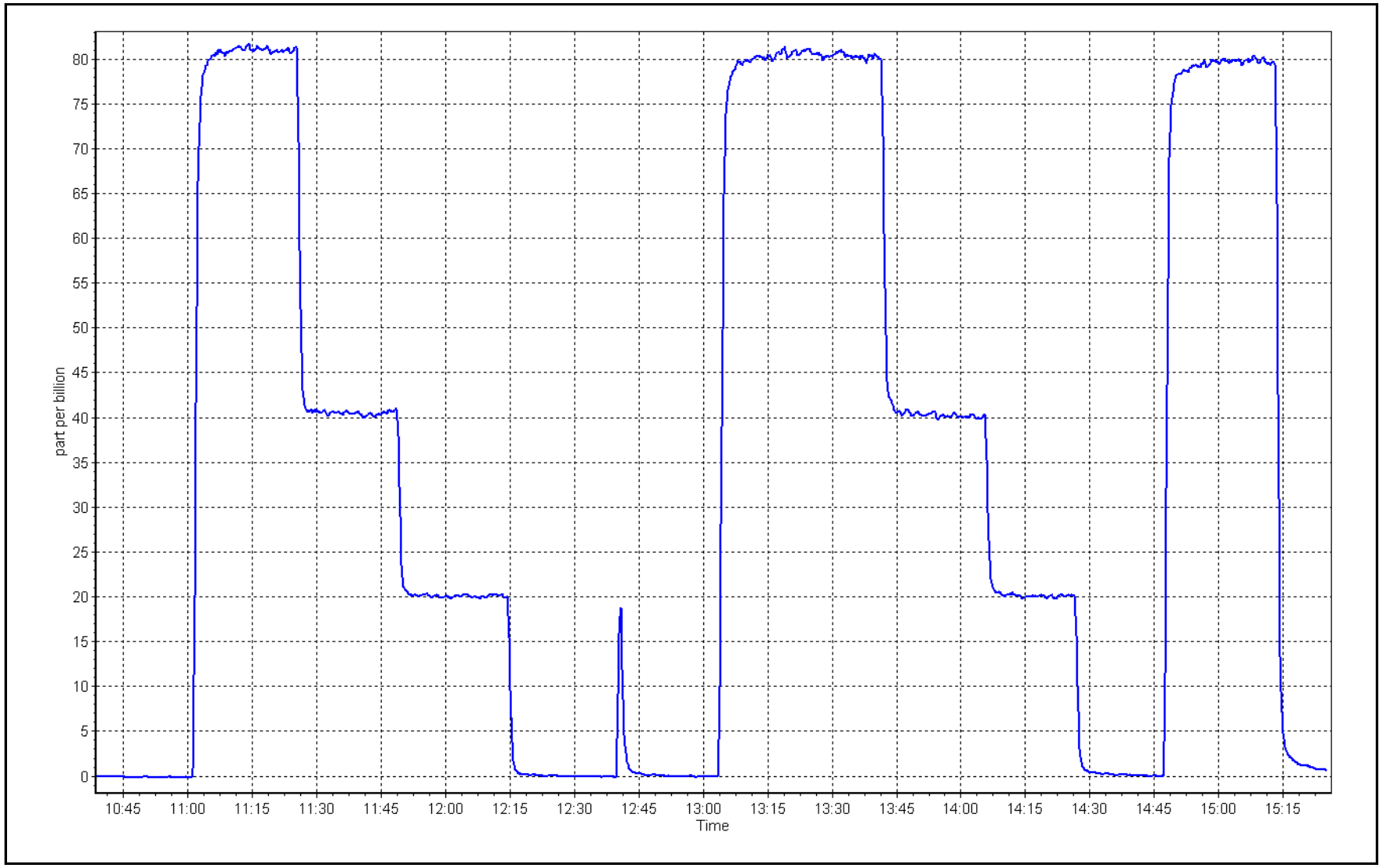
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.2	0.9975
40.1	40.1	1.0002
20.1	20.1	0.9977

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.003331	*0.90 - 1.10*
Intercept	-0.082920	*+/-3*



H_2S Calibration Plot Date: December 4, 2023 Location: Surmont 2



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	December 1, 2023	Last Cal Date:	November 16, 2023
Start time (MST):	10:27	End time (MST):	14:04
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:	0.998269	1.007452	Background:	3.53	3.45
Calibration intercept:	-0.044666	-0.027439	Coefficient:	3.986	4.017

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	4918	81.3	17.31	17.23	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.03	----
high point	4918	81.3	17.31	17.45	0.992
second point	4959	40.6	8.65	8.64	1.001
third point	4979	20.3	4.32	4.28	1.011
as left zero	5000	0.0	0.00	0.02	----
as left span	4918	81.3	17.31	17.44	0.993
				Average Correction Factor	1.001

Baseline Corr As found:	17.32	Previous response	17.24	*% change	0.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

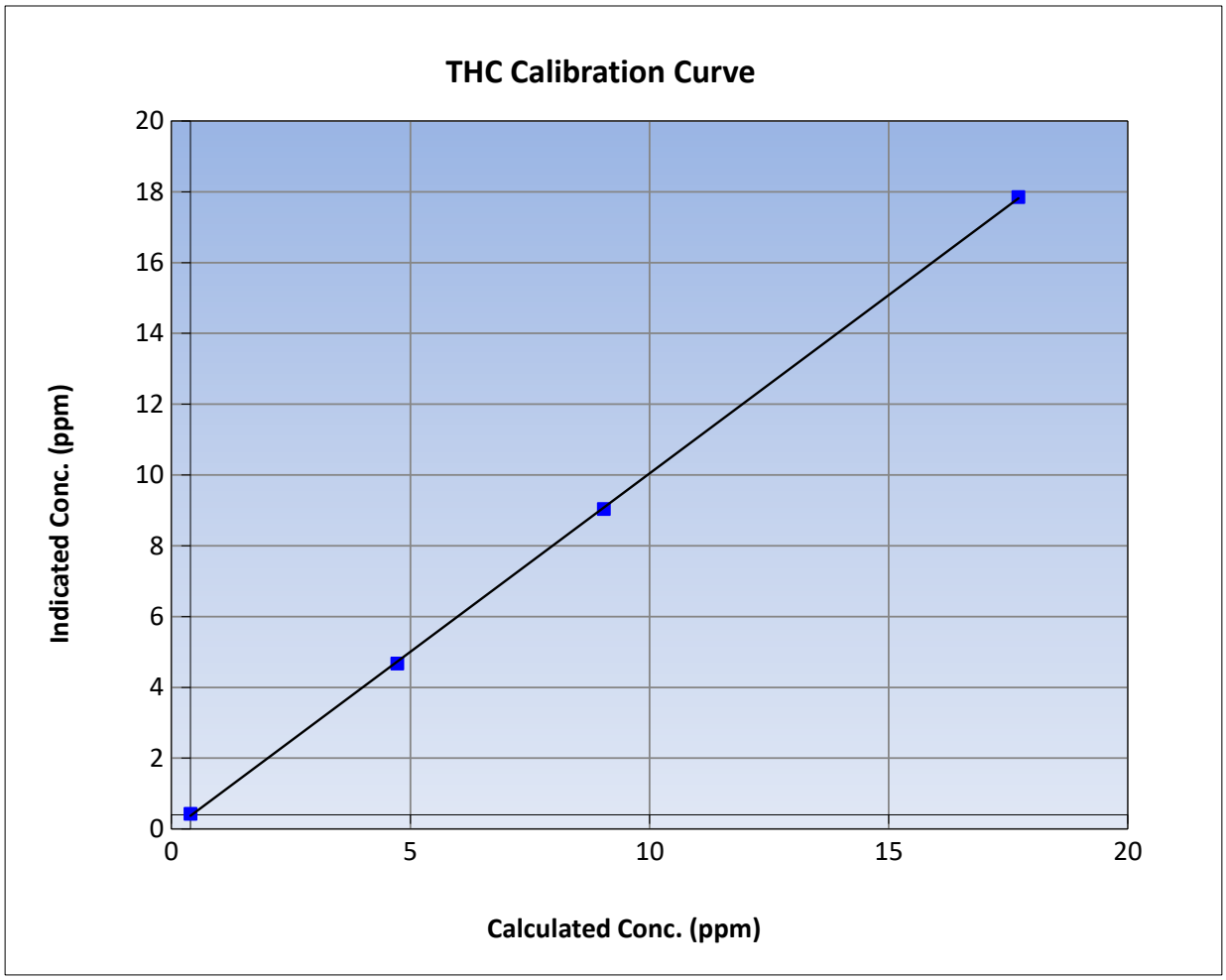
Station Information

Calibration Date:	December 1, 2023	Previous Calibration:	November 16, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:27	End Time (MST):	14:04
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1170050149

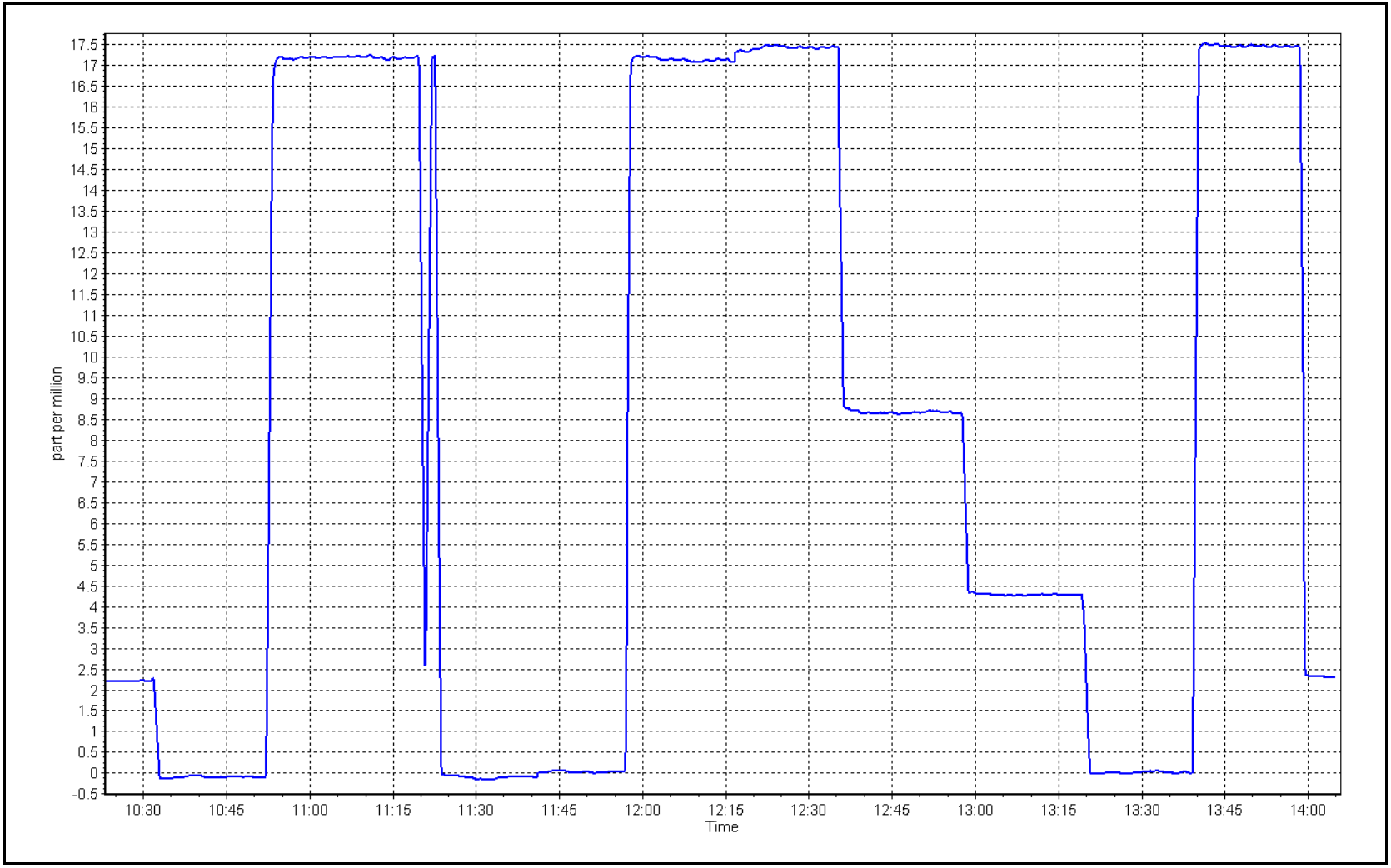
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.03	----
17.31	17.45	0.9922
8.65	8.64	1.0007
4.32	4.28	1.0110

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999944	*≥0.995*
Slope	1.007452	*0.90 - 1.10*
Intercept	-0.027439	*+/-1.5*



THC Calibration Plot Date: December 1, 2023 Location: Surmont 2



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	December 5, 2023	Last Cal Date:	November 14, 2023
Start time (MST):	10:55	End time (MST):	16:02
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:	1.366	1.374	NO bkgnd or offset:	1.3	1.3
NOX coeff or slope:	0.995	0.996	NOX bkgnd or offset:	1.4	1.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	173.5	173.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999094	0.999051
NO_X Cal Offset:	0.047580	0.087651
NO Cal Slope:	1.003756	1.000223
NO Cal Offset:	-1.632802	-1.272240
NO_2 Cal Slope:	0.994951	1.001015
NO_2 Cal Offset:	0.472711	0.481350

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	-0.2	0.0	----	----
as found span	4916	84.2	799.2	799.2	0.0	795.3	793.9	1.4	1.0049	1.0067
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
high point	4916	84.2	799.2	799.2	0.0	797.9	798.4	-0.5	1.0016	1.0010
second point	4958	42.1	399.6	399.6	0.0	401.1	398.7	2.5	0.9963	1.0023
third point	4979	21.1	200.3	200.3	0.0	199.1	197.3	1.8	1.0059	1.0151
as left zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
as left span	4916	84.2	799.2	415.8	383.4	797.8	411.0	386.8	1.0017	1.0117
								Average Correction Factor	1.0013	1.0061

Corrected As found	NO_X = 795.5 ppb	NO = 794.1 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -0.4%
Previous Response	NO_X = 798.5 ppb	NO = 800.6 ppb		*Percent Change	NO = -0.8%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	794.5	411.1	383.4	384.2	0.9979	100.2%
2nd GPT point (200 ppb O3)	794.5	607.9	186.6	187.1	0.9973	100.3%
3rd GPT point (100 ppb O3)	794.5	699.9	94.6	95.8	0.9875	101.3%
				Average Correction Factor	0.9942	100.6%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

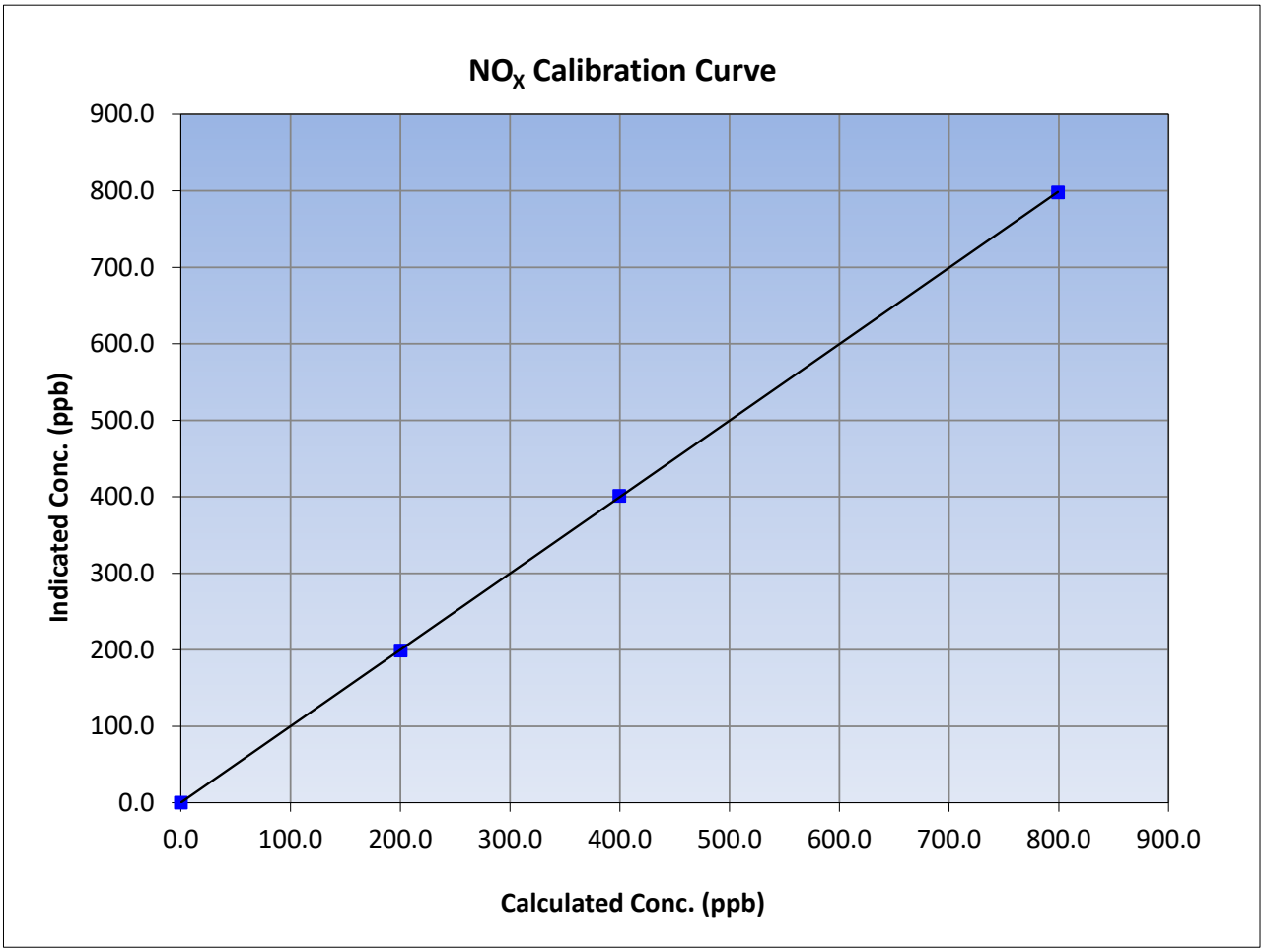
Version-04-2020

Station Information

Calibration Date:	December 5, 2023	Previous Calibration:	November 14, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:55	End Time (MST):	16:02
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	0.999986	≥0.995
799.2	797.9	1.0016			
399.6	401.1	0.9963	Slope	0.999051	0.90 - 1.10
200.3	199.1	1.0059			
			Intercept	0.087651	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

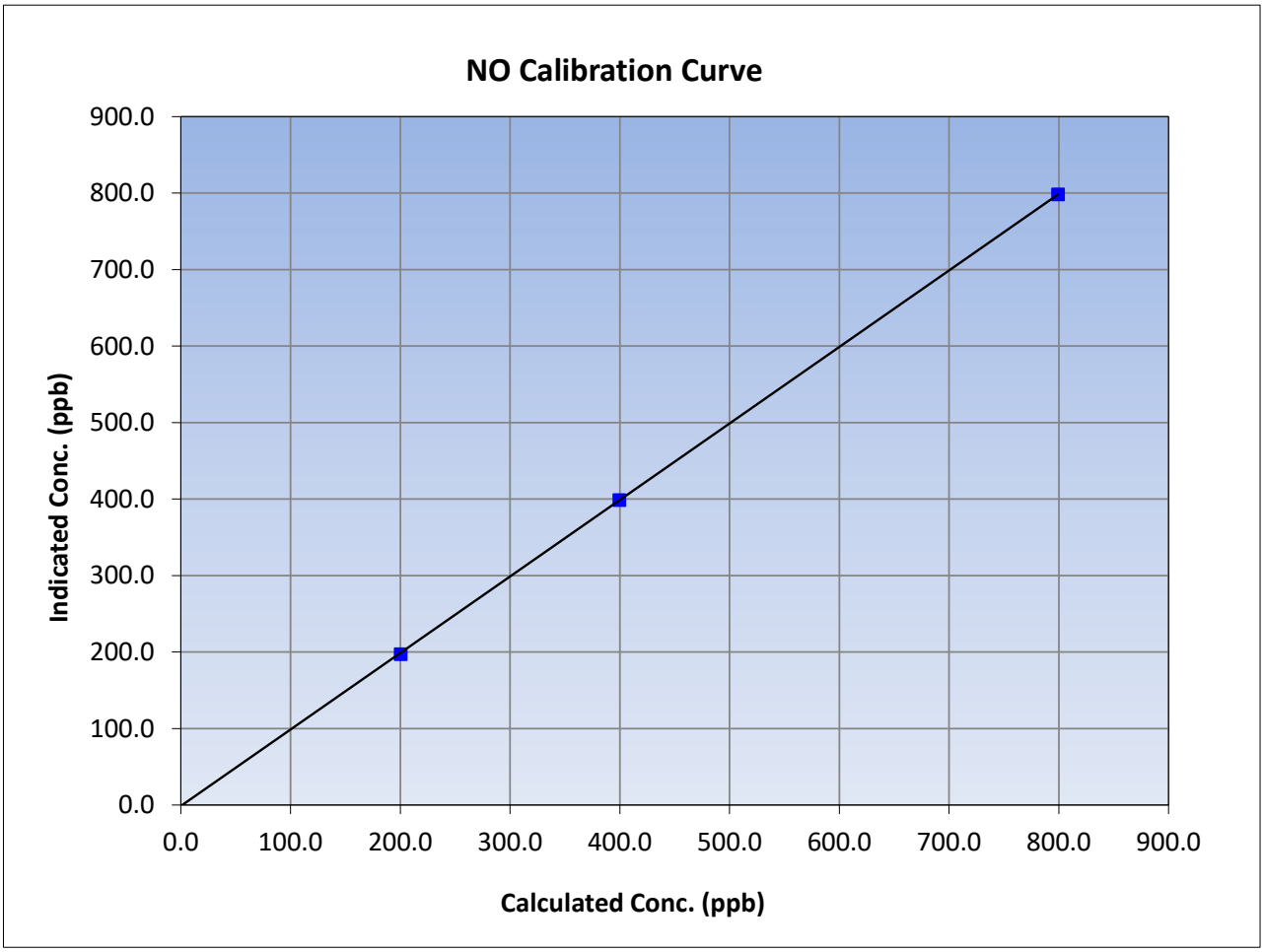
Version-04-2020

Station Information

Calibration Date:	December 5, 2023	Previous Calibration:	November 14, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:55	End Time (MST):	16:02
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	0.999987	≥0.995
799.2	798.4	1.0010			
399.6	398.7	1.0023	Slope	1.000223	0.90 - 1.10
200.3	197.3	1.0151			
			Intercept	-1.272240	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

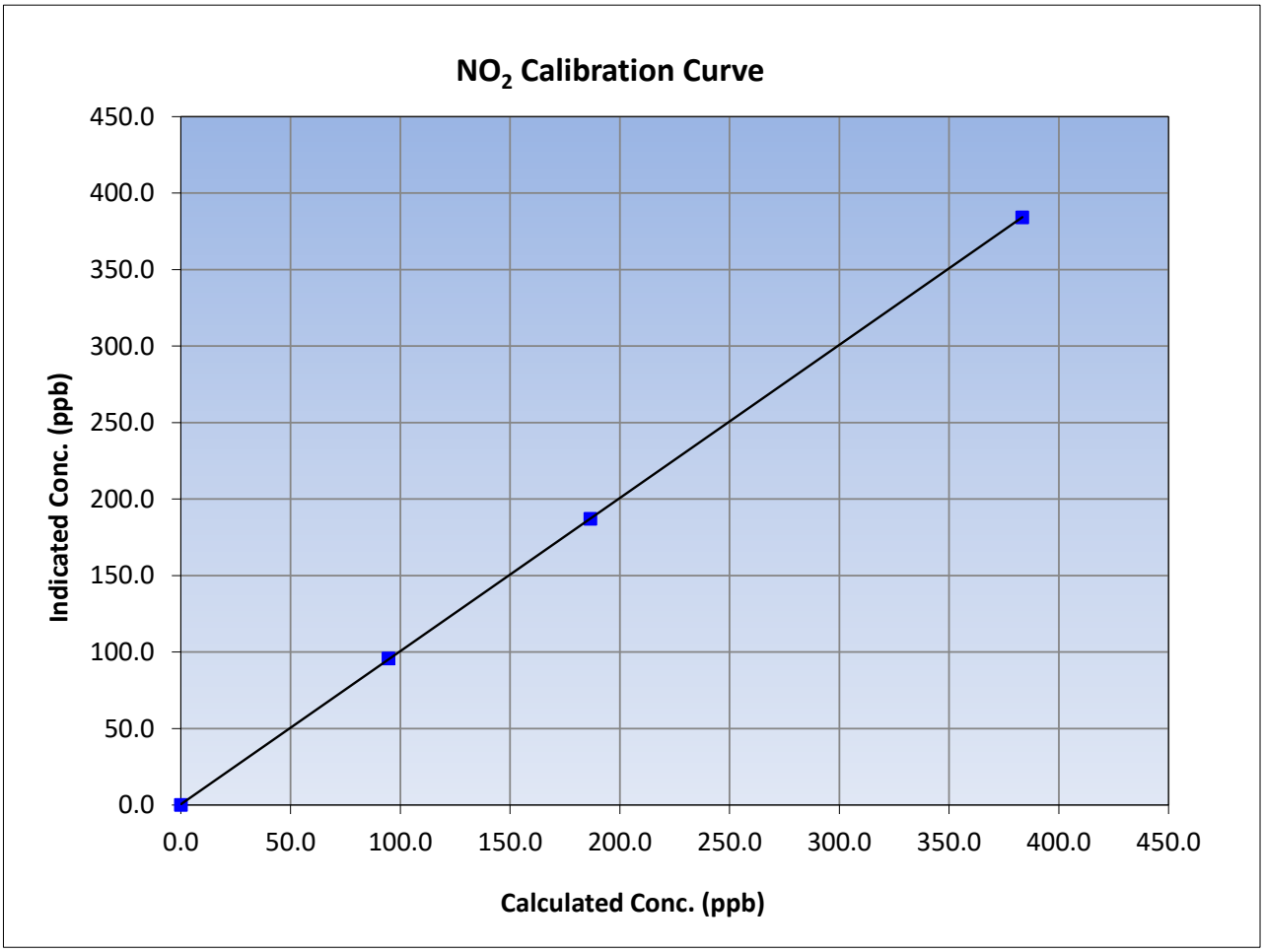
Version-04-2020

Station Information

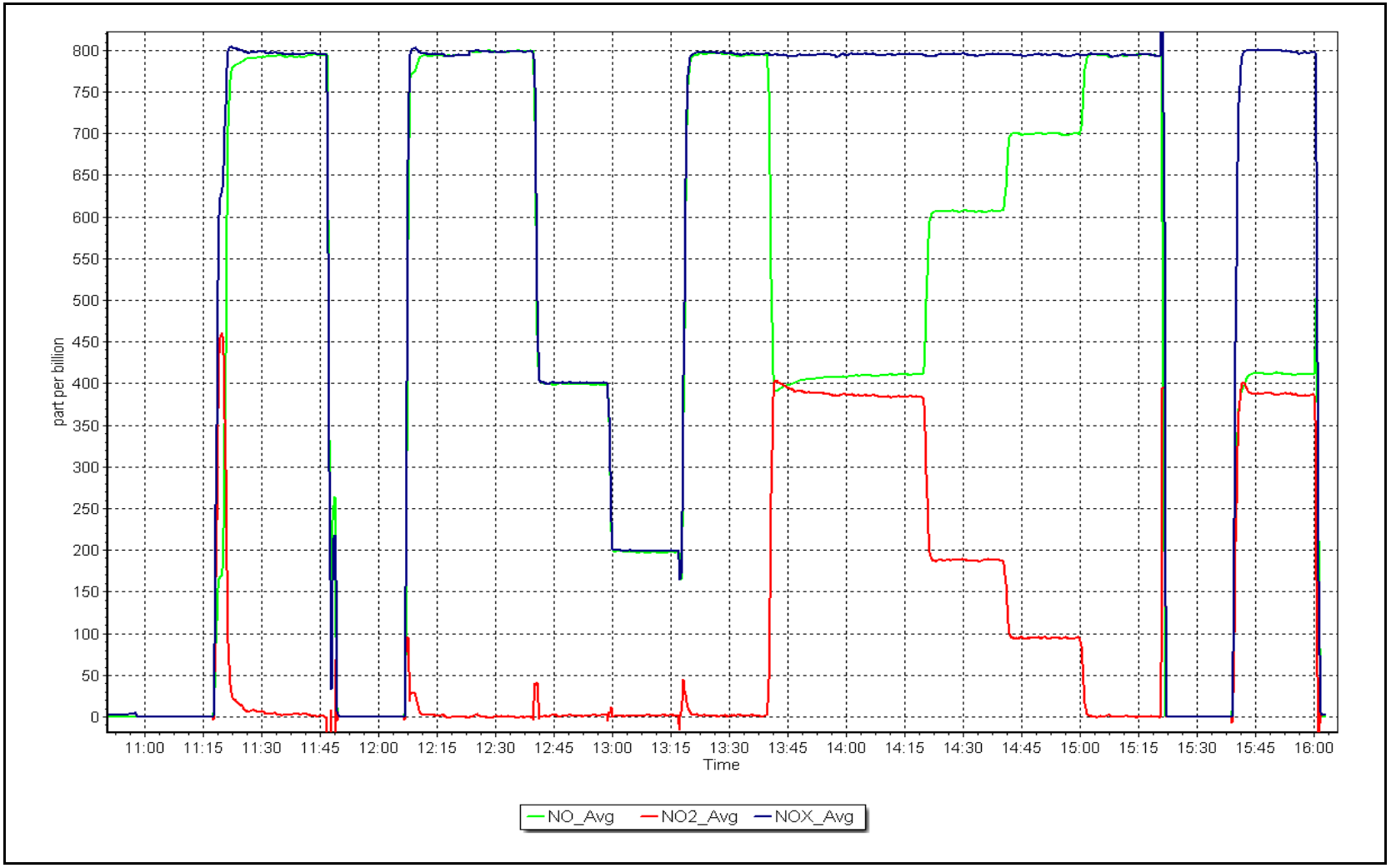
Calibration Date:	December 5, 2023	Previous Calibration:	November 14, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:55	End Time (MST):	16:02
Analyzer make:	Thermo 42i	Analyzer serial #:	1170050148

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999993	≥0.995
383.4	384.2	0.9979			
186.6	187.1	0.9973	Slope	1.001015	0.90 - 1.10
94.6	95.8	0.9875			
			Intercept	0.481350	+/-20



NO_X Calibration Plot Date: December 5, 2023 Location: Surmont 2



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Surmont 2	Station number:	AMS 29
Calibration Date:	December 1, 2023	Last Cal Date:	November 16, 2023
Start time (MST):	11:26	End time (MST):	13:50
Analyzer Make:	API T640	S/N:	253
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388750
Temp/RH standard:	Alicat FP-25BT	S/N:	388750

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-7.6	-7.30	-7.30	☐	+/- 2 °C
P (mmHg)	700.7	701.50	701.50	☐	+/- 10 mmHg
flow (LPM)	4.99	5.125	5.062	☑	+/- 0.25 LPM

Leak Test: Date of check: December 1, 2023 Last Cal Date: November 16, 2023

PM w/o HEPA: 1.6 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test				☐	11.3 +/- 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: Adjusted flow only. Updated firmware. Leak check passed.

Calibration by: Braiden Boutilier

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS30
ELLS RIVER

DECEMBER 2023

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

January 31, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Ells River	Station number:	AMS 30
Calibration Date:	December 1, 2023	Last Cal Date:	November 8, 2023
Start time (MST):	10:14	End time (MST):	13:18
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.53	ppm	Cal Gas Exp Date:	December 29, 2028
Cal Gas Cylinder #:	CC494126			
Removed Cal Gas Conc:	50.53	ppm	Rem Gas Exp Date:	
Removed Gas Cyl #:			Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3061
ZAG Make/Model:	API T701H		Serial Number:	358

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1008841397

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.002373	0.999175	Backgd or Offset:	9.5	9.5
Calibration intercept:	-3.655880	-2.535883	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	-0.4	----
as found span	4921	79.2	800.4	798.4	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4921	79.2	800.4	798.5	1.002
second point	4960	39.6	400.2	395.7	1.011
third point	4980	19.8	200.1	195.4	1.024
as left zero	5000	0.0	0.0	-0.1	----
as left span	4921	79.2	800.4	798.3	1.003
				Average Correction Factor	1.013

Baseline Corr As found:	798.80	Previous response	798.61	*% 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: Inlet filter changed after As Founds, no adjustments required.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

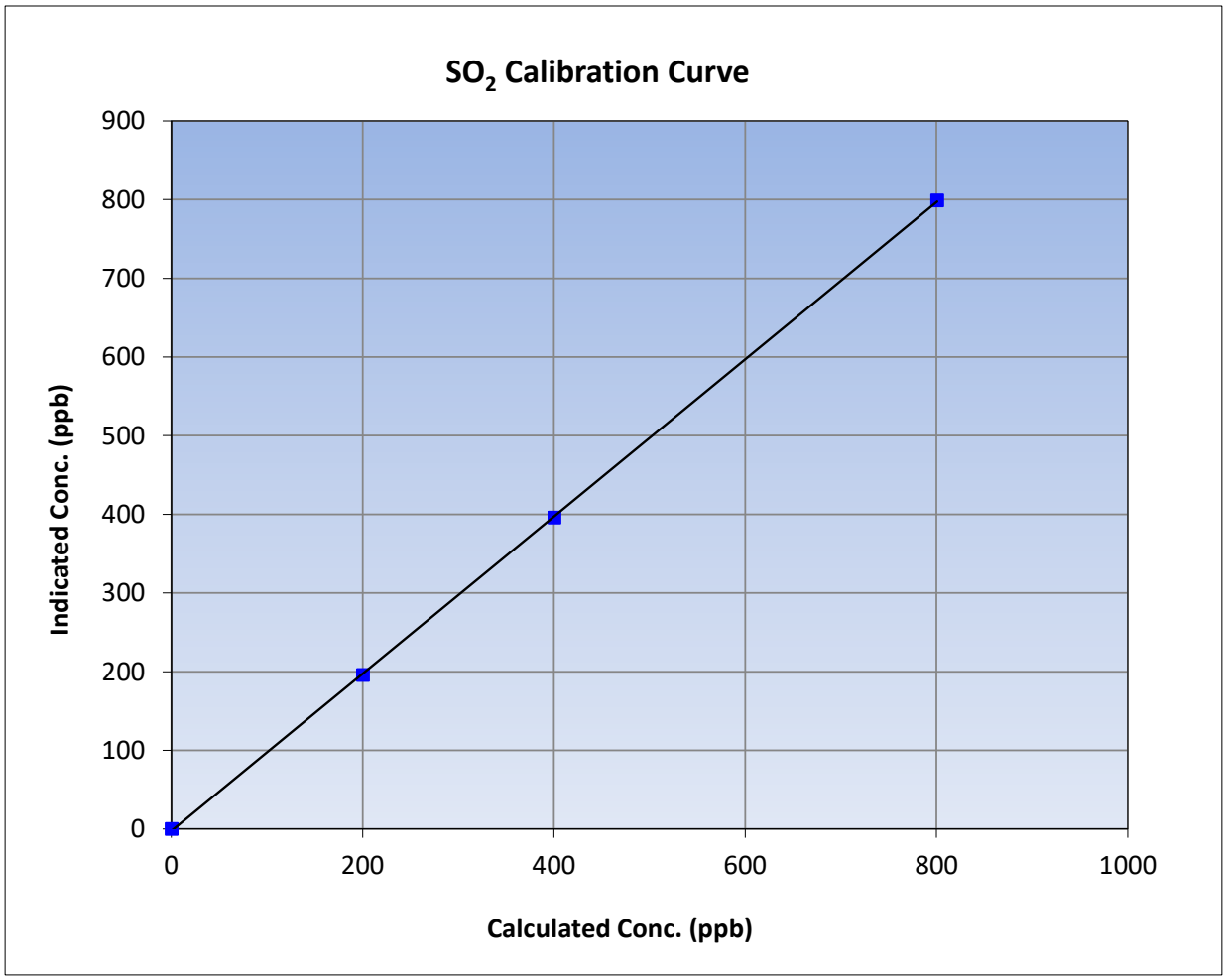
Station Information

Calibration Date:	December 1, 2023	Previous Calibration:	November 8, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	10:14	End Time (MST):	13:18
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841397

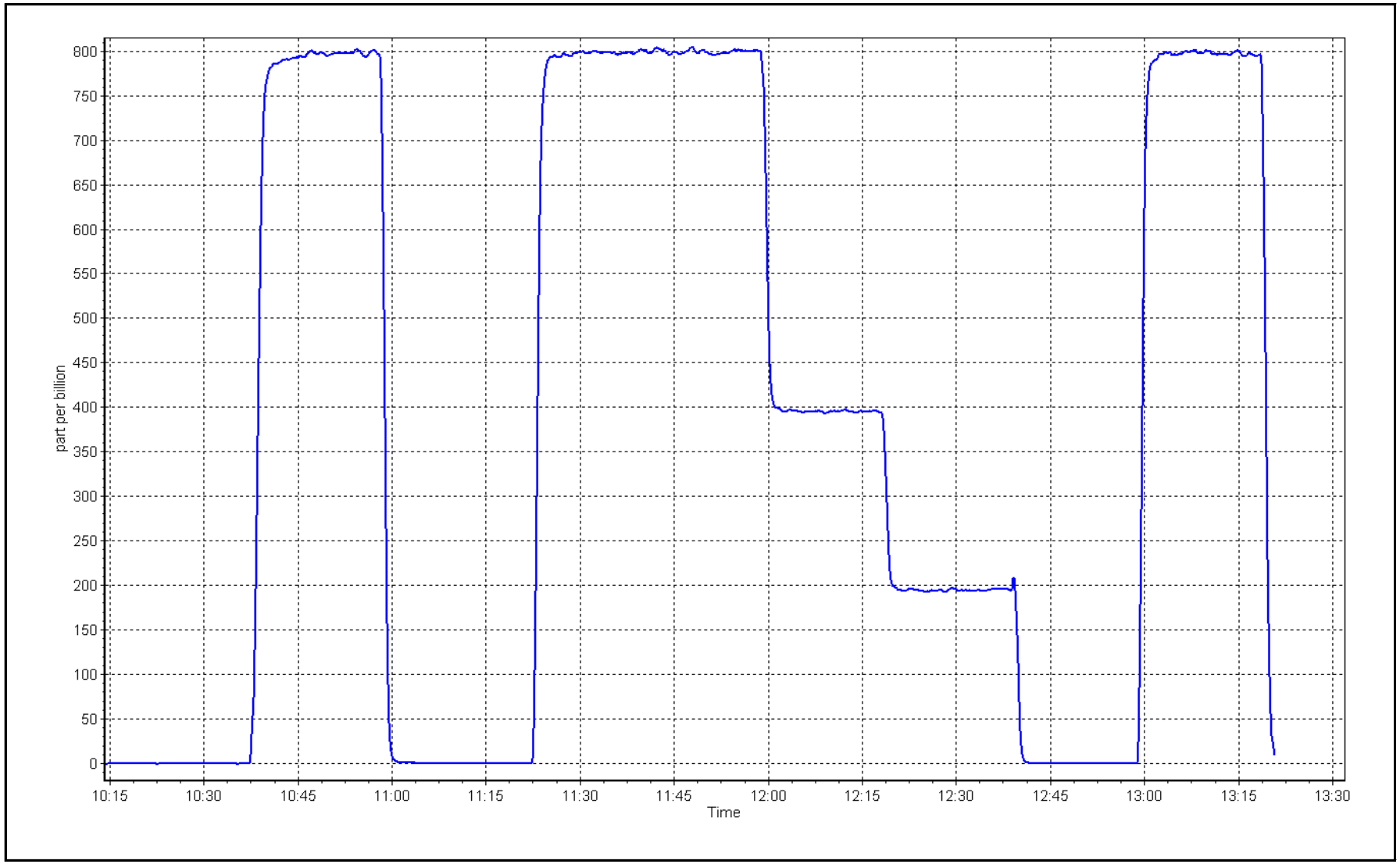
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
800.4	798.5	1.0023
400.2	395.7	1.0114
200.1	195.4	1.0241

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999960	*≥0.995*
Slope	0.999175	*0.90 - 1.10*
Intercept	-2.535883	*+/-30*



SO2 Calibration Plot Date: December 1, 2023 Location: Ells River



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Ells River	Station number:	AMS30
Calibration Date:	December 15, 2023	Last Cal Date:	November 30, 2023
Start time (MST):	11:19	End time (MST):	15:14
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.08	ppm	Cal Gas Exp Date:	February 9, 2024
Cal Gas Cylinder #:	EY0002443			
Removed Cal Gas Conc:	5.08	ppm	Rem Gas Exp Date:	
Removed Gas Cyl #:			Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3061
ZAG Make/Model:	API T701H		Serial Number:	358

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1410661331	
Converter make:	CDN - 101		Converter serial #:	562	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001780	1.000065	Backgd or Offset:	1.57	1.57
Calibration intercept:	-0.139199	0.020811	Coeff or Slope:	1.100	1.100

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4921	78.7	80.0	79.8	1.002
as found 2nd point	4961	39.4	40.0	39.9	1.003
as found 3rd point	4980	19.7	20.0	19.9	1.006
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4921	78.7	80.0	80.0	1.000
second point	4961	39.4	40.0	40.1	0.998
third point	4980	19.7	20.0	19.9	1.006
as left zero	5000	0.0	0.0	0.2	----
as left span	4921	78.7	80.0	80.1	0.998
SO2 Scrubber Check	4921	79.2	800.4	0.1	----
Date of last scrubber change:		N/A		Ave Corr Factor	1.001
Date of last converter efficiency test:		N/A			efficiency

Baseline Corr As found:	79.8	Prev response:	79.97	*% change:	-0.2%
Baseline Corr 2nd AF pt:	39.9	AF Slope:	0.998207	AF Intercept:	-0.039148
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999999		

* = > +/-5% change initiates investigation

Notes: Change inlet filters after multipoint as founds. SOx scrubber check done after calibrator zero, passed. No adjustments made.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

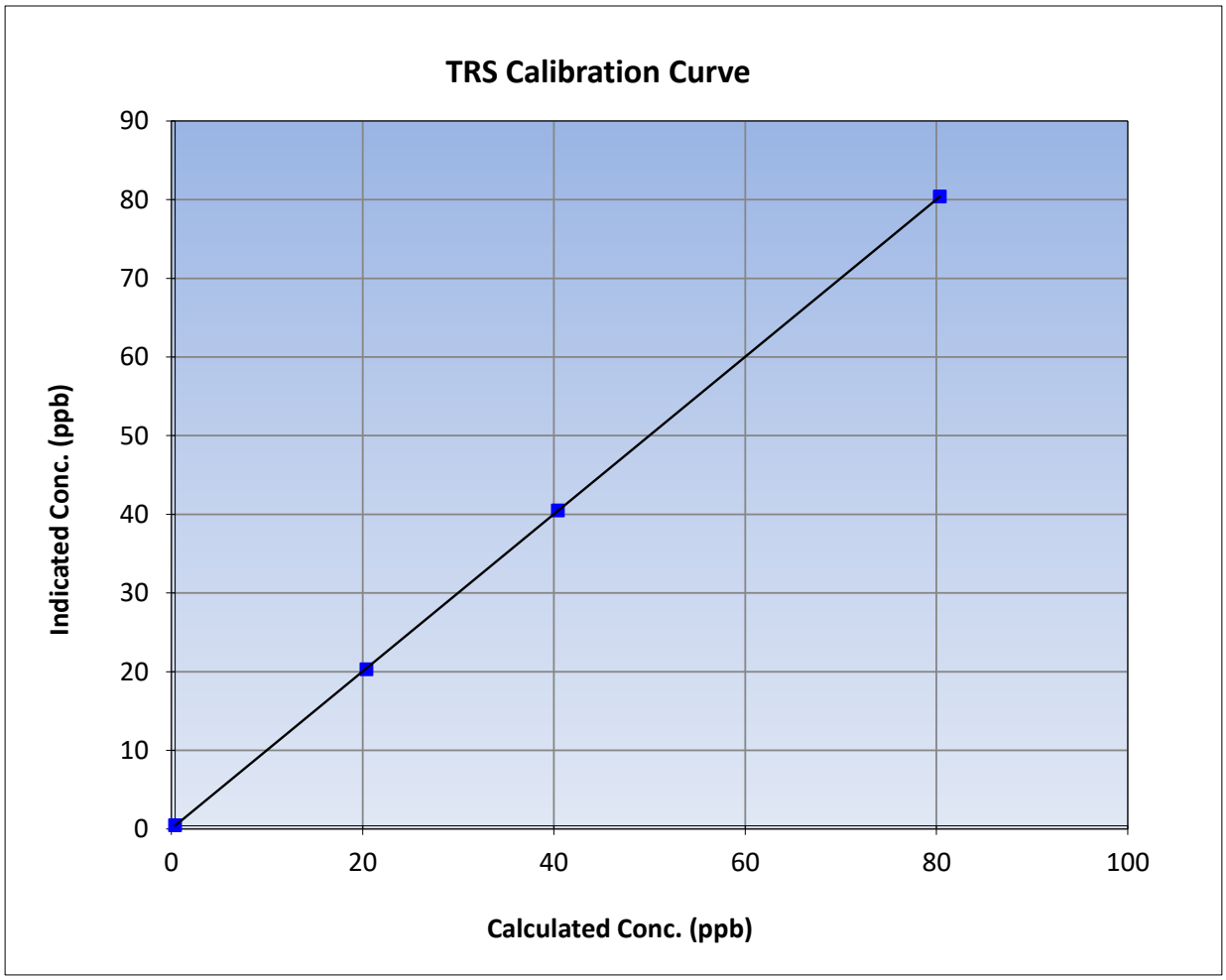
Station Information

Calibration Date:	December 15, 2023	Previous Calibration:	November 30, 2023
Station Name:	Ells River	Station Number:	AMS30
Start Time (MST):	11:19	End Time (MST):	15:14
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1410661331

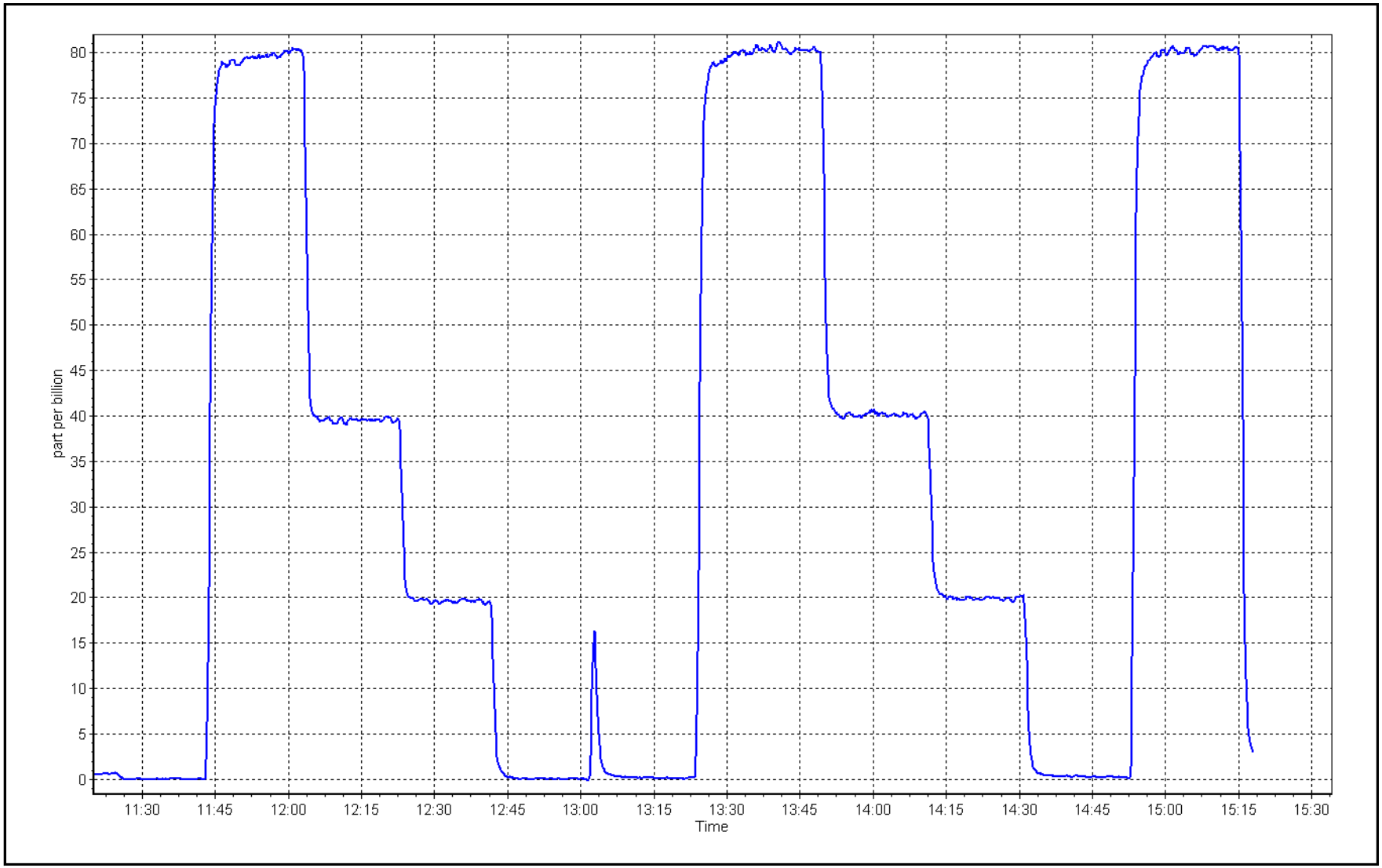
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.0	0.9995
40.0	40.1	0.9982
20.0	19.9	1.0058

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	1.000065	*0.90 - 1.10*
Intercept	0.020811	*+/-3*



TRS Calibration Plot Date: December 15, 2023 Location: Ells River



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Ells River	Station number:	AMS 30
Calibration Date:	December 1, 2023	Last Cal Date:	November 8, 2023
Start time (MST):	10:14	End time (MST):	13:18
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:	2.46E-04	2.48E-04	NMHC SP Ratio:	5.47E-05	5.80E-05
CH4 Retention time:	14.2	14.2	NMHC Peak Area:	166643	157070

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	16.54	1.029
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	17.03	16.95	1.005
second point	4960	39.6	8.51	8.42	1.011
third point	4980	19.8	4.26	4.17	1.020
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	16.90	1.008
				Average Correction Factor	1.012
Baseline Corr AF:	16.54	Prev response	16.98	*% change	-2.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4921	79.2	9.11	8.72	1.045
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4921	79.2	9.11	9.10	1.001
second point	4960	39.6	4.56	4.52	1.009
third point	4980	19.8	2.28	2.24	1.016
as left zero	5000	0	0.00	0.00	----
as left span	4921	79.2	9.11	9.05	1.007
				Average Correction Factor	1.009
Baseline Corr AF:	8.72	Prev response	9.09	*% change	-4.2%
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	7.91	7.82	1.012
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	7.91	7.85	1.009
second point	4960	39.6	3.96	3.90	1.014
third point	4980	19.8	1.98	1.93	1.025
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.91	7.86	1.008
				Average Correction Factor	1.016
Baseline Corr AF:	7.82	Prev response	7.89	*% 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:	1.000046	0.996248
THC Cal Offset:	-0.048138	-0.036338
CH4 Cal Slope:	1.001246	0.992583
CH4 Cal Offset:	-0.032757	-0.016756
NMHC Cal Slope:	0.998929	0.999405
NMHC Cal Offset:	-0.015582	-0.019981

Notes: Inlet filter changed after As Founds, adjusted span only.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

THC Calibration Summary

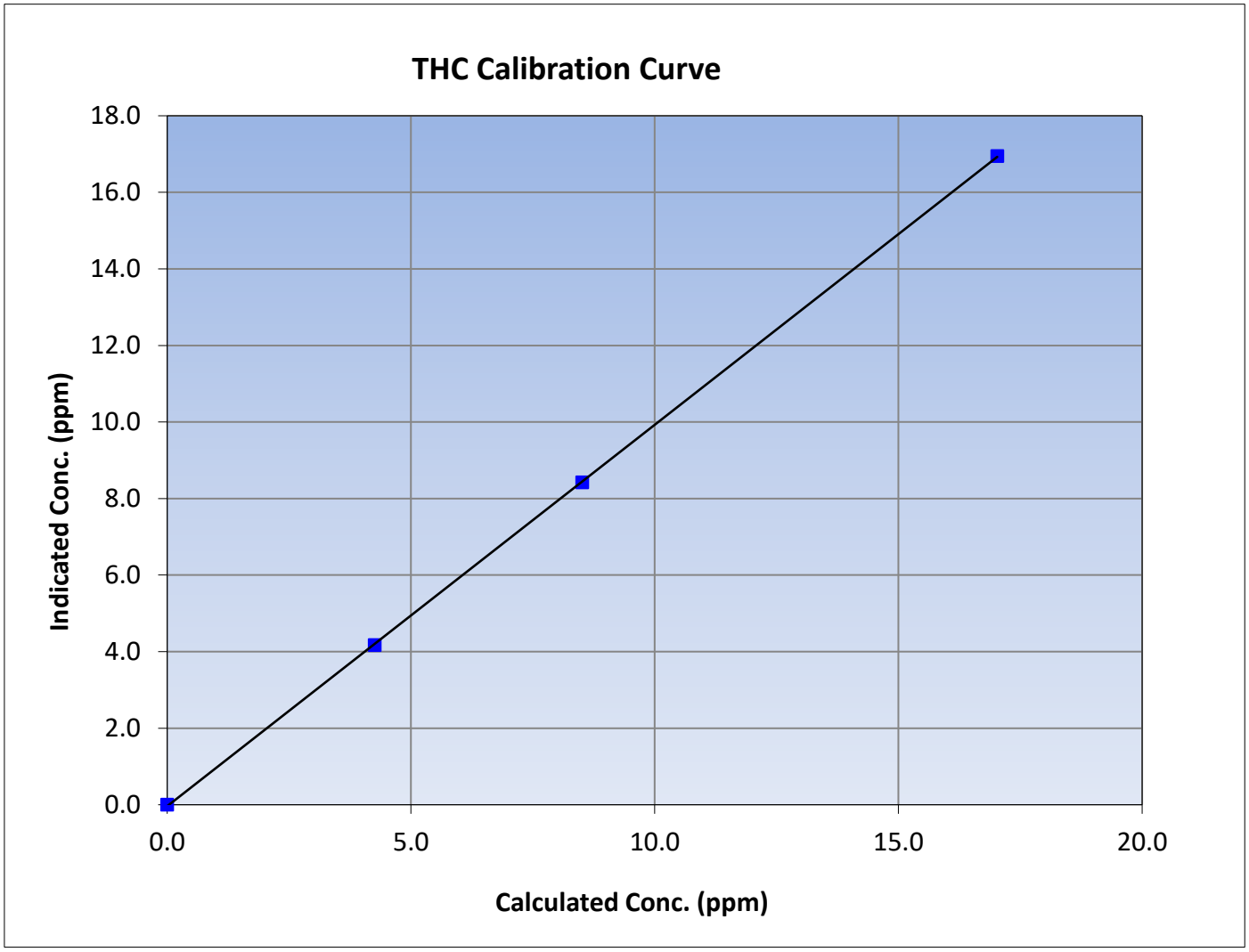
Version-01-2020

Station Information

Calibration Date:	December 1, 2023	Previous Calibration:	November 8, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	10:14	End Time (MST):	13:18
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	0.999978	*≥0.995*
17.03	16.95	1.0047			
8.51	8.42	1.0112	Slope	0.996248	*0.90 - 1.10*
4.26	4.17	1.0199			
			Intercept	-0.036338	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

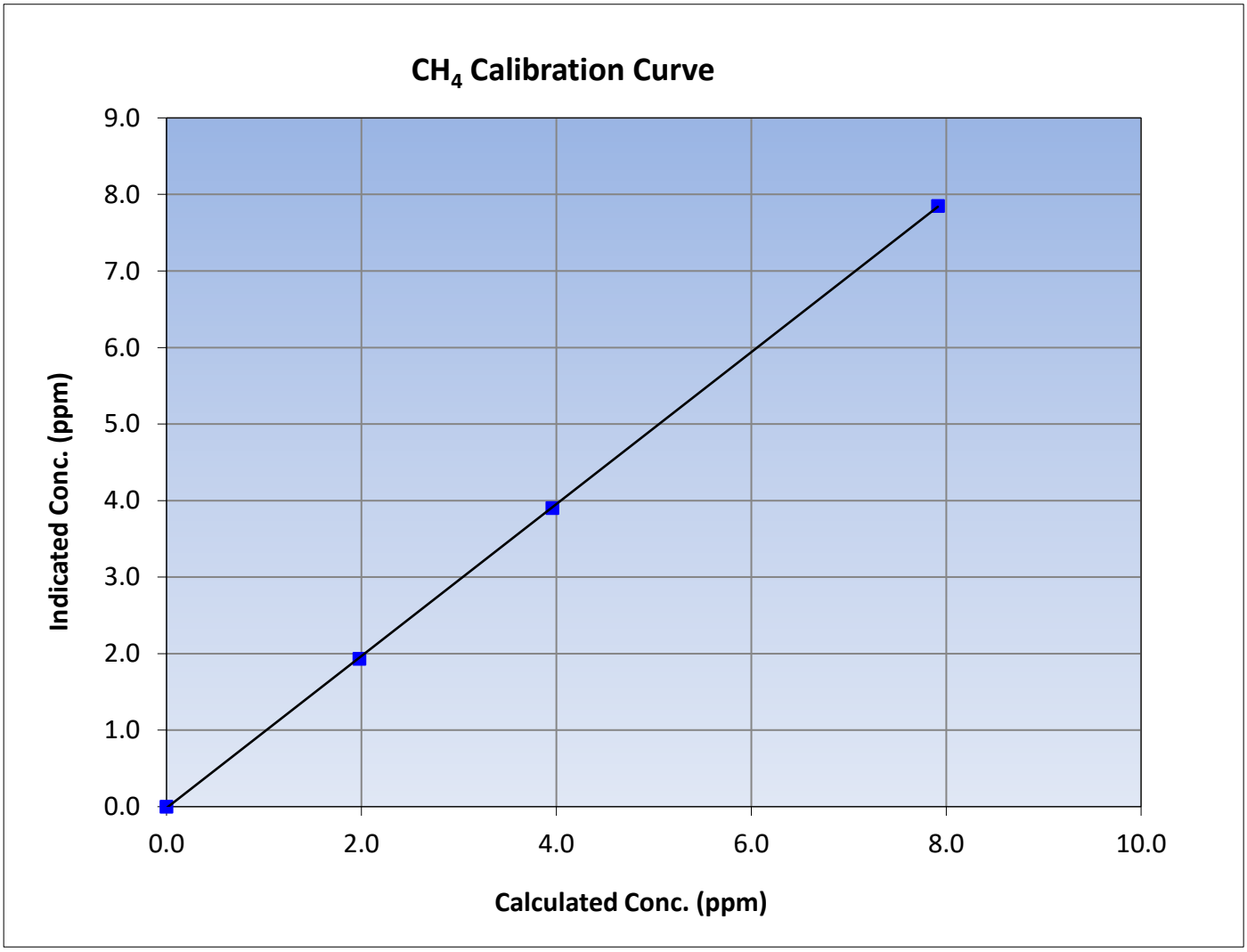
Version-01-2020

Station Information

Calibration Date:	December 1, 2023	Previous Calibration:	November 8, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	10:14	End Time (MST):	13:18
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	0.999979	≥0.995
7.91	7.85	1.0085			
3.96	3.90	1.0141	Slope	0.992583	0.90 - 1.10
1.98	1.93	1.0248			
			Intercept	-0.016756	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

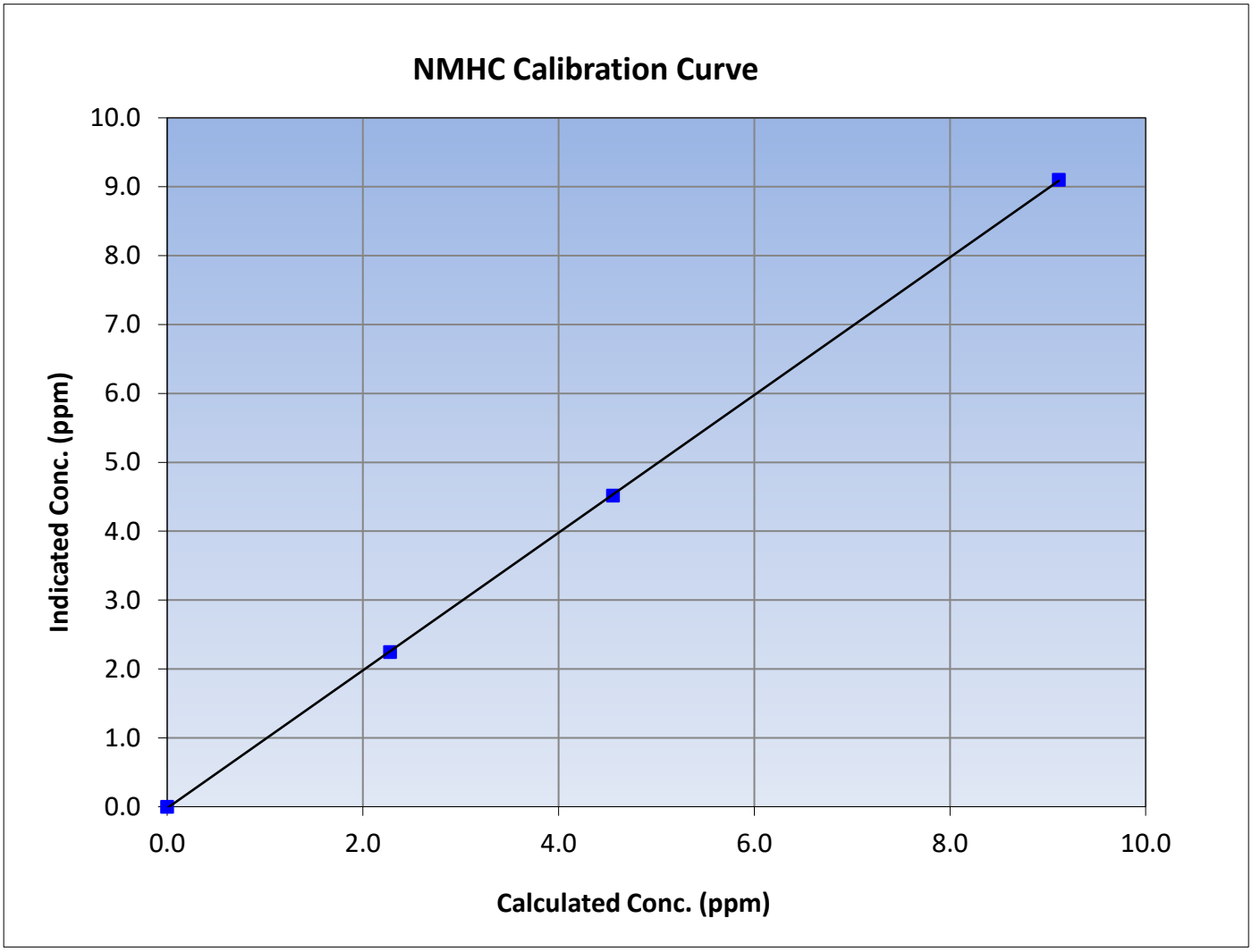
Version-01-2020

Station Information

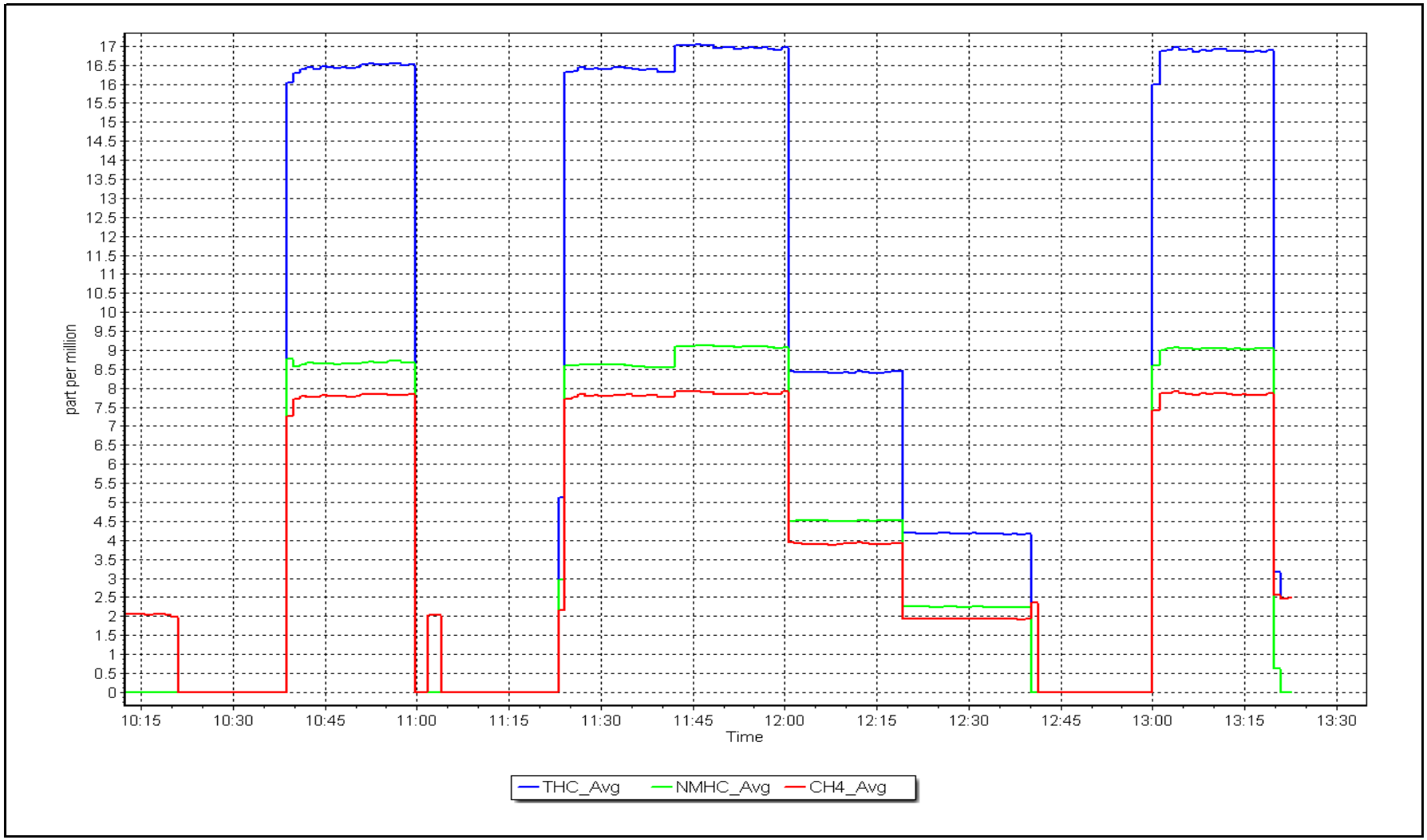
Calibration Date:	December 1, 2023	Previous Calibration:	November 8, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	10:14	End Time (MST):	13:18
Analyzer make:	Thermo 55i	Analyzer serial #:	1181490018

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*
9.11	9.10	1.0014			
4.56	4.52	1.0092	Slope	0.999405	*0.90 - 1.10*
2.28	2.24	1.0157			
			Intercept	-0.019981	*+/-0.5*



NMHC Calibration Plot Date: December 1, 2023 Location: Ells River



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Ells River	Station number:	AMS 30
Calibration Date:	December 15, 2023	Last Cal Date:	December 1, 2023
Start time (MST):	9:49	End time (MST):	11:16
Reason:	Cylinder Change		

Calibration Standards

Gas Cert Reference:		CC494126	Cal Gas Expiry Date:	December 29, 2028	
CH4 Cal Gas Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm
C3H8 Cal Gas Conc.	209.2	ppm			
Removed Gas Cert:			Removed Gas Expiry:		
Removed CH4 Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm
Removed C3H8 Conc.	209.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3061	
ZAG make/model:	API T701H		Serial Number:	358	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1181490018	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.46E-04	2.48E-04	NMHC SP Ratio:	5.47E-05	5.80E-05
CH4 Retention time:	14.2	14.2	NMHC Peak Area:	166643	157070

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	16.86	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	79.2	17.03	16.85	1.010
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.010

Baseline Corr AF:	16.86	Prev response	16.98	*% change	-0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4921	79.2	9.11	8.96	1.017
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	8.94	1.019
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.019
Baseline Corr AF:	8.96	Prev response	9.09	*% change	-1.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	7.91	7.90	1.002
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	7.91	1.000
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.000
Baseline Corr AF:	7.90	Prev response	7.89	*% change	0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

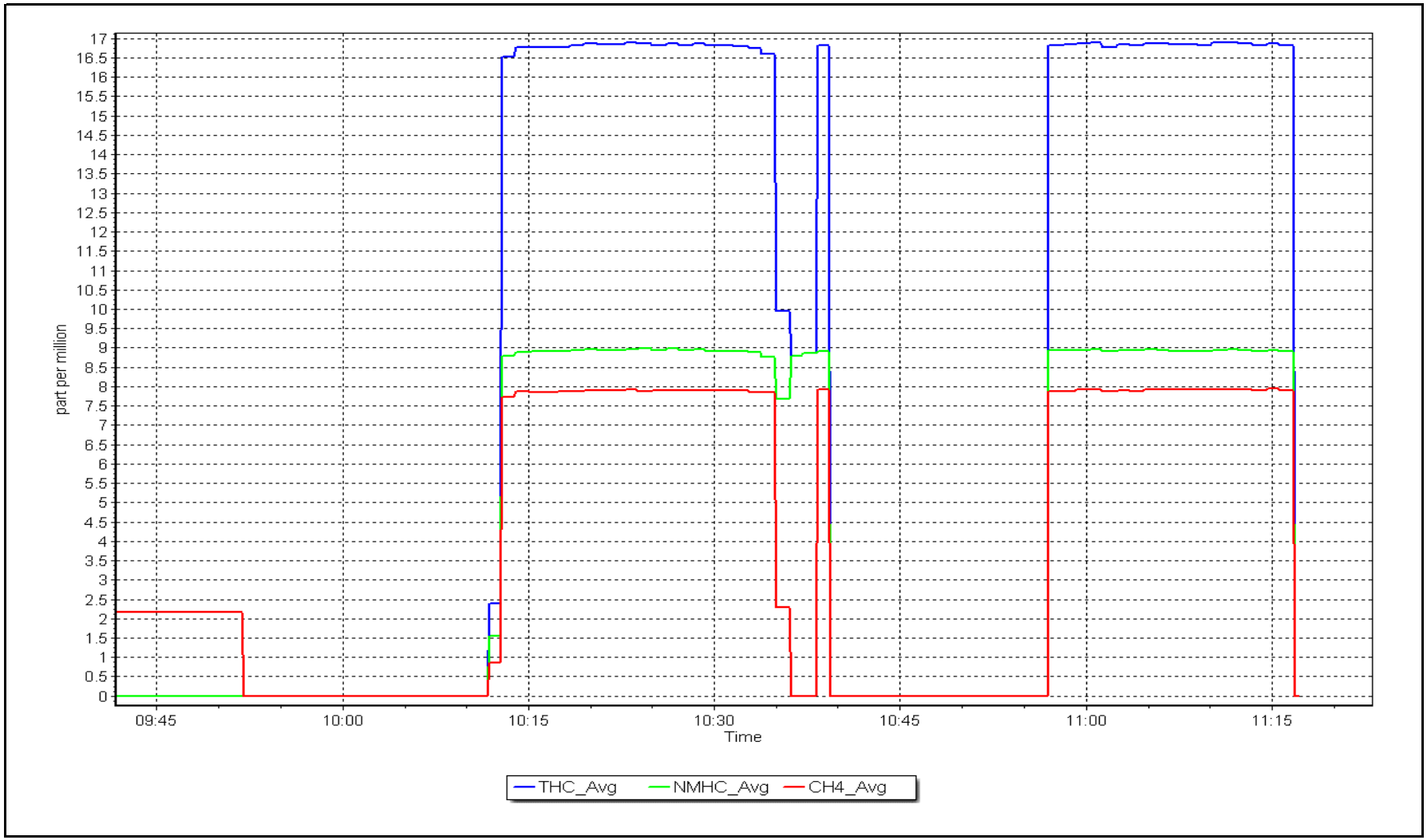
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000046	0.989645
THC Cal Offset:	-0.048138	0.000000
CH4 Cal Slope:	1.001246	0.999630
CH4 Cal Offset:	-0.032757	0.000000
NMHC Cal Slope:	0.998929	0.981192
NMHC Cal Offset:	-0.015582	0.000000

Notes: Cylinder changed after as founds.

Calibration Performed By: Jan Castro

NMHC Calibration Plot Date: December 15, 2023 Location: Ells River



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Ells River	Station number:	AMS 30
Calibration Date:	December 18, 2023	Last Cal Date:	November 28, 2023
Start time (MST):	10:59	End time (MST):	15:31
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2Y1P2R		Cal Gas Expiry Date:	December 11, 2023	
NOX Cal Gas Conc:	50.83	ppm	NO Cal Gas Conc:	49.97	ppm
Removed Cylinder #:			Removed Gas Exp Date:		
Removed Gas NOX Conc:	50.83	ppm	Removed Gas NO Conc:	49.97	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3061	
ZAG make/model:	API T701H		Serial Number:	358	

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	710321429
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.147	1.153	NO bkgnd or offset:	14.0	14.1
NOX coeff or slope:	0.992	0.992	NOX bkgnd or offset:	14.0	14.1
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	190.3	189.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.995096	1.000506
NO_X Cal Offset:	-1.240000	-1.440000
NO Cal Slope:	0.993053	0.998642
NO Cal Offset:	-2.360000	-2.440000
NO_2 Cal Slope:	1.003095	1.005022
NO_2 Cal Offset:	0.737995	0.180492

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.8	-0.7	-0.1	----	----
as found span	4920	80.0	813.3	799.5	13.8	812.9	794.3	18.5	1.0005	1.0066
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.6	-0.6	-0.1	----	----
high point	4920	80.0	813.3	799.5	13.8	812.6	796.7	15.8	1.0008	1.0035
second point	4960	40.0	406.6	399.8	6.9	405.2	396.5	8.7	1.0036	1.0082
third point	4980	20.0	203.3	199.9	3.4	201.0	194.9	6.1	1.0115	1.0256
as left zero	5000	0.0	0.0	0.0	0.0	-0.6	-0.6	0.0	----	----
as left span	4920	80.0	813.3	425.1	388.2	813.0	423.4	389.5	1.0003	1.0041
								Average Correction Factor	1.0053	1.0124

Corrected As found	NO_X = 813.7 ppb	NO = 795.0 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.7%
Previous Response	NO_X = 808.1 ppb	NO = 791.6 ppb		*Percent Change	NO =	0.4%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	795.0	420.6	388.2	390.0	0.9953	100.5%
2nd GPT point (200 ppb O3)	795.0	610.8	198.0	199.7	0.9913	100.9%
3rd GPT point (100 ppb O3)	795.0	698.3	110.5	111.2	0.9933	100.7%
				Average Correction Factor	0.9933	100.7%

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

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

NO_X Calibration Summary

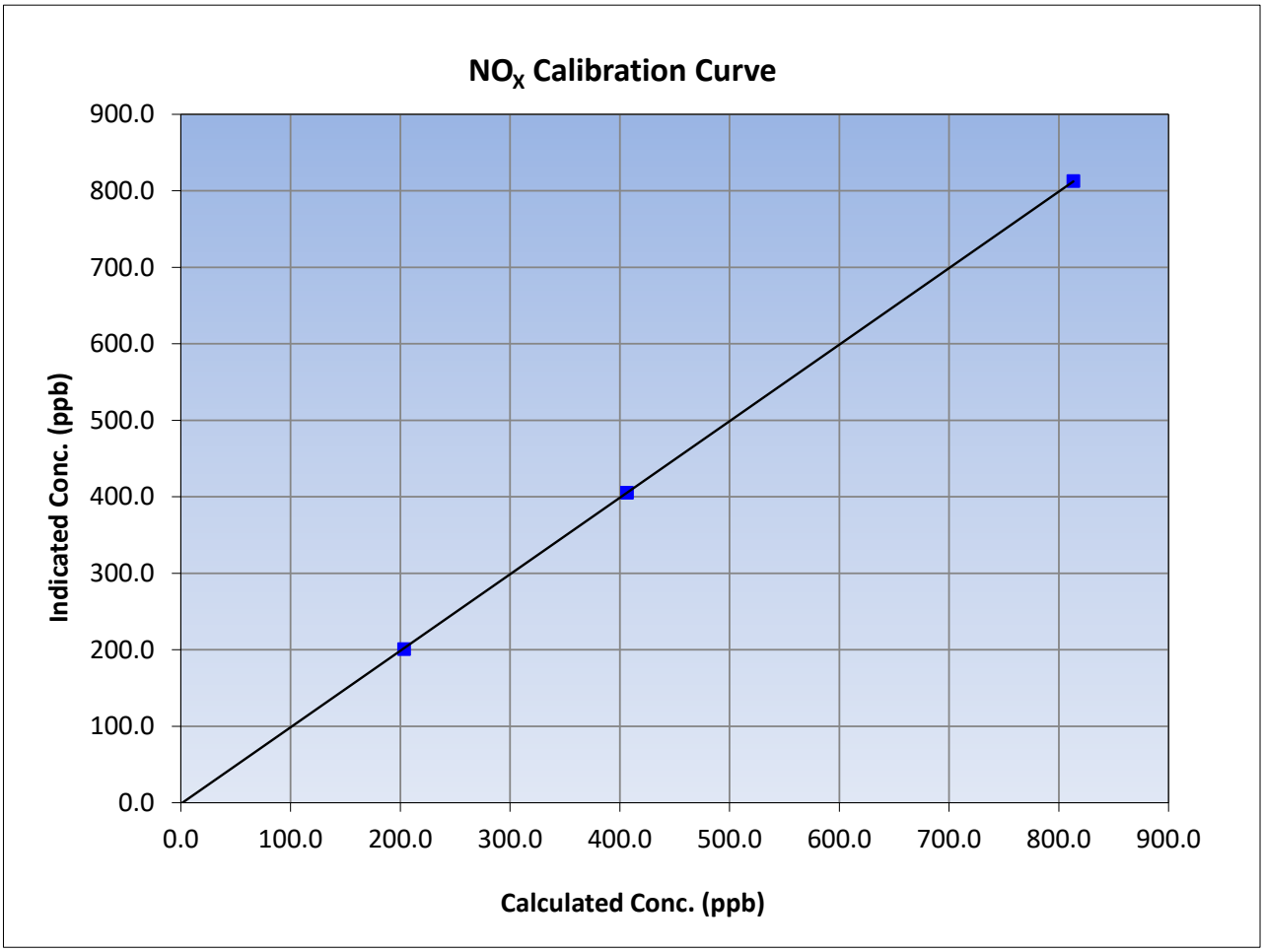
Version-04-2020

Station Information

Calibration Date:	December 18, 2023	Previous Calibration:	November 28, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	10:59	End Time (MST):	15:31
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	-0.6	----	Correlation Coefficient	0.999995	≥0.995
813.3	812.6	1.0008			
406.6	405.2	1.0036	Slope	1.000506	0.90 - 1.10
203.3	201.0	1.0115			
			Intercept	-1.440000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

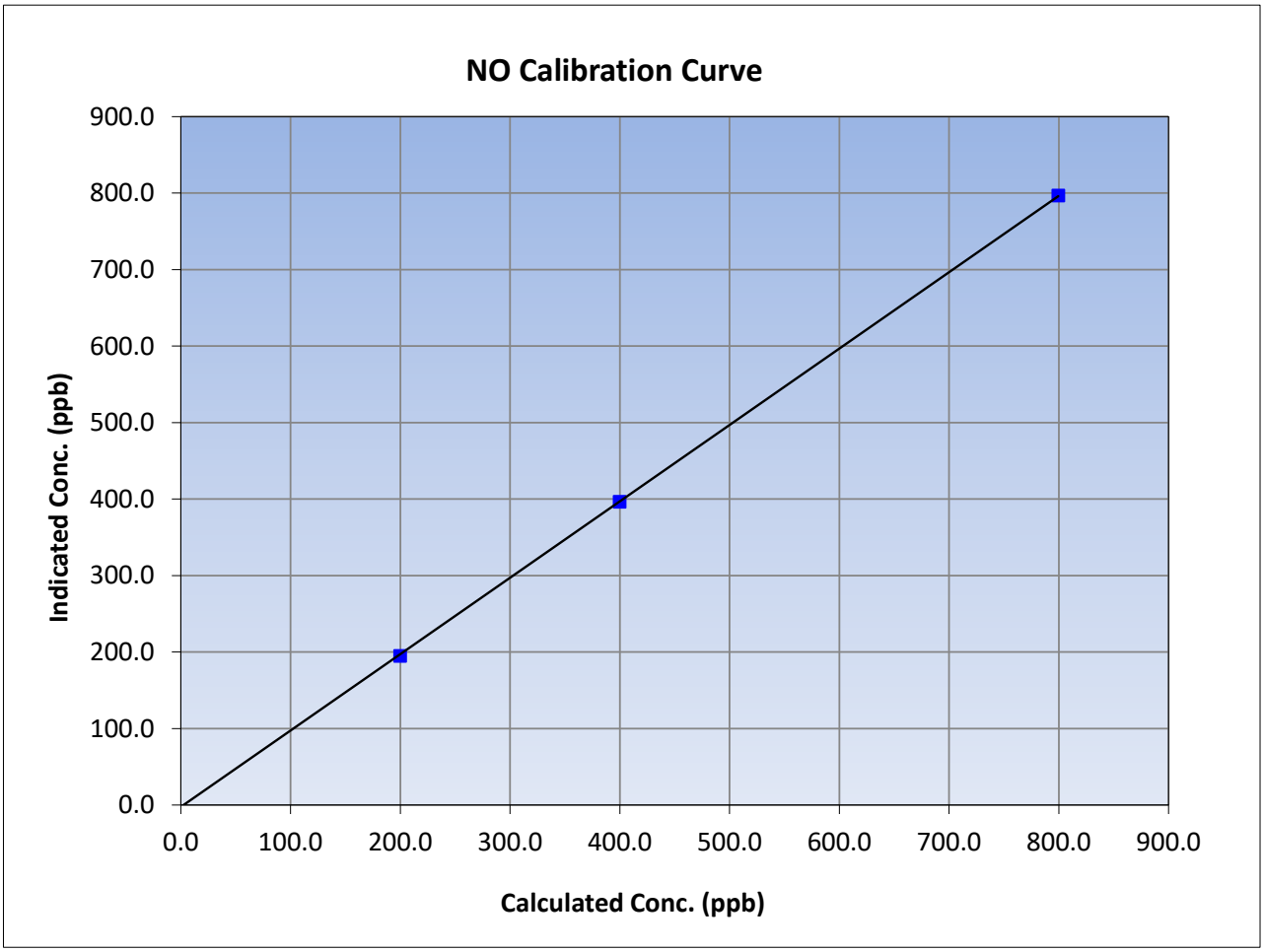
Version-04-2020

Station Information

Calibration Date:	December 18, 2023	Previous Calibration:	November 28, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	10:59	End Time (MST):	15:31
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	-0.6	----	Correlation Coefficient	0.999974	≥0.995
799.5	796.7	1.0035			
399.8	396.5	1.0082	Slope	0.998642	0.90 - 1.10
199.9	194.9	1.0256			
			Intercept	-2.440000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

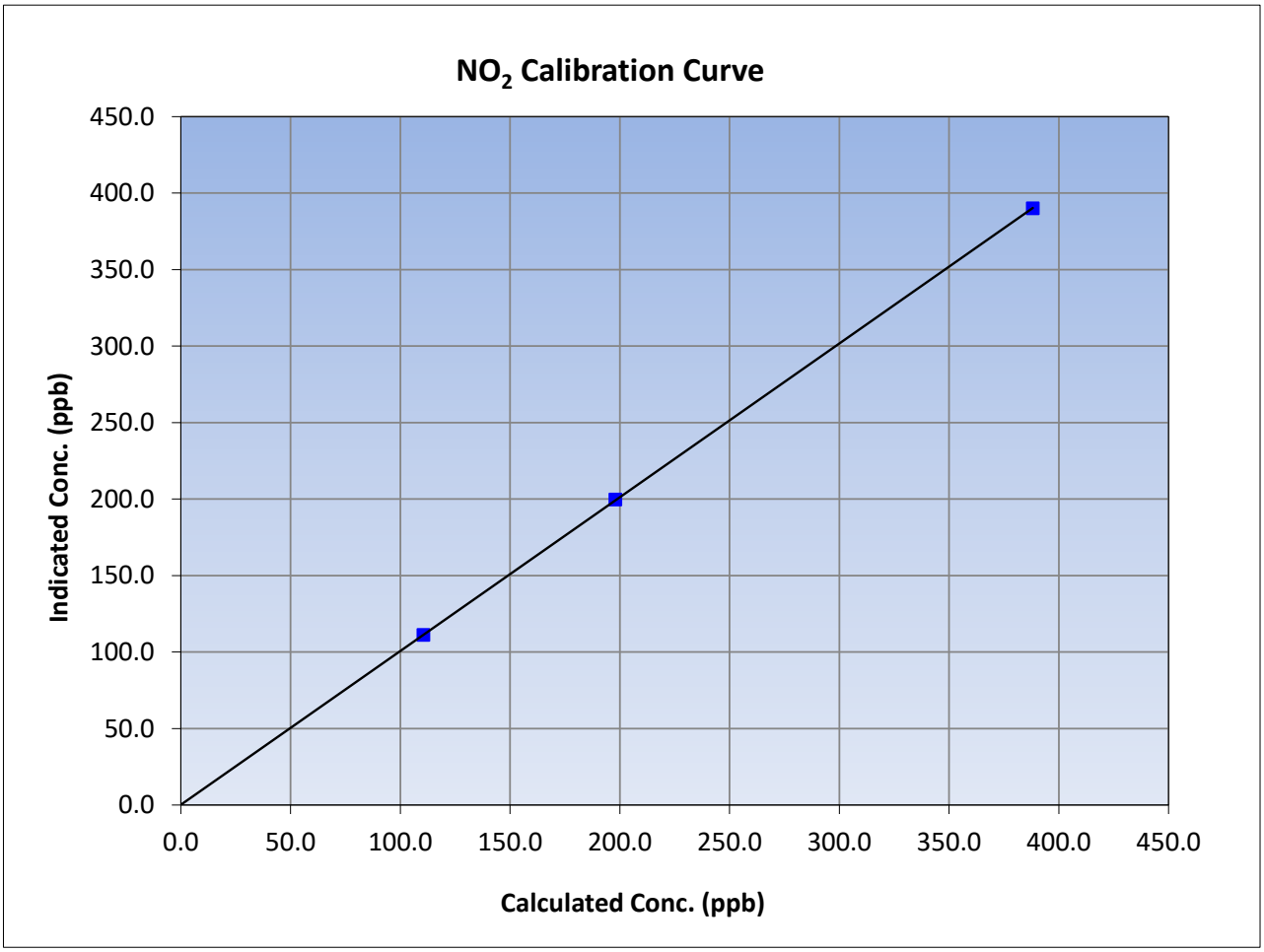
Version-04-2020

Station Information

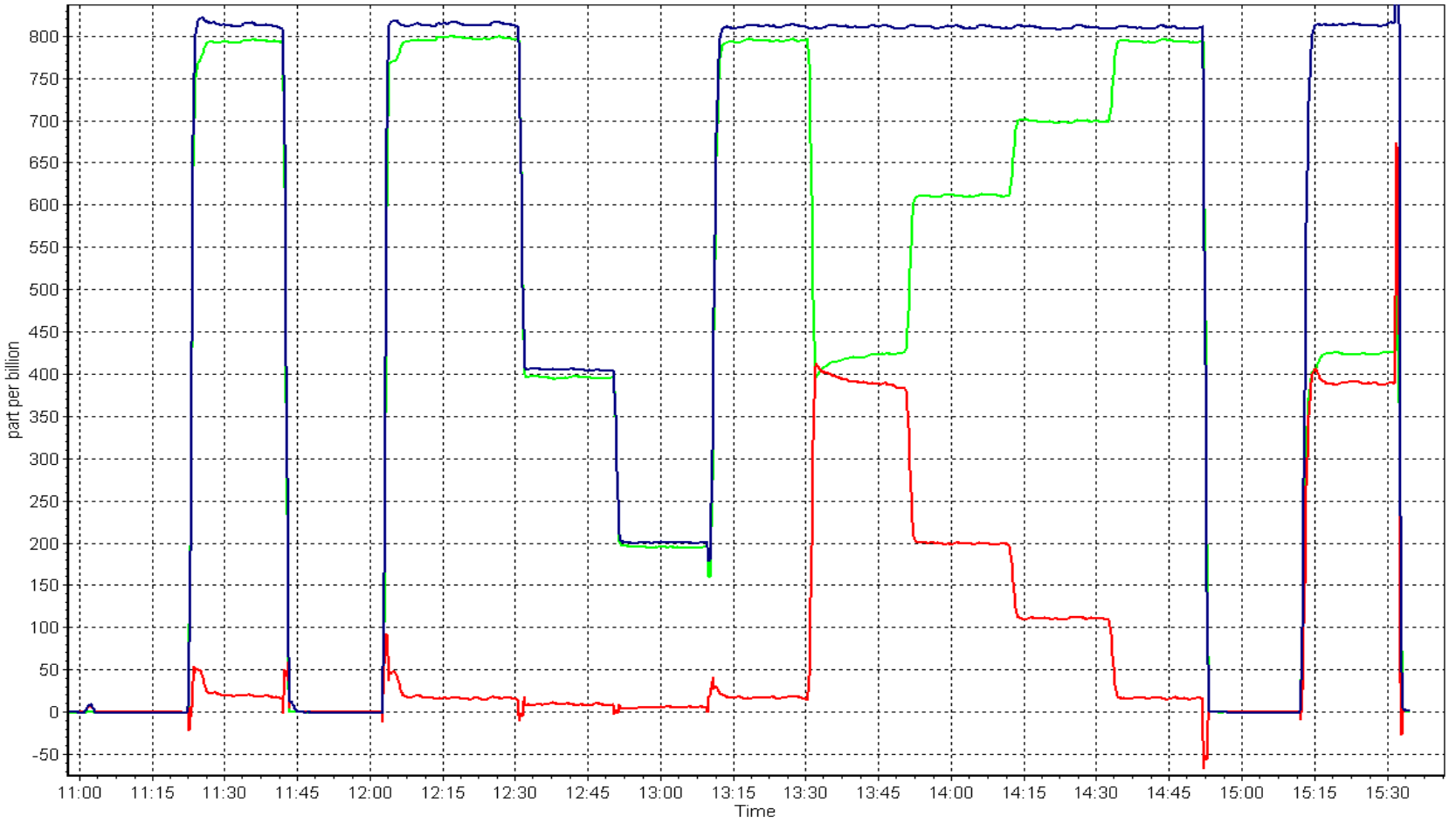
Calibration Date:	December 18, 2023	Previous Calibration:	November 28, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	10:59	End Time (MST):	15:31
Analyzer make:	Thermo 42i	Analyzer serial #:	710321429

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999994	≥0.995
388.2	390.0	0.9953			
198.0	199.7	0.9913	Slope	1.005022	0.90 - 1.10
110.5	111.2	0.9933			
			Intercept	0.180492	+/-20



NO_X Calibration Plot Date: December 18, 2023 Location: Ells River



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Ells River	Station number:	AMS 30
Calibration Date:	December 18, 2023	Last Cal Date:	November 30, 2023
Start time (MST):	13:10	End time (MST):	14:17
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 (^{o}C)	0.4	-0.28	0.4	☐	+/- 2 deg C
P (mmHg)	722.3	723.97	722.3	☐	+/- 10 mmHg
flow (LPM)	4.98	4.95	4.98	☐	+/- 0.25 LPM

Leak Test: Date of check: December 18, 2023 Last Cal Date: November 30, 2023

PM w/o HEPA: 1.1 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: October 27, 2023 <0.2 ug/m3

Disposable Filter Changed: October 27, 2023

Annual Maintenance

Date Sample Tube Cleaned: October 27, 2023

Date RH/T Sensor Cleaned: November 30, 2023

Notes: No adjustments made.

Calibration by: Jan Castro

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS501
LEISMER

DECEMBER 2023

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

January 31, 2024

CALS_543

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Leismer	Station number:	AMS501
Calibration Date:	December 12, 2023	Last Cal Date:	November 28, 2023
Start time (MST):	13:13	End time (MST):	15:55
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:	1.003829	0.999030	Backgd or Offset:	19.2	19.2
Calibration intercept:	-1.496012	-1.115967	Coeff or Slope:	0.971	0.971

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	798.7	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4921	79.2	800.2	798.7	1.002
second point	4960	39.6	400.2	398.8	1.003
third point	4980	19.8	200.1	196.9	1.016
as left zero	5000	0.0	0.0	0.2	----
as left span	4921	79.2	800.2	800.2	1.000
				Average Correction Factor	1.007

Baseline Corr As found:	798.70	Previous response	801.77	*% 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 inlet filter after as founds. No adjustment.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

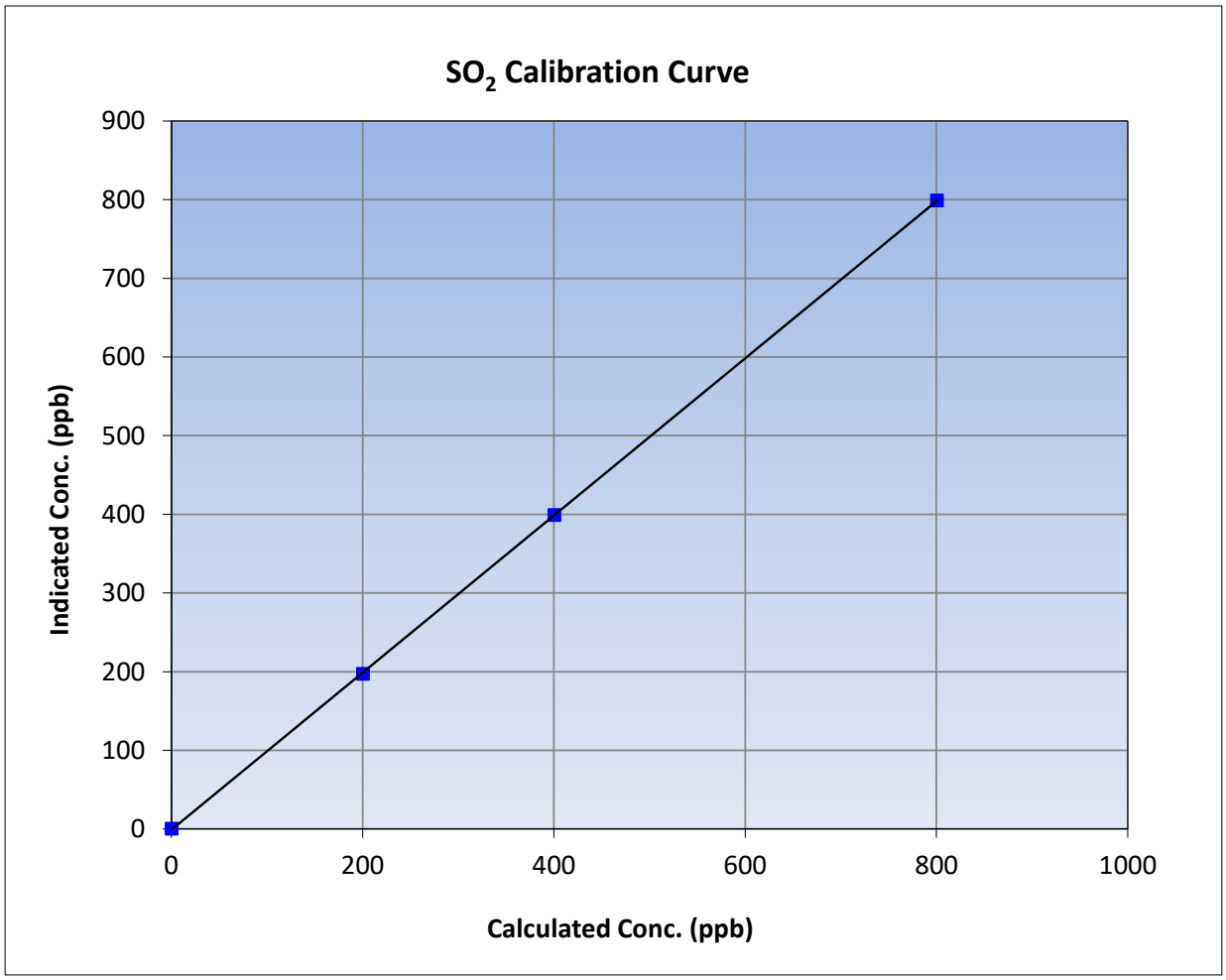
Station Information

Calibration Date:	December 12, 2023	Previous Calibration:	November 28, 2023
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	13:13	End Time (MST):	15:55
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290011

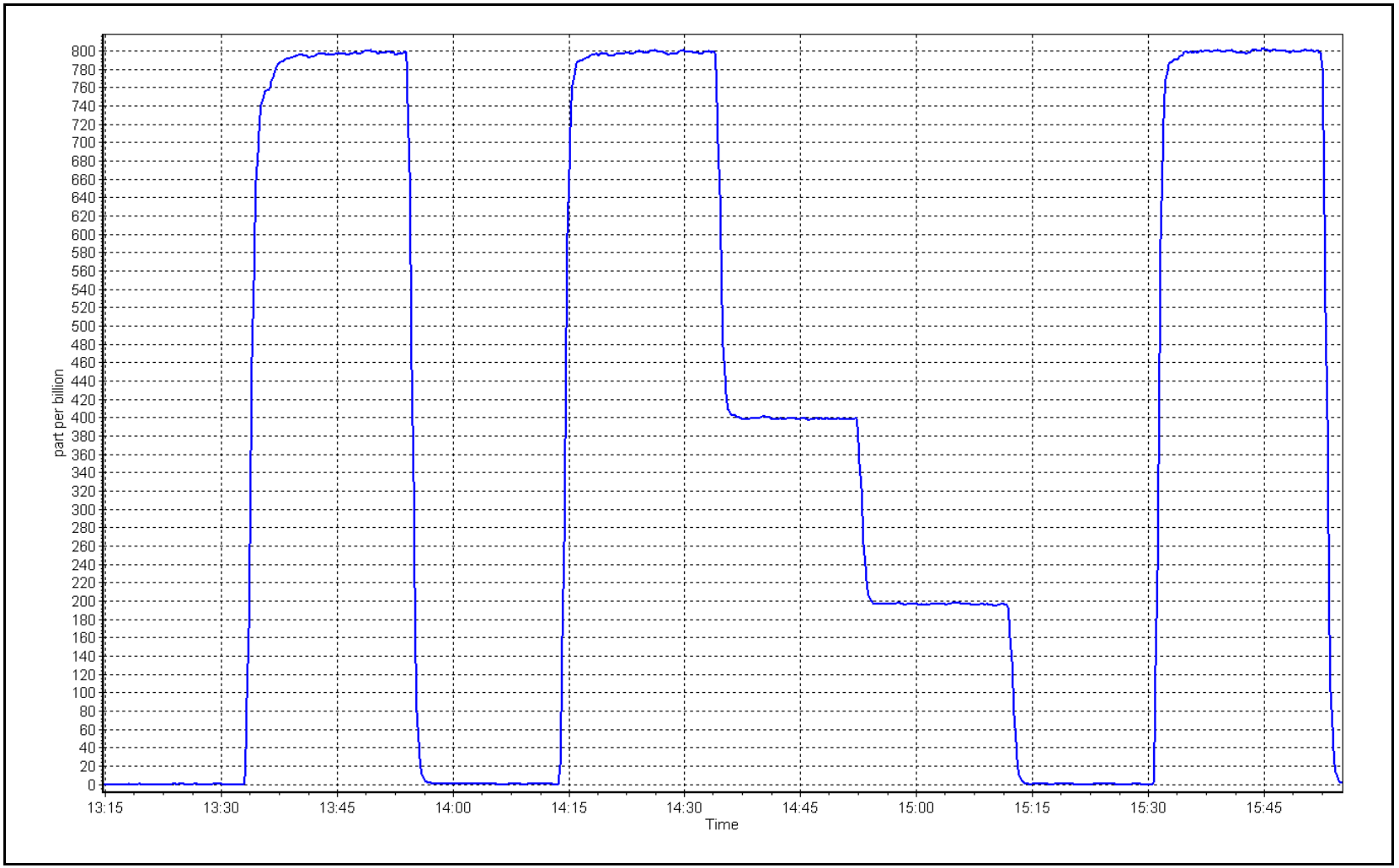
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
800.2	798.7	1.0019
400.2	398.8	1.0034
200.1	196.9	1.0161

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999985	*≥0.995*
Slope	0.999030	*0.90 - 1.10*
Intercept	-1.115967	*+/-30*



SO2 Calibration Plot Date: December 12, 2023 Location: Leismer



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Leismer	Station number:	AMS501
Calibration Date:	December 12, 2023	Last Cal Date:	November 29, 2023
Start time (MST):	9:32	End time (MST):	13:19
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:	1.002431	0.995716	Backgd or Offset:	3.47	3.47
Calibration intercept:	-0.138350	-0.078455	Coeff or Slope:	1.105	1.105

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	77.8	80.0	79.1	1.009
as found 2nd point	4961	38.9	40.0	39.6	1.005
as found 3rd point	4981	19.4	19.9	19.6	1.007
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	79.5	1.006
second point	4961	38.9	40.0	39.9	1.002
third point	4981	19.4	19.9	19.7	1.012
as left zero	5000	0.0	0.0	0.0	----
as left span	4922	77.8	80.0	79.5	1.006
SO2 Scrubber Check	4921	79.2	792.0	0.1	----
Date of last scrubber change:		24-Feb-23		Ave Corr Factor	1.007
Date of last converter efficiency test:		December 1, 2022			efficiency

Baseline Corr As found:	79.3	Prev response:	80.04	*% change:	-0.9%
Baseline Corr 2nd AF pt:	39.8	AF Slope:	0.991572	AF Intercept:	-0.158512
Baseline Corr 3rd AF pt:	19.8	AF Correlation:	0.999995		

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after as founds. Scrubber test done after calibrator zero. No adjustment.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

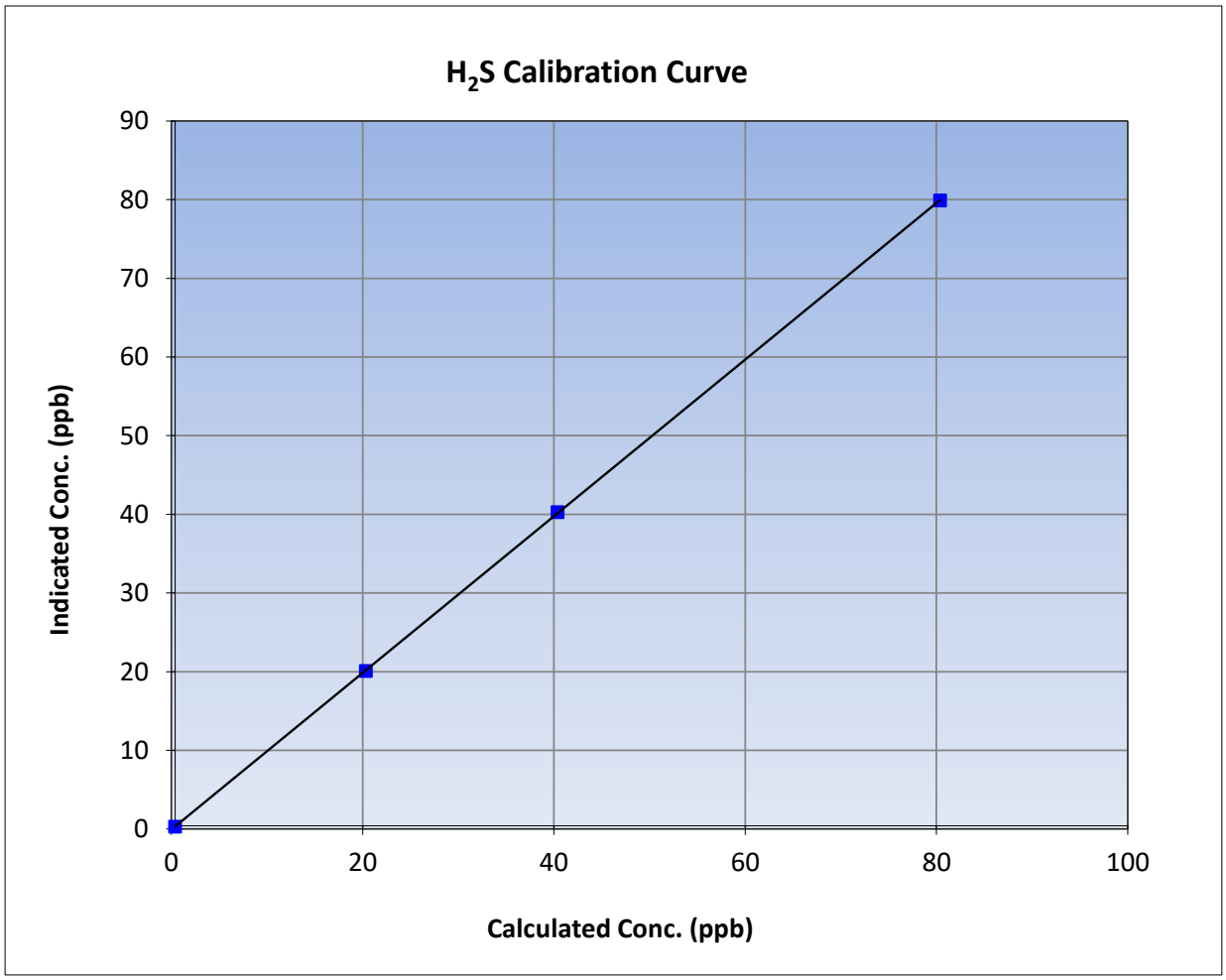
Station Information

Calibration Date:	December 12, 2023	Previous Calibration:	November 29, 2023
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	9:32	End Time (MST):	13:19
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1180540020

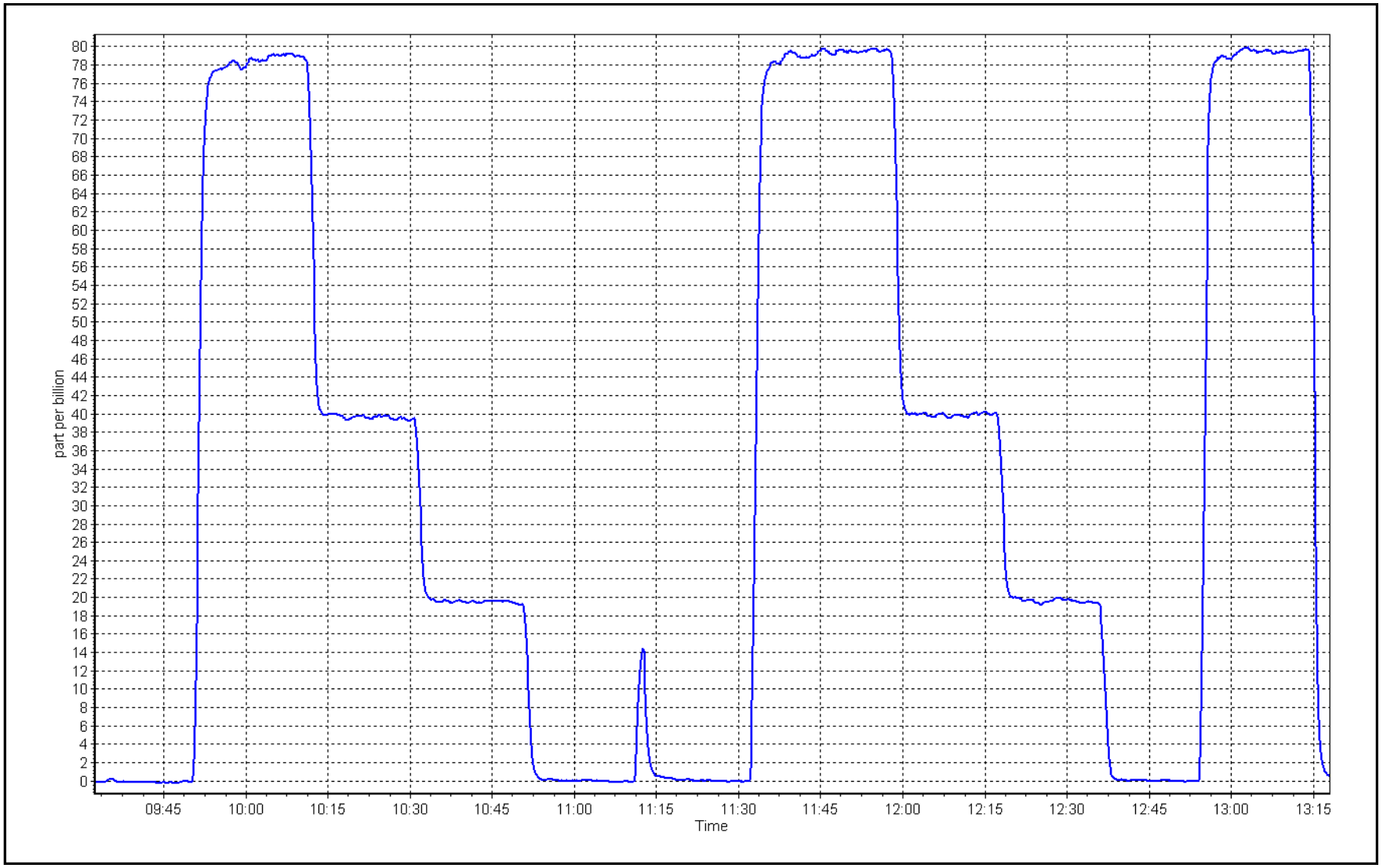
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	79.5	1.0061
40.0	39.9	1.0023
19.9	19.7	1.0123

Statistical Evaluation		Limits
Correlation Coefficient	0.999990	≥0.995
Slope	0.995716	0.90 - 1.10
Intercept	-0.078455	+/-3



H_2S Calibration Plot Date: December 12, 2023 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:	December 13, 2023	Last Cal Date:	November 28, 2023
Start time (MST):	8:21	End time (MST):	13:46
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:	1.225	1.238	NO bkgnd or offset:	3.6	3.7
NOX coeff or slope:	0.992	0.990	NOX bkgnd or offset:	3.6	3.6
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	165.0	166.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.007139	1.001988
NO_X Cal Offset:	-3.748007	-4.067947
NO Cal Slope:	1.006069	1.004511
NO Cal Offset:	-4.627968	-4.907940
NO_2 Cal Slope:	0.997452	0.999993
NO_2 Cal Offset:	0.289298	0.065389

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	-0.3	0.2	----	----
as found span	4916	84.4	801.1	799.9	1.2	796.5	792.4	4.1	1.0057	1.0094
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.2	----	----
high point	4916	84.4	801.1	799.9	1.2	800.5	800.9	-0.3	1.0007	0.9987
second point	4958	42.2	400.5	400.0	0.6	395.7	394.8	0.8	1.0122	1.0131
third point	4979	21.1	200.3	200.0	0.3	192.1	190.8	1.3	1.0426	1.0481
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as left span	4916	84.4	801.1	410.8	390.3	798.7	411.7	387.0	1.0030	0.9978
								Average Correction Factor	1.0185	1.0200

Corrected As found	NO_X = 796.6 ppb	NO = 792.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -0.8%
Previous Response	NO_X = 803.0 ppb	NO = 800.1 ppb		*Percent Change	NO = -0.9%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx 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)	798.5	409.4	390.3	390.4	0.9997	100.0%
2nd GPT point (200 ppb O3)	798.5	487.8	311.9	312.0	0.9996	100.0%
3rd GPT point (100 ppb O3)	798.5	640.8	158.9	158.7	1.0011	99.9%
				Average Correction Factor	1.0002	100.0%

Notes: Changed inlet filter after as founds. Adjusted span. 3rd point was failing, back to calibrator zero to check any drift. Used 2nd NO reference point due to drift.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

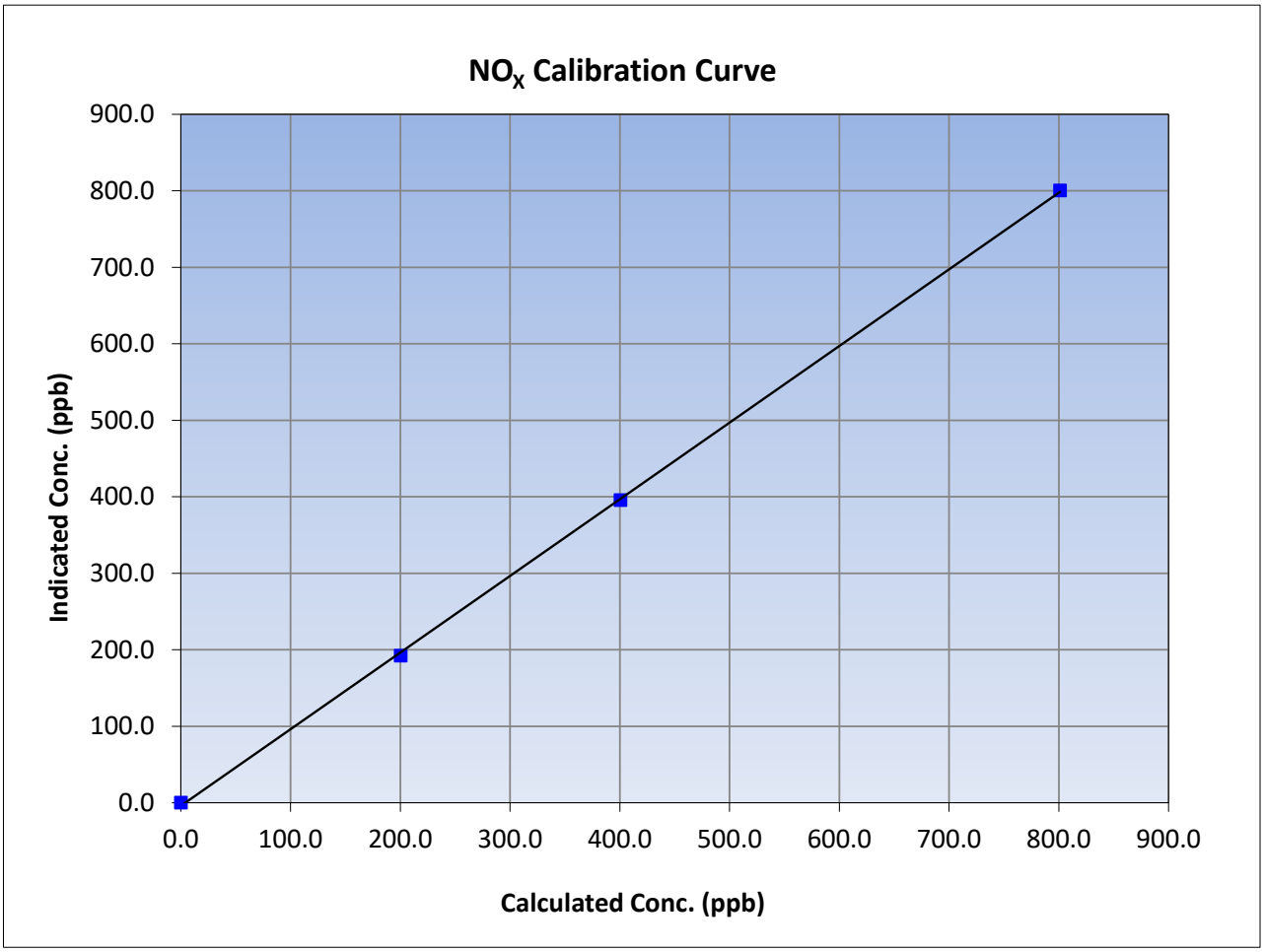
Version-04-2020

Station Information

Calibration Date:	December 13, 2023	Previous Calibration:	November 28, 2023
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	8:21	End Time (MST):	13:46
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	0.1	----	Correlation Coefficient	0.999876	≥0.995
801.1	800.5	1.0007			
400.5	395.7	1.0122	Slope	1.001988	0.90 - 1.10
200.3	192.1	1.0426			
			Intercept	-4.067947	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

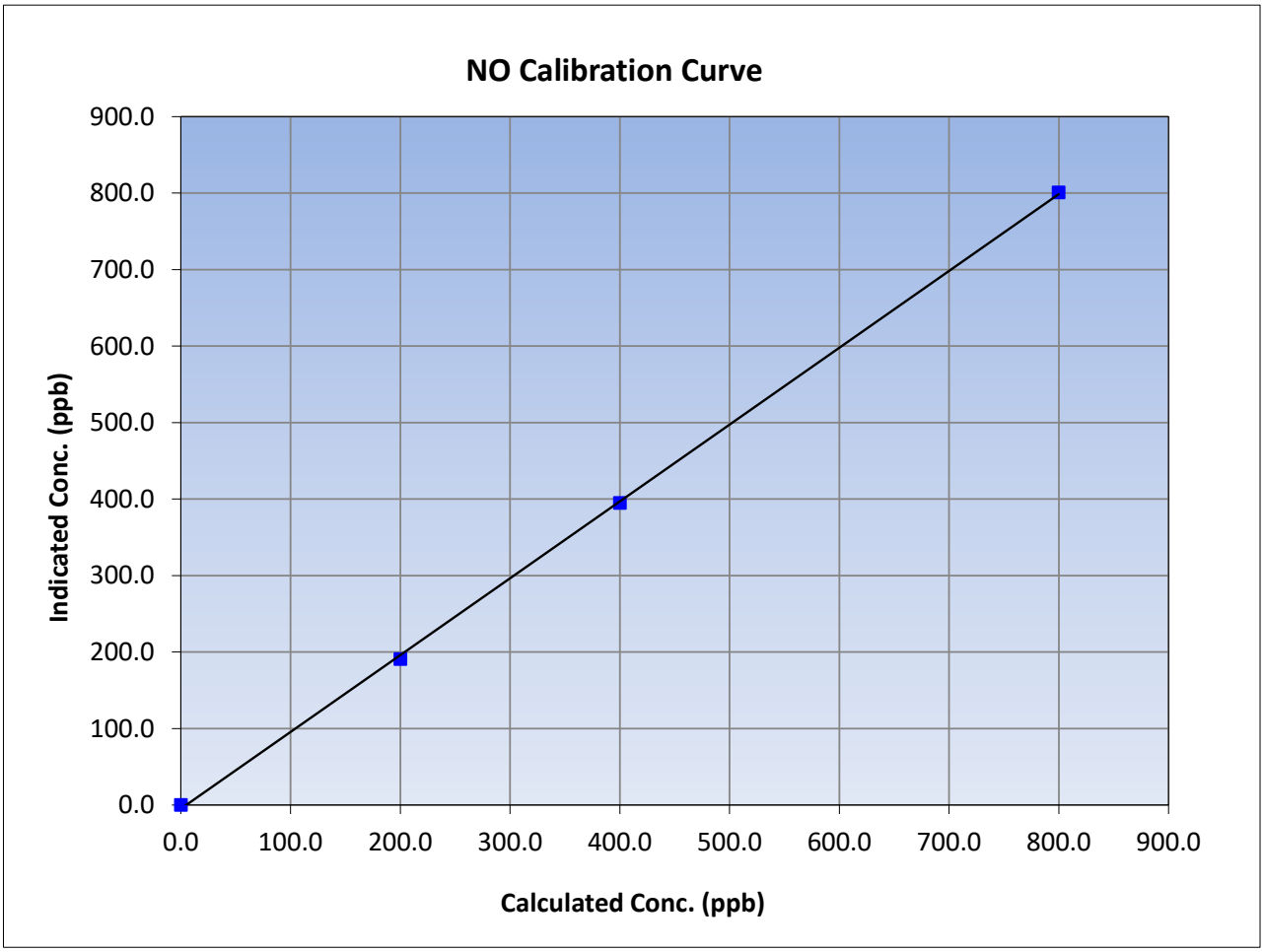
Version-04-2020

Station Information

Calibration Date:	December 13, 2023	Previous Calibration:	November 28, 2023
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	8:21	End Time (MST):	13:46
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	0.999829	≥0.995
799.9	800.9	0.9987			
400.0	394.8	1.0131	Slope	1.004511	0.90 - 1.10
200.0	190.8	1.0481			
			Intercept	-4.907940	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

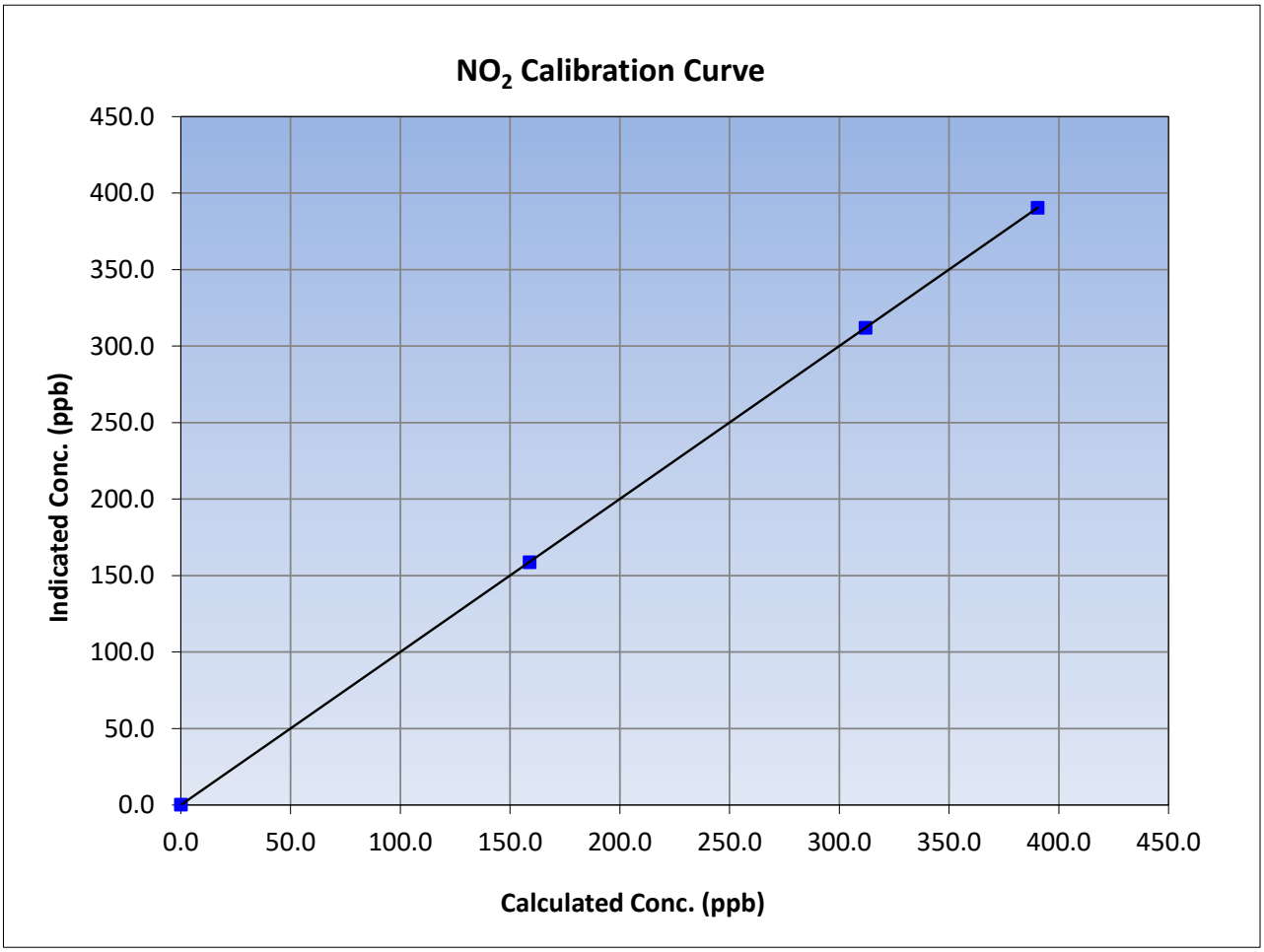
Version-04-2020

Station Information

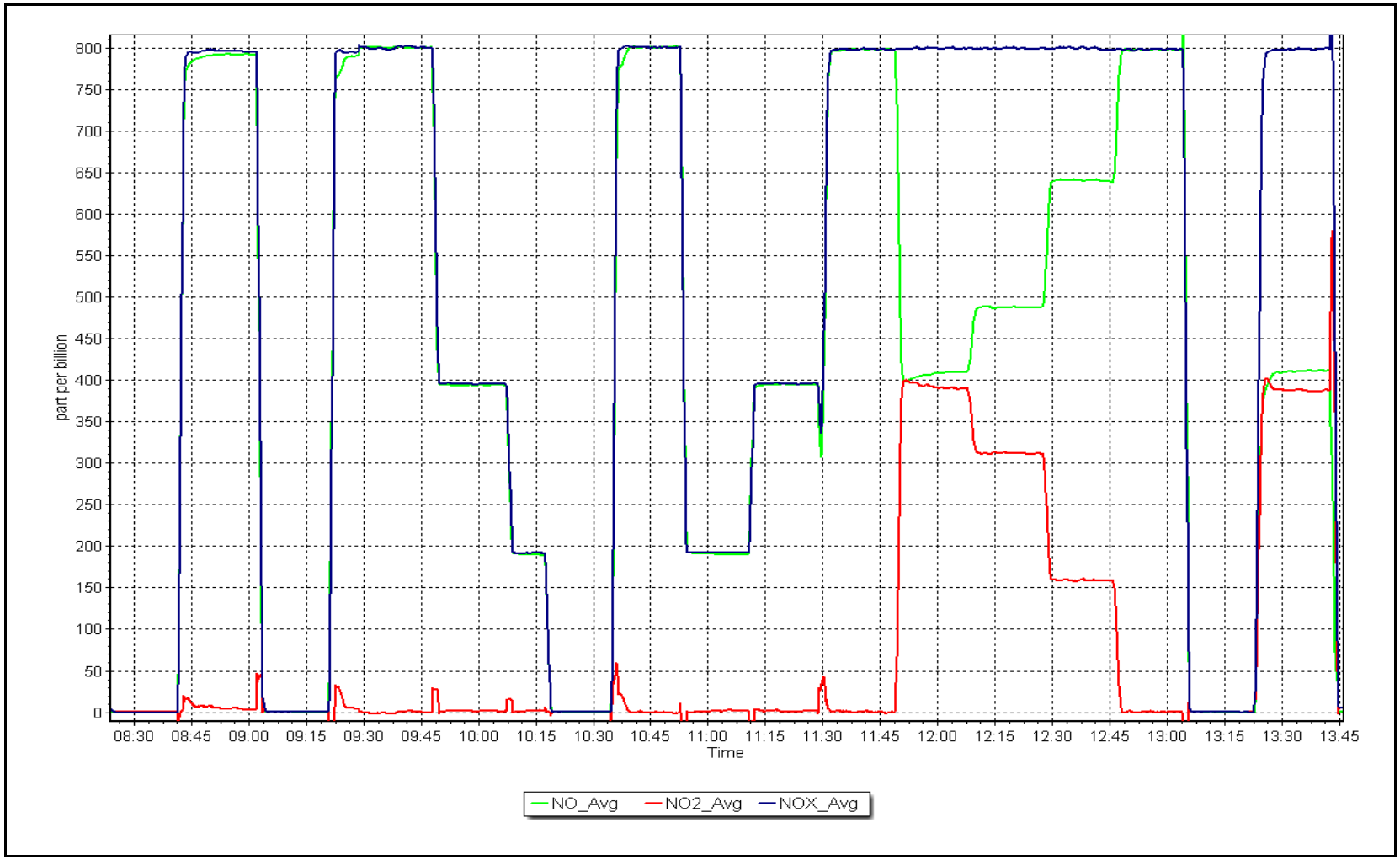
Calibration Date:	December 13, 2023	Previous Calibration:	November 28, 2023
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	8:21	End Time (MST):	13:46
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999999	≥0.995
390.3	390.4	0.9997			
311.9	312.0	0.9996	Slope	0.999993	0.90 - 1.10
158.9	158.7	1.0011			
			Intercept	0.065389	+/-20



NO_X Calibration Plot Date: December 13, 2023 Location: Leismer



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS505
SAWBONES BAY

DECEMBER 2023

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

January 31, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Sawbones Bay	Station number:	AMS505
Calibration Date:	December 6, 2023	Last Cal Date:	November 8, 2023
Start time (MST):	13:35	End time (MST):	16:19
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:	0.999808	1.000723	Backgd or Offset:	20.3	20.5
Calibration intercept:	-1.371905	-0.792239	Coeff or Slope:	0.987	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	-0.3	----
as found span	4922	77.8	799.8	795.0	1.006
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	799.5	1.000
second point	4961	38.9	399.9	400.3	0.999
third point	4981	19.5	200.4	198.4	1.010
as left zero	5000	0.0	0.0	-0.4	----
as left span	4922	77.8	799.8	803.8	0.995
				Average Correction Factor	1.003

Baseline Corr As found:	795.30	Previous response	798.29	*% 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 inlet filter. Adjusted span.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

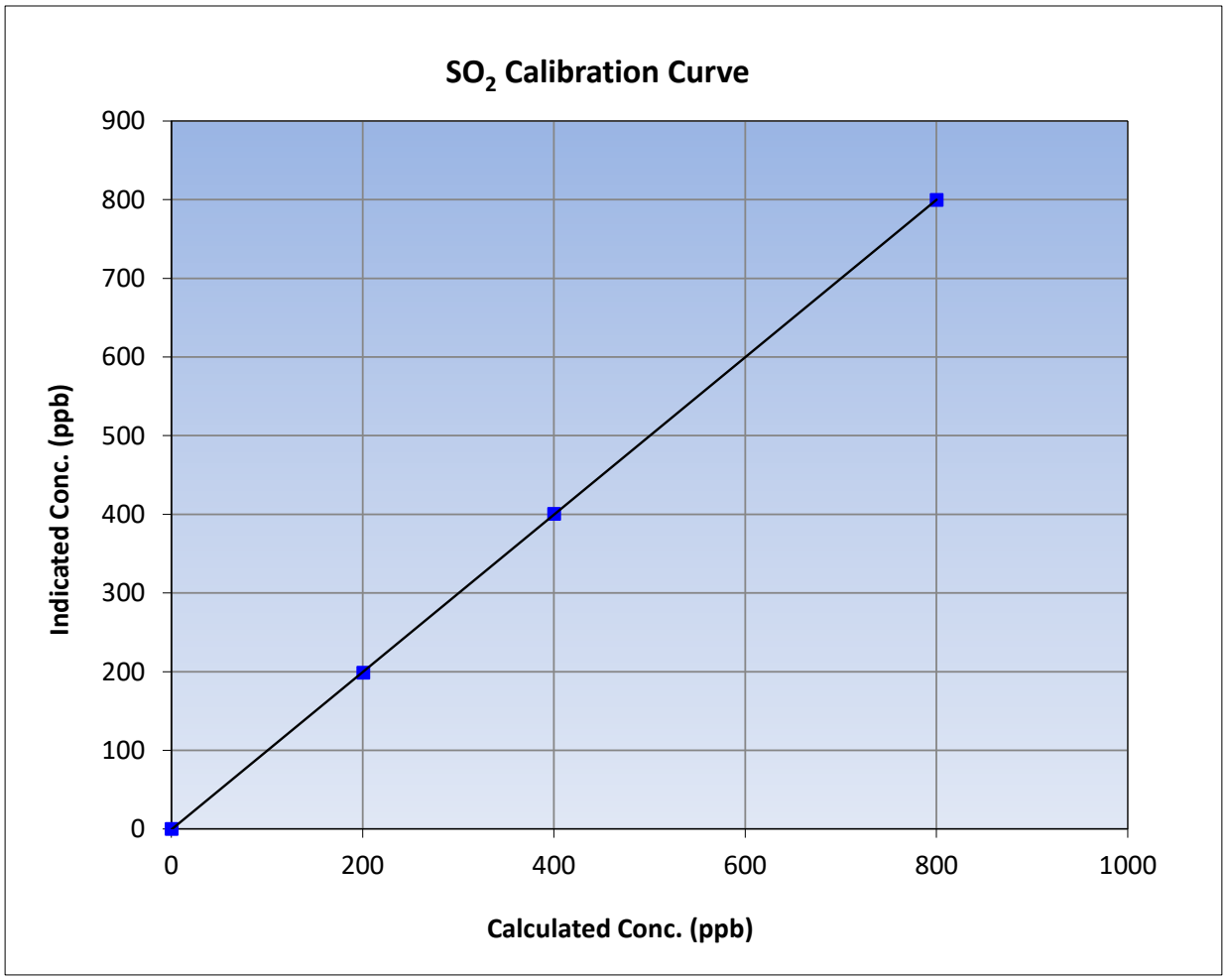
Station Information

Calibration Date:	December 6, 2023	Previous Calibration:	November 8, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	13:35	End Time (MST):	16:19
Analyzer make:	Thermo 43i	Analyzer serial #:	0710321323

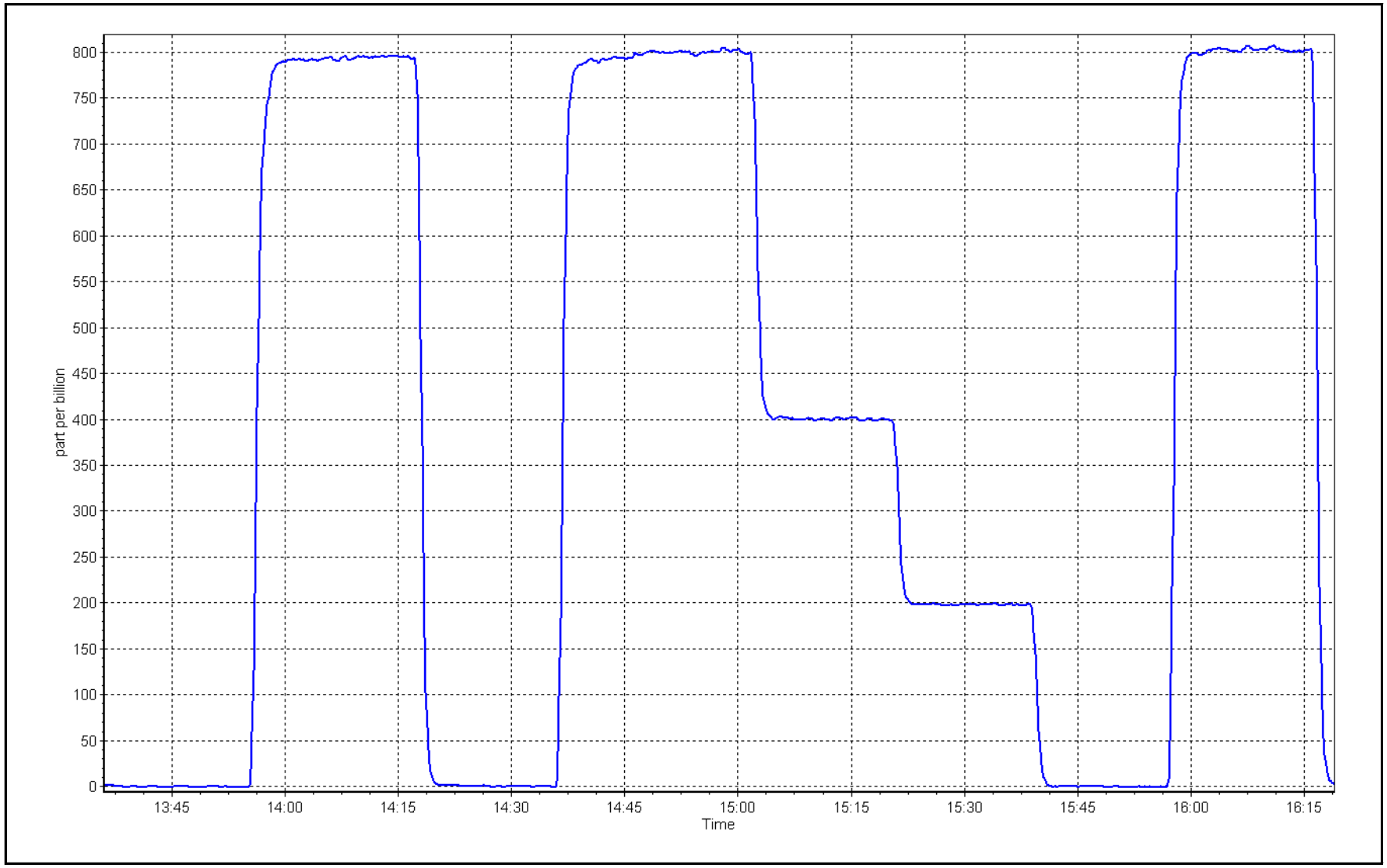
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
799.8	799.5	1.0004
399.9	400.3	0.9990
200.4	198.4	1.0103

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999991	*≥0.995*
Slope	1.000723	*0.90 - 1.10*
Intercept	-0.792239	*+/-30*



SO2 Calibration Plot Date: December 6, 2023 Location: Sawbones Bay



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Sawbones Bay	Station number:	AMS505
Calibration Date:	December 6, 2023	Last Cal Date:	November 9, 2023
Start time (MST):	9:42	End time (MST):	13:42
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.15	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517397			
Removed Cal Gas Conc:	5.15	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5112
ZAG Make/Model:	Teledyne API T701		Serial Number:	690

Analyzer Information

Analyzer make:	Thermo 43iQ		Analyzer serial #:	1228021057	
Converter make:	Global 150		Converter serial #:	2022-224	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.994794	0.987083	Backgd or Offset:	2.21	2.21
Calibration intercept:	0.261745	0.281580	Coeff or Slope:	1.021	1.021

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.2	----
as found span	4922	77.7	80.0	79.6	1.009
as found 2nd point	4961	38.8	40.0	39.8	1.009
as found 3rd point	4981	19.4	20.0	20.1	1.004
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.3	----
high point	4922	77.7	80.0	79.3	1.009
second point	4961	38.8	40.0	39.7	1.007
third point	4981	19.4	20.0	20.0	0.999
as left zero	5000	0.0	0.0	0.4	----
as left span	4922	77.7	80.0	79.0	1.013
SO2 Scrubber Check	4922	77.8	778.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.005
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.4	Prev response:	79.88	*% change:	-0.7%
Baseline Corr 2nd AF pt:	39.6	AF Slope:	0.991138	AF Intercept:	0.229684
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999998		

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after calibrator zero. Scrubber check and passed after calibrator zero. No adjustment made.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

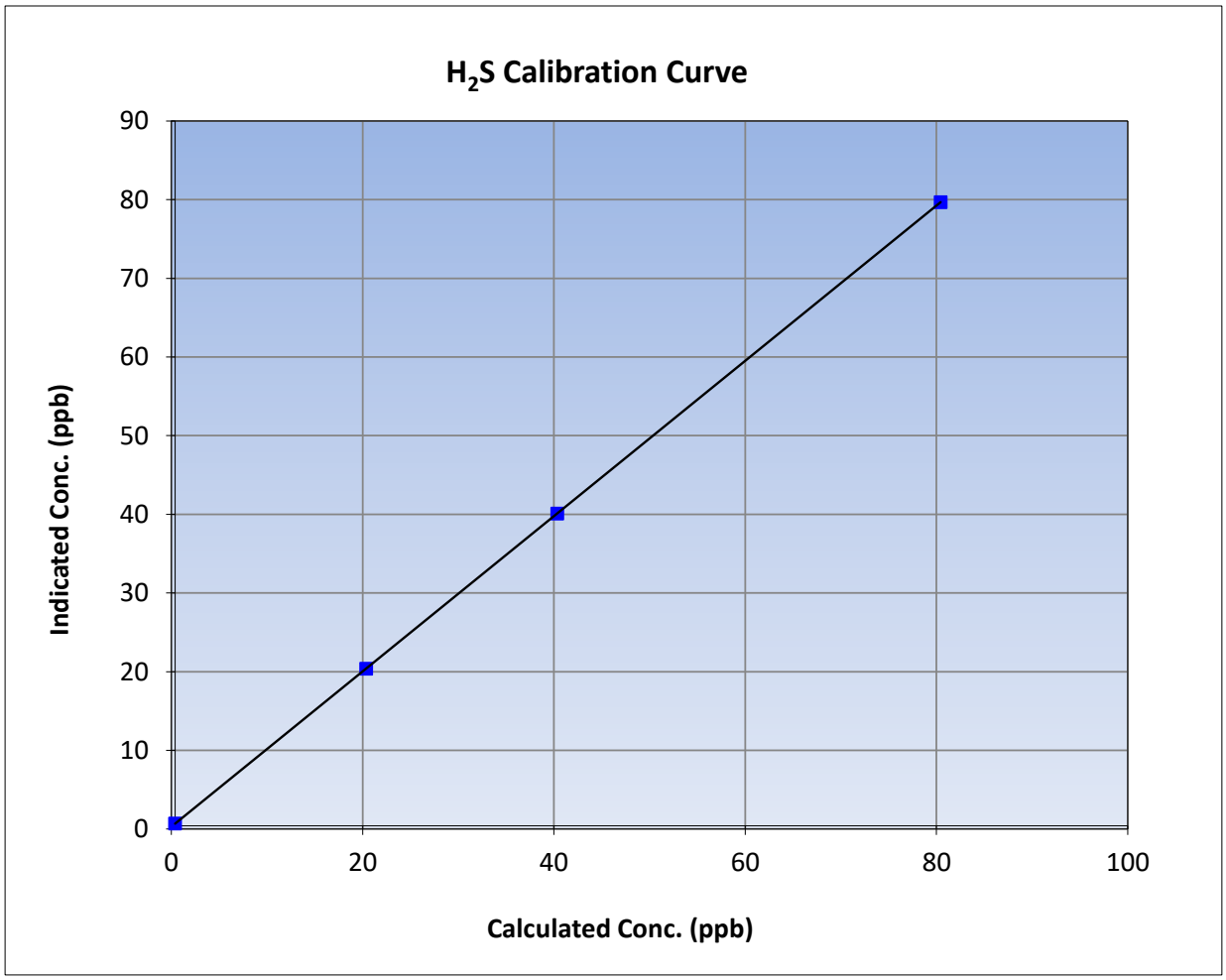
Station Information

Calibration Date:	December 6, 2023	Previous Calibration:	November 9, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	9:42	End Time (MST):	13:42
Analyzer make:	Thermo 43iQ	Analyzer serial #:	1228021057

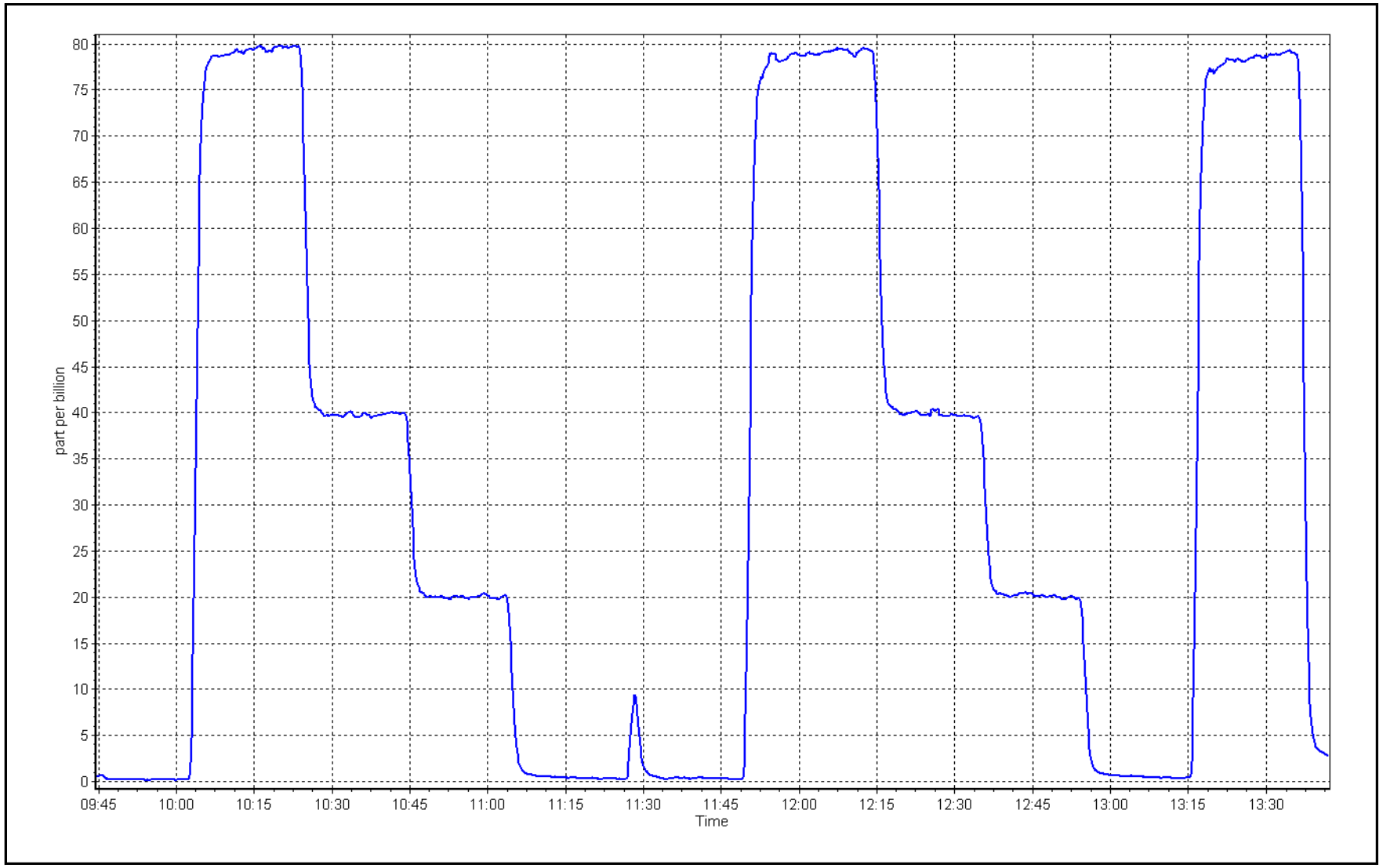
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
80.0	79.3	1.0093
40.0	39.7	1.0067
20.0	20.0	0.9990

Statistical Evaluation		Limits
Correlation Coefficient	1.000000	≥0.995
Slope	0.987083	0.90 - 1.10
Intercept	0.281580	+/-3



H_2S Calibration Plot Date: December 6, 2023 Location: Sawbones Bay



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Sawbones Bay	Station number:	AMS505
Calibration Date:	December 7, 2023	Last Cal Date:	November 8, 2023
Start time (MST):	8:26	End time (MST):	12:42
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	1.069	NO bkgnd or offset:	0.4	0.4
NOX coeff or slope:	1.065	1.065	NOX bkgnd or offset:	1.3	1.3
NO2 coeff or slope:	NA	NA	Reaction cell Press:	7.5	7.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.003423	1.003180
NO_X Cal Offset:	-1.650848	-1.290916
NO Cal Slope:	1.003879	1.004108
NO Cal Offset:	-1.810600	-1.590759
NO_2 Cal Slope:	1.000996	0.997701
NO_2 Cal Offset:	-0.666972	-0.376391

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	-0.3	0.2	----	----
as found span	4917	83.4	799.6	799.6	0.0	803.0	801.6	1.4	0.9957	0.9975
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	0.0	-0.3	----	----
high point	4917	83.4	799.6	799.6	0.0	801.1	801.8	-0.6	0.9981	0.9972
second point	4958	41.7	399.8	399.8	0.0	400.0	399.9	0.1	0.9996	0.9999
third point	4979	20.9	200.4	200.4	0.0	198.3	197.5	0.7	1.0106	1.0146
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	332.5	467.2	797.3	333.3	463.9	1.0031	0.9977
								Average Correction Factor	1.0028	1.0039

Corrected As found	NO_X = 803.1 ppb	NO = 801.9 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	0.3%
Previous Response	NO_X = 800.7 ppb	NO = 800.9 ppb			*Percent Change	NO =	0.1%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	798.9	331.7	467.2	465.8	1.0030	99.7%
2nd GPT point (200 ppb O3)	798.9	547.2	251.7	250.7	1.0040	99.6%
3rd GPT point (100 ppb O3)	798.9	650.1	148.8	148.0	1.0054	99.5%
				Average Correction Factor	1.0041	99.6%

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

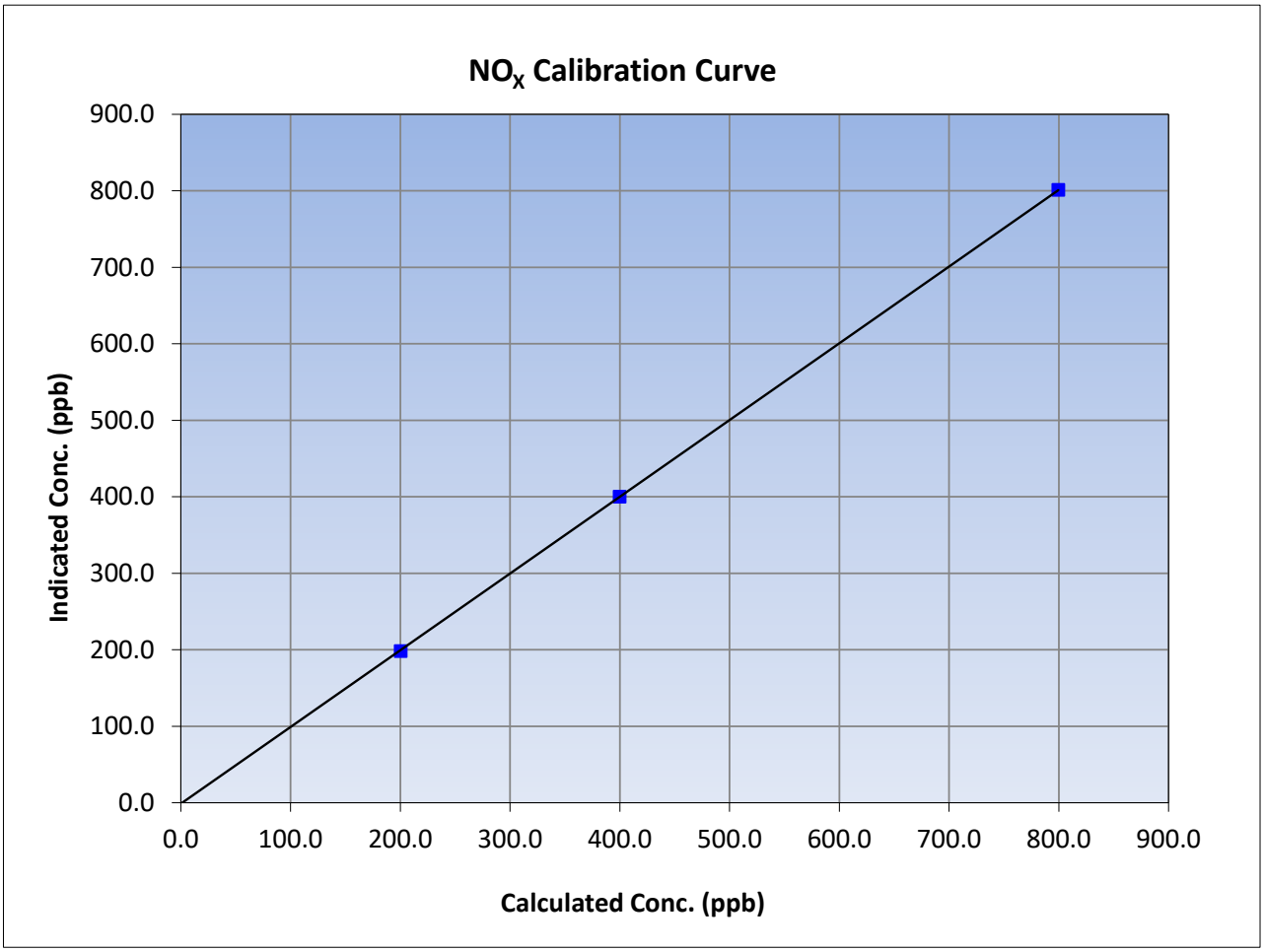
Version-04-2020

Station Information

Calibration Date:	December 7, 2023	Previous Calibration:	November 8, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:26	End Time (MST):	12:42
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	0.999991	≥0.995
799.6	801.1	0.9981			
399.8	400.0	0.9996	Slope	1.003180	0.90 - 1.10
200.4	198.3	1.0106			
			Intercept	-1.290916	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

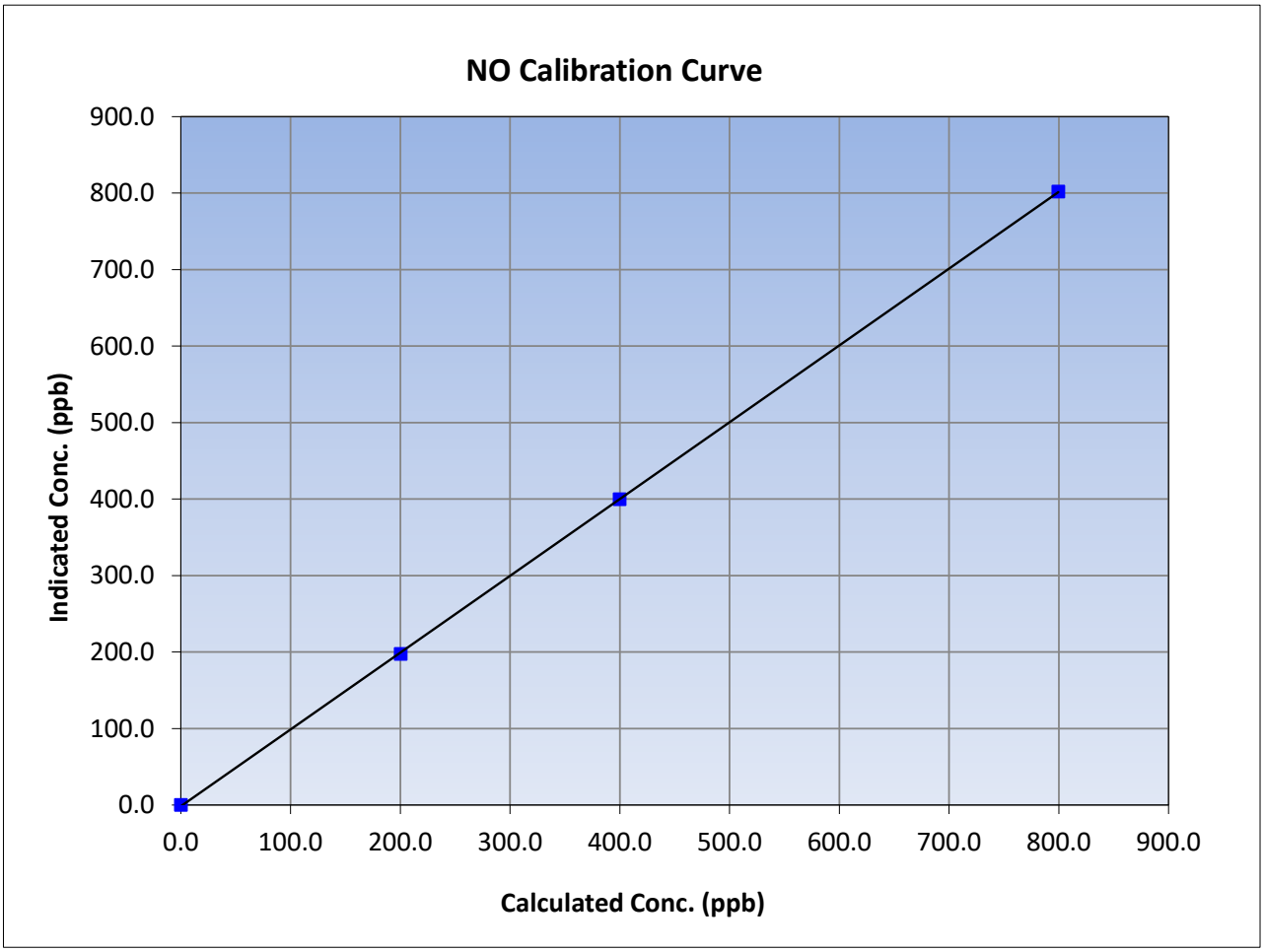
Version-04-2020

Station Information

Calibration Date:	December 7, 2023	Previous Calibration:	November 8, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:26	End Time (MST):	12:42
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	0.0	----	Correlation Coefficient	0.999979	≥0.995
799.6	801.8	0.9972			
399.8	399.9	0.9999	Slope	1.004108	0.90 - 1.10
200.4	197.5	1.0146			
			Intercept	-1.590759	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

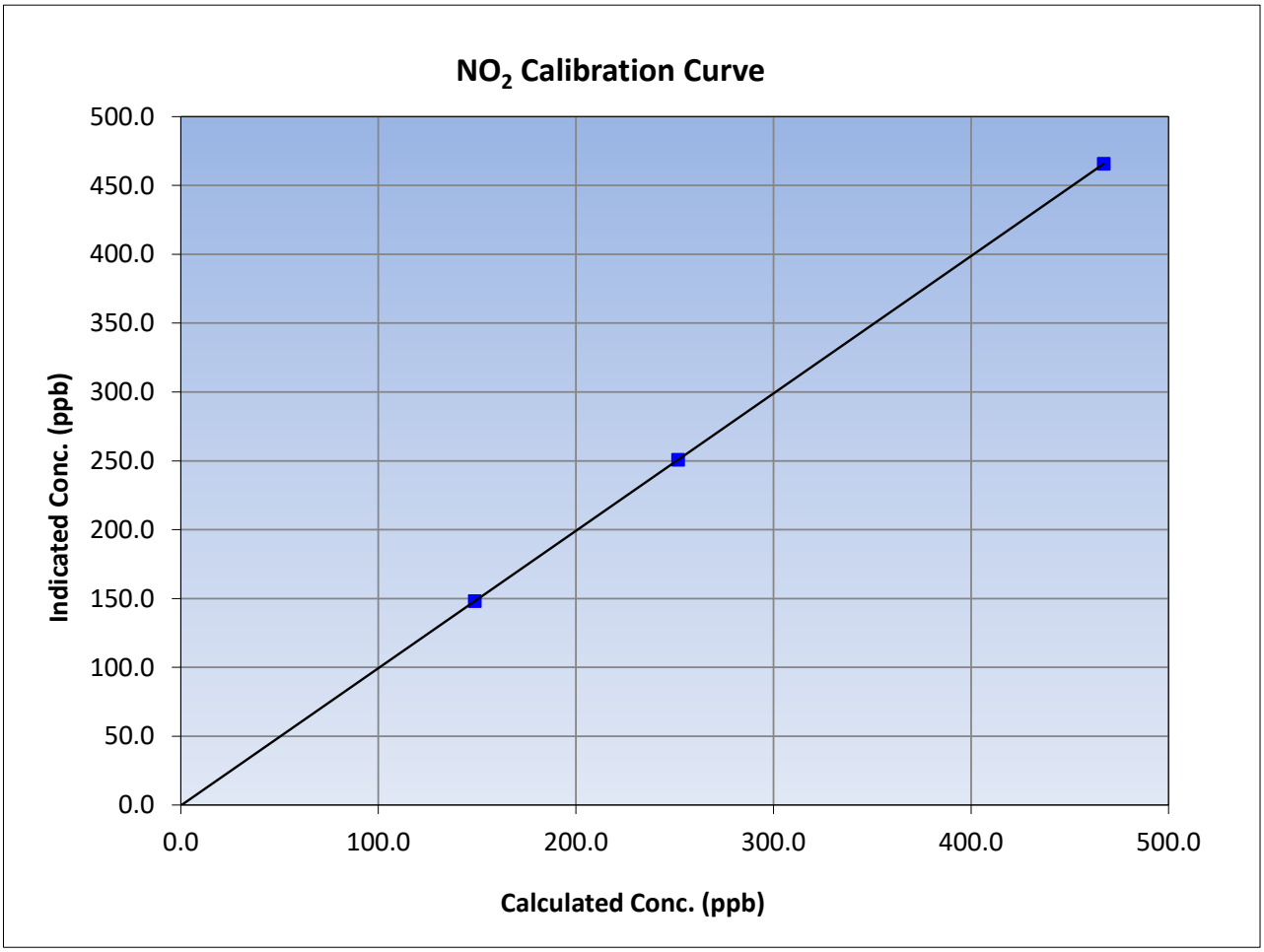
Version-04-2020

Station Information

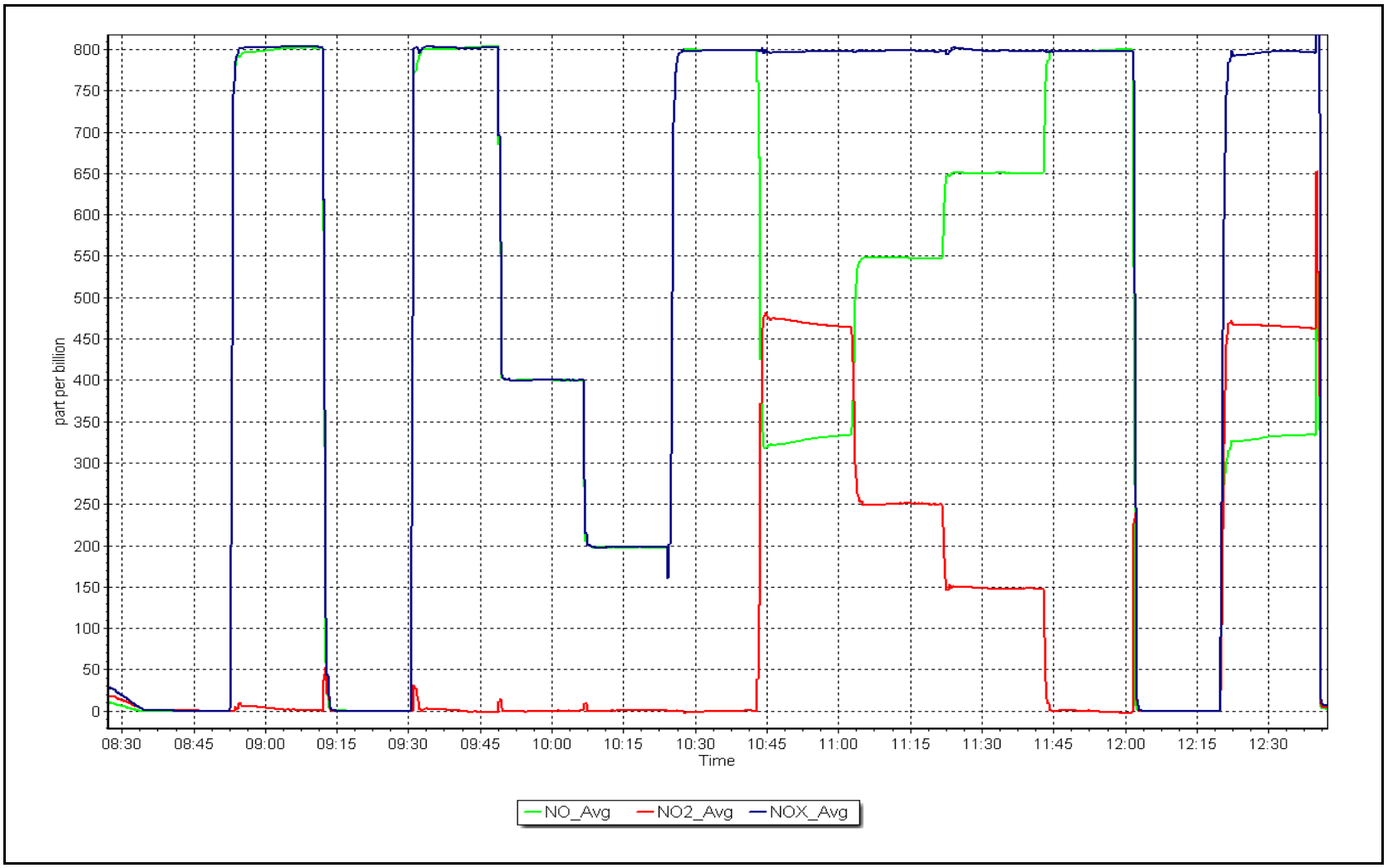
Calibration Date:	December 7, 2023	Previous Calibration:	November 8, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:26	End Time (MST):	12:42
Analyzer make:	API T200	Analyzer serial #:	4260

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.3	----	Correlation Coefficient	1.000000	≥0.995
467.2	465.8	1.0030			
251.7	250.7	1.0040	Slope	0.997701	0.90 - 1.10
148.8	148.0	1.0054			
			Intercept	-0.376391	+/-20



NO_X Calibration Plot Date: December 7, 2023 Location: Sawbones Bay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS507
KIRBY SOUTH

DECEMBER 2023

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

January 31, 2024

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Kirby South	Station number:	AMS 507
Calibration Date:	December 7, 2023	Last Cal Date:	November 6, 2023
Start time (MST):	13:10	End time (MST):	16:13
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:	1.005777	0.998878	Backgd or Offset:	20.7	20.4
Calibration intercept:	-1.328222	-0.089018	Coeff or Slope:	1.158	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	-0.1	----
as found span	4919	81.3	799.6	805.0	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4919	81.3	799.6	799.0	1.001
second point	4959	40.7	400.3	398.9	1.004
third point	4980	20.3	199.7	199.7	1.000
as left zero	5000	0.0	0.0	0.1	----
as left span	4919	81.3	799.6	799.8	1.000
				Average Correction Factor	1.001

Baseline Corr As found:	805.10	Previous response	802.91	*% change	0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

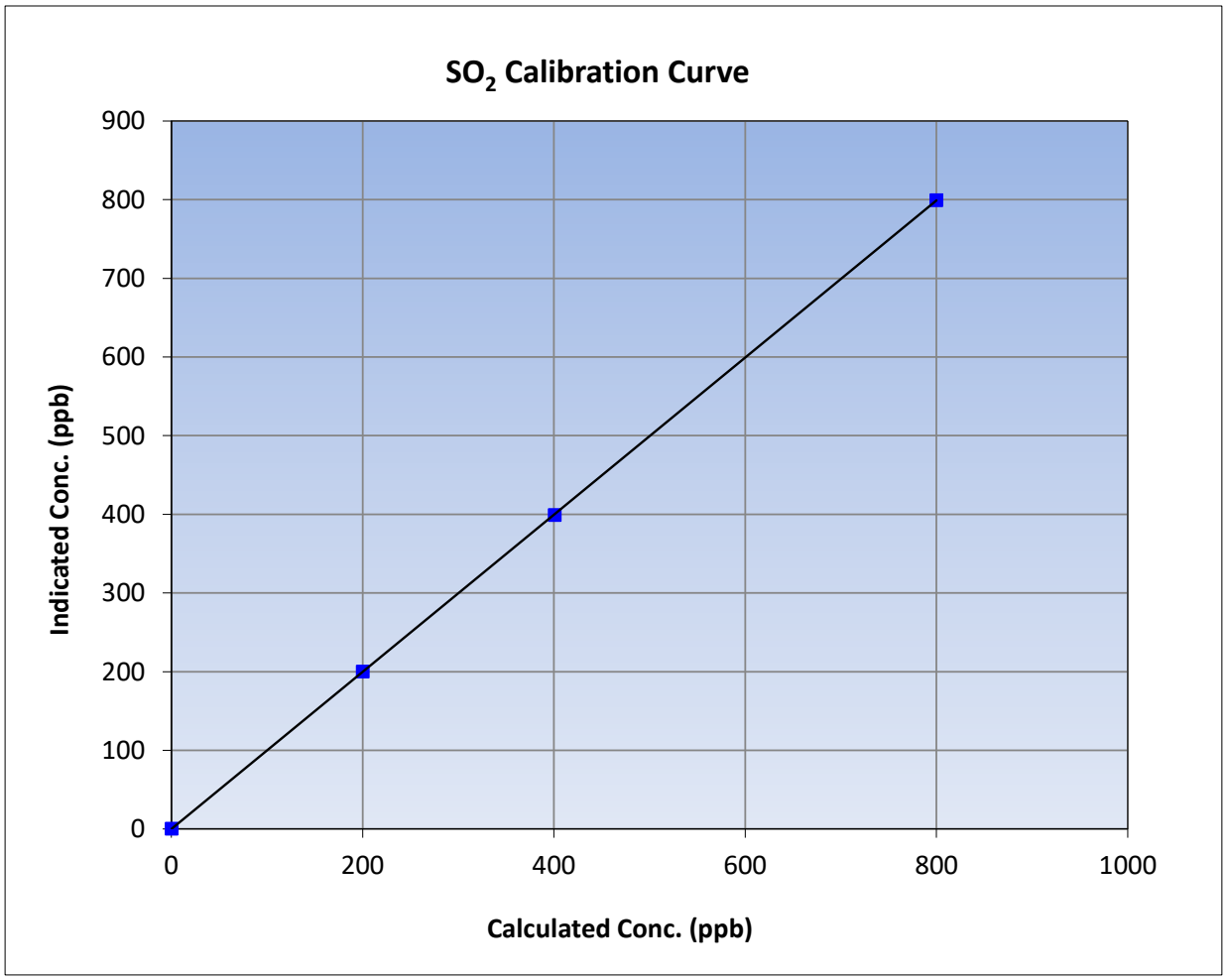
Station Information

Calibration Date:	December 7, 2023	Previous Calibration:	November 6, 2023
Station Name:	Kirby South	Station Number:	AMS 507
Start Time (MST):	13:10	End Time (MST):	16:13
Analyzer make:	Thermo 43iQ	Analyzer serial #:	1182340007

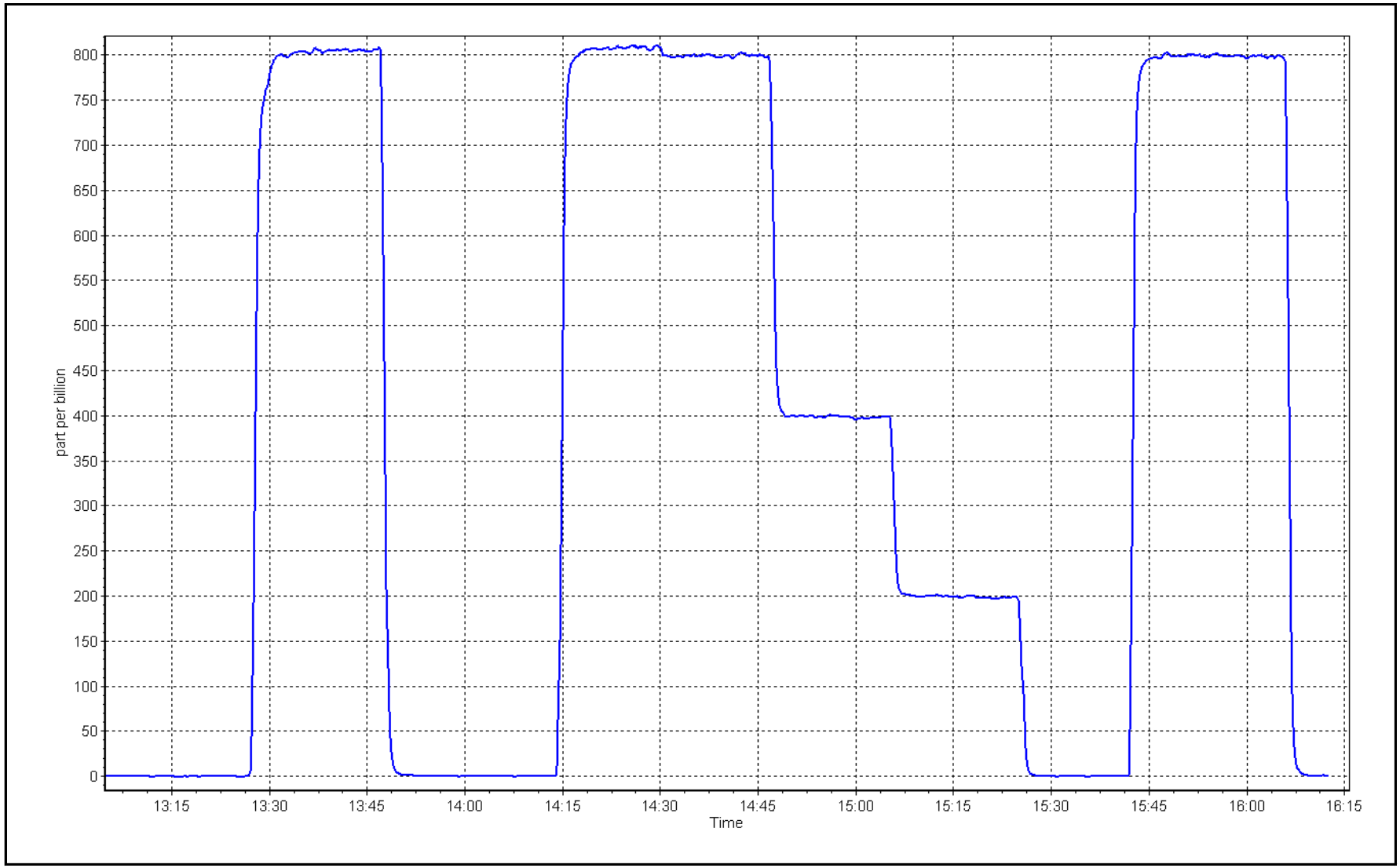
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
799.6	799.0	1.0008
400.3	398.9	1.0036
199.7	199.7	0.9998

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999997	*≥0.995*
Slope	0.998878	*0.90 - 1.10*
Intercept	-0.089018	*+/-30*



SO2 Calibration Plot Date: December 7, 2023 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:	December 24, 2023	Last Cal Date:	December 7, 2023
Start time (MST):	14:15	End time (MST):	15:30
Reason:	Maintenance	Stalled firmware, MP check for performance after reset	

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:	0.998878	1.016010	Backgd or Offset:	20.2	20.2
Calibration intercept:	-0.089018	-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	0.7	----
as found span	4919	81.3	799.6	813.2	0.983
as found 2nd point	4959	40.7	400.3	405.1	0.988
as found 3rd point	4980	20.3	199.7	203.0	0.984
new cylinder response					
calibrator zero	5000	0.0	0.0	0.7	----
high point	4919	81.3	799.6	813.2	0.983
second point	4959	40.7	400.3	405.1	0.988
third point	4980	20.3	199.7	203.0	0.984
as left zero					
as left span					
				Average Correction Factor	0.985

Baseline Corr As found:	812.50	Previous response	798.63	*% change	1.7%
Baseline Corr 2nd AF pt:	404.40	AF Slope:	1.016010	AF Intercept:	-0.008833
Baseline Corr 3rd AF pt:	202.30	AF Correlation:	0.999989		

* = > +/-5% change initiates investigation

Notes: Firmware appears to have caused the instrument to malfunction, performed a remote reset of the analyzer and an A/D gain auto cal. 3-point calibration is documented as both As found and Calibration test to validate the operation of the instrument.

Calibration Performed By: Kelly Baragar

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

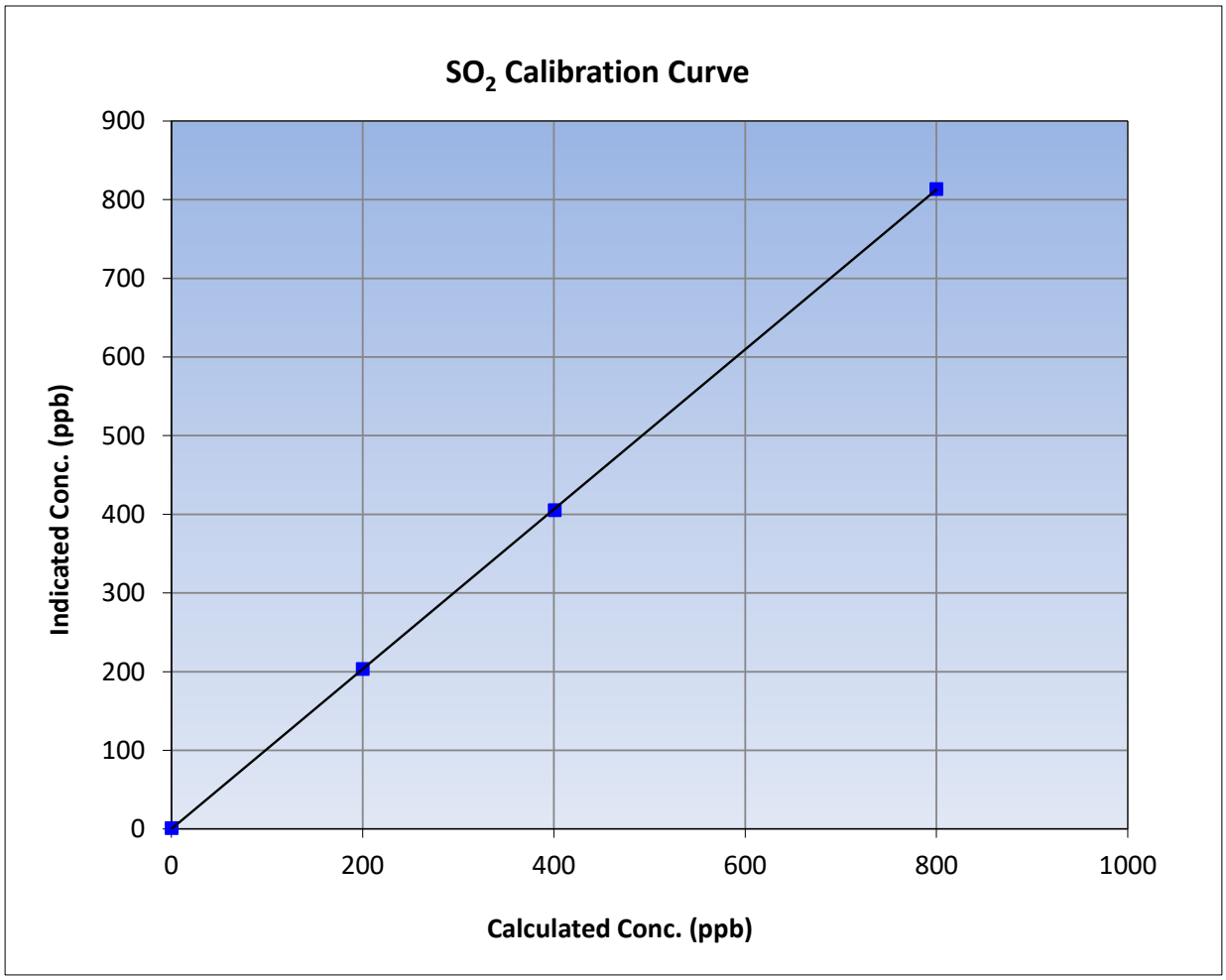
Station Information

Calibration Date:	December 24, 2023	Previous Calibration:	December 7, 2023
Station Name:	Kirby South	Station Number:	AMS 507
Start Time (MST):	14:15	End Time (MST):	15:30
Analyzer make:	Thermo 43iQ	Analyzer serial #:	1182340007

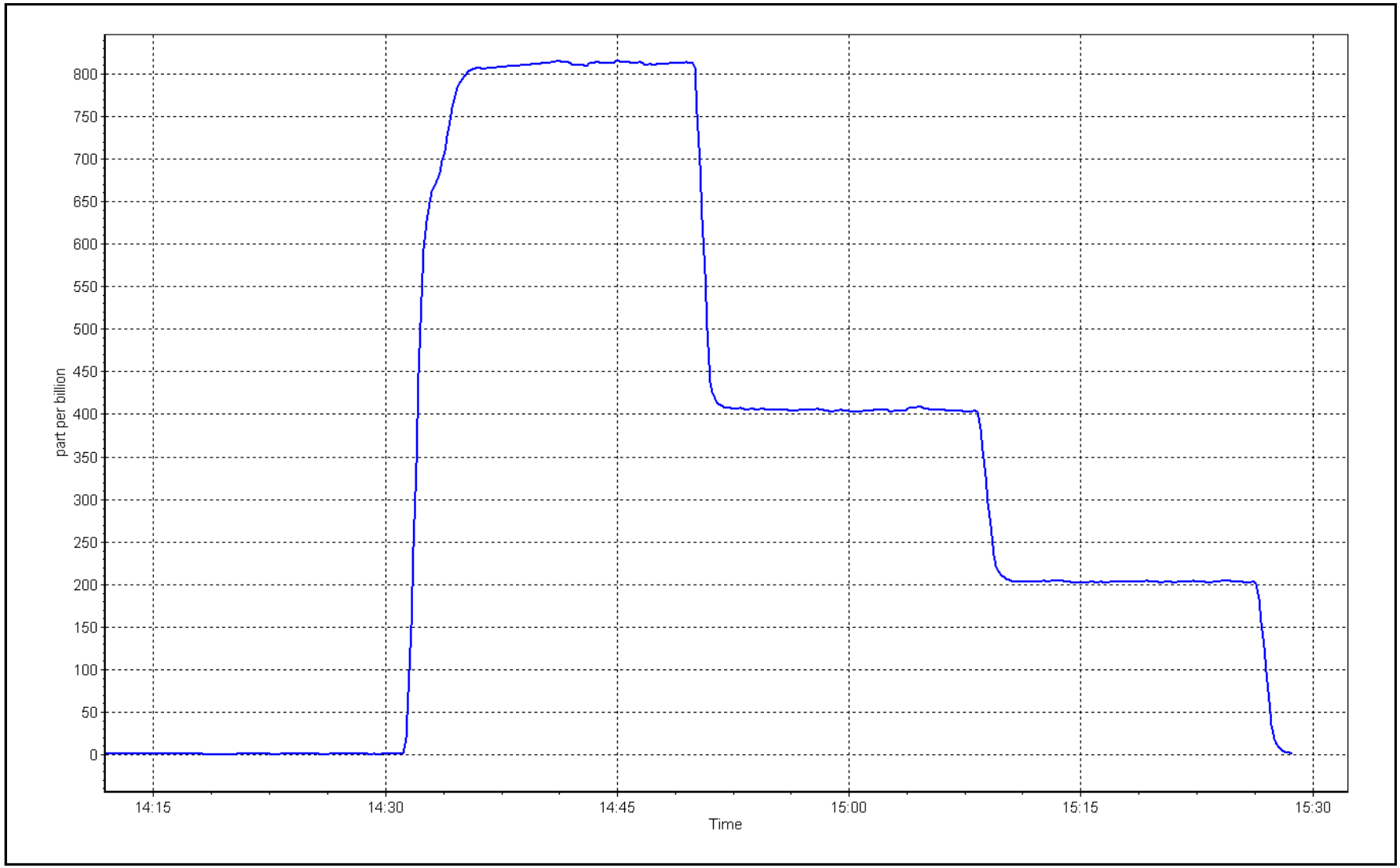
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.7	----
799.6	813.2	0.9833
400.3	405.1	0.9883
199.7	203.0	0.9835

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999989	*≥0.995*
Slope	1.016010	*0.90 - 1.10*
Intercept	-0.008833	*+/-30*



SO2 Calibration Plot Date: December 24, 2023 Location: Kirby South



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Kirby South	Station number:	AMS507
Calibration Date:	December 7, 2023	Last Cal Date:	November 8, 2023
Start time (MST):	8:35	End time (MST):	13:17
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.167	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517378			
Removed Cal Gas Conc:	5.167	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3804
ZAG Make/Model:	API T701H		Serial Number:	880

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1150840012	
Converter make:	Global		Converter serial #:	2022-197	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.004602	1.002178	Backgd or Offset:	1.98	1.81
Calibration intercept:	0.058972	-0.081174	Coeff or Slope:	1.058	1.079

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.3	----
as found span	4923	77.4	80.0	79.0	1.009
as found 2nd point	4961	38.8	40.1	39.3	1.013
as found 3rd point	4981	19.3	19.9	19.3	1.018
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	4923	77.4	80.0	80.1	0.998
second point	4961	38.8	40.1	40.1	1.000
third point	4981	19.3	19.9	19.8	1.007
as left zero	5000	0.0	0.0	0.2	----
as left span	4923	77.4	80.0	79.7	1.003
SO2 Scrubber Check	4919	80.0	800.2	0.0	----
Date of last scrubber change:		25-Jul-23		Ave Corr Factor	1.002
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.3	Prev response:	80.41	*% change:	-1.4%
Baseline Corr 2nd AF pt:	39.6	AF Slope:	0.992034	AF Intercept:	-0.401072
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999992		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. Scrubber check done after MPAF's, passed. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

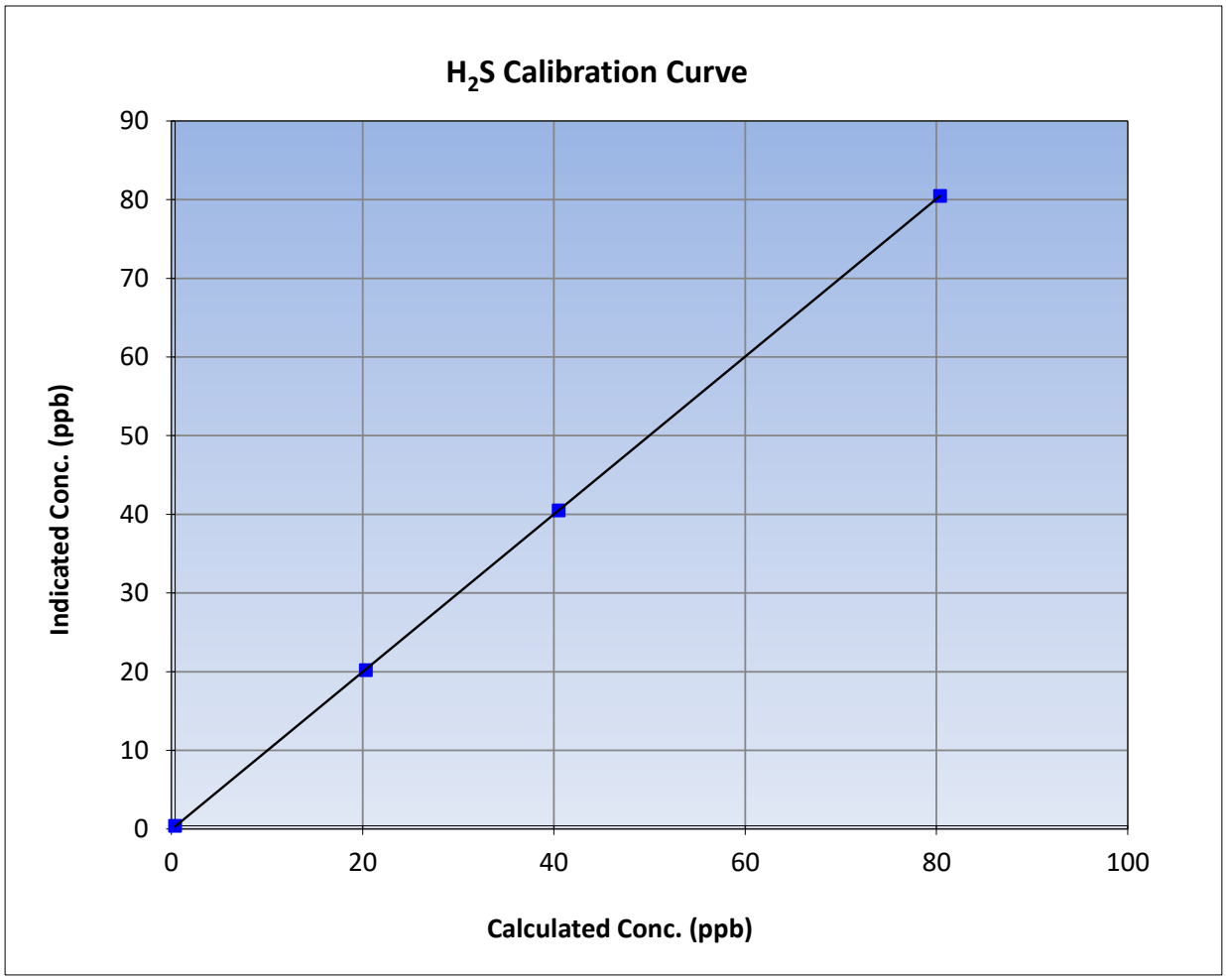
Station Information

Calibration Date:	December 7, 2023	Previous Calibration:	November 8, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	8:35	End Time (MST):	13:17
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1150840012

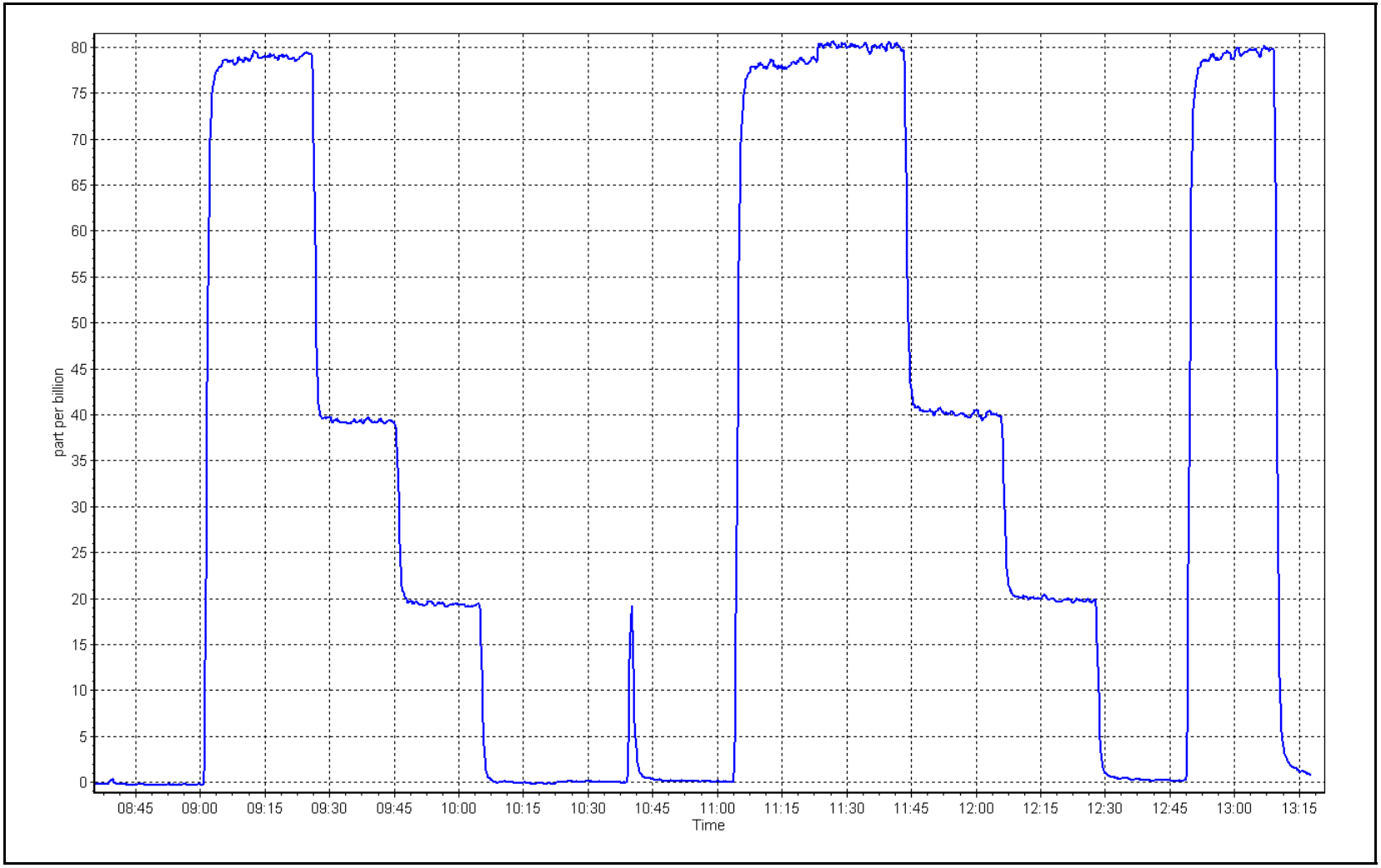
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.1	0.9985
40.1	40.1	0.9999
19.9	19.8	1.0072

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.002178	*0.90 - 1.10*
Intercept	-0.081174	*+/-3*



H_2S Calibration Plot Date: December 7, 2023 Location: Kirby South



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Kirby South	Station number:	AMS507
Calibration Date:	December 7, 2023	Last Cal Date:	November 6, 2023
Start time (MST):	13:10	End time (MST):	16:13
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:	1.004599	1.001294	Background:	3.15	2.86
Calibration intercept:	-0.117967	-0.045008	Coefficient:	3.755	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	-0.34	----
as found span	4919	81.3	17.26	16.97	1.017
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.3	17.26	17.26	1.000
second point	4959	40.7	8.64	8.59	1.006
third point	4980	20.3	4.31	4.23	1.019
as left zero	5000	0.0	0.00	-0.06	----
as left span	4919	81.3	17.26	17.22	1.002
				Average Correction Factor	1.009

Baseline Corr As found:	17.31	Previous response	17.22	*% change	0.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

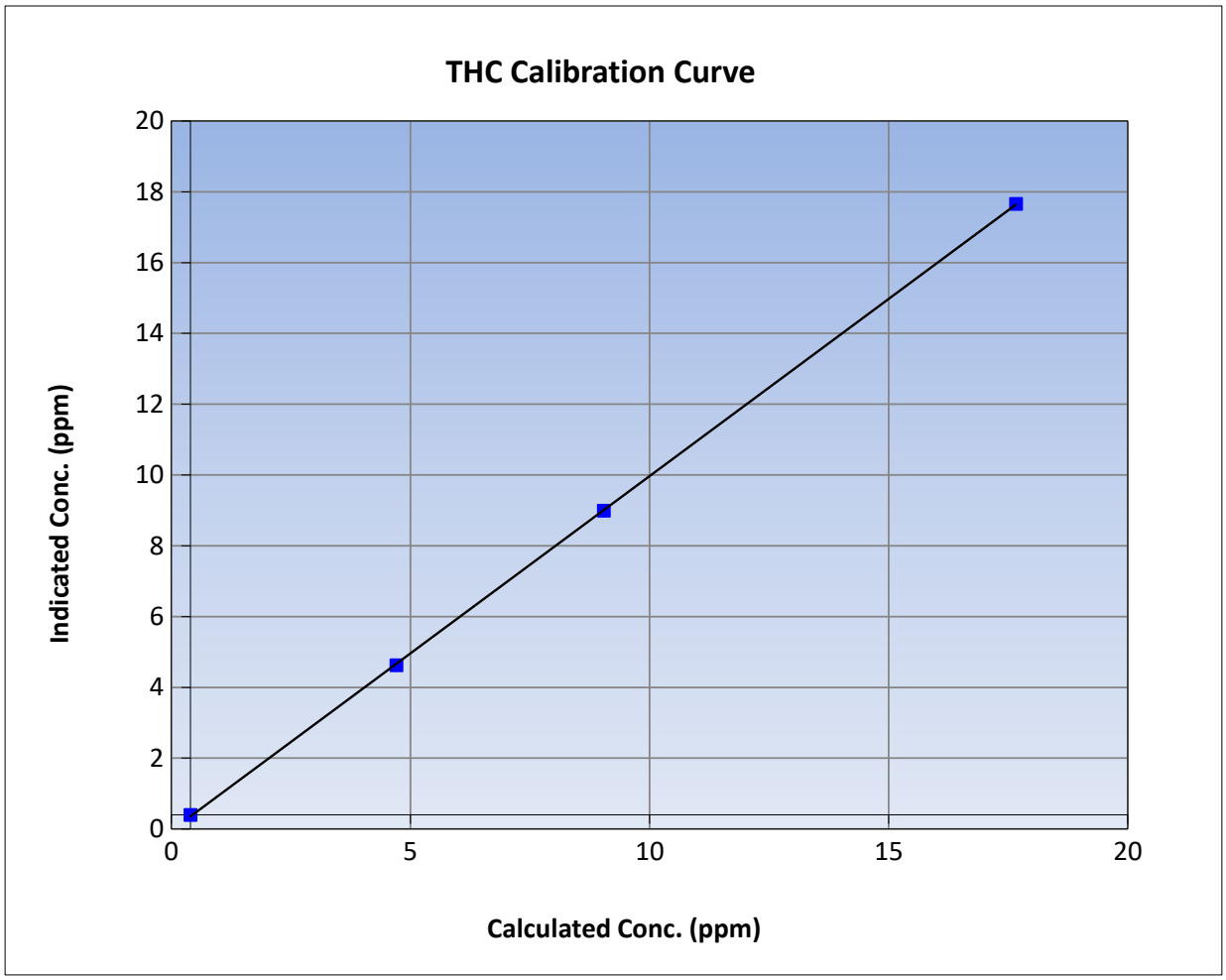
Station Information

Calibration Date:	December 7, 2023	Previous Calibration:	November 6, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	13:10	End Time (MST):	16:13
Analyzer make:	Thermo 51i	Analyzer serial #:	1182340005

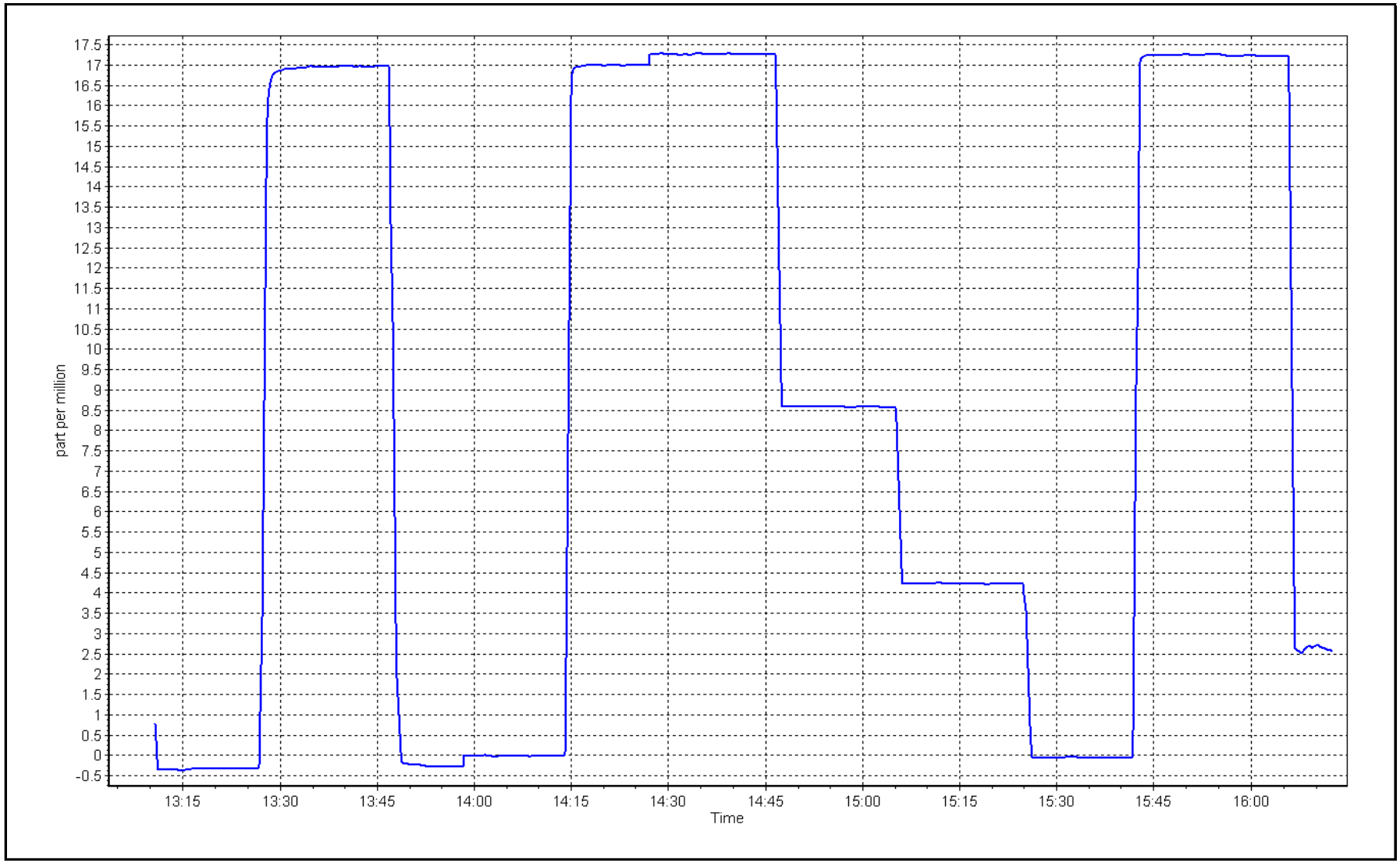
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.00	----
17.26	17.26	1.0002
8.64	8.59	1.0062
4.31	4.23	1.0192

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999974	*≥0.995*
Slope	1.001294	*0.90 - 1.10*
Intercept	-0.045008	*+/-1.5*



THC Calibration Plot Date: December 7, 2023 Location: Kirby South



CALS_581

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:	December 6, 2023	Last Cal Date:	November 8, 2023
Start time (MST):	12:10	End time (MST):	16:56
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:	1.424	1.397	NO bkgnd or offset:	1.7	1.7
NOX coeff or slope:	0.997	0.995	NOX bkgnd or offset:	1.8	1.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	202.82	202.87

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.007732	1.002591
NO_X Cal Offset:	-4.271621	-4.472891
NO Cal Slope:	1.008462	1.001411
NO Cal Offset:	-5.833654	-4.934867
NO_2 Cal Slope:	1.005705	0.999171
NO_2 Cal Offset:	0.483774	0.864517

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	-0.4	-0.2	----	----
as found span	4919	81.0	800.1	794.1	6.0	822.0	811.0	11.0	0.9734	0.9792
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.3	0.1	----	----
high point	4919	81.0	800.1	794.1	6.0	799.9	792.7	7.2	1.0003	1.0018
second point	4960	40.5	400.0	397.0	3.0	394.3	390.1	4.2	1.0145	1.0177
third point	4980	20.2	199.5	198.0	1.5	191.4	188.9	2.5	1.0425	1.0483
as left zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
as left span	4919	81.0	800.1	410.2	389.9	797.4	407.7	389.6	1.0034	1.0062
								Average Correction Factor	1.0191	1.0226

Corrected As found	NO_X = 822.6 ppb	NO = 811.4 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	2.5%
Previous Response	NO_X = 802.0 ppb	NO = 795.0 ppb		*Percent Change	NO =	2.0%
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)	792.3	408.4	389.9	389.9	1.0000	100.0%
2nd GPT point (200 ppb O3)	792.3	623.2	175.1	176.9	0.9898	101.0%
3rd GPT point (100 ppb O3)	792.3	711.6	86.7	87.7	0.9885	101.2%
				Average Correction Factor	0.9928	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

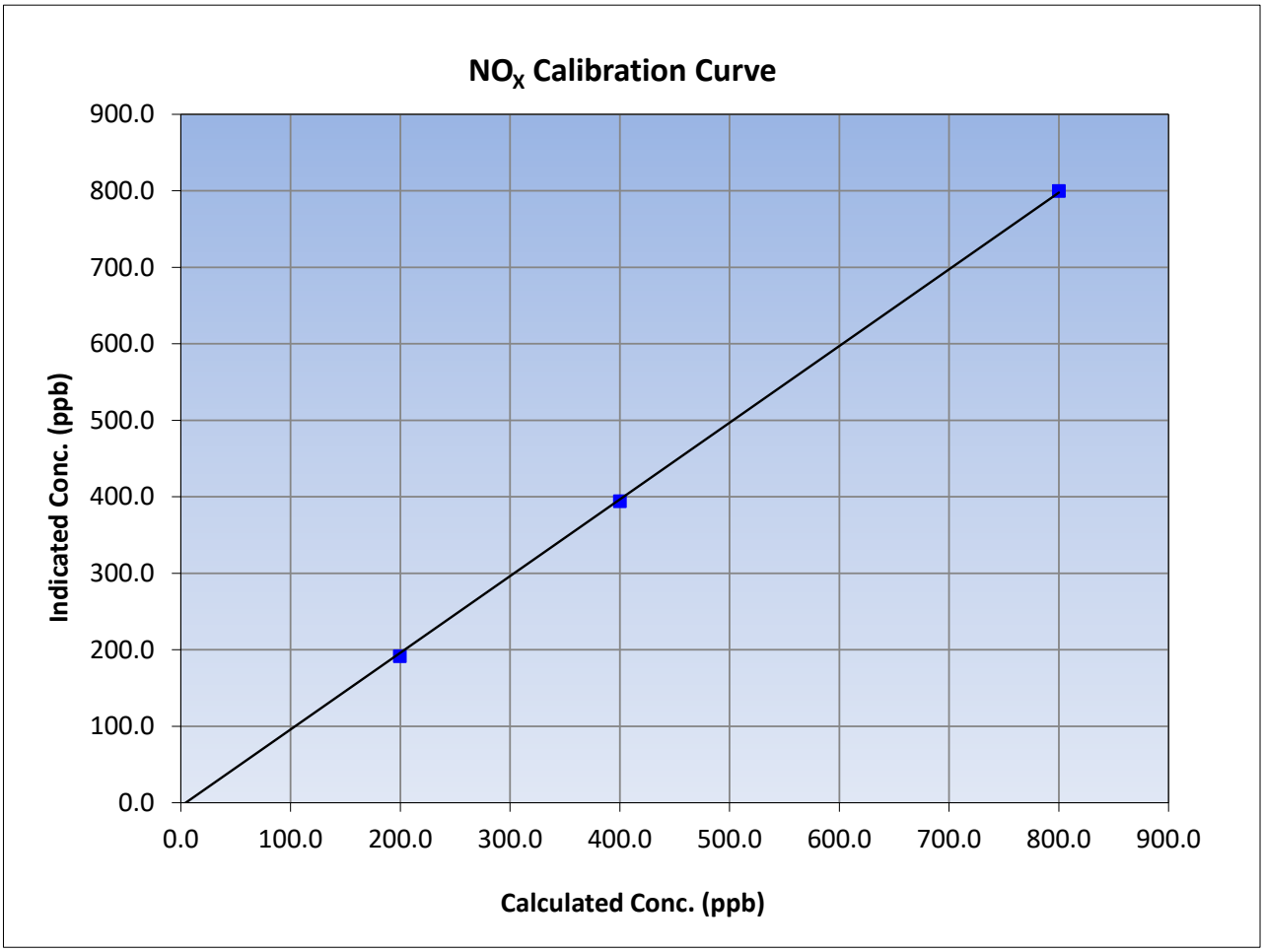
Version-04-2020

Station Information

Calibration Date:	December 6, 2023	Previous Calibration:	November 8, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	12:10	End Time (MST):	16:56
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	-0.2	----	Correlation Coefficient	0.999870	≥0.995
800.1	799.9	1.0003			
400.0	394.3	1.0145	Slope	1.002591	0.90 - 1.10
199.5	191.4	1.0425			
			Intercept	-4.472891	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

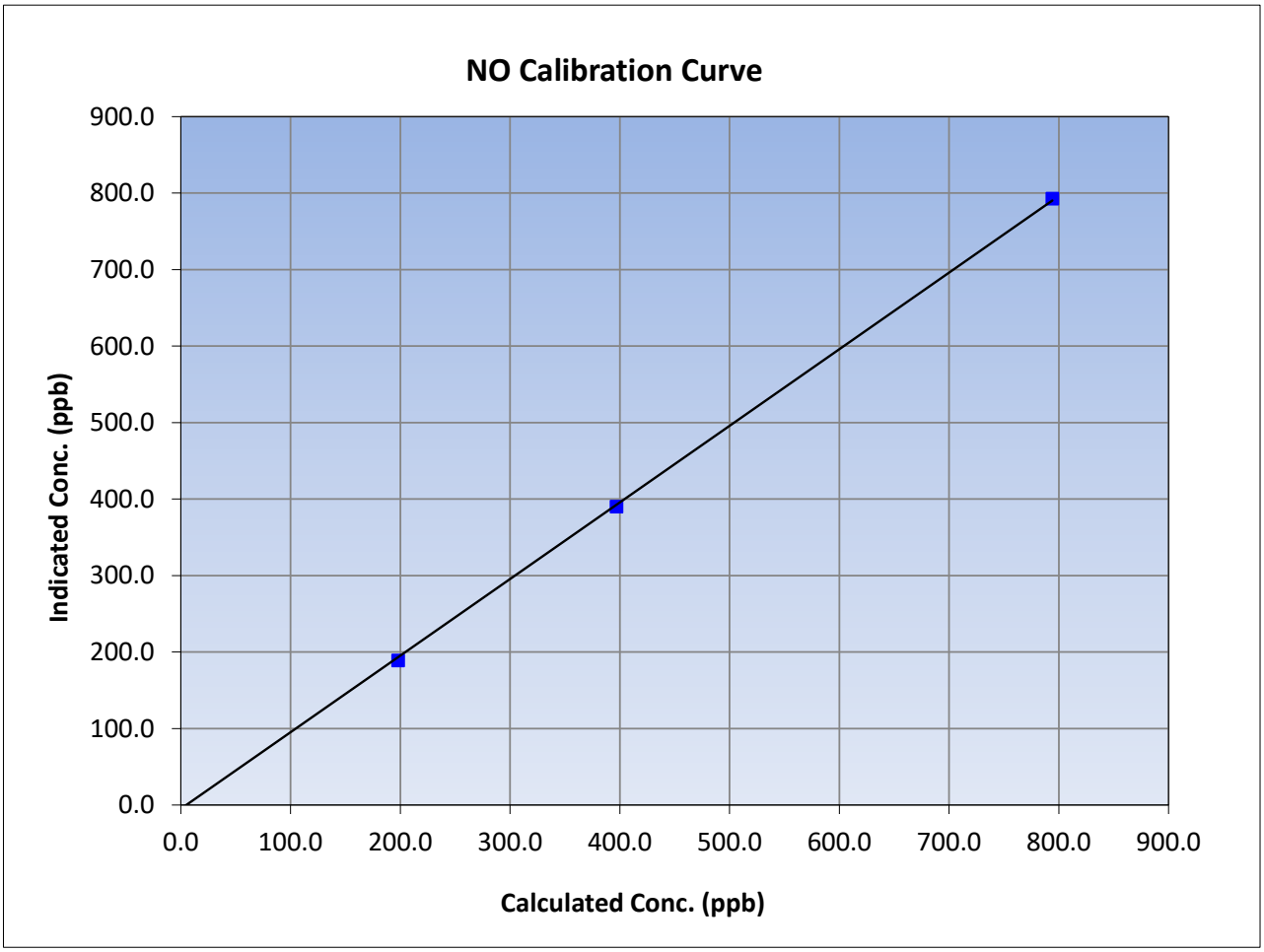
Version-04-2020

Station Information

Calibration Date:	December 6, 2023	Previous Calibration:	November 8, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	12:10	End Time (MST):	16:56
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	0.999845	≥0.995
794.1	792.7	1.0018			
397.0	390.1	1.0177	Slope	1.001411	0.90 - 1.10
198.0	188.9	1.0483			
			Intercept	-4.934867	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

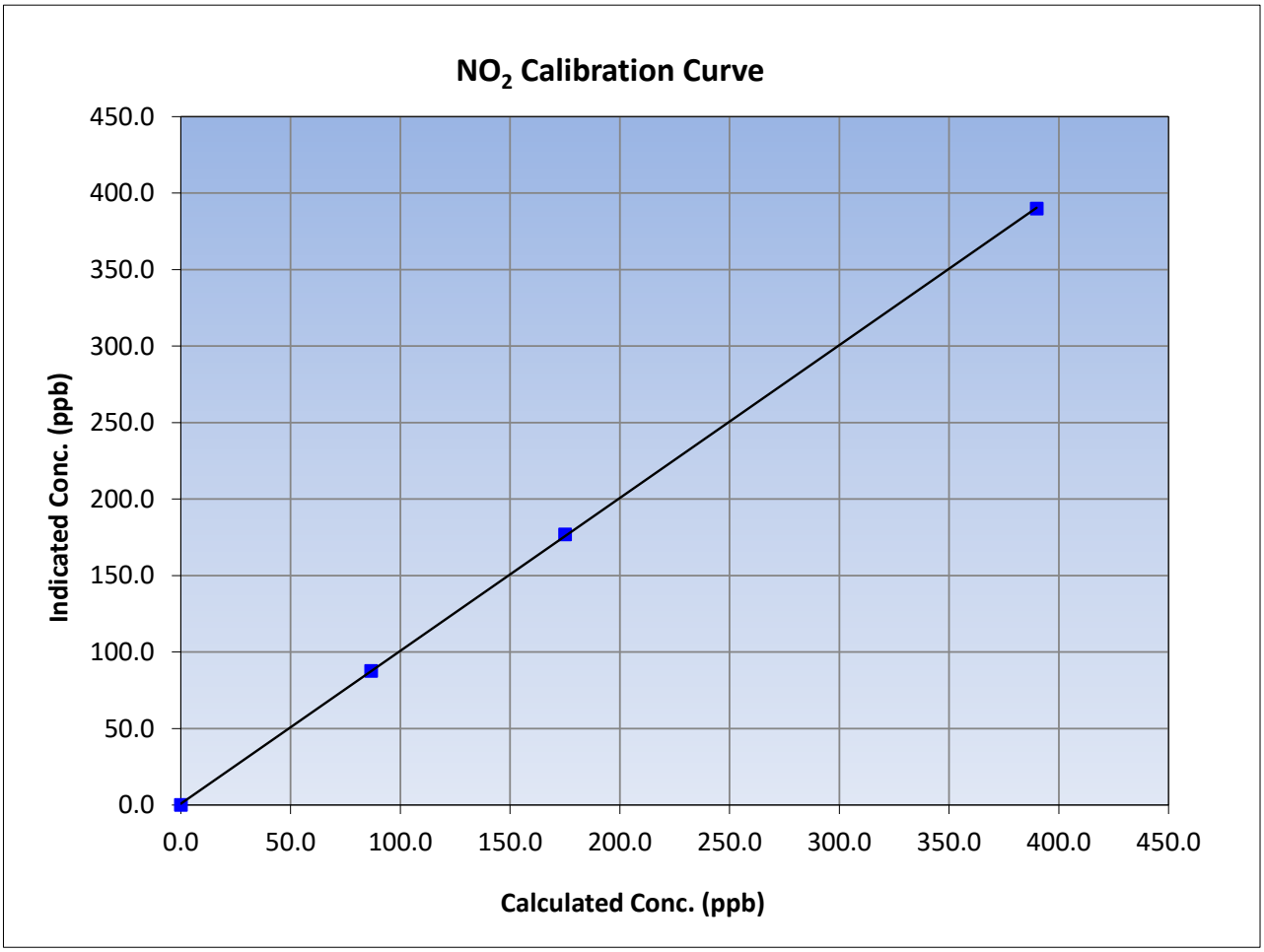
Version-04-2020

Station Information

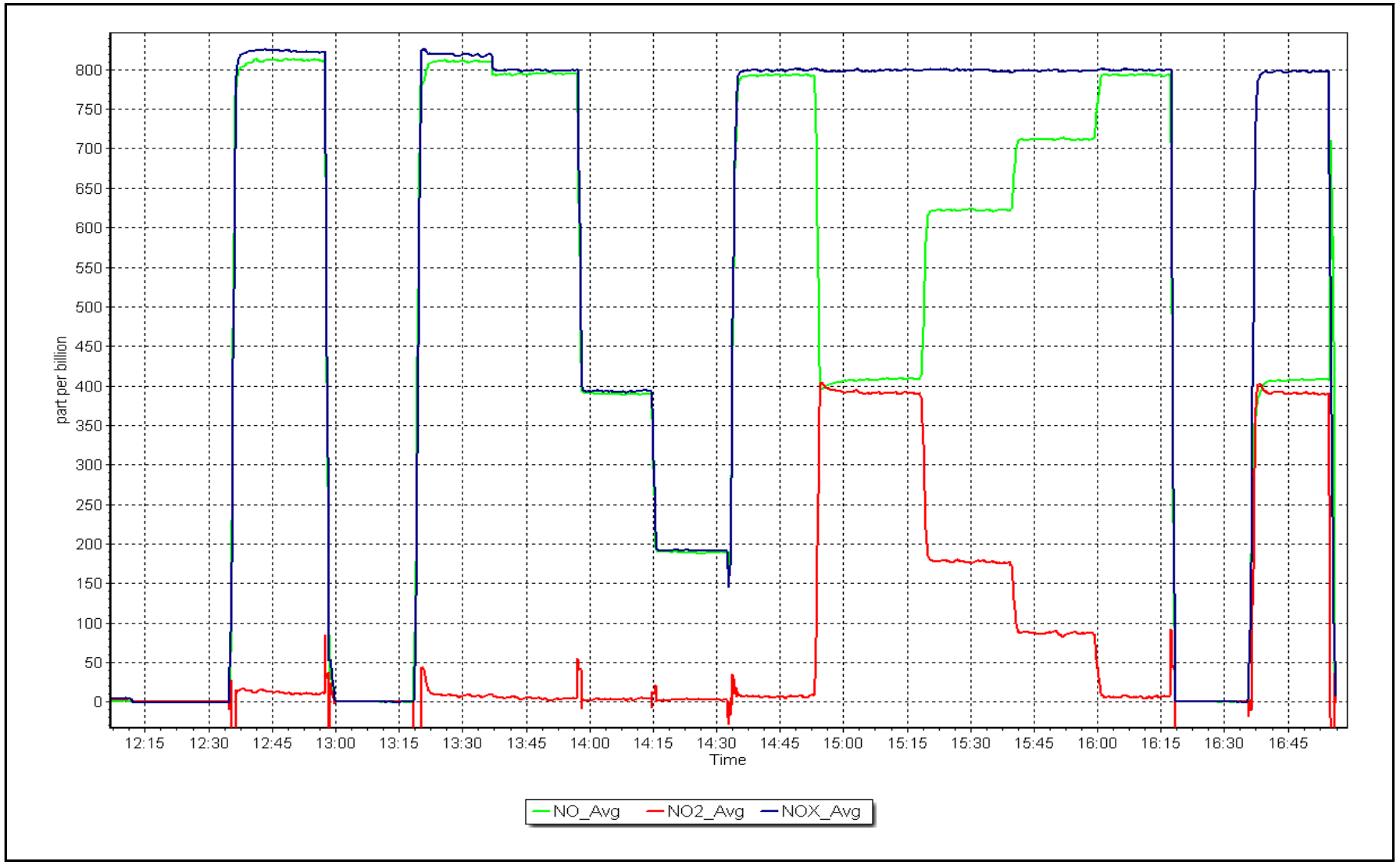
Calibration Date:	December 6, 2023	Previous Calibration:	November 8, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	12:10	End Time (MST):	16:56
Analyzer make:	Thermo 42iQ	Analyzer serial #:	1182340006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999975	≥0.995
389.9	389.9	1.0000			
175.1	176.9	0.9898	Slope	0.999171	0.90 - 1.10
86.7	87.7	0.9885			
			Intercept	0.864517	+/-20



NO_X Calibration Plot Date: December 6, 2023 Location: Kirby South



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS511
BLACKGOLD

DECEMBER 2023

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

January 31, 2024

CALS_588

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Blackgold	Station number:	AMS511
Calibration Date:	December 14, 2023	Last Cal Date:	November 7, 2023
Start time (MST):	12:13	End time (MST):	15:31
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:	1.002724	1.002260	Backgd or Offset:	34.9	35.4
Calibration intercept:	-1.426148	0.830491	Coeff or Slope:	1.156	1.187

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	4926	79.9	799.0	778.7	1.026
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.5	----
high point	4926	79.9	799.0	801.2	0.997
second point	4968	40.0	399.8	402.6	0.993
third point	4987	20.0	200.0	201.0	0.995
as left zero	5000	0.0	0.0	0.3	----
as left span	4926	80.0	800.0	802.2	0.997
				Average Correction Factor	0.995

Baseline Corr As found:	778.20	Previous response	799.77	*% change	-2.8%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed the 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

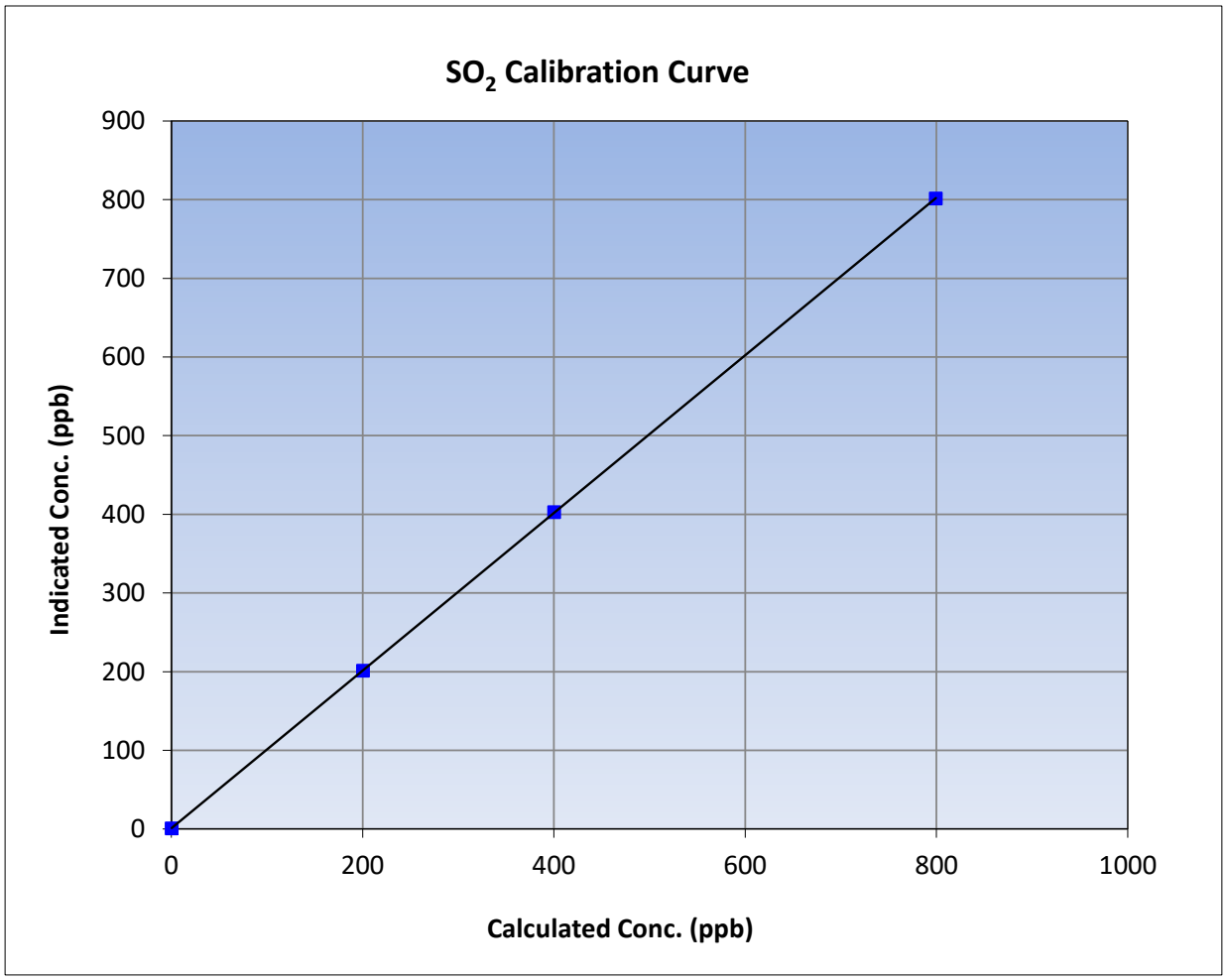
Station Information

Calibration Date:	December 14, 2023	Previous Calibration:	November 7, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	12:13	End Time (MST):	15:31
Analyzer make:	Thermo scientific	Analyzer serial #:	1160290014

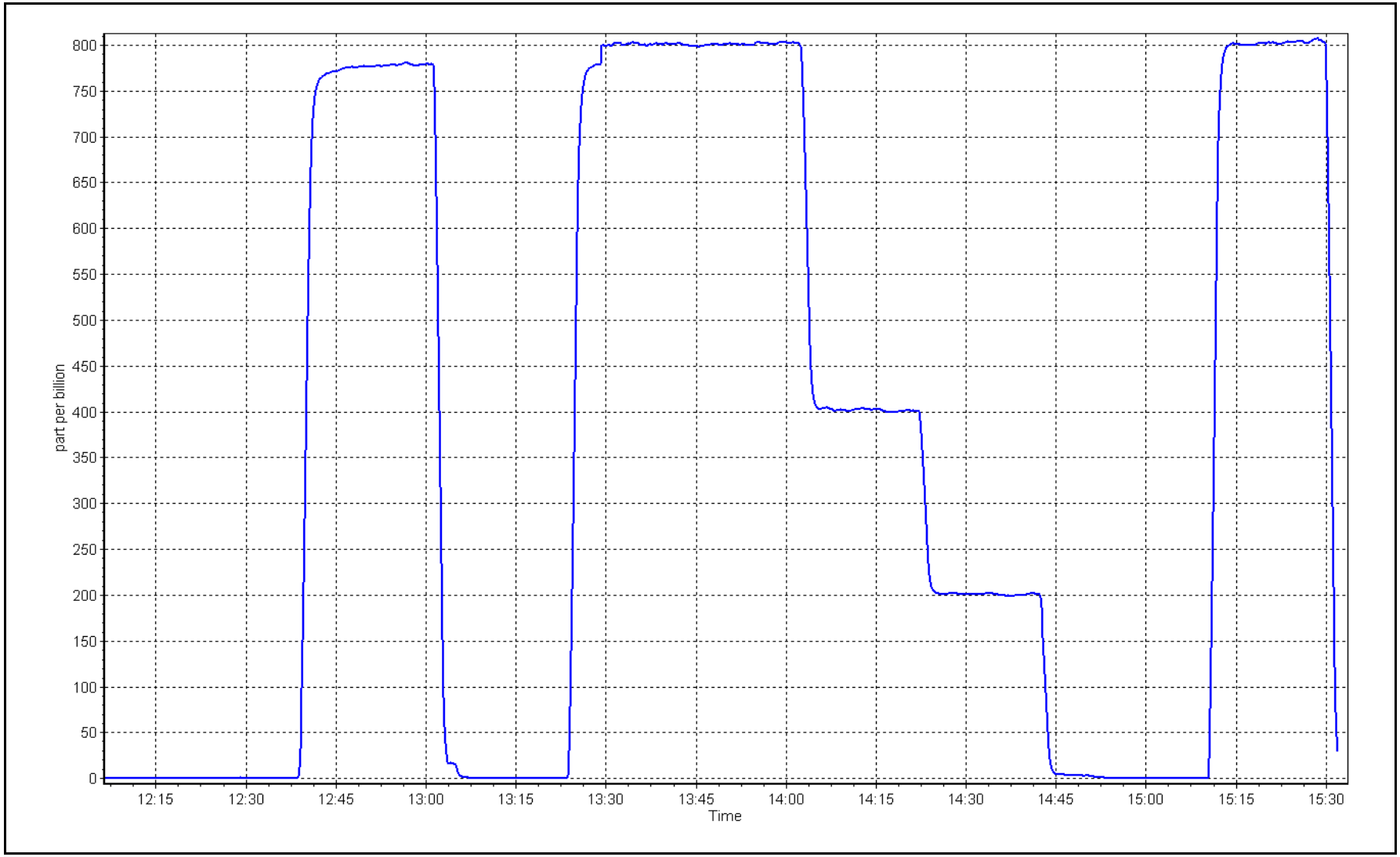
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
799.0	801.2	0.9973
399.8	402.6	0.9931
200.0	201.0	0.9948

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	1.002260	*0.90 - 1.10*
Intercept	0.830491	*+/-30*



SO2 Calibration Plot Date: December 14, 2023 Location: Blackgold



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Blackgold	Station number:	AMS511
Calibration Date:	December 13, 2023	Last Cal Date:	November 9, 2023
Start time (MST):	9:57	End time (MST):	14:02
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:	1.006353	0.982906	Backgd or Offset:	3.37	3.41
Calibration intercept:	-0.019423	0.001152	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	0.0	----
as found span	4922	77.8	80.0	78.2	1.023
as found 2nd point	4961	38.9	40.0	39.2	1.020
as found 3rd point	4981	19.5	20.0	19.6	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	5000	0.0	0.0	0.1	----
high point	4922	77.8	80.0	78.6	1.017
second point	4961	38.9	40.0	39.4	1.015
third point	4981	19.5	20.0	19.5	1.028
as left zero	5000	0.0	0.0	0.3	----
as left span	4922	77.9	80.0	77.8	1.029
SO2 Scrubber Check	4920	80.0	800.0	0.1	----
Date of last scrubber change:				Ave Corr Factor	1.020
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.2	Prev response:	80.45	*% change:	-2.9%
Baseline Corr 2nd AF pt:	39.2	AF Slope:	0.978048	AF Intercept:	0.021159
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999998		

* = > +/-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

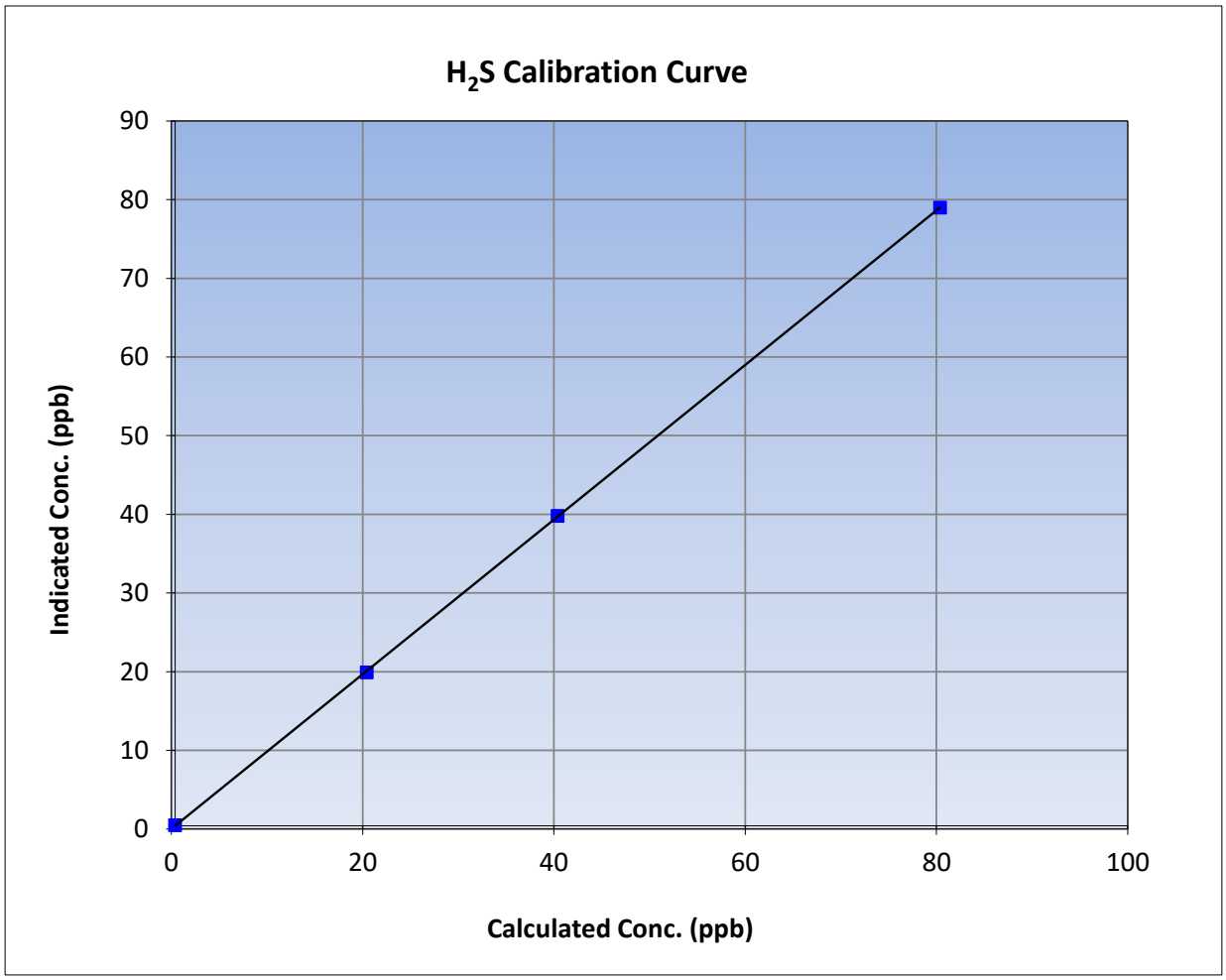
Station Information

Calibration Date:	December 13, 2023	Previous Calibration:	November 9, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	9:57	End Time (MST):	14:02
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1336160090

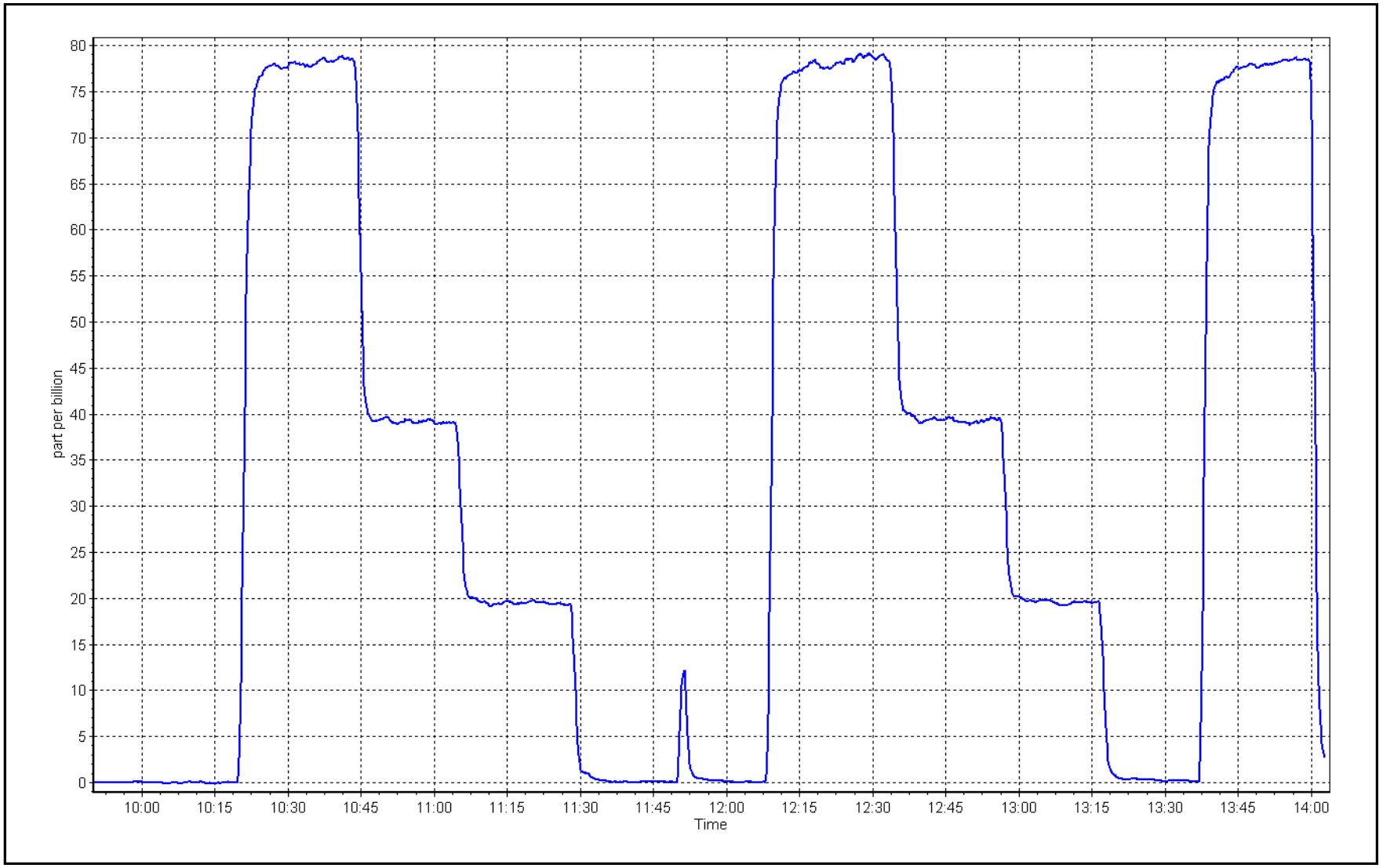
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	78.6	1.0174
40.0	39.4	1.0148
20.0	19.5	1.0277

Statistical Evaluation		Limits
Correlation Coefficient	0.999982	≥0.995
Slope	0.982906	0.90 - 1.10
Intercept	0.001152	+/-3



H_2S Calibration Plot Date: December 13, 2023 Location: Blackgold



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Blackgold	Station number:	AMS511
Calibration Date:	December 14, 2023	Last Cal Date:	November 7, 2023
Start time (MST):	12:13	End time (MST):	15:31
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:	1.000266	0.994672	Background:	0.93	0.90
Calibration intercept:	-0.072772	0.019633	Coefficient:	0.595	0.575

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	0.08	----
as found span	4920	79.9	17.11	17.69	0.968
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.06	----
high point	4920	79.9	17.11	17.07	1.003
second point	4960	40.0	8.57	8.50	1.008
third point	4980	20.0	4.28	4.26	1.006
as left zero	5000	0.0	0.00	0.08	----
as left span	4926	80.0	17.11	17.18	0.996
				Average Correction Factor	1.006

Baseline Corr As found:	17.61	Previous response	17.05	*% change	3.2%
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

THC Calibration Summary

Version-01-2020

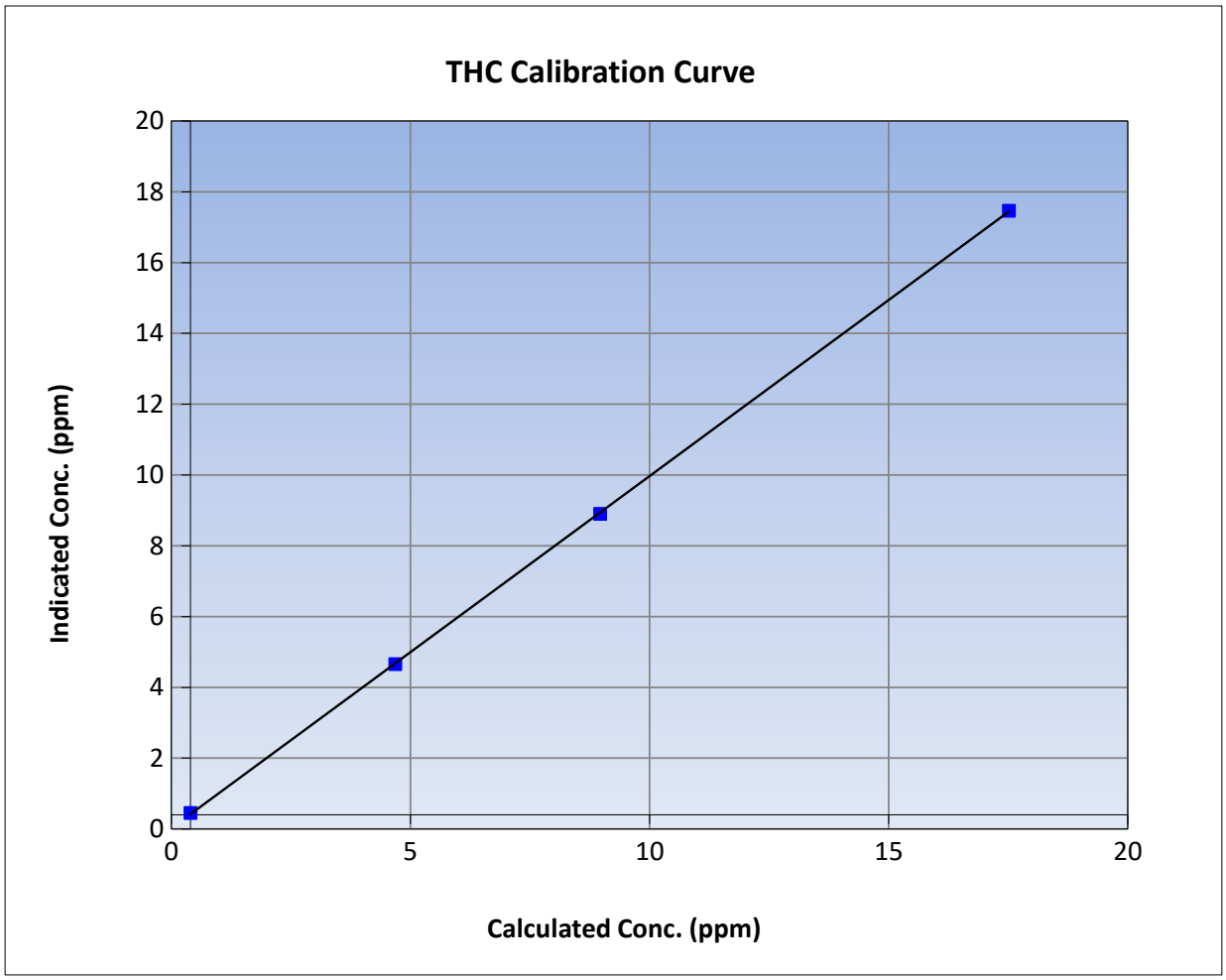
Station Information

Calibration Date:	December 14, 2023	Previous Calibration:	November 7, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	12:13	End Time (MST):	15:31
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1317958295

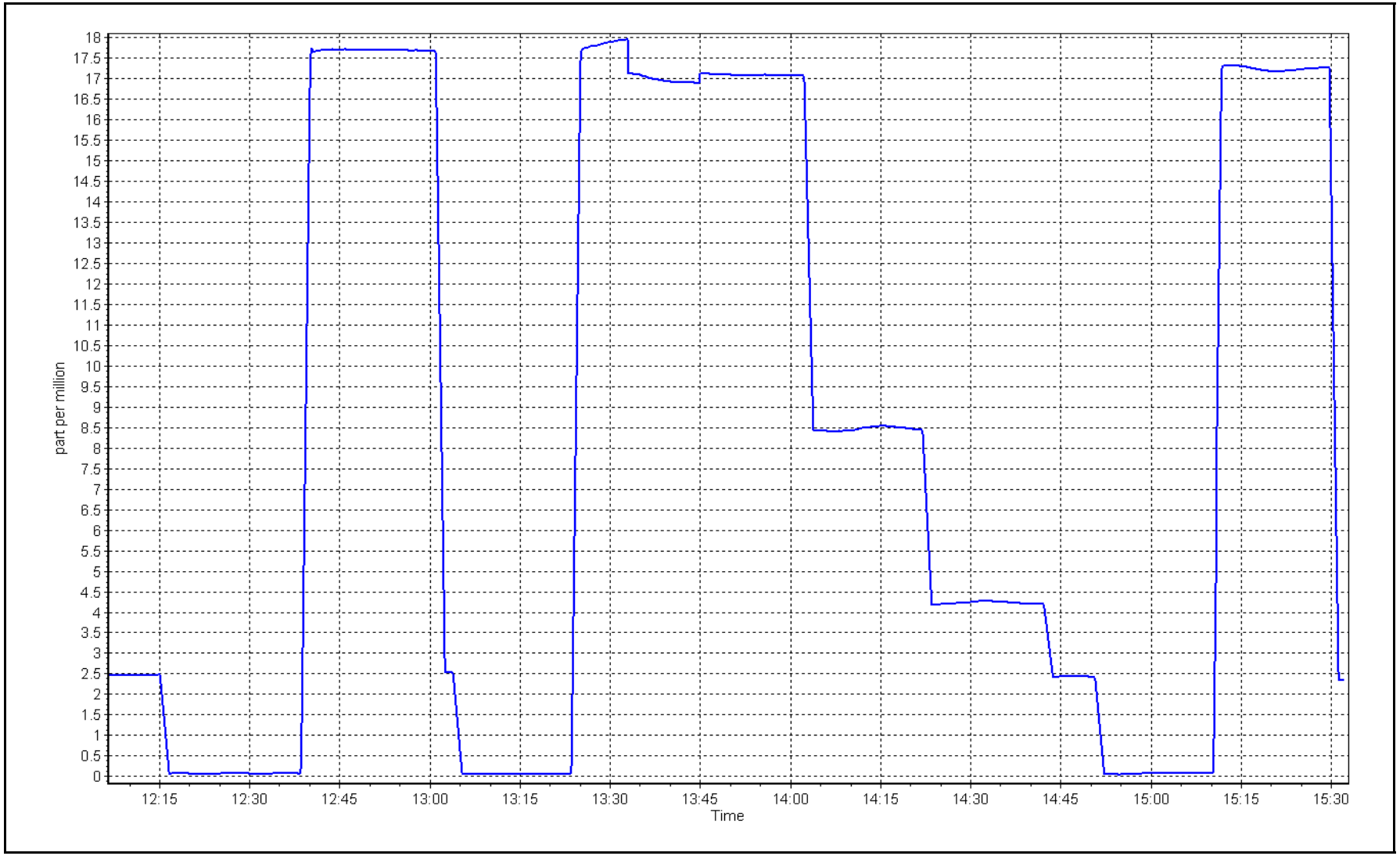
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.06	----
17.11	17.07	1.0027
8.57	8.50	1.0078
4.28	4.26	1.0065

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999972	*≥0.995*
Slope	0.994672	*0.90 - 1.10*
Intercept	0.019633	*+/-1.5*



THC Calibration Plot Date: December 14, 2023 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:	December 22, 2023	Last Cal Date:	November 9, 2023
Start time (MST):	10:16	End time (MST):	14:43
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	4.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.004049	1.012843
NO_X Cal Offset:	-1.772798	0.247028
NO Cal Slope:	1.003178	1.011487
NO Cal Offset:	-2.292773	-0.052956
NO_2 Cal Slope:	1.000729	0.998436
NO_2 Cal Offset:	0.157575	1.931124

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.8	-0.1	0.9	----	----
as found span	4916	84.4	800.6	800.6	0.0	810.9	806.4	4.4	0.9872	0.9928
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.5	0.0	0.5	----	----
high point	4916	84.4	800.6	800.6	0.0	811.1	809.7	1.4	0.9870	0.9887
second point	4958	42.2	400.3	400.3	0.0	405.9	404.9	1.0	0.9862	0.9887
third point	4979	21.1	200.2	200.2	0.0	202.5	202.3	0.2	0.9884	0.9894
as left zero	5000	0.0	0.0	0.0	0.0	0.1	-0.1	0.2	----	----
as left span	4916	84.4	800.6	391.8	408.8	808.3	407.3	401.1	0.9904	0.9618
								Average Correction Factor	0.9872	0.9889

Corrected As found	NO_X = 810.1 ppb	NO = 806.5 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	1.0%
Previous Response	NO_X = 802.0 ppb	NO = 800.8 ppb		*Percent Change	NO =	0.7%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	809.0	400.2	408.8	409.5	0.9983	100.2%
2nd GPT point (200 ppb O3)	809.0	642.8	166.2	168.8	0.9846	101.6%
3rd GPT point (100 ppb O3)	809.0	729.0	80.0	82.9	0.9650	103.6%
				Average Correction Factor	0.9826	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

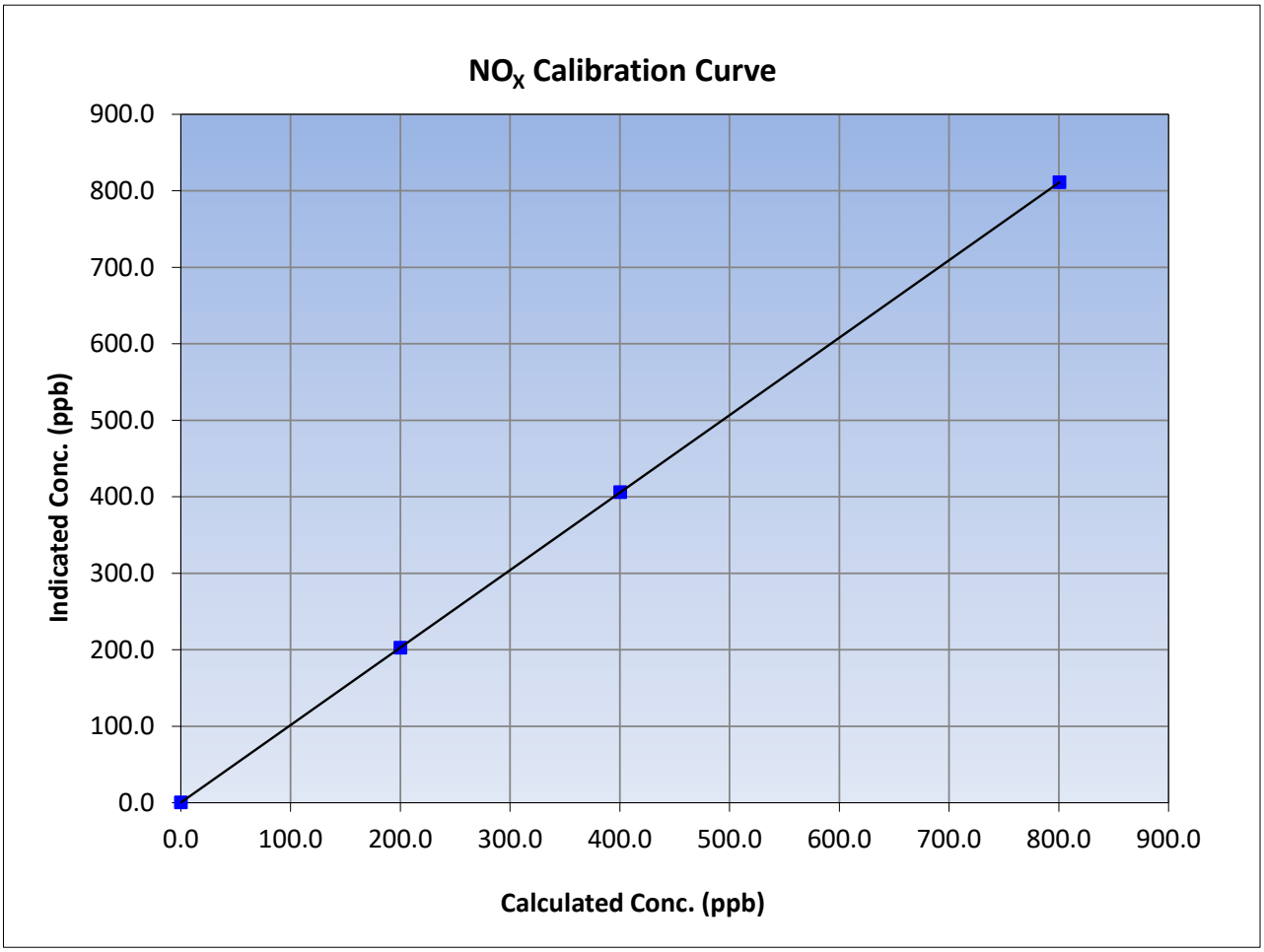
Version-04-2020

Station Information

Calibration Date:	December 22, 2023	Previous Calibration:	November 9, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	10:16	End Time (MST):	14:43
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	0.5	----	Correlation Coefficient	0.999999	*≥0.995*
800.6	811.1	0.9870			
400.3	405.9	0.9862	Slope	1.012843	*0.90 - 1.10*
200.2	202.5	0.9884			
			Intercept	0.247028	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

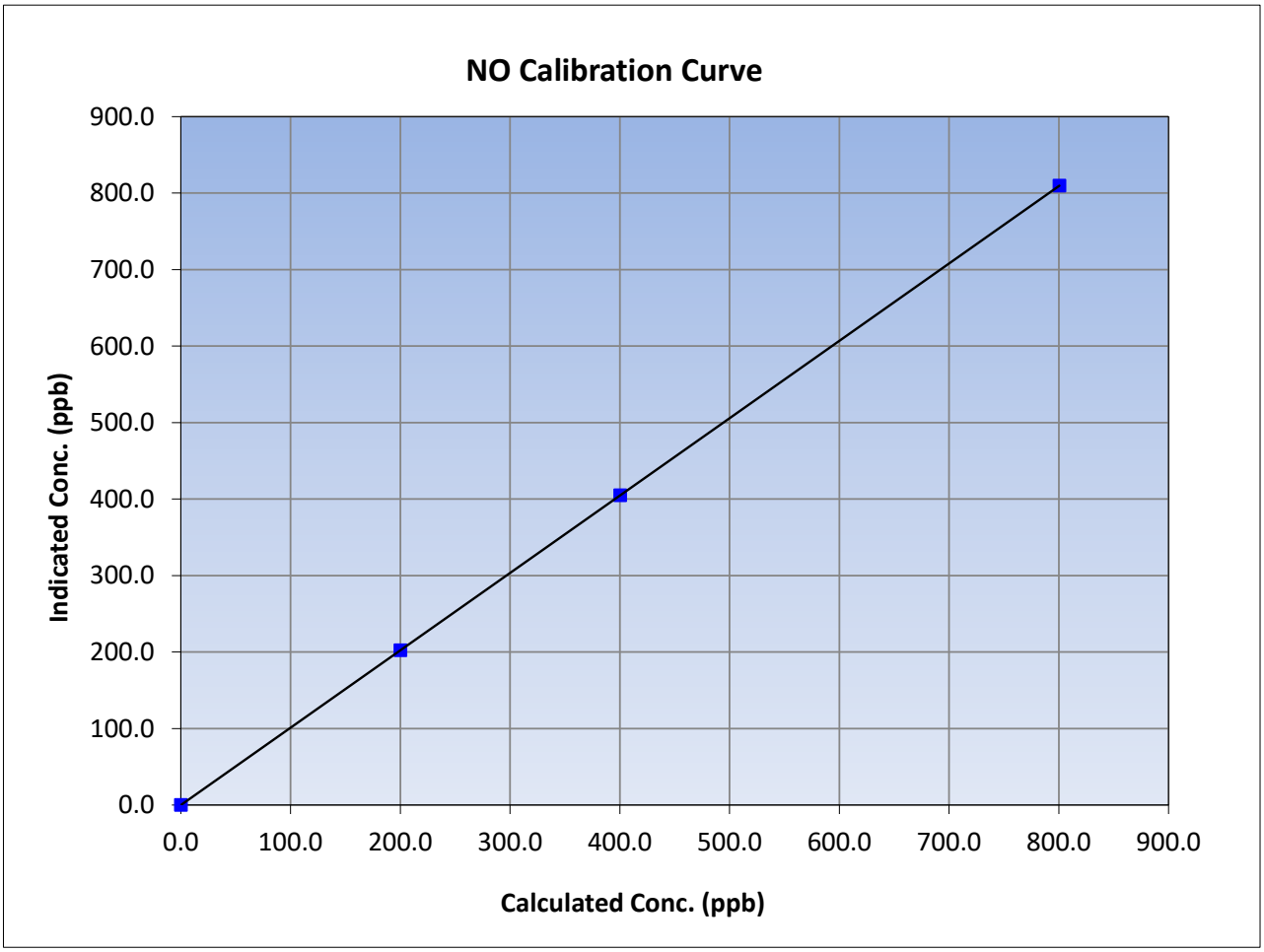
Version-04-2020

Station Information

Calibration Date:	December 22, 2023	Previous Calibration:	November 9, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	10:16	End Time (MST):	14:43
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	1.000000	≥0.995
800.6	809.7	0.9887			
400.3	404.9	0.9887	Slope	1.011487	0.90 - 1.10
200.2	202.3	0.9894			
			Intercept	-0.052956	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

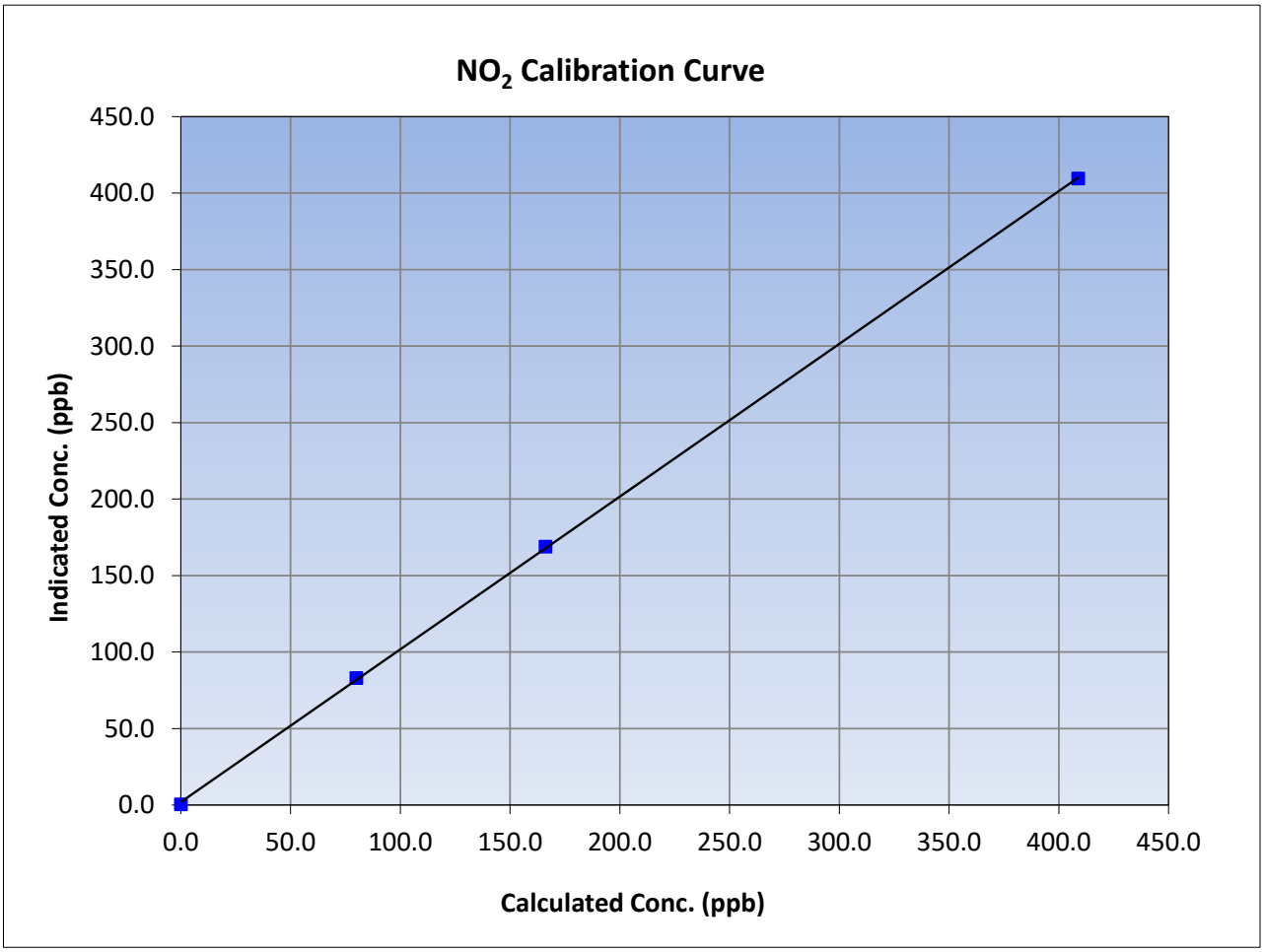
Version-04-2020

Station Information

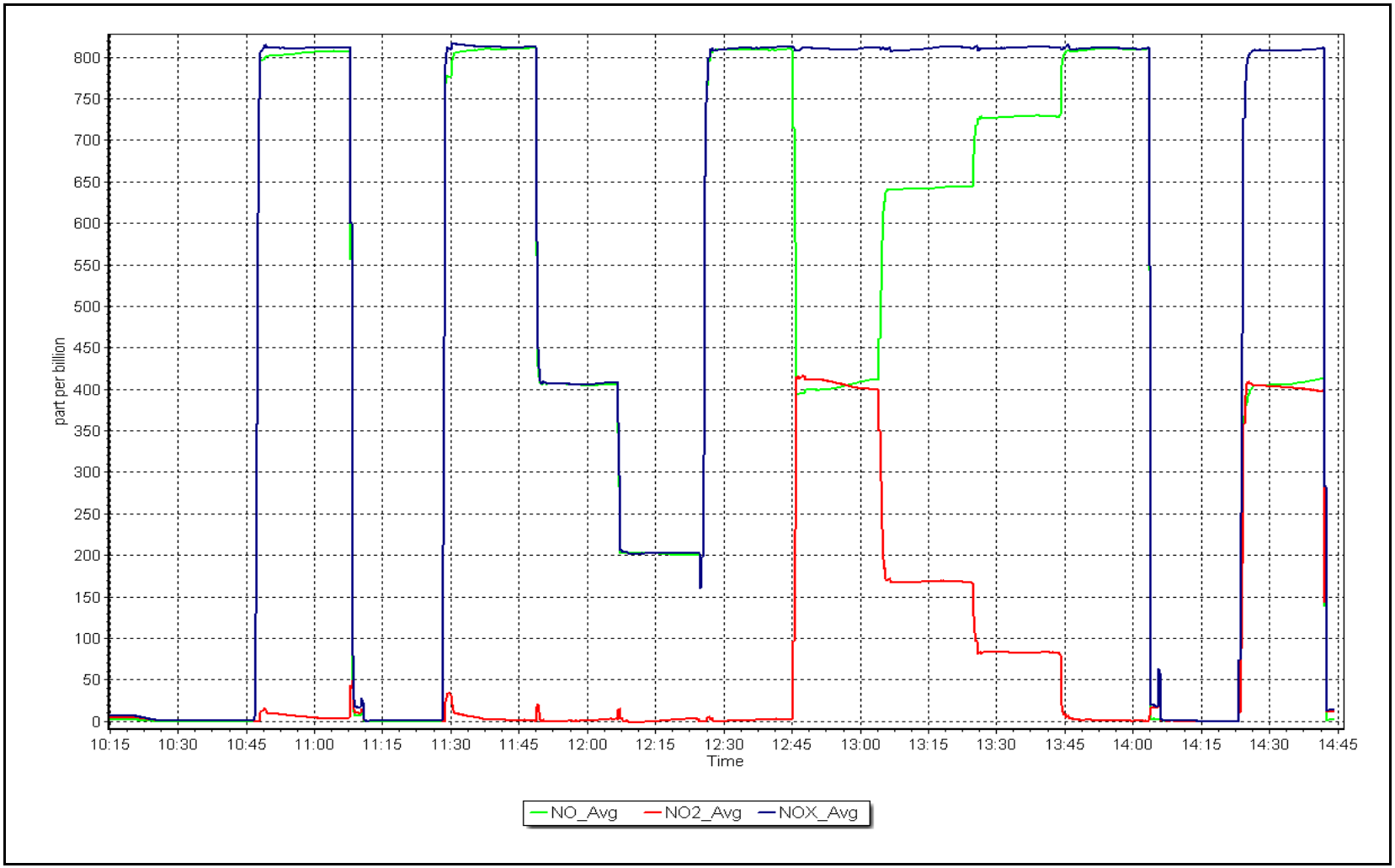
Calibration Date:	December 22, 2023	Previous Calibration:	November 9, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	10:16	End Time (MST):	14:43
Analyzer make:	Teledyne API T200	Analyzer serial #:	7029

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.5	----	Correlation Coefficient	0.999952	*≥0.995*
408.8	409.5	0.9983			
166.2	168.8	0.9846	Slope	0.998436	*0.90 - 1.10*
80.0	82.9	0.9650			
			Intercept	1.931124	*+/-20*



NO_X Calibration Plot Date: December 22, 2023 Location: Blackgold



End of Report