WOOD BUFFALO
ENVIRONMENTAL ASSOCIATION

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Wood Buffalo Environmental Association

MARCH 2023

MONTHLY CALIBRATION REPORT

CONTINUOUS MONITORING

April 29, 2023

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS01
BERTHA GANTER - FORT MCKAY
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	March 13, 2023	Last Cal Date:	February 1, 2023
Start time (MST):	15:30	End time (MST):	18:20
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.19	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC486642			
Removed Cal Gas Conc:	49.19	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3565
ZAG Make/Model:	Teledyne API T701		Serial Number:	5609

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998801	1.000943	Backgd or Offset:	19.0	19.4
Calibration intercept:	-0.333078	-0.132808	Coeff or Slope:	0.891	0.897

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	799.9	795.0	1.006
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4918	81.3	799.9	801.2	0.998
second point	4959	40.7	400.4	399.2	1.003
third point	4979	20.3	199.7	200.2	0.998
as left zero	5000	0.0	0.0	0.3	----
as left span	4918	81.3	799.9	800.3	1.000
				Average Correction Factor	1.000

Baseline Corr As found:	794.80	Previous response	798.65	*% 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. Adjusted span only.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

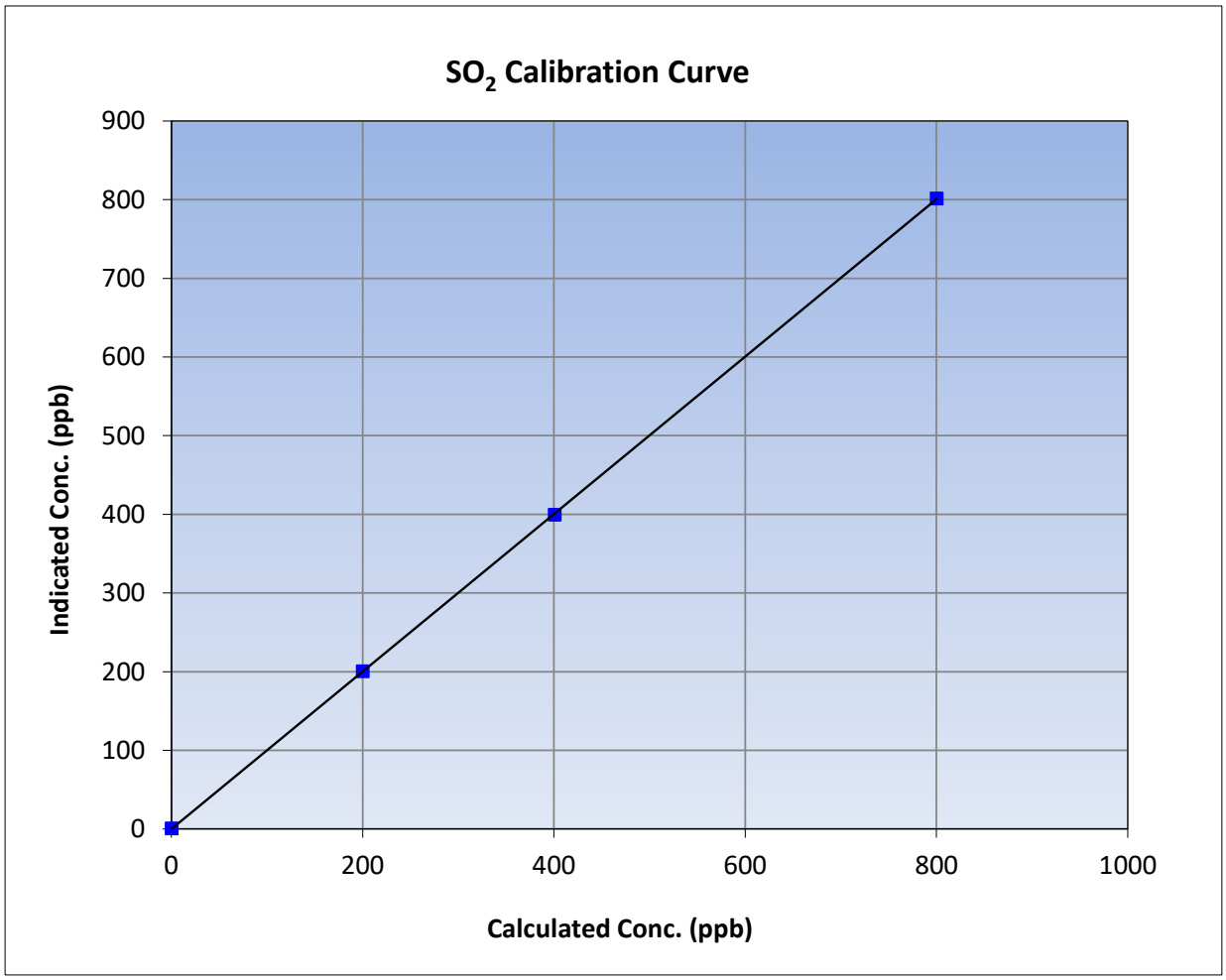
Station Information

Calibration Date:	March 13, 2023	Previous Calibration:	February 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	15:30	End Time (MST):	18:20
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301448

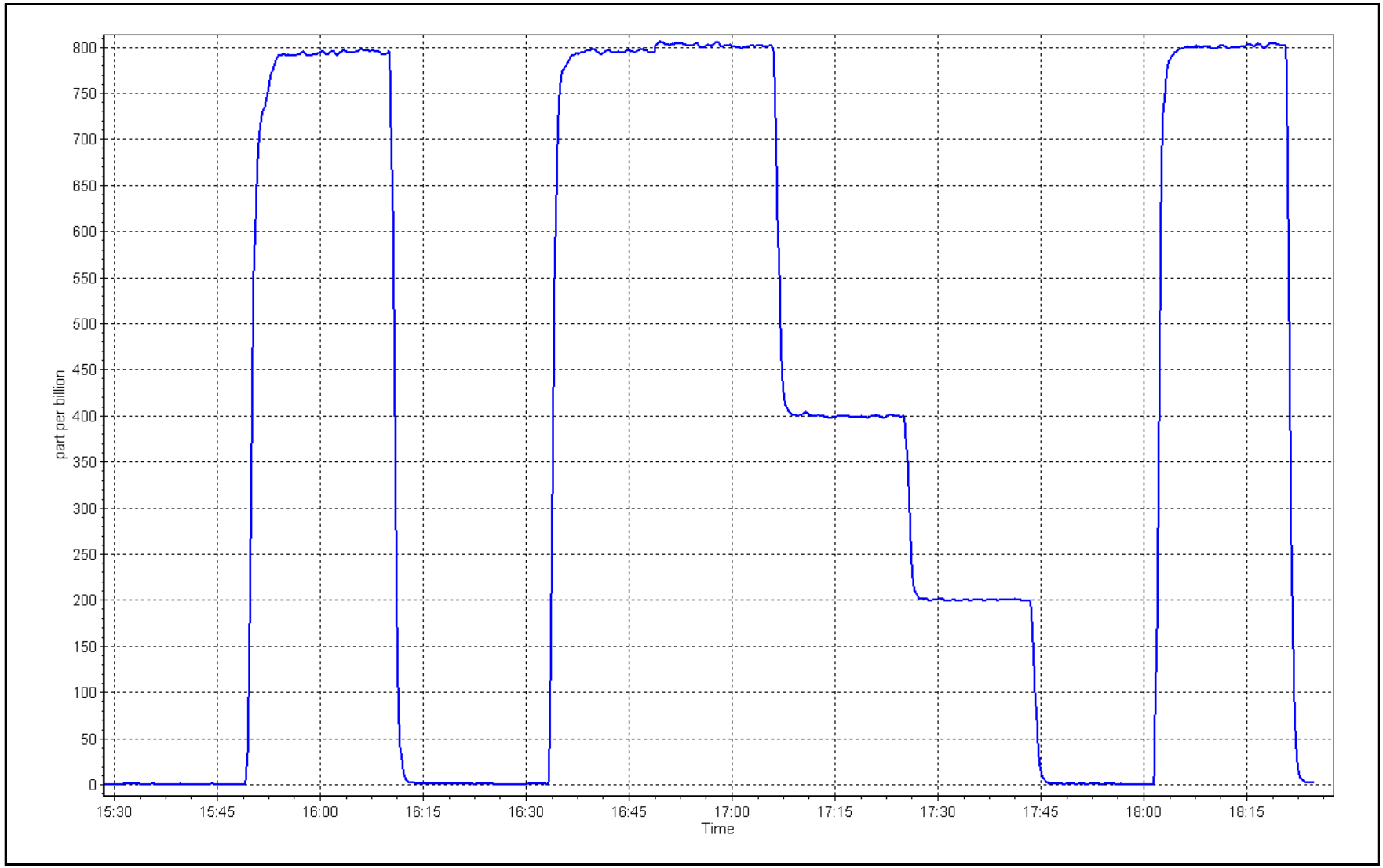
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
799.9	801.2	0.9984
400.4	399.2	1.0031
199.7	200.2	0.9977

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	1.000943	*0.90 - 1.10*
Intercept	-0.132808	*+/-30*



SO2 Calibration Plot Date: March 13, 2023 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	March 13, 2023	Last Cal Date:	February 13, 2023
Start time (MST):	9:58	End time (MST):	15:33
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1218153461	
Converter make:	CD Nova		Converter serial #:	470	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.995507	1.000364	Backgd or Offset:	2.30	2.27
Calibration intercept:	0.059999	0.439997	Coeff or Slope:	0.919	0.919

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4921	78.4	80.0	79.0	1.013
as found 2nd point	4960	39.2	40.0	39.5	1.013
as found 3rd point	4980	19.6	20.0	19.9	1.005
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4921	78.4	80.0	80.3	0.996
second point	4960	39.2	40.0	40.7	0.983
third point	4980	19.6	20.0	20.6	0.971
as left zero	5000	0.0	0.0	1.0	----
as left span	4921	78.4	80.0	79.4	1.007
SO2 Scrubber Check	4919	81.3	813.0	0.0	----
Date of last scrubber change:		December 17, 2021		Ave Corr Factor	0.983
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.0	Prev response:	79.69	*% change:	-0.9%
Baseline Corr 2nd AF pt:	39.5	AF Slope:	0.986934	AF Intercept:	0.060001
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999995		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

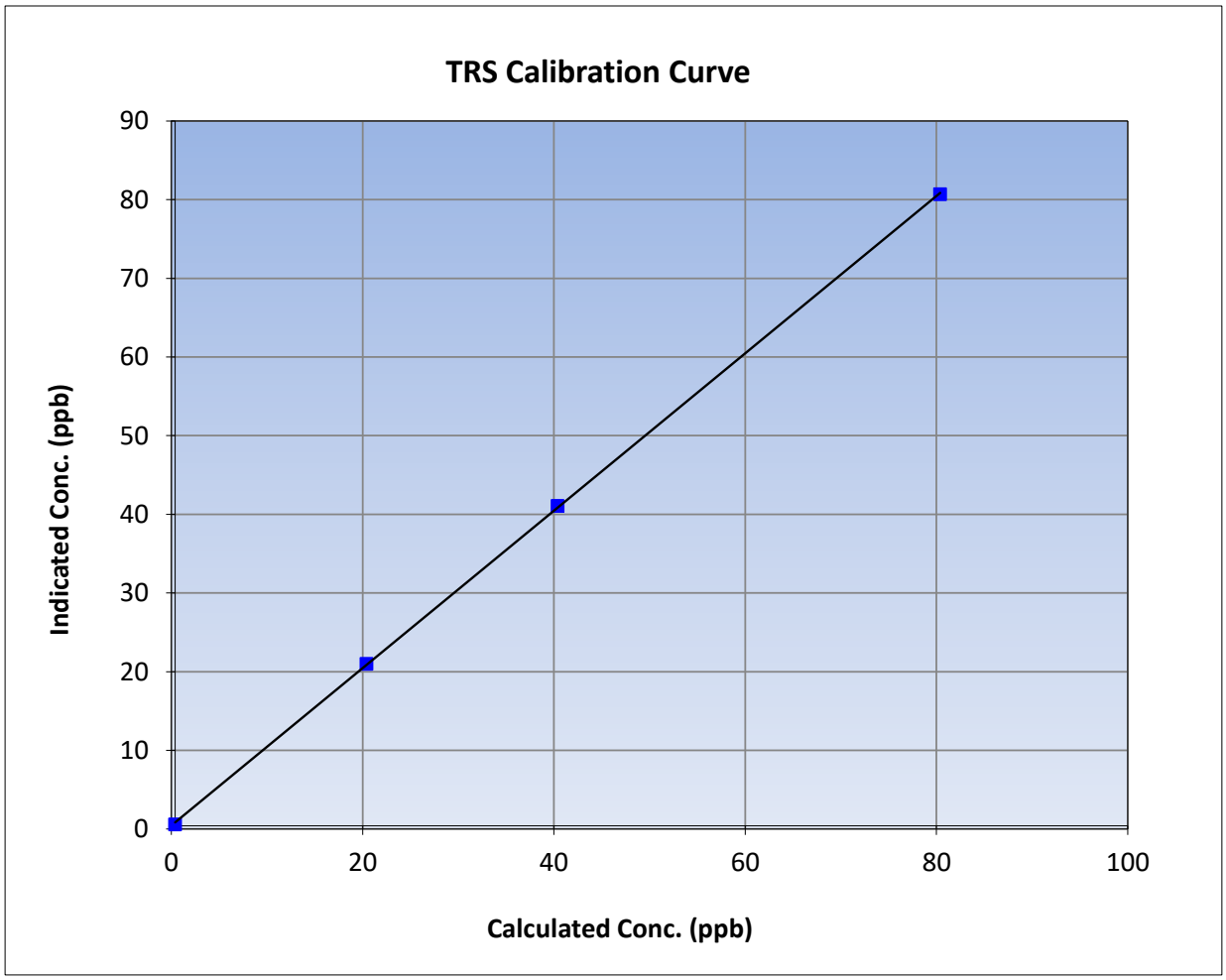
Station Information

Calibration Date:	March 13, 2023	Previous Calibration:	February 13, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:58	End Time (MST):	15:33
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153461

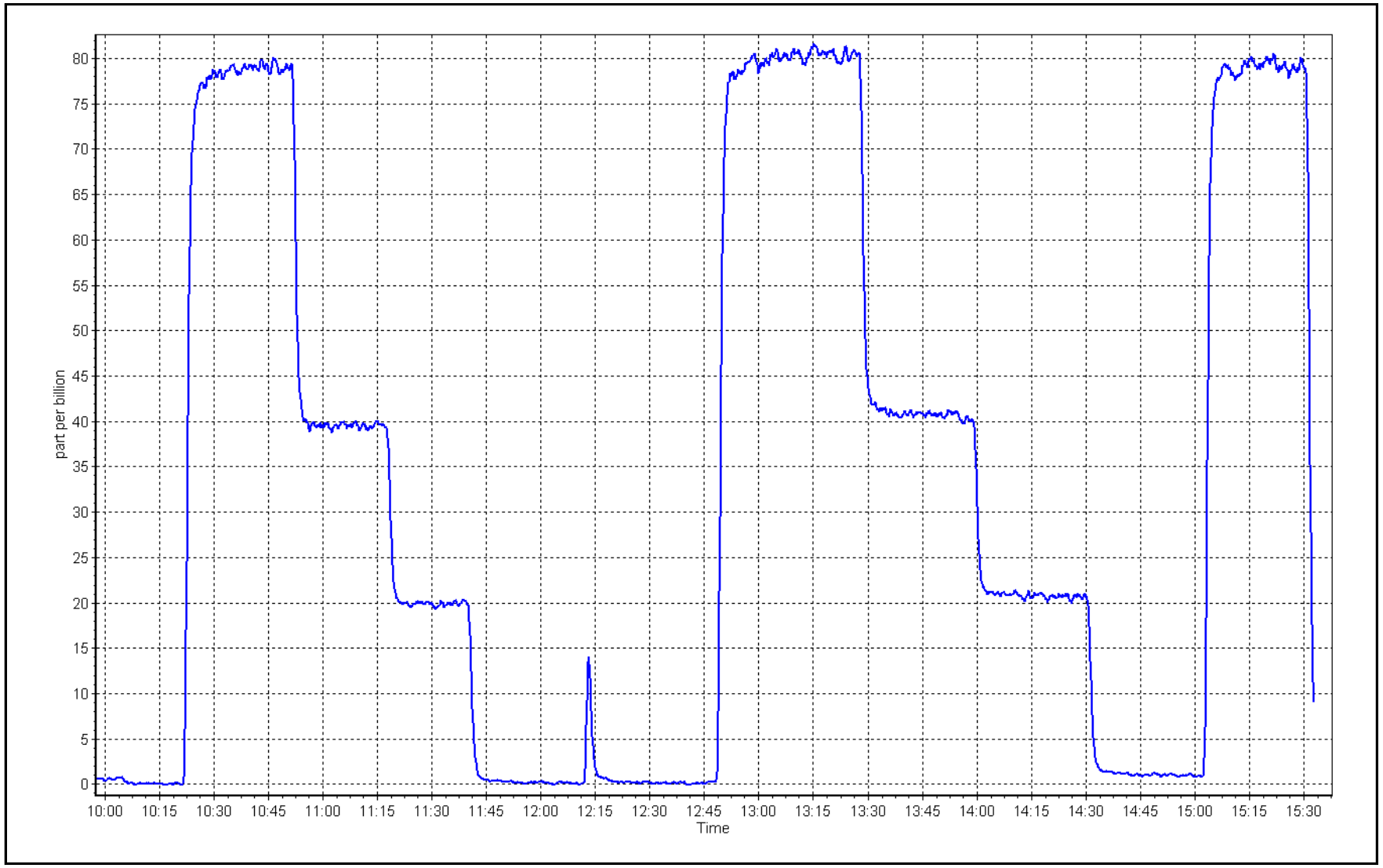
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	80.3	0.9962
40.0	40.7	0.9828
20.0	20.6	0.9708

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999952	*≥0.995*
Slope	1.000364	*0.90 - 1.10*
Intercept	0.439997	*+/-3*



TRS Calibration Plot Date: March 13, 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:	March 13, 2023	Last Cal Date:	February 13, 2023
Start time (MST):	9:58	End time (MST):	15:33
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43iQTL		Analyzer serial #:	1200326167	
Converter make:	Thermo Converter		Converter serial #:	N/A	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.996946	0.996518	Backgd or Offset:	1.95	1.94
Calibration intercept:	0.361624	0.401597	Coeff or Slope:	1.014	1.014

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4921	78.4	80.0	79.7	1.005
as found 2nd point	4960	39.2	40.0	40.3	0.995
as found 3rd point	4980	19.6	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	0.4	----
high point	4921	78.4	80.0	80.1	0.999
second point	4961	39.2	40.0	40.3	0.992
third point	4980	19.6	20.0	20.3	0.985
as left zero	5000	0.0	0.0	0.6	----
as left span	4921	78.4	80.0	79.1	1.011
SO2 Scrubber Check	4919	81.3	813.0	-0.2	----
Date of last scrubber change:		March 21, 2022		Ave Corr Factor	0.992
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.6	Prev response:	80.09	*% change:	-0.6%
Baseline Corr 2nd AF pt:	40.2	AF Slope:	0.994559	AF Intercept:	0.299997
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999964		

* = > +/-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

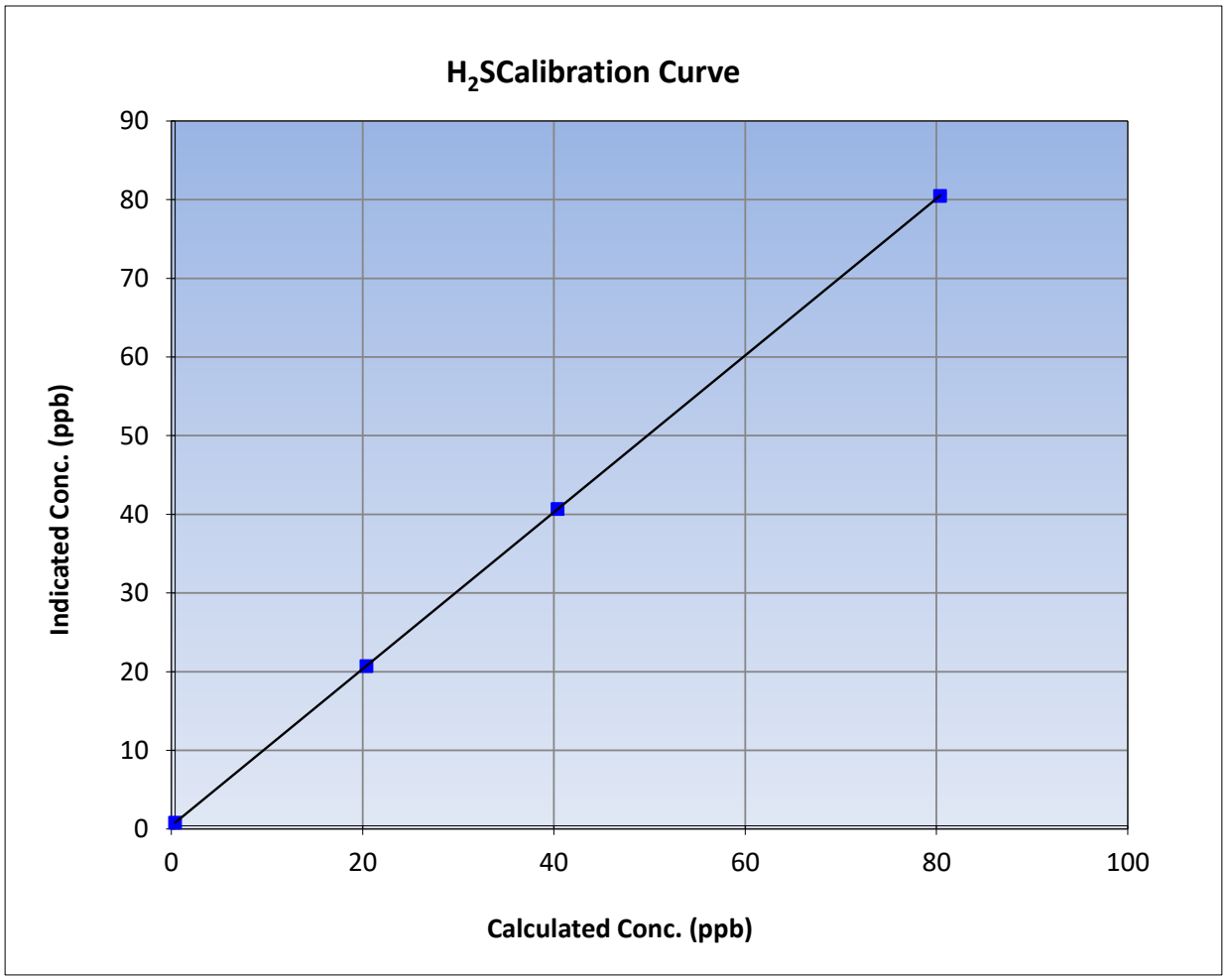
Station Information

Calibration Date:	March 13, 2023	Previous Calibration:	February 13, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:58	End Time (MST):	15:33
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1200326167

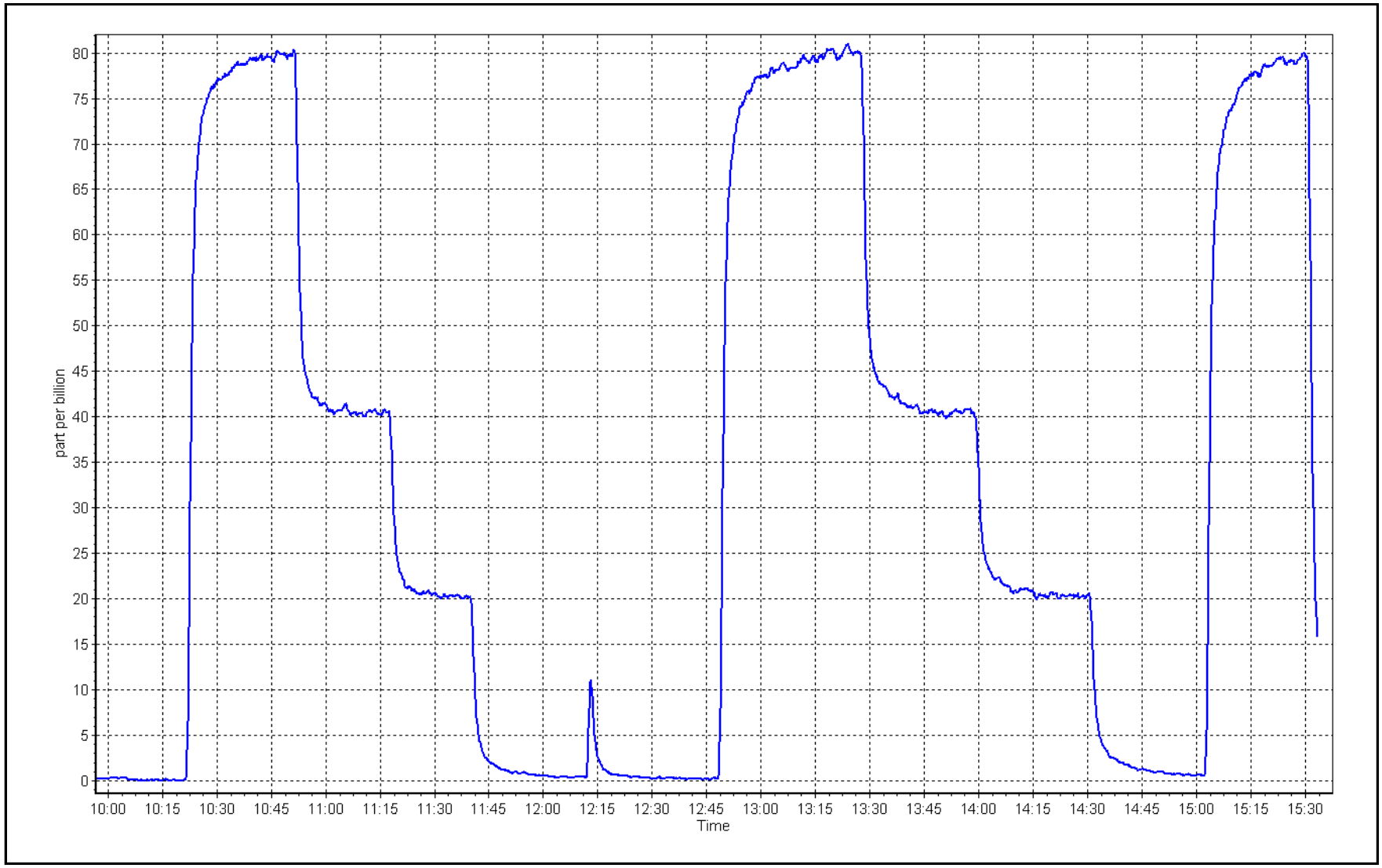
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
80.0	80.1	0.9987
40.0	40.3	0.9923
20.0	20.3	0.9851

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	0.996518	*0.90 - 1.10*
Intercept	0.401597	*+/-3*



H_2S Calibration Plot Date: March 13, 2023 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	March 13, 2023	Last Cal Date:	February 1, 2023
Start time (MST):	15:30	End time (MST):	18:20
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	CC486642		Cal Gas Expiry Date:	February 23, 2025	
CH4 Cal Gas Conc.	497.7	ppm	CH4 Equiv Conc.	1063.1	ppm
C3H8 Cal Gas Conc.	205.6	ppm			
Removed Gas Cert:	NA		Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.7	ppm	CH4 Equiv Conc.	1063.1	ppm
Removed C3H8 Conc.	205.6	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	3565	
ZAG make/model:	Teledyne API T701		Serial Number:	5609	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320040	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.52E-04	2.64E-04	NMHC SP Ratio:	5.06E-05	5.52E-05
CH4 Retention time:	14.4	14.4	NMHC Peak Area:	181561	166551

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	17.29	16.20	1.067
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4918	81.3	17.29	17.32	0.998
second point	4959	40.7	8.65	8.62	1.004
third point	4980	20.3	4.32	4.32	0.998
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	17.29	17.35	0.997
				Average Correction Factor	1.000

Baseline Corr AF:	16.20	Prev response	17.19	*% change	-6.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4918	81.3	9.19	8.46	1.087
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4918	81.3	9.19	9.22	0.998
second point	4959	40.7	4.60	4.60	1.000
third point	4980	20.3	2.30	2.31	0.993
as left zero	5000	0	0.00	0.00	----
as left span	4918	81.3	9.19	9.24	0.996
				Average Correction Factor	0.997
Baseline Corr AF:	8.46	Prev response	9.14	*% change	-8.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4918	81.3	8.09	7.74	1.046
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	8.11	0.998
second point	4959	40.7	4.05	4.02	1.009
third point	4980	20.3	2.02	2.01	1.004
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	8.09	8.11	0.998
				Average Correction Factor	1.004
Baseline Corr AF:	7.74	Prev response	8.05	*% change	-4.1%
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:	0.995861	1.001736
THC Cal Offset:	-0.022506	-0.010696
CH4 Cal Slope:	0.996625	1.001692
CH4 Cal Offset:	-0.014967	-0.013161
NMHC Cal Slope:	0.994978	1.001763
NMHC Cal Offset:	-0.007938	0.002265

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

THC Calibration Summary

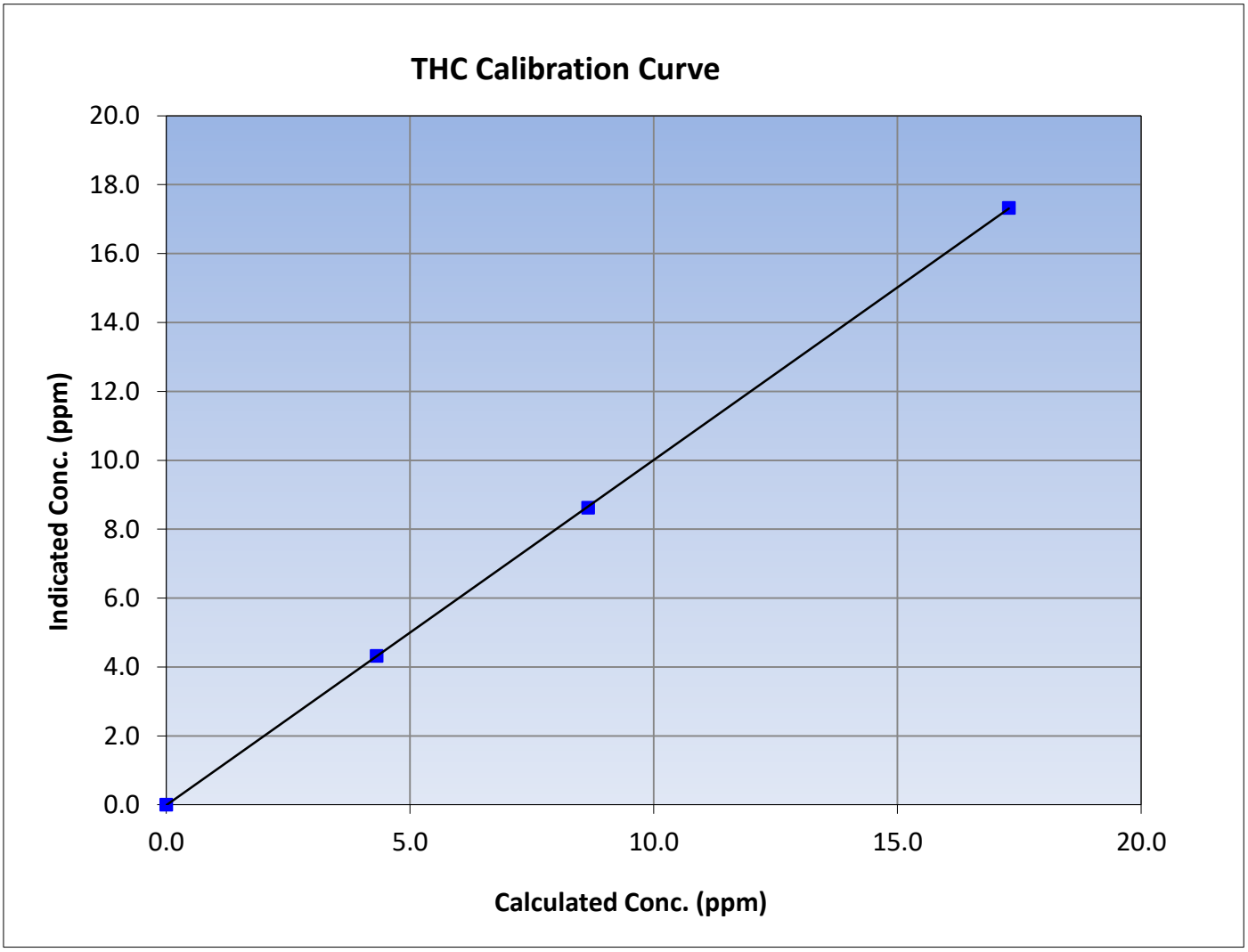
Version-01-2020

Station Information

Calibration Date:	March 13, 2023	Previous Calibration:	February 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	15:30	End Time (MST):	18:20
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	0.999988	*≥0.995*
17.29	17.32	0.9979			
8.65	8.62	1.0039	Slope	1.001736	*0.90 - 1.10*
4.32	4.32	0.9982			
			Intercept	-0.010696	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

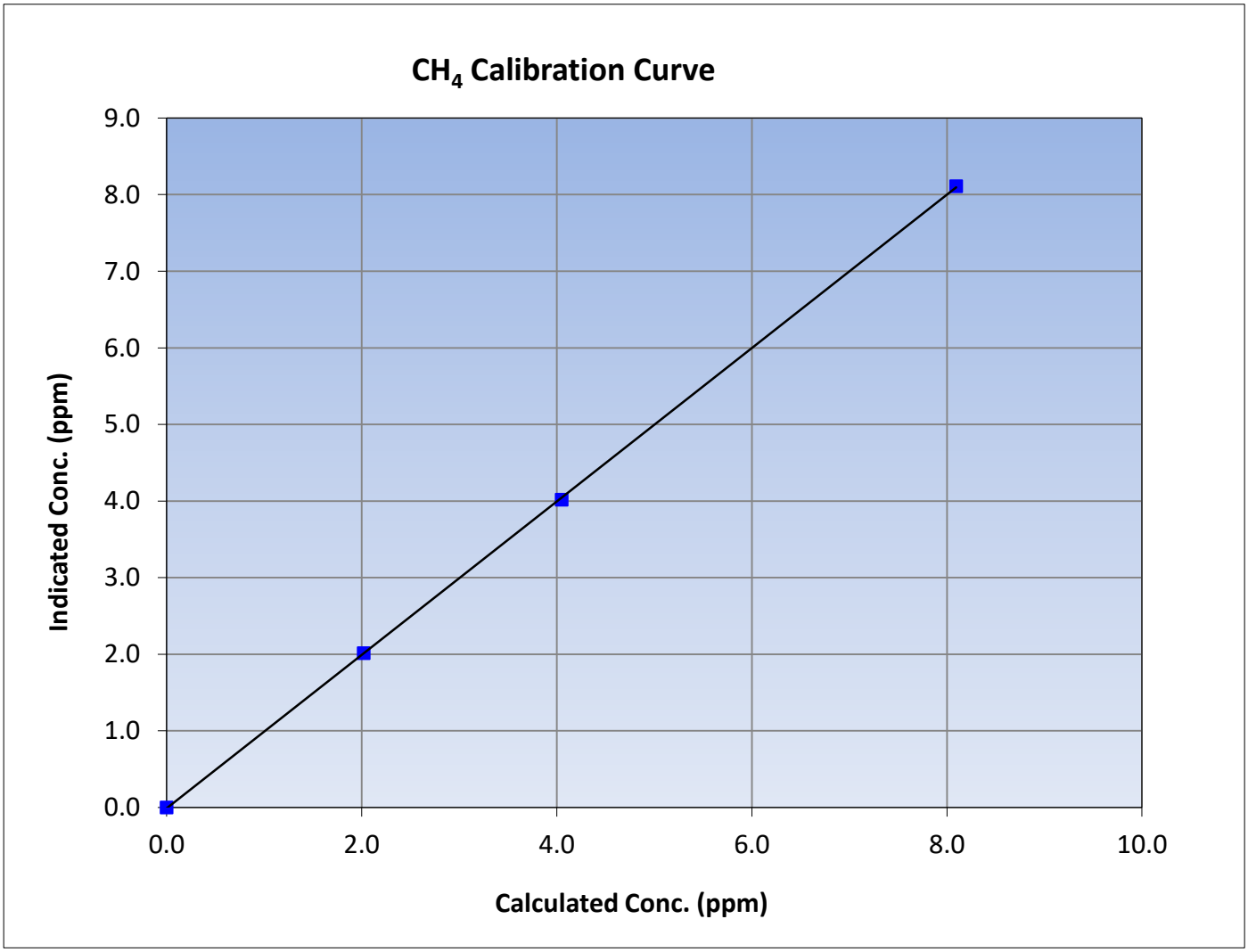
Version-01-2020

Station Information

Calibration Date:	March 13, 2023	Previous Calibration:	February 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	15:30	End Time (MST):	18:20
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	0.999968	*≥0.995*
8.09	8.11	0.9982			
4.05	4.02	1.0085	Slope	1.001692	*0.90 - 1.10*
2.02	2.01	1.0043			
			Intercept	-0.013161	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

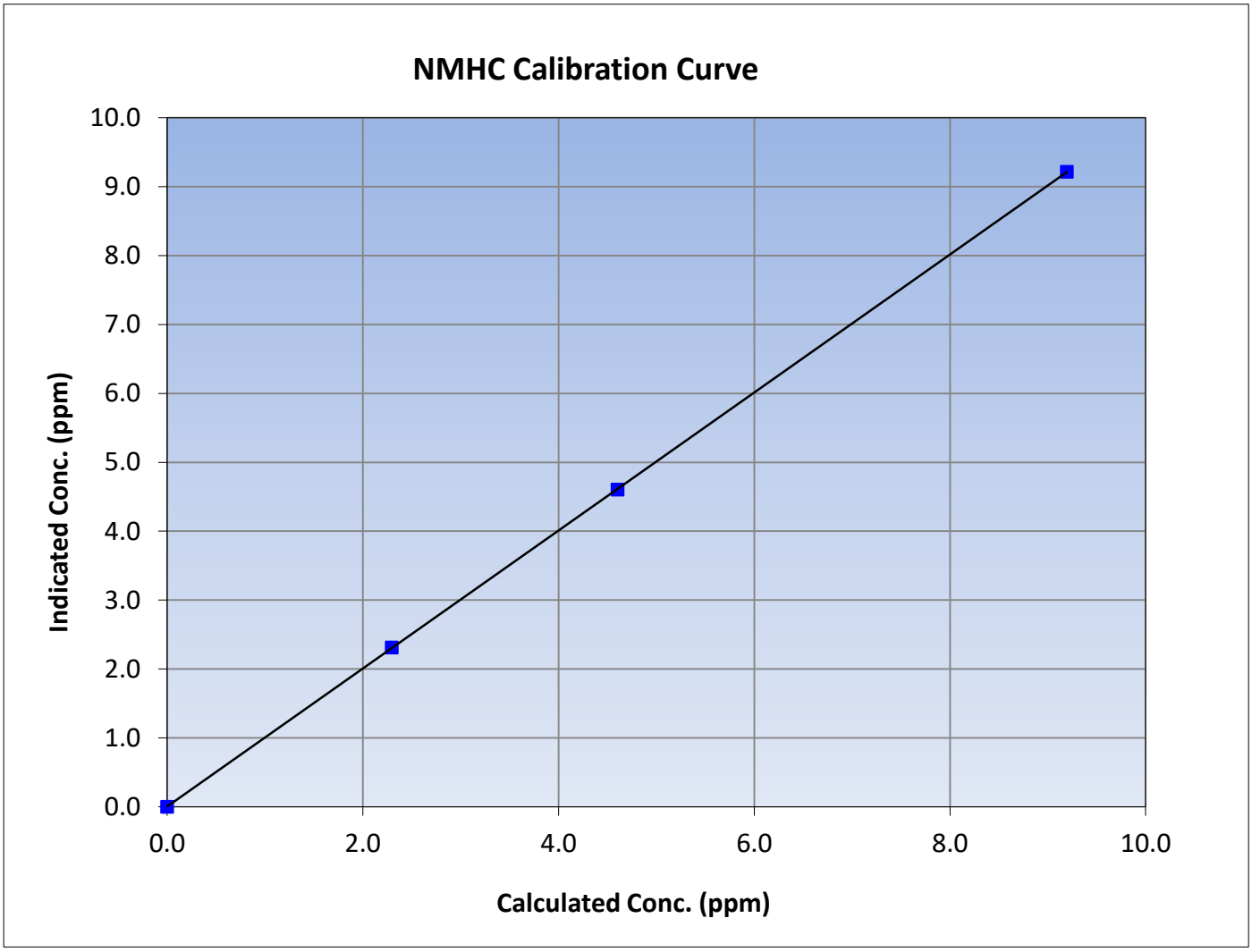
Version-01-2020

Station Information

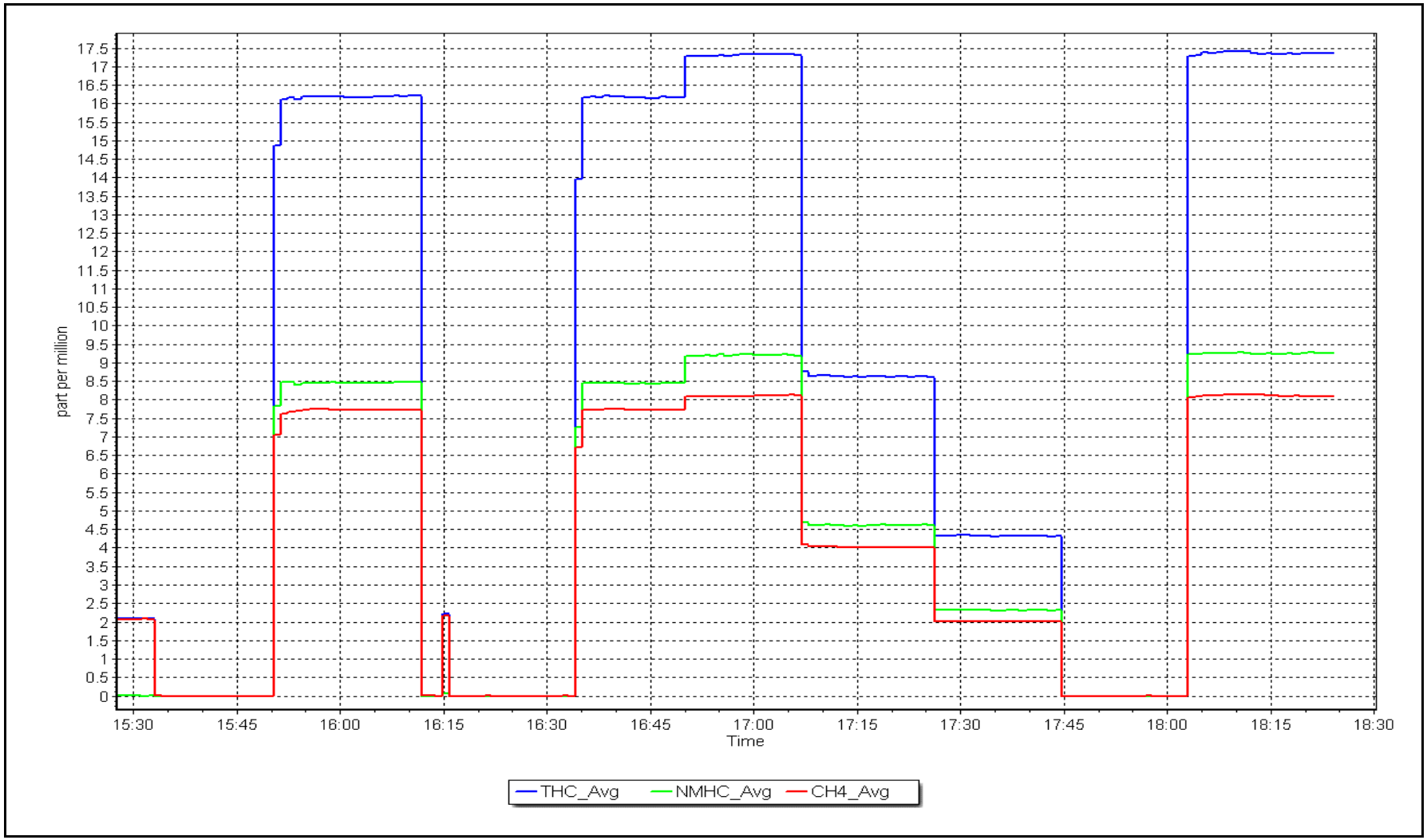
Calibration Date:	March 13, 2023	Previous Calibration:	February 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	15:30	End Time (MST):	18:20
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320040

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999995	*≥0.995*
9.19	9.22	0.9977			
4.60	4.60	1.0001	Slope	1.001763	*0.90 - 1.10*
2.30	2.31	0.9929			
			Intercept	0.002265	*+/-0.5*



NMHC Calibration Plot Date: March 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:	March 3, 2023	Last Cal Date:	February 2, 2023
Start time (MST):	10:39	End time (MST):	15:36
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.440	1.458	NO bkgnd or offset:	6.8	6.9
NOX coeff or slope:	0.990	0.990	NOX bkgnd or offset:	6.9	7.0
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	194.8	196.0

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.997218	0.999171
NO_X Cal Offset:	0.060000	-0.060000
NO Cal Slope:	0.998701	1.000071
NO Cal Offset:	-0.400000	-0.880000
NO_2 Cal Slope:	0.997388	0.998181
NO_2 Cal Offset:	-0.442888	-0.132907

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	4920	80.0	813.4	800.6	12.8	803.7	788.4	15.5	1.0121	1.0155
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.4	0.3	0.1	----	----
high point	4920	80.0	813.4	800.6	12.8	812.8	800.3	12.5	1.0008	1.0004
second point	4960	40.0	406.7	400.3	6.4	406.5	399.2	7.3	1.0005	1.0028
third point	4980	20.0	203.4	200.2	3.2	202.4	197.9	4.4	1.0047	1.0114
as left zero	5000	0.0	0.0	0.0	0.0	0.4	0.2	0.2	----	----
as left span	4920	80.0	813.4	388.4	425.0	809.6	385.1	424.4	1.0047	1.0087
								Average Correction Factor	1.0020	1.0049

Corrected As found	NO_X = 803.5 ppb	NO = 788.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-1.0%
Previous Response	NO_X = 811.2 ppb	NO = 799.2 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)	796.5	384.3	425.0	424.4	1.0014	99.9%
2nd GPT point (200 ppb O3)	796.5	594.2	215.1	213.9	1.0056	99.4%
3rd GPT point (100 ppb O3)	796.5	697.0	112.3	112.1	1.0018	99.8%
				Average Correction Factor	1.0029	99.7%

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

NO_X Calibration Summary

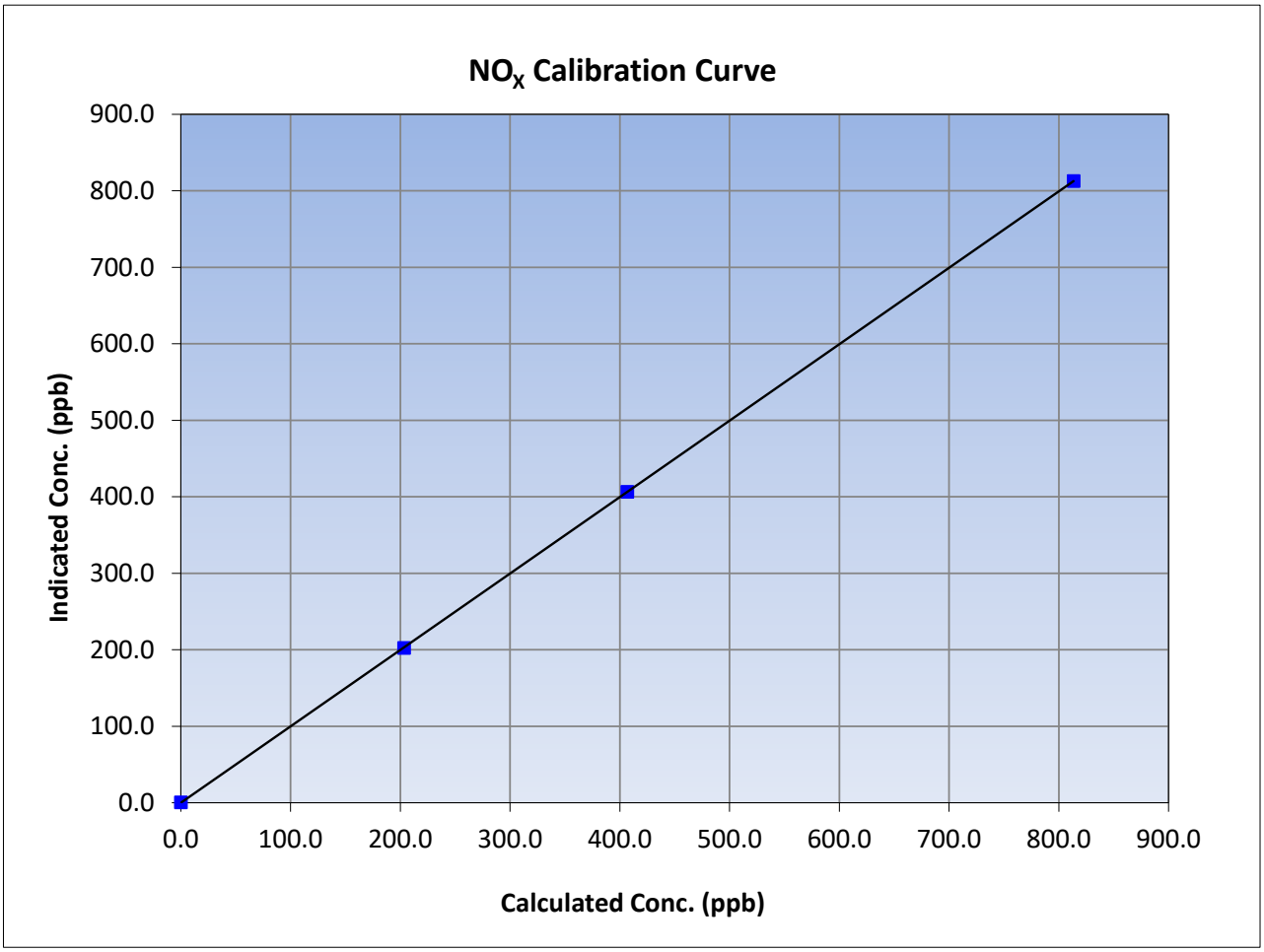
Version-04-2020

Station Information

Calibration Date:	March 3, 2023	Previous Calibration:	February 2, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:39	End Time (MST):	15:36
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	0.4	----	Correlation Coefficient	0.999998	≥0.995
813.4	812.8	1.0008			
406.7	406.5	1.0005	Slope	0.999171	0.90 - 1.10
203.4	202.4	1.0047			
			Intercept	-0.060000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

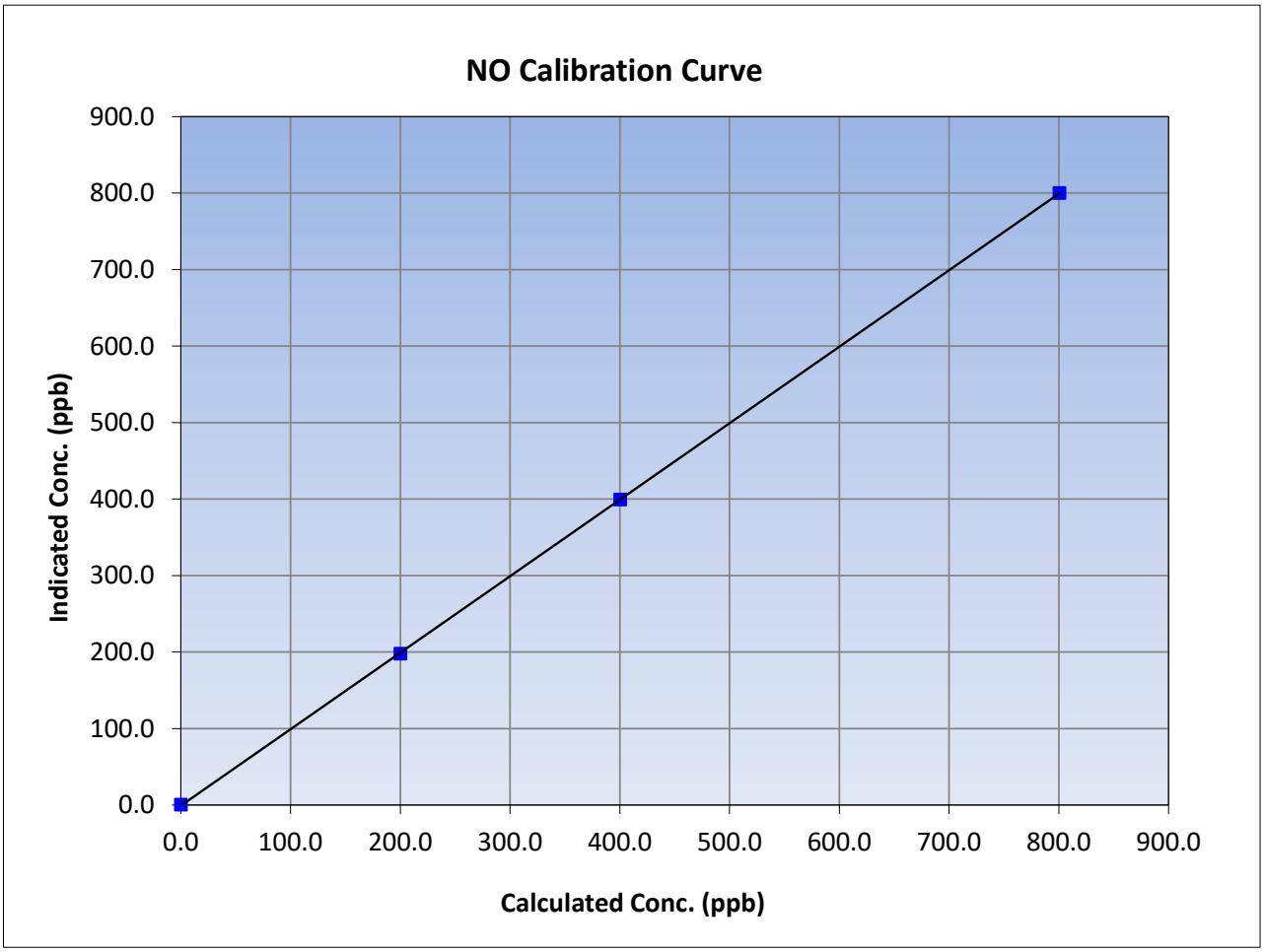
Version-04-2020

Station Information

Calibration Date:	March 3, 2023	Previous Calibration:	February 2, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:39	End Time (MST):	15:36
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	0.3	----	Correlation Coefficient	0.999990	≥0.995
800.6	800.3	1.0004			
400.3	399.2	1.0028	Slope	1.000071	0.90 - 1.10
200.2	197.9	1.0114			
			Intercept	-0.880000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

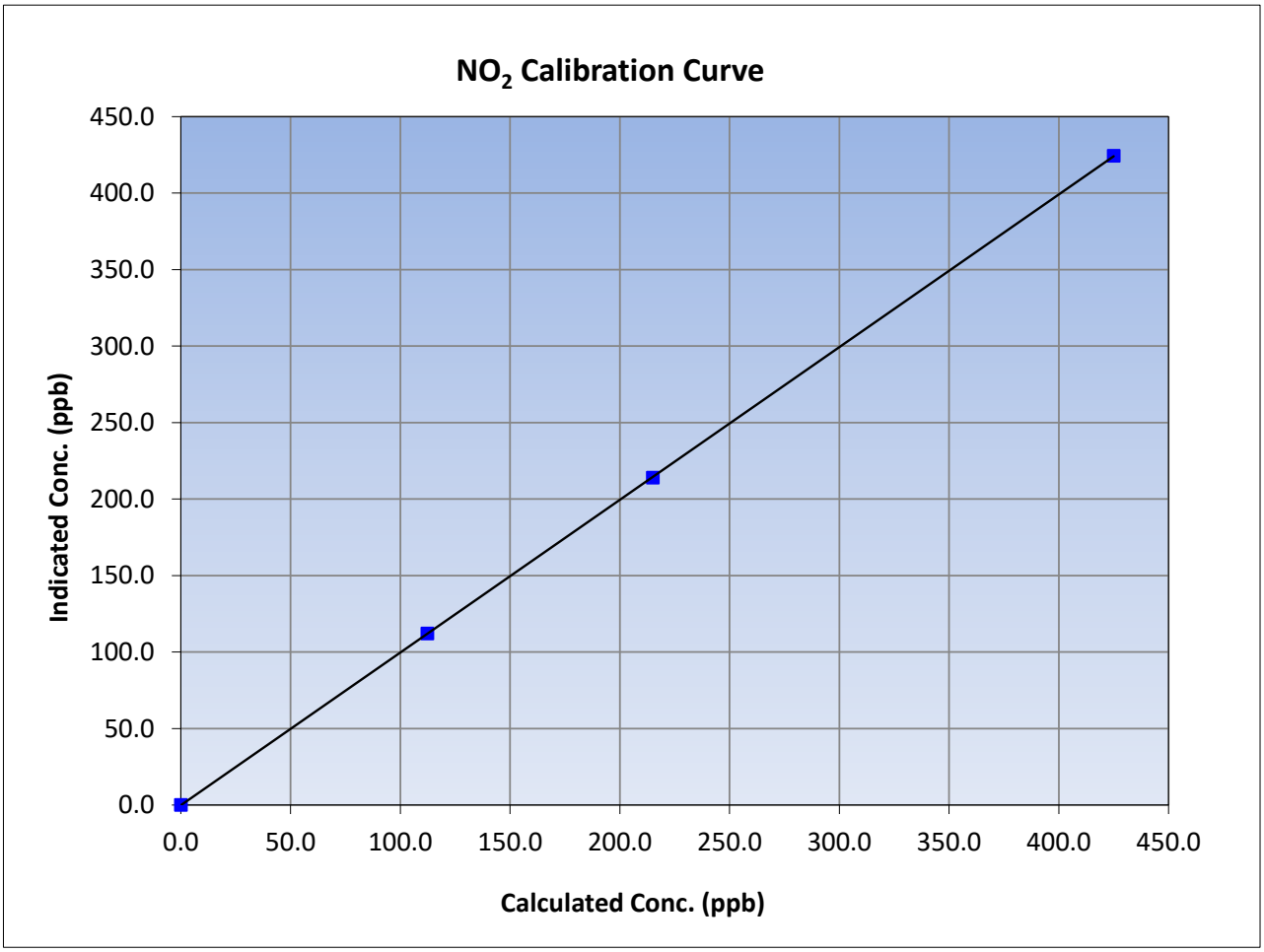
Version-04-2020

Station Information

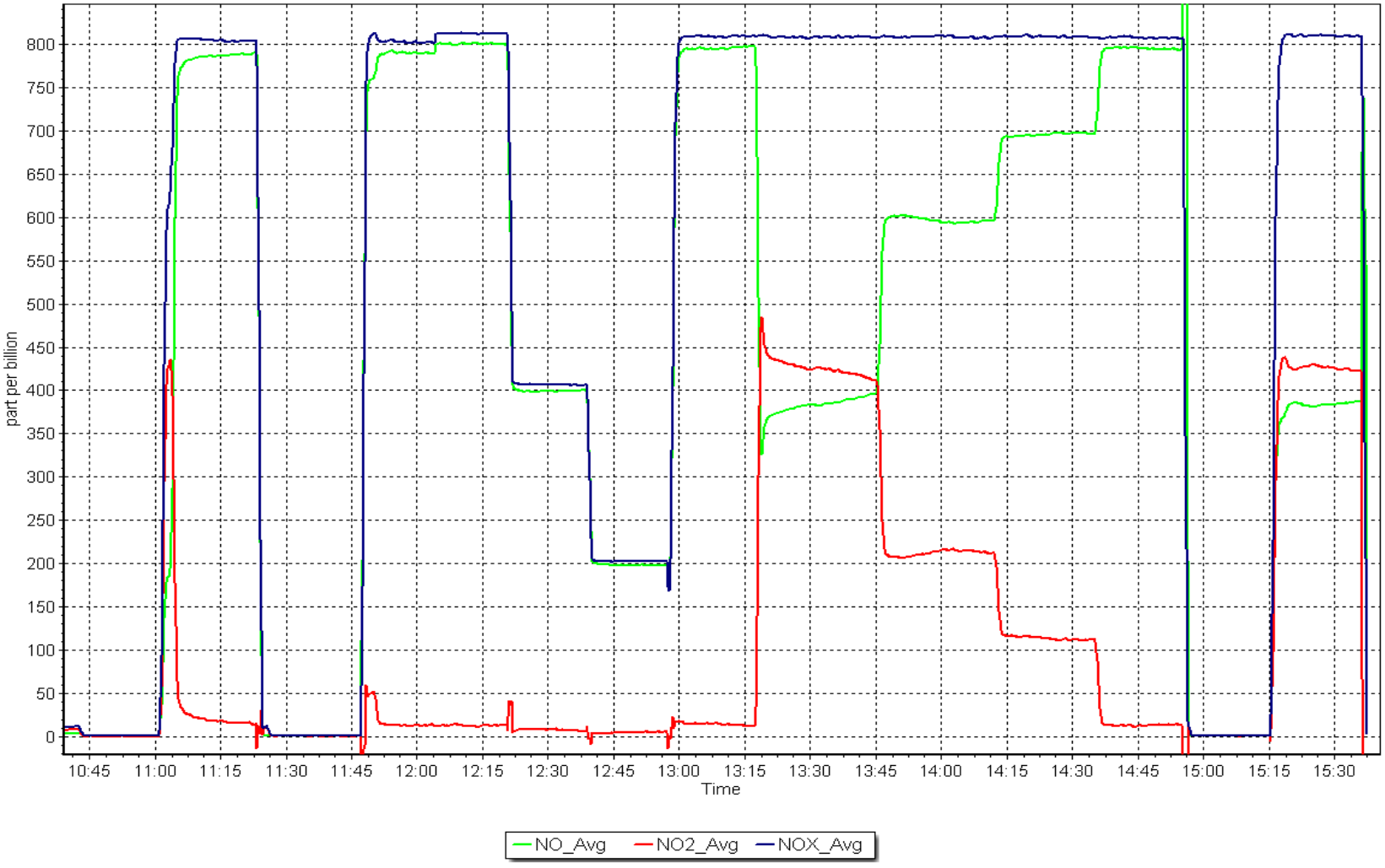
Calibration Date:	March 3, 2023	Previous Calibration:	February 2, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:39	End Time (MST):	15:36
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999994	≥0.995
425.0	424.4	1.0014			
215.1	213.9	1.0056	Slope	0.998181	0.90 - 1.10
112.3	112.1	1.0018			
			Intercept	-0.132907	+/-20



NO_X Calibration Plot Date: March 3, 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:	March 1, 2023	Last Cal Date:	February 8, 2023
Start time (MST):	11:28	End time (MST):	14:20
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000086	0.999829	Backgd or Offset:	2.4	2.5
Calibration intercept:	0.760000	0.780000	Coeff or Slope:	1.016	1.025

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	855.5	400.0	398.3	1.004
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.3	----
high point	5000	855.5	400.0	400.3	0.999
second point	5000	738.6	200.0	201.5	0.993
third point	5000	649.2	100.0	100.9	0.991
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	855.5	400.0	401.0	0.998
				Average Correction Factor	0.994

Baseline Corr As found:	398.0	Previous response	400.8	*% change	-0.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

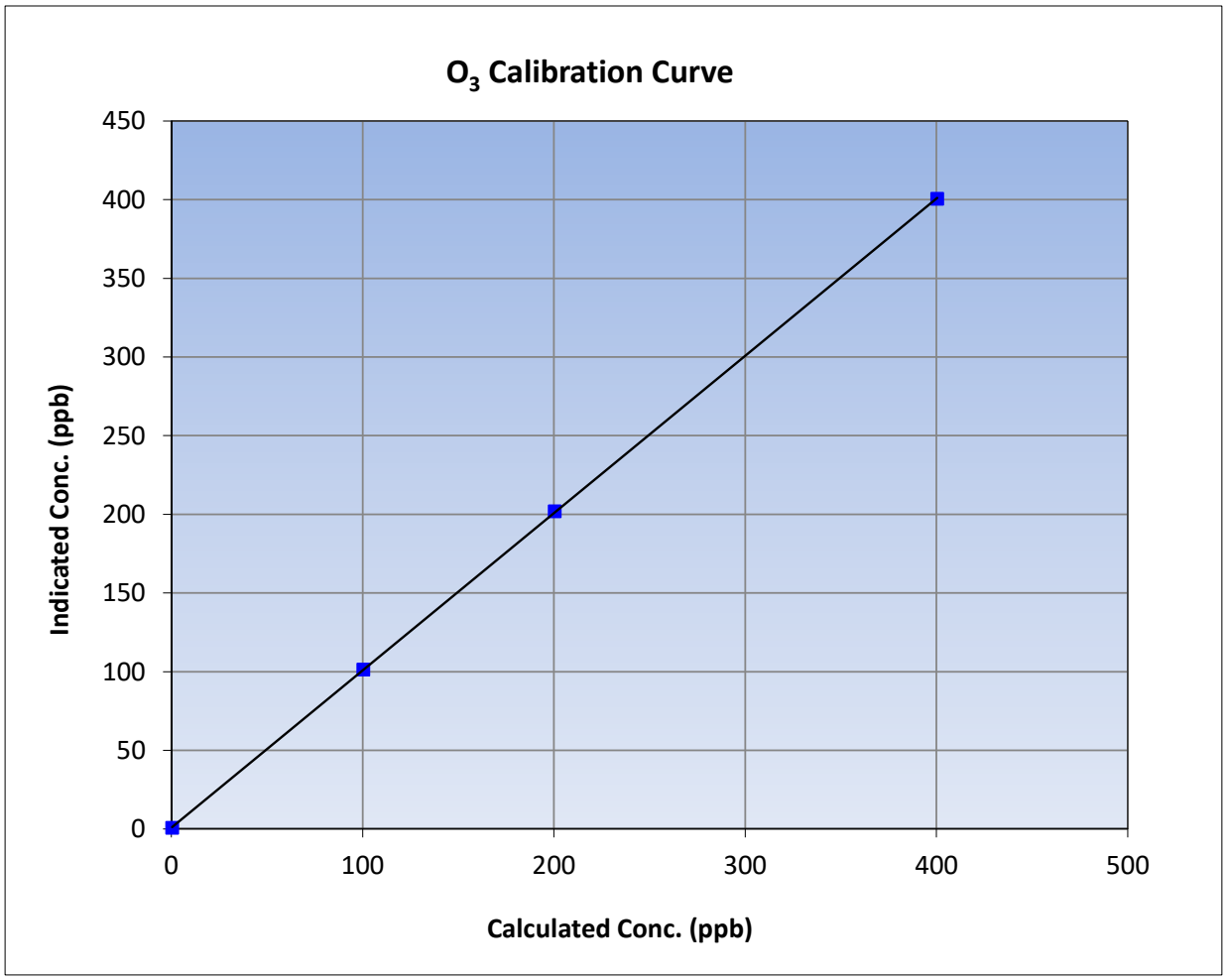
Station Information

Calibration Date:	March 1, 2023	Previous Calibration:	February 8, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:28	End Time (MST):	14:20
Analyzer make:	Teledyne API T400	Analyzer serial #:	1107

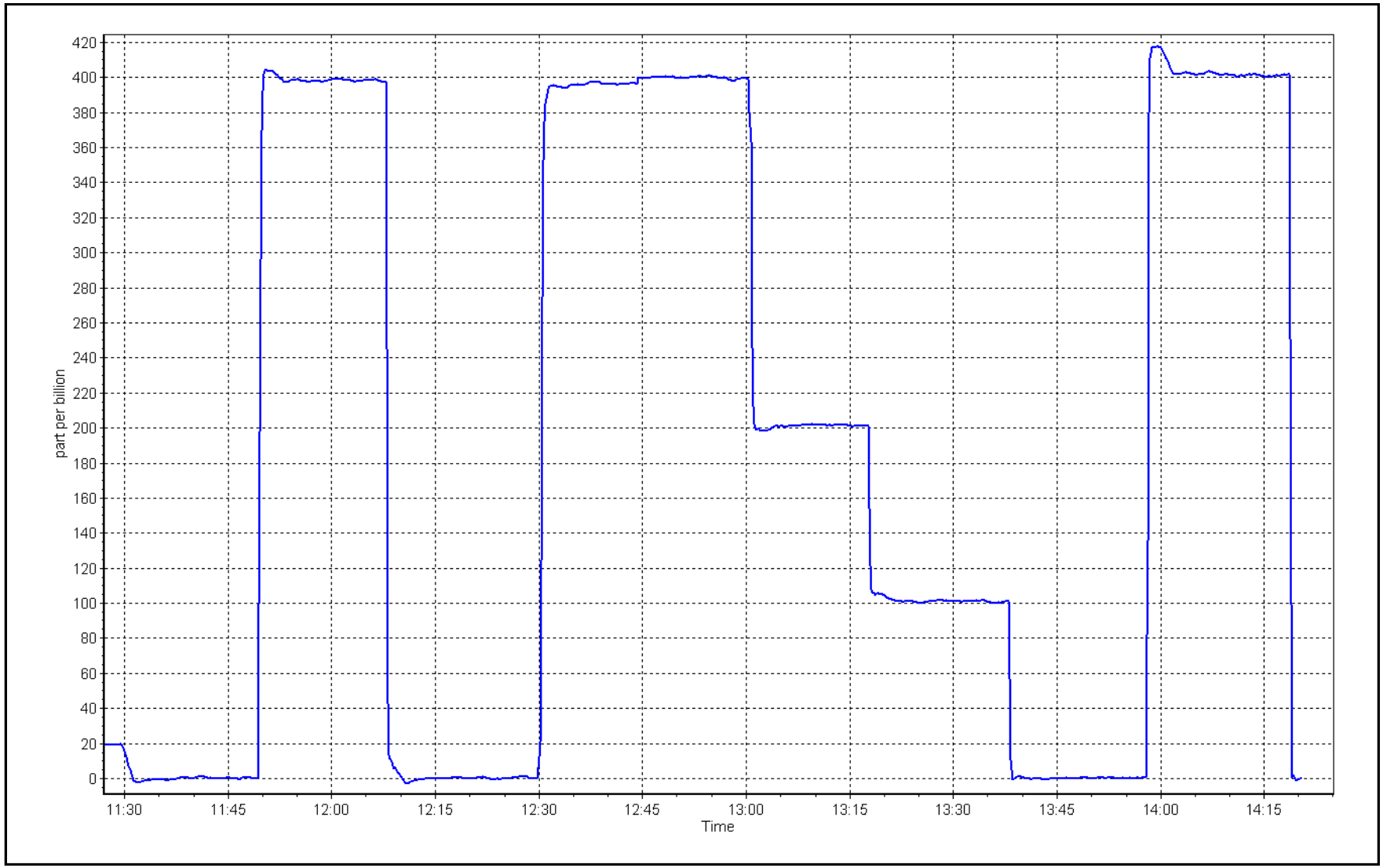
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
400.0	400.3	0.9993
200.0	201.5	0.9926
100.0	100.9	0.9911

Statistical Evaluation		Limits
Correlation Coefficient	0.999989	≥0.995
Slope	0.999829	0.90 - 1.10
Intercept	0.780000	+/- 5



O_3 Calibration Plot Date: March 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:	March 30, 2023	Last Cal Date:	February 16, 2023
Start time (MST):	11:13	End time (MST):	14:17
Analyzer Make:	API T640	S/N:	306
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	1450
Temp/RH standard:	Delta Cal	S/N:	1450

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-2.9	-2.4	-2.9	☐	+/- 2 °C
P (mmHg)	733.5	734.1	733.5	☐	+/- 10 mmHg
flow (LPM)	5.03	5.00	5.03	☐	+/- 0.25 LPM

Leak Test: Date of check: March 30, 2023 Last Cal Date: February 16, 2023

PM w/o HEPA: 13.2 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	9.5	11	11	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 13 w/ HEPA: 0

Date Optical Chamber Cleaned: March 30, 2023 <0.2 ug/m3

Disposable Filter Changed: March 30, 2023

Annual Maintenance

Date Sample Tube Cleaned: August 31, 2022

Date RH/T Sensor Cleaned: December 19, 2022

Notes: Flow, temperature and pressure verified. Leak check passed. Optical chamber cleaned. Disposable filter changed. PMT peak test within limits post maintenance, no adjustments made. Inlet head cleaned.

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:	March 8, 2023	Last Cal Date:	February 15, 2023
Start time (MST):	10:59	End time (MST):	14:22
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range: 0 - 50 ppm

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.001201	1.002977	Backgd or Offset:	-0.012	-0.012
Calibration intercept:	0.093816	0.109828	Coeff or Slope:	0.991	0.996

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4933	66.7	40.6	40.9	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4933	66.7	40.6	40.7	0.997
second point	4966	33.3	20.2	20.7	0.980
third point	4983	16.7	10.2	10.3	0.990
as left zero	5000	0.0	0.0	0.0	----
as left span	2960	40.0	40.5	40.2	1.010
				Average Correction Factor	0.989

Baseline Corr As found:	40.72	Prev response:	40.70	*% change:	0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

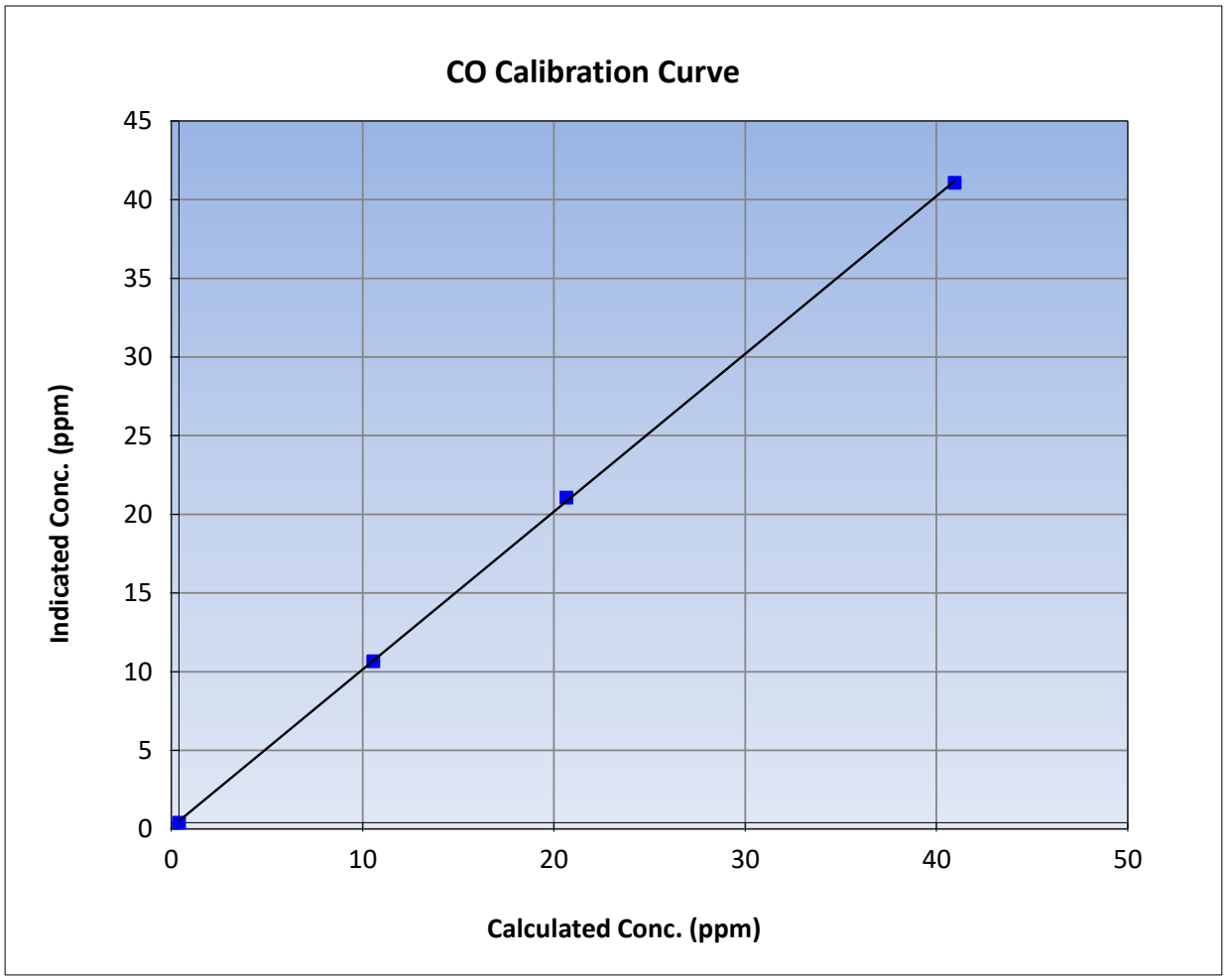
Station Information

Calibration Date:	March 8, 2023	Previous Calibration:	February 15, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:59	End Time (MST):	14:22
Analyzer make:	Teledyne API T300	Analyzer serial #:	3520

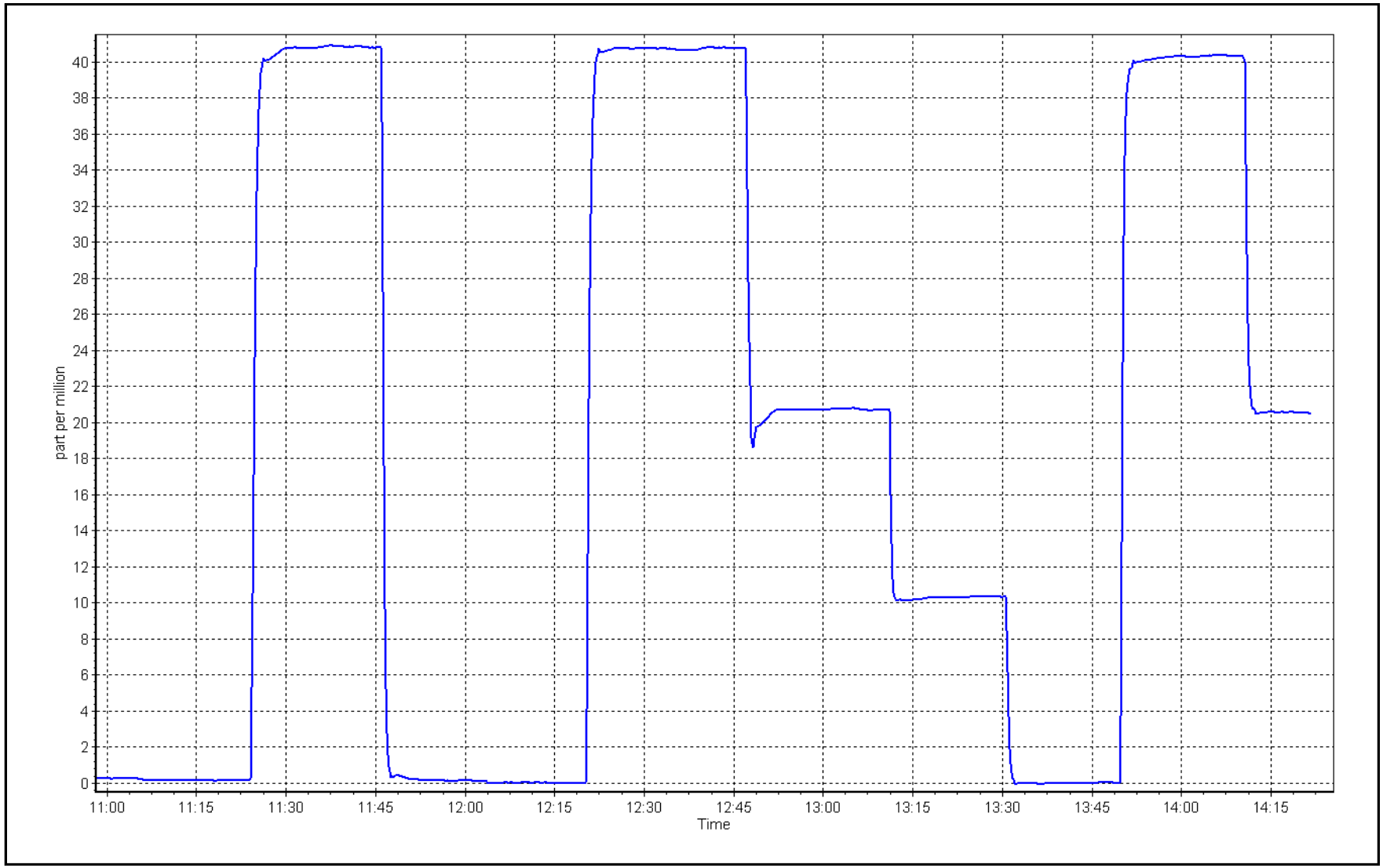
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.6	40.7	0.9972
20.2	20.7	0.9796
10.2	10.3	0.9897

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999903	*≥0.995*
Slope	1.002977	*0.90 - 1.10*
Intercept	0.109828	*+/-1.5*



CO Calibration Plot Date: March 8, 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:	March 7, 2023	Last Cal Date:	February 7, 2023
Start time (MST):	10:47	End time (MST):	14:38
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:	0.999874	1.002067	Backgd or Offset:	0.037	0.037
Calibration intercept:	-5.820000	-4.460000	Coeff or Slope:	0.883	0.880

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	-0.3	----
as found span	2920	80.0	1605.3	1617.9	0.992
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	-0.2	----
high point	2920	80.0	1605.3	1606.1	1.000
second point	2960	40.0	802.7	798.4	1.005
third point	2980	20.0	401.3	393.0	1.021
as left zero	3000	0.0	0.0	-0.4	----
as left span	2960	40.0	802.7	785.7	1.022
				Average Correction Factor	1.009

Baseline Corr As found:	1618.20	Prev response:	1599.31	*% change:	1.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

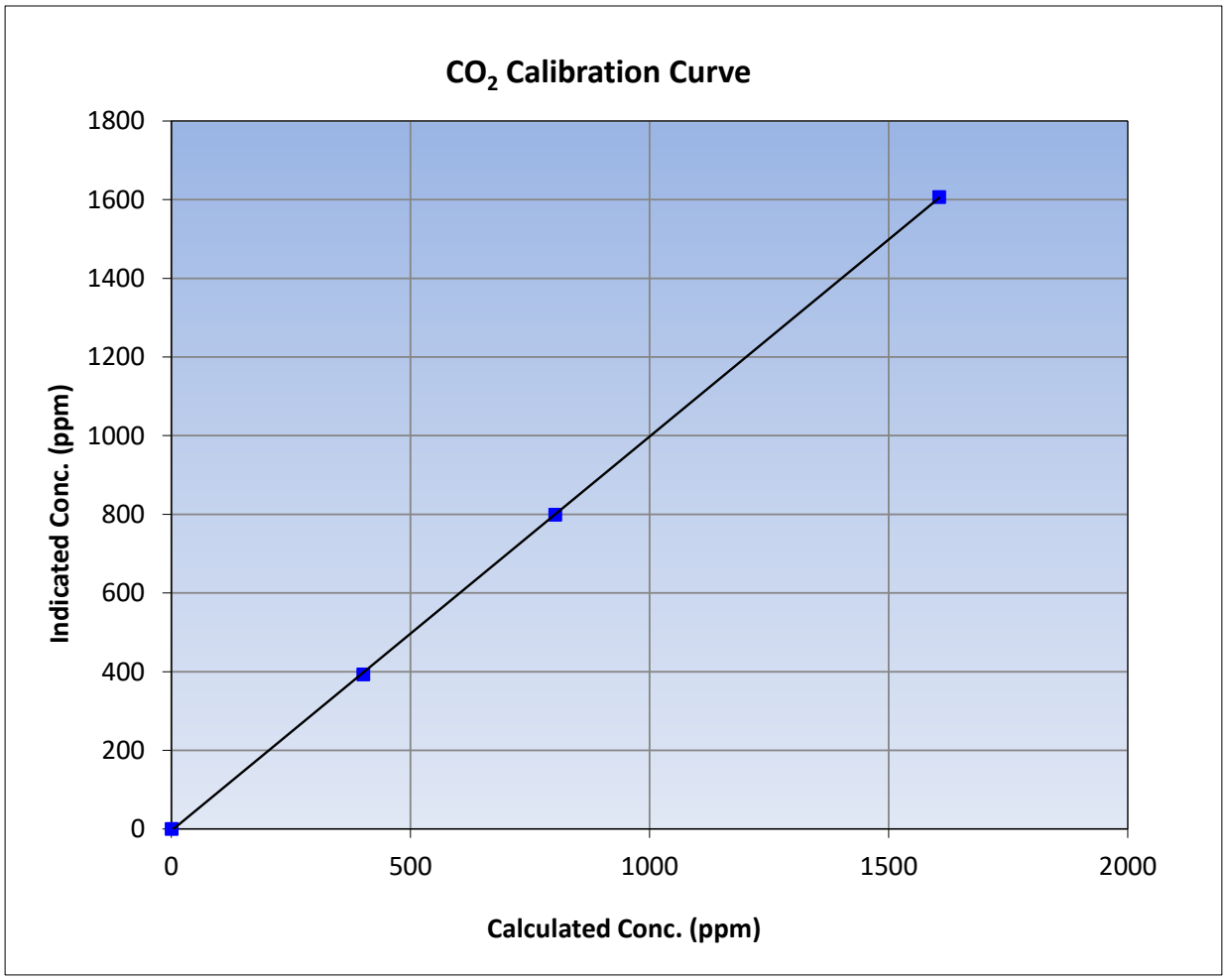
Station Information

Calibration Date	March 7, 2023	Previous Calibration	February 7, 2023
Station Name	Bertha Ganter-Fort McKay	Station Number	AMS01
Start Time (MST)	10:47	End Time (MST)	14:38
Analyzer make	Teledyne API 360	Analyzer serial #	442

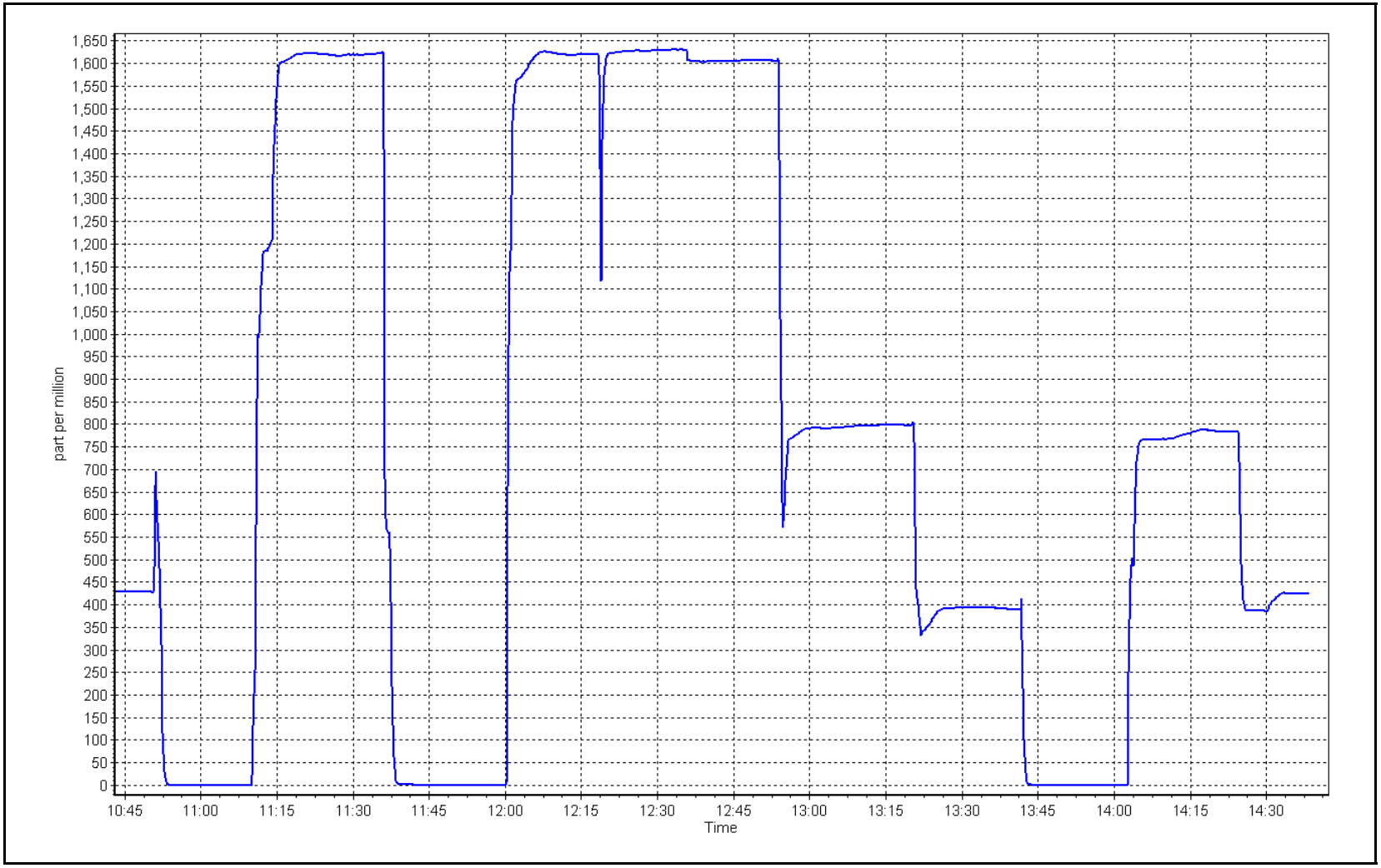
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
1605.3	1606.1	0.9995
802.7	798.4	1.0053
401.3	393.0	1.0212

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999967	*≥0.995*
Slope	1.002067	*0.90 - 1.10*
Intercept	-4.460000	*+/-10*



CO_2 Calibration Plot Date: March 7, 2023 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

TN - NO_X - NH_3 Calibration Report

Version-11-2021

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
NOX Cal Date:	March 30, 2023	Last Cal Date:	February 17, 2023
Start time (MST):	10:04	End time (MST):	15:15
NH3 Cal Date:	March 30, 2023	Last Cal Date:	February 17, 2023
Start time (MST):	15:35	End time (MST):	20:02
Reason:	Routine		

Calibration Standards

NOX Cal Gas Conc:	50.84	ppm	NO Gas Cylinder #:	T2Y1P9L
NO Cal Gas Conc:	50.04	ppm	NO Cal Gas Expiry:	March 3, 2028
Removed NOX Conc:	50.84	ppm	Removed Cylinder #:	NA
Removed NO Conc:	50.04	ppm	Removed cyl Expiry:	NA
NOX gas Diff:			NO gas Diff:	
NH3 Cal Gas Conc:	72.93	ppm	NH3 Gas Cylinder #:	CC281298
			NH3 Cal Gas Expiry:	February 28, 2023
Removed NH3 Conc:	72.93	ppm	Removed Cylinder #:	NA
NH3 gas Diff:			Removed cyl Expiry:	NA
Calibrator Model:	Teledyne API T700		Serial Number:	3565
ZAG make/model:	Teledyne API T701		Serial Number:	5609

Analyzer Information

Analyzer model:	Teledyne API T201	Analyzer serial #:	808
Converter model:	Teledyne API T501	Converter serial #:	824
NH3 Range (ppb):	0 - 2000 ppb	Reaction cell Press:	5.20
NOX Range (ppb):	0 - 1000 ppb	Sample Flow:	468

	Start	*Finish*		*Start*	*Finish*
NO coefficient:	0.833	0.828	TN coefficient:	0.828	0.828
NOX coefficient:	0.834	0.829	NO bkgrnd:	-11.017	-0.727
NO2 coefficient:	1.000	1.000	NOX bkgrnd:	-10.278	0.384
NH3 coefficient:	0.854	0.911	TN bkgrnd:	-4.631	2.561

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	1.000885	1.002051
NO_X Cal Offset:	0.380000	-1.360000
NO Cal Slope:	0.999215	1.003626
NO Cal Offset:	-0.780000	-1.700000
NO_2 Cal Slope:	0.999881	1.006842
NO_2 Cal Offset:	0.372129	-0.842838
NH3 Cal Slope:	1.010718	1.004604
NH3 Cal Offset:	-8.022555	-2.552362
TN Cal Slope:	1.015098	1.007959
TN Cal Offset:	-7.787324	-2.846246

Wood Buffalo Environmental Association

TN - NOX - NH_3 Calibration Report

Version-11-2021

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated TN concentration (ppb) (Cc)	Calculated NOX concentration (ppb) (Cc)	Calculated NH3 concentration (ppb) (Cc)	Indicated TN concentration (ppb) (Ic)	Indicated NOX concentration (ppb) (Ic)	Indicated NH3 concentration (ppb) (Ic)	TN Correction factor (Cc/Ic) *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	1.6	3.8	-2.2	----	----
as found NO	4920	80.0	813.4	813.4	----	824.0	826.4	-2.4	0.987	----
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
high NO point	4920	80.0	813.4	813.4	----	814.8	815.0	0.0	0.998	----
NO/O3 point	4920	80.0	813.4	813.4	----	808.0	808.8	-0.9	1.007	----
as found NH3	3413	86.4	1800.6	----	1800.6	1819.1	----	1813.1	0.990	0.993
new NH3 cyl rp							----			
first NH3	3413	86.4	1800.6	----	1800.6	1819.1	----	1813.1	0.990	0.993
second NH3	3452	48.0	1000.2	----	1000.2	989.9	----	987.2	1.010	1.013
third NH3	3476	24.0	500.1	----	500.1	506.9	----	505.7	0.987	0.989
								Average Correction Factor	1.0025	0.9984

Corrected As found TN = 822.4 ppb NO_X = 822.6 ppb NH3 = 1815.3 ppb

Previous Response TN = 817.9 ppb NO_X = 814.5 ppb NH3 = 1811.9 ppb

*Percent Change TN = 0.5%

*Percent Change NO_X = 1.0%

*Percent Change NH3 = 0.2%

* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 85.4%

NH3 Current Converter Efficiency = 91.1%

Wood Buffalo Environmental Association

NO_X - NO - NO_2 Calibration Report

Version-11-2021

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	3.8	3.9	1.6	----	----
as found span	4920	80.0	813.4	800.6	813.4	826.4	810.3	824.0	0.9843	0.9881
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	----	----
high point	4920	80.0	813.4	800.6	813.4	815.0	802.4	814.8	0.9981	0.9978
second point	4960	40.0	406.7	400.3	406.7	403.8	400.0	404.6	1.0072	1.0008
third point	4980	20.0	203.4	200.2	203.4	202.2	197.1	202.8	1.0057	1.0155
								Average Correction Factor	1.0037	1.0047

Baseline Corr As fnd	TN =	822.4 ppb	NO_X =	822.6 ppb	NO =	806.4 ppb	*Percent Change	TN = 0.5%
Previous Response	TN =	817.9 ppb	NO_X =	814.5 ppb	NO =	799.2 ppb	*Percent Change	NO_X = 1.0%
							*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	-0.1	----	----
calibration zero	----	----	0.0	0.1	----	----
1st GPT point (400 ppb O3)	793.7	387.7	418.8	421.2	0.9943	100.6%
2nd GPT point (200 ppb O3)	793.7	597.5	209.0	209.5	0.9976	100.2%
3rd GPT point (100 ppb O3)	793.7	693.1	113.4	112.1	1.0116	98.9%
				Average Correction Factor	1.0012	99.9%

Notes: Changed the inlet filter. Adjusted both zero and span. Adjusted the NH3 span.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TN Calibration Summary

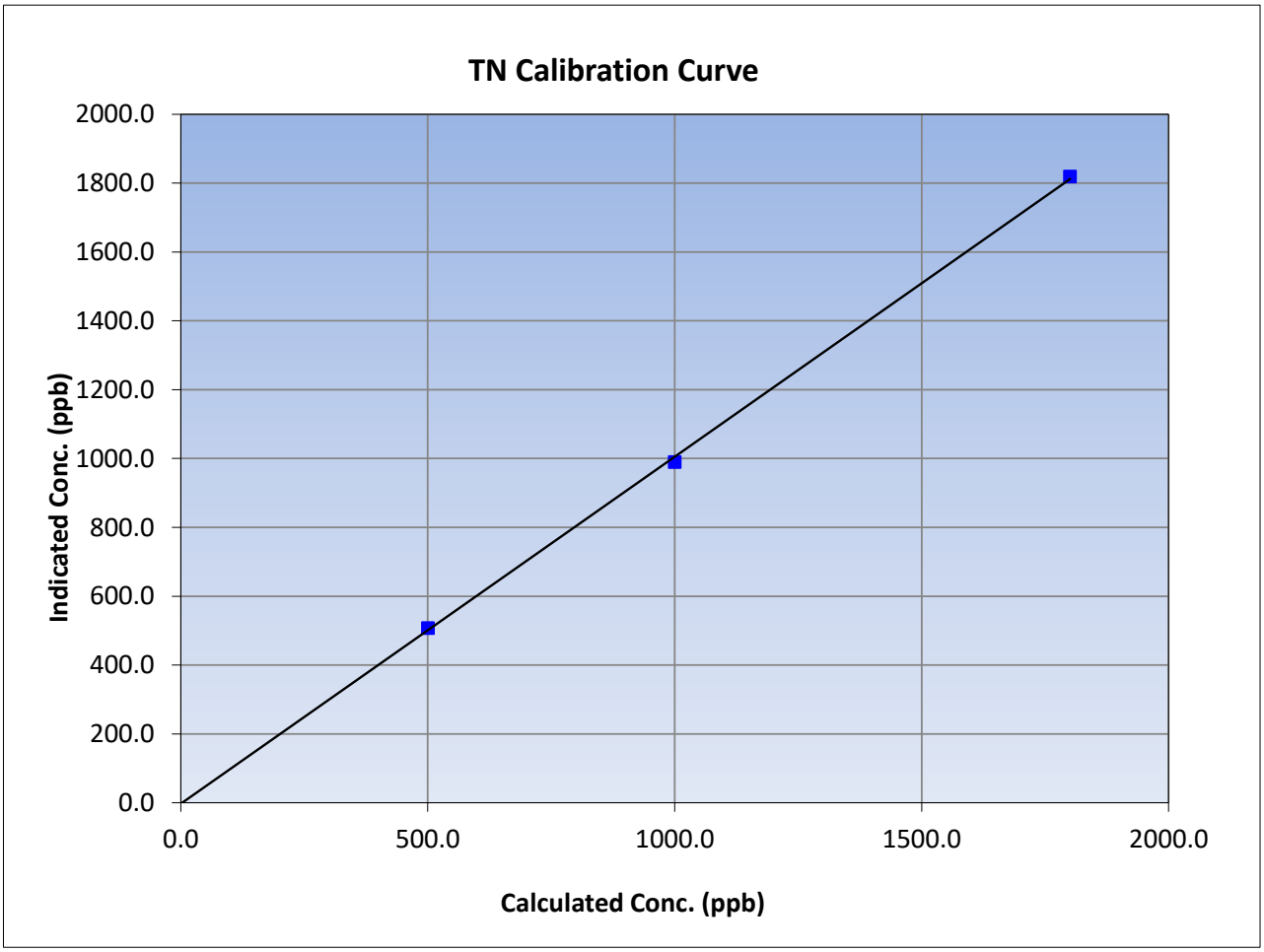
Version-11-2021

Station Information

Calibration Date:	March 30, 2023	Previous Calibration:	February 17, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:04	End Time (MST):	15:15
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	-0.1	----	Correlation Coefficient	0.999819	≥0.995
1800.6	1819.1	0.9899			
1000.2	989.9	1.0104	Slope	1.007959	0.90 - 1.10
500.1	506.9	0.9866			
			Intercept	-2.846246	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

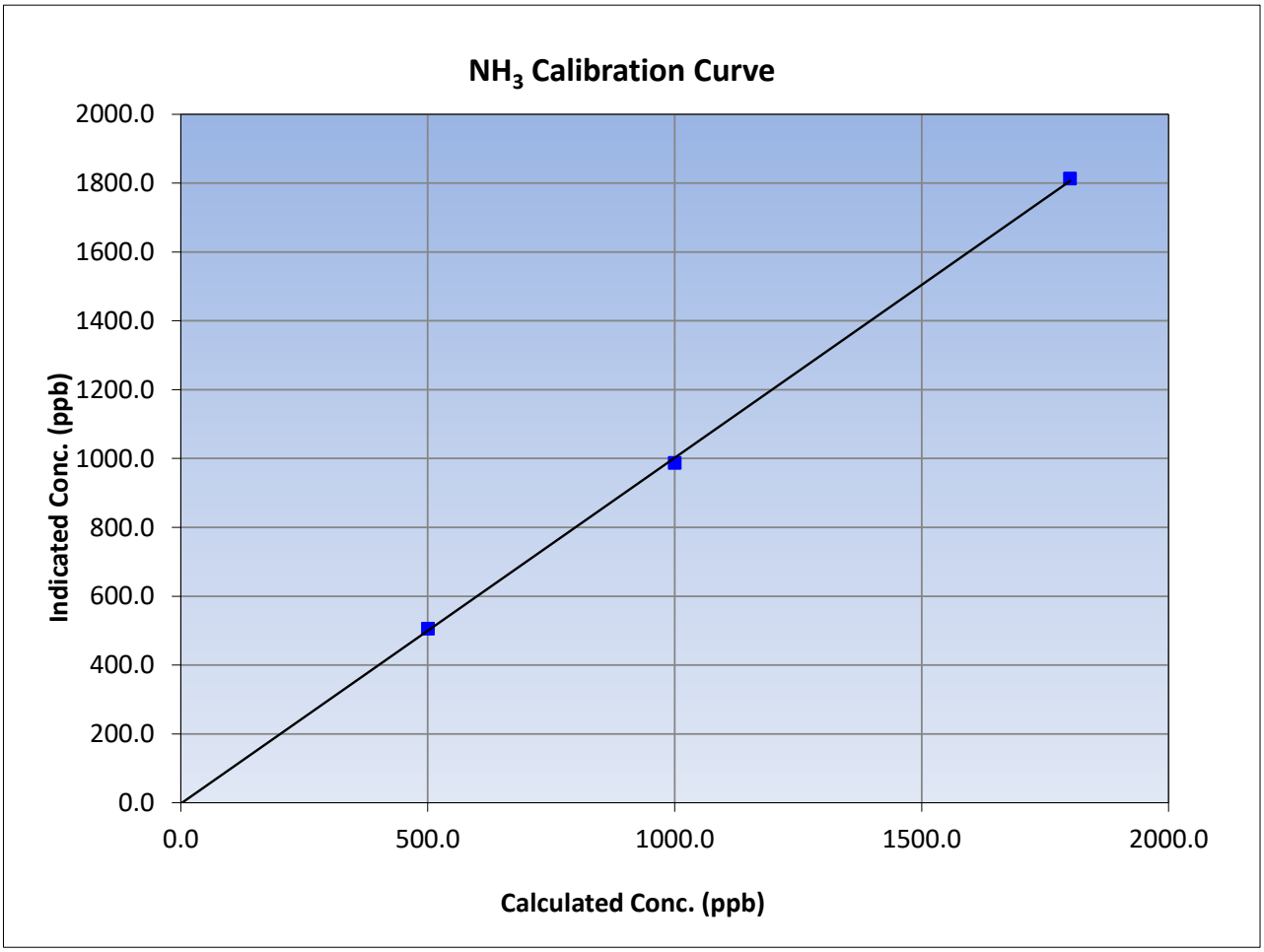
Version-11-2021

Station Information

Calibration Date:	March 30, 2023	Previous Calibration:	February 17, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:04	End Time (MST):	15:15
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	-0.1	----	Correlation Coefficient	0.999825	≥0.995
1800.6	1813.1	0.9931			
1000.2	987.2	1.0132	Slope	1.004604	0.90 - 1.10
500.1	505.7	0.9889			
			Intercept	-2.552362	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

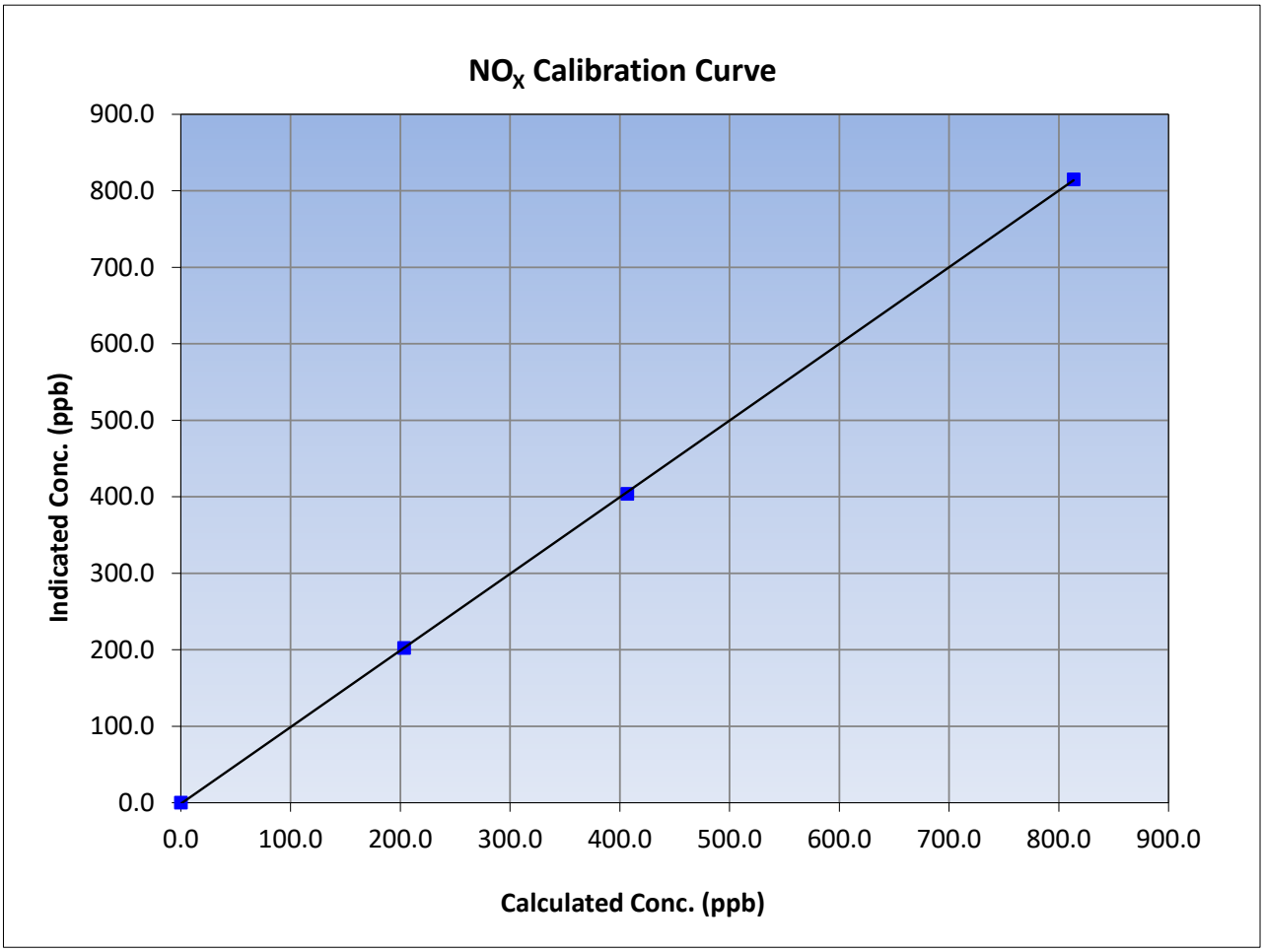
Version-11-2021

Station Information

Calibration Date:	March 30, 2023	Previous Calibration:	February 17, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:04	End Time (MST):	15:15
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	0.999975	≥0.995
813.4	815.0	0.9981			
406.7	403.8	1.0072	Slope	1.002051	0.90 - 1.10
203.4	202.2	1.0057			
			Intercept	-1.360000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

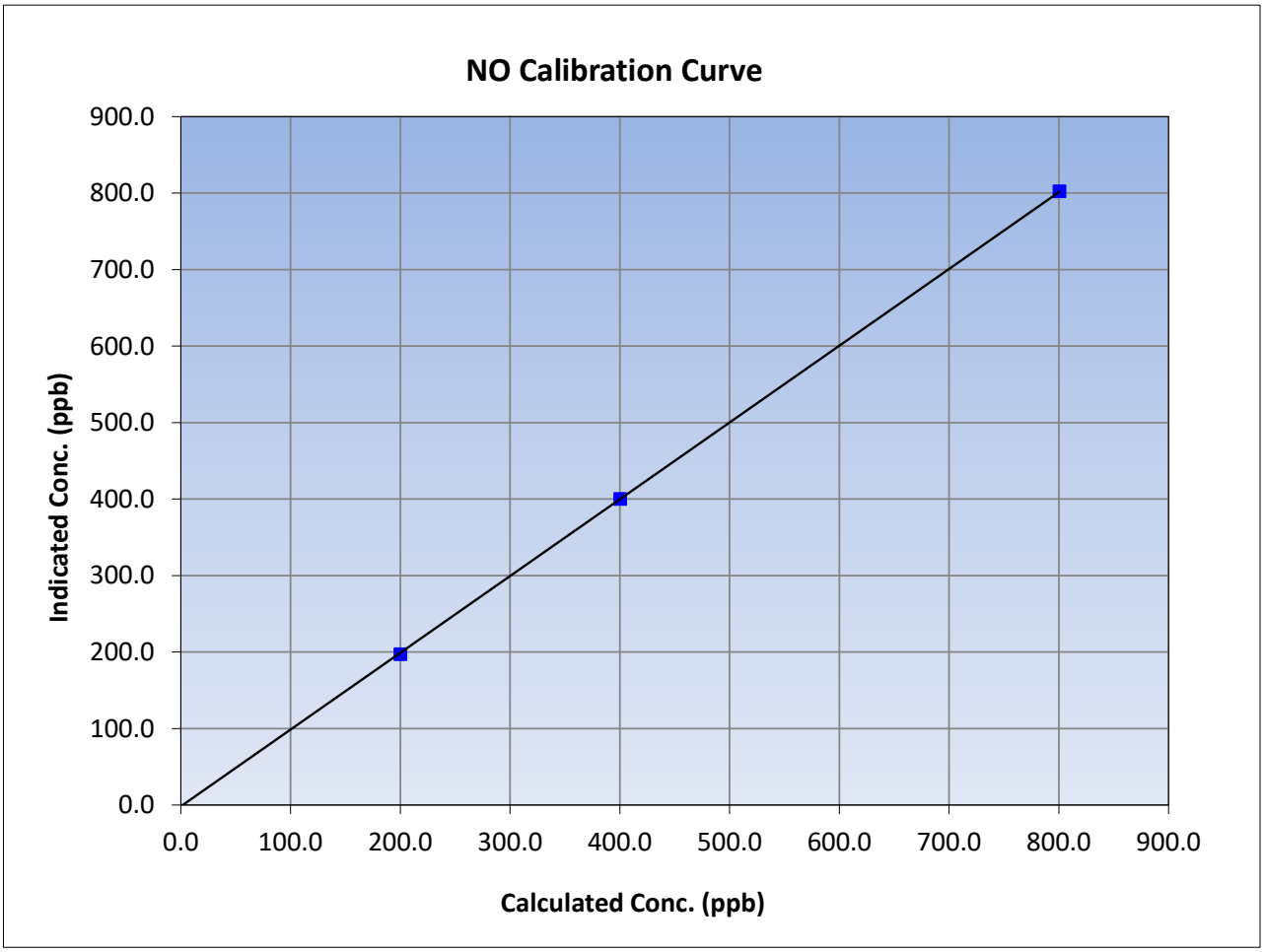
Version-11-2021

Station Information

Calibration Date:	March 30, 2023	Previous Calibration:	February 17, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:04	End Time (MST):	15:15
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	-0.1	----	Correlation Coefficient	0.999980	≥0.995
800.6	802.4	0.9978			
400.3	400.0	1.0008	Slope	1.003626	0.90 - 1.10
200.2	197.1	1.0155			
			Intercept	-1.700000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

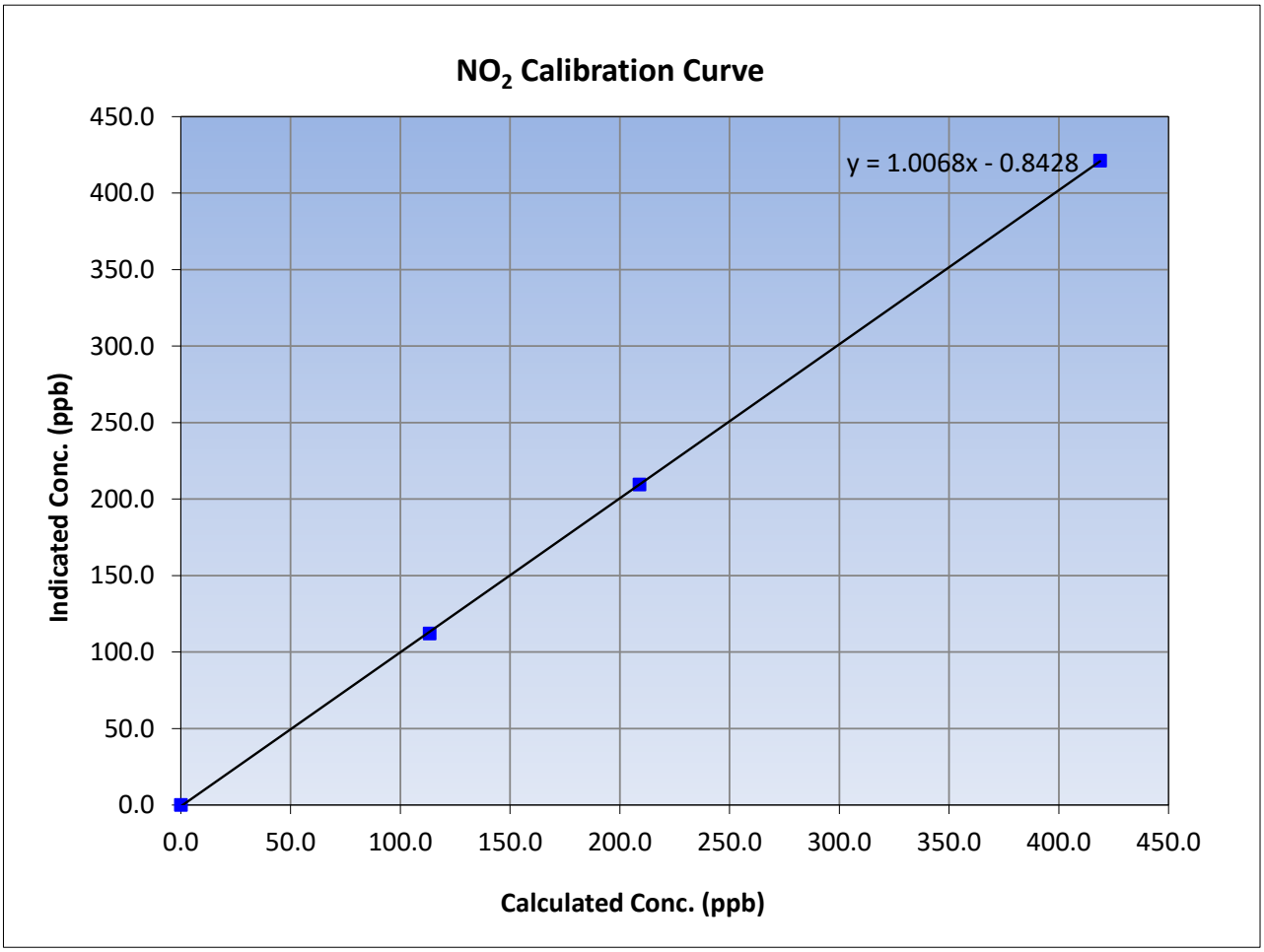
Version-11-2021

Station Information

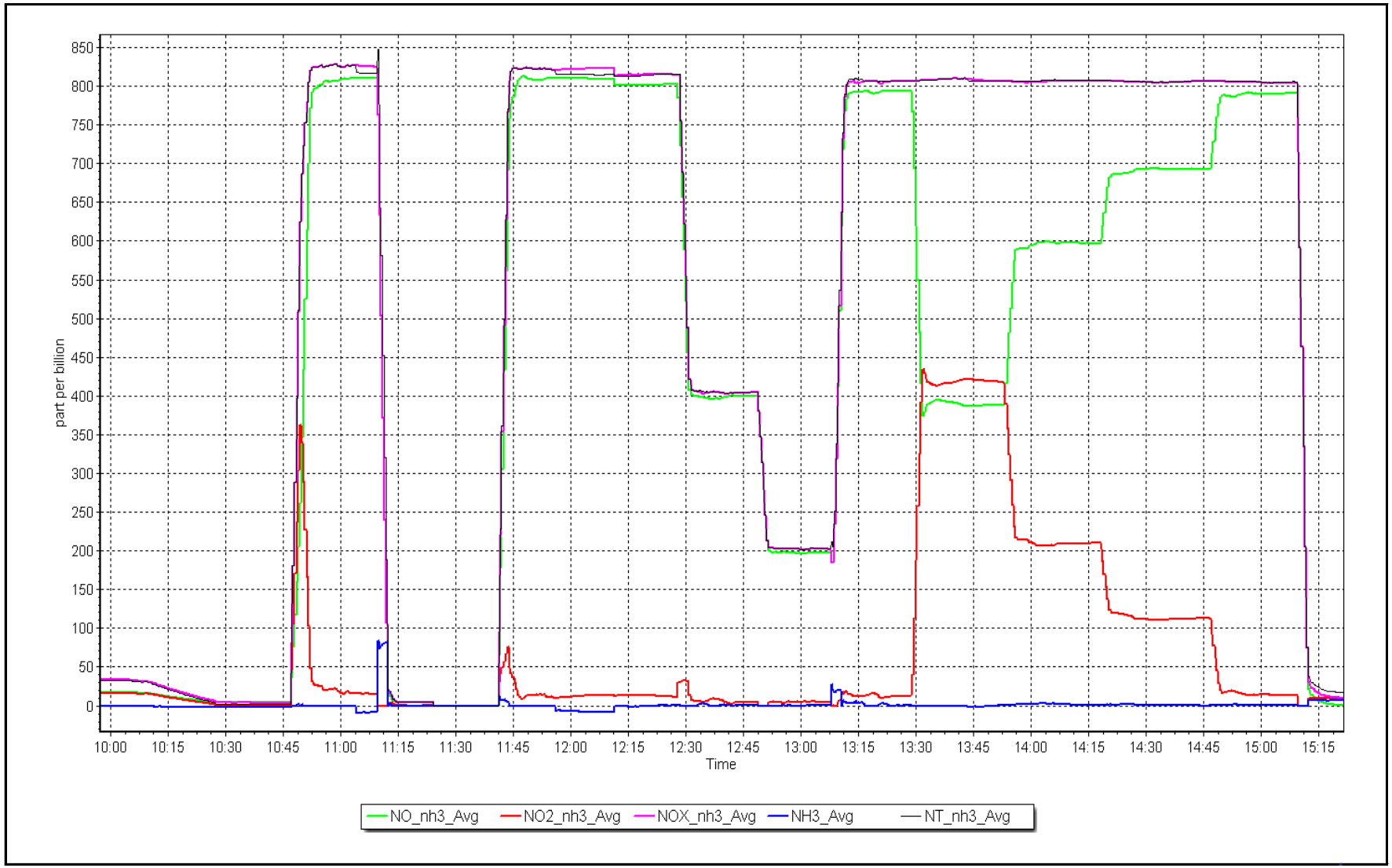
Calibration Date:	March 30, 2023	Previous Calibration:	February 17, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:04	End Time (MST):	15:15
Analyzer make:	Teledyne API T201	Analyzer serial #:	808

Calibration Data

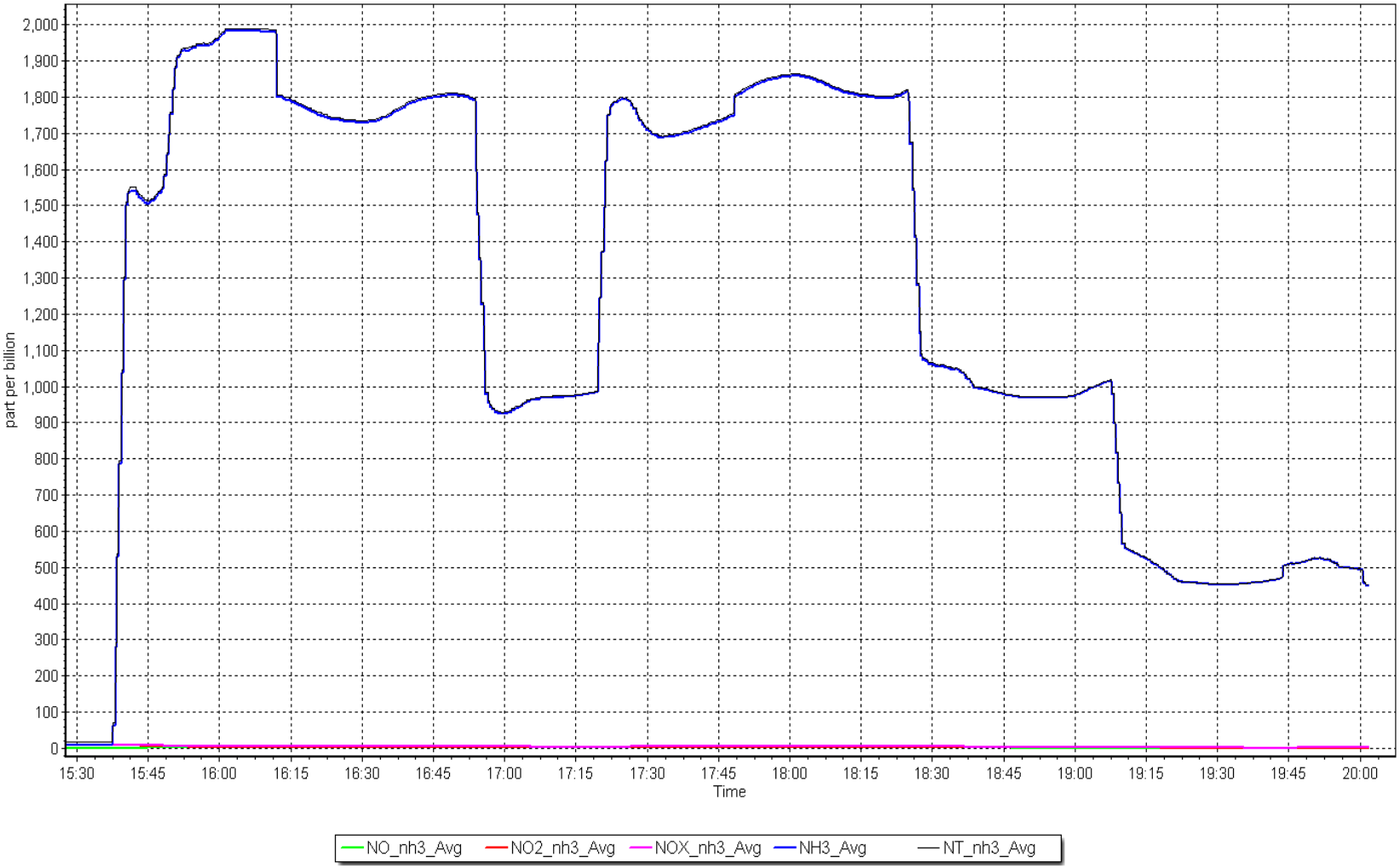
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999973	≥0.995
418.8	421.2	0.9943			
209.0	209.5	0.9976	Slope	1.006842	0.90 - 1.10
113.4	112.1	1.0116			
			Intercept	-0.842838	+/-20



NO_X Calibration Plot Date: March 30, 2023 Location: Bertha Ganter-Fort McKay



NH_3 Calibration Plot Date: March 30, 2023 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

TN - NO_X - NH_3 Calibration Report

Version-11-2021

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
NOX Cal Date:	March 31, 2023	Last Cal Date:	February 17, 2023
Start time (MST):	9:35	End time (MST):	14:10
NH3 Cal Date:	March 31, 2023	Last Cal Date:	February 17, 2023
Start time (MST):	14:30	End time (MST):	17:00
Reason:	Maintenance		

Calibration Standards

NOX Cal Gas Conc:	50.84	ppm	NO Gas Cylinder #:	T2Y1P9L
NO Cal Gas Conc:	50.04	ppm	NO Cal Gas Expiry:	March 3, 2028
Removed NOX Conc:	50.84	ppm	Removed Cylinder #:	NA
Removed NO Conc:	50.04	ppm	Removed cyl Expiry:	NA
NOX gas Diff:			NO gas Diff:	
NH3 Cal Gas Conc:	72.93	ppm	NH3 Gas Cylinder #:	CC281298
			NH3 Cal Gas Expiry:	February 28, 2023
Removed NH3 Conc:	72.93	ppm	Removed Cylinder #:	NA
NH3 gas Diff:			Removed cyl Expiry:	NA
Calibrator Model:	Teledyne API T700		Serial Number:	3565
ZAG make/model:	Teledyne API T701		Serial Number:	5609

Analyzer Information

Analyzer model:	Teledyne API T201	Analyzer serial #:	808
Converter model:	Teledyne API T501	Converter serial #:	824
NH3 Range (ppb):	0 - 2000 ppb	Reaction cell Press:	5.20
NOX Range (ppb):	0 - 1000 ppb	Sample Flow:	466

	Start	*Finish*		*Start*	*Finish*
NO coefficient:	0.828	0.850	TN coefficient:	0.828	0.850
NOX coefficient:	0.829	0.854	NO bkgrnd:	-0.727	-1.529
NO2 coefficient:	1.000	1.000	NOX bkgrnd:	0.384	-1.049
NH3 coefficient:	0.911	0.937	TN bkgrnd:	2.561	3.877

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	1.002051	1.003400
NO_X Cal Offset:	-1.360000	-1.540000
NO Cal Slope:	1.003626	0.999800
NO Cal Offset:	-1.700000	-1.960000
NO_2 Cal Slope:	1.006842	1.014549
NO_2 Cal Offset:	-0.842838	0.808984
NH3 Cal Slope:	1.004604	0.996086
NH3 Cal Offset:	-2.552362	-1.322705
TN Cal Slope:	1.007959	0.999769
TN Cal Offset:	-2.846246	-1.287257

Wood Buffalo Environmental Association

TN - NOX - NH_3 Calibration Report

Version-11-2021

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated TN concentration (ppb) (Cc)	Calculated NOX concentration (ppb) (Cc)	Calculated NH3 concentration (ppb) (Cc)	Indicated TN concentration (ppb) (Ic)	Indicated NOX concentration (ppb) (Ic)	Indicated NH3 concentration (ppb) (Ic)	TN Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NH3 Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero										
as found NO										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
high NO point	4920	80.0	813.4	813.4	----	815.0	816.0	-1.1	0.998	----
NO/O3 point										
as found NH3										
new NH3 cyl rp							----			
first NH3	3413	86.4	1800.6	----	1800.6	1800.3	----	1793.6	1.000	1.004
second NH3	3452	48.0	1000.2	----	1000.2	996.3	----	992.7	1.004	1.008
third NH3	3476	24.0	500.1	----	500.1	498.5	----	496.5	1.003	1.007
							Average Correction Factor		0.9981	1.0062

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

Previous Response TN = NA ppb NO_X = NA ppb NH3 = NA ppb

*Percent Change TN = NA

*Percent Change NO_X = NA

*Percent Change NH3 = NA

* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 91.1%

NH3 Current Converter Efficiency = 93.7%

Wood Buffalo Environmental Association

NO_X - NO - NO_2 Calibration Report

Version-11-2021

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										
as found span										
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	----	----
high point	4920	80.0	813.4	800.6	813.4	816.0	799.9	815.0	0.9969	1.0009
second point	4960	40.0	406.7	400.3	406.7	404.1	396.1	404.1	1.0065	1.0107
third point	4980	20.0	203.4	200.2	203.4	202.1	197.0	202.1	1.0062	1.0160
								Average Correction Factor	1.0032	1.0092

Baseline Corr As fnd TN = NA ppb NO_X = NA ppb NO = NA ppb

Previous Response TN = NA ppb NO_X = NA ppb NO = NA ppb

*Percent Change TN = NA

*Percent Change NO_X = NA

*Percent Change NO = NA

* = > +/-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						
calibration zero	----	----	0.0	0.0	----	----
1st GPT point (400 ppb O3)	788.1	394.5	406.4	413.2	0.9835	101.7%
2nd GPT point (200 ppb O3)	788.1	589.7	211.2	214.0	0.9869	101.3%
3rd GPT point (100 ppb O3)	788.1	692.4	108.5	112.7	0.9627	103.9%
				Average Correction Factor	0.9777	102.3%

Notes: As founds were skipped because they were done yesterday. Changed out the pump and scrubber pack. Changed out the vent line. Adjusted both zero and span. Adjusted the NH3 span. Used the 2nd GPT reference point.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TN Calibration Summary

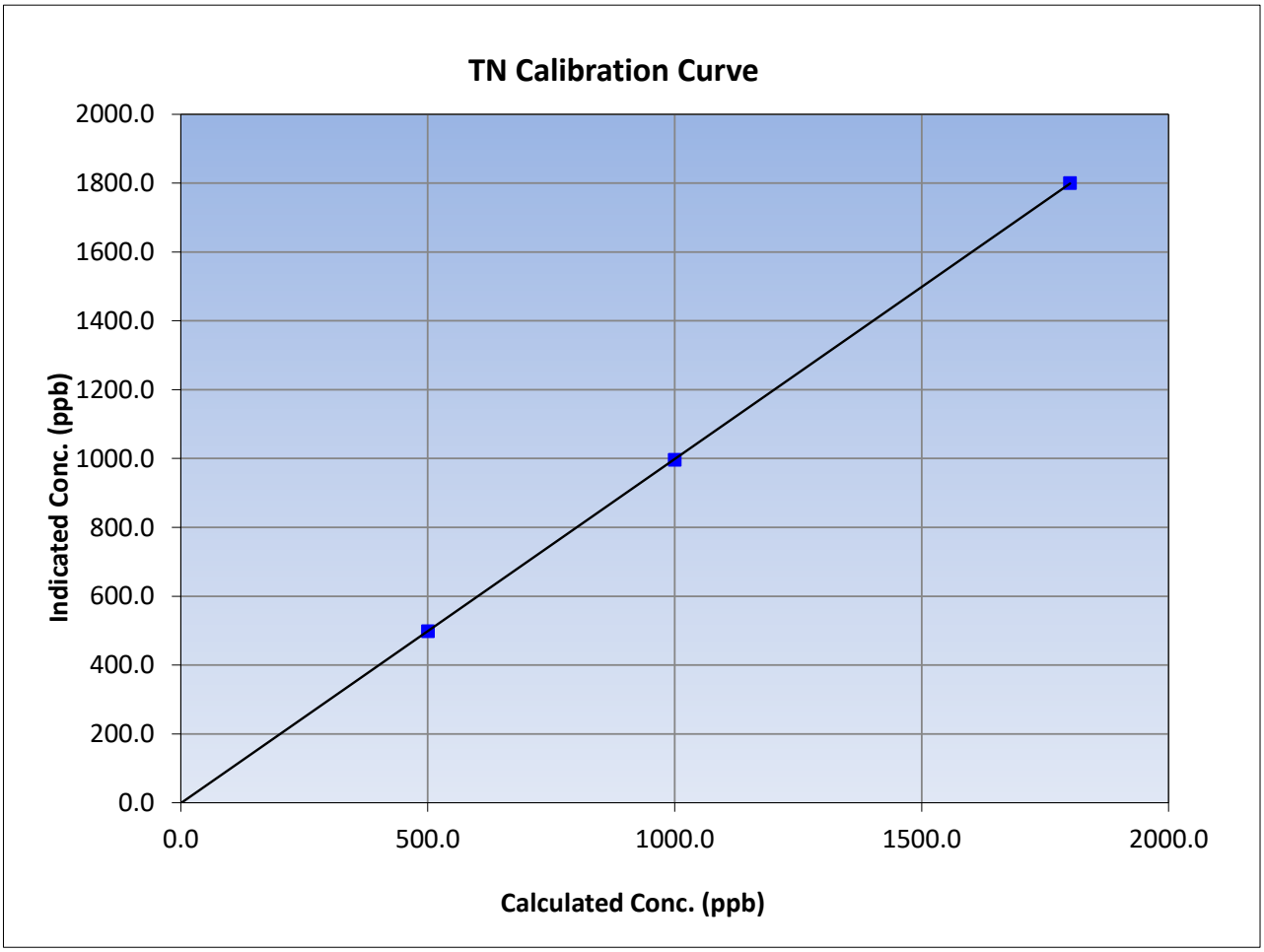
Version-11-2021

Station Information

Calibration Date:	March 31, 2023	Previous Calibration:	February 17, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:35	End Time (MST):	14:10
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	-0.1	----	Correlation Coefficient	0.999995	≥0.995
1800.6	1800.3	1.0002			
1000.2	996.3	1.0039	Slope	0.999769	0.90 - 1.10
500.1	498.5	1.0032			
			Intercept	-1.287257	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

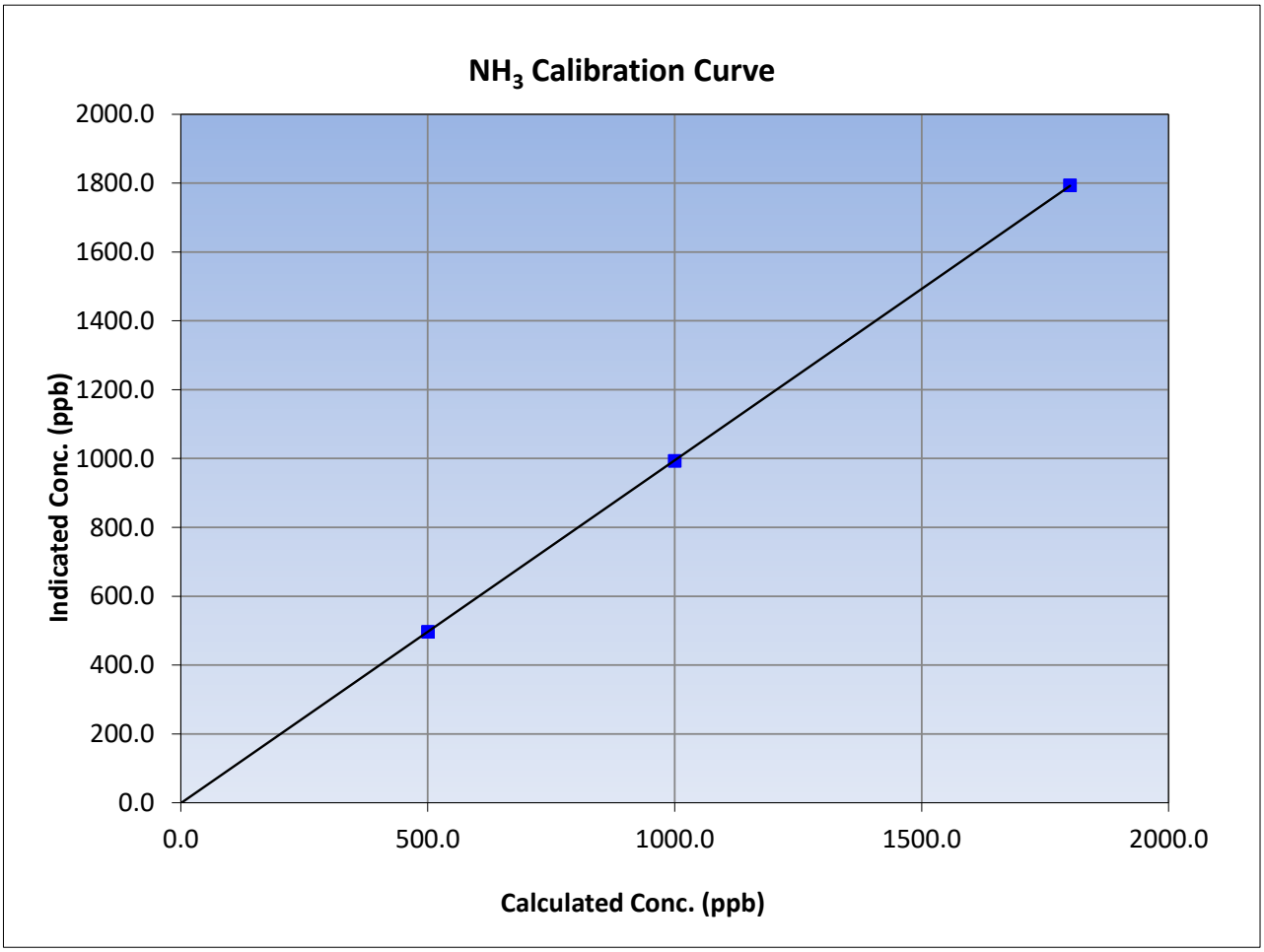
Version-11-2021

Station Information

Calibration Date:	March 31, 2023	Previous Calibration:	February 17, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:35	End Time (MST):	14:10
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	-0.1	----	Correlation Coefficient	0.999995	≥0.995
1800.6	1793.6	1.0039			
1000.2	992.7	1.0075	Slope	0.996086	0.90 - 1.10
500.1	496.5	1.0072			
			Intercept	-1.322705	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

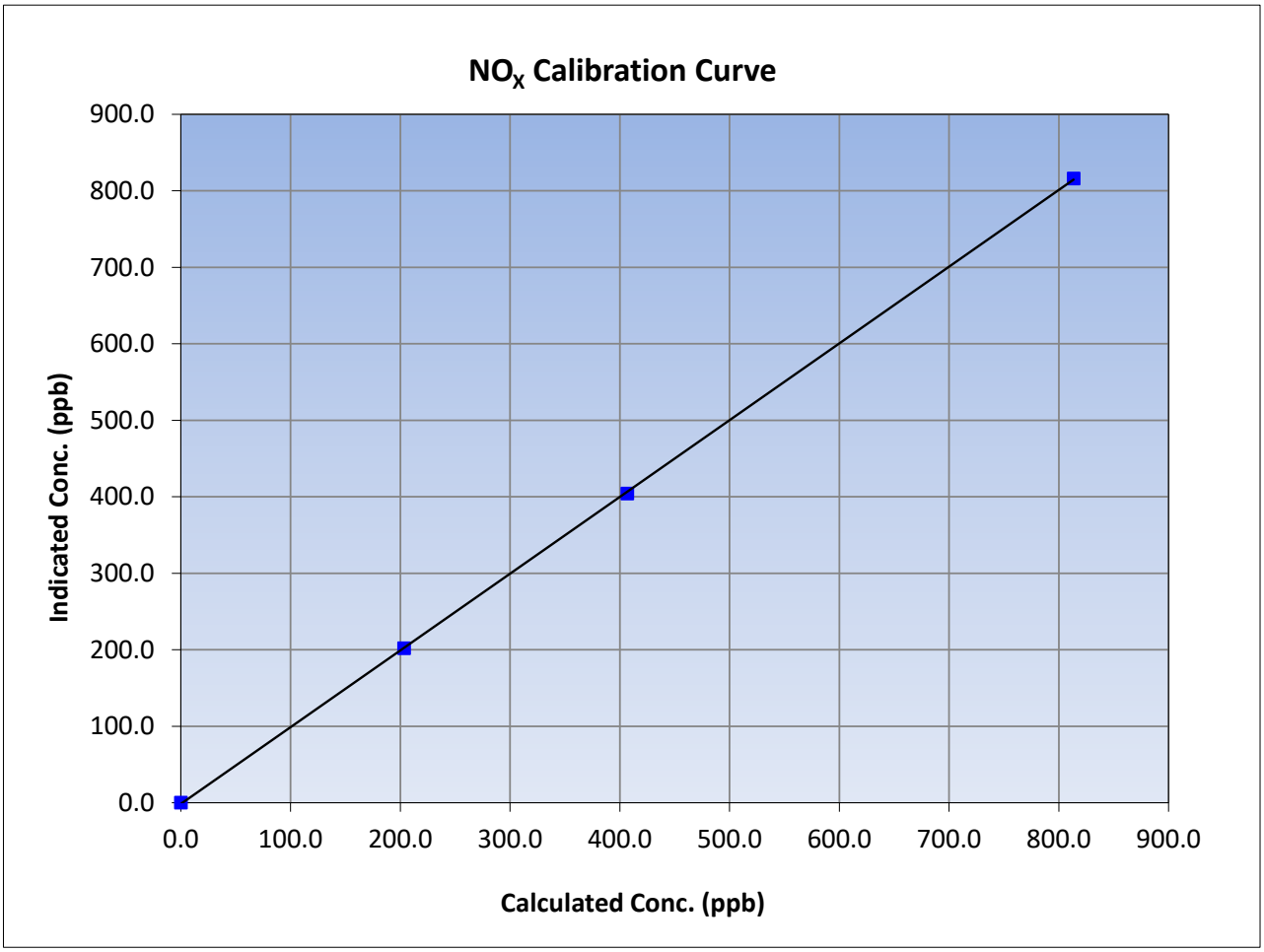
Version-11-2021

Station Information

Calibration Date:	March 31, 2023	Previous Calibration:	February 17, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:35	End Time (MST):	14:10
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	0.999971	≥0.995
813.4	816.0	0.9969			
406.7	404.1	1.0065	Slope	1.003400	0.90 - 1.10
203.4	202.1	1.0062			
			Intercept	-1.540000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

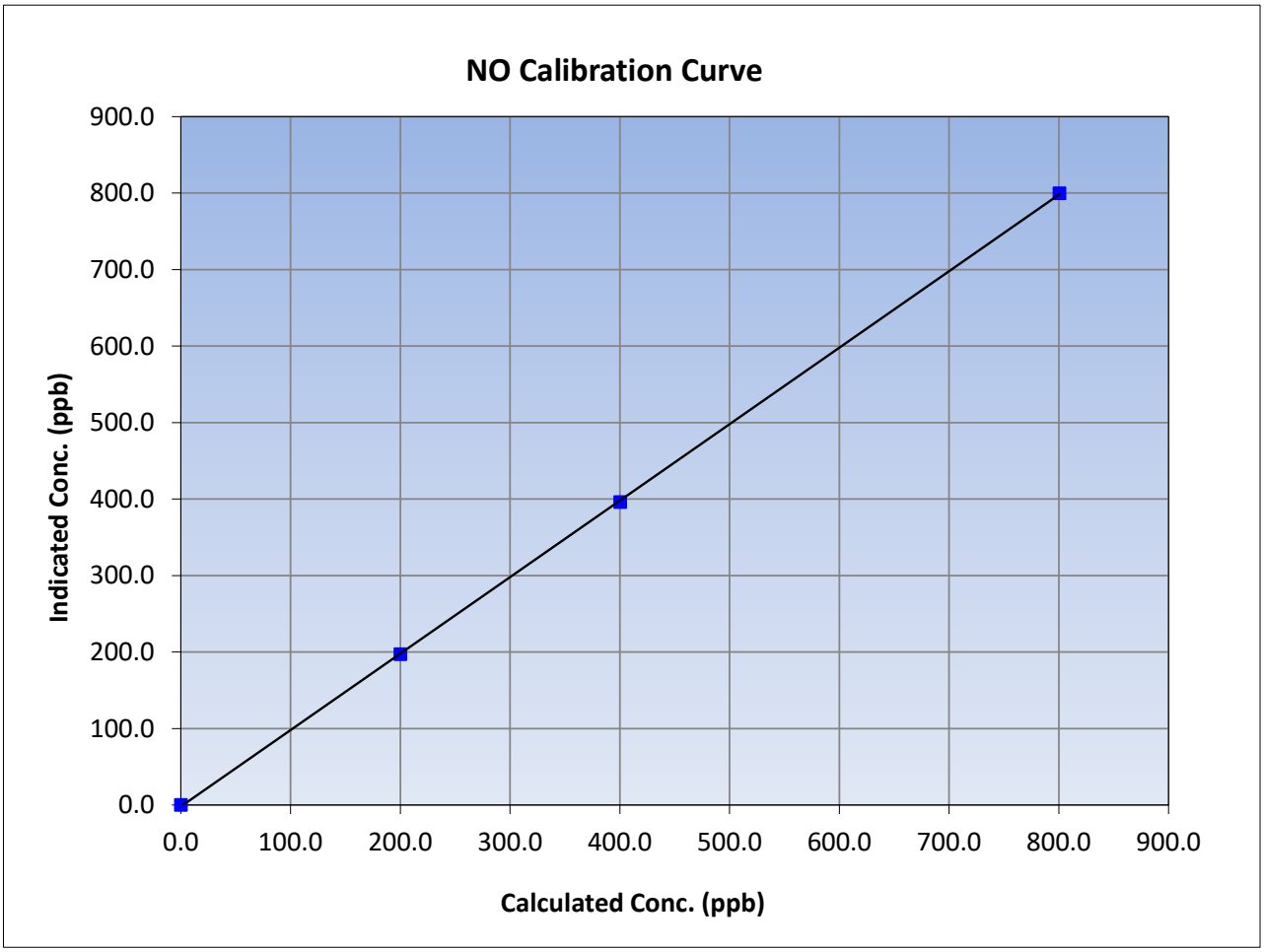
Version-11-2021

Station Information

Calibration Date:	March 31, 2023	Previous Calibration:	February 17, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:35	End Time (MST):	14:10
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	0.999966	≥0.995
800.6	799.9	1.0009			
400.3	396.1	1.0107	Slope	0.999800	0.90 - 1.10
200.2	197.0	1.0160			
			Intercept	-1.960000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

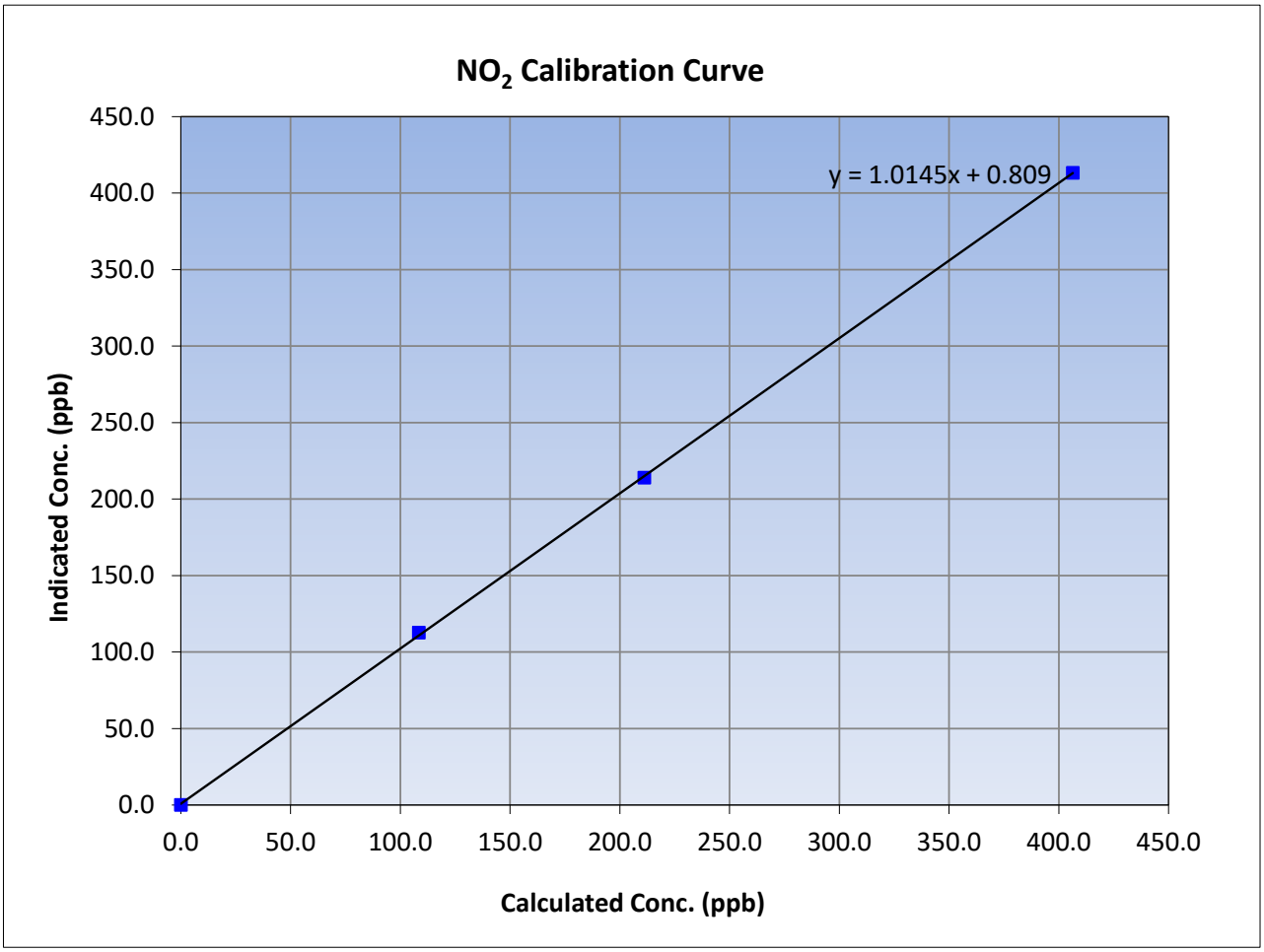
Version-11-2021

Station Information

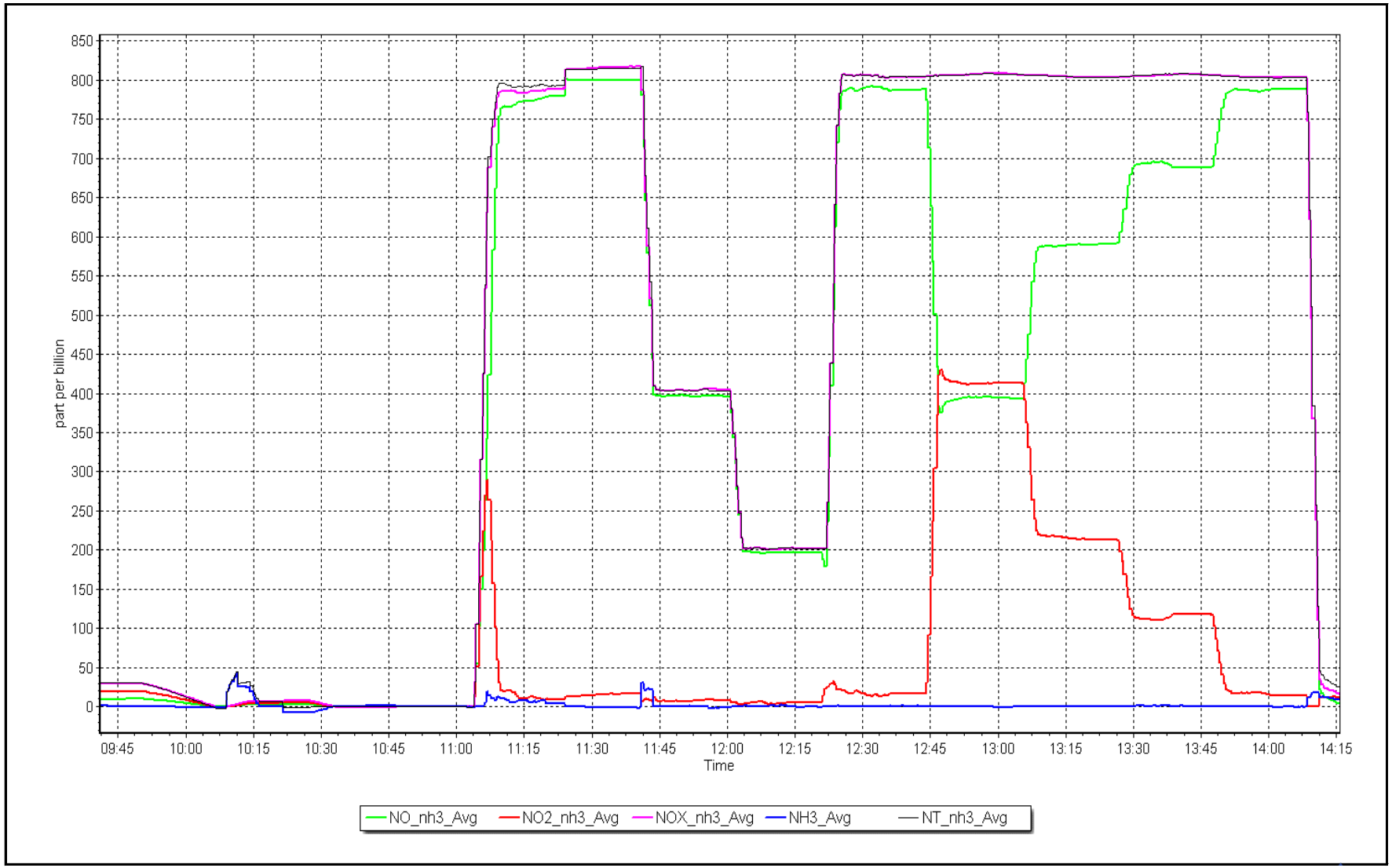
Calibration Date:	March 31, 2023	Previous Calibration:	February 17, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:35	End Time (MST):	14:10
Analyzer make:	Teledyne API T201	Analyzer serial #:	808

Calibration Data

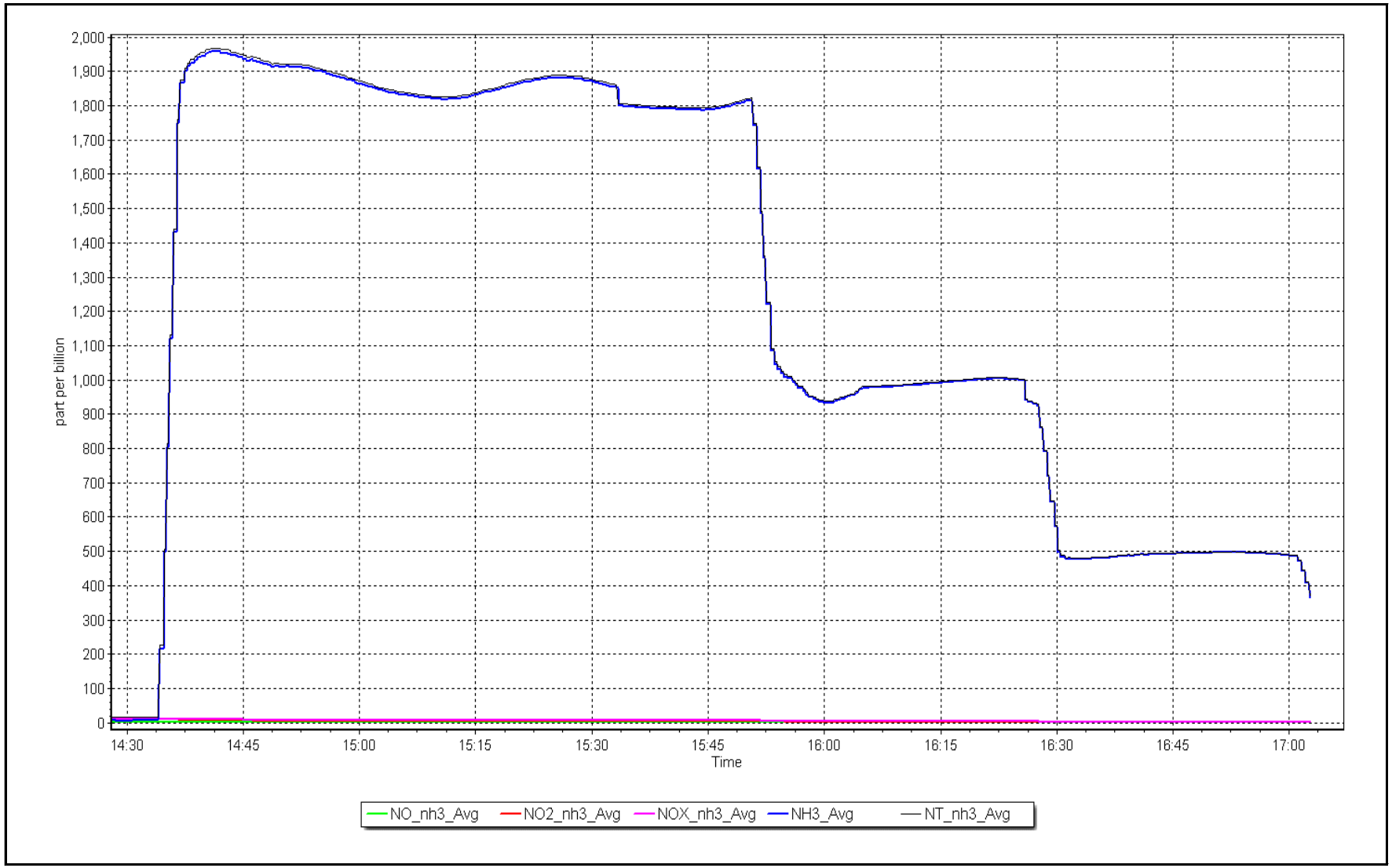
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999945	≥0.995
406.4	413.2	0.9835			
211.2	214.0	0.9869	Slope	1.014549	0.90 - 1.10
108.5	112.7	0.9627			
			Intercept	0.808984	+/-20



NO_X Calibration Plot Date: March 31, 2023 Location: Bertha Ganter-Fort McKay



NH_3 Calibration Plot Date: March 31, 2023 Location: Bertha Ganter-Fort McKay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS02
MILDRED LAKE
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Mildred Lake	Station number:	AMS02
Calibration Date:	March 8, 2023	Last Cal Date:	February 8, 2023
Start time (MST):	9:53 AM	End time (MST):	12:58
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.98	ppm	Cal Gas Exp Date:	August 12, 2024
Cal Gas Cylinder #:	CC501209			
Removed Cal Gas Conc:	49.98	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	1185
ZAG Make/Model:	API T701		Serial Number:	5608

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.002695	1.002096	Backgd or Offset:	17.9	18.0
Calibration intercept:	-0.144667	-0.984595	Coeff or Slope:	0.827	0.811

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.4	----
as found span	4920	80.2	801.6	817.9	0.980
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	803.1	0.998
second point	4960	40.1	400.8	399.3	1.004
third point	4980	20.0	199.9	199.1	1.004
as left zero	5000	0.0	0.0	0.0	----
as left span	4920	80.2	801.6	802.9	0.998
				Average Correction Factor	1.002

Baseline Corr As found:	817.50	Previous response	803.66	*% change	1.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

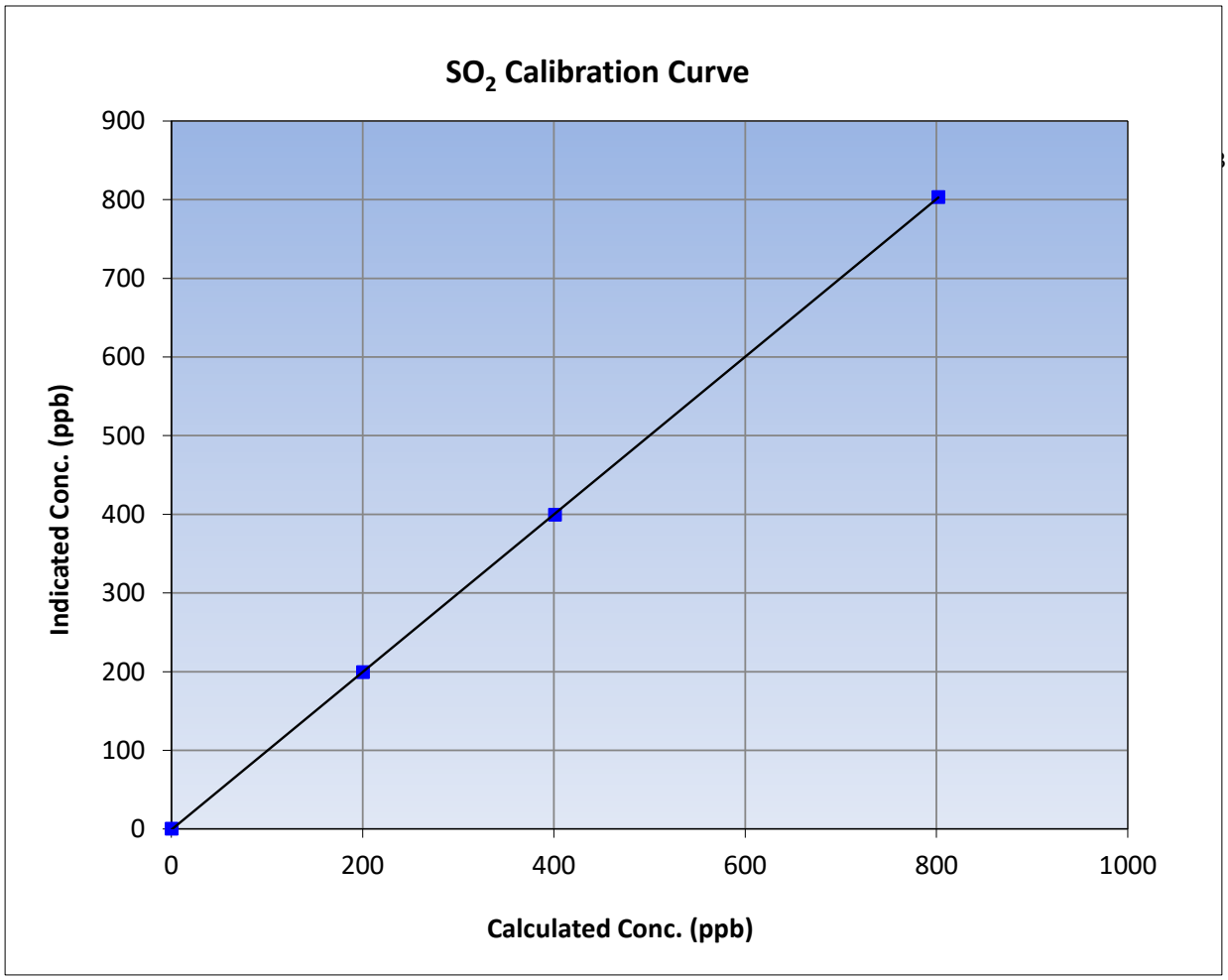
Station Information

Calibration Date:	March 8, 2023	Previous Calibration:	February 8, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:53	End Time (MST):	12:58
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1404901075

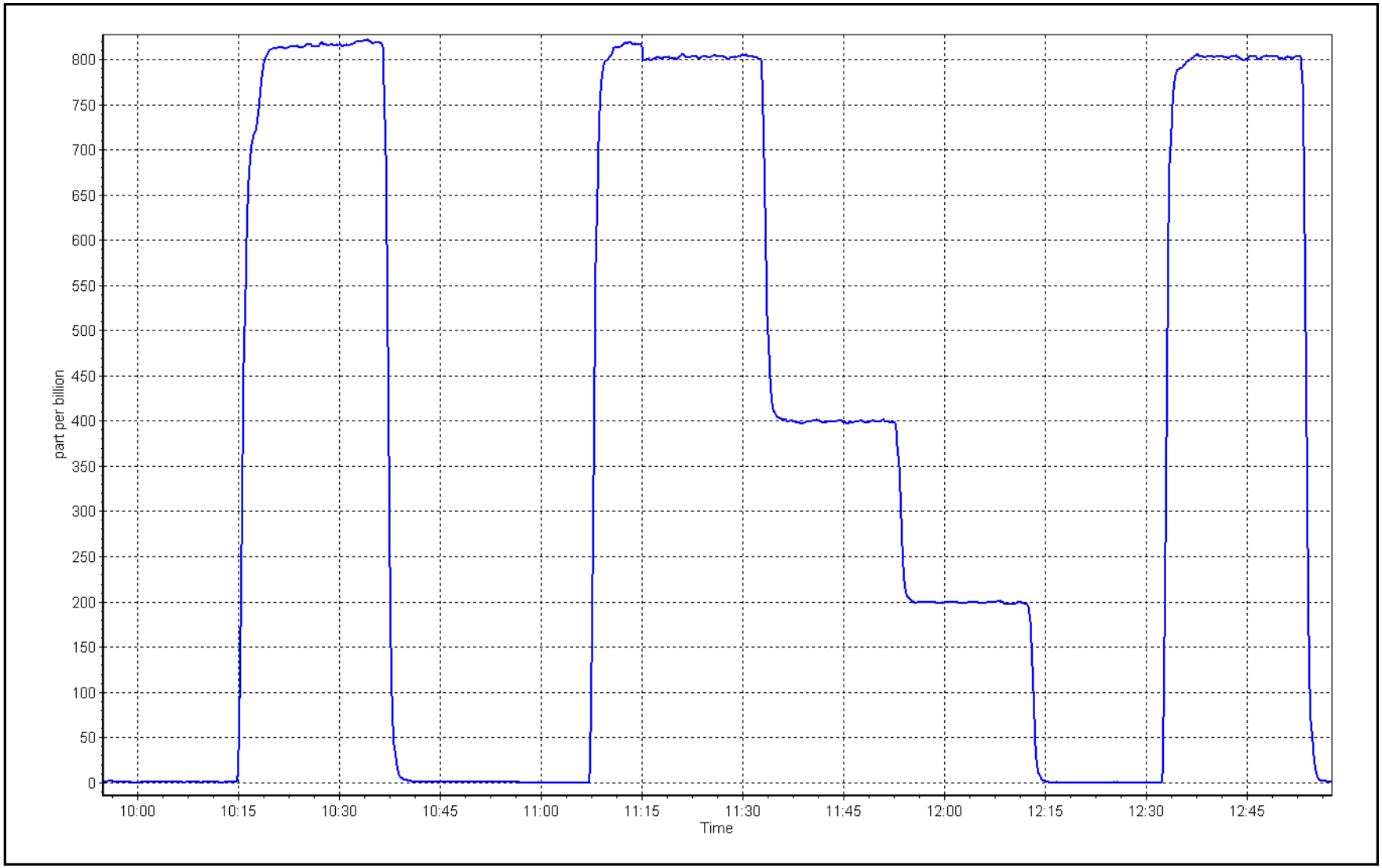
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
801.6	803.1	0.9982
400.8	399.3	1.0038
199.9	199.1	1.0041

Statistical Evaluation		Limits
Correlation Coefficient	0.999991	≥0.995
Slope	1.002096	0.90 - 1.10
Intercept	-0.984595	+/-30



SO2 Calibration Plot Date: March 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:	March 16, 2023	Last Cal Date:	February 6, 2023
Start time (MST):	9:45	End time (MST):	12:45
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43iQTL		Analyzer serial #:	12113311966	
Converter make:	Global G150		Converter serial #:	2022-198	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.993964	1.007251	Backgd or Offset:	1.83	1.83
Calibration intercept:	-0.059204	0.000807	Coeff or Slope:	0.844	0.844

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	81.4	0.981
as found 2nd point	4962	37.8	40.0	40.8	0.978
as found 3rd point	4981	18.9	20.0	20.1	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	0.0	----
high point	4924	75.6	80.0	80.5	0.994
second point	4962	37.8	40.0	40.5	0.988
third point	4981	18.9	20.0	20.0	1.000
as left zero	5000	0.0	0.0	0.1	----
as left span	4924	75.6	80.0	81.6	0.980
SO2 Scrubber Check	4920	80.2	802.0	0.0	----
Date of last scrubber change:		12-Sep-22		Ave Corr Factor	0.994
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.5	Prev response:	79.45	*% change:	2.5%
Baseline Corr 2nd AF pt:	40.9	AF Slope:	1.019824	AF Intercept:	-0.139184
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999986		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

H_2S Calibration Summary

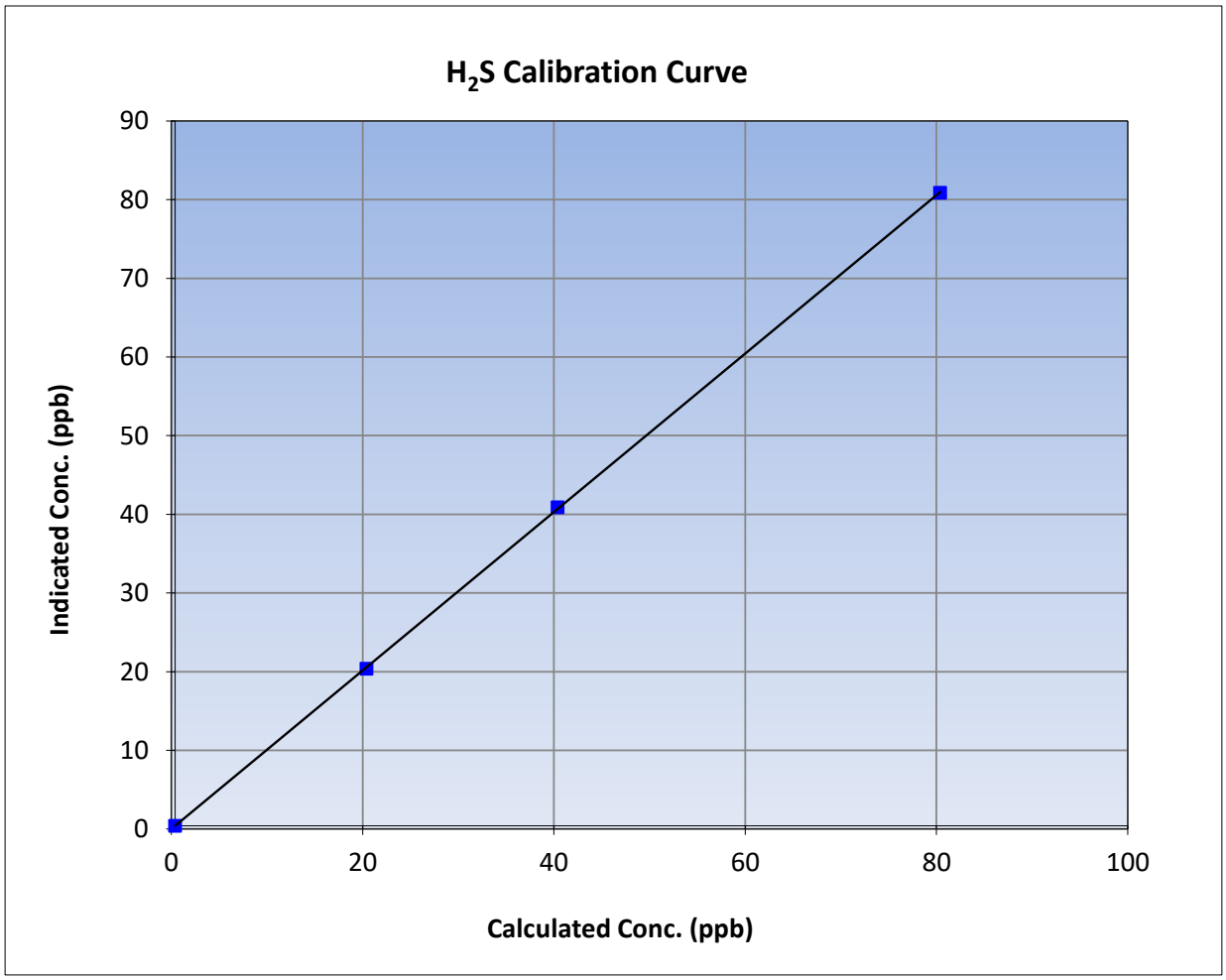
Version-11-2021

Station Information

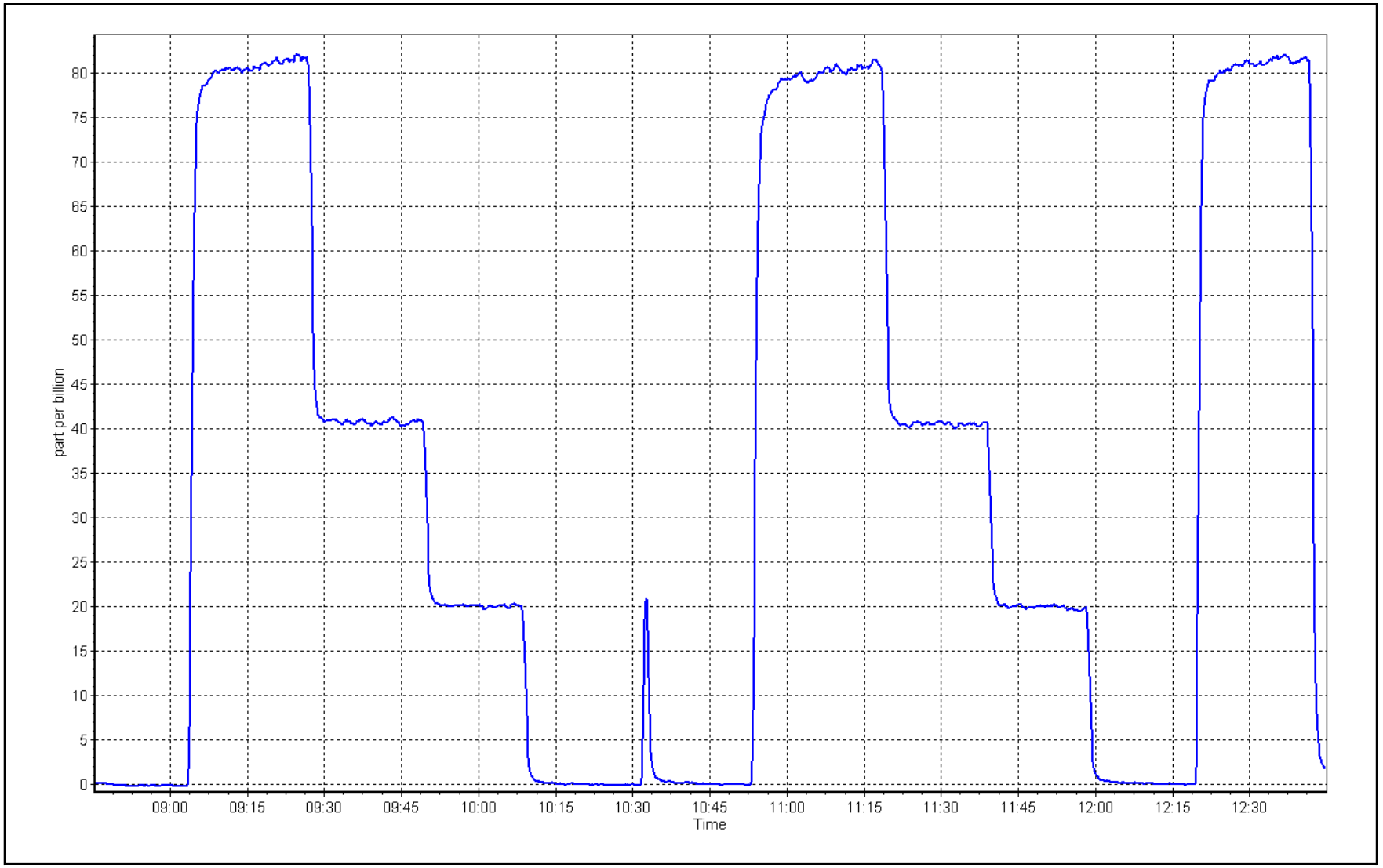
Calibration Date:	March 16, 2023	Previous Calibration:	February 6, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:45	End Time (MST):	12:45
Analyzer make:	API T700	Analyzer serial #:	1185

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999980	*≥0.995*
80.0	80.5	0.9937			
40.0	40.5	0.9875	Slope	1.007251	*0.90 - 1.10*
20.0	20.0	0.9998			
			Intercept	0.000807	*+/-3*



H_2S Calibration Plot Date: March 16, 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:	March 8, 2023	Last Cal Date:	February 8, 2023
Start time (MST):	9:53	End time (MST):	12:58
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC501209	Cal Gas Expiry Date:	August 12, 2024	
CH4 Cal Gas Conc.	500.2	ppm	CH4 Equiv Conc.	1048.6	ppm
C3H8 Cal Gas Conc.	199.4	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:		
Removed CH4 Conc.	500.2	ppm	CH4 Equiv Conc.	1048.6	ppm
Removed C3H8 Conc.	199.4	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	1185	
ZAG make/model:	Teledyne API T701		Serial Number:	5608	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320038	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.80E-04	2.84E-04	NMHC SP Ratio:	4.43E-04	4.45E-04
CH4 Retention time:	14.4	14.6	NMHC Peak Area:	198634	197833
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	16.79	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	16.82	16.82	1.000
second point	4960	40.1	8.41	8.37	1.005
third point	4980	20.0	4.19	4.15	1.010
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	16.82	16.87	0.997
				Average Correction Factor	1.005

Baseline Corr AF:	16.79	Prev response	16.79	*% 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	4920	80.2	8.80	8.83	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	8.80	8.79	1.000
second point	4960	40.1	4.40	4.39	1.001
third point	4980	20.0	2.19	2.19	1.002
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.80	8.83	0.996
				Average Correction Factor	1.001
Baseline Corr AF:	8.83	Prev response	8.79	*% change	0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	8.02	7.96	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	8.02	8.02	1.000
second point	4960	40.1	4.01	3.97	1.010
third point	4980	20.0	2.00	1.96	1.019
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.02	8.04	0.998
				Average Correction Factor	1.010
Baseline Corr AF:	7.96	Prev response	8.00	*% change	-0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999735	1.000469
THC Cal Offset:	-0.023917	-0.025314
CH4 Cal Slope:	0.999431	1.001069
CH4 Cal Offset:	-0.023056	-0.023053
NMHC Cal Slope:	1.000064	0.999791
NMHC Cal Offset:	-0.001060	-0.002261

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

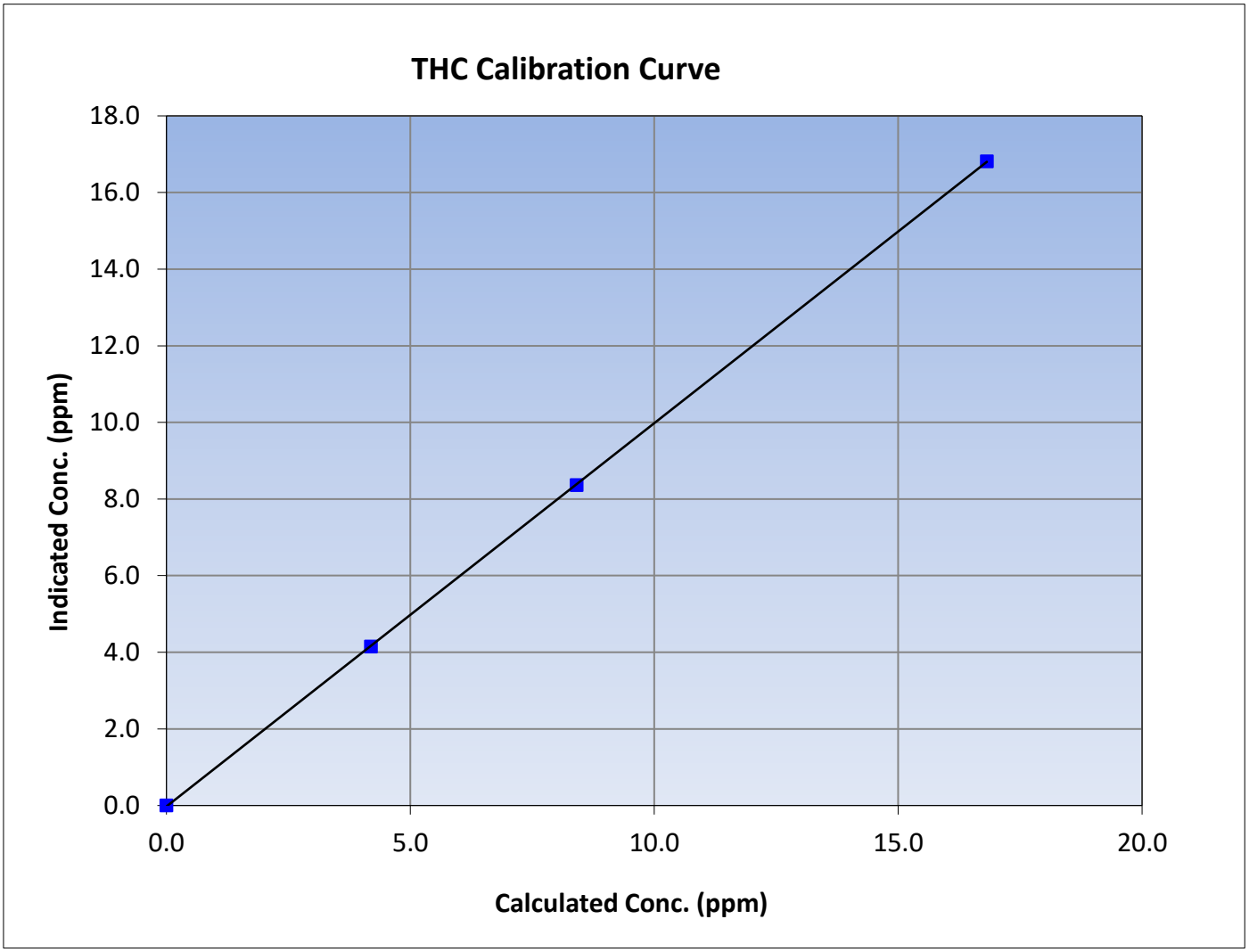
Version-06-2022

Station Information

Calibration Date:	March 8, 2023	Previous Calibration:	February 8, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:53	End Time (MST):	12:58
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320038

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999989	*≥0.995*
16.82	16.82	1.0001			
8.41	8.37	1.0050	Slope	1.000469	*0.90 - 1.10*
4.19	4.15	1.0104			
			Intercept	-0.025314	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

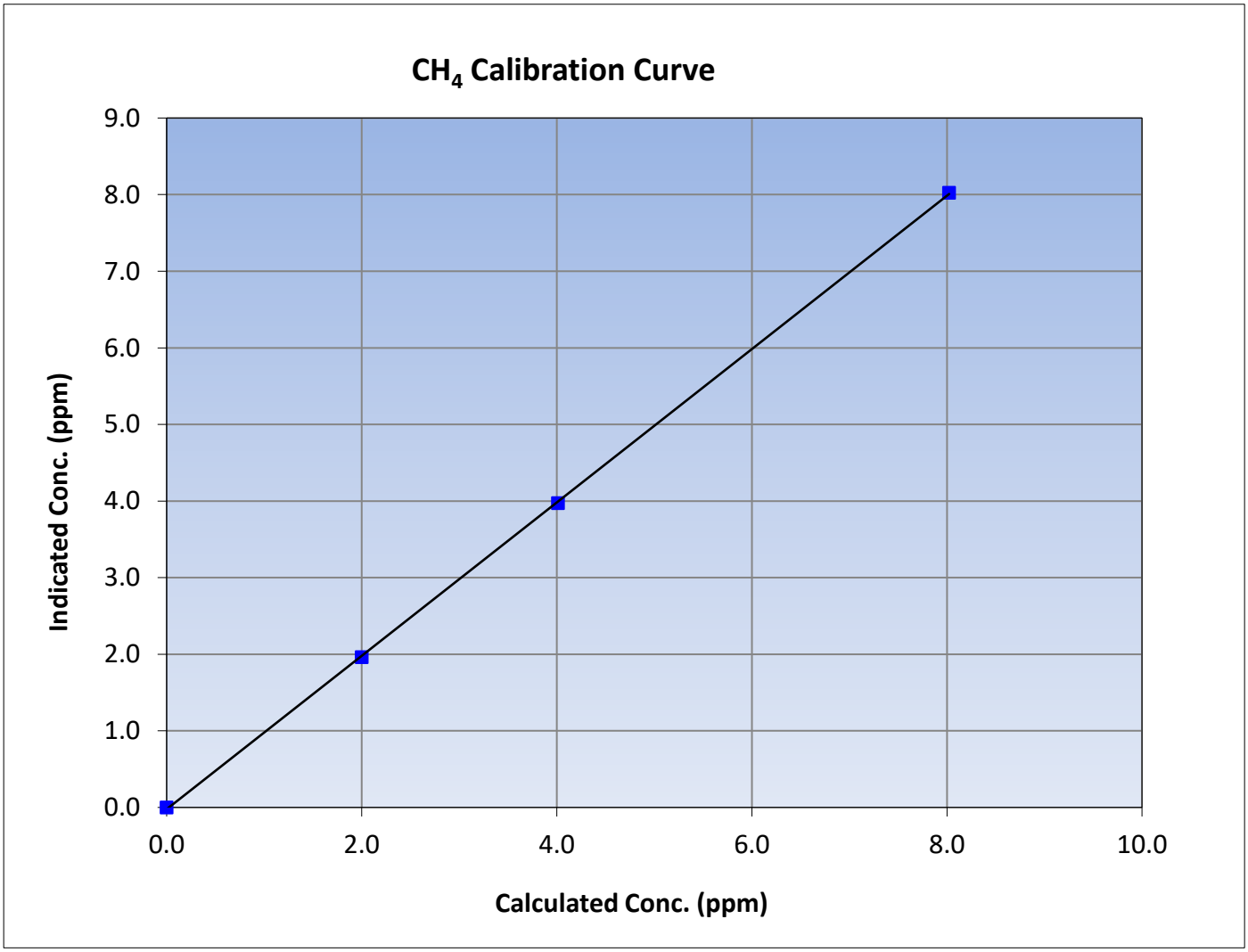
Version-06-2022

Station Information

Calibration Date:	March 8, 2023	Previous Calibration:	February 8, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:53	End Time (MST):	12:58
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320038

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999959	*≥0.995*
8.02	8.02	1.0000			
4.01	3.97	1.0100	Slope	1.001069	*0.90 - 1.10*
2.00	1.96	1.0193			
			Intercept	-0.023053	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

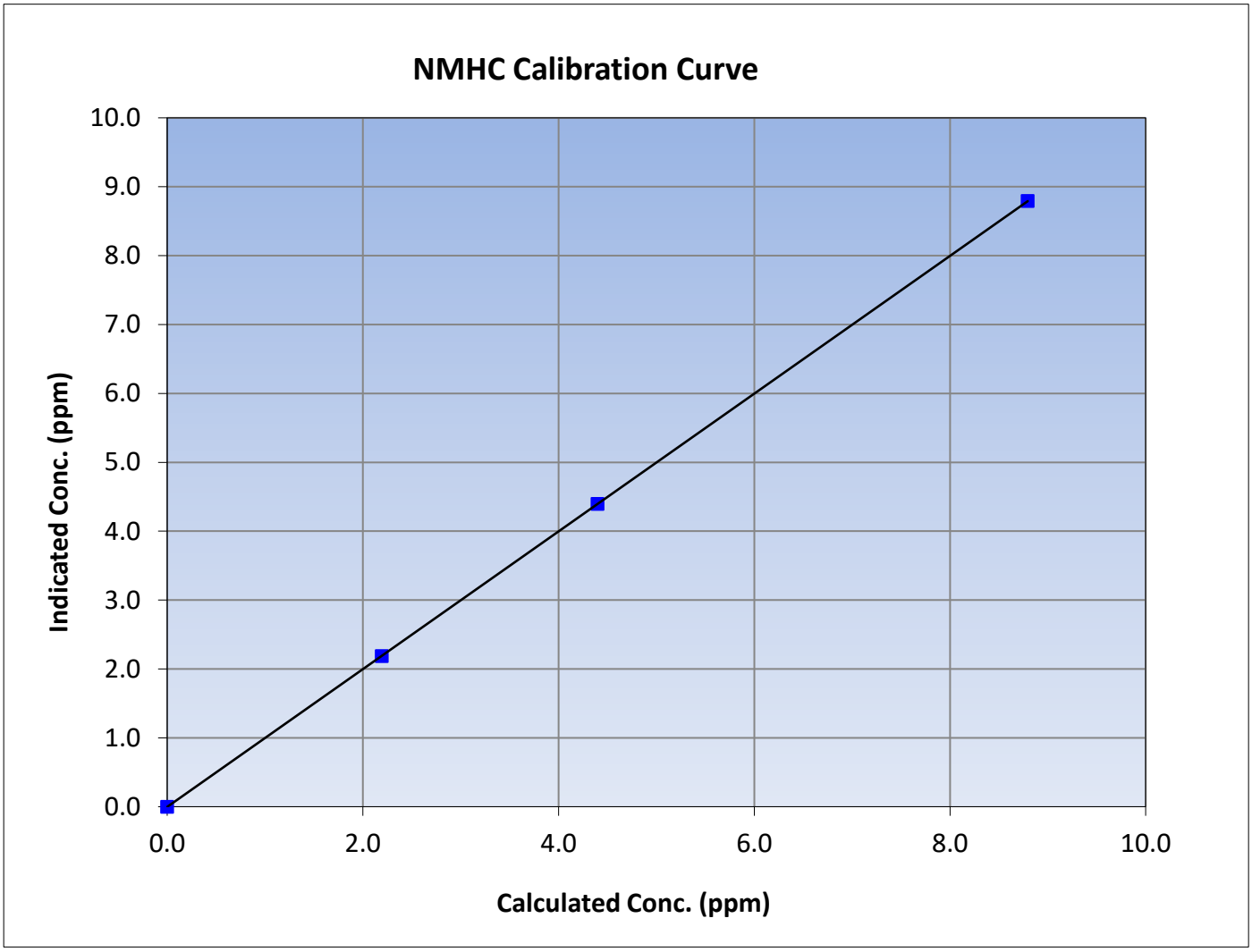
Version-06-2022

Station Information

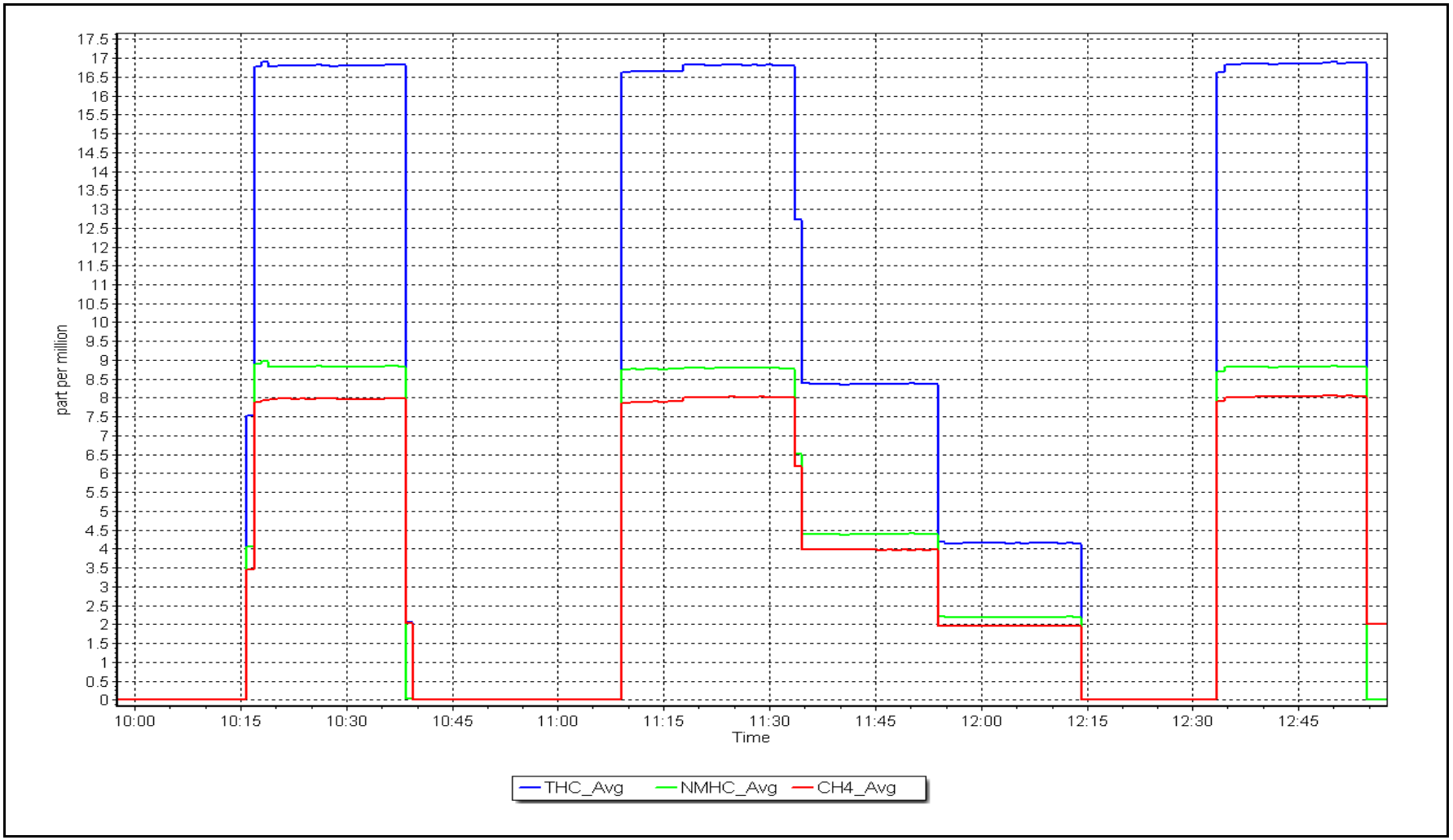
Calibration Date:	March 8, 2023	Previous Calibration:	February 8, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:53	End Time (MST):	12:58
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320038

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	1.000000	*≥0.995*
8.80	8.79	1.0004			
4.40	4.39	1.0008	Slope	0.999791	*0.90 - 1.10*
2.19	2.19	1.0025			
			Intercept	-0.002261	*+/-0.5*



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



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS04
BUFFALO VIEWPOINT
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	March 28, 2023	Last Cal Date:	February 10, 2023
Start time (MST):	6:30	End time (MST):	9:25
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.02	ppm	Cal Gas Exp Date:	September 9, 2028
Cal Gas Cylinder #:	CC470284			
Removed Cal Gas Conc:	50.02	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3808
ZAG Make/Model:	API T701		Serial Number:	5611

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998701	0.996516	Backgd or Offset:	21.5	22.1
Calibration intercept:	1.140000	-0.920000	Coeff or Slope:	0.869	0.869

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.4	----
as found span	4920	80.0	800.3	794.6	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.3	----
high point	4920	80.0	800.3	796.7	1.005
second point	4960	40.0	400.2	398.2	1.005
third point	4980	20.0	200.1	197.4	1.014
as left zero	5000	0.0	0.0	0.0	----
as left span	4920	80.0	800.3	797.8	1.003
				Average Correction Factor	1.008

Baseline Corr As found:	794.20	Previous response	800.42	*% 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: No Maintenance done. Zero Adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

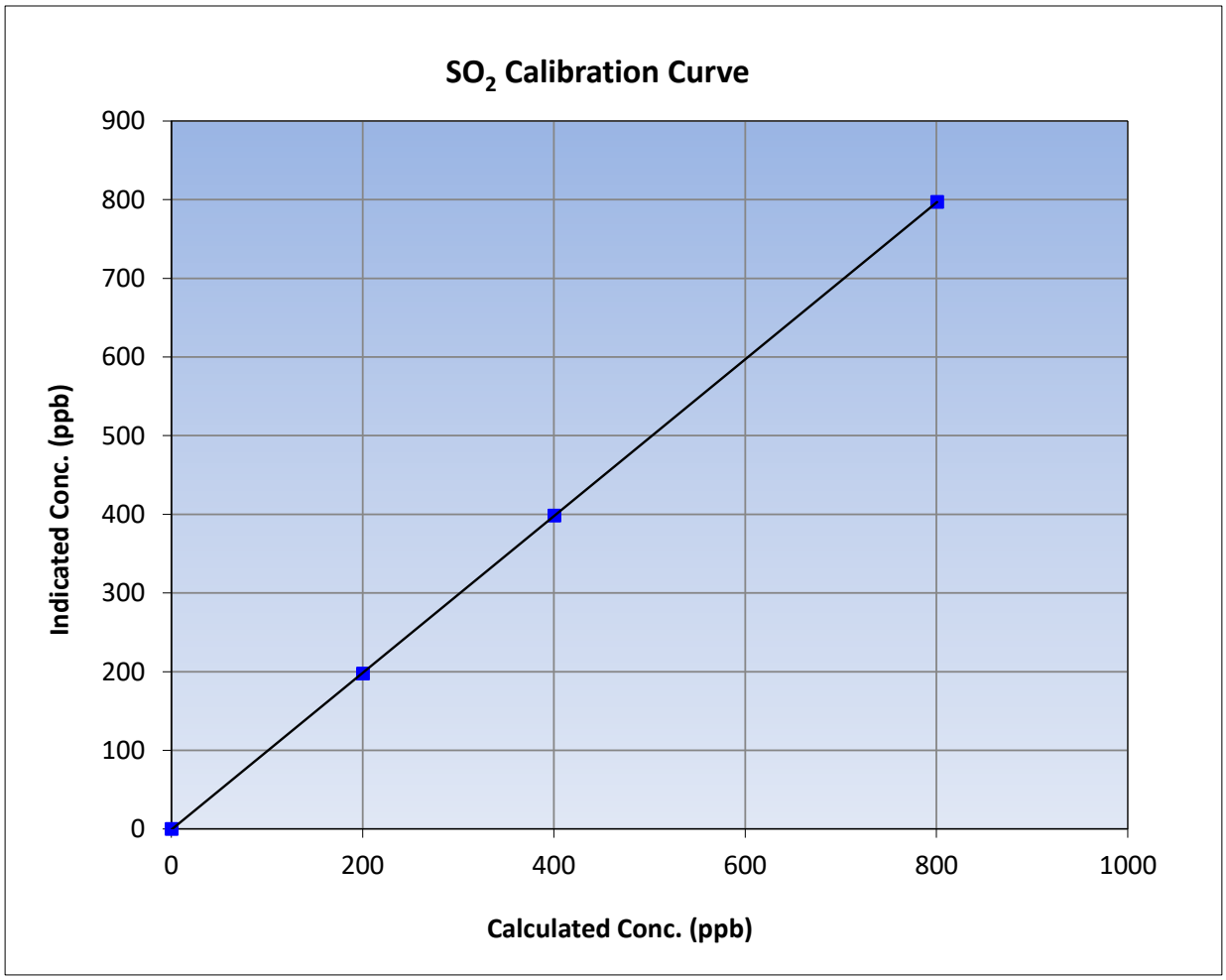
Station Information

Calibration Date:	March 28, 2023	Previous Calibration:	February 10, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:30	End Time (MST):	9:25
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1327300932

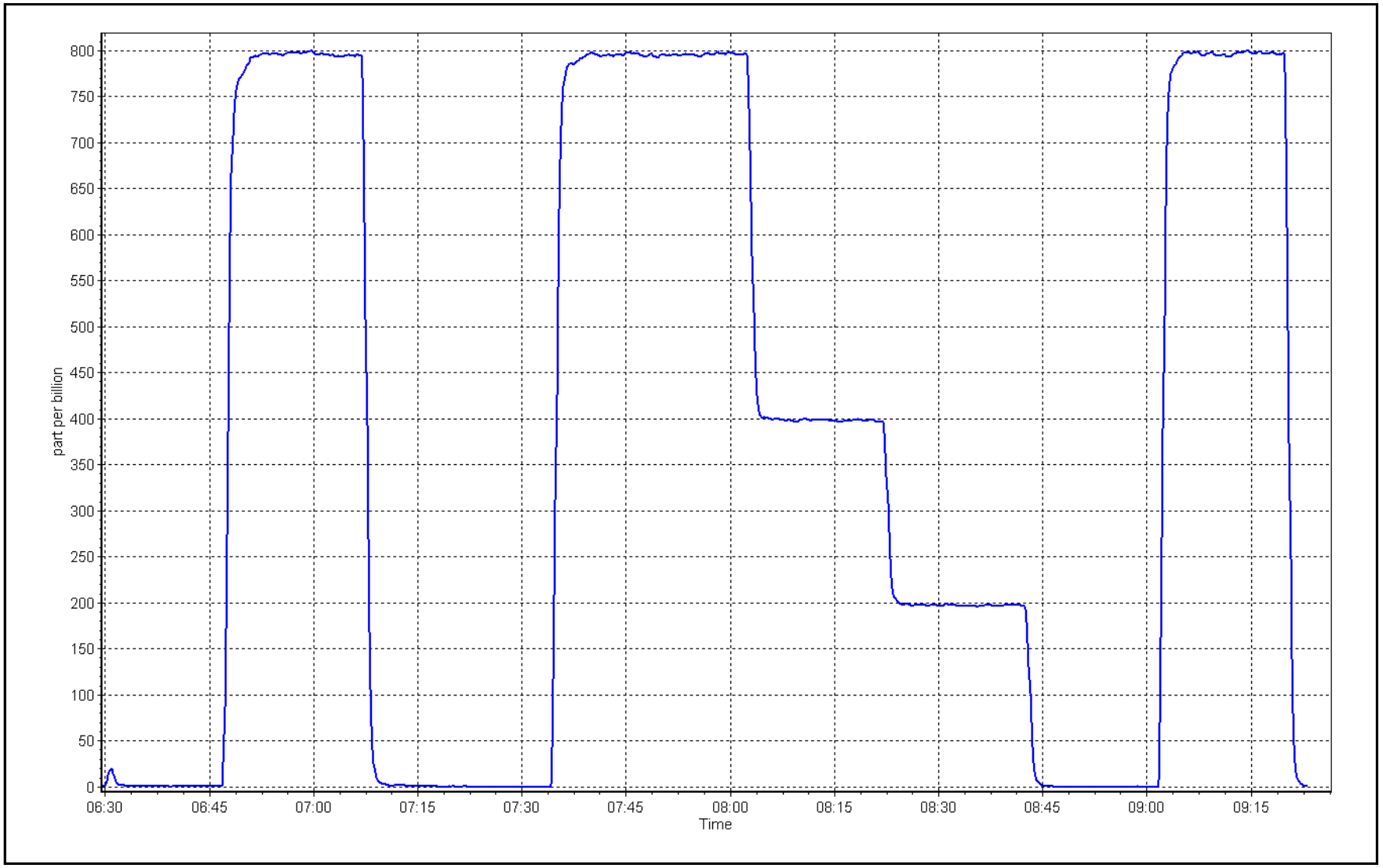
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
800.3	796.7	1.0045
400.2	398.2	1.0049
200.1	197.4	1.0136

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	0.996516	*0.90 - 1.10*
Intercept	-0.920000	*+/-30*



SO2 Calibration Plot Date: March 28, 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:	March 8, 2023	Last Cal Date:	February 15, 2023
Start time (MST):	8:50	End time (MST):	12:30
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 450i		Analyzer serial #:	1336160094	
Converter make:	NA		Converter serial #:	NA	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001200	0.995796	Backgd or Offset:	18.7	18.7
Calibration intercept:	0.162167	0.201944	Coeff or Slope:	1.080	1.080

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.3	----
as found span	4926	74.1	80.3	80.6	1.000
as found 2nd point	4963	37.0	40.1	40.7	0.993
as found 3rd point	4982	18.5	20.1	20.0	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	0.4	----
high point	4926	74.1	80.3	80.3	1.000
second point	4963	37.0	40.1	40.0	1.003
third point	4982	18.5	20.1	20.0	1.003
as left zero	5000	0.0	0.0	0.4	----
as left span	4926	74.1	80.3	81.0	0.992
SO2 Scrubber Check	4920	80.0	800.0	-0.2	----
Date of last scrubber change:				Ave Corr Factor	1.002
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.3	Prev response:	80.58	*% change:	-0.4%
Baseline Corr 2nd AF pt:	40.4	AF Slope:	1.001624	AF Intercept:	0.222271
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999944		

* = > +/-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

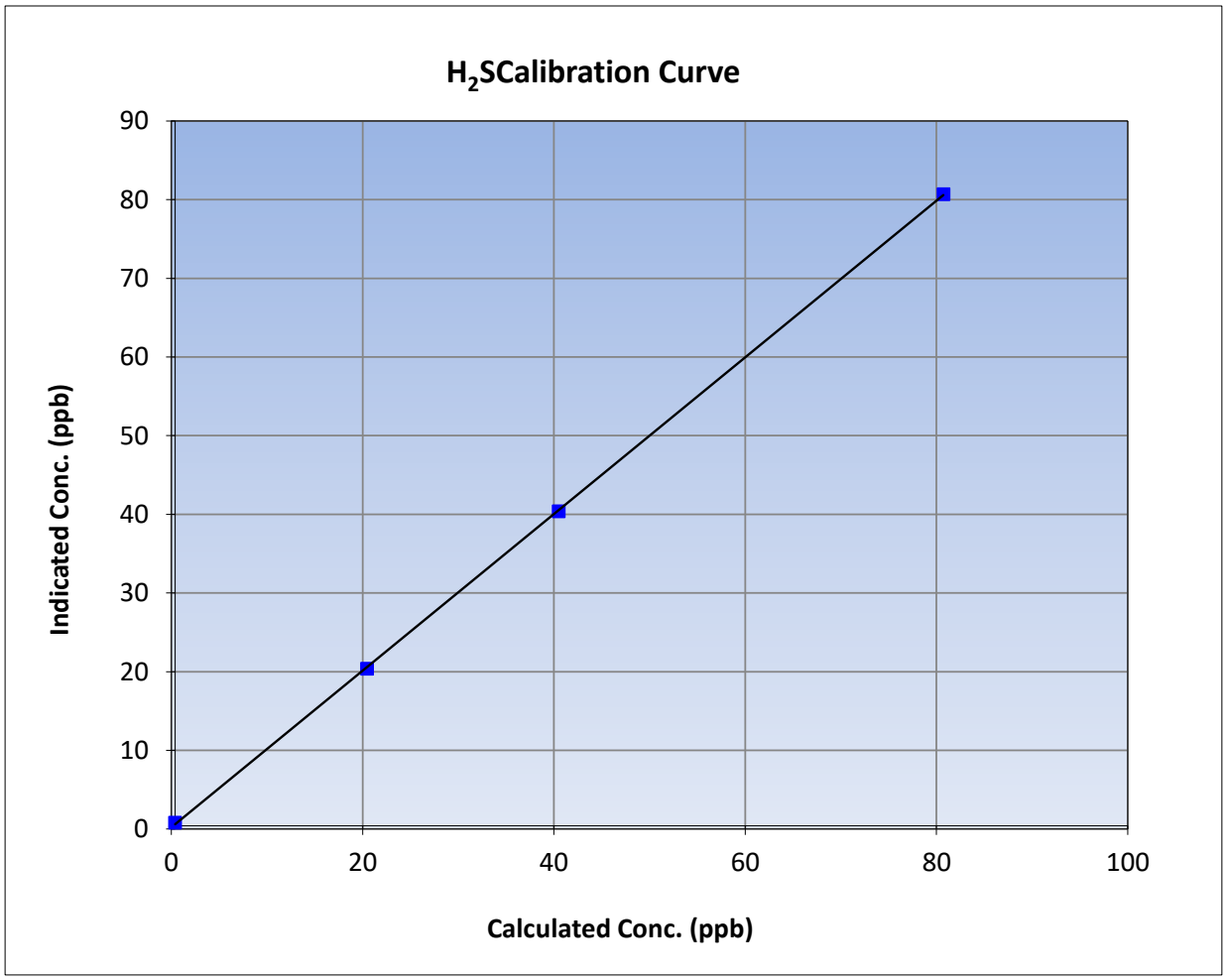
Station Information

Calibration Date:	March 8, 2023	Previous Calibration:	February 15, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:50	End Time (MST):	12:30
Analyzer make:	Thermo 450i	Analyzer serial #:	1336160094

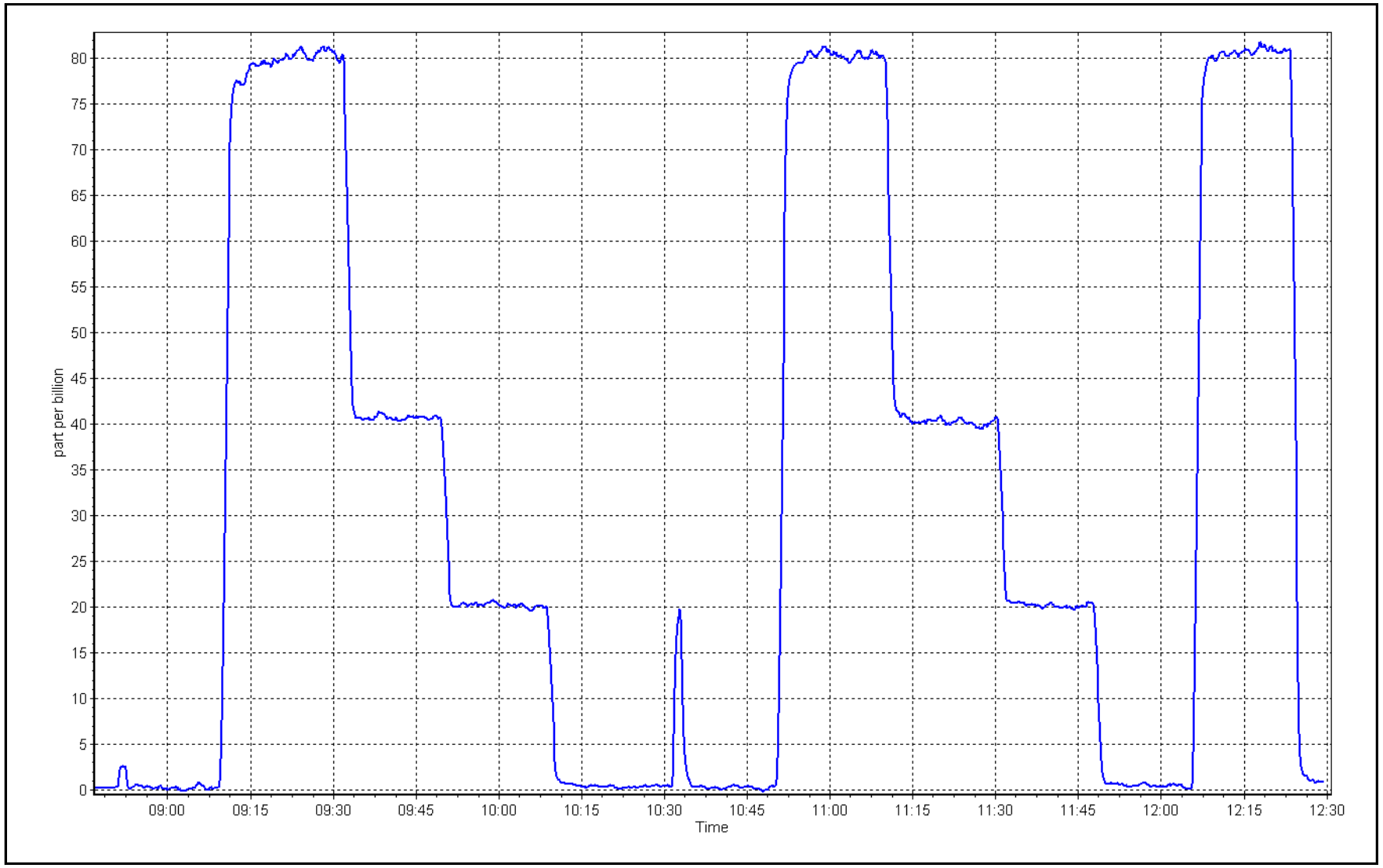
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
80.3	80.3	1.0003
40.1	40.0	1.0027
20.1	20.0	1.0026

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999971	*≥0.995*
Slope	0.995796	*0.90 - 1.10*
Intercept	0.201944	*+/-3*



H_2S Calibration Plot Date: March 8, 2023 Location: Buffalo Viewpoint



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	March 28, 2023	Last Cal Date:	February 10, 2023
Start time (MST):	6:30	End time (MST):	8:45
Reason:	Removal		

Calibration Standards

Gas Cert Reference:		CC470284	Cal Gas Expiry Date:	September 9, 2028	
CH4 Cal Gas Conc.	497.8	ppm	CH4 Equiv Conc.	1062.9	ppm
C3H8 Cal Gas Conc.	205.5	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.8	ppm	CH4 Equiv Conc.	1062.9	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:	3808	
ZAG make/model:	API T701		Serial Number:	362	

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:	3.070E-04	3.190E-04	NMHC SP Ratio:	6.120E-05	6.400E-05
CH4 Retention time:	13.6	13.6	NMHC Peak Area:	147690	141169

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	17.01	16.75	1.015
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	17.01	17.02	0.999
second point	4960	40.0	8.50	8.33	1.021
third point	4980	20.0	4.25	4.10	1.037
as left zero					
as left span					
				Average Correction Factor	1.019

Baseline Corr AF:	16.75	Prev response	17.01	*% 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-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.0	9.04	8.85	1.022
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	9.04	9.00	1.005
second point	4960	40.0	4.52	4.46	1.014
third point	4980	20.0	2.26	2.21	1.023
as left zero					
as left span					
				Average Correction Factor	1.014
Baseline Corr AF:	8.85	Prev response	9.03	*% change	-2.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	7.96	7.90	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	7.96	8.02	0.993
second point	4960	40.0	3.98	3.87	1.029
third point	4980	20.0	1.99	1.88	1.059
as left zero					
as left span					
				Average Correction Factor	1.027
Baseline Corr AF:	7.90	Prev response	7.99	*% 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:	1.004640	1.002691
THC Cal Offset:	-0.080000	-0.098000
CH4 Cal Slope:	1.011594	1.010302
CH4 Cal Offset:	-0.070000	-0.078000
NMHC Cal Slope:	0.999400	0.996366
NMHC Cal Offset:	-0.006000	-0.024000

Notes: Removal Due to third point being 6% low. Span was adjusted, before finding out third point was low.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

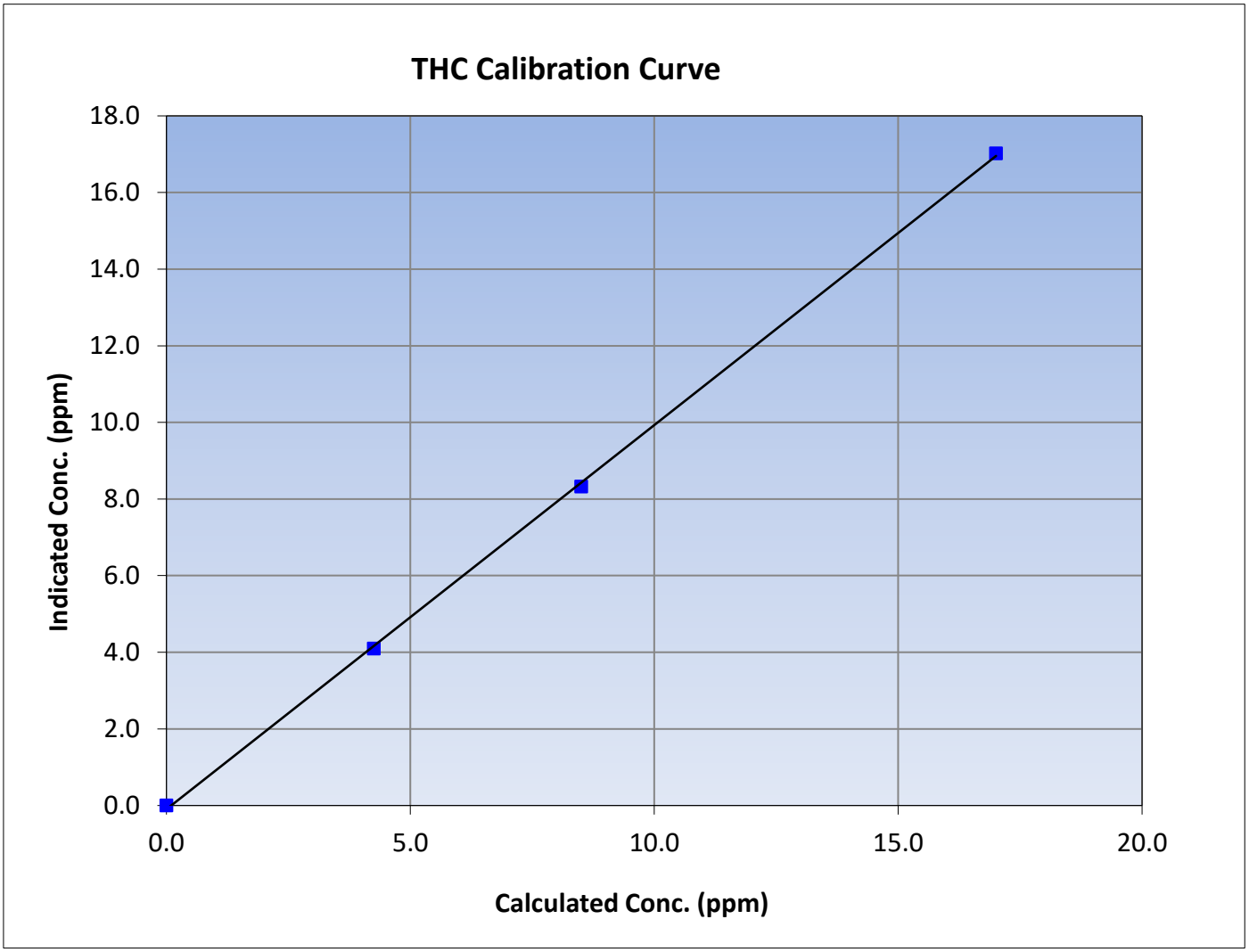
Version-01-2020

Station Information

Calibration Date:	March 28, 2023	Previous Calibration:	February 10, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:30	End Time (MST):	8:45
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	0.999825	*≥0.995*
17.01	17.02	0.9992			
8.50	8.33	1.0208	Slope	1.002691	*0.90 - 1.10*
4.25	4.10	1.0370			
			Intercept	-0.098000	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

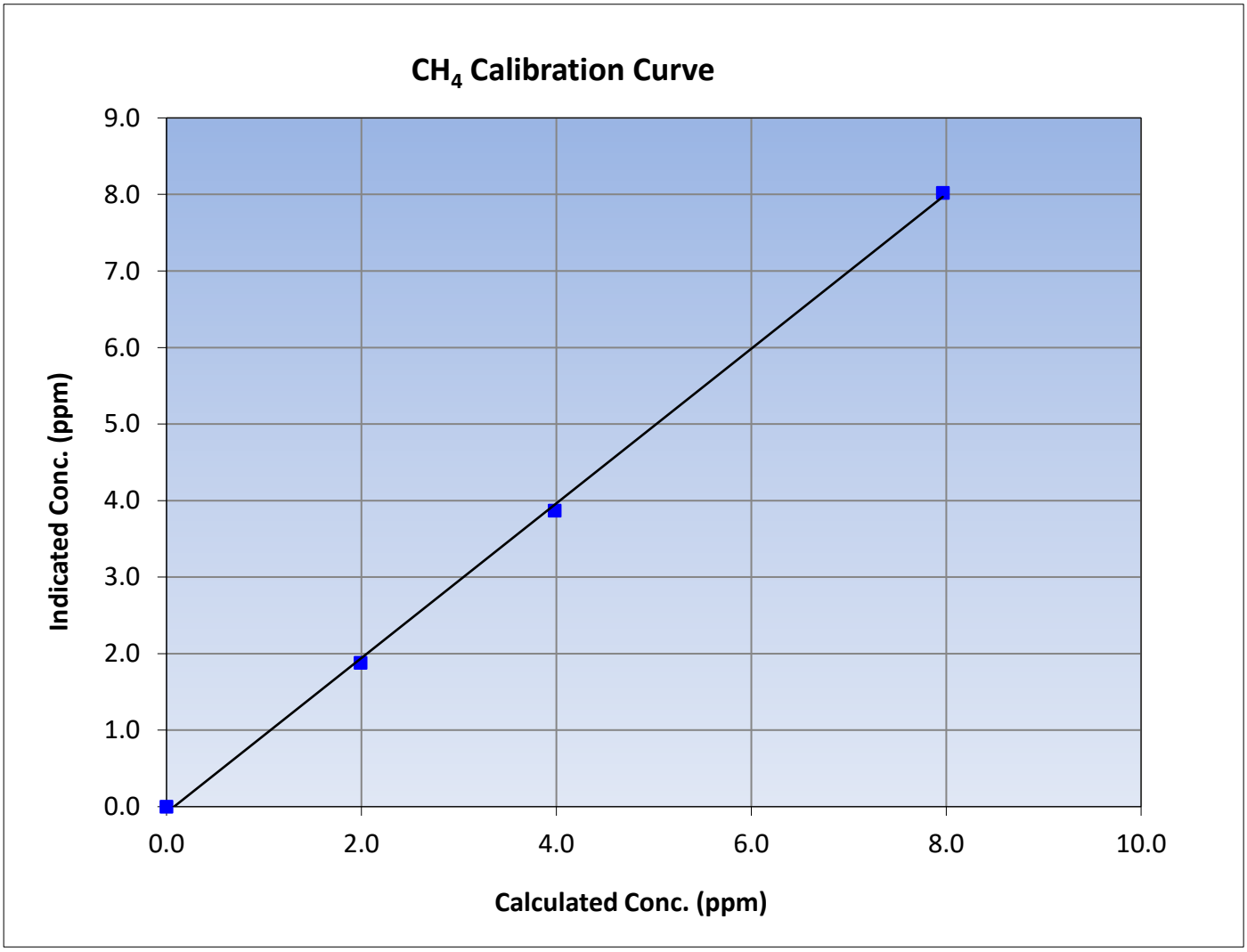
Version-01-2020

Station Information

Calibration Date:	March 28, 2023	Previous Calibration:	February 10, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:30	End Time (MST):	8:45
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	0.999512	*≥0.995*
7.96	8.02	0.9931			
3.98	3.87	1.0290	Slope	1.010302	*0.90 - 1.10*
1.99	1.88	1.0591			
			Intercept	-0.078000	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

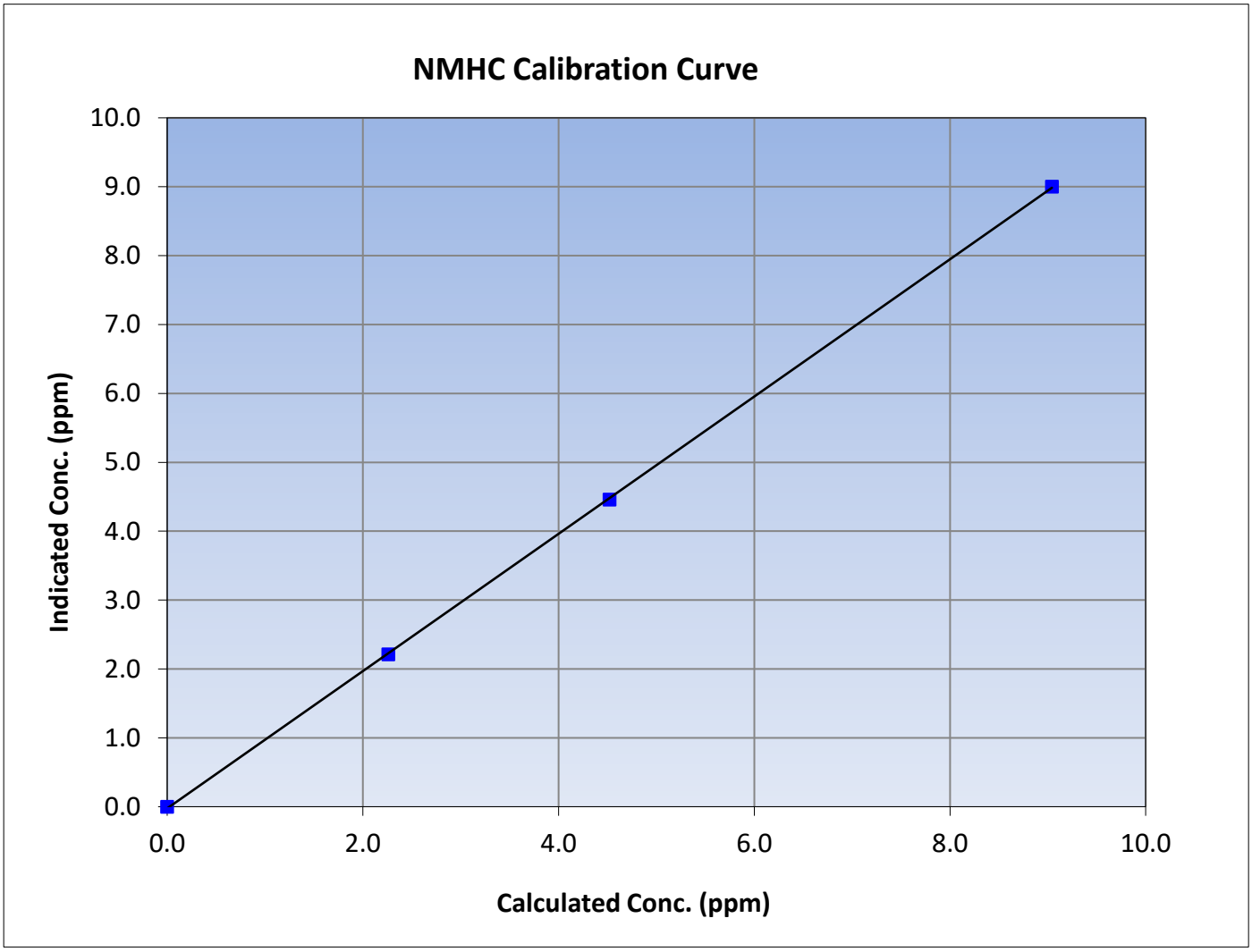
Version-01-2020

Station Information

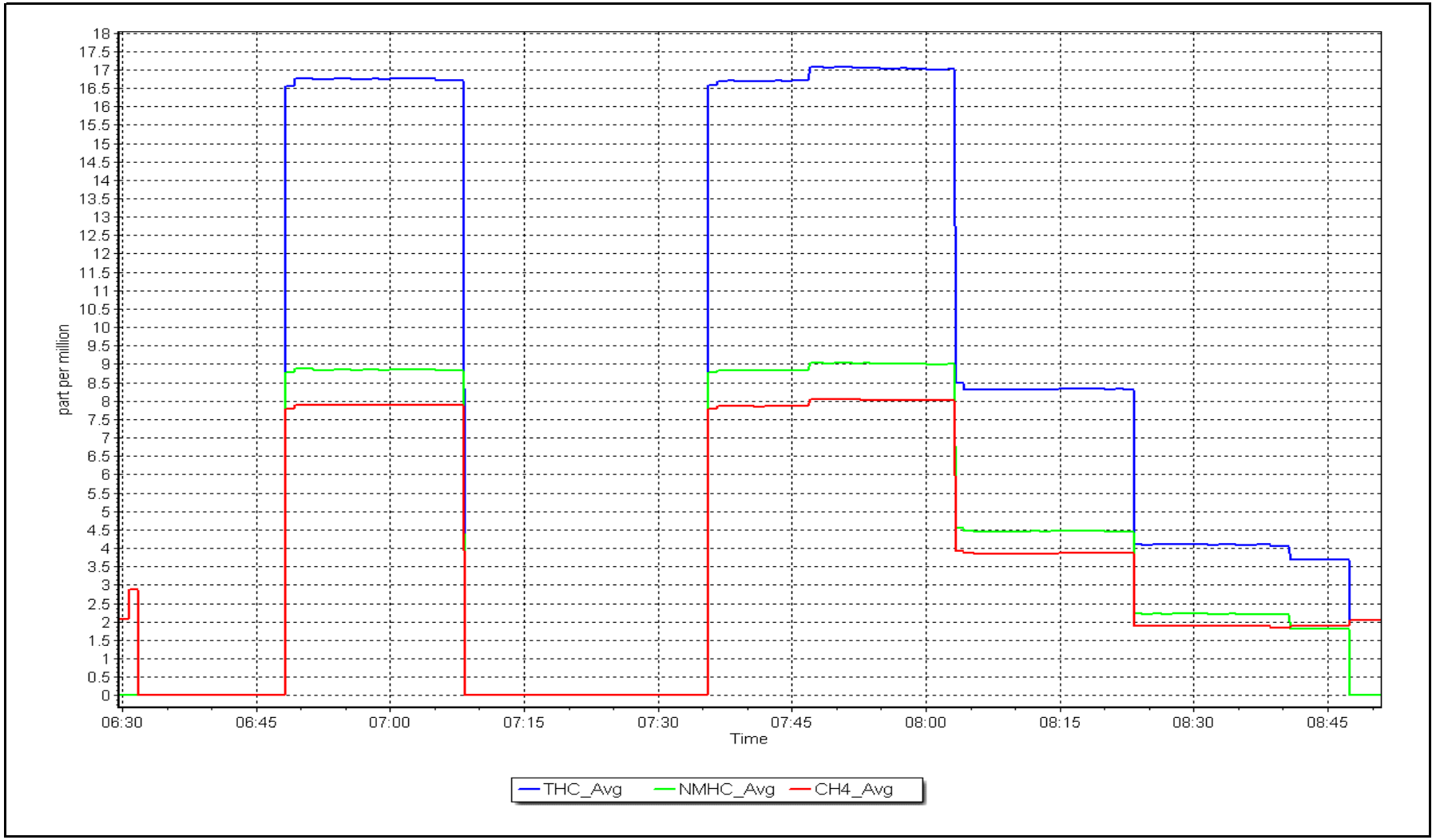
Calibration Date:	March 28, 2023	Previous Calibration:	February 10, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:30	End Time (MST):	8:45
Analyzer make:	Thermo 55i	Analyzer serial #:	1426262594

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999965	≥0.995
9.04	9.00	1.0047			
4.52	4.46	1.0137	Slope	0.996366	0.90 - 1.10
2.26	2.21	1.0229			
			Intercept	-0.024000	+/-0.5



NMHC Calibration Plot Date: March 28, 2023 Location: Buffalo Viewpoint



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	March 29, 2023	Last Cal Date:	
Start time (MST):	8:24	End time (MST):	10:37
Reason:	Install		

Calibration Standards

Gas Cert Reference:		CC470284	Cal Gas Expiry Date:	September 9, 2028	
CH4 Cal Gas Conc.	497.8	ppm	CH4 Equiv Conc.	1062.9	ppm
C3H8 Cal Gas Conc.	205.5	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.8	ppm	CH4 Equiv Conc.	1062.9	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:	3808	
ZAG make/model:	API T701		Serial Number:	362	

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:		1.860E-04	NMHC SP Ratio:		3.820E-05
CH4 Retention time:		12.0	NMHC Peak Area:		236627

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	80.0	17.01	17.00	1.000
second point	4960	40.0	8.50	8.50	1.000
third point	4980	20.0	4.25	4.22	1.008
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	17.01	17.07	0.996
				Average Correction Factor	1.003

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

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	9.04	9.04	1.000
second point	4960	40.0	4.52	4.51	1.002
third point	4980	20.0	2.26	2.24	1.009
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	9.04	9.04	1.000
				Average Correction Factor	1.004
Baseline Corr AF:	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	80.0	7.96	7.97	0.999
second point	4960	40.0	3.98	3.99	0.998
third point	4980	20.0	1.99	1.99	1.001
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	7.96	8.02	0.993
				Average Correction Factor	0.999
Baseline Corr AF:	NA	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:		1.000205
THC Cal Offset:		-0.012000
CH4 Cal Slope:		1.000832
CH4 Cal Offset:		0.000000
NMHC Cal Slope:		1.000411
NMHC Cal Offset:		-0.010000

Notes: Removed 55i not linear. Install calibration. Use zero chromatogram to NO. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

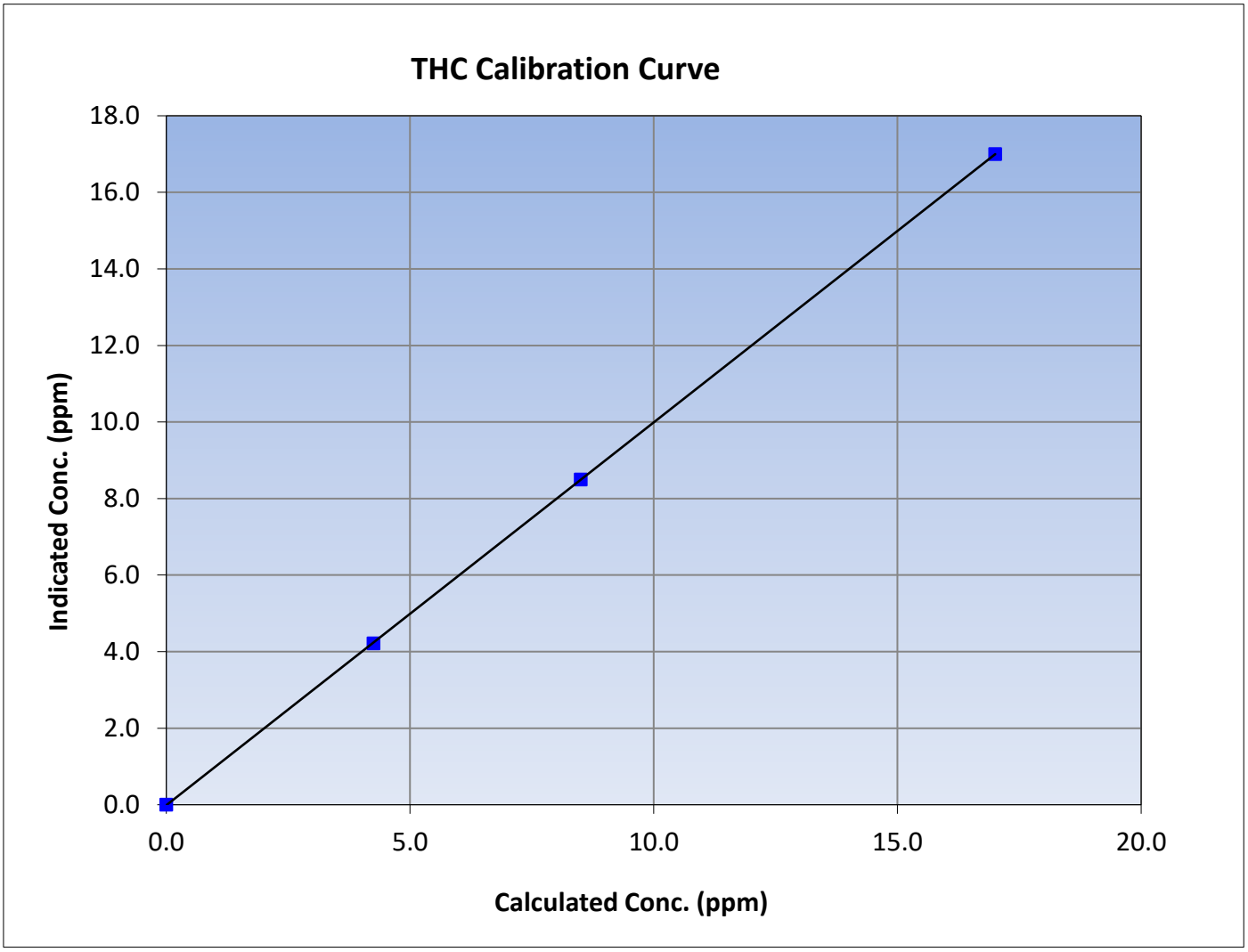
Version-01-2020

Station Information

Calibration Date:	March 29, 2023	Previous Calibration:	
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:24	End Time (MST):	10:37
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	0.999996	≥0.995
17.01	17.00	1.0004			
8.50	8.50	1.0004	Slope	1.000205	0.90 - 1.10
4.25	4.22	1.0075			
			Intercept	-0.012000	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

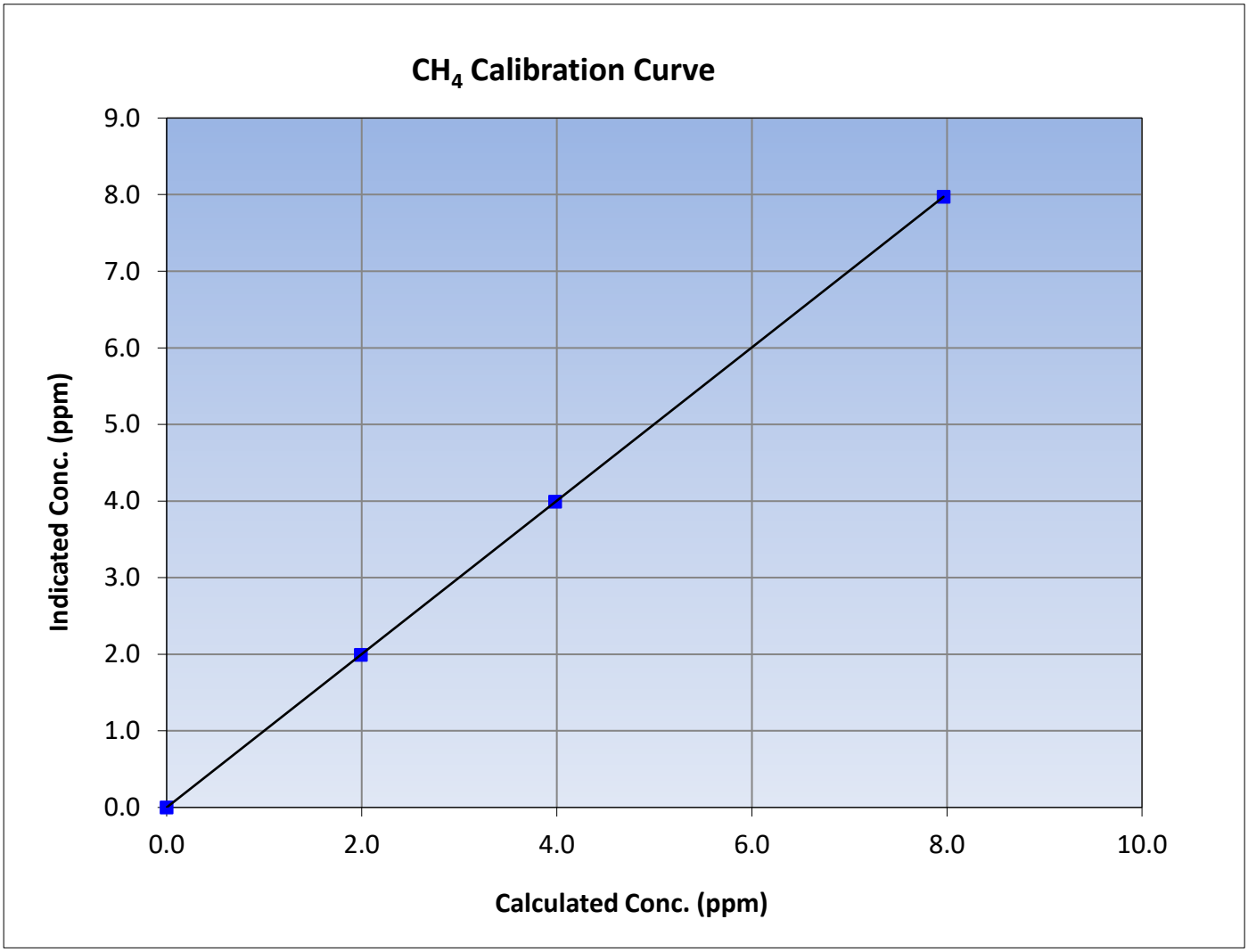
Version-01-2020

Station Information

Calibration Date:	March 29, 2023	Previous Calibration:	
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:24	End Time (MST):	10:37
Analyzer make:	Thermo 55i	Analyzer serial #:	1222762077

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999999	*≥0.995*
7.96	7.97	0.9993			
3.98	3.99	0.9981	Slope	1.000832	*0.90 - 1.10*
1.99	1.99	1.0006			
			Intercept	0.000000	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

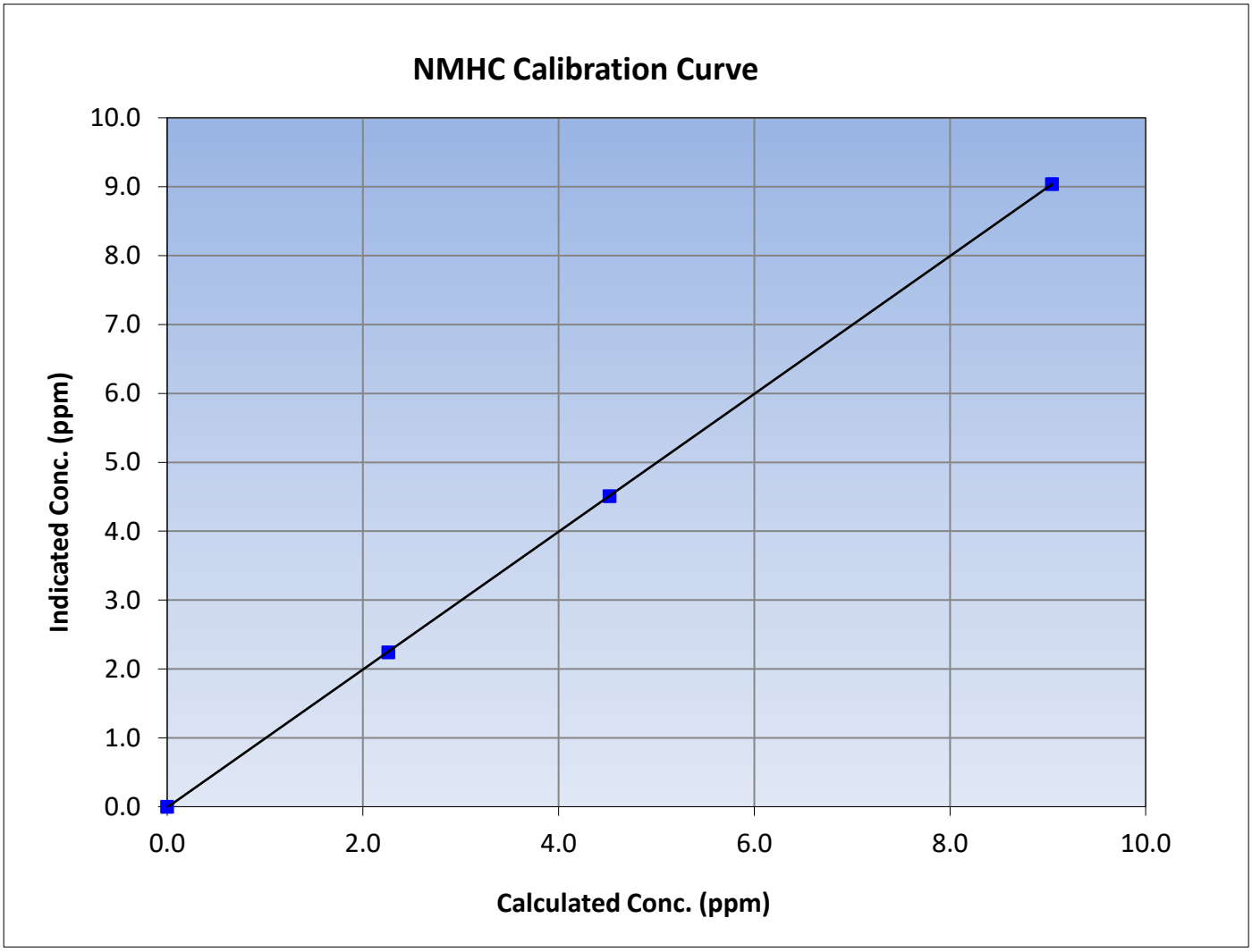
Version-01-2020

Station Information

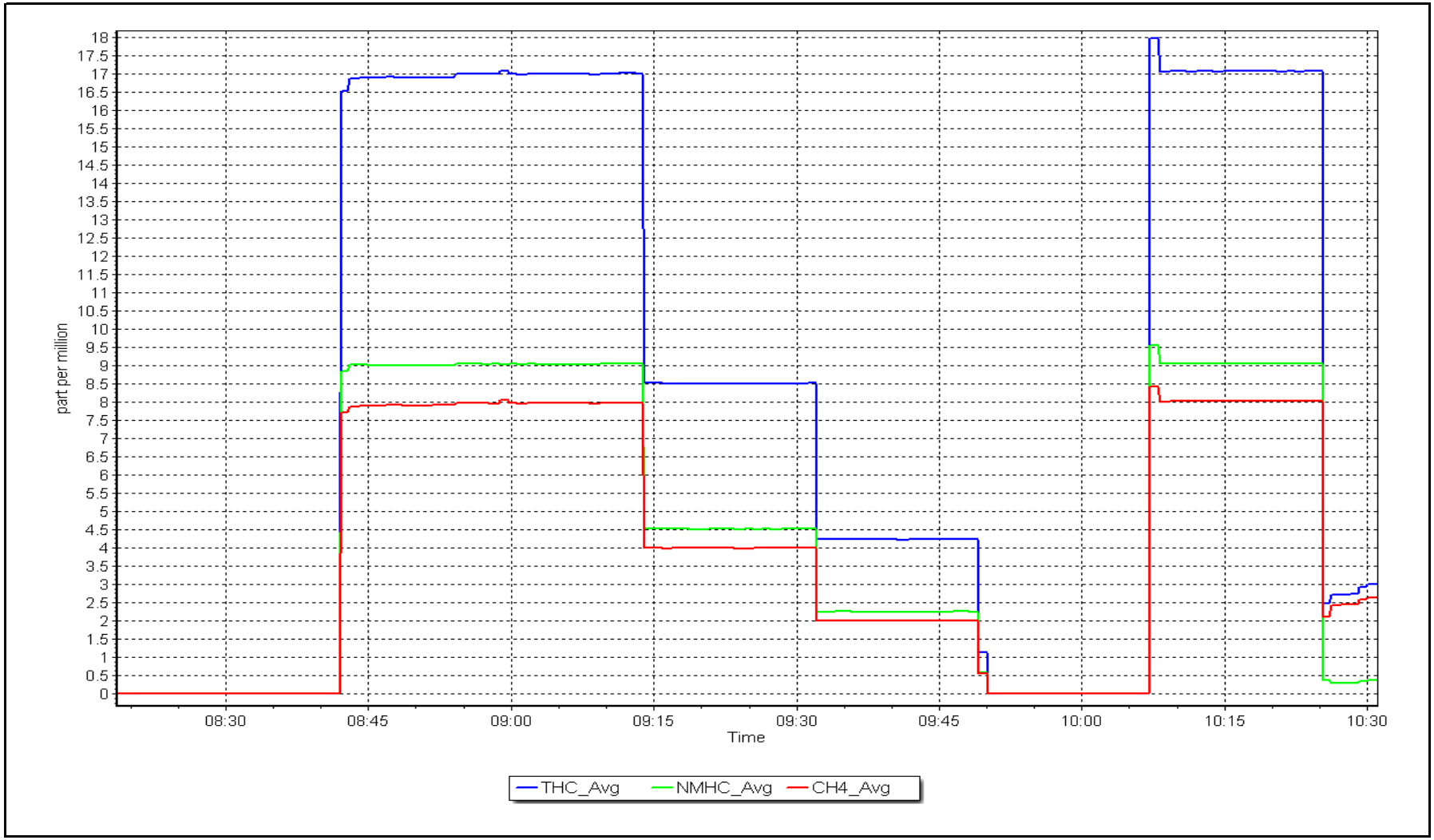
Calibration Date:	March 29, 2023	Previous Calibration:	
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:24	End Time (MST):	10:37
Analyzer make:	Thermo 55i	Analyzer serial #:	1222762077

Calibration Data

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



NMHC Calibration Plot Date: March 29, 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:	March 3, 2023	Last Cal Date:	February 14, 2023
Start time (MST):	8:07	End time (MST):	12:49
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	0.998	0.998	NO bkgnd or offset:	-9.0	-2.1
NOX coeff or slope:	0.992	0.992	NOX bkgnd or offset:	-9.0	-1.7
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	7.3	7.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000759	0.998743
NO_X Cal Offset:	0.966826	0.546857
NO Cal Slope:	1.004151	1.004711
NO Cal Offset:	-0.053156	-0.973240
NO_2 Cal Slope:	0.994427	0.992216
NO_2 Cal Offset:	-0.612933	0.603575

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	4.5	3.4	1.2	----	----
as found span	4922	78.1	799.1	795.2	3.9	799.2	797.1	2.1	0.9999	0.9976
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.3	-0.2	----	----
high point	4922	78.1	799.1	795.2	3.9	798.6	798.8	-0.2	1.0006	0.9955
second point	4961	39.1	400.1	398.1	2.0	399.7	397.8	2.0	1.0009	1.0008
third point	4981	19.5	199.5	198.5	1.0	200.8	197.6	3.1	0.9935	1.0047
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as left span	4922	78.1	799.1	366.2	432.9	799.2	363.5	435.8	0.9999	1.0074
								Average Correction Factor	0.9984	1.0003

Corrected As found	NO_X = 794.7 ppb	NO = 793.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.8%
Previous Response	NO_X = 800.7 ppb	NO = 798.4 ppb		*Percent Change	NO =	-0.6%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	796.4	367.4	432.9	429.6	1.0077	99.2%
2nd GPT point (200 ppb O3)	796.4	582.3	218.0	217.7	1.0014	99.9%
3rd GPT point (100 ppb O3)	796.4	689.5	110.8	111.1	0.9973	100.3%
				Average Correction Factor	1.0021	99.8%

Notes: No maintenance done. Zero adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

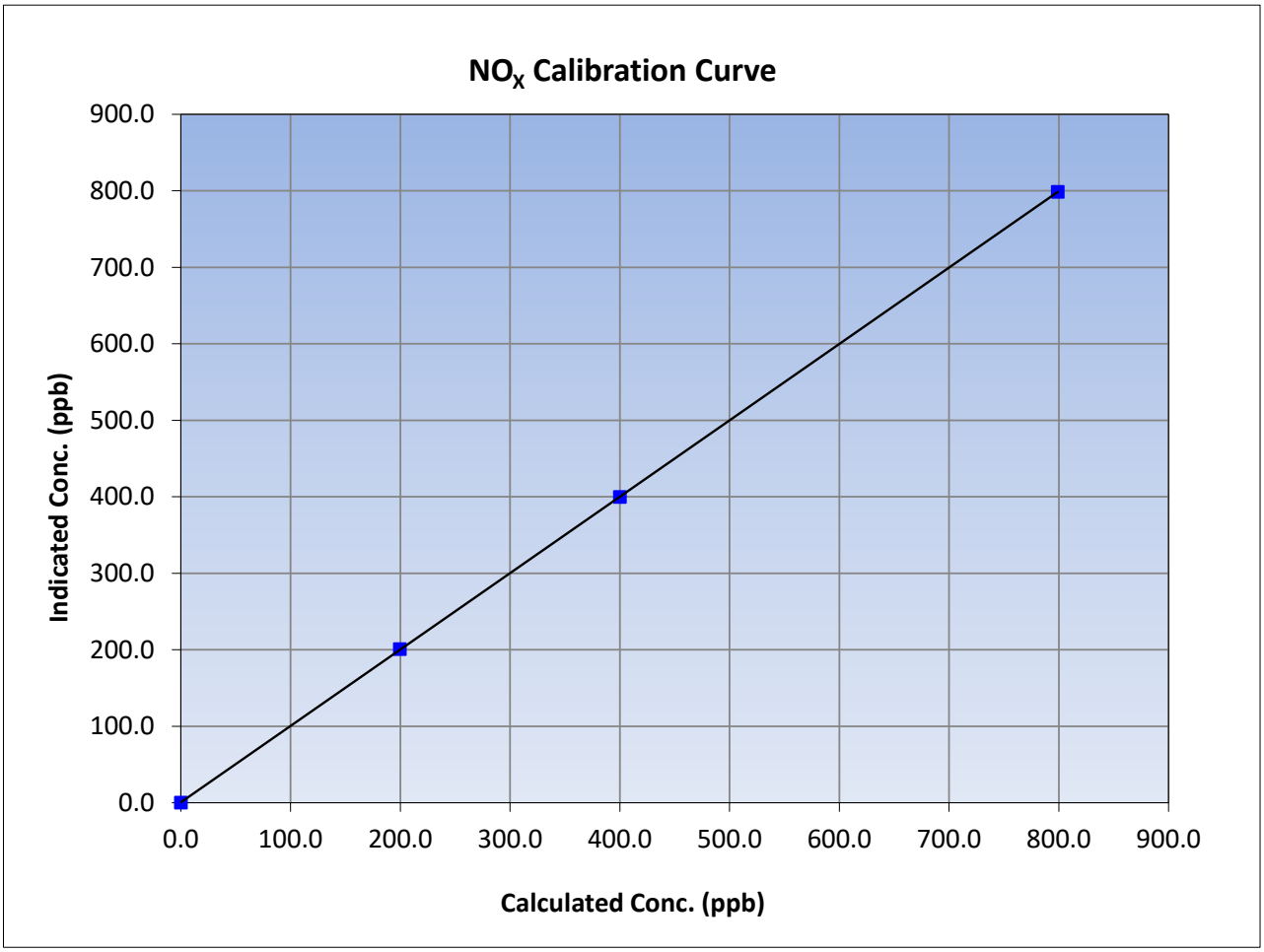
Version-04-2020

Station Information

Calibration Date:	March 3, 2023	Previous Calibration:	February 14, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:07	End Time (MST):	12:49
Analyzer make:	API T200	Analyzer serial #:	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999996	≥0.995
799.1	798.6	1.0006			
400.1	399.7	1.0009	Slope	0.998743	0.90 - 1.10
199.5	200.8	0.9935			
			Intercept	0.546857	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

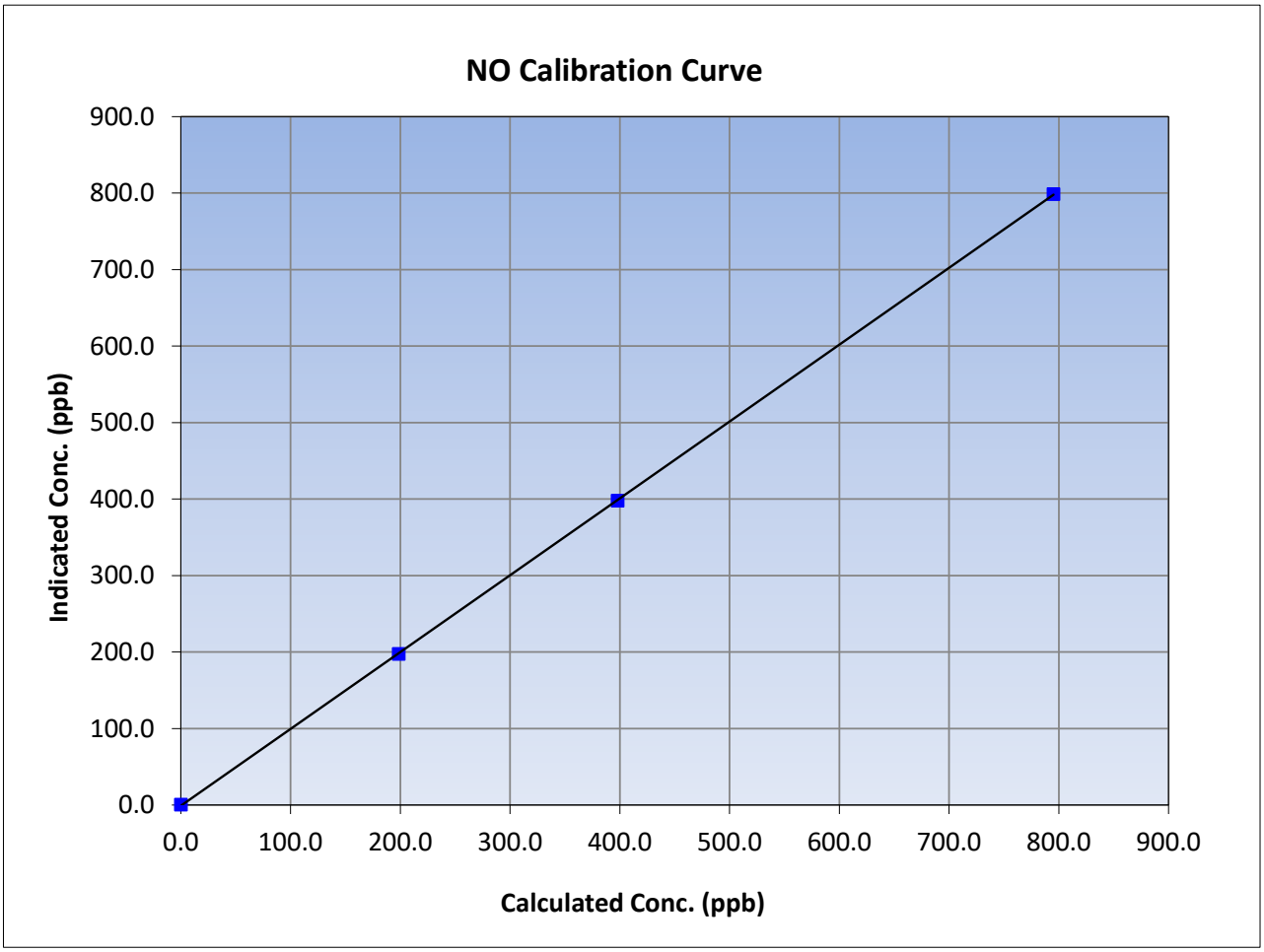
Version-04-2020

Station Information

Calibration Date:	March 3, 2023	Previous Calibration:	February 14, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:07	End Time (MST):	12:49
Analyzer make:	API T200	Analyzer serial #:	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.3	----	Correlation Coefficient	0.999987	≥0.995
795.2	798.8	0.9955			
398.1	397.8	1.0008	Slope	1.004711	0.90 - 1.10
198.5	197.6	1.0047			
			Intercept	-0.973240	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

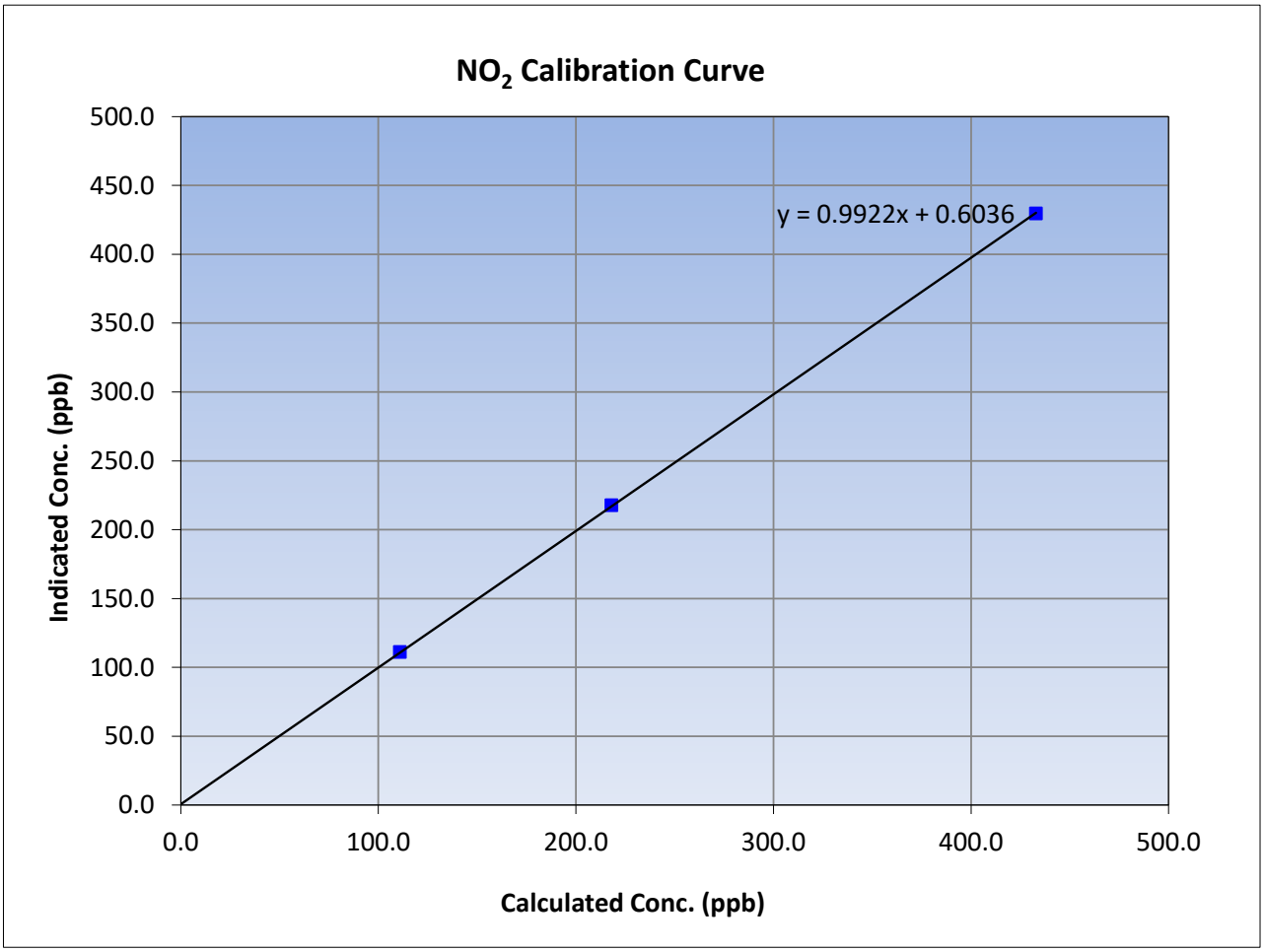
Version-04-2020

Station Information

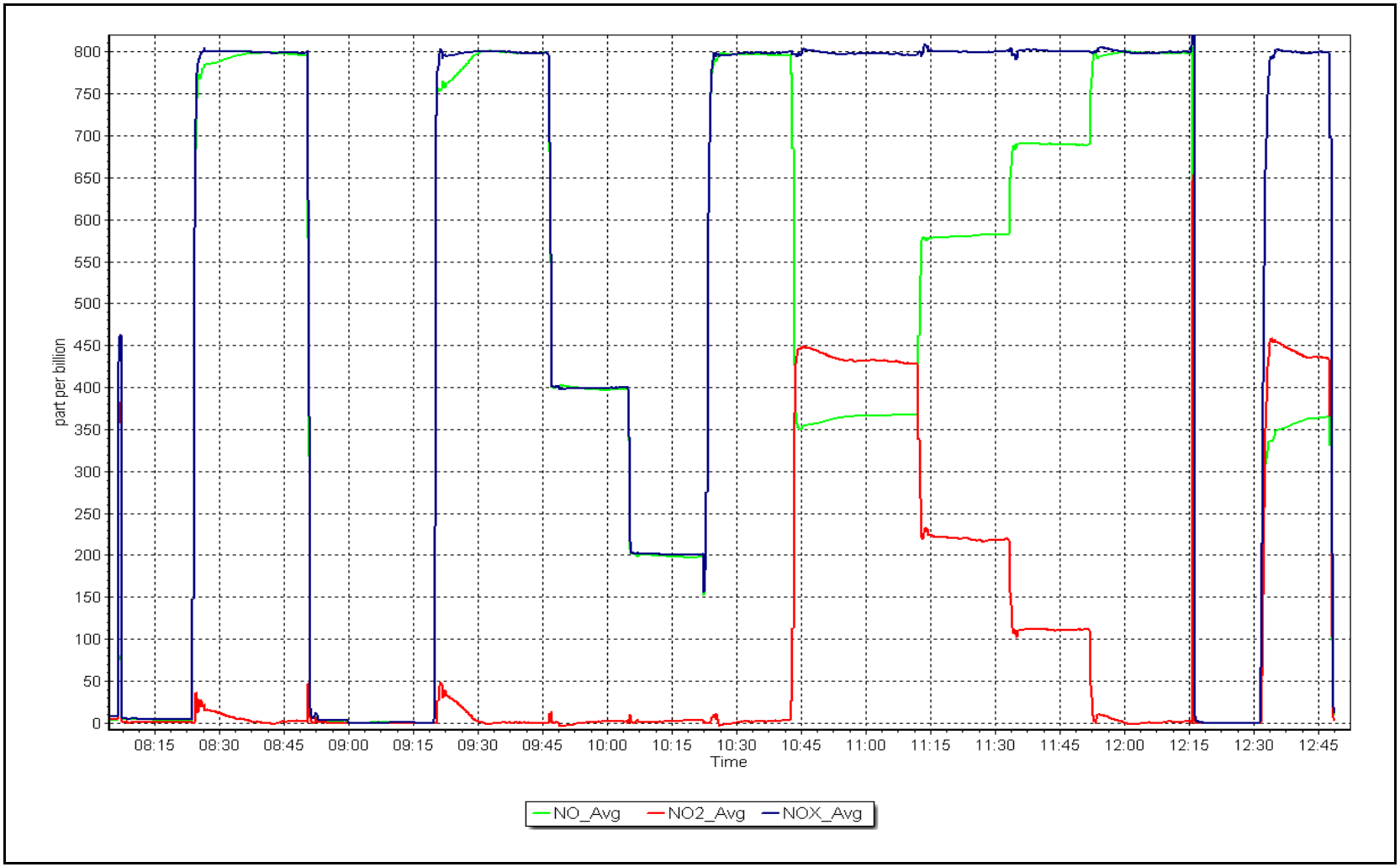
Calibration Date:	March 3, 2023	Previous Calibration:	February 14, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:07	End Time (MST):	12:49
Analyzer make:	API T200	Analyzer serial #:	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999981	≥0.995
432.9	429.6	1.0077			
218.0	217.7	1.0014	Slope	0.992216	0.90 - 1.10
110.8	111.1	0.9973			
			Intercept	0.603575	+/-20



NO_X Calibration Plot Date: March 3, 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:	March 6, 2023	Last Cal Date:	February 10, 2023
Start time (MST):	7:14	End time (MST):	8:35
Reason:	As Found		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	API T700	Serial Number:	2445
ZAG Make/Model:	API T701	Serial Number:	362

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.988657		Backgd or Offset:	-3.3	-3.3
Calibration intercept:	3.560000		Coeff or Slope:	1.065	1.065

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	1158.5	400.0	382.2	1.047
as found 2nd point	5000	915.0	200.0	194.9	1.026
as found 3rd point	5000	784.5	100.0	99.9	1.001
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	

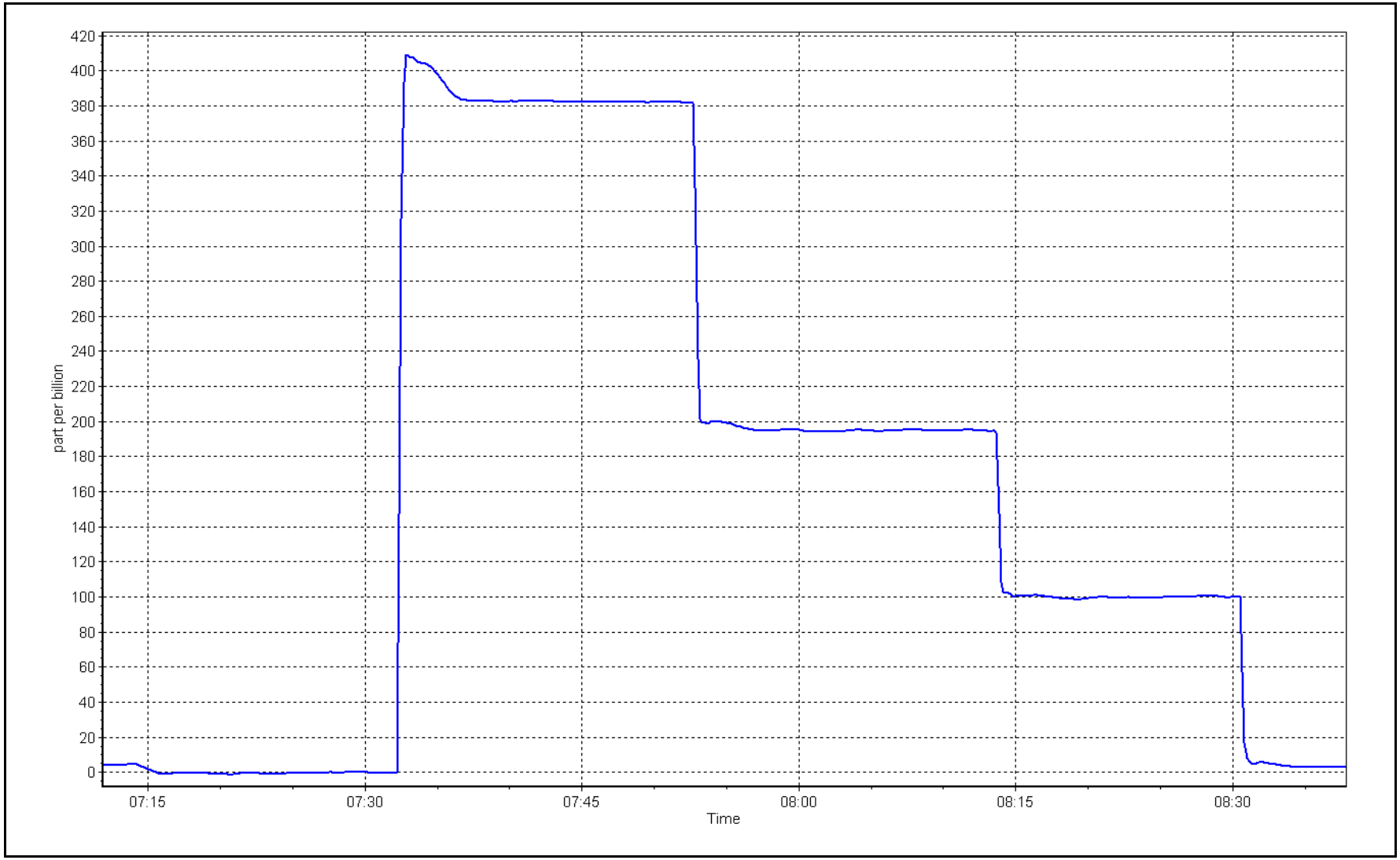
Baseline Corr As found:	382.4	Previous response	399.0	*% change	-4.3%
Baseline Corr 2nd AF pt:	-187.3	AF Slope:	0.953257	AF Intercept:	2.380000
Baseline Corr 3rd AF pt:	-95.0	AF Correlation:	0.999784		

* = > +/-5% change initiates investigation

Notes: As founds done with the station calibrator. Station calibrator not working properly. Analyzer maintenance- Lamp changed, Leak check passed.

Calibration Performed By: Melissa Lemay

O_3 Calibration Plot Date: March 6, 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:	March 7, 2023	Last Cal Date:	March 6, 2023
Start time (MST):	9:20	End time (MST):	11:39
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.988657	0.996114	Backgd or Offset:	-3.3	-5.3
Calibration intercept:	3.560000	1.880000	Coeff or Slope:	1.065	1.178

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.3	----
high point	5000	970.8	400.0	399.6	1.001
second point	5000	806.0	200.0	201.7	0.992
third point	5000	697.0	100.0	103.2	0.969
as left zero	5000	0.0	0.0	1.2	----
as left span	5000	971.2	400.0	399.2	1.002
				Average Correction Factor	0.987

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: Station calibrator was replaced. Analyzer maintenance- Lamp changed, Leak check passed. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

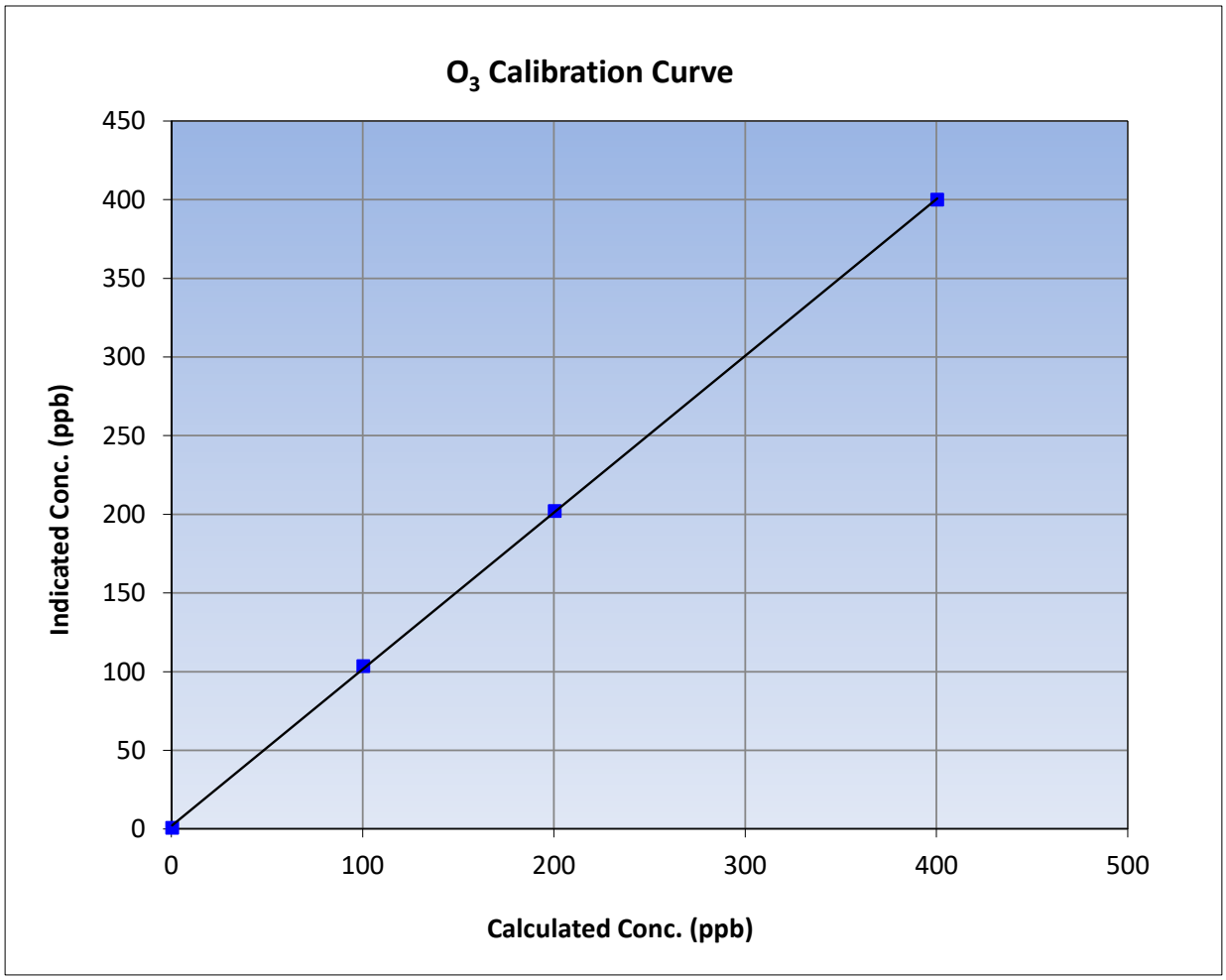
Station Information

Calibration Date:	March 7, 2023	Previous Calibration:	March 6, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	9:20	End Time (MST):	11:39
Analyzer make:	API T400	Analyzer serial #:	2961

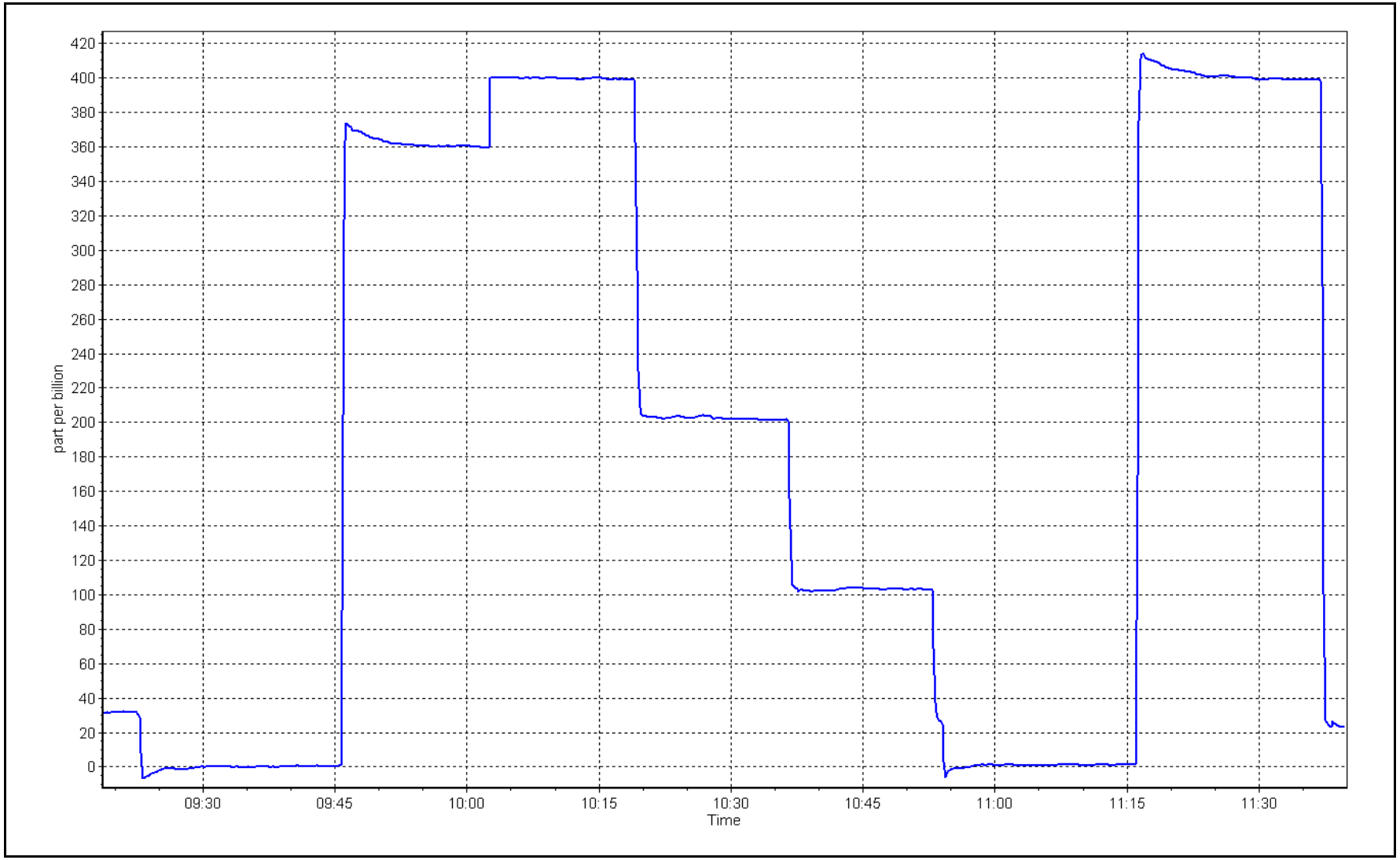
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
400.0	399.6	1.0010
200.0	201.7	0.9916
100.0	103.2	0.9690

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999927	*≥0.995*
Slope	0.996114	*0.90 - 1.10*
Intercept	1.880000	*+/- 5*



O_3 Calibration Plot Date: March 7, 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:	March 28, 2023	Last Cal Date:	February 15, 2023
Start time (MST):	9:26	End time (MST):	10:33
Analyzer Make:	API T640	S/N:	844
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	AliCat	S/N:	228085
Temp/RH standard:	AliCat	S/N:	228085

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-11.4	-11.5	-11.4	☐	+/- 2 °C
P (mmHg)	736.3	738.1	736.1	☐	+/- 10 mmHg
flow (LPM)	5	4.8	5	☐	+/- 0.25 LPM

Leak Test: Date of check: March 28, 2023 Last Cal Date: February 15, 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	10.5	---	10.5	☐	10.9 +/- 0.5

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

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

Disposable Filter Changed: March 28, 2023

Annual Maintenance

Date Sample Tube Cleaned: September 15, 2022

Date RH/T Sensor Cleaned: September 15, 2022

Notes: PM10 was showing readings once in a while before cleaning, then a steady 30ug/m3 after cleaning. PM2.5 was showing no readings before cleaning, after cleaning was showing readings. Leak check failed after cleaning. Pump at 80%. This is the removal Calibration.

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:	March 29, 2023	Last Cal Date:	
Start time (MST):	6:29	End time (MST):	7:09
Analyzer Make:	API T640	S/N:	322
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	AliCat	S/N:	228085
Temp/RH standard:	AliCat	S/N:	228085

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-4	-3.85	-4	☐	+/- 2 °C
P (mmHg)	728.6	729.9	728.6	☐	+/- 10 mmHg
flow (LPM)	5	4.95	5	☐	+/- 0.25 LPM

Leak Test: Date of check: March 29, 2023 Last Cal Date: _____

PM w/o HEPA: 5.9 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	10.4	---	10.4	☐	10.9 +/- 0.5

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

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

Disposable Filter Changed: March 28, 2023

Annual Maintenance

Date Sample Tube Cleaned: September 15, 2022

Date RH/T Sensor Cleaned: September 15, 2022

Notes: Install Calibration.

Calibration by: Melissa Lemay

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS05
MANNIX
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	March 2, 2023	Last Cal Date:	February 21, 2023
Start time (MST):	10:34	End time (MST):	14:43
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:	0.996758	0.999400	Backgd or Offset:	8.8	9.1
Calibration intercept:	-0.080000	-0.280000	Coeff or Slope:	0.914	0.920

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	80.0	800.3	792.2	1.010
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4920	80.0	800.3	799.4	1.001
second point	4960	40.0	400.2	400.5	0.999
third point	4980	20.0	200.1	198.6	1.007
as left zero	5000	0.0	0.0	0.1	----
as left span	4920	80.0	800.3	803.8	0.996
				Average Correction Factor	1.003

Baseline Corr As found:	792.30	Previous response	797.65	*% change	-0.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

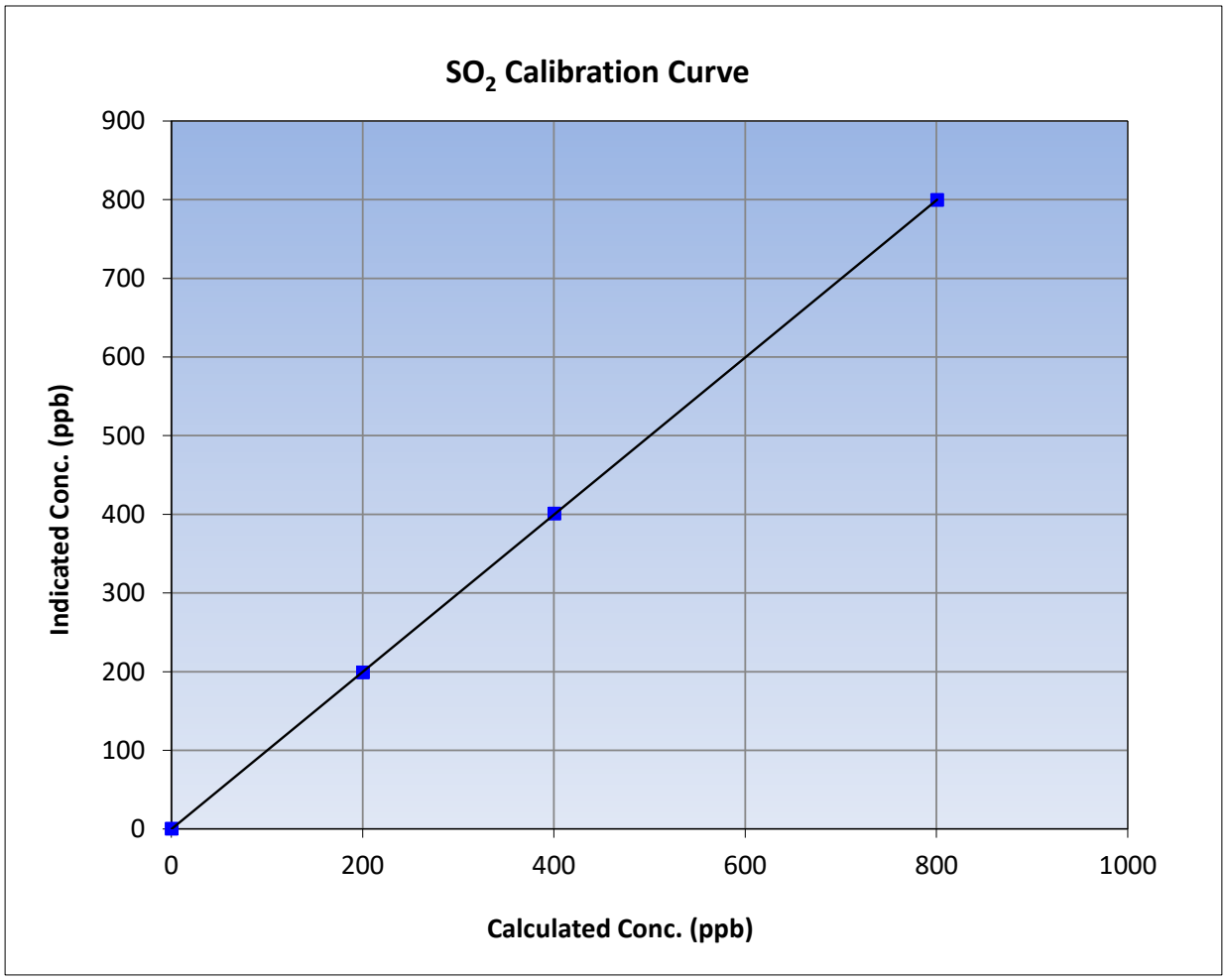
Station Information

Calibration Date:	March 2, 2023	Previous Calibration:	February 21, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	10:34	End Time (MST):	14:43
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841399

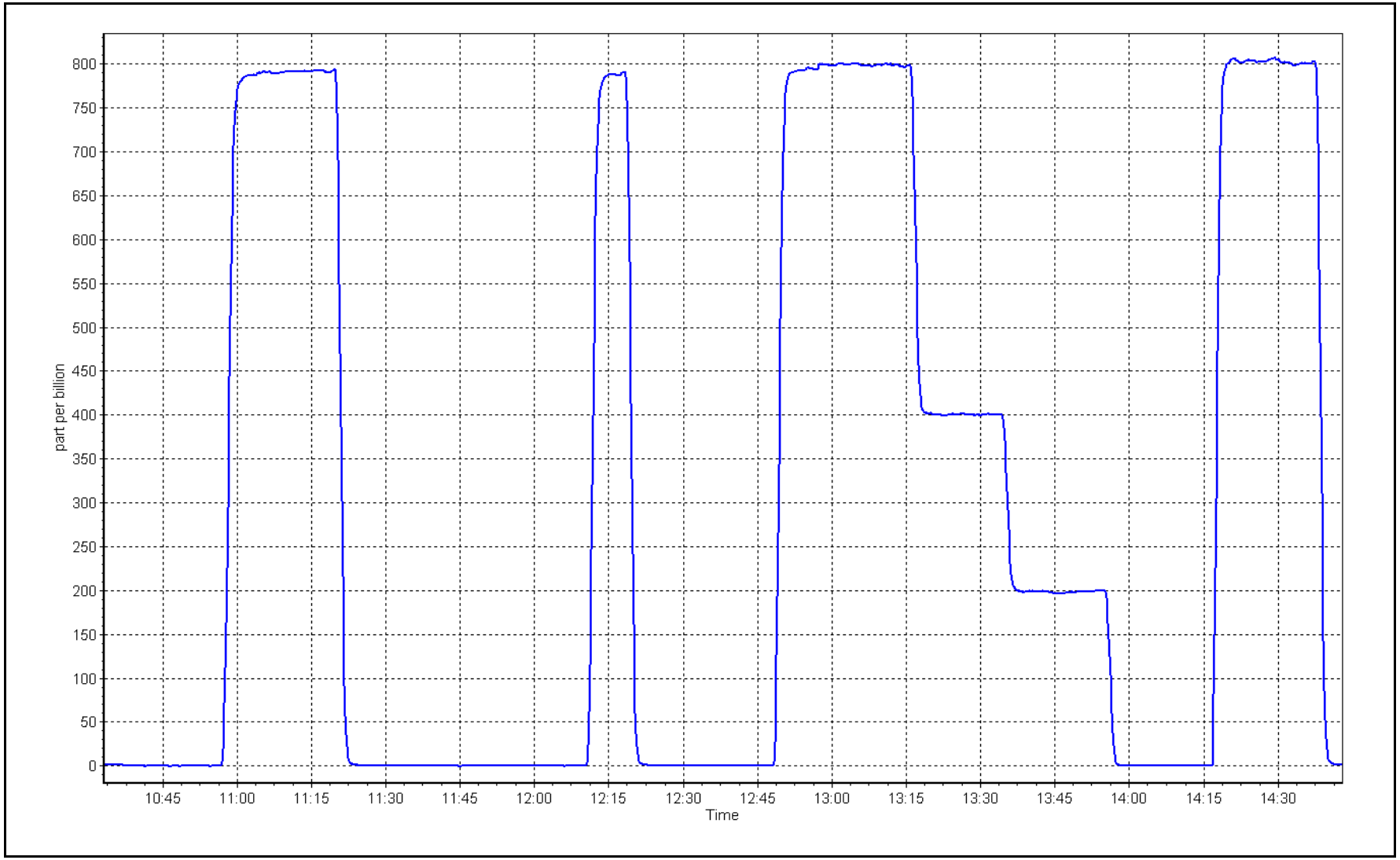
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
800.3	799.4	1.0012
400.2	400.5	0.9992
200.1	198.6	1.0075

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999994	*≥0.995*
Slope	0.999400	*0.90 - 1.10*
Intercept	-0.280000	*+/-30*



SO2 Calibration Plot Date: March 2, 2023 Location: Mannix



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	March 15, 2023	Last Cal Date:	February 15, 2023
Start time (MST):	8:52	End time (MST):	13:37
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:	0.998613	0.988329	Backgd or Offset:	2.09	2.07
Calibration intercept:	0.220652	0.380632	Coeff or Slope:	0.822	0.822

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	79.0	1.015
as found 2nd point	4960	40.7	40.0	40.1	1.004
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	0.3	----
high point	4919	81.3	80.0	79.4	1.007
second point	4960	40.7	40.0	40.0	1.001
third point	4980	20.3	20.0	20.2	0.989
as left zero	5000	0.0	0.0	0.4	----
as left span	4919	81.3	80.0	80.0	1.000
SO2 Scrubber Check	4920	80.0	800.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.999
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.8	Prev response:	80.10	*% change:	-1.7%
Baseline Corr 2nd AF pt:	39.9	AF Slope:	0.984332	AF Intercept:	0.420538
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999953		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

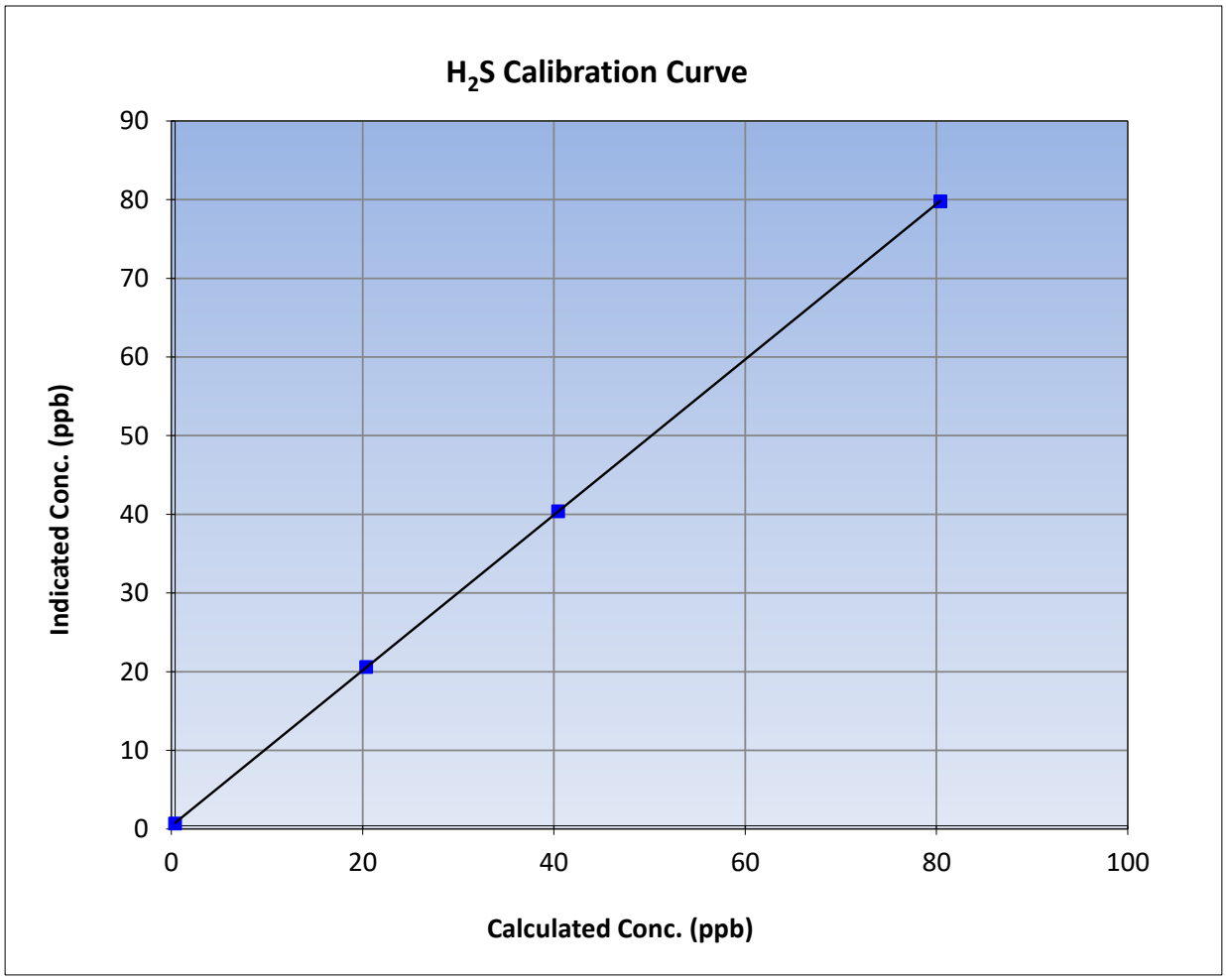
Station Information

Calibration Date:	March 15, 2023	Previous Calibration:	February 15, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	8:52	End Time (MST):	13:37
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1203169745

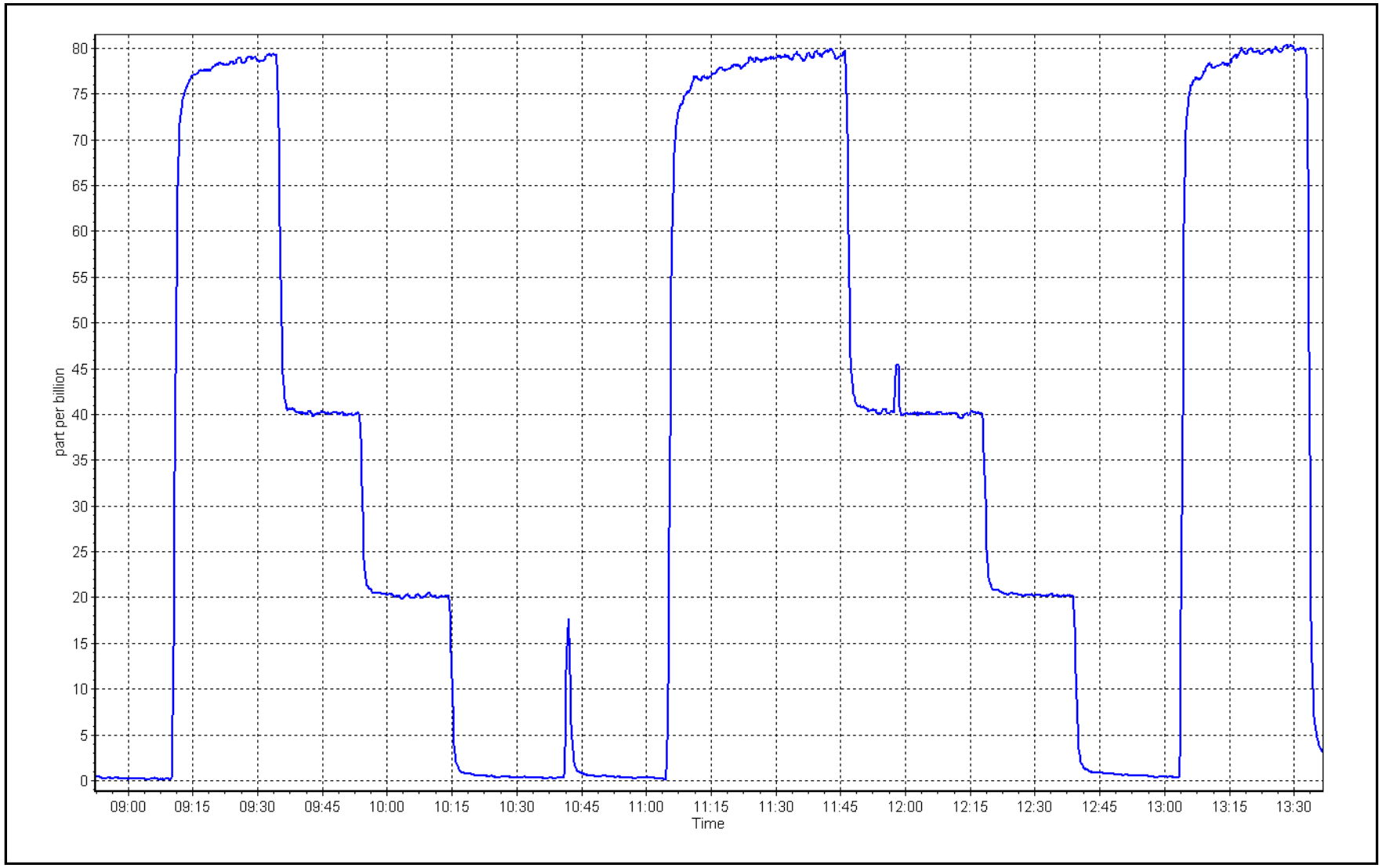
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
80.0	79.4	1.0075
40.0	40.0	1.0011
20.0	20.2	0.9888

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	0.988329	*0.90 - 1.10*
Intercept	0.380632	*+/-3*



H_2S Calibration Plot Date: March 15, 2023 Location: Mannix



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	March 2, 2023	Last Cal Date:	February 21, 2023
Start time (MST):	10:34	End time (MST):	14:43
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:		NA	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 T701H		Serial Number:	832	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1152430011	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.56E-04	2.58E-04	NMHC SP Ratio:	4.36E-05	4.50E-05
CH4 Retention time:	15.00	15.00	NMHC Peak Area:	209913	203233

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	17.06	1.010
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	17.23	17.23	1.000
second point	4960	40.0	8.61	8.61	1.000
third point	4980	20.0	4.31	4.29	1.003
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	17.23	17.29	0.996
				Average Correction Factor	1.001
Baseline Corr AF:	17.06	Prev response	17.17	*% 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	0.00	0.00	----
as found span	4920	80	9.15	9.01	1.015
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4920	80	9.15	9.15	0.999
second point	4960	40	4.57	4.59	0.996
third point	4980	20	2.29	2.30	0.996
as left zero	5000	0	0.00	0.00	----
as left span	4920	80	9.15	9.22	0.992
				Average Correction Factor	0.997
Baseline Corr AF:	9.01	Prev response	9.12	*% 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	80.0	8.08	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	4920	80.0	8.08	8.07	1.001
second point	4960	40.0	4.04	4.02	1.005
third point	4980	20.0	2.02	2.00	1.012
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	8.08	8.07	1.001
				Average Correction Factor	1.006
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:	0.997356	1.000262
THC Cal Offset:	-0.010200	-0.006600
CH4 Cal Slope:	0.997864	0.999646
CH4 Cal Offset:	-0.012000	-0.011800
NMHC Cal Slope:	0.997020	1.000469
NMHC Cal Offset:	0.000600	0.005800

Notes: Sample inlet filter changed after as founds. Zero chromatogram was used. Span was adjusted.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

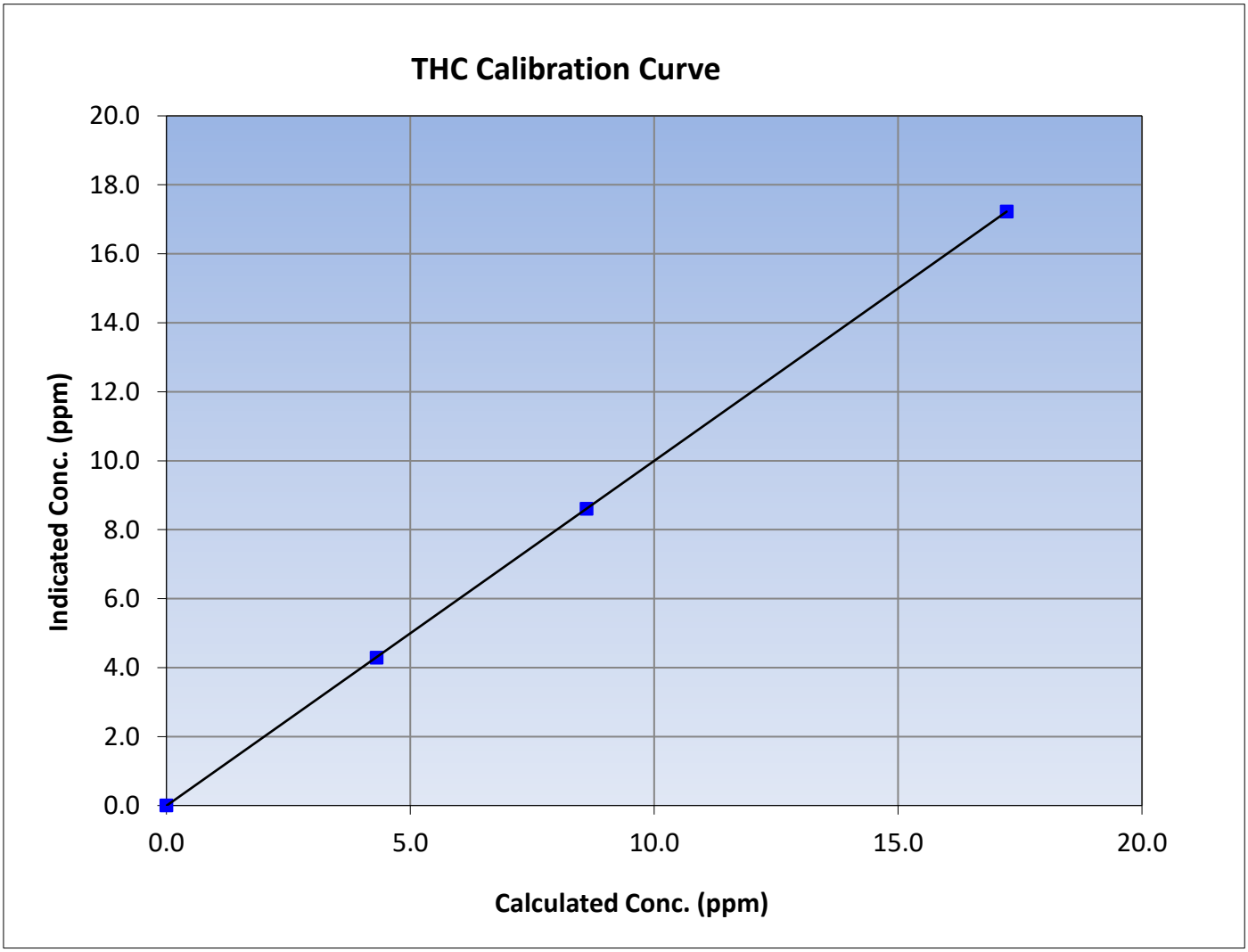
Version-01-2020

Station Information

Calibration Date:	March 2, 2023	Previous Calibration:	February 21, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	10:34	End Time (MST):	14:43
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999999	*≥0.995*
17.23	17.23	1.0000			
8.61	8.61	1.0005	Slope	1.000262	*0.90 - 1.10*
4.31	4.29	1.0034			
			Intercept	-0.006600	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

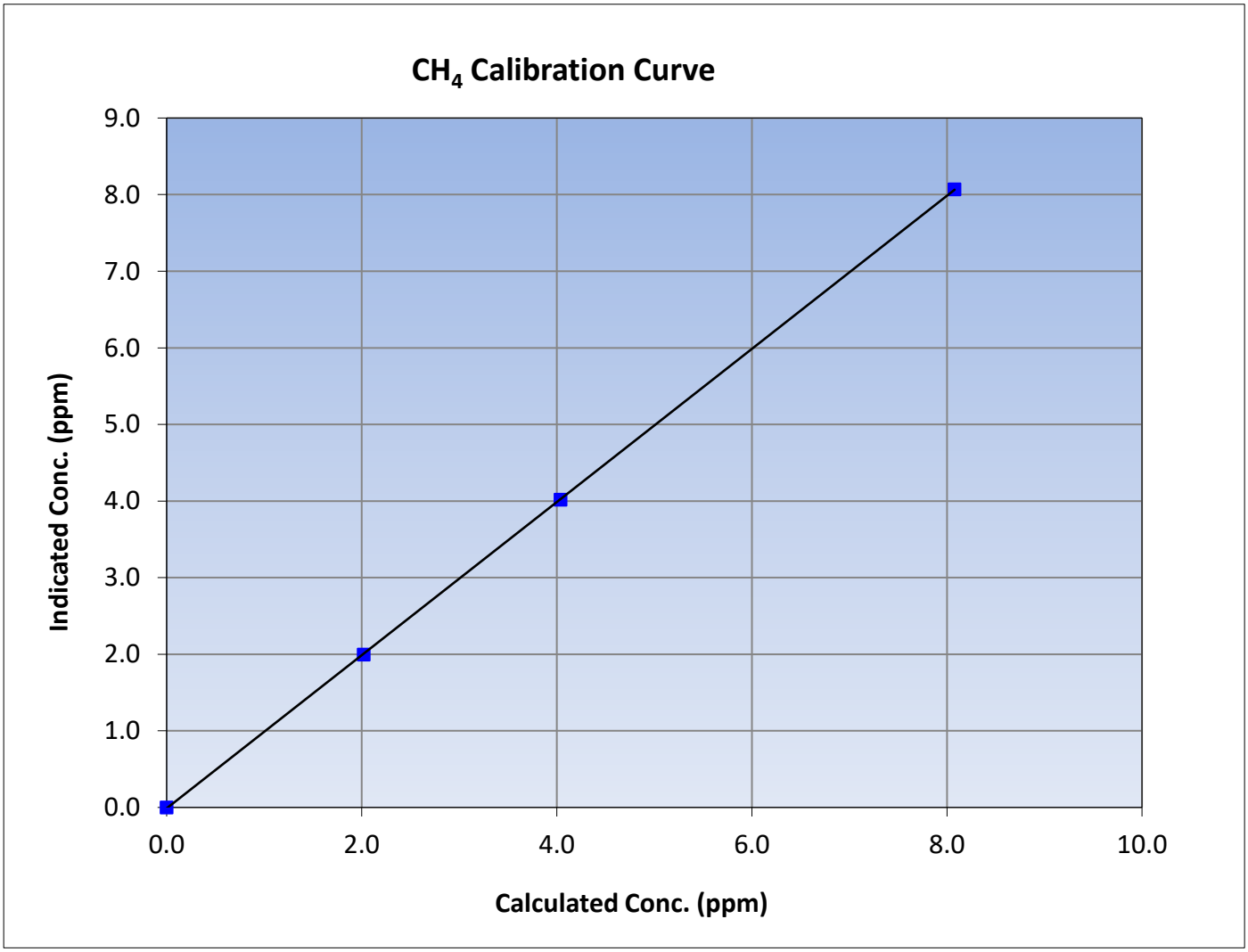
Version-01-2020

Station Information

Calibration Date:	March 2, 2023	Previous Calibration:	February 21, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	10:34	End Time (MST):	14:43
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	0.999990	*≥0.995*
8.08	8.07	1.0010			
4.04	4.02	1.0050	Slope	0.999646	*0.90 - 1.10*
2.02	2.00	1.0118			
			Intercept	-0.011800	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

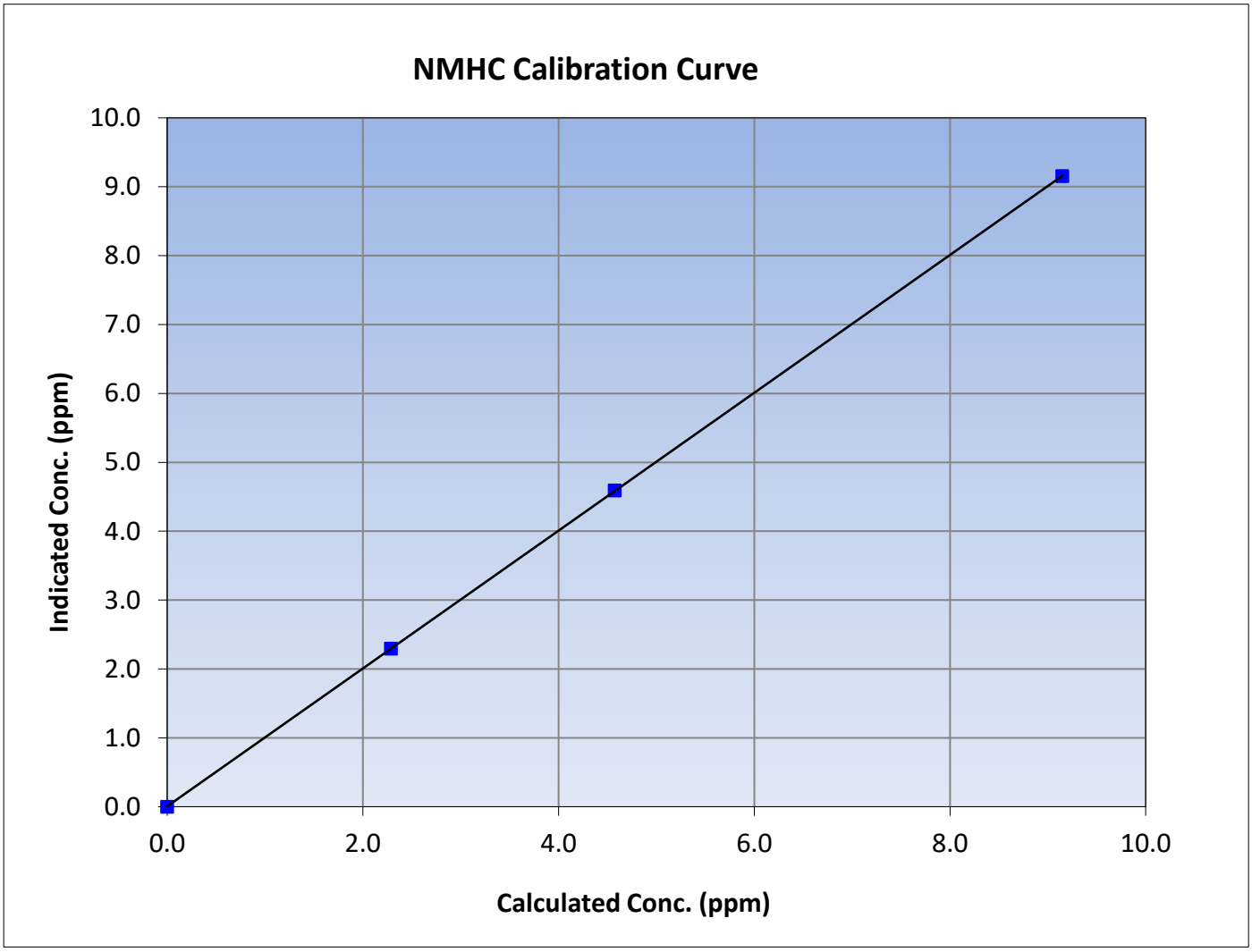
Version-01-2020

Station Information

Calibration Date:	March 2, 2023	Previous Calibration:	February 21, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	10:34	End Time (MST):	14:43
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	0.999997	≥0.995
9.15	9.15	0.9994			
4.57	4.59	0.9965	Slope	1.000469	0.90 - 1.10
2.29	2.30	0.9960			
			Intercept	0.005800	+/-0.5



NMHC Calibration Plot Date: March 2, 2023 Location: Mannix

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	March 10, 2023	Last Cal Date:	March 2, 2023
Start time (MST):	9:30	End time (MST):	10:56
Reason:	Maintenance		

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:		NA	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 T701H		Serial Number:	832	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1152430011	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.58E-04	NA	NMHC SP Ratio:	4.50E-05	NA
CH4 Retention time:	15.00	NA	NMHC Peak Area:	203233	NA

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	80.0	17.23	17.42	0.989
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.989

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

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4920	80	9.15	9.39	0.974
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.974
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	80.0	8.08	8.03	1.006
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.006
Baseline Corr AF:	NA	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000262	1.011204
THC Cal Offset:	-0.006600	0.000000
CH4 Cal Slope:	0.999646	0.993637
CH4 Cal Offset:	-0.011800	0.000000
NMHC Cal Slope:	1.000469	1.026827
NMHC Cal Offset:	0.005800	0.000000

Notes: Low dilution pressure caused insufficient air supply which affected the instrument baseline and zero-span sequence. Was not able to generate as founds due this issue. Replaced the Zero Air Generator.

Calibration Performed By: Karan Pandit

NMHC Calibration Plot Date: March 10, 2023 Location: Mannix

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	March 16, 2023	Last Cal Date:	March 2, 2023
Start time (MST):	9:33	End time (MST):	11:15
Reason:	Cylinder Change		

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:		NA	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 T701H		Serial Number:	832	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1152430011	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.58E-04	NA	NMHC SP Ratio:	4.50E-05	NA
CH4 Retention time:	15.00	NA	NMHC Peak Area:	203233	NA

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	17.45	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	80.0	17.23	17.44	0.988
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.988

Baseline Corr AF:	17.45	Prev response	17.22	*% 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-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4920	80.0	9.15	9.41	0.972
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4920	80.0	9.15	9.40	0.973
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.973
Baseline Corr AF:	9.41	Prev response	9.16	*% 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	80.0	8.08	8.03	1.006
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	8.08	8.04	1.005
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.005
Baseline Corr AF:	8.03	Prev response	8.06	*% change	-0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

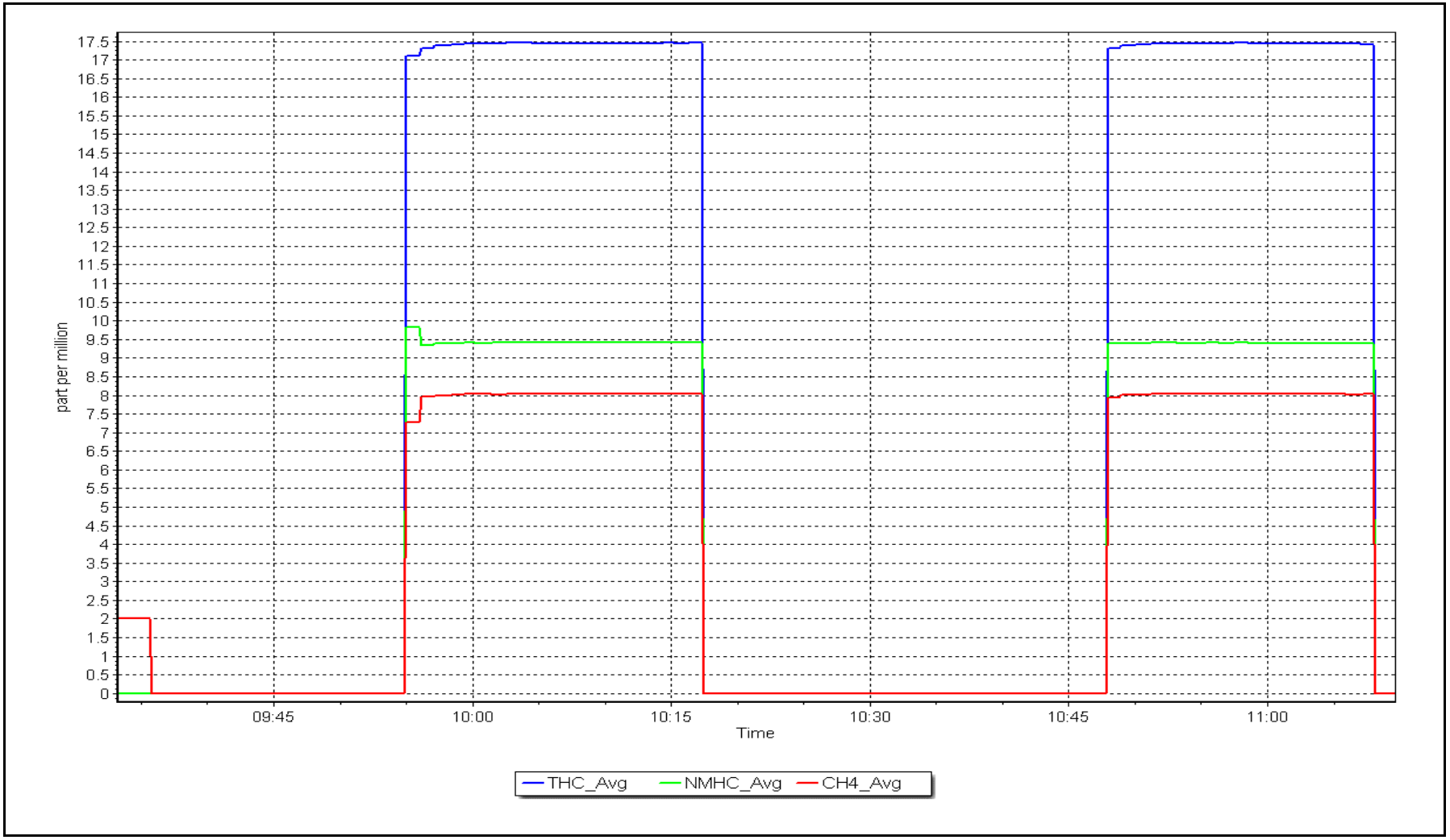
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000262	1.012133
THC Cal Offset:	-0.006600	0.000000
CH4 Cal Slope:	0.999646	0.994875
CH4 Cal Offset:	-0.011800	0.000000
NMHC Cal Slope:	1.000469	1.027373
NMHC Cal Offset:	0.005800	0.000000

Notes: Nitrogen cylinder changed after as founds.

Calibration Performed By: Karan Pandit

NMHC Calibration Plot Date: March 16, 2023 Location: Mannix



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS06
PATRICIA MCINNES
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	March 13, 2023	Last Cal Date:	February 16, 2023
Start time (MST):	9:37	End time (MST):	13:59
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.78	ppm	Cal Gas Exp Date:	September 9, 2024
Cal Gas Cylinder #:	AAL070632			
Removed Cal Gas Conc:	49.78	ppm	Rem Gas Exp Date:	N/A
Removed Gas Cyl #:	N/A		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	689
ZAG Make/Model:	API T701		Serial Number:	3566

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.993085	0.991070	Backgd or Offset:	17.2	17.2
Calibration intercept:	1.541481	1.621614	Coeff or Slope:	0.907	0.907

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	789.8	1.012
as found 2nd point	4960	40.2	400.2	397.5	1.007
as found 3rd point	4980	20.1	200.1	201.2	0.995
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4920	80.3	799.5	792.9	1.008
second point	4960	40.2	400.2	399.7	1.001
third point	4980	20.1	200.1	201.3	0.994
as left zero	5000	0.0	0.0	0.0	----
as left span	4920	80.3	799.5	793.0	1.008
				Average Correction Factor	1.001

Baseline Corr As found:	789.70	Previous response	795.48	*% change	-0.7%
Baseline Corr 2nd AF pt:	397.40	AF Slope:	0.986609	AF Intercept:	1.882706
Baseline Corr 3rd AF pt:	201.10	AF Correlation:	0.999977		

* = > +/-5% change initiates investigation

Notes: Completed multipoint as founds to complete maintenance for the NMHC. 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

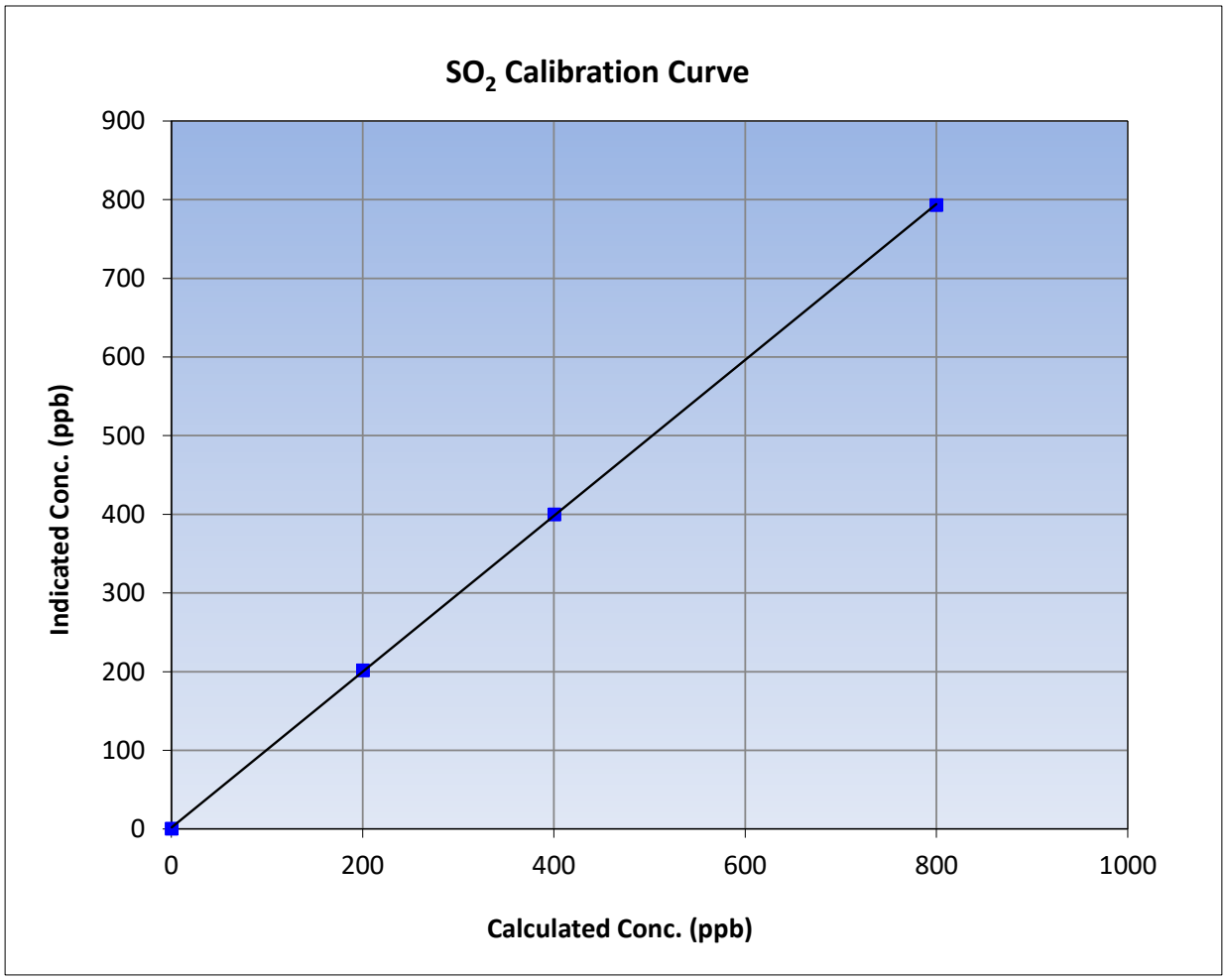
Station Information

Calibration Date:	March 13, 2023	Previous Calibration:	February 16, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:37	End Time (MST):	13:59
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290013

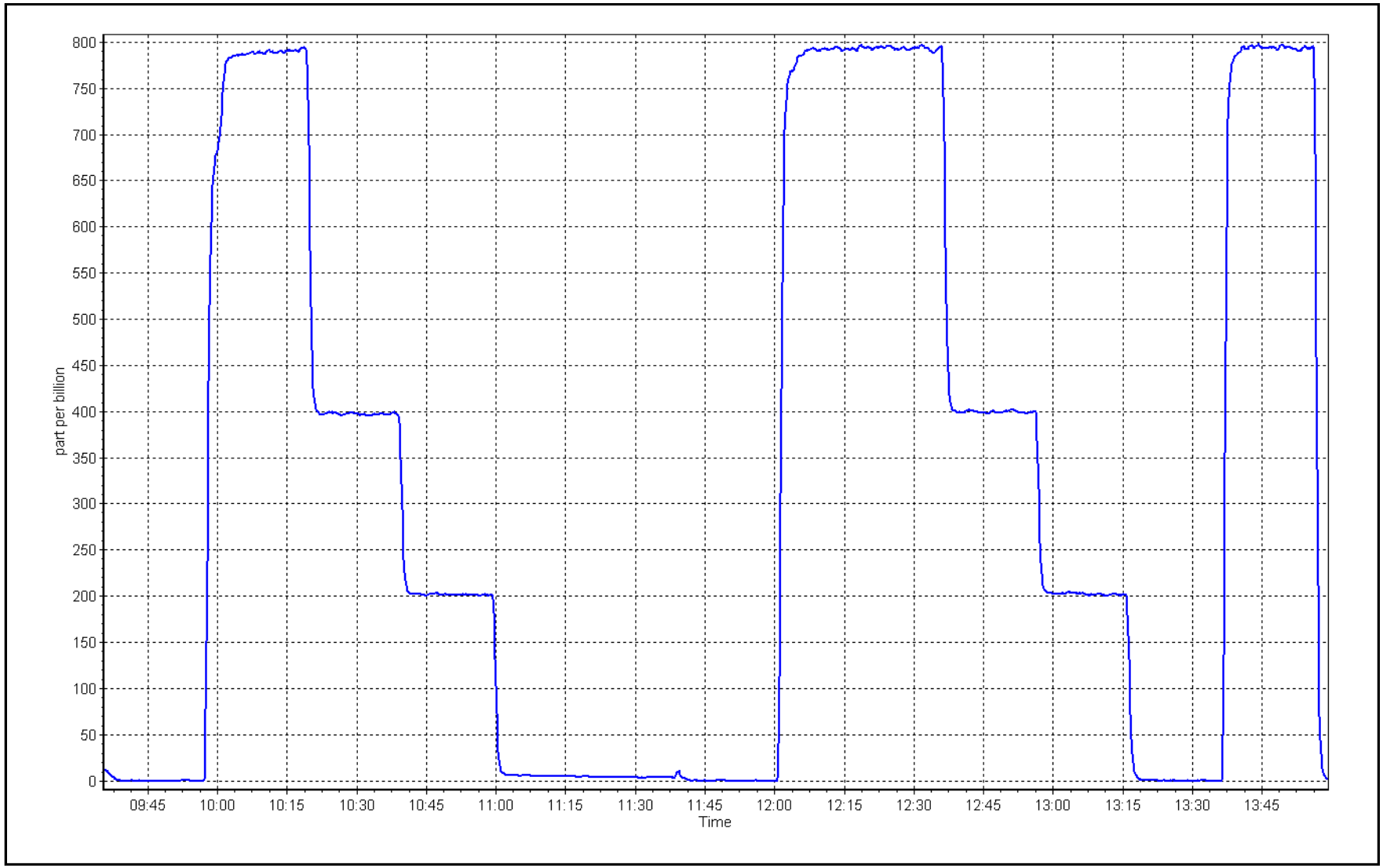
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
799.5	792.9	1.0083
400.2	399.7	1.0013
200.1	201.3	0.9941

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999977	*≥0.995*
Slope	0.991070	*0.90 - 1.10*
Intercept	1.621614	*+/-30*



SO2 Calibration Plot Date: March 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:	March 15, 2023	Last Cal Date:	February 6, 2023
Start time (MST):	8:55	End time (MST):	13:18
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.38	ppm	Cal Gas Exp Date:	March 2, 2023
Cal Gas Cylinder #:	EY0000809			
Removed Cal Gas Conc:	5.38	ppm	Rem Gas Exp Date:	N/A
Removed Gas Cyl #:	N/A		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3566
ZAG Make/Model:	API T701 H		Serial Number:	689

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1218153358	
Converter make:	Global G150		Converter serial #:	2022-195	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.990341	0.997060	Backgd or Offset:	1.82	1.84
Calibration intercept:	0.217319	0.257193	Coeff or Slope:	1.049	1.070

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4926	74.3	79.9	77.6	1.030
as found 2nd point	4963	37.2	40.0	39.2	1.021
as found 3rd point	4981	18.6	20.0	20.0	1.001
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4926	74.3	79.9	79.9	1.001
second point	4963	37.2	40.0	40.2	0.996
third point	4981	18.6	20.0	20.4	0.981
as left zero	5000	0.0	0.0	0.2	----
as left span	4926	74.3	79.9	79.8	1.002
SO2 Scrubber Check	4920	80.3	803.0	0.0	----
Date of last scrubber change:		December 20, 2021		Ave Corr Factor	0.992
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	77.6	Prev response:	79.39	*% change:	-2.3%
Baseline Corr 2nd AF pt:	39.2	AF Slope:	0.968755	AF Intercept:	0.297750
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999932		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

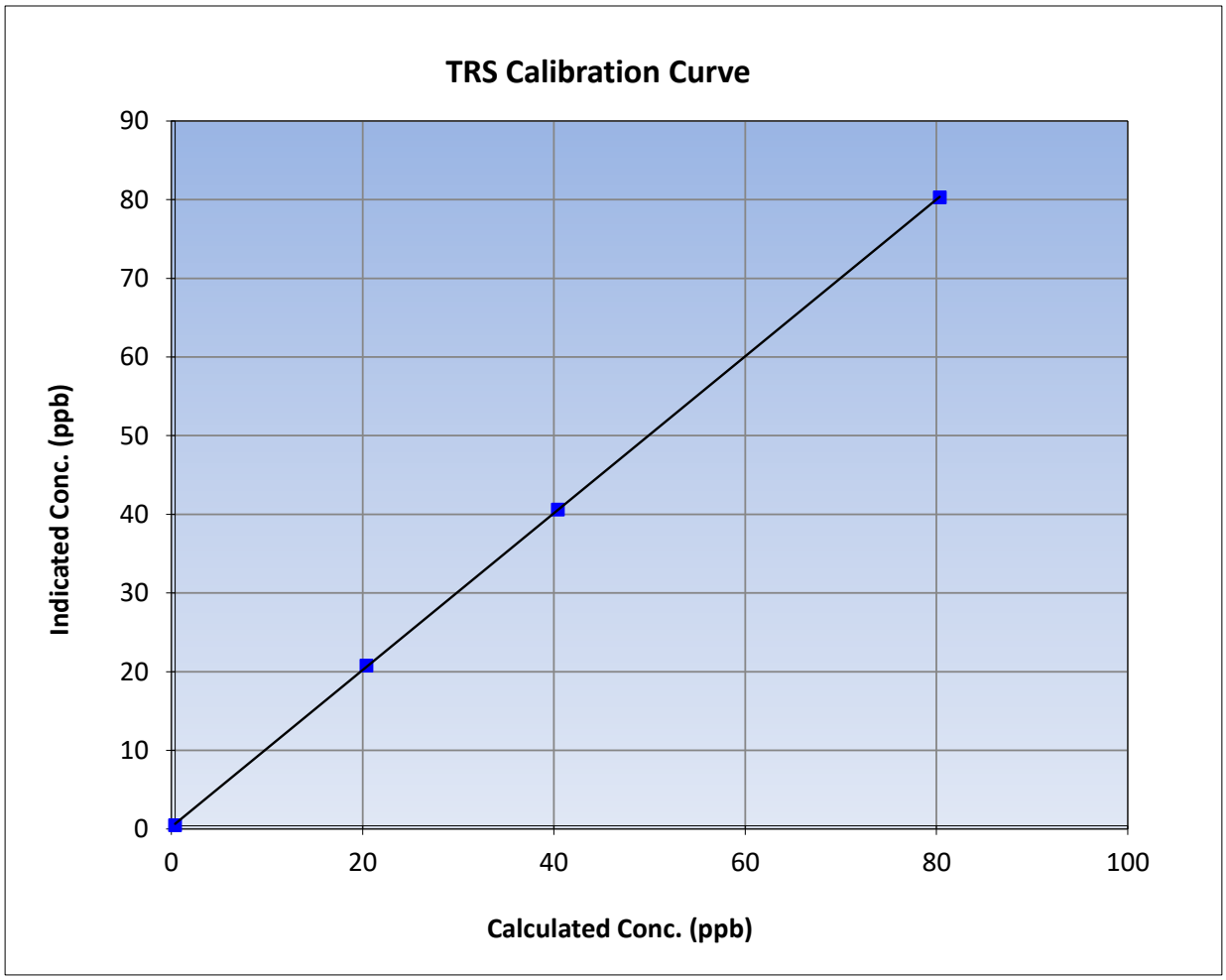
Station Information

Calibration Date:	March 15, 2023	Previous Calibration:	February 6, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:55	End Time (MST):	13:18
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1218153358

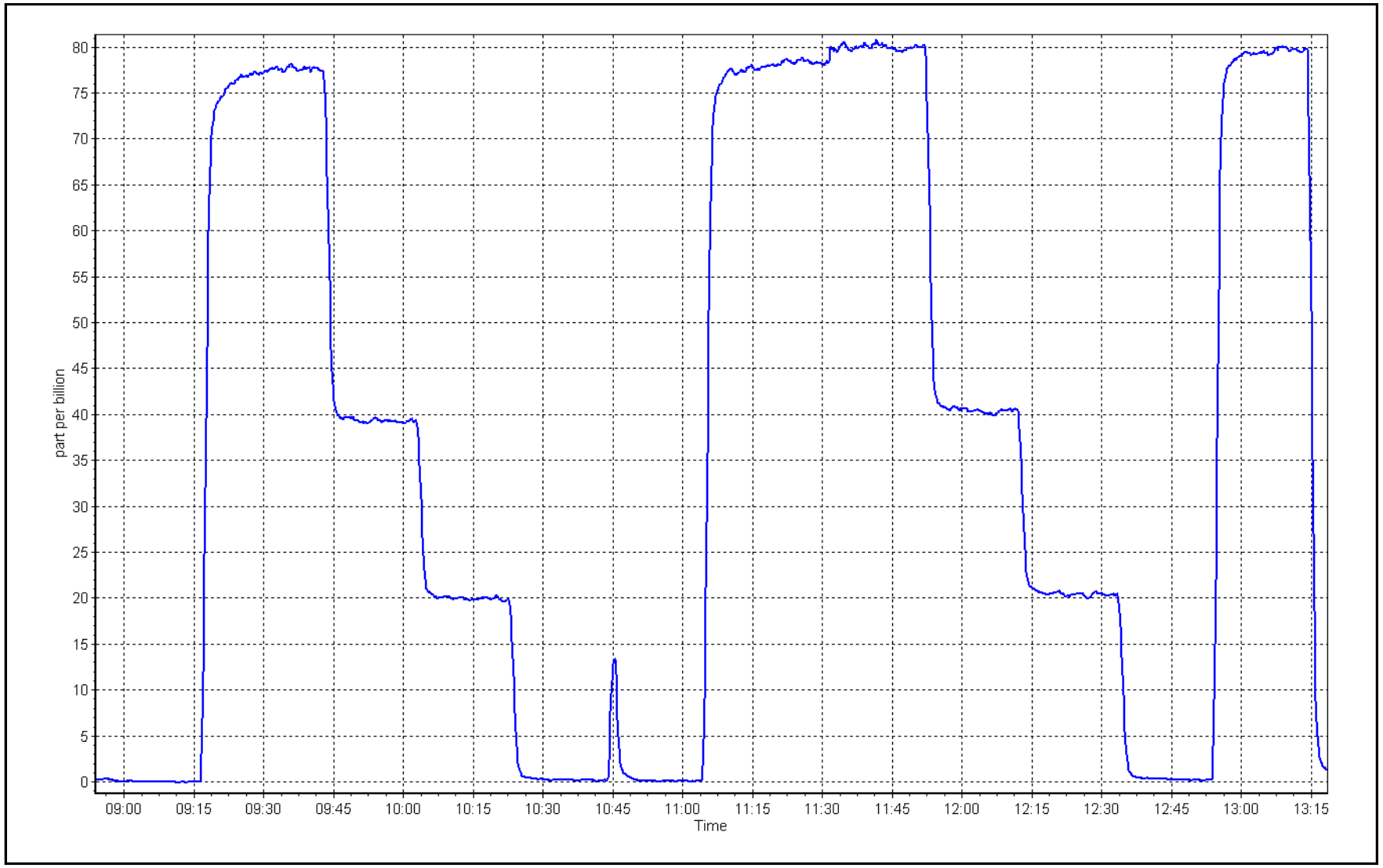
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
79.9	79.9	1.0005
40.0	40.2	0.9957
20.0	20.4	0.9811

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999981	*≥0.995*
Slope	0.997060	*0.90 - 1.10*
Intercept	0.257193	*+/-3*



TRS Calibration Plot Date: March 15, 2023 Location: Patricia McInnes



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	March 13, 2023	Last Cal Date:	February 25, 2023
Start time (MST):	9:37	End time (MST):	13:59
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		AAL070632	Cal Gas Expiry Date:	September 9, 2024	
CH4 Cal Gas Conc.	501.6	ppm	CH4 Equiv Conc.	1066.2	ppm
C3H8 Cal Gas Conc.	205.3	ppm			
Removed Gas Ref.		N/A	Removed Gas Expiry:	N/A	
Removed CH4 Conc.	501.6	ppm	CH4 Equiv Conc.	1066.2	ppm
Removed C3H8 Conc.	205.3	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3566	
ZAG make/model:	API T701		Serial Number:	261	

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:	3.26E-04	3.33E-04	NMHC SP Ratio:	5.79E-05	5.86E-05
CH4 Retention time:	14	14.0	NMHC Peak Area:	156880	154840

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	17.12	16.91	1.013
as found 2nd point	4960	40.2	8.57	8.45	1.015
as found 3rd point	4980	20.1	4.29	4.26	1.007
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	17.12	17.15	0.998
second point	4960	40.2	8.57	8.57	1.000
third point	4980	20.1	4.29	4.32	0.992
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.12	17.16	0.998
				Average Correction Factor	0.997

Baseline Corr AF:	16.91	Prev response	17.13	*% change	-1.3%
Baseline Corr 2nd AF:	8.4	AF Slope:	0.986971	AF Intercept:	0.006195
Baseline Corr 3rd AF:	4.3	AF Correlation:	0.999995	* = > +/-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	4920	80.3	9.07	8.99	1.008
as found 2nd point	4960	40.2	4.54	4.51	1.007
as found 3rd point	4980	20.1	2.27	2.27	1.002
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4920	80.3	9.07	9.08	0.999
second point	4960	40.2	4.54	4.55	0.997
third point	4980	20.1	2.27	2.29	0.990
as left zero	5000	0	0.00	0.00	----
as left span	4920	80.3	9.07	9.08	0.998
				Average Correction Factor	0.996
Baseline Corr AF:	8.99	Prev response	9.08	*% change	-0.9%
Baseline Corr 2nd AF:	4.5	AF Slope:	0.991315	AF Intercept:	0.006759
Baseline Corr 3rd AF:	2.3	AF Correlation:	0.999997	* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	8.06	7.92	1.017
as found 2nd point	4960	40.2	4.03	3.94	1.023
as found 3rd point	4980	20.1	2.02	1.99	1.013
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	8.06	8.07	0.998
second point	4960	40.2	4.03	4.02	1.003
third point	4980	20.1	2.02	2.03	0.994
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	8.06	8.07	0.998
				Average Correction Factor	0.998
Baseline Corr AF:	7.92	Prev response	8.05	*% change	-1.7%
Baseline Corr 2nd AF:	3.94	AF Slope:	0.982351	AF Intercept:	-0.000765
Baseline Corr 3rd AF:	1.99	AF Correlation:	0.999986	* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000813	1.000848
THC Cal Offset:	-0.008055	0.007935
CH4 Cal Slope:	1.000524	1.001093
CH4 Cal Offset:	-0.008597	-0.000603
NMHC Cal Slope:	1.001070	1.000428
NMHC Cal Offset:	0.000542	0.009337

Notes: Completed multipoint as founds due to H2 generator requiring routine maintenance. Adjusted the span only.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

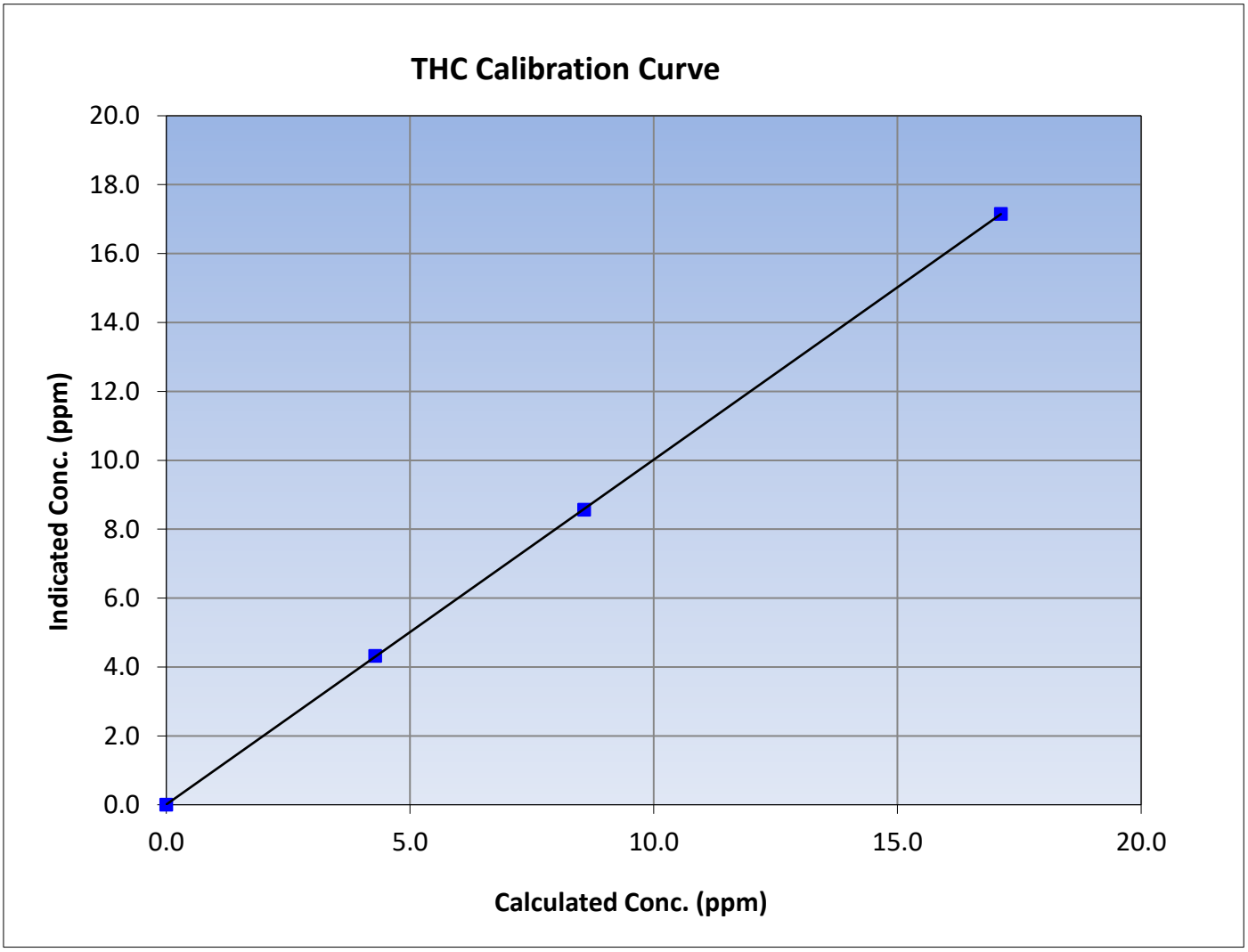
Version-01-2020

Station Information

Calibration Date:	March 13, 2023	Previous Calibration:	February 25, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:37	End Time (MST):	13:59
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*
17.12	17.15	0.9985			
8.57	8.57	1.0005	Slope	1.000848	*0.90 - 1.10*
4.29	4.32	0.9919			
			Intercept	0.007935	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

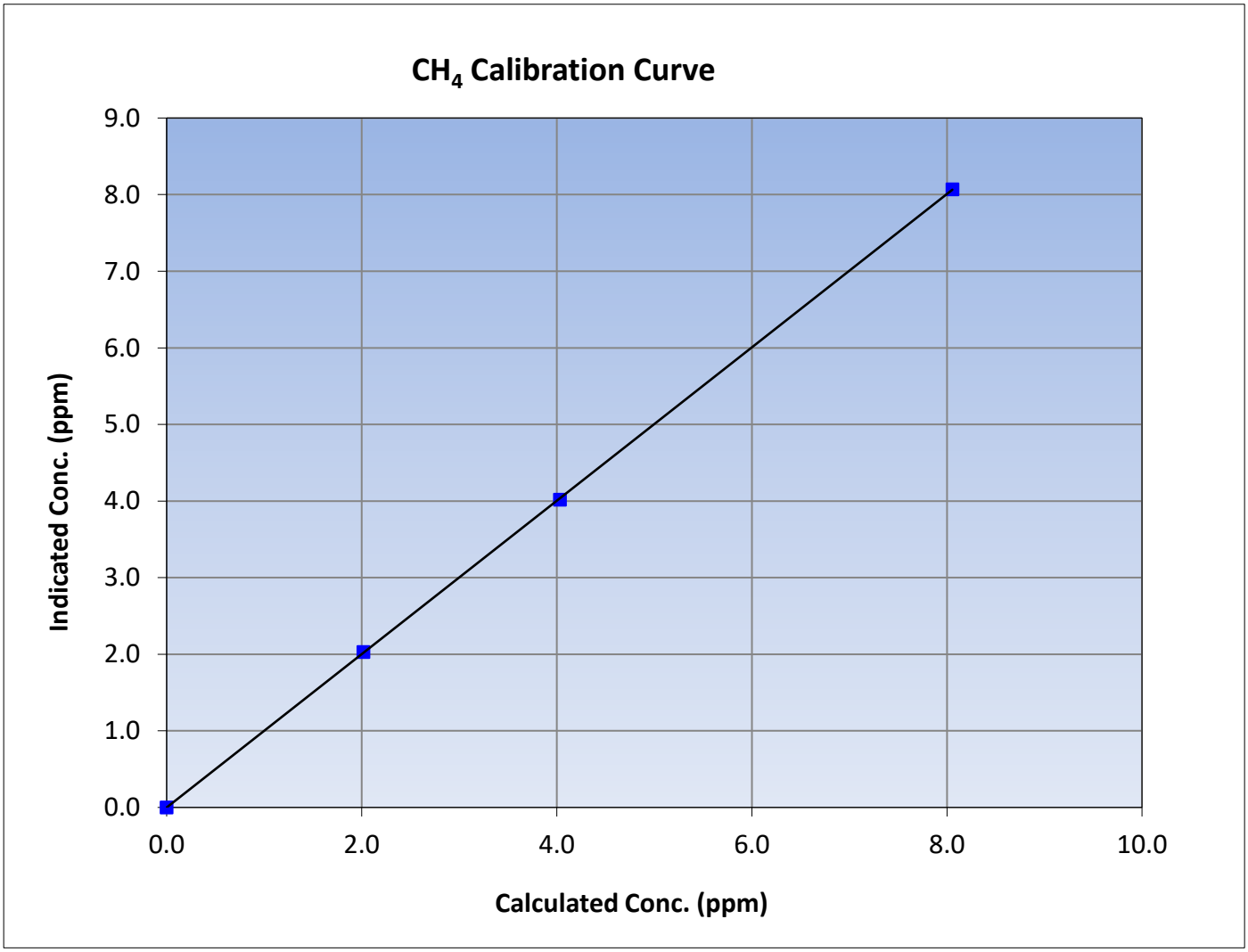
Version-01-2020

Station Information

Calibration Date:	March 13, 2023	Previous Calibration:	February 25, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:37	End Time (MST):	13:59
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999987	≥0.995
8.06	8.07	0.9982			
4.03	4.02	1.0034	Slope	1.001093	0.90 - 1.10
2.02	2.03	0.9938			
			Intercept	-0.000603	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

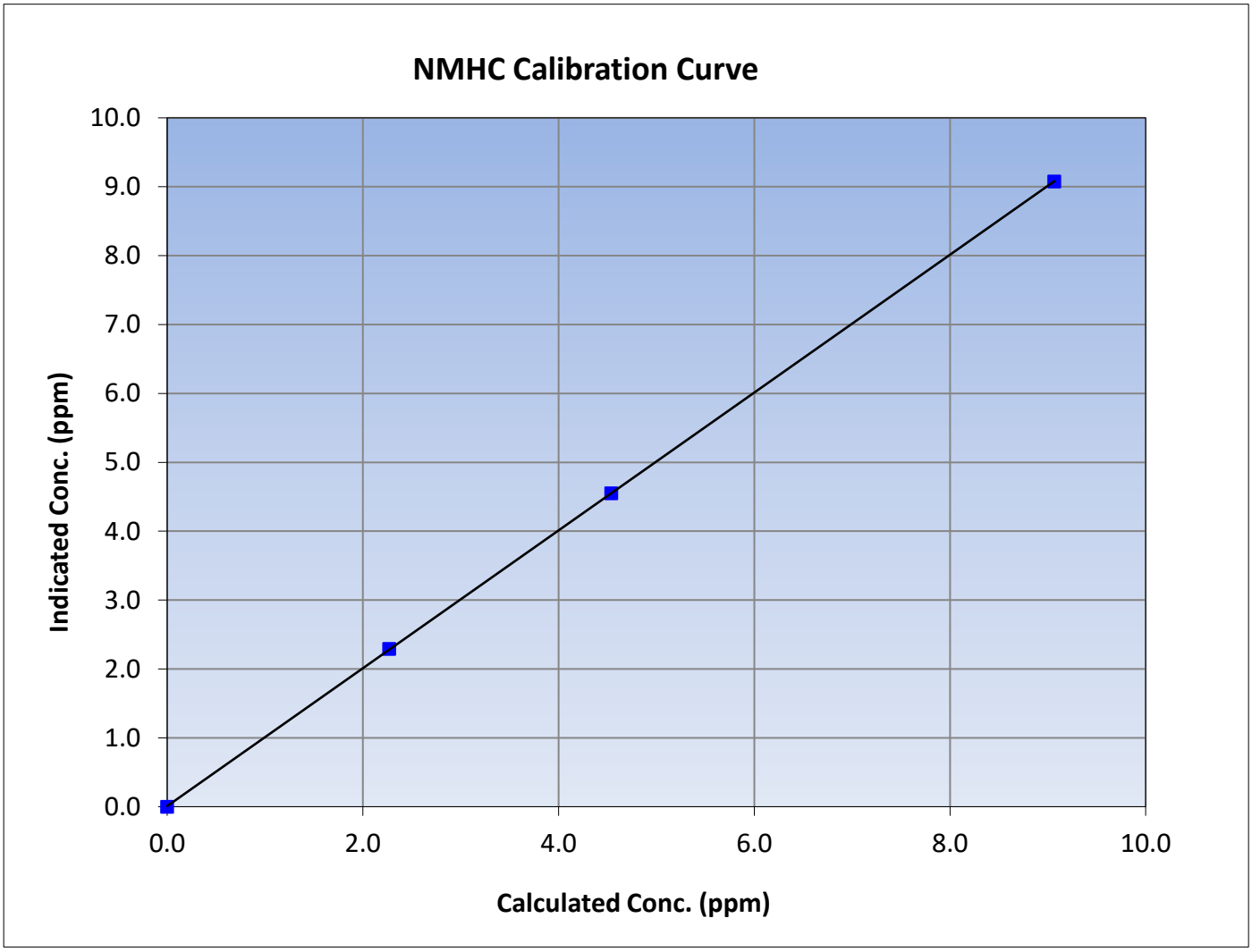
Version-01-2020

Station Information

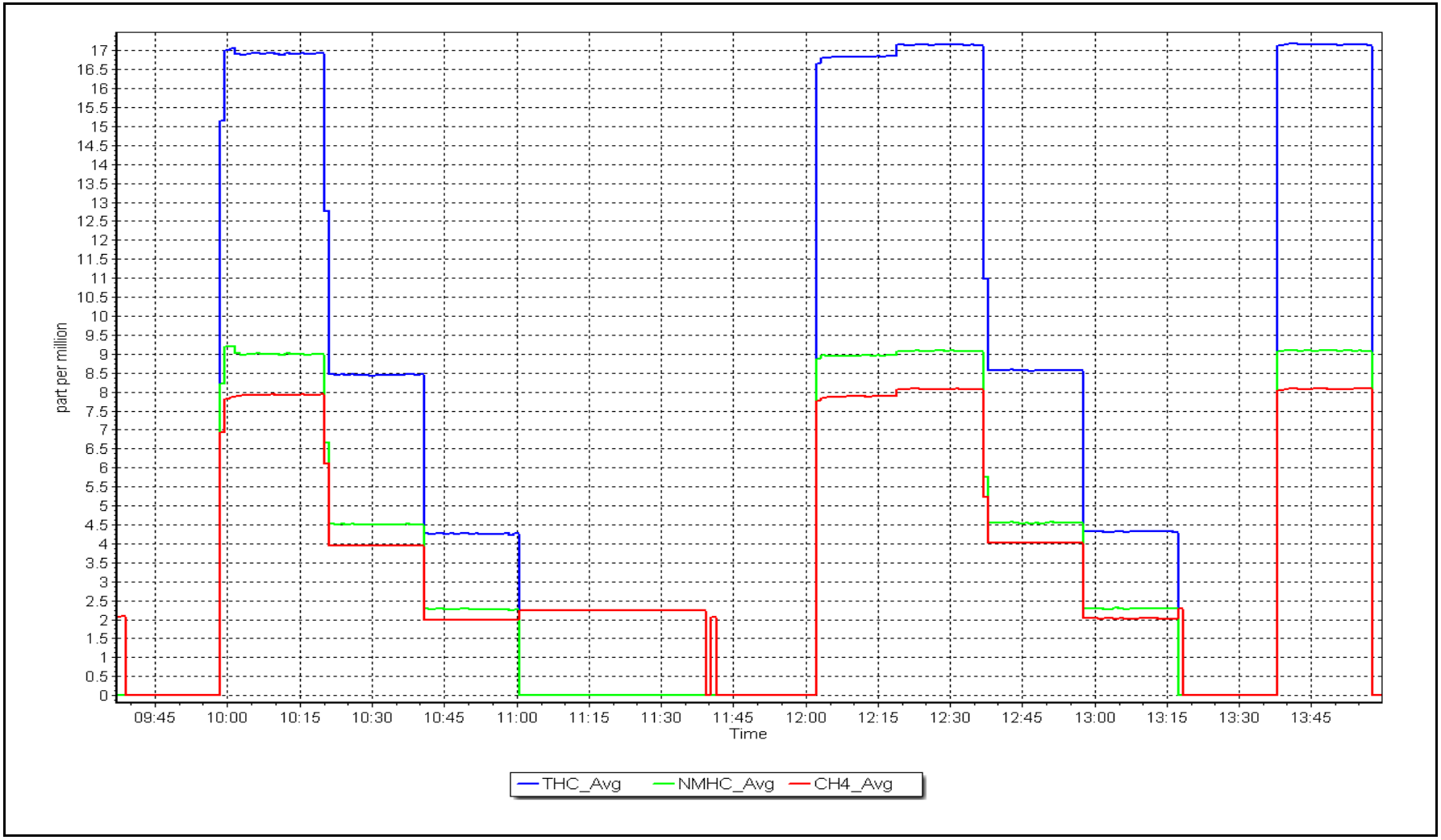
Calibration Date:	March 13, 2023	Previous Calibration:	February 25, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:37	End Time (MST):	13:59
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999995	*≥0.995*
9.07	9.08	0.9989			
4.54	4.55	0.9974	Slope	1.000428	*0.90 - 1.10*
2.27	2.29	0.9902			
			Intercept	0.009337	*+/-0.5*



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



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	March 24, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	8:53	End time (MST):	10:20
Reason:	Cylinder Change		

Calibration Standards

Gas Cert Reference:		AAL070632	Cal Gas Expiry Date:	September 9, 2024	
CH4 Cal Gas Conc.	501.6	ppm	CH4 Equiv Conc.	1066.2	ppm
C3H8 Cal Gas Conc.	205.3	ppm			
Removed Gas Ref.		N/A	Removed Gas Expiry:	N/A	
Removed CH4 Conc.	501.6	ppm	CH4 Equiv Conc.	1066.2	ppm
Removed C3H8 Conc.	205.3	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3566	
ZAG make/model:	API T701		Serial Number:	261	

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:	3.33E-04	3.33E-04	NMHC SP Ratio:	5.86E-05	5.86E-05
CH4 Retention time:	14	14.0	NMHC Peak Area:	154840	154840

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	17.12	17.15	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	80.3	17.12	17.13	1.000
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.000

Baseline Corr AF:	17.15	Prev response	17.15	*% change	0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4920	80.3	9.07	9.13	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4920	80.3	9.07	9.11	0.995
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.995
Baseline Corr AF:	9.13	Prev response	9.08	*% change	0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	8.06	8.02	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	8.06	8.02	1.004
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.004
Baseline Corr AF:	8.02	Prev response	8.06	*% change	-0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

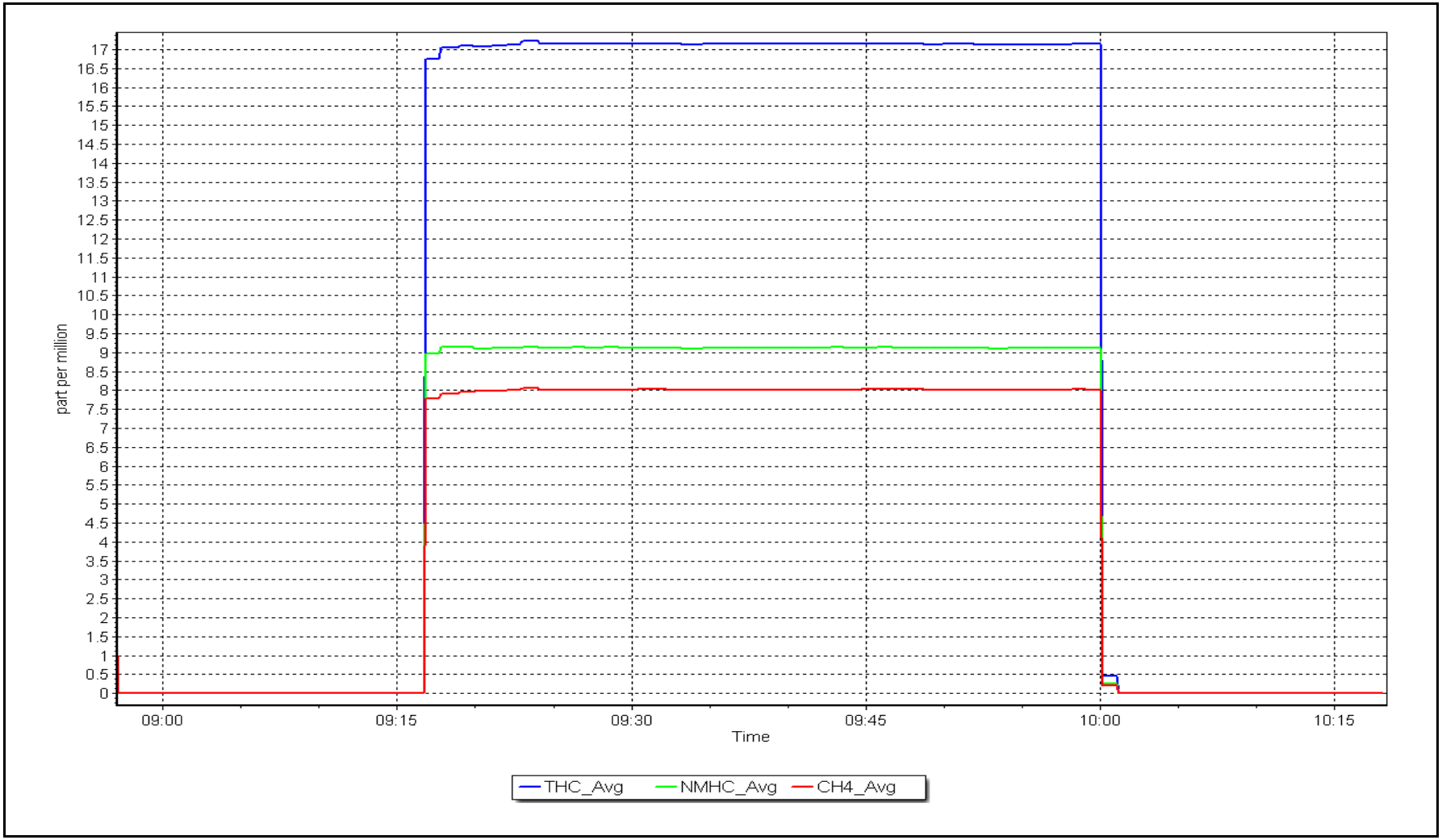
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000848	1.000481
THC Cal Offset:	0.007935	0.000000
CH4 Cal Slope:	1.001093	0.995569
CH4 Cal Offset:	-0.000603	0.000000
NMHC Cal Slope:	1.000428	1.005175
NMHC Cal Offset:	0.009337	0.000000

Notes: Cylinder change.

Calibration Performed By: Sean Bala

NMHC Calibration Plot Date: March 24, 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:	March 7, 2023	Last Cal Date:	February 2, 2023
Start time (MST):	9:33	End time (MST):	14:21
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	0.818	0.818	NO bkgnd or offset:	3.2	3.2
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:	155.1	155.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.004307	0.993329
NO_X Cal Offset:	2.260596	2.240132
NO Cal Slope:	1.003971	0.991966
NO Cal Offset:	1.260503	1.559980
NO_2 Cal Slope:	1.009891	1.003238
NO_2 Cal Offset:	0.497022	1.111866

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.4	0.0	-0.5	----	----
as found span	4923	76.9	807.6	799.5	8.2	805.4	792.5	12.9	1.0027	1.0088
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.2	-0.1	----	----
high point	4923	76.9	807.6	799.5	8.2	803.4	793.9	9.6	1.0052	1.0070
second point	4962	38.5	404.3	400.2	4.1	404.8	399.3	5.6	0.9988	1.0024
third point	4981	19.2	201.6	199.6	2.0	204.9	200.9	4.0	0.9841	0.9935
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.3	-0.3	----	----
as left span	4923	76.9	807.6	389.9	417.8	801.2	384.2	417.1	1.0080	1.0147
								Average Correction Factor	0.9960	1.0010

Corrected As found	NO_X = 805.8 ppb	NO = 792.5 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -0.9%
Previous Response	NO_X = 813.3 ppb	NO = 803.9 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)	791.9	382.3	417.8	419.6	0.9956	100.4%
2nd GPT point (200 ppb O3)	791.9	587.1	213.0	215.3	0.9891	101.1%
3rd GPT point (100 ppb O3)	791.9	690.1	110.0	112.7	0.9756	102.5%
				Average Correction Factor	0.9868	101.3%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

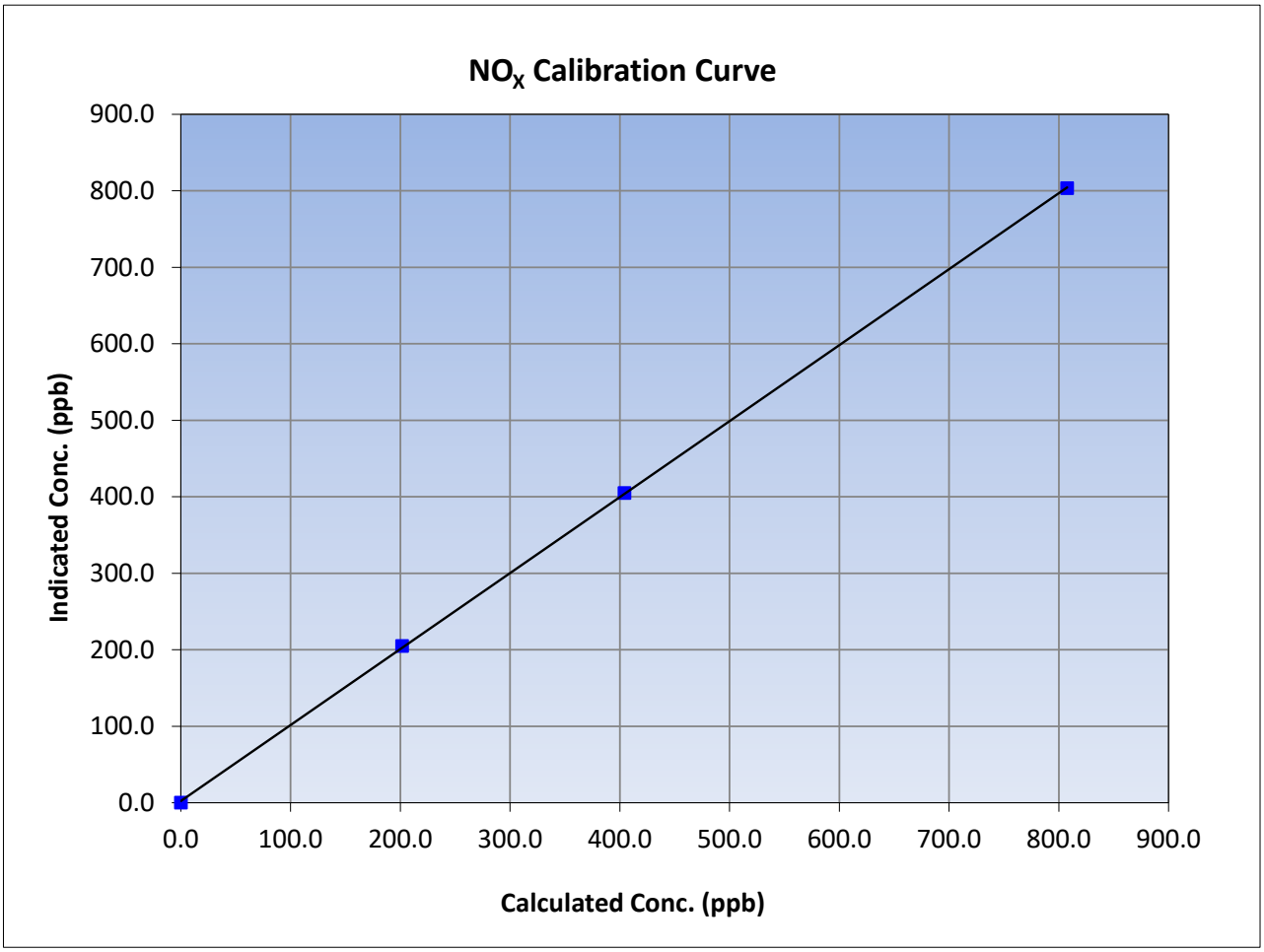
Version-04-2020

Station Information

Calibration Date:	March 7, 2023	Previous Calibration:	February 2, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:33	End Time (MST):	14:21
Analyzer make:	Thermo 42i	Analyzer serial #:	1172750022

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999964	≥0.995
807.6	803.4	1.0052			
404.3	404.8	0.9988	Slope	0.993329	0.90 - 1.10
201.6	204.9	0.9841			
			Intercept	2.240132	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

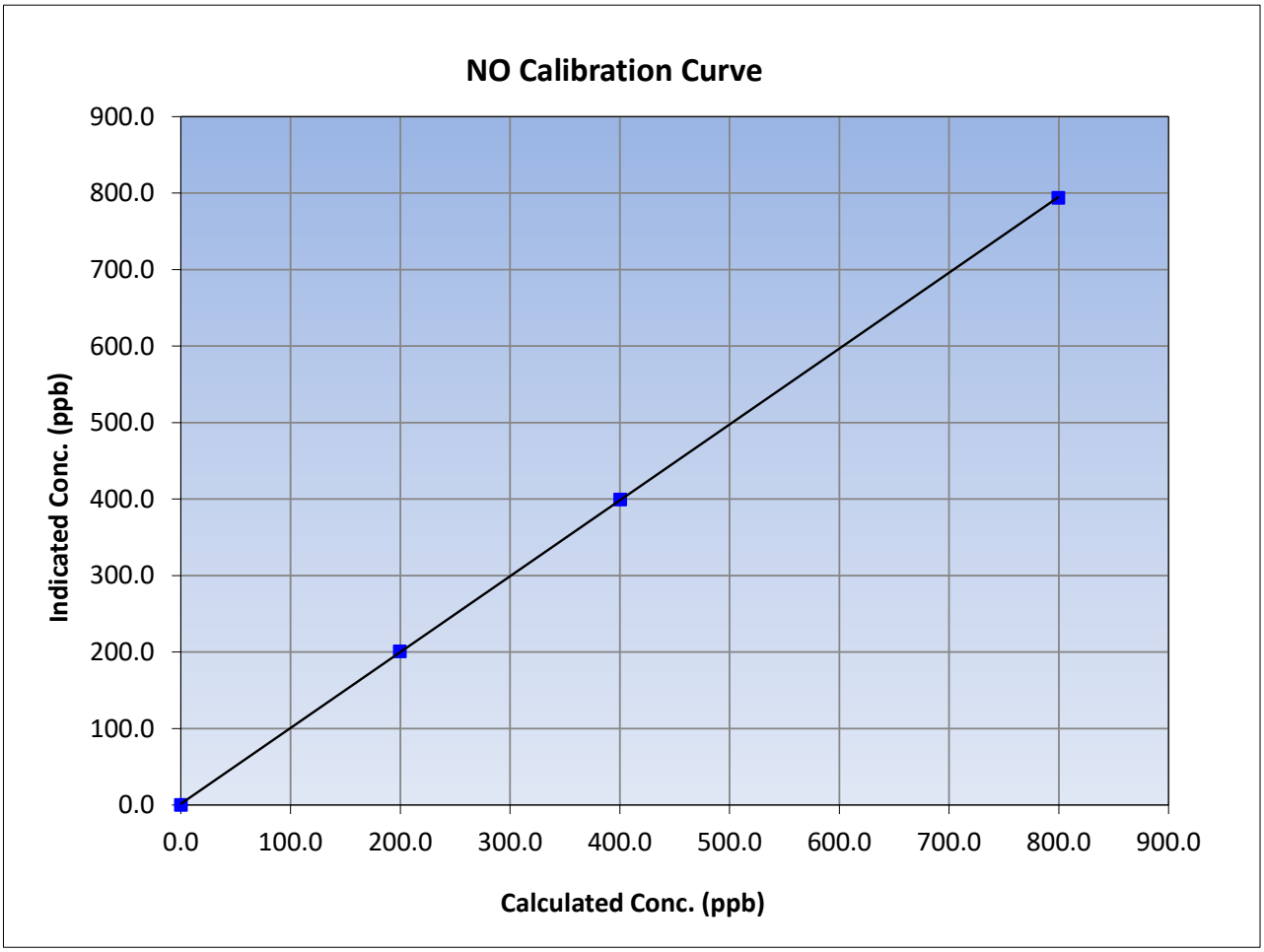
Version-04-2020

Station Information

Calibration Date:	March 7, 2023	Previous Calibration:	February 2, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:33	End Time (MST):	14:21
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	0.999987	≥0.995
799.5	793.9	1.0070			
400.2	399.3	1.0024	Slope	0.991966	0.90 - 1.10
199.6	200.9	0.9935			
			Intercept	1.559980	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

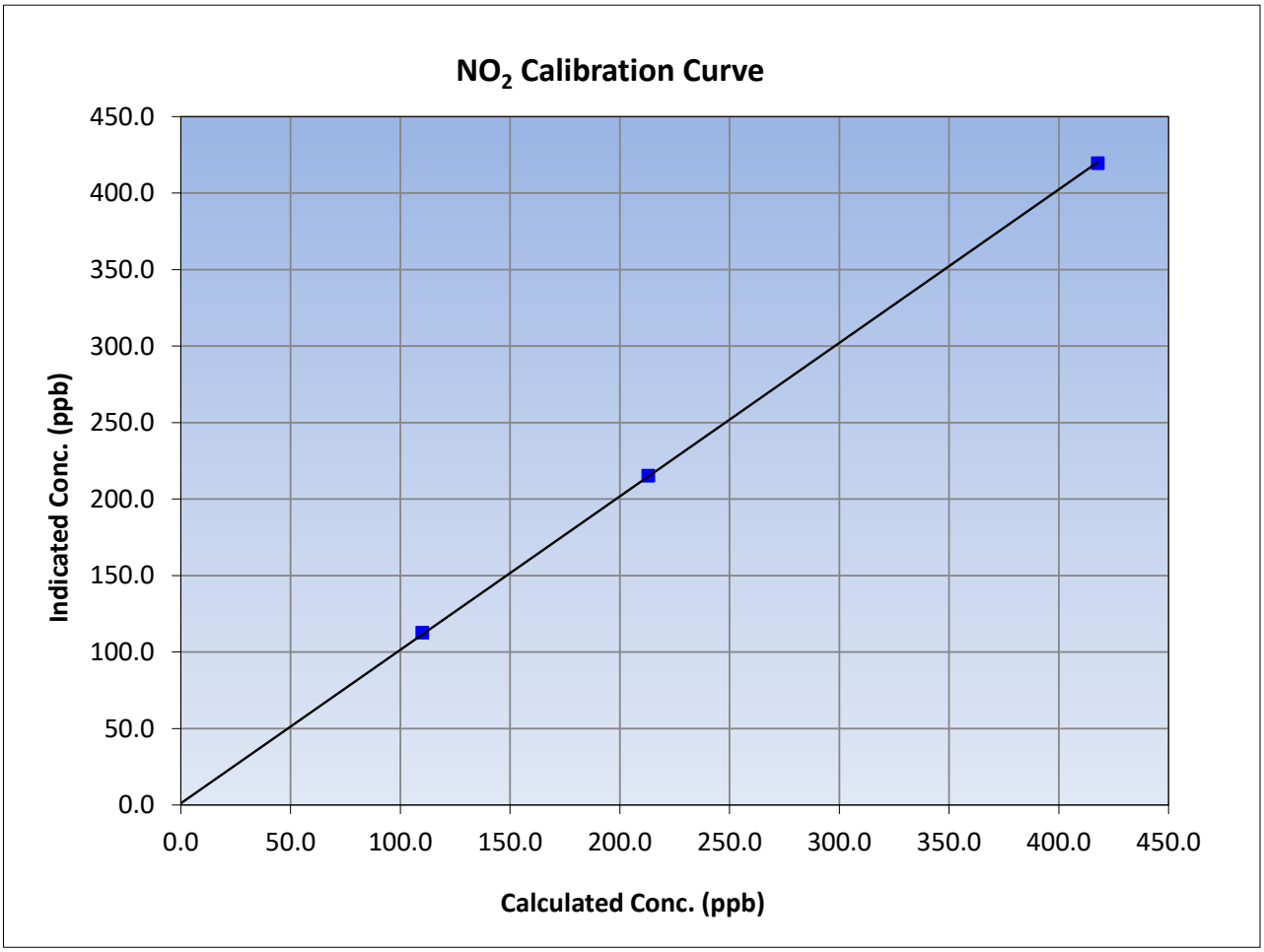
Version-04-2020

Station Information

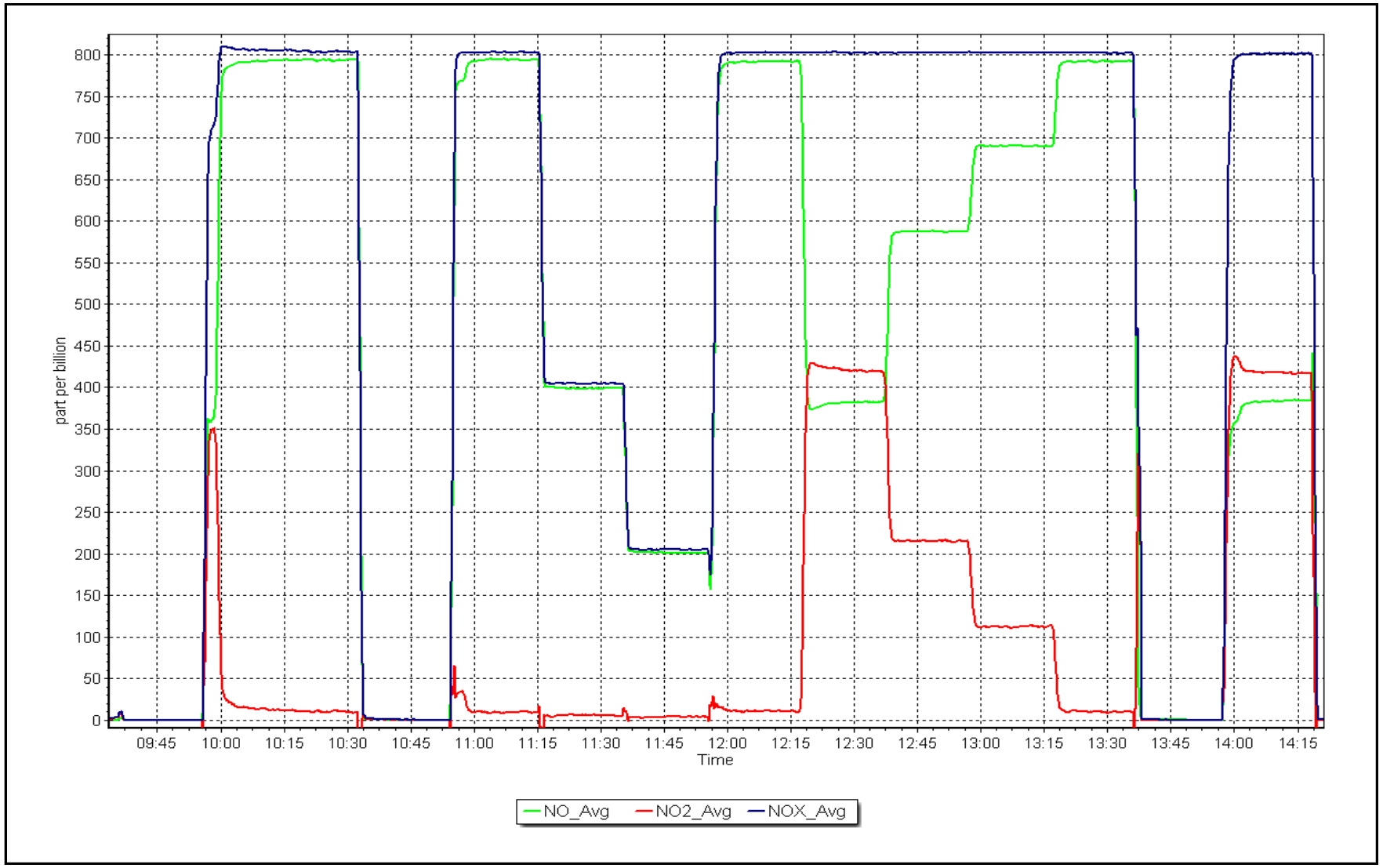
Calibration Date:	March 7, 2023	Previous Calibration:	February 2, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:33	End Time (MST):	14:21
Analyzer make:	Thermo 42i	Analyzer serial #:	1172750022

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.1	----	Correlation Coefficient	0.999960	*≥0.995*
417.8	419.6	0.9956			
213.0	215.3	0.9891	Slope	1.003238	*0.90 - 1.10*
110.0	112.7	0.9756			
			Intercept	1.111866	*+/-20*



NO_X Calibration Plot Date: March 7, 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:	March 9, 2023	Last Cal Date:	February 8, 2023
Start time (MST):	11:10	End time (MST):	14:11
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005057	1.005771	Backgd or Offset:	-1.2	-1.2
Calibration intercept:	1.240000	0.940000	Coeff or Slope:	1.019	1.019

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	800.0	0.0	0.2	----
as found span	5000	1303.0	400.0	402.5	0.994
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	0.2	----
high point	5000	1303.0	400.0	402.8	0.993
second point	5000	966.5	200.0	202.7	0.987
third point	5000	794.3	100.0	102.1	0.979
as left zero	5000	800.0	0.0	0.4	----
as left span	5000	1303.0	400.0	404.6	0.989
				Average Correction Factor	0.986

Baseline Corr As found:	402.3	Previous response	403.3	*% 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: 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

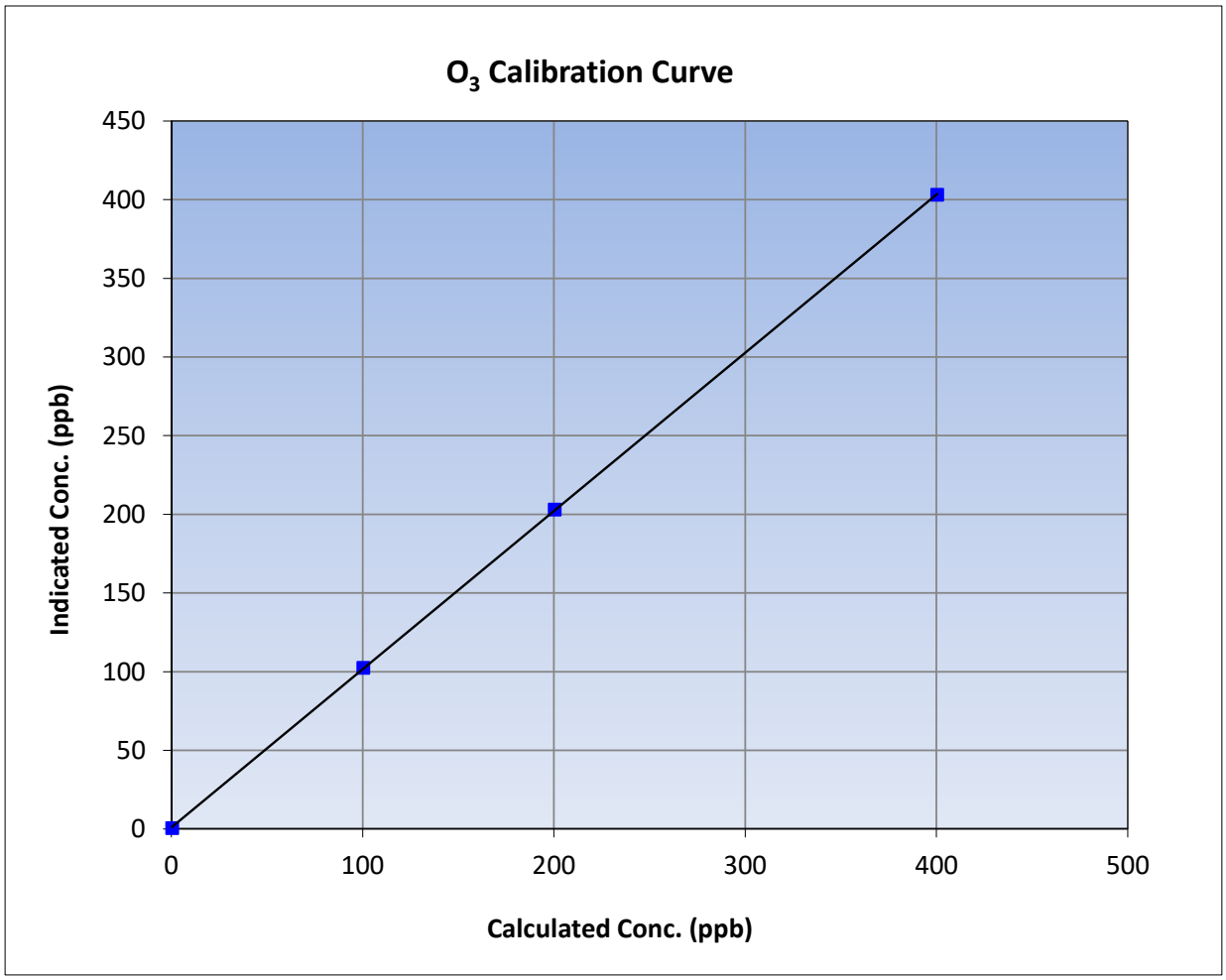
Station Information

Calibration Date:	March 9, 2023	Previous Calibration:	February 8, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	11:10	End Time (MST):	14:11
Analyzer make:	Thermo 49i	Analyzer serial #:	1300156234

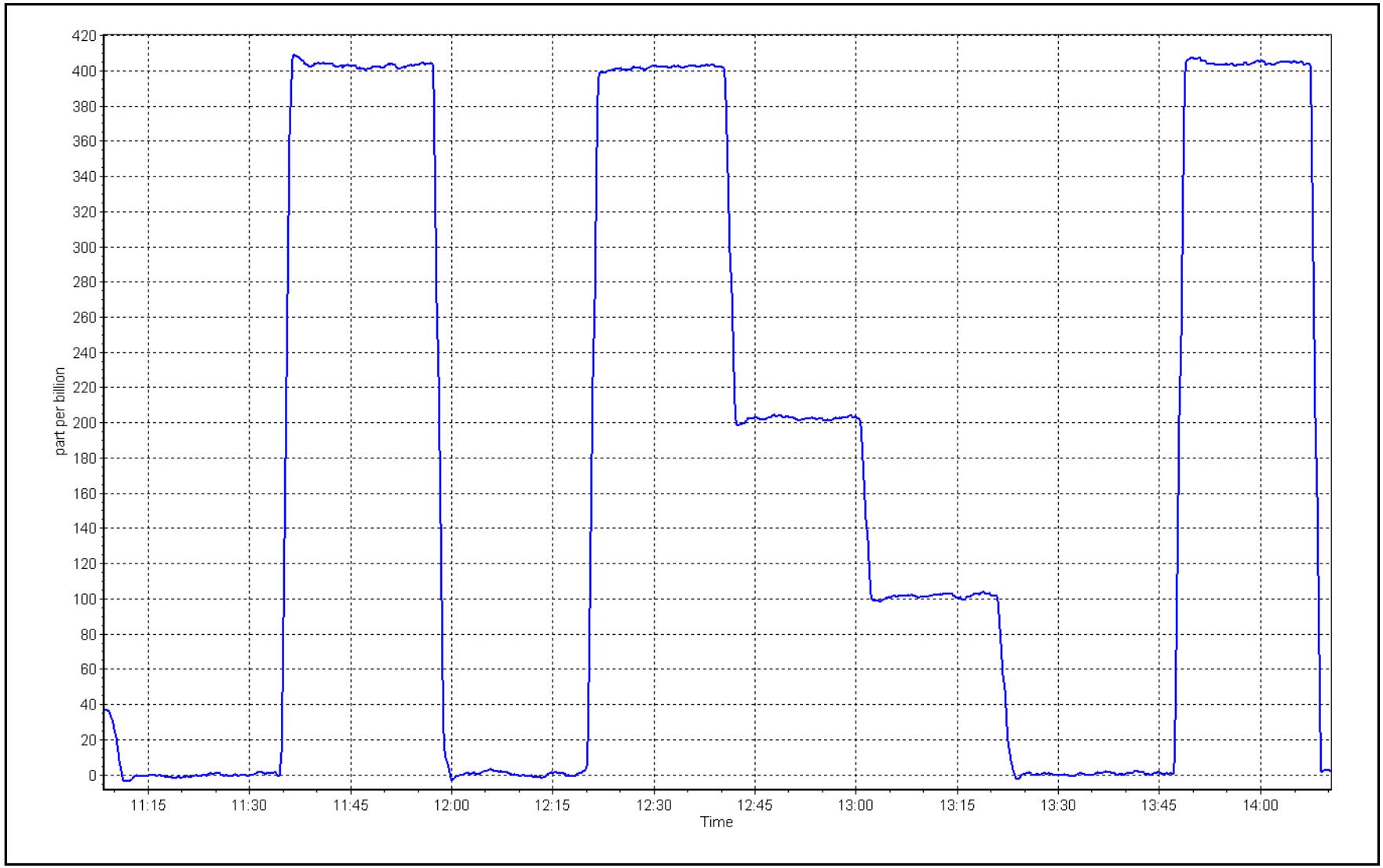
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
400.0	402.8	0.9930
200.0	202.7	0.9867
100.0	102.1	0.9794

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999984	*≥0.995*
Slope	1.005771	*0.90 - 1.10*
Intercept	0.940000	*+/- 5*



O_3 Calibration Plot Date: March 9, 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:	March 15, 2023	Last Cal Date:	February 16, 2023
Start time (MST):	13:50	End time (MST):	14:17
Analyzer Make:	API T640	S/N:	766
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	628
Temp/RH standard:	Delta Cal	S/N:	628

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-8.4	-7.5	-8.4	☐	+/- 2 °C
P (mmHg)	727.8	725.5	727.8	☐	+/- 10 mmHg
flow (LPM)	5	5.14	5	☐	+/- 0.25 LPM

Leak Test: Date of check: March 15, 2023 Last Cal Date: February 16, 2023

PM w/o HEPA: 9.4 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: January 9, 2023 <0.2 ug/m3

Disposable Filter Changed: January 9, 2023

Annual Maintenance

Date Sample Tube Cleaned: August 28, 2020

Date RH/T Sensor Cleaned: August 28, 2020

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

Calibration by: Max Farrell

Wood Buffalo Environmental Association

TN - NO_X - NH_3 Calibration Report

Version-11-2021

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
NOX Cal Date:	March 8, 2023	Last Cal Date:	February 7, 2023
Start time (MST):	9:25	End time (MST):	14:00
NH3 Cal Date:	March 8, 2023	Last Cal Date:	February 7, 2023
Start time (MST):	14:30	End time (MST):	16:05
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	*Finish*		*Start*	*Finish*
NO coefficient:	0.853	0.823	TN coefficient:	0.851	0.822
NOX coefficient:	0.855	0.824	NO bkgrnd:	-0.1	-0.1
NO2 coefficient:	1.000	1.000	NOX bkgrnd:	0.0	0.0
NH3 coefficient:	0.951	0.951	TN bkgrnd:	0.0	0.0

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	0.994899	0.999337
NO_X Cal Offset:	2.960281	1.041887
NO Cal Slope:	0.994939	0.997013
NO Cal Offset:	1.319966	2.119639
NO_2 Cal Slope:	0.993439	0.993721
NO_2 Cal Offset:	1.205483	-1.386593
NH3 Cal Slope:	0.998917	1.005985
NH3 Cal Offset:	8.375709	7.240605
TN Cal Slope:	1.004451	1.011422
TN Cal Offset:	8.831802	7.102178

Wood Buffalo Environmental Association

TN - NOX - NH_3 Calibration Report

Version-11-2021

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated TN concentration (ppb) (Cc)	Calculated NOX concentration (ppb) (Cc)	Calculated NH3 concentration (ppb) (Cc)	Indicated TN concentration (ppb) (Ic)	Indicated NOX concentration (ppb) (Ic)	Indicated NH3 concentration (ppb) (Ic)	TN Correction factor (Cc/Ic) *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	0.8	-0.1	0.9	----	----
as found NO	4923	76.9	807.6	807.6	----	838.4	835.4	3.1	0.963	----
calibrator zero	5000	0.0	0.0	0.0	0.0	0.7	-0.4	1.1	----	----
high NO point	4923	76.9	807.6	807.6	----	809.4	808.3	1.2	0.998	----
NO/O3 point	4923	76.9	807.6	807.6	----	804.1	803.3	1.0	1.004	----
as found NH3	3415	85.3	1801.0	----	1801.0	1824.2	----	1814.8	0.987	0.992
new NH3 cyl rp							----			
first NH3	3415	85.3	1801.0	----	1801.0	1824.2	----	1814.8	0.987	0.992
second NH3	3453	47.4	1000.8	----	1000.8	1024.7	----	1019.0	0.977	0.982
third NH3	3476	23.7	500.4	----	500.4	518.8	----	516.1	0.965	0.970
								Average Correction Factor	1.0011	0.9814

Corrected As found TN = 837.6 ppb NO_X = 835.5 ppb NH3 = 1813.9 ppb *Percent Change TN = 2.1%

Previous Response TN = 820 ppb NO_X = 806.4 ppb NH3 = 1807.5 ppb *Percent Change NO_X = 3.5%

*Percent Change NH3 = 0.4%

* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 95.1%

NH3 Current Converter Efficiency = 95.1%

Wood Buffalo Environmental Association

NO_X - NO - NO_2 Calibration Report

Version-11-2021

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	0.4	0.8	----	----
as found span	4923	76.9	807.6	799.5	807.6	835.4	824.9	838.4	0.9667	0.9692
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.4	0.1	0.7	----	----
high point	4923	76.9	807.6	799.5	807.6	808.3	798.0	809.4	0.9991	1.0018
second point	4962	38.5	404.3	400.2	404.3	403.1	402.7	408.0	1.0030	0.9939
third point	4981	19.2	201.6	199.6	201.6	205.8	202.8	208.7	0.9798	0.9842
								Average Correction Factor	0.9940	0.9933

Baseline Corr As fnd	TN =	837.6 ppb	NO_X =	835.5 ppb	NO =	824.5 ppb	*Percent Change	TN = 2.1%
Previous Response	TN =	820 ppb	NO_X =	806.4 ppb	NO =	796.7 ppb	*Percent Change	NO_X = 3.5%
							*Percent Change	NO = 3.4%

* = > +/-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	-0.5	----	----
calibration zero	----	----	0.0	-0.5	----	----
1st GPT point (400 ppb O3)	798.2	378.1	428.3	425.0	1.0077	99.2%
2nd GPT point (200 ppb O3)	798.2	586.4	220.0	215.7	1.0197	98.1%
3rd GPT point (100 ppb O3)	798.2	688.9	117.5	115.1	1.0204	98.0%
				Average Correction Factor	1.0159	98.4%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TN Calibration Summary

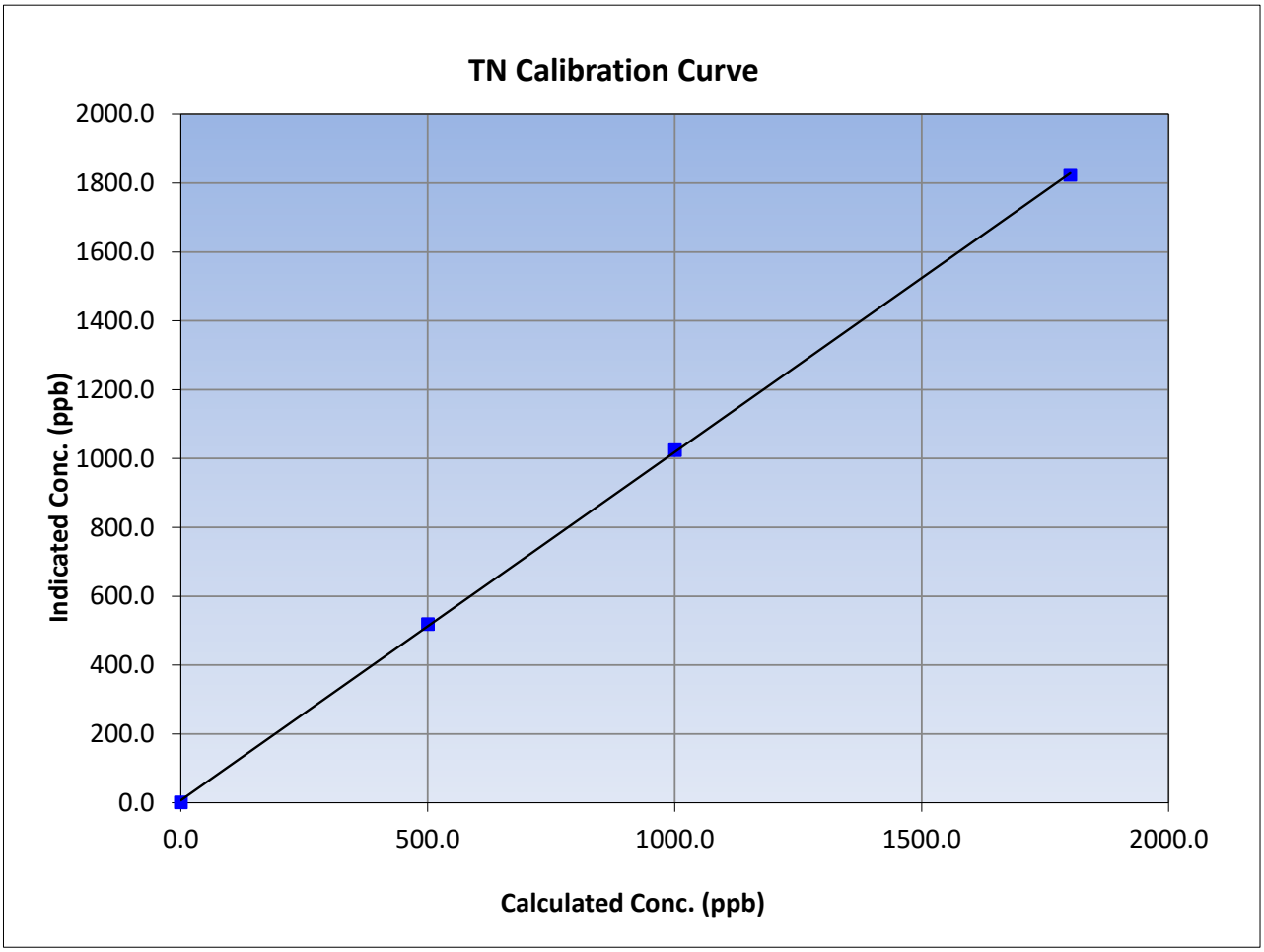
Version-11-2021

Station Information

Calibration Date:	March 8, 2023	Previous Calibration:	February 7, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:25	End Time (MST):	14:00
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.7	----	Correlation Coefficient	0.999933	≥0.995
1801.0	1824.2	0.9873			
1000.8	1024.7	0.9767	Slope	1.011422	0.90 - 1.10
500.4	518.8	0.9646			
			Intercept	7.102178	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

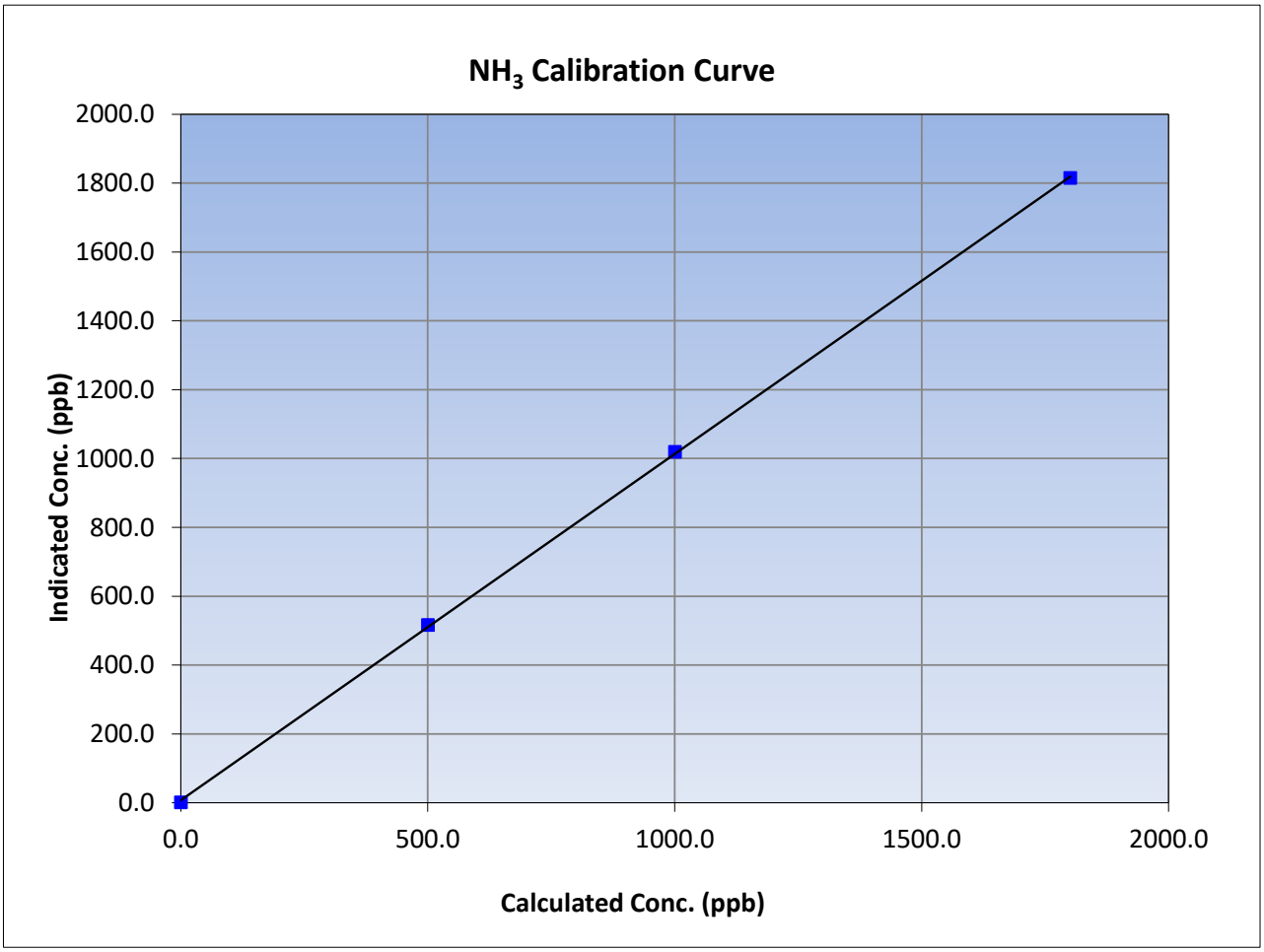
Version-11-2021

Station Information

Calibration Date:	March 8, 2023	Previous Calibration:	February 7, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:25	End Time (MST):	14:00
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	1.1	----	Correlation Coefficient	0.999938	≥0.995
1801.0	1814.8	0.9924			
1000.8	1019.0	0.9822	Slope	1.005985	0.90 - 1.10
500.4	516.1	0.9696			
			Intercept	7.240605	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

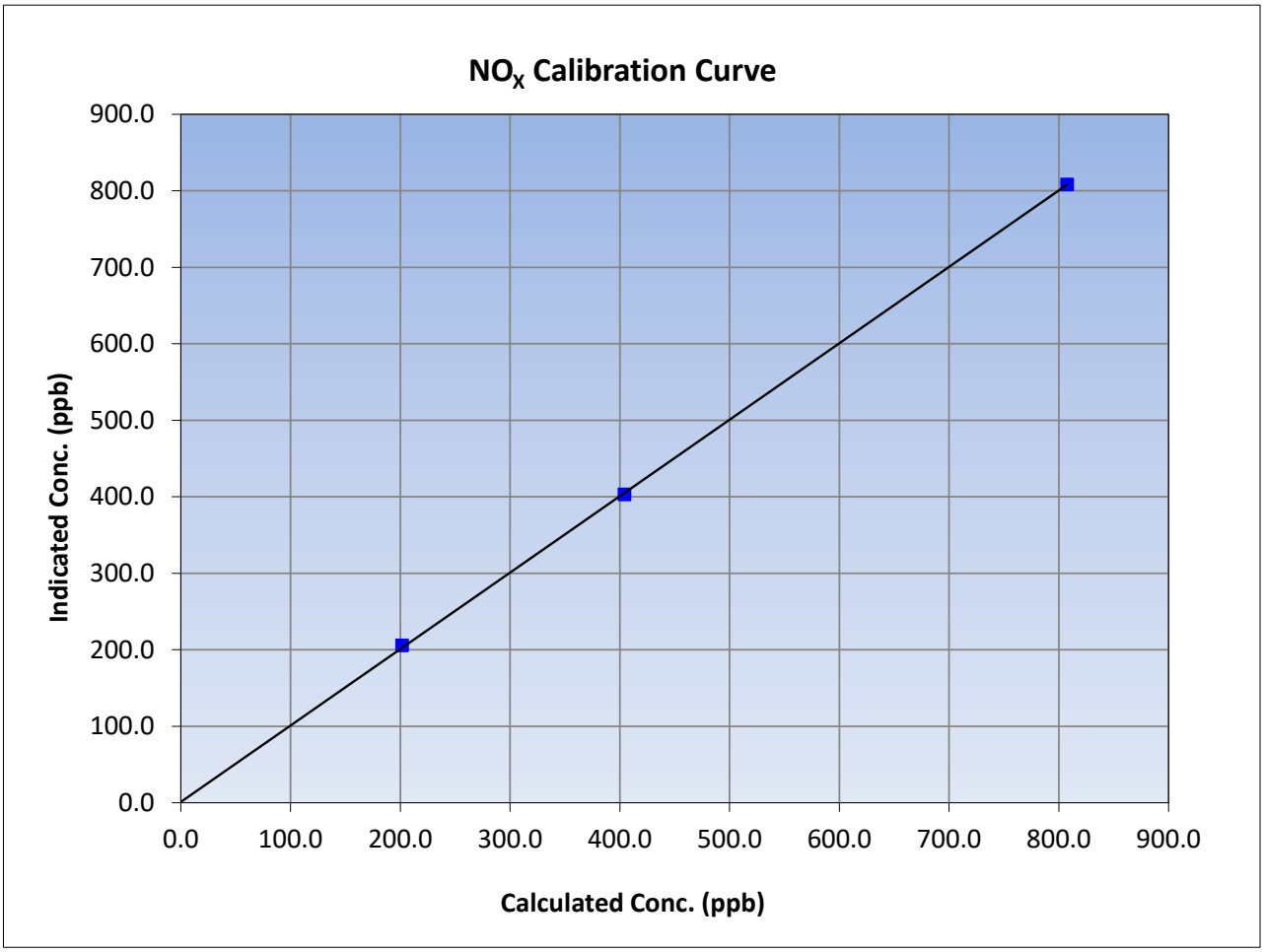
Version-11-2021

Station Information

Calibration Date:	March 8, 2023	Previous Calibration:	February 7, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:25	End Time (MST):	14:00
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.4	----	Correlation Coefficient	0.999953	≥0.995
807.6	808.3	0.9991			
404.3	403.1	1.0030	Slope	0.999337	0.90 - 1.10
201.6	205.8	0.9798			
			Intercept	1.041887	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

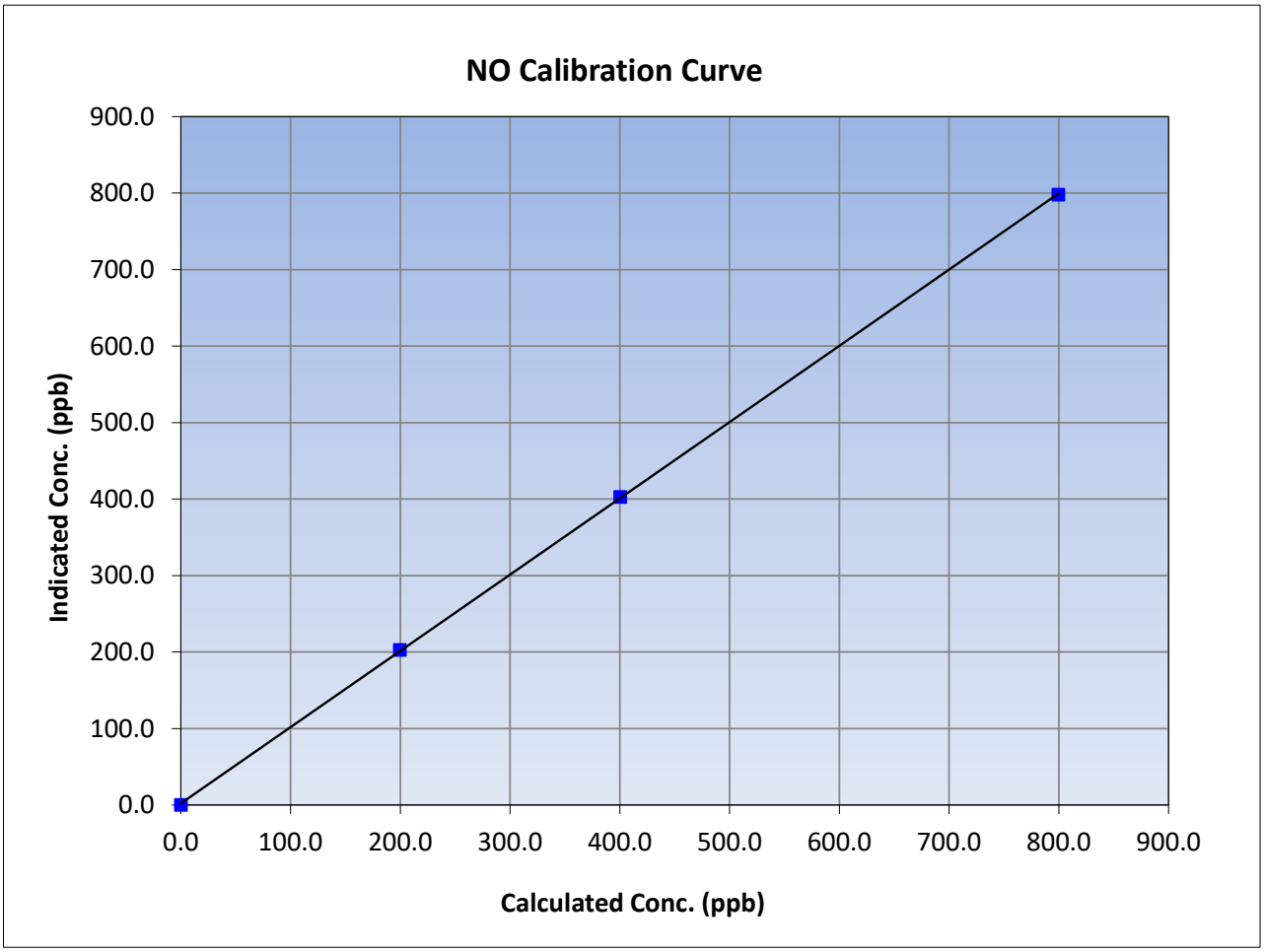
Version-11-2021

Station Information

Calibration Date:	March 8, 2023	Previous Calibration:	February 7, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:25	End Time (MST):	14:00
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999969	≥0.995
799.5	798.0	1.0018			
400.2	402.7	0.9939	Slope	0.997013	0.90 - 1.10
199.6	202.8	0.9842			
			Intercept	2.119639	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

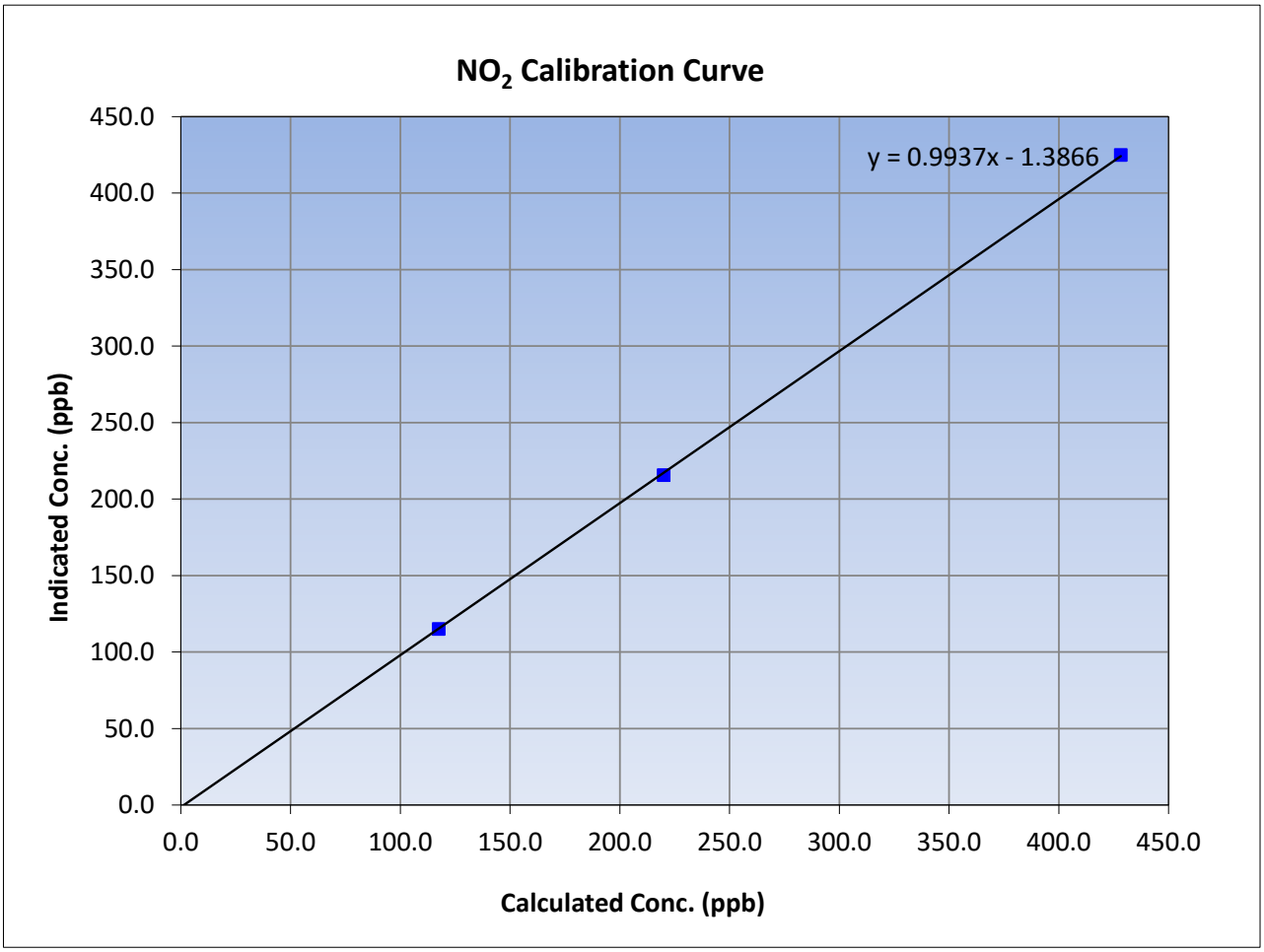
Version-11-2021

Station Information

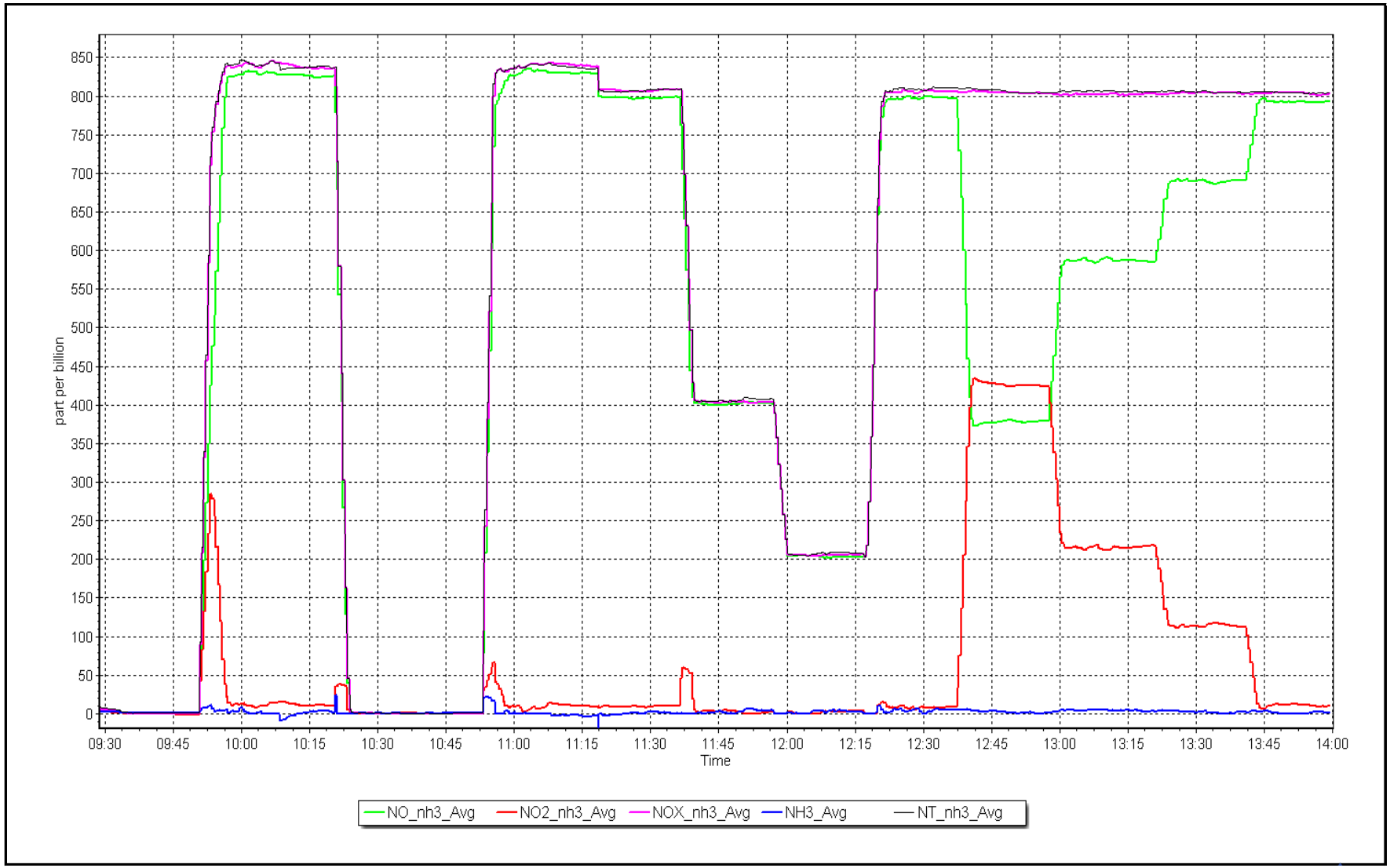
Calibration Date:	March 8, 2023	Previous Calibration:	February 7, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:25	End Time (MST):	14:00
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.5	----	Correlation Coefficient	0.999962	≥0.995
428.3	425.0	1.0077			
220.0	215.7	1.0197	Slope	0.993721	0.90 - 1.10
117.5	115.1	1.0204			
			Intercept	-1.386593	+/-20



NO_X Calibration Plot Date: March 8, 2023 Location: Patricia McInnes



NH_3 Calibration Plot Date: March 8, 2023 Location: Patricia McInnes

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS07
ATHABASCA VALLEY
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	March 9, 2023	Last Cal Date:	February 1, 2023
Start time (MST):	10:56	End time (MST):	13:35
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998179	0.995896	Backgd or Offset:	2.70	2.70
Calibration intercept:	1.983813	2.083550	Coeff or Slope:	0.857	0.857

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4921	79.3	801.2	797.2	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4921	79.3	801.2	798.4	1.004
second point	4960	39.6	400.2	403.4	0.992
third point	4980	19.8	200.1	202.1	0.990
as left zero	5000	0.0	0.0	0.0	----
as left span	4921	79.2	800.2	800.7	0.999
				Average Correction Factor	0.995

Baseline Corr As found:	797.30	Previous response	801.72	*% change	-0.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments or maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

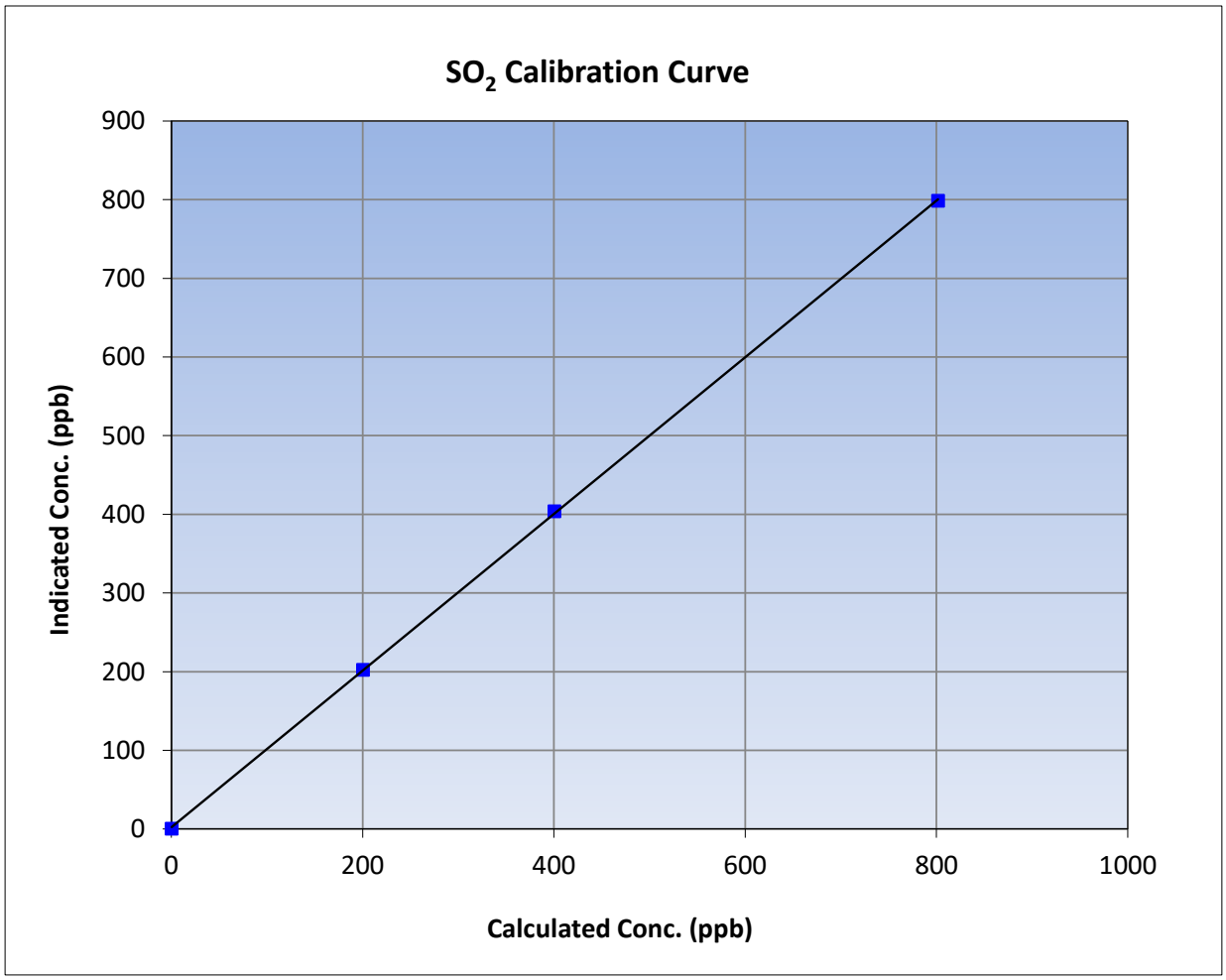
Station Information

Calibration Date:	March 9, 2023	Previous Calibration:	February 1, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:56	End Time (MST):	13:35
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1507864683

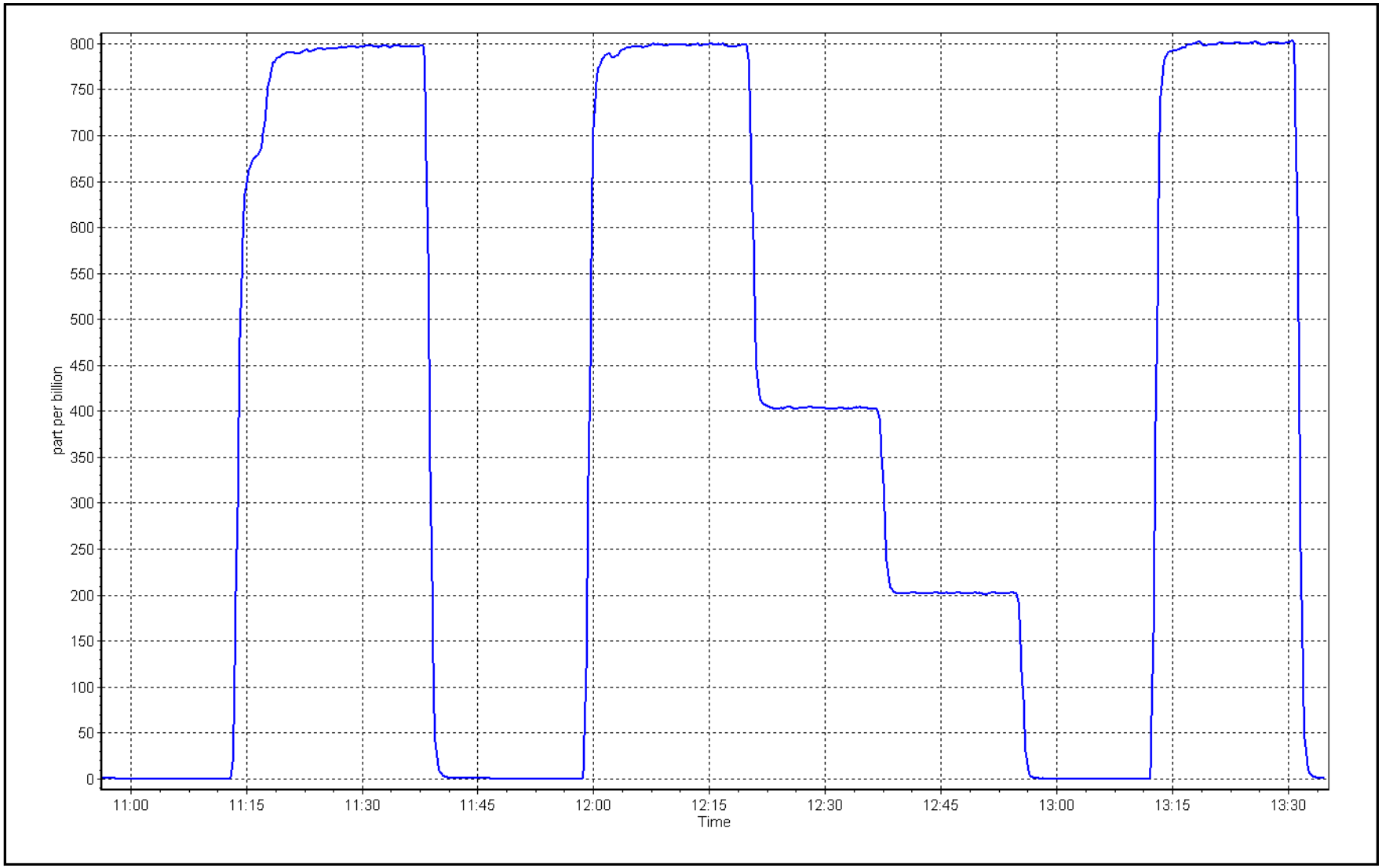
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
801.2	798.4	1.0035
400.2	403.4	0.9919
200.1	202.1	0.9899

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999957	*≥0.995*
Slope	0.995896	*0.90 - 1.10*
Intercept	2.083550	*+/-30*



SO2 Calibration Plot Date: March 9, 2023 Location: Athabasca Valley



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	March 13, 2023	Last Cal Date:	February 6, 2023
Start time (MST):	7:52	End time (MST):	11:54
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	4.94	ppm	Cal Gas Exp Date:	February 9, 2024
Cal Gas Cylinder #:	EY0002277			
Removed Cal Gas Conc:	4.94	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3805
ZAG Make/Model:	API T701H		Serial Number:	198

Analyzer Information

Analyzer make:	Thermo 43i LTE		Analyzer serial #:	1180540018	
Converter make:	CDN-101		Converter serial #:	551	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.988807	0.993485	Backgd or Offset:	2.33	2.20
Calibration intercept:	0.421592	0.081597	Coeff or Slope:	0.886	0.841

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	4918	81.6	80.6	84.5	0.954
as found 2nd point	4959	40.8	40.3	42.2	0.955
as found 3rd point	4980	20.4	20.2	20.9	0.964
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	4918	81.6	80.6	80.2	1.005
second point	4959	40.8	40.3	40.2	1.003
third point	4980	20.4	20.2	19.9	1.013
as left zero	5000	0.0	0.0	0.1	----
as left span	4918	81.6	80.6	79.6	1.013
SO2 Scrubber Check	4921	79.2	800.2	-0.1	----
Date of last scrubber change:		25-Feb-22		Ave Corr Factor	1.007
Date of last converter efficiency test:		April 22, 2022		98.5%	efficiency

Baseline Corr As found:	84.5	Prev response:	80.15	*% change:	5.2%
Baseline Corr 2nd AF pt:	42.2	AF Slope:	1.048907	AF Intercept:	-0.098313
Baseline Corr 3rd AF pt:	20.9	AF Correlation:	0.999992		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

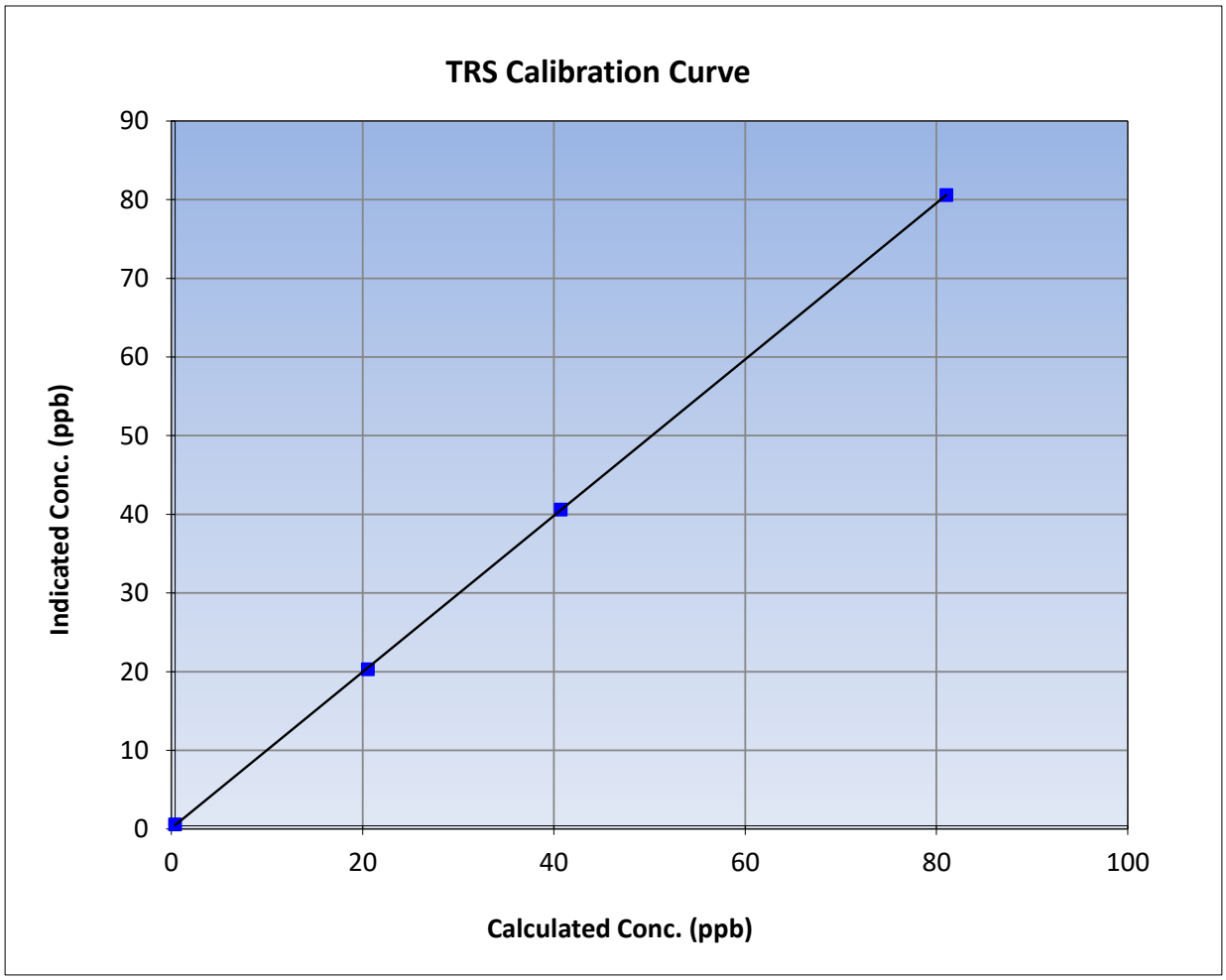
Station Information

Calibration Date:	March 13, 2023	Previous Calibration:	February 6, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:52	End Time (MST):	11:54
Analyzer make:	CDN-101	Analyzer serial #:	551

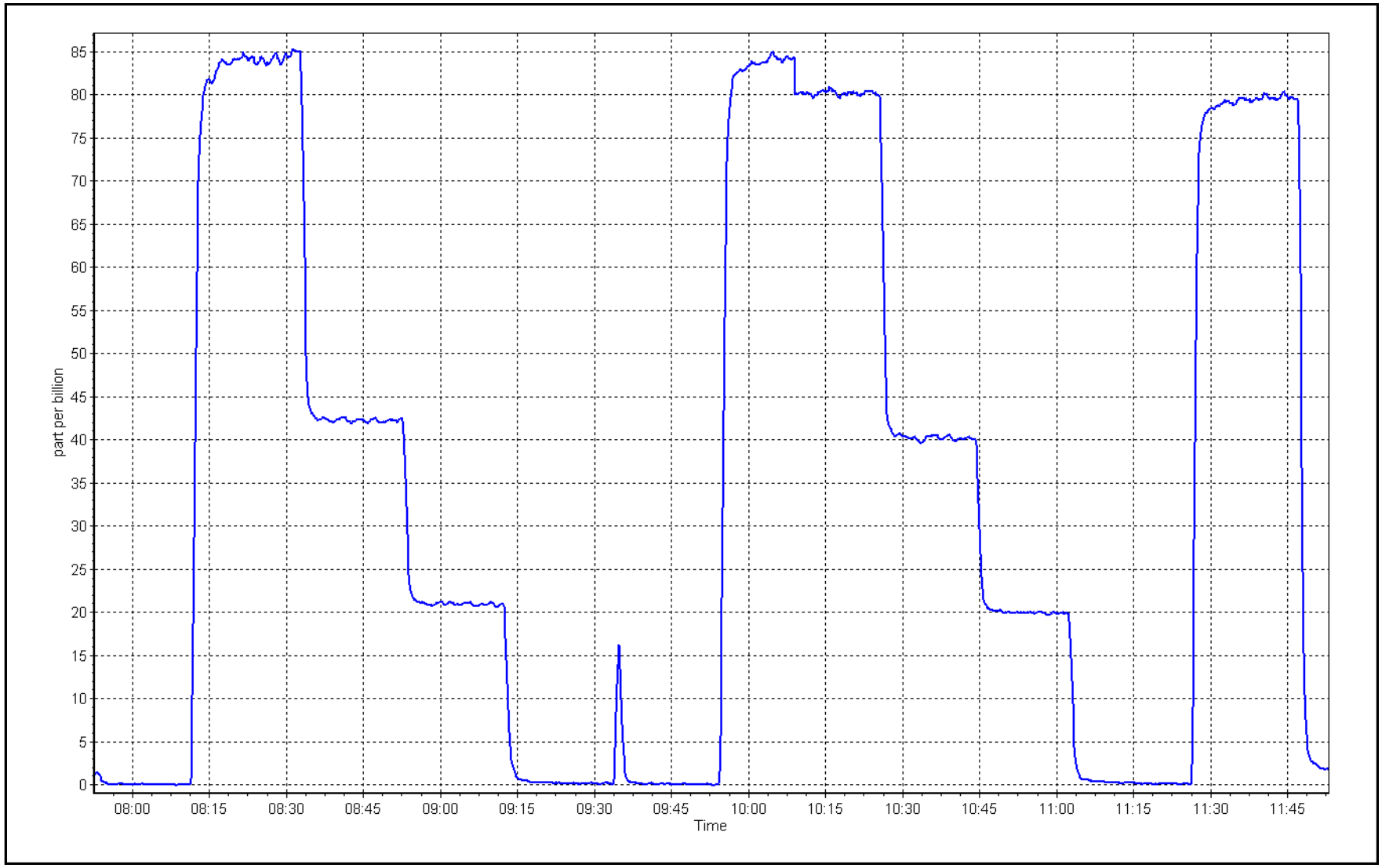
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.6	80.2	1.0053
40.3	40.2	1.0028
20.2	19.9	1.0127

Statistical Evaluation		Limits
Correlation Coefficient	0.999983	≥0.995
Slope	0.993485	0.90 - 1.10
Intercept	0.081597	+/-3



TRS Calibration Plot Date: March 13, 2023 Location: Athabasca Valley



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	March 9, 2023	Last Cal Date:	February 1, 2023
Start time (MST):	10:57	End time (MST):	13:34
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1317958219	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	0.000270	0.000270	NMHC SP Ratio:	4.42E-05	4.42E-05
CH4 Retention time:	13.4	13.4	NMHC Peak Area:	205840	205840

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	79.3	17.05	17.01	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	79.3	17.05	16.97	1.005
second point	4960	39.6	8.52	8.48	1.004
third point	4980	19.8	4.26	4.27	0.997
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	16.98	1.003
				Average Correction Factor	1.002

Baseline Corr AF:	17.01	Prev response	17.16	*% 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-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	79.3	9.10	9.14	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.3	9.10	9.12	0.998
second point	4960	39.6	4.55	4.57	0.995
third point	4980	19.8	2.27	2.30	0.988
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	9.09	9.12	0.997
				Average Correction Factor	0.994
Baseline Corr AF:	9.14	Prev response	9.16	*% change	-0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.3	7.95	7.87	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	79.3	7.95	7.86	1.011
second point	4960	39.6	3.97	3.91	1.015
third point	4980	19.8	1.98	1.97	1.008
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.94	7.86	1.010
				Average Correction Factor	1.011
Baseline Corr AF:	7.87	Prev response	8.00	*% change	-1.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.004980	0.994780
THC Cal Offset:	0.021918	0.013474
CH4 Cal Slope:	1.006293	0.988322
CH4 Cal Offset:	-0.000176	-0.000211
NMHC Cal Slope:	1.004211	1.001323
NMHC Cal Offset:	0.018094	0.012086

Notes: No Maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

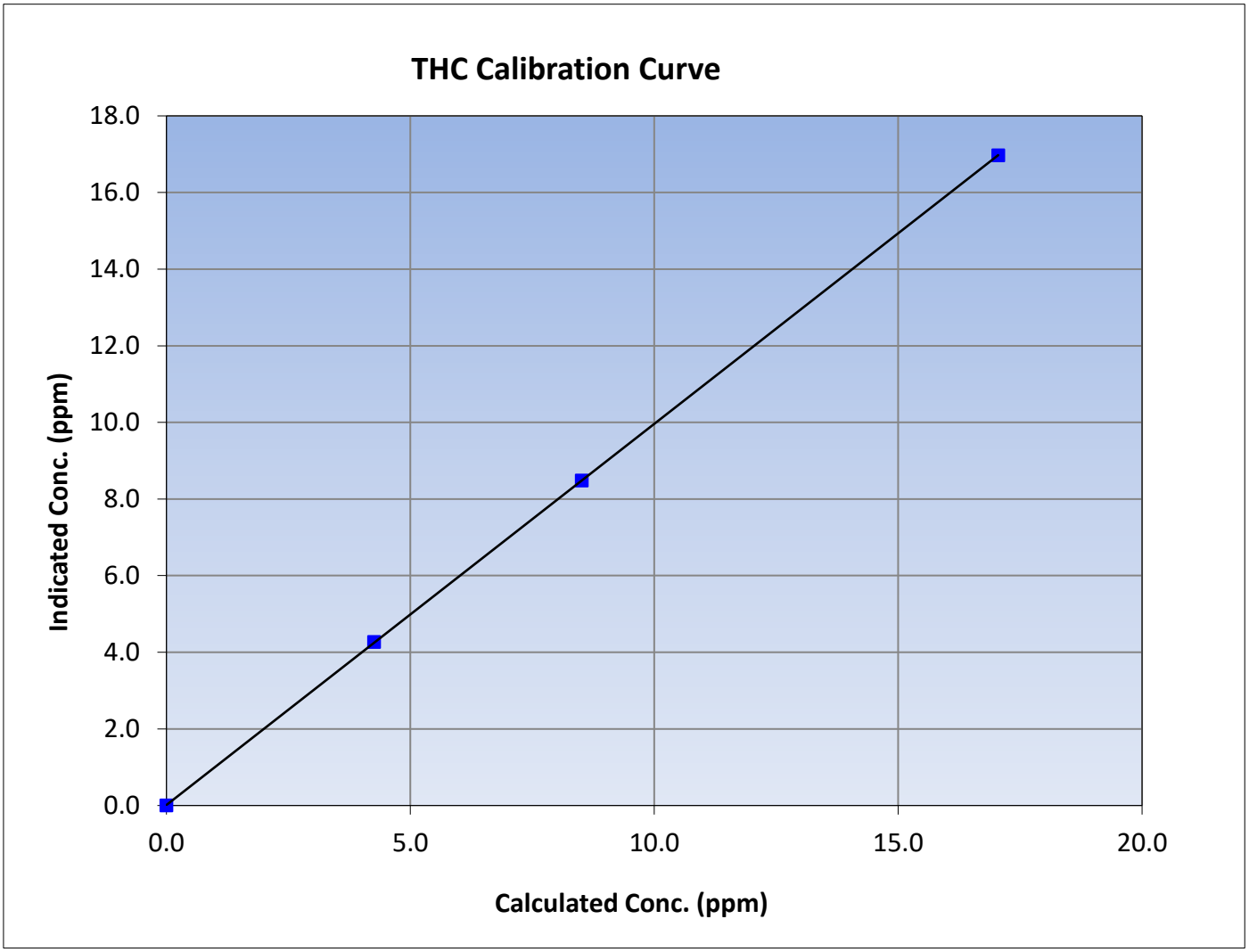
Version-01-2020

Station Information

Calibration Date:	March 9, 2023	Previous Calibration:	February 1, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:57	End Time (MST):	13:34
Analyzer make:	Thermo 55i	Analyzer serial #:	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999996	*≥0.995*
17.05	16.97	1.0046			
8.52	8.48	1.0042	Slope	0.994780	*0.90 - 1.10*
4.26	4.27	0.9971			
			Intercept	0.013474	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

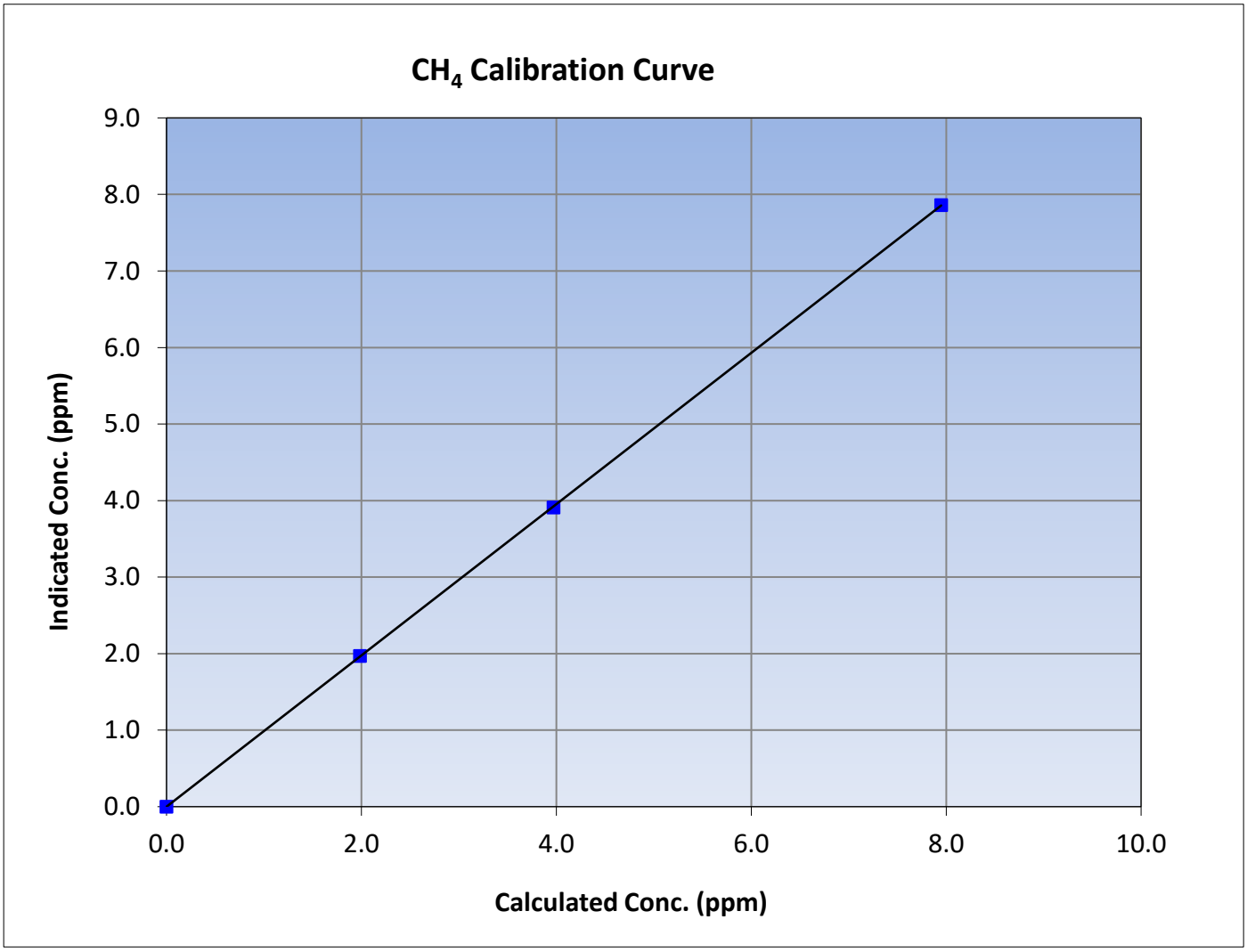
Version-01-2020

Station Information

Calibration Date:	March 9, 2023	Previous Calibration:	February 1, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:57	End Time (MST):	13:34
Analyzer make:	Thermo 55i	Analyzer serial #:	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999992	*≥0.995*
7.95	7.86	1.0113			
3.97	3.91	1.0153	Slope	0.988322	*0.90 - 1.10*
1.98	1.97	1.0075			
			Intercept	-0.000211	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

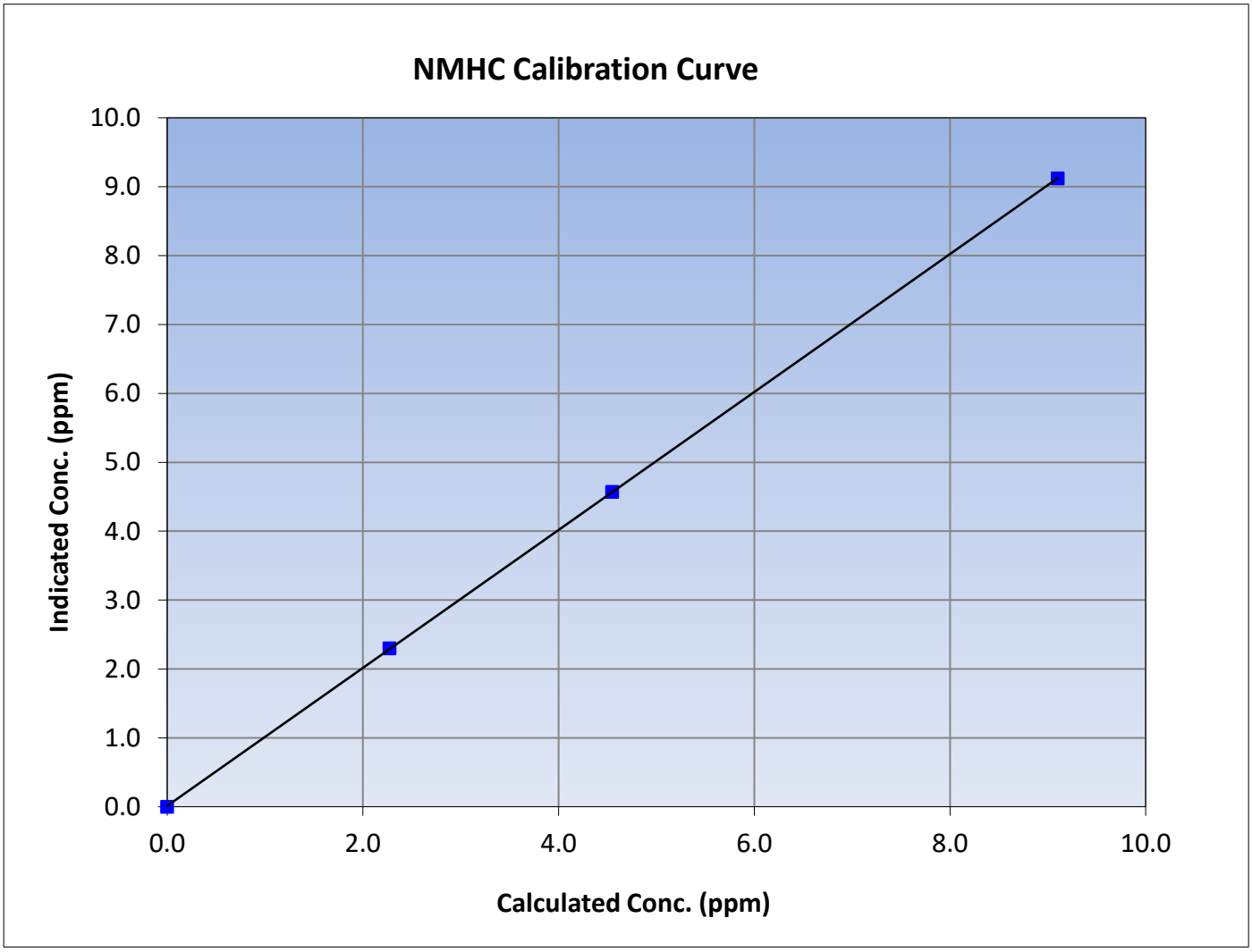
Version-01-2020

Station Information

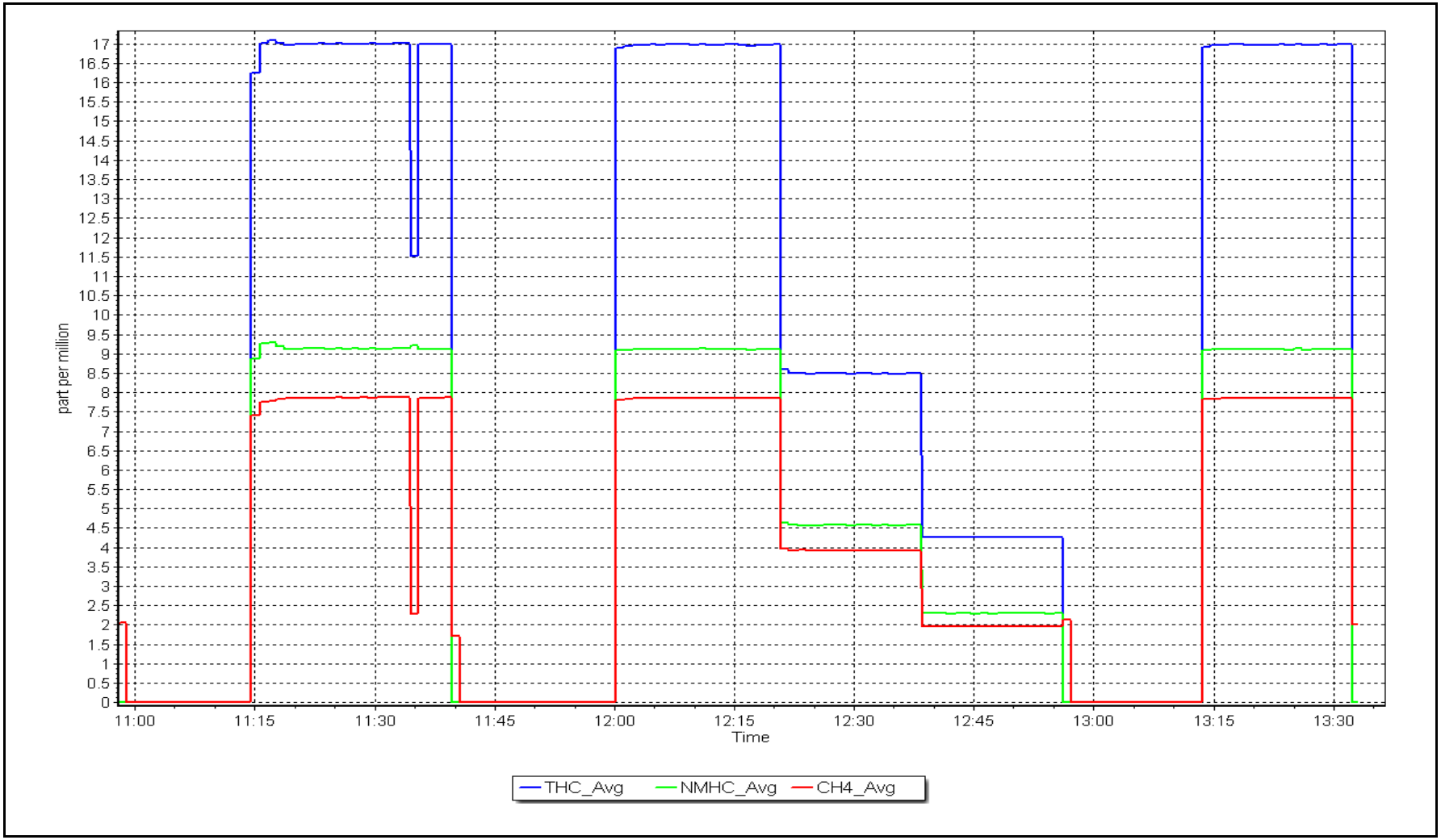
Calibration Date:	March 9, 2023	Previous Calibration:	February 1, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:57	End Time (MST):	13:34
Analyzer make:	Thermo 55i	Analyzer serial #:	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999992	≥0.995
9.10	9.12	0.9980			
4.55	4.57	0.9947	Slope	1.001323	0.90 - 1.10
2.27	2.30	0.9882			
			Intercept	0.012086	+/-0.5



NMHC Calibration Plot Date: March 9, 2023 Location: Athabasca Valley



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	March 31, 2023	Last Cal Date:	March 9, 2023
Start time (MST):	8:45	End time (MST):	9:58
Reason:	Cylinder Change	Hydrogen cylinder change	

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1317958219	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	0.000270	0.000270	NMHC SP Ratio:	4.42E-05	4.42E-05
CH4 Retention time:	13.4	13.4	NMHC Peak Area:	205840	205840

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	79.3	17.05	16.74	1.019
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.3	17.05	16.73	1.019
second point					
third point					
as left zero			0.00		
as left span					
				Average Correction Factor	1.019
Baseline Corr AF:	16.74	Prev response	16.97	*% 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-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	79.3	9.10	8.98	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	79.3	9.10	8.97	1.015
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.015
Baseline Corr AF:	8.98	Prev response	9.13	*% change	-1.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.3	7.95	7.76	1.024
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.3	7.95	7.76	1.024
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.024
Baseline Corr AF:	7.76	Prev response	7.86	*% change	-1.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

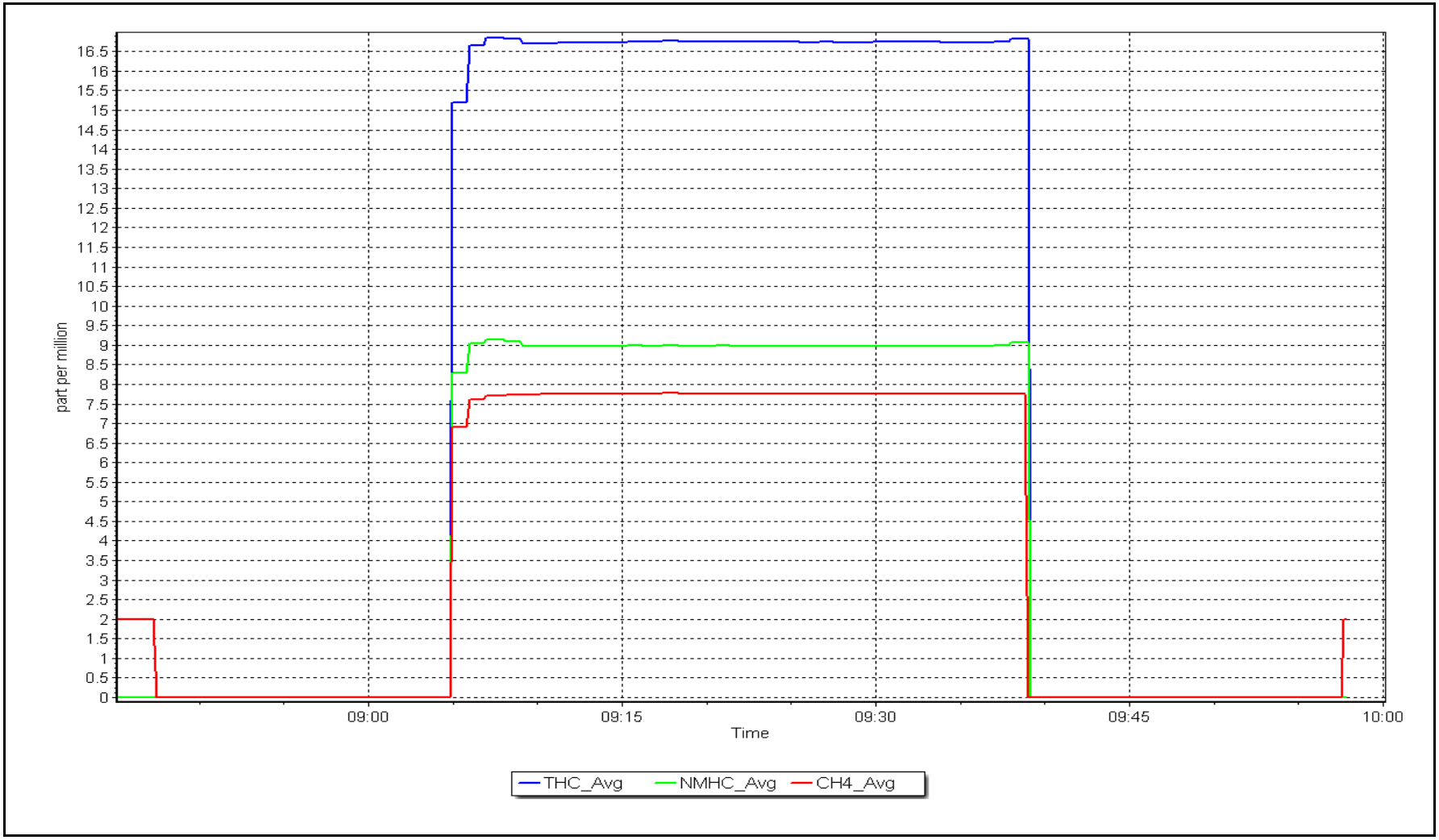
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.994780	0.981205
THC Cal Offset:	0.013474	0.000000
CH4 Cal Slope:	0.988322	0.976278
CH4 Cal Offset:	-0.000211	0.000000
NMHC Cal Slope:	1.001323	0.985508
NMHC Cal Offset:	0.012086	0.000000

Notes: Hydrogen cylinder changed.

Calibration Performed By: Melissa Lemay

NMHC Calibration Plot Date: March 31, 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:	March 10, 2023	Last Cal Date:	February 7, 2023
Start time (MST):	7:40	End time (MST):	12:10
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:	1.048	1.048	NO bkgnd or offset:	7.3	7.3
NOX coeff or slope:	0.995	0.995	NOX bkgnd or offset:	7.5	7.5
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	201.9	197.9

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.991039	0.997475
NO_X Cal Offset:	1.157178	1.358498
NO Cal Slope:	0.991042	0.997406
NO Cal Offset:	0.933204	1.054447
NO_2 Cal Slope:	1.000742	1.001683
NO_2 Cal Offset:	0.457636	0.681681

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as found span	4920	80.2	816.7	800.7	16.0	817.5	799.6	17.9	0.9991	1.0014
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.1	----	----
high point	4920	80.2	816.7	800.7	16.0	815.1	798.8	16.3	1.0020	1.0024
second point	4960	40.1	408.4	400.4	8.0	410.3	402.0	8.3	0.9953	0.9959
third point	4980	20.0	203.7	199.7	4.0	205.0	200.4	4.6	0.9936	0.9964
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
as left span	4920	80.2	816.7	398.9	417.8	820.6	397.4	423.3	0.9953	1.0037
								Average Correction Factor	0.9970	0.9982

Corrected As found	NO_X = 817.6 ppb	NO = 799.7 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	0.9%
Previous Response	NO_X = 810.6 ppb	NO = 794.4 ppb			*Percent Change	NO =	0.7%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.1	395.3	417.8	419.0	0.9972	100.3%
2nd GPT point (200 ppb O3)	797.1	599.1	214.0	215.1	0.9951	100.5%
3rd GPT point (100 ppb O3)	797.1	699.2	113.9	115.6	0.9856	101.5%
				Average Correction Factor	0.9926	100.7%

Notes: No maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

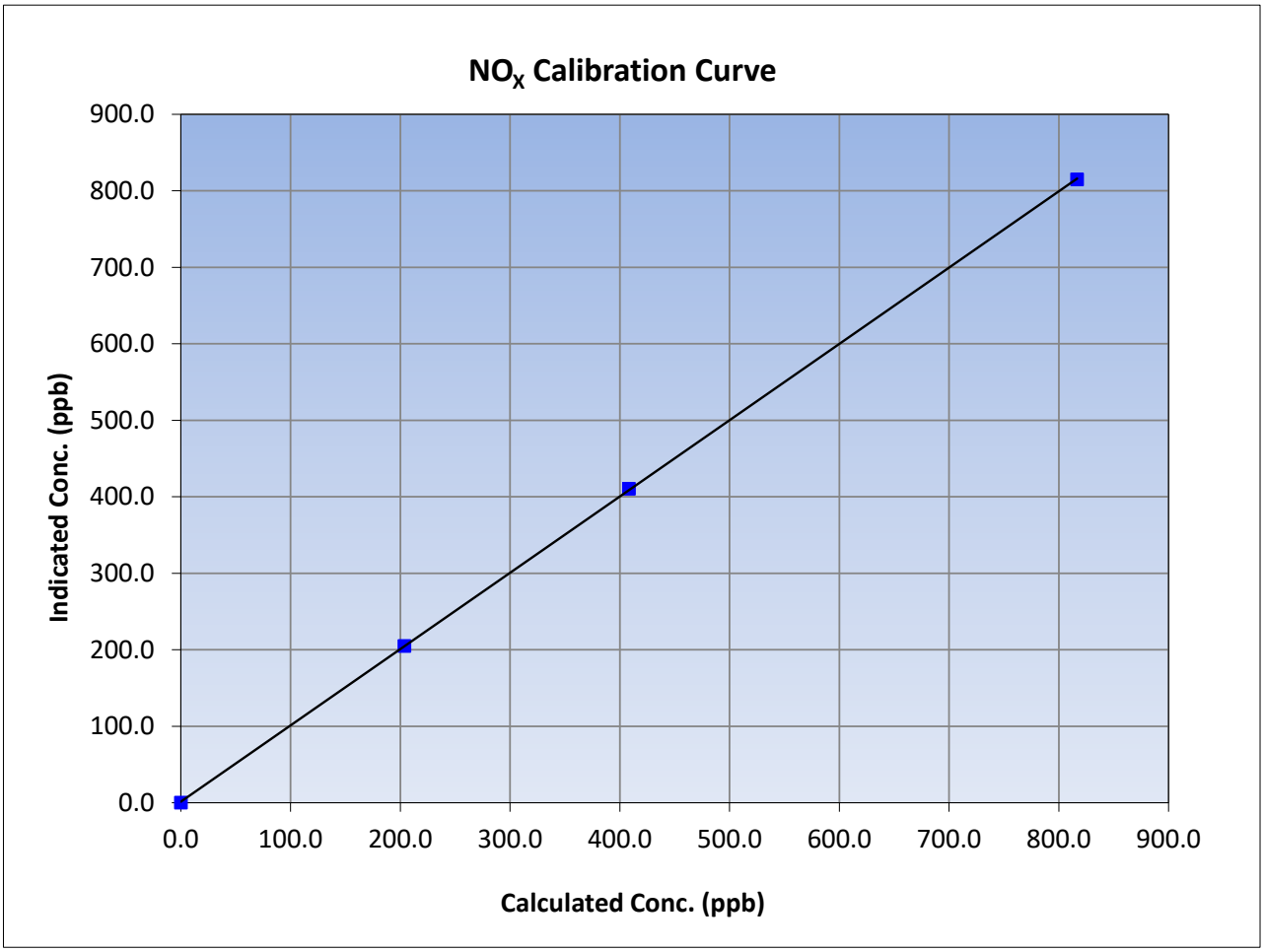
Version-04-2020

Station Information

Calibration Date:	March 10, 2023	Previous Calibration:	February 7, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:40	End Time (MST):	12:10
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.2	----	Correlation Coefficient	0.999986	*≥0.995*
816.7	815.1	1.0020			
408.4	410.3	0.9953	Slope	0.997475	*0.90 - 1.10*
203.7	205.0	0.9936			
			Intercept	1.358498	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

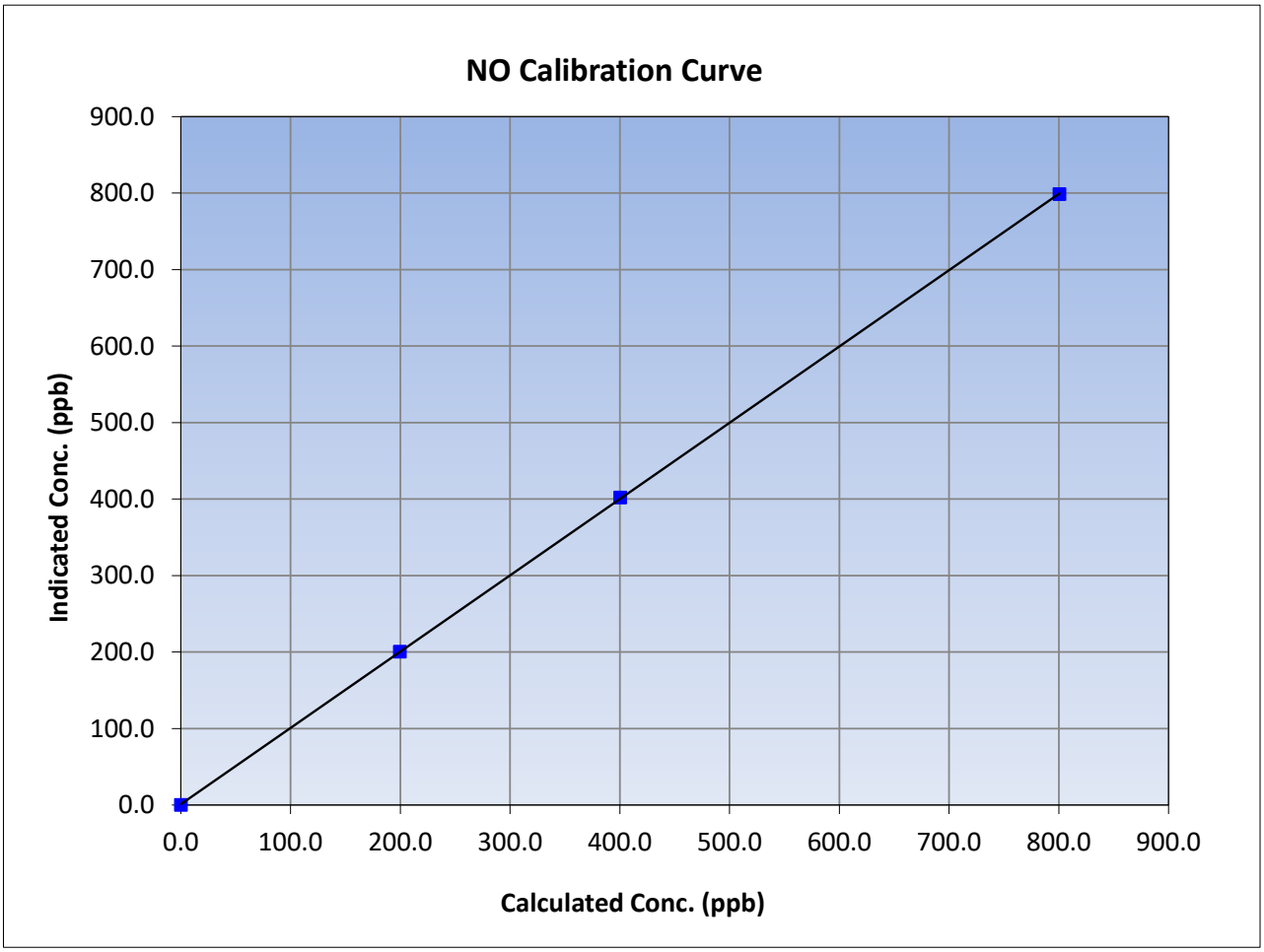
Version-04-2020

Station Information

Calibration Date:	March 10, 2023	Previous Calibration:	February 7, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:40	End Time (MST):	12:10
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	0.999988	≥0.995
800.7	798.8	1.0024			
400.4	402.0	0.9959	Slope	0.997406	0.90 - 1.10
199.7	200.4	0.9964			
			Intercept	1.054447	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

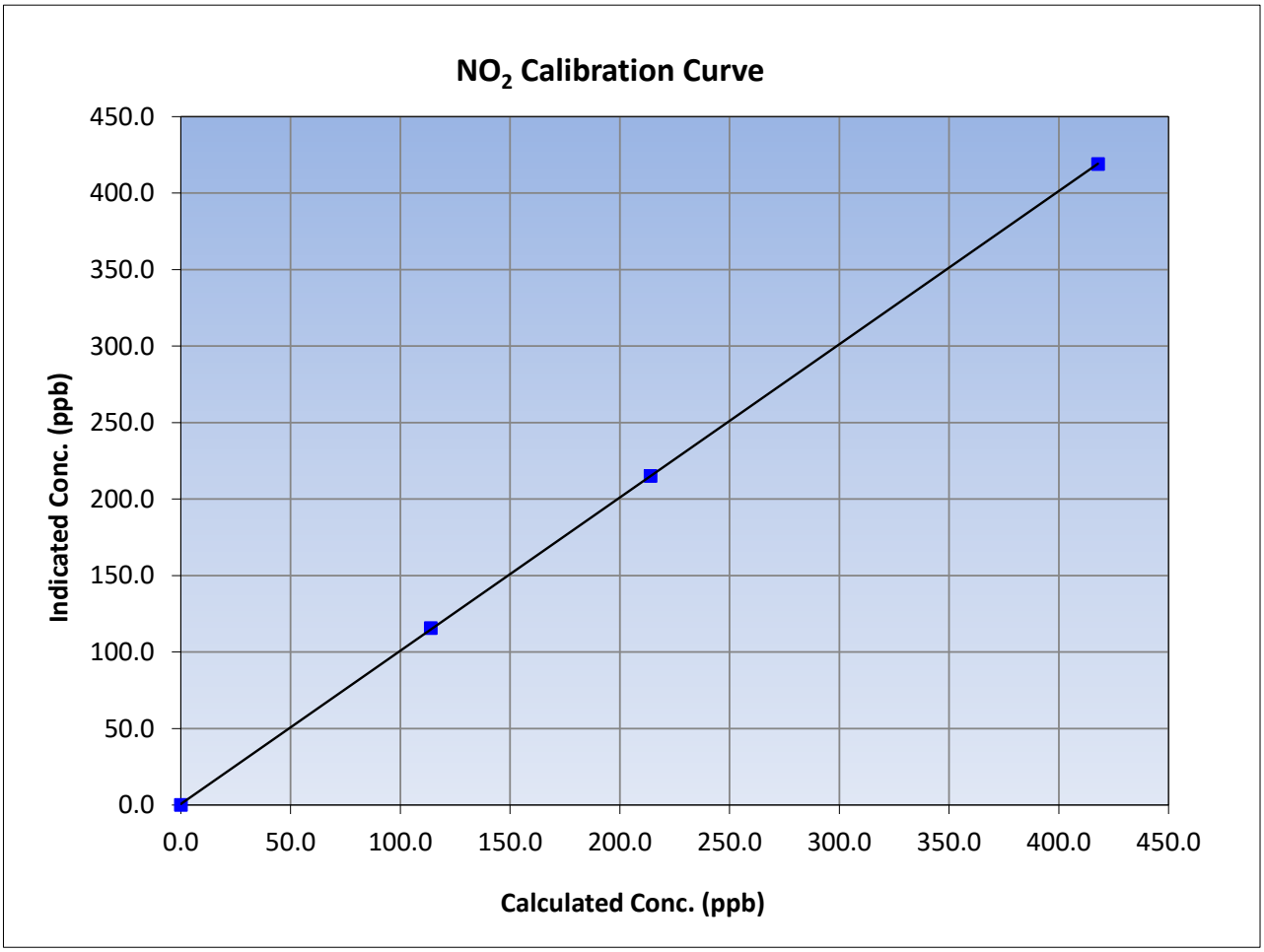
Version-04-2020

Station Information

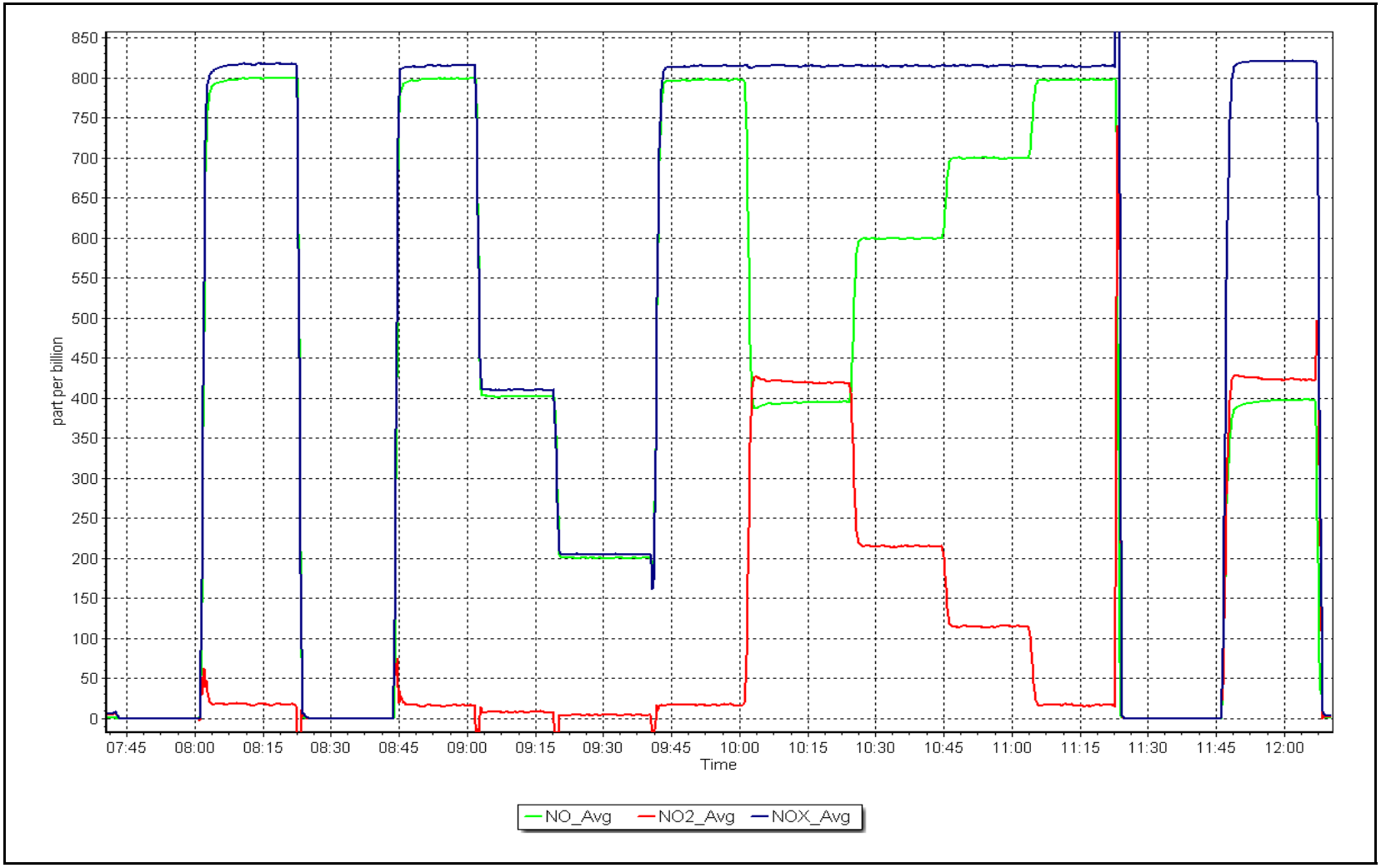
Calibration Date:	March 10, 2023	Previous Calibration:	February 7, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:40	End Time (MST):	12:10
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

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
417.8	419.0	0.9972			
214.0	215.1	0.9951	Slope	1.001683	0.90 - 1.10
113.9	115.6	0.9856			
			Intercept	0.681681	+/-20



NO_X Calibration Plot Date: March 10, 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:	March 9, 2023	Last Cal Date:	February 8, 2023
Start time (MST):	7:22	End time (MST):	10:23
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 #:	1507964700
Analyzer Range	0 - 500 ppb		

	Start	Finish		Start	Finish
Calibration slope:	0.995429	0.994371	Backgd or Offset:	-0.6	-0.6
Calibration intercept:	1.600000	2.260000	Coeff or Slope:	1.119	1.170

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	1383.2	400.0	388.9	1.029
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.5	----
high point	5000	1383.7	400.0	398.9	1.003
second point	5000	1022.2	200.0	202.7	0.987
third point	5000	843.8	100.0	103.0	0.971
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	1380.2	400.0	396.8	1.008
				Average Correction Factor	0.987

Baseline Corr As found:	388.8	Previous response	399.8	*% 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: No Maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

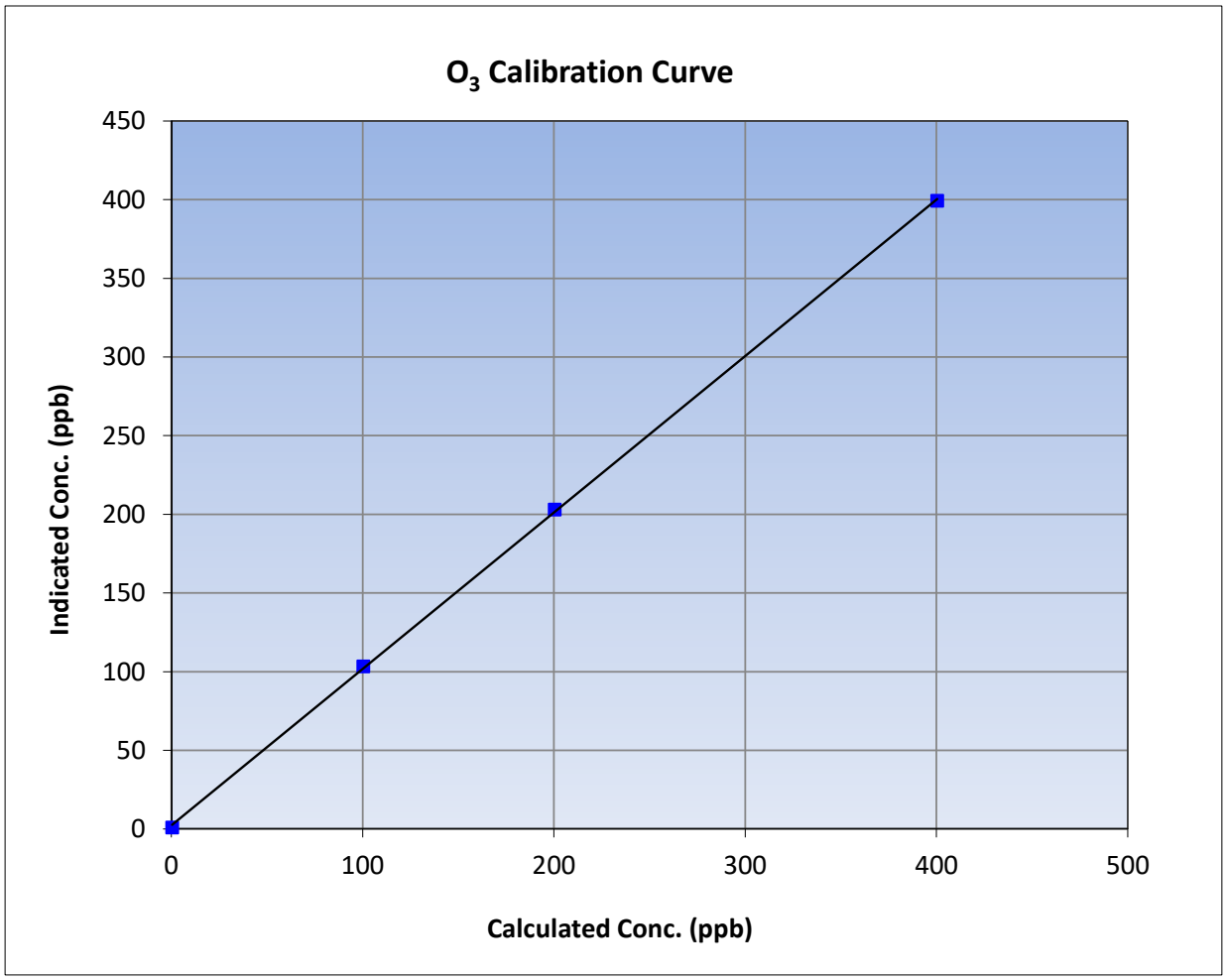
Station Information

Calibration Date:	March 9, 2023	Previous Calibration:	February 8, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:22	End Time (MST):	10:23
Analyzer make:	Thermo 49i	Analyzer serial #:	1507964700

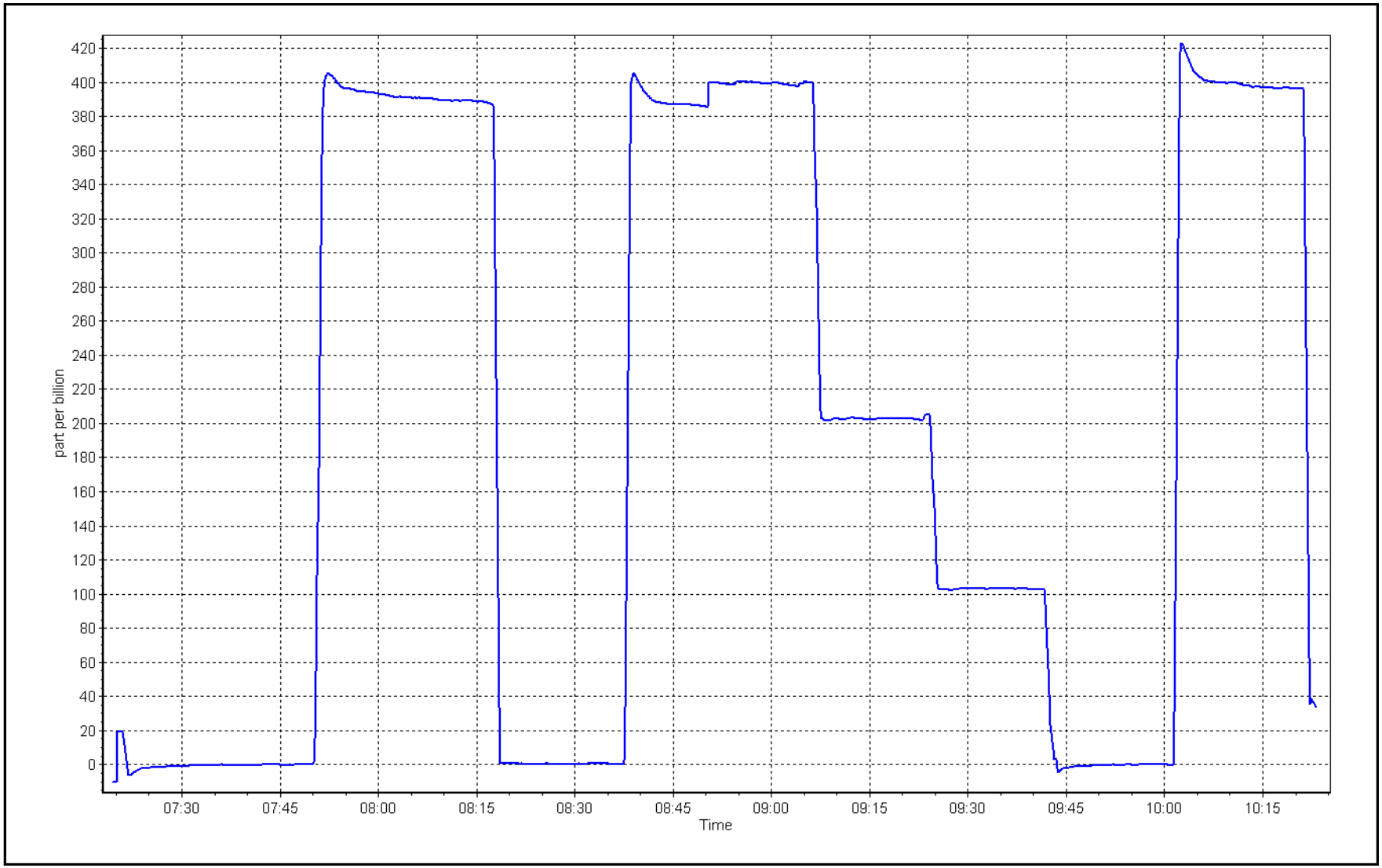
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
400.0	398.9	1.0028
200.0	202.7	0.9867
100.0	103.0	0.9709

Statistical Evaluation		Limits
Correlation Coefficient	0.999902	≥0.995
Slope	0.994371	0.90 - 1.10
Intercept	2.260000	+/- 5



O_3 Calibration Plot Date: March 9, 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:	March 31, 2023	Last Cal Date:	February 1, 2023
Start time (MST):	8:21	End time (MST):	8:43
Analyzer Make:	API T640	S/N:	645
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388753
Temp/RH standard:	Alicat FP-25BT	S/N:	388753

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-3.9	-3	-3.9	☐	+/- 2 °C
P (mmHg)	733.9	732.6	733.9	☐	+/- 10 mmHg
flow (LPM)	5	5.17	5	☐	+/- 0.25 LPM

Leak Test: Date of check: March 31, 2023 Last Cal Date: February 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: February 1, 2023 <0.2 ug/m3

Disposable Filter Changed: February 1, 2023

Annual Maintenance

Date Sample Tube Cleaned: December 5, 2022

Date RH/T Sensor Cleaned: December 5, 2022

Notes: No adjustments done. Head cleaned.

Calibration by: Melissa Lemay

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	March 14, 2023	Last Cal Date:	February 8, 2023
Start time (MST):	8:44	End time (MST):	11:48
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make: Thermo 48i-LTE Analyzer serial #: 1408761381

Analyzer Range: 0 - 50 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997345	0.998030	Backgd or Offset:	3.651	3.773
Calibration intercept:	0.018531	0.026535	Coeff or Slope:	1.079	1.079

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4933	66.7	40.0	40.2	0.997
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4933	66.7	40.0	39.9	1.002
second point	4967	33.3	20.0	20.1	0.996
third point	4983	16.7	10.0	10.0	1.000
as left zero	5000	0.0	0.0	0.0	----
as left span	4933	66.7	40.0	39.9	1.003
				Average Correction Factor	1.000

Baseline Corr As found:	40.08	Prev response:	39.93	*% 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: No Maintenance done. Zero adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

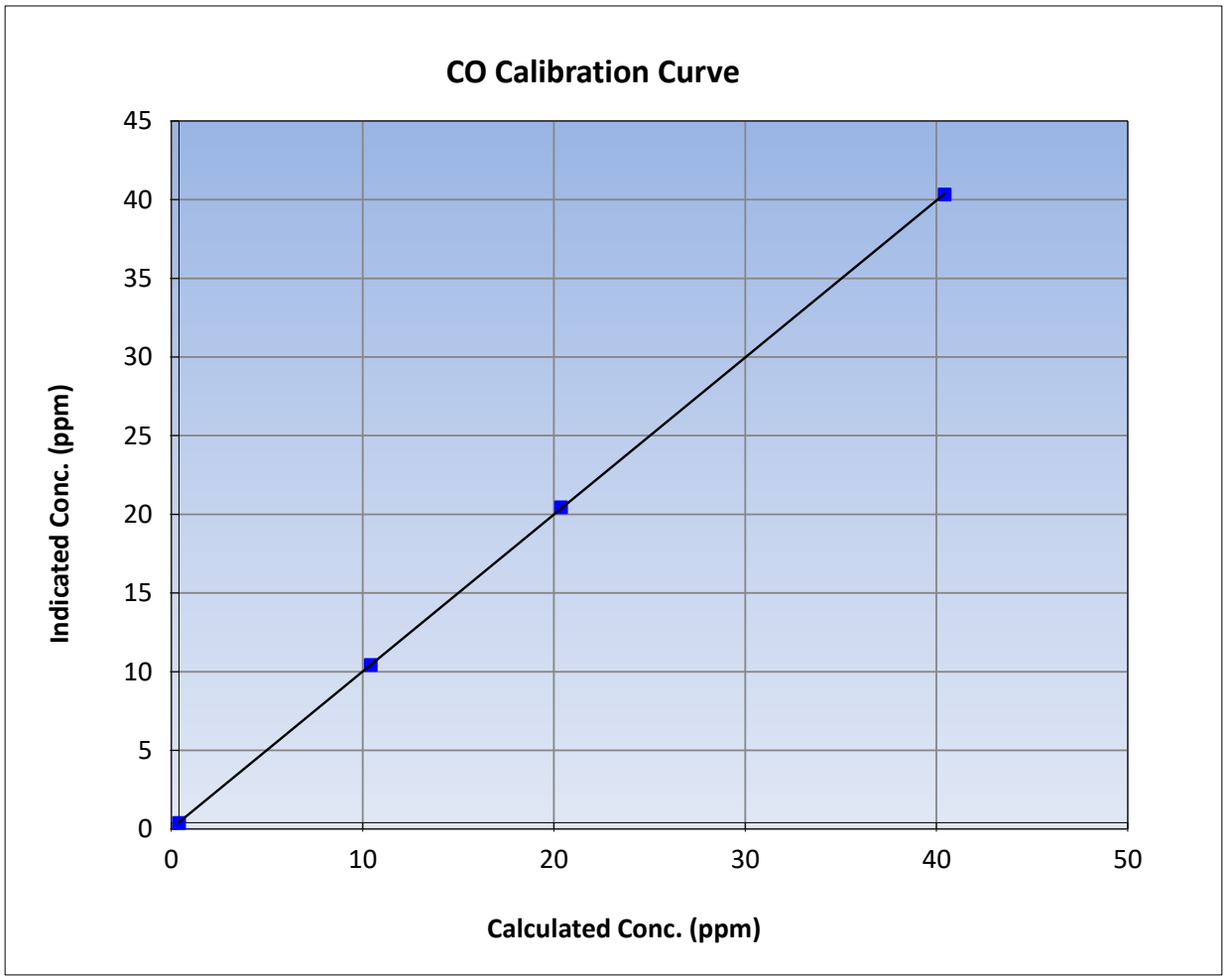
Station Information

Calibration Date:	March 14, 2023	Previous Calibration:	February 8, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	8:44	End Time (MST):	11:48
Analyzer make:	Thermo 48i-LTE	Analyzer serial #:	1408761381

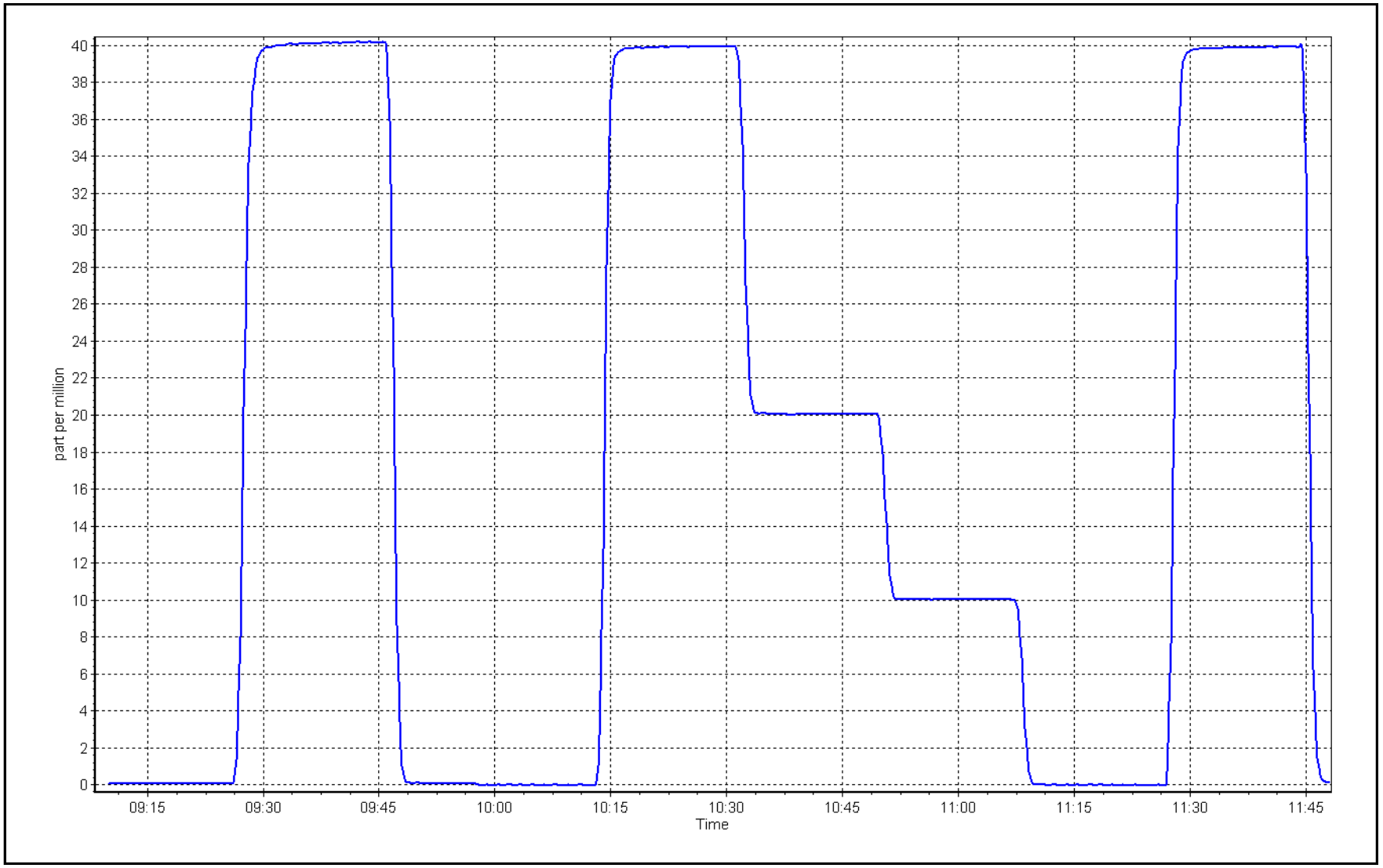
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.0	39.9	1.0023
20.0	20.1	0.9964
10.0	10.0	1.0001

Statistical Evaluation		Limits
Correlation Coefficient	0.999988	≥0.995
Slope	0.998030	0.90 - 1.10
Intercept	0.026535	+/-1.5



CO Calibration Plot Date: March 14, 2023 Location: Athabasca Valley



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS08
FORT CHIPEWYAN
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	March 13, 2023	Last Cal Date:	February 10, 2023
Start time (MST):	10:22	End time (MST):	13:08
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.84	ppm	Cal Gas Exp Date:	January 6, 2030
Cal Gas Cylinder #:	CC196697			
Removed Cal Gas Conc:	49.84	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3252
ZAG Make/Model:	Teledyne API T701		Serial Number:	260

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.996661	0.998816	Backgd or Offset:	1.32	1.27
Calibration intercept:	1.336570	0.356495	Coeff or Slope:	1.006	0.981

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4920	80.3	800.4	815.6	0.981
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4920	80.3	800.4	800.2	1.000
second point	4960	40.2	400.7	399.3	1.004
third point	4980	20.1	200.4	201.4	0.995
as left zero	5000	0.0	0.0	0.1	----
as left span	4920	80.3	800.4	782.3	1.023
				Average Correction Factor	1.000

Baseline Corr As found: 815.50 Previous response 799.05 *% change 2.0%

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

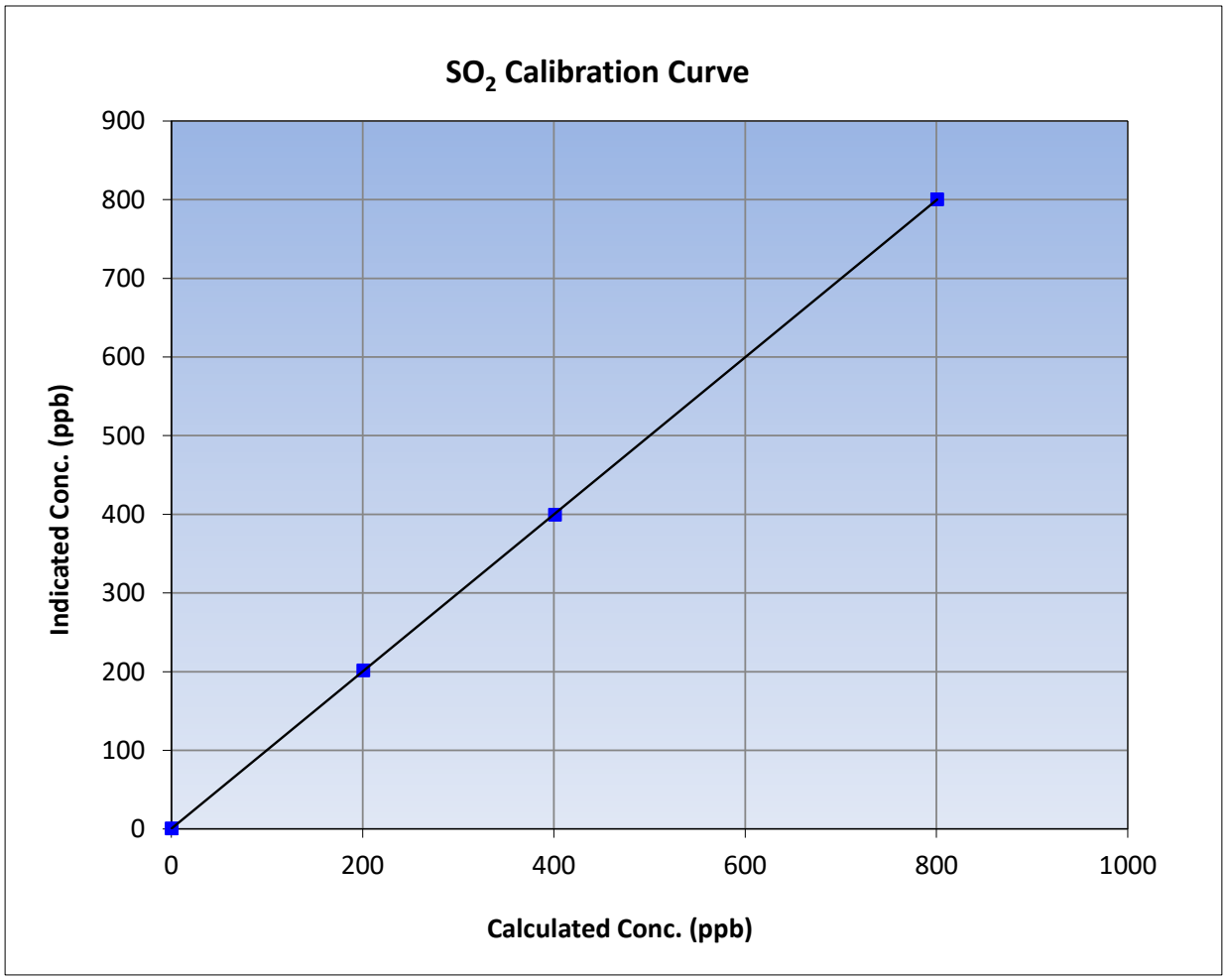
Station Information

Calibration Date:	March 13, 2023	Previous Calibration:	February 10, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	10:22	End Time (MST):	13:08
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1136451241

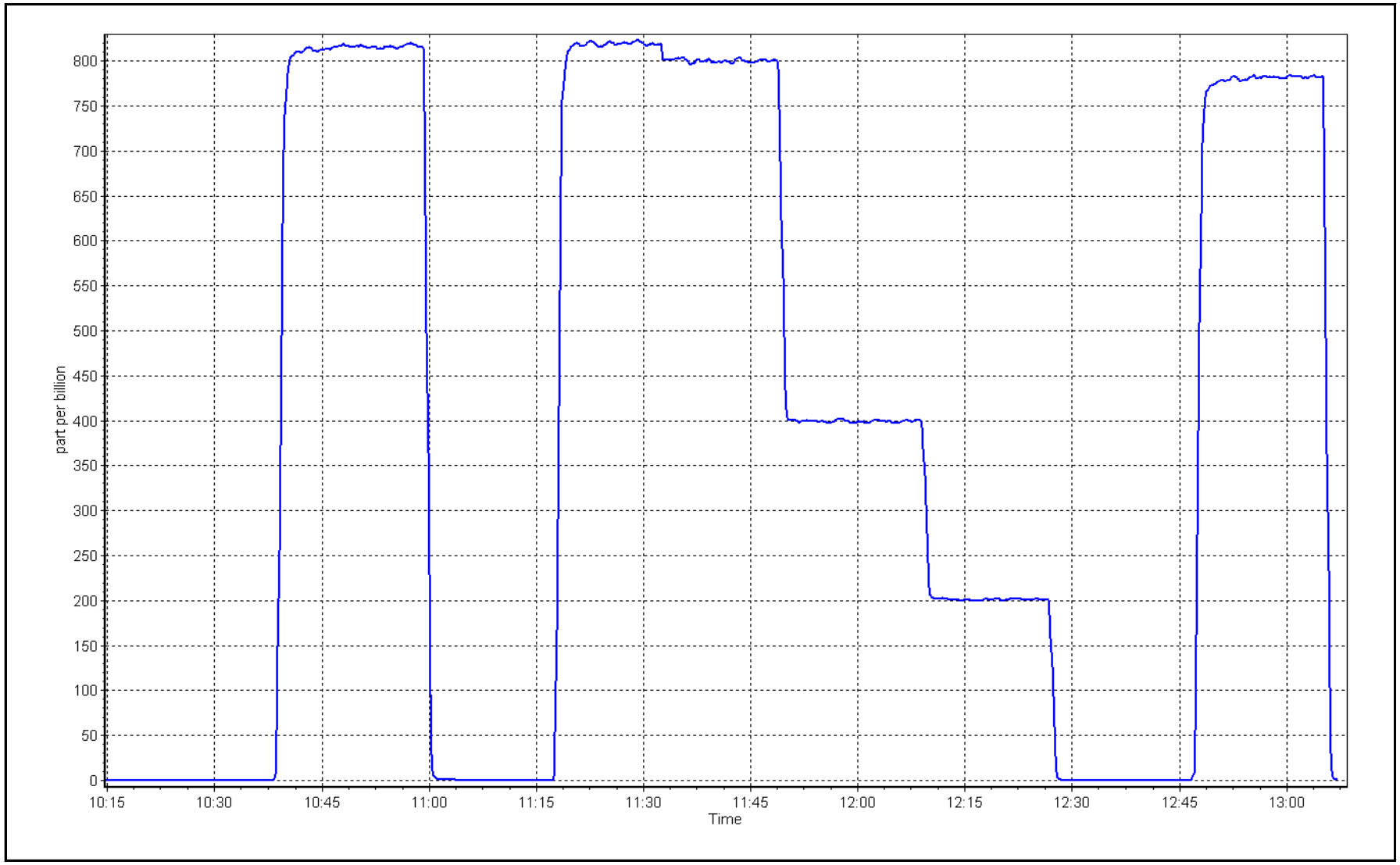
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
800.4	800.2	1.0002
400.7	399.3	1.0035
200.4	201.4	0.9948

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	0.998816	*0.90 - 1.10*
Intercept	0.356495	*+/-30*



SO2 Calibration Plot Date: March 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:	March 12, 2023	Last Cal Date:	February 10, 2023
Start time (MST):	11:41	End time (MST):	16:35
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43iQ-TL		Analyzer serial #:	1203169744	
Converter make:	CDN-101		Converter serial #:	14639	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000139	0.995571	Backgd or Offset:	1.43	1.37
Calibration intercept:	0.058837	0.018651	Coeff or Slope:	0.743	0.717

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	80.5	80.0	81.6	0.981
as found 2nd point	4960	40.2	40.0	41.1	0.972
as found 3rd point	4980	20.1	20.0	20.4	0.979
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	80.5	80.0	79.7	1.004
second point	4960	40.2	40.0	39.8	1.004
third point	4980	20.1	20.0	19.8	1.009
as left zero	5000	0.0	0.0	0.1	----
as left span	4920	80.5	80.0	77.6	1.031
SO2 Scrubber Check	4919.7	80.3	803.0	0.0	----
Date of last scrubber change:		March 7, 2022		Ave Corr Factor	1.006
Date of last converter efficiency test:		March 15, 2022		100.7%	efficiency

Baseline Corr As found:	81.6	Prev response:	80.08	*% change:	1.9%
Baseline Corr 2nd AF pt:	41.1	AF Slope:	1.020278	AF Intercept:	0.079245
Baseline Corr 3rd AF pt:	20.4	AF Correlation:	0.999976		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

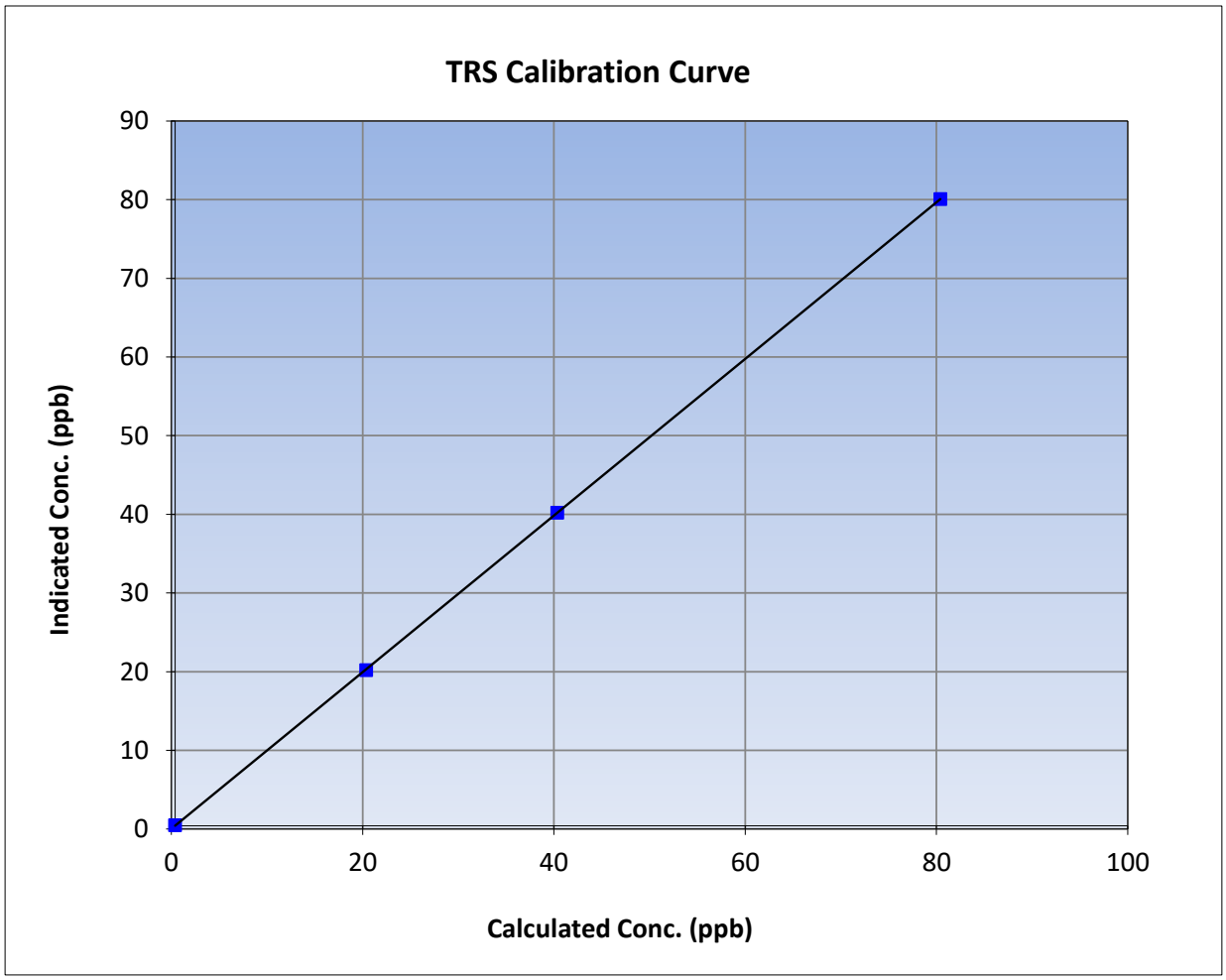
Station Information

Calibration Date:	March 12, 2023	Previous Calibration:	February 10, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	11:41	End Time (MST):	16:35
Analyzer make:	Thermo 43iQ-TL	Analyzer serial #:	1203169744

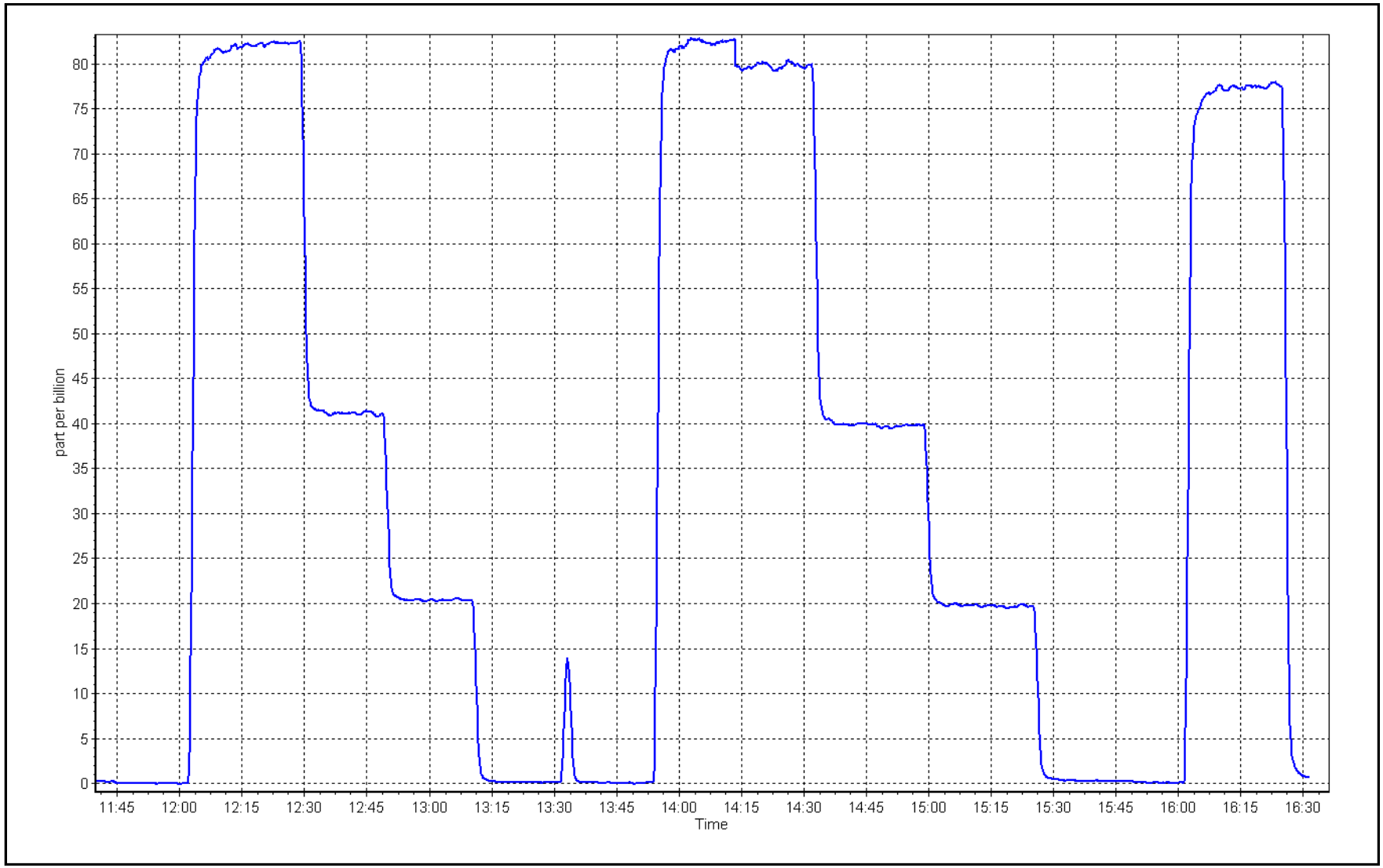
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	79.7	1.0039
40.0	39.8	1.0039
20.0	19.8	1.0090

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999994	*≥0.995*
Slope	0.995571	*0.90 - 1.10*
Intercept	0.018651	*+/-3*



TRS Calibration Plot Date: March 12, 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:	March 13, 2023	Last Cal Date:	February 6, 2023
Start time (MST):	7:00	End time (MST):	12:23
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1426262592	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.844	1.882	NO bkgnd or offset:	6.9	7.9
NOX coeff or slope:	0.993	0.995	NOX bkgnd or offset:	6.9	8.1
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	252.6	256.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.986463	1.000657
NO_X Cal Offset:	2.200000	0.680000
NO Cal Slope:	0.990518	1.001428
NO Cal Offset:	1.180000	0.260000
NO_2 Cal Slope:	0.996180	1.016898
NO_2 Cal Offset:	-1.402288	0.900918

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	2.6	2.6	0.0	----	----
as found span	4918	82.0	800.3	800.3	0.0	787.2	788.3	-1.1	1.0167	1.0152
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.1	-0.2	----	----
high point	4918	82.0	800.3	800.3	0.0	801.3	801.7	-0.3	0.9988	0.9983
second point	4959	41.0	400.2	400.2	0.0	400.8	400.7	0.2	0.9984	0.9987
third point	4980	20.5	200.1	200.1	0.0	202.4	201.3	1.1	0.9885	0.9939
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	0.0	-0.2	----	----
as left span	4918	82.0	800.3	423.2	377.1	796.2	411.1	385.1	1.0052	1.0295
								Average Correction Factor	0.9952	0.9970

Corrected As found	NO_X = 784.6 ppb	NO = 785.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -0.9%
Previous Response	NO_X = 791.7 ppb	NO = 793.9 ppb		*Percent Change	NO = -1.0%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	790.4	413.3	377.1	383.4	0.9836	101.7%
2nd GPT point (200 ppb O3)	790.4	599.2	191.2	197.1	0.9701	103.1%
3rd GPT point (100 ppb O3)	790.4	696.1	94.3	97.1	0.9712	103.0%
				Average Correction Factor	0.9749	102.6%

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

NO_X Calibration Summary

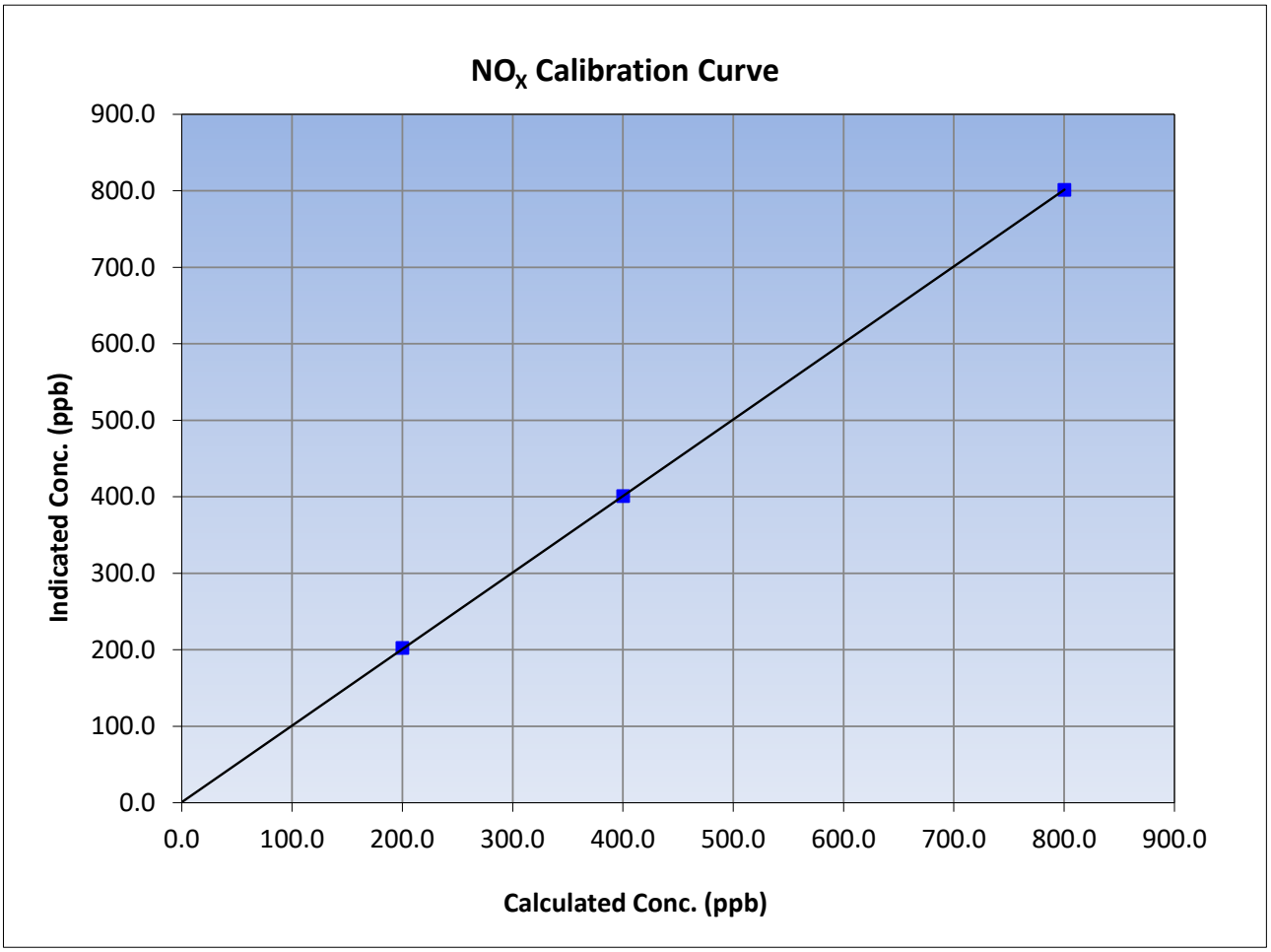
Version-04-2020

Station Information

Calibration Date:	March 13, 2023	Previous Calibration:	February 6, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	7:00	End Time (MST):	12:23
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	0.999990	≥0.995
800.3	801.3	0.9988			
400.2	400.8	0.9984	Slope	1.000657	0.90 - 1.10
200.1	202.4	0.9885			
			Intercept	0.680000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

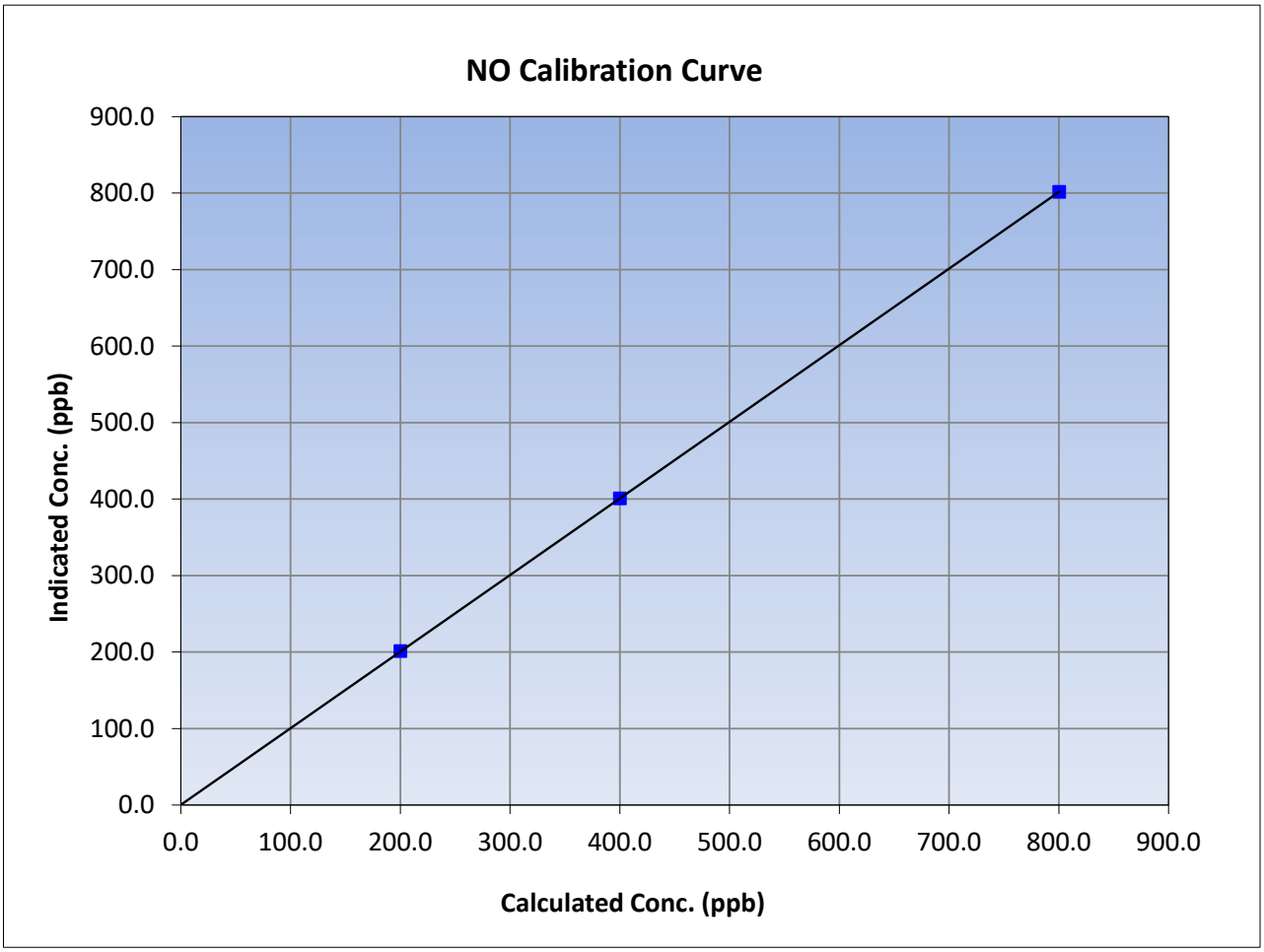
Version-04-2020

Station Information

Calibration Date:	March 13, 2023	Previous Calibration:	February 6, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	7:00	End Time (MST):	12:23
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	0.999998	≥0.995
800.3	801.7	0.9983			
400.2	400.7	0.9987	Slope	1.001428	0.90 - 1.10
200.1	201.3	0.9939			
			Intercept	0.260000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

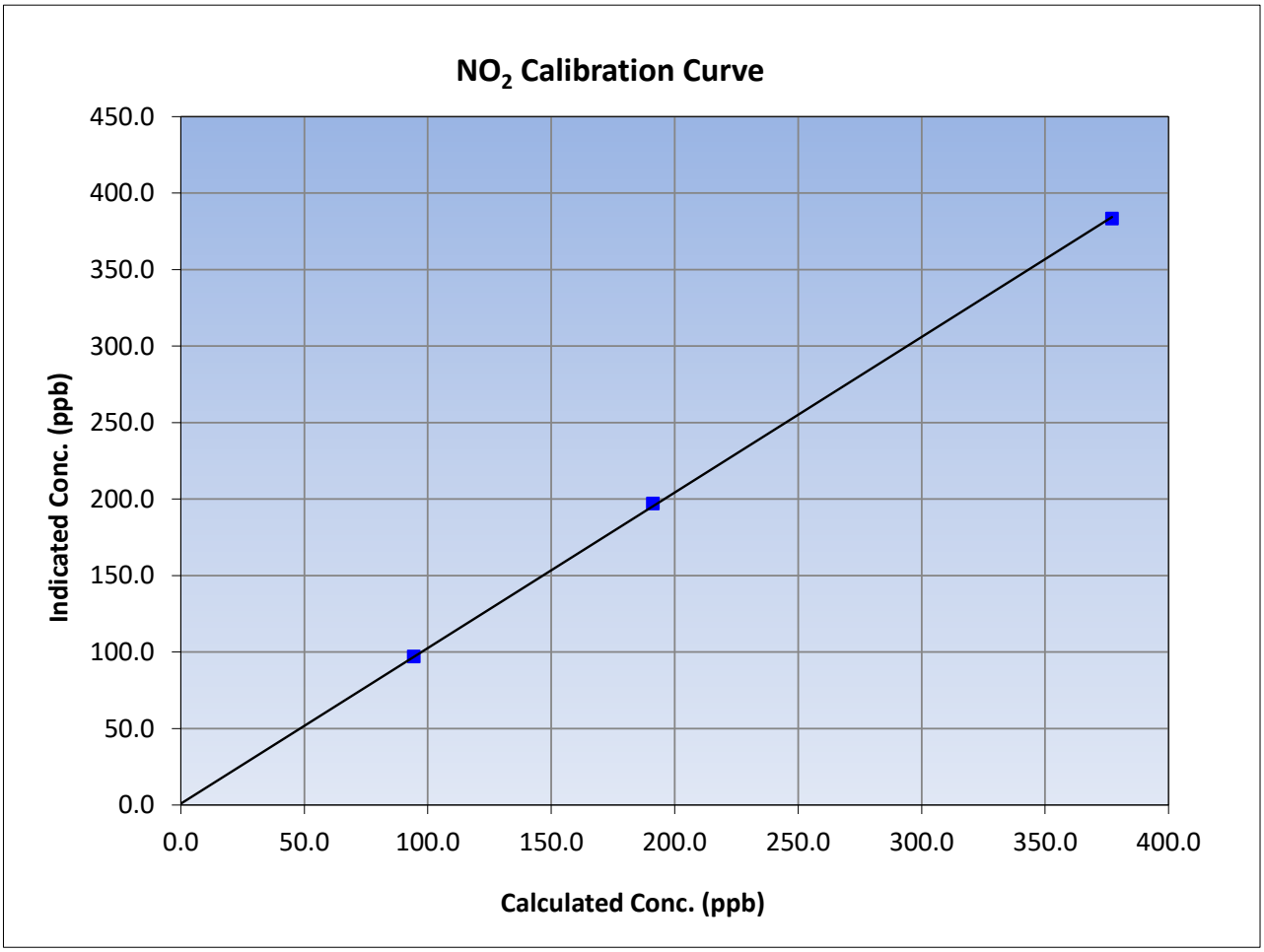
Version-04-2020

Station Information

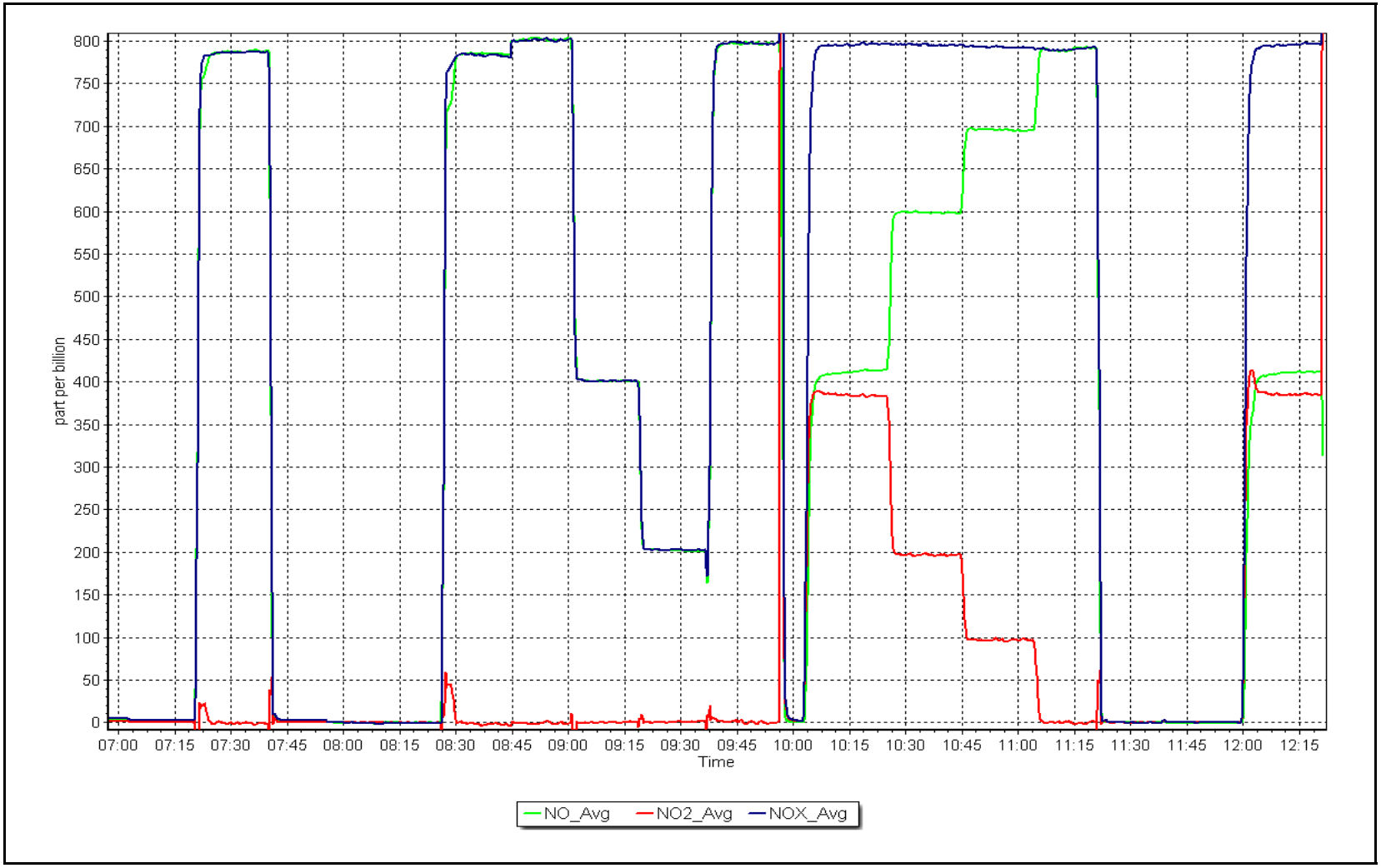
Calibration Date:	March 13, 2023	Previous Calibration:	February 6, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	7:00	End Time (MST):	12:23
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999933	≥0.995
377.1	383.4	0.9836			
191.2	197.1	0.9701	Slope	1.016898	0.90 - 1.10
94.3	97.1	0.9712			
			Intercept	0.900918	+/-20



NO_X Calibration Plot Date: March 13, 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:	March 13, 2023	Last Cal Date:	February 6, 2023
Start time (MST):	13:05	End time (MST):	15:48
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.007143	1.002171	Backgd or Offset:	-2.0	-2.0
Calibration intercept:	-0.600000	-0.880000	Coeff or Slope:	1.036	1.036

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	NA	0.0	1.1	----
as found span	5000	963.6	400.0	400.8	0.998
as found 2nd point					
as found 3rd point					
calibrator zero	5000	NA	0.0	0.5	----
high point	5000	961.7	400.0	400.6	0.999
second point	5000	810.3	200.0	199.1	1.005
third point	5000	701.3	100.0	97.8	1.022
as left zero	5000	NA	0.0	0.4	----
as left span	5000	963.3	400.0	401.3	0.997
				Average Correction Factor	1.009

Baseline Corr As found:	399.7	Previous response	402.3	*% change	-0.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

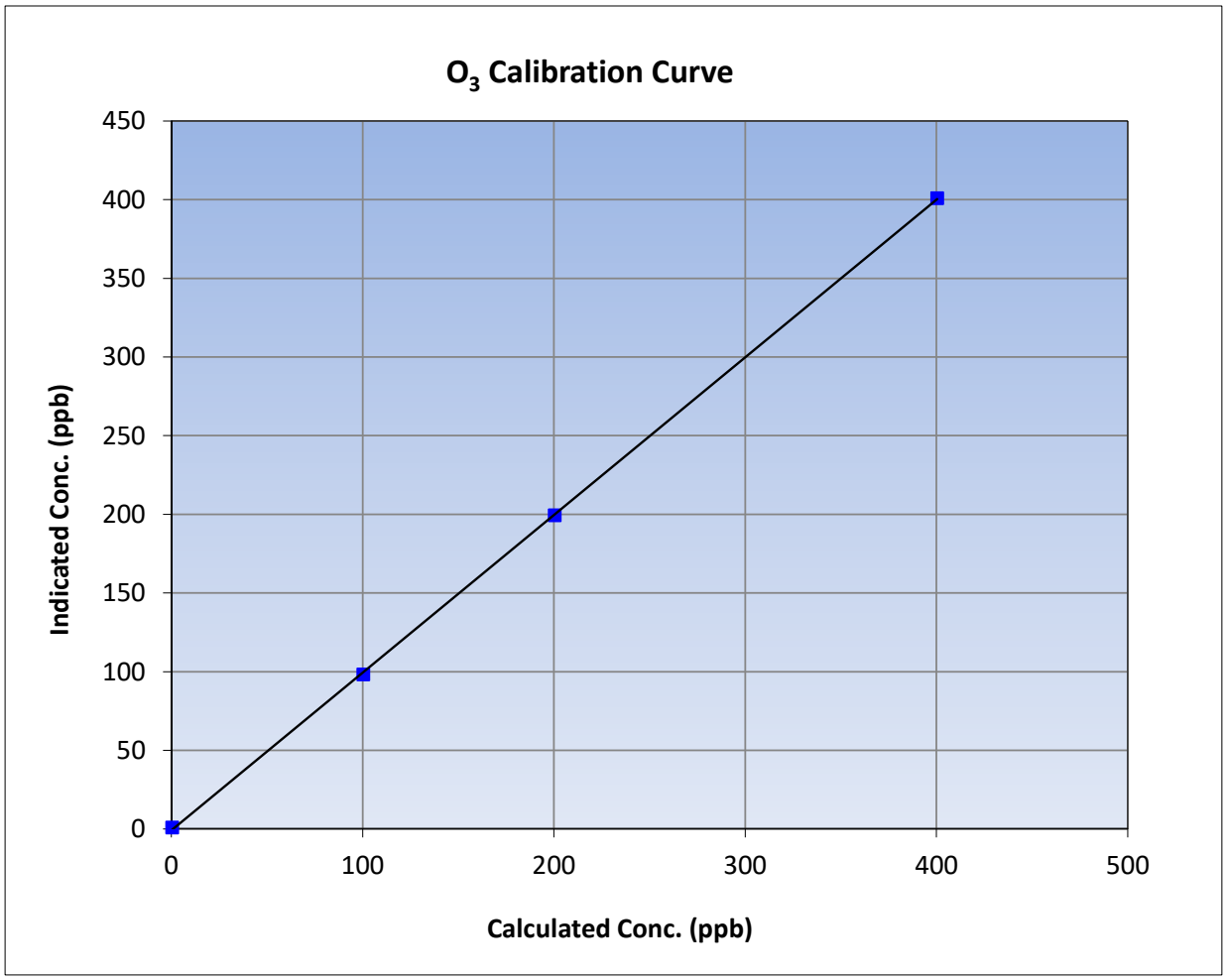
Station Information

Calibration Date:	March 13, 2023	Previous Calibration:	February 6, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	13:05	End Time (MST):	15:48
Analyzer make:	Teledyne API T400	Analyzer serial #:	3872

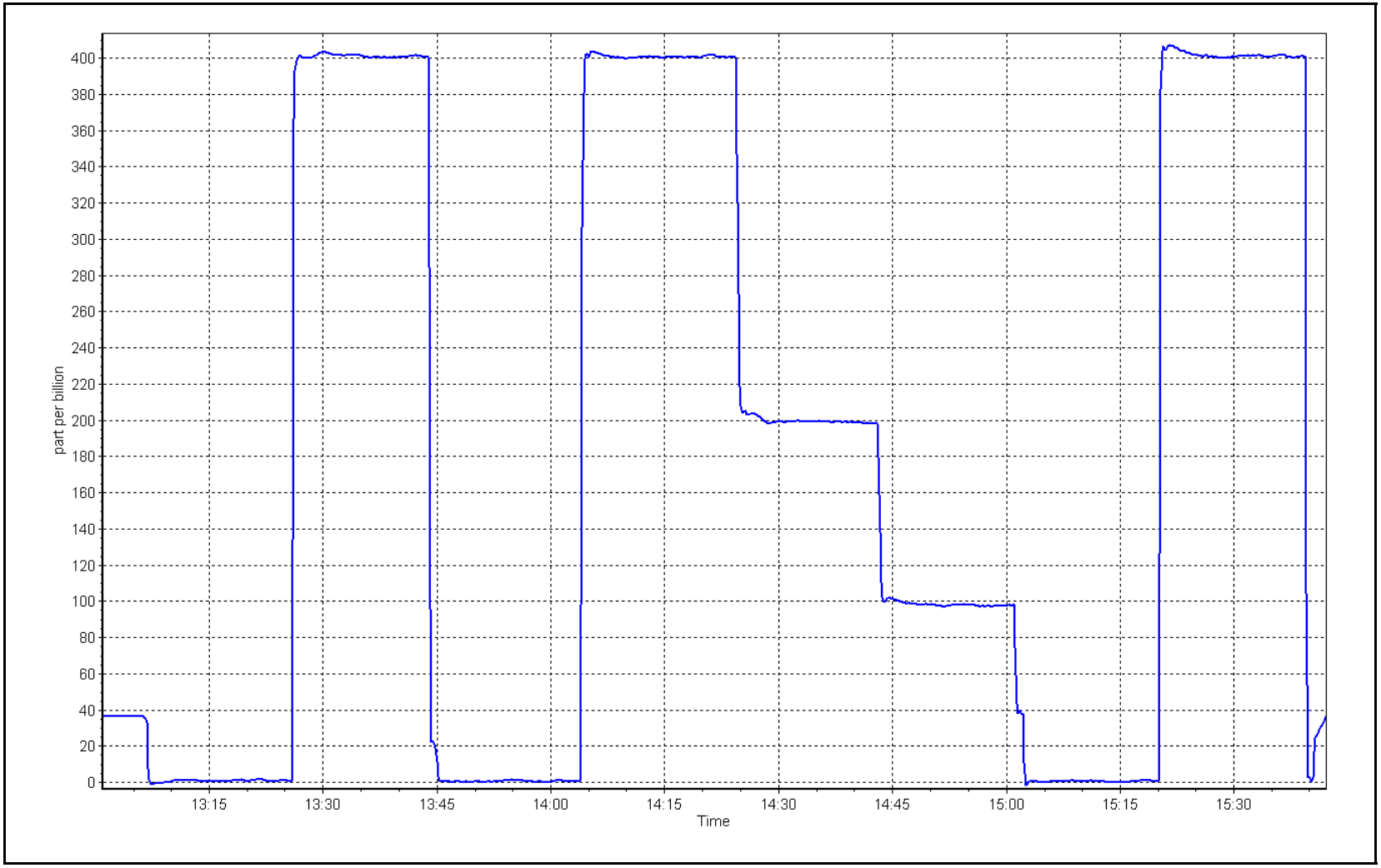
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
400.0	400.6	0.9985
200.0	199.1	1.0045
100.0	97.8	1.0225

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999945	*≥0.995*
Slope	1.002171	*0.90 - 1.10*
Intercept	-0.880000	*+/- 5*



O_3 Calibration Plot Date: March 13, 2023 Location: Fort Chipewyan



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Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS 08
Calibration Date:	March 13, 2023	Last Cal Date:	February 15, 2023
Start time (MST):	9:43	End time (MST):	11:24
Analyzer Make:	API	S/N:	216
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	1212
Temp/RH standard:	Delta Cal	S/N:	1212

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-18.9	-18.5	-18.9	☐	+/- 2 °C
P (mmHg)	741.0	739.6	741.0	☐	+/- 10 mmHg
flow (LPM)	5.01	4.98	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: March 13, 2023 Last Cal Date: February 15, 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	11.0	11.2	11.2	☐	11.3 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 8.4 w/ HEPA: 0.0

Date Optical Chamber Cleaned: March 13, 2023 <0.2 ug/m3

Disposable Filter Changed: March 13, 2023

Annual Maintenance

Date Sample Tube Cleaned: July 14, 2022

Date RH/T Sensor Cleaned: July 14, 2022

Notes: Pump changed after leak check. Optical chamber cleaned. No adjustments made.

Calibration by: Karan Pandit

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	March 13, 2023	Last Cal Date:	February 14, 2023
Start time (MST):	7:12	End time (MST):	12:05
Reason:	Maintenance		

Calibration Standards

Cal Gas Concentration:	3,030	ppm	Cal Gas Exp Date:	December 1, 2028
Cal Gas Cylinder #:	ALM014846			
Removed Cal Gas Conc:	3,030	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	5272
ZAG Make/Model:	API T701H		Serial Number:	197

Analyzer Information

Analyzer make: API T300 — Analyzer serial #: 3505

Analyzer Range: 0 - 50 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.983508	0.998892	Backgd or Offset:	-0.013	-0.014
Calibration intercept:	0.322926	0.030961	Coeff or Slope:	0.987	0.996

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	0.21	----
as found span	4933	66.7	40.4	40.7	0.993
as found 2nd point	4967	33.3	20.2	20.6	0.978
as found 3rd point	4983	16.7	10.1	10.4	0.975
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4934	66.7	40.4	40.4	1.002
second point	4967	33.3	20.2	20.3	0.993
third point	4983	16.7	10.1	10.1	1.004
as left zero	5000	0.0	0.0	0.0	----
as left span	2960	40.0	40.4	39.4	1.026
				Average Correction Factor	1.000

Baseline Corr As found:	40.48	Prev response:	40.08	*% change:	1.0%
Baseline Corr 2nd AF pt:	20.4	AF Slope:	1.001720	AF Intercept:	0.266590
Baseline Corr 3rd AF pt:	10.2	AF Correlation:	0.999965		

* = > +/-5% change initiates investigation

Notes: Peaked the IR source and changed the sample inlet filter after as founds. Adjusted the zero and span.

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

CO Calibration Summary

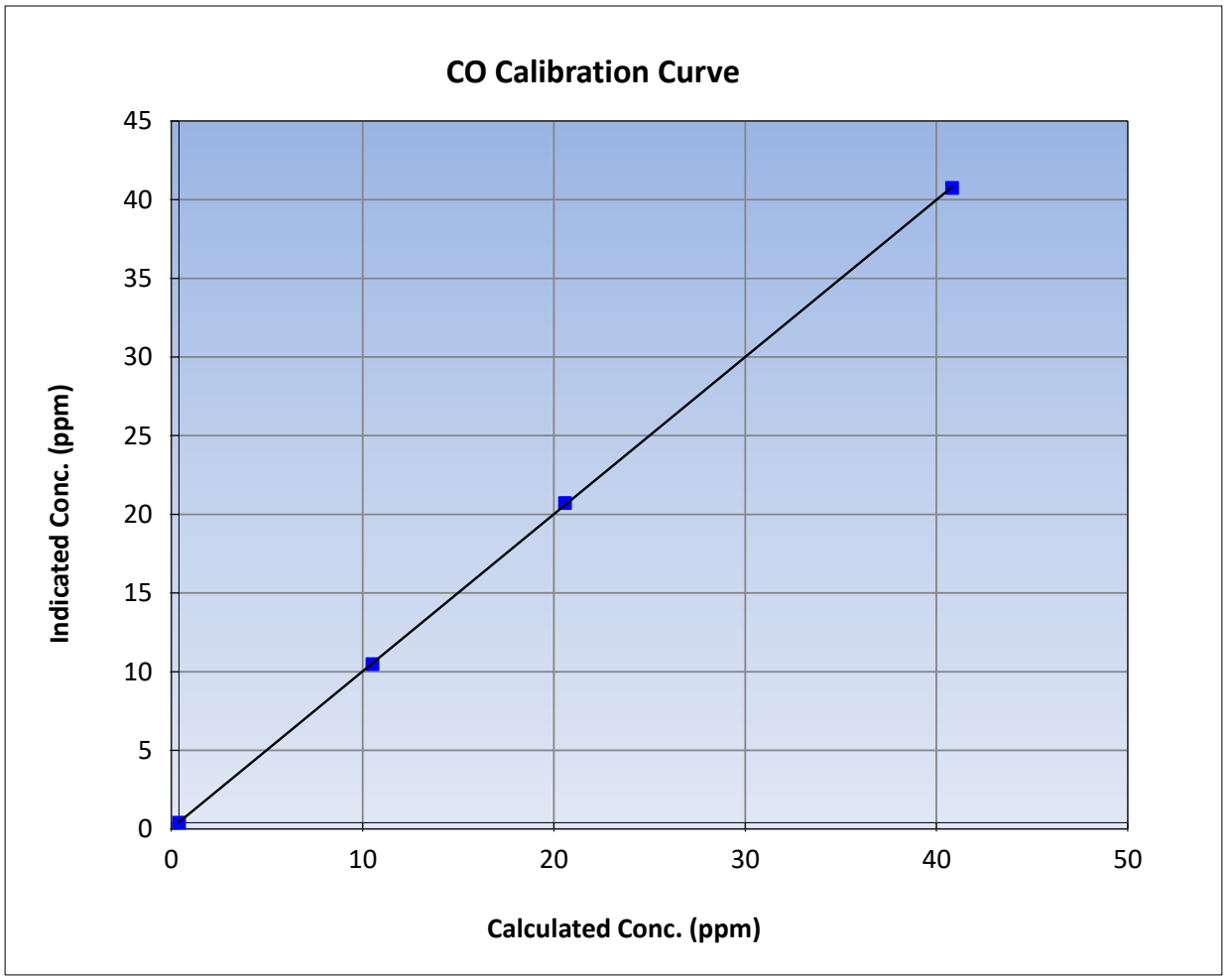
Version-01-2020

Station Information

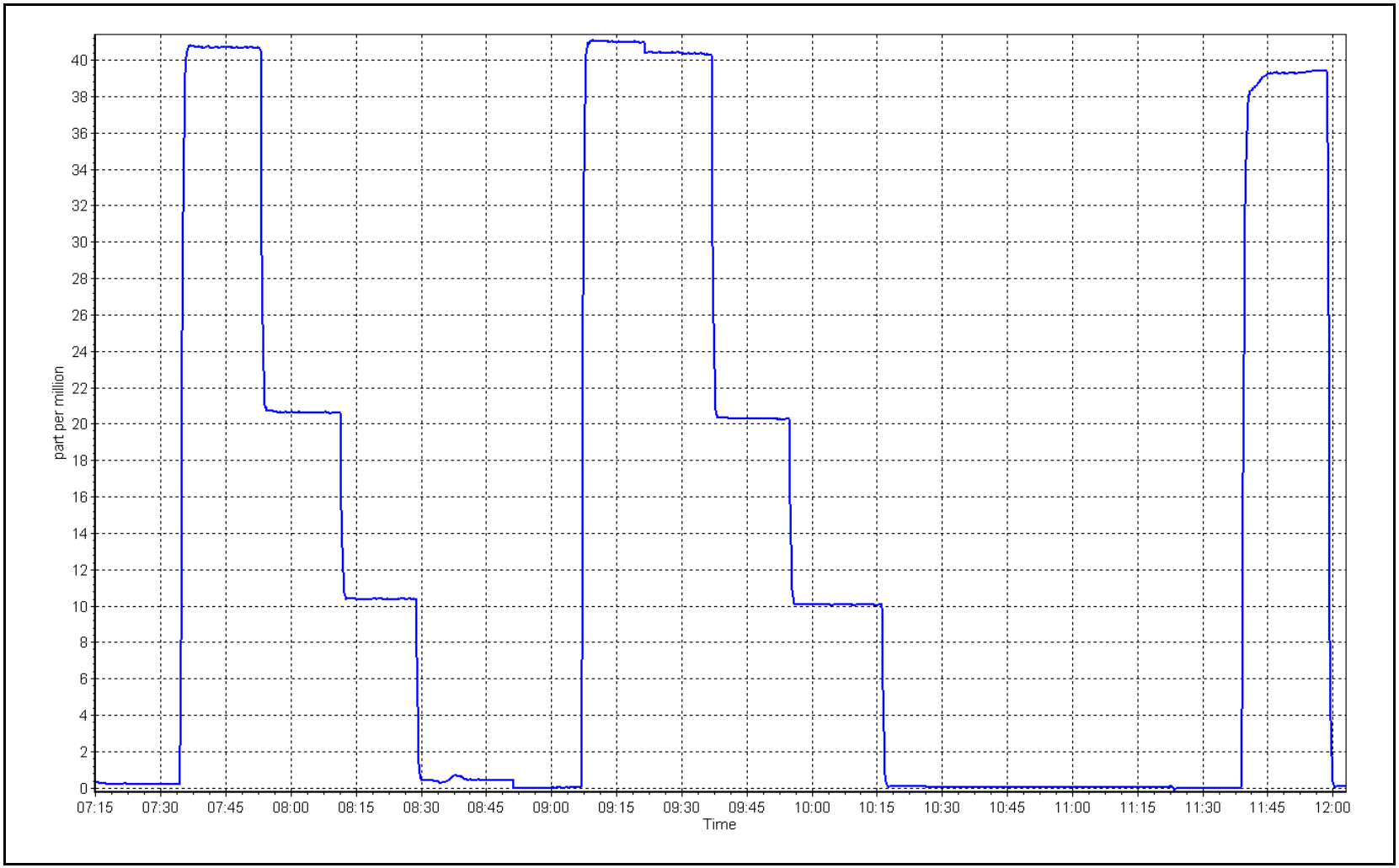
Calibration Date:	March 13, 2023	Previous Calibration:	February 14, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	7:12	End Time (MST):	12:05
Analyzer make:	API T300	Analyzer serial #:	3505

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999973	*≥0.995*
40.4	40.4	1.0016			
20.2	20.3	0.9931	Slope	0.998892	*0.90 - 1.10*
10.1	10.1	1.0040			
			Intercept	0.030961	*+/-1.5*



CO Calibration Plot Date: March 13, 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:	March 12, 2023	Last Cal Date:	February 15, 2023
Start time (MST):	11:46	End time (MST):	15:55
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	60,220	ppm	Cal Gas Exp Date:	December 1, 2028
Cal Gas Cylinder #:	ALM014846			
Removed Cal Gas Conc:	60,220	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5272
N2 Gen Make/Model:	NG 5000		Serial Number:	771048318

Analyzer Information

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

Analyzer Range 0 - 2,000 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.006830	0.998937	Backgd or Offset:	0.019	0.006
Calibration intercept:	-1.740000	-4.820000	Coeff or Slope:	1.011	1.018

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	0.9	----
as found span	2920	80.0	1605.9	1626.3	0.987
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	-0.1	----
high point	2920	80.0	1605.9	1605.8	1.000
second point	2960	40.0	802.9	782.6	1.026
third point	2980	20.0	401.5	399.7	1.004
as left zero	3000	0.0	0.0	0.0	----
as left span	2960	40.0	802.9	779.8	1.030
				Average Correction Factor	1.010

Baseline Corr As found:	1625.40	Prev response:	1615.09	*% change:	0.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

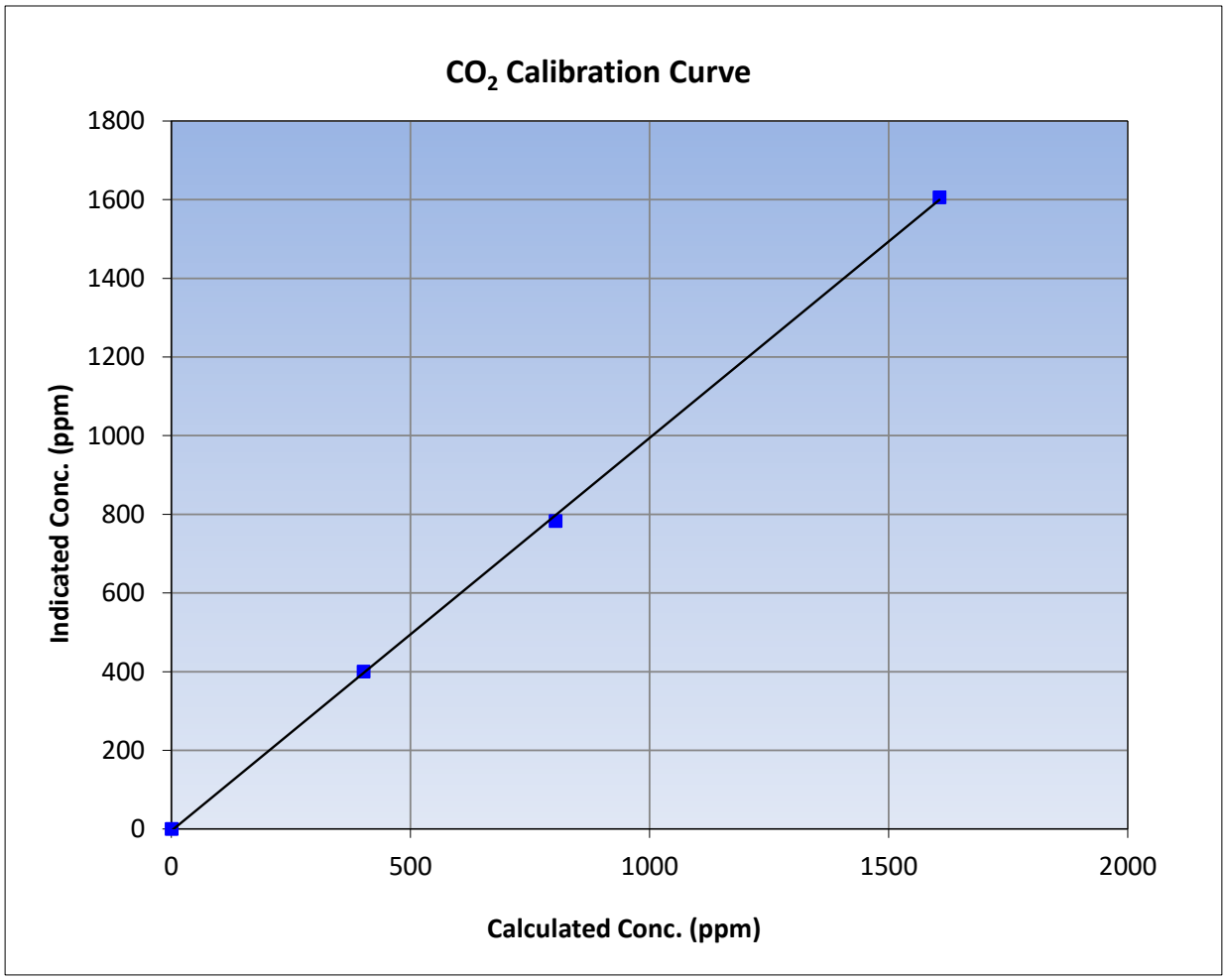
Station Information

Calibration Date	March 12, 2023	Previous Calibration	February 15, 2023
Station Name	Fort Chipewyan	Station Number	AMS08
Start Time (MST)	11:46	End Time (MST)	15:55
Analyzer make	Teledyne API T360	Analyzer serial #	289

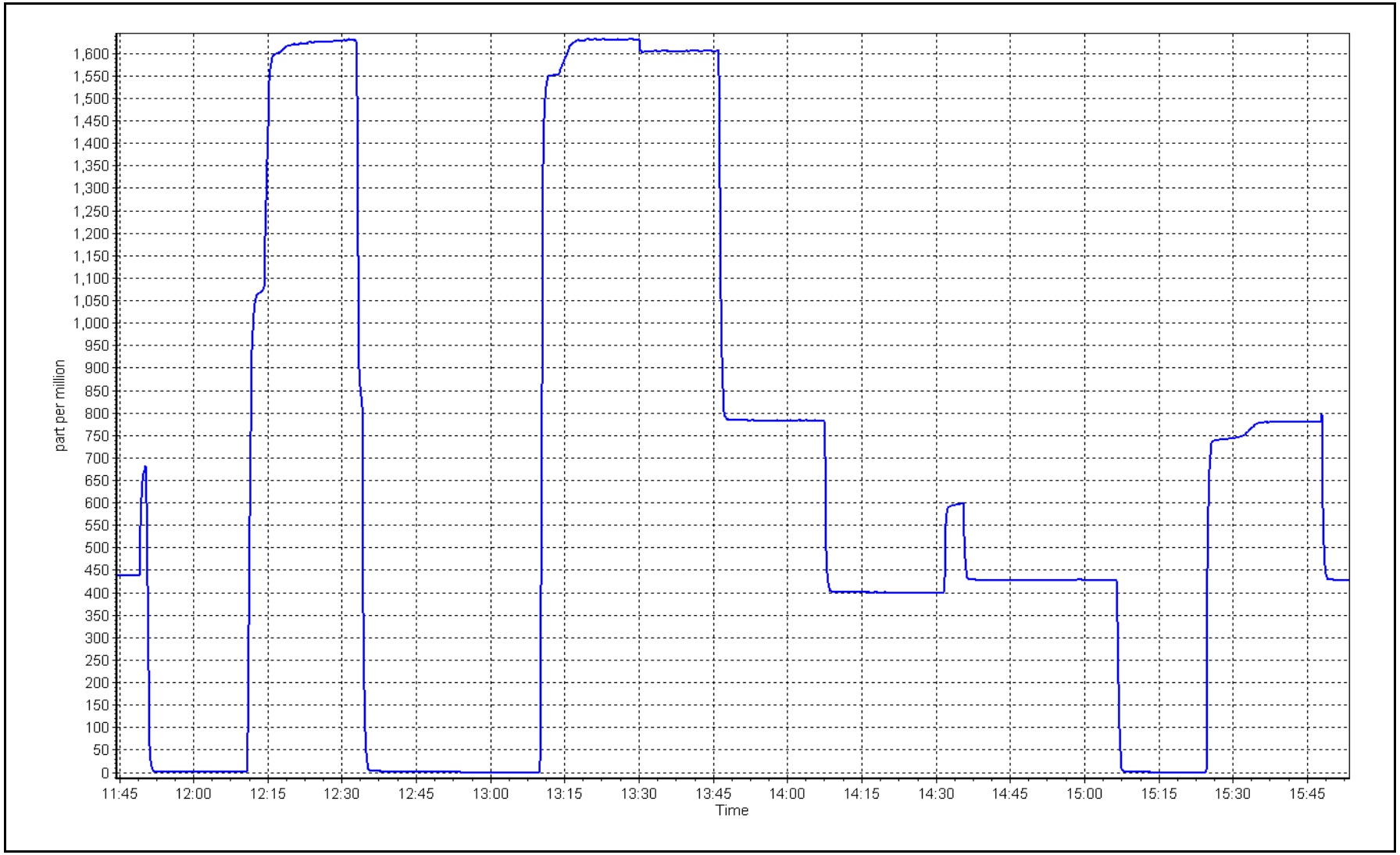
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
1605.9	1605.8	1.0000
802.9	782.6	1.0260
401.5	399.7	1.0044

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999793	*≥0.995*
Slope	0.998937	*0.90 - 1.10*
Intercept	-4.820000	*+/-20*



CO_2 Calibration Plot Date: March 12, 2023 Location: Fort Chipewyan



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS09
BARGE LANDING
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	March 10, 2023	Last Cal Date:	February 3, 2023
Start time (MST):	10:58	End time (MST):	14:05
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:	1.002493	1.001709	Backgd or Offset:	9.8	9.7
Calibration intercept:	0.431711	0.631572	Coeff or Slope:	0.986	0.986

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	801.7	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4919	80.2	801.5	803.3	0.998
second point	4959	40.1	400.8	402.3	0.996
third point	4980	20.0	199.8	201.1	0.994
as left zero	5000	0.0	0.0	0.2	----
as left span	4919	80.2	801.5	808.0	0.992
				Average Correction Factor	0.996

Baseline Corr As found:	801.60	Previous response	803.92	*% 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: Ryan Power

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

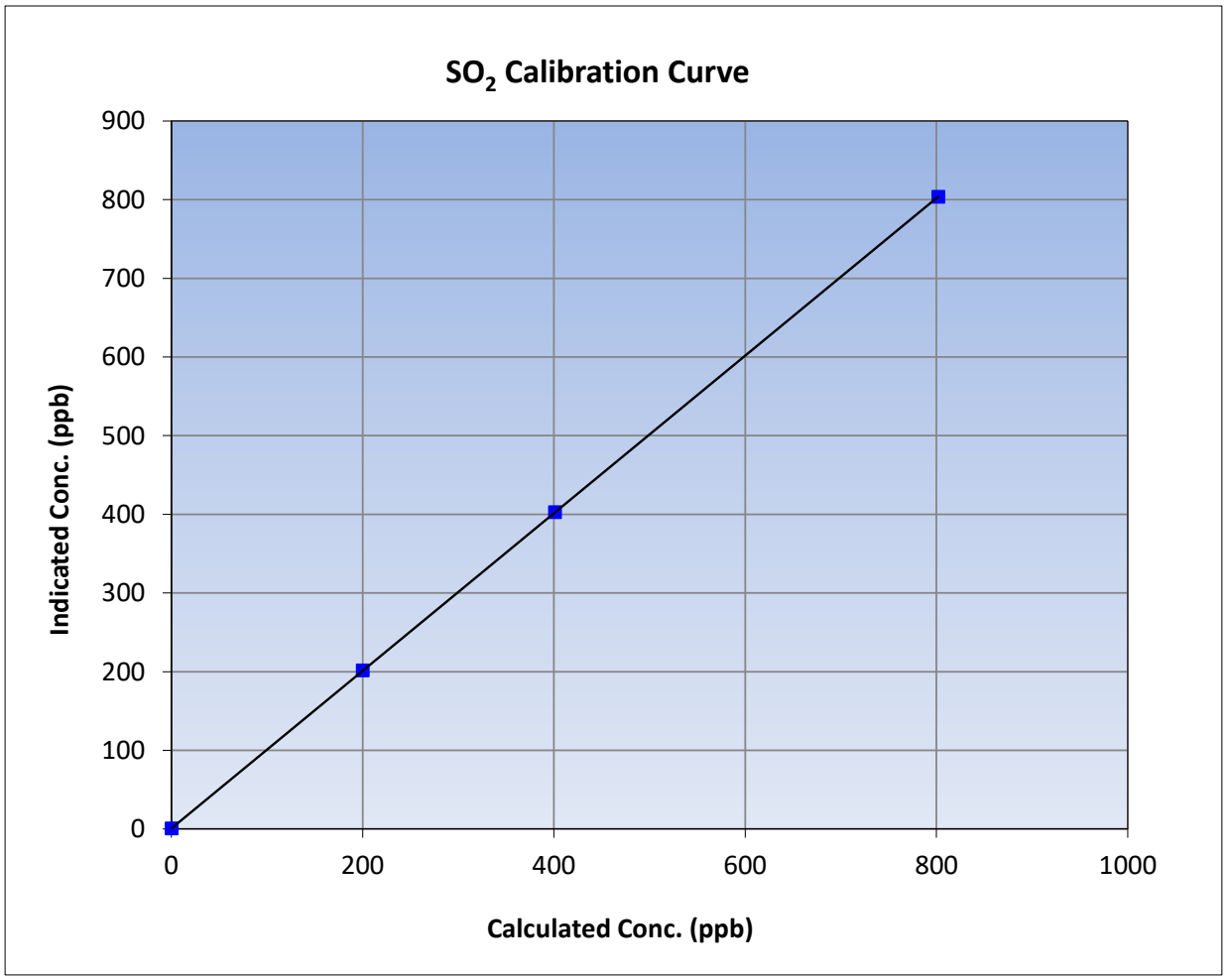
Station Information

Calibration Date:	March 10, 2023	Previous Calibration:	February 3, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:58	End Time (MST):	14:05
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148498

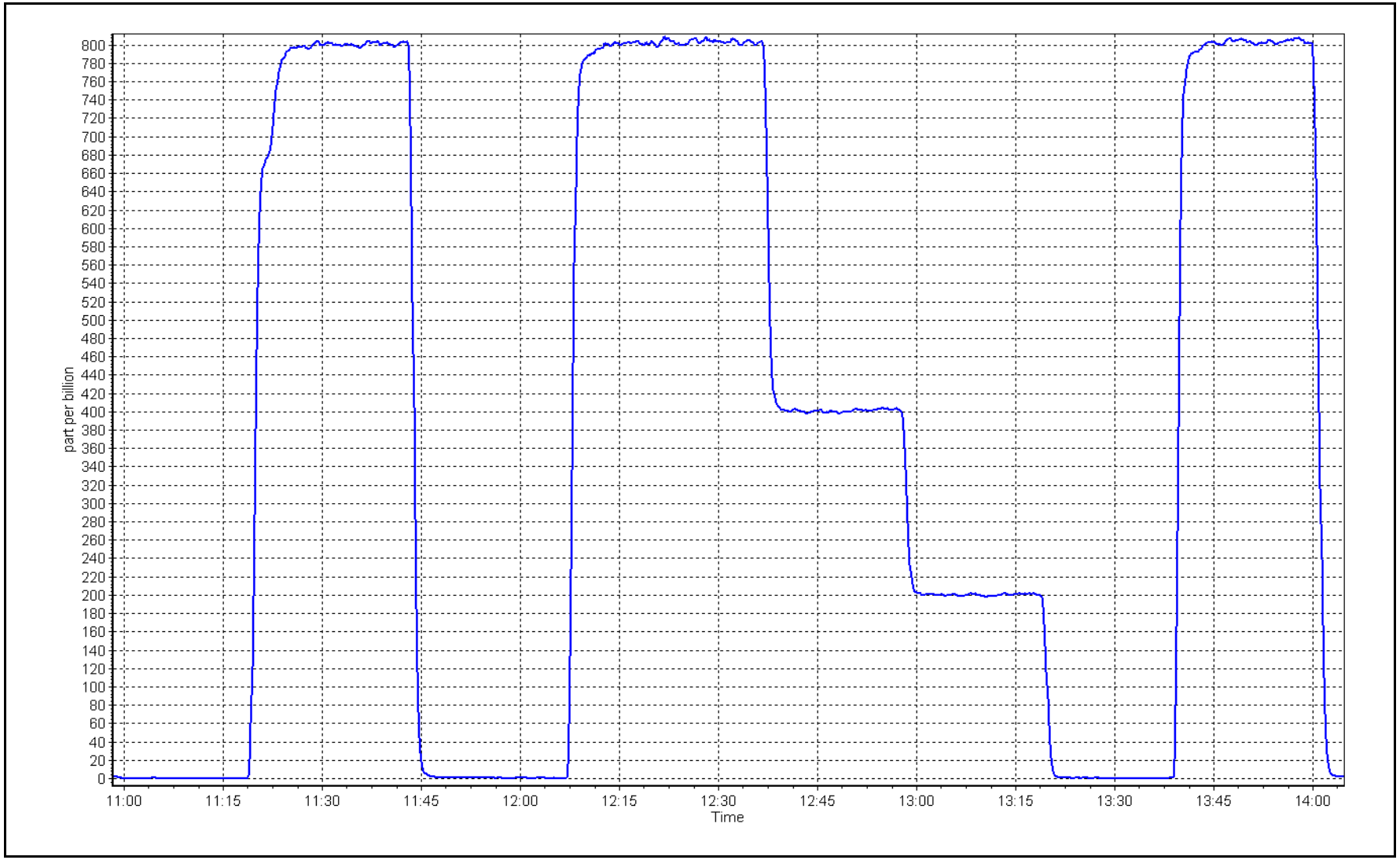
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
801.5	803.3	0.9977
400.8	402.3	0.9962
199.8	201.1	0.9937

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	1.001709	*0.90 - 1.10*
Intercept	0.631572	*+/-30*



SO2 Calibration Plot Date: March 10, 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:	March 23, 2023	Last Cal Date:	February 28, 2023
Start time (MST):	9:07	End time (MST):	13:47
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1331259320	
Converter make:	CDN-101		Converter serial #:	519	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003148	1.006146	Backgd or Offset:	2.65	2.76
Calibration intercept:	-0.000990	0.019102	Coeff or Slope:	1.094	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	4918	82.1	80.0	77.5	1.032
as found 2nd point	4959	41.1	40.0	38.7	1.034
as found 3rd point	4979	20.5	20.0	19.2	1.040
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	4918	82.1	80.0	80.5	0.993
second point	4959	41.1	40.0	40.2	0.996
third point	4979	20.5	20.0	20.2	0.989
as left zero	5000	0.0	0.0	0.0	----
as left span	4918	82.1	80.0	80.3	0.996
SO2 Scrubber Check	4920	80.2	802.0	0.0	----
Date of last scrubber change:		28-Feb-23		Ave Corr Factor	0.993
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	77.5	Prev response:	80.21	*% change:	-3.5%
Baseline Corr 2nd AF pt:	38.7	AF Slope:	0.969709	AF Intercept:	-0.080930
Baseline Corr 3rd AF pt:	19.2	AF Correlation:	0.999995		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

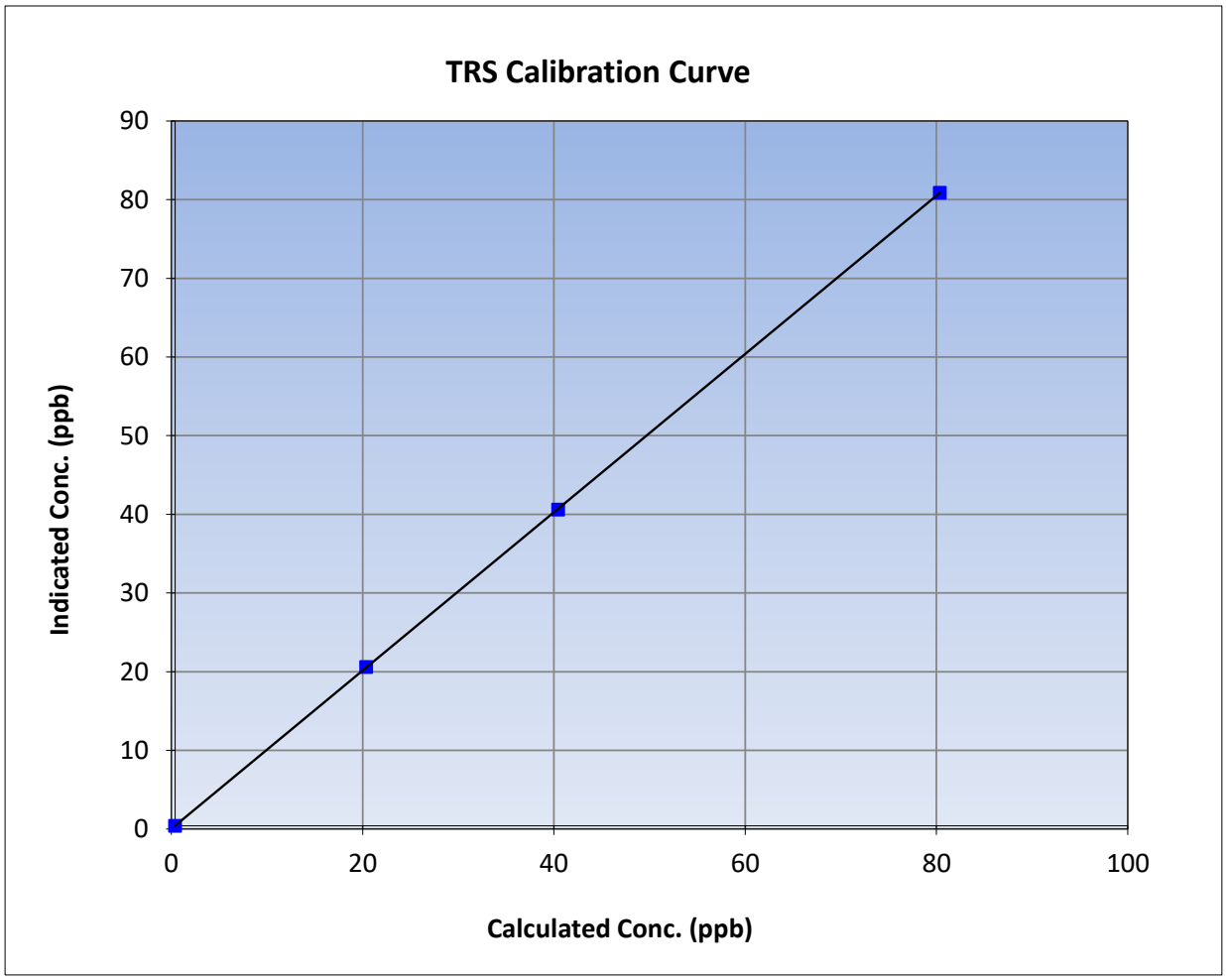
Station Information

Calibration Date:	March 23, 2023	Previous Calibration:	February 28, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:07	End Time (MST):	13:47
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1331259320

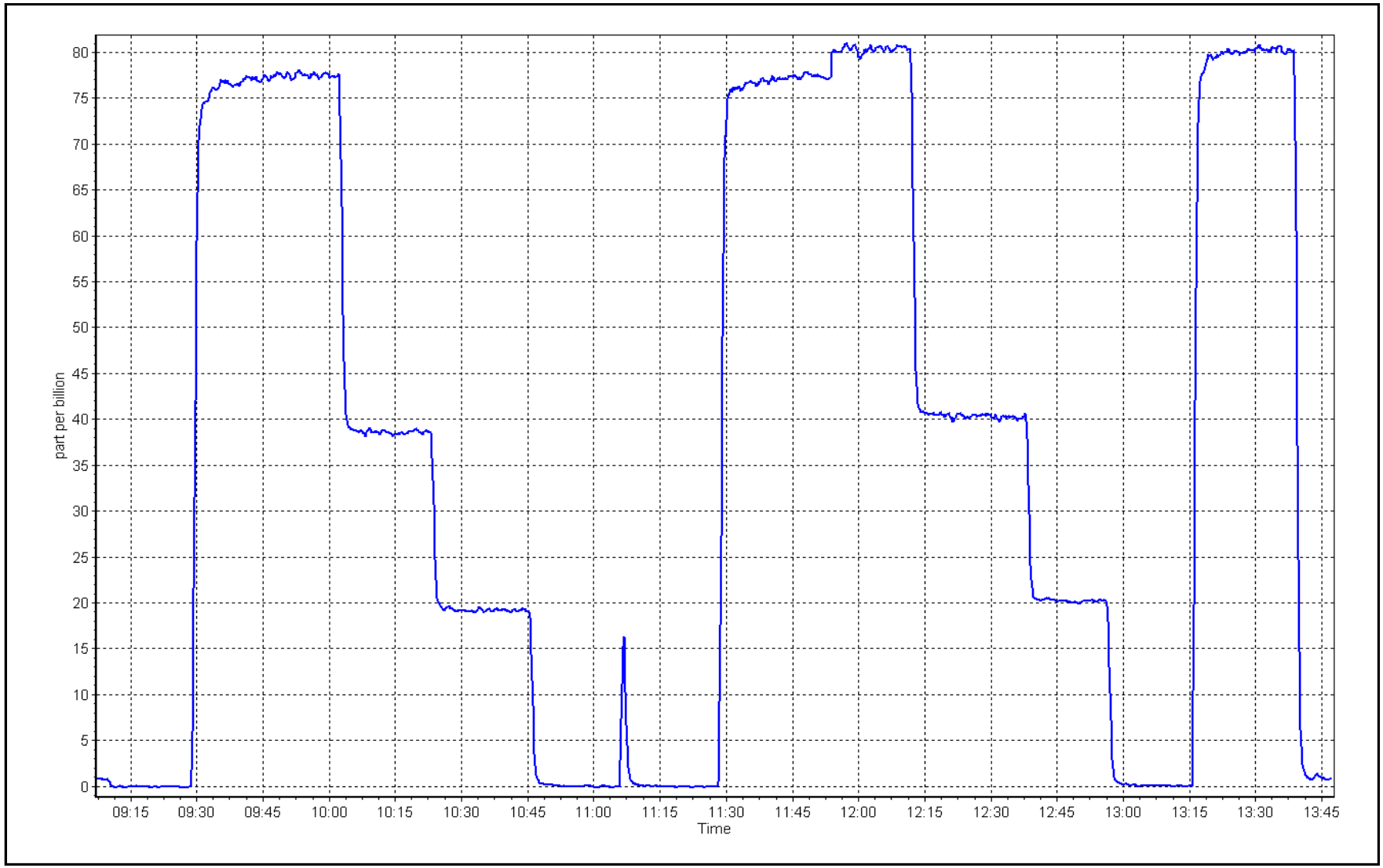
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.5	0.9933
40.0	40.2	0.9958
20.0	20.2	0.9886

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.006146	*0.90 - 1.10*
Intercept	0.019102	*+/-3*



TRS Calibration Plot Date: March 23, 2023 Location: Barge Landing



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	March 10, 2023	Last Cal Date:	February 3, 2023
Start time (MST):	10:58	End time (MST):	14:03
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1170050131	
THC Range (ppm):	0 - 100 ppm				
NMHC Range (ppm):	0 - 50 ppm		CH4 Range (ppm):	0 - 50 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	1.99E-04	2.03E-04	NMHC SP Ratio:	4.28E-05	4.30E-05
CH4 Retention time:	12.2	12.6	NMHC Peak Area:	213327	212383

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	80.2	17.12	16.69	1.026
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	8.50	1.007
third point	4980	20.0	4.27	4.23	1.010
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	17.12	17.12	1.000
				Average Correction Factor	1.006
Baseline Corr AF:	16.69	Prev response	17.10	*% change	-2.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.0	----
as found span	4919	80.2	9.14	9.07	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	9.14	9.14	1.000
second point	4960	40.1	4.57	4.55	1.003
third point	4980	20	2.28	2.27	1.002
as left zero	5000	0	0.00	0.00	----
as left span	4919	80.2	9.14	9.14	0.999
				Average Correction Factor	1.002
Baseline Corr AF:	9.07	Prev response	9.08	*% change	-0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	80.2	7.98	7.63	1.047
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	7.98	7.97	1.001
second point	4960	40.1	3.99	3.95	1.011
third point	4980	20.0	1.99	1.95	1.020
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	7.98	7.98	1.000
				Average Correction Factor	1.011
Baseline Corr AF:	7.63	Prev response	8.02	*% change	-5.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.001427	0.999991
THC Cal Offset:	-0.043961	-0.027960
CH4 Cal Slope:	1.007423	0.999623
CH4 Cal Offset:	-0.020126	-0.022149
NMHC Cal Slope:	0.996127	1.000225
NMHC Cal Offset:	-0.024834	-0.005211

Notes: Changed sample inlet filter after as founds. Calibrated span to adjust CH4 RT, no dipping in signal

Calibration Performed By: Ryan Power

Wood Buffalo Environmental Association

THC Calibration Summary

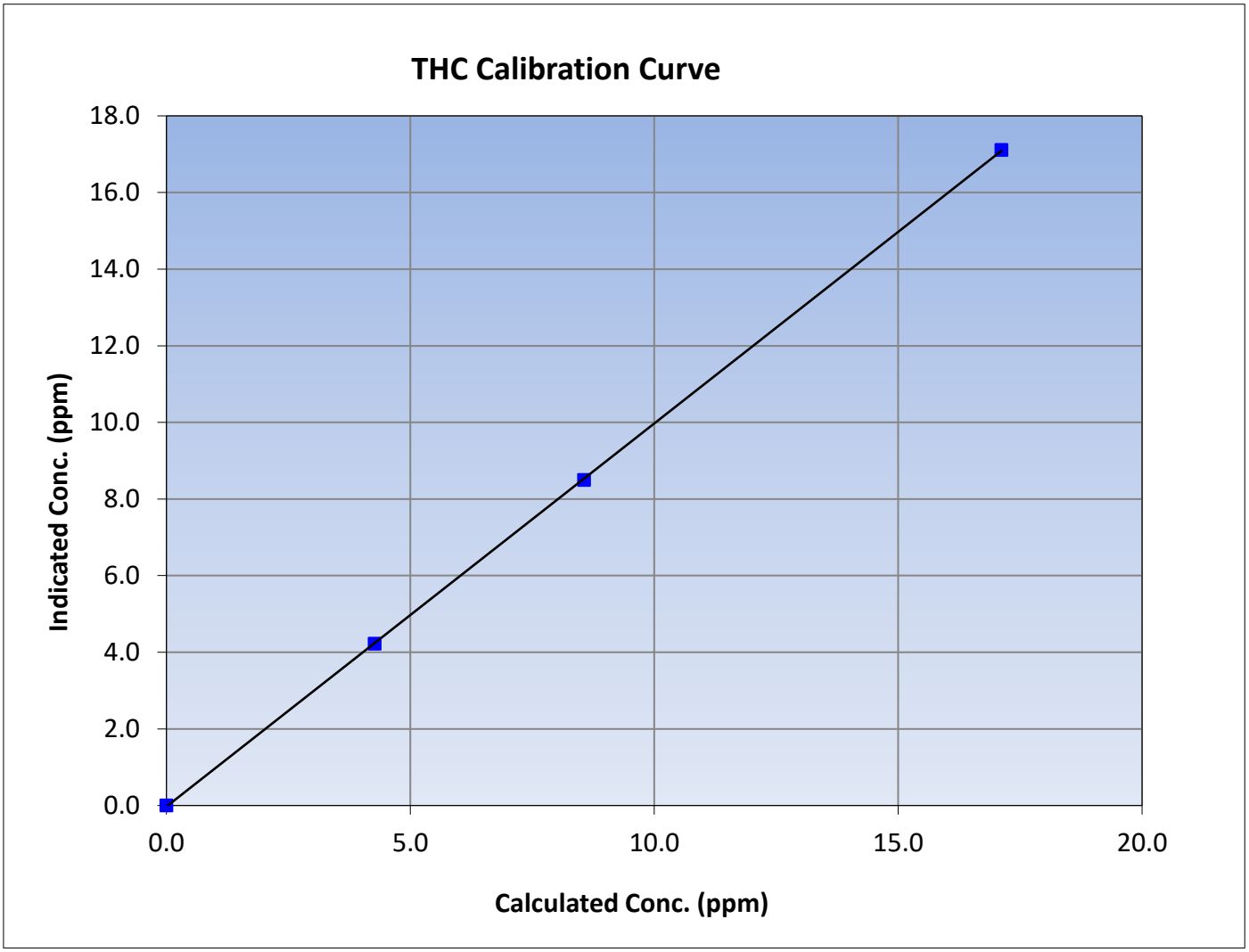
Version-01-2020

Station Information

Calibration Date:	March 10, 2023	Previous Calibration:	February 3, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:58	End Time (MST):	14:03
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050131

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*
17.12	17.11	1.0004			
8.56	8.50	1.0073	Slope	0.999991	*0.90 - 1.10*
4.27	4.23	1.0101			
			Intercept	-0.027960	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

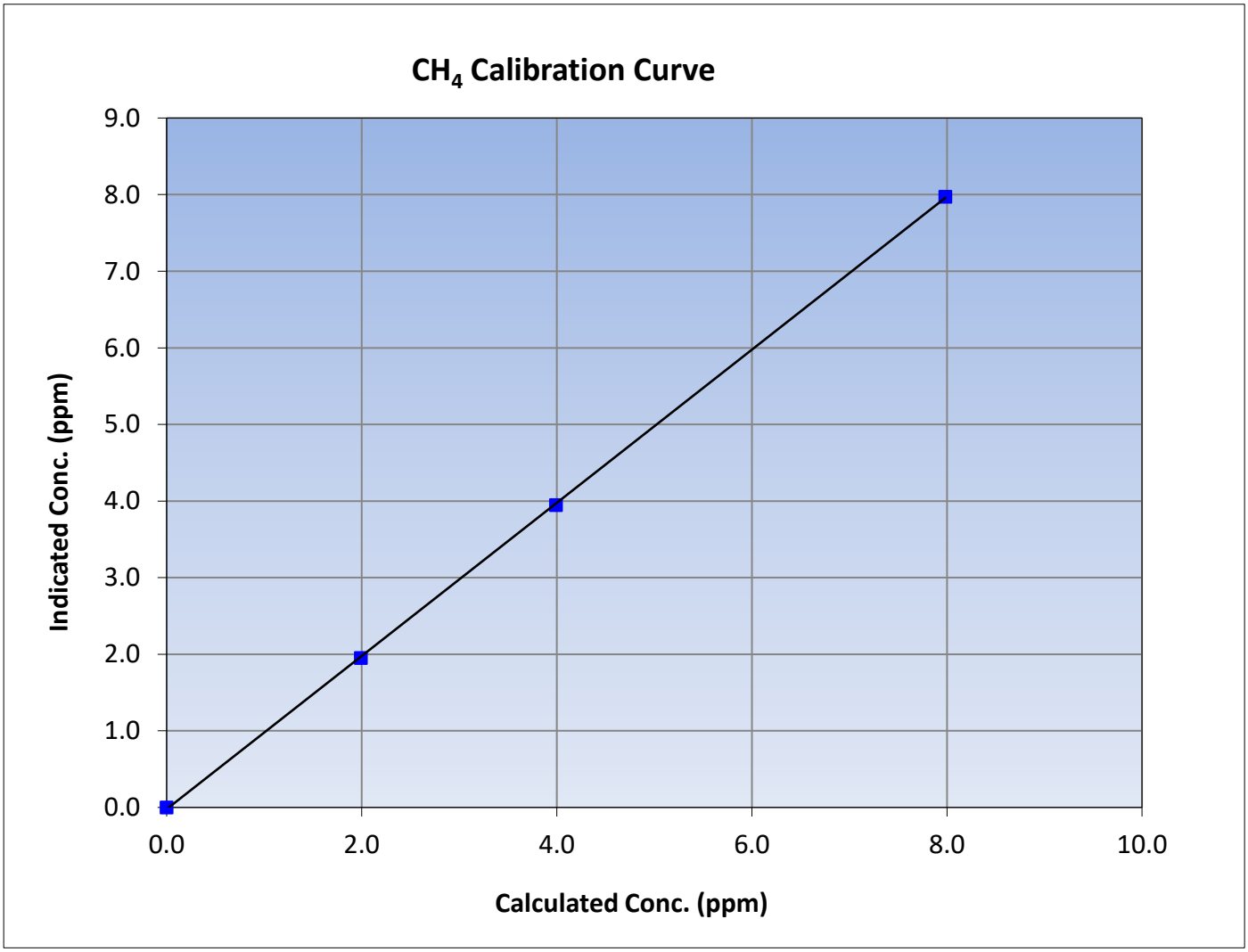
Version-01-2020

Station Information

Calibration Date:	March 10, 2023	Previous Calibration:	February 3, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:58	End Time (MST):	14:03
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050131

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999960	≥0.995
7.98	7.97	1.0014			
3.99	3.95	1.0113	Slope	0.999623	0.90 - 1.10
1.99	1.95	1.0197			
			Intercept	-0.022149	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

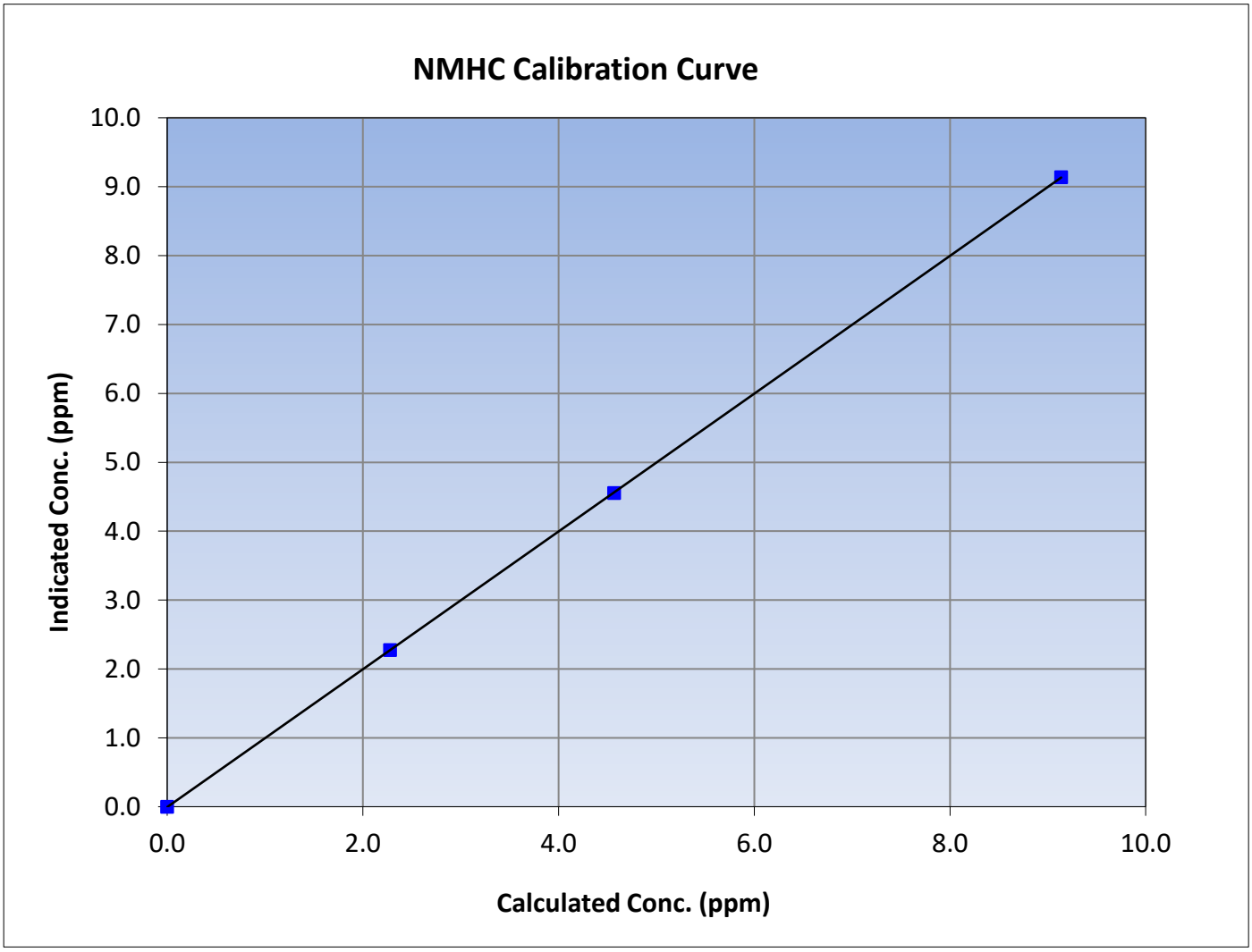
Version-01-2020

Station Information

Calibration Date:	March 10, 2023	Previous Calibration:	February 3, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:58	End Time (MST):	14:03
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050131

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999996	≥0.995
9.14	9.14	0.9997			
4.57	4.55	1.0034	Slope	1.000225	0.90 - 1.10
2.28	2.27	1.0018			
			Intercept	-0.005211	+/-0.5



NMHC Calibration Plot Date: March 10, 2023 Location: Barge Landing

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	March 20, 2023	Last Cal Date:	March 10, 2023
Start time (MST):	8:10	End time (MST):	12:16
Reason:	Maintenance		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1170050131	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.03E-04	2.16E-04	NMHC SP Ratio:	4.30E-05	4.38E-05
CH4 Retention time:	12.6	13.0	NMHC Peak Area:	212383	208794

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	0.02	----
as found span	4919	80.2	17.12	16.55	1.034
as found 2nd point	4960	40.1	8.56	7.90	1.083
as found 3rd point	4980	20.0	4.27	4.08	1.046
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	17.12	17.10	1.001
second point	4960	40.1	8.56	8.49	1.008
third point	4980	20.0	4.27	4.24	1.007
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	17.12	17.08	1.002
				Average Correction Factor	1.005

Baseline Corr AF:	16.53	Prev response	17.09	*% change	-3.4%
Baseline Corr 2nd AF:	7.9	AF Slope:	0.964242	AF Intercept:	-0.081318
Baseline Corr 3rd AF:	4.1	AF Correlation:	0.999323	* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.0	----
as found span	4919	80.2	9.14	9.11	1.003
as found 2nd point	4960	40.1	4.57	4.5	1.006
as found 3rd point	4980	20.0	2.28	2.26	1.008
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	9.14	9.13	1.001
second point	4960	40.1	4.57	4.55	1.004
third point	4980	20	2.28	2.28	0.999
as left zero	5000	0	0.00	0.00	----
as left span	4919	80.2	9.14	9.11	1.003
				Average Correction Factor	1.001
Baseline Corr AF:	9.11	Prev response	9.13	*% change	-0.3%
Baseline Corr 2nd AF:	4.5	AF Slope:	0.997337	AF Intercept:	-0.007421
Baseline Corr 3rd AF:	2.3	AF Correlation:	0.999996	* = > +/-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	0.02	----
as found span	4919	80.2	7.98	7.44	1.073
as found 2nd point	4960	40.1	3.99	3.24	1.232
as found 3rd point	4980	20.0	1.99	1.82	1.094
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	7.98	7.96	1.003
second point	4960	40.1	3.99	3.95	1.010
third point	4980	20.0	1.99	1.96	1.016
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	7.98	7.97	1.002
				Average Correction Factor	1.010
Baseline Corr AF:	7.42	Prev response	7.96	*% change	-7.2%
Baseline Corr 2nd AF:	3.22	AF Slope:	0.924642	AF Intercept:	-0.097893
Baseline Corr 3rd AF:	1.80	AF Correlation:	0.994383	* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999991	0.998949
THC Cal Offset:	-0.027960	-0.021159
CH4 Cal Slope:	0.999623	0.997790
CH4 Cal Offset:	-0.022149	-0.015750
NMHC Cal Slope:	1.000225	0.998962
NMHC Cal Offset:	-0.005211	-0.001412

Notes: CH4 channel dipping. Actuator and pump changed. Zero and Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

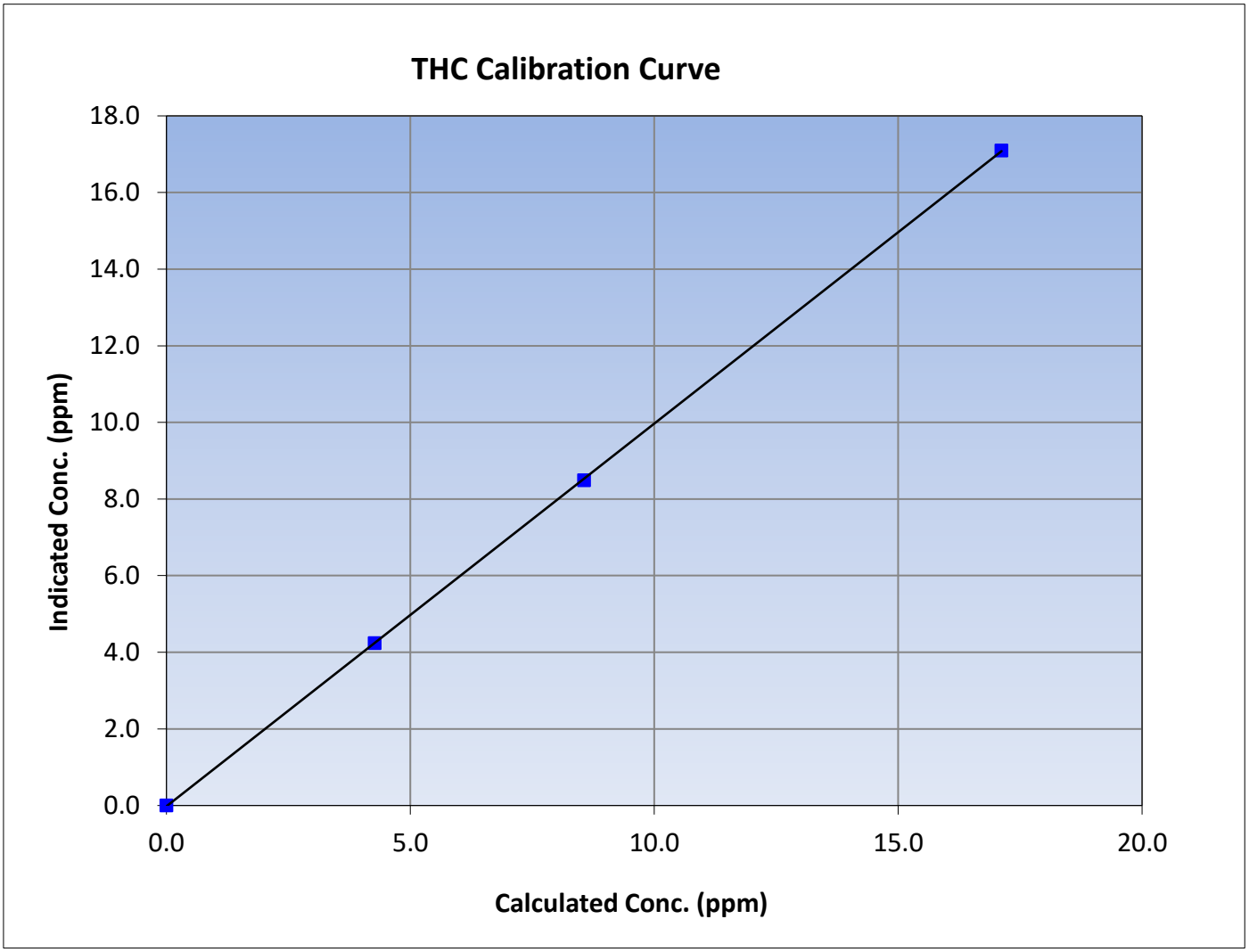
Version-01-2020

Station Information

Calibration Date:	March 20, 2023	Previous Calibration:	March 10, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	8:10	End Time (MST):	12:16
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050131

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999986	*≥0.995*
17.12	17.10	1.0011			
8.56	8.49	1.0080	Slope	0.998949	*0.90 - 1.10*
4.27	4.24	1.0067			
			Intercept	-0.021159	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

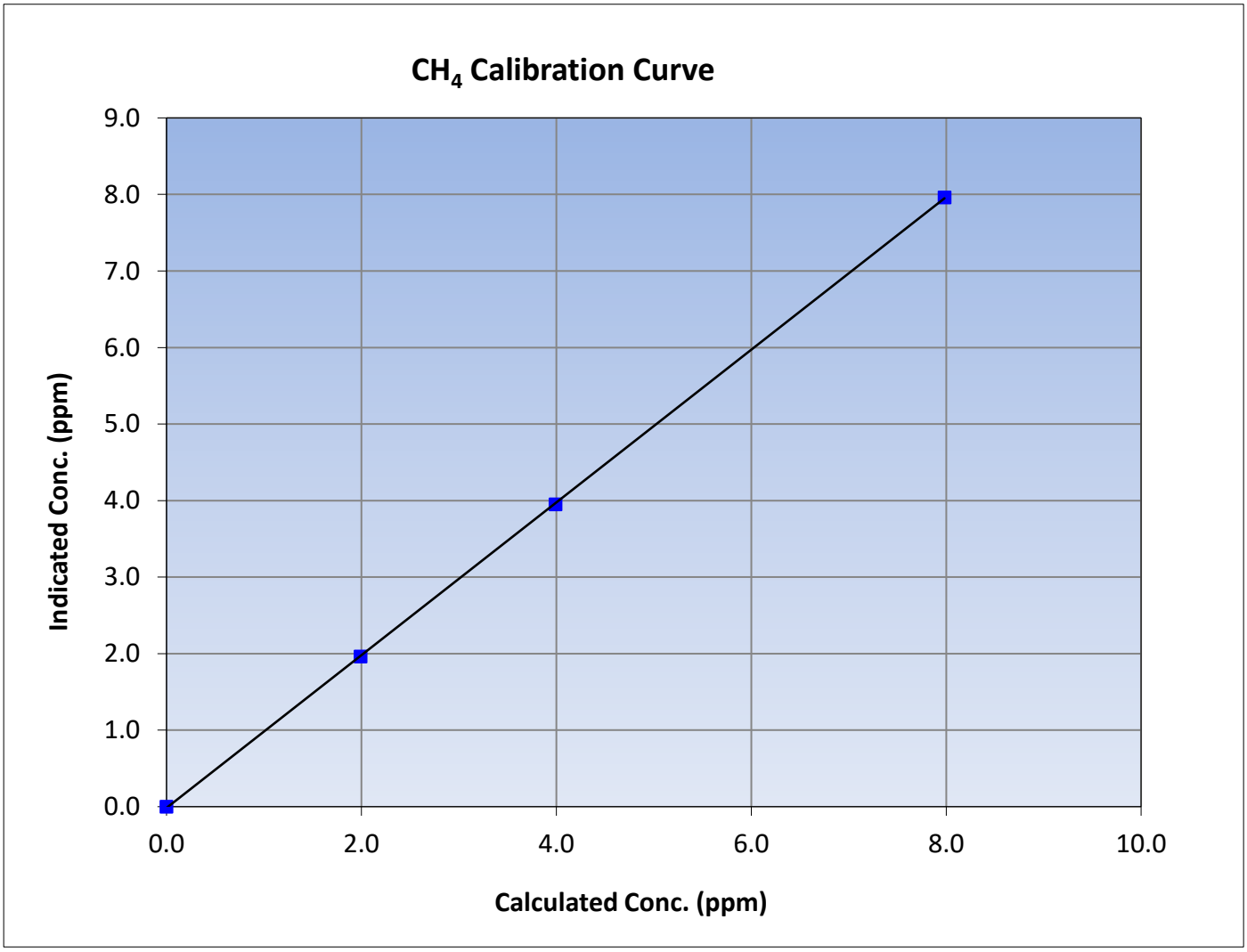
Version-01-2020

Station Information

Calibration Date:	March 20, 2023	Previous Calibration:	March 10, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	8:10	End Time (MST):	12:16
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050131

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*
7.98	7.96	1.0029			
3.99	3.95	1.0103	Slope	0.997790	*0.90 - 1.10*
1.99	1.96	1.0155			
			Intercept	-0.015750	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

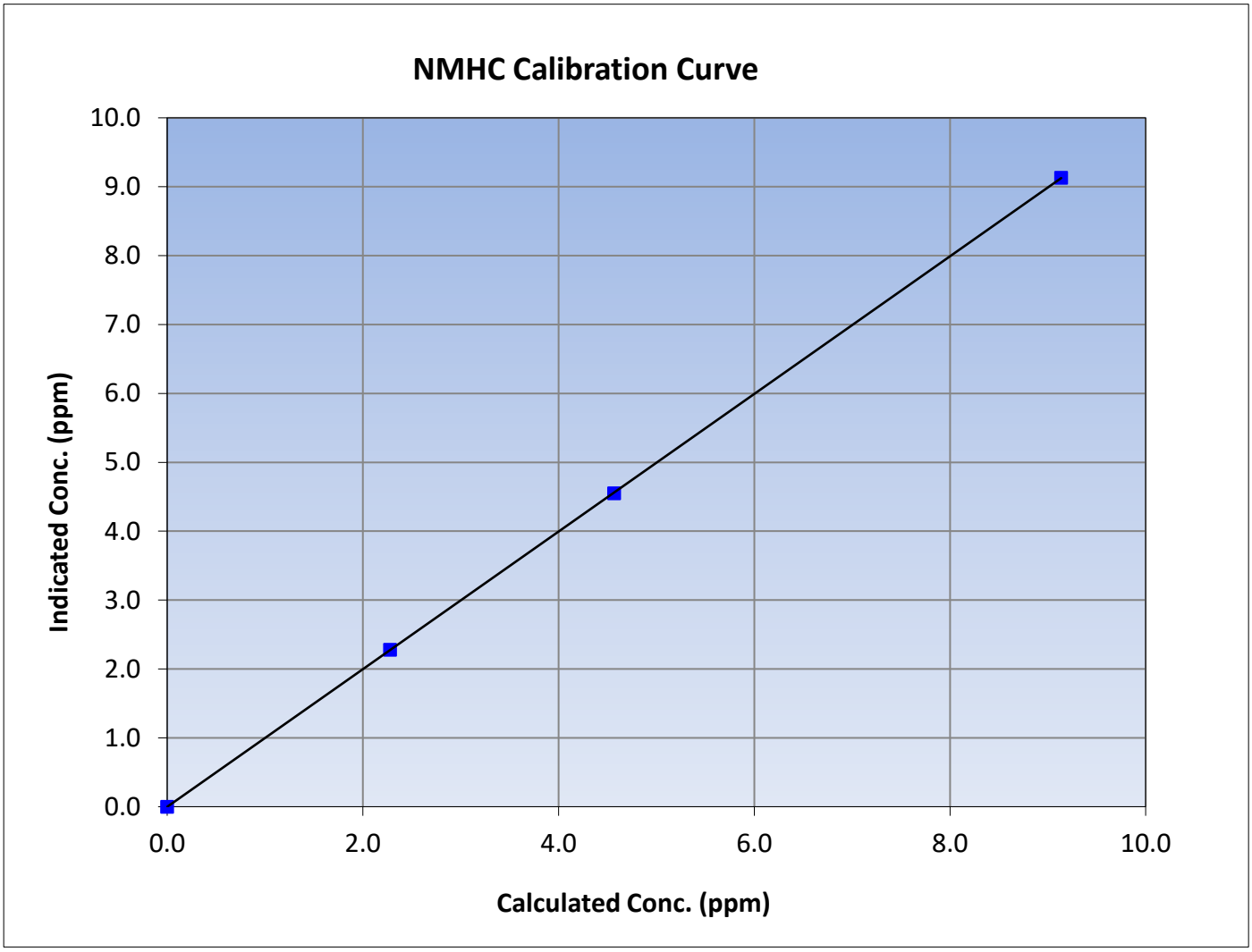
Version-01-2020

Station Information

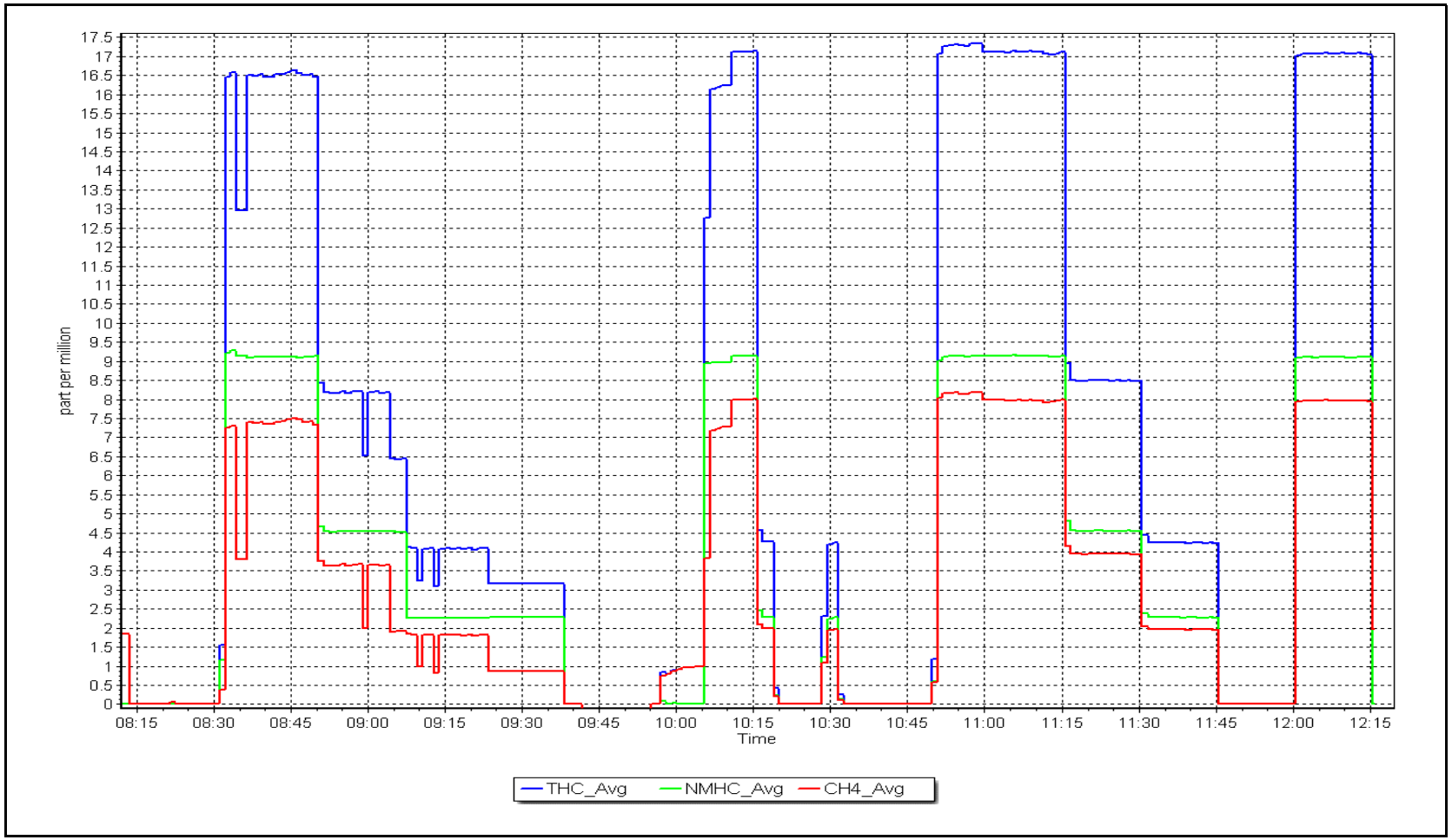
Calibration Date:	March 20, 2023	Previous Calibration:	March 10, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	8:10	End Time (MST):	12:16
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050131

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999996	*≥0.995*
9.14	9.13	1.0007			
4.57	4.55	1.0038	Slope	0.998962	*0.90 - 1.10*
2.28	2.28	0.9992			
			Intercept	-0.001412	*+/-0.5*



NMHC Calibration Plot Date: March 20, 2023 Location: Barge Landing



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	March 28, 2023	Last Cal Date:	March 20, 2023
Start time (MST):	10:37	End time (MST):	16:45
Reason:	Install		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1193585649	
THC Range (ppm):	0 - 100 ppm				
NMHC Range (ppm):	0 - 50 ppm		CH4 Range (ppm):	0 - 50 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:		2.49E-04	NMHC SP Ratio:		4.79E-05
CH4 Retention time:		15.2	NMHC Peak Area:		190949

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	17.12	17.09	1.002
second point	4960	40.1	8.56	8.52	1.004
third point	4980	20.0	4.27	4.28	0.998
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	17.12	17.10	1.001
				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-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	9.14	9.13	1.001
second point	4960	40.1	4.57	4.56	1.002
third point	4980	20	2.28	2.30	0.993
as left zero	5000	0	0.00	0.00	----
as left span	4919	80.2	9.14	9.13	1.001
				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	4919	80.2	7.98	7.96	1.003
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	7.98	1.001
				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:		0.997787
THC Cal Offset:		0.002047
CH4 Cal Slope:		0.996643
CH4 Cal Offset:		-0.003745
NMHC Cal Slope:		0.998523
NMHC Cal Offset:		0.006592

Notes: Replaced after a failed nightly span, the baseline also drifted to around 1 ppm THC. Adjusted window timings and span, used new zero chromatogram.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

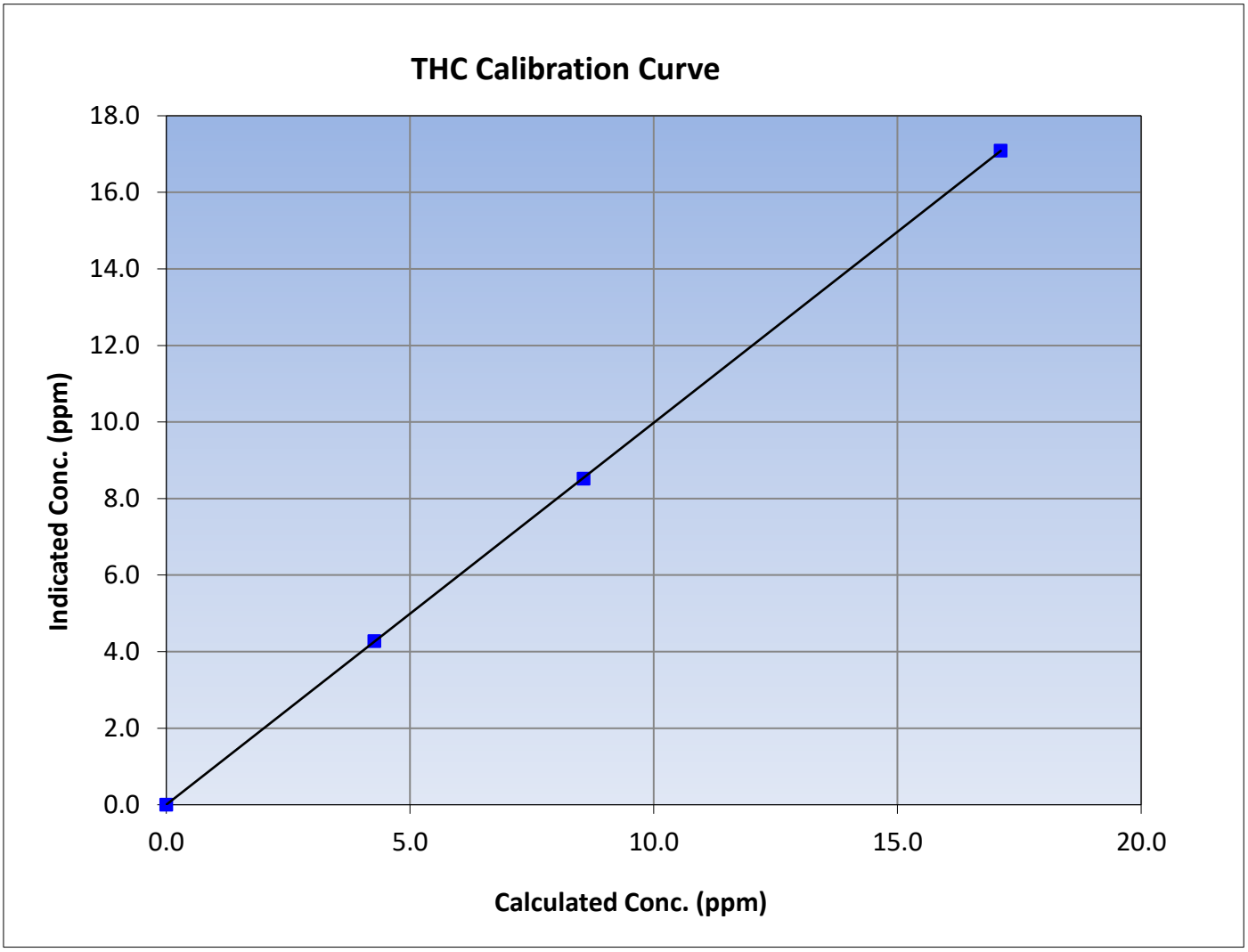
Version-01-2020

Station Information

Calibration Date:	March 28, 2023	Previous Calibration:	March 20, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:37	End Time (MST):	16:45
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	0.999995	*≥0.995*
17.12	17.09	1.0017			
8.56	8.52	1.0045	Slope	0.997787	*0.90 - 1.10*
4.27	4.28	0.9978			
			Intercept	0.002047	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

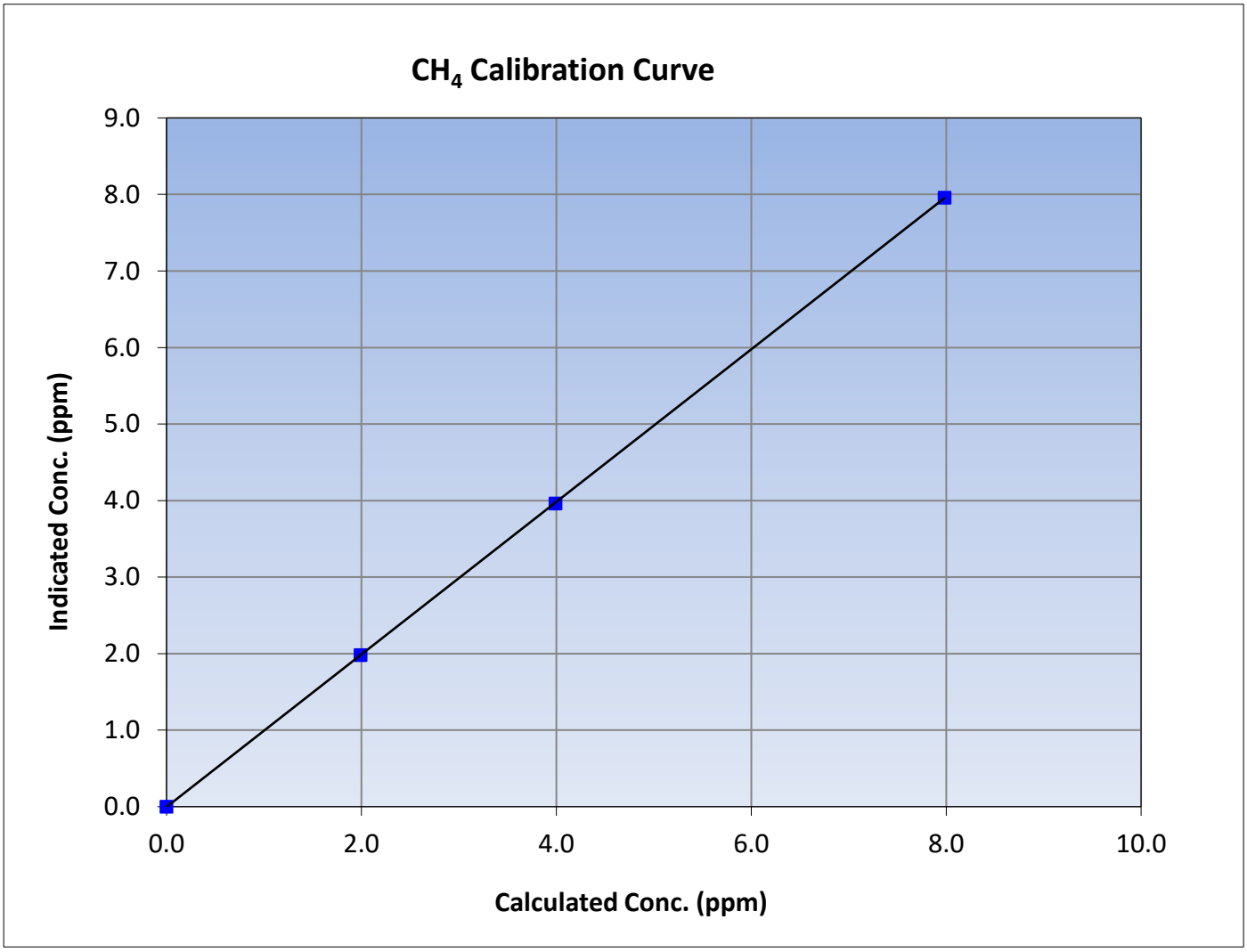
Version-01-2020

Station Information

Calibration Date:	March 28, 2023	Previous Calibration:	March 20, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:37	End Time (MST):	16:45
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	0.999996	≥0.995
7.98	7.96	1.0032			
3.99	3.96	1.0070	Slope	0.996643	0.90 - 1.10
1.99	1.98	1.0042			
			Intercept	-0.003745	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

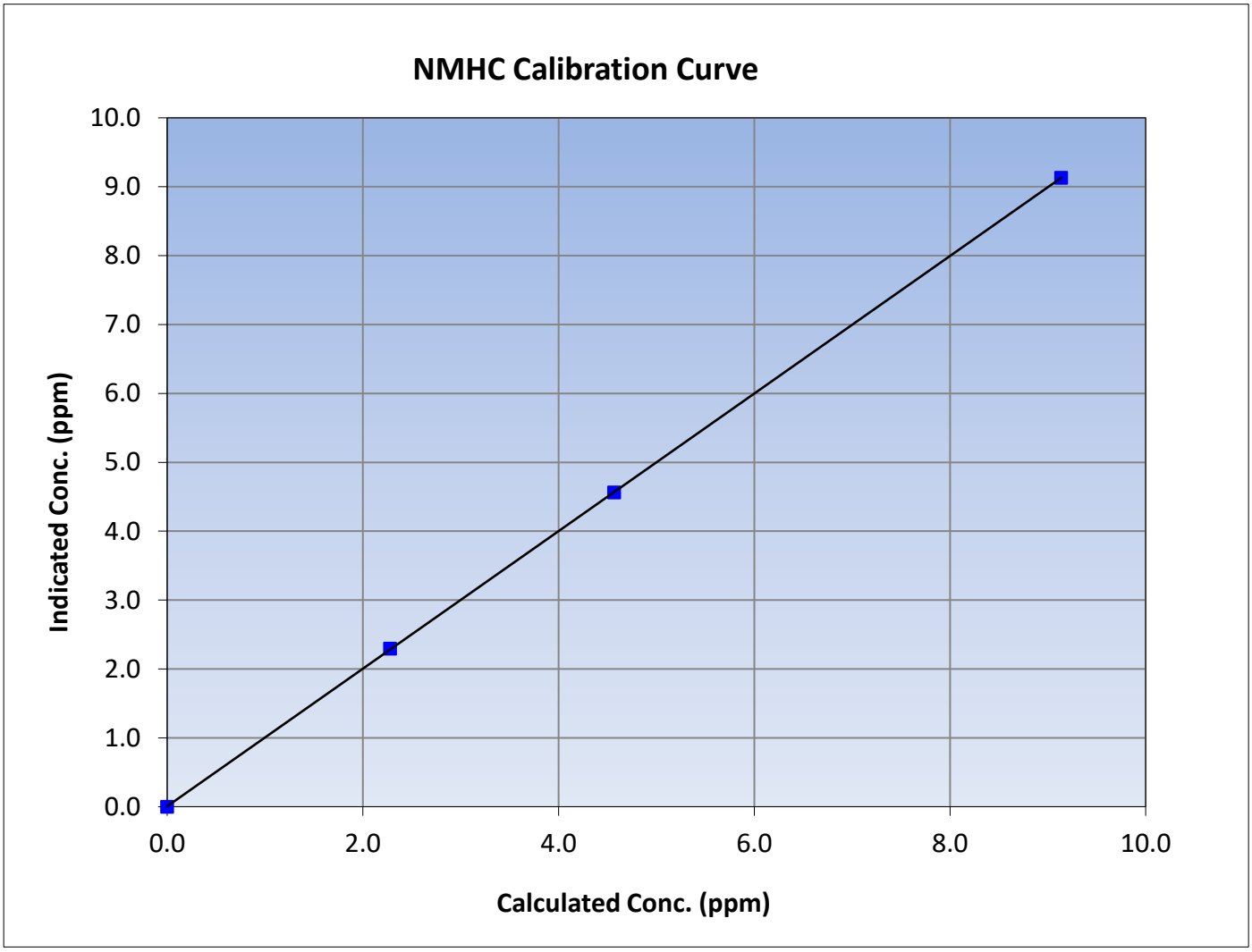
Version-01-2020

Station Information

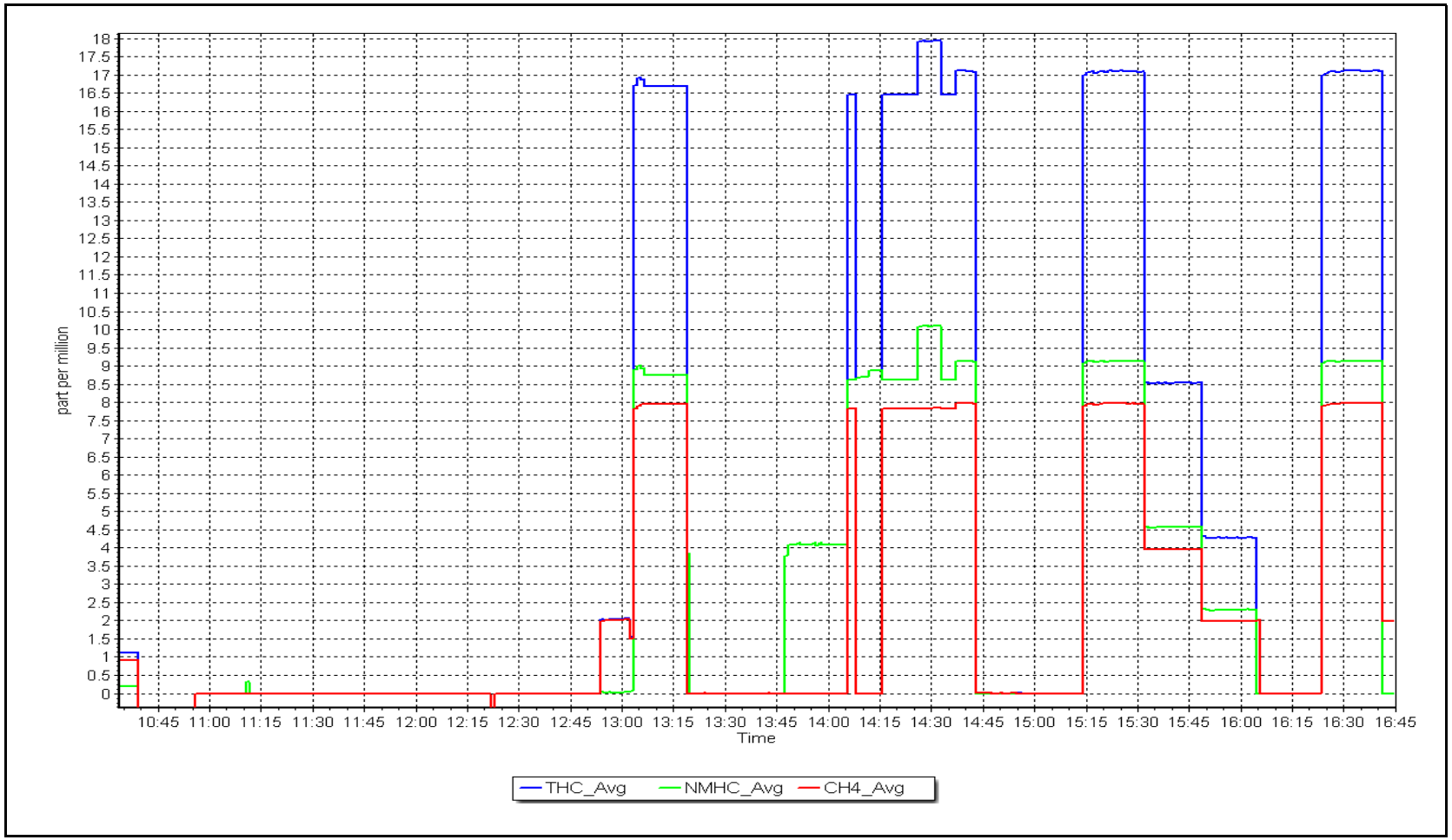
Calibration Date:	March 28, 2023	Previous Calibration:	March 20, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:37	End Time (MST):	16:45
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999994	*≥0.995*
9.14	9.13	1.0007			
4.57	4.56	1.0016	Slope	0.998523	*0.90 - 1.10*
2.28	2.30	0.9926			
			Intercept	0.006592	*+/-0.5*



NMHC Calibration Plot Date: March 28, 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:	March 15, 2023	Last Cal Date:	February 22, 2023
Start time (MST):	9:45	End time (MST):	15:12
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:	1.146	1.175	NO bkgnd or offset:	10.3	10.5
NOX coeff or slope:	0.996	0.995	NOX bkgnd or offset:	10.3	10.6
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	179.2	175.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.998455	0.998241
NO_X Cal Offset:	0.648644	0.748819
NO Cal Slope:	1.000928	1.000056
NO Cal Offset:	-0.732611	-0.352413
NO_2 Cal Slope:	1.000063	1.001921
NO_2 Cal Offset:	-1.156786	-0.892005

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	4919	80.5	805.1	800.3	4.8	787.0	781.9	5.1	1.023	1.023
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
high point	4919	80.5	805.1	800.3	4.8	804.0	800.0	3.4	1.001	1.000
second point	4959	40.2	402.1	399.7	2.4	402.7	399.6	3.1	0.998	1.000
third point	4979	20.1	201.0	199.8	1.2	201.9	198.7	3.2	0.996	1.006
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
as left span	4919	80.5	805.1	450.4	354.7	799.3	445.0	354.3	1.007	1.012
								Average Correction Factor	0.998	1.002

Corrected As found	NO_X = 787.1 ppb	NO = 782.0 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-2.2%
Previous Response	NO_X = 804.5 ppb	NO = 800.3 ppb		*Percent Change	NO =	-2.3%
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)	794.5	444.6	354.7	354.9	1.000	100.0%
2nd GPT point (200 ppb O3)	794.5	664.2	135.1	133.8	1.010	99.0%
3rd GPT point (100 ppb O3)	794.5	728.8	70.5	69.2	1.019	98.1%
				Average Correction Factor	1.010	99.1%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

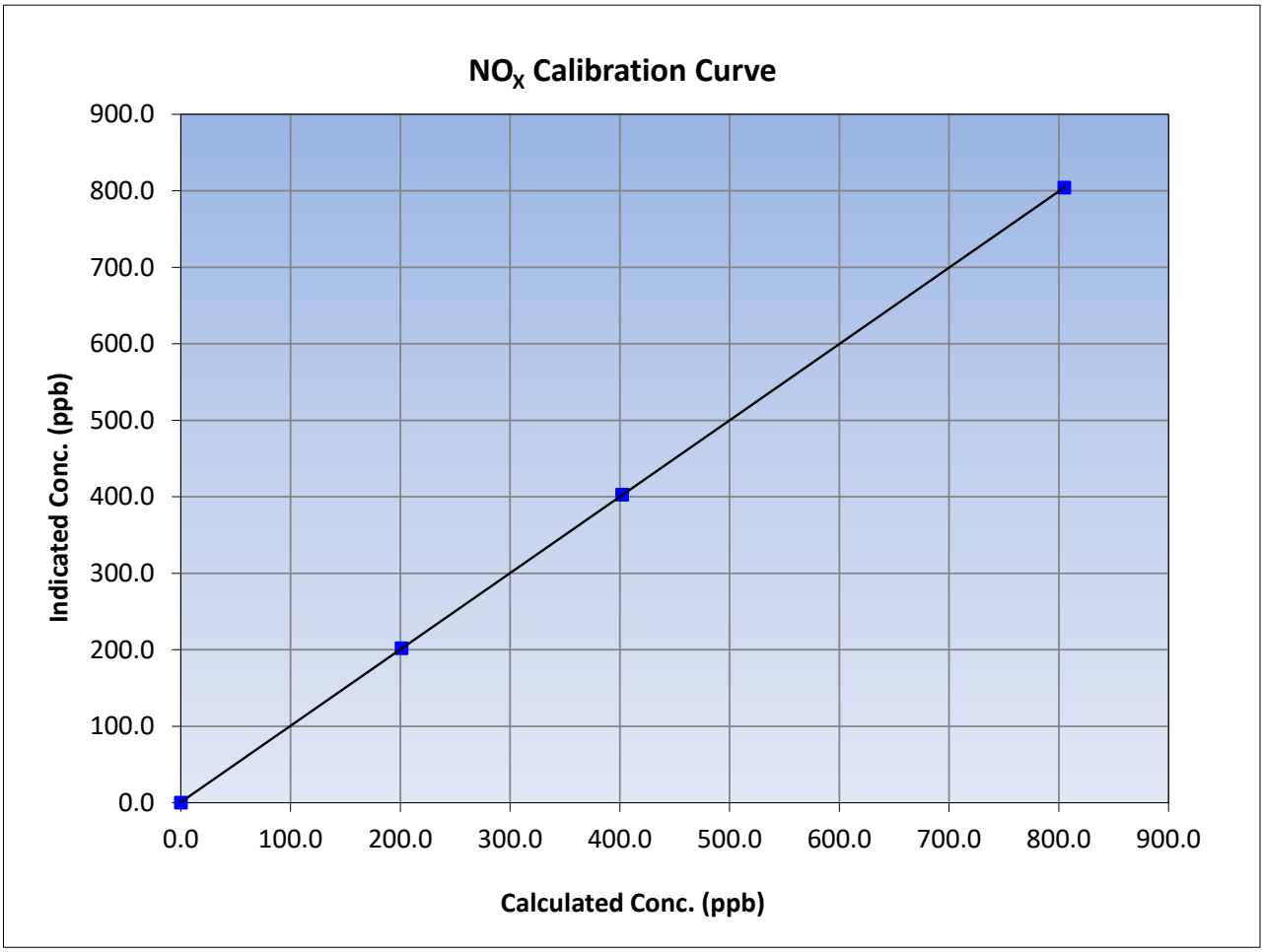
Version-04-2020

Station Information

Calibration Date:	March 15, 2023	Previous Calibration:	February 22, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:45	End Time (MST):	15:12
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	0.999997	≥0.995
805.1	804.0	1.0013			
402.1	402.7	0.9984	Slope	0.998241	0.90 - 1.10
201.0	201.9	0.9957			
			Intercept	0.748819	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

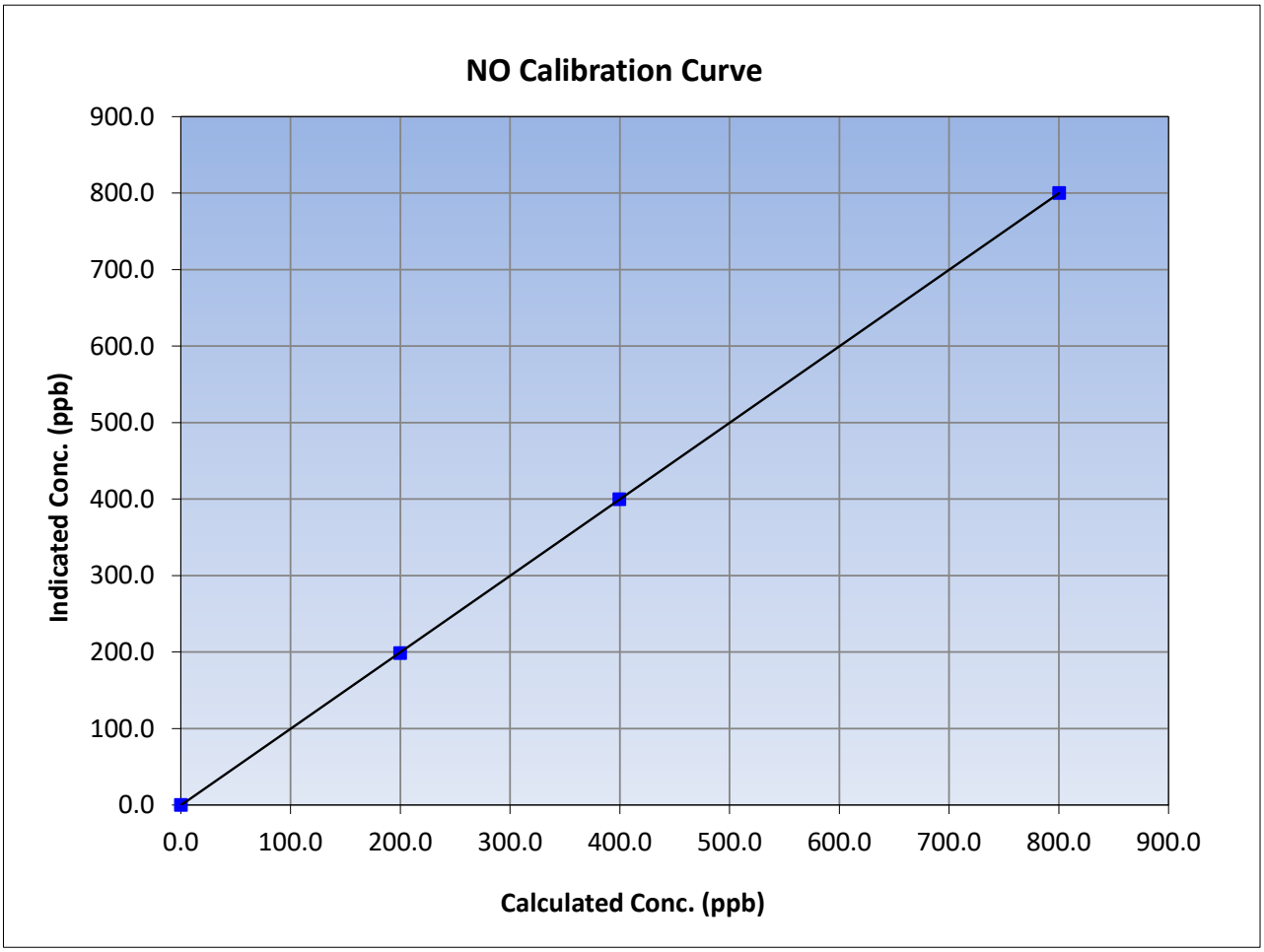
Version-04-2020

Station Information

Calibration Date:	March 15, 2023	Previous Calibration:	February 22, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:45	End Time (MST):	15:12
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	0.999997	≥0.995
800.3	800.0	1.0003			
399.7	399.6	1.0001	Slope	1.000056	0.90 - 1.10
199.8	198.7	1.0057			
			Intercept	-0.352413	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

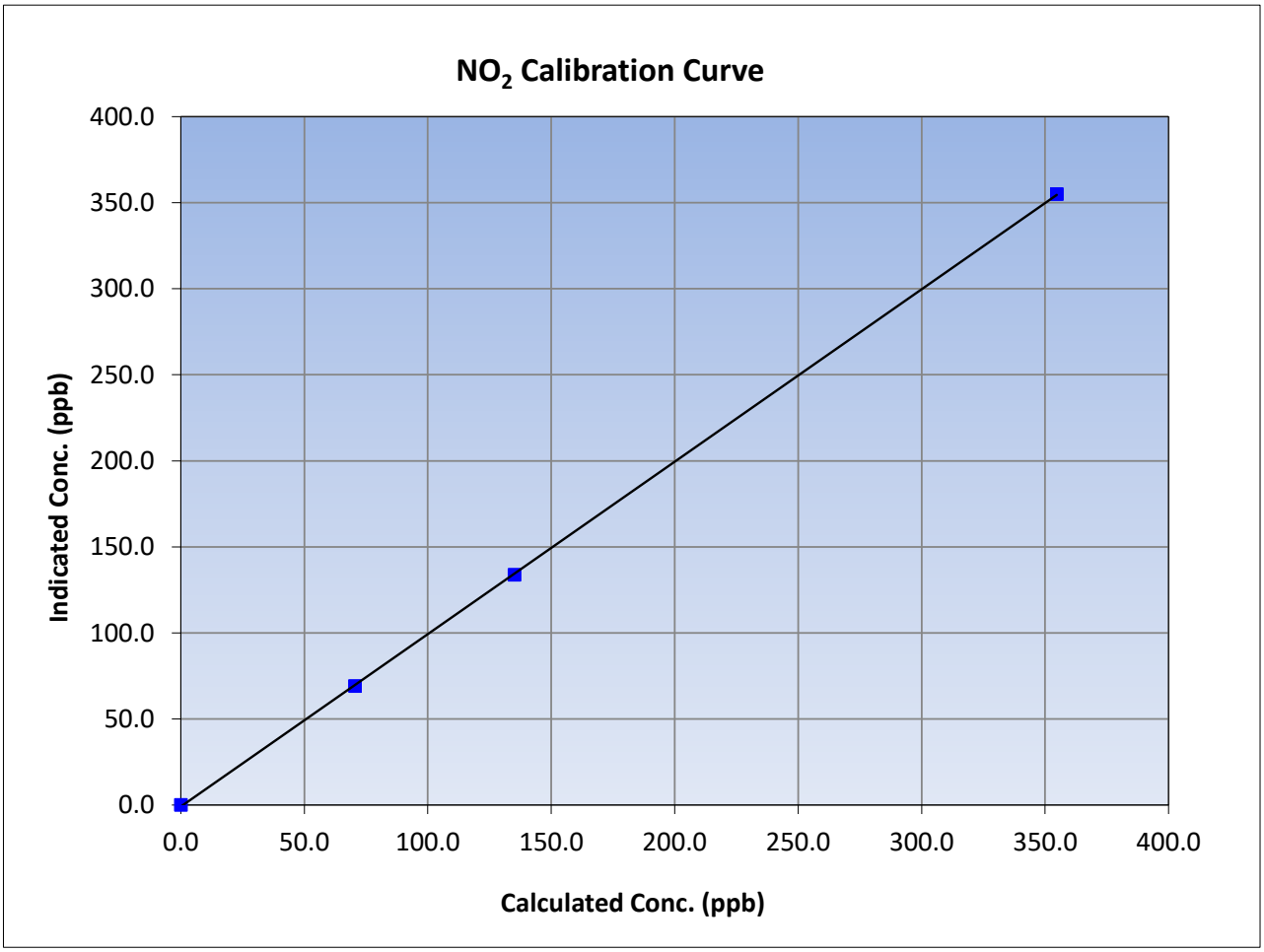
Version-04-2020

Station Information

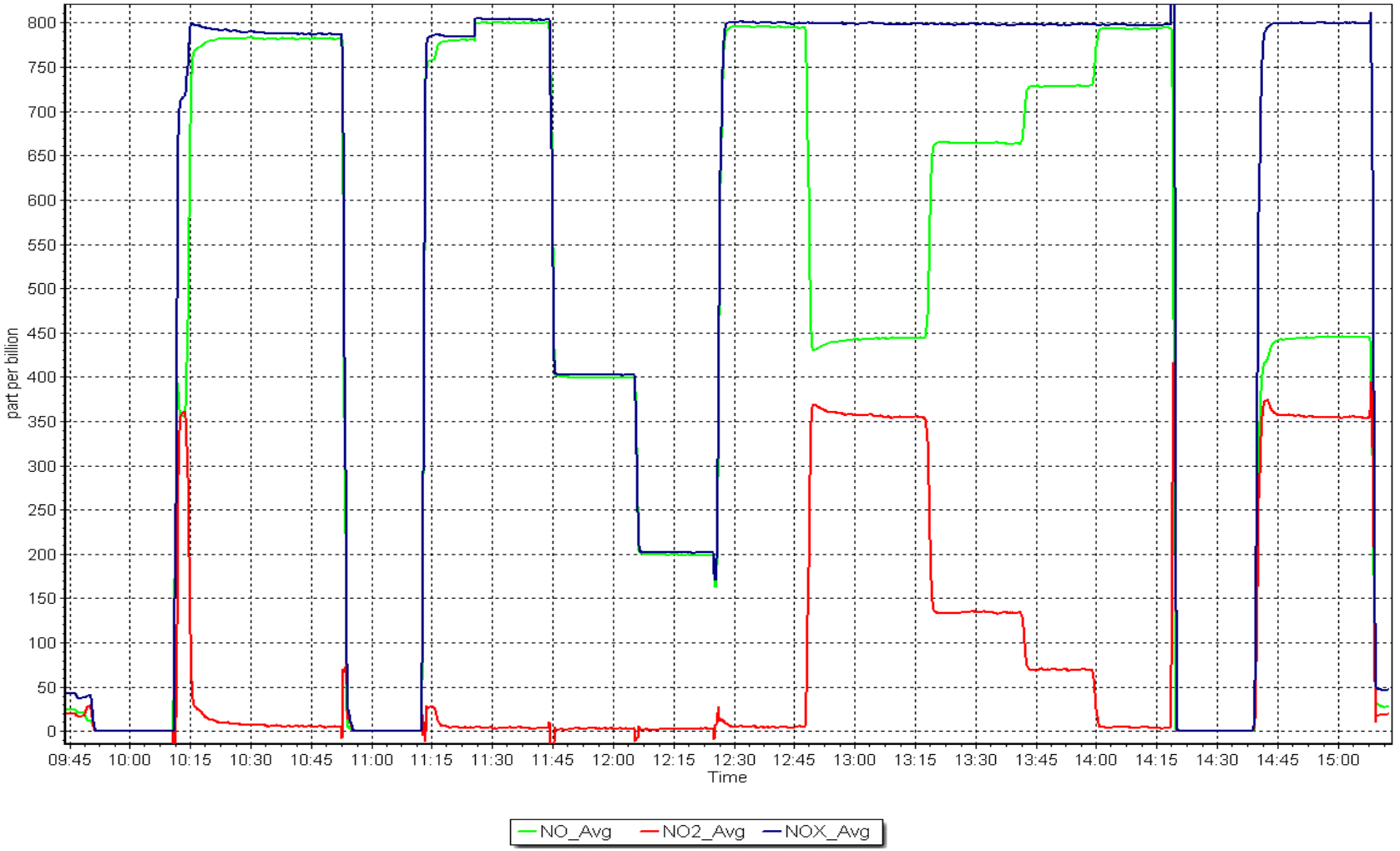
Calibration Date:	March 15, 2023	Previous Calibration:	February 22, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:45	End Time (MST):	15:12
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999975	≥0.995
354.7	354.9	0.9995			
135.1	133.8	1.0099	Slope	1.001921	0.90 - 1.10
70.5	69.2	1.0192			
			Intercept	-0.892005	+/-20



NO_X Calibration Plot Date: March 15, 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:	March 23, 2023	Last Cal Date:	February 28, 2023
Start time (MST):	12:14	End time (MST):	12:44
Analyzer Make:	API T640	S/N:	321
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)	0.0	-0.66	0.0	☐	+/- 2 °C
P (mmHg)	727.6	729.67	727.6	☐	+/- 10 mmHg
flow (LPM)	5.02	5.032	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: March 23, 2023 Last Cal Date: February 28, 2023

PM w/o HEPA: 5.7 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

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

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

Disposable Filter Changed: February 28, 2023

Annual Maintenance

Date Sample Tube Cleaned: November 15, 2022

Date RH/T Sensor Cleaned: November 15, 2022

Notes: No adjustments made. Leak check passed.

Calibration by: Braiden Boutilier

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS11
LOWER CAMP
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Lower Camp	Station number:	AMS11
Calibration Date:	March 7, 2023	Last Cal Date:	February 7, 2023
Start time (MST):	10:53	End time (MST):	14:06
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:	0.992304	0.995374	Backgd or Offset:	14.3	14.0
Calibration intercept:	-0.508143	-0.208611	Coeff or Slope:	1.051	1.051

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	800.8	798.2	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	800.8	797.6	1.004
second point	4959	40.7	400.9	397.2	1.009
third point	4980	20.3	199.9	199.1	1.004
as left zero	5000	0.0	0.0	0.4	----
as left span	4919	81.3	800.8	798.1	1.003
				Average Correction Factor	1.006

Baseline Corr As found:	798.20	Previous response	794.09	*% 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

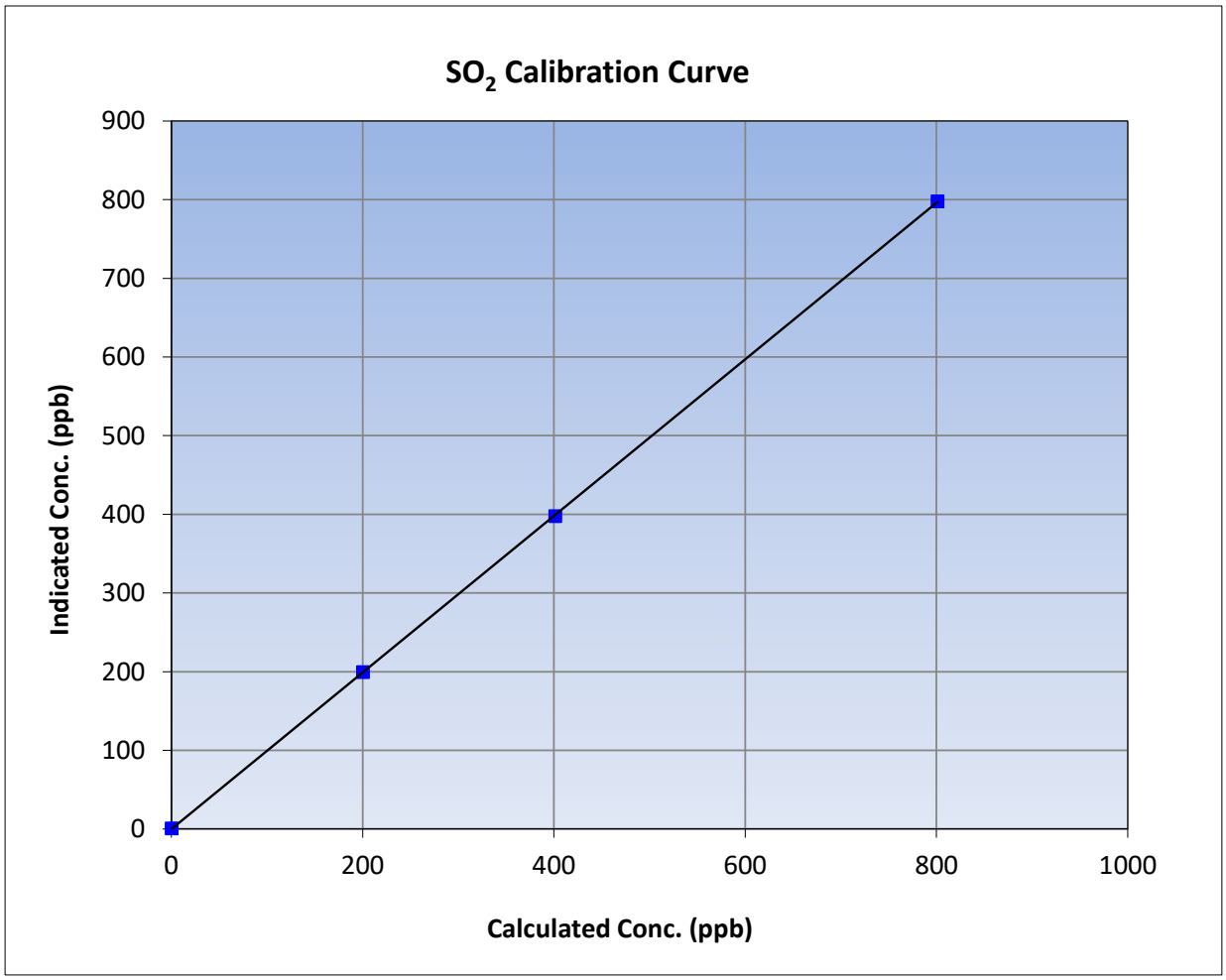
Station Information

Calibration Date:	March 7, 2023	Previous Calibration:	February 7, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:53	End Time (MST):	14:06
Analyzer make:	Thermo 43i	Analyzer serial #:	100841398

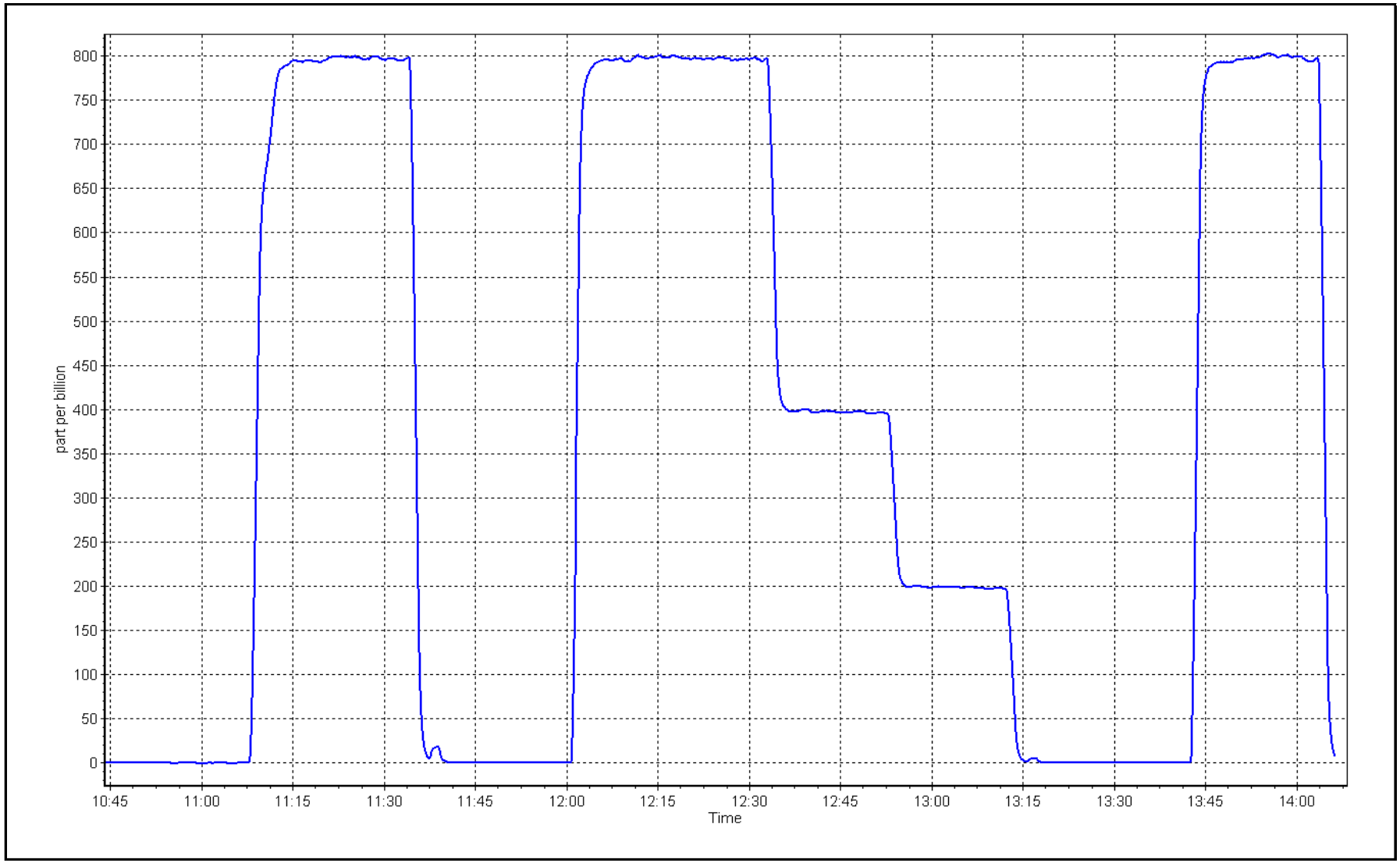
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
800.8	797.6	1.0040
400.9	397.2	1.0094
199.9	199.1	1.0042

Statistical Evaluation		Limits
Correlation Coefficient	0.999989	≥0.995
Slope	0.995374	0.90 - 1.10
Intercept	-0.208611	+/-30



SO2 Calibration Plot Date: March 7, 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:	March 28, 2023	Last Cal Date:	February 8, 2023
Start time (MST):	9:47	End time (MST):	16:03
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:	0.997193	1.026375	Backgd or Offset:	14.0	13.9
Calibration intercept:	0.454865	0.532956	Coeff or Slope:	1.043	1.043

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.4	----
as found span	4926	73.6	79.9	79.2	1.014
as found 2nd point	4963	36.8	40.0	40.3	1.001
as found 3rd point	4982	18.6	20.2	20.1	1.025
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	0.4	----
high point	4926	73.6	79.9	82.4	0.970
second point	4963	36.8	40.0	41.9	0.954
third point	4982	18.6	20.2	21.2	0.953
as left zero	5000	0.0	0.0	1.7	----
as left span	4926	73.6	79.9	80.2	0.997
SO2 Scrubber Check	4919	81.1	811.0	1.7	----
Date of last scrubber change:				Ave Corr Factor	0.959
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.8	Prev response:	80.15	*% change:	-1.7%
Baseline Corr 2nd AF pt:	39.9	AF Slope:	0.987574	AF Intercept:	0.416680
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999922		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

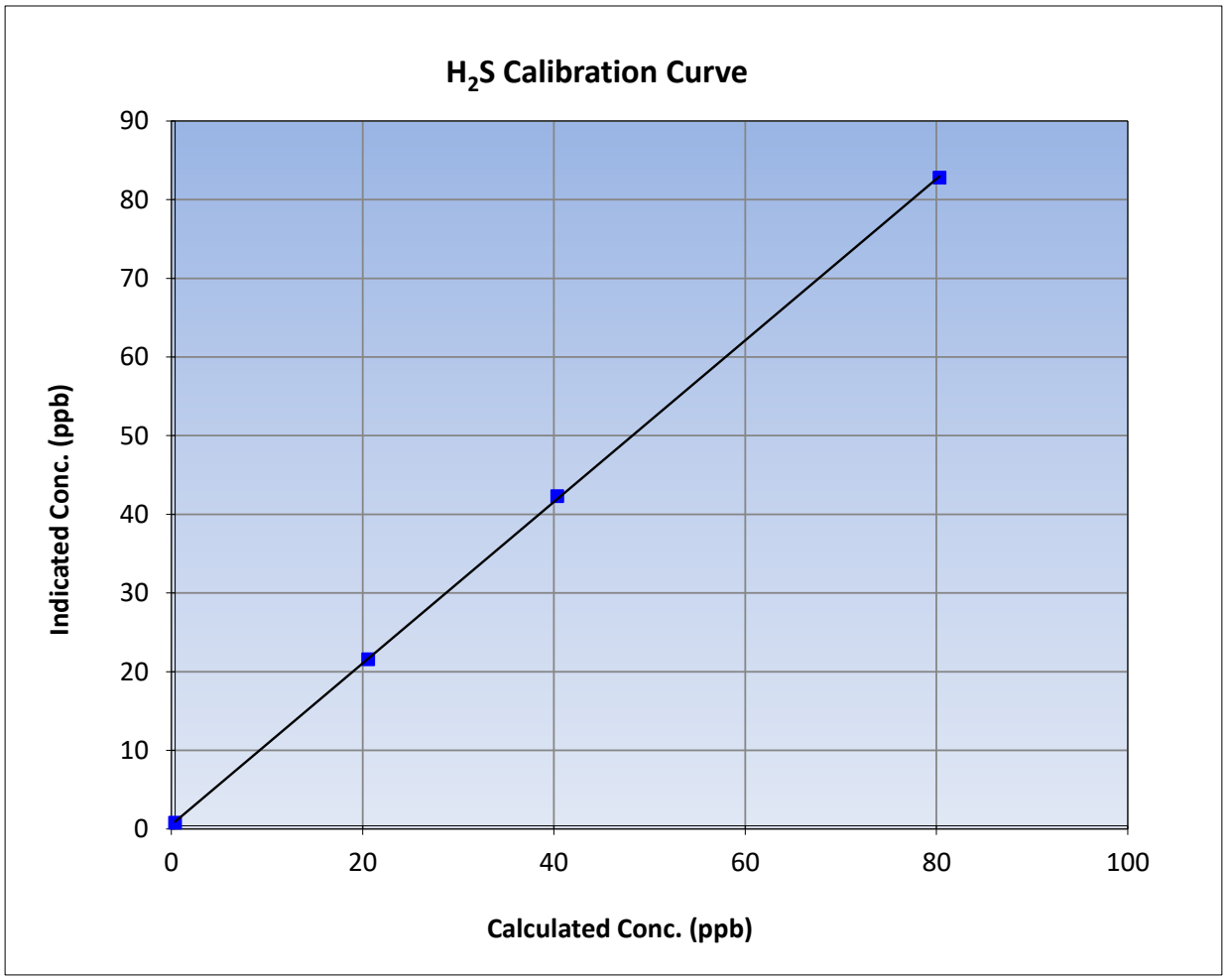
Station Information

Calibration Date:	March 28, 2023	Previous Calibration:	February 8, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:47	End Time (MST):	16:03
Analyzer make:	Thermo 450iQ	Analyzer serial #:	CM20080003

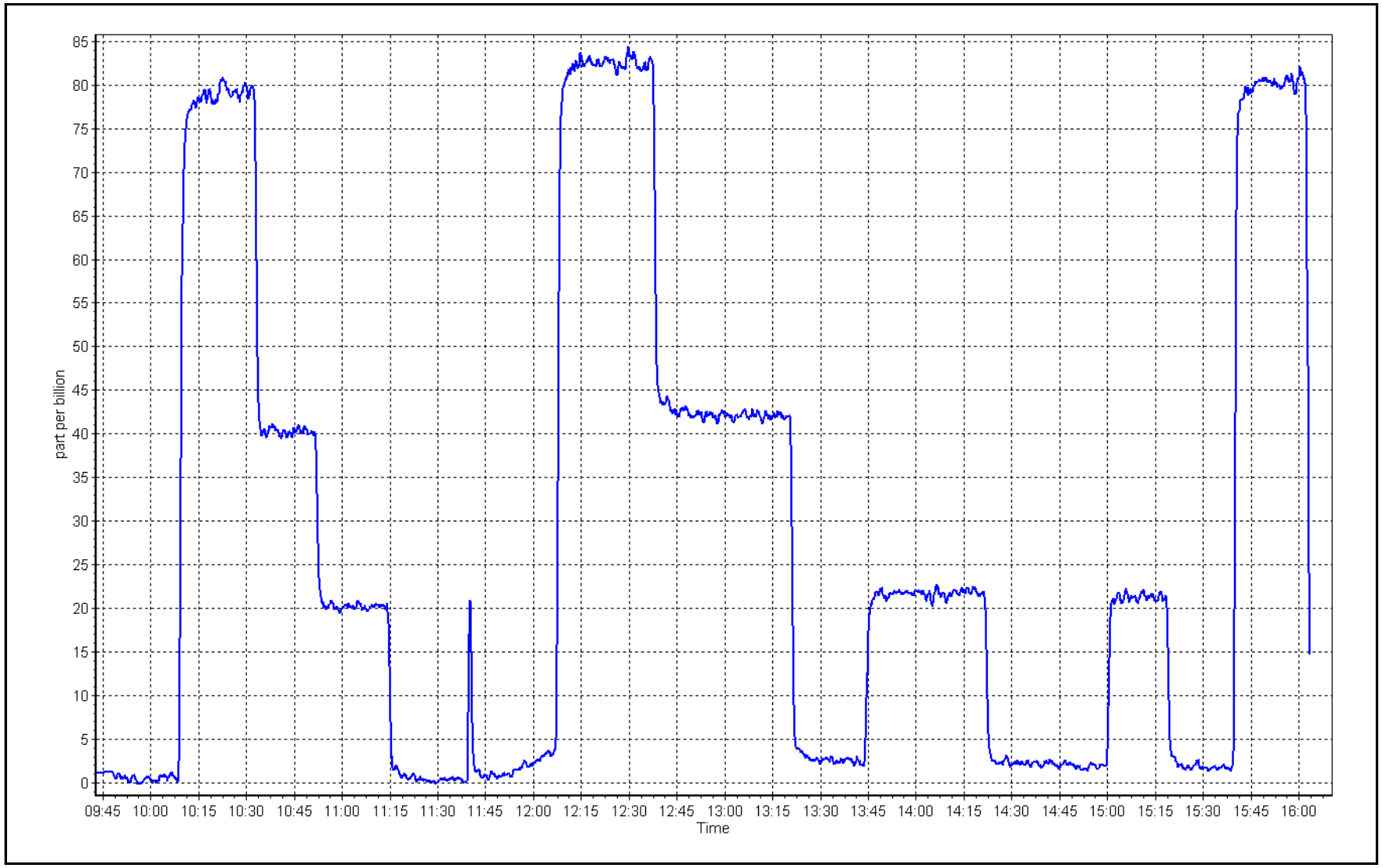
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
79.9	82.4	0.9699
40.0	41.9	0.9537
20.2	21.2	0.9525

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999953	*≥0.995*
Slope	1.026375	*0.90 - 1.10*
Intercept	0.532956	*+/-3*



H_2S Calibration Plot Date: March 28, 2023 Location: Lower Camp



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Lower Camp	Station number:	AMS11
Calibration Date:	March 7, 2023	Last Cal Date:	February 7, 2023
Start time (MST):	10:53	End time (MST):	14:06
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1505164381	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.09E-04	3.02E-04	NMHC SP Ratio:	5.97E-05	5.86E-05
CH4 Retention time:	14.0	13.8	NMHC Peak Area:	153551	156599

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	17.71	0.980
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.3	17.35	17.32	1.002
second point	4959	40.7	8.69	8.62	1.008
third point	4980	20.3	4.33	4.30	1.007
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	17.35	17.42	0.996
				Average Correction Factor	1.006

Baseline Corr AF:	17.71	Prev response	17.41	*% change	1.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	9.19	9.35	0.983
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.3	9.19	9.16	1.004
second point	4959	40.7	4.60	4.56	1.010
third point	4980	20.3	2.29	2.28	1.008
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	9.19	9.22	0.997
				Average Correction Factor	1.007
Baseline Corr AF:	9.35	Prev response	9.19	*% change	1.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	8.16	8.37	0.975
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.3	8.16	8.16	1.000
second point	4959	40.7	4.09	4.06	1.007
third point	4980	20.3	2.04	2.03	1.006
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	8.16	8.20	0.995
				Average Correction Factor	1.004
Baseline Corr AF:	8.37	Prev response	8.22	*% change	1.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.004951	0.998030
THC Cal Offset:	-0.022988	-0.019190
CH4 Cal Slope:	1.008833	1.000126
CH4 Cal Offset:	-0.014688	-0.010089
NMHC Cal Slope:	1.001278	0.996404
NMHC Cal Offset:	-0.007900	-0.009301

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

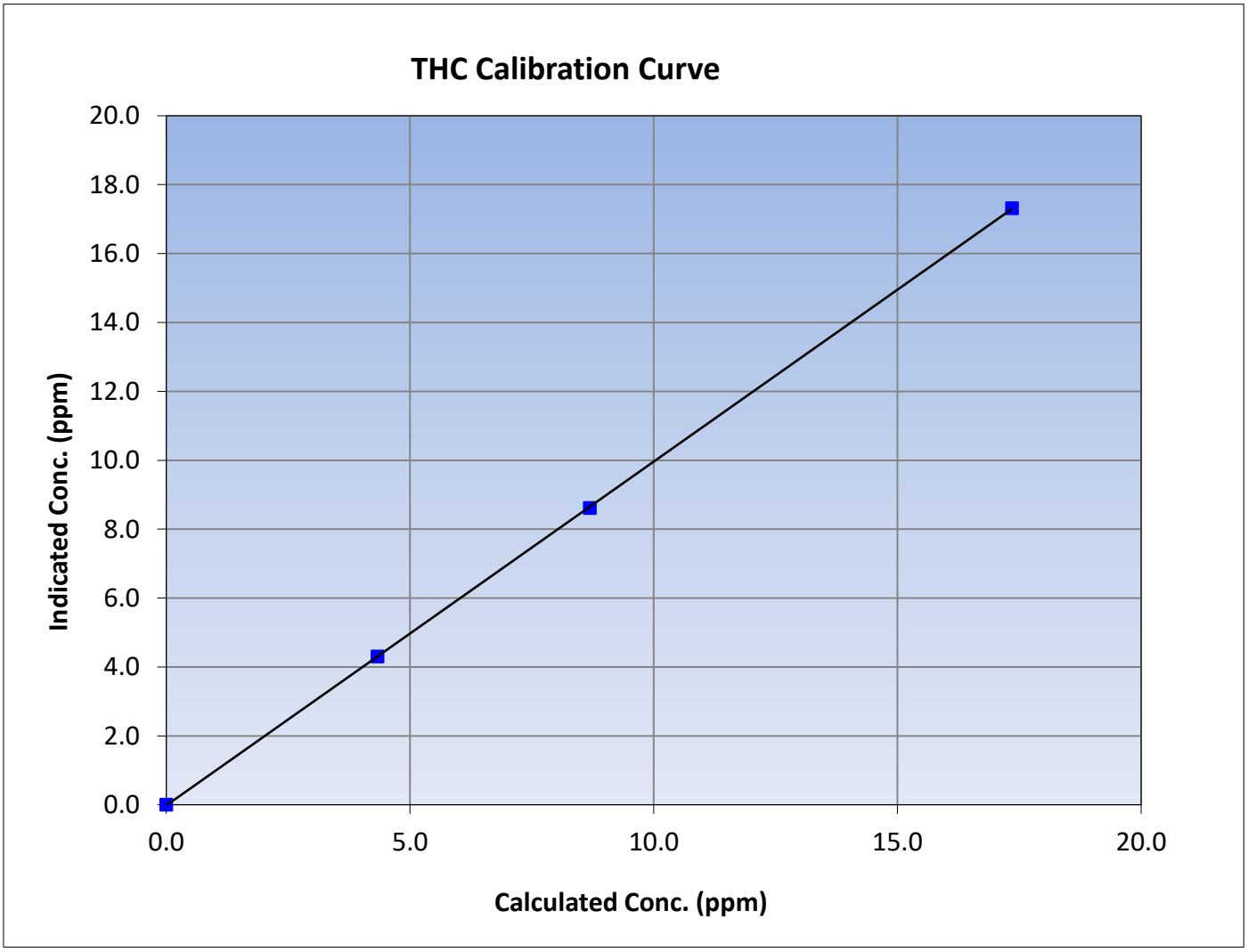
Version-01-2020

Station Information

Calibration Date:	March 7, 2023	Previous Calibration:	February 7, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:53	End Time (MST):	14:06
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	0.999988	≥0.995
17.35	17.32	1.0020			
8.69	8.62	1.0082	Slope	0.998030	0.90 - 1.10
4.33	4.30	1.0070			
			Intercept	-0.019190	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

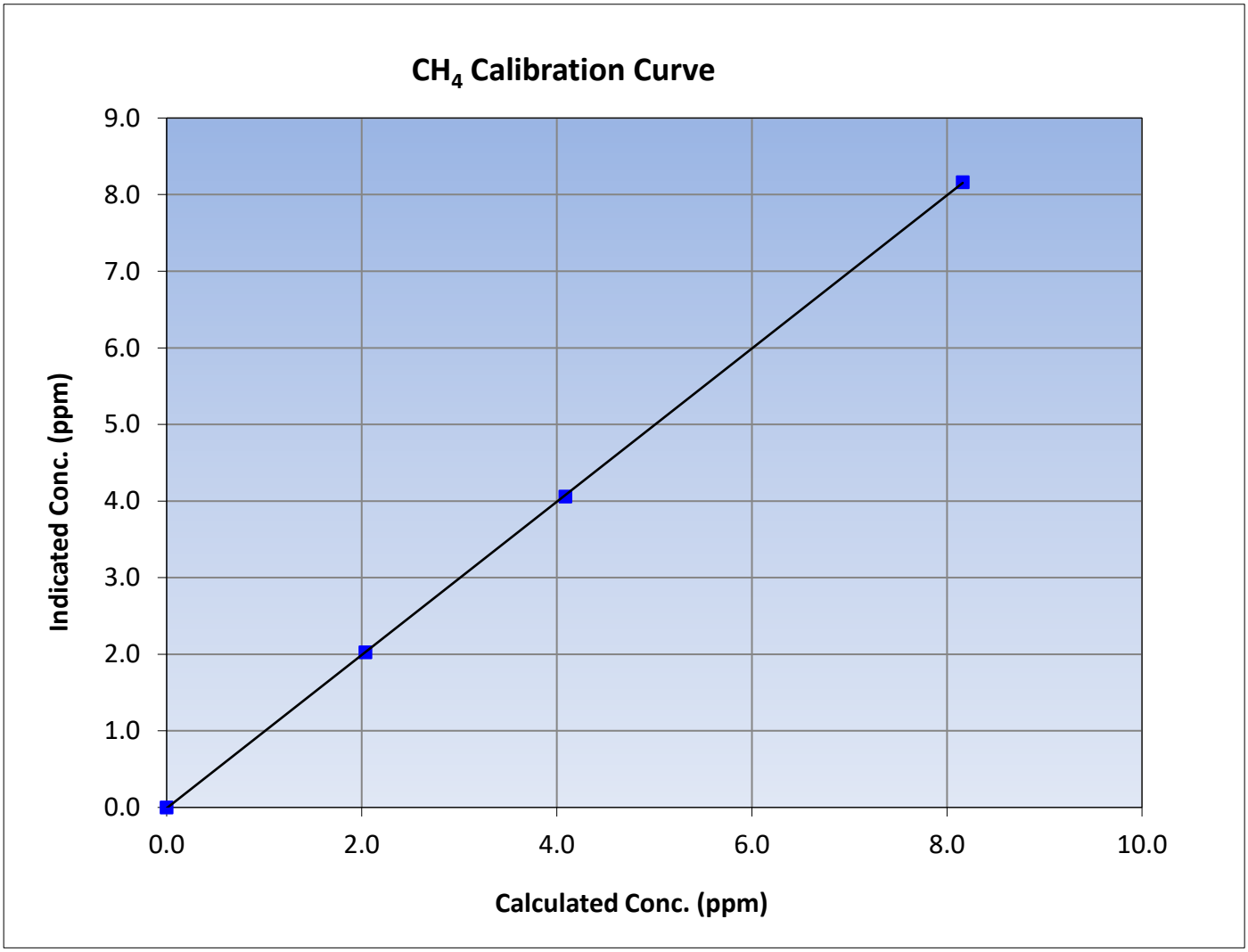
Version-01-2020

Station Information

Calibration Date:	March 7, 2023	Previous Calibration:	February 7, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:53	End Time (MST):	14:06
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	0.999987	*≥0.995*
8.16	8.16	1.0000			
4.09	4.06	1.0065	Slope	1.000126	*0.90 - 1.10*
2.04	2.03	1.0059			
			Intercept	-0.010089	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

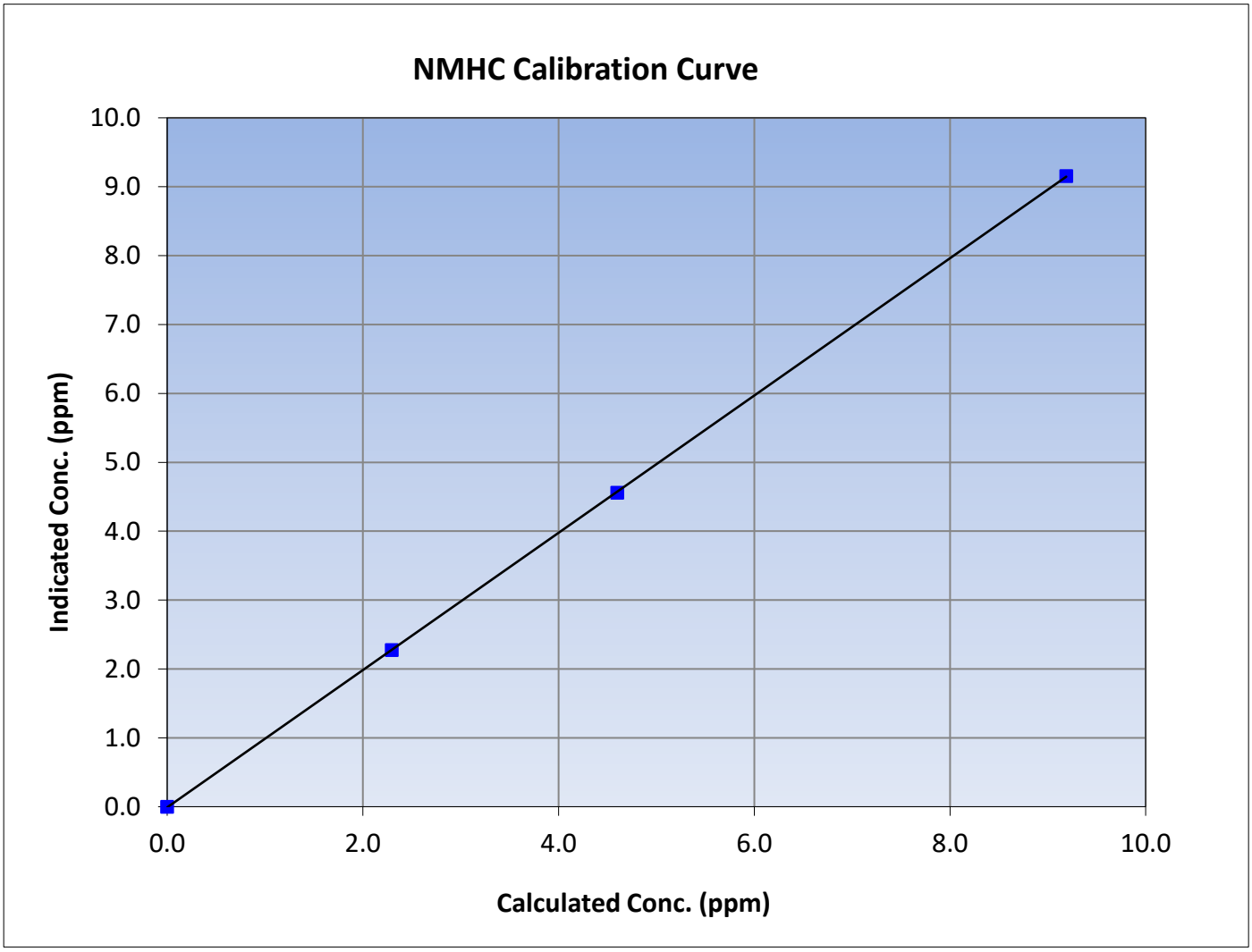
Version-01-2020

Station Information

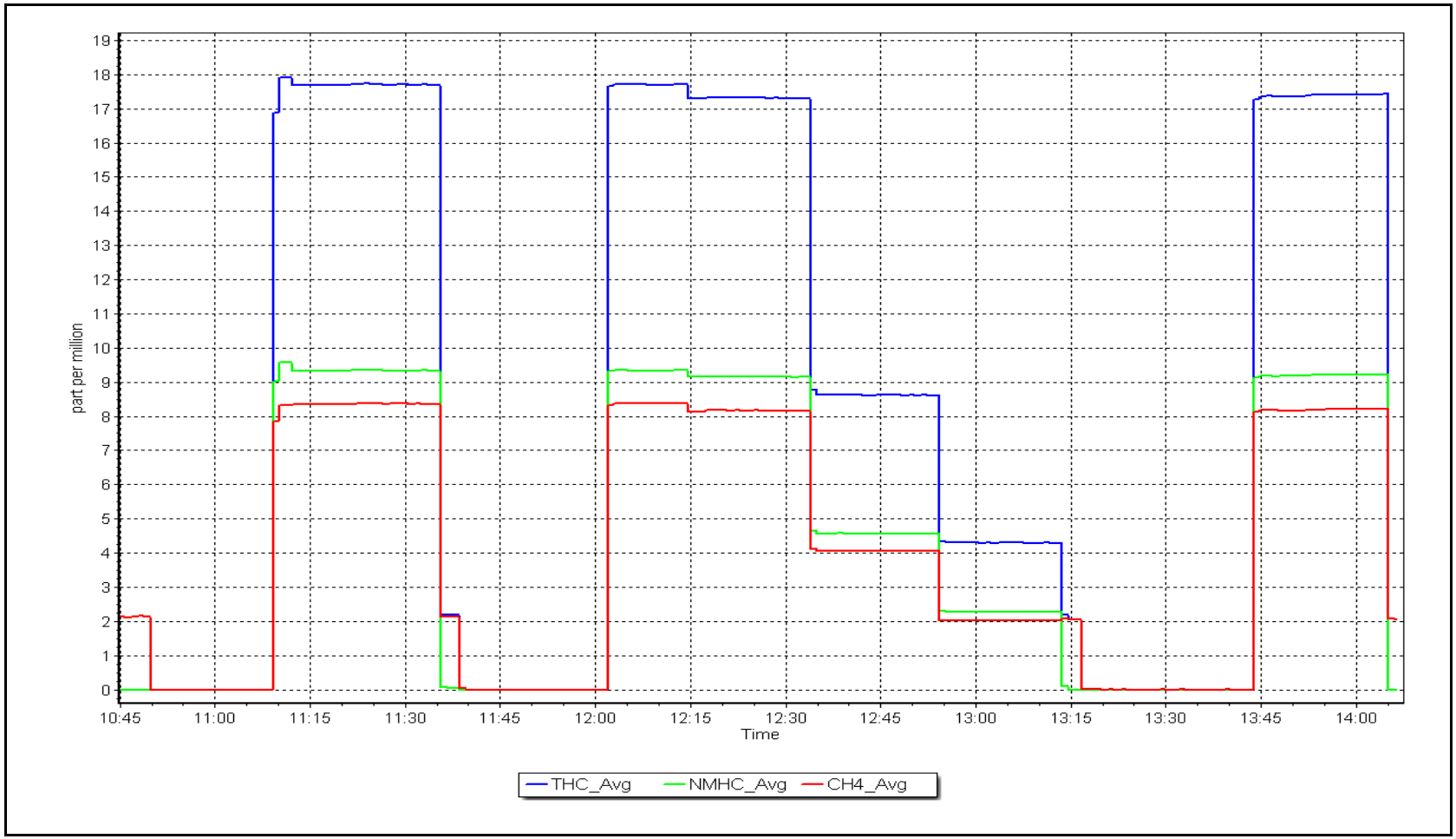
Calibration Date:	March 7, 2023	Previous Calibration:	February 7, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:53	End Time (MST):	14:06
Analyzer make:	Thermo 55i	Analyzer serial #:	1505164381

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999990	*≥0.995*
9.19	9.16	1.0036			
4.60	4.56	1.0095	Slope	0.996404	*0.90 - 1.10*
2.29	2.28	1.0080			
			Intercept	-0.009301	*+/-0.5*



NMHC Calibration Plot Date: March 7, 2023 Location: Lower Camp



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS13
FORT MCKAY SOUTH
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	March 2, 2023	Last Cal Date:	February 2, 2023
Start time (MST):	10:07	End time (MST):	16:10
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:	1.001413	1.006516	Backgd or Offset:	77.5	80.5
Calibration intercept:	-2.738219	-2.298208	Coeff or Slope:	0.735	0.735

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	1.2	----
as found span	4921	79.1	799.7	802.7	0.996
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	803.8	0.995
second point	4961	39.5	399.3	398.6	1.002
third point	4980	19.8	200.2	196.4	1.019
as left zero	5000	0.0	0.0	0.3	----
as left span	4921	79.1	799.7	798.9	1.001
				Average Correction Factor	1.005

Baseline Corr As found:	801.50	Previous response	798.08	*% 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 zero only.

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

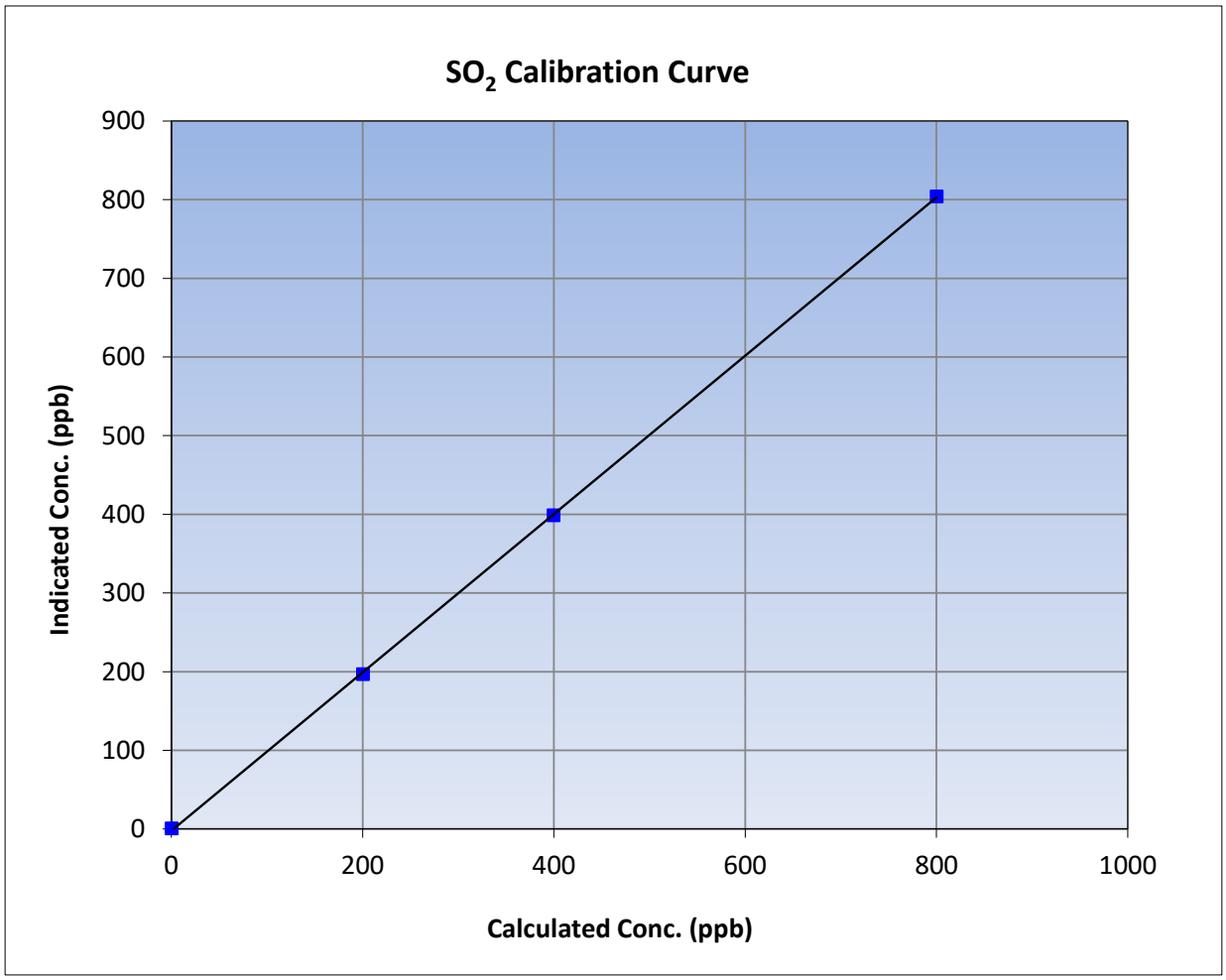
Station Information

Calibration Date:	March 2, 2023	Previous Calibration:	February 2, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:07	End Time (MST):	16:10
Analyzer make:	API T100	Analyzer serial #:	599

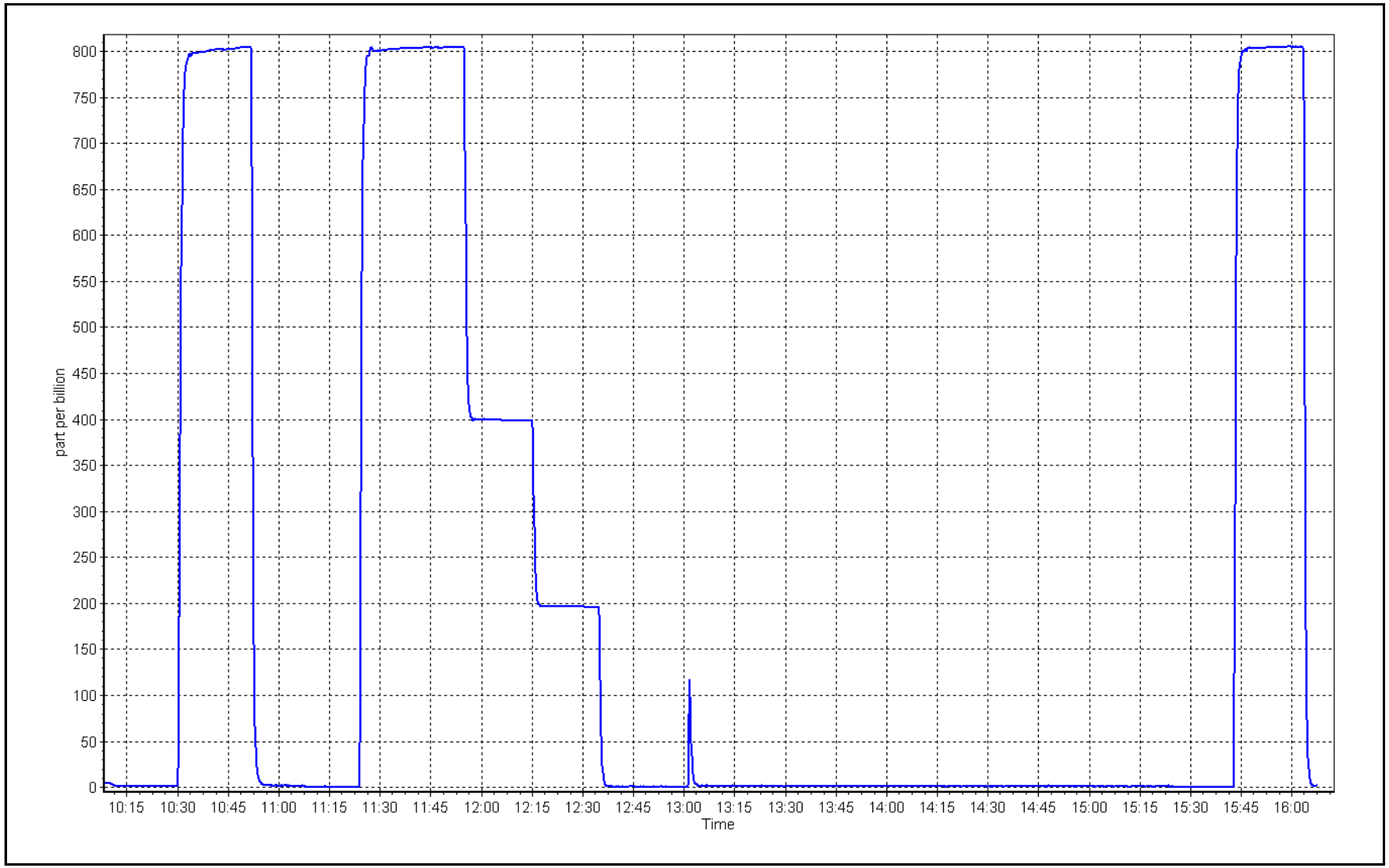
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
799.7	803.8	0.9949
399.3	398.6	1.0018
200.2	196.4	1.0193

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999952	*≥0.995*
Slope	1.006516	*0.90 - 1.10*
Intercept	-2.298208	*+/-30*



SO2 Calibration Plot Date: March 2, 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:	March 1, 2023	Last Cal Date:	February 7, 2023
Start time (MST):	9:43	End time (MST):	14:15
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1180540017	
Converter make:	CDN-101		Converter serial #:	521	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.002489	0.987178	Backgd or Offset:	3.69	3.69
Calibration intercept:	-0.082182	0.057822	Coeff or Slope:	1.120	1.120

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4925	75.5	80.6	79.2	1.019
as found 2nd point	4962	37.7	40.3	39.4	1.025
as found 3rd point	4981	18.9	20.2	19.4	1.046
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4925	75.5	80.6	79.7	1.012
second point	4962	37.7	40.3	39.8	1.012
third point	4981	18.9	20.2	19.8	1.019
as left zero	5000	0.0	0.0	0.4	----
as left span	4925	75.5	80.6	79.8	1.010
SO2 Scrubber Check	4921	79.1	791.0	0.0	----
Date of last scrubber change:		20-Mar-20		Ave Corr Factor	1.014
Date of last converter efficiency test:		NA			efficiency

Baseline Corr As found:	79.1	Prev response:	80.74	*% change:	-2.1%
Baseline Corr 2nd AF pt:	39.3	AF Slope:	0.982925	AF Intercept:	-0.142149
Baseline Corr 3rd AF pt:	19.3	AF Correlation:	0.999954		

* = > +/-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

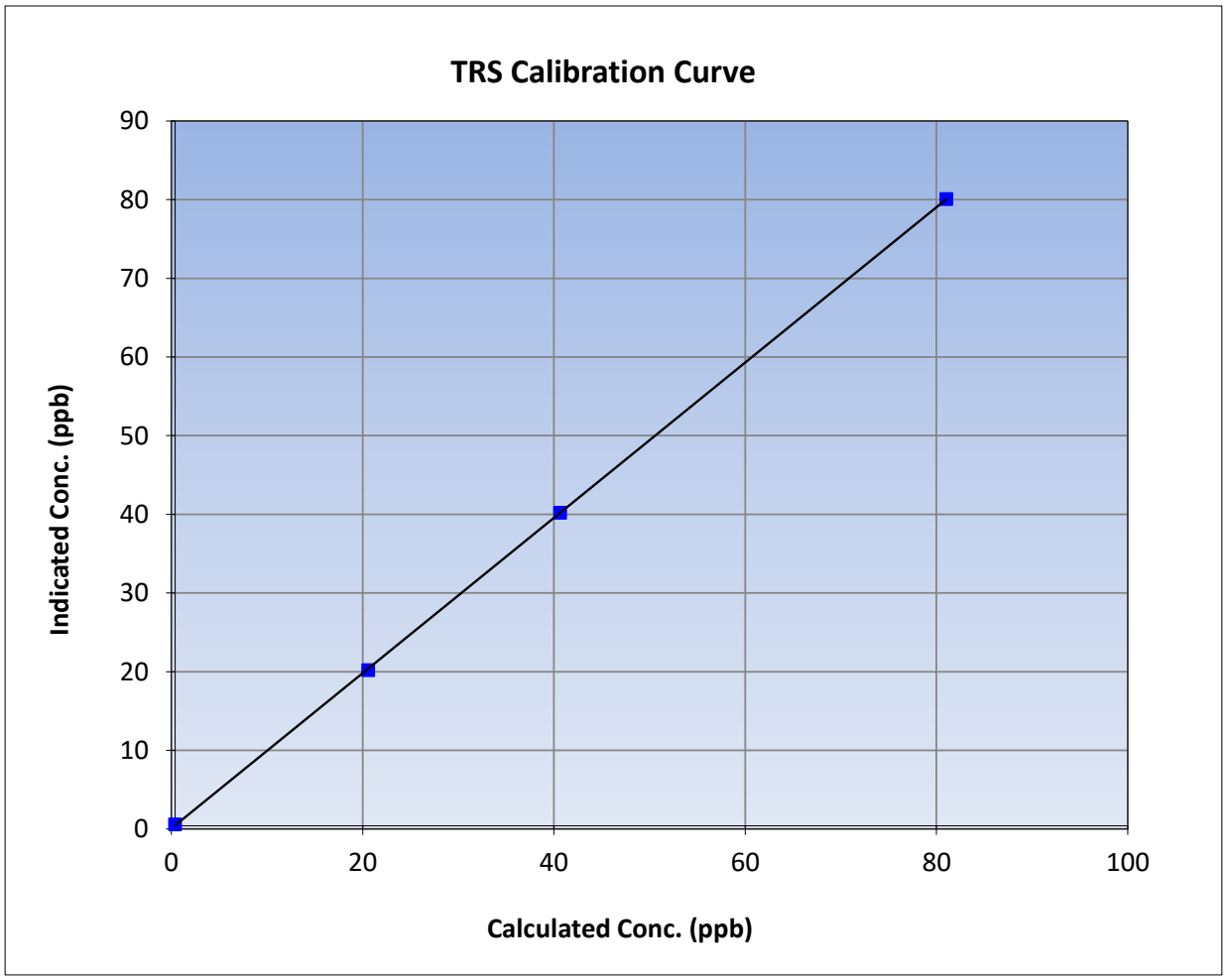
Station Information

Calibration Date:	March 1, 2023	Previous Calibration:	February 7, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	9:43	End Time (MST):	13:36
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1180540017

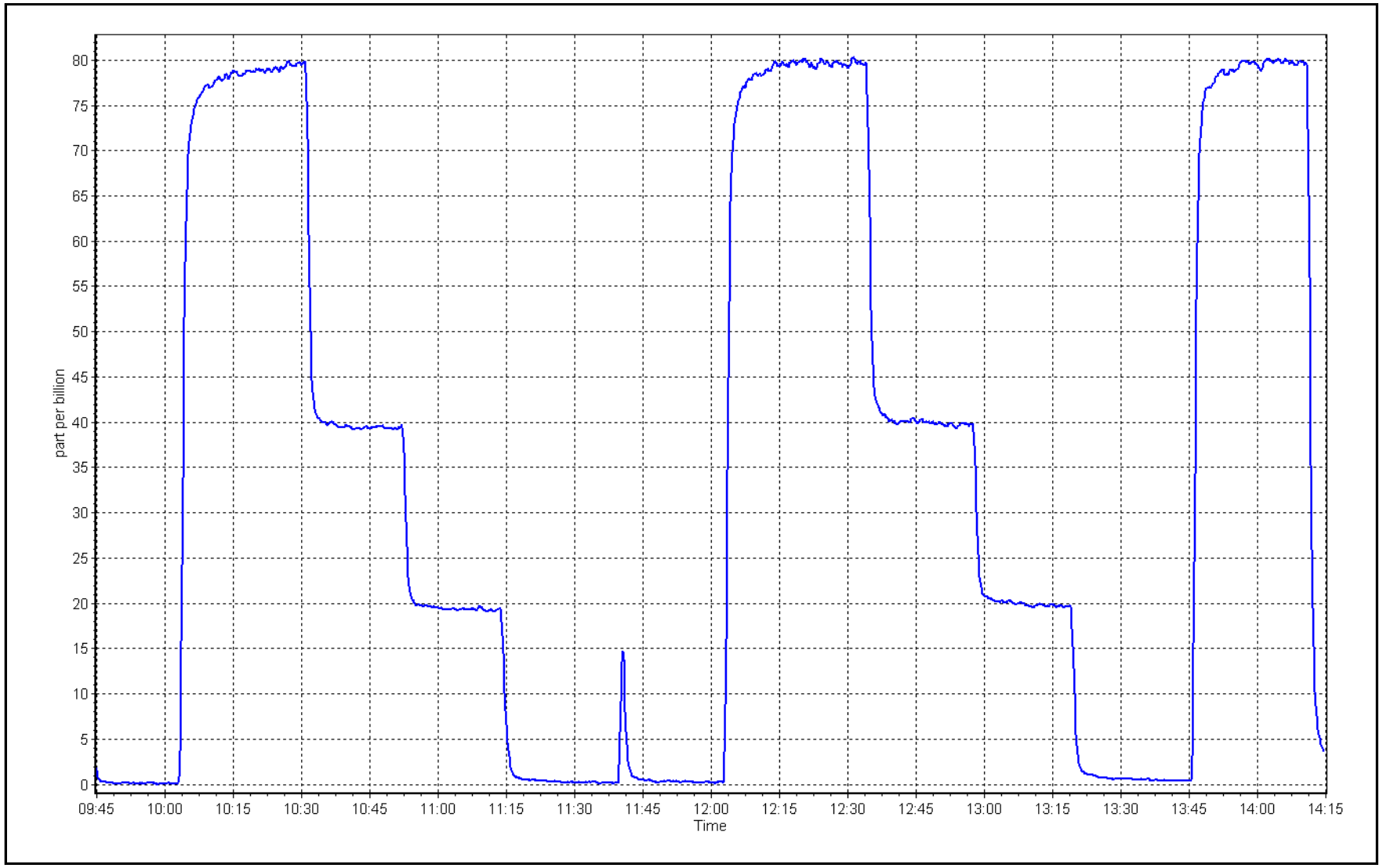
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.6	79.7	1.0116
40.3	39.8	1.0117
20.2	19.8	1.0195

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999984	*≥0.995*
Slope	0.987178	*0.90 - 1.10*
Intercept	0.057822	*+/-3*



TRS Calibration Plot Date: March 1, 2023 Location: Fort McKay South



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	March 2, 2023	Last Cal Date:	February 2, 2023
Start time (MST):	10:07	End time (MST):	16:10
Reason:	Maintenance		

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:	NA	
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:	API 701		Serial Number:	1117	

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:	2.39E-04	2.39E-04	NMHC SP Ratio:	4.69E-05	4.70E-05
CH4 Retention time:	12.0	12.0	NMHC Peak Area:	193720	193333

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	16.85	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	79.1	17.05	17.07	0.999
second point	4961	39.5	8.51	8.35	1.019
third point	4980	19.8	4.27	4.11	1.039
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	17.05	17.06	0.999
				Average Correction Factor	1.019

Baseline Corr AF:	16.85	Prev response	16.98	*% 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-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	79.1	9.08	8.88	1.023
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4921	79.1	9.08	9.10	0.998
second point	4961	39.5	4.53	4.47	1.015
third point	4980	19.8	2.27	2.21	1.027
as left zero	5000	0	0.00	0.00	----
as left span	4921	79.1	9.08	9.08	1.000
				Average Correction Factor	1.013
Baseline Corr AF:	8.88	Prev response	9.04	*% 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	4921	79.1	7.97	7.97	0.999
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.1	7.97	7.97	1.000
second point	4961	39.5	3.98	3.89	1.023
third point	4980	19.8	1.99	1.89	1.053
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	7.97	7.99	0.997
				Average Correction Factor	1.025
Baseline Corr AF:	7.97	Prev response	7.94	*% change	0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.002074	1.003410
THC Cal Offset:	-0.104181	-0.099393
CH4 Cal Slope:	1.003774	1.003172
CH4 Cal Offset:	-0.056196	-0.058596
NMHC Cal Slope:	1.000594	1.003631
NMHC Cal Offset:	-0.047785	-0.040597

Notes: Changed the inlet filter after as founds. Enabled and captured a new zero chromatogram, and adjusted the span. Enabled use flat baseline as well. Maintenance to be continued next day.

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

THC Calibration Summary

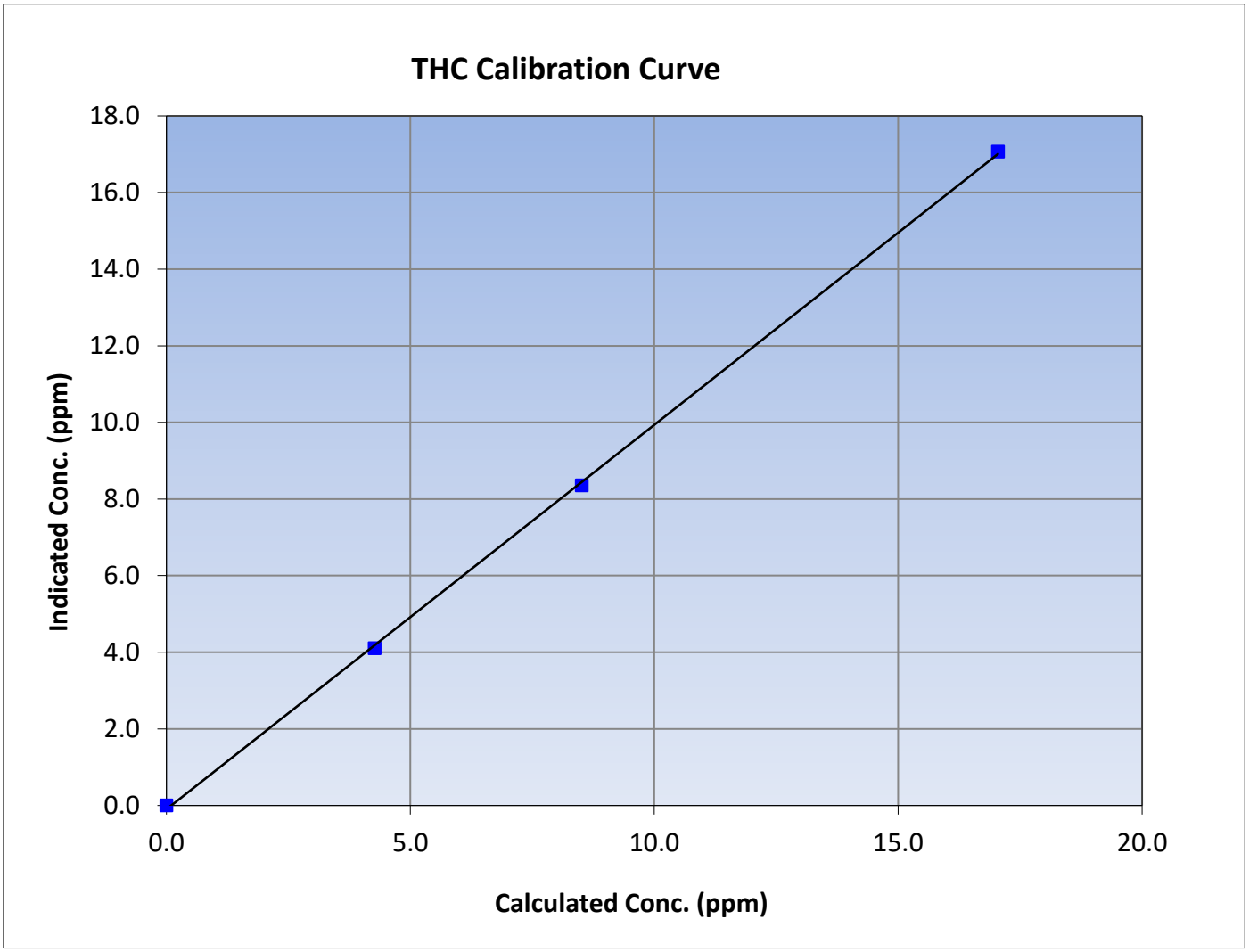
Version-01-2020

Station Information

Calibration Date:	March 2, 2023	Previous Calibration:	February 2, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:07	End Time (MST):	16:10
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	0.999832	*≥0.995*
17.05	17.07	0.9988			
8.51	8.35	1.0189	Slope	1.003410	*0.90 - 1.10*
4.27	4.11	1.0387			
			Intercept	-0.099393	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

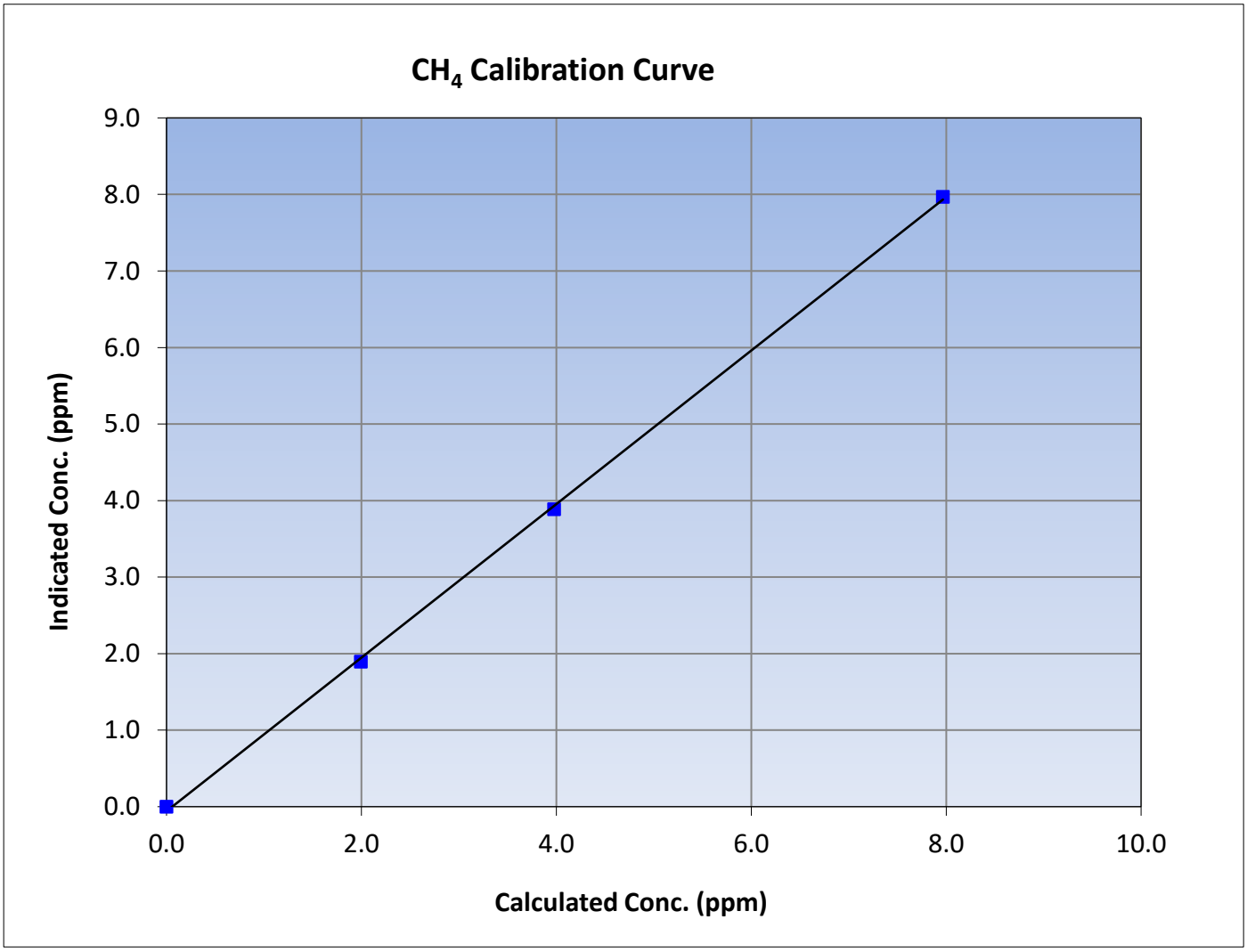
Version-01-2020

Station Information

Calibration Date:	March 2, 2023	Previous Calibration:	February 2, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:07	End Time (MST):	16:10
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	0.999743	*≥0.995*
7.97	7.97	0.9998			
3.98	3.89	1.0234	Slope	1.003172	*0.90 - 1.10*
1.99	1.89	1.0530			
			Intercept	-0.058596	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

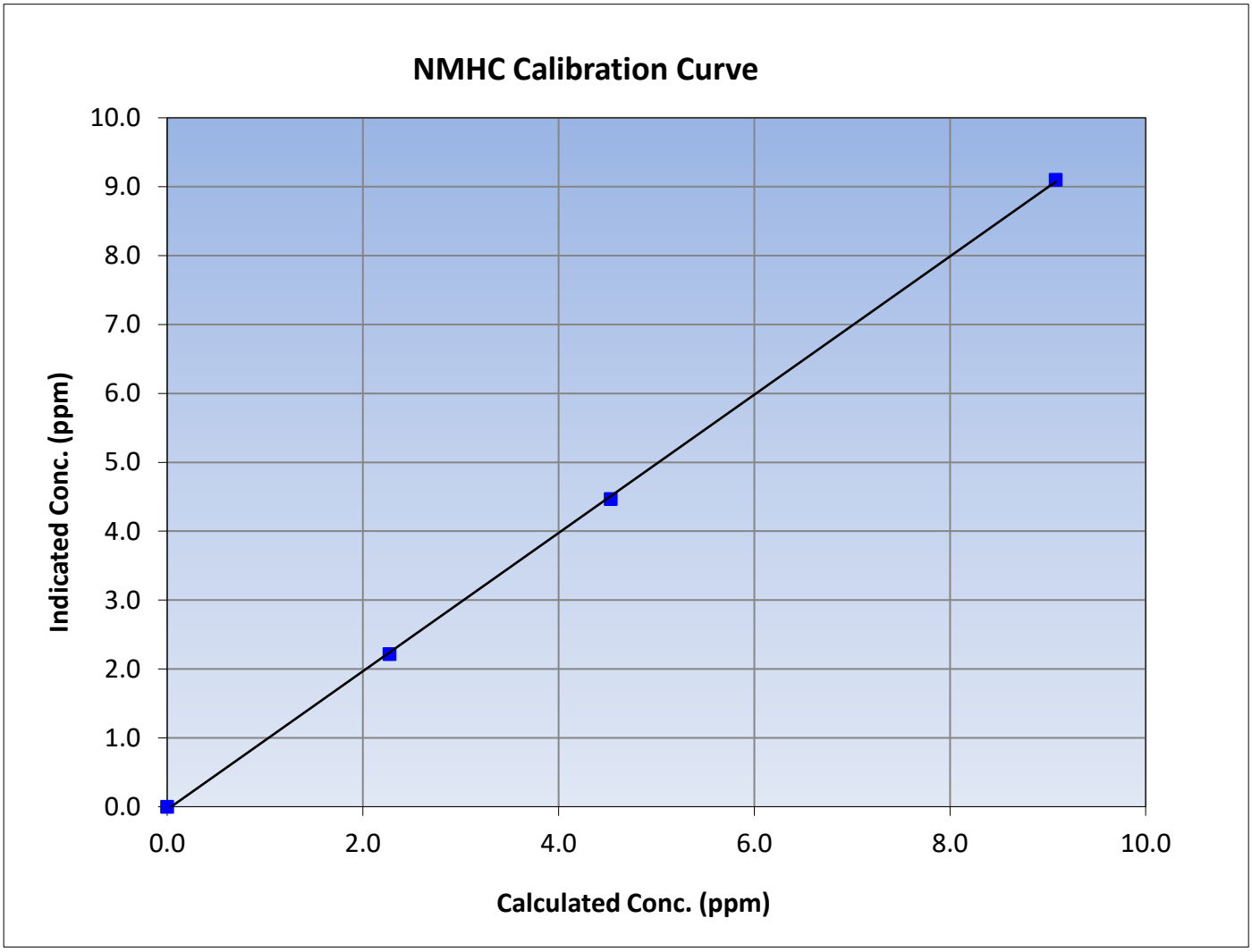
Version-01-2020

Station Information

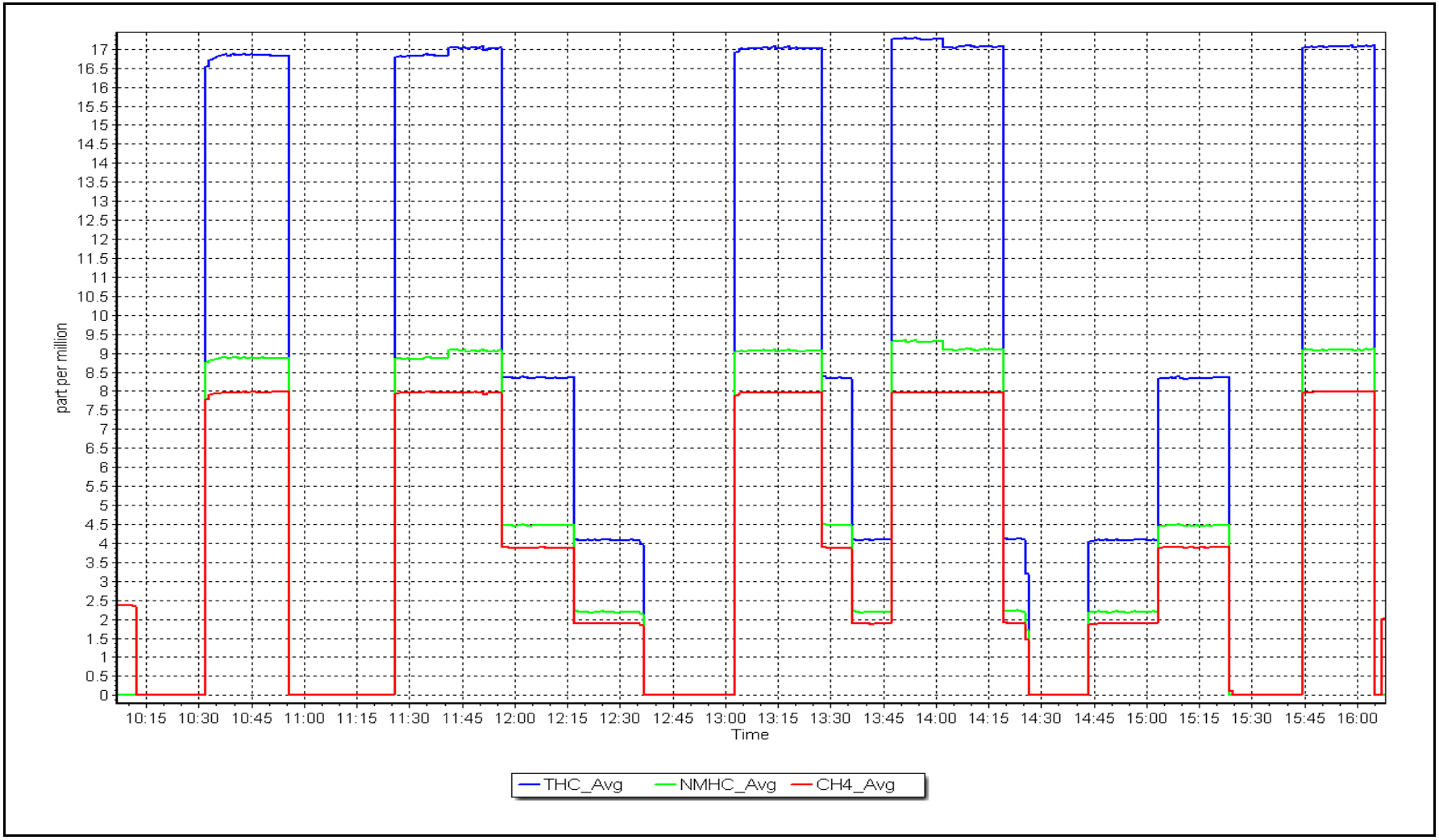
Calibration Date:	March 2, 2023	Previous Calibration:	February 2, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:07	End Time (MST):	16:10
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999894	≥0.995
9.08	9.10	0.9978			
4.53	4.47	1.0147	Slope	1.003631	0.90 - 1.10
2.27	2.21	1.0266			
			Intercept	-0.040597	+/-0.5



NMHC Calibration Plot Date: March 2, 2023 Location: Fort McKay South



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	March 3, 2023	Last Cal Date:	March 2, 2023
Start time (MST):	10:12	End time (MST):	10:53
Reason:	Removal		

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:	NA	
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:	API 701		Serial Number:	1117	

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:	2.39E-04	2.39E-04	NMHC SP Ratio:	4.70E-05	4.70E-05
CH4 Retention time:	12.0	12.0	NMHC Peak Area:	193333	193333

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.1	17.05	17.18	0.992
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	

Baseline Corr AF:	17.18	Prev response	16.98	*% change	1.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4921	79.1	9.08	9.19	0.988
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	9.19	Prev response	9.04	*% change	1.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.1	7.97	7.99	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	7.99	Prev response	7.94	*% change	0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

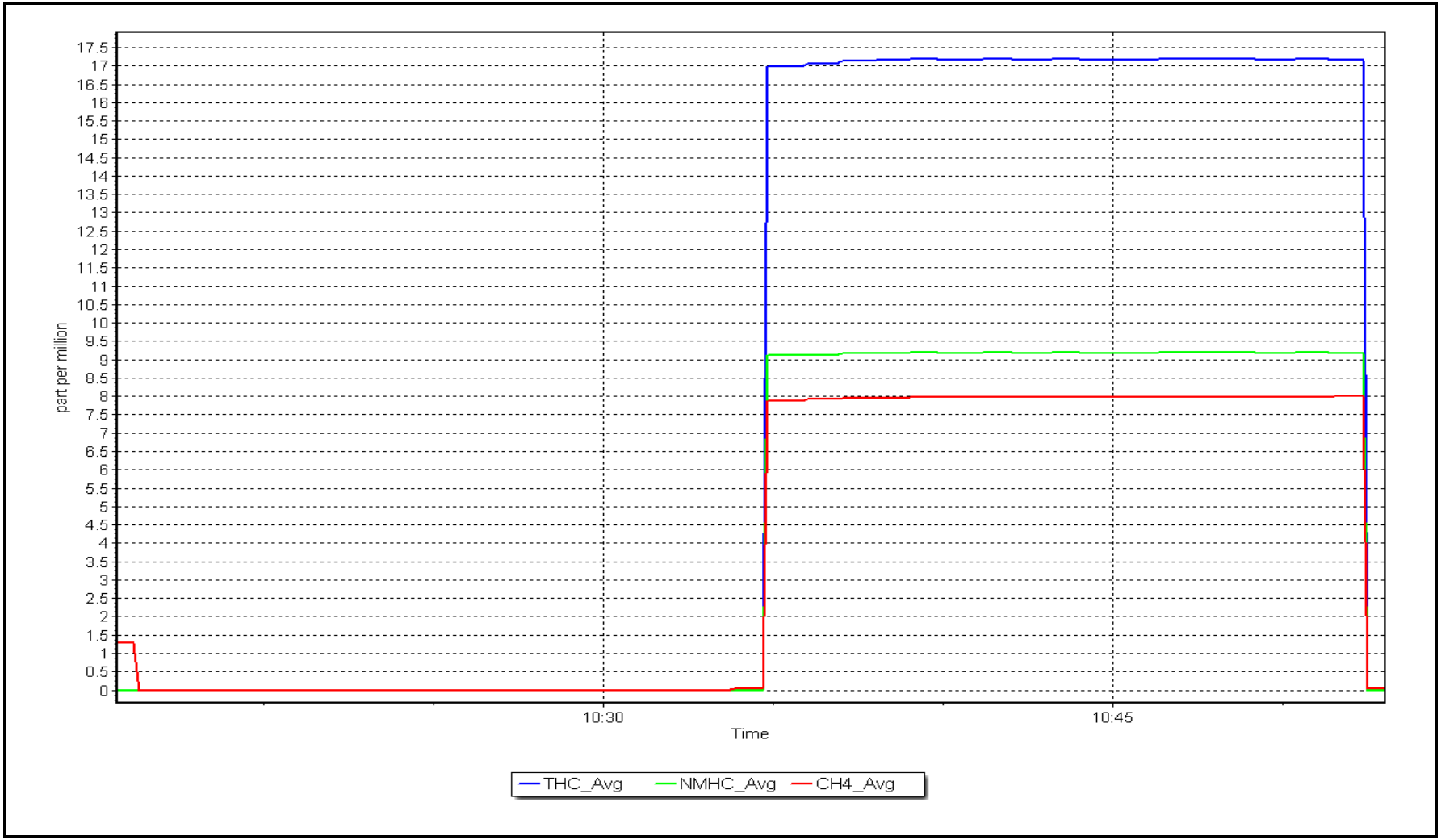
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.002074	
THC Cal Offset:	-0.104181	
CH4 Cal Slope:	1.003774	
CH4 Cal Offset:	-0.056196	
NMHC Cal Slope:	1.000594	
NMHC Cal Offset:	-0.047785	

Notes: Removal calibration. Just zero and span to validate yesterday calibration/maintenance.

Calibration Performed By: Sean Bala

NMHC Calibration Plot Date: March 3, 2023 Location: Fort McKay South



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	March 3, 2023	Last Cal Date:	March 2, 2023
Start time (MST):	11:08	End time (MST):	15:19
Reason:	Install		

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:	NA	
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:	API 701		Serial Number:	1117	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1170050130	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	NA	2.16E-04	NMHC SP Ratio:	NA	5.11E-04
CH4 Retention time:	NA	12.8	NMHC Peak Area:	NA	177635

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.1	17.05	17.10	0.997
second point	4961	39.5	8.51	8.42	1.011
third point	4980	19.8	4.27	4.13	1.034
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	17.05	17.20	0.991
				Average Correction Factor	1.014

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

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4921	79.1	9.08	9.13	0.995
second point	4960	39.5	4.53	4.50	1.007
third point	4980	19.8	2.27	2.21	1.027
as left zero	5000	0	0.00	0.00	----
as left span	4921	79.1	9.08	9.16	0.991
				Average Correction Factor	1.010
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	4921	79.1	7.97	7.98	0.999
second point	4960	39.5	3.98	3.92	1.016
third point	4980	19.8	1.99	1.91	1.042
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	7.97	8.03	0.992
				Average Correction Factor	1.019
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:	NA	1.005694
THC Cal Offset:	NA	-0.086175
CH4 Cal Slope:	NA	1.003875
CH4 Cal Offset:	NA	-0.046747
NMHC Cal Slope:	NA	1.007142
NMHC Cal Offset:	NA	-0.039766

Notes: Install calibration. First CH4 3rd point was failing 5.6%. Do a zero chromatogram and use zero chromatogram. Noticed that the alarm for Detector and filter temperature is on/off. Readjust it to 175˚ C and it clears off the alarms. Adjusted span.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

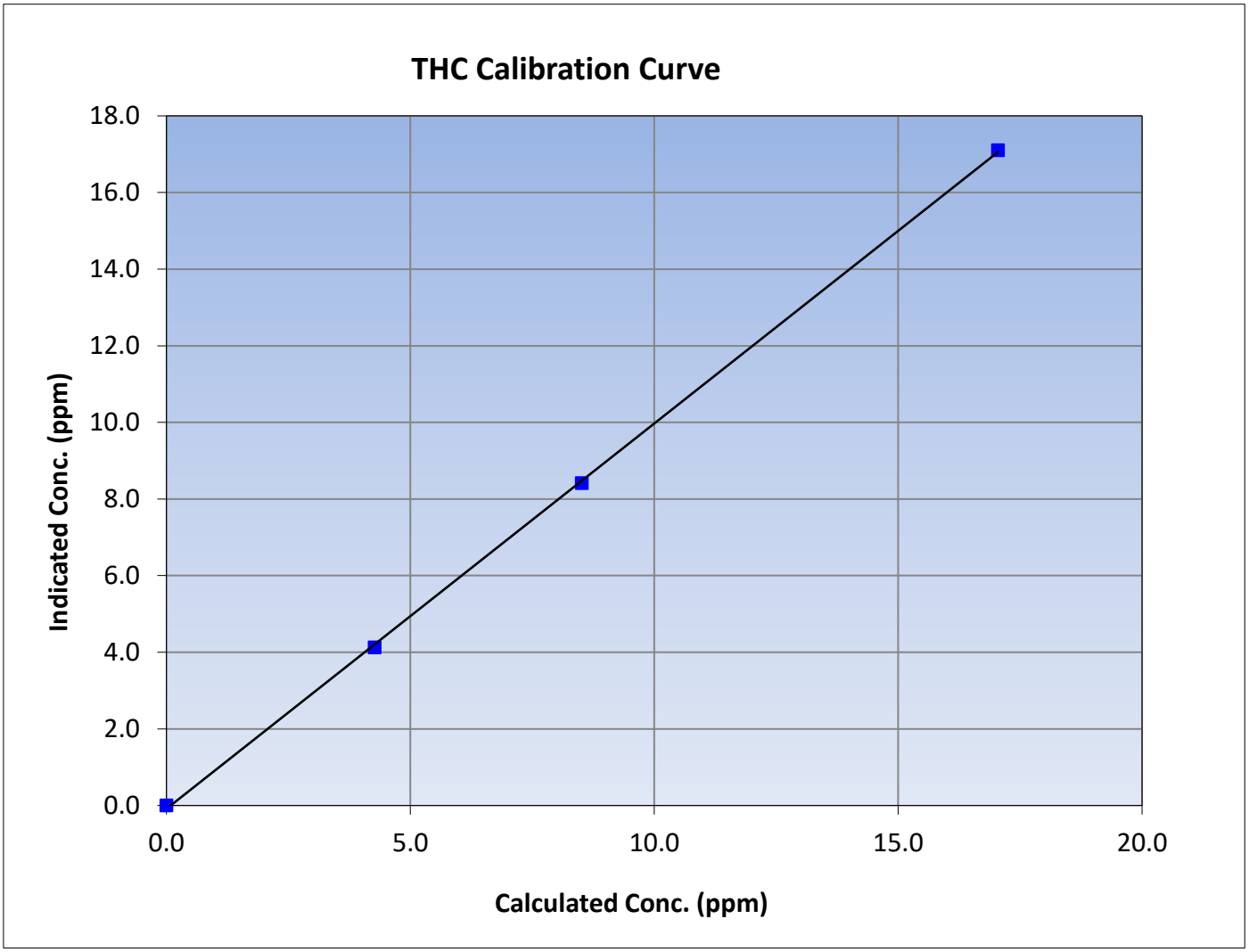
Version-01-2020

Station Information

Calibration Date:	March 3, 2023	Previous Calibration:	March 2, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	11:08	End Time (MST):	15:19
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050130

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999883	*≥0.995*
17.05	17.10	0.9966			
8.51	8.42	1.0110	Slope	1.005694	*0.90 - 1.10*
4.27	4.13	1.0340			
			Intercept	-0.086175	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

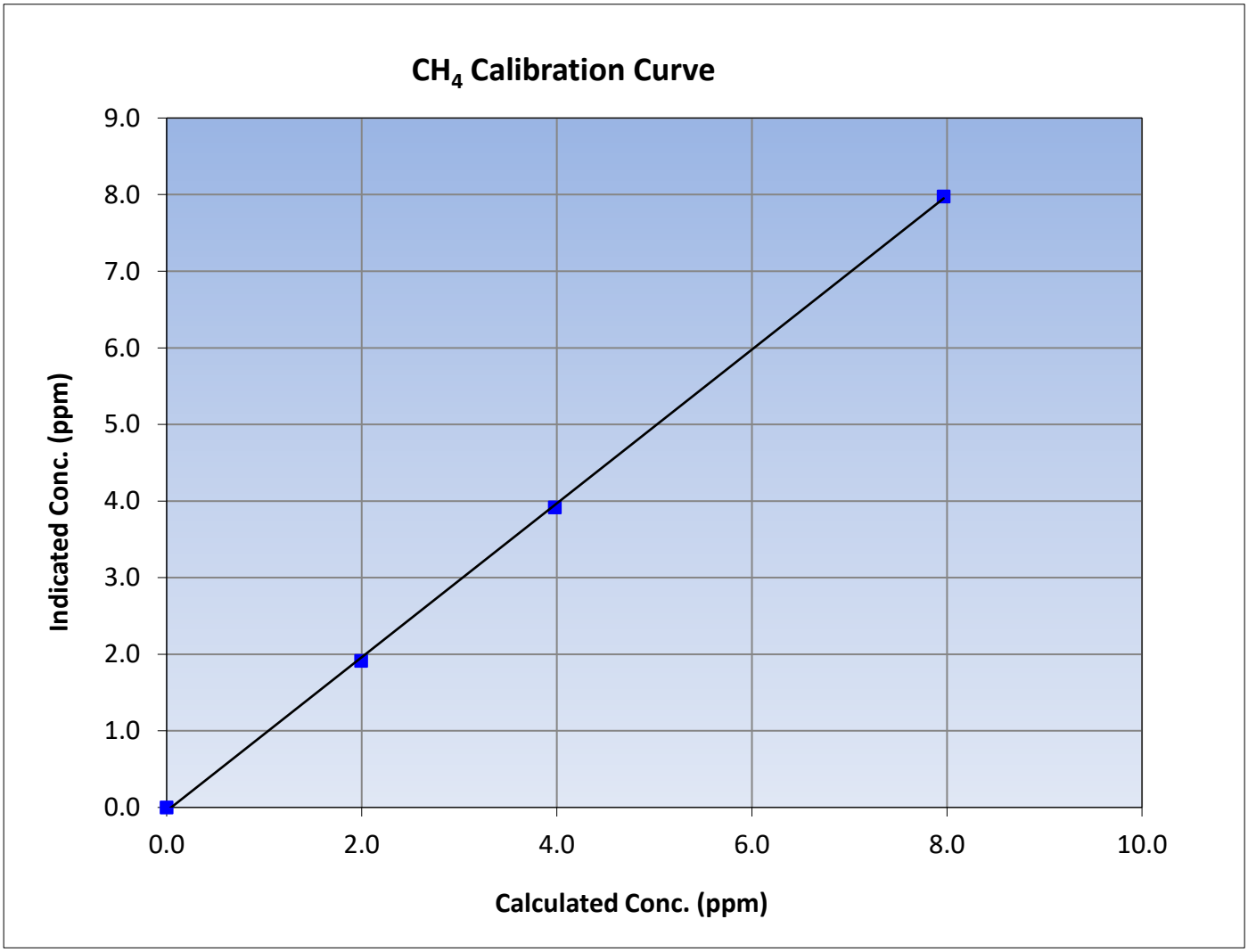
Version-01-2020

Station Information

Calibration Date:	March 3, 2023	Previous Calibration:	March 2, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	11:08	End Time (MST):	15:19
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050130

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999841	*≥0.995*
7.97	7.98	0.9987			
3.98	3.92	1.0160	Slope	1.003875	*0.90 - 1.10*
1.99	1.91	1.0420			
			Intercept	-0.046747	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

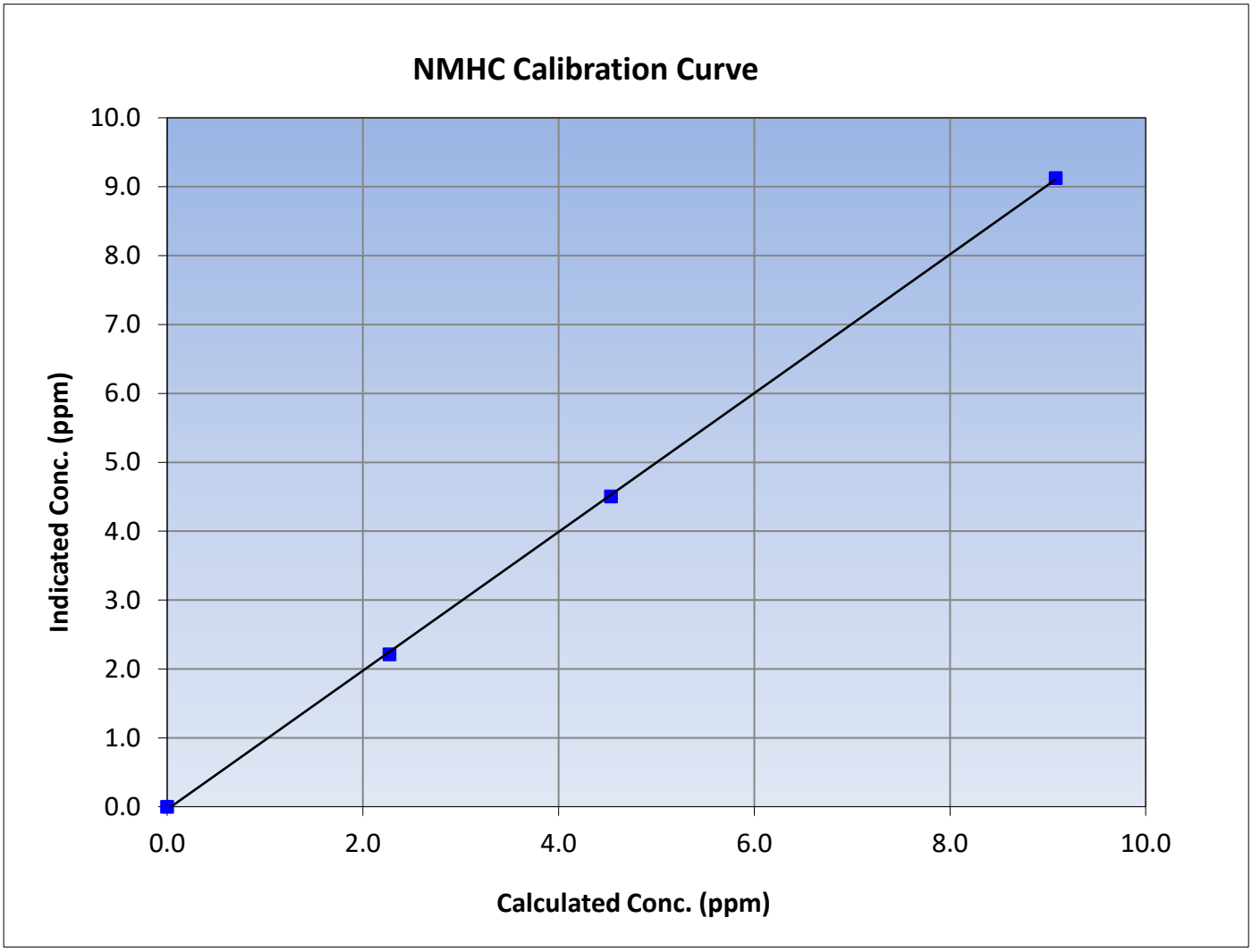
Version-01-2020

Station Information

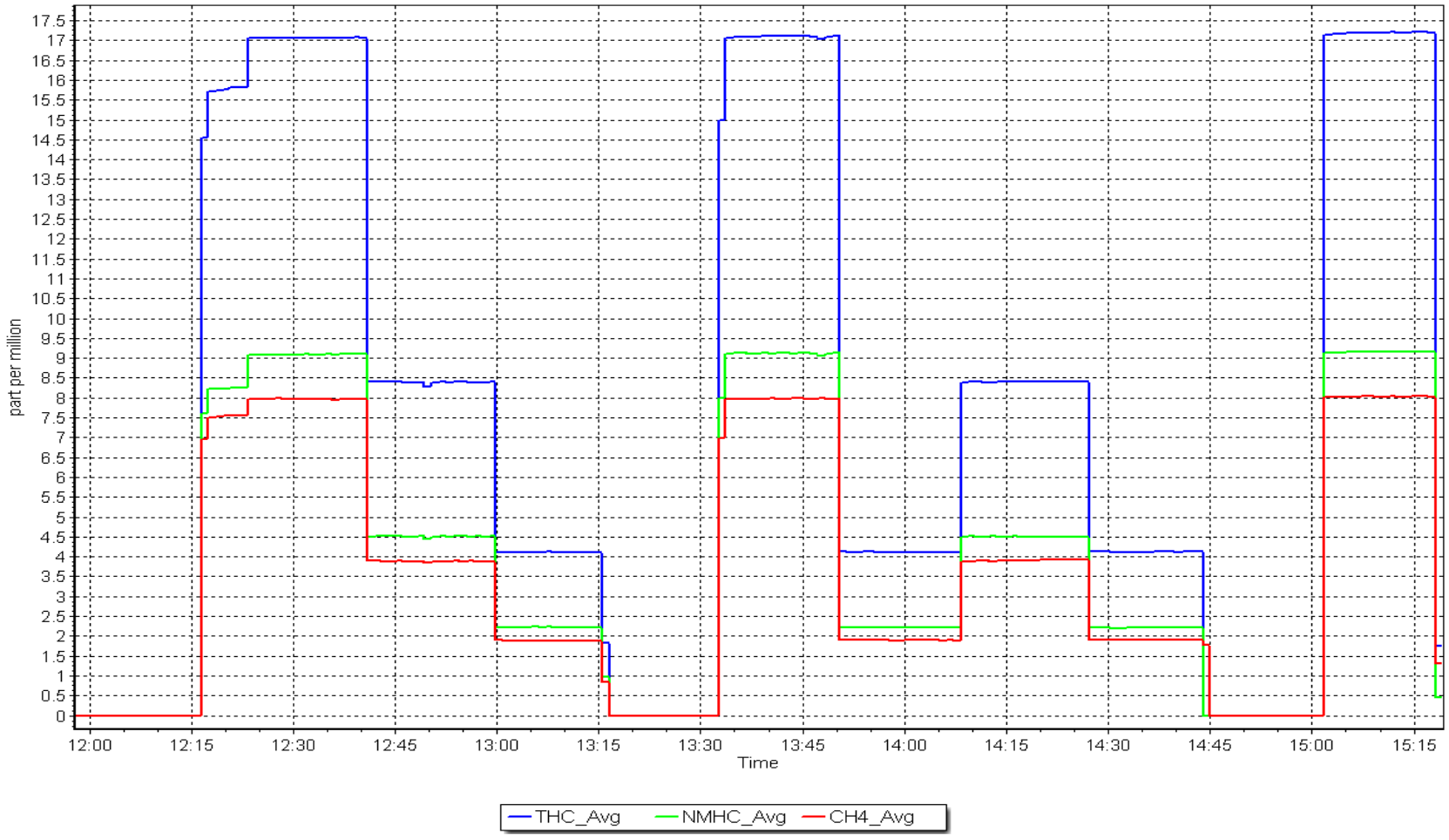
Calibration Date:	March 3, 2023	Previous Calibration:	March 2, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	11:08	End Time (MST):	15:19
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050130

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999913	≥0.995
9.08	9.13	0.9949			
4.53	4.50	1.0072	Slope	1.007142	0.90 - 1.10
2.27	2.21	1.0270			
			Intercept	-0.039766	+/-0.5



NMHC Calibration Plot Date: March 3, 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:	March 23, 2023	Last Cal Date:	February 10, 2023
Start time (MST):	8:20	End time (MST):	12:59
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:	1.204	1.213	NO bkgnd or offset:	9.5	9.7
NOX coeff or slope:	0.992	0.992	NOX bkgnd or offset:	9.6	9.7
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	192.6	196.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999138	1.000036
NO_X Cal Offset:	-2.151243	-2.351272
NO Cal Slope:	1.002334	1.002705
NO Cal Offset:	-3.145082	-3.225164
NO_2 Cal Slope:	0.996233	0.998357
NO_2 Cal Offset:	-0.877794	-0.332208

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	81.1	826.9	800.0	26.9	823.1	794.6	28.5	1.0046	1.0067
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high point	4919	81.1	826.9	800.0	26.9	825.7	800.4	25.3	1.0014	0.9994
second point	4960	40.6	413.9	400.4	13.5	410.4	396.9	13.5	1.0085	1.0089
third point	4980	20.3	207.0	200.2	6.7	202.4	194.3	8.1	1.0226	1.0305
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as left span	4919	81.1	826.9	379.9	447.0	836.8	381.6	455.2	0.9881	0.9954
								Average Correction Factor	1.0108	1.0129

Corrected As found	NO_X = 823.3 ppb	NO = 794.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.1%
Previous Response	NO_X = 824.0 ppb	NO = 798.7 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)	795.0	374.9	447.0	446.2	1.0018	99.8%
2nd GPT point (200 ppb O3)	795.0	583.1	238.8	237.8	1.0043	99.6%
3rd GPT point (100 ppb O3)	795.0	688.9	133.0	132.2	1.0062	99.4%
				Average Correction Factor	1.0041	99.6%

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

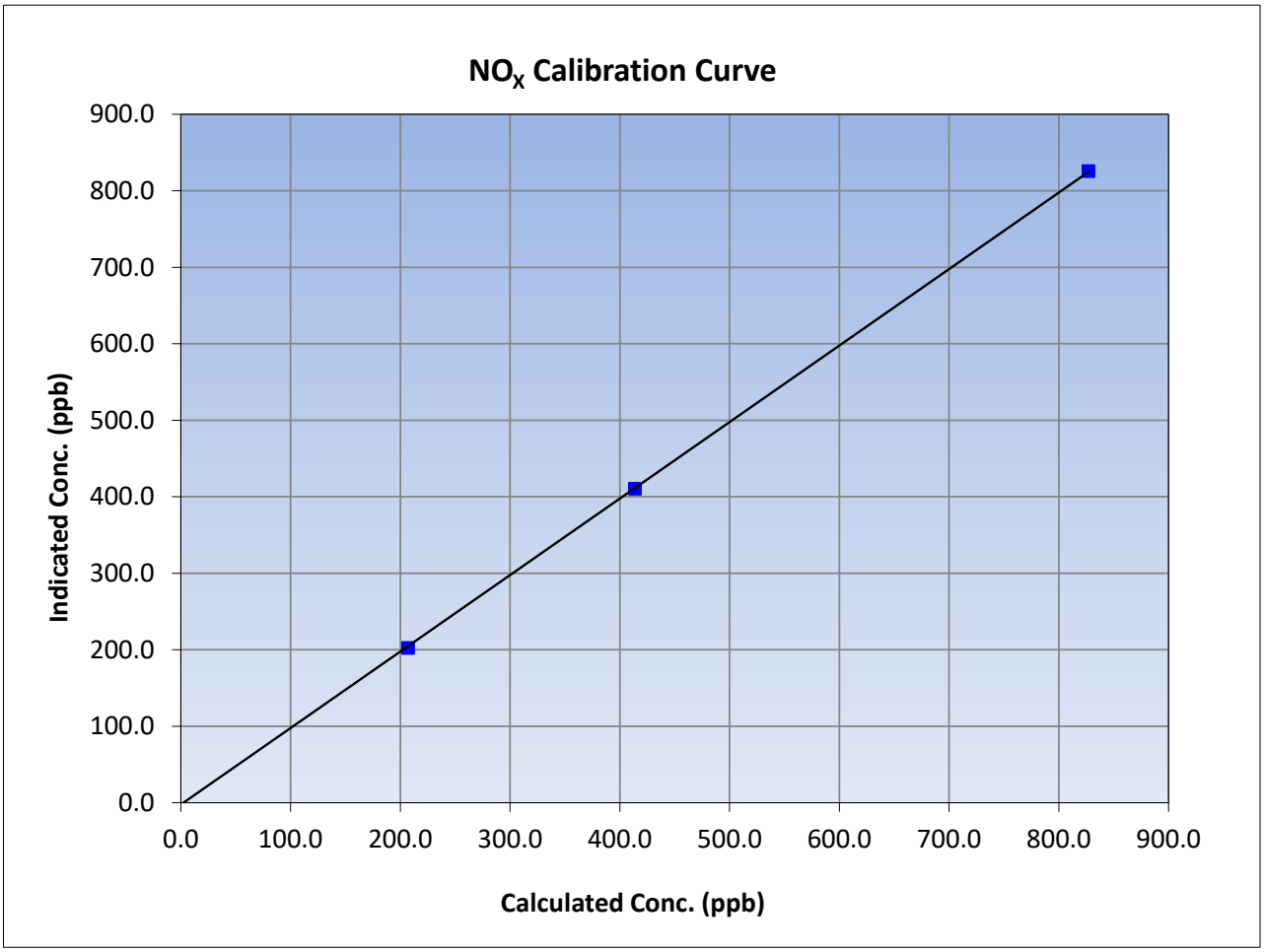
Version-04-2020

Station Information

Calibration Date:	March 23, 2023	Previous Calibration:	February 10, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	8:20	End Time (MST):	12:59
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	0.999966	≥0.995
826.9	825.7	1.0014			
413.9	410.4	1.0085	Slope	1.000036	0.90 - 1.10
207.0	202.4	1.0226			
			Intercept	-2.351272	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

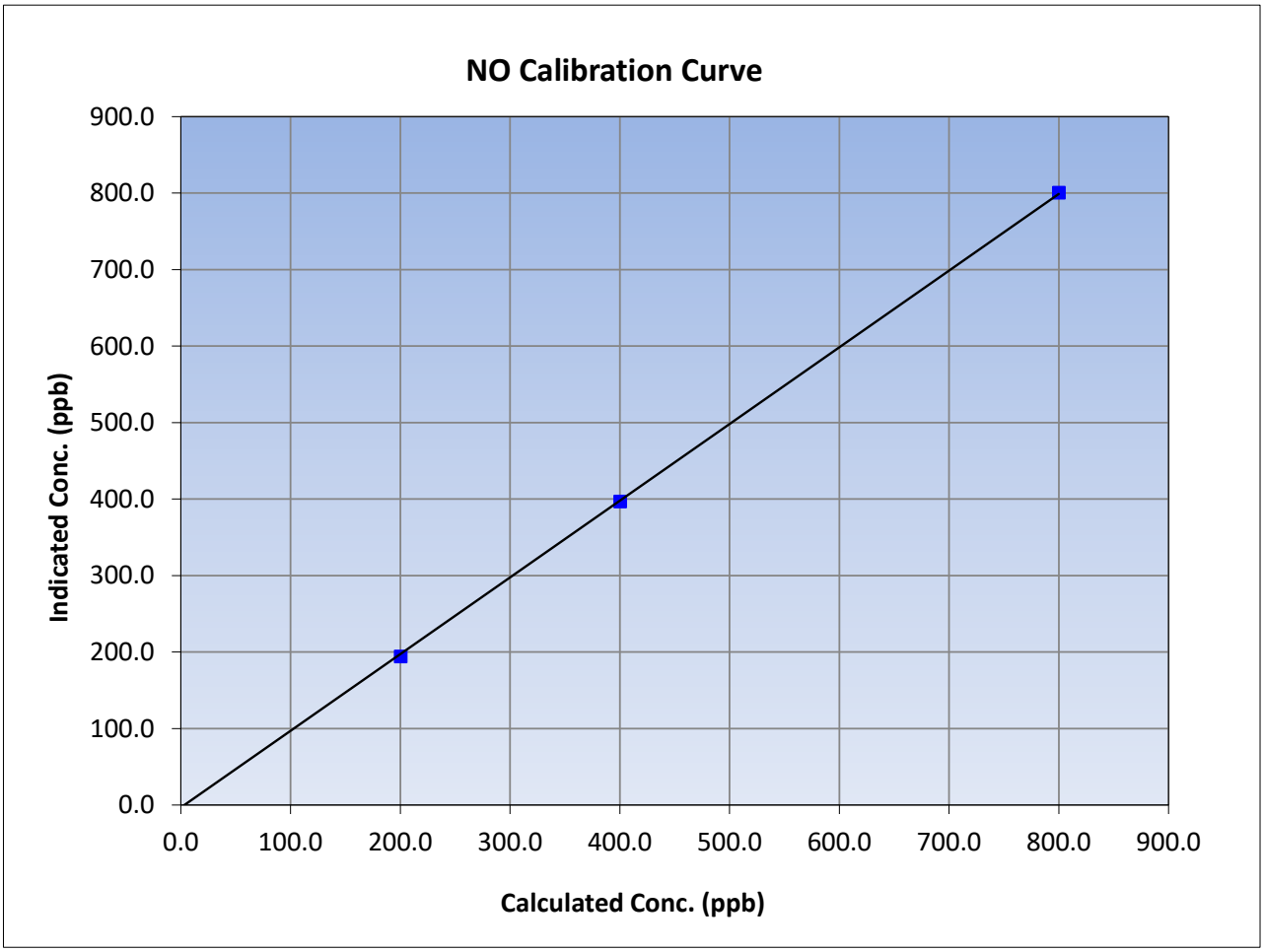
Version-04-2020

Station Information

Calibration Date:	March 23, 2023	Previous Calibration:	February 10, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	8:20	End Time (MST):	12:59
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	0.999930	≥0.995
800.0	800.4	0.9994			
400.4	396.9	1.0089	Slope	1.002705	0.90 - 1.10
200.2	194.3	1.0305			
			Intercept	-3.225164	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

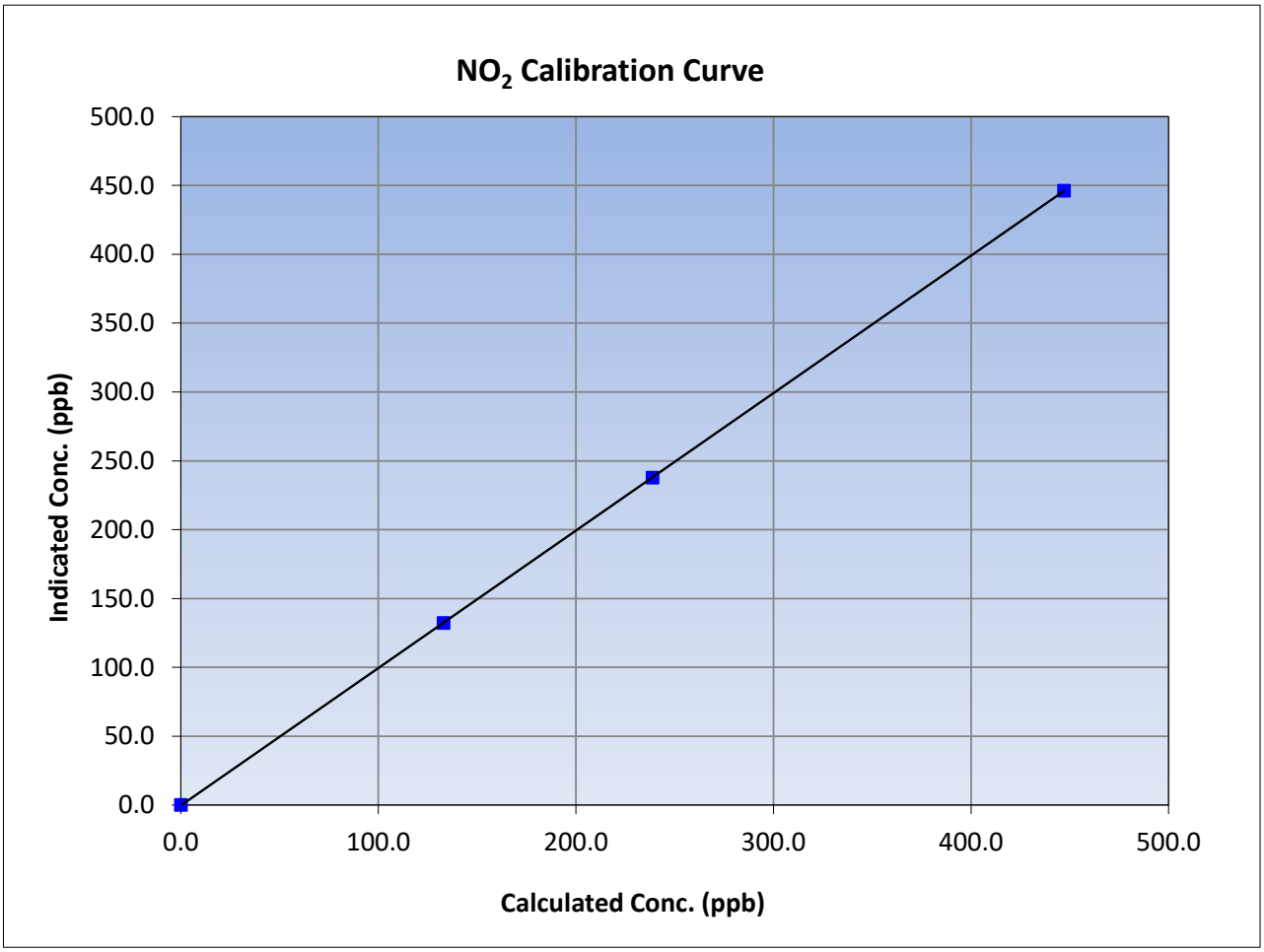
Version-04-2020

Station Information

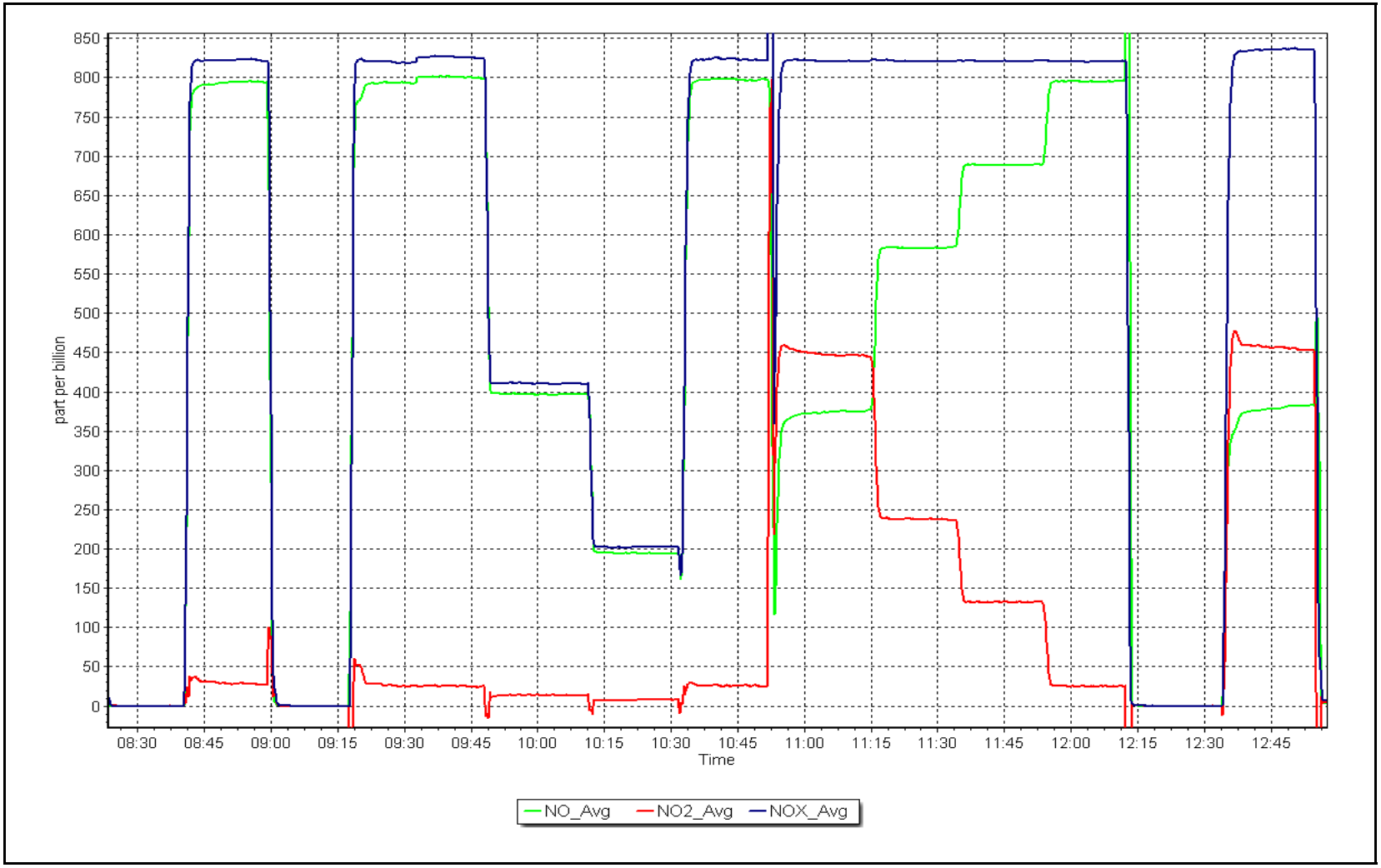
Calibration Date:	March 23, 2023	Previous Calibration:	February 10, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	8:20	End Time (MST):	12:59
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999997	≥0.995
447.0	446.2	1.0018			
238.8	237.8	1.0043	Slope	0.998357	0.90 - 1.10
133.0	132.2	1.0062			
			Intercept	-0.332208	+/-20



NO_X Calibration Plot Date: March 23, 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:	March 22, 2023	Last Cal Date:	February 3, 2023
Start time (MST):	8:54	End time (MST):	12:20
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997629	0.997886	Backgd or Offset:	2.7	3.7
Calibration intercept:	1.040000	0.320000	Coeff or Slope:	0.962	0.964

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	969.9	400.0	399.0	1.003
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.3	----
high point	5000	980.6	400.0	399.1	1.002
second point	5000	838.0	200.0	200.4	0.998
third point	5000	735.3	100.0	100.6	0.994
as left zero	5000	0.0	0.0	-1.0	----
as left span	5000	979.1	400.0	400.8	0.998
				Average Correction Factor	0.998

Baseline Corr As found:	399.1	Previous response	400.1	*% change	-0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after as founds. Zero adjusted.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

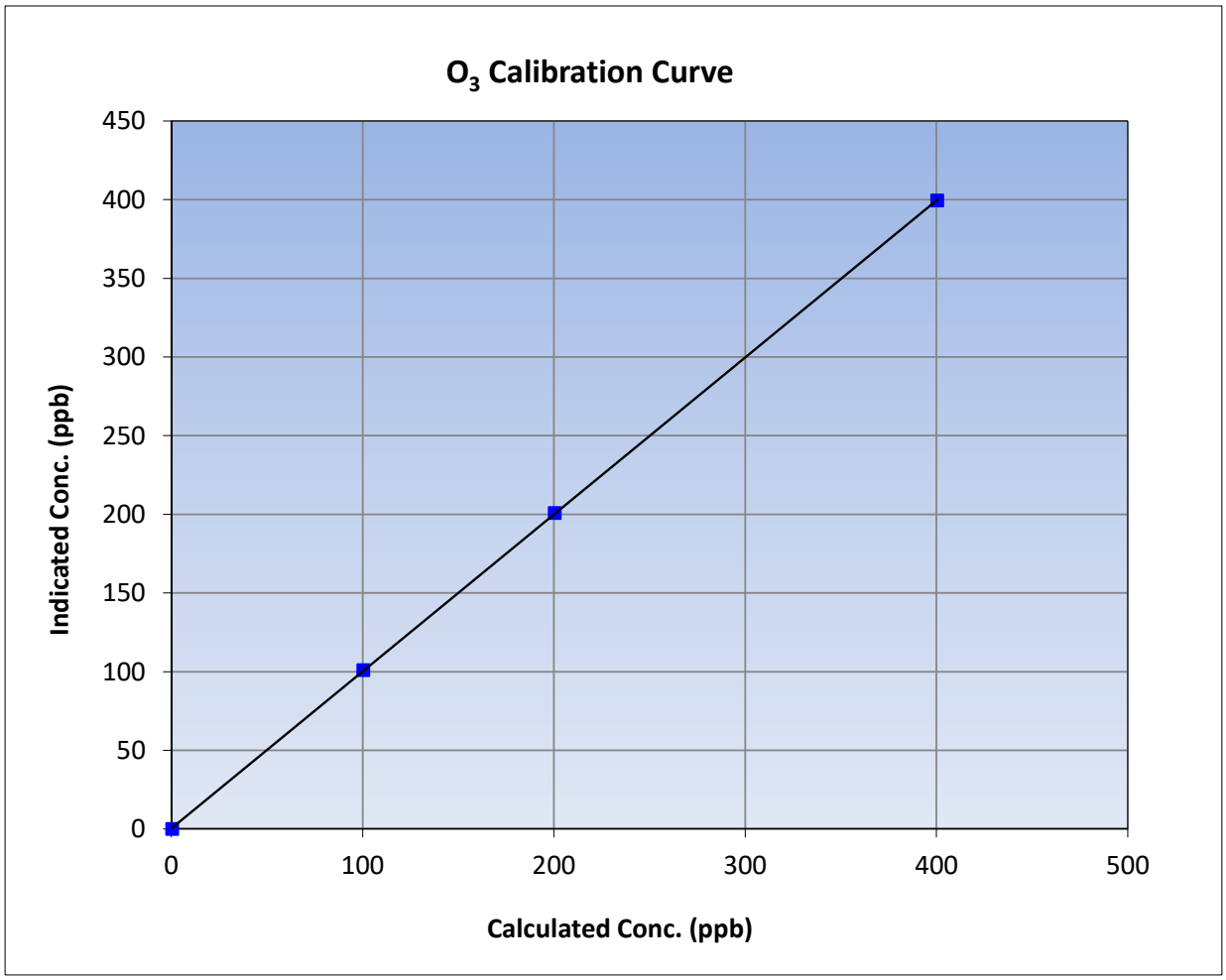
Station Information

Calibration Date:	March 22, 2023	Previous Calibration:	February 3, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:54	End Time (MST):	12:20
Analyzer make:	Teledyne API T400	Analyzer serial #:	3871

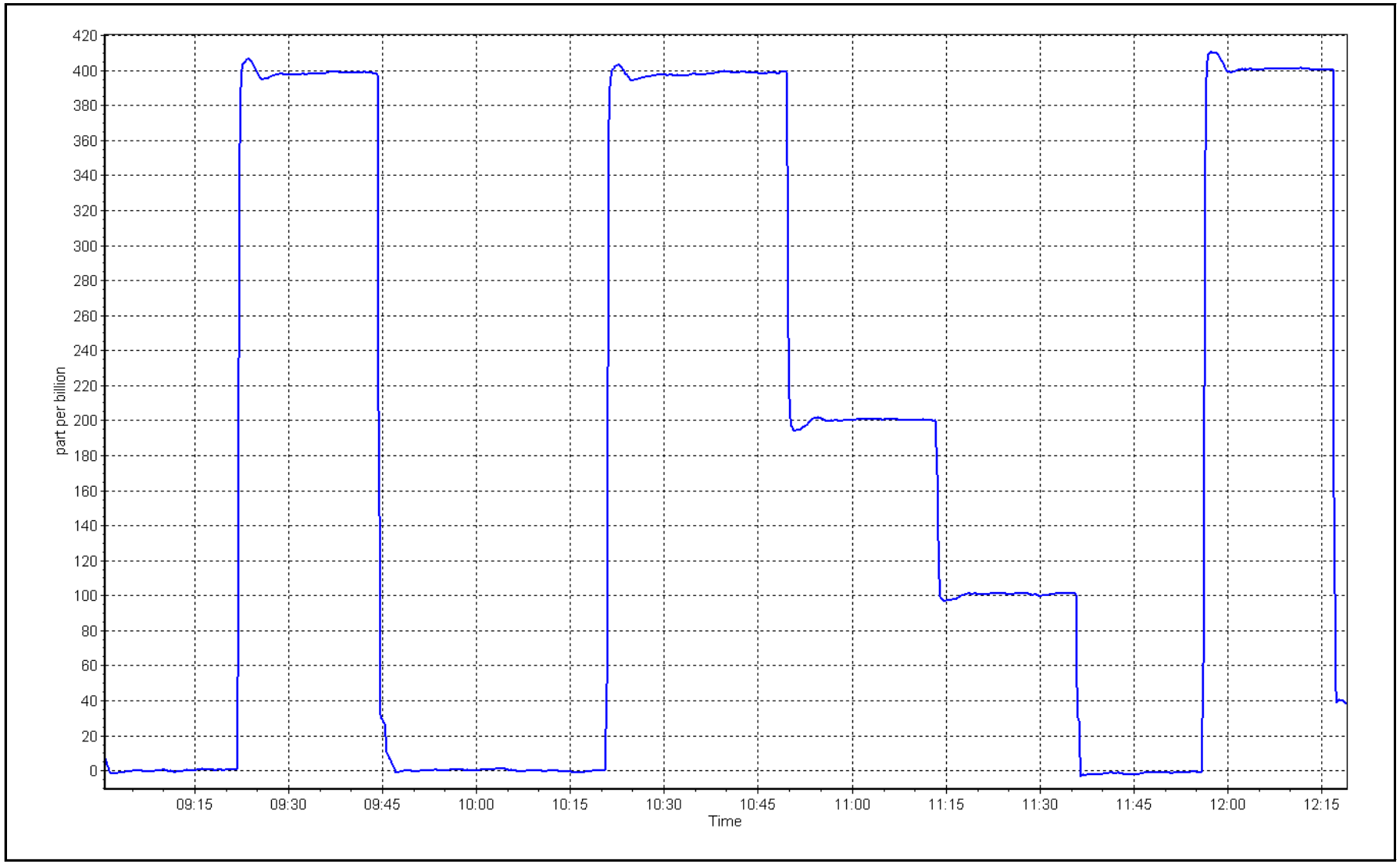
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
400.0	399.1	1.0023
200.0	200.4	0.9980
100.0	100.6	0.9940

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999988	*≥0.995*
Slope	0.997886	*0.90 - 1.10*
Intercept	0.320000	*+/- 5*



O_3 Calibration Plot Date: March 22, 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:	March 22, 2023	Last Cal Date:	February 16, 2023
Start time (MST):	9:34	End time (MST):	11:32
Analyzer Make:	API T640	S/N:	319
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	141229
Temp/RH standard:	Delta Cal	S/N:	141229

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-7.3	-6.9	-7.3	☐	+/- 2 °C
P (mmHg)	729.5	729.1	729.5	☐	+/- 10 mmHg
flow (LPM)	5.01	5.02	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: March 22, 2023 Last Cal Date: February 16, 2023

PM w/o HEPA: 7.2 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	10.9	11.1	10.7	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 29.1 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: March 22, 2023

Disposable Filter Changed: March 22, 2023

Annual Maintenance

Date Sample Tube Cleaned: _____

Date RH/T Sensor Cleaned: _____

Notes: Inlet inspected and cleaned. Pump was replaced as well.

Calibration by: Sean Bala

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS14
ANZAC
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	March 17, 2023	Last Cal Date:	February 21, 2023
Start time (MST):	6:45	End time (MST):	9:16
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.95	ppm	Cal Gas Exp Date:	January 5, 2025
Cal Gas Cylinder #:	CC279389			
Removed Cal Gas Conc:	49.95	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	5239
ZAG Make/Model:	API T701H		Serial Number:	357

Analyzer Information

Analyzer make: Thermo 43i Analyzer serial #: 0710321322

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.993711	0.997012	Backgd or Offset:	25.1	25.1
Calibration intercept:	-1.045321	-1.625104	Coeff or Slope:	0.795	0.795

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.4	----
as found span	4920	80.1	800.2	800.0	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.5	----
high point	4920	80.1	800.2	797.3	1.004
second point	4960	40.0	399.6	395.5	1.010
third point	4980	20.0	199.8	195.6	1.021
as left zero	5000	0.0	0.0	0.5	----
as left span	4920	80.1	800.2	795.1	1.006
				Average Correction Factor	1.012

Baseline Corr As found:	799.60	Previous response	794.11	*% change	0.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No Maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

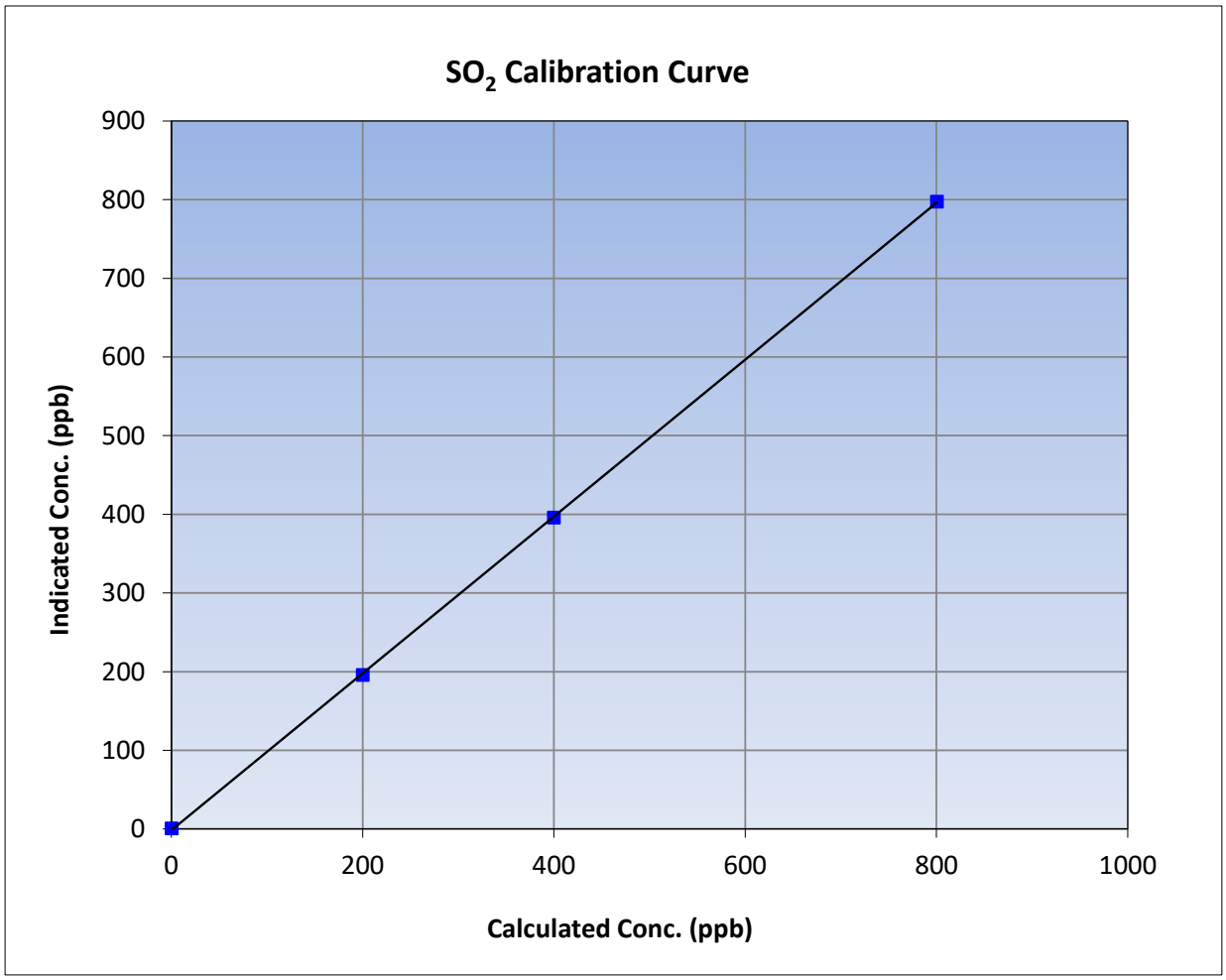
Station Information

Calibration Date:	March 17, 2023	Previous Calibration:	February 21, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	6:45	End Time (MST):	9:16
Analyzer make:	Thermo 43i	Analyzer serial #:	0710321322

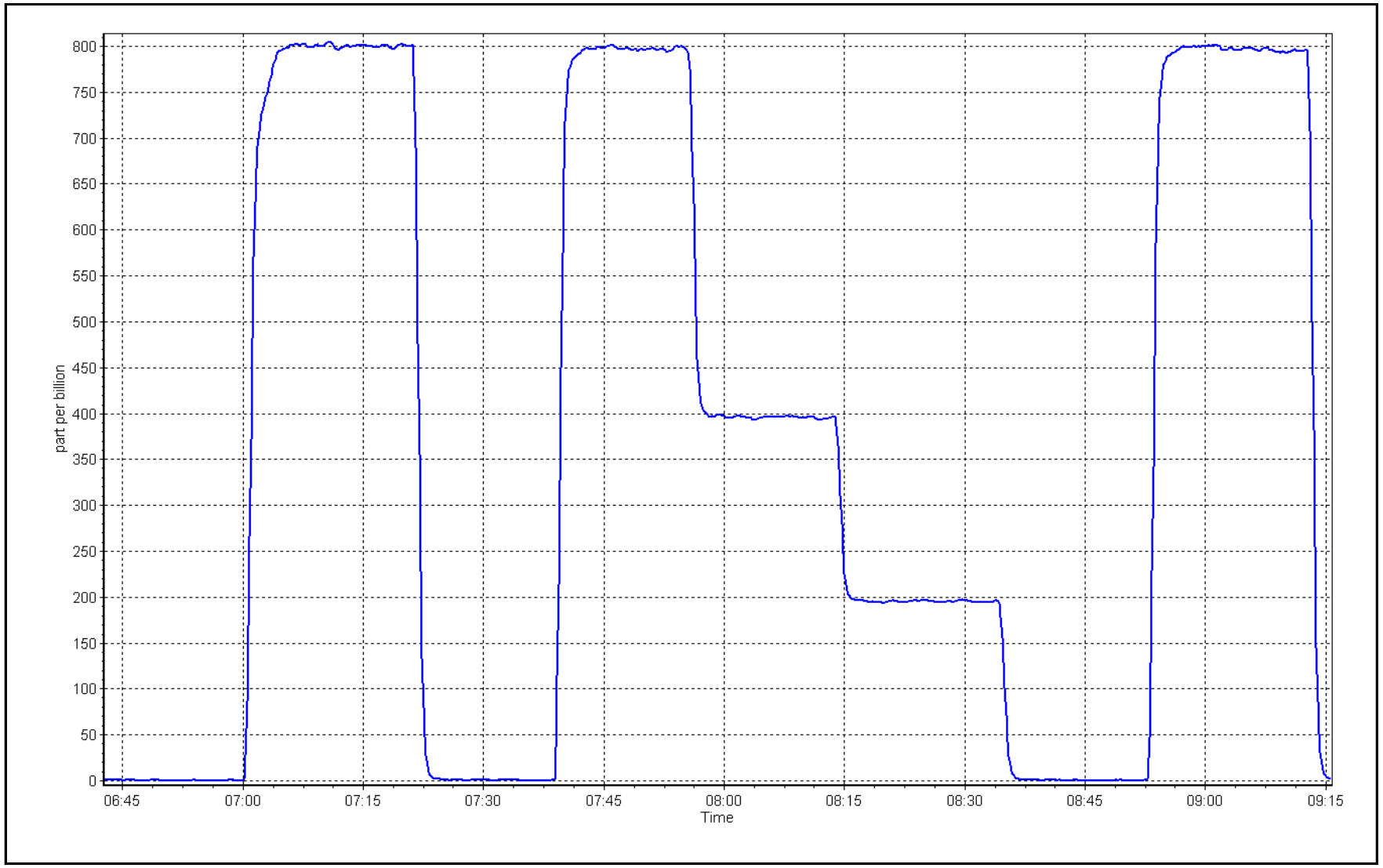
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
800.2	797.3	1.0036
399.6	395.5	1.0104
199.8	195.6	1.0215

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999967	*≥0.995*
Slope	0.997012	*0.90 - 1.10*
Intercept	-1.625104	*+/-30*



SO2 Calibration Plot Date: March 17, 2023 Location: Anzac



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	March 1, 2023	Last Cal Date:	February 3, 2023
Start time (MST):	8:49	End time (MST):	12:51
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.004840	1.004840	Backgd or Offset:	5.66	5.76
Calibration intercept:	-0.021121	0.178882	Coeff or Slope:	1.008	1.031

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.3	----
as found span	4925	74.3	80.0	78.7	1.020
as found 2nd point	4962	37.2	40.0	39.2	1.029
as found 3rd point	4981	18.6	20.0	19.4	1.048
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.5	----
high point	4925	74.3	80.0	80.7	0.991
second point	4962	37.2	40.0	40.2	0.996
third point	4981	18.6	20.0	20.0	1.001
as left zero	5000	0.0	0.0	0.5	----
as left span	4925	74.3	80.0	80.4	0.995
SO2 Scrubber Check	4920	80.0	800.0	-0.1	----
Date of last scrubber change:				Ave Corr Factor	0.996
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.4	Prev response:	80.32	*% change:	-2.5%
Baseline Corr 2nd AF pt:	38.9	AF Slope:	0.982257	AF Intercept:	0.019323
Baseline Corr 3rd AF pt:	19.1	AF Correlation:	0.999942		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

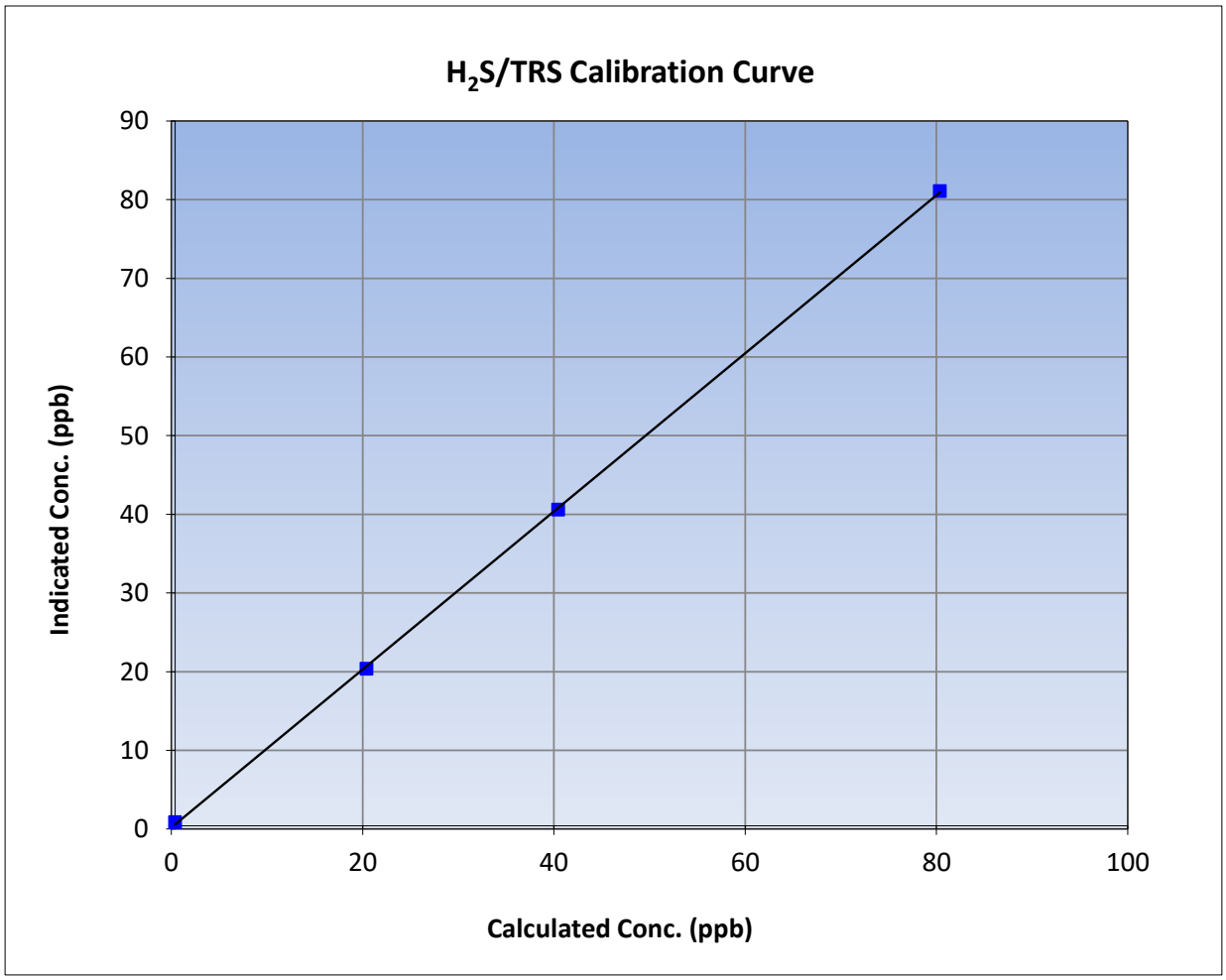
Station Information

Calibration Date:	March 1, 2023	Previous Calibration:	February 3, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	8:49	End Time (MST):	12:51
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1180540019

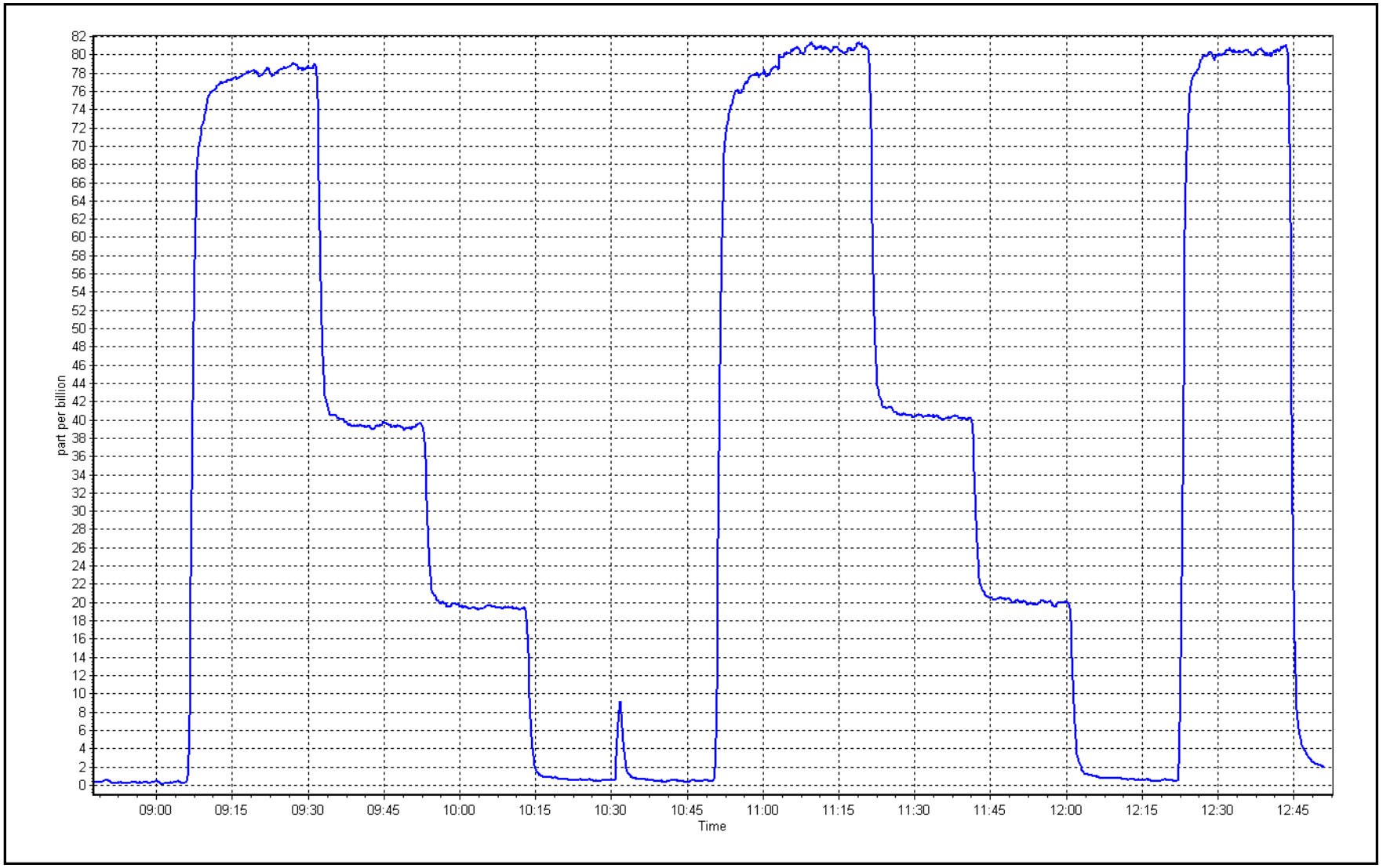
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
80.0	80.7	0.9908
40.0	40.2	0.9959
20.0	20.0	1.0008

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999926	*≥0.995*
Slope	1.004840	*0.90 - 1.10*
Intercept	0.178882	*+/-3*



TRS Calibration Plot Date: March 1, 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:	March 1, 2023	Last Cal Date:	February 21, 2023
Start time (MST):	7:45	End time (MST):	8:51
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:		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:	5252	
ZAG make/model:	API 701H		Serial Number:	357	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1118148494	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.85E-04	3.85E-04	NMHC SP Ratio:	4.46E-05	4.46E-05
CH4 Retention time:	12.00	12.00	NMHC Peak Area:	204554	204554

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	17.12	17.02	1.006
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	17.12	16.98	1.008
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.008

Baseline Corr AF:	17.02	Prev response	16.92	*% 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	4920	80.1	9.12	9.02	1.011
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	9.12	9.00	1.013
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.013
Baseline Corr AF:	9.02	Prev response	9.01	*% change	0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	8.00	7.99	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	8.00	7.98	1.002
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.002
Baseline Corr AF:	7.99	Prev response	7.98	*% change	0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

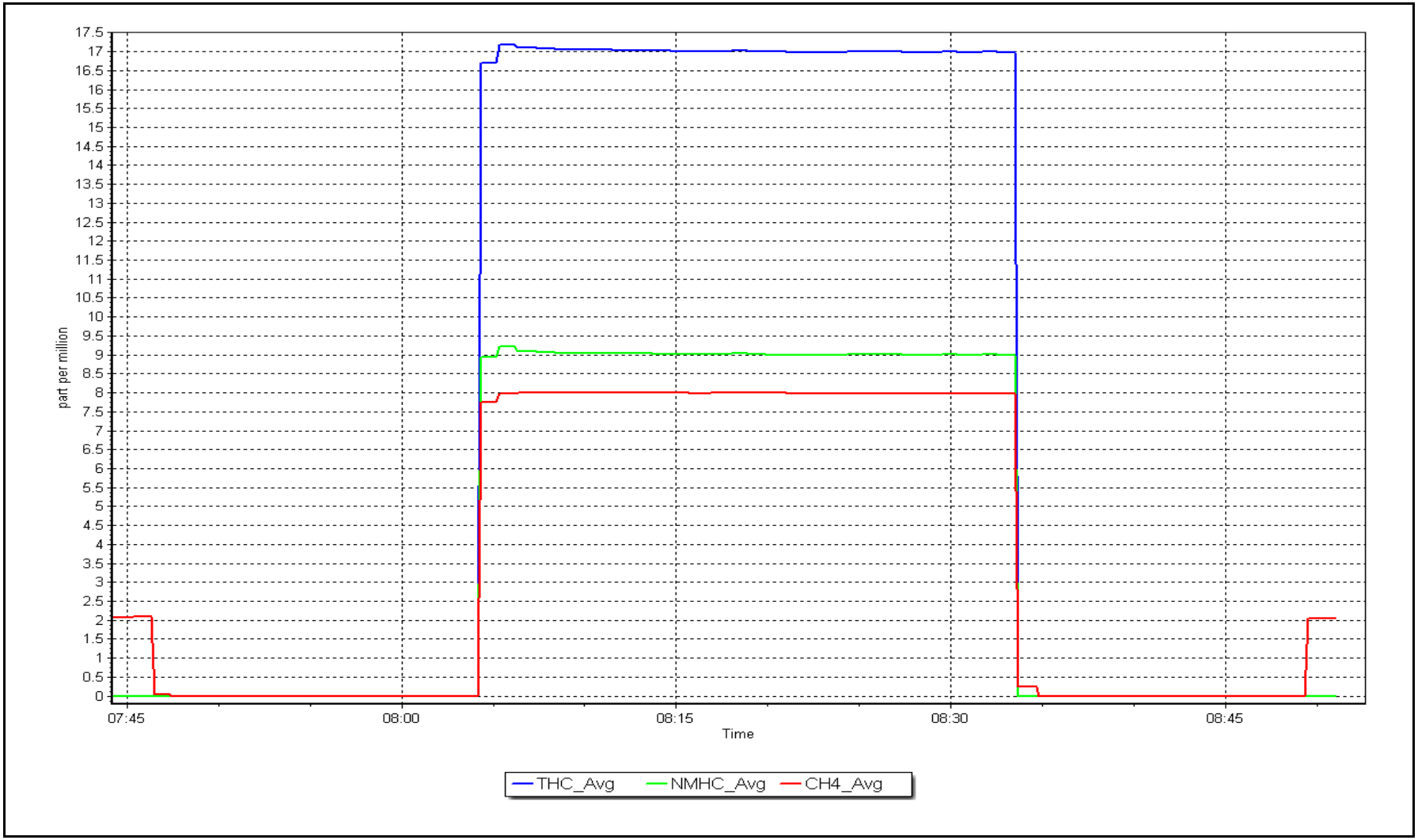
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.988889	0.991693
THC Cal Offset:	-0.013842	0.000000
CH4 Cal Slope:	0.999568	0.997671
CH4 Cal Offset:	-0.016046	0.000000
NMHC Cal Slope:	0.989676	0.986890
NMHC Cal Offset:	-0.015788	0.000000

Notes: Nitrogen Cylinder Change

Calibration Performed By: Melissa Lemay

NMHC Calibration Plot Date: March 1, 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:	March 17, 2023	Last Cal Date:	February 21, 2023
Start time (MST):	6:45	End time (MST):	9:15
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:	5252	
ZAG make/model:	API 701H		Serial Number:	357	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1118148494	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.85E-04	3.85E-04	NMHC SP Ratio:	4.46E-05	4.46E-05
CH4 Retention time:	12.00	12.00	NMHC Peak Area:	204554	204554

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	17.12	17.02	1.006
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	17.12	17.04	1.005
second point	4960	40.0	8.55	8.50	1.006
third point	4980	20.0	4.28	4.21	1.016
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.1	17.12	16.97	1.009
				Average Correction Factor	1.009
Baseline Corr AF:	17.02	Prev response	16.92	*% 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	4920	80.1	9.12	9.09	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	9.12	9.10	1.003
second point	4960	40.0	4.56	4.54	1.004
third point	4980	20.0	2.28	2.24	1.017
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.1	9.12	9.06	1.007
				Average Correction Factor	1.008
Baseline Corr AF:	9.09	Prev response	9.01	*% 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	4920	80.1	8.00	7.93	1.009
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	8.00	7.94	1.007
second point	4960	40.0	3.99	3.97	1.006
third point	4980	20.0	2.00	1.97	1.014
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.1	8.00	7.91	1.011
				Average Correction Factor	1.009
Baseline Corr AF:	7.93	Prev response	7.98	*% change	-0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.988889	0.996031
THC Cal Offset:	-0.013842	-0.019815
CH4 Cal Slope:	0.999568	0.993278
CH4 Cal Offset:	-0.016046	-0.004047
NMHC Cal Slope:	0.989676	0.998568
NMHC Cal Offset:	-0.015788	-0.013765

Notes: No adjustments done. Hydrogen Cylinder changed out.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

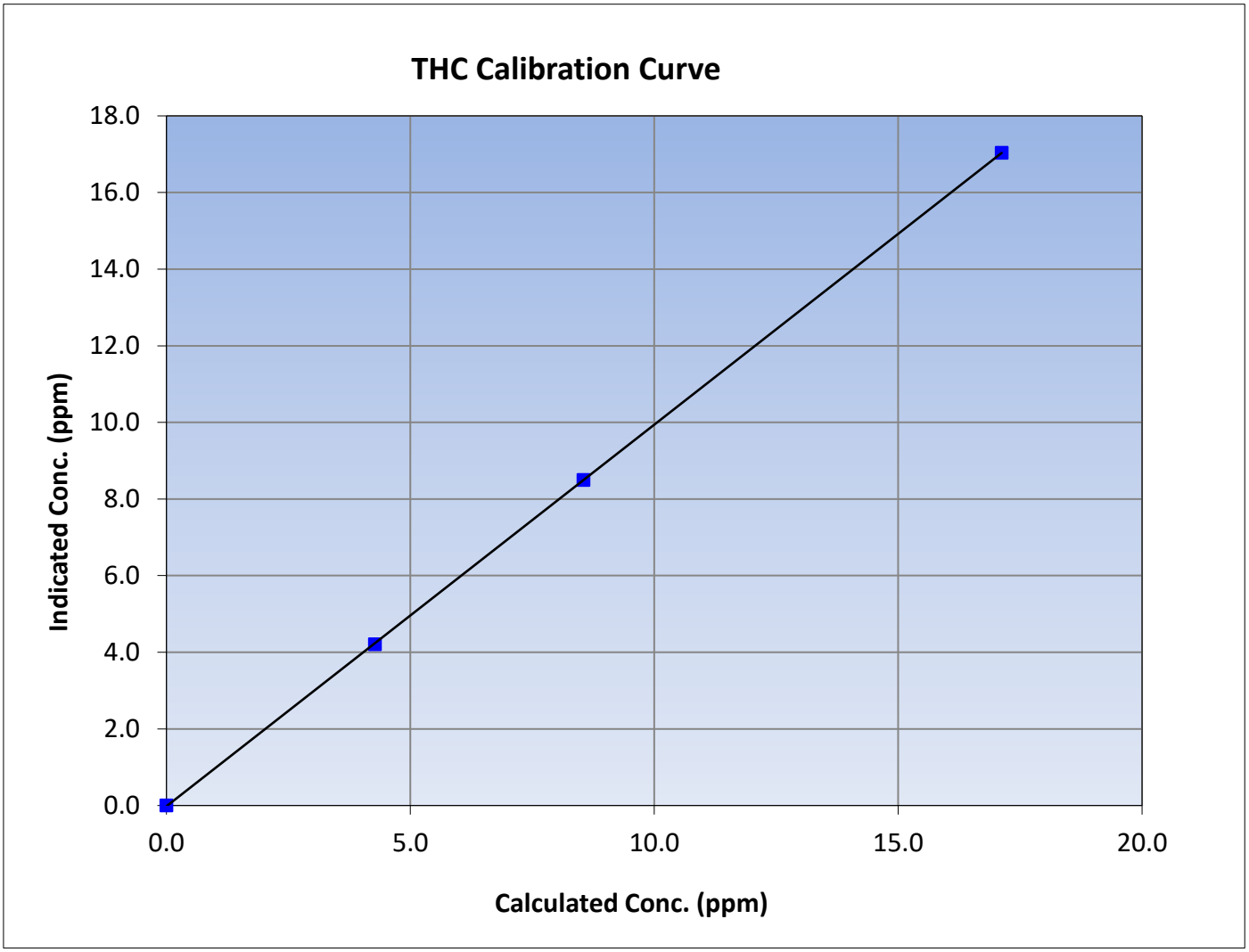
Version-01-2020

Station Information

Calibration Date:	March 17, 2023	Previous Calibration:	February 21, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	6:45	End Time (MST):	9:15
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	0.999992	≥0.995
17.12	17.04	1.0048			
8.55	8.50	1.0060	Slope	0.996031	0.90 - 1.10
4.28	4.21	1.0155			
			Intercept	-0.019815	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

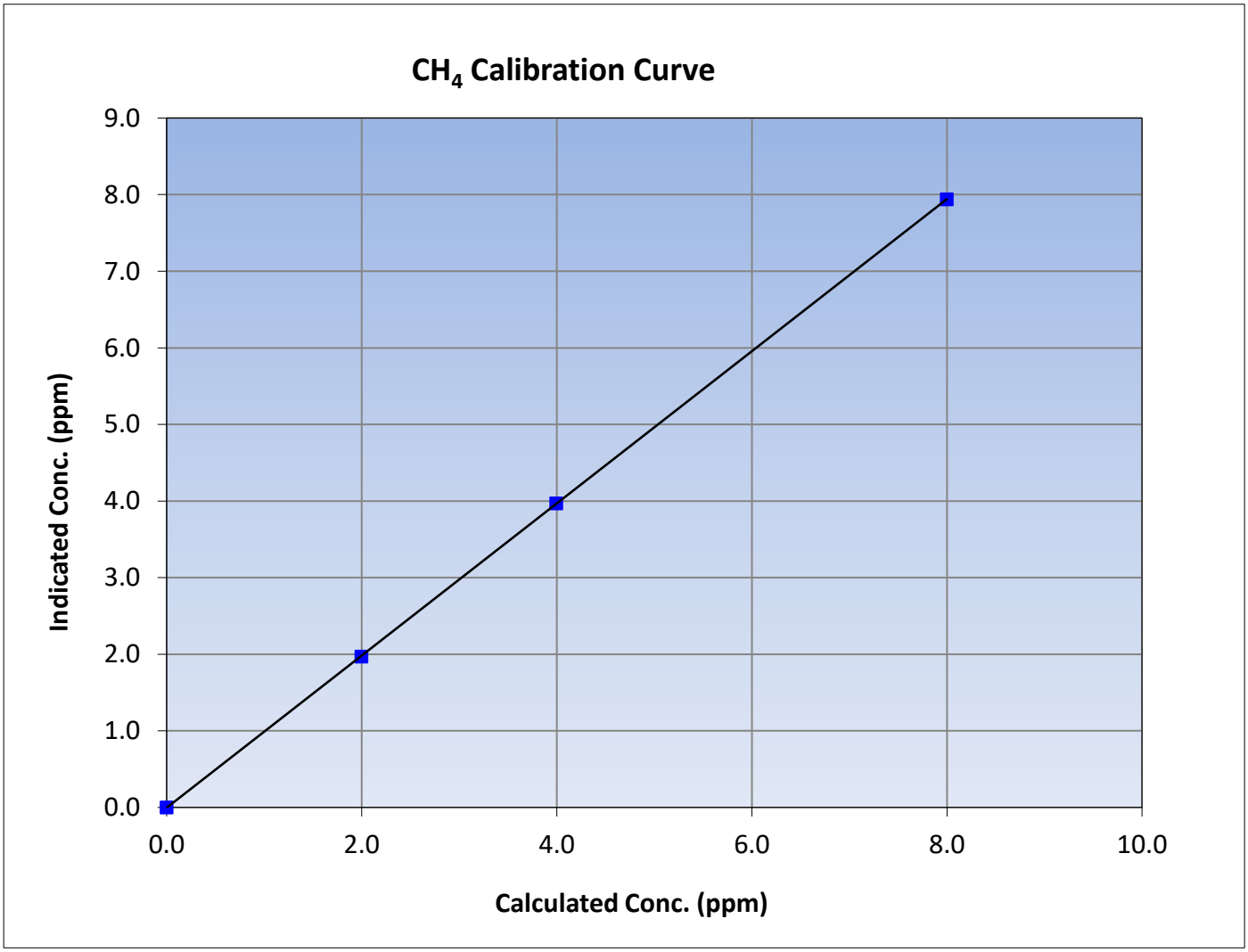
Version-01-2020

Station Information

Calibration Date:	March 17, 2023	Previous Calibration:	February 21, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	6:45	End Time (MST):	9:15
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	0.999996	*≥0.995*
8.00	7.94	1.0074			
3.99	3.97	1.0061	Slope	0.993278	*0.90 - 1.10*
2.00	1.97	1.0138			
			Intercept	-0.004047	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

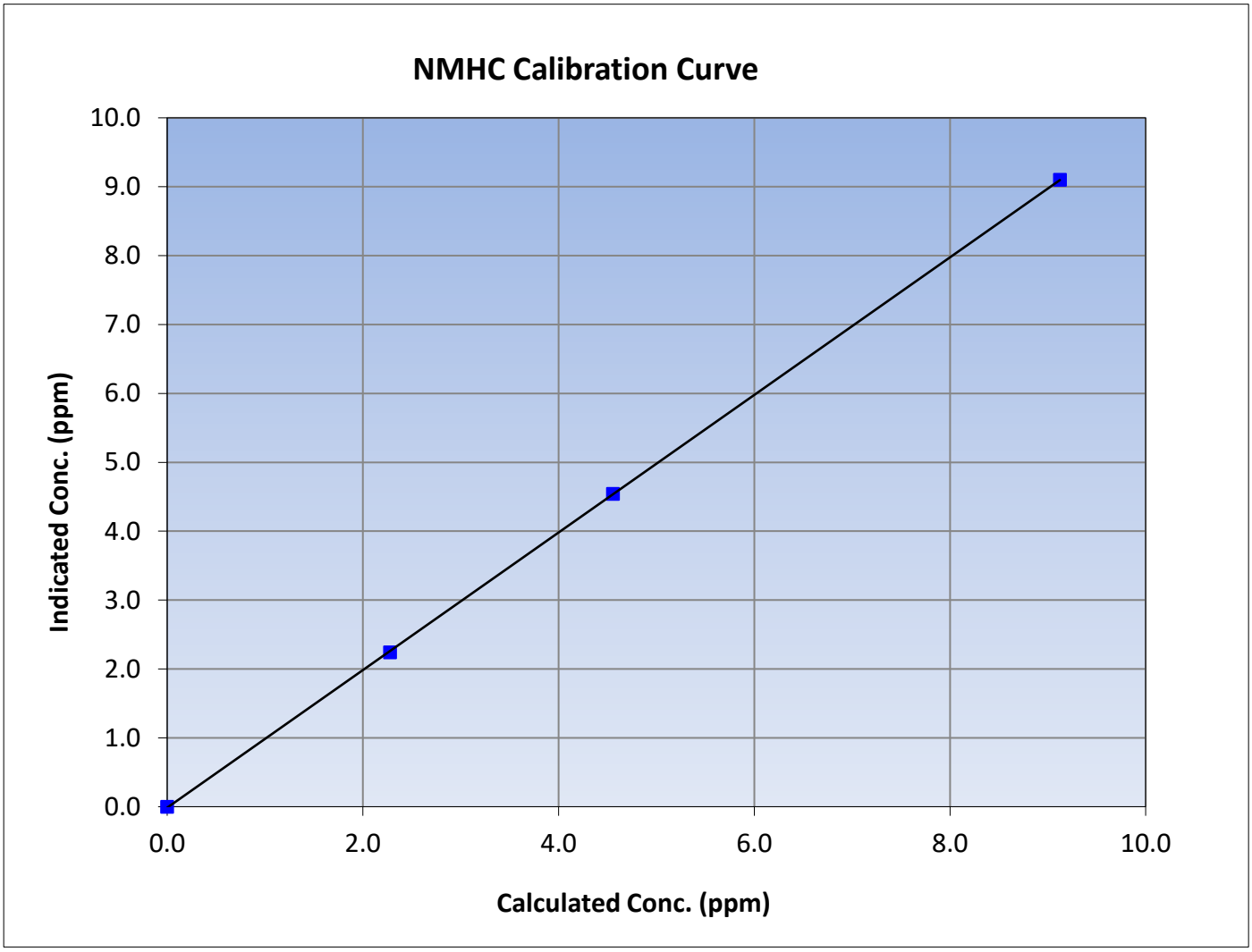
Version-01-2020

Station Information

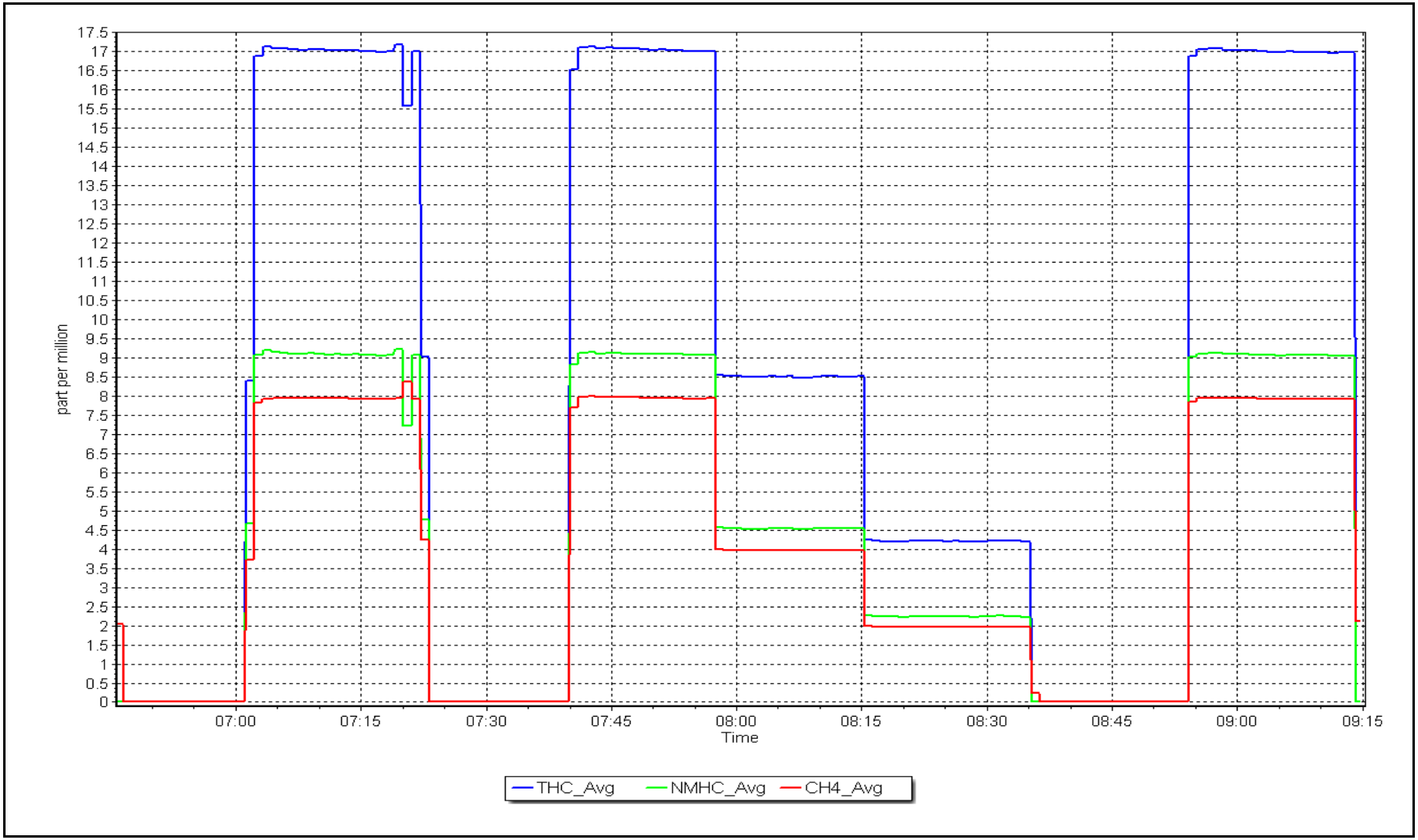
Calibration Date:	March 17, 2023	Previous Calibration:	February 21, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	6:45	End Time (MST):	9:15
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999985	≥0.995
9.12	9.10	1.0026			
4.56	4.54	1.0036	Slope	0.998568	0.90 - 1.10
2.28	2.24	1.0170			
			Intercept	-0.013765	+/-0.5



NMHC Calibration Plot Date: March 17, 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:	March 2, 2023	Last Cal Date:	February 2, 2023
Start time (MST):	7:45	End time (MST):	12:16
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:	5239	
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:	1.361	1.361	NO bkgnd or offset:	3.7	3.7
NOX coeff or slope:	0.996	0.996	NOX bkgnd or offset:	3.7	3.7
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	158.5	163.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.011937	0.993239
NO_X Cal Offset:	-0.743109	-0.747177
NO Cal Slope:	1.013337	0.995505
NO Cal Offset:	-1.947043	-2.010875
NO_2 Cal Slope:	1.000011	0.999852
NO_2 Cal Offset:	0.089892	0.368111

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	4921	78.6	800.5	786.8	13.7	796.8	781.7	15.1	1.0047	1.0066
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	-0.1	0.2	----	----
high point	4921	78.6	800.5	786.8	13.7	794.7	782.1	12.6	1.0073	1.0061
second point	4961	39.3	400.2	393.4	6.8	396.7	389.1	7.6	1.0088	1.0110
third point	4980	19.6	199.6	196.2	3.4	196.3	191.1	5.2	1.0169	1.0267
as left zero	5000	0.0	0.0	0.0	0.0	0.2	-0.1	0.3	----	----
as left span	4921	78.6	800.5	396.5	404.0	791.4	387.9	403.5	1.0115	1.0223
								Average Correction Factor	1.0110	1.0146

Corrected As found	NO_X = 796.6 ppb	NO = 781.9 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-1.6%
Previous Response	NO_X = 809.3 ppb	NO = 795.4 ppb		*Percent Change	NO =	-1.7%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	776.1	385.8	404.0	404.2	0.9994	100.1%
2nd GPT point (200 ppb O3)	776.1	591.4	198.4	198.8	0.9979	100.2%
3rd GPT point (100 ppb O3)	776.1	683.8	106.0	106.5	0.9951	100.5%
				Average Correction Factor	0.9975	100.3%

Notes: No maintenance or adjustments done.

Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

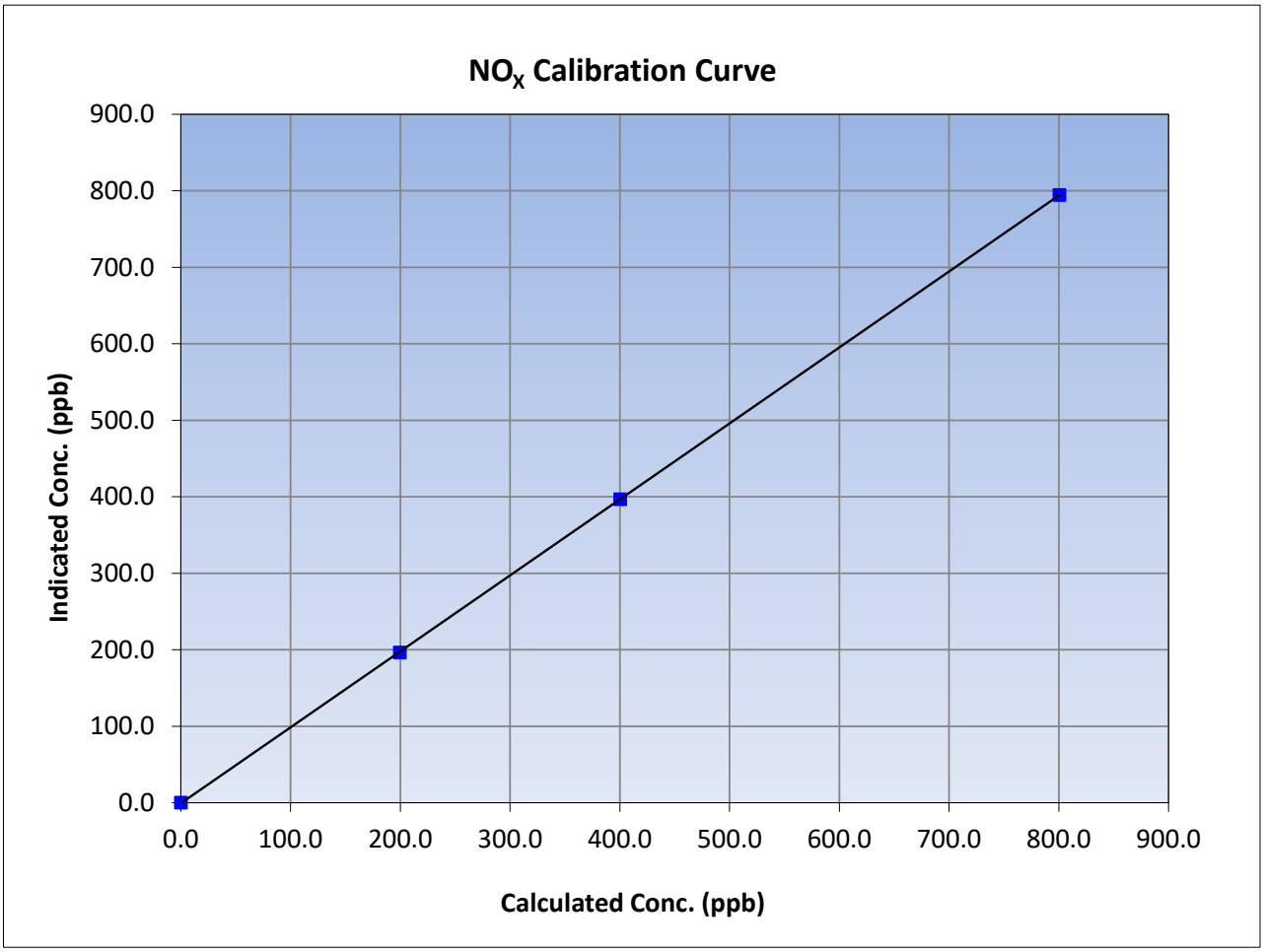
Version-04-2020

Station Information

Calibration Date:	March 2, 2023	Previous Calibration:	February 2, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	7:45	End Time (MST):	12:16
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	0.2	----	Correlation Coefficient	0.999993	≥0.995
800.5	794.7	1.0073			
400.2	396.7	1.0088	Slope	0.993239	0.90 - 1.10
199.6	196.3	1.0169			
			Intercept	-0.747177	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

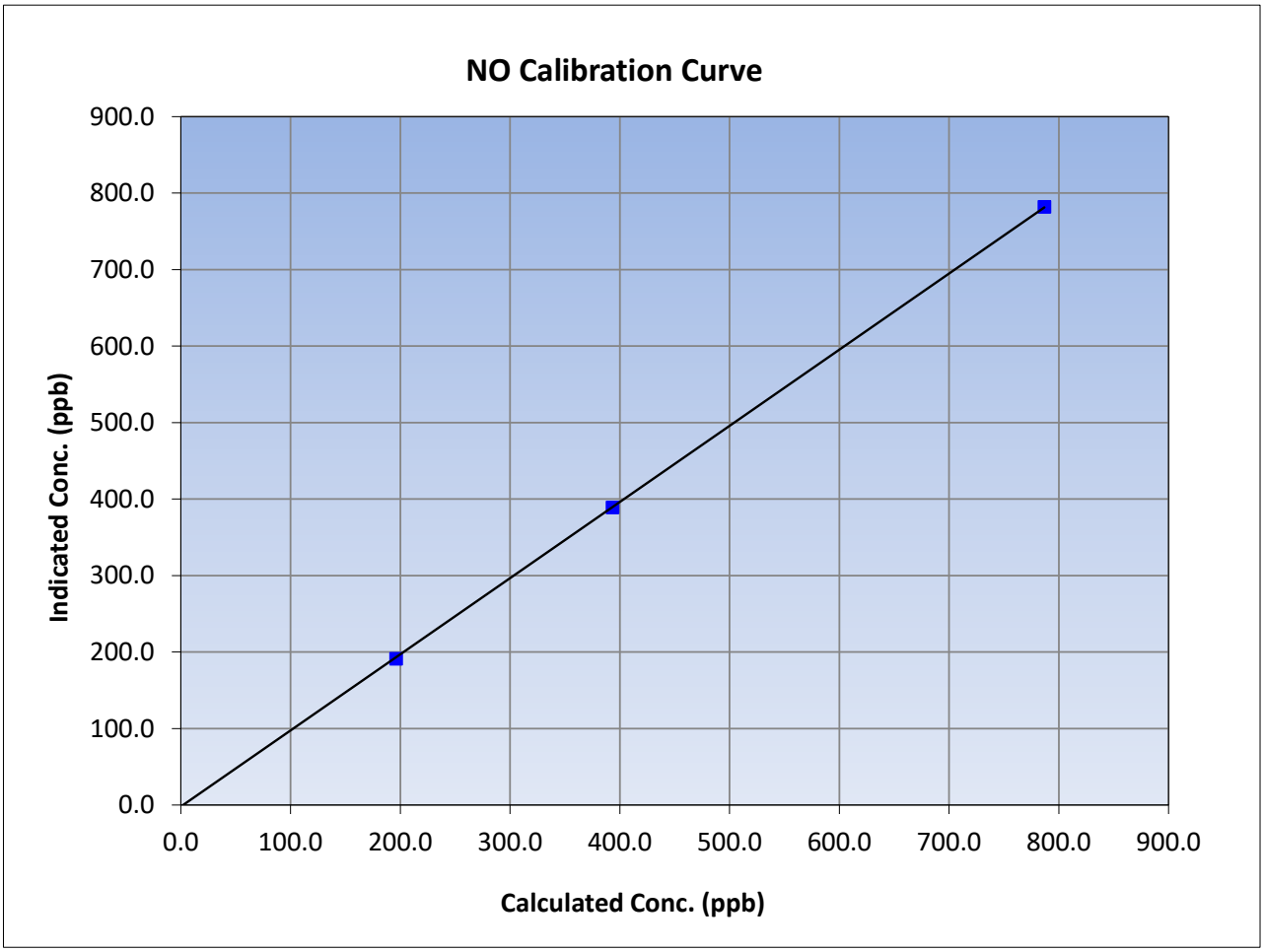
Version-04-2020

Station Information

Calibration Date:	March 2, 2023	Previous Calibration:	February 2, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	7:45	End Time (MST):	12:16
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	-0.1	----	Correlation Coefficient	0.999972	≥0.995
786.8	782.1	1.0061			
393.4	389.1	1.0110	Slope	0.995505	0.90 - 1.10
196.2	191.1	1.0267			
			Intercept	-2.010875	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

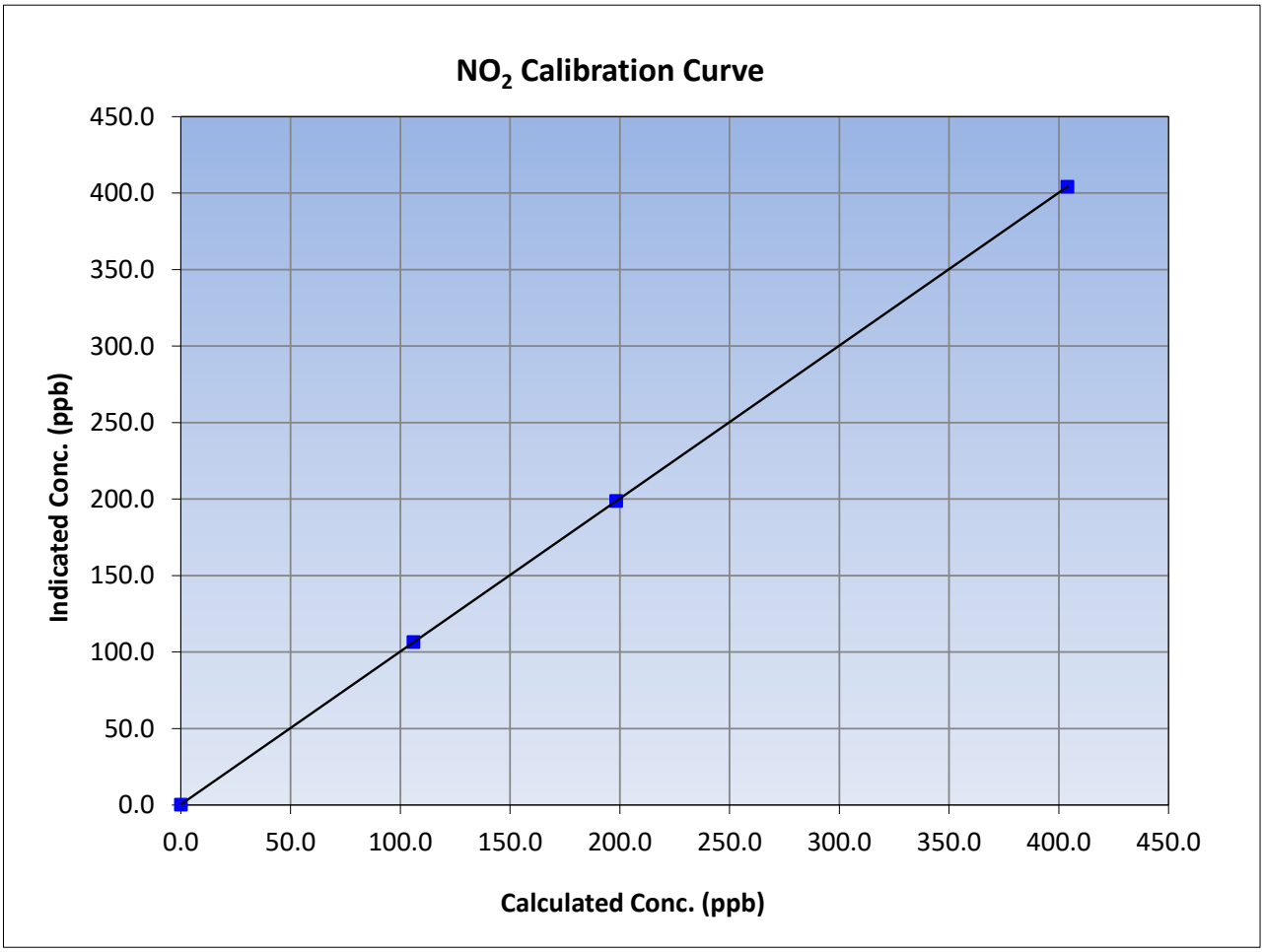
Version-04-2020

Station Information

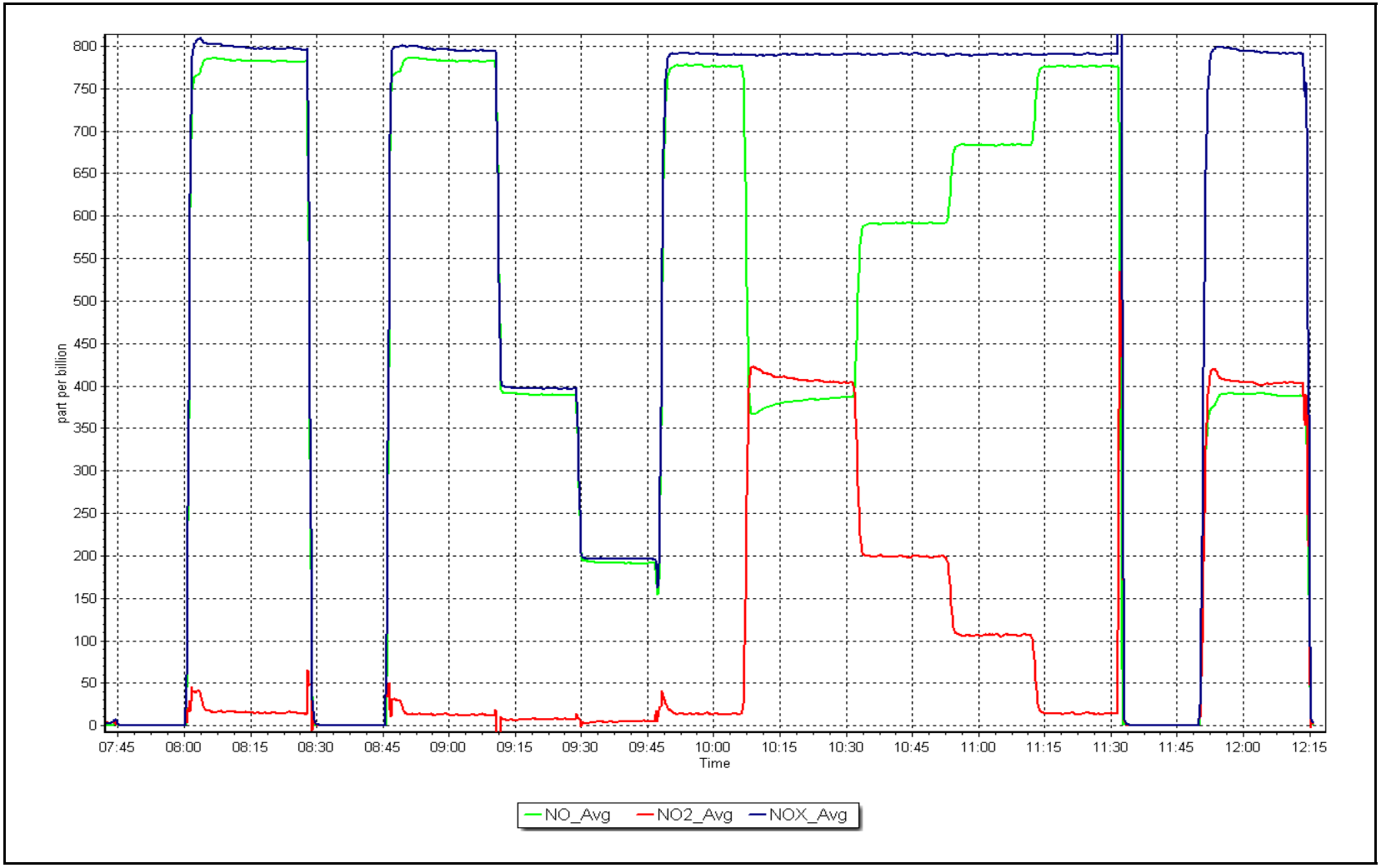
Calibration Date:	March 2, 2023	Previous Calibration:	February 2, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	7:45	End Time (MST):	12:16
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999999	≥0.995
404.0	404.2	0.9994			
198.4	198.8	0.9979	Slope	0.999852	0.90 - 1.10
106.0	106.5	0.9951			
			Intercept	0.368111	+/-20



NO_X Calibration Plot Date: March 2, 2023 Location: Anzac



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	March 30, 2023	Last Cal Date:	February 21, 2023
Start time (MST):	7:34	End time (MST):	10:25
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	API T700	Serial Number:	5239
ZAG Make/Model:	API 701H	Serial Number:	357

Analyzer Information

Analyzer make:	Thermo 49i	Analyzer serial #:	1426262595
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.995743	1.001686	Backgd or Offset:	0.9	0.9
Calibration intercept:	0.420000	0.080000	Coeff or Slope:	1.499	1.516

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	883.9	400.0	395.6	1.011
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.5	----
high point	5000	885.2	400.0	400.5	0.999
second point	5000	771.0	200.0	200.6	0.997
third point	5000	671.5	100.0	100.9	0.991
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	881.6	400.0	402.7	0.993
				Average Correction Factor	0.996

Baseline Corr As found:	395.7	Previous response	398.7	*% change	-0.8%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

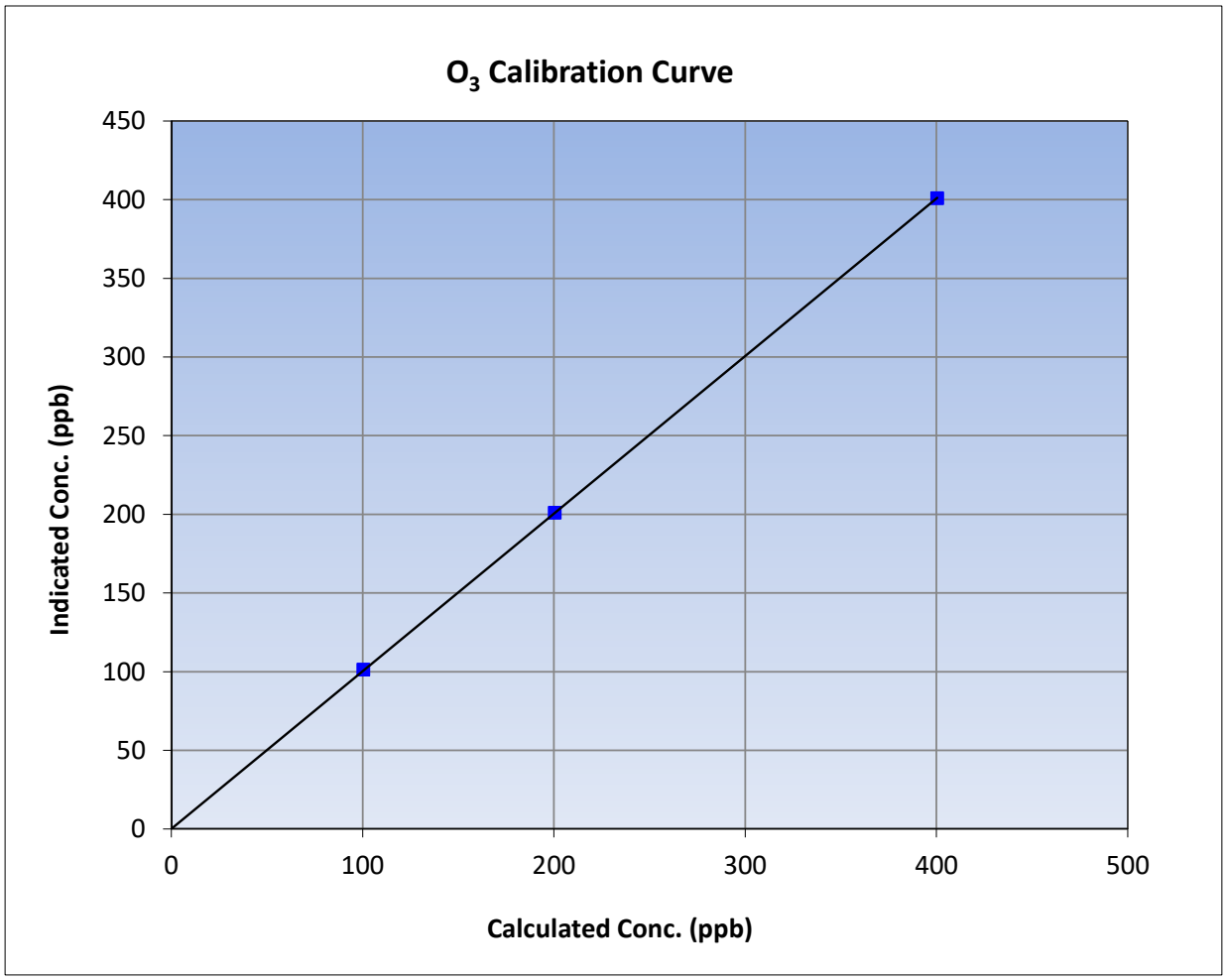
Station Information

Calibration Date:	March 30, 2023	Previous Calibration:	February 21, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	7:34	End Time (MST):	10:25
Analyzer make:	Thermo 49i	Analyzer serial #:	1426262595

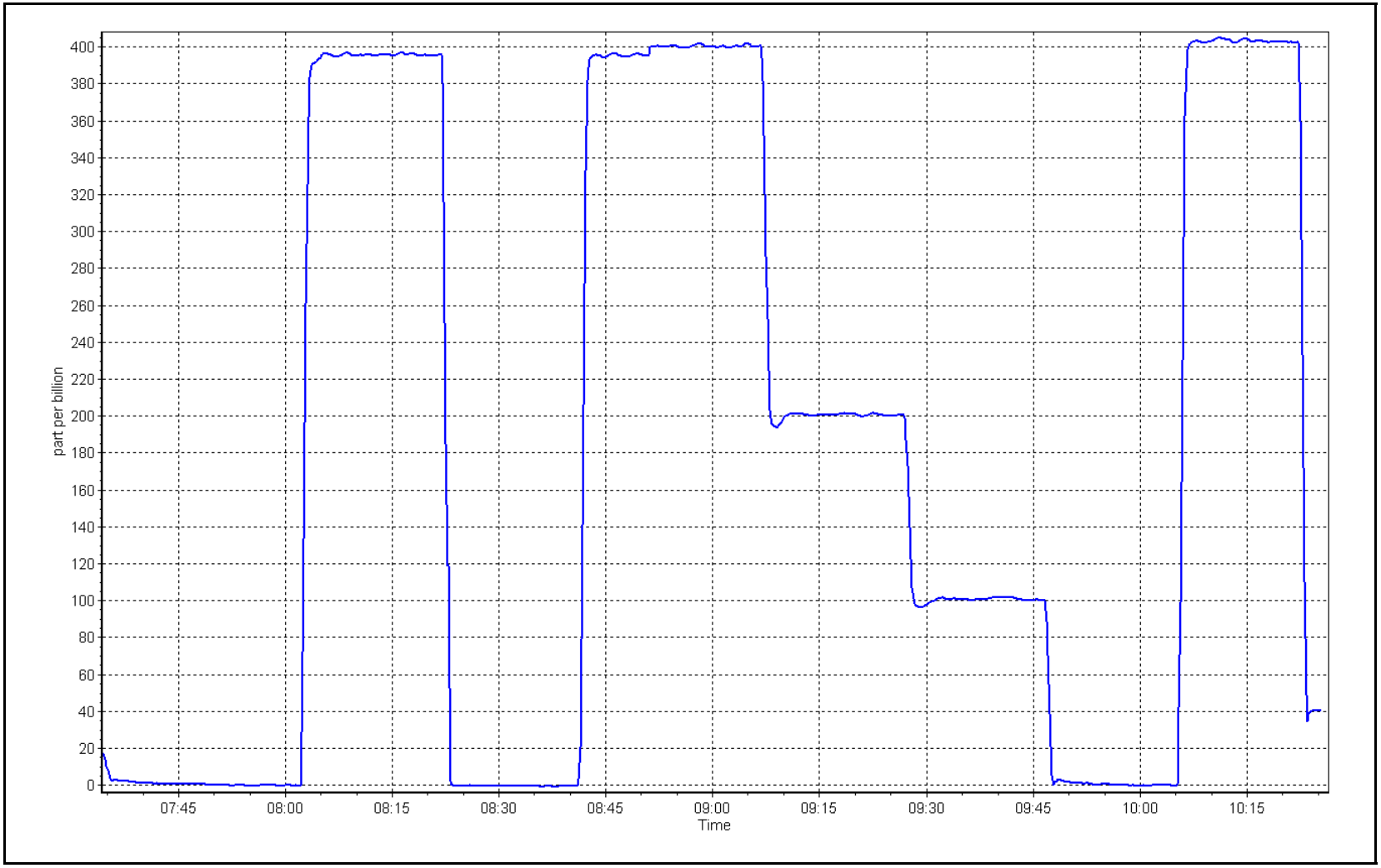
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.5	----
400.0	400.5	0.9988
200.0	200.6	0.9970
100.0	100.9	0.9911

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999990	*≥0.995*
Slope	1.001686	*0.90 - 1.10*
Intercept	0.080000	*+/- 5*



O_3 Calibration Plot Date: March 30, 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:	March 30, 2023	Last Cal Date:	February 22, 2023
Start time (MST):	6:25	End time (MST):	7:27
Analyzer Make:	API T640	S/N:	825
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25	S/N:	388753
Temp/RH standard:	Alicat FP-25	S/N:	388753

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-15	-14.8	-15	☐	+/- 2 °C
P (mmHg)	715.2	716.2	715.2	☐	+/- 10 mmHg
flow (LPM)	5	5.09	5	☐	+/- 0.25 LPM

Leak Test: Date of check: March 30, 2023 Last Cal Date: February 22, 2023

PM w/o HEPA: 3.2 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	9.1	10	10.8	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 100 w/ HEPA: 0

Date Optical Chamber Cleaned: March 30, 2023 <0.2 ug/m3

Disposable Filter Changed: March 30, 2023

Annual Maintenance

Date Sample Tube Cleaned: June 21, 2022

Date RH/T Sensor Cleaned: June 21, 2022

Notes: PMT adjusted after cleaning. Zero and Flow also checked before and after cleaning. Head Cleaned.

Calibration by: Melissa Lemay

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS17
WAPASU
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	March 9, 2023	Last Cal Date:	February 14, 2023
Start time (MST):	10:07	End time (MST):	13:28
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:	1.000068	0.999724	Backgd or Offset:	12.5	12.4
Calibration intercept:	-1.979730	-1.859598	Coeff or Slope:	1.099	1.099

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4921	79.4	800.0	797.9	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4921	79.4	800.0	799.5	1.001
second point	4960	39.7	400.0	395.3	1.012
third point	4980	19.8	199.5	196.7	1.014
as left zero	5000	0.0	0.0	0.5	----
as left span	4920	79.4	800.1	802.2	0.997
				Average Correction Factor	1.009

Baseline Corr As found:	797.80	Previous response	798.04	*% change	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

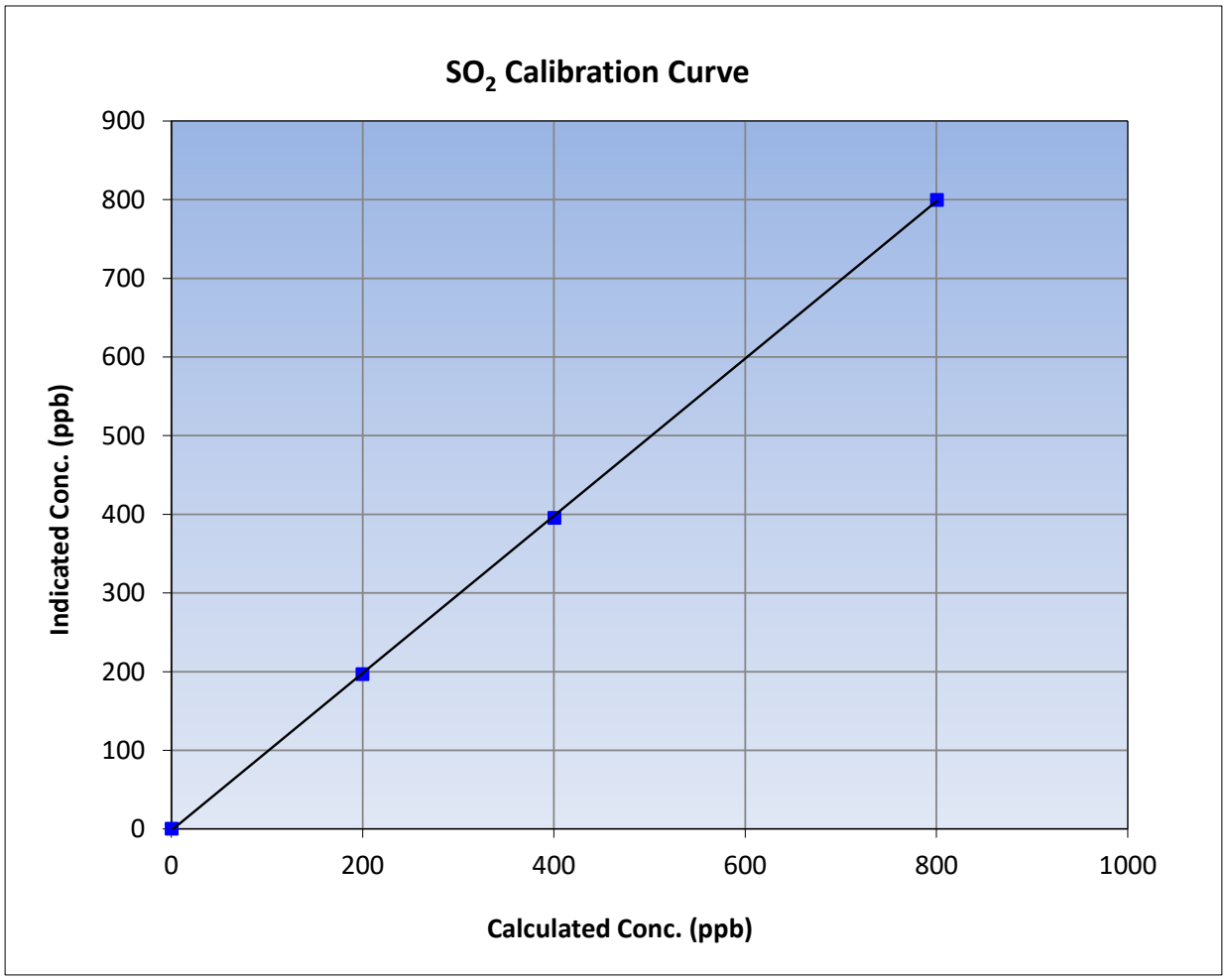
Station Information

Calibration Date:	March 9, 2023	Previous Calibration:	February 14, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:07	End Time (MST):	13:28
Analyzer make:	Thermo 43i	Analyzer serial #:	1218153459

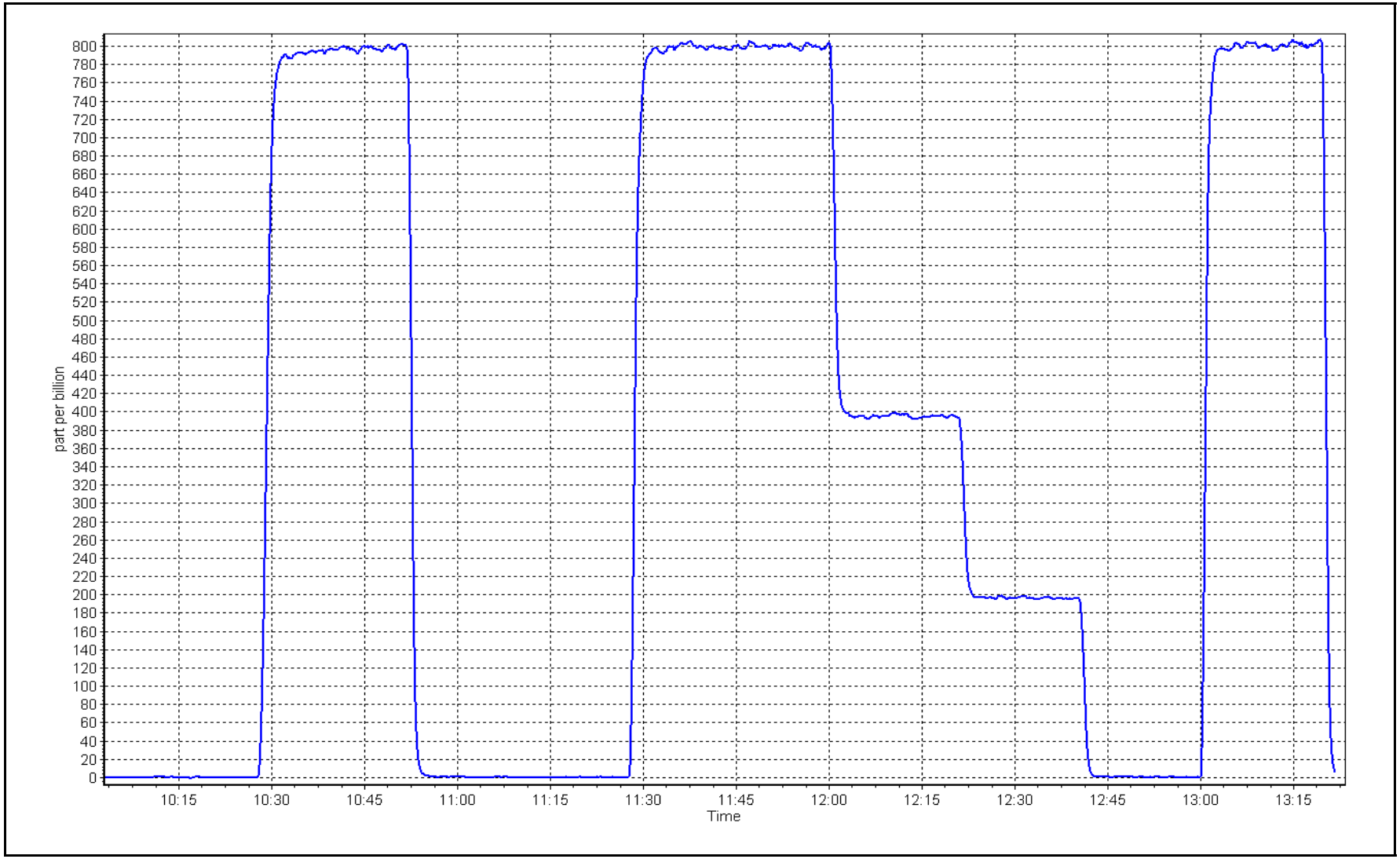
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
800.0	799.5	1.0006
400.0	395.3	1.0120
199.5	196.7	1.0143

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999956	*≥0.995*
Slope	0.999724	*0.90 - 1.10*
Intercept	-1.859598	*+/-30*



SO2 Calibration Plot Date: March 9, 2023 Location: Wapasu



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	March 8, 2023	Last Cal Date:	February 16, 2023
Start time (MST):	10:19	End time (MST):	14:42
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.076	ppm	Cal Gas Exp Date:	September 16, 2024
Cal Gas Cylinder #:	CC511852			
Removed Cal Gas Conc:	5.076	ppm	Rem Gas Exp Date:	n/a
Removed Gas Cyl #:	n/a		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	2449
ZAG Make/Model:	API T701H		Serial Number:	359

Analyzer Information

Analyzer make:	Thermo 450i		Analyzer serial #:	1218153583	
Converter make:	n/a		Converter serial #:	n/a	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.995568	0.990568	Backgd or Offset:	13.0	12.7
Calibration intercept:	0.080792	0.180784	Coeff or Slope:	1.085	1.085

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4921	78.8	80.0	79.7	1.005
as found 2nd point	4961	39.4	40.0	40.1	1.000
as found 3rd point	4980	19.7	20.0	20.1	1.000
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	4921	78.8	80.0	79.6	1.005
second point	4961	39.4	40.0	39.6	1.010
third point	4980	19.7	20.0	19.7	1.015
as left zero	5000	0.0	0.0	0.7	----
as left span	4921	78.8	80.0	78.5	1.019
SO2 Scrubber Check	4921	79.4	800.0	-0.2	----
Date of last scrubber change:		n/a		Ave Corr Factor	1.010
Date of last converter efficiency test:		n/a			efficiency

Baseline Corr As found:	79.6	Prev response:	79.73	*% change:	-0.2%
Baseline Corr 2nd AF pt:	40.0	AF Slope:	0.994854	AF Intercept:	0.180802
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999992		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

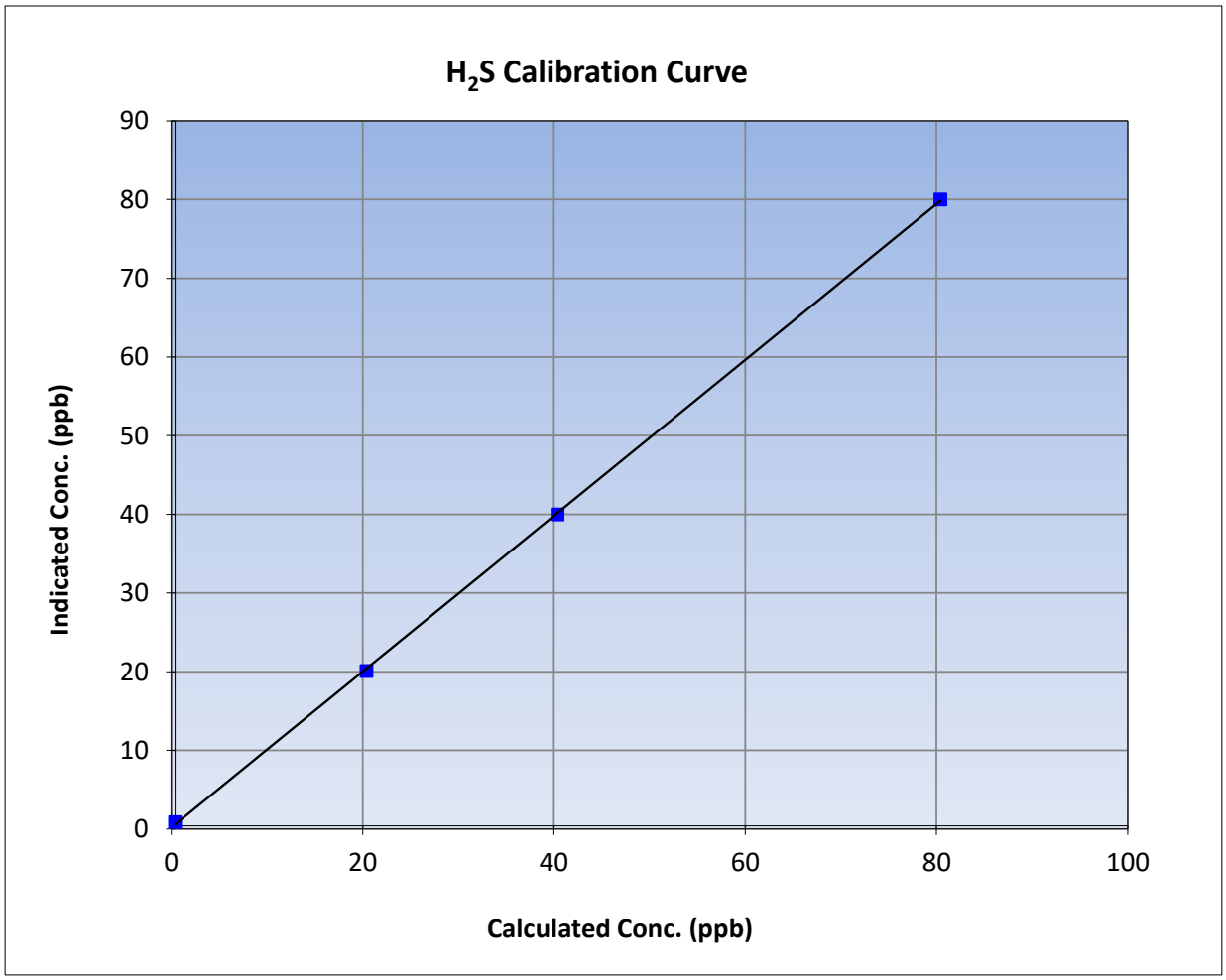
Station Information

Calibration Date:	March 8, 2023	Previous Calibration:	February 16, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:19	End Time (MST):	14:42
Analyzer make:	Thermo 450i	Analyzer serial #:	1218153583

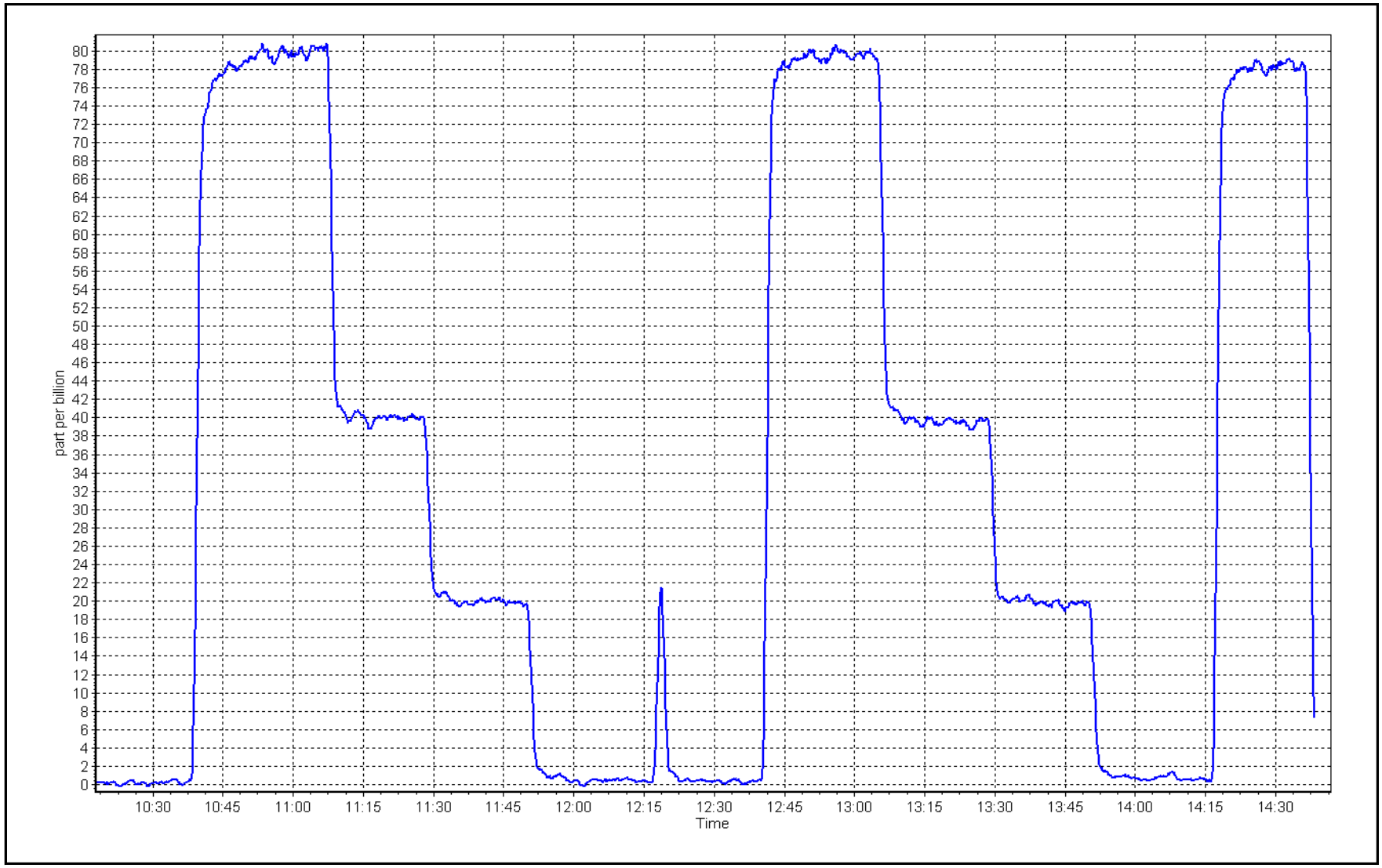
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
80.0	79.6	1.0050
40.0	39.6	1.0100
20.0	19.7	1.0153

Statistical Evaluation		Limits
Correlation Coefficient	0.999925	≥0.995
Slope	0.990568	0.90 - 1.10
Intercept	0.180784	+/-3



H_2S Calibration Plot Date: March 8, 2023 Location: Wapasu



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	March 9, 2023	Last Cal Date:	February 14, 2023
Start time (MST):	10:07	End time (MST):	13:28
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:	1.011424	1.000425	Background:	3.090	3.140
Calibration intercept:	-0.037301	-0.058335	Coefficient:	4.324	4.250

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	0.08	----
as found span	4921	79.4	17.09	17.48	0.978
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.03	----
high point	4921	79.4	17.09	17.07	1.001
second point	4960	39.7	8.55	8.43	1.014
third point	4980	19.8	4.26	4.20	1.014
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.4	17.09	17.07	1.001
				Average Correction Factor	1.010

Baseline Corr As found:	17.40	Previous response	17.25	*% change	0.9%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

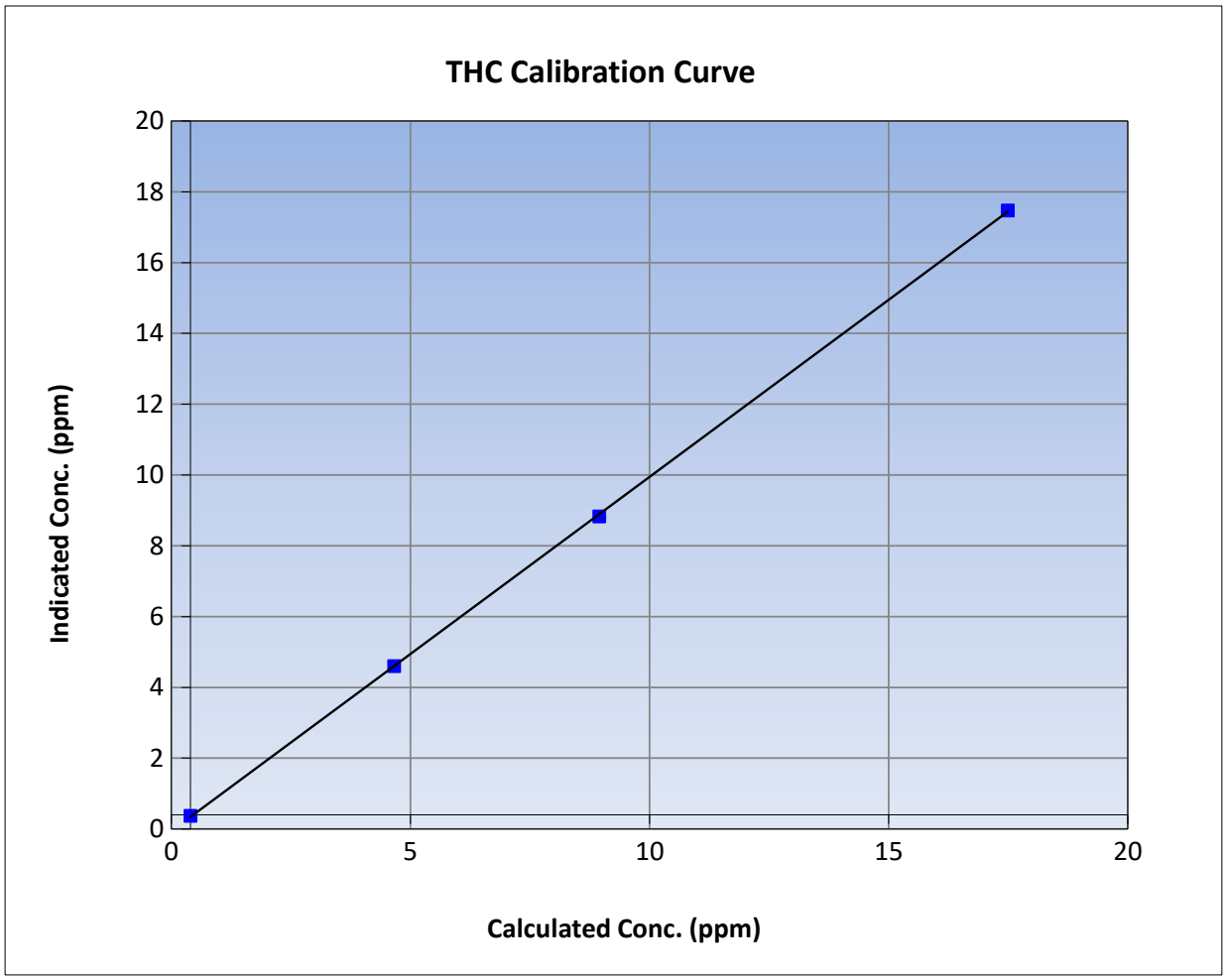
Station Information

Calibration Date:	March 9, 2023	Previous Calibration:	February 14, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:07	End Time (MST):	13:28
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1218153352

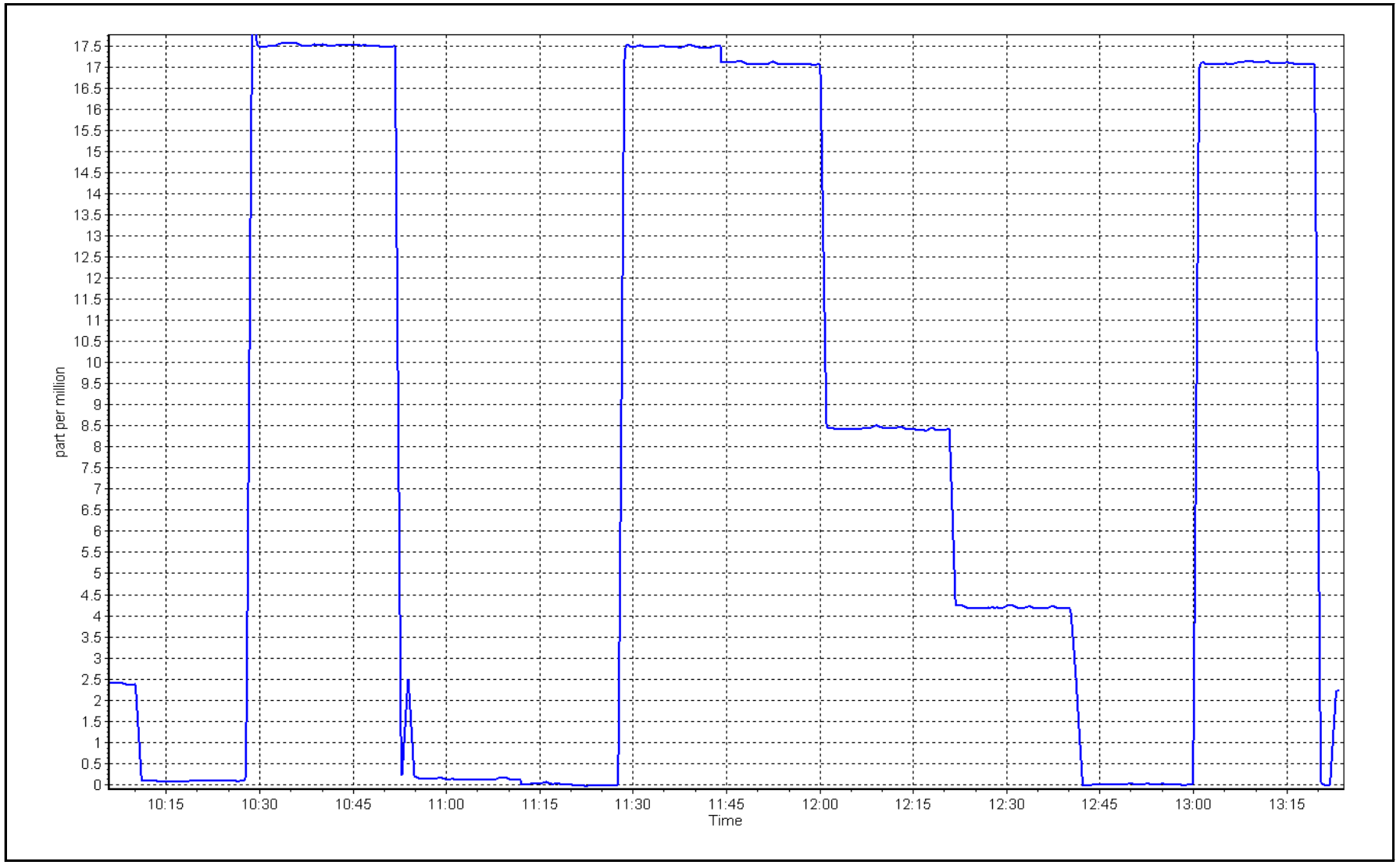
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.03	----
17.09	17.07	1.0011
8.55	8.43	1.0141
4.26	4.20	1.0139

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999961	*≥0.995*
Slope	1.000425	*0.90 - 1.10*
Intercept	-0.058335	*+/-1.5*



THC Calibration Plot Date: March 9, 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:	March 23, 2023	Last Cal Date:	February 23, 2023
Start time (MST):	9:09	End time (MST):	14:05
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:	Teledyne API T200	Analyzer serial #:	833
NOX Range (ppb):	0 - 1000 ppb		

	Start	*Finish*		*Start*	*Finish*
NO coeff or slope:	0.820	0.820	NO bkgnd or offset:	0.1	0.1
NOX coeff or slope:	0.812	0.812	NOX bkgnd or offset:	-0.4	-0.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	4.5	4.4

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	0.989719	0.987970
NO_X Cal Offset:	-1.420000	-1.020000
NO Cal Slope:	0.990300	0.989414
NO Cal Offset:	-1.880000	-1.920000
NO_2 Cal Slope:	0.986936	0.999015
NO_2 Cal Offset:	-0.501997	0.401105

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	0.6	----	----
as found span	4917	83.2	817.2	799.9	17.3	805.1	788.1	17.1	1.0150	1.0150
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	-0.1	0.3	----	----
high point	4917	83.2	817.2	799.9	17.3	807.2	790.4	16.8	1.0124	1.0120
second point	4958	41.6	408.6	399.9	8.7	401.3	392.9	8.5	1.0182	1.0179
third point	4979	20.8	204.3	200.0	4.3	200.1	194.1	6.1	1.0210	1.0302
as left zero	5000	0.0	0.0	0.0	0.0	0.3	0.1	0.2	----	----
as left span	4917	83.2	817.2	410.0	407.2	798.5	394.7	403.8	1.0234	1.0387
								Average Correction Factor	1.0172	1.0201

Corrected As found	NO_X = 804.9 ppb	NO = 788.4 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -0.3%
Previous Response	NO_X = 807.4 ppb	NO = 790.2 ppb		*Percent Change	NO = -0.2%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx 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)	784.9	395.0	407.2	407.2	1.0000	100.0%
2nd GPT point (200 ppb O3)	784.9	589.8	212.4	212.5	0.9996	100.0%
3rd GPT point (100 ppb O3)	784.9	689.7	112.5	113.0	0.9956	100.4%
				Average Correction Factor	0.9984	100.2%

Notes: Sample inlet filter changed after as founds. No adjustments made. Used the second NO reference point.

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

NO_X Calibration Summary

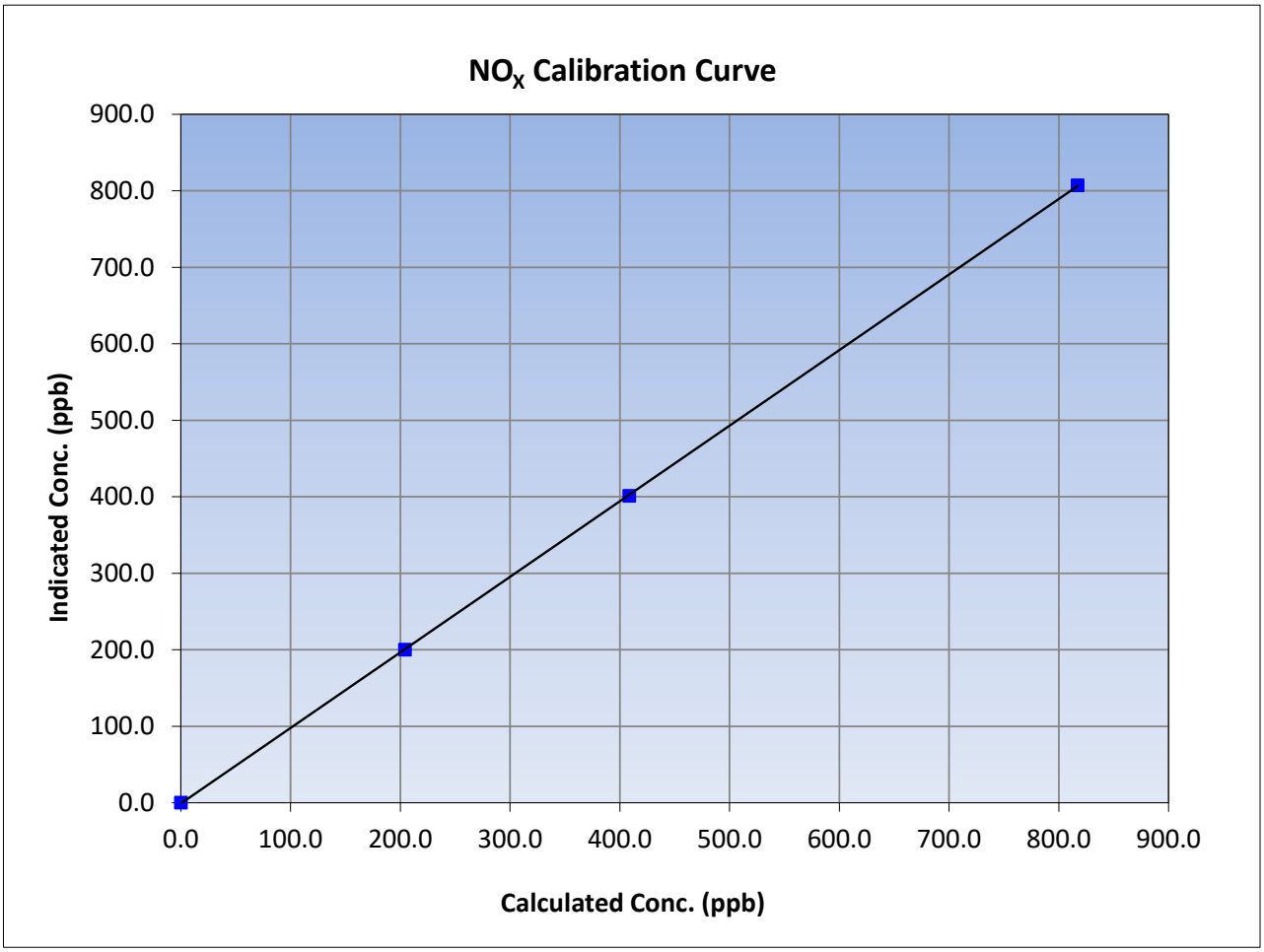
Version-04-2020

Station Information

Calibration Date:	March 23, 2023	Previous Calibration:	February 23, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:09	End Time (MST):	14:05
Analyzer make:	Teledyne API T200	Analyzer serial #:	833

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999987	≥0.995
817.2	807.2	1.0124			
408.6	401.3	1.0182	Slope	0.987970	0.90 - 1.10
204.3	200.1	1.0210			
			Intercept	-1.020000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

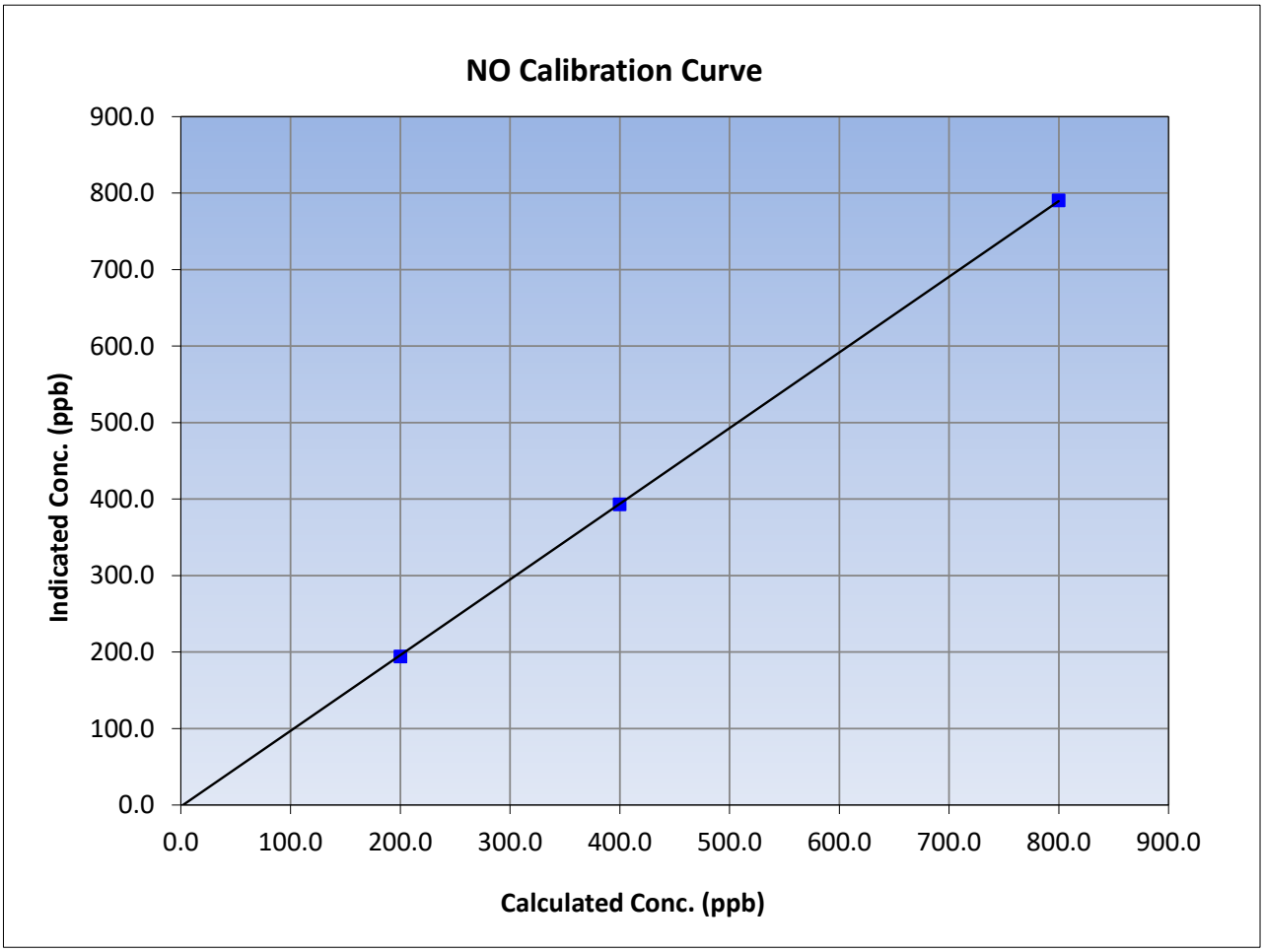
Version-04-2020

Station Information

Calibration Date:	March 23, 2023	Previous Calibration:	February 23, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:09	End Time (MST):	14:05
Analyzer make:	Teledyne API T200	Analyzer serial #:	833

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999976	≥0.995
799.9	790.4	1.0120			
399.9	392.9	1.0179	Slope	0.989414	0.90 - 1.10
200.0	194.1	1.0302			
			Intercept	-1.920000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

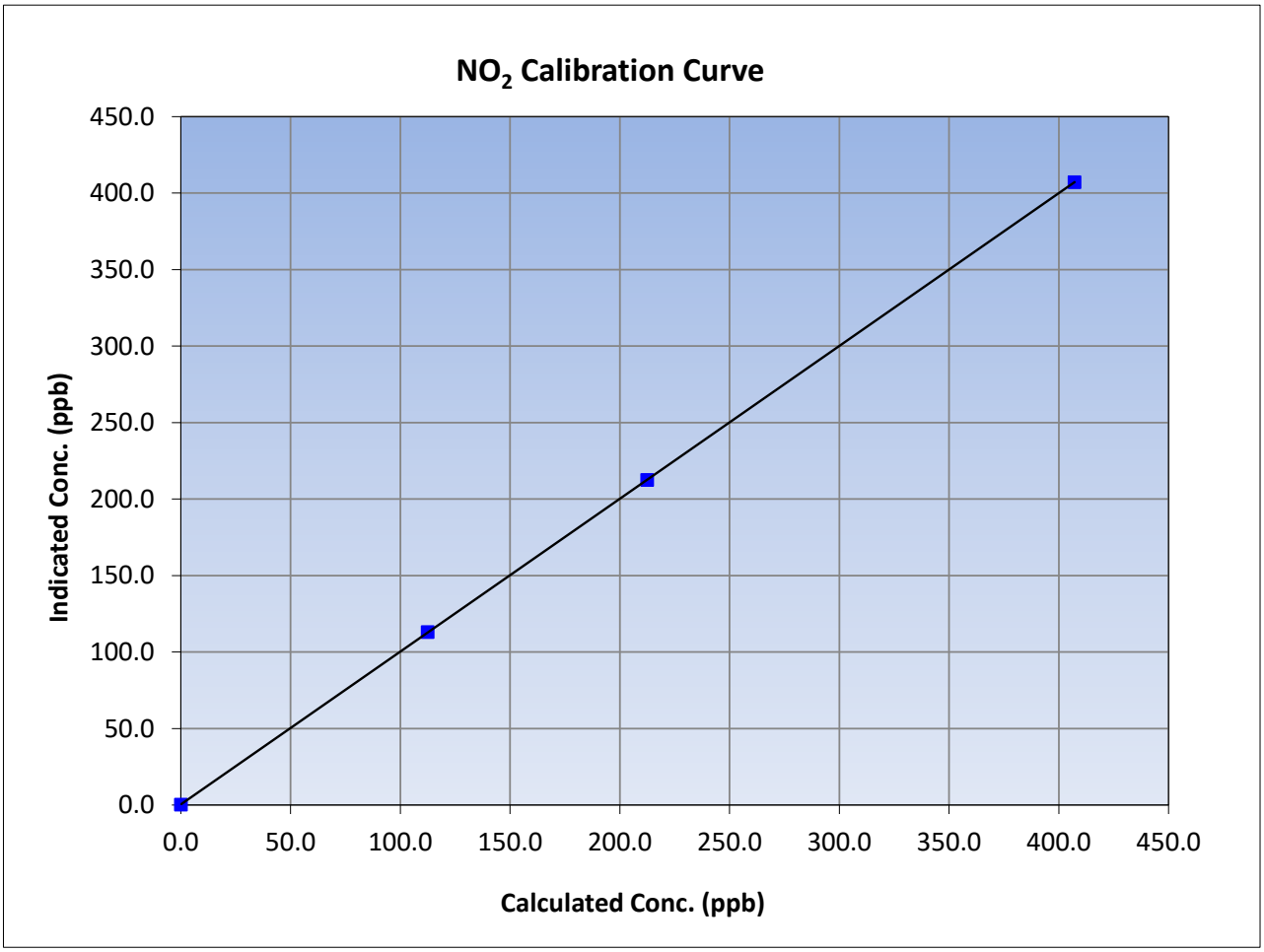
Version-04-2020

Station Information

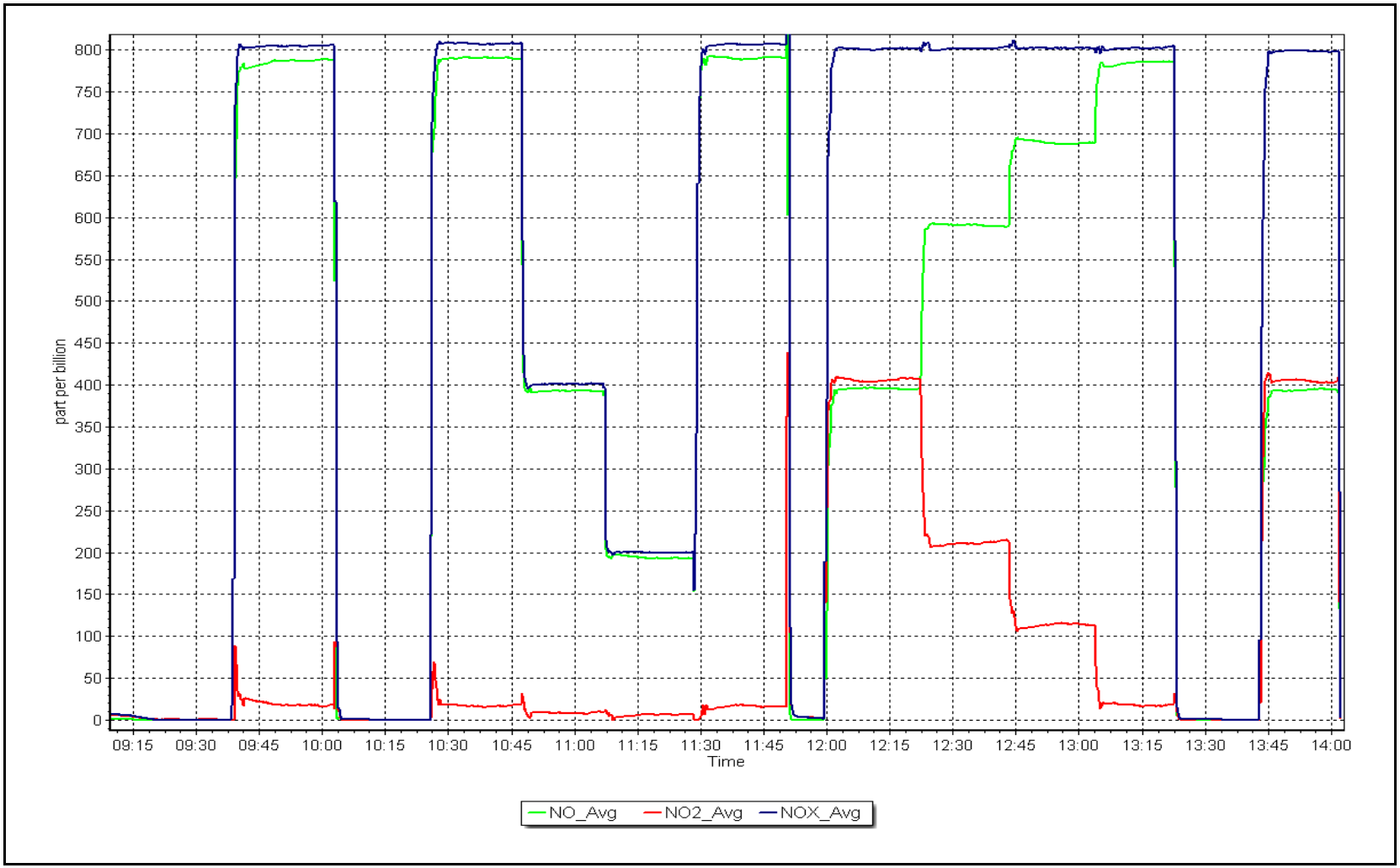
Calibration Date:	March 23, 2023	Previous Calibration:	February 23, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:09	End Time (MST):	14:05
Analyzer make:	Teledyne API T200	Analyzer serial #:	833

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.3	----	Correlation Coefficient	0.999999	≥0.995
407.2	407.2	1.0000			
212.4	212.5	0.9996	Slope	0.999015	0.90 - 1.10
112.5	113.0	0.9956			
			Intercept	0.401105	+/-20



NO_X Calibration Plot Date: March 23, 2023 Location: Wapasu



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	March 3, 2023	Last Cal Date:	February 6, 2023
Start time (MST):	10:33	End time (MST):	13:30
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:	1.005686	1.006086	Backgd or Offset:	-1.8	-1.8
Calibration intercept:	-0.320000	-0.540000	Coeff or Slope:	1.020	1.020

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	403.4	0.992
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	1077.3	400.0	402.1	0.995
second point	5000	900.3	200.0	200.5	0.998
third point	5000	789.5	100.0	99.6	1.004
as left zero	5000	0.0	0.0	-0.1	----
as left span	5000	1077.3	400.0	406.3	0.984
				Average Correction Factor	0.999

Baseline Corr As found:	403.7	Previous response	402.0	*% change	0.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

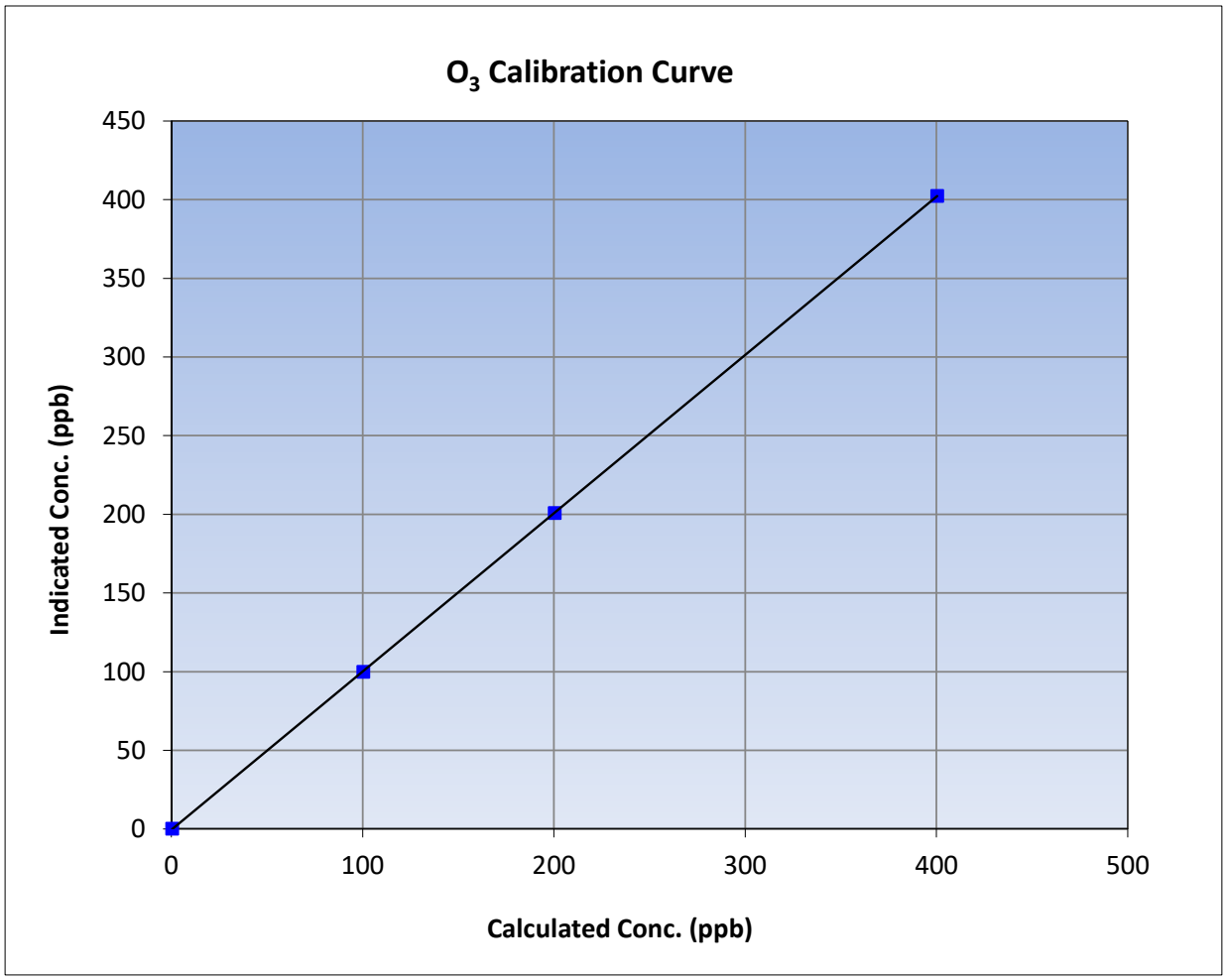
Station Information

Calibration Date:	March 3, 2023	Previous Calibration:	February 6, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:33	End Time (MST):	13:30
Analyzer make:	API T400	Analyzer serial #:	3870

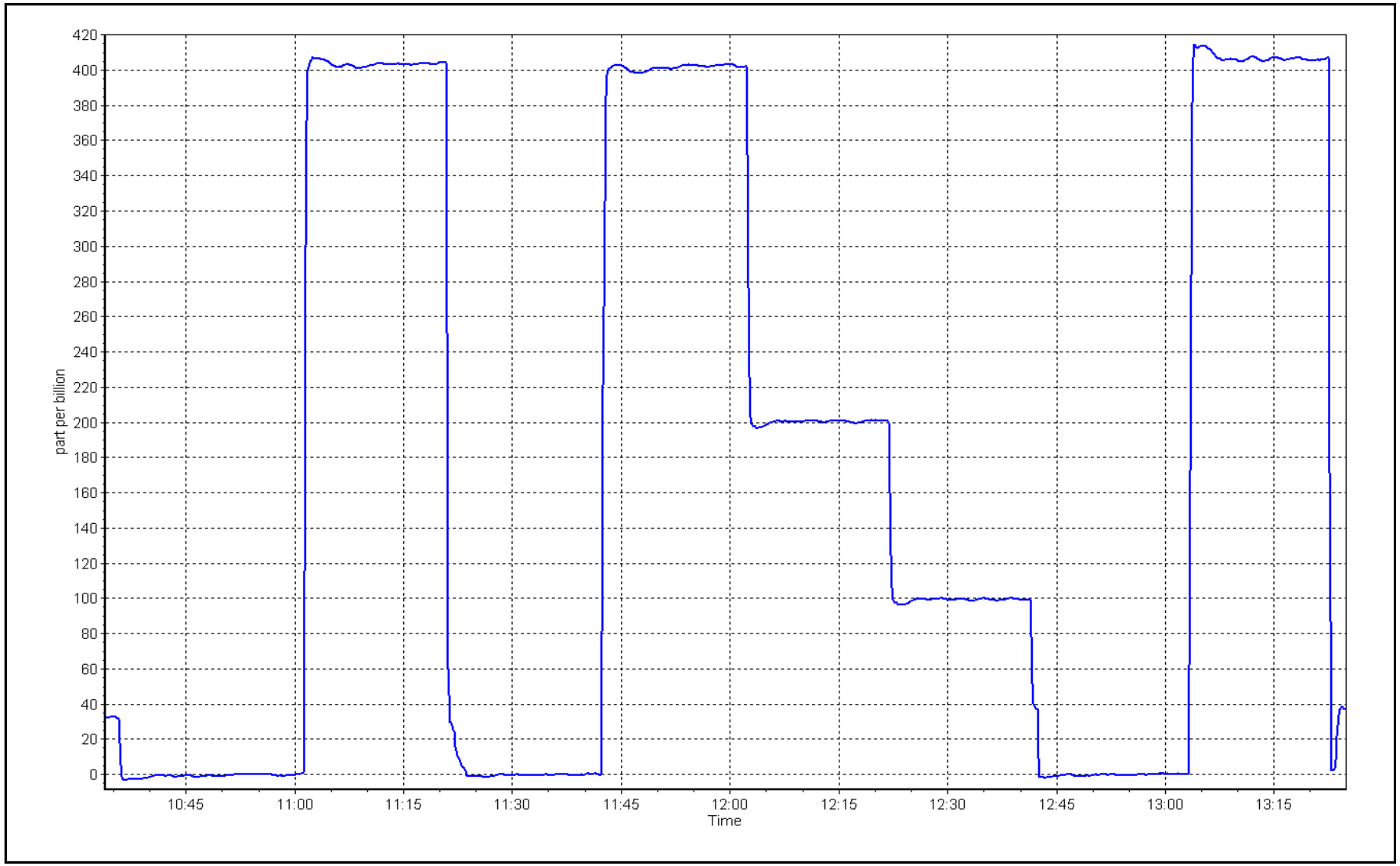
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
400.0	402.1	0.9948
200.0	200.5	0.9975
100.0	99.6	1.0040

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.006086	*0.90 - 1.10*
Intercept	-0.540000	*+/- 5*



O_3 Calibration Plot Date: March 3, 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:	March 23, 2023	Last Cal Date:	February 23, 2023
Start time (MST):	10:50	End time (MST):	12:02
Analyzer Make:	API T640	S/N:	1183
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	1102
Temp/RH standard:	Delta Cal	S/N:	1102

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-1.8	-1.8	-1.8	☐	+/- 2 °C
P (mmHg)	706.9	708.4	706.9	☐	+/- 10 mmHg
flow (LPM)	5.02	5.06	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: March 23, 2023 Last Cal Date: February 23, 2023

PM w/o HEPA: 4.8 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	11.0	11.1	11.1	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 8.1 w/ HEPA: 0.0

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

Disposable Filter Changed: March 23, 2023

Annual Maintenance

Date Sample Tube Cleaned:

Date RH/T Sensor Cleaned:

Notes: No adjustments made. Leak check passed. Optical chamber and inlet head cleaned.

Calibration by: Karan Pandit

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS18
STONY MOUNTAIN
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	March 30, 2023	Last Cal Date:	February 17, 2023
Start time (MST):	9:58	End time (MST):	12:52
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:	1.008829	1.006974	Backgd or Offset:	23.0	22.9
Calibration intercept:	-0.882227	-1.482948	Coeff or Slope:	0.817	0.817

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	-0.6	----
as found span	4919	81.0	800.3	801.6	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4919	81.0	800.3	804.6	0.995
second point	4959	40.5	400.2	402.1	0.995
third point	4979	20.2	199.6	197.4	1.011
as left zero	5000	0.0	0.0	-0.5	----
as left span	4919	81.0	800.3	803.1	0.996
				Average Correction Factor	1.000

Baseline Corr As found:	802.20	Previous response	806.46	*% 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: Sample inlet filter changed after as founds. No adjustments were made

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

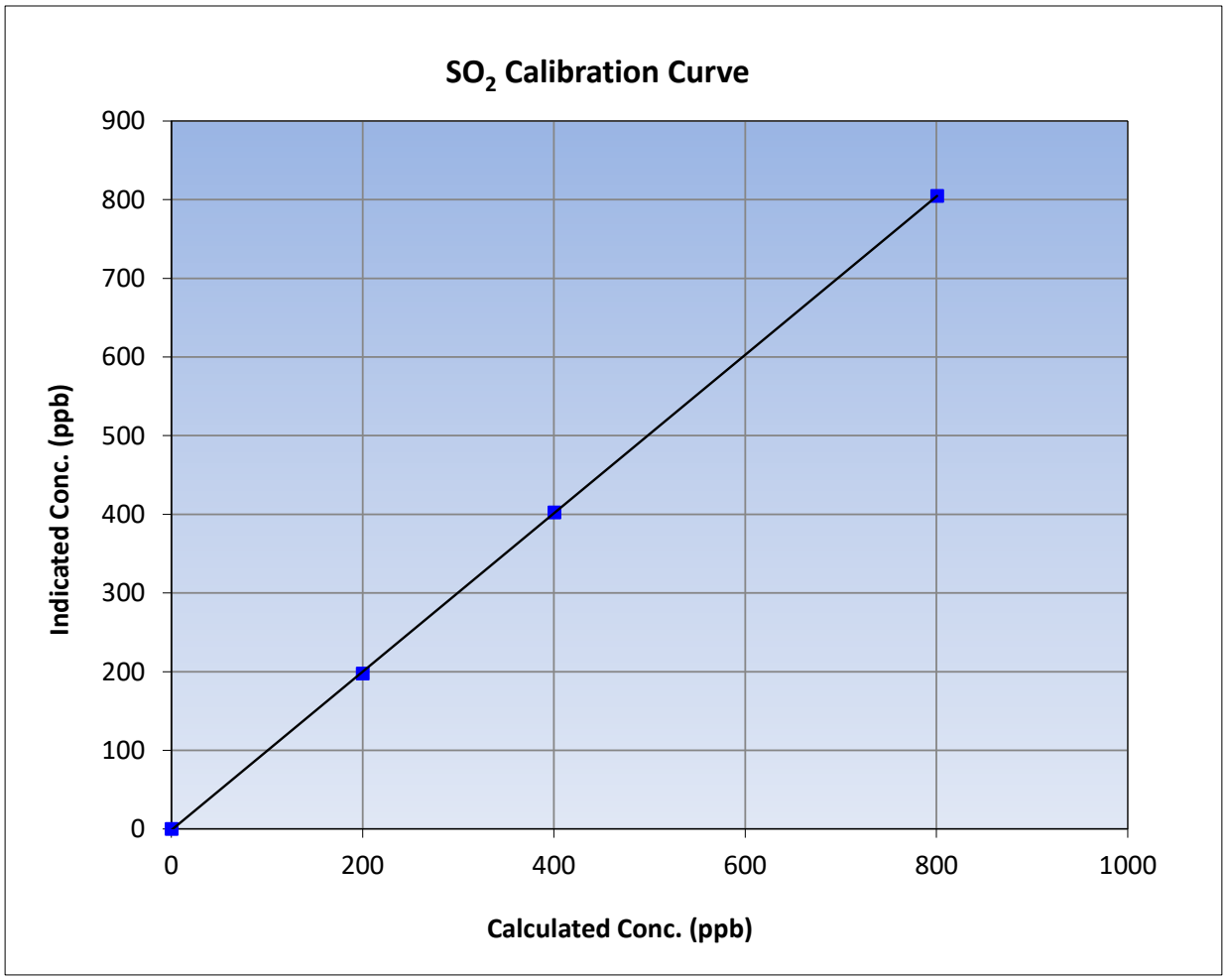
Station Information

Calibration Date:	March 30, 2023	Previous Calibration:	February 17, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:58	End Time (MST):	12:52
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301453

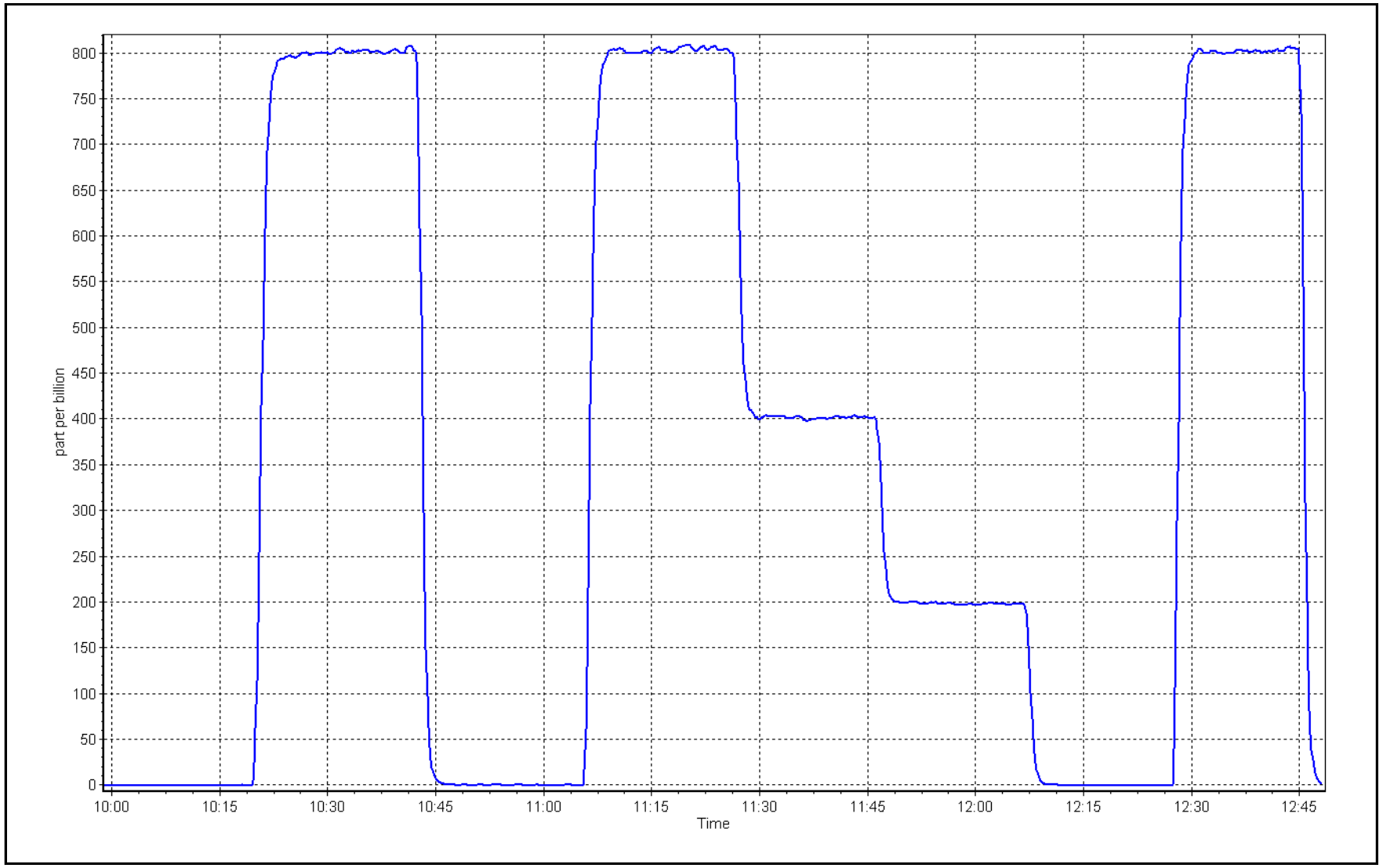
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
800.3	804.6	0.9946
400.2	402.1	0.9952
199.6	197.4	1.0112

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999982	*≥0.995*
Slope	1.006974	*0.90 - 1.10*
Intercept	-1.482948	*+/-30*



SO2 Calibration Plot Date: March 30, 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:	March 7, 2023	Last Cal Date:	February 13, 2023
Start time (MST):	10:34	End time (MST):	14:45
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:	1.000870	1.005159	Backgd or Offset:	2.63	2.56
Calibration intercept:	0.161019	0.260882	Coeff or Slope:	1.151	1.151

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4927	73.0	80.0	80.7	0.992
as found 2nd point	4964	36.5	40.0	40.8	0.983
as found 3rd point	4983	18.3	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	4927	73.0	80.0	80.6	0.992
second point	4964	36.5	40.0	40.6	0.985
third point	4983	18.3	20.0	20.4	0.983
as left zero	5000	0.0	0.0	0.3	----
as left span	4927	73.0	80.0	80.6	0.992
SO2 Scrubber Check	4923	77.1	771.0	0.1	----
Date of last scrubber change:		17-Dec-21		Ave Corr Factor	0.987
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.6	Prev response:	80.22	*% change:	0.5%
Baseline Corr 2nd AF pt:	40.7	AF Slope:	1.008159	AF Intercept:	0.180871
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999966		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

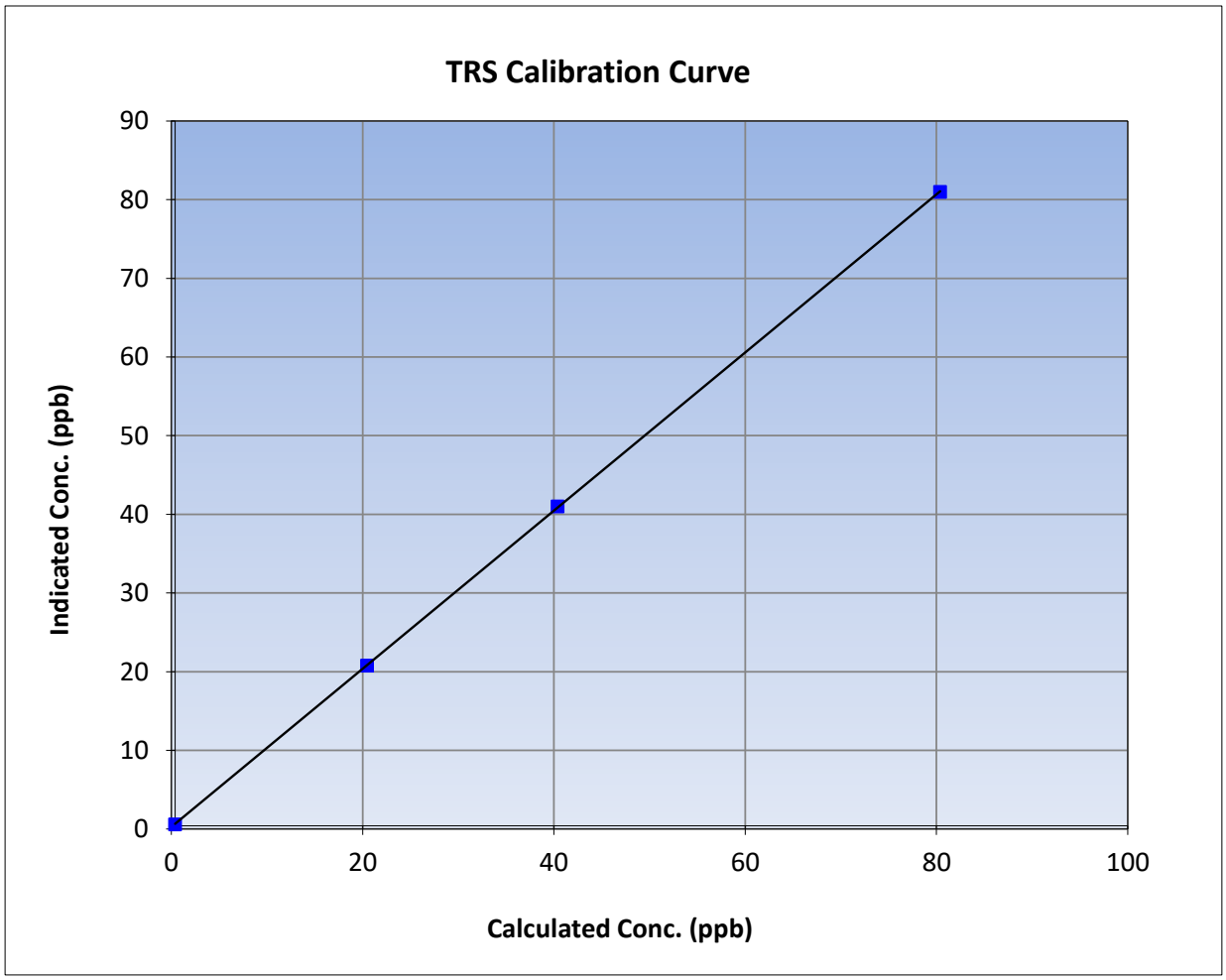
Station Information

Calibration Date:	March 7, 2023	Previous Calibration:	February 13, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	10:34	End Time (MST):	14:45
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153359

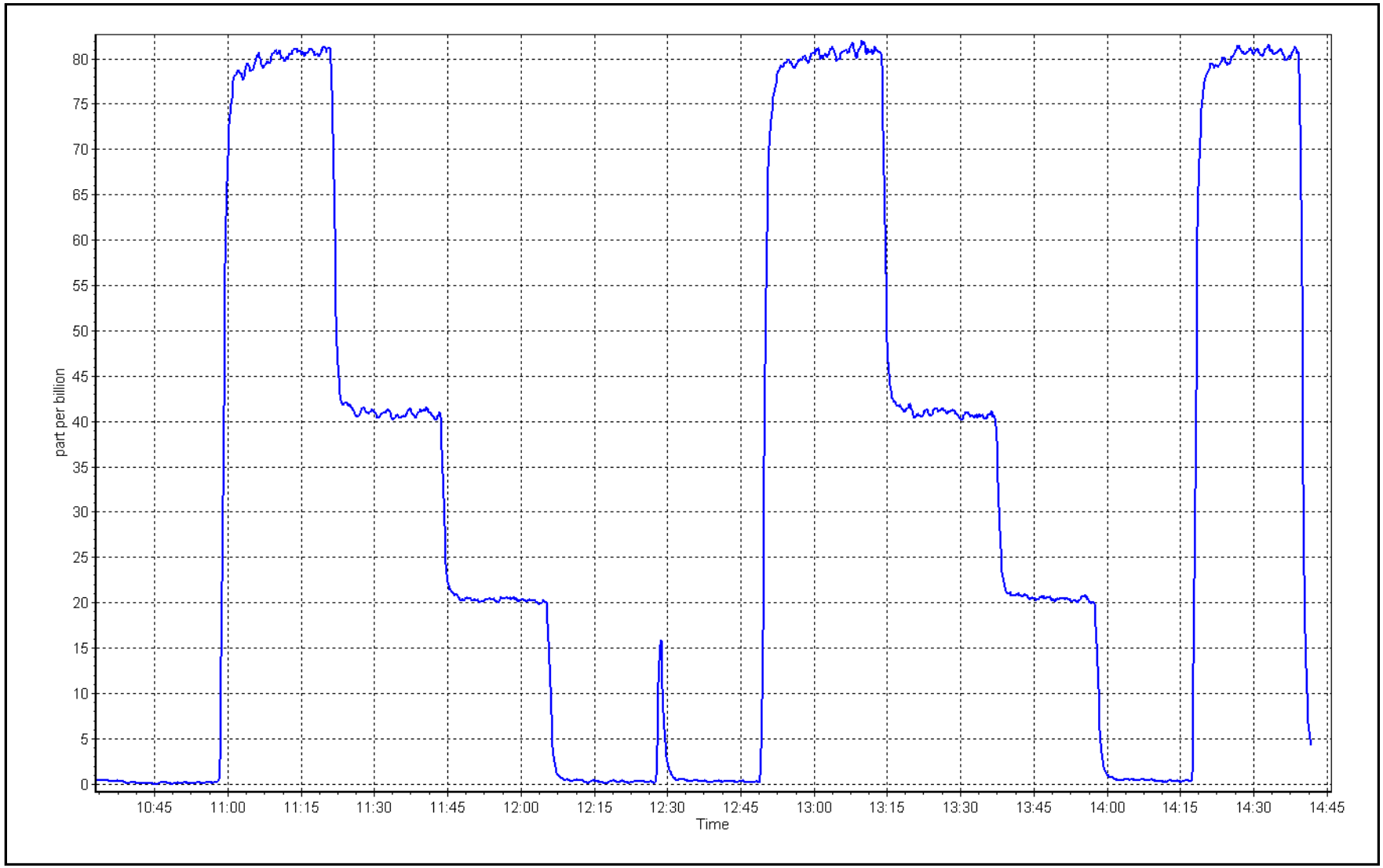
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	80.6	0.9925
40.0	40.6	0.9850
20.0	20.4	0.9827

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	1.005159	*0.90 - 1.10*
Intercept	0.260882	*+/-3*



TRS Calibration Plot Date: March 7, 2023 Location: Stony Mountain



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	March 30, 2023	Last Cal Date:	February 17, 2023
Start time (MST):	9:58	End time (MST):	12:52
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC463851	Cal Gas Expiry Date:	February 23, 2025	
CH4 Cal Gas Conc.	500.8	ppm	CH4 Equiv Conc.	1066.8	ppm
C3H8 Cal Gas Conc.	205.8	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	500.8	ppm	CH4 Equiv Conc.	1066.8	ppm
Removed C3H8 Conc.	205.8	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	2658	
ZAG make/model:	Teledyne API T701H		Serial Number:	360	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320039	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.06E-04	3.06E-04	NMHC SP Ratio:	5.66E-05	5.66E-05
CH4 Retention time:	14.60	14.60	NMHC Peak Area:	162130	162130

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	17.31	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.0	17.28	17.23	1.003
second point	4959	40.5	8.64	8.60	1.004
third point	4979	20.2	4.31	4.28	1.007
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	17.28	17.26	1.001
				Average Correction Factor	1.005

Baseline Corr AF:	17.31	Prev response	17.32	*% 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-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	9.17	9.16	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	81.0	9.17	9.10	1.007
second point	4959	40.5	4.58	4.56	1.006
third point	4979	20.2	2.29	2.27	1.006
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81	9.17	9.09	1.009
				Average Correction Factor	1.006
Baseline Corr AF:	9.16	Prev response	9.16	*% change	-0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	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	8.12	0.999
second point	4959	40.5	4.06	4.04	1.003
third point	4979	20.2	2.02	2.01	1.009
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	8.11	8.17	0.993
				Average Correction Factor	1.004
Baseline Corr AF:	8.15	Prev response	8.15	*% 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:	1.002575	0.997054
THC Cal Offset:	-0.009777	-0.008797
CH4 Cal Slope:	1.007610	1.001440
CH4 Cal Offset:	-0.020602	-0.011209
NMHC Cal Slope:	0.998345	0.992924
NMHC Cal Offset:	0.010426	0.002412

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

THC Calibration Summary

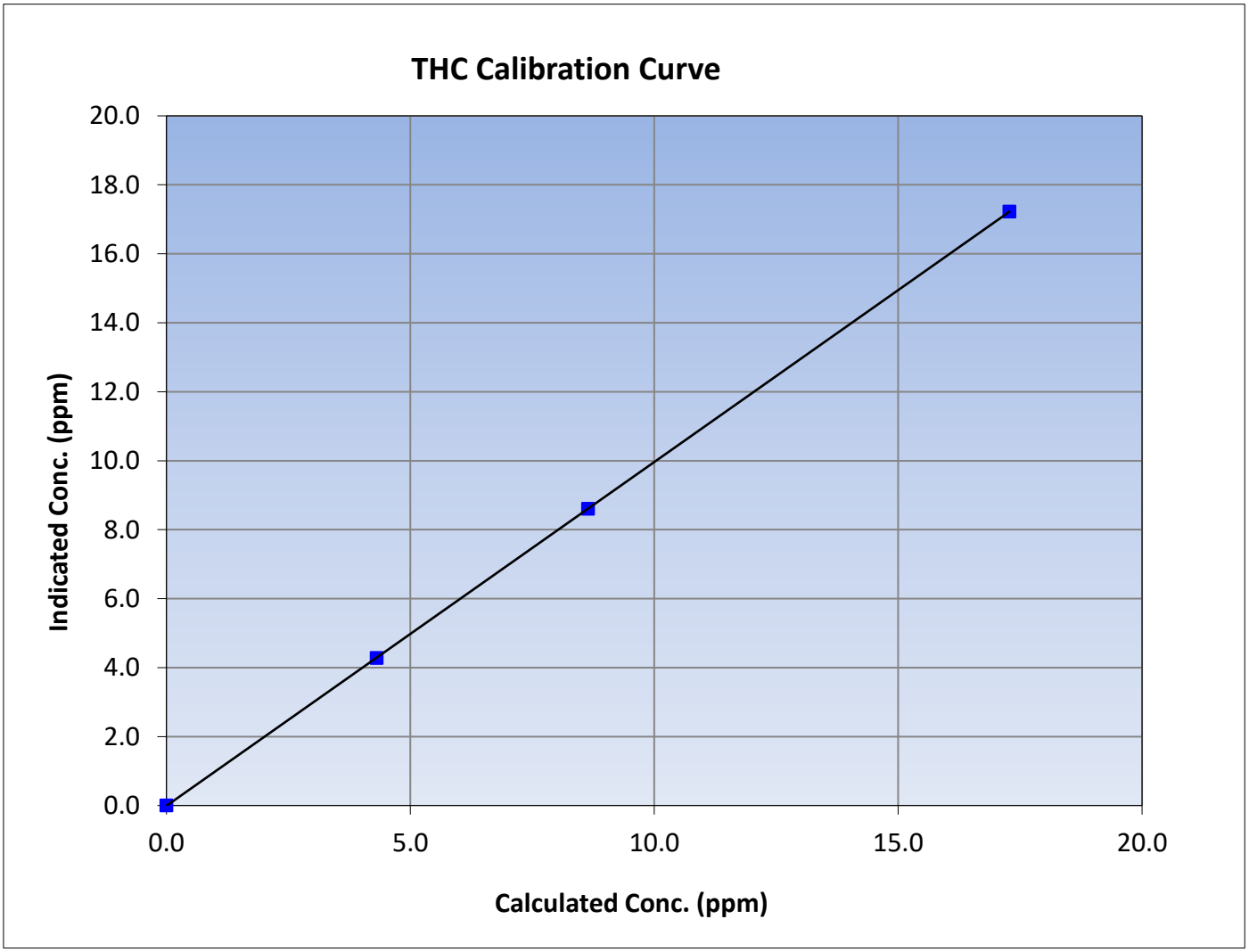
Version-01-2020

Station Information

Calibration Date:	March 30, 2023	Previous Calibration:	February 17, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:58	End Time (MST):	12:52
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	0.999999	*≥0.995*
17.28	17.23	1.0032			
8.64	8.60	1.0045	Slope	0.997054	*0.90 - 1.10*
4.31	4.28	1.0071			
			Intercept	-0.008797	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

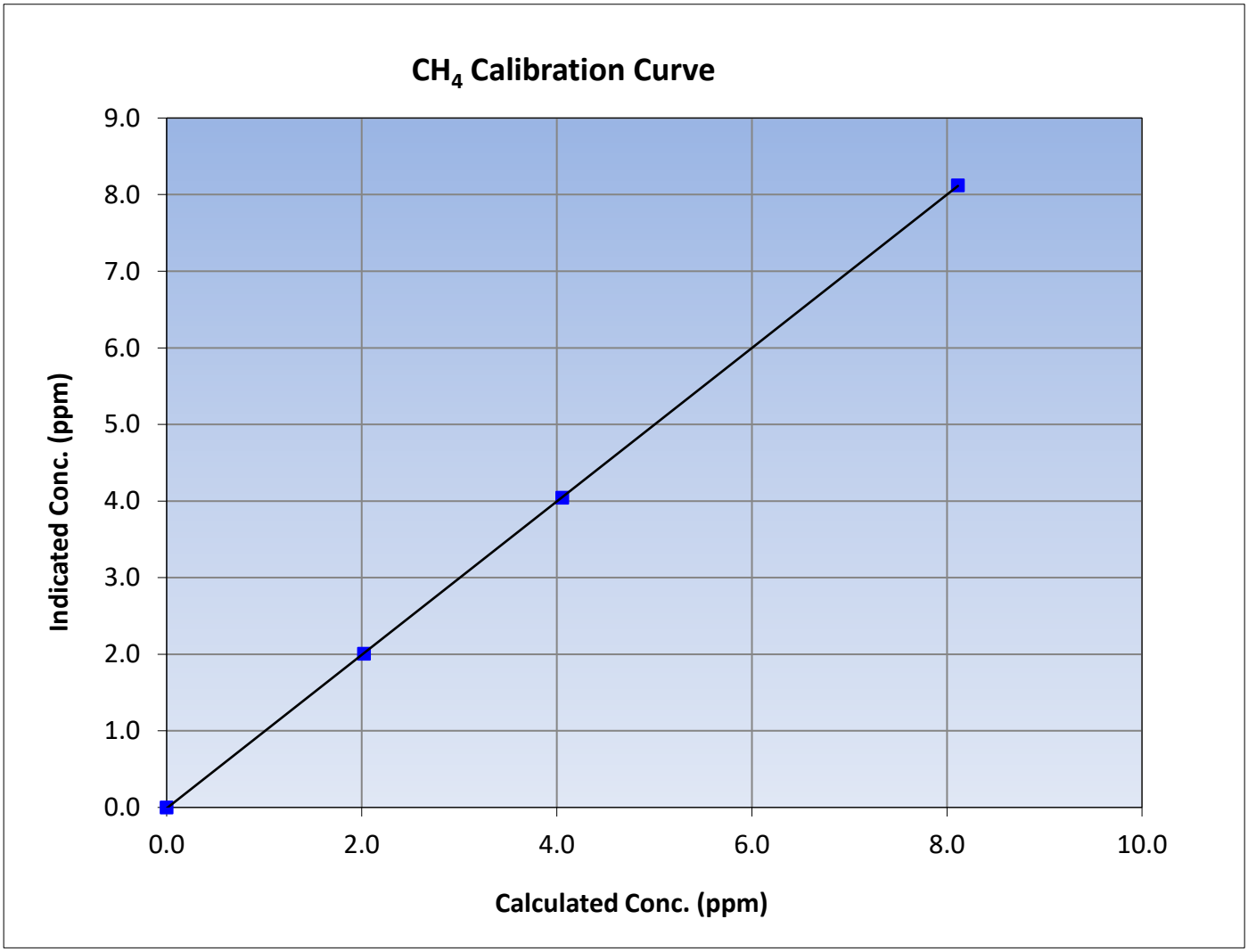
Version-01-2020

Station Information

Calibration Date:	March 30, 2023	Previous Calibration:	February 17, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:58	End Time (MST):	12:52
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	0.999991	≥0.995
8.11	8.12	0.9991			
4.06	4.04	1.0034	Slope	1.001440	0.90 - 1.10
2.02	2.01	1.0088			
			Intercept	-0.011209	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

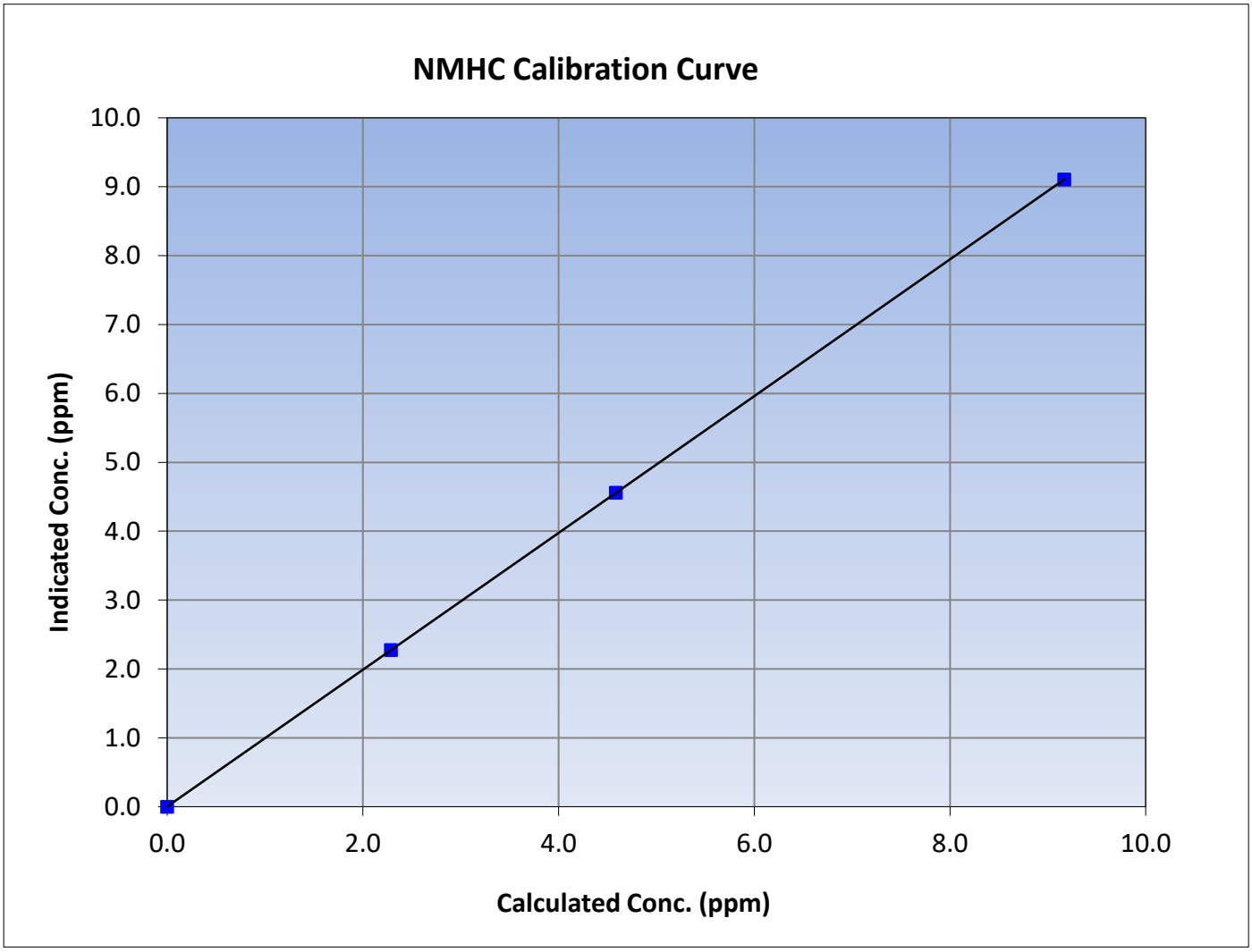
Version-01-2020

Station Information

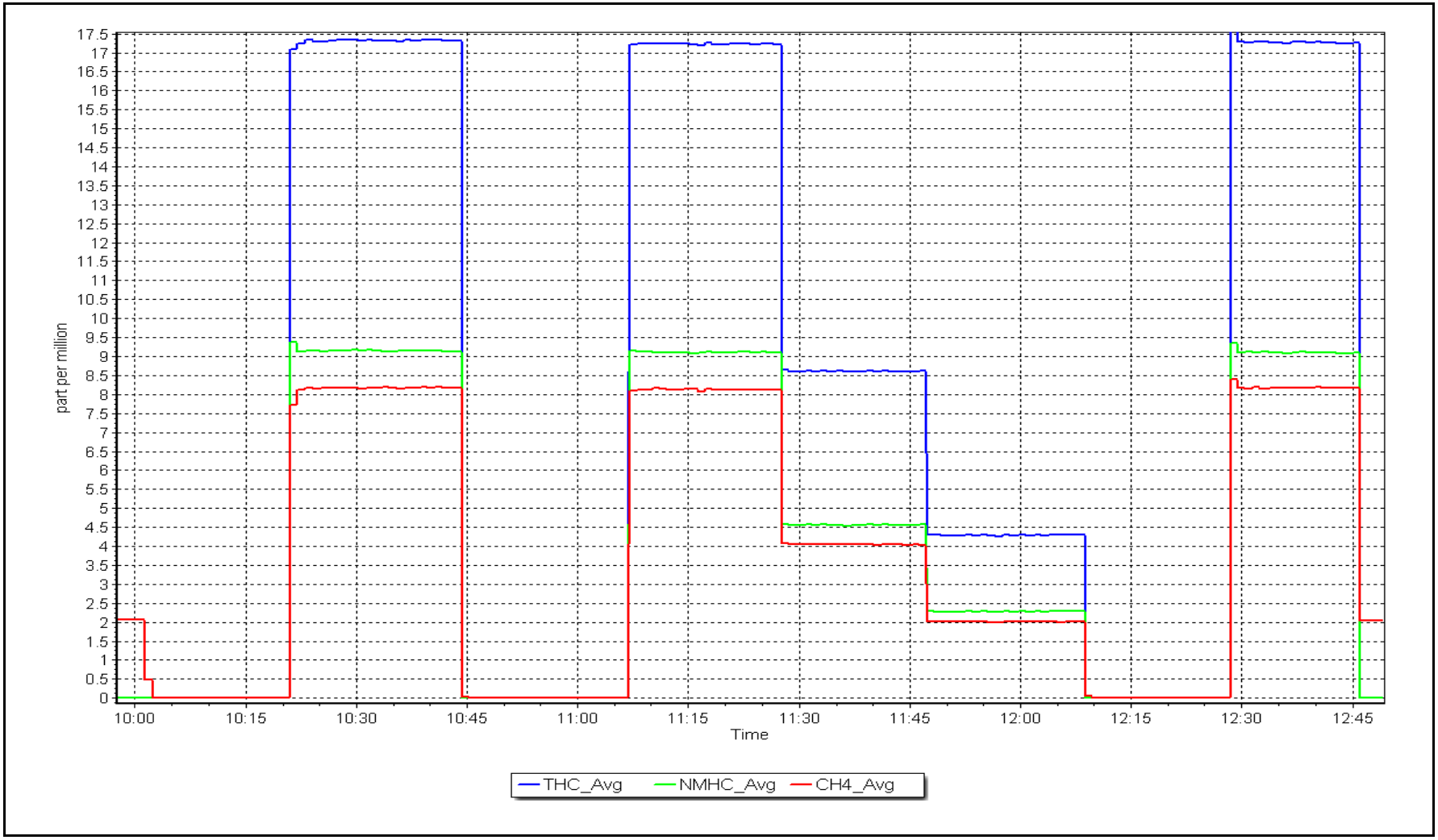
Calibration Date:	March 30, 2023	Previous Calibration:	February 17, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:58	End Time (MST):	12:52
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	1.000000	*≥0.995*
9.17	9.10	1.0071			
4.58	4.56	1.0058	Slope	0.992924	*0.90 - 1.10*
2.29	2.27	1.0056			
			Intercept	0.002412	*+/-0.5*



NMHC Calibration Plot Date: March 30, 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:	March 22, 2023	Last Cal Date:	February 22, 2023
Start time (MST):	9:43	End time (MST):	14:15
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2XX7ME		Cal Gas Expiry Date:	January 14, 2024	
NOX Cal Gas Conc:	50.48	ppm	NO Cal Gas Conc:	49.22	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	50.48	ppm	Removed Gas NO Conc:	49.22	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	2658	
ZAG make/model:	Teledyne API 701H		Serial Number:	360	

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.043	1.062	NO bkgnd or offset:	2.9	3.0
NOX coeff or slope:	0.987	0.984	NOX bkgnd or offset:	2.9	3.0
NO2 coeff or slope:	0.999	0.999	Reaction cell Press:	222.7	223.9

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.002587	0.999873
NO_X Cal Offset:	0.289742	-0.210265
NO Cal Slope:	1.003123	1.002239
NO Cal Offset:	-0.910073	-0.950426
NO_2 Cal Slope:	0.999064	0.999365
NO_2 Cal Offset:	0.020158	-0.185598

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	809.4	786.6	22.9	1.0140	1.0174
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.0	----	----
high point	4919	81.3	820.8	800.3	20.5	820.4	801.2	19.2	1.0004	0.9988
second point	4959	40.7	410.9	400.7	10.3	411.1	401.3	9.8	0.9996	0.9984
third point	4980	20.3	204.9	199.8	5.1	204.0	197.6	6.4	1.0046	1.0112
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.1	----	----
as left span	4919	81.3	820.8	362.9	457.9	821.8	358.8	463.0	0.9987	1.0113
								Average Correction Factor	1.0015	1.0028

Corrected As found	NO_X = 809.4 ppb	NO = 786.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -1.7%
Previous Response	NO_X = 823.2 ppb	NO = 801.9 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)	799.3	361.9	457.9	457.4	1.0011	99.9%
2nd GPT point (200 ppb O3)	799.3	588.6	231.2	231.1	1.0004	100.0%
3rd GPT point (100 ppb O3)	799.3	695.6	124.2	123.5	1.0056	99.4%
				Average Correction Factor	1.0023	99.8%

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

NO_X Calibration Summary

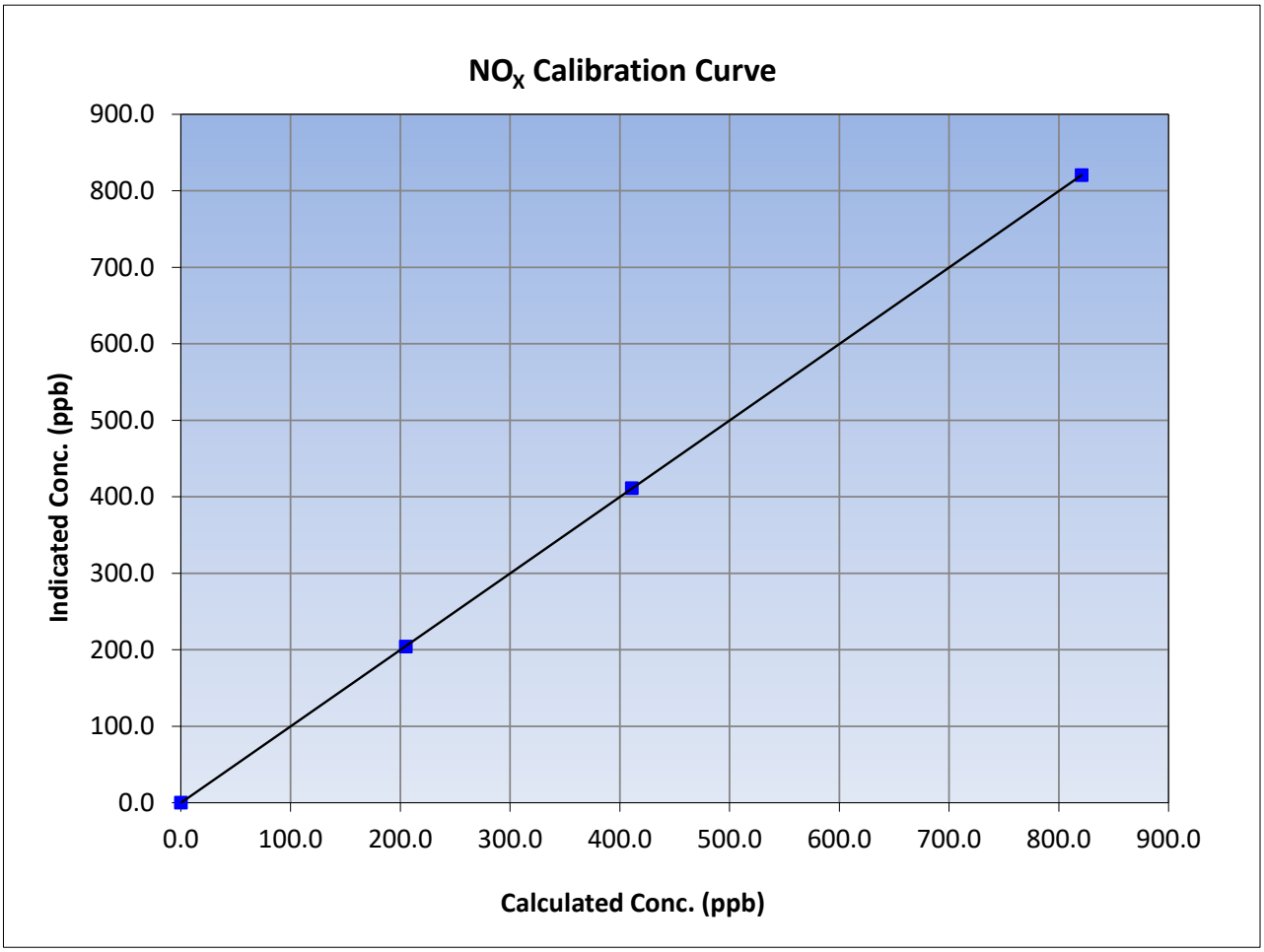
Version-04-2020

Station Information

Calibration Date:	March 22, 2023	Previous Calibration:	February 22, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:43	End Time (MST):	14:15
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999998	≥0.995
820.8	820.4	1.0004			
410.9	411.1	0.9996	Slope	0.999873	0.90 - 1.10
204.9	204.0	1.0046			
			Intercept	-0.210265	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

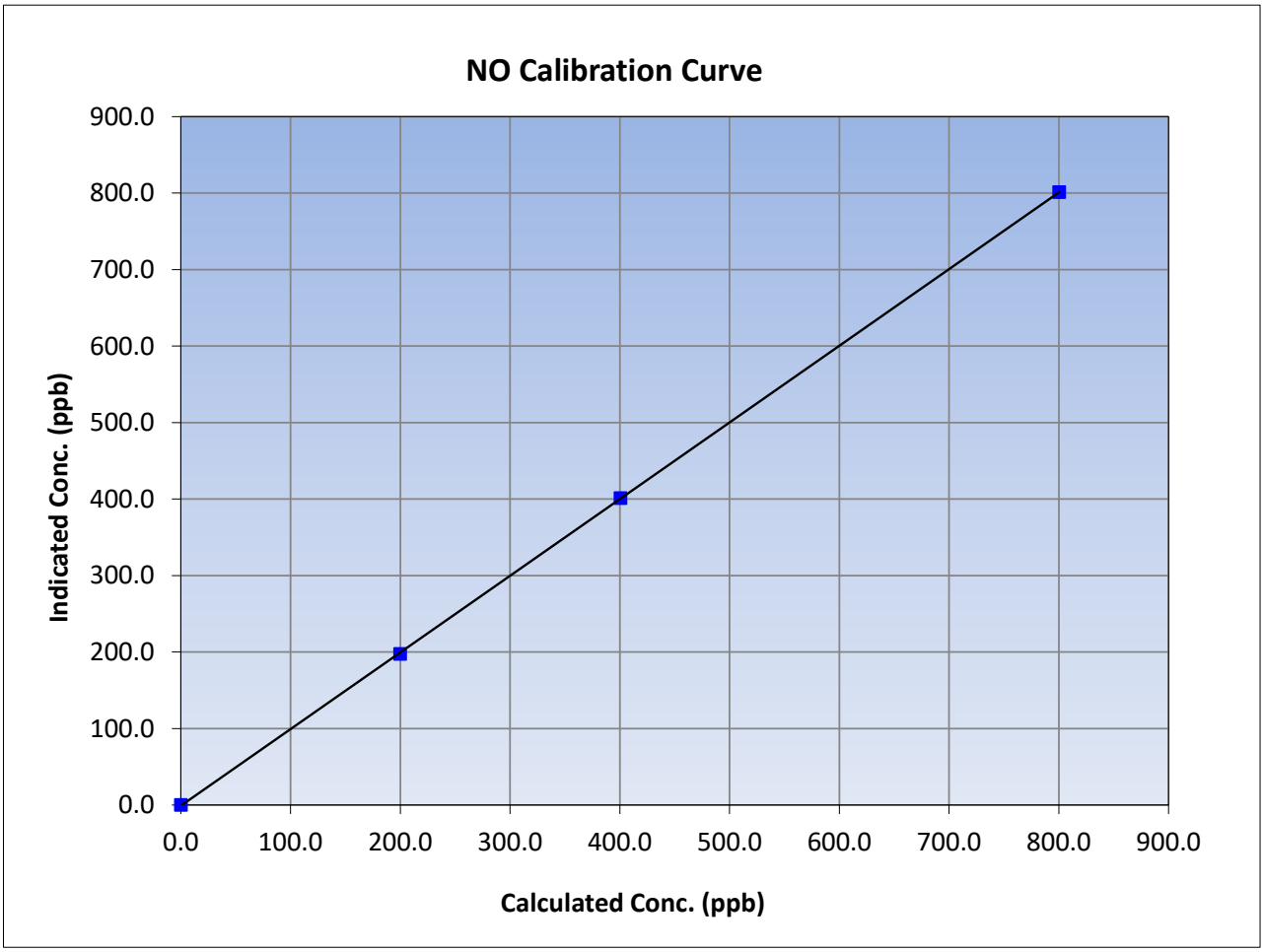
Version-04-2020

Station Information

Calibration Date:	March 22, 2023	Previous Calibration:	February 22, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:43	End Time (MST):	14:15
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999988	≥0.995
800.3	801.2	0.9988			
400.7	401.3	0.9984	Slope	1.002239	0.90 - 1.10
199.8	197.6	1.0112			
			Intercept	-0.950426	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

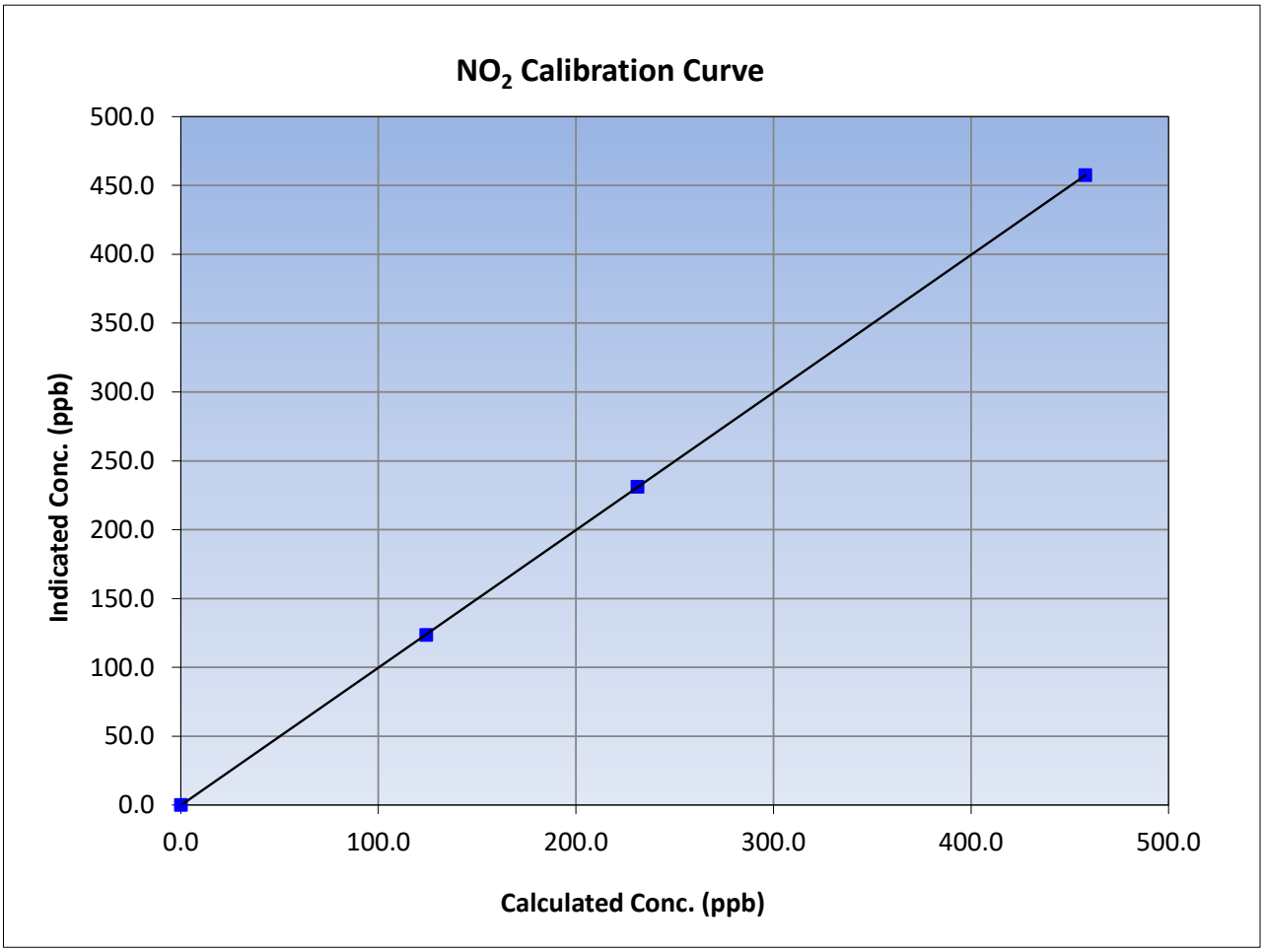
Version-04-2020

Station Information

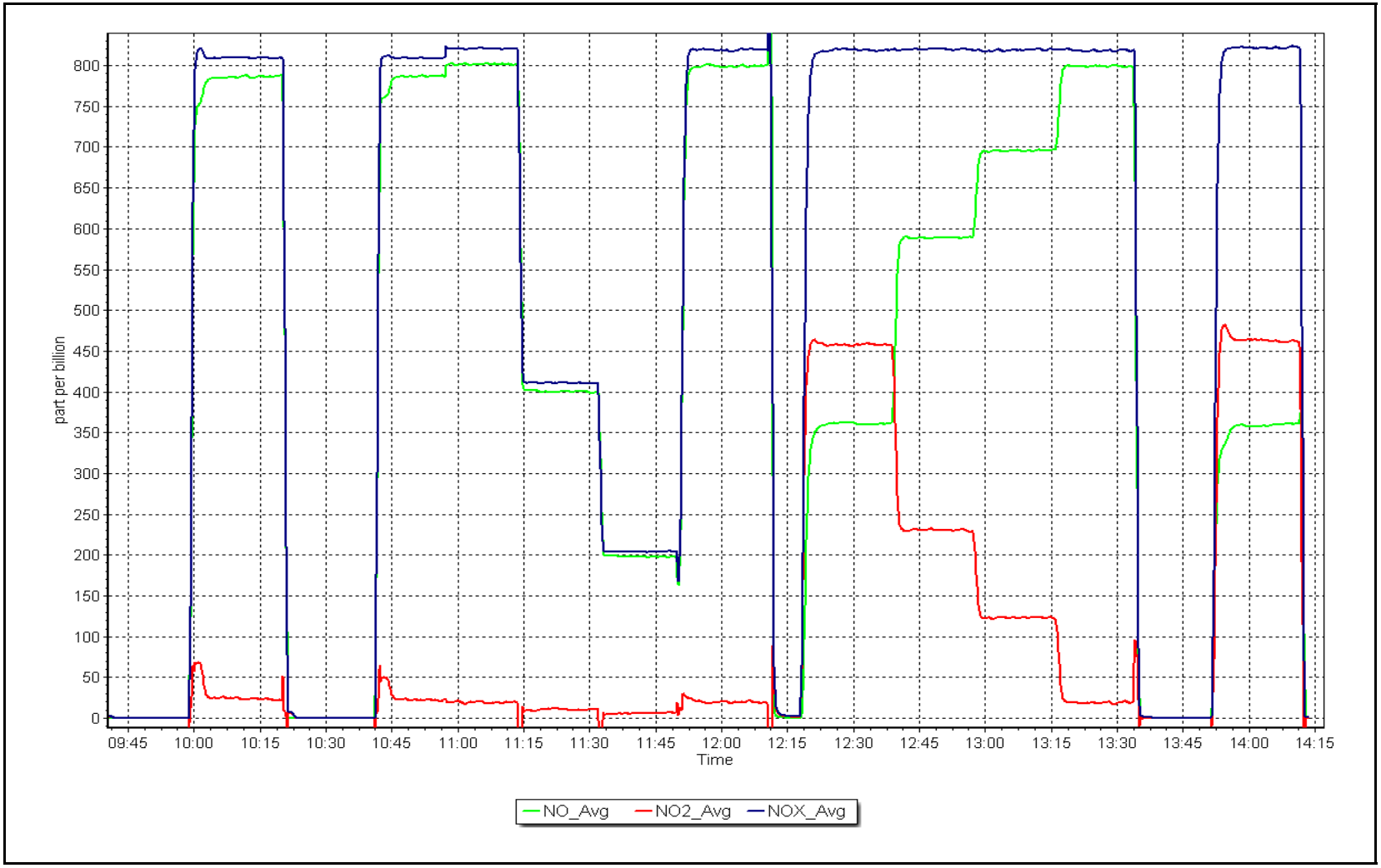
Calibration Date:	March 22, 2023	Previous Calibration:	February 22, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:43	End Time (MST):	14:15
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999998	≥0.995
457.9	457.4	1.0011			
231.2	231.1	1.0004	Slope	0.999365	0.90 - 1.10
124.2	123.5	1.0056			
			Intercept	-0.185598	+/-20



NO_X Calibration Plot Date: March 22, 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:	March 22, 2023	Last Cal Date:	February 24, 2023
Start time (MST):	11:05	End time (MST):	12:06
Analyzer Make:	API T640	S/N:	1335
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	1102
Temp/RH standard:	Delta Cal	S/N:	1102

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-3.1	-3.2	-3.1	☐	+/- 2 °C
P (mmHg)	692.0	693.3	692.0	☐	+/- 10 mmHg
flow (LPM)	4.99	4.95	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: March 22, 2023 Last Cal Date: February 24, 2023

PM w/o HEPA: 6.7 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	10.0	10.4	11.0	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 8.6 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: March 22, 2023

Disposable Filter Changed: March 22, 2023

Annual Maintenance

Date Sample Tube Cleaned: August 30, 2022

Date RH/T Sensor Cleaned: August 30, 2022

Notes: No adjustments made to temperature, pressure or flow. Optical chamber and inlet head cleaned. Leak check passed. PMT adjusted.

Calibration by: Karan Pandit

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	March 24, 2023	Last Cal Date:	February 24, 2023
Start time (MST):	9:30	End time (MST):	12:18
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	3,050	ppm	Cal Gas Exp Date:	December 1, 2028
Cal Gas Cylinder #:	ALM063503			
Removed Cal Gas Conc:	3,050	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	2658
ZAG Make/Model:	Teledyne API T701		Serial Number:	360

Analyzer Information

Analyzer make: API T300 — Analyzer serial #: 3504

Analyzer Range: 0 - 50 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997892	1.002302	Backgd or Offset:	-0.009	-0.009
Calibration intercept:	0.161801	0.205803	Coeff or Slope:	0.904	0.904

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	40.9	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	40.7	40.9	0.995
second point	4966	33.3	20.3	20.8	0.978
third point	4983	16.7	10.2	10.4	0.982
as left zero	3000	0.0	0.0	0.2	----
as left span	2960	40.0	40.7	41.1	0.991
				Average Correction Factor	0.985

Baseline Corr As found:	40.80	Prev response:	40.77	*% change:	0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

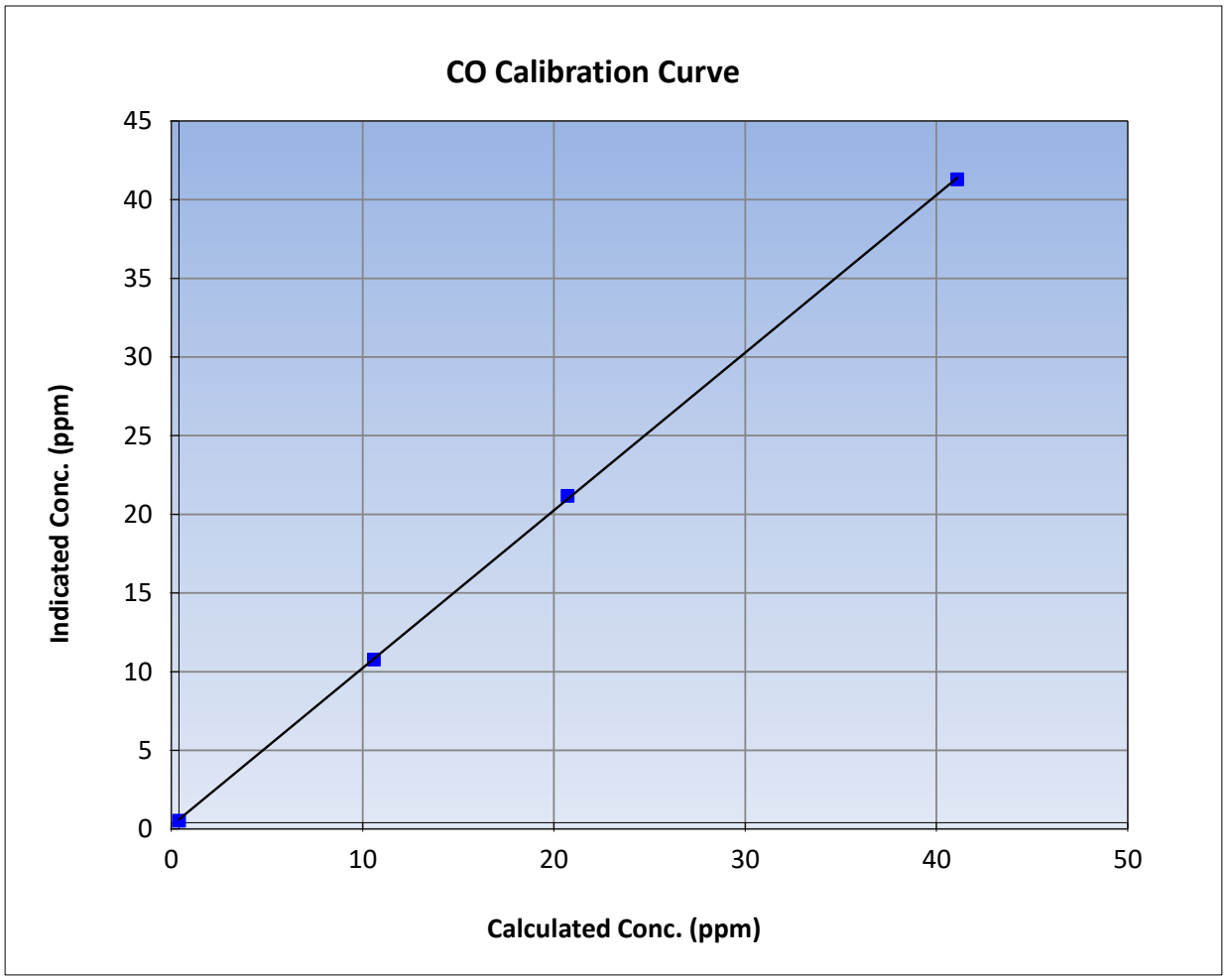
Station Information

Calibration Date:	March 24, 2023	Previous Calibration:	February 24, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:30	End Time (MST):	12:18
Analyzer make:	API T300	Analyzer serial #:	3504

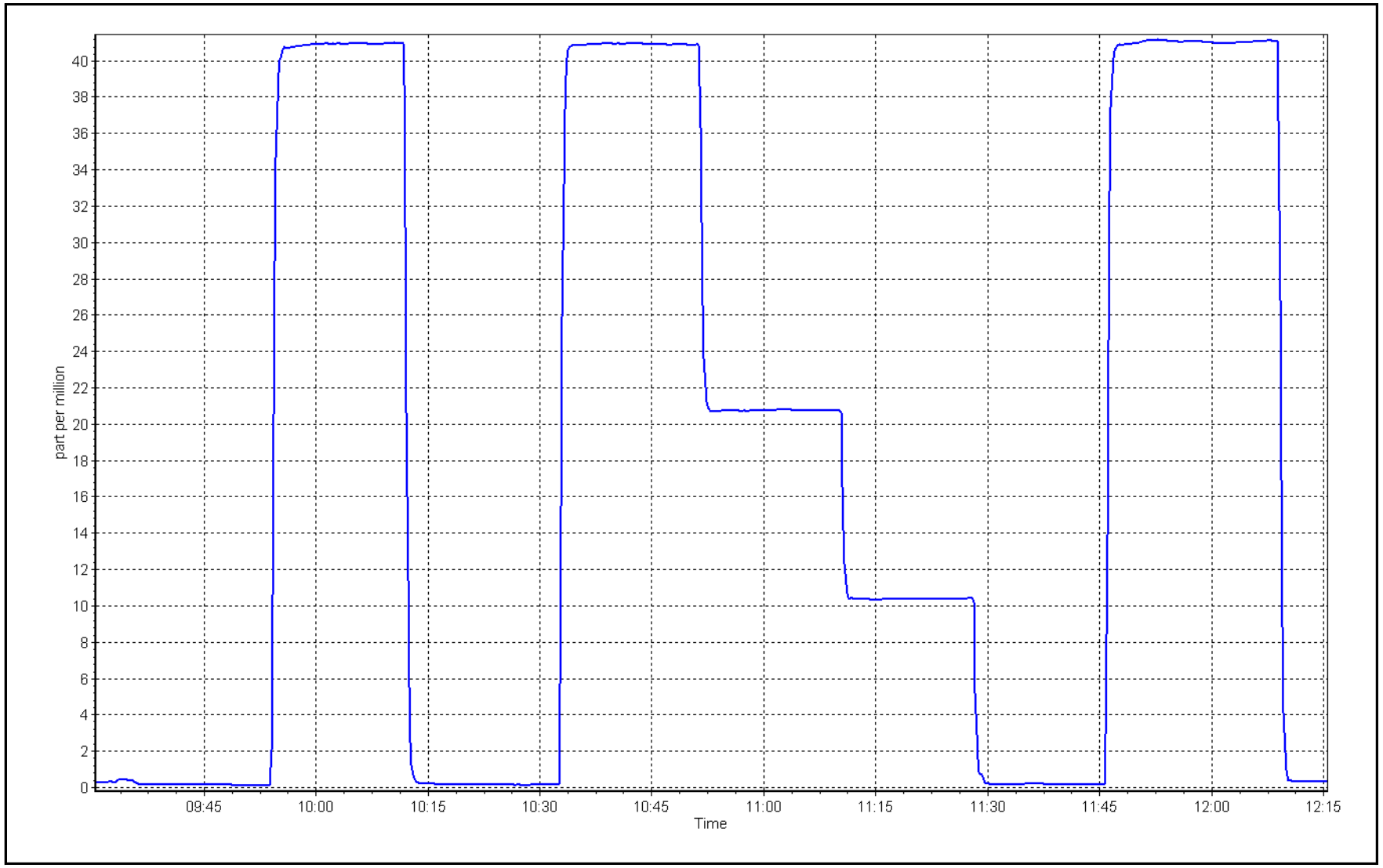
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
40.7	40.9	0.9949
20.3	20.8	0.9781
10.2	10.4	0.9824

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999939	*≥0.995*
Slope	1.002302	*0.90 - 1.10*
Intercept	0.205803	*+/-1.5*



CO Calibration Plot Date: March 24, 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:	March 29, 2023	Last Cal Date:	February 8, 2023
Start time (MST):	9:42	End time (MST):	13:18
Reason:	Maintenance		

Calibration Standards

Cal Gas Concentration:	60,220	ppm	Cal Gas Exp Date:	December 1, 2026
Cal Gas Cylinder #:	ALM063503			
Removed Cal Gas Conc:	60,220	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	2658
N2 Gen Make/Model:	Peak Scientific		Serial Number:	771048317

Analyzer Information

Analyzer make: API T360 — Analyzer serial #: 283

Analyzer Range 0 - 2,000 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999561	1.008751	Backgd or Offset:	-0.059	-0.059
Calibration intercept:	1.700000	4.460000	Coeff or Slope:	1.066	1.066

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	0.6	----
as found span	2920	80.0	1605.9	1612.7	0.996
as found 2nd point	2960	40.0	802.9	815.4	0.985
as found 3rd point	2980	20.0	401.5	405.9	0.989
new cylinder response					
calibrator zero	3000	0.0	0.0	0.5	----
high point	2920	80.0	1605.9	1620.5	0.991
second point	2960	40.0	802.9	822.1	0.977
third point	2980	20.0	401.5	409.6	0.980
as left zero	3000	0.0	0.0	0.5	----
as left span	2930	80.0	1600.5	1619.4	0.988
				Average Correction Factor	0.983

Baseline Corr As found:	1612.10	Prev response:	1606.86	*% change:	0.3%
Baseline Corr 2nd AF pt:	814.8	AF Slope:	1.004019	AF Intercept:	3.260000
Baseline Corr 3rd AF pt:	405.3	AF Correlation:	0.999964		

* = > +/-5% change initiates investigation

Notes: Pump and sample inlet filter changed after multipoint as founds. No adjustments made.

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

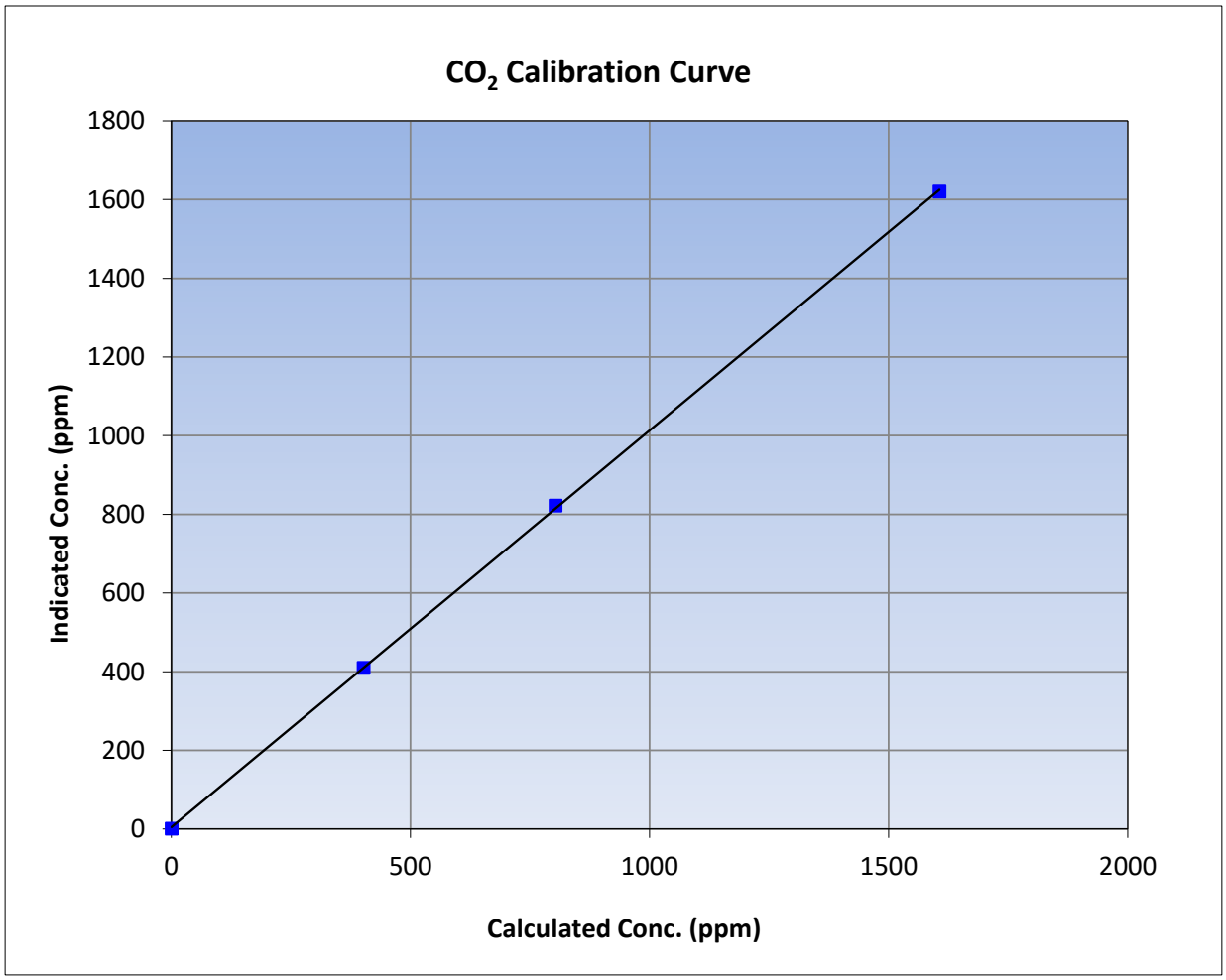
Station Information

Calibration Date	March 29, 2023	Previous Calibration	February 8, 2023
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	9:42	End Time (MST)	13:18
Analyzer make	API T360	Analyzer serial #	283

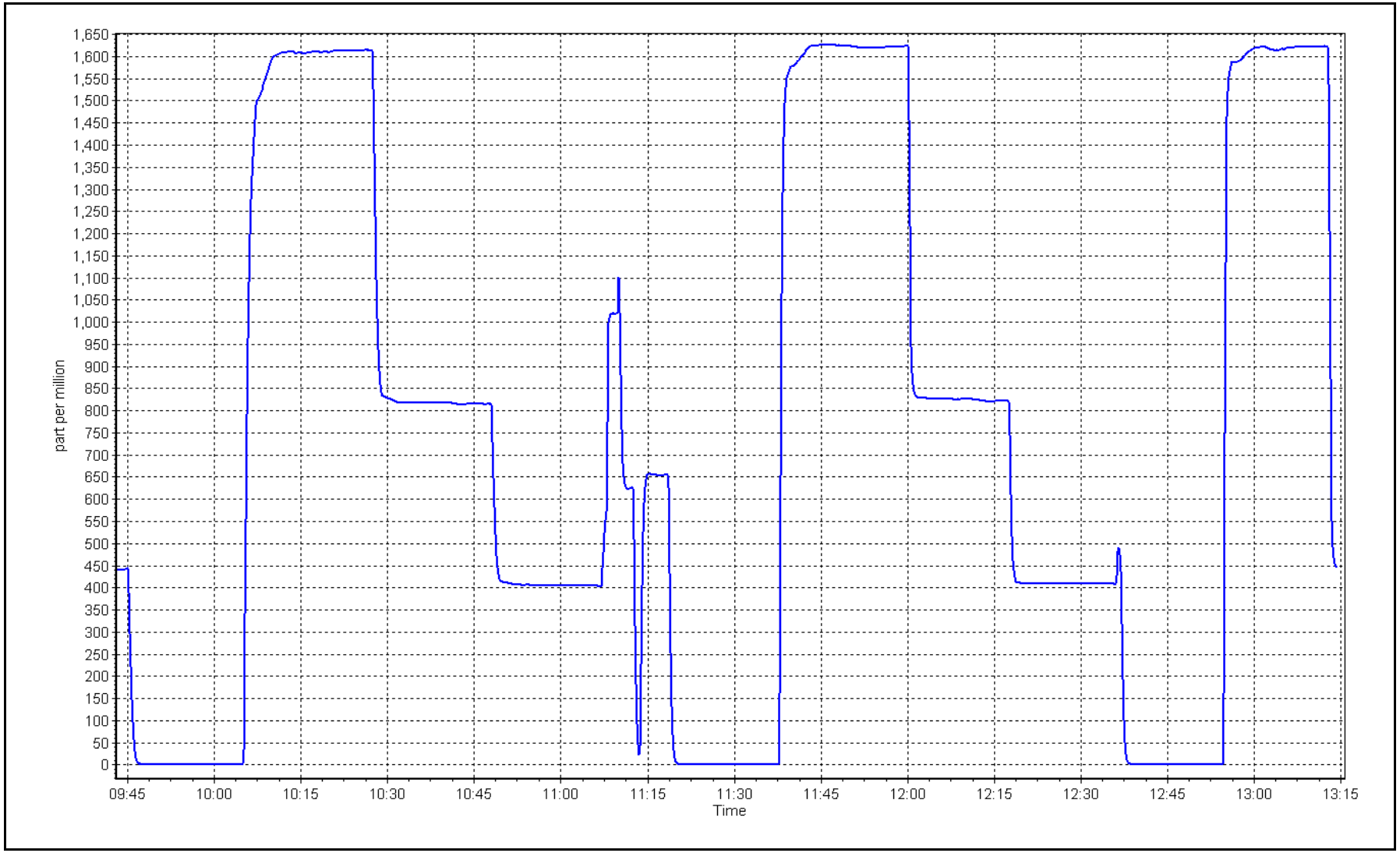
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
1605.9	1620.5	0.9910
802.9	822.1	0.9767
401.5	409.6	0.9801

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999937	*≥0.995*
Slope	1.008751	*0.90 - 1.10*
Intercept	4.460000	*+/-10*



CO_2 Calibration Plot Date: March 29, 2023 Location: Stony Mountain



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS19
FIREBAG
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	March 7, 2023	Last Cal Date:	February 7, 2023
Start time (MST):	11:15	End time (MST):	14:43
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.29	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC716618			
Removed Cal Gas Conc:	49.29	ppm	Rem Gas Exp Date:	
Removed Gas Cyl #:			Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	1607
ZAG Make/Model:	API T701		Serial Number:	1118

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1410661308

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998105	1.000420	Backgd or Offset:	10.3	10.0
Calibration intercept:	-0.121714	-0.181972	Coeff or Slope:	0.987	0.976

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	4999	0.0	0.0	-0.2	----
as found span	4919	81.1	799.5	808.0	0.989
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	4999	0.0	0.0	0.1	----
high point	4919	81.1	799.5	799.7	1.000
second point	4959	40.6	400.3	400.3	1.000
third point	4980	20.3	200.1	199.6	1.003
as left zero	4999	0.0	0.0	0.0	----
as left span	4919	81.1	799.5	799.4	1.000
				Average Correction Factor	1.001

Baseline Corr As found:	808.20	Previous response	797.83	*% 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 sample inlet filter after as founds. Adjusted span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

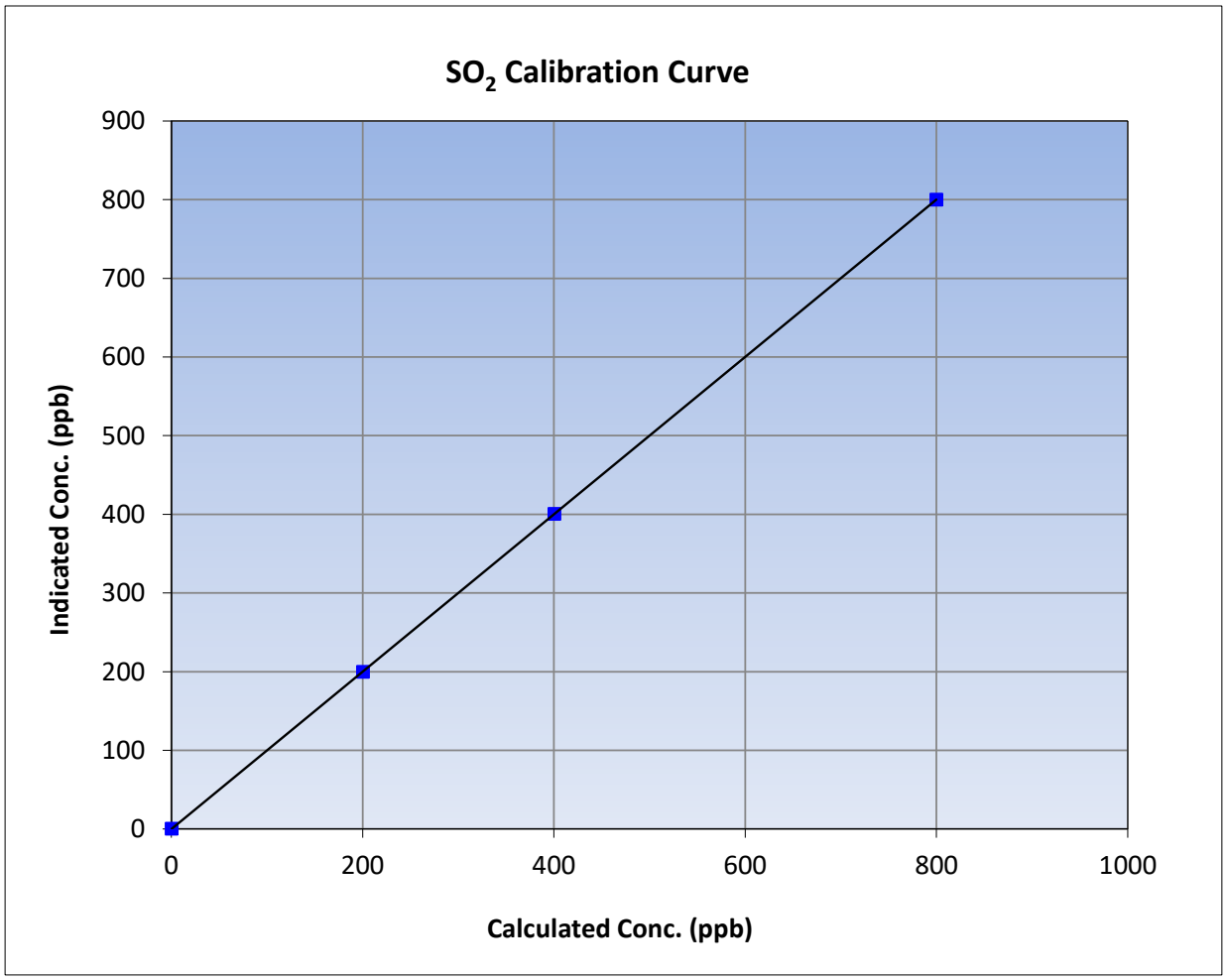
Station Information

Calibration Date:	March 7, 2023	Previous Calibration:	February 7, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	11:15	End Time (MST):	14:43
Analyzer make:	Thermo 43i	Analyzer serial #:	1410661308

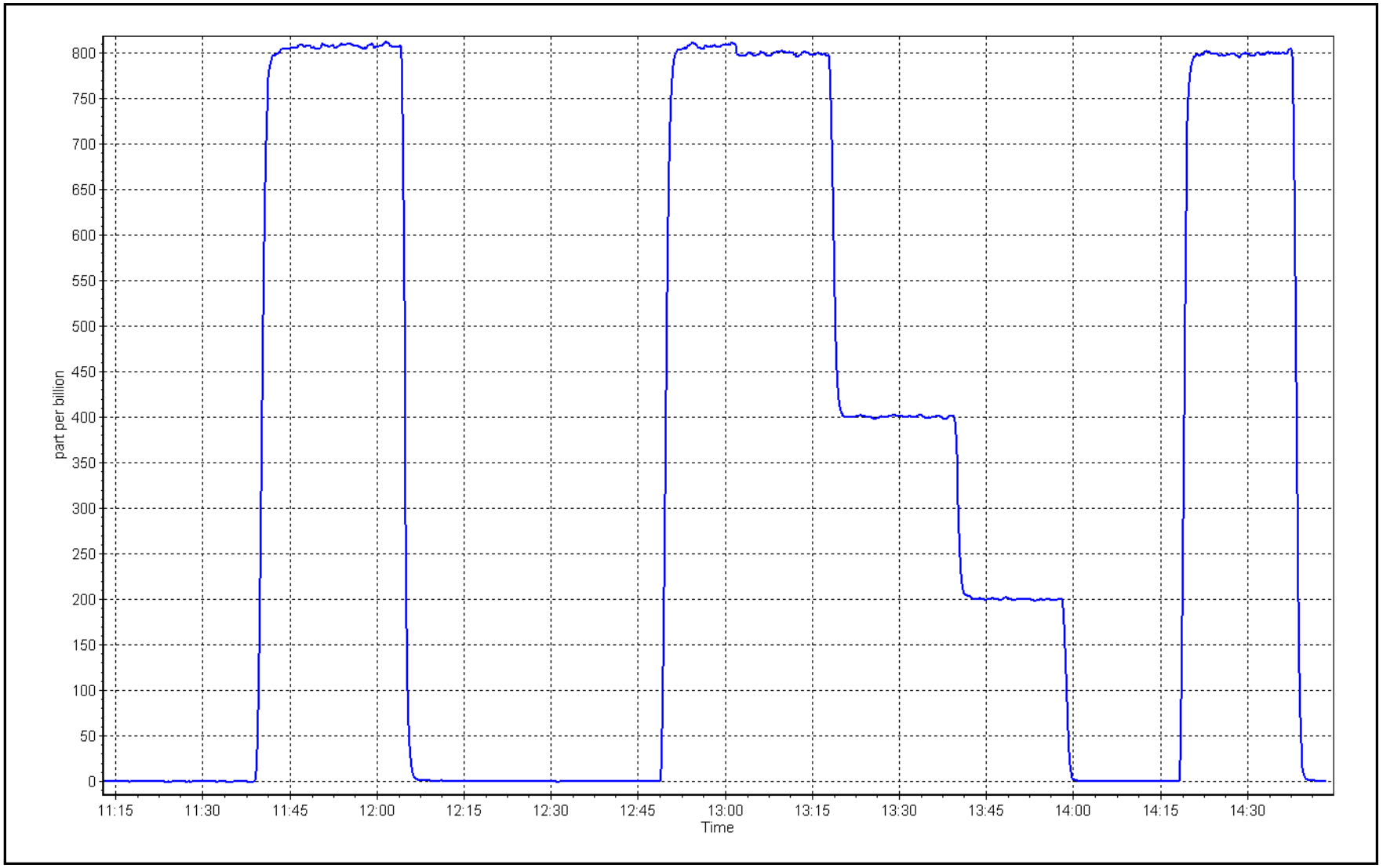
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
799.5	799.7	0.9997
400.3	400.3	0.9999
200.1	199.6	1.0025

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	1.000420	*0.90 - 1.10*
Intercept	-0.181972	*+/-30*



SO2 Calibration Plot Date: March 7, 2023 Location: Firebag



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Firebag	Station number:	AMS19
Calibration Date:	March 2, 2023	Last Cal Date:	February 6, 2023
Start time (MST):	11:30	End time (MST):	16:07
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1336160090	
Converter make:	Global		Converter serial #:	2022-222	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997909	1.003769	Backgd or Offset:	2.96	3.18
Calibration intercept:	0.118481	0.038321	Coeff or Slope:	0.979	0.990

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	79.3	1.010
as found 2nd point	4961	39.1	40.0	39.8	1.007
as found 3rd point	4980	19.6	20.0	20.0	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	0.0	----
high point	4922	78.2	80.0	80.3	0.996
second point	4961	39.1	40.0	40.2	0.995
third point	4980	19.6	20.0	20.2	0.992
as left zero	5000	0.0	0.0	0.0	----
as left span	4922	78.2	80.0	80.1	0.998
SO2 Scrubber Check	4922	78.3	800.2	0.0	----
Date of last scrubber change:		December 9, 2021		Ave Corr Factor	0.994
Date of last converter efficiency test:		n/a			efficiency

Baseline Corr As found:	79.2	Prev response:	79.93	*% change:	-0.9%
Baseline Corr 2nd AF pt:	39.7	AF Slope:	0.990191	AF Intercept:	0.138629
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999998		

* = > +/-5% change initiates investigation

Notes: SOx scrubber check done after calibrator zero. Adjusted zero and span. Changed sample inlet filter after MPAF's.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

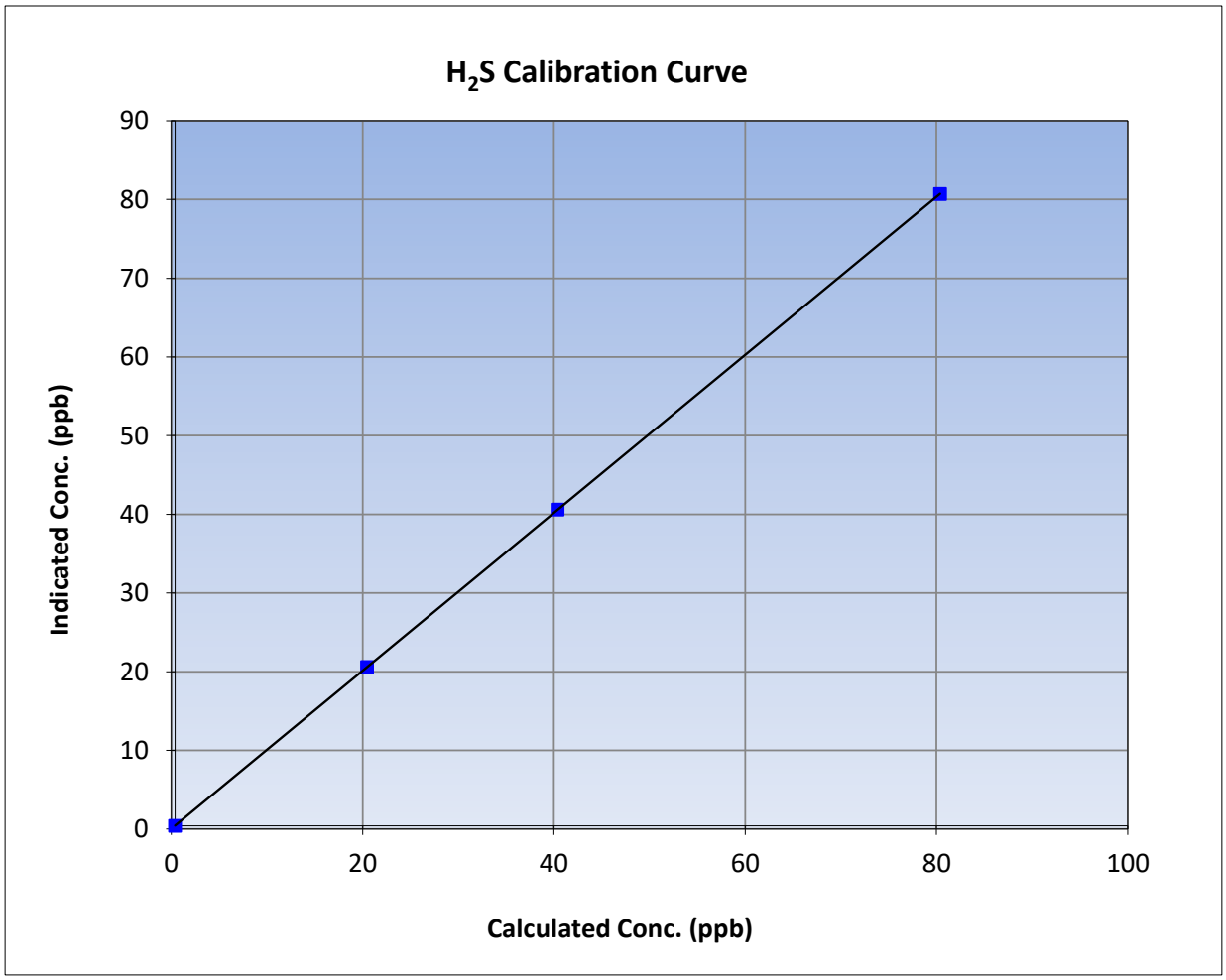
Station Information

Calibration Date:	March 2, 2023	Previous Calibration:	February 6, 2023
Station Name:	Firebag	Station Number:	AMS19
Start Time (MST):	11:30	End Time (MST):	16:07
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1336160090

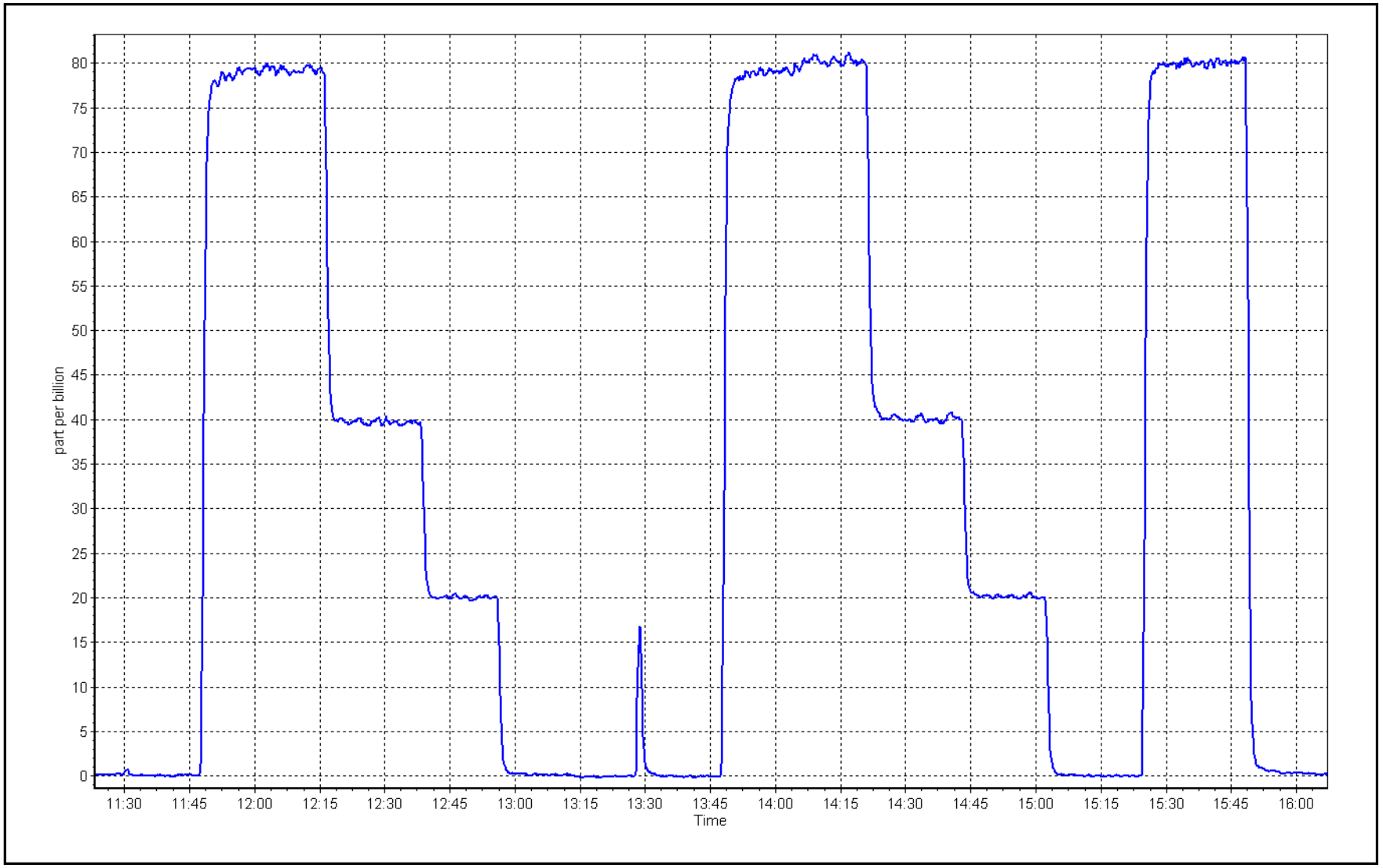
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.3	0.9960
40.0	40.2	0.9948
20.0	20.2	0.9925

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	1.003769	*0.90 - 1.10*
Intercept	0.038321	*+/-3*



H_2S Calibration Plot Date: March 2, 2023 Location: Firebag



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	March 7, 2023	Last Cal Date:	February 7, 2023
Start time (MST):	11:15	End time (MST):	14:43
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC716618	Cal Gas Expiry Date:	February 23, 2025	
CH4 Cal Gas Conc.	500.7	ppm	CH4 Equiv Conc.	1066.9	ppm
C3H8 Cal Gas Conc.	205.9	ppm			
Removed Gas Cert:			Removed Gas Expiry:		
Removed CH4 Conc.	500.7	ppm	CH4 Equiv Conc.	1066.9	ppm
Removed C3H8 Conc.	205.9	ppm	Diff between cyl:		
Calibrator Make/Model:	API T700		Serial Number:	1607	
ZAG Make/Model:	API T701		Serial Number:	1118	

Analyzer Information

Analyzer make: Thermo 51i-LT
Analyzer serial #: 1336160089
Analyzer Range: 0 - 20 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.986792	0.998521	Background:	2.11	2.24
Calibration intercept:	0.033117	-0.017736	Coefficient:	3.748	3.732

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	4919	81.1	17.31	17.56	0.985
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	4999	0.0	0.00	0.02	----
high point	4919	81.1	17.31	17.29	1.001
second point	4959	40.6	8.66	8.59	1.009
third point	4980	20.3	4.33	4.28	1.012
as left zero	5000	0.0	0.00	0.05	----
as left span	4919	81.1	17.31	17.35	0.997
				Average Correction Factor	1.007

Baseline Corr As found:	17.44	Previous response	17.11	*% 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 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

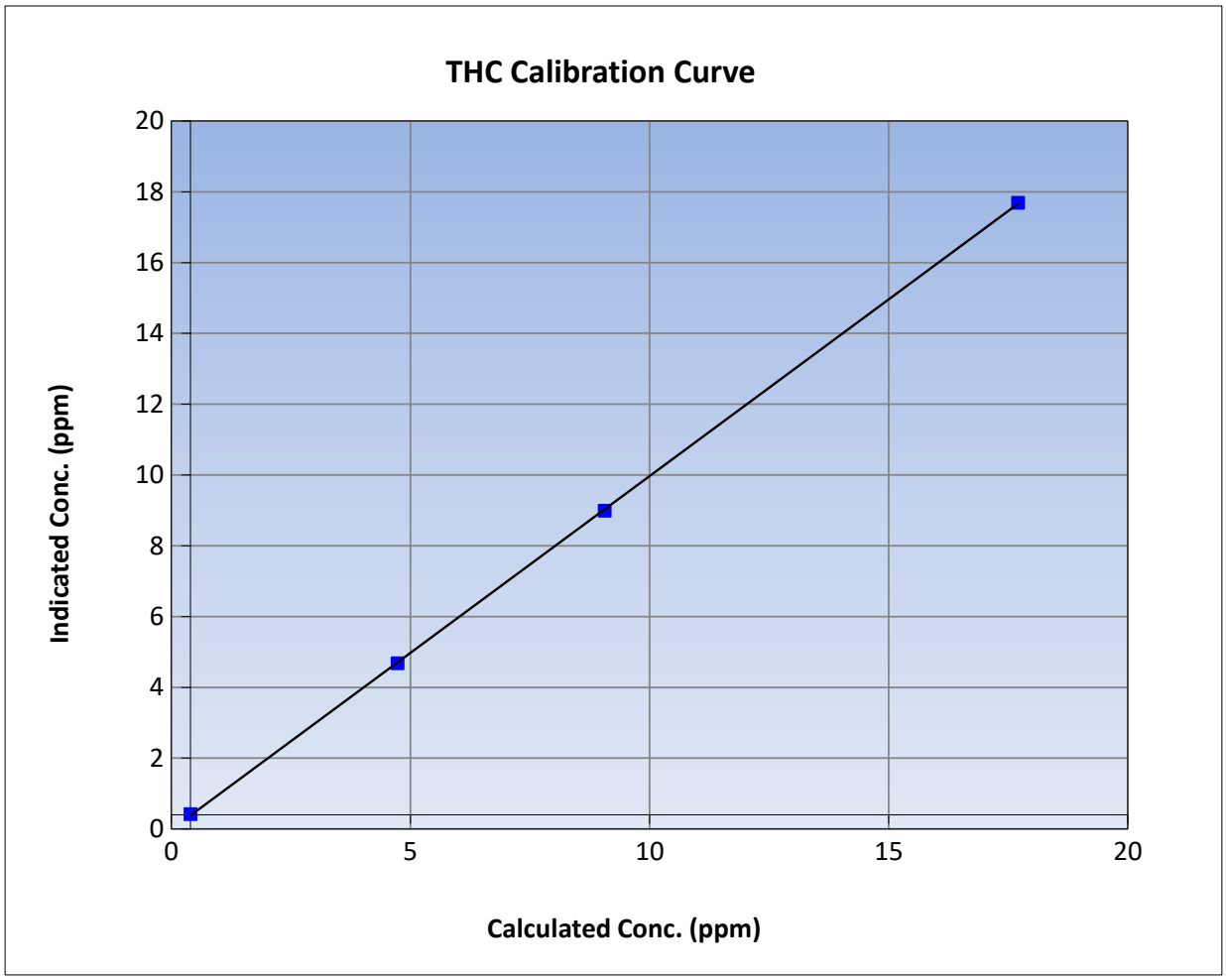
Station Information

Calibration Date:	March 7, 2023	Previous Calibration:	February 7, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	11:15	End Time (MST):	14:43
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1336160089

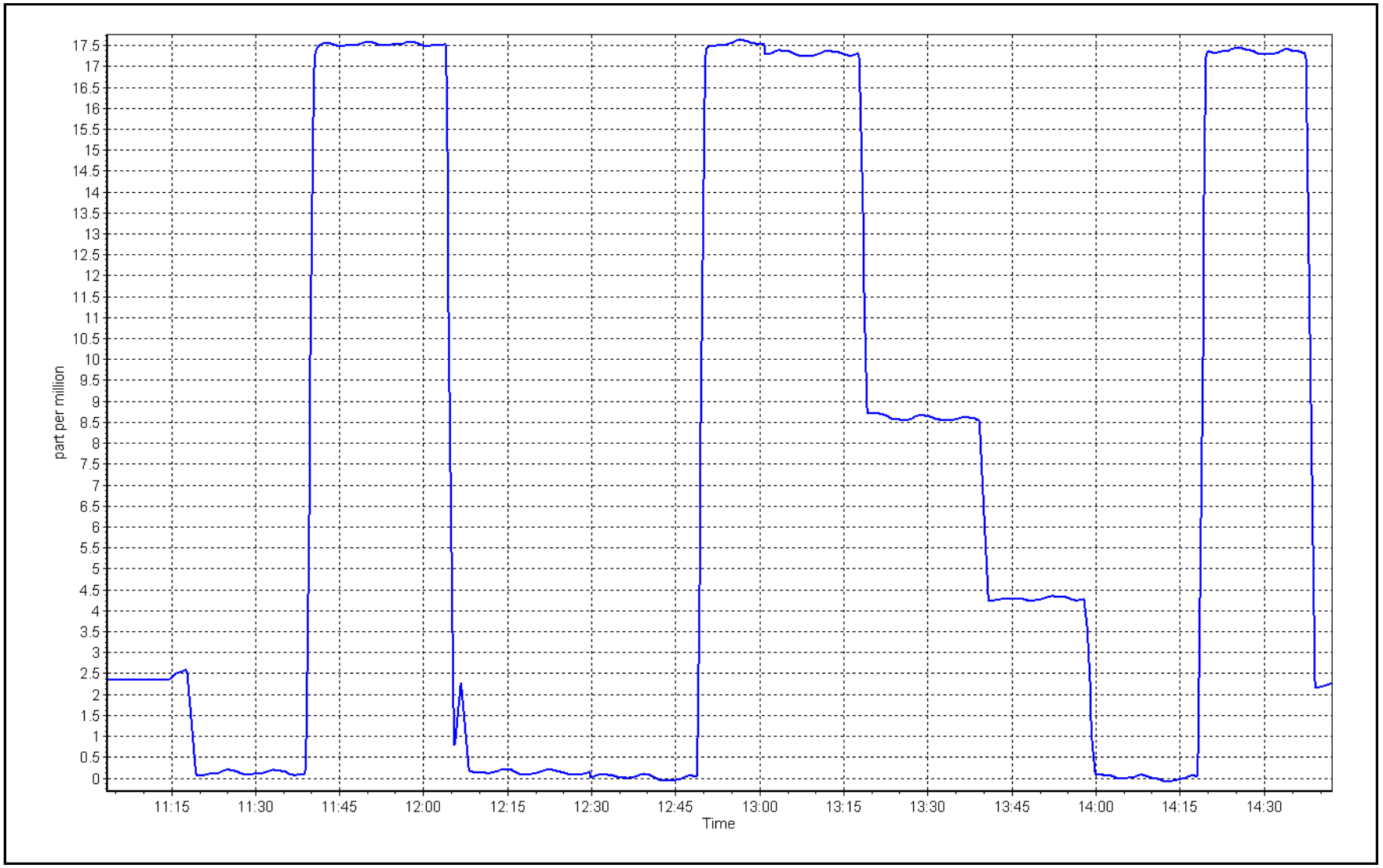
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.02	----
17.31	17.29	1.0009
8.66	8.59	1.0086
4.33	4.28	1.0115

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999969	*≥0.995*
Slope	0.998521	*0.90 - 1.10*
Intercept	-0.017736	*+/-1.5*



THC Calibration Plot Date: March 7, 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:	March 3, 2023	Last Cal Date:	February 8, 2023
Start time (MST):	11:14	End time (MST):	16:11
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1410661309	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.041	1.041	NO bkgnd or offset:	7.3	7.2
NOX coeff or slope:	0.996	0.996	NOX bkgnd or offset:	7.3	7.3
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	210.9	206.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.997423	0.994815
NO_X Cal Offset:	0.135510	0.755137
NO Cal Slope:	0.998470	0.993858
NO Cal Offset:	-0.351682	0.287575
NO_2 Cal Slope:	0.999864	1.003159
NO_2 Cal Offset:	-0.568980	0.561215

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	-0.2	-0.2	-0.1	----	----
as found span	4919	81.0	828.1	800.3	27.9	825.0	794.6	30.1	1.0038	1.0071
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	4999	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
high point	4919	81.0	828.1	800.3	27.9	824.0	795.3	29.1	1.0050	1.0063
second point	4960	40.5	414.0	400.1	13.9	413.7	398.6	15.1	1.0008	1.0038
third point	4980	20.2	206.5	199.6	6.9	206.5	198.7	7.8	1.0001	1.0044
as left zero	4999	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
as left span	4919	81.0	828.1	364.8	463.4	827.0	358.3	468.3	1.0014	1.0181
								Average Correction Factor	1.0020	1.0048

Corrected As found NO_X = 825.2 ppb NO = 794.8 ppb

Previous Response NO_X = 826.1 ppb NO = 798.7 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 = -0.1%

*Percent Change NO = -0.5%

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)	793.1	357.6	463.4	465.2	0.9961	100.4%
2nd GPT point (200 ppb O3)	793.1	575.8	245.2	246.5	0.9946	100.5%
3rd GPT point (100 ppb O3)	793.1	686.4	134.6	136.2	0.9880	101.2%
				Average Correction Factor	0.9929	100.7%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

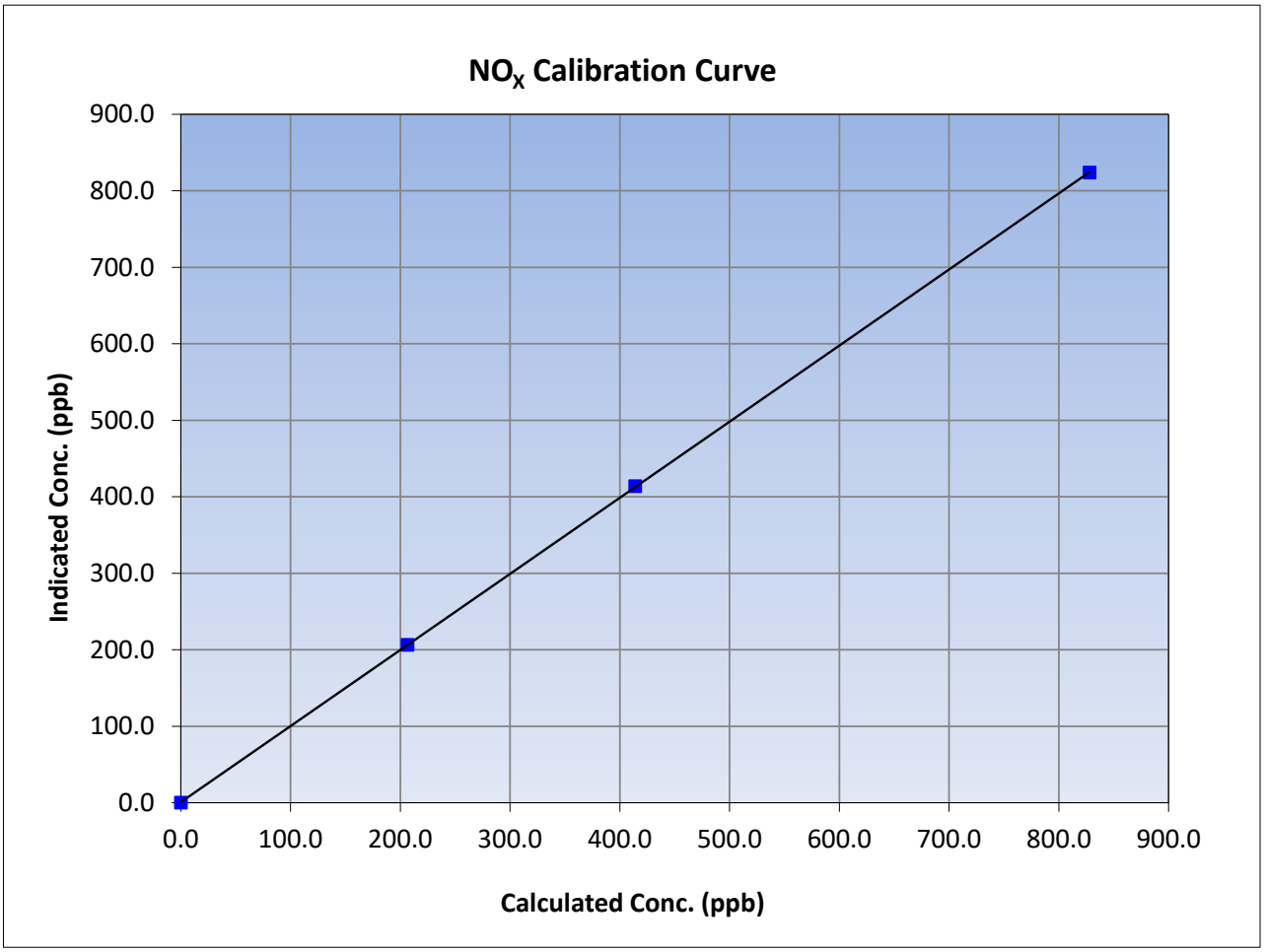
Version-04-2020

Station Information

Calibration Date:	March 3, 2023	Previous Calibration:	February 8, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	11:14	End Time (MST):	16:11
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999994	≥0.995
828.1	824.0	1.0050			
414.0	413.7	1.0008	Slope	0.994815	0.90 - 1.10
206.5	206.5	1.0001			
			Intercept	0.755137	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

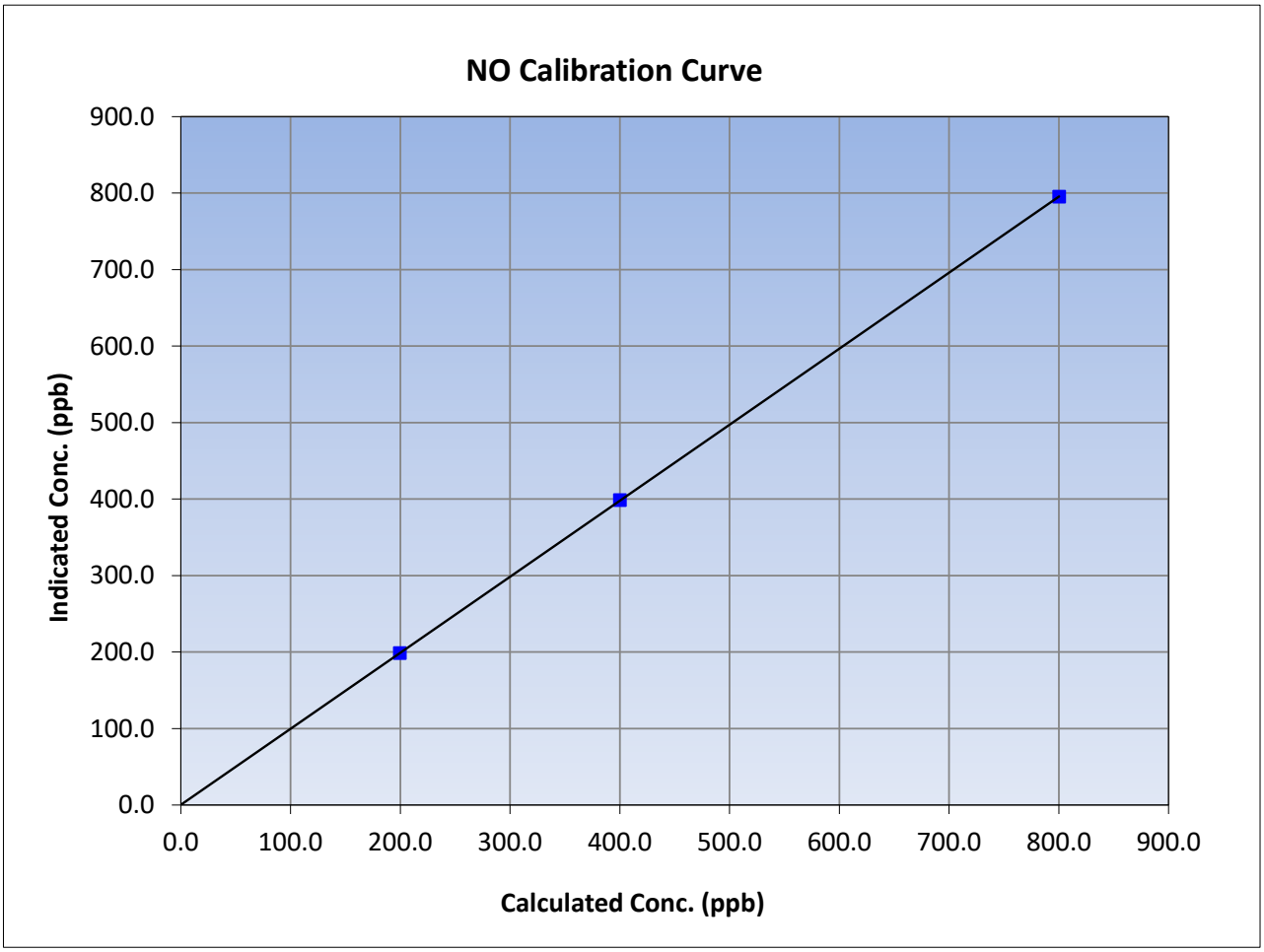
Version-04-2020

Station Information

Calibration Date:	March 3, 2023	Previous Calibration:	February 8, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	11:14	End Time (MST):	16:11
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
800.3	795.3	1.0063			
400.1	398.6	1.0038	Slope	0.993858	0.90 - 1.10
199.6	198.7	1.0044			
			Intercept	0.287575	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

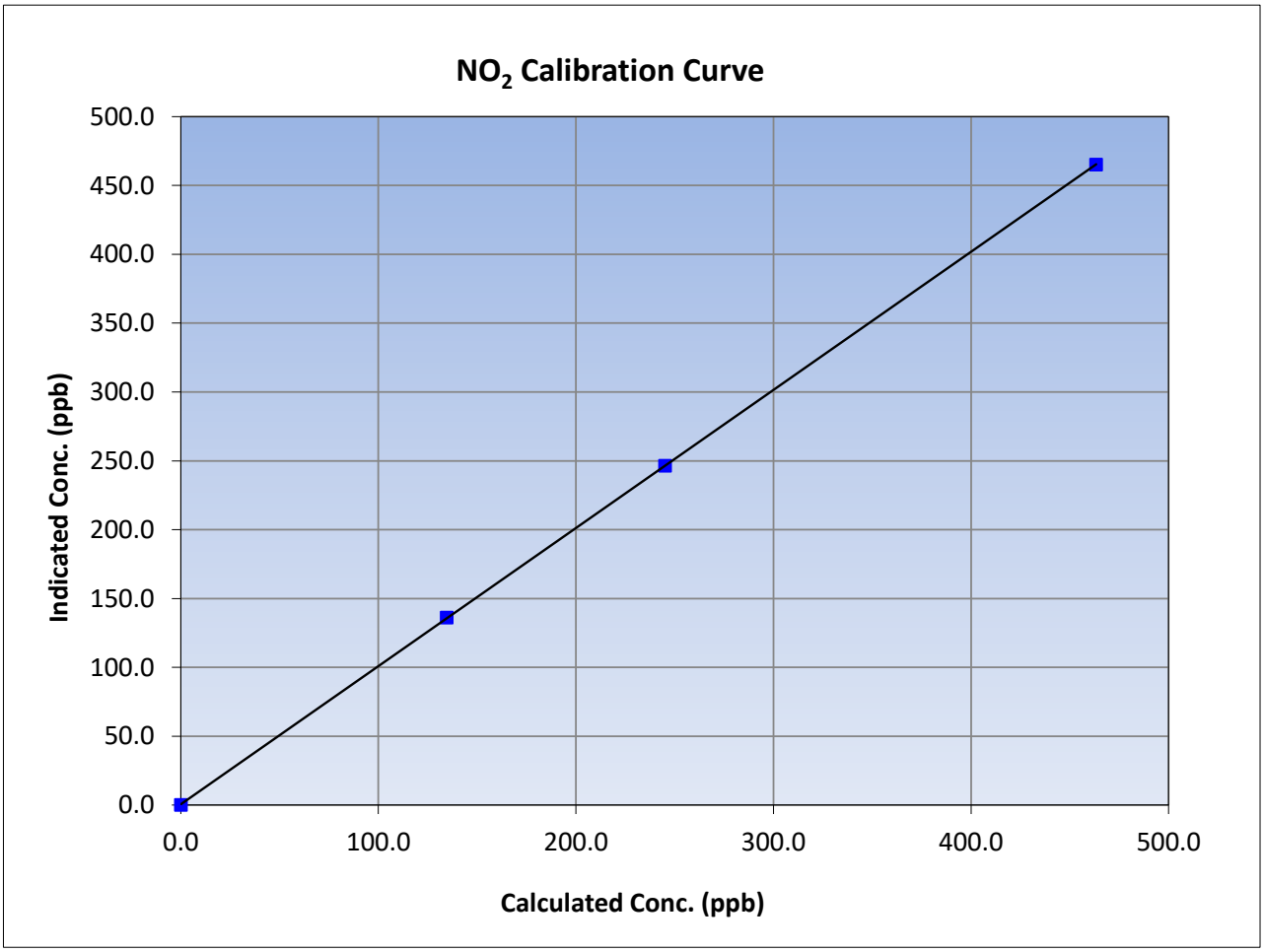
Version-04-2020

Station Information

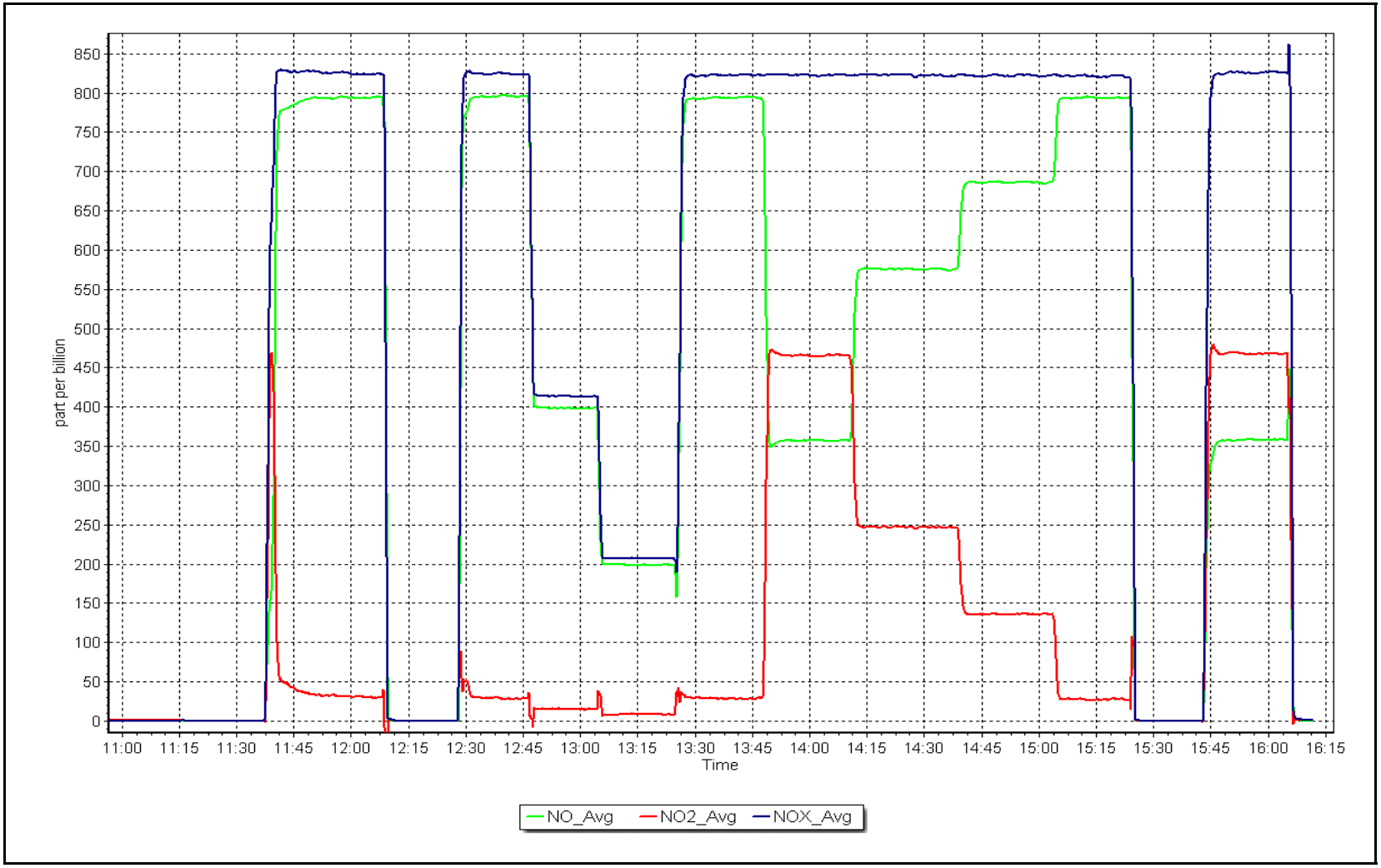
Calibration Date:	March 3, 2023	Previous Calibration:	February 8, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	11:14	End Time (MST):	16:11
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999994	≥0.995
463.4	465.2	0.9961			
245.2	246.5	0.9946	Slope	1.003159	0.90 - 1.10
134.6	136.2	0.9880			
			Intercept	0.561215	+/-20



NO_X Calibration Plot Date: March 3, 2023 Location: Firebag



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS20
MACKAY RIVER
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	March 1, 2023	Last Cal Date:	February 1, 2023
Start time (MST):	10:51	End time (MST):	14:17
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:	0.999451	0.992140	Backgd or Offset:	18.6	19.1
Calibration intercept:	2.850831	3.311046	Coeff or Slope:	0.974	0.974

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	800.3	794.1	1.008
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	800.3	796.0	1.005
second point	4959	40.7	400.7	401.5	0.998
third point	4980	20.3	199.8	205.4	0.973
as left zero	5000	0.0	0.0	-0.1	----
as left span	4919	81.3	800.3	796.6	1.005
				Average Correction Factor	0.992

Baseline Corr As found:	794.20	Previous response	802.68	*% 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: Sample inlet filter changed after as founds. No adjustments requried.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

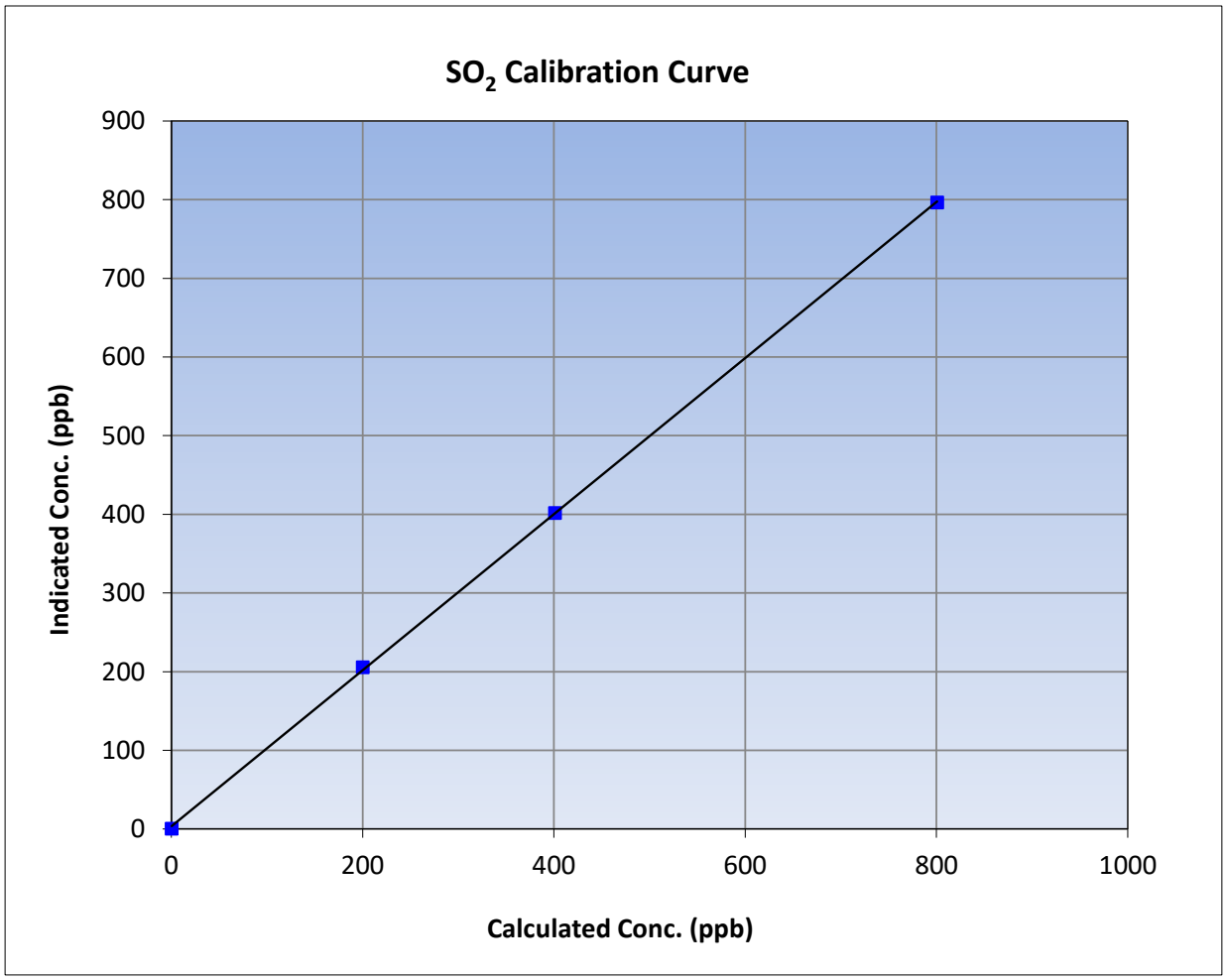
Station Information

Calibration Date:	March 1, 2023	Previous Calibration:	February 1, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	10:51	End Time (MST):	14:17
Analyzer make:	Thermo 43i	Analyzer serial #:	1501301450

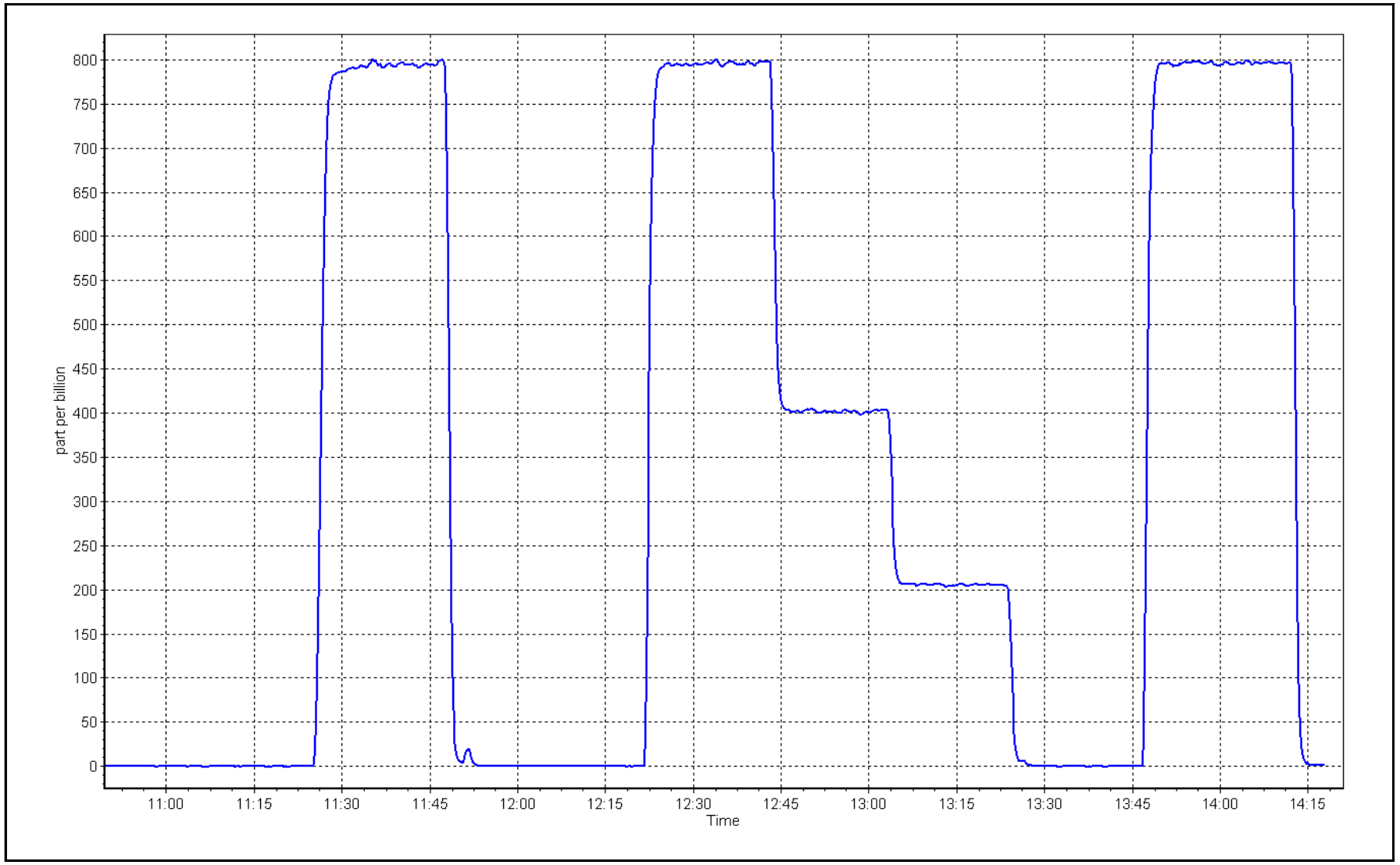
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
800.3	796.0	1.0054
400.7	401.5	0.9979
199.8	205.4	0.9728

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999921	*≥0.995*
Slope	0.992140	*0.90 - 1.10*
Intercept	3.311046	*+/-30*



SO2 Calibration Plot Date: March 1, 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:	March 2, 2023	Last Cal Date:	February 13, 2023
Start time (MST):	10:17	End time (MST):	15:13
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	4.87	ppm	Cal Gas Exp Date:	May 5, 2023
Cal Gas Cylinder #:	EY0001922			
Removed Cal Gas Conc:	4.87	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	1220
ZAG Make/Model:	Teledyne API 701		Serial Number:	4522

Analyzer Information

Analyzer make:	Teledyne API T101		Analyzer serial #:	196	
Converter make:	Internal		Converter serial #:	NA	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.990859	1.005578	Backgd or Offset:	46.3	47.9
Calibration intercept:	0.878999	0.338970	Coeff or Slope:	0.981	0.991

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	4918	82.1	80.0	81.0	0.993
as found 2nd point	4959	41.1	40.0	41.3	0.981
as found 3rd point	4979	20.5	20.0	21.3	0.960
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	4918	82.1	80.0	80.5	0.993
second point	4959	41.1	40.0	40.9	0.979
third point	4979	20.5	20.0	20.8	0.960
as left zero	5000	0.0	0.0	0.2	----
as left span	4918	82.1	80.0	79.9	1.001
SO2 Scrubber Check	4919	80.0	800.2	0.1	----
Date of last scrubber change:		December 15, 2020		Ave Corr Factor	0.977
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.5	Prev response:	80.11	*% change:	0.5%
Baseline Corr 2nd AF pt:	40.8	AF Slope:	1.004434	AF Intercept:	0.879013
Baseline Corr 3rd AF pt:	20.8	AF Correlation:	0.999898		

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after multi point as founds. Performed scrubber test after calibrator zero. Adjusted zero only.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

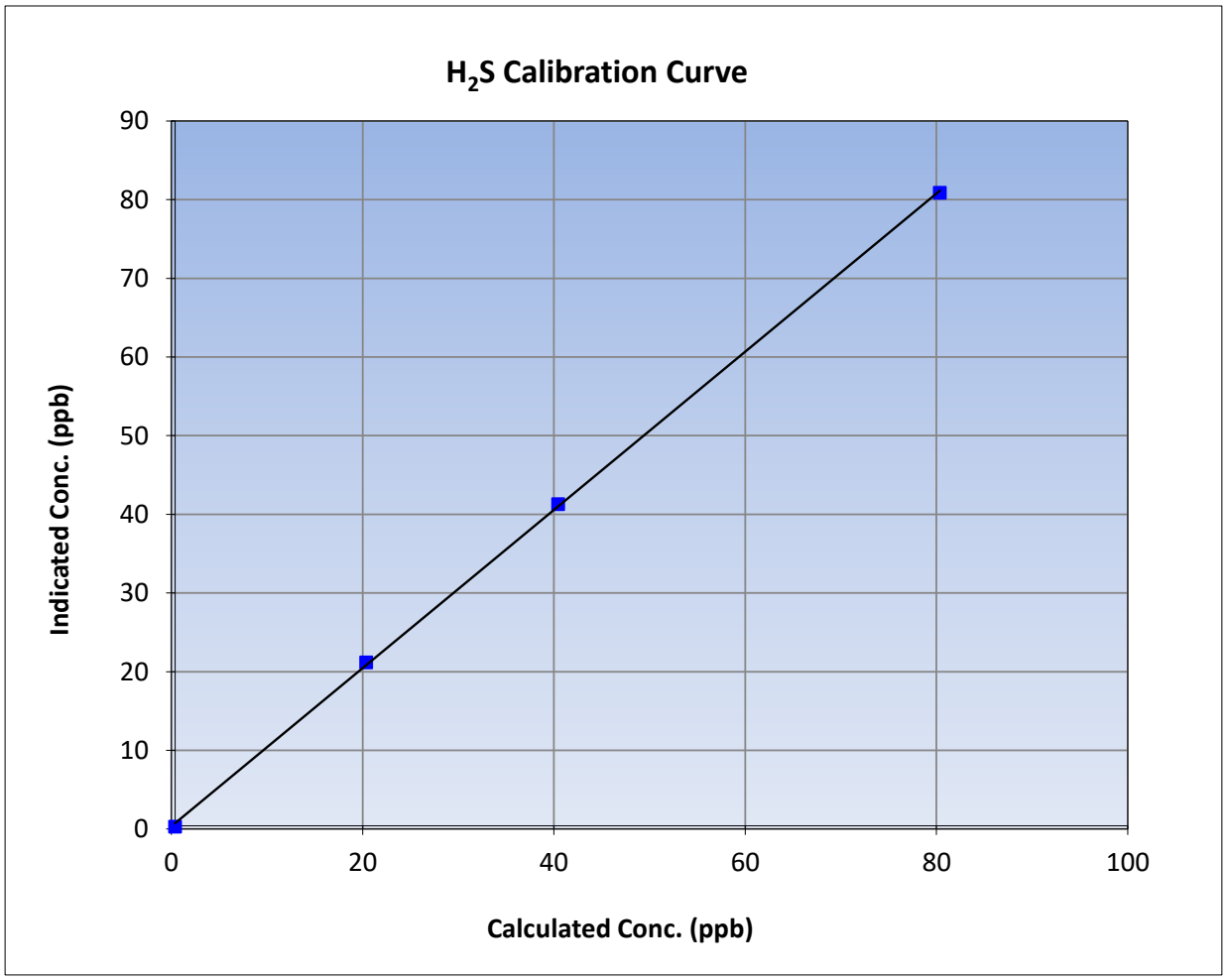
Station Information

Calibration Date:	March 2, 2023	Previous Calibration:	February 13, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	10:17	End Time (MST):	15:13
Analyzer make:	Teledyne API T101	Analyzer serial #:	196

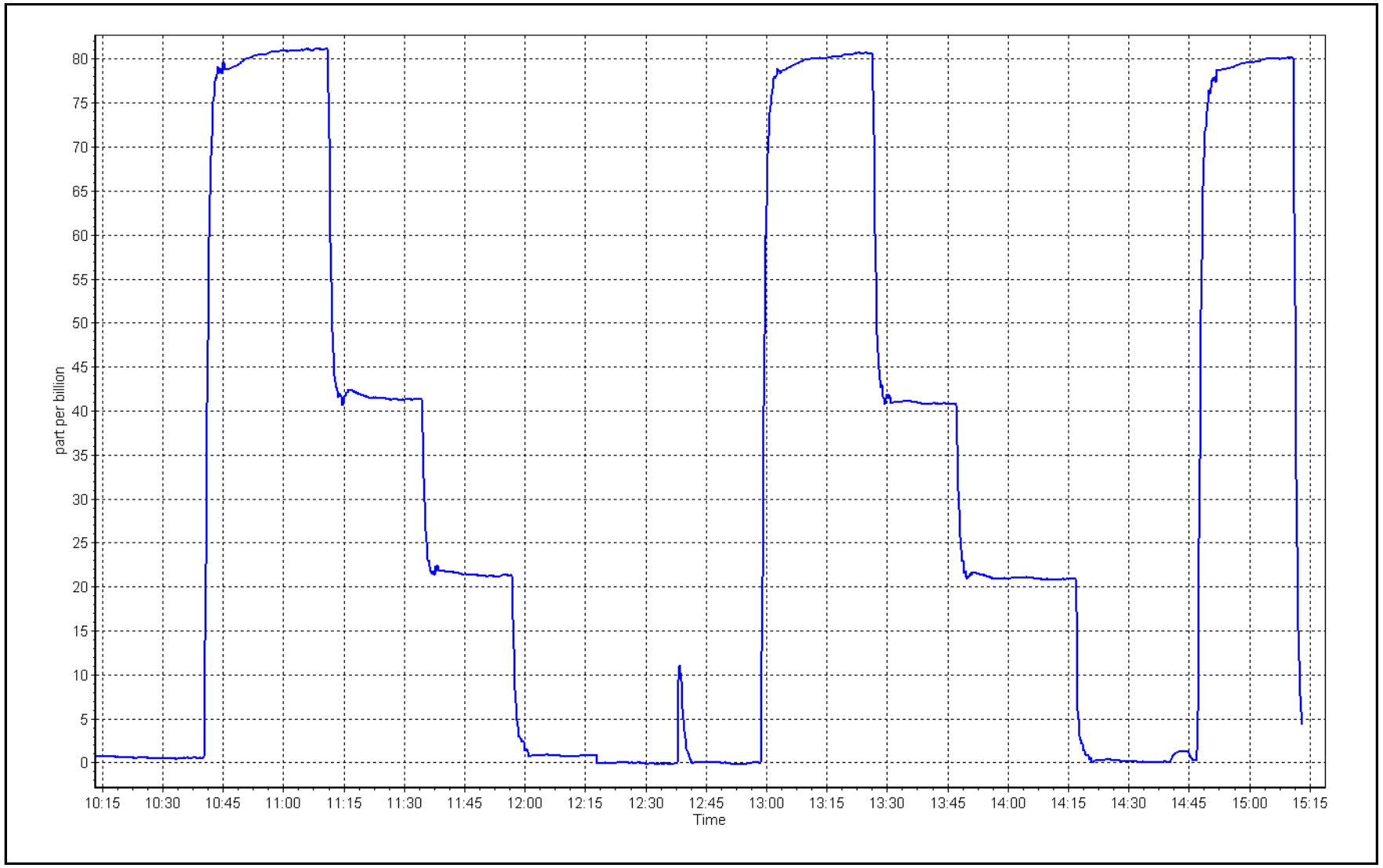
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.5	0.9933
40.0	40.9	0.9787
20.0	20.8	0.9600

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999860	*≥0.995*
Slope	1.005578	*0.90 - 1.10*
Intercept	0.338970	*+/-3*



H_2S Calibration Plot Date: March 2, 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:	March 8, 2023	Last Cal Date:	March 2, 2023
Start time (MST):	10:20	End time (MST):	15:58
Reason:	Maintenance		

Calibration Standards

Cal Gas Concentration:	4.87	ppm	Cal Gas Exp Date:	May 5, 2023
Cal Gas Cylinder #:	EY0001922			
Removed Cal Gas Conc:	4.87	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	1220
ZAG Make/Model:	Teledyne API 701		Serial Number:	4522

Analyzer Information

Analyzer make:	Teledyne API T101		Analyzer serial #:	196	
Converter make:	Internal		Converter serial #:	NA	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005578	0.999432	Backgd or Offset:	47.9	44.9
Calibration intercept:	0.338970	0.479018	Coeff or Slope:	0.991	1.008

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	-1.4	----
as found span	4918	82.1	80.0	77.8	1.010
as found 2nd point	4959	41.1	40.0	38.7	0.998
as found 3rd point	4979	20.5	20.0	19.0	0.979
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	4918	82.1	80.0	80.2	0.997
second point	4959	41.1	40.0	40.7	0.984
third point	4979	20.5	20.0	20.8	0.960
as left zero	5000	0.0	0.0	0.2	----
as left span	4918	82.1	80.0	79.4	1.007

SO2 Scrubber Check

Date of last scrubber change:	December 15, 2020	Ave Corr Factor	0.980
Date of last converter efficiency test:			efficiency

Baseline Corr As found:	79.2	Prev response:	80.75	*% change:	-2.0%
Baseline Corr 2nd AF pt:	40.1	AF Slope:	0.988429	AF Intercept:	-1.060971
Baseline Corr 3rd AF pt:	20.4	AF Correlation:	0.999916		

* = > +/-5% change initiates investigation

Notes: Adjusted zero and span.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

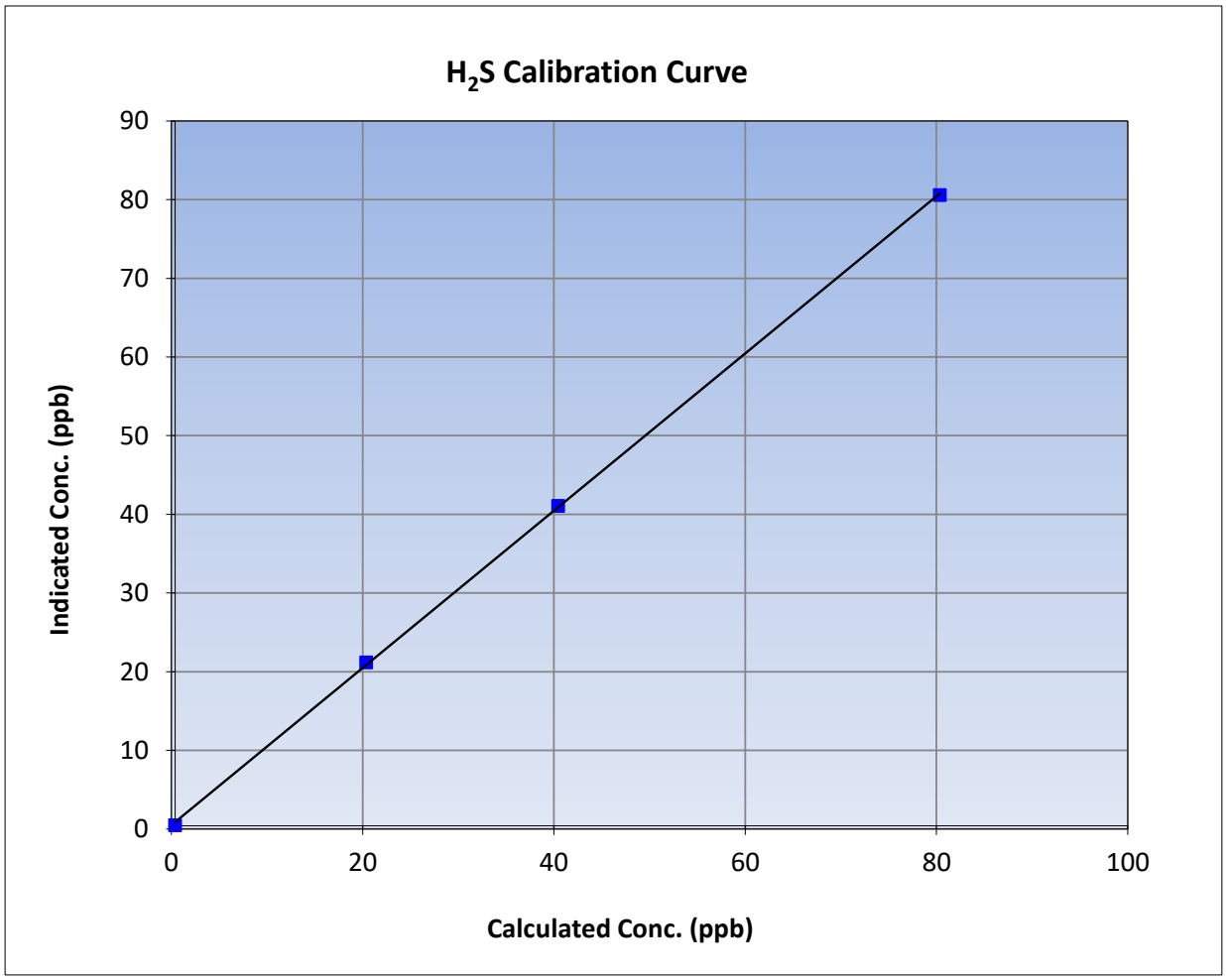
Station Information

Calibration Date:	March 8, 2023	Previous Calibration:	March 2, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	10:20	End Time (MST):	15:58
Analyzer make:	Teledyne API T101	Analyzer serial #:	196

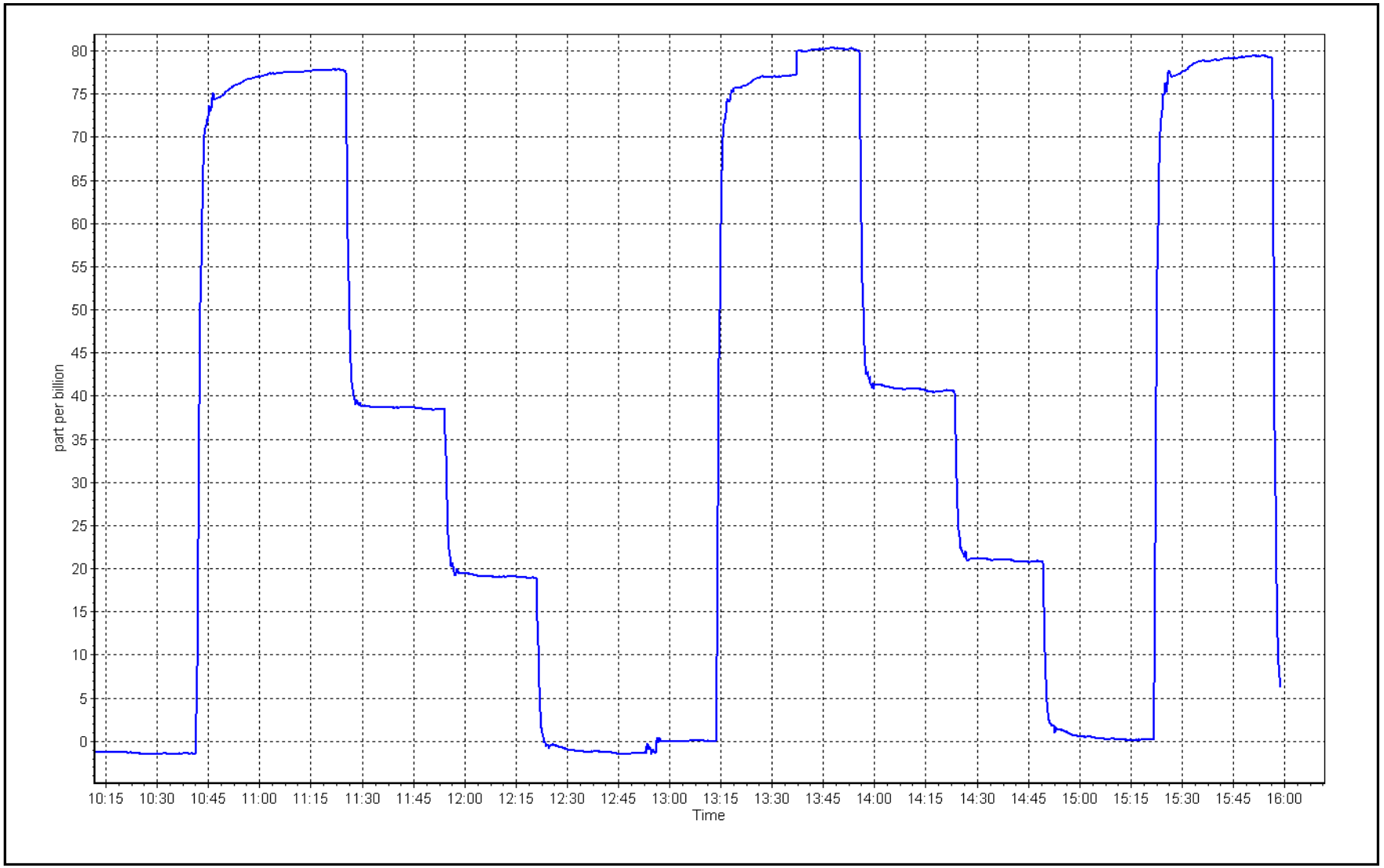
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.2	0.9971
40.0	40.7	0.9836
20.0	20.8	0.9600

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999897	*≥0.995*
Slope	0.999432	*0.90 - 1.10*
Intercept	0.479018	*+/-3*



H_2S Calibration Plot Date: March 8, 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:	March 1, 2023	Last Cal Date:	February 1, 2023
Start time (MST):	10:51	End time (MST):	14:17
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:	0.996170	0.993043	Background:	3.440	2.870
Calibration intercept:	0.044213	0.145942	Coefficient:	5.402	5.253

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	-0.46	----
as found span	4919	81.3	17.34	17.22	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.05	----
high point	4919	81.3	17.34	17.29	1.003
second point	4959	40.7	8.68	8.89	0.977
third point	4980	20.3	4.33	4.50	0.963
as left zero	5000	0.0	0.00	0.12	----
as left span	4919	81.3	17.34	17.12	1.013
				Average Correction Factor	0.981

Baseline Corr As found:	17.68	Previous response	17.32	*% 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: Sample inlet filter changed after as founds. Adjusted zero only.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

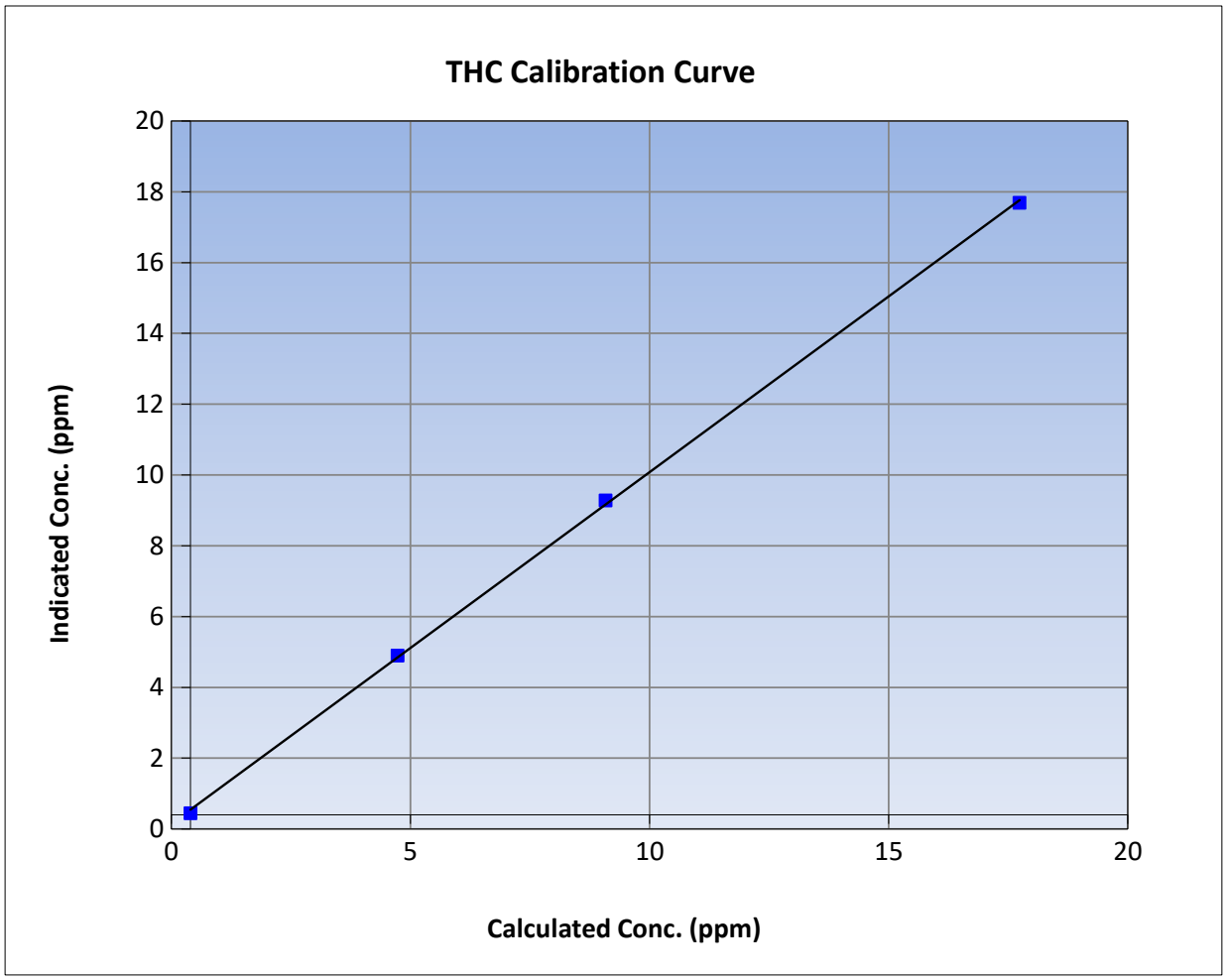
Station Information

Calibration Date:	March 1, 2023	Previous Calibration:	February 1, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	10:51	End Time (MST):	14:17
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1501663727

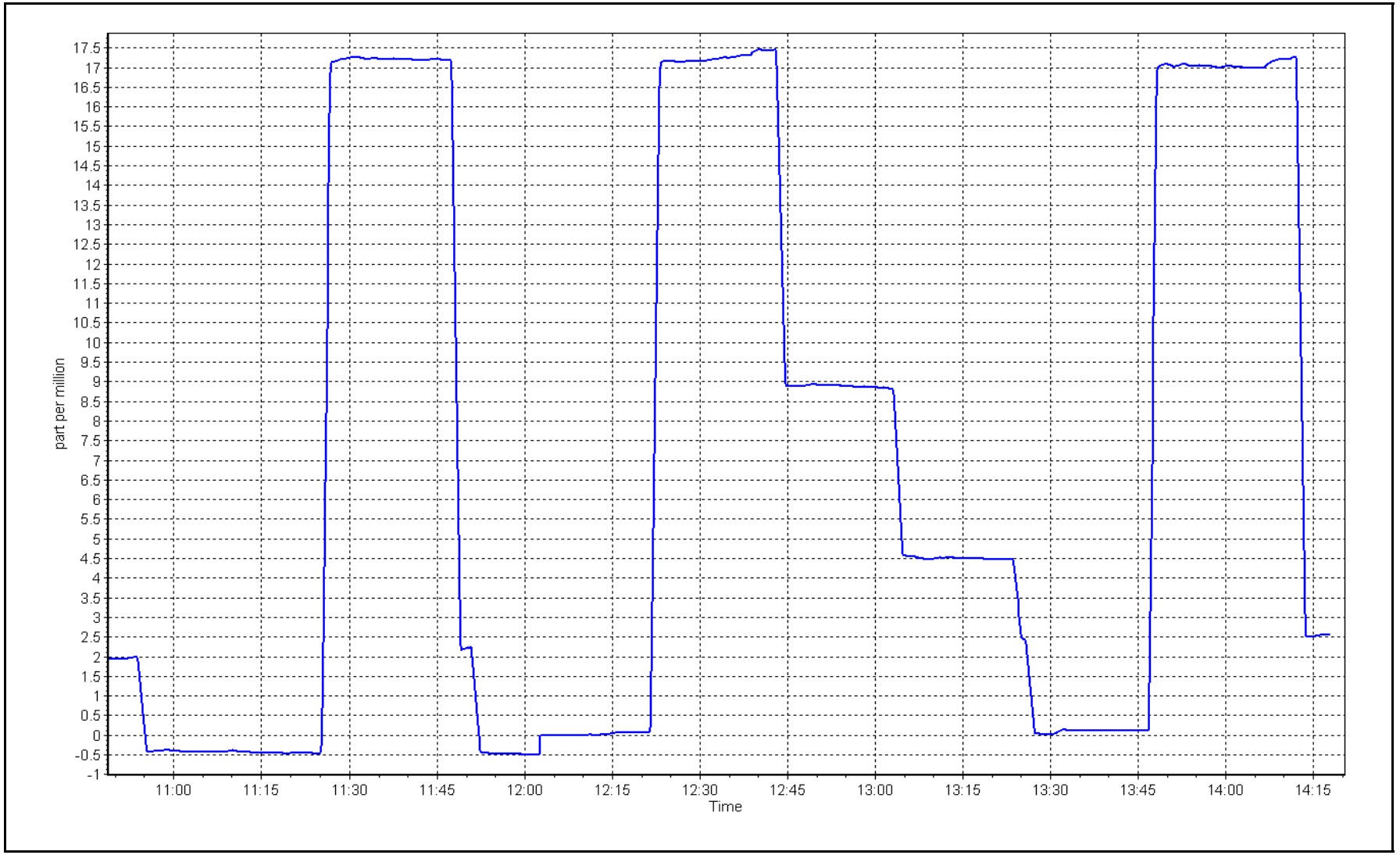
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.05	----
17.34	17.29	1.0027
8.68	8.89	0.9770
4.33	4.50	0.9625

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999803	*≥0.995*
Slope	0.993043	*0.90 - 1.10*
Intercept	0.145942	*+/-1.5*



THC Calibration Plot Date: March 1, 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:	March 9, 2023	Last Cal Date:	February 2, 2023
Start time (MST):	10:48	End time (MST):	15:41
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T376265		Cal Gas Expiry Date:	April 13, 2025	
NOX Cal Gas Conc:	49.19	ppm	NO Cal Gas Conc:	48.04	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	49.19	ppm	Removed Gas NO Conc:	48.04	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	1220	
ZAG make/model:	Teledyne API 701		Serial Number:	4522	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1505164379	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.364	1.412	NO bkgnd or offset:	3.8	3.9
NOX coeff or slope:	0.990	0.990	NOX bkgnd or offset:	3.8	3.9
NO2 coeff or slope:	0.995	0.995	Reaction cell Press:	176.8	182.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.993580	1.000735
NO_X Cal Offset:	3.070250	3.529487
NO Cal Slope:	0.997347	1.004217
NO Cal Offset:	1.531522	2.250337
NO_2 Cal Slope:	0.998061	1.000187
NO_2 Cal Offset:	-1.818500	-1.449451

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	803.5	784.2	19.3	1.0199	1.0205
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
high point	4917	83.3	819.5	800.3	19.2	822.2	805.0	17.3	0.9967	0.9942
second point	4956	41.7	410.4	400.8	9.6	415.0	405.3	9.7	0.9890	0.9890
third point	4979	20.8	204.6	199.9	4.8	212.4	205.6	6.8	0.9635	0.9721
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as left span	4917	83.3	819.5	462.2	357.3	813.3	455.6	357.7	1.0076	1.0145
								Average Correction Factor	0.9830	0.9851

Corrected As found	NO_X = 803.6 ppb	NO = 784.3 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-1.7%
Previous Response	NO_X = 817.3 ppb	NO = 799.7 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)	795.4	457.3	357.3	356.9	1.0010	99.9%
2nd GPT point (200 ppb O3)	795.4	618.1	196.5	194.1	1.0121	98.8%
3rd GPT point (100 ppb O3)	795.4	703.8	110.8	107.7	1.0284	97.2%
				Average Correction Factor	1.0138	98.6%

Notes: Adjusted span only.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

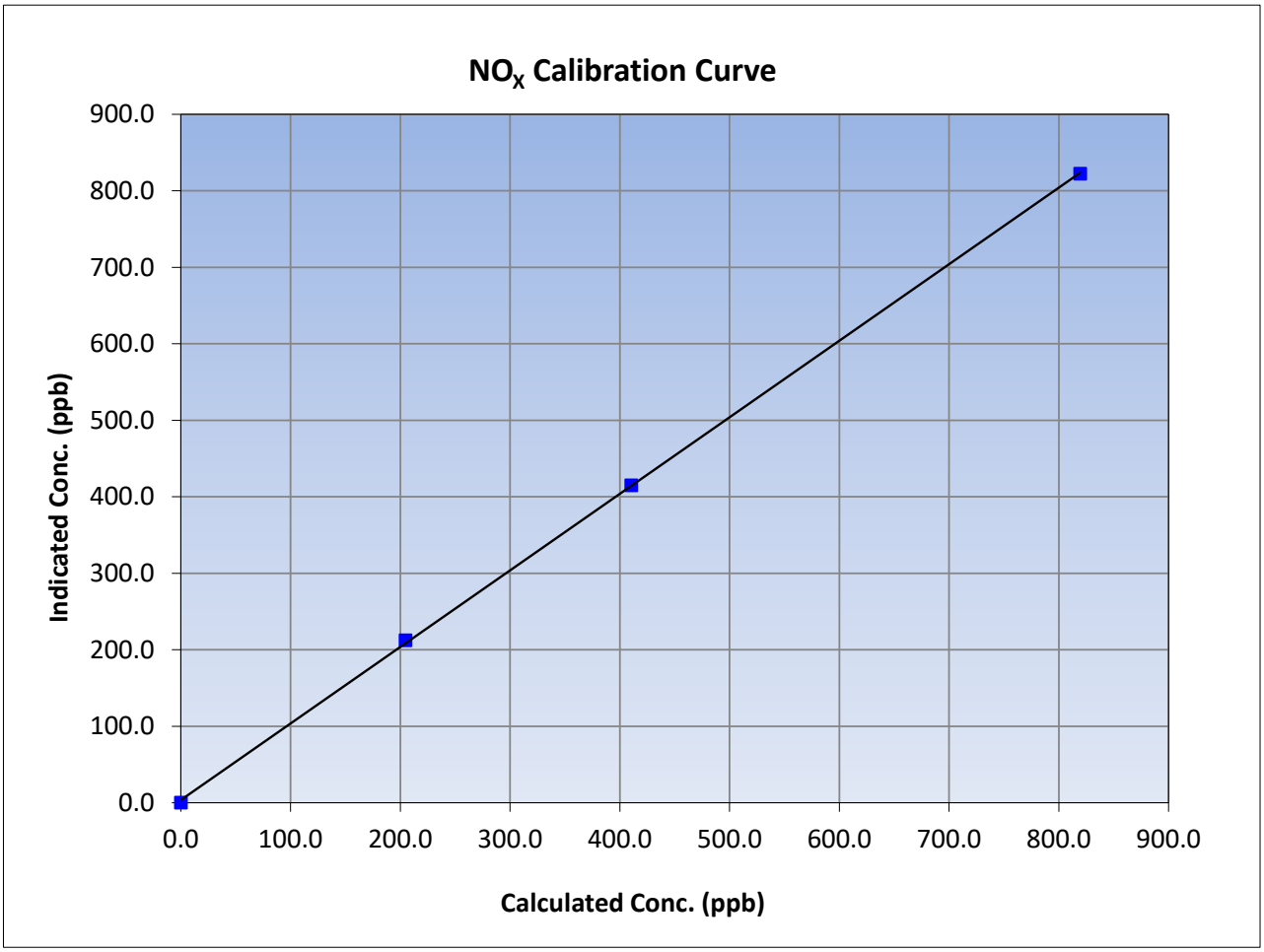
Version-04-2020

Station Information

Calibration Date:	March 9, 2023	Previous Calibration:	February 2, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	10:48	End Time (MST):	15:41
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	0.999916	≥0.995
819.5	822.2	0.9967			
410.4	415.0	0.9890	Slope	1.000735	0.90 - 1.10
204.6	212.4	0.9635			
			Intercept	3.529487	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

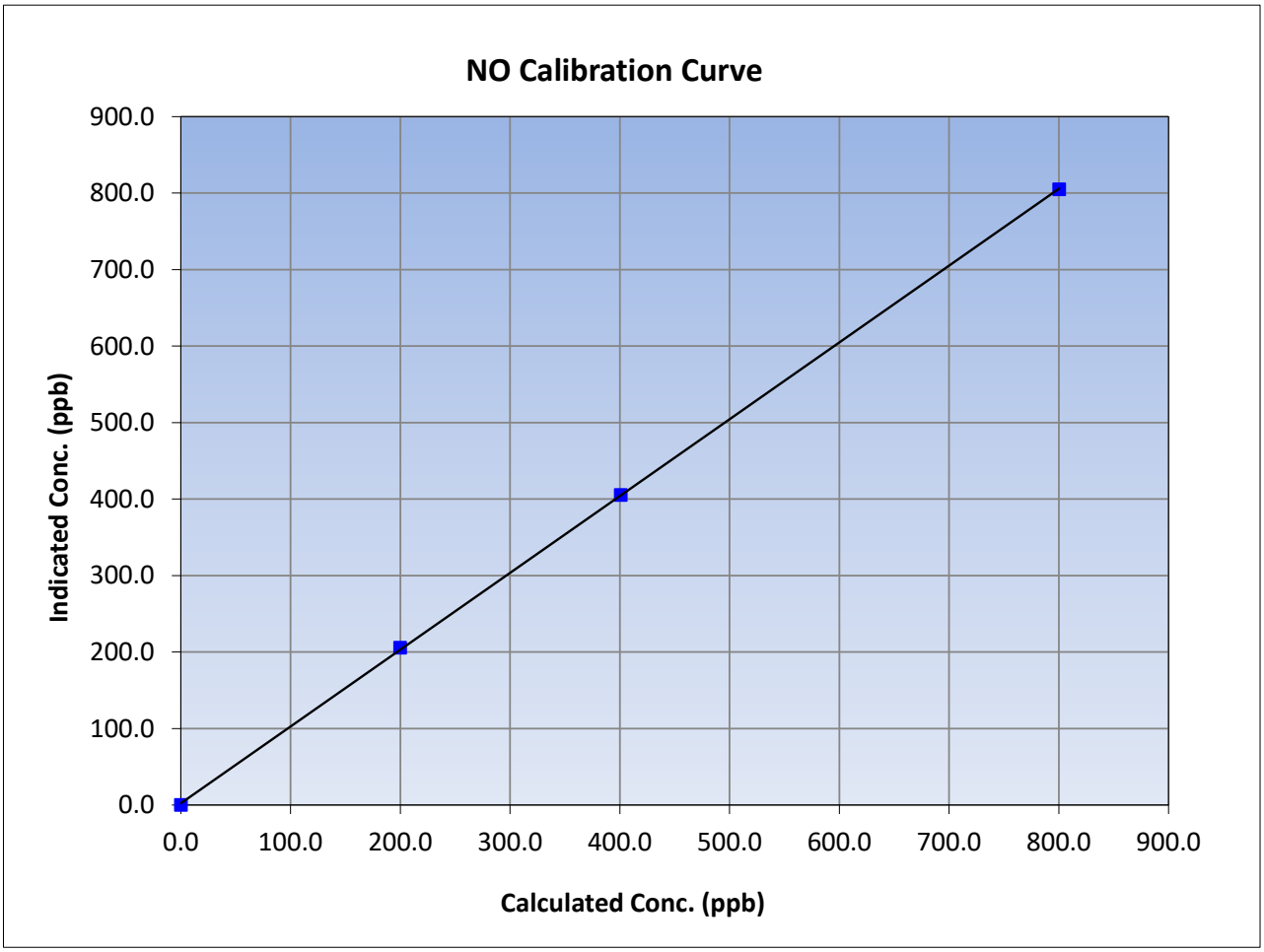
Version-04-2020

Station Information

Calibration Date:	March 9, 2023	Previous Calibration:	February 2, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	10:48	End Time (MST):	15:41
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	0.999963	≥0.995
800.3	805.0	0.9942			
400.8	405.3	0.9890	Slope	1.004217	0.90 - 1.10
199.9	205.6	0.9721			
			Intercept	2.250337	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

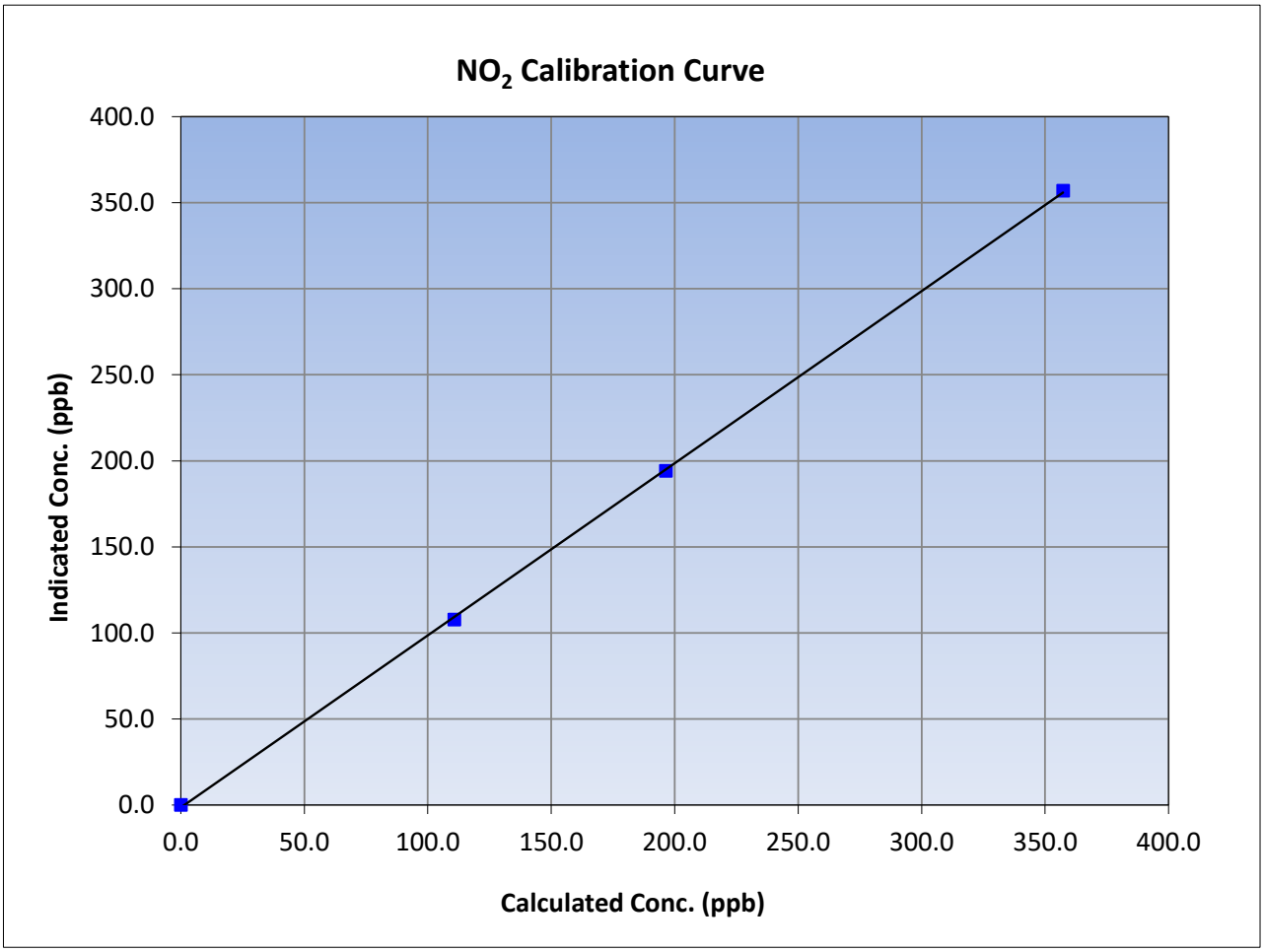
Version-04-2020

Station Information

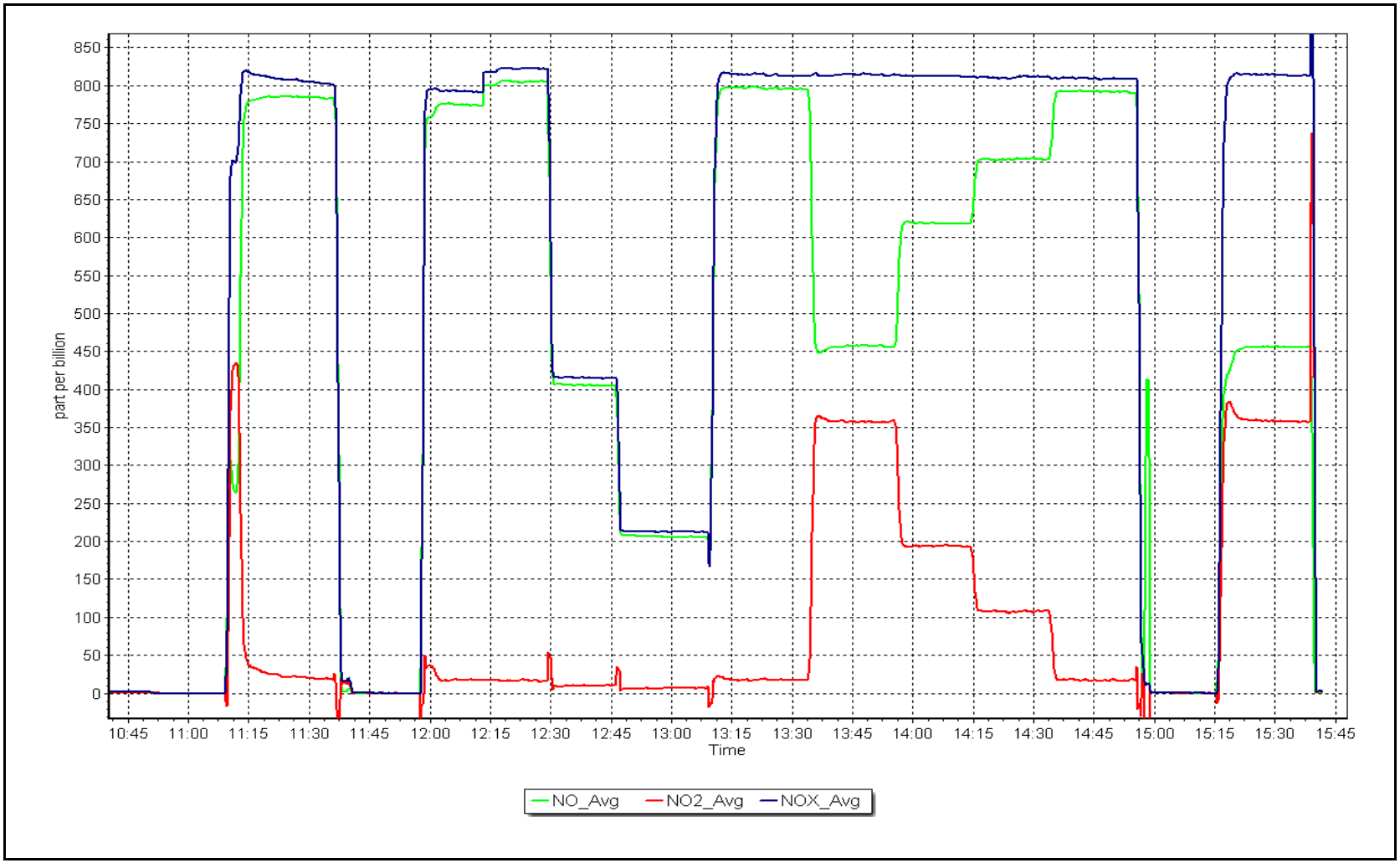
Calibration Date:	March 9, 2023	Previous Calibration:	February 2, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	10:48	End Time (MST):	15:41
Analyzer make:	Thermo 42i	Analyzer serial #:	1505164379

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999897	≥0.995
357.3	356.9	1.0010			
196.5	194.1	1.0121	Slope	1.000187	0.90 - 1.10
110.8	107.7	1.0284			
			Intercept	-1.449451	+/-20



NO_X Calibration Plot Date: March 9, 2023 Location: MacKay River



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS21
CONKLIN
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	March 3, 2023	Last Cal Date:	February 6, 2023
Start time (MST):	10:17	End time (MST):	13:00
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.93	ppm	Cal Gas Exp Date:	January 5, 2025
Cal Gas Cylinder #:	CC259455			
Removed Cal Gas Conc:	49.93	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:			Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3810
ZAG Make/Model:	Teledyne API 701		Serial Number:	262

Analyzer Information

Analyzer make: Thermo 43i Analyzer serial #: 1428701363

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	0.999888	1.005625	Backgd or Offset:	27.9	28.6
Calibration intercept:	0.415841	0.356047	Coeff or Slope:	0.914	0.914

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	0.3	----
as found span	4920	80.2	800.8	800.9	1.000
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	805.6	0.994
second point	4960	40.1	400.4	402.9	0.994
third point	4980	20.0	200.1	202.3	0.989
as left zero	5005	0.0	0.0	-0.1	----
as left span	4920	80.2	800.8	802.5	0.998
				Average Correction Factor	0.992

Baseline Corr As found:	800.60	Previous response	801.17	*% change	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Adjusted the zero only.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

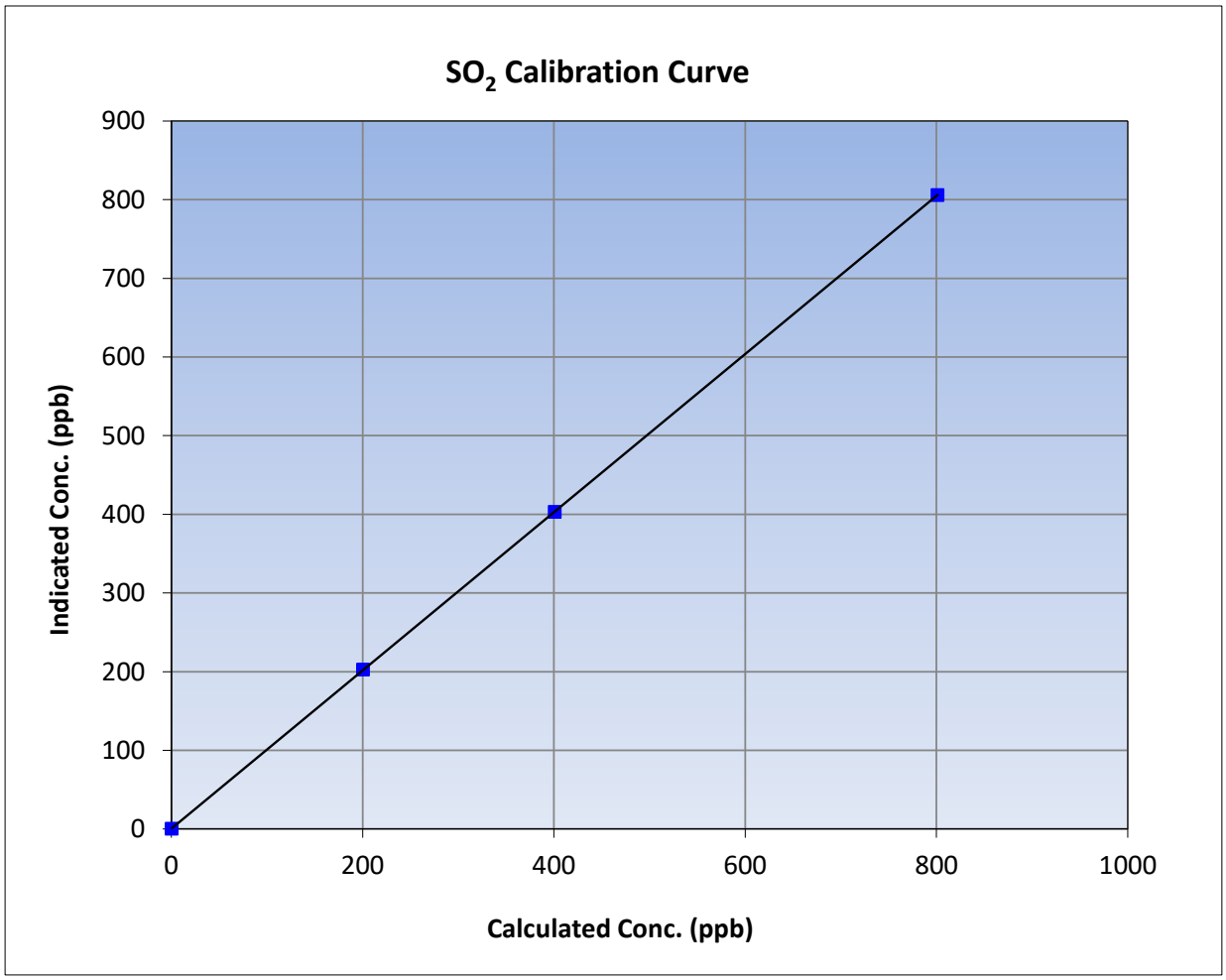
Station Information

Calibration Date:	March 3, 2023	Previous Calibration:	February 6, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:17	End Time (MST):	13:00
Analyzer make:	Thermo 43i	Analyzer serial #:	1428701363

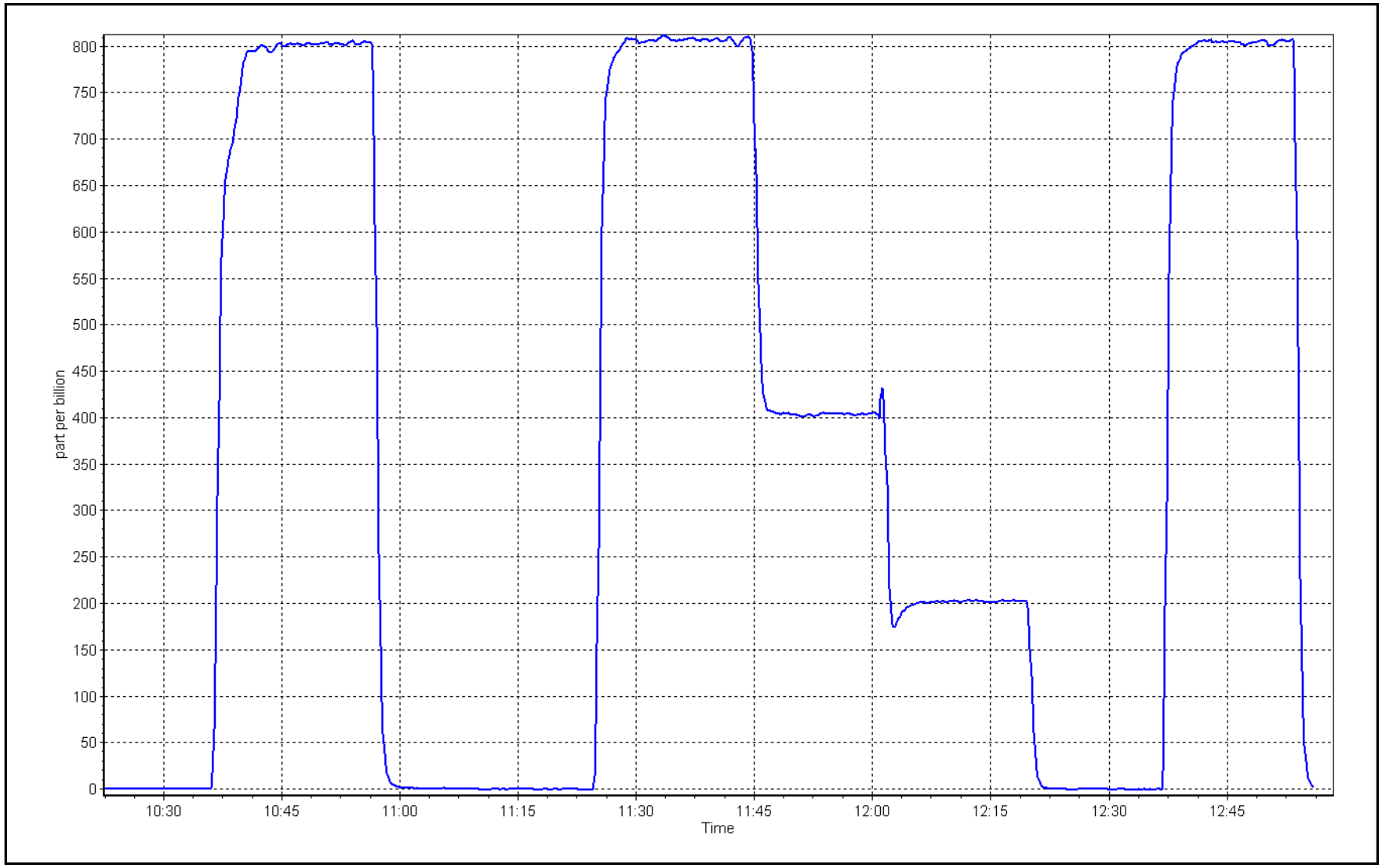
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
800.8	805.6	0.9941
400.4	402.9	0.9939
200.1	202.3	0.9892

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.005625	*0.90 - 1.10*
Intercept	0.356047	*+/-30*



SO2 Calibration Plot Date: March 3, 2023 Location: Conklin



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	March 22, 2023	Last Cal Date:	February 8, 2023
Start time (MST):	9:27	End time (MST):	13:20
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.03	ppm	Cal Gas Exp Date:	April 16, 2022
Cal Gas Cylinder #:	CC505493			
Removed Cal Gas Conc:	5.03	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3810
ZAG Make/Model:	API 701		Serial Number:	263

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:	0.983711	1.019442	Backgd or Offset:	2.8	2.9
Calibration intercept:	0.237934	0.237078	Coeff or Slope:	0.951	0.991

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	-0.4	----
as found span	4921	79.5	80.0	77.3	1.029
as found 2nd point	4960	39.8	40.0	39.2	1.011
as found 3rd point	4980	19.9	20.0	19.7	0.996
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	79.5	80.0	81.5	0.981
second point	4960	39.8	40.0	41.5	0.965
third point	4980	19.9	20.0	20.8	0.962
as left zero	5000	0.0	0.0	0.0	----
as left span	4921	79.5	80.0	81.0	0.987
SO2 Scrubber Check	4920	80.2	802.0	-0.1	----
Date of last scrubber change:				Ave Corr Factor	0.970
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	77.7	Prev response:	78.90	*% change:	-1.5%
Baseline Corr 2nd AF pt:	39.6	AF Slope:	0.969850	AF Intercept:	-0.001815
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999866		

* = > +/-5% change initiates investigation

Notes: Adjusted the span only.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

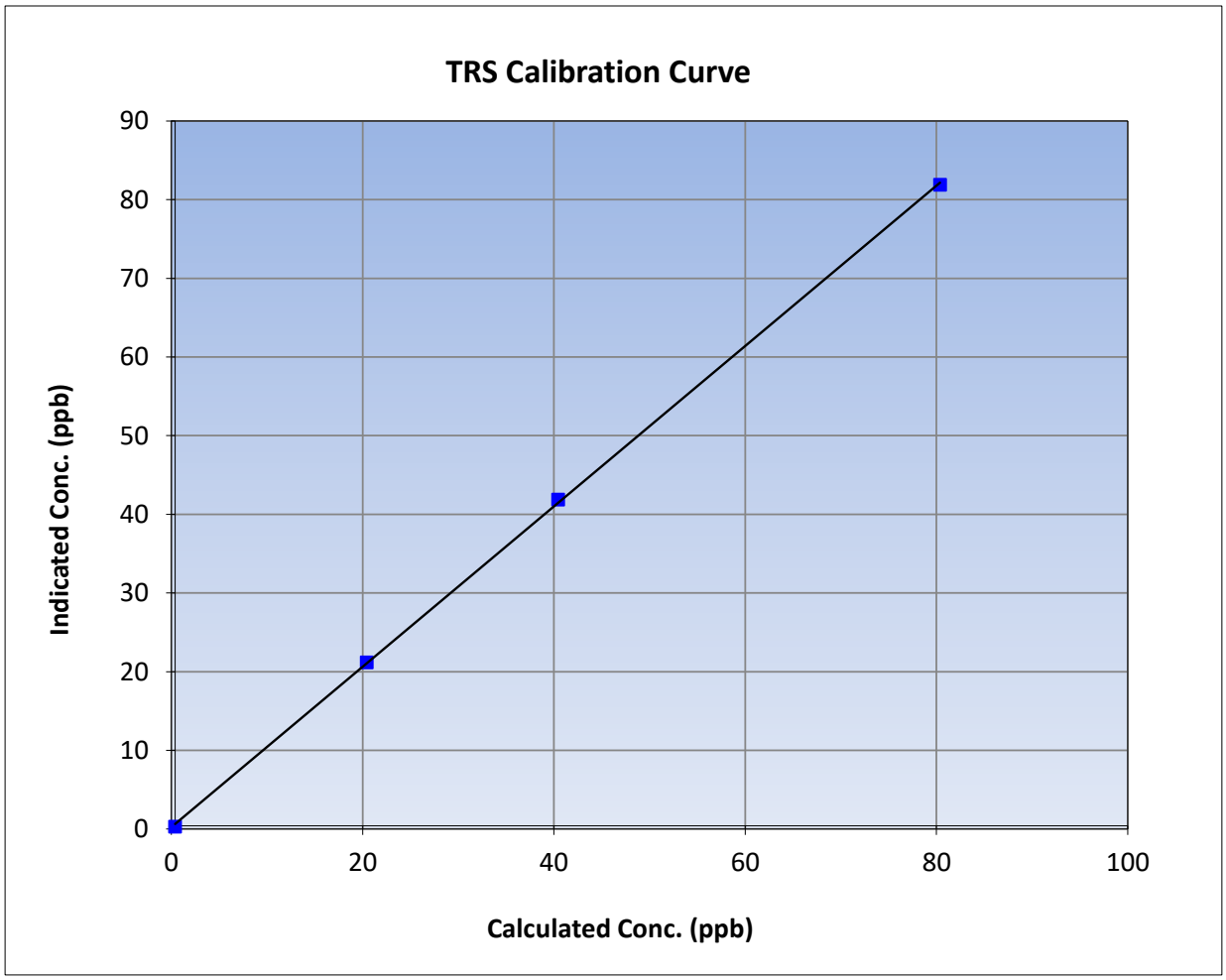
Station Information

Calibration Date:	March 22, 2023	Previous Calibration:	February 8, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:27	End Time (MST):	13:20
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1236656116

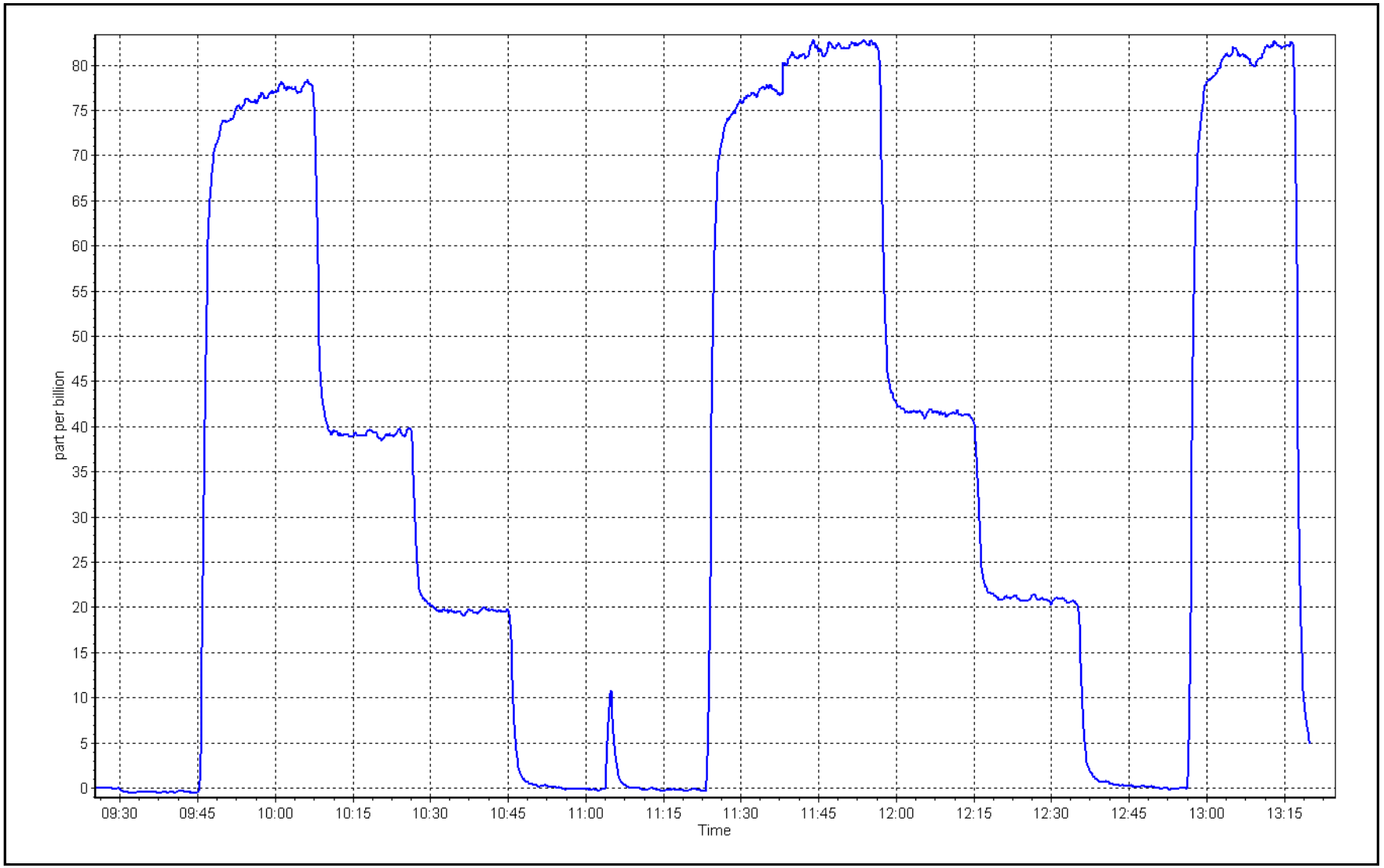
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	81.5	0.9812
40.0	41.5	0.9648
20.0	20.8	0.9625

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999889	*≥0.995*
Slope	1.019442	*0.90 - 1.10*
Intercept	0.237078	*+/-3*



TRS Calibration Plot Date: March 22, 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:	March 3, 2023	Last Cal Date:	February 3, 2023
Start time (MST):	10:17	End time (MST):	13:00
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 701		Serial Number:	691	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	118148495	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	1.86E-04	1.86E-04	NMHC SP Ratio:	4.56E-05	4.56E-05
CH4 Retention time:	12.60	12.60	NMHC Peak Area:	200658	200658

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	17.13	17.22	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	17.20	0.996
second point	4960	40.1	8.56	8.64	0.992
third point	4980	20.0	4.27	4.34	0.985
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	17.13	17.10	1.001
				Average Correction Factor	0.991
Baseline Corr AF:	17.22	Prev response	17.14	*% 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	4920	80.2	9.14	9.17	0.997
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	9.14	9.17	0.997
second point	4960	40.1	4.57	4.60	0.993
third point	4980	20.0	2.28	2.31	0.985
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	9.14	9.10	1.005
				Average Correction Factor	0.992
Baseline Corr AF:	9.17	Prev response	9.14	*% change	0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	7.99	8.05	0.992
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	7.99	8.03	0.994
second point	4960	40.1	3.99	4.03	0.990
third point	4980	20.0	1.99	2.03	0.984
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	7.99	8.00	0.998
				Average Correction Factor	0.989
Baseline Corr AF:	8.05	Prev response	8.00	*% change	0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.998993	1.003632
THC Cal Offset:	0.030589	0.026595
CH4 Cal Slope:	1.001541	1.005332
CH4 Cal Offset:	-0.002053	0.011959
NMHC Cal Slope:	0.996416	1.002247
NMHC Cal Offset:	0.033041	0.014236

Notes: No adjustments made. Changed N2 cylinder after the as founds.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

THC Calibration Summary

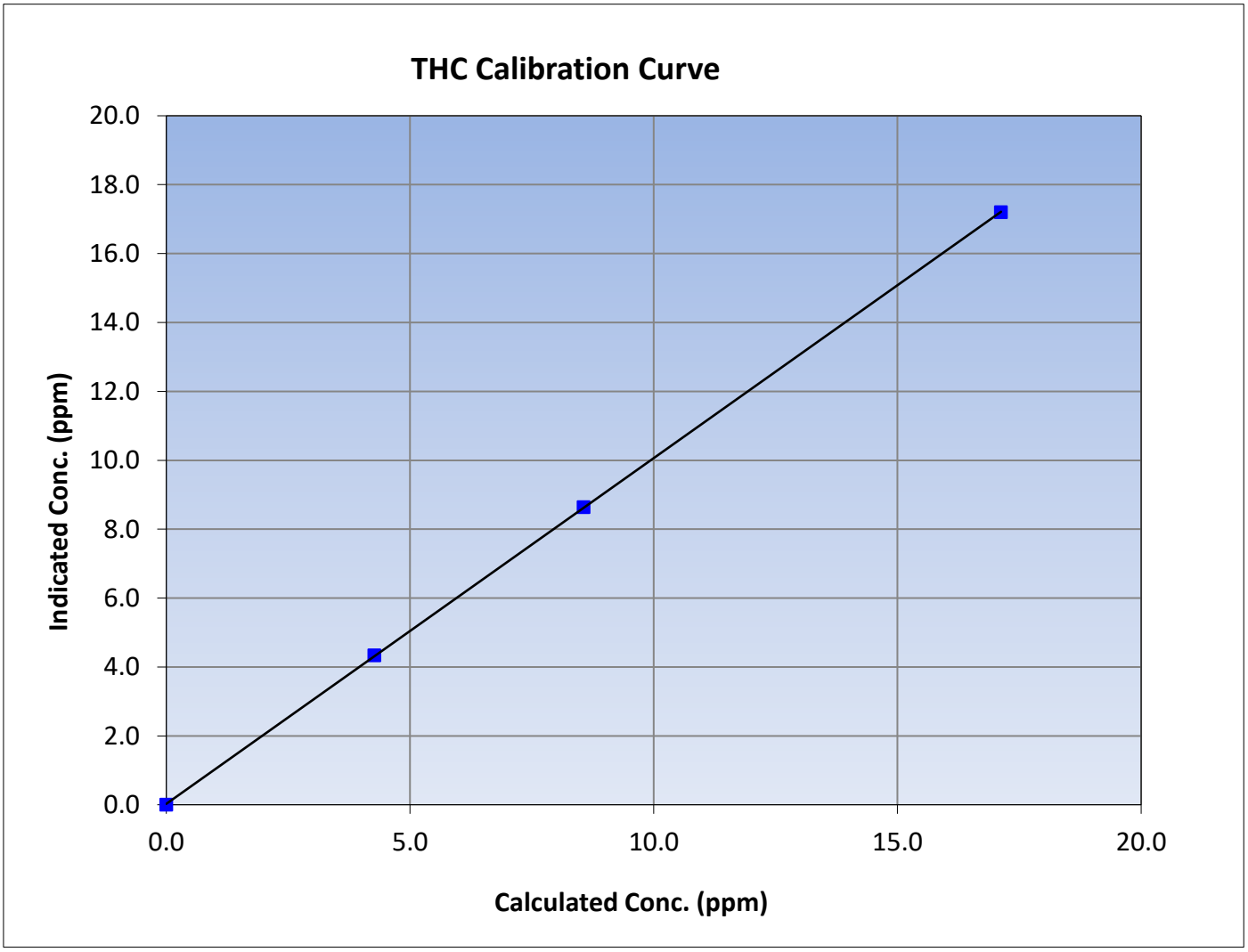
Version-06-2022

Station Information

Calibration Date:	March 3, 2023	Previous Calibration:	February 3, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:17	End Time (MST):	13:00
Analyzer make:	Thermo 55i	Analyzer serial #:	118148495

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*
17.13	17.20	0.9957			
8.56	8.64	0.9915	Slope	1.003632	*0.90 - 1.10*
4.27	4.34	0.9845			
			Intercept	0.026595	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

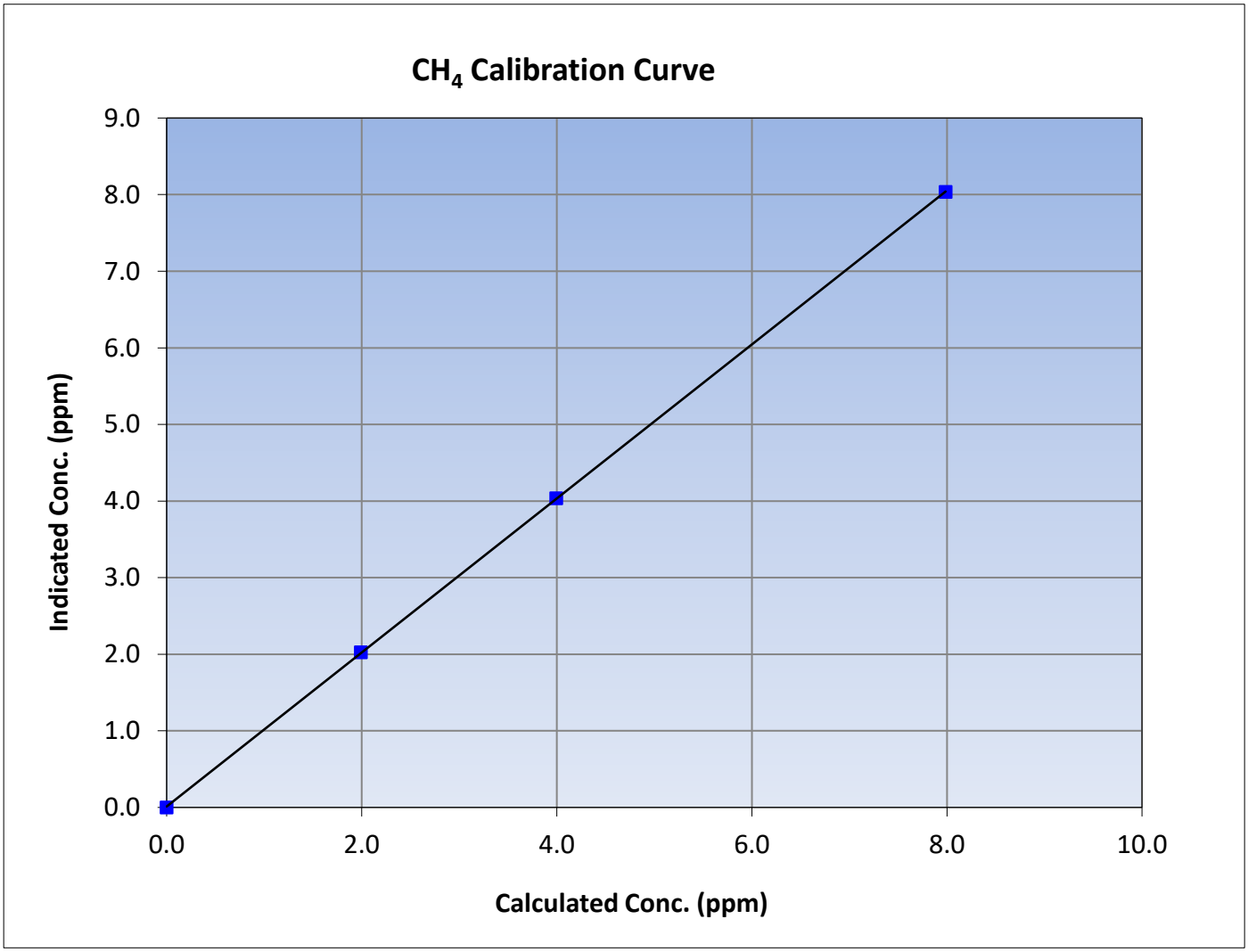
Version-06-2022

Station Information

Calibration Date:	March 3, 2023	Previous Calibration:	February 3, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:17	End Time (MST):	13:00
Analyzer make:	Thermo 55i	Analyzer serial #:	118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999990	*≥0.995*
7.99	8.03	0.9940			
3.99	4.03	0.9899	Slope	1.005332	*0.90 - 1.10*
1.99	2.03	0.9835			
			Intercept	0.011959	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

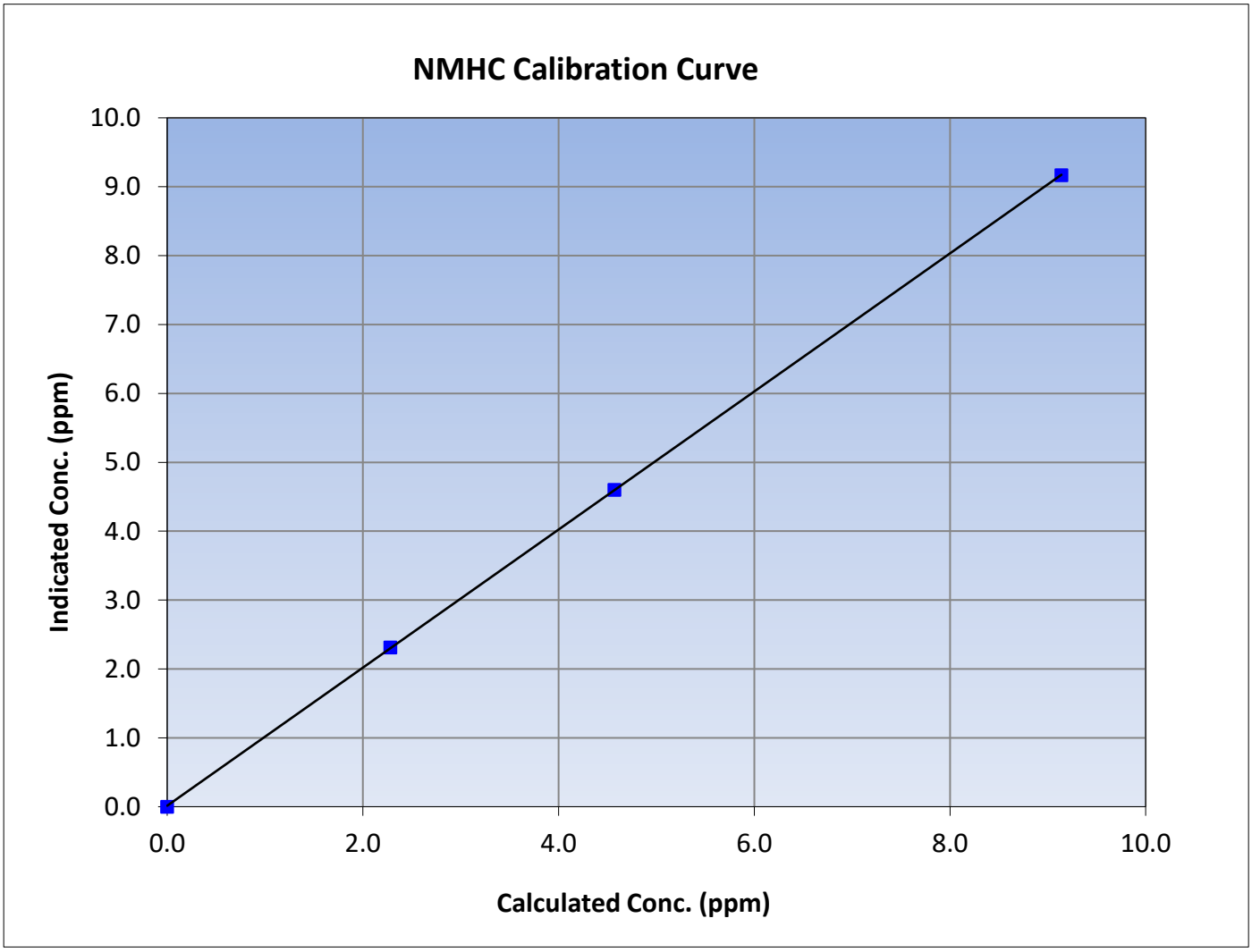
Version-06-2022

Station Information

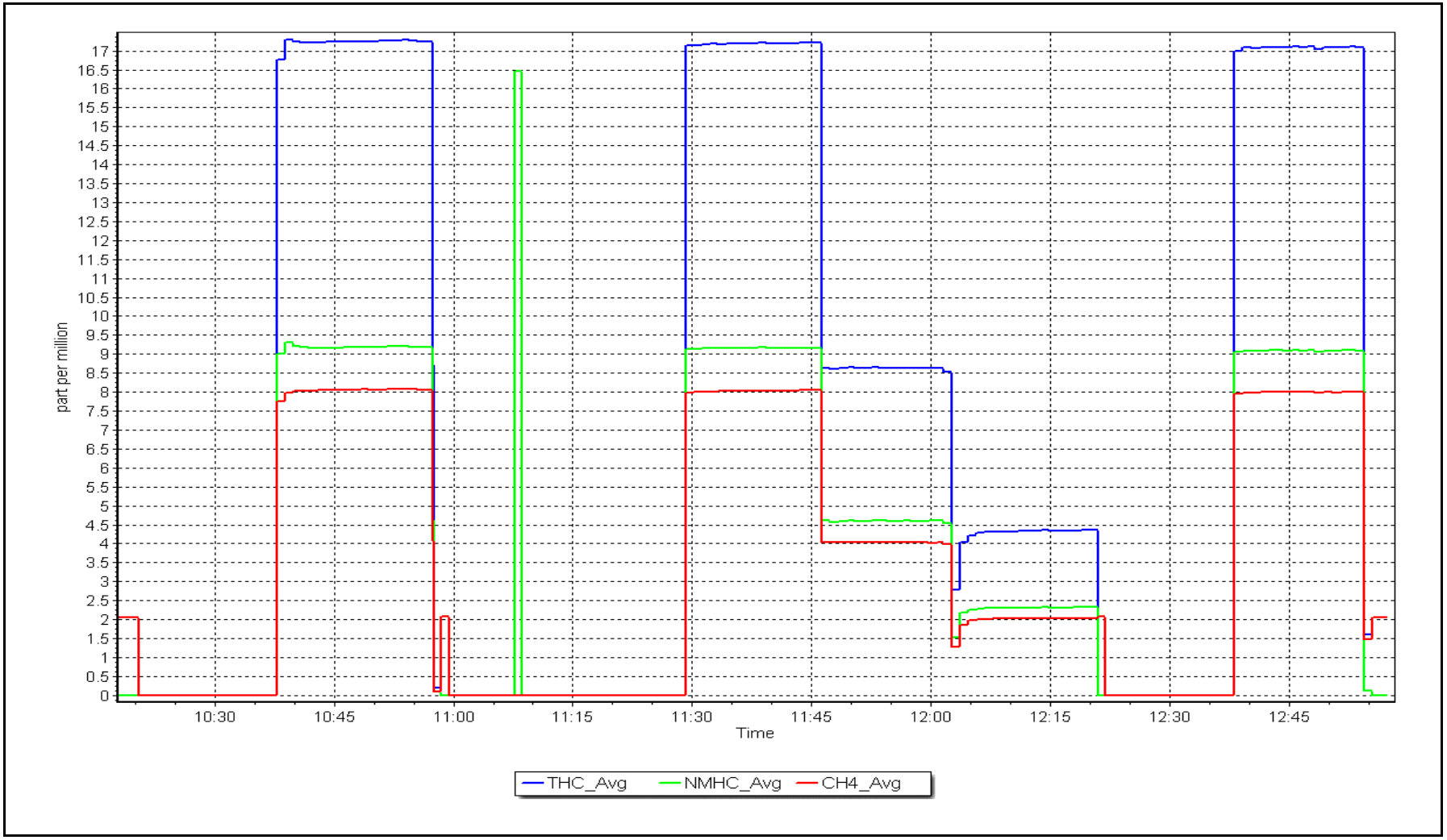
Calibration Date:	March 3, 2023	Previous Calibration:	February 3, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:17	End Time (MST):	13:00
Analyzer make:	Thermo 55i	Analyzer serial #:	118148495

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	9.17	0.9970			
4.57	4.60	0.9932	Slope	1.002247	0.90 - 1.10
2.28	2.31	0.9854			
			Intercept	0.014236	+/-0.5



NMHC Calibration Plot Date: March 3, 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:	March 17, 2023	Last Cal Date:	March 3, 2023
Start time (MST):	9:45	End time (MST):	11:30
Reason:	Cylinder Change		

Calibration Standards

Gas Cert Reference:		CC259455	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
C3H8 Cal Gas Conc.	207.2	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
Removed C3H8 Conc.	207.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	3810	
ZAG make/model:	Teledyne API 701		Serial Number:	691	

Analyzer Information

Analyzer make:	Thermo 55i	Analyzer serial #:	118148495
THC Range (ppm):	0 - 20 ppm		
NMHC Range (ppm):	0 - 10 ppm	CH4 Range (ppm):	0 - 10 ppm

	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	1.86E-04	1.86E-04	NMHC SP Ratio:	4.56E-05	4.56E-05
CH4 Retention time:	12.60	12.60	NMHC Peak Area:	200658	200658

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	17.13	17.78	0.963
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	17.13	17.69	0.968
				Average Correction Factor	
Baseline Corr AF:	17.78	Prev response	17.21	*% change	3.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	9.14	9.57	0.955
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	9.14	9.49	0.963
				Average Correction Factor	
Baseline Corr AF:	9.57	Prev response	9.17	*% change	4.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	7.99	8.20	0.974
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	7.99	8.20	0.974
				Average Correction Factor	
Baseline Corr AF:	8.20	Prev response	8.04	*% change	2.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

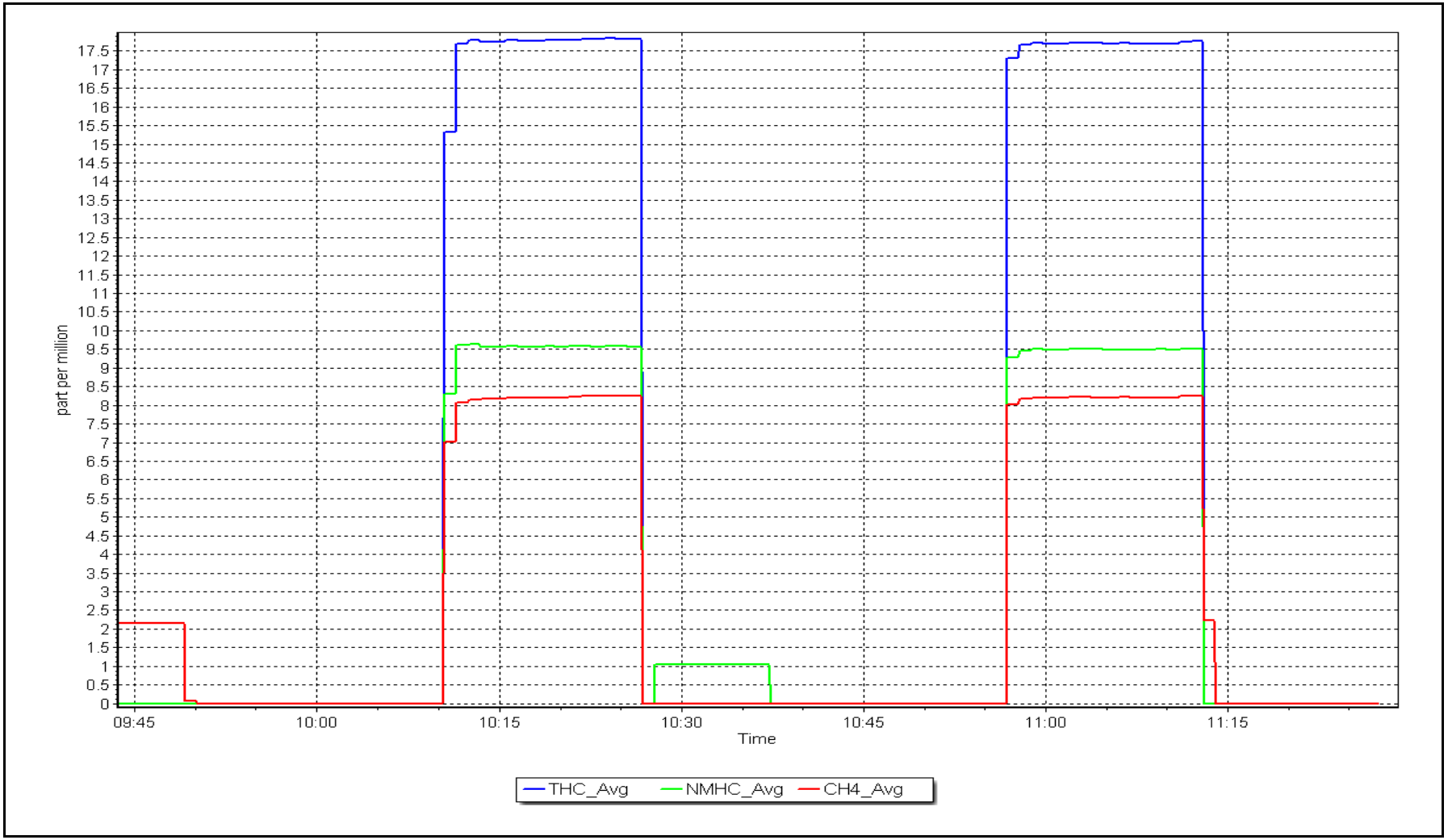
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.003632	
THC Cal Offset:	0.026595	
CH4 Cal Slope:	1.005332	
CH4 Cal Offset:	0.011959	
NMHC Cal Slope:	1.002247	
NMHC Cal Offset:	0.014236	

Notes: Replaced H2 Cylinder.

Calibration Performed By: Denny Ray Estador

NMHC Calibration Plot Date: March 17, 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:	March 29, 2023	Last Cal Date:	February 24, 2023
Start time (MST):	9:37	End time (MST):	13:35
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2Y1P1H		Cal Gas Expiry Date:	December 11, 2023	
NOX Cal Gas Conc:	51.09	ppm	NO Cal Gas Conc:	50.39	ppm
Removed Cylinder #:	n/a		Removed Gas Exp Date:	n/a	
Removed Gas NOX Conc:	51.09	ppm	Removed Gas NO Conc:	50.39	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T750		Serial Number:	282	
ZAG make/model:	Teledyne API T701		Serial Number:	361	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1501663731	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.144	1.144	NO bkgnd or offset:	11.6	11.6
NOX coeff or slope:	1.001	1.001	NOX bkgnd or offset:	11.8	11.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	224.3	220.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.004927	1.009334
NO_X Cal Offset:	1.765059	2.026079
NO Cal Slope:	1.004393	1.010890
NO Cal Offset:	0.961963	0.963352
NO_2 Cal Slope:	1.001583	1.002951
NO_2 Cal Offset:	-0.384496	-0.706596

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	4921	79.4	811.2	800.1	11.1	822.7	809.4	13.3	0.9861	0.9885
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high point	4921	79.4	811.2	800.1	11.1	819.9	809.4	10.5	0.9894	0.9885
second point	4960	39.7	405.7	400.1	5.6	412.2	405.6	6.6	0.9842	0.9865
third point	4980	19.8	202.3	199.6	2.8	208.6	204.0	4.6	0.9699	0.9782
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as left span	4921	79.4	811.2	370.5	440.7	818.3	378.8	439.6	0.9914	0.9782
								Average Correction Factor	0.9812	0.9844

Corrected As found	NO_X = 822.9 ppb	NO = 809.6 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.7%
Previous Response	NO_X = 817.0 ppb	NO = 804.6 ppb		*Percent Change	NO =	0.6%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl: ;	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	805.0	375.4	440.7	441.7	0.9978	100.2%
2nd GPT point (200 ppb O3)	805.0	598.0	218.1	217.6	1.0024	99.8%
3rd GPT point (100 ppb O3)	805.0	701.9	114.2	113.2	1.0090	99.1%
				Average Correction Factor	1.0030	99.7%

Notes: No adjustments required.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

NO_X Calibration Summary

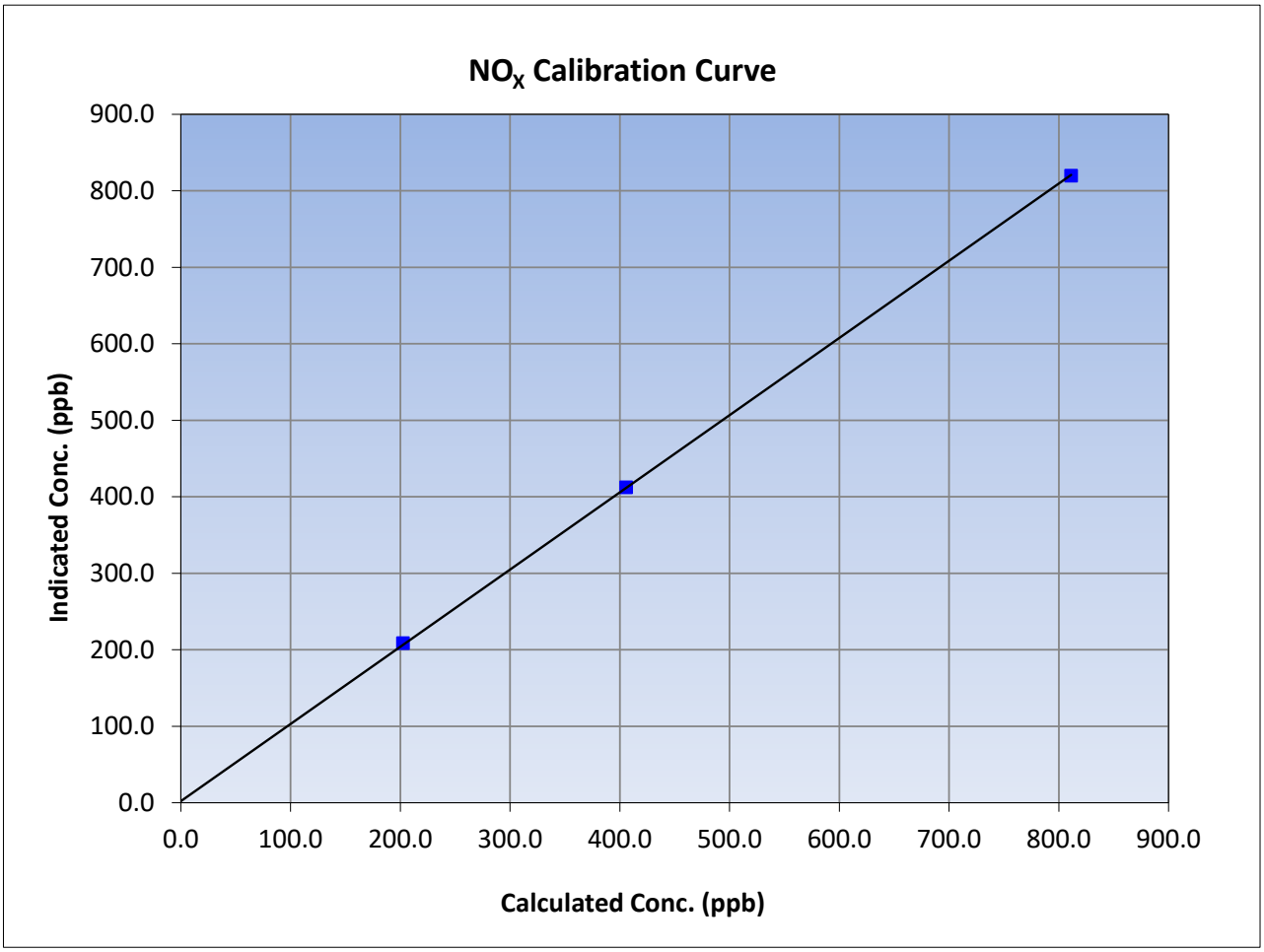
Version-04-2020

Station Information

Calibration Date:	March 29, 2023	Previous Calibration:	February 24, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:37	End Time (MST):	13:35
Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.1	----	Correlation Coefficient	0.999969	*≥0.995*
811.2	819.9	0.9894			
405.7	412.2	0.9842	Slope	1.009334	*0.90 - 1.10*
202.3	208.6	0.9699			
			Intercept	2.026079	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

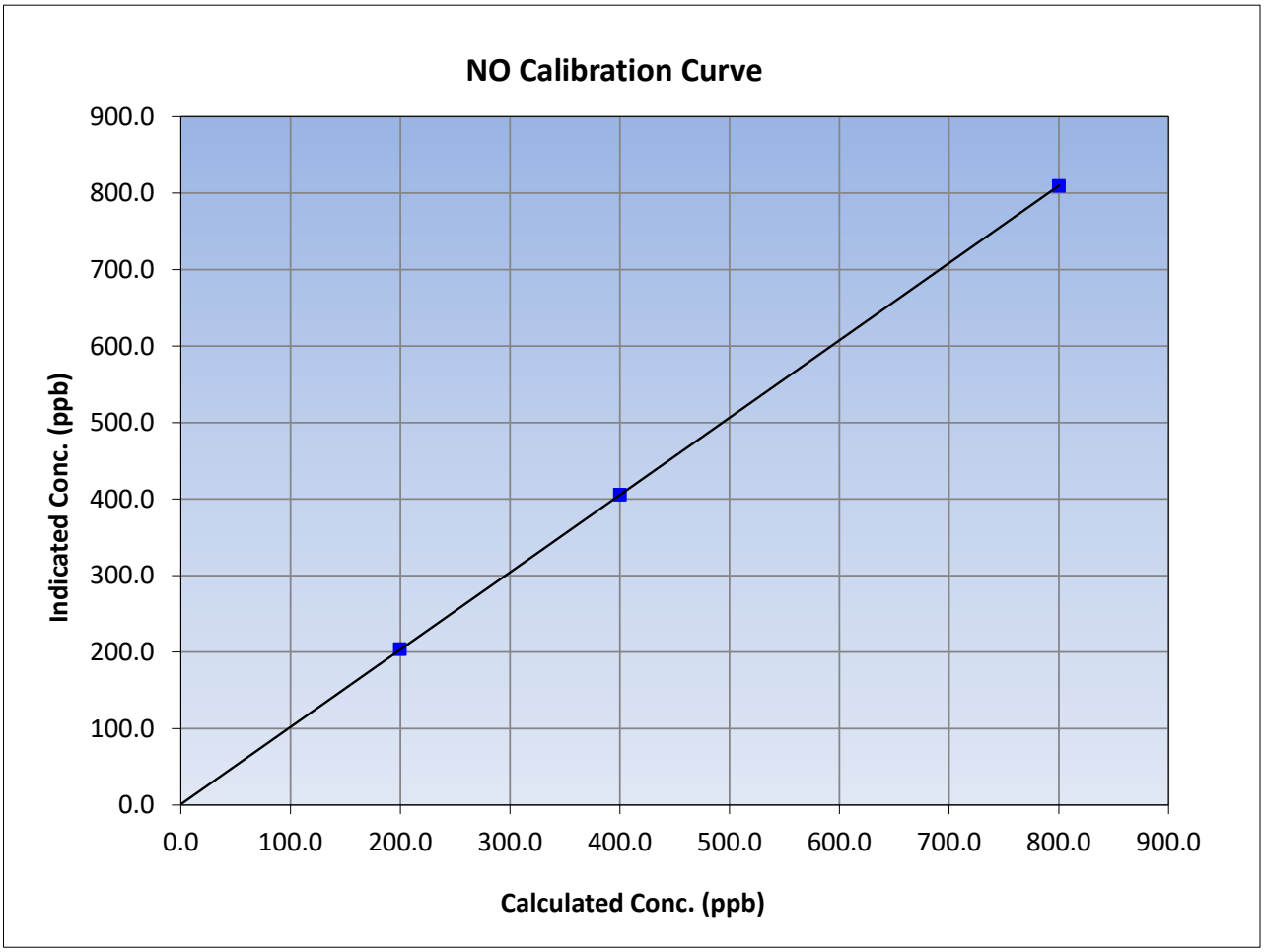
Version-04-2020

Station Information

Calibration Date:	March 29, 2023	Previous Calibration:	February 24, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:37	End Time (MST):	13:35
Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999992	≥0.995
800.1	809.4	0.9885			
400.1	405.6	0.9865	Slope	1.010890	0.90 - 1.10
199.6	204.0	0.9782			
			Intercept	0.963352	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

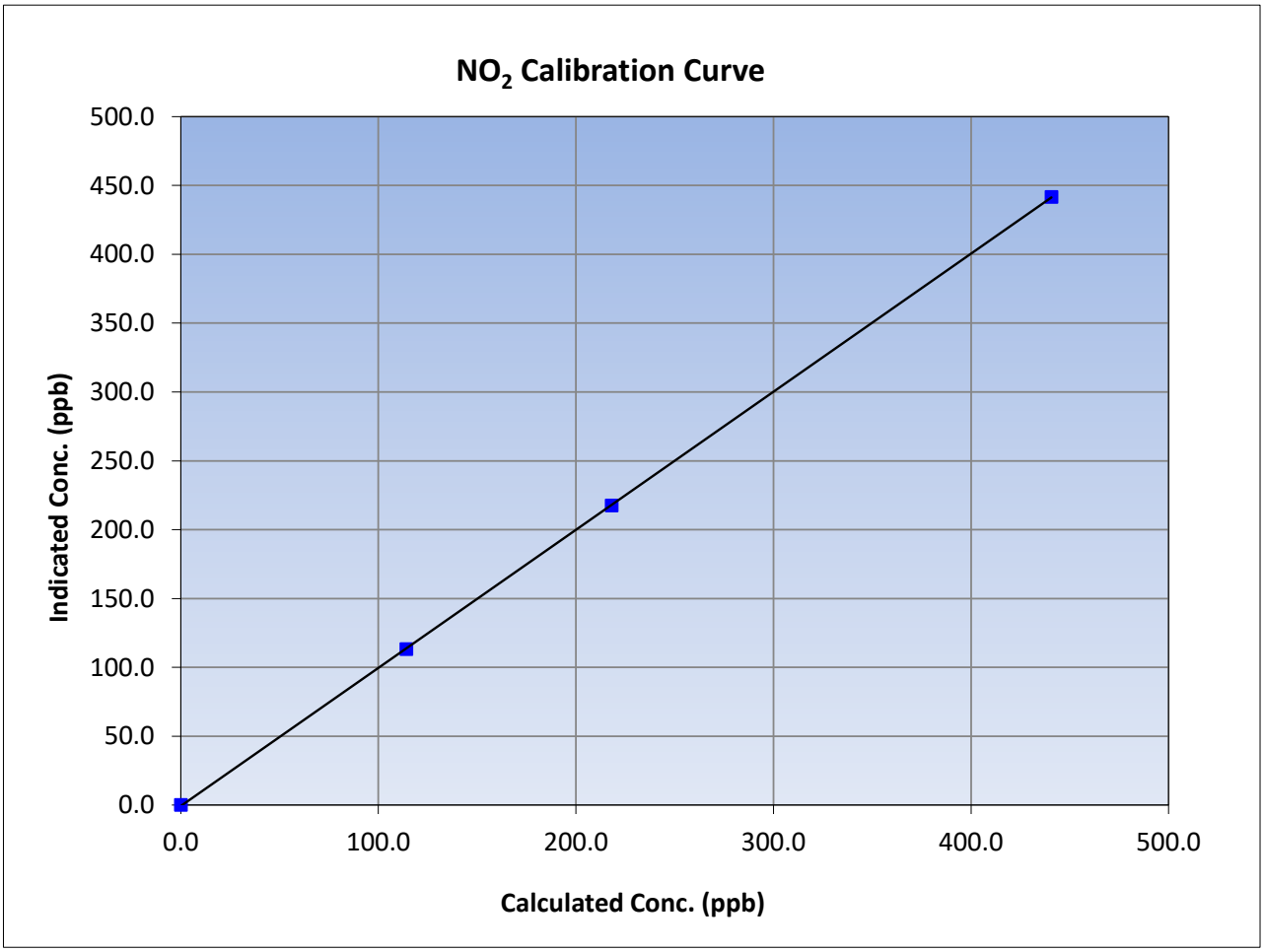
Version-04-2020

Station Information

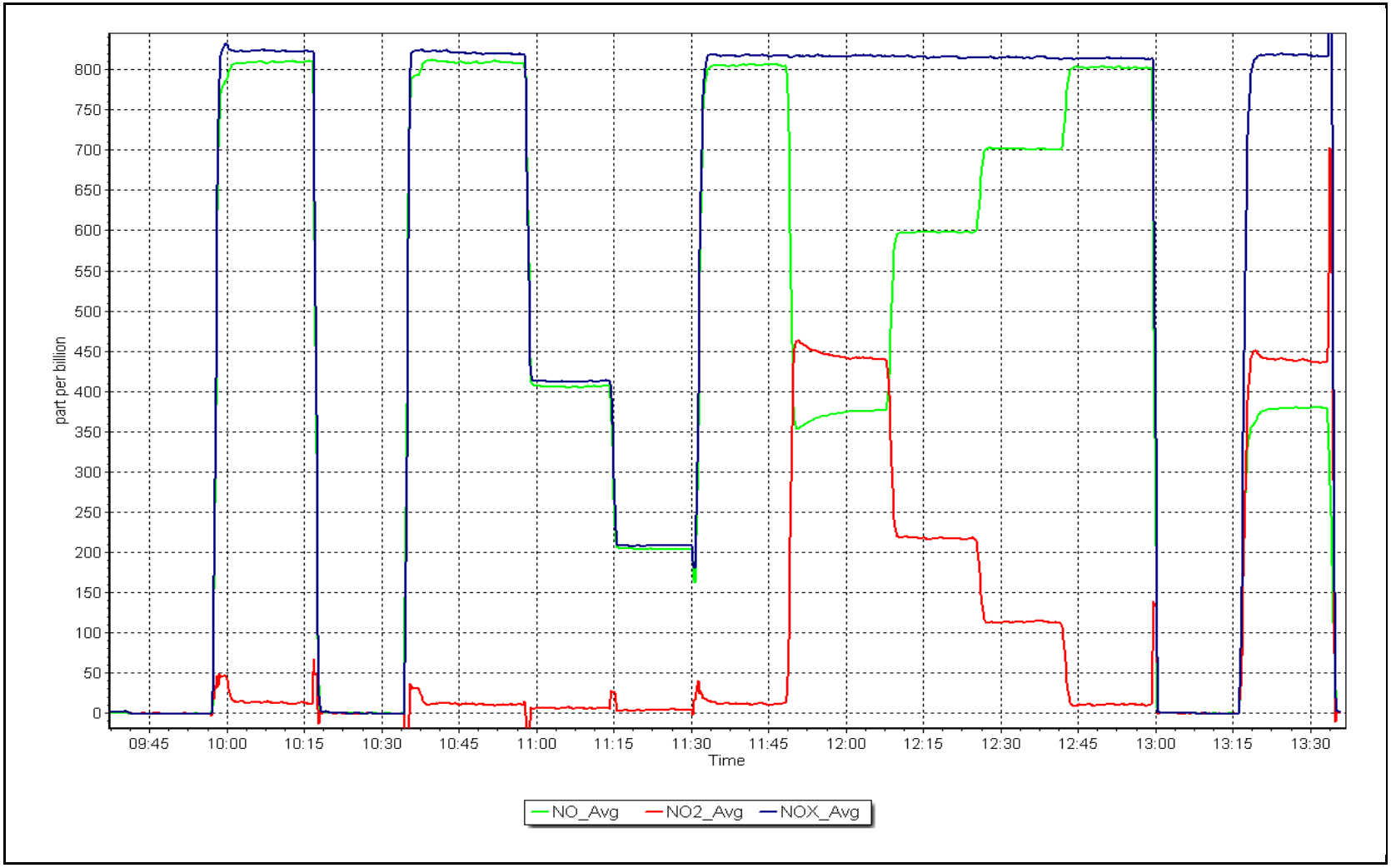
Calibration Date:	March 29, 2023	Previous Calibration:	February 24, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:37	End Time (MST):	13:35
Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999988	≥0.995
440.7	441.7	0.9978			
218.1	217.6	1.0024	Slope	1.002951	0.90 - 1.10
114.2	113.2	1.0090			
			Intercept	-0.706596	+/-20



NO_X Calibration Plot Date: March 29, 2023 Location: Conklin



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	March 9, 2023	Last Cal Date:	February 3, 2023
Start time (MST):	10:34	End time (MST):	13:26
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	Teledyne API T700	Serial Number:	3810
ZAG Make/Model:	Teledyne API 701	Serial Number:	263

Analyzer Information

Analyzer make:	Thermo 49i	Analyzer serial #:	1501663734
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001543	1.000343	Backgd or Offset:	-0.7	-0.7
Calibration intercept:	0.380000	0.240000	Coeff or Slope:	1.002	1.002

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.5	----
as found span	5000	935.6	400.0	400.0	1.000
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	933.0	400.0	400.0	1.000
second point	5000	799.4	200.0	201.0	0.995
third point	5000	701.9	100.0	100.4	0.996
as left zero	5000	0.0	0.0	-0.3	----
as left span	5000	936.0	400.0	403.4	0.992
				Average Correction Factor	0.997

Baseline Corr As found:	400.5	Previous response	401.0	*% change	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

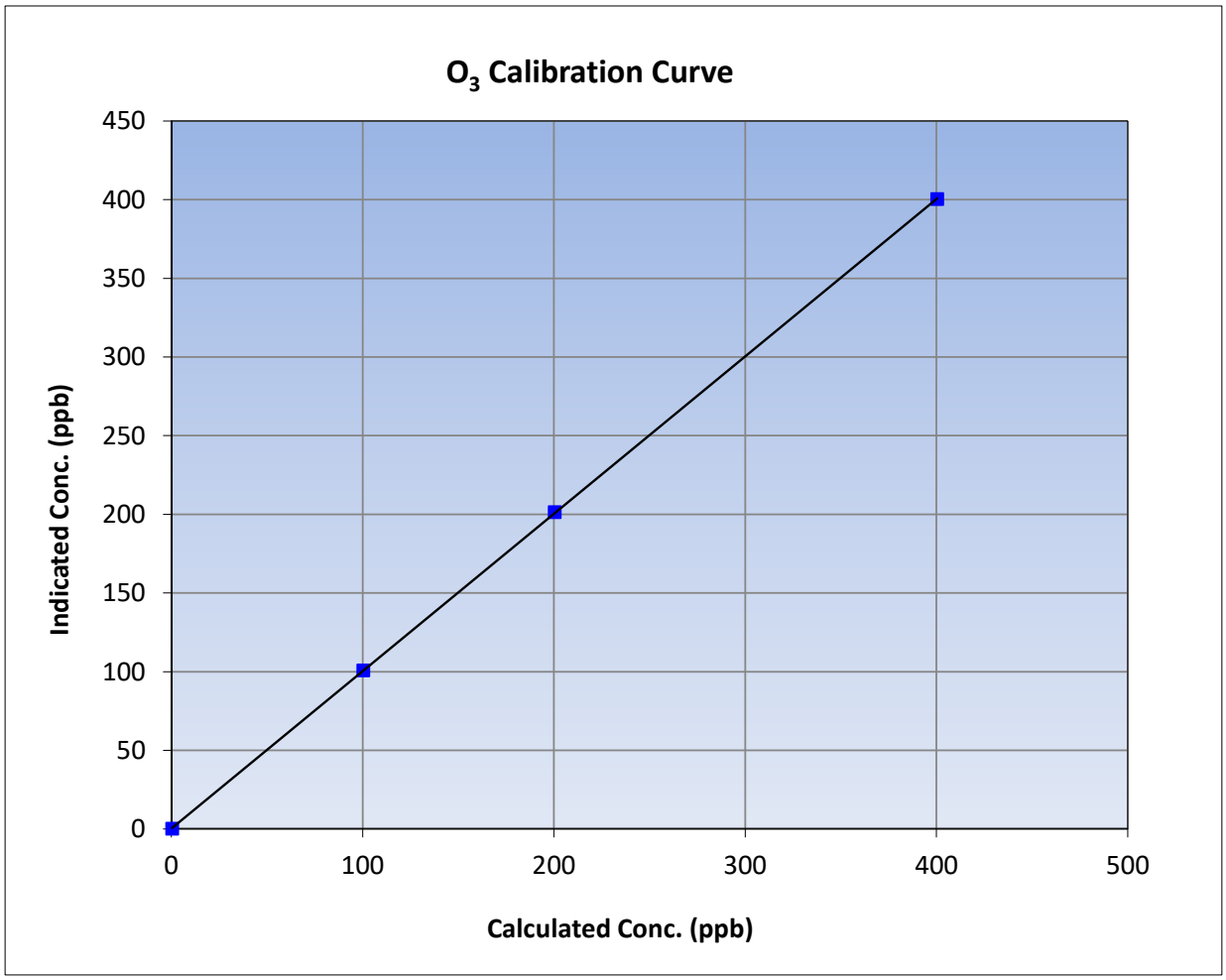
Station Information

Calibration Date:	March 9, 2023	Previous Calibration:	February 3, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:34	End Time (MST):	13:26
Analyzer make:	Thermo 49i	Analyzer serial #:	1501663734

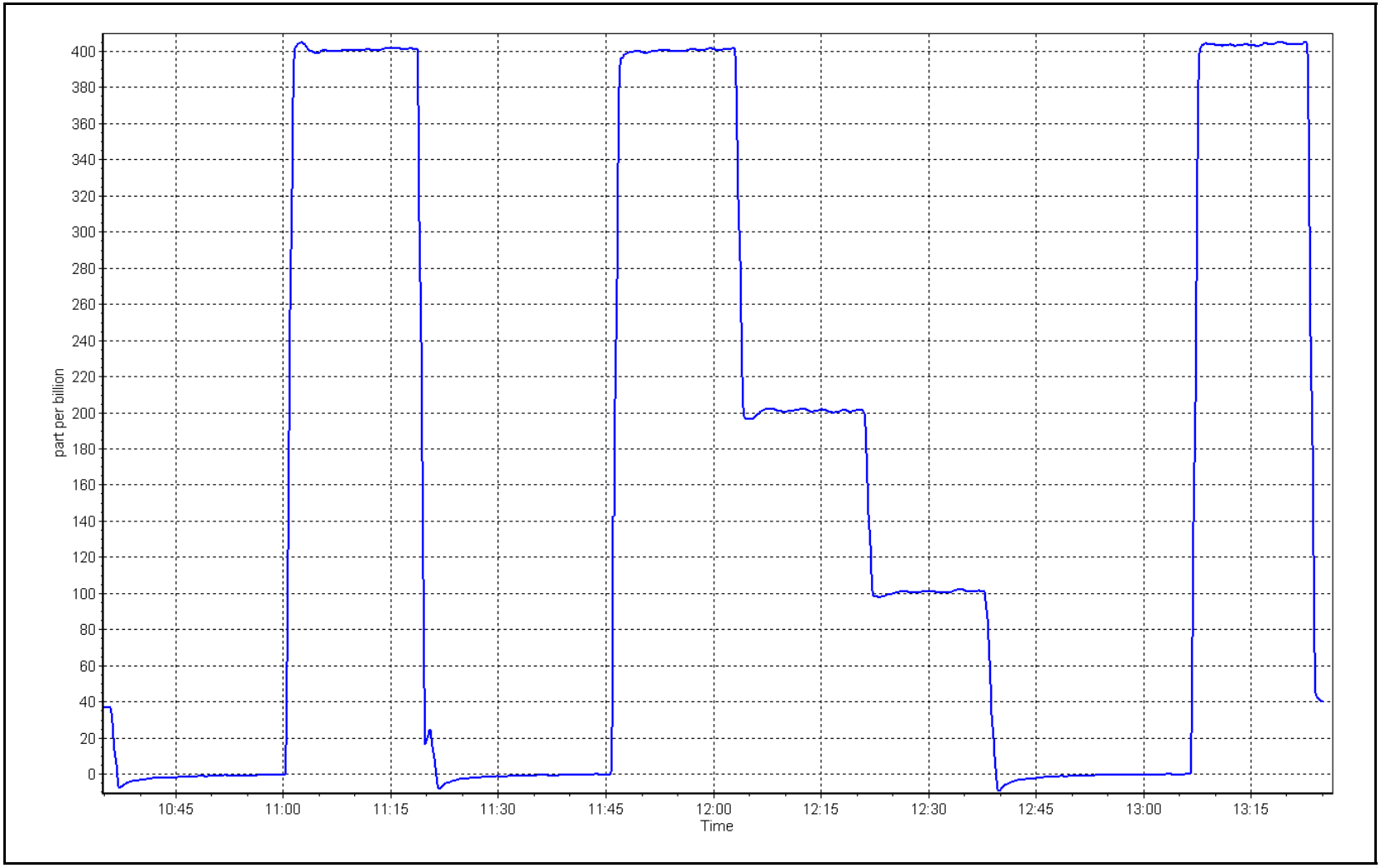
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
400.0	400.0	1.0000
200.0	201.0	0.9950
100.0	100.4	0.9960

Statistical Evaluation		Limits
Correlation Coefficient	0.999991	≥0.995
Slope	1.000343	0.90 - 1.10
Intercept	0.240000	+/- 5



O_3 Calibration Plot Date: March 9, 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:	March 29, 2023	Last Cal Date:	February 8, 2023
Start time (MST):	10:02	End time (MST):	11:10
Analyzer Make:	API T640	S/N:	1547
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	DeltaCal	S/N:	954
Temp/RH standard:	DeltaCal	S/N:	954

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-0.2	-0.4	-0.2	☐	+/- 2 °C
P (mmHg)	710.8	707.4	710.8	☐	+/- 10 mmHg
flow (LPM)	5	5.06	5	☐	+/- 0.25 LPM

Leak Test: Date of check: March 29, 2023 Last Cal Date: February 8, 2023

PM w/o HEPA: 3.6 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	11.1	11.9	11	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 3.3 w/ HEPA: 0 <0.2 ug/m3

Date Optical Chamber Cleaned: March 29, 2023

Disposable Filter Changed: March 29, 2023

Annual Maintenance

Date Sample Tube Cleaned: _____

Date RH/T Sensor Cleaned: _____

Notes: Adjustment made for PMT Peak Test. Inspect inlet head; relatively clean.

Calibration by: Denny Ray Estador

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS22
JANVIER
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	March 15, 2023	Last Cal Date:	February 22, 2023
Start time (MST):	10:37	End time (MST):	14:05
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:	1.000663	0.998449	Backgd or Offset:	21.4	21.5
Calibration intercept:	0.364554	0.464715	Coeff or Slope:	1.031	1.022

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4920	79.8	799.8	803.6	0.995
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4920	79.8	799.8	798.6	1.001
second point	4960	39.9	399.9	400.6	0.998
third point	4980	20.0	200.4	200.5	1.000
as left zero	5000	0.0	0.0	0.4	----
as left span	4920	79.8	799.8	800.8	0.999
				Average Correction Factor	1.000

Baseline Corr As found:	803.50	Previous response	800.68	*% change	0.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Inlet filter changed after as founds. Adjusted span only.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

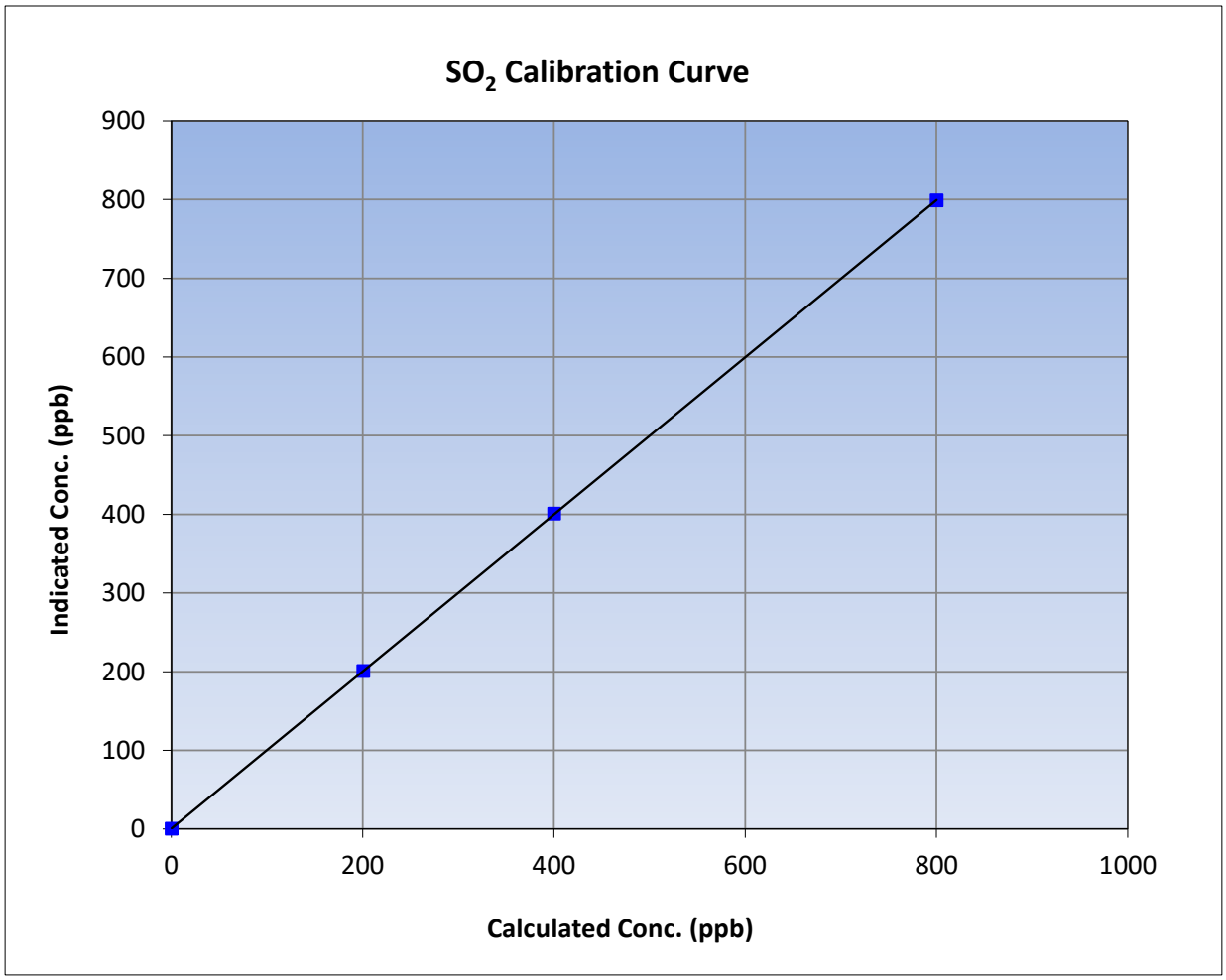
Station Information

Calibration Date:	March 15, 2023	Previous Calibration:	February 22, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:37	End Time (MST):	14:05
Analyzer make:	Thermo 43i	Analyzer serial #:	1152430006

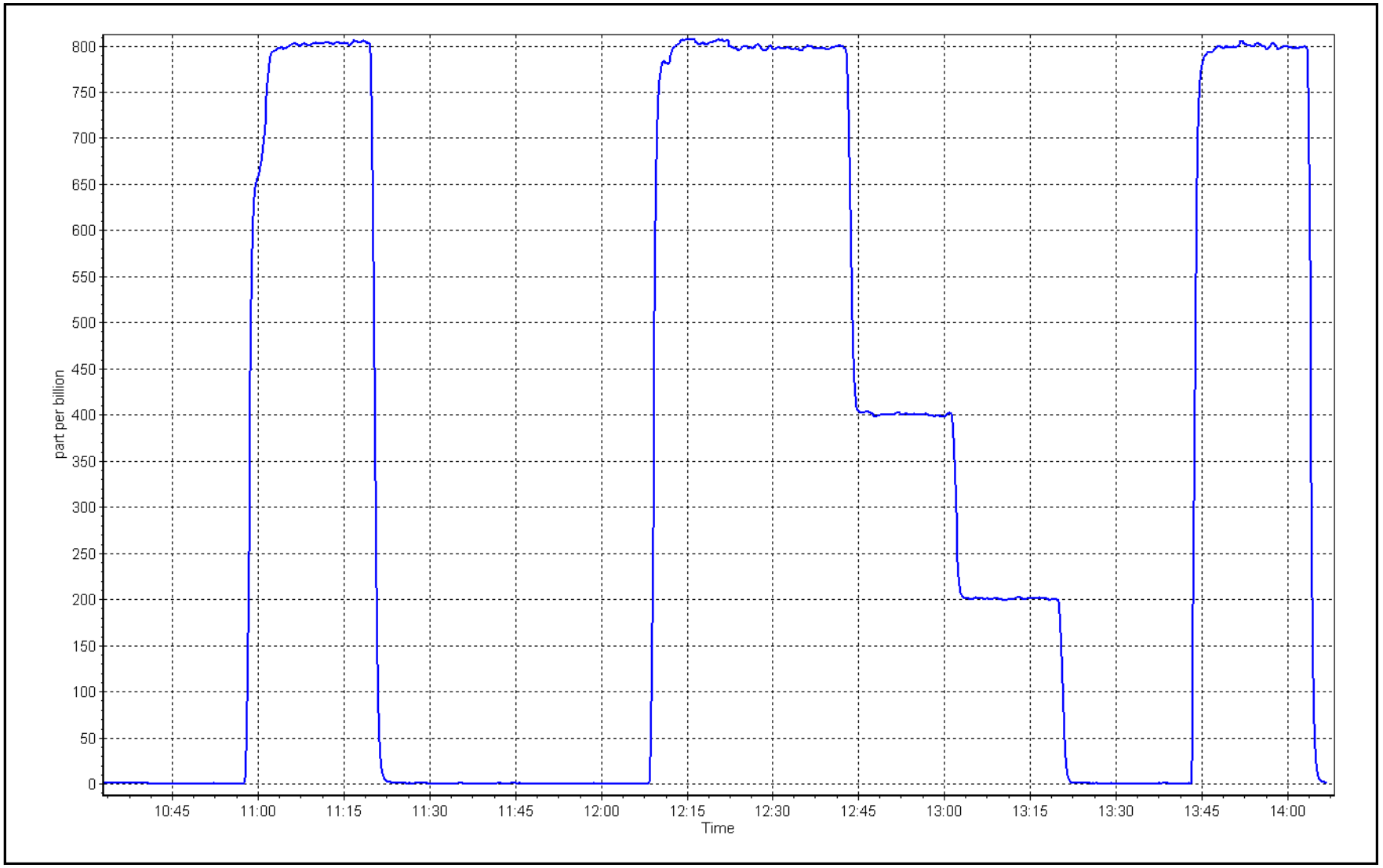
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
799.8	798.6	1.0015
399.9	400.6	0.9982
200.4	200.5	0.9997

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999997	*≥0.995*
Slope	0.998449	*0.90 - 1.10*
Intercept	0.464715	*+/-30*



SO2 Calibration Plot Date: March 15, 2023 Location: Janvier



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Janvier	Station number:	AMS22
Calibration Date:	March 29, 2023	Last Cal Date:	February 24, 2023
Start time (MST):	10:46	End time (MST):	15:08
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:	1.002650	0.999222	Backgd or Offset:	3.56	3.50
Calibration intercept:	0.120931	0.140953	Coeff or Slope:	1.239	1.220

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	4920	79.5	80.0	80.2	0.999
as found 2nd point	4960	39.8	40.0	40.8	0.984
as found 3rd point	4980	19.9	20.0	20.6	0.977
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	20.1	0.996
as left zero	5000	0.0	0.0	0.2	----
as left span	4920	79.5	80.0	79.9	1.001
SO2 Scrubber Check	4920	79.8	798.0	0.1	----
Date of last scrubber change:				Ave Corr Factor	0.996
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.1	Prev response:	80.32	*% change:	-0.3%
Baseline Corr 2nd AF pt:	40.7	AF Slope:	1.000369	AF Intercept:	0.400787
Baseline Corr 3rd AF pt:	20.5	AF Correlation:	0.999919		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

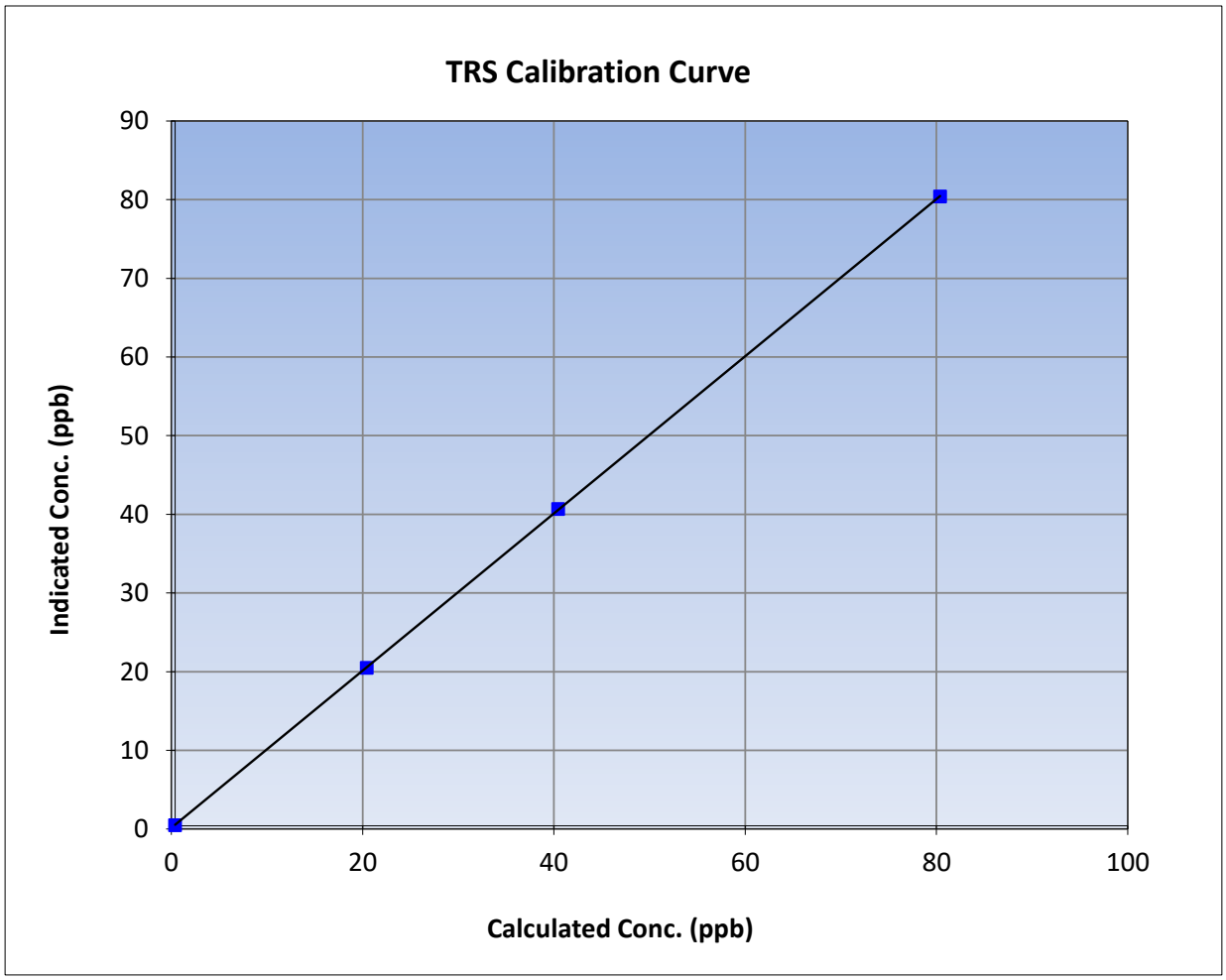
Station Information

Calibration Date:	March 29, 2023	Previous Calibration:	February 24, 2023
Station Name:	Janvier	Station Number:	AMS22
Start Time (MST):	10:46	End Time (MST):	15:08
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1151680031

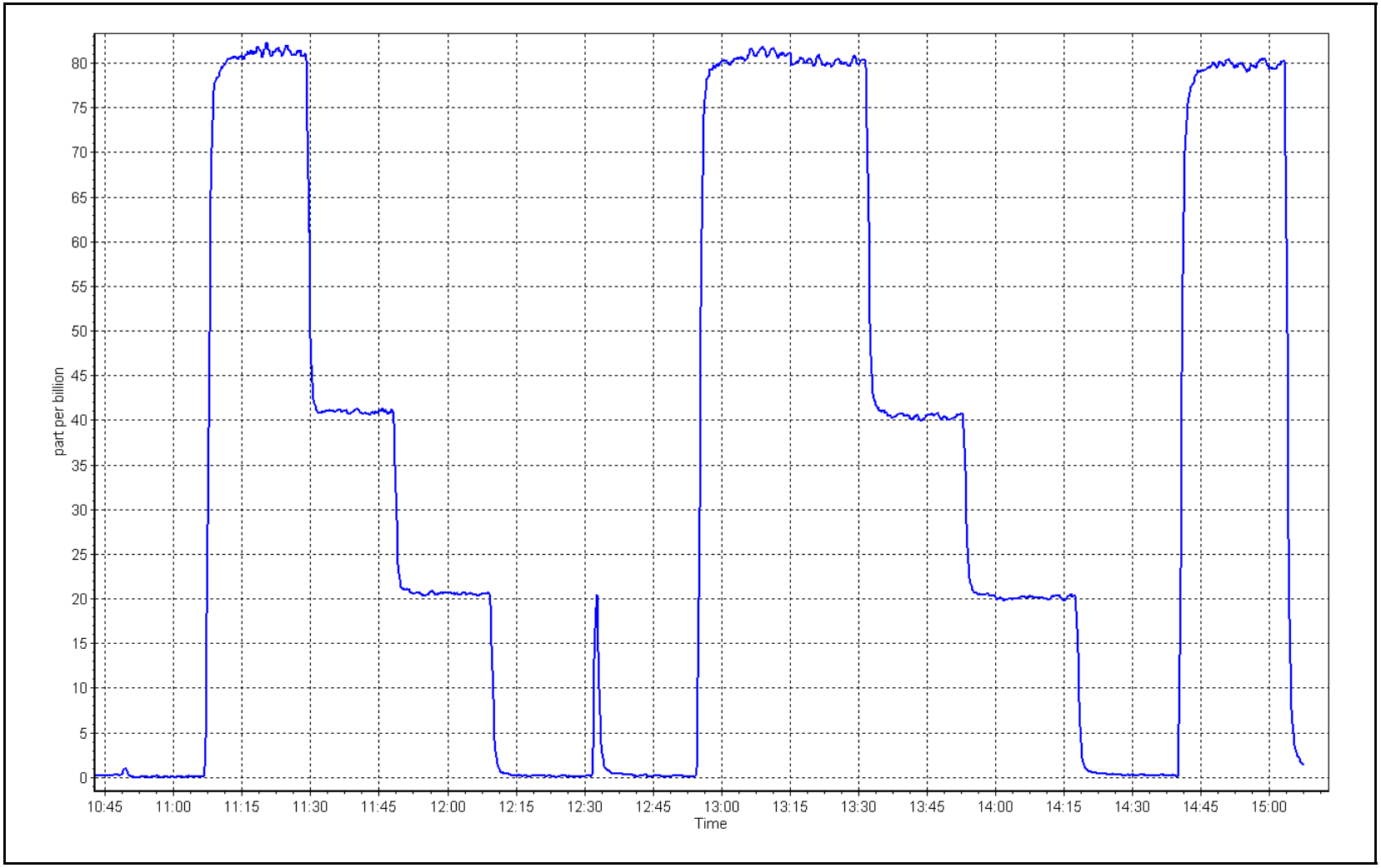
Calibration Data

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	20.1	0.9960

Statistical Evaluation		Limits
Correlation Coefficient	0.999991	≥0.995
Slope	0.999222	0.90 - 1.10
Intercept	0.140953	+/-3



TRS Calibration Plot Date: March 29, 2023 Location: Janvier



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	March 15, 2023	Last Cal Date:	February 22, 2023
Start time (MST):	10:37	End time (MST):	14:05
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:	N/A		Removed Gas Expiry:	N/A	
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 #:	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:	2.180E-04	2.150E-04	NMHC SP Ratio:	4.50E-05	4.51E-05
CH4 Retention time:	13.20	13.20	NMHC Peak Area:	203120	202703

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	17.43	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	79.8	17.17	17.16	1.001
second point	4960	39.9	8.59	8.55	1.005
third point	4980	20.0	4.30	4.25	1.013
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	17.17	17.25	0.996
				Average Correction Factor	1.006

Baseline Corr AF:	17.43	Prev response	17.21	*% 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-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4920	79.8	9.15	9.40	0.974
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4920	79.8	9.15	9.10	1.005
second point	4960	39.9	4.57	4.55	1.006
third point	4980	20.0	2.29	2.26	1.013
as left zero	5000	0	0.00	0.00	----
as left span	4920	79.8	9.15	9.16	0.999
				Average Correction Factor	1.008
Baseline Corr AF:	9.40	Prev response	9.17	*% change	2.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	79.8	8.03	8.04	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	79.8	8.03	8.06	0.996
second point	4960	39.9	4.01	4.00	1.003
third point	4980	20.0	2.01	1.99	1.013
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	8.03	8.09	0.992
				Average Correction Factor	1.004
Baseline Corr AF:	8.04	Prev response	8.05	*% change	-0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.003856	1.000168
THC Cal Offset:	-0.027606	-0.027388
CH4 Cal Slope:	1.004586	1.005284
CH4 Cal Offset:	-0.017766	-0.018965
NMHC Cal Slope:	1.003078	0.995905
NMHC Cal Offset:	-0.009039	-0.008823

Notes: Changed the inlet filter and H2/N2 cylinders after as founds. Adjusted span only.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

THC Calibration Summary

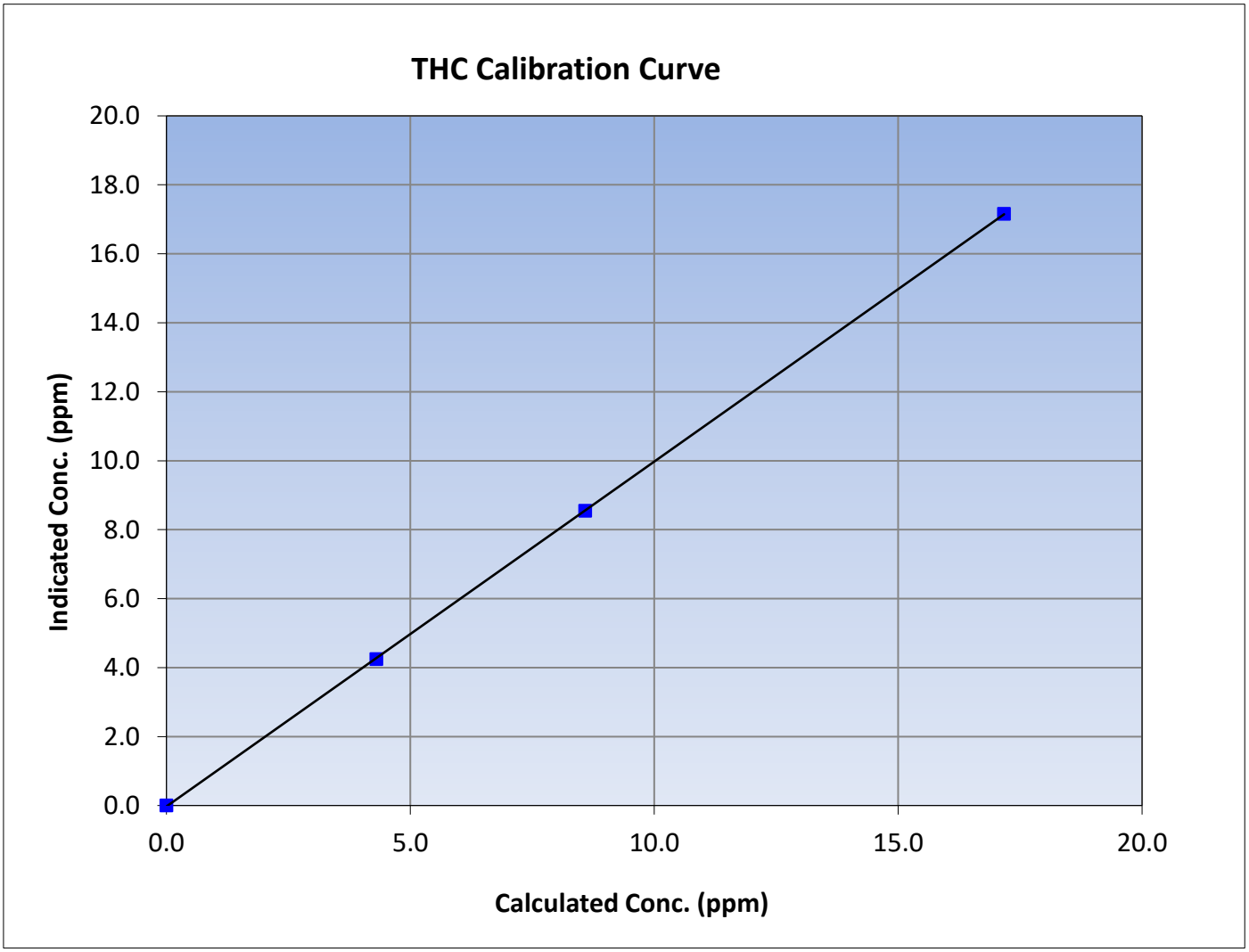
Version-01-2020

Station Information

Calibration Date:	March 15, 2023	Previous Calibration:	February 22, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:37	End Time (MST):	14:05
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	0.999988	*≥0.995*
17.17	17.16	1.0006			
8.59	8.55	1.0045	Slope	1.000168	*0.90 - 1.10*
4.30	4.25	1.0129			
			Intercept	-0.027388	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

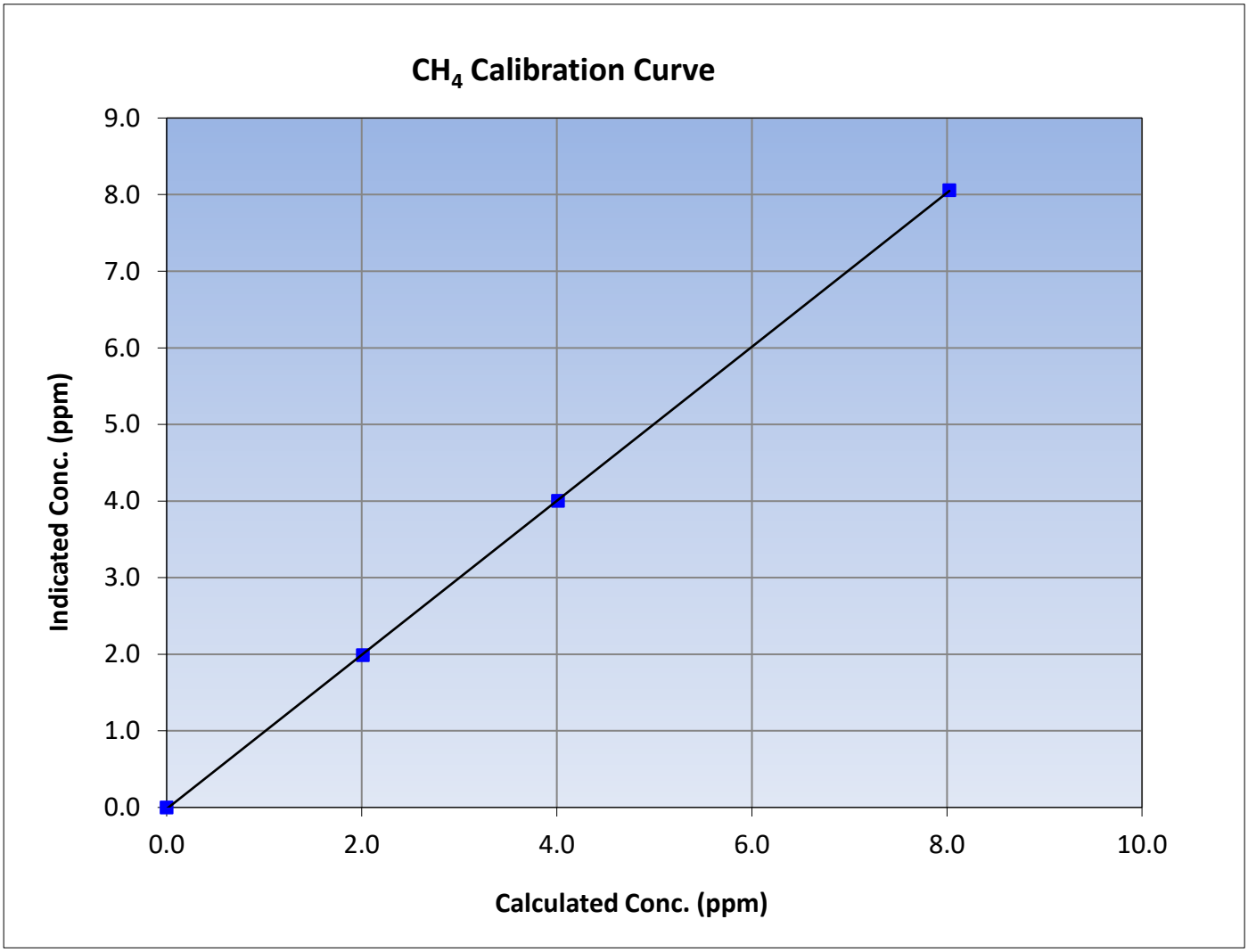
Version-01-2020

Station Information

Calibration Date:	March 15, 2023	Previous Calibration:	February 22, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:37	End Time (MST):	14:05
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	0.999974	*≥0.995*
8.03	8.06	0.9958			
4.01	4.00	1.0026	Slope	1.005284	*0.90 - 1.10*
2.01	1.99	1.0127			
			Intercept	-0.018965	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

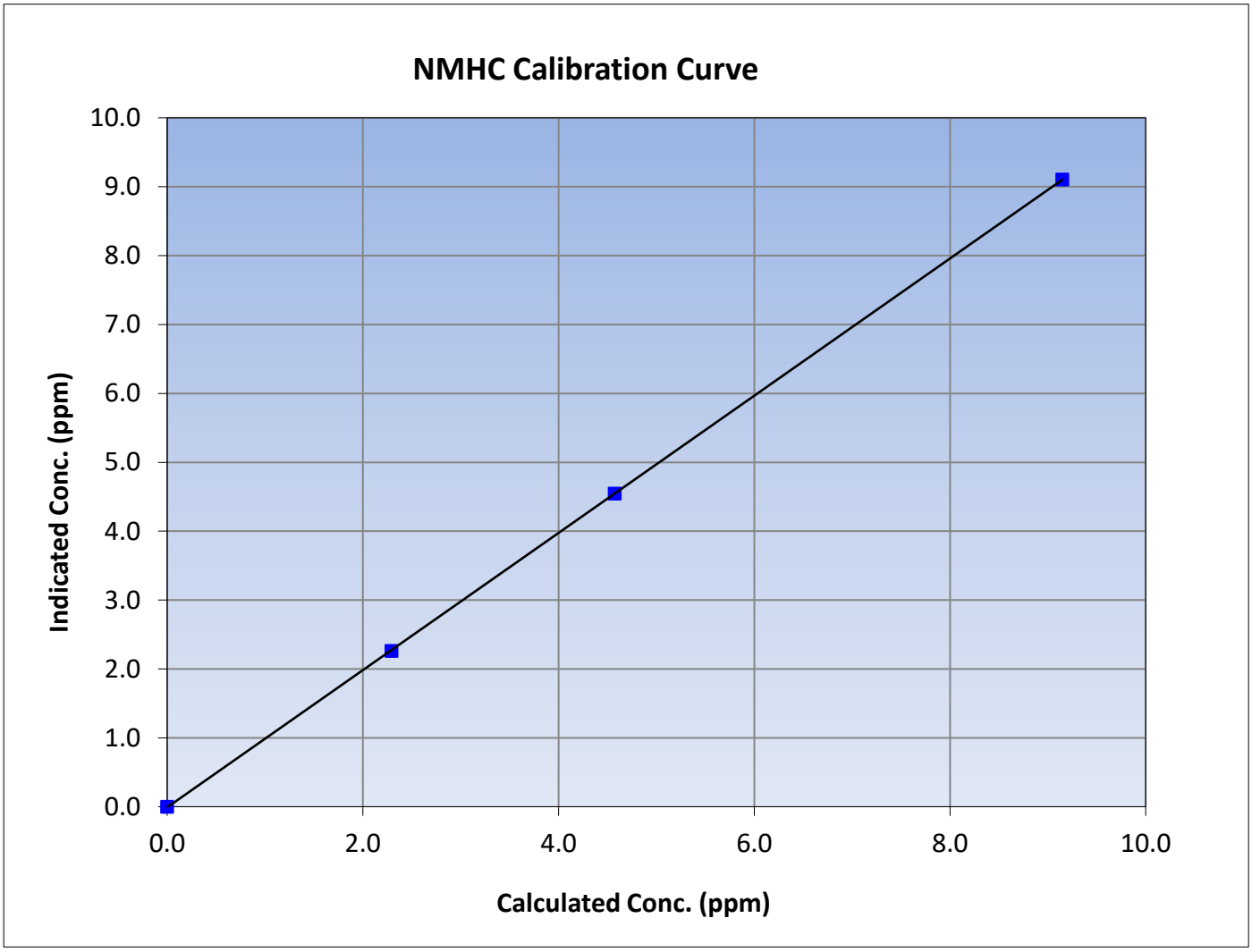
Version-01-2020

Station Information

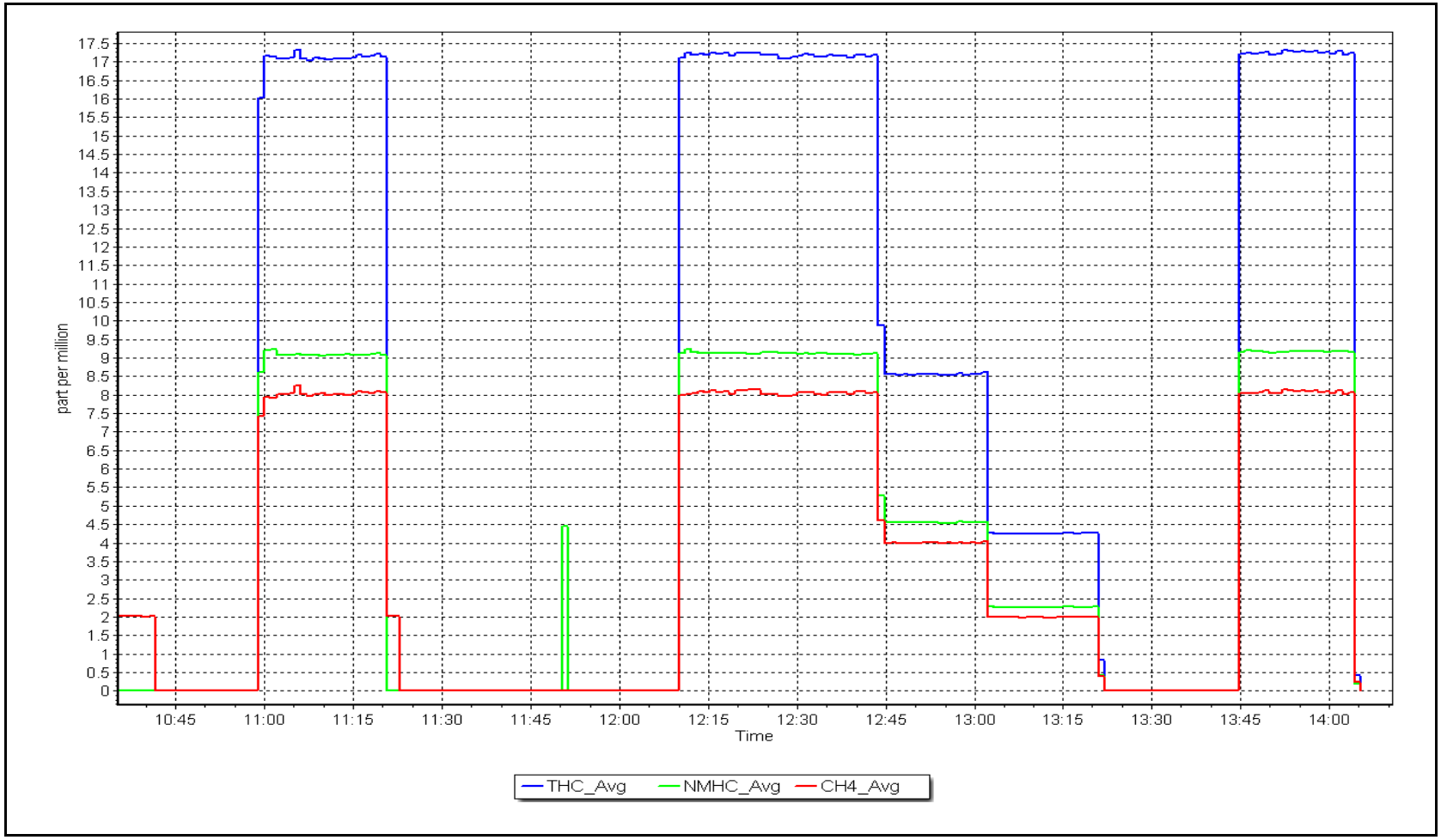
Calibration Date:	March 15, 2023	Previous Calibration:	February 22, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:37	End Time (MST):	14:05
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750023

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999995	*≥0.995*
9.15	9.10	1.0047			
4.57	4.55	1.0063	Slope	0.995905	*0.90 - 1.10*
2.29	2.26	1.0130			
			Intercept	-0.008823	*+/-0.5*



NMHC Calibration Plot Date: March 15, 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:	March 9, 2023	Last Cal Date:	February 23, 2023
Start time (MST):	12:20	End time (MST):	17:03
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	CC424183		Cal Gas Expiry Date:	April 16, 2023	
NOX Cal Gas Conc:	48.60	ppm	NO Cal Gas Conc:	48.60	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	48.60	ppm	Removed Gas NO Conc:	48.60	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	3806	
ZAG make/model:	Teledyne API T701		Serial Number:	4890	

Analyzer Information

Analyzer make:	Teledyne API T200	Analyzer serial #:	7117
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.019	1.019	NO bkgnd or offset:	-0.3	-0.3
NOX coeff or slope:	1.009	1.009	NOX bkgnd or offset:	0.4	0.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	5.1	5.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000016	1.001316
NO_X Cal Offset:	0.328470	0.648371
NO Cal Slope:	0.999486	1.001644
NO Cal Offset:	-0.011076	0.008462
NO_2 Cal Slope:	0.999574	1.000730
NO_2 Cal Offset:	0.324675	0.876715

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as found span	4918	82.3	799.9	799.9	0.0	798.3	796.4	1.9	1.0020	1.0044
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.2	-0.2	----	----
high point	4918	82.3	799.9	799.9	0.0	801.4	801.2	0.2	0.9981	0.9984
second point	4959	41.2	400.4	400.4	0.0	401.6	401.4	0.2	0.9971	0.9976
third point	4980	20.6	200.2	200.2	0.0	202.0	200.1	1.9	0.9911	1.0005
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.2	-0.2	----	----
as left span	4918	82.3	799.9	408.7	391.2	800.6	417.0	383.6	0.9991	0.9801
								Average Correction Factor	0.9955	0.9989

Corrected As found	NO_X = 798.3 ppb	NO = 796.4 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -0.2%		
Previous Response	NO_X = 800.2 ppb	NO = 799.5 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)	800.5	409.3	391.2	391.9	0.9982	100.2%
2nd GPT point (200 ppb O3)	800.5	608.6	191.9	193.3	0.9928	100.7%
3rd GPT point (100 ppb O3)	800.5	707.7	92.8	94.9	0.9779	102.3%
				Average Correction Factor	0.9896	101.1%

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

NO_X Calibration Summary

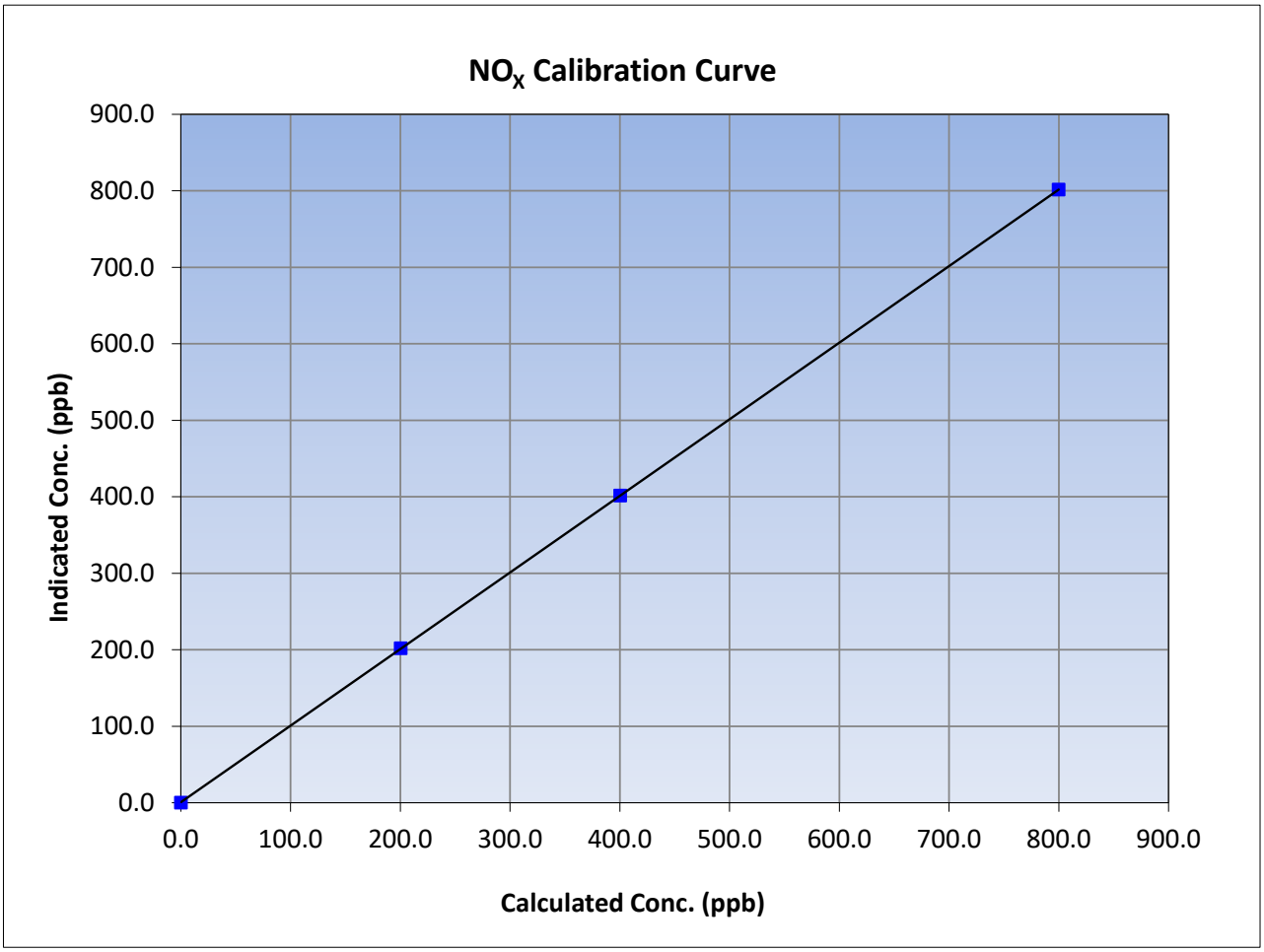
Version-04-2020

Station Information

Calibration Date:	March 9, 2023	Previous Calibration:	February 23, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	12:20	End Time (MST):	17:03
Analyzer make:	Teledyne API T200	Analyzer serial #:	7117

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999996	≥0.995
799.9	801.4	0.9981			
400.4	401.6	0.9971	Slope	1.001316	0.90 - 1.10
200.2	202.0	0.9911			
			Intercept	0.648371	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

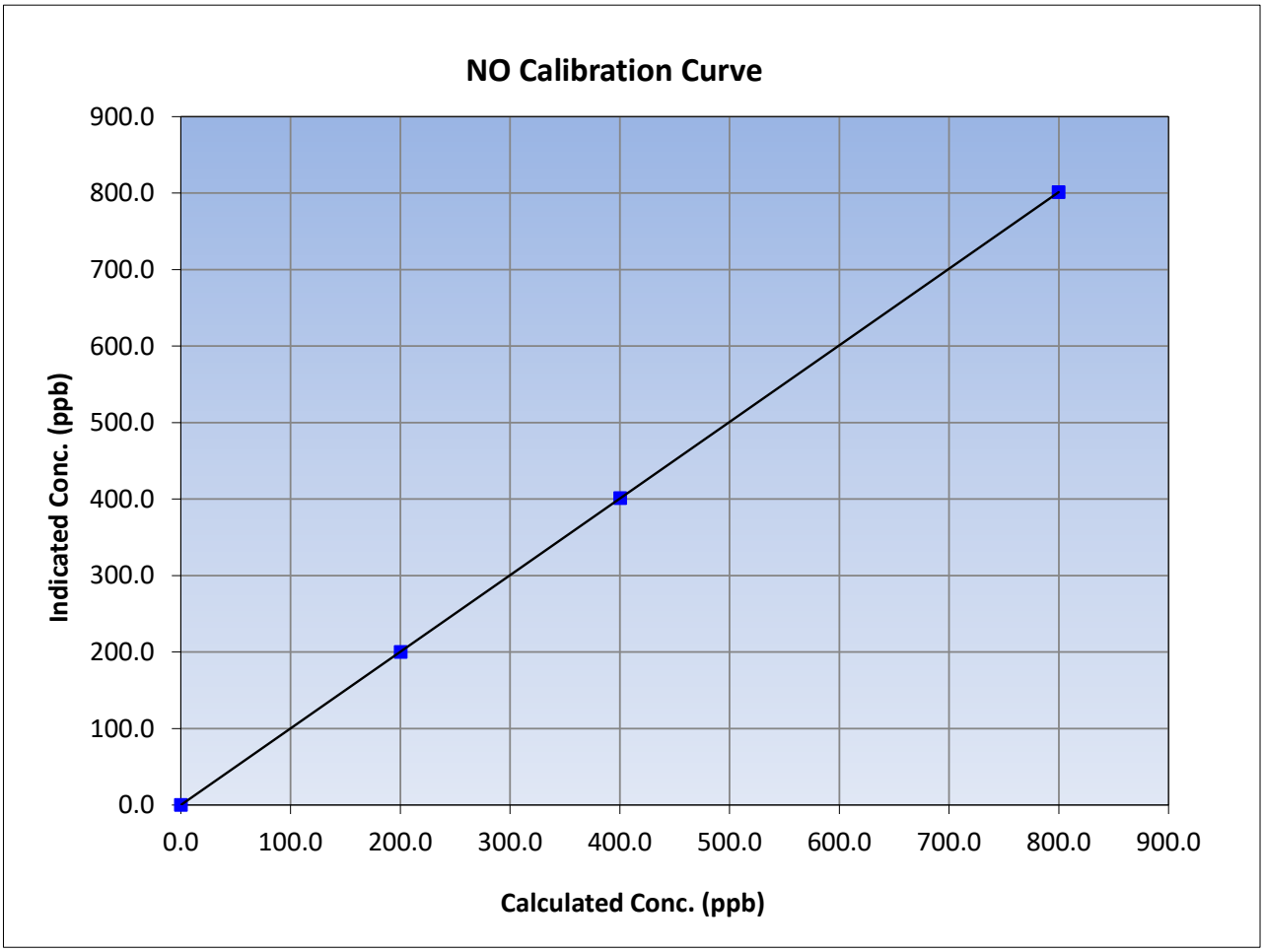
Version-04-2020

Station Information

Calibration Date:	March 9, 2023	Previous Calibration:	February 23, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	12:20	End Time (MST):	17:03
Analyzer make:	Teledyne API T200	Analyzer serial #:	7117

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
799.9	801.2	0.9984			
400.4	401.4	0.9976	Slope	1.001644	0.90 - 1.10
200.2	200.1	1.0005			
			Intercept	0.008462	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

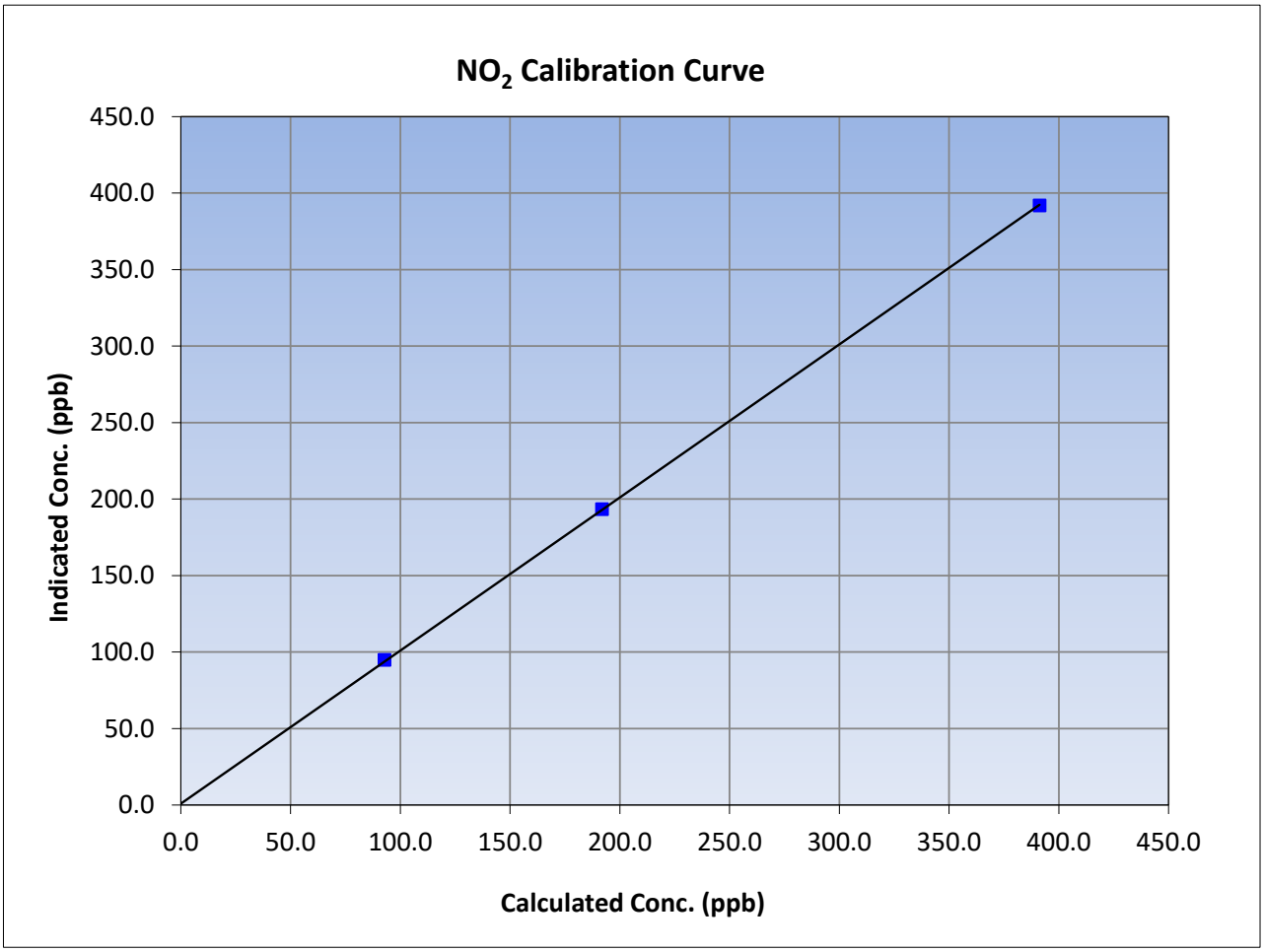
Version-04-2020

Station Information

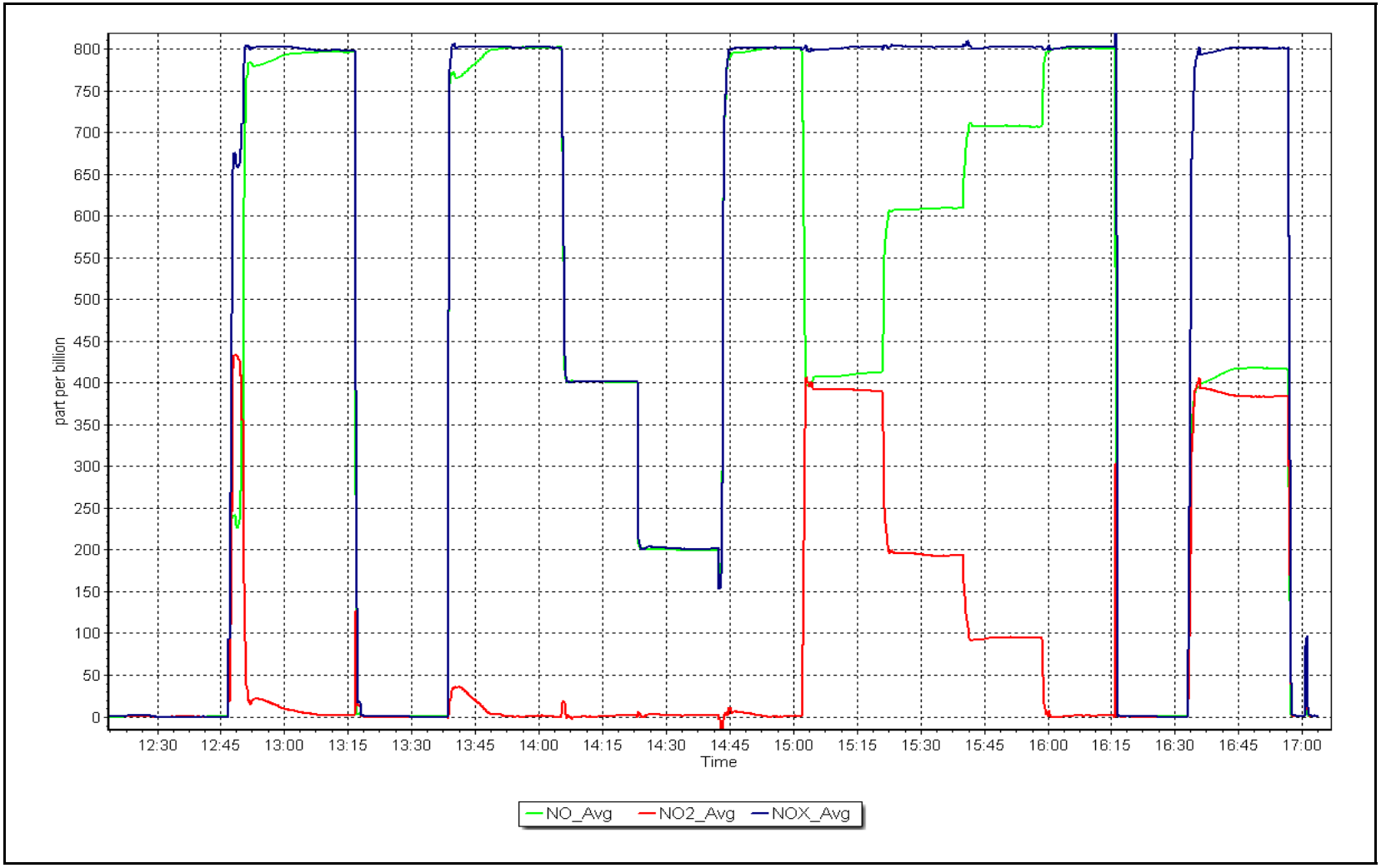
Calibration Date:	March 9, 2023	Previous Calibration:	February 23, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	12:20	End Time (MST):	17:03
Analyzer make:	Teledyne API T200	Analyzer serial #:	7117

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999966	≥0.995
391.2	391.9	0.9982			
191.9	193.3	0.9928	Slope	1.000730	0.90 - 1.10
92.8	94.9	0.9779			
			Intercept	0.876715	+/-20



NO_X Calibration Plot Date: March 9, 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:	March 28, 2023	Last Cal Date:	February 14, 2023
Start time (MST):	10:33	End time (MST):	13:26
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	Teledyne API T700	Serial Number:	3806
ZAG Make/Model:	Teledyne API T701	Serial Number:	201

Analyzer Information

Analyzer make:	Teledyne API T400	Analyzer serial #:	3869
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000057	1.000429	Backgd or Offset:	-2.0	-2.0
Calibration intercept:	0.440000	0.000000	Coeff or Slope:	1.011	1.011

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	800.0	0.0	-0.1	----
as found span	4893	899.1	400.0	399.3	1.002
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	0.2	----
high point	4893	899.1	400.0	400.3	0.999
second point	4893	753.4	200.0	199.9	1.001
third point	4893	655.7	100.0	99.9	1.001
as left zero	5000	800.0	0.0	0.1	----
as left span	4816	899.1	400.0	401.0	0.998
				Average Correction Factor	1.000

Baseline Corr As found:	399.4	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 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

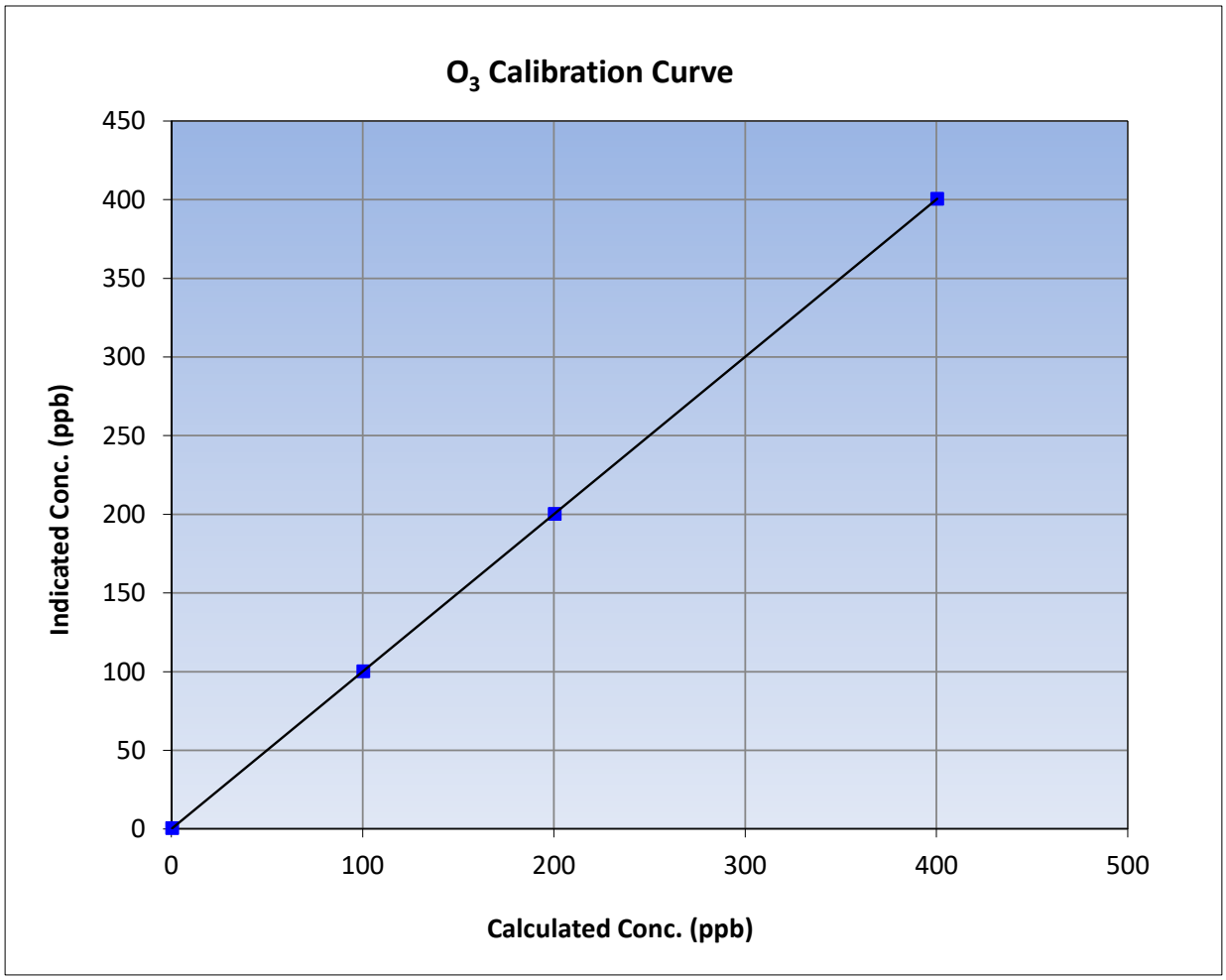
Station Information

Calibration Date:	March 28, 2023	Previous Calibration:	February 14, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:33	End Time (MST):	13:26
Analyzer make:	Teledyne API T400	Analyzer serial #:	3869

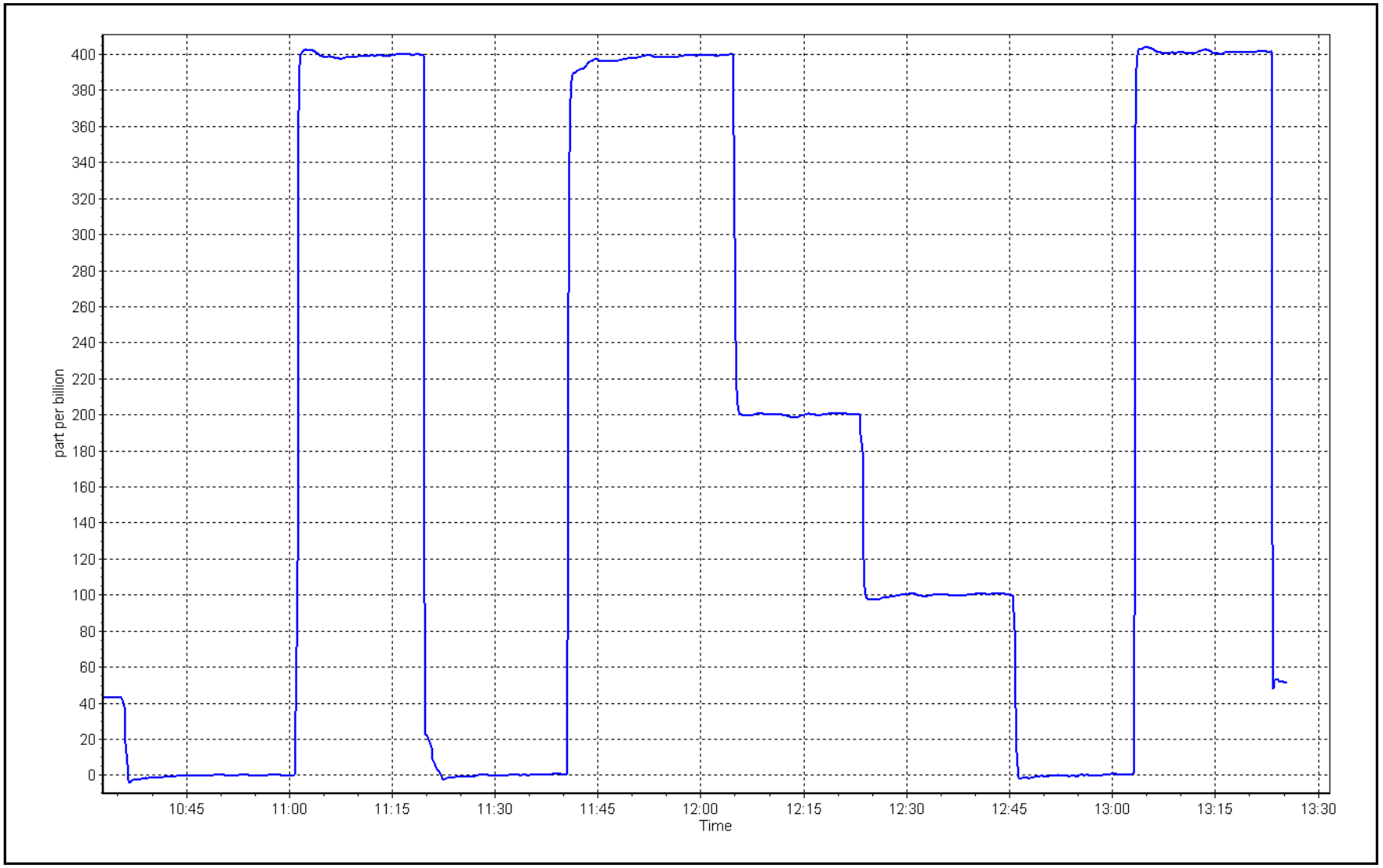
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
400.0	400.3	0.9993
200.0	199.9	1.0005
100.0	99.9	1.0010

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	1.000429	*0.90 - 1.10*
Intercept	0.000000	*+/- 5*



O_3 Calibration Plot Date: March 28, 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:	March 29, 2023	Last Cal Date:	February 24, 2023
Start time (MST):	12:11	End time (MST):	13:33
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)	0.6	0	0.6	☐	+/- 2 °C
P (mmHg)	716.4	714.9	716.4	☐	+/- 10 mmHg
flow (LPM)	5.01	4.88	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: March 29, 2023 Last Cal Date: February 24, 2023

PM w/o HEPA: 3 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: January 26, 2023 <0.2 ug/m3

Disposable Filter Changed: January 26, 2023

Annual Maintenance

Date Sample Tube Cleaned: October 6, 2022

Date RH/T Sensor Cleaned: October 6, 2022

Notes: Verified flow, temperature, and pressure. Leak test passed.

Calibration by: Rene Chamberland

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS23
FORT HILLS
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	March 2, 2023	Last Cal Date:	February 1, 2023
Start time (MST):	11:31	End time (MST):	14:55
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:	0.997162	0.995960	Backgd or Offset:	18.1	18.5
Calibration intercept:	-0.103174	-0.582785	Coeff or Slope:	1.048	1.053

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	799.1	791.0	1.010
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4920	80.3	799.1	795.5	1.005
second point	4960	40.2	400.1	398.0	1.005
third point	4980	20.1	200.0	197.5	1.013
as left zero	5000	0.0	0.0	0.1	----
as left span	4920	80.3	799.1	799.2	1.000
				Average Correction Factor	1.008

Baseline Corr As found:	791.10	Previous response	796.73	*% change	-0.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

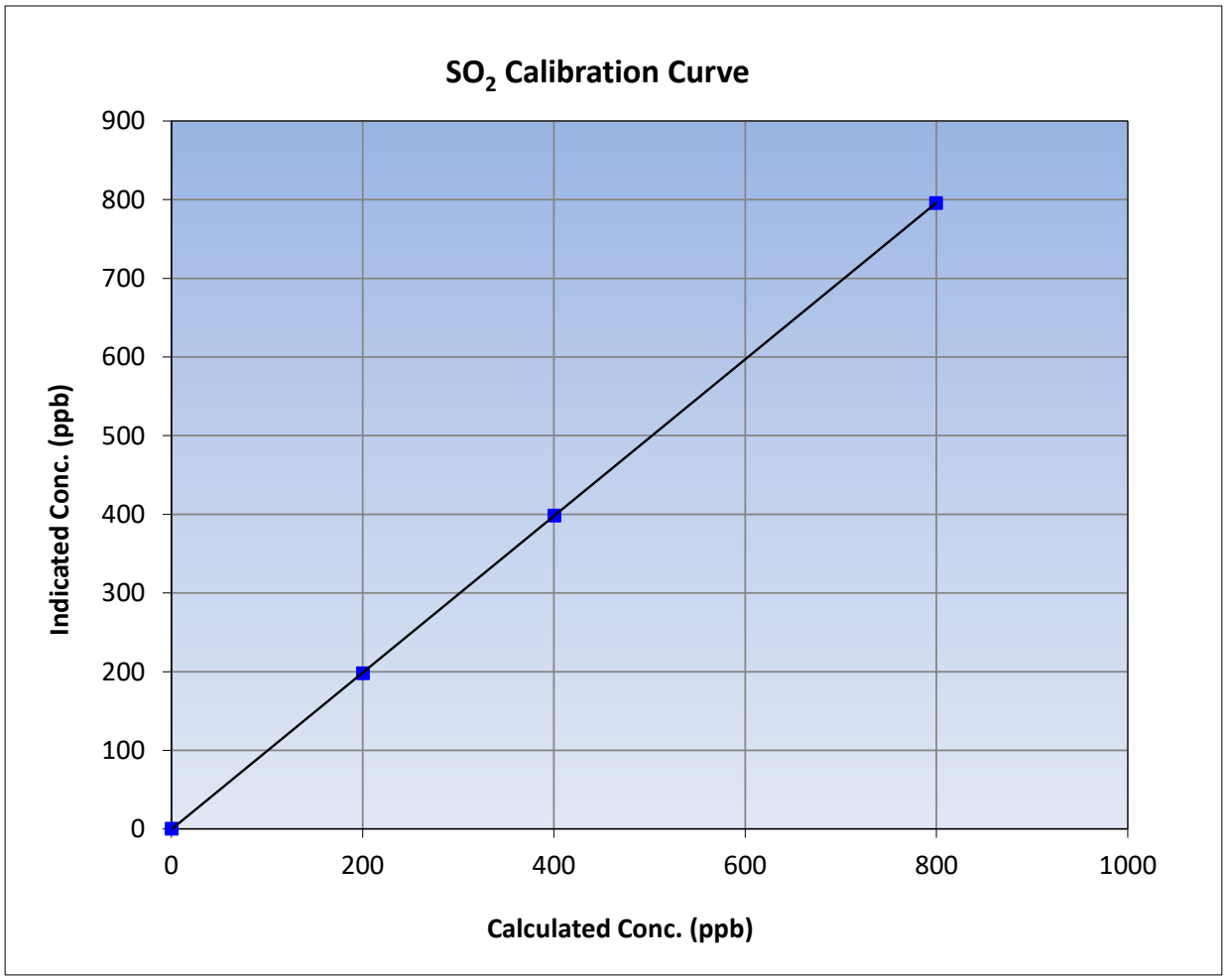
Station Information

Calibration Date:	March 2, 2023	Previous Calibration:	February 1, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	11:31	End Time (MST):	14:55
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290012

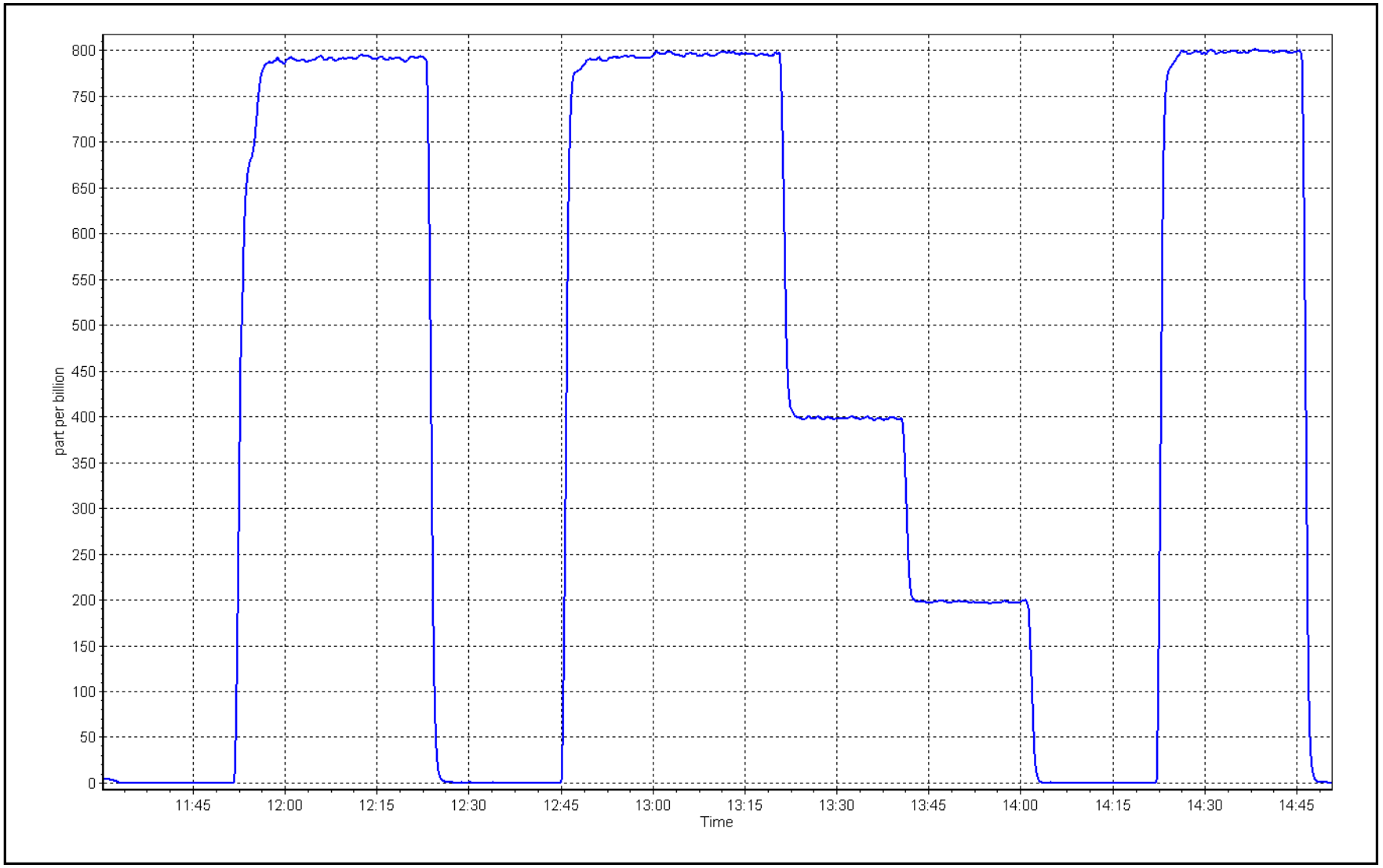
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
799.1	795.5	1.0045
400.1	398.0	1.0052
200.0	197.5	1.0128

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999994	*≥0.995*
Slope	0.995960	*0.90 - 1.10*
Intercept	-0.582785	*+/-30*



SO2 Calibration Plot Date: March 2, 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:	March 17, 2023	Last Cal Date:	February 14, 2023
Start time (MST):	9:03	End time (MST):	12:00
Reason:	Removal		

Calibration Standards

Cal Gas Concentration:	5.20	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517372			
Removed Cal Gas Conc:	5.20	ppm	Rem Gas Exp Date:	N/A
Removed Gas Cyl #:	N/A		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	451
ZAG Make/Model:	API T701		Serial Number:	5611

Analyzer Information

Analyzer make:	Thermo 43iQ TLE		Analyzer serial #:	12113311965
Converter make:	CDN-101		Converter serial #:	594
Analyzer Range	0 - 100 ppb			

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.004890		Backgd or Offset:	0.96	N/A
Calibration intercept:	-0.158196		Coeff or Slope:	0.714	N/A

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	4923	77.0	80.0	80.2	1.000
as found 2nd point	4962	38.5	40.0	40.1	1.002
as found 3rd point	4981	19.2	19.9	19.9	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					
high point					
second point					
third point					
as left zero					
as left span					
SO2 Scrubber Check	4922	78.3	783.0		----
Date of last scrubber change:				Ave Corr Factor	
Date of last converter efficiency test:					efficiency

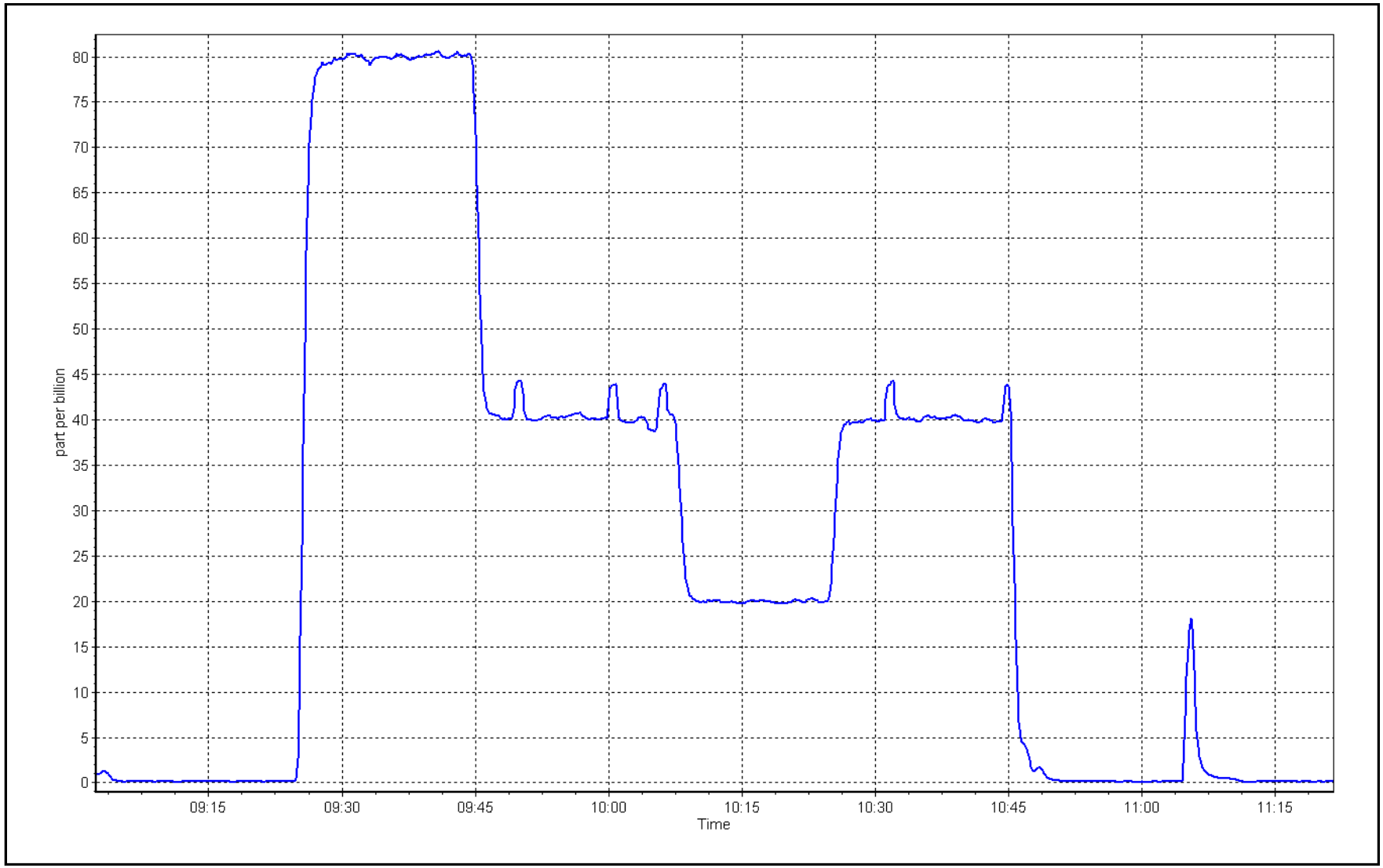
Baseline Corr As found:	80.0	Prev response:	80.24	*% change:	-0.3%
Baseline Corr 2nd AF pt:	39.9	AF Slope:	1.000887	AF Intercept:	0.081840
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999989		

* = > +/-5% change initiates investigation

Notes: Pump flow on the instrument is dropping and the readings spiking during the drop, changed the pump and still getting the same problem, removing the instrument to replace it with a new one.

Calibration Performed By: Max Farrell

TRS Calibration Plot Date: March 17, 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:	March 17, 2023	Last Cal Date:	February 14, 2023
Start time (MST):	14:30	End time (MST):	18:56
Reason:	Install		

Calibration Standards

Cal Gas Concentration:	5.20	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517372			
Removed Cal Gas Conc:	5.20	ppm	Rem Gas Exp Date:	N/A
Removed Gas Cyl #:	N/A		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	451
ZAG Make/Model:	API T701		Serial Number:	5611

Analyzer Information

Analyzer make:	Thermo 43iQ TLE	Analyzer serial #:	1300156232
Converter make:	CDN-101	Converter serial #:	594
Analyzer Range	0 - 100 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:		0.998462	Backgd or Offset:		1.75
Calibration intercept:		-0.258331	Coeff or Slope:		1.031

TRS As Found Data

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

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4923	77.0	80.0	79.8	1.003
second point	4962	38.5	40.0	39.5	1.013
third point	4981	19.2	19.9	19.3	1.034
as left zero	5000	0.0	0.0	0.0	----
as left span	4923	77.0	80.0	79.0	1.013

SO2 Scrubber Check

Date of last scrubber change:				Ave Corr Factor	1.016
Date of last converter efficiency test:					efficiency

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

* = > +/-5% change initiates investigation

Notes: Installing a new green tagged TRS due to noise issues. Scrubber test was completed earlier today. Adjusted the span only.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

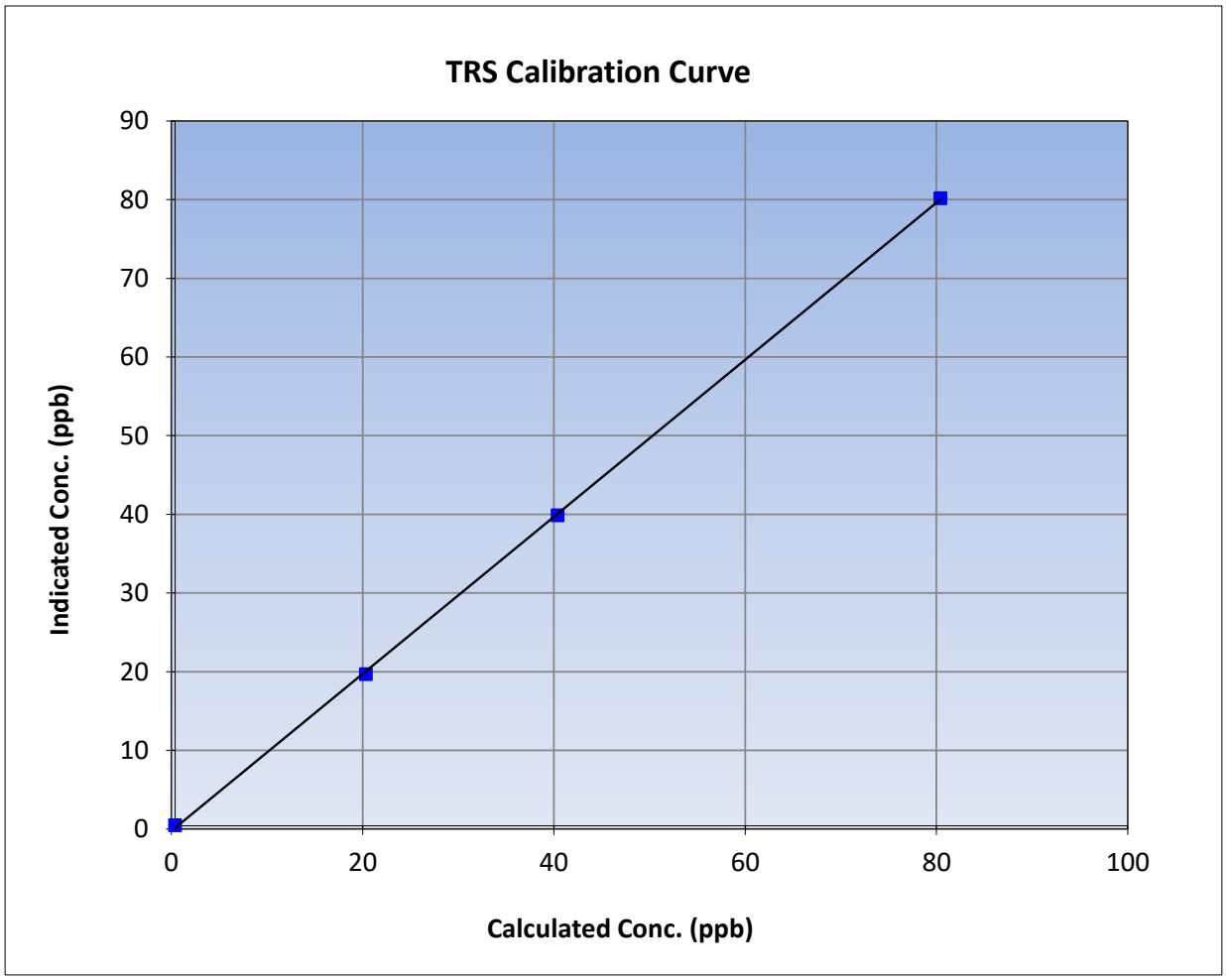
Station Information

Calibration Date:	March 17, 2023	Previous Calibration:	February 14, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	14:30	End Time (MST):	18:56
Analyzer make:	Thermo 43iQ TLE	Analyzer serial #:	1300156232

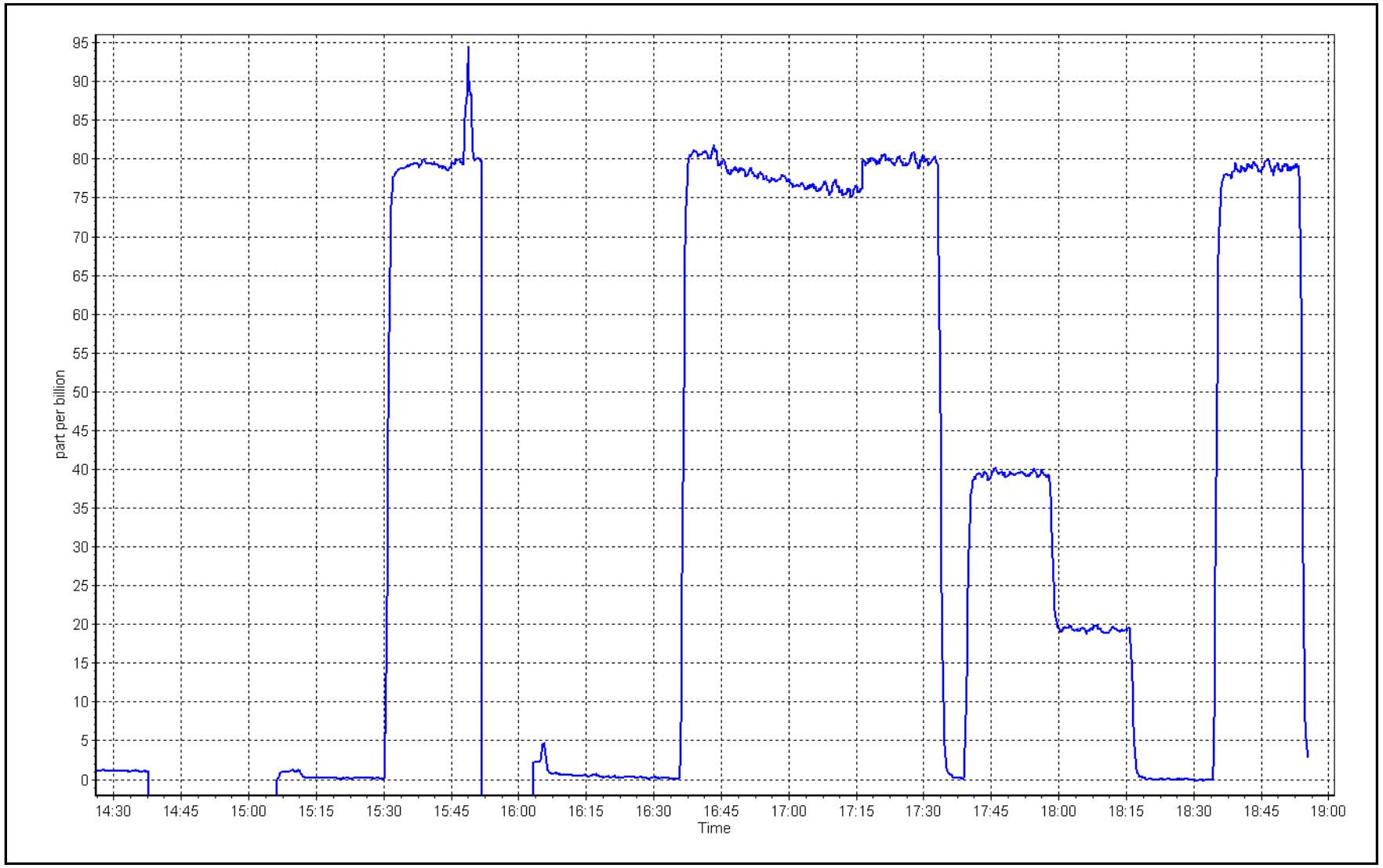
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	79.8	1.0025
40.0	39.5	1.0126
19.9	19.3	1.0336

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999908	*≥0.995*
Slope	0.998462	*0.90 - 1.10*
Intercept	-0.258331	*+/-3*



TRS Calibration Plot Date: March 17, 2023 Location: Fort Hills



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	March 2, 2023	Last Cal Date:	February 1, 2023
Start time (MST):	11:31	End time (MST):	14:55
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:	2.28E-04	2.36E-04	NMHC SP Ratio:	5.02E-05	5.24E-05
CH4 Retention time:	13.0	13.0	NMHC Peak Area:	183429	175506

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	17.19	16.62	1.035
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	17.21	0.999
second point	4960	40.2	8.61	8.62	0.998
third point	4980	20.1	4.30	4.33	0.994
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.19	17.23	0.998
				Average Correction Factor	0.997
Baseline Corr AF:	16.62	Prev response	17.27	*% change	-3.9%
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-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	9.16	8.80	1.040
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	0.974
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	9.16	9.18	0.998
				Average Correction Factor	0.987
Baseline Corr AF:	8.80	Prev response	9.20	*% change	-4.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	8.03	7.81	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	80.3	8.03	8.03	1.000
second point	4960	40.2	4.02	3.99	1.008
third point	4980	20.1	2.01	1.98	1.018
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	8.03	8.06	0.997
				Average Correction Factor	1.009
Baseline Corr AF:	7.81	Prev response	8.06	*% change	-3.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.005188	1.000597
THC Cal Offset:	-0.012392	0.010408
CH4 Cal Slope:	1.007325	1.000840
CH4 Cal Offset:	-0.029242	-0.020438
NMHC Cal Slope:	1.003089	1.000146
NMHC Cal Offset:	0.017251	0.031047

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

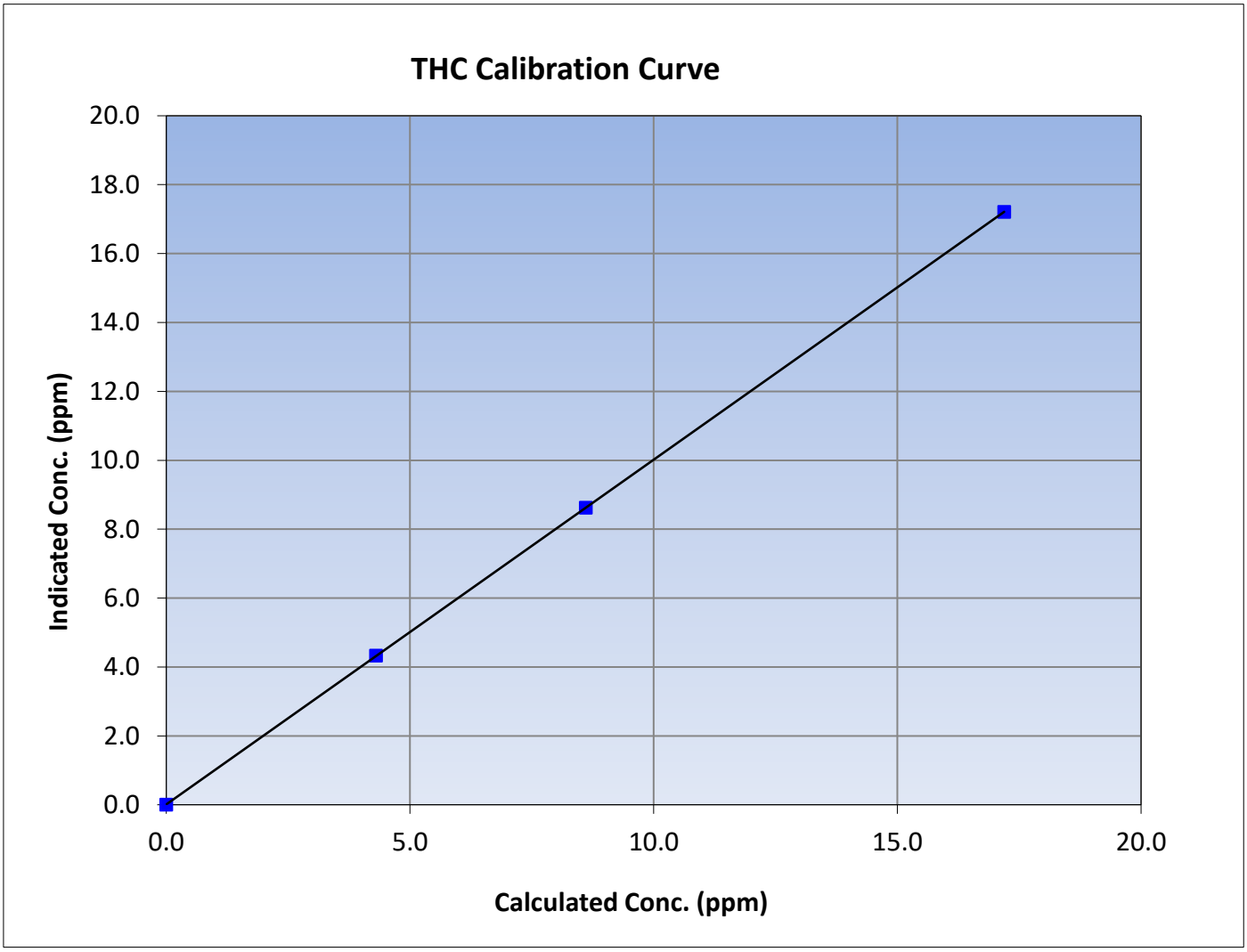
Version-01-2020

Station Information

Calibration Date:	March 2, 2023	Previous Calibration:	February 1, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	11:31	End Time (MST):	14:55
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	0.999998	*≥0.995*
17.19	17.21	0.9990			
8.61	8.62	0.9981	Slope	1.000597	*0.90 - 1.10*
4.30	4.33	0.9939			
			Intercept	0.010408	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

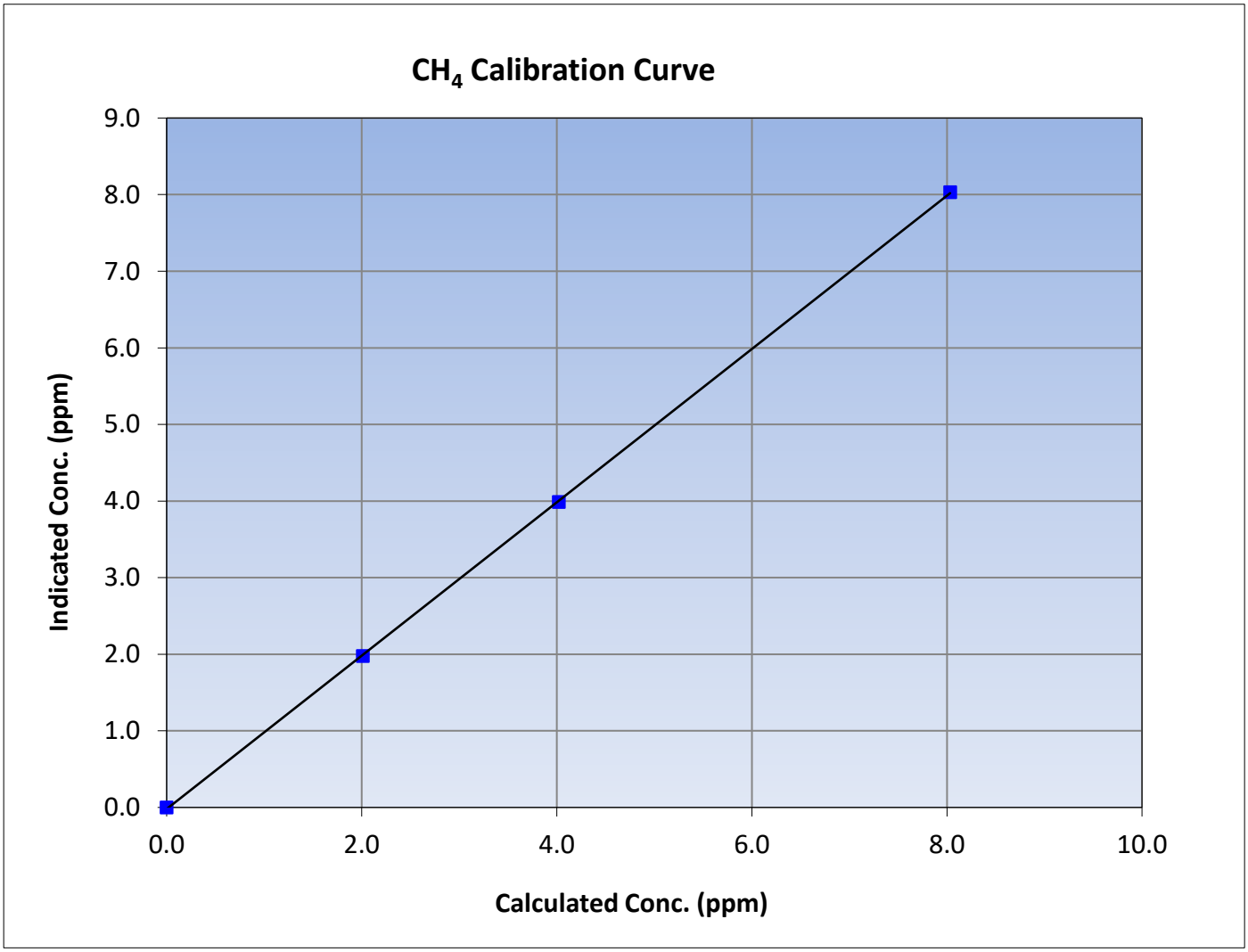
Version-01-2020

Station Information

Calibration Date:	March 2, 2023	Previous Calibration:	February 1, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	11:31	End Time (MST):	14:55
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	0.999969	*≥0.995*
8.03	8.03	1.0002			
4.02	3.99	1.0081	Slope	1.000840	*0.90 - 1.10*
2.01	1.98	1.0181			
			Intercept	-0.020438	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

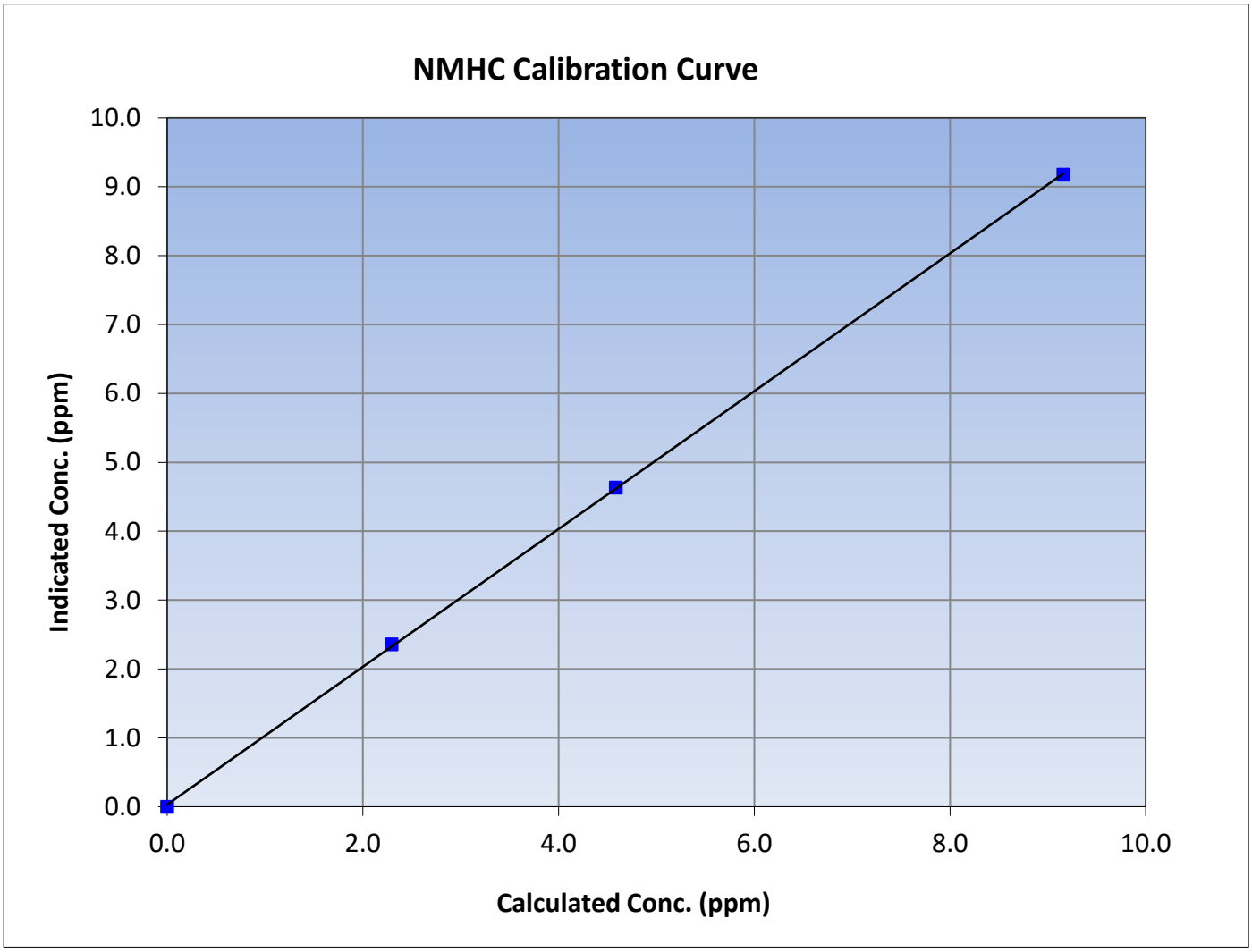
Version-01-2020

Station Information

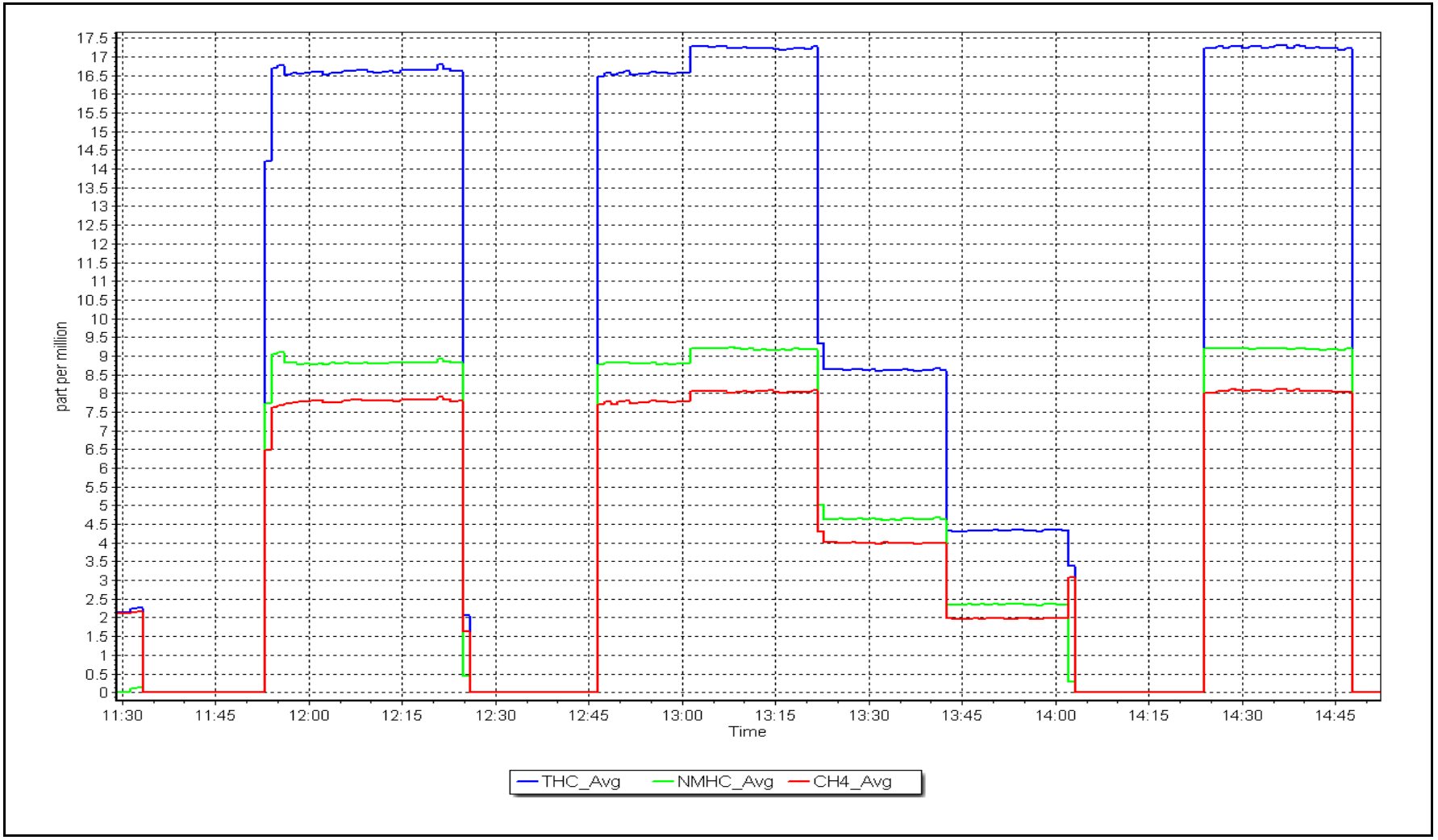
Calibration Date:	March 2, 2023	Previous Calibration:	February 1, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	11:31	End Time (MST):	14:55
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585648

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999947	≥0.995
9.16	9.18	0.9982			
4.59	4.63	0.9897	Slope	1.000146	0.90 - 1.10
2.29	2.36	0.9736			
			Intercept	0.031047	+/-0.5



NMHC Calibration Plot Date: March 2, 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:	March 1, 2023	Last Cal Date:	February 23, 2023
Start time (MST):	10:10	End time (MST):	18:08
Reason:	Maintenance		

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 T750		Serial Number:	275	
ZAG make/model:	Teledyne API T751H		Serial Number:	307	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1152430007	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.815	1.025	NO bkgnd or offset:	5.1	2.8
NOX coeff or slope:	0.996	0.995	NOX bkgnd or offset:	5.6	3.1
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	266.3	155

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.004364	0.992756
NO_X Cal Offset:	0.065025	0.201484
NO Cal Slope:	1.005722	0.995756
NO Cal Offset:	-0.434914	-1.598210
NO_2 Cal Slope:	0.999767	0.998881
NO_2 Cal Offset:	-0.637319	0.599000

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	762.0	759.4	2.6	1.050	1.054
as found 2nd	4960	40.2	399.6	399.6	0.0	383.4	381.4	2.0	1.0422	1.0476
as found 3rd	4980	20.1	199.8	199.8	0.0	190.5	188.6	1.9	1.0488	1.0593
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	1.5	0.3	1.3	----	----
high point	4920	80.5	800.2	800.2	0.0	795.2	796.1	-0.9	1.006	1.005
second point	4960	40.2	399.6	399.6	0.0	396.3	395.4	0.9	1.008	1.011
third point	4980	20.1	199.8	199.8	0.0	197.2	195.4	1.8	1.013	1.022
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as left span	4920	80.5	800.2	443.5	356.7	792.7	435.4	357.3	1.009	1.019
								Average Correction Factor	1.009	1.013

Corrected As found	NO_X = 762.2 ppb	NO = 759.4 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -5.4%
Previous Response	NO_X = 803.7 ppb	NO = 804.3 ppb		*Percent Change	NO = -5.9%
Baseline Corr 2nd pt	NO_X = 383.6 ppb	NO = 381.4 ppb	As found	NO_X r^2: 0.999980	Nx Sl: 0.952804	Nx Int: 0.555
Baseline Corr 3rd pt	NO_X = 190.7 ppb	NO = 188.6 ppb	As found	NO r^2: 0.999983	NO Sl: 0.949792	NO Int: 0.034
			As found	NO_2 r^2: 1.000000	NO2 Sl: 1.000874	NO_2 Int: -0.200

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	-0.2	----	----
as found GPT point (400 ppb NO2)	756.7	413.3	343.4	343.5	0.9997	100.0%
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	790.8	434.1	356.7	357.2	0.999	100.1%
2nd GPT point (200 ppb O3)	790.8	615.0	175.8	176.0	0.999	100.1%
3rd GPT point (100 ppb O3)	790.8	701.3	89.5	89.2	1.003	99.7%
				Average Correction Factor	1.000	100.0%

Notes: Completed multipoint as founds. Found the leak that caused the low chamber pressure and fixed the leak. Adjusted the span.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

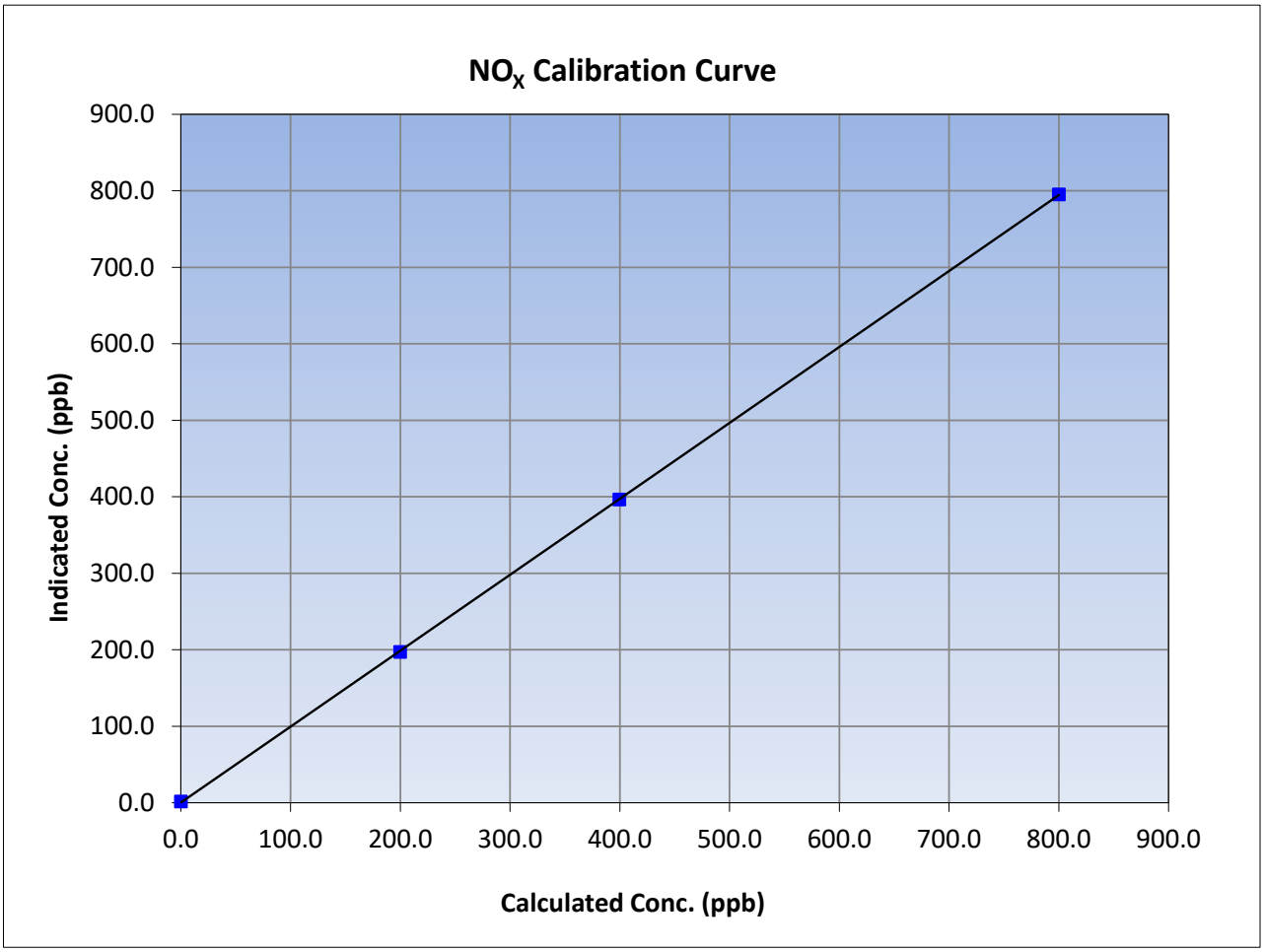
Version-04-2020

Station Information

Calibration Date:	March 1, 2023	Previous Calibration:	February 23, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:10	End Time (MST):	18:08
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	1.5	----	Correlation Coefficient	0.999988	*≥0.995*
800.2	795.2	1.0063			
399.6	396.3	1.0083	Slope	0.992756	*0.90 - 1.10*
199.8	197.2	1.0131			
			Intercept	0.201484	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

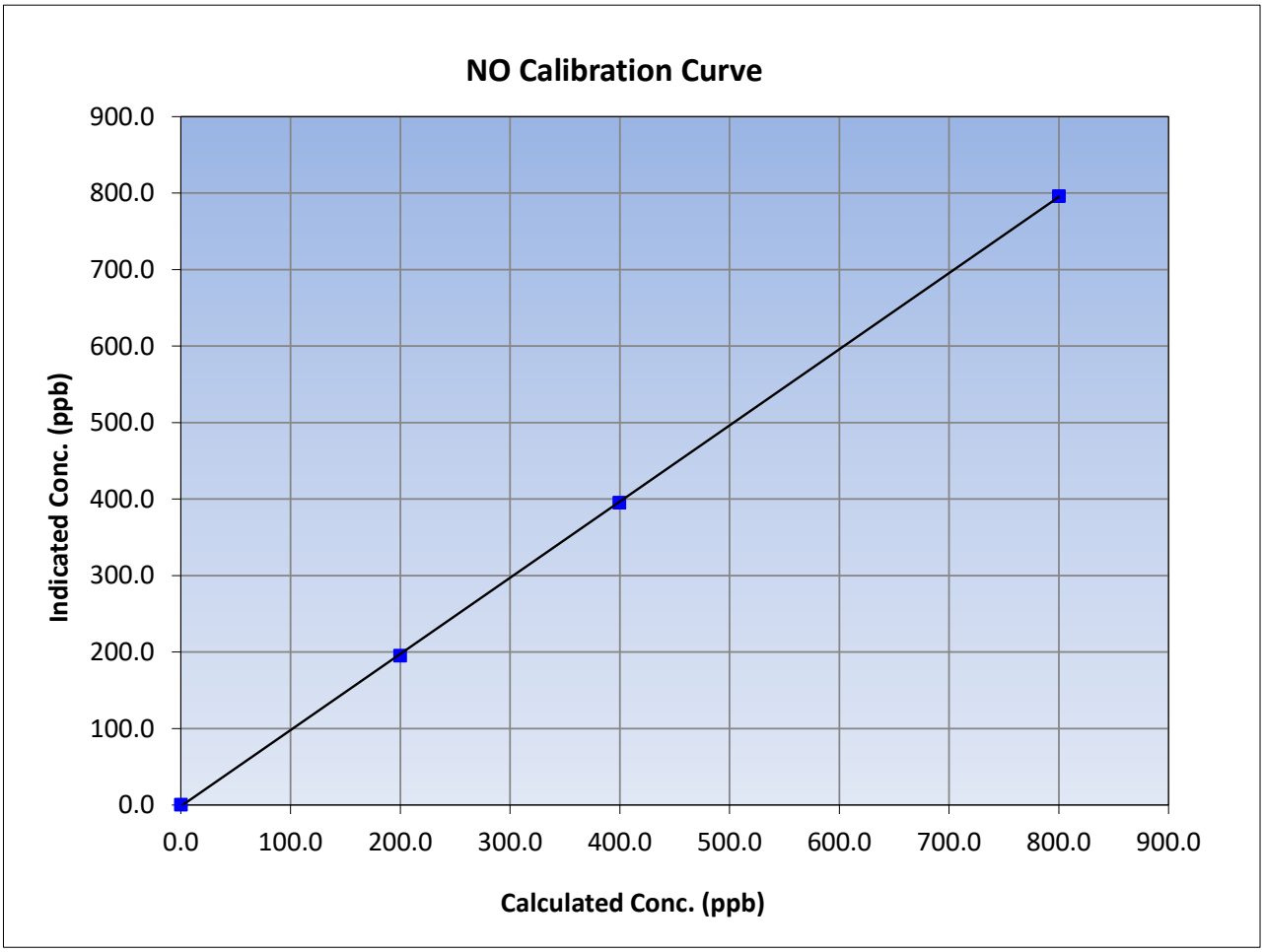
Version-04-2020

Station Information

Calibration Date:	March 1, 2023	Previous Calibration:	February 23, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:10	End Time (MST):	18:08
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.3	----	Correlation Coefficient	0.999974	≥0.995
800.2	796.1	1.0051			
399.6	395.4	1.0106	Slope	0.995756	0.90 - 1.10
199.8	195.4	1.0225			
			Intercept	-1.598210	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

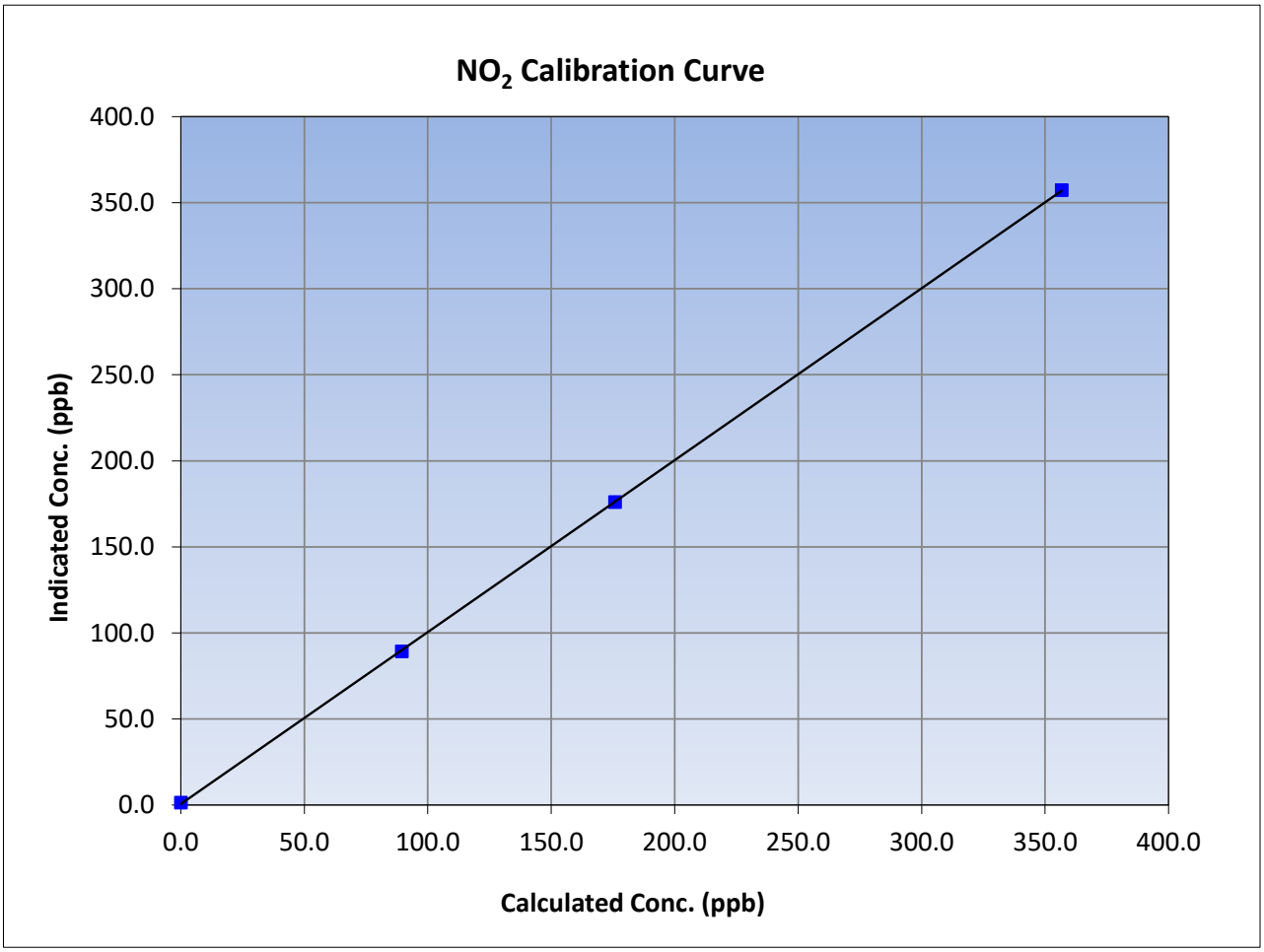
Version-04-2020

Station Information

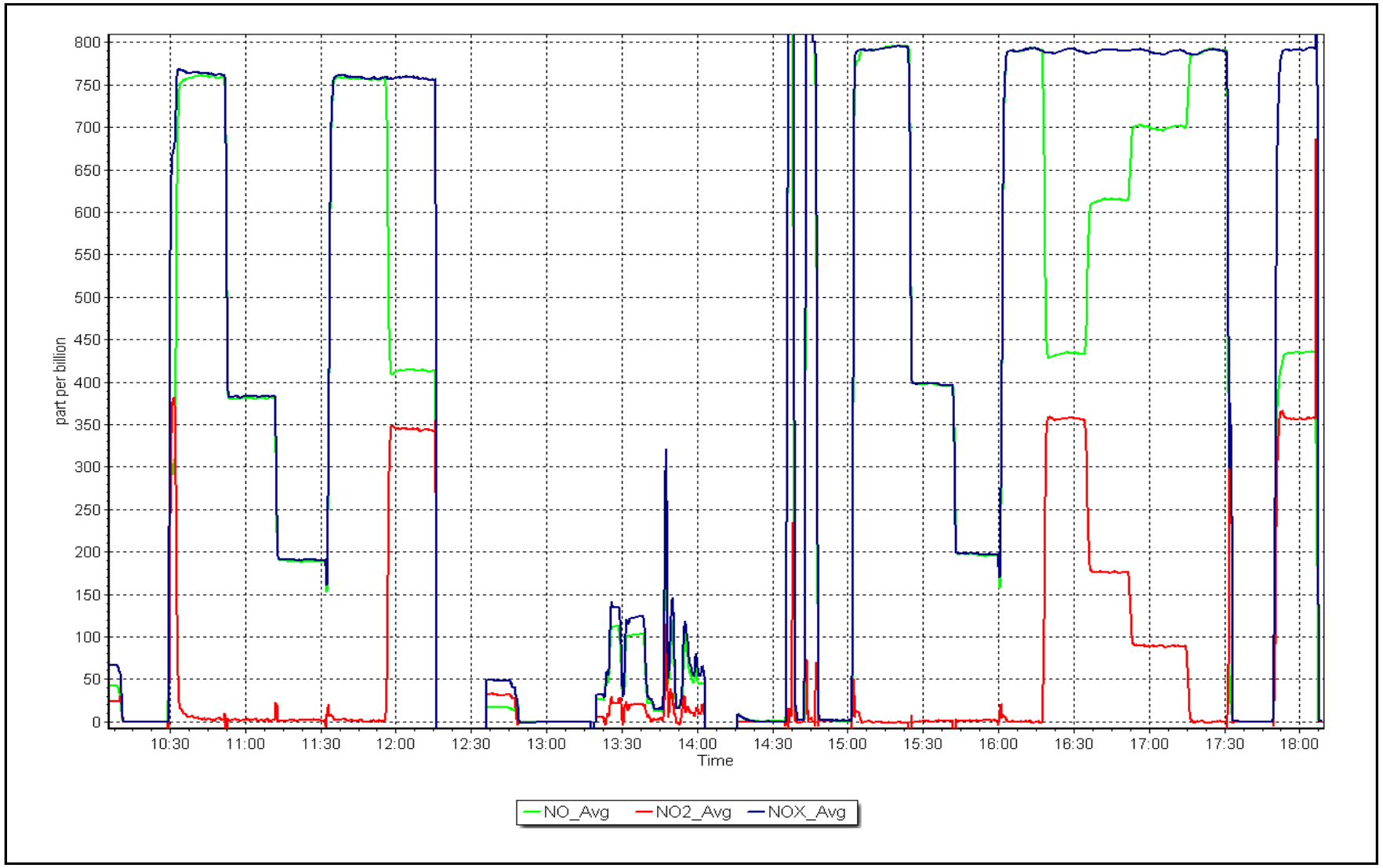
Calibration Date:	March 1, 2023	Previous Calibration:	February 23, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:10	End Time (MST):	18:08
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	1.3	----	Correlation Coefficient	0.999982	*≥0.995*
356.7	357.2	0.9986			
175.8	176.0	0.9989	Slope	0.998881	*0.90 - 1.10*
89.5	89.2	1.0034			
			Intercept	0.599000	*+/-20*



NO_X Calibration Plot Date: March 1, 2023 Location: Fort Hills



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Fort Hills	Station number:	AMS 23
Calibration Date:	March 18, 2023	Last Cal Date:	February 17, 2023
Start time (MST):	12:37	End time (MST):	13:25
Analyzer Make:	API T640	S/N:	1546
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388755
Temp/RH standard:	Alicat FP-25BT	S/N:	388755

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	4.6	4.48	4.6	☐	+/- 2 °C
P (mmHg)	735.81	735	735.81	☐	+/- 10 mmHg
flow (LPM)	5.00	4.948	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: March 18, 2023 Last Cal Date: February 17, 2023

PM w/o HEPA: NA PM w/ HEPA: NA <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

Post-maintenance leak check: PM w/o HEPA: 8.7 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: March 18, 2023

Disposable Filter Changed: March 18, 2023

Annual Maintenance

Date Sample Tube Cleaned: September 26, 2022

Date RH/T Sensor Cleaned: September 26, 2022

Notes: Analyzer DOA. Removed asset: 11458, installed asset: 11808. No adjustments made.

Calibration by: Braiden Boutilier

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS25
WASKŌW OHCI PIMÂTISIWIN
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Waskow ohci Pimatisiwin	Station number:	AMS25
Calibration Date:	March 15, 2023	Last Cal Date:	January 3, 2023
Start time (MST):	10:00	End time (MST):	12:12
Reason:	Install		

Calibration Standards

Cal Gas Concentration:	52.4	ppm	Cal Gas Exp Date:	October 19, 2022
Cal Gas Cylinder #:	ET0016672			
Removed Cal Gas Conc:	52.4	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 — Analyzer serial #: 1118148497

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999783	1.006789	Backgd or Offset:	11.0	10.1
Calibration intercept:	-0.314119	-0.116149	Coeff or Slope:	1.212	1.039

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4924	76.3	799.6	804.6	0.994
second point	4962	38.2	400.3	403.9	0.991
third point	4981	19.1	200.2	200.6	0.998
as left zero	5000	0.0	0.0	0.4	----
as left span	4924	76.3	799.6	808.9	0.988
				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: Install calibration from power being put back on. Flash lamp adjustment and Initial flash reference done. Zero and Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

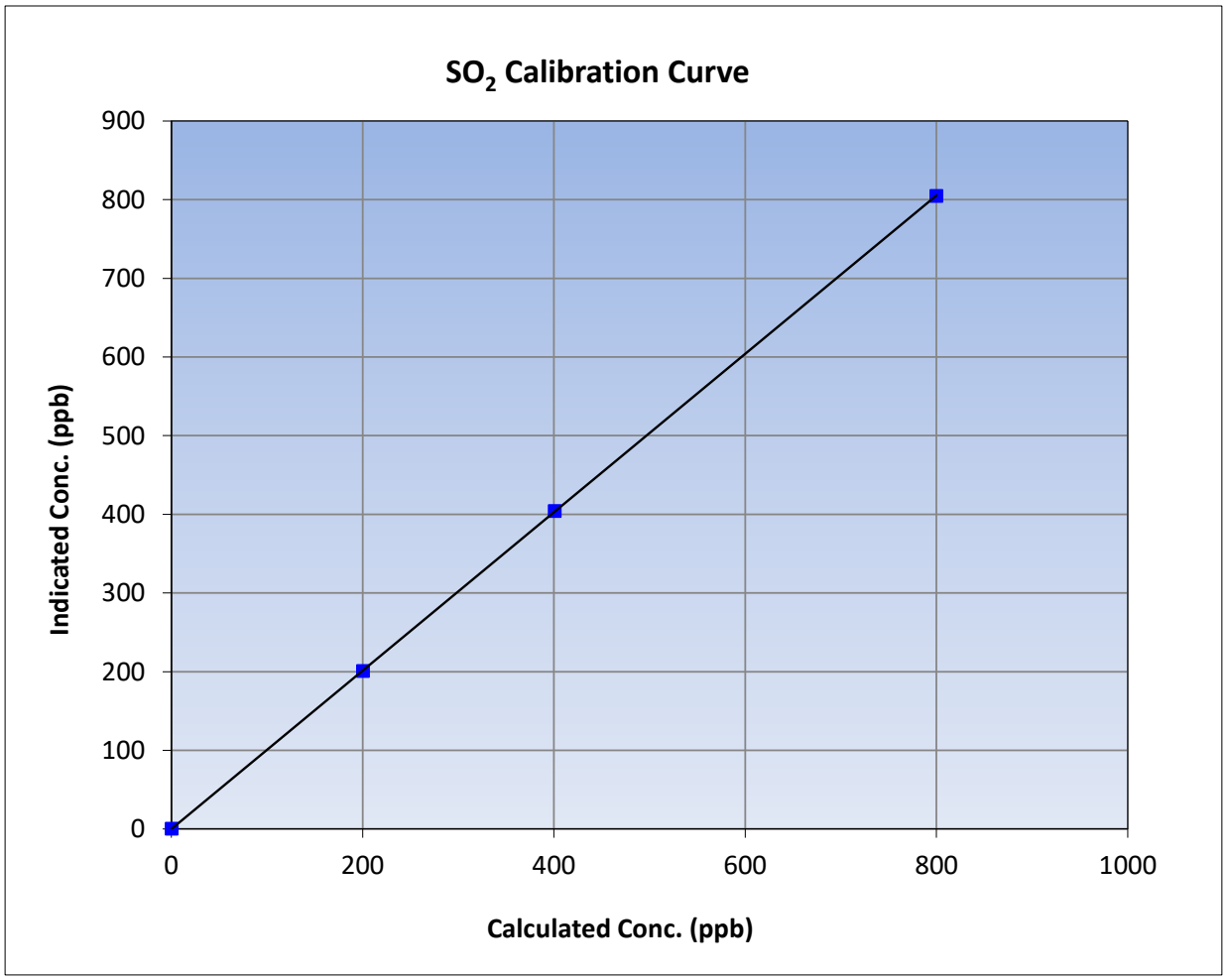
Station Information

Calibration Date:	March 15, 2023	Previous Calibration:	January 3, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	10:00	End Time (MST):	12:12
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148497

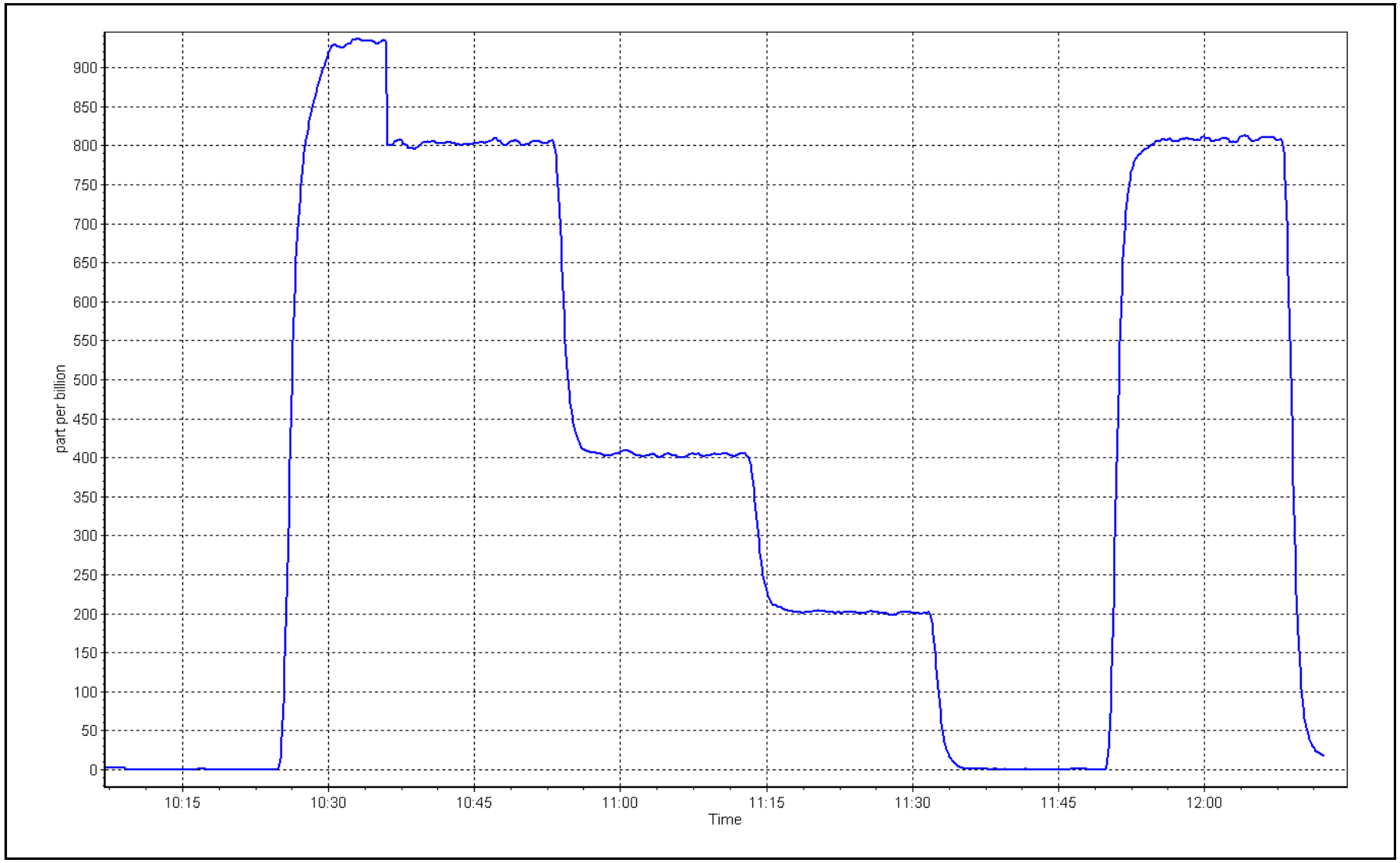
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
799.6	804.6	0.9938
400.3	403.9	0.9911
200.2	200.6	0.9978

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.006789	*0.90 - 1.10*
Intercept	-0.116149	*+/-30*



SO2 Calibration Plot Date: March 15, 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:	March 16, 2023	Last Cal Date:	January 11, 2023
Start time (MST):	7:20	End time (MST):	10:14
Reason:	Install		

Calibration Standards

Cal Gas Concentration:	4.90	ppm	Cal Gas Exp Date:	May 5, 2023
Cal Gas Cylinder #:	LL119538			
Removed Cal Gas Conc:	4.90	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:	Thermo 43C		Converter serial #:	328702539	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.002738	1.003738	Backgd or Offset:	3.3	3.3
Calibration intercept:	0.341605	0.281608	Coeff or Slope:	1.085	1.085

H_2S As Found Data

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

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4918	81.6	80.0	80.5	0.993
second point	4959	40.8	40.0	40.5	0.987
third point	4980	20.4	20.0	20.4	0.980
as left zero	5000	0.0	0.0	0.2	----
as left span	4912	88.3	800.0	803.0	0.996
SO2 Scrubber Check	4924	76.3	800.0	0.2	----
Date of last scrubber change:		19-Jul-10		Ave Corr Factor	0.987
Date of last converter efficiency test:					efficiency

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

* = > +/-5% change initiates investigation

Notes: Sox scrubber checked after the calibrator zero. No adjustments done. Install Calibration after power put back on.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

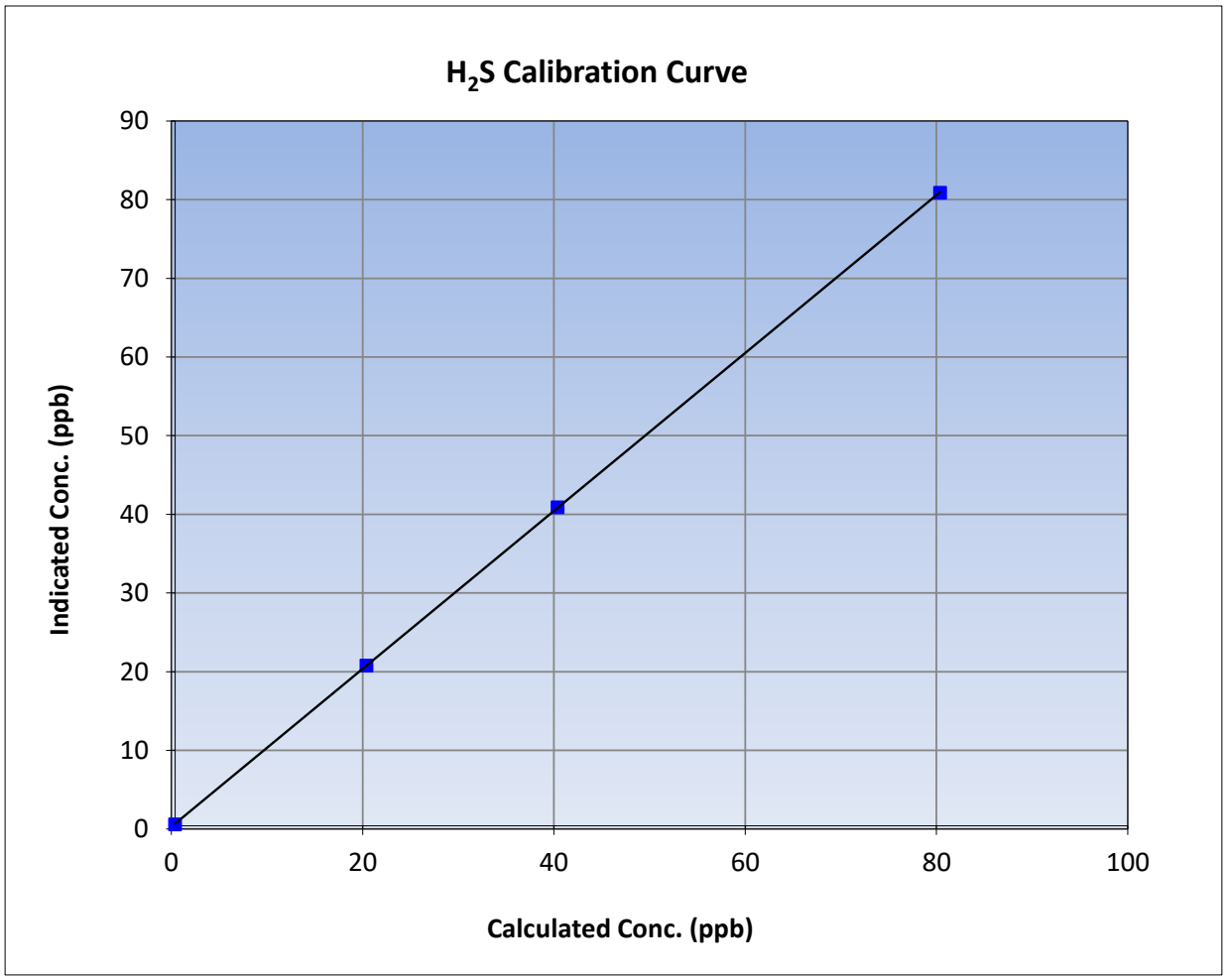
Station Information

Calibration Date:	March 16, 2023	Previous Calibration:	January 11, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	7:20	End Time (MST):	10:14
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1170050146

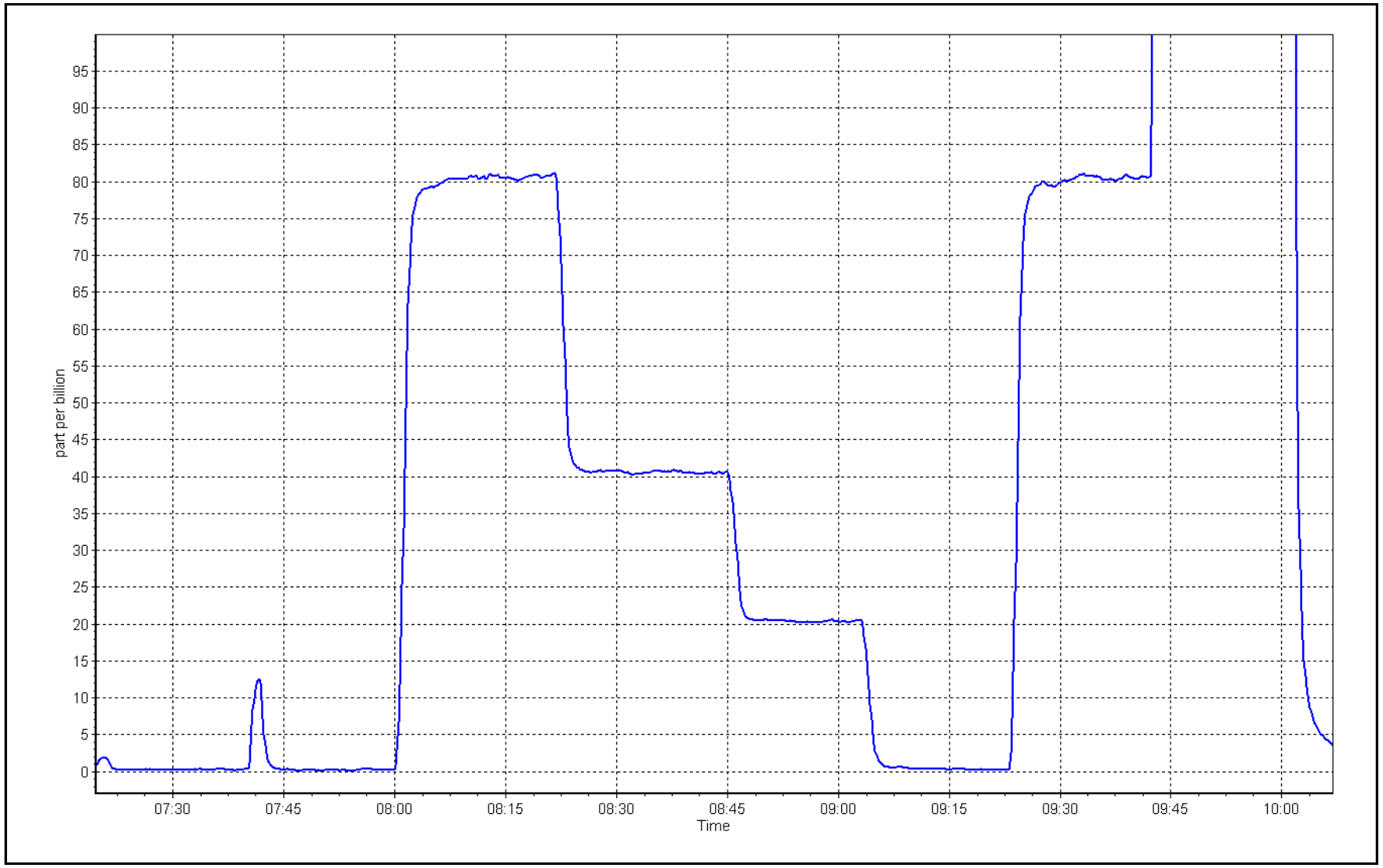
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	80.5	0.9935
40.0	40.5	0.9873
20.0	20.4	0.9799

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999994	*≥0.995*
Slope	1.003738	*0.90 - 1.10*
Intercept	0.281608	*+/-3*



H_2S Calibration Plot Date: March 16, 2023 Location: Waskow ohci Pimatisiwin



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS26
CHRISTINA LAKE
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Christina Lake	Station number:	AMS 26
Calibration Date:	March 23, 2023	Last Cal Date:	February 14, 2023
Start time (MST):	10:41	End time (MST):	13:40
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.56	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC362134			
Removed Cal Gas Conc:	49.56	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	2447
ZAG Make/Model:	API T701		Serial Number:	953

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1173410001

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.994255	0.990536	Backgd or Offset:	16.4	16.5
Calibration intercept:	-2.695113	-2.994790	Coeff or Slope:	0.929	0.929

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	80.6	799.0	789.9	1.011
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4919	80.6	799.0	790.4	1.011
second point	4960	40.3	399.4	389.9	1.024
third point	4980	20.2	200.2	192.9	1.038
as left zero	5000	0.0	0.0	0.3	----
as left span	4919	80.6	799.0	788.2	1.014
				Average Correction Factor	1.024

Baseline Corr As found:	789.90	Previous response	791.69	*% change	-0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

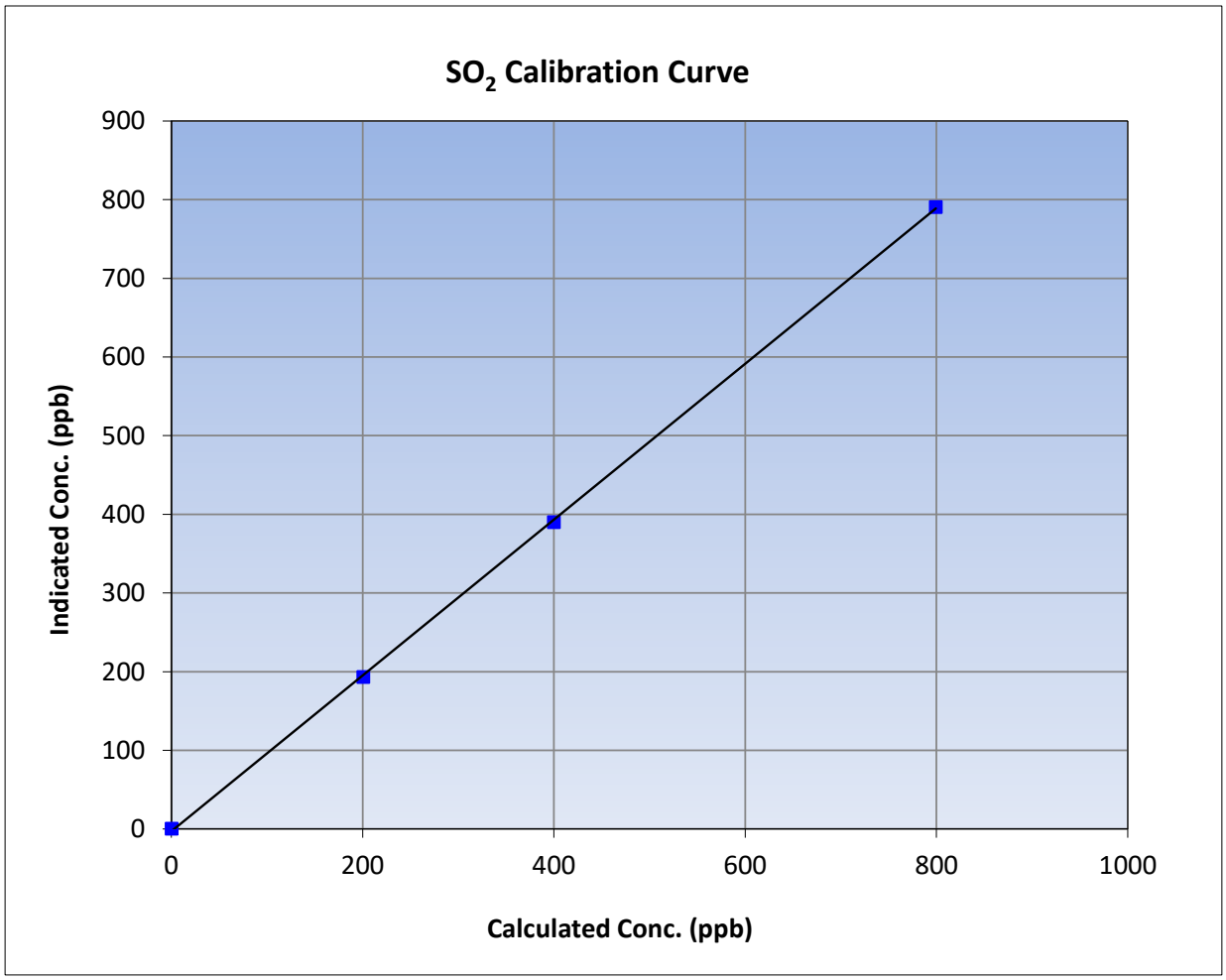
Station Information

Calibration Date:	March 23, 2023	Previous Calibration:	February 14, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	10:41	End Time (MST):	13:40
Analyzer make:	Thermo 43i	Analyzer serial #:	1173410001

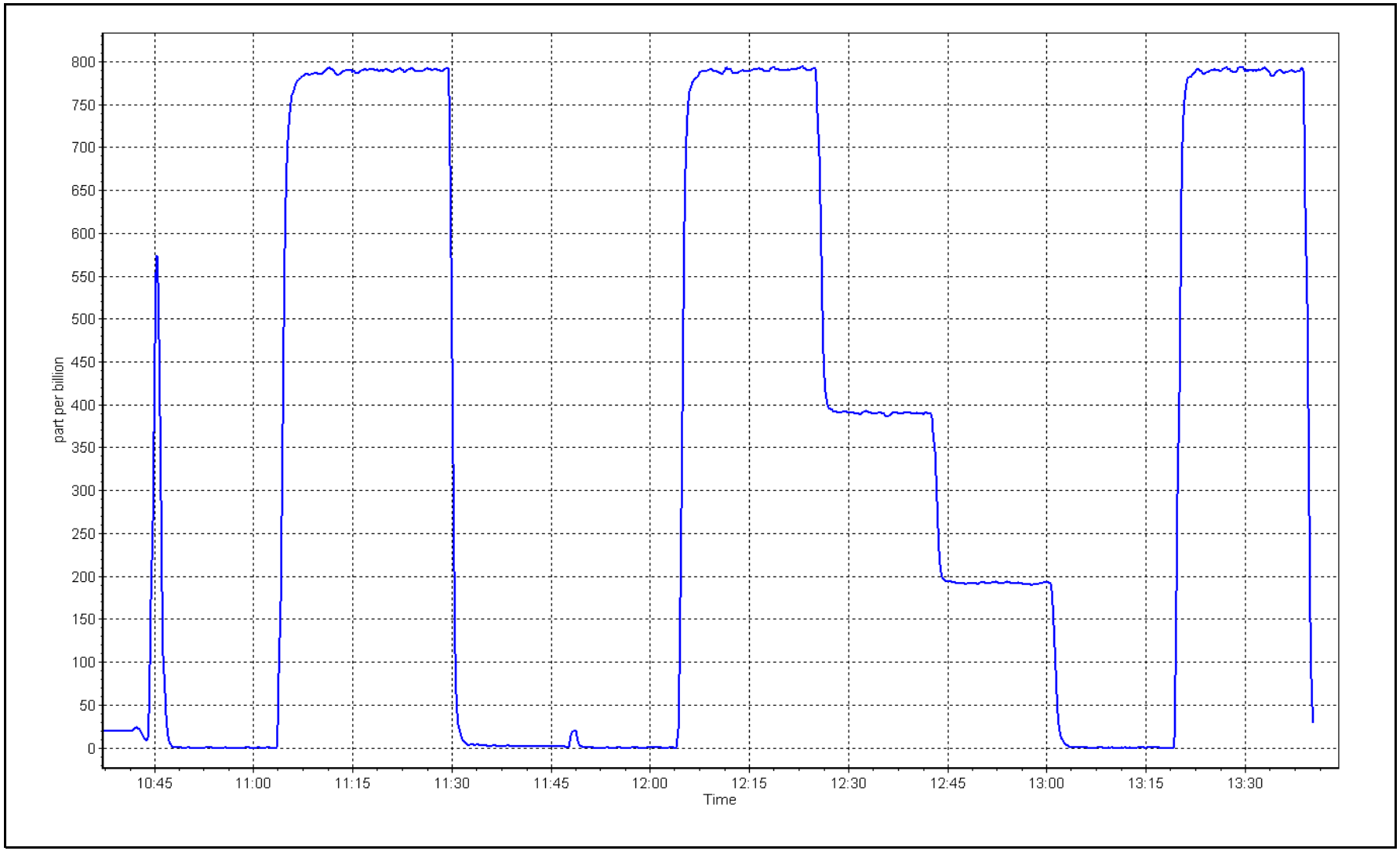
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
799.0	790.4	1.0108
399.4	389.9	1.0244
200.2	192.9	1.0379

Statistical Evaluation		Limits
Correlation Coefficient	0.999919	≥0.995
Slope	0.990536	0.90 - 1.10
Intercept	-2.994790	+/-30



SO2 Calibration Plot Date: March 23, 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:	March 22, 2023	Last Cal Date:	February 15, 2023
Start time (MST):	10:38	End time (MST):	15:04
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	4.89	ppm	Cal Gas Exp Date:	February 9, 2024
Cal Gas Cylinder #:	EY0002466			
Removed Cal Gas Conc:	4.89	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	2447
ZAG Make/Model:	API T701		Serial Number:	953

Analyzer Information

Analyzer make:	Thermo 450i		Analyzer serial #:	1180030032	
Converter make:	NA		Converter serial #:	NA	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.996758	0.979904	Backgd or Offset:	33.6	33.6
Calibration intercept:	0.098881	0.438608	Coeff or Slope:	1.125	1.125

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.5	----
as found span	4918	81.8	80.0	80.6	0.999
as found 2nd point	4959	40.9	40.0	40.4	1.003
as found 3rd point	4979	20.4	20.0	20.1	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	0.6	----
high point	4918	81.8	80.0	78.9	1.014
second point	4959	40.9	40.0	39.6	1.010
third point	4979	20.4	20.0	19.8	1.008
as left zero	5000	0.0	0.0	0.6	----
as left span	4918	81.8	80.0	80.8	0.990
SO2 Scrubber Check	4919	80.6	806.1	0.1	----
Date of last scrubber change:		27-Feb-19		Ave Corr Factor	1.011
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.1	Prev response:	79.84	*% change:	0.3%
Baseline Corr 2nd AF pt:	39.9	AF Slope:	1.002613	AF Intercept:	0.319026
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999975		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after MAF's, changed zero/span valve before calibrator zero. Ran scrubber check after calibrator zero. No adjustments made.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

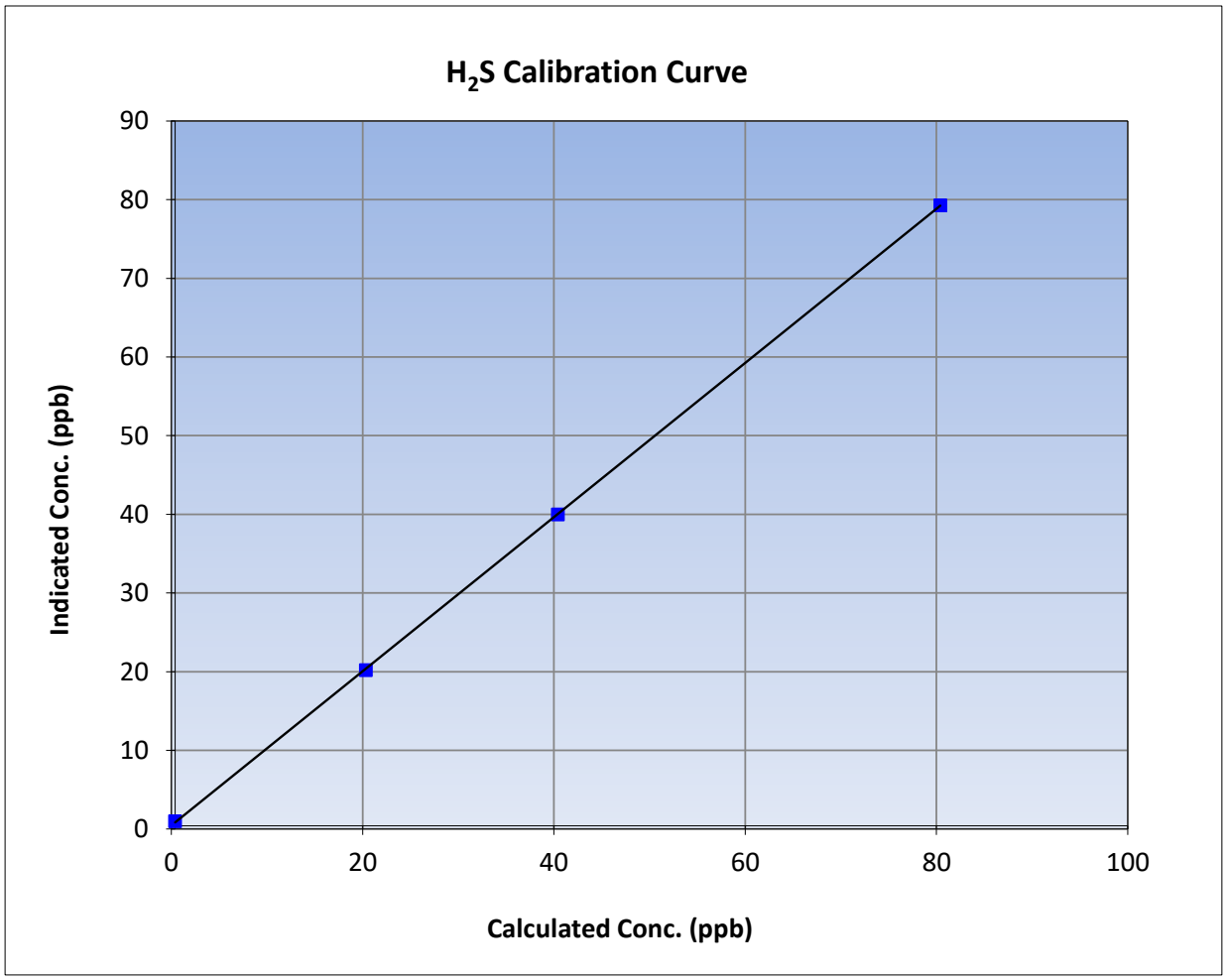
Station Information

Calibration Date:	March 22, 2023	Previous Calibration:	February 15, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	10:38	End Time (MST):	15:04
Analyzer make:	Thermo 450i	Analyzer serial #:	1180030032

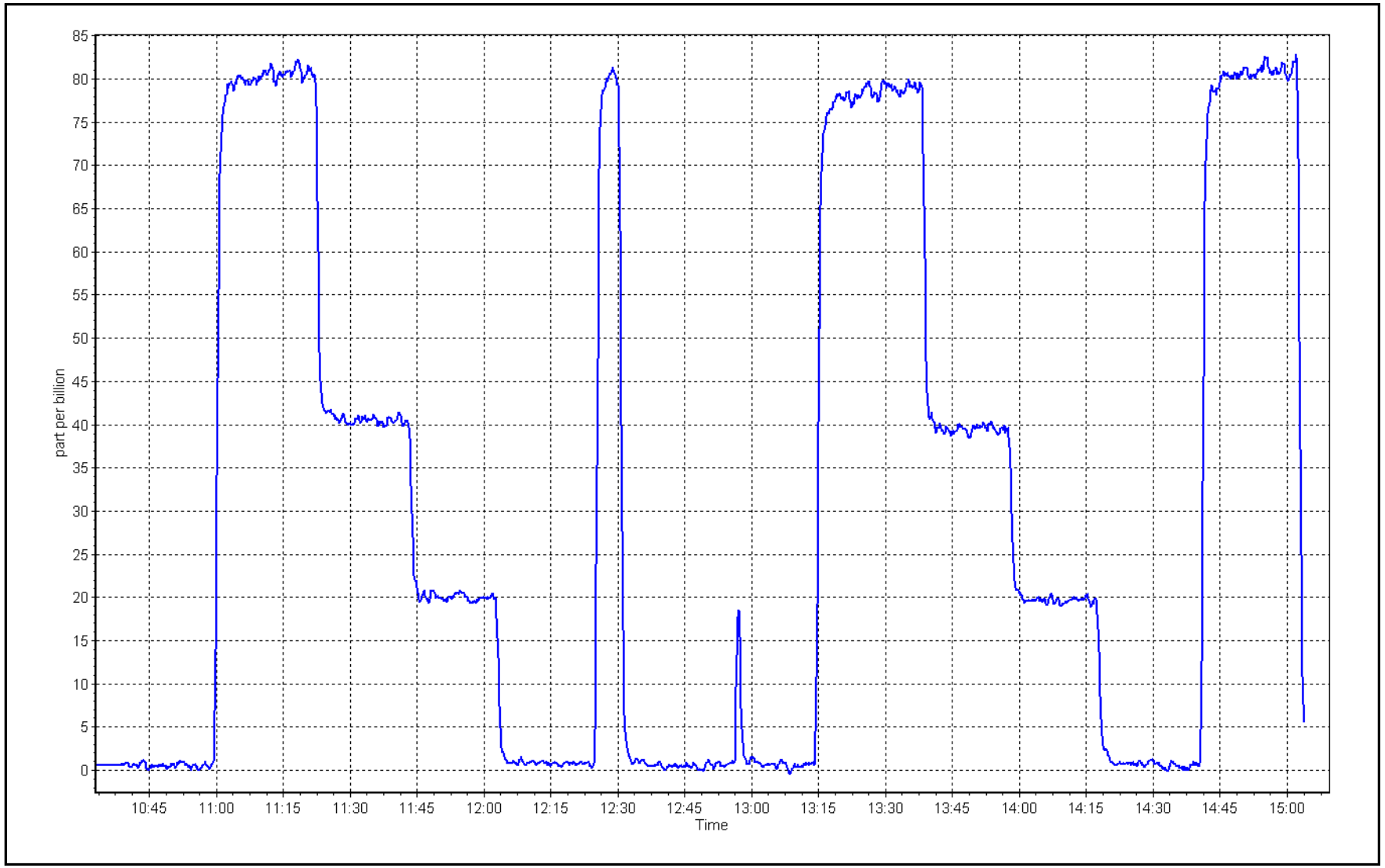
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.6	----
80.0	78.9	1.0140
40.0	39.6	1.0101
20.0	19.8	1.0078

Statistical Evaluation		Limits
Correlation Coefficient	0.999980	≥0.995
Slope	0.979904	0.90 - 1.10
Intercept	0.438608	+/-3



H_2S Calibration Plot Date: March 22, 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:	AMS 26
Calibration Date:	March 29, 2023	Last Cal Date:	February 16, 2023
Start time (MST):	10:57	End time (MST):	15:06
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2Y1P4C		Cal Gas Expiry Date:	November 12, 2023	
NOX Cal Gas Conc:	50.82	ppm	NO Cal Gas Conc:	50.02	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	50.82	ppm	Removed Gas NO Conc:	50.02	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	2447	
ZAG make/model:	API T701		Serial Number:	953	

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.713	1.713	NO bkgnd or offset:	2.8	2.9
NOX coeff or slope:	0.996	0.996	NOX bkgnd or offset:	2.9	2.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	191.9	191.9

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000661	0.989754
NO_X Cal Offset:	-1.500000	-1.920000
NO Cal Slope:	1.000043	0.990261
NO Cal Offset:	-2.080000	-2.780000
NO_2 Cal Slope:	1.003073	1.001972
NO_2 Cal Offset:	-0.020912	0.216428

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	----	----
as found span	4920	80.0	813.1	800.3	12.8	804.3	788.3	16.0	1.0110	1.0152
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	813.1	800.3	12.8	803.9	791.1	12.8	1.0115	1.0117
second point	4960	40.0	406.6	400.2	6.4	399.4	392.3	7.1	1.0179	1.0200
third point	4980	20.0	203.3	200.1	3.2	197.3	192.3	5.0	1.0303	1.0405
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.1	----	----
as left span	4920	80.0	813.1	398.4	414.7	807.0	389.8	417.0	1.0076	1.0221
								Average Correction Factor	1.0199	1.0240

Corrected As found	NO_X = 804.3 ppb	NO = 788.4 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-1.0%
Previous Response	NO_X = 812.2 ppb	NO = 798.3 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)	789.7	387.8	414.7	415.8	0.9974	100.3%
2nd GPT point (200 ppb O3)	789.7	595.4	207.1	207.3	0.9990	100.1%
3rd GPT point (100 ppb O3)	789.7	697.0	105.5	106.5	0.9906	100.9%
				Average Correction Factor	0.9957	100.4%

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

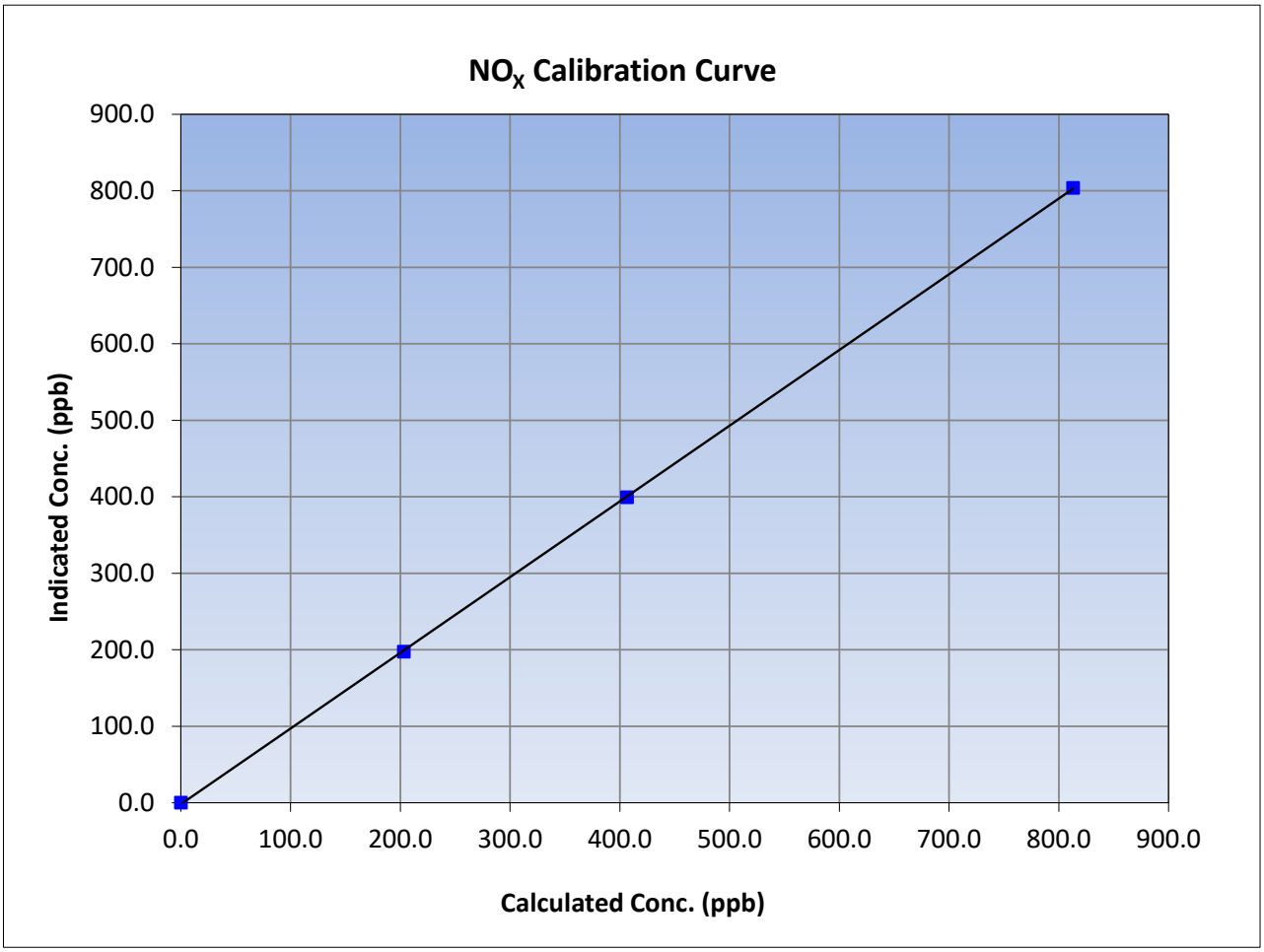
Version-04-2020

Station Information

Calibration Date:	March 29, 2023	Previous Calibration:	February 16, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	10:57	End Time (MST):	15:06
Analyzer make:	Thermo 42i	Analyzer serial #:	14:00

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999971	≥0.995
813.1	803.9	1.0115			
406.6	399.4	1.0179	Slope	0.989754	0.90 - 1.10
203.3	197.3	1.0303			
			Intercept	-1.920000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

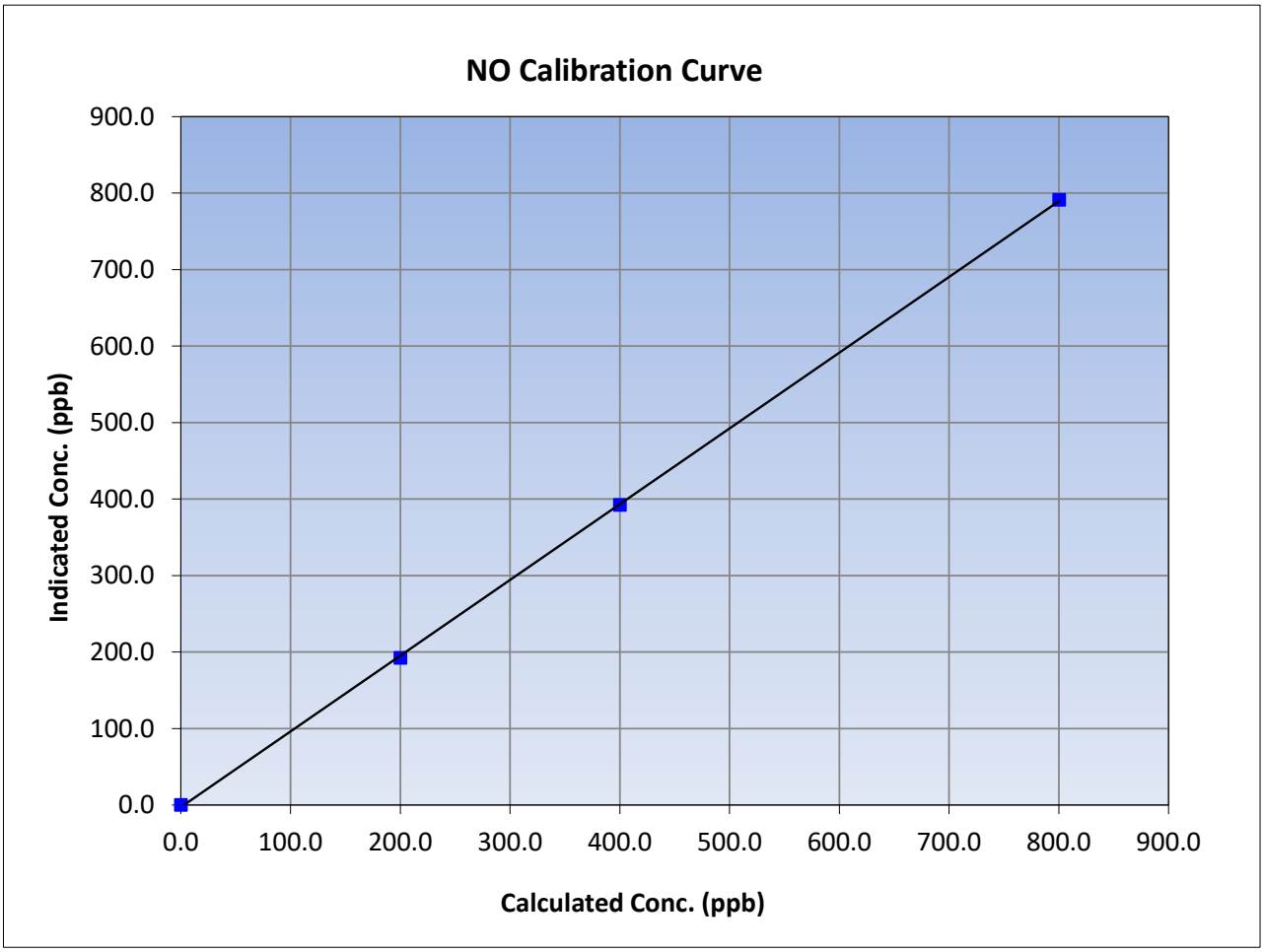
Version-04-2020

Station Information

Calibration Date:	March 29, 2023	Previous Calibration:	February 16, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	10:57	End Time (MST):	15:06
Analyzer make:	Thermo 42i	Analyzer serial #:	14:00

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.1	----	Correlation Coefficient	0.999939	*≥0.995*
800.3	791.1	1.0117			
400.2	392.3	1.0200	Slope	0.990261	*0.90 - 1.10*
200.1	192.3	1.0405			
			Intercept	-2.780000	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

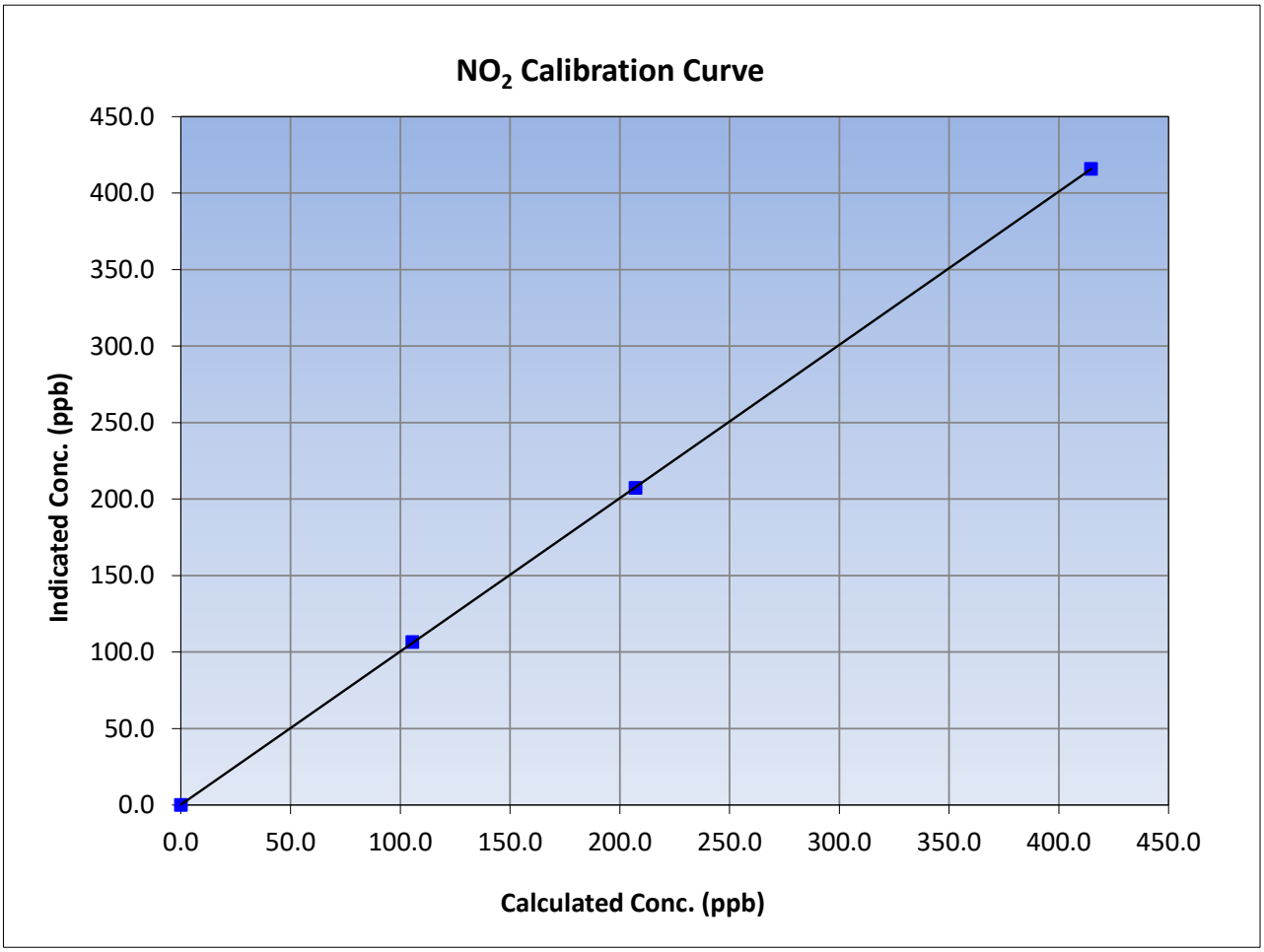
Version-04-2020

Station Information

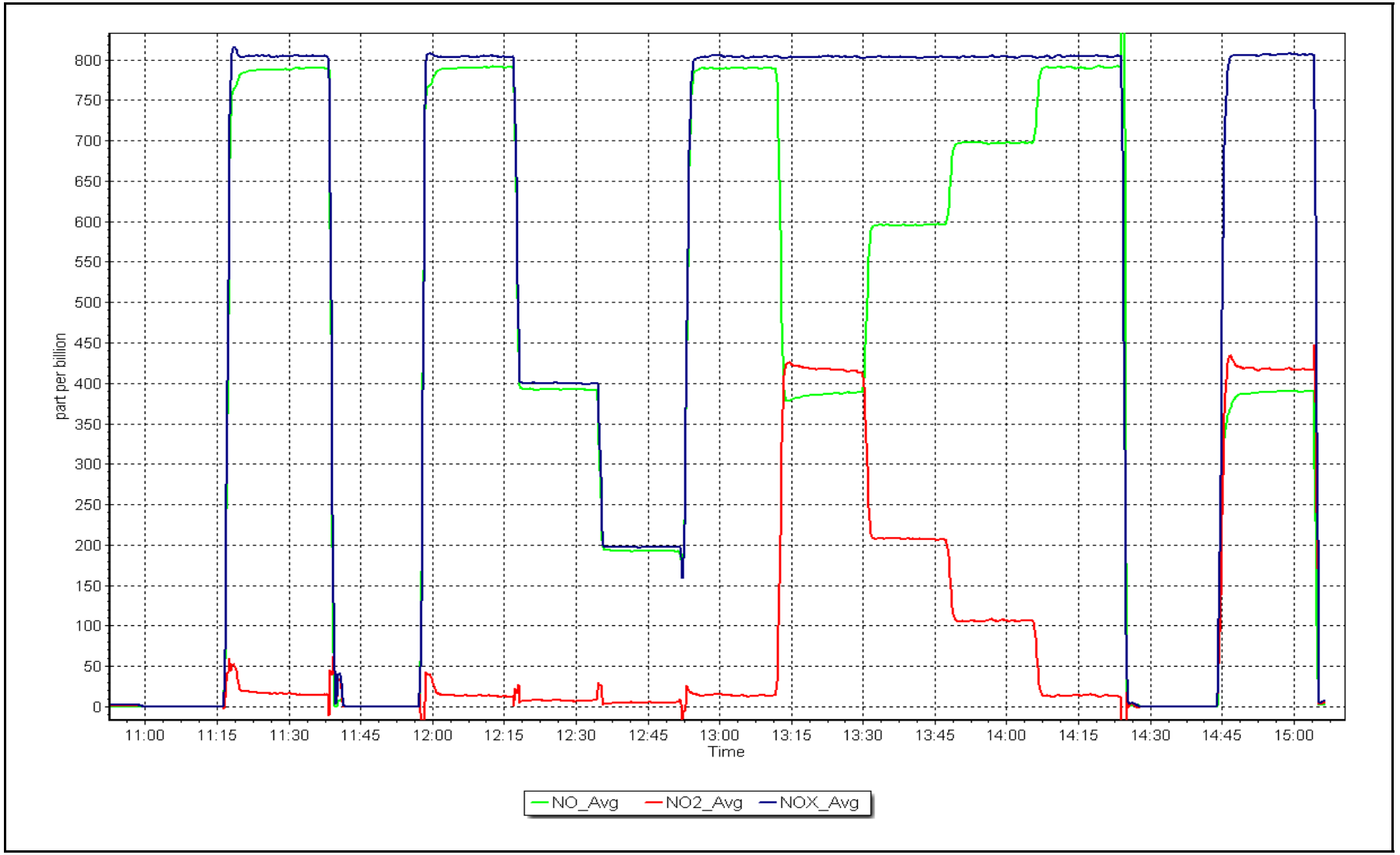
Calibration Date:	March 29, 2023	Previous Calibration:	February 16, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	10:57	End Time (MST):	15:06
Analyzer make:	Thermo 42i	Analyzer serial #:	14:00

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999994	≥0.995
414.7	415.8	0.9974			
207.1	207.3	0.9990	Slope	1.001972	0.90 - 1.10
105.5	106.5	0.9906			
			Intercept	0.216428	+/-20



NO_X Calibration Plot Date: March 29, 2023 Location: Christina Lake



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS27
JACKFISH 2/3
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Jackfish 2/3	Station number:	AMS 27
Calibration Date:	March 8, 2023	Last Cal Date:	February 14, 2023
Start time (MST):	10:52	End time (MST):	13:45
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 701H		Serial Number:	135

Analyzer Information

Analyzer make: Thero 43iQ — Analyzer serial #: 12124313138

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.001161	1.002034	Backgd or Offset:	7.4	7.8
Calibration intercept:	-1.757862	-2.538384	Coeff or Slope:	0.979	0.990

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	790.0	1.013
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4921	79.1	800.2	800.5	1.000
second point	4961	39.5	399.5	396.6	1.007
third point	4980	19.8	200.3	195.6	1.024
as left zero	5000	0.0	0.0	0.2	----
as left span	4921	79.1	800.2	800.2	1.000
				Average Correction Factor	1.010

Baseline Corr As found:	789.80	Previous response	799.33	*% change	-1.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Adjusted both zero & span.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

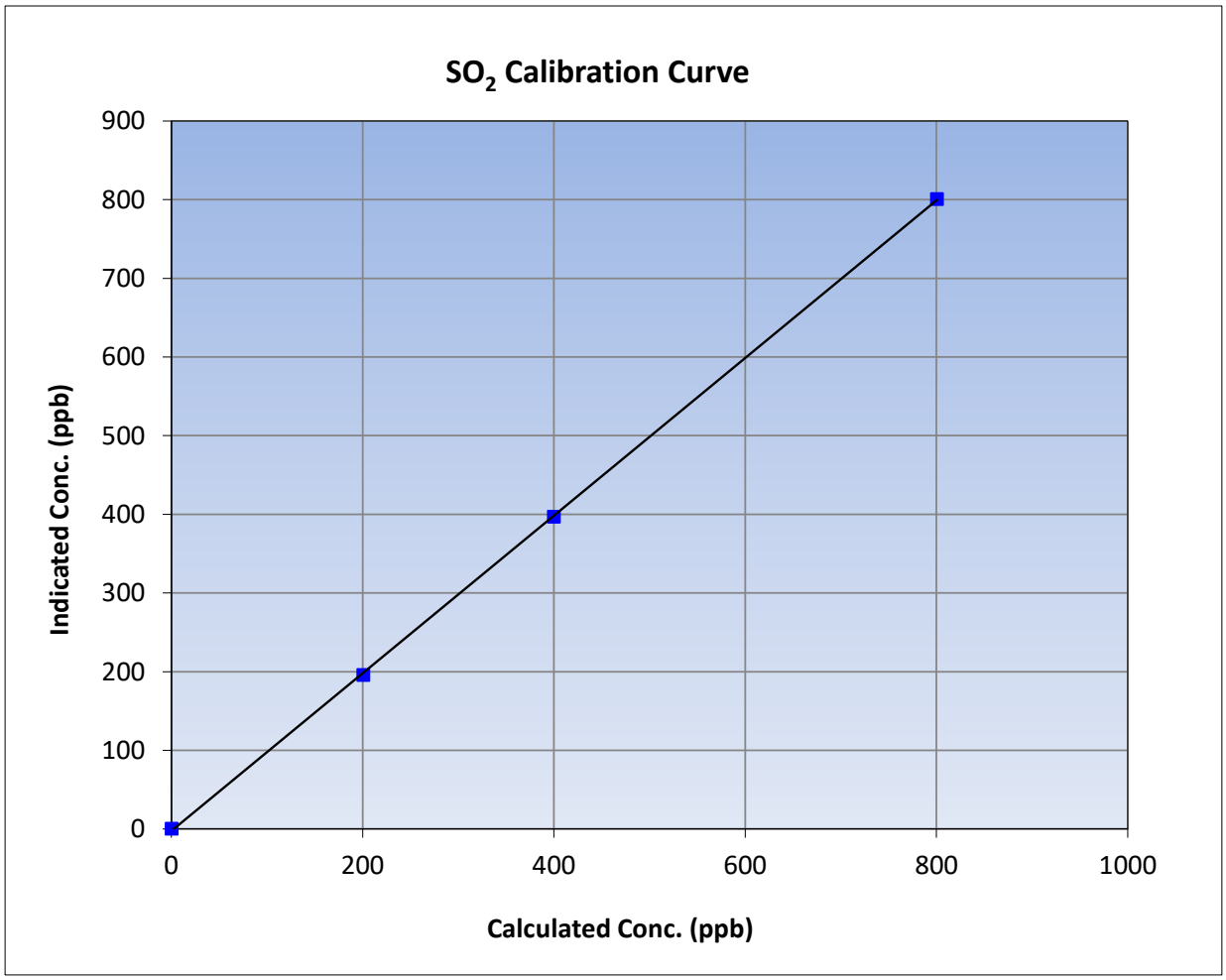
Station Information

Calibration Date:	March 8, 2023	Previous Calibration:	February 14, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS 27
Start Time (MST):	10:52	End Time (MST):	13:45
Analyzer make:	Thero 43iQ	Analyzer serial #:	12124313138

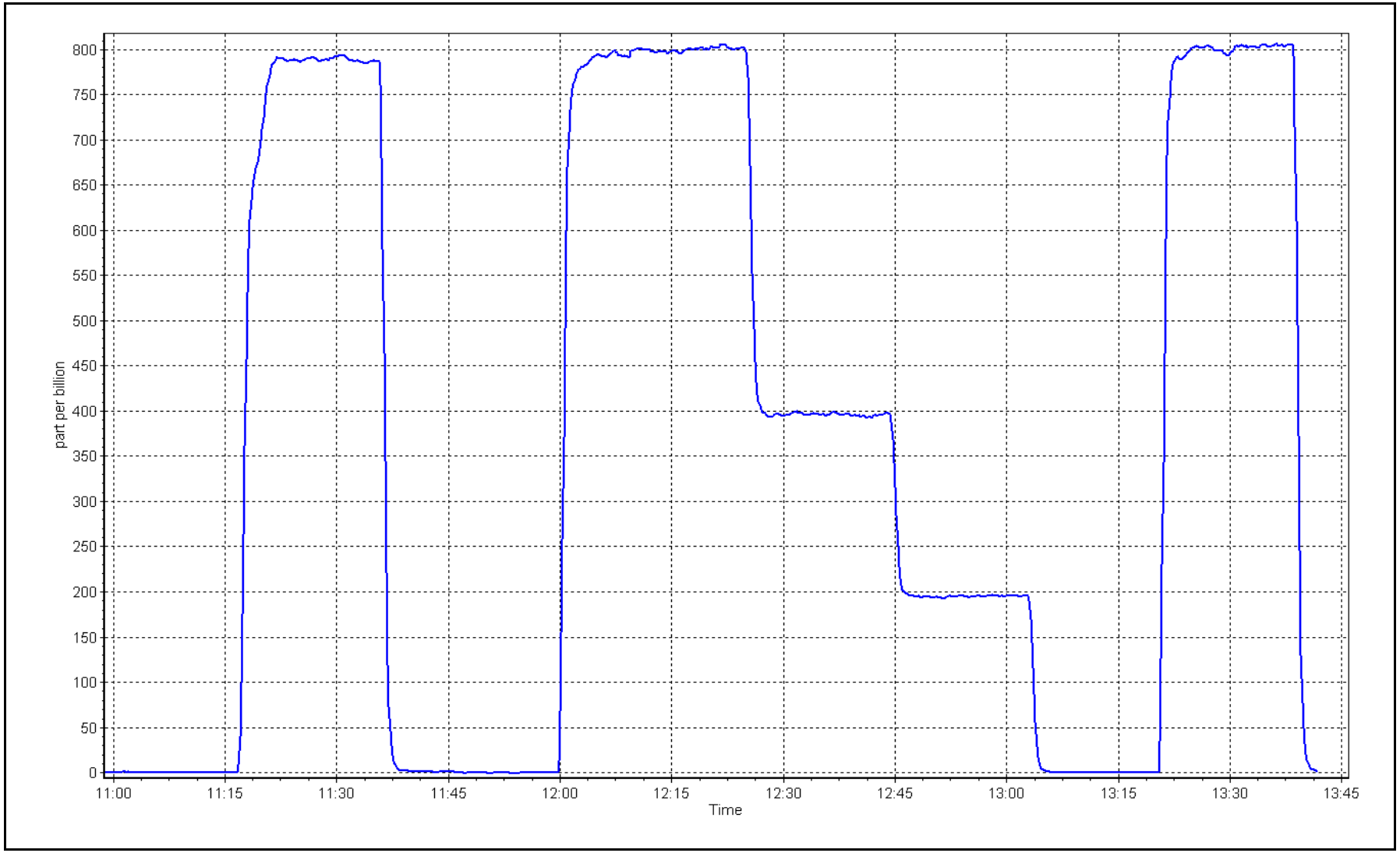
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
800.2	800.5	0.9996
399.5	396.6	1.0074
200.3	195.6	1.0241

Statistical Evaluation		Limits
Correlation Coefficient	0.999954	≥0.995
Slope	1.002034	0.90 - 1.10
Intercept	-2.538384	+/-30



SO2 Calibration Plot Date: March 8, 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:	March 23, 2023	Last Cal Date:	February 7, 2023
Start time (MST):	9:29	End time (MST):	13:37
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 701H		Serial Number:	135

Analyzer Information

Analyzer make:	API T101		Analyzer serial #:	621	
Converter make:			Converter serial #:		
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000628	0.983812	Backgd or Offset:	25.4	25.4
Calibration intercept:	-0.177928	-0.138417	Coeff or Slope:	0.949	0.949

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4926	74.1	80.2	80.4	0.998
as found 2nd point	4963	37.0	40.0	39.9	1.006
as found 3rd point	4982	18.5	20.0	19.5	1.032
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4926	74.1	80.2	78.9	1.016
second point	4963	37.0	40.0	39.1	1.024
third point	4982	18.5	20.0	19.2	1.042
as left zero	5000	0.0	0.0	0.2	----
as left span	4926	74.1	80.2	79.0	1.015
SO2 Scrubber Check	4921	79.1	791.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.027
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.3	Prev response:	80.05	*% change:	0.3%
Baseline Corr 2nd AF pt:	39.8	AF Slope:	1.003909	AF Intercept:	-0.217940
Baseline Corr 3rd AF pt:	19.4	AF Correlation:	0.999925		

* = > +/-5% change initiates investigation

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

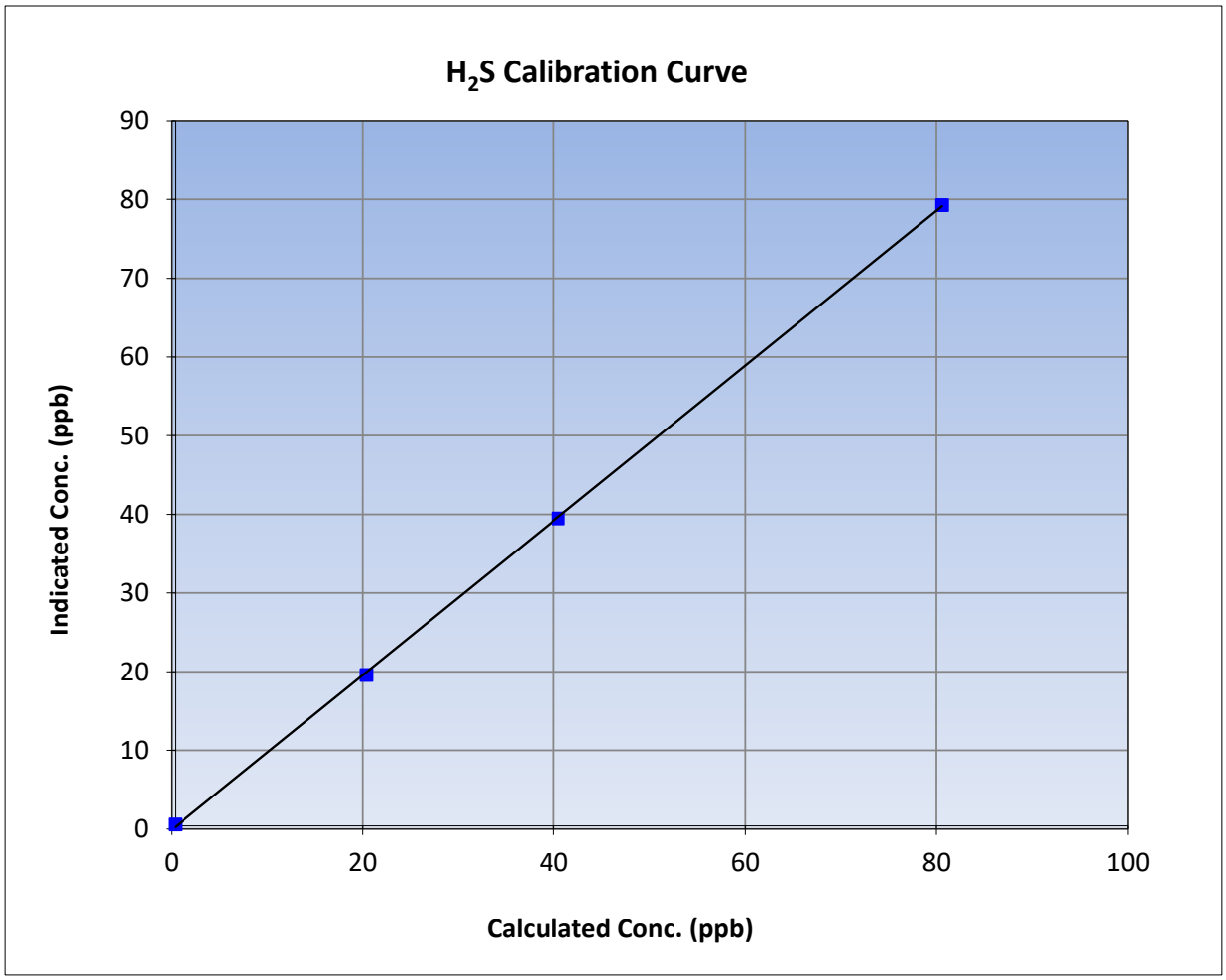
Station Information

Calibration Date:	March 23, 2023	Previous Calibration:	February 7, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:29	End Time (MST):	13:37
Analyzer make:	API T101	Analyzer serial #:	621

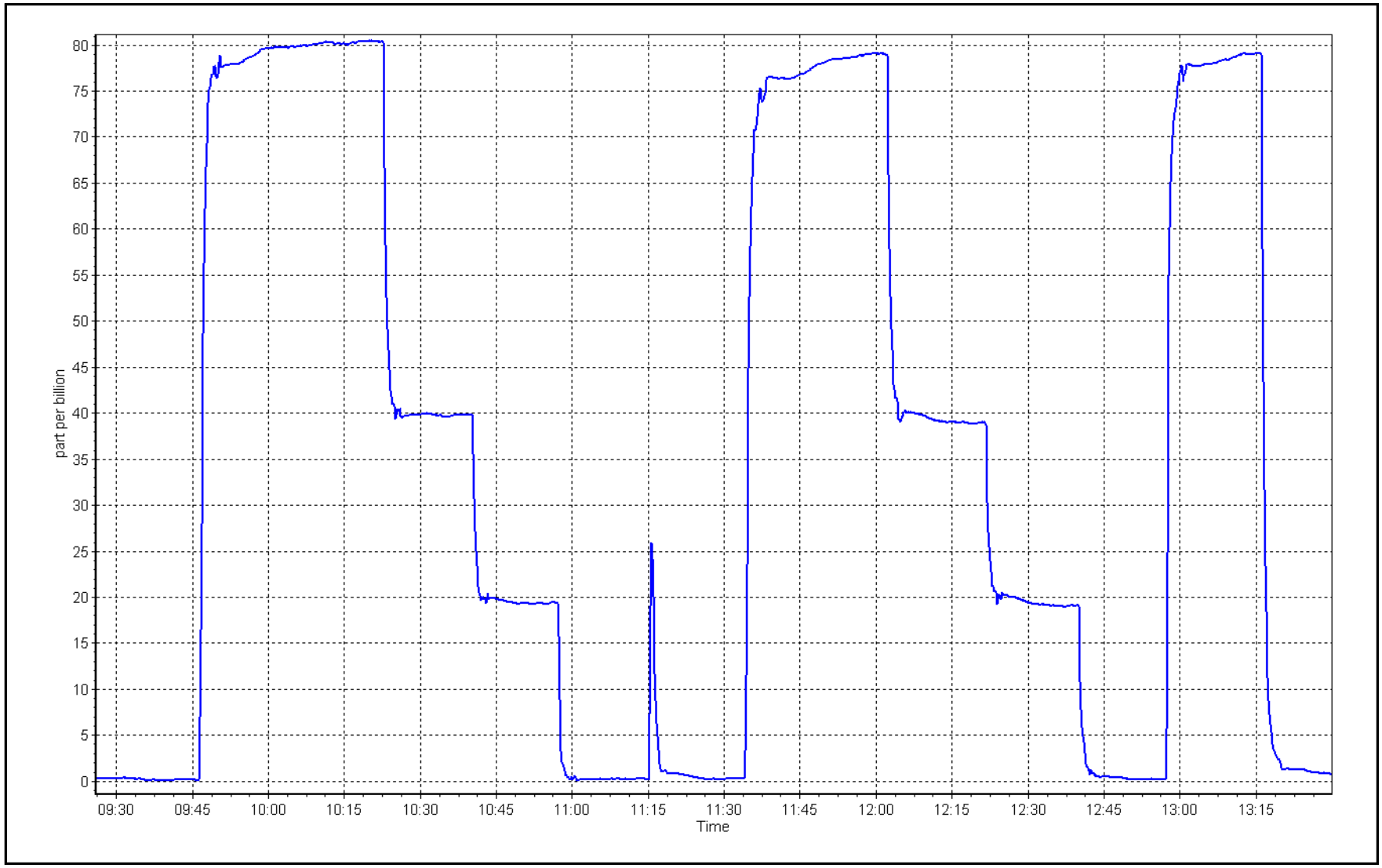
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.2	78.9	1.0162
40.0	39.1	1.0239
20.0	19.2	1.0424

Statistical Evaluation		Limits
Correlation Coefficient	0.999916	≥0.995
Slope	0.983812	0.90 - 1.10
Intercept	-0.138417	+/-3



H_2S Calibration Plot Date: March 23, 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:	March 28, 2023	Last Cal Date:	February 22, 2023
Start time (MST):	9:45	End time (MST):	13:50
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 T701H		Serial Number:	135	

Analyzer Information

Analyzer make:	API T200	Analyzer serial #:	4460
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.241	1.241	NO bkgnd or offset:	0.9	0.9
NOX coeff or slope:	1.228	1.228	NOX bkgnd or offset:	0.9	0.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	4.4	4.4

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.998669	0.998179
NO_X Cal Offset:	-3.017307	-4.217263
NO Cal Slope:	1.000287	0.998789
NO Cal Offset:	-2.020303	-3.720948
NO_2 Cal Slope:	0.990573	0.995821
NO_2 Cal Offset:	-1.100427	-0.727241

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.0	-0.2	0.2	----	----
as found span	4921	79.4	816.8	800.3	16.5	810.0	796.9	13.2	1.0084	1.0043
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	4921	79.4	816.8	800.3	16.5	813.6	797.5	16.1	1.0039	1.0035
second point	4960	39.7	408.5	400.2	8.3	400.2	393.9	6.2	1.0206	1.0160
third point	4980	19.8	203.7	199.6	4.1	195.7	192.2	3.5	1.0409	1.0385
as left zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.3	-0.2	----	----
as left span	4921	79.4	816.8	412.5	417.7	807.6	403.3	404.3	1.0114	1.0228
								Average Correction Factor	1.0218	1.0193

Corrected As found	NO_X = 810.0 ppb	NO = 797.1 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -0.3%
Previous Response	NO_X = 812.7 ppb	NO = 798.5 ppb		*Percent Change	NO = -0.2%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	796.1	394.9	417.7	414.9	1.0068	99.3%
2nd GPT point (200 ppb O3)	796.1	609.4	203.2	203.6	0.9981	100.2%
3rd GPT point (100 ppb O3)	796.1	707.9	104.7	101.1	1.0357	96.5%
				Average Correction Factor	1.0135	98.7%

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

NO_X Calibration Summary

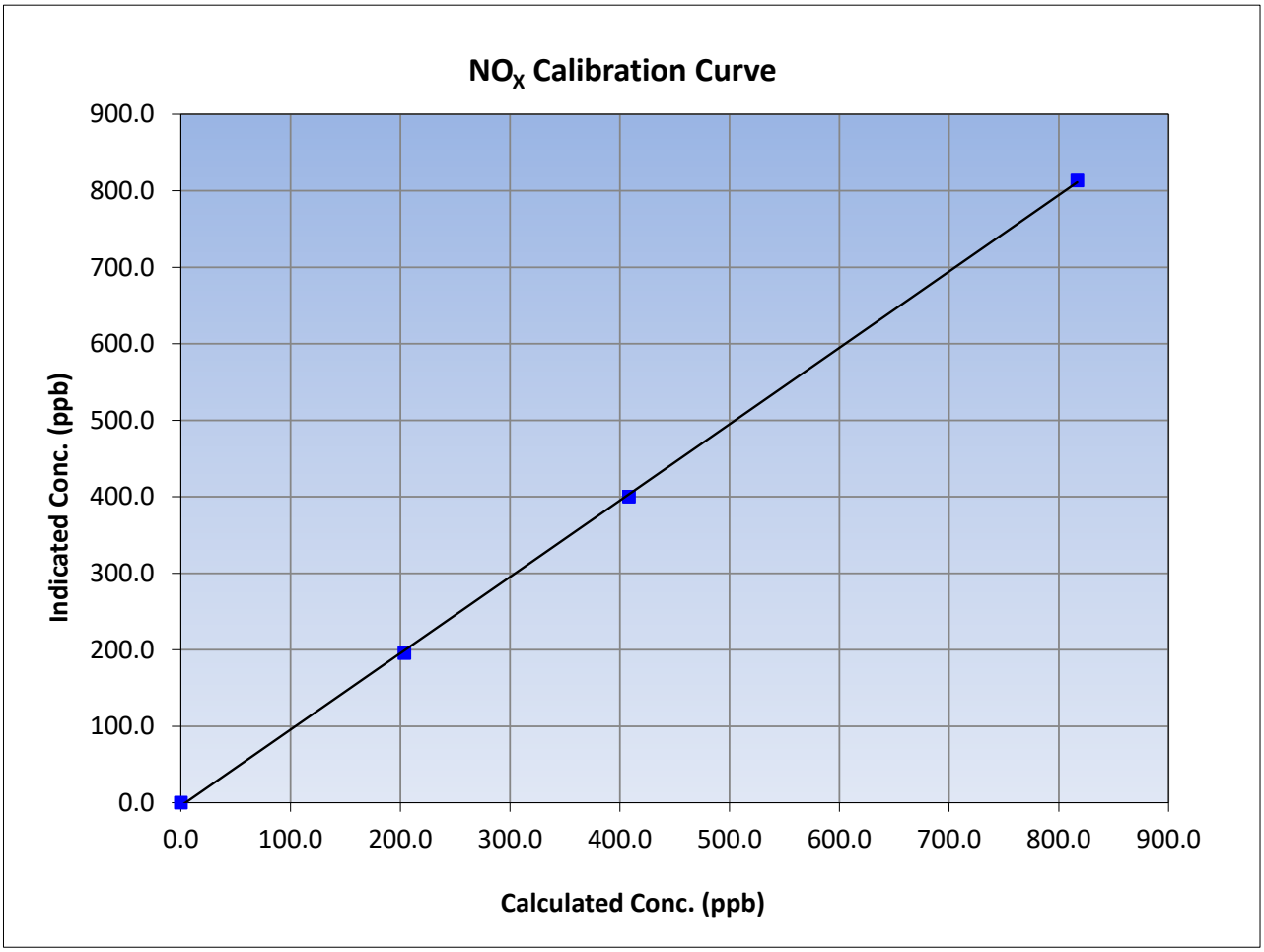
Version-04-2020

Station Information

Calibration Date:	March 28, 2023	Previous Calibration:	February 22, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:45	End Time (MST):	13:50
Analyzer make:	API T200	Analyzer serial #:	4460

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999872	≥0.995
816.8	813.6	1.0039			
408.5	400.2	1.0206	Slope	0.998179	0.90 - 1.10
203.7	195.7	1.0409			
			Intercept	-4.217263	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

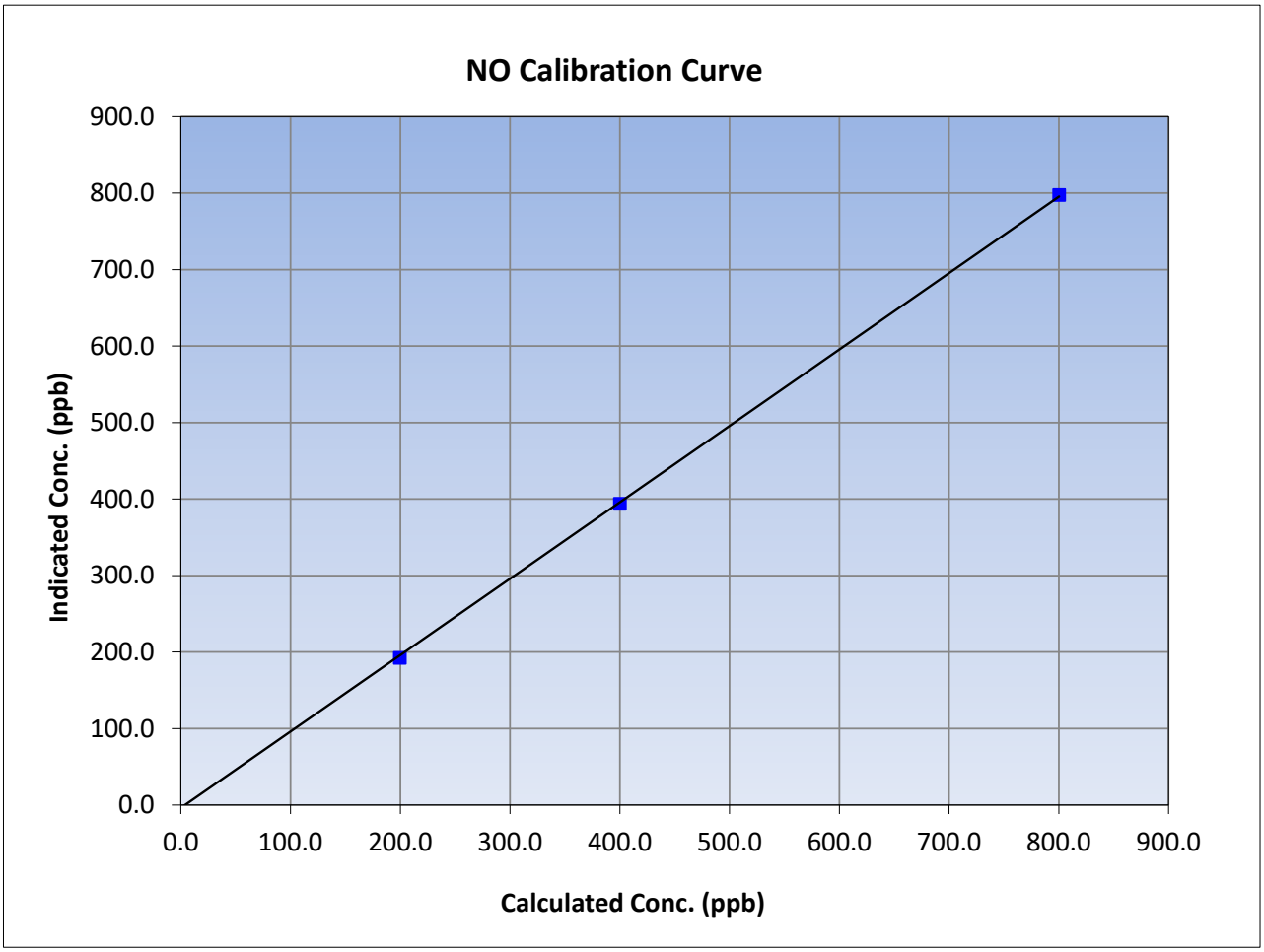
Version-04-2020

Station Information

Calibration Date:	March 28, 2023	Previous Calibration:	February 22, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:45	End Time (MST):	13:50
Analyzer make:	API T200	Analyzer serial #:	4460

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999906	≥0.995
800.3	797.5	1.0035			
400.2	393.9	1.0160	Slope	0.998789	0.90 - 1.10
199.6	192.2	1.0385			
			Intercept	-3.720948	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

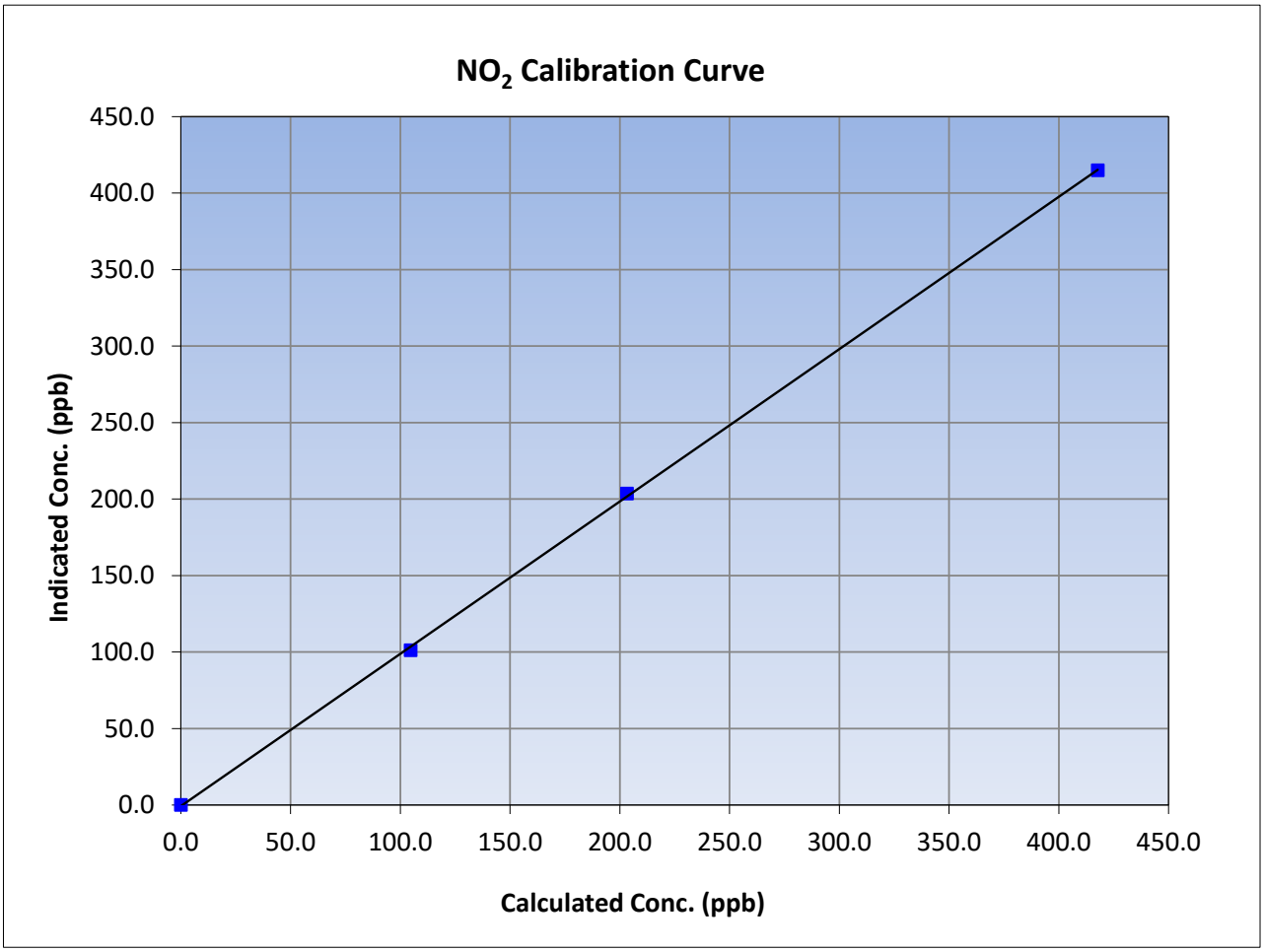
Version-04-2020

Station Information

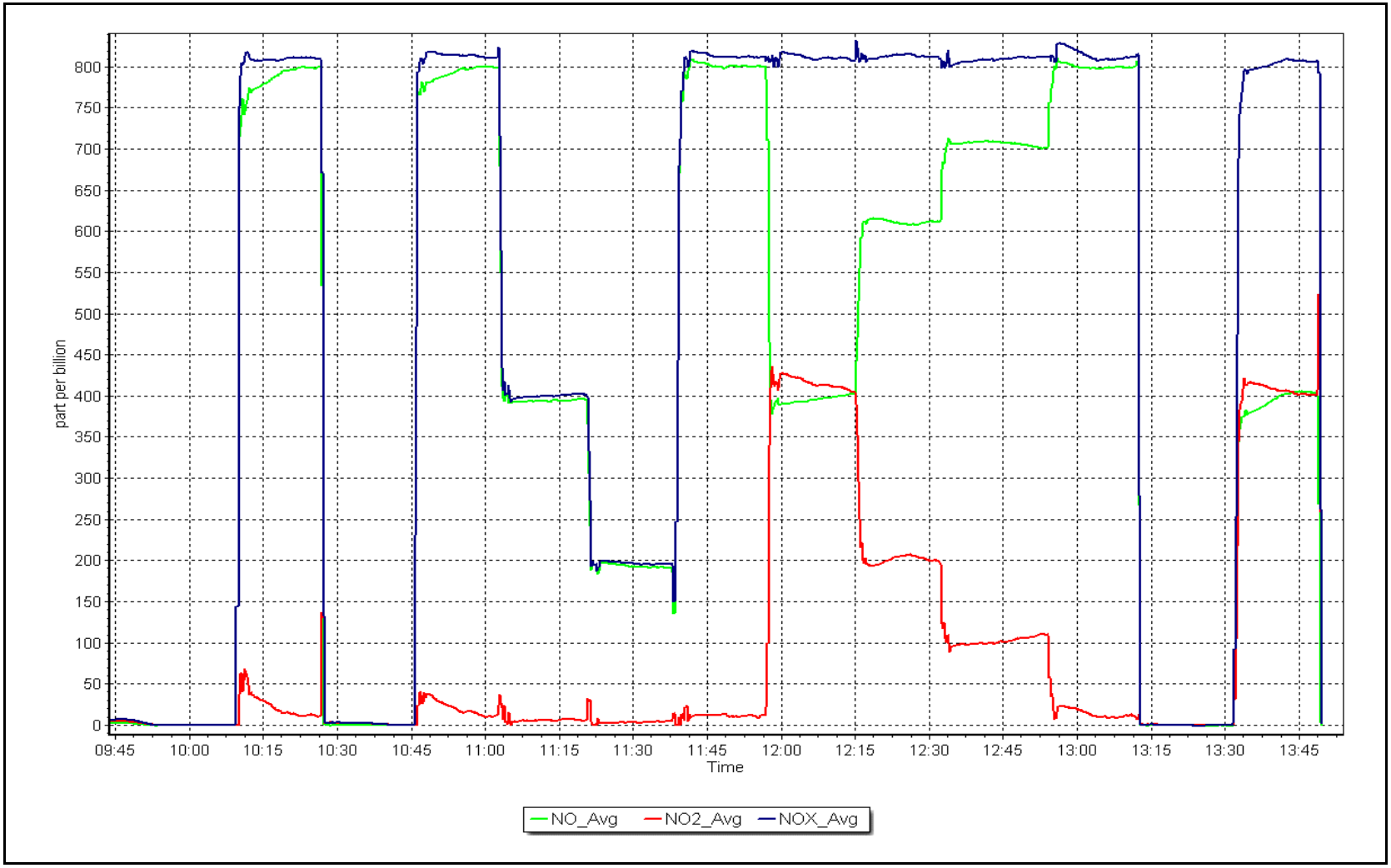
Calibration Date:	March 28, 2023	Previous Calibration:	February 22, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:45	End Time (MST):	13:50
Analyzer make:	API T200	Analyzer serial #:	4460

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999887	≥0.995
417.7	414.9	1.0068			
203.2	203.6	0.9981	Slope	0.995821	0.90 - 1.10
104.7	101.1	1.0357			
			Intercept	-0.727241	+/-20



NO_X Calibration Plot Date: March 28, 2023 Location: Jackfish 2/3



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS29
SURMONT 2
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	March 13, 2023	Last Cal Date:	February 16, 2023
Start time (MST):	10:09	End time (MST):	13:27
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:	5258
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:	0.999443	1.006112	Backgd or Offset:	12.5	12.4
Calibration intercept:	-2.985140	-2.145180	Coeff or Slope:	0.934	0.934

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	800.1	798.8	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.3	----
high point	4919	81.3	800.1	804.0	0.995
second point	4959	40.7	400.6	399.3	1.003
third point	4979	20.3	199.8	197.5	1.012
as left zero	5000	0.0	0.0	0.0	----
as left span	4919	81.3	800.1	803.0	0.996
				Average Correction Factor	1.003

Baseline Corr As found:	799.30	Previous response	796.68	*% 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

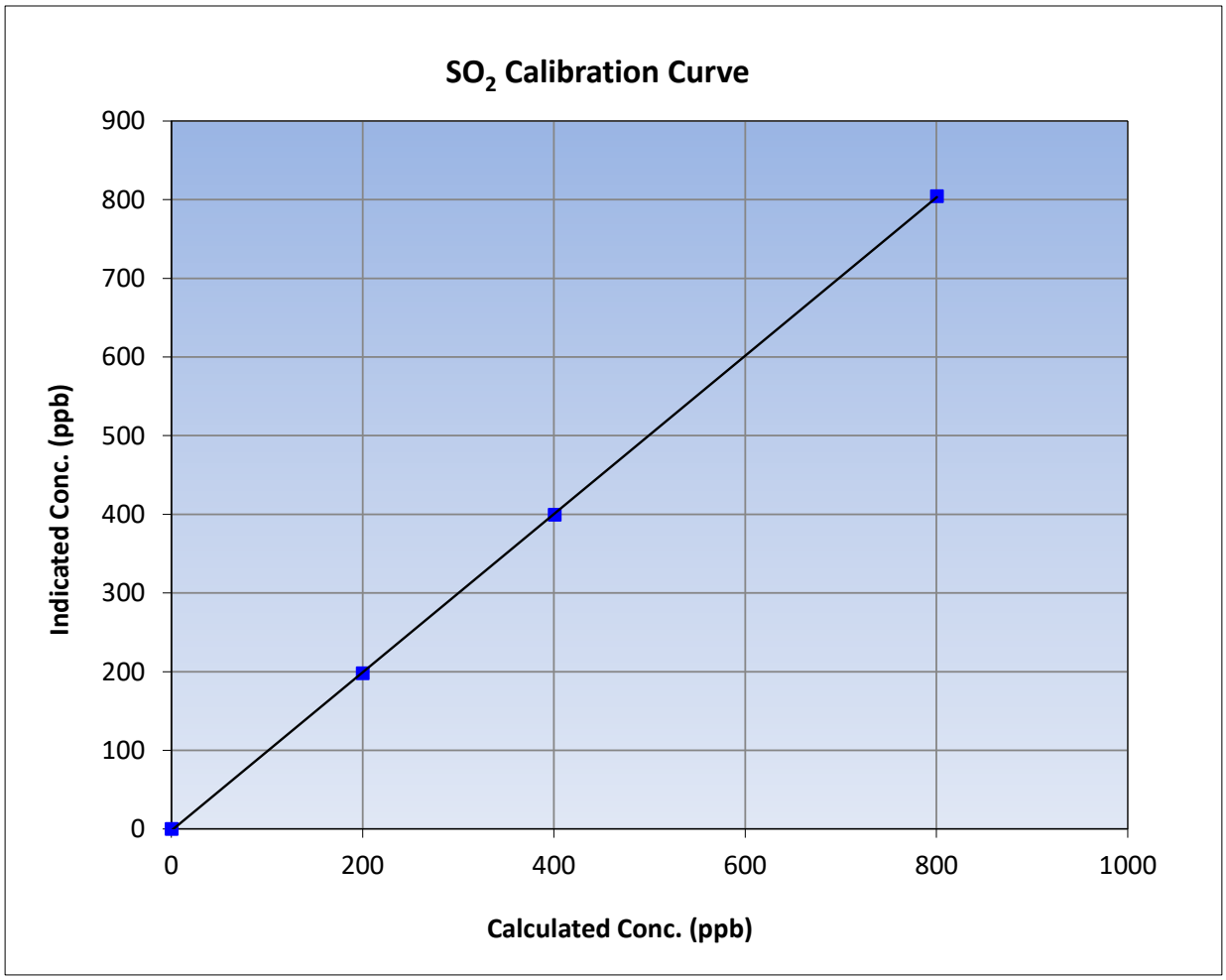
Station Information

Calibration Date:	March 13, 2023	Previous Calibration:	February 16, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:09	End Time (MST):	13:27
Analyzer make:	Thermo 43i	Analyzer serial #:	1170050150

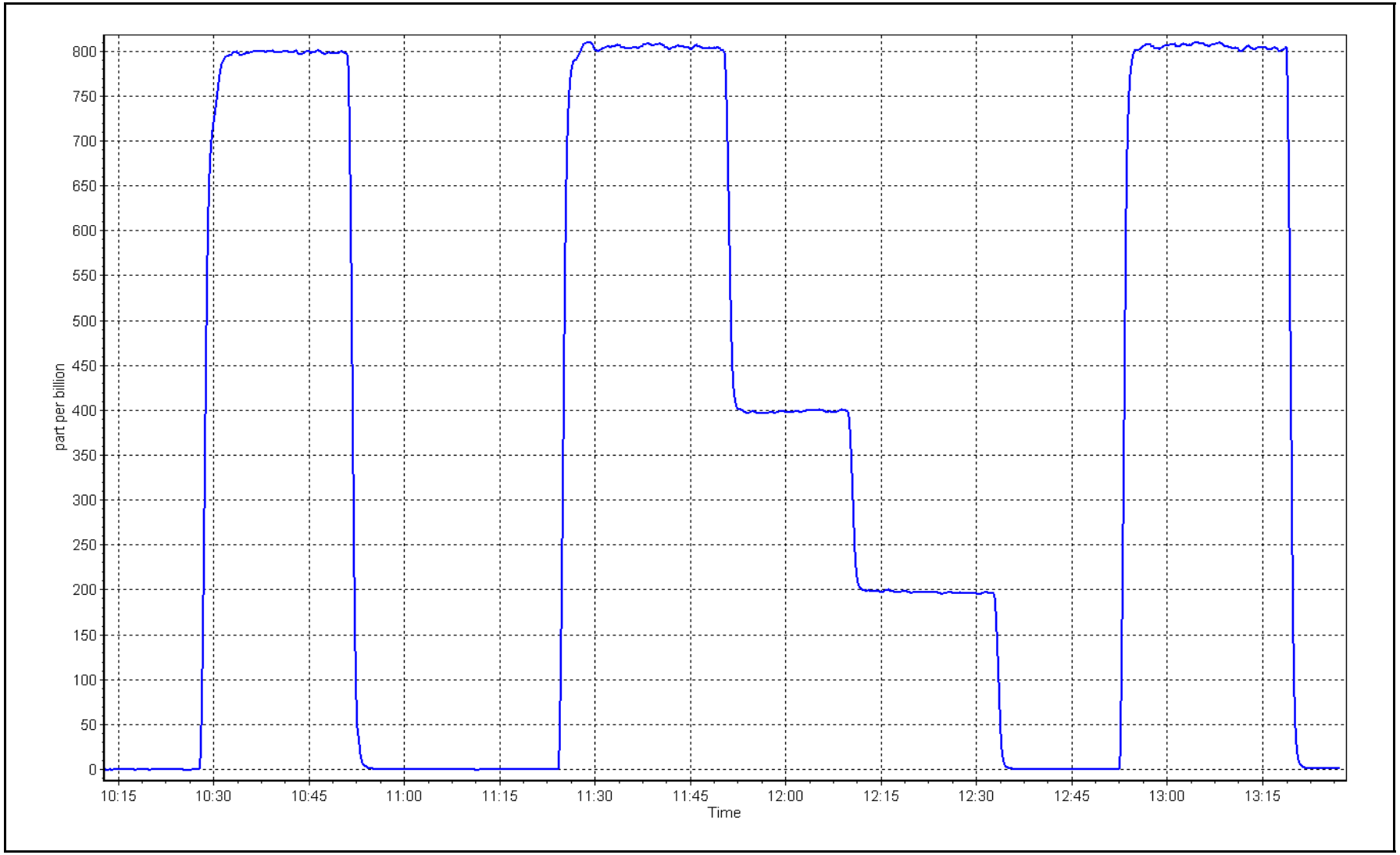
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
800.1	804.0	0.9952
400.6	399.3	1.0032
199.8	197.5	1.0117

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999974	*≥0.995*
Slope	1.006112	*0.90 - 1.10*
Intercept	-2.145180	*+/-30*



SO2 Calibration Plot Date: March 13, 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:	March 13, 2023	Last Cal Date:	February 16, 2023
Start time (MST):	10:09	End time (MST):	13:27
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:	5258	
ZAG Make/Model:	Teledyne API T701		Serial Number:	4297	

Analyzer Information

Analyzer make:	Thermo 51i-LT		Analyzer serial #:	1170050149	
Analyzer Range:	0 - 20 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.995950	1.008880	Background:	4.36	4.62
Calibration intercept:	0.026135	-0.118074	Coefficient:	5.223	5.286

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	0.11	----
as found span	4918	81.3	17.31	17.22	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.06	----
high point	4918	81.3	17.31	17.37	0.997
second point	4959	40.7	8.67	8.62	1.005
third point	4979	20.3	4.32	4.17	1.036
as left zero	5000	0.0	0.00	-0.17	----
as left span	4918	81.3	17.31	17.40	0.995
				Average Correction Factor	1.013

Baseline Corr As found:	17.11	Previous response	17.27	*% change	-1.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

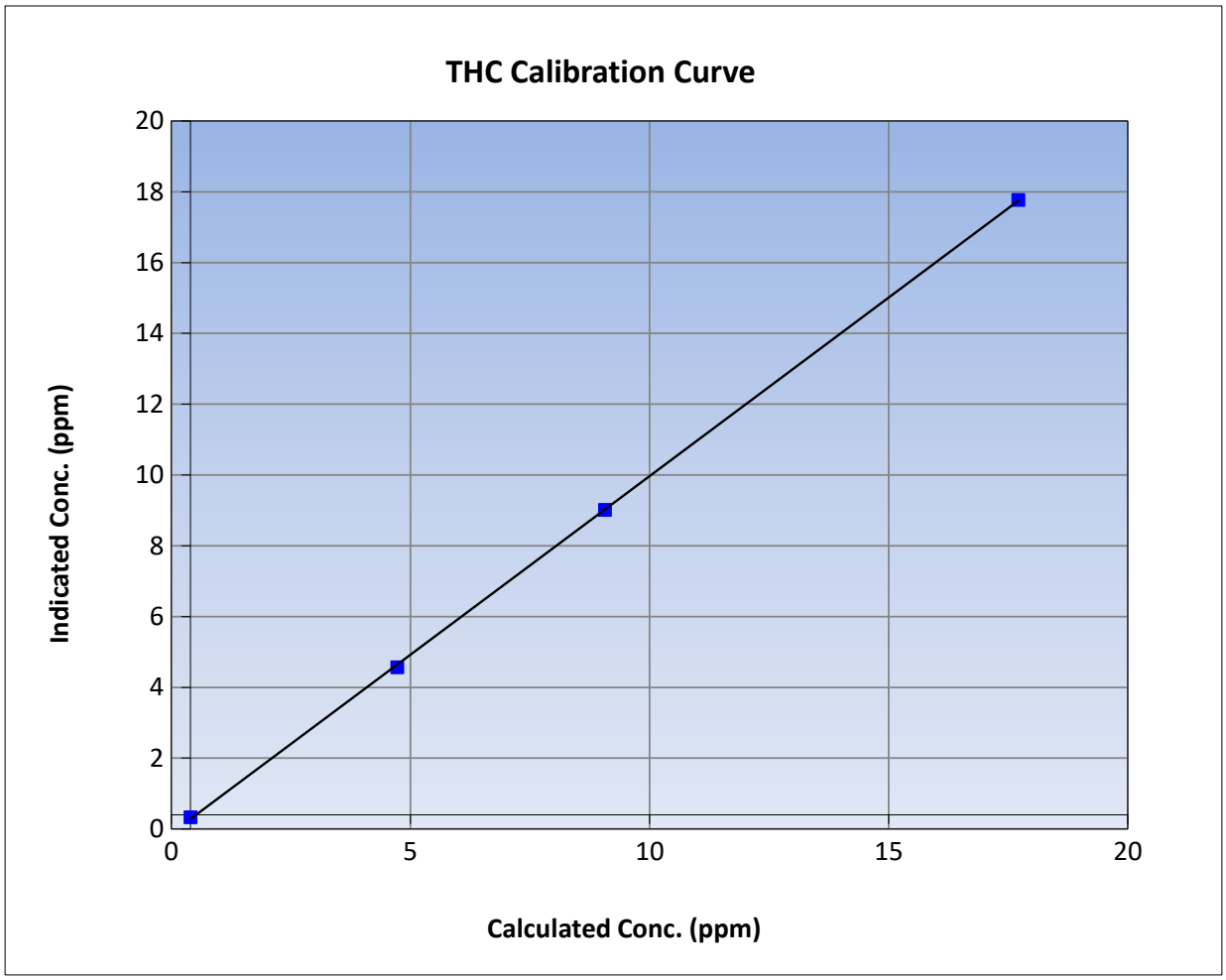
Station Information

Calibration Date:	March 13, 2023	Previous Calibration:	February 16, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:09	End Time (MST):	13:27
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1170050149

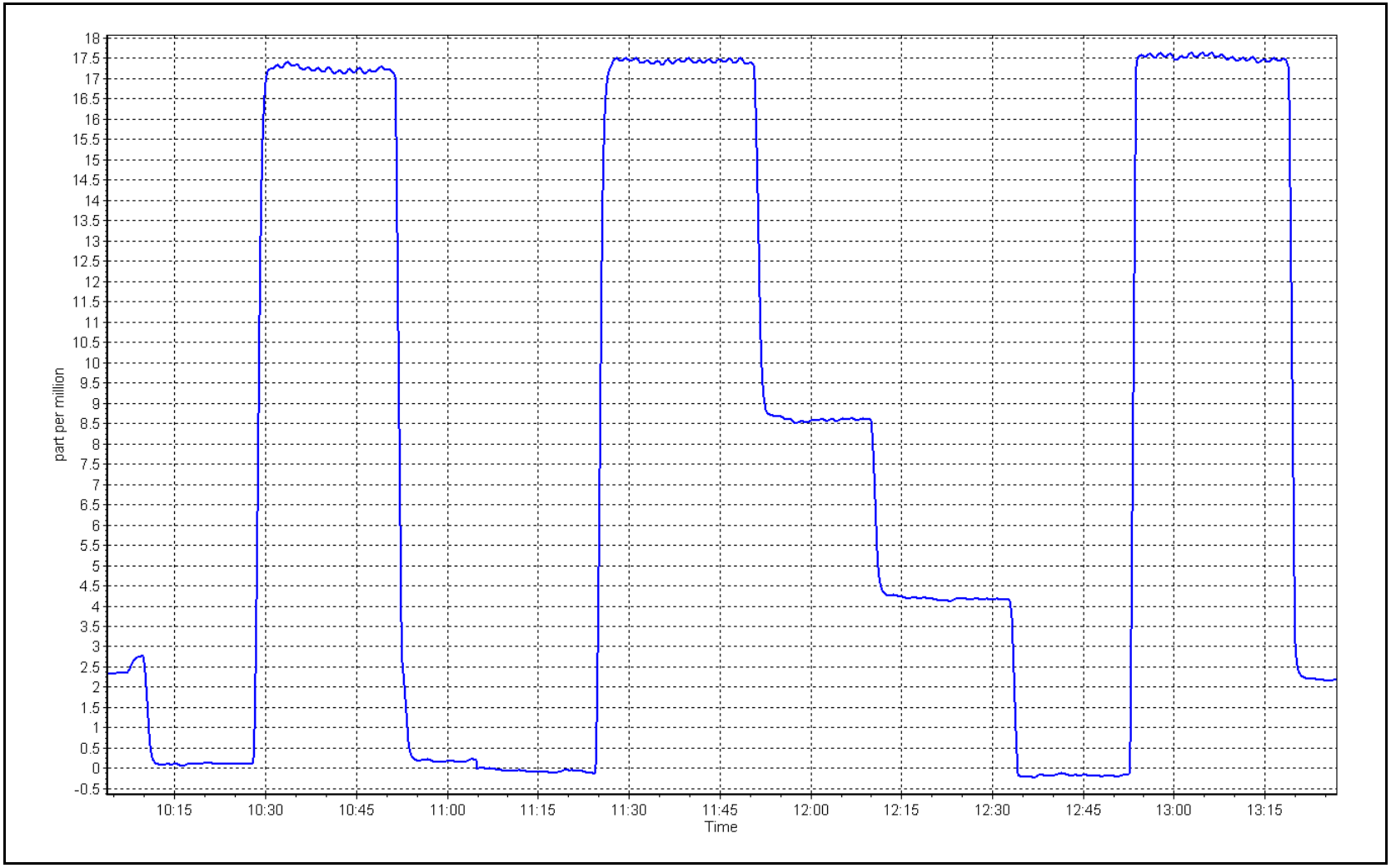
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.06	----
17.31	17.37	0.9968
8.67	8.62	1.0054
4.32	4.17	1.0357

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999950	*≥0.995*
Slope	1.008880	*0.90 - 1.10*
Intercept	-0.118074	*+/-1.5*



THC Calibration Plot Date: March 13, 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:	March 29, 2023	Last Cal Date:	February 13, 2023
Start time (MST):	10:05	End time (MST):	12:20
Reason:	Removal		

Calibration Standards

Cal Gas Concentration:	5.391	ppm	Cal Gas Exp Date:	January 4, 2025
Cal Gas Cylinder #:	CC508338			
Removed Cal Gas Conc:	5.391	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	CC508338		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5258
ZAG Make/Model:	Teledyne API T701		Serial Number:	4297

Analyzer Information

Analyzer make:	Thermo 450i		Analyzer serial #:	1170050142
Converter make:	Internal		Converter serial #:	NA
Analyzer Range	0 - 100 ppb			

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.994905		Backgd or Offset:	17.0	17.0
Calibration intercept:	-0.062658		Coeff or Slope:	1.024	1.024

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.2	----
as found span	4926	74.2	80.0	83.0	0.962
as found 2nd point	4963	37.2	40.1	41.5	0.962
as found 3rd point	4982	18.6	20.1	20.3	0.978
new cylinder response					

H_2S Calibration Data

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

Date of last scrubber change:	15-Apr-21	Ave Corr Factor	
Date of last converter efficiency test:			efficiency

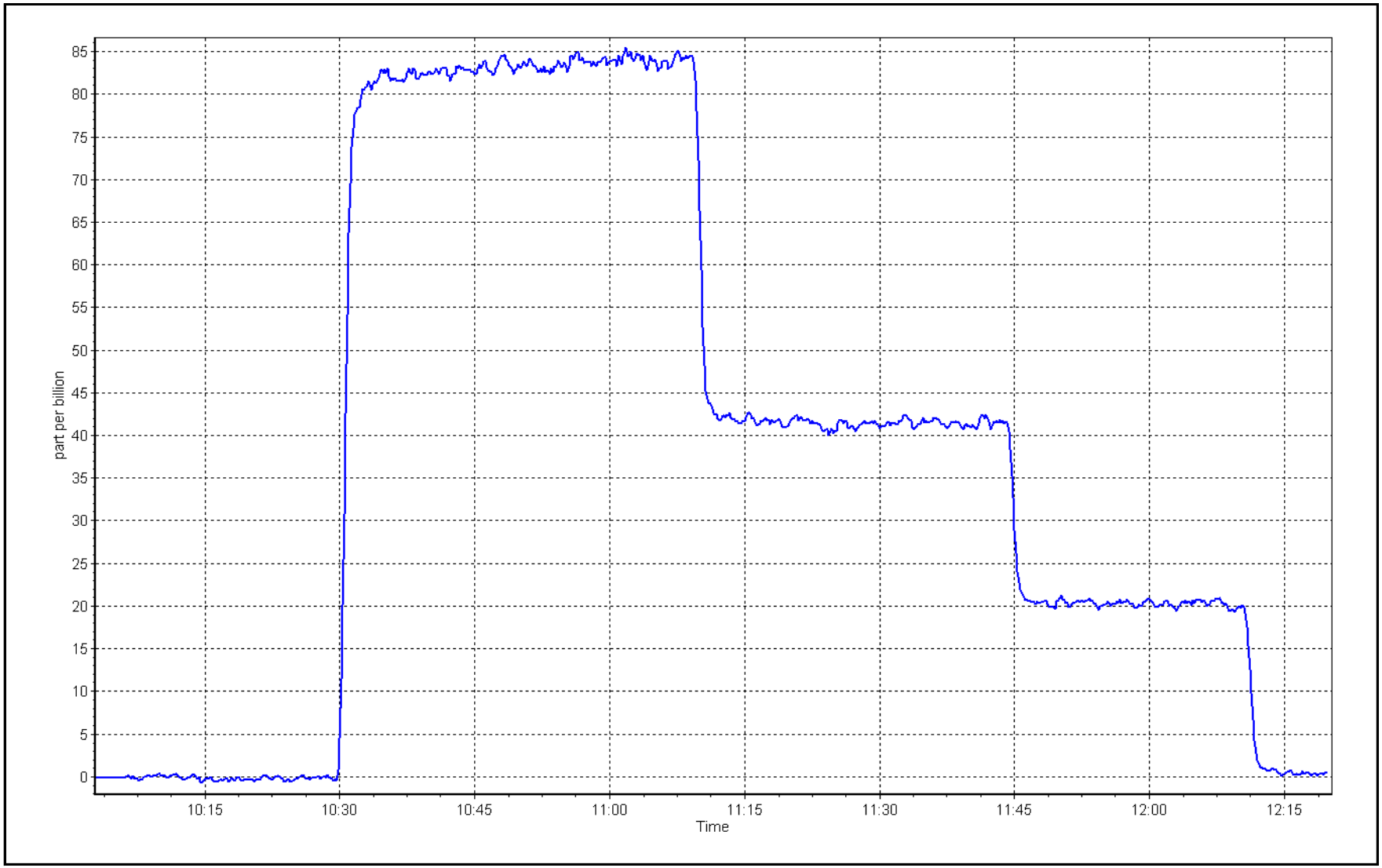
Baseline Corr As found:	83.2	Prev response:	79.53	*% change:	4.4%
Baseline Corr 2nd AF pt:	41.7	AF Slope:	1.041475	AF Intercept:	-0.344531
Baseline Corr 3rd AF pt:	20.5	AF Correlation:	0.999978		

* = > +/-5% change initiates investigation

Notes: As founds done in preparation to swap the 450i with a 43iQ-TLE with an external converter.

Calibration Performed By: Braiden Boutilier

H_2S Calibration Plot Date: March 29, 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:	March 30, 2023	Last Cal Date:	March 29, 2023
Start time (MST):	9:33	End time (MST):	15:27
Reason:	Install		

Calibration Standards

Cal Gas Concentration:	5.391	ppm	Cal Gas Exp Date:	January 4, 2025
Cal Gas Cylinder #:	CC508338			
Removed Cal Gas Conc:	5.391	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	CC508338		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5258
ZAG Make/Model:	Teledyne API T701		Serial Number:	4297

Analyzer Information

Analyzer make:	Thermo 43iQ-TLE		Analyzer serial #:	1200326170	
Converter make:	Global		Converter serial #:	2022-223	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:		1.002040	Backgd or Offset:		1.22
Calibration intercept:		-0.162687	Coeff or Slope:		1.043

H_2S As Found Data

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

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4926	74.2	80.0	80.1	0.999
second point	4963	37.2	40.1	39.9	1.005
third point	4982	18.6	20.1	19.8	1.013
as left zero	5000	0.0	0.0	0.0	----
as left span	4926	74.2	80.0	80.4	0.995
SO2 Scrubber Check	4919	81.3	813.0	0.0	----
Date of last scrubber change:		30-Mar-23		Ave Corr Factor	1.006
Date of last converter efficiency test:					efficiency

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

* = > +/-5% change initiates investigation

Notes: Install calibration. Swapped the 450i with a 43iQ-TLE and external global converter. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

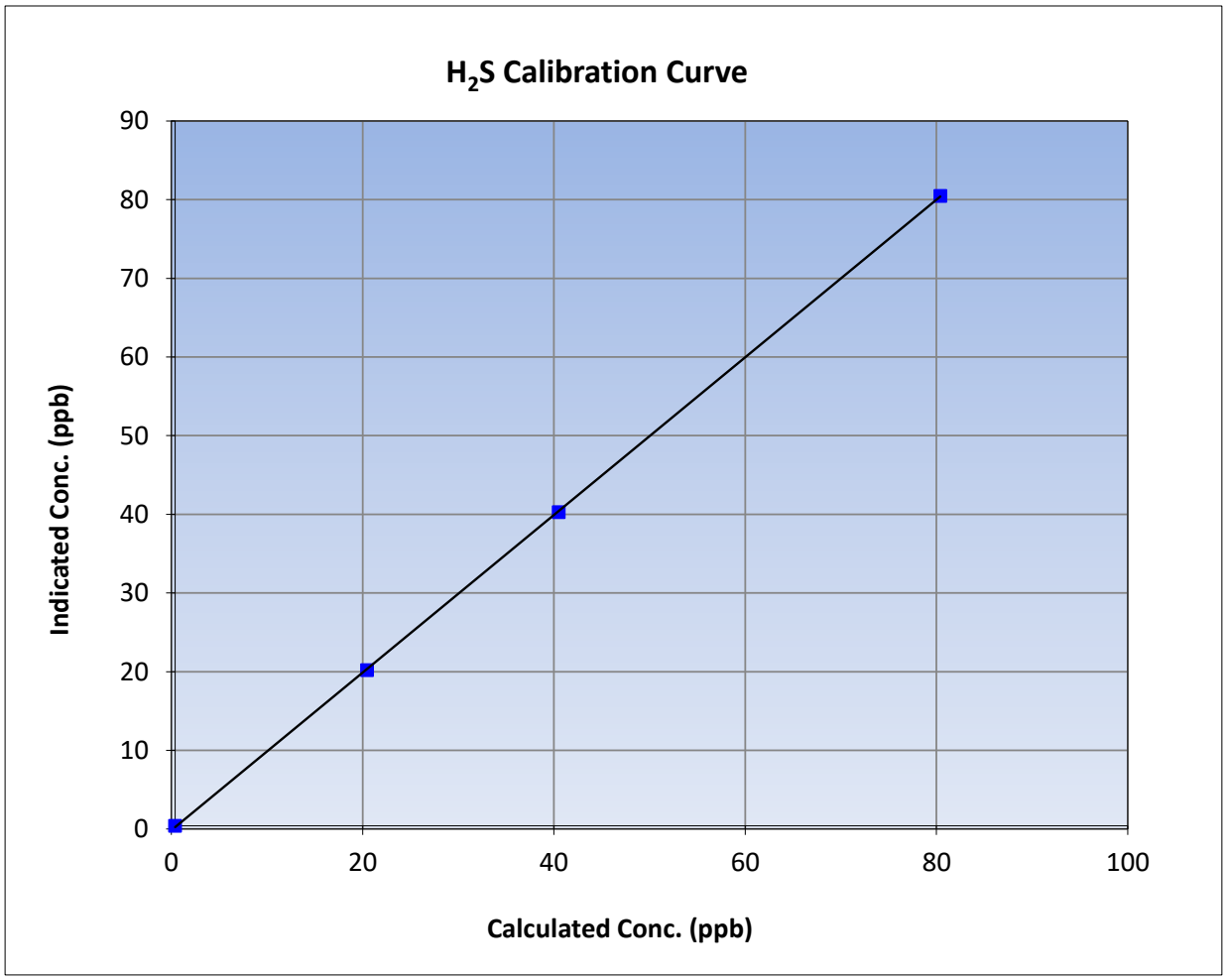
Station Information

Calibration Date:	March 30, 2023	Previous Calibration:	March 29, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:33	End Time (MST):	15:27
Analyzer make:	Thermo 43iQ-TLE	Analyzer serial #:	1200326170

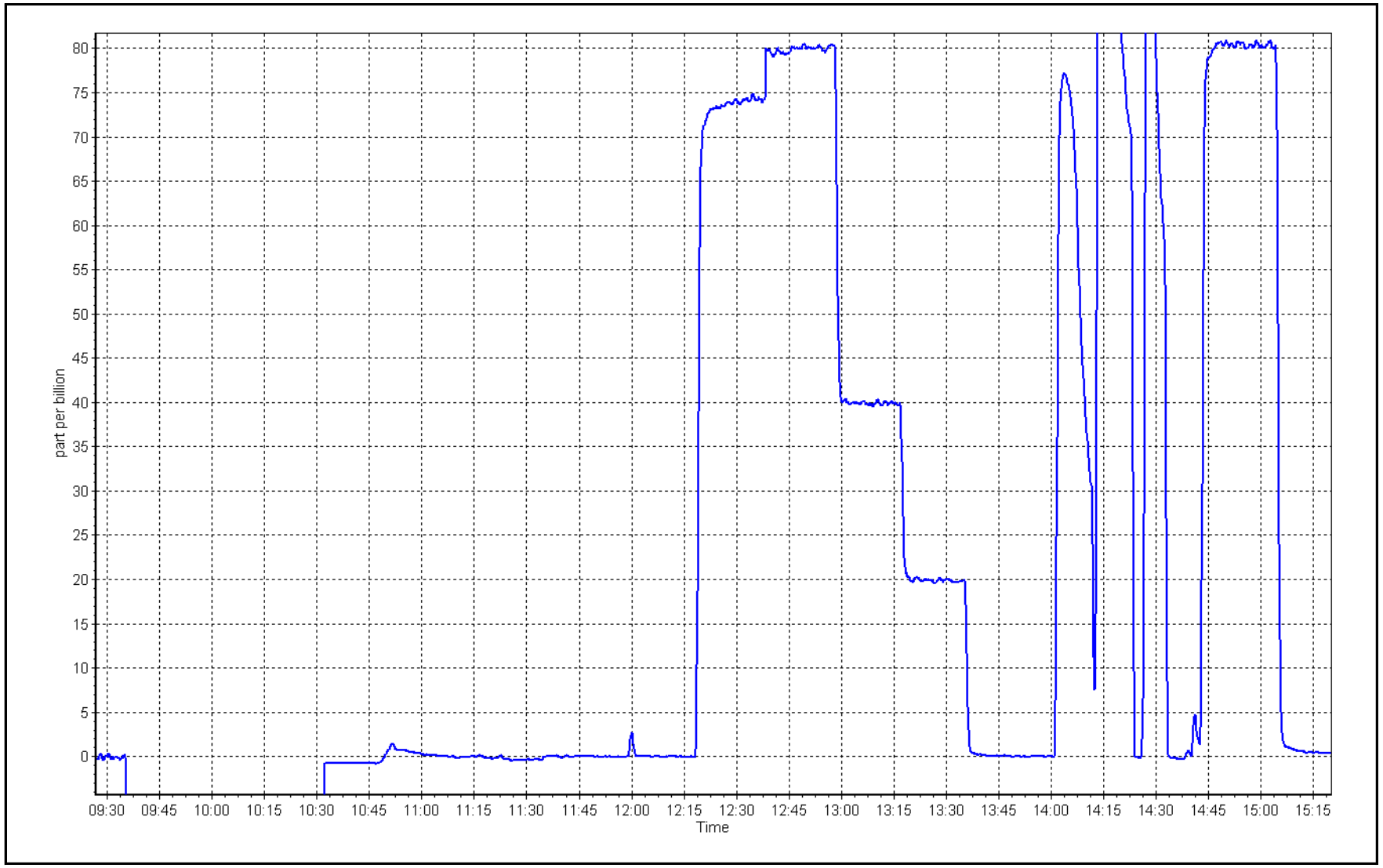
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.1	0.9988
40.1	39.9	1.0052
20.1	19.8	1.0128

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999980	*≥0.995*
Slope	1.002040	*0.90 - 1.10*
Intercept	-0.162687	*+/-3*



H_2S Calibration Plot Date: March 30, 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:	March 13, 2023	Last Cal Date:	February 22, 2023
Start time (MST):	14:15	End time (MST):	16:55
Reason:	GPT Check		

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:	5258	
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:	1.340	1.340	NO bkgnd or offset:	1.3	1.3
NOX coeff or slope:	0.998	0.998	NOX bkgnd or offset:	1.4	1.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	168.4	168.4

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000440	
NO_X Cal Offset:	0.326827	
NO Cal Slope:	1.000353	
NO Cal Offset:	-0.592834	
NO_2 Cal Slope:	1.006976	
NO_2 Cal Offset:	1.486191	

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as found span	4916	84.2	799.2	799.2	0.0	783.8	778.8	5.1	1.0196	1.0262
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero										
high point										
second point										
third point										
as left zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	----	----
as left span	4916	84.2	799.2	416.8	382.4	780.2	397.9	382.2	1.0243	1.0475
								Average Correction Factor		

Corrected As found	NO_X = 783.8 ppb	NO = 778.8 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X = -2.1%
Previous Response	NO_X = 799.9 ppb	NO = 798.9 ppb			*Percent Change	NO = -2.6%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

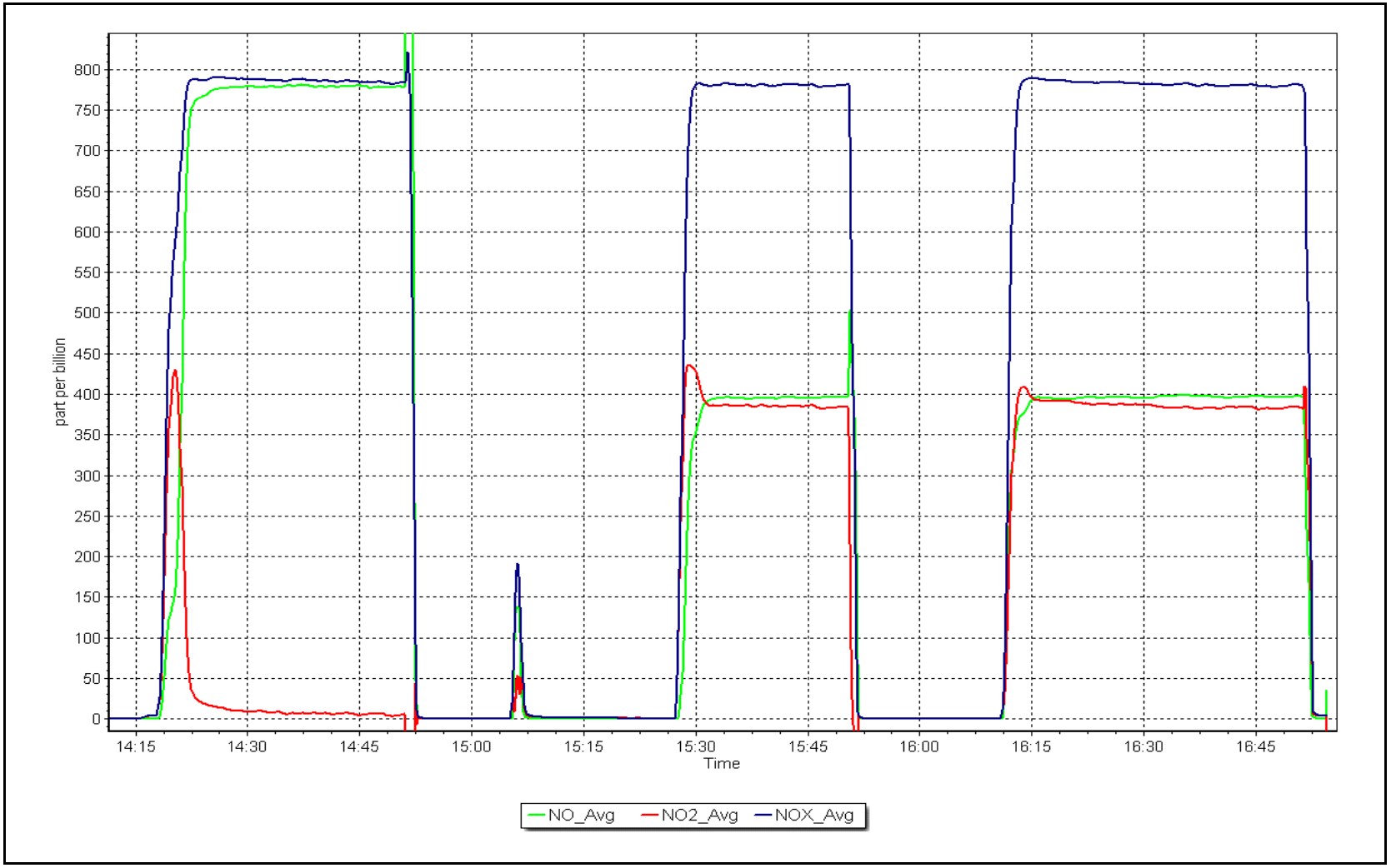
GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	778.8	396.4	382.4	384.0	0.9958	100.4%
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
				Average Correction Factor	0.9958	100.4%

Notes: Checking the output of the calibrator prior to the monthly NOx calibration. GPTPS 400 ozone point generated, GPT 400 ozone point checked.

Calibration Performed By: Braiden Boutilier

NO_X Calibration Plot Date: March 13, 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:	March 16, 2023	Last Cal Date:	February 22, 2023
Start time (MST):	10:06	End time (MST):	15:50
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:	5258	
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:	1.340	1.357	NO bkgnd or offset:	1.3	1.3
NOX coeff or slope:	0.998	0.996	NOX bkgnd or offset:	1.4	1.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	168.4	175.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000440	0.999093
NO_X Cal Offset:	0.326827	-1.251932
NO Cal Slope:	1.000353	0.999707
NO Cal Offset:	-0.592834	-1.991859
NO_2 Cal Slope:	1.006976	0.998536
NO_2 Cal Offset:	1.486191	0.601598

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	4916	84.2	799.2	799.2	0.0	790.1	788.0	2.1	1.0115	1.0142
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high point	4916	84.2	799.2	799.2	0.0	797.4	797.7	-0.3	1.0023	1.0019
second point	4958	42.1	399.6	399.6	0.0	398.6	397.2	1.4	1.0025	1.0061
third point	4979	21.1	200.3	200.3	0.0	196.9	195.9	1.0	1.0172	1.0223
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as left span	4916	84.2	799.2	412.9	386.3	790.0	403.0	387.1	1.0116	1.0246
								Average Correction Factor	1.0073	1.0101

Corrected As found	NO_X = 790.2 ppb	NO = 788.2 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-1.2%
Previous Response	NO_X = 799.9 ppb	NO = 798.9 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)	788.5	402.2	386.3	386.2	1.0003	100.0%
2nd GPT point (200 ppb O3)	788.5	587.0	201.5	201.6	0.9995	100.0%
3rd GPT point (100 ppb O3)	788.5	688.7	99.8	101.2	0.9862	101.4%
				Average Correction Factor	0.9953	100.5%

Notes: Changed sample inlet filter after as founds. Adjusted span. Second high NO reference point used for Indicated NO reference concentrations.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

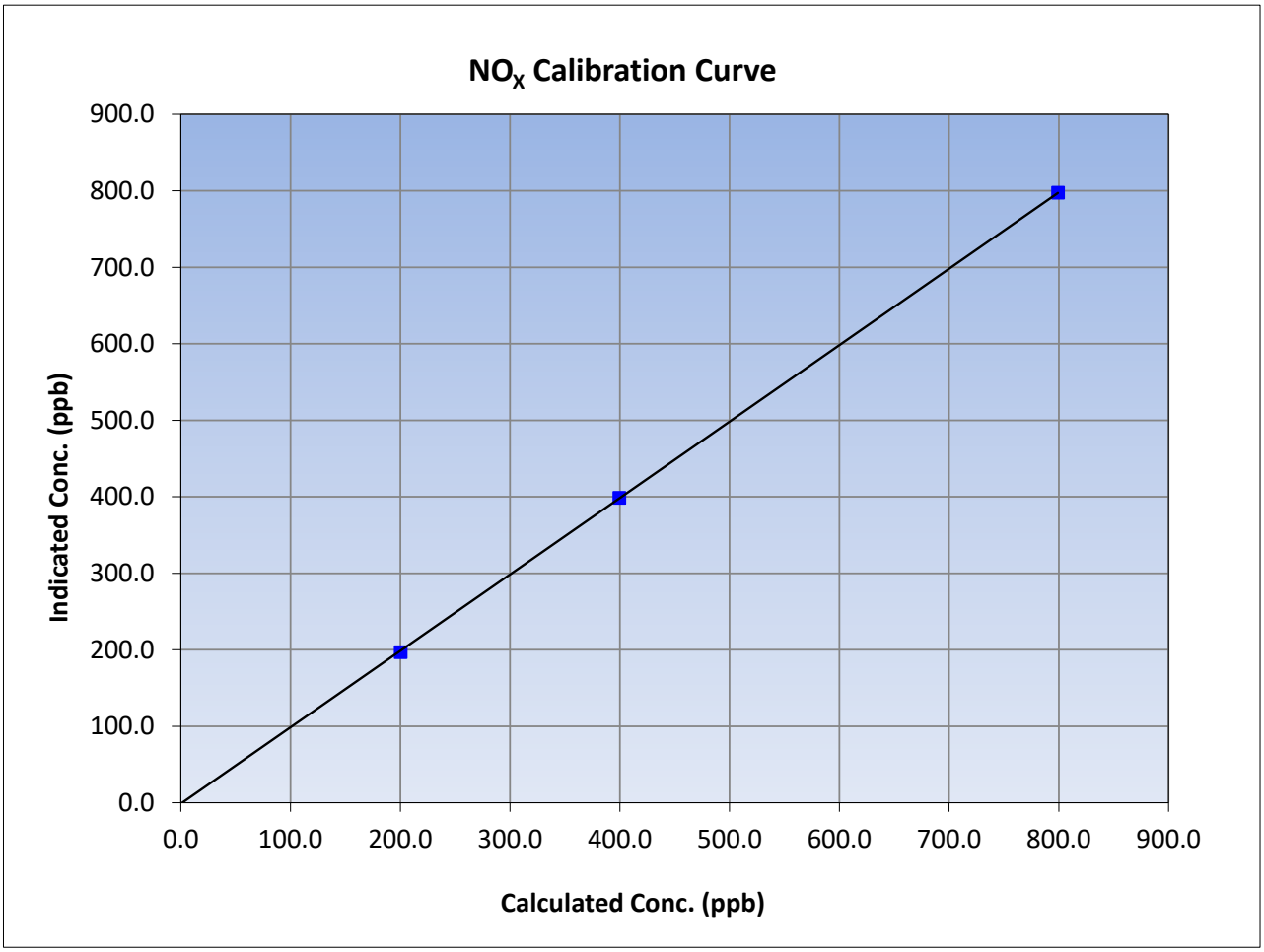
Version-04-2020

Station Information

Calibration Date:	March 16, 2023	Previous Calibration:	February 22, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:06	End Time (MST):	15:50
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	0.999984	≥0.995
799.2	797.4	1.0023			
399.6	398.6	1.0025	Slope	0.999093	0.90 - 1.10
200.3	196.9	1.0172			
			Intercept	-1.251932	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

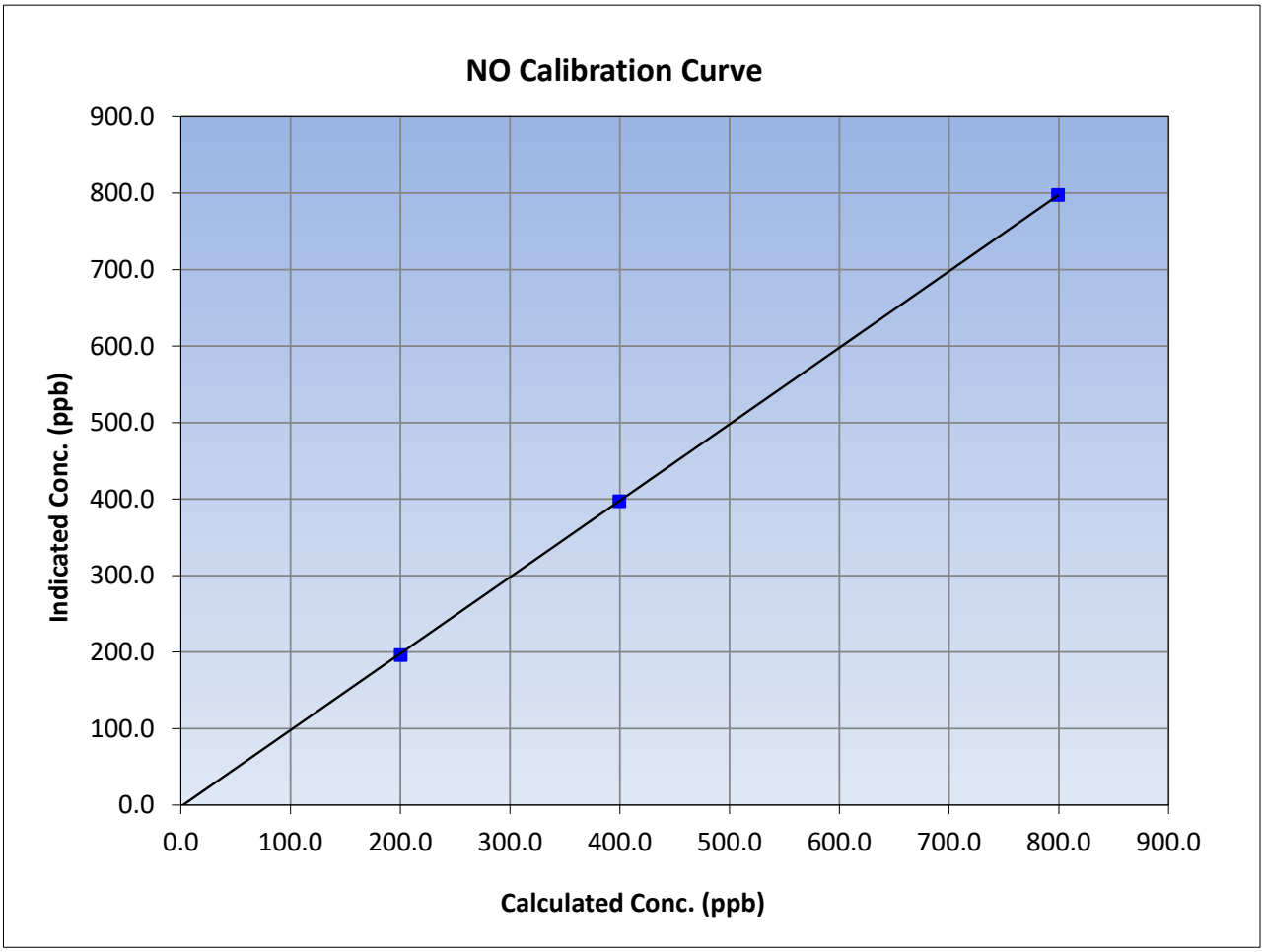
Version-04-2020

Station Information

Calibration Date:	March 16, 2023	Previous Calibration:	February 22, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:06	End Time (MST):	15:50
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	0.999972	≥0.995
799.2	797.7	1.0019			
399.6	397.2	1.0061	Slope	0.999707	0.90 - 1.10
200.3	195.9	1.0223			
			Intercept	-1.991859	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

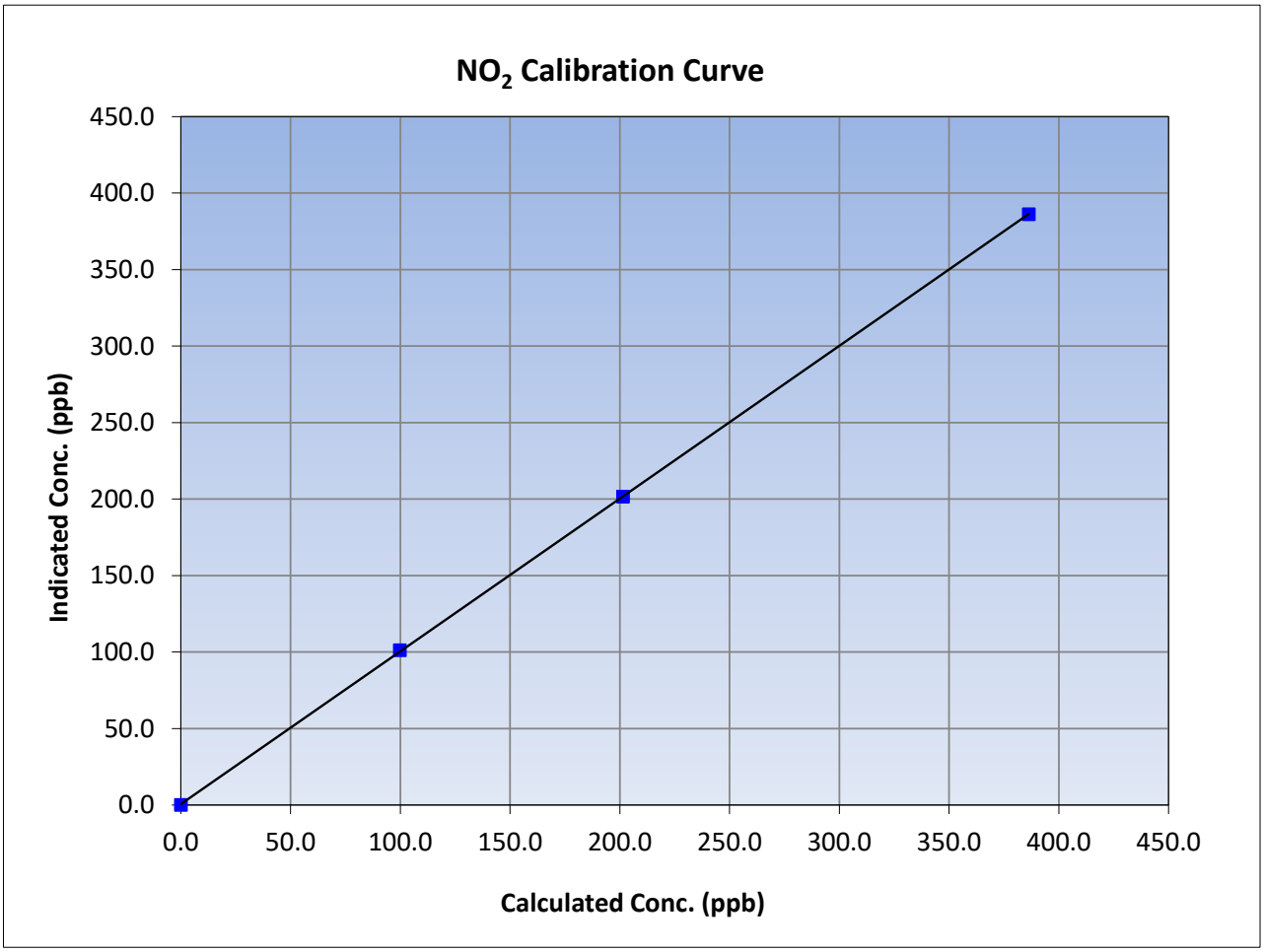
Version-04-2020

Station Information

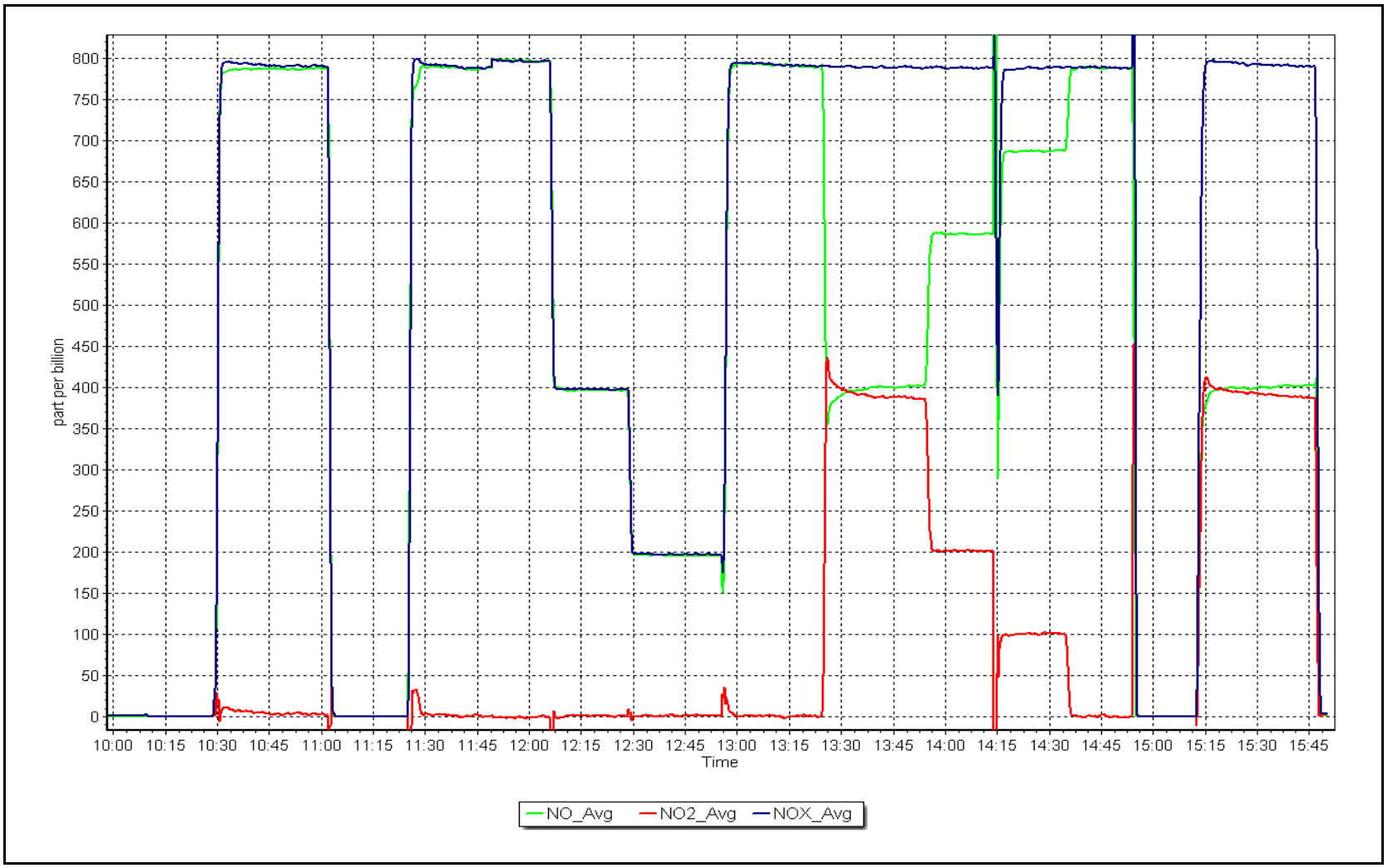
Calibration Date:	March 16, 2023	Previous Calibration:	February 22, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:06	End Time (MST):	15:50
Analyzer make:	Thermo 42i	Analyzer serial #:	1170050148

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999984	≥0.995
386.3	386.2	1.0003			
201.5	201.6	0.9995	Slope	0.998536	0.90 - 1.10
99.8	101.2	0.9862			
			Intercept	0.601598	+/-20



NO_X Calibration Plot Date: March 16, 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:	March 13, 2023	Last Cal Date:	February 17, 2023
Start time (MST):	13:04	End time (MST):	14:09
Analyzer Make:	API T640	S/N:	253
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)	-5.7	-5.4	-5.7	☐	+/- 2 °C
P (mmHg)	706.8	707.77	706.8	☐	+/- 10 mmHg
flow (LPM)	4.99	4.962	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: March 13, 2023 Last Cal Date: February 17, 2023

PM w/o HEPA: 3.7 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				☐	11.3 +/- 0.5

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

Date Optical Chamber Cleaned: February 17, 2023 <0.2 ug/m3

Disposable Filter Changed: February 17, 2023

Annual Maintenance

Date Sample Tube Cleaned: September 30, 2022

Date RH/T Sensor Cleaned: October 6, 2022

Notes: No adjustments made, Leak check passed.

Calibration by: Braiden Boutilier

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS30
ELLS RIVER
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Ells River	Station number:	AMS 30
Calibration Date:	March 1, 2023	Last Cal Date:	February 15, 2023
Start time (MST):	9:43	End time (MST):	12:45
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.53	ppm	Cal Gas Exp Date:	December 29, 2028
Cal Gas Cylinder #:	CC494126			
Removed Cal Gas Conc:	50.53	ppm	Rem Gas Exp Date:	
Removed Gas Cyl #:			Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3061
ZAG Make/Model:	API T701H		Serial Number:	358

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1008841397

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.006172	1.004115	Backgd or Offset:	9.2	8.9
Calibration intercept:	-2.436019	-2.615941	Coeff or Slope:	0.988	0.988

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.5	----
as found span	4921	79.2	800.4	800.1	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4921	79.2	800.4	802.6	0.997
second point	4960	39.6	400.2	397.2	1.008
third point	4980	19.8	200.1	196.2	1.020
as left zero	5000	0.0	0.0	0.0	----
as left span	4921	79.2	800.4	801.7	0.998
				Average Correction Factor	1.008

Baseline Corr As found:	800.60	Previous response	802.87	*% 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: Adjusted the zero only.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

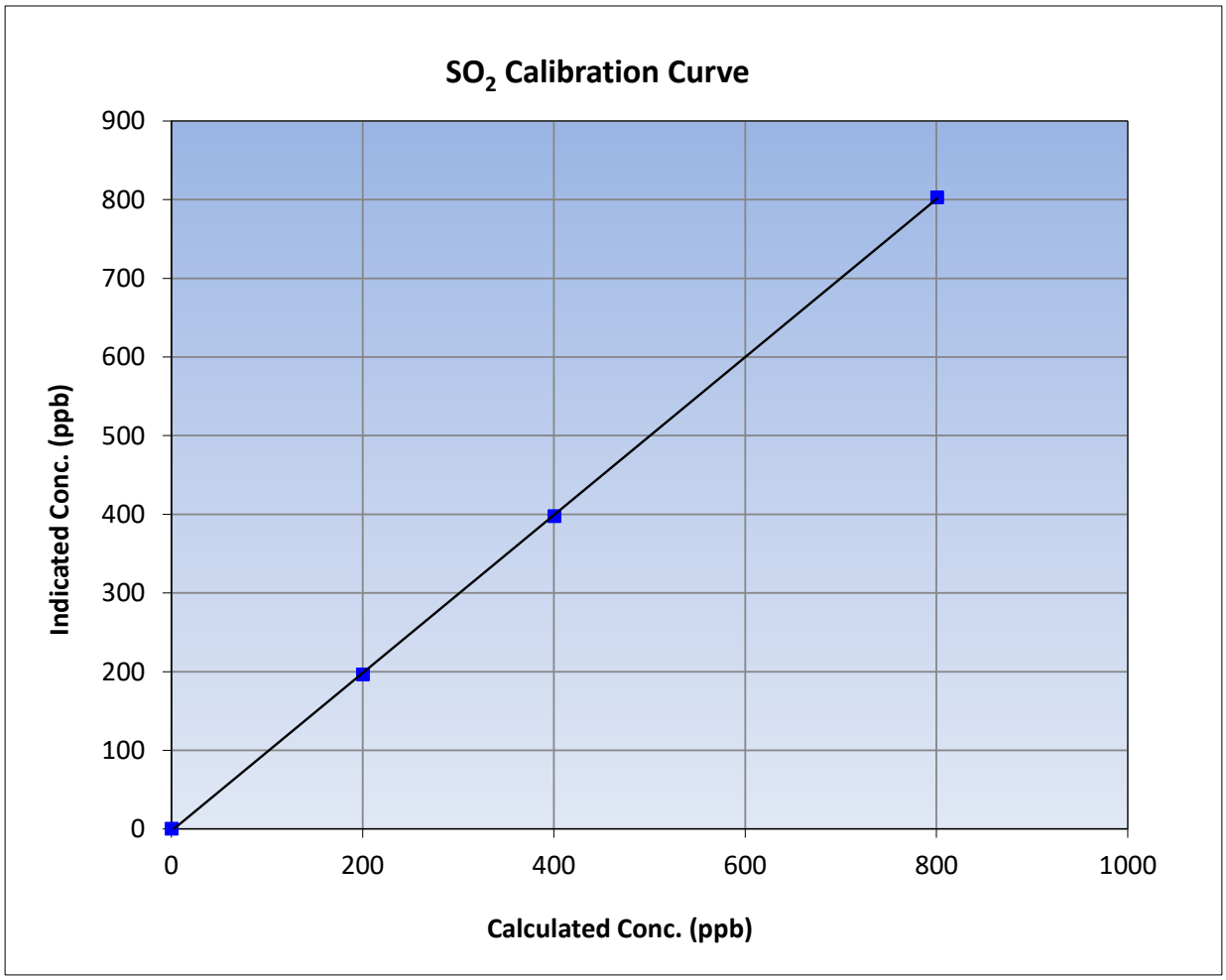
Station Information

Calibration Date:	March 1, 2023	Previous Calibration:	February 15, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:43	End Time (MST):	12:45
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841397

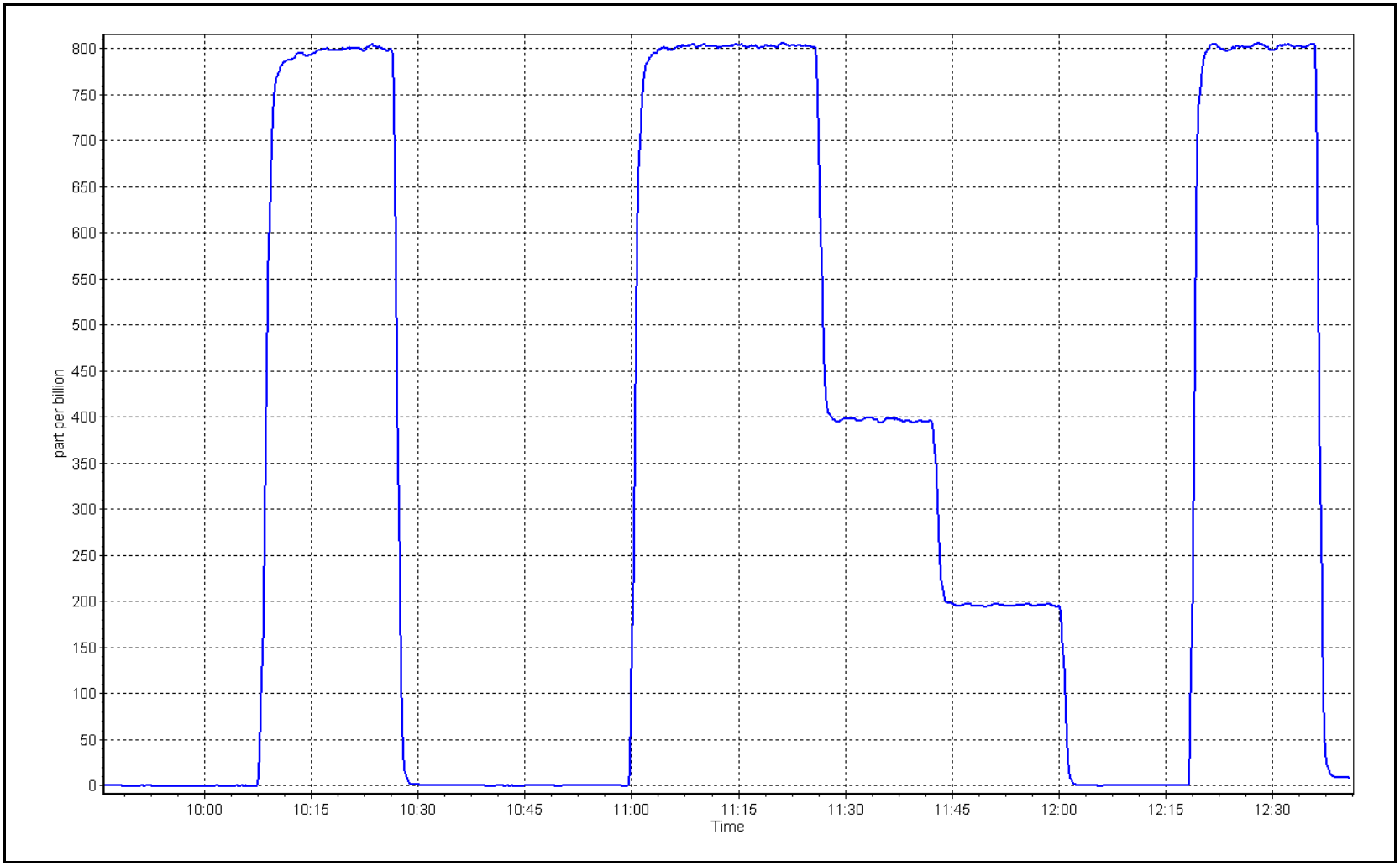
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
800.4	802.6	0.9972
400.2	397.2	1.0076
200.1	196.2	1.0199

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999949	*≥0.995*
Slope	1.004115	*0.90 - 1.10*
Intercept	-2.615941	*+/-30*



SO2 Calibration Plot Date: March 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:	March 2, 2023	Last Cal Date:	February 13, 2023
Start time (MST):	9:39	End time (MST):	13:20
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.08	ppm	Cal Gas Exp Date:	February 9, 2024
Cal Gas Cylinder #:	EY0002443			
Removed Cal Gas Conc:	5.08	ppm	Rem Gas Exp Date:	
Removed Gas Cyl #:			Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3061
ZAG Make/Model:	API T701H		Serial Number:	358

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1410661331	
Converter make:	CDN - 101		Converter serial #:	555	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999493	0.998207	Backgd or Offset:	1.57	1.57
Calibration intercept:	0.040843	0.060852	Coeff or Slope:	1.092	1.092

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4921	78.7	80.0	79.3	1.008
as found 2nd point	4961	39.4	40.0	39.4	1.016
as found 3rd point	4980	19.7	20.0	19.5	1.026
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4921	78.7	80.0	79.9	1.001
second point	4961	39.4	40.0	40.0	1.001
third point	4980	19.7	20.0	20.0	1.001
as left zero	5000	0.0	0.0	0.4	----
as left span	4921	78.7	80.0	80.3	0.996
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		95.1%	efficiency

Baseline Corr As found:	79.3	Prev response:	79.96	*% change:	-0.8%
Baseline Corr 2nd AF pt:	39.4	AF Slope:	0.992773	AF Intercept:	-0.198955
Baseline Corr 3rd AF pt:	19.5	AF Correlation:	0.999971		

* = > +/-5% change initiates investigation

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

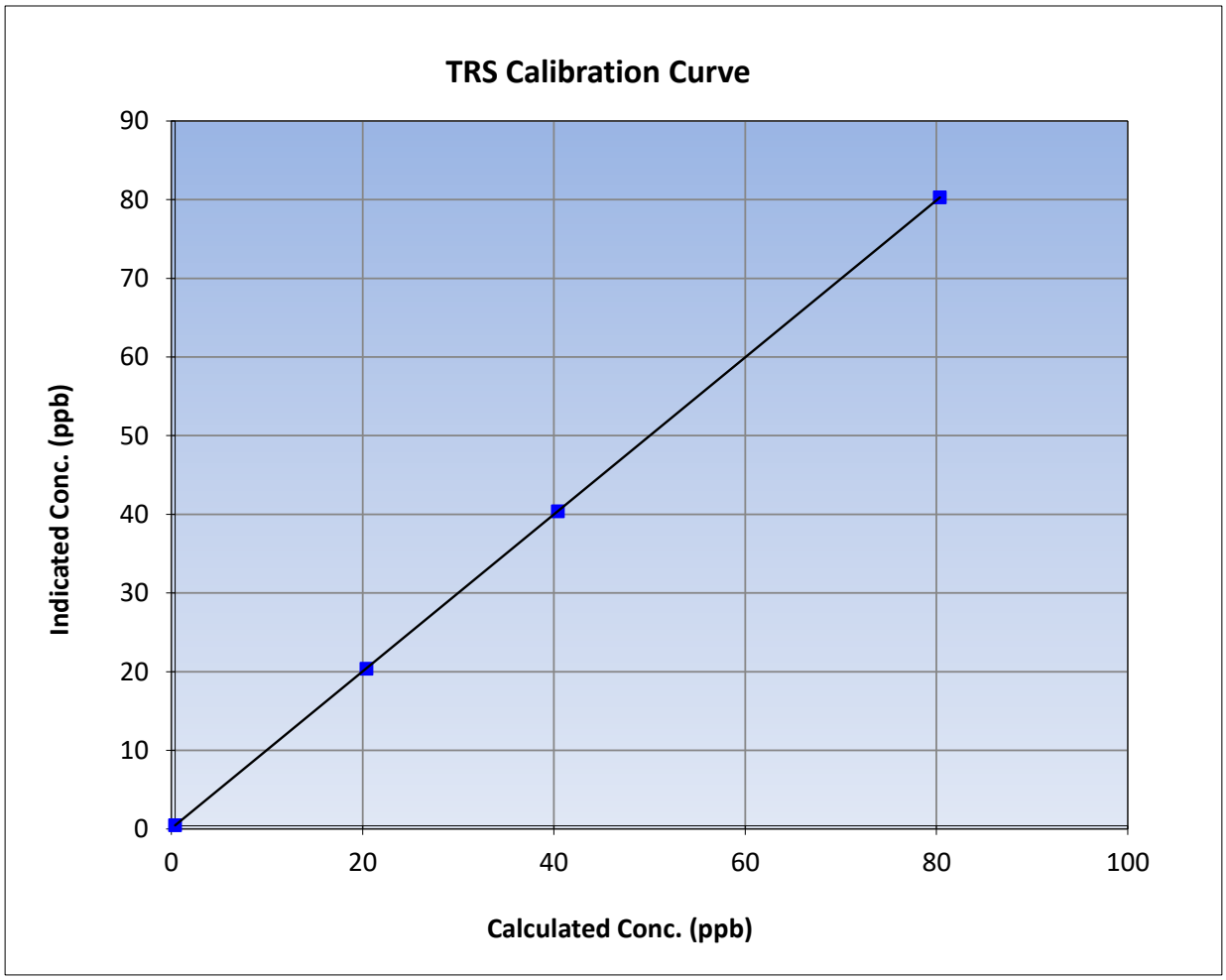
Station Information

Calibration Date:	March 2, 2023	Previous Calibration:	February 13, 2023
Station Name:	Ells River	Station Number:	AMS30
Start Time (MST):	9:39	End Time (MST):	13:20
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1410661331

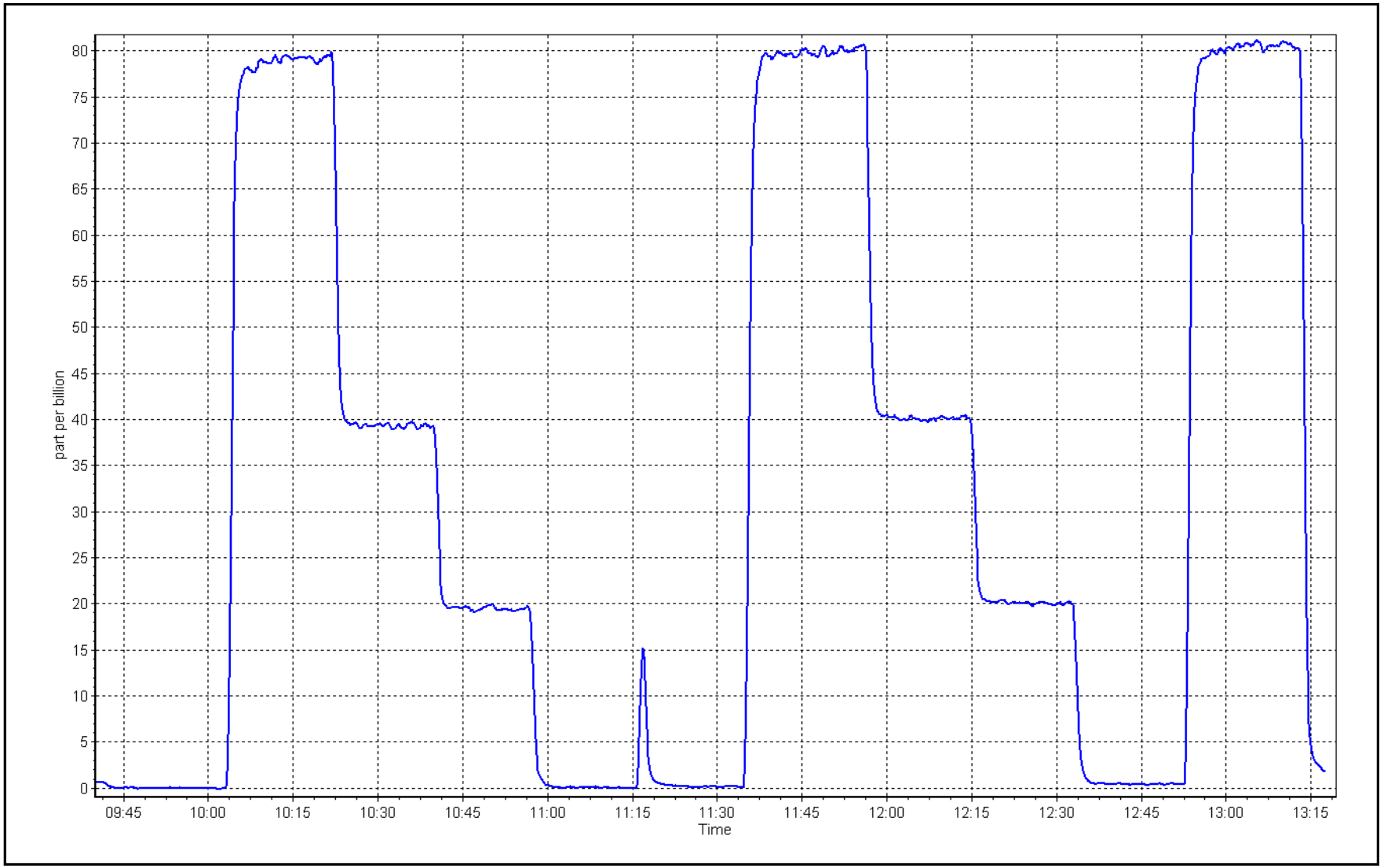
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	79.9	1.0008
40.0	40.0	1.0007
20.0	20.0	1.0008

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	0.998207	*0.90 - 1.10*
Intercept	0.060852	*+/-3*



TRS Calibration Plot Date: March 2, 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:	March 1, 2023	Last Cal Date:	February 10, 2023
Start time (MST):	9:43	End time (MST):	12:45
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC494126	Cal Gas Expiry Date:	December 29, 2028	
CH4 Cal Gas Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm
C3H8 Cal Gas Conc.	209.2	ppm			
Removed Gas Cert:			Removed Gas Expiry:		
Removed CH4 Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm
Removed C3H8 Conc.	209.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3061	
ZAG make/model:	API T701H		Serial Number:	358	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1193585650	
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:	0.000236	0.000234	NMHC SP Ratio:	4.96E-05	4.19E-05
CH4 Retention time:	13.6	14.2	NMHC Peak Area:	183767	217301

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	16.46	1.035
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	17.03	16.99	1.002
second point	4960	39.6	8.51	8.40	1.014
third point	4980	19.8	4.26	4.17	1.021
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	17.01	1.001
				Average Correction Factor	1.012
Baseline Corr AF:	16.46	Prev response	16.88	*% change	-2.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	-0.023379		* = > +/-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	8.74	1.043
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	9.11	1.001
second point	4960	39.6	4.56	4.52	1.008
third point	4980	19.8	2.28	2.25	1.014
as left zero	5000	0	0.00	0.00	----
as left span	4921	79.2	9.11	9.13	0.998
				Average Correction Factor	1.008
Baseline Corr AF:	8.74	Prev response	9.00	*% change	-3.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	7.91	7.72	1.025
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	7.89	1.003
second point	4960	39.6	3.96	3.88	1.020
third point	4980	19.8	1.98	1.92	1.029
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.91	7.89	1.004
				Average Correction Factor	1.017
Baseline Corr AF:	7.72	Prev response	7.89	*% 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:	0.994670	0.998858
THC Cal Offset:	-0.054336	-0.050537
CH4 Cal Slope:	1.000380	0.997766
CH4 Cal Offset:	-0.030757	-0.031956
NMHC Cal Slope:	0.989848	1.000170
NMHC Cal Offset:	-0.023379	-0.018781

Notes: Changed N2 cylinder after the as founds. Adjusted the span.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

THC Calibration Summary

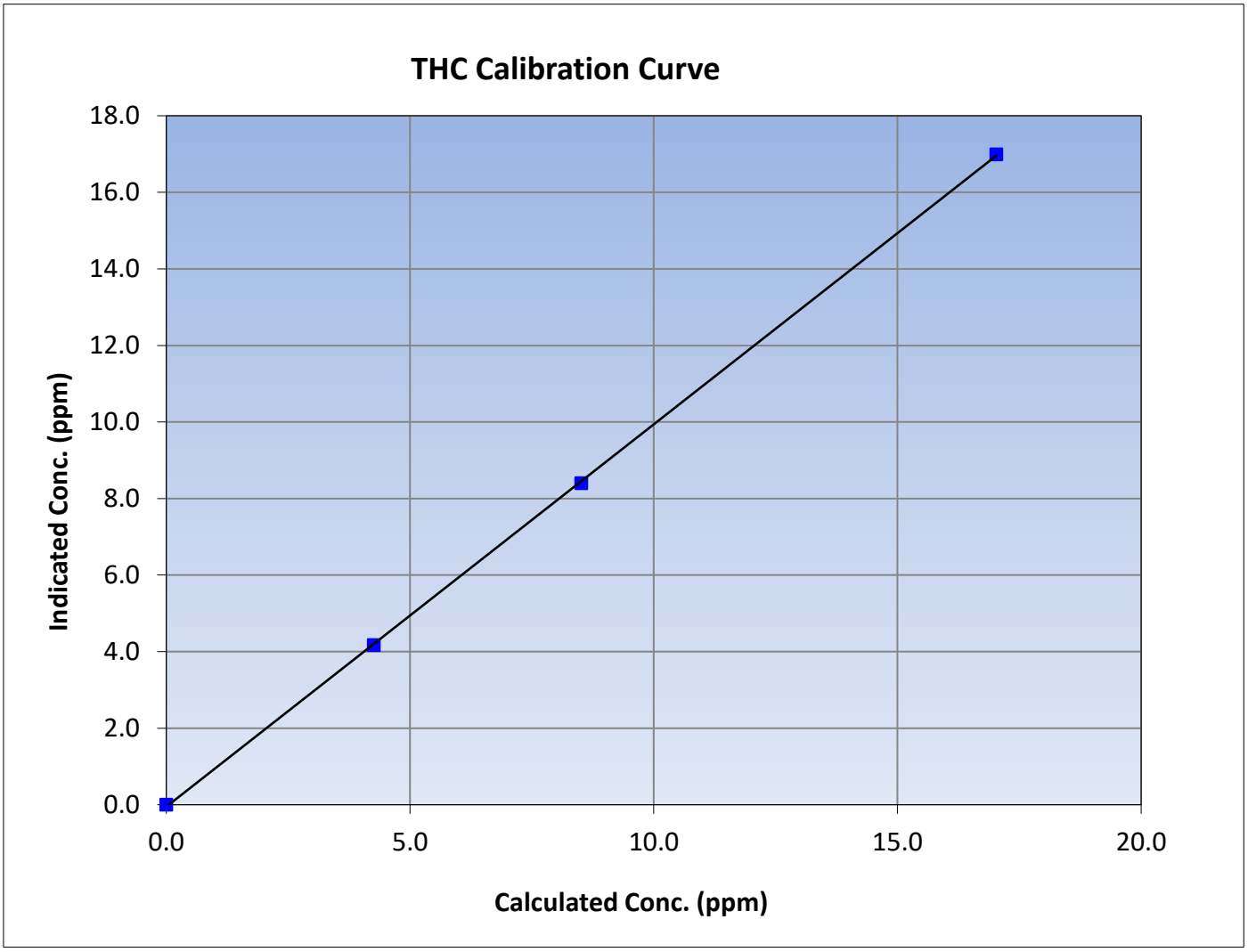
Version-01-2020

Station Information

Calibration Date:	March 1, 2023	Previous Calibration:	February 10, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:43	End Time (MST):	12:45
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585650

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999952	*≥0.995*
17.03	16.99	1.0021			
8.51	8.40	1.0135	Slope	0.998858	*0.90 - 1.10*
4.26	4.17	1.0209			
			Intercept	-0.050537	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

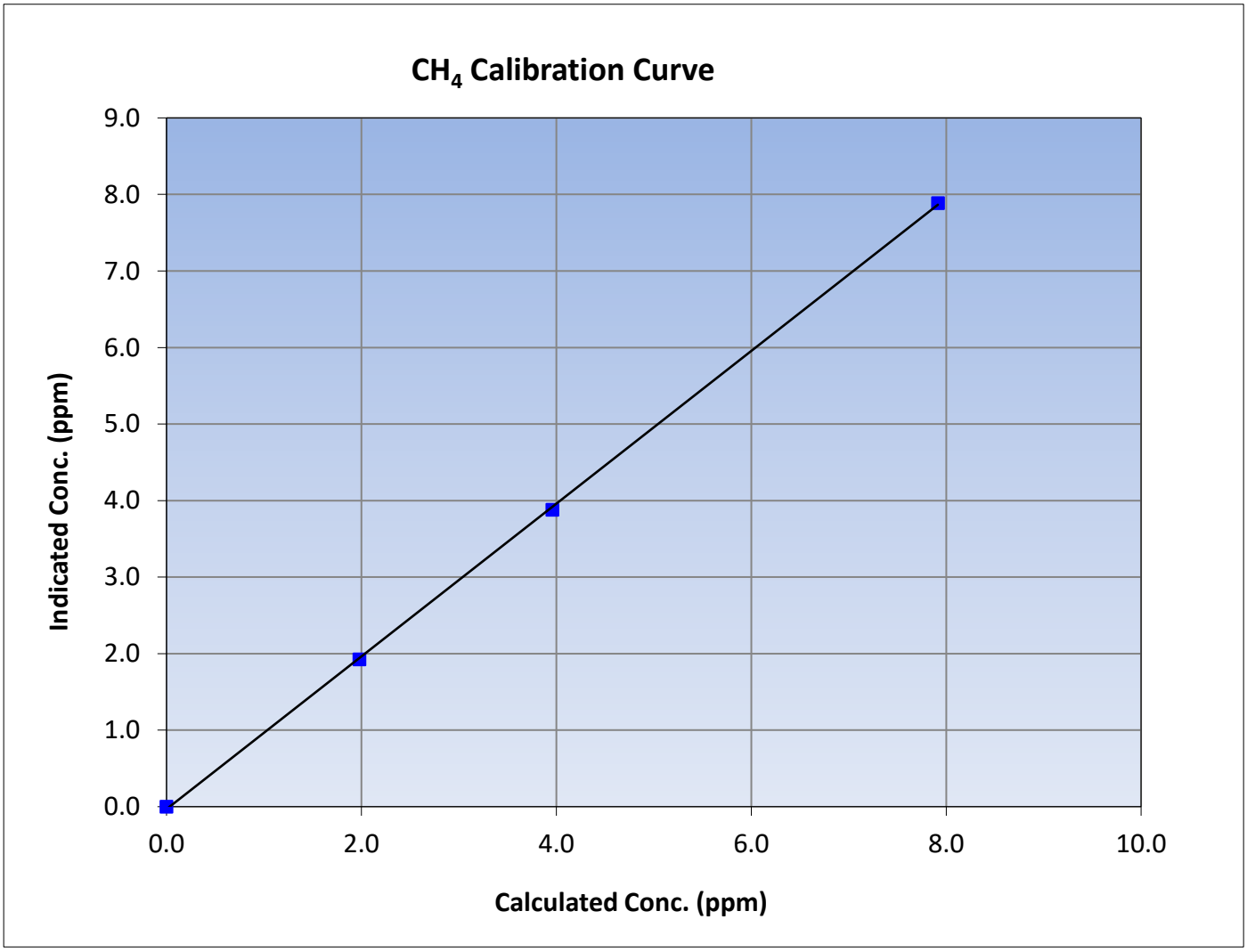
Version-01-2020

Station Information

Calibration Date:	March 1, 2023	Previous Calibration:	February 10, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:43	End Time (MST):	12:45
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585650

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
7.91	7.89	1.0034			
3.96	3.88	1.0198	Slope	0.997766	0.90 - 1.10
1.98	1.92	1.0285			
			Intercept	-0.031956	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

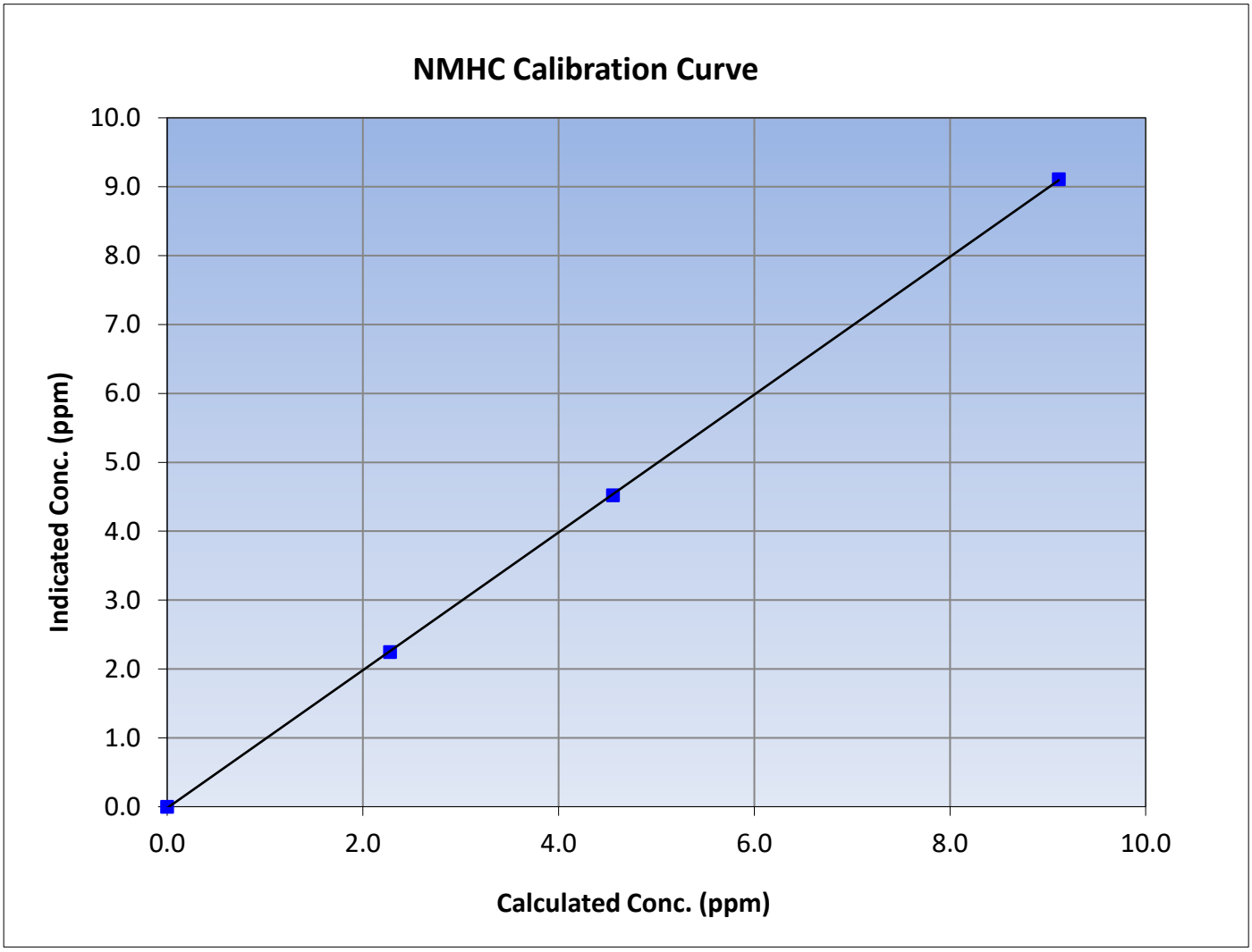
Version-01-2020

Station Information

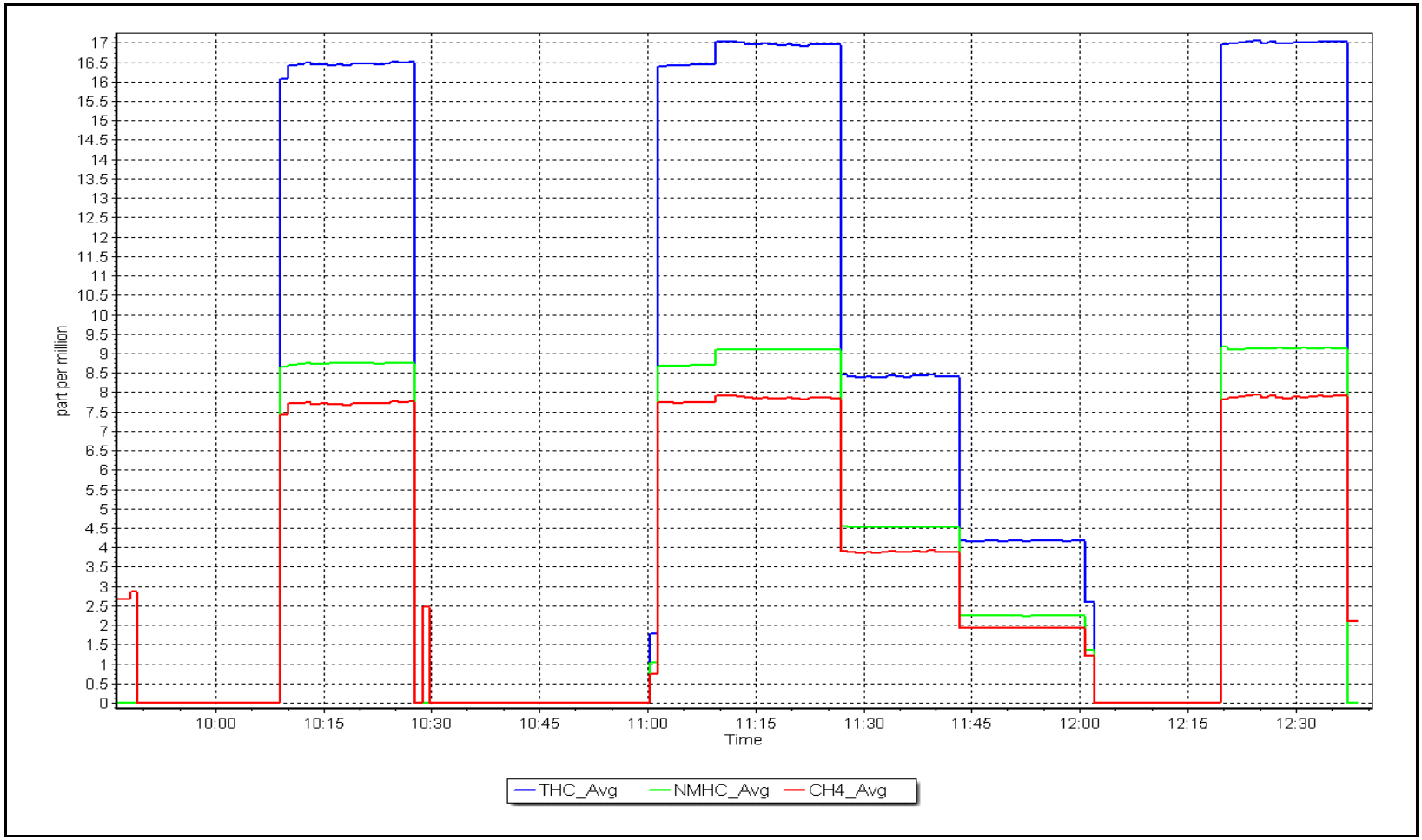
Calibration Date:	March 1, 2023	Previous Calibration:	February 10, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:43	End Time (MST):	12:45
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585650

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*
9.11	9.11	1.0006			
4.56	4.52	1.0077	Slope	1.000170	*0.90 - 1.10*
2.28	2.25	1.0144			
			Intercept	-0.018781	*+/-0.5*



NMHC Calibration Plot Date: March 1, 2023 Location: Ells River



-0.02338

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:	March 15, 2023	Last Cal Date:	February 1, 2023
Start time (MST):	9:24	End time (MST):	13:40
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:	1.029	1.029	NO bkgnd or offset:	12.5	12.5
NOX coeff or slope:	0.992	0.992	NOX bkgnd or offset:	12.4	12.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	185.1	182.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001096	0.999129
NO_X Cal Offset:	-0.800000	-0.900000
NO Cal Slope:	1.001429	0.999714
NO Cal Offset:	-1.540000	-1.740000
NO_2 Cal Slope:	1.001609	1.002165
NO_2 Cal Offset:	0.350570	0.164860

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.3	0.0	----	----
as found span	4920	80.0	813.3	799.5	13.8	814.8	800.0	14.7	0.9981	0.9994
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	813.3	799.5	13.8	812.1	798.3	13.9	1.0015	1.0015
second point	4960	40.0	406.6	399.8	6.9	404.9	397.3	7.6	1.0043	1.0062
third point	4980	20.0	203.3	199.9	3.4	201.5	196.3	5.1	1.0090	1.0182
as left zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
as left span	4920	80.0	813.3	432.3	381.0	812.3	423.3	389.0	1.0012	1.0213
								Average Correction Factor	1.0049	1.0087

Corrected As found	NO_X = 815.1 ppb	NO = 800.3 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.2%
Previous Response	NO_X = 813.4 ppb	NO = 799.1 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)	793.6	426.4	381.0	381.9	0.9975	100.2%
2nd GPT point (200 ppb O3)	793.6	617.0	190.4	190.9	0.9972	100.3%
3rd GPT point (100 ppb O3)	793.6	704.1	103.3	103.9	0.9938	100.6%
				Average Correction Factor	0.9962	100.4%

Notes: No adjusments have been made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

NO_X Calibration Summary

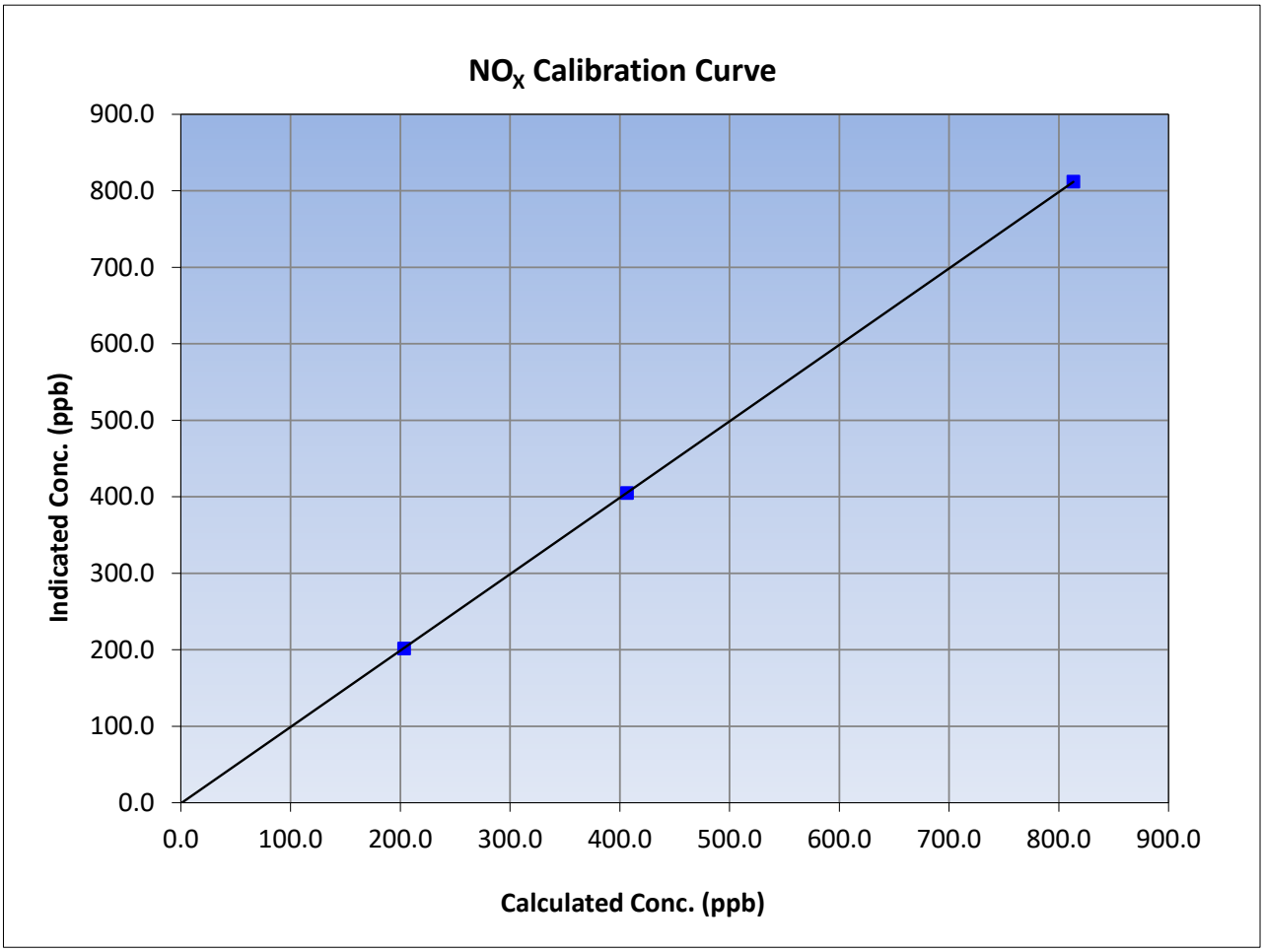
Version-04-2020

Station Information

Calibration Date:	March 15, 2023	Previous Calibration:	February 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:24	End Time (MST):	13:40
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	0.999996	≥0.995
813.3	812.1	1.0015			
406.6	404.9	1.0043	Slope	0.999129	0.90 - 1.10
203.3	201.5	1.0090			
			Intercept	-0.900000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

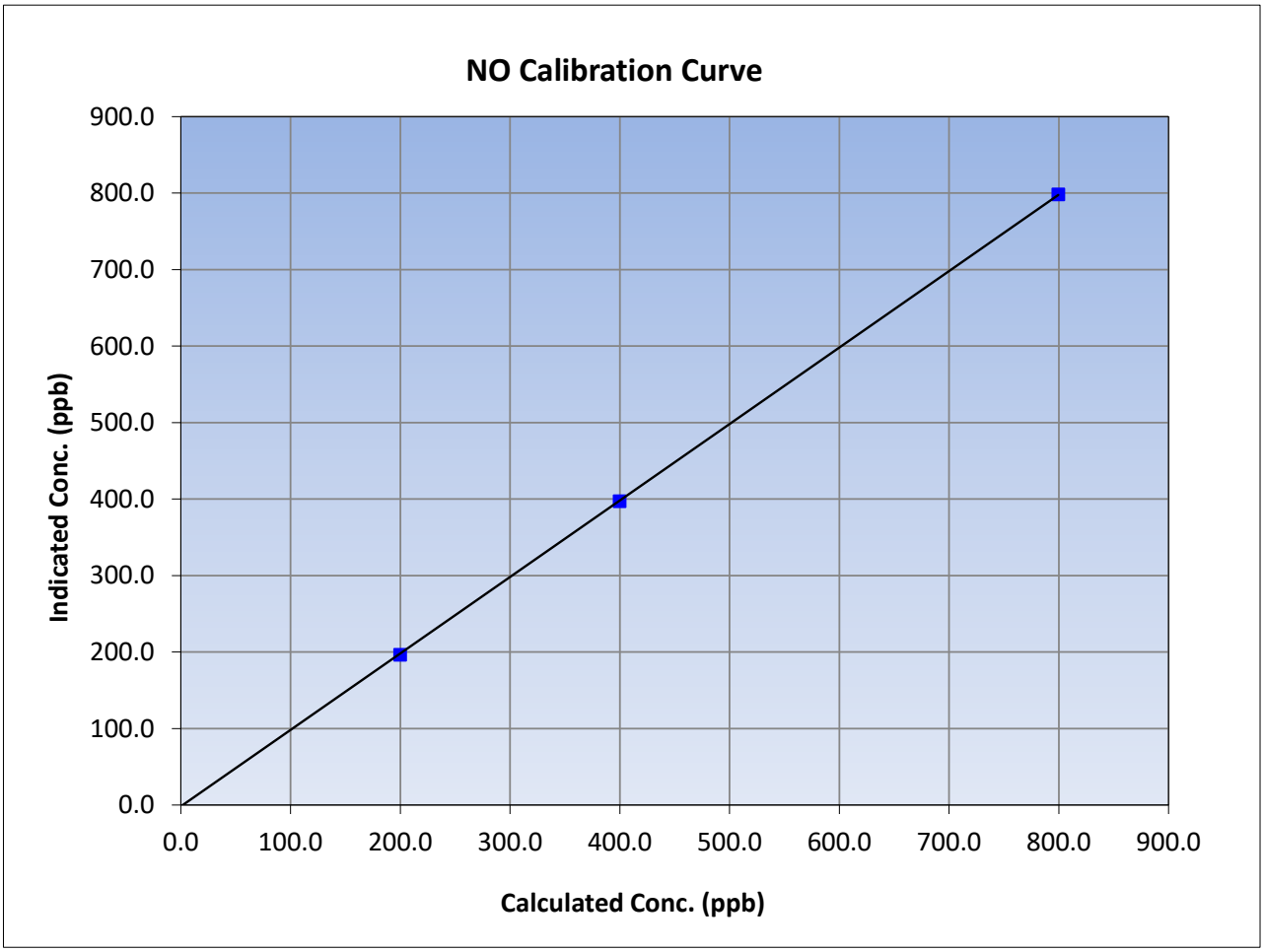
Version-04-2020

Station Information

Calibration Date:	March 15, 2023	Previous Calibration:	February 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:24	End Time (MST):	13:40
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	0.999981	≥0.995
799.5	798.3	1.0015			
399.8	397.3	1.0062	Slope	0.999714	0.90 - 1.10
199.9	196.3	1.0182			
			Intercept	-1.740000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

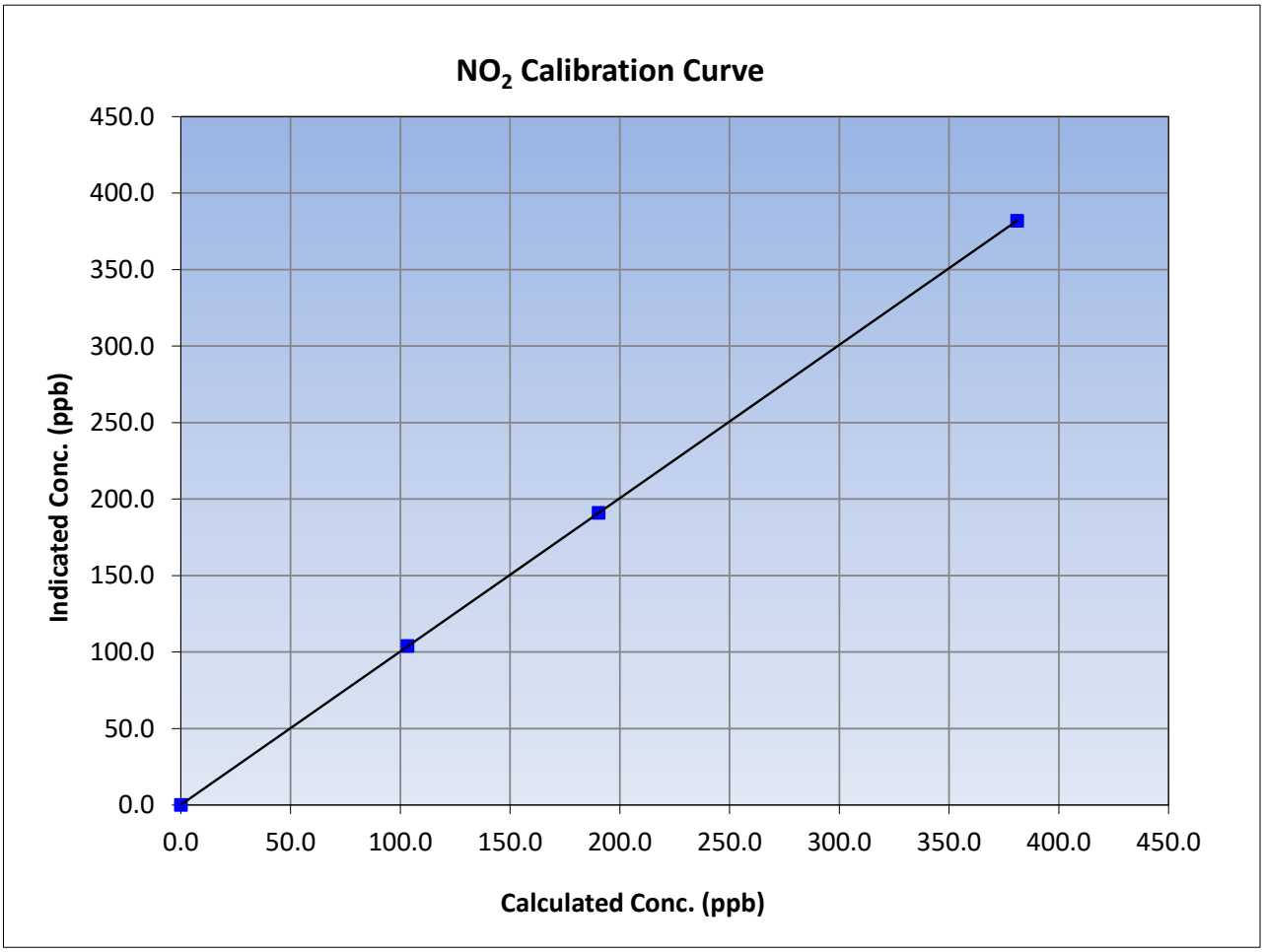
Version-04-2020

Station Information

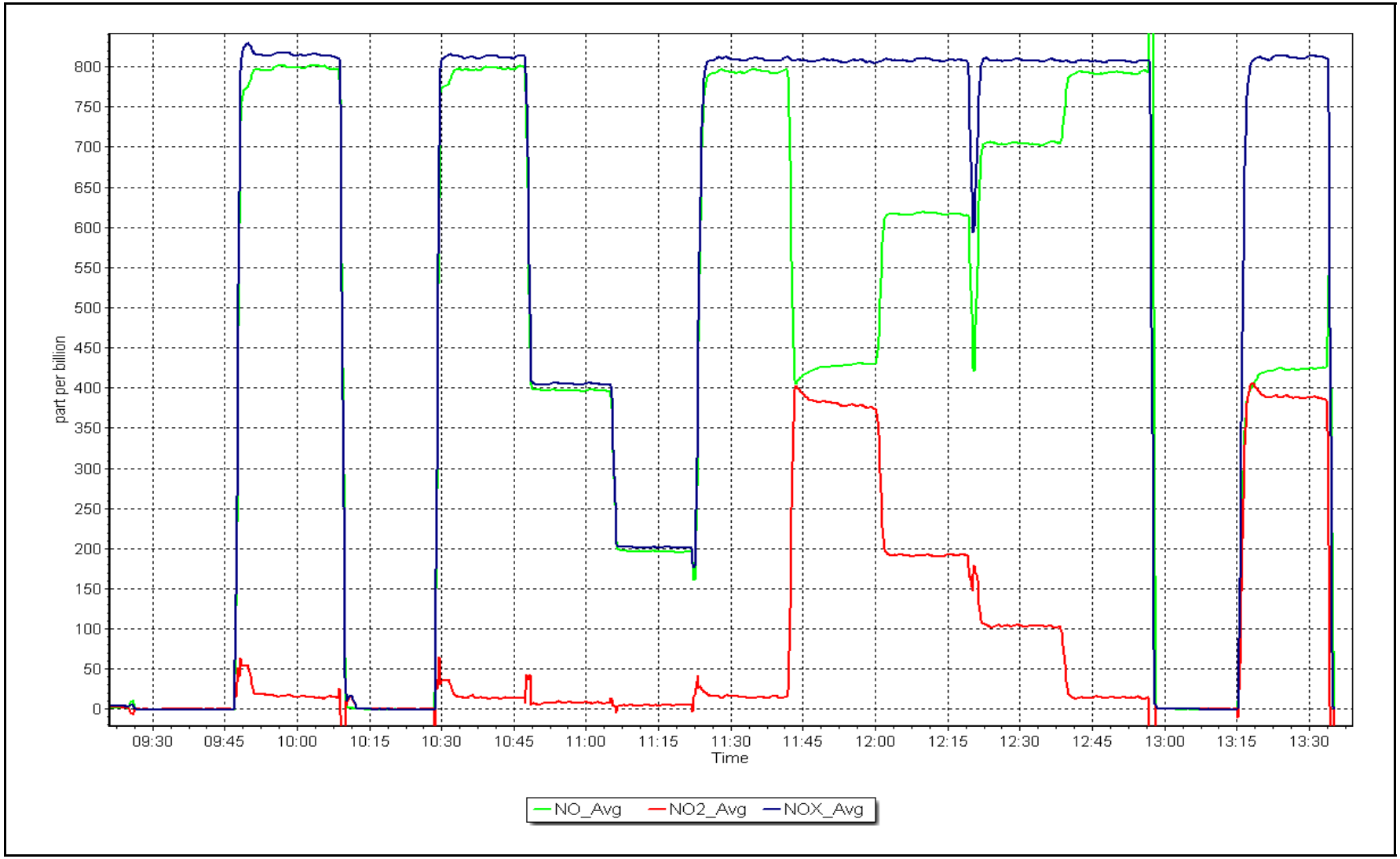
Calibration Date:	March 15, 2023	Previous Calibration:	February 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:24	End Time (MST):	13:40
Analyzer make:	Thermo 42i	Analyzer serial #:	710321429

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999999	≥0.995
381.0	381.9	0.9975			
190.4	190.9	0.9972	Slope	1.002165	0.90 - 1.10
103.3	103.9	0.9938			
			Intercept	0.164860	+/-20



NO_X Calibration Plot Date: March 15, 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:	March 16, 2023	Last Cal Date:	February 17, 2023
Start time (MST):	9:41	End time (MST):	10:50
Analyzer Make:	API T640	S/N:	875
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	954
Temp/RH standard:	Delta Cal	S/N:	954

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-11	-11	-11	☐	+/- 2 °C
P (mmHg)	739.3	736.7	739.3	☐	+/- 10 mmHg
flow (LPM)	5.01	5.05	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: March 16, 2023 Last Cal Date: February 17, 2023

PM w/o HEPA: 4.2 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	8.7	10.8	10.8	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 4.9 w/ HEPA: 0 <0.2 ug/m3

Date Optical Chamber Cleaned: March 16, 2023

Disposable Filter Changed: March 16, 2023

Annual Maintenance

Date Sample Tube Cleaned: _____

Date RH/T Sensor Cleaned: _____

Notes: No adjustments made. Inlet head still clean.

Calibration by: Denny Ray Estador

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS506
JACKFISH 1
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Jackfish 1	Station number:	AMS 506
Calibration Date:	March 9, 2023	Last Cal Date:	February 14, 2023
Start time (MST):	10:58	End time (MST):	13:43
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:	1.004300	1.001172	Backgd or Offset:	18.9	18.9
Calibration intercept:	-1.536060	-1.416002	Coeff or Slope:	0.960	0.966

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	4921	79.2	800.2	794.0	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	800.2	800.1	1.000
second point	4960	39.6	400.2	399.3	1.002
third point	4980	19.8	200.1	197.2	1.015
as left zero	5000	0.0	0.0	-0.3	----
as left span	4921	79.2	800.2	801.7	0.998
				Average Correction Factor	1.006

Baseline Corr As found:	794.60	Previous response	802.11	*% change	-0.9%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

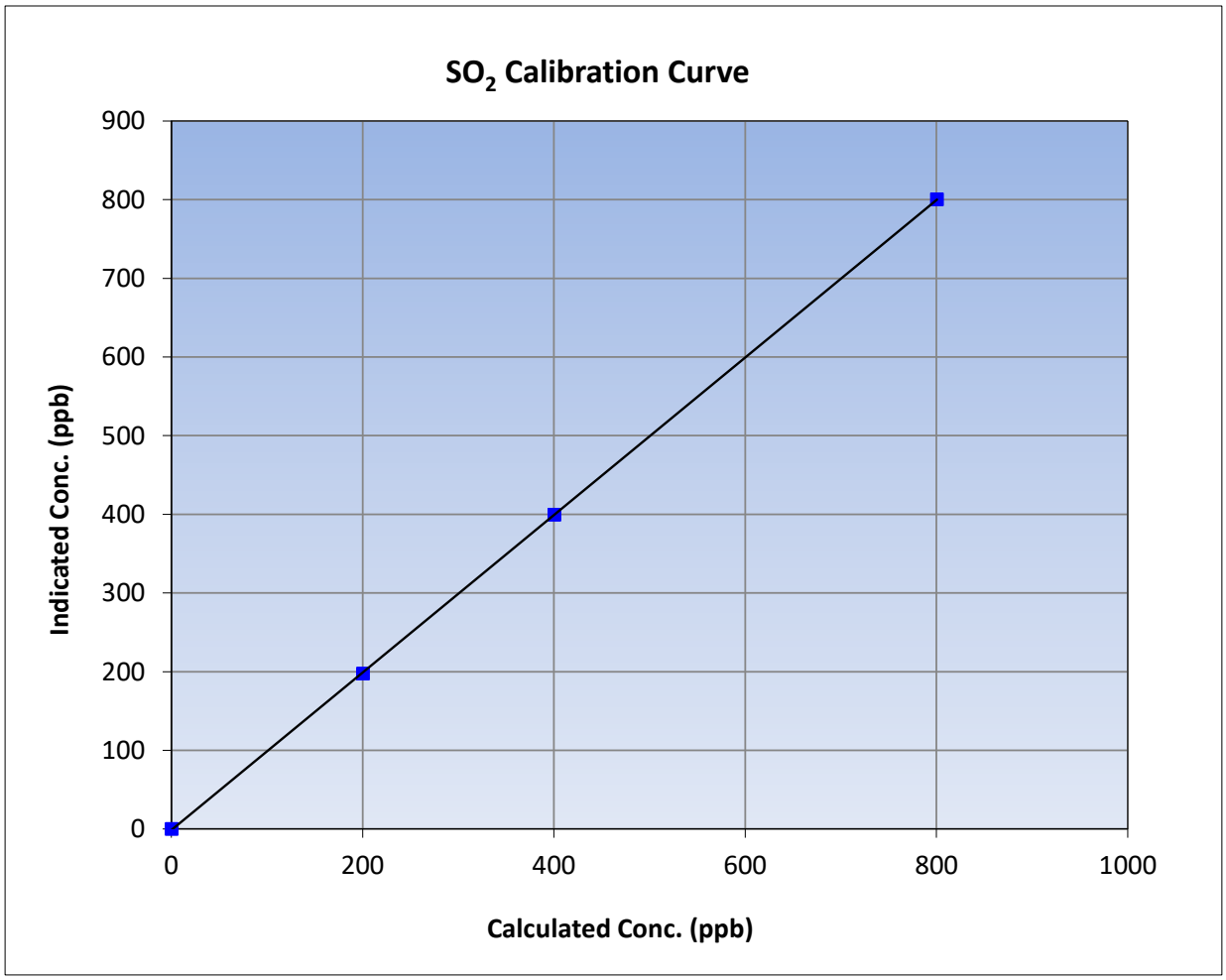
Station Information

Calibration Date:	March 9, 2023	Previous Calibration:	February 14, 2023
Station Name:	Jackfish 1	Station Number:	AMS 506
Start Time (MST):	10:58	End Time (MST):	13:43
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290011

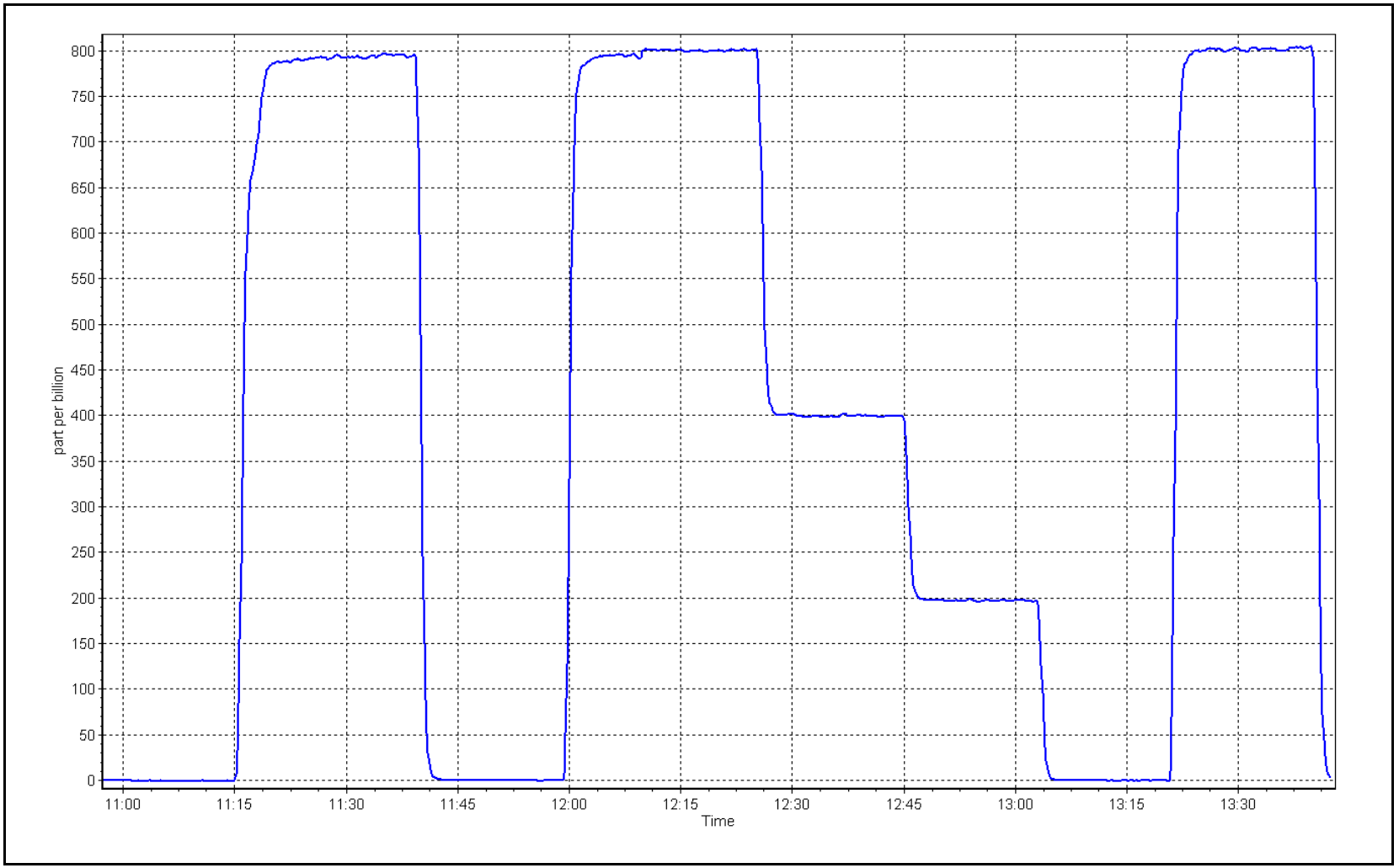
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
800.2	800.1	1.0001
400.2	399.3	1.0021
200.1	197.2	1.0145

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999987	*≥0.995*
Slope	1.001172	*0.90 - 1.10*
Intercept	-1.416002	*+/-30*



SO2 Calibration Plot Date: March 9, 2023 Location: Jackfish 1



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Jackfish 1	Station number:	AMS506
Calibration Date:	March 29, 2023	Last Cal Date:	February 24, 2023
Start time (MST):	8:21	End time (MST):	12:06
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.14	ppm	Cal Gas Exp Date:	September 16, 2024
Cal Gas Cylinder #:	CC511843			
Removed Cal Gas Conc:	5.14	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	2659
ZAG Make/Model:	API 701		Serial Number:	4427

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1180540020	
Converter make:	Global G150		Converter serial #:	2022-218	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.995862	1.005003	Backgd or Offset:	1.04	3.42
Calibration intercept:	0.041428	-0.178301	Coeff or Slope:	0.720	1.090

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	4922	77.8	80.0	76.4	1.040
as found 2nd point	4961	38.9	40.0	38.1	1.036
as found 3rd point	4981	19.4	19.9	18.4	1.055
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	80.2	0.997
second point	4961	38.9	40.0	40.1	0.997
third point	4981	19.4	19.9	19.7	1.012
as left zero	5000	0.0	0.0	0.0	----
as left span	4922	77.8	80.0	80.1	0.999
SO2 Scrubber Check	4921	79.2	792.0	0.1	----
Date of last scrubber change:		24-Feb-23		Ave Corr Factor	1.002
Date of last converter efficiency test:		December 1, 2022			efficiency

Baseline Corr As found:	76.9	Prev response:	79.69	*% change:	-3.6%
Baseline Corr 2nd AF pt:	38.6	AF Slope:	0.962861	AF Intercept:	-0.579245
Baseline Corr 3rd AF pt:	18.9	AF Correlation:	0.999973		

* = > +/-5% change initiates investigation

Notes: Cahnged inlet filter after multi-point as founds. Scrubber test done and passed after calibrator zero. Adjusted zero and span.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

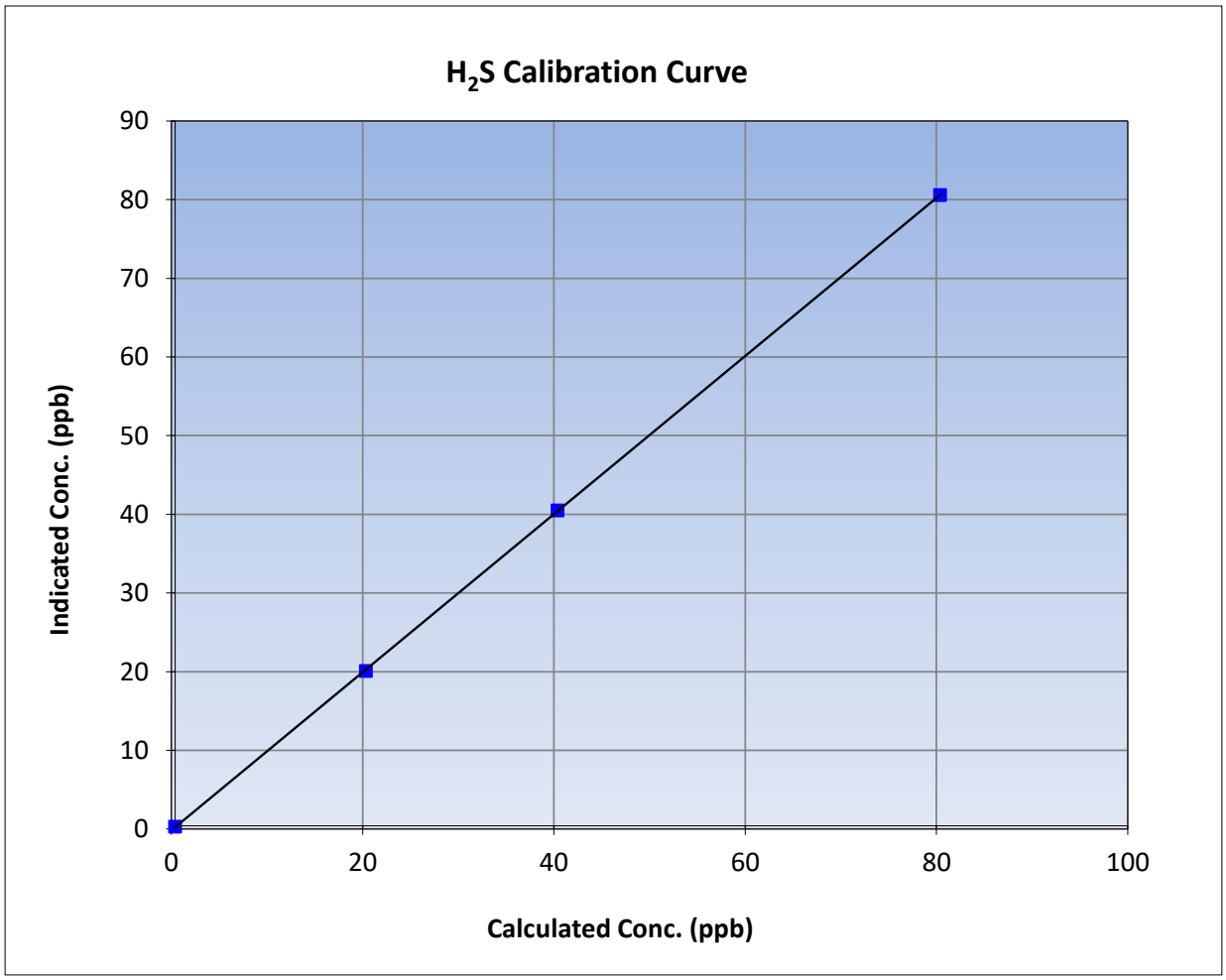
Station Information

Calibration Date:	March 29, 2023	Previous Calibration:	February 24, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	8:21	End Time (MST):	12:06
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1180540020

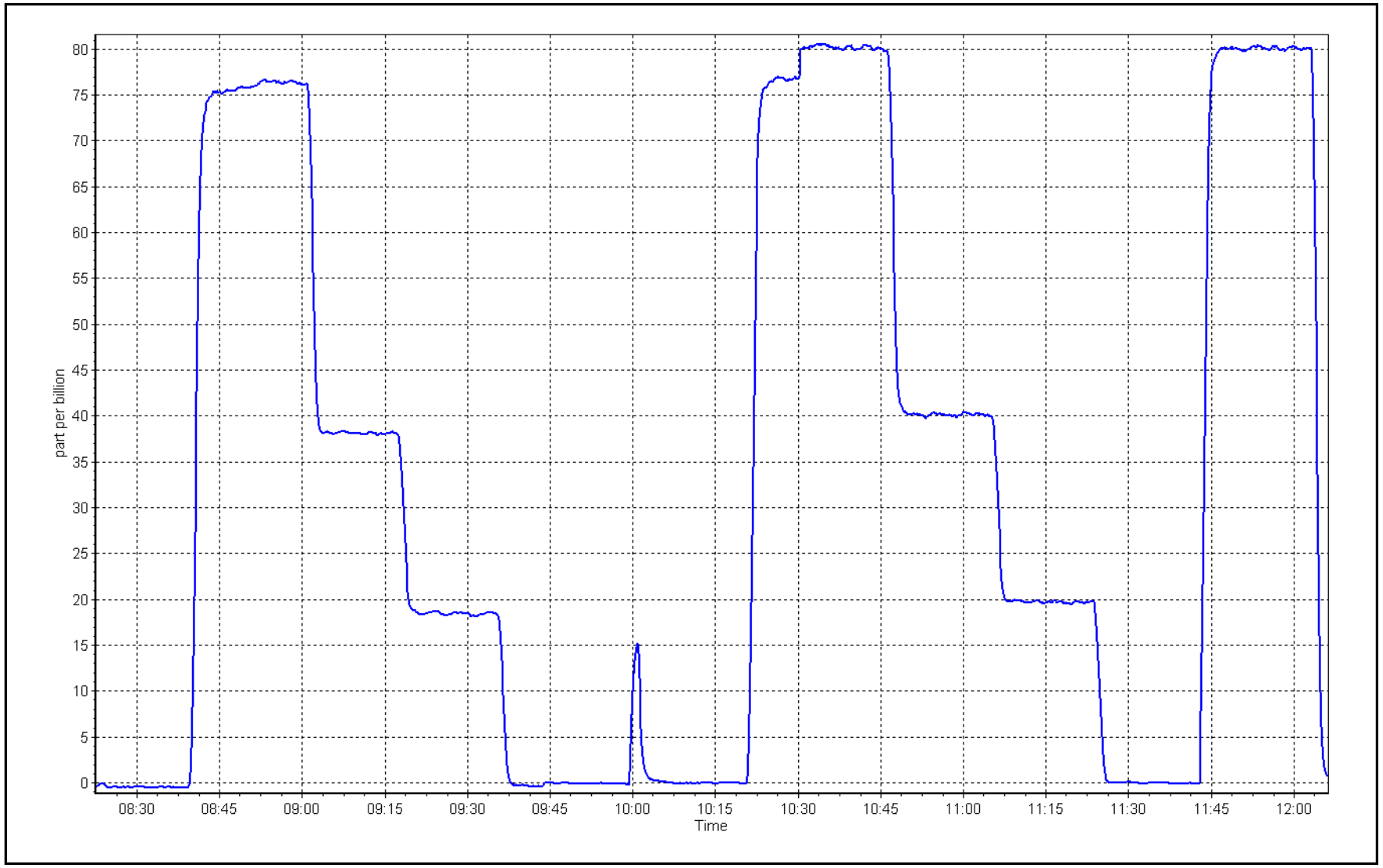
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.2	0.9973
40.0	40.1	0.9973
19.9	19.7	1.0123

Statistical Evaluation		Limits
Correlation Coefficient	0.999989	≥0.995
Slope	1.005003	0.90 - 1.10
Intercept	-0.178301	+/-3



H_2S Calibration Plot Date: March 29, 2023 Location: Jackfish 1



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Jackfish 1	Station number:	AMS506
Calibration Date:	March 30, 2023	Last Cal Date:	February 15, 2023
Start time (MST):	8:22	End time (MST):	12:36
Reason:	Routine		

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:	1.144	1.130	NO bkgnd or offset:	3.3	3.2
NOX coeff or slope:	0.992	0.993	NOX bkgnd or offset:	3.4	3.3
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	173.4	172.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999791	1.003601
NO_X Cal Offset:	-1.047992	-0.808032
NO Cal Slope:	1.001240	1.002854
NO Cal Offset:	-2.087973	-1.627998
NO_2 Cal Slope:	0.999204	1.003399
NO_2 Cal Offset:	-0.347850	0.523900

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	4916	84.4	801.1	799.9	1.2	812.2	807.9	4.2	0.9863	0.9901
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.2	0.0	----	----
high point	4916	84.4	801.1	799.9	1.2	803.1	800.9	2.2	0.9975	0.9987
second point	4958	42.2	400.5	400.0	0.6	402.3	400.2	2.1	0.9956	0.9994
third point	4979	21.1	200.3	200.0	0.3	198.1	196.0	2.2	1.0110	1.0203
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
as left span	4916	84.4	801.1	401.7	399.4	803.4	404.6	398.7	0.9971	0.9928
								Average Correction Factor	1.0014	1.0061

Corrected As found	NO_X = 812.1 ppb	NO = 807.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	1.5%
Previous Response	NO_X = 799.8 ppb	NO = 798.8 ppb		*Percent Change	NO =	1.1%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	799.5	401.3	399.4	401.0	0.9960	100.4%
2nd GPT point (200 ppb O3)	799.5	587.7	213.0	214.4	0.9934	100.7%
3rd GPT point (100 ppb O3)	799.5	689.3	111.4	112.9	0.9866	101.4%
				Average Correction Factor	0.9920	100.8%

Notes: Adjusted the span only.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

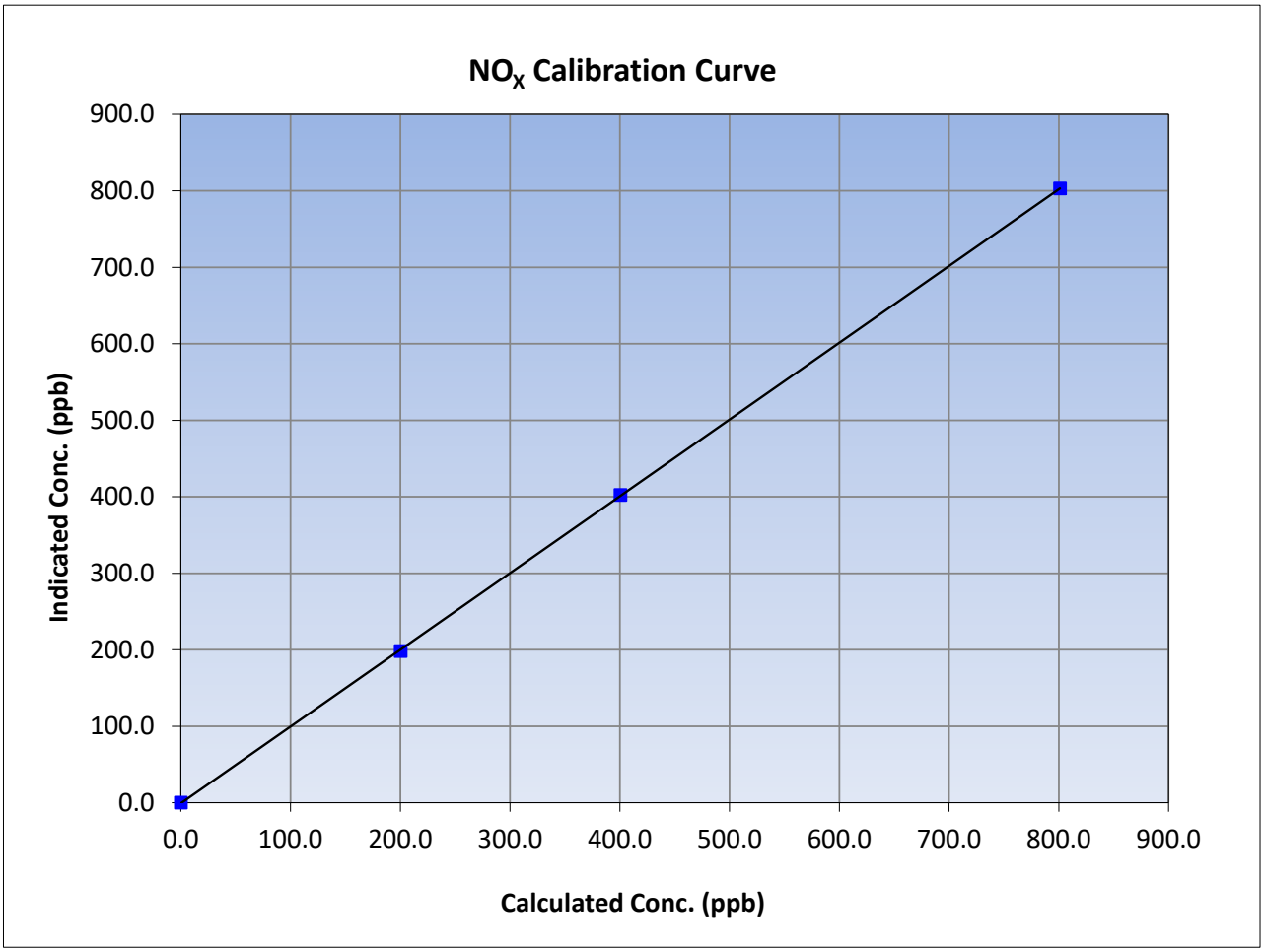
Version-04-2020

Station Information

Calibration Date:	March 30, 2023	Previous Calibration:	February 15, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	8:22	End Time (MST):	12:36
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	0.999981	≥0.995
801.1	803.1	0.9975			
400.5	402.3	0.9956	Slope	1.003601	0.90 - 1.10
200.3	198.1	1.0110			
			Intercept	-0.808032	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

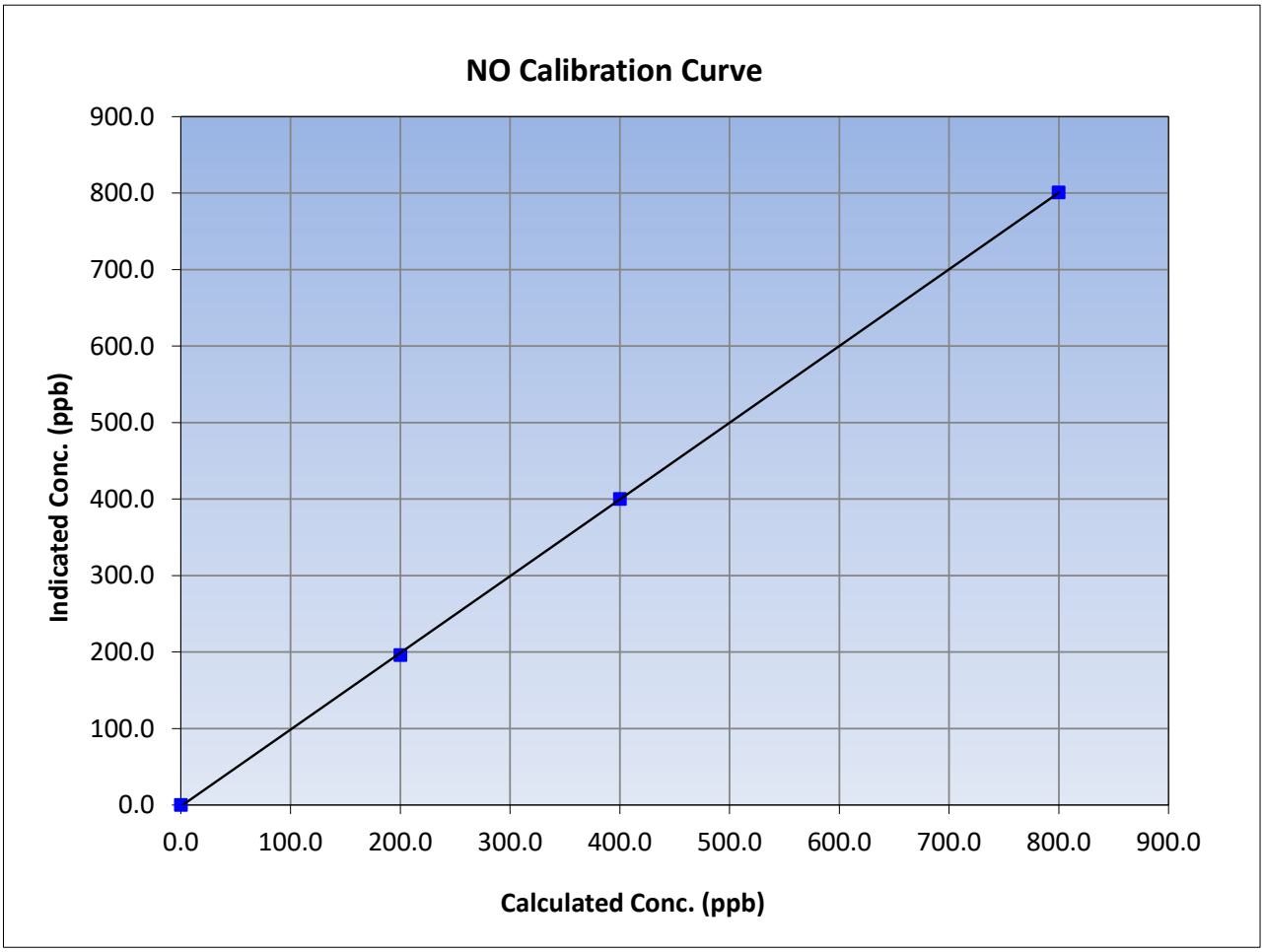
Version-04-2020

Station Information

Calibration Date:	March 30, 2023	Previous Calibration:	February 15, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	8:22	End Time (MST):	12:36
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	0.999964	≥0.995
799.9	800.9	0.9987			
400.0	400.2	0.9994	Slope	1.002854	0.90 - 1.10
200.0	196.0	1.0203			
			Intercept	-1.627998	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

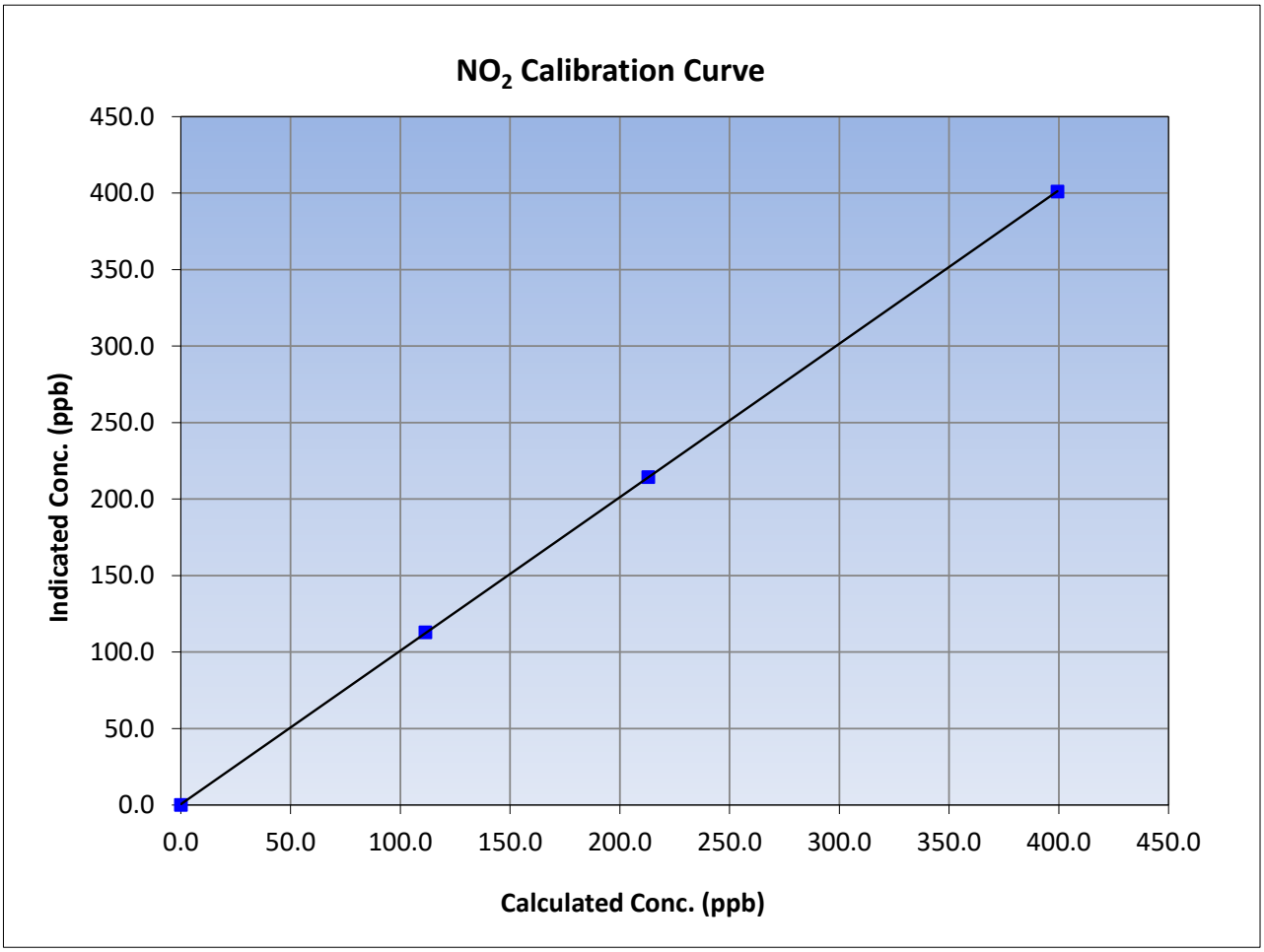
Version-04-2020

Station Information

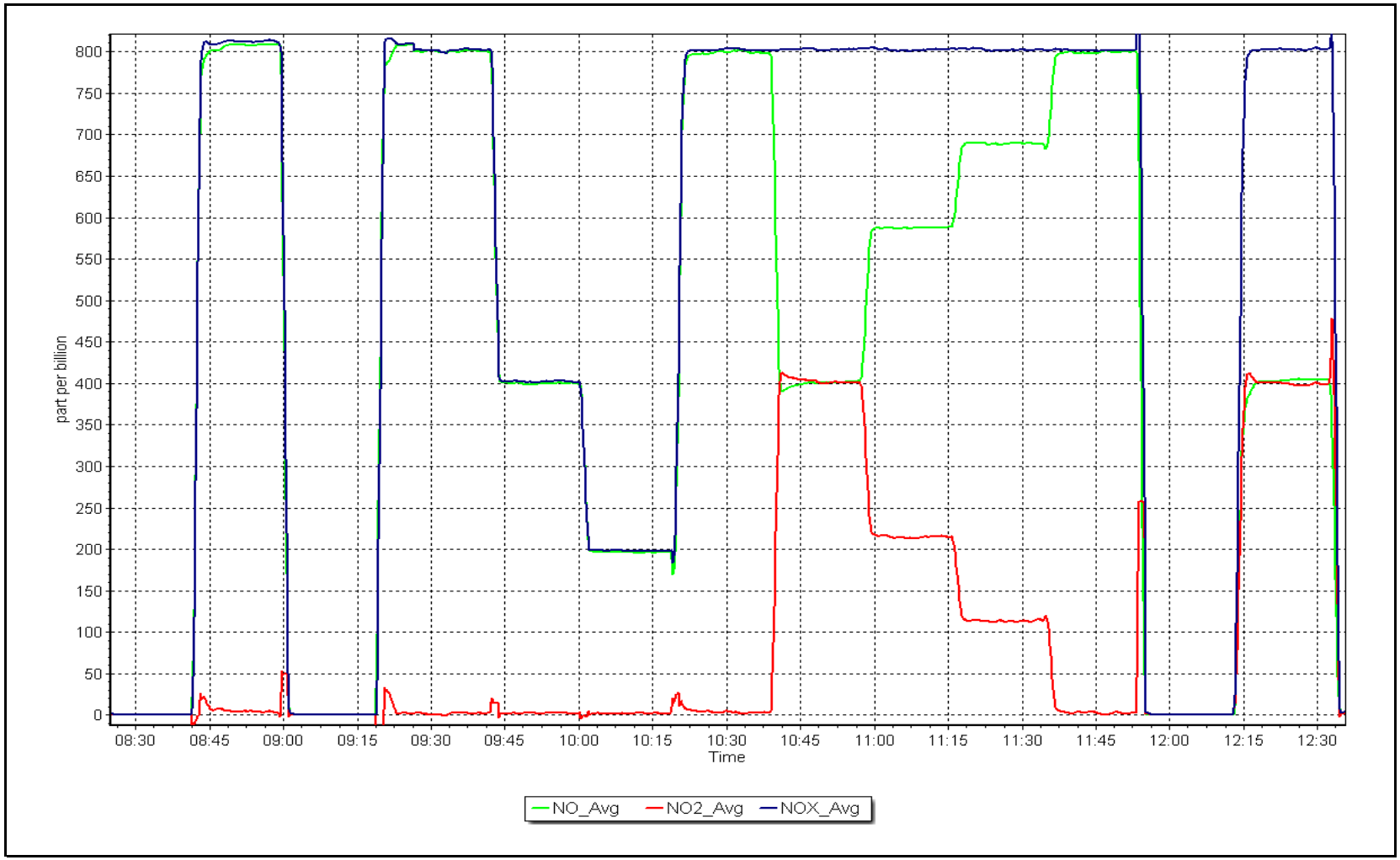
Calibration Date:	March 30, 2023	Previous Calibration:	February 15, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	8:22	End Time (MST):	12:36
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999991	≥0.995
399.4	401.0	0.9960			
213.0	214.4	0.9934	Slope	1.003399	0.90 - 1.10
111.4	112.9	0.9866			
			Intercept	0.523900	+/-20



NO_x Calibration Plot Date: March 30, 2023 Location: Jackfish 1



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS508
KIRBY NORTH
MARCH 2023

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

April 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Kirby North	Station number:	AMS508
Calibration Date:	March 9, 2023	Last Cal Date:	February 2, 2023
Start time (MST):	8:48	End time (MST):	14:04
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:	1.001676	0.997350	Backgd or Offset:	19.2	19.6
Calibration intercept:	-1.468267	-0.929311	Coeff or Slope:	1.151	1.151

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.8	----
as found span	4919	81.3	799.6	796.3	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4919	81.3	799.6	797.3	1.003
second point	4959	40.7	400.3	397.4	1.007
third point	4980	20.3	199.7	197.2	1.012
as left zero	5000	0.0	0.0	0.1	----
as left span	4919	81.3	799.6	795.2	1.006
				Average Correction Factor	1.008

Baseline Corr As found:	795.50	Previous response	799.49	*% 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.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

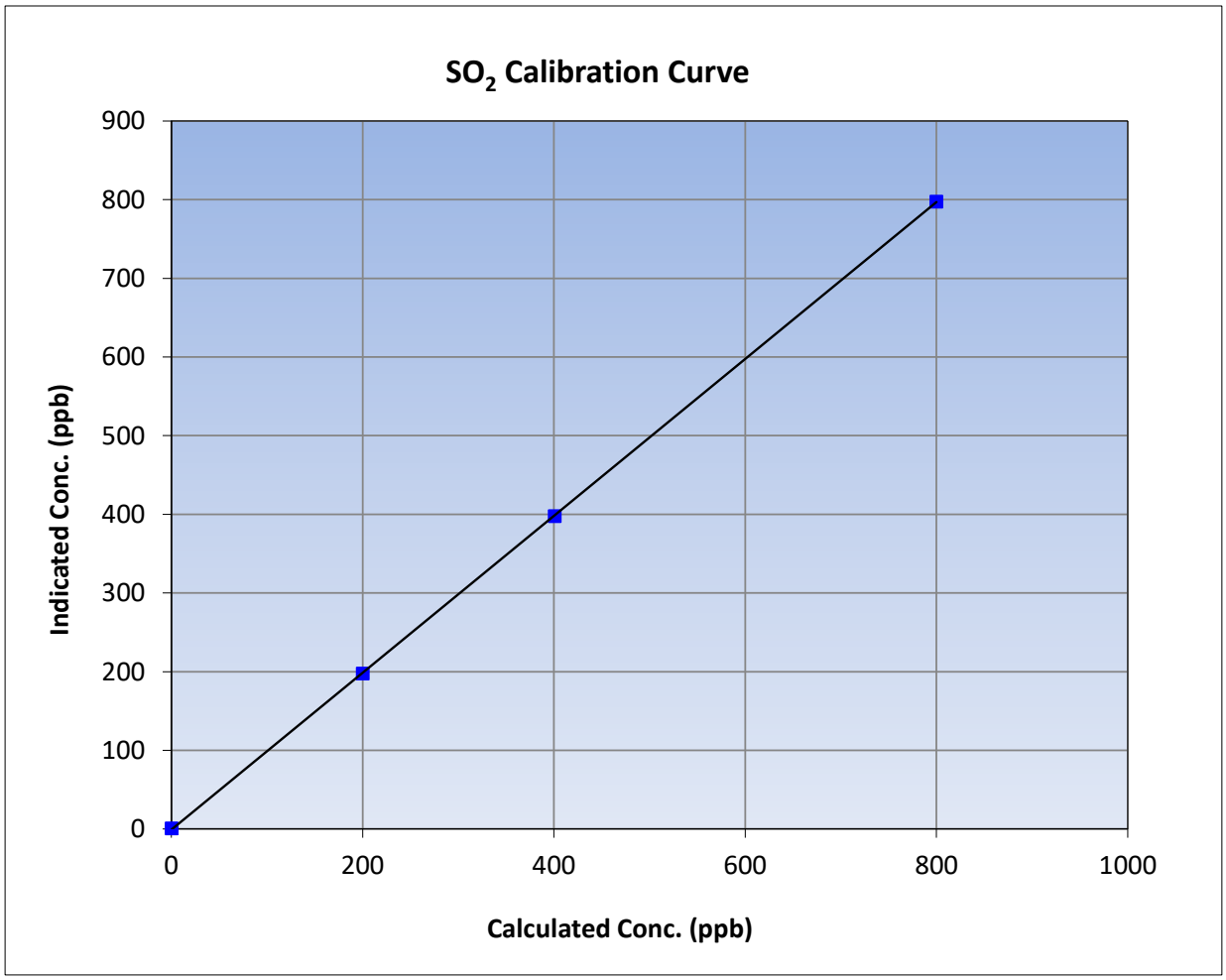
Station Information

Calibration Date:	March 9, 2023	Previous Calibration:	February 2, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	8:48	End Time (MST):	14:04
Analyzer make:	Thermo 43iQ	Analyzer serial #:	1182340007

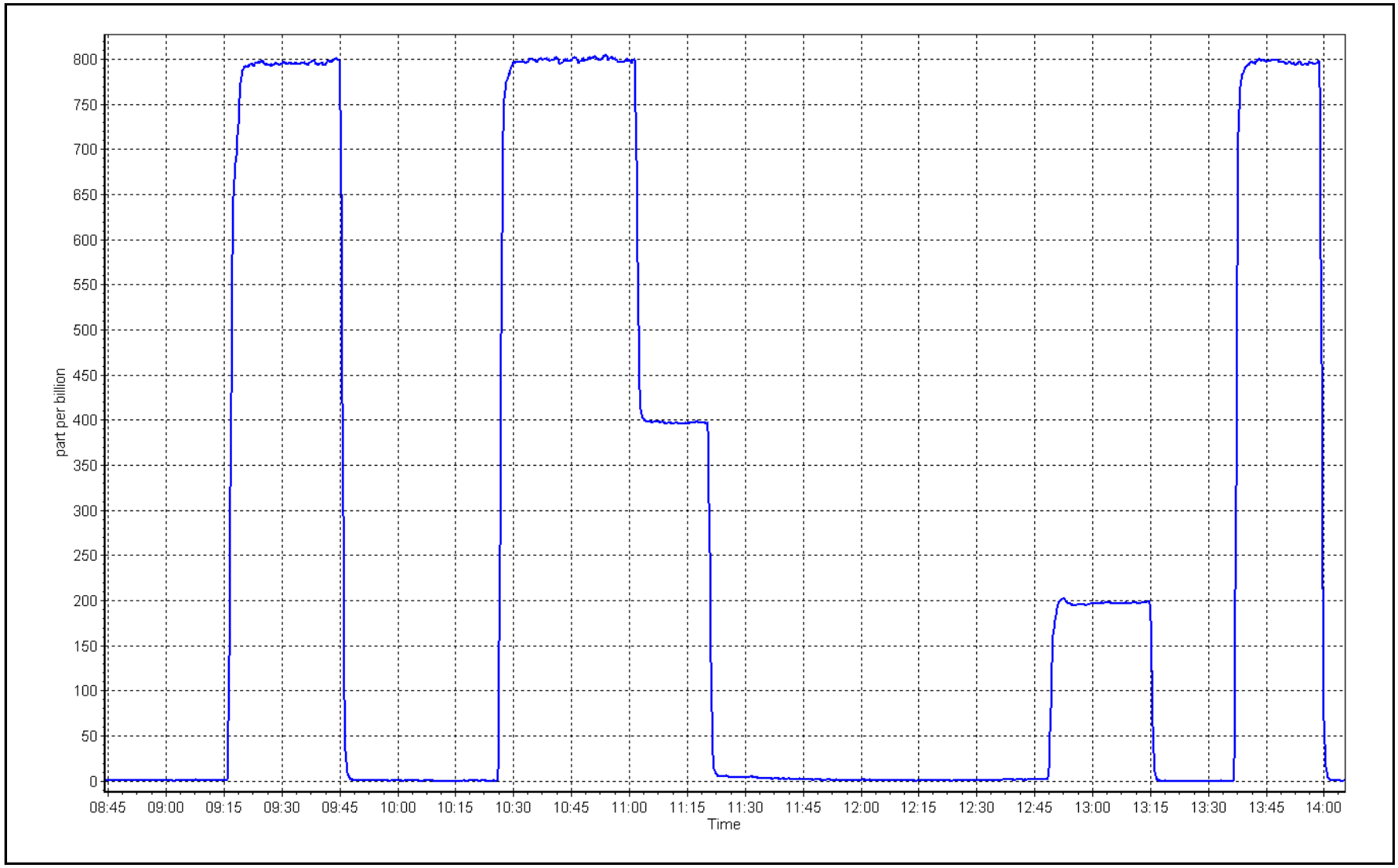
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
799.6	797.3	1.0029
400.3	397.4	1.0074
199.7	197.2	1.0125

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999989	*≥0.995*
Slope	0.997350	*0.90 - 1.10*
Intercept	-0.929311	*+/-30*



SO2 Calibration Plot Date: March 9, 2023 Location: Kirby North



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Kirby North	Station number:	AMS508
Calibration Date:	March 9, 2023	Last Cal Date:	February 15, 2023
Start time (MST):	8:48	End time (MST):	15:13
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 T750		Serial Number:	282
ZAG Make/Model:	API 751H		Serial Number:	322

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:	0.995603	1.007456	Backgd or Offset:	1.70	1.67
Calibration intercept:	-0.101015	-0.140937	Coeff or Slope:	1.022	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	4923	77.4	80.0	81.5	0.979
as found 2nd point	4961	38.8	40.1	40.5	0.985
as found 3rd point	4981	19.3	19.9	20.2	0.978
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4923	77.4	80.0	80.5	0.994
second point	4961	38.8	40.1	40.1	1.000
third point	4981	19.3	19.9	20.0	0.997
as left zero	5000	0.0	0.0	0.0	----
as left span	4923	77.4	80.0	78.6	1.018
SO2 Scrubber Check	4920	79.8	798.0	0.1	----
Date of last scrubber change:		21-Sep-22		Ave Corr Factor	0.997
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.7	Prev response:	79.53	*% change:	2.7%
Baseline Corr 2nd AF pt:	40.7	AF Slope:	1.021025	AF Intercept:	-0.240889
Baseline Corr 3rd AF pt:	20.4	AF Correlation:	0.999985		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

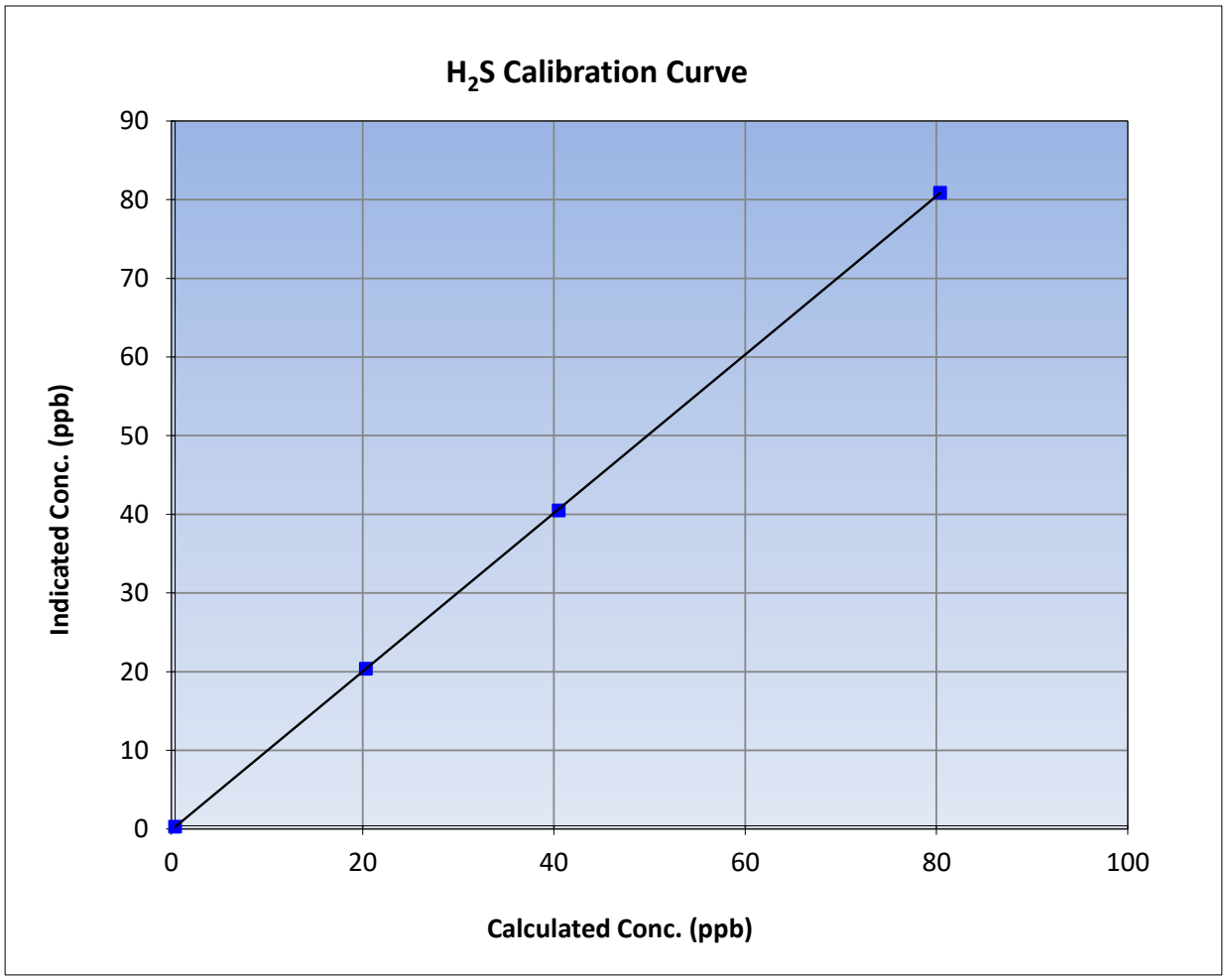
Station Information

Calibration Date:	March 9, 2023	Previous Calibration:	February 15, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	8:48	End Time (MST):	15:13
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1150840012

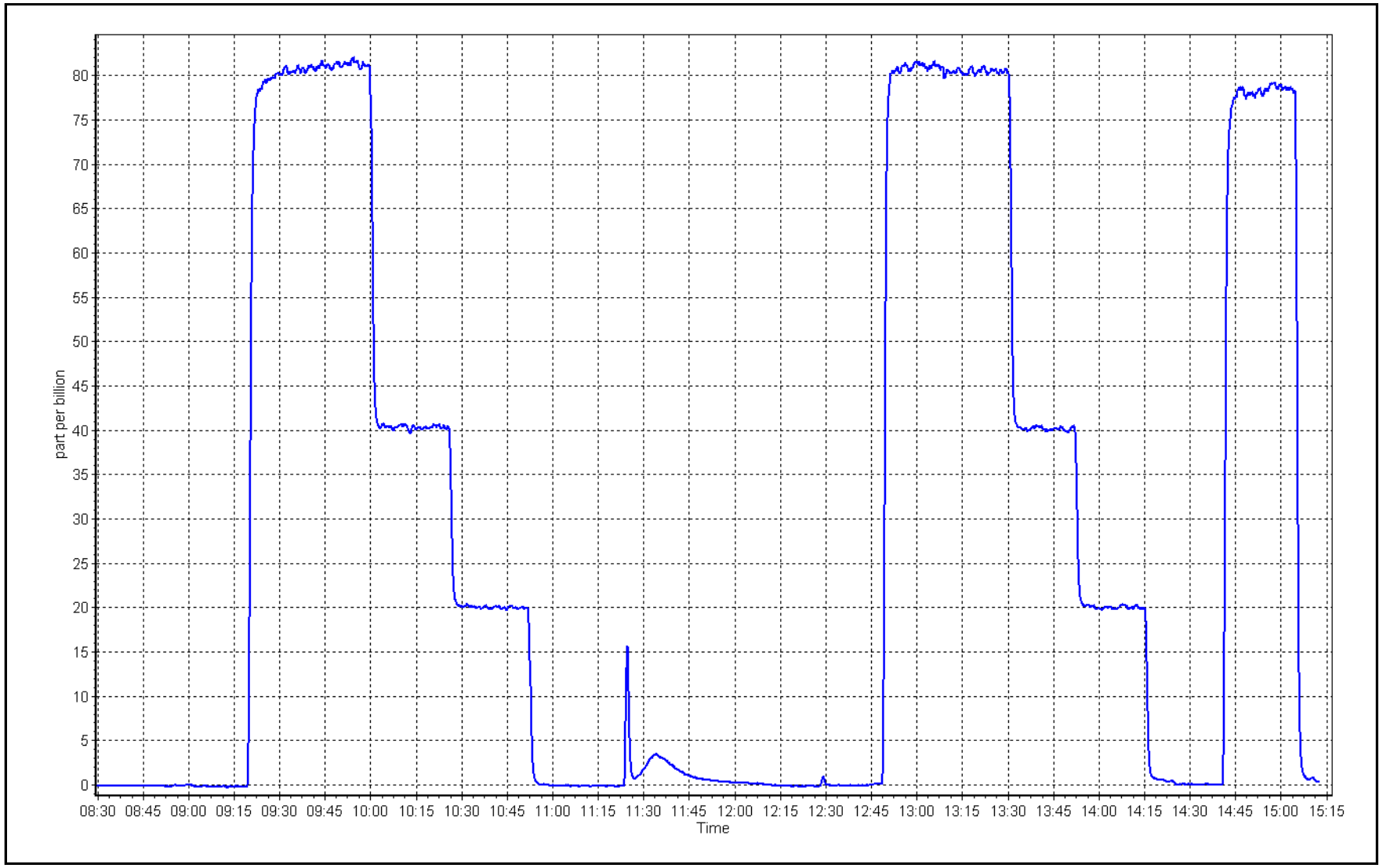
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.5	0.9935
40.1	40.1	0.9999
19.9	20.0	0.9972

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999991	*≥0.995*
Slope	1.007456	*0.90 - 1.10*
Intercept	-0.140937	*+/-3*



H_2S Calibration Plot Date: March 9, 2023 Location: Kirby North



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Kirby North	Station number:	AMS508
Calibration Date:	March 9, 2023	Last Cal Date:	February 4, 2023
Start time (MST):	8:48	End time (MST):	14:04
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:	1.002675	0.998186	Background:	2.70	2.86
Calibration intercept:	-0.018187	0.031226	Coefficient:	3.796	3.706

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	0.19	----
as found span	4919	81.3	17.26	17.80	0.970
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.06	----
high point	4919	81.3	17.26	17.29	0.998
second point	4959	40.7	8.64	8.60	1.005
third point	4980	20.3	4.31	4.34	0.993
as left zero	5000	0.0	0.00	0.12	----
as left span	4919	81.3	17.26	17.32	0.997
				Average Correction Factor	0.999

Baseline Corr As found:	17.61	Previous response	17.29	*% change	1.8%
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 filter after as founds. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

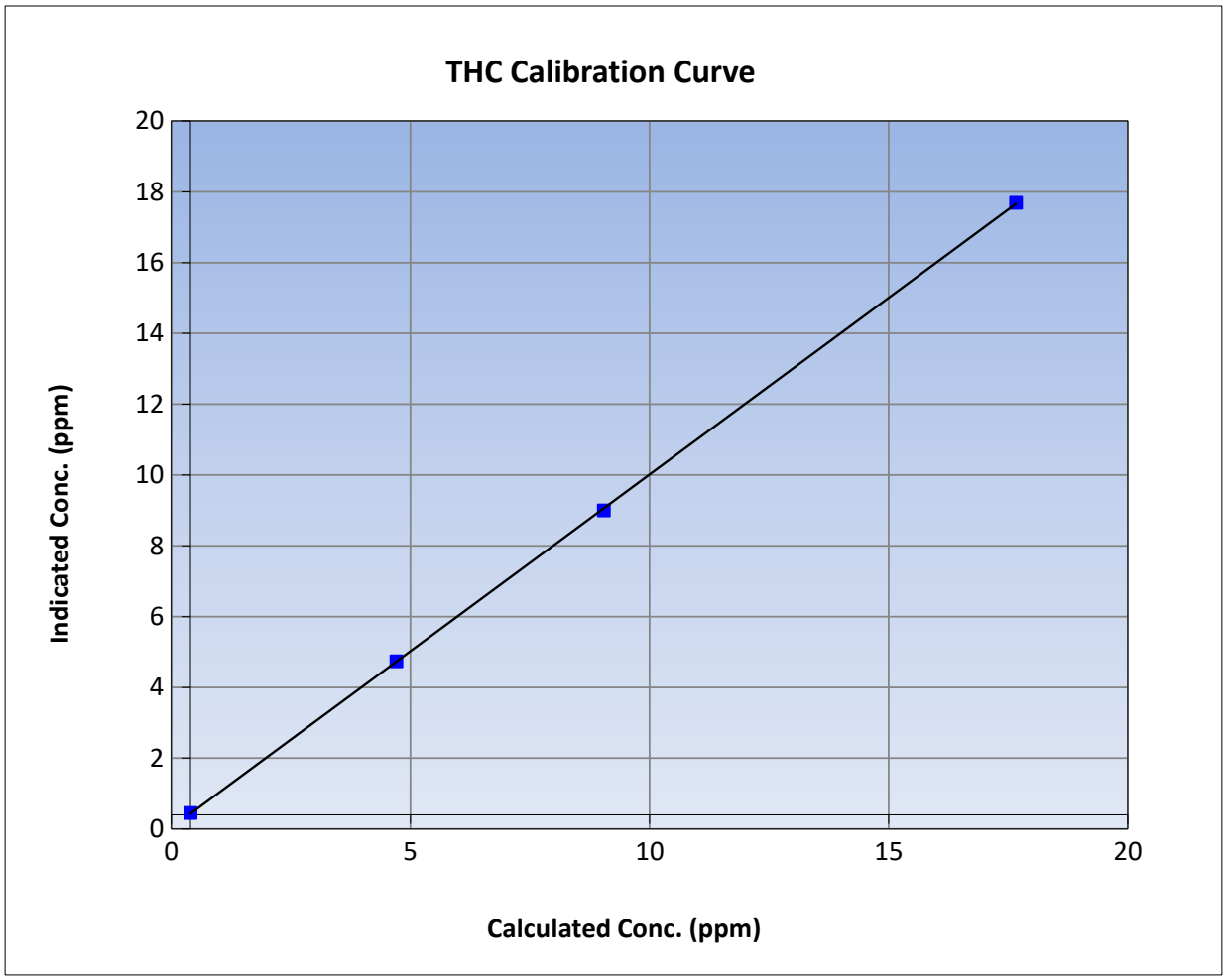
Station Information

Calibration Date:	March 9, 2023	Previous Calibration:	February 4, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	8:48	End Time (MST):	14:04
Analyzer make:	Thermo 51i	Analyzer serial #:	1182340005

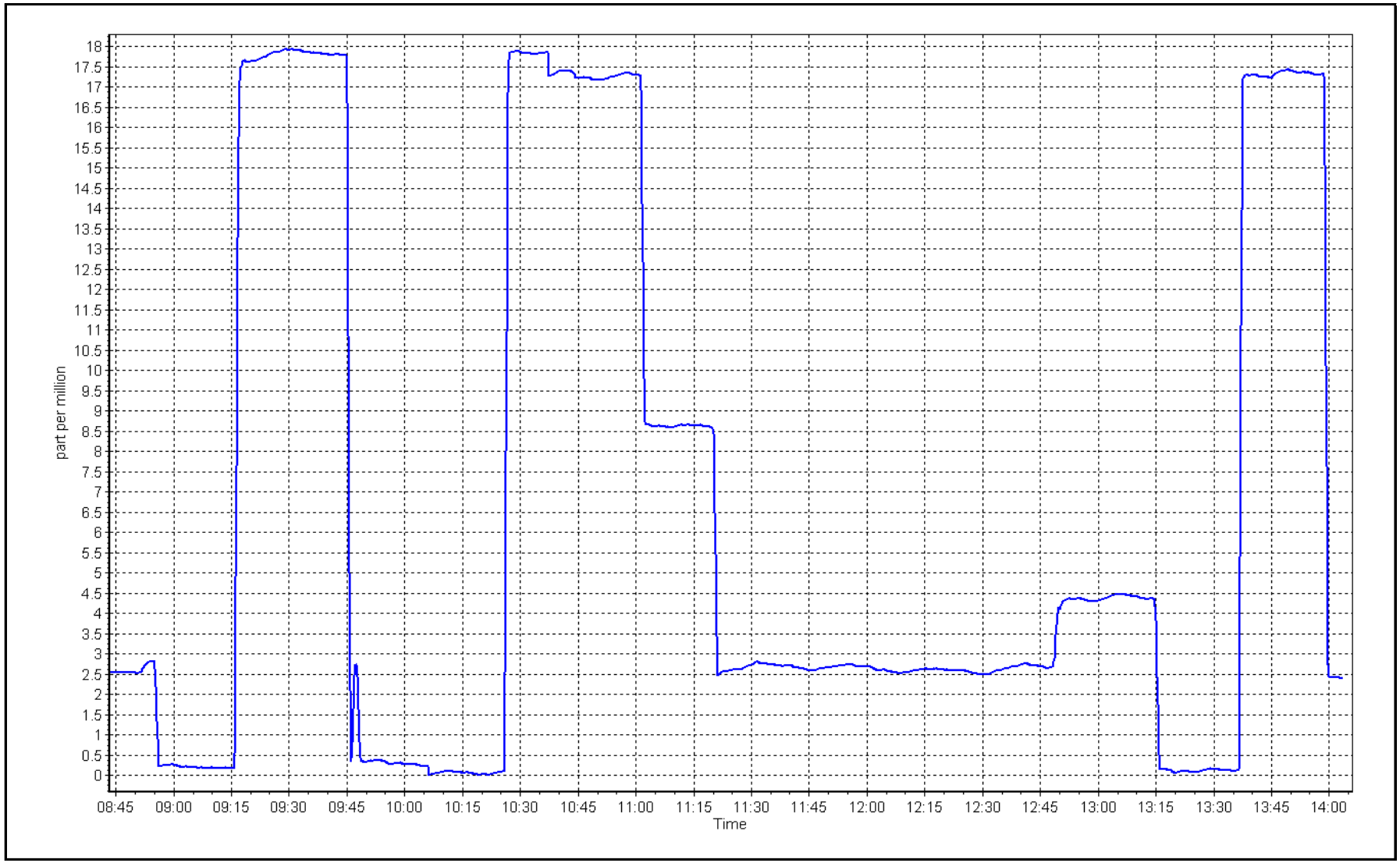
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.06	----
17.26	17.29	0.9984
8.64	8.60	1.0050
4.31	4.34	0.9929

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999970	*≥0.995*
Slope	0.998186	*0.90 - 1.10*
Intercept	0.031226	*+/-1.5*



THC Calibration Plot Date: March 9, 2023 Location: Kirby North



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Kirby North	Station number:	AMS508
Calibration Date:	March 8, 2023	Last Cal Date:	February 1, 2023
Start time (MST):	11:35	End time (MST):	17:03
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:		T34ULGL	Cal Gas Expiry Date:	March 8, 2025	
NOX Cal Gas Conc:	49.39	ppm	NO Cal Gas Conc:	49.02	ppm
Removed Cylinder #:		NA	Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	49.39	ppm	Removed Gas NO Conc:	49.02	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3804	
ZAG make/model:	API 701H		Serial Number:	880	

Analyzer Information

Analyzer make:	API T200	Analyzer serial #:	7029
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.026	1.026	NO bkgnd or offset:	0.1	0.1
NOX coeff or slope:	1.023	1.023	NOX bkgnd or offset:	0.3	0.3
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	4.8	5.0

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.002073	0.997146
NO_X Cal Offset:	-1.391610	-1.392505
NO Cal Slope:	1.001077	0.996559
NO Cal Offset:	-2.093883	-2.174660
NO_2 Cal Slope:	0.998942	1.007853
NO_2 Cal Offset:	-0.787844	0.638504

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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	81.0	800.1	794.1	6.0	780.8	774.4	6.3	1.0247	1.0255
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
high point	4919	81.0	800.1	794.1	6.0	797.1	790.3	6.8	1.0038	1.0048
second point	4960	40.5	400.0	397.0	3.0	396.8	392.4	4.5	1.0081	1.0118
third point	4980	20.2	199.5	198.0	1.5	196.3	193.0	3.3	1.0164	1.0261
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	0.1	----	----
as left span	4919	81.0	800.1	415.1	385.0	792.0	408.2	383.8	1.0103	1.0170
								Average Correction Factor	1.0094	1.0142

Corrected As found	NO_X = 781.0 ppb	NO = 774.6 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-2.5%
Previous Response	NO_X = 800.4 ppb	NO = 792.9 ppb		*Percent Change	NO =	-2.4%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	788.7	409.7	385.0	388.3	0.9915	100.9%
2nd GPT point (200 ppb O3)	788.7	594.2	200.5	203.0	0.9877	101.2%
3rd GPT point (100 ppb O3)	788.7	697.1	97.6	99.8	0.9779	102.3%
				Average Correction Factor	0.9857	101.5%

Notes: Changed sample inlet filter after as founds. No adjustments made. Second High NO reference point used for converter efficiency.

Calibration Performed By: Braiden Boutilier

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Station Name:	Kirby North	Station Number:	AMS508
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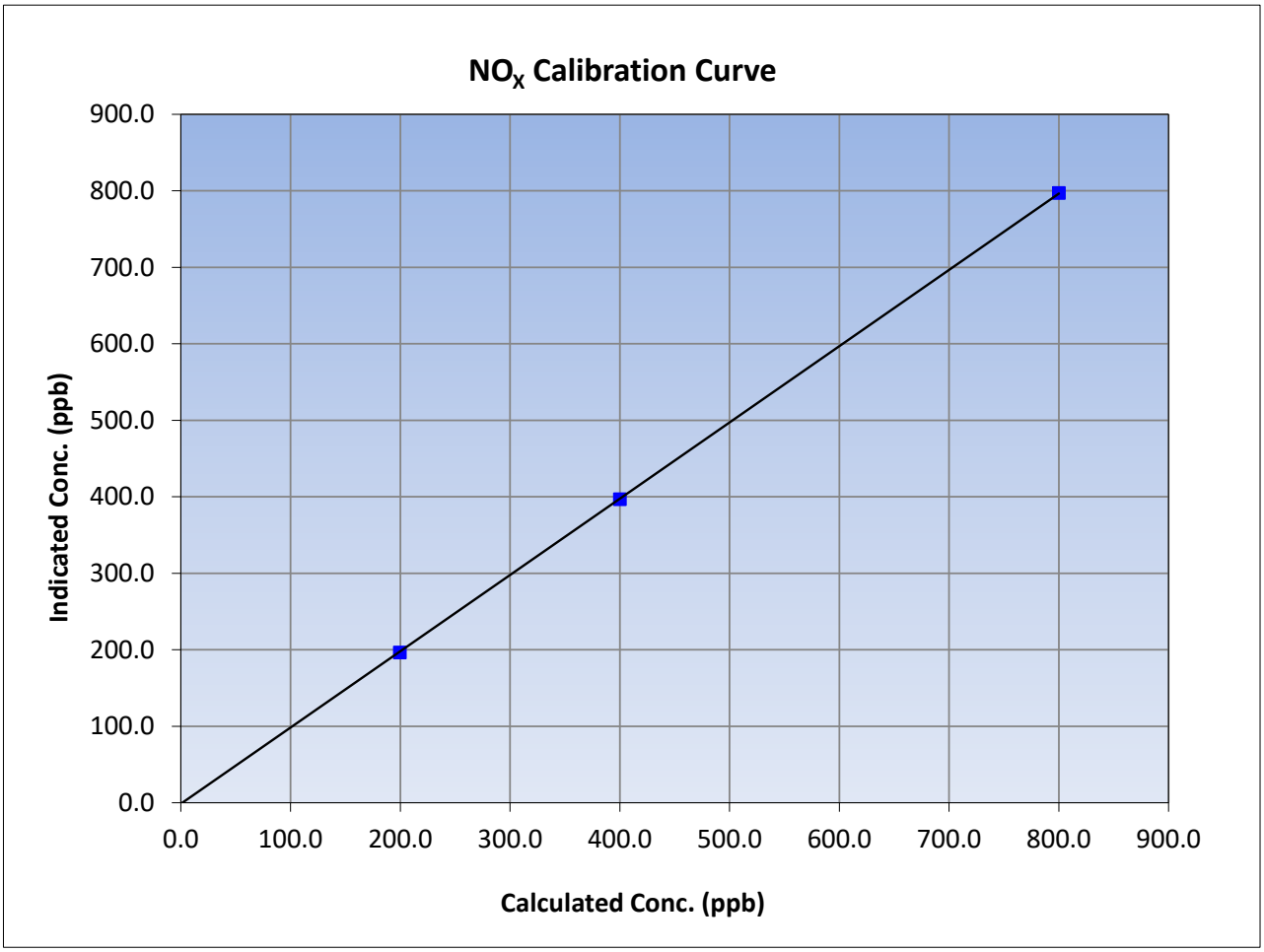
Analyzer make:	API T200	Analyzer serial #:	7029

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999988	≥0.995
800.1	797.1	1.0038			
400.0	396.8	1.0081	Slope	0.997146	0.90 - 1.10
199.5	196.3	1.0164			
			Intercept	-1.392505	+/-20



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NO Calibration Summary

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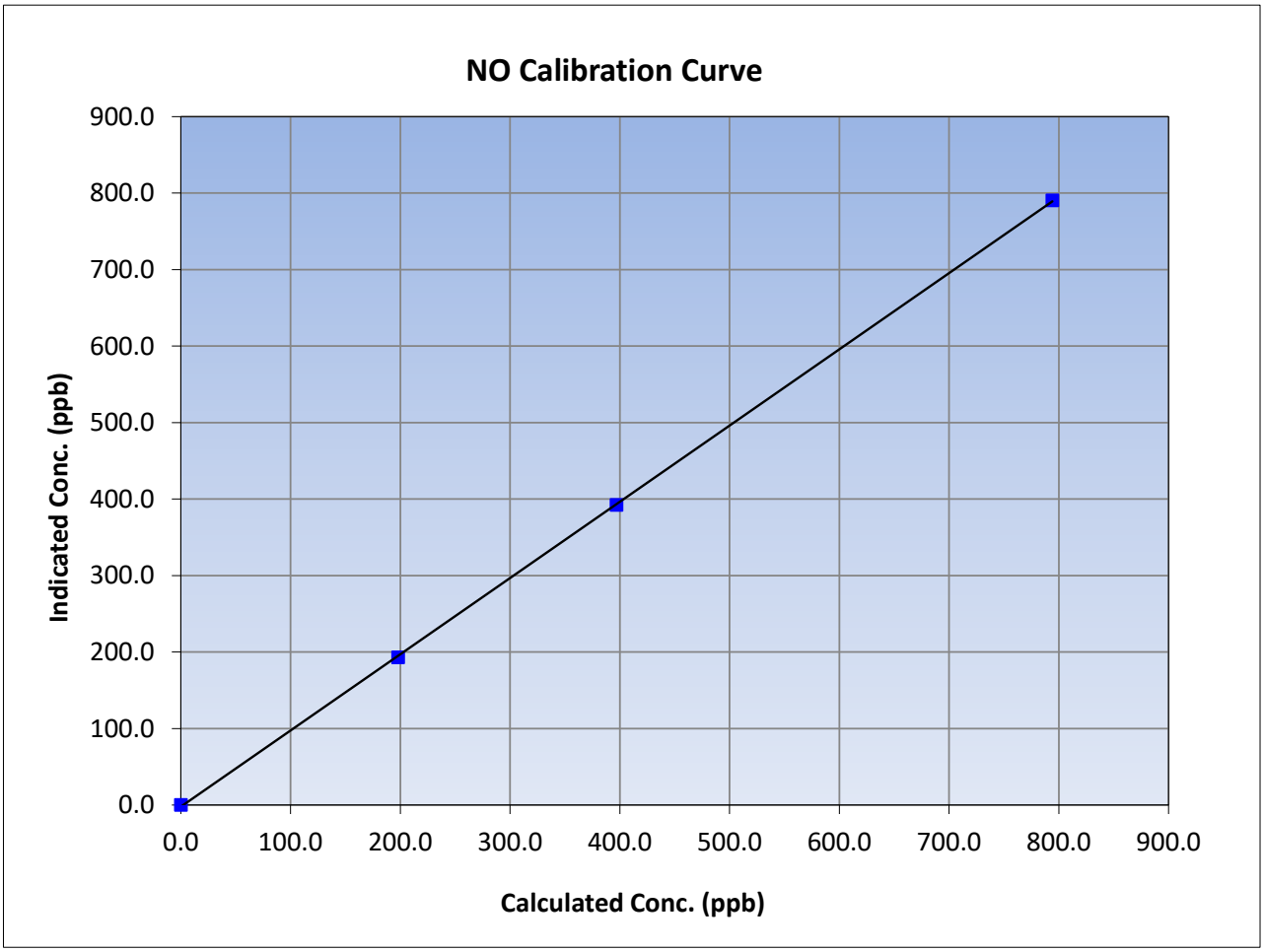
Analyzer make:	API T200	Analyzer serial #:	7029

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999966	≥0.995
794.1	790.3	1.0048			
397.0	392.4	1.0118	Slope	0.996559	0.90 - 1.10
198.0	193.0	1.0261			
			Intercept	-2.174660	+/-20



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NO_2 Calibration Summary

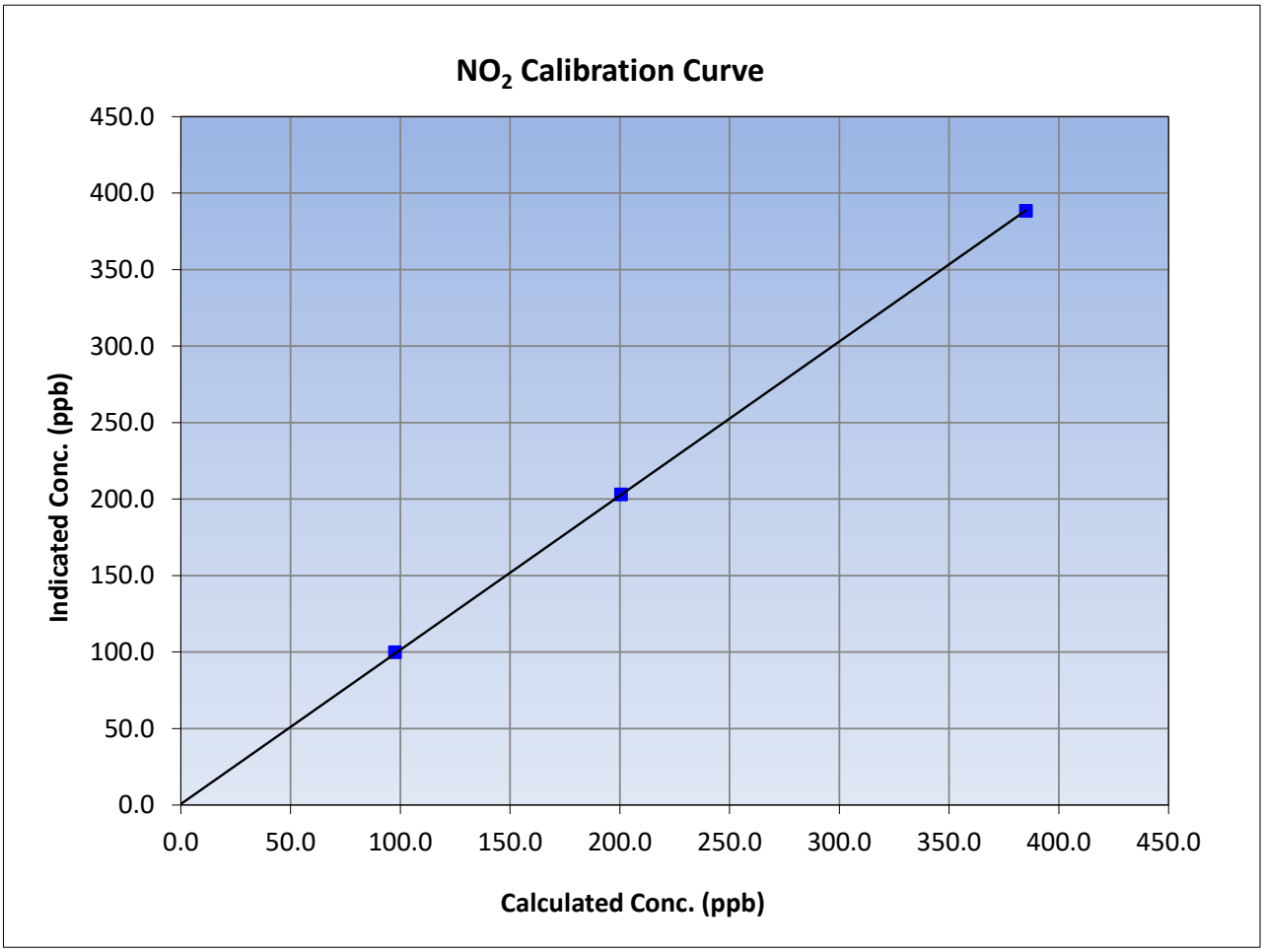
Version-04-2020

Station Information

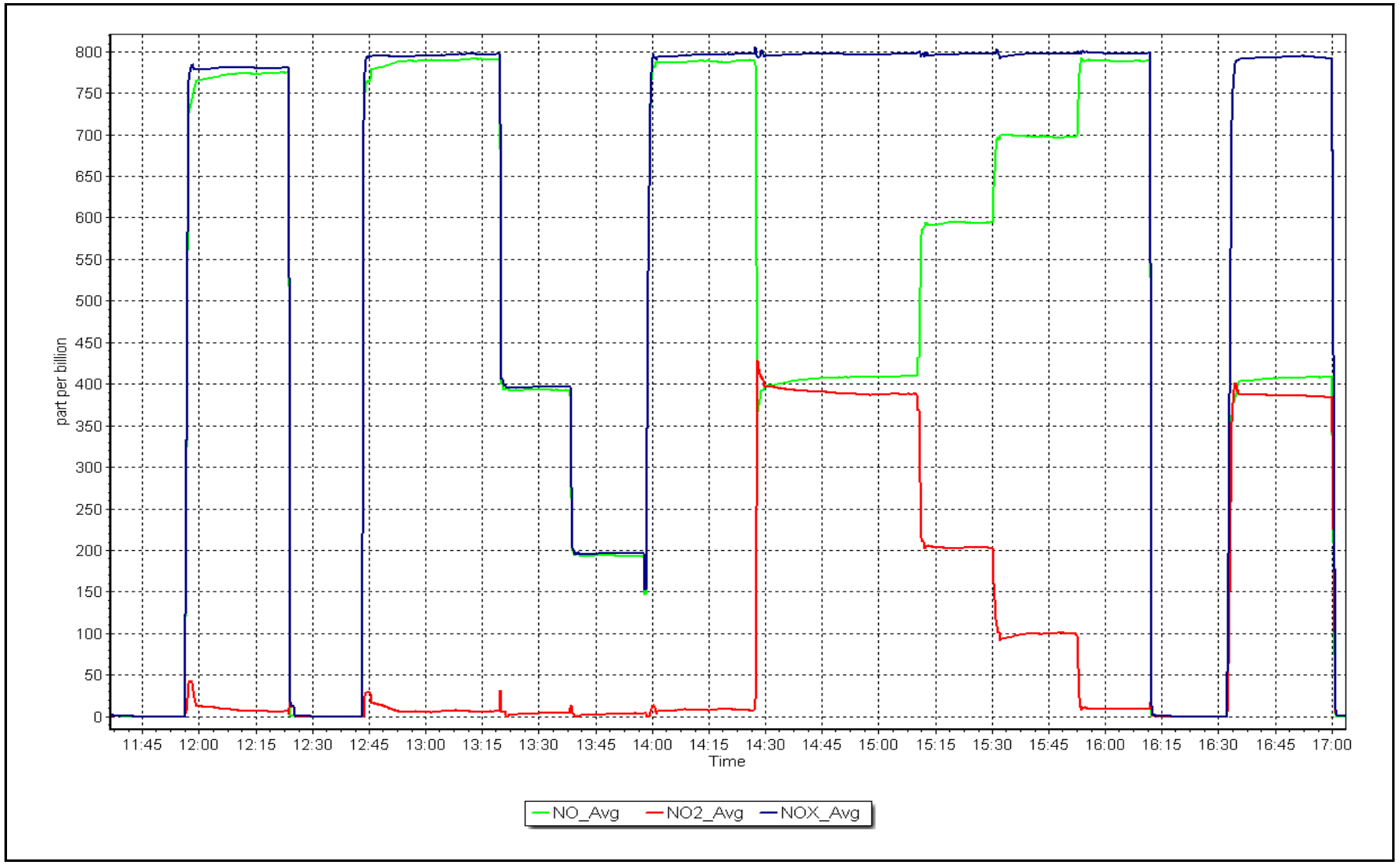
Calibration Date:	March 8, 2023	Previous Calibration:	February 1, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	11:35	End Time (MST):	17:03
Analyzer make:	API T200	Analyzer serial #:	7029

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999983	≥0.995
385.0	388.3	0.9915			
200.5	203.0	0.9877	Slope	1.007853	0.90 - 1.10
97.6	99.8	0.9779			
			Intercept	0.638504	+/-20



NO_X Calibration Plot Date: March 8, 2023 Location: Kirby North



End of Report