WOOD BUFFALO
ENVIRONMENTAL ASSOCIATION

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Wood Buffalo Environmental Association

FEBRUARY 2023

MONTHLY CALIBRATION REPORT

CONTINUOUS MONITORING

March 31, 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
FEBRUARY 2023

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

March 31, 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:	February 1, 2023	Last Cal Date:	January 5, 2023
Start time (MST):	10:45	End time (MST):	14:21
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:	0.998187	0.998801	Backgd or Offset:	19.1	19.0
Calibration intercept:	-0.293417	-0.333078	Coeff or Slope:	0.891	0.891

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4918	81.3	799.9	797.8	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4918	81.3	799.9	799.2	1.001
second point	4959	40.7	400.4	398.5	1.005
third point	4979	20.3	199.7	199.2	1.003
as left zero	5000	0.0	0.0	0.3	----
as left span	4918	81.3	799.9	799.6	1.000
				Average Correction Factor	1.003

Baseline Corr As found:	797.70	Previous response	798.20	*% change	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

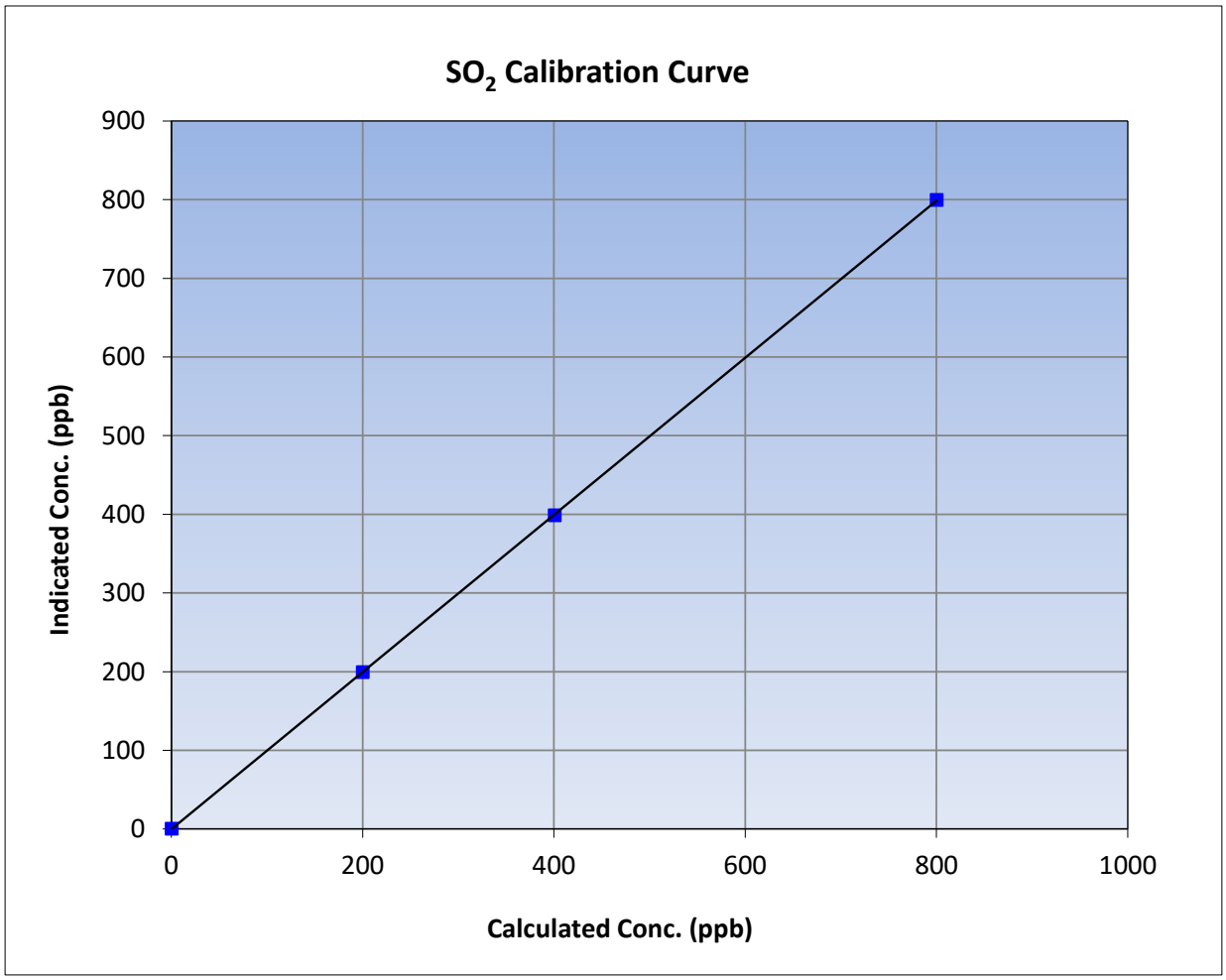
Station Information

Calibration Date:	February 1, 2023	Previous Calibration:	January 5, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:45	End Time (MST):	14:21
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301448

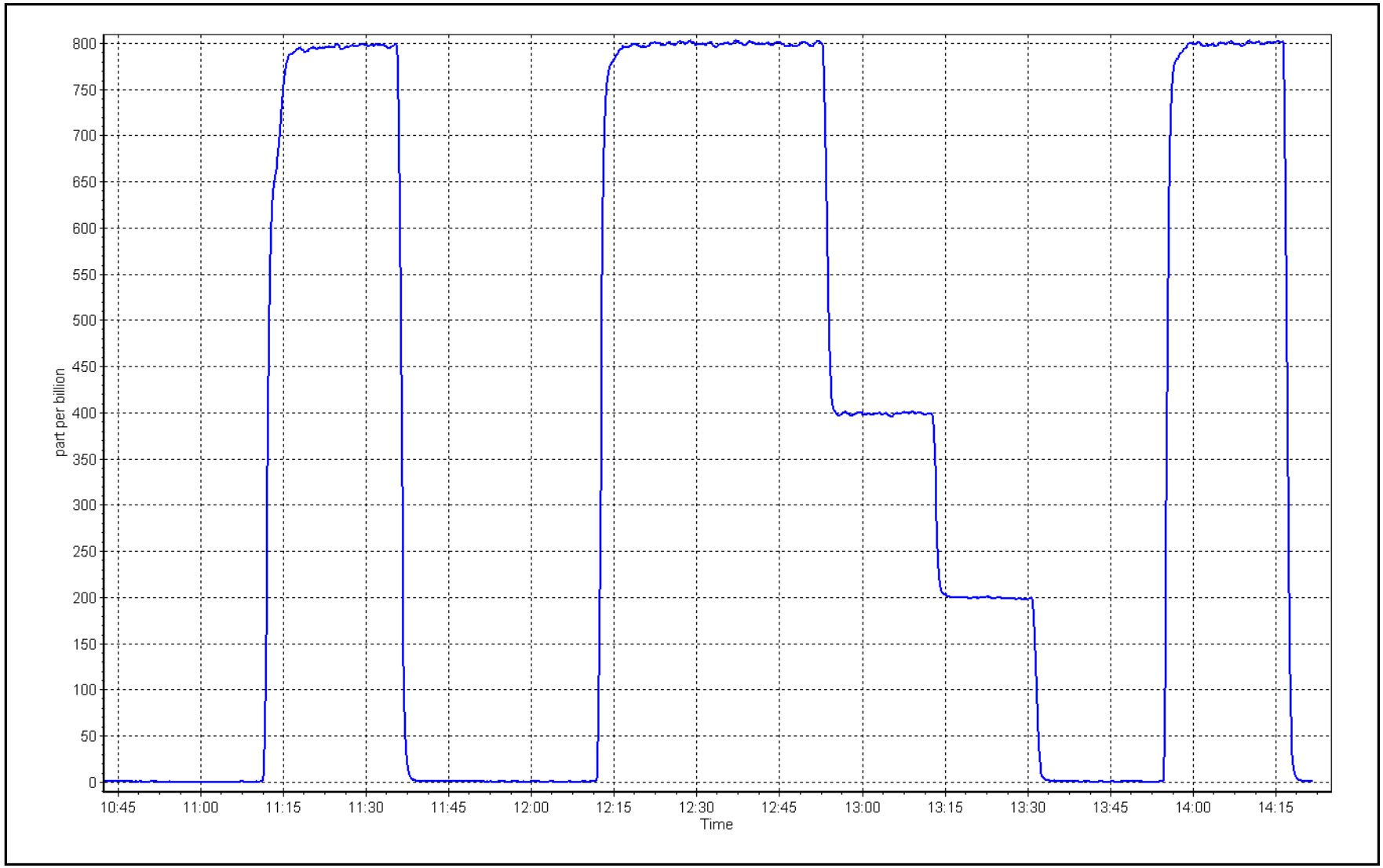
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
799.9	799.2	1.0009
400.4	398.5	1.0048
199.7	199.2	1.0027

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	0.998801	*0.90 - 1.10*
Intercept	-0.333078	*+/-30*



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



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	February 13, 2023	Last Cal Date:	January 10, 2023
Start time (MST):	11:12	End time (MST):	17:19
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:	0.998364	0.995507	Backgd or Offset:	2.29	2.30
Calibration intercept:	0.059997	0.059999	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	0.1	----
as found span	4921	78.4	80.0	79.6	1.006
as found 2nd point	4960	39.2	40.0	39.8	1.008
as found 3rd point	4980	19.6	20.0	20.2	0.995
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	78.4	80.0	79.7	1.004
second point	4960	39.2	40.0	39.9	1.002
third point	4980	19.6	20.0	19.9	1.005
as left zero	5000	0.0	0.0	0.1	----
as left span	4921	78.4	80.0	79.6	1.005
SO2 Scrubber Check	4919	81.3	813.0	0.0	----
Date of last scrubber change:		December 17, 2021		Ave Corr Factor	1.004
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.5	Prev response:	79.92	*% change:	-0.5%
Baseline Corr 2nd AF pt:	39.7	AF Slope:	0.992792	AF Intercept:	0.180003
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999988		

* = > +/-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

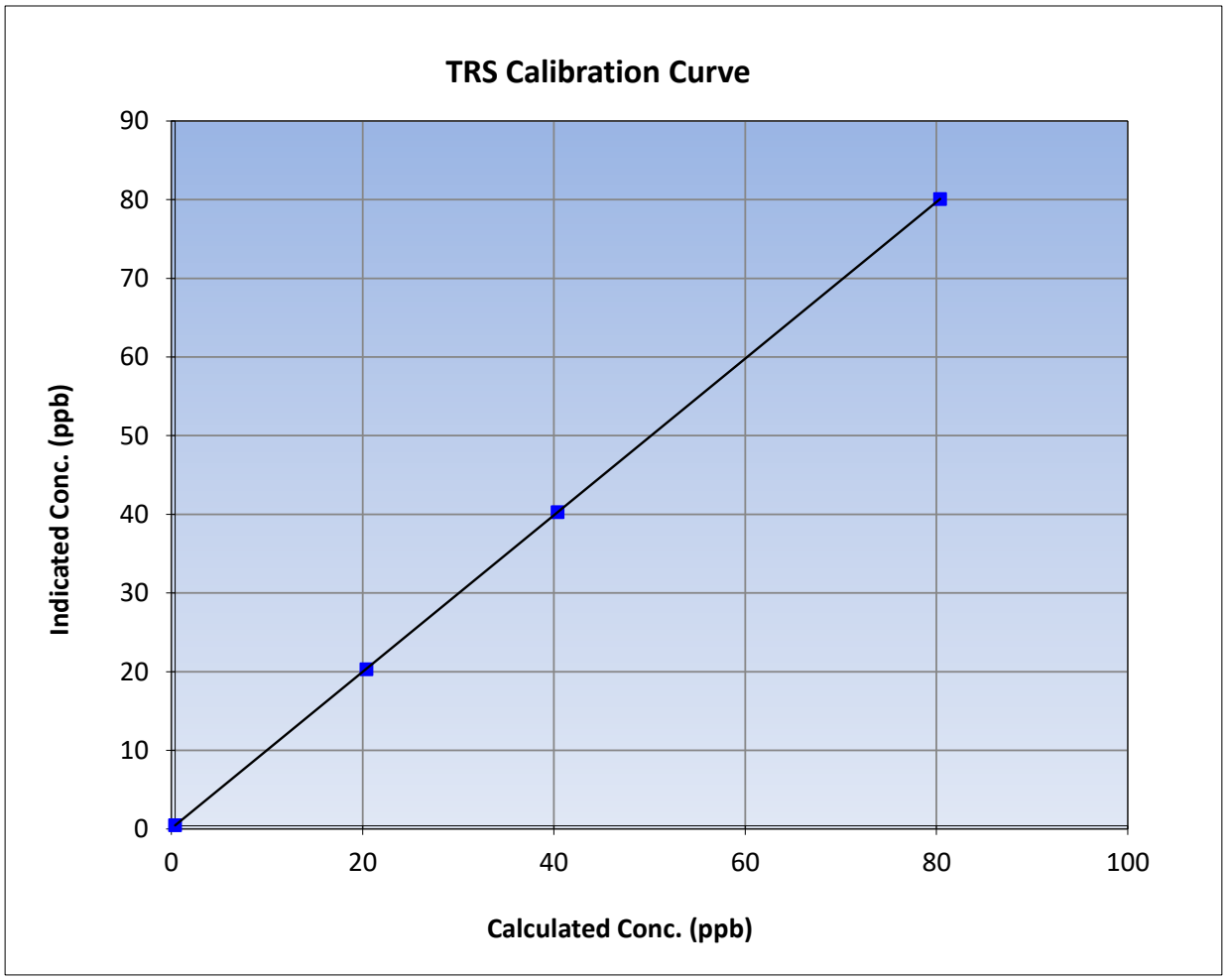
Station Information

Calibration Date:	February 13, 2023	Previous Calibration:	January 10, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:12	End Time (MST):	17:19
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153461

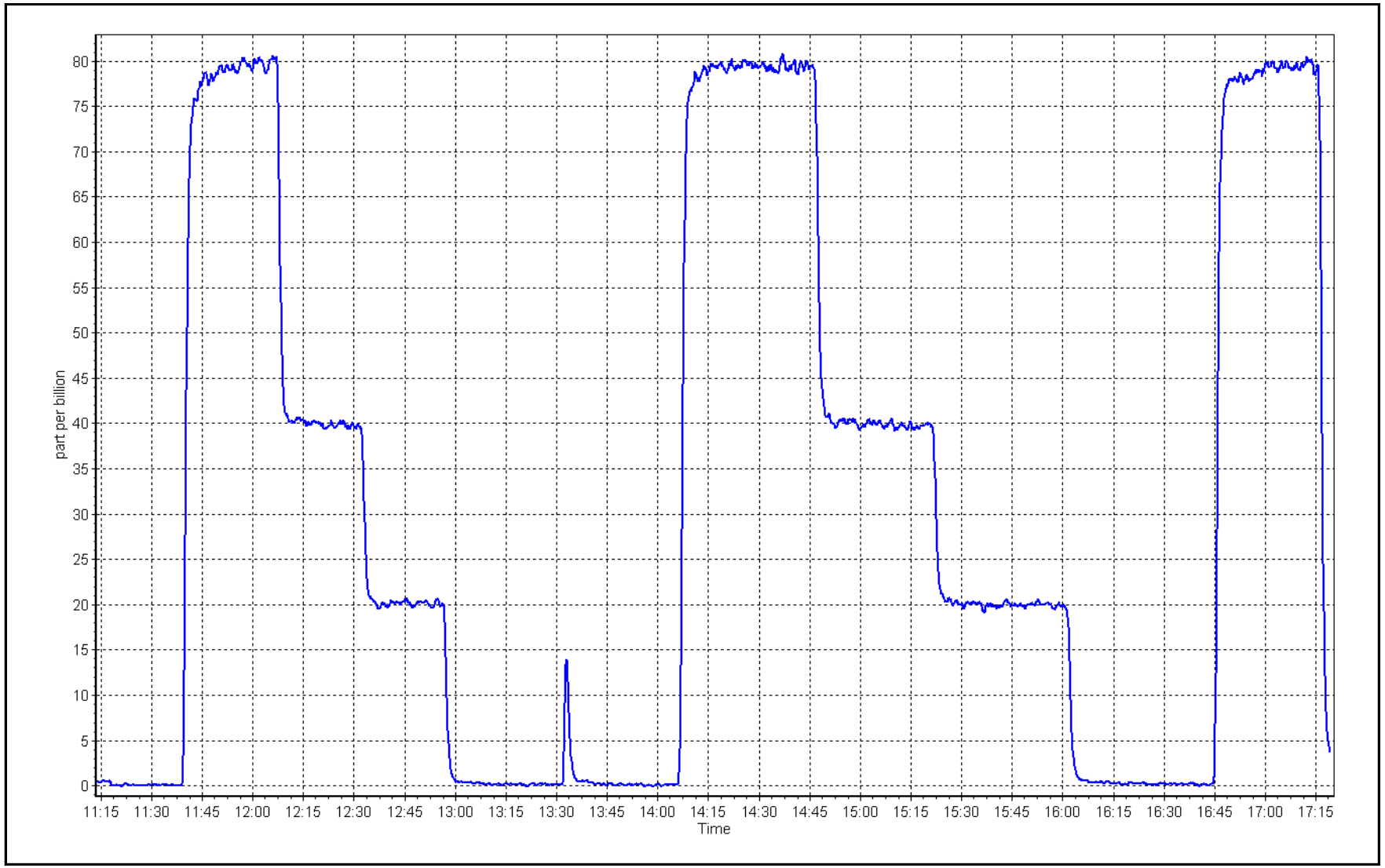
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	79.7	1.0037
40.0	39.9	1.0025
20.0	19.9	1.0049

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	0.995507	*0.90 - 1.10*
Intercept	0.059999	*+/-3*



TRS Calibration Plot Date: February 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:	February 13, 2023	Last Cal Date:	January 10, 2023
Start time (MST):	11:12	End time (MST):	17:19
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	0.996946	Backgd or Offset:	1.94	1.95
Calibration intercept:	0.161599	0.361624	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	80.0	0.998
as found 2nd point	4960	39.2	40.0	40.3	0.990
as found 3rd point	4980	19.6	20.0	20.2	0.985
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4921	78.4	80.0	79.9	1.001
second point	4961	39.2	40.0	40.7	0.983
third point	4980	19.6	20.0	20.2	0.990
as left zero	5000	0.0	0.0	0.4	----
as left span	4921	78.4	80.0	78.7	1.016
SO2 Scrubber Check	4919	81.3	813.0	0.0	----
Date of last scrubber change:		March 21, 2022		Ave Corr Factor	0.991
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.1	Prev response:	79.89	*% change:	0.3%
Baseline Corr 2nd AF pt:	40.4	AF Slope:	1.000846	AF Intercept:	0.079998
Baseline Corr 3rd AF pt:	20.3	AF Correlation:	0.999972		

* = > +/-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

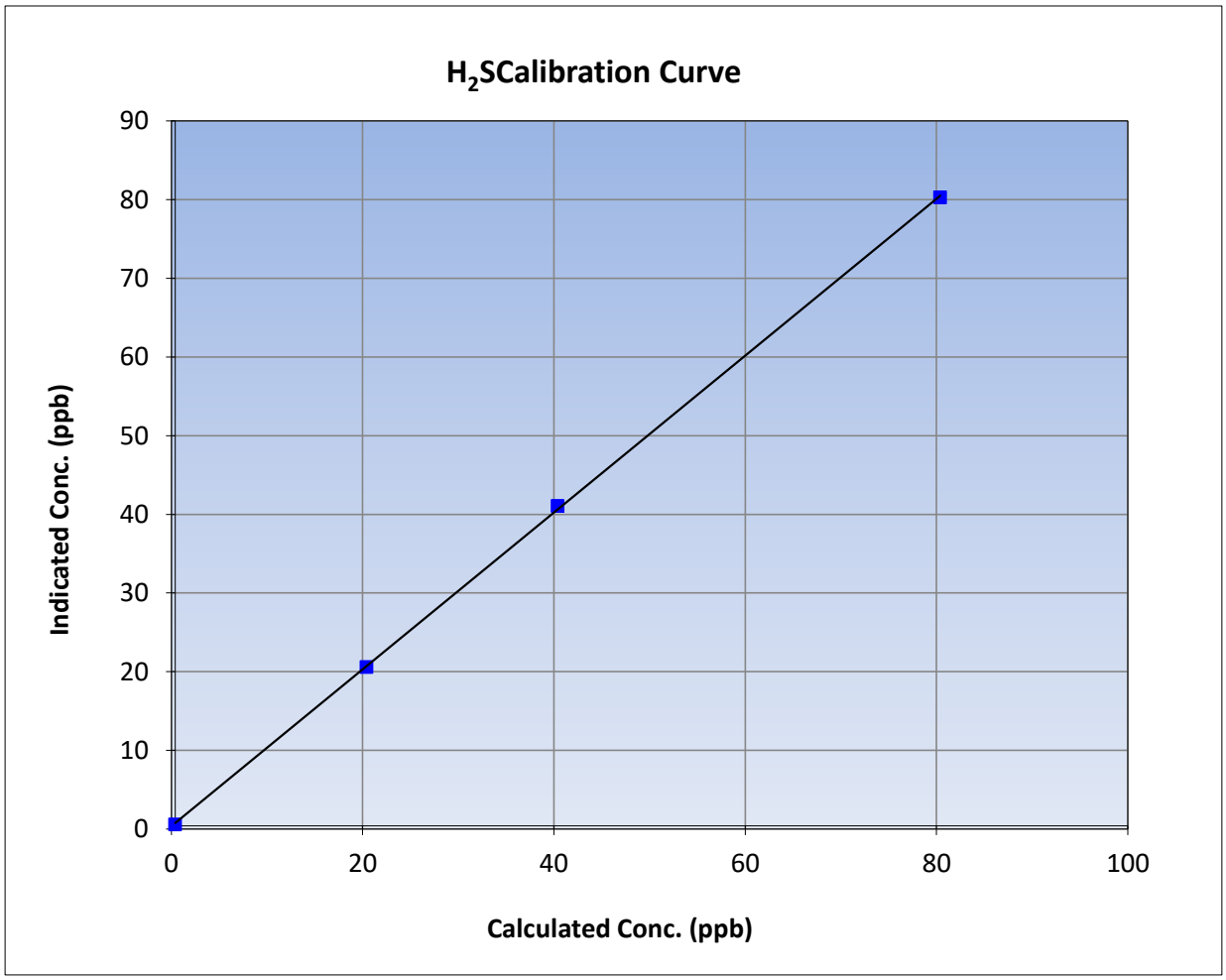
Station Information

Calibration Date:	February 13, 2023	Previous Calibration:	January 10, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:12	End Time (MST):	17:19
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1200326167

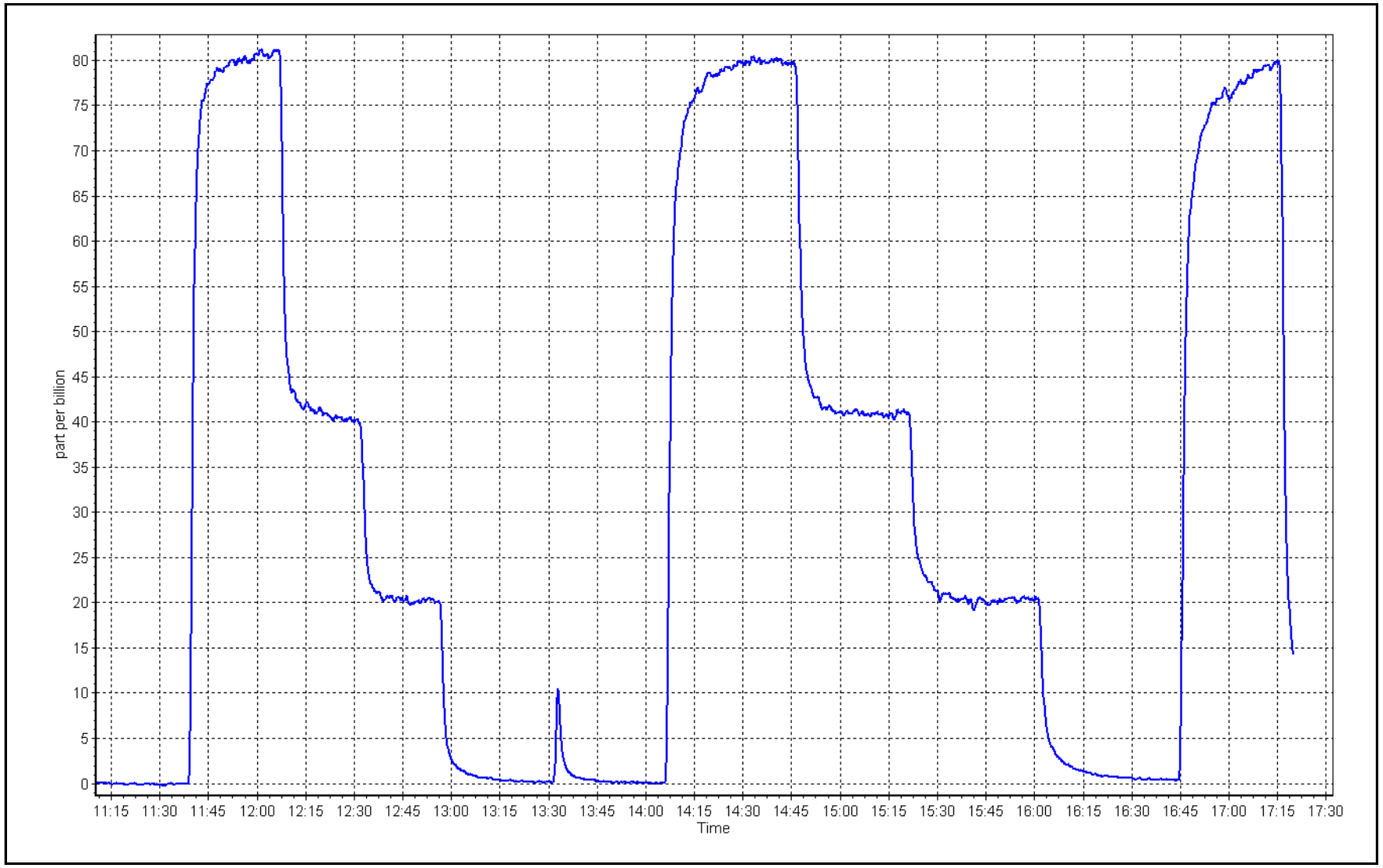
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	79.9	1.0012
40.0	40.7	0.9826
20.0	20.2	0.9900

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999913	*≥0.995*
Slope	0.996946	*0.90 - 1.10*
Intercept	0.361624	*+/-3*



H_2S Calibration Plot Date: February 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:	February 1, 2023	Last Cal Date:	January 24, 2023
Start time (MST):	10:45	End time (MST):	14:21
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:	2.54E-04	2.52E-04	NMHC SP Ratio:	5.11E-05	5.06E-05
CH4 Retention time:	14.4	14.4	NMHC Peak Area:	179761	181561

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	17.25	1.002
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	17.21	1.004
second point	4959	40.7	8.65	8.56	1.011
third point	4980	20.3	4.32	4.27	1.011
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	17.29	17.10	1.011
				Average Correction Factor	1.009
Baseline Corr AF:	17.25	Prev response	17.28	*% change	-0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4918	81.3	9.19	9.22	0.998
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	9.15	1.005
second point	4959	40.7	4.60	4.56	1.010
third point	4980	20.3	2.30	2.28	1.009
as left zero	5000	0	0.00	0.00	----
as left span	4918	81.3	9.19	9.07	1.014
				Average Correction Factor	1.008
Baseline Corr AF:	9.22	Prev response	9.20	*% 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	4918	81.3	8.09	8.03	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4918	81.3	8.09	8.06	1.004
second point	4959	40.7	4.05	4.00	1.012
third point	4980	20.3	2.02	1.99	1.014
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	8.09	8.03	1.007
				Average Correction Factor	1.010
Baseline Corr AF:	8.03	Prev response	8.09	*% change	-0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999160	0.995861
THC Cal Offset:	0.008295	-0.022506
CH4 Cal Slope:	0.998842	0.996625
CH4 Cal Offset:	0.003433	-0.014967
NMHC Cal Slope:	0.999663	0.994978
NMHC Cal Offset:	0.004462	-0.007938

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

THC Calibration Summary

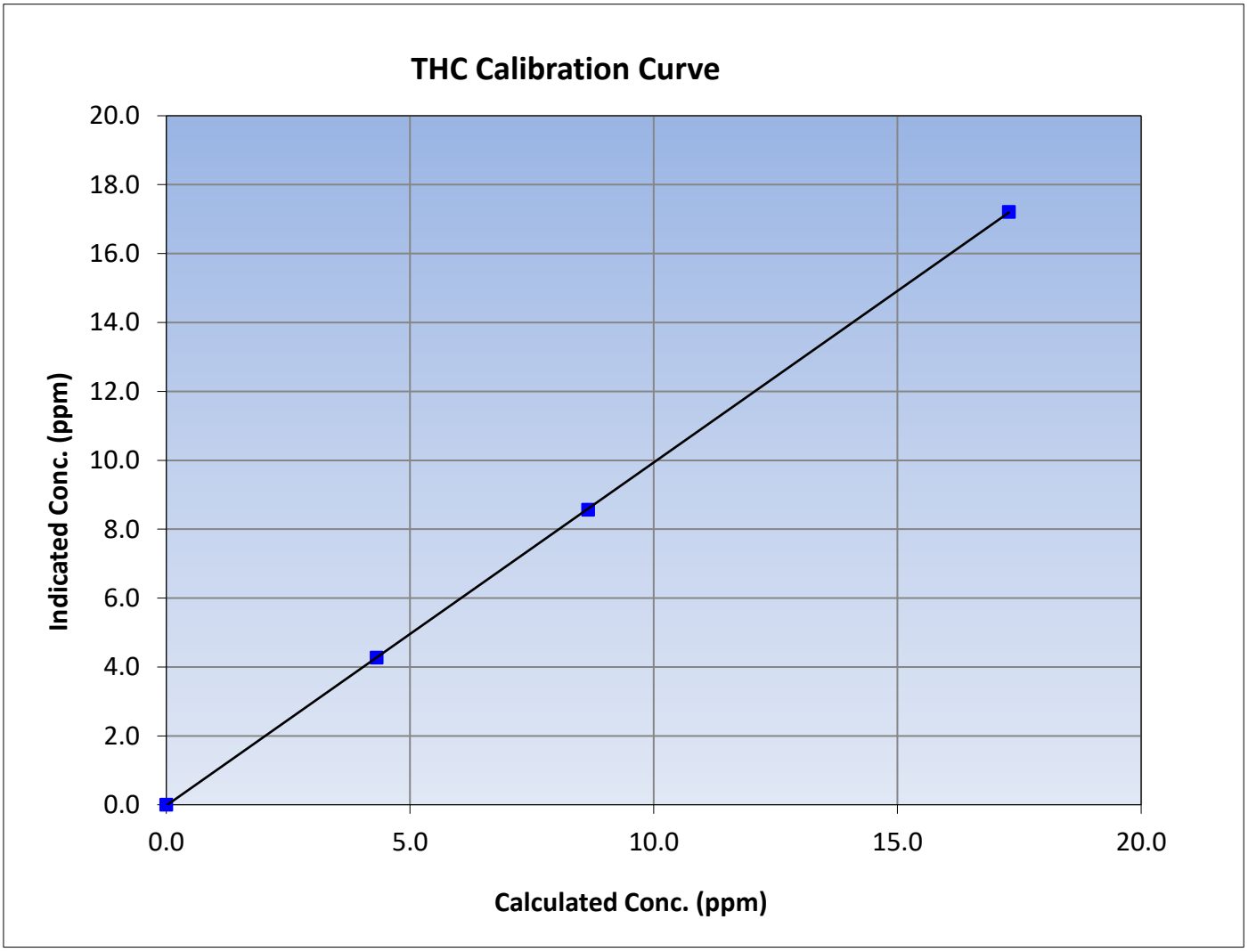
Version-01-2020

Station Information

Calibration Date:	February 1, 2023	Previous Calibration:	January 24, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:45	End Time (MST):	14:21
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	17.21	1.0044			
8.65	8.56	1.0107	Slope	0.995861	0.90 - 1.10
4.32	4.27	1.0113			
			Intercept	-0.022506	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

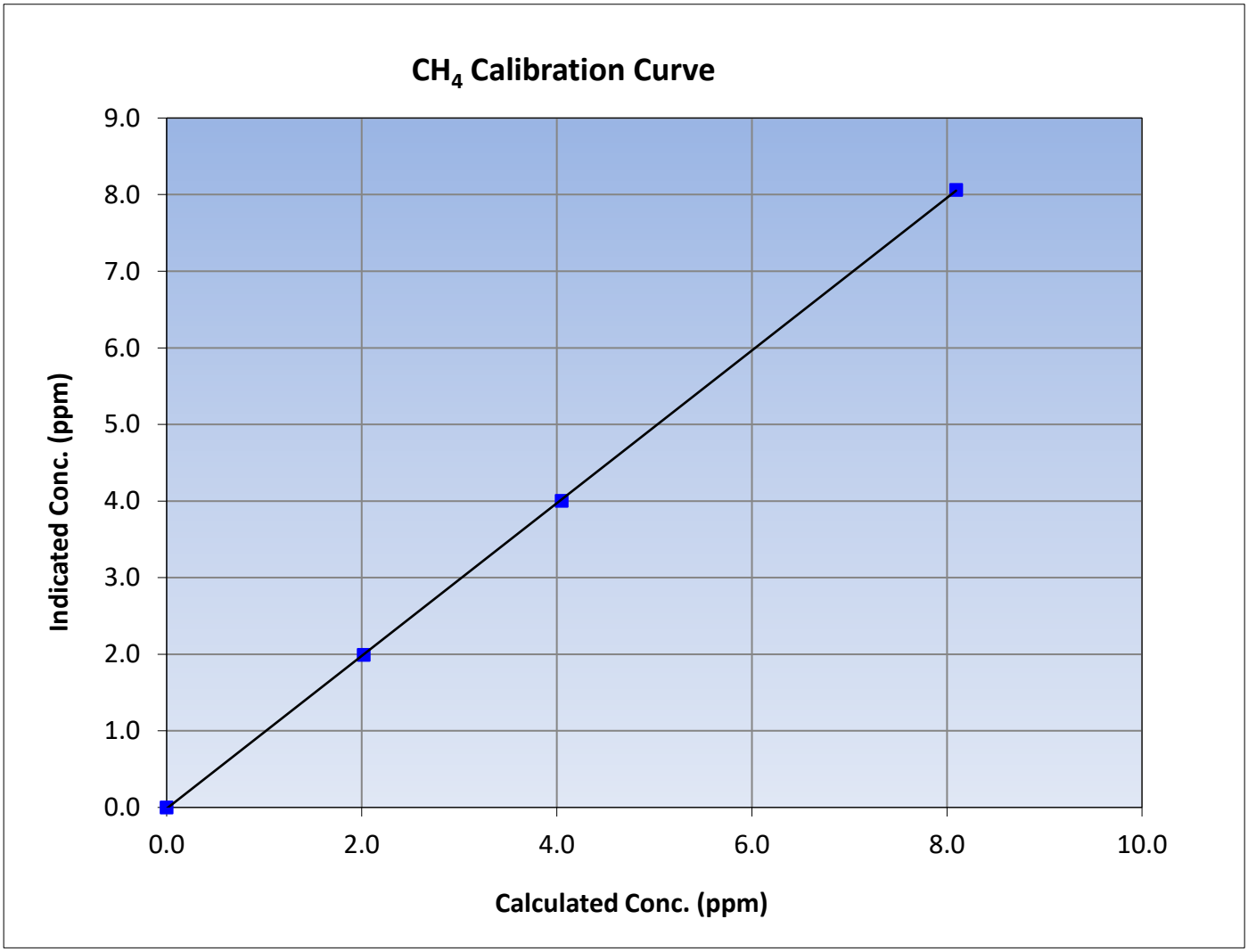
Version-01-2020

Station Information

Calibration Date:	February 1, 2023	Previous Calibration:	January 24, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:45	End Time (MST):	14:21
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	0.999978	*≥0.995*
8.09	8.06	1.0038			
4.05	4.00	1.0121	Slope	0.996625	*0.90 - 1.10*
2.02	1.99	1.0144			
			Intercept	-0.014967	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

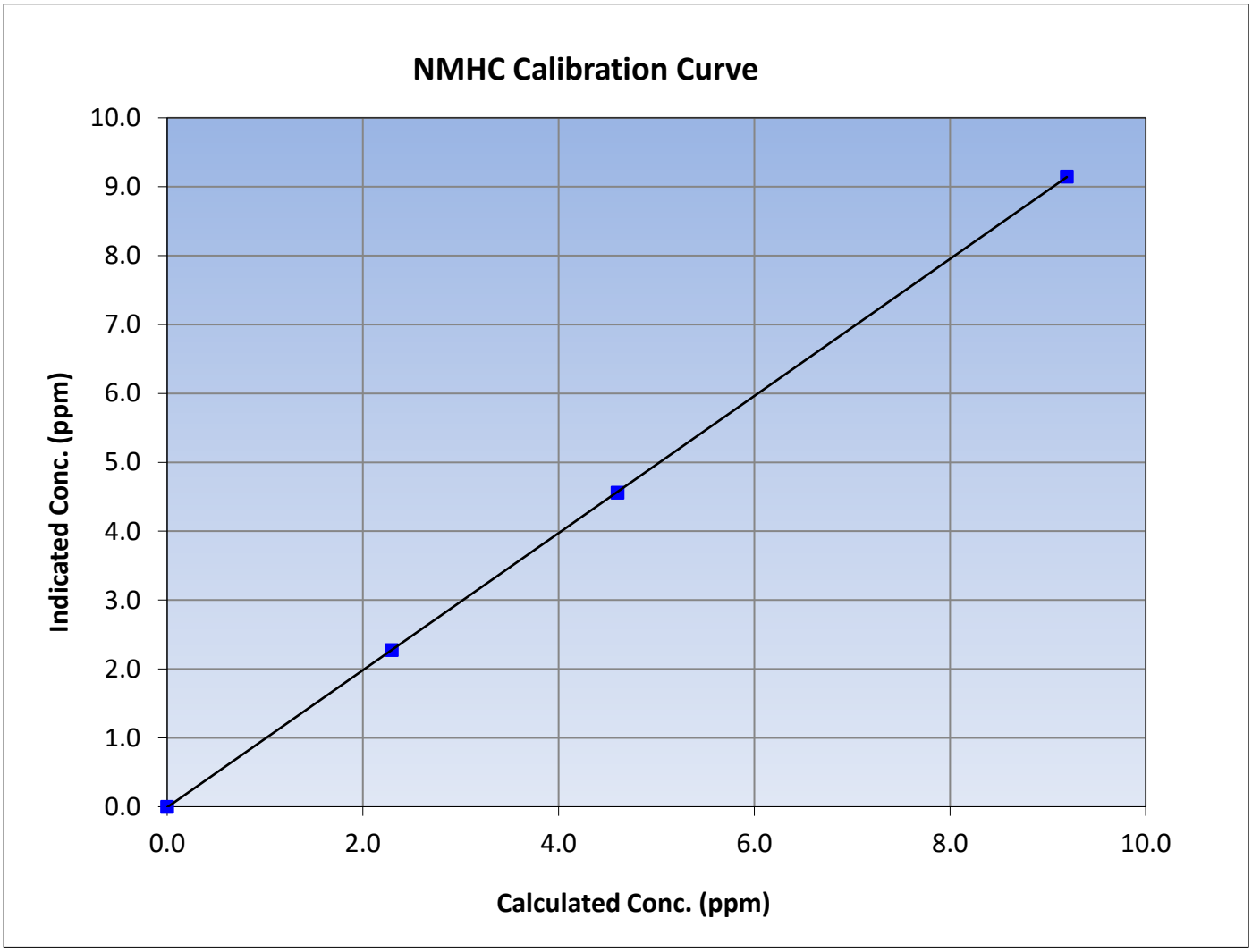
Version-01-2020

Station Information

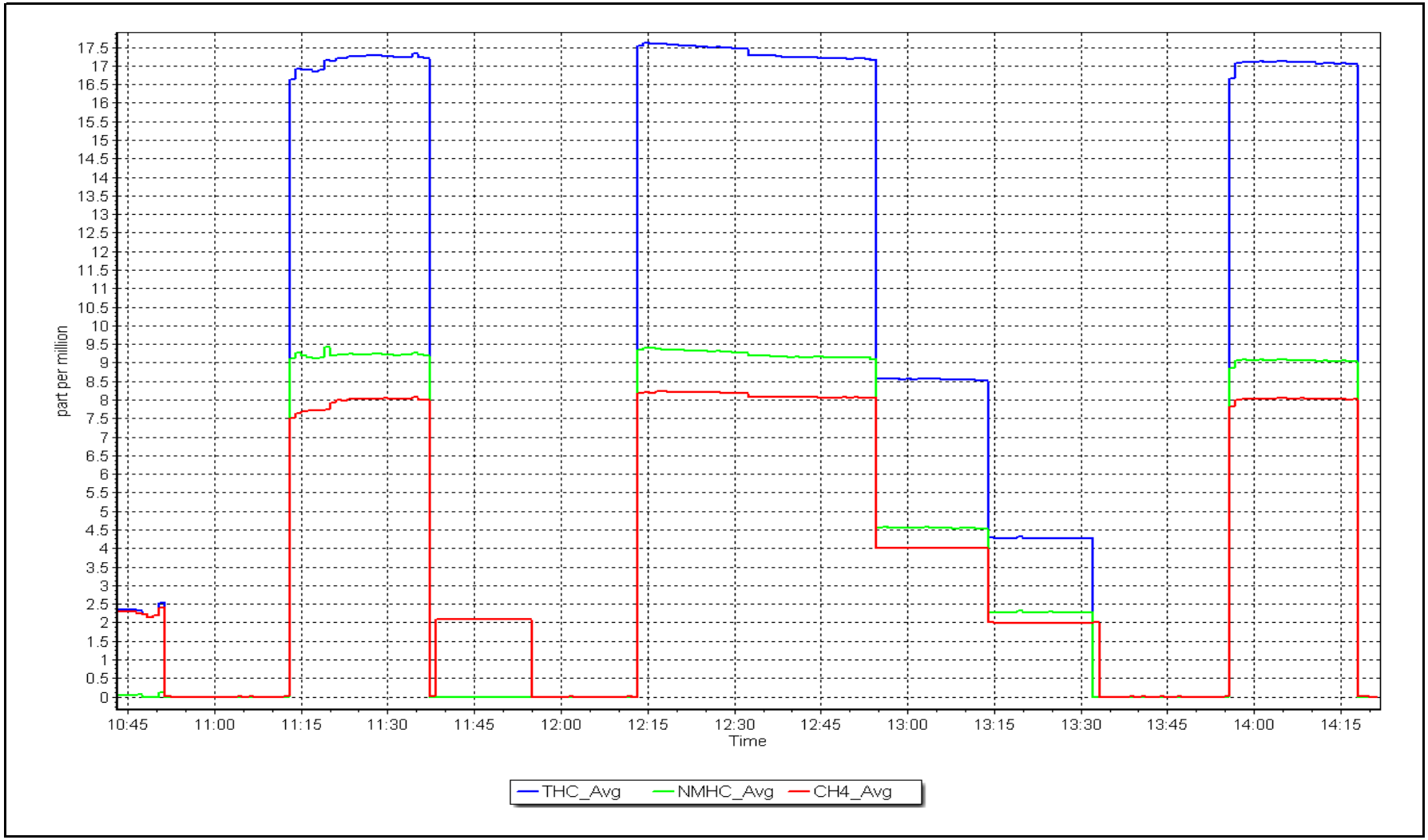
Calibration Date:	February 1, 2023	Previous Calibration:	January 24, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:45	End Time (MST):	14:21
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320040

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999993	≥0.995
9.19	9.15	1.0051			
4.60	4.56	1.0100	Slope	0.994978	0.90 - 1.10
2.30	2.28	1.0090			
			Intercept	-0.007938	+/-0.5



NMHC Calibration Plot Date: February 1, 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:	February 21, 2023	Last Cal Date:	February 1, 2023
Start time (MST):	11:32	End time (MST):	14:31
Reason:	Cylinder Change		

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	2.52E-04	NMHC SP Ratio:	5.06E-05	5.06E-05
CH4 Retention time:	14.4	14.4	NMHC Peak Area:	181561	181561

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	17.09	1.011
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	0.01	----
as left span	4918	81.3	17.29	16.93	1.021
				Average Correction Factor	
Baseline Corr AF:	17.09	Prev response	17.19	*% 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	4918	81.3	9.19	9.05	1.016
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0	0.00	0.00	----
as left span	4918	81.3	9.19	8.95	1.028
				Average Correction Factor	
Baseline Corr AF:	9.05	Prev response	9.14	*% change	-1.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4918	81.3	8.09	8.04	1.007
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	0.01	----
as left span	4918	81.3	8.09	7.98	1.014
				Average Correction Factor	
Baseline Corr AF:	8.04	Prev response	8.05	*% change	-0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

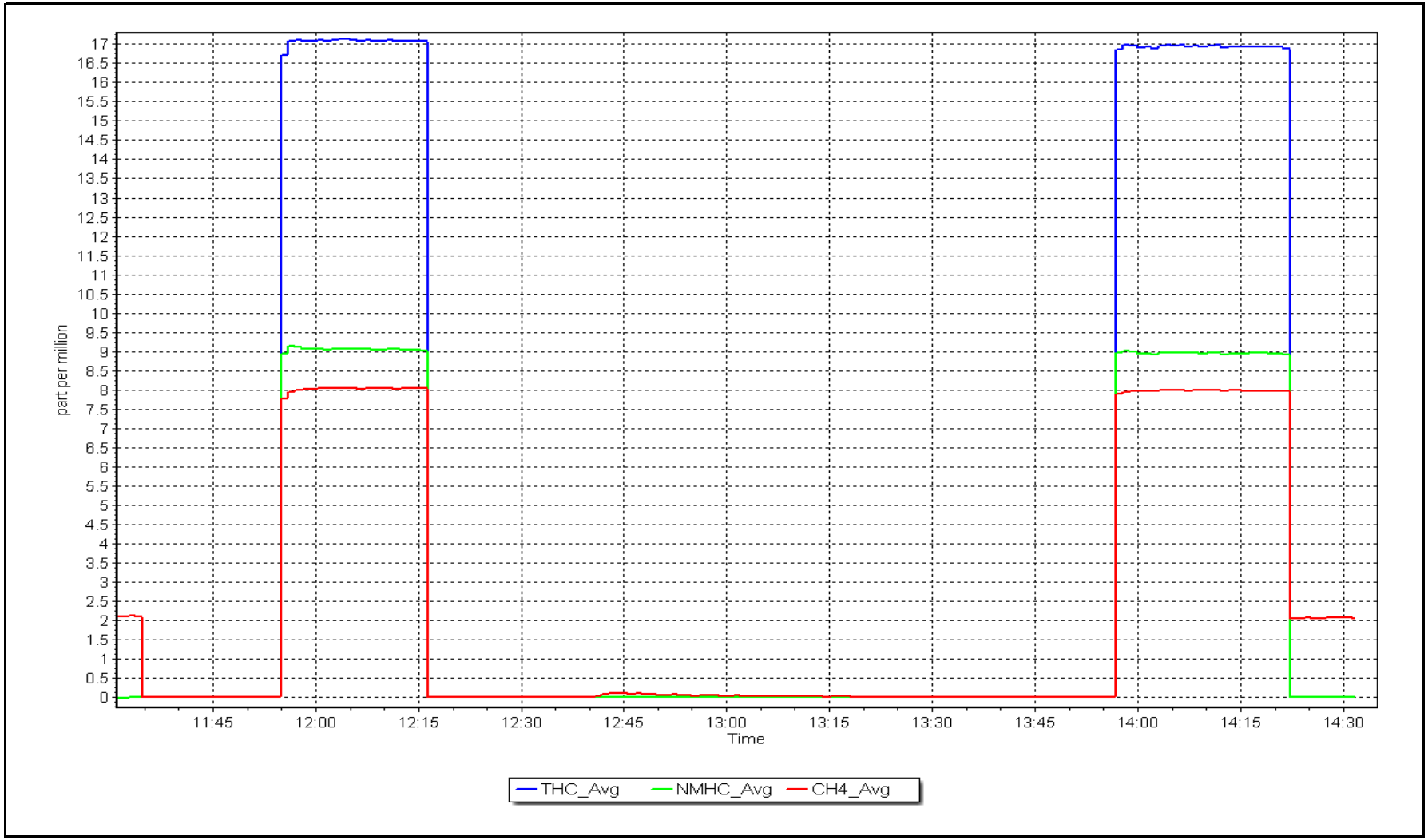
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.995861	
THC Cal Offset:	-0.022506	
CH4 Cal Slope:	0.996625	
CH4 Cal Offset:	-0.014967	
NMHC Cal Slope:	0.994978	
NMHC Cal Offset:	-0.007938	

Notes: Changed out the H2 cylinder.

Calibration Performed By: Rene Chamberland

NMHC Calibration Plot Date: February 21, 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:	February 2, 2023	Last Cal Date:	January 6, 2023
Start time (MST):	11:23	End time (MST):	16:07
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:	1.453	1.440	NO bkgnd or offset:	6.9	6.8
NOX coeff or slope:	0.990	0.990	NOX bkgnd or offset:	7.0	6.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	199.5	198.9

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999269	0.997218
NO_X Cal Offset:	-0.220000	0.060000
NO Cal Slope:	1.000842	0.998701
NO Cal Offset:	-0.900000	-0.400000
NO_2 Cal Slope:	0.996966	0.997388
NO_2 Cal Offset:	-0.078101	-0.442888

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	821.9	806.2	15.7	0.9897	0.9931
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.3	0.3	0.0	----	----
high point	4920	80.0	813.4	800.6	12.8	811.3	799.5	11.7	1.0026	1.0014
second point	4960	40.0	406.7	400.3	6.4	405.7	399.2	6.5	1.0025	1.0028
third point	4980	20.0	203.4	200.2	3.2	202.5	198.7	3.9	1.0042	1.0073
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	413.7	399.7	805.5	408.0	397.5	1.0099	1.0141
								Average Correction Factor	1.0031	1.0039

Corrected As found	NO_X = 821.7 ppb	NO = 806.0 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	1.1%
Previous Response	NO_X = 812.6 ppb	NO = 800.4 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)	793.8	406.9	399.7	398.5	1.0030	99.7%
2nd GPT point (200 ppb O3)	793.8	585.2	221.4	220.1	1.0059	99.4%
3rd GPT point (100 ppb O3)	793.8	689.3	117.3	116.1	1.0103	99.0%
				Average Correction Factor	1.0064	99.4%

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

NO_X Calibration Summary

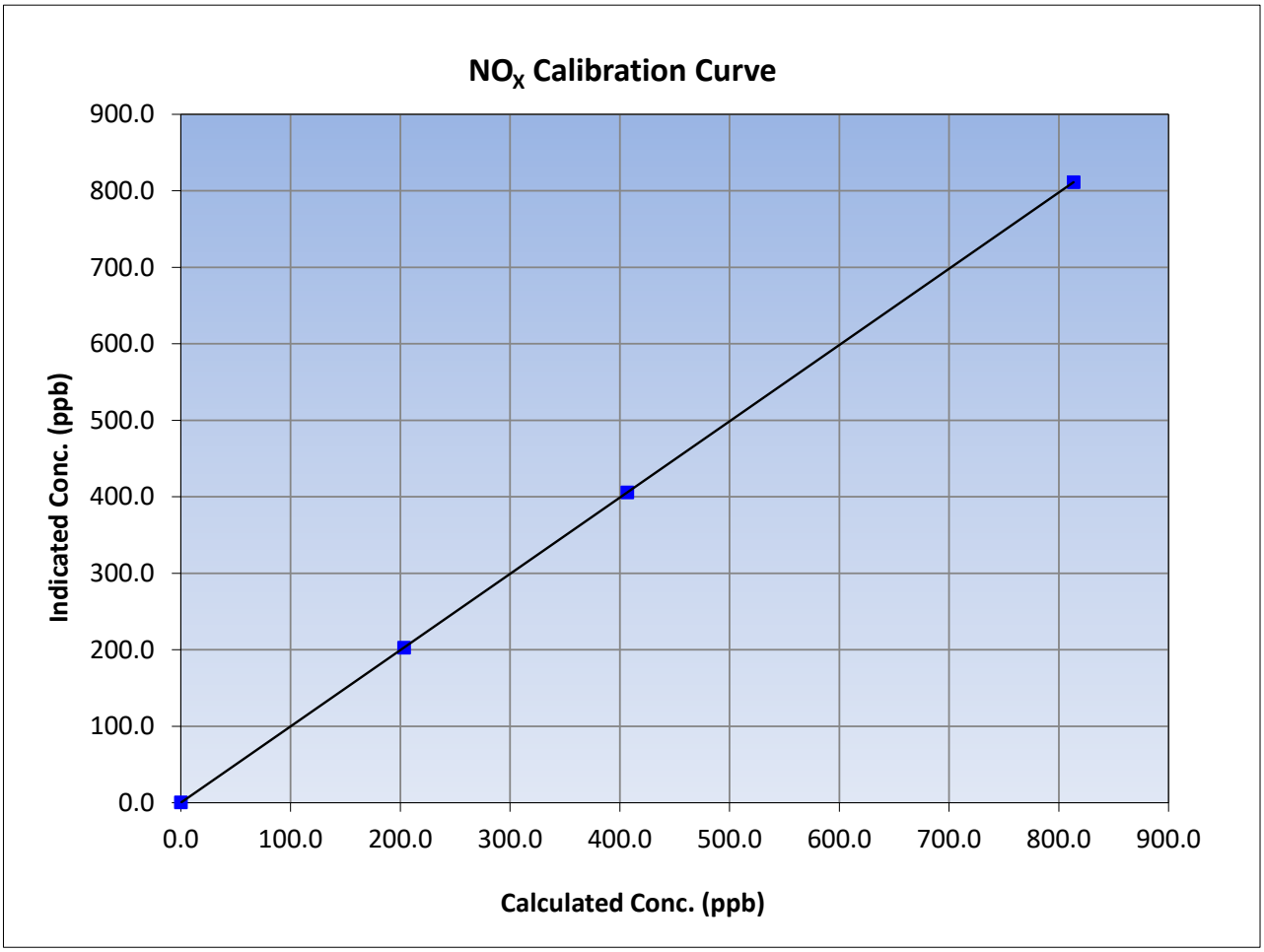
Version-04-2020

Station Information

Calibration Date:	February 2, 2023	Previous Calibration:	January 6, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:23	End Time (MST):	16:07
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	0.999999	≥0.995
813.4	811.3	1.0026			
406.7	405.7	1.0025	Slope	0.997218	0.90 - 1.10
203.4	202.5	1.0042			
			Intercept	0.060000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

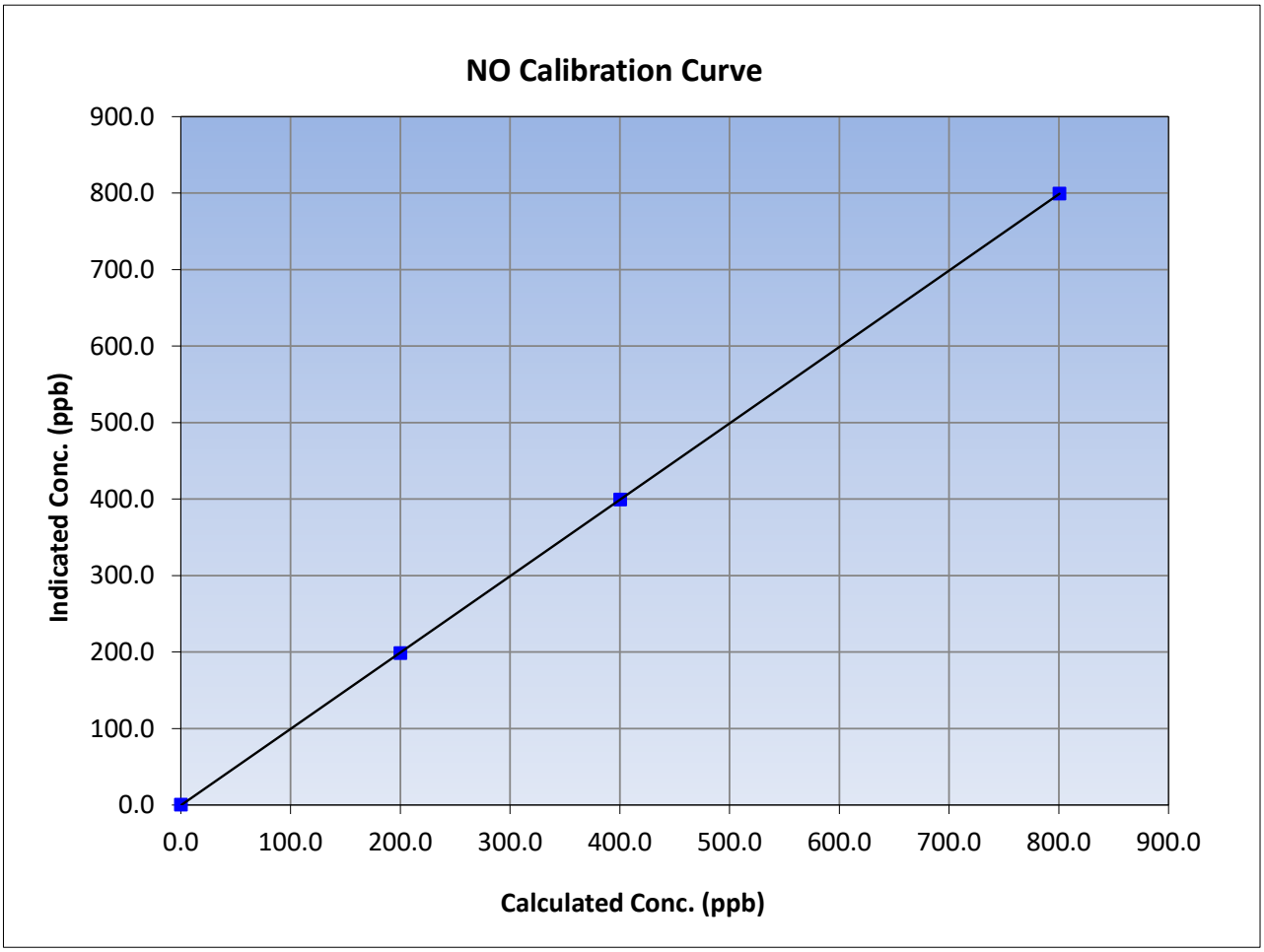
Version-04-2020

Station Information

Calibration Date:	February 2, 2023	Previous Calibration:	January 6, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:23	End Time (MST):	16:07
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	0.999996	≥0.995
800.6	799.5	1.0014			
400.3	399.2	1.0028	Slope	0.998701	0.90 - 1.10
200.2	198.7	1.0073			
			Intercept	-0.400000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

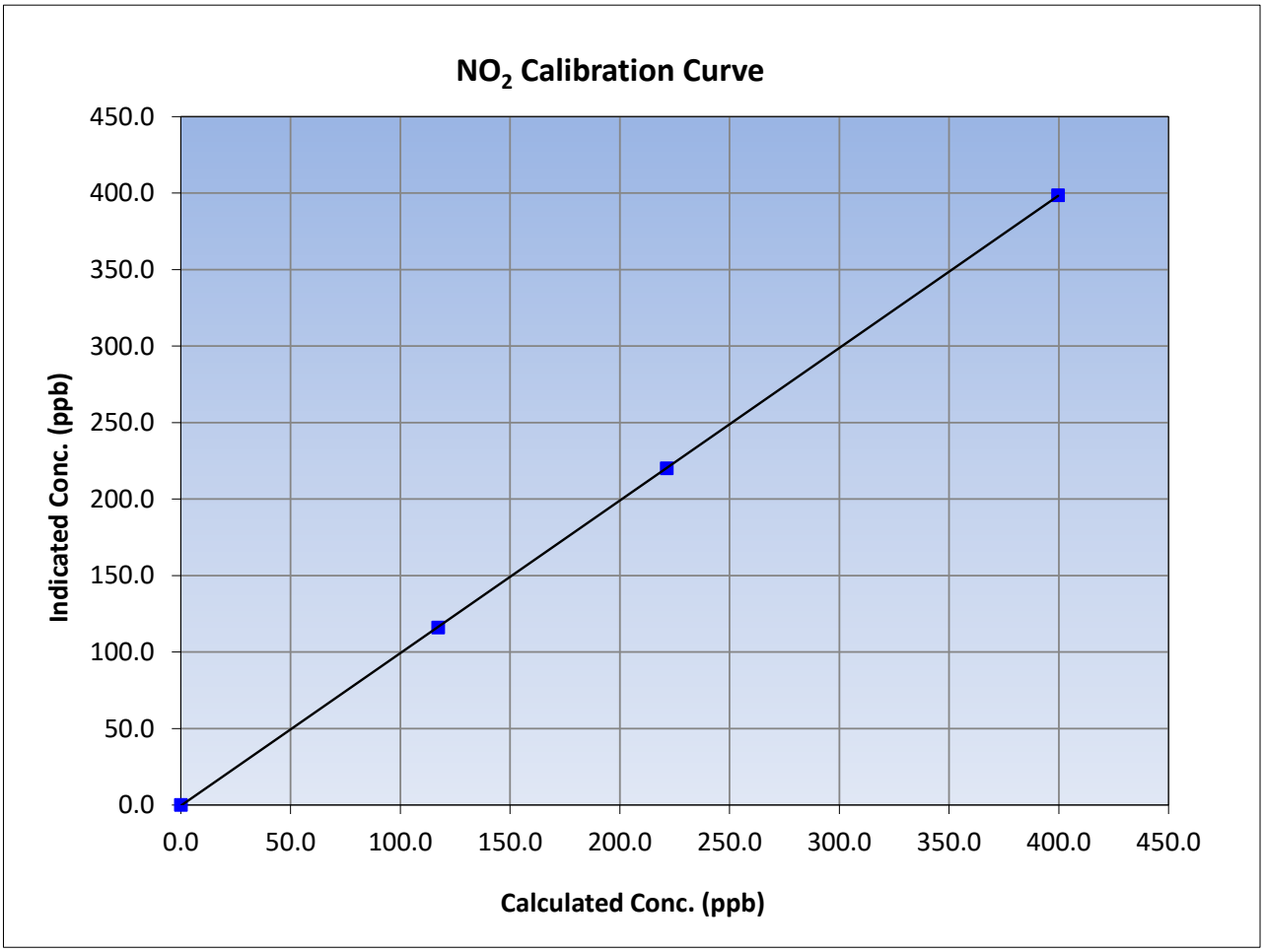
Version-04-2020

Station Information

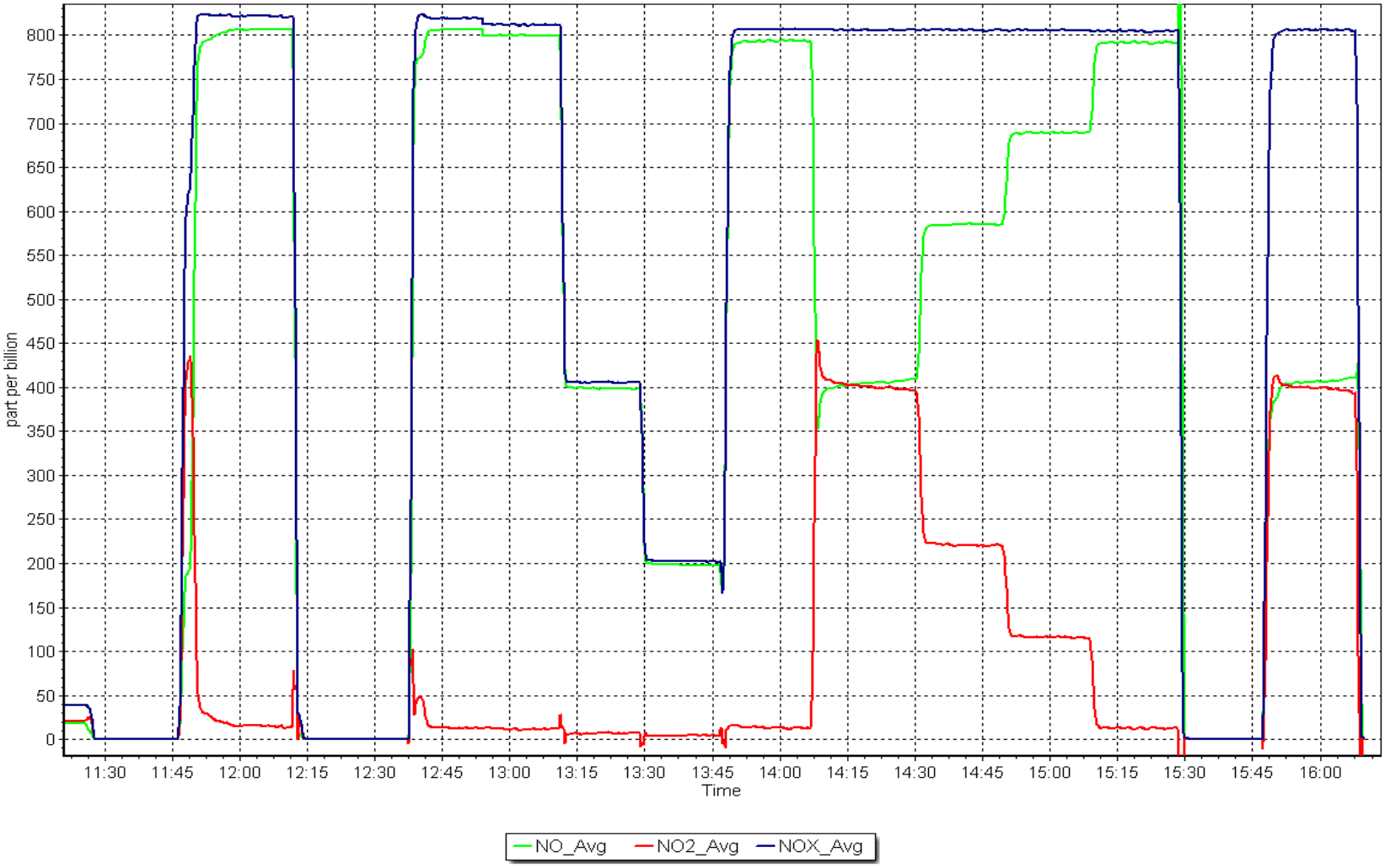
Calibration Date:	February 2, 2023	Previous Calibration:	January 6, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:23	End Time (MST):	16:07
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999993	≥0.995
399.7	398.5	1.0030			
221.4	220.1	1.0059	Slope	0.997388	0.90 - 1.10
117.3	116.1	1.0103			
			Intercept	-0.442888	+/-20



NO_X Calibration Plot Date: February 2, 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:	February 8, 2023	Last Cal Date:	January 4, 2023
Start time (MST):	11:06	End time (MST):	14:30
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:	1.001400	1.000086	Backgd or Offset:	2.9	2.4
Calibration intercept:	0.480000	0.760000	Coeff or Slope:	1.011	1.016

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.4	----
as found span	5000	855.5	400.0	399.3	1.002
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.5	----
high point	5000	855.5	400.0	400.6	0.999
second point	5000	738.6	200.0	201.1	0.995
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	402.8	0.993
				Average Correction Factor	0.995

Baseline Corr As found:	399.7	Previous response	401.0	*% change	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

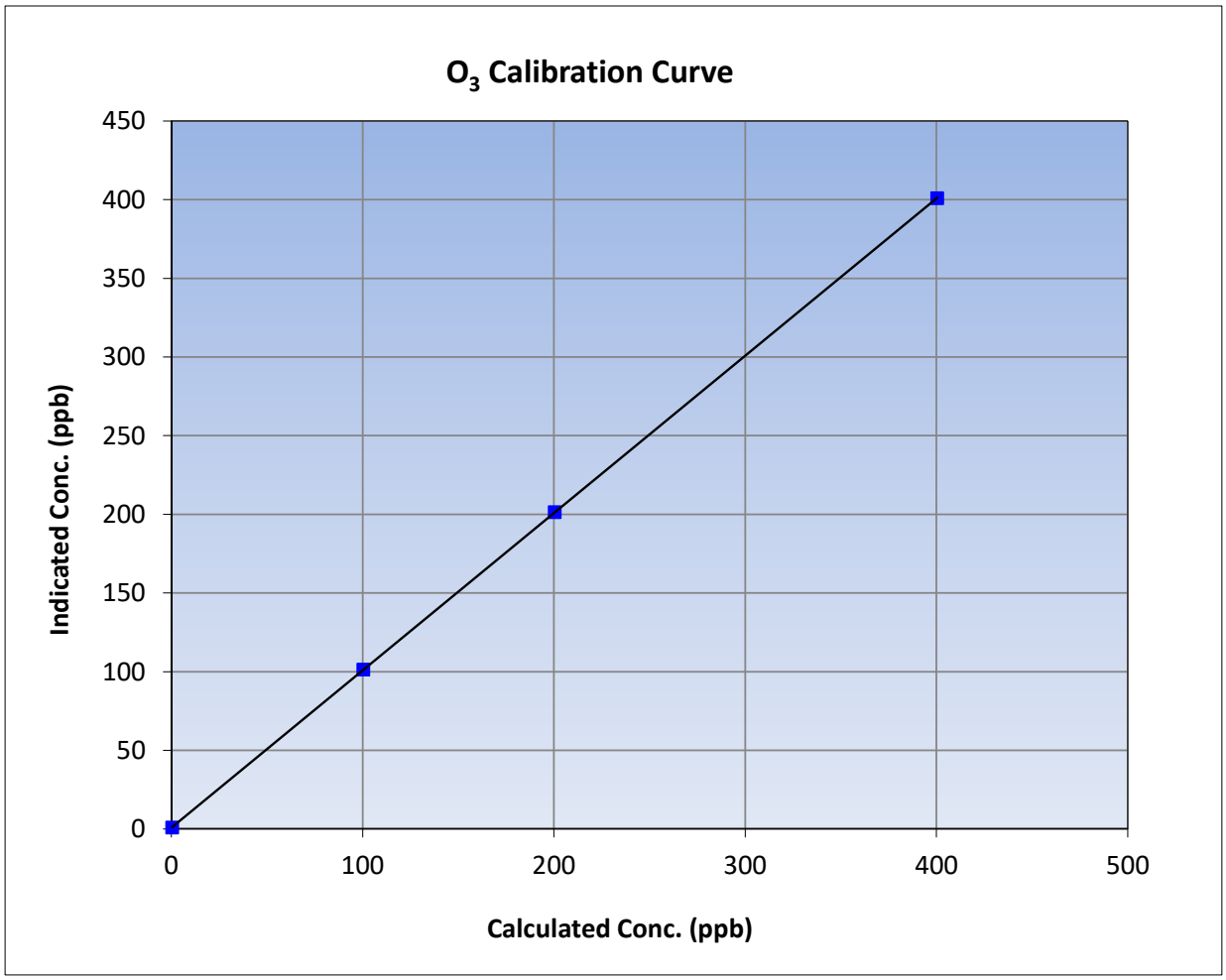
Station Information

Calibration Date:	February 8, 2023	Previous Calibration:	January 4, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:06	End Time (MST):	14:30
Analyzer make:	Teledyne API T400	Analyzer serial #:	1107

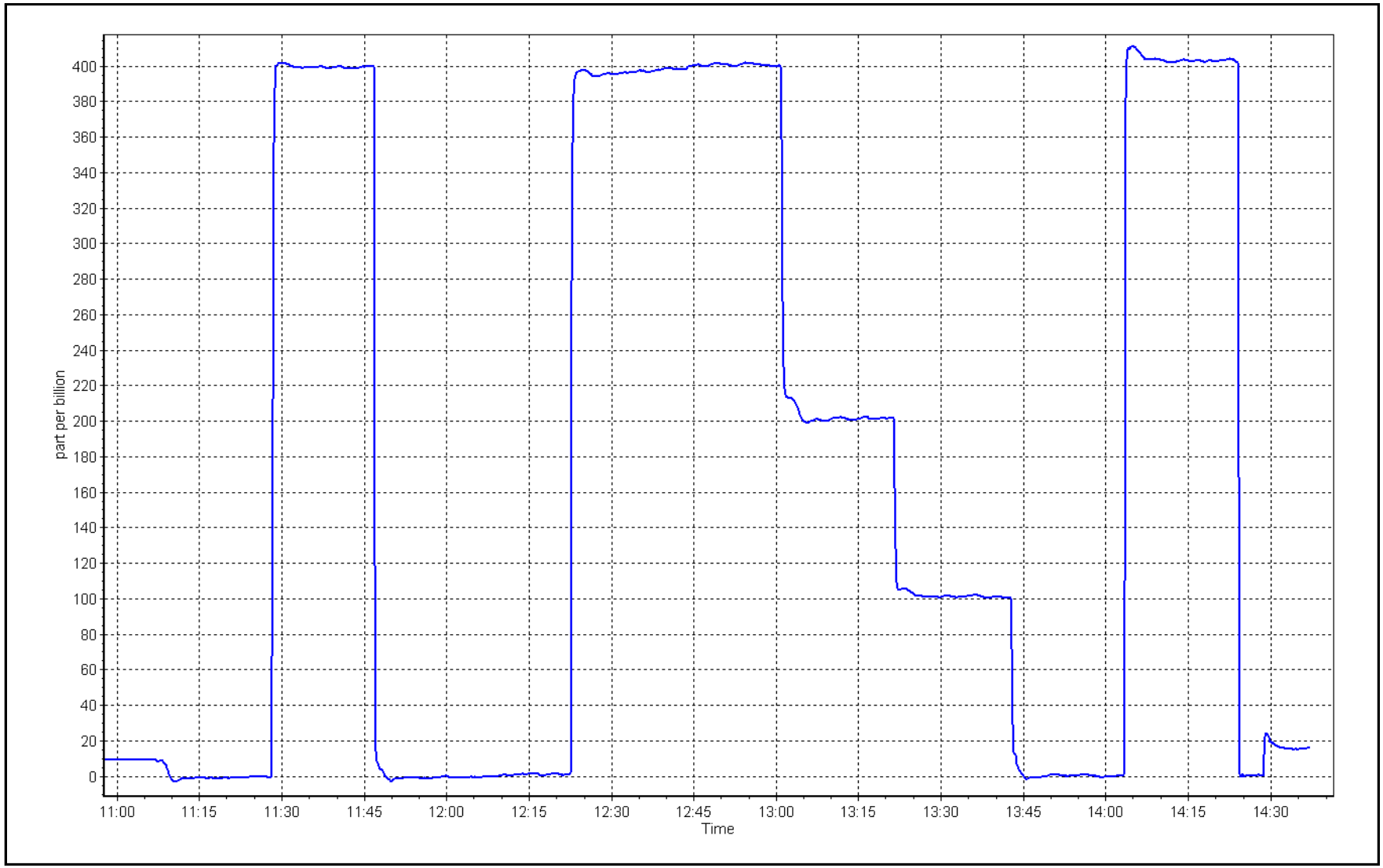
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
400.0	400.6	0.9985
200.0	201.1	0.9945
100.0	100.9	0.9911

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999997	*≥0.995*
Slope	1.000086	*0.90 - 1.10*
Intercept	0.760000	*+/- 5*



O_3 Calibration Plot Date: February 8, 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:	February 16, 2023	Last Cal Date:	January 23, 2023
Start time (MST):	12:45	End time (MST):	13:46
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 (^{o}C)	-7.6	-8.2	-7.6	☐	+/- 2 ^{o}C
P (mmHg)	724.1	723.2	724.1	☐	+/- 10 mmHg
flow (LPM)	5.00	5.03	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: February 16, 2023 Last Cal Date: January 24, 2023

PM w/o HEPA: 7.5 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: December 19, 2022 <0.2 ug/m3

Disposable Filter Changed: December 19, 2022

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.

Calibration by: Rene Chamberland

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:	February 16, 2023	Last Cal Date:	January 26, 2023
Start time (MST):	11:12	End time (MST):	15:18
NH3 Cal Date:	February 16, 2023	Last Cal Date:	January 26, 2023
Start time (MST):	15:50	End time (MST):	18:20
Reason:	Removal		

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 T201E	Analyzer serial #:	56
Converter model:	Teledyne API T501	Converter serial #:	217
NH3 Range (ppb):	0 - 2000 ppb	Reaction cell Press:	4.90
NOX Range (ppb):	0 - 1000 ppb	Sample Flow:	541

	Start	*Finish*		*Start*	*Finish*
NO coefficient:	0.793		TN coefficient:	0.806	
NOX coefficient:	0.804		NO bkgrnd:	-1.500	
NO2 coefficient:	1.000		NOX bkgrnd:	-0.400	
NH3 coefficient:	0.919		TN bkgrnd:	3.100	

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	1.001644	0.986302
NO_X Cal Offset:	-0.440000	-0.180000
NO Cal Slope:	1.001856	0.988309
NO Cal Offset:	-1.080000	-0.560000
NO_2 Cal Slope:	0.999297	0.982947
NO_2 Cal Offset:	0.756159	-0.400969
NH3 Cal Slope:	0.988888	1.009740
NH3 Cal Offset:	14.116543	1.383893
TN Cal Slope:	0.996806	1.017473
TN Cal Offset:	16.482567	1.877552

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	0.8	-0.8	----	----
high NO point	4920	80.0	813.4	813.4	----	802.5	802.8	-0.2	1.014	----
NO/O3 point										
as found NH3										
new NH3 cyl rp							----			
first NH3	3413	86.4	1800.6	----	1800.6	1839.0	----	1824.3	0.979	0.987
second NH3	3452	48.0	1000.2	----	1000.2	1004.7	----	996.8	0.996	1.003
third NH3	3476	24.0	500.1	----	500.1	522.3	----	518.3	0.957	0.965
							Average Correction Factor		1.0136	0.9851

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 = 91.9%

NH3 Current Converter Efficiency =

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	0.8	1.0	0.1	----	----
as found span	4920	80.0	813.4	800.6	813.4	802.8	791.0	802.5	1.0133	1.0122
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.8	1.0	0.1	----	----
high point	4920	80.0	813.4	800.6	813.4	802.8	791.0	802.5	1.0133	1.0122
second point	4960	40.0	406.7	400.3	406.7	399.9	395.8	397.9	1.0171	1.0114
third point	4980	20.0	203.4	200.2	203.4	199.8	194.7	199.8	1.0178	1.0280
								Average Correction Factor	1.0160	1.0172

Baseline Corr As fnd	TN =	802.4 ppb	NO_X =	802.0 ppb	NO =	790.0 ppb	*Percent Change	TN = -3.1%
Previous Response	TN =	827.3 ppb	NO_X =	814.3 ppb	NO =	801.0 ppb	*Percent Change	NO_X = -1.5%
							*Percent Change	NO = -1.4%

* = > +/-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	-0.2	----	----
calibration zero	----	----	0.0	-0.2	----	----
1st GPT point (400 ppb O3)	784.3	392.6	404.5	398.6	1.0148	98.5%
2nd GPT point (200 ppb O3)	784.3	583.3	213.8	205.9	1.0384	96.3%
3rd GPT point (100 ppb O3)	784.3	682.6	114.5	114.4	1.0009	99.9%
				Average Correction Factor	1.0180	98.3%

Notes: Completing multi point as founds. Removing the analyzer/converter.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TN Calibration Summary

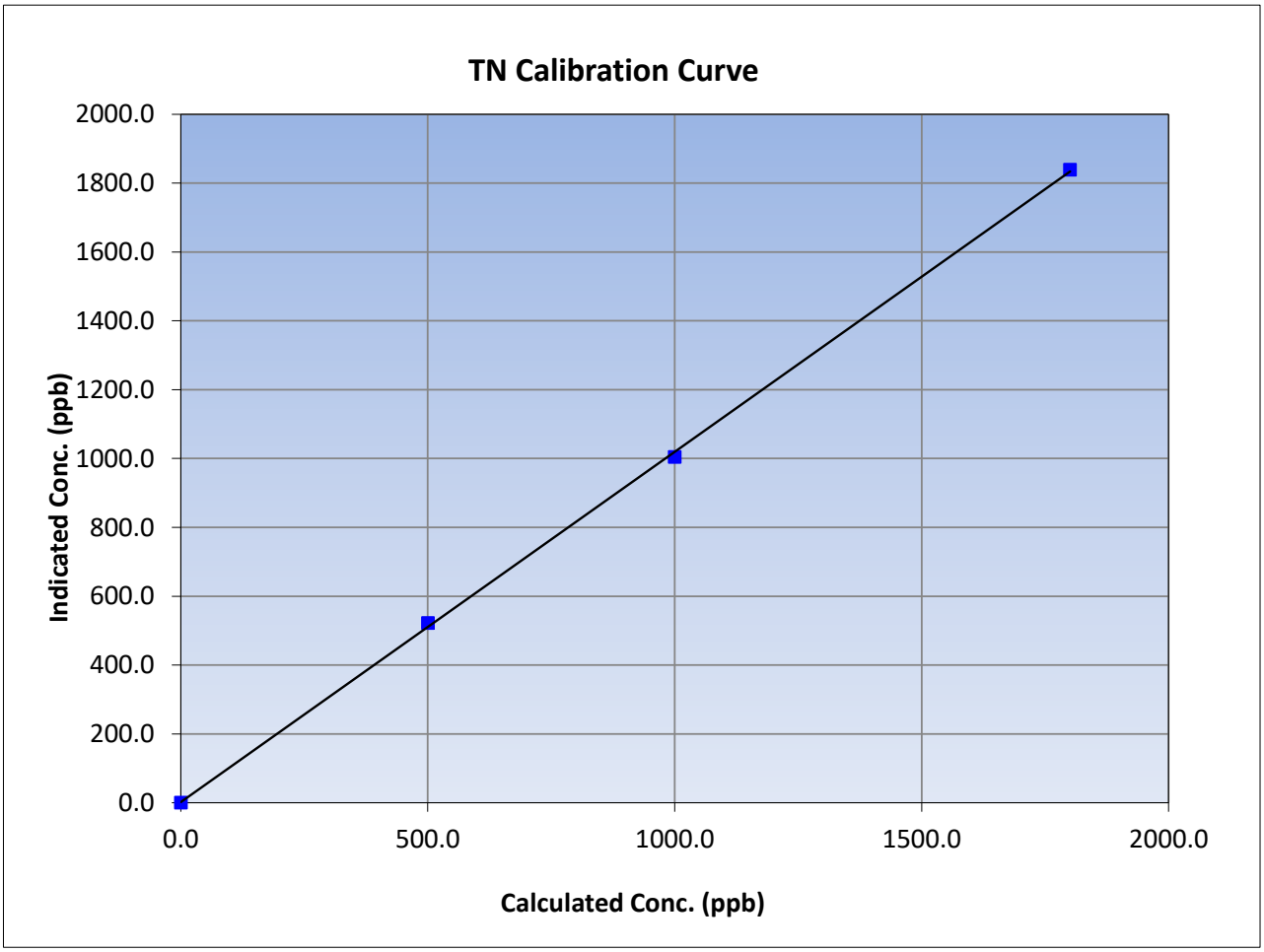
Version-11-2021

Station Information

Calibration Date:	February 16, 2023	Previous Calibration:	January 26, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:12	End Time (MST):	15:18
Analyzer make:	Teledyne API T201E	Analyzer serial #:	56

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999791	≥0.995
1800.6	1839.0	0.9791			
1000.2	1004.7	0.9955	Slope	1.017473	0.90 - 1.10
500.1	522.3	0.9575			
			Intercept	1.877552	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

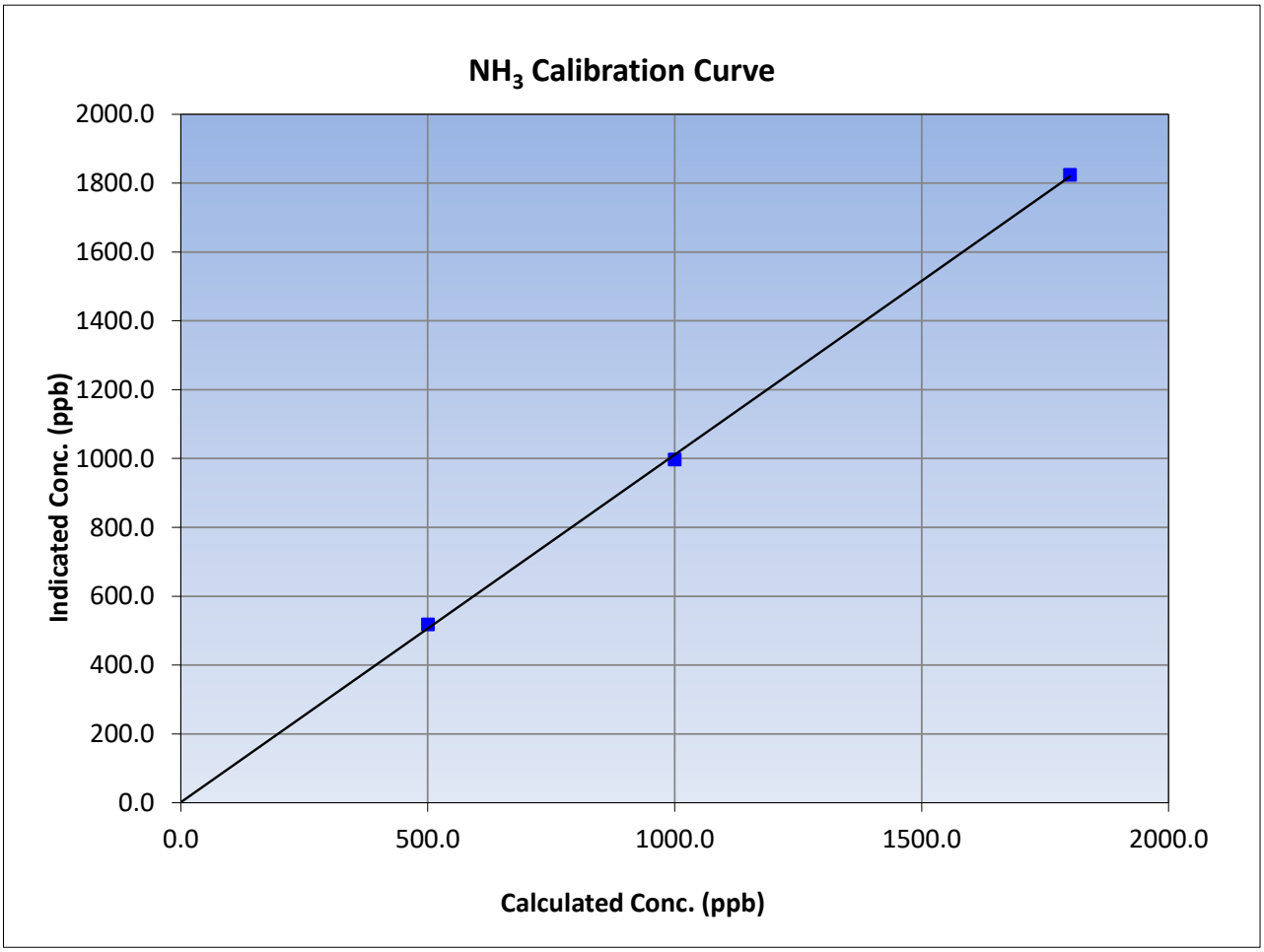
Version-11-2021

Station Information

Calibration Date:	February 16, 2023	Previous Calibration:	January 26, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:12	End Time (MST):	15:18
Analyzer make:	Teledyne API T201E	Analyzer serial #:	56

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.8	----	Correlation Coefficient	0.999789	≥0.995
1800.6	1824.3	0.9870			
1000.2	996.8	1.0034	Slope	1.009740	0.90 - 1.10
500.1	518.3	0.9649			
			Intercept	1.383893	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

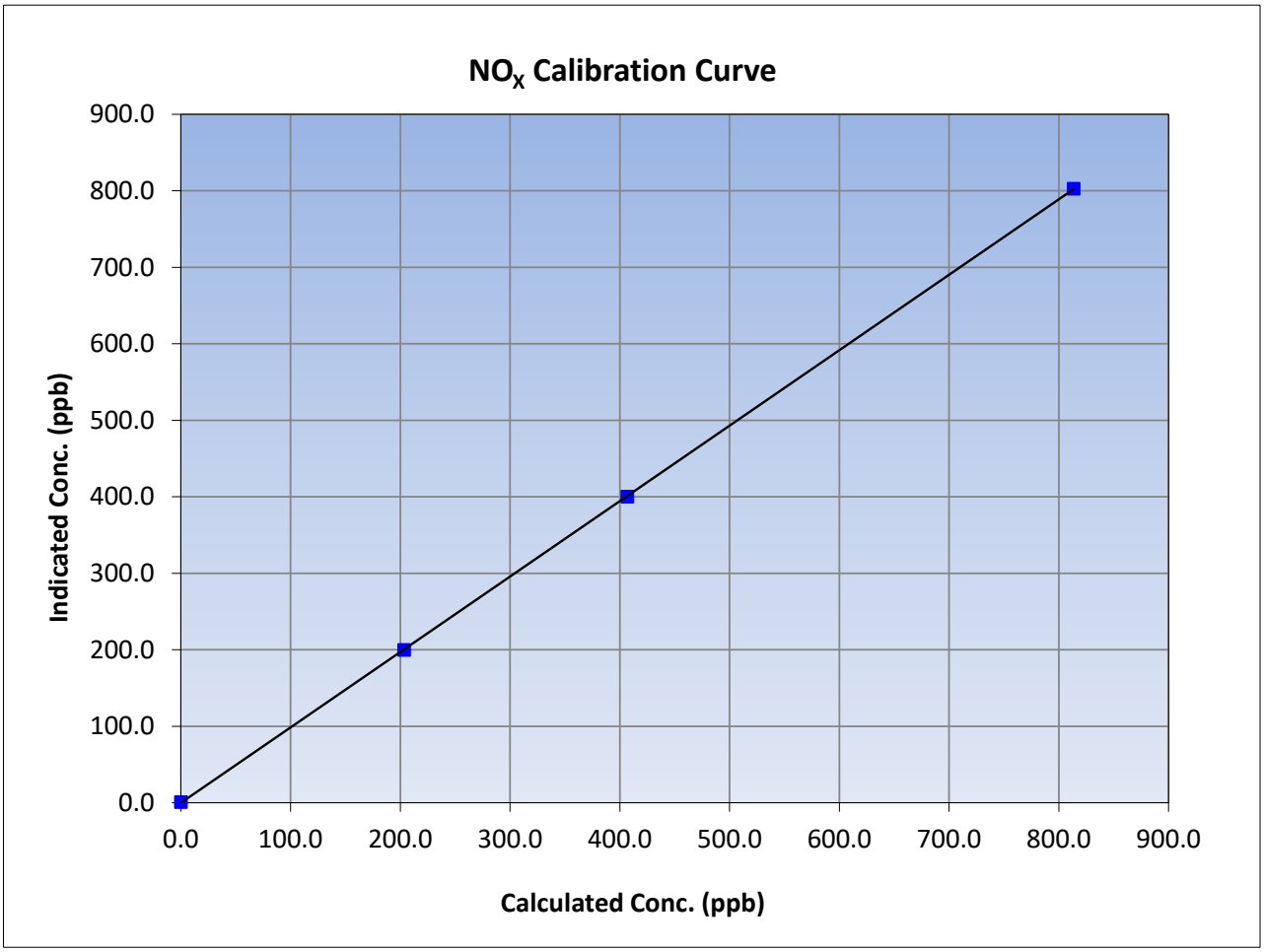
Version-11-2021

Station Information

Calibration Date:	February 16, 2023	Previous Calibration:	January 26, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:12	End Time (MST):	15:18
Analyzer make:	Teledyne API T201E	Analyzer serial #:	56

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.8	----	Correlation Coefficient	0.999992	≥0.995
813.4	802.8	1.0133			
406.7	399.9	1.0171	Slope	0.986302	0.90 - 1.10
203.4	199.8	1.0178			
			Intercept	-0.180000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

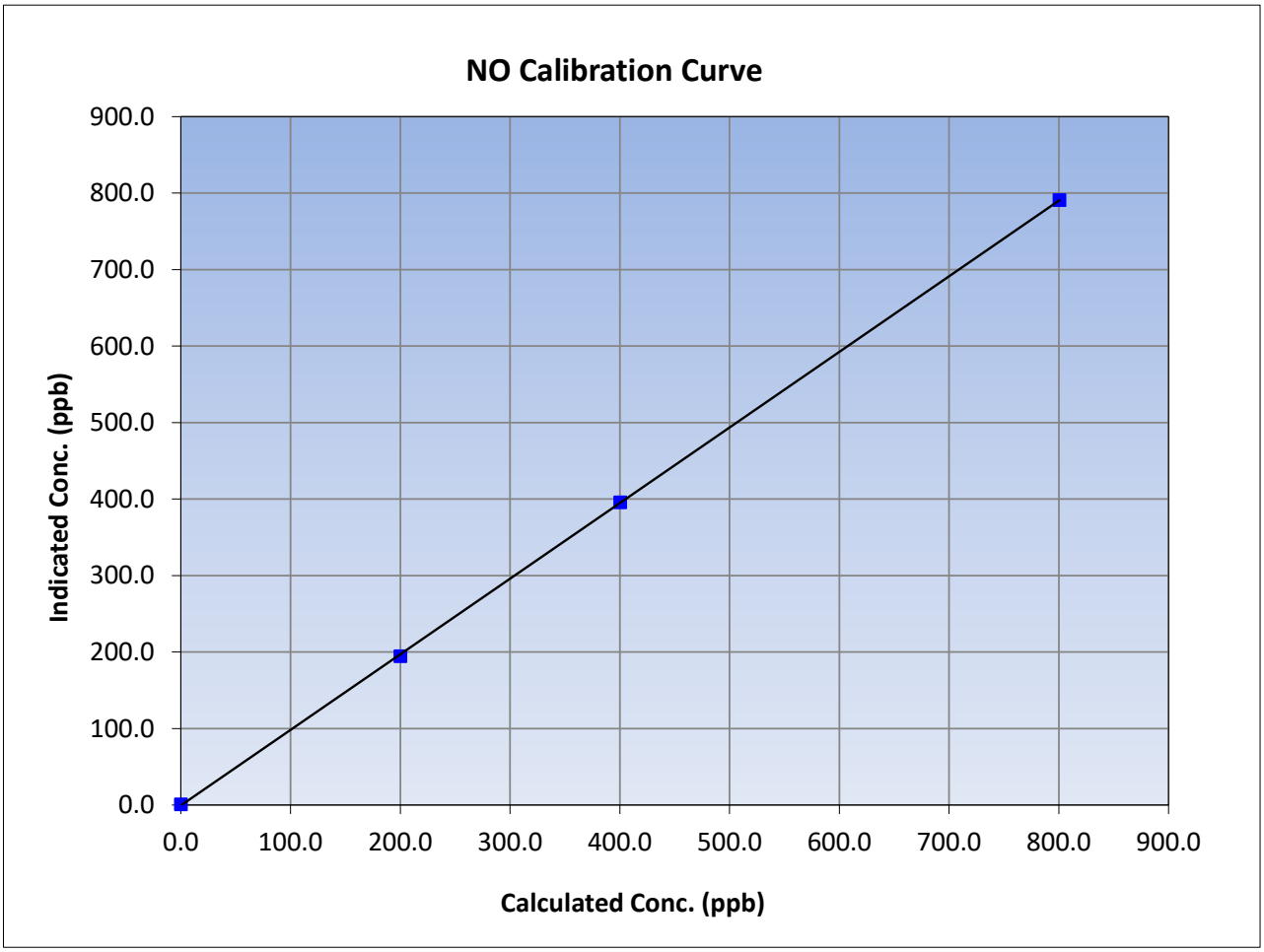
Version-11-2021

Station Information

Calibration Date:	February 16, 2023	Previous Calibration:	January 26, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:12	End Time (MST):	15:18
Analyzer make:	Teledyne API T201E	Analyzer serial #:	56

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	1.0	----	Correlation Coefficient	0.999972	≥0.995
800.6	791.0	1.0122			
400.3	395.8	1.0114	Slope	0.988309	0.90 - 1.10
200.2	194.7	1.0280			
			Intercept	-0.560000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

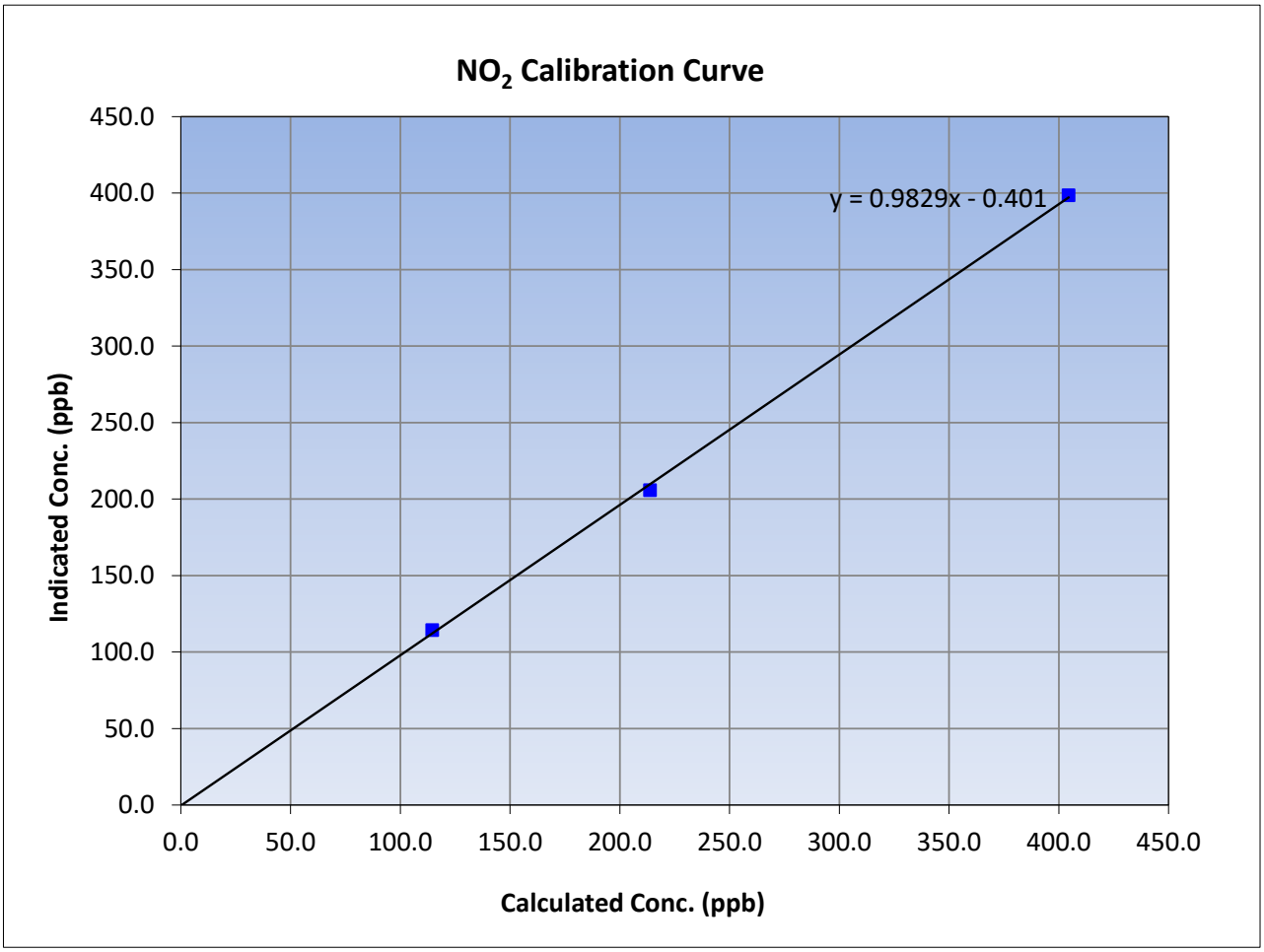
Version-11-2021

Station Information

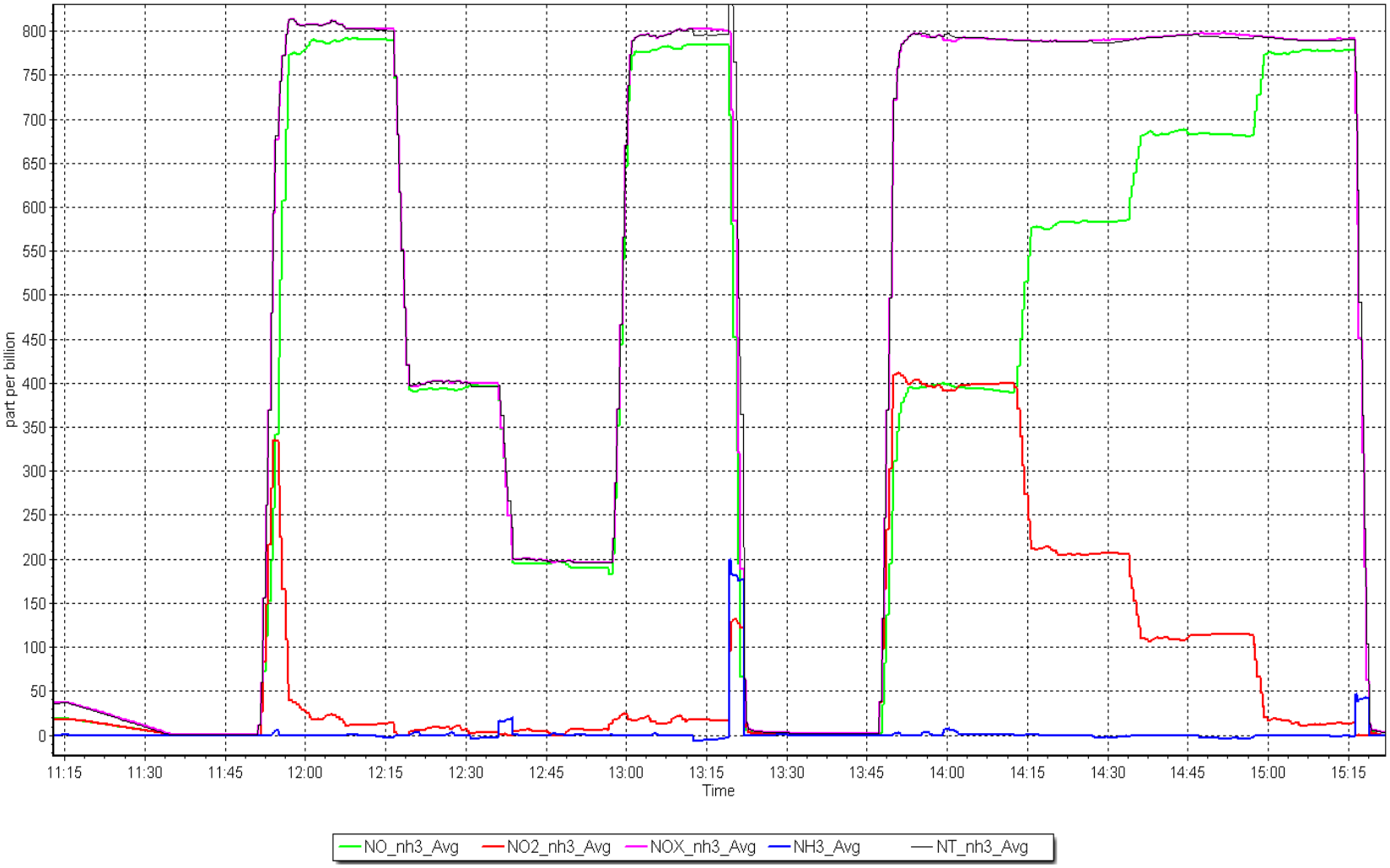
Calibration Date:	February 16, 2023	Previous Calibration:	January 26, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:12	End Time (MST):	15:18
Analyzer make:	Teledyne API T201E	Analyzer serial #:	56

Calibration Data

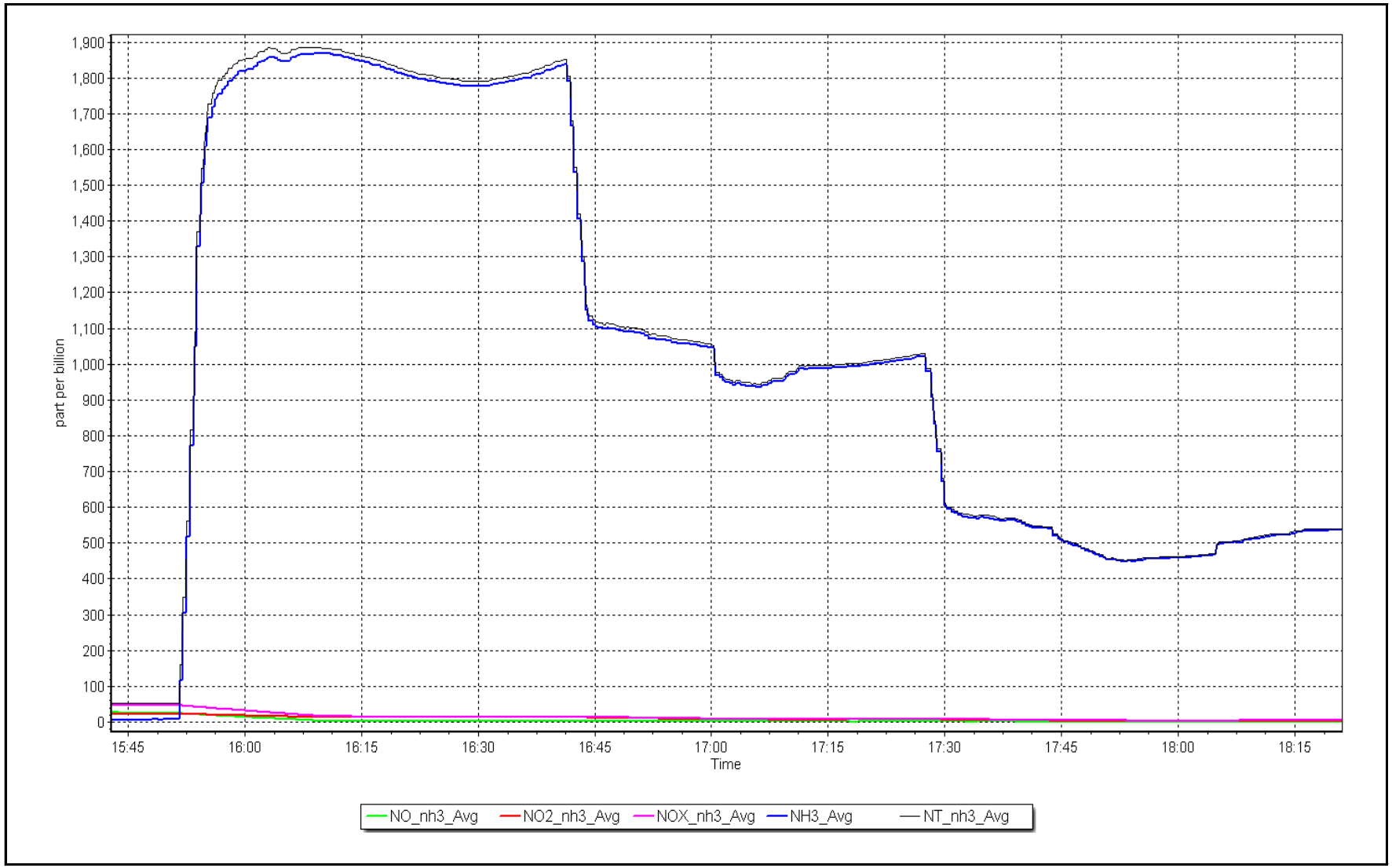
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999743	≥0.995
404.5	398.6	1.0148			
213.8	205.9	1.0384	Slope	0.982947	0.90 - 1.10
114.5	114.4	1.0009			
			Intercept	-0.400969	+/-20



NO_X Calibration Plot Date: February 16, 2023 Location: Bertha Ganter-Fort McKay



NH_3 Calibration Plot Date: February 16, 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:	February 17, 2023	Last Cal Date:	NA
Start time (MST):	11:32	End time (MST):	15:30
NH3 Cal Date:	February 17, 2023	Last Cal Date:	NA
Start time (MST):	15:50	End time (MST):	18:15
Reason:	Install		

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:	5.10
NOX Range (ppb):	0 - 1000 ppb	Sample Flow:	470

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

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:		1.000885
NO_X Cal Offset:		0.380000
NO Cal Slope:		0.999215
NO Cal Offset:		-0.780000
NO_2 Cal Slope:		0.999881
NO_2 Cal Offset:		0.372129
NH3 Cal Slope:		1.010718
NH3 Cal Offset:		-8.022555
TN Cal Slope:		1.015098
TN Cal Offset:		-7.787324

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	----	812.9	814.6	-1.9	1.001	----
NO/O3 point										
as found NH3										
new NH3 cyl rp							----			
first NH3	3413	86.4	1800.6	----	1800.6	1817.8	----	1809.8	0.991	0.995
second NH3	3452	48.0	1000.2	----	1000.2	1021.0	----	1016.3	0.980	0.984
third NH3	3476	24.0	500.1	----	500.1	480.9	----	478.2	1.040	1.046
							Average Correction Factor		1.0007	1.0083

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 =

NH3 Current Converter Efficiency = 85.4%

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	-0.1	-0.1	----	----
high point	4920	80.0	813.4	800.6	813.4	814.6	799.8	812.9	0.9986	1.0011
second point	4960	40.0	406.7	400.3	406.7	406.9	398.2	406.9	0.9996	1.0053
third point	4980	20.0	203.4	200.2	203.4	204.8	199.0	204.0	0.9930	1.0058
								Average Correction Factor	0.9970	1.0041

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	0.1	----	----
1st GPT point (400 ppb O3)	795.6	393.9	414.5	414.9	0.9990	100.1%
2nd GPT point (200 ppb O3)	795.6	594.5	213.9	213.7	1.0009	99.9%
3rd GPT point (100 ppb O3)	795.6	693.9	114.5	115.6	0.9905	101.0%
				Average Correction Factor	0.9968	100.3%

Notes: Installing a new NH3 analyzer/converter. Changed the inlet filter. Adjusted both zero and span. Used the 2nd GPT point. Adjusted the NH3 span.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TN Calibration Summary

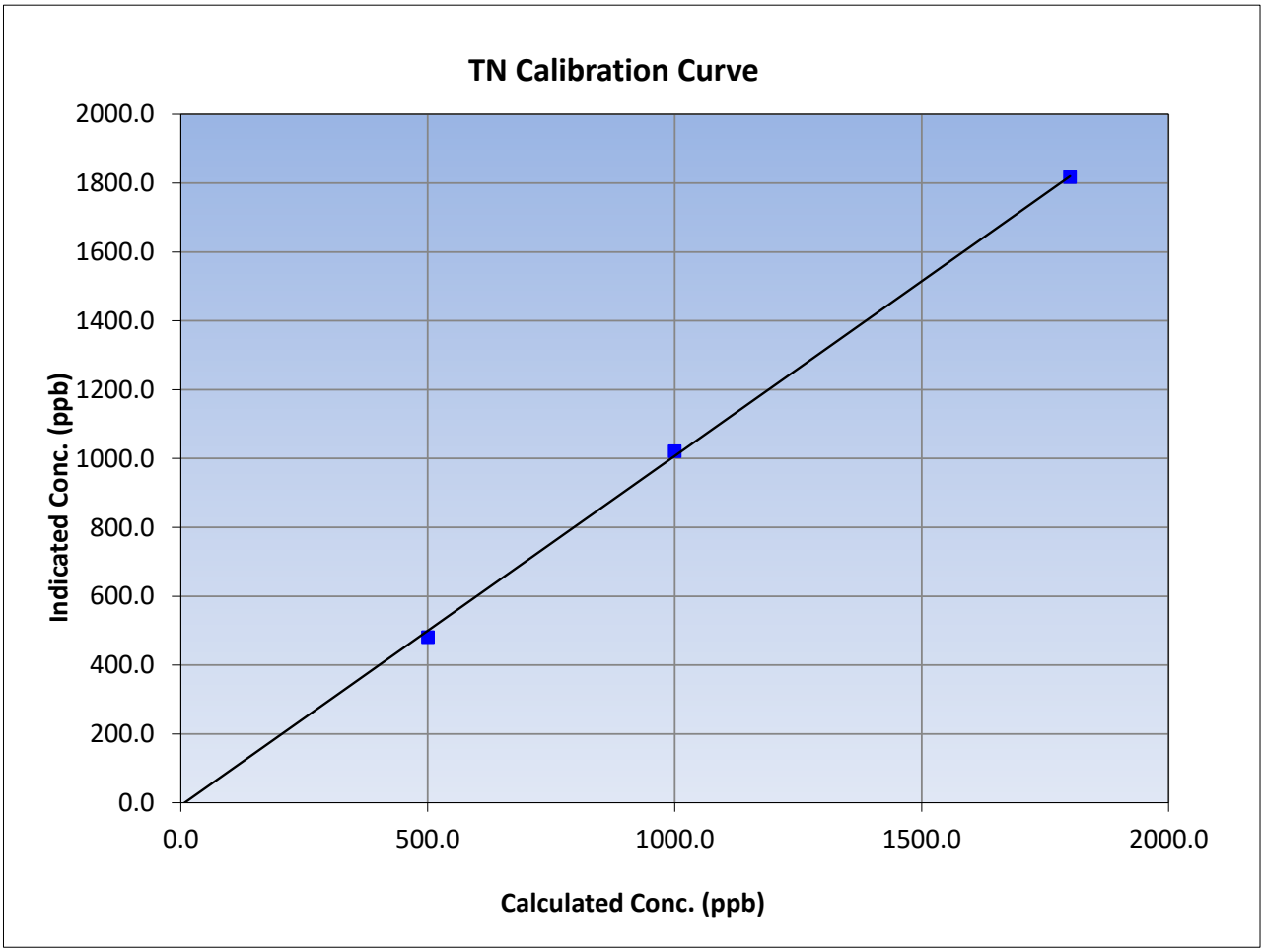
Version-11-2021

Station Information

Calibration Date:	February 17, 2023	Previous Calibration:	NA
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:32	End Time (MST):	15:30
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	0.999668	≥0.995
1800.6	1817.8	0.9906			
1000.2	1021.0	0.9796	Slope	1.015098	0.90 - 1.10
500.1	480.9	1.0399			
			Intercept	-7.787324	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

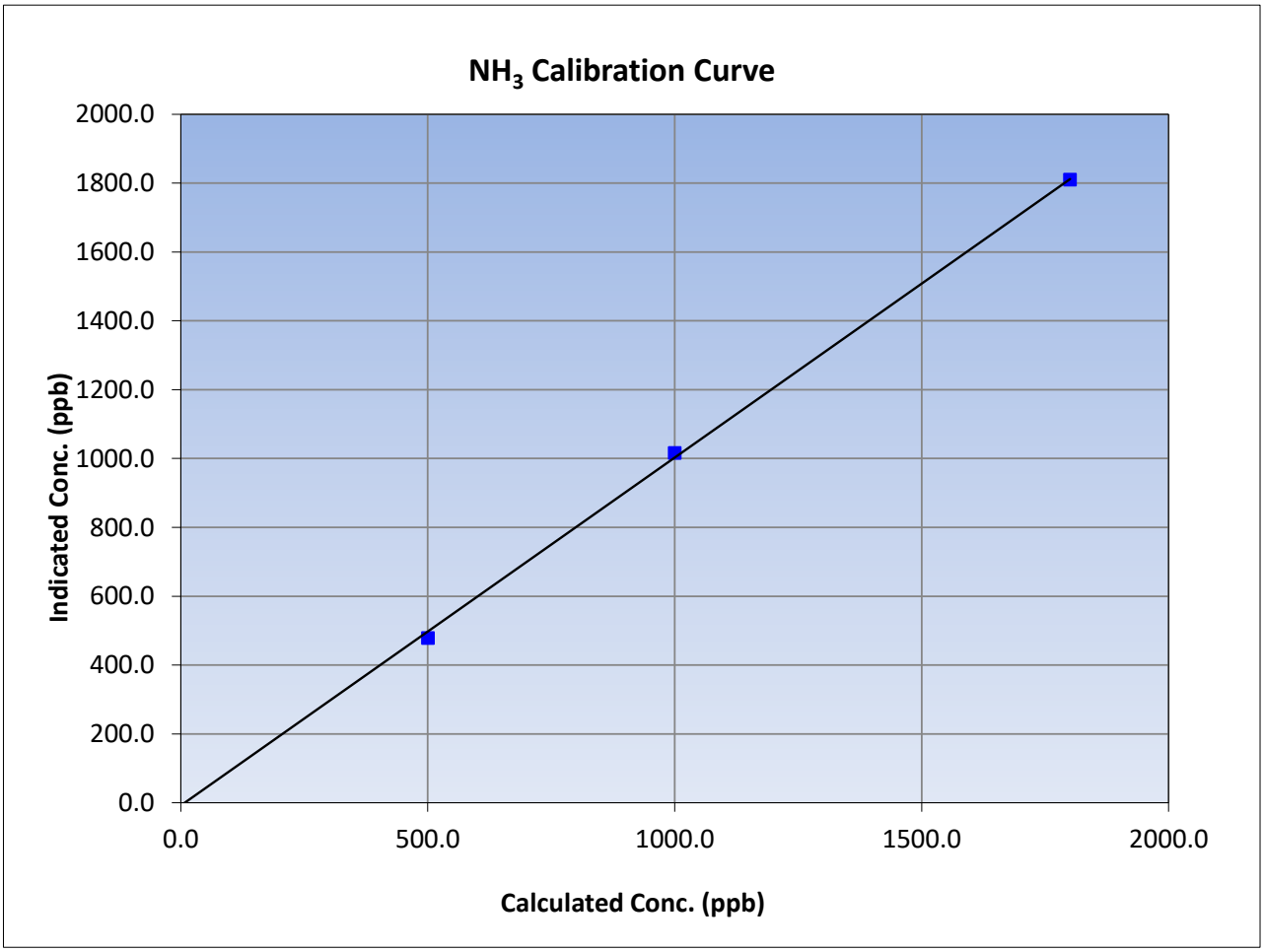
Version-11-2021

Station Information

Calibration Date:	February 17, 2023	Previous Calibration:	NA
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:32	End Time (MST):	15:30
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	0.999659	*≥0.995*
1800.6	1809.8	0.9949			
1000.2	1016.3	0.9841	Slope	1.010718	*0.90 - 1.10*
500.1	478.2	1.0458			
			Intercept	-8.022555	*+/-20*



Wood Buffalo Environmental Association

NO_X Calibration Summary

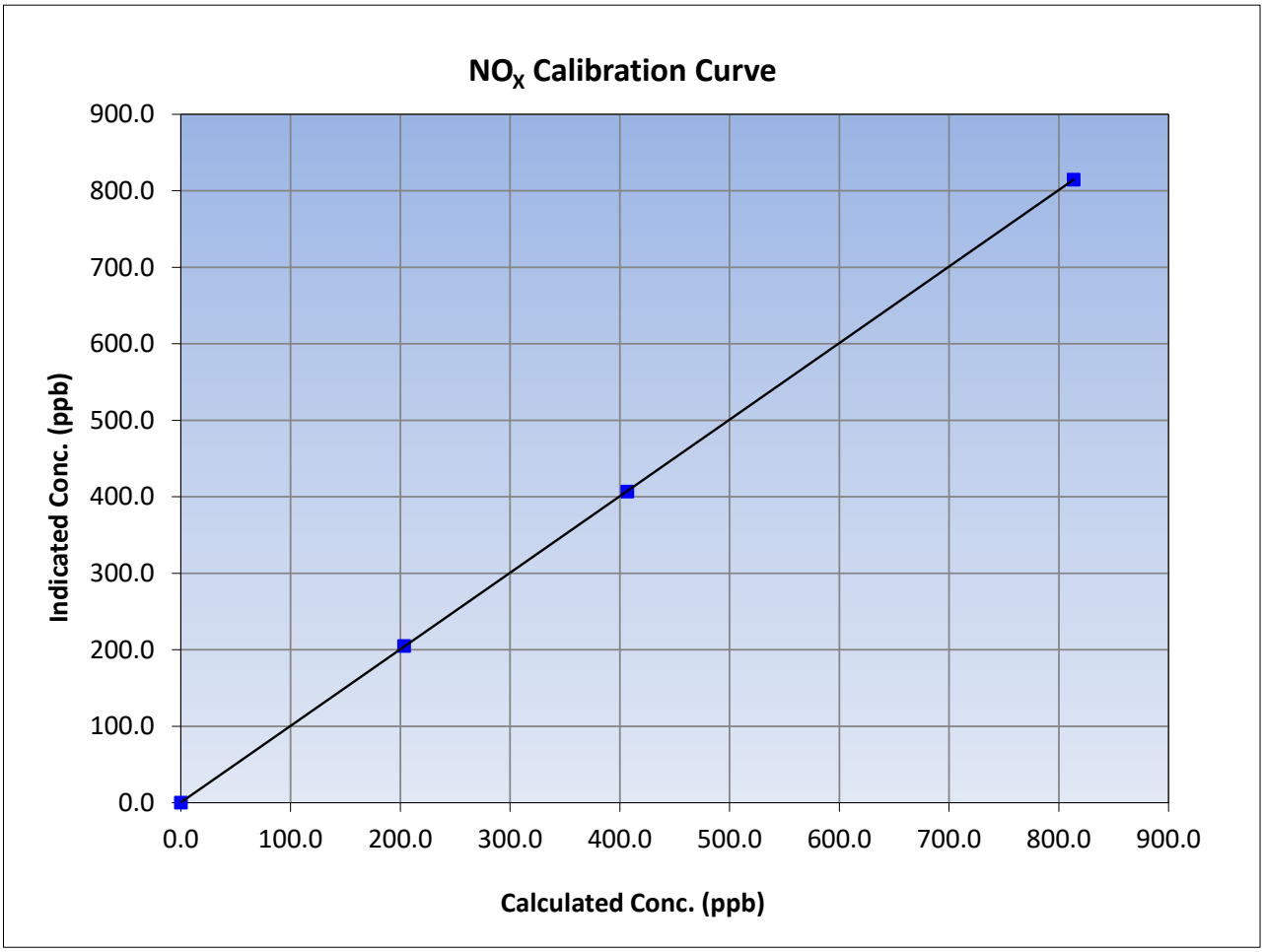
Version-11-2021

Station Information

Calibration Date:	February 17, 2023	Previous Calibration:	NA
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:32	End Time (MST):	15:30
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	0.999997	≥0.995
813.4	814.6	0.9986			
406.7	406.9	0.9996	Slope	1.000885	0.90 - 1.10
203.4	204.8	0.9930			
			Intercept	0.380000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

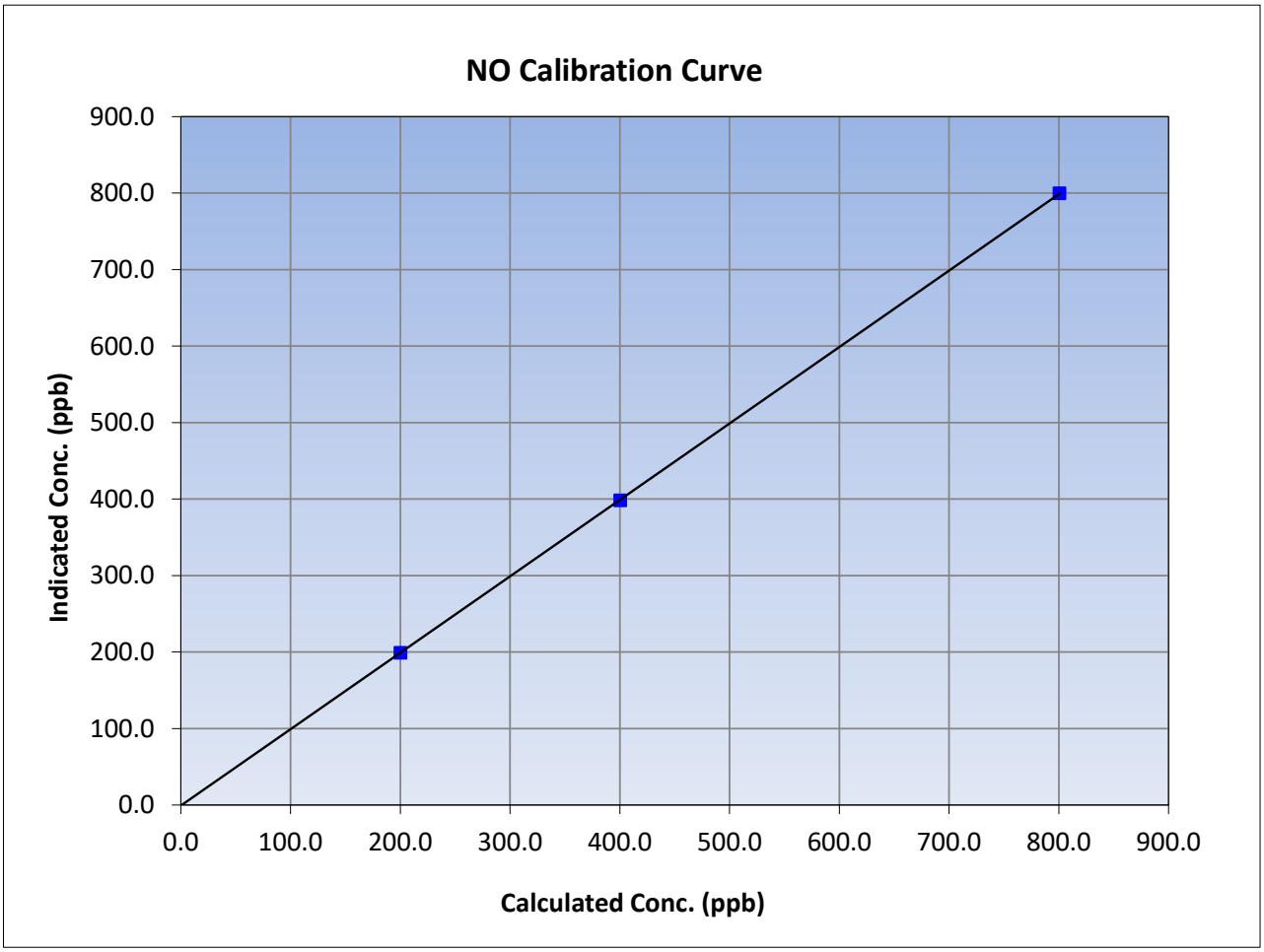
Version-11-2021

Station Information

Calibration Date:	February 17, 2023	Previous Calibration:	NA
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:32	End Time (MST):	15:30
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
800.6	799.8	1.0011			
400.3	398.2	1.0053	Slope	0.999215	0.90 - 1.10
200.2	199.0	1.0058			
			Intercept	-0.780000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

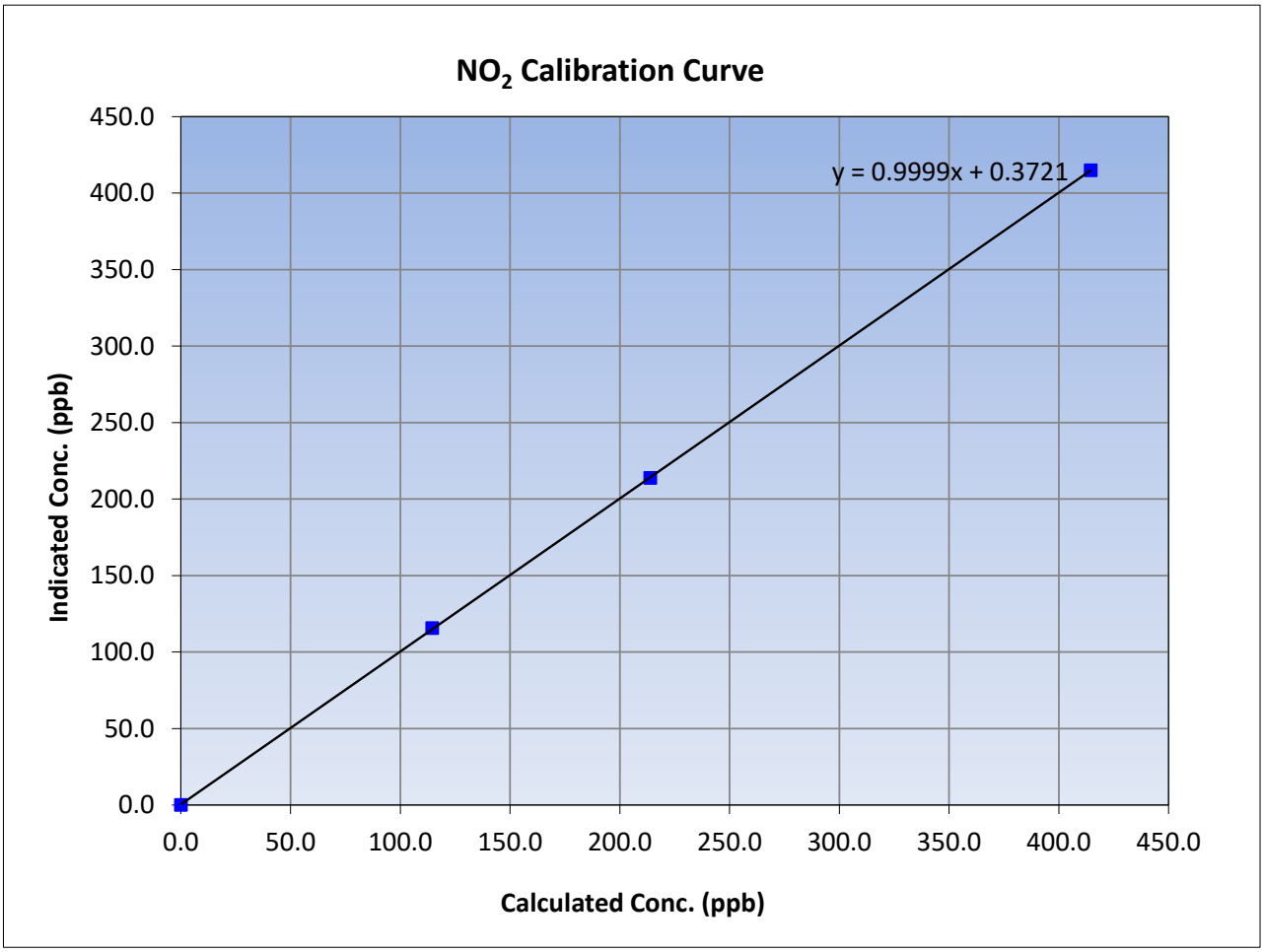
Version-11-2021

Station Information

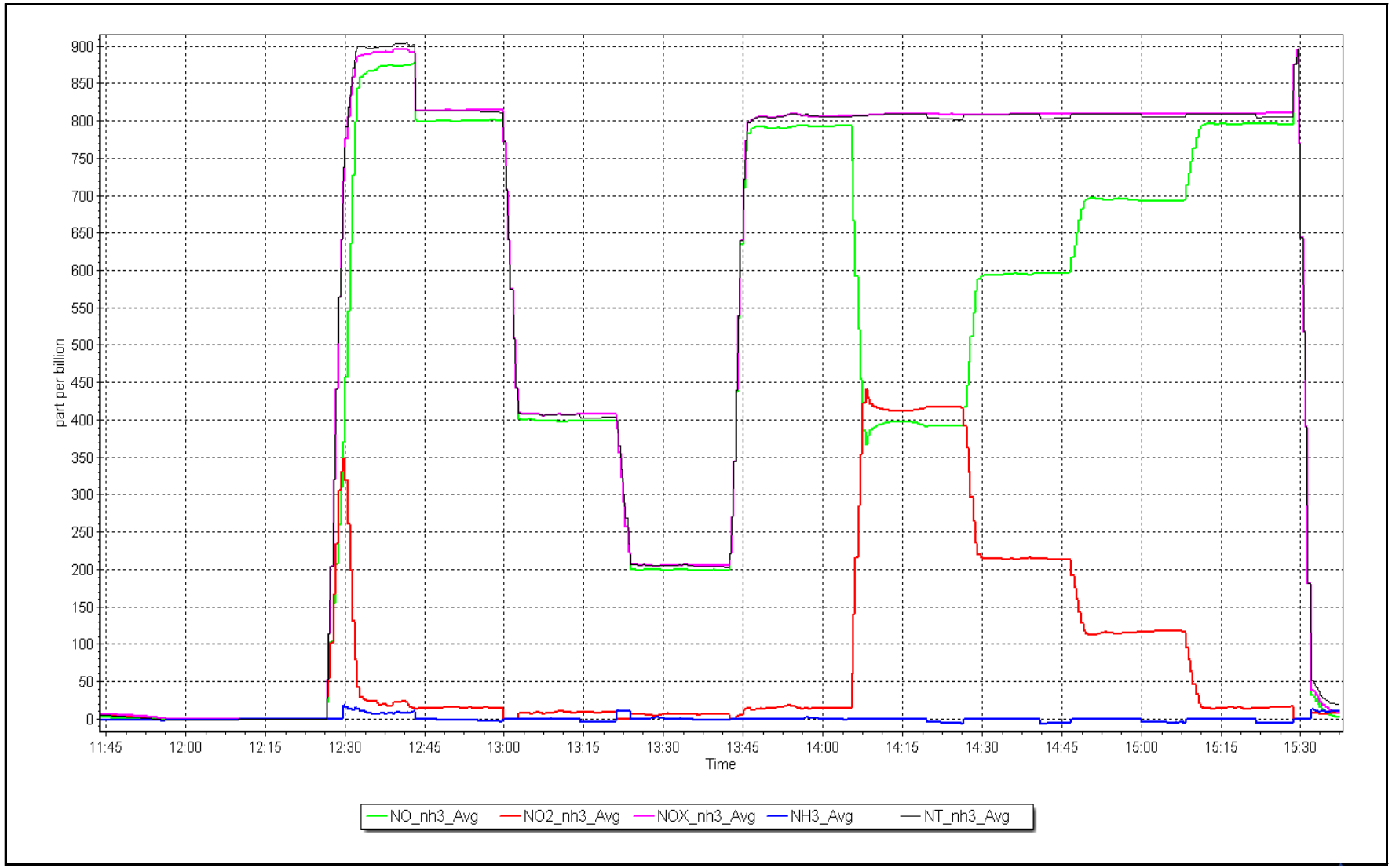
Calibration Date:	February 17, 2023	Previous Calibration:	NA
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:32	End Time (MST):	15:30
Analyzer make:	Teledyne API T201	Analyzer serial #:	808

Calibration Data

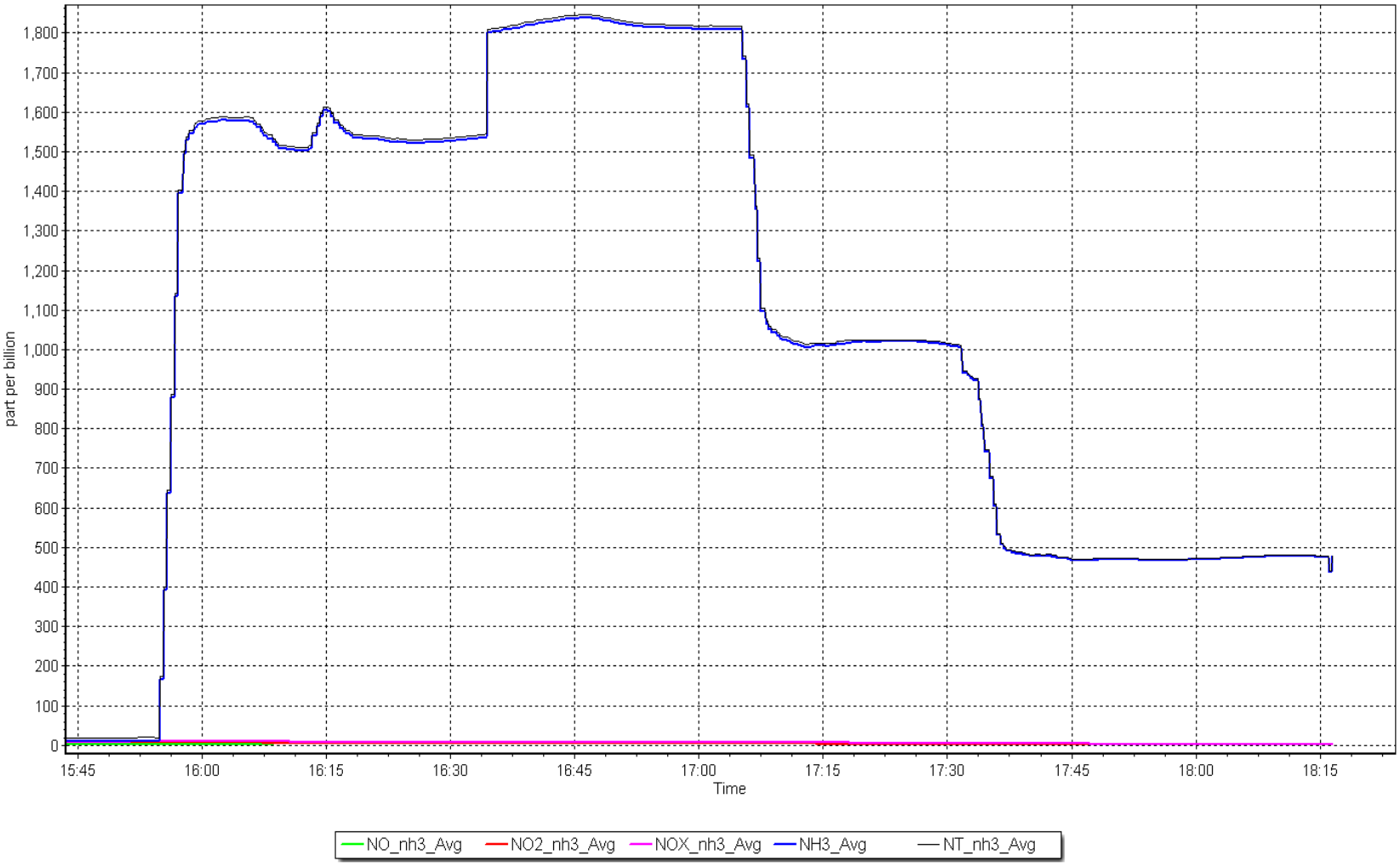
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999990	≥0.995
414.5	414.9	0.9990			
213.9	213.7	1.0009	Slope	0.999881	0.90 - 1.10
114.5	115.6	0.9905			
			Intercept	0.372129	+/-20



NO_X Calibration Plot Date: February 17, 2023 Location: Bertha Ganter-Fort McKay



NH_3 Calibration Plot Date: February 17, 2023 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	February 15, 2023	Last Cal Date:	January 11, 2023
Start time (MST):	11:15	End time (MST):	15:35
Reason:	Maintenance		

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:	0.999735	1.001201	Backgd or Offset:	-0.012	-0.012
Calibration intercept:	0.169836	0.093816	Coeff or Slope:	0.989	0.991

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	40.2	1.008
as found 2nd point	4966	33.3	20.2	20.4	0.991
as found 3rd point	4983	16.7	10.2	10.1	1.010
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4933	66.7	40.6	40.6	0.999
second point	4966	33.3	20.2	20.6	0.982
third point	4983	16.7	10.2	10.3	0.991
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	0.991

Baseline Corr As found:	40.36	Prev response:	40.72	*% change:	-0.9%
Baseline Corr 2nd AF pt:	20.6	AF Slope:	0.995619	AF Intercept:	-0.022146
Baseline Corr 3rd AF pt:	10.2	AF Correlation:	0.999867		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

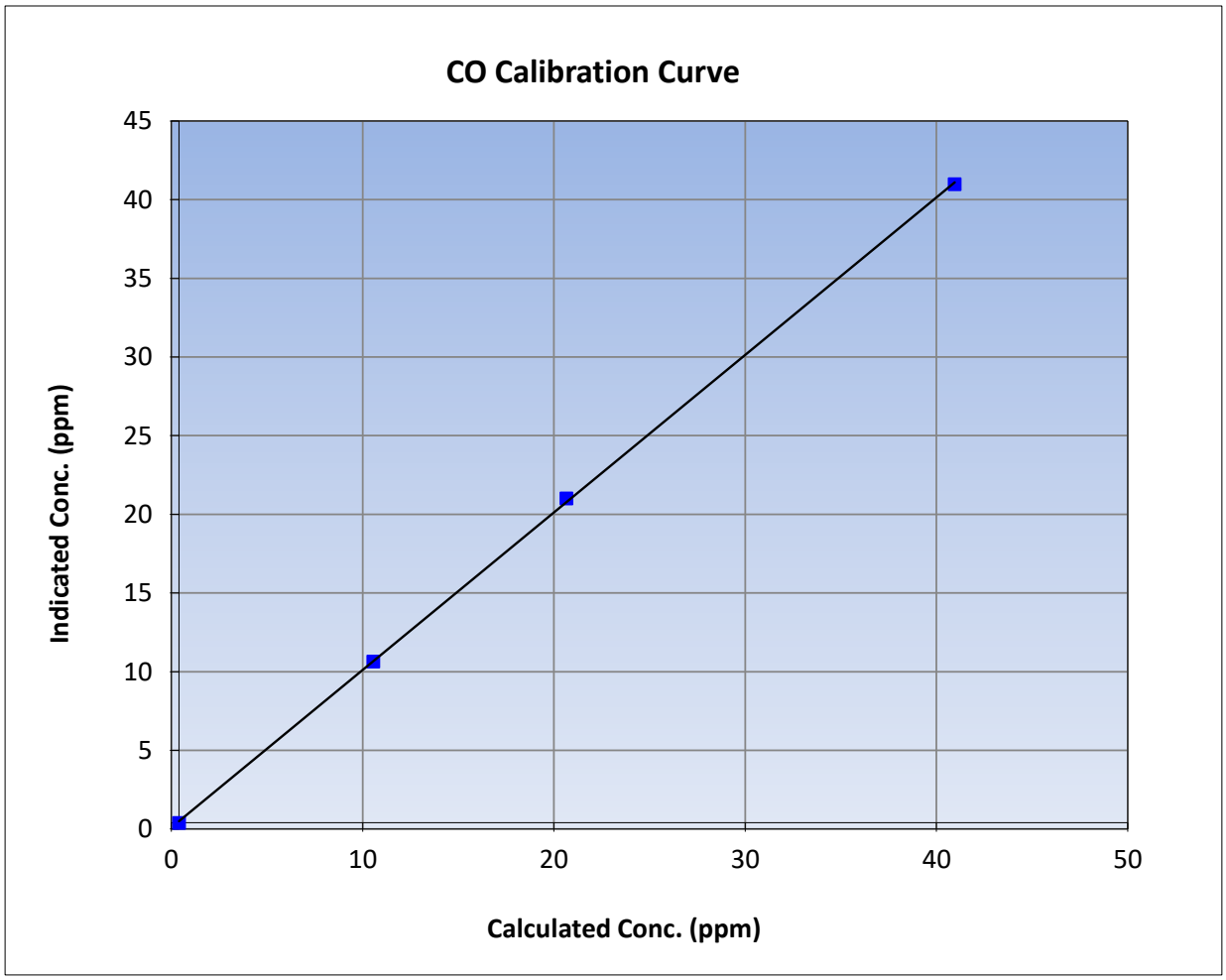
Station Information

Calibration Date:	February 15, 2023	Previous Calibration:	January 11, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:15	End Time (MST):	15:35
Analyzer make:	Teledyne API T300	Analyzer serial #:	3520

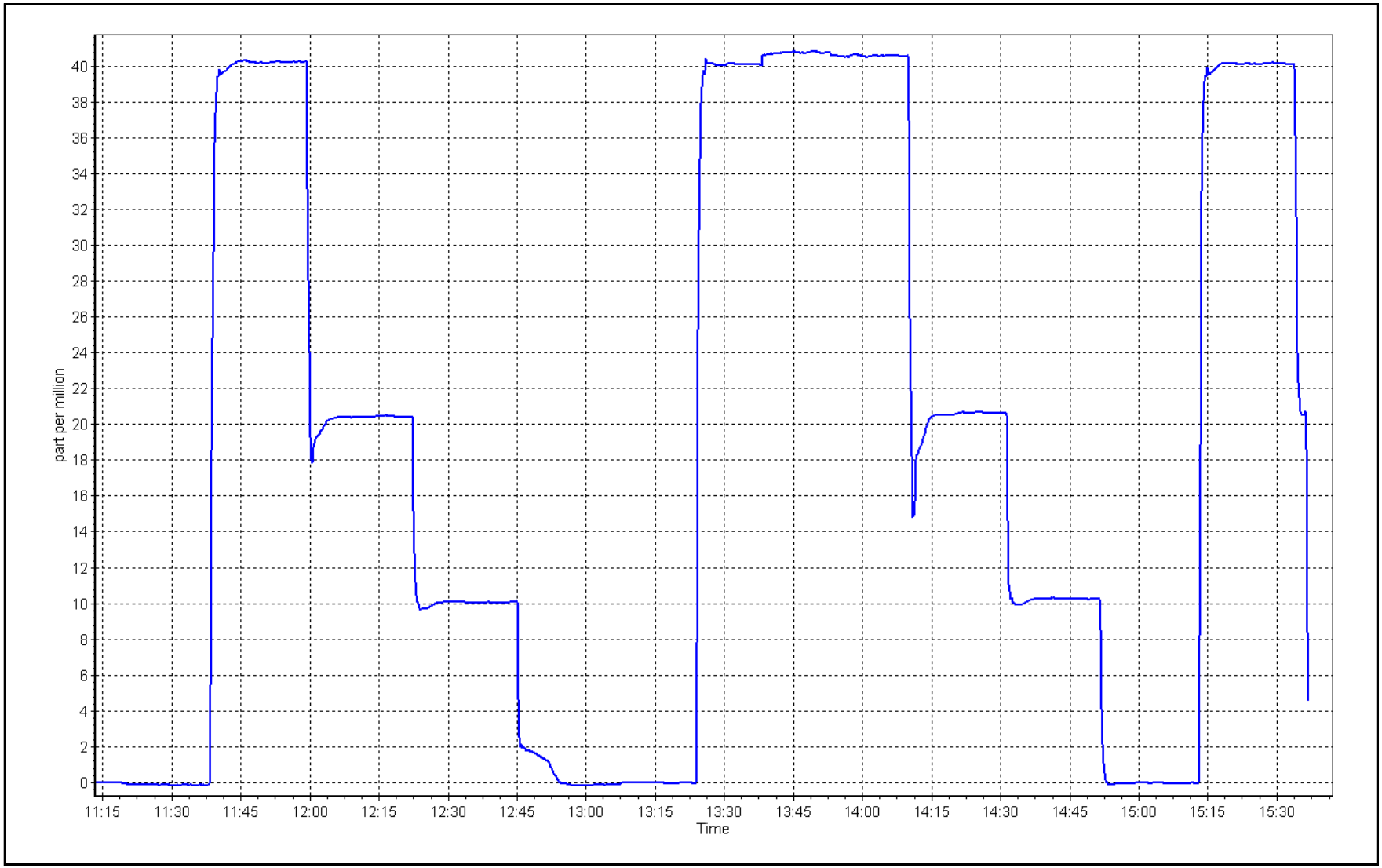
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.6	40.6	0.9994
20.2	20.6	0.9825
10.2	10.3	0.9907

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999905	*≥0.995*
Slope	1.001201	*0.90 - 1.10*
Intercept	0.093816	*+/-1.5*



CO Calibration Plot Date: February 15, 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:	February 7, 2023	Last Cal Date:	January 16, 2023
Start time (MST):	10:46	End time (MST):	14:02
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 2,000 ppm

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.002131	0.999874	Backgd or Offset:	0.037	0.037
Calibration intercept:	-6.480000	-5.820000	Coeff or Slope:	0.883	0.883

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	-0.4	----
as found span	2920	80.0	1605.3	1601.0	1.003
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	1605.3	1602.5	1.002
second point	2960	40.0	802.7	792.9	1.012
third point	2980	20.0	401.3	390.4	1.028
as left zero	3000	0.0	0.0	-0.4	----
as left span	2960	40.0	802.7	780.8	1.028
				Average Correction Factor	1.014

Baseline Corr As found:	1601.40	Prev response:	1602.27	*% change:	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

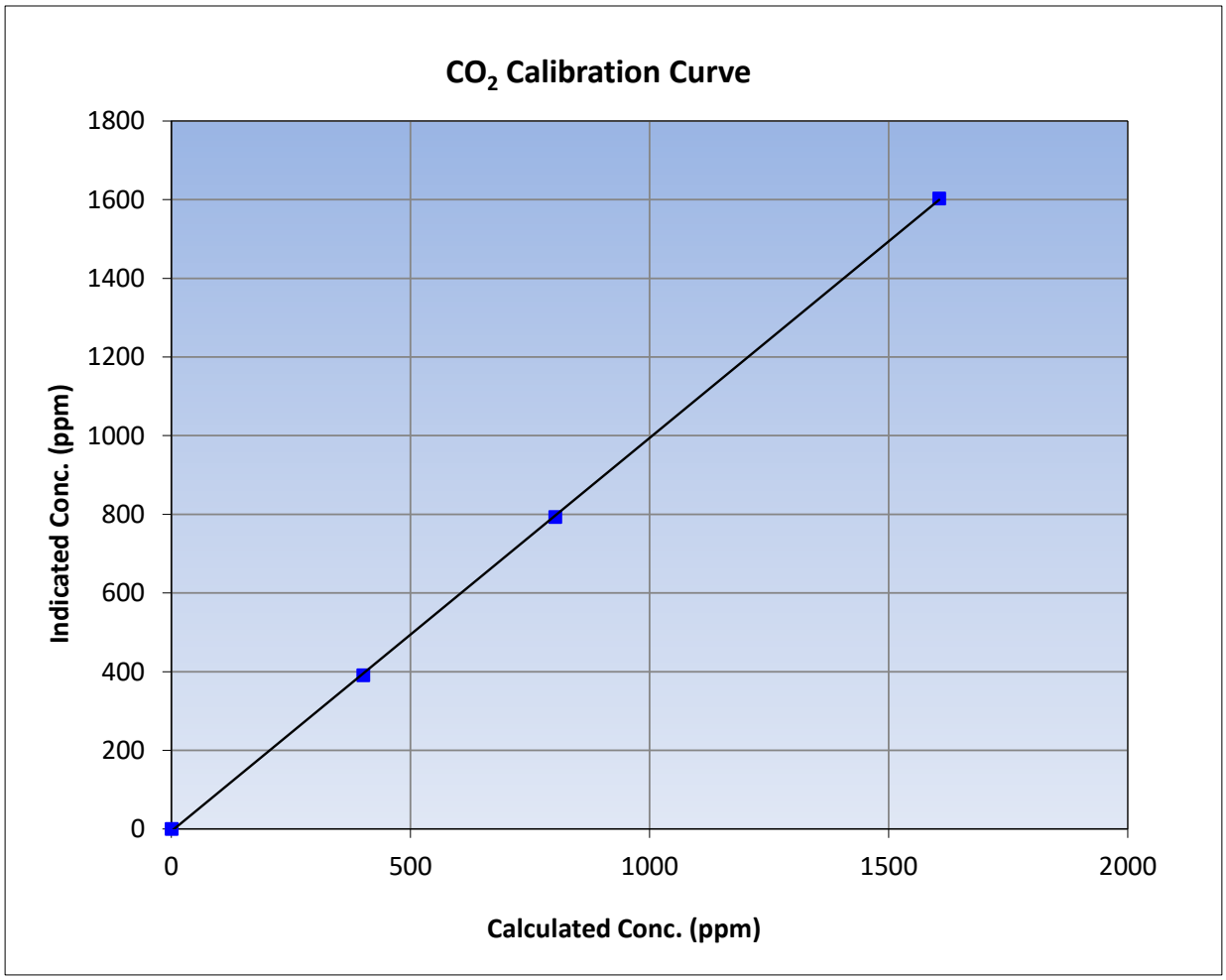
Station Information

Calibration Date	February 7, 2023	Previous Calibration	January 16, 2023
Station Name	Bertha Ganter-Fort McKay	Station Number	AMS01
Start Time (MST)	10:46	End Time (MST)	14:02
Analyzer make	Teledyne API 360	Analyzer serial #	442

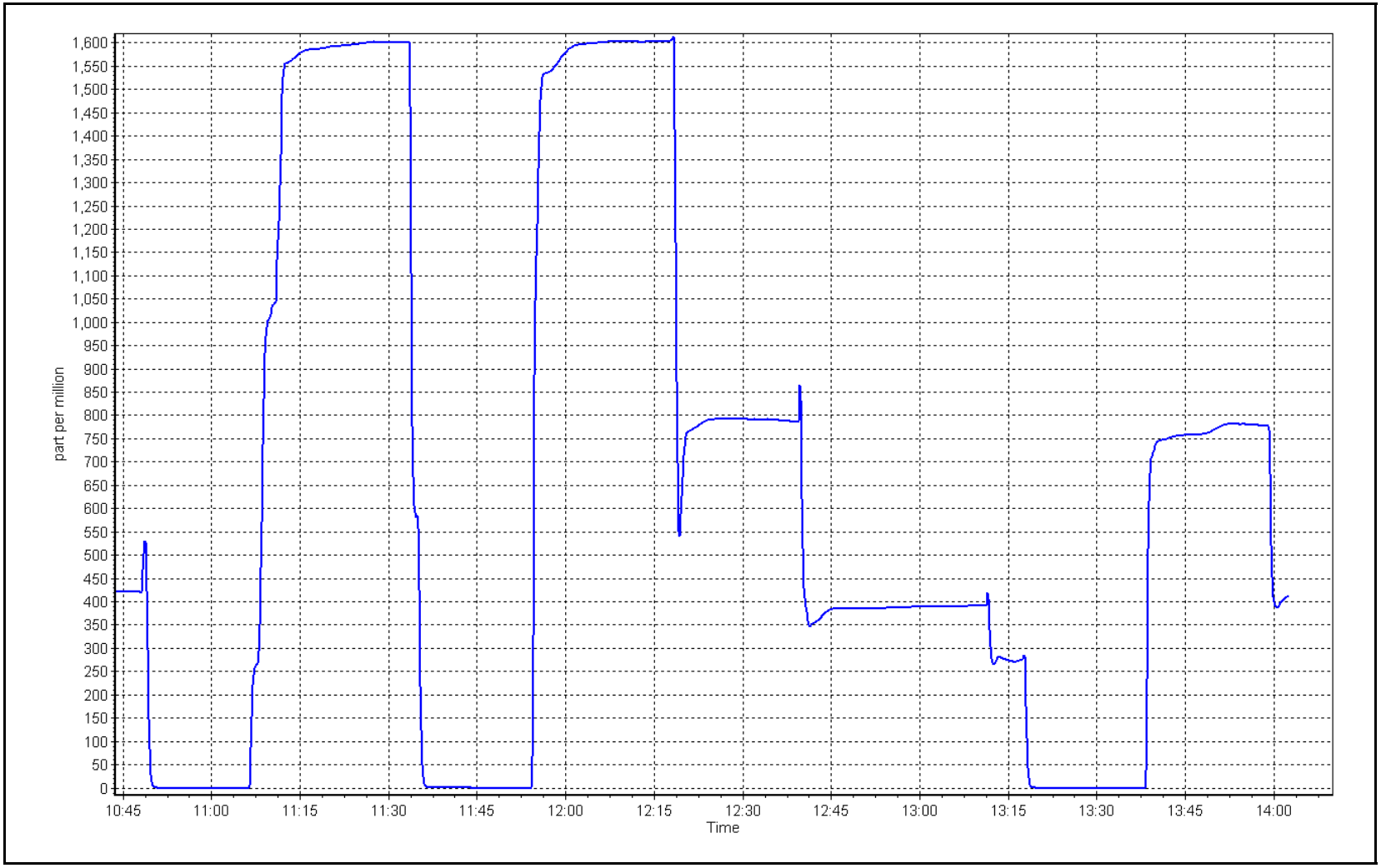
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
1605.3	1602.5	1.0018
802.7	792.9	1.0123
401.3	390.4	1.0280

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999941	*≥0.995*
Slope	0.999874	*0.90 - 1.10*
Intercept	-5.820000	*+/-10*



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



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS02
MILDRED LAKE
FEBRUARY 2023

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

March 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Mildred Lake	Station number:	AMS02
Calibration Date:	February 8, 2023	Last Cal Date:	January 3, 2023
Start time (MST):	9:57 AM	End time (MST):	13:07
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:	0.996082	1.002695	Backgd or Offset:	17.8	17.9
Calibration intercept:	-0.526045	-0.144667	Coeff or Slope:	0.816	0.827

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	4920	80.2	801.6	793.0	1.011
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4920	80.2	801.6	803.7	0.997
second point	4960	40.1	400.8	402.0	0.997
third point	4980	20.0	199.9	199.7	1.001
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	80.2	801.6	807.8	0.992
				Average Correction Factor	0.999

Baseline Corr As found:	793.00	Previous response	797.98	*% change	-0.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

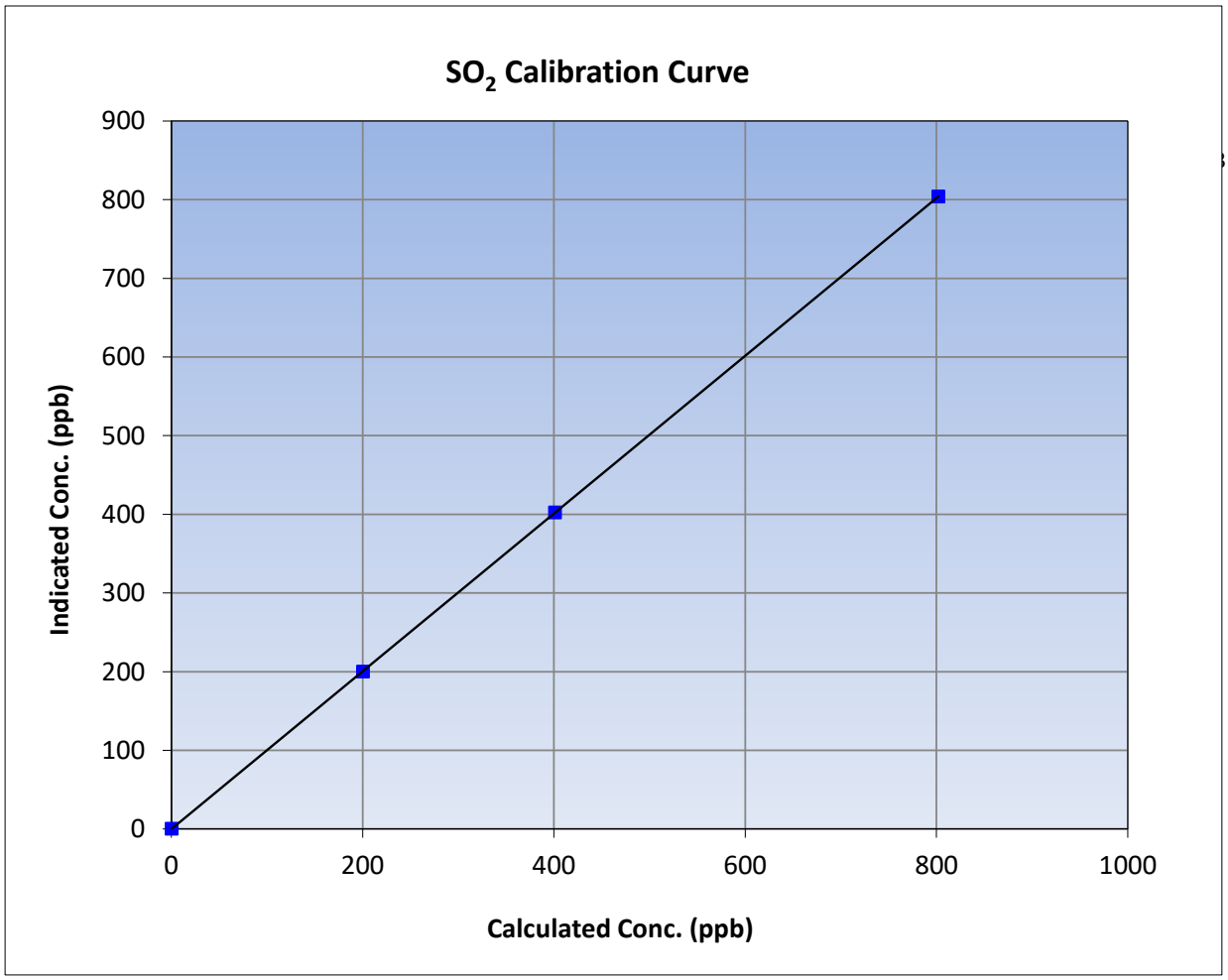
Station Information

Calibration Date:	February 8, 2023	Previous Calibration:	January 3, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:57	End Time (MST):	13:07
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1404901075

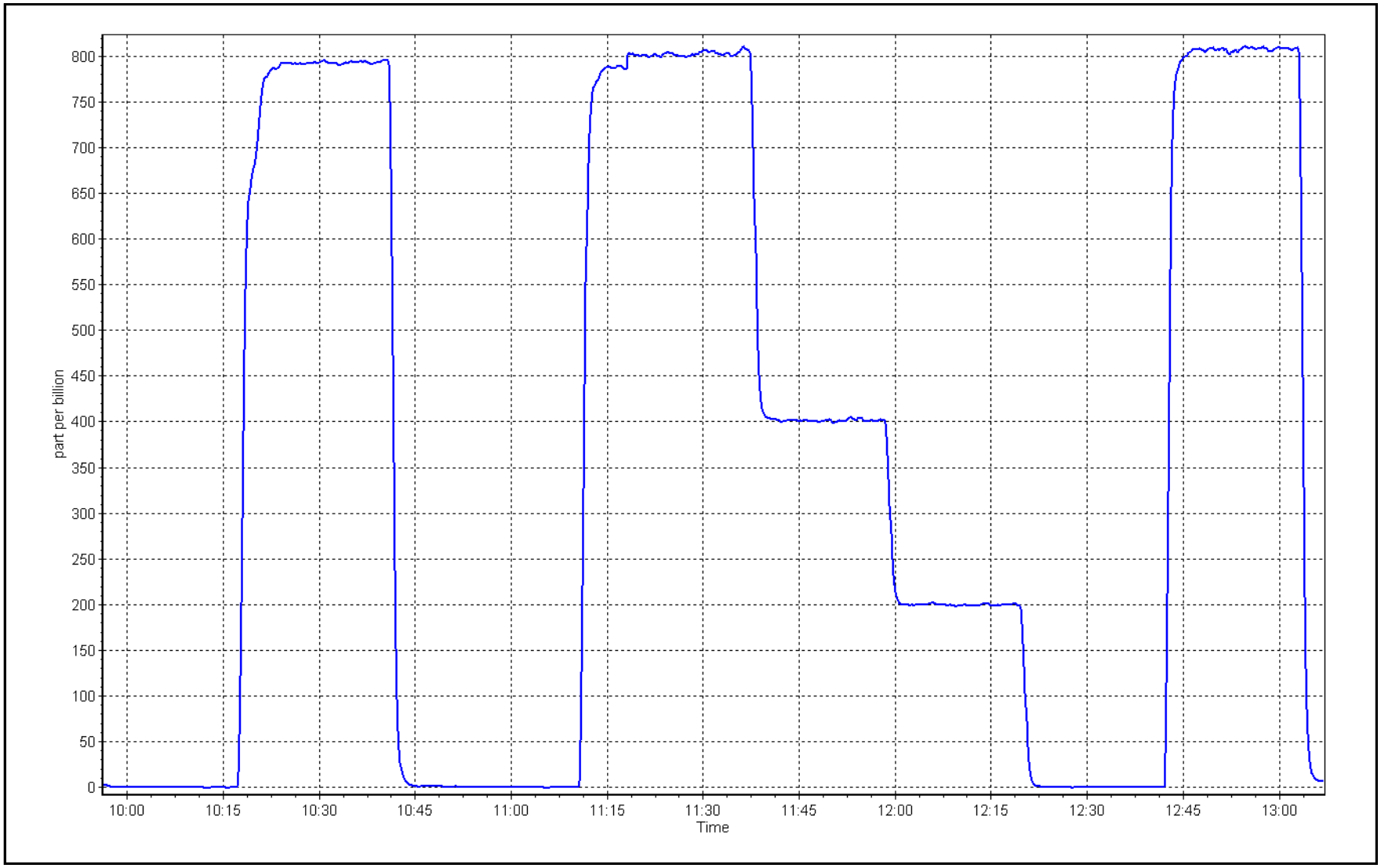
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
801.6	803.7	0.9974
400.8	402.0	0.9971
199.9	199.7	1.0011

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.002695	*0.90 - 1.10*
Intercept	-0.144667	*+/-30*



SO2 Calibration Plot Date: February 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:	February 6, 2023	Last Cal Date:	January 17, 2023
Start time (MST):	10:07	End time (MST):	14:25
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43iQTL		Analyzer serial #:	12113311966	
Converter make:	Global G150		Converter serial #:	2022-198	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.010965	0.993964	Backgd or Offset:	1.83	1.83
Calibration intercept:	-0.179192	-0.059204	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	79.7	1.002
as found 2nd point	4962	37.8	40.0	40.1	0.995
as found 3rd point	4981	18.9	20.0	19.8	1.005
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4924	75.6	80.0	79.4	1.007
second point	4962	37.8	40.0	39.9	1.002
third point	4981	18.9	20.0	19.6	1.020
as left zero	5000	0.0	0.0	0.1	----
as left span	4924	75.6	80.0	79.9	1.001
SO2 Scrubber Check	4920	80.2	802.0	0.0	----
Date of last scrubber change:		12-Sep-22		Ave Corr Factor	1.010
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.8	Prev response:	80.69	*% change:	-1.1%
Baseline Corr 2nd AF pt:	40.2	AF Slope:	0.998250	AF Intercept:	-0.059199
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999978		

* = > +/-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

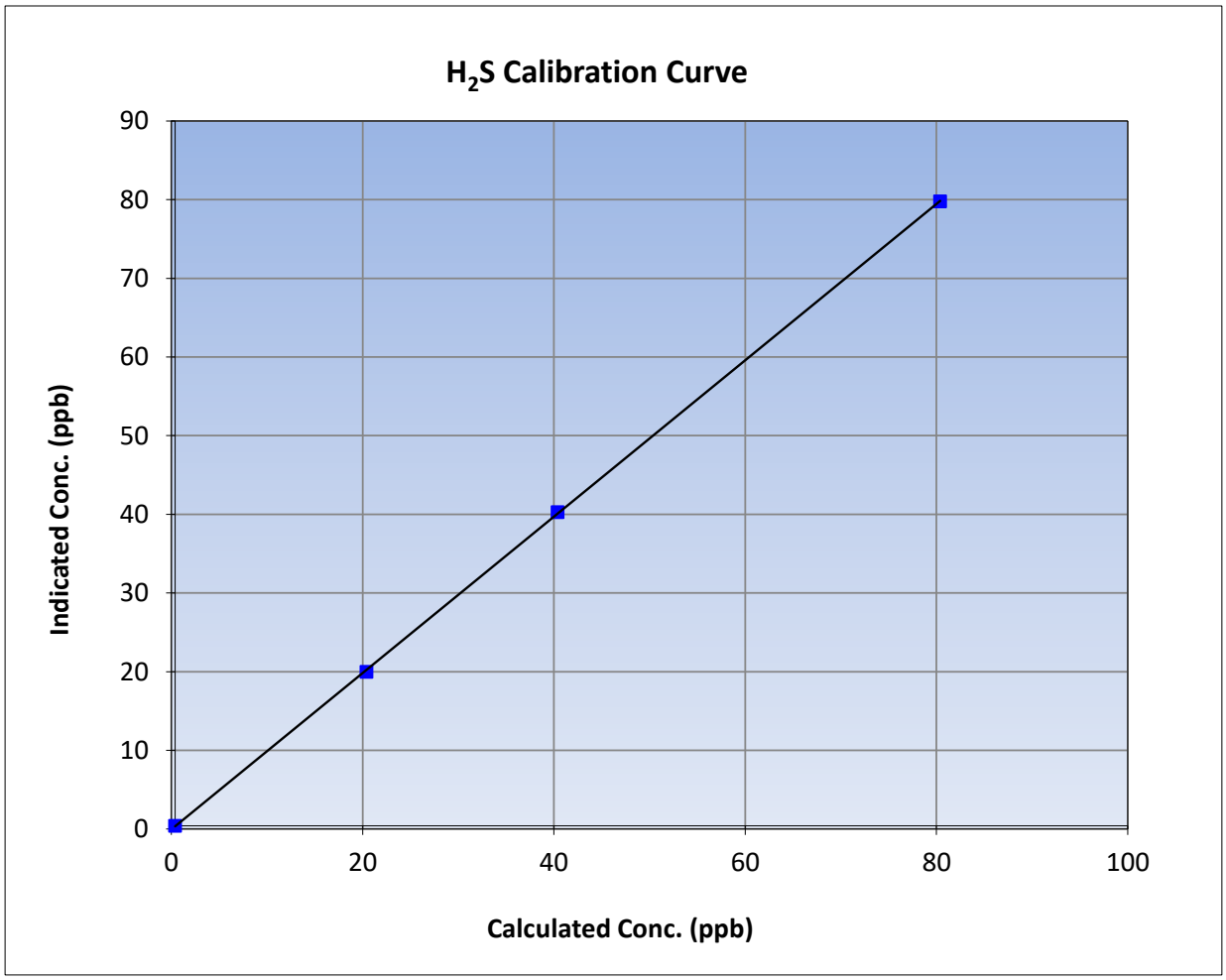
Station Information

Calibration Date:	February 6, 2023	Previous Calibration:	January 17, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:07	End Time (MST):	14:25
Analyzer make:	API T700	Analyzer serial #:	1185

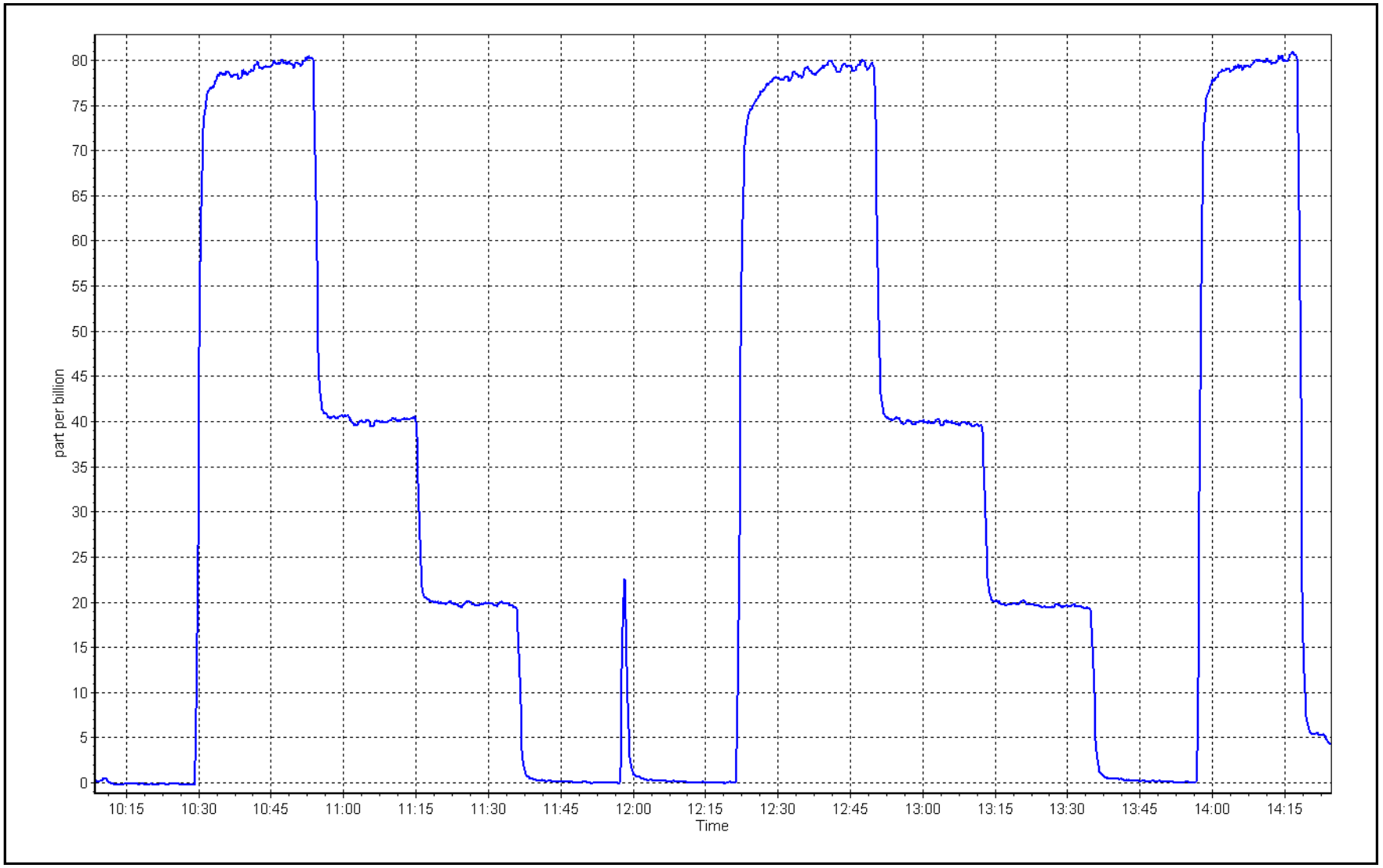
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	79.4	1.0074
40.0	39.9	1.0024
20.0	19.6	1.0202

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999972	*≥0.995*
Slope	0.993964	*0.90 - 1.10*
Intercept	-0.059204	*+/-3*



H_2S Calibration Plot Date: February 6, 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:	February 8, 2023	Last Cal Date:	January 3, 2023
Start time (MST):	9:57	End time (MST):	13:07
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:	2.87E-04	2.80E-04	NMHC SP Ratio:	4.52E-04	4.43E-04
CH4 Retention time:	14.6	14.4	NMHC Peak Area:	194883	198634
Zero Chromatogram:	ON	ON	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	16.82	17.13	0.982
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	16.80	1.001
second point	4960	40.1	8.41	8.36	1.005
third point	4980	20.0	4.19	4.15	1.011
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	16.82	16.81	1.000
				Average Correction Factor	1.006
Baseline Corr AF:	17.13	Prev response	16.85	*% change	1.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	8.80	8.98	0.979
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	8.80	8.80	1.000
second point	4960	40.1	4.40	4.40	1.000
third point	4980	20.0	2.19	2.19	1.001
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.80	8.84	0.995
				Average Correction Factor	1.000
Baseline Corr AF:	8.98	Prev response	8.79	*% change	2.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	8.02	8.15	0.985
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	8.02	8.01	1.002
second point	4960	40.1	4.01	3.97	1.012
third point	4980	20.0	2.00	1.96	1.021
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.02	7.97	1.007
				Average Correction Factor	1.011
Baseline Corr AF:	8.15	Prev response	8.06	*% 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:	1.003029	0.999735
THC Cal Offset:	-0.014898	-0.023917
CH4 Cal Slope:	1.006623	0.999431
CH4 Cal Offset:	-0.017040	-0.023056
NMHC Cal Slope:	0.999387	1.000064
NMHC Cal Offset:	0.002541	-0.001060

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

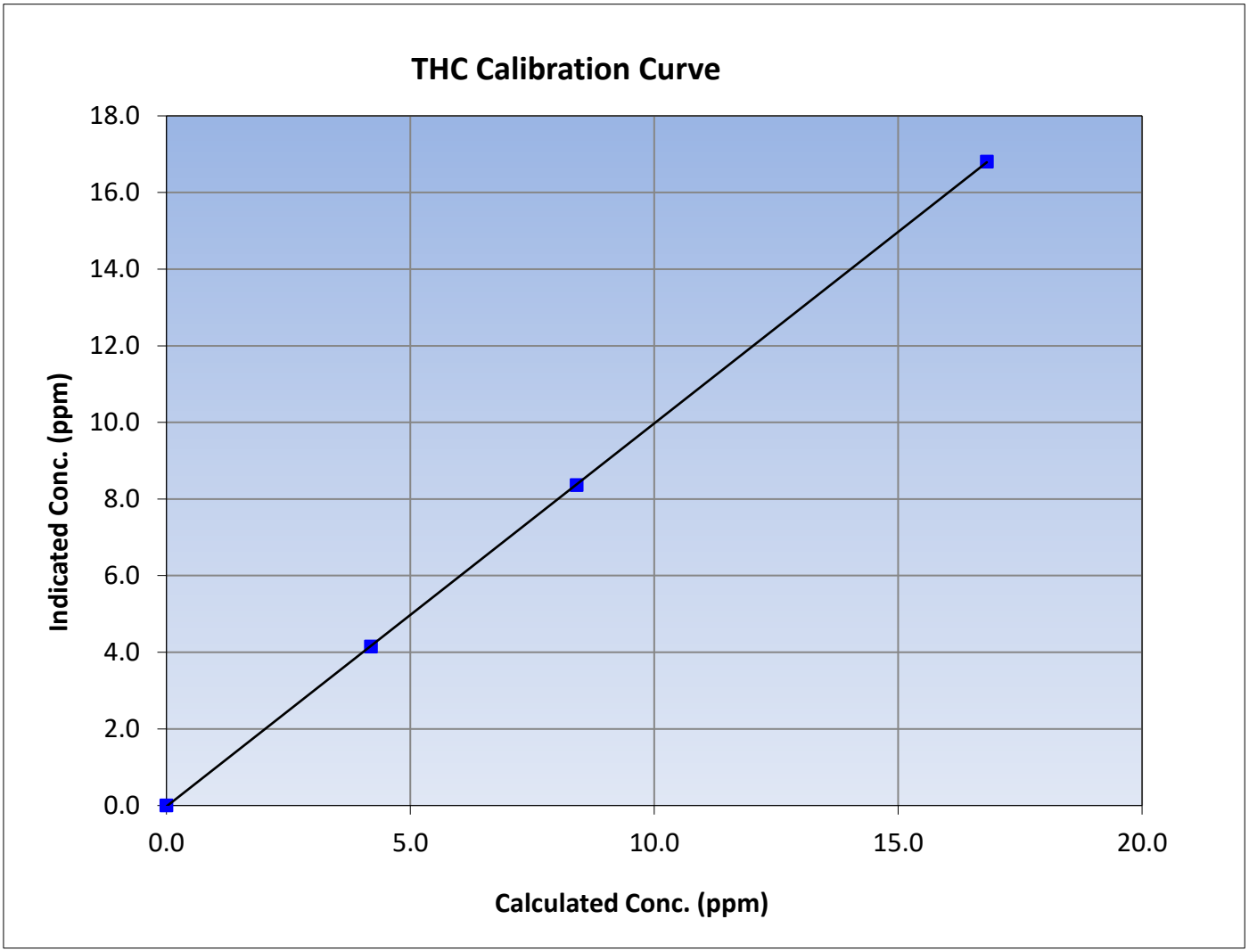
Version-06-2022

Station Information

Calibration Date:	February 8, 2023	Previous Calibration:	January 3, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:57	End Time (MST):	13:07
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	0.999990	*≥0.995*
16.82	16.80	1.0008			
8.41	8.36	1.0054	Slope	0.999735	*0.90 - 1.10*
4.19	4.15	1.0107			
			Intercept	-0.023917	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

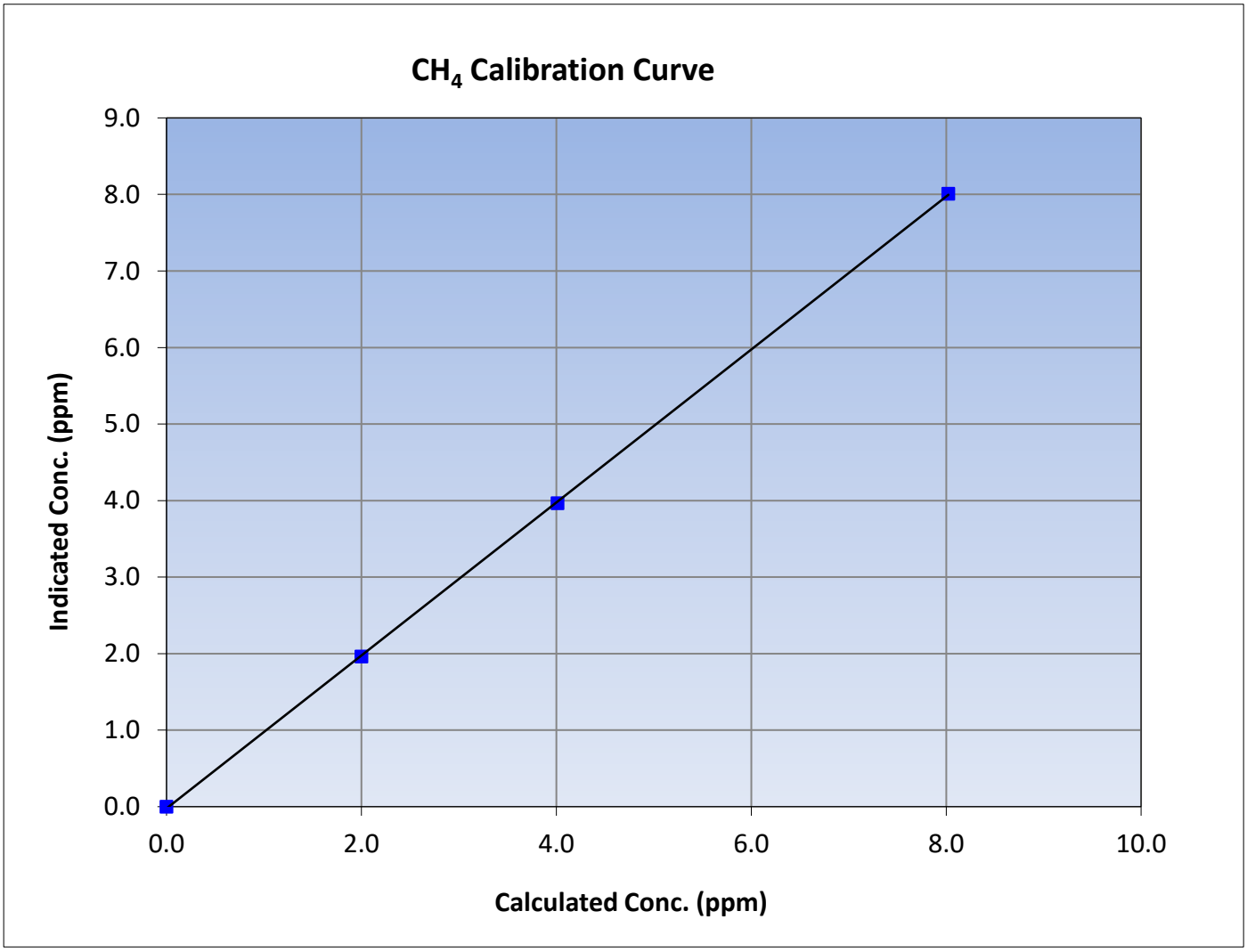
Version-06-2022

Station Information

Calibration Date:	February 8, 2023	Previous Calibration:	January 3, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:57	End Time (MST):	13:07
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	0.999958	≥0.995
8.02	8.01	1.0016			
4.01	3.97	1.0117	Slope	0.999431	0.90 - 1.10
2.00	1.96	1.0208			
			Intercept	-0.023056	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

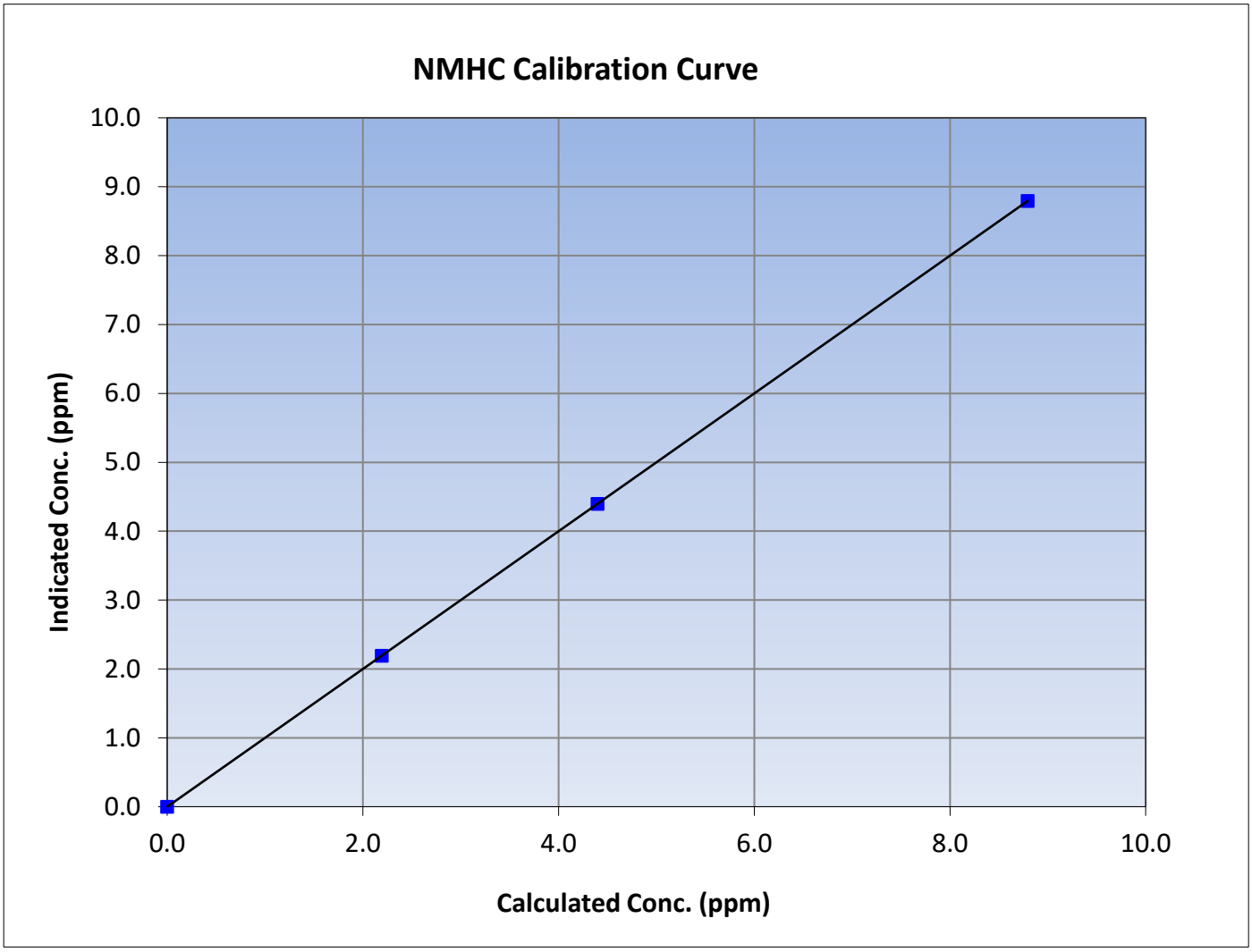
Version-06-2022

Station Information

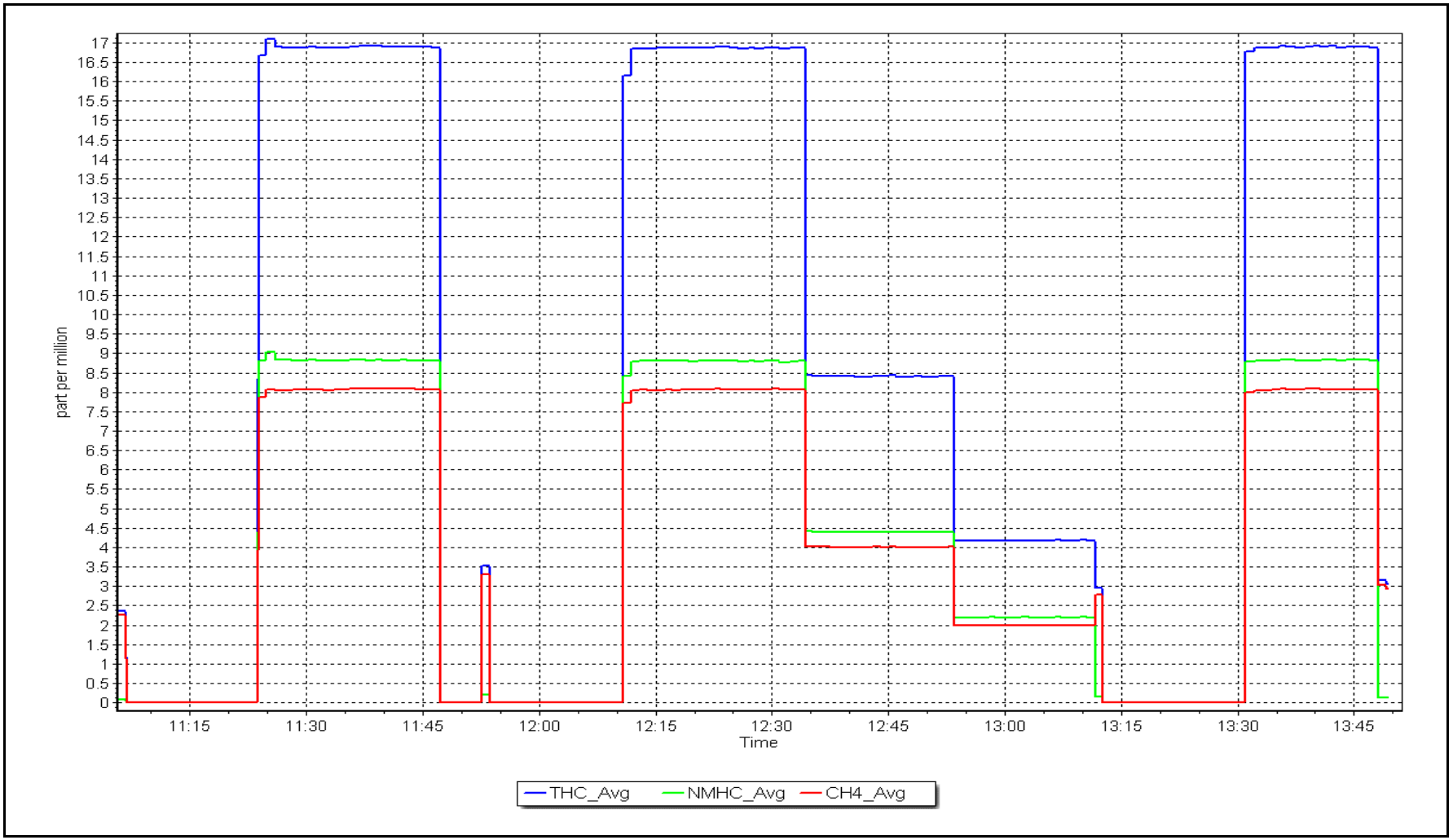
Calibration Date:	February 8, 2023	Previous Calibration:	January 3, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:57	End Time (MST):	13:07
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320038

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	8.80	1.0000			
4.40	4.40	1.0002	Slope	1.000064	*0.90 - 1.10*
2.19	2.19	1.0011			
			Intercept	-0.001060	*+/-0.5*



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



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS04
BUFFALO VIEWPOINT
FEBRUARY 2023

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

March 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	February 10, 2023	Last Cal Date:	January 12, 2023
Start time (MST):	7:18	End time (MST):	10:59
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:	2445
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:	0.998800	0.998701	Backgd or Offset:	21.5	21.5
Calibration intercept:	0.680000	1.140000	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	0.7	----
as found span	4920	80.0	800.3	763.8	1.048
as found 2nd point	4960	40.0	400.2	374.0	1.070
as found 3rd point	4980	20.0	200.1	188.0	1.064
new cylinder response					
calibrator zero	5000	0.0	0.0	0.9	----
high point	4920	80.0	800.3	800.2	1.000
second point	4960	40.0	400.2	401.2	0.997
third point	4980	20.0	200.1	201.0	0.995
as left zero	5000	0.0	0.0	0.8	----
as left span	4920	80.0	800.3	798.5	1.002
				Average Correction Factor	0.998

Baseline Corr As found:	763.10	Previous response	800.04	*% change	-4.8%
Baseline Corr 2nd AF pt:	373.30	AF Slope:	0.953804	AF Intercept:	-2.340000
Baseline Corr 3rd AF pt:	187.30	AF Correlation:	0.999856		

* = > +/-5% change initiates investigation

Notes: As found Span is low, nightly spans around 800ppb. After filter change spans around 800ppb. No Maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

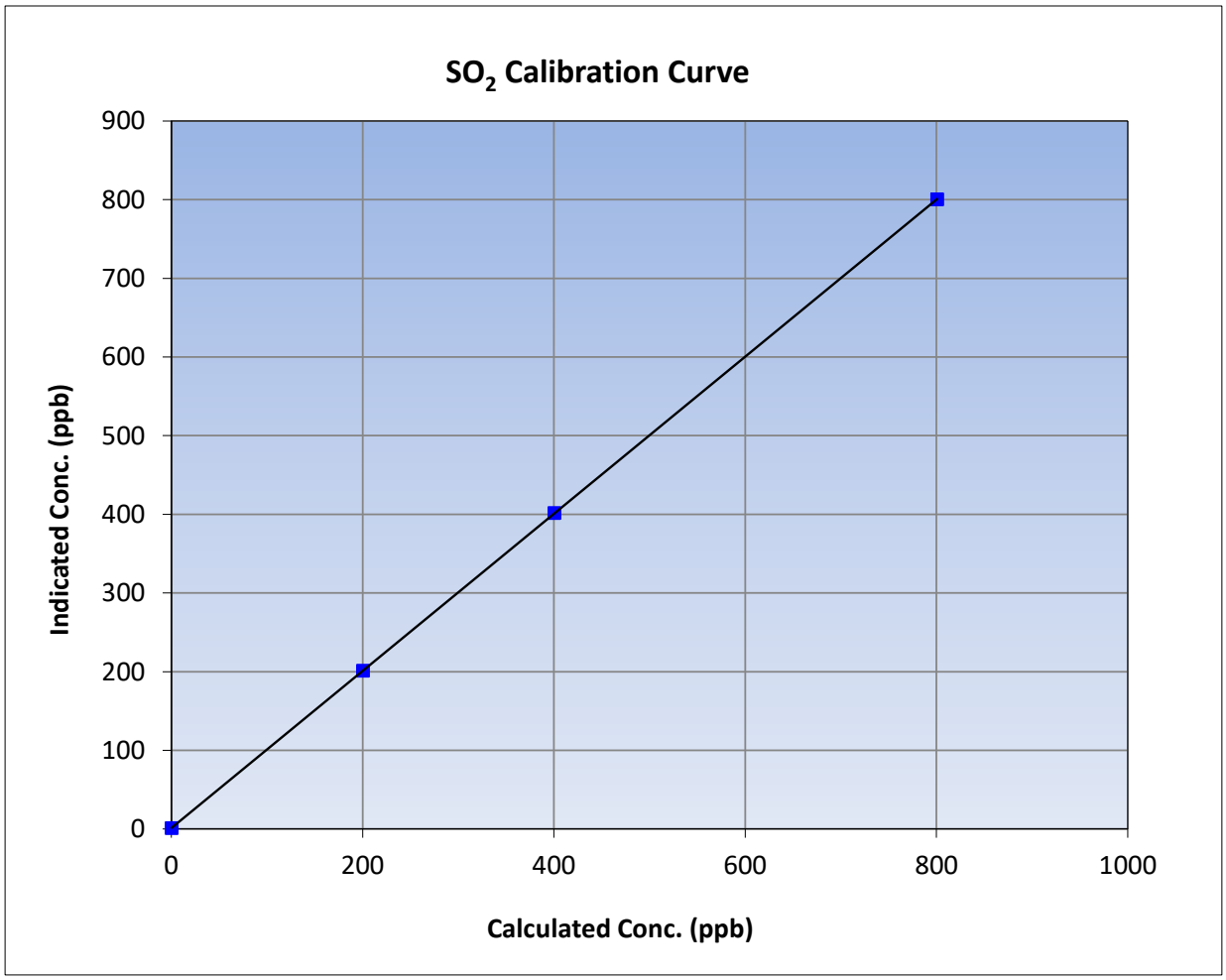
Station Information

Calibration Date:	February 10, 2023	Previous Calibration:	January 12, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:45	End Time (MST):	10:59
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1327300932

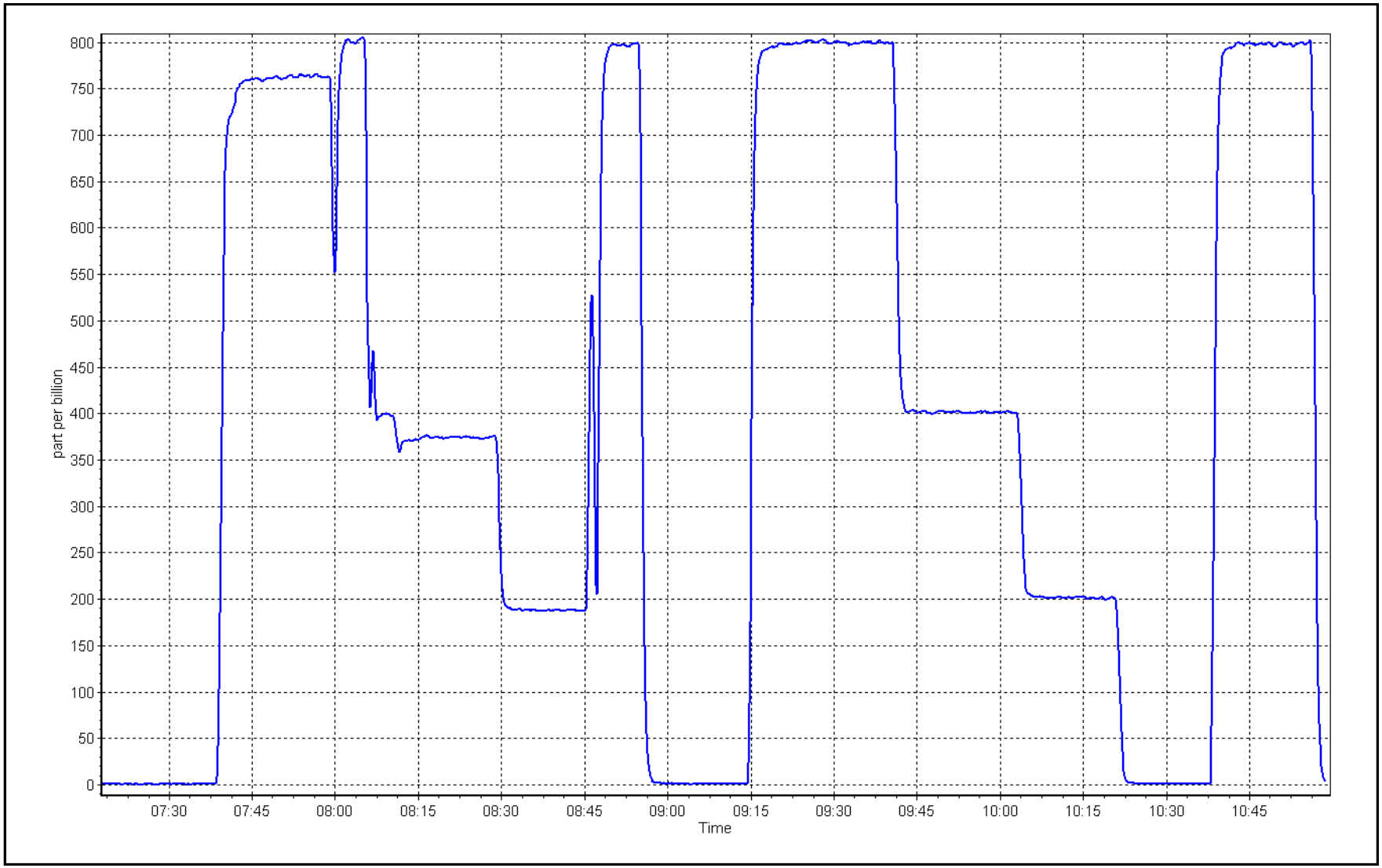
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.9	----
800.3	800.2	1.0001
400.2	401.2	0.9974
200.1	201.0	0.9954

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	0.998701	*0.90 - 1.10*
Intercept	1.140000	*+/-30*



SO2 Calibration Plot Date: February 10, 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:	February 15, 2023	Last Cal Date:	January 16, 2023
Start time (MST):	7:20	End time (MST):	11:19
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:	3060
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:	1.000770	1.001200	Backgd or Offset:	20.1	18.7
Calibration intercept:	0.002271	0.162167	Coeff or Slope:	1.119	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	-0.4	----
as found span	4926	74.1	80.3	82.9	0.964
as found 2nd point	4963	37.0	40.1	41.5	0.957
as found 3rd point	4982	18.5	20.1	20.6	0.955
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	80.3	80.6	0.997
second point	4963	37.0	40.1	40.3	0.995
third point	4982	18.5	20.1	20.2	0.993
as left zero	5000	0.0	0.0	0.3	----
as left span	4926	74.1	80.3	80.6	0.997
SO2 Scrubber Check	4920	80.0	800.0	-0.2	----
Date of last scrubber change:				Ave Corr Factor	0.995
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	83.3	Prev response:	80.39	*% change:	3.5%
Baseline Corr 2nd AF pt:	41.9	AF Slope:	1.036623	AF Intercept:	-0.256912
Baseline Corr 3rd AF pt:	21.0	AF Correlation:	0.999982		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

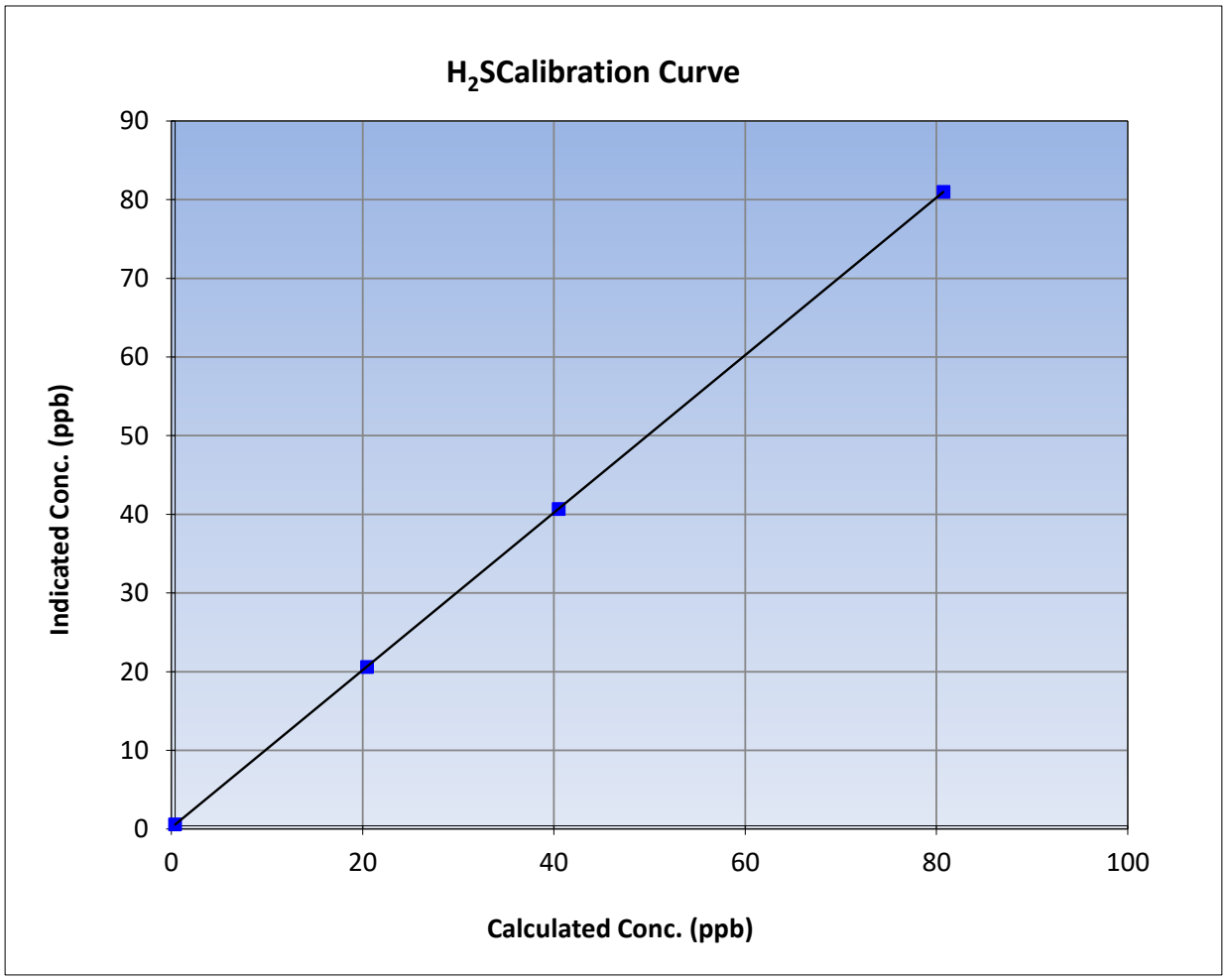
Station Information

Calibration Date:	February 15, 2023	Previous Calibration:	January 16, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:20	End Time (MST):	11:19
Analyzer make:	Thermo 450i	Analyzer serial #:	1336160094

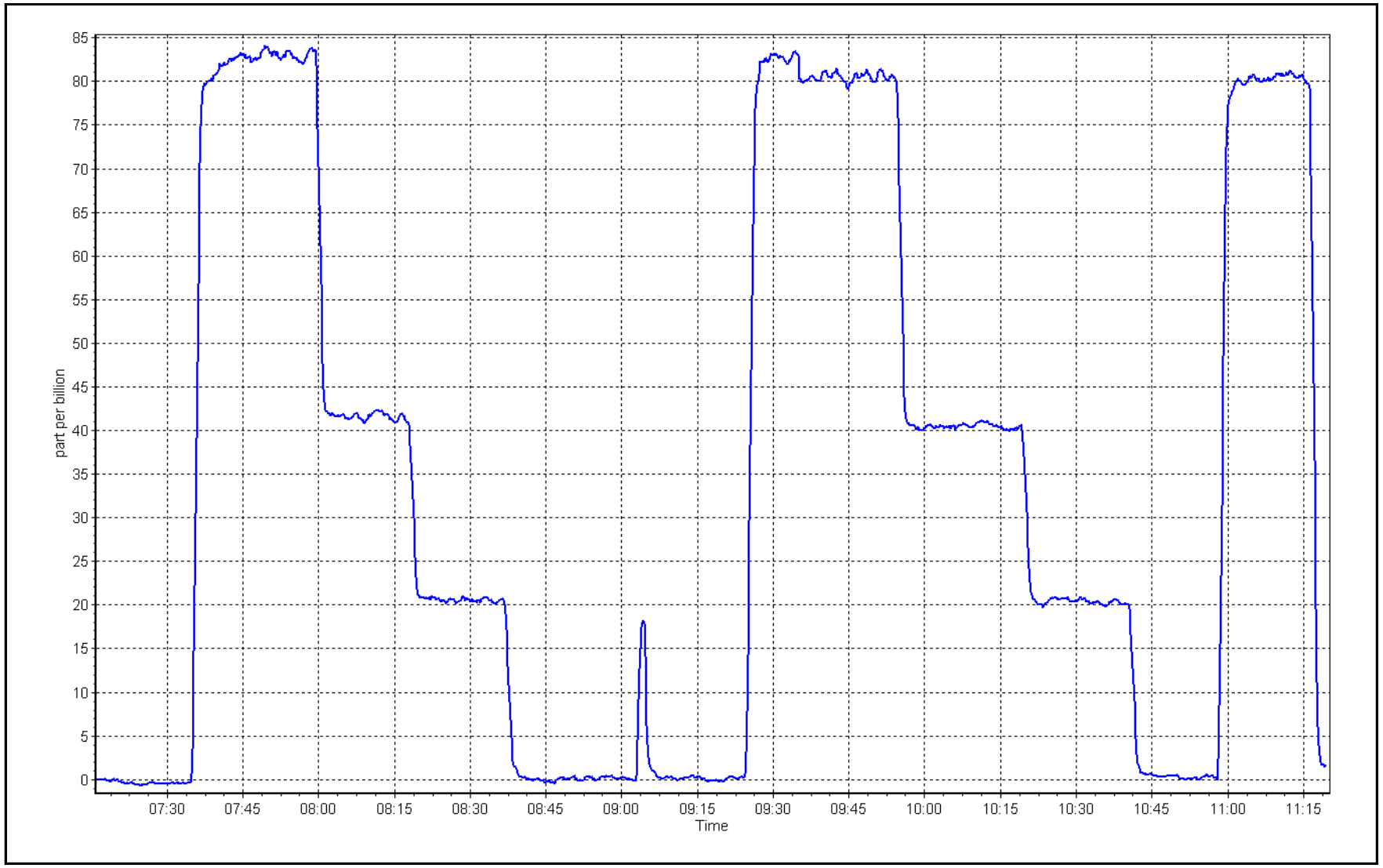
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.3	80.6	0.9966
40.1	40.3	0.9952
20.1	20.2	0.9927

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	1.001200	*0.90 - 1.10*
Intercept	0.162167	*+/-3*



H_2S Calibration Plot Date: February 15, 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:	February 10, 2023	Last Cal Date:	January 12, 2023
Start time (MST):	7:18	End time (MST):	10:58
Reason:	Routine		

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:	2445	
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	3.070E-04	NMHC SP Ratio:	6.120E-05	6.120E-05
CH4 Retention time:	13.6	13.6	NMHC Peak Area:	147690	147690

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	16.86	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	80.0	17.01	17.07	0.996
second point	4960	40.0	8.50	8.35	1.018
third point	4980	20.0	4.25	4.16	1.022
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	17.01	17.06	0.997
				Average Correction Factor	1.012

Baseline Corr AF:	16.86	Prev response	17.03	*% change	-1.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-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	8.87	1.019
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	4.49	1.007
third point	4980	20.0	2.26	2.26	1.000
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	9.04	9.03	1.001
				Average Correction Factor	1.002
Baseline Corr AF:	8.87	Prev response	9.05	*% 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	7.99	0.997
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	7.96	8.04	0.991
second point	4960	40.0	3.98	3.87	1.029
third point	4980	20.0	1.99	1.91	1.043
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	7.96	8.03	0.992
				Average Correction Factor	1.021
Baseline Corr AF:	7.99	Prev response	7.99	*% 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:	1.005648	1.004640
THC Cal Offset:	-0.070000	-0.080000
CH4 Cal Slope:	1.011450	1.011594
CH4 Cal Offset:	-0.062000	-0.070000
NMHC Cal Slope:	1.001675	0.999400
NMHC Cal Offset:	-0.010000	-0.006000

Notes: No maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

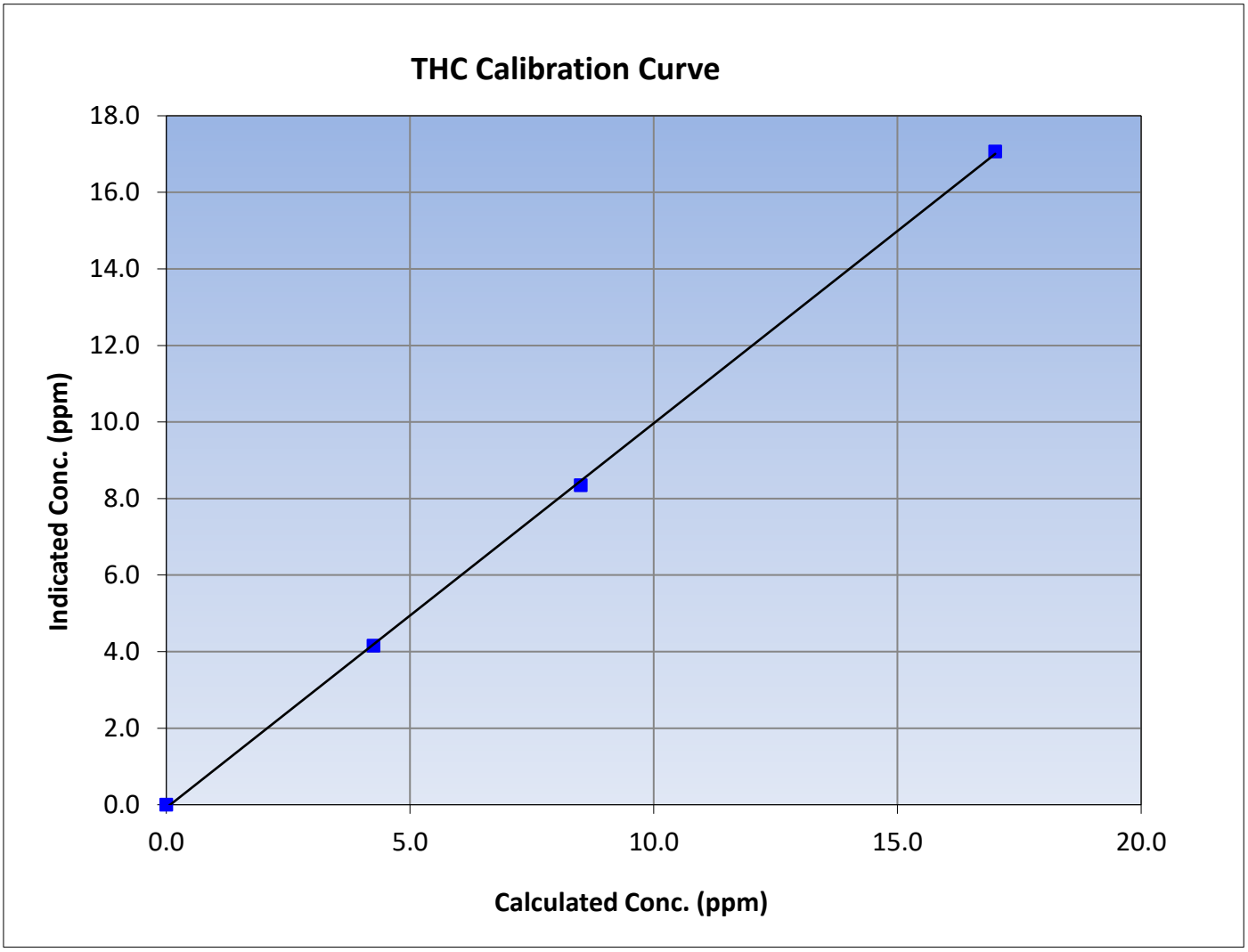
Version-01-2020

Station Information

Calibration Date:	February 10, 2023	Previous Calibration:	January 12, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:18	End Time (MST):	10:58
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	0.999848	≥0.995
17.01	17.07	0.9963			
8.50	8.35	1.0184	Slope	1.004640	0.90 - 1.10
4.25	4.16	1.0220			
			Intercept	-0.080000	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

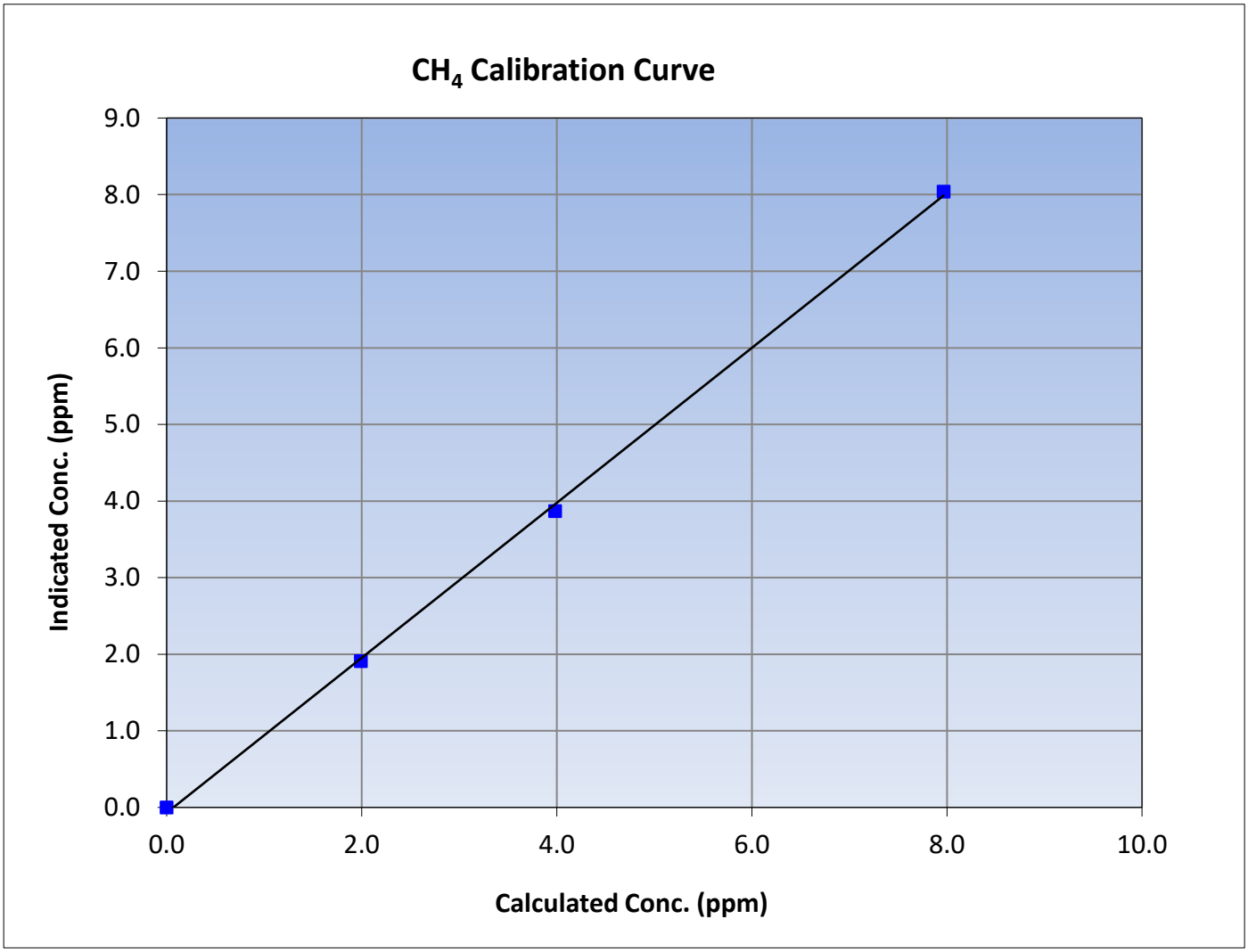
Version-01-2020

Station Information

Calibration Date:	February 10, 2023	Previous Calibration:	January 12, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:18	End Time (MST):	10:58
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	0.999529	*≥0.995*
7.96	8.04	0.9906			
3.98	3.87	1.0290	Slope	1.011594	*0.90 - 1.10*
1.99	1.91	1.0425			
			Intercept	-0.070000	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

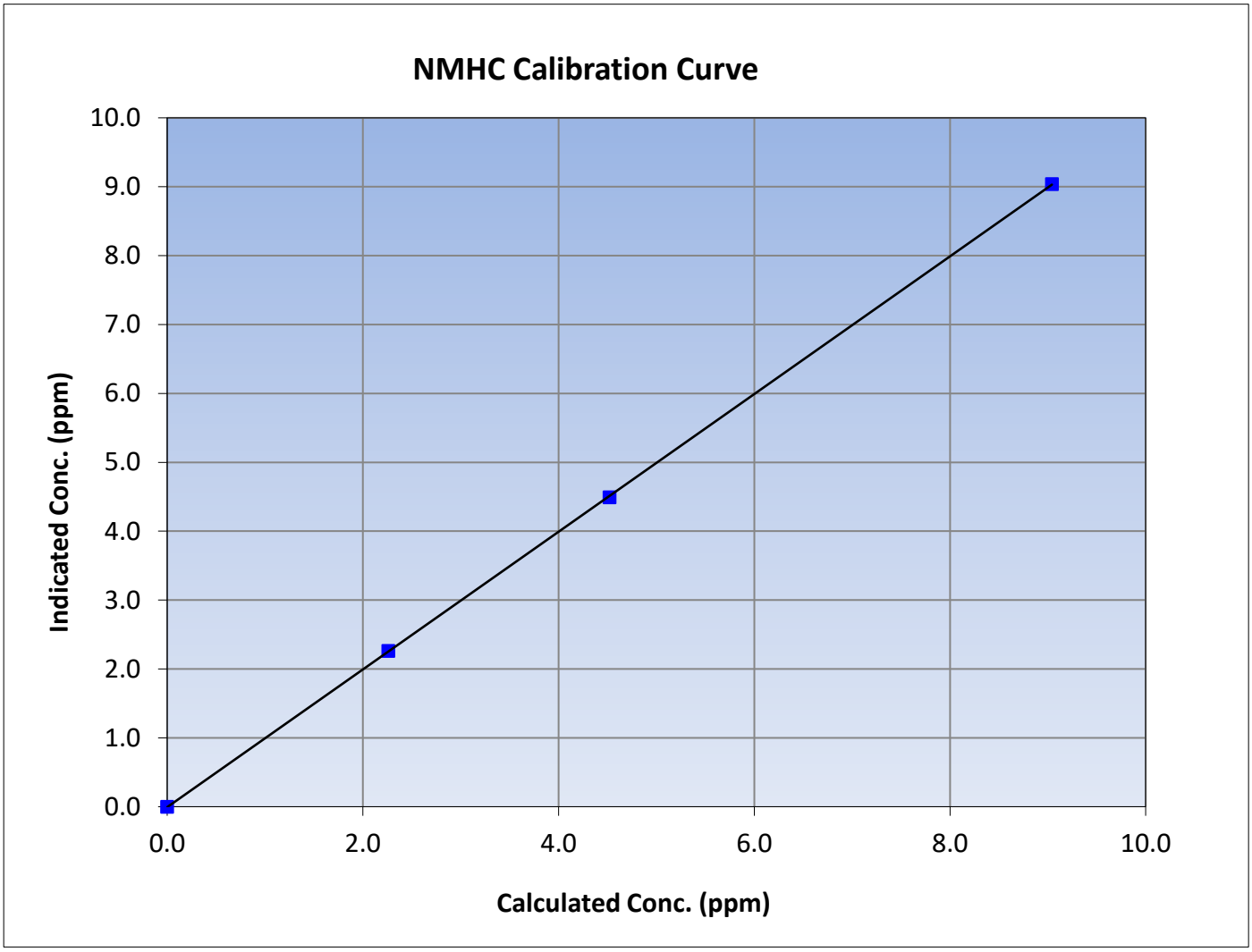
Version-01-2020

Station Information

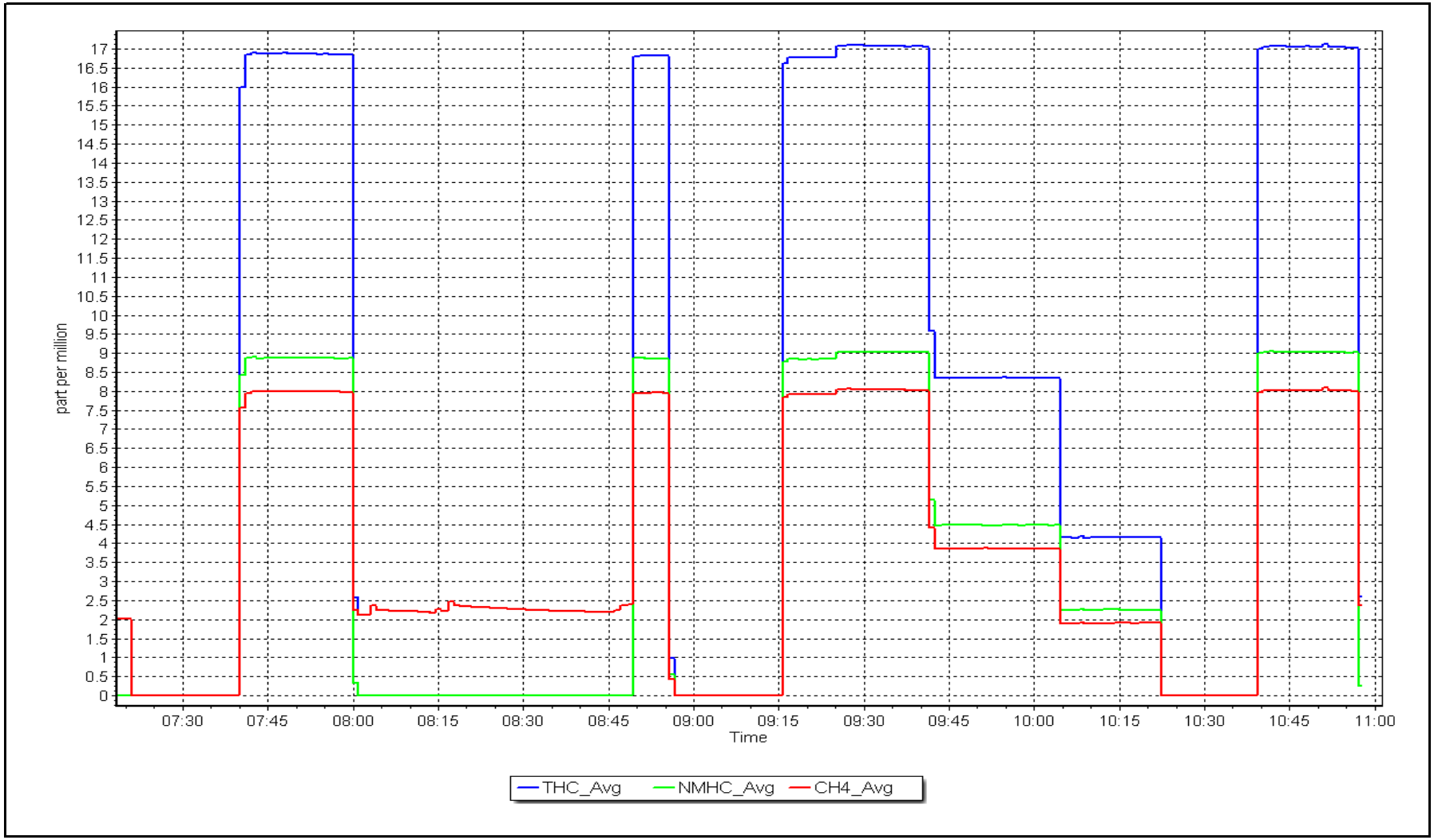
Calibration Date:	February 10, 2023	Previous Calibration:	January 12, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:18	End Time (MST):	10:58
Analyzer make:	Thermo 55i	Analyzer serial #:	1426262594

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999985	≥0.995
9.04	9.04	1.0002			
4.52	4.49	1.0069	Slope	0.999400	0.90 - 1.10
2.26	2.26	1.0002			
			Intercept	-0.006000	+/-0.5



NMHC Calibration Plot Date: February 10, 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:	February 16, 2023	Last Cal Date:	February 10, 2023
Start time (MST):	11:25	End time (MST):	12:44
Reason:	Cylinder Change	Nitrogen Cylinder Change	

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:	2445	
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	3.070E-04	NMHC SP Ratio:	6.120E-05	6.120E-05
CH4 Retention time:	13.6	13.6	NMHC Peak Area:	147690	147690

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	17.11	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	80.0	17.01	17.03	0.999
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.999

Baseline Corr AF:	17.11	Prev response	17.01	*% 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	80.0	9.04	9.04	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	9.04	9.00	1.005
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.005
Baseline Corr AF:	9.04	Prev response	9.03	*% 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	80.0	7.96	8.06	0.988
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	7.96	8.03	0.992
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.992
Baseline Corr AF:	8.06	Prev response	7.99	*% change	0.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

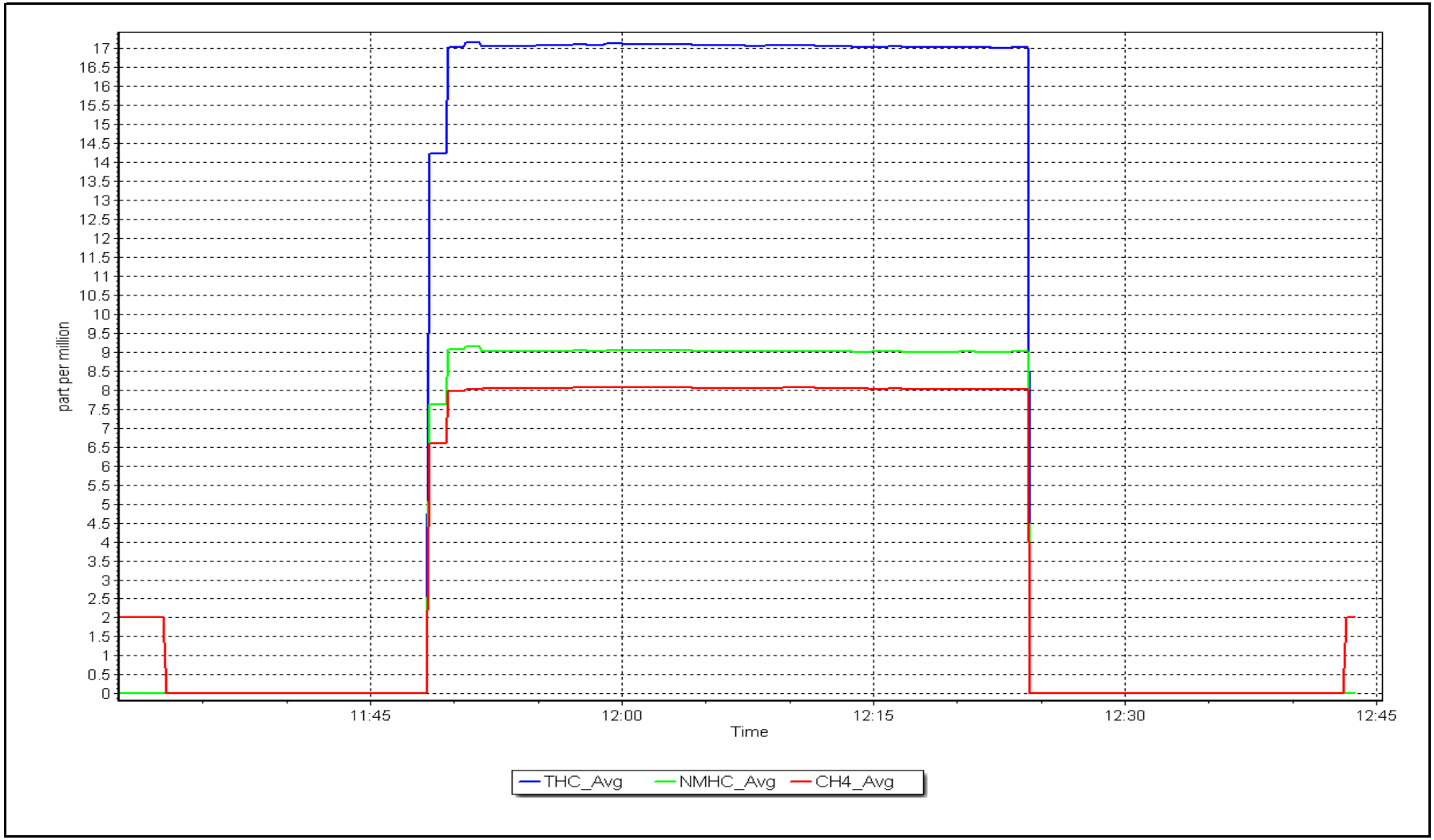
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.004640	1.001364
THC Cal Offset:	-0.080000	0.000000
CH4 Cal Slope:	1.011594	1.008186
CH4 Cal Offset:	-0.070000	0.000000
NMHC Cal Slope:	0.999400	0.995355
NMHC Cal Offset:	-0.006000	0.000000

Notes: Nitrogen Cylinder Change

Calibration Performed By: Melissa Lemay

NMHC Calibration Plot Date: February 16, 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:	February 13, 2023	Last Cal Date:	January 13, 2023
Start time (MST):	8:00	End time (MST):	11:00
Reason:	As Found		

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:	1.204	1.204	NO bkgnd or offset:	-0.3	-0.3
NOX coeff or slope:	1.203	1.203	NOX bkgnd or offset:	-0.1	-0.1
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	6.4	6.4

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000402	
NO_X Cal Offset:	0.466890	
NO Cal Slope:	1.001422	
NO Cal Offset:	-0.653871	
NO_2 Cal Slope:	1.000220	
NO_2 Cal Offset:	1.229528	

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.9	0.4	0.6	----	----
as found span	4922	78.1	799.1	795.2	3.9	772.1	767.9	4.2	1.0350	1.0355
as found 2nd	4961	39.1	400.1	398.1	2.0	385.8	382.6	3.2	1.0370	1.0405
as found 3rd	4981	19.5	199.5	198.5	1.0	193.9	189.5	4.4	1.0289	1.0476
new cyl resp										
calibrator zero										
high point										
second point										
third point										
as left zero										
as left span										
								Average Correction Factor		

Corrected As found	NO_X = 771.2 ppb	NO = 767.5 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-3.7%
Previous Response	NO_X = 799.9 ppb	NO = 795.7 ppb			*Percent Change	NO =	-3.7%
Baseline Corr 2nd pt	NO_X = 384.9 ppb	NO = 382.2 ppb	As found	NO_X r^2: 0.999996	Nx Sl: 0.964711	Nx Int:	0.847
Baseline Corr 3rd pt	NO_X = 193.0 ppb	NO = 189.1 ppb	As found	NO r^2: 0.999984	NO Sl: 0.965958	NO Int:	-1.014
			As found	NO_2 r^2: 0.999972	NO2 Sl: 0.994883	NO_2 Int:	1.558

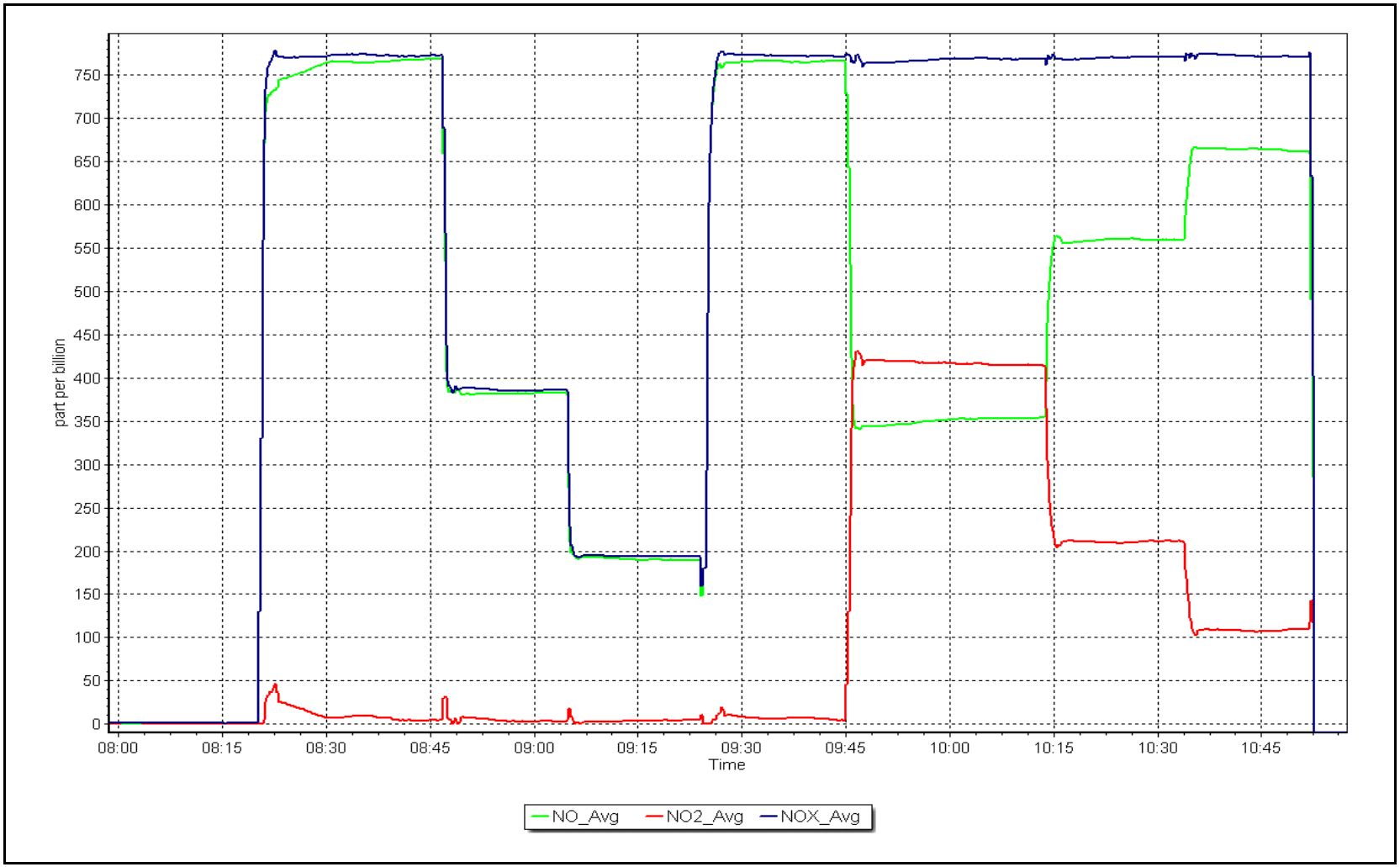
GPT Calibration Data

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	0.6	----	----
as found GPT point (400 ppb NO2)	765.7	353.5	416.1	414.9	1.0029	99.7%
as found GPT point (200 ppb NO2)	765.7	559.6	210.0	211.4	0.9934	100.7%
as found GPT point (100 ppb NO2)	765.7	663.2	106.4	108.1	0.9843	101.6%
1st GPT point (400 ppb O3)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
				Average Correction Factor		

Notes: As Founds for Cleaning Reaction Cell and replacing critical flow orifices.

Calibration Performed By: Melissa Lemay

NO_X Calibration Plot Date: February 13, 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:	February 14, 2023	Last Cal Date:	February 13, 2023
Start time (MST):	7:40	End time (MST):	11:16
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:	1.204	0.993	NO bkgnd or offset:	-0.3	-9.0
NOX coeff or slope:	1.203	0.988	NOX bkgnd or offset:	-0.1	-9.0
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	7.6	7.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000402	1.000759
NO_X Cal Offset:	0.466890	0.966826
NO Cal Slope:	1.001422	1.004151
NO Cal Offset:	-0.653871	-0.053156
NO_2 Cal Slope:	1.000220	0.994427
NO_2 Cal Offset:	1.229528	-0.612933

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero										
as found span										
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.4	0.4	0.1	----	----
high point	4922	78.1	799.1	795.2	3.9	800.6	798.9	1.7	0.9981	0.9954
second point	4961	39.1	400.1	398.1	2.0	401.0	398.8	2.2	0.9977	0.9983
third point	4981	19.5	199.5	198.5	1.0	201.6	199.3	2.3	0.9896	0.9961
as left zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.3	0.0	----	----
as left span	4922	78.1	799.1	358.0	441.1	795.5	357.8	437.8	1.0045	1.0006
								Average Correction Factor	0.9951	0.9966

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

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	796.0	358.8	441.1	438.1	1.0069	99.3%
2nd GPT point (200 ppb O3)	796.0	574.5	225.4	224.1	1.0058	99.4%
3rd GPT point (100 ppb O3)	796.0	683.5	116.4	113.8	1.0229	97.8%
				Average Correction Factor	1.0119	98.8%

Notes: Calibration after Cleaning Reaction Cell and replacing critical flow orifices. Zero and Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

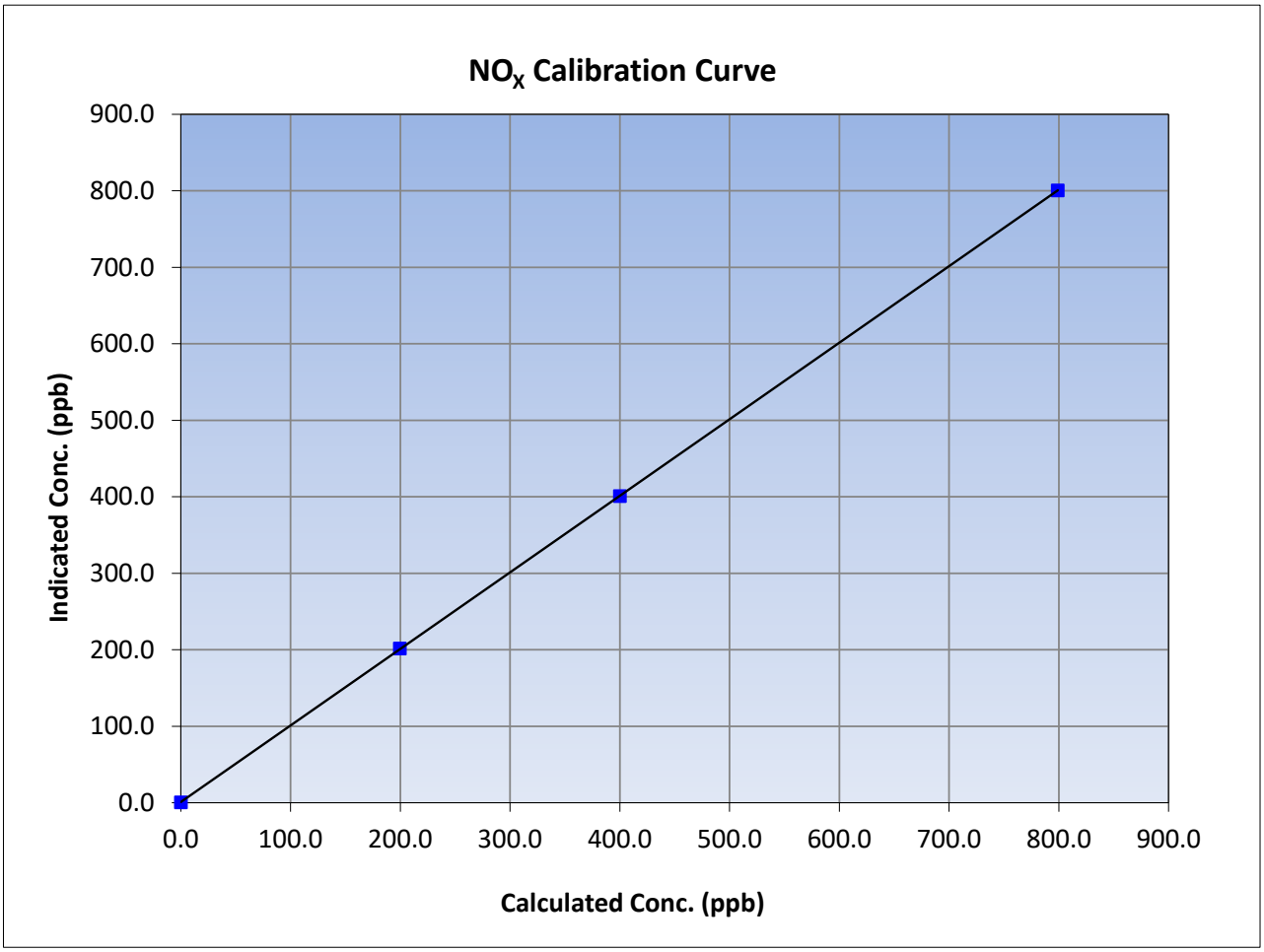
Version-04-2020

Station Information

Calibration Date:	February 14, 2023	Previous Calibration:	February 13, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:40	End Time (MST):	11:16
Analyzer make:	API T200	Analyzer serial #:	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.4	----	Correlation Coefficient	0.999996	≥0.995
799.1	800.6	0.9981			
400.1	401.0	0.9977	Slope	1.000759	0.90 - 1.10
199.5	201.6	0.9896			
			Intercept	0.966826	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

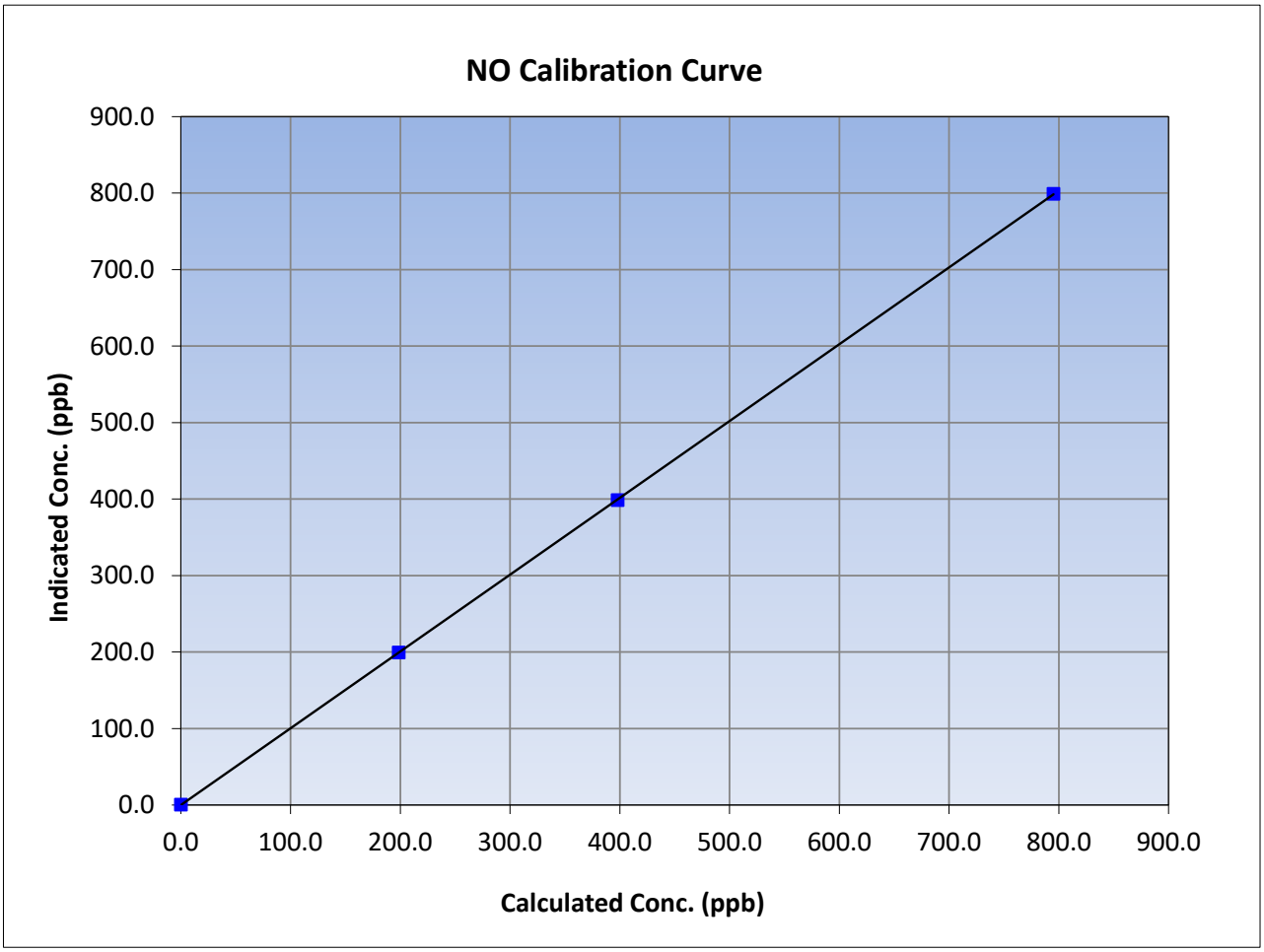
Version-04-2020

Station Information

Calibration Date:	February 14, 2023	Previous Calibration:	February 13, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:40	End Time (MST):	11:16
Analyzer make:	API T200	Analyzer serial #:	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.4	----	Correlation Coefficient	0.999996	≥0.995
795.2	798.9	0.9954			
398.1	398.8	0.9983	Slope	1.004151	0.90 - 1.10
198.5	199.3	0.9961			
			Intercept	-0.053156	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

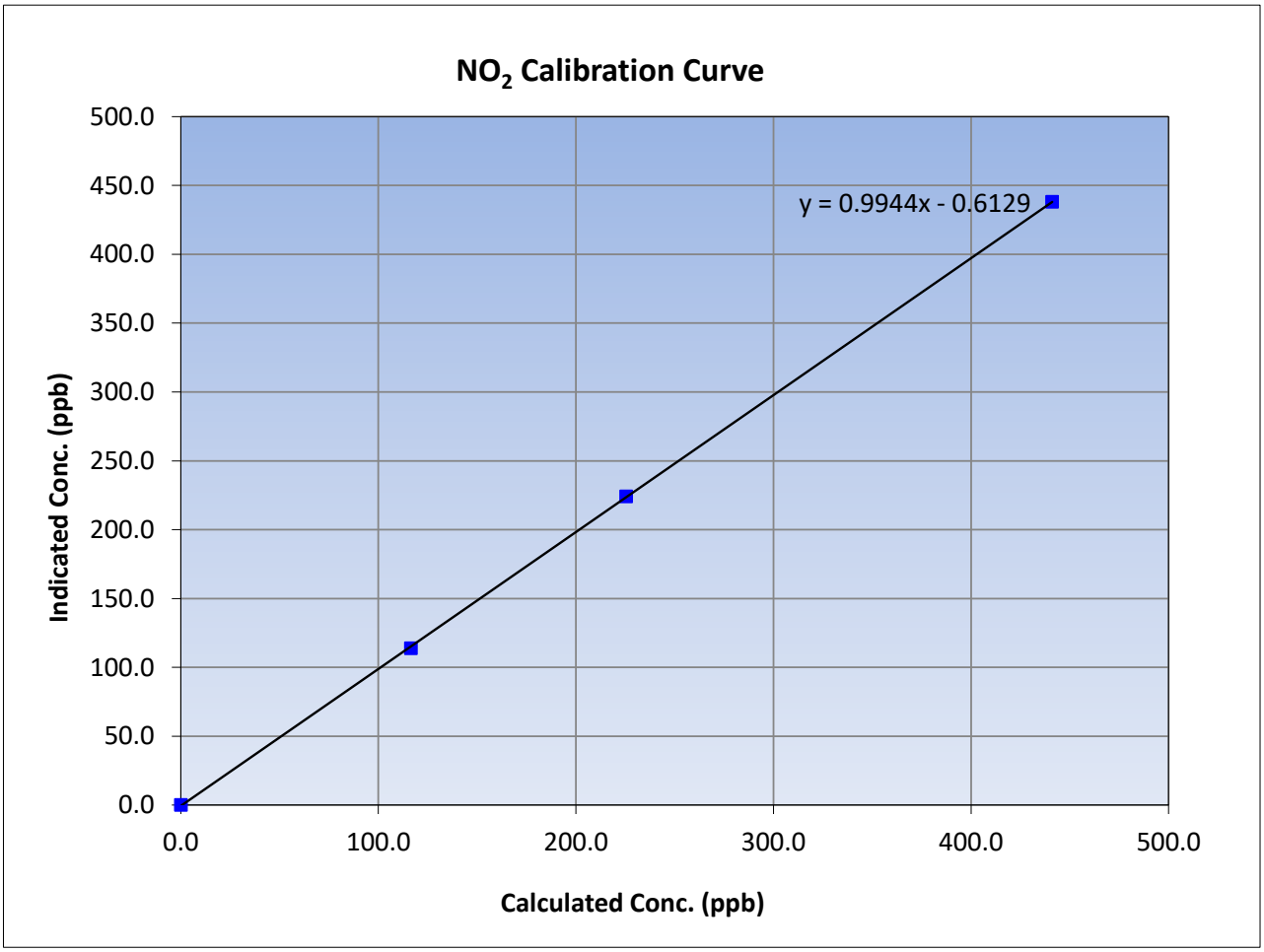
Version-04-2020

Station Information

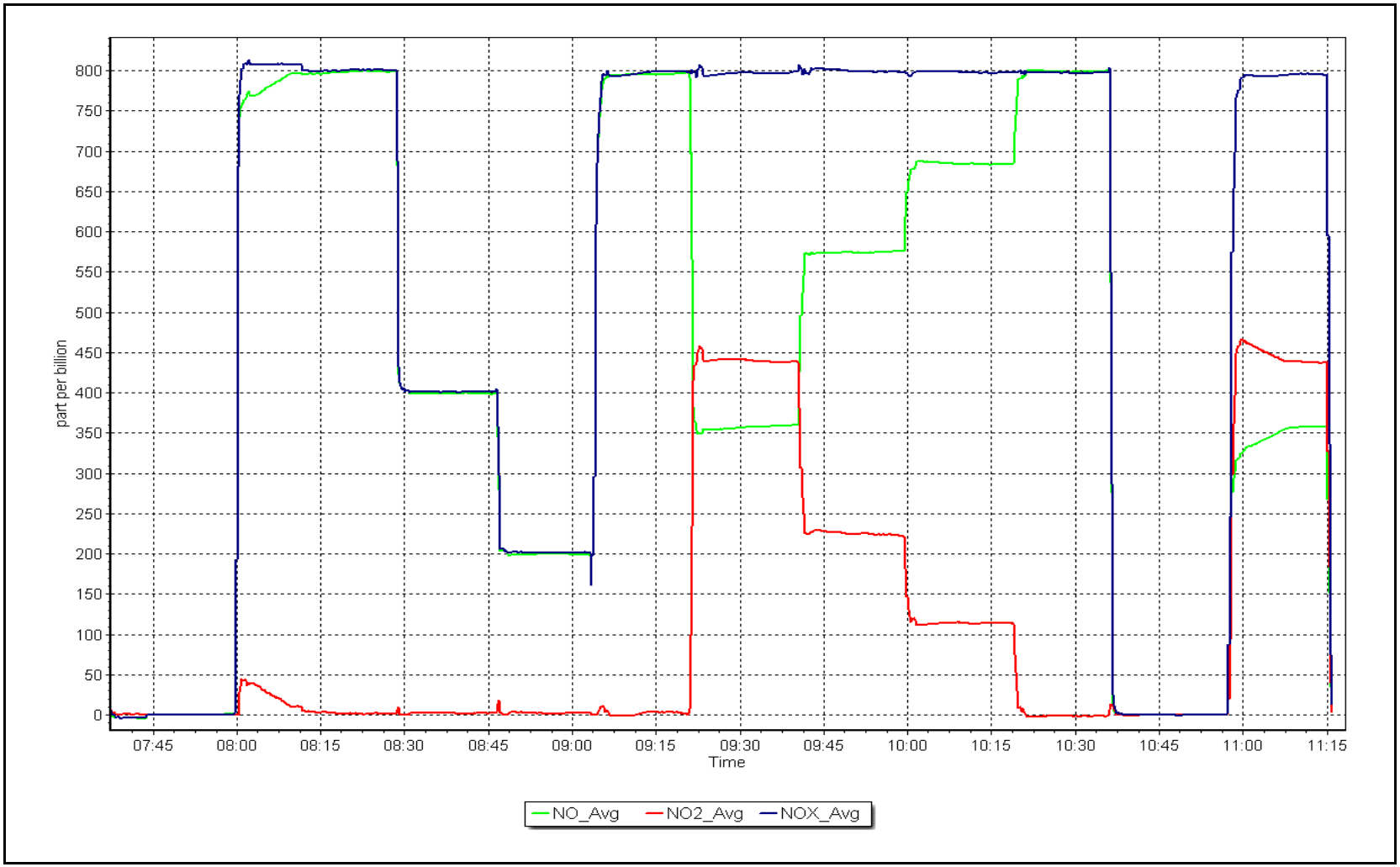
Calibration Date:	February 14, 2023	Previous Calibration:	February 13, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:40	End Time (MST):	11:16
Analyzer make:	API T200	Analyzer serial #:	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999975	≥0.995
441.1	438.1	1.0069			
225.4	224.1	1.0058	Slope	0.994427	0.90 - 1.10
116.4	113.8	1.0229			
			Intercept	-0.612933	+/-20



NO_X Calibration Plot Date: February 14, 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:	February 10, 2023	Last Cal Date:	January 12, 2023
Start time (MST):	10:55	End time (MST):	13:26
Reason:	Routine		

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:	0.992571	0.988657	Backgd or Offset:	-3.3	-3.3
Calibration intercept:	2.700000	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	0.5	----
as found span	5000	1160.2	400.0	398.3	1.004
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	1.2	----
high point	5000	1161.4	400.0	397.8	1.006
second point	5000	919.0	200.0	202.6	0.987
third point	5000	788.4	100.0	104.7	0.955
as left zero	5000	0.0	0.0	1.1	----
as left span	5000	1159.5	400.0	397.2	1.007
				Average Correction Factor	0.983

Baseline Corr As found:	397.8	Previous response	399.7	*% change	-0.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

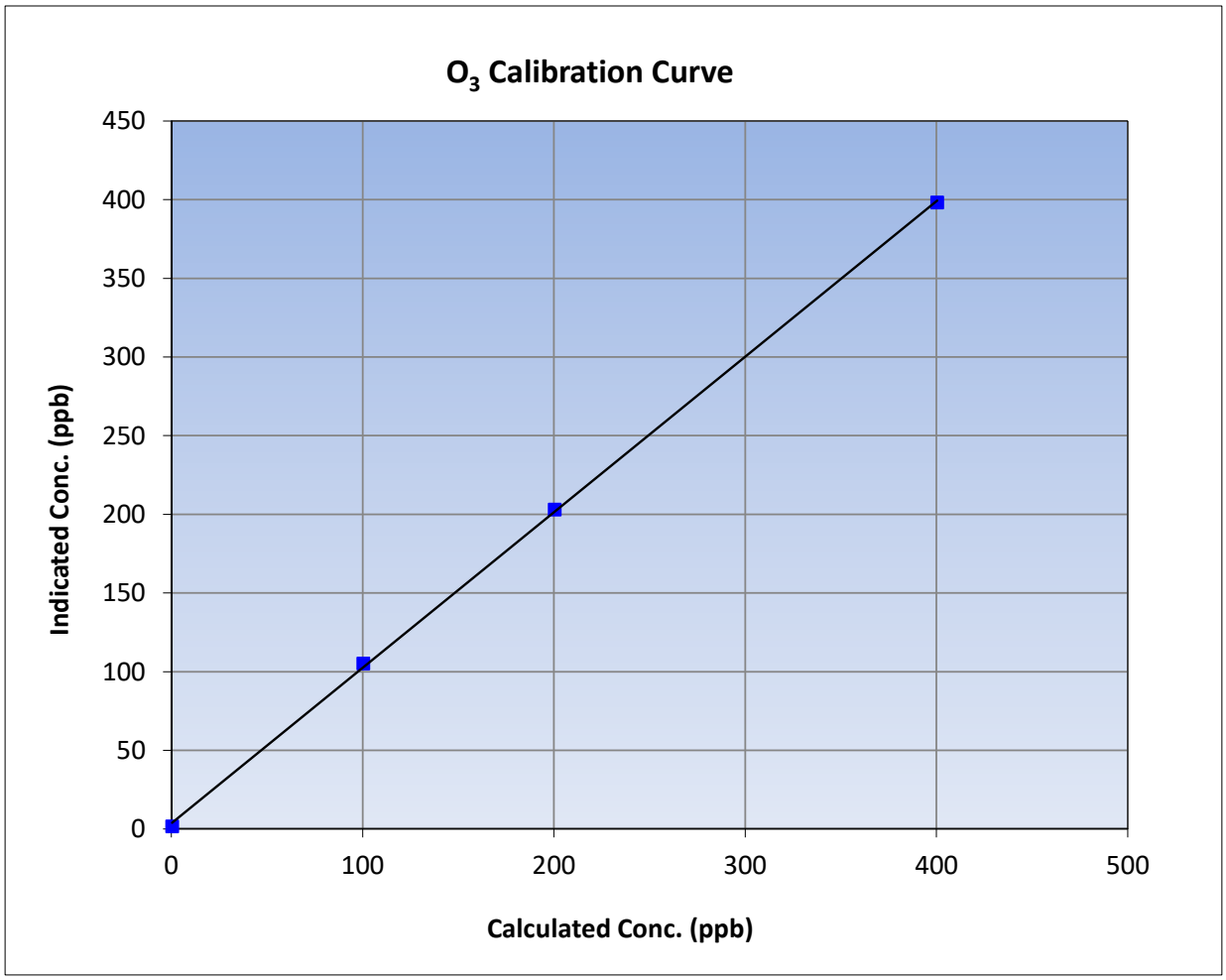
Station Information

Calibration Date:	February 10, 2023	Previous Calibration:	January 12, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	10:55	End Time (MST):	13:26
Analyzer make:	API T400	Analyzer serial #:	2961

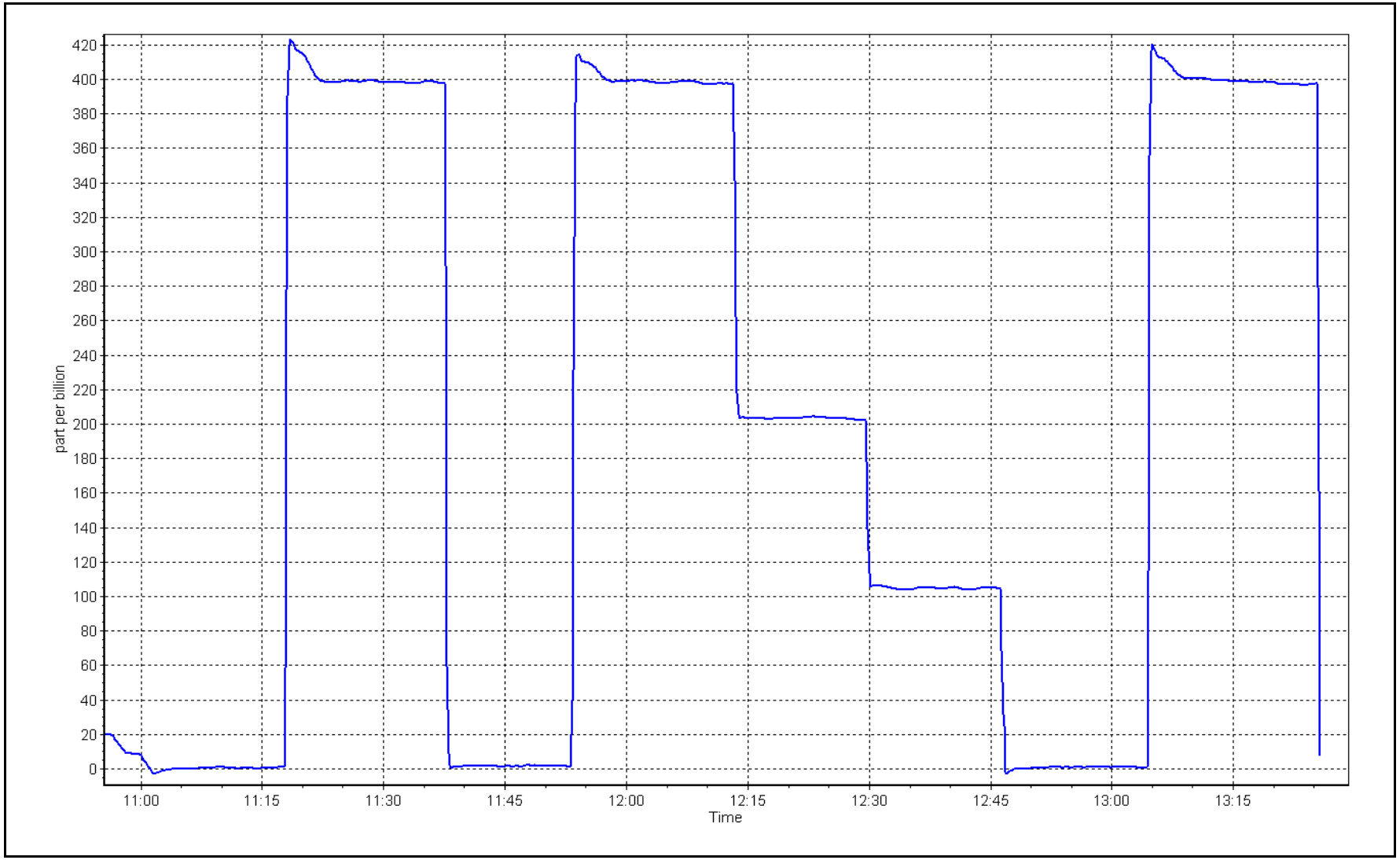
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	1.2	----
400.0	397.8	1.0055
200.0	202.6	0.9872
100.0	104.7	0.9551

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999837	*≥0.995*
Slope	0.988657	*0.90 - 1.10*
Intercept	3.560000	*+/- 5*



O_3 Calibration Plot Date: February 10, 2023 Location: Buffalo Viewpoint



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-09-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS 04
Calibration Date:	February 15, 2023	Last Cal Date:	January 16, 2023
Start time (MST):	9:46	End time (MST):	10:15
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 (^{o}C)	-19.1	-18.8	-19.1	☐	+/- 2 ^{o}C
P (mmHg)	734.8	736.6	734.8	☐	+/- 10 mmHg
flow (LPM)	5	4.80	5	☑	+/- 0.25 LPM

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

PM w/o HEPA: 5.1 PM w/ HEPA: 0

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

Date Optical Chamber Cleaned: December 13, 2022

Disposable Filter Changed: December 13, 2022

Annual Maintenance

Date Sample Tube Cleaned: September 15, 2022

Date RH/T Sensor Cleaned: September 15, 2022

Notes: No adjustments done. Inlet head cleaned.

Calibration by: Melissa Lemay

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS05
MANNIX
FEBRUARY 2023

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

March 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	February 21, 2023	Last Cal Date:	January 20, 2023
Start time (MST):	10:52	End time (MST):	13:57
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:	0.996673	0.996758	Backgd or Offset:	8.9	8.8
Calibration intercept:	0.800000	-0.080000	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	5000	0.0	0.0	0.1	----
as found span	4920	80.0	800.3	796.2	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4920	80.0	800.3	797.5	1.004
second point	4960	40.0	400.2	399.5	1.002
third point	4980	20.0	200.1	198.5	1.008
as left zero	5000	0.0	0.0	0.1	----
as left span	4920	80.0	800.3	800.6	1.000
				Average Correction Factor	1.004

Baseline Corr As found:	796.10	Previous response	798.46	*% change	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

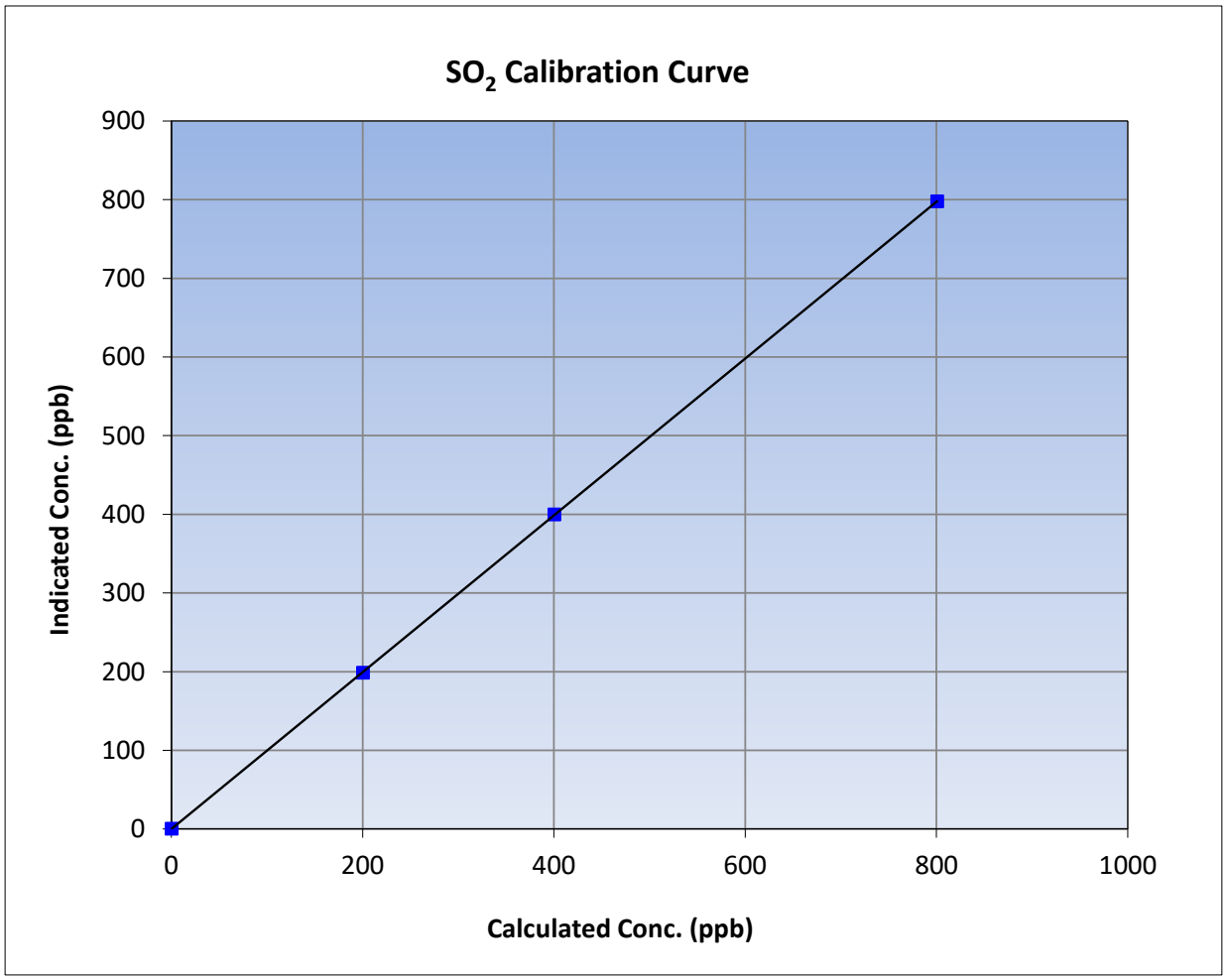
Station Information

Calibration Date:	February 21, 2023	Previous Calibration:	January 20, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	10:52	End Time (MST):	13:57
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841399

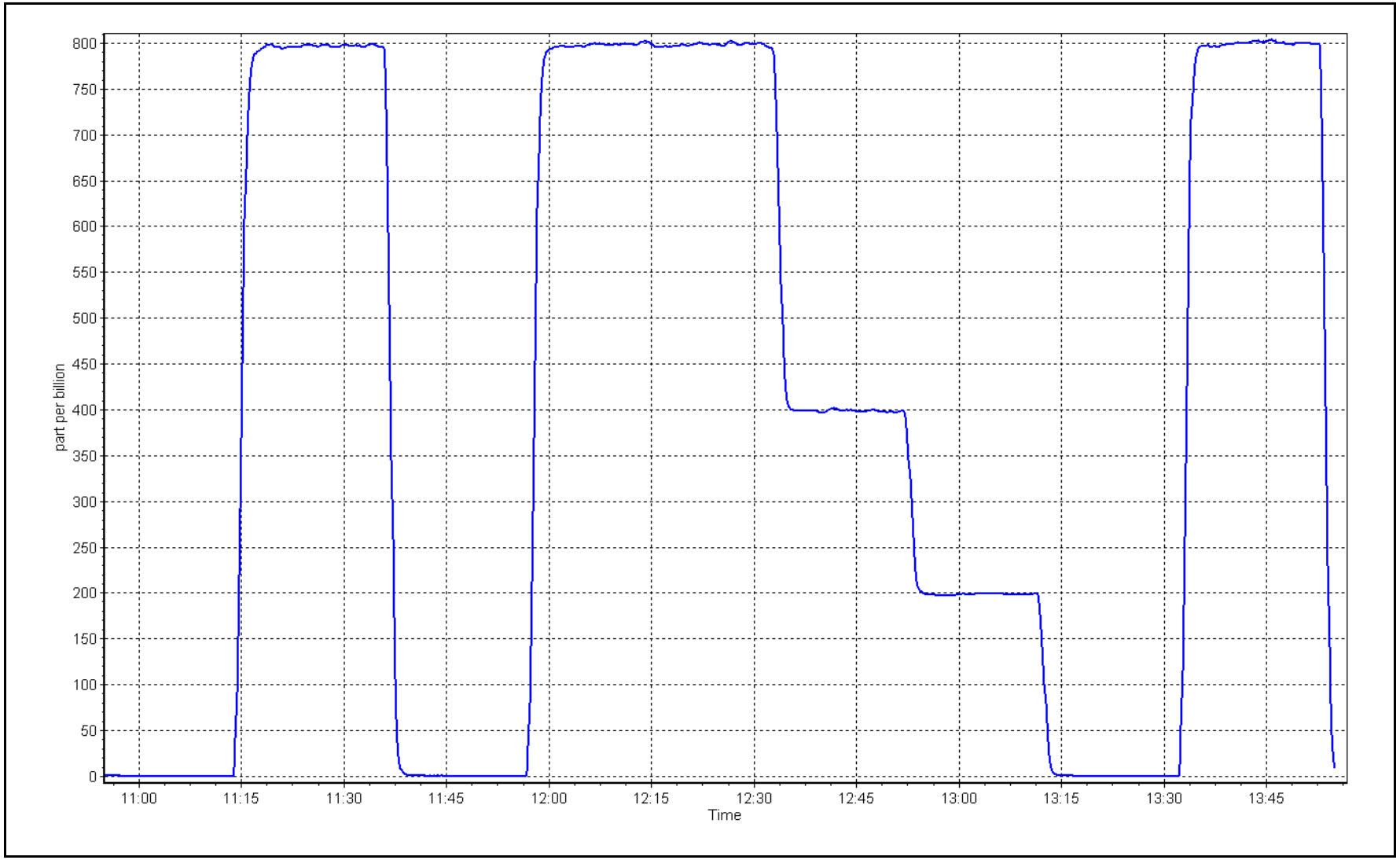
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
800.3	797.5	1.0035
400.2	399.5	1.0017
200.1	198.5	1.0080

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	0.996758	*0.90 - 1.10*
Intercept	-0.080000	*+/-30*



SO2 Calibration Plot Date: February 21, 2023 Location: Mannix



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	February 7, 2023	Last Cal Date:	January 3, 2023
Start time (MST):	10:35	End time (MST):	15:10
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:	0.998045	0.998613	Backgd or Offset:	2.09	2.09
Calibration intercept:	0.340531	0.220652	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	80.7	0.994
as found 2nd point	4960	40.7	40.0	40.8	0.986
as found 3rd point	4980	20.3	20.0	20.4	0.989
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4919	81.3	80.0	80.1	0.999
second point	4960	40.7	40.0	40.2	0.996
third point	4980	20.3	20.0	20.2	0.989
as left zero	5000	0.0	0.0	0.5	----
as left span	4919	81.3	80.0	78.8	1.015
SO2 Scrubber Check	4920	80.0	800.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.995
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.5	Prev response:	80.18	*% change:	0.4%
Baseline Corr 2nd AF pt:	40.6	AF Slope:	1.006329	AF Intercept:	0.300551
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999983		

* = > +/-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

H_2S Calibration Summary

Version-11-2021

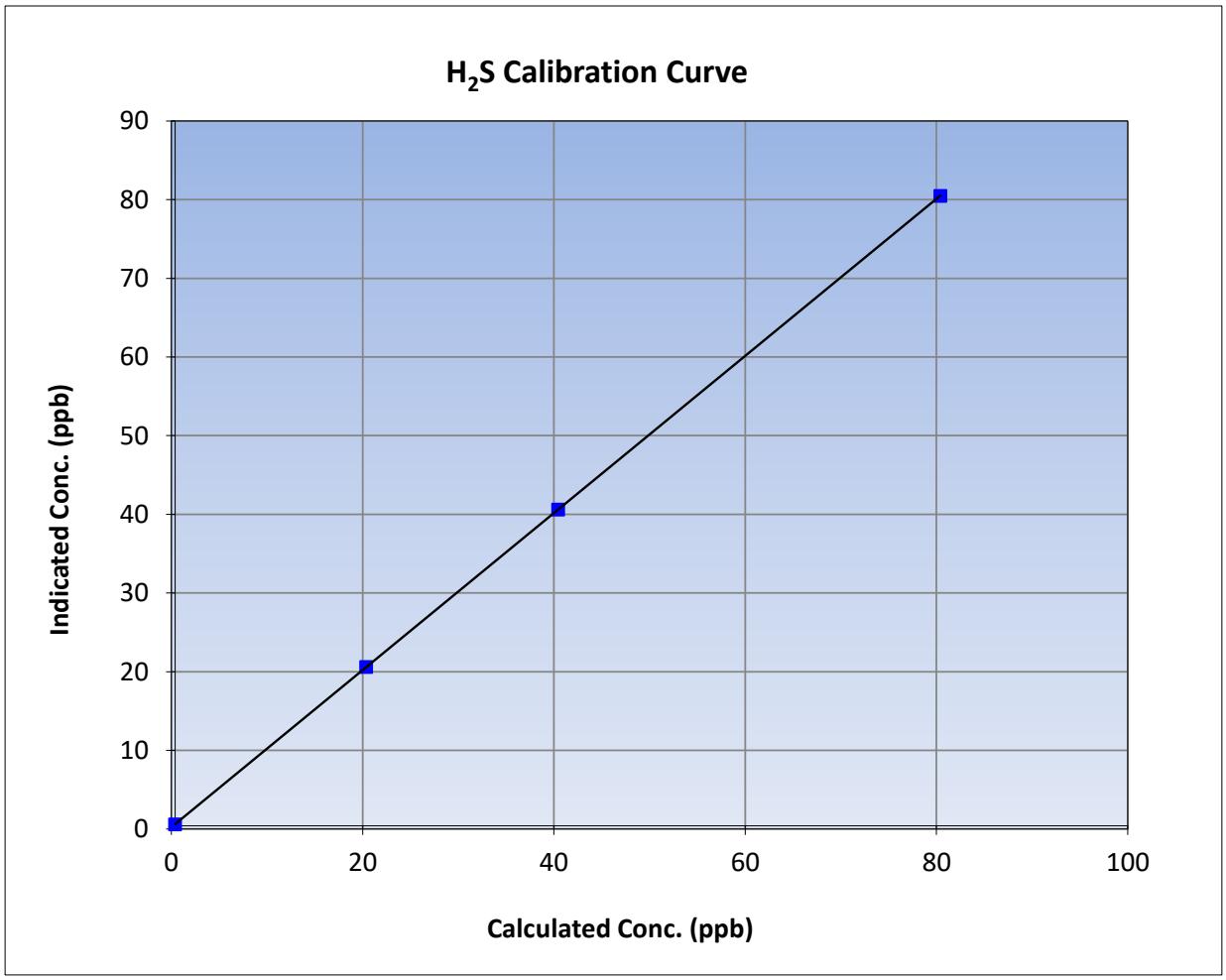
Station Information

Calibration Date:	February 7, 2023	Previous Calibration:	January 3, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	10:35	End Time (MST):	15:10
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1203169745

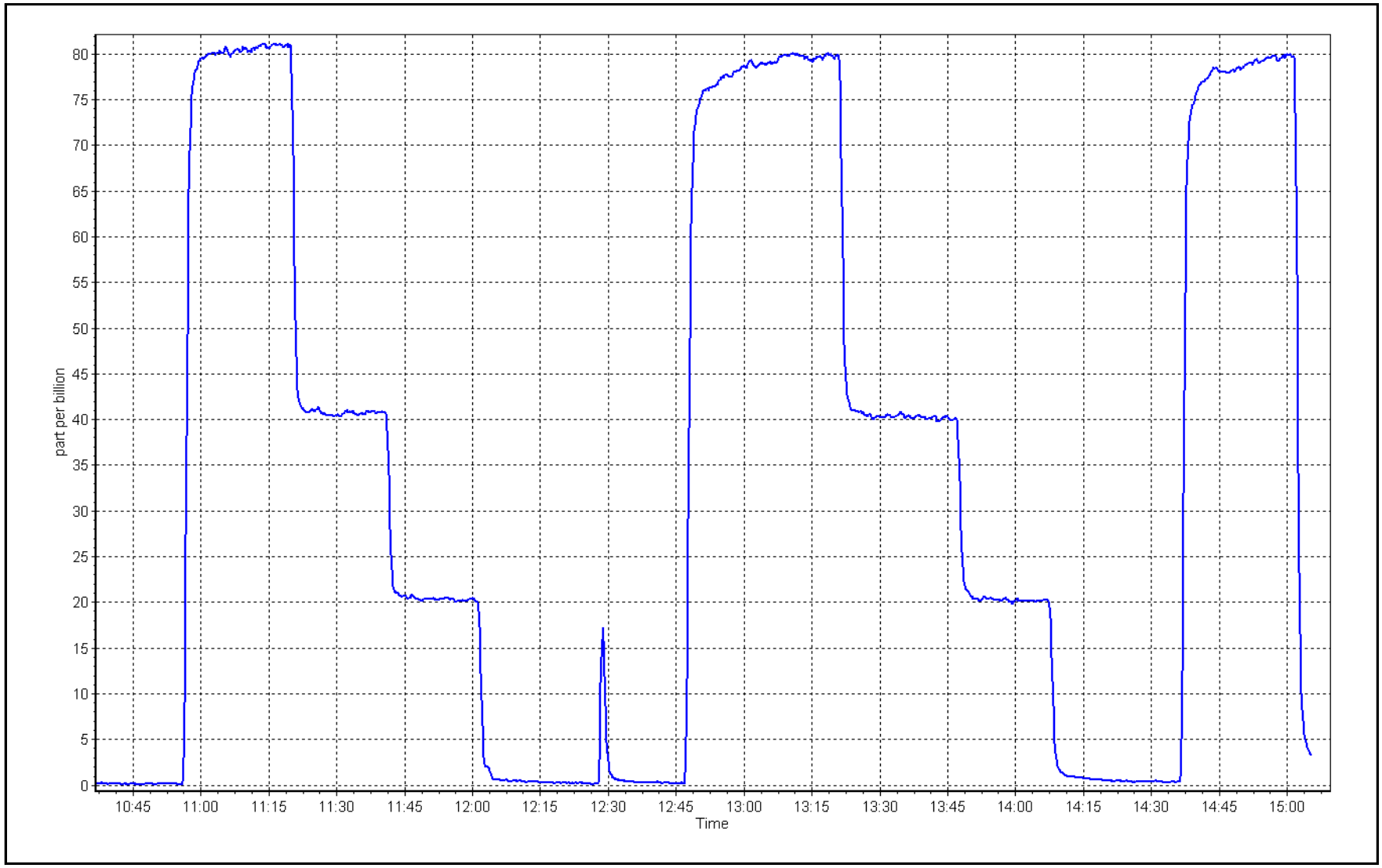
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	80.1	0.9987
40.0	40.2	0.9961
20.0	20.2	0.9888

Statistical Evaluation		Limits
Correlation Coefficient	1.000000	≥0.995
Slope	0.998613	0.90 - 1.10
Intercept	0.220652	+/-3



H_2S Calibration Plot Date: February 7, 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:	February 21, 2023	Last Cal Date:	January 20, 2023
Start time (MST):	10:52	End time (MST):	13:57
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:	2.57E-04	2.56E-04	NMHC SP Ratio:	4.41E-05	4.36E-05
CH4 Retention time:	15.00	15.00	NMHC Peak Area:	207495	209913

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	17.56	0.981
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	17.23	17.18	1.003
second point	4960	40.0	8.61	8.58	1.004
third point	4980	20.0	4.31	4.27	1.008
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	17.23	17.27	0.998
				Average Correction Factor	1.005

Baseline Corr AF:	17.56	Prev response	17.27	*% 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	0.00	0.00	----
as found span	4920	80	9.15	9.34	0.979
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4920	80	9.15	9.12	1.003
second point	4960	40	4.57	4.57	1.002
third point	4980	20	2.29	2.28	1.004
as left zero	5000	0	0.00	0.00	----
as left span	4920	80	9.15	9.18	0.996
				Average Correction Factor	1.003
Baseline Corr AF:	9.34	Prev response	9.17	*% change	1.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	8.08	8.23	0.982
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	8.06	1.003
second point	4960	40.0	4.04	4.01	1.008
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	8.09	0.999
				Average Correction Factor	1.008
Baseline Corr AF:	8.23	Prev response	8.10	*% change	1.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.004873	0.997356
THC Cal Offset:	-0.040600	-0.010200
CH4 Cal Slope:	1.006140	0.997864
CH4 Cal Offset:	-0.026000	-0.012000
NMHC Cal Slope:	1.003542	0.997020
NMHC Cal Offset:	-0.015000	0.000600

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

THC Calibration Summary

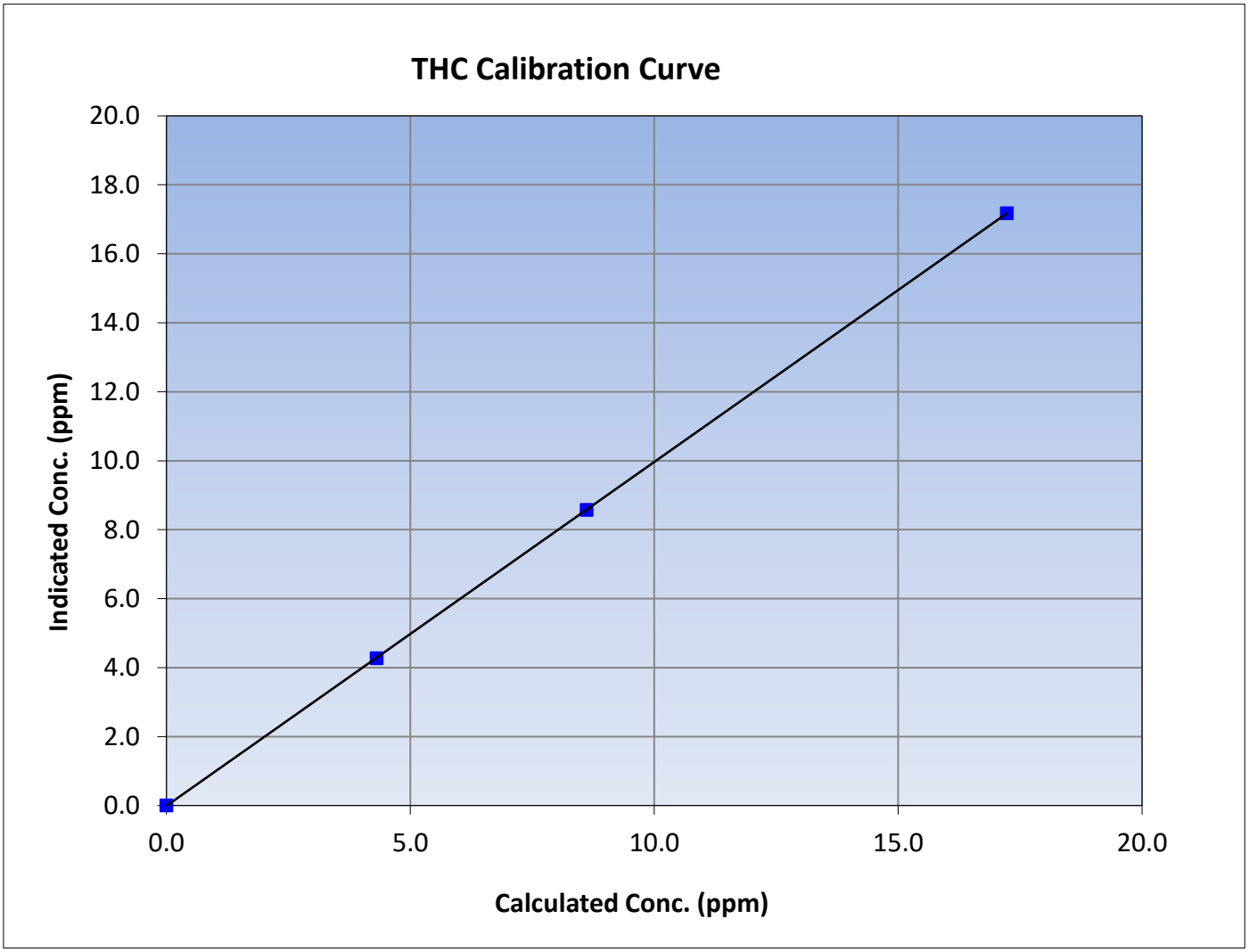
Version-01-2020

Station Information

Calibration Date:	February 21, 2023	Previous Calibration:	January 20, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	10:52	End Time (MST):	13:57
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999998	*≥0.995*
17.23	17.18	1.0030			
8.61	8.58	1.0043	Slope	0.997356	*0.90 - 1.10*
4.31	4.27	1.0076			
			Intercept	-0.010200	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

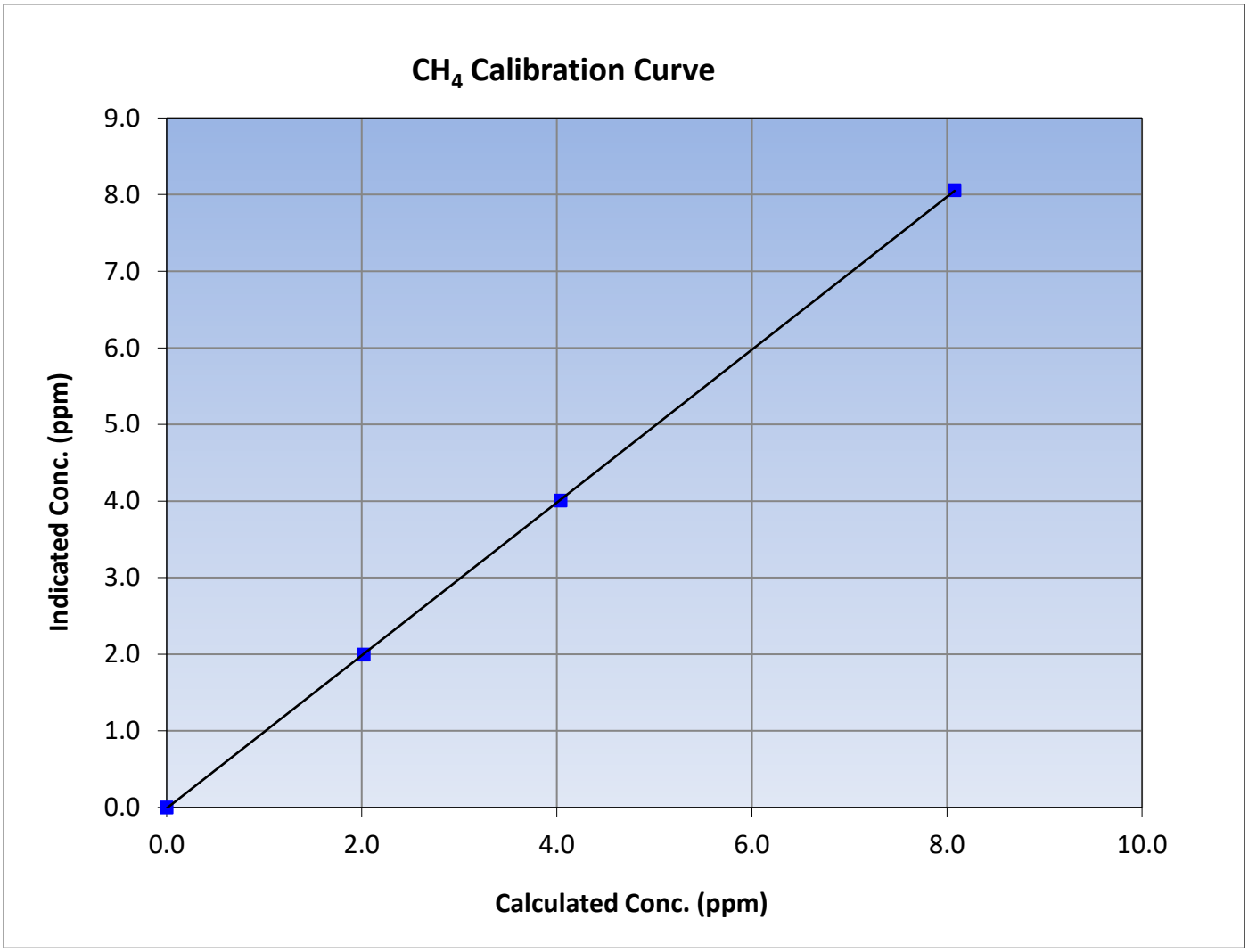
Version-01-2020

Station Information

Calibration Date:	February 21, 2023	Previous Calibration:	January 20, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	10:52	End Time (MST):	13:57
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	0.999989	*≥0.995*
8.08	8.06	1.0027			
4.04	4.01	1.0080	Slope	0.997864	*0.90 - 1.10*
2.02	2.00	1.0123			
			Intercept	-0.012000	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

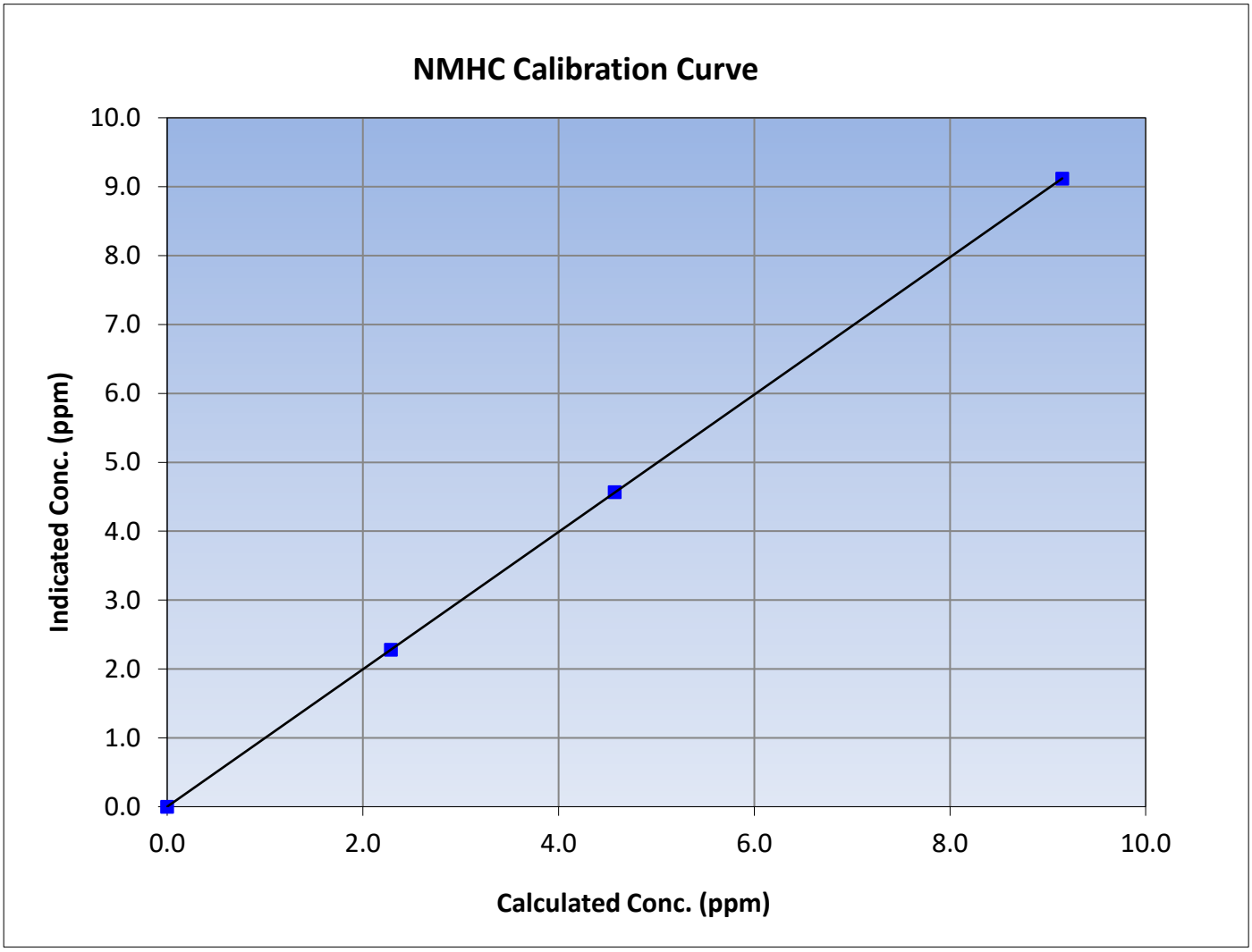
Version-01-2020

Station Information

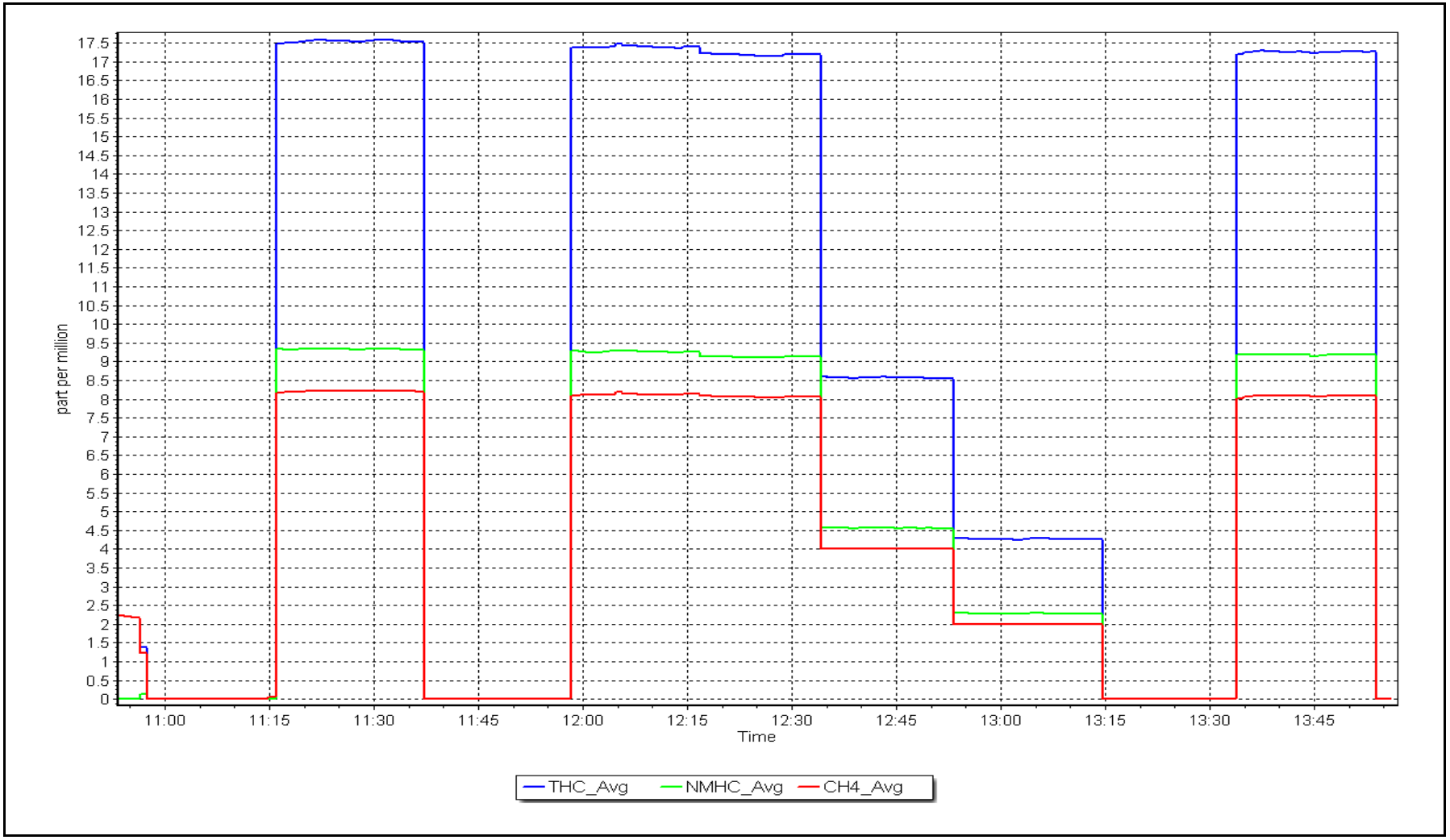
Calibration Date:	February 21, 2023	Previous Calibration:	January 20, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	10:52	End Time (MST):	13:57
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999999	*≥0.995*
9.15	9.12	1.0031			
4.57	4.57	1.0017	Slope	0.997020	*0.90 - 1.10*
2.29	2.28	1.0039			
			Intercept	0.000600	*+/-0.5*



NMHC Calibration Plot Date: February 21, 2023 Location: Mannix



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS06
PATRICIA MCINNES
FEBRUARY 2023

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

March 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	February 16, 2023	Last Cal Date:	January 9, 2023
Start time (MST):	10:16	End time (MST):	13:48
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:	0.992084	0.993085	Backgd or Offset:	17.2	17.2
Calibration intercept:	1.741680	1.541481	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	-0.3	----
as found span	4920	80.3	799.5	794.3	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4920	80.3	799.5	794.7	1.006
second point	4960	40.2	400.2	399.8	1.001
third point	4980	20.1	200.1	201.8	0.992
as left zero	5000	0.0	0.0	-0.1	----
as left span	4920	80.3	799.5	795.6	1.005
				Average Correction Factor	1.000

Baseline Corr As found:	794.60	Previous response	794.88	*% change	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

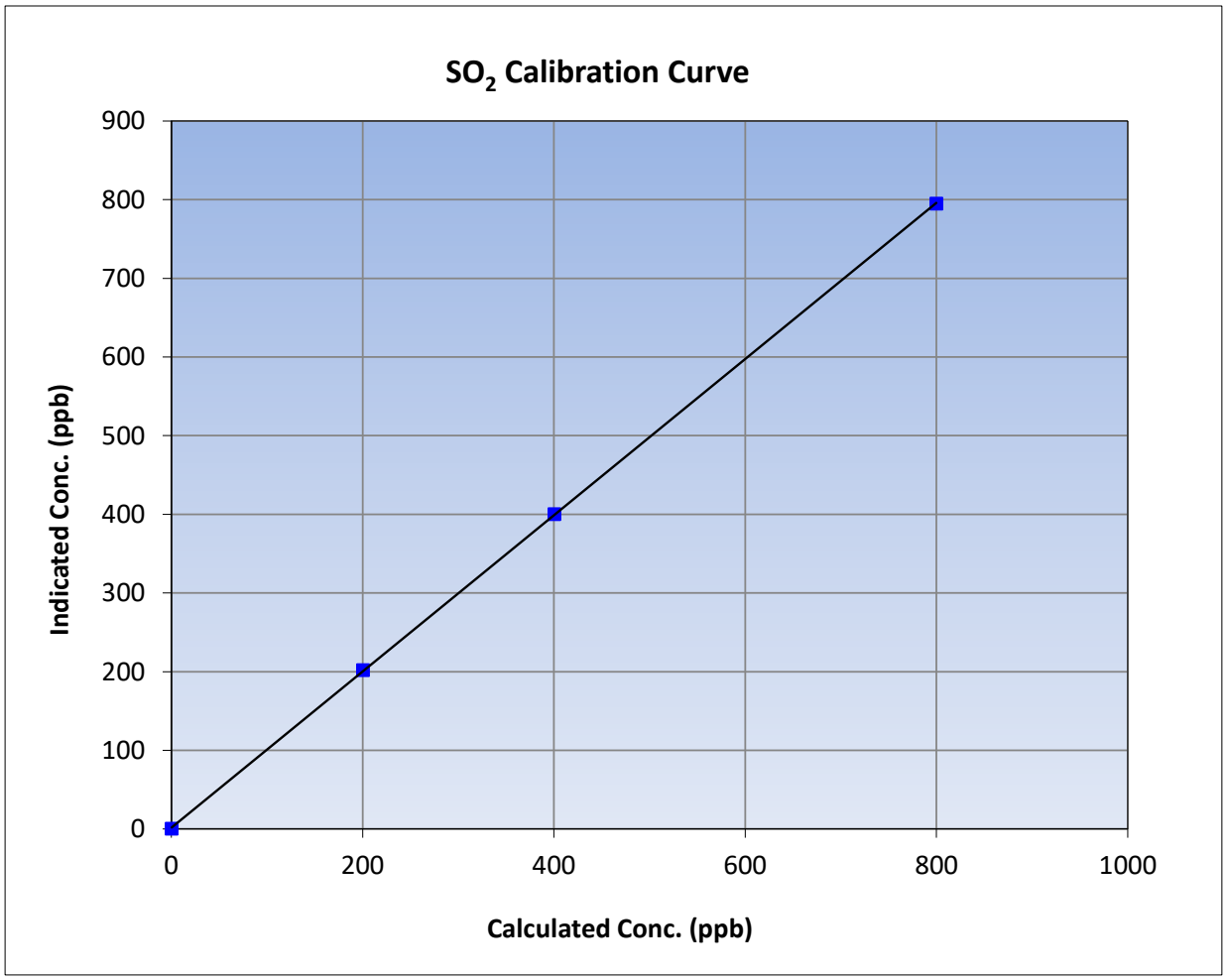
Station Information

Calibration Date:	February 16, 2023	Previous Calibration:	January 9, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	10:16	End Time (MST):	13:48
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290013

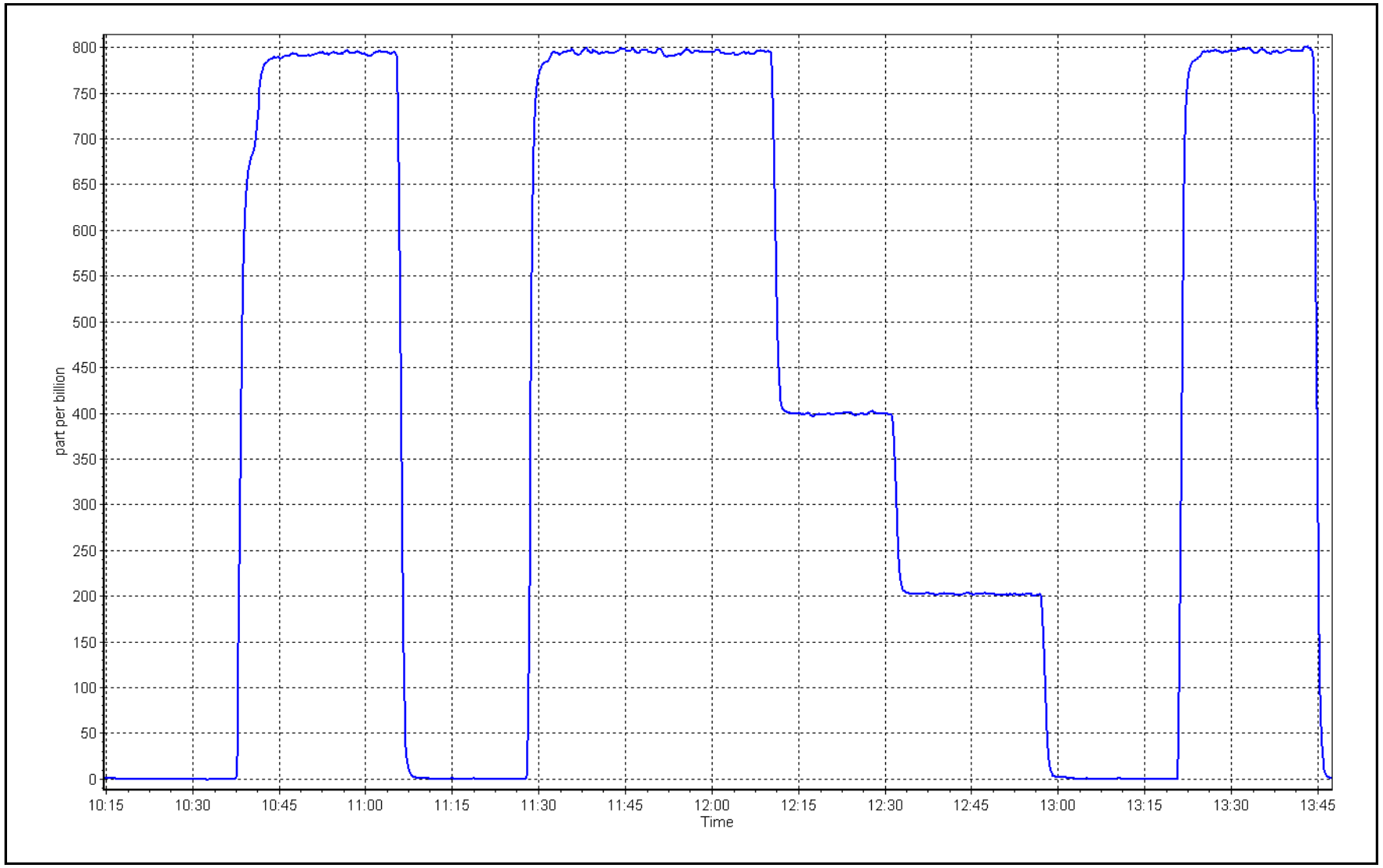
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
799.5	794.7	1.0060
400.2	399.8	1.0011
200.1	201.8	0.9917

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999983	*≥0.995*
Slope	0.993085	*0.90 - 1.10*
Intercept	1.541481	*+/-30*



SO2 Calibration Plot Date: February 16, 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:	February 6, 2023	Last Cal Date:	January 3, 2023
Start time (MST):	10:23	End time (MST):	14:43
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:	0.997488	0.990341	Backgd or Offset:	2.38	1.82
Calibration intercept:	0.117191	0.217319	Coeff or Slope:	1.049	1.049

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	-0.6	----
as found span	4926	74.3	79.9	78.5	1.011
as found 2nd point	4963	37.2	40.0	39.4	1.001
as found 3rd point	4981	18.6	20.0	19.5	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	0.0	----
high point	4926	74.3	79.9	79.3	1.008
second point	4963	37.2	40.0	39.9	1.003
third point	4981	18.6	20.0	20.3	0.986
as left zero	5000	0.0	0.0	0.1	----
as left span	4926	74.3	79.9	79.4	1.007
SO2 Scrubber Check	4920	80.3	803.0	0.1	----
Date of last scrubber change:		December 20, 2021		Ave Corr Factor	0.999
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.1	Prev response:	79.86	*% change:	-1.0%
Baseline Corr 2nd AF pt:	40.0	AF Slope:	0.988770	AF Intercept:	-0.402701
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999964		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

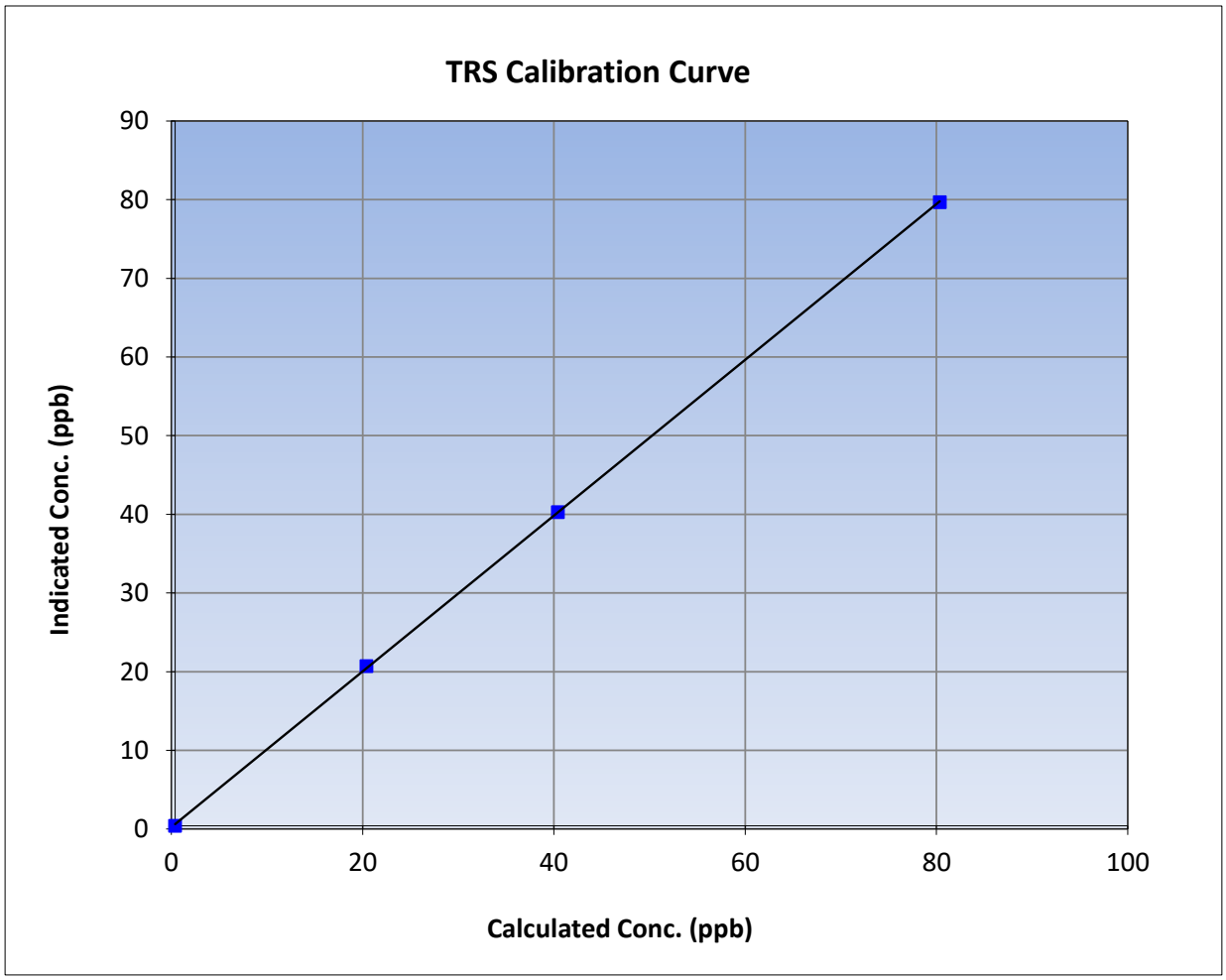
Station Information

Calibration Date:	February 6, 2023	Previous Calibration:	January 3, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	10:23	End Time (MST):	14:43
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1218153358

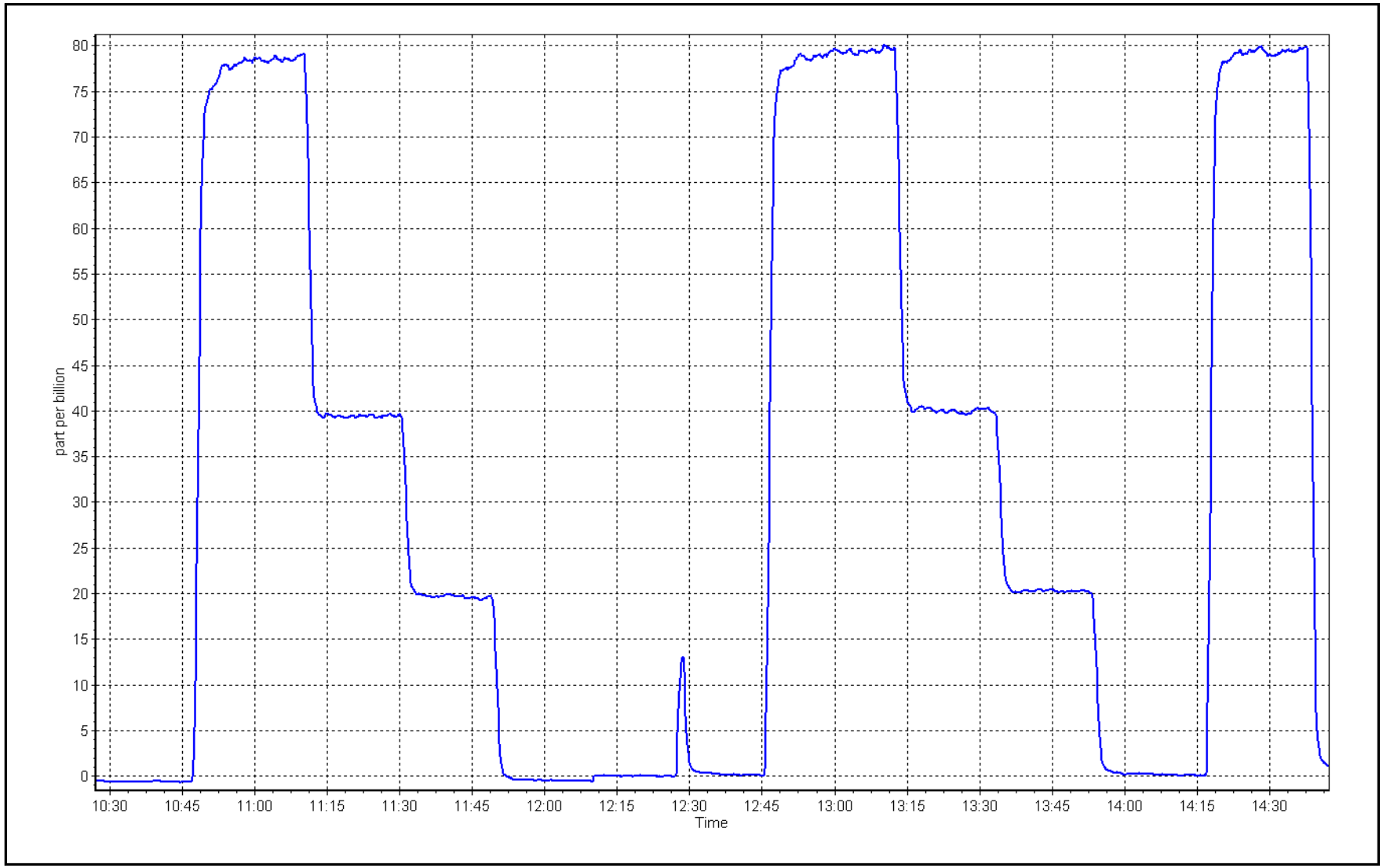
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
79.9	79.3	1.0081
40.0	39.9	1.0031
20.0	20.3	0.9860

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999964	*≥0.995*
Slope	0.990341	*0.90 - 1.10*
Intercept	0.217319	*+/-3*



TRS Calibration Plot Date: February 6, 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:	February 16, 2023	Last Cal Date:	January 9, 2023
Start time (MST):	10:17	End time (MST):	13:49
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:	689	
ZAG make/model:	API T701		Serial Number:	3566	

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:	3.19E-04	3.19E-04	NMHC SP Ratio:	5.63E-05	5.63E-05
CH4 Retention time:	13.8	13.8	NMHC Peak Area:	161210	161210

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	16.74	1.023
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	17.14	0.999
second point	4960	40.2	8.57	8.56	1.001
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	17.14	0.999
				Average Correction Factor	0.997

Baseline Corr AF:	16.74	Prev response	17.12	*% change	-2.3%
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	80.3	9.07	8.85	1.025
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	9.08	0.999
second point	4960	40.2	4.54	4.55	0.999
third point	4980	20.1	2.27	2.29	0.989
as left zero	5000	0	0.00	0.00	----
as left span	4920	80.3	9.07	9.09	0.998
				Average Correction Factor	0.995
Baseline Corr AF:	8.85	Prev response	9.06	*% change	-2.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	8.06	7.89	1.021
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	8.06	1.000
second point	4960	40.2	4.03	4.02	1.004
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	8.06	1.000
				Average Correction Factor	1.000
Baseline Corr AF:	7.89	Prev response	8.06	*% 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:	1.000499	1.000113
THC Cal Offset:	-0.007453	0.008939
CH4 Cal Slope:	1.001107	0.999419
CH4 Cal Offset:	-0.004401	0.000800
NMHC Cal Slope:	1.000174	1.000630
NMHC Cal Offset:	-0.003652	0.008539

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

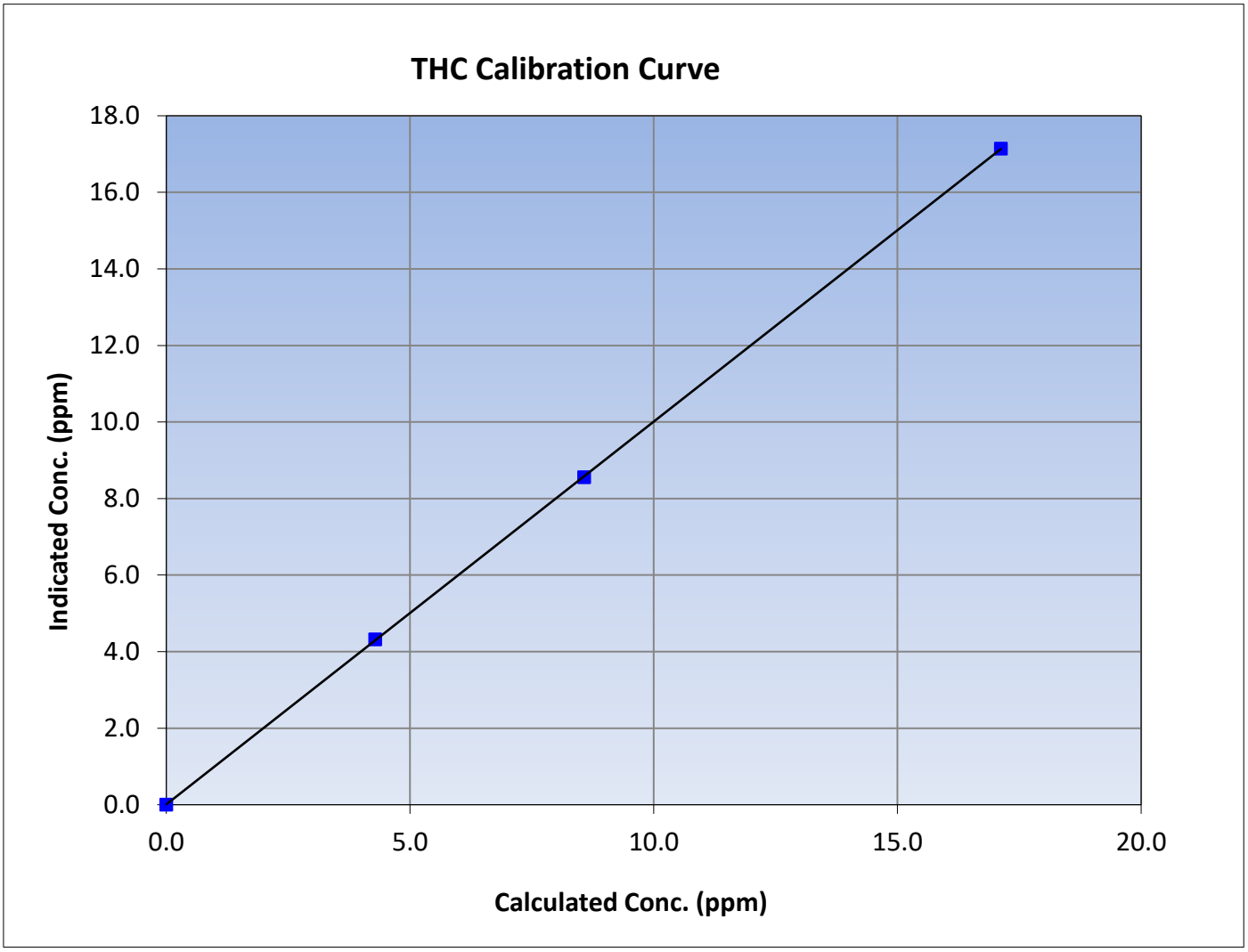
Version-01-2020

Station Information

Calibration Date:	February 16, 2023	Previous Calibration:	January 9, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	10:17	End Time (MST):	13:49
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	0.999992	≥0.995
17.12	17.14	0.9991			
8.57	8.56	1.0014	Slope	1.000113	0.90 - 1.10
4.29	4.32	0.9917			
			Intercept	0.008939	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

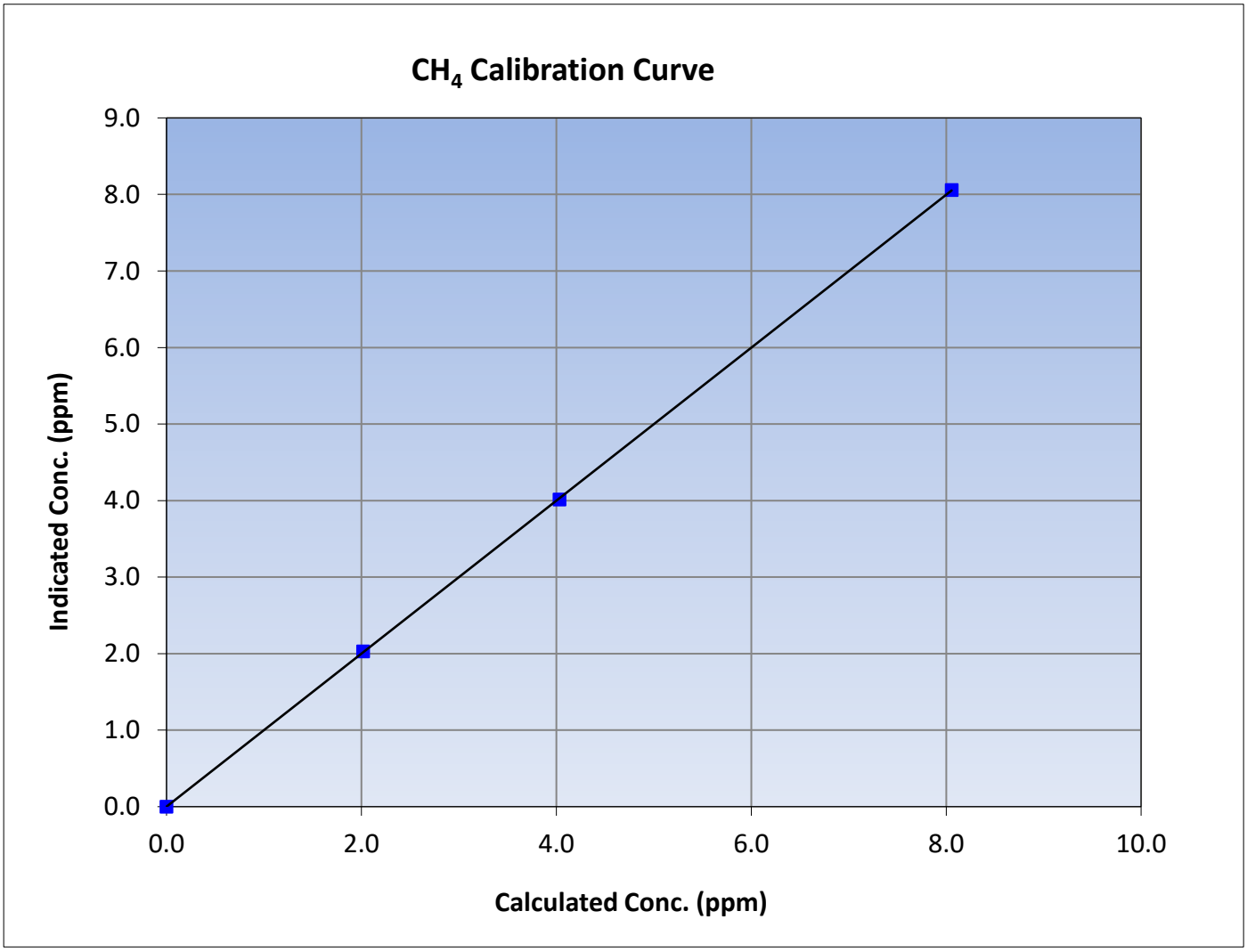
Version-01-2020

Station Information

Calibration Date:	February 16, 2023	Previous Calibration:	January 9, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	10:17	End Time (MST):	13:49
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999988	≥0.995
8.06	8.06	0.9998			
4.03	4.02	1.0044	Slope	0.999419	0.90 - 1.10
2.02	2.03	0.9943			
			Intercept	0.000800	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

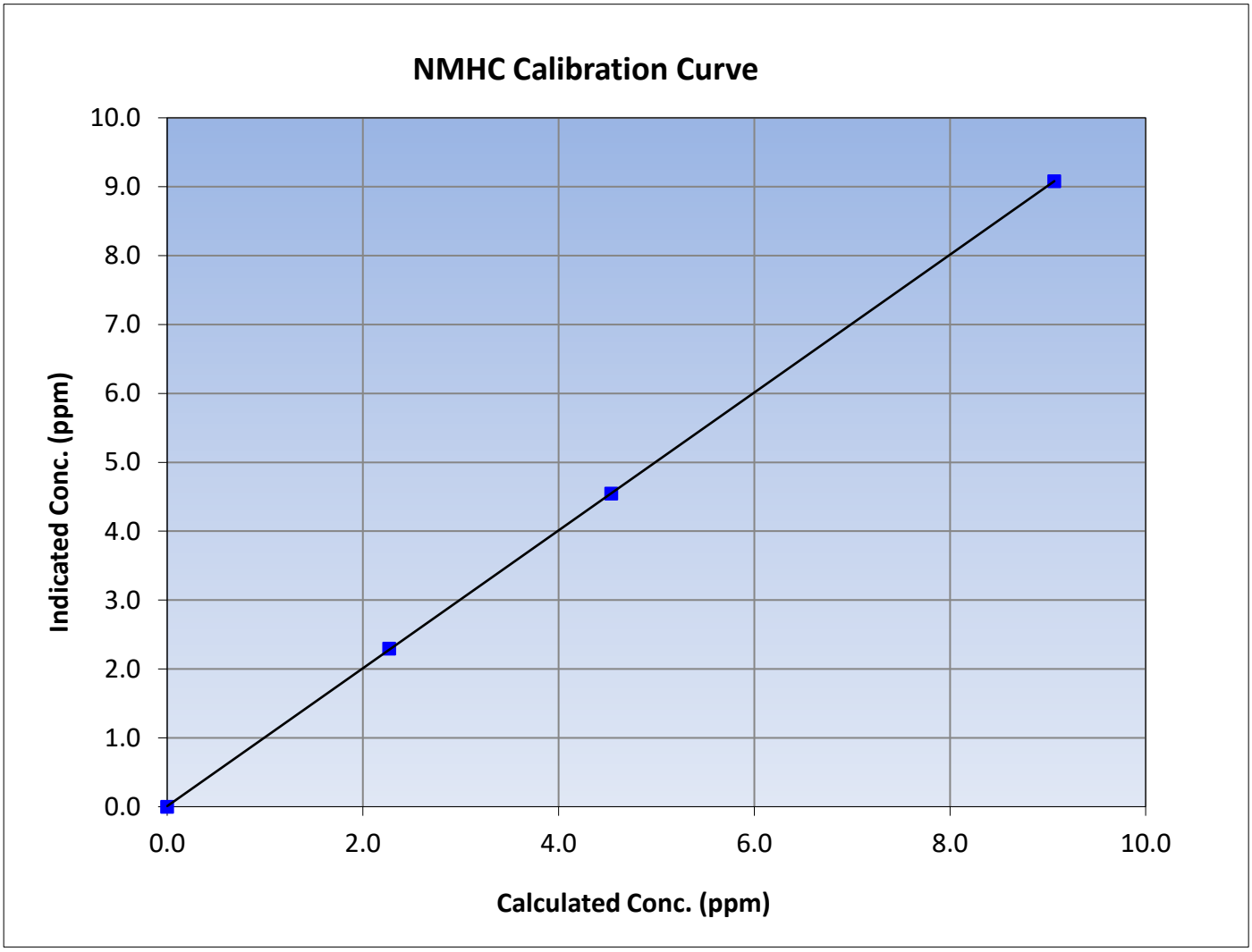
Version-01-2020

Station Information

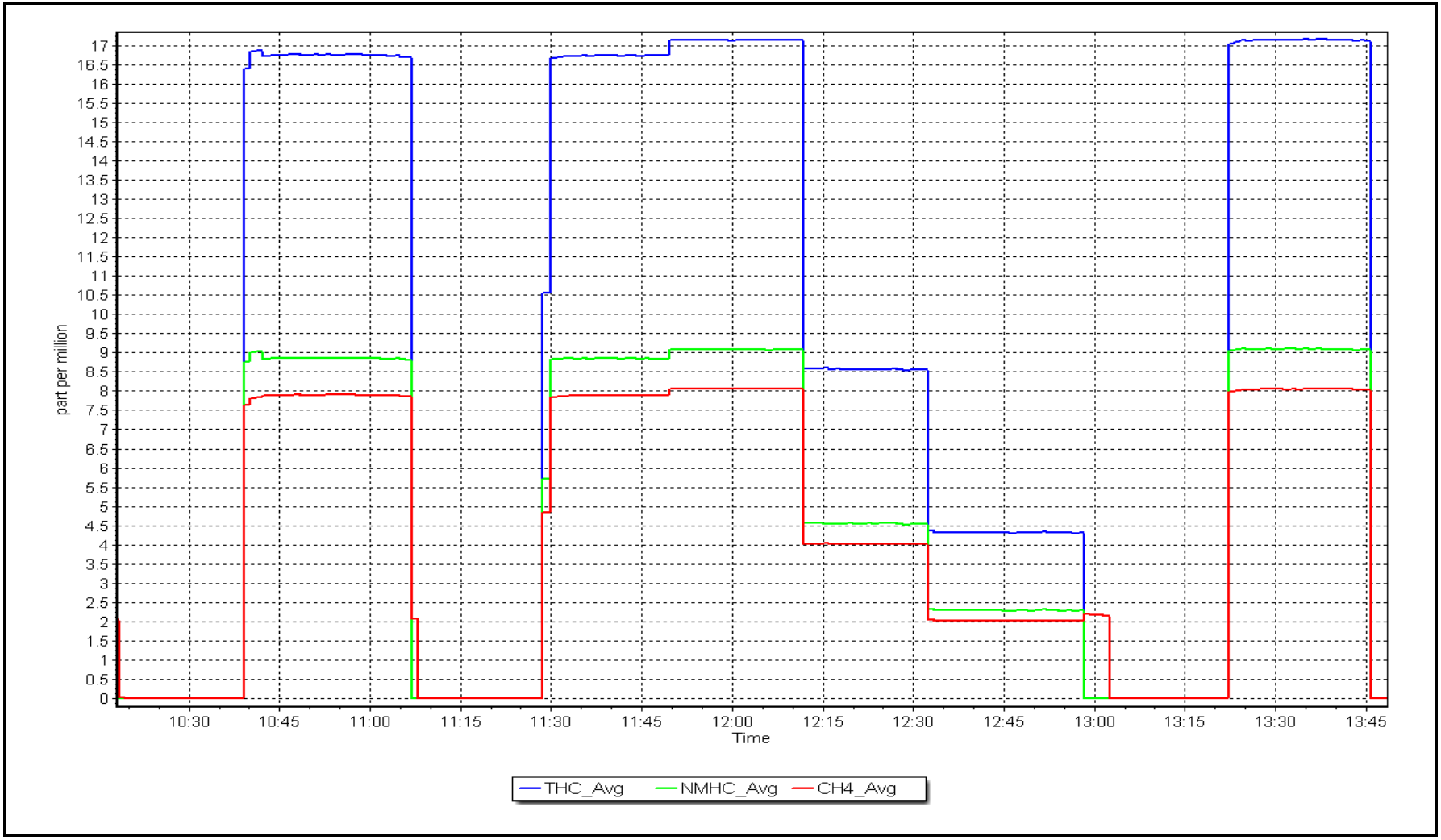
Calibration Date:	February 16, 2023	Previous Calibration:	January 9, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	10:17	End Time (MST):	13:49
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999993	≥0.995
9.07	9.08	0.9986			
4.54	4.55	0.9985	Slope	1.000630	0.90 - 1.10
2.27	2.29	0.9894			
			Intercept	0.008539	+/-0.5



NMHC Calibration Plot Date: February 16, 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:	February 25, 2023	Last Cal Date:	February 16, 2023
Start time (MST):	10:52	End time (MST):	17:04
Reason:	Maintenance		

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:	3.19E-04	3.26E-04	NMHC SP Ratio:	5.63E-05	5.79E-05
CH4 Retention time:	13.8	14.0	NMHC Peak Area:	161210	156880

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	14.77	1.159
as found 2nd point	4960	40.2	8.57	7.37	1.163
as found 3rd point	4980	20.1	4.29	3.70	1.158
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	17.12	17.14	0.999
second point	4960	40.2	8.57	8.54	1.004
third point	4980	20.1	4.29	4.29	0.999
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.12	17.09	1.002
				Average Correction Factor	1.000

Baseline Corr AF:	14.77	Prev response	17.13	*% change	-16.0%
Baseline Corr 2nd AF:	7.4	AF Slope:	0.862320	AF Intercept:	-0.003271
Baseline Corr 3rd AF:	3.7	AF Correlation:	0.999996	* = > +/-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	7.58	1.196
as found 2nd point	4960	40.2	4.54	3.79	1.199
as found 3rd point	4980	20.1	2.27	1.90	1.196
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	4.54	1.001
third point	4980	20.1	2.27	2.28	0.996
as left zero	5000	0	0.00	0.00	----
as left span	4920	80.3	9.07	9.06	1.001
				Average Correction Factor	0.998
Baseline Corr AF:	7.58	Prev response	9.08	*% change	-19.8%
Baseline Corr 2nd AF:	3.8	AF Slope:	0.836122	AF Intercept:	-0.002285
Baseline Corr 3rd AF:	1.9	AF Correlation:	0.999998	* = > +/-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	7.19	1.121
as found 2nd point	4960	40.2	4.03	3.59	1.125
as found 3rd point	4980	20.1	2.02	1.80	1.118
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	8.06	8.06	0.999
second point	4960	40.2	4.03	4.00	1.007
third point	4980	20.1	2.02	2.01	1.002
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	8.06	8.03	1.003
				Average Correction Factor	1.003
Baseline Corr AF:	7.19	Prev response	8.05	*% change	-12.0%
Baseline Corr 2nd AF:	3.59	AF Slope:	0.891680	AF Intercept:	-0.000785
Baseline Corr 3rd AF:	1.80	AF Correlation:	0.999995	* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000113	1.000813
THC Cal Offset:	0.008939	-0.008055
CH4 Cal Slope:	0.999419	1.000524
CH4 Cal Offset:	0.000800	-0.008597
NMHC Cal Slope:	1.000630	1.001070
NMHC Cal Offset:	0.008539	0.000542

Notes: Changed pump after MAF's. Adjusted span only.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

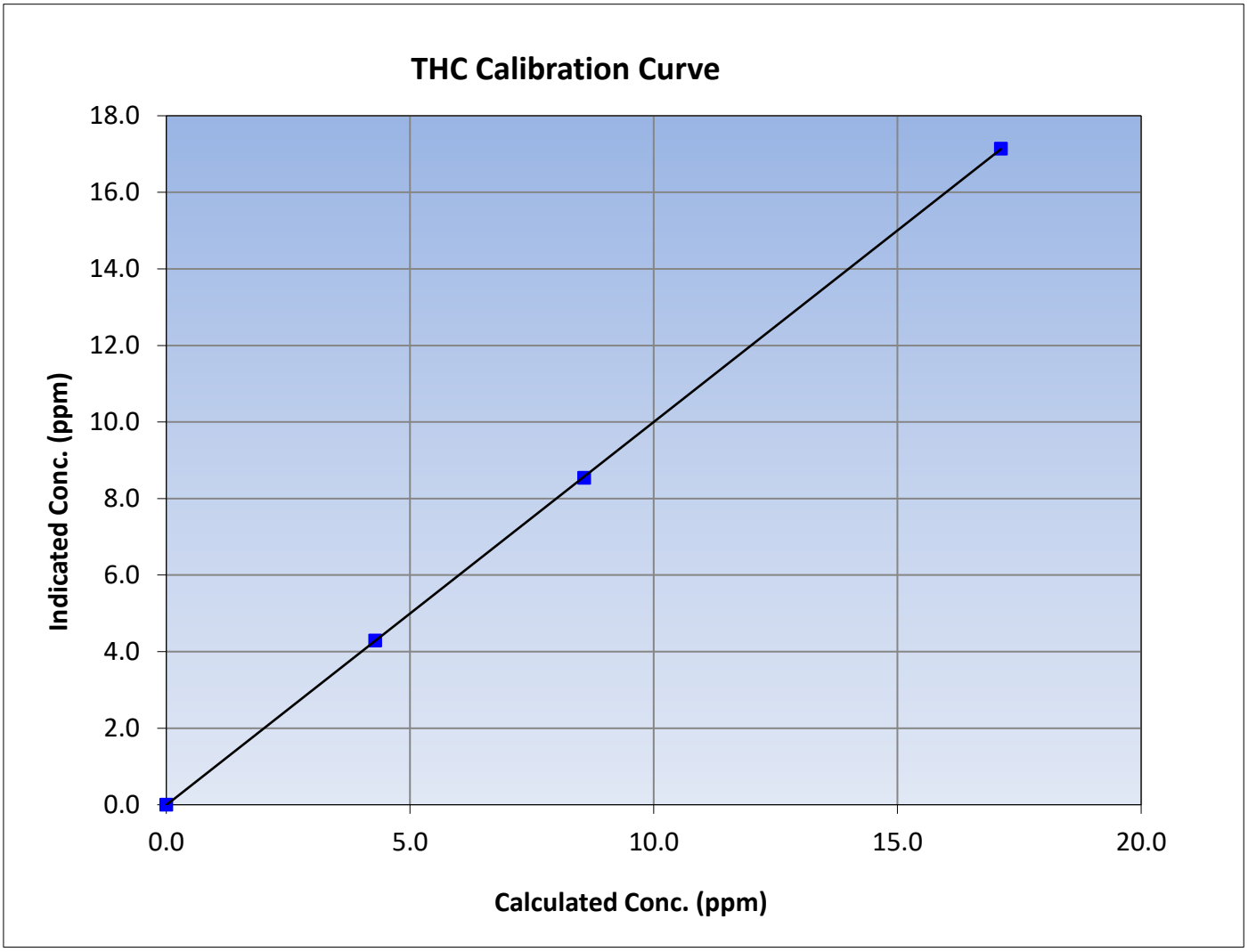
Version-01-2020

Station Information

Calibration Date:	February 25, 2023	Previous Calibration:	February 16, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	10:52	End Time (MST):	17:04
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999991	*≥0.995*
17.12	17.14	0.9989			
8.57	8.54	1.0039	Slope	1.000813	*0.90 - 1.10*
4.29	4.29	0.9986			
			Intercept	-0.008055	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

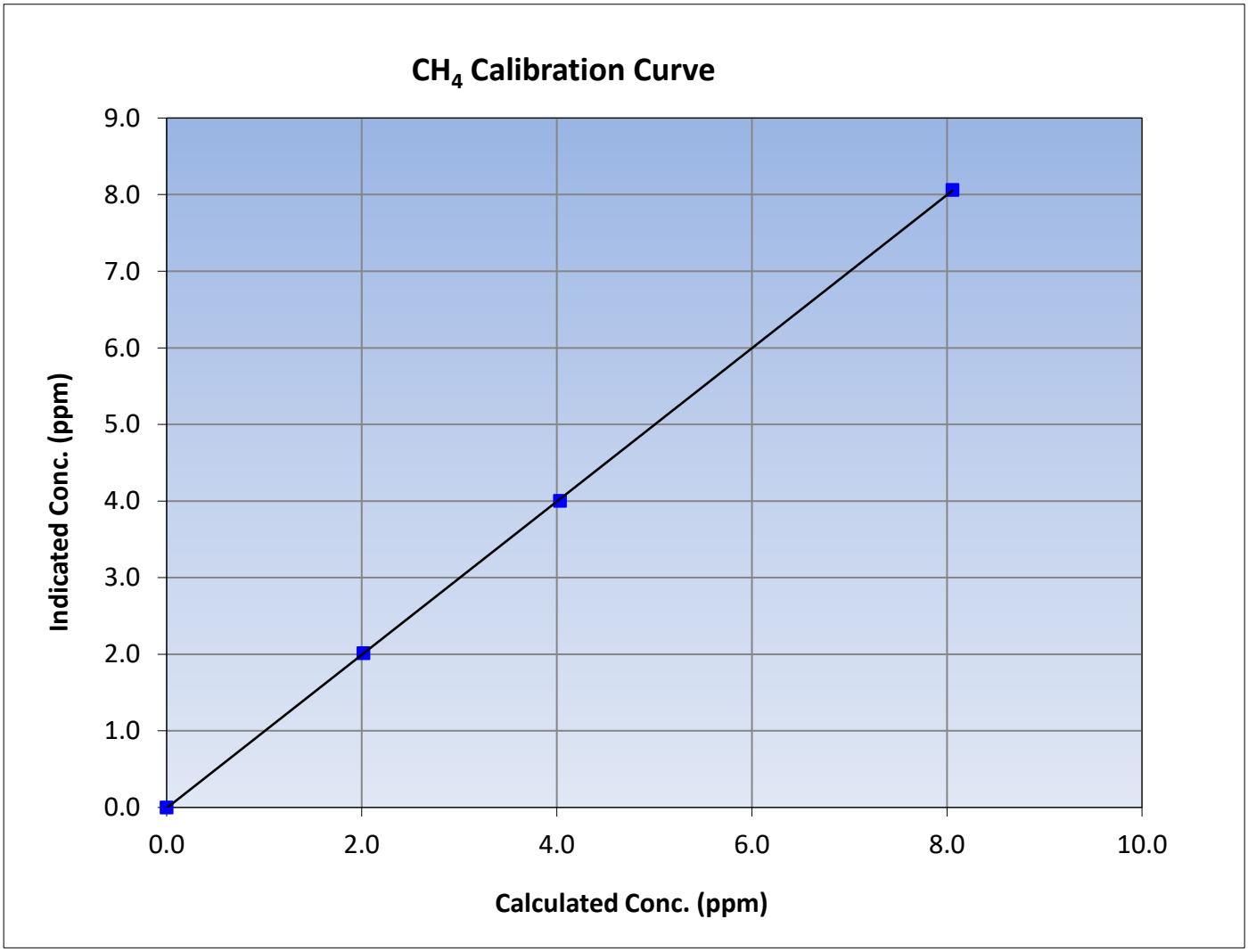
Version-01-2020

Station Information

Calibration Date:	February 25, 2023	Previous Calibration:	February 16, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	10:52	End Time (MST):	17:04
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	0.999979	≥0.995
8.06	8.06	0.9992			
4.03	4.00	1.0075	Slope	1.000524	0.90 - 1.10
2.02	2.01	1.0017			
			Intercept	-0.008597	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

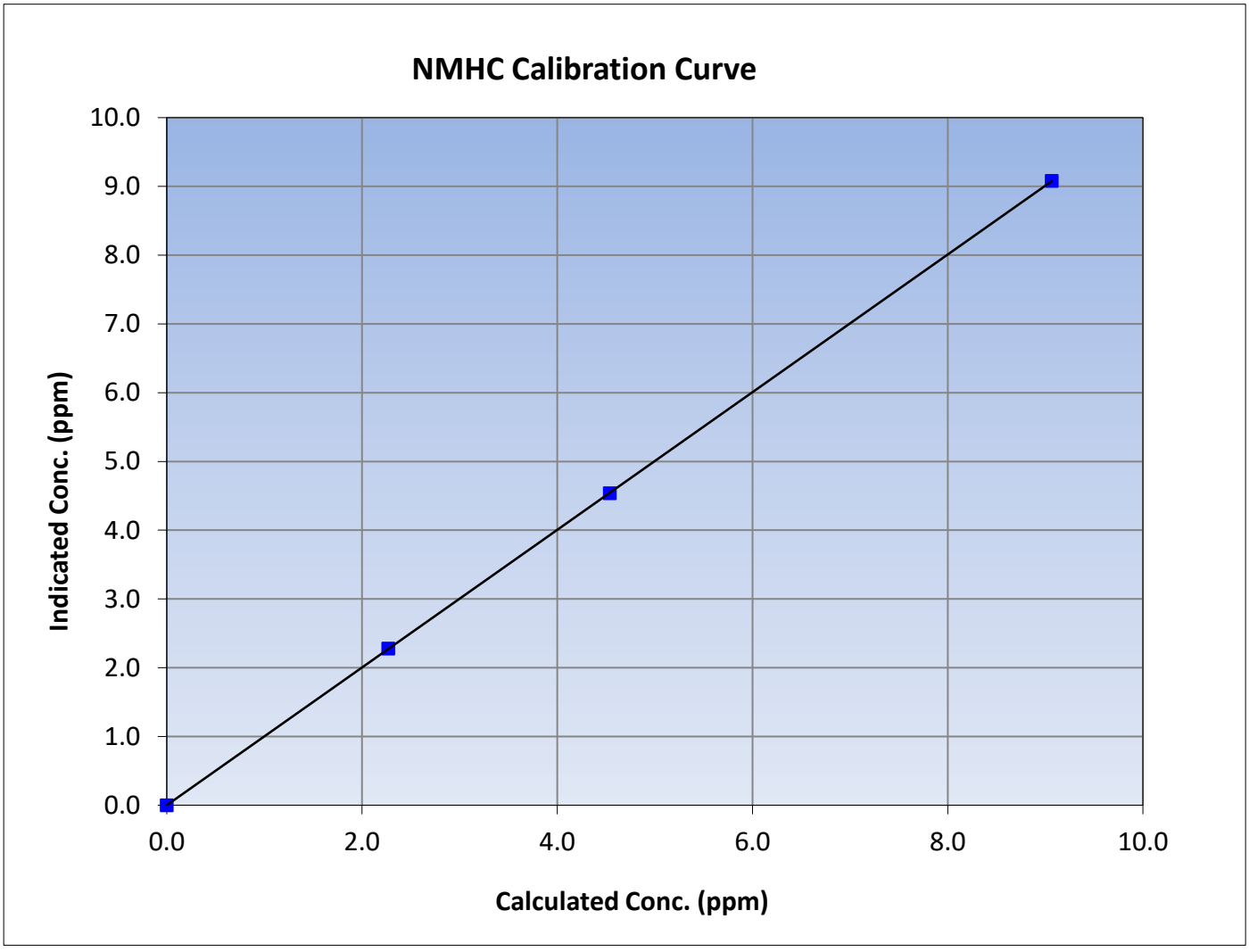
Version-01-2020

Station Information

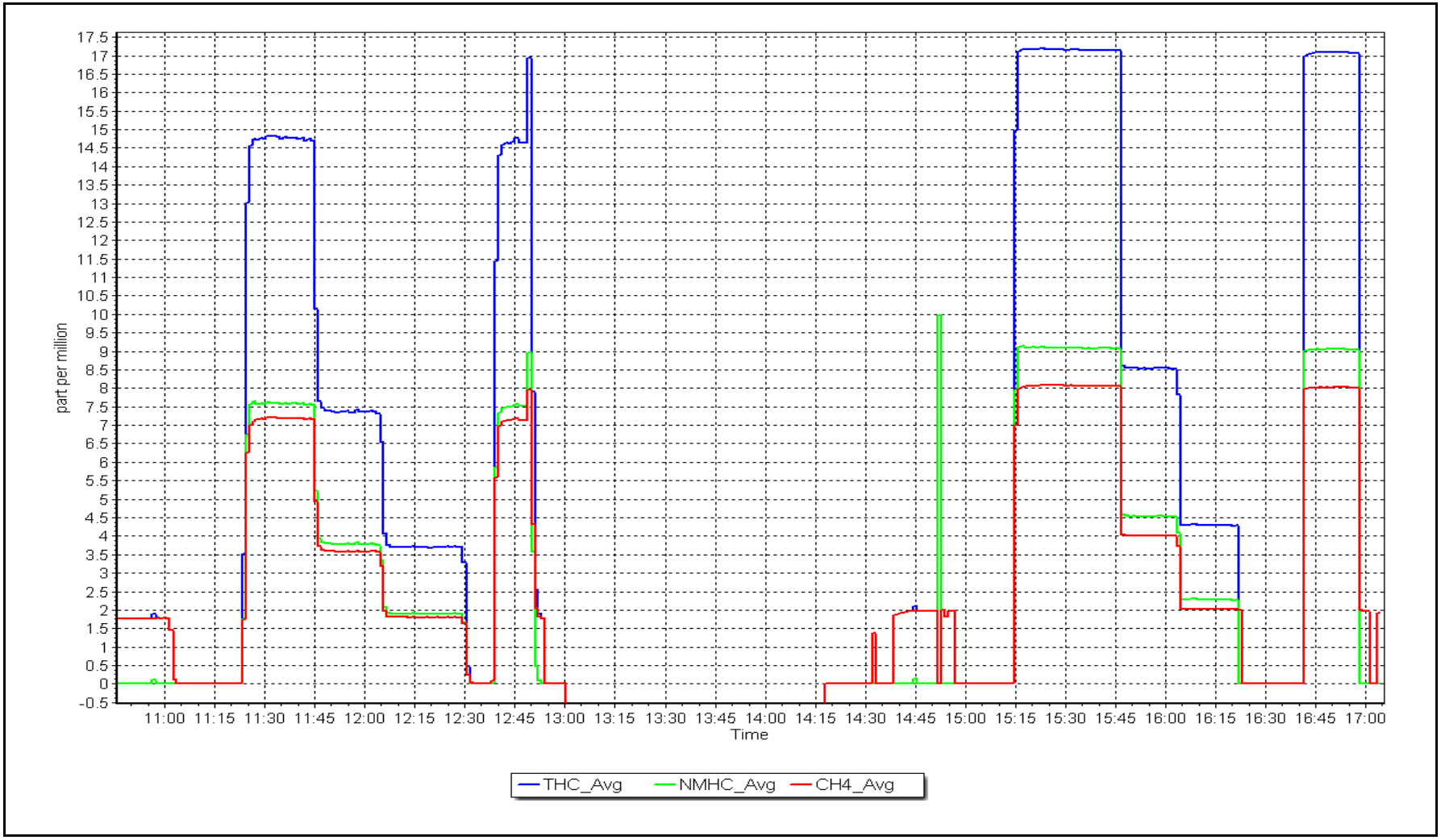
Calibration Date:	February 25, 2023	Previous Calibration:	February 16, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	10:52	End Time (MST):	17:04
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999997	≥0.995
9.07	9.08	0.9986			
4.54	4.54	1.0007	Slope	1.001070	0.90 - 1.10
2.27	2.28	0.9959			
			Intercept	0.000542	+/-0.5



NMHC Calibration Plot Date: February 25, 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:	February 2, 2023	Last Cal Date:	January 5, 2023
Start time (MST):	9:39	End time (MST):	14:14
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:	154.2	155.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000715	1.004307
NO_X Cal Offset:	2.680164	2.260596
NO Cal Slope:	0.999284	1.003971
NO Cal Offset:	1.700041	1.260503
NO_2 Cal Slope:	1.007019	1.009891
NO_2 Cal Offset:	0.124373	0.497022

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	0.1	-0.3	----	----
as found span	4923	76.9	807.6	799.5	8.2	815.2	802.4	12.8	0.9907	0.9963
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	4923	76.9	807.6	799.5	8.2	812.5	803.6	8.9	0.9940	0.9948
second point	4962	38.5	404.3	400.2	4.1	408.6	402.9	5.7	0.9895	0.9934
third point	4981	19.2	201.6	199.6	2.0	207.6	203.2	4.4	0.9713	0.9823
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	0.2	-0.3	----	----
as left span	4923	76.9	807.6	388.2	419.5	810.2	389.2	421.0	0.9968	0.9973
								Average Correction Factor	0.9849	0.9902

Corrected As found	NO_X = 815.5 ppb	NO = 802.3 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.6%
Previous Response	NO_X = 810.9 ppb	NO = 800.6 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)	799.4	388.1	419.5	423.7	0.9900	101.0%
2nd GPT point (200 ppb O3)	799.4	594.2	213.4	216.4	0.9859	101.4%
3rd GPT point (100 ppb O3)	799.4	696.5	111.1	113.3	0.9802	102.0%
				Average Correction Factor	0.9853	101.5%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

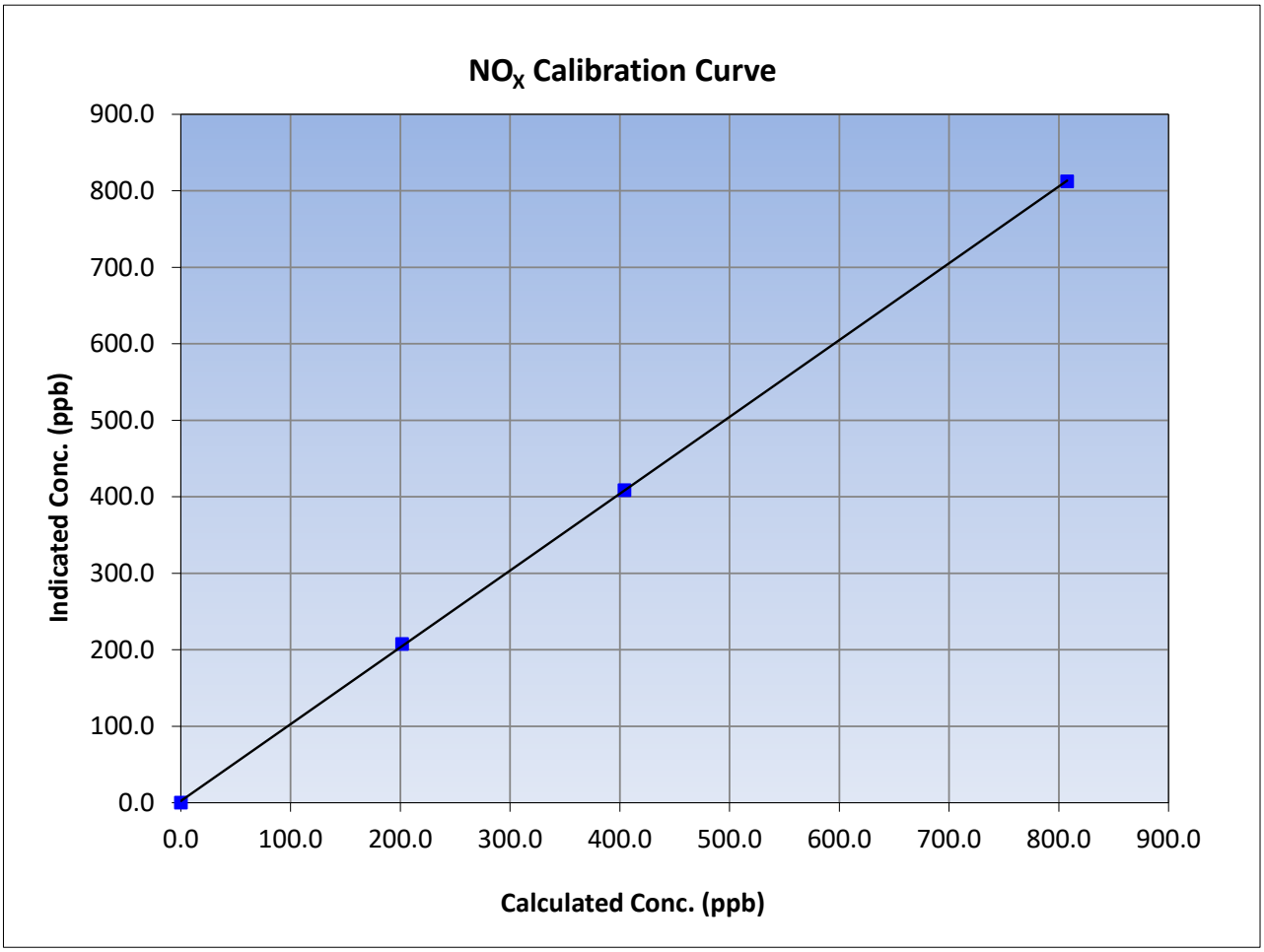
Version-04-2020

Station Information

Calibration Date:	February 2, 2023	Previous Calibration:	January 5, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:39	End Time (MST):	14:14
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	0.999961	≥0.995
807.6	812.5	0.9940			
404.3	408.6	0.9895	Slope	1.004307	0.90 - 1.10
201.6	207.6	0.9713			
			Intercept	2.260596	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

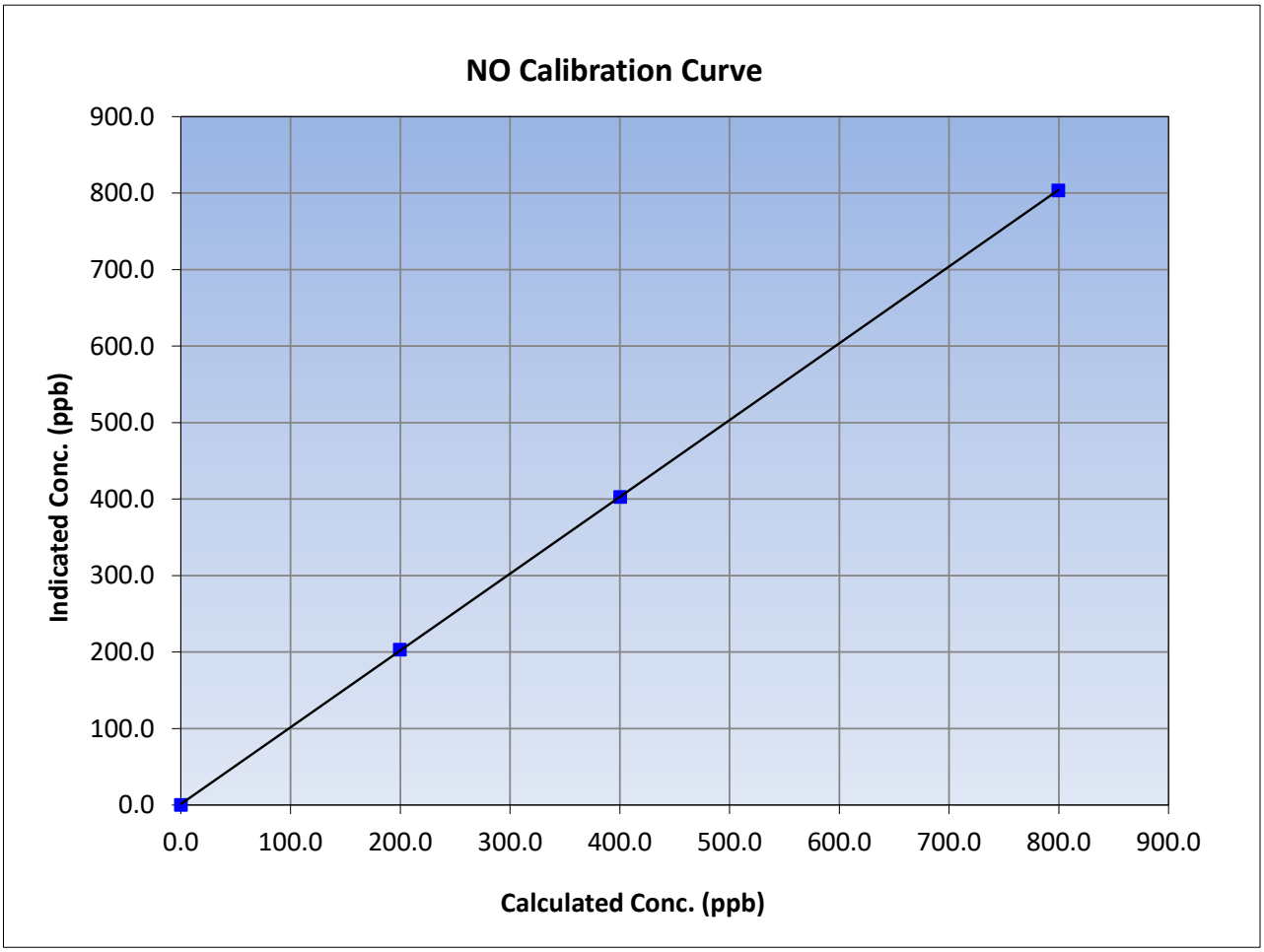
Version-04-2020

Station Information

Calibration Date:	February 2, 2023	Previous Calibration:	January 5, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:39	End Time (MST):	14:14
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	0.999990	≥0.995
799.5	803.6	0.9948			
400.2	402.9	0.9934	Slope	1.003971	0.90 - 1.10
199.6	203.2	0.9823			
			Intercept	1.260503	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

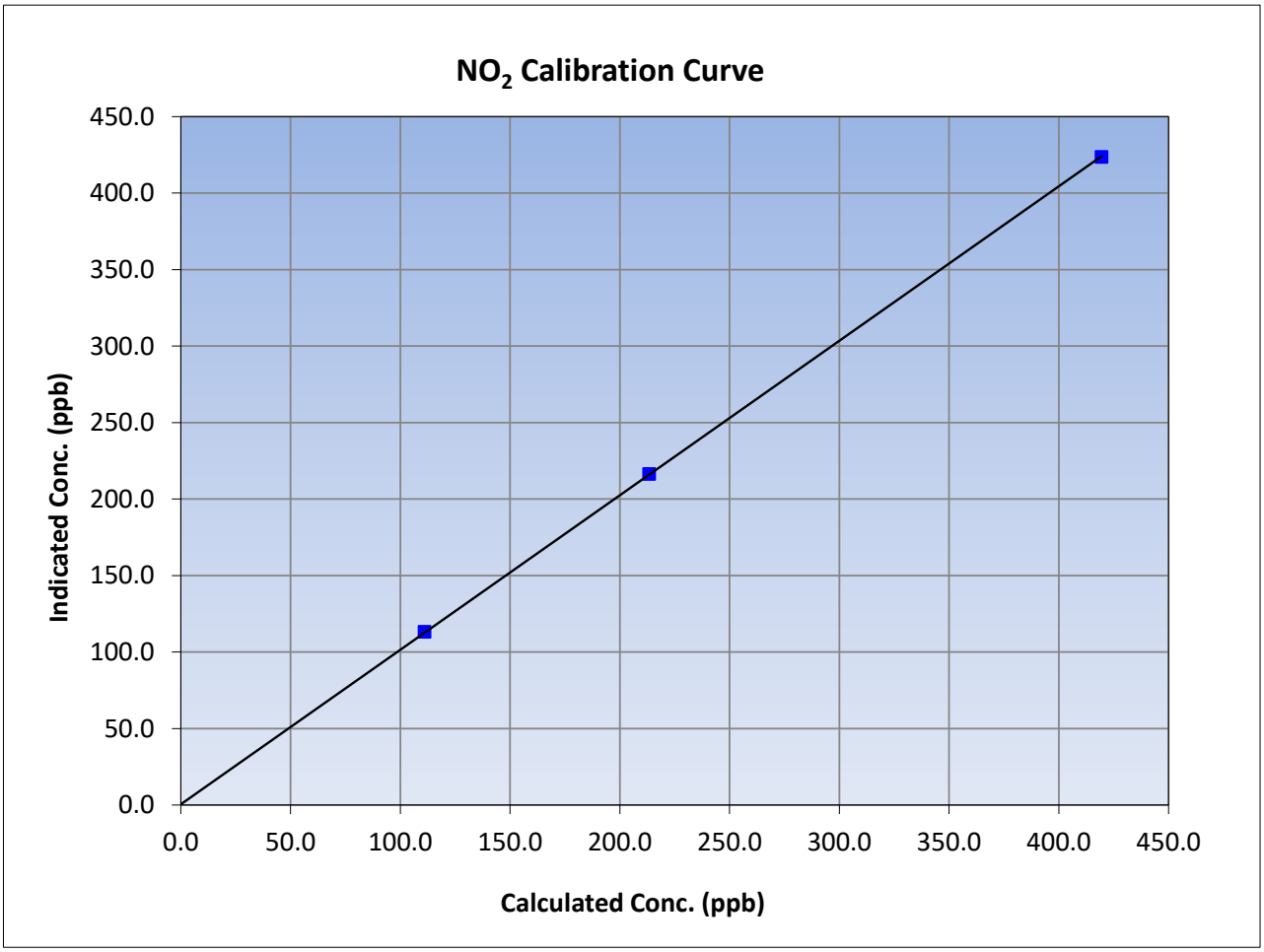
Version-04-2020

Station Information

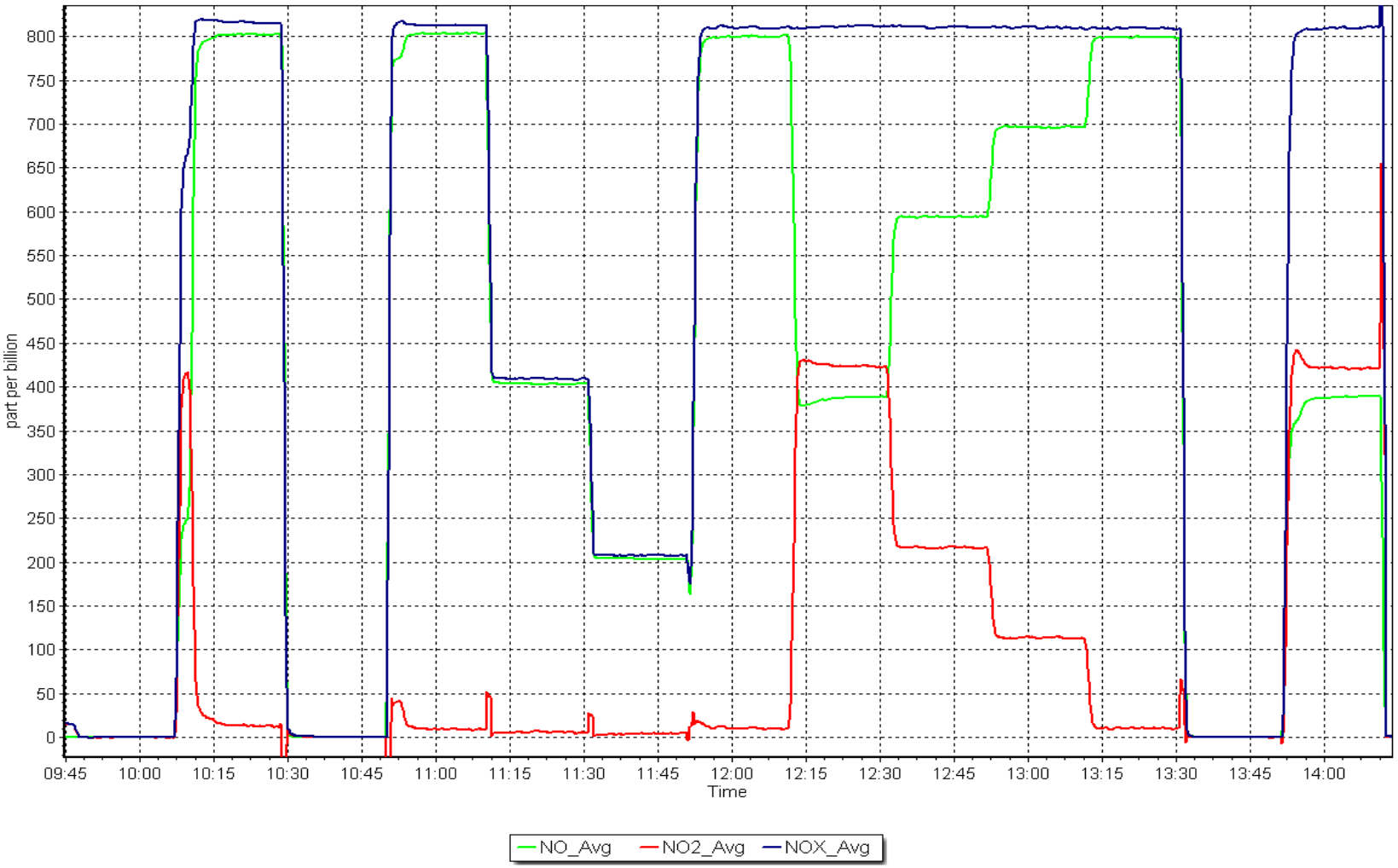
Calibration Date:	February 2, 2023	Previous Calibration:	January 5, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:39	End Time (MST):	14:14
Analyzer make:	Thermo 42i	Analyzer serial #:	1172750022

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
419.5	423.7	0.9900			
213.4	216.4	0.9859	Slope	1.009891	0.90 - 1.10
111.1	113.3	0.9802			
			Intercept	0.497022	+/-20



NO_X Calibration Plot Date: February 2, 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:	February 8, 2023	Last Cal Date:	January 12, 2023
Start time (MST):	10:19	End time (MST):	13:52
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:	1.004914	1.005057	Backgd or Offset:	-1.2	-1.2
Calibration intercept:	1.440000	1.240000	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	0.4	----
as found span	5000	1303.0	400.0	403.3	0.992
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	0.6	----
high point	5000	1303.0	400.0	402.8	0.993
second point	5000	966.5	200.0	203.0	0.985
third point	5000	794.3	100.0	102.1	0.979
as left zero	5000	800.0	0.0	0.9	----
as left span	5000	1303.0	400.0	405.4	0.987
				Average Correction Factor	0.986

Baseline Corr As found:	402.9	Previous response	403.4	*% change	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

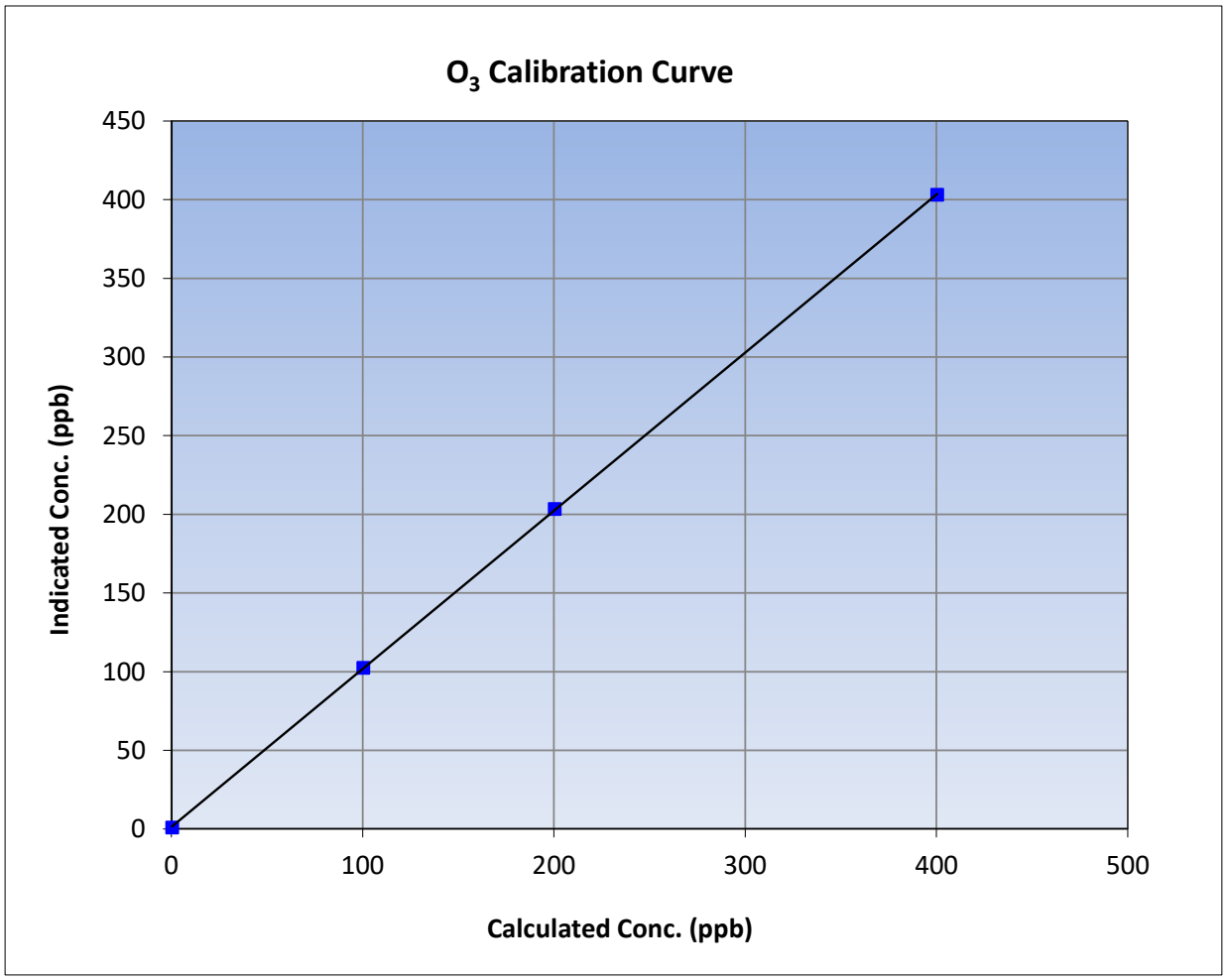
Station Information

Calibration Date:	February 8, 2023	Previous Calibration:	January 12, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	10:19	End Time (MST):	13:52
Analyzer make:	Thermo 49i	Analyzer serial #:	1300156234

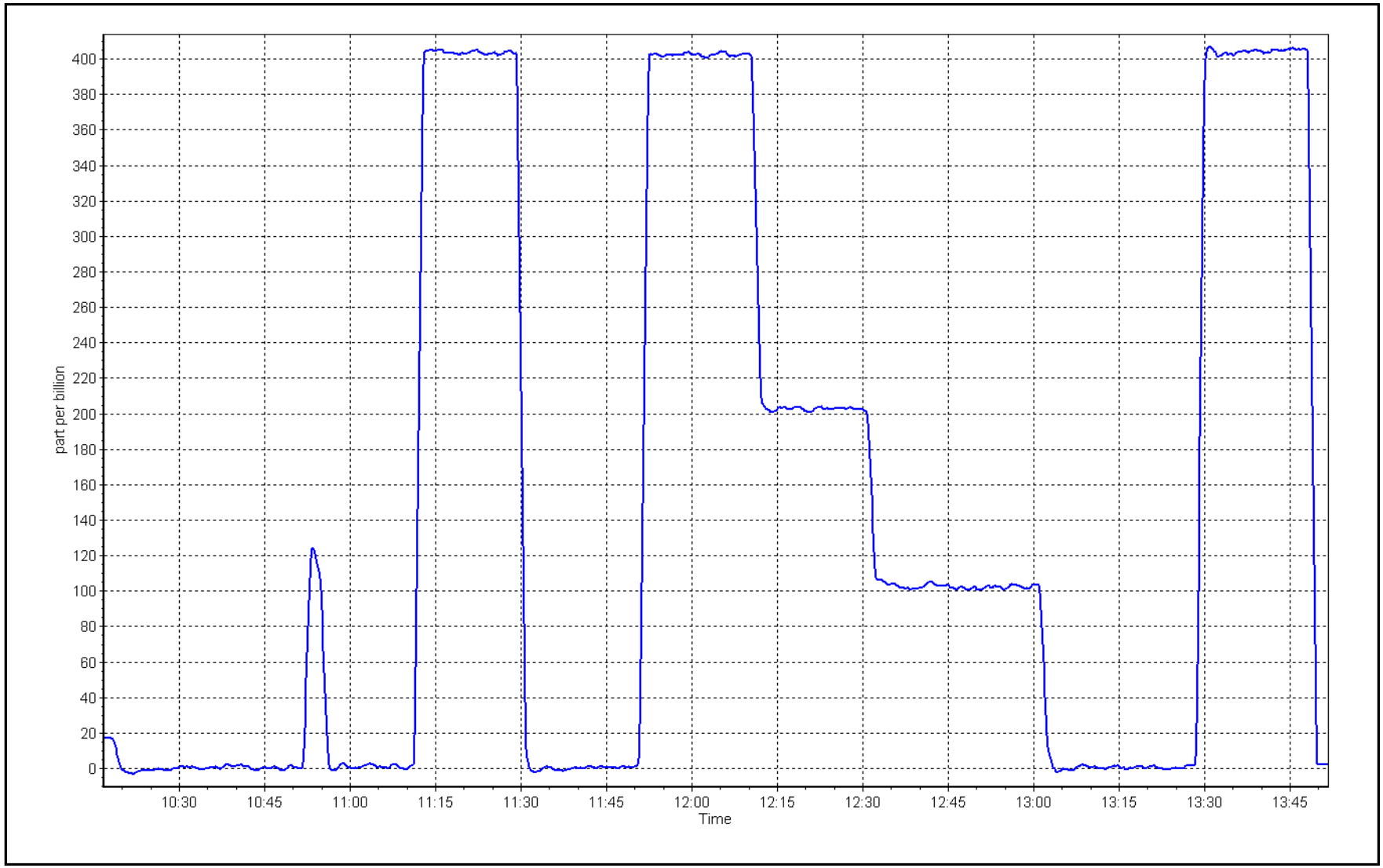
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.6	----
400.0	402.8	0.9930
200.0	203.0	0.9852
100.0	102.1	0.9794

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999985	*≥0.995*
Slope	1.005057	*0.90 - 1.10*
Intercept	1.240000	*+/- 5*



O_3 Calibration Plot Date: February 8, 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:	February 16, 2023	Last Cal Date:	January 9, 2023
Start time (MST):	14:29	End time (MST):	15:08
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)	-6.5	-7.2	-6.5	☐	+/- 2 °C
P (mmHg)	715.9	713.3	715.9	☐	+/- 10 mmHg
flow (LPM)	5.02	5.1	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: February 16, 2023 Last Cal Date: January 9, 2023

PM w/o HEPA: 9.1 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test				☐	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 last month. 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:	February 7, 2023	Last Cal Date:	January 11, 2023
Start time (MST):	9:09	End time (MST):	13:20
NH3 Cal Date:	February 7, 2023	Last Cal Date:	January 11, 2023
Start time (MST):	13:21	End time (MST):	15:25
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:	0.839	0.853	TN coefficient:	0.843	0.851
NOX coefficient:	0.840	0.855	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:	0.996497	0.994899
NO_X Cal Offset:	1.220653	2.960281
NO Cal Slope:	1.002531	0.994939
NO Cal Offset:	-0.260924	1.319966
NO_2 Cal Slope:	1.003819	0.993439
NO_2 Cal Offset:	1.157200	1.205483
NH3 Cal Slope:	0.998364	0.998917
NH3 Cal Offset:	7.107284	8.375709
TN Cal Slope:	1.003901	1.004451
TN Cal Offset:	5.611013	8.831802

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	0.4	-0.3	0.7	----	----
as found NO	4923	76.9	807.6	807.6	----	796.1	790.1	5.9	1.014	----
calibrator zero	5000	0.0	0.0	0.0	0.0	0.6	0.4	0.2	----	----
high NO point	4923	76.9	807.6	807.6	----	802.1	805.3	-3.2	1.007	----
NO/O3 point	4923	76.9	807.6	807.6	----	803.5	802.8	0.7	1.005	----
as found NH3	3415	85.3	1801.0	----	1801.0	1813.5	----	1803.1	0.993	0.999
new NH3 cyl rp							----			
first NH3	3415	85.3	1801.0	----	1801.0	1813.5	----	1803.1	0.993	0.999
second NH3	3453	47.4	1000.8	----	1000.8	1017.3	----	1011.3	0.984	0.990
third NH3	3476	23.7	500.4	----	500.4	520.9	----	517.6	0.961	0.967
								Average Correction Factor	1.0060	0.9851

Corrected As found TN = 795.7 ppb NO_X = 790.4 ppb NH3 = 1802.4 ppb

Previous Response TN = 816.4 ppb NO_X = 806.0 ppb NH3 = 1805.2 ppb

*Percent Change TN = -2.6%

*Percent Change NO_X = -2.0%

*Percent Change NH3 = -0.2%

* = > +/-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	-0.3	0.4	0.4	----	----
as found span	4923	76.9	807.6	799.5	807.6	790.1	782.9	796.1	1.0222	1.0211
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.4	0.3	0.6	----	----
high point	4923	76.9	807.6	799.5	807.6	805.3	796.2	802.1	1.0029	1.0041
second point	4962	38.5	404.3	400.2	404.3	406.1	400.1	405.0	0.9956	1.0004
third point	4981	19.2	201.6	199.6	201.6	206.4	200.9	205.1	0.9769	0.9935
								Average Correction Factor	0.9918	0.9993

Baseline Corr As fnd	TN =	795.7 ppb	NO_X =	790.4 ppb	NO =	782.5 ppb	*Percent Change TN = -2.6%
Previous Response	TN =	816.4 ppb	NO_X =	806.0 ppb	NO =	801.2 ppb	*Percent Change NO_X = -2.0%
							*Percent Change NO = -2.4%

* = > +/-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	-0.7	----	----
calibration zero	----	----	0.0	0.1	----	----
1st GPT point (400 ppb O3)	796.9	385.8	419.3	416.9	1.0056	99.4%
2nd GPT point (200 ppb O3)	796.9	592.6	212.5	213.5	0.9951	100.5%
3rd GPT point (100 ppb O3)	796.9	693.5	111.6	112.7	0.9898	101.0%
				Average Correction Factor	0.9968	100.3%

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

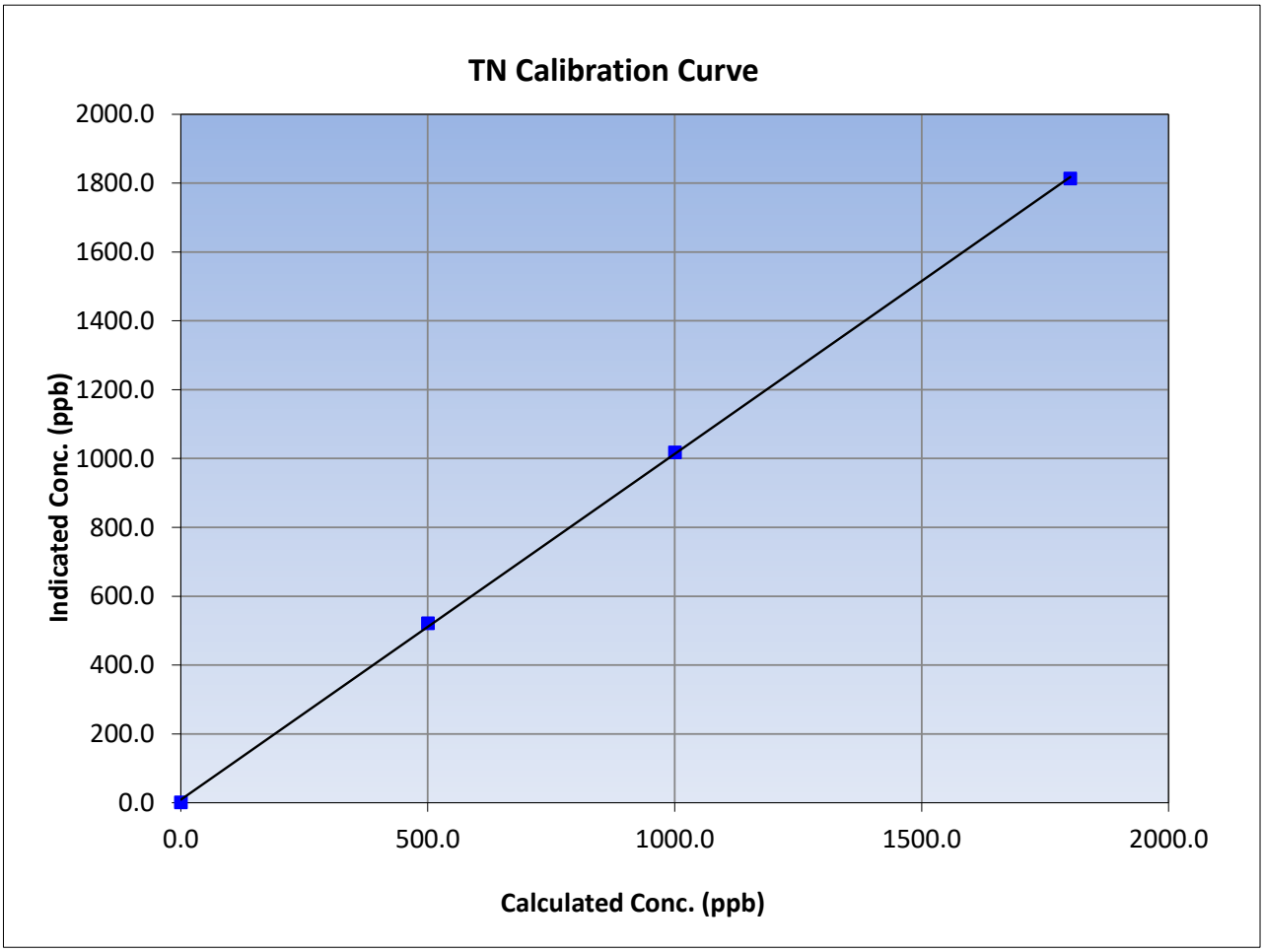
Version-11-2021

Station Information

Calibration Date:	February 7, 2023	Previous Calibration:	January 11, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:09	End Time (MST):	13:20
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	0.6	----	Correlation Coefficient	0.999896	≥0.995
1801.0	1813.5	0.9931			
1000.8	1017.3	0.9838	Slope	1.004451	0.90 - 1.10
500.4	520.9	0.9607			
			Intercept	8.831802	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

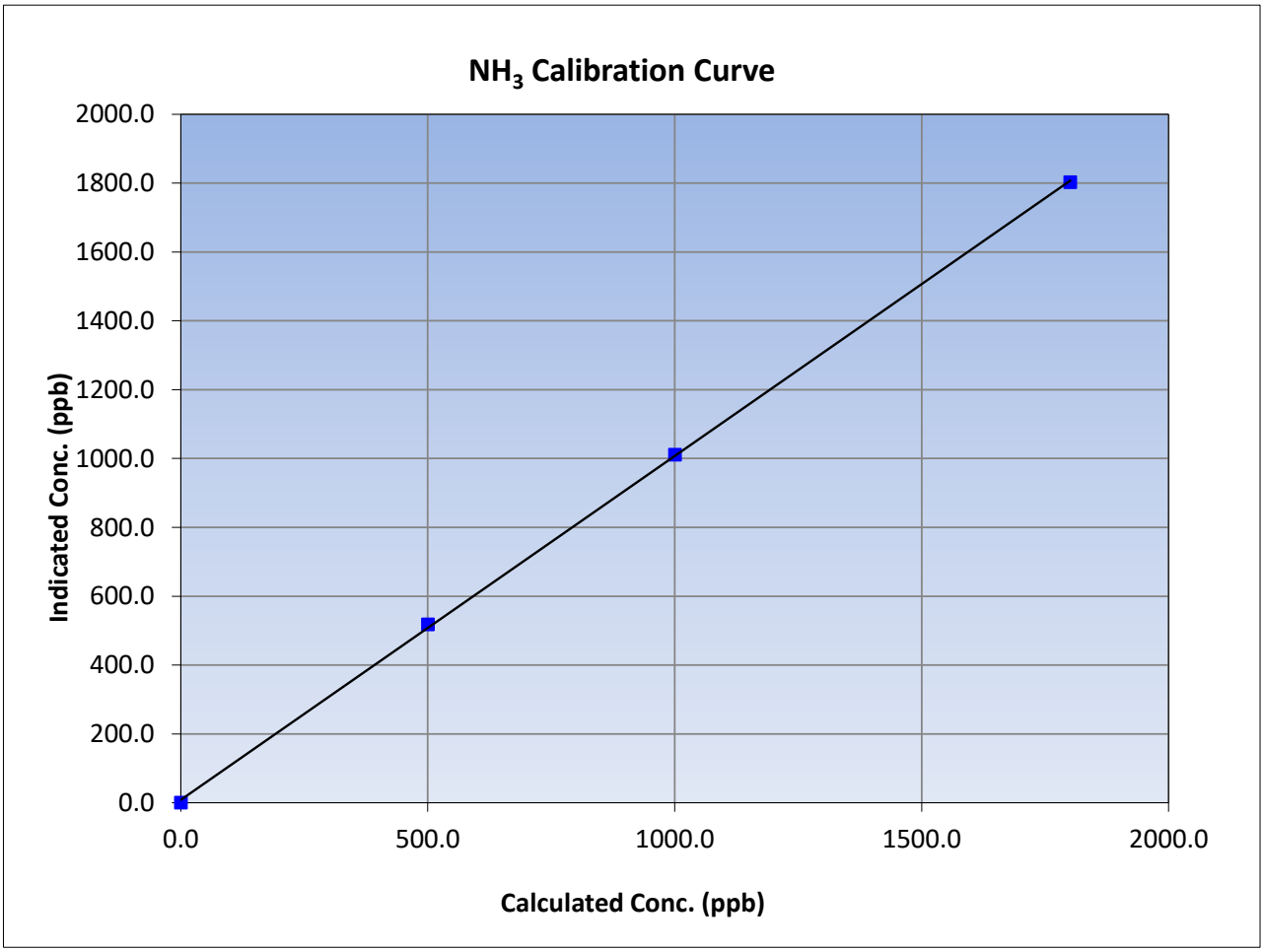
Version-11-2021

Station Information

Calibration Date:	February 7, 2023	Previous Calibration:	January 11, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:09	End Time (MST):	13:20
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	0.2	----	Correlation Coefficient	0.999896	≥0.995
1801.0	1803.1	0.9989			
1000.8	1011.3	0.9896	Slope	0.998917	0.90 - 1.10
500.4	517.6	0.9668			
			Intercept	8.375709	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

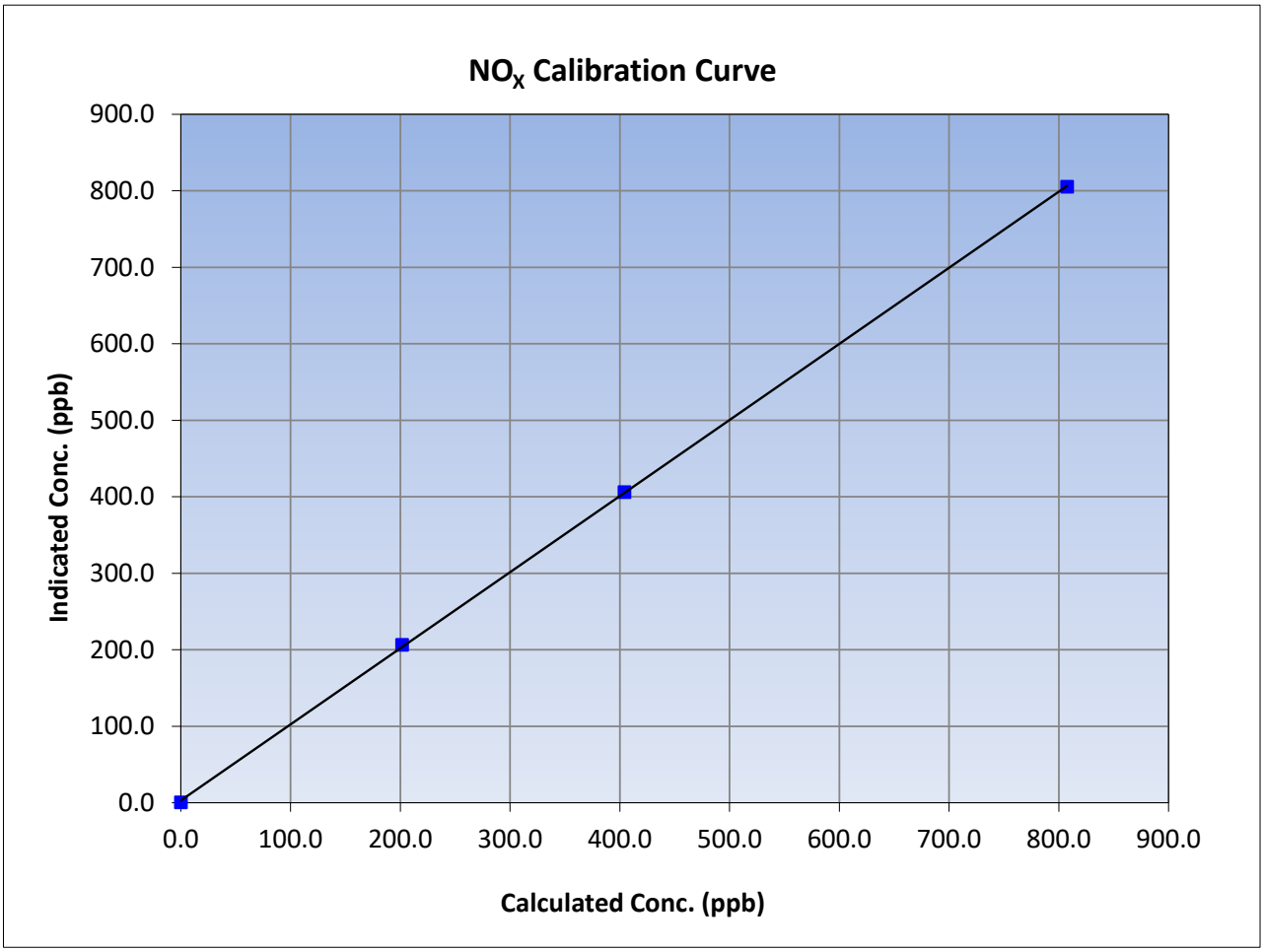
Version-11-2021

Station Information

Calibration Date:	February 7, 2023	Previous Calibration:	January 11, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:09	End Time (MST):	13:20
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	805.3	1.0029			
404.3	406.1	0.9956	Slope	0.994899	0.90 - 1.10
201.6	206.4	0.9769			
			Intercept	2.960281	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

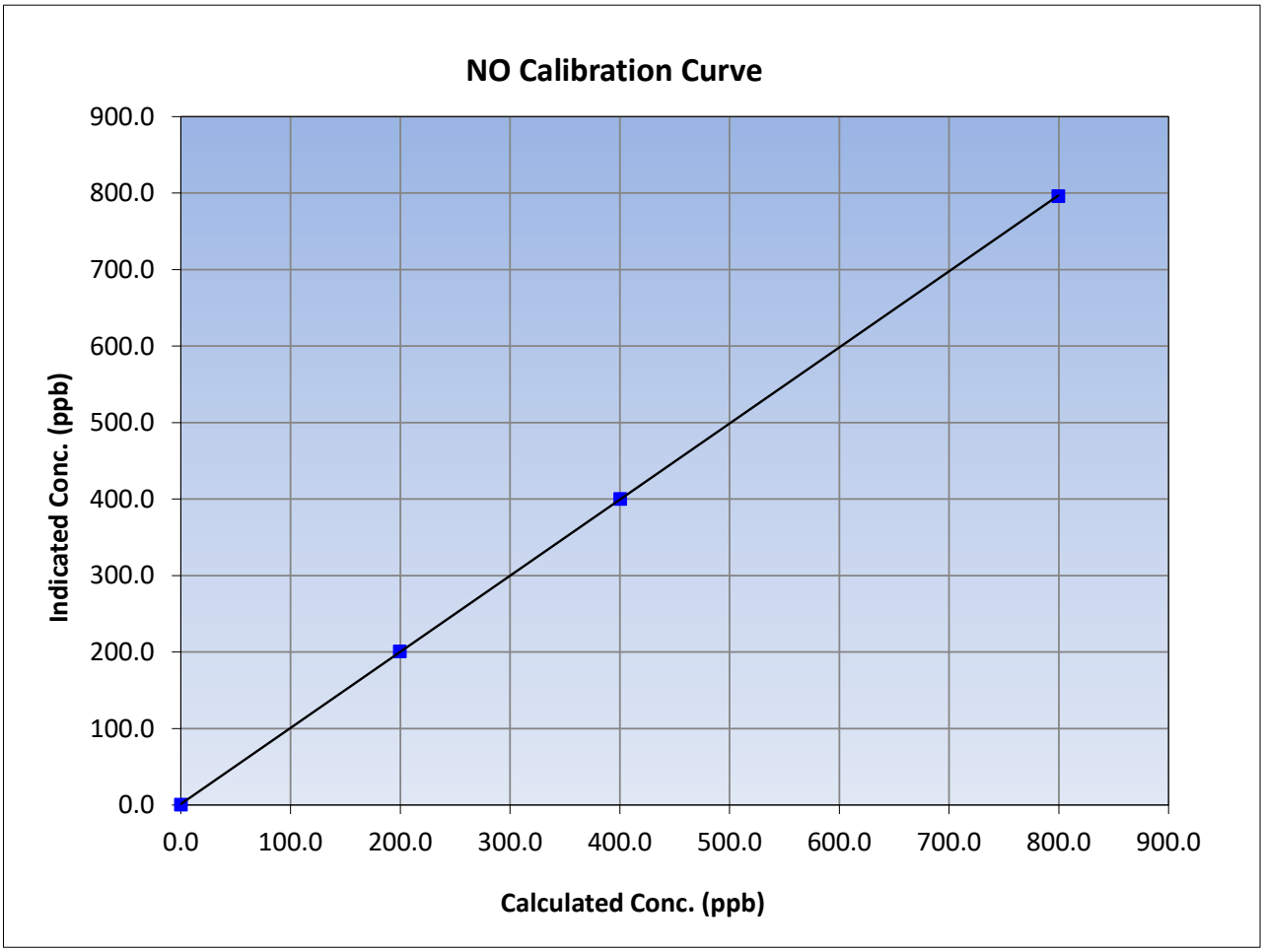
Version-11-2021

Station Information

Calibration Date:	February 7, 2023	Previous Calibration:	January 11, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:09	End Time (MST):	13:20
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	0.3	----	Correlation Coefficient	0.999992	≥0.995
799.5	796.2	1.0041			
400.2	400.1	1.0004	Slope	0.994939	0.90 - 1.10
199.6	200.9	0.9935			
			Intercept	1.319966	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

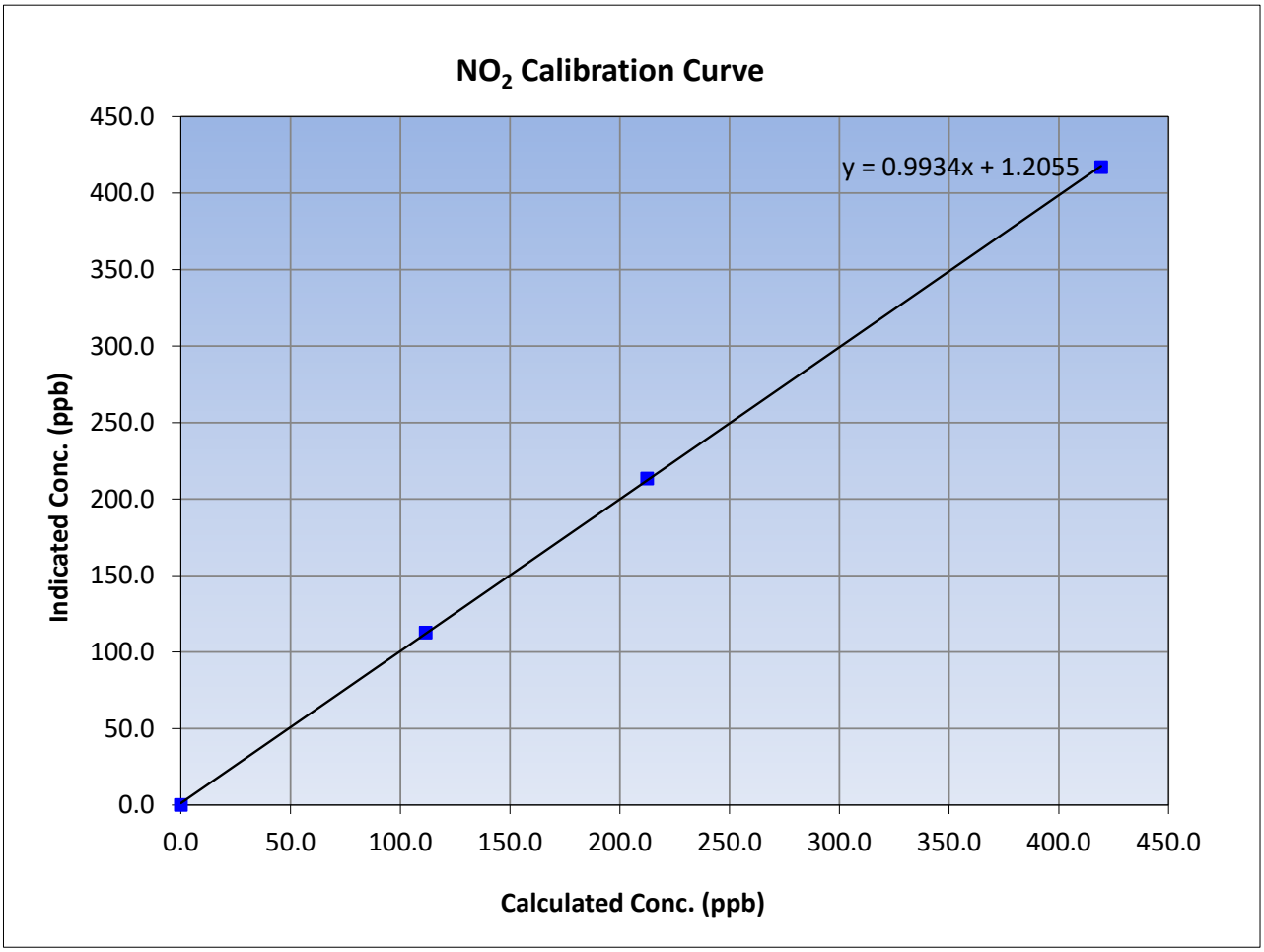
Version-11-2021

Station Information

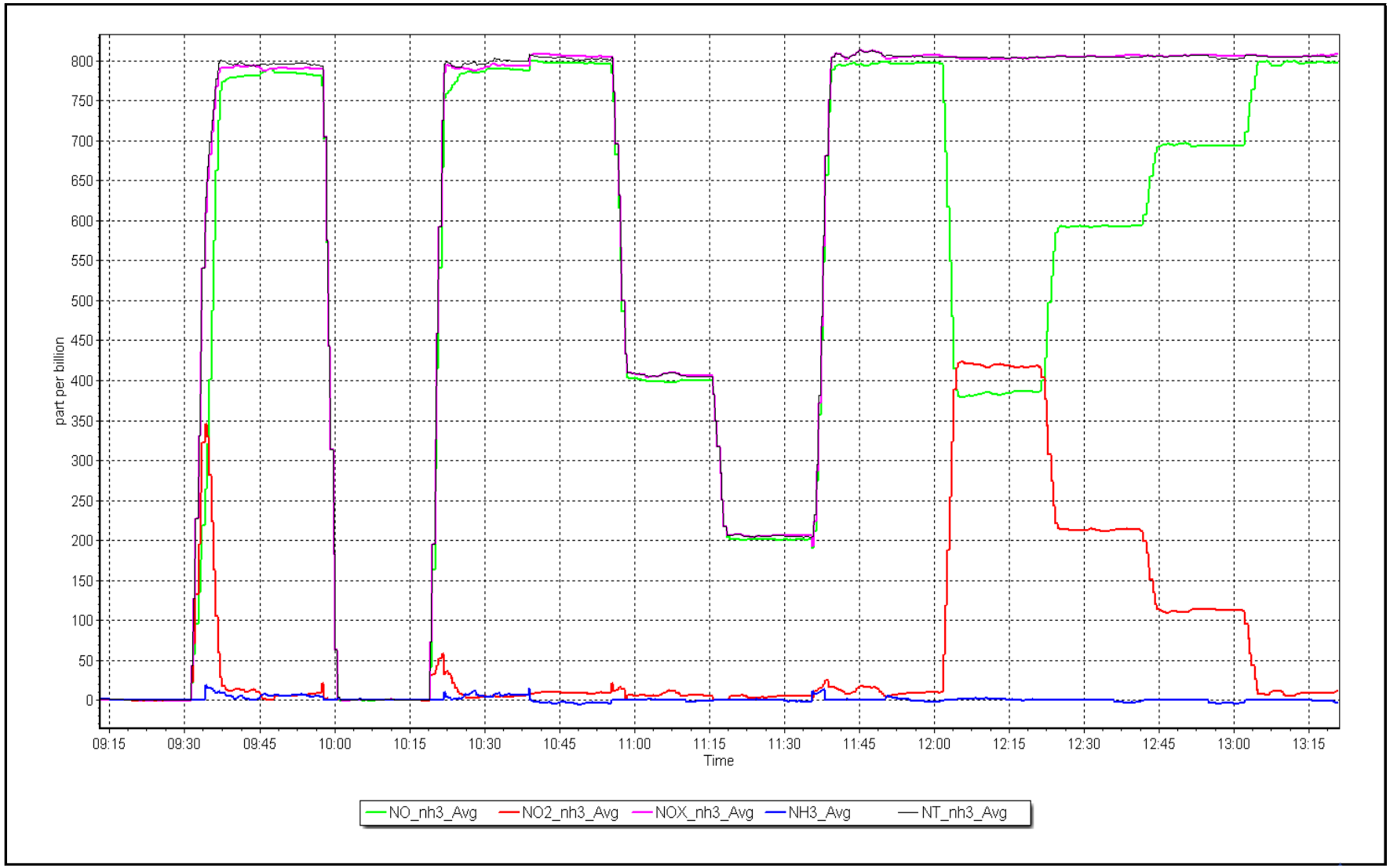
Calibration Date:	February 7, 2023	Previous Calibration:	January 11, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:09	End Time (MST):	13:20
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

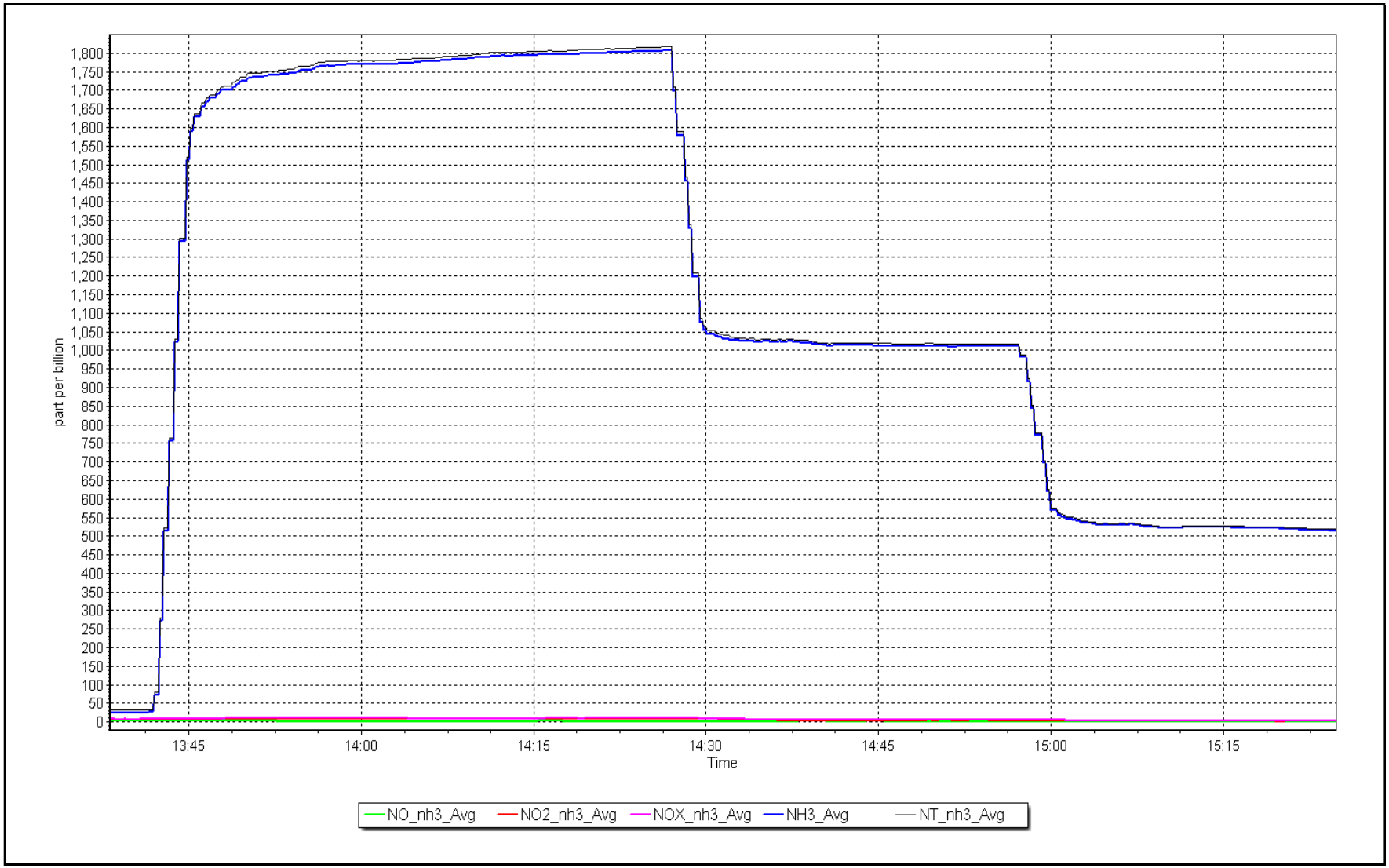
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999959	≥0.995
419.3	416.9	1.0056			
212.5	213.5	0.9951	Slope	0.993439	0.90 - 1.10
111.6	112.7	0.9898			
			Intercept	1.205483	+/-20



NO_X Calibration Plot Date: February 7, 2023 Location: Patricia McInnes



NH_3 Calibration Plot Date: February 7, 2023 Location: Patricia McInnes



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS07
ATHABASCA VALLEY
FEBRUARY 2023

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

March 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	February 1, 2023	Last Cal Date:	January 16, 2023
Start time (MST):	7:20	End time (MST):	10:22
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:	0.997038	0.998179	Backgd or Offset:	2.70	2.71
Calibration intercept:	1.683589	1.983813	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	802.5	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4921	79.3	801.2	800.3	1.001
second point	4960	39.6	400.2	403.9	0.991
third point	4980	19.8	200.1	202.4	0.988
as left zero	5000	0.0	0.0	0.1	----
as left span	4921	79.2	800.2	801.8	0.998
				Average Correction Factor	0.993

Baseline Corr As found:	802.60	Previous response	800.51	*% change	0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments or maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

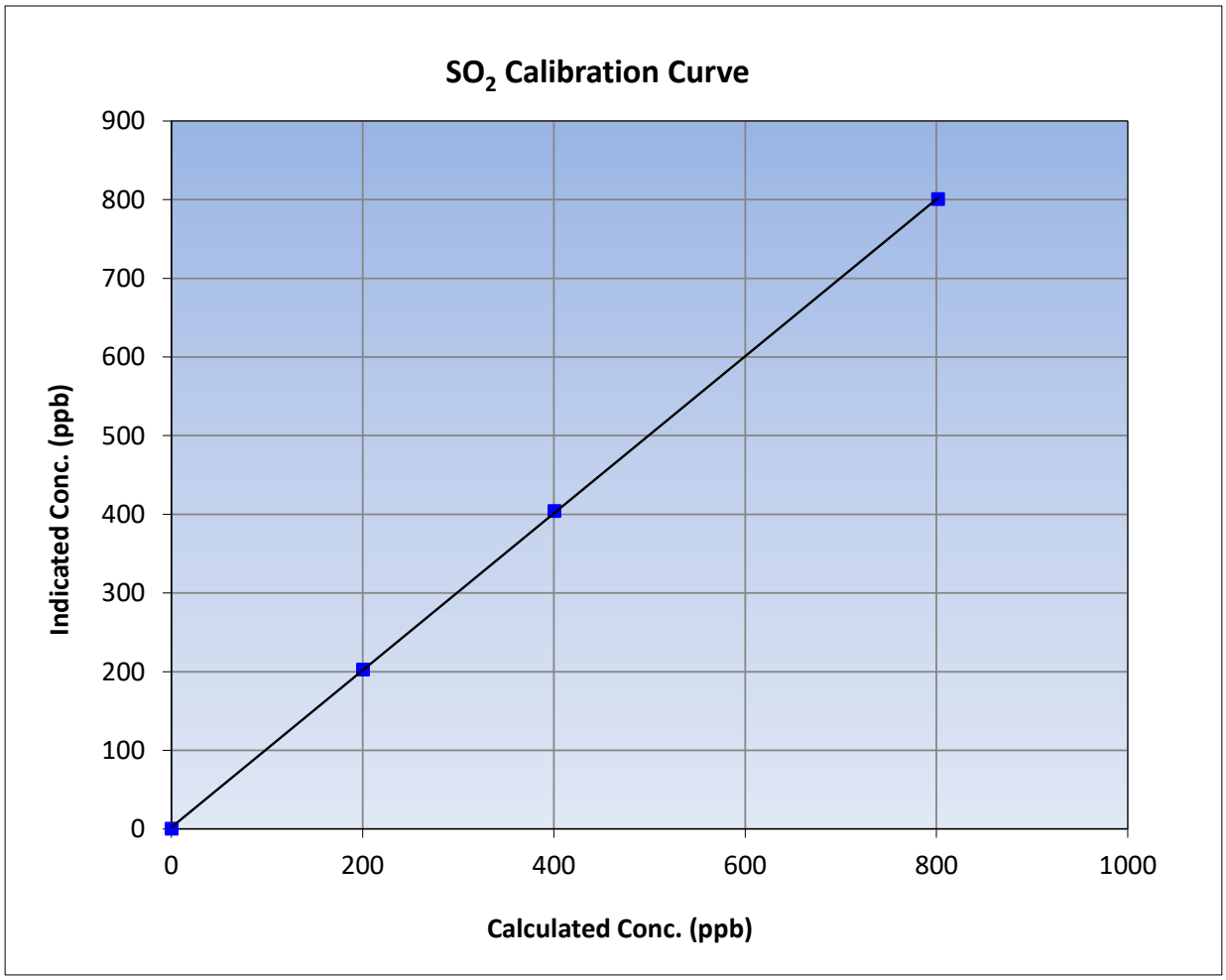
Station Information

Calibration Date:	February 1, 2023	Previous Calibration:	January 16, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:20	End Time (MST):	10:22
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1507864683

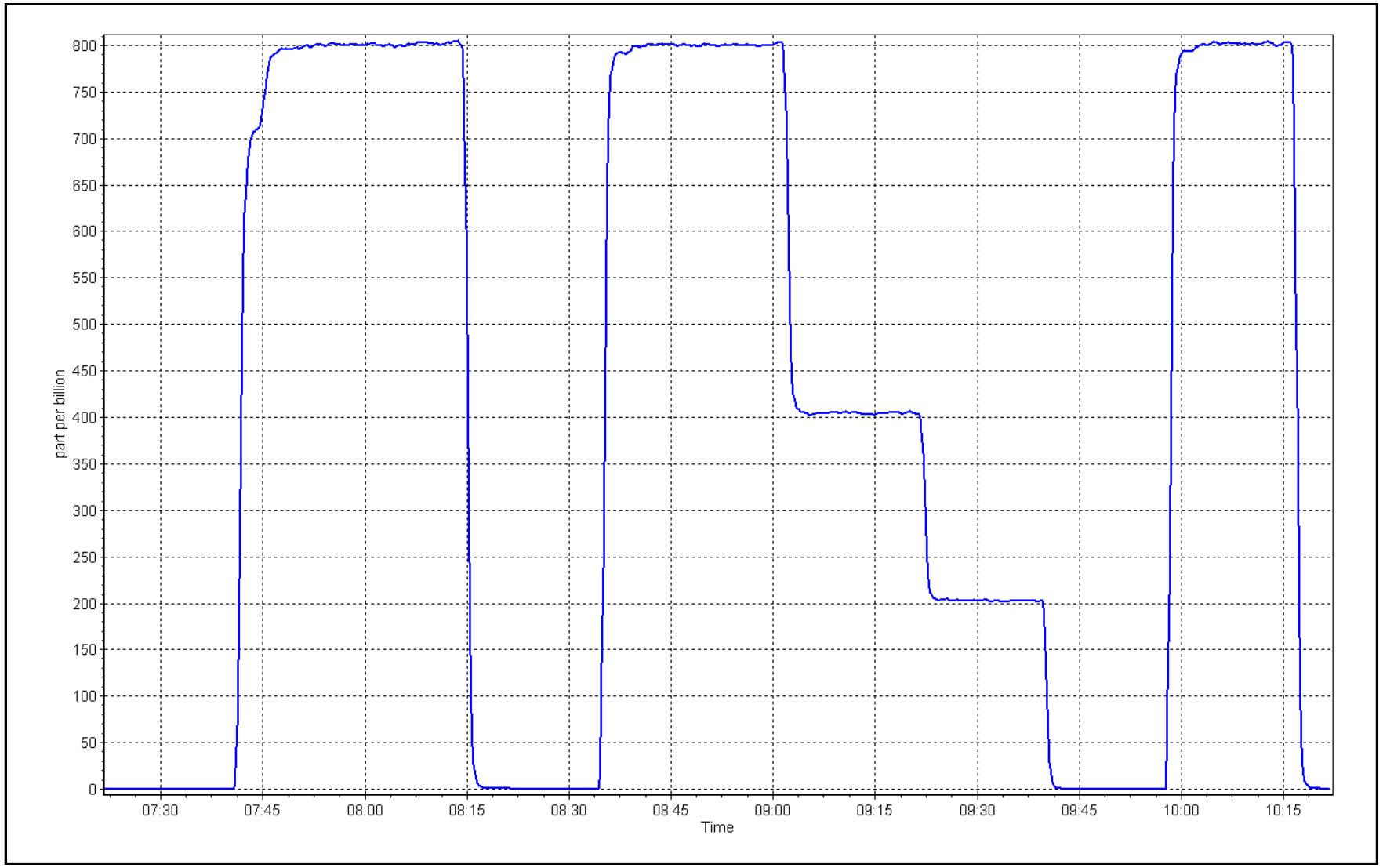
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
801.2	800.3	1.0011
400.2	403.9	0.9907
200.1	202.4	0.9885

Statistical Evaluation		Limits
Correlation Coefficient	0.999966	≥0.995
Slope	0.998179	0.90 - 1.10
Intercept	1.983813	+/-30



SO2 Calibration Plot Date: February 1, 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:	February 6, 2023	Last Cal Date:	January 17, 2023
Start time (MST):	8:15	End time (MST):	14:20
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:	0.987815	0.988807	Backgd or Offset:	2.18	2.33
Calibration intercept:	0.181600	0.421592	Coeff or Slope:	0.834	0.886

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	78.6	1.026
as found 2nd point	4959	40.8	40.3	39.2	1.028
as found 3rd point	4980	20.4	20.2	19.4	1.039
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.5	----
high point	4918	81.6	80.6	80.2	1.005
second point	4959	40.8	40.3	40.2	1.003
third point	4980	20.4	20.2	20.3	0.993
as left zero	5000	0.0	0.0	0.4	----
as left span	4918	81.6	80.6	79.5	1.014
SO2 Scrubber Check	4921	79.2	800.2	-0.4	----
Date of last scrubber change:		25-Feb-22		Ave Corr Factor	1.000
Date of last converter efficiency test:		April 22, 2022		98.5%	efficiency

Baseline Corr As found:	78.6	Prev response:	79.83	*% change:	-1.6%
Baseline Corr 2nd AF pt:	39.2	AF Slope:	0.975767	AF Intercept:	-0.118432
Baseline Corr 3rd AF pt:	19.4	AF Correlation:	0.999989		

* = > +/-5% change initiates investigation

Notes: Sox scrubber failed and Beads replaced. Sox scrubber hydrated for 20mins. Sox scrubber passed after replacing beads. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

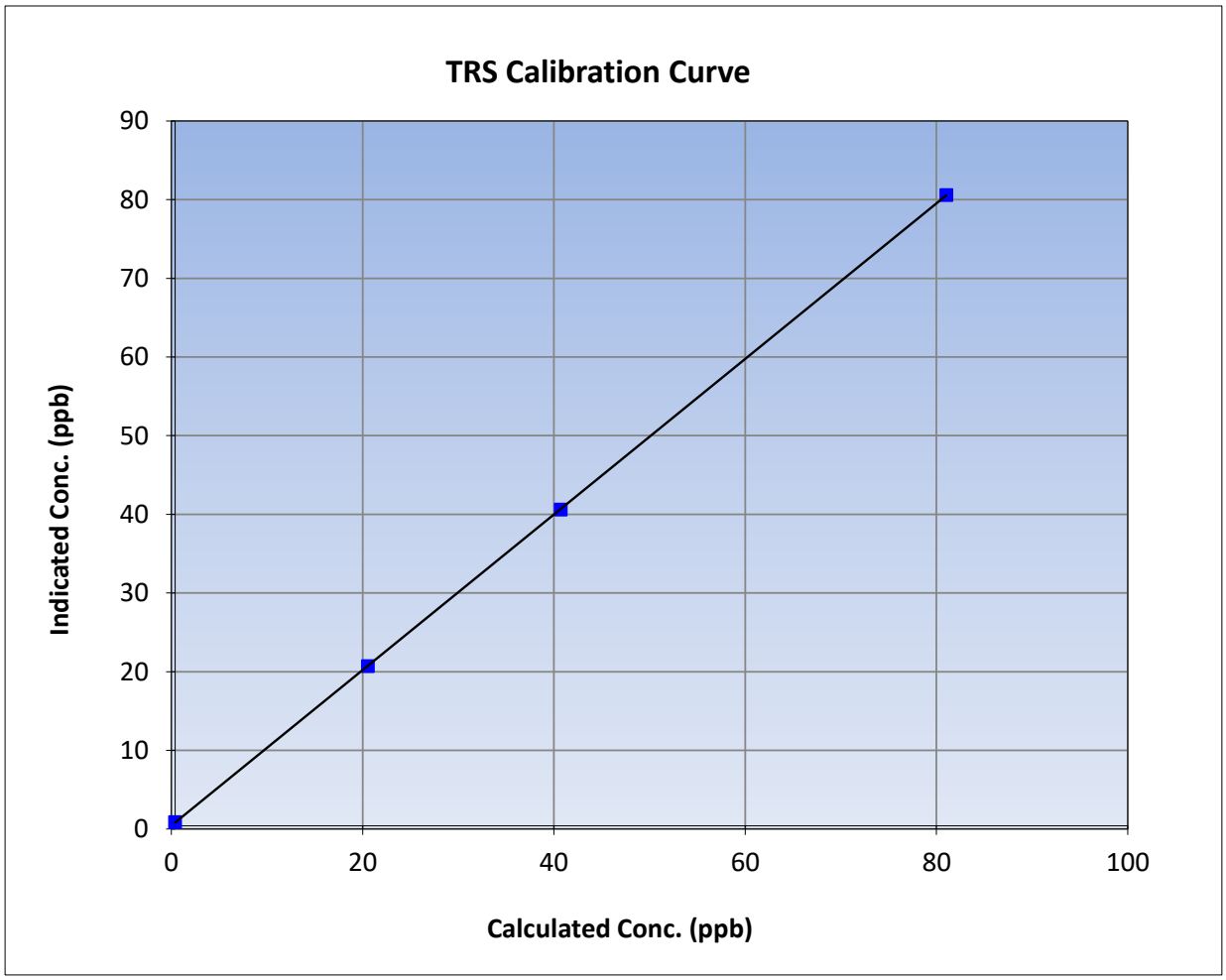
Station Information

Calibration Date:	February 6, 2023	Previous Calibration:	January 17, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	8:15	End Time (MST):	14:20
Analyzer make:	CDN-101	Analyzer serial #:	551

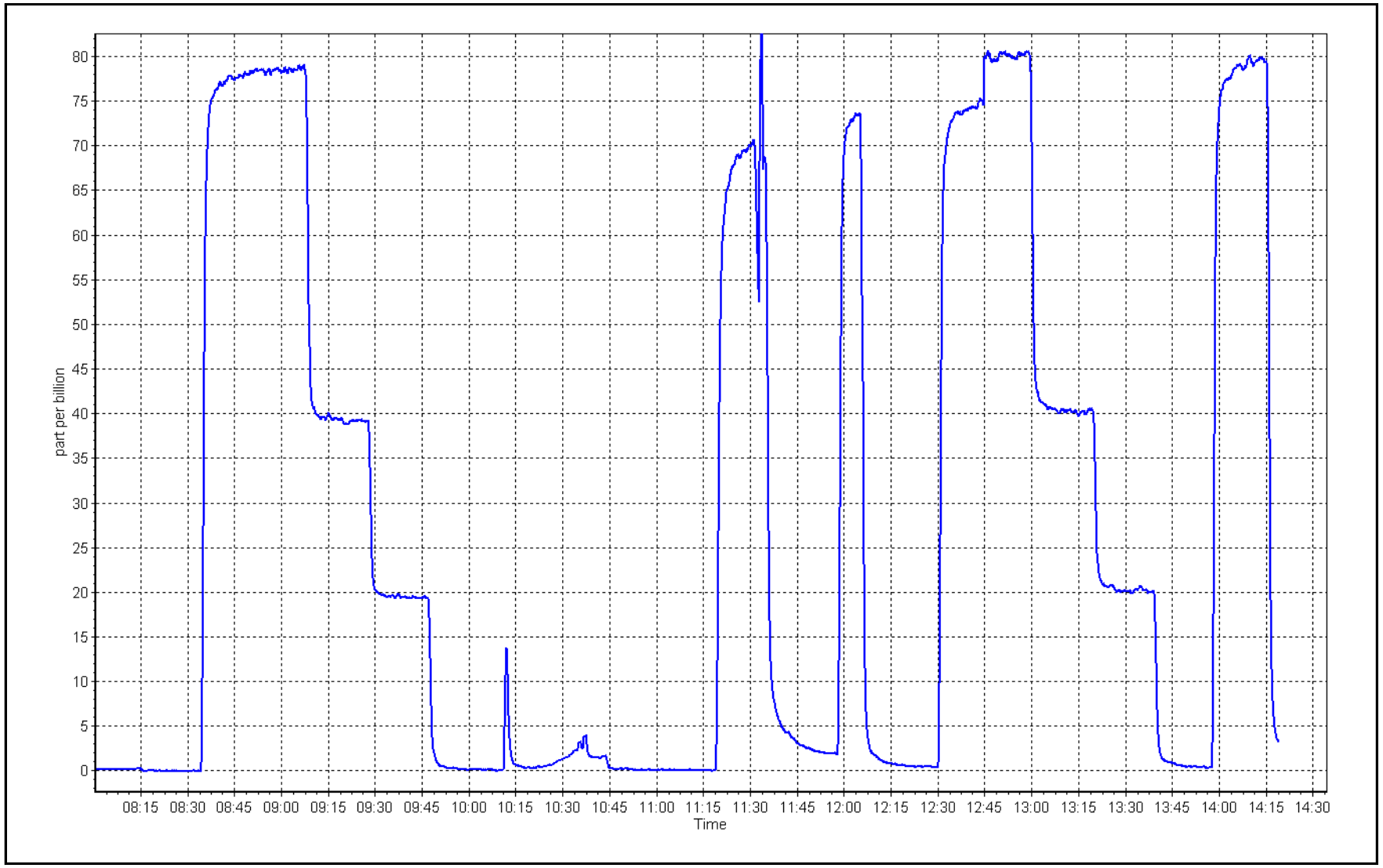
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
80.6	80.2	1.0053
40.3	40.2	1.0028
20.2	20.3	0.9928

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	0.988807	*0.90 - 1.10*
Intercept	0.421592	*+/-3*



TRS Calibration Plot Date: February 6, 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:	February 1, 2023	Last Cal Date:	January 16, 2023
Start time (MST):	7:20	End time (MST):	10:21
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	17.08	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.3	17.05	17.15	0.994
second point	4960	39.6	8.52	8.58	0.993
third point	4980	19.8	4.26	4.33	0.983
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	17.14	0.994
				Average Correction Factor	0.990

Baseline Corr AF:	17.08	Prev response	16.97	*% 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	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	9.15	0.995
second point	4960	39.6	4.55	4.59	0.990
third point	4980	19.8	2.27	2.32	0.980
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	9.09	9.15	0.994
				Average Correction Factor	0.988
Baseline Corr AF:	9.14	Prev response	9.04	*% change	1.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.3	7.95	7.94	1.001
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	8.00	0.994
second point	4960	39.6	3.97	3.99	0.995
third point	4980	19.8	1.98	2.00	0.992
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.94	8.00	0.992
				Average Correction Factor	0.994
Baseline Corr AF:	7.94	Prev response	7.94	*% 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:	0.994820	1.004980
THC Cal Offset:	0.009674	0.021918
CH4 Cal Slope:	0.998255	1.006293
CH4 Cal Offset:	0.002012	-0.000176
NMHC Cal Slope:	0.992058	1.004211
NMHC Cal Offset:	0.007463	0.018094

Notes: Hydrogen and Nitrogen Changed. No adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

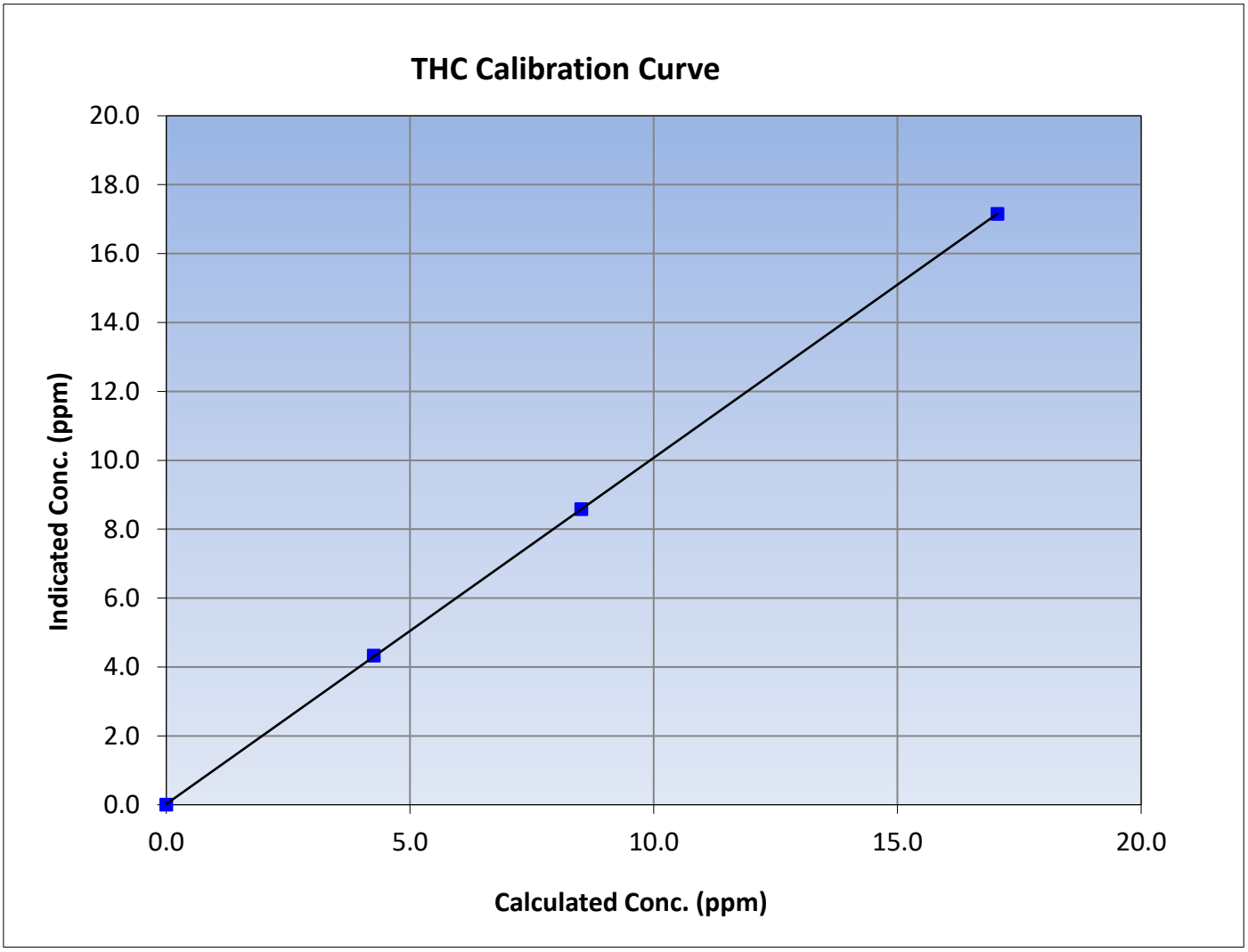
Version-01-2020

Station Information

Calibration Date:	February 1, 2023	Previous Calibration:	January 16, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:20	End Time (MST):	10:21
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	0.999991	*≥0.995*
17.05	17.15	0.9942			
8.52	8.58	0.9925	Slope	1.004980	*0.90 - 1.10*
4.26	4.33	0.9833			
			Intercept	0.021918	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

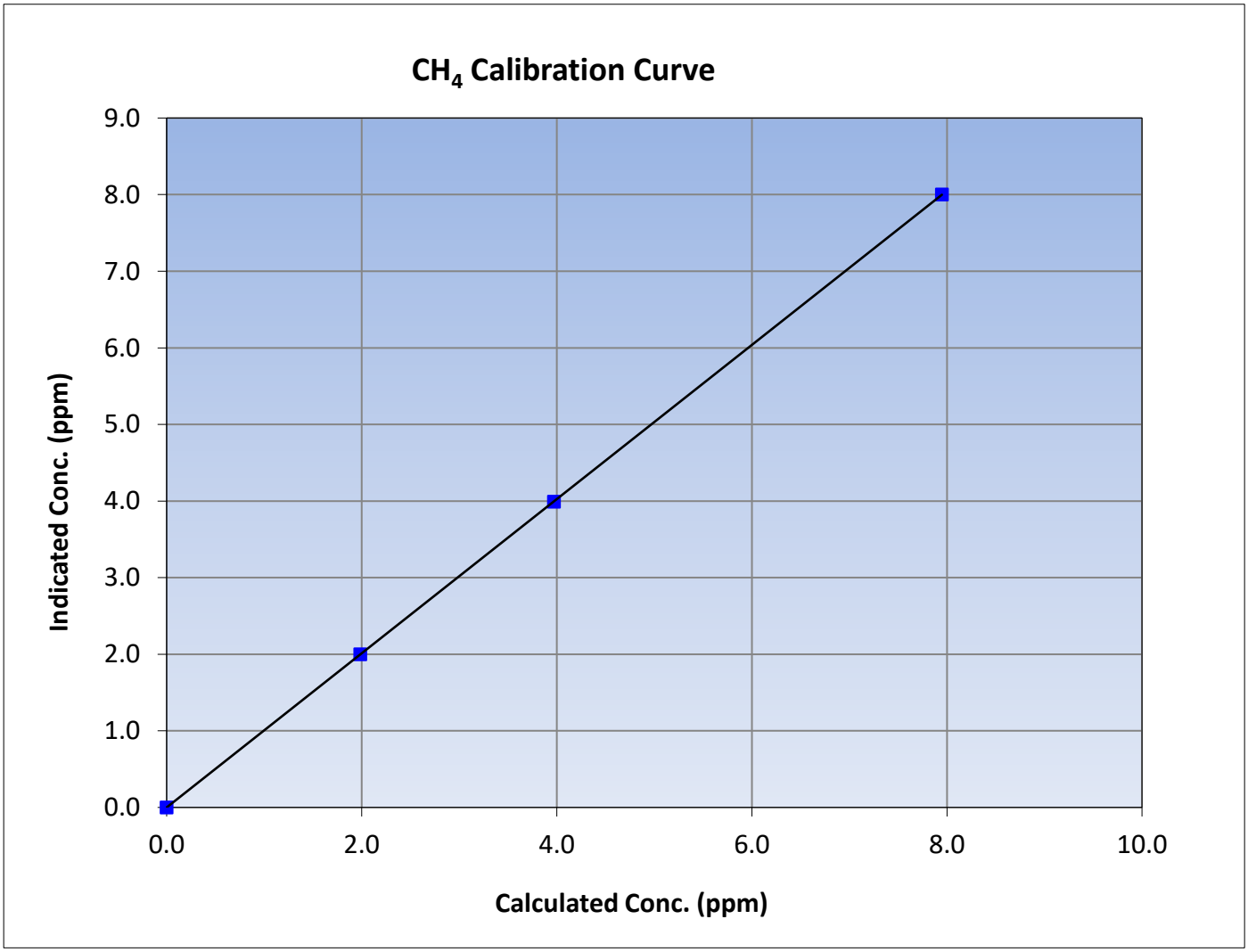
Version-01-2020

Station Information

Calibration Date:	February 1, 2023	Previous Calibration:	January 16, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:20	End Time (MST):	10:21
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	0.999999	*≥0.995*
7.95	8.00	0.9936			
3.97	3.99	0.9949	Slope	1.006293	*0.90 - 1.10*
1.98	2.00	0.9924			
			Intercept	-0.000176	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

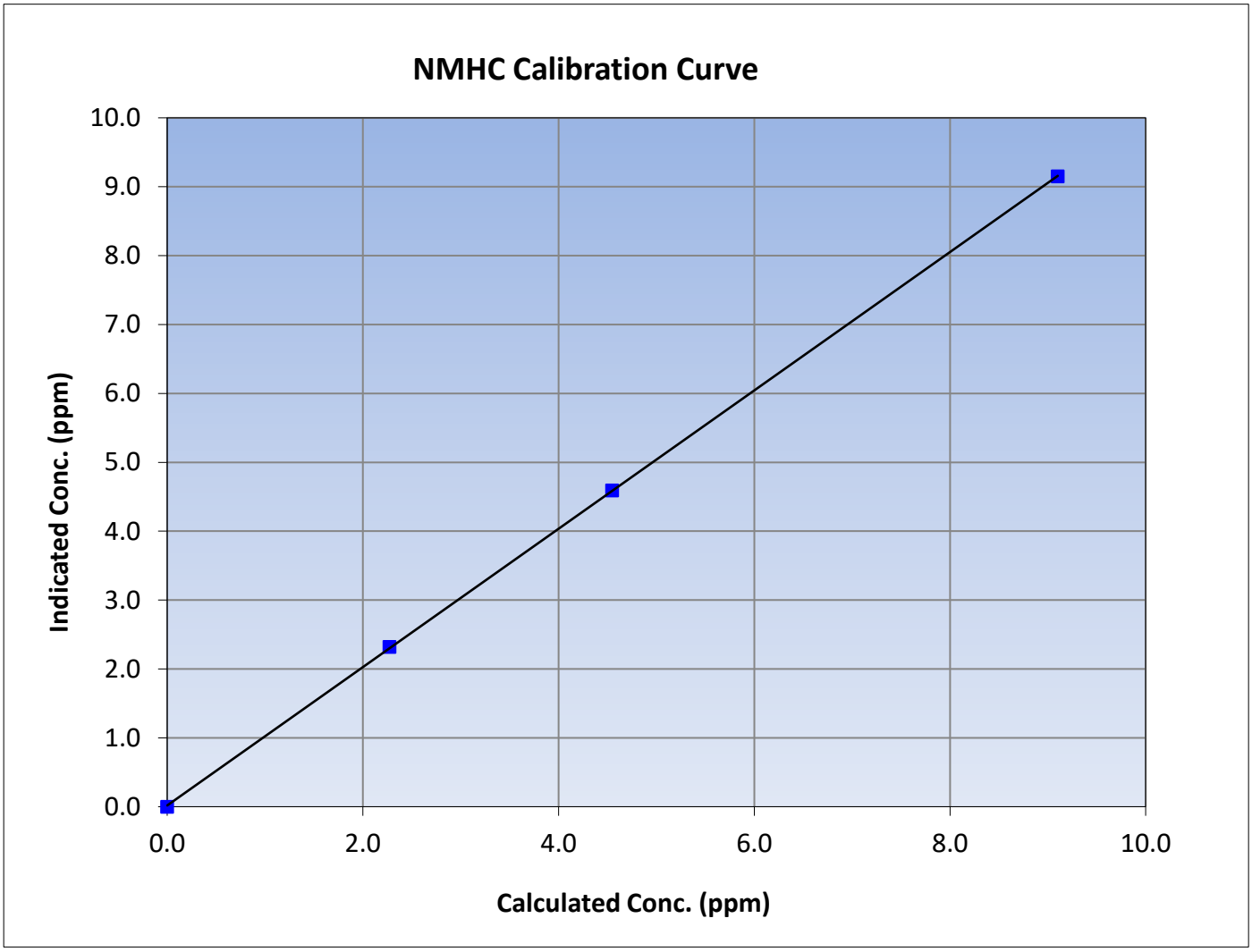
Version-01-2020

Station Information

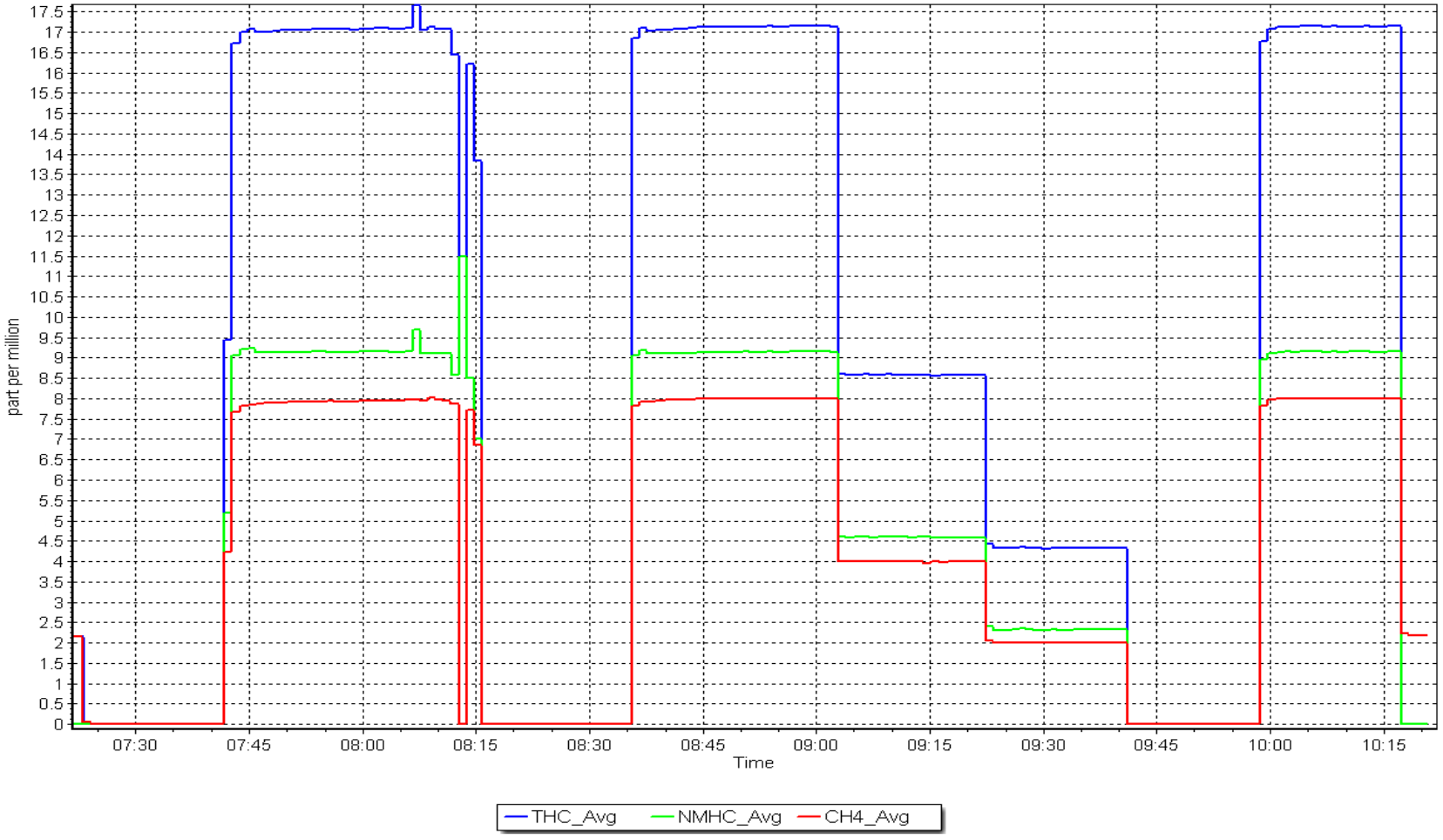
Calibration Date:	February 1, 2023	Previous Calibration:	January 16, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:20	End Time (MST):	10:21
Analyzer make:	Thermo 55i	Analyzer serial #:	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999982	≥0.995
9.10	9.15	0.9947			
4.55	4.59	0.9904	Slope	1.004211	0.90 - 1.10
2.27	2.32	0.9797			
			Intercept	0.018094	+/-0.5



NMHC Calibration Plot Date: February 1, 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:	February 7, 2023	Last Cal Date:	January 19, 2023
Start time (MST):	7:22	End time (MST):	11:41
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:	197.9	197.9

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.991445	0.991039
NO_X Cal Offset:	1.137226	1.157178
NO Cal Slope:	0.991156	0.991042
NO Cal Offset:	0.993235	0.933204
NO_2 Cal Slope:	1.002806	1.000742
NO_2 Cal Offset:	0.326300	0.457636

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
as found span	4920	80.2	816.7	800.7	16.0	808.6	791.4	17.1	1.0100	1.0117
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.2	----	----
high point	4920	80.2	816.7	800.7	16.0	809.8	793.6	16.2	1.0086	1.0089
second point	4960	40.1	408.4	400.4	8.0	407.2	399.3	7.9	1.0029	1.0026
third point	4980	20.0	203.7	199.7	4.0	203.4	199.0	4.4	1.0014	1.0034
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as left span	4920	80.2	816.7	399.5	417.2	811.5	390.9	420.6	1.0064	1.0220
								Average Correction Factor	1.0043	1.0050

Corrected As found	NO_X = 808.6 ppb	NO = 791.5 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.3%
Previous Response	NO_X = 810.9 ppb	NO = 794.6 ppb		*Percent Change	NO =	-0.4%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	791.9	390.7	417.2	417.7	0.9989	100.1%
2nd GPT point (200 ppb O3)	791.9	595.5	212.4	213.7	0.9941	100.6%
3rd GPT point (100 ppb O3)	791.9	694.2	113.7	114.2	0.9960	100.4%
				Average Correction Factor	0.9963	100.4%

Notes: No maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

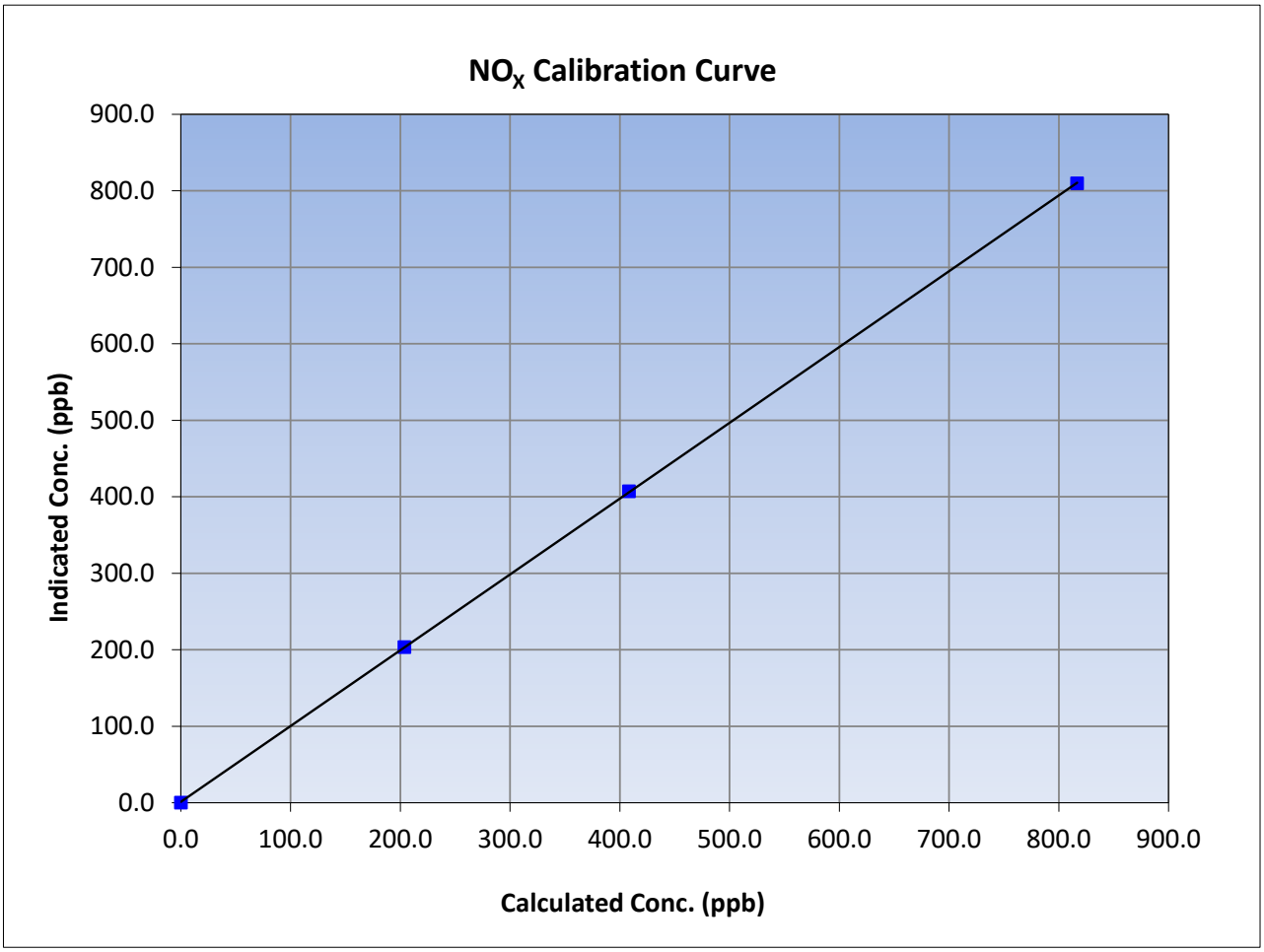
Version-04-2020

Station Information

Calibration Date:	February 7, 2023	Previous Calibration:	January 19, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:22	End Time (MST):	11:41
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	0.999990	*≥0.995*
816.7	809.8	1.0086			
408.4	407.2	1.0029	Slope	0.991039	*0.90 - 1.10*
203.7	203.4	1.0014			
			Intercept	1.157178	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

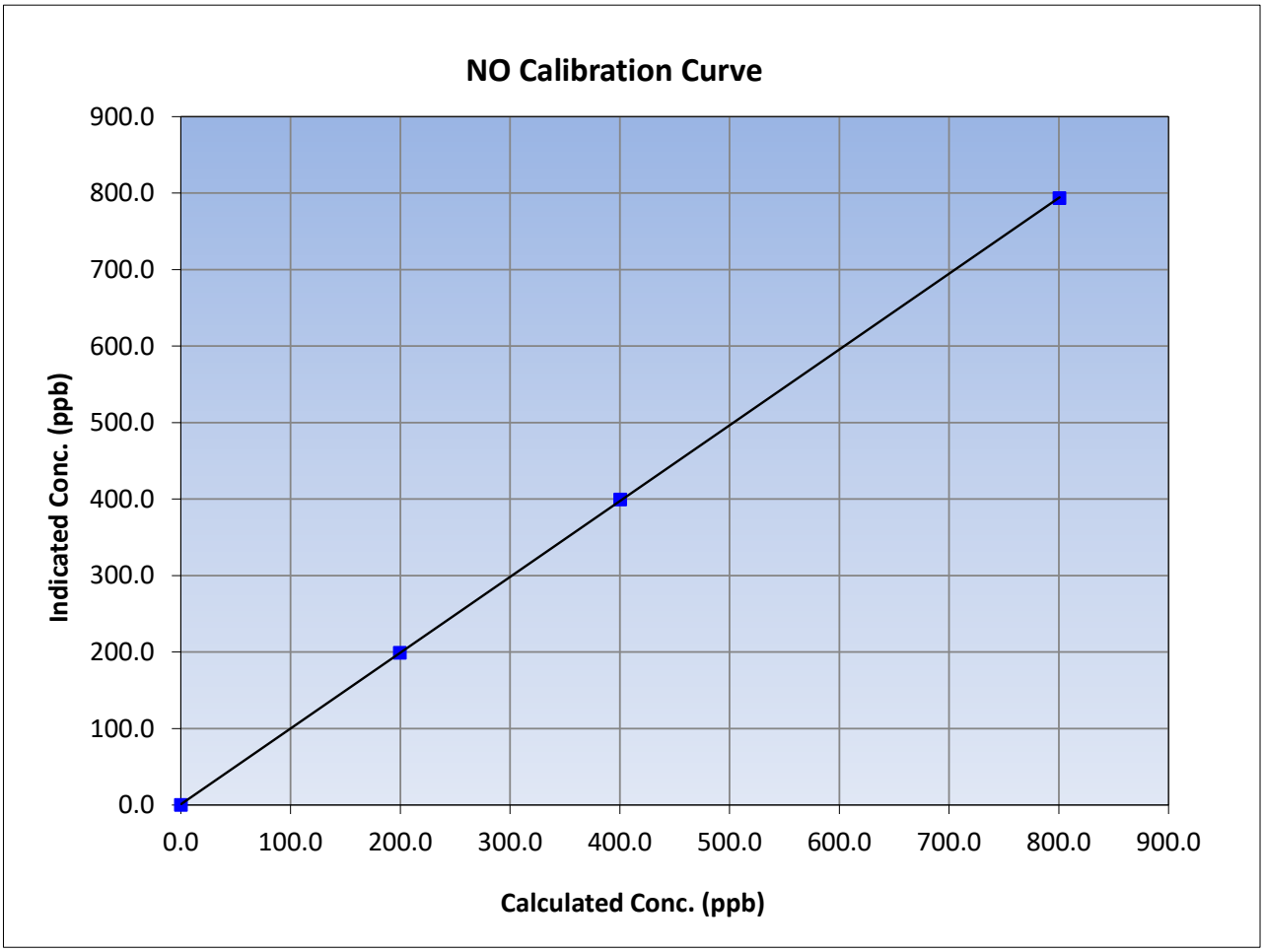
Version-04-2020

Station Information

Calibration Date:	February 7, 2023	Previous Calibration:	January 19, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:22	End Time (MST):	11:41
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999988	*≥0.995*
800.7	793.6	1.0089			
400.4	399.3	1.0026	Slope	0.991042	*0.90 - 1.10*
199.7	199.0	1.0034			
			Intercept	0.933204	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

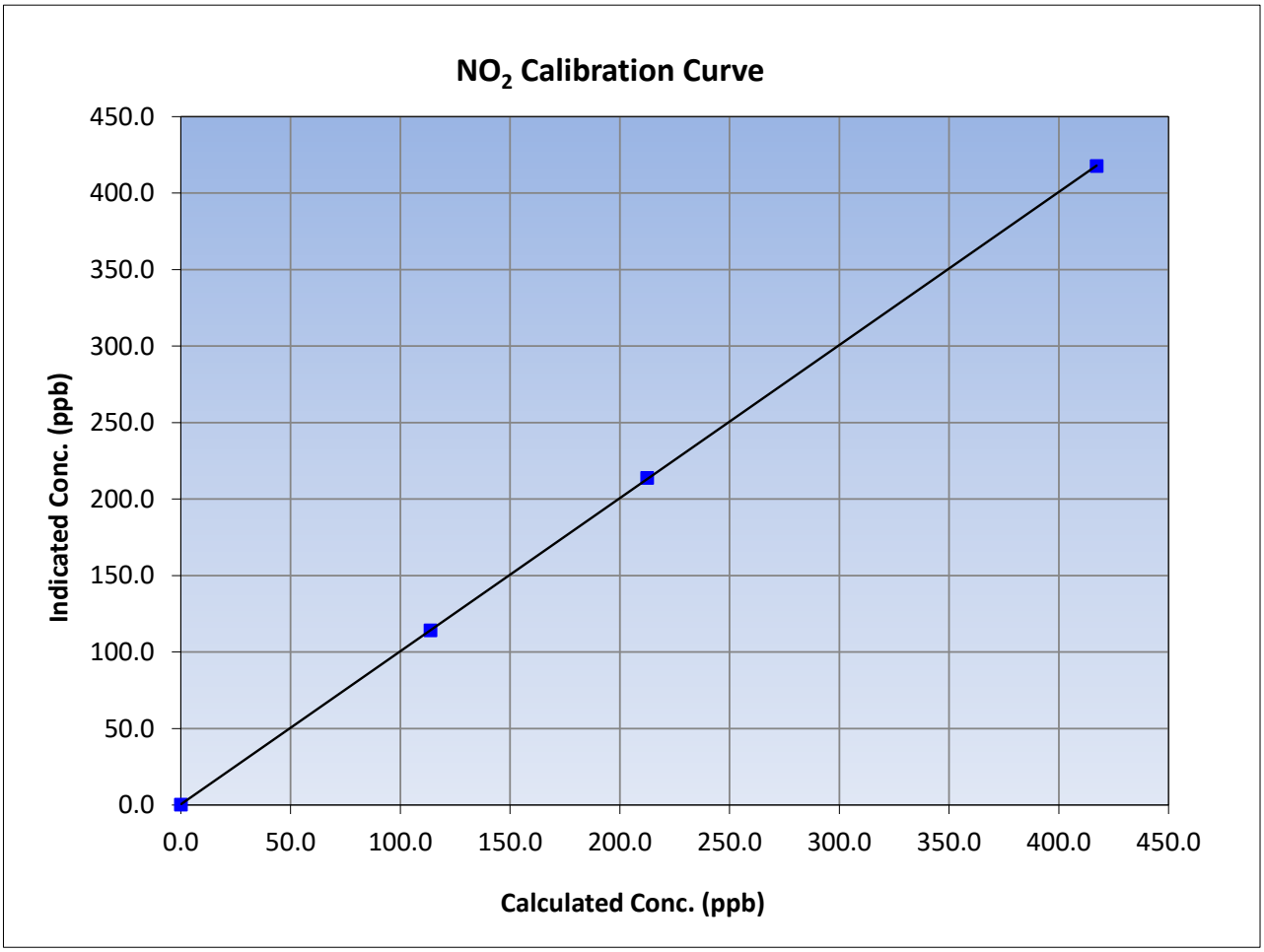
Version-04-2020

Station Information

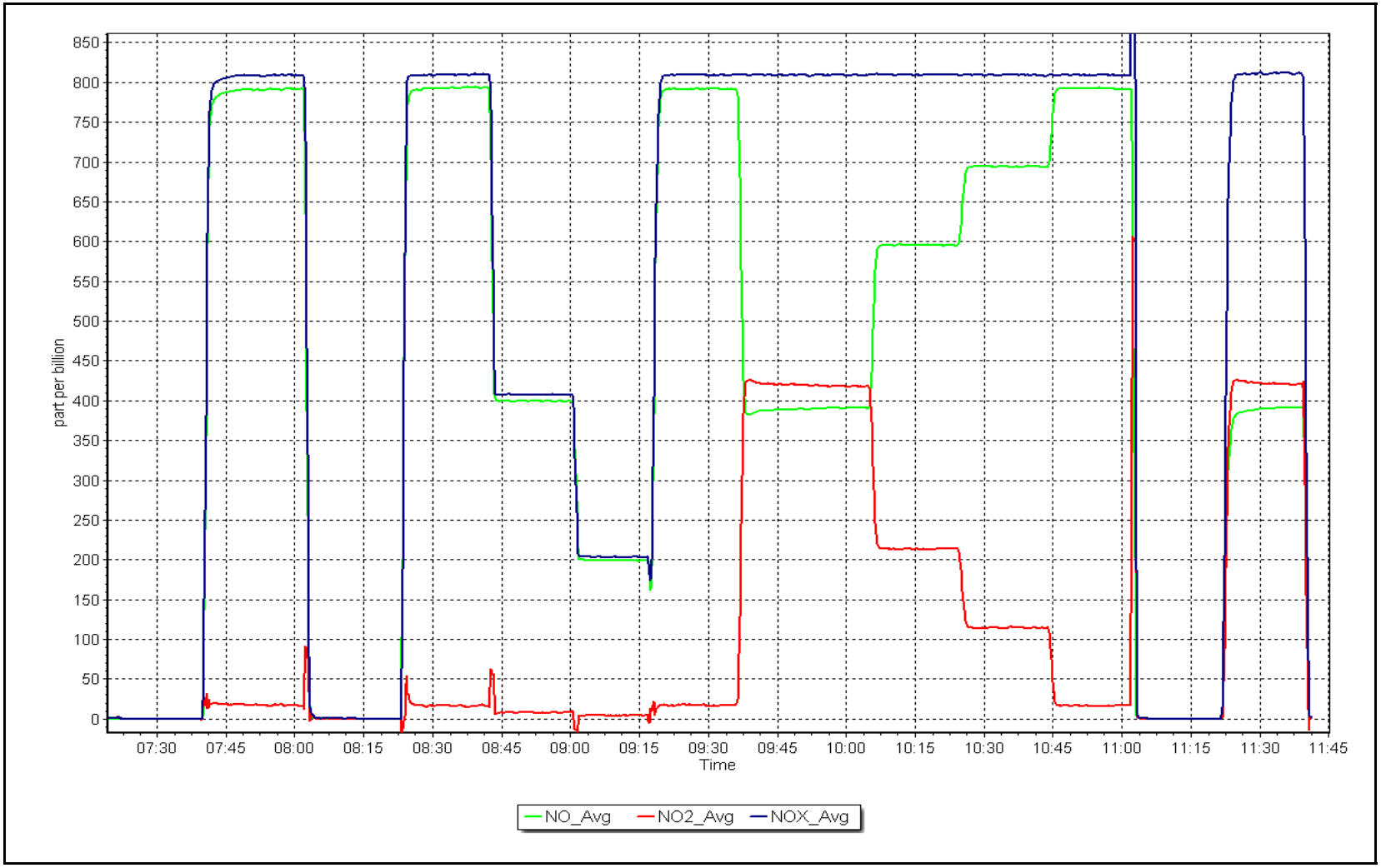
Calibration Date:	February 7, 2023	Previous Calibration:	January 19, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:22	End Time (MST):	11:41
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.2	----	Correlation Coefficient	0.999994	*≥0.995*
417.2	417.7	0.9989			
212.4	213.7	0.9941	Slope	1.000742	*0.90 - 1.10*
113.7	114.2	0.9960			
			Intercept	0.457636	*+/-20*



NO_X Calibration Plot Date: February 7, 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:	February 8, 2023	Last Cal Date:	January 20, 2023
Start time (MST):	7:45	End time (MST):	10:52
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 49i	Analyzer serial #:	1507964700
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.995429	0.995429	Backgd or Offset:	-0.6	-0.6
Calibration intercept:	1.500000	1.600000	Coeff or Slope:	1.102	1.119

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	1378.0	400.0	397.5	1.006
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.4	----
high point	5000	1378.4	400.0	399.1	1.002
second point	5000	1022.6	200.0	201.5	0.993
third point	5000	844.7	100.0	102.2	0.978
as left zero	5000	0.0	0.0	0.4	----
as left span	5000	1374.5	400.0	392.6	1.019
				Average Correction Factor	0.991

Baseline Corr As found:	397.8	Previous response	399.7	*% change	-0.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No Maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

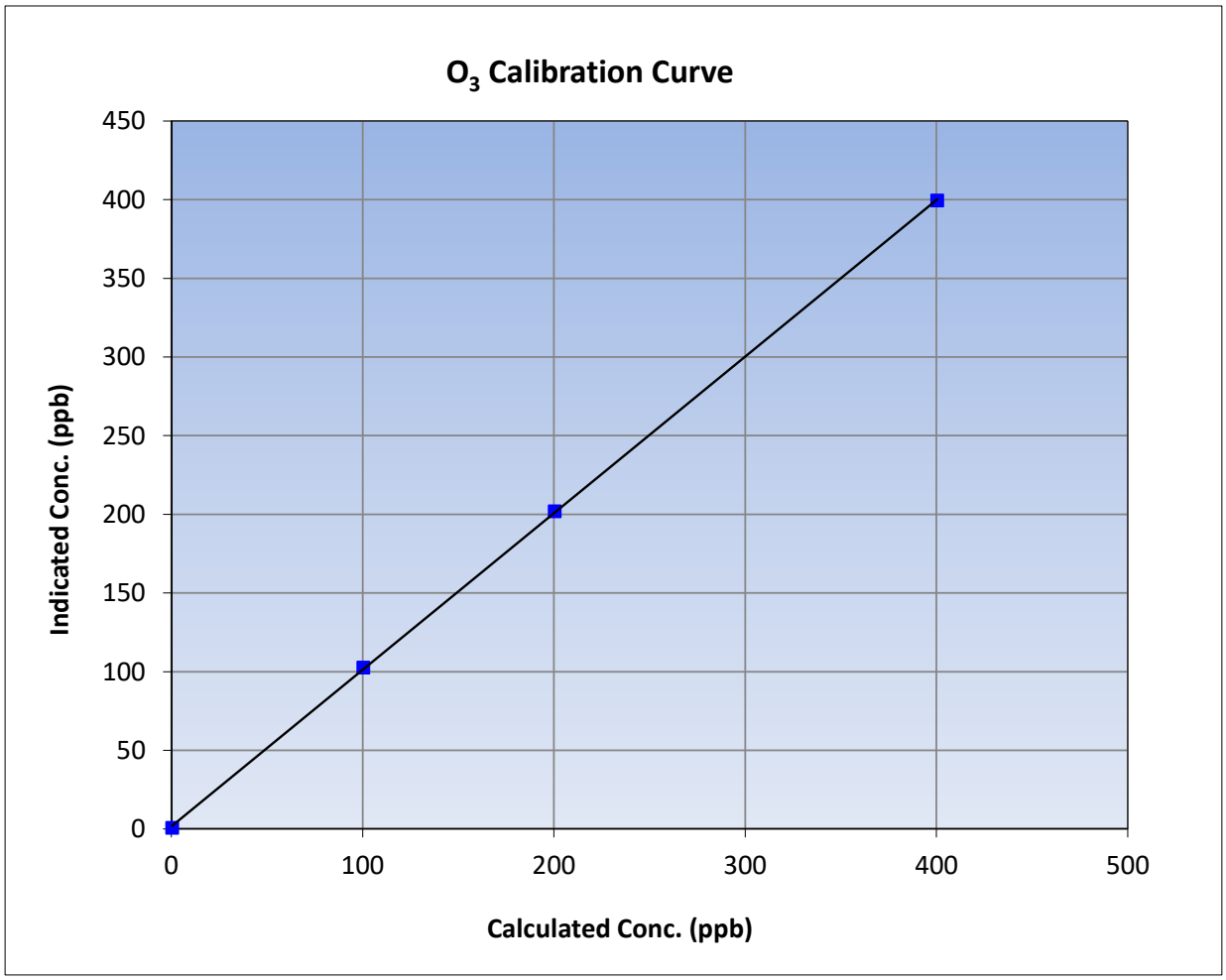
Station Information

Calibration Date:	February 8, 2023	Previous Calibration:	January 20, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:45	End Time (MST):	10:52
Analyzer make:	Thermo 49i	Analyzer serial #:	1507964700

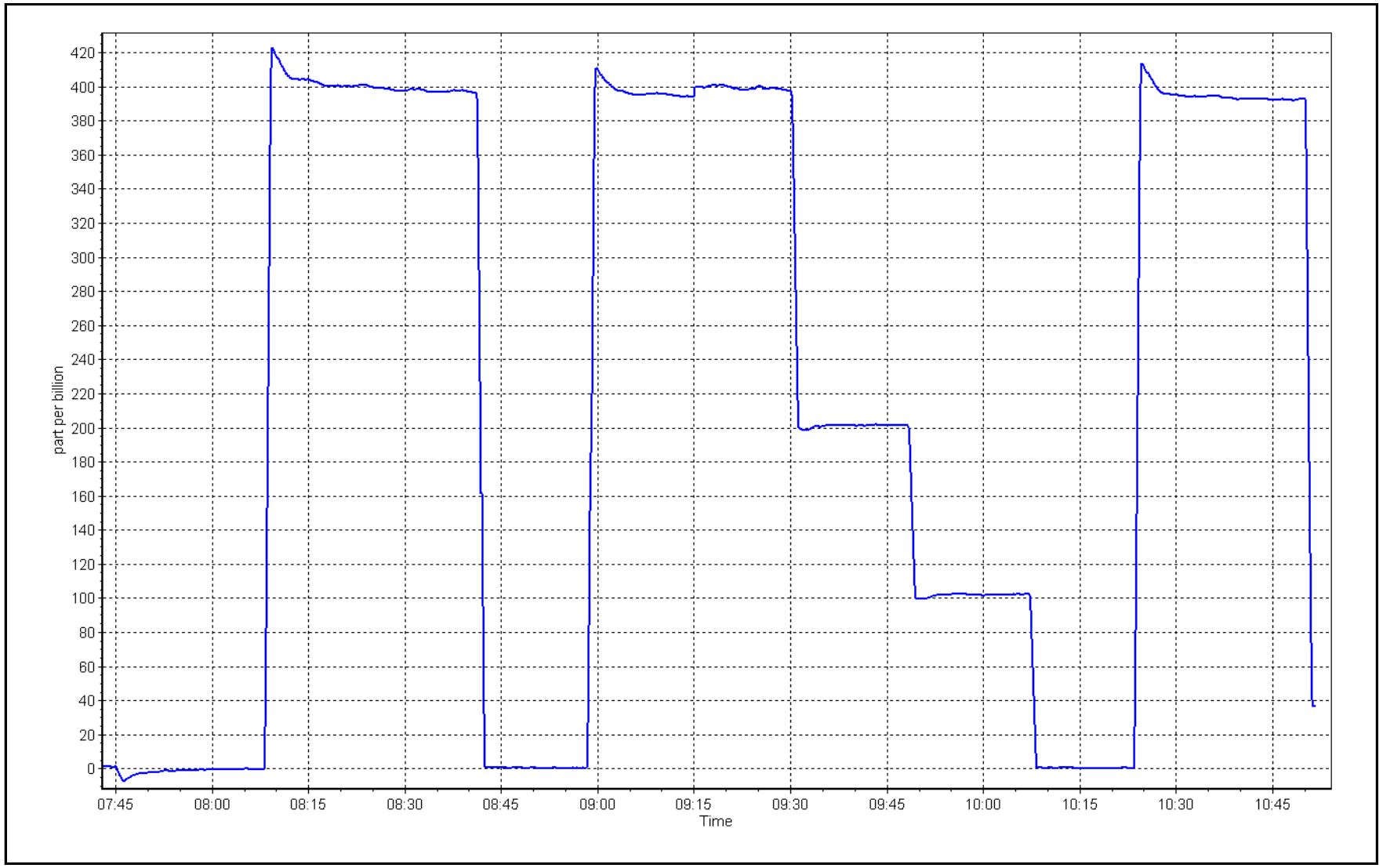
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
400.0	399.1	1.0023
200.0	201.5	0.9926
100.0	102.2	0.9785

Statistical Evaluation		Limits
Correlation Coefficient	0.999958	≥0.995
Slope	0.995429	0.90 - 1.10
Intercept	1.600000	+/- 5



O_3 Calibration Plot Date: February 8, 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:	February 1, 2023	Last Cal Date:	January 19, 2023
Start time (MST):	10:25	End time (MST):	11:48
Analyzer Make:	API T640	S/N:	326
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388753
Temp/RH standard:	Alicat FP-25BT	S/N:	388753

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (^{o}C)	-24	-24.4	-24	☐	+/- 2 ^{o}C
P (mmHg)	746	747.7	746	☐	+/- 10 mmHg
flow (LPM)	5	5.1	5	☐	+/- 0.25 LPM

Leak Test: Date of check: February 1, 2023 Last Cal Date: January 19, 2023

PM w/o HEPA: 4.1 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	10.6	N/A	10.6	☐	10.9 +/- 0.5

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

Date Optical Chamber Cleaned: December 5, 2022 <0.2 ug/m3

Disposable Filter Changed: December 5, 2022

Annual Maintenance

Date Sample Tube Cleaned: December 5, 2022

Date RH/T Sensor Cleaned: December 5, 2022

Notes: Removal Calibration done. Original AMU T640 being put back in.

Calibration by: Melissa Lemay

Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Athabasca Valley	Station number:	AMS 07
Calibration Date:	February 1, 2023	Last Cal Date:	
Start time (MST):	10:25	End time (MST):	11:48
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 (^{o}C)	-21.9	-22	-21.9	☐	+/- 2 ^{o}C
P (mmHg)	748.9	747.7	748.9	☐	+/- 10 mmHg
flow (LPM)	5	5.1	5	☐	+/- 0.25 LPM

Leak Test: Date of check: February 1, 2023 Last Cal Date: _____

PM w/o HEPA: 1.2 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	10.9	10.9	☑	10.9 +/- 0.5

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

Date Optical Chamber Cleaned: _____

Disposable Filter Changed: _____

Annual Maintenance

Date Sample Tube Cleaned: December 5, 2022

Date RH/T Sensor Cleaned: December 5, 2022

Notes: Install Calibration. AMU T640 being put back into station.

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:	February 8, 2023	Last Cal Date:	January 20, 2023
Start time (MST):	10:50	End time (MST):	13:39
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999713	0.997345	Backgd or Offset:	3.600	3.651
Calibration intercept:	0.044565	0.018531	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	40.1	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4933	66.7	40.0	39.9	1.003
second point	4967	33.3	20.0	20.0	0.998
third point	4983	16.7	10.0	10.0	1.002
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	1.001

Baseline Corr As found:	40.05	Prev response:	40.06	*% change:	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No Maintenance done. Zero adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

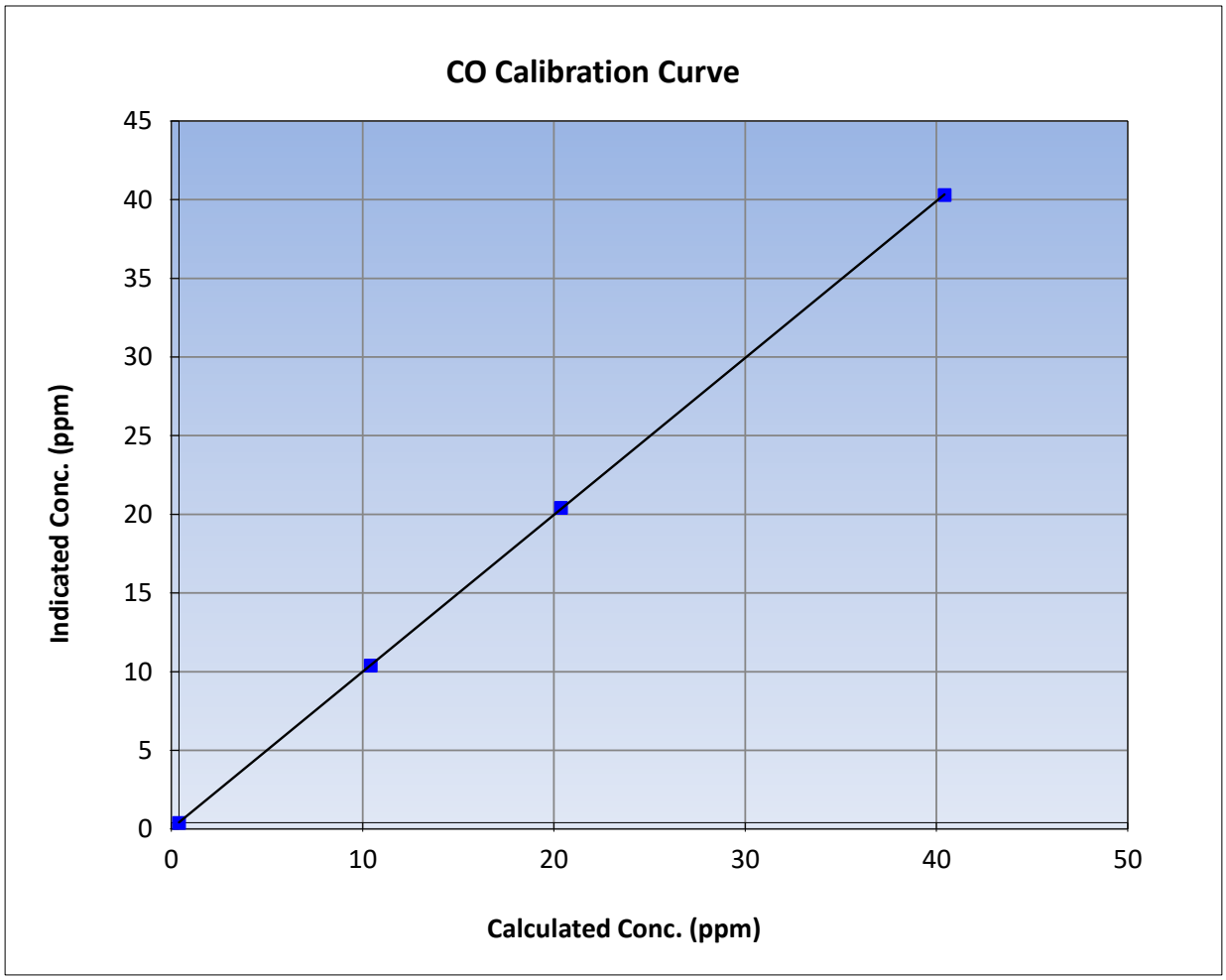
Station Information

Calibration Date:	February 8, 2023	Previous Calibration:	January 20, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:50	End Time (MST):	13:39
Analyzer make:	Thermo 48i-LTE	Analyzer serial #:	1408761381

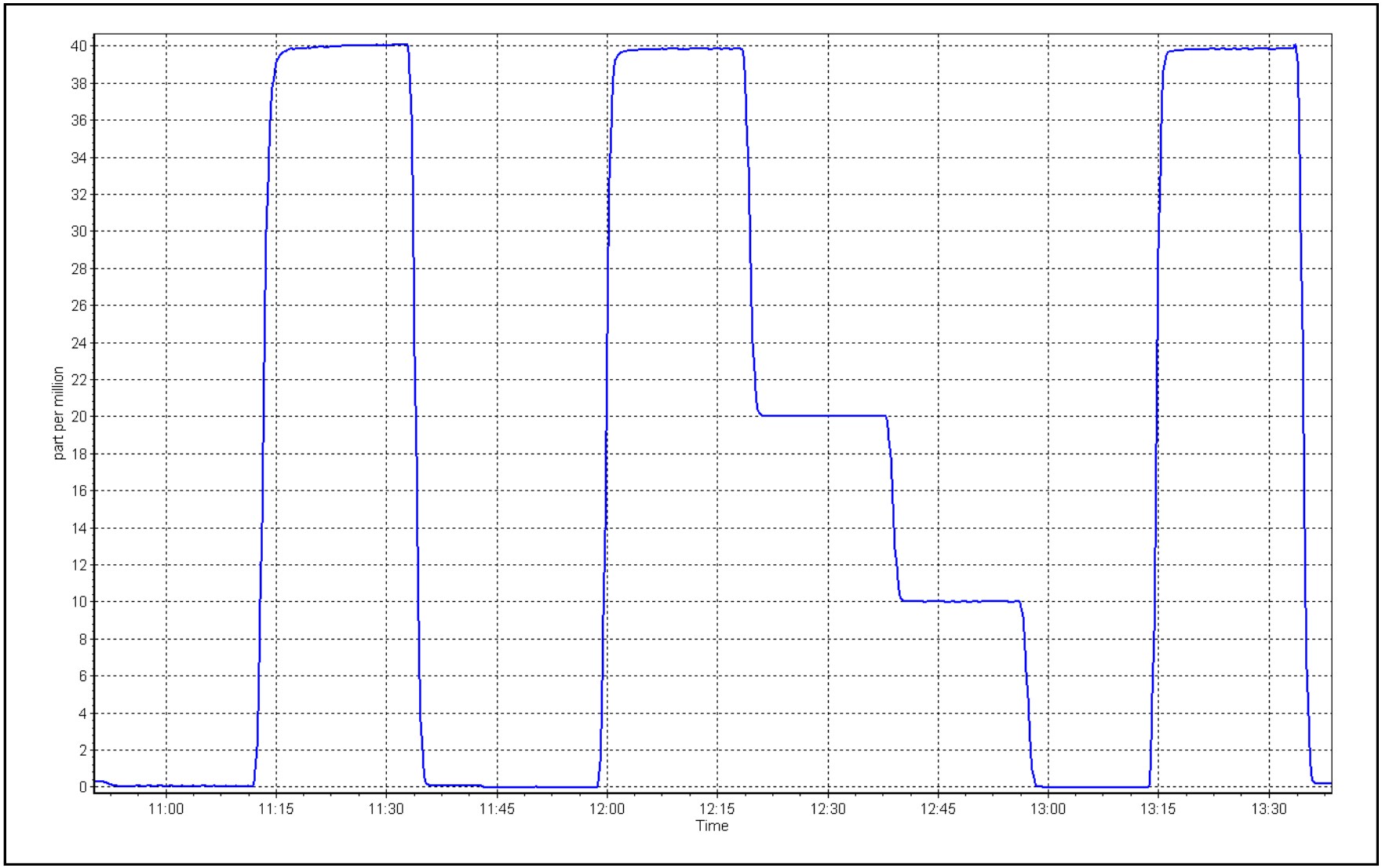
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.0	39.9	1.0031
20.0	20.0	0.9979
10.0	10.0	1.0021

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999991	*≥0.995*
Slope	0.997345	*0.90 - 1.10*
Intercept	0.018531	*+/-1.5*



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



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS08
FORT CHIPEWYAN
FEBRUARY 2023

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

March 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	February 10, 2023	Last Cal Date:	January 11, 2023
Start time (MST):	14:06	End time (MST):	4:42 PM
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:	1.000787	0.996661	Backgd or Offset:	1.32	1.32
Calibration intercept:	0.415954	1.336570	Coeff or Slope:	1.006	1.006

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	795.6	1.006
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	800.4	799.1	1.002
second point	4960	40.2	400.7	399.4	1.003
third point	4980	20.1	200.4	203.4	0.985
as left zero	5000	0.0	0.0	0.2	----
as left span	4920	80.3	800.4	800.1	1.000
				Average Correction Factor	0.997

Baseline Corr As found:	795.50	Previous response	801.43	*% change	-0.7%

* = > +/-5% change initiates investigation

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

Calibration Performed By: Morgan Voyageur & Matthew Courtoreille

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

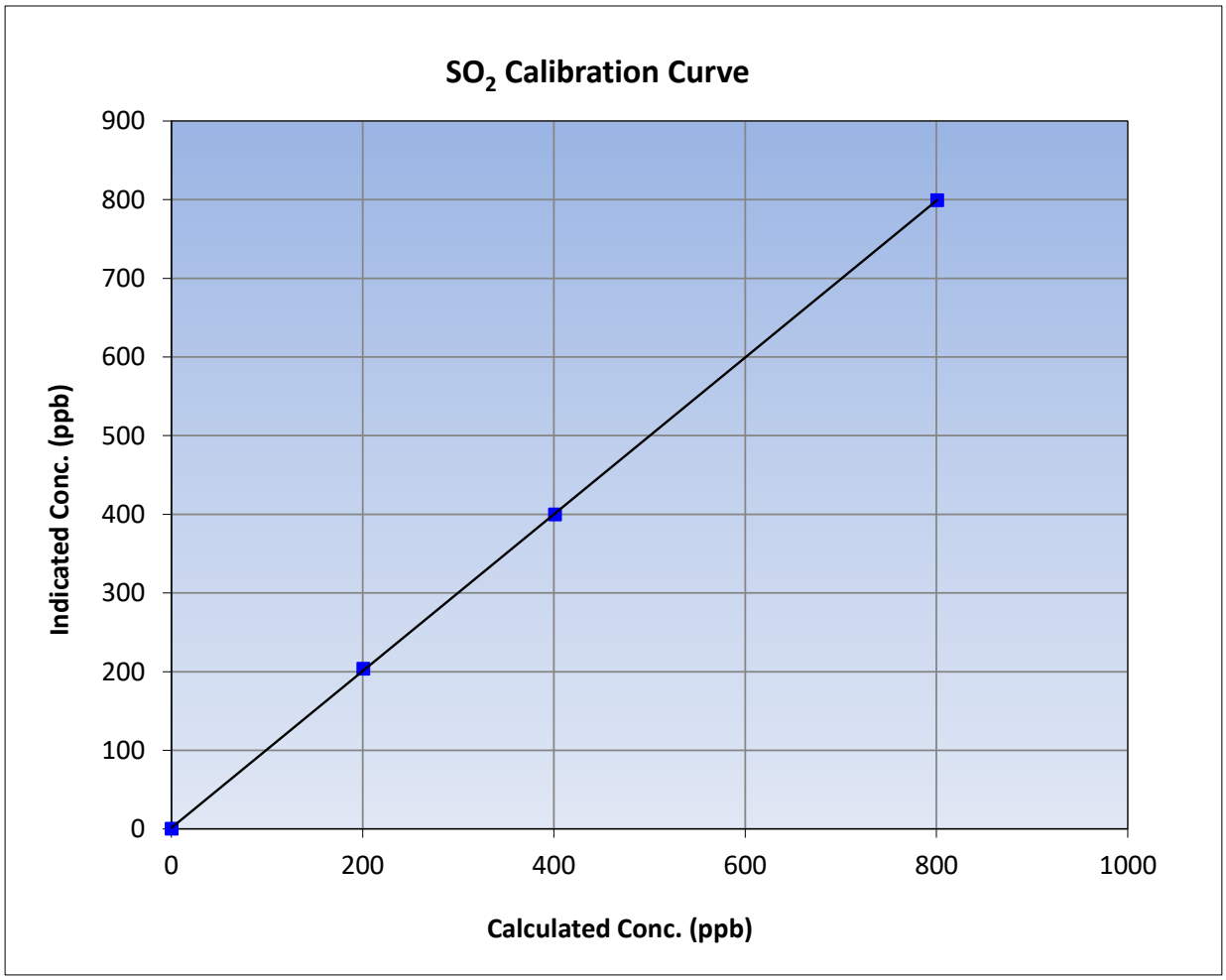
Station Information

Calibration Date:	February 10, 2023	Previous Calibration:	January 11, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	14:06	End Time (MST):	16:42
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1136451241

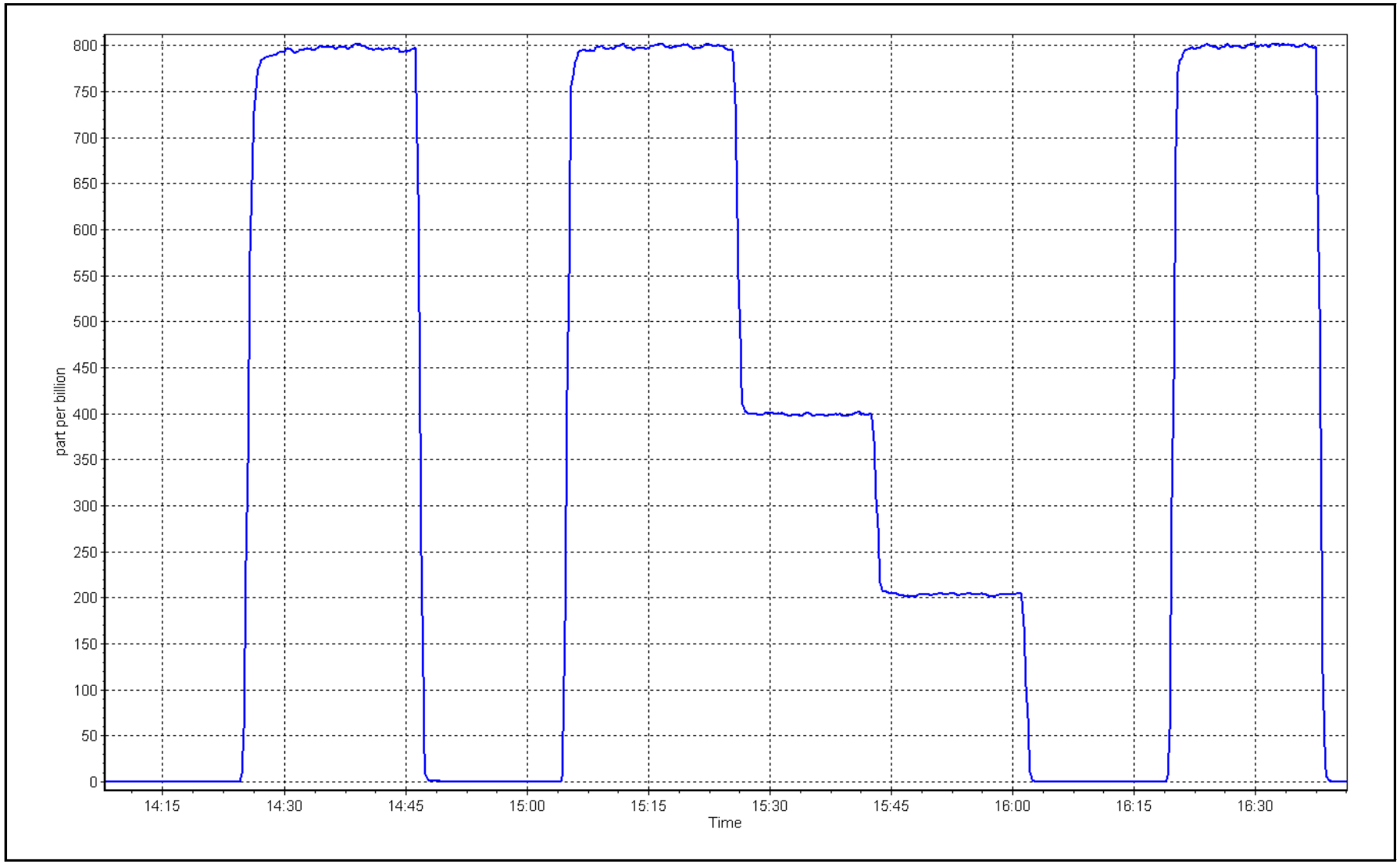
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
800.4	799.1	1.0016
400.7	399.4	1.0032
200.4	203.4	0.9850

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999975	*≥0.995*
Slope	0.996661	*0.90 - 1.10*
Intercept	1.336570	*+/-30*



SO2 Calibration Plot Date: February 10, 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:	February 10, 2023	Last Cal Date:	January 11, 2023
Start time (MST):	9:24	End time (MST):	13:29
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:	0.999140	1.000139	Backgd or Offset:	1.42	1.43
Calibration intercept:	0.018799	0.058837	Coeff or Slope:	0.743	0.743

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	79.8	1.003
as found 2nd point	4960	40.2	40.0	40.1	0.996
as found 3rd point	4980	20.1	20.0	19.9	1.004
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	4920	80.5	80.0	80.0	1.000
second point	4960	40.2	40.0	40.2	0.994
third point	4980	20.1	20.0	20.0	0.999
as left zero	5000	0.0	0.0	0.1	----
as left span	4920	80.5	80.0	80.2	0.998
SO2 Scrubber Check	4919.7	80.3	803.0	0.1	----
Date of last scrubber change:		March 7, 2022		Ave Corr Factor	0.998
Date of last converter efficiency test:		March 15, 2022		100.7%	efficiency

Baseline Corr As found:	79.8	Prev response:	79.96	*% change:	-0.2%
Baseline Corr 2nd AF pt:	40.1	AF Slope:	0.997854	AF Intercept:	0.038791
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999986		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Morgan Voyageur & Matthew Courtoreille

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

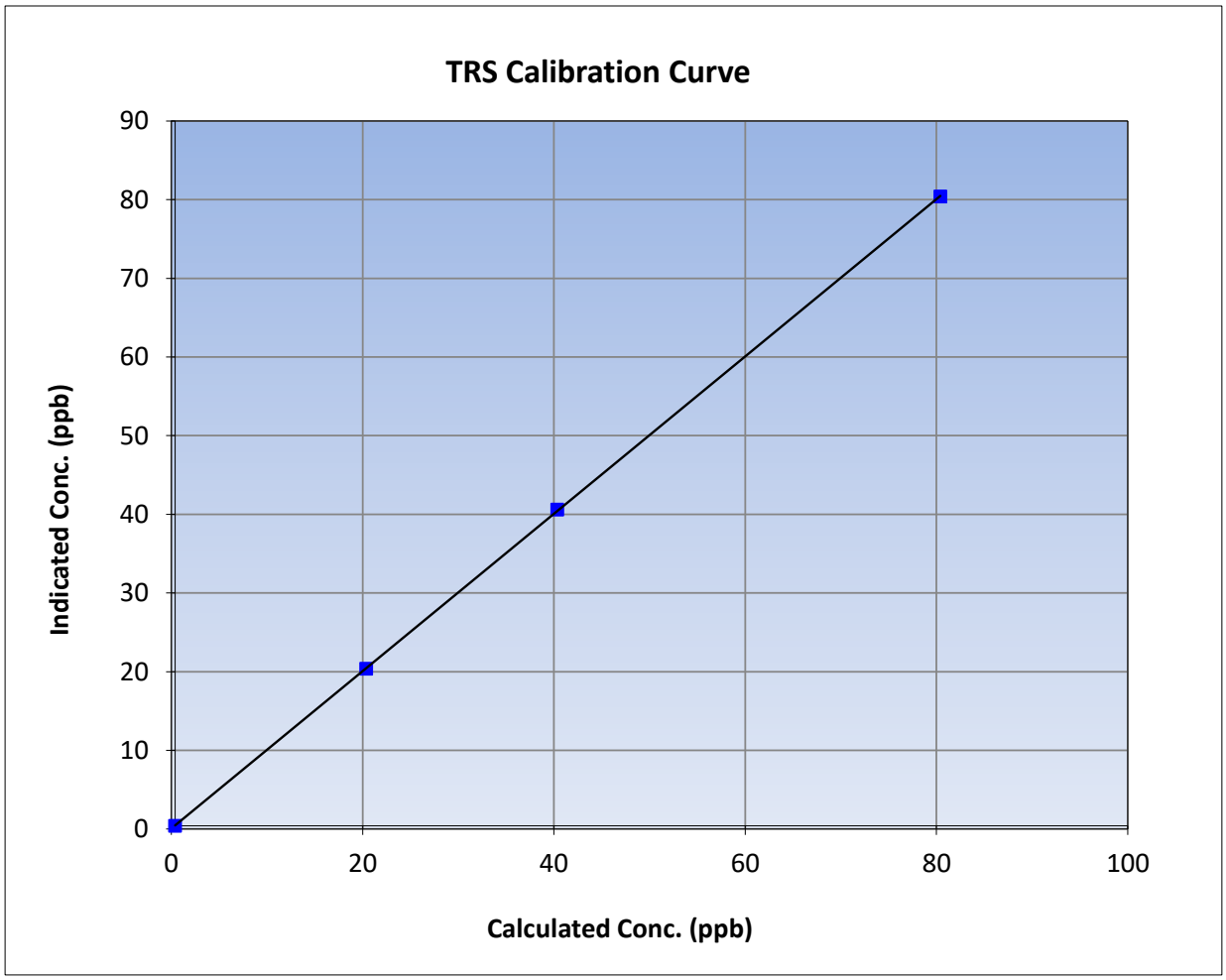
Station Information

Calibration Date:	February 10, 2023	Previous Calibration:	January 11, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	9:24	End Time (MST):	13:29
Analyzer make:	Thermo 43iQ-TL	Analyzer serial #:	1203169744

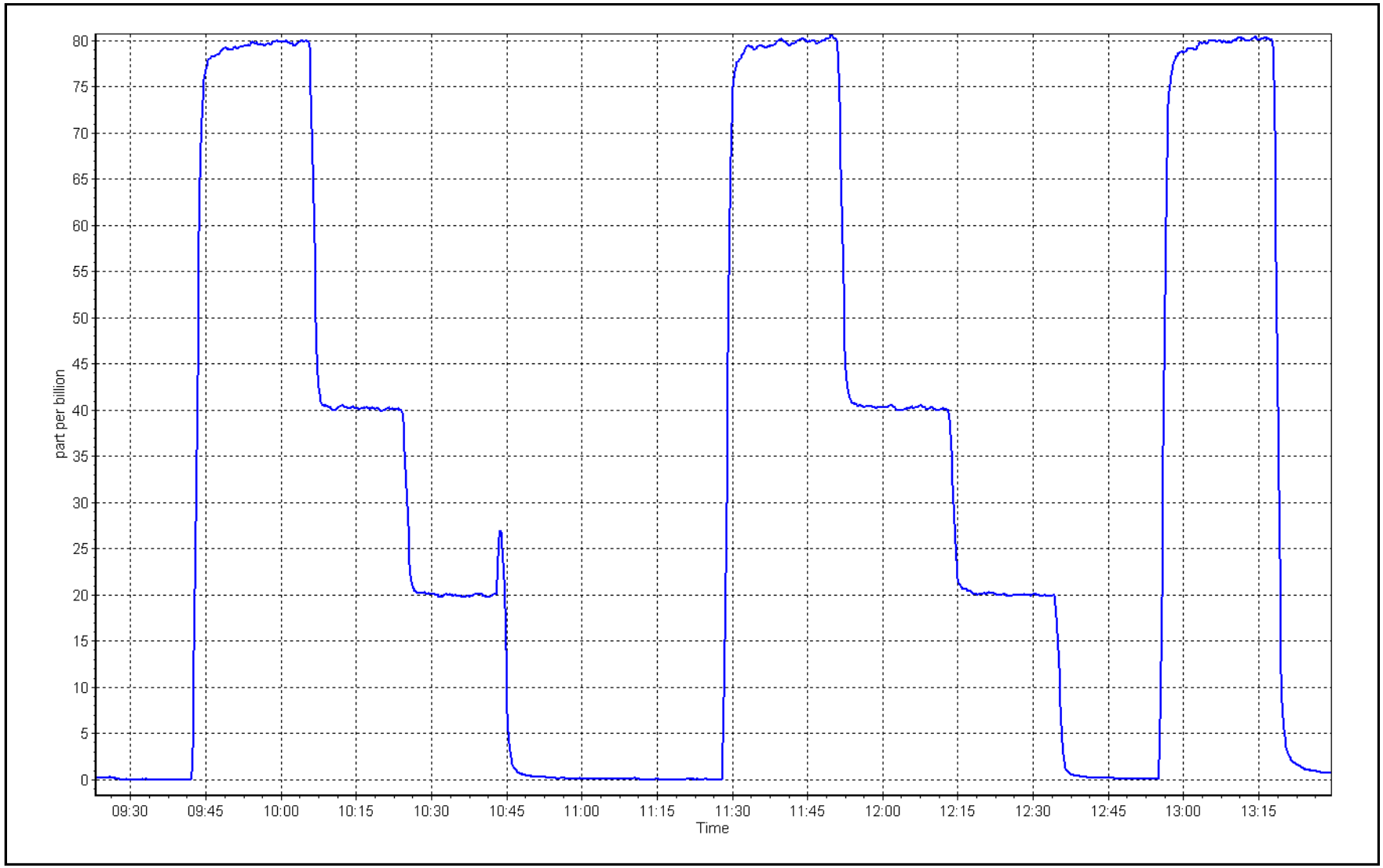
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.0	1.0001
40.0	40.2	0.9940
20.0	20.0	0.9990

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999988	*≥0.995*
Slope	1.000139	*0.90 - 1.10*
Intercept	0.058837	*+/-3*



TRS Calibration Plot Date: February 10, 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:	February 6, 2023	Last Cal Date:	January 10, 2023
Start time (MST):	10:03	End time (MST):	14:19
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	1.844	NO bkgnd or offset:	6.9	6.9
NOX coeff or slope:	0.993	0.993	NOX bkgnd or offset:	6.9	6.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	252.6	252.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.995345	0.986463
NO_X Cal Offset:	0.840000	2.200000
NO Cal Slope:	0.998815	0.990518
NO Cal Offset:	-0.200000	1.180000
NO_2 Cal Slope:	0.991767	0.996180
NO_2 Cal Offset:	-0.832054	-1.402288

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	1.4	1.4	0.0	----	----
as found span	4918	82.0	800.3	800.3	0.0	799.5	798.1	1.2	1.0010	1.0028
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	1.3	1.3	0.0	----	----
high point	4918	82.0	800.3	800.3	0.0	791.6	794.4	-2.9	1.0110	1.0075
second point	4959	41.0	400.2	400.2	0.0	396.3	396.2	0.1	1.0097	1.0100
third point	4980	20.5	200.1	200.1	0.0	201.2	200.1	1.1	0.9944	0.9999
as left zero	5000	0.0	0.0	0.0	0.0	1.4	1.4	0.0	----	----
as left span	4918	82.0	800.3	407.8	392.5	793.8	405.3	388.5	1.0082	1.0062
								Average Correction Factor	1.0051	1.0058

Corrected As found	NO_X = 798.1 ppb	NO = 796.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = 0.1%
Previous Response	NO_X = 797.4 ppb	NO = 799.2 ppb		*Percent Change	NO = -0.3%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	792.2	399.7	392.5	390.0	1.0064	99.4%
2nd GPT point (200 ppb O3)	792.2	600.9	191.3	189.3	1.0106	99.0%
3rd GPT point (100 ppb O3)	792.2	697.7	94.5	90.8	1.0407	96.1%
				Average Correction Factor	1.0192	98.1%

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

Calibration Performed By: Morgan Voyageur, Matthew Courtoreille

Wood Buffalo Environmental Association

NO_X Calibration Summary

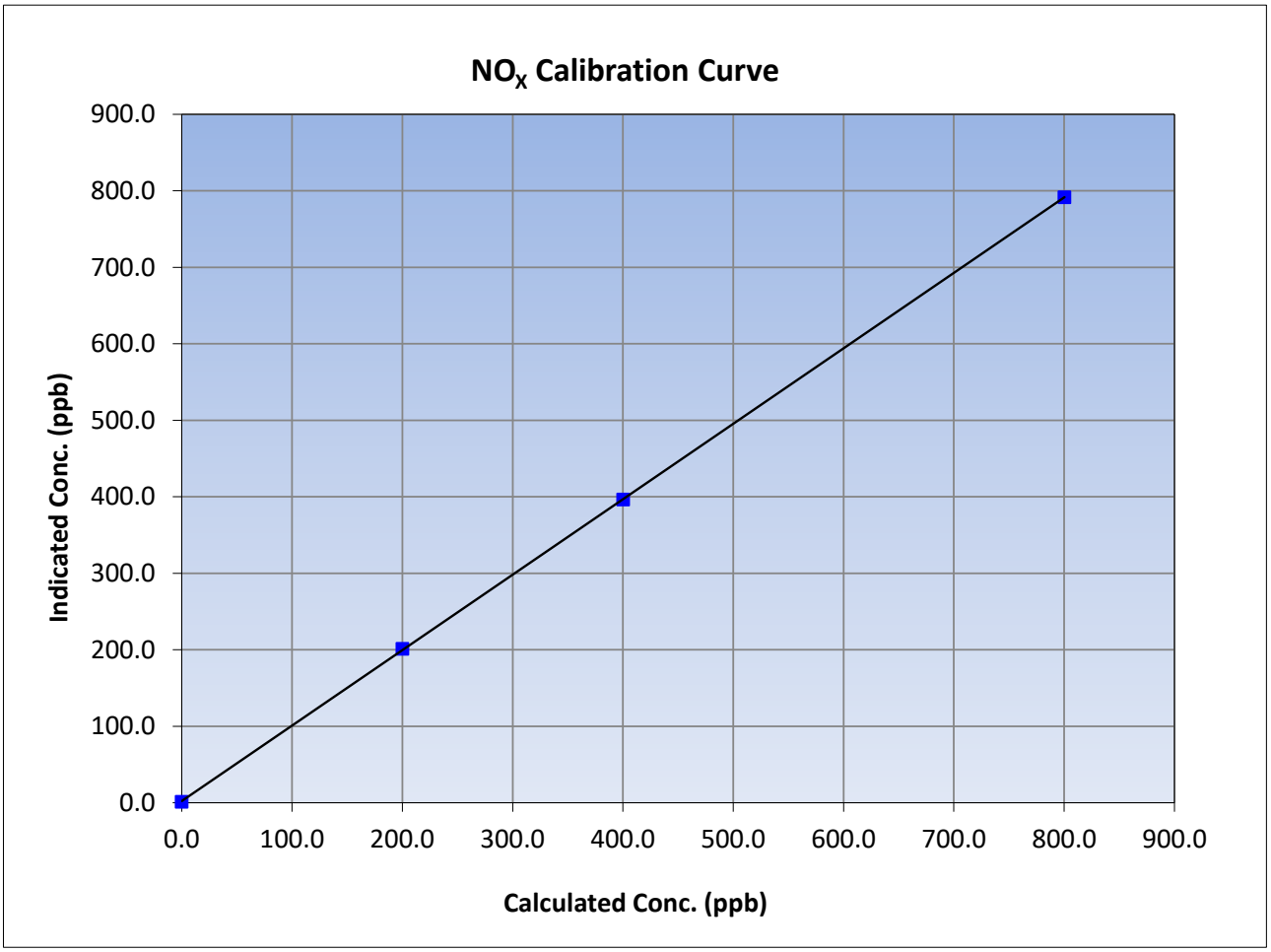
Version-04-2020

Station Information

Calibration Date:	February 6, 2023	Previous Calibration:	January 10, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	10:03	End Time (MST):	14:19
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	1.3	----	Correlation Coefficient	0.999989	≥0.995
800.3	791.6	1.0110			
400.2	396.3	1.0097	Slope	0.986463	0.90 - 1.10
200.1	201.2	0.9944			
			Intercept	2.200000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

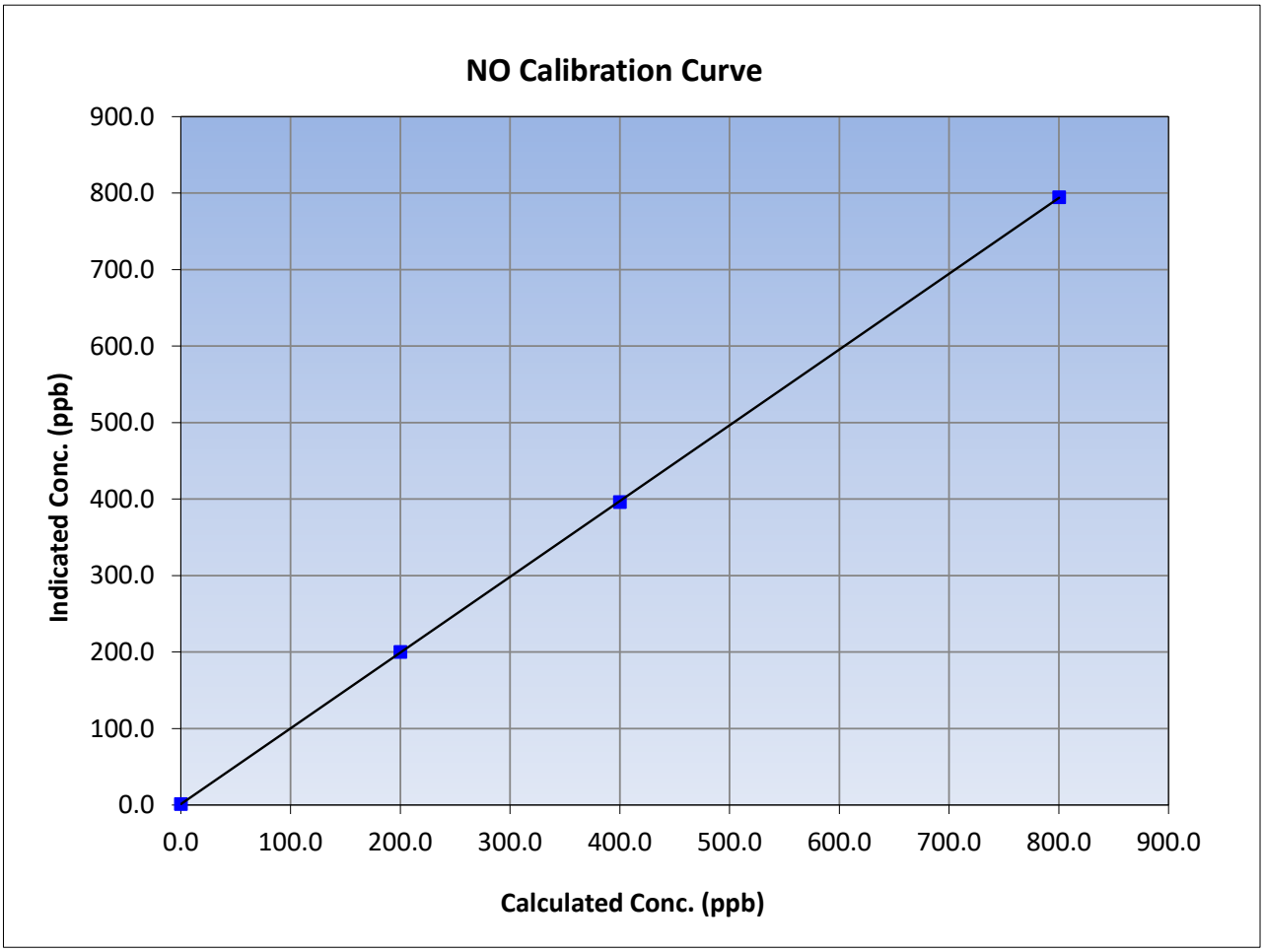
Version-04-2020

Station Information

Calibration Date:	February 6, 2023	Previous Calibration:	January 10, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	10:03	End Time (MST):	14:19
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	1.3	----	Correlation Coefficient	0.999992	≥0.995
800.3	794.4	1.0075			
400.2	396.2	1.0100	Slope	0.990518	0.90 - 1.10
200.1	200.1	0.9999			
			Intercept	1.180000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

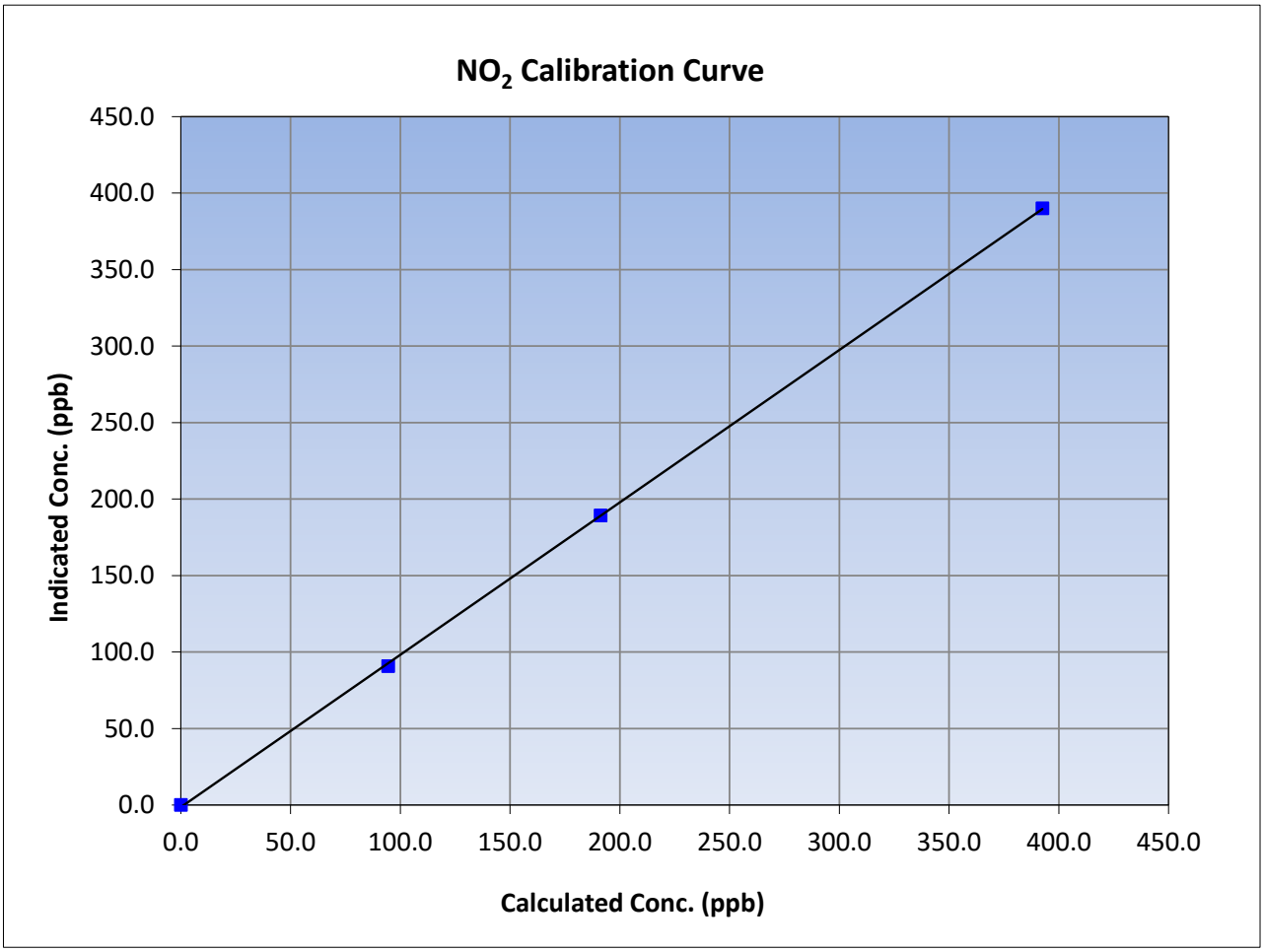
Version-04-2020

Station Information

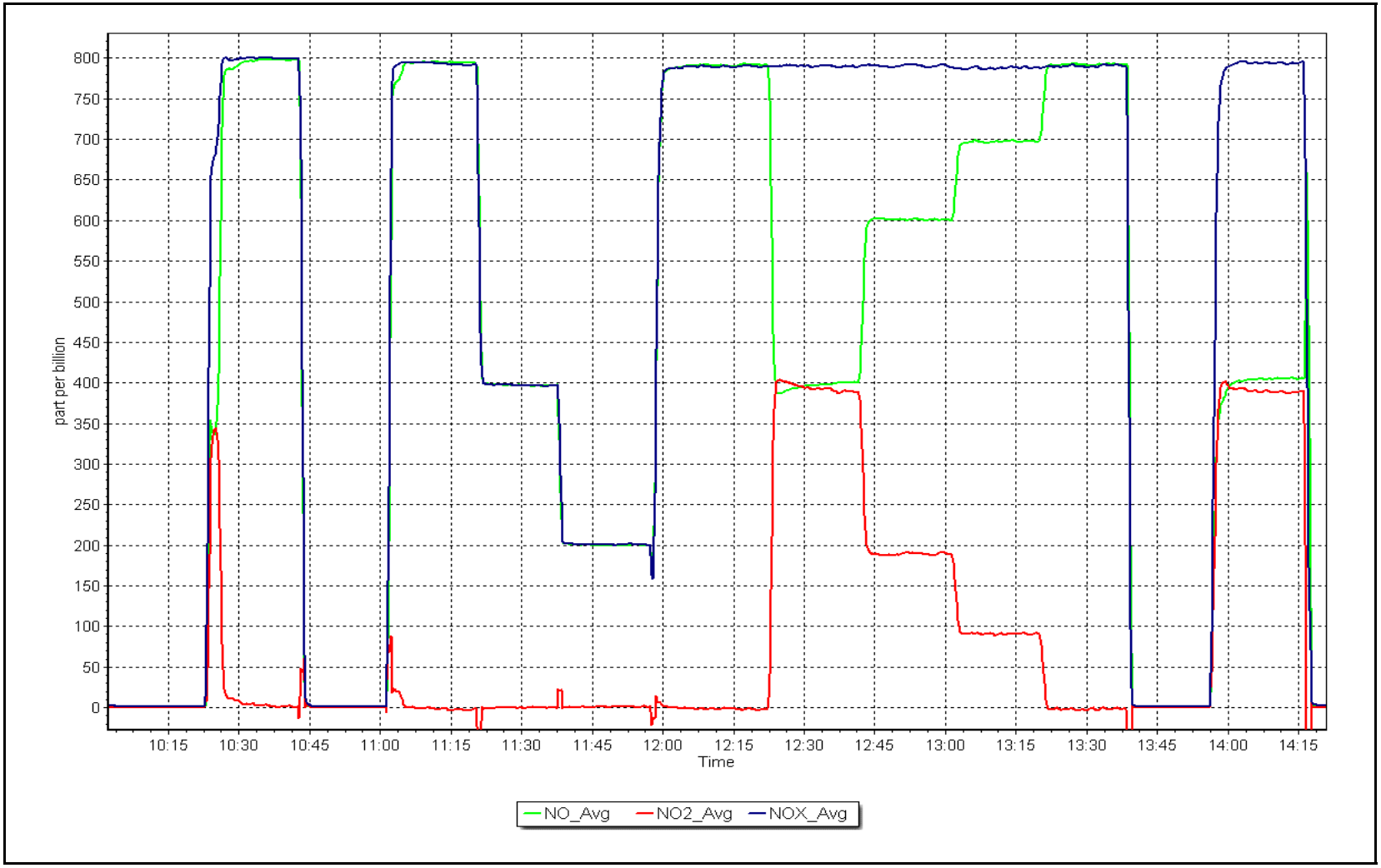
Calibration Date:	February 6, 2023	Previous Calibration:	January 10, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	10:03	End Time (MST):	14:19
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999930	≥0.995
392.5	390.0	1.0064			
191.3	189.3	1.0106	Slope	0.996180	0.90 - 1.10
94.5	90.8	1.0407			
			Intercept	-1.402288	+/-20



NO_X Calibration Plot Date: February 6, 2023 Location: Fort Chipewyan



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS 08
Calibration Date:	February 15, 2023	Last Cal Date:	January 11, 2023
Start time (MST):	13:07	End time (MST):	14:30
Analyzer Make:		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)	-21.2	-21.2	-21.2	☐	+/- 2 °C
P (mmHg)	743.2	733.8	743.2	☐	+/- 10 mmHg
flow (LPM)	5.00	4.89	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: February 15, 2023 Last Cal Date: January 11, 2023

PM w/o HEPA: 1.6 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: December 5, 2022 <0.2 ug/m3

Disposable Filter Changed: December 5, 2022

Annual Maintenance

Date Sample Tube Cleaned: July 14, 2022

Date RH/T Sensor Cleaned: July 14, 2022

Notes: No adjustment needed.

Calibration by: Morgan Voyageur

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	February 3, 2023	Last Cal Date:	January 13, 2023
Start time (MST):	11:11	End time (MST):	13:45
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:	0.995217		Backgd or Offset:	-0.013	NA
Calibration intercept:	0.070924		Coeff or Slope:	0.999	NA

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					
as found span					
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	0.0	0.3	----
as left span	2960	40.0	40.4	40.6	0.995
				Average Correction Factor	

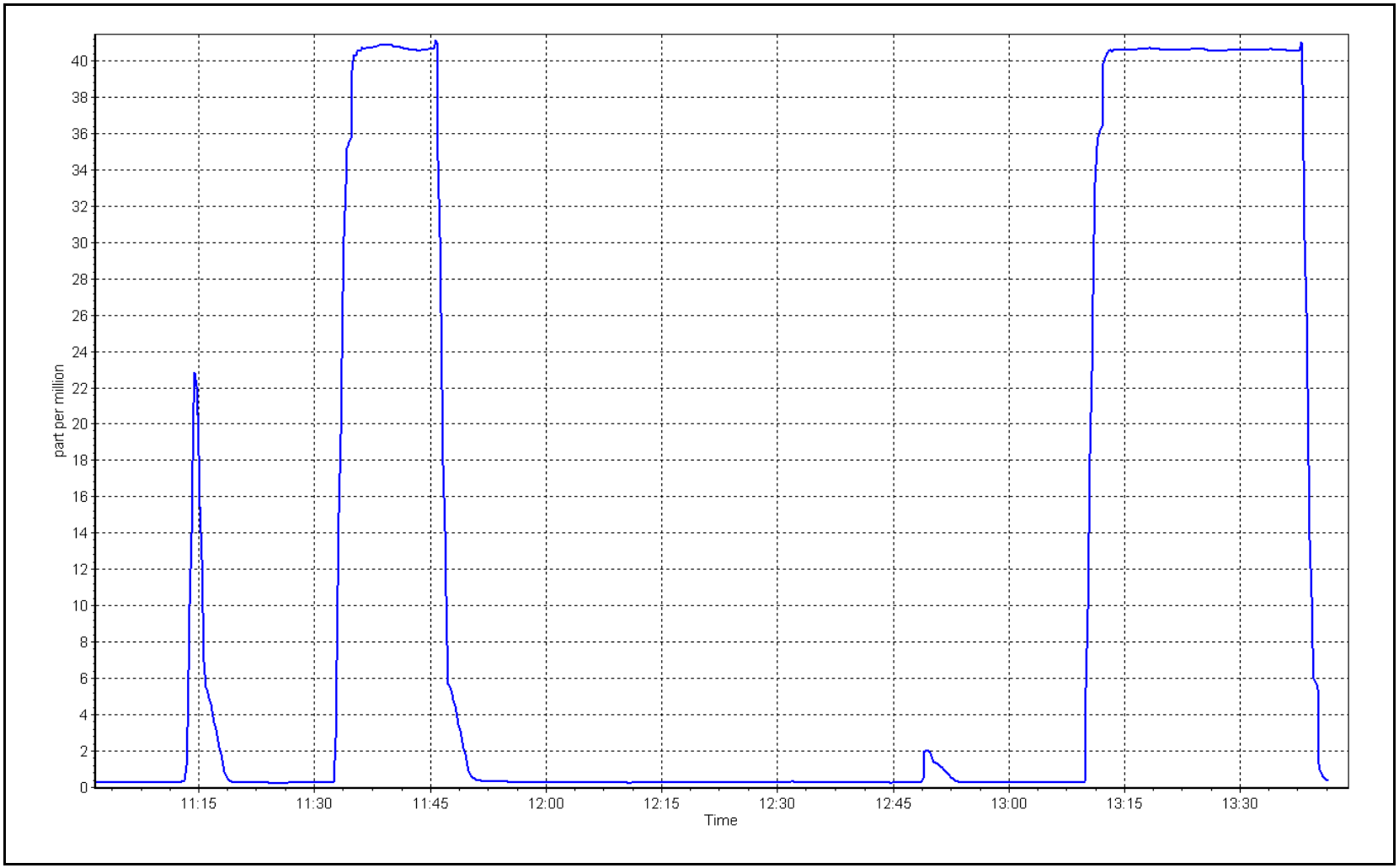
Baseline Corr As found:	NA	Prev response:	NA	*% change:	NA
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Unable to complete as founds due to pressure warnings on calibrator. Changed out the flow controller in the Nitrogen generator.

Calibration Performed By: Karan Pandit

CO Calibration Plot Date: February 3, 2023 Location: Fort Chipewyan



Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	February 14, 2023	Last Cal Date:	January 13, 2023
Start time (MST):	9:20	End time (MST):	12:49
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:	0.995217	0.983508	Backgd or Offset:	-0.013	-0.013
Calibration intercept:	0.070924	0.322926	Coeff or Slope:	0.999	0.987

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.19	----
as found span	4933	66.7	40.4	40.6	0.996
as found 2nd point	4967	33.3	20.2	20.5	0.983
as found 3rd point	4983	16.7	10.1	10.5	0.968
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4934	66.7	40.4	40.0	1.010
second point	4967	33.3	20.2	20.3	0.995
third point	4983	16.7	10.1	10.3	0.979
as left zero	5000	0.0	0.0	0.2	----
as left span	2960	40.0	40.4	39.8	1.015
				Average Correction Factor	0.995

Baseline Corr As found:	40.41	Prev response:	40.30	*% change:	0.3%
Baseline Corr 2nd AF pt:	20.3	AF Slope:	0.998924	AF Intercept:	0.278520
Baseline Corr 3rd AF pt:	10.3	AF Correlation:	0.999975		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Matthew Courtoreille & Morgan V

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

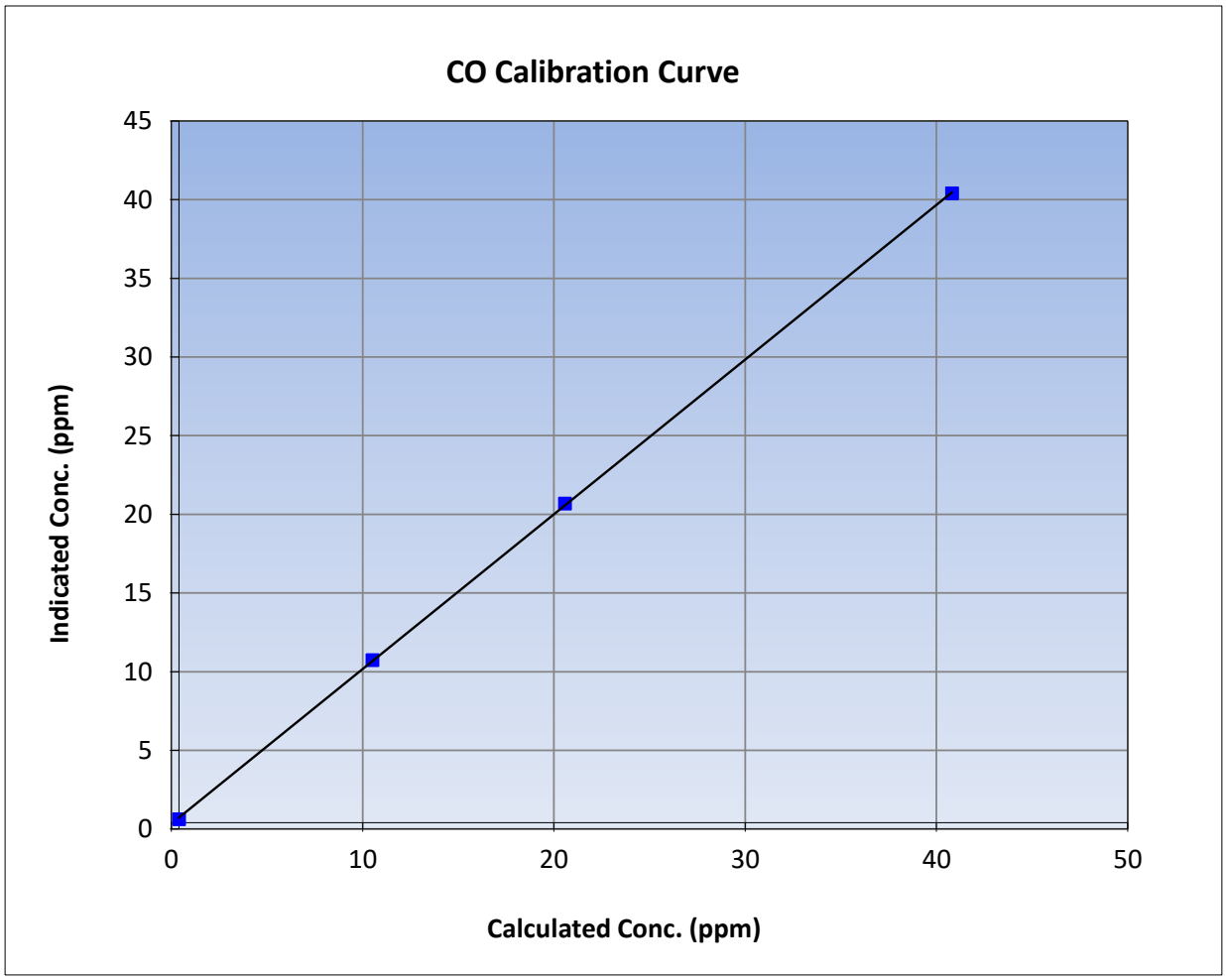
Station Information

Calibration Date:	February 14, 2023	Previous Calibration:	January 13, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	9:20	End Time (MST):	12:49
Analyzer make:	API T300	Analyzer serial #:	3505

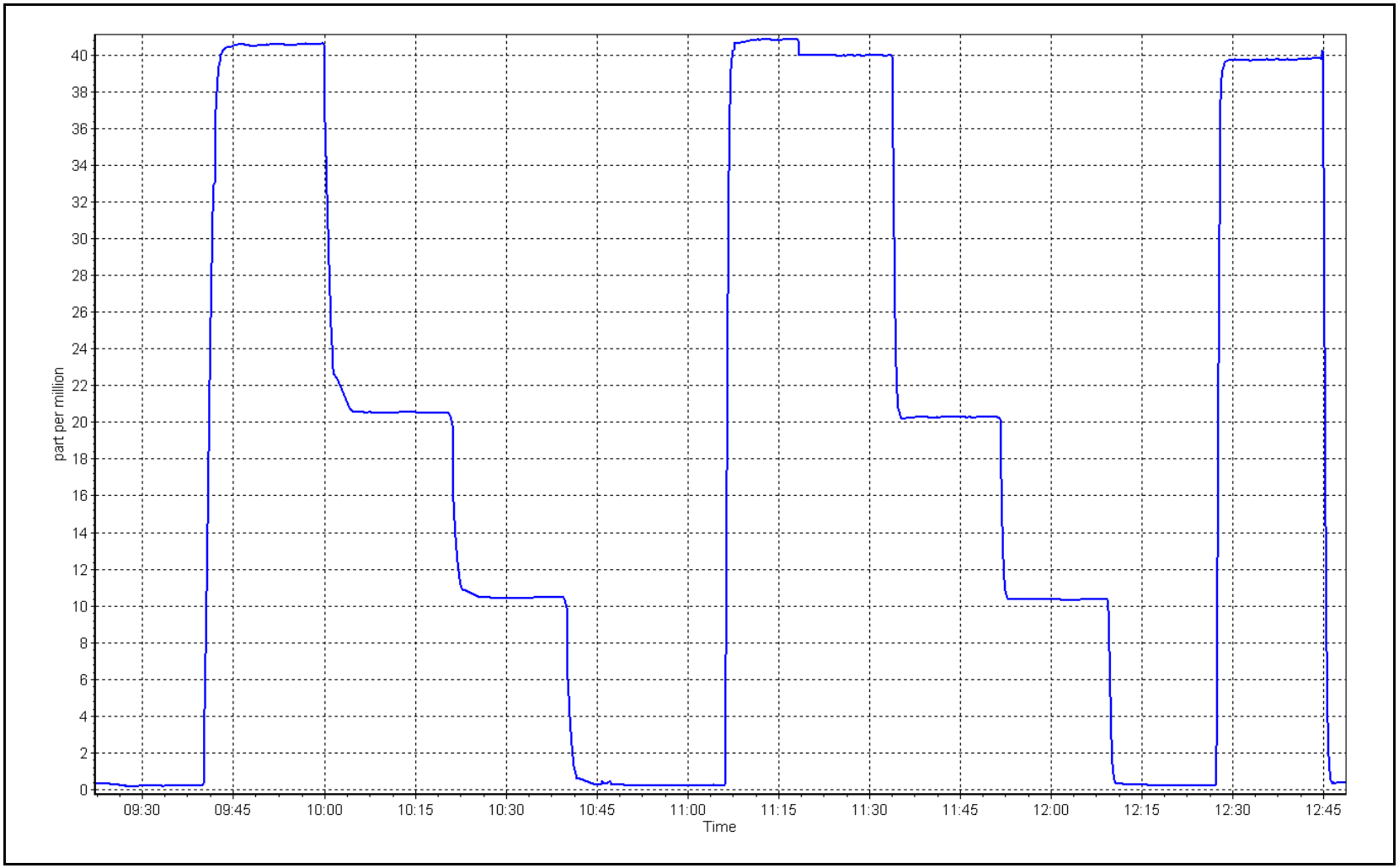
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
40.4	40.0	1.0104
20.2	20.3	0.9951
10.1	10.3	0.9787

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999963	*≥0.995*
Slope	0.983508	*0.90 - 1.10*
Intercept	0.322926	*+/-1.5*



CO Calibration Plot Date: February 14, 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:	February 3, 2023	Last Cal Date:	January 13, 2023
Start time (MST):	11:11	End time (MST):	13:45
Reason:	Maintenance		

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:	0.998112		Backgd or Offset:	0.019	NA
Calibration intercept:	-5.540000		Coeff or Slope:	1.011	NA

CO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	3000	0.0	0.0	0.1	----
as left span	2960	40.0	802.9	788.8	1.018
				Average Correction Factor	

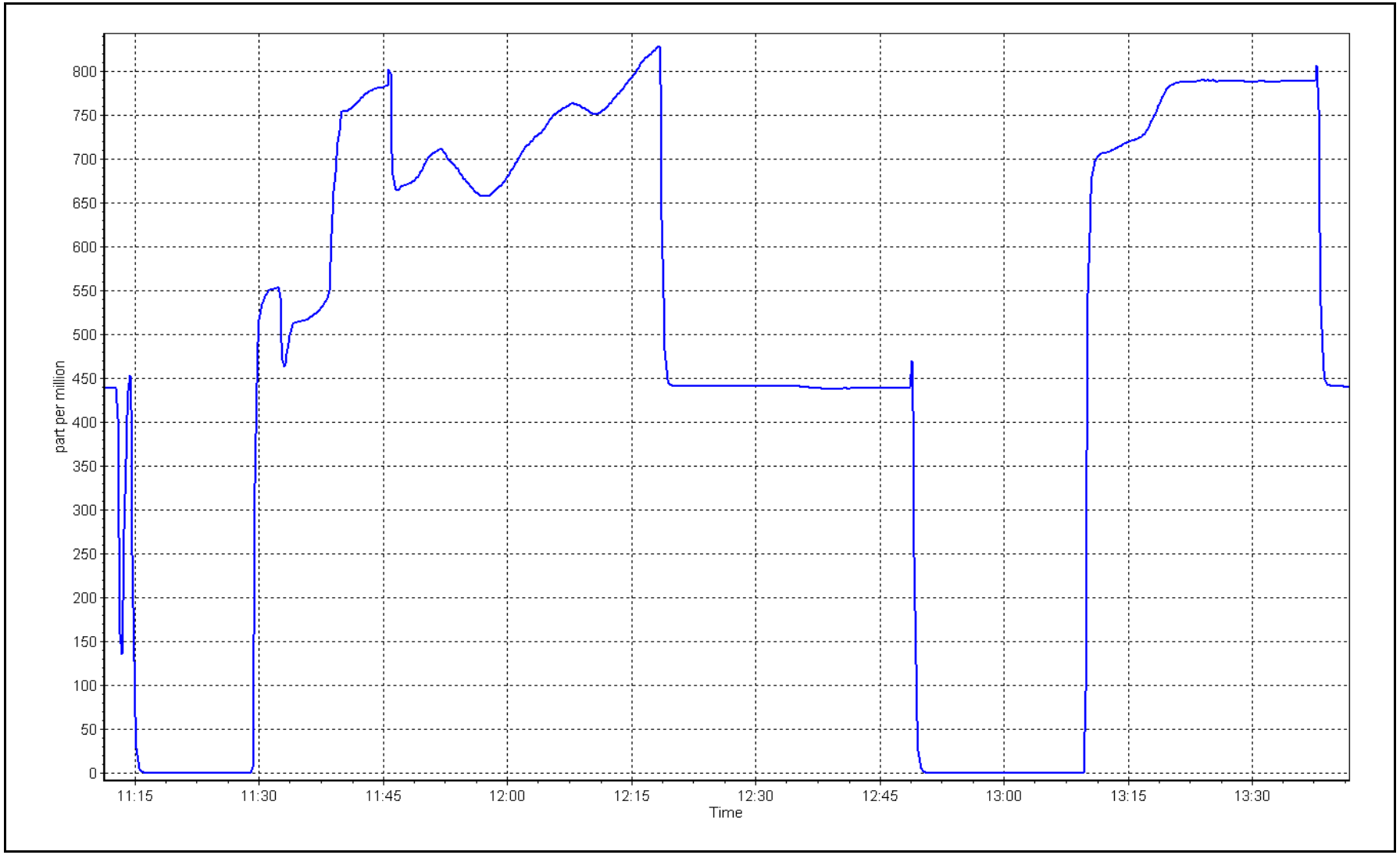
Baseline Corr As found:	NA	Prev response:	NA	*% change:	NA
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Unable to complete as founds due to pressure warnings on calibrator. Changed out the flow controller in the Nitrogen generator.

Calibration Performed By: Karan Pandit

CO_2 Calibration Plot Date: February 3, 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:	February 15, 2023	Last Cal Date:	January 13, 2023
Start time (MST):	9:02	End time (MST):	12:12
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:	0.998112	1.006830	Backgd or Offset:	0.019	0.019
Calibration intercept:	-5.540000	-1.740000	Coeff or Slope:	1.011	1.011

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	1617.8	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	1.0	----
high point	2920	80.0	1605.9	1620.1	0.991
second point	2960	40.0	802.9	794.4	1.011
third point	2980	20.0	401.5	407.0	0.986
as left zero	3000	0.0	0.0	0.8	----
as left span	2960	40.0	802.9	791.8	1.014
				Average Correction Factor	0.996

Baseline Corr As found:	1617.20	Prev response:	1597.29	*% 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: Sample inlet filter changed after as founds. No adjustments made.

Calibration Performed By: Matthew Courtoreille & Morgan Voyageur

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

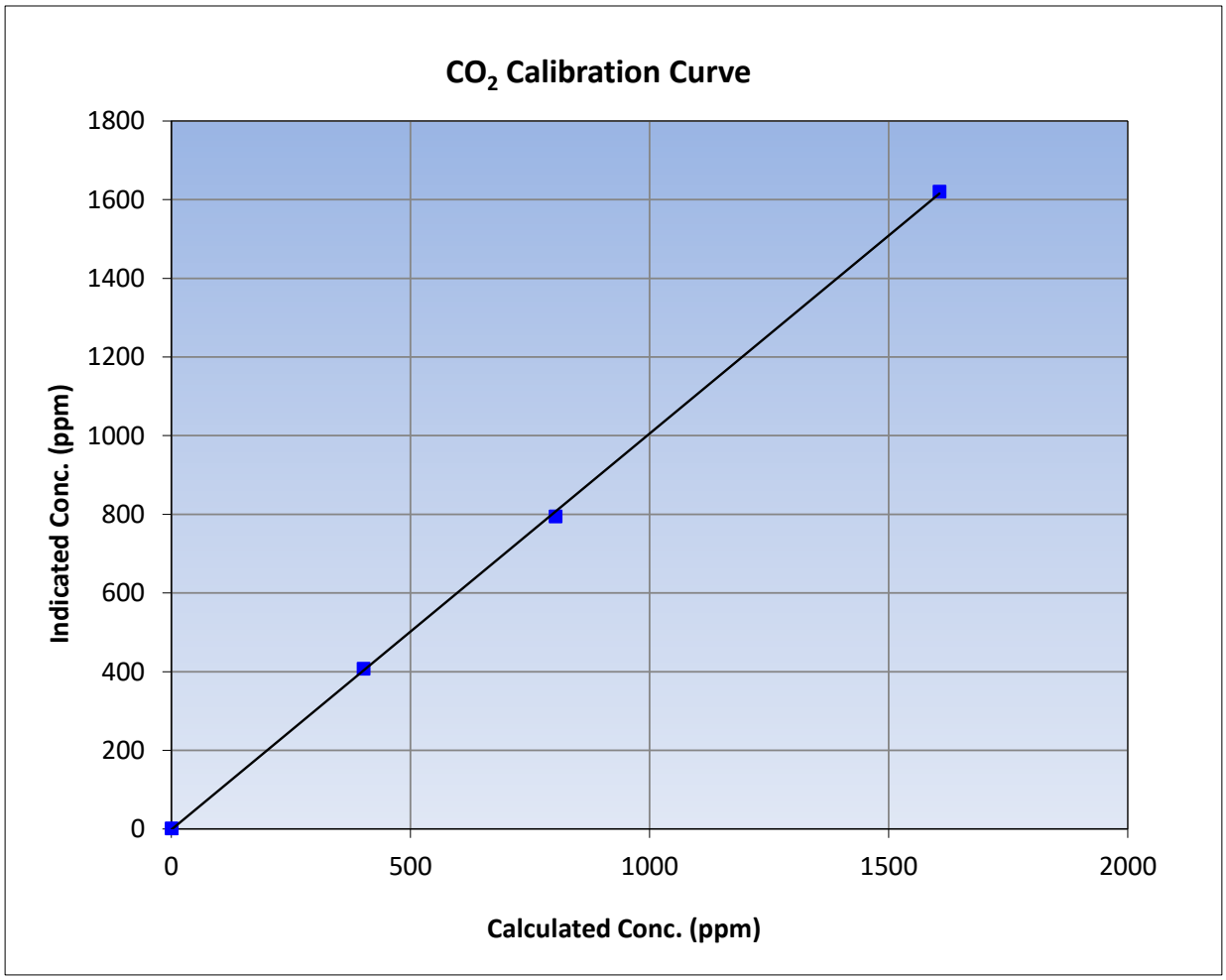
Station Information

Calibration Date	February 15, 2023	Previous Calibration	January 13, 2023
Station Name	Fort Chipewyan	Station Number	AMS08
Start Time (MST)	9:02	End Time (MST)	12:12
Analyzer make	Teledyne API T360	Analyzer serial #	289

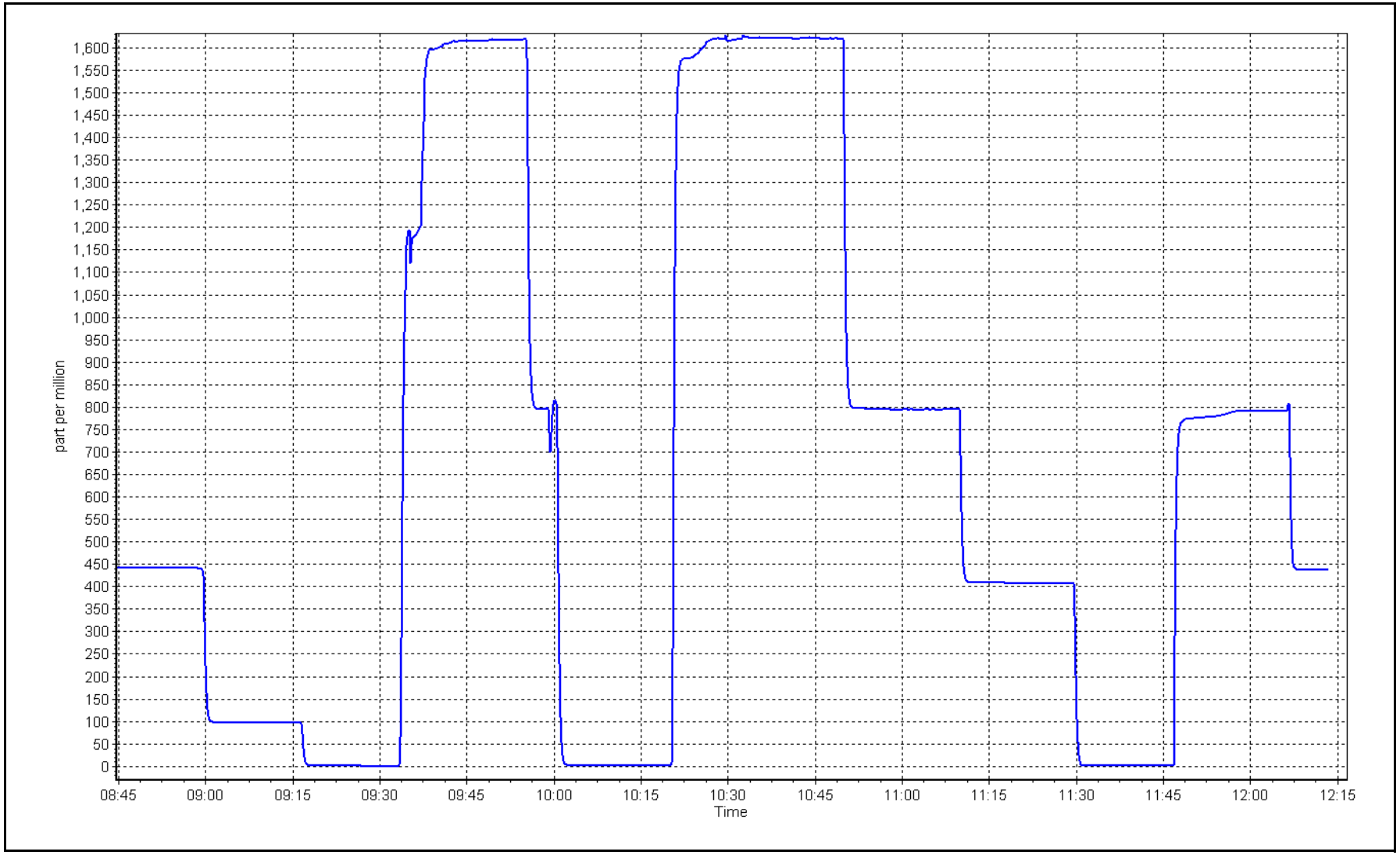
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	1.0	----
1605.9	1620.1	0.9912
802.9	794.4	1.0107
401.5	407.0	0.9864

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999857	*≥0.995*
Slope	1.006830	*0.90 - 1.10*
Intercept	-1.740000	*+/-20*



CO_2 Calibration Plot Date: February 15, 2023 Location: Fort Chipewyan



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS09
BARGE LANDING
FEBRUARY 2023

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

March 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	February 3, 2023	Last Cal Date:	January 13, 2023
Start time (MST):	10:20	End time (MST):	13:38
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.994624	1.002493	Backgd or Offset:	9.8	9.8
Calibration intercept:	-0.310040	0.431711	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	803.0	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	----
high point	4919	80.2	801.5	804.0	0.997
second point	4959	40.1	400.8	401.9	0.997
third point	4980	20.0	199.8	201.0	0.994
as left zero	5000	0.0	0.0	0.3	----
as left span	4919	80.2	801.5	804.0	0.997
				Average Correction Factor	0.996

Baseline Corr As found:	802.90	Previous response	796.87	*% change	0.8%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

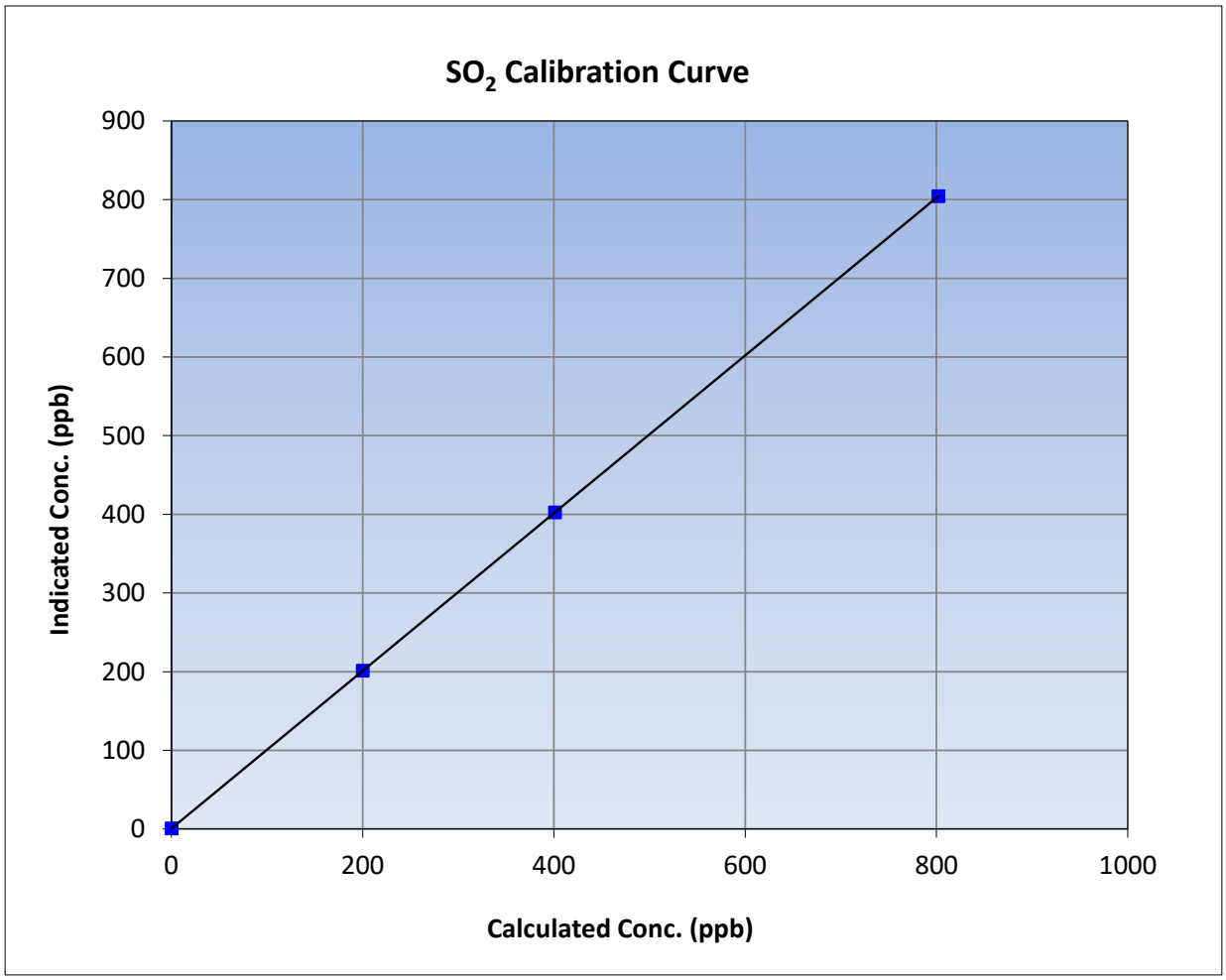
Station Information

Calibration Date:	February 3, 2023	Previous Calibration:	January 13, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:20	End Time (MST):	13:38
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148498

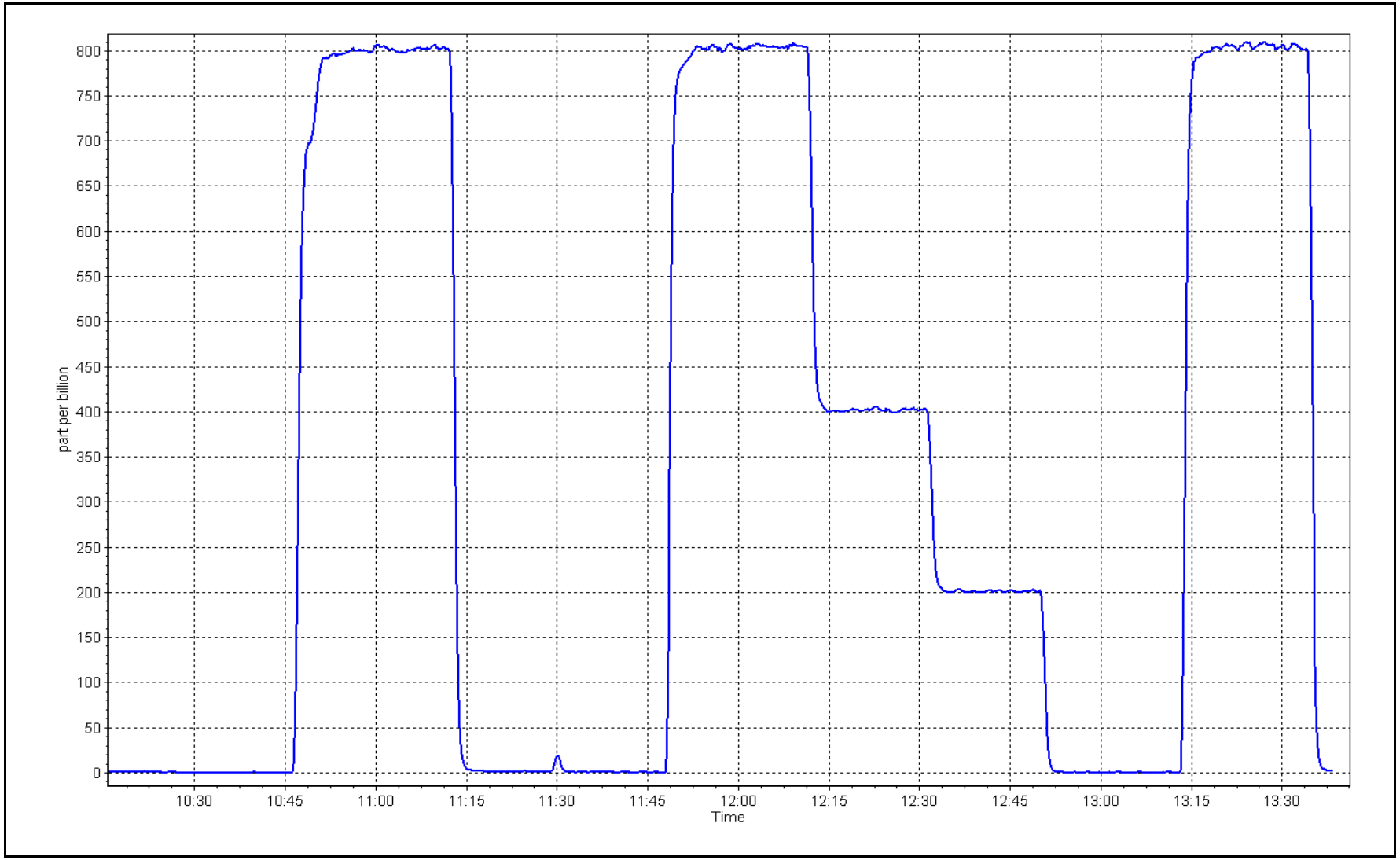
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
801.5	804.0	0.9969
400.8	401.9	0.9971
199.8	201.0	0.9942

Statistical Evaluation		Limits
Correlation Coefficient	1.000000	≥0.995
Slope	1.002493	0.90 - 1.10
Intercept	0.431711	+/-30



SO2 Calibration Plot Date: February 3, 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:	February 28, 2023	Last Cal Date:	January 23, 2023
Start time (MST):	10:44	End time (MST):	19:03
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	1.003148	Backgd or Offset:	2.52	2.65
Calibration intercept:	-0.000990	-0.000990	Coeff or Slope:	1.091	1.094

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4918	82.1	80.0	79.9	1.002
as found 2nd point	4959	41.1	40.0	40.1	1.001
as found 3rd point	4979	20.5	20.0	20.1	0.998
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	80.2	0.997
second point	4959	41.1	40.0	40.2	0.996
third point	4979	20.5	20.0	20.0	0.998
as left zero	5000	0.0	0.0	0.1	----
as left span	4918	82.1	80.0	80.4	0.995
SO2 Scrubber Check	4920	80.2	802.0	0.1	----
Date of last scrubber change:		28-Feb-23		Ave Corr Factor	0.997
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.8	Prev response:	80.21	*% change:	-0.5%
Baseline Corr 2nd AF pt:	40.0	AF Slope:	0.997717	AF Intercept:	0.139041
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999999		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. Changed scrubber beads after elevated 40ppb cal point. Second scrubber check passed. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

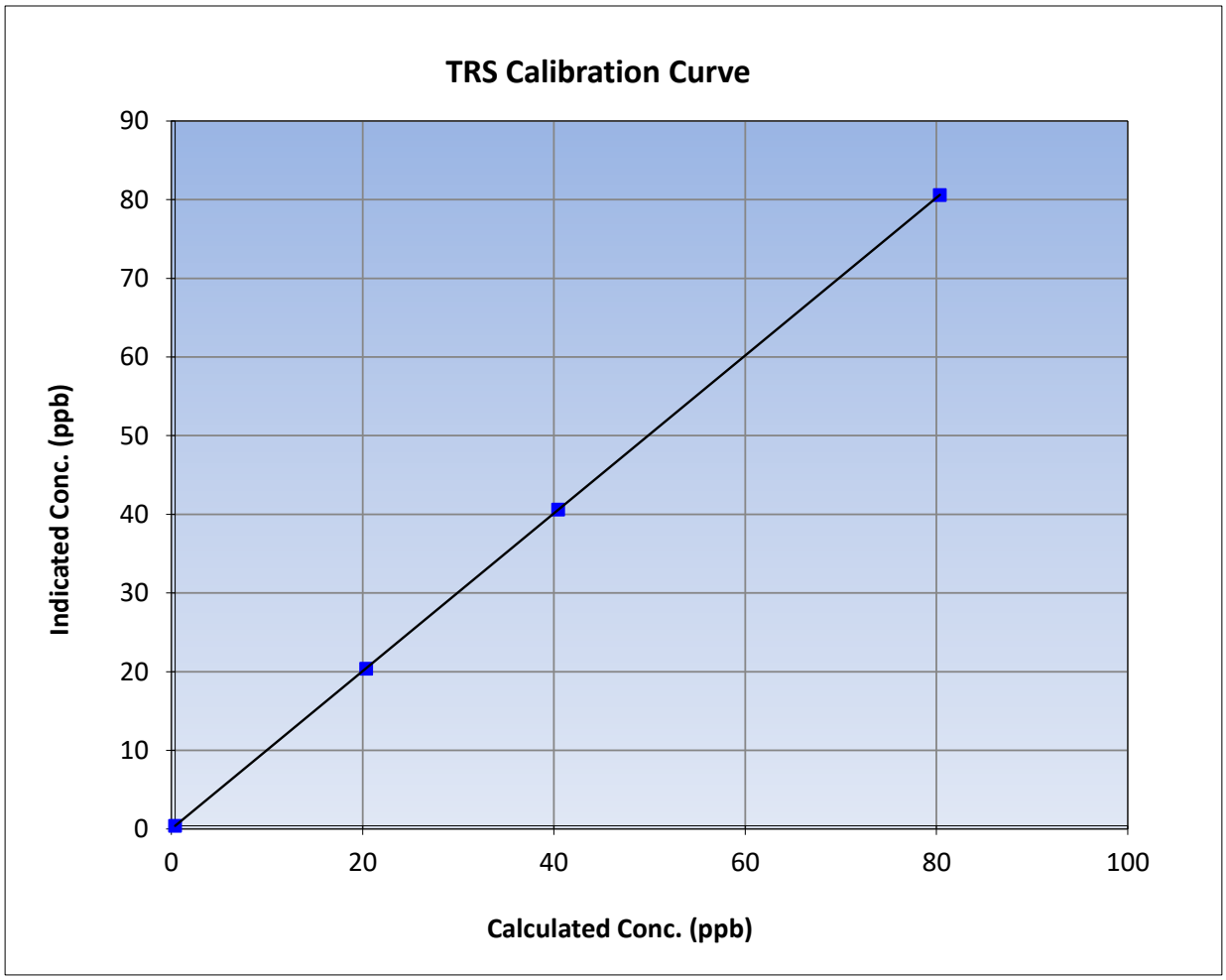
Station Information

Calibration Date:	February 28, 2023	Previous Calibration:	January 23, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:44	End Time (MST):	19:03
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1331259320

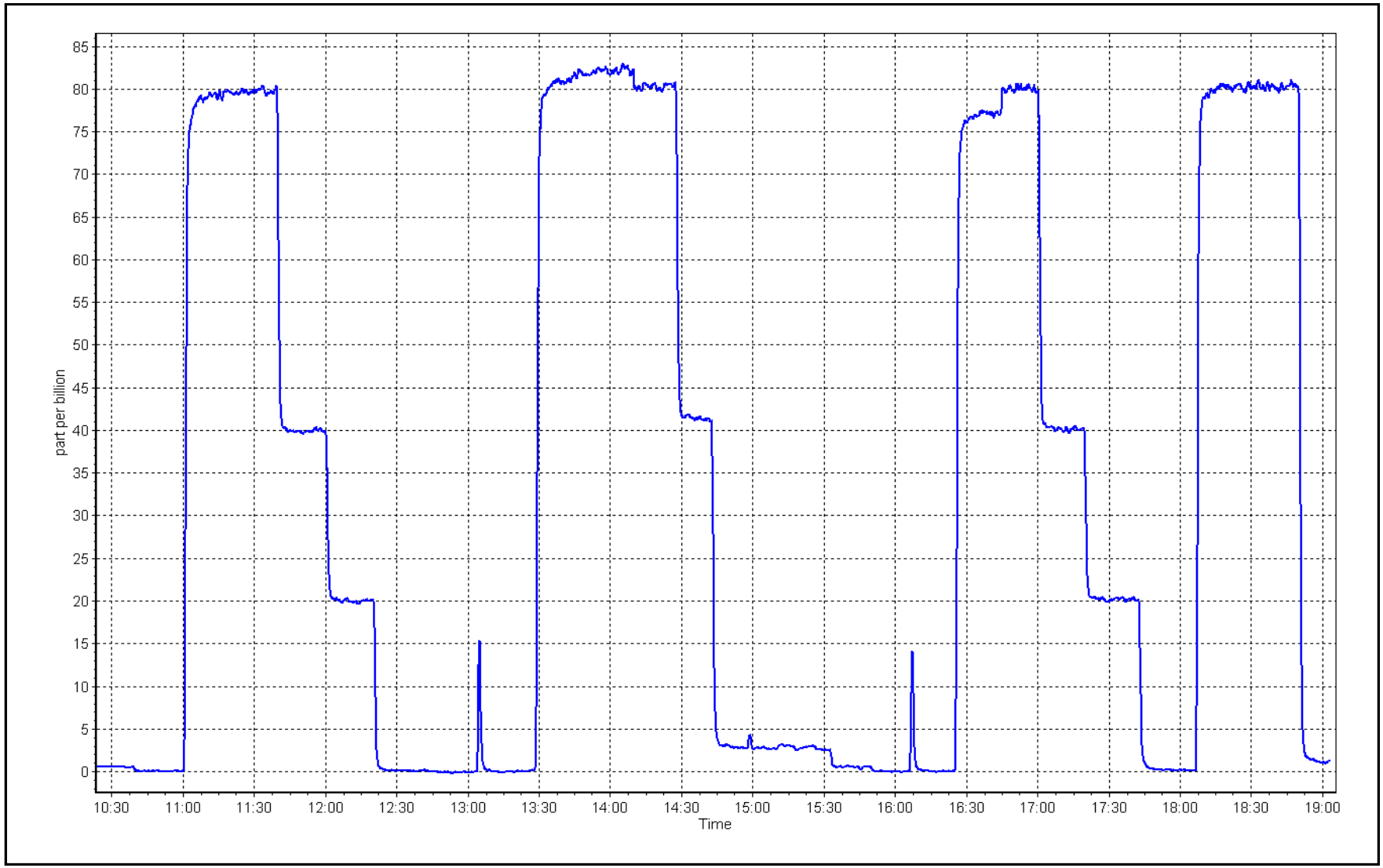
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.2	0.9971
40.0	40.2	0.9958
20.0	20.0	0.9984

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	1.003148	*0.90 - 1.10*
Intercept	-0.000990	*+/-3*



TRS Calibration Plot Date: February 28, 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:	February 3, 2023	Last Cal Date:	January 13, 2023
Start time (MST):	10:20	End time (MST):	13:38
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	1.99E-04	NMHC SP Ratio:	4.28E-05	4.28E-05
CH4 Retention time:	12.2	12.2	NMHC Peak Area:	213327	213327

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	80.2	17.12	17.07	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	17.12	17.13	0.999
second point	4960	40.1	8.56	8.48	1.009
third point	4980	20.0	4.27	4.20	1.016
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	1.008
Baseline Corr AF:	17.07	Prev response	17.11	*% change	-0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.0	----
as found span	4919	80.2	9.14	9.08	1.006
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	9.14	9.09	1.005
second point	4960	40.1	4.57	4.51	1.013
third point	4980	20	2.28	2.22	1.025
as left zero	5000	0	0.00	0.00	----
as left span	4919	80.2	9.14	9.07	1.007
				Average Correction Factor	1.014
Baseline Corr AF:	9.08	Prev response	9.15	*% change	-0.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	80.2	7.98	7.99	0.999
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	7.98	8.04	0.993
second point	4960	40.1	3.99	3.97	1.006
third point	4980	20.0	1.99	1.98	1.005
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	7.98	8.03	0.994
				Average Correction Factor	1.001
Baseline Corr AF:	7.99	Prev response	7.95	*% change	0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.002709	1.001427
THC Cal Offset:	-0.059558	-0.043961
CH4 Cal Slope:	1.000454	1.007423
CH4 Cal Offset:	-0.035549	-0.020126
NMHC Cal Slope:	1.004517	0.996127
NMHC Cal Offset:	-0.024610	-0.024834

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

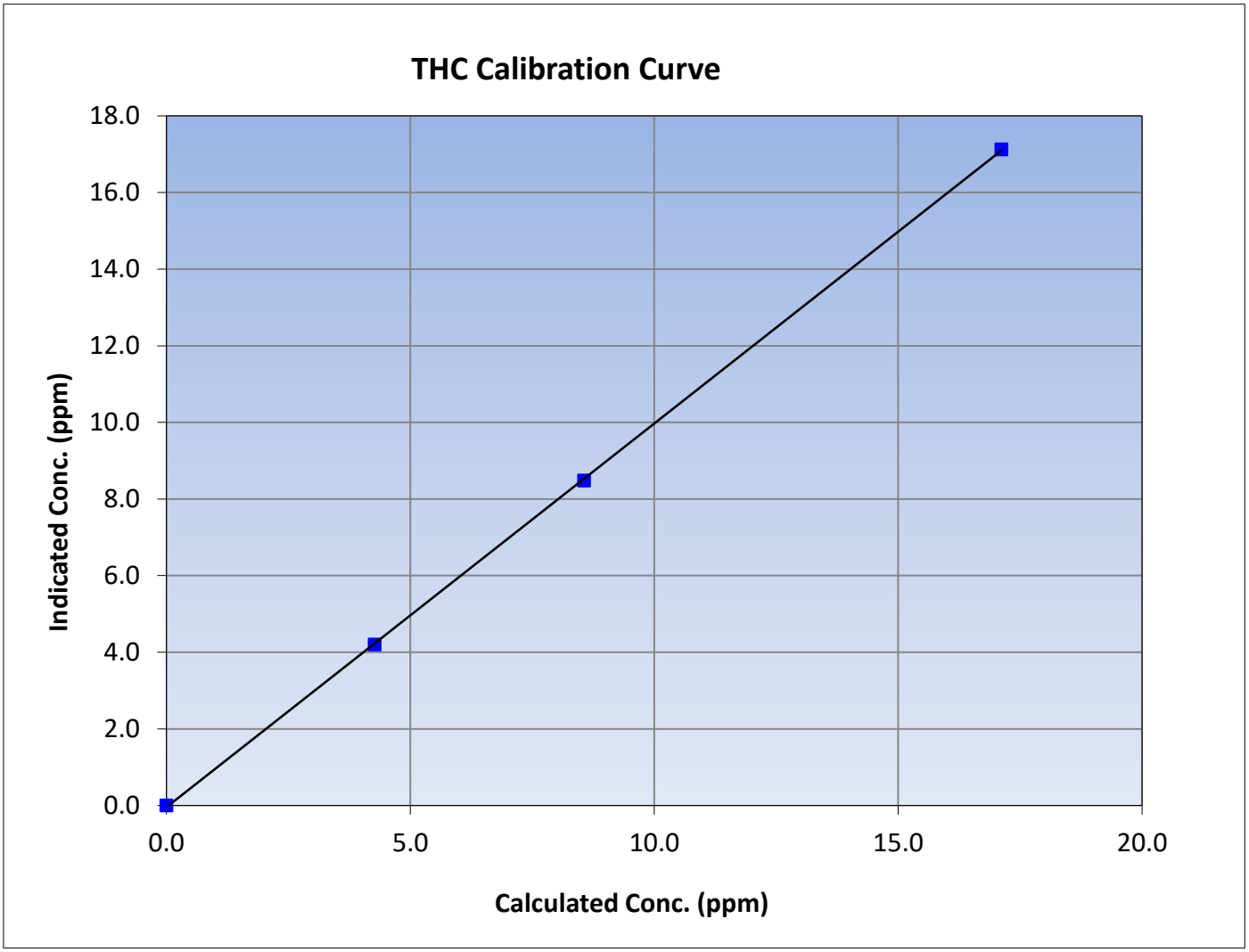
Version-01-2020

Station Information

Calibration Date:	February 3, 2023	Previous Calibration:	January 13, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:20	End Time (MST):	13:38
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	0.999964	*≥0.995*
17.12	17.13	0.9994			
8.56	8.48	1.0092	Slope	1.001427	*0.90 - 1.10*
4.27	4.20	1.0156			
			Intercept	-0.043961	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

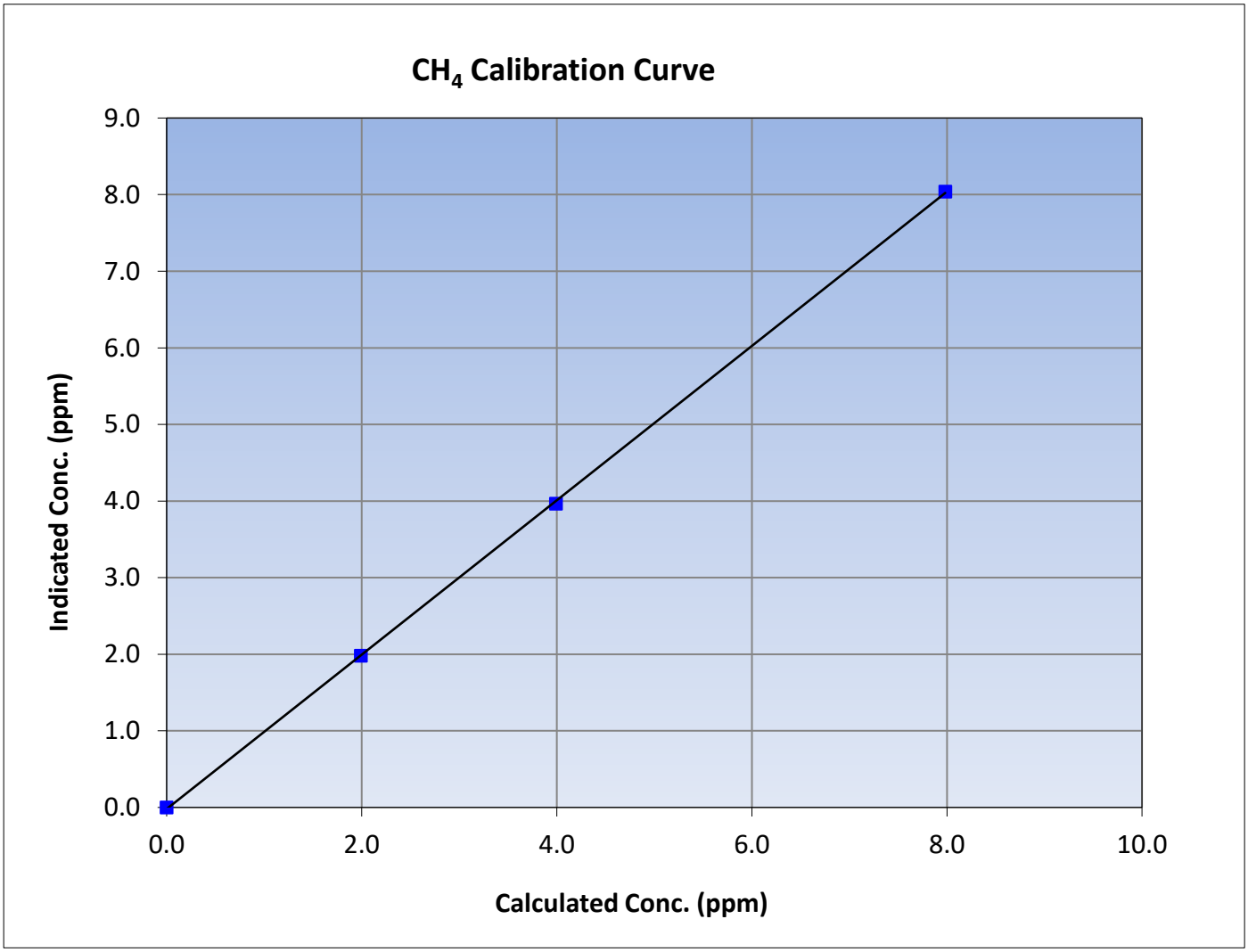
Version-01-2020

Station Information

Calibration Date:	February 3, 2023	Previous Calibration:	January 13, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:20	End Time (MST):	13:38
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	0.999946	*≥0.995*
7.98	8.04	0.9929			
3.99	3.97	1.0062	Slope	1.007423	*0.90 - 1.10*
1.99	1.98	1.0047			
			Intercept	-0.020126	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

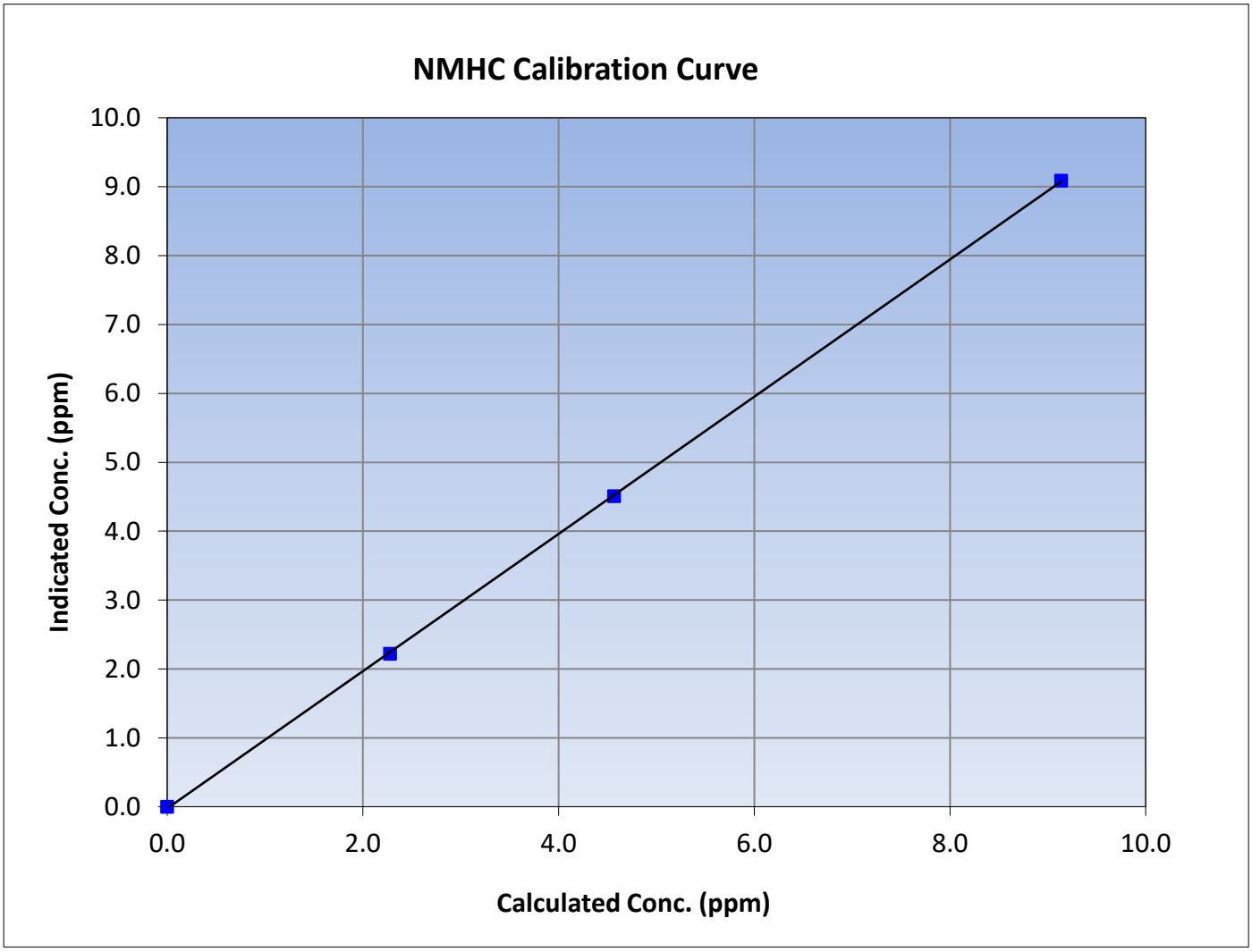
Version-01-2020

Station Information

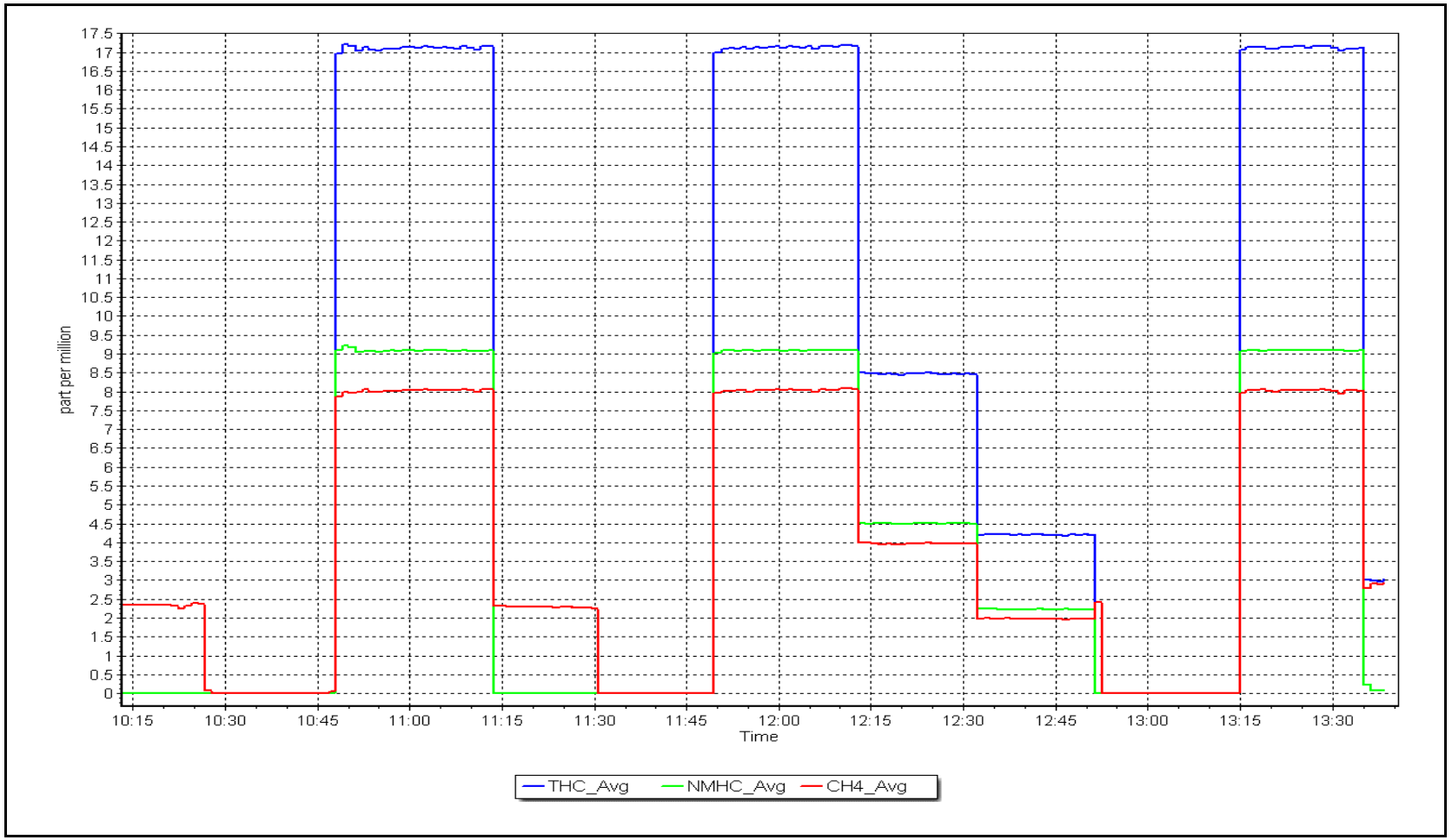
Calibration Date:	February 3, 2023	Previous Calibration:	January 13, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:20	End Time (MST):	13:38
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050131

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999966	*≥0.995*
9.14	9.09	1.0051			
4.57	4.51	1.0130	Slope	0.996127	*0.90 - 1.10*
2.28	2.22	1.0252			
			Intercept	-0.024834	*+/-0.5*



NMHC Calibration Plot Date: February 3, 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:	February 22, 2023	Last Cal Date:	January 20, 2023
Start time (MST):	9:55	End time (MST):	14:48
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:	1.182	1.146	NO bkgnd or offset:	10.6	10.3
NOX coeff or slope:	0.996	0.996	NOX bkgnd or offset:	10.6	10.3
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	172.5	179.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.998369	0.998455
NO_X Cal Offset:	0.728922	0.648644
NO Cal Slope:	0.997899	1.000928
NO Cal Offset:	-0.272767	-0.732611
NO_2 Cal Slope:	1.000917	1.000063
NO_2 Cal Offset:	0.473394	-1.156786

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	4919	80.5	805.1	800.3	4.8	834.7	826.6	8.2	0.965	0.968
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.3	0.1	0.1	----	----
high point	4919	80.5	805.1	800.3	4.8	804.3	800.7	3.5	1.001	0.999
second point	4959	40.2	402.1	399.7	2.4	402.3	398.8	3.5	0.999	1.002
third point	4979	20.1	201.0	199.8	1.2	201.7	198.5	3.2	0.997	1.007
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	444.9	360.2	796.7	440.0	356.7	1.011	1.011
								Average Correction Factor	0.999	1.003

Corrected As found	NO_X = 834.7 ppb	NO = 826.6 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	3.6%
Previous Response	NO_X = 804.5 ppb	NO = 798.3 ppb		*Percent Change	NO =	3.4%
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)	794.9	439.5	360.2	359.5	1.002	99.8%
2nd GPT point (200 ppb O3)	794.9	662.8	136.9	135.4	1.011	98.9%
3rd GPT point (100 ppb O3)	794.9	726.9	72.8	70.4	1.035	96.7%
				Average Correction Factor	1.016	98.4%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

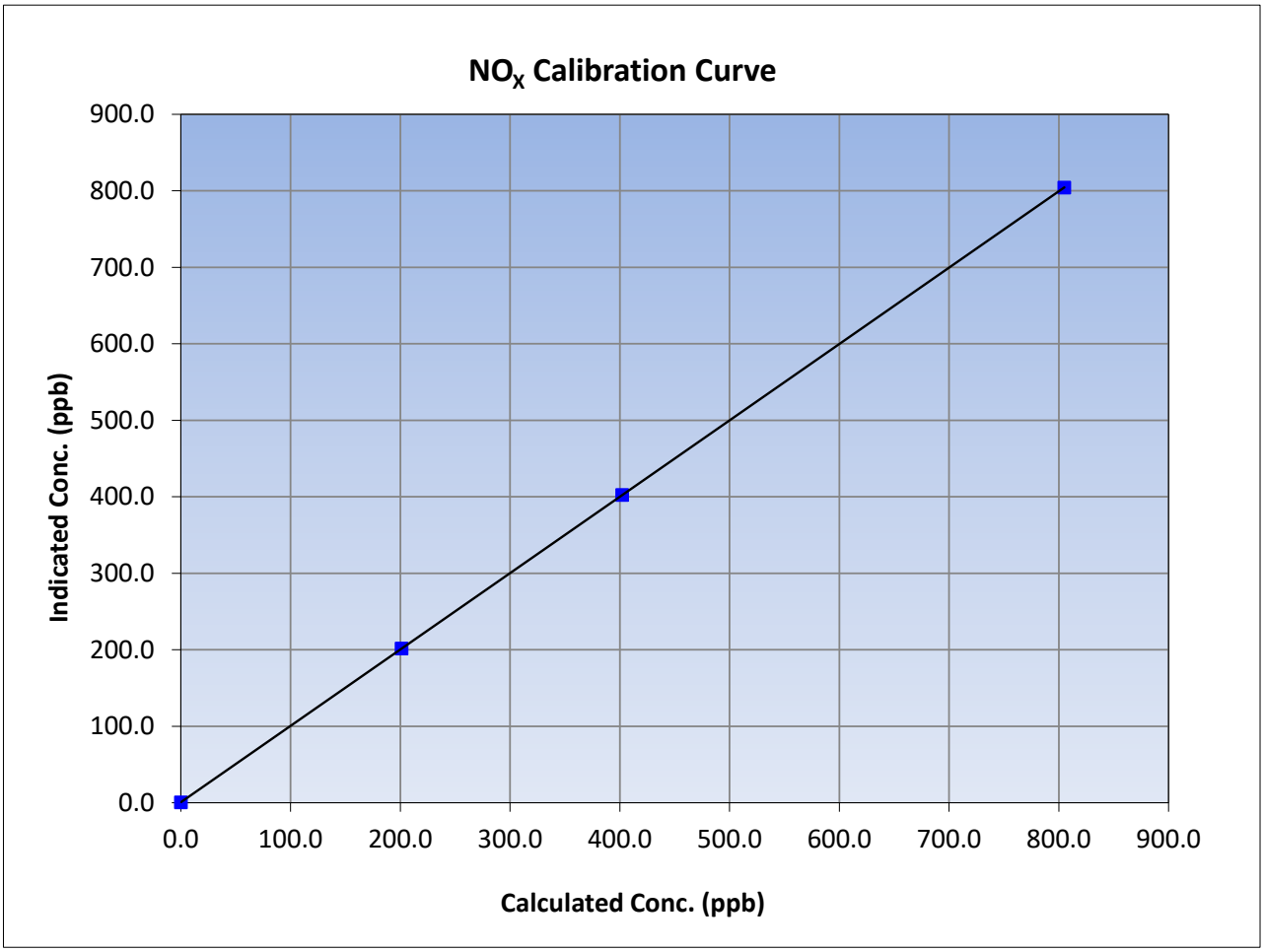
Version-04-2020

Station Information

Calibration Date:	February 22, 2023	Previous Calibration:	January 20, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:55	End Time (MST):	14:48
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	0.3	----	Correlation Coefficient	0.999999	≥0.995
805.1	804.3	1.0010			
402.1	402.3	0.9994	Slope	0.998455	0.90 - 1.10
201.0	201.7	0.9967			
			Intercept	0.648644	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

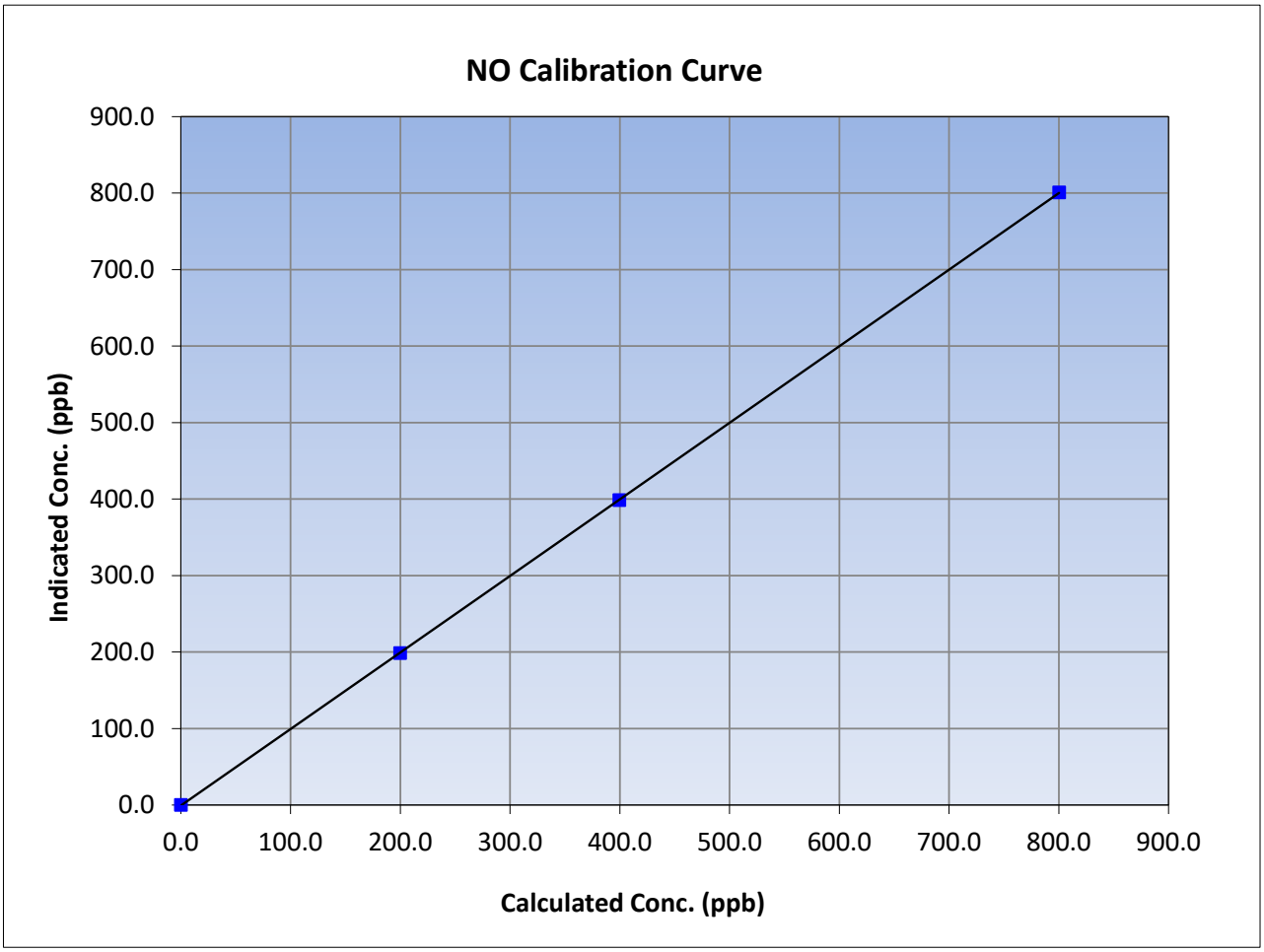
Version-04-2020

Station Information

Calibration Date:	February 22, 2023	Previous Calibration:	January 20, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:55	End Time (MST):	14:48
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	0.999995	≥0.995
800.3	800.7	0.9994			
399.7	398.8	1.0021	Slope	1.000928	0.90 - 1.10
199.8	198.5	1.0067			
			Intercept	-0.732611	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

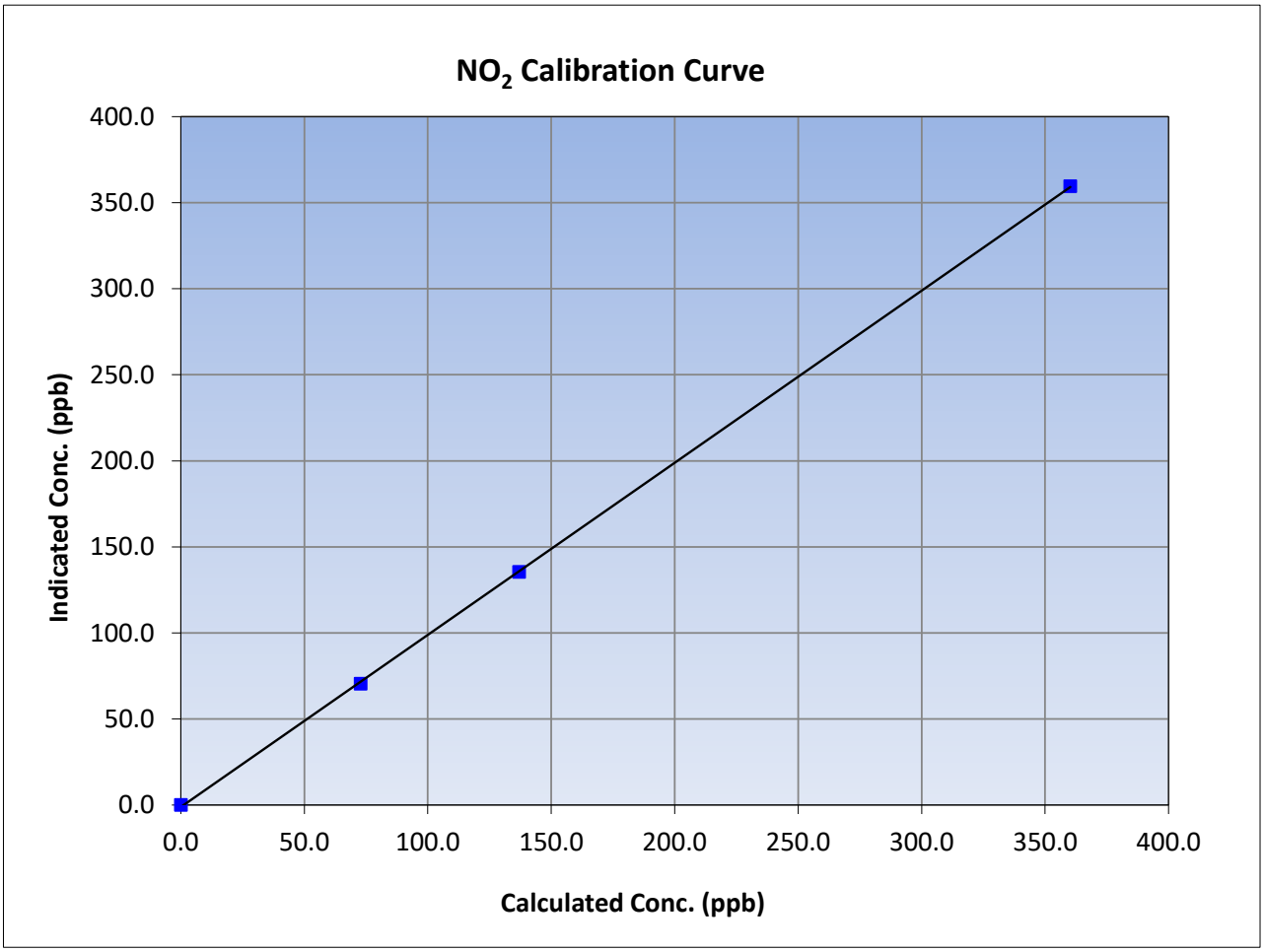
Version-04-2020

Station Information

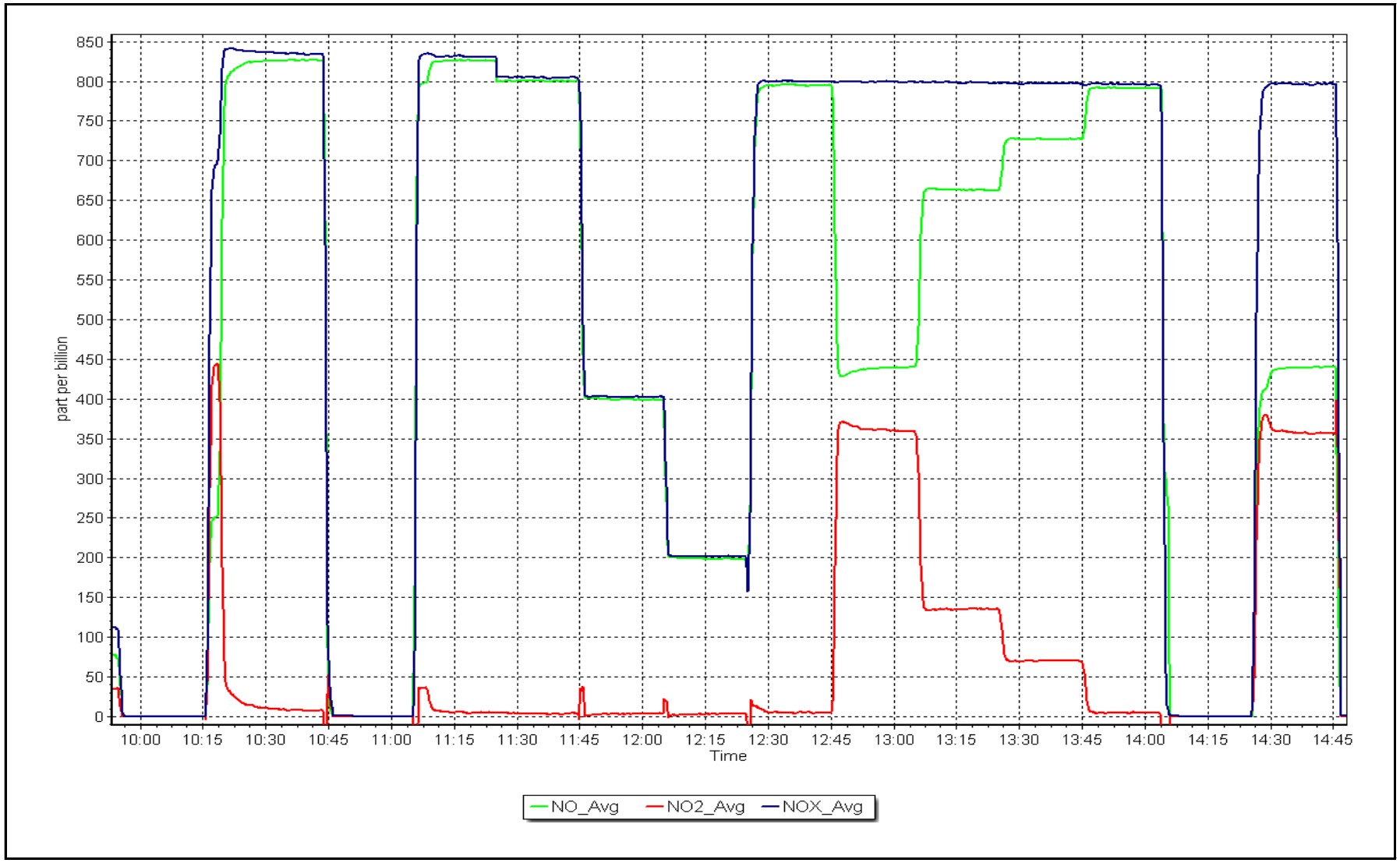
Calibration Date:	February 22, 2023	Previous Calibration:	January 20, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:55	End Time (MST):	14:48
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999951	≥0.995
360.2	359.5	1.0020			
136.9	135.4	1.0113	Slope	1.000063	0.90 - 1.10
72.8	70.4	1.0345			
			Intercept	-1.156786	+/-20



NO_X Calibration Plot Date: February 22, 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:	February 28, 2023	Last Cal Date:	January 27, 2023
Start time (MST):	10:46	End time (MST):	12:56
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)	-15.7	-16.3	-15.7	☐	+/- 2 °C
P (mmHg)	733.1	734.6	733.1	☐	+/- 10 mmHg
flow (LPM)	4.99	5.16	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: February 28, 2023 Last Cal Date: January 27, 2023

PM w/o HEPA: 5.7 PM w/ HEPA: 0.2 <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	6.0	11.0	11.0	☐	11.3 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 5.7 w/ HEPA: 0.0

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: Initial leak check failed. PMT test was low before cleaning. Leak check after cleaning passed, PMT peak test passed after cleaning. No adjustments made.

Calibration by: Braiden Boutilier

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS11
LOWER CAMP
FEBRUARY 2023

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

March 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Lower Camp	Station number:	AMS11
Calibration Date:	February 7, 2023	Last Cal Date:	January 20, 2023
Start time (MST):	9:53	End time (MST):	13:19
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:	0.996844	0.992304	Backgd or Offset:	14.2	14.3
Calibration intercept:	-0.548951	-0.508143	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	0.1	----
as found span	4919	81.3	800.8	795.0	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4919	81.3	800.8	795.1	1.007
second point	4959	40.7	400.9	395.0	1.015
third point	4980	20.3	199.9	198.5	1.007
as left zero	5000	0.0	0.0	0.2	----
as left span	4919	81.3	800.8	795.7	1.006
				Average Correction Factor	1.010

Baseline Corr As found:	794.90	Previous response	797.68	*% 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 and N2 cylinder after as founds. No adjustments made.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

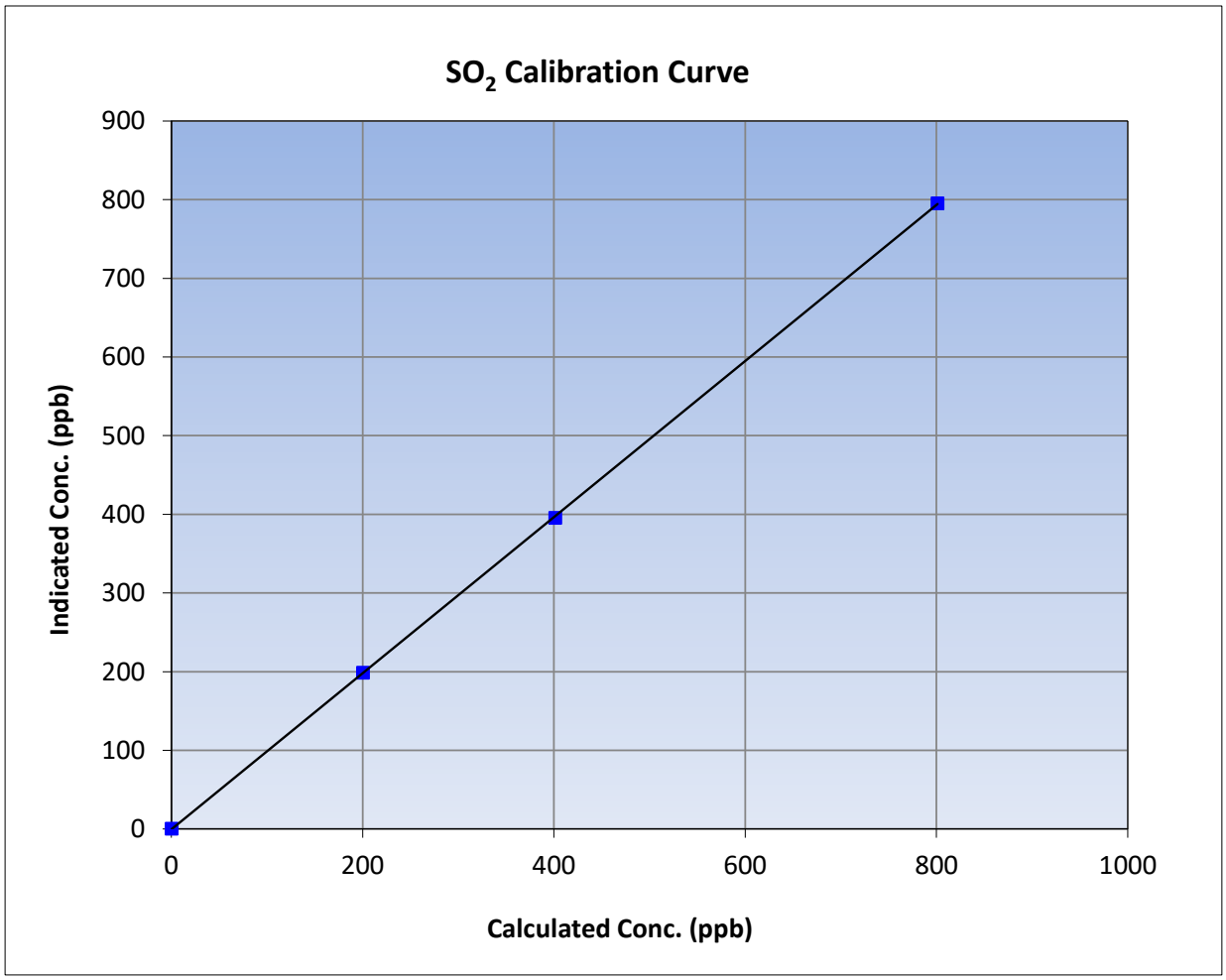
Station Information

Calibration Date:	February 7, 2023	Previous Calibration:	January 20, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:53	End Time (MST):	13:19
Analyzer make:	Thermo 43i	Analyzer serial #:	100841398

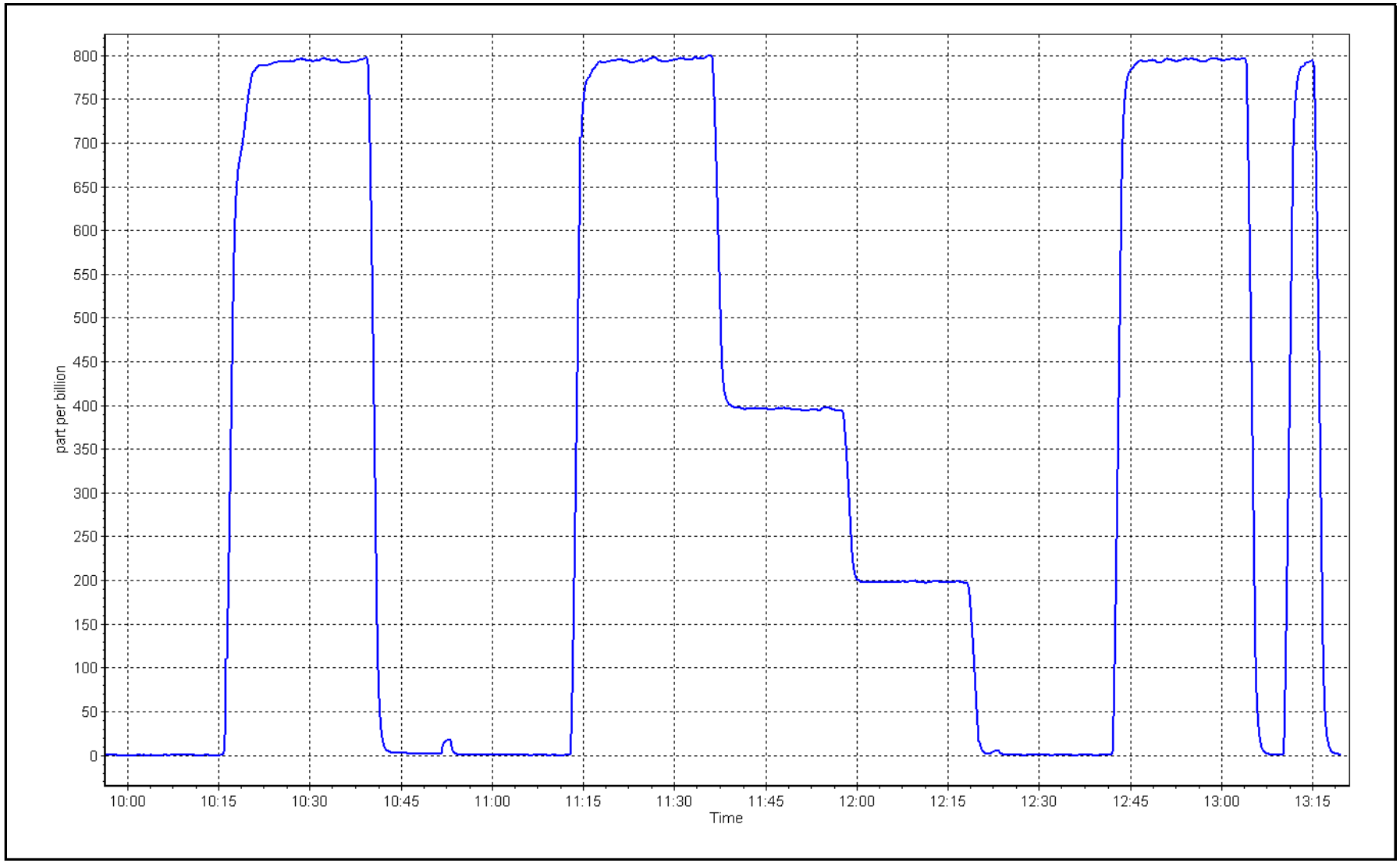
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
800.8	795.1	1.0071
400.9	395.0	1.0150
199.9	198.5	1.0073

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999979	*≥0.995*
Slope	0.992304	*0.90 - 1.10*
Intercept	-0.508143	*+/-30*



SO2 Calibration Plot Date: February 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:	February 8, 2023	Last Cal Date:	January 19, 2023
Start time (MST):	10:06	End time (MST):	14:47
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 450iQ		Analyzer serial #:	CM20080003	
Converter make:	NA		Converter serial #:	NA	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000040	0.997193	Backgd or Offset:	13.9	14.0
Calibration intercept:	0.055163	0.454865	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	0.2	----
as found span	4926	73.6	79.9	80.1	1.000
as found 2nd point	4963	36.8	40.0	39.9	1.007
as found 3rd point	4982	18.6	20.2	19.9	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	0.1	----
high point	4926	73.6	79.9	79.9	1.000
second point	4963	36.8	40.0	40.7	0.982
third point	4982	18.6	20.2	20.8	0.971
as left zero	5000	0.0	0.0	0.8	----
as left span	4926	73.6	79.9	80.4	0.994
SO2 Scrubber Check	4919	81.1	811.0	0.4	----
Date of last scrubber change:				Ave Corr Factor	0.984
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.9	Prev response:	79.98	*% change:	-0.1%
Baseline Corr 2nd AF pt:	39.7	AF Slope:	1.001457	AF Intercept:	-0.044467
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999956		

* = > +/-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

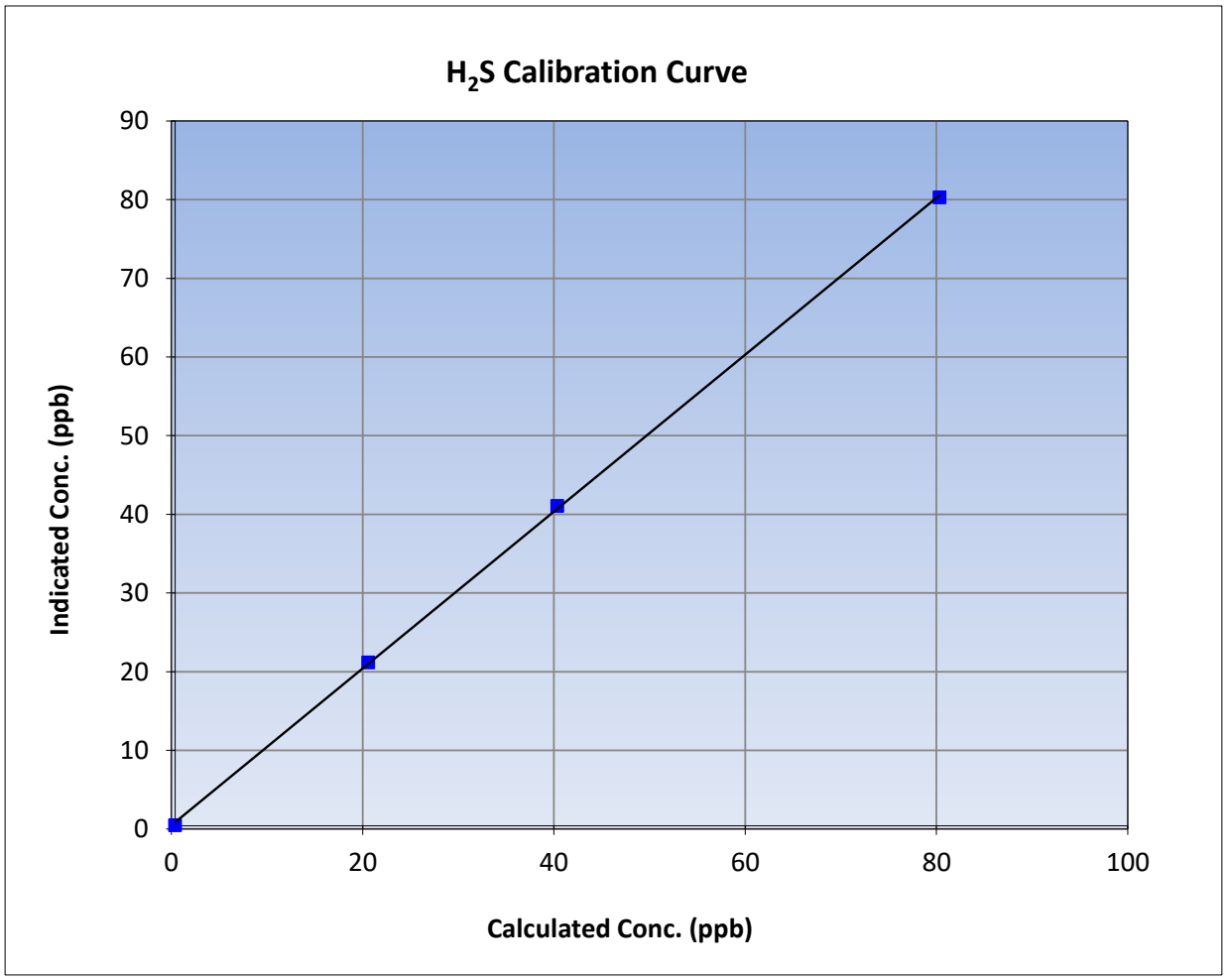
Station Information

Calibration Date:	February 8, 2023	Previous Calibration:	January 19, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:06	End Time (MST):	14:47
Analyzer make:	Thermo 450iQ	Analyzer serial #:	CM20080003

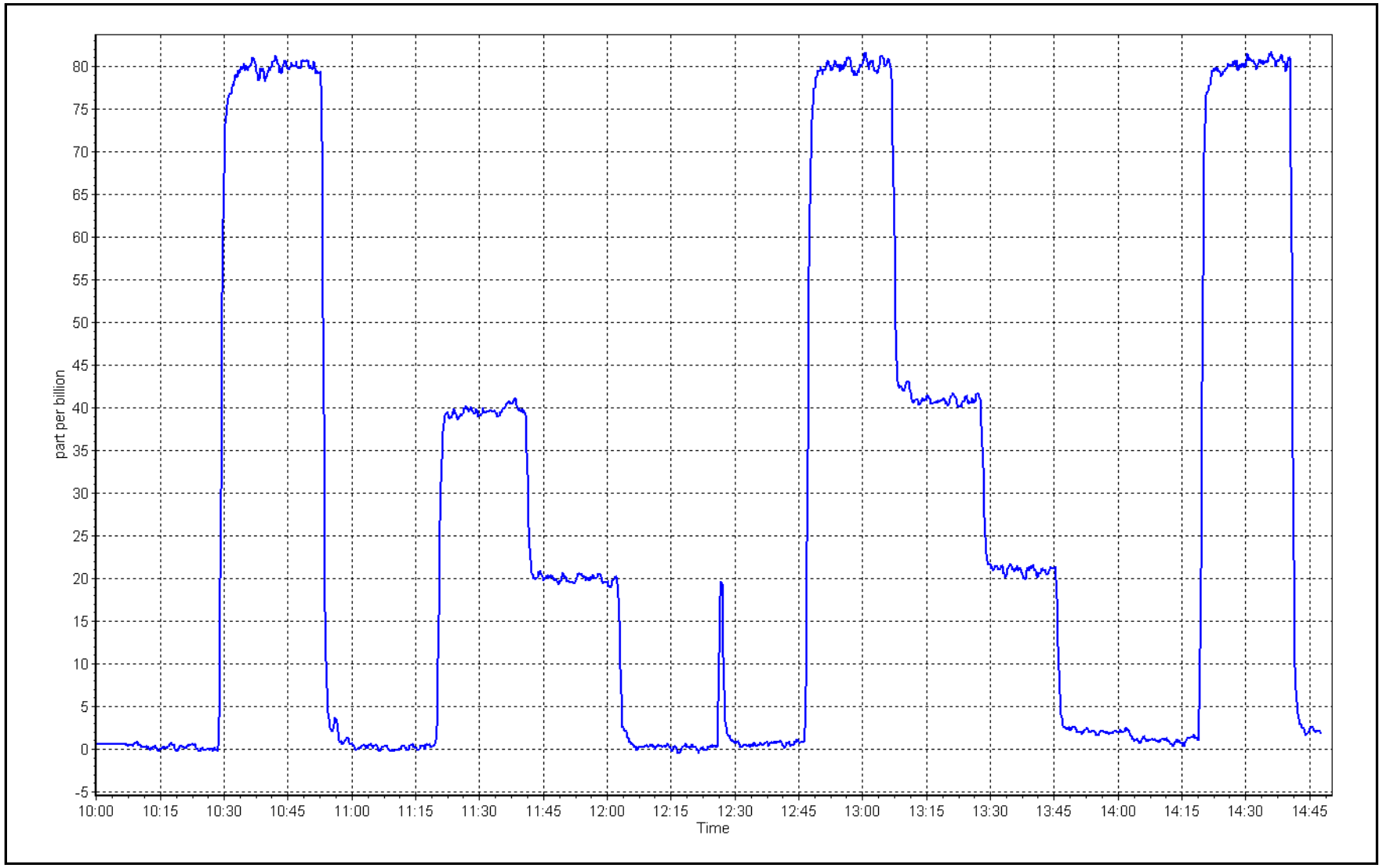
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
79.9	79.9	1.0003
40.0	40.7	0.9818
20.2	20.8	0.9708

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999887	*≥0.995*
Slope	0.997193	*0.90 - 1.10*
Intercept	0.454865	*+/-3*



H_2S Calibration Plot Date: February 8, 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:	February 7, 2023	Last Cal Date:	January 20, 2023
Start time (MST):	9:53	End time (MST):	13:19
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	3.09E-04	NMHC SP Ratio:	5.97E-05	5.97E-05
CH4 Retention time:	14.0	14.0	NMHC Peak Area:	153551	153551

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	17.40	0.997
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	17.44	0.995
second point	4959	40.7	8.69	8.67	1.003
third point	4980	20.3	4.33	4.33	1.001
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	17.35	17.49	0.992
				Average Correction Factor	1.000

Baseline Corr AF:	17.40	Prev response	17.40	*% 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	81.3	9.19	9.18	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.3	9.19	9.20	0.999
second point	4959	40.7	4.60	4.58	1.004
third point	4980	20.3	2.29	2.29	1.001
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	9.19	9.25	0.994
				Average Correction Factor	1.002
Baseline Corr AF:	9.18	Prev response	9.19	*% 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	81.3	8.16	8.23	0.992
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	8.23	0.992
second point	4959	40.7	4.09	4.09	1.000
third point	4980	20.3	2.04	2.04	1.000
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	8.16	8.24	0.990
				Average Correction Factor	0.997
Baseline Corr AF:	8.23	Prev response	8.21	*% change	0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.004292	1.004951
THC Cal Offset:	-0.024989	-0.022988
CH4 Cal Slope:	1.007657	1.008833
CH4 Cal Offset:	-0.016486	-0.014688
NMHC Cal Slope:	1.001092	1.001278
NMHC Cal Offset:	-0.007903	-0.007900

Notes: Changed sample inlet filter and N2 cylinder after as founds. No adjustments made.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

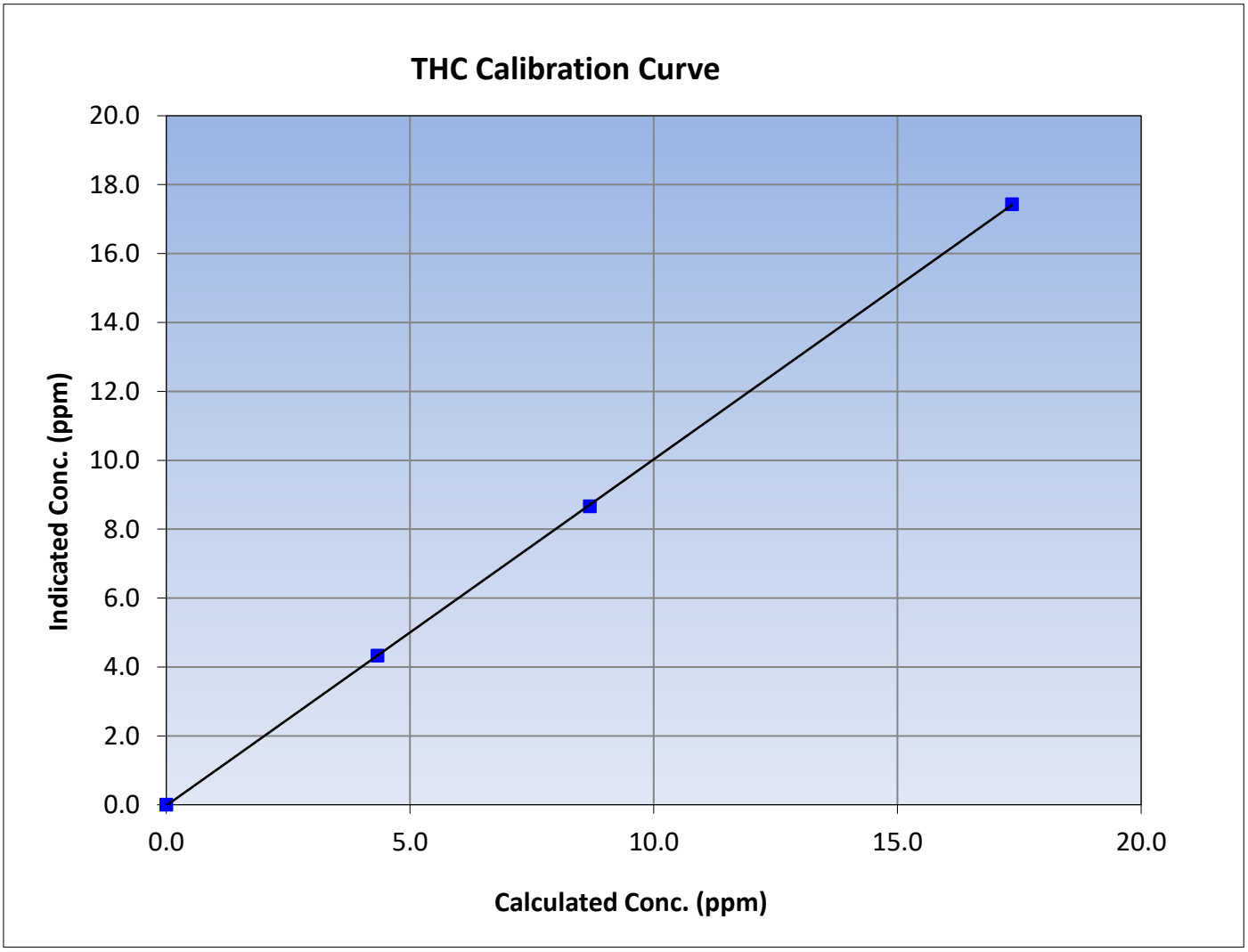
Version-01-2020

Station Information

Calibration Date:	February 7, 2023	Previous Calibration:	January 20, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:53	End Time (MST):	13:19
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	0.999983	*≥0.995*
17.35	17.44	0.9951			
8.69	8.67	1.0025	Slope	1.004951	*0.90 - 1.10*
4.33	4.33	1.0010			
			Intercept	-0.022988	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

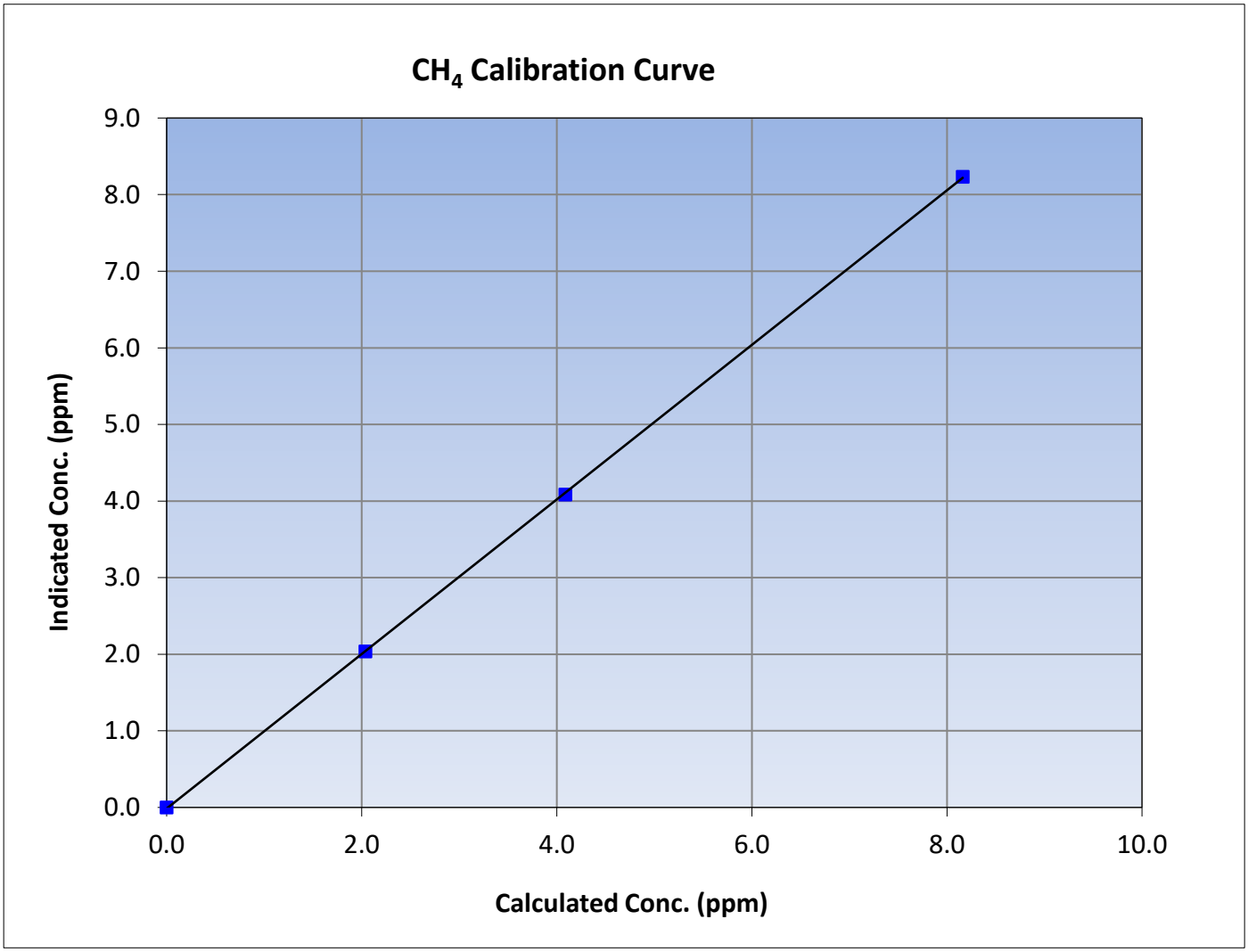
Version-01-2020

Station Information

Calibration Date:	February 7, 2023	Previous Calibration:	January 20, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:53	End Time (MST):	13:19
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	0.999975	*≥0.995*
8.16	8.23	0.9915			
4.09	4.09	1.0004	Slope	1.008833	*0.90 - 1.10*
2.04	2.04	1.0005			
			Intercept	-0.014688	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

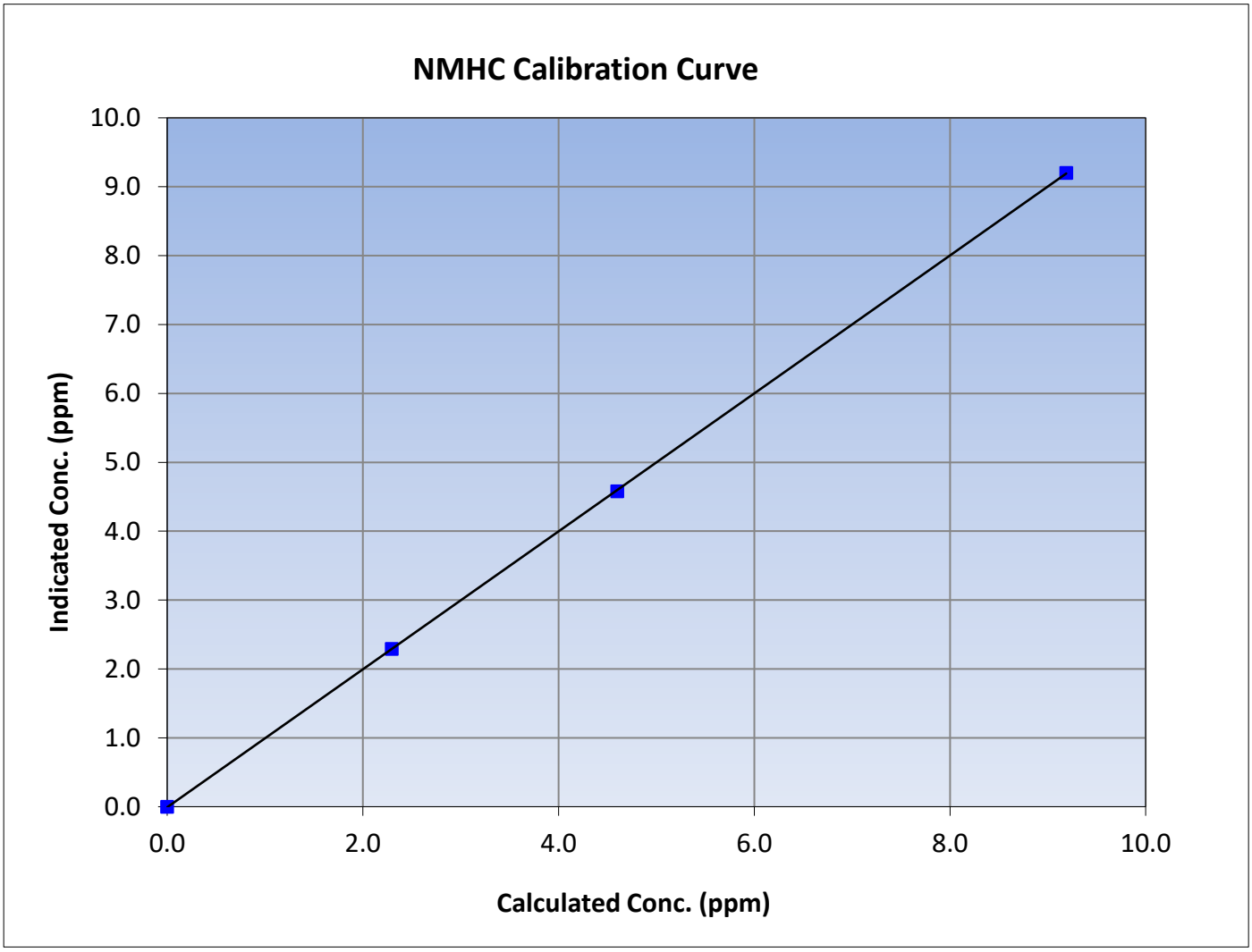
Version-01-2020

Station Information

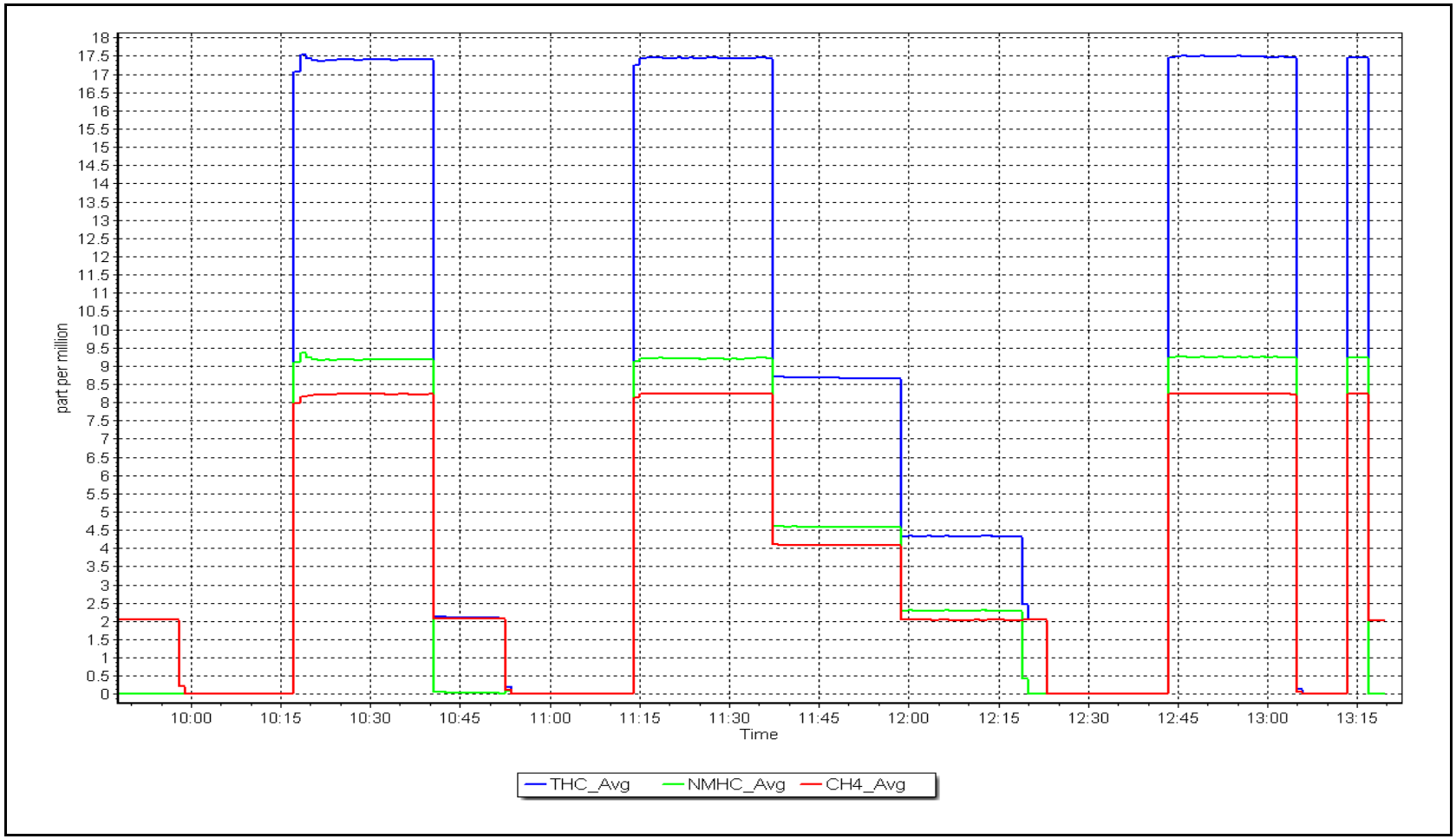
Calibration Date:	February 7, 2023	Previous Calibration:	January 20, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:53	End Time (MST):	13:19
Analyzer make:	Thermo 55i	Analyzer serial #:	1505164381

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	9.20	0.9986			
4.60	4.58	1.0045	Slope	1.001278	*0.90 - 1.10*
2.29	2.29	1.0014			
			Intercept	-0.007900	*+/-0.5*



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



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS13
FORT MCKAY SOUTH
FEBRUARY 2023

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

March 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	February 2, 2023	Last Cal Date:	January 16, 2023
Start time (MST):	9:48	End time (MST):	12:50
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:	1.003886	1.001413	Backgd or Offset:	79.7	77.5
Calibration intercept:	-3.178199	-2.738219	Coeff or Slope:	0.733	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	-0.9	----
as found span	4921	79.1	799.7	796.3	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4921	79.1	799.7	799.4	1.000
second point	4961	39.5	399.3	396.0	1.008
third point	4980	19.8	200.2	194.7	1.028
as left zero	5000	0.0	0.0	0.1	----
as left span	4921	79.1	799.7	798.9	1.001
				Average Correction Factor	1.012

Baseline Corr As found:	797.20	Previous response	799.61	*% 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. Adjusted zero and span.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

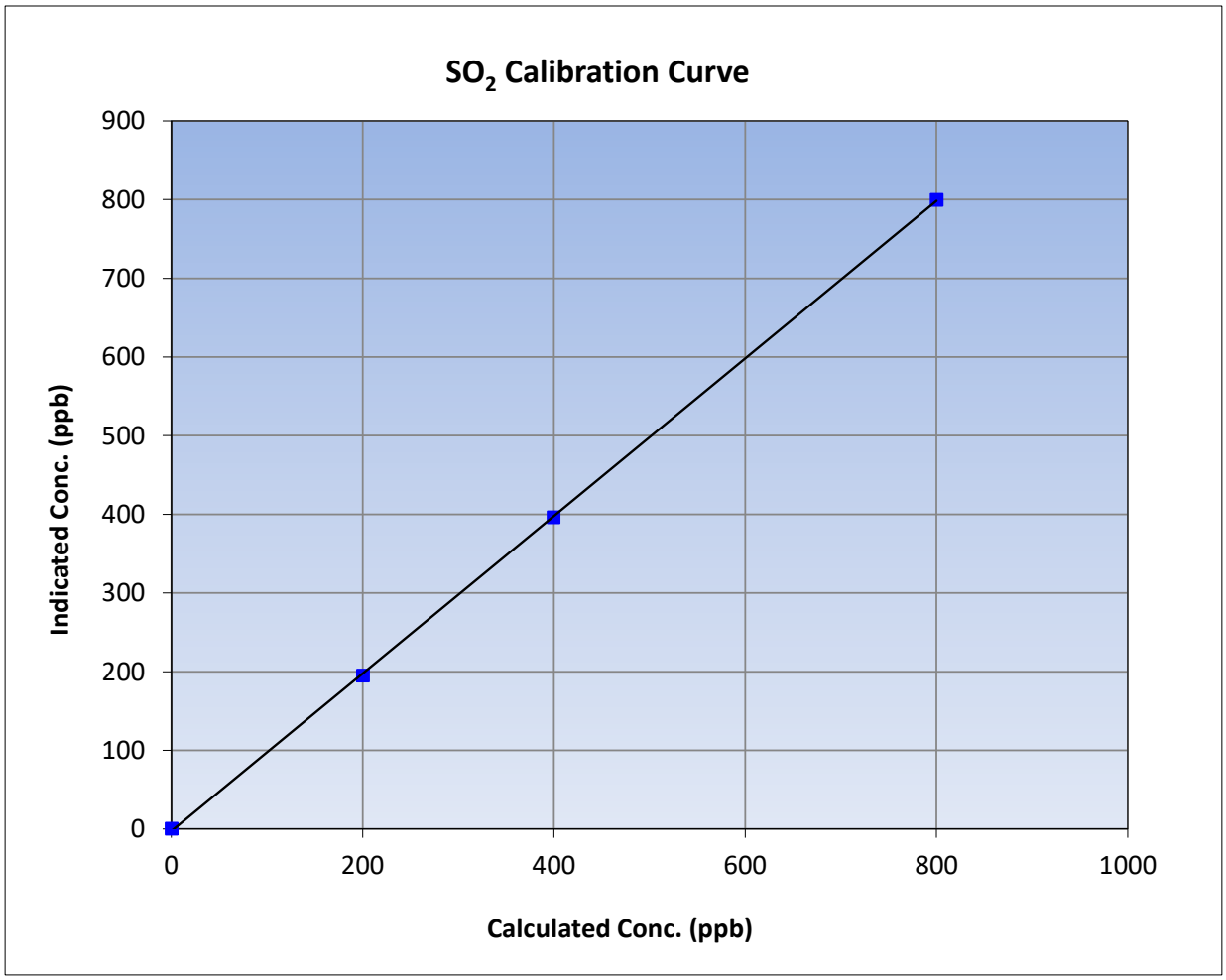
Station Information

Calibration Date:	February 2, 2023	Previous Calibration:	January 16, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	9:48	End Time (MST):	12:50
Analyzer make:	API T100	Analyzer serial #:	599

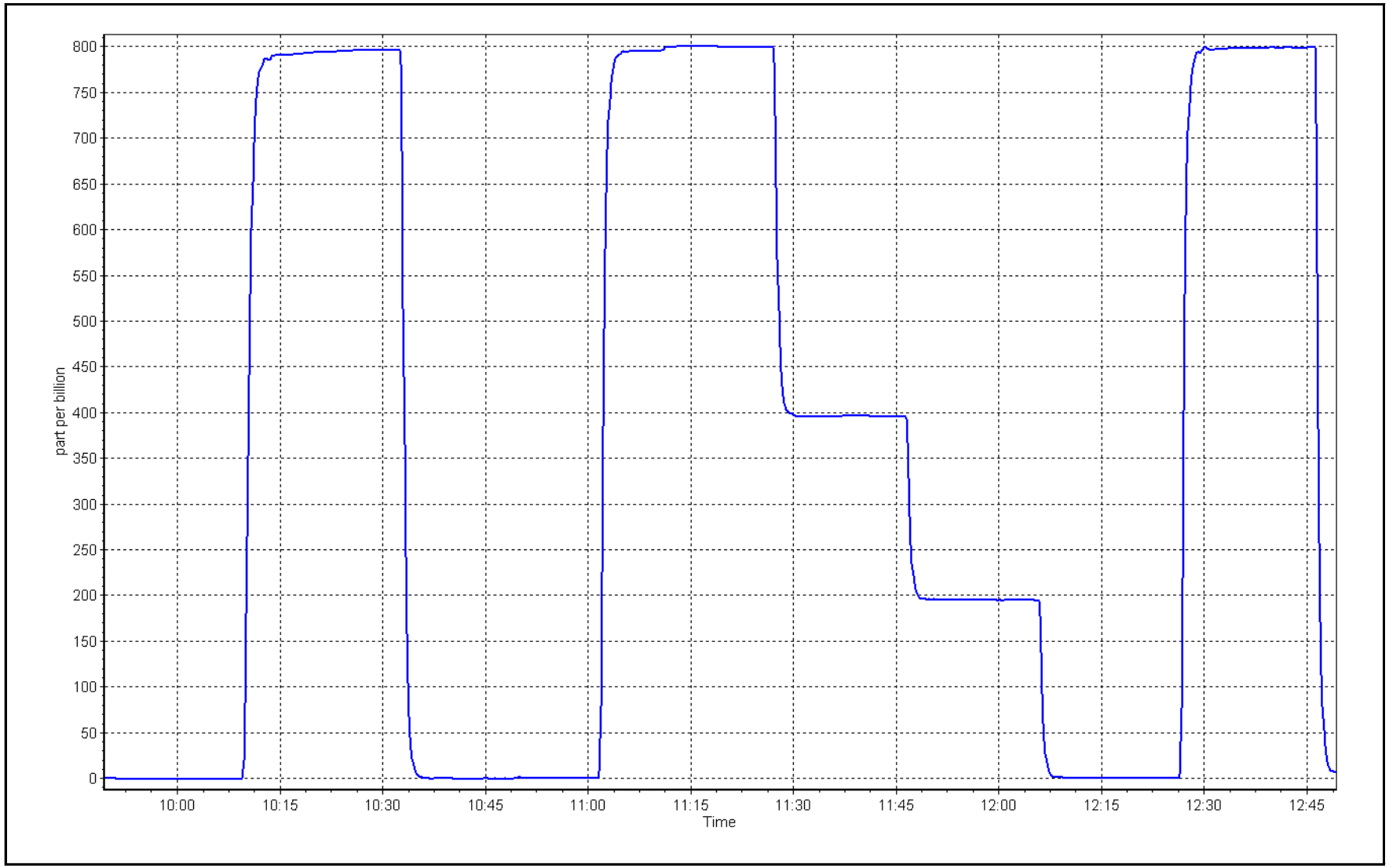
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
799.7	799.4	1.0004
399.3	396.0	1.0083
200.2	194.7	1.0282

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999942	*≥0.995*
Slope	1.001413	*0.90 - 1.10*
Intercept	-2.738219	*+/-30*



SO2 Calibration Plot Date: February 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:	February 7, 2023	Last Cal Date:	January 17, 2023
Start time (MST):	9:31	End time (MST):	14:05
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:	0.999228	1.002489	Backgd or Offset:	3.69	3.69
Calibration intercept:	-0.042157	-0.082182	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	80.6	1.002
as found 2nd point	4962	37.7	40.3	40.0	1.009
as found 3rd point	4981	18.9	20.2	19.6	1.035
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4925	75.5	80.6	80.8	0.998
second point	4962	37.7	40.3	40.3	0.999
third point	4981	18.9	20.2	19.9	1.014
as left zero	5000	0.0	0.0	0.3	----
as left span	4925	75.5	80.6	80.7	0.999
SO2 Scrubber Check	4921	79.1	791.0	0.0	----
Date of last scrubber change:		20-Mar-20		Ave Corr Factor	1.004
Date of last converter efficiency test:		NA			efficiency

Baseline Corr As found:	80.5	Prev response:	80.52	*% change:	0.0%
Baseline Corr 2nd AF pt:	39.9	AF Slope:	1.000788	AF Intercept:	-0.222185
Baseline Corr 3rd AF pt:	19.5	AF Correlation:	0.999924		

* = > +/-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

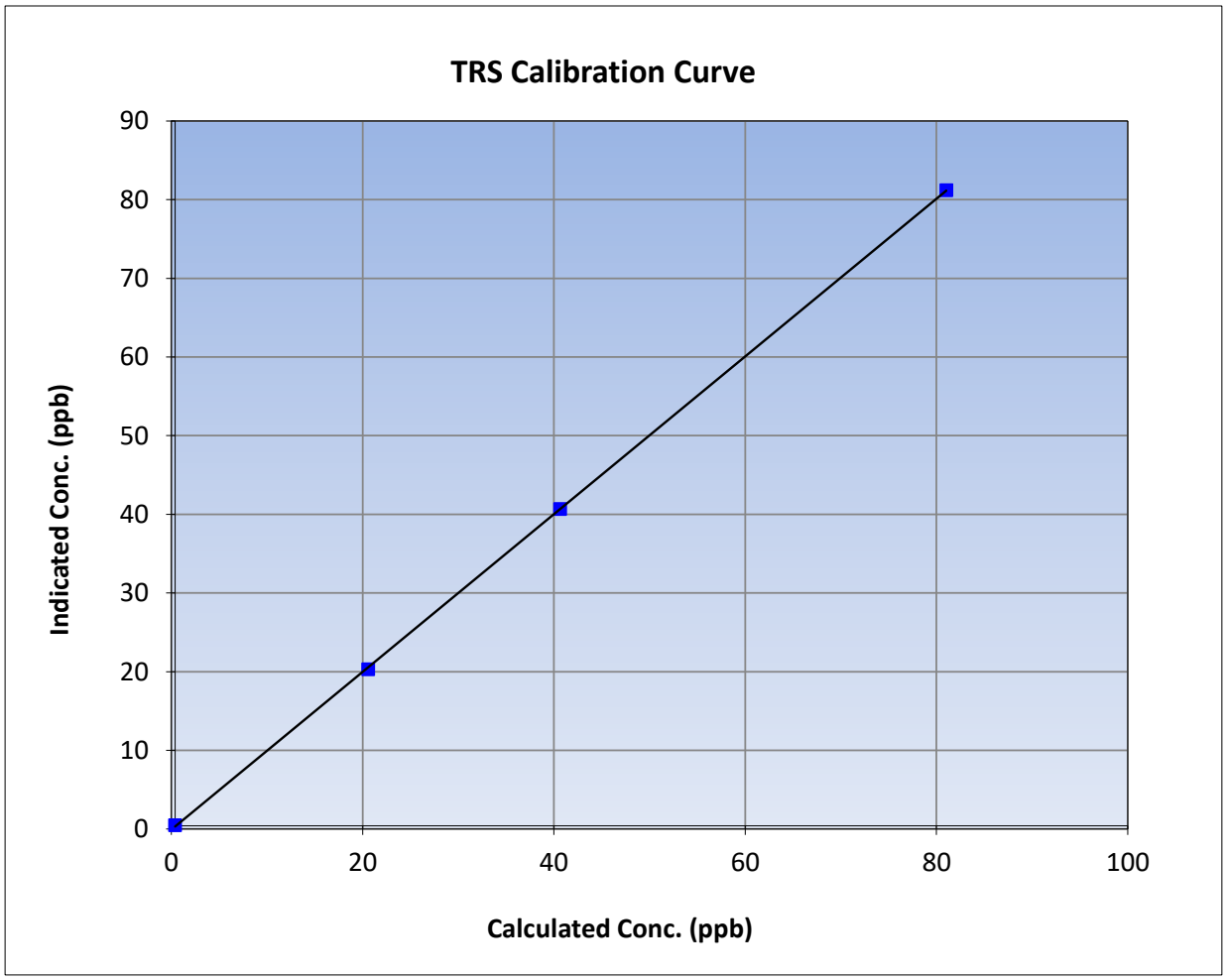
Station Information

Calibration Date:	February 7, 2023	Previous Calibration:	January 17, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	9:31	End Time (MST):	13:36
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1180540017

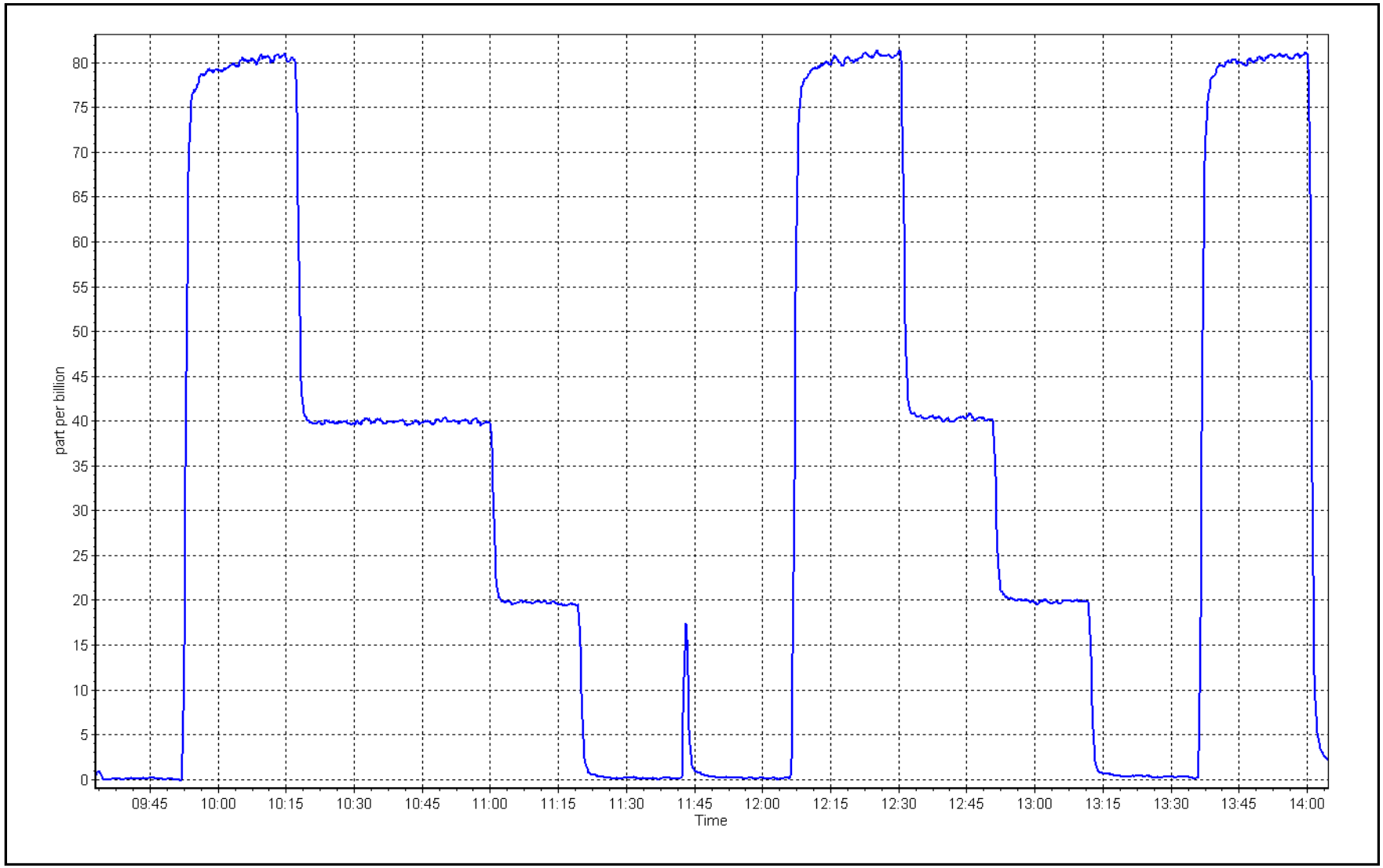
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.6	80.8	0.9978
40.3	40.3	0.9992
20.2	19.9	1.0144

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999972	*≥0.995*
Slope	1.002489	*0.90 - 1.10*
Intercept	-0.082182	*+/-3*



TRS Calibration Plot Date: February 7, 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:	February 2, 2023	Last Cal Date:	January 16, 2023
Start time (MST):	9:48	End time (MST):	12:50
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC260812	Cal Gas Expiry Date:	December 29, 2028	
CH4 Cal Gas Conc.	503.6	ppm	CH4 Equiv Conc.	1077.5	ppm
C3H8 Cal Gas Conc.	208.7	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	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:	2.38E-04	2.39E-04	NMHC SP Ratio:	4.74E-05	4.69E-05
CH4 Retention time:	12.0	12.0	NMHC Peak Area:	191456	193720

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	17.14	0.994
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	17.04	1.001
second point	4961	39.5	8.51	8.35	1.019
third point	4980	19.8	4.27	4.08	1.046
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	17.05	17.09	0.998
				Average Correction Factor	1.022

Baseline Corr AF:	17.14	Prev response	17.02	*% change	0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4921	79.1	9.08	9.20	0.987
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4921	79.1	9.08	9.06	1.002
second point	4961	39.5	4.53	4.46	1.016
third point	4980	19.8	2.27	2.18	1.042
as left zero	5000	0	0.00	0.00	----
as left span	4921	79.1	9.08	9.07	1.001
				Average Correction Factor	1.020
Baseline Corr AF:	9.20	Prev response	9.08	*% change	1.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.1	7.97	7.95	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	79.1	7.97	7.97	0.999
second point	4961	39.5	3.98	3.89	1.022
third point	4980	19.8	1.99	1.90	1.050
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	7.97	8.01	0.995
				Average Correction Factor	1.024
Baseline Corr AF:	7.95	Prev response	7.94	*% 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:	1.000765	1.002074
THC Cal Offset:	-0.043424	-0.104181
CH4 Cal Slope:	1.000366	1.003774
CH4 Cal Offset:	-0.031817	-0.056196
NMHC Cal Slope:	1.001015	1.000594
NMHC Cal Offset:	-0.011206	-0.047785

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

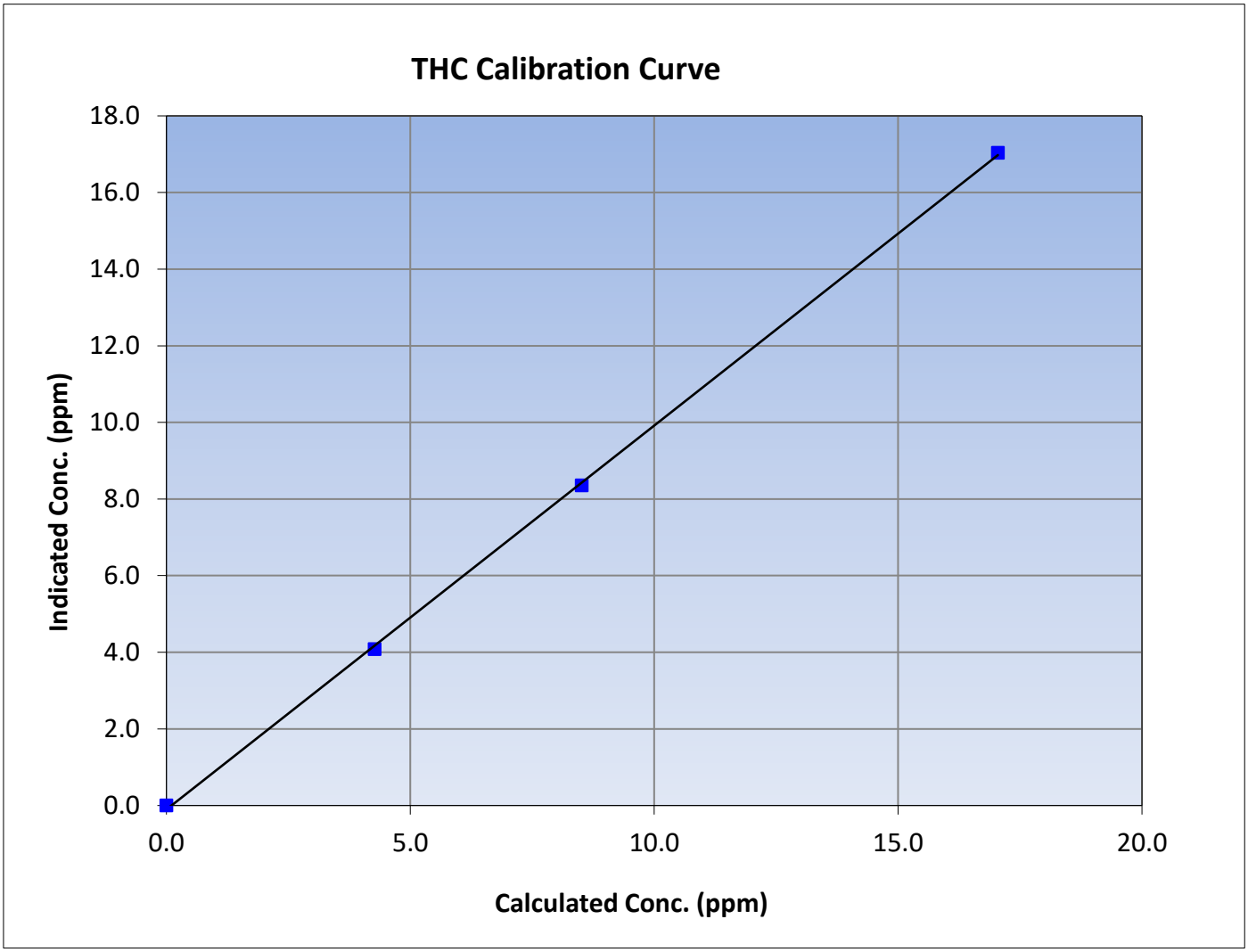
Version-01-2020

Station Information

Calibration Date:	February 2, 2023	Previous Calibration:	January 16, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	9:48	End Time (MST):	12:50
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	0.999826	*≥0.995*
17.05	17.04	1.0006			
8.51	8.35	1.0190	Slope	1.002074	*0.90 - 1.10*
4.27	4.08	1.0456			
			Intercept	-0.104181	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

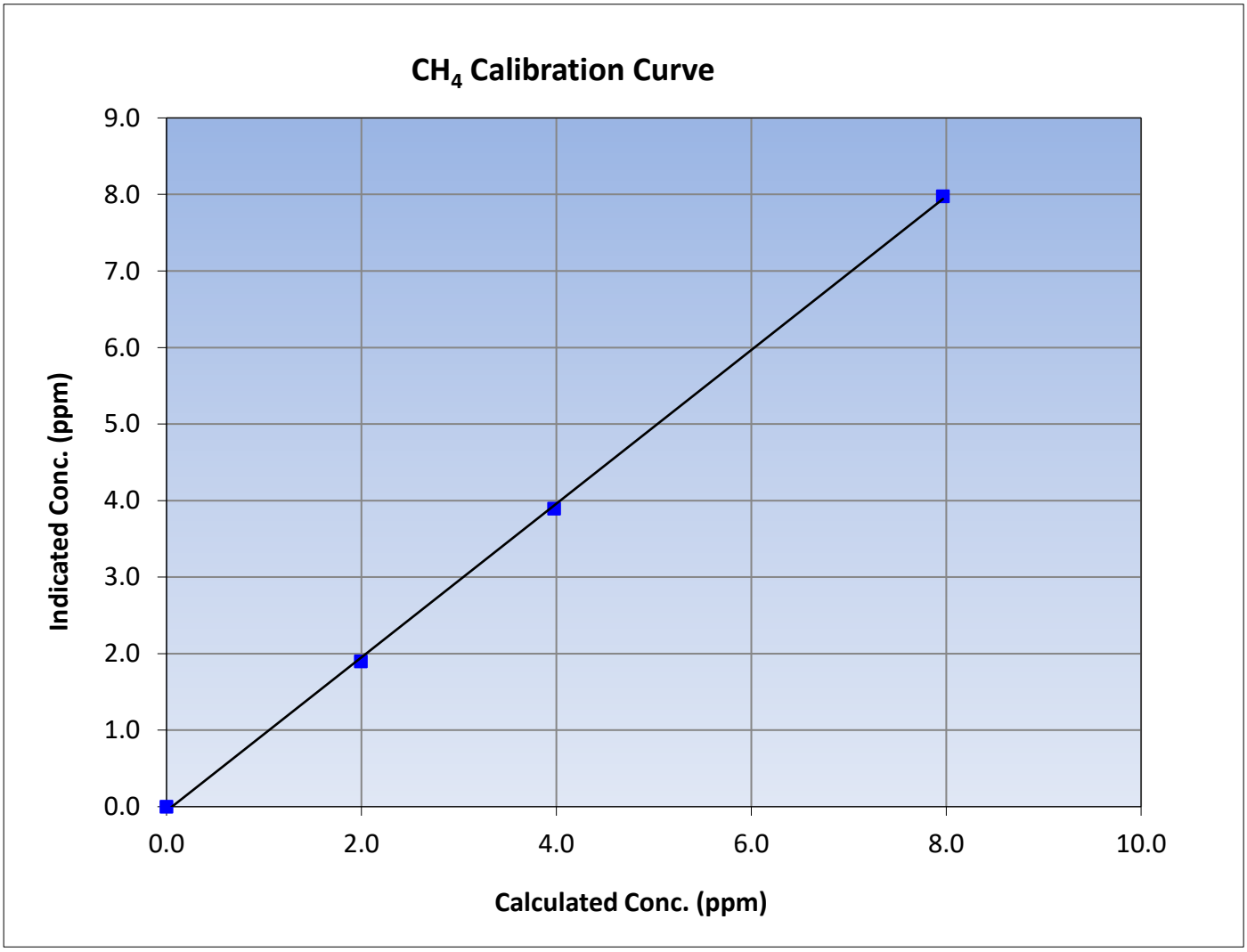
Version-01-2020

Station Information

Calibration Date:	February 2, 2023	Previous Calibration:	January 16, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	9:48	End Time (MST):	12:50
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	0.999763	≥0.995
7.97	7.97	0.9991			
3.98	3.89	1.0218	Slope	1.003774	0.90 - 1.10
1.99	1.90	1.0497			
			Intercept	-0.056196	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

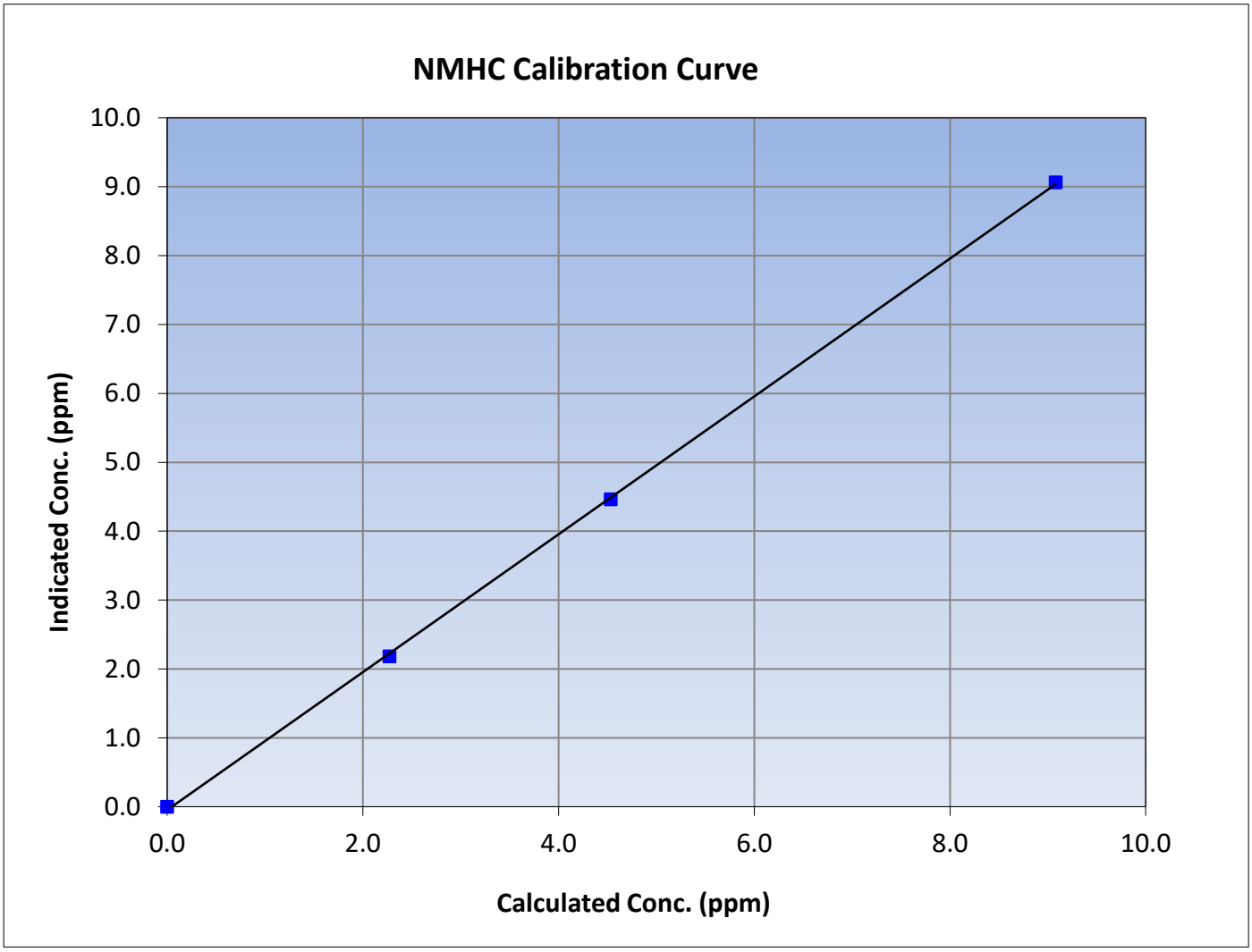
Version-01-2020

Station Information

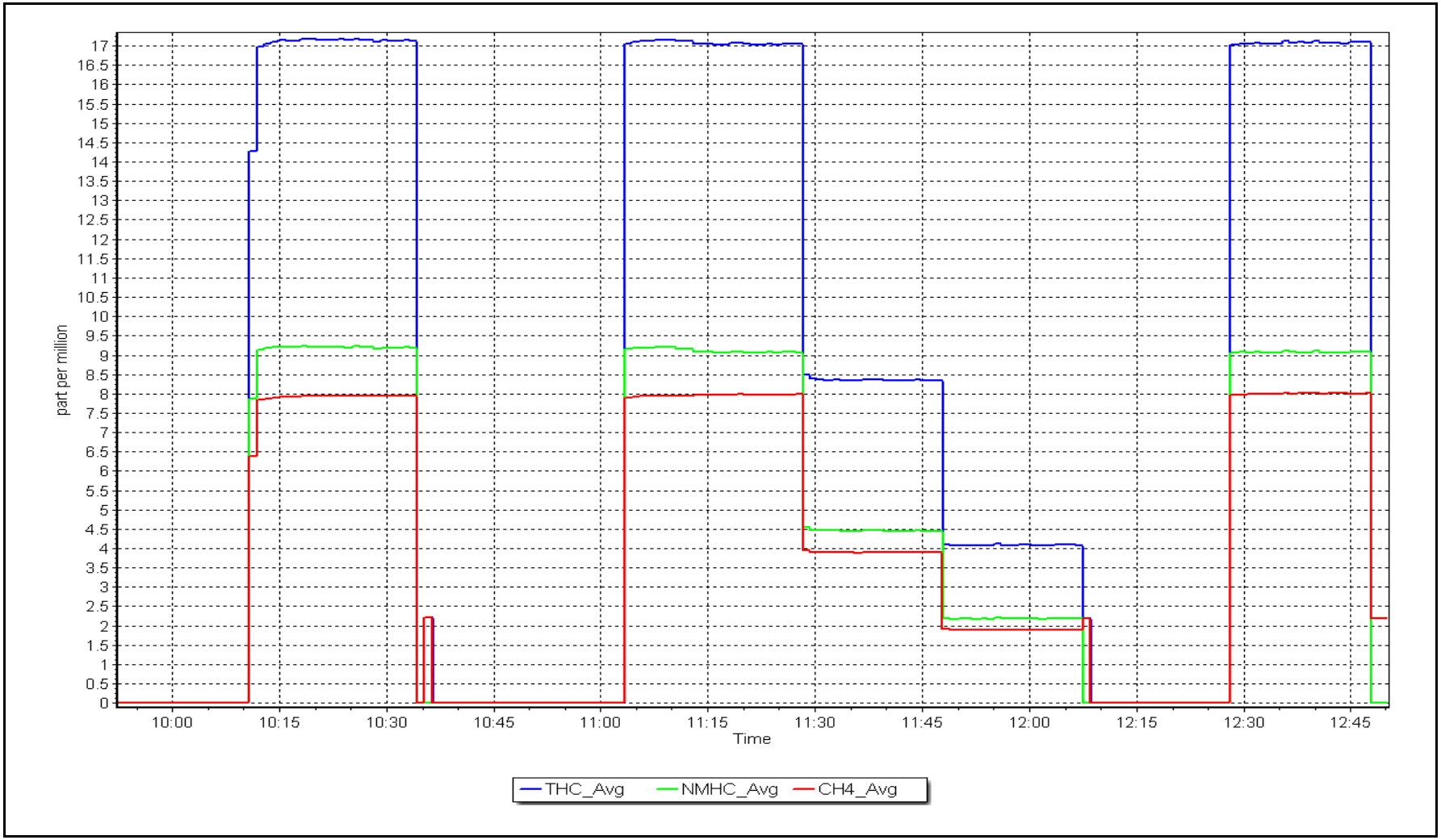
Calibration Date:	February 2, 2023	Previous Calibration:	January 16, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	9:48	End Time (MST):	12:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999873	≥0.995
9.08	9.06	1.0019			
4.53	4.46	1.0163	Slope	1.000594	0.90 - 1.10
2.27	2.18	1.0421			
			Intercept	-0.047785	+/-0.5



NMHC Calibration Plot Date: February 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:	February 2, 2023	Last Cal Date:	February 2, 2023
Start time (MST):	10:10	End time (MST):	11:37
Reason:	Cylinder Change		

Calibration Standards

Gas Cert Reference:		CC260812	Cal Gas Expiry Date:	December 29, 2028	
CH4 Cal Gas Conc.	503.6	ppm	CH4 Equiv Conc.	1077.5	ppm
C3H8 Cal Gas Conc.	208.7	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	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	4.69E-05
CH4 Retention time:	12.0	12.0	NMHC Peak Area:	193720	193720

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	16.97	1.005
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	16.95	1.005
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.005

Baseline Corr AF:	16.97	Prev response	16.98	*% 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	4921	79.1	9.08	8.99	1.010
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4921	79.1	9.08	8.97	1.012
second point					
third point					
as left zero					
as left span		79.1			
				Average Correction Factor	1.012
Baseline Corr AF:	8.99	Prev response	9.04	*% change	-0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.1	7.97	7.98	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	7.98	0.998
second point					
third point					
as left zero					
as left span		79.1			
				Average Correction Factor	0.998
Baseline Corr AF:	7.98	Prev response	7.94	*% change	0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

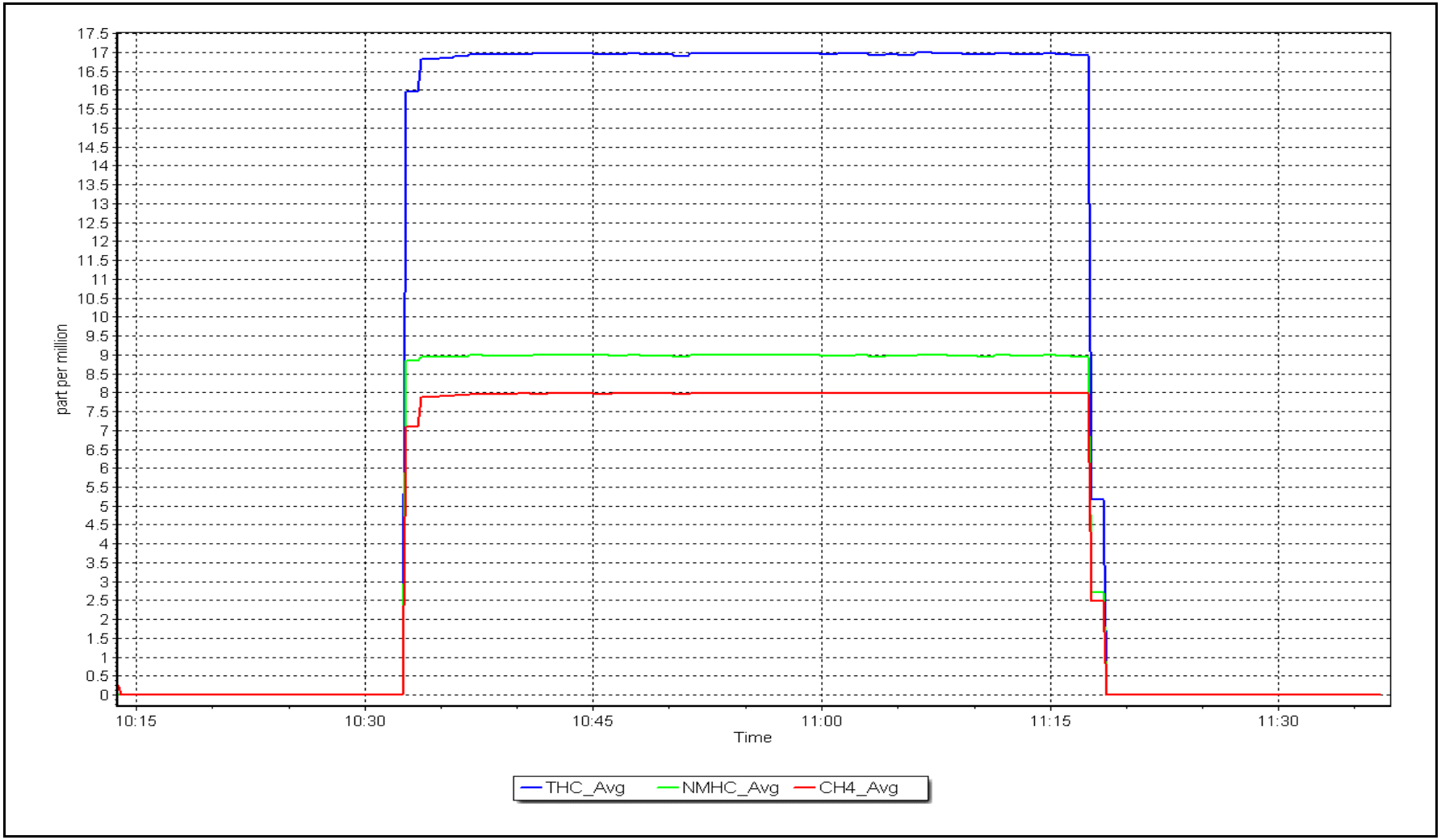
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.002074	0.994538
THC Cal Offset:	-0.104181	0.000000
CH4 Cal Slope:	1.003774	1.001783
CH4 Cal Offset:	-0.056196	0.000000
NMHC Cal Slope:	1.000594	0.988070
NMHC Cal Offset:	-0.047785	0.000000

Notes: Changed N2 cylinder after as founds.

Calibration Performed By: Sean Bala

NMHC Calibration Plot Date: February 2, 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:	February 10, 2023	Last Cal Date:	January 19, 2023
Start time (MST):	10:16	End time (MST):	14:37
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:	1.200	1.204	NO bkgnd or offset:	9.6	9.5
NOX coeff or slope:	0.992	0.992	NOX bkgnd or offset:	9.6	9.6
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	194.1	192.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999594	0.999138
NO_X Cal Offset:	-2.291272	-2.151243
NO Cal Slope:	1.002005	1.002334
NO Cal Offset:	-3.105090	-3.145082
NO_2 Cal Slope:	1.006533	0.996233
NO_2 Cal Offset:	-0.433464	-0.877794

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	824.2	797.8	26.3	1.0033	1.0027
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	825.0	800.2	24.8	1.0023	0.9997
second point	4960	40.6	413.9	400.4	13.5	410.5	396.7	13.7	1.0083	1.0094
third point	4980	20.3	207.0	200.2	6.7	202.5	194.5	8.0	1.0221	1.0294
as left zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	----	----
as left span	4919	81.1	826.9	383.2	443.7	835.9	386.1	449.7	0.9892	0.9924
								Average Correction Factor	1.0109	1.0128

Corrected As found NO_X = 824.4 ppb NO = 798.0 ppb

Previous Response NO_X = 824.3 ppb NO = 798.5 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 = 0.0%

*Percent Change NO = -0.1%

As found NO_X r^2: Nx Sl: Nx Int:

As found NO r^2: NO Sl: NO Int:

As found NO_2 r^2: NO2 Sl: NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.2	380.4	443.7	441.6	1.0048	99.5%
2nd GPT point (200 ppb O3)	797.2	587.2	236.9	235.0	1.0082	99.2%
3rd GPT point (100 ppb O3)	797.2	691.8	132.3	129.8	1.0195	98.1%
				Average Correction Factor	1.0108	98.9%

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

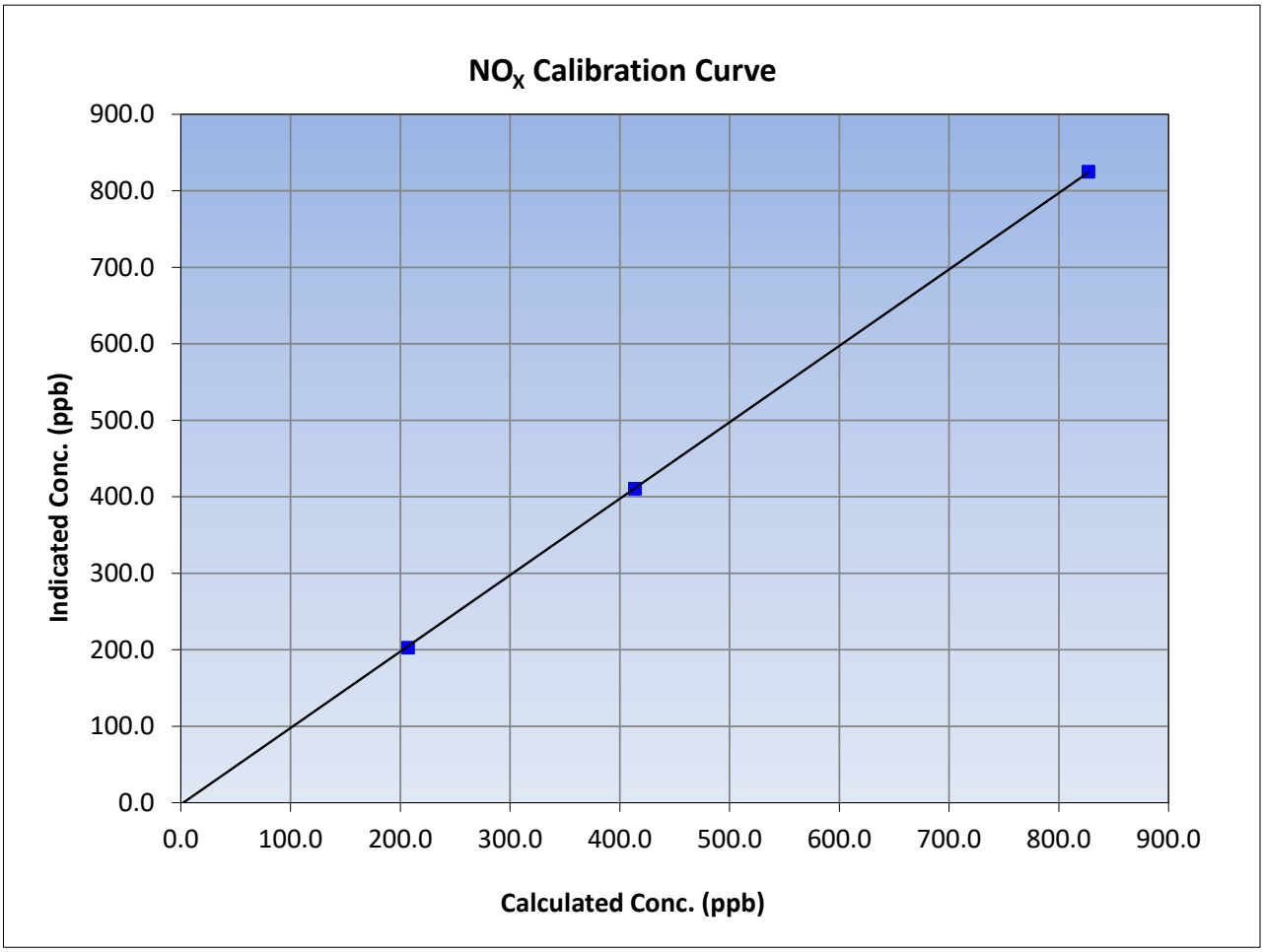
Version-04-2020

Station Information

Calibration Date:	February 10, 2023	Previous Calibration:	January 19, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	10:16	End Time (MST):	14:37
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	0.999972	*≥0.995*
826.9	825.0	1.0023			
413.9	410.5	1.0083	Slope	0.999138	*0.90 - 1.10*
207.0	202.5	1.0221			
			Intercept	-2.151243	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

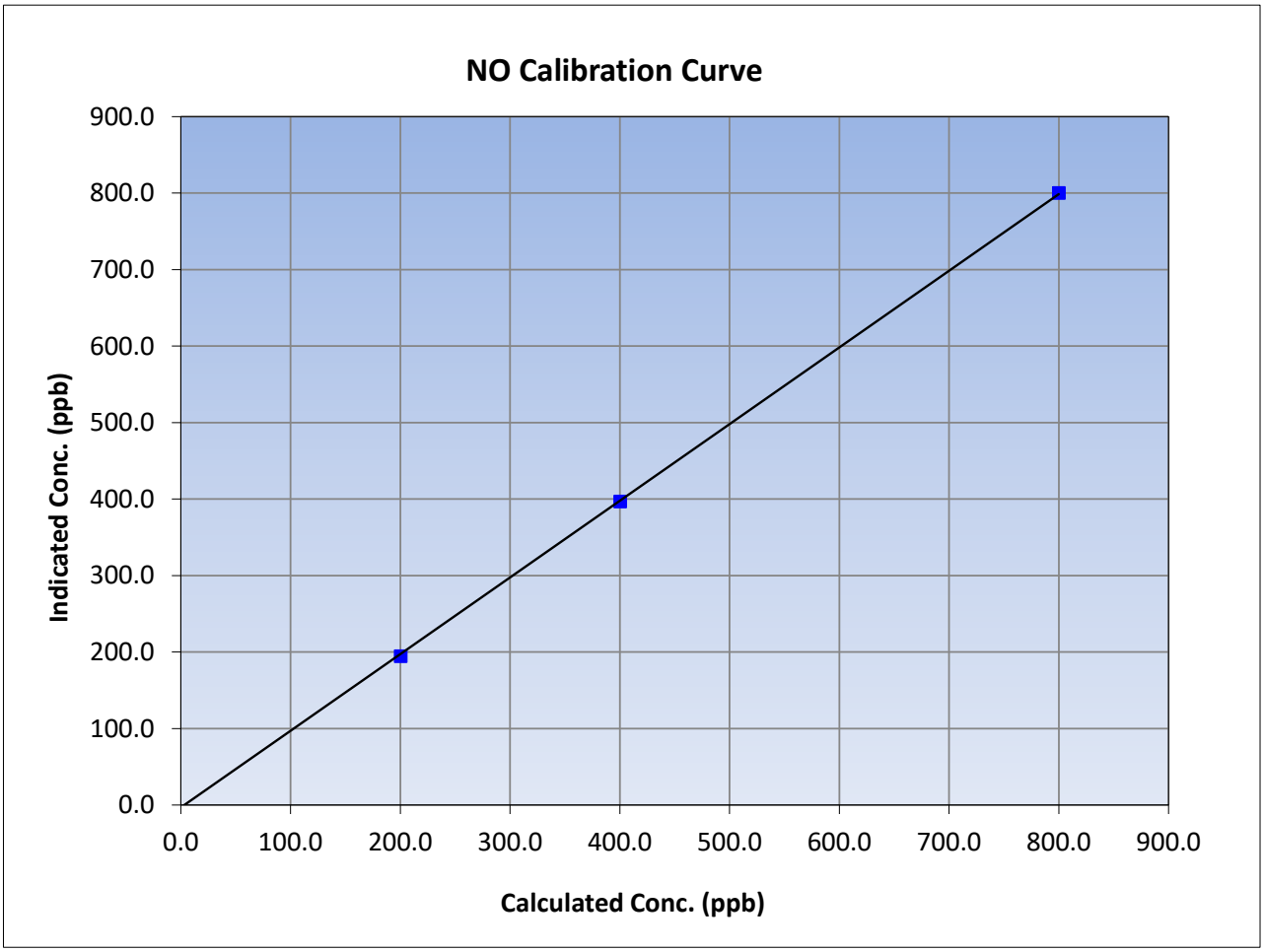
Version-04-2020

Station Information

Calibration Date:	February 10, 2023	Previous Calibration:	January 19, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	10:16	End Time (MST):	14:37
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999934	≥0.995
800.0	800.2	0.9997			
400.4	396.7	1.0094	Slope	1.002334	0.90 - 1.10
200.2	194.5	1.0294			
			Intercept	-3.145082	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

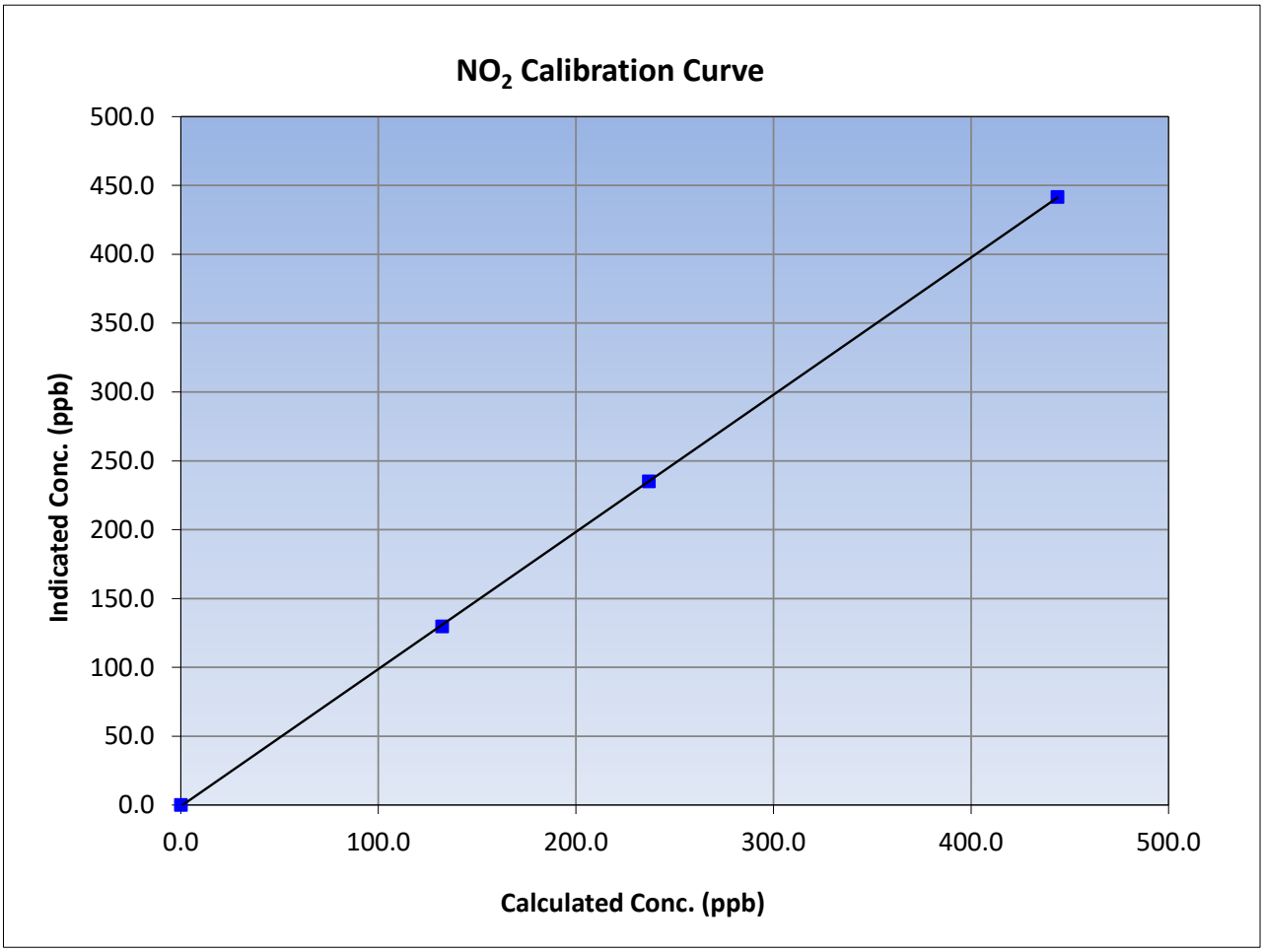
Version-04-2020

Station Information

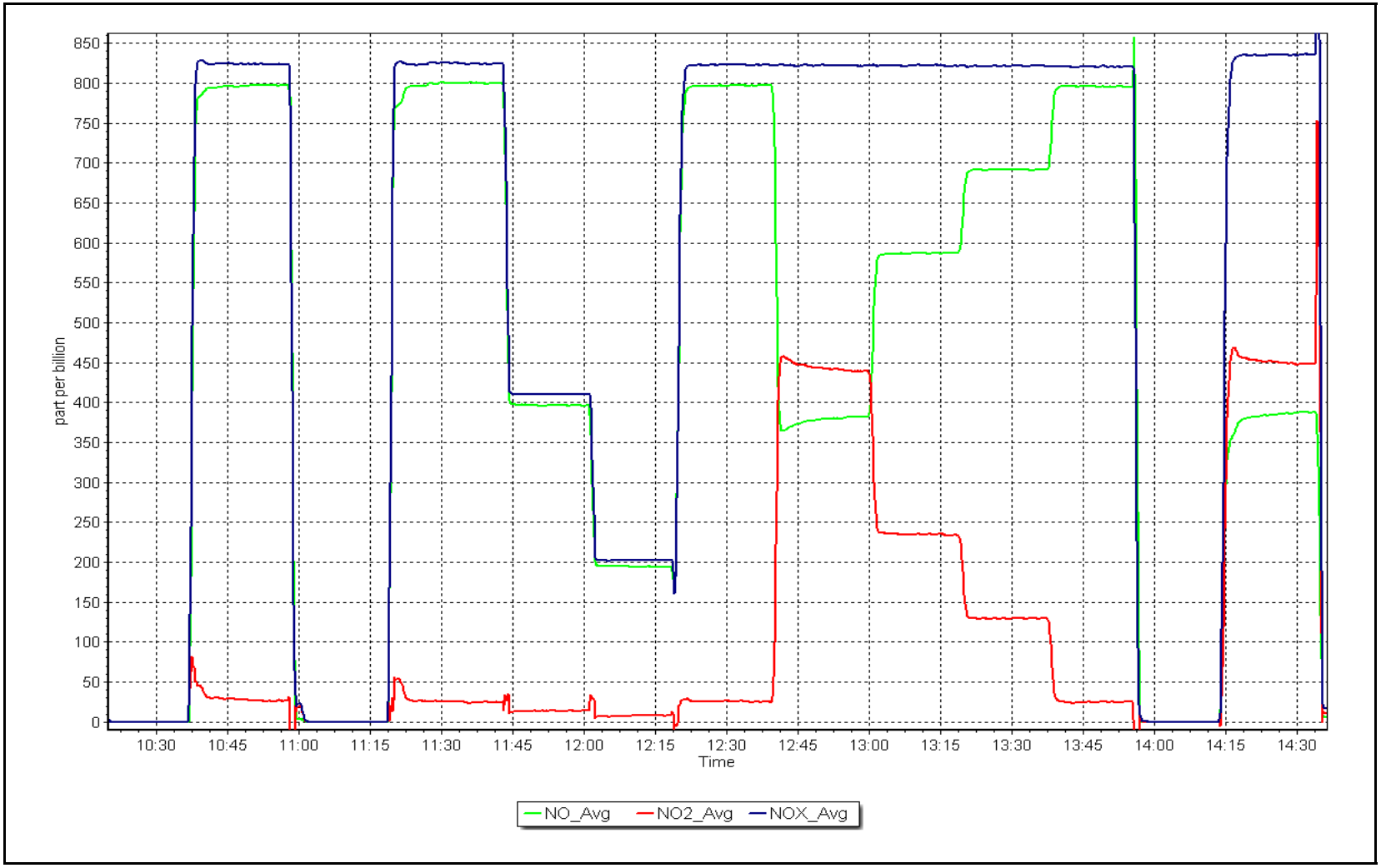
Calibration Date:	February 10, 2023	Previous Calibration:	January 19, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	10:16	End Time (MST):	14:37
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999978	≥0.995
443.7	441.6	1.0048			
236.9	235.0	1.0082	Slope	0.996233	0.90 - 1.10
132.3	129.8	1.0195			
			Intercept	-0.877794	+/-20



NO_X Calibration Plot Date: February 10, 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:	February 3, 2023	Last Cal Date:	January 18, 2023
Start time (MST):	9:56	End time (MST):	12:50
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:	0.996143	0.997629	Backgd or Offset:	2.7	2.7
Calibration intercept:	1.300000	1.040000	Coeff or Slope:	0.962	0.962

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	399.7	1.001
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	980.6	400.0	399.4	1.002
second point	5000	838.0	200.0	201.4	0.993
third point	5000	735.3	100.0	101.9	0.981
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	979.1	400.0	401.7	0.996
				Average Correction Factor	0.992

Baseline Corr As found:	399.8	Previous response	399.8	*% change	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

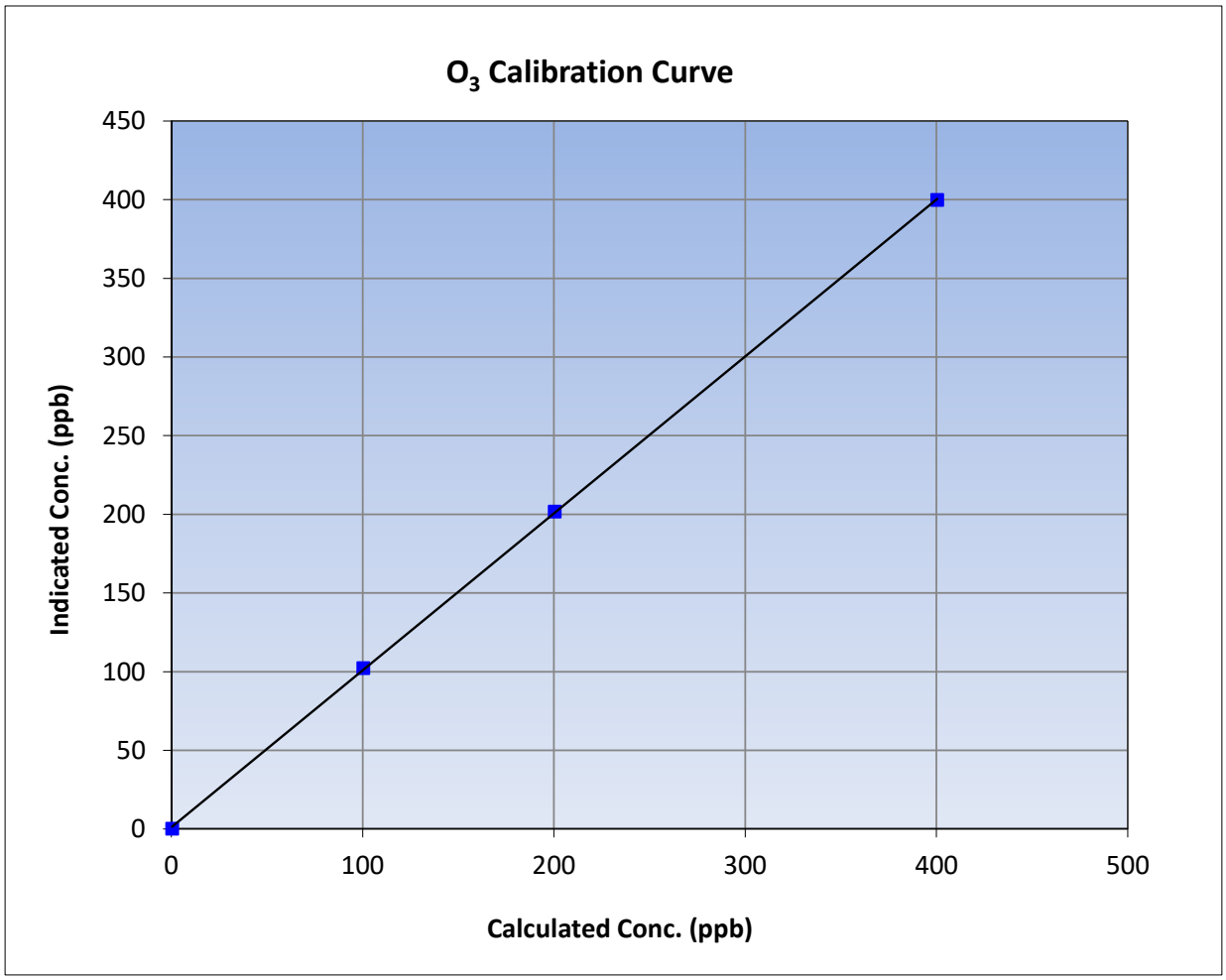
Station Information

Calibration Date:	February 3, 2023	Previous Calibration:	January 18, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	9:56	End Time (MST):	12:50
Analyzer make:	Teledyne API T400	Analyzer serial #:	3871

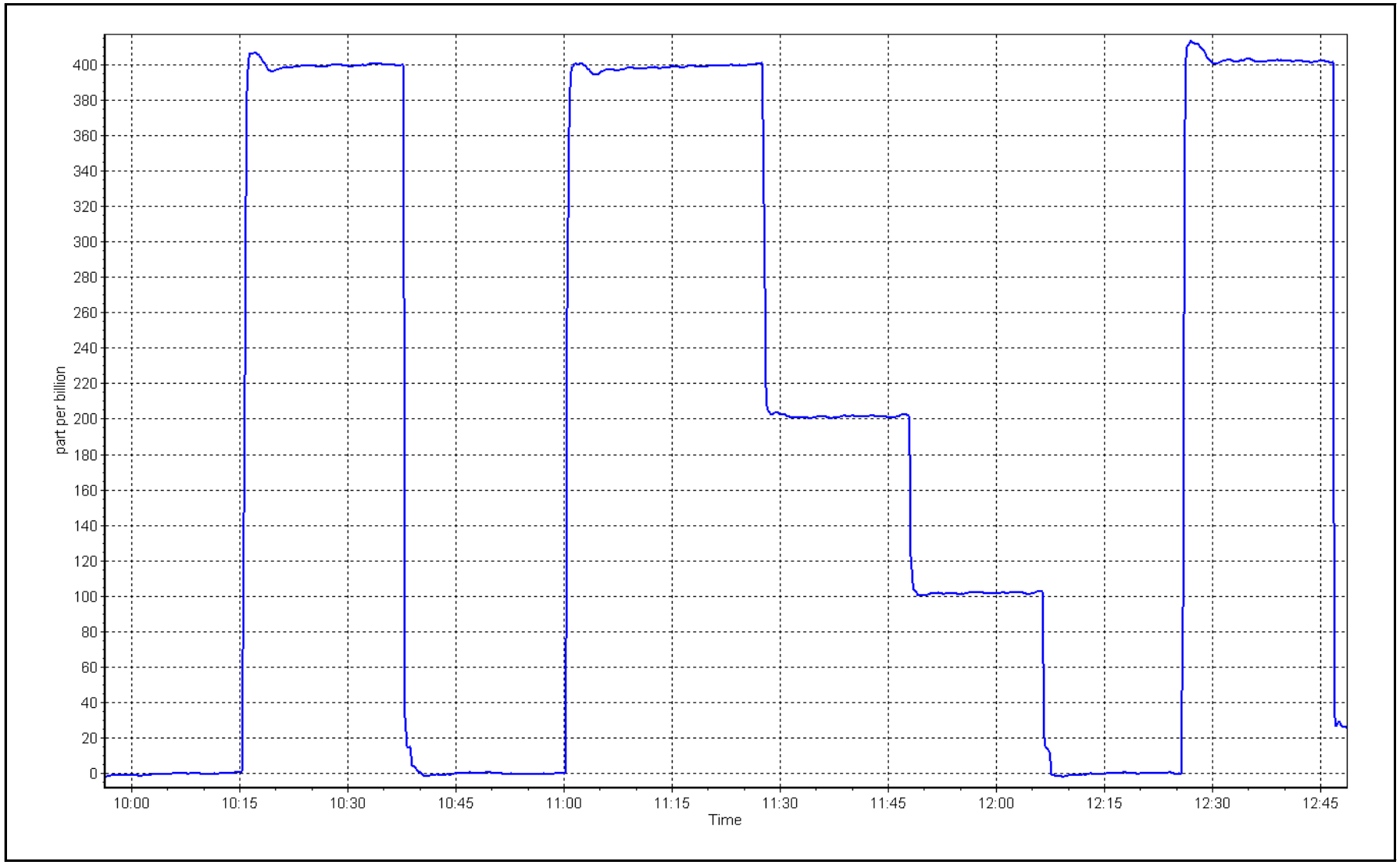
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
400.0	399.4	1.0015
200.0	201.4	0.9930
100.0	101.9	0.9814

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999955	*≥0.995*
Slope	0.997629	*0.90 - 1.10*
Intercept	1.040000	*+/- 5*



O_3 Calibration Plot Date: February 3, 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:	February 16, 2023	Last Cal Date:	January 19, 2023
Start time (MST):	11:37	End time (MST):	11:53
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)	-10.0	-9.4	-10.0	☐	+/- 2 °C
P (mmHg)	726.1	725.6	726.1	☐	+/- 10 mmHg
flow (LPM)	5.01	5.04	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: February 16, 2023 Last Cal Date: January 19, 2023

PM w/o HEPA: 11.0 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: December 13, 2022 <0.2 ug/m3

Disposable Filter Changed: December 13, 2022

Annual Maintenance

Date Sample Tube Cleaned: June 29, 2022

Date RH/T Sensor Cleaned: June 29, 2022

Notes: No adjustment made. Leak check passed. Built up of snow on the inlet head and clean it.

Calibration by: Sean Bala

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS14
ANZAC
FEBRUARY 2023

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

March 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	February 21, 2023	Last Cal Date:	January 24, 2023
Start time (MST):	10:28	End time (MST):	13:02
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:	0.998268	0.993711	Backgd or Offset:	25.1	25.1
Calibration intercept:	-1.664595	-1.045321	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	0.3	----
as found span	4920	80.1	800.2	791.6	1.011
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	----
high point	4920	80.1	800.2	794.8	1.007
second point	4960	40.0	399.6	395.4	1.011
third point	4980	20.0	199.8	196.0	1.019
as left zero	5000	0.0	0.0	0.4	----
as left span	4920	80.1	800.2	796.8	1.004
				Average Correction Factor	1.012

Baseline Corr As found:	791.30	Previous response	797.13	*% 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

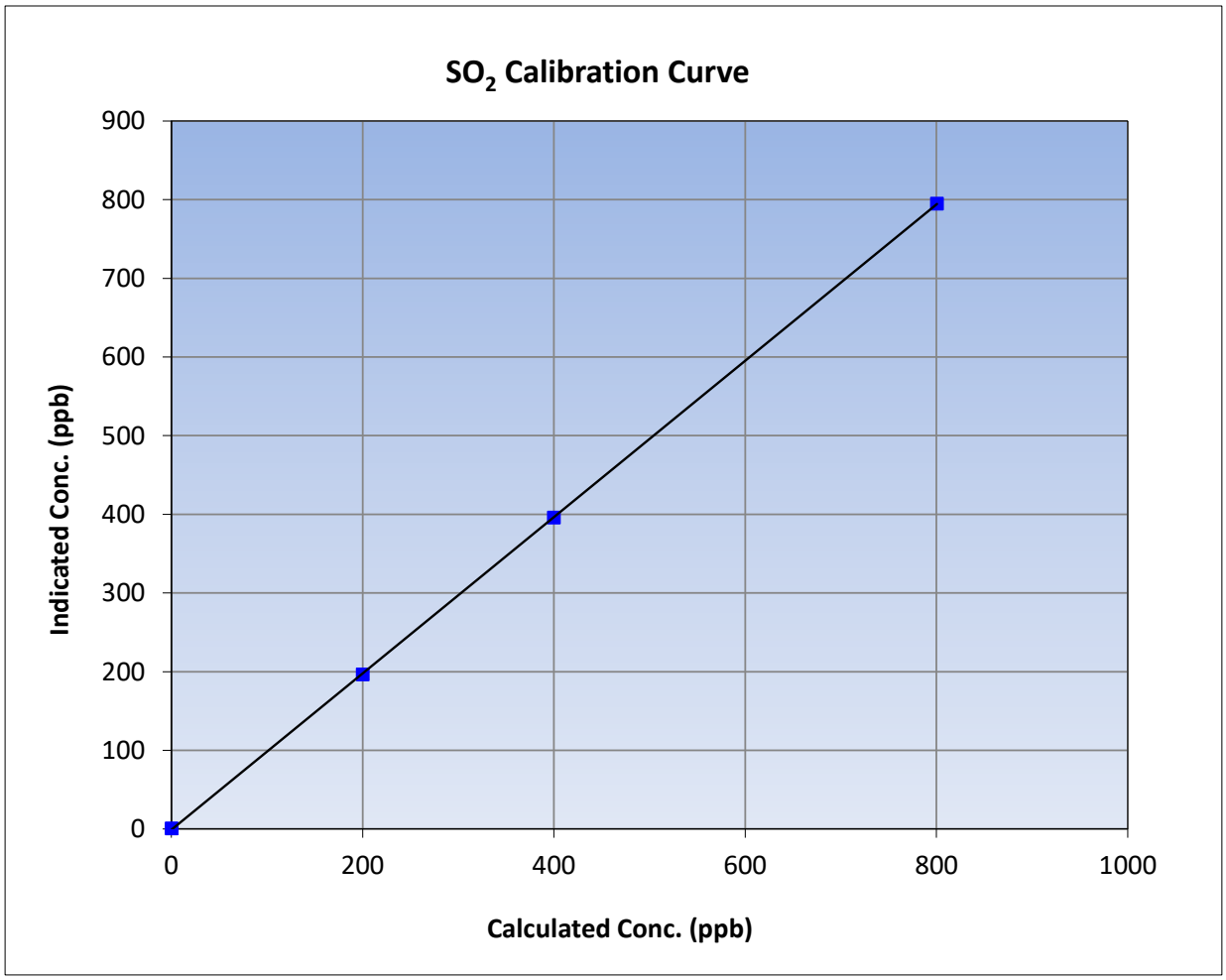
Station Information

Calibration Date:	February 21, 2023	Previous Calibration:	January 24, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	10:28	End Time (MST):	13:02
Analyzer make:	Thermo 43i	Analyzer serial #:	0710321322

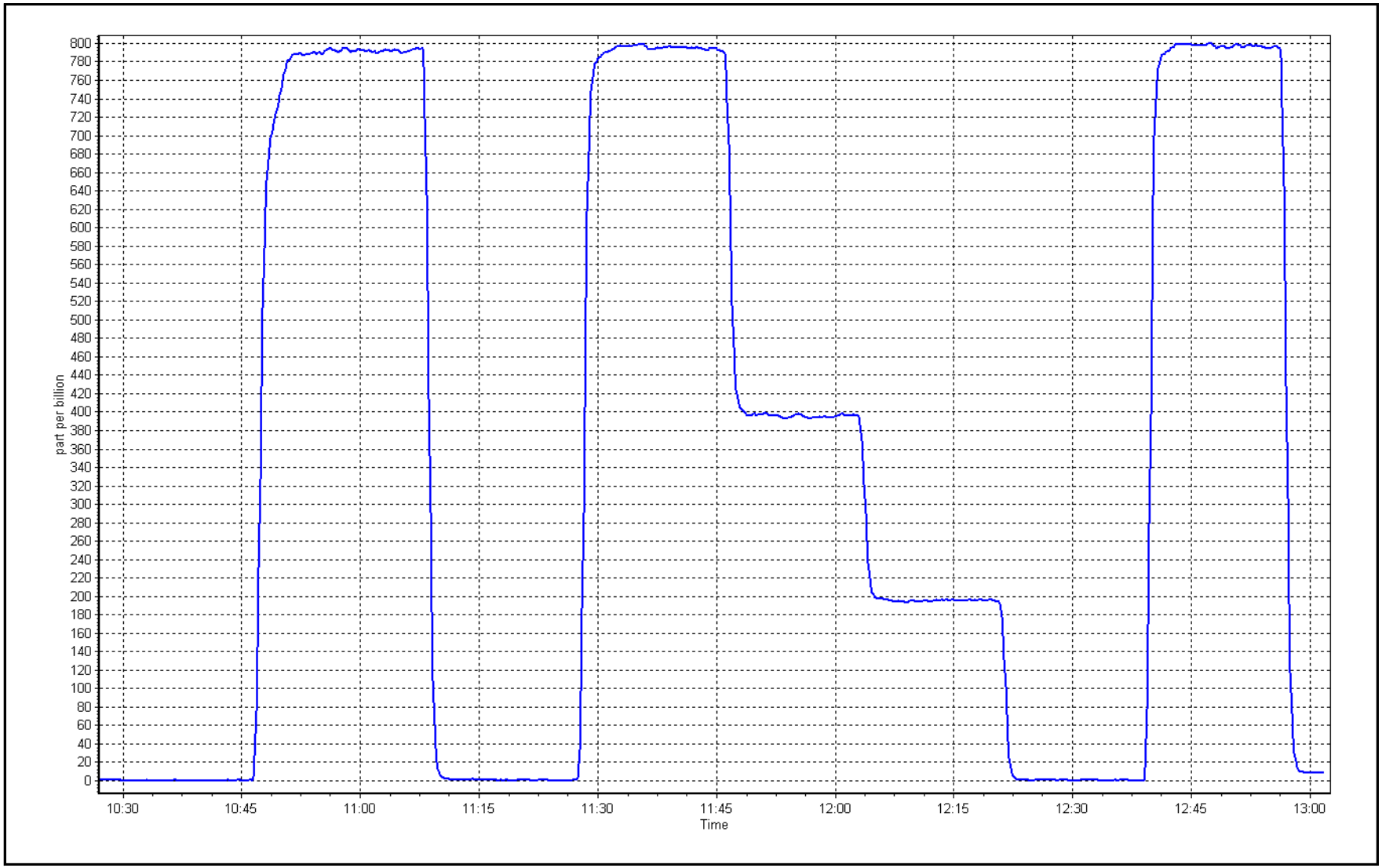
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
800.2	794.8	1.0068
399.6	395.4	1.0106
199.8	196.0	1.0194

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999985	*≥0.995*
Slope	0.993711	*0.90 - 1.10*
Intercept	-1.045321	*+/-30*



SO2 Calibration Plot Date: February 21, 2023 Location: Anzac



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TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	February 3, 2023	Last Cal Date:	January 6, 2023
Start time (MST):	7:55	End time (MST):	12:20
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:	1.003842	1.004840	Backgd or Offset:	5.54	5.66
Calibration intercept:	0.038815	-0.021121	Coeff or Slope:	0.990	1.008

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.2	----
as found span	4925	74.3	80.0	78.3	1.024
as found 2nd point	4962	37.2	40.0	39.3	1.024
as found 3rd point	4981	18.6	20.0	19.2	1.053
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.4	----
high point	4925	74.3	80.0	80.5	0.993
second point	4962	37.2	40.0	40.1	0.998
third point	4981	18.6	20.0	19.6	1.021
as left zero	5000	0.0	0.0	0.4	----
as left span	4925	74.3	80.0	79.9	1.001
SO2 Scrubber Check	4920	80.0	800.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.004
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.1	Prev response:	80.30	*% change:	-2.8%
Baseline Corr 2nd AF pt:	39.1	AF Slope:	0.979116	AF Intercept:	-0.020730
Baseline Corr 3rd AF pt:	19.0	AF Correlation:	0.999938		

* = > +/-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

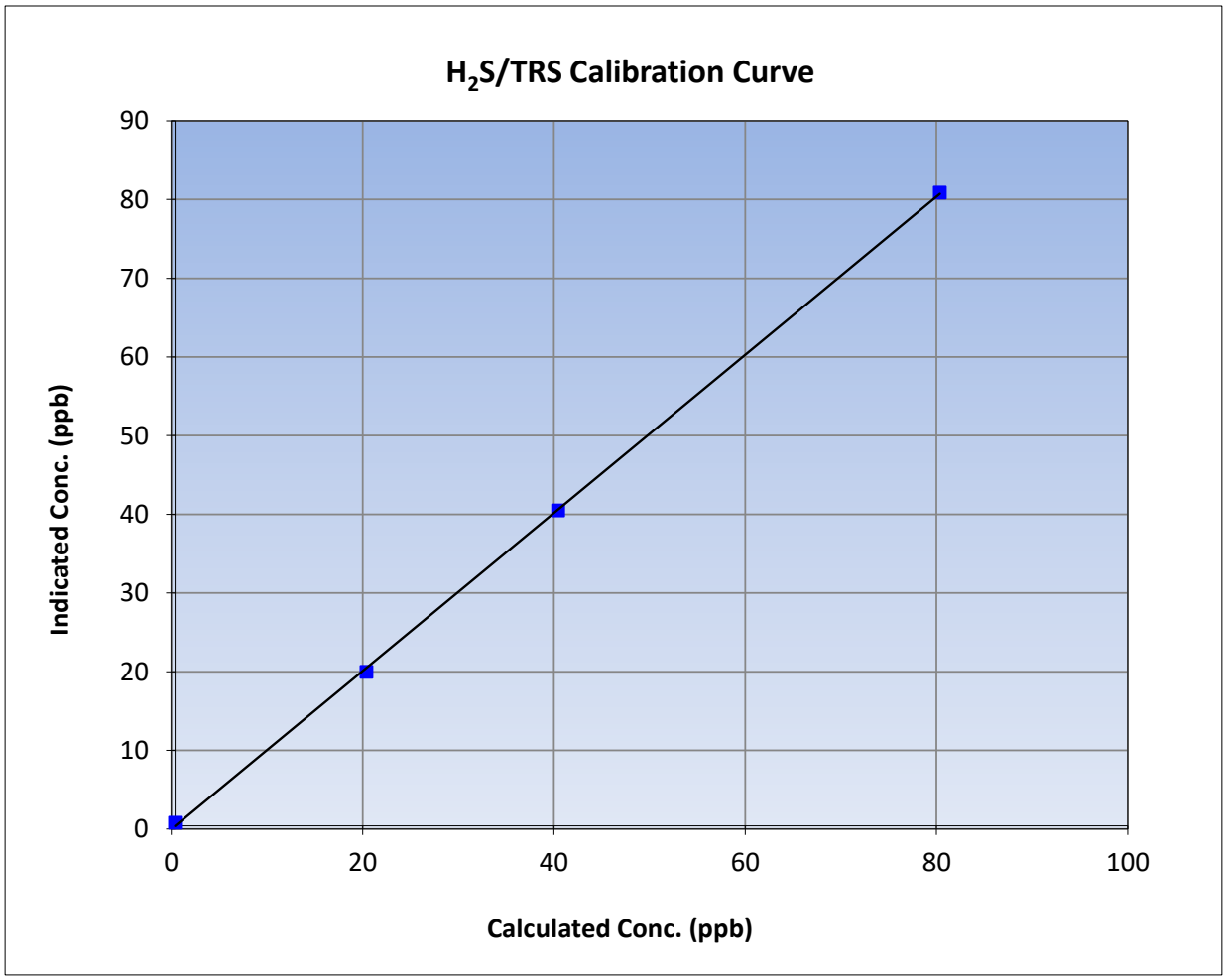
Station Information

Calibration Date:	February 3, 2023	Previous Calibration:	January 6, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	7:55	End Time (MST):	12:20
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1180540019

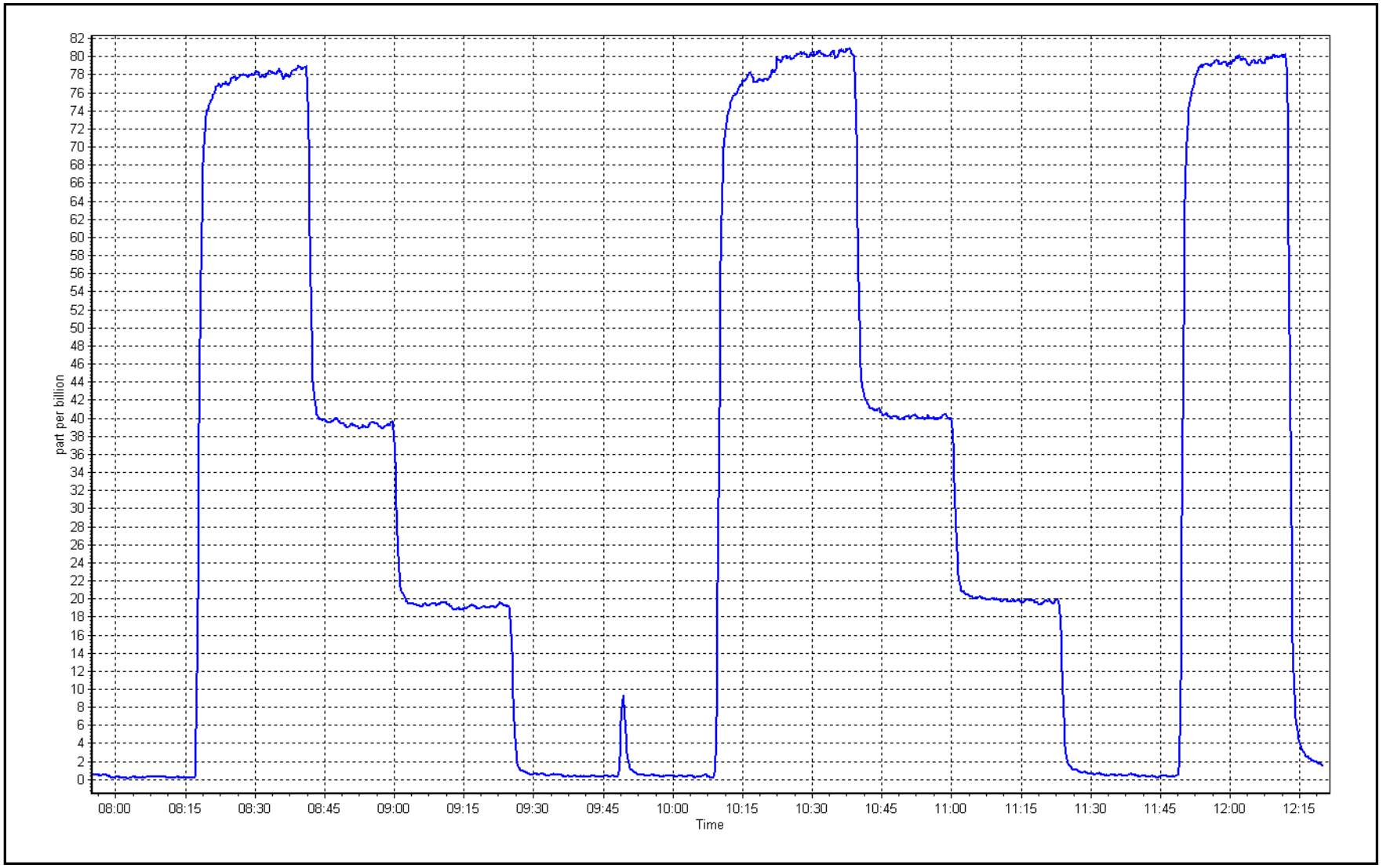
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
80.0	80.5	0.9933
40.0	40.1	0.9983
20.0	19.6	1.0212

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999870	*≥0.995*
Slope	1.004840	*0.90 - 1.10*
Intercept	-0.021121	*+/-3*



TRS Calibration Plot Date: February 3, 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:	February 21, 2023	Last Cal Date:	January 23, 2023
Start time (MST):	10:28	End time (MST):	13:01
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	16.95	1.010
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	17.12	16.92	1.012
second point	4960	40.0	8.55	8.45	1.012
third point	4980	20.0	4.28	4.19	1.020
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.1	17.12	17.03	1.005
				Average Correction Factor	1.015

Baseline Corr AF:	16.95	Prev response	17.13	*% change	-1.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	9.12	9.04	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	9.12	9.02	1.011
second point	4960	40.0	4.56	4.49	1.015
third point	4980	20.0	2.28	2.22	1.026
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.1	9.12	9.08	1.005
				Average Correction Factor	1.017
Baseline Corr AF:	9.04	Prev response	9.03	*% 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	7.91	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	8.00	7.99	1.001
second point	4960	40.0	3.99	3.96	1.009
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	7.95	1.006
				Average Correction Factor	1.008
Baseline Corr AF:	7.91	Prev response	8.10	*% change	-2.4%
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:	1.001116	0.988889
THC Cal Offset:	-0.010387	-0.013842
CH4 Cal Slope:	1.012466	0.999568
CH4 Cal Offset:	0.001594	-0.016046
NMHC Cal Slope:	0.991290	0.989676
NMHC Cal Offset:	-0.011980	-0.015788

Notes: No Maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

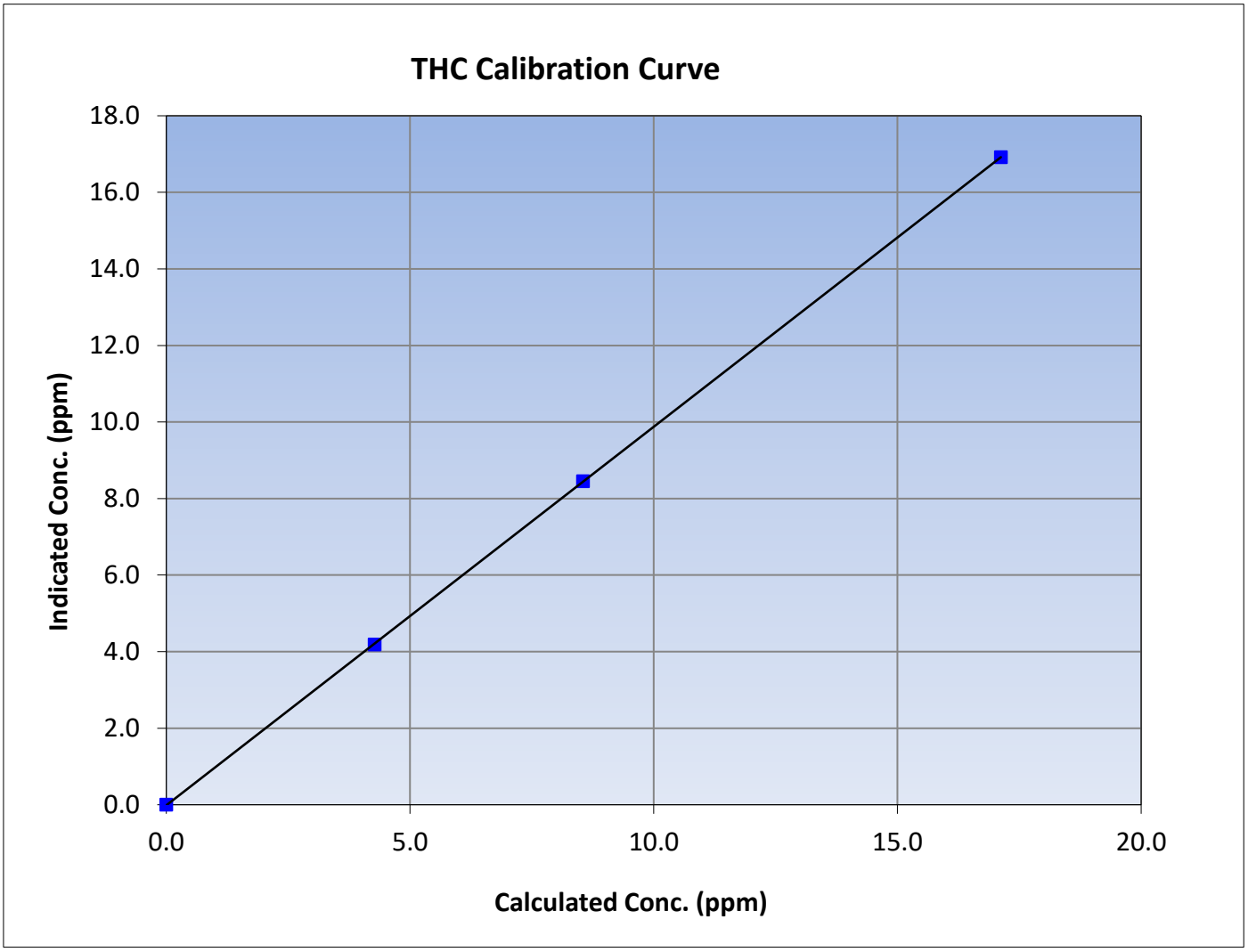
Version-01-2020

Station Information

Calibration Date:	February 21, 2023	Previous Calibration:	January 23, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	10:28	End Time (MST):	13:01
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999995	≥0.995
17.12	16.92	1.0120			
8.55	8.45	1.0119	Slope	0.988889	0.90 - 1.10
4.28	4.19	1.0204			
			Intercept	-0.013842	+/-0.5



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CH_4 Calibration Summary

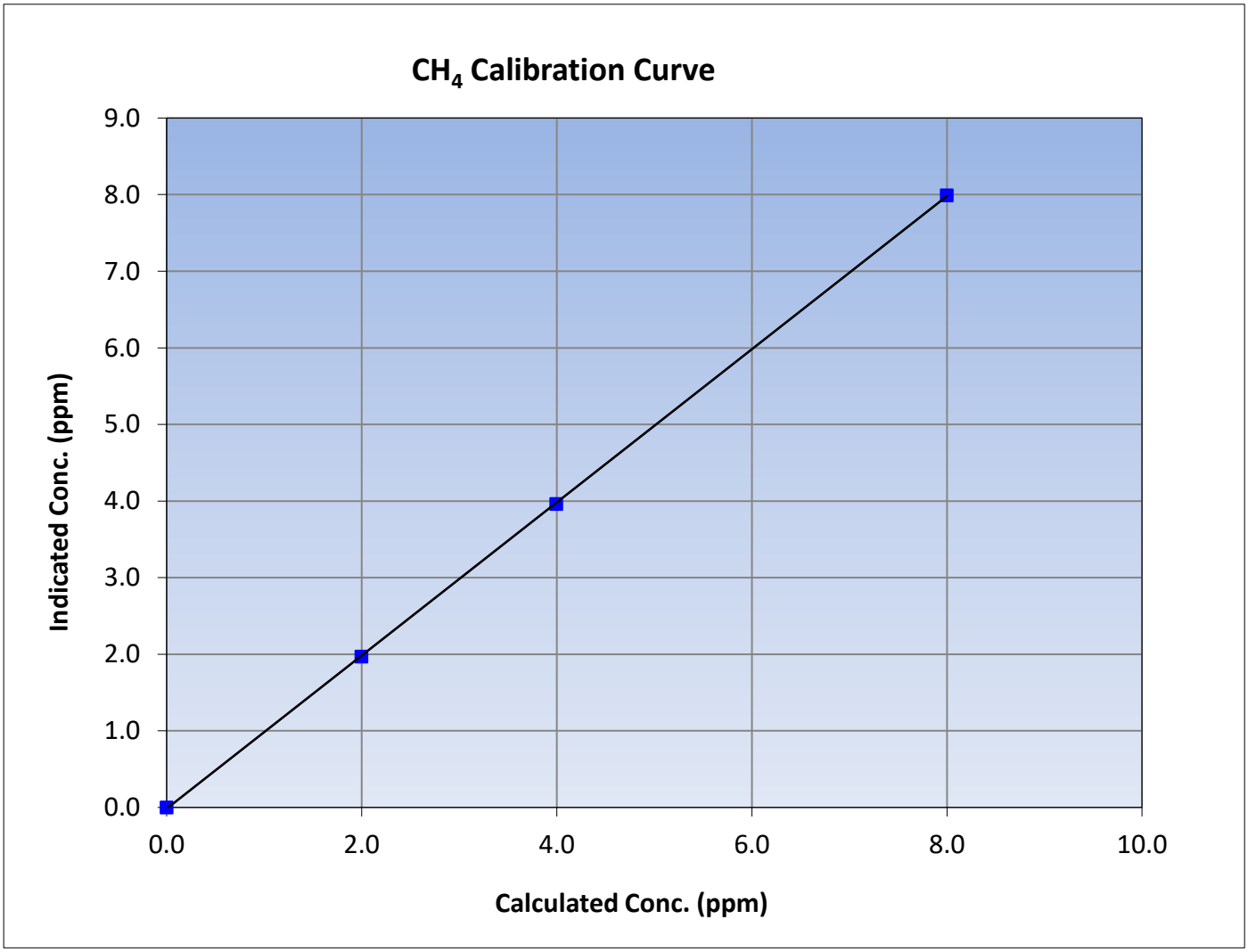
Version-01-2020

Station Information

Calibration Date:	February 21, 2023	Previous Calibration:	January 23, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	10:28	End Time (MST):	13:01
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	0.999978	*≥0.995*
8.00	7.99	1.0011			
3.99	3.96	1.0087	Slope	0.999568	*0.90 - 1.10*
2.00	1.97	1.0138			
			Intercept	-0.016046	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

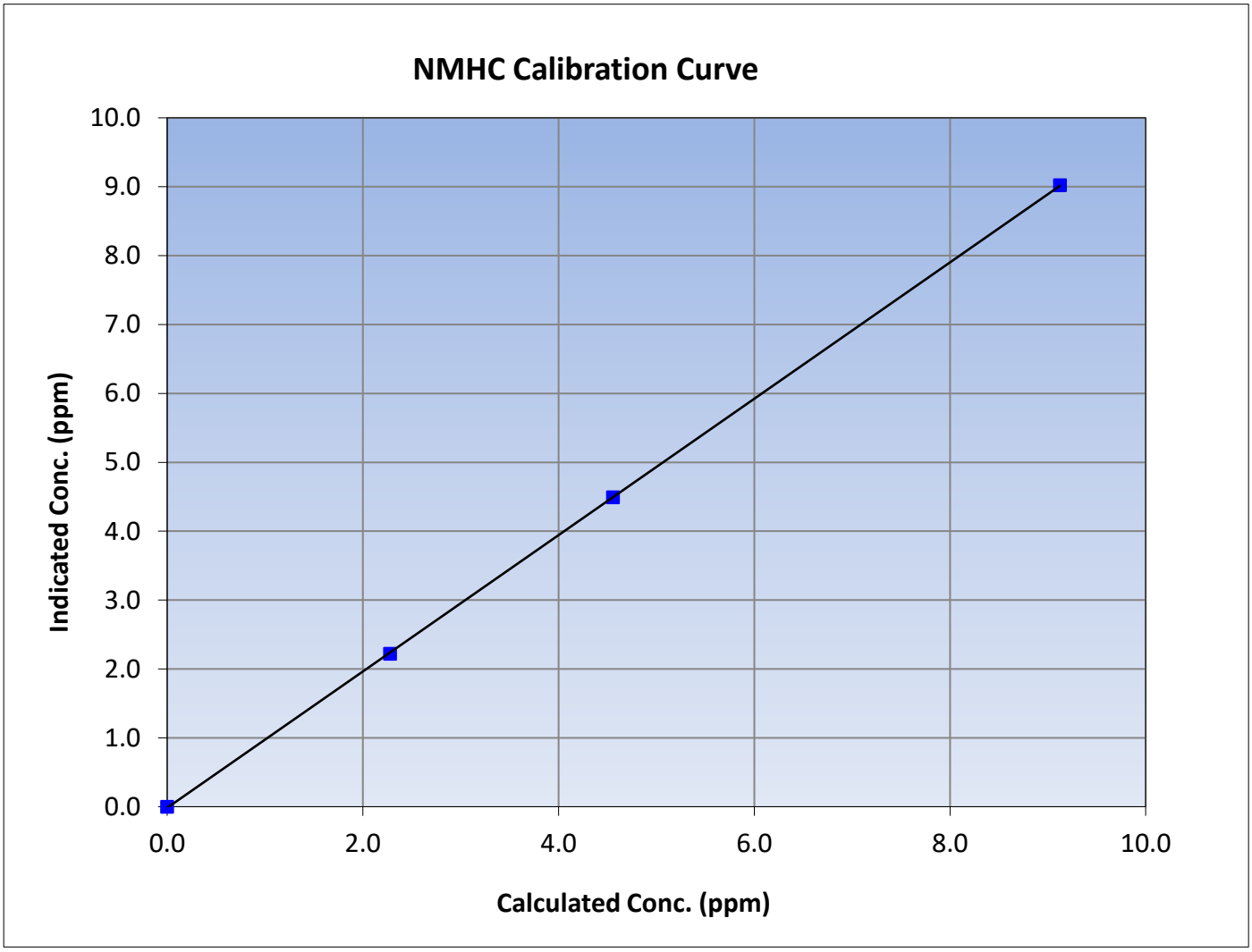
Version-01-2020

Station Information

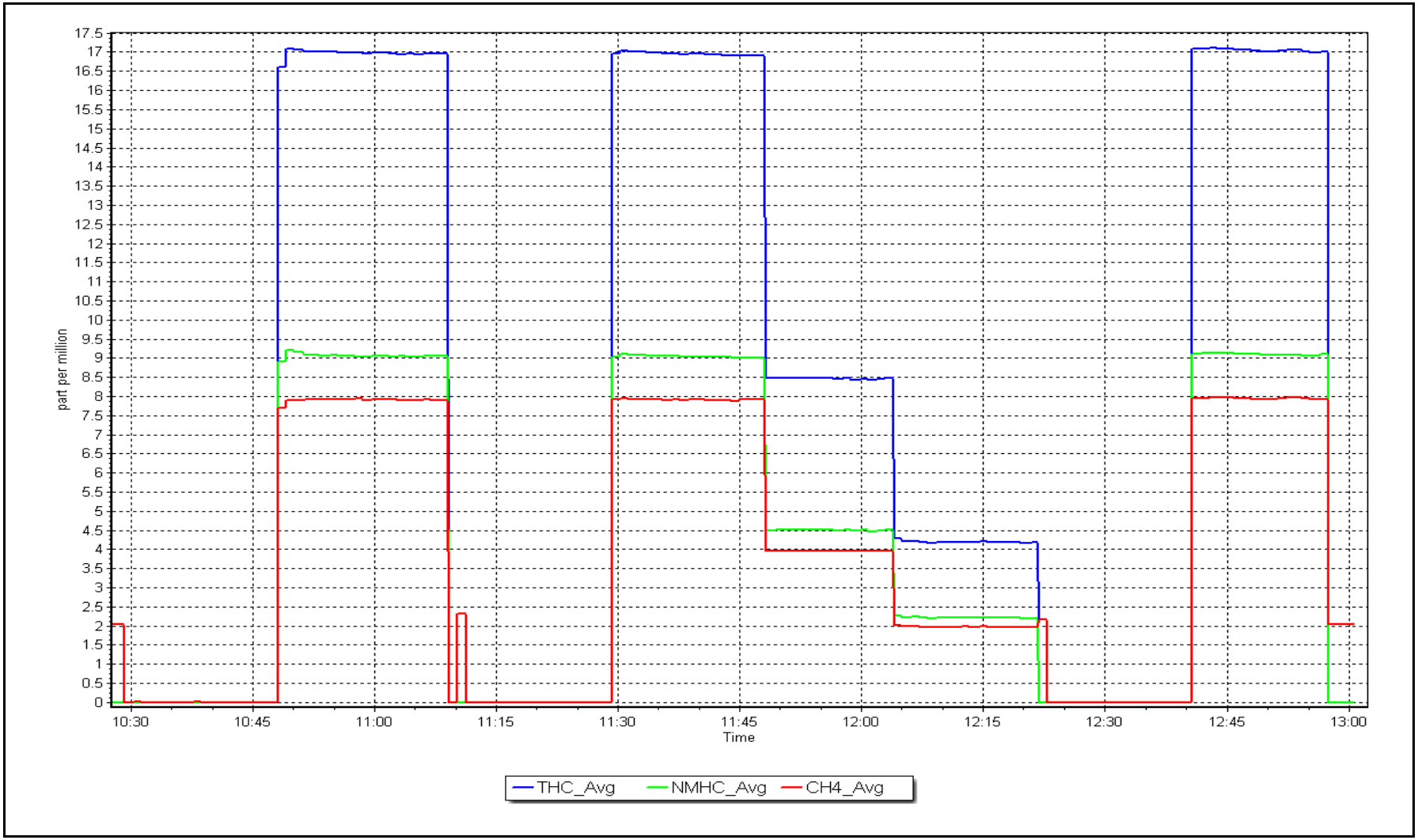
Calibration Date:	February 21, 2023	Previous Calibration:	January 23, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	10:28	End Time (MST):	13:01
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

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	9.02	1.0115			
4.56	4.49	1.0147	Slope	0.989676	*0.90 - 1.10*
2.28	2.22	1.0262			
			Intercept	-0.015788	*+/-0.5*



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



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	February 2, 2023	Last Cal Date:	January 4, 2023
Start time (MST):	7:45	End time (MST):	12:33
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:	164.2	163.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999876	1.011937
NO_X Cal Offset:	-0.745750	-0.743109
NO Cal Slope:	1.001401	1.013337
NO Cal Offset:	-1.789671	-1.947043
NO_2 Cal Slope:	1.002246	1.000011
NO_2 Cal Offset:	0.204305	0.089892

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	0.1	----	----
as found span	4921	78.6	800.5	786.8	13.7	811.8	796.3	15.5	0.9861	0.9881
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	78.6	800.5	786.8	13.7	809.5	796.2	13.4	0.9889	0.9883
second point	4961	39.3	400.2	393.4	6.8	404.5	396.1	8.4	0.9894	0.9931
third point	4980	19.6	199.6	196.2	3.4	200.1	194.8	5.3	0.9976	1.0072
as left zero	5000	0.0	0.0	0.0	0.0	0.1	-0.1	0.1	----	----
as left span	4921	78.6	800.5	389.3	411.2	806.2	395.5	410.7	0.9930	0.9844
								Average Correction Factor	0.9920	0.9962

Corrected As found	NO_X = 812.0 ppb	NO = 796.5 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	1.5%
Previous Response	NO_X = 799.7 ppb	NO = 786.2 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)	790.4	392.9	411.2	411.3	0.9997	100.0%
2nd GPT point (200 ppb O3)	790.4	584.6	219.5	219.5	0.9999	100.0%
3rd GPT point (100 ppb O3)	790.4	686.5	117.6	117.7	0.9990	100.1%
				Average Correction Factor	0.9995	100.0%

Notes: No maintenance or adjustments done.

Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

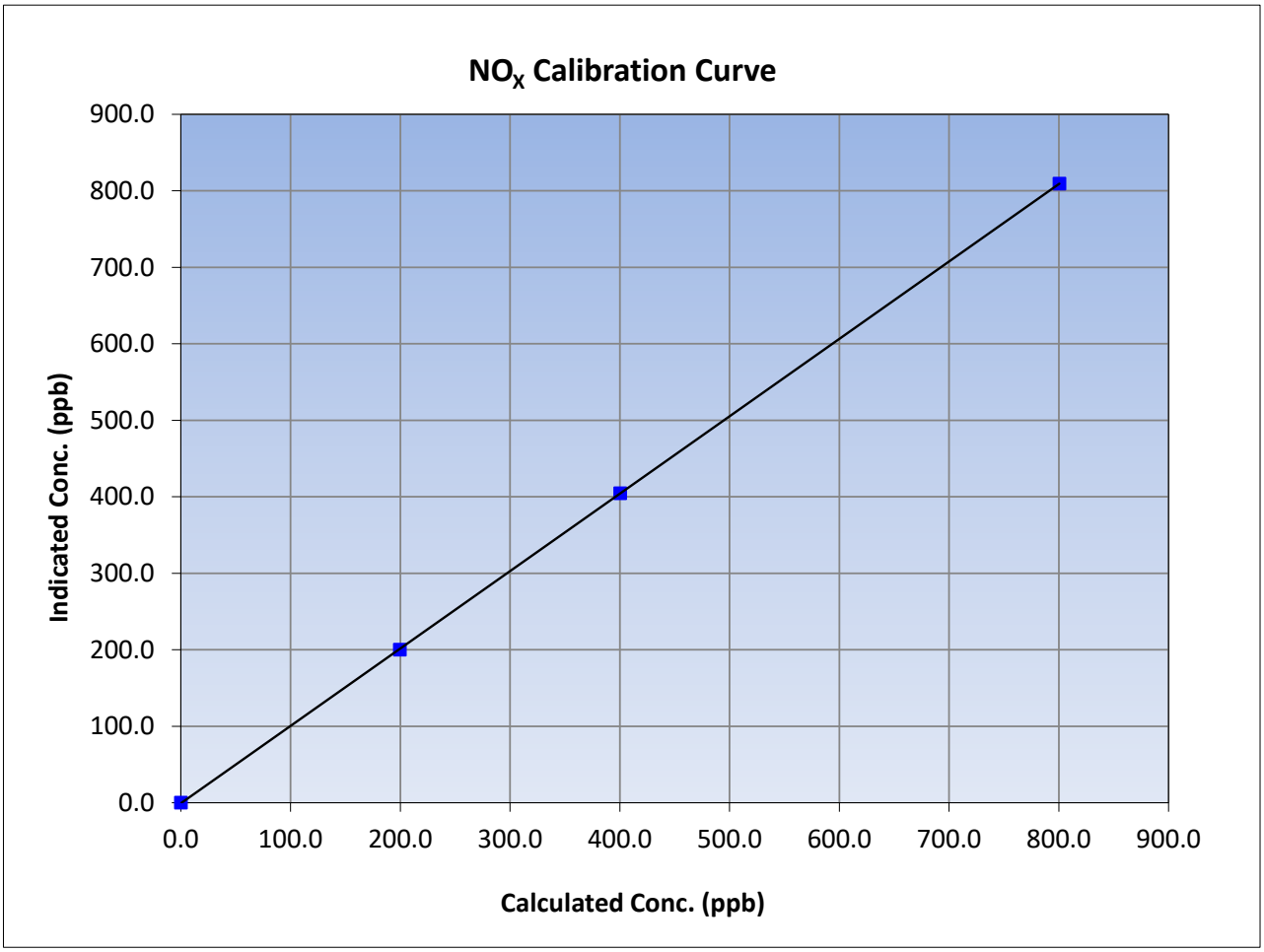
Version-04-2020

Station Information

Calibration Date:	February 2, 2023	Previous Calibration:	January 4, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	7:45	End Time (MST):	12:33
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999994	*≥0.995*
800.5	809.5	0.9889			
400.2	404.5	0.9894	Slope	1.011937	*0.90 - 1.10*
199.6	200.1	0.9976			
			Intercept	-0.743109	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

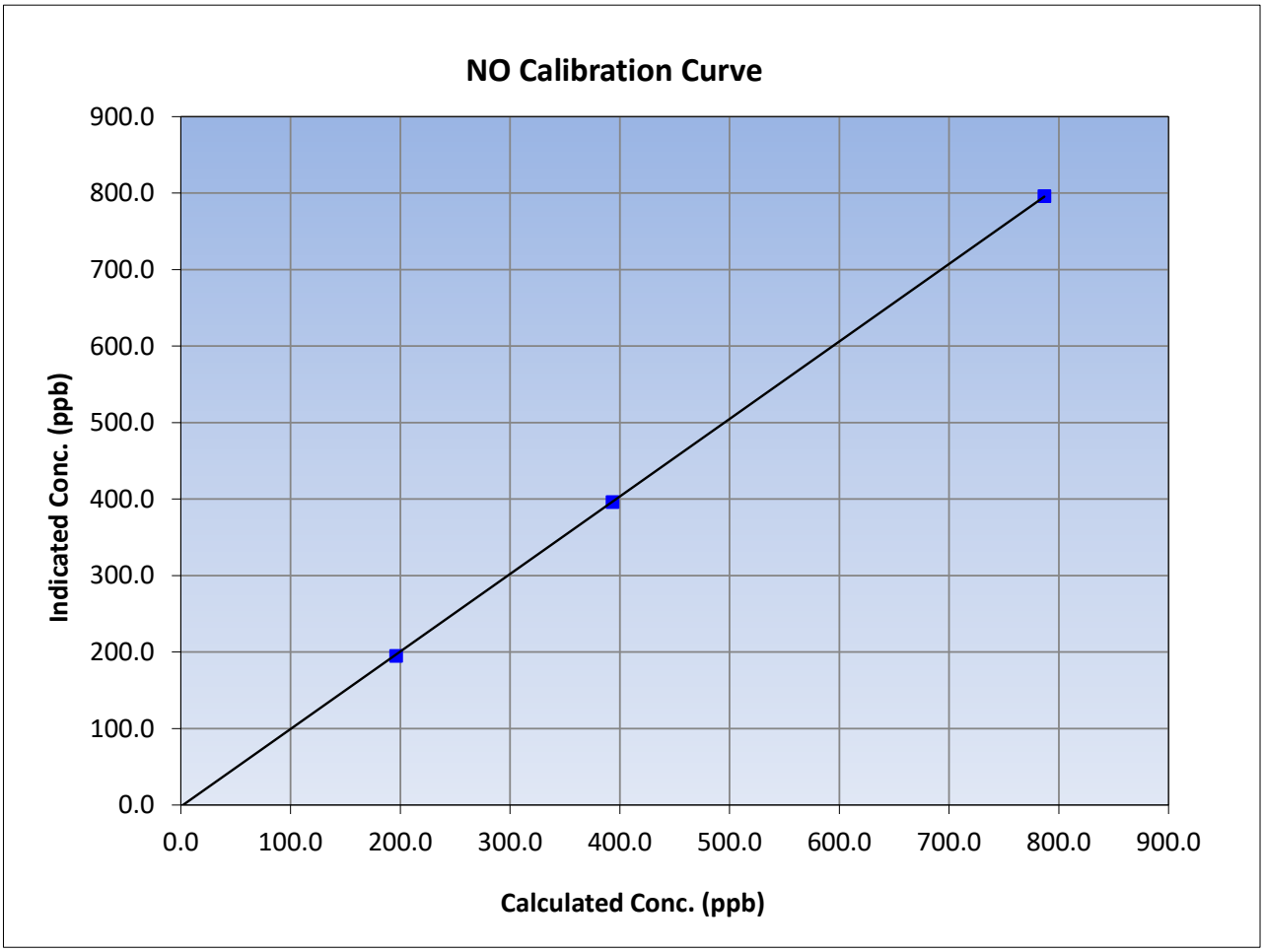
Version-04-2020

Station Information

Calibration Date:	February 2, 2023	Previous Calibration:	January 4, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	7:45	End Time (MST):	12:33
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	0.999975	≥0.995
786.8	796.2	0.9883			
393.4	396.1	0.9931	Slope	1.013337	0.90 - 1.10
196.2	194.8	1.0072			
			Intercept	-1.947043	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

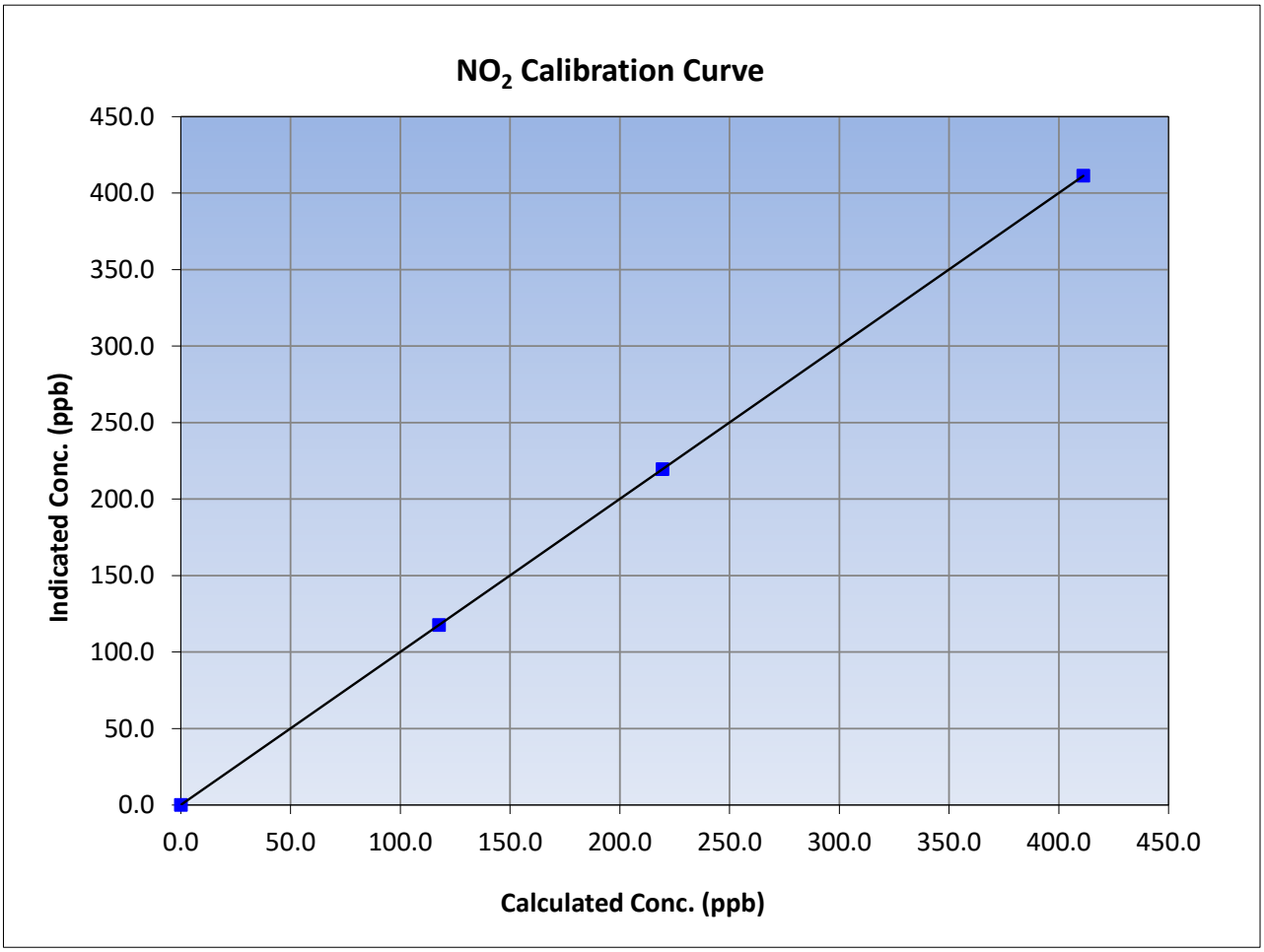
Version-04-2020

Station Information

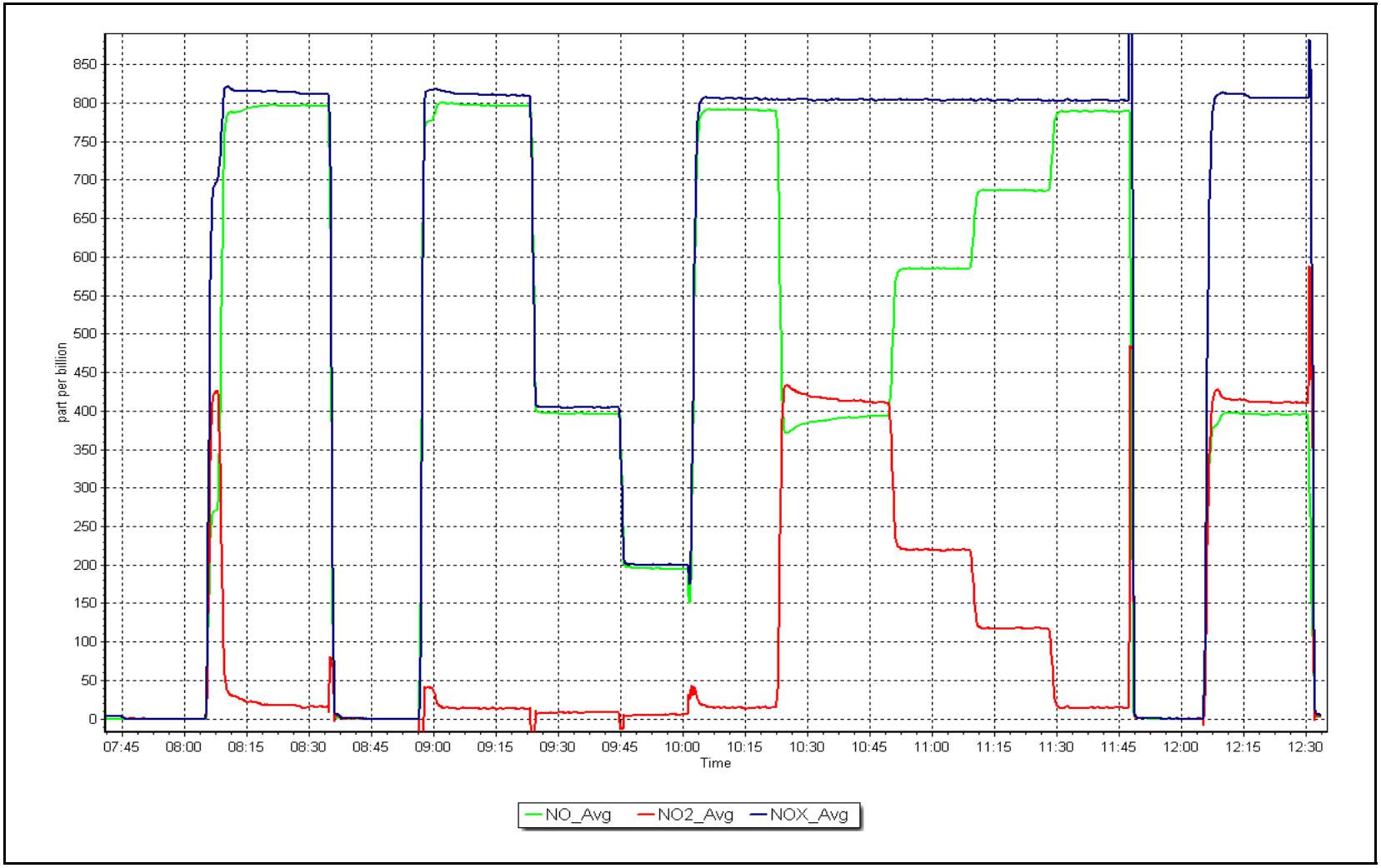
Calibration Date:	February 2, 2023	Previous Calibration:	January 4, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	7:45	End Time (MST):	12:33
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	1.000000	≥0.995
411.2	411.3	0.9997			
219.5	219.5	0.9999	Slope	1.000011	0.90 - 1.10
117.6	117.7	0.9990			
			Intercept	0.089892	+/-20



NO_X Calibration Plot Date: February 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:	February 21, 2023	Last Cal Date:	January 24, 2023
Start time (MST):	7:44	End time (MST):	10:30
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:	1.005686	0.995743	Backgd or Offset:	2.7	0.9
Calibration intercept:	-1.420000	0.420000	Coeff or Slope:	1.499	1.499

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-1.0	----
as found span	5000	877.7	400.0	396.9	1.008
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	877.7	400.0	398.3	1.004
second point	5000	746.2	200.0	200.2	0.999
third point	5000	669.6	100.0	100.4	0.996
as left zero	5000	0.0	0.0	-0.5	----
as left span	5000	924.8	400.0	397.5	1.006
				Average Correction Factor	1.000

Baseline Corr As found:	397.9	Previous response	400.9	*% 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 done. Zero adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

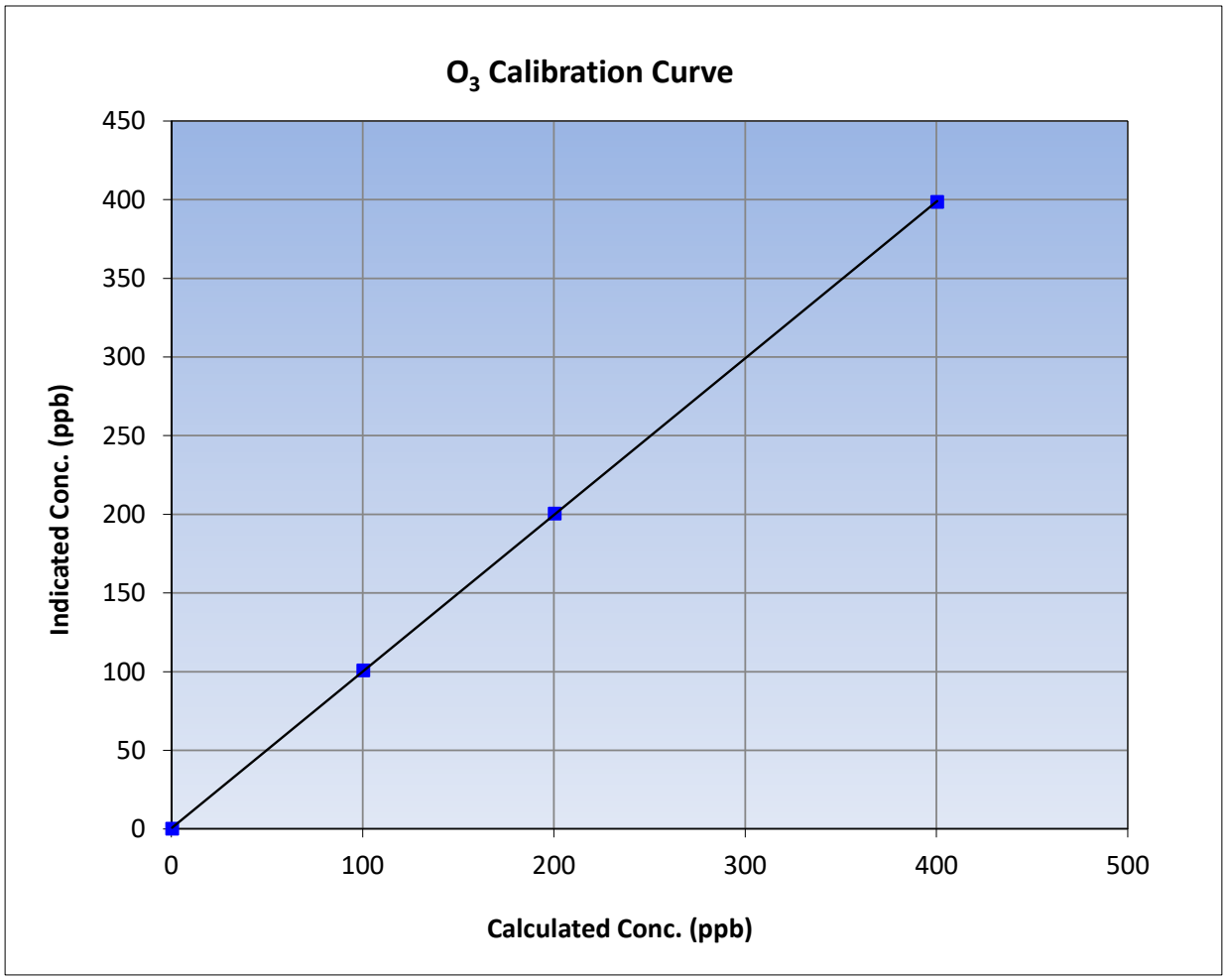
Station Information

Calibration Date:	February 21, 2023	Previous Calibration:	January 24, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	7:44	End Time (MST):	10:30
Analyzer make:	Thermo 49i	Analyzer serial #:	1426262595

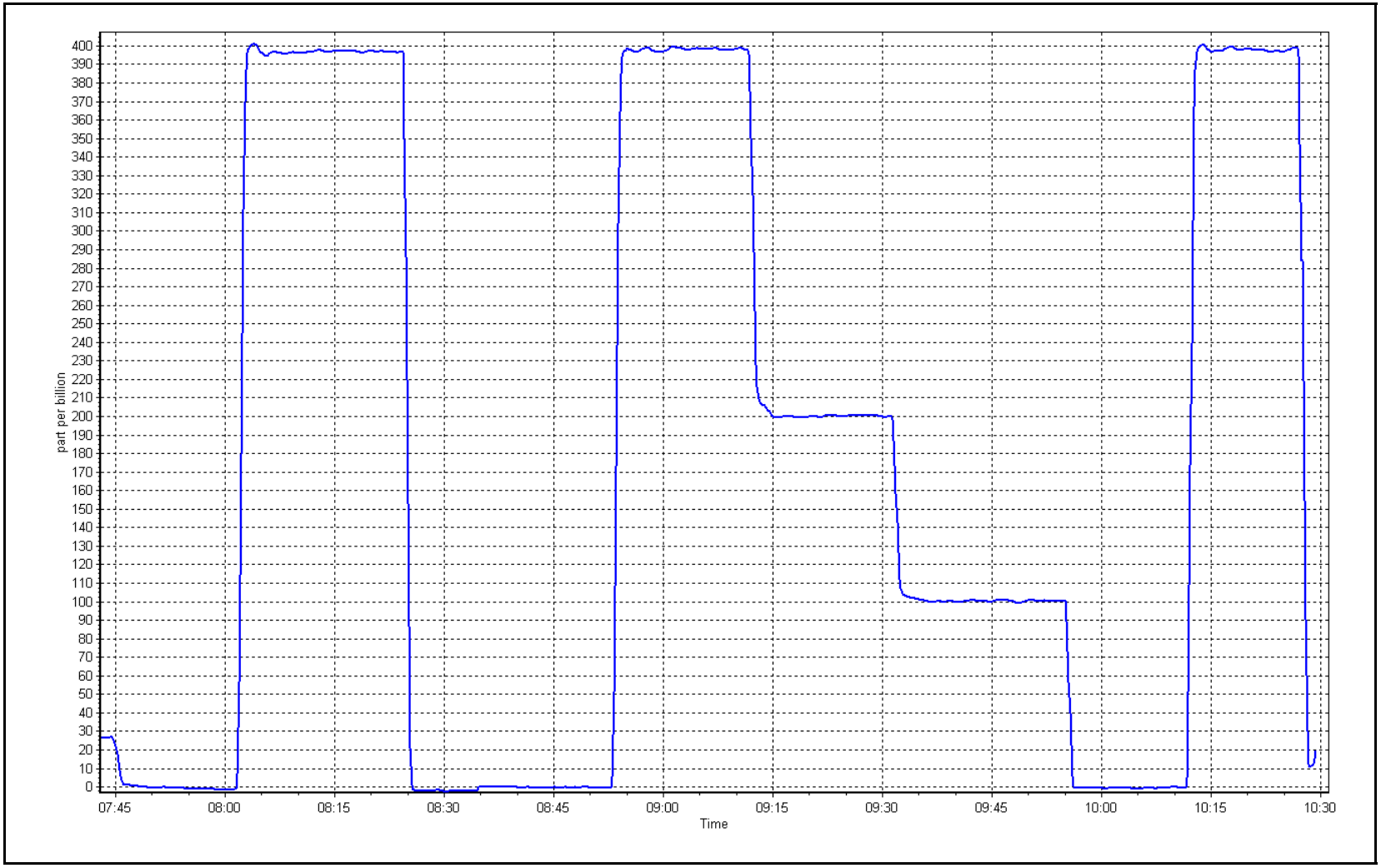
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
400.0	398.3	1.0043
200.0	200.2	0.9990
100.0	100.4	0.9960

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999987	*≥0.995*
Slope	0.995743	*0.90 - 1.10*
Intercept	0.420000	*+/- 5*



O_3 Calibration Plot Date: February 21, 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:	February 22, 2023	Last Cal Date:	January 24, 2023
Start time (MST):	8:48	End time (MST):	9:15
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)	-25.3	-25.6	-25.3	☐	+/- 2 °C
P (mmHg)	727.7	728.7	727.7	☐	+/- 10 mmHg
flow (LPM)	5	5.2	5	☐	+/- 0.25 LPM

Leak Test: Date of check: February 22, 2023 Last Cal Date: January 24, 2023

PM w/o HEPA: 3.4 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: December 14, 2022 <0.2 ug/m3

Disposable Filter Changed: December 14, 2022

Annual Maintenance

Date Sample Tube Cleaned: June 21, 2022

Date RH/T Sensor Cleaned: June 21, 2022

Notes: No adjustments done. Inlet Head cleaned.

Calibration by: Melissa Lemay

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS17
WAPASU
FEBRUARY 2023

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

March 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	February 14, 2023	Last Cal Date:	January 10, 2023
Start time (MST):	11:04	End time (MST):	14:08
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.38 ppm	Cal Gas Exp Date:	January 12, 2029
Cal Gas Cylinder #:	ALM066507		
Removed Cal Gas Conc:	50.38 ppm	Rem Gas Exp Date:	n/a
Removed Gas Cyl #:	n/a	Diff between cyl:	
Calibrator Make/Model:	API T700	Serial Number:	2449
ZAG Make/Model:	API 701H	Serial Number:	359

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1218153459

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	0.999825	1.000068	Backgd or Offset:	12.0	12.5
Calibration intercept:	-1.319798	-1.979730	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	0.5	----
as found span	4921	79.4	800.0	796.7	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4921	79.4	800.0	799.5	1.001
second point	4960	39.7	400.0	395.8	1.011
third point	4980	19.8	199.5	196.3	1.016
as left zero	5000	0.0	0.0	0.1	----
as left span	4920	79.4	800.1	800.3	1.000
				Average Correction Factor	1.009

Baseline Corr As found:	796.20	Previous response	798.51	*% change	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

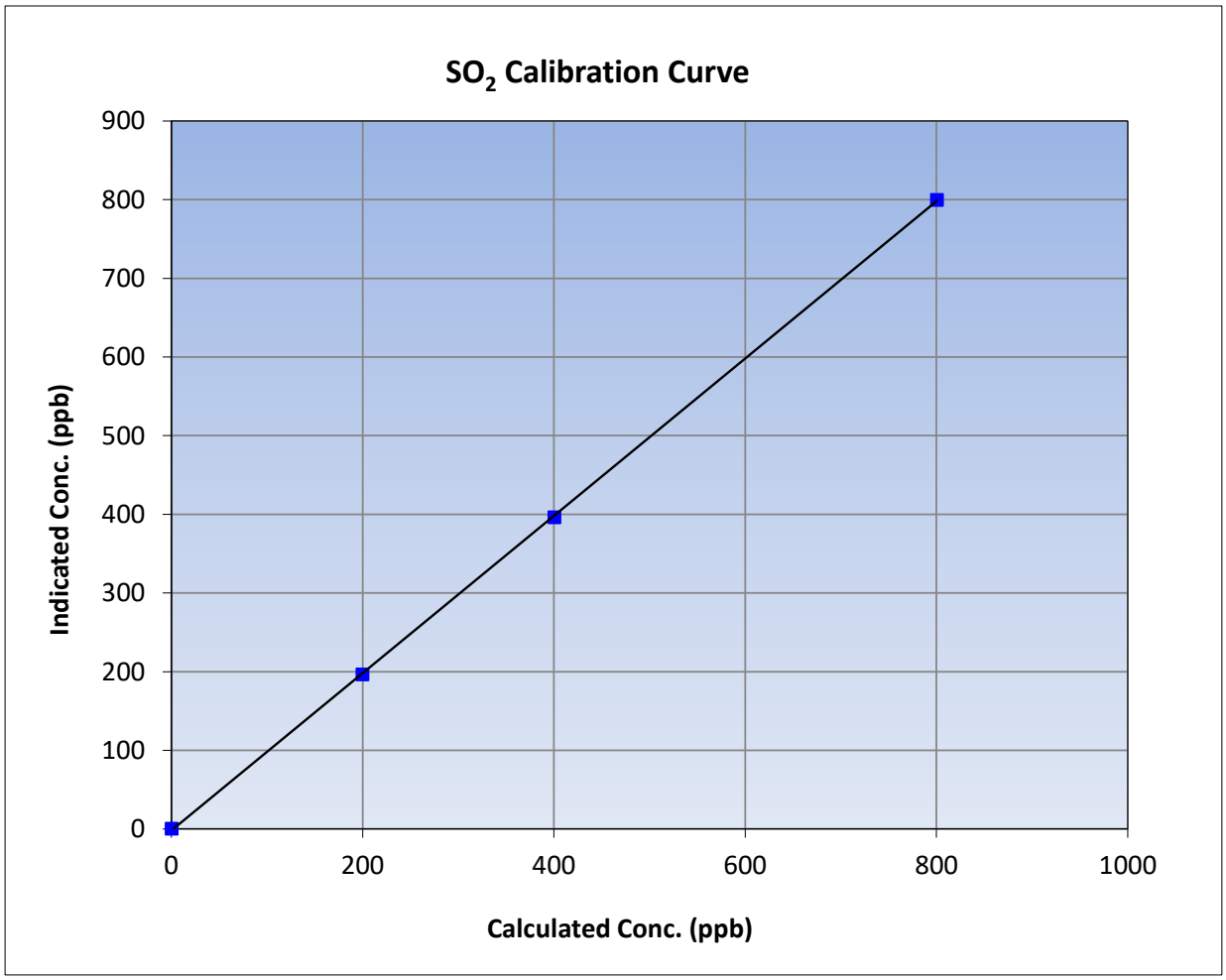
Station Information

Calibration Date:	February 14, 2023	Previous Calibration:	January 10, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:04	End Time (MST):	14:08
Analyzer make:	Thermo 43i	Analyzer serial #:	1218153459

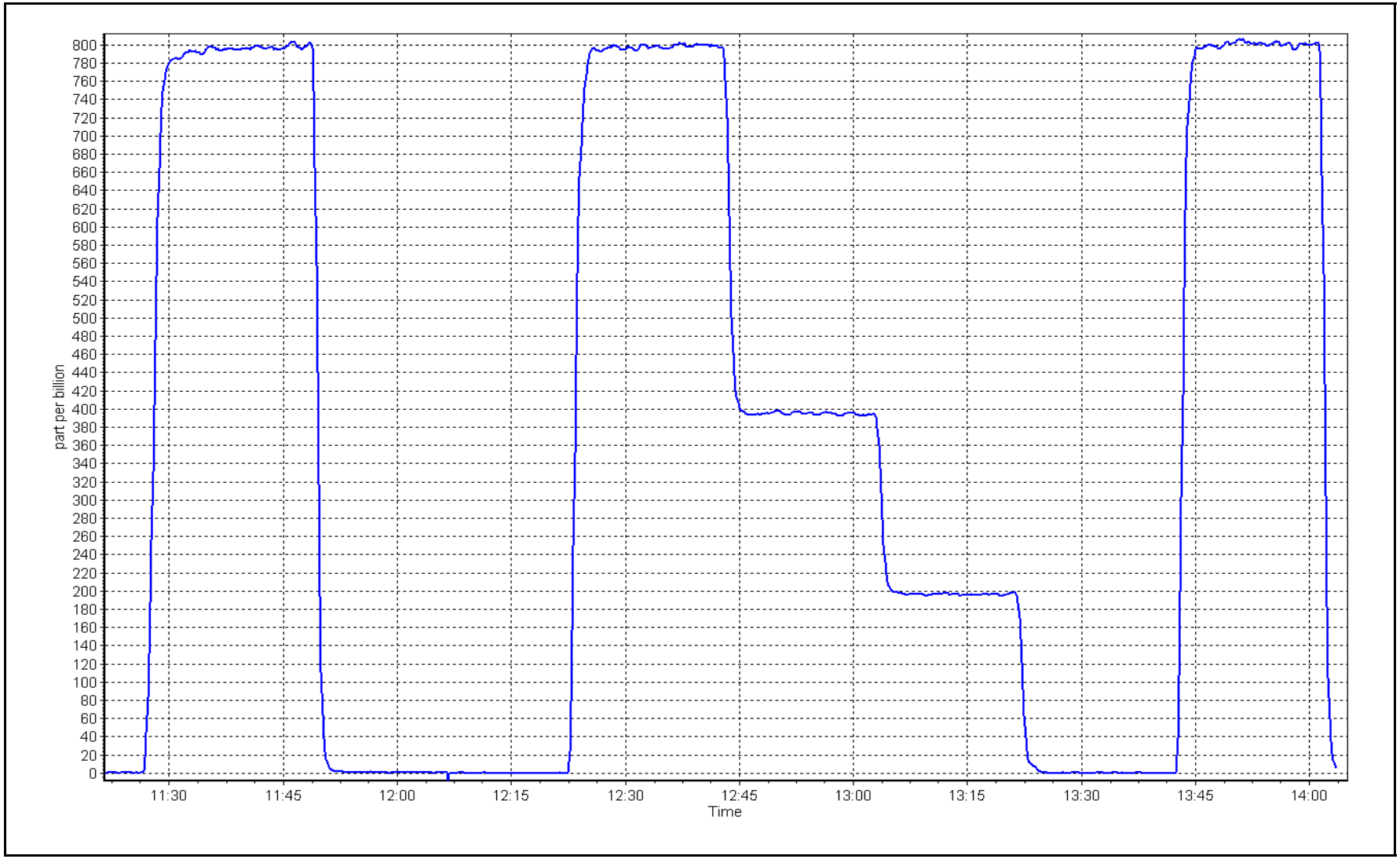
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
800.0	799.5	1.0006
400.0	395.8	1.0107
199.5	196.3	1.0164

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999962	*≥0.995*
Slope	1.000068	*0.90 - 1.10*
Intercept	-1.979730	*+/-30*



SO2 Calibration Plot Date: February 14, 2023 Location: Wapasu



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	February 16, 2023	Last Cal Date:	January 5, 2023
Start time (MST):	10:28	End time (MST):	14:50
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 450i		Analyzer serial #:	1218153583	
Converter make:	n/a		Converter serial #:	n/a	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.002282	0.995568	Backgd or Offset:	12.9	13.0
Calibration intercept:	0.320801	0.080792	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	0.3	----
as found span	4921	78.8	80.0	80.4	0.999
as found 2nd point	4961	39.4	40.0	40.1	1.005
as found 3rd point	4980	19.7	20.0	20.1	1.010
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4921	78.8	80.0	79.8	1.003
second point	4961	39.4	40.0	39.8	1.005
third point	4980	19.7	20.0	19.9	1.005
as left zero	5000	0.0	0.0	0.5	----
as left span	4921	78.8	80.0	79.3	1.009
SO2 Scrubber Check	4921	79.4	800.0	-0.1	----
Date of last scrubber change:		n/a		Ave Corr Factor	1.004
Date of last converter efficiency test:		n/a			efficiency

Baseline Corr As found:	80.1	Prev response:	80.50	*% change:	-0.5%
Baseline Corr 2nd AF pt:	39.8	AF Slope:	1.001854	AF Intercept:	0.160796
Baseline Corr 3rd AF pt:	19.8	AF Correlation:	0.999985		

* = > +/-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

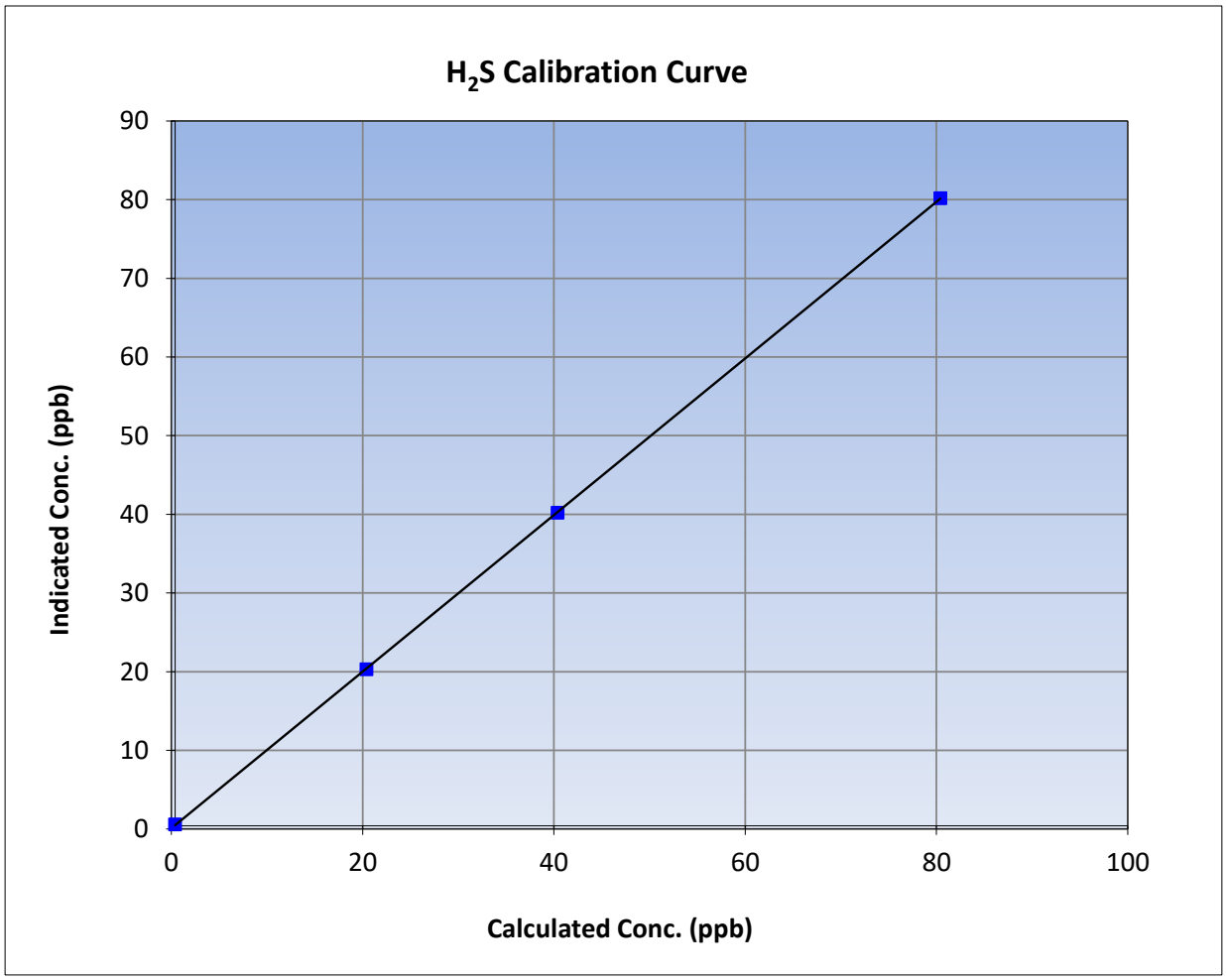
Station Information

Calibration Date:	February 16, 2023	Previous Calibration:	January 5, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:28	End Time (MST):	14:50
Analyzer make:	Thermo 450i	Analyzer serial #:	1218153583

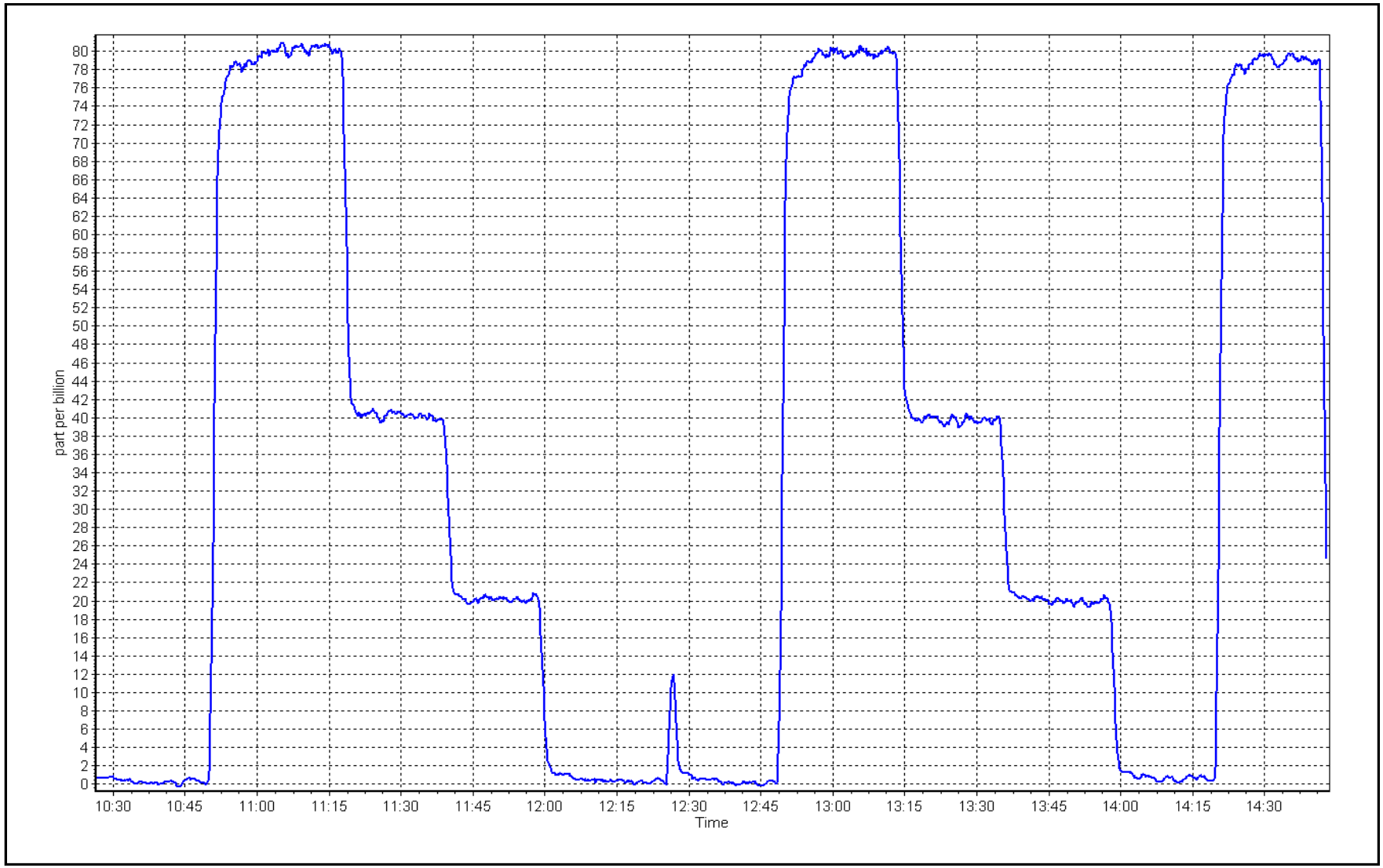
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	79.8	1.0025
40.0	39.8	1.0049
20.0	19.9	1.0051

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999989	*≥0.995*
Slope	0.995568	*0.90 - 1.10*
Intercept	0.080792	*+/-3*



H_2S Calibration Plot Date: February 16, 2023 Location: Wapasu



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	February 14, 2023	Last Cal Date:	January 10, 2023
Start time (MST):	11:04	End time (MST):	14:08
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	ALM066507		Cal Gas Expiry Date:	January 12, 2029	
CH4 Cal Gas Conc.	503.5	ppm	CH4 Equiv Conc.	1076.3	ppm
C3H8 Cal Gas Conc.	208.3	ppm			
Removed Gas Cert:	n/a		Removed Gas Expiry:	n/a	
Removed CH4 Conc.	503.5	ppm	CH4 Equiv Conc.	1076.3	ppm
Removed C3H8 Conc.	208.3	ppm	Diff between cyl:		
Calibrator Make/Model:	API T700		Serial Number:	2449	
ZAG Make/Model:	API 701H		Serial Number:	359	

Analyzer Information

Analyzer make:	Thermo 51i-LT		Analyzer serial #:	1218153352	
Analyzer Range:	0 - 20 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003975	1.011424	Background:	2.950	3.090
Calibration intercept:	0.033881	-0.037301	Coefficient:	4.292	4.324

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	4921	79.4	17.09	17.30	0.988
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.01	----
high point	4921	79.4	17.09	17.29	0.989
second point	4960	39.7	8.55	8.54	1.000
third point	4980	19.8	4.26	4.25	1.002
as left zero	5000	0.0	0.00	-0.01	----
as left span	4920	79.4	17.09	17.36	0.985
				Average Correction Factor	0.997

Baseline Corr As found:	17.20	Previous response	17.19	*% 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. Adjusted the zero only.

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

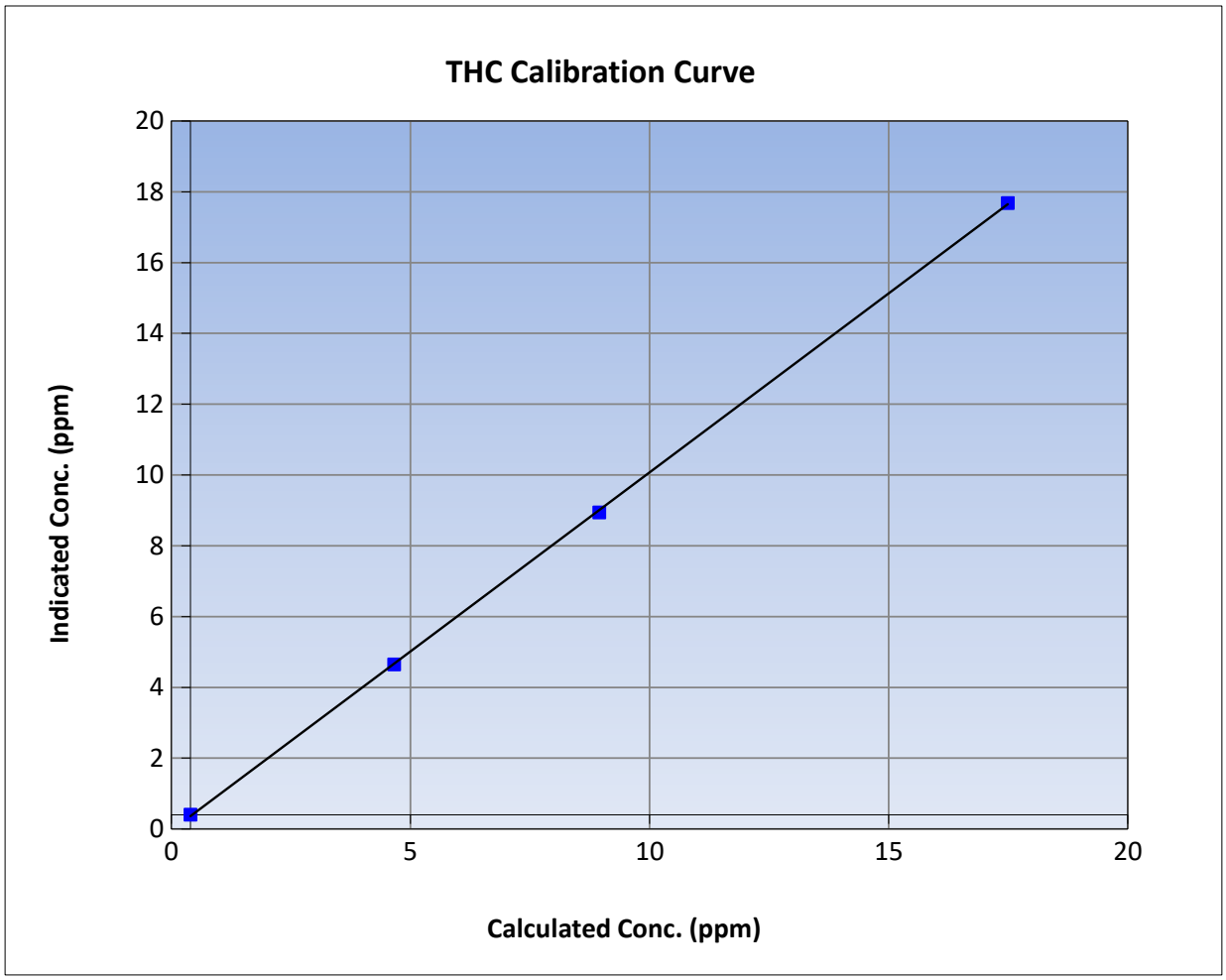
Station Information

Calibration Date:	February 14, 2023	Previous Calibration:	January 10, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:04	End Time (MST):	14:08
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1218153352

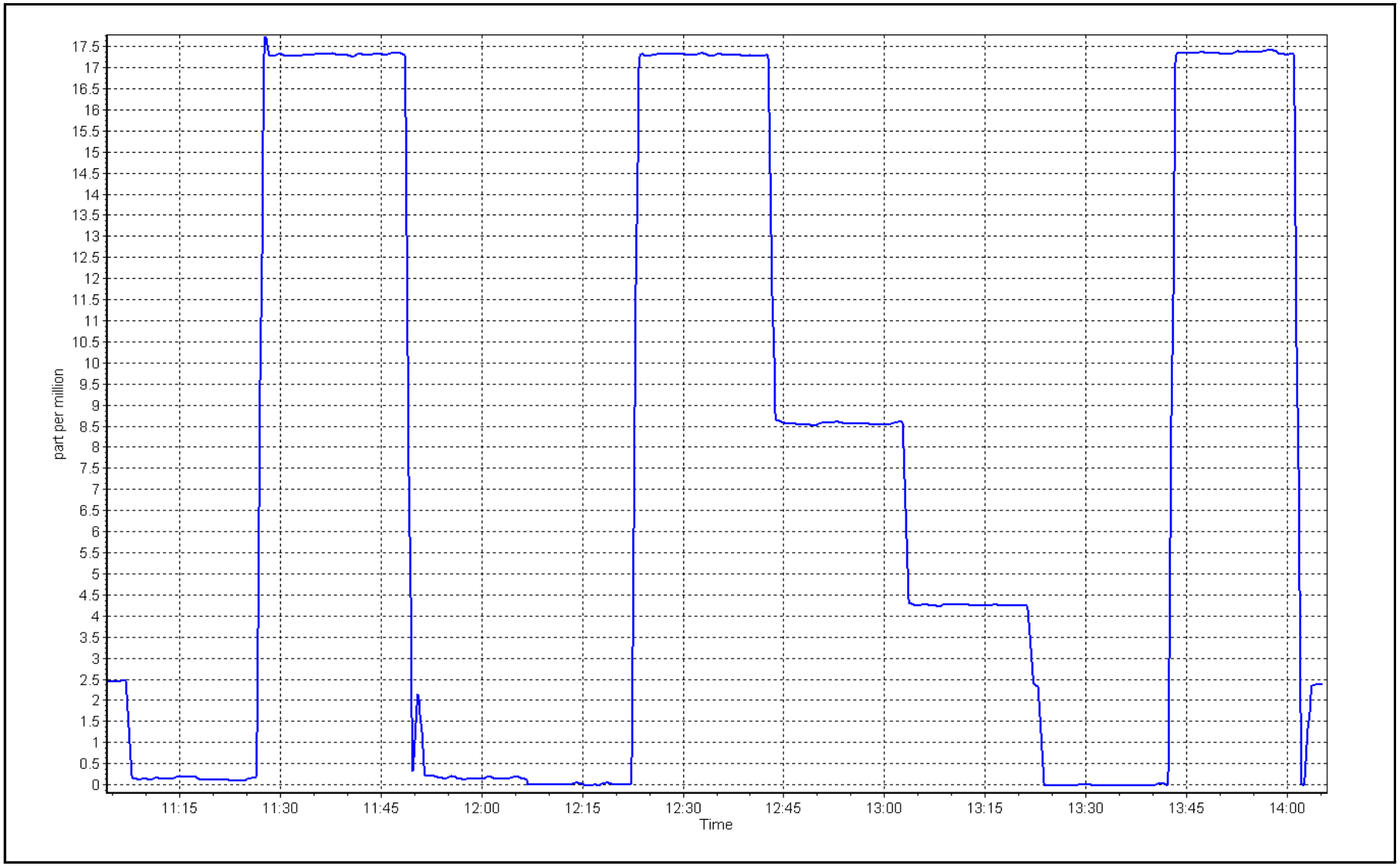
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.01	----
17.09	17.29	0.9888
8.55	8.54	1.0003
4.26	4.25	1.0020

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999952	*≥0.995*
Slope	1.011424	*0.90 - 1.10*
Intercept	-0.037301	*+/-1.5*



THC Calibration Plot Date: February 14, 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:	February 23, 2023	Last Cal Date:	January 19, 2023
Start time (MST):	11:33	End time (MST):	15:52
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:	4.4	4.5

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	0.999578	0.989719
NO_X Cal Offset:	-1.120000	-1.420000
NO Cal Slope:	1.000973	0.990300
NO Cal Offset:	-2.440000	-1.880000
NO_2 Cal Slope:	0.996862	0.986936
NO_2 Cal Offset:	-0.247483	-0.501997

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	0.2	----	----
as found span	4917	83.2	817.2	799.9	17.3	805.7	790.7	15.0	1.0143	1.0116
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.5	0.2	0.3	----	----
high point	4917	83.2	817.2	799.9	17.3	808.6	791.4	17.3	1.0106	1.0107
second point	4958	41.6	408.6	399.9	8.7	401.2	392.8	8.5	1.0184	1.0182
third point	4979	20.8	204.3	200.0	4.3	199.4	194.3	5.1	1.0246	1.0292
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	403.5	413.7	797.3	389.7	407.5	1.0249	1.0354
								Average Correction Factor	1.0179	1.0194

Corrected As found NO_X = 805.6 ppb NO = 790.8 ppb

Previous Response NO_X = 815.7 ppb NO = 798.2 ppb

Baseline Corr 2nd pt NO_X = NA ppb NO = NA ppb

Baseline Corr 3rd pt NO_X = NA ppb NO = NA ppb

* = > +/-5% change initiates investigation

*Percent Change NO_X = -1.3%

*Percent Change NO = -0.9%

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)	790.5	394.1	413.7	408.2	1.0135	98.7%
2nd GPT point (200 ppb O3)	790.5	588.5	219.3	215.7	1.0167	98.4%
3rd GPT point (100 ppb O3)	790.5	690.0	117.8	114.8	1.0262	97.4%
				Average Correction Factor	1.0188	98.2%

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

NO_X Calibration Summary

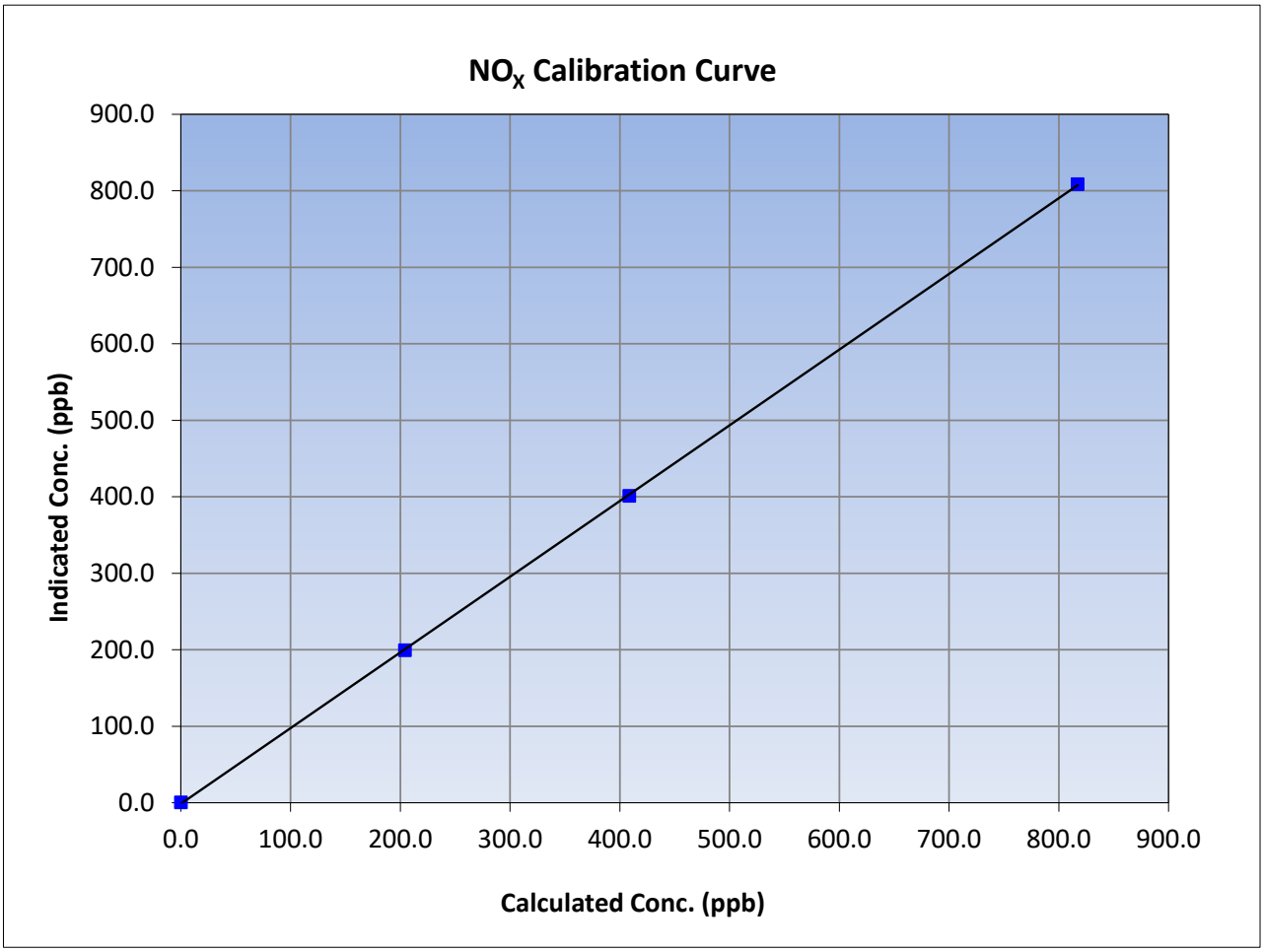
Version-04-2020

Station Information

Calibration Date:	February 23, 2023	Previous Calibration:	January 19, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:33	End Time (MST):	15:52
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	0.5	----	Correlation Coefficient	0.999971	≥0.995
817.2	808.6	1.0106			
408.6	401.2	1.0184	Slope	0.989719	0.90 - 1.10
204.3	199.4	1.0246			
			Intercept	-1.420000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

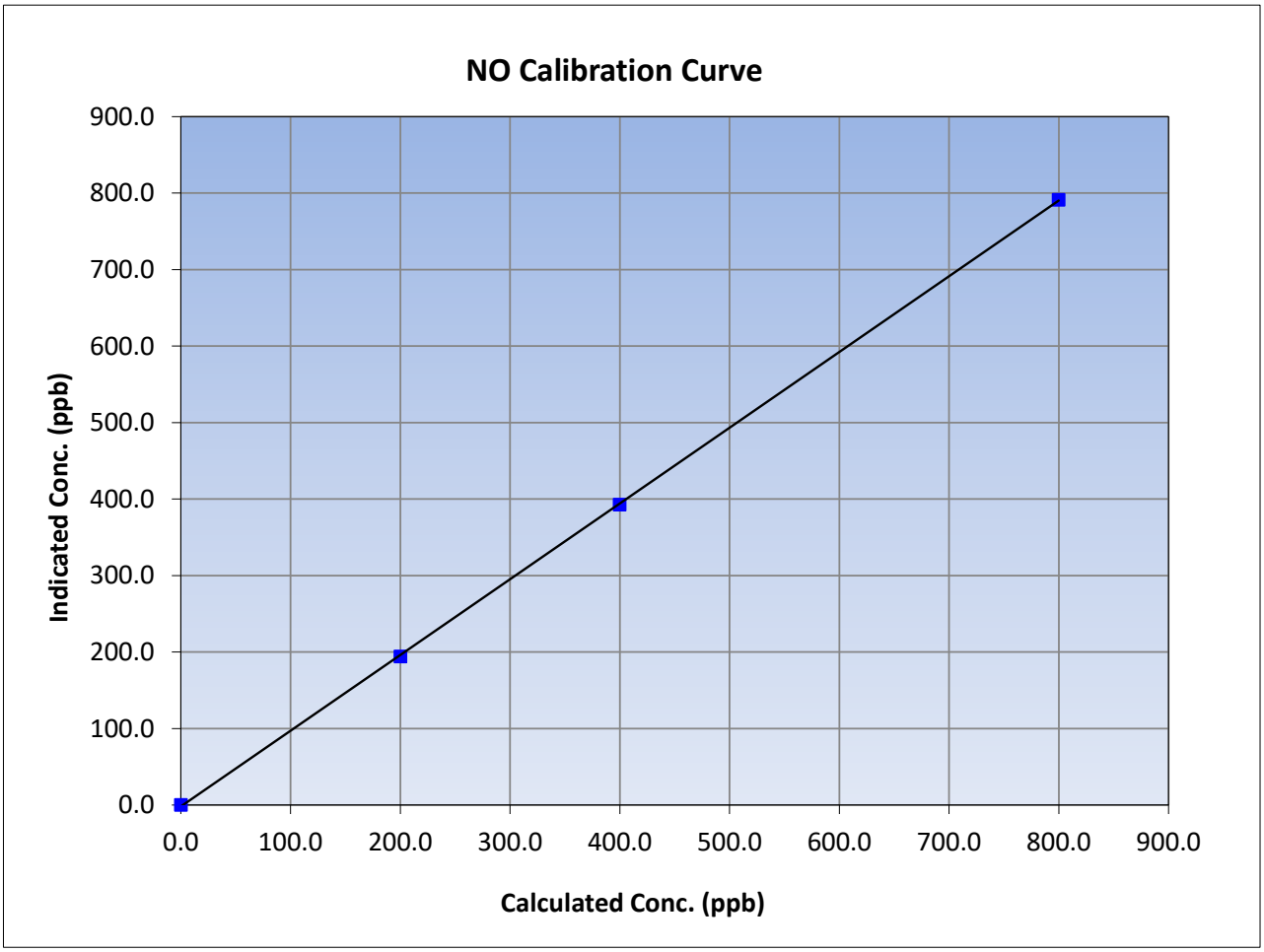
Version-04-2020

Station Information

Calibration Date:	February 23, 2023	Previous Calibration:	January 19, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:33	End Time (MST):	15:52
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	0.999968	*≥0.995*
799.9	791.4	1.0107			
399.9	392.8	1.0182	Slope	0.990300	*0.90 - 1.10*
200.0	194.3	1.0292			
			Intercept	-1.880000	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

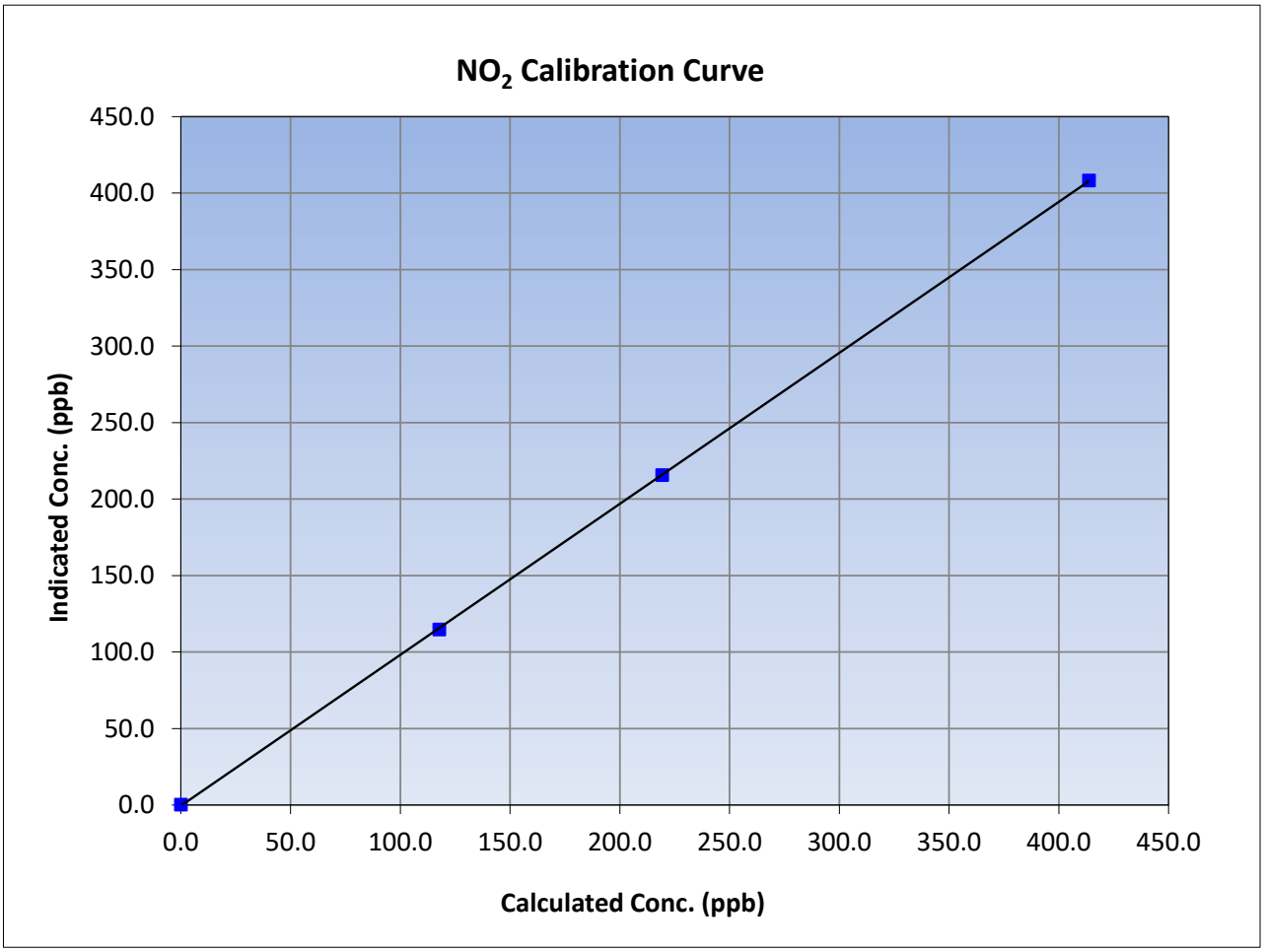
Version-04-2020

Station Information

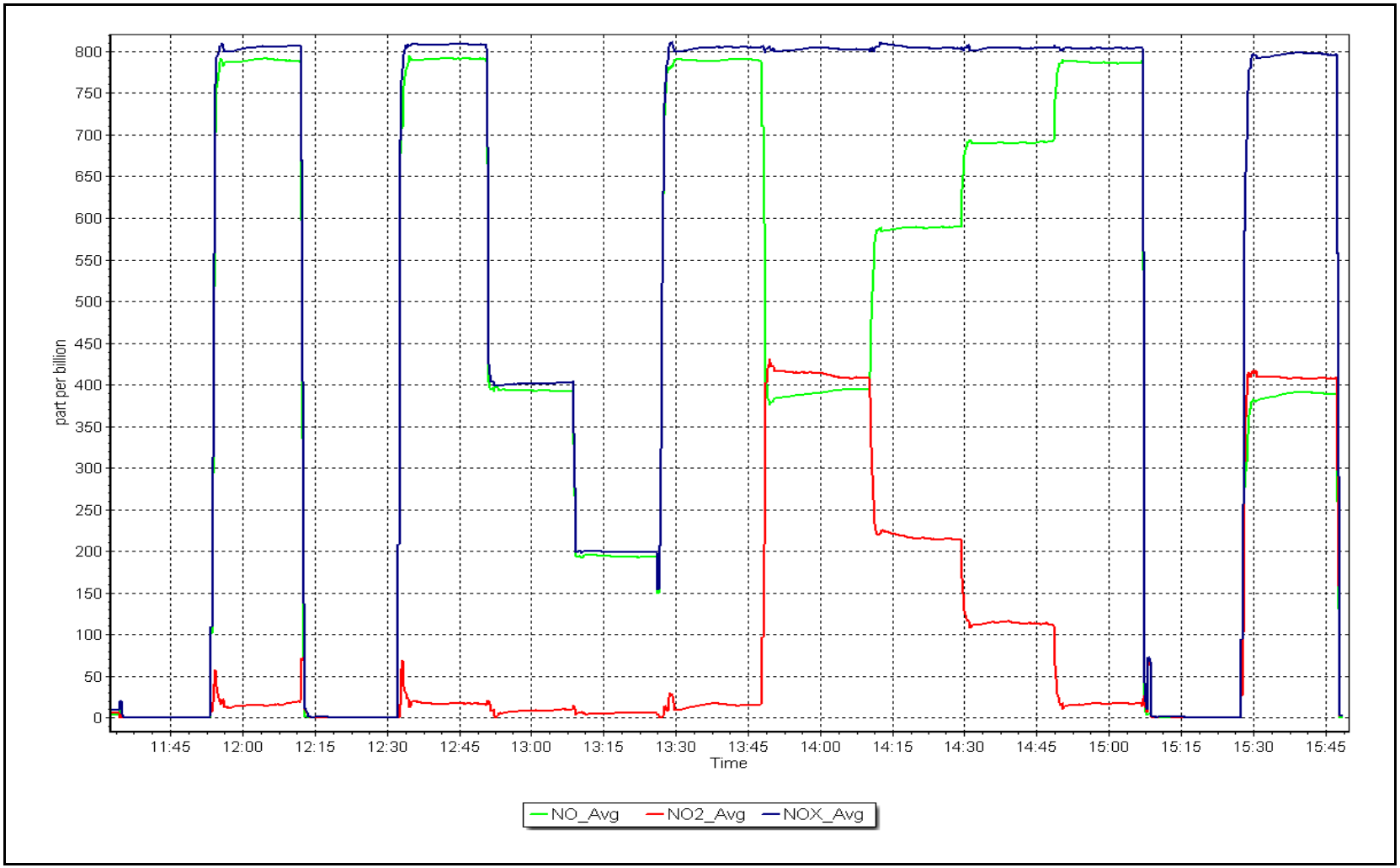
Calibration Date:	February 23, 2023	Previous Calibration:	January 19, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:33	End Time (MST):	15:52
Analyzer make:	Teledyne API T200	Analyzer serial #:	833

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.3	----	Correlation Coefficient	0.999980	≥0.995
413.7	408.2	1.0135			
219.3	215.7	1.0167	Slope	0.986936	0.90 - 1.10
117.8	114.8	1.0262			
			Intercept	-0.501997	+/-20



NO_x Calibration Plot Date: February 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:	February 6, 2023	Last Cal Date:	January 4, 2023
Start time (MST):	11:05	End time (MST):	13:58
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:	1.005486	1.005686	Backgd or Offset:	-1.8	-1.8
Calibration intercept:	-0.360000	-0.320000	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	0.1	----
as found span	5000	1077.3	400.0	403.2	0.992
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	1077.3	400.0	402.1	0.995
second point	5000	900.3	200.0	200.9	0.996
third point	5000	789.5	100.0	99.5	1.005
as left zero	5000	0.0	0.0	-0.1	----
as left span	5000	1077.3	400.0	405.9	0.985
				Average Correction Factor	0.998

Baseline Corr As found:	403.1	Previous response	401.8	*% change	0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

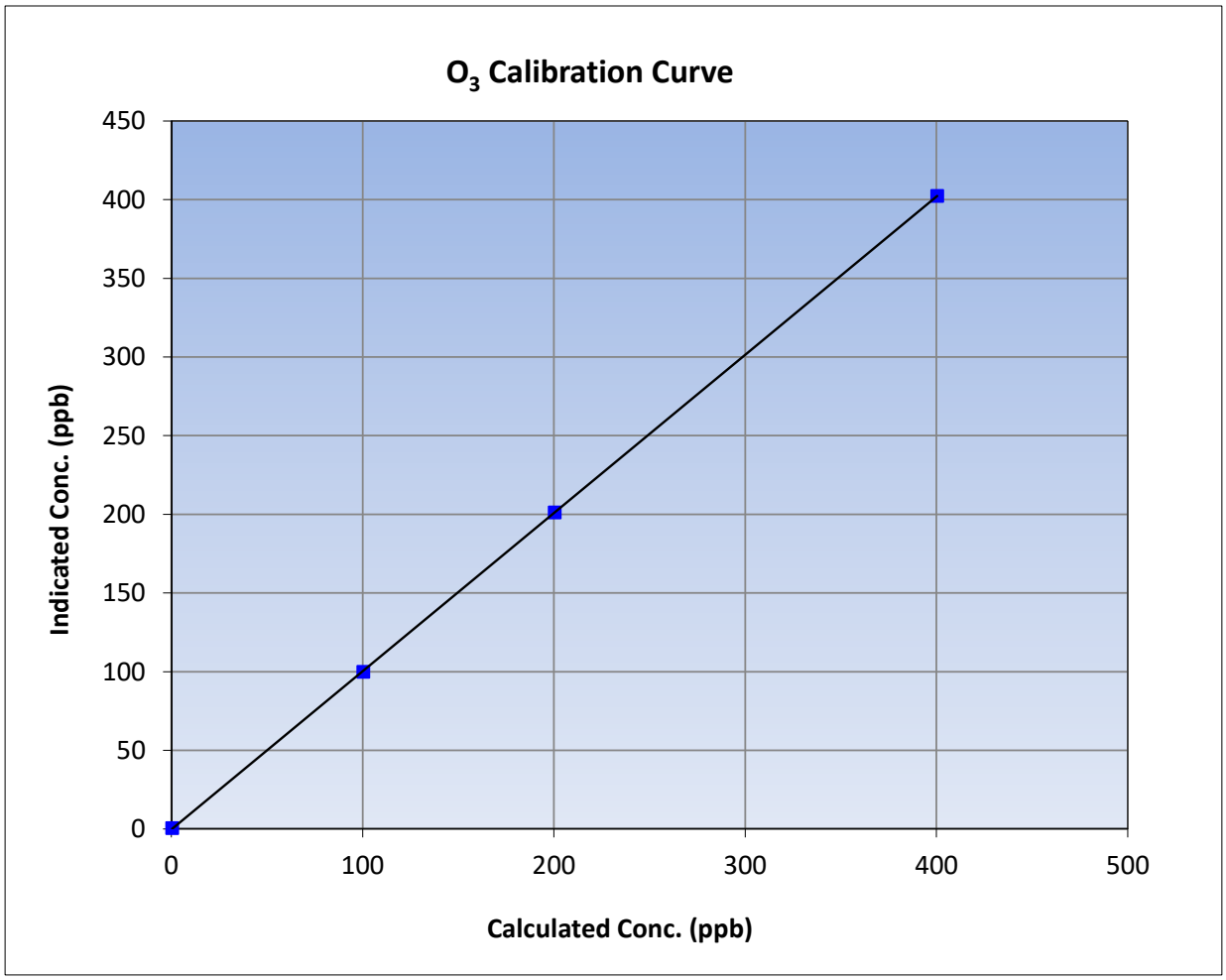
Station Information

Calibration Date:	February 6, 2023	Previous Calibration:	January 4, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:05	End Time (MST):	13:58
Analyzer make:	API T400	Analyzer serial #:	3870

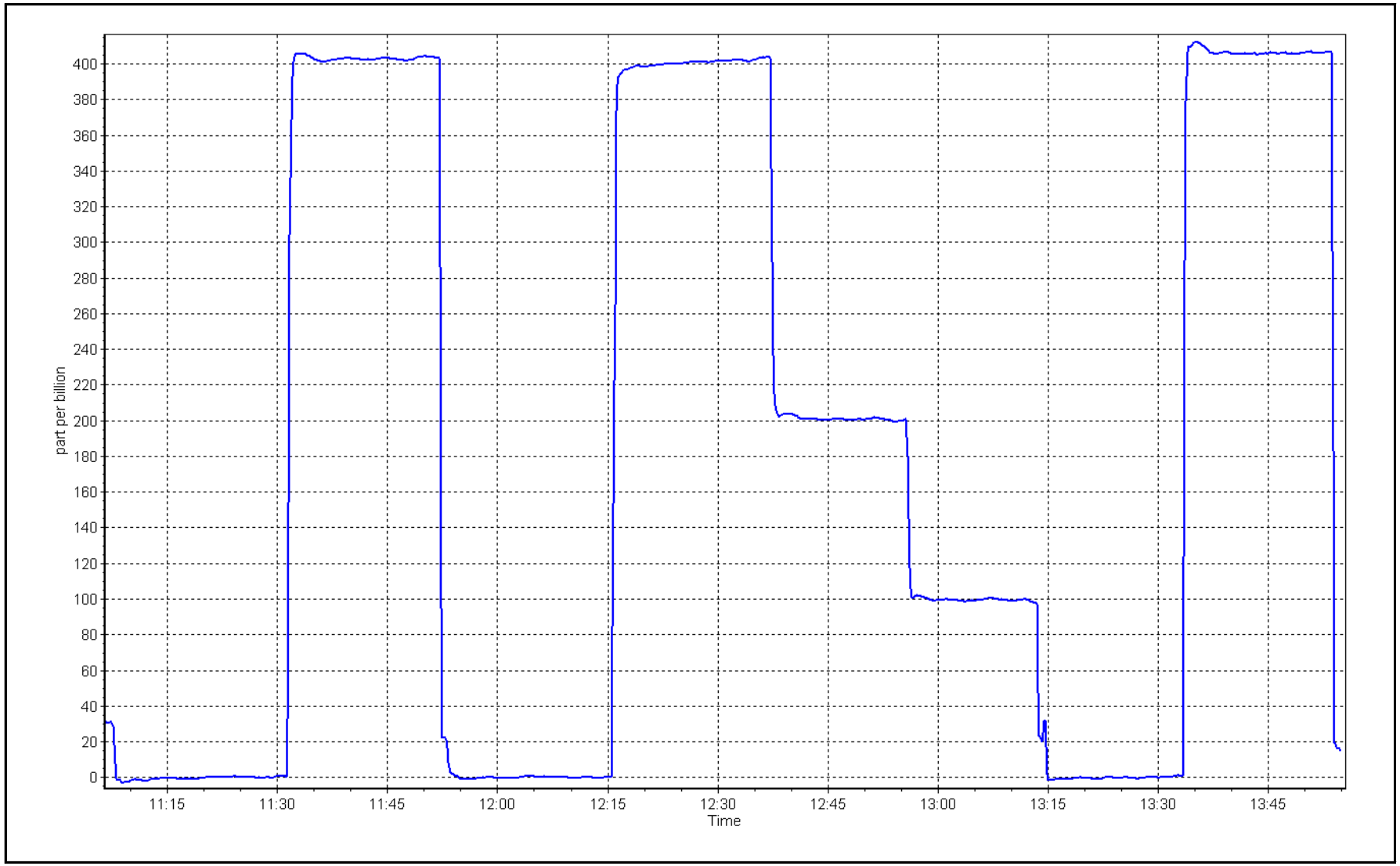
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
400.0	402.1	0.9948
200.0	200.9	0.9955
100.0	99.5	1.0050

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999990	*≥0.995*
Slope	1.005686	*0.90 - 1.10*
Intercept	-0.320000	*+/- 5*



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



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Wapasu	Station number:	AMS 17
Calibration Date:	February 23, 2023	Last Cal Date:	January 19, 2023
Start time (MST):	12:16	End time (MST):	12:47
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)	-21.8	-22.3	-21.8	☐	+/- 2 °C
P (mmHg)	730.2	730.9	730.2	☐	+/- 10 mmHg
flow (LPM)	5.02	4.98	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: February 23, 2023 Last Cal Date: January 19, 2023

PM w/o HEPA: 3.6 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: December 15, 2022 <0.2 ug/m3

Disposable Filter Changed: December 15, 2022

Annual Maintenance

Date Sample Tube Cleaned: _____

Date RH/T Sensor Cleaned: _____

Notes: No adjustments made. Leak check passed.

Calibration by: Karan Pandit

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS18
STONY MOUNTAIN
FEBRUARY 2023

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

March 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	February 3, 2023	Last Cal Date:	January 16, 2023
Start time (MST):	10:55	End time (MST):	12:12
Reason:	As Found		

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:	1.003075		Backgd or Offset:	23.0	23.0
Calibration intercept:	-1.143339		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	804.9	0.994
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5009	0.0	0.0	-0.5	----
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	

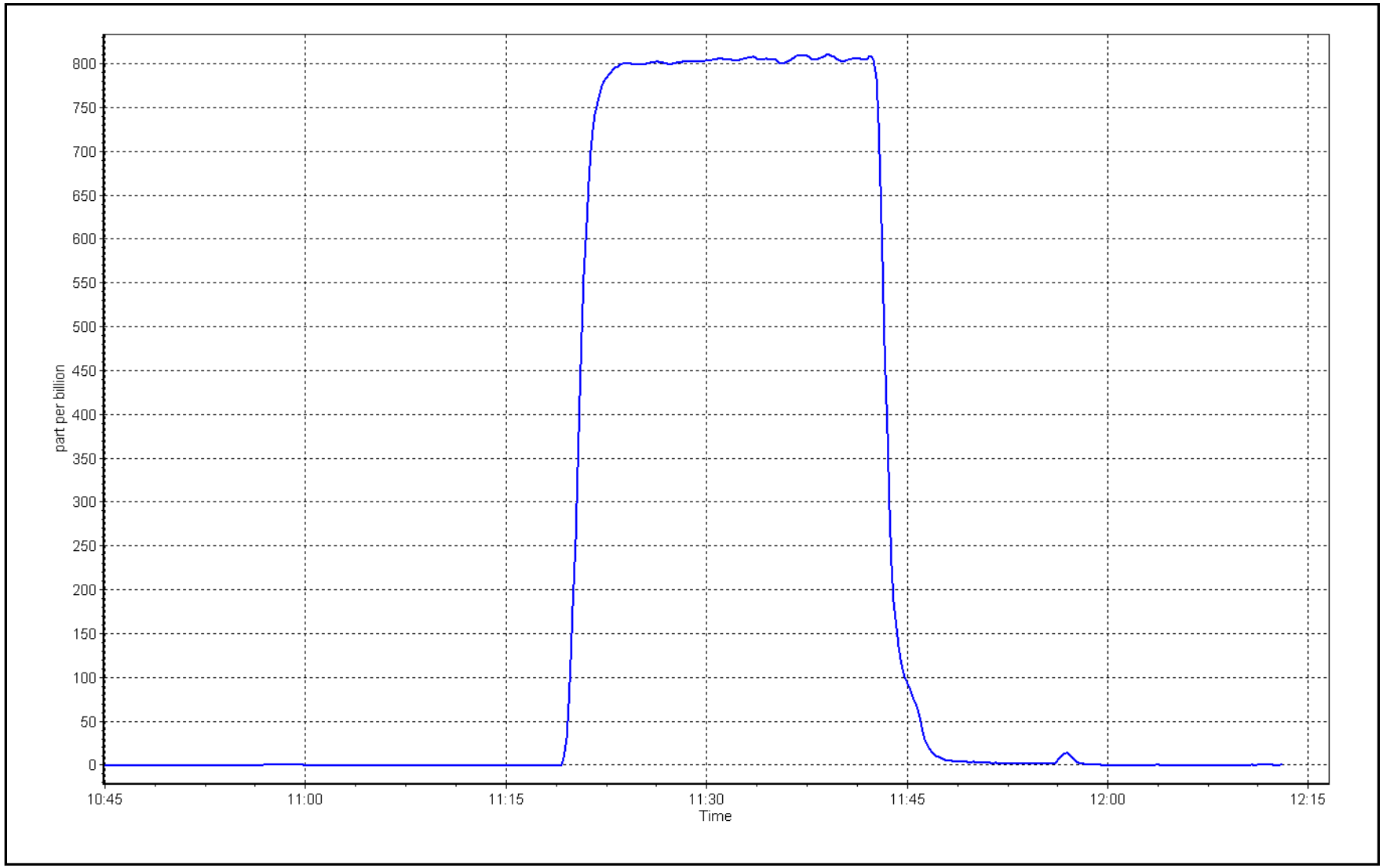
Baseline Corr As found:	805.50	Previous response	801.60	*% change	0.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No changes/adjustments made.

Calibration Performed By: Mohammed Kashif

SO2 Calibration Plot Date: February 3, 2023 Location: Stony Mountain



Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	February 17, 2023	Last Cal Date:	January 16, 2023
Start time (MST):	10:55	End time (MST):	13:59
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:	1.003075	1.008829	Backgd or Offset:	23.0	23.0
Calibration intercept:	-1.143339	-0.882227	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	-0.3	----
as found span	4919	81.0	800.3	804.2	0.995
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4919	81.0	800.3	806.6	0.992
second point	4959	40.5	400.2	403.2	0.993
third point	4979	20.2	199.6	199.2	1.002
as left zero	5000	0.0	0.0	-0.2	----
as left span	4919	81.0	800.3	806.6	0.992
				Average Correction Factor	0.996

Baseline Corr As found:	804.50	Previous response	801.60	*% 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 were made

Calibration Performed By: Karan Pandit and Karina Fenwick

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

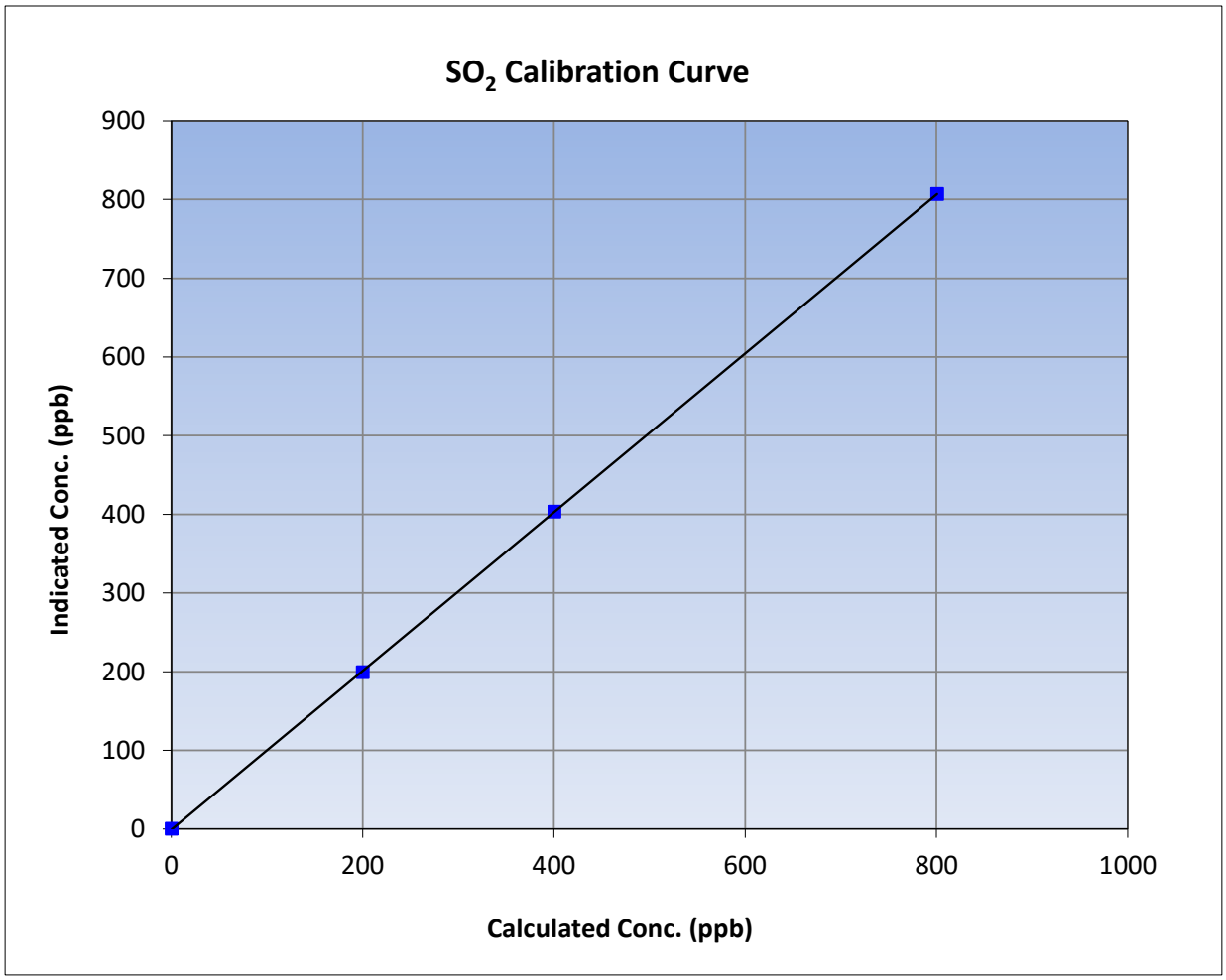
Station Information

Calibration Date:	February 17, 2023	Previous Calibration:	January 16, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:55	End Time (MST):	13:59
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301453

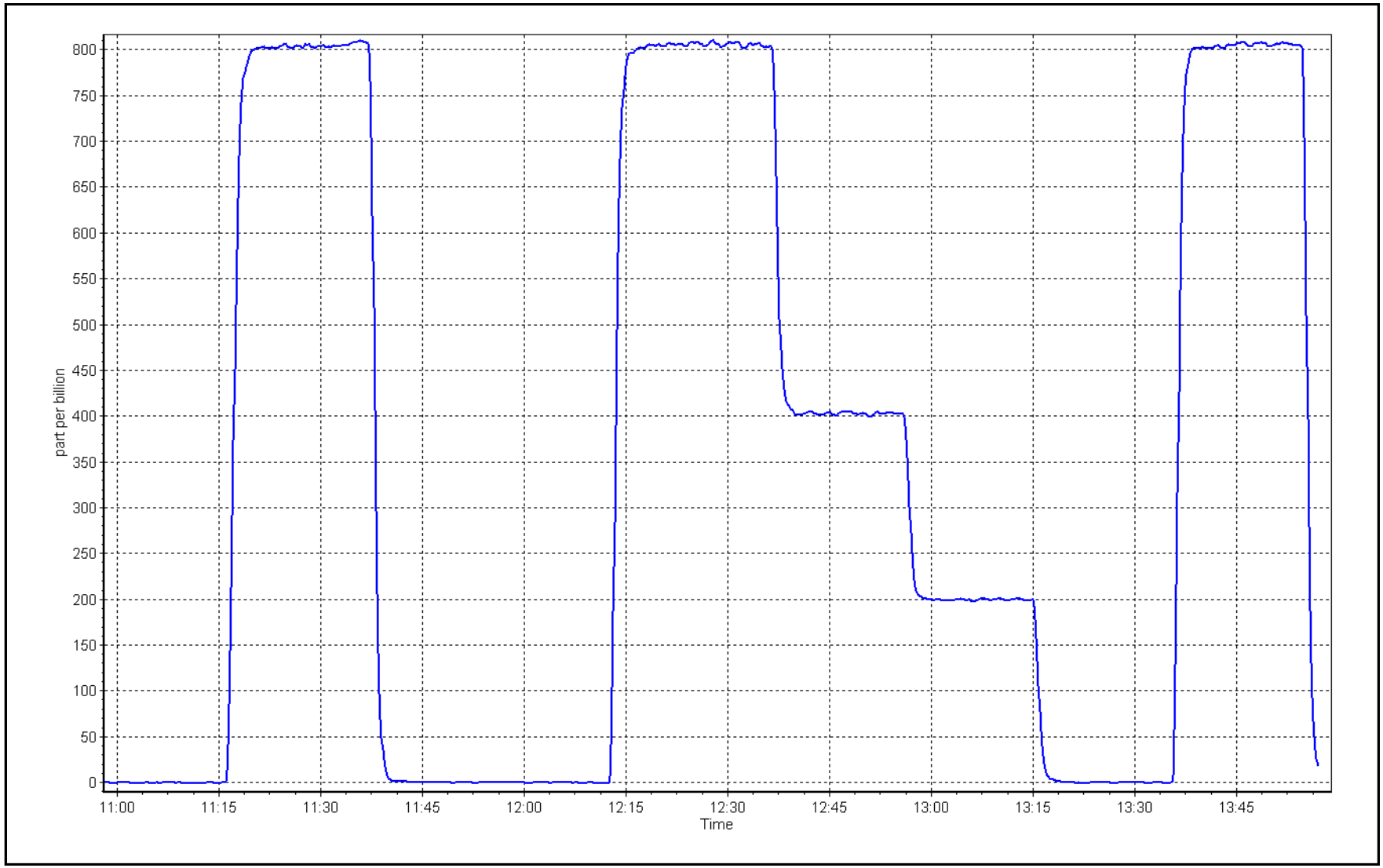
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
800.3	806.6	0.9922
400.2	403.2	0.9925
199.6	199.2	1.0020

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999993	*≥0.995*
Slope	1.008829	*0.90 - 1.10*
Intercept	-0.882227	*+/-30*



SO2 Calibration Plot Date: February 17, 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:	February 13, 2023	Last Cal Date:	January 18, 2023
Start time (MST):	11:14	End time (MST):	15:35
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:	0.989724	1.000870	Backgd or Offset:	2.55	2.63
Calibration intercept:	0.201244	0.161019	Coeff or Slope:	1.129	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	76.6	1.046
as found 2nd point	4964	36.5	40.0	38.1	1.052
as found 3rd point	4983	18.3	20.0	18.9	1.066
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	80.2	0.997
second point	4964	36.5	40.0	40.3	0.992
third point	4983	18.3	20.0	20.1	0.997
as left zero	5000	0.0	0.0	0.3	----
as left span	4927	73.0	80.0	79.7	1.004
SO2 Scrubber Check	4923	77.1	771.0	-0.1	----
Date of last scrubber change:		17-Dec-21		Ave Corr Factor	0.996
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	76.5	Prev response:	79.37	*% change:	-3.8%
Baseline Corr 2nd AF pt:	38.0	AF Slope:	0.957571	AF Intercept:	-0.098129
Baseline Corr 3rd AF pt:	18.8	AF Correlation:	0.999969		

* = > +/-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

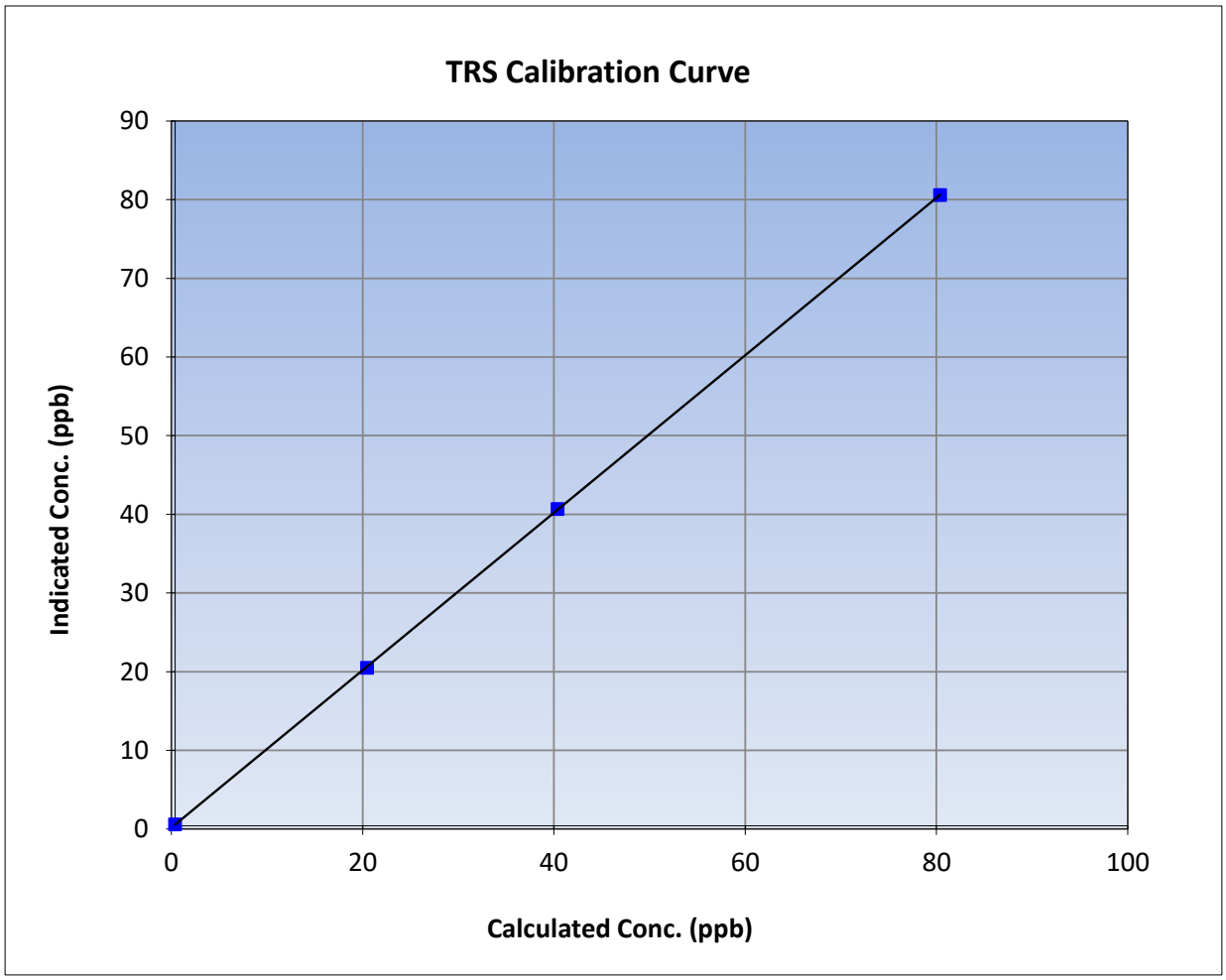
Station Information

Calibration Date:	February 13, 2023	Previous Calibration:	January 18, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	11:14	End Time (MST):	15:35
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153359

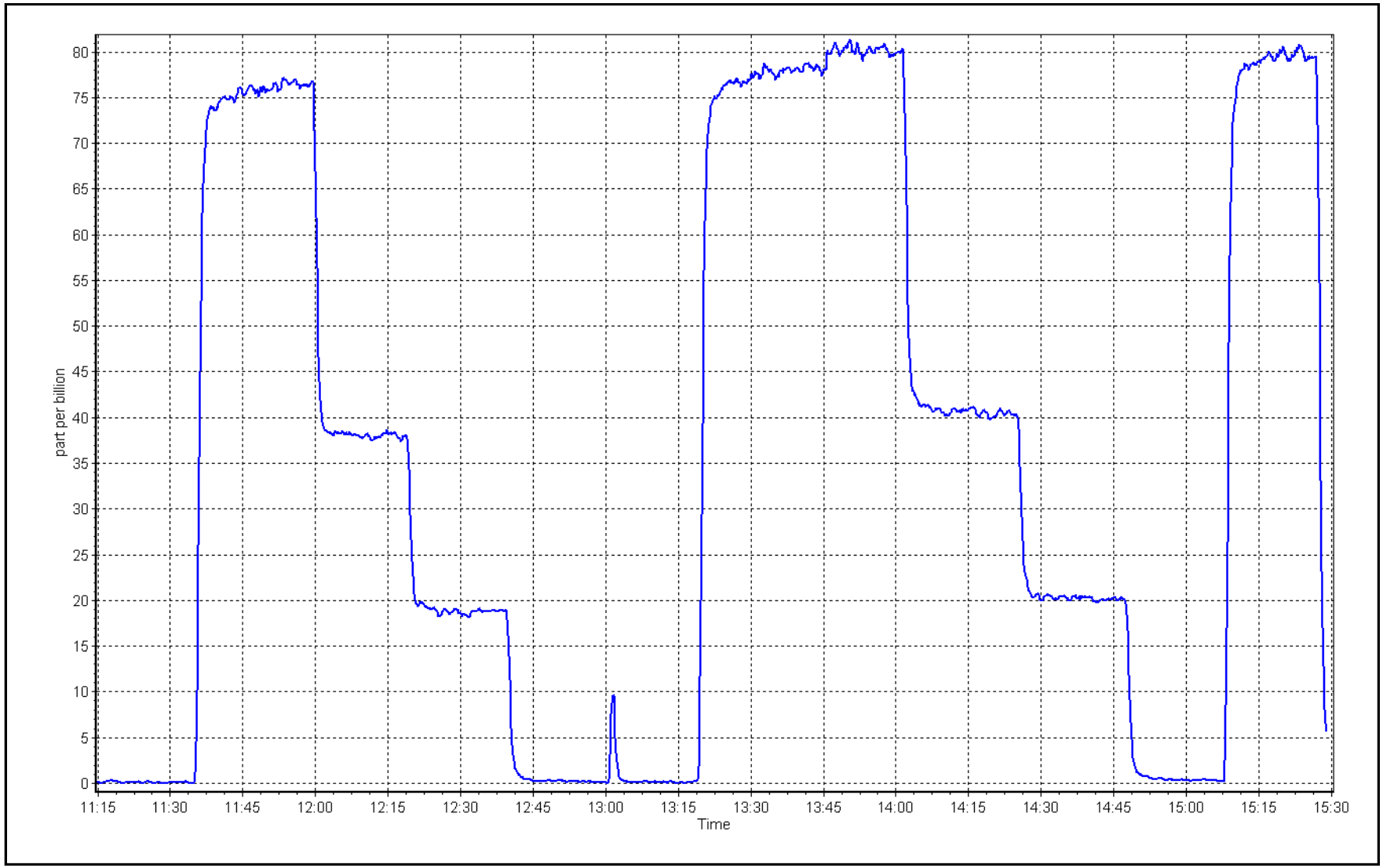
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	80.2	0.9974
40.0	40.3	0.9924
20.0	20.1	0.9974

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999991	*≥0.995*
Slope	1.000870	*0.90 - 1.10*
Intercept	0.161019	*+/-3*



TRS Calibration Plot Date: February 13, 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:	February 3, 2023	Last Cal Date:	January 16, 2023
Start time (MST):	10:55	End time (MST):	12:43
Reason:	Cylinder Change		

Calibration Standards

Gas Cert Reference:		CC463851	Cal Gas Expiry Date:	February 23, 2025	
CH4 Cal Gas Conc.	500.8	ppm	CH4 Equiv Conc.	1066.8	ppm
C3H8 Cal Gas Conc.	205.8	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	500.8	ppm	CH4 Equiv Conc.	1066.8	ppm
Removed C3H8 Conc.	205.8	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	2658	
ZAG make/model:	Teledyne API T701H		Serial Number:	360	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320039	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.06E-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	17.22	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	17.28	17.23	1.003
				Average Correction Factor	
Baseline Corr AF:	17.22	Prev response	17.24	*% change	-0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4919	81.0	9.17	9.10	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0	0.00	0.00	----
as left span	4919	81	9.17	9.11	1.006
				Average Correction Factor	
Baseline Corr AF:	9.10	Prev response	9.14	*% change	-0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	8.11	8.11	1.000
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	4919	81.0	8.11	8.12	0.999
				Average Correction Factor	
Baseline Corr AF:	8.11	Prev response	8.10	*% change	0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

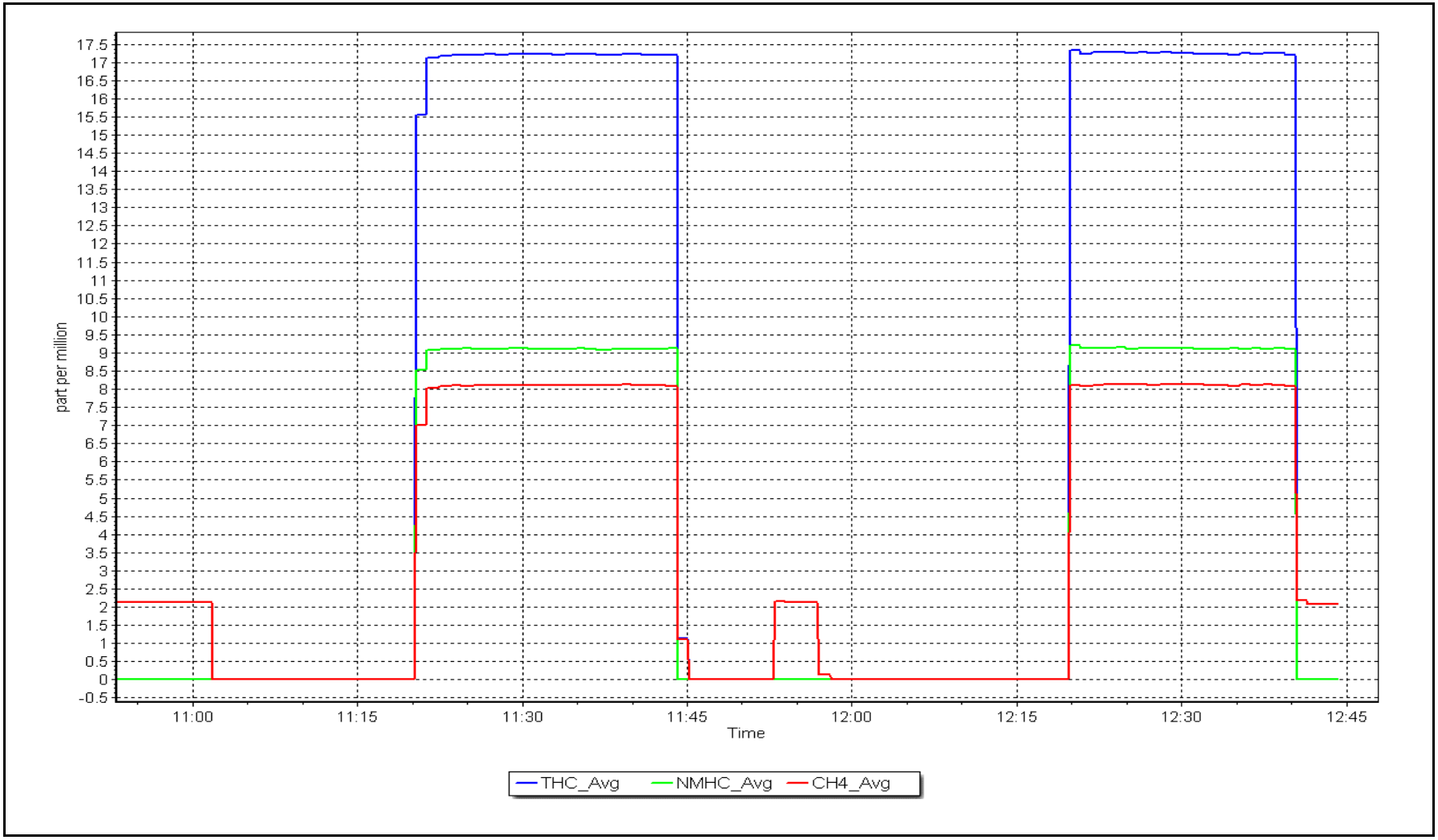
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.998211	
THC Cal Offset:	-0.008790	
CH4 Cal Slope:	0.999750	
CH4 Cal Offset:	-0.013212	
NMHC Cal Slope:	0.996638	
NMHC Cal Offset:	0.005021	

Notes: Changed the N2 cylinder after as founds.

Calibration Performed By: Mohammed Kashif

NMHC Calibration Plot Date: February 3, 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:	February 17, 2023	Last Cal Date:	January 16, 2023
Start time (MST):	11:55	End time (MST):	13:59
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	17.32	0.998
second point	4959	40.5	8.64	8.65	0.999
third point	4979	20.2	4.31	4.30	1.002
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	17.28	17.32	0.998
				Average Correction Factor	1.000

Baseline Corr AF:	17.31	Prev response	17.24	*% change	0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-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	4919	81.0	9.17	9.16	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4919	81.0	9.17	9.16	1.001
second point	4959	40.5	4.58	4.60	0.997
third point	4979	20.2	2.29	2.30	0.994
as left zero	5000	0	0.00	0.00	----
as left span	4919	81	9.17	9.17	1.000
				Average Correction Factor	0.997
Baseline Corr AF:	9.16	Prev response	9.14	*% change	0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *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	8.17	0.994
second point	4959	40.5	4.06	4.06	1.000
third point	4979	20.2	2.02	2.00	1.012
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	8.11	8.15	0.995
				Average Correction Factor	1.002
Baseline Corr AF:	8.15	Prev response	8.10	*% change	0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.998211	1.002575
THC Cal Offset:	-0.008790	-0.009777
CH4 Cal Slope:	0.999750	1.007610
CH4 Cal Offset:	-0.013212	-0.020602
NMHC Cal Slope:	0.996638	0.998345
NMHC Cal Offset:	0.005021	0.010426

Notes: Sample inlet filter and hydrogen cylinder changed after as founds. No adjustments were made

Calibration Performed By: Karan Pandit and Karina Fenwick

Wood Buffalo Environmental Association

THC Calibration Summary

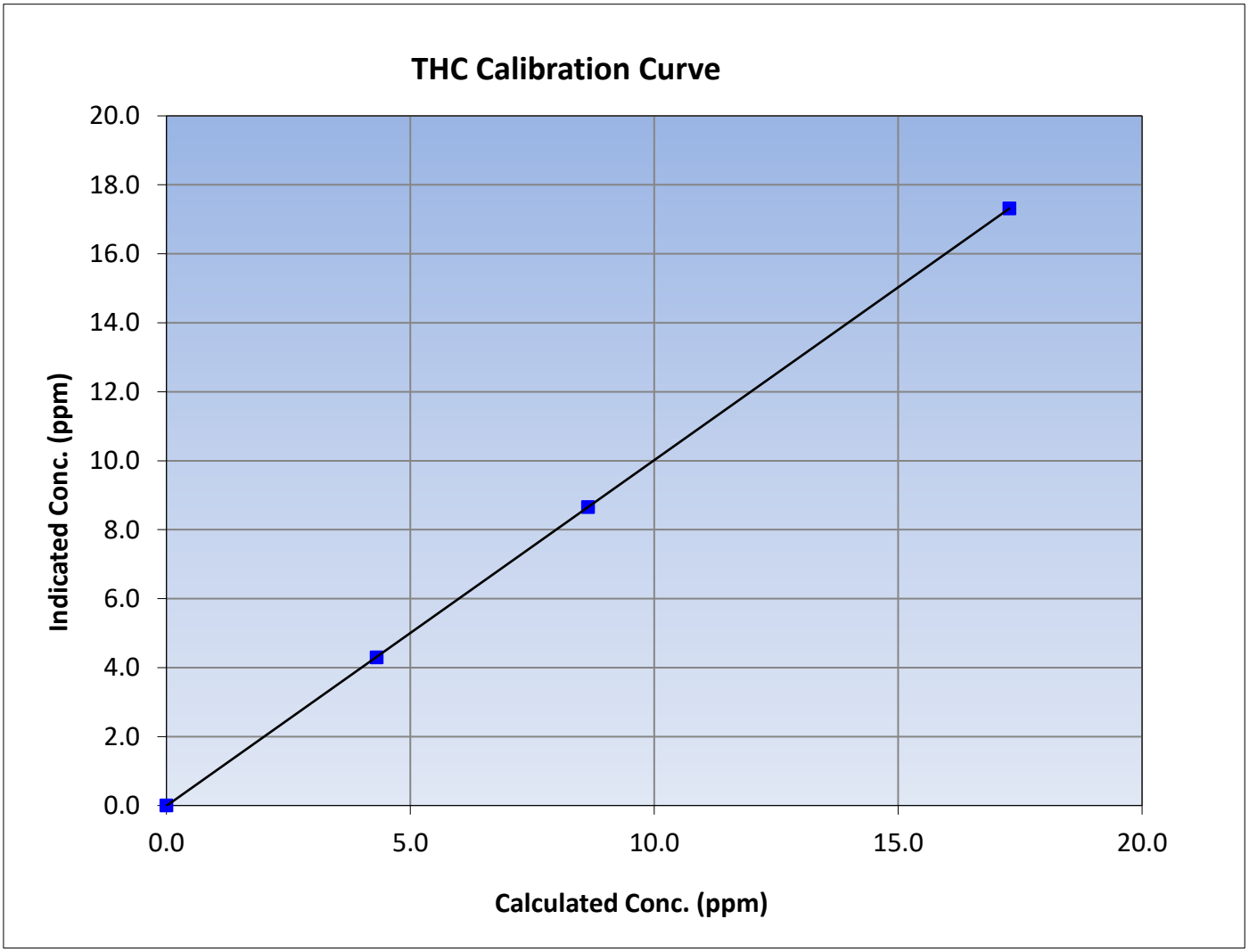
Version-01-2020

Station Information

Calibration Date:	February 17, 2023	Previous Calibration:	January 16, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:55	End Time (MST):	13:59
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999998	*≥0.995*
17.28	17.32	0.9978			
8.64	8.65	0.9988	Slope	1.002575	*0.90 - 1.10*
4.31	4.30	1.0024			
			Intercept	-0.009777	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

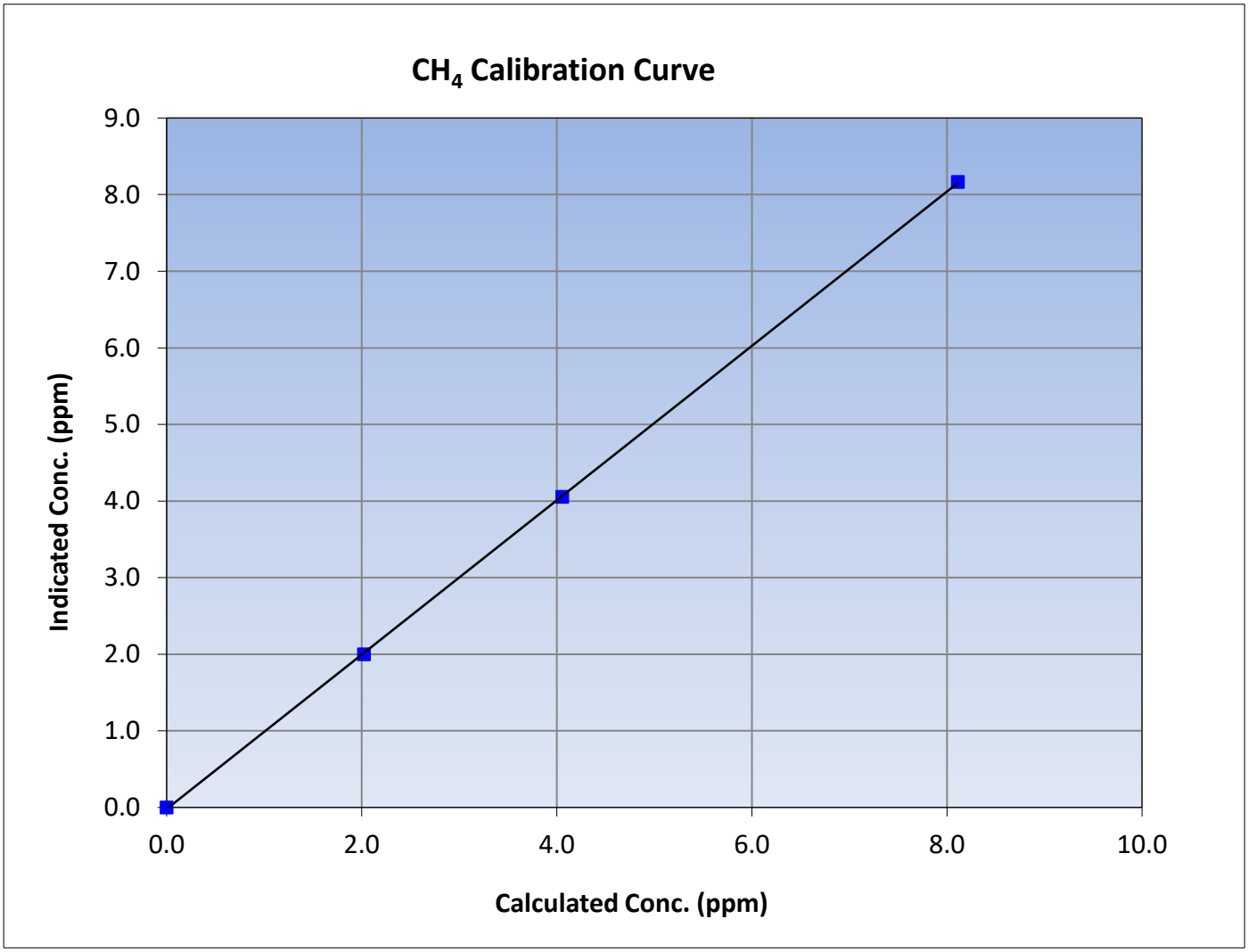
Version-01-2020

Station Information

Calibration Date:	February 17, 2023	Previous Calibration:	January 16, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:55	End Time (MST):	13:59
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	0.999971	≥0.995
8.11	8.17	0.9936			
4.06	4.06	1.0005	Slope	1.007610	0.90 - 1.10
2.02	2.00	1.0123			
			Intercept	-0.020602	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

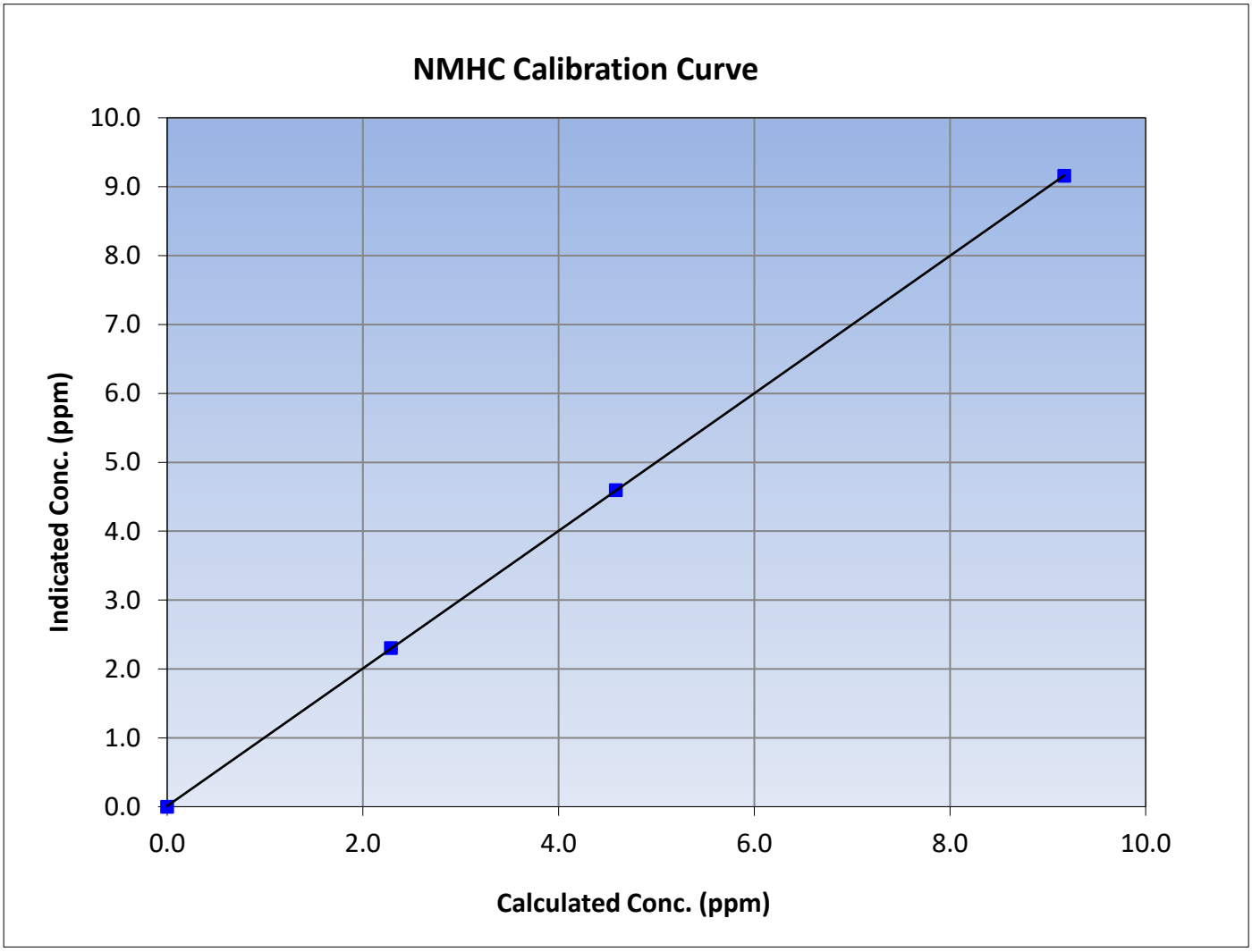
Version-01-2020

Station Information

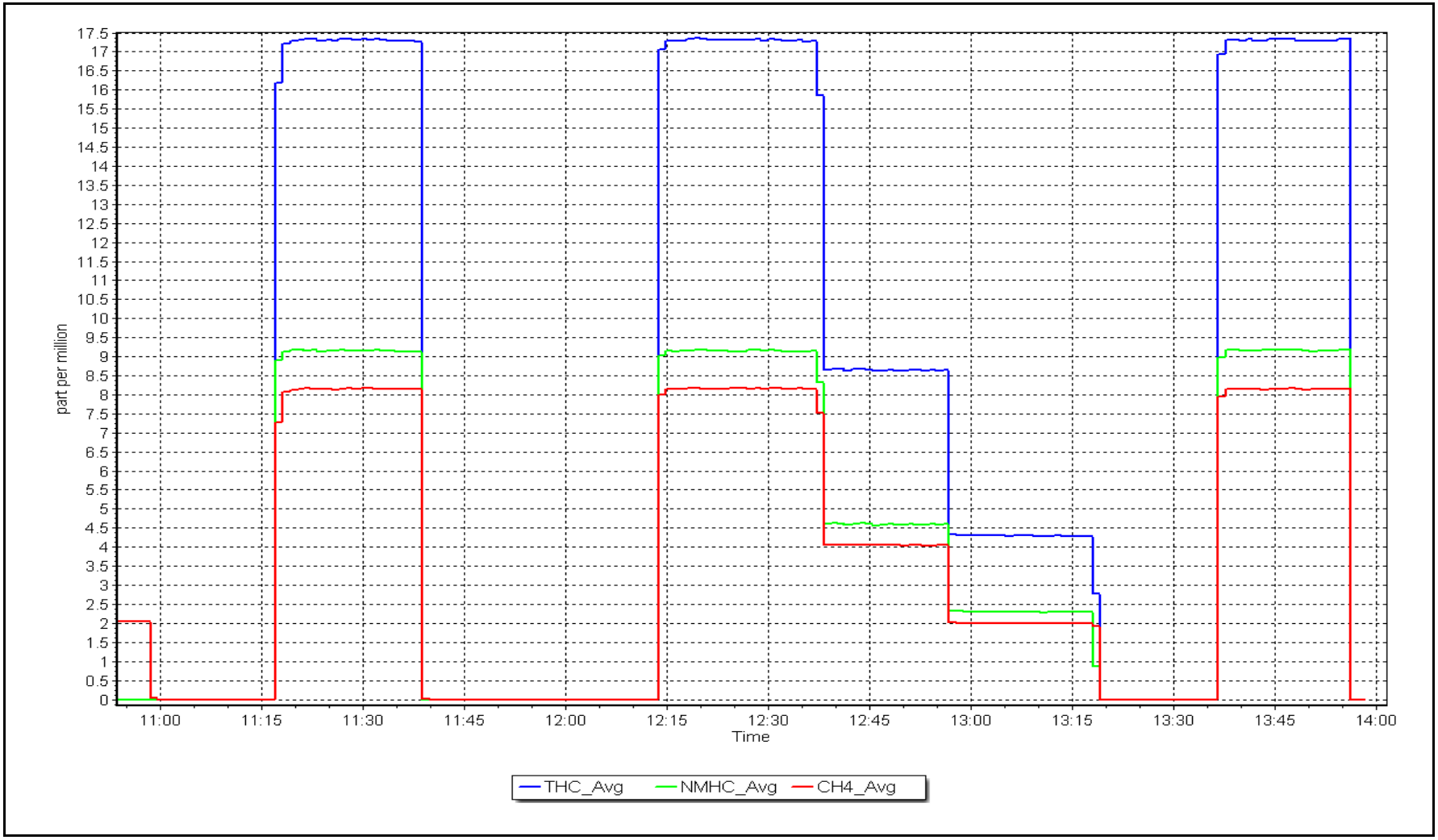
Calibration Date:	February 17, 2023	Previous Calibration:	January 16, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:55	End Time (MST):	13:59
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999993	≥0.995
9.17	9.16	1.0012			
4.58	4.60	0.9973	Slope	0.998345	0.90 - 1.10
2.29	2.30	0.9938			
			Intercept	0.010426	+/-0.5



NMHC Calibration Plot Date: February 17, 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:	February 22, 2023	Last Cal Date:	January 24, 2023
Start time (MST):	10:55	End time (MST):	15:25
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	1.043	NO bkgnd or offset:	2.9	2.9
NOX coeff or slope:	0.987	0.987	NOX bkgnd or offset:	2.9	2.9
NO2 coeff or slope:	0.999	0.999	Reaction cell Press:	218.6	222.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000554	1.002587
NO_X Cal Offset:	0.069933	0.289742
NO Cal Slope:	1.001394	1.003123
NO Cal Offset:	-0.829546	-0.910073
NO_2 Cal Slope:	1.001873	0.999064
NO_2 Cal Offset:	0.315702	0.020158

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	4919	81.3	820.8	800.3	20.5	824.5	801.4	23.2	0.9955	0.9986
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
high point	4919	81.3	820.8	800.3	20.5	822.9	802.1	20.9	0.9974	0.9977
second point	4959	40.7	410.9	400.7	10.3	412.9	401.2	11.8	0.9952	0.9987
third point	4980	20.3	204.9	199.8	5.1	205.6	198.2	7.4	0.9968	1.0082
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	388.1	432.7	826.3	390.3	436.0	0.9933	0.9943
								Average Correction Factor	0.9965	1.0015

Corrected As found	NO_X = 824.5 ppb	NO = 801.5 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.4%
Previous Response	NO_X = 821.3 ppb	NO = 800.6 ppb		*Percent Change	NO =	0.1%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	802.7	390.5	432.7	432.4	1.0007	99.9%
2nd GPT point (200 ppb O3)	802.7	591.0	232.2	231.8	1.0017	99.8%
3rd GPT point (100 ppb O3)	802.7	697.5	125.7	125.6	1.0007	99.9%
				Average Correction Factor	1.0010	99.9%

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

NO_X Calibration Summary

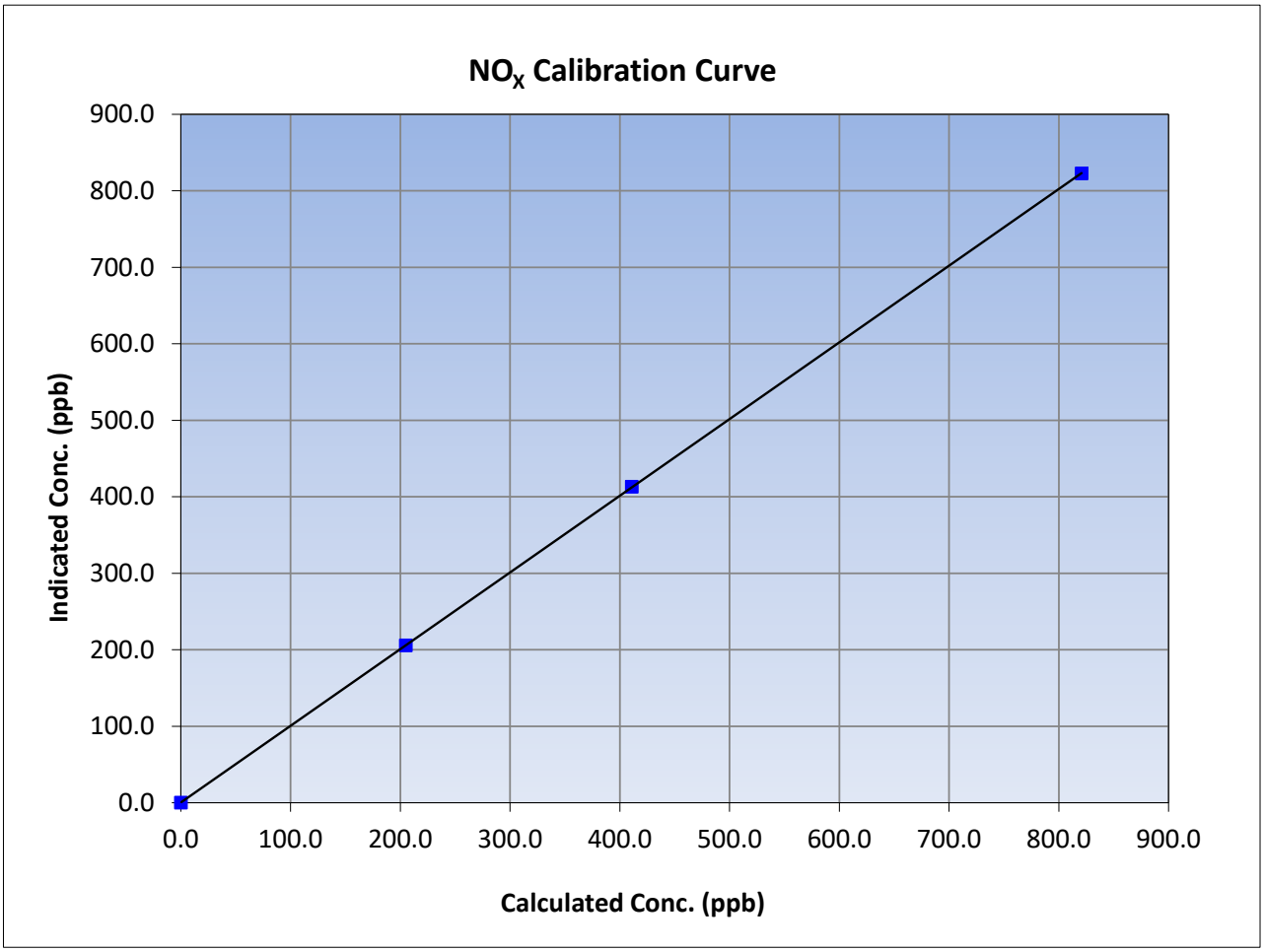
Version-04-2020

Station Information

Calibration Date:	February 22, 2023	Previous Calibration:	January 24, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:55	End Time (MST):	15:25
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	0.999999	*≥0.995*
820.8	822.9	0.9974			
410.9	412.9	0.9952	Slope	1.002587	*0.90 - 1.10*
204.9	205.6	0.9968			
			Intercept	0.289742	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

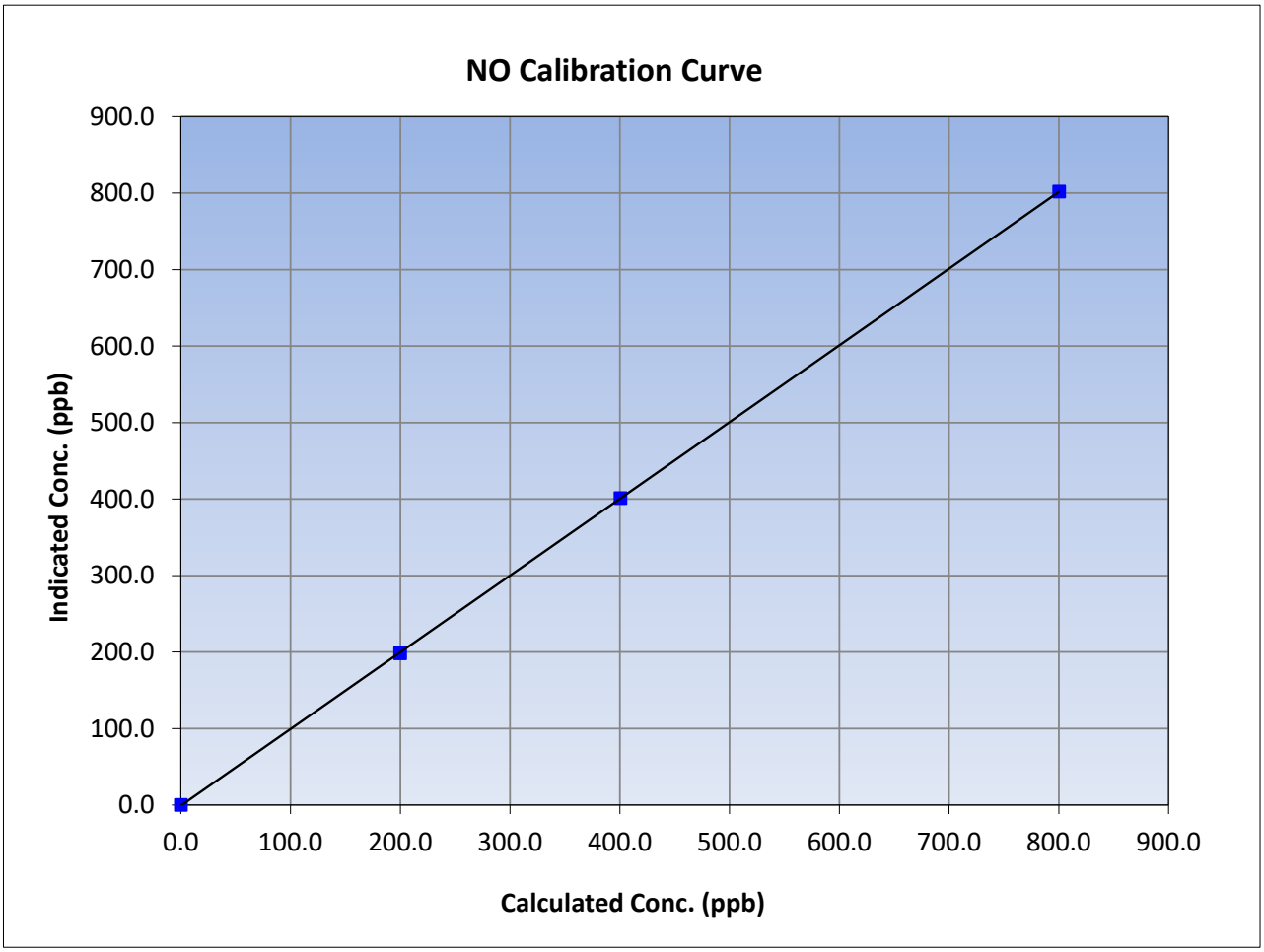
Version-04-2020

Station Information

Calibration Date:	February 22, 2023	Previous Calibration:	January 24, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:55	End Time (MST):	15:25
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	0.999992	≥0.995
800.3	802.1	0.9977			
400.7	401.2	0.9987	Slope	1.003123	0.90 - 1.10
199.8	198.2	1.0082			
			Intercept	-0.910073	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

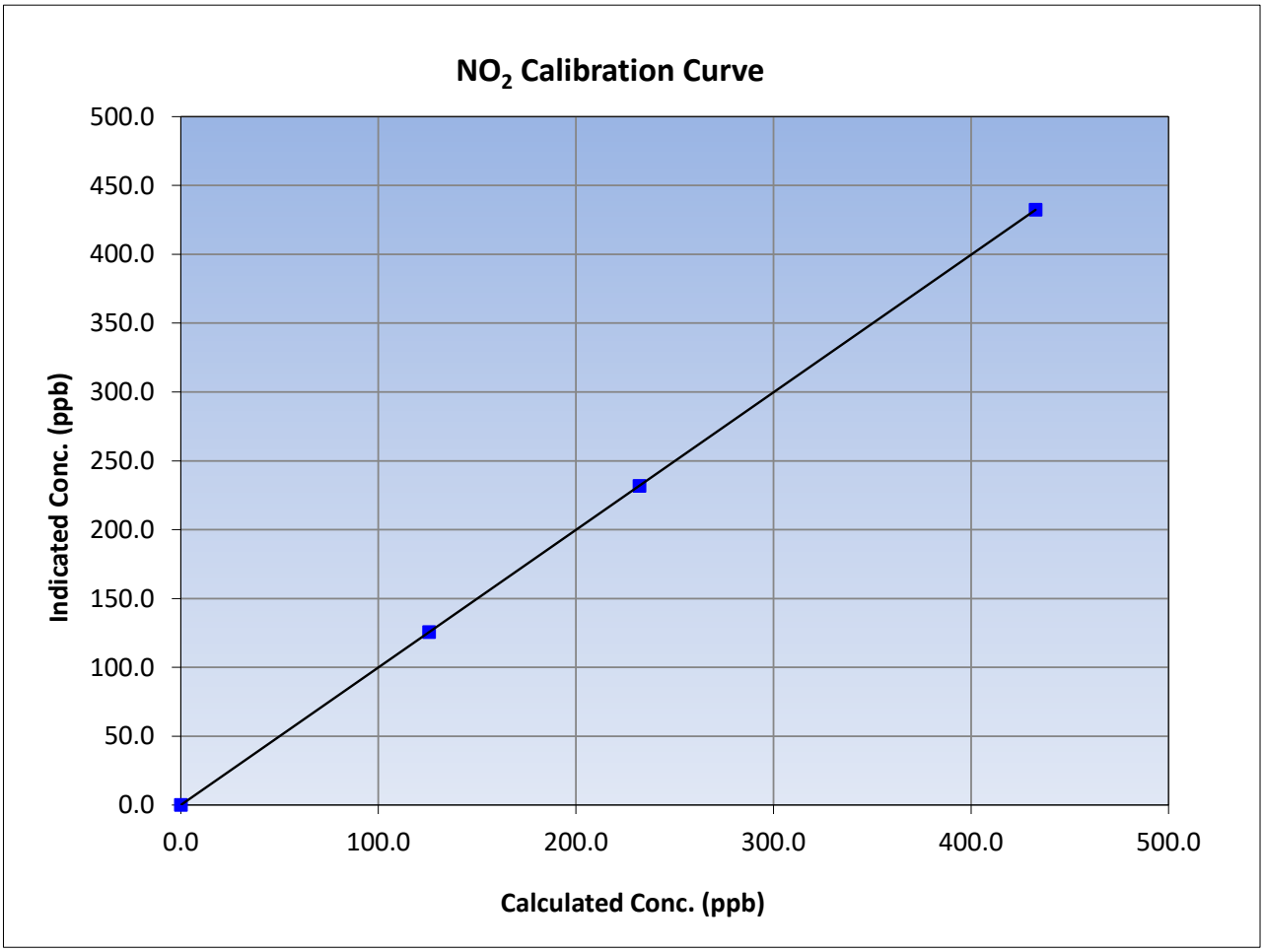
Version-04-2020

Station Information

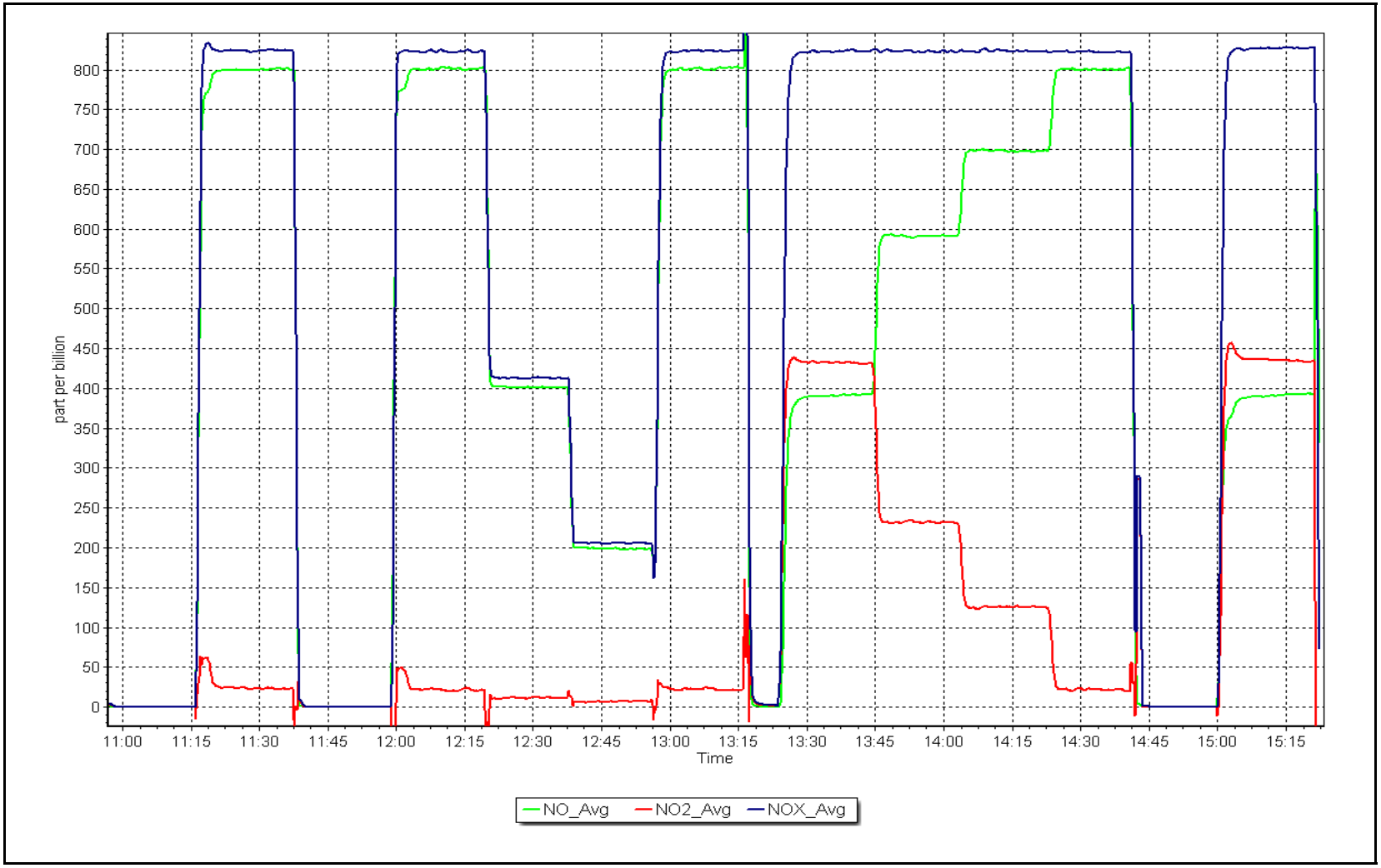
Calibration Date:	February 22, 2023	Previous Calibration:	January 24, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:55	End Time (MST):	15:25
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999999	≥0.995
432.7	432.4	1.0007			
232.2	231.8	1.0017	Slope	0.999064	0.90 - 1.10
125.7	125.6	1.0007			
			Intercept	0.020158	+/-20



NO_X Calibration Plot Date: February 22, 2023 Location: Stony Mountain



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS18
Calibration Date:	February 15, 2023	Last Cal Date:	January 9, 2023
Start time (MST):	10:34	End time (MST):	13:34
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.993114	1.001514	Backgd or Offset:	1.000	1.000
Calibration intercept:	-0.320000	-0.040000	Coeff or Slope:	0.976	0.993

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	800.0	0.0	-0.3	----
as found span	4888	1096.9	400.0	395.5	1.011
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	-0.2	----
high point	4888	1101.7	400.0	400.4	0.999
second point	4888	863.9	200.0	200.6	0.997
third point	4888	741.4	100.0	100.1	0.999
as left zero	5000	800.0	0.0	0.2	----
as left span	4812	1097.9	400.0	402.7	0.993
				Average Correction Factor	0.998

Baseline Corr As found:	395.8	Previous response	396.9	*% change	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

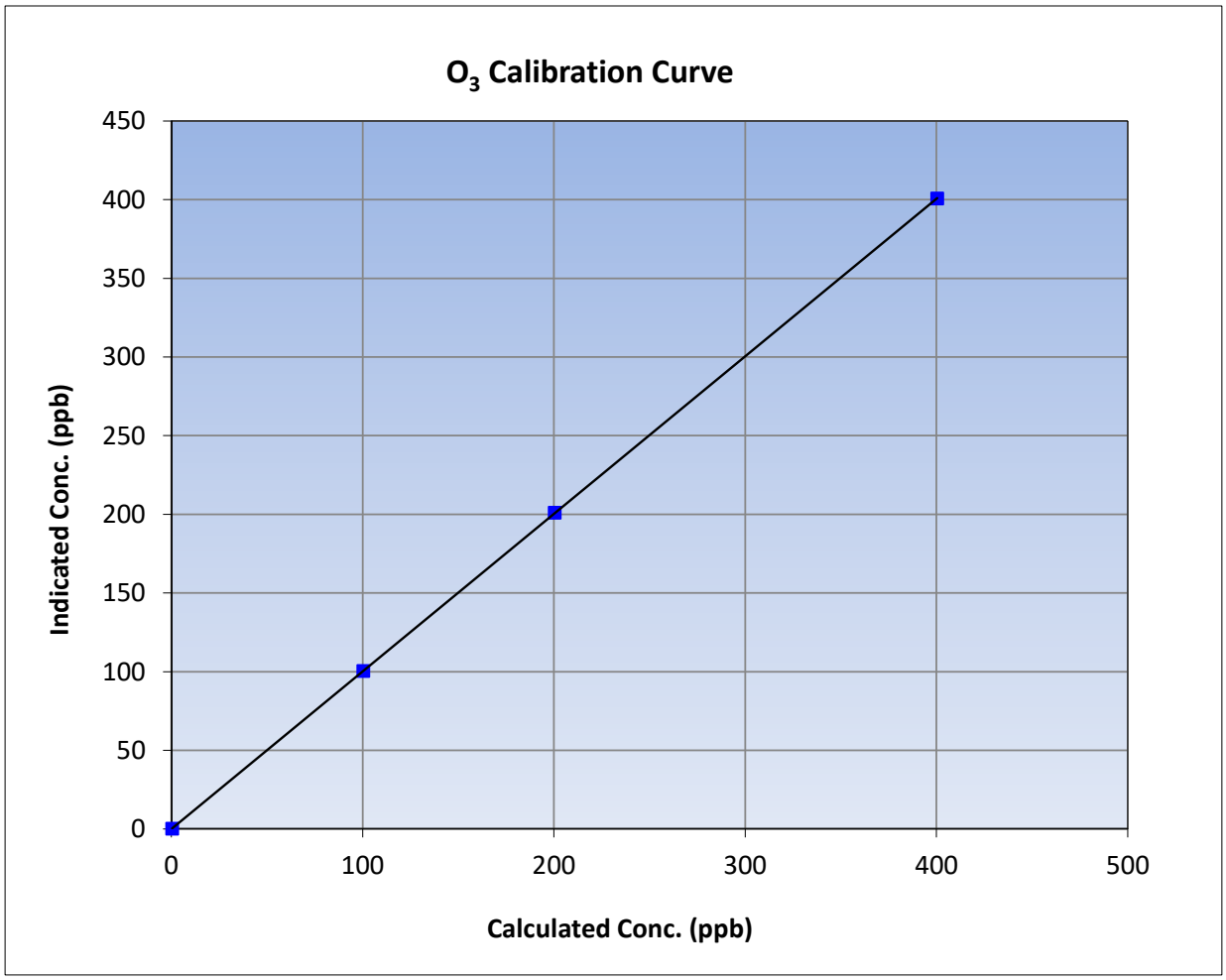
Station Information

Calibration Date:	February 15, 2023	Previous Calibration:	January 9, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	10:34	End Time (MST):	13:34
Analyzer make:	API T400	Analyzer serial #:	825

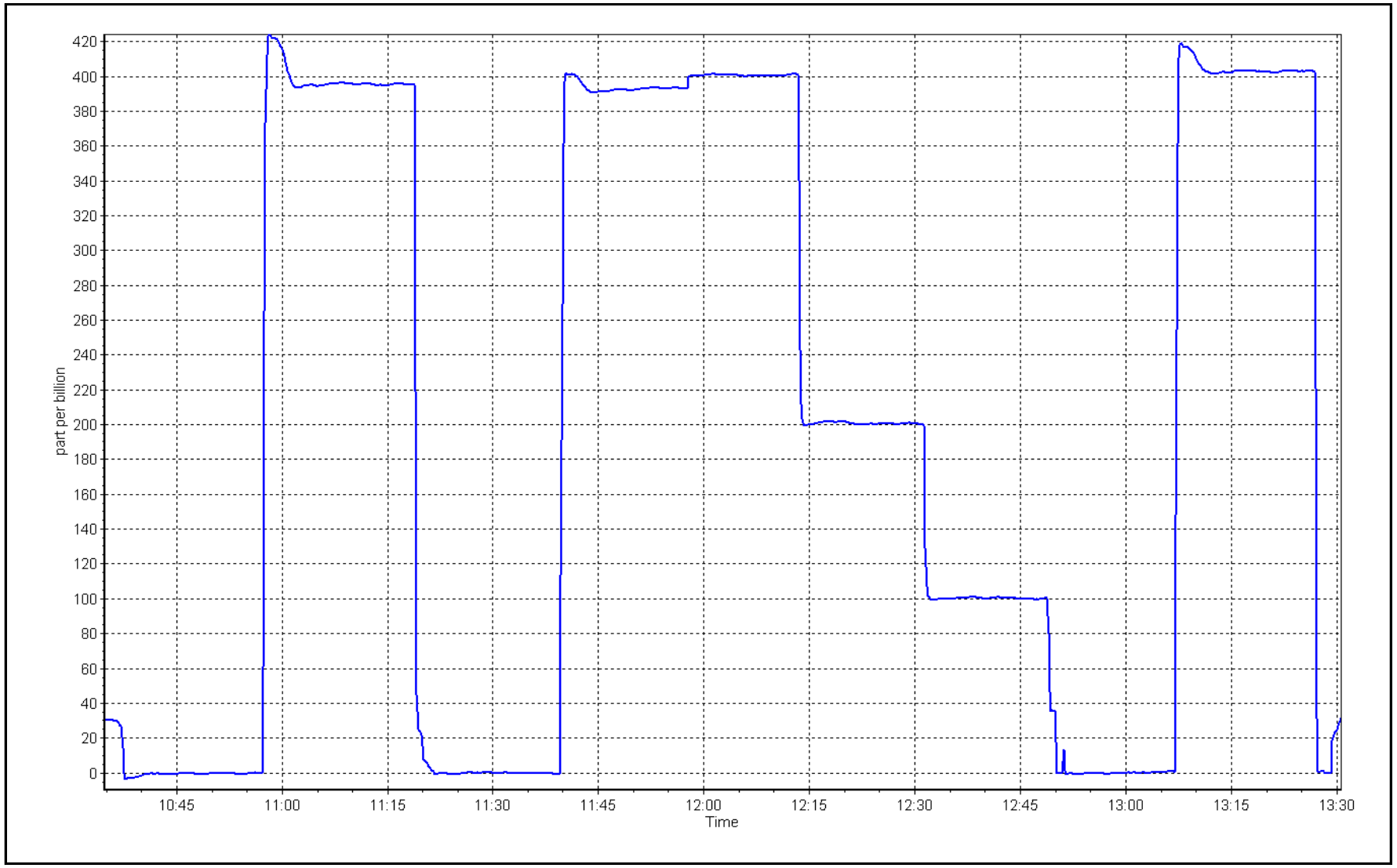
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
400.0	400.4	0.9990
200.0	200.6	0.9970
100.0	100.1	0.9990

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.001514	*0.90 - 1.10*
Intercept	-0.040000	*+/- 5*



O_3 Calibration Plot Date: February 15, 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:	February 24, 2023	Last Cal Date:	January 24, 2023
Start time (MST):	12:02	End time (MST):	12:24
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)	-17.9	-18.3	-17.9	☐	+/- 2 °C
P (mmHg)	698.8	699.6	698.8	☐	+/- 10 mmHg
flow (LPM)	5.02	4.98	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: February 24, 2023 Last Cal Date: January 24, 2023

PM w/o HEPA: 2.2 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: November 16, 2022 <0.2 ug/m3

Disposable Filter Changed: November 16, 2022

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. Leak check passed.

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:	February 24, 2023	Last Cal Date:	January 6, 2023
Start time (MST):	11:05	End time (MST):	13:53
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:	1.018233	0.997892	Backgd or Offset:	-0.009	-0.009
Calibration intercept:	0.009764	0.161801	Coeff or Slope:	0.916	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	41.7	0.976
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	40.7	1.000
second point	4966	33.3	20.3	20.6	0.985
third point	4983	16.7	10.2	10.3	0.991
as left zero	3000	0.0	0.0	0.0	----
as left span	2960	40.0	40.7	41.0	0.993
				Average Correction Factor	0.992

Baseline Corr As found:	41.59	Prev response:	41.44	*% 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. Adjusted the span only.

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

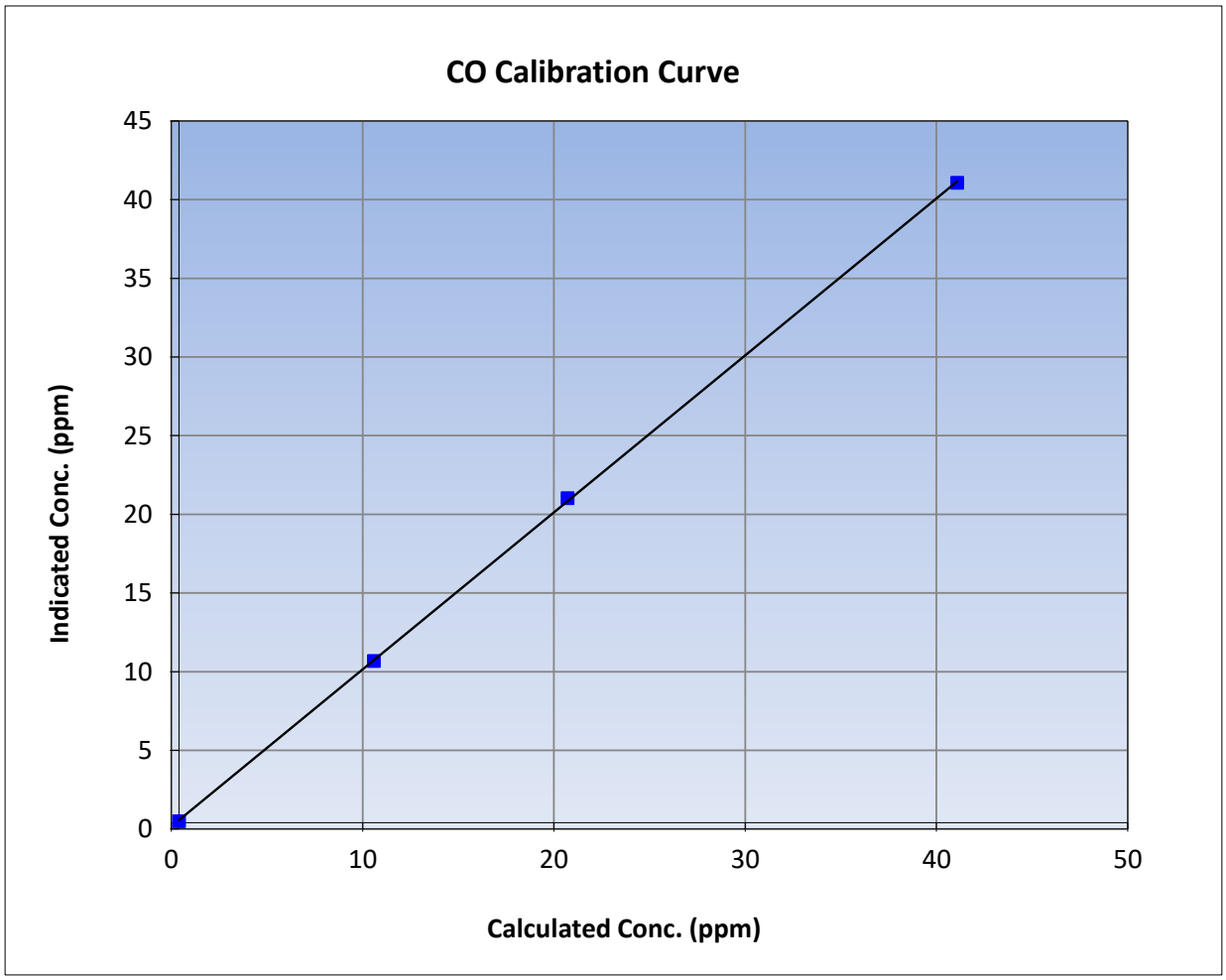
Station Information

Calibration Date:	February 24, 2023	Previous Calibration:	January 6, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:05	End Time (MST):	13:53
Analyzer make:	API T300	Analyzer serial #:	3504

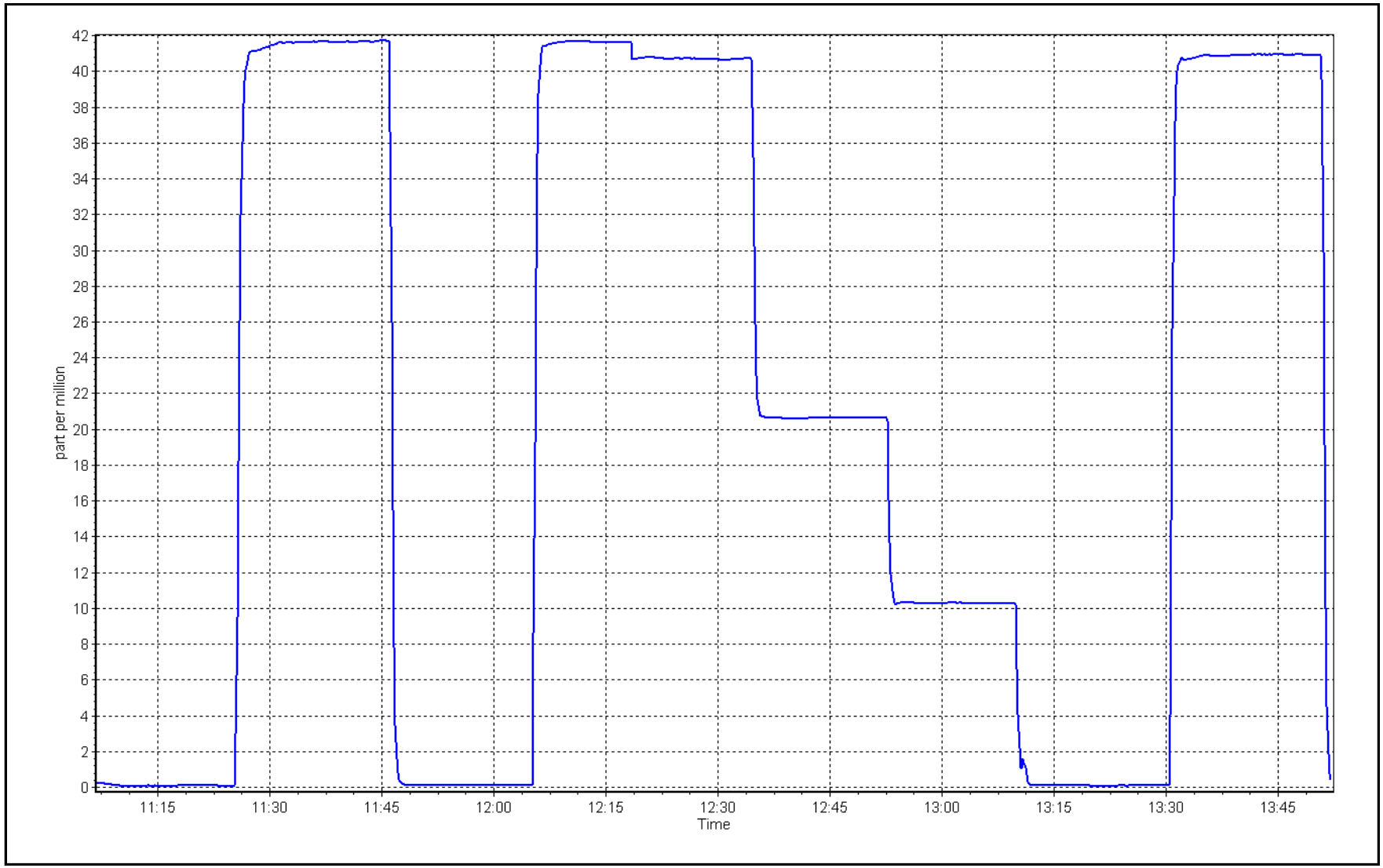
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
40.7	40.7	1.0002
20.3	20.6	0.9848
10.2	10.3	0.9910

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999943	*≥0.995*
Slope	0.997892	*0.90 - 1.10*
Intercept	0.161801	*+/-1.5*



CO Calibration Plot Date: February 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:	February 8, 2023	Last Cal Date:	January 12, 2023
Start time (MST):	11:15	End time (MST):	16:07
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:	1.000425	0.999561	Backgd or Offset:	-0.045	-0.059
Calibration intercept:	5.520000	1.700000	Coeff or Slope:	1.051	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	1.7	----
as found span	2930	80.0	1600.5	1583.5	1.011
as found 2nd point	2970	40.0	800.3	803.8	0.996
as found 3rd point	2990	20.0	400.1	401.8	0.996
new cylinder response					
calibrator zero	3000	0.0	0.0	-0.1	----
high point	2930	80.0	1600.5	1598.4	1.001
second point	2970	40.0	800.3	809.2	0.989
third point	2990	20.0	400.1	399.0	1.003
as left zero	3000	0.0	0.0	-0.3	----
as left span	2930	80.0	1600.5	1606.2	0.996
				Average Correction Factor	0.998

Baseline Corr As found:	1581.80	Prev response:	1606.73	*% change:	-1.6%
Baseline Corr 2nd AF pt:	802.1	AF Slope:	0.988100	AF Intercept:	5.800000
Baseline Corr 3rd AF pt:	400.1	AF Correlation:	0.999938		

* = > +/-5% change initiates investigation

Notes: Sample pump started to fail. Completed multipoint as founds. Changed the pump and sample inlet filter. Adjusted the zero only.

Calibration Performed By: Karan Pandit and Karina Fenwick

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

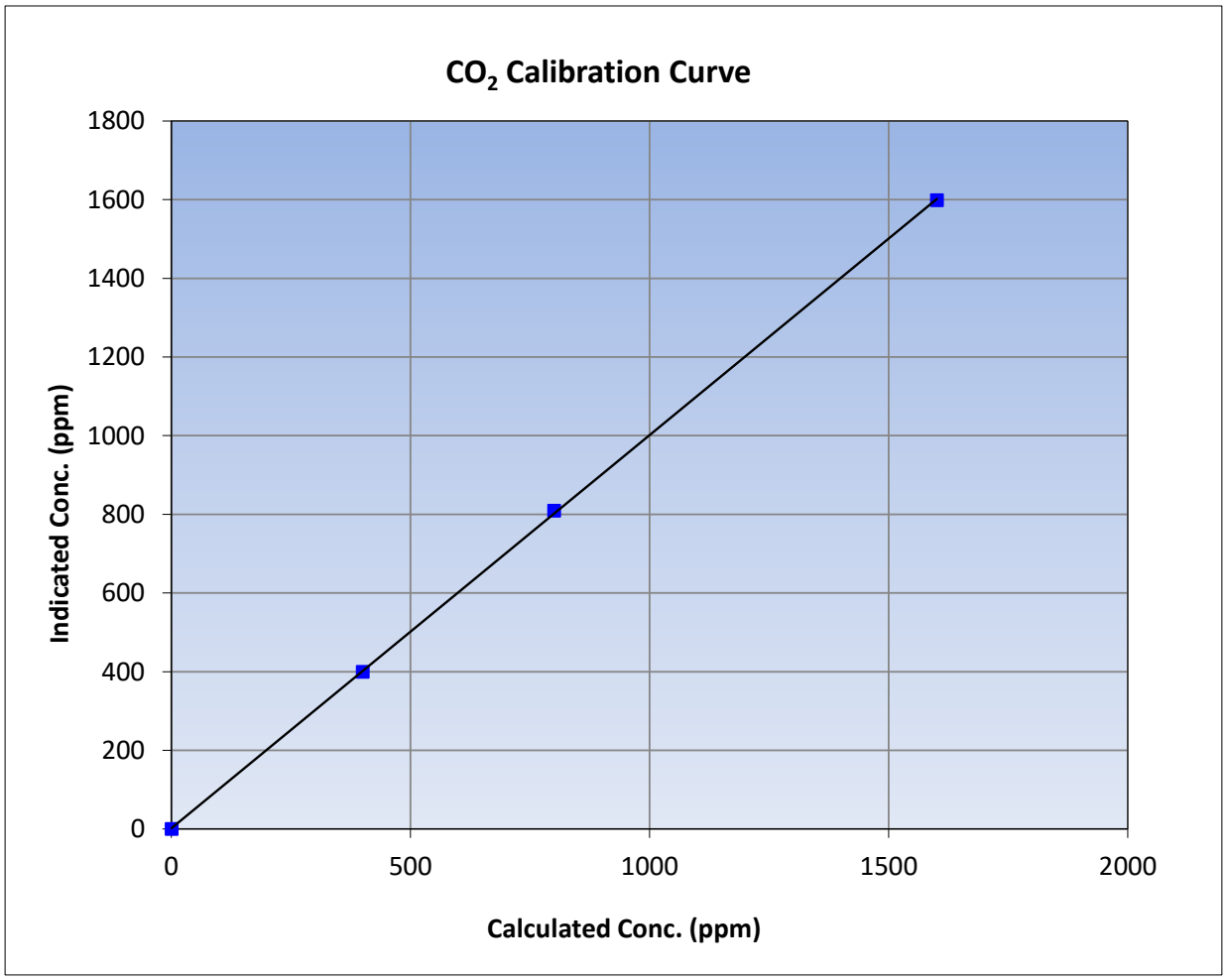
Station Information

Calibration Date	February 8, 2023	Previous Calibration	January 12, 2023
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	11:15	End Time (MST)	16:07
Analyzer make	API T360	Analyzer serial #	283

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
1600.5	1598.4	1.0013
800.3	809.2	0.9890
400.1	399.0	1.0028

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999945	*≥0.995*
Slope	0.999561	*0.90 - 1.10*
Intercept	1.700000	*+/-10*



CO_2 Calibration Plot Date: February 8, 2023 Location: Stony Mountain

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS19
FIREBAG
FEBRUARY 2023

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

March 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	February 7, 2023	Last Cal Date:	January 26, 2023
Start time (MST):	11:41	End time (MST):	14:46
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:	0.997774	0.998105	Backgd or Offset:	10.2	10.3
Calibration intercept:	-0.381080	-0.121714	Coeff or Slope:	0.987	0.987

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	-0.5	----
as found span	4919	81.1	799.5	796.6	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	4999	0.0	0.0	-0.3	----
high point	4919	81.1	799.5	797.7	1.002
second point	4959	40.6	400.3	399.6	1.002
third point	4980	20.3	200.1	199.7	1.002
as left zero	4999	0.0	0.0	-0.2	----
as left span	4919	81.1	799.5	797.3	1.003
				Average Correction Factor	1.002

Baseline Corr As found:	797.10	Previous response	797.31	*% change	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

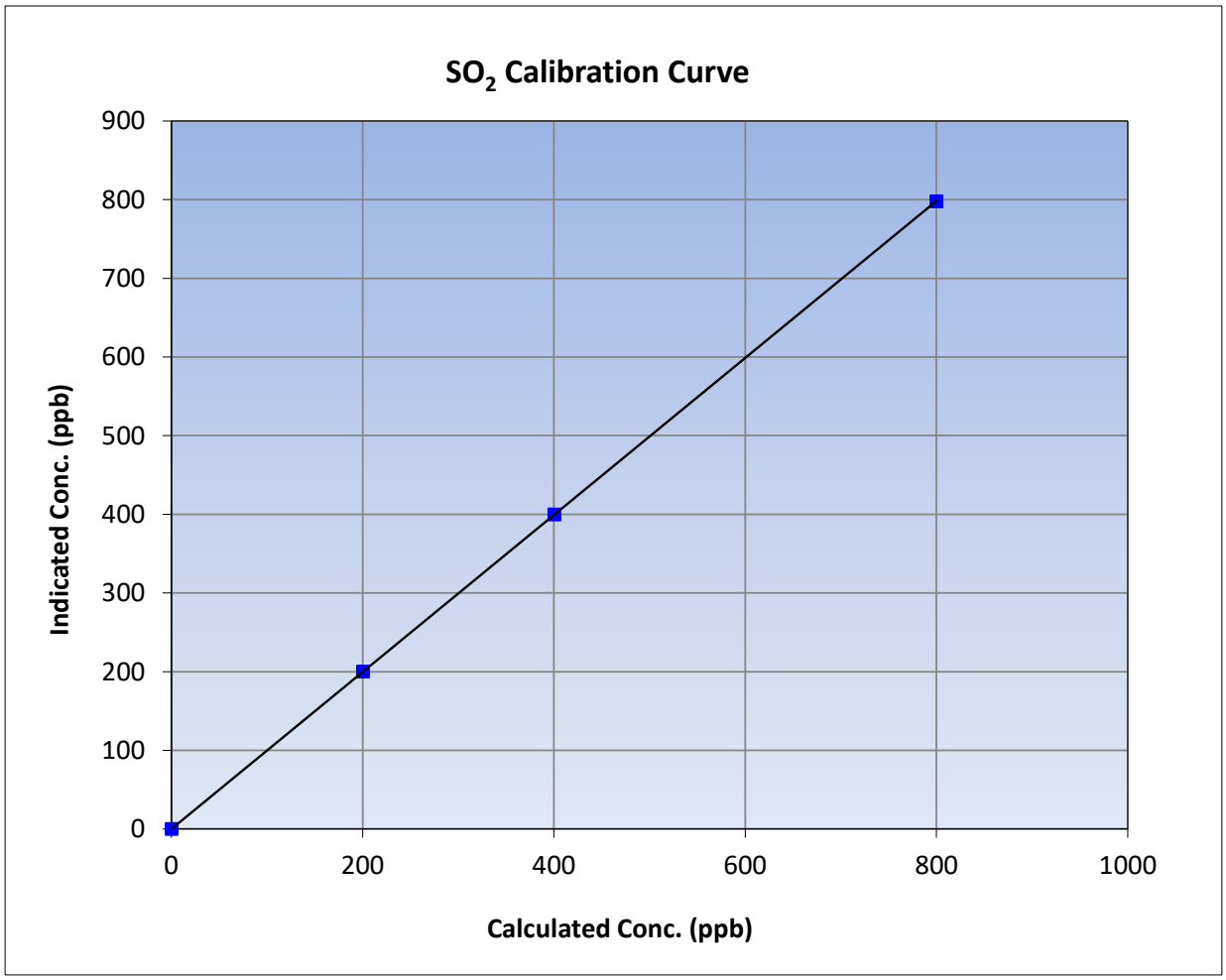
Station Information

Calibration Date:	February 7, 2023	Previous Calibration:	January 26, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	11:41	End Time (MST):	14:46
Analyzer make:	Thermo 43i	Analyzer serial #:	1410661308

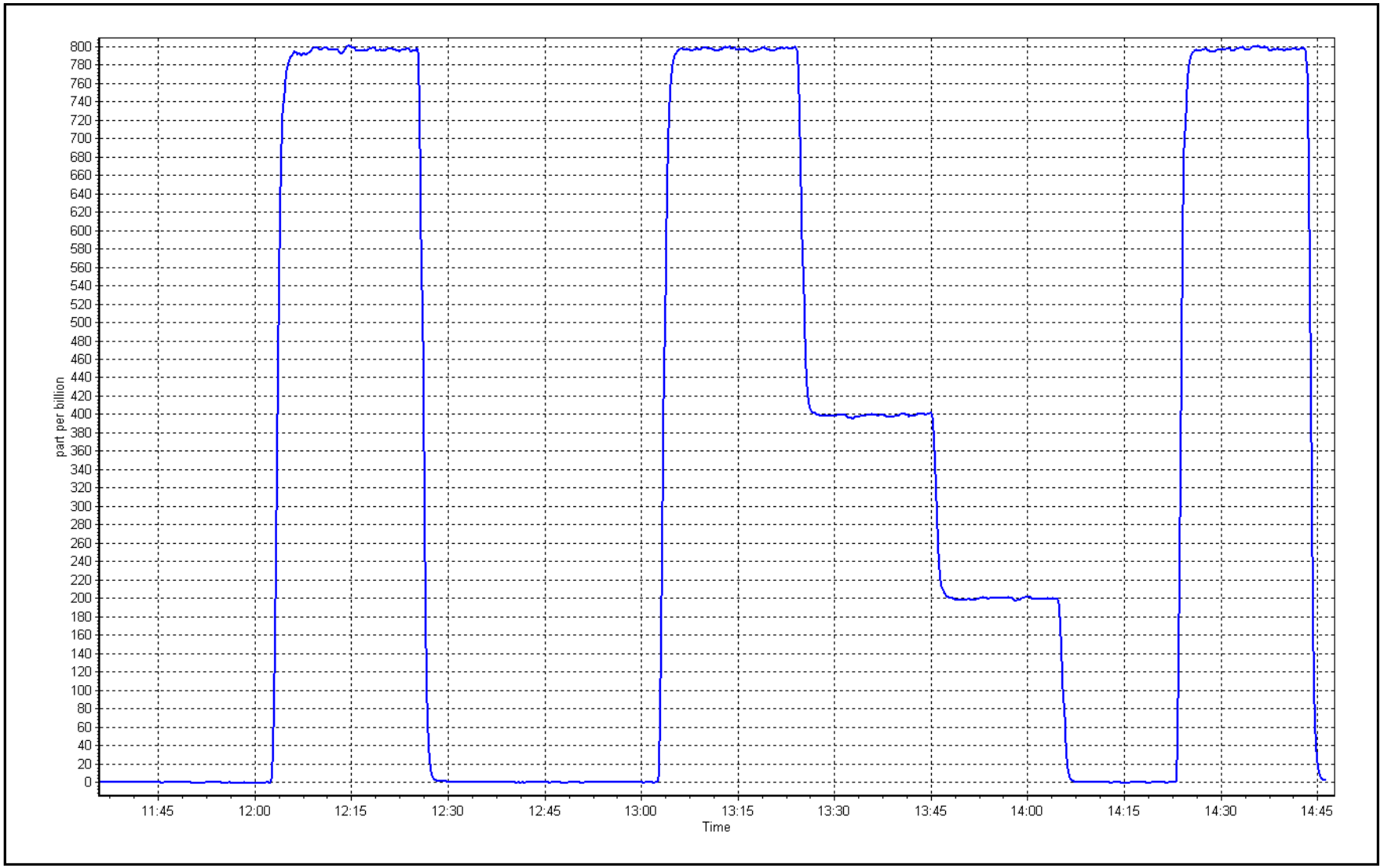
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
799.5	797.7	1.0022
400.3	399.6	1.0017
200.1	199.7	1.0020

Statistical Evaluation		Limits
Correlation Coefficient	1.000000	≥0.995
Slope	0.998105	0.90 - 1.10
Intercept	-0.121714	+/-30



SO2 Calibration Plot Date: February 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:	February 6, 2023	Last Cal Date:	January 18, 2023
Start time (MST):	11:02	End time (MST):	15:18
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:	0.998910	0.997909	Backgd or Offset:	2.88	2.96
Calibration intercept:	0.058437	0.118481	Coeff or Slope:	0.955	0.979

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	78.2	1.024
as found 2nd point	4961	39.1	40.0	39.0	1.028
as found 3rd point	4980	19.6	20.0	19.5	1.033
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4922	78.2	80.0	79.9	1.001
second point	4961	39.1	40.0	40.1	0.997
third point	4980	19.6	20.0	20.1	0.997
as left zero	5000	0.0	0.0	0.2	----
as left span	4922	78.2	80.0	79.8	1.002
SO2 Scrubber Check	4922	78.3	800.2	0.0	----
Date of last scrubber change:		December 9, 2021		Ave Corr Factor	0.999
Date of last converter efficiency test:		n/a			efficiency

Baseline Corr As found:	78.1	Prev response:	79.95	*% change:	-2.4%
Baseline Corr 2nd AF pt:	38.9	AF Slope:	0.977040	AF Intercept:	-0.001035
Baseline Corr 3rd AF pt:	19.4	AF Correlation:	0.999992		

* = > +/-5% change initiates investigation

Notes: SOx scrubber check done after calibrator zero. Adjusted span. Changed sample inlet filter after MPAF's.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

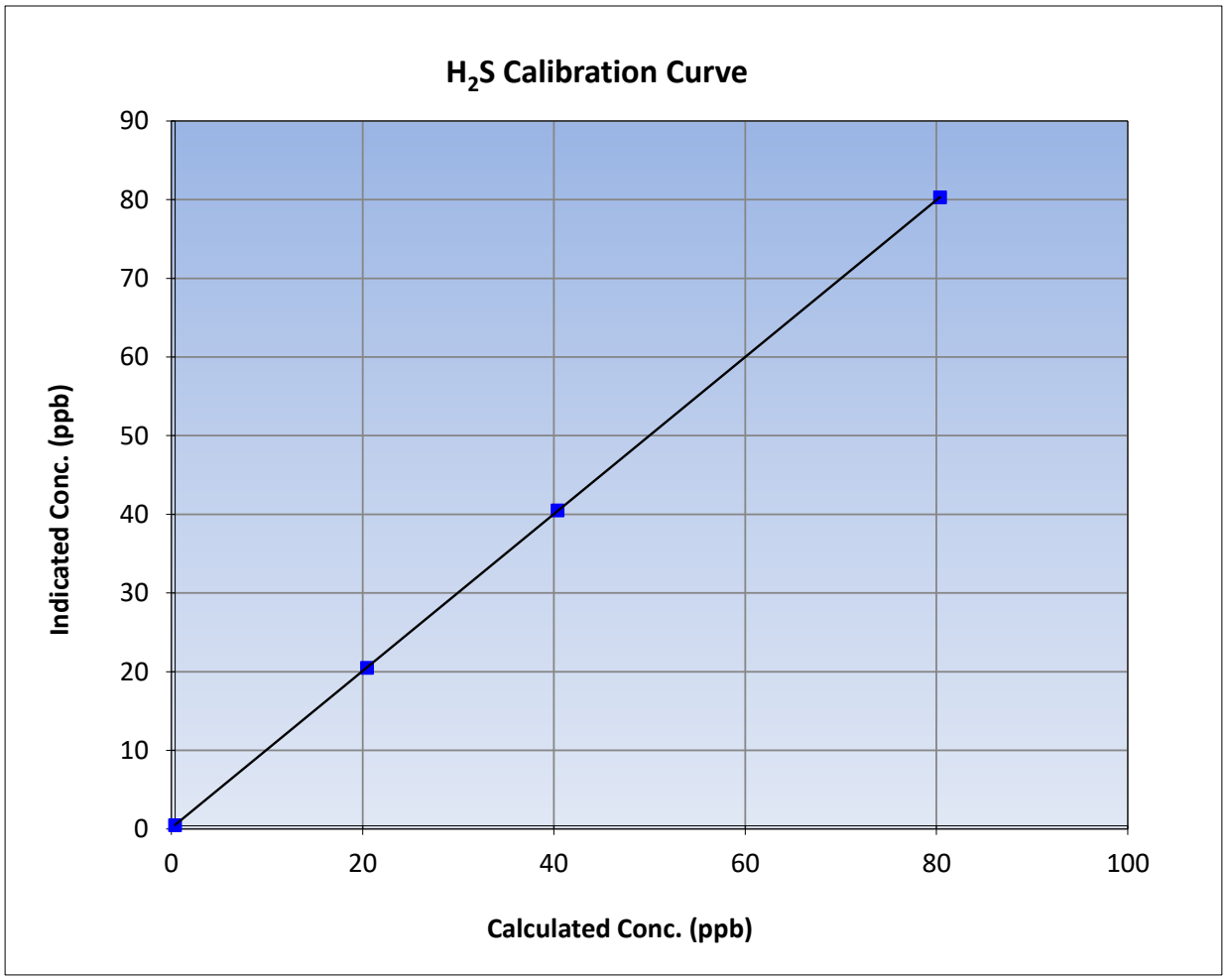
Station Information

Calibration Date:	February 6, 2023	Previous Calibration:	January 18, 2023
Station Name:	Firebag	Station Number:	AMS19
Start Time (MST):	11:02	End Time (MST):	15:18
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1336160090

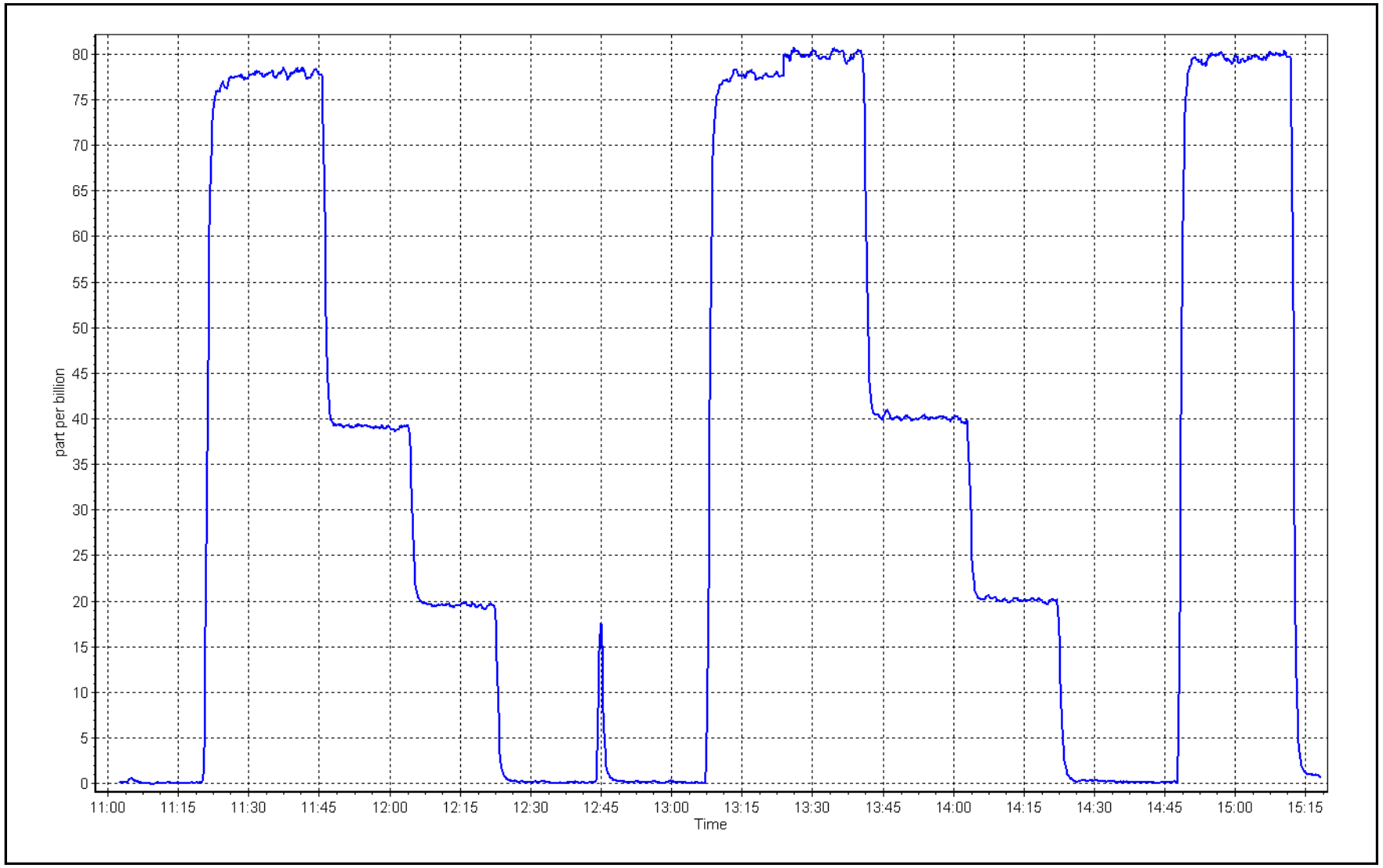
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	79.9	1.0010
40.0	40.1	0.9973
20.0	20.1	0.9974

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	0.997909	*0.90 - 1.10*
Intercept	0.118481	*+/-3*



H_2S Calibration Plot Date: February 6, 2023 Location: Firebag



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	February 7, 2023	Last Cal Date:	January 26, 2023
Start time (MST):	11:41	End time (MST):	14:46
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC716618	Cal Gas Expiry Date:	February 23, 2025	
CH4 Cal Gas Conc.	500.7	ppm	CH4 Equiv Conc.	1066.9	ppm
C3H8 Cal Gas Conc.	205.9	ppm			
Removed Gas Cert:			Removed Gas Expiry:		
Removed CH4 Conc.	500.7	ppm	CH4 Equiv Conc.	1066.9	ppm
Removed C3H8 Conc.	205.9	ppm	Diff between cyl:		
Calibrator Make/Model:	API T700		Serial Number:	1607	
ZAG Make/Model:	API T701		Serial Number:	1118	

Analyzer Information

Analyzer make:	Thermo 51i-LT		Analyzer serial #:	1336160089	
Analyzer Range:	0 - 20 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001270	0.986792	Background:	2.25	2.11
Calibration intercept:	-0.051562	0.033117	Coefficient:	3.774	3.748

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	17.18	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	4999	0.0	0.00	0.08	----
high point	4919	81.1	17.31	17.14	1.010
second point	4959	40.6	8.66	8.54	1.015
third point	4980	20.3	4.33	4.27	1.014
as left zero	5000	0.0	0.00	0.05	----
as left span	4919	81.1	17.31	17.29	1.001
				Average Correction Factor	1.013

Baseline Corr As found:	17.30	Previous response	17.28	*% change	0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

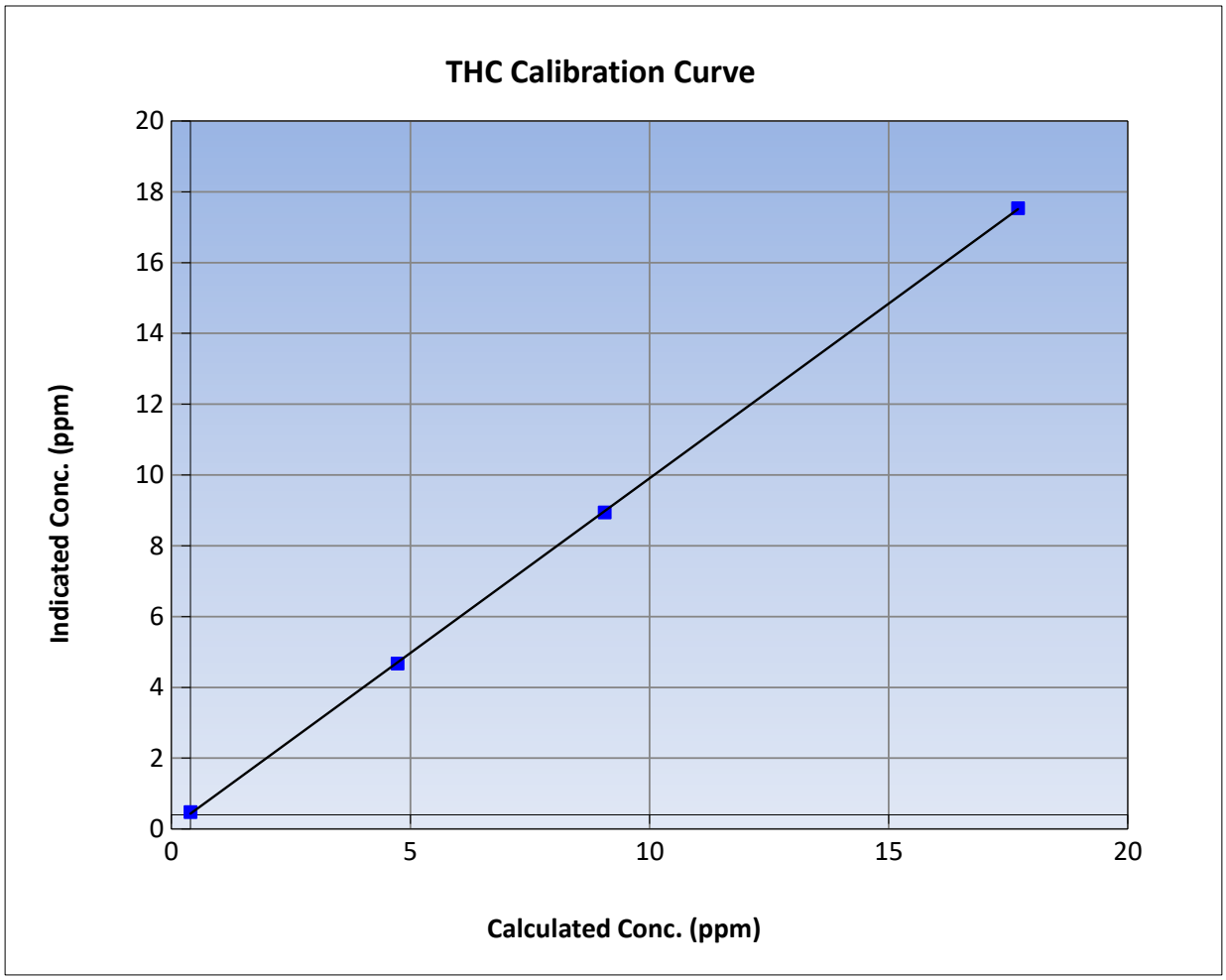
Station Information

Calibration Date:	February 7, 2023	Previous Calibration:	January 26, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	11:41	End Time (MST):	14:46
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1336160089

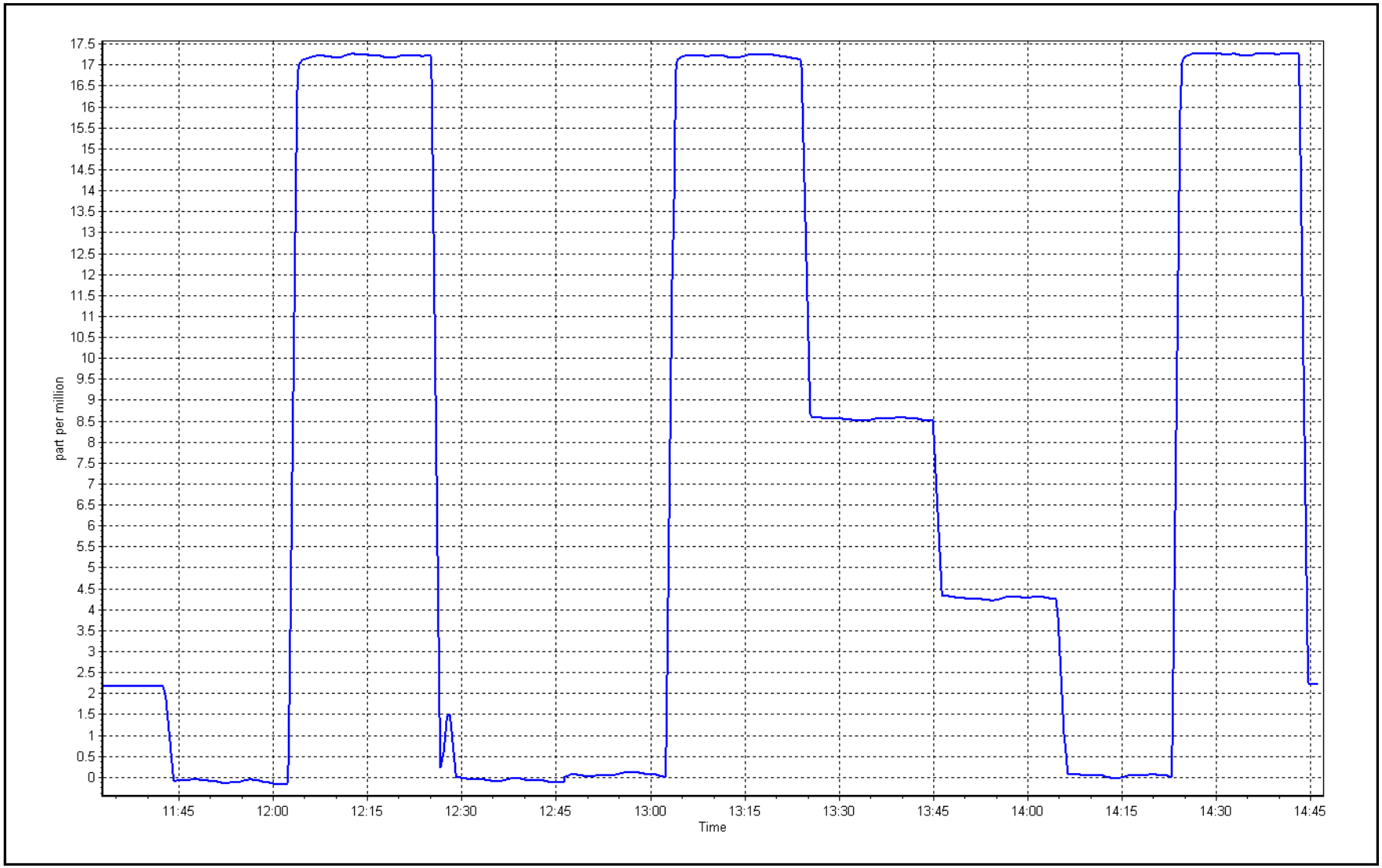
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.08	----
17.31	17.14	1.0096
8.66	8.54	1.0145
4.33	4.27	1.0139

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999961	*≥0.995*
Slope	0.986792	*0.90 - 1.10*
Intercept	0.033117	*+/-1.5*



THC Calibration Plot Date: February 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:	February 8, 2023	Last Cal Date:	January 19, 2023
Start time (MST):	10:48	End time (MST):	15:35
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:	7.2	7.3
NOX coeff or slope:	0.996	0.996	NOX bkgnd or offset:	7.3	7.3
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	207.8	210.9

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.990896	0.997423
NO_X Cal Offset:	0.574492	0.135510
NO Cal Slope:	0.991188	0.998470
NO Cal Offset:	0.047030	-0.351682
NO_2 Cal Slope:	1.003489	0.999864
NO_2 Cal Offset:	-1.311603	-0.568980

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	4999	0.0	0.0	0.0	0.0	-0.1	-0.2	0.1	----	----
as found span	4919	81.0	828.1	800.3	27.9	830.0	799.7	30.7	0.9978	1.0007
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	826.0	798.8	27.4	1.0026	1.0019
second point	4960	40.5	414.0	400.1	13.9	413.4	399.1	14.3	1.0015	1.0025
third point	4980	20.2	206.5	199.6	6.9	206.1	198.6	7.6	1.0020	1.0049
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	359.5	468.7	819.0	350.5	468.8	1.0112	1.0256
								Average Correction Factor	1.0020	1.0031

Corrected As found	NO_X = 830.1 ppb	NO = 799.9 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	1.1%
Previous Response	NO_X = 821.2 ppb	NO = 793.3 ppb			*Percent Change	NO =	0.8%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	791.4	350.6	468.7	468.4	1.0006	99.9%
2nd GPT point (200 ppb O3)	791.4	570.2	249.1	248.2	1.0035	99.7%
3rd GPT point (100 ppb O3)	791.4	680.6	138.7	137.3	1.0099	99.0%
				Average Correction Factor	1.0047	99.5%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

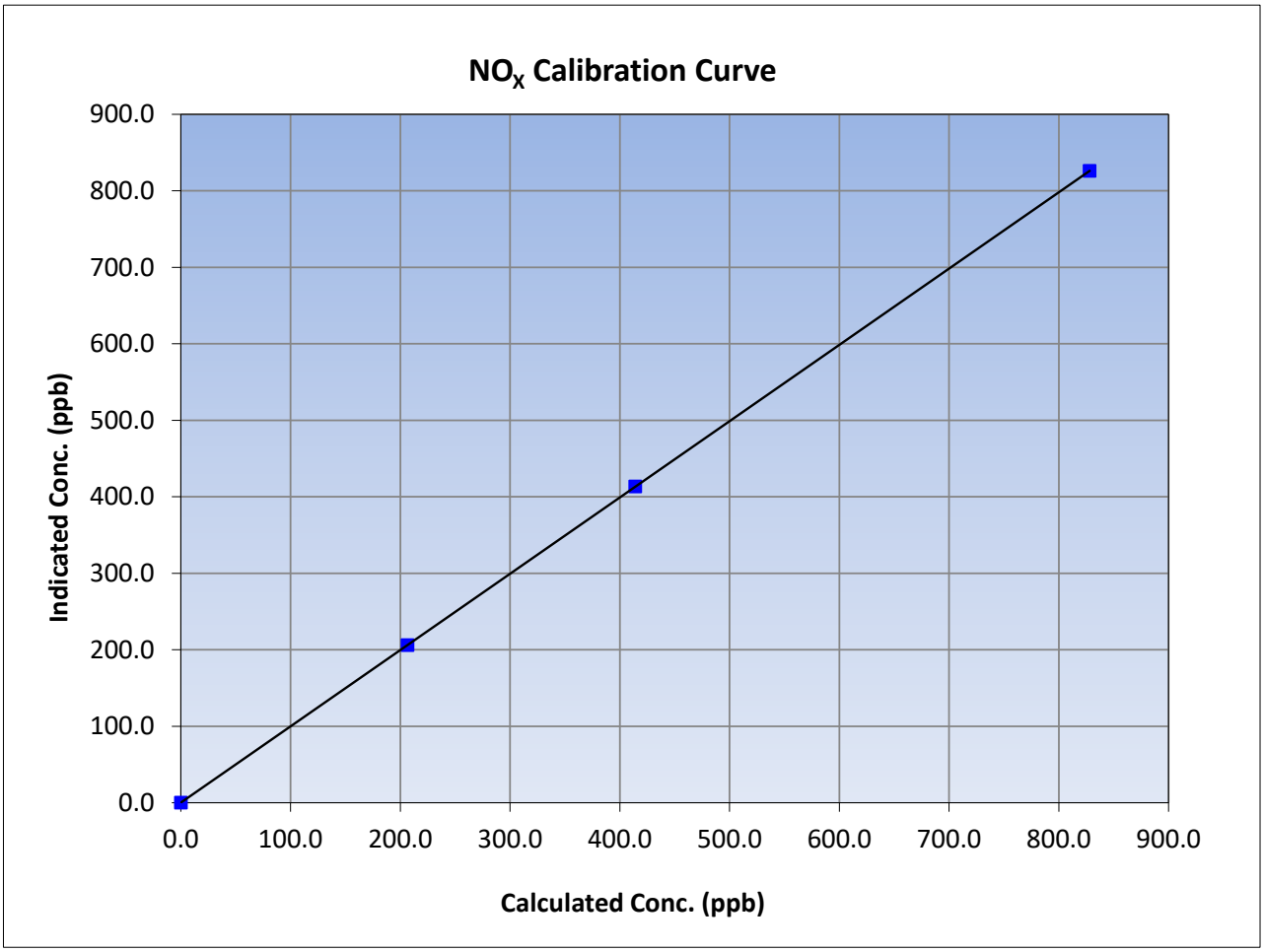
Version-04-2020

Station Information

Calibration Date:	February 8, 2023	Previous Calibration:	January 19, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:48	End Time (MST):	15:35
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	1.000000	*≥0.995*
828.1	826.0	1.0026			
414.0	413.4	1.0015	Slope	0.997423	*0.90 - 1.10*
206.5	206.1	1.0020			
			Intercept	0.135510	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

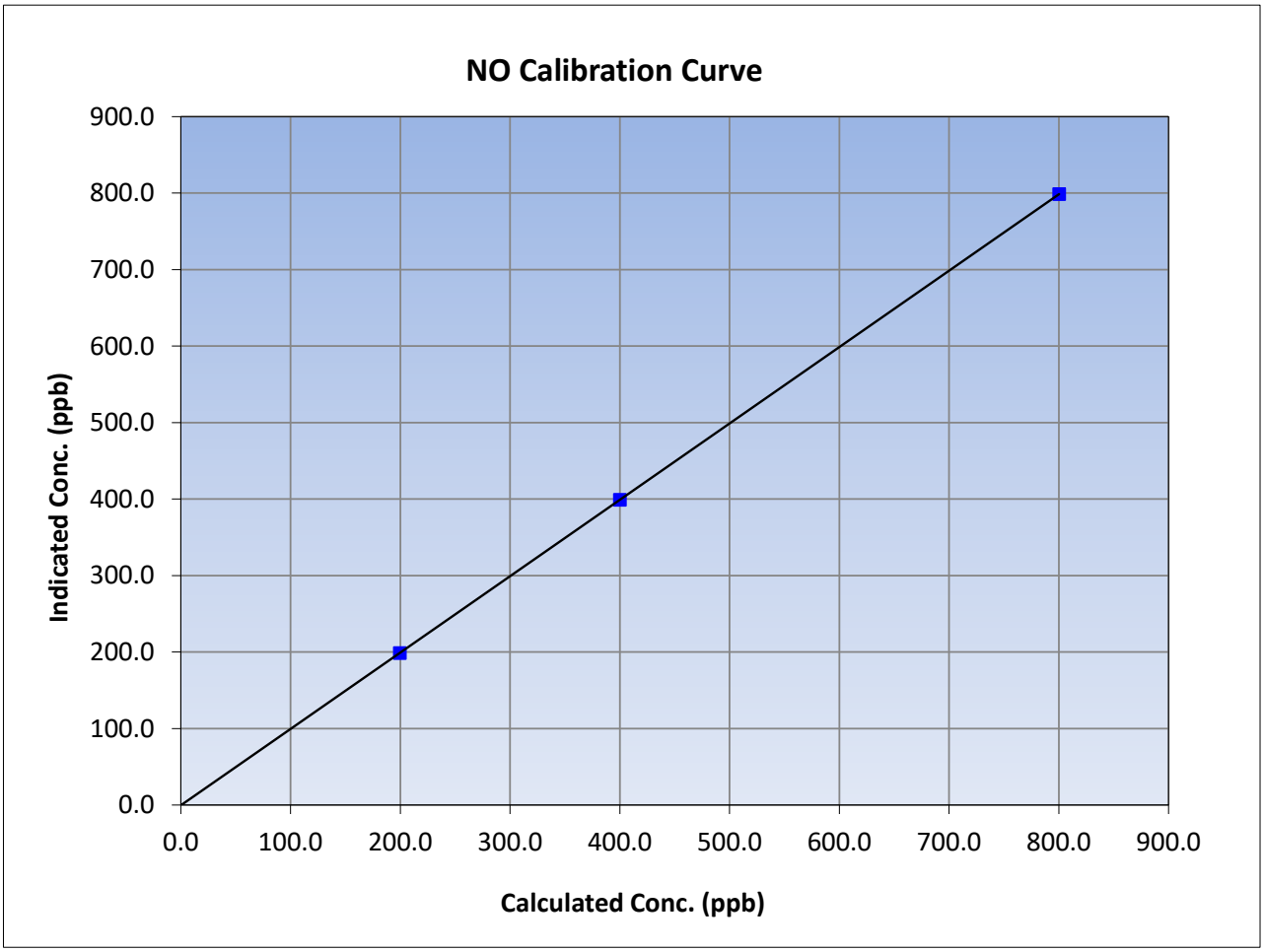
Version-04-2020

Station Information

Calibration Date:	February 8, 2023	Previous Calibration:	January 19, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:48	End Time (MST):	15:35
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	1.000000	≥0.995
800.3	798.8	1.0019			
400.1	399.1	1.0025	Slope	0.998470	0.90 - 1.10
199.6	198.6	1.0049			
			Intercept	-0.351682	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

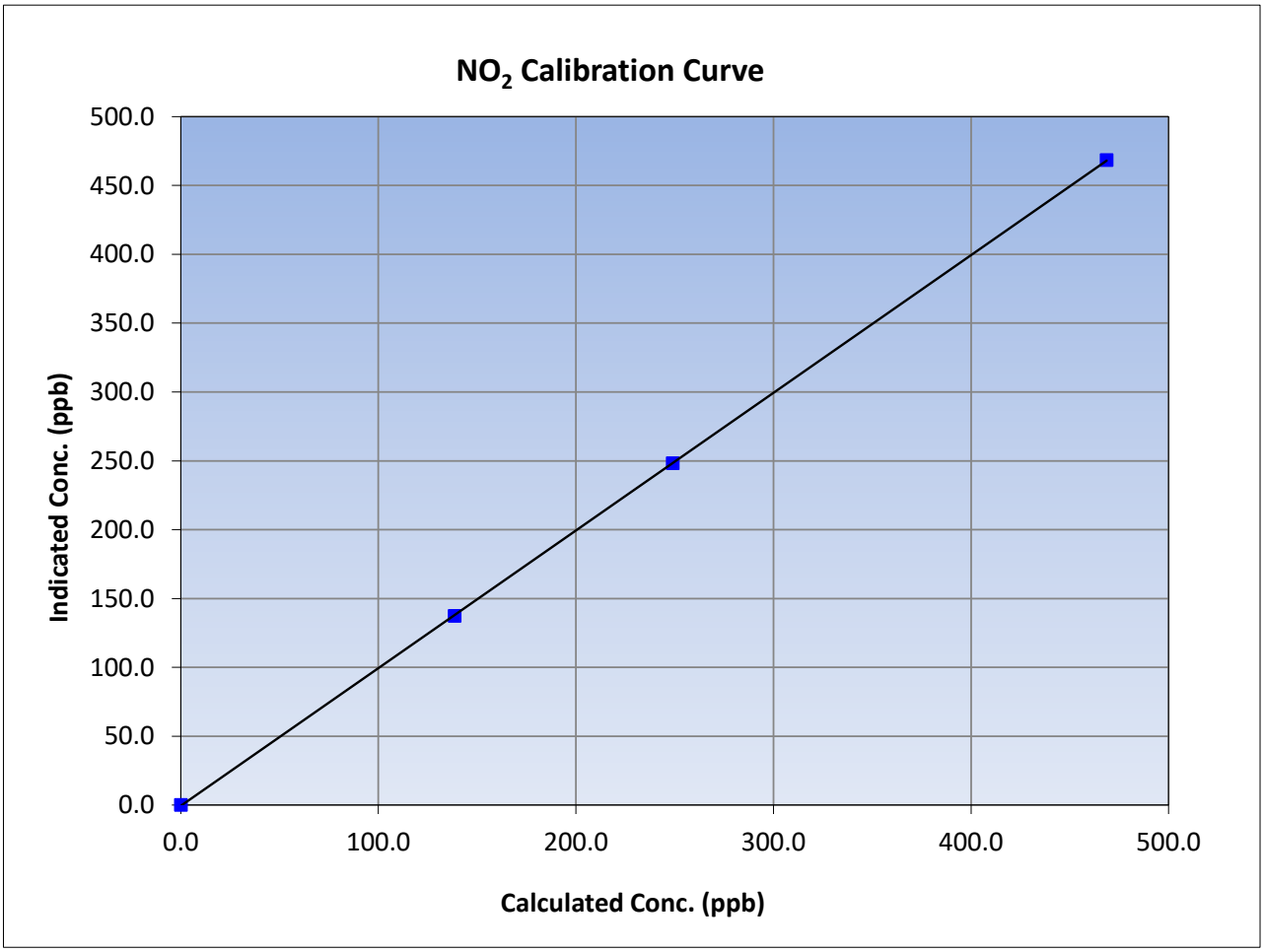
Version-04-2020

Station Information

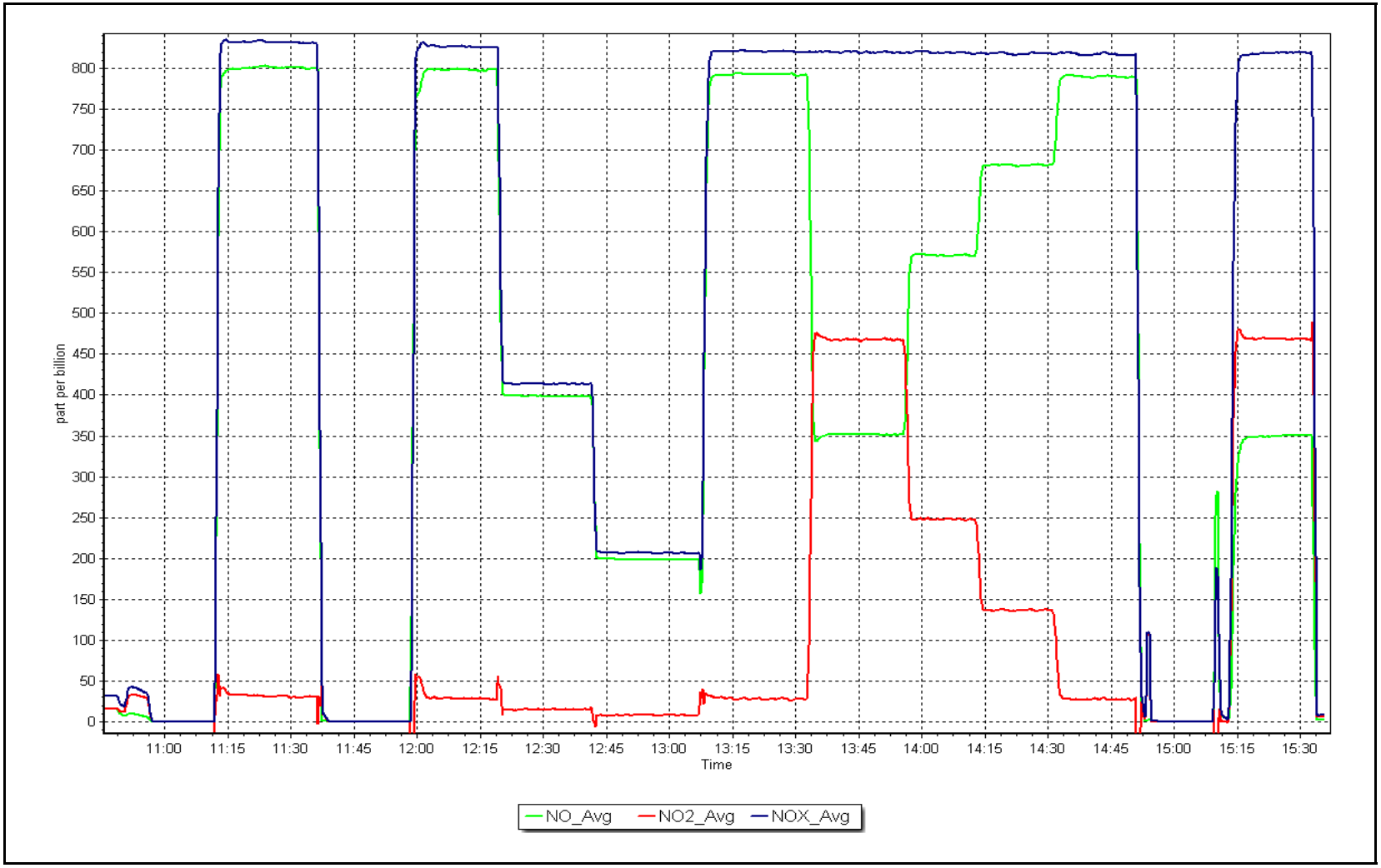
Calibration Date:	February 8, 2023	Previous Calibration:	January 19, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:48	End Time (MST):	15:35
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999989	≥0.995
468.7	468.4	1.0006			
249.1	248.2	1.0035	Slope	0.999864	0.90 - 1.10
138.7	137.3	1.0099			
			Intercept	-0.568980	+/-20



NO_X Calibration Plot Date: February 8, 2023 Location: Firebag



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS20
MACKAY RIVER
FEBRUARY 2023

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

March 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	February 1, 2023	Last Cal Date:	January 17, 2023
Start time (MST):	10:09	End time (MST):	13:52
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:	0.993569	0.999451	Backgd or Offset:	18.6	18.6
Calibration intercept:	3.910928	2.850831	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	-0.4	----
as found span	4919	81.3	800.3	797.8	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4919	81.3	800.3	801.4	0.999
second point	4959	40.7	400.7	404.1	0.992
third point	4980	20.3	199.8	206.1	0.970
as left zero	5000	0.0	0.0	0.1	----
as left span	4919	81.3	800.3	804.8	0.994
				Average Correction Factor	0.987

Baseline Corr As found:	798.20	Previous response	799.03	*% 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 requried.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

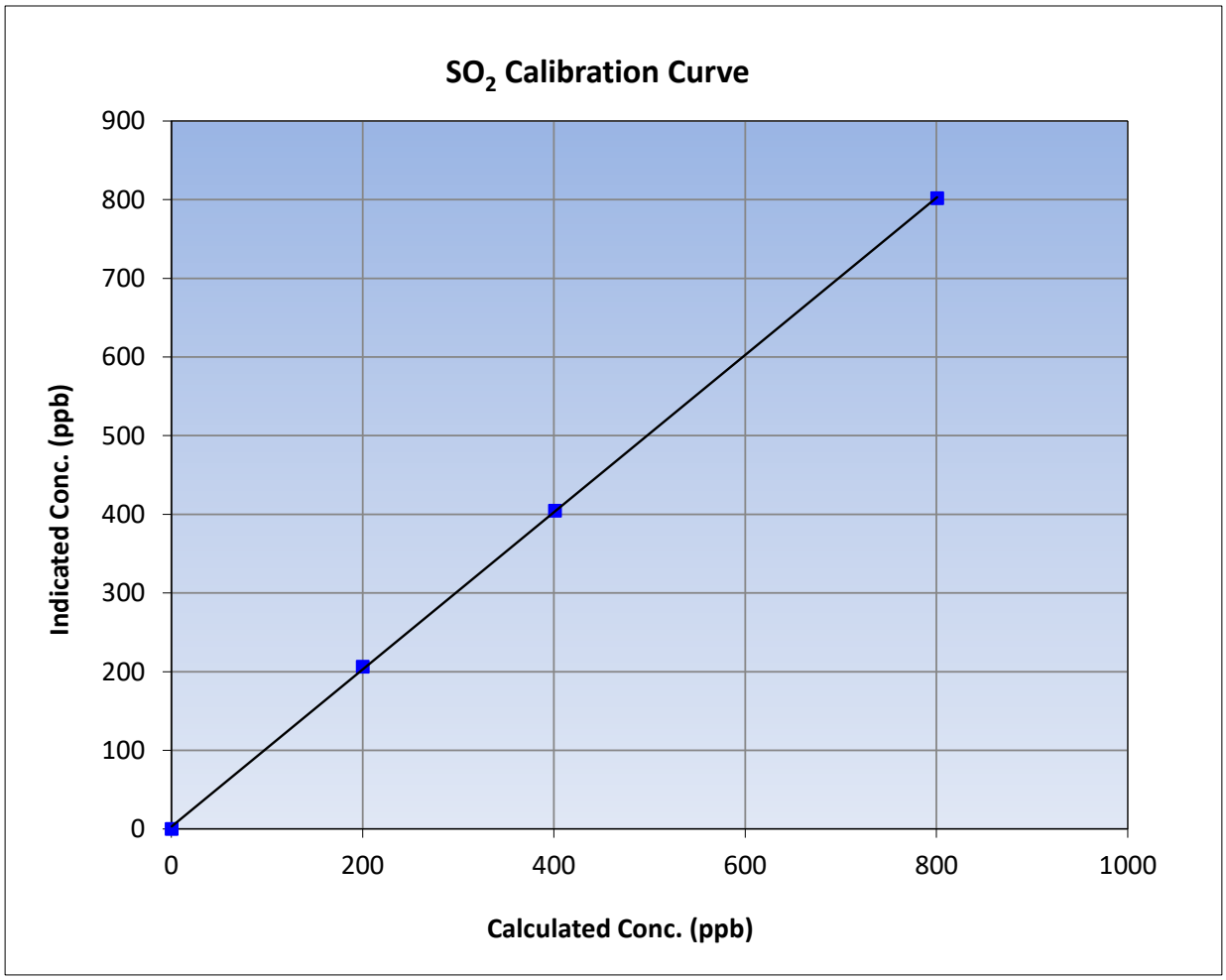
Station Information

Calibration Date:	February 1, 2023	Previous Calibration:	January 17, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	10:09	End Time (MST):	13:52
Analyzer make:	Thermo 43i	Analyzer serial #:	1501301450

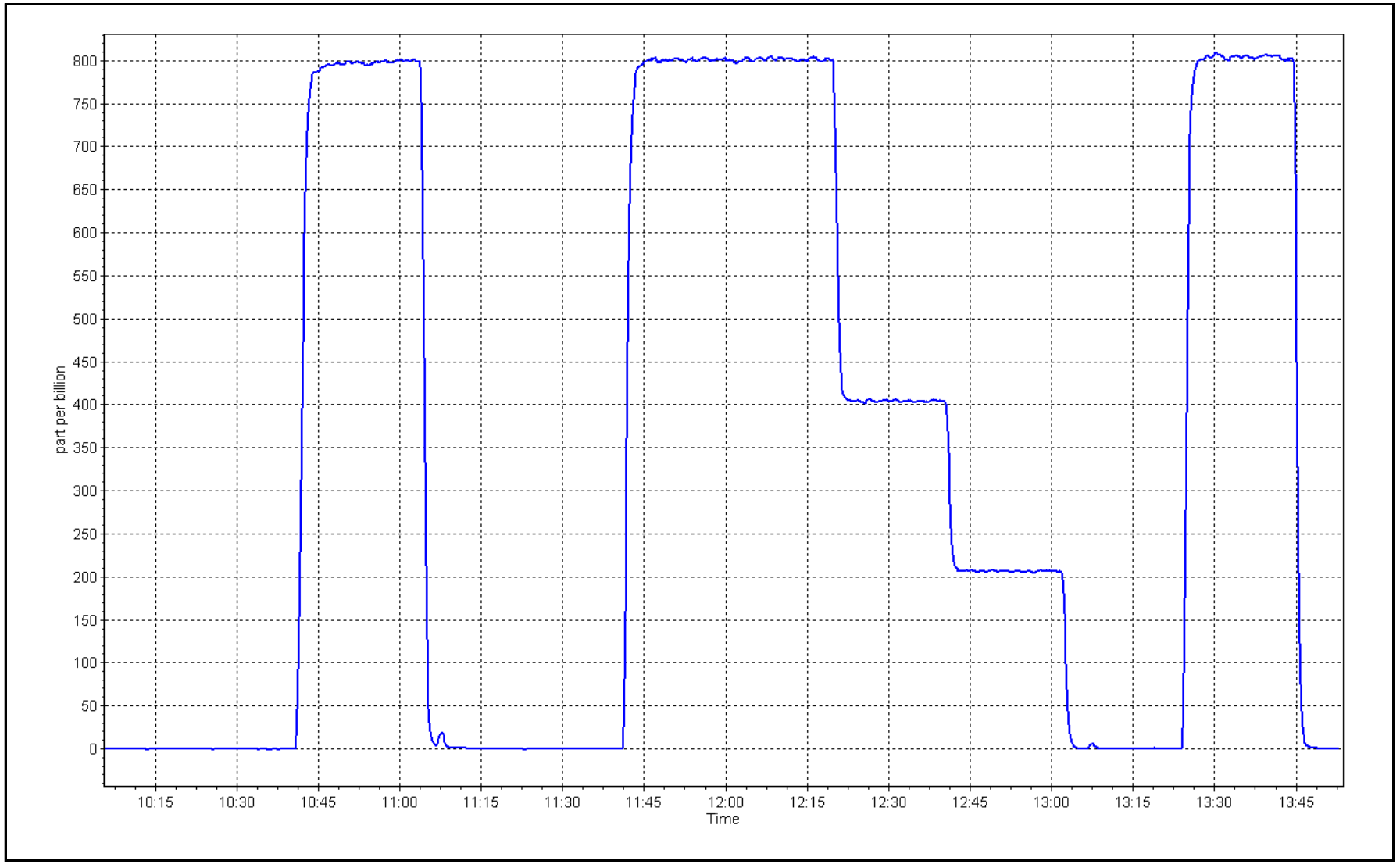
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
800.3	801.4	0.9986
400.7	404.1	0.9915
199.8	206.1	0.9695

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999931	*≥0.995*
Slope	0.999451	*0.90 - 1.10*
Intercept	2.850831	*+/-30*



SO2 Calibration Plot Date: February 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:	February 13, 2023	Last Cal Date:	January 23, 2023
Start time (MST):	10:56	End time (MST):	16:00
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:	0.999429	0.990859	Backgd or Offset:	46.3	46.3
Calibration intercept:	0.379115	0.878999	Coeff or Slope:	0.981	0.981

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	0.6	----
as found span	4918	82.1	80.0	81.5	0.988
as found 2nd point	4959	41.1	40.0	41.2	0.986
as found 3rd point	4979	20.5	20.0	21.2	0.969
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	4918	82.1	80.0	79.9	1.001
second point	4959	41.1	40.0	40.8	0.981
third point	4979	20.5	20.0	21.0	0.951
as left zero	5000	0.0	0.0	0.5	----
as left span	4918	82.1	80.0	79.1	1.011
SO2 Scrubber Check	4919	80.0	800.2	0.1	----
Date of last scrubber change:		December 15, 2020		Ave Corr Factor	0.978
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.9	Prev response:	80.30	*% change:	0.7%
Baseline Corr 2nd AF pt:	40.6	AF Slope:	1.010147	AF Intercept:	0.779094
Baseline Corr 3rd AF pt:	20.6	AF Correlation:	0.999973		

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after multi point as founds. Scrubber test after calibrator zero. No adjustments made.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

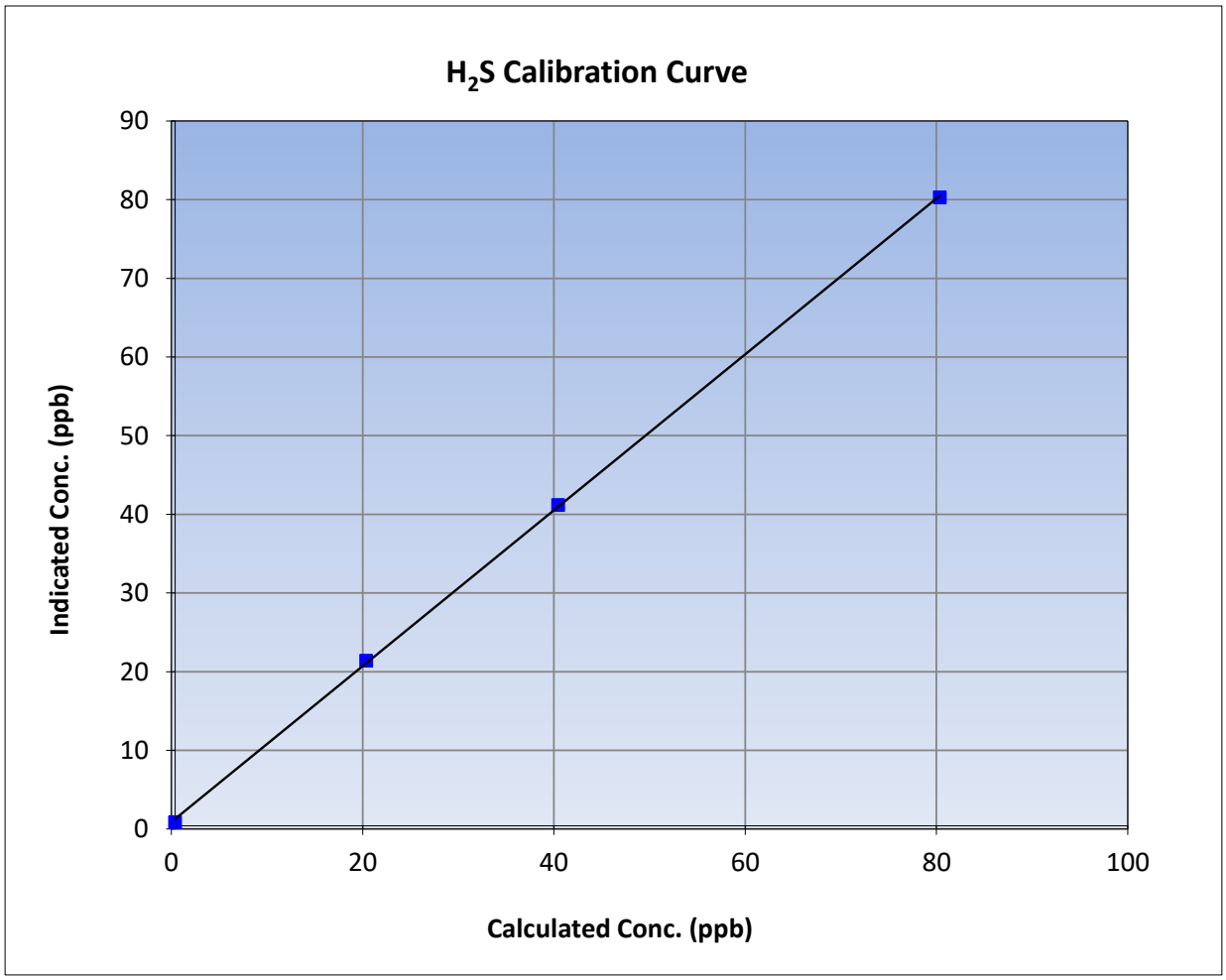
Station Information

Calibration Date:	February 13, 2023	Previous Calibration:	January 23, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	10:56	End Time (MST):	16:00
Analyzer make:	Teledyne API T101	Analyzer serial #:	196

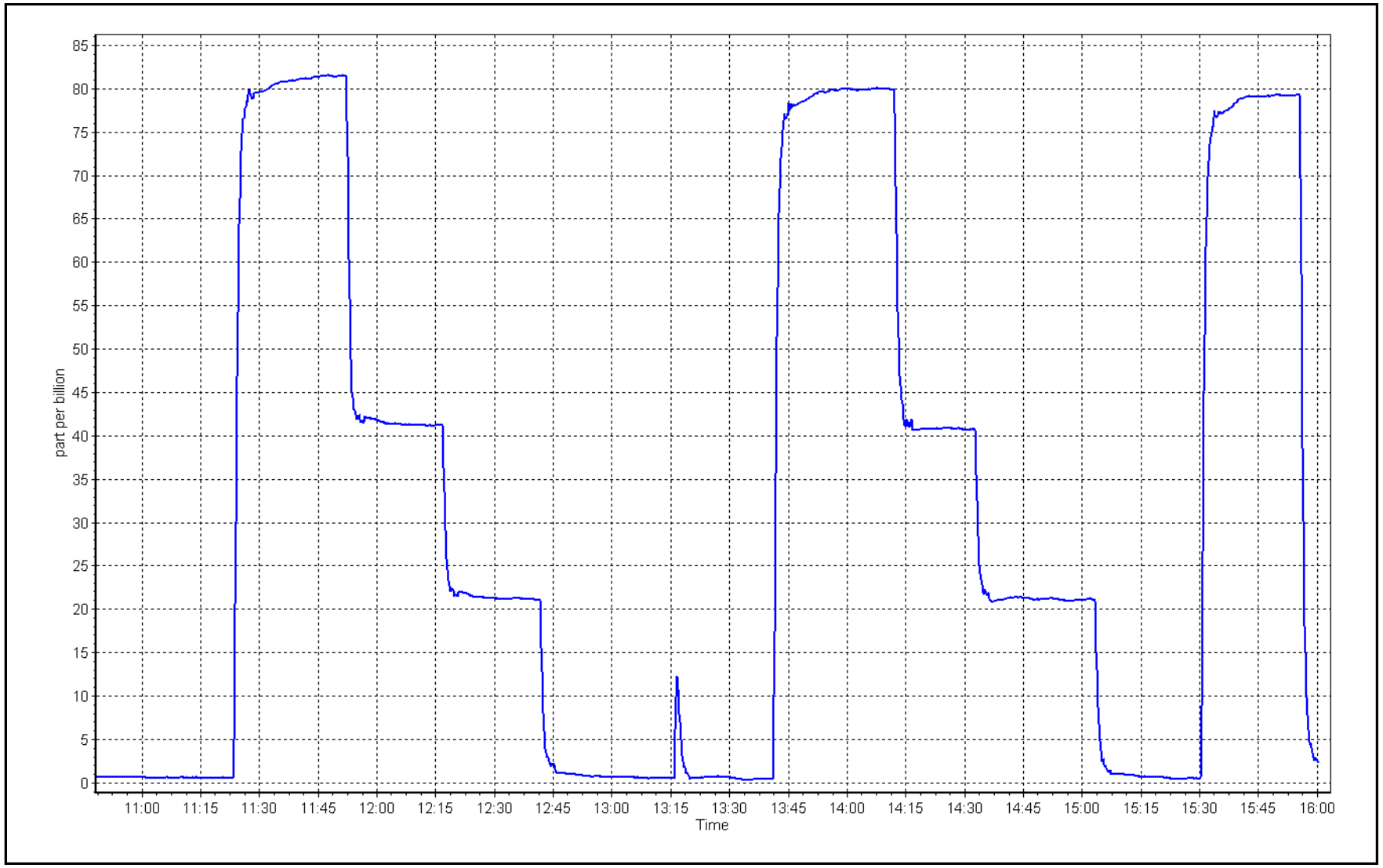
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
80.0	79.9	1.0008
40.0	40.8	0.9811
20.0	21.0	0.9509

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999893	*≥0.995*
Slope	0.990859	*0.90 - 1.10*
Intercept	0.878999	*+/-3*



H_2S Calibration Plot Date: February 13, 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:	February 1, 2023	Last Cal Date:	January 17, 2023
Start time (MST):	10:09	End time (MST):	13:52
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:	0.986110	0.996170	Background:	3.180	3.440
Calibration intercept:	0.143798	0.044213	Coefficient:	5.471	5.402

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	0.27	----
as found span	4919	81.3	17.34	17.75	0.977
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.03	----
high point	4919	81.3	17.34	17.29	1.003
second point	4959	40.7	8.68	8.70	0.998
third point	4980	20.3	4.33	4.45	0.973
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	17.34	17.37	0.998
				Average Correction Factor	0.991

Baseline Corr As found:	17.48	Previous response	17.24	*% change	1.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Sample inlet filter changed after as founds. Zero and span adjusted.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

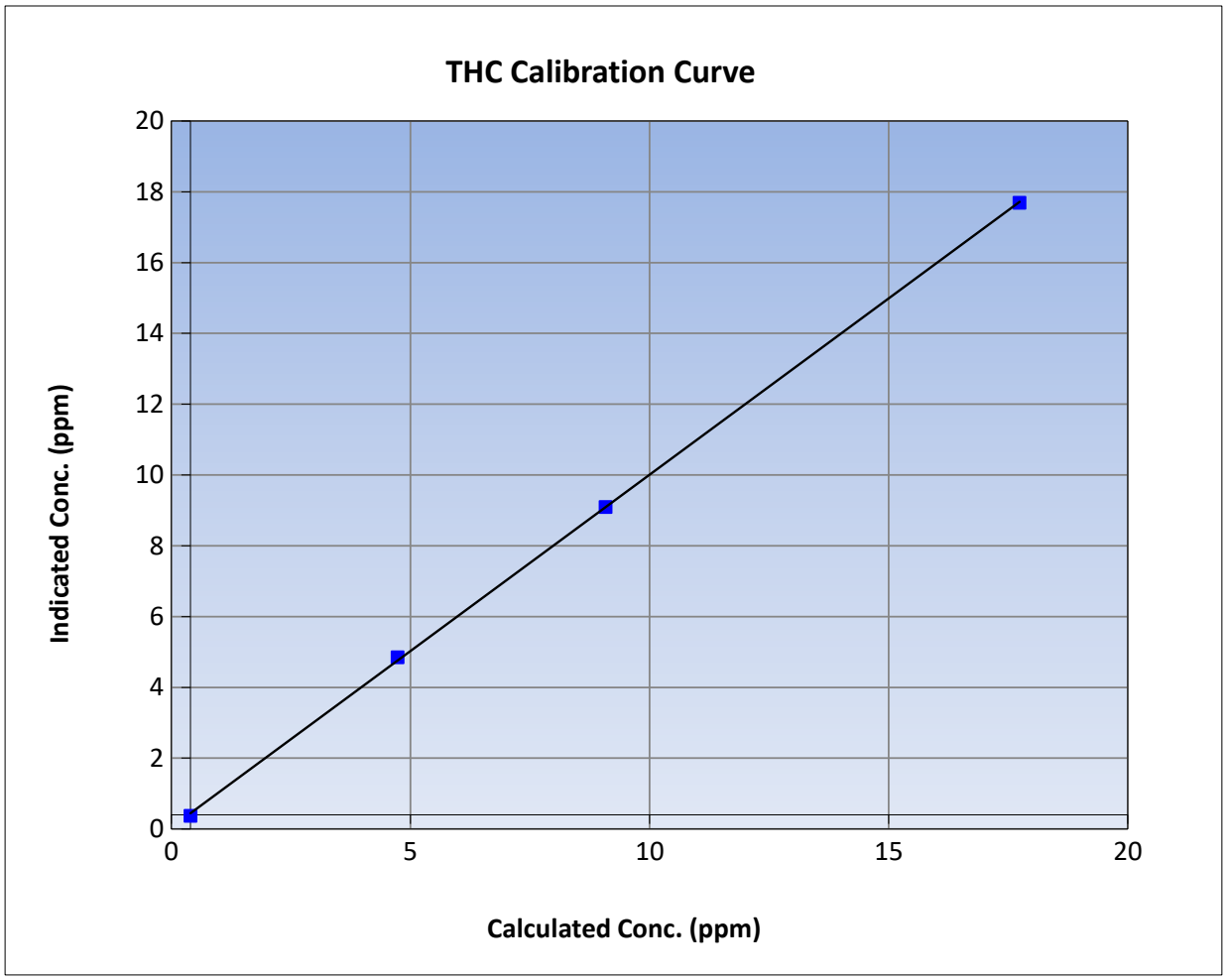
Station Information

Calibration Date:	February 1, 2023	Previous Calibration:	January 17, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	10:09	End Time (MST):	13:52
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1501663727

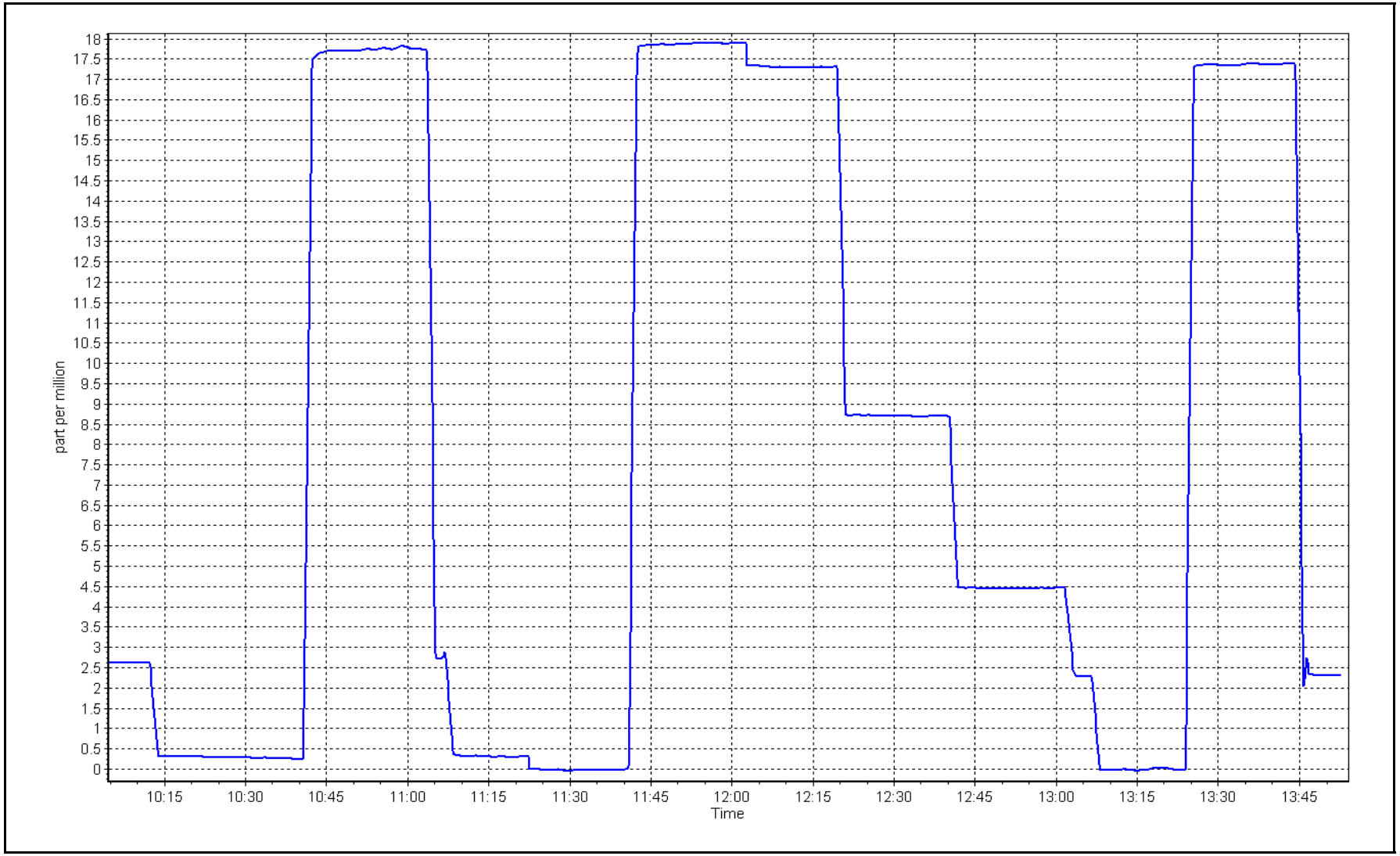
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.03	----
17.34	17.29	1.0027
8.68	8.70	0.9982
4.33	4.45	0.9731

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999913	*≥0.995*
Slope	0.996170	*0.90 - 1.10*
Intercept	0.044213	*+/-1.5*



THC Calibration Plot Date: February 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:	February 2, 2023	Last Cal Date:	January 24, 2023
Start time (MST):	10:20	End time (MST):	15:53
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:	4766	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1505164379	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.409	1.364	NO bkgnd or offset:	3.9	3.8
NOX coeff or slope:	0.995	0.990	NOX bkgnd or offset:	3.9	3.8
NO2 coeff or slope:	0.995	0.995	Reaction cell Press:	175.0	176.8

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.996925	0.993580
NO_X Cal Offset:	2.570800	3.070250
NO Cal Slope:	0.998231	0.997347
NO Cal Offset:	1.372065	1.531522
NO_2 Cal Slope:	1.007507	0.998061
NO_2 Cal Offset:	-1.673176	-1.818500

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	4917	83.3	819.5	800.3	19.2	854.9	831.8	23.0	0.9585	0.9621
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
high point	4917	83.3	819.5	800.3	19.2	816.2	799.4	16.6	1.0040	1.0011
second point	4956	41.7	410.4	400.8	9.6	411.0	400.6	10.4	0.9986	1.0006
third point	4979	20.8	204.6	199.9	4.8	210.4	203.5	6.9	0.9726	0.9821
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	458.8	360.7	811.3	451.9	359.5	1.0101	1.0153
								Average Correction Factor	0.9917	0.9946

Corrected As found	NO_X = 855.0 ppb	NO = 832.0 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	4.2%
Previous Response	NO_X = 819.5 ppb	NO = 800.3 ppb		*Percent Change	NO =	3.8%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found NO r^2:	NO Sl:	NO Int:	
			As found NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	791.8	450.3	360.7	359.2	1.0041	99.6%
2nd GPT point (200 ppb O3)	791.8	614.0	197.0	194.2	1.0142	98.6%
3rd GPT point (100 ppb O3)	791.8	698.4	112.6	108.1	1.0412	96.0%
				Average Correction Factor	1.0198	98.1%

Notes: Adjusted the span only.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

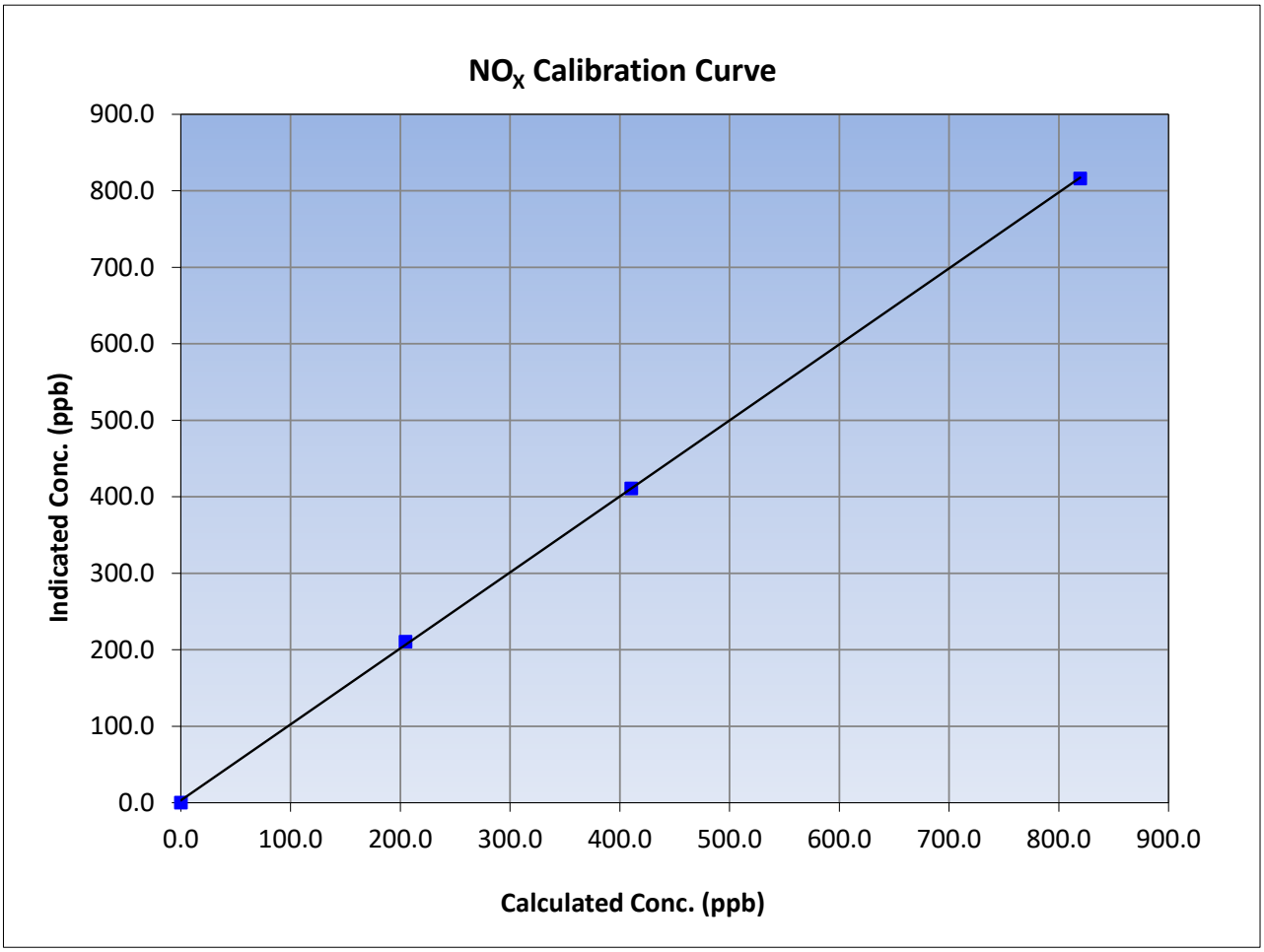
Version-04-2020

Station Information

Calibration Date:	February 2, 2023	Previous Calibration:	January 24, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	10:20	End Time (MST):	15:53
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	0.999927	*≥0.995*
819.5	816.2	1.0040			
410.4	411.0	0.9986	Slope	0.993580	*0.90 - 1.10*
204.6	210.4	0.9726			
			Intercept	3.070250	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

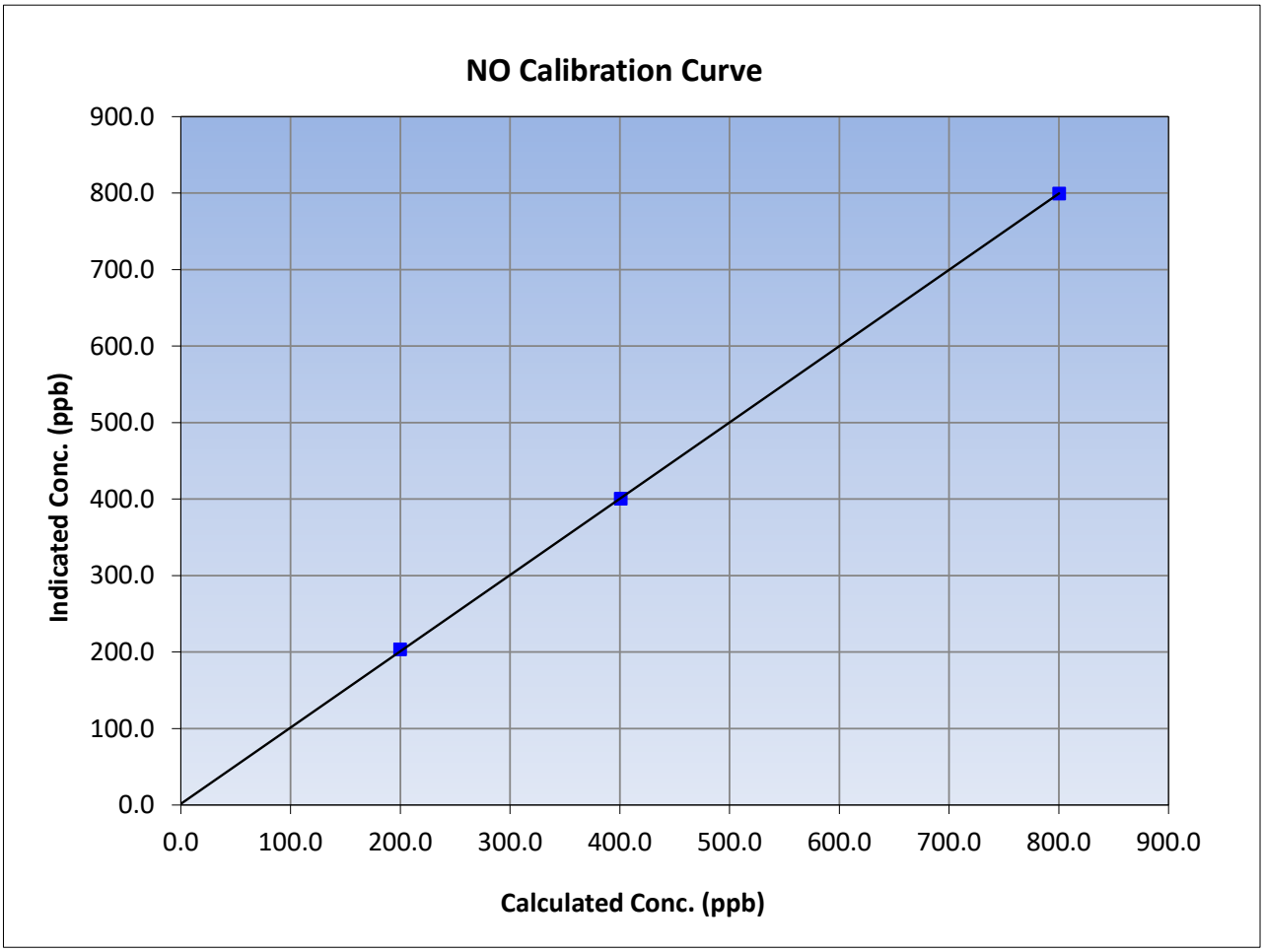
Version-04-2020

Station Information

Calibration Date:	February 2, 2023	Previous Calibration:	January 24, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	10:20	End Time (MST):	15:53
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	0.999971	≥0.995
800.3	799.4	1.0011			
400.8	400.6	1.0006	Slope	0.997347	0.90 - 1.10
199.9	203.5	0.9821			
			Intercept	1.531522	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

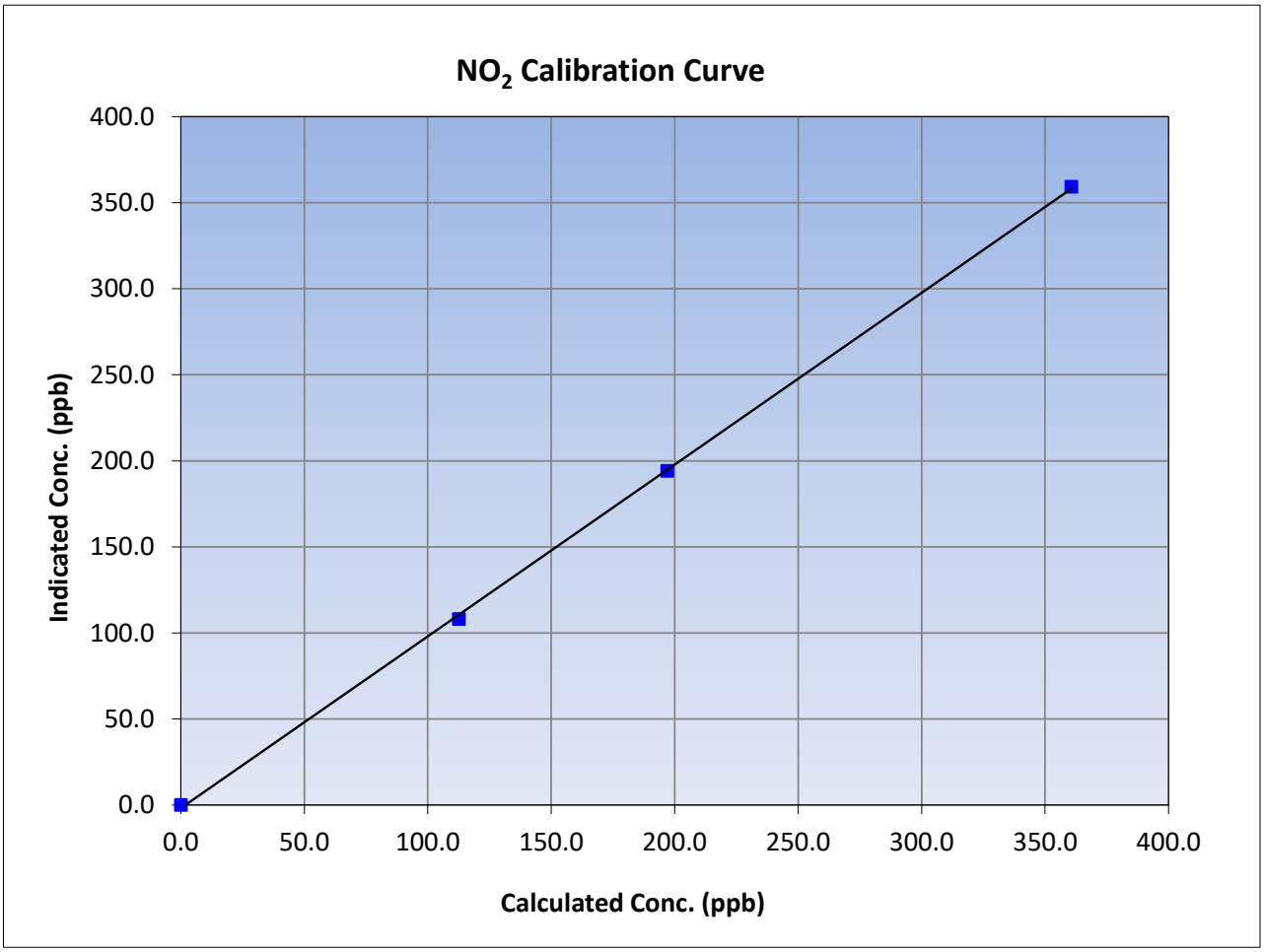
Version-04-2020

Station Information

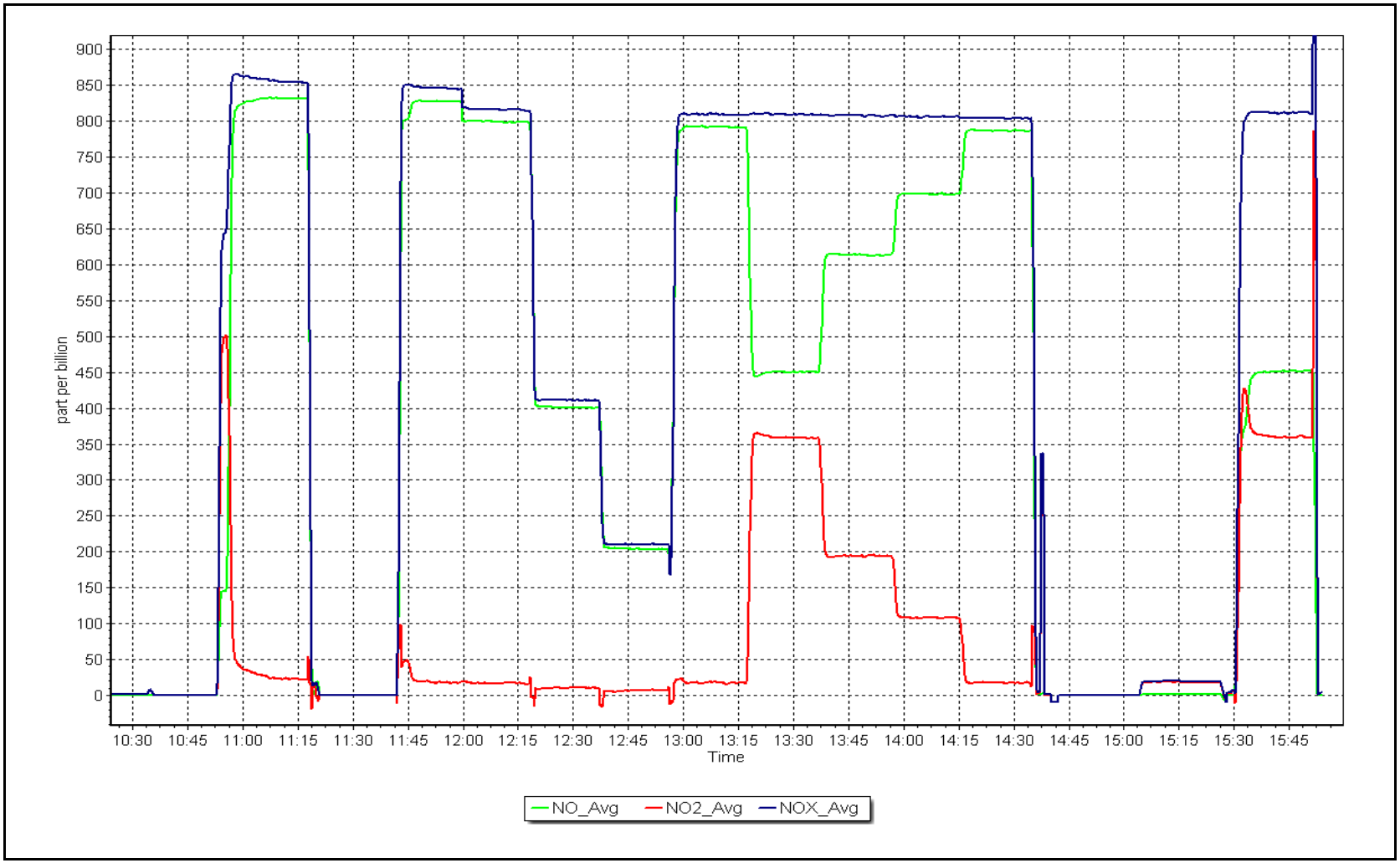
Calibration Date:	February 2, 2023	Previous Calibration:	January 24, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	10:20	End Time (MST):	15:53
Analyzer make:	Thermo 42i	Analyzer serial #:	1505164379

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999841	≥0.995
360.7	359.2	1.0041			
197.0	194.2	1.0142	Slope	0.998061	0.90 - 1.10
112.6	108.1	1.0412			
			Intercept	-1.818500	+/-20



NO_X Calibration Plot Date: February 2, 2023 Location: MacKay River



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS21
CONKLIN
FEBRUARY 2023

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

March 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	February 6, 2023	Last Cal Date:	January 3, 2023
Start time (MST):	10:51	End time (MST):	13:30
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:	1.003298	0.999888	Backgd or Offset:	27.9	27.9
Calibration intercept:	0.595998	0.415841	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	0.1	----
as found span	4920	80.2	800.8	801.4	0.999
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5005	0.0	0.0	0.0	----
high point	4920	80.2	800.8	801.1	1.000
second point	4960	40.1	400.4	400.6	1.000
third point	4980	20.0	200.1	201.2	0.995
as left zero	5005	0.0	0.0	0.0	----
as left span	4920	80.2	800.8	802.0	0.999
				Average Correction Factor	0.998

Baseline Corr As found:	801.30	Previous response	804.08	*% change	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments required.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

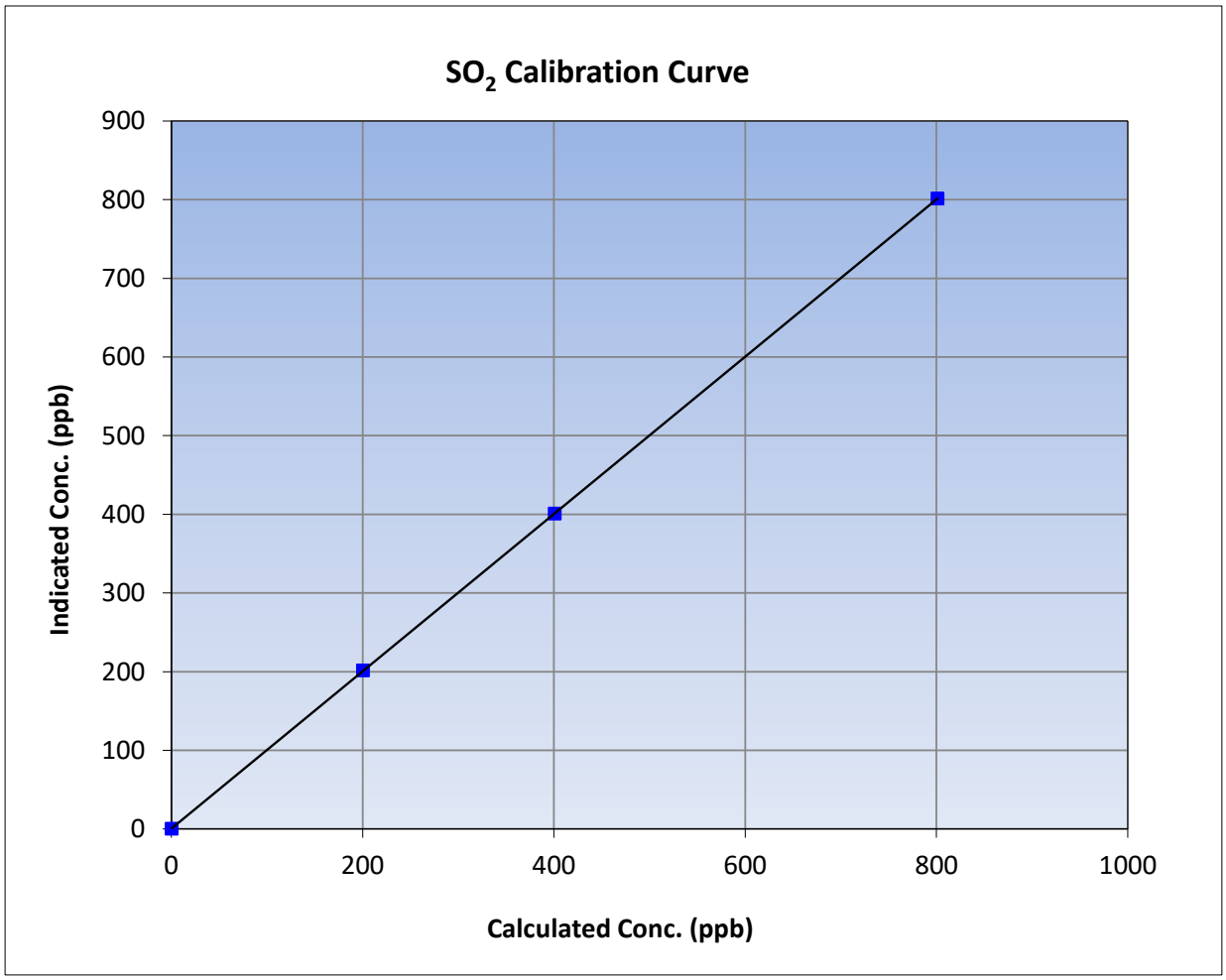
Station Information

Calibration Date:	February 6, 2023	Previous Calibration:	January 3, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:51	End Time (MST):	13:30
Analyzer make:	Thermo 43i	Analyzer serial #:	1428701363

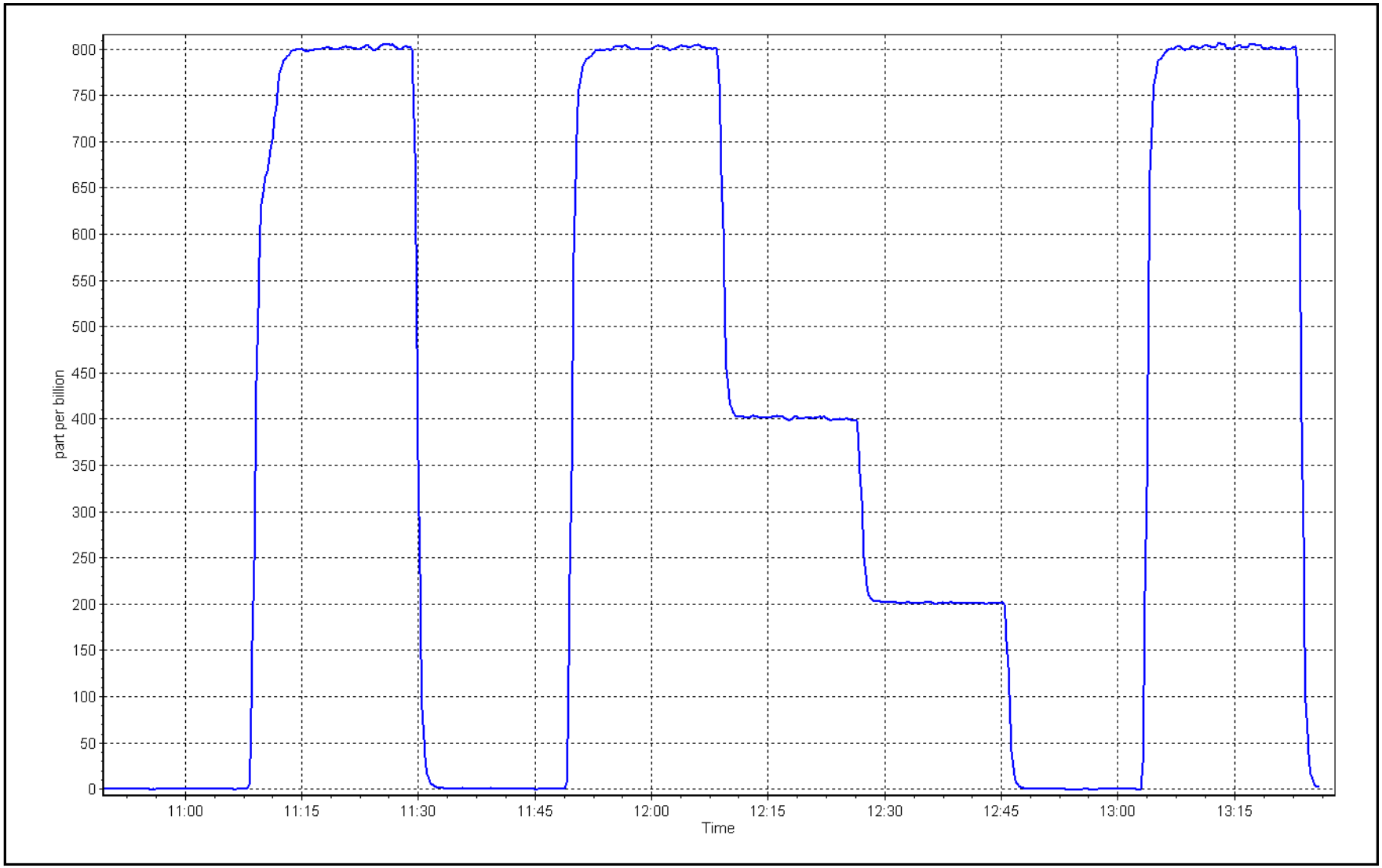
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
800.8	801.1	0.9997
400.4	400.6	0.9996
200.1	201.2	0.9946

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	0.999888	*0.90 - 1.10*
Intercept	0.415841	*+/-30*



SO2 Calibration Plot Date: February 6, 2023 Location: Conklin



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	February 8, 2023	Last Cal Date:	January 9, 2023
Start time (MST):	9:02	End time (MST):	12:55
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:	1.005143	0.983711	Backgd or Offset:	2.8	2.8
Calibration intercept:	-0.162334	0.237934	Coeff or Slope:	0.951	0.951

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	78.5	1.014
as found 2nd point	4960	39.8	40.0	39.5	1.004
as found 3rd point	4980	19.9	20.0	19.8	0.991
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4921	79.5	80.0	78.7	1.016
second point	4960	39.8	40.0	40.0	1.001
third point	4980	19.9	20.0	20.0	1.001
as left zero	5000	0.0	0.0	0.0	----
as left span	4921	79.5	80.0	78.6	1.017
SO2 Scrubber Check	4920	80.2	802.0	-0.2	----
Date of last scrubber change:				Ave Corr Factor	1.006
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.9	Prev response:	80.22	*% change:	-1.7%
Baseline Corr 2nd AF pt:	39.9	AF Slope:	0.985281	AF Intercept:	-0.142040
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999949		

* = > +/-5% change initiates investigation

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

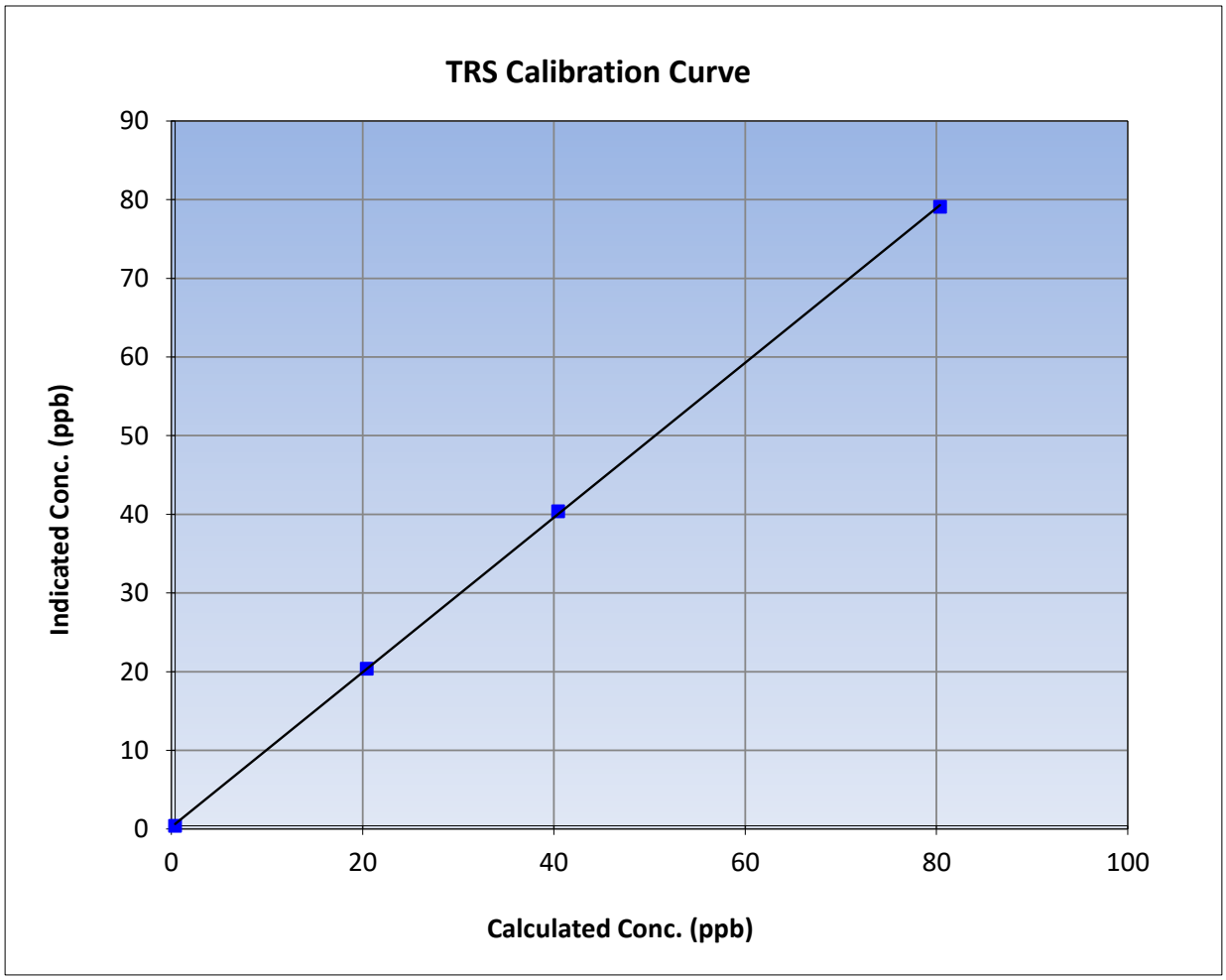
Station Information

Calibration Date:	February 8, 2023	Previous Calibration:	January 9, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:02	End Time (MST):	12:55
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1236656116

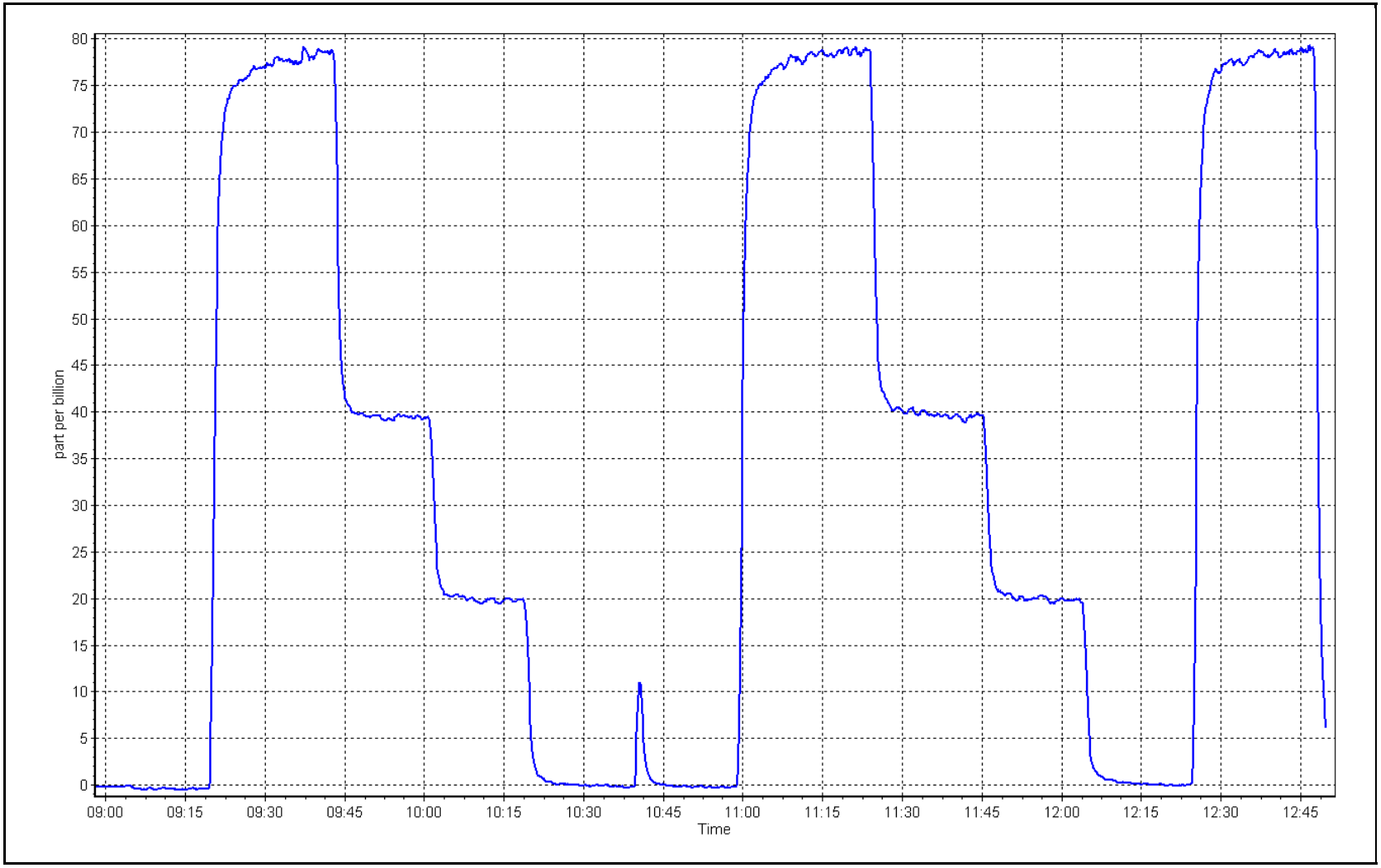
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	78.7	1.0161
40.0	40.0	1.0010
20.0	20.0	1.0010

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999928	*≥0.995*
Slope	0.983711	*0.90 - 1.10*
Intercept	0.237934	*+/-3*



TRS Calibration Plot Date: February 8, 2023 Location: Conklin



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	February 3, 2023	Last Cal Date:	January 4, 2023
Start time (MST):	12:08	End time (MST):	17:16
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:	1.85E-04	1.86E-04	NMHC SP Ratio:	4.66E-05	4.56E-05
CH4 Retention time:	12.20	12.60	NMHC Peak Area:	196117	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	17.31	0.989
as found 2nd point	4960	40.1	8.56	8.65	0.989
as found 3rd point	4980	20.0	4.27	4.35	0.982
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	17.13	17.13	0.999
second point	4960	40.1	8.56	8.57	0.999
third point	4980	20.0	4.27	4.35	0.982
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	17.13	16.95	1.011
				Average Correction Factor	0.994

Baseline Corr AF:	17.31	Prev response	17.12	*% change	1.1%
Baseline Corr 2nd AF:	8.7	AF Slope:	1.010198	AF Intercept:	0.012422
Baseline Corr 3rd AF:	4.3	AF Correlation:	0.999996	* = > +/-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	9.36	0.976
as found 2nd point	4960	40.1	4.57	4.67	0.978
as found 3rd point	4980	20.0	2.28	2.36	0.968
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	9.14	9.13	1.001
second point	4960	40.1	4.57	4.58	0.999
third point	4980	20.0	2.28	2.36	0.968
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	9.14	9.03	1.012
				Average Correction Factor	0.989
Baseline Corr AF:	9.36	Prev response	9.14	*% change	2.4%
Baseline Corr 2nd AF:	4.7	AF Slope:	1.023526	AF Intercept:	0.006684
Baseline Corr 3rd AF:	2.4	AF Correlation:	0.999992	* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	7.99	7.95	1.005
as found 2nd point	4960	40.1	3.99	3.98	1.004
as found 3rd point	4980	20.0	1.99	1.99	0.999
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	7.99	8.00	0.998
second point	4960	40.1	3.99	3.99	1.001
third point	4980	20.0	1.99	1.99	0.999
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	7.99	7.92	1.009
				Average Correction Factor	0.999
Baseline Corr AF:	7.95	Prev response	7.99	*% change	-0.6%
Baseline Corr 2nd AF:	3.98	AF Slope:	0.994544	AF Intercept:	0.006137
Baseline Corr 3rd AF:	1.99	AF Correlation:	0.999997	* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999155	0.998993
THC Cal Offset:	0.013380	0.030589
CH4 Cal Slope:	1.000338	1.001541
CH4 Cal Offset:	0.001151	-0.002053
NMHC Cal Slope:	0.998171	0.996416
NMHC Cal Offset:	0.013029	0.033041

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

Calibration Performed By: Denny Ray Estador and Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

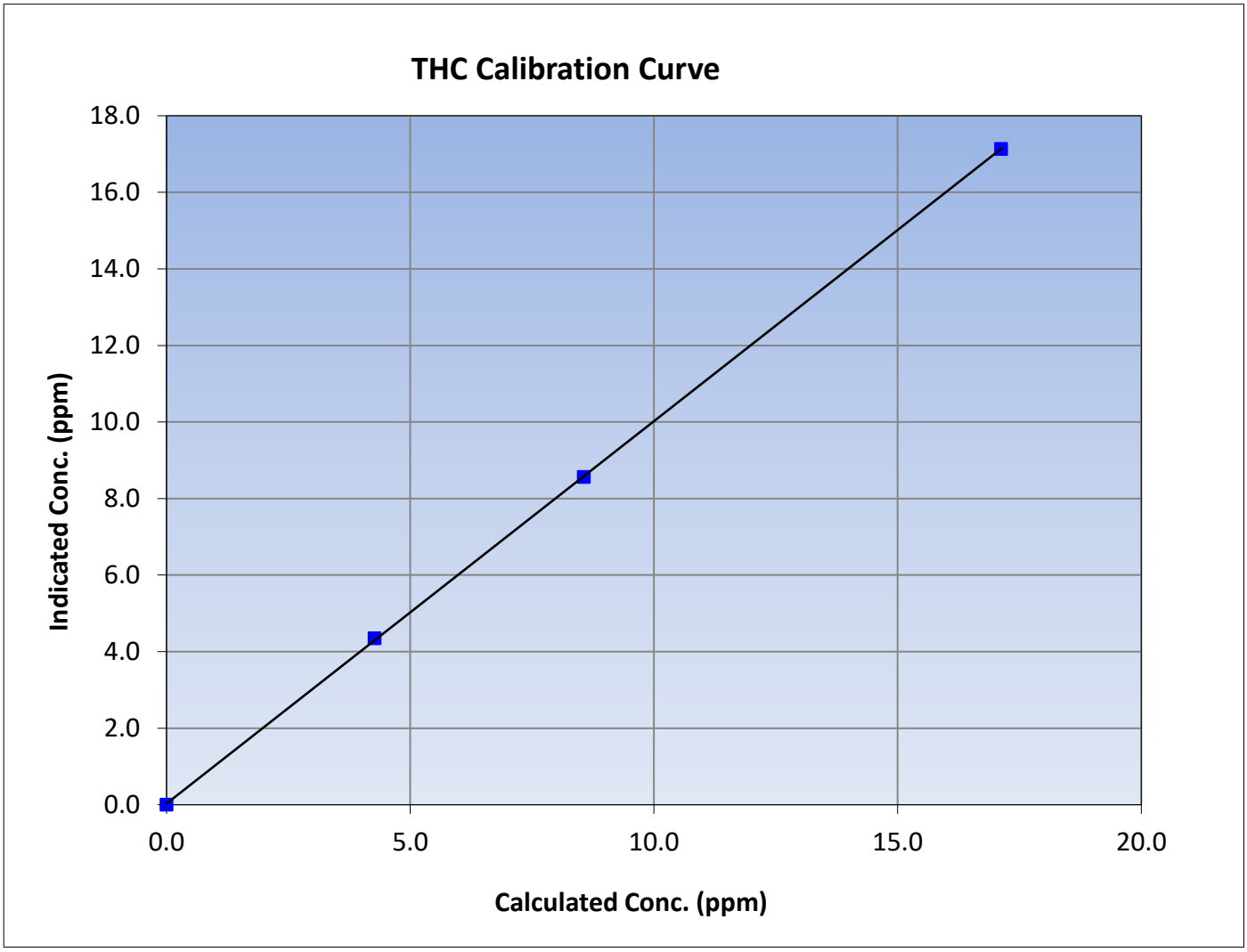
Version-06-2022

Station Information

Calibration Date:	February 3, 2023	Previous Calibration:	January 4, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	12:08	End Time (MST):	17:16
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	0.999975	*≥0.995*
17.13	17.13	0.9995			
8.56	8.57	0.9994	Slope	0.998993	*0.90 - 1.10*
4.27	4.35	0.9820			
			Intercept	0.030589	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

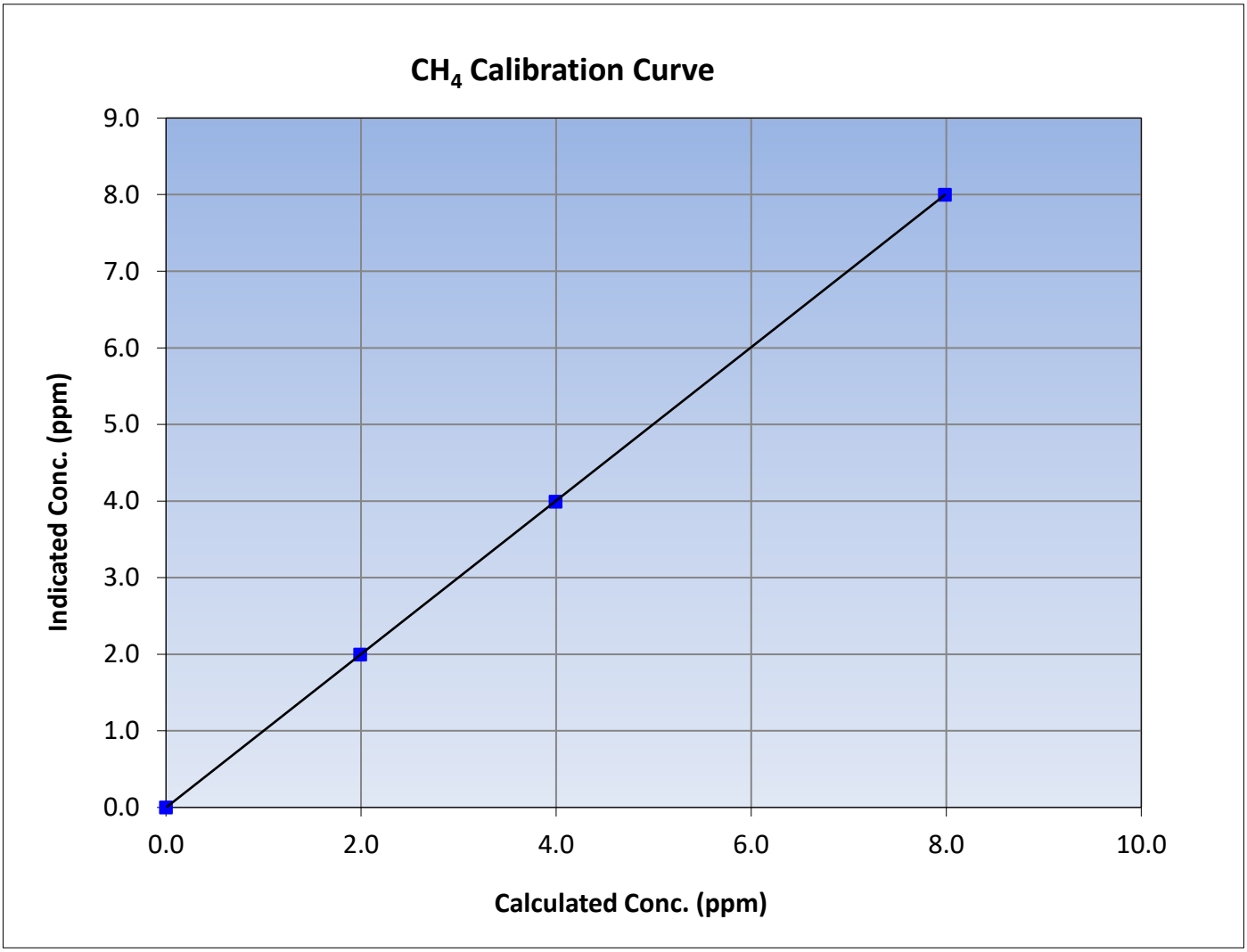
Version-06-2022

Station Information

Calibration Date:	February 3, 2023	Previous Calibration:	January 4, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	12:08	End Time (MST):	17:16
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	0.999999	*≥0.995*
7.99	8.00	0.9984			
3.99	3.99	1.0005	Slope	1.001541	*0.90 - 1.10*
1.99	1.99	0.9988			
			Intercept	-0.002053	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

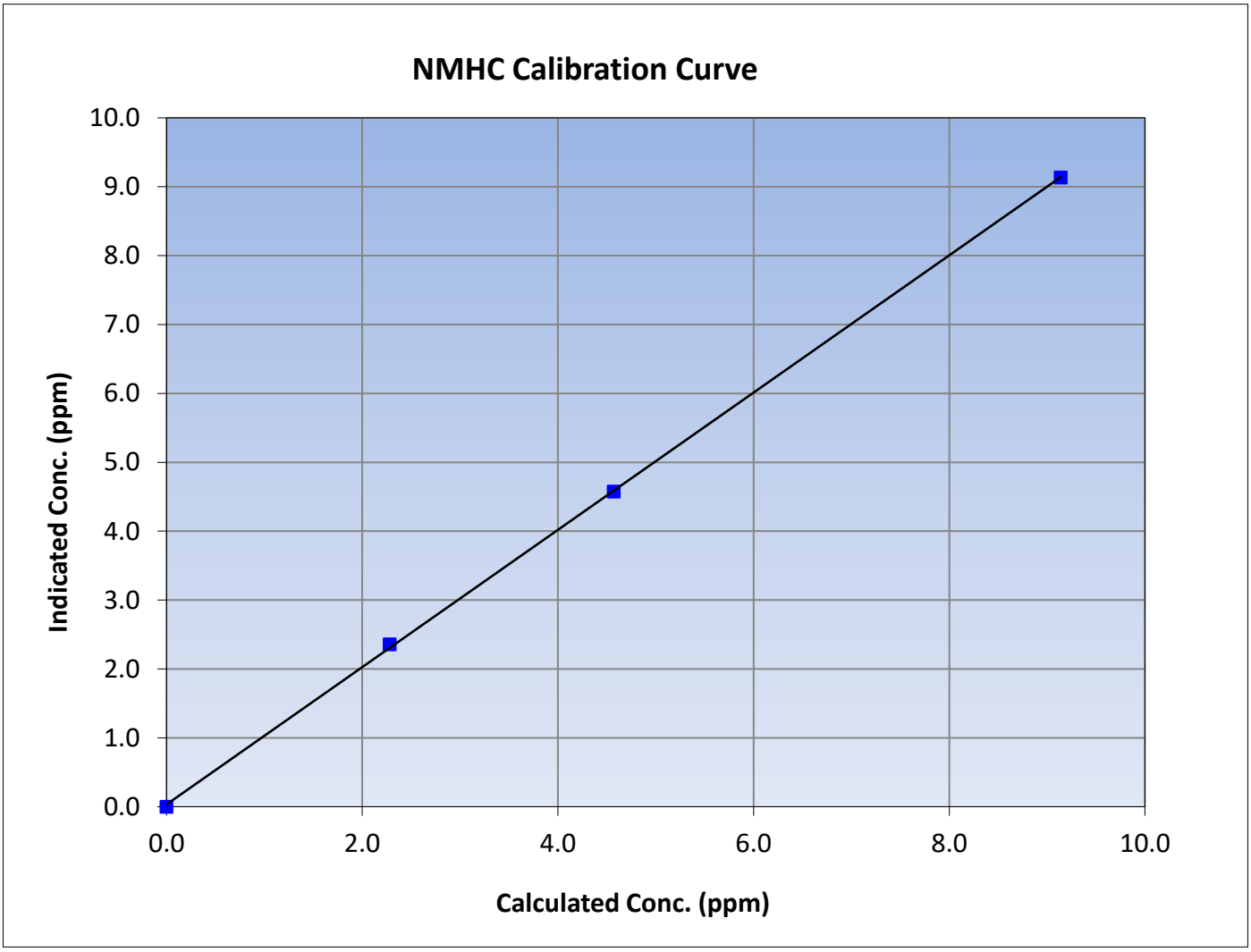
Version-06-2022

Station Information

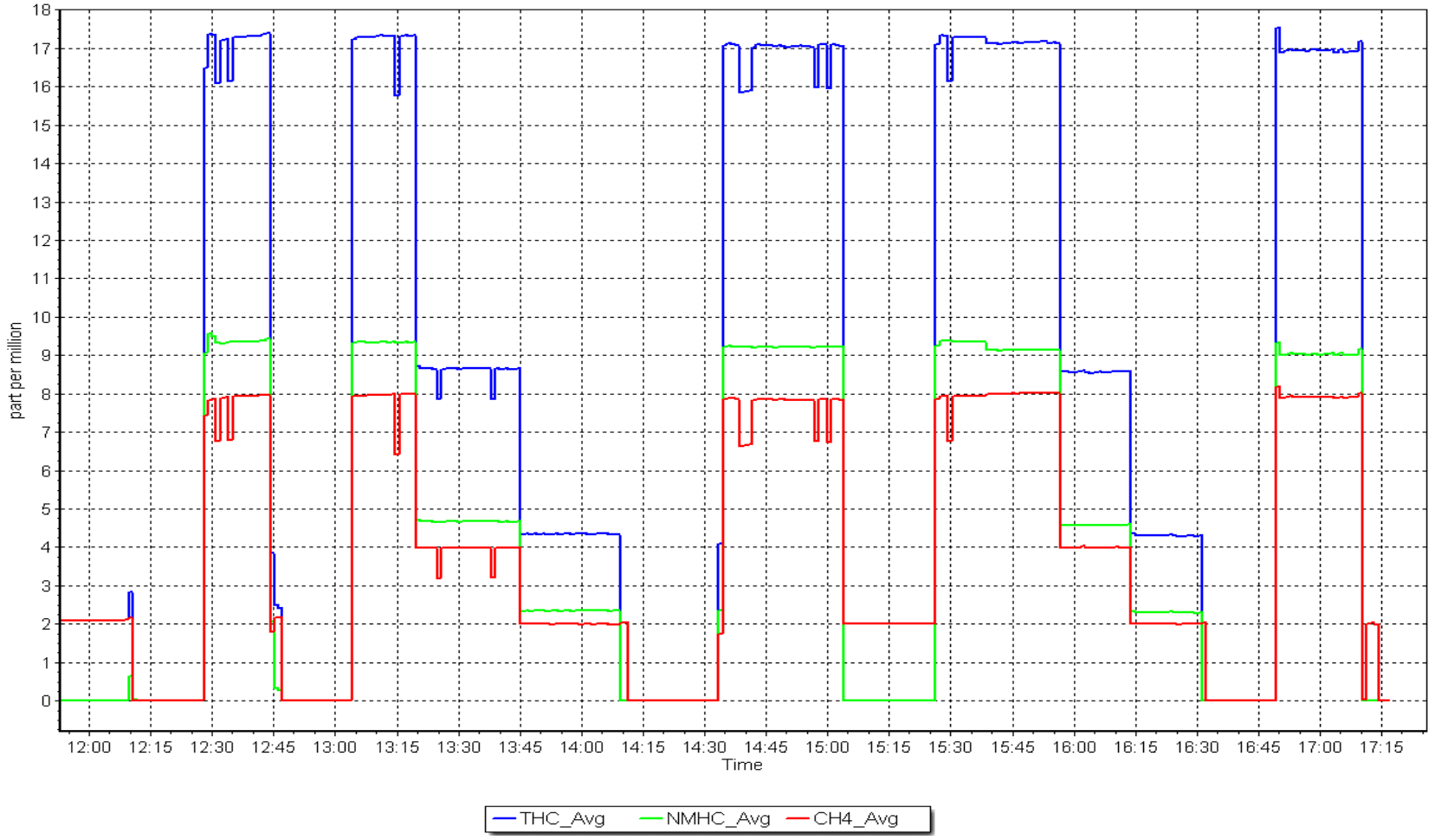
Calibration Date:	February 3, 2023	Previous Calibration:	January 4, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	12:08	End Time (MST):	17:16
Analyzer make:	Thermo 55i	Analyzer serial #:	118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999915	*≥0.995*
9.14	9.13	1.0008			
4.57	4.58	0.9986	Slope	0.996416	*0.90 - 1.10*
2.28	2.36	0.9678			
			Intercept	0.033041	*+/-0.5*



NMHC Calibration Plot Date: February 3, 2023 Location: Conklin



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	February 24, 2023	Last Cal Date:	January 17, 2023
Start time (MST):	9:10	End time (MST):	13:05
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:	11.7	11.6
NOX coeff or slope:	1.001	1.001	NOX bkgnd or offset:	11.9	11.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	226.7	224.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001997	1.004927
NO_X Cal Offset:	1.704503	1.765059
NO Cal Slope:	0.998723	1.004393
NO Cal Offset:	1.321276	0.961963
NO_2 Cal Slope:	0.999769	1.001583
NO_2 Cal Offset:	-0.317822	-0.384496

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
as found span	4921	79.4	811.2	800.1	11.1	818.3	804.8	13.5	0.9914	0.9942
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	----	----
high point	4921	79.4	811.2	800.1	11.1	816.2	804.1	12.1	0.9939	0.9951
second point	4960	39.7	405.7	400.1	5.6	410.1	403.4	6.7	0.9892	0.9919
third point	4980	19.8	202.3	199.6	2.8	207.0	202.3	4.7	0.9774	0.9864
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	381.6	429.6	814.0	388.4	425.6	0.9966	0.9826
								Average Correction Factor	0.9869	0.9911

Corrected As found NO_X = 818.6 ppb NO = 805.0 ppb

Previous Response NO_X = 814.6 ppb NO = 800.4 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 = 0.5%

*Percent Change NO = 0.6%

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)	800.8	382.3	429.6	430.0	0.9991	100.1%
2nd GPT point (200 ppb O3)	800.8	599.8	212.1	212.1	1.0001	100.0%
3rd GPT point (100 ppb O3)	800.8	700.3	111.6	111.0	1.0055	99.4%
				Average Correction Factor	1.0016	99.8%

Notes: No adjustments required.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

NO_X Calibration Summary

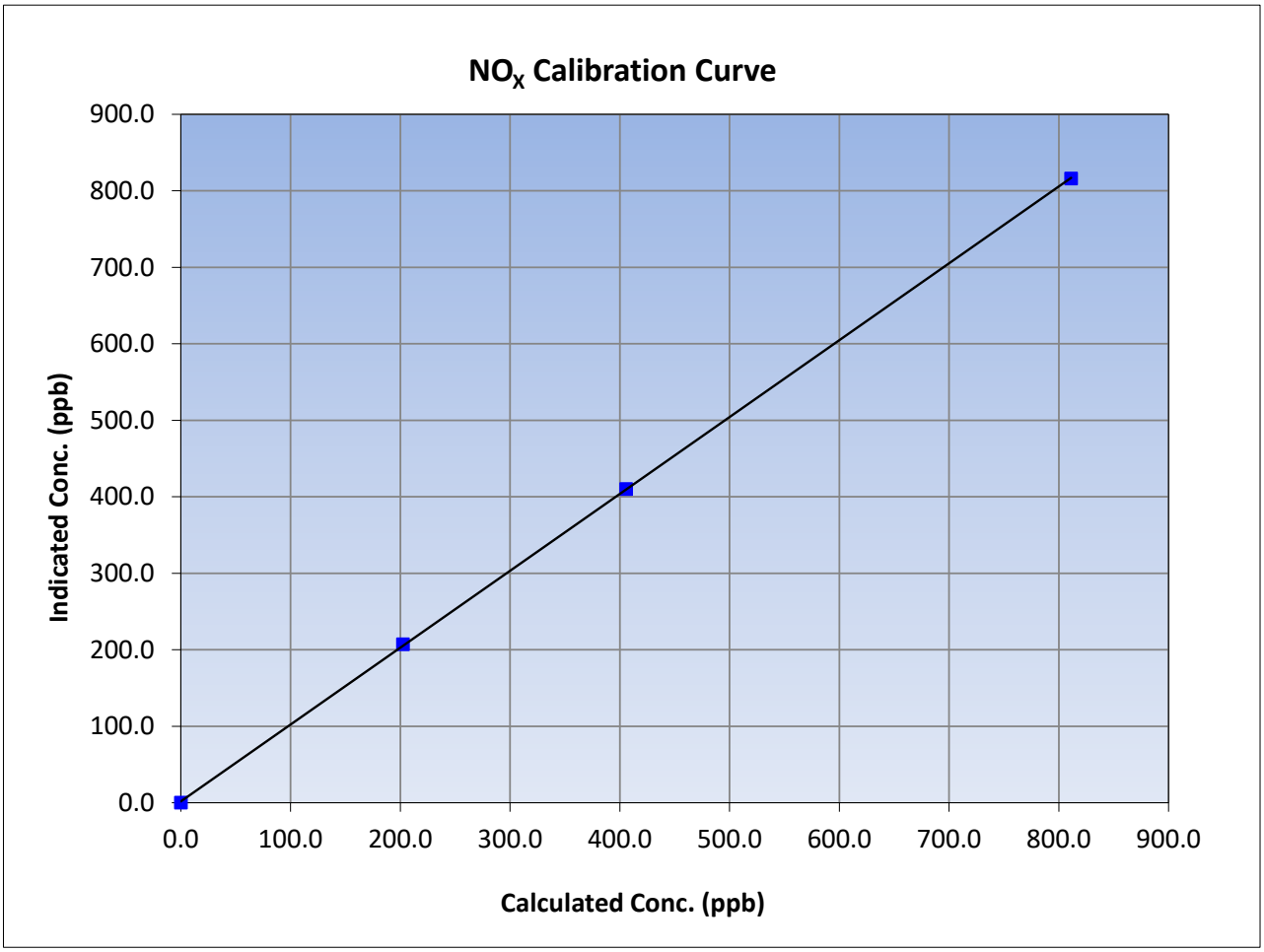
Version-04-2020

Station Information

Calibration Date:	February 24, 2023	Previous Calibration:	January 17, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:10	End Time (MST):	13:05
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	0.999978	≥0.995
811.2	816.2	0.9939			
405.7	410.1	0.9892	Slope	1.004927	0.90 - 1.10
202.3	207.0	0.9774			
			Intercept	1.765059	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

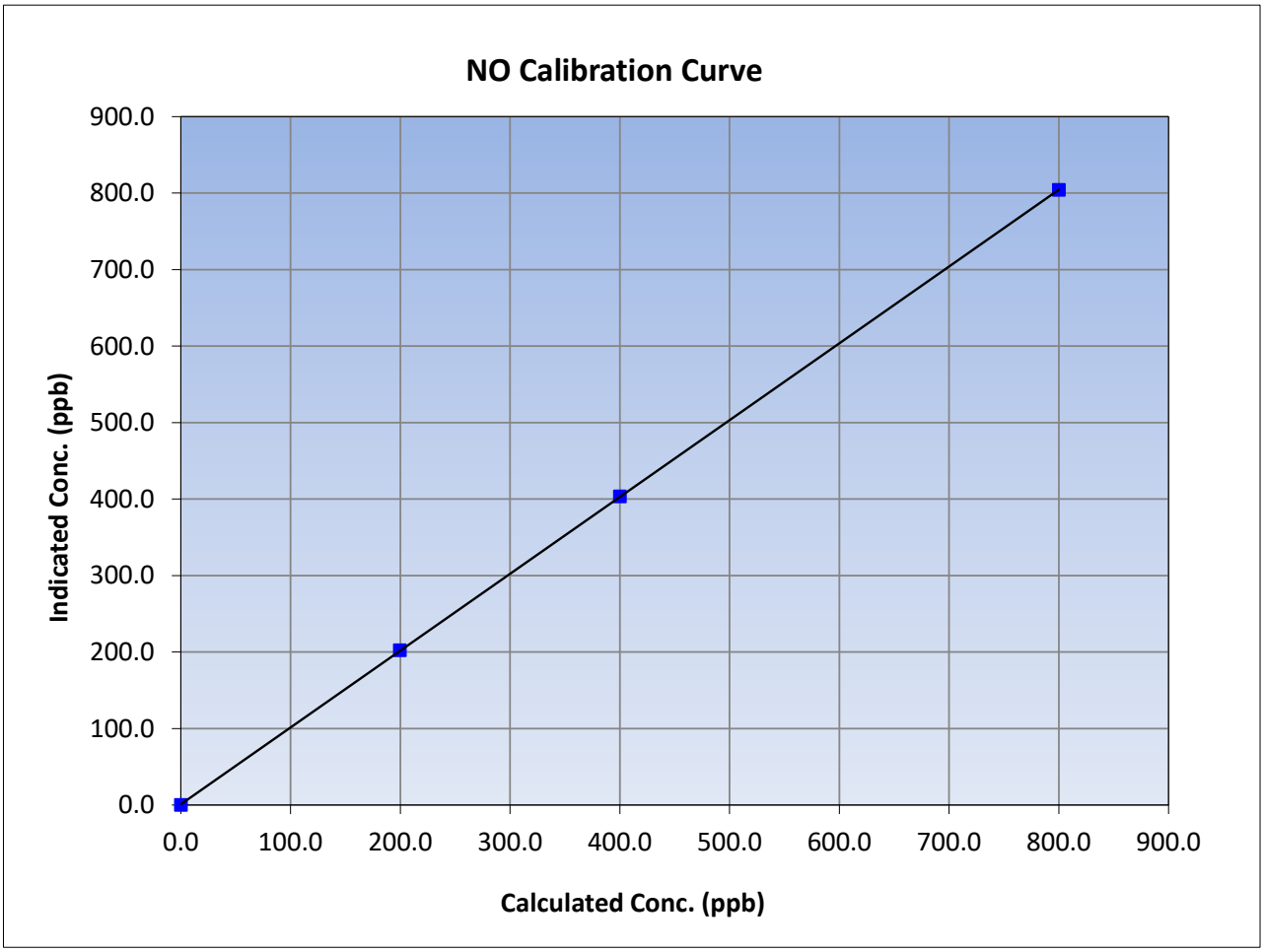
Version-04-2020

Station Information

Calibration Date:	February 24, 2023	Previous Calibration:	January 17, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:10	End Time (MST):	13:05
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	0.999993	≥0.995
800.1	804.1	0.9951			
400.1	403.4	0.9919	Slope	1.004393	0.90 - 1.10
199.6	202.3	0.9864			
			Intercept	0.961963	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

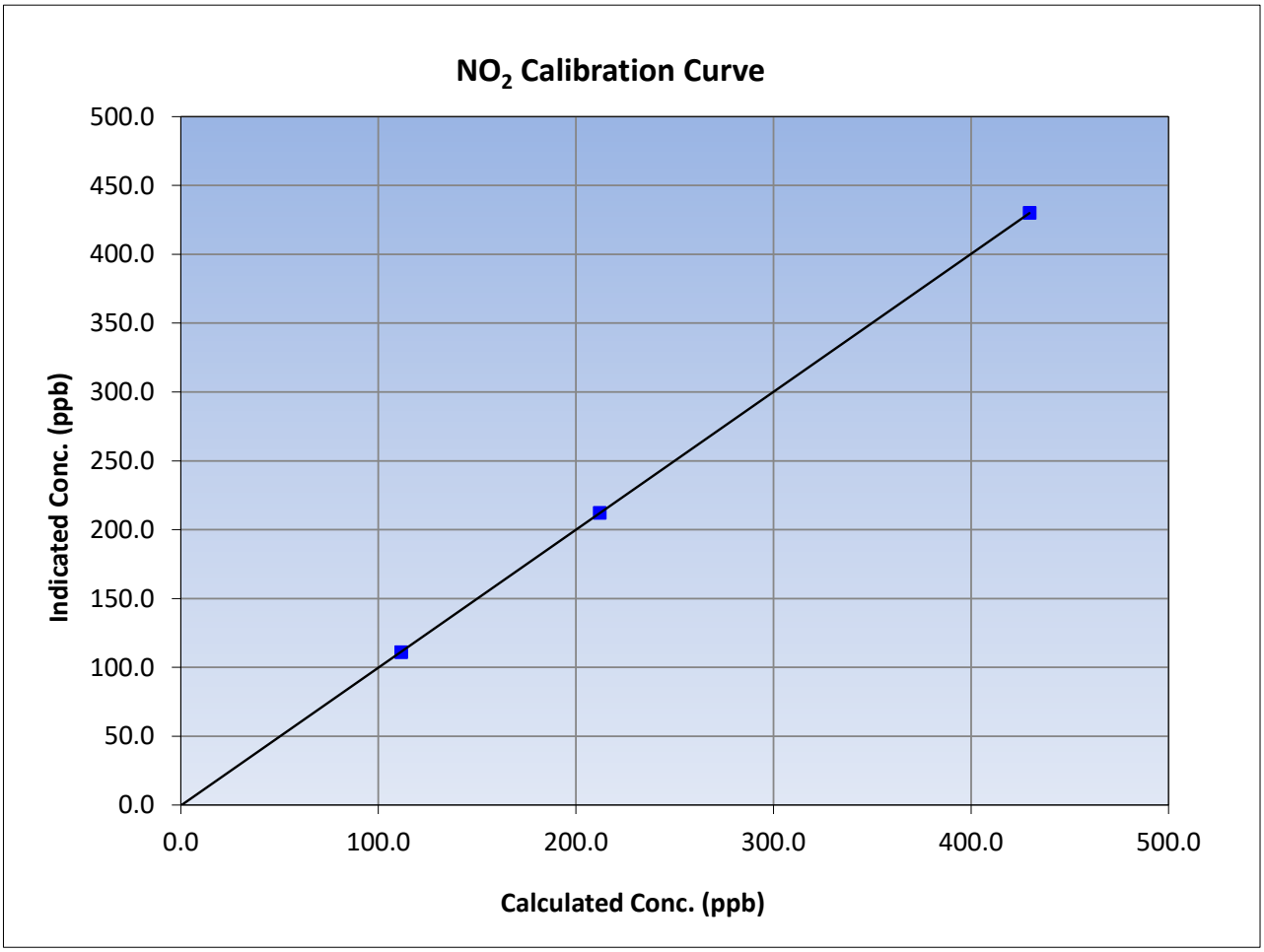
Version-04-2020

Station Information

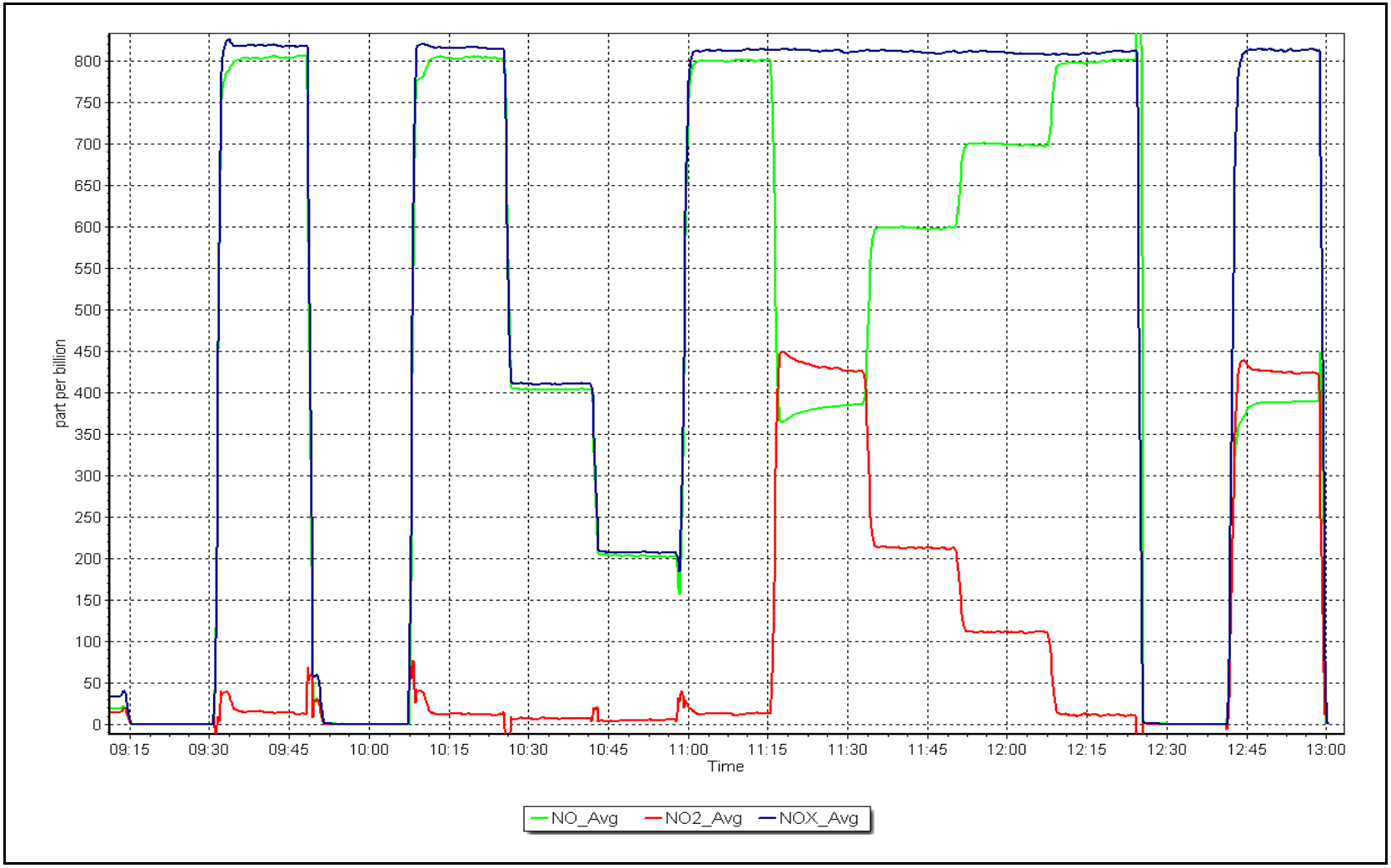
Calibration Date:	February 24, 2023	Previous Calibration:	January 17, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:10	End Time (MST):	13:05
Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999997	≥0.995
429.6	430.0	0.9991			
212.1	212.1	1.0001	Slope	1.001583	0.90 - 1.10
111.6	111.0	1.0055			
			Intercept	-0.384496	+/-20



NO_X Calibration Plot Date: February 24, 2023 Location: Conklin



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	February 3, 2023	Last Cal Date:	January 20, 2023
Start time (MST):	8:56	End time (MST):	12:15
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:	0.997857	1.001543	Backgd or Offset:	-0.3	-0.7
Calibration intercept:	0.200000	0.380000	Coeff or Slope:	1.011	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	-0.8	----
as found span	5000	935.6	400.0	398.7	1.003
as found 2nd point	5000	799.4	200.0	200.0	1.000
as found 3rd point	5000	701.9	100.0	100.2	0.998
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	933.0	400.0	400.7	0.998
second point	5000	799.4	200.0	201.3	0.994
third point	5000	701.9	100.0	100.5	0.995
as left zero					
as left span					
				Average Correction Factor	0.996

Baseline Corr As found:	399.5	Previous response	399.3	*% change	0.0%
Baseline Corr 2nd AF pt:	200.8	AF Slope:	0.998086	AF Intercept:	-0.140000
Baseline Corr 3rd AF pt:	101.0	AF Correlation:	0.999987		

* = > +/-5% change initiates investigation

Notes: Changed the pump after the MPAFs. Adjusted both zero and span. No as lefts.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

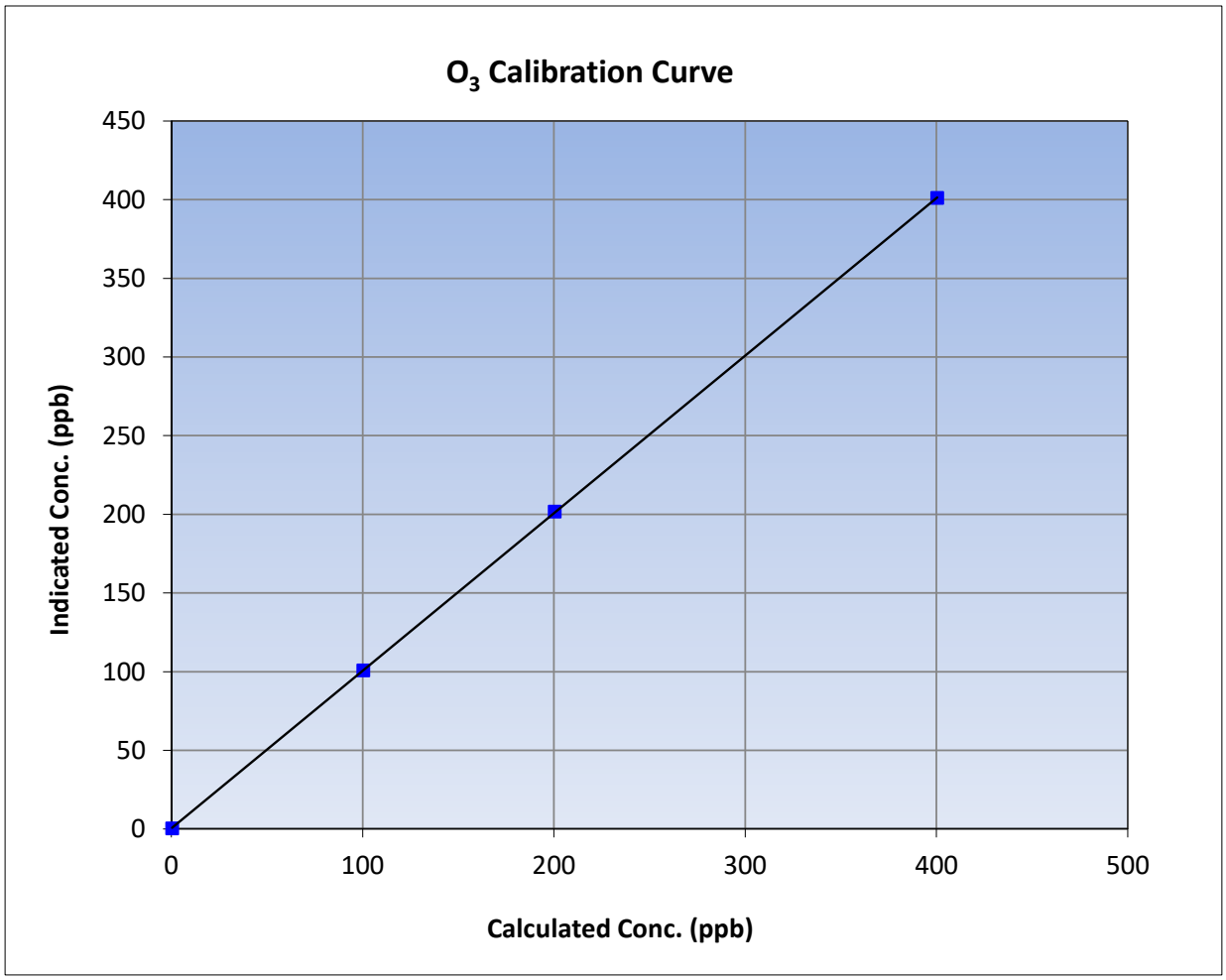
Station Information

Calibration Date:	February 3, 2023	Previous Calibration:	January 20, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	8:56	End Time (MST):	12:15
Analyzer make:	Thermo 49i	Analyzer serial #:	1501663734

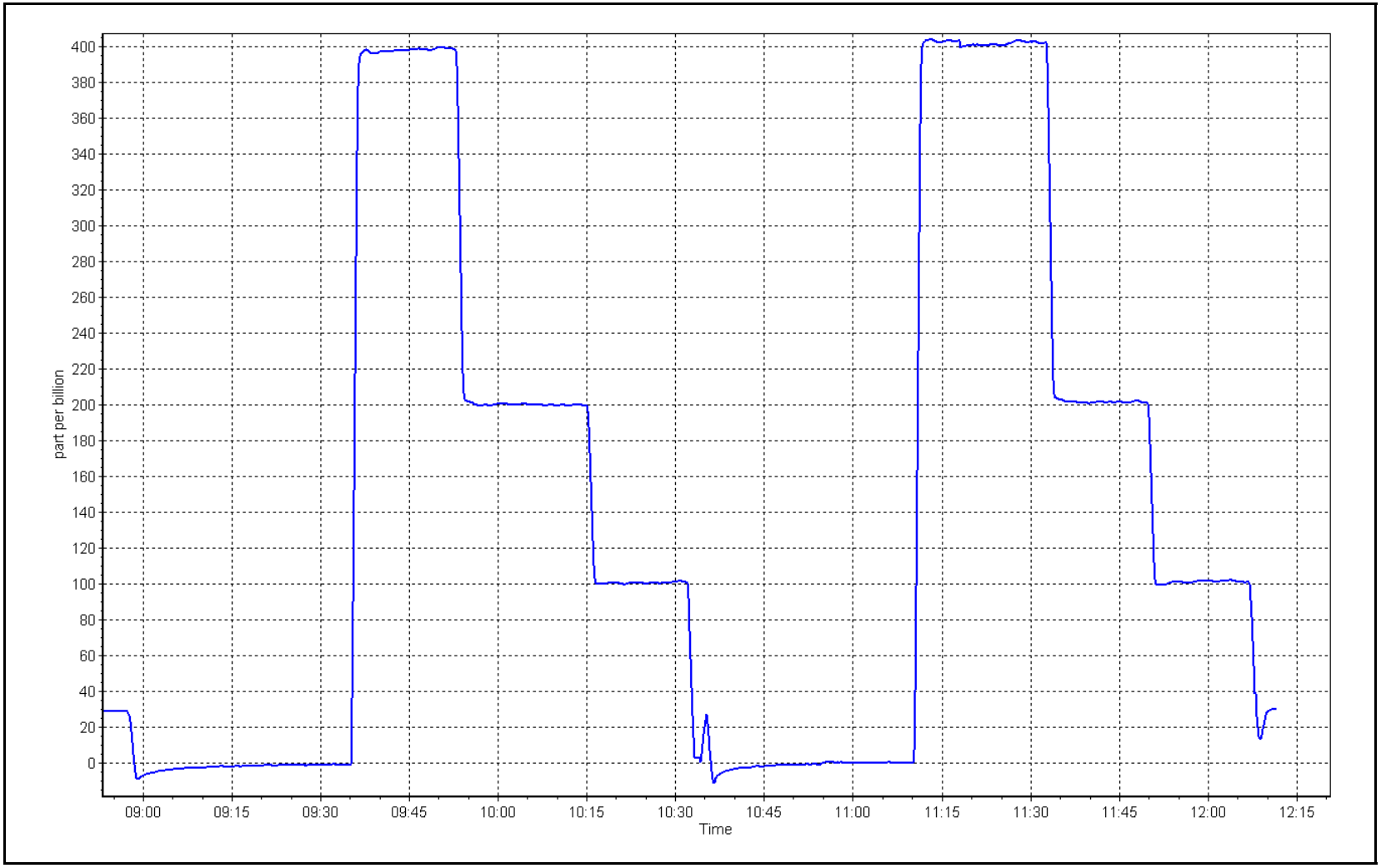
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
400.0	400.7	0.9983
200.0	201.3	0.9935
100.0	100.5	0.9950

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999994	*≥0.995*
Slope	1.001543	*0.90 - 1.10*
Intercept	0.380000	*+/- 5*



O_3 Calibration Plot Date: February 3, 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:	February 8, 2023	Last Cal Date:	January 4, 2023
Start time (MST):	10:43	End time (MST):	11:00
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)	-2.5	-2.4	-2.5	☐	+/- 2 °C
P (mmHg)	713.7	709.5	713.7	☐	+/- 10 mmHg
flow (LPM)	5	5.07	5	☐	+/- 0.25 LPM

Leak Test: Date of check: February 8, 2023 Last Cal Date: January 4, 2023

PM w/o HEPA: 2.6 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: _____

Disposable Filter Changed: _____

Annual Maintenance

Date Sample Tube Cleaned: _____

Date RH/T Sensor Cleaned: _____

Notes: No adjustments made. Inspect inlet head; relatively clean.

Calibration by: Denny Ray Estador

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS22
JANVIER
FEBRUARY 2023

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

March 31, 2023

CALS_394

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	February 22, 2023	Last Cal Date:	January 17, 2023
Start time (MST):	12:33	End time (MST):	16:31
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:	1.000335	1.000663	Backgd or Offset:	19.2	21.4
Calibration intercept:	0.604356	0.364554	Coeff or Slope:	1.007	1.031

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	2.0	----
as found span	4920	79.8	799.8	806.7	0.991
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4920	79.8	799.8	800.2	0.999
second point	4960	39.9	399.9	401.8	0.995
third point	4980	20.0	200.4	200.3	1.001
as left zero	5000	0.0	0.0	0.2	----
as left span	4920	79.8	799.8	802.9	0.996
				Average Correction Factor	0.998

Baseline Corr As found:	804.70	Previous response	800.66	*% 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: Inlet filter changed after as founds. Adjusted both zero and span.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

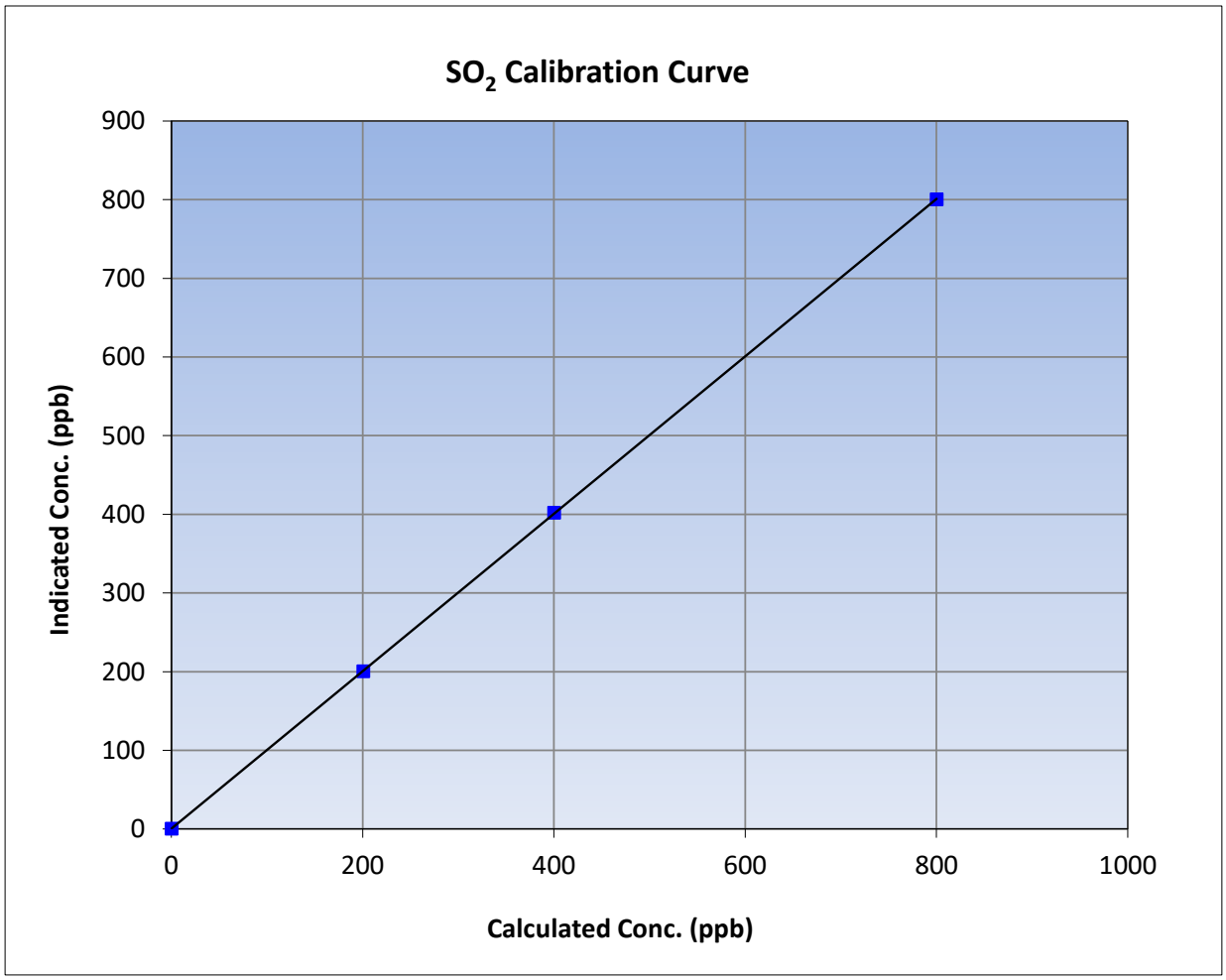
Station Information

Calibration Date:	February 22, 2023	Previous Calibration:	January 17, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	12:33	End Time (MST):	16:31
Analyzer make:	Thermo 43i	Analyzer serial #:	1152430006

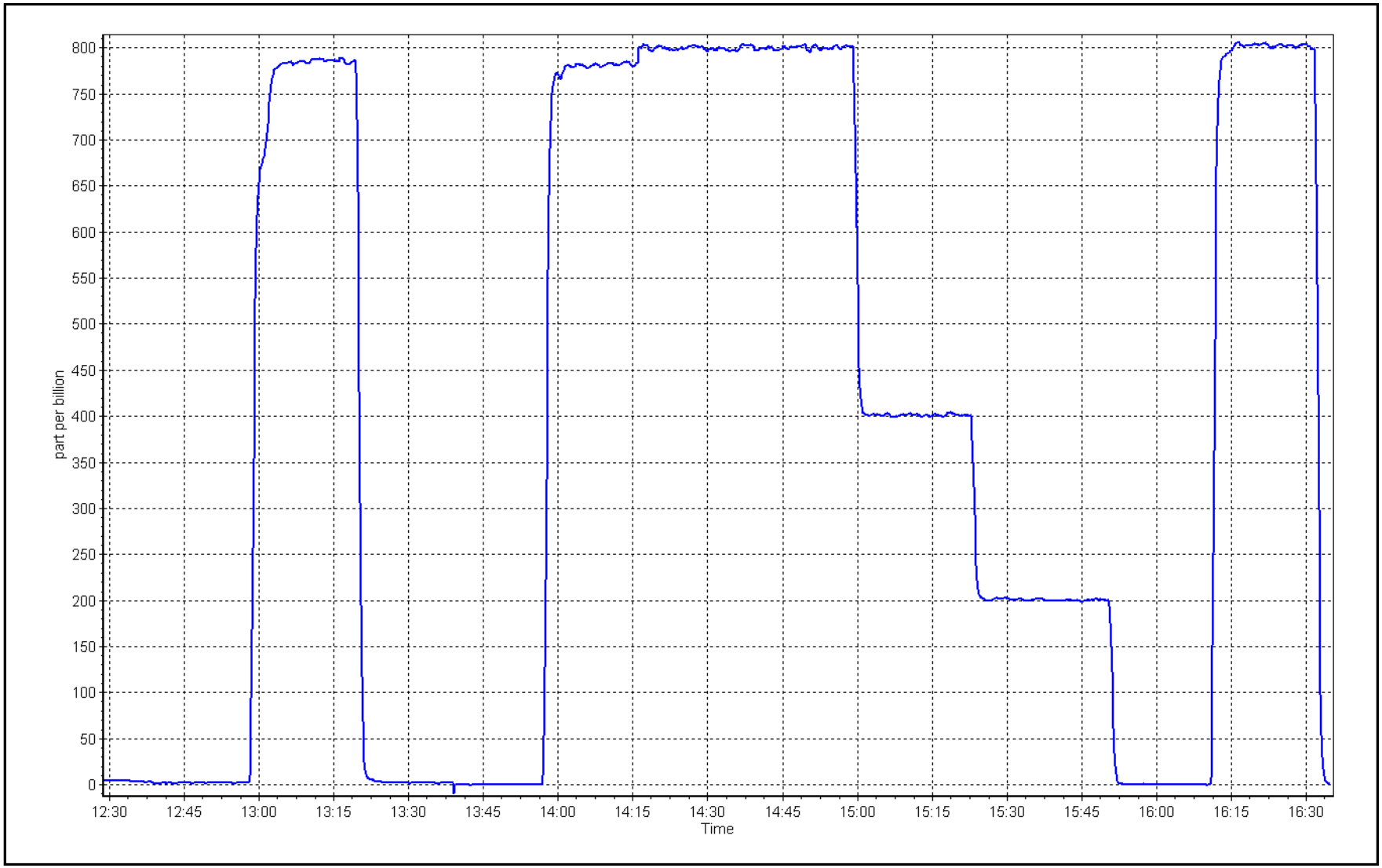
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
799.8	800.2	0.9995
399.9	401.8	0.9952
200.4	200.3	1.0007

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999993	*≥0.995*
Slope	1.000663	*0.90 - 1.10*
Intercept	0.364554	*+/-30*



SO2 Calibration Plot Date: February 22, 2023 Location: Janvier



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Janvier	Station number:	AMS22
Calibration Date:	February 24, 2023	Last Cal Date:	January 20, 2023
Start time (MST):	12:12	End time (MST):	17:09
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:	1.005365	1.002650	Backgd or Offset:	3.42	3.56
Calibration intercept:	0.000881	0.120931	Coeff or Slope:	1.239	1.239

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.3	----
as found span	4920	79.5	80.0	80.2	1.001
as found 2nd point	4960	39.8	40.0	40.3	1.001
as found 3rd point	4980	19.9	20.0	19.0	1.071
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4920	79.5	80.0	80.3	0.996
second point	4960	39.8	40.0	40.4	0.991
third point	4980	19.9	20.0	20.0	1.001
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	79.5	80.0	80.4	0.995
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:	79.9	Prev response:	80.41	*% change:	-0.6%
Baseline Corr 2nd AF pt:	40.0	AF Slope:	1.004505	AF Intercept:	-0.219019
Baseline Corr 3rd AF pt:	18.7	AF Correlation:	0.999672		

* = > +/-5% change initiates investigation

Notes: Changed out the inlet filter after as founds. Scrubber check passed. Increased the converter temperature to 860C. Adjusted zero only.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TRS Calibration Summary

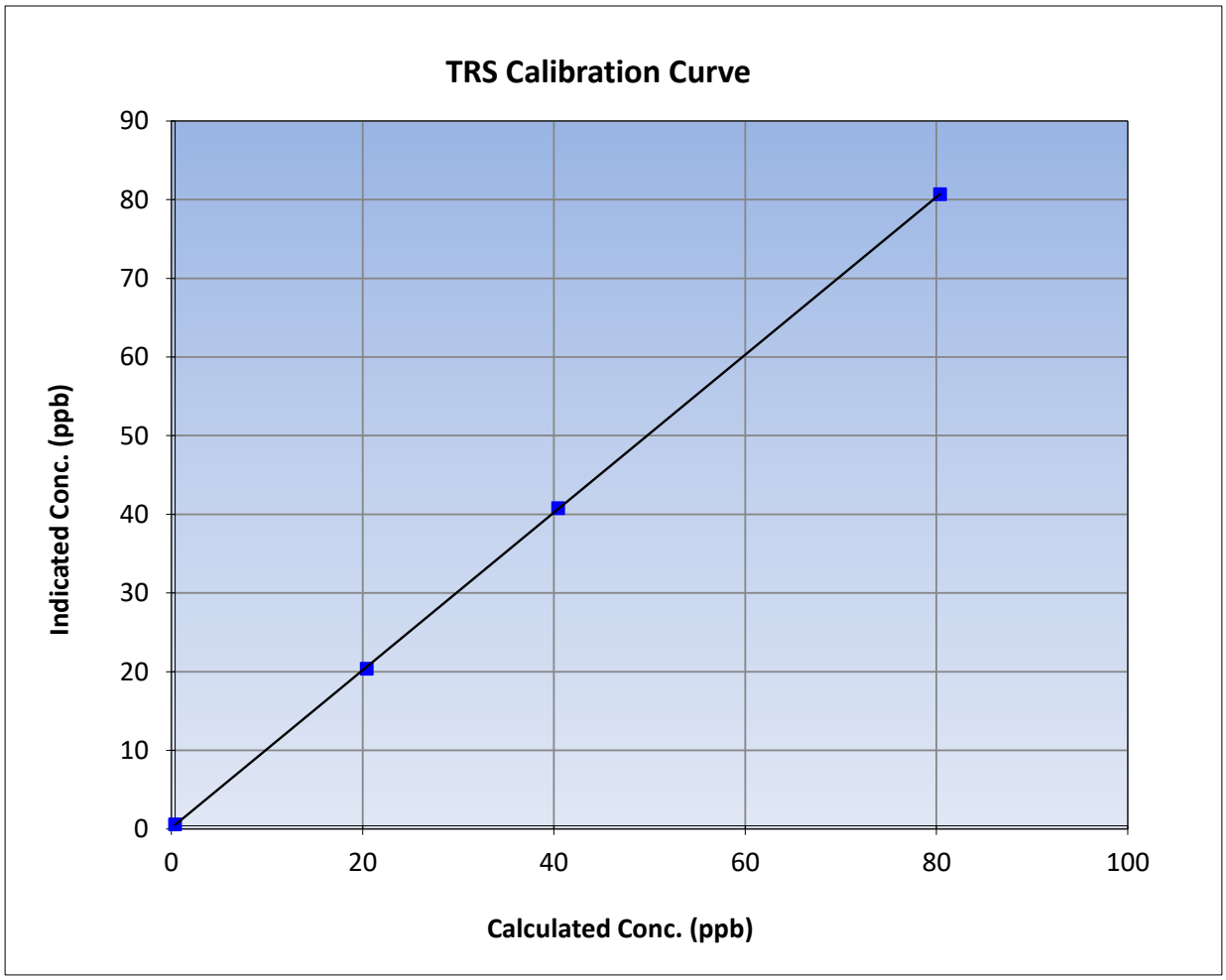
Version-11-2021

Station Information

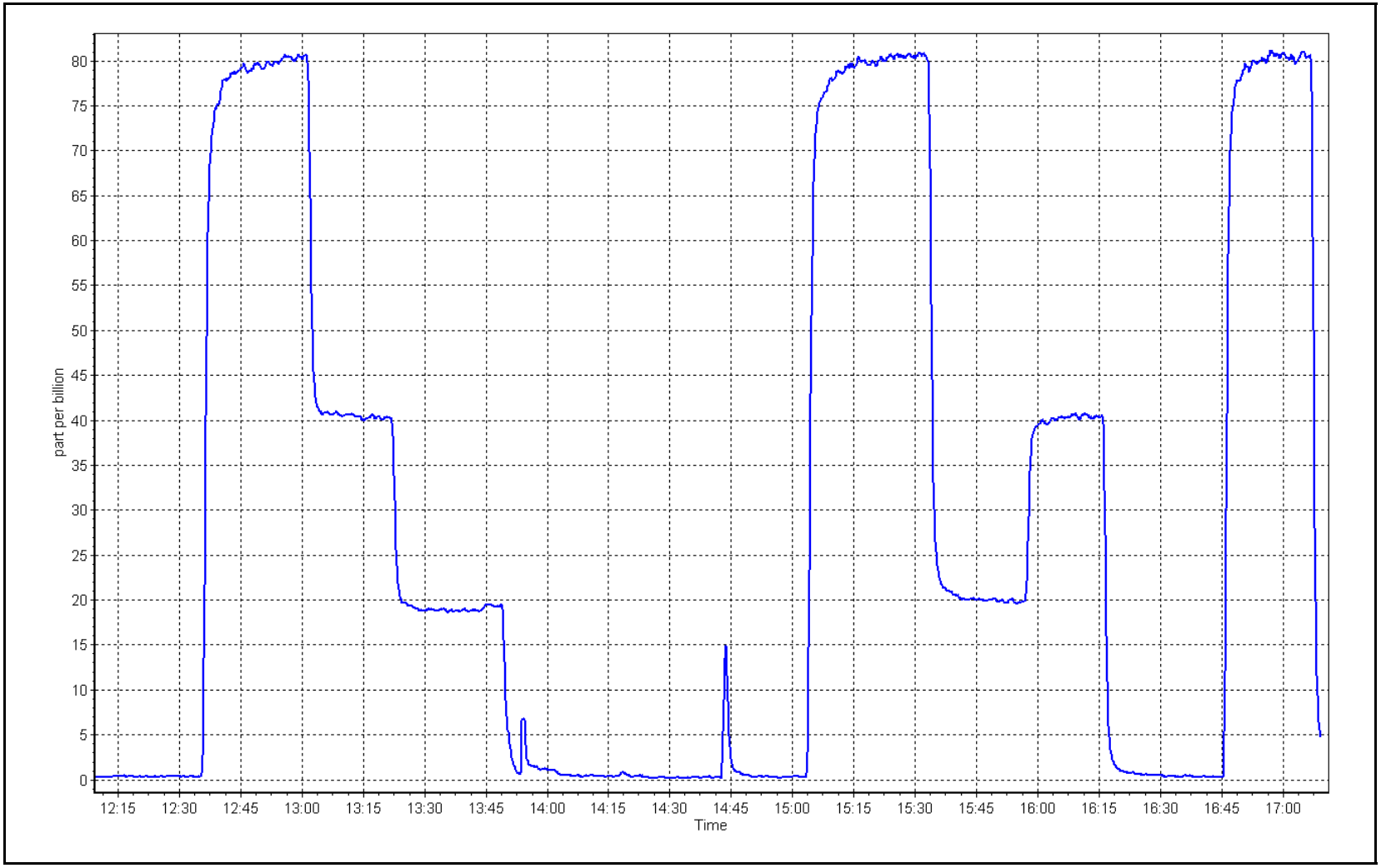
Calibration Date:	February 24, 2023	Previous Calibration:	January 20, 2023
Station Name:	Janvier	Station Number:	AMS22
Start Time (MST):	12:12	End Time (MST):	17:09
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1151680031

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.2	----	Correlation Coefficient	0.999982	*≥0.995*
80.0	80.3	0.9961			
40.0	40.4	0.9911	Slope	1.002650	*0.90 - 1.10*
20.0	20.0	1.0010			
			Intercept	0.120931	*+/-3*



TRS Calibration Plot Date: February 24, 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:	February 22, 2023	Last Cal Date:	January 17, 2023
Start time (MST):	12:33	End time (MST):	16:31
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	2.180E-04	NMHC SP Ratio:	4.69E-05	4.50E-05
CH4 Retention time:	13.00	13.20	NMHC Peak Area:	195272	203120

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	17.23	0.997
second point	4960	39.9	8.59	8.57	1.002
third point	4980	20.0	4.30	4.27	1.008
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	17.17	17.33	0.991
				Average Correction Factor	1.002

Baseline Corr AF:	17.43	Prev response	17.12	*% change	1.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-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	9.17	0.997
second point	4960	39.9	4.57	4.58	0.999
third point	4980	20.0	2.29	2.28	1.005
as left zero	5000	0	0.00	0.00	----
as left span	4920	79.8	9.15	9.25	0.989
				Average Correction Factor	1.001
Baseline Corr AF:	9.40	Prev response	9.10	*% change	3.1%
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	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	1.004
third point	4980	20.0	2.01	1.99	1.010
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	8.03	8.08	0.994
				Average Correction Factor	1.004
Baseline Corr AF:	8.04	Prev response	8.02	*% change	0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999594	1.003856
THC Cal Offset:	-0.041578	-0.027606
CH4 Cal Slope:	1.001935	1.004586
CH4 Cal Offset:	-0.020955	-0.017766
NMHC Cal Slope:	0.997466	1.003078
NMHC Cal Offset:	-0.020822	-0.009039

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

THC Calibration Summary

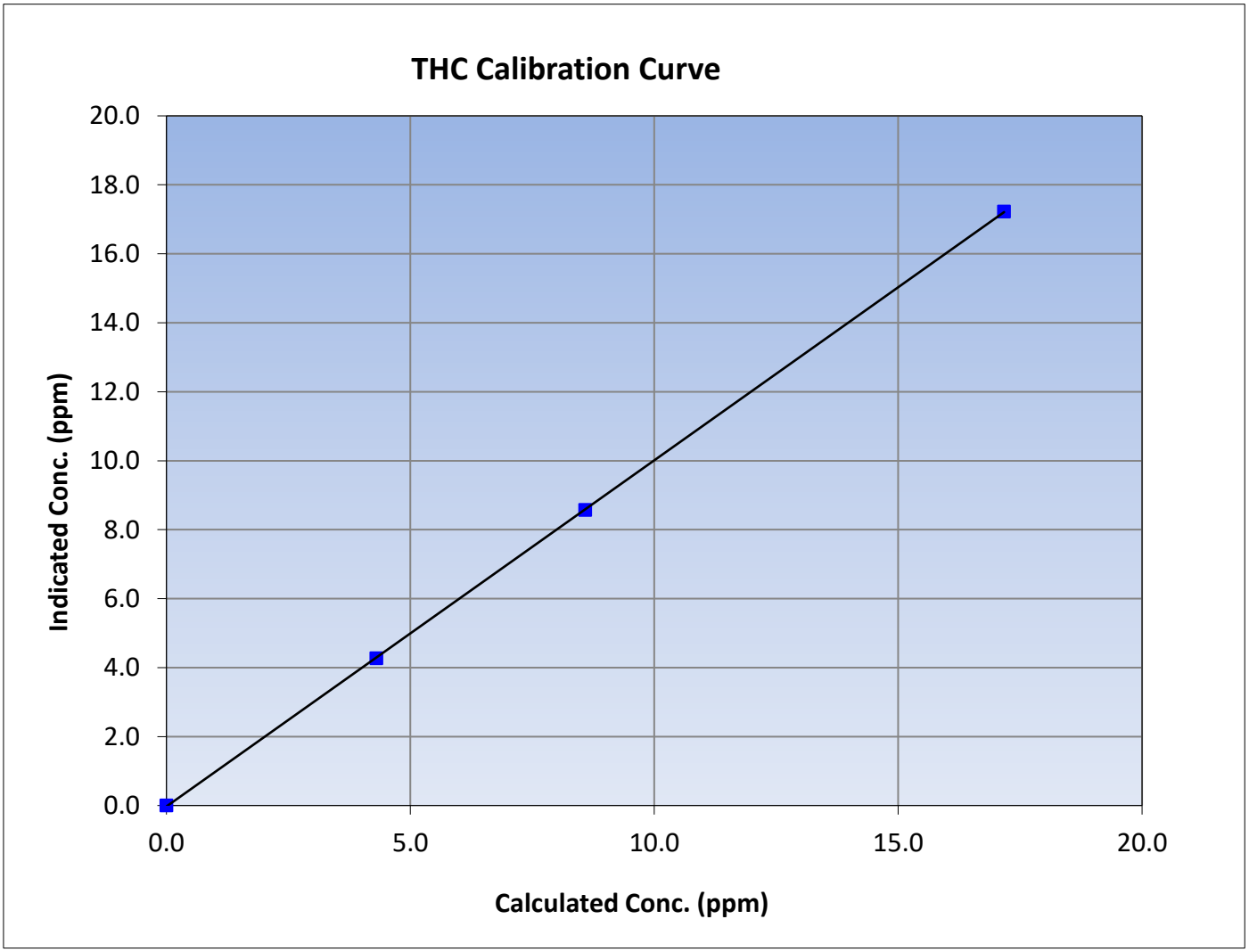
Version-01-2020

Station Information

Calibration Date:	February 22, 2023	Previous Calibration:	January 17, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	12:33	End Time (MST):	16:31
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	17.23	0.9968			
8.59	8.57	1.0018	Slope	1.003856	*0.90 - 1.10*
4.30	4.27	1.0079			
			Intercept	-0.027606	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

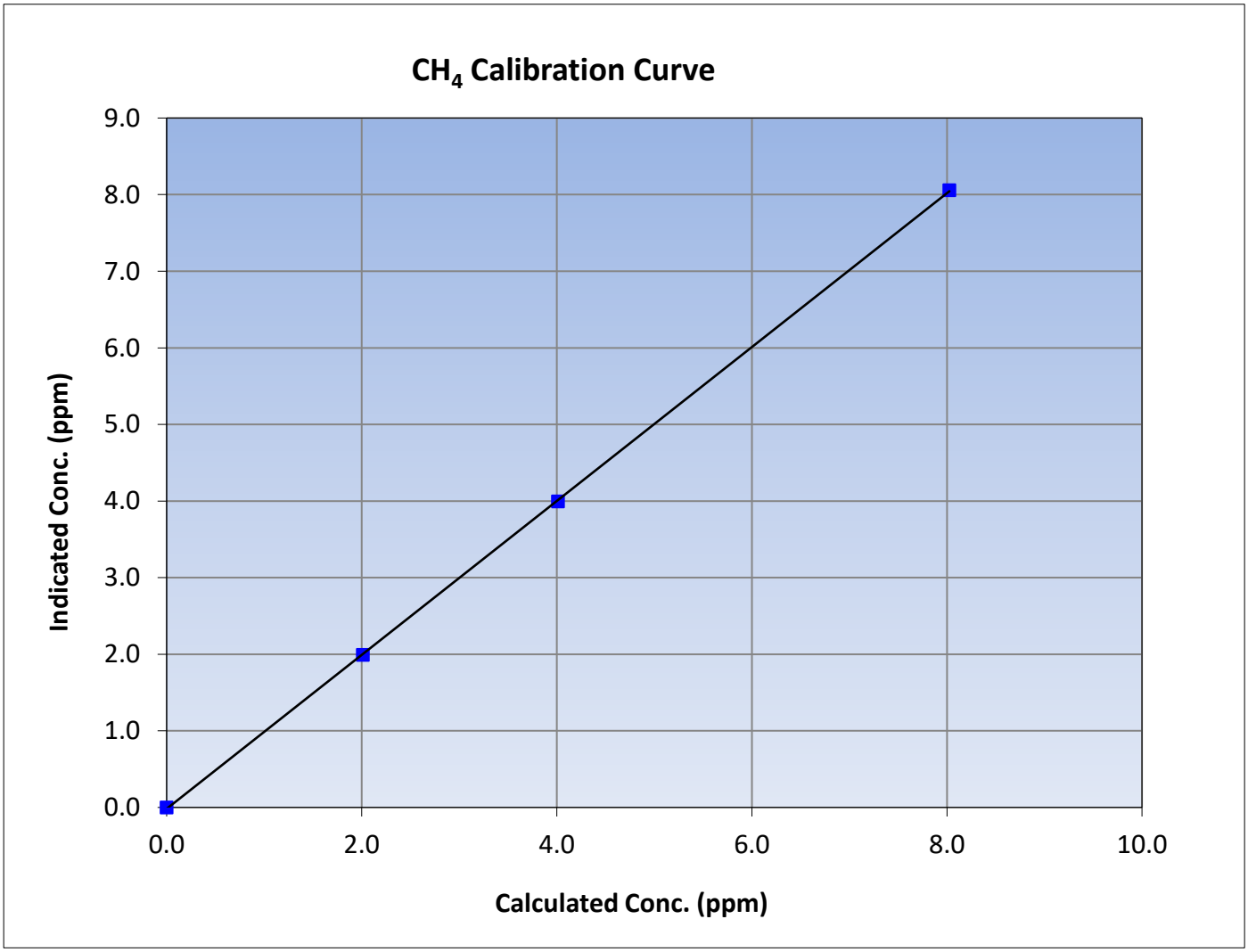
Version-01-2020

Station Information

Calibration Date:	February 22, 2023	Previous Calibration:	January 17, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	12:33	End Time (MST):	16:31
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	0.9962			
4.01	4.00	1.0044	Slope	1.004586	*0.90 - 1.10*
2.01	1.99	1.0101			
			Intercept	-0.017766	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

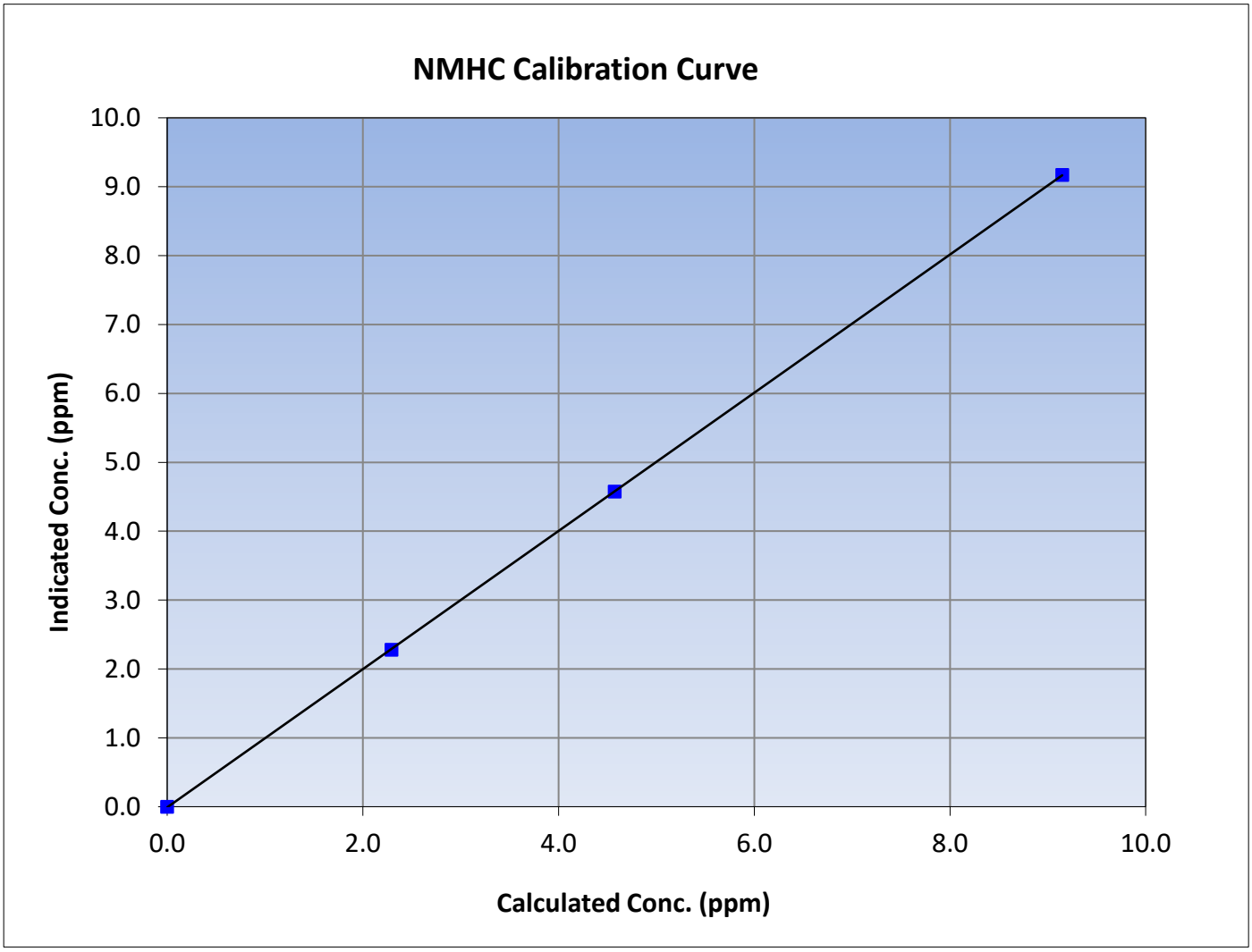
Version-01-2020

Station Information

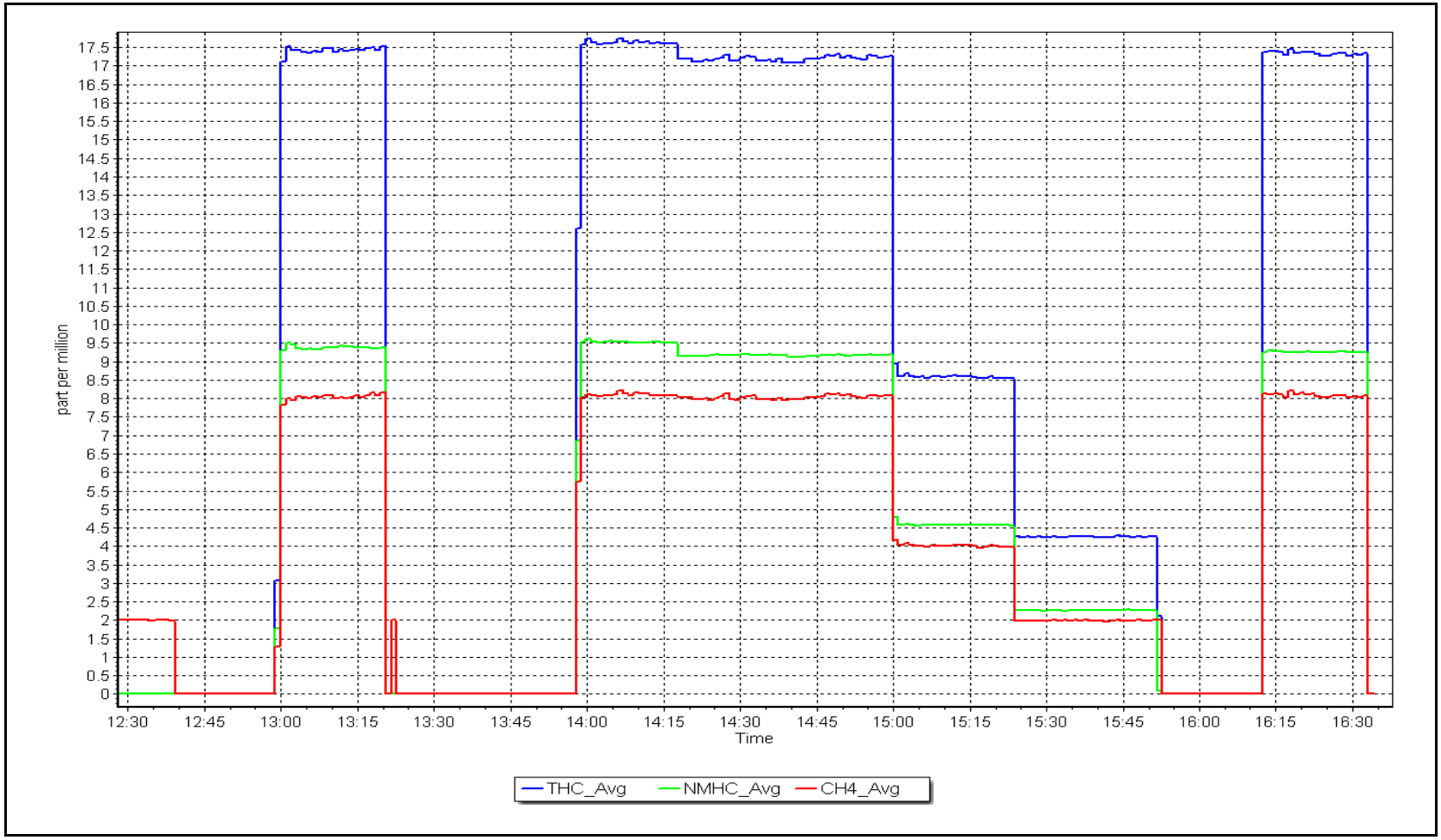
Calibration Date:	February 22, 2023	Previous Calibration:	January 17, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	12:33	End Time (MST):	16:31
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750023

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	9.17	0.9975			
4.57	4.58	0.9994	Slope	1.003078	*0.90 - 1.10*
2.29	2.28	1.0054			
			Intercept	-0.009039	*+/-0.5*



NMHC Calibration Plot Date: February 22, 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:	February 23, 2023	Last Cal Date:	January 26, 2023
Start time (MST):	12:21	End time (MST):	17:33
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:	1.015	1.019	NO bkgnd or offset:	-0.3	-0.3
NOX coeff or slope:	1.004	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:	1.004514	1.000016
NO_X Cal Offset:	-0.271695	0.328470
NO Cal Slope:	1.003357	0.999486
NO Cal Offset:	-0.891348	-0.011076
NO_2 Cal Slope:	1.001018	0.999574
NO_2 Cal Offset:	0.153243	0.324675

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.1	-0.3	----	----
as found span	4918	82.3	799.9	799.9	0.0	794.3	790.8	3.5	1.0071	1.0115
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.1	-0.2	----	----
high point	4918	82.3	799.9	799.9	0.0	799.9	799.5	0.5	1.0000	1.0005
second point	4959	41.2	400.4	400.4	0.0	401.4	400.3	1.0	0.9976	1.0004
third point	4980	20.6	200.2	200.2	0.0	200.7	199.9	0.8	0.9975	1.0015
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	395.8	404.1	797.4	402.1	395.3	1.0031	0.9844
								Average Correction Factor	0.9984	1.0008

Corrected As found	NO_X = 794.6 ppb	NO = 790.9 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-1.1%
Previous Response	NO_X = 803.2 ppb	NO = 801.7 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)	798.0	393.9	404.1	403.9	1.0005	100.0%
2nd GPT point (200 ppb O3)	798.0	599.3	198.7	199.5	0.9960	100.4%
3rd GPT point (100 ppb O3)	798.0	699.7	98.3	98.9	0.9939	100.6%
				Average Correction Factor	0.9968	100.3%

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

NO_X Calibration Summary

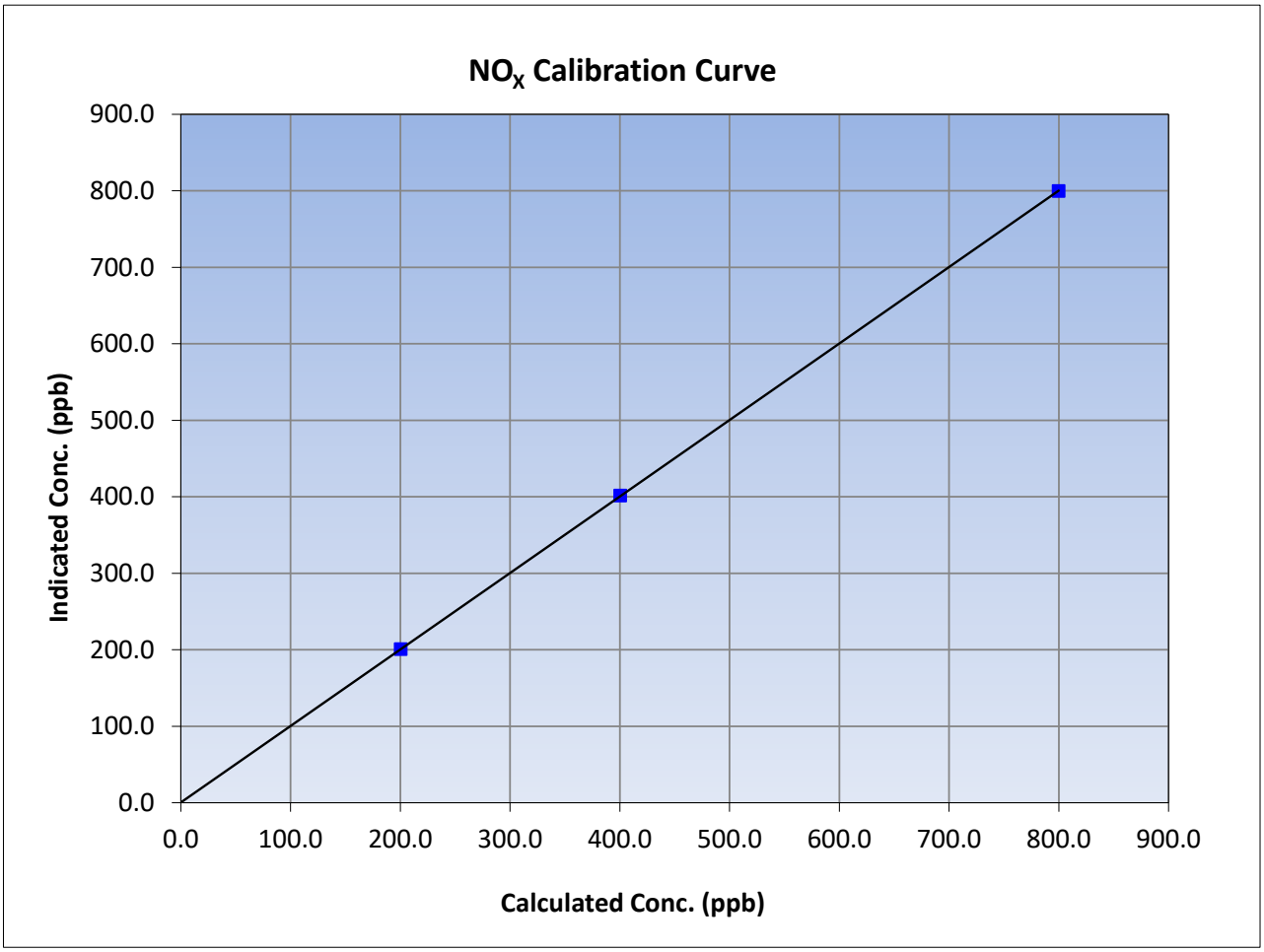
Version-04-2020

Station Information

Calibration Date:	February 23, 2023	Previous Calibration:	January 26, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	12:21	End Time (MST):	17:33
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	-0.1	----	Correlation Coefficient	0.999998	*≥0.995*
799.9	799.9	1.0000			
400.4	401.4	0.9976	Slope	1.000016	*0.90 - 1.10*
200.2	200.7	0.9975			
			Intercept	0.328470	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

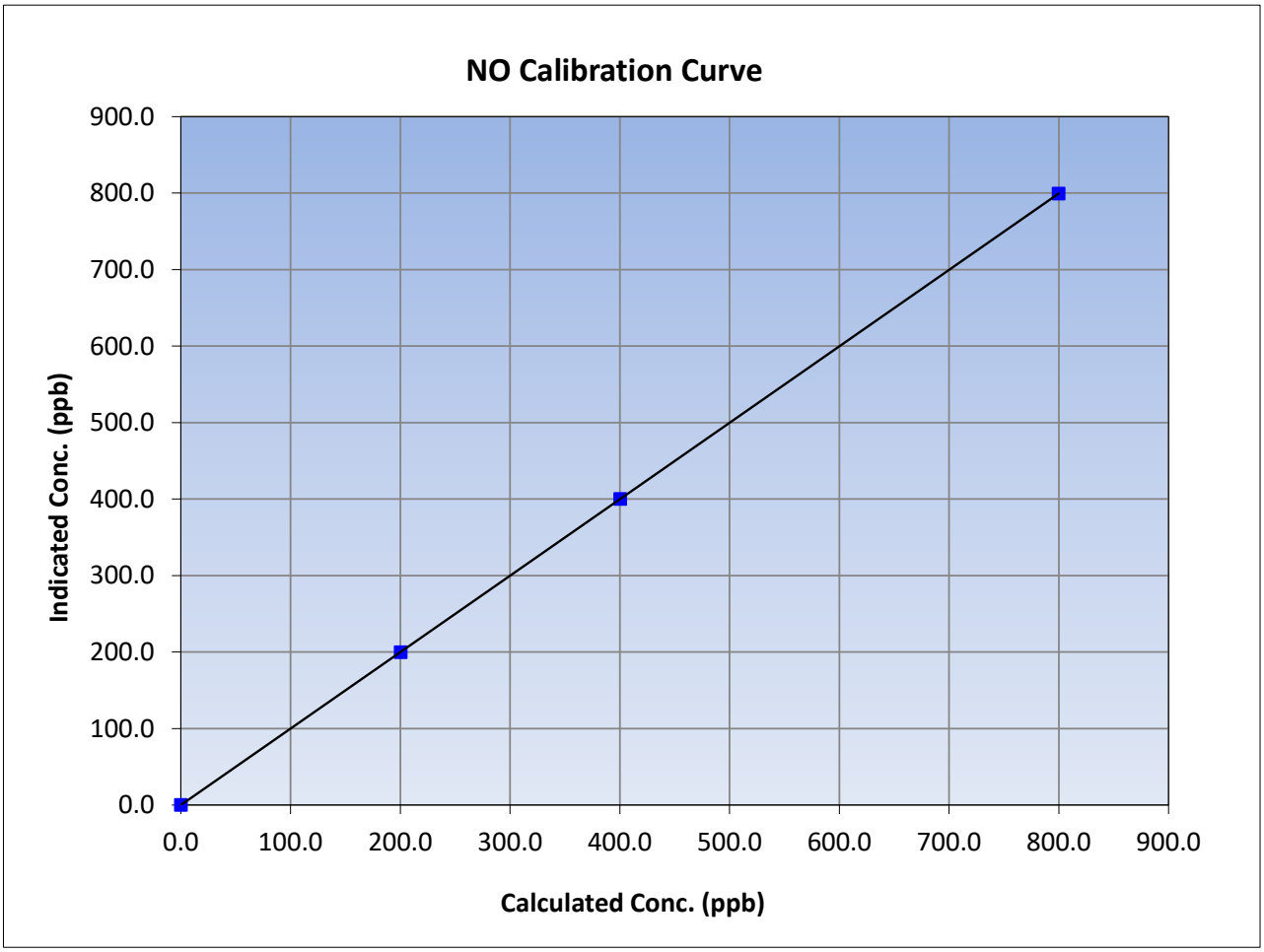
Version-04-2020

Station Information

Calibration Date:	February 23, 2023	Previous Calibration:	January 26, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	12:21	End Time (MST):	17:33
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	0.1	----	Correlation Coefficient	1.000000	≥0.995
799.9	799.5	1.0005			
400.4	400.3	1.0004	Slope	0.999486	0.90 - 1.10
200.2	199.9	1.0015			
			Intercept	-0.011076	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

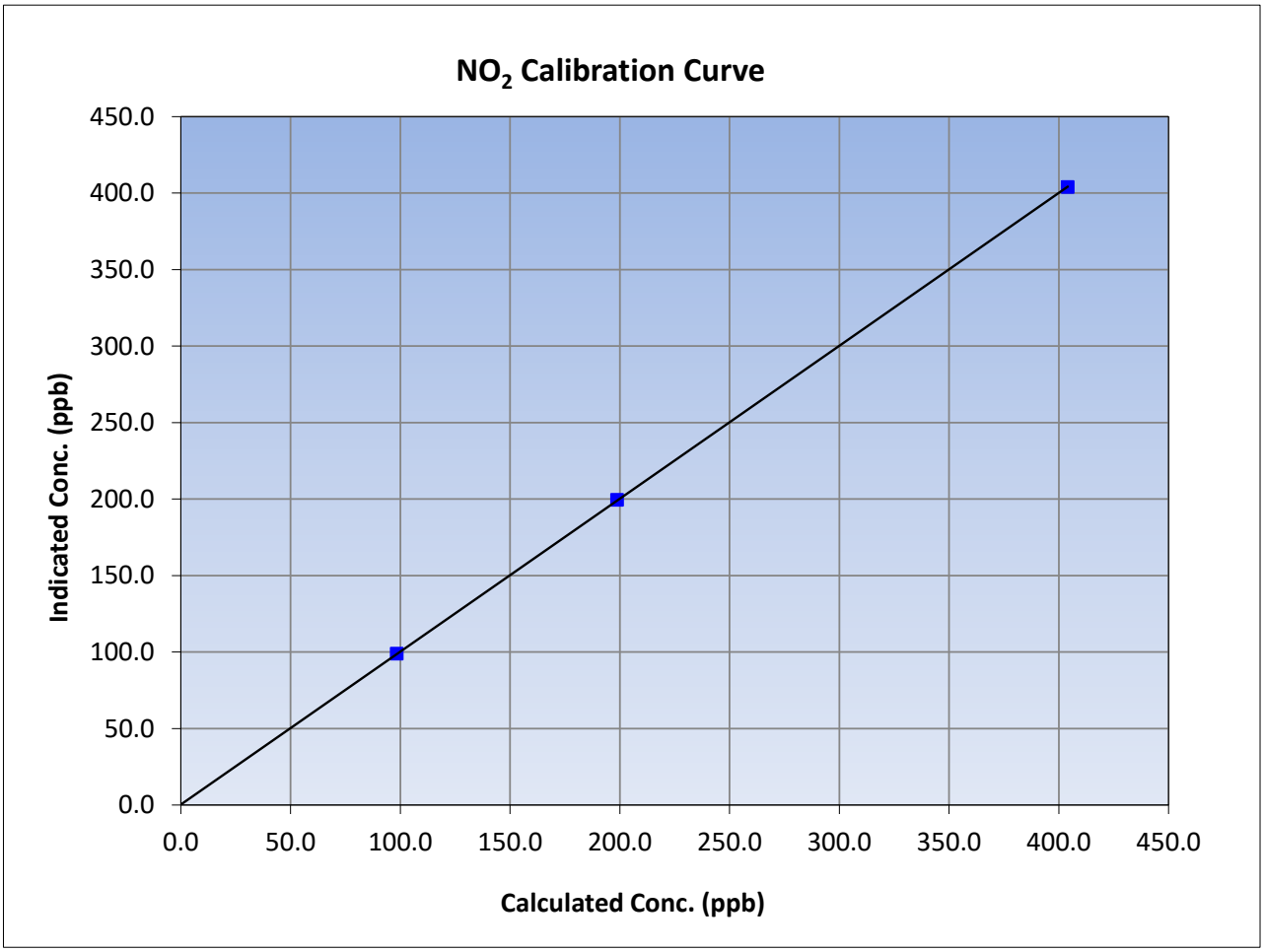
Version-04-2020

Station Information

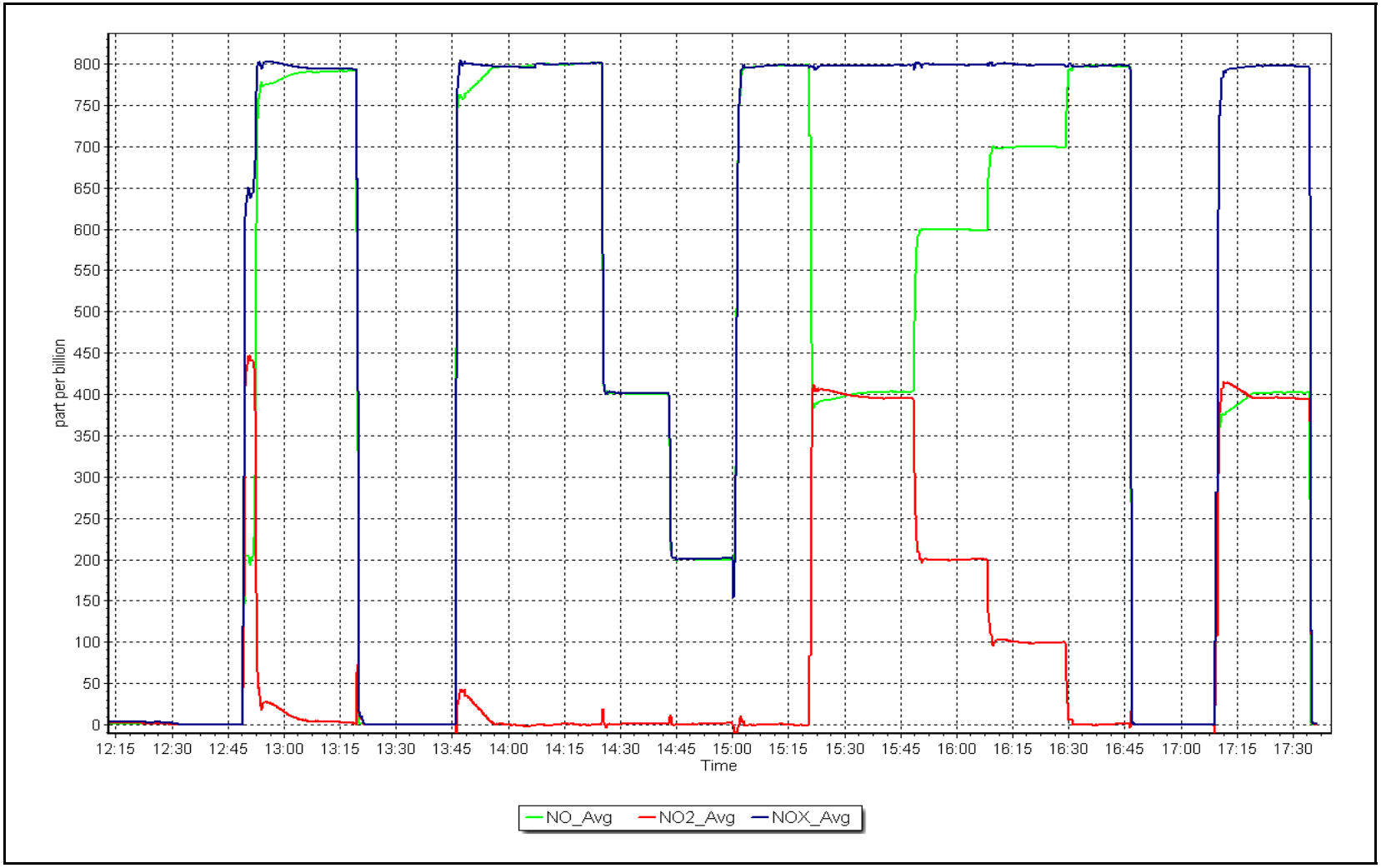
Calibration Date:	February 23, 2023	Previous Calibration:	January 26, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	12:21	End Time (MST):	17:33
Analyzer make:	Teledyne API T200	Analyzer serial #:	7117

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999991	≥0.995
404.1	403.9	1.0005			
198.7	199.5	0.9960	Slope	0.999574	0.90 - 1.10
98.3	98.9	0.9939			
			Intercept	0.324675	+/-20



NO_X Calibration Plot Date: February 23, 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:	February 14, 2023	Last Cal Date:	January 25, 2023
Start time (MST):	11:15	End time (MST):	14:07
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:	0.998486	1.000057	Backgd or Offset:	-2.0	-2.0
Calibration intercept:	0.240000	0.440000	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	-0.3	----
as found span	4893	897.4	400.0	400.5	0.999
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	0.2	----
high point	4893	897.4	400.0	400.3	0.999
second point	4893	752.6	200.0	200.7	0.997
third point	4893	653.0	100.0	100.6	0.994
as left zero	5000	800.0	0.0	0.4	----
as left span	4816	897.4	400.0	402.0	0.995
				Average Correction Factor	0.997

Baseline Corr As found:	400.8	Previous response	399.6	*% 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

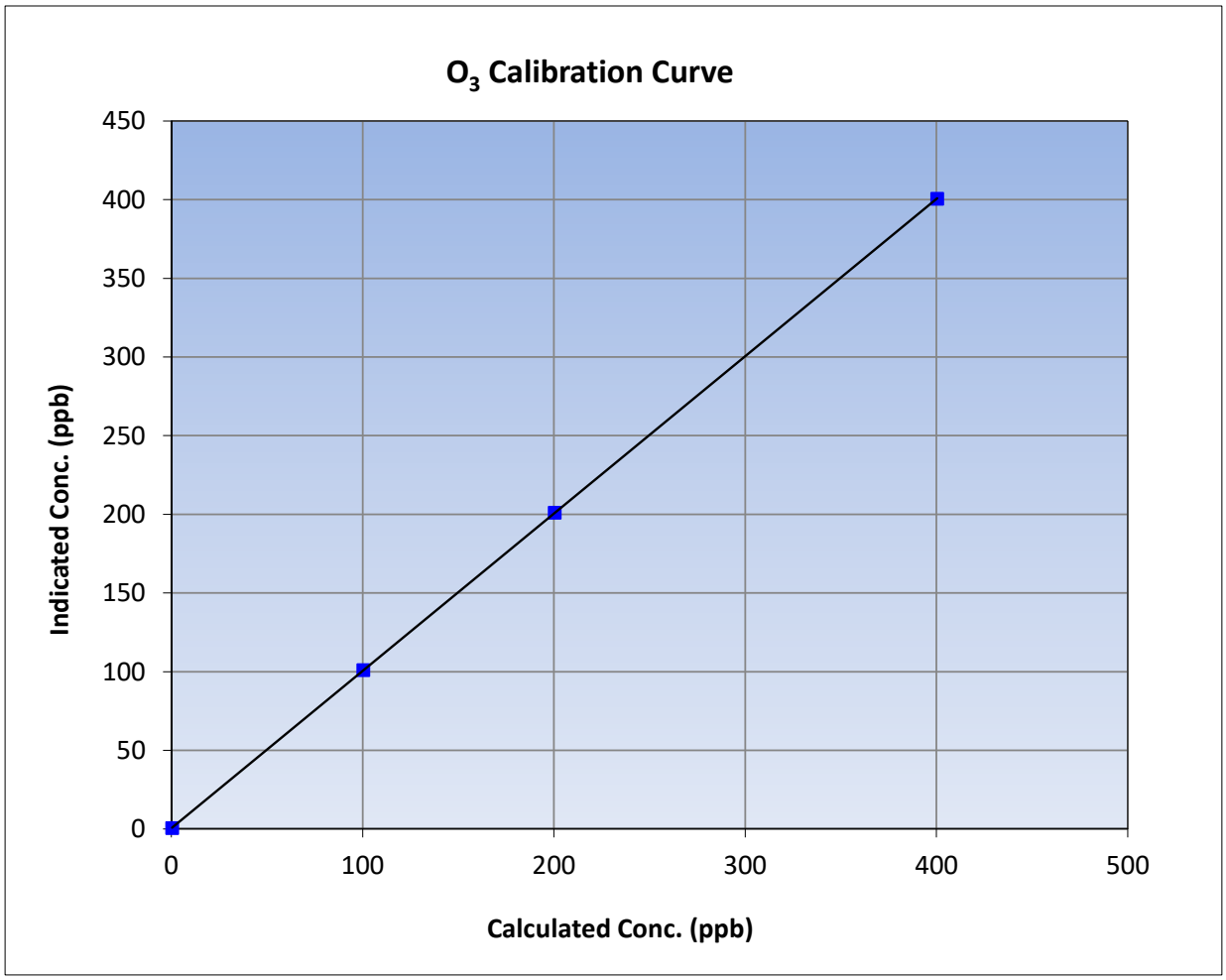
Station Information

Calibration Date:	February 14, 2023	Previous Calibration:	January 25, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	11:15	End Time (MST):	14:07
Analyzer make:	Teledyne API T400	Analyzer serial #:	3869

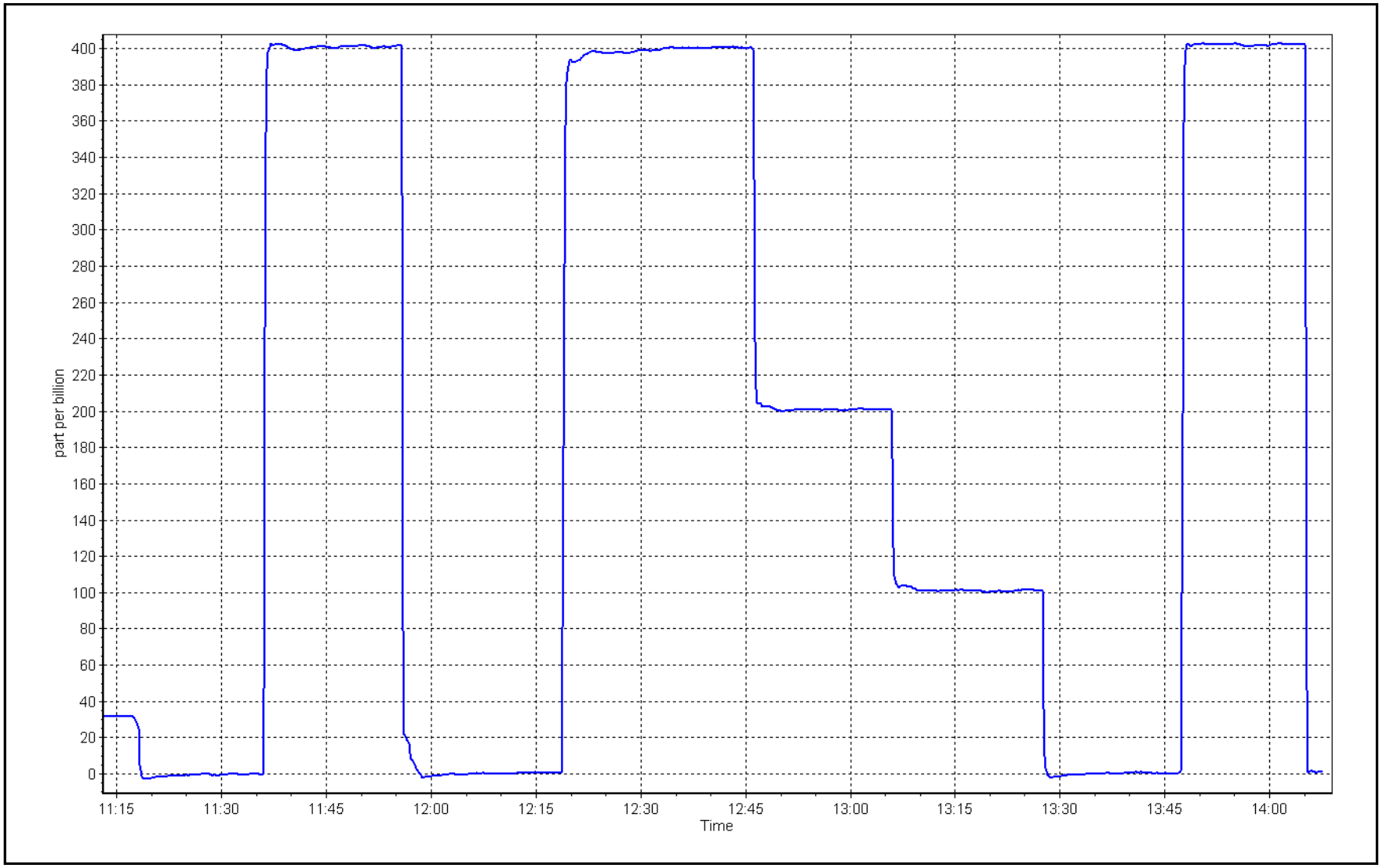
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
400.0	400.3	0.9993
200.0	200.7	0.9965
100.0	100.6	0.9940

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.000057	*0.90 - 1.10*
Intercept	0.440000	*+/- 5*



O_3 Calibration Plot Date: February 14, 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:	February 24, 2023	Last Cal Date:	January 26, 2023
Start time (MST):	14:17	End time (MST):	16:09
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)	-14.4	-14.7	-14.4	☐	+/- 2 °C
P (mmHg)	716.4	714.2	716.4	☐	+/- 10 mmHg
flow (LPM)	5.01	5.07	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: February 24, 2023 Last Cal Date: January 26, 2023

PM w/o HEPA: 2.6 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test				☐	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
FEBRUARY 2023

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

March 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	February 1, 2023	Last Cal Date:	January 4, 2023
Start time (MST):	10:42	End time (MST):	13:41
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:	0.999236	0.997162	Backgd or Offset:	18.1	18.1
Calibration intercept:	-0.603450	-0.103174	Coeff or Slope:	1.048	1.048

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	797.8	1.002
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	796.8	1.003
second point	4960	40.2	400.1	398.9	1.003
third point	4980	20.1	200.0	198.9	1.006
as left zero	5000	0.0	0.0	0.0	----
as left span	4920	80.3	799.1	800.1	0.999
				Average Correction Factor	1.004

Baseline Corr As found:	797.90	Previous response	797.88	*% change	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

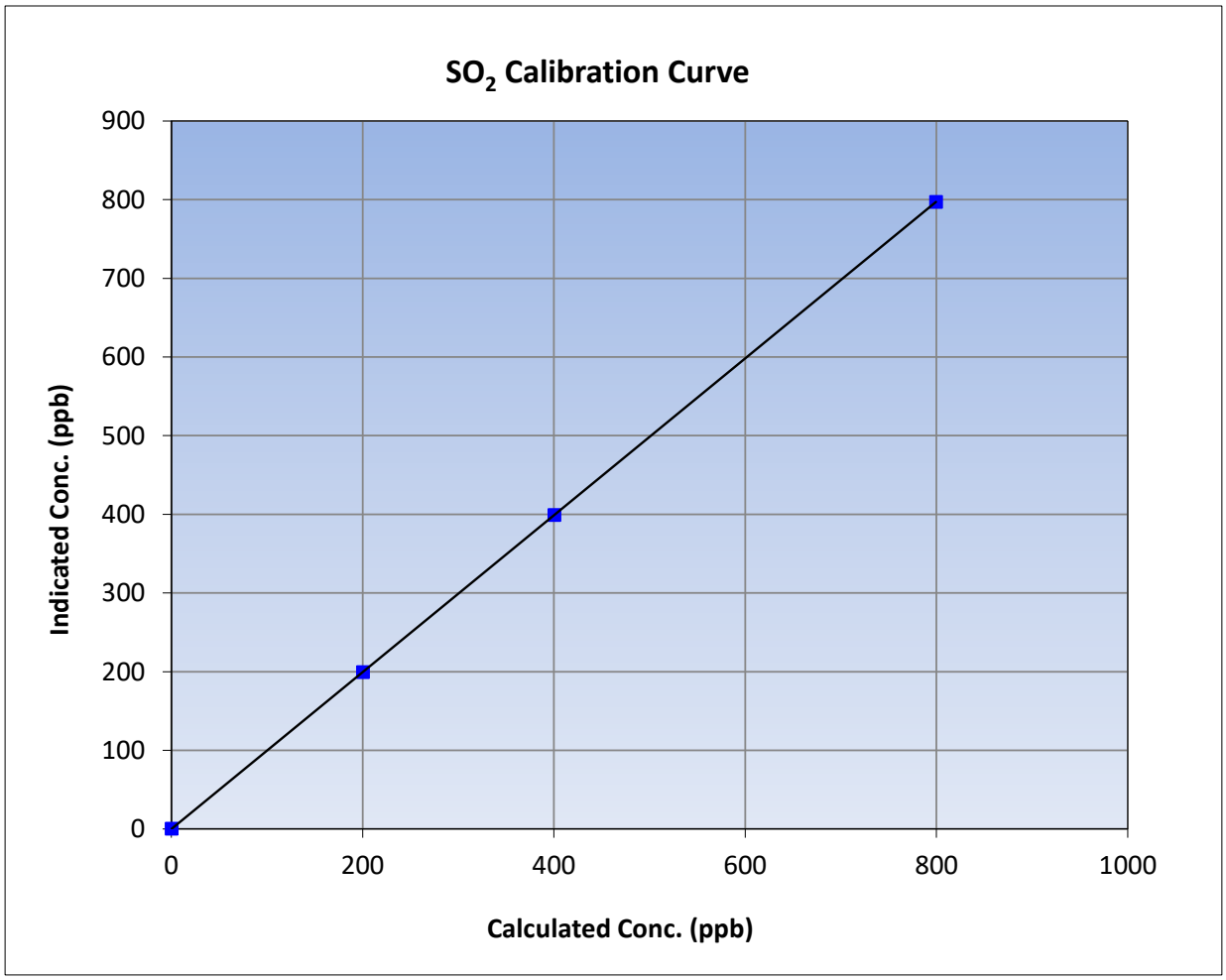
Station Information

Calibration Date:	February 1, 2023	Previous Calibration:	January 4, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:42	End Time (MST):	13:41
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290012

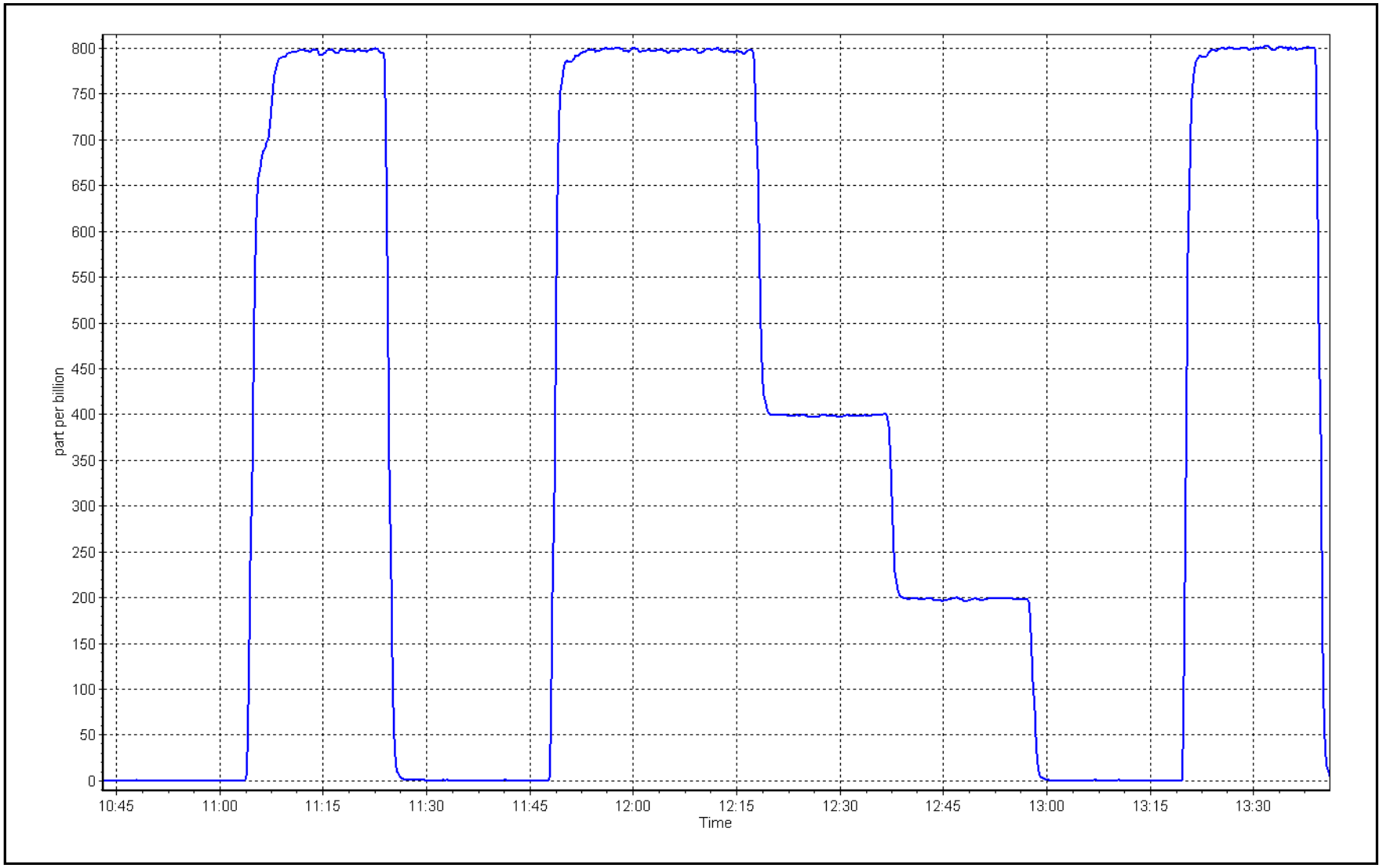
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
799.1	796.8	1.0029
400.1	398.9	1.0029
200.0	198.9	1.0057

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	0.997162	*0.90 - 1.10*
Intercept	-0.103174	*+/-30*



SO2 Calibration Plot Date: February 1, 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:	February 13, 2023	Last Cal Date:	January 10, 2023
Start time (MST):	10:36	End time (MST):	14:30
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.20	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517372			
Removed Cal Gas Conc:	5.20	ppm	Rem Gas Exp Date:	N/A
Removed Gas Cyl #:	N/A		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	451
ZAG Make/Model:	API T701		Serial Number:	5611

Analyzer Information

Analyzer make:	Thermo 43iQ TLE		Analyzer serial #:	12113311965	
Converter make:	CDN-101		Converter serial #:	594	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.988739	0.998176	Backgd or Offset:	0.96	0.96
Calibration intercept:	0.581876	-0.098303	Coeff or Slope:	0.714	0.714

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4923	77.0	80.0	79.6	1.006
as found 2nd point	4962	38.5	40.0	39.6	1.013
as found 3rd point	4981	19.2	19.9	20.1	0.997
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	39.9	1.002
third point	4981	19.2	19.9	19.5	1.023
as left zero	5000	0.0	0.0	0.1	----
as left span	4923	77.0	80.0	80.1	0.999
SO2 Scrubber Check	4922	78.3	783.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.009
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.5	Prev response:	79.68	*% change:	-0.2%
Baseline Corr 2nd AF pt:	39.5	AF Slope:	0.992599	AF Intercept:	0.121822
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999975		

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds, ran a SO2 scrubber check after calibrator zero. No adjustments made. There are random spikes that are occurring, suspecting a problem with the calibrator, the dilution reading goes up during the spikes.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

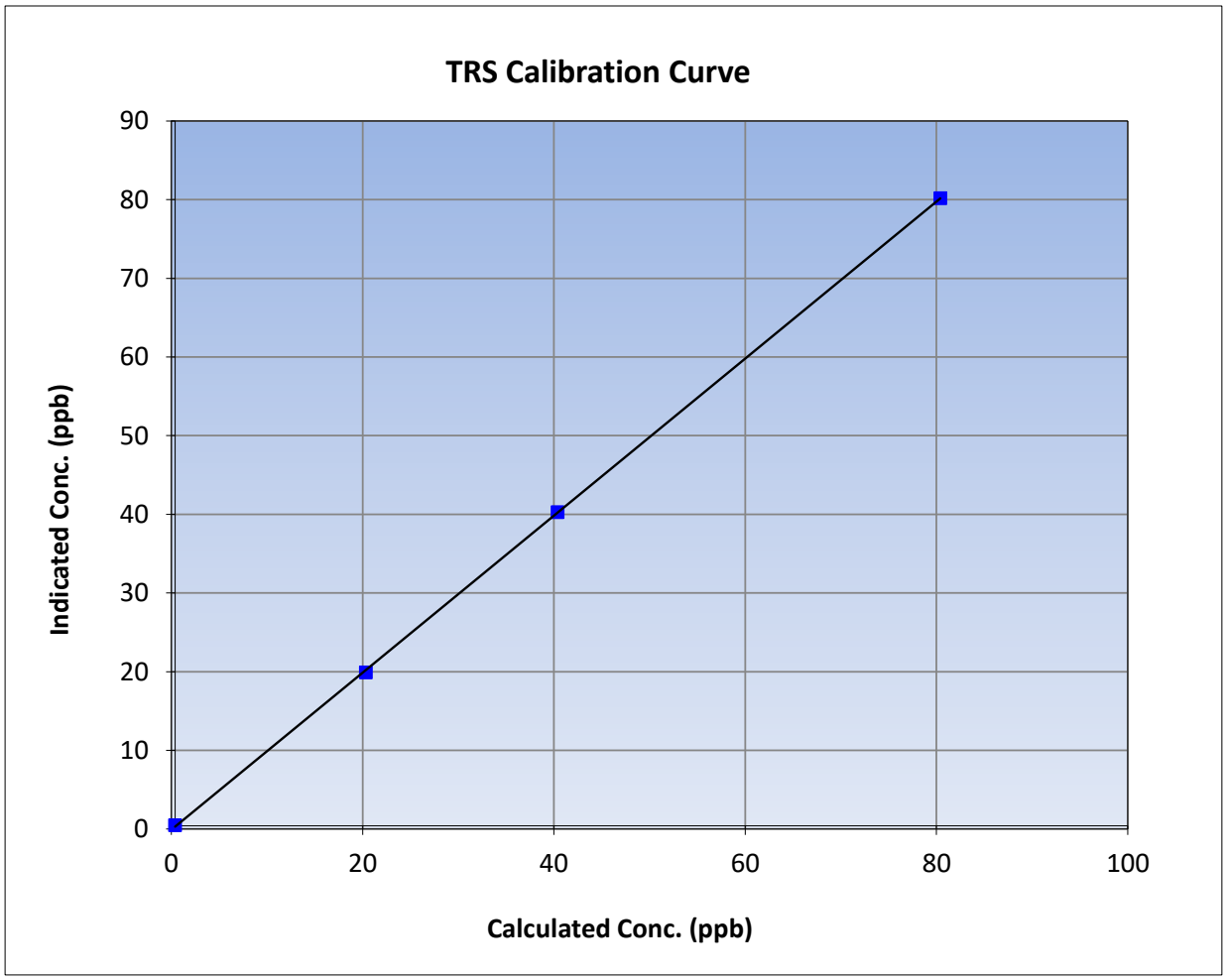
Station Information

Calibration Date:	February 13, 2023	Previous Calibration:	January 10, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:36	End Time (MST):	14:30
Analyzer make:	Thermo 43iQ TLE	Analyzer serial #:	12113311965

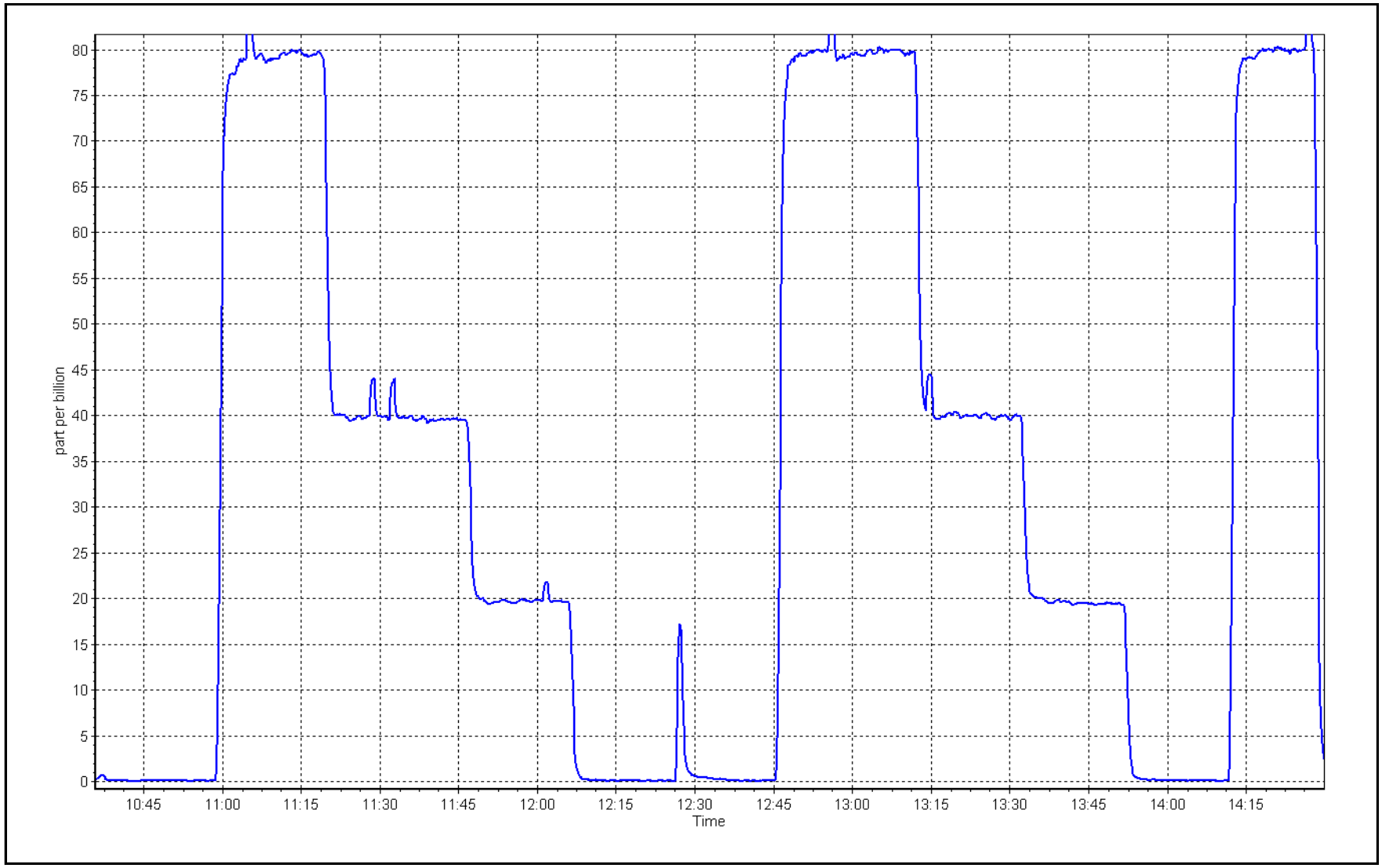
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	79.8	1.0025
40.0	39.9	1.0024
19.9	19.5	1.0230

Statistical Evaluation		Limits
Correlation Coefficient	0.999959	≥0.995
Slope	0.998176	0.90 - 1.10
Intercept	-0.098303	+/-3



TRS Calibration Plot Date: February 13, 2023 Location: Fort Hills



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	February 14, 2023	Last Cal Date:	February 13, 2023
Start time (MST):	13:00	End time (MST):	16:23
Reason:	Maintenance		

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:	0.998176	1.004890	Backgd or Offset:	0.96	0.96
Calibration intercept:	-0.098303	-0.158196	Coeff or Slope:	0.714	0.714

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	80.3	0.999
as found 2nd point	4962	38.5	40.0	40.0	1.005
as found 3rd point	4981	19.2	19.9	19.6	1.028
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4923	77.0	80.0	80.3	0.996
second point	4962	38.5	40.0	40.1	0.997
third point	4981	19.2	19.9	19.5	1.023
as left zero	5000	0.0	0.0	0.1	----
as left span	4923	77.0	80.0	80.0	1.000
SO2 Scrubber Check	4922	78.3	783.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.006
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.1	Prev response:	79.76	*% change:	0.4%
Baseline Corr 2nd AF pt:	39.8	AF Slope:	1.003318	AF Intercept:	-0.078208
Baseline Corr 3rd AF pt:	19.4	AF Correlation:	0.999942		

* = > +/-5% change initiates investigation

Notes: Internal pump randomly drops in flow, turned off the internal pump and hooked up an external pump after multipoint as founds. No adjustments made. More spikes detected on the third point, will monitor the instrument.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

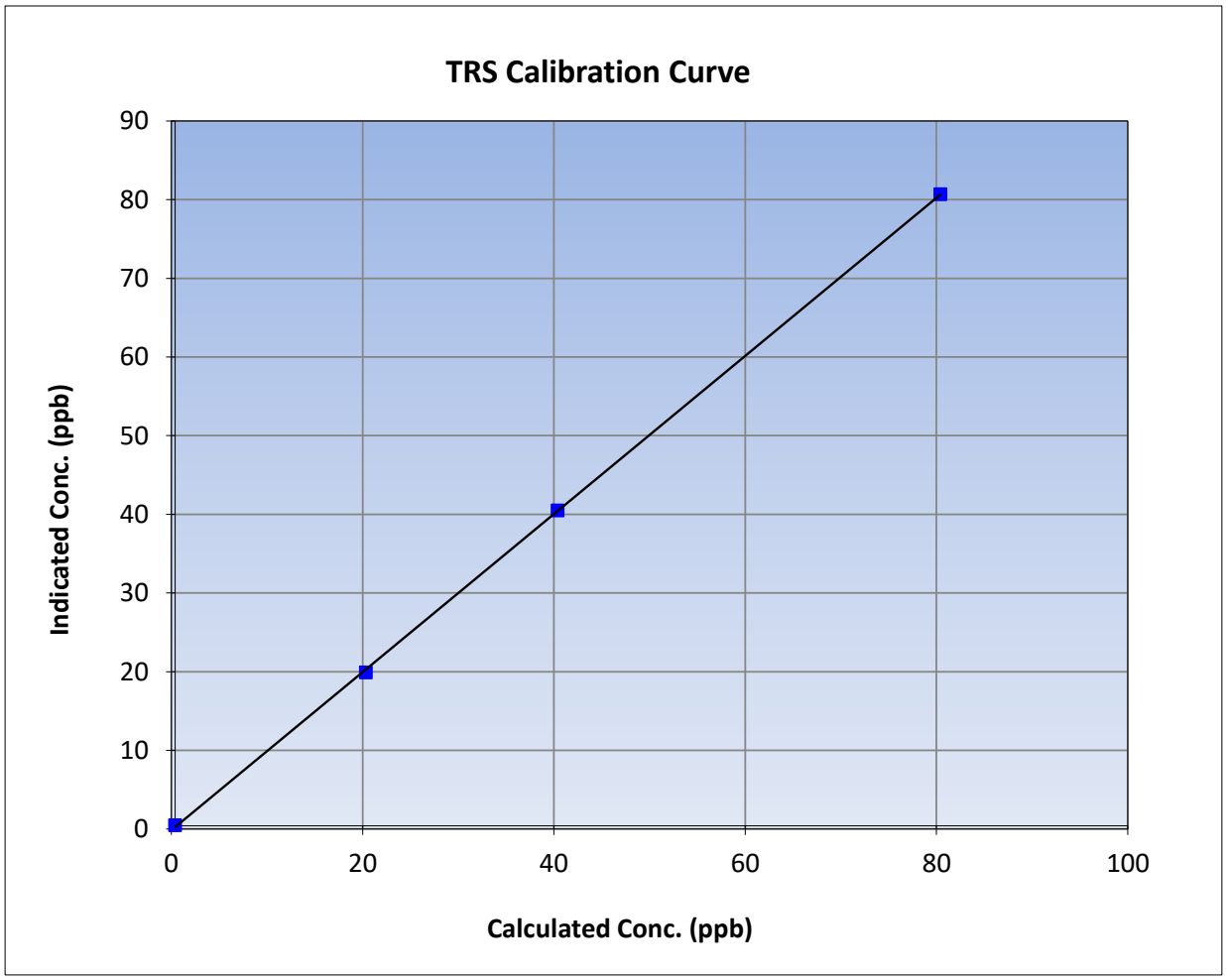
Station Information

Calibration Date:	February 14, 2023	Previous Calibration:	February 13, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	13:00	End Time (MST):	16:23
Analyzer make:	Thermo 43iQ TLE	Analyzer serial #:	12113311965

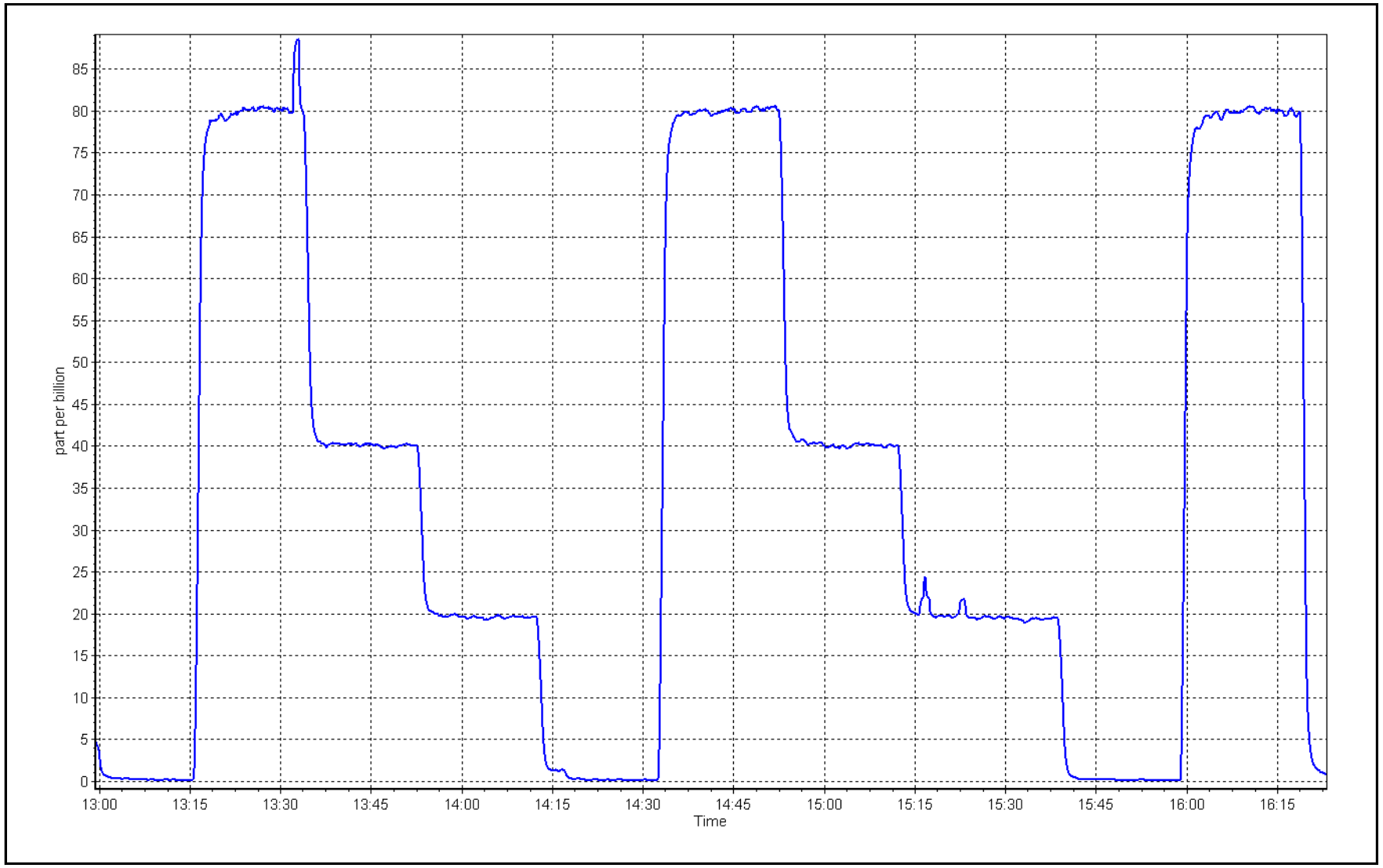
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.3	0.9963
40.0	40.1	0.9974
19.9	19.5	1.0230

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999936	*≥0.995*
Slope	1.004890	*0.90 - 1.10*
Intercept	-0.158196	*+/-3*



TRS Calibration Plot Date: February 14, 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:	February 1, 2023	Last Cal Date:	January 18, 2023
Start time (MST):	10:42	End time (MST):	13:41
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:	2.33E-04	2.28E-04	NMHC SP Ratio:	5.01E-05	5.01E-05
CH4 Retention time:	13.0	13.0	NMHC Peak Area:	180258	180258

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	17.19	17.65	0.974
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	17.19	17.29	0.995
second point	4960	40.2	8.61	8.60	1.000
third point	4980	20.1	4.30	4.32	0.996
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.19	17.33	0.992
				Average Correction Factor	0.997

Baseline Corr AF:	17.65	Prev response	17.18	*% change	2.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	9.16	9.36	0.979
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	9.16	9.20	0.996
second point	4960	40.2	4.59	4.62	0.993
third point	4980	20.1	2.29	2.34	0.980
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	0.990
Baseline Corr AF:	9.36	Prev response	9.15	*% change	2.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	8.03	8.29	0.969
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	8.08	0.994
second point	4960	40.2	4.02	3.99	1.009
third point	4980	20.1	2.01	1.98	1.015
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	8.03	8.14	0.987
				Average Correction Factor	1.006
Baseline Corr AF:	8.29	Prev response	8.03	*% change	3.1%
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:	0.998822	1.005188
THC Cal Offset:	0.006016	-0.012392
CH4 Cal Slope:	1.001922	1.007325
CH4 Cal Offset:	-0.016245	-0.029242
NMHC Cal Slope:	0.996115	1.003089
NMHC Cal Offset:	0.022460	0.017251

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

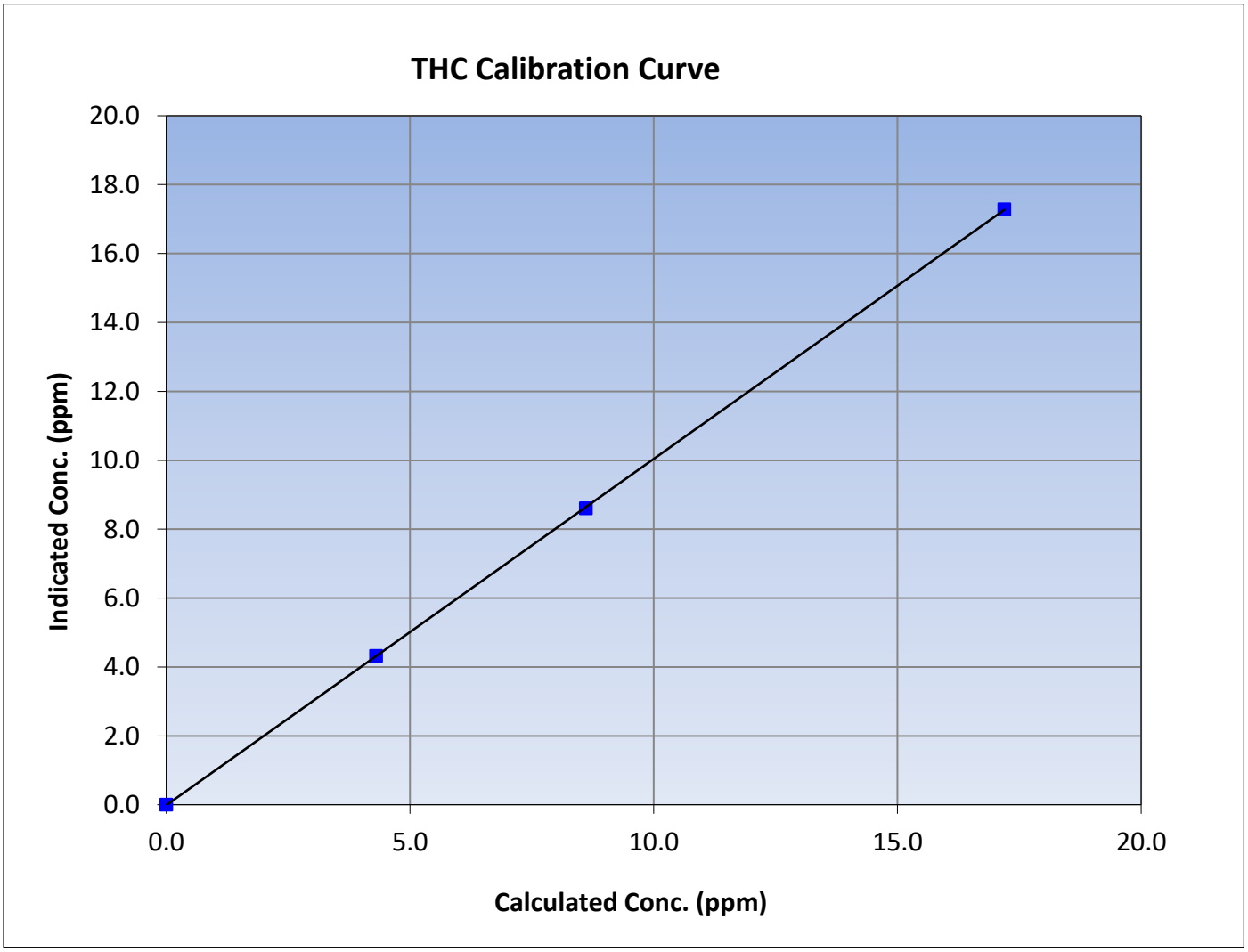
Version-01-2020

Station Information

Calibration Date:	February 1, 2023	Previous Calibration:	January 18, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:42	End Time (MST):	13:41
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	0.999989	*≥0.995*
17.19	17.29	0.9946			
8.61	8.60	1.0005	Slope	1.005188	*0.90 - 1.10*
4.30	4.32	0.9960			
			Intercept	-0.012392	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

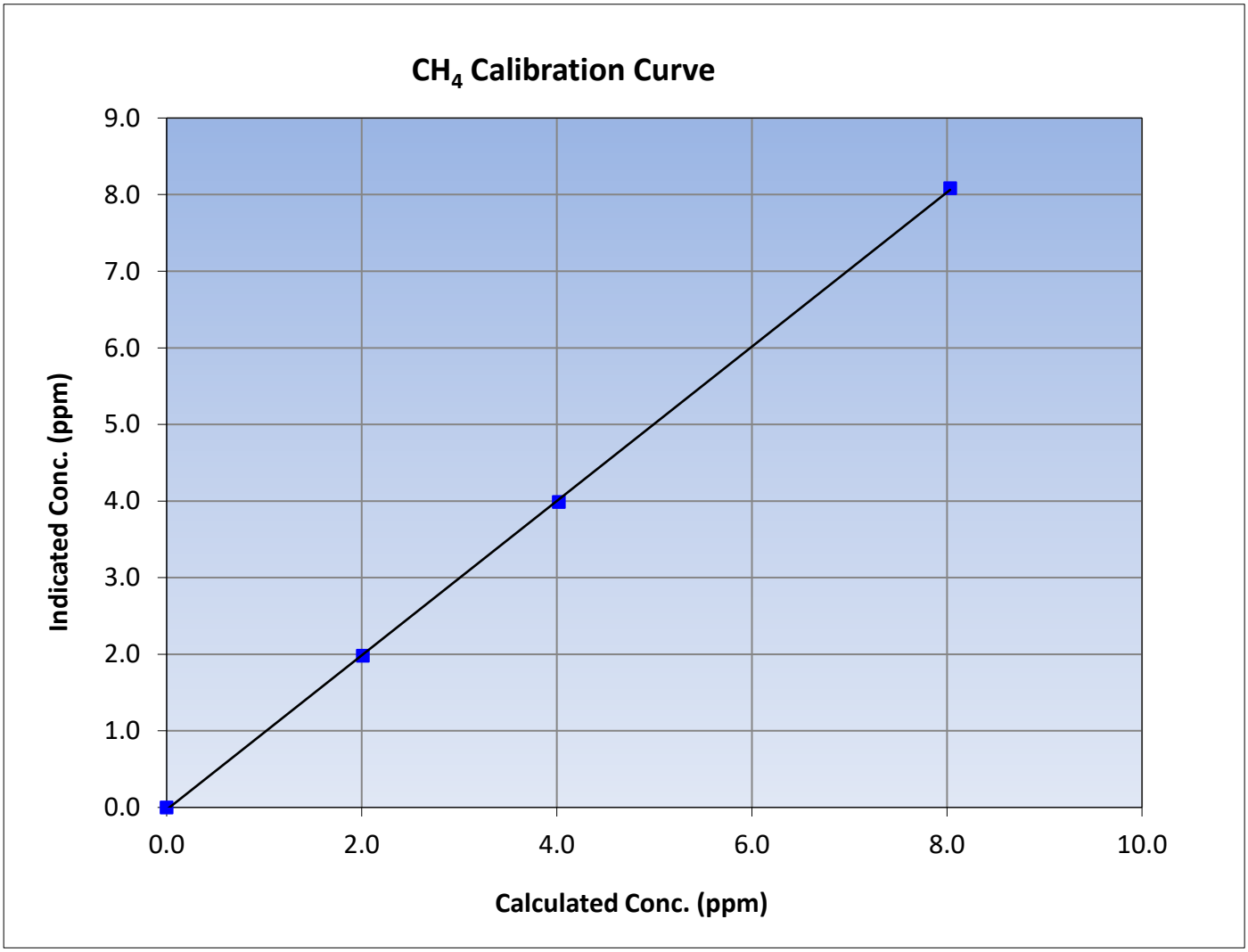
Version-01-2020

Station Information

Calibration Date:	February 1, 2023	Previous Calibration:	January 18, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:42	End Time (MST):	13:41
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	0.999921	*≥0.995*
8.03	8.08	0.9937			
4.02	3.99	1.0089	Slope	1.007325	*0.90 - 1.10*
2.01	1.98	1.0150			
			Intercept	-0.029242	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

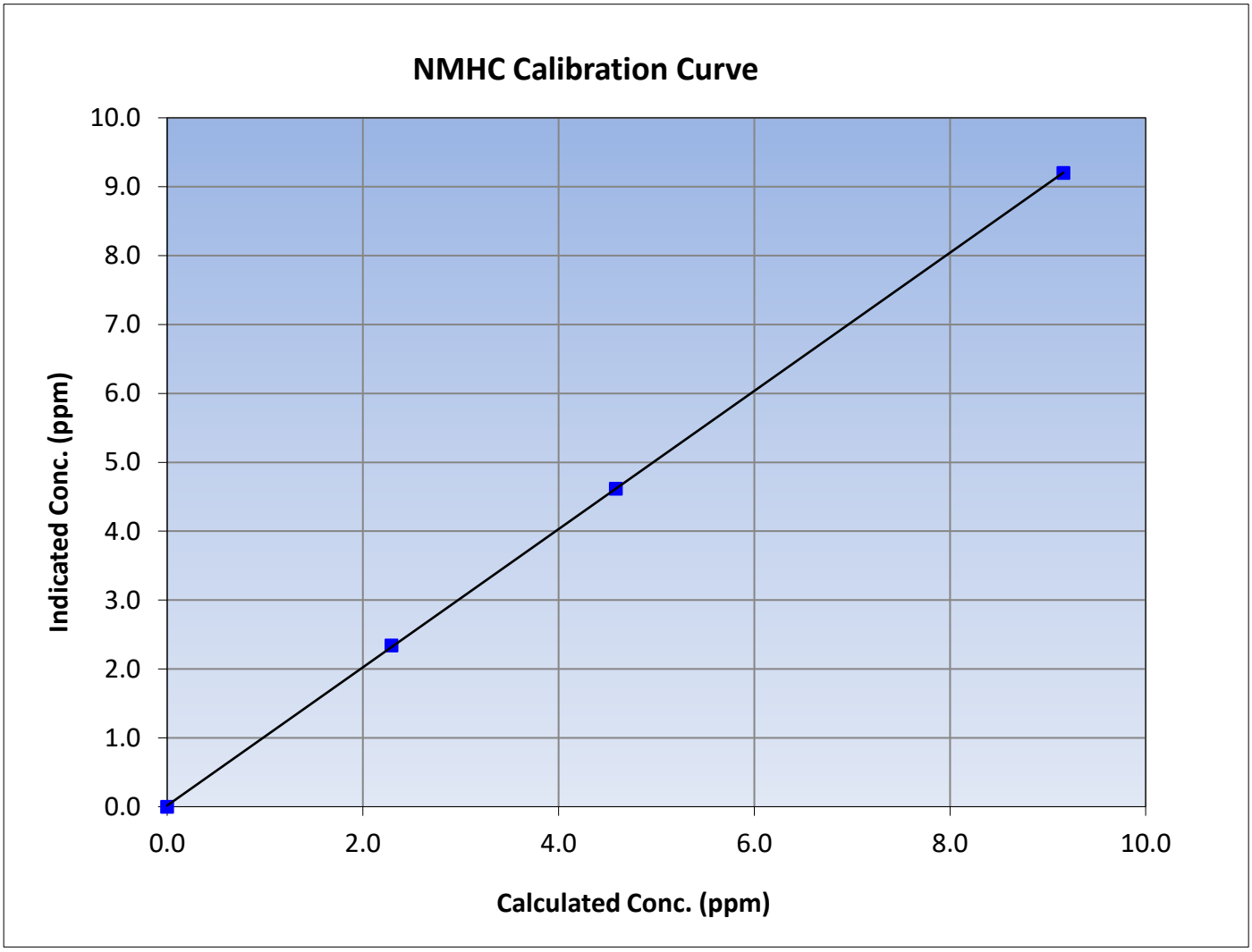
Version-01-2020

Station Information

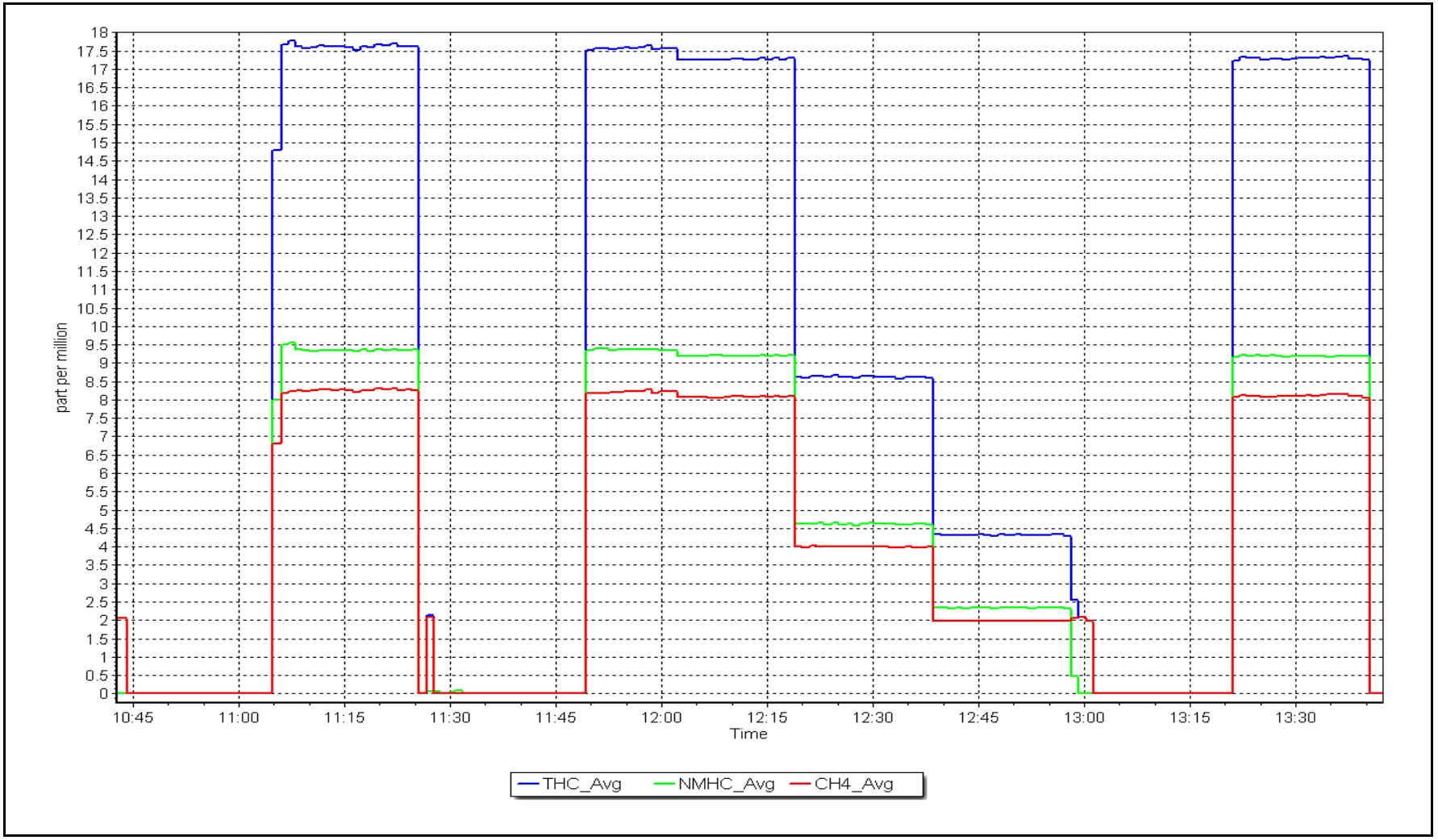
Calibration Date:	February 1, 2023	Previous Calibration:	January 18, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:42	End Time (MST):	13:41
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585648

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999981	*≥0.995*
9.16	9.20	0.9957			
4.59	4.62	0.9932	Slope	1.003089	*0.90 - 1.10*
2.29	2.34	0.9798			
			Intercept	0.017251	*+/-0.5*



NMHC Calibration Plot Date: February 1, 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:	February 17, 2023	Last Cal Date:	January 24, 2023
Start time (MST):	10:01	End time (MST):	14:49
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	CC332703		Cal Gas Expiry Date:	January 28, 2024	
NOX Cal Gas Conc:	49.7	ppm	NO Cal Gas Conc:	49.7	ppm
Removed Cylinder #:	N/A		Removed Gas Exp Date:	N/A	
Removed Gas NOX Conc:	49.7	ppm	Removed Gas NO Conc:	49.7	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API 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:	1.527	1.565	NO bkgnd or offset:	4.3	4.4
NOX coeff or slope:	0.997	0.997	NOX bkgnd or offset:	4.7	4.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	225.4	230.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999637	1.000236
NO_X Cal Offset:	0.644160	0.184305
NO Cal Slope:	0.999282	0.999895
NO Cal Offset:	-0.256715	-0.496226
NO_2 Cal Slope:	1.001046	0.995394
NO_2 Cal Offset:	0.284247	-0.512082

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	0.0	-0.3	----	----
as found span	4920	80.5	800.2	800.2	0.0	781.1	777.7	3.4	1.024	1.029
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	0.0	-0.3	----	----
high point	4920	80.5	800.2	800.2	0.0	799.9	799.4	0.5	1.000	1.001
second point	4960	40.2	399.6	399.6	0.0	401.3	400.1	1.2	0.996	0.999
third point	4980	20.1	199.8	199.8	0.0	199.7	197.9	1.8	1.000	1.010
as left zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.2	-0.3	----	----
as left span	4920	80.5	800.2	435.3	364.9	799.7	435.1	364.5	1.001	1.000
								Average Correction Factor	0.999	1.003

Corrected As found	NO_X = 781.4 ppb	NO = 777.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -2.4%
Previous Response	NO_X = 800.5 ppb	NO = 799.3 ppb		*Percent Change	NO = -2.8%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	798.3	433.4	364.9	362.7	1.006	99.4%
2nd GPT point (200 ppb O3)	798.3	616.5	181.8	180.7	1.006	99.4%
3rd GPT point (100 ppb O3)	798.3	704.2	94.1	92.7	1.015	98.5%
				Average Correction Factor	1.009	99.1%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

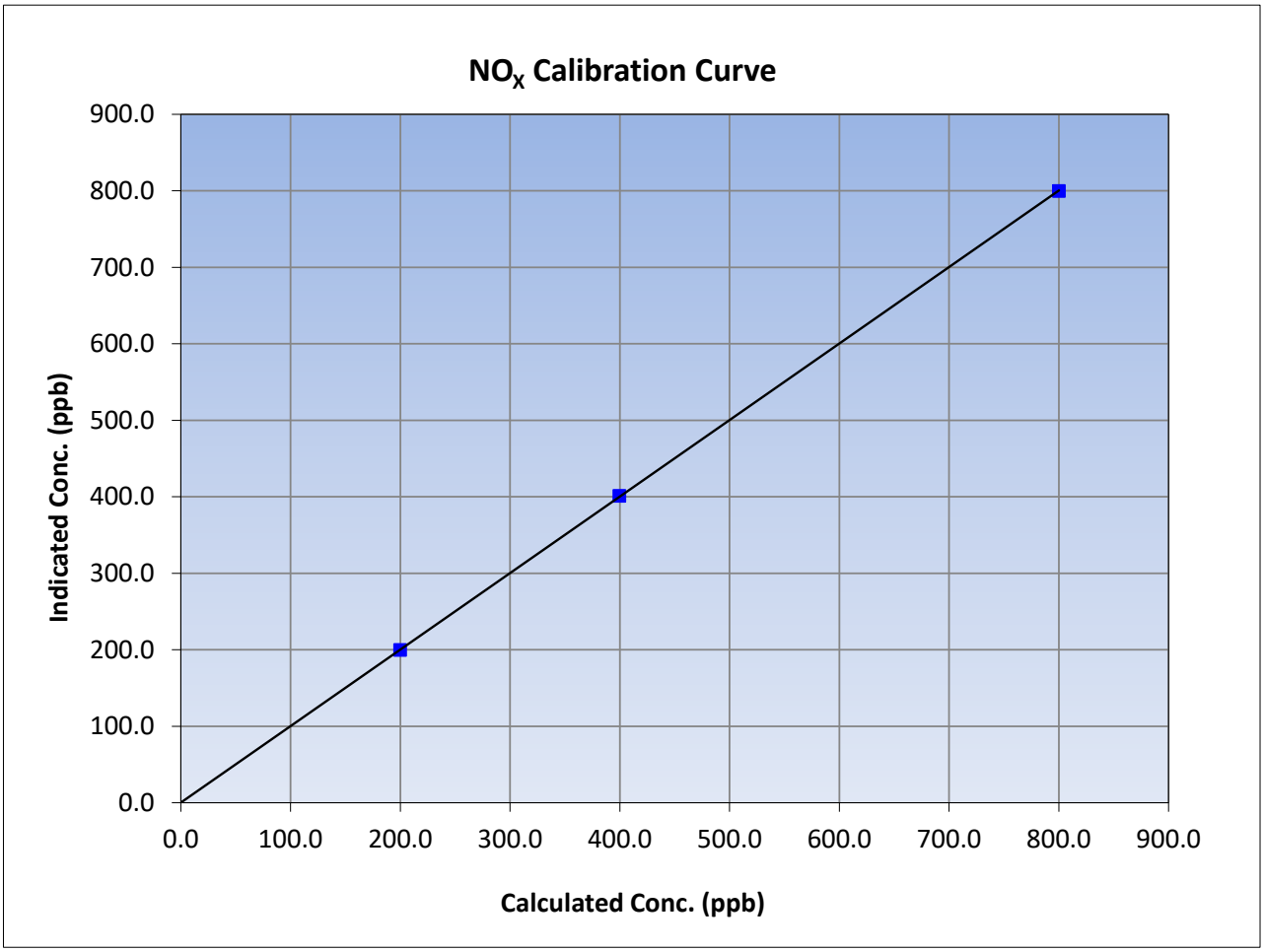
Version-04-2020

Station Information

Calibration Date:	February 17, 2023	Previous Calibration:	January 24, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:01	End Time (MST):	14:49
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	0.999992	*≥0.995*
800.2	799.9	1.0003			
399.6	401.3	0.9957	Slope	1.000236	*0.90 - 1.10*
199.8	199.7	1.0005			
			Intercept	0.184305	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

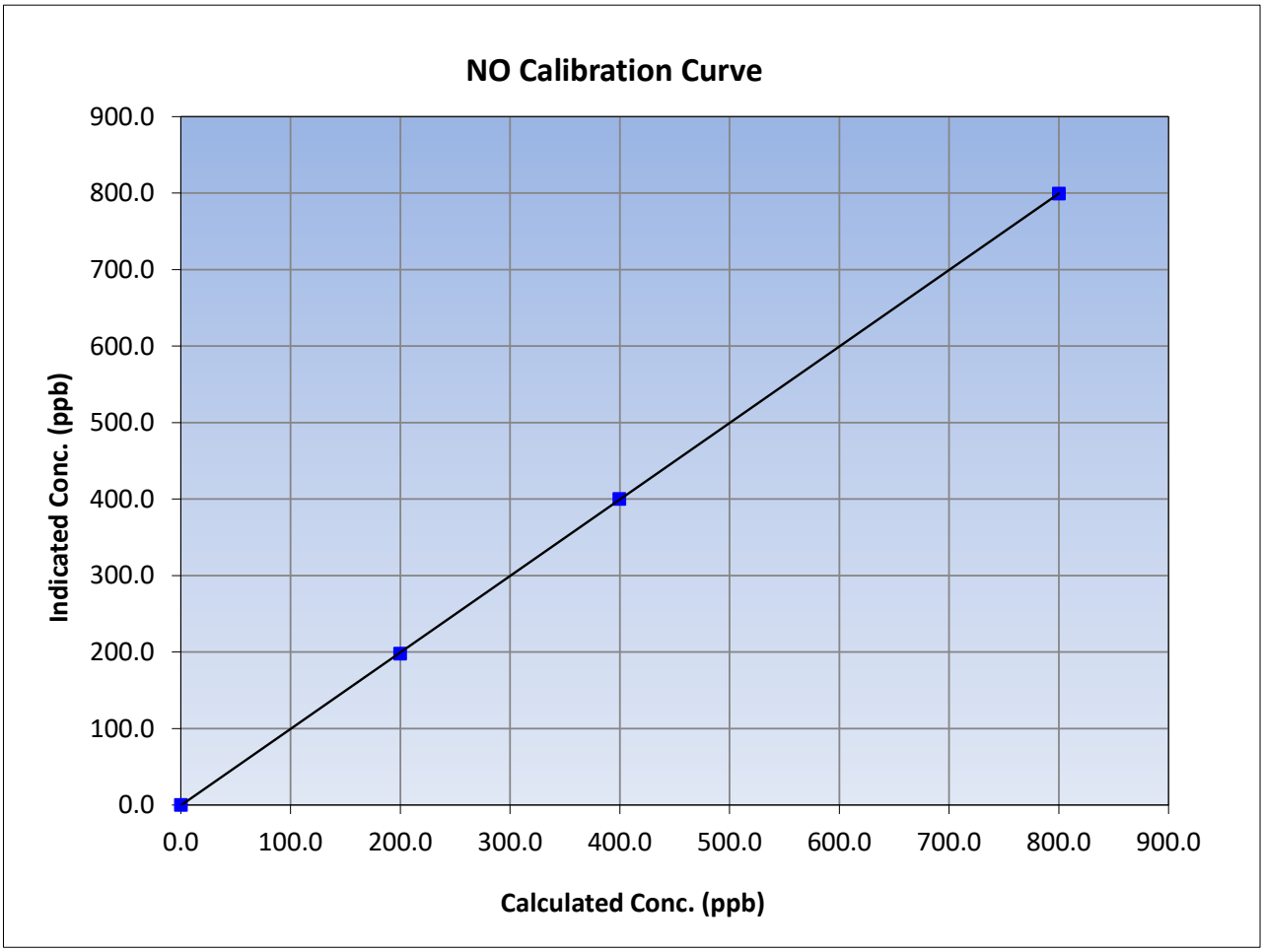
Version-04-2020

Station Information

Calibration Date:	February 17, 2023	Previous Calibration:	January 24, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:01	End Time (MST):	14:49
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999991	*≥0.995*
800.2	799.4	1.0010			
399.6	400.1	0.9987	Slope	0.999895	*0.90 - 1.10*
199.8	197.9	1.0096			
			Intercept	-0.496226	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

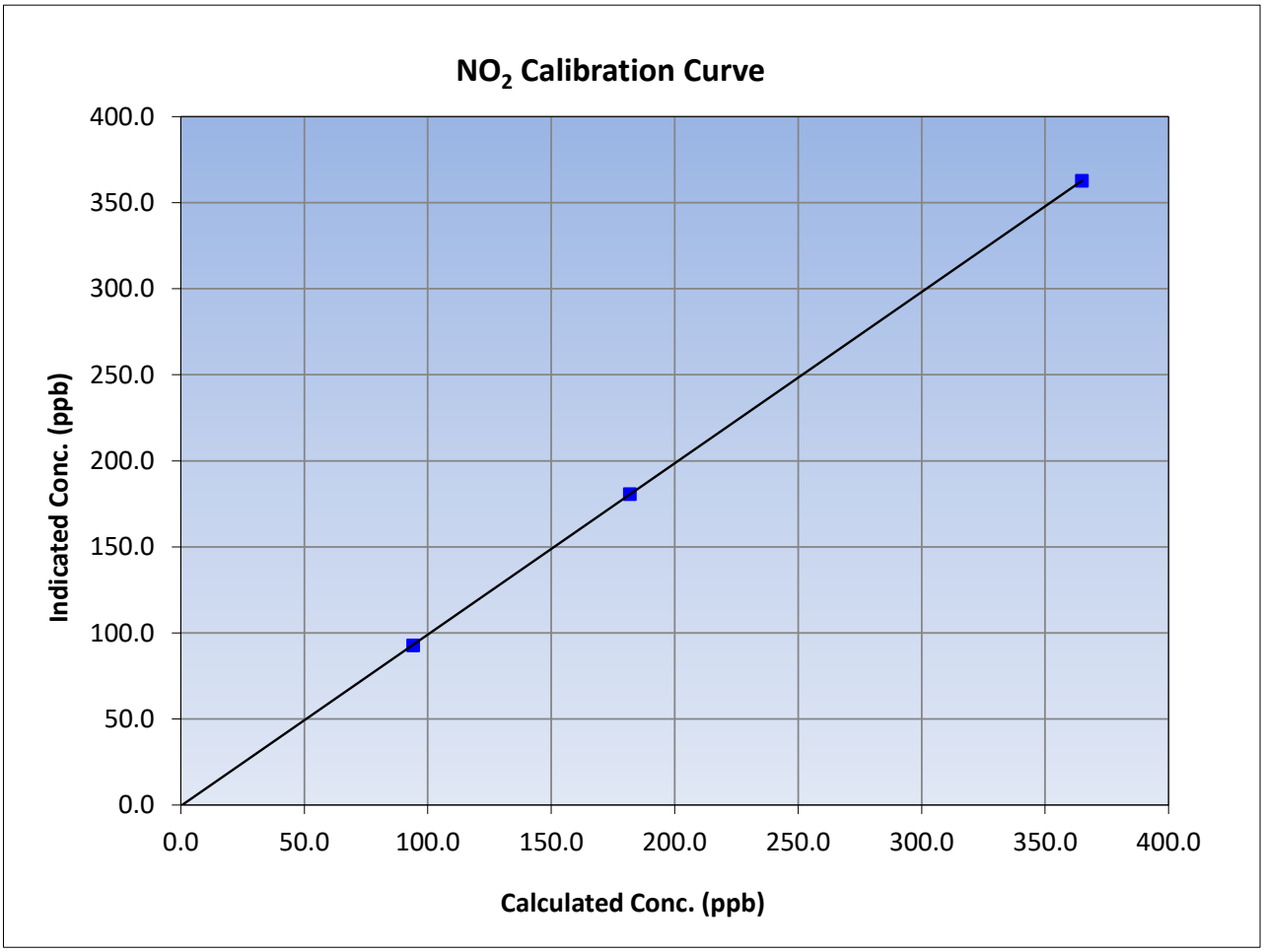
Version-04-2020

Station Information

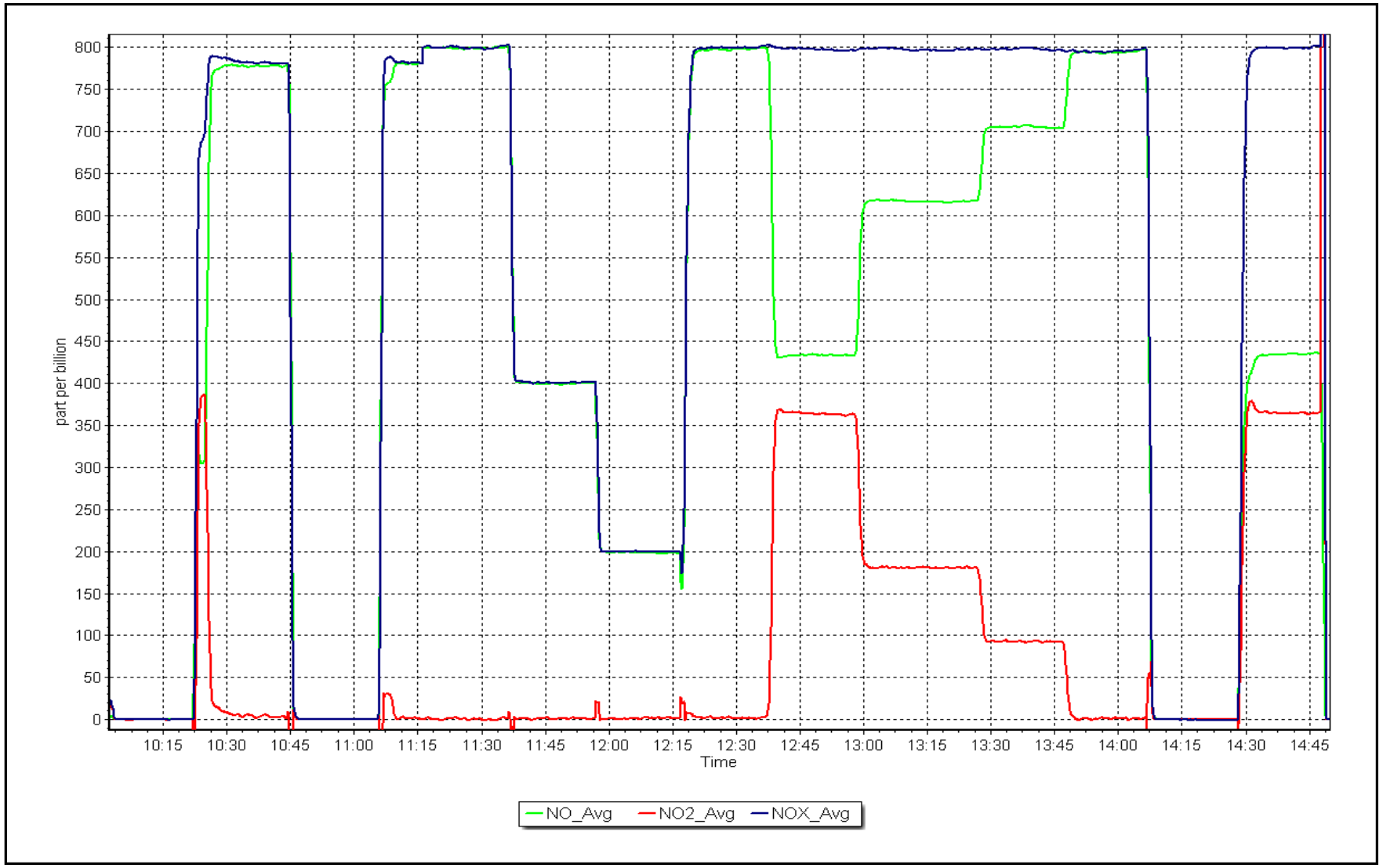
Calibration Date:	February 17, 2023	Previous Calibration:	January 24, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:01	End Time (MST):	14:49
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.3	----	Correlation Coefficient	0.999996	≥0.995
364.9	362.7	1.0061			
181.8	180.7	1.0061	Slope	0.995394	0.90 - 1.10
94.1	92.7	1.0151			
			Intercept	-0.512082	+/-20



NO_X Calibration Plot Date: February 17, 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:	February 23, 2023	Last Cal Date:	February 17, 2023
Start time (MST):	10:56	End time (MST):	17:40
Reason:	Maintenance	Pump change	

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:	1.565	1.815	NO bkgnd or offset:	4.4	5.1
NOX coeff or slope:	0.997	0.996	NOX bkgnd or offset:	4.8	5.6
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	266.6	266.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000236	1.004364
NO_X Cal Offset:	0.184305	0.065025
NO Cal Slope:	0.999895	1.005722
NO Cal Offset:	-0.496226	-0.434914
NO_2 Cal Slope:	0.995394	0.999767
NO_2 Cal Offset:	-0.512082	-0.637319

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	699.4	697.6	1.8	1.144	1.147
as found 2nd	4960	40.2	399.6	399.6	0.0	350.2	347.6	2.6	1.1410	1.1495
as found 3rd	4980	20.1	199.8	199.8	0.0	174.3	172.2	2.2	1.1462	1.1602
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.2	-0.2	----	----
high point	4920	80.5	800.2	800.2	0.0	803.2	804.0	-0.9	0.996	0.995
second point	4960	40.2	399.6	399.6	0.0	402.5	402.6	-0.1	0.993	0.992
third point	4980	20.1	199.8	199.8	0.0	200.6	199.4	1.2	0.996	1.002
as left zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.3	-0.2	----	----
as left span	4920	80.5	800.2	430.6	369.6	801.8	432.1	369.8	0.998	0.996
								Average Correction Factor	0.995	0.997

Corrected As found	NO_X = 699.6 ppb	NO = 697.6 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -14.4%	
Previous Response	NO_X = 800.5 ppb	NO = 799.6 ppb		*Percent Change	NO = -14.6%	
Baseline Corr 2nd pt	NO_X = 350.4 ppb	NO = 347.6 ppb	As found	NO_X r^2: 0.999997	Nx Sl: 0.874540	Nx Int: -0.062
Baseline Corr 3rd pt	NO_X = 174.5 ppb	NO = 172.2 ppb	As found	NO r^2: 0.999991	NO Sl: 0.872557	NO Int: -0.943
			As found	NO_2 r^2: 1.000000	NO2 Sl: 1.003430	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)	694.7	374.0	320.7	321.6	0.9972	100.3%
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	800.5	430.9	369.6	369.0	1.002	99.8%
2nd GPT point (200 ppb O3)	800.5	617.0	183.5	182.9	1.003	99.7%
3rd GPT point (100 ppb O3)	800.5	706.4	94.1	92.8	1.014	98.6%
				Average Correction Factor	1.006	99.4%

Notes: Daily span is 13% low and pump flow went down since yesterday. Swapped out the pump after multi-point as founds. Chamber pressure stayed the same with the new pump. There is possibly a leak somewhere inside the instrument. Adjusted the span only. Check Doctit for more info.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

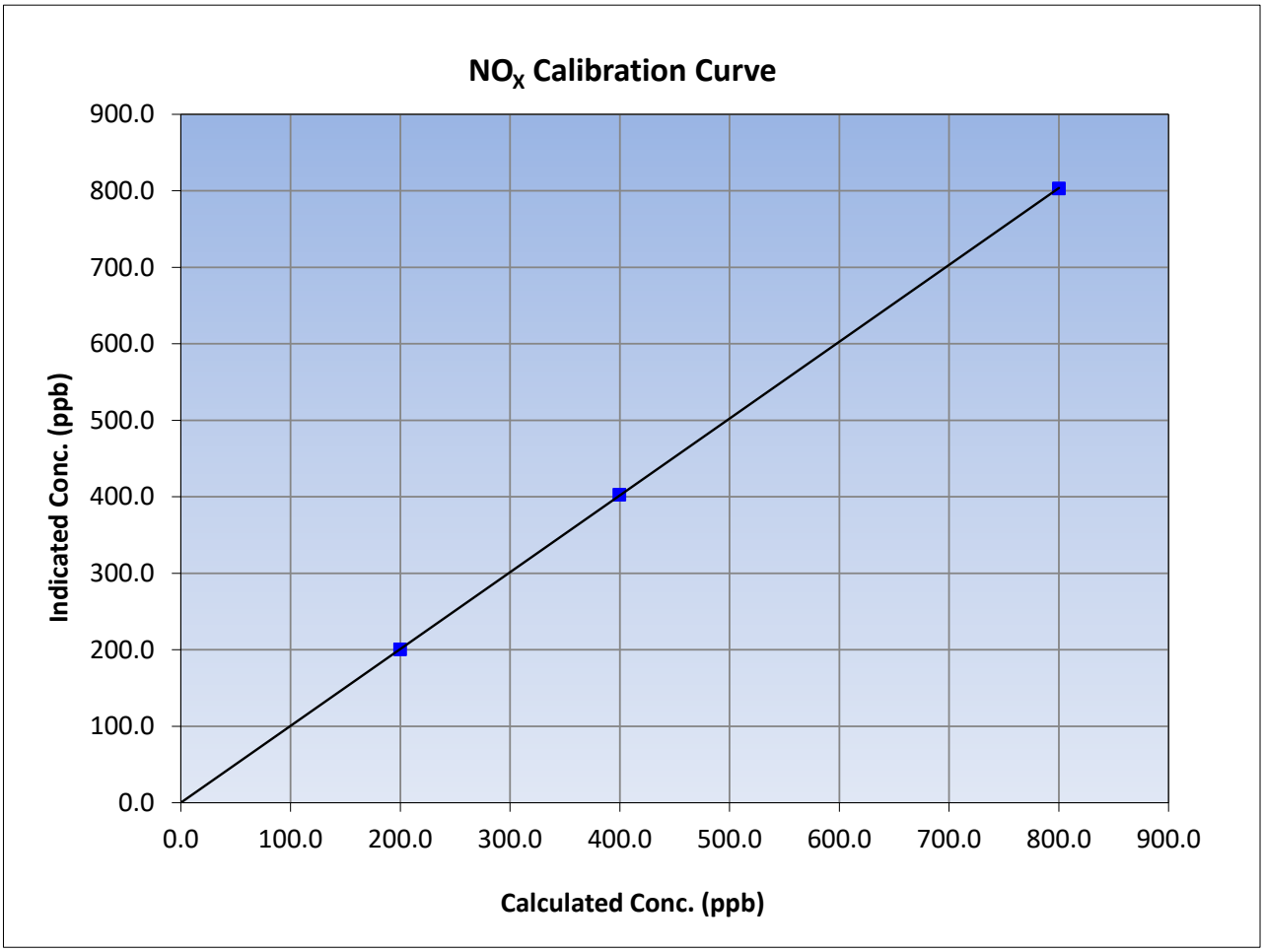
Version-04-2020

Station Information

Calibration Date:	February 23, 2023	Previous Calibration:	February 17, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:56	End Time (MST):	17:40
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.4	----	Correlation Coefficient	0.999995	*≥0.995*
800.2	803.2	0.9962			
399.6	402.5	0.9927	Slope	1.004364	*0.90 - 1.10*
199.8	200.6	0.9960			
			Intercept	0.065025	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

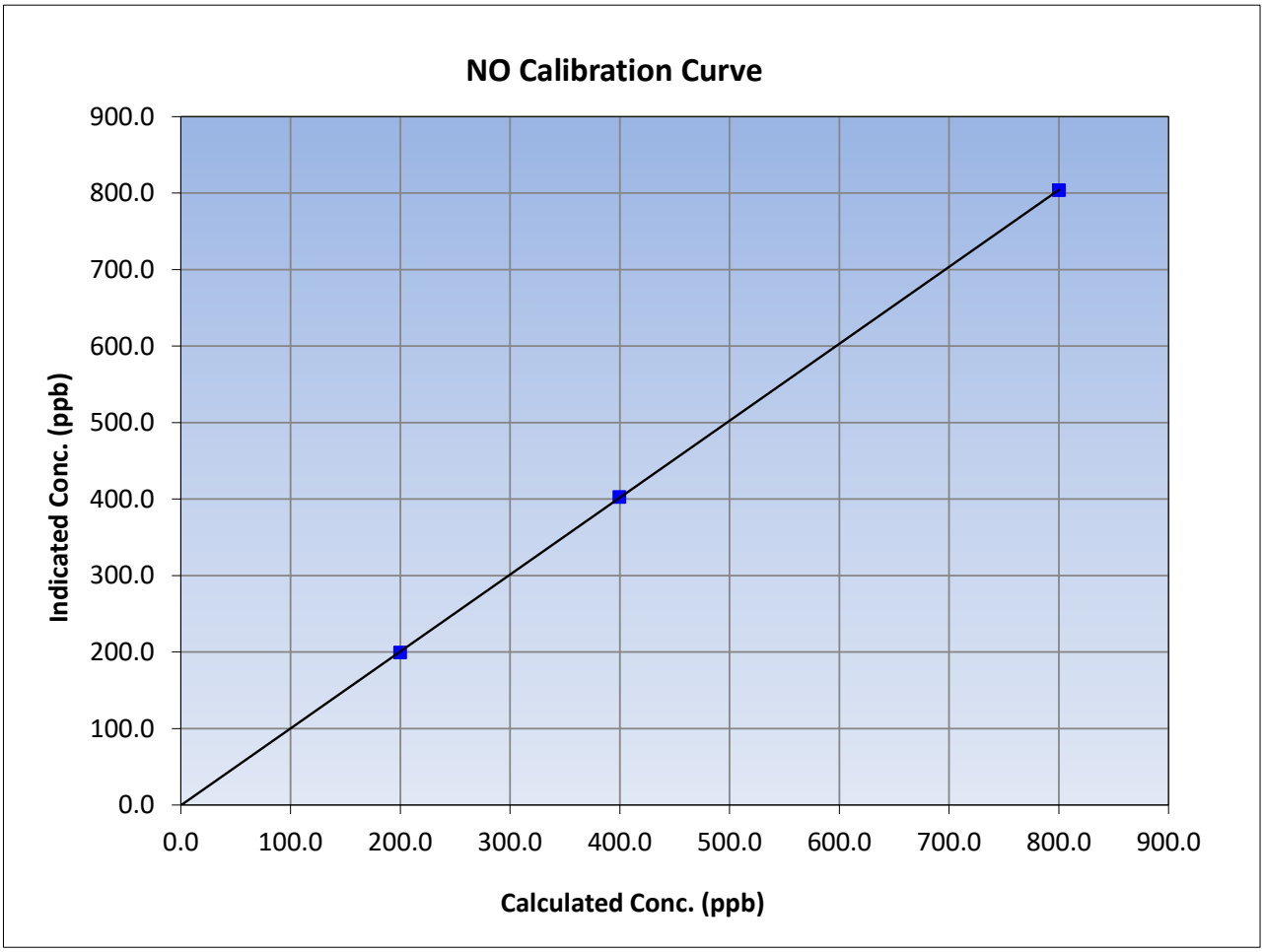
Version-04-2020

Station Information

Calibration Date:	February 23, 2023	Previous Calibration:	February 17, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:56	End Time (MST):	17:40
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999992	≥0.995
800.2	804.0	0.9952			
399.6	402.6	0.9925	Slope	1.005722	0.90 - 1.10
199.8	199.4	1.0020			
			Intercept	-0.434914	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

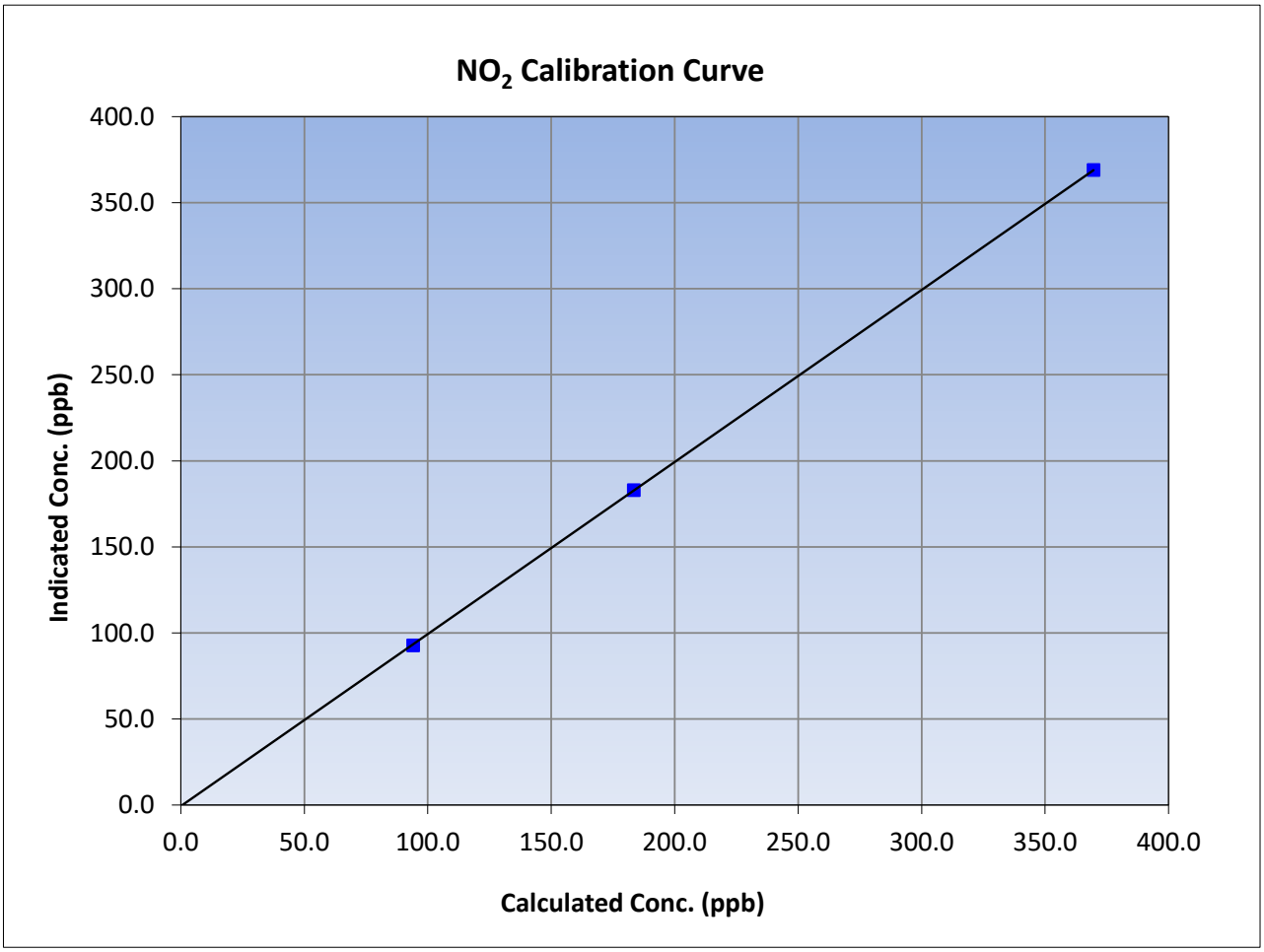
Version-04-2020

Station Information

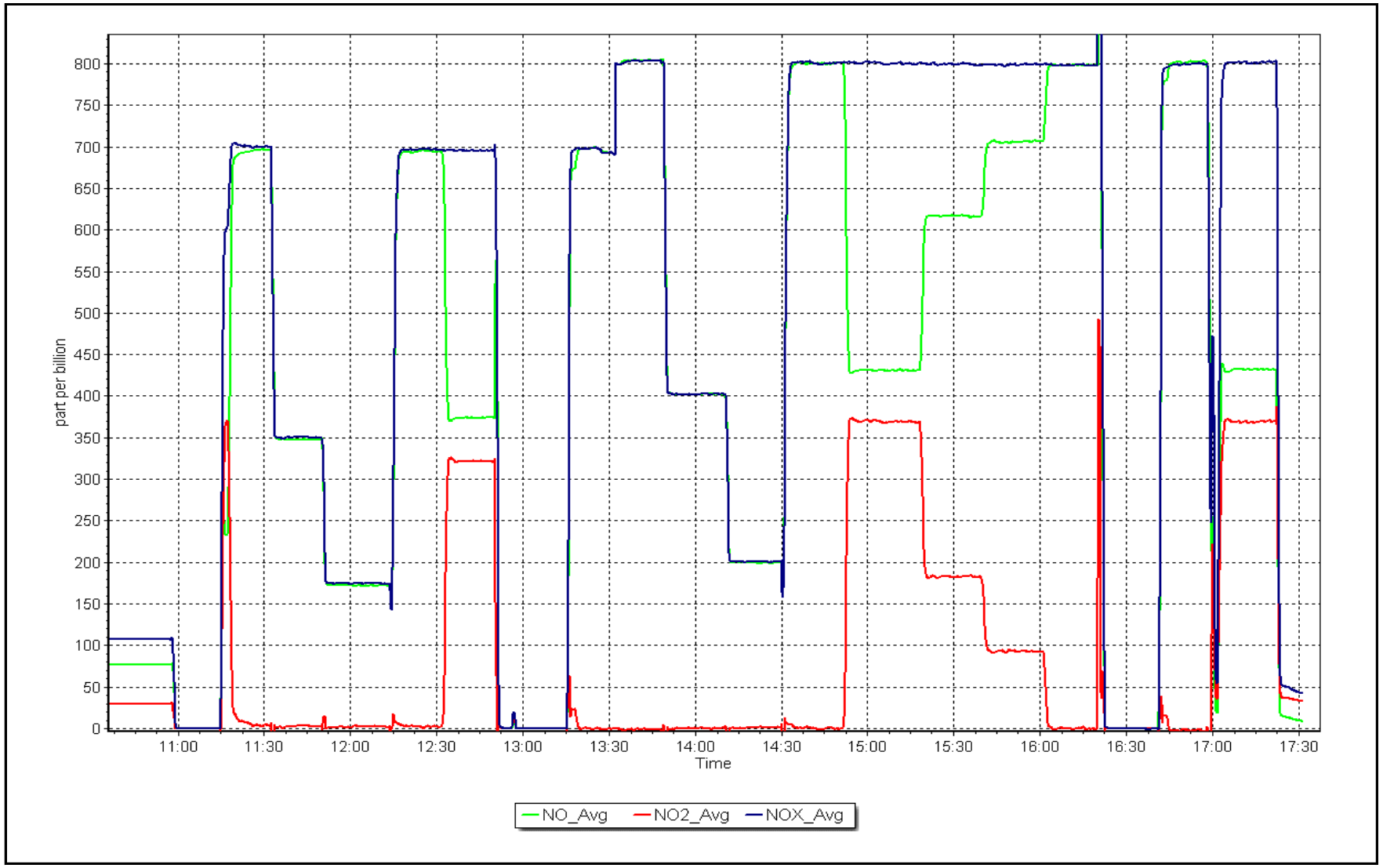
Calibration Date:	February 23, 2023	Previous Calibration:	February 17, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:56	End Time (MST):	17:40
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999992	≥0.995
369.6	369.0	1.0016			
183.5	182.9	1.0033	Slope	0.999767	0.90 - 1.10
94.1	92.8	1.0140			
			Intercept	-0.637319	+/-20



NO_X Calibration Plot Date: February 23, 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:	February 17, 2023	Last Cal Date:	January 18, 2023
Start time (MST):	10:40	End time (MST):	11:14
Analyzer Make:	API T640	S/N:	1162
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	DeltaCal	S/N:	141229
Temp/RH standard:	DeltaCal	S/N:	141229

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-17.5	-17.5	-17.5	☐	+/- 2 °C
P (mmHg)	734.5	728.4	734.5	☐	+/- 10 mmHg
flow (LPM)	5.02	4.95	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: February 17, 2023 Last Cal Date: January 18, 2023

PM w/o HEPA: 9.2 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				☐	11.3 +/- 0.5

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

Date Optical Chamber Cleaned: December 8, 2022 <0.2 ug/m3

Disposable Filter Changed: December 8, 2022

Annual Maintenance

Date Sample Tube Cleaned: September 26, 2022

Date RH/T Sensor Cleaned: September 26, 2022

Notes: Quarterly calibration completed in December. No adjustments made. Leak check passed.

Calibration by: Max Farrell

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS26
CHRISTINA LAKE
FEBRUARY 2023

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

March 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Christina Lake	Station number:	AMS 26
Calibration Date:	February 14, 2023	Last Cal Date:	January 25, 2023
Start time (MST):	13:41	End time (MST):	16:38
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:	1.000779	0.994255	Backgd or Offset:	16.4	16.4
Calibration intercept:	-2.876133	-2.695113	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	789.6	1.012
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	793.1	1.007
second point	4960	40.3	399.4	393.1	1.016
third point	4980	20.2	200.2	193.4	1.035
as left zero	5000	0.0	0.0	0.2	----
as left span	4919	80.6	799.0	795.9	1.004
				Average Correction Factor	1.020

Baseline Corr As found:	789.60	Previous response	796.72	*% change	-0.9%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

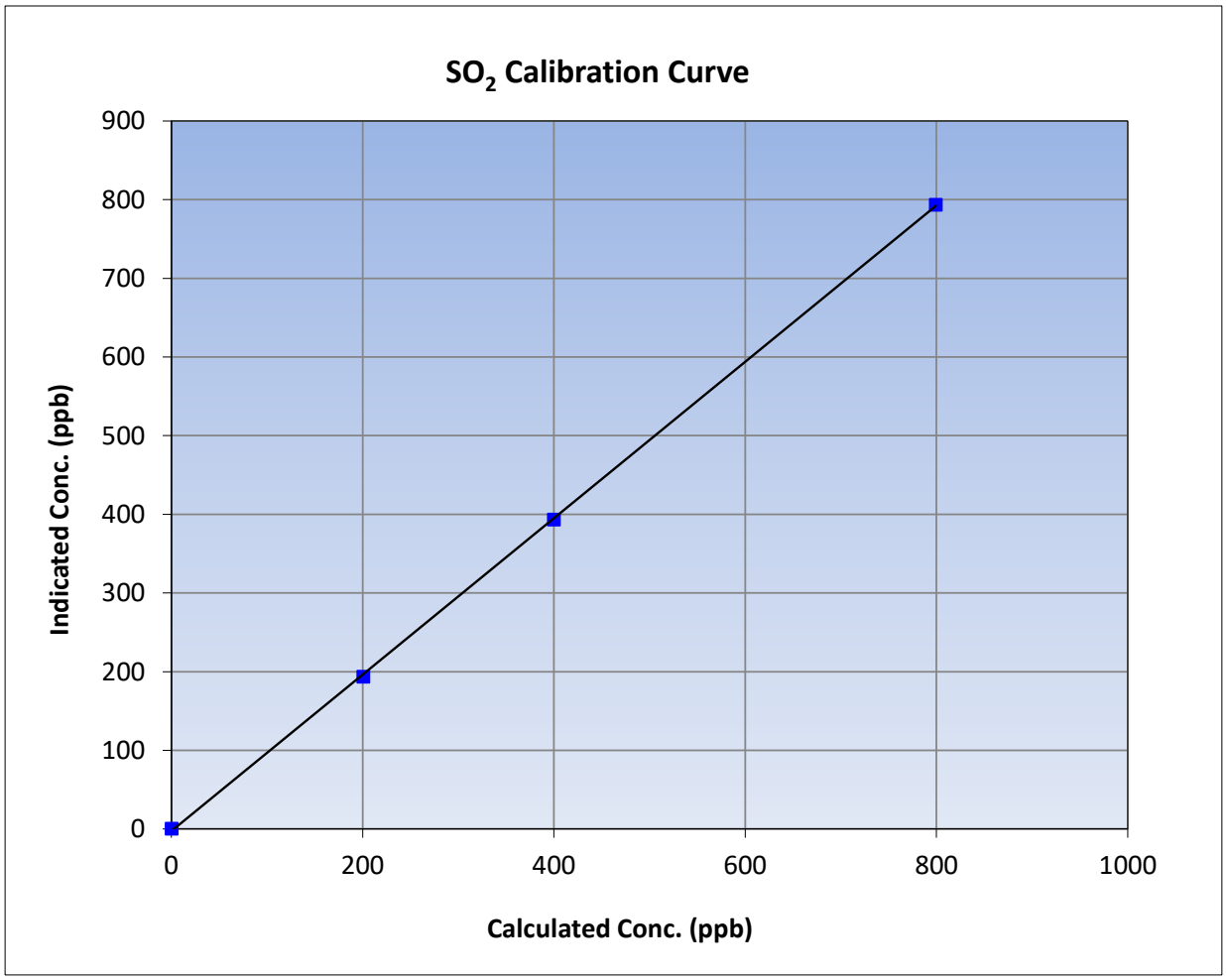
Station Information

Calibration Date:	February 14, 2023	Previous Calibration:	January 25, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	13:41	End Time (MST):	16:38
Analyzer make:	Thermo 43i	Analyzer serial #:	1173410001

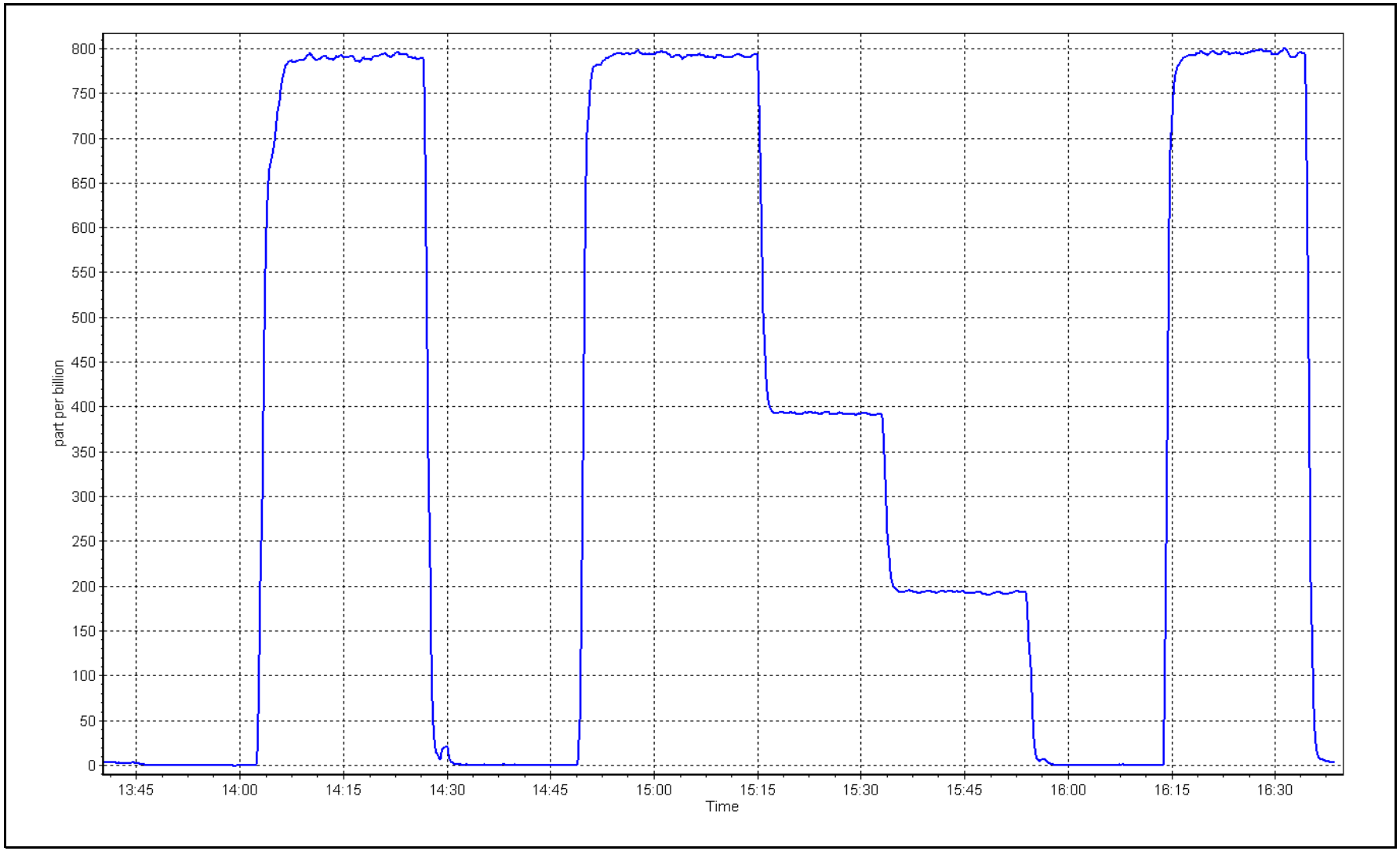
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
799.0	793.1	1.0074
399.4	393.1	1.0161
200.2	193.4	1.0352

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999939	*≥0.995*
Slope	0.994255	*0.90 - 1.10*
Intercept	-2.695113	*+/-30*



SO2 Calibration Plot Date: February 14, 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:	February 15, 2023	Last Cal Date:	January 25, 2023
Start time (MST):	11:04	End time (MST):	15:50
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 T750		Serial Number:	282
ZAG Make/Model:	API T751H		Serial Number:	322

Analyzer Information

Analyzer make:	Thermo 450i		Analyzer serial #:	1180030032
Converter make:	NA		Converter serial #:	NA
Analyzer Range	0 - 100 ppb			

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.010037	0.996758	Backgd or Offset:	33.3	33.6
Calibration intercept:	0.159267	0.098881	Coeff or Slope:	1.113	1.125

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4918	81.8	80.0	78.5	1.020
as found 2nd point	4959	40.9	40.0	39.6	1.013
as found 3rd point	4979	20.4	20.0	19.4	1.034
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	4918	81.8	80.0	80.1	0.999
second point	4959	40.9	40.0	39.6	1.010
third point	4979	20.4	20.0	19.7	1.013
as left zero	5000	0.0	0.0	0.6	----
as left span	4918	81.8	80.0	79.9	1.001
SO2 Scrubber Check	4919	80.6	806.1	0.2	----
Date of last scrubber change:		27-Feb-19		Ave Corr Factor	1.007
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.4	Prev response:	80.97	*% change:	-3.3%
Baseline Corr 2nd AF pt:	39.5	AF Slope:	0.981475	AF Intercept:	0.058616
Baseline Corr 3rd AF pt:	19.3	AF Correlation:	0.999957		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after MAF's, ran scrubber check after calibrator span. Adjusted span only.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

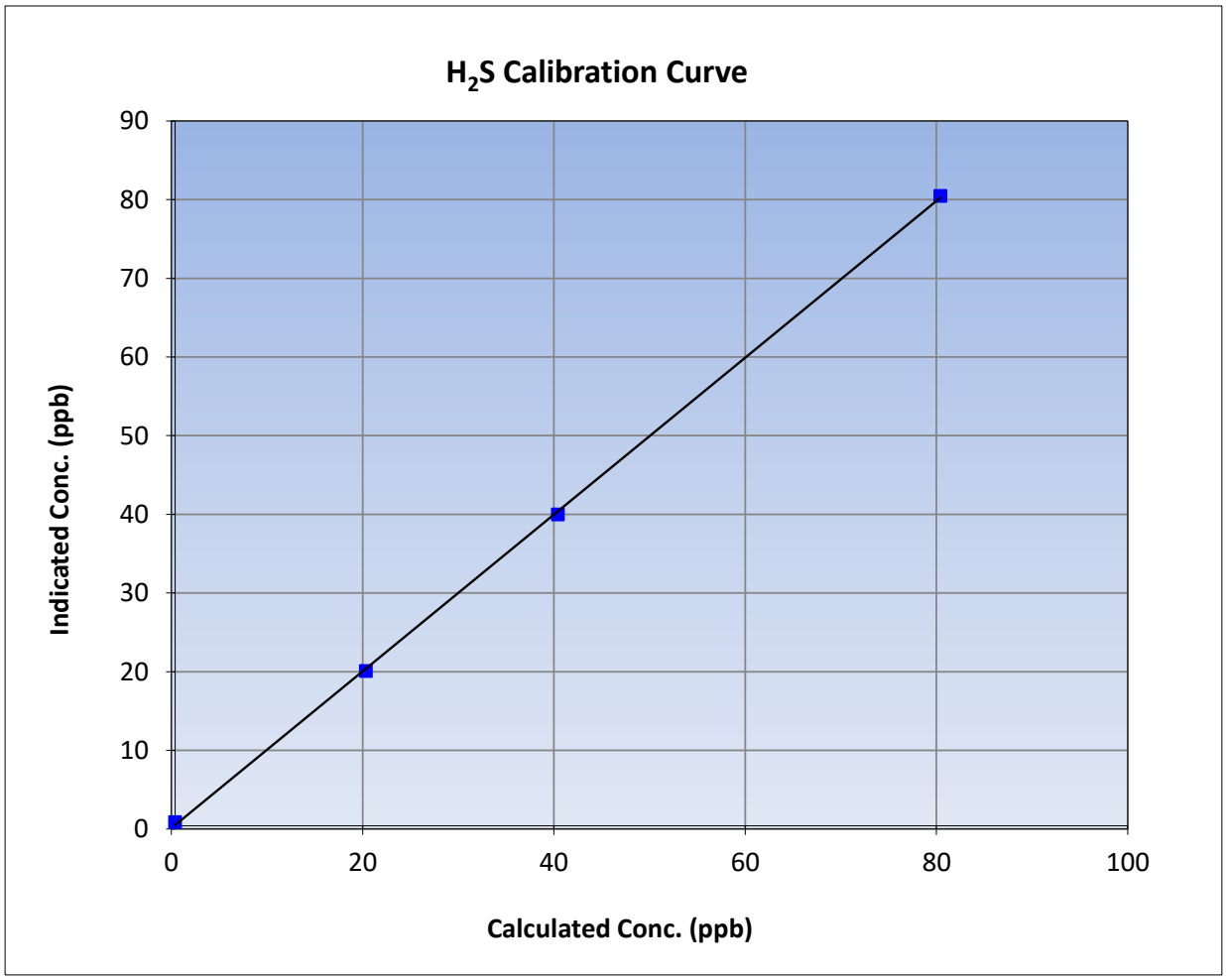
Station Information

Calibration Date:	February 15, 2023	Previous Calibration:	January 25, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	11:04	End Time (MST):	15:50
Analyzer make:	Thermo 450i	Analyzer serial #:	1180030032

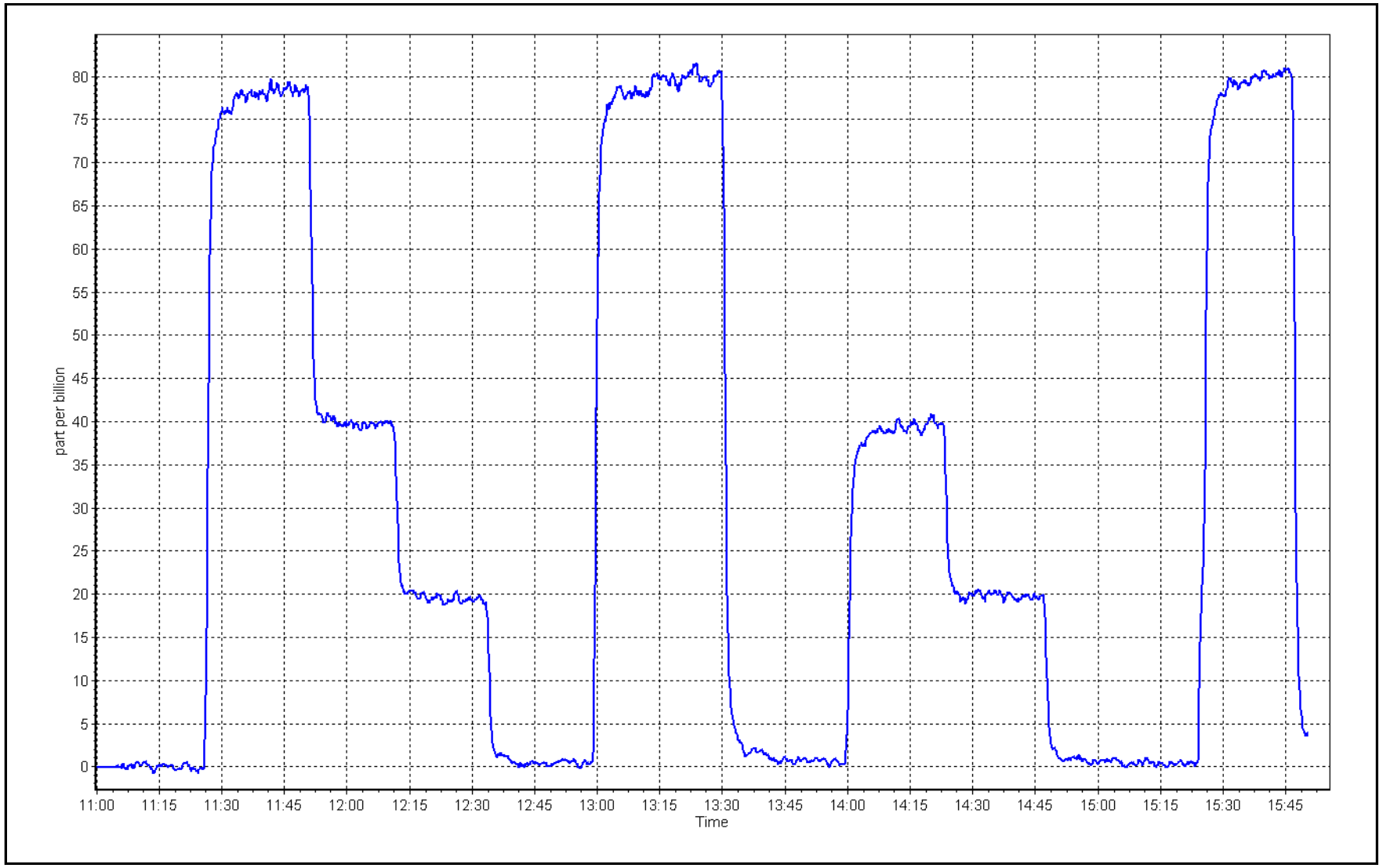
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
80.0	80.1	0.9988
40.0	39.6	1.0101
20.0	19.7	1.0129

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999872	*≥0.995*
Slope	0.996758	*0.90 - 1.10*
Intercept	0.098881	*+/-3*



H_2S Calibration Plot Date: February 15, 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:	February 16, 2023	Last Cal Date:	January 24, 2023
Start time (MST):	10:27	End time (MST):	14:48
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2Y1P4C		Cal Gas Expiry Date:	November 12, 2023	
NOX Cal Gas Conc:	50.82	ppm	NO Cal Gas Conc:	50.02	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	50.82	ppm	Removed Gas NO Conc:	50.02	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	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:	1.647	1.713	NO bkgnd or offset:	2.7	2.8
NOX coeff or slope:	0.996	0.996	NOX bkgnd or offset:	2.8	2.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	190.1	191.9

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000028	1.000661
NO_X Cal Offset:	-2.400000	-1.500000
NO Cal Slope:	1.000828	1.000043
NO Cal Offset:	-3.180000	-2.080000
NO_2 Cal Slope:	0.997345	1.003073
NO_2 Cal Offset:	-0.231843	-0.020912

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	-0.1	0.2	----	----
as found span	4920	80.0	813.1	800.3	12.8	782.3	768.4	13.9	1.0394	1.0415
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.4	0.2	0.2	----	----
high point	4920	80.0	813.1	800.3	12.8	813.1	799.3	13.8	1.0000	1.0013
second point	4960	40.0	406.6	400.2	6.4	404.4	397.3	7.0	1.0053	1.0072
third point	4980	20.0	203.3	200.1	3.2	200.0	195.5	4.5	1.0164	1.0234
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	389.5	423.6	815.6	392.2	423.5	0.9970	0.9932
								Average Correction Factor	1.0073	1.0106

Corrected As found	NO_X = 782.1 ppb	NO = 768.5 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -3.7%
Previous Response	NO_X = 810.7 ppb	NO = 797.8 ppb		*Percent Change	NO = -3.8%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found NO r^2:	NO Sl:	NO Int:
			As found NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	799.6	388.8	423.6	424.9	0.9969	100.3%
2nd GPT point (200 ppb O3)	799.6	600.5	211.9	212.7	0.9962	100.4%
3rd GPT point (100 ppb O3)	799.6	704.7	107.7	107.6	1.0009	99.9%
				Average Correction Factor	0.9980	100.2%

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

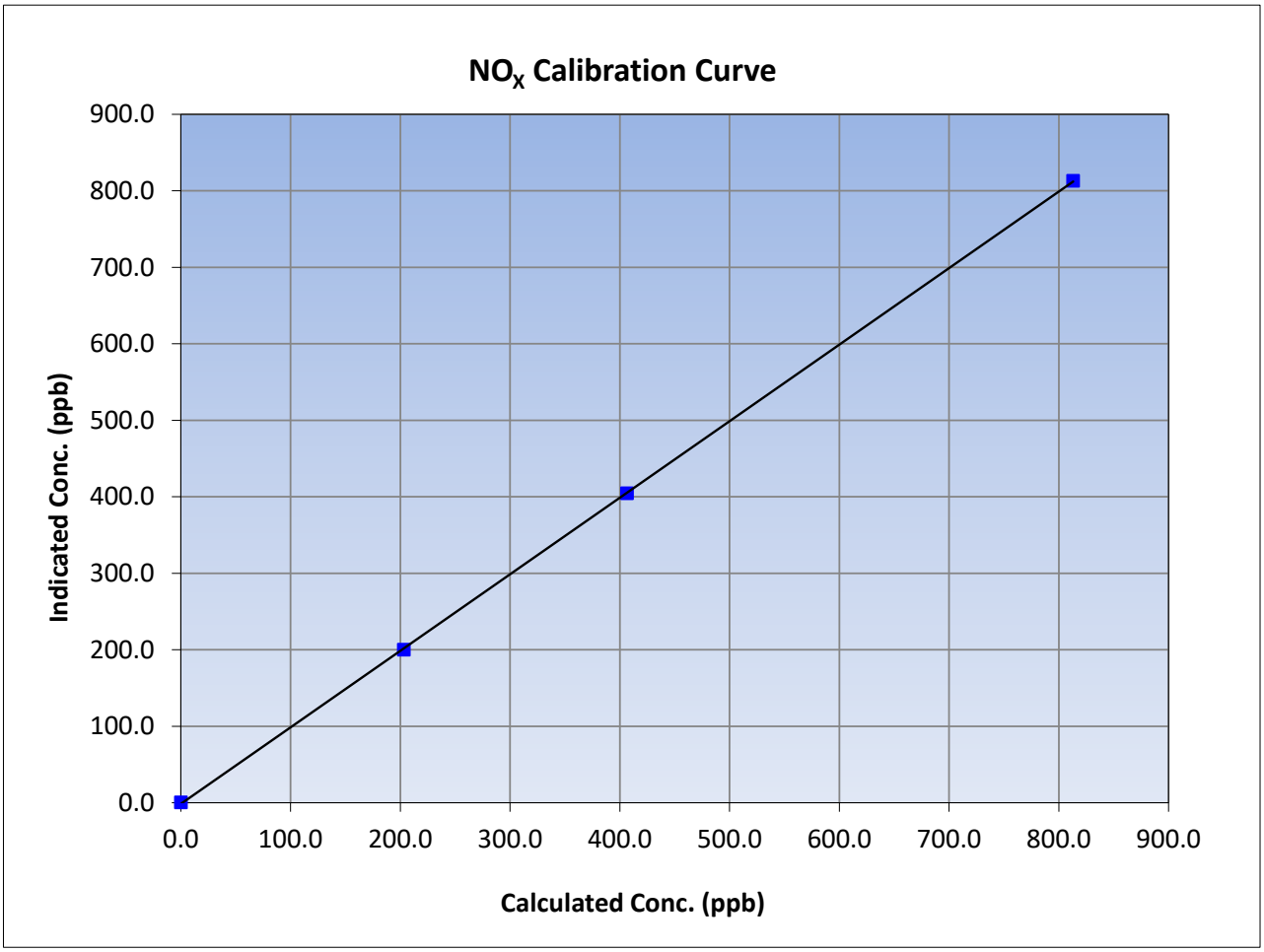
Version-04-2020

Station Information

Calibration Date:	February 16, 2023	Previous Calibration:	January 24, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	10:27	End Time (MST):	14:48
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	0.4	----	Correlation Coefficient	0.999975	*≥0.995*
813.1	813.1	1.0000			
406.6	404.4	1.0053	Slope	1.000661	*0.90 - 1.10*
203.3	200.0	1.0164			
			Intercept	-1.500000	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

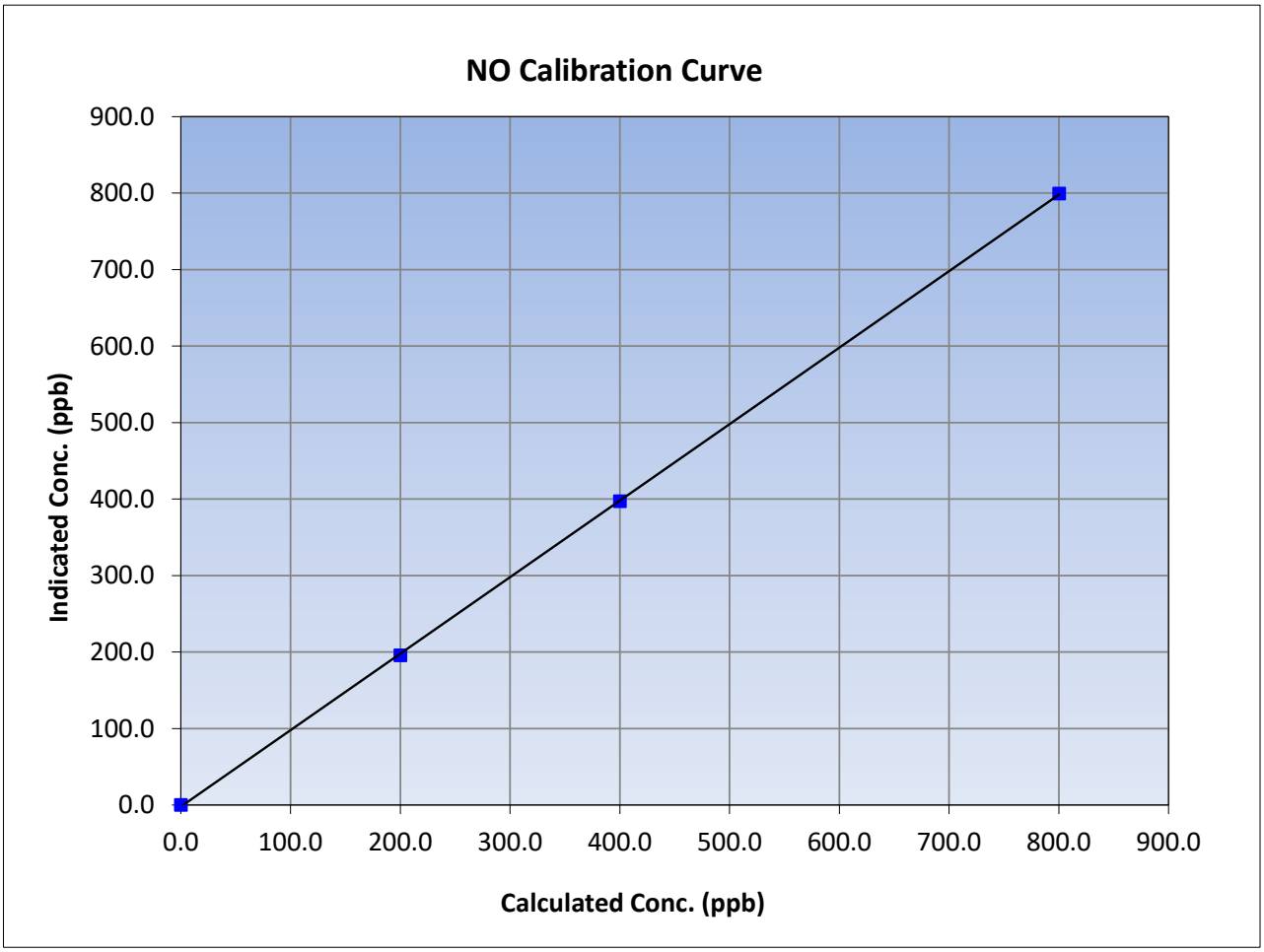
Version-04-2020

Station Information

Calibration Date:	February 16, 2023	Previous Calibration:	January 24, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	10:27	End Time (MST):	14:48
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	0.2	----	Correlation Coefficient	0.999962	*≥0.995*
800.3	799.3	1.0013			
400.2	397.3	1.0072	Slope	1.000043	*0.90 - 1.10*
200.1	195.5	1.0234			
			Intercept	-2.080000	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

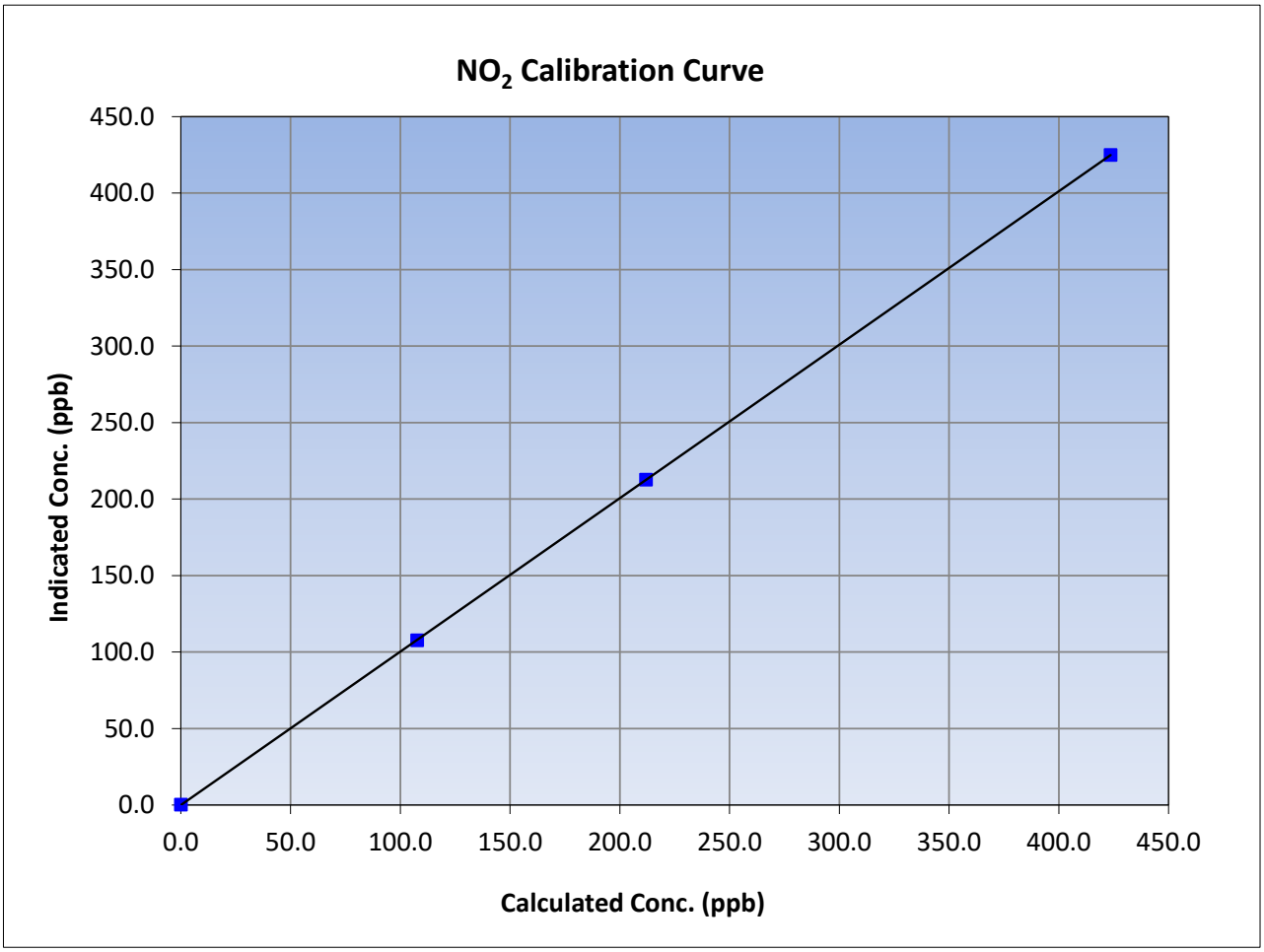
Version-04-2020

Station Information

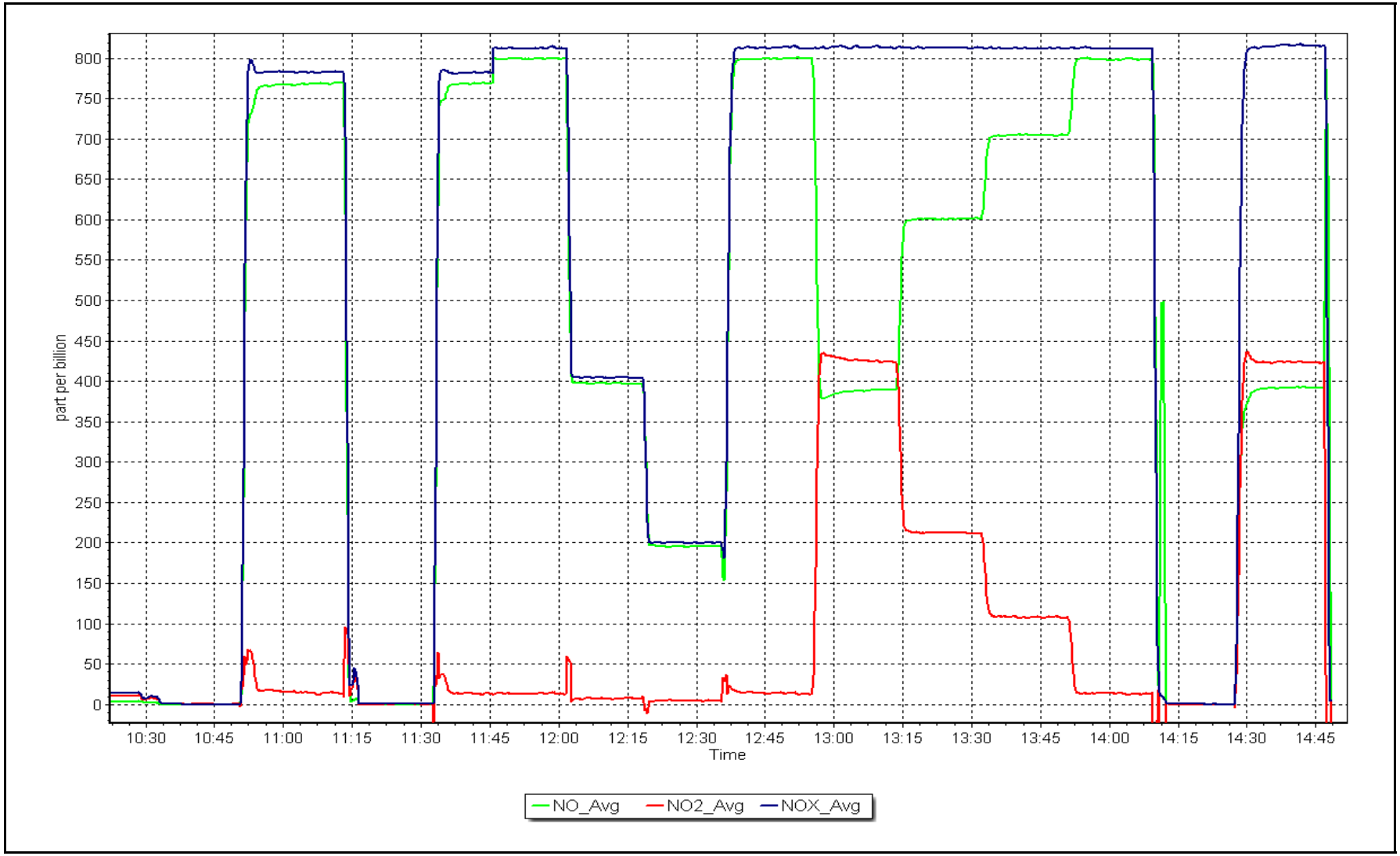
Calibration Date:	February 16, 2023	Previous Calibration:	January 24, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	10:27	End Time (MST):	14:48
Analyzer make:	Thermo 42i	Analyzer serial #:	14:00

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999998	≥0.995
423.6	424.9	0.9969			
211.9	212.7	0.9962	Slope	1.003073	0.90 - 1.10
107.7	107.6	1.0009			
			Intercept	-0.020912	+/-20



NO_X Calibration Plot Date: February 16, 2023 Location: Christina Lake



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS27
JACKFISH 2/3
FEBRUARY 2023

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

March 31, 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:	February 14, 2023	Last Cal Date:	January 19, 2023
Start time (MST):	10:57	End time (MST):	13:40
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.58	ppm	Cal Gas Exp Date:	December 29, 2028
Cal Gas Cylinder #:	SG9133974BAL			
Removed Cal Gas Conc:	50.58	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3811
ZAG Make/Model:	API 701		Serial Number:	364

Analyzer Information

Analyzer make: Thero 43iQ — Analyzer serial #: 12124313138

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.001858	1.001161	Backgd or Offset:	7.4	7.4
Calibration intercept:	-1.876897	-1.757862	Coeff or Slope:	0.979	0.979

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	----
as found span	4921	79.1	800.2	800.0	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4921	79.1	800.2	800.0	1.000
second point	4961	39.5	399.5	398.1	1.004
third point	4980	19.8	200.3	196.4	1.020
as left zero	5000	0.0	0.0	0.1	----
as left span	4921	79.1	800.2	805.0	0.994
				Average Correction Factor	1.008

Baseline Corr As found:	800.00	Previous response	799.77	*% change	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments have been made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

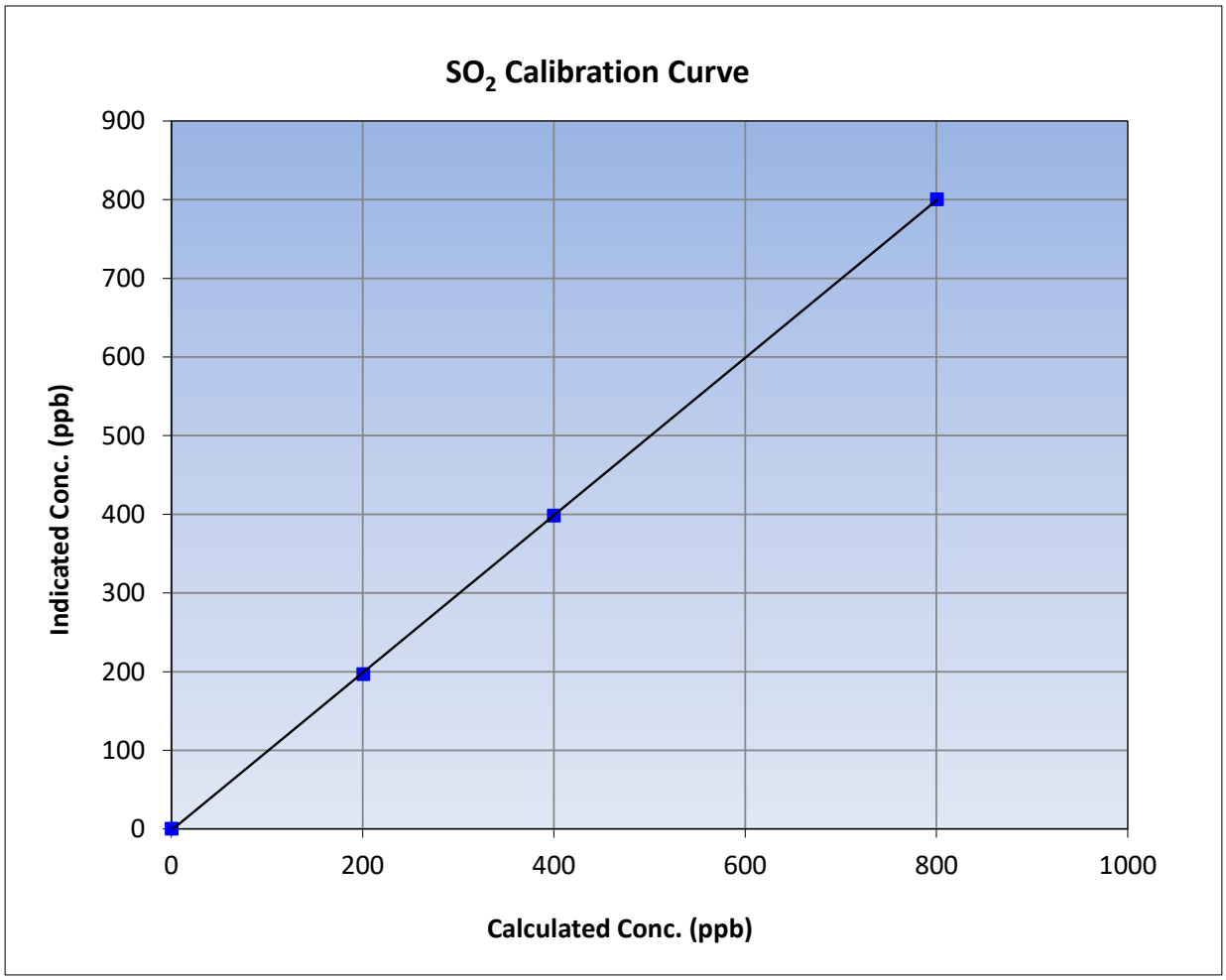
Station Information

Calibration Date:	February 14, 2023	Previous Calibration:	January 19, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS 27
Start Time (MST):	10:57	End Time (MST):	13:40
Analyzer make:	Thero 43iQ	Analyzer serial #:	12124313138

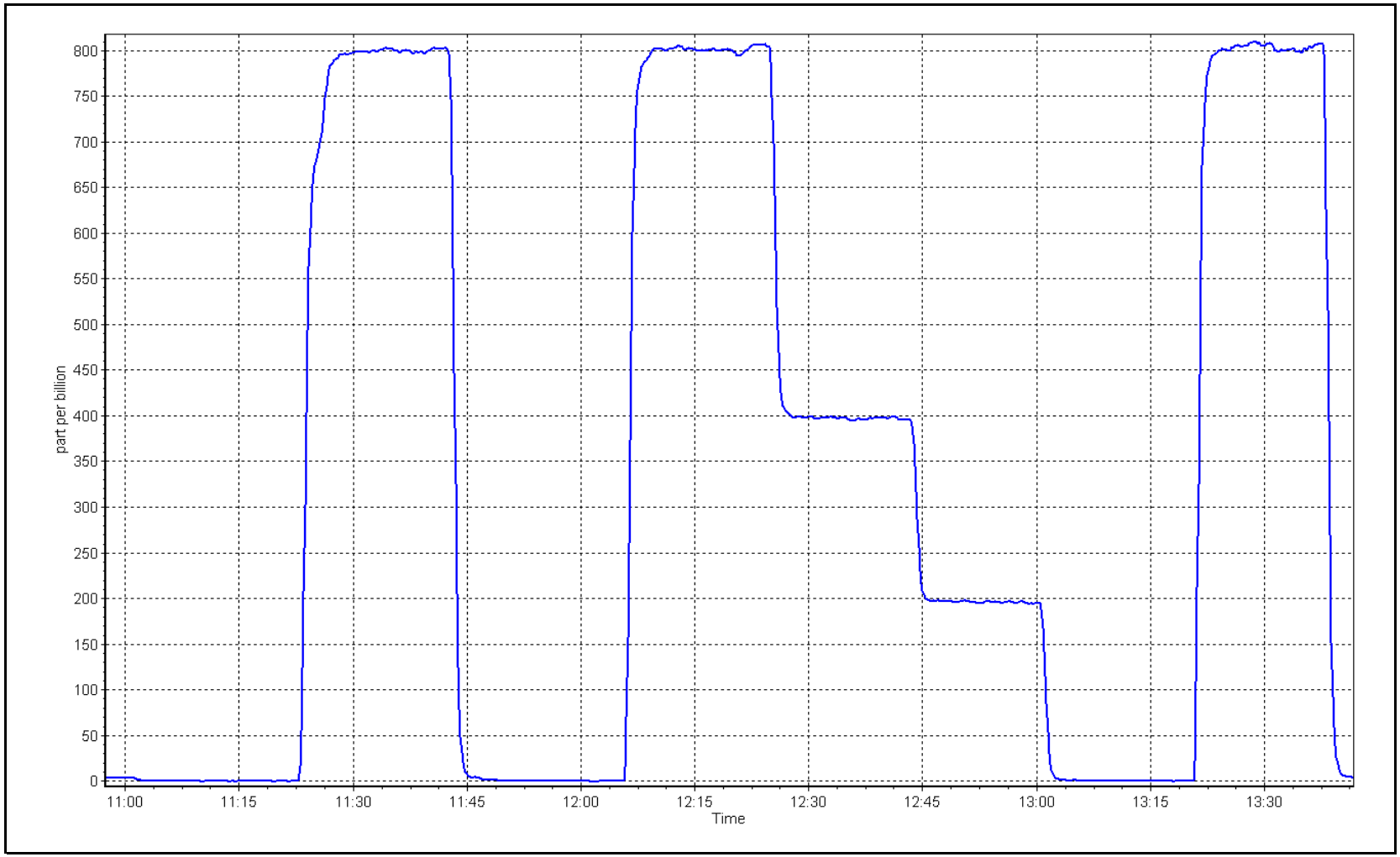
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
800.2	800.0	1.0002
399.5	398.1	1.0036
200.3	196.4	1.0199

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999973	*≥0.995*
Slope	1.001161	*0.90 - 1.10*
Intercept	-1.757862	*+/-30*



SO2 Calibration Plot Date: February 14, 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:	February 7, 2023	Last Cal Date:	January 11, 2023
Start time (MST):	9:20	End time (MST):	13:50
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.41	ppm	Cal Gas Exp Date:	January 4, 2025
Cal Gas Cylinder #:	CC345023			
Removed Cal Gas Conc:	5.41	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3811
ZAG Make/Model:	API 701		Serial Number:	364

Analyzer Information

Analyzer make:	API T101		Analyzer serial #:	621	
Converter make:			Converter serial #:		
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997920	1.000628	Backgd or Offset:	24.3	25.4
Calibration intercept:	0.042016	-0.177928	Coeff or Slope:	0.965	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	0.5	----
as found span	4926	74.1	80.2	82.0	0.984
as found 2nd point	4963	37.0	40.0	41.0	0.988
as found 3rd point	4982	18.5	20.0	20.2	1.016
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4926	74.1	80.2	80.1	1.001
second point	4963	37.0	40.0	39.9	1.003
third point	4982	18.5	20.0	19.6	1.021
as left zero	5000	0.0	0.0	0.1	----
as left span	4926	74.1	80.2	79.8	1.005
SO2 Scrubber Check	4921	79.1	791.0	0.1	----
Date of last scrubber change:				Ave Corr Factor	1.008
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.5	Prev response:	80.05	*% change:	1.8%
Baseline Corr 2nd AF pt:	40.5	AF Slope:	1.019017	AF Intercept:	0.202428
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999930		

* = > +/-5% change initiates investigation

Notes: Adjusted both zero and span.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

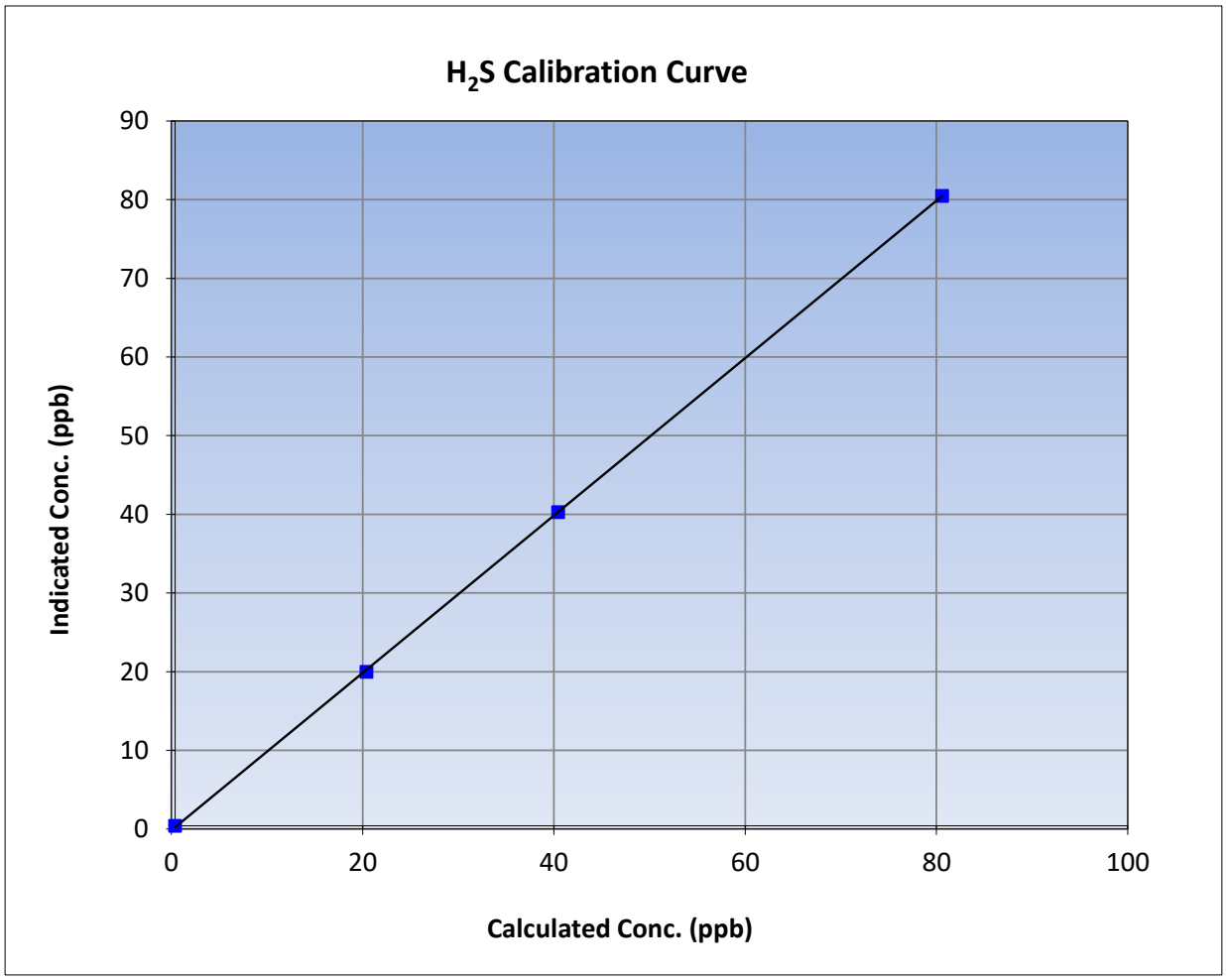
Station Information

Calibration Date:	February 7, 2023	Previous Calibration:	January 11, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:20	End Time (MST):	13:50
Analyzer make:	API T101	Analyzer serial #:	621

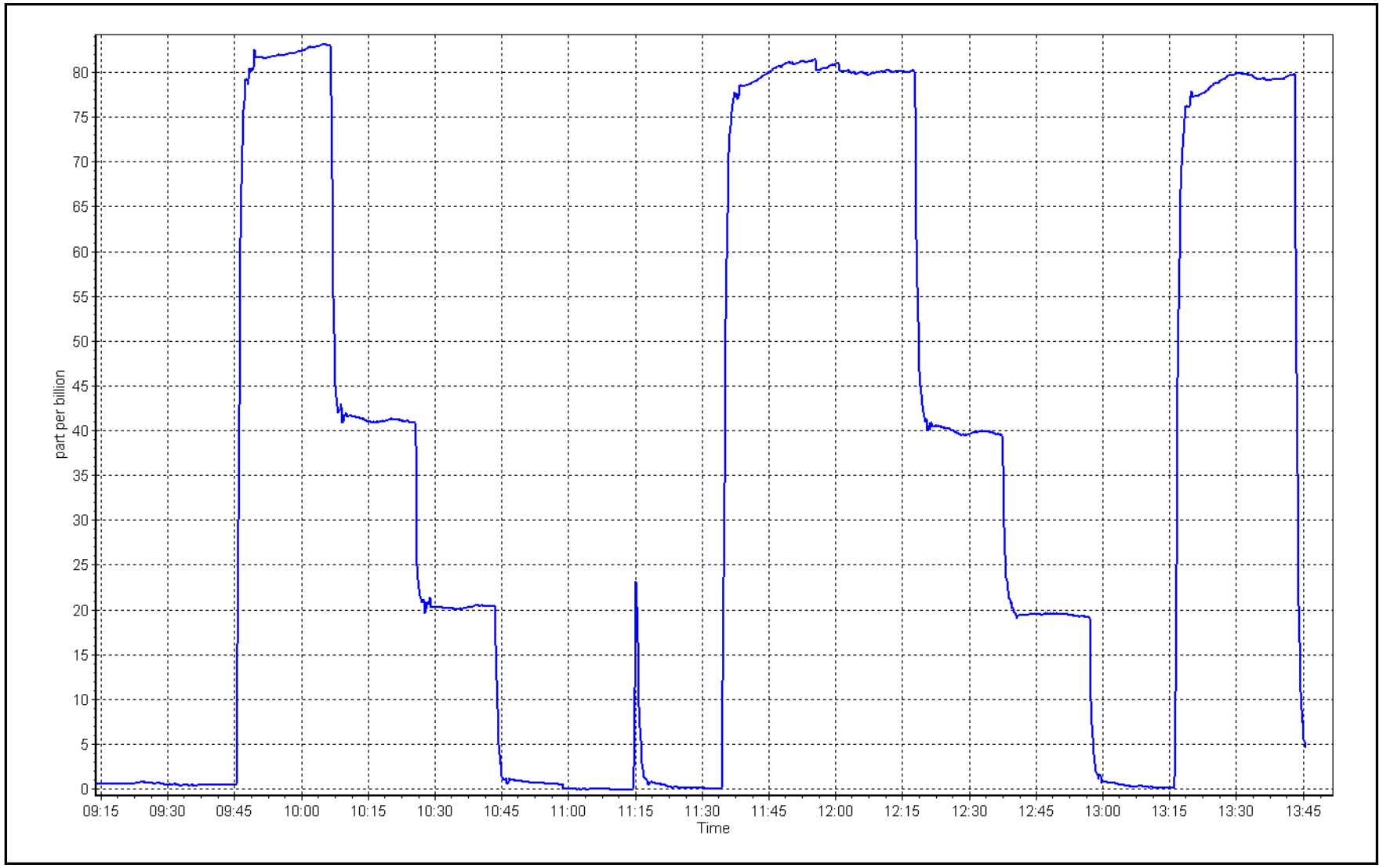
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.2	80.1	1.0009
40.0	39.9	1.0034
20.0	19.6	1.0212

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999972	*≥0.995*
Slope	1.000628	*0.90 - 1.10*
Intercept	-0.177928	*+/-3*



H_2S Calibration Plot Date: February 7, 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:	February 22, 2023	Last Cal Date:	January 18, 2023
Start time (MST):	9:27	End time (MST):	13:20
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 T750		Serial Number:	282	
ZAG make/model:	API 751H		Serial Number:	321	

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:	4.3	4.4

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001608	0.998669
NO_X Cal Offset:	-3.416967	-3.017307
NO Cal Slope:	1.005444	1.000287
NO Cal Offset:	-4.300508	-2.020303
NO_2 Cal Slope:	0.998544	0.990573
NO_2 Cal Offset:	0.230642	-1.100427

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.7	-0.9	0.2	----	----
as found span	4921	79.4	816.8	800.3	16.5	810.0	798.9	11.5	1.0084	1.0017
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	814.0	799.2	14.7	1.0034	1.0014
second point	4960	39.7	408.5	400.2	8.3	404.0	398.1	5.9	1.0110	1.0053
third point	4980	19.8	203.7	199.6	4.1	197.0	195.2	1.8	1.0341	1.0225
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
as left span	4921	79.4	816.8	403.7	414.2	812.1	399.0	413.1	1.0058	1.0118
								Average Correction Factor	1.0162	1.0097

Corrected As found	NO_X = 810.7 ppb	NO = 799.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.5%
Previous Response	NO_X = 814.7 ppb	NO = 800.3 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)	801.0	403.3	414.2	410.0	1.0103	99.0%
2nd GPT point (200 ppb O3)	801.0	611.7	205.8	201.6	1.0209	98.0%
3rd GPT point (100 ppb O3)	801.0	712.0	105.5	102.6	1.0284	97.2%
				Average Correction Factor	1.0199	98.1%

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

NO_X Calibration Summary

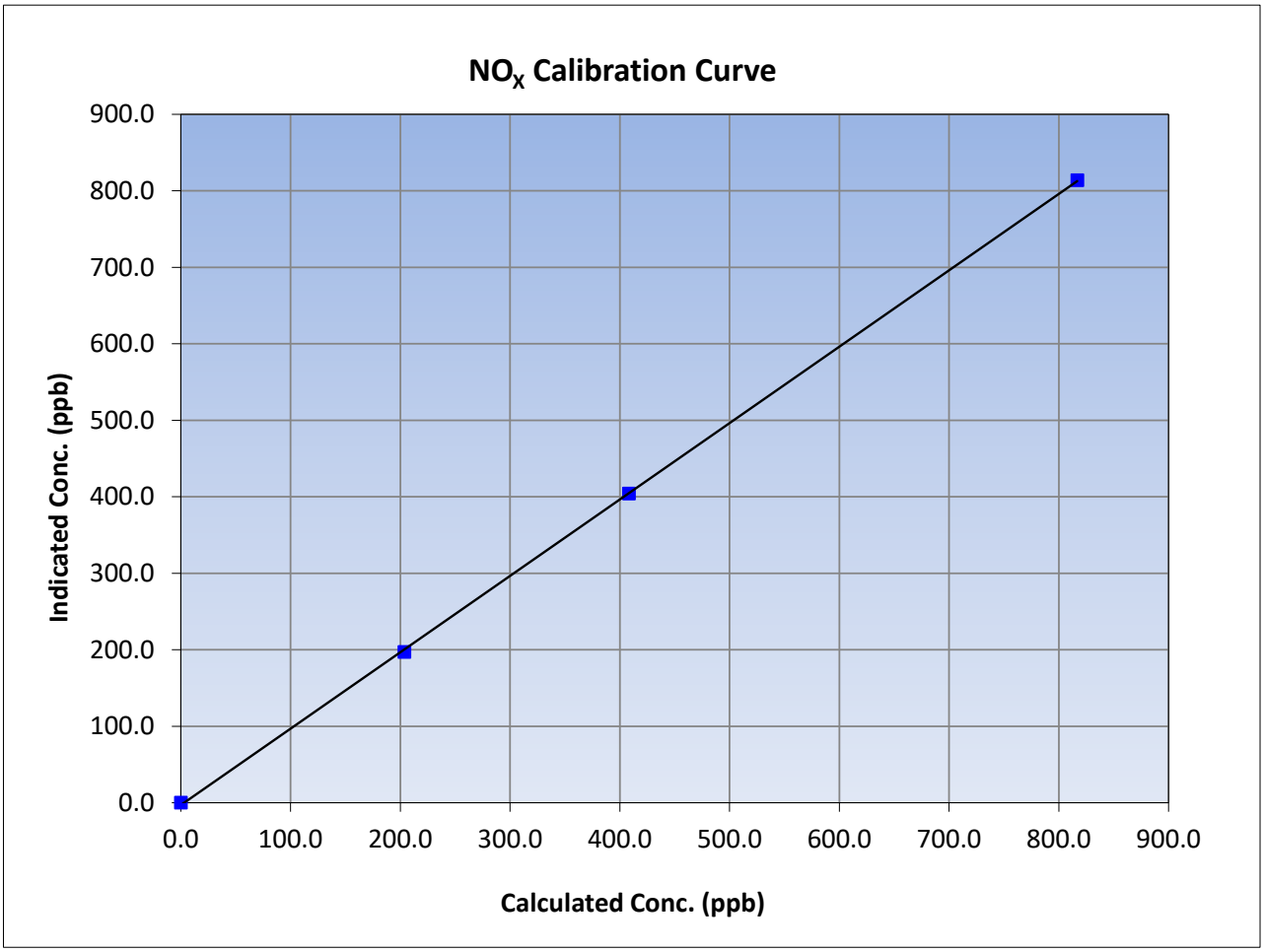
Version-04-2020

Station Information

Calibration Date:	February 22, 2023	Previous Calibration:	January 18, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:27	End Time (MST):	13:20
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	0.999936	≥0.995
816.8	814.0	1.0034			
408.5	404.0	1.0110	Slope	0.998669	0.90 - 1.10
203.7	197.0	1.0341			
			Intercept	-3.017307	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

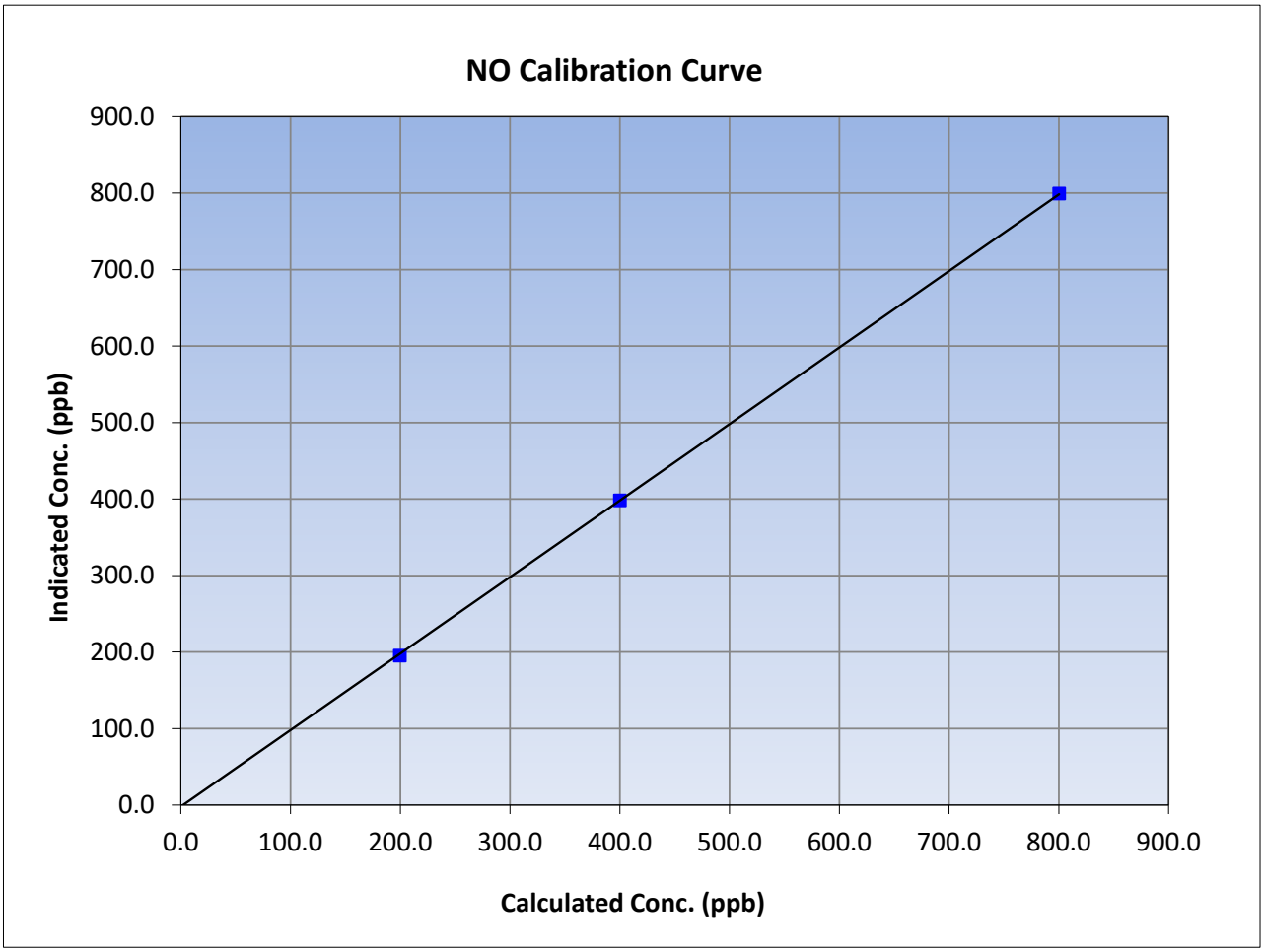
Version-04-2020

Station Information

Calibration Date:	February 22, 2023	Previous Calibration:	January 18, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:27	End Time (MST):	13:20
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	0.999971	≥0.995
800.3	799.2	1.0014			
400.2	398.1	1.0053	Slope	1.000287	0.90 - 1.10
199.6	195.2	1.0225			
			Intercept	-2.020303	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

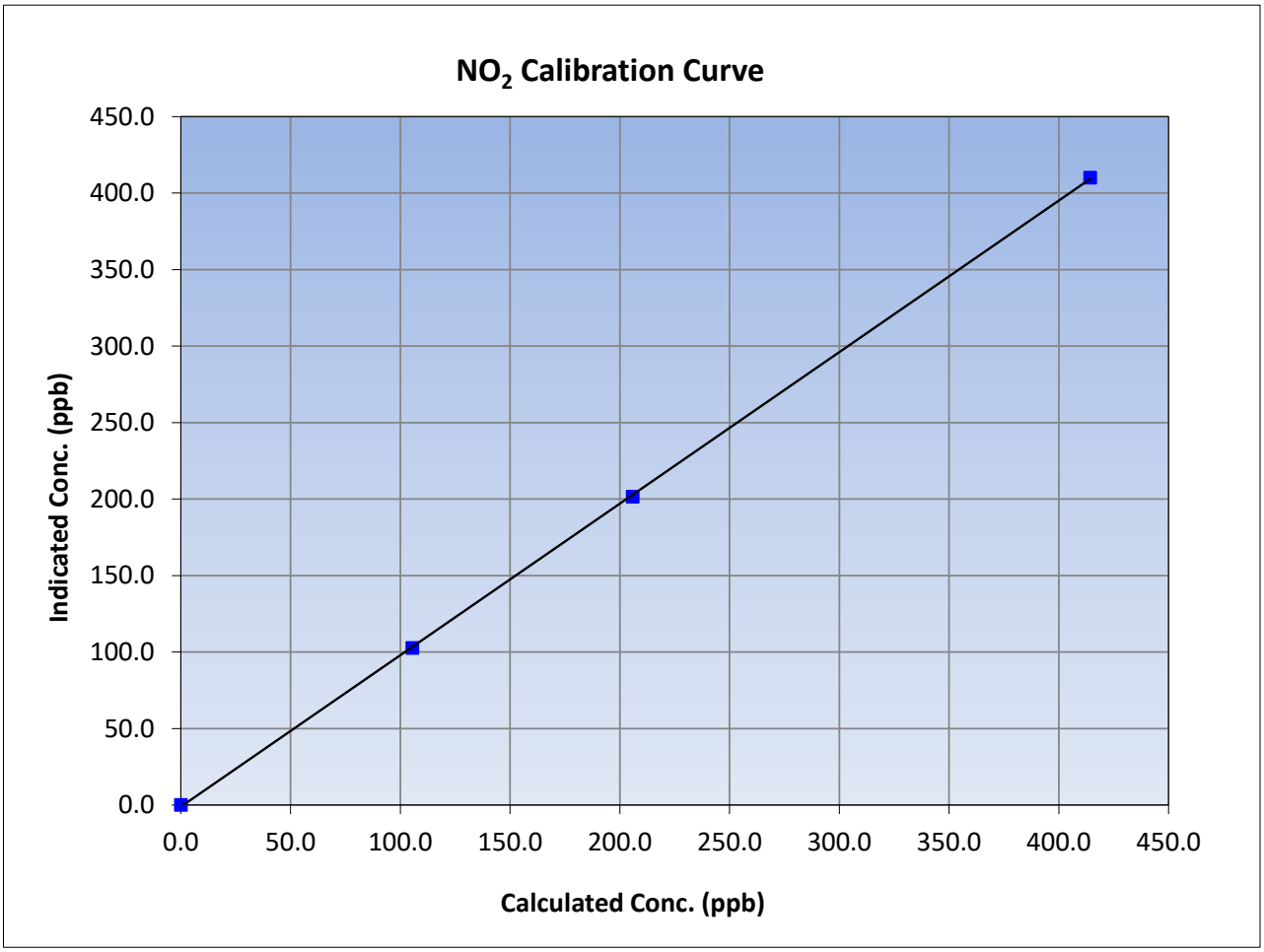
Version-04-2020

Station Information

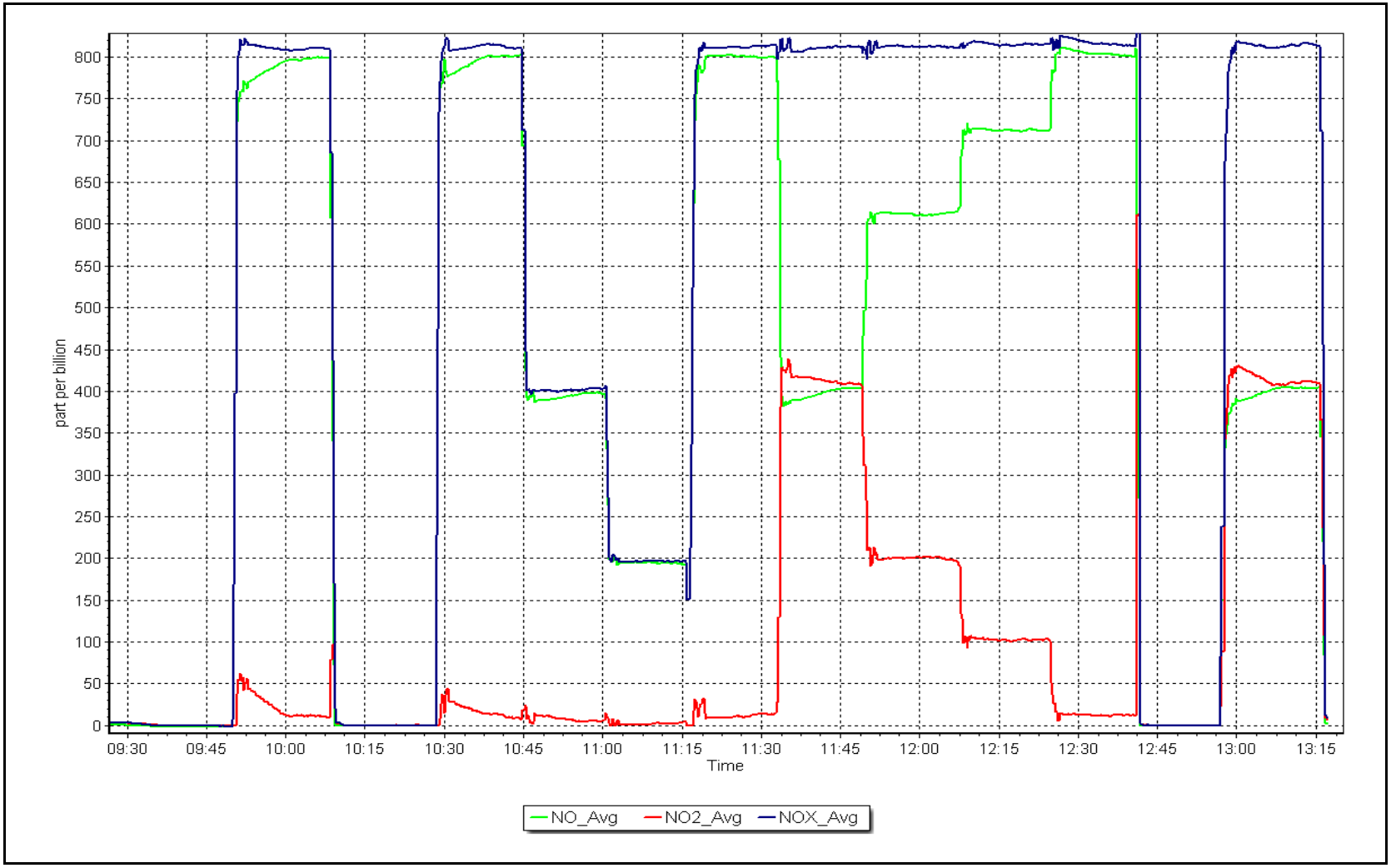
Calibration Date:	February 22, 2023	Previous Calibration:	January 18, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:27	End Time (MST):	13:20
Analyzer make:	API T200	Analyzer serial #:	4460

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999955	≥0.995
414.2	410.0	1.0103			
205.8	201.6	1.0209	Slope	0.990573	0.90 - 1.10
105.5	102.6	1.0284			
			Intercept	-1.100427	+/-20



NO_X Calibration Plot Date: February 22, 2023 Location: Jackfish 2/3



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS29
SURMONT 2
FEBRUARY 2023

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

March 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	February 16, 2023	Last Cal Date:	January 3, 2023
Start time (MST):	13:10	End time (MST):	17:09
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:	0.997244	0.999443	Backgd or Offset:	12.4	12.5
Calibration intercept:	-0.565207	-2.985140	Coeff or Slope:	0.966	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	0.1	----
as found span	4919	81.3	800.1	824.0	0.971
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4919	81.3	800.1	798.2	1.002
second point	4959	40.7	400.6	395.6	1.013
third point	4979	20.3	199.8	194.2	1.029
as left zero	5000	0.0	0.0	-0.1	----
as left span	4919	81.3	800.1	803.0	0.996
				Average Correction Factor	1.015

Baseline Corr As found:	823.90	Previous response	797.34	*% change	3.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

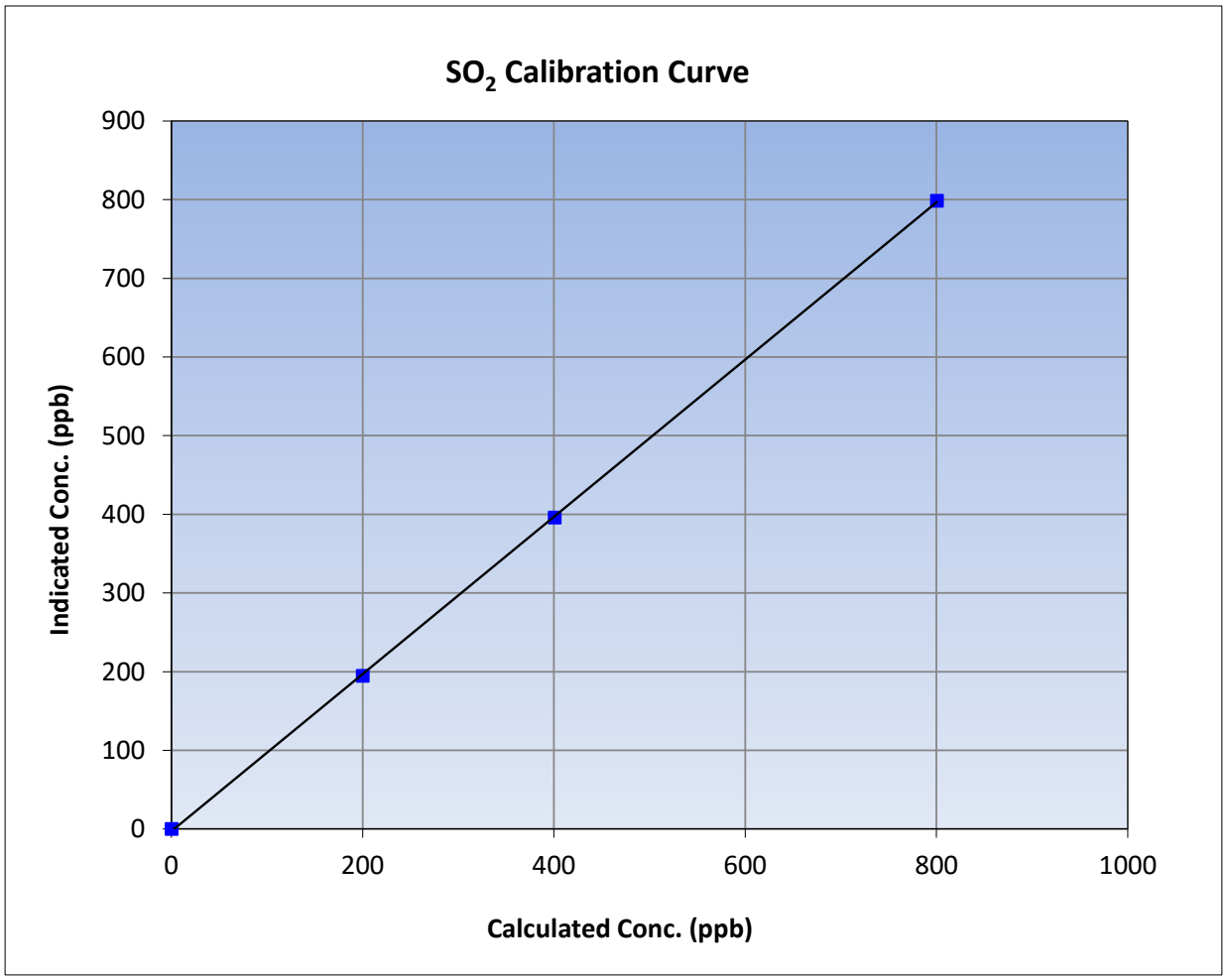
Station Information

Calibration Date:	February 16, 2023	Previous Calibration:	January 3, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	13:10	End Time (MST):	17:09
Analyzer make:	Thermo 43i	Analyzer serial #:	1170050150

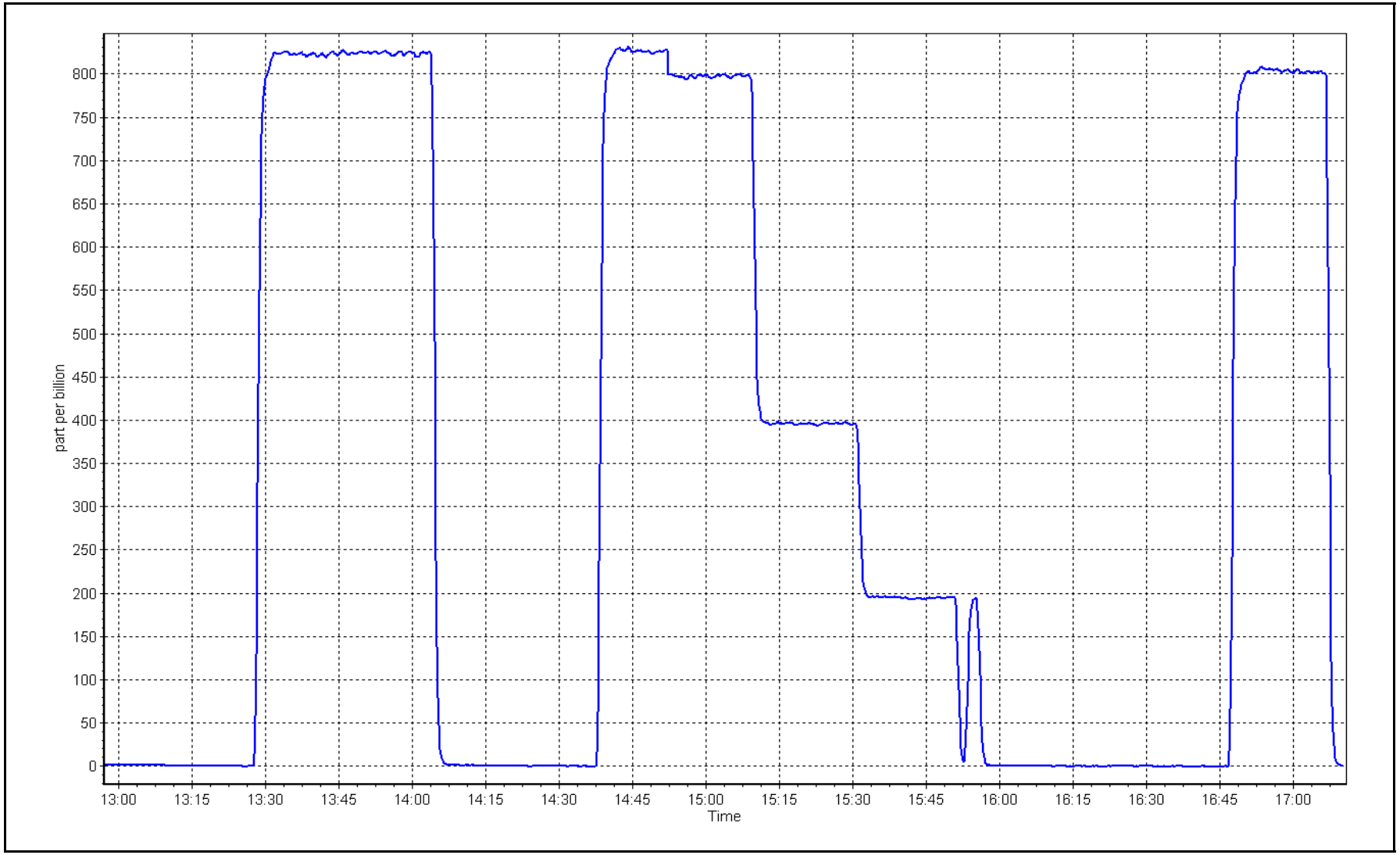
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
800.1	798.2	1.0024
400.6	395.6	1.0126
199.8	194.2	1.0289

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999944	*≥0.995*
Slope	0.999443	*0.90 - 1.10*
Intercept	-2.985140	*+/-30*



SO2 Calibration Plot Date: February 16, 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:	February 13, 2023	Last Cal Date:	January 9, 2023
Start time (MST):	11:03	End time (MST):	15:54
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.391	ppm	Cal Gas Exp Date:	January 4, 2025
Cal Gas Cylinder #:	CC508338			
Removed Cal Gas Conc:	5.391	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	CC508338		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3808
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:	0.996612	0.994905	Backgd or Offset:	16.0	17.0
Calibration intercept:	0.177532	-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	0.1	----
as found span	4926	74.2	80.0	81.7	0.980
as found 2nd point	4963	37.2	40.1	41.2	0.976
as found 3rd point	4982	18.6	20.1	20.5	0.983
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4926	74.2	80.0	79.5	1.006
second point	4963	37.2	40.1	39.9	1.005
third point	4982	18.6	20.1	19.9	1.008
as left zero	5000	0.0	0.0	0.1	----
as left span	4926	74.2	80.0	78.7	1.017
SO2 Scrubber Check	4919	81.3	813.0	0.1	----
Date of last scrubber change:		15-Apr-21		Ave Corr Factor	1.006
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.6	Prev response:	79.91	*% change:	2.1%
Baseline Corr 2nd AF pt:	41.1	AF Slope:	1.020479	AF Intercept:	0.116195
Baseline Corr 3rd AF pt:	20.4	AF Correlation:	0.999991		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after MAF's. Conducted SOx scrubber check after calibrator zero. Adjusted zero.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

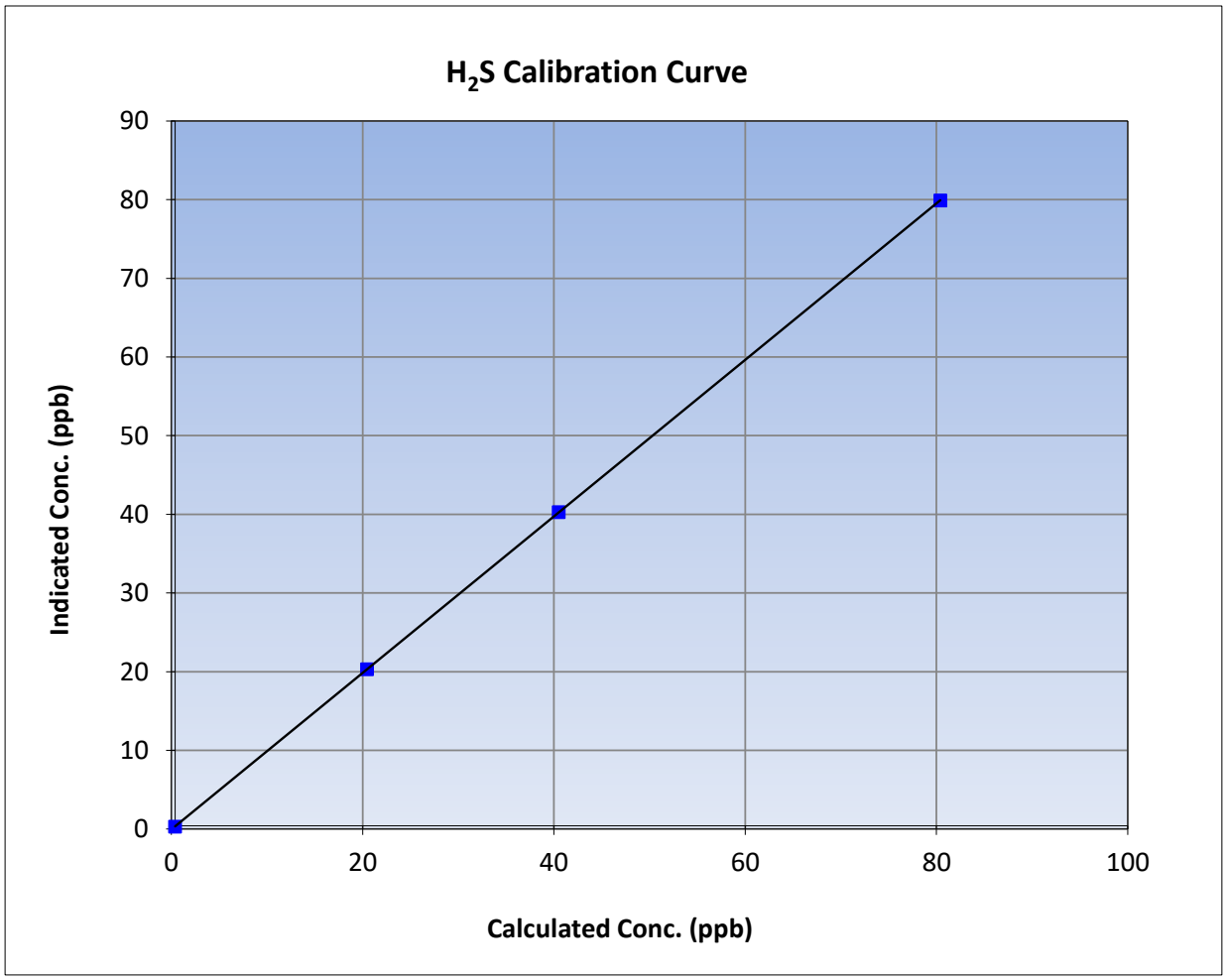
Station Information

Calibration Date:	February 13, 2023	Previous Calibration:	January 9, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	11:03	End Time (MST):	15:54
Analyzer make:	Thermo 450i	Analyzer serial #:	1170050142

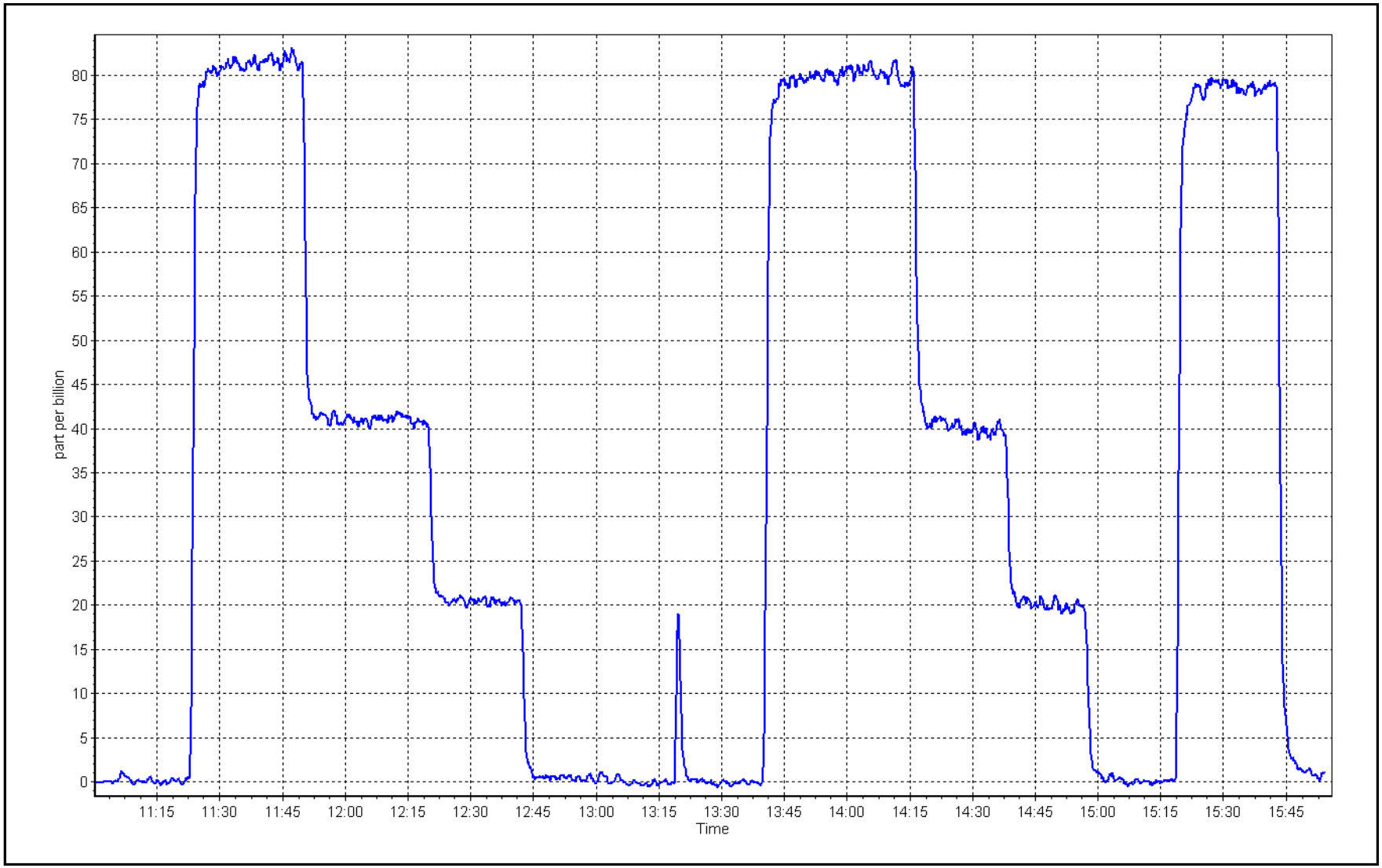
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	79.5	1.0063
40.1	39.9	1.0052
20.1	19.9	1.0077

Statistical Evaluation		Limits
Correlation Coefficient	0.999998	≥0.995
Slope	0.994905	0.90 - 1.10
Intercept	-0.062658	+/-3



H_2S Calibration Plot Date: February 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:	February 16, 2023	Last Cal Date:	January 3, 2023
Start time (MST):	13:10	End time (MST):	17:09
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:	0.999326	0.995950	Background:	4.510	4.36
Calibration intercept:	-0.002444	0.026135	Coefficient:	5.288	5.223

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	-0.13	----
as found span	4918	81.3	17.31	17.35	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.09	----
high point	4918	81.3	17.31	17.30	1.001
second point	4959	40.7	8.67	8.63	1.004
third point	4979	20.3	4.32	4.27	1.013
as left zero	5000	0.0	0.00	0.08	----
as left span	4918	81.3	17.31	17.44	0.993
				Average Correction Factor	1.006

Baseline Corr As found:	17.48	Previous response	17.30	*% 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 and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

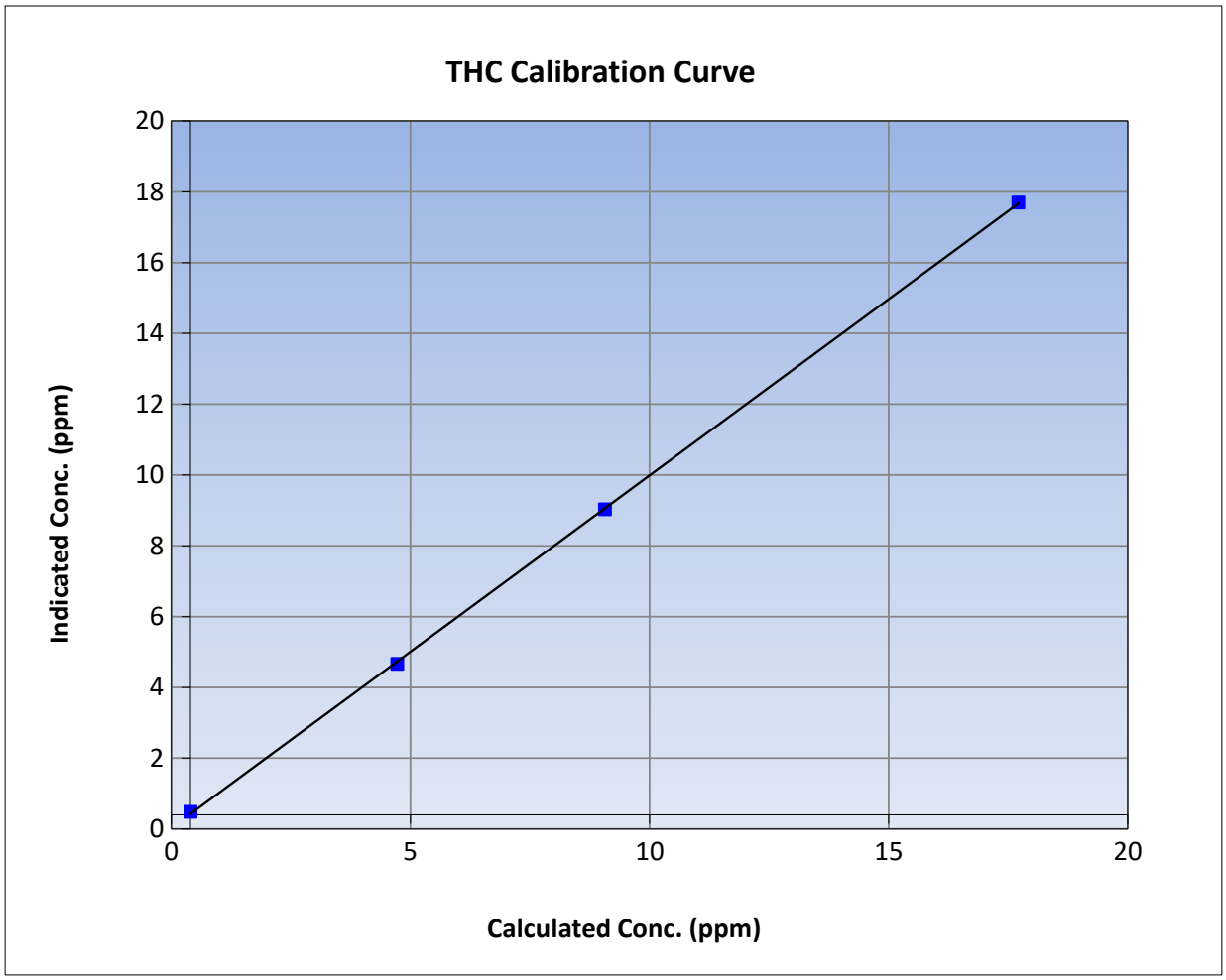
Station Information

Calibration Date:	February 16, 2023	Previous Calibration:	January 3, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	13:10	End Time (MST):	17:09
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1170050149

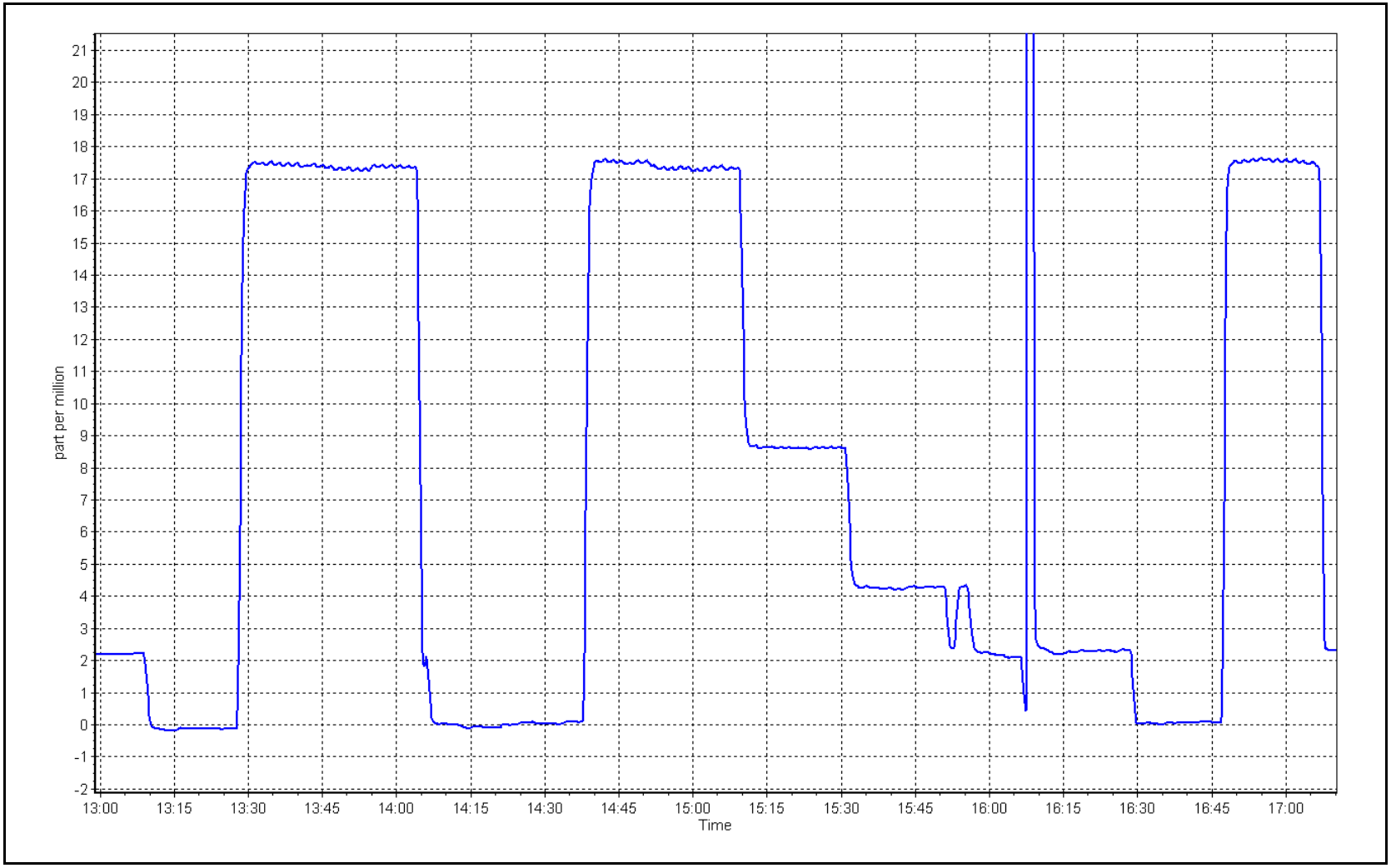
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.09	----
17.31	17.30	1.0008
8.67	8.63	1.0043
4.32	4.27	1.0129

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999941	*≥0.995*
Slope	0.995950	*0.90 - 1.10*
Intercept	0.026135	*+/-1.5*



THC Calibration Plot Date: February 16, 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:	February 17, 2023	Last Cal Date:	January 1, 2023
Start time (MST):	10:46	End time (MST):	13:50
Reason:	As Found		

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:	1.445	1.445	NO bkgnd or offset:	1.4	1.4
NOX coeff or slope:	0.995	0.995	NOX bkgnd or offset:	1.5	1.5
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	168.4	168.4

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.998337	
NO_X Cal Offset:	0.787346	
NO Cal Slope:	1.000325	
NO Cal Offset:	-0.232760	
NO_2 Cal Slope:	0.997537	
NO_2 Cal Offset:	-0.620843	

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	----	----
as found span	4916	84.2	799.2	799.2	0.0	848.0	849.0	-0.6	0.9424	0.9413
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	-0.2	-0.2	0.0	----	----
as left span	4916	84.2	799.2			842.0	429.1	413.1	0.9492	
								Average Correction Factor		

Corrected As found	NO_X = 848.2 ppb	NO = 849.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = 5.8%		
Previous Response	NO_X = 798.7 ppb	NO = 799.2 ppb		*Percent Change	NO = 5.9%		
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:	

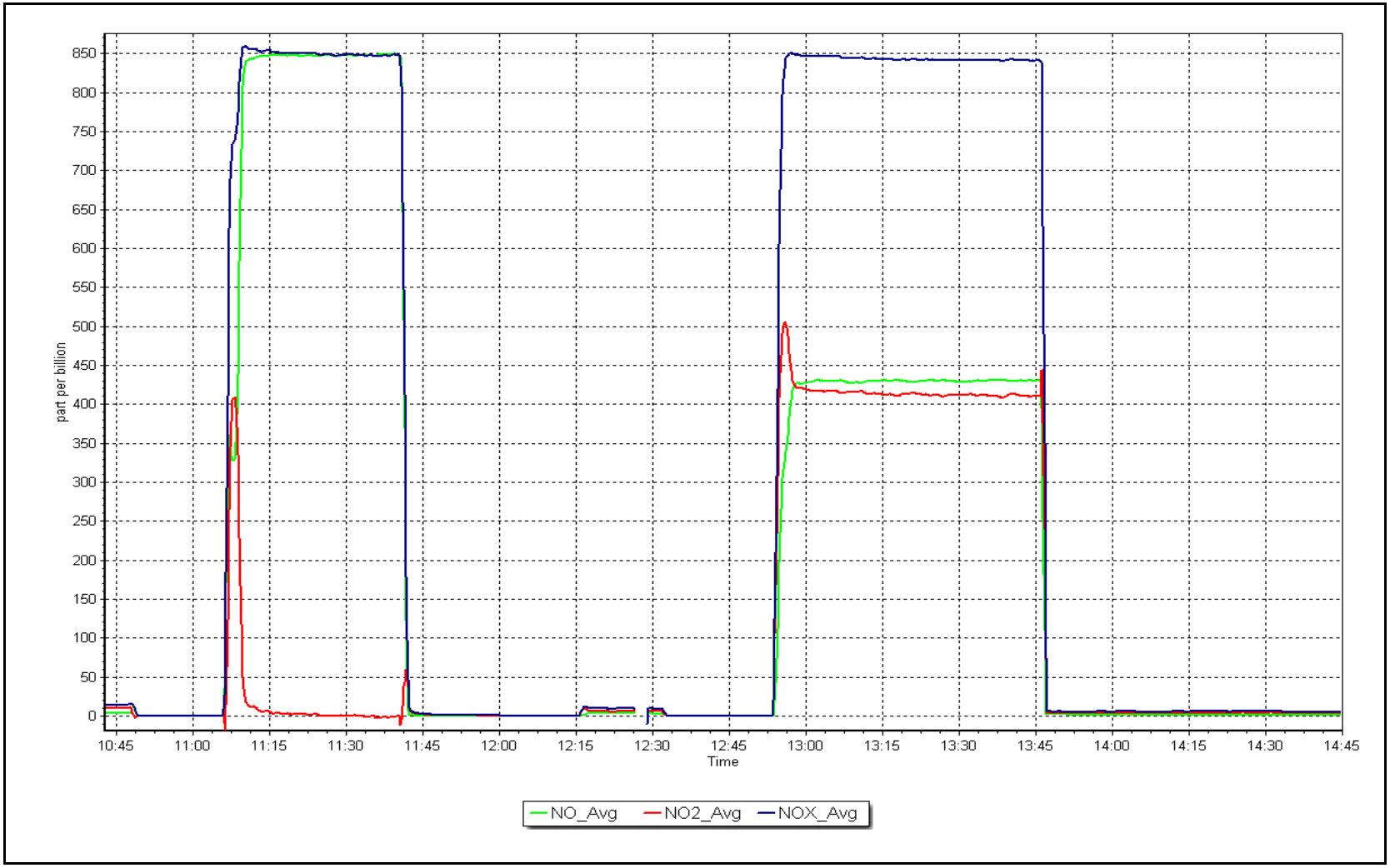
GPT Calibration Data

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)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
				Average Correction Factor		

Notes: Attempted calibration after changing the dilution calibrator. A portable calibrator will be brought to verfiy readings before making any large adjustments. Only as founds, GPTPS points and as lefts done.

Calibration Performed By: Braiden Boutilier

NO_X Calibration Plot Date: February 17, 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:	February 22, 2023	Last Cal Date:	January 1, 2023
Start time (MST):	11:23	End time (MST):	16:18
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 T750		Serial Number:	282	
ZAG make/model:	Teledyne API T751		Serial Number:	321	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1170050148	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.445	1.340	NO bkgnd or offset:	1.4	1.3
NOX coeff or slope:	0.995	0.998	NOX bkgnd or offset:	1.5	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:	0.998337	1.000440
NO_X Cal Offset:	0.787346	0.326827
NO Cal Slope:	1.000325	1.000353
NO Cal Offset:	-0.232760	-0.592834
NO_2 Cal Slope:	0.997537	1.006976
NO_2 Cal Offset:	-0.620843	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	-0.2	-0.2	0.0	----	----
as found span	4916	84.2	799.2	799.2	0.0	861.0	861.0	0.3	0.9282	0.9282
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	----	----
high point	4916	84.2	799.2	799.2	0.0	799.6	799.1	0.5	0.9995	1.0001
second point	4958	42.1	399.6	399.6	0.0	400.6	399.0	1.6	0.9975	1.0015
third point	4979	21.1	200.3	200.3	0.0	200.8	199.2	1.6	0.9974	1.0054
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as left span	4916	84.2	799.2	414.6	384.6	797.5	395.4	402.1	1.0021	1.0485
								Average Correction Factor	0.9981	1.0023

Corrected As found	NO_X = 861.2 ppb	NO = 861.2 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	7.3%
Previous Response	NO_X = 798.7 ppb	NO = 799.2 ppb			*Percent Change	NO =	7.2%
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)	793.3	408.7	384.6	387.8	0.9917	100.8%
2nd GPT point (200 ppb O3)	793.3	606.2	187.1	191.4	0.9775	102.3%
3rd GPT point (100 ppb O3)	793.3	697.7	95.6	98.7	0.9686	103.2%
				Average Correction Factor	0.9793	102.1%

Notes: Calibration done with a portable calibrator and ZAG as the new calibrator installed this month has high readings compared to the old calibrator. Adjusted span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

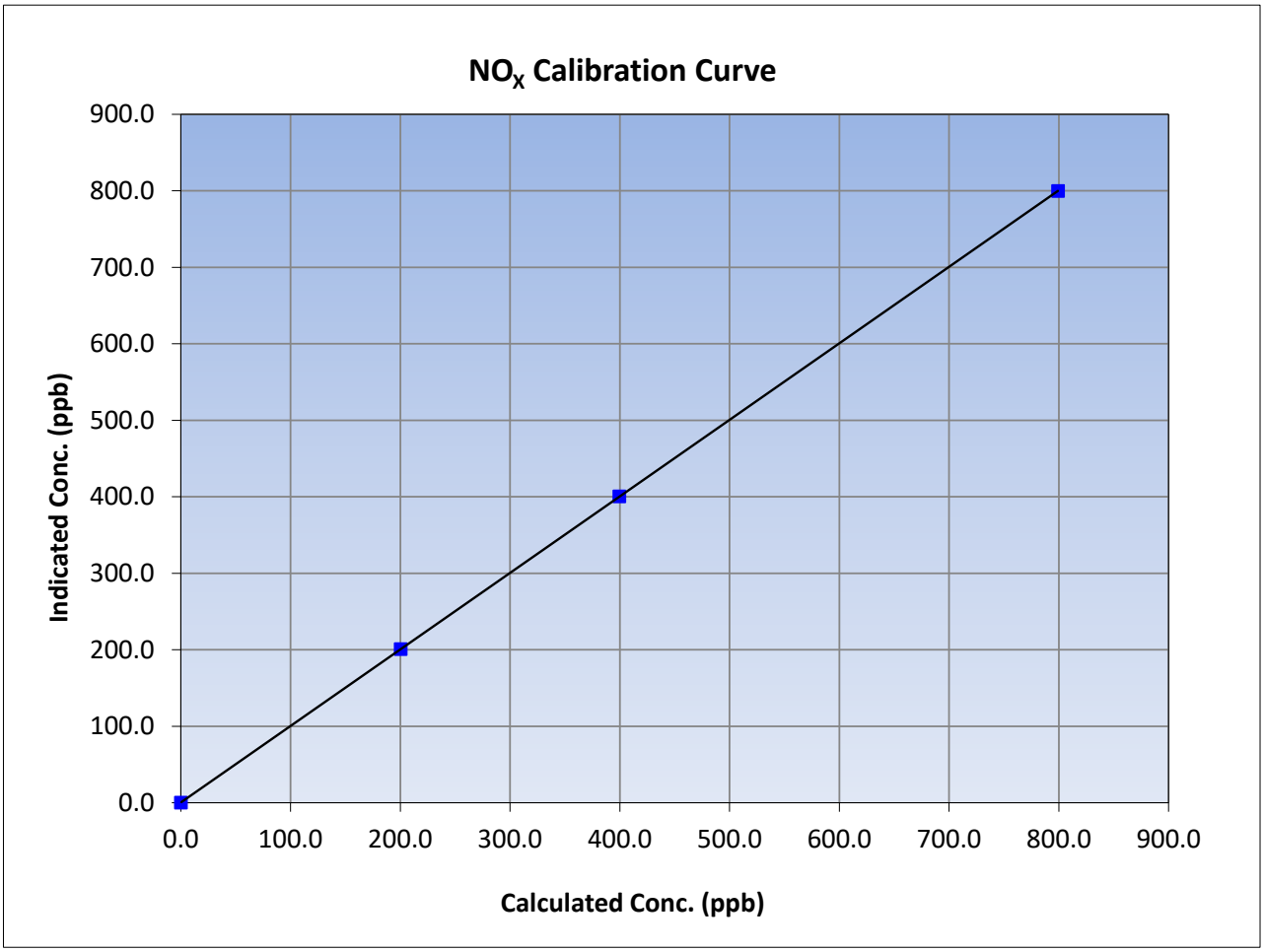
Version-04-2020

Station Information

Calibration Date:	February 22, 2023	Previous Calibration:	January 1, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	11:23	End Time (MST):	16:18
Analyzer make:	Thermo 42i	Analyzer serial #:	1170050148

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999999	*≥0.995*
799.2	799.6	0.9995			
399.6	400.6	0.9975	Slope	1.000440	*0.90 - 1.10*
200.3	200.8	0.9974			
			Intercept	0.326827	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

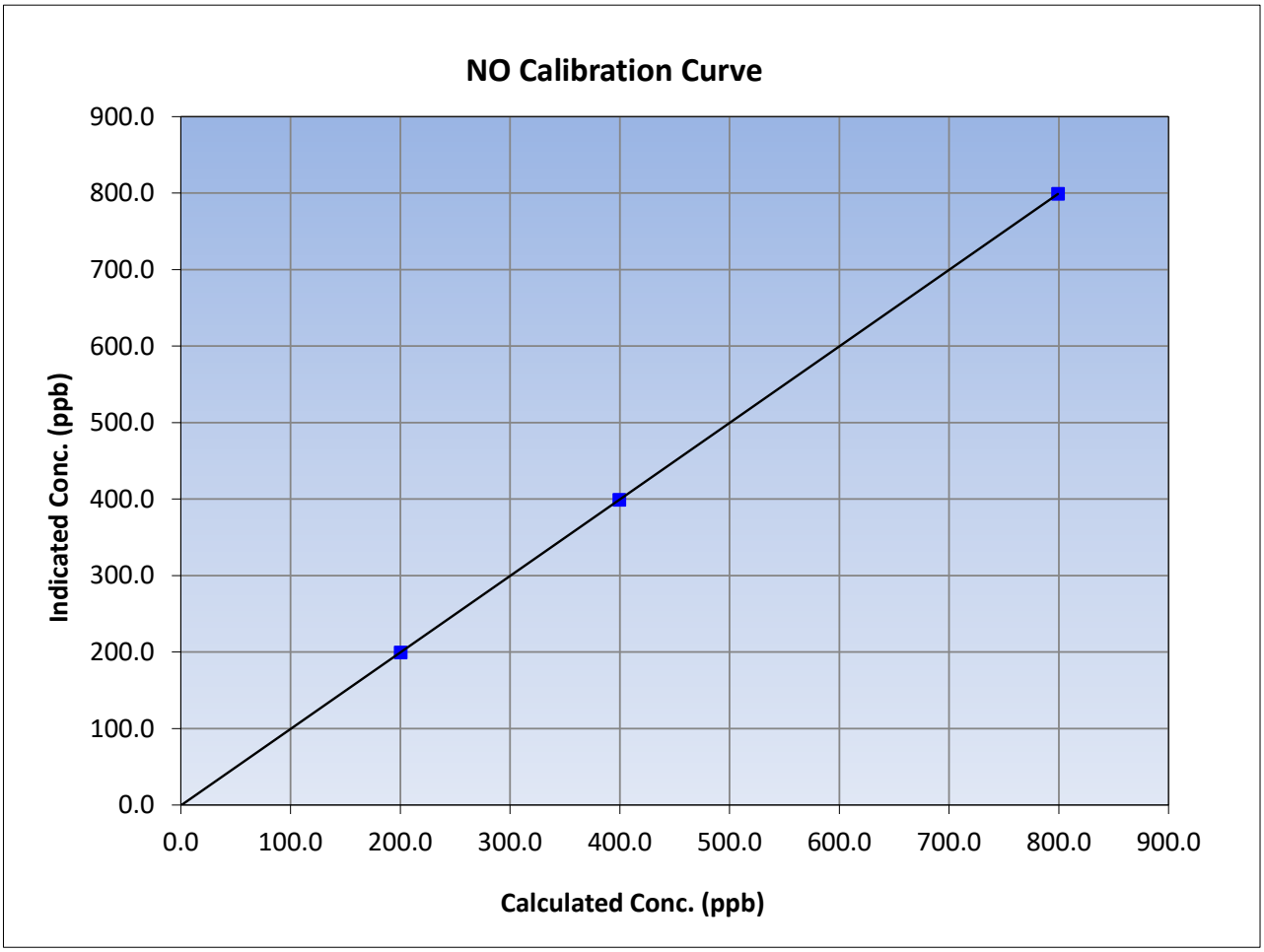
Version-04-2020

Station Information

Calibration Date:	February 22, 2023	Previous Calibration:	January 1, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	11:23	End Time (MST):	16:18
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	0.999998	≥0.995
799.2	799.1	1.0001			
399.6	399.0	1.0015	Slope	1.000353	0.90 - 1.10
200.3	199.2	1.0054			
			Intercept	-0.592834	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

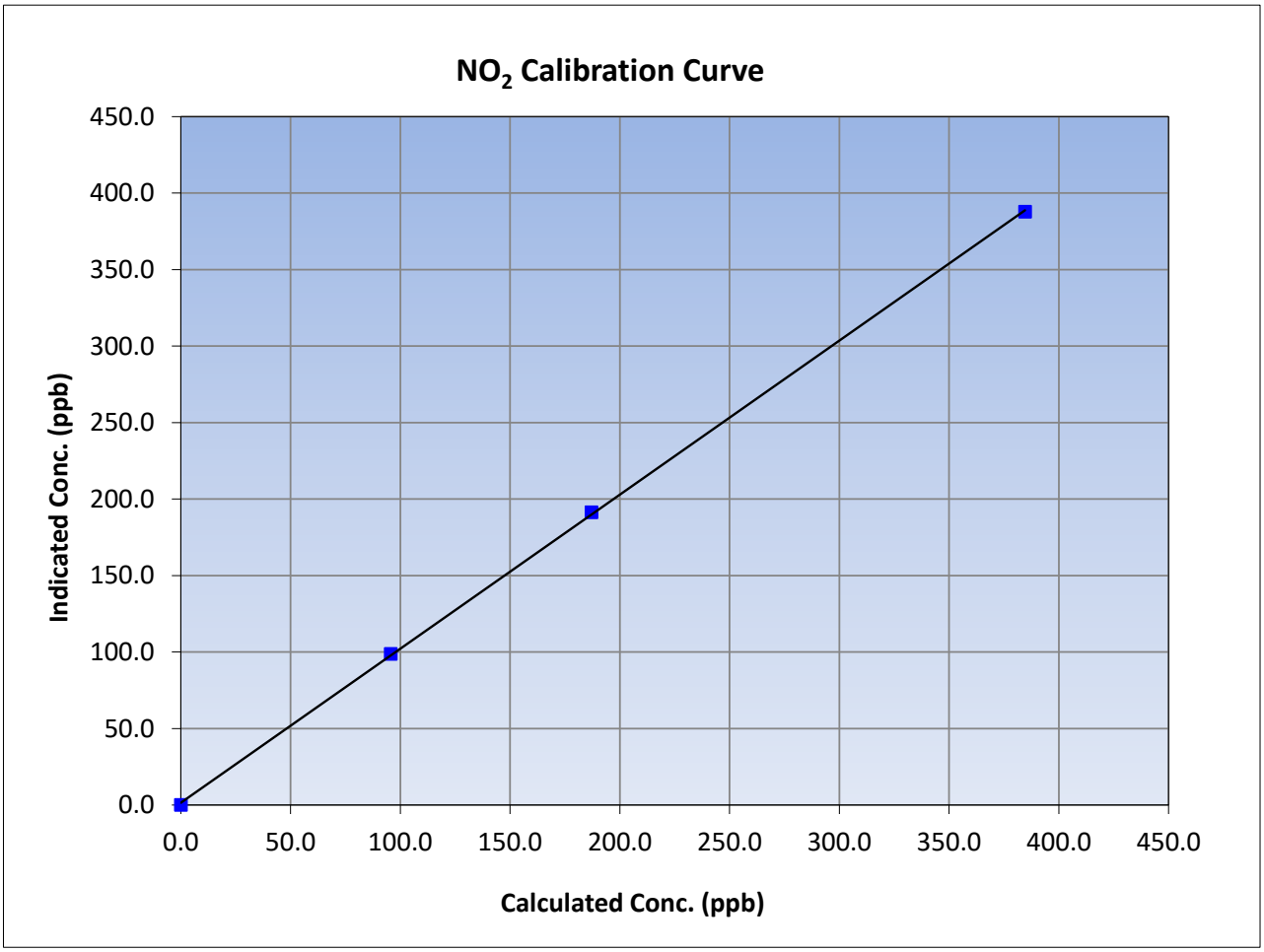
Version-04-2020

Station Information

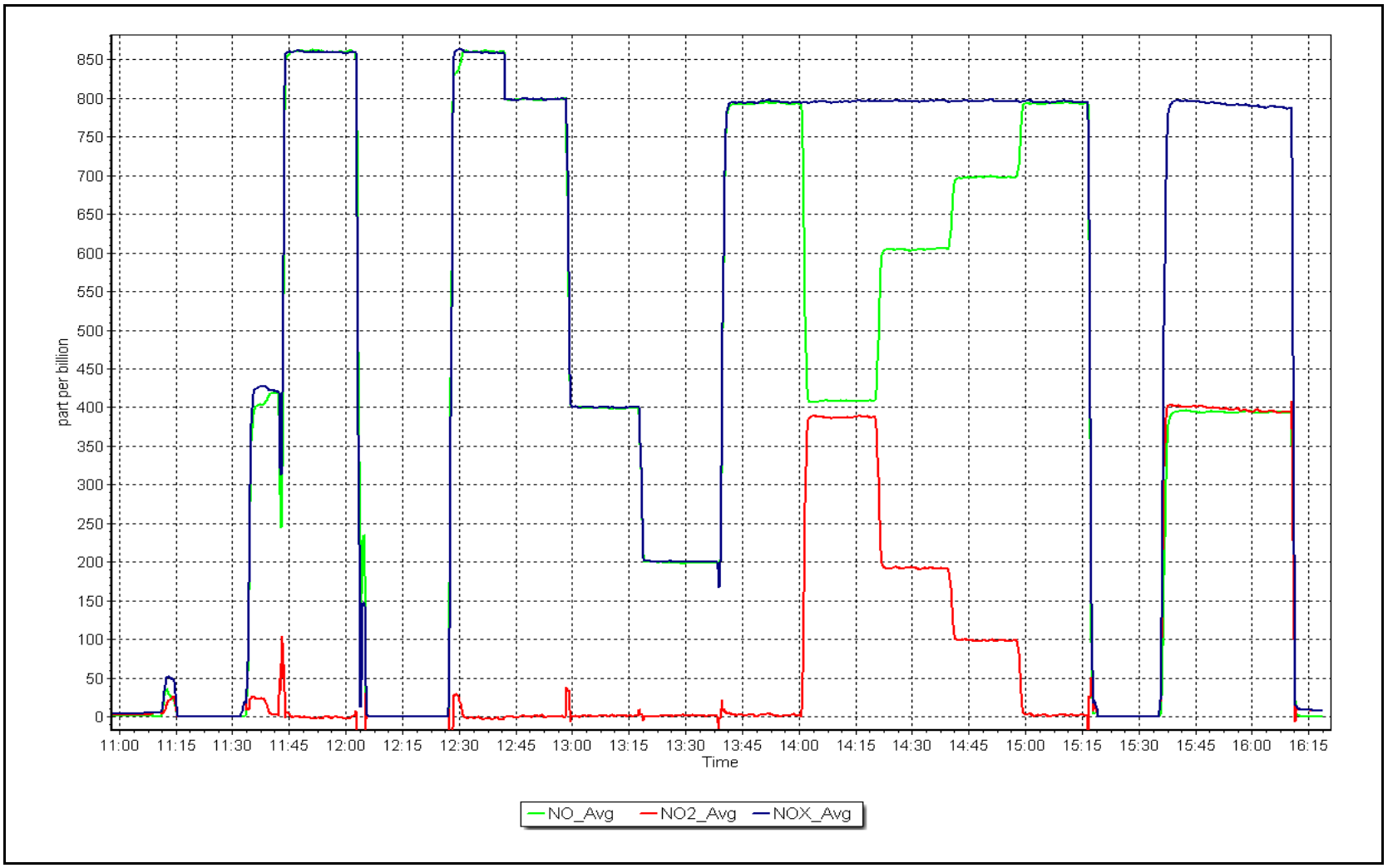
Calibration Date:	February 22, 2023	Previous Calibration:	January 1, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	11:23	End Time (MST):	16:18
Analyzer make:	Thermo 42i	Analyzer serial #:	1170050148

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999923	≥0.995
384.6	387.8	0.9917			
187.1	191.4	0.9775	Slope	1.006976	0.90 - 1.10
95.6	98.7	0.9686			
			Intercept	1.486191	+/-20



NO_X Calibration Plot Date: February 22, 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:	February 17, 2023	Last Cal Date:	January 12, 2023
Start time (MST):	13:25	End time (MST):	15:00
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)	-10.8	-10.7	-10.8	☐	+/- 2 °C
P (mmHg)	706.1	707.0	706.1	☐	+/- 10 mmHg
flow (LPM)	5.01	5.36	5.01	☑	+/- 0.25 LPM

Leak Test: Date of check: February 17, 2023 Last Cal Date: January 12, 2023

PM w/o HEPA: 3.8 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

Post-maintenance leak check: PM w/o HEPA: 3.8 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: February 17, 2023

Disposable Filter Changed: February 17, 2023

Annual Maintenance

Date Sample Tube Cleaned: September 30, 2022

Date RH/T Sensor Cleaned: October 6, 2022

Notes: Adjusted flow only.

Calibration by: Braiden Boutilier

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS30
ELLS RIVER
FEBRUARY 2023

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

March 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Ells River	Station number:	AMS 30
Calibration Date:	February 15, 2023	Last Cal Date:	January 10, 2023
Start time (MST):	9:56	End time (MST):	12:50
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:	1.003501	1.006172	Backgd or Offset:	9.3	9.2
Calibration intercept:	-2.675936	-2.436019	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	0.4	----
as found span	4921	79.2	800.4	801.3	0.999
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	804.0	0.995
second point	4960	39.6	400.2	399.3	1.002
third point	4980	19.8	200.1	196.3	1.019
as left zero	5000	0.0	0.0	-0.1	----
as left span	4921	79.2	800.4	808.0	0.991
				Average Correction Factor	1.006

Baseline Corr As found:	800.90	Previous response	800.49	*% 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 have been made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

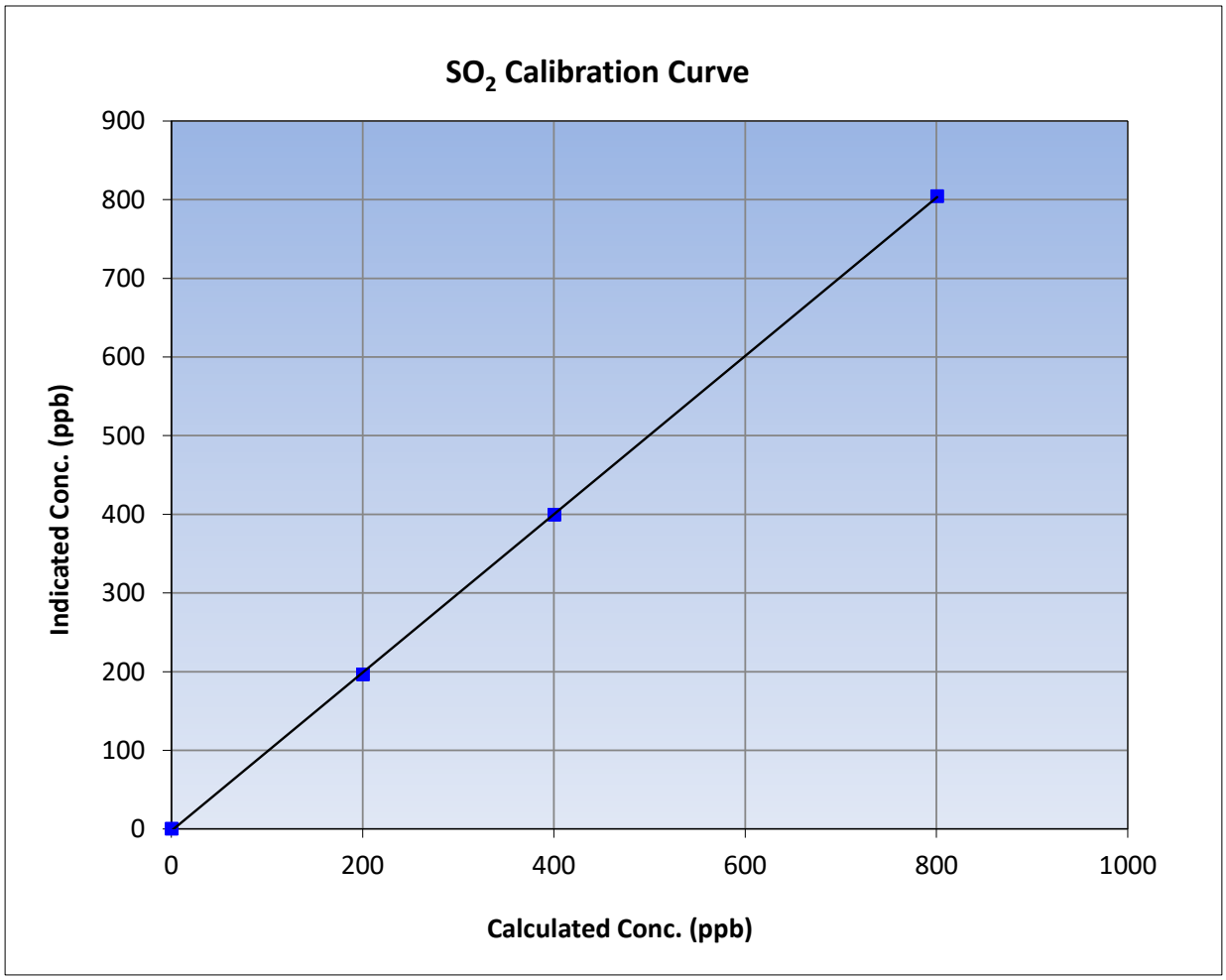
Station Information

Calibration Date:	February 15, 2023	Previous Calibration:	January 10, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:56	End Time (MST):	12:50
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841397

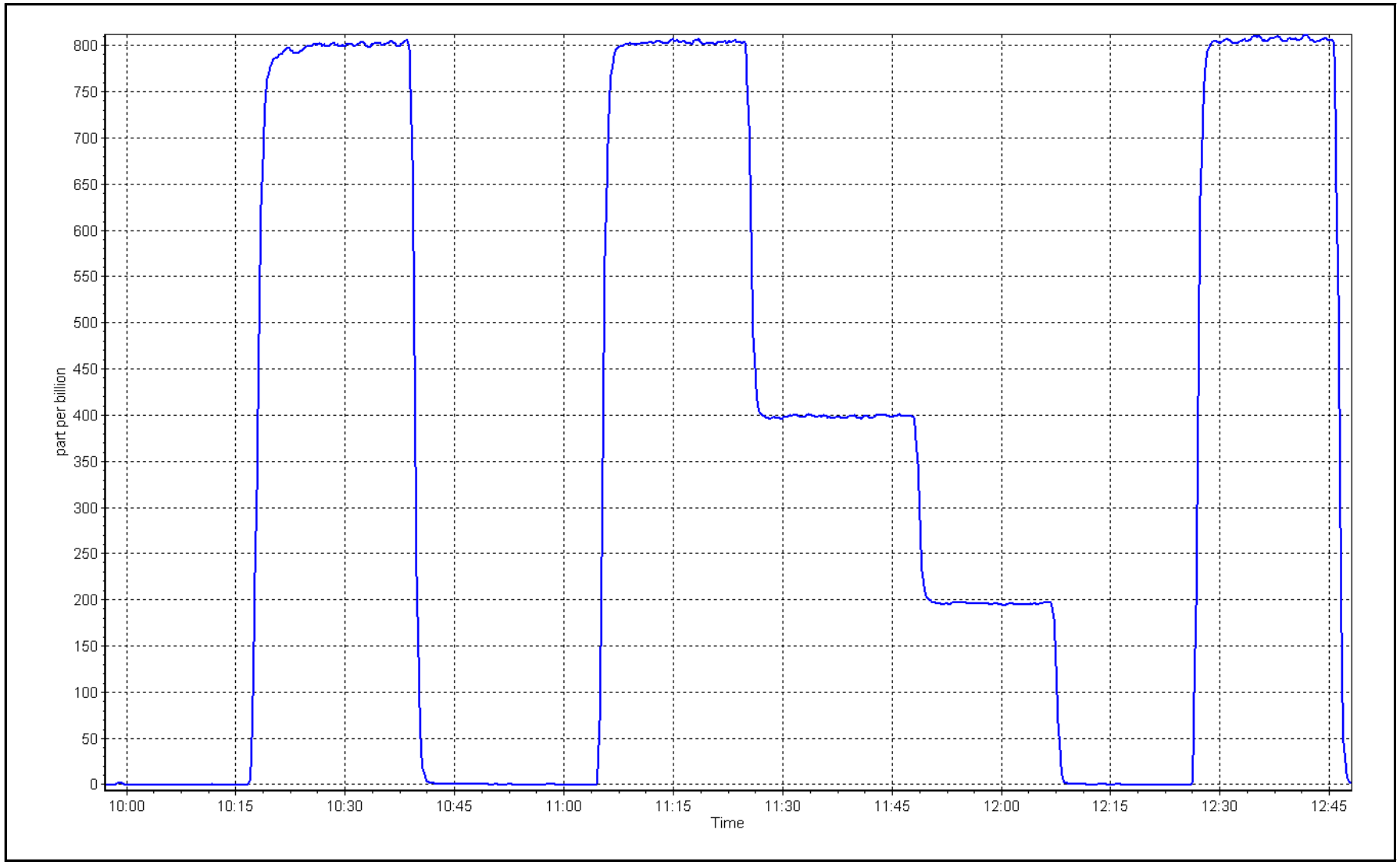
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
800.4	804.0	0.9955
400.2	399.3	1.0023
200.1	196.3	1.0194

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999958	*≥0.995*
Slope	1.006172	*0.90 - 1.10*
Intercept	-2.436019	*+/-30*



SO2 Calibration Plot Date: February 15, 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:	February 13, 2023	Last Cal Date:	January 5, 2023
Start time (MST):	10:37	End time (MST):	14:43
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:	1.029508	0.999493	Backgd or Offset:	1.59	1.57
Calibration intercept:	0.140267	0.040843	Coeff or Slope:	1.123	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	81.5	0.981
as found 2nd point	4961	39.4	40.0	40.6	0.986
as found 3rd point	4980	19.7	20.0	20.1	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	78.7	80.0	80.0	1.000
second point	4961	39.4	40.0	40.0	1.001
third point	4980	19.7	20.0	20.0	1.001
as left zero	5000	0.0	0.0	0.1	----
as left span	4921	78.7	80.0	80.0	1.000
SO2 Scrubber Check	4921	79.2	800.4	-0.1	----
Date of last scrubber change:		N/A		Ave Corr Factor	1.000
Date of last converter efficiency test:		N/A		95.1%	efficiency

Baseline Corr As found:	81.5	Prev response:	82.46	*% change:	-1.2%
Baseline Corr 2nd AF pt:	40.6	AF Slope:	1.020216	AF Intercept:	-0.159513
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999983		

* = > +/-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

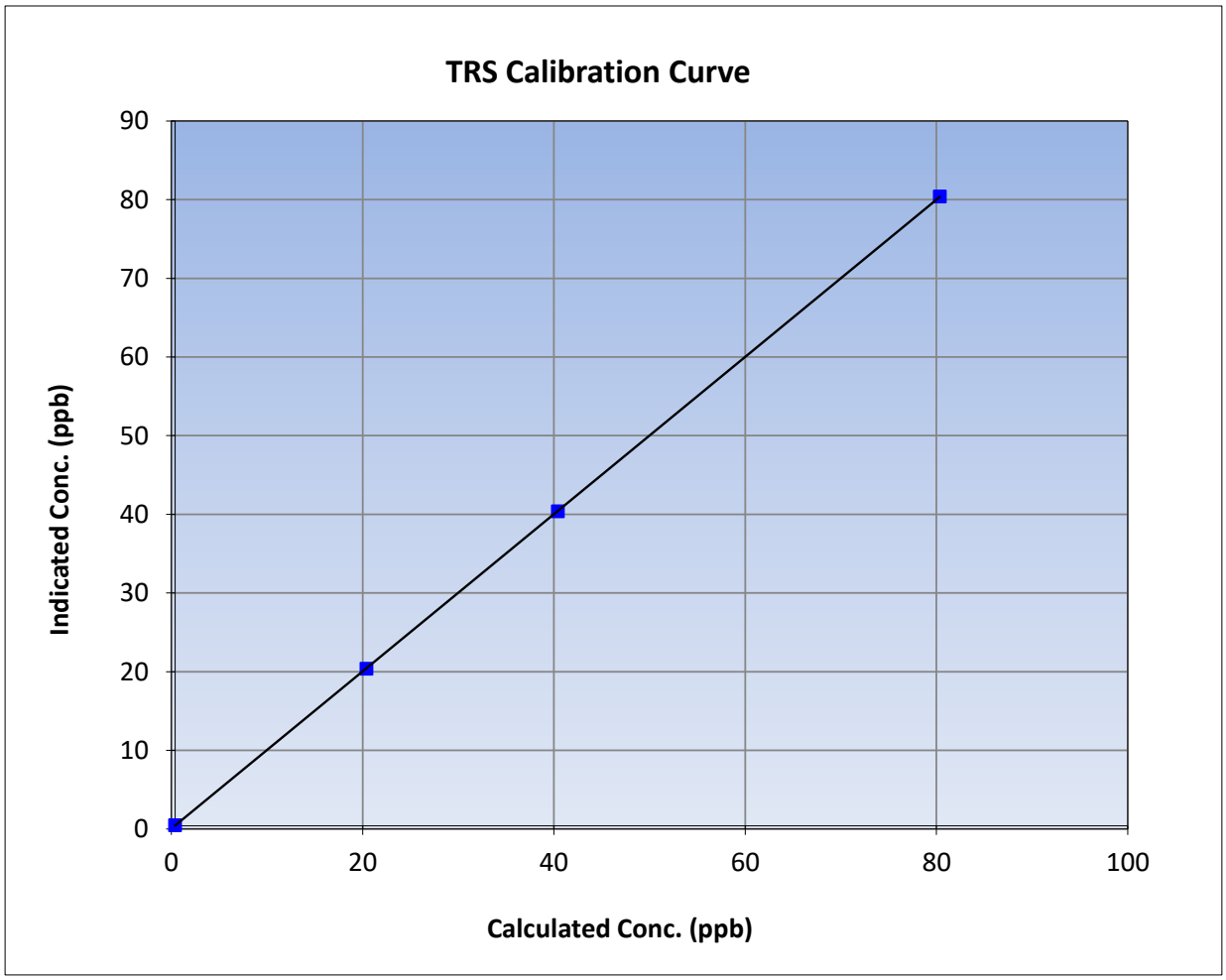
Station Information

Calibration Date:	February 13, 2023	Previous Calibration:	January 5, 2023
Station Name:	Ells River	Station Number:	AMS30
Start Time (MST):	10:37	End Time (MST):	14:43
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1410661331

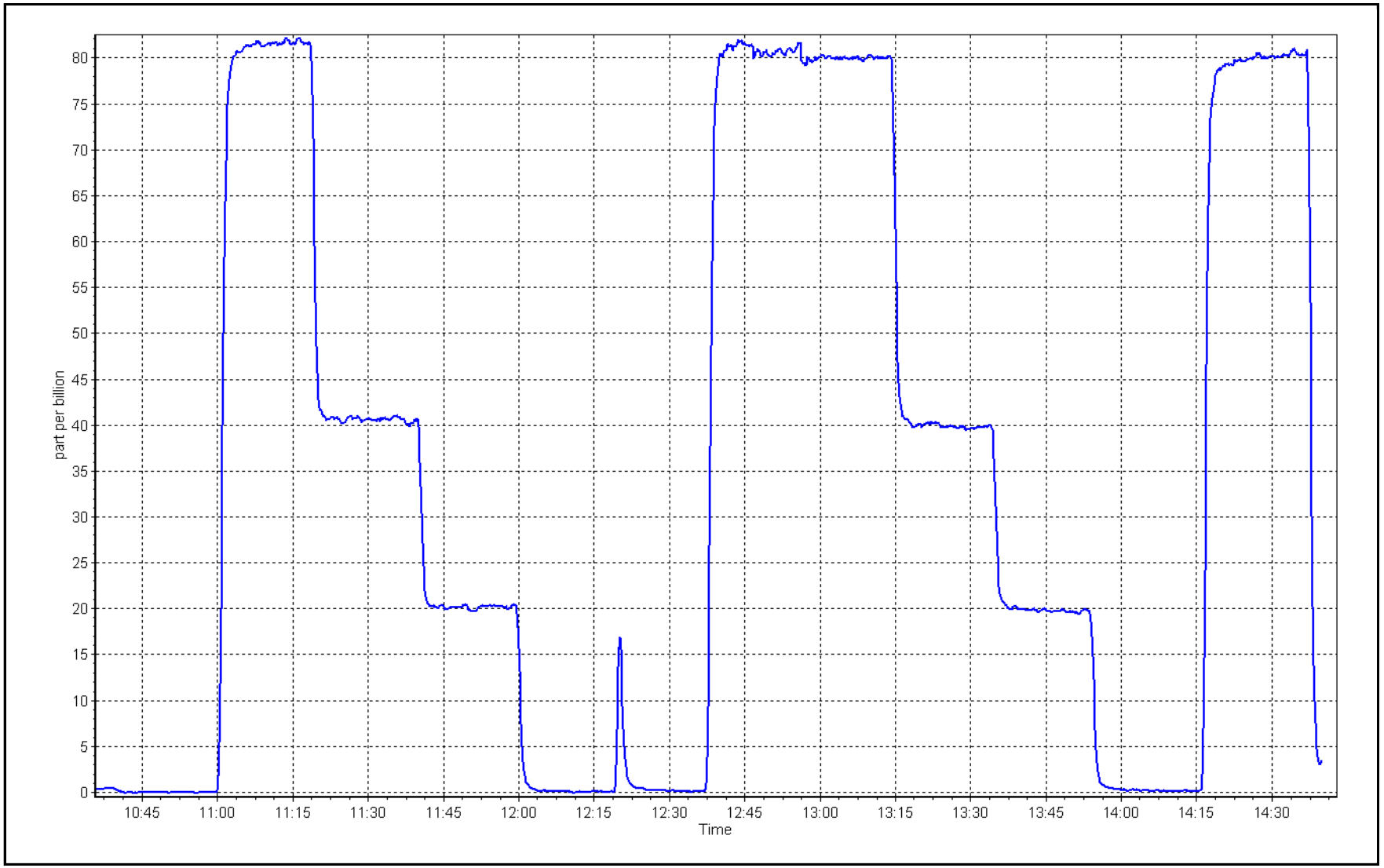
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.0	0.9995
40.0	40.0	1.0007
20.0	20.0	1.0008

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999997	*≥0.995*
Slope	0.999493	*0.90 - 1.10*
Intercept	0.040843	*+/-3*



TRS Calibration Plot Date: February 13, 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:	February 10, 2023	Last Cal Date:	January 2, 2023
Start time (MST):	9:56	End time (MST):	13:06
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:	0.000234	0.000236	NMHC SP Ratio:	5.04E-05	4.96E-05
CH4 Retention time:	13.2	13.6	NMHC Peak Area:	180847	183767

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	17.03	17.06	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	17.03	17.02	1.000
second point	4960	39.6	8.51	8.35	1.020
third point	4980	19.8	4.26	4.13	1.030
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	17.03	1.000
				Average Correction Factor	1.017

Baseline Corr AF:	17.06	Prev response	17.05	*% 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	4921	79.2	9.11	9.25	0.985
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	1.000
second point	4960	39.6	4.56	4.51	1.011
third point	4980	19.8	2.28	2.24	1.018
as left zero	5000	0	0.00	0.00	----
as left span	4921	79.2	9.11	9.10	1.002
				Average Correction Factor	1.010
Baseline Corr AF:	9.25	Prev response	9.15	*% change	1.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	7.91	7.82	1.013
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	7.91	7.91	1.000
second point	4960	39.6	3.96	3.84	1.031
third point	4980	19.8	1.98	1.89	1.045
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.91	7.93	0.998
				Average Correction Factor	1.025
Baseline Corr AF:	7.82	Prev response	7.90	*% 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:	1.006389	1.000952
THC Cal Offset:	-0.085138	-0.082136
CH4 Cal Slope:	1.004928	1.001462
CH4 Cal Offset:	-0.050756	-0.056755
NMHC Cal Slope:	1.007959	1.000622
NMHC Cal Offset:	-0.034582	-0.025581

Notes: Adjusted the span.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

THC Calibration Summary

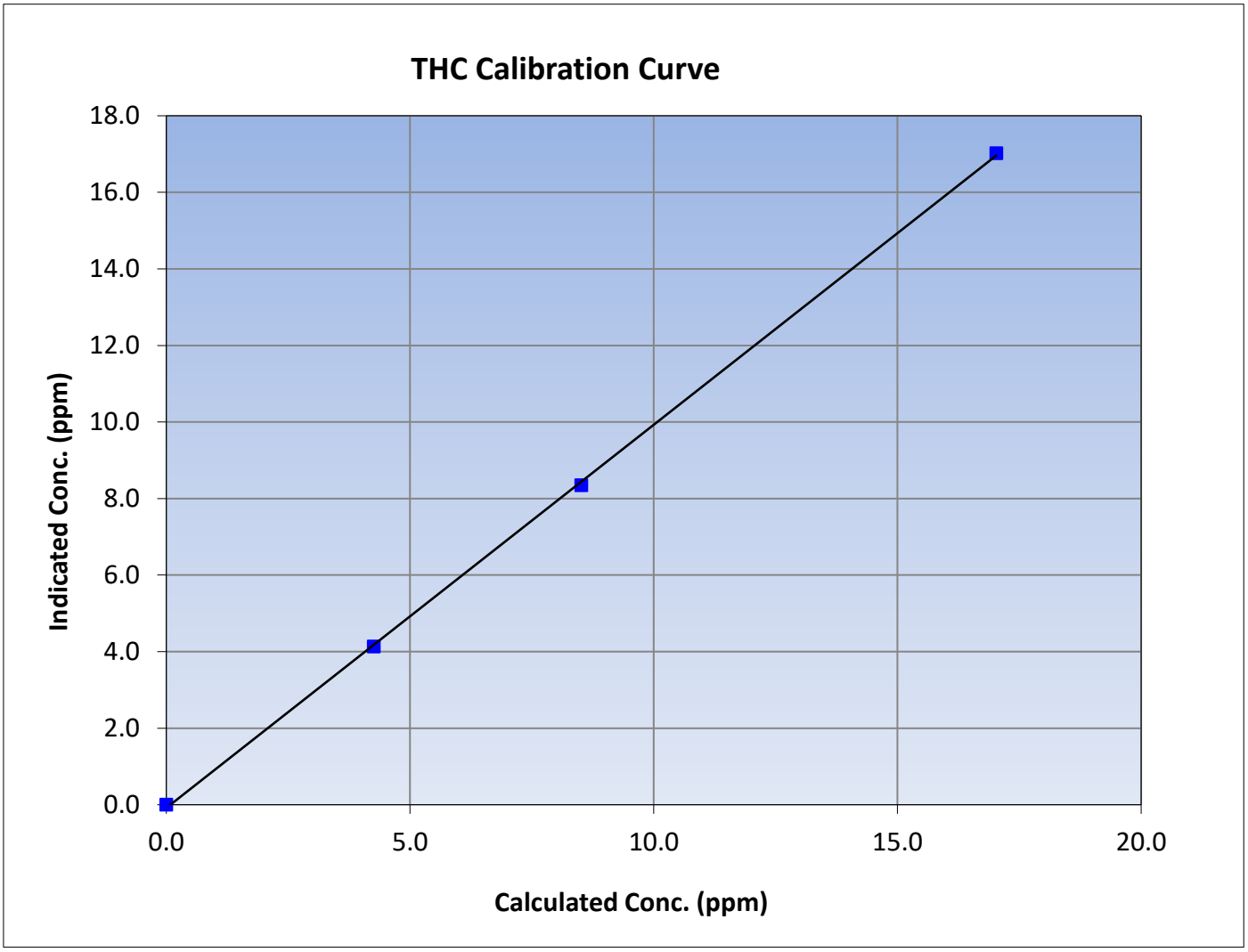
Version-01-2020

Station Information

Calibration Date:	February 10, 2023	Previous Calibration:	January 2, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:56	End Time (MST):	13:06
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	0.999867	*≥0.995*
17.03	17.02	1.0004			
8.51	8.35	1.0201	Slope	1.000952	*0.90 - 1.10*
4.26	4.13	1.0303			
			Intercept	-0.082136	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

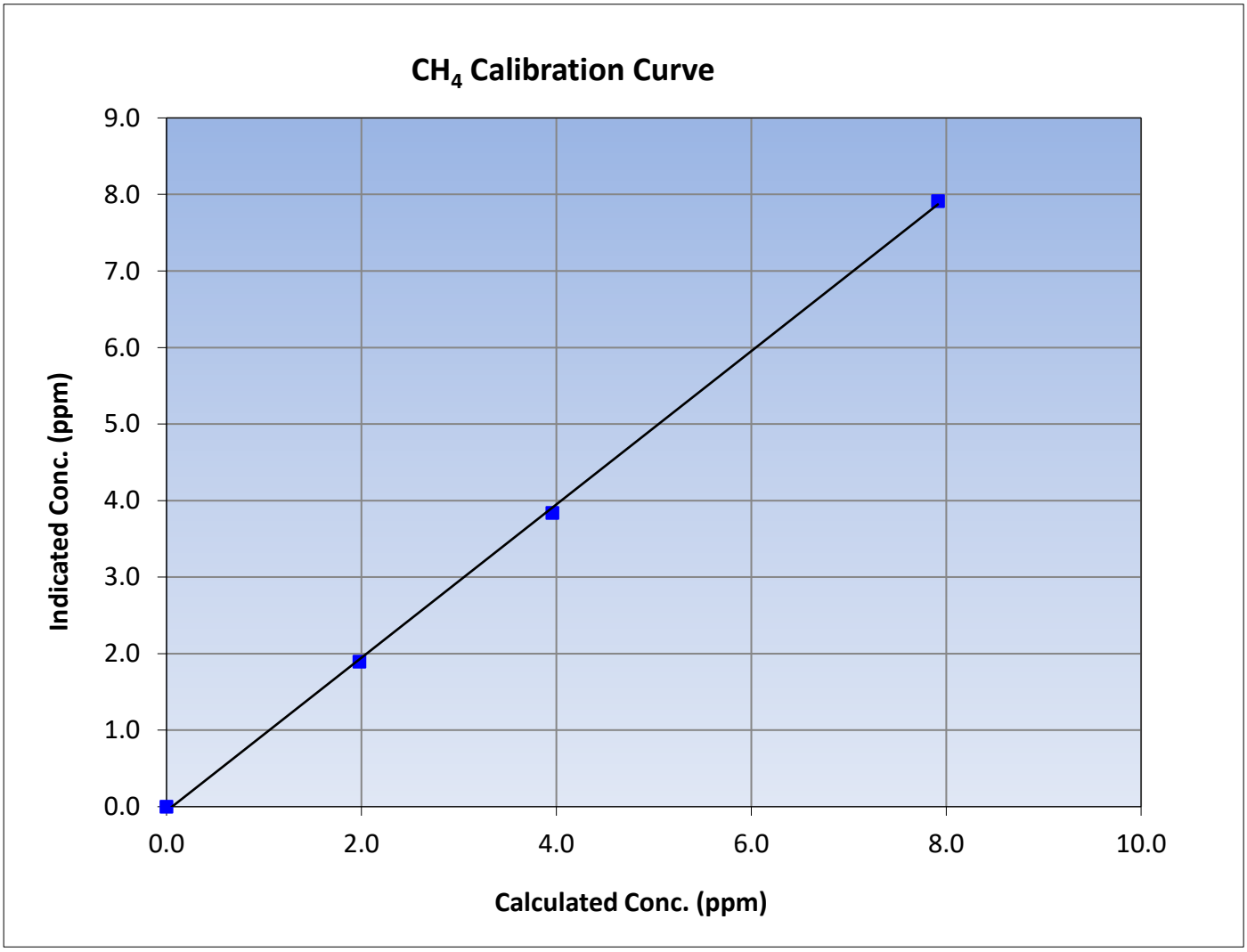
Version-01-2020

Station Information

Calibration Date:	February 10, 2023	Previous Calibration:	January 2, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:56	End Time (MST):	13:06
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	0.999698	≥0.995
7.91	7.91	1.0005			
3.96	3.84	1.0307	Slope	1.001462	0.90 - 1.10
1.98	1.89	1.0448			
			Intercept	-0.056755	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

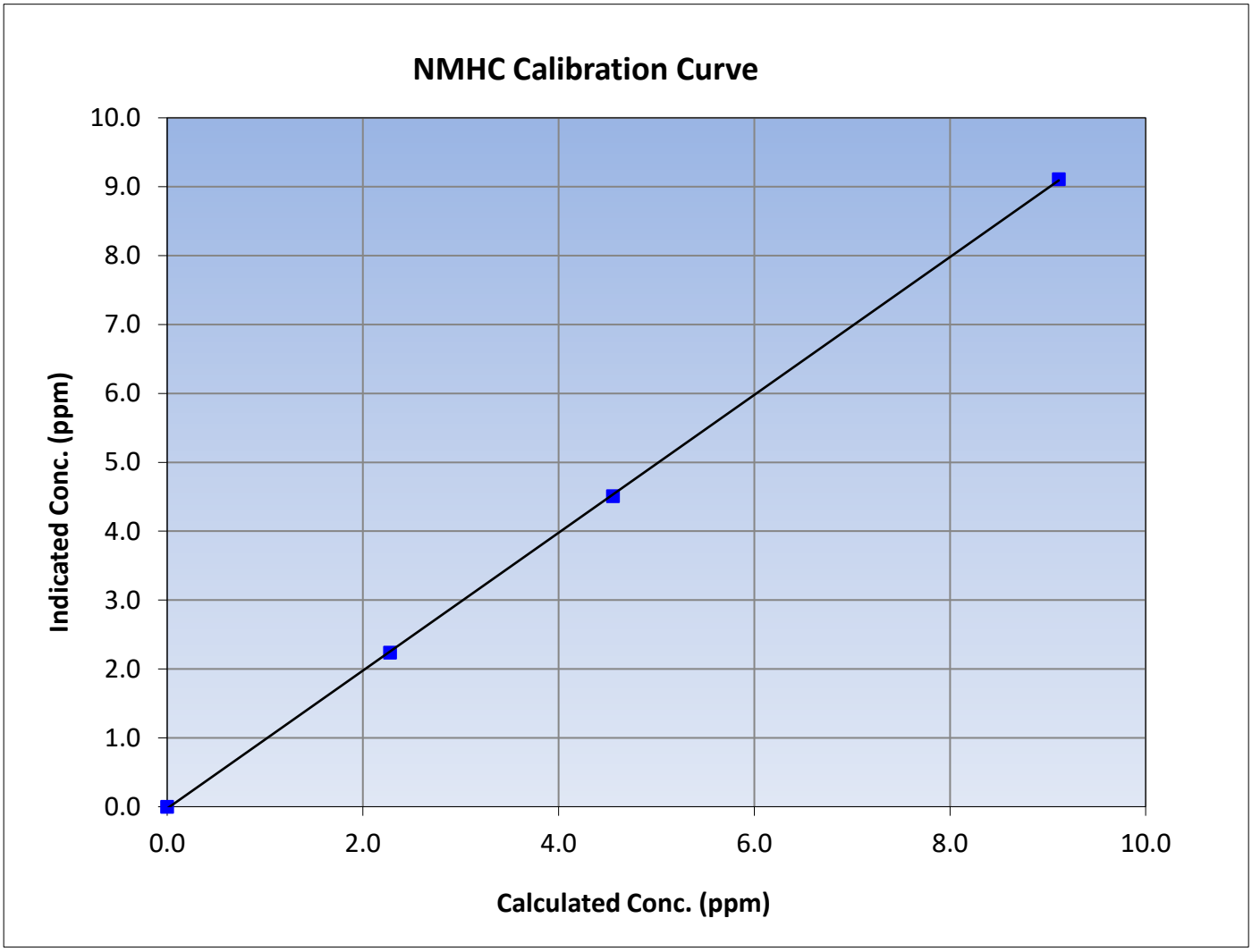
Version-01-2020

Station Information

Calibration Date:	February 10, 2023	Previous Calibration:	January 2, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:56	End Time (MST):	13:06
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	0.999957	≥0.995
9.11	9.11	1.0003			
4.56	4.51	1.0110	Slope	1.000622	0.90 - 1.10
2.28	2.24	1.0180			
			Intercept	-0.025581	+/-0.5



NMHC Calibration Plot Date: February 10, 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:	February 12, 2023	Last Cal Date:	February 10, 2023
Start time (MST):	10:00	End time (MST):	11:23
Reason:	Removal		

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	NA	NMHC SP Ratio:	4.96E-05	NA
CH4 Retention time:	13.6	NA	NMHC Peak Area:	183767	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	4921	79.2	17.03	16.90	1.007
as found 2nd point	4960	39.6	8.51	8.29	1.027
as found 3rd point	4980	19.8	4.26	4.15	1.027
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	

Baseline Corr AF:	16.90	Prev response	16.96	*% change	-0.4%
Baseline Corr 2nd AF:	8.3	AF Slope:	0.993223	AF Intercept:	-0.064347
Baseline Corr 3rd AF:	4.1	AF Correlation:	0.999889	* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4921	79.2	9.11	9.11	1.000
as found 2nd point	4960	39.6	4.56	4.51	1.011
as found 3rd point	4980	19.8	2.28	2.24	1.020
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	9.11	Prev response	9.09	*% change	0.2%
Baseline Corr 2nd AF:	4.5	AF Slope:	1.000681	AF Intercept:	-0.027312
Baseline Corr 3rd AF:	2.2	AF Correlation:	0.999954	* = > +/-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	7.79	1.016
as found 2nd point	4960	39.6	3.96	3.78	1.048
as found 3rd point	4980	19.8	1.98	1.91	1.035
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	7.79	Prev response	7.87	*% change	-1.0%
Baseline Corr 2nd AF:	3.78	AF Slope:	0.984307	AF Intercept:	-0.038378
Baseline Corr 3rd AF:	1.91	AF Correlation:	0.999713	* = > +/-5% change initiates investigation	

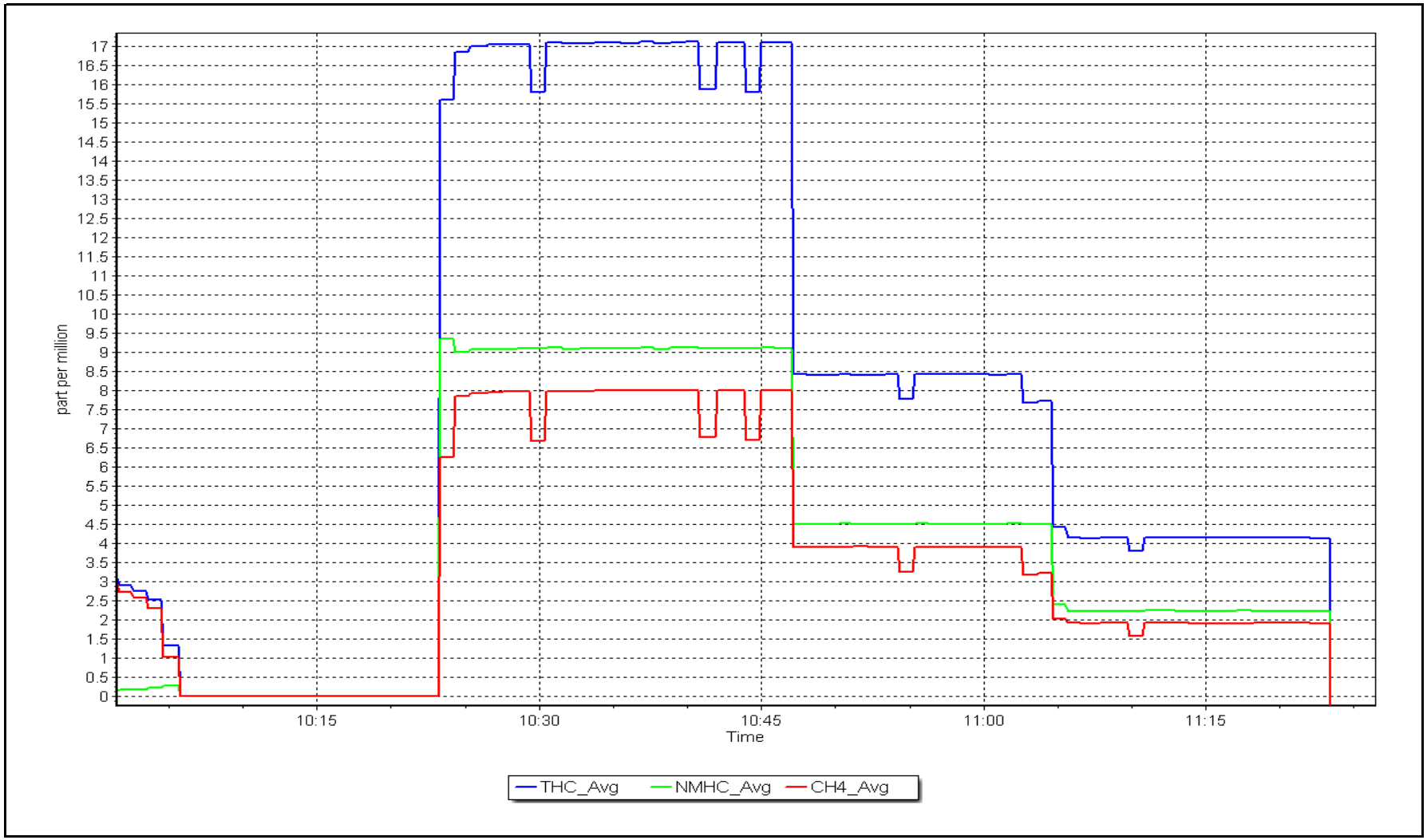
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000952	
THC Cal Offset:	-0.082136	
CH4 Cal Slope:	1.001462	
CH4 Cal Offset:	-0.056755	
NMHC Cal Slope:	1.000622	
NMHC Cal Offset:	-0.025581	

Notes: Removal calibration for instrument change out.

Calibration Performed By: Karan Pandit

NMHC Calibration Plot Date: February 12, 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:	February 12, 2023	Last Cal Date:	NA
Start time (MST):	12:30	End time (MST):	14:50
Reason:	Install		

Calibration Standards

Gas Cert Reference:		CC494126	Cal Gas Expiry Date:	December 29, 2028	
CH4 Cal Gas Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm
C3H8 Cal Gas Conc.	209.2	ppm			
Removed Gas Cert:			Removed Gas Expiry:		
Removed CH4 Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm
Removed C3H8 Conc.	209.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3061	
ZAG make/model:	API T701H		Serial Number:	358	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1181490018	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	NA	0.000230	NMHC SP Ratio:	NA	4.00E-05
CH4 Retention time:	NA	14.0	NMHC Peak Area:	NA	227486

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	17.03	16.92	1.006
second point	4960	39.6	8.51	8.36	1.018
third point	4980	19.8	4.26	4.14	1.028
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	16.73	1.018
				Average Correction Factor	1.017

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

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-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	79.2	9.11	9.01	1.011
second point	4960	39.6	4.56	4.47	1.020
third point	4980	19.8	2.28	2.21	1.029
as left zero	5000	0	0.00	0.00	----
as left span	4921	79.2	9.11	8.91	1.023
				Average Correction Factor	1.020
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	79.2	7.91	7.91	1.001
second point	4960	39.6	3.96	3.90	1.016
third point	4980	19.8	1.98	1.93	1.026
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.91	7.82	1.012
				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	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	NA	0.994670
THC Cal Offset:	NA	-0.054336
CH4 Cal Slope:	NA	1.000380
CH4 Cal Offset:	NA	-0.030757
NMHC Cal Slope:	NA	0.989848
NMHC Cal Offset:	NA	-0.023379

Notes: Install calibration for instrument change out. Adjusted the span only.

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

THC Calibration Summary

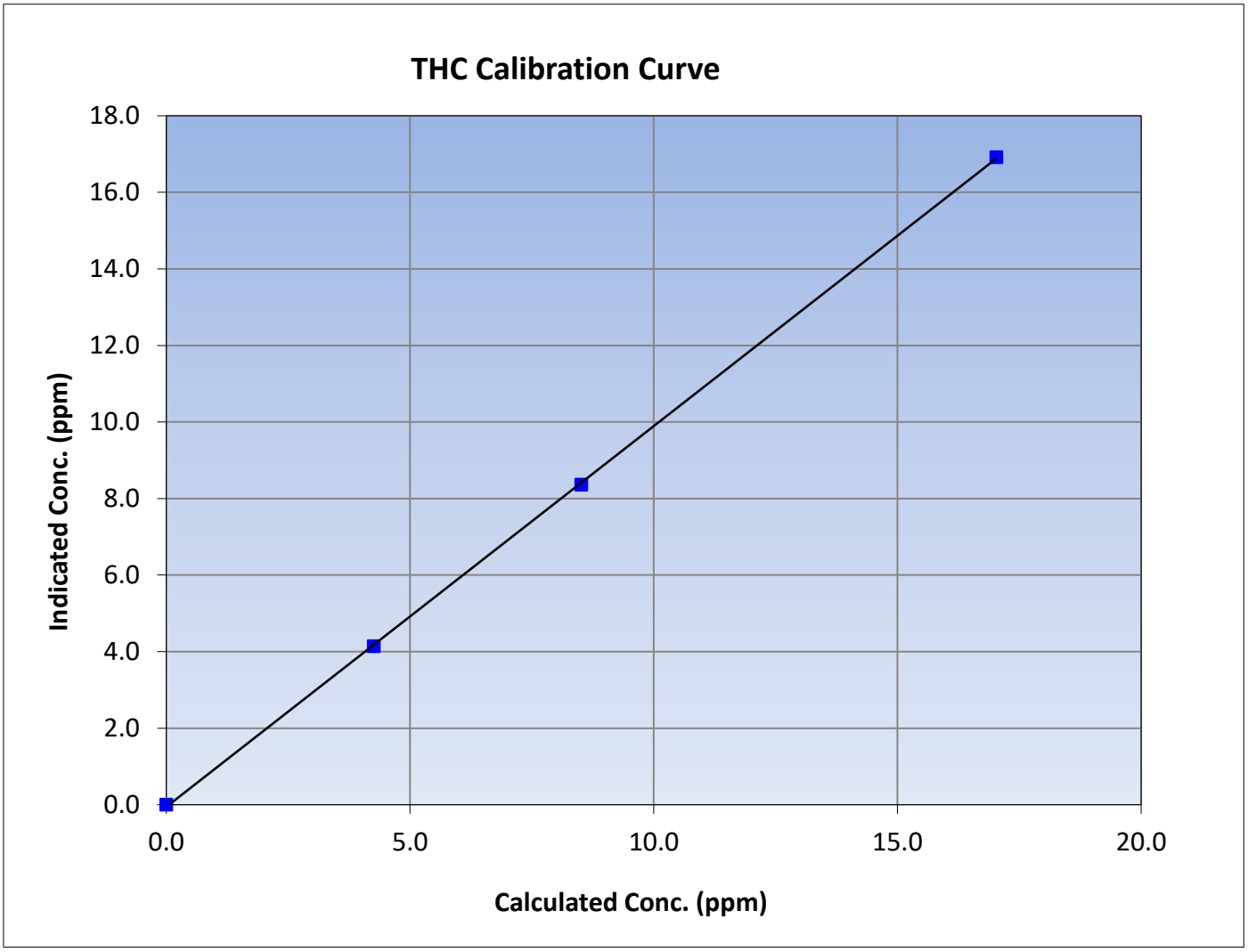
Version-01-2020

Station Information

Calibration Date:	February 12, 2023	Previous Calibration:	NA
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	12:30	End Time (MST):	14:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1181490018

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999946	≥0.995
17.03	16.92	1.0065			
8.51	8.36	1.0183	Slope	0.994670	0.90 - 1.10
4.26	4.14	1.0276			
			Intercept	-0.054336	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

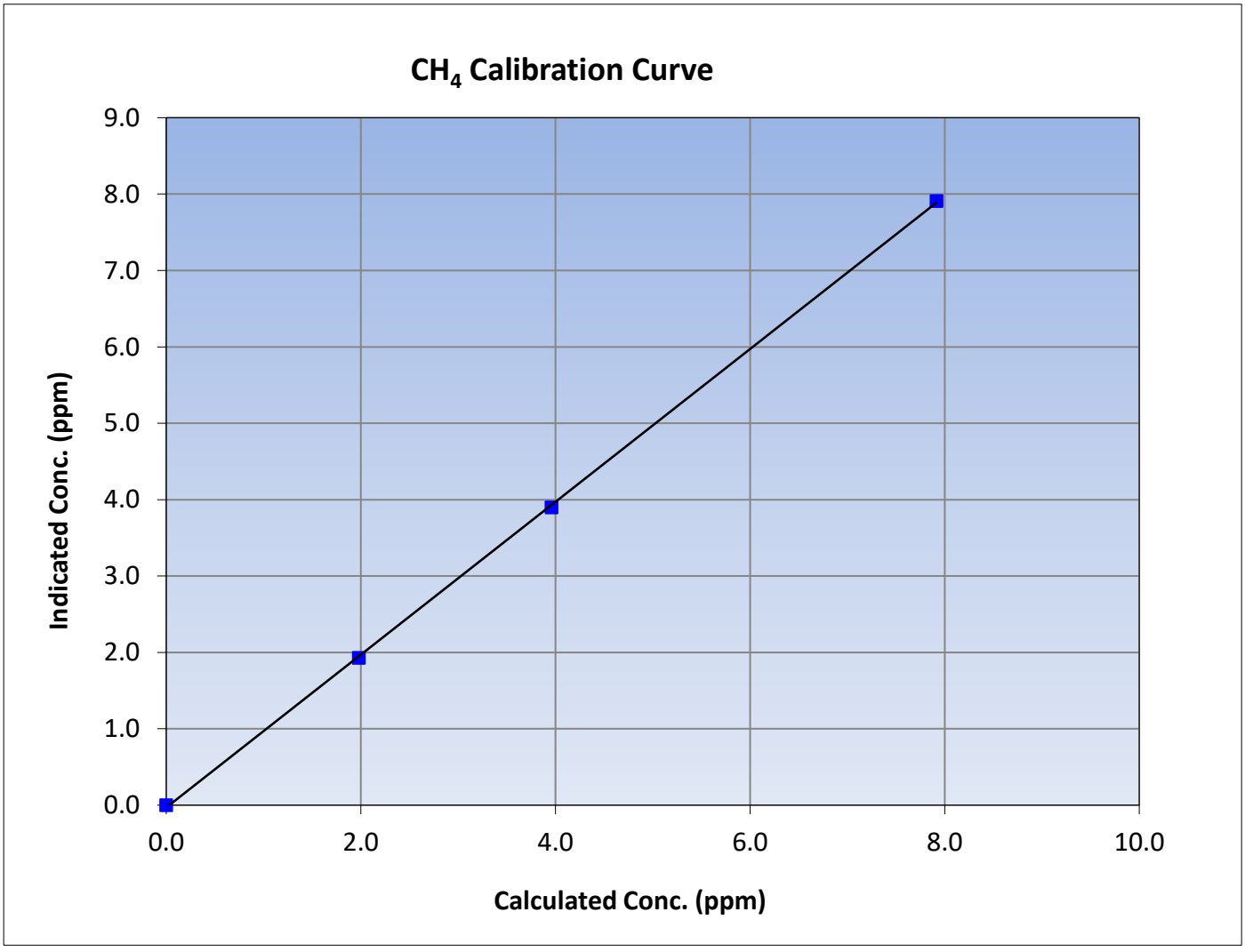
Version-01-2020

Station Information

Calibration Date:	February 12, 2023	Previous Calibration:	NA
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	12:30	End Time (MST):	14:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1181490018

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999919	≥0.995
7.91	7.91	1.0009			
3.96	3.90	1.0156	Slope	1.000380	0.90 - 1.10
1.98	1.93	1.0259			
			Intercept	-0.030757	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

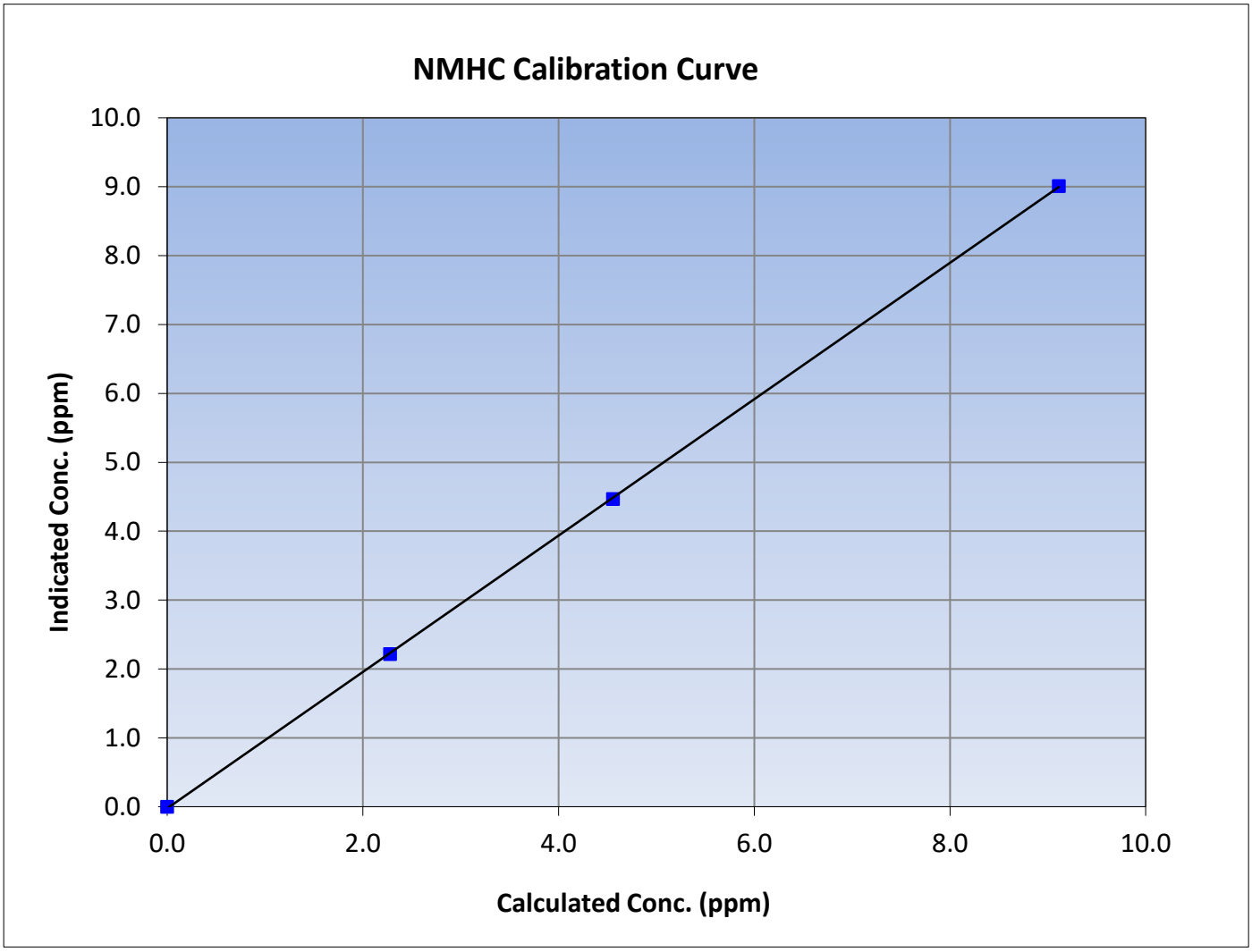
Version-01-2020

Station Information

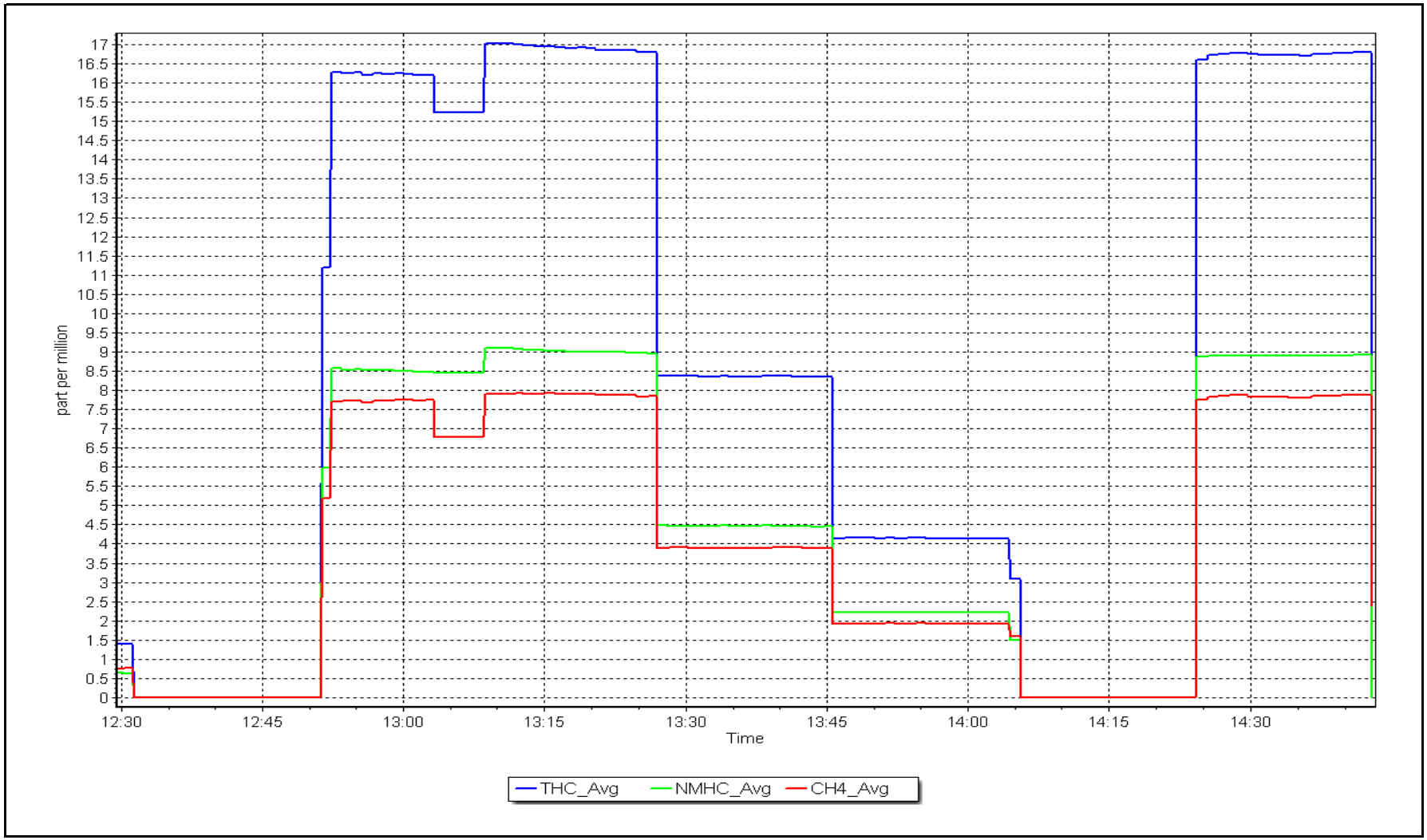
Calibration Date:	February 12, 2023	Previous Calibration:	NA
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	12:30	End Time (MST):	14:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1181490018

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999967	≥0.995
9.11	9.01	1.0113			
4.56	4.47	1.0201	Slope	0.989848	0.90 - 1.10
2.28	2.21	1.0290			
			Intercept	-0.023379	+/-0.5



NMHC Calibration Plot Date: February 12, 2023 Location: Ells River



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Ells River	Station number:	AMS 30
Calibration Date:	February 1, 2023	Last Cal Date:	January 13, 2023
Start time (MST):	8:55	End time (MST):	13:15
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:	12.6	12.5
NOX coeff or slope:	0.992	0.992	NOX bkgnd or offset:	12.5	12.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	181.5	185.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.998693	1.001096
NO_X Cal Offset:	-0.720000	-0.800000
NO Cal Slope:	0.997541	1.001429
NO Cal Offset:	-1.280000	-1.540000
NO_2 Cal Slope:	1.000846	1.001609
NO_2 Cal Offset:	0.511635	0.350570

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	813.3	799.5	13.8	817.9	802.1	15.8	0.9944	0.9968
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	4920	80.0	813.3	799.5	13.8	813.8	799.9	14.0	0.9994	0.9995
second point	4960	40.0	406.6	399.8	6.9	405.8	397.9	7.9	1.0021	1.0047
third point	4980	20.0	203.3	199.9	3.4	202.0	197.3	4.7	1.0065	1.0131
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	422.6	390.7	813.6	429.2	384.3	0.9996	0.9847
								Average Correction Factor	1.0027	1.0058

Corrected As found	NO_X = 818.1 ppb	NO = 802.3 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	0.8%
Previous Response	NO_X = 811.5 ppb	NO = 796.3 ppb			*Percent Change	NO =	0.8%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.4	420.5	390.7	391.2	0.9986	100.1%
2nd GPT point (200 ppb O3)	797.4	613.2	198.0	199.7	0.9913	100.9%
3rd GPT point (100 ppb O3)	797.4	704.9	106.3	106.4	0.9987	100.1%
				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

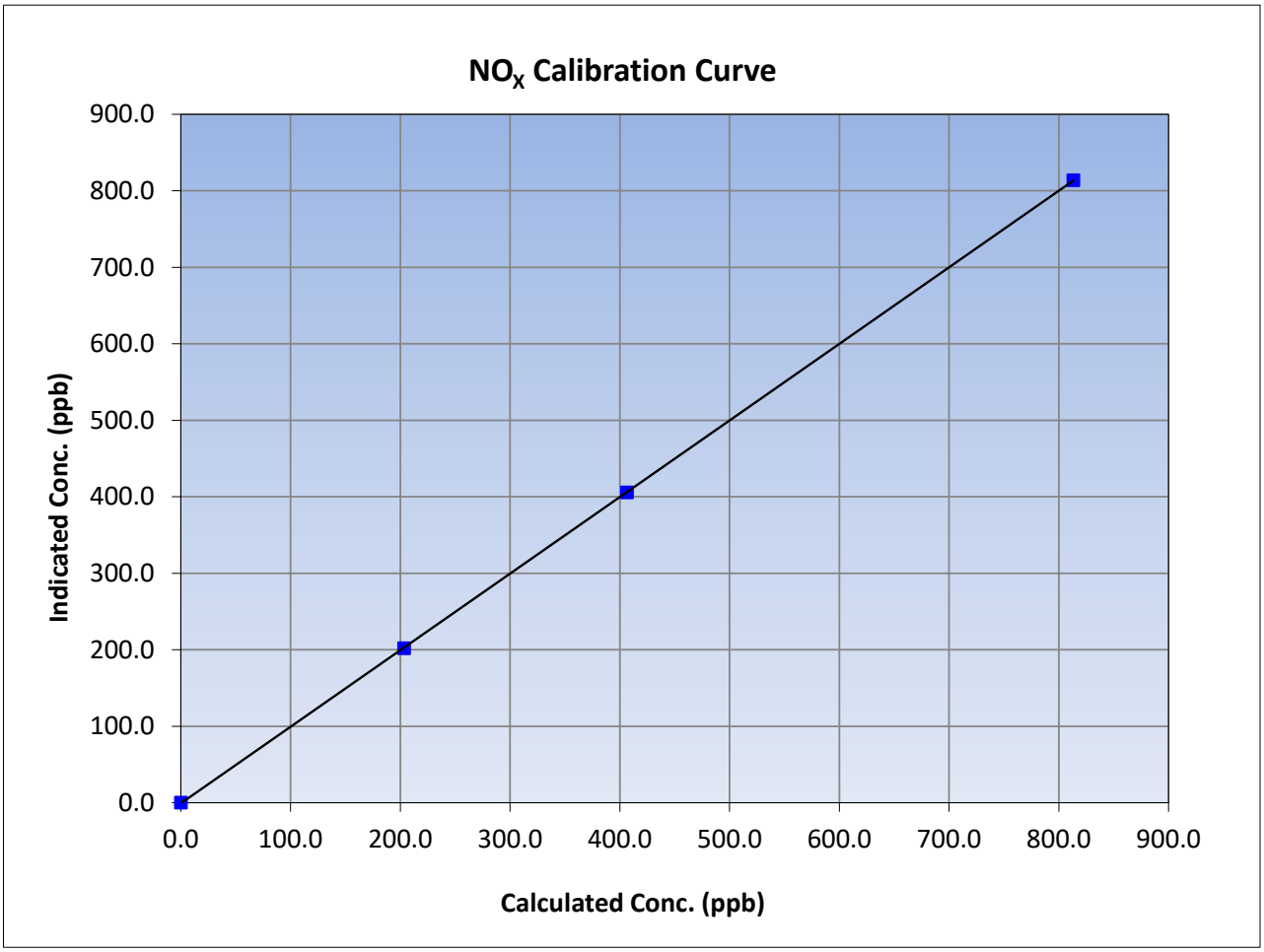
Version-04-2020

Station Information

Calibration Date:	February 1, 2023	Previous Calibration:	January 13, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	8:55	End Time (MST):	13:15
Analyzer make:	Thermo 42i	Analyzer serial #:	710321429

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999996	≥0.995
813.3	813.8	0.9994			
406.6	405.8	1.0021	Slope	1.001096	0.90 - 1.10
203.3	202.0	1.0065			
			Intercept	-0.800000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

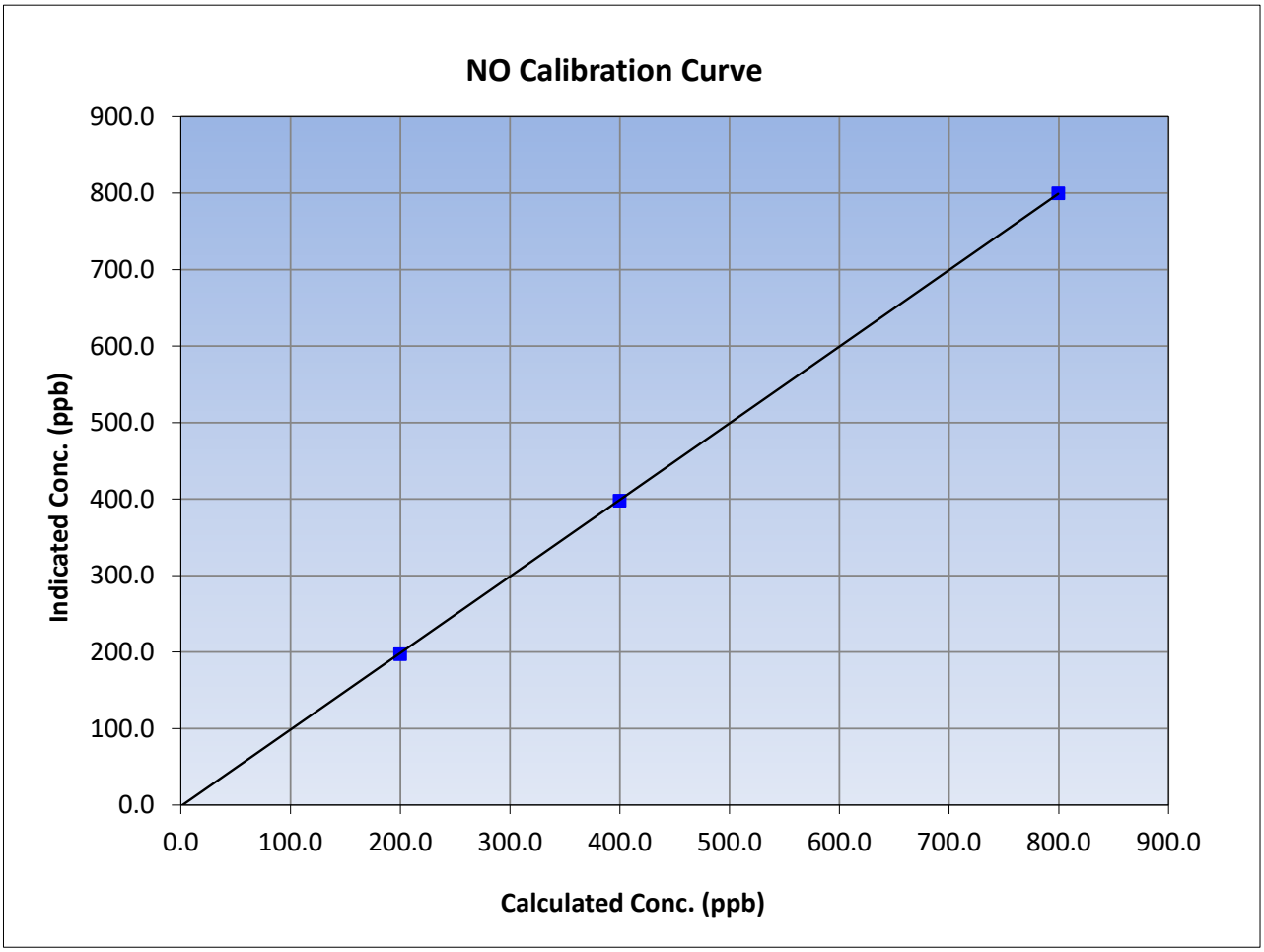
Version-04-2020

Station Information

Calibration Date:	February 1, 2023	Previous Calibration:	January 13, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	8:55	End Time (MST):	13:15
Analyzer make:	Thermo 42i	Analyzer serial #:	710321429

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999985	≥0.995
799.5	799.9	0.9995			
399.8	397.9	1.0047	Slope	1.001429	0.90 - 1.10
199.9	197.3	1.0131			
			Intercept	-1.540000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

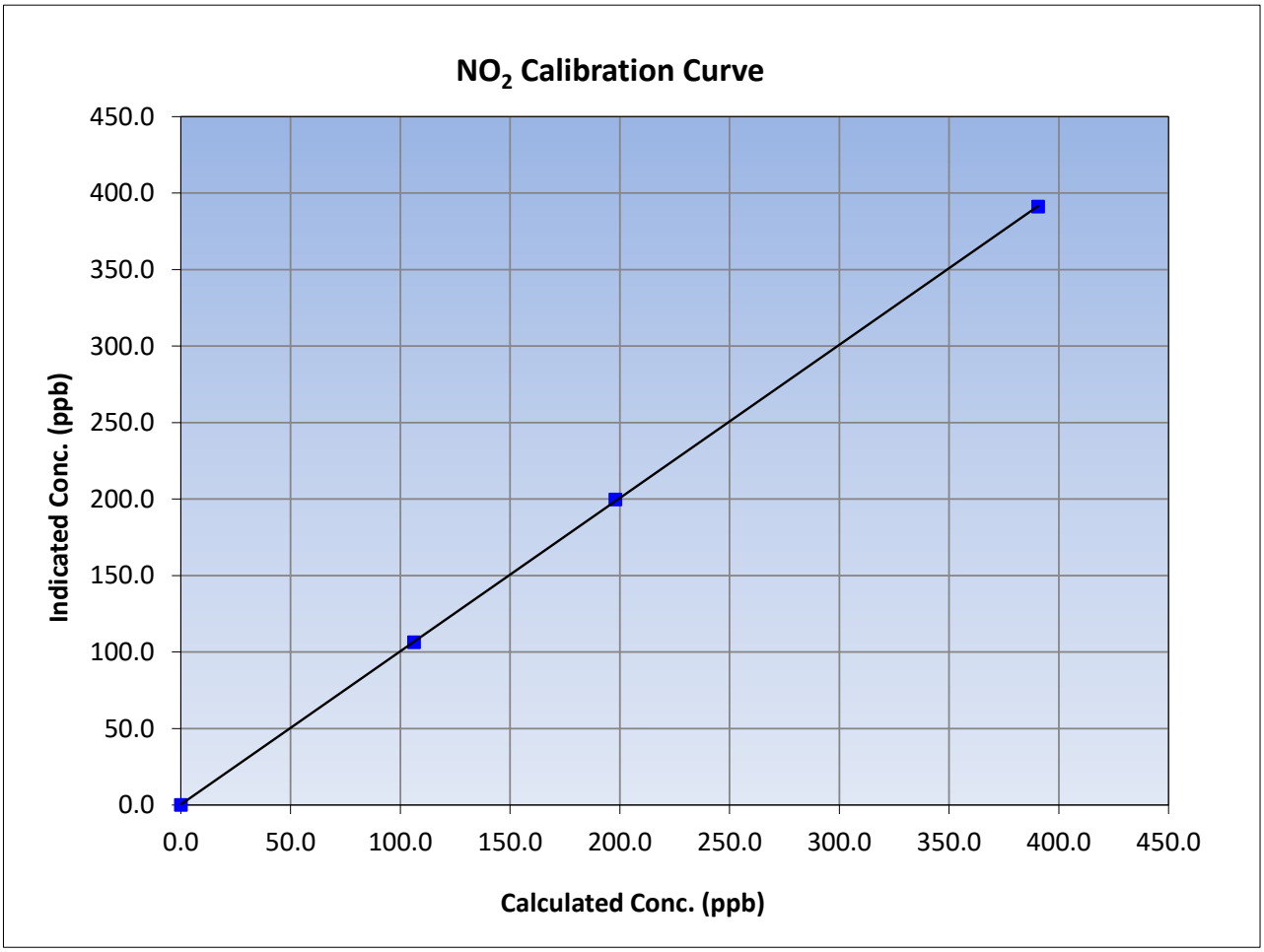
Version-04-2020

Station Information

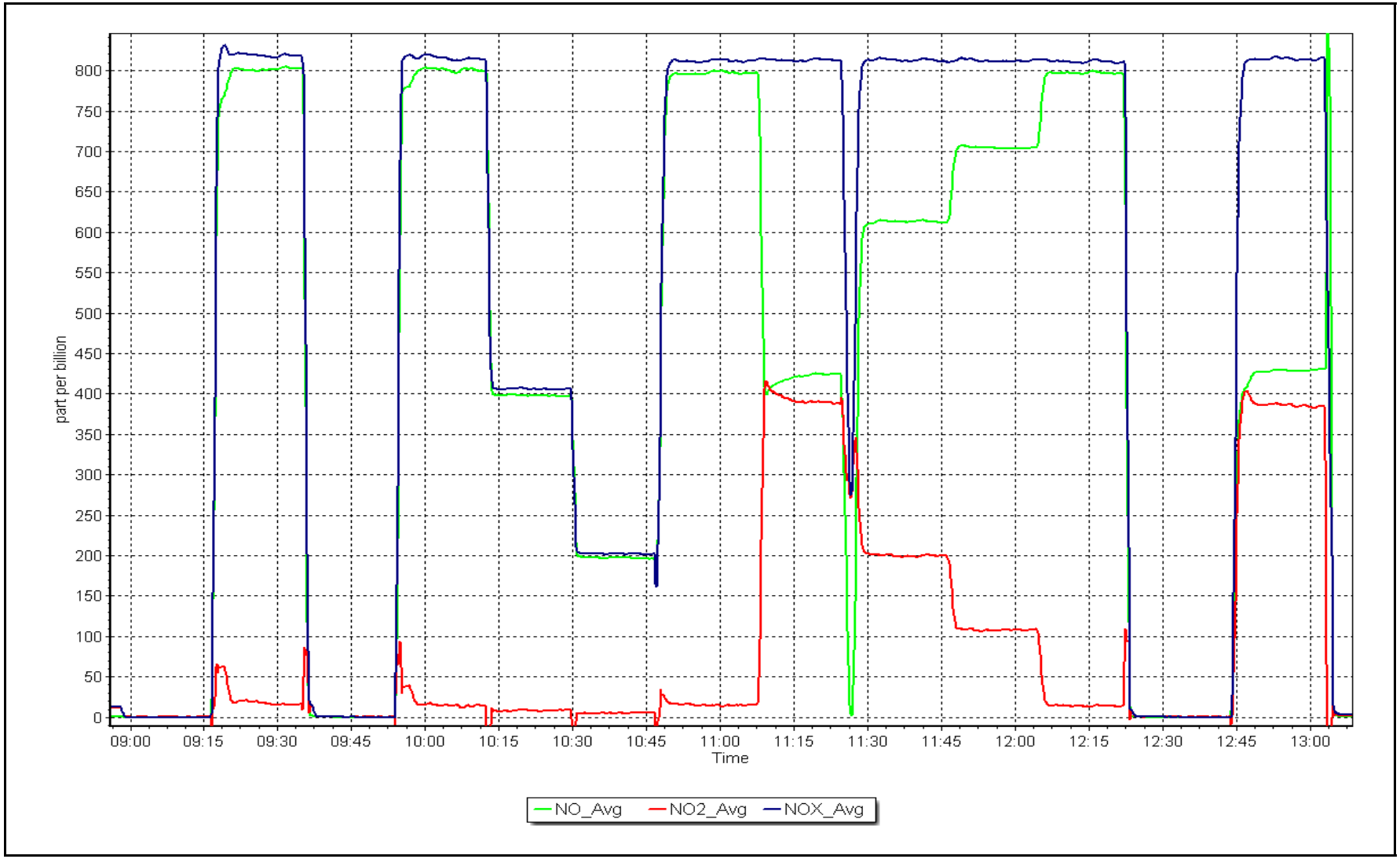
Calibration Date:	February 1, 2023	Previous Calibration:	January 13, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	8:55	End Time (MST):	13:15
Analyzer make:	Thermo 42i	Analyzer serial #:	710321429

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999981	≥0.995
390.7	391.2	0.9986			
198.0	199.7	0.9913	Slope	1.001609	0.90 - 1.10
106.3	106.4	0.9987			
			Intercept	0.350570	+/-20



NO_X Calibration Plot Date: February 1, 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:	February 17, 2023	Last Cal Date:	January 5, 2023
Start time (MST):	12:55	End time (MST):	13:08
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 (^{o}C)	-16.8	-17.1	-16.8	☐	+/- 2 ^{o}C
P (mmHg)	730.4	726.5	730.4	☐	+/- 10 mmHg
flow (LPM)	5.01	5.07	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: February 17, 2023 Last Cal Date: January 5, 2023

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

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: December 19, 2022 <0.2 ug/m3

Disposable Filter Changed: December 19, 2022

Annual Maintenance

Date Sample Tube Cleaned: October 17, 2022

Date RH/T Sensor Cleaned: October 17, 2022

Notes: No adjustments required.

Calibration by: Denny Ray Estador

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS506
JACKFISH 1
FEBRUARY 2023

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

March 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Jackfish 1	Station number:	AMS 506
Calibration Date:	February 14, 2023	Last Cal Date:	January 24, 2023
Start time (MST):	11:36	End time (MST):	14:16
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:	1.006642	1.004300	Backgd or Offset:	19.0	18.9
Calibration intercept:	-1.856099	-1.536060	Coeff or Slope:	0.960	0.960

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.7	----
as found span	4921	79.2	800.2	800.4	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.4	----
high point	4921	79.2	800.2	802.4	0.997
second point	4960	39.6	400.2	400.6	0.999
third point	4980	19.8	200.1	197.7	1.012
as left zero	5000	0.0	0.0	-0.5	----
as left span	4921	79.2	800.2	802.4	0.997
				Average Correction Factor	1.003

Baseline Corr As found:	801.10	Previous response	803.66	*% change	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

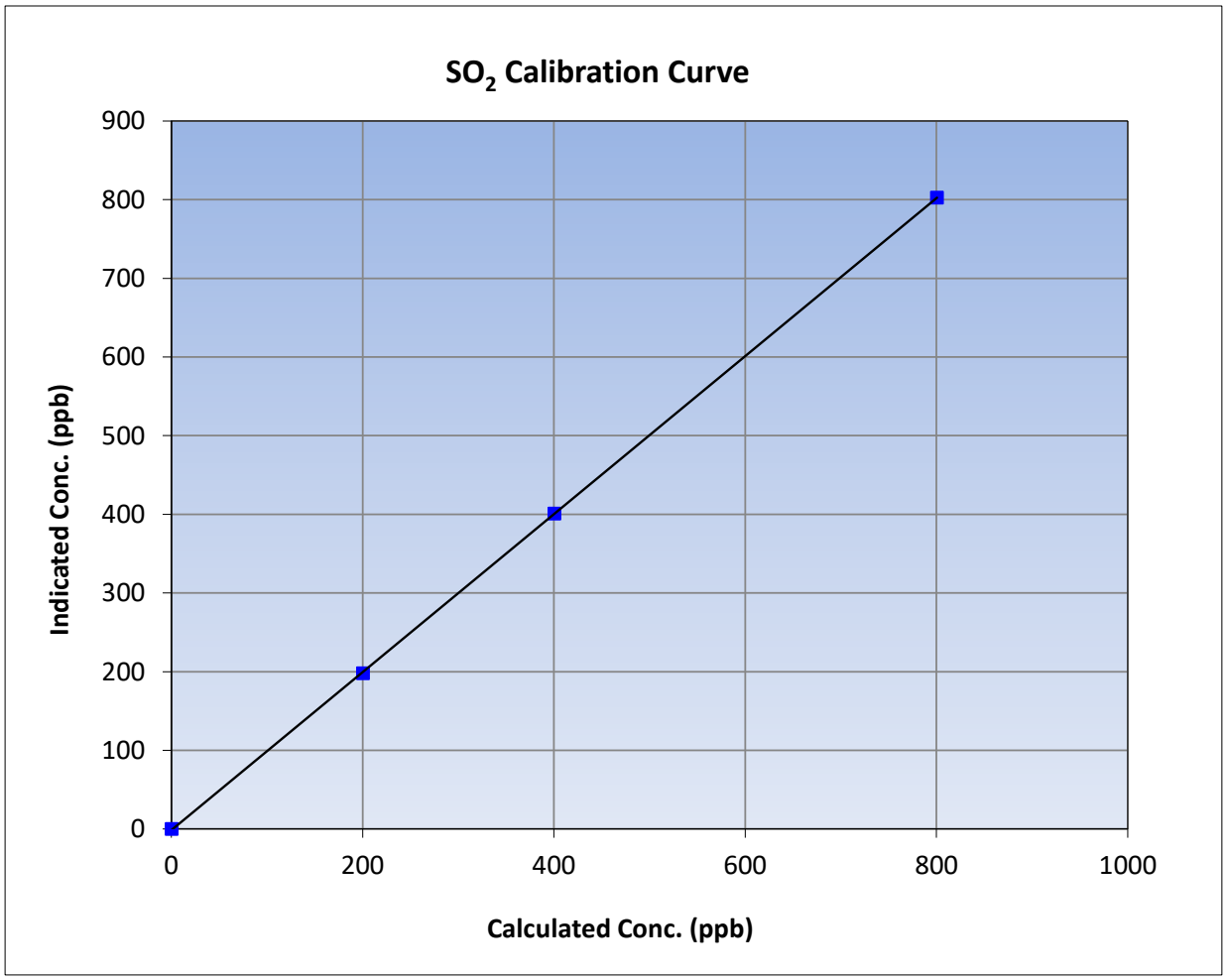
Station Information

Calibration Date:	February 14, 2023	Previous Calibration:	January 24, 2023
Station Name:	Jackfish 1	Station Number:	AMS 506
Start Time (MST):	11:36	End Time (MST):	14:16
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290011

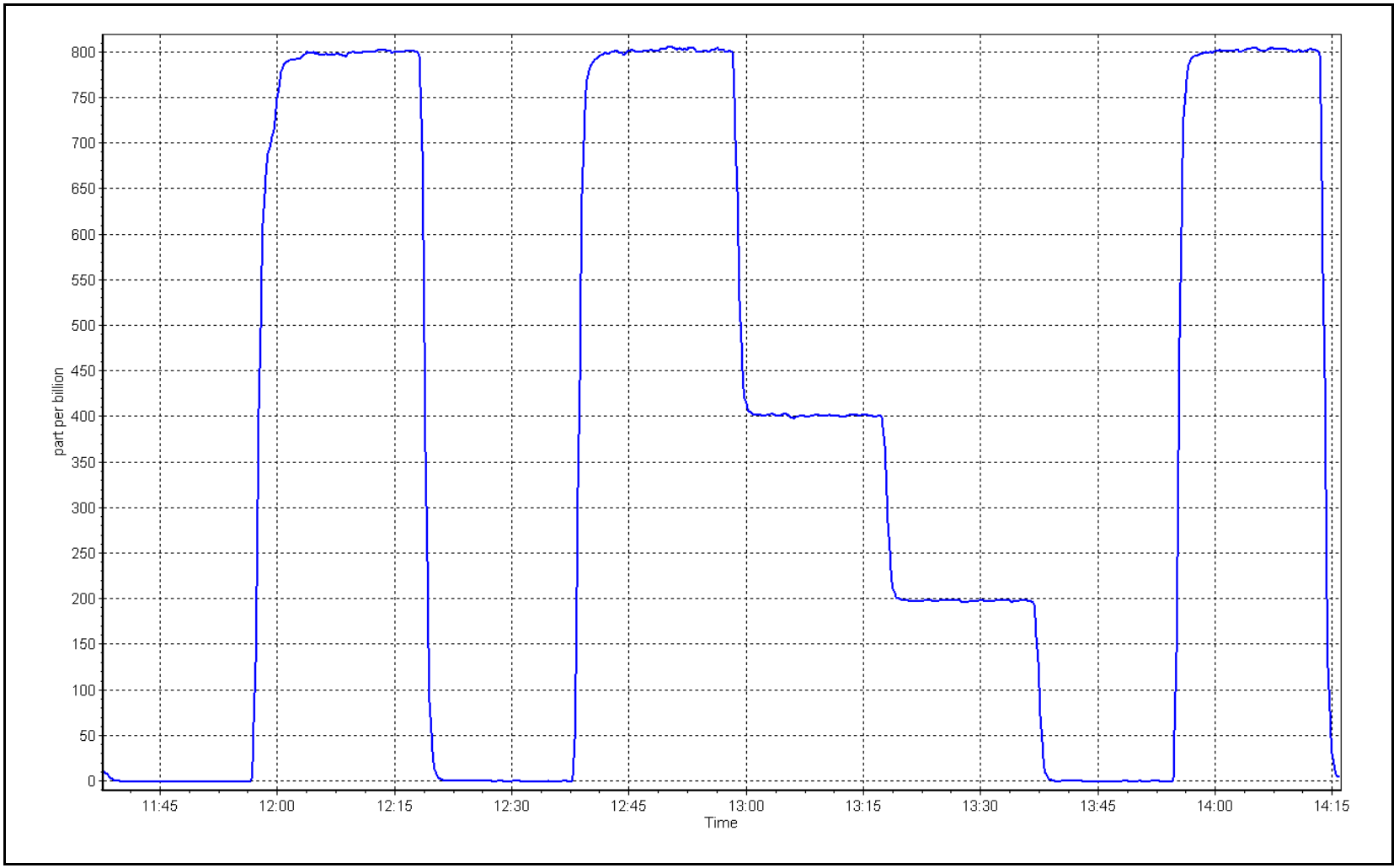
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.4	----
800.2	802.4	0.9973
400.2	400.6	0.9989
200.1	197.7	1.0120

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999988	*≥0.995*
Slope	1.004300	*0.90 - 1.10*
Intercept	-1.536060	*+/-30*



SO2 Calibration Plot Date: February 14, 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:	February 1, 2023	Last Cal Date:	January 20, 2023
Start time (MST):	10:12	End time (MST):	14:10
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 43iQTL		Analyzer serial #:	12124313139	
Converter make:	Global G150		Converter serial #:	2022-200	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.008437	1.003151	Backgd or Offset:	1.04	1.04
Calibration intercept:	-0.098415	-0.038506	Coeff or Slope:	0.736	0.736

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.2	----
as found span	4922	77.8	80.0	74.6	1.075
as found 2nd point	4961	38.9	40.0	37.0	1.087
as found 3rd point	4981	19.4	19.9	17.8	1.133
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	4922	77.8	80.0	80.4	0.995
second point	4961	38.9	40.0	39.9	1.002
third point	4981	19.4	19.9	19.5	1.023
as left zero	5000	0.0	0.0	0.6	----
as left span	4922	77.8	80.0	80.9	0.989
SO2 Scrubber Check	4921	79.2	792.0	0.1	----
Date of last scrubber change:				Ave Corr Factor	1.007
Date of last converter efficiency test:		December 1, 2022			efficiency

Baseline Corr As found:	74.4	Prev response:	80.56	*% change:	-8.3%
Baseline Corr 2nd AF pt:	36.8	AF Slope:	0.933723	AF Intercept:	-0.260061
Baseline Corr 3rd AF pt:	17.6	AF Correlation:	0.999815		

* = > +/-5% change initiates investigation

Notes: Noticed as found 3rd point is off the correction factor. Hydration might be required, inlet filter changed and hydrator filled after third As Found, scrubber check after calibrator zero. No adjustment made.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

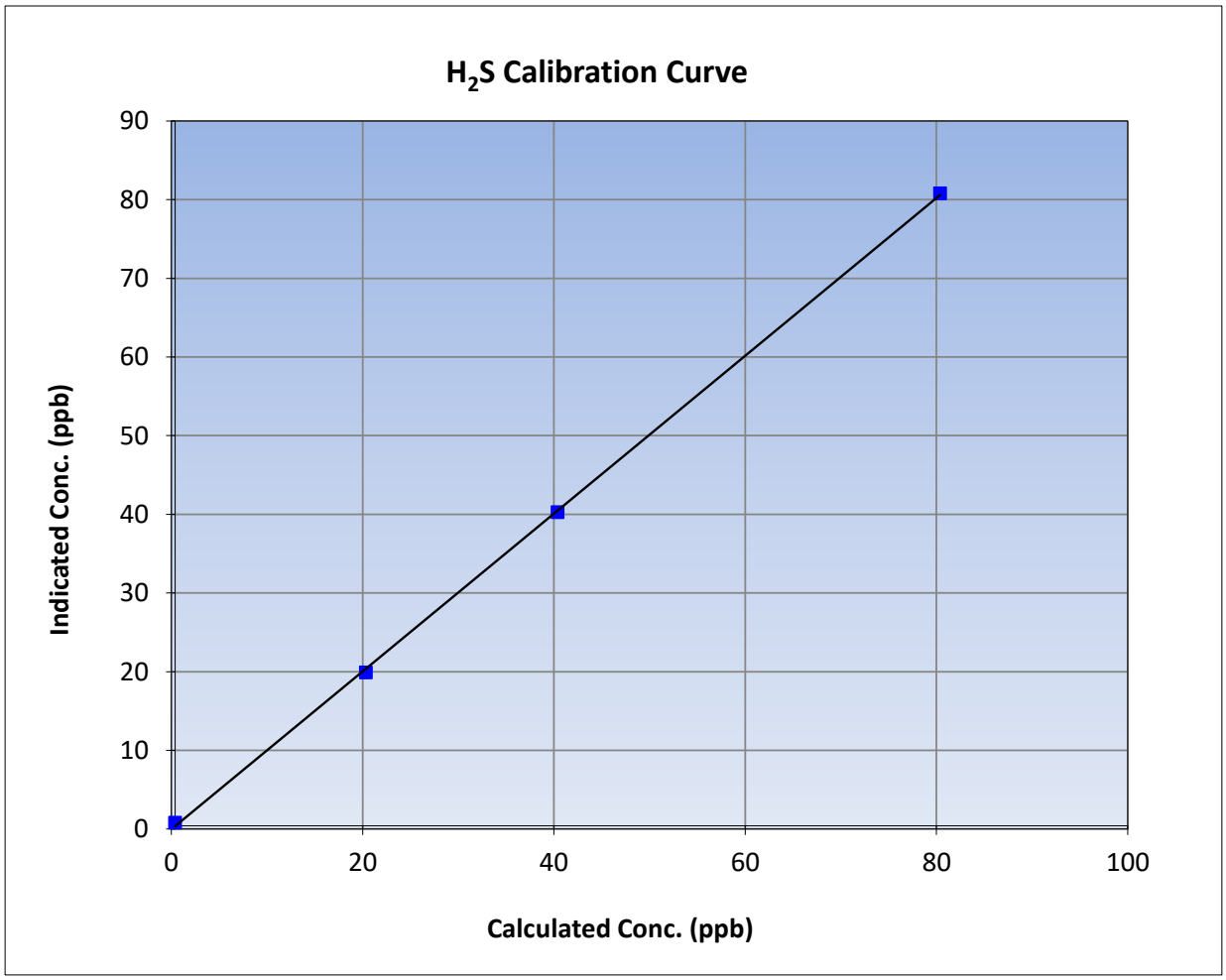
Station Information

Calibration Date:	February 1, 2023	Previous Calibration:	January 20, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	10:12	End Time (MST):	14:10
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	12124313139

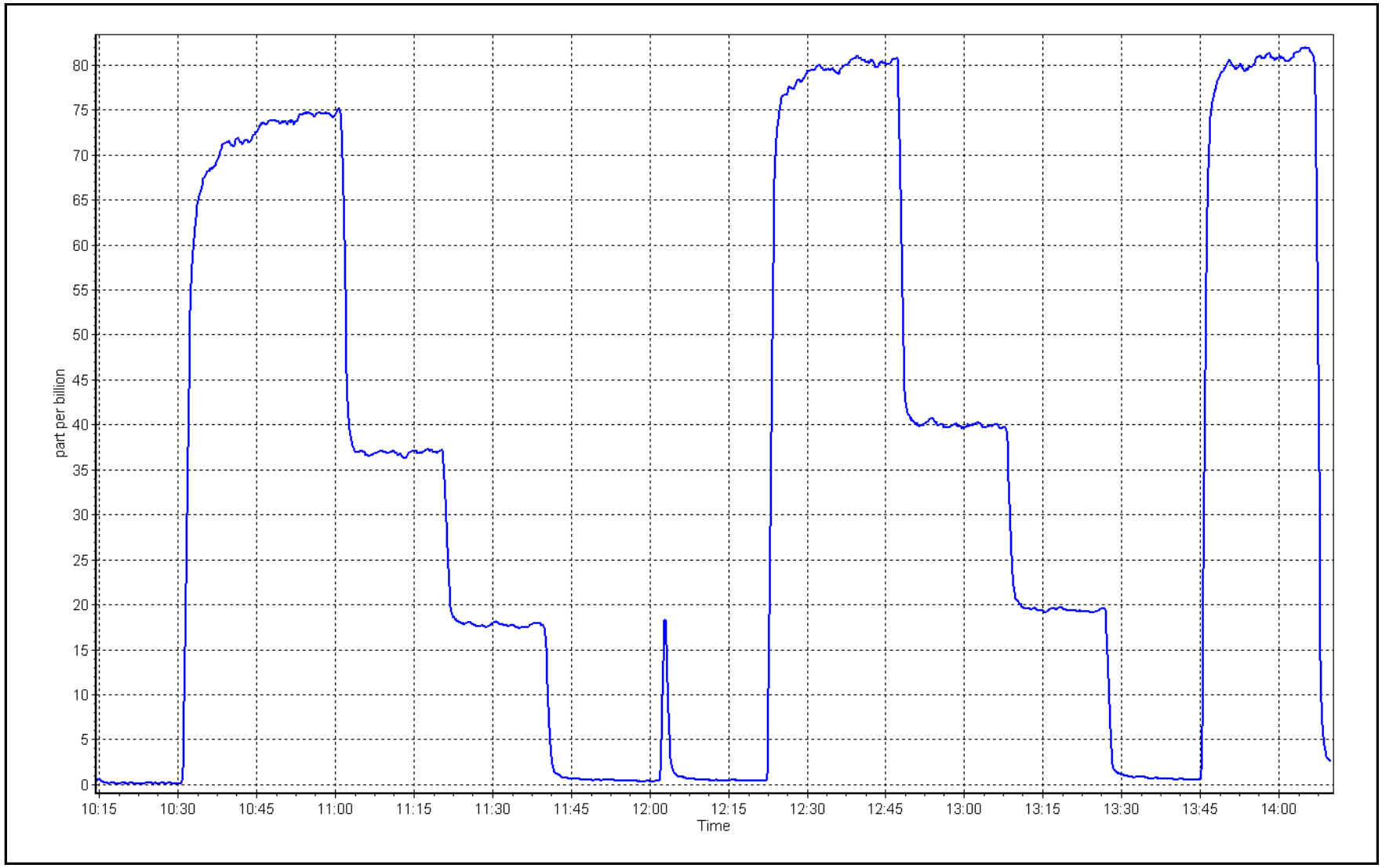
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
80.0	80.4	0.9948
40.0	39.9	1.0023
19.9	19.5	1.0226

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999863	*≥0.995*
Slope	1.003151	*0.90 - 1.10*
Intercept	-0.038506	*+/-3*



H_2S Calibration Plot Date: February 1, 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:	February 13, 2023	Last Cal Date:	February 1, 2023
Start time (MST):	10:00	End time (MST):	14:06
Reason:	Maintenance H2S low spans		

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 43iQTL		Analyzer serial #:	12124313139	
Converter make:	Global G150		Converter serial #:	2022-200	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.008437	1.002721	Backgd or Offset:	1.04	1.04
Calibration intercept:	-0.098415	0.101523	Coeff or Slope:	0.736	0.720

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4922	77.8	80.0	67.8	1.181
as found 2nd point	4961	38.9	40.0	33.0	1.216
as found 3rd point	4981	19.4	19.9	16.2	1.239
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	4922	77.8	80.0	80.4	0.995
second point	4961	38.9	40.0	40.2	0.995
third point	4981	19.4	19.9	19.7	1.012
as left zero	5000	0.0	0.0	0.6	----
as left span	4922	77.8	80.0	81.0	0.987
SO2 Scrubber Check	4921	79.2	792.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.001
Date of last converter efficiency test:		December 1, 2022			efficiency

Baseline Corr As found:	67.7	Prev response:	80.56	*% change:	-19.0%
Baseline Corr 2nd AF pt:	32.9	AF Slope:	0.848434	AF Intercept:	-0.401783
Baseline Corr 3rd AF pt:	16.1	AF Correlation:	0.999703		

* = > +/-5% change initiates investigation

Notes: Here to address H2S low spans. Inlet filter changed and hydrator filled after third As Found, scrubber check after calibrator zero. Adjusted span.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

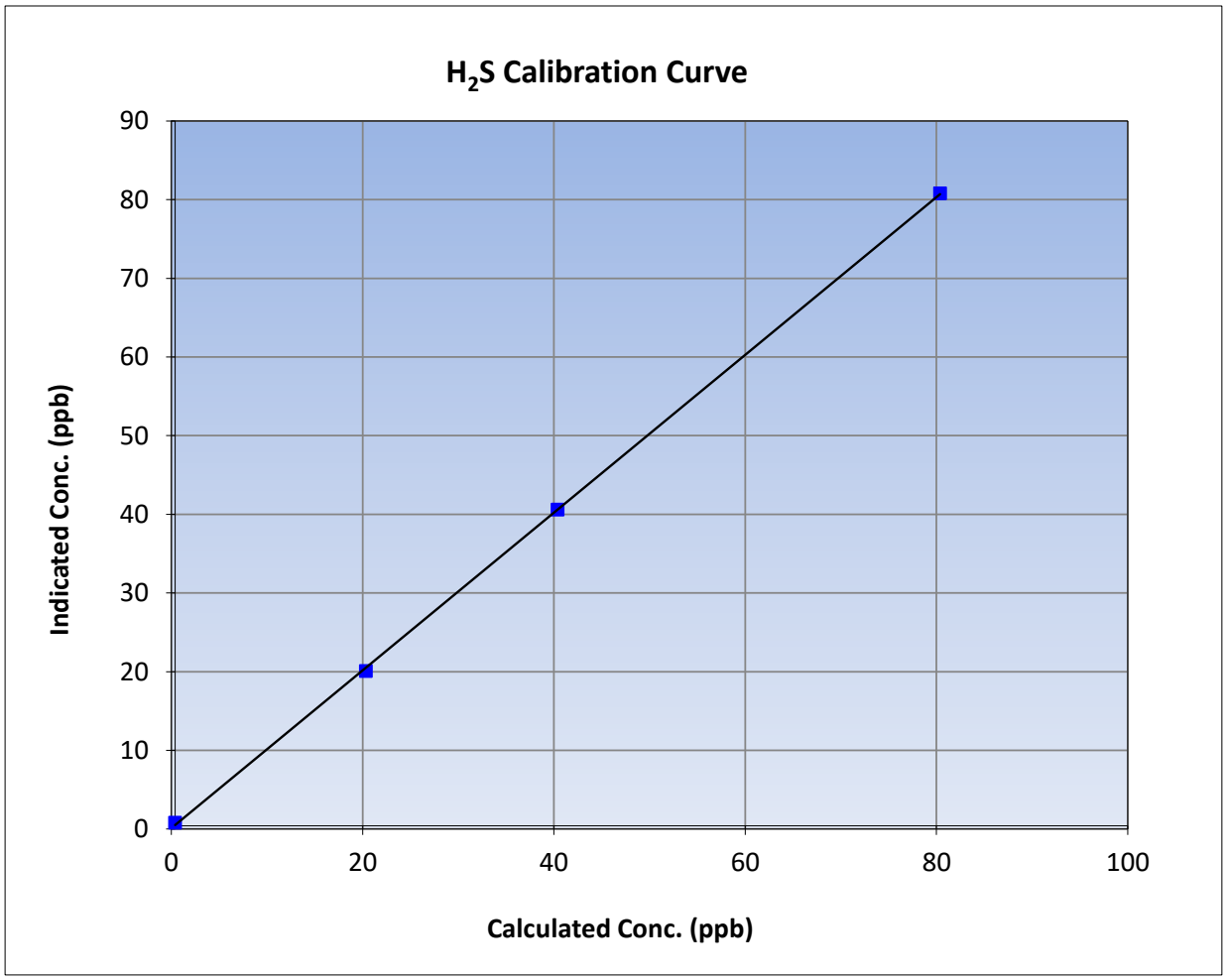
Station Information

Calibration Date:	February 13, 2023	Previous Calibration:	February 1, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	10:00	End Time (MST):	14:06
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	12124313139

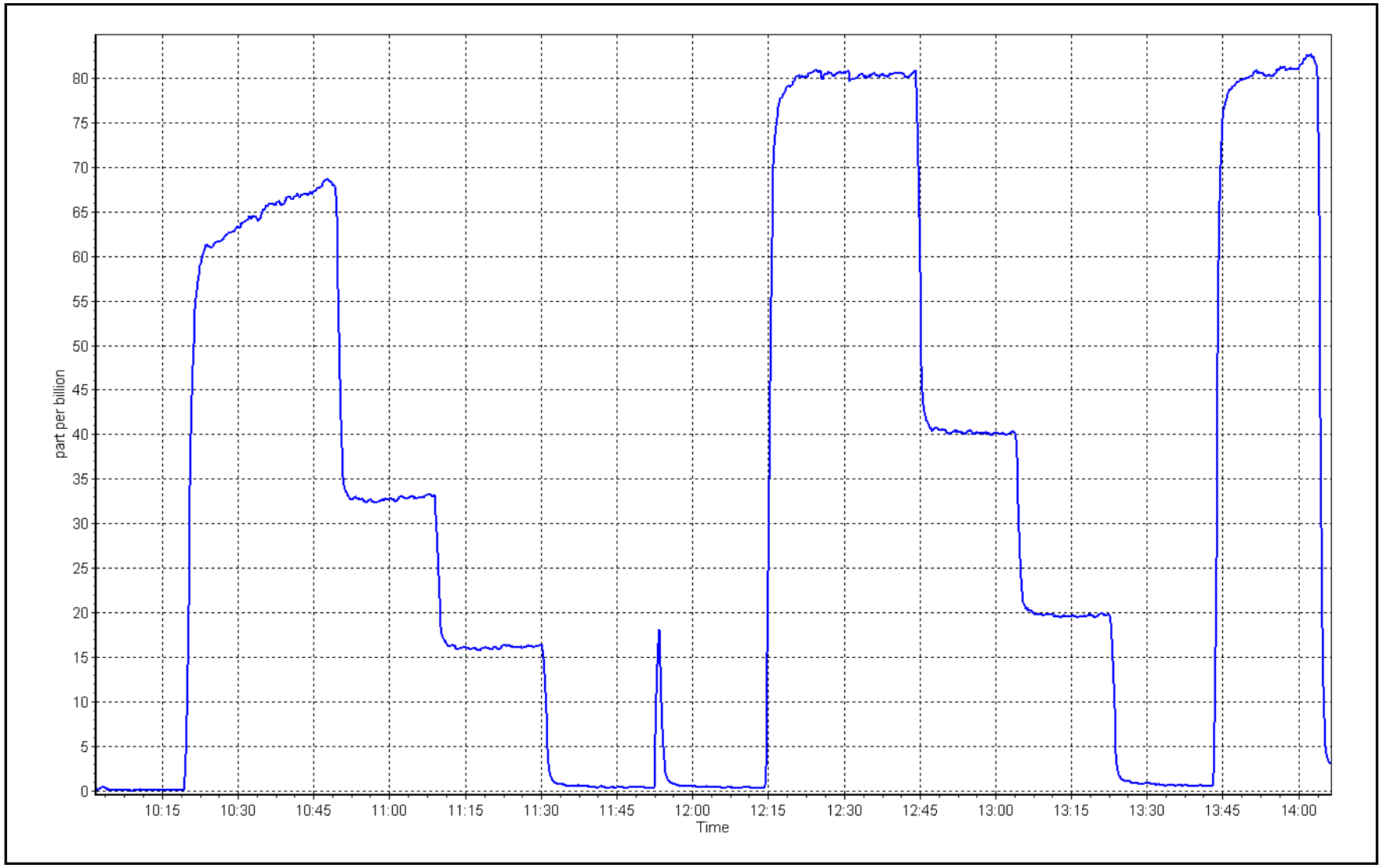
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
80.0	80.4	0.9948
40.0	40.2	0.9948
19.9	19.7	1.0123

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999927	*≥0.995*
Slope	1.002721	*0.90 - 1.10*
Intercept	0.101523	*+/-3*



H_2S Calibration Plot Date: February 13, 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:	February 22, 2023	Last Cal Date:	February 13, 2023
Start time (MST):	9:57	End time (MST):	14:49
Reason:	Maintenance		

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 43iQ		Analyzer serial #:	12124313139	
Converter make:	Global G150		Converter serial #:	2022-200	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.002721		Backgd or Offset:	1.04	1.04
Calibration intercept:	0.101523		Coeff or Slope:	0.720	0.720

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.2	----
as found span	4922	77.8	80.0	75.1	1.068
as found 2nd point	4961	38.9	40.0	37.9	1.061
as found 3rd point	4981	19.4	19.9	18.4	1.096
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:		22-Feb-23		Ave Corr Factor	
Date of last converter efficiency test:		December 1, 2022			efficiency

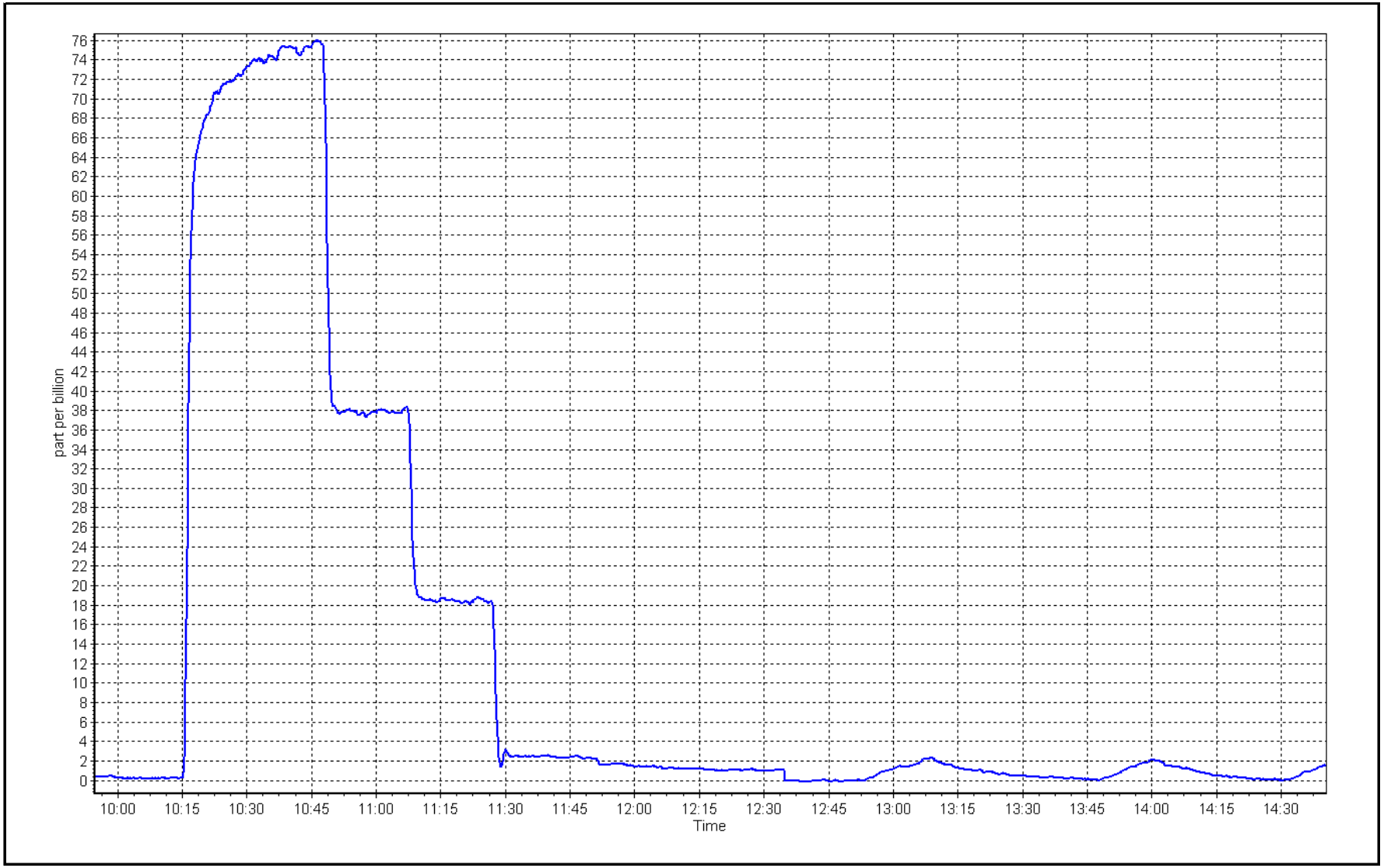
Baseline Corr As found:	74.9	Prev response:	80.30	*% change:	-7.2%
Baseline Corr 2nd AF pt:	37.7	AF Slope:	0.938864	AF Intercept:	0.060149
Baseline Corr 3rd AF pt:	18.2	AF Correlation:	0.999917		

* = > +/-5% change initiates investigation

Notes: Changed inlet filter and SO2 scrubber beads after multi-point as founds. Multiple attempts to remedy SO2 scrubber failure. Discussed with the lead and decided to leave it hydrated overnight.

Calibration Performed By: Sean Bala

H_2S Calibration Plot Date: February 22, 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:	February 24, 2023	Last Cal Date:	February 22, 2023
Start time (MST):	9:32	End time (MST):	13:05
Reason:	Maintenance	Installing a new H2S setup	

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:	NA	0.995862	Backgd or Offset:	NA	1.04
Calibration intercept:	NA	0.041428	Coeff or Slope:	NA	0.720

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	4922	77.8	80.0	79.7	1.004
second point	4961	38.9	40.0	40.0	1.000
third point	4981	19.4	19.9	19.6	1.017
as left zero	5000	0.0	0.0	0.1	----
as left span	4922	77.8	80.0	80.0	1.000
SO2 Scrubber Check	4921	79.2	792.0	-0.1	----
Date of last scrubber change:		24-Feb-23		Ave Corr Factor	1.007
Date of last converter efficiency test:		December 1, 2022			efficiency

Baseline Corr As found:	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: Started maintenance on 2023-02-22. Inlet filter changed and multi-point as found was already done. H2S setup need to be change because it was not responding. Adjusted span.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

H_2S Calibration Summary

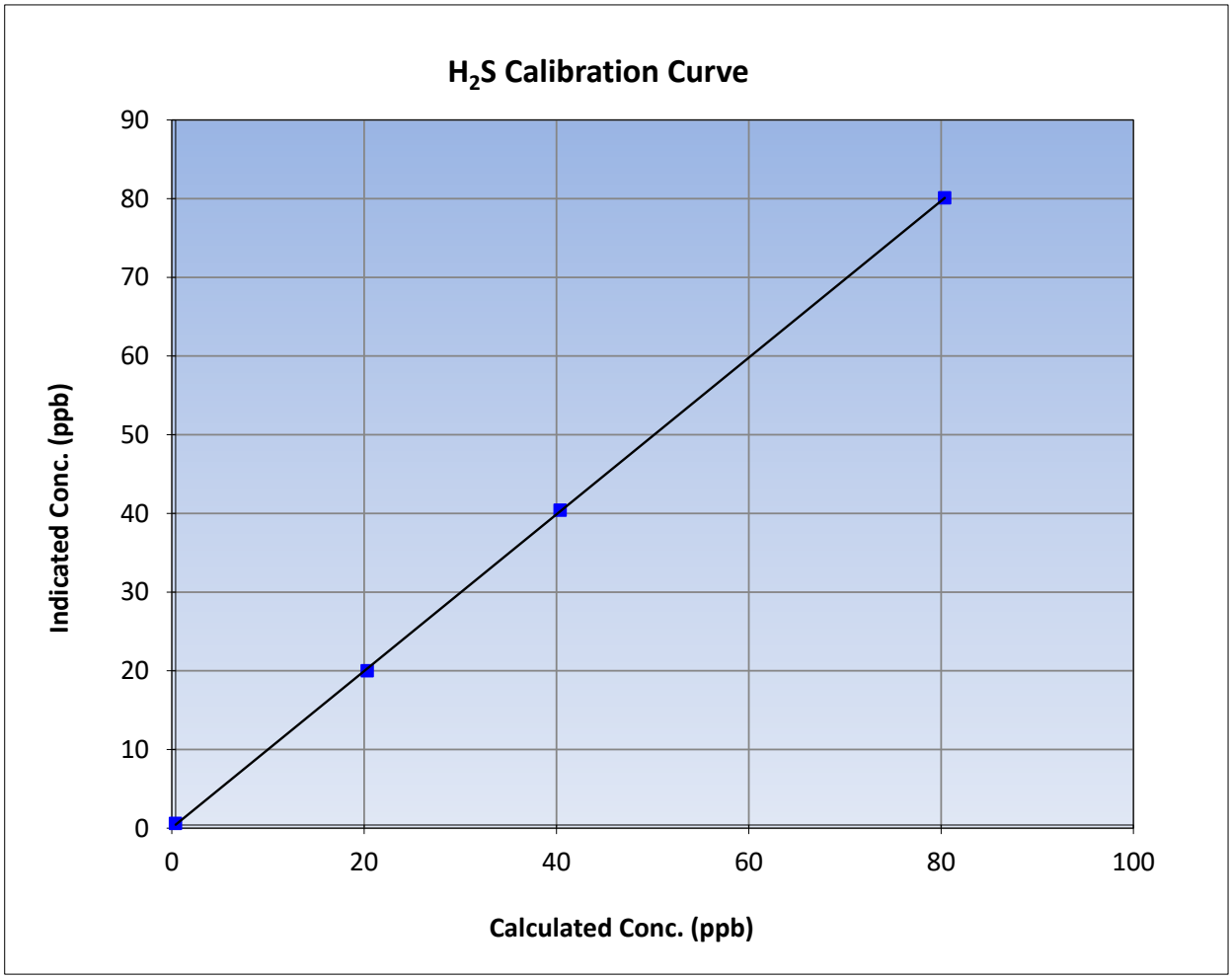
Version-11-2021

Station Information

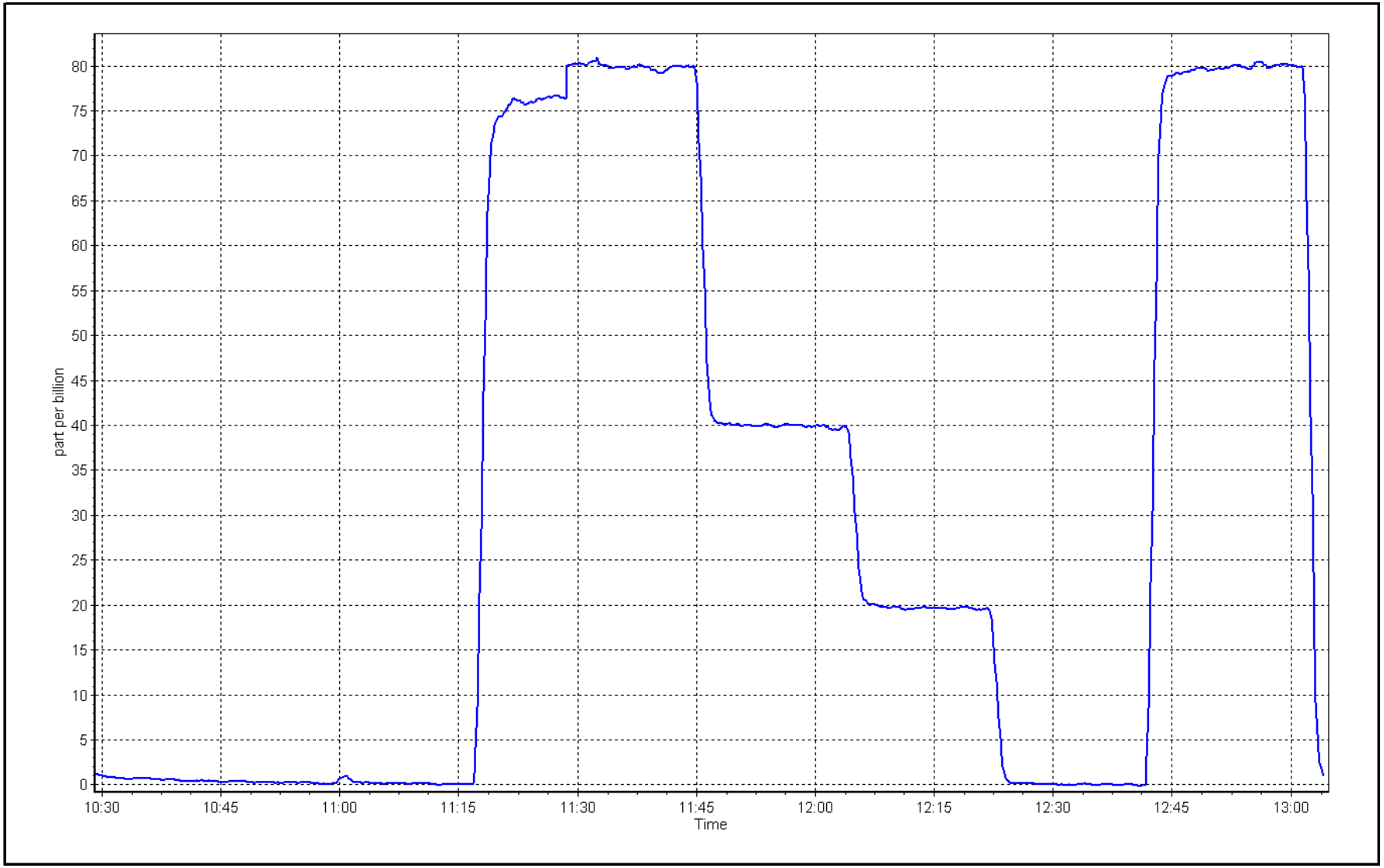
Calibration Date:	February 24, 2023	Previous Calibration:	February 22, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	9:32	End Time (MST):	13:05
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1180540020

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.2	----	Correlation Coefficient	0.999962	*≥0.995*
80.0	79.7	1.0035			
40.0	40.0	0.9997	Slope	0.995862	*0.90 - 1.10*
19.9	19.6	1.0174			
			Intercept	0.041428	*+/-3*



H_2S Calibration Plot Date: February 24, 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:	February 15, 2023	Last Cal Date:	January 25, 2023
Start time (MST):	10:21	End time (MST):	14:36
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:	1.151	1.144	NO bkgnd or offset:	3.3	3.3
NOX coeff or slope:	0.991	0.992	NOX bkgnd or offset:	3.4	3.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	174.0	173.4

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999577	0.999791
NO_X Cal Offset:	-0.847995	-1.047992
NO Cal Slope:	1.001211	1.001240
NO Cal Offset:	-2.027974	-2.087973
NO_2 Cal Slope:	1.000608	0.999204
NO_2 Cal Offset:	0.007440	-0.347850

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	806.9	804.8	2.1	0.9928	0.9939
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.3	0.2	0.1	----	----
high point	4916	84.4	801.1	799.9	1.2	800.1	799.5	0.6	1.0012	1.0005
second point	4958	42.2	400.5	400.0	0.6	400.0	398.5	1.5	1.0014	1.0037
third point	4979	21.1	200.3	200.0	0.3	197.0	195.0	2.0	1.0166	1.0255
as left zero	5000	0.0	0.0	0.0	0.0	0.3	0.2	0.1	----	----
as left span	4916	84.4	801.1	415.9	385.2	793.9	411.3	382.6	1.0090	1.0111
								Average Correction Factor	1.0064	1.0099

Corrected As found	NO_X = 806.8 ppb	NO = 804.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.9%
Previous Response	NO_X = 799.9 ppb	NO = 798.8 ppb		*Percent Change	NO =	0.7%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	792.8	408.8	385.2	385.0	1.0005	100.0%
2nd GPT point (200 ppb O3)	792.8	591.0	203.0	201.6	1.0069	99.3%
3rd GPT point (100 ppb O3)	792.8	687.5	106.5	106.0	1.0045	99.5%
				Average Correction Factor	1.0040	99.6%

Notes: Adjusted the span only.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

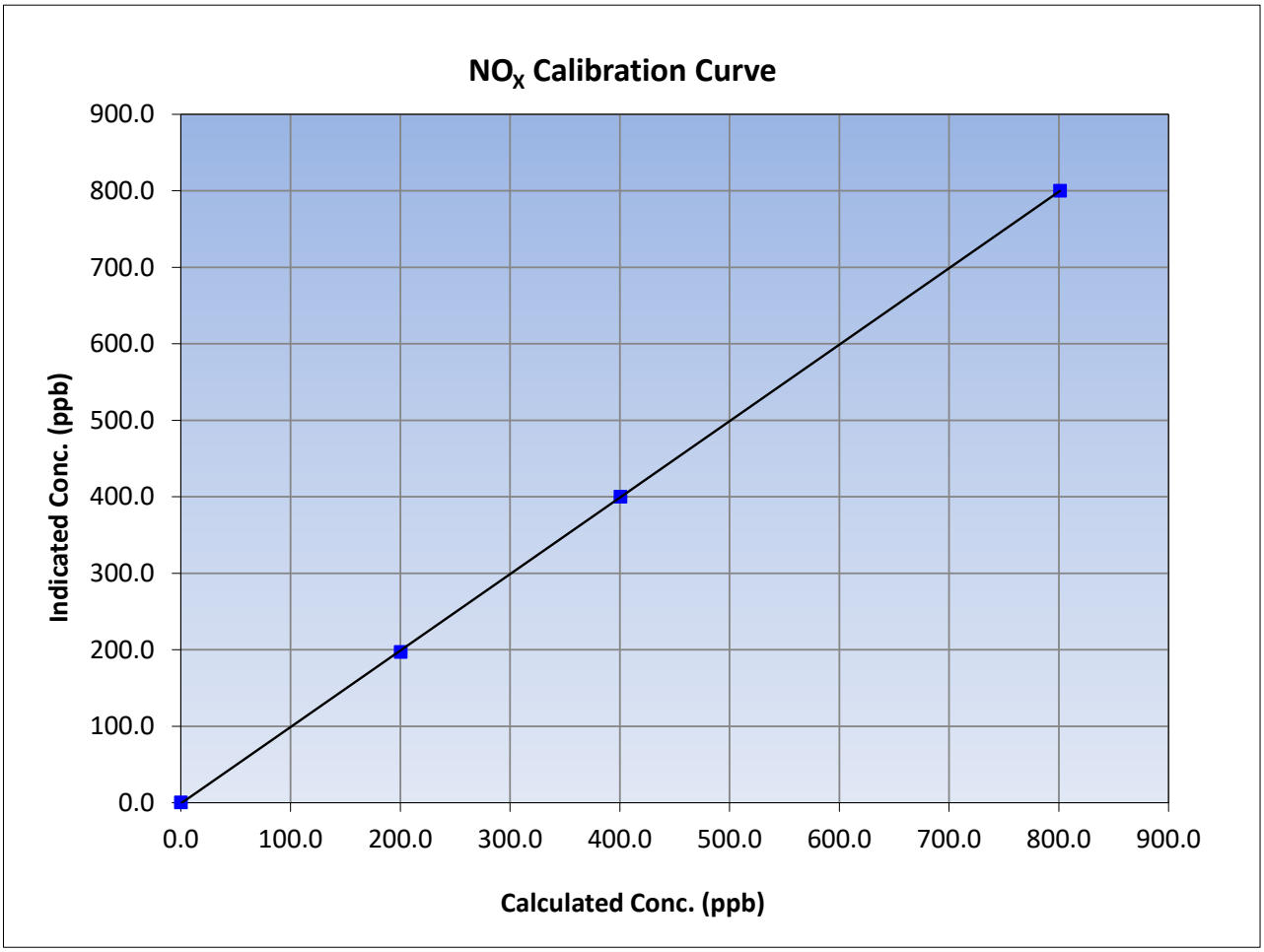
Version-04-2020

Station Information

Calibration Date:	February 15, 2023	Previous Calibration:	January 25, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	10:21	End Time (MST):	14:36
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	0.3	----	Correlation Coefficient	0.999980	*≥0.995*
801.1	800.1	1.0012			
400.5	400.0	1.0014	Slope	0.999791	*0.90 - 1.10*
200.3	197.0	1.0166			
			Intercept	-1.047992	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

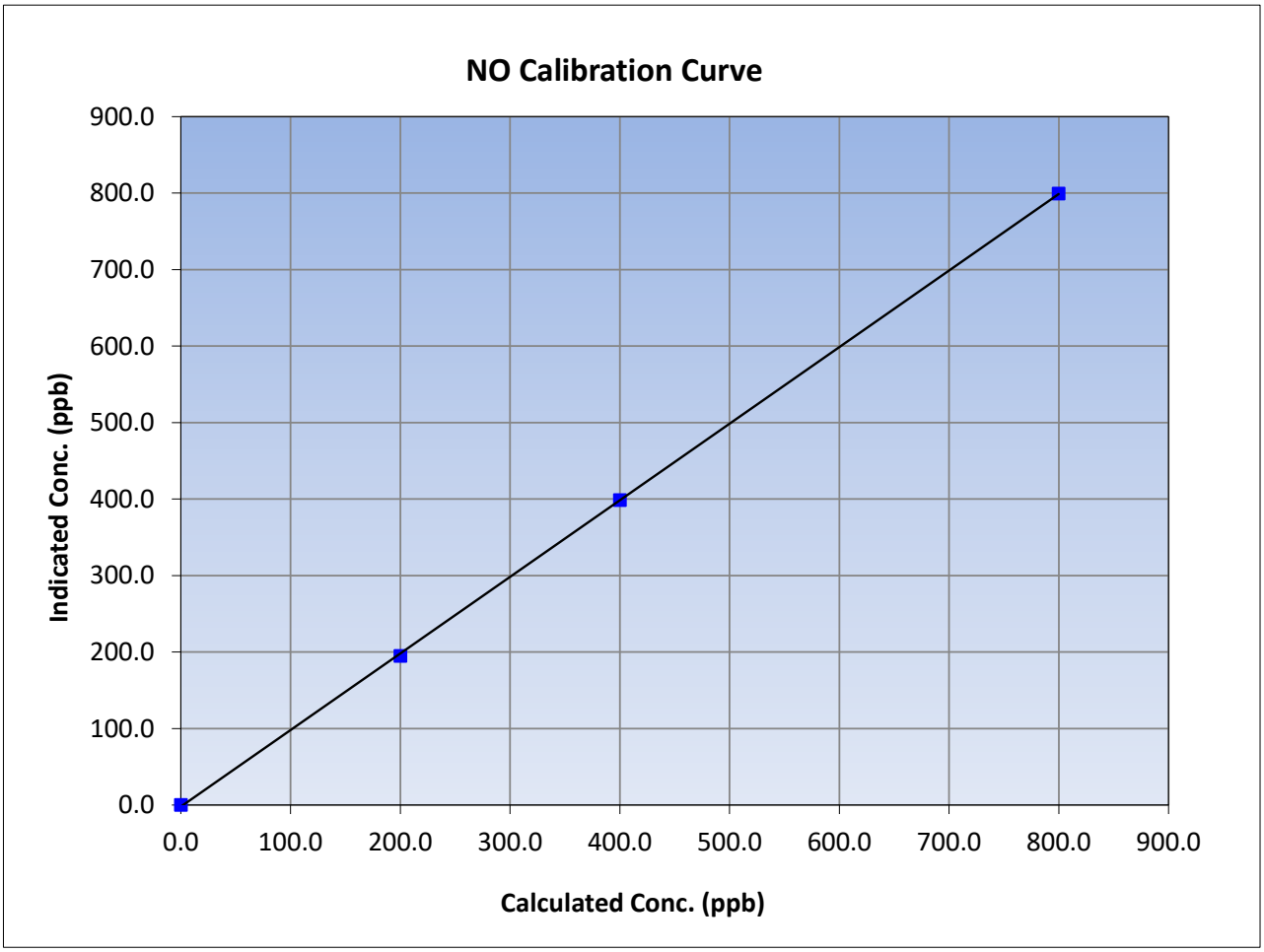
Version-04-2020

Station Information

Calibration Date:	February 15, 2023	Previous Calibration:	January 25, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	10:21	End Time (MST):	14:36
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	0.999955	≥0.995
799.9	799.5	1.0005			
400.0	398.5	1.0037	Slope	1.001240	0.90 - 1.10
200.0	195.0	1.0255			
			Intercept	-2.087973	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

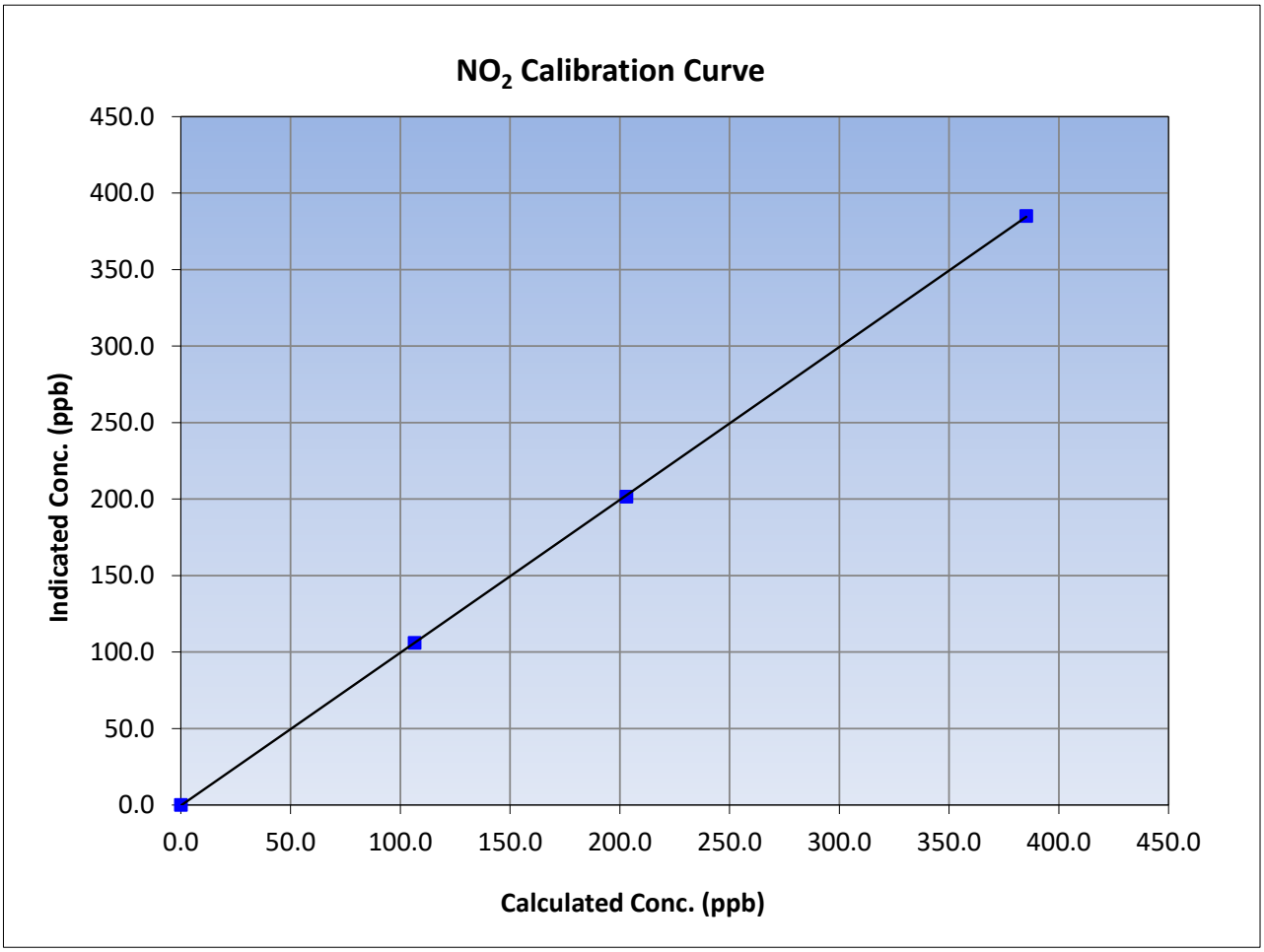
Version-04-2020

Station Information

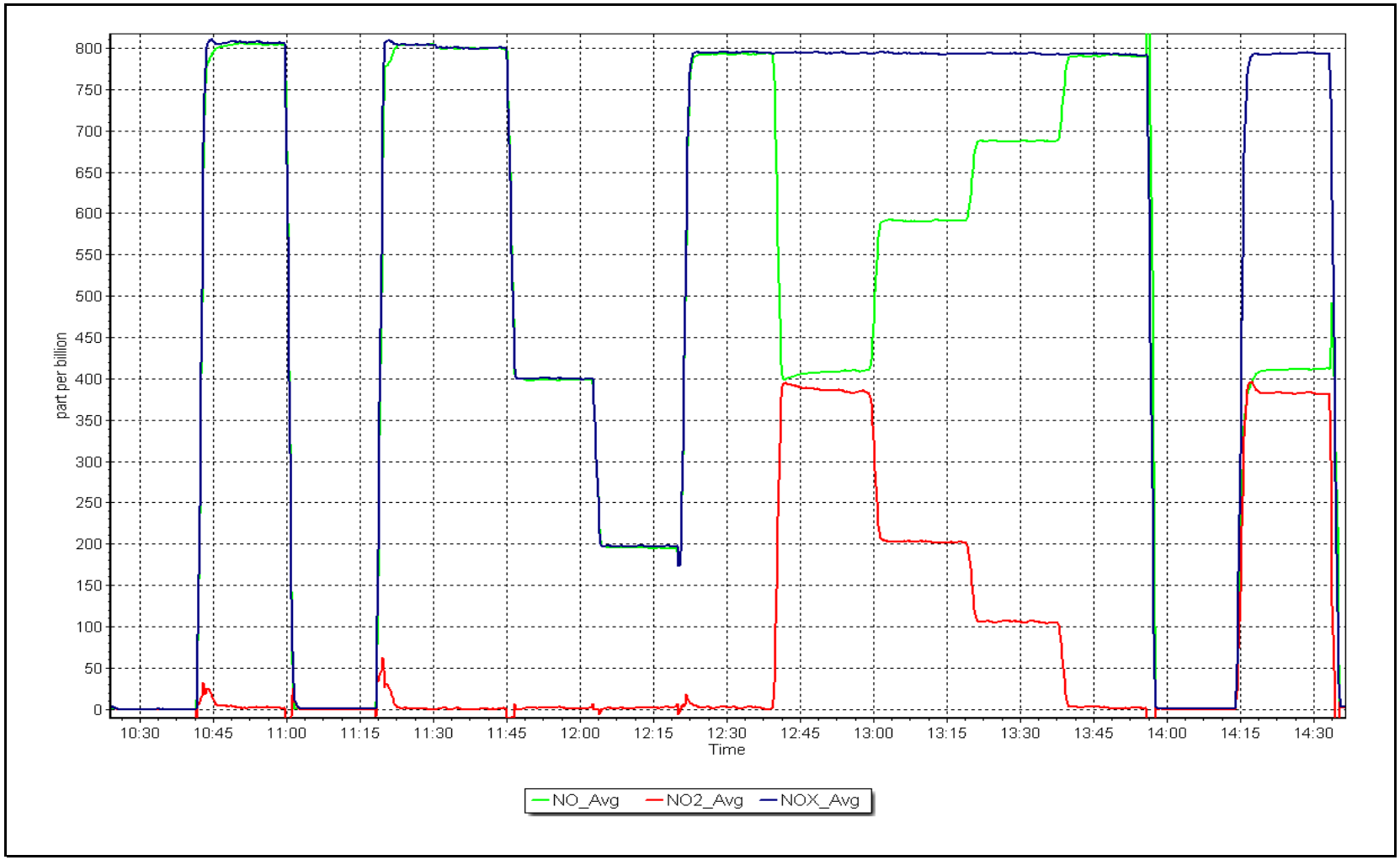
Calibration Date:	February 15, 2023	Previous Calibration:	January 25, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	10:21	End Time (MST):	14:36
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.1	----	Correlation Coefficient	0.999985	*≥0.995*
385.2	385.0	1.0005			
203.0	201.6	1.0069	Slope	0.999204	*0.90 - 1.10*
106.5	106.0	1.0045			
			Intercept	-0.347850	*+/-20*



NO_X Calibration Plot Date: February 15, 2023 Location: Jackfish 1



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS508
KIRBY NORTH
FEBRUARY 2023

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

March 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Kirby North	Station number:	AMS508
Calibration Date:	February 2, 2023	Last Cal Date:	January 11, 2023
Start time (MST):	8:41	End time (MST):	14:52
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.18	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC303554			
Removed Cal Gas Conc:	49.18	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3804
ZAG Make/Model:	API T701H		Serial Number:	880

Analyzer Information

Analyzer make: Thermo 43iQ — Analyzer serial #: 1182340007

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.001350	1.001676	Backgd or Offset:	19.2	19.2
Calibration intercept:	-0.328940	-1.468267	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	0.3	----
as found span	4919	81.3	799.6	796.6	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4919	81.3	799.6	801.0	0.998
second point	4959	40.7	400.3	396.8	1.009
third point	4980	20.3	199.7	198.0	1.008
as left zero	5000	0.0	0.0	0.7	----
as left span	4919	81.3	799.6	800.0	1.000
				Average Correction Factor	1.005

Baseline Corr As found:	796.30	Previous response	800.37	*% 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: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

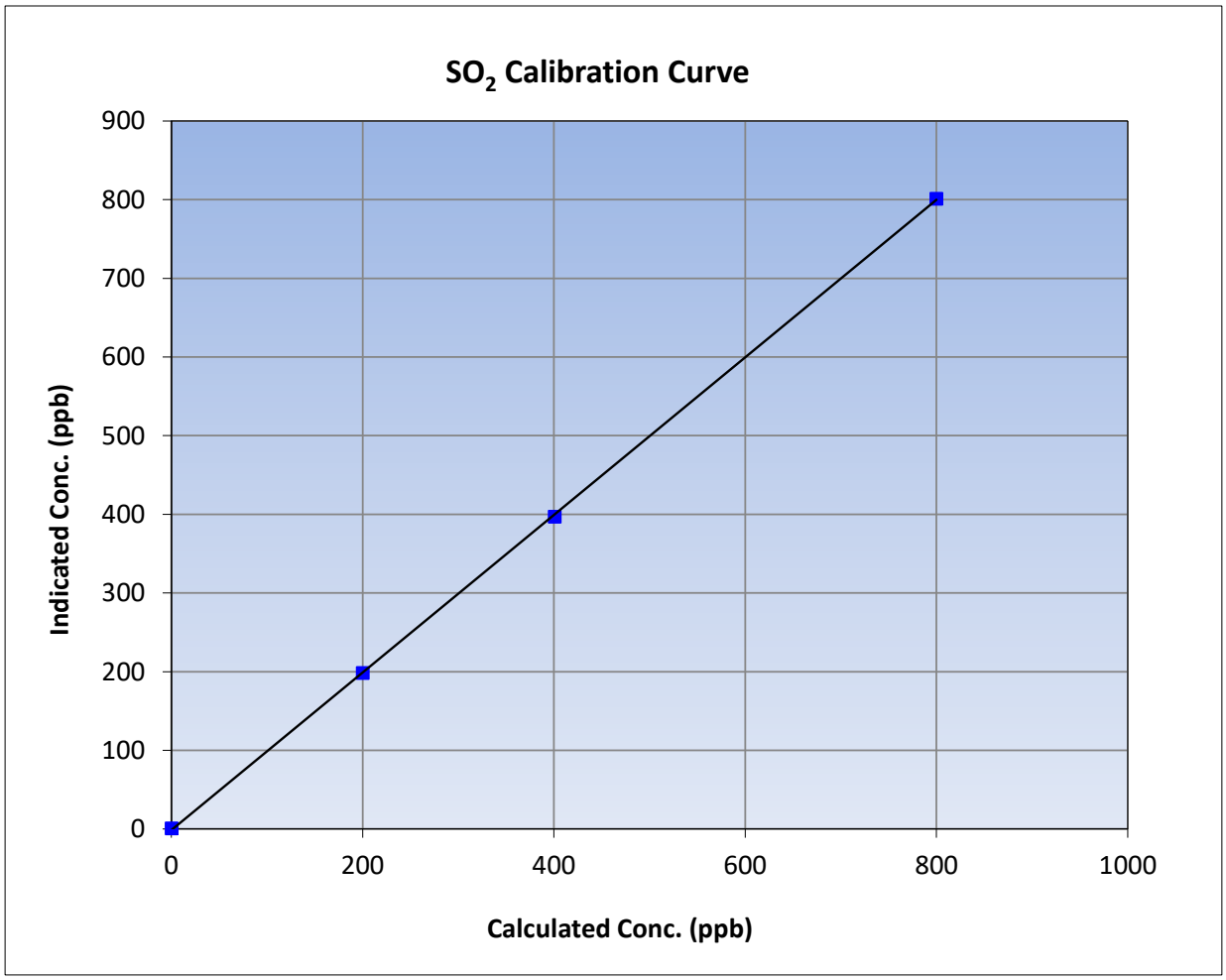
Station Information

Calibration Date:	February 2, 2023	Previous Calibration:	January 11, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	8:41	End Time (MST):	14:52
Analyzer make:	Thermo 43iQ	Analyzer serial #:	1182340007

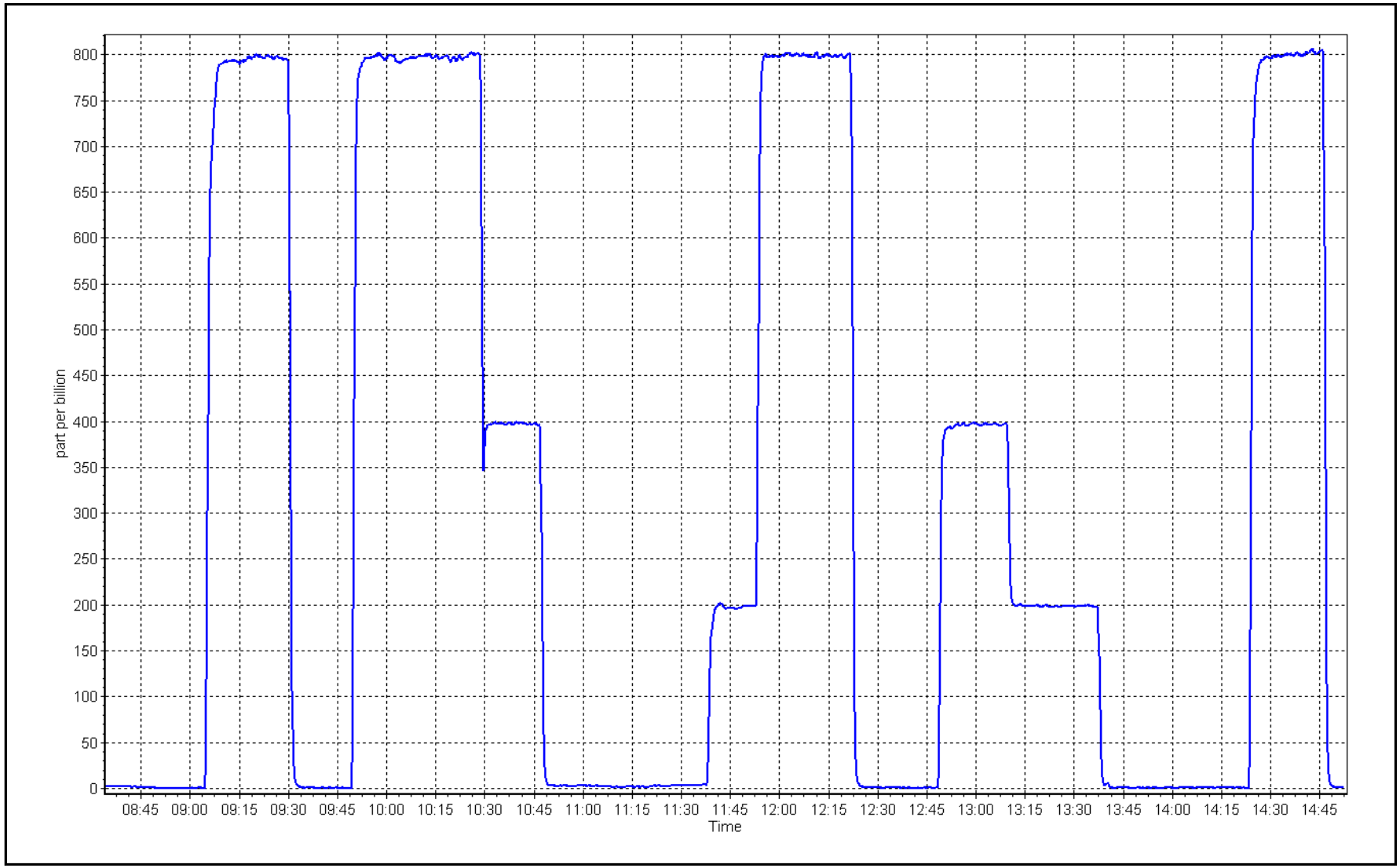
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
799.6	801.0	0.9983
400.3	396.8	1.0089
199.7	198.0	1.0084

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999962	*≥0.995*
Slope	1.001676	*0.90 - 1.10*
Intercept	-1.468267	*+/-30*



SO2 Calibration Plot Date: February 2, 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:	February 2, 2023	Last Cal Date:	January 12, 2023
Start time (MST):	8:41	End time (MST):	14:34
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.167	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517378			
Removed Cal Gas Conc:	5.167	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3804
ZAG Make/Model:	API 701H		Serial Number:	880

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1150840012	
Converter make:	Global		Converter serial #:	2022-197	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.007171	1.005874	Backgd or Offset:	1.76	1.77
Calibration intercept:	-0.280963	-0.260560	Coeff or Slope:	1.058	1.069

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	81.8	0.975
as found 2nd point	4961	38.8	40.1	41.0	0.973
as found 3rd point	4981	19.3	19.9	20.4	0.968
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	39.5	1.015
third point	4981	19.3	19.9	19.7	1.012
as left zero	5000	0.0	0.0	0.0	----
as left span	4923	77.4	80.0	78.3	1.021
SO2 Scrubber Check	4920	79.8	798.0	0.1	----
Date of last scrubber change:		27-Nov-19		Ave Corr Factor	1.007
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	82.0	Prev response:	80.27	*% change:	2.1%
Baseline Corr 2nd AF pt:	41.2	AF Slope:	1.024745	AF Intercept:	-0.121140
Baseline Corr 3rd AF pt:	20.6	AF Correlation:	0.999996		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. First scrubber check failed. Used DI water in a hydrator to hydrate the scrubber beads. Second test passed. Adjusted span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

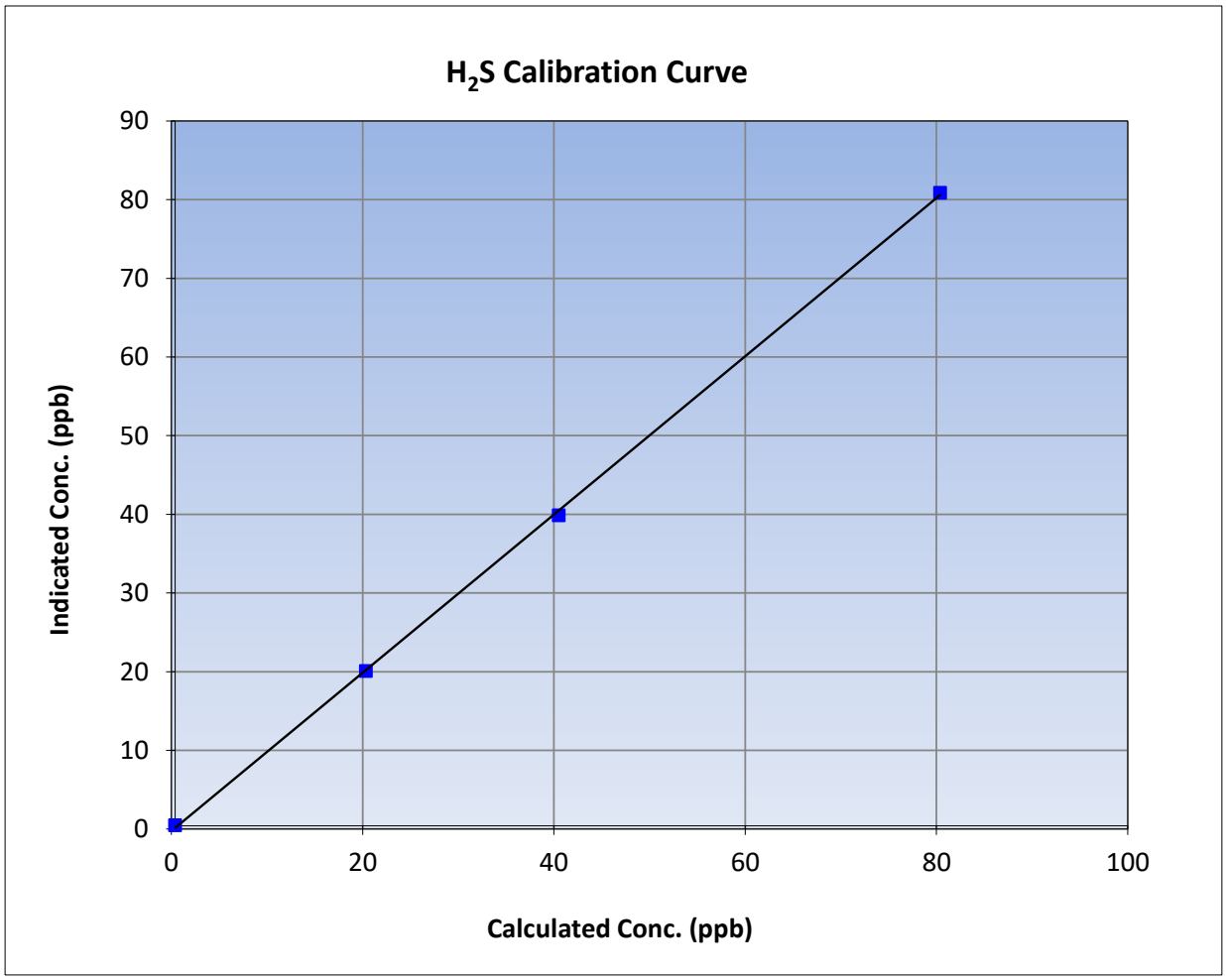
Station Information

Calibration Date:	February 2, 2023	Previous Calibration:	January 12, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	8:41	End Time (MST):	14:34
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1150840012

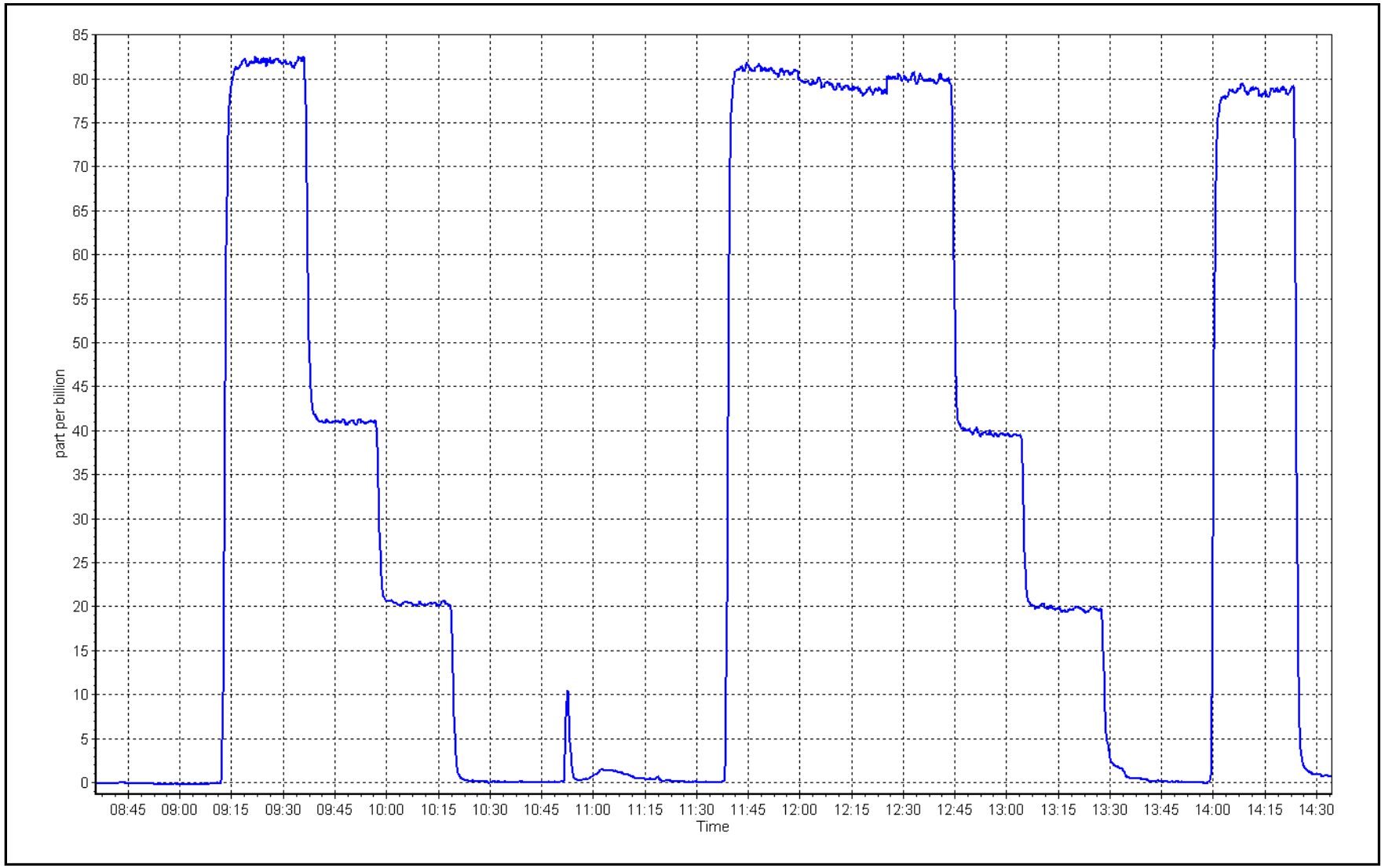
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.5	0.9935
40.1	39.5	1.0151
19.9	19.7	1.0124

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999840	*≥0.995*
Slope	1.005874	*0.90 - 1.10*
Intercept	-0.260560	*+/-3*



H_2S Calibration Plot Date: February 2, 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:	February 14, 2023	Last Cal Date:	February 2, 2023
Start time (MST):	12:51	End time (MST):	16:45
Reason:	As Found		

Calibration Standards

Cal Gas Concentration:	5.167	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517378			
Removed Cal Gas Conc:	5.167	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3804
ZAG Make/Model:	API 701H		Serial Number:	880

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1150840012
Converter make:	Global		Converter serial #:	2022-197
Analyzer Range	0 - 100 ppb			

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.007171		Backgd or Offset:	1.77	1.77
Calibration intercept:	-0.280963		Coeff or Slope:	1.069	1.069

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4923	77.4	80.0	78.2	1.021
as found 2nd point	4961	38.8	40.1	38.5	1.039
as found 3rd point	4981	19.3	19.9	19.1	1.039
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:	27-Nov-19	Ave Corr Factor	
Date of last converter efficiency test:			efficiency

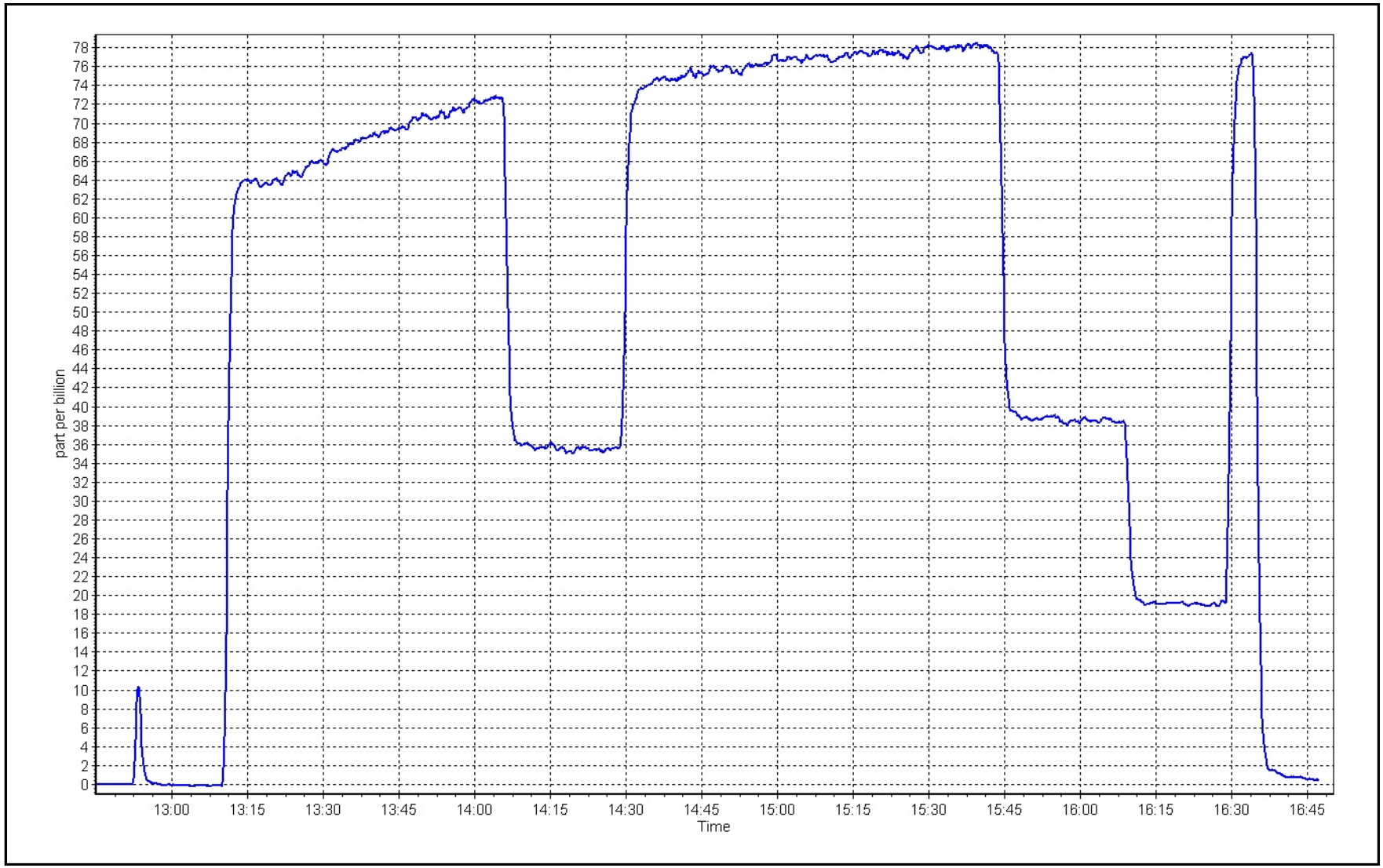
Baseline Corr As found:	78.3	Prev response:	80.27	*% change:	-2.5%
Baseline Corr 2nd AF pt:	38.6	AF Slope:	0.979453	AF Intercept:	-0.360689
Baseline Corr 3rd AF pt:	19.2	AF Correlation:	0.999912		

* = > +/-5% change initiates investigation

Notes: As founds done after a low nightly span. Hydrator ran dry and likely changed the conditions of the scrubber.

Calibration Performed By: Braiden Boutilier

H_2S Calibration Plot Date: February 14, 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:	February 15, 2023	Last Cal Date:	February 14, 2023
Start time (MST):	11:48	End time (MST):	17:04
Reason:	Maintenance		

Calibration Standards

Cal Gas Concentration:	5.167	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517378			
Removed Cal Gas Conc:	5.167	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3804
ZAG Make/Model:	API 701H		Serial Number:	880

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1150840012	
Converter make:	Global		Converter serial #:	2022-197	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005874	0.995603	Backgd or Offset:	1.77	1.70
Calibration intercept:	-0.260560	-0.101015	Coeff or Slope:	1.069	1.022

H_2S As Found Data

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

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4923	77.4	80.0	79.6	1.005
second point	4961	38.8	40.1	39.7	1.010
third point	4981	19.3	19.9	19.7	1.012
as left zero	5000	0.0	0.0	0.0	----
as left span	4923	77.4	80.0	79.4	1.007
SO2 Scrubber Check	4920	79.8	798.0	0.0	----
Date of last scrubber change:		21-Sep-22		Ave Corr Factor	1.009
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: Followup calibration after as founds from February 14. Adjusted zero and span. Second SOx scrubber check passed.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

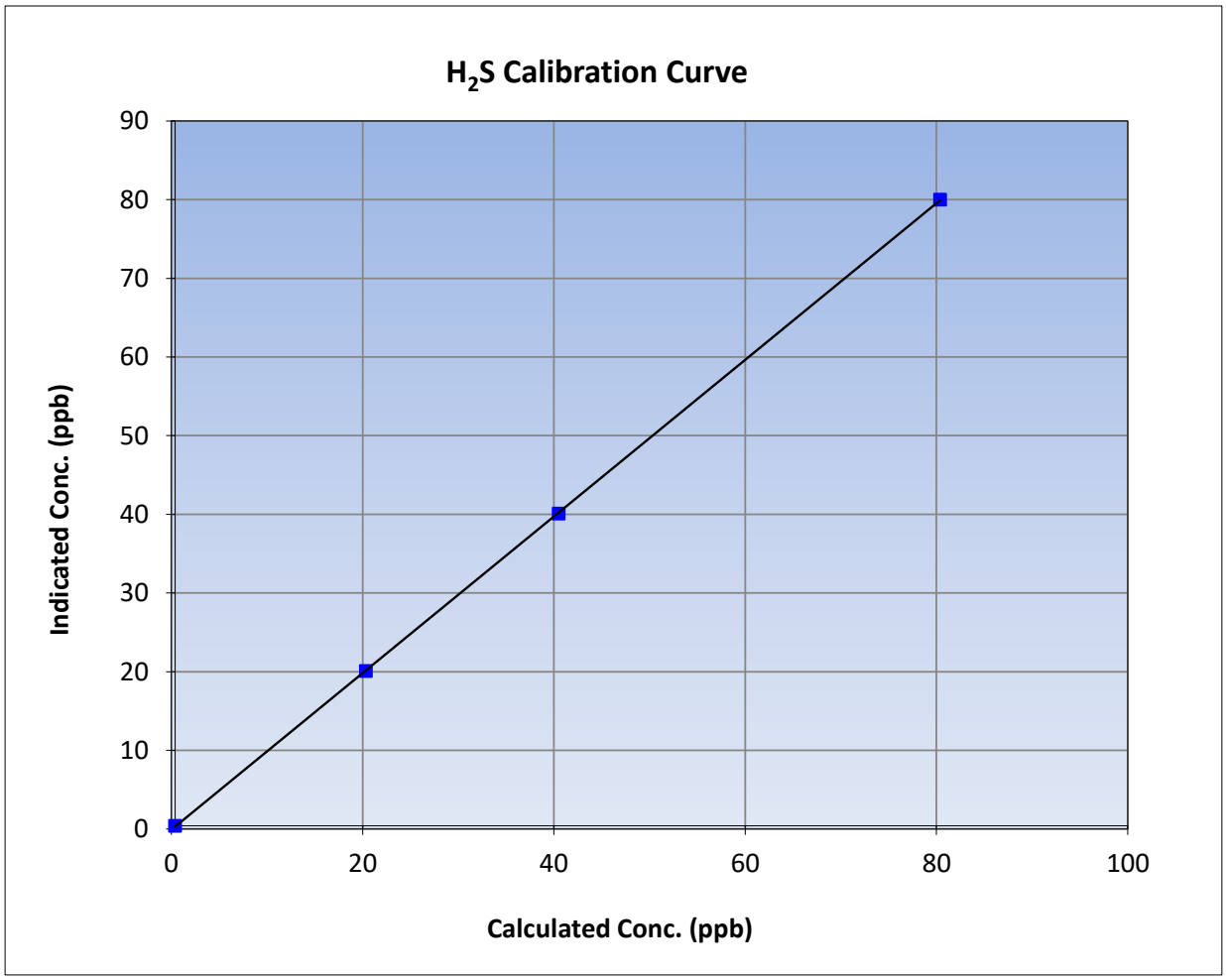
Station Information

Calibration Date:	February 15, 2023	Previous Calibration:	February 14, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	11:48	End Time (MST):	17:04
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1150840012

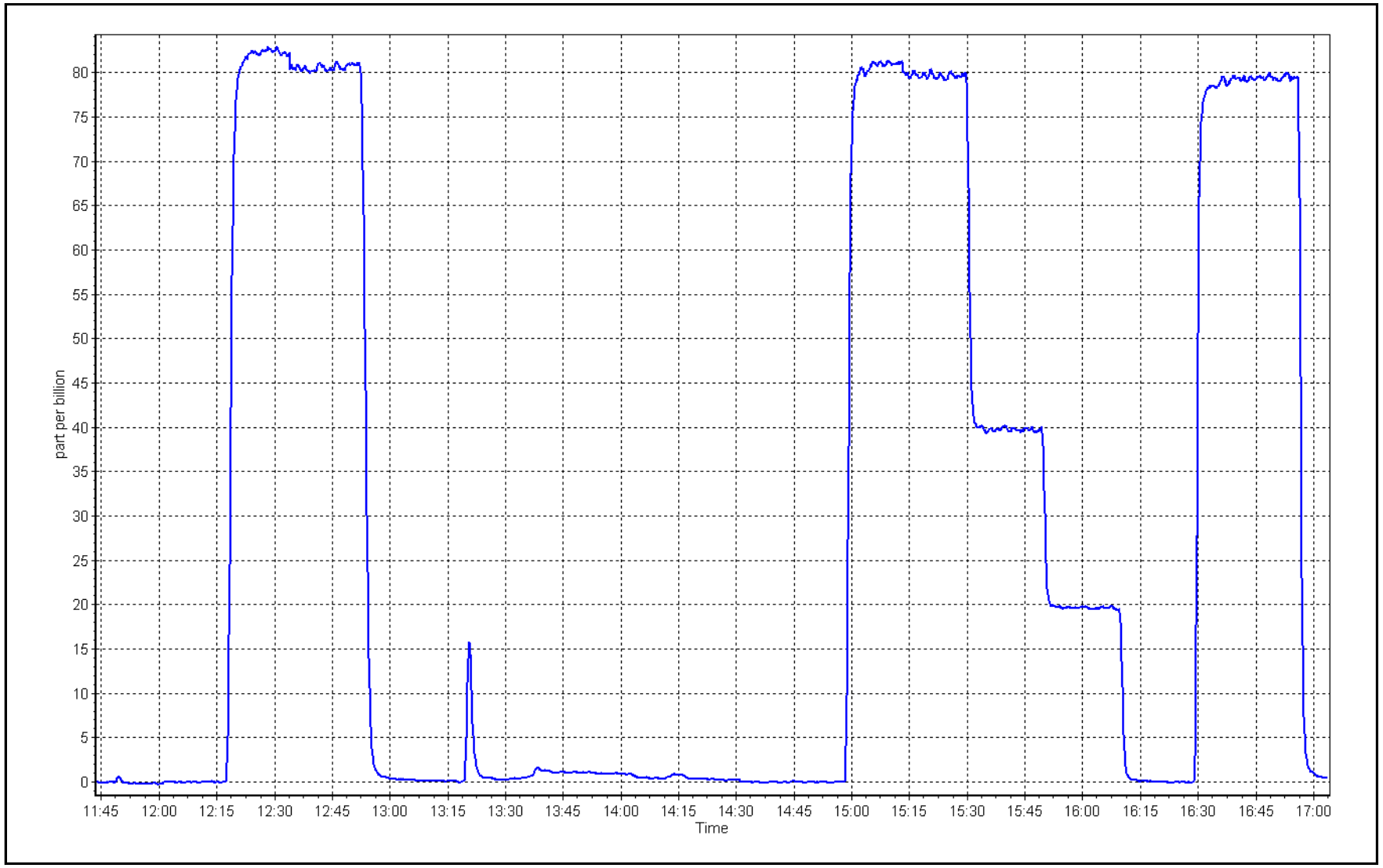
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	79.6	1.0048
40.1	39.7	1.0100
19.9	19.7	1.0124

Statistical Evaluation		Limits
Correlation Coefficient	0.999990	≥0.995
Slope	0.995603	0.90 - 1.10
Intercept	-0.101015	+/-3



H_2S Calibration Plot Date: February 15, 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:	February 2, 2023	Last Cal Date:	January 11, 2023
Start time (MST):	8:41	End time (MST):	14:52
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC303554	Cal Gas Expiry Date:	March 23, 2025	
CH4 Cal Gas Conc.	496.6	ppm	CH4 Equiv Conc.	1061.7	ppm
C3H8 Cal Gas Conc.	205.5	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	496.6	ppm	CH4 Equiv Conc.	1061.7	ppm
Removed C3H8 Conc.	205.5	ppm	Diff between cyl:		
Calibrator Make/Model:	API T700		Serial Number:	3804	
ZAG Make/Model:	API T701H		Serial Number:	880	

Analyzer Information

Analyzer make: Thermo 51i — Analyzer serial #: 1182340005

Analyzer Range: 0 - 20 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999219	0.998377	Background:	2.820	3.37
Calibration intercept:	-0.026583	0.036779	Coefficient:	3.789	3.750

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	-0.03	----
as found span	4919	81.3	17.26	17.32	0.997
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.03	----
high point	4919	81.3	17.26	17.26	1.000
second point	4959	40.7	8.64	8.69	0.995
third point	4980	20.3	4.31	4.34	0.994
as left zero	5000	0.0	0.00	-0.11	----
as left span	4919	81.3	17.26	17.29	0.998
				Average Correction Factor	0.996

Baseline Corr As found:	17.35	Previous response	17.22	*% change	0.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. Span and zero adjusted.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

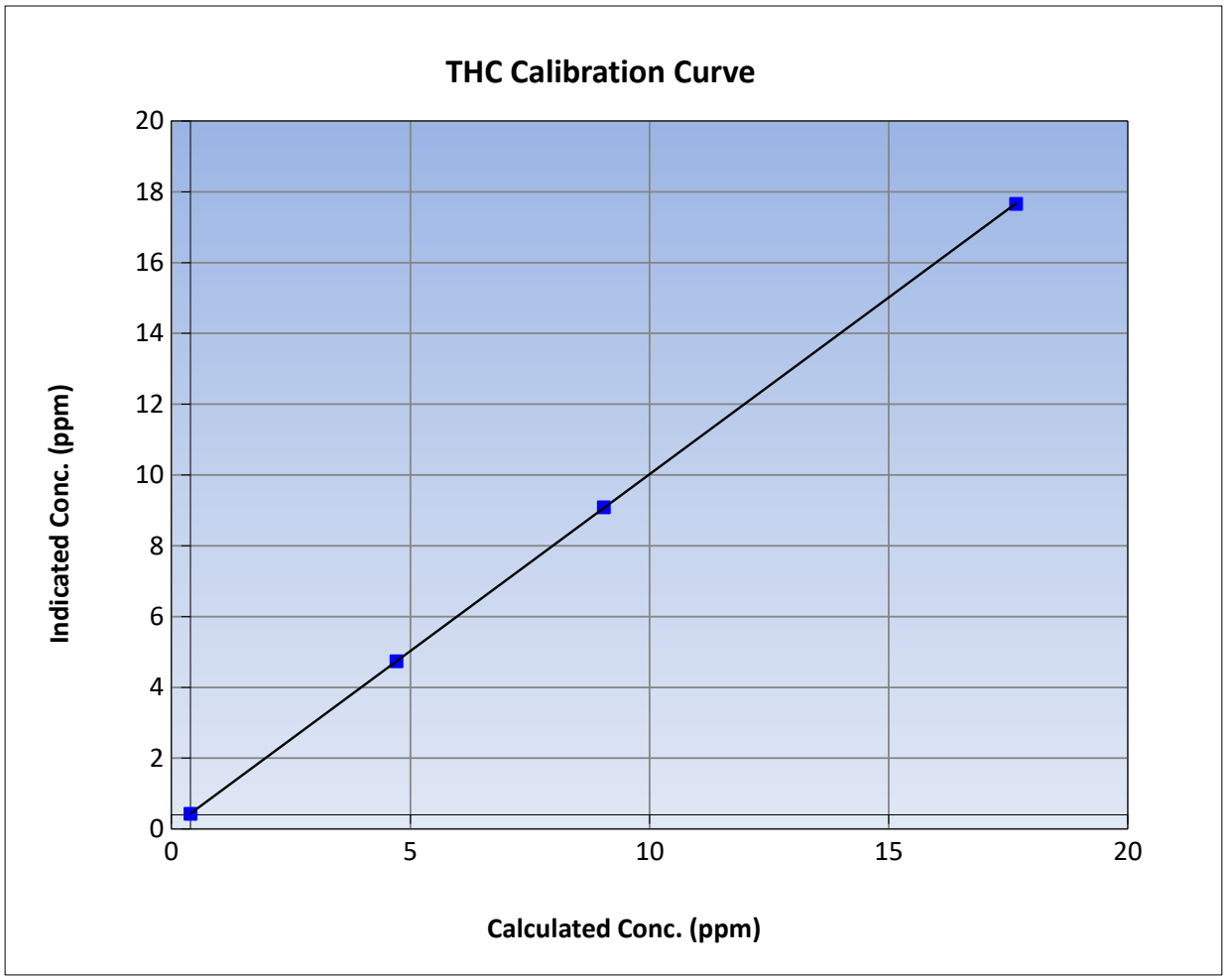
Station Information

Calibration Date:	February 2, 2023	Previous Calibration:	January 11, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	8:41	End Time (MST):	14:52
Analyzer make:	Thermo 51i	Analyzer serial #:	1182340005

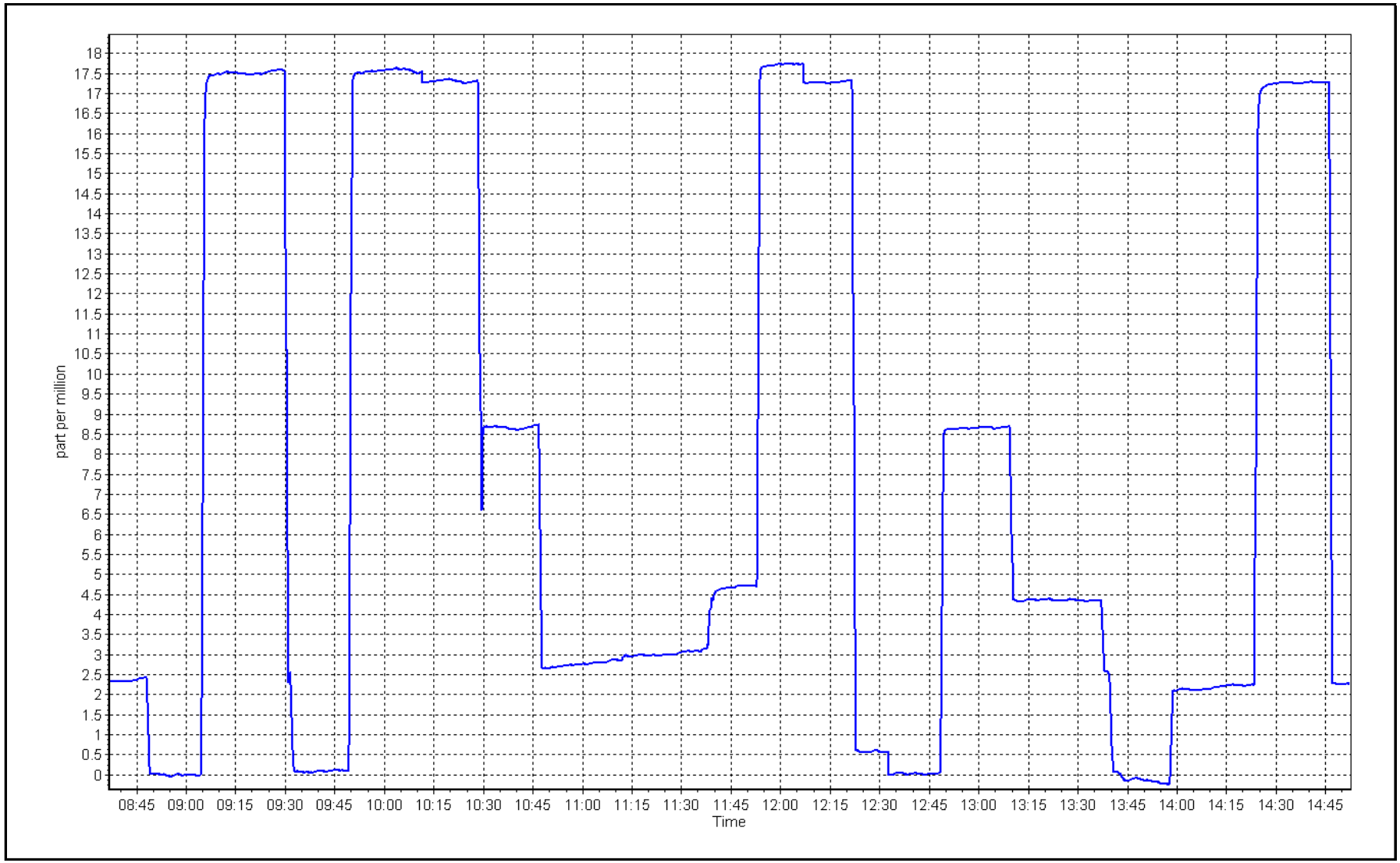
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.03	----
17.26	17.26	1.0002
8.64	8.69	0.9946
4.31	4.34	0.9939

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	0.998377	*0.90 - 1.10*
Intercept	0.036779	*+/-1.5*



THC Calibration Plot Date: February 2, 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:	February 4, 2023	Last Cal Date:	February 2, 2023
Start time (MST):	10:50	End time (MST):	14:29
Reason:	Maintenance		

Calibration Standards

Gas Cert Reference:		CC303554	Cal Gas Expiry Date:	March 23, 2025	
CH4 Cal Gas Conc.	496.6	ppm	CH4 Equiv Conc.	1061.7	ppm
C3H8 Cal Gas Conc.	205.5	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	496.6	ppm	CH4 Equiv Conc.	1061.7	ppm
Removed C3H8 Conc.	205.5	ppm	Diff between cyl:		
Calibrator Make/Model:	API T700		Serial Number:	3804	
ZAG Make/Model:	API T701H		Serial Number:	880	

Analyzer Information

Analyzer make:	Thermo 51i		Analyzer serial #:	1182340005	
Analyzer Range:	0 - 20 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998377	1.002675	Background:	3.37	2.70
Calibration intercept:	0.036779	-0.018187	Coefficient:	3.750	3.796

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	-0.66	----
as found span	4919	81.3	17.26	16.45	1.049
as found 2nd point	4959	40.7	8.64	7.86	1.100
as found 3rd point	4980	20.3	4.31	3.58	1.204
new cylinder response					
calibrator zero	5000	0.0	0.00	0.02	----
high point	4919	81.3	17.26	17.32	0.997
second point	4959	40.7	8.64	8.60	1.005
third point	4980	20.3	4.31	4.28	1.007
as left zero	5000	0.0	0.00	0.08	----
as left span	4919	81.3	17.26	17.35	0.995
				Average Correction Factor	1.003

Baseline Corr As found:	17.11	Previous response	17.27	*% change	-1.0%
Baseline Corr 2nd AF pt:	8.51	AF Slope:	0.991324	AF Intercept:	-0.681192
Baseline Corr 3rd AF pt:	4.24	AF Correlation:	0.999987		

* = > +/-5% change initiates investigation

Notes: Linearity test from last calibration. Adjusted zero and span. Readings were shifted down from the calibration on February 2.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

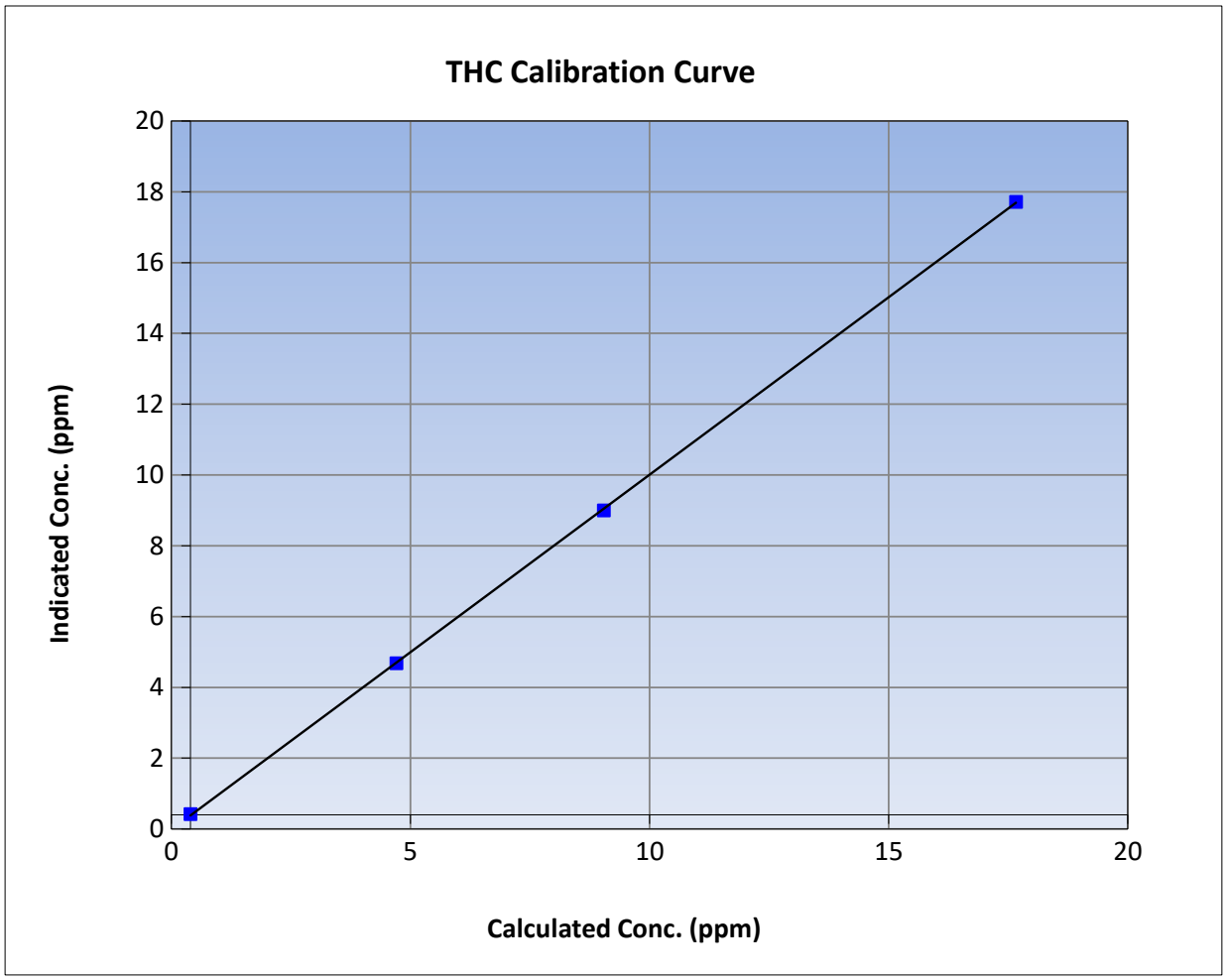
Station Information

Calibration Date:	February 4, 2023	Previous Calibration:	February 2, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	10:50	End Time (MST):	14:29
Analyzer make:	Thermo 51i	Analyzer serial #:	1182340005

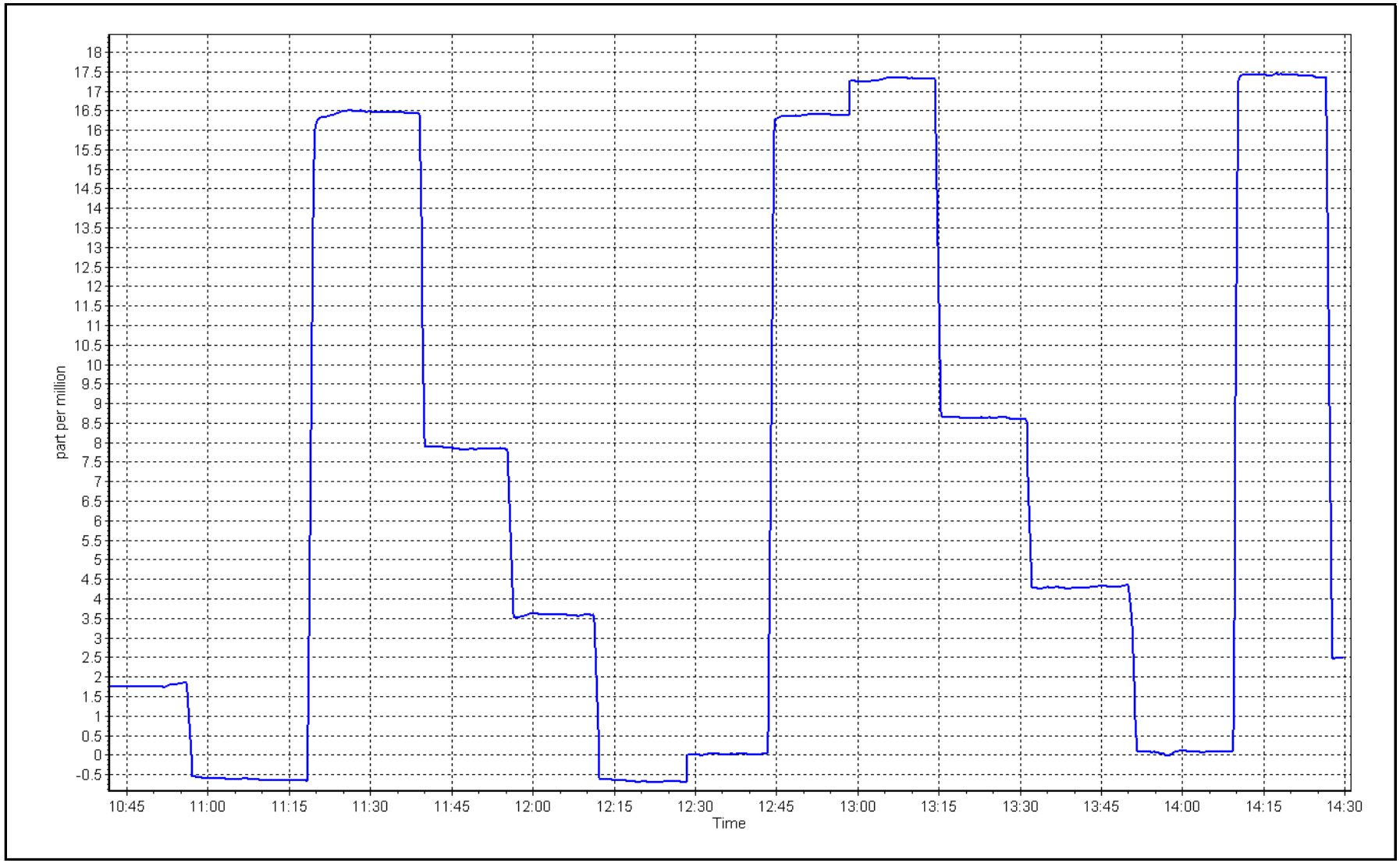
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.02	----
17.26	17.32	0.9967
8.64	8.60	1.0050
4.31	4.28	1.0066

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999968	*≥0.995*
Slope	1.002675	*0.90 - 1.10*
Intercept	-0.018187	*+/-1.5*



THC Calibration Plot Date: February 4, 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:	February 1, 2023	Last Cal Date:	January 22, 2023
Start time (MST):	11:39	End time (MST):	17:28
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:	1.037	1.026	NO bkgnd or offset:	0.1	0.1
NOX coeff or slope:	1.032	1.023	NOX bkgnd or offset:	0.3	0.3
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	4.8	4.8

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001403	1.002073
NO_X Cal Offset:	-2.032210	-1.391610
NO Cal Slope:	1.002948	1.001077
NO Cal Offset:	-3.293659	-2.093883
NO_2 Cal Slope:	0.998706	0.998942
NO_2 Cal Offset:	0.927800	-0.787844

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
as found span	4919	81.0	800.1	794.1	6.0	791.3	784.3	7.0	1.0111	1.0125
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
high point	4919	81.0	800.1	794.1	6.0	801.0	793.7	7.1	0.9989	1.0005
second point	4960	40.5	400.0	397.0	3.0	399.0	395.0	4.0	1.0026	1.0051
third point	4980	20.2	199.5	198.0	1.5	197.0	193.6	3.4	1.0128	1.0229
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as left span	4919	81.0	800.1	413.2	386.9	799.5	420.8	378.7	1.0008	0.9820
								Average Correction Factor	1.0048	1.0095

Corrected As found	NO_X = 791.6 ppb	NO = 784.5 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-1.0%
Previous Response	NO_X = 799.2 ppb	NO = 793.2 ppb			*Percent Change	NO =	-1.1%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	793.5	412.6	386.9	385.4	1.0039	99.6%
2nd GPT point (200 ppb O3)	793.5	599.0	200.5	201.2	0.9965	100.4%
3rd GPT point (100 ppb O3)	793.5	696.1	103.4	100.3	1.0308	97.0%
				Average Correction Factor	1.0104	99.0%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

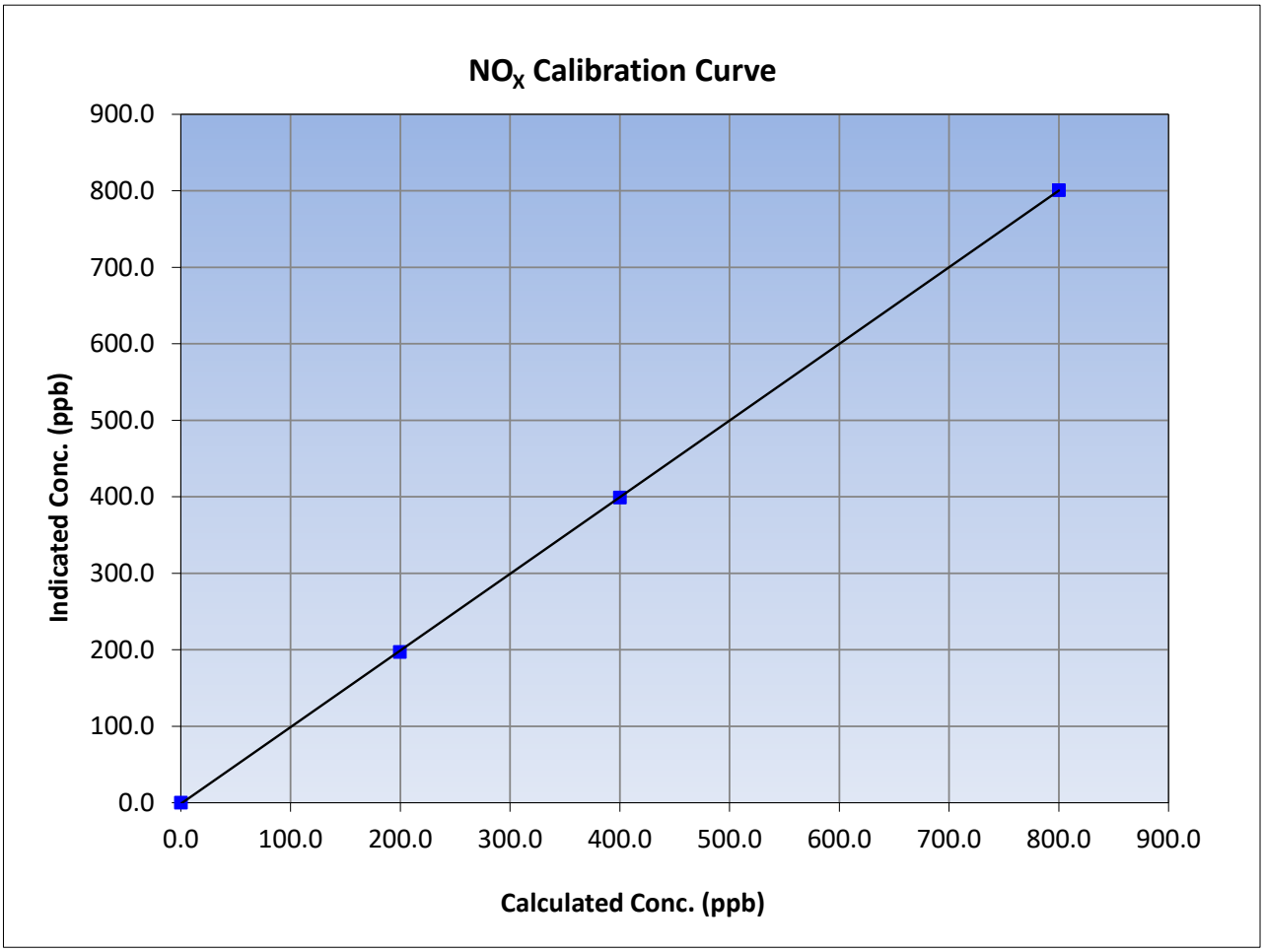
Version-04-2020

Station Information

Calibration Date:	February 1, 2023	Previous Calibration:	January 22, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	11:39	End Time (MST):	17:28
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	0.999986	≥0.995
800.1	801.0	0.9989			
400.0	399.0	1.0026	Slope	1.002073	0.90 - 1.10
199.5	197.0	1.0128			
			Intercept	-1.391610	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

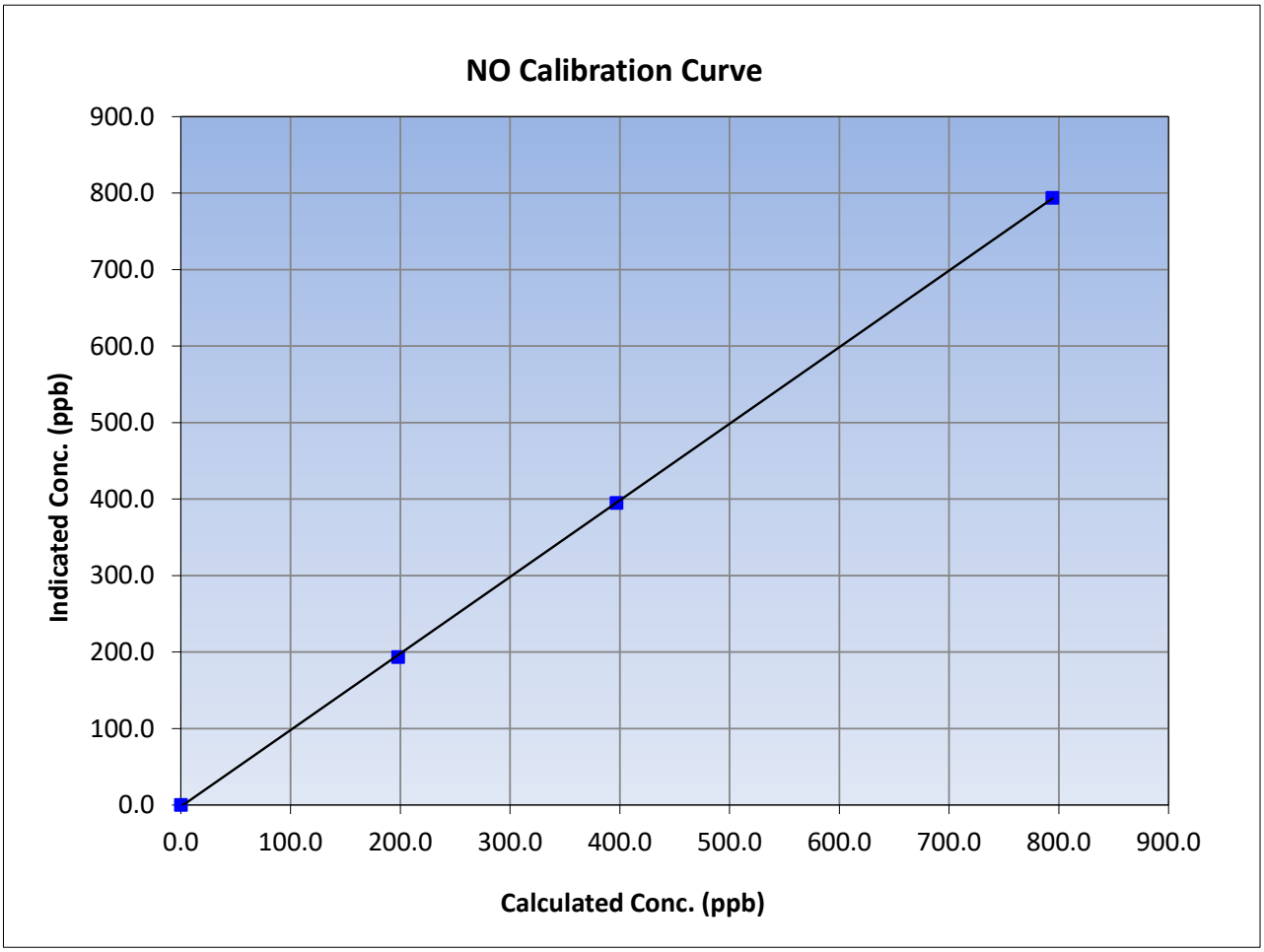
Version-04-2020

Station Information

Calibration Date:	February 1, 2023	Previous Calibration:	January 22, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	11:39	End Time (MST):	17:28
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	793.7	1.0005			
397.0	395.0	1.0051	Slope	1.001077	0.90 - 1.10
198.0	193.6	1.0229			
			Intercept	-2.093883	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

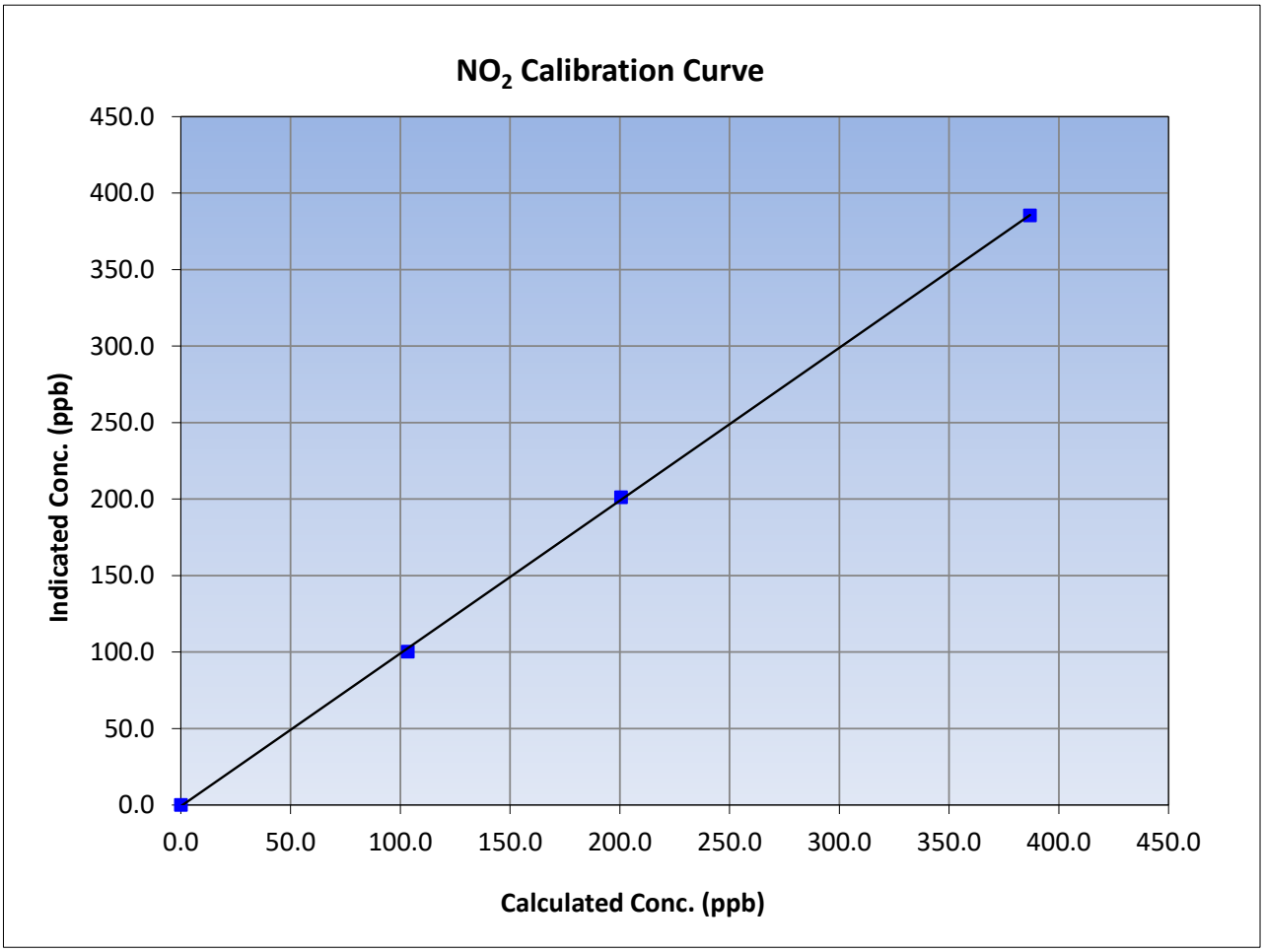
Version-04-2020

Station Information

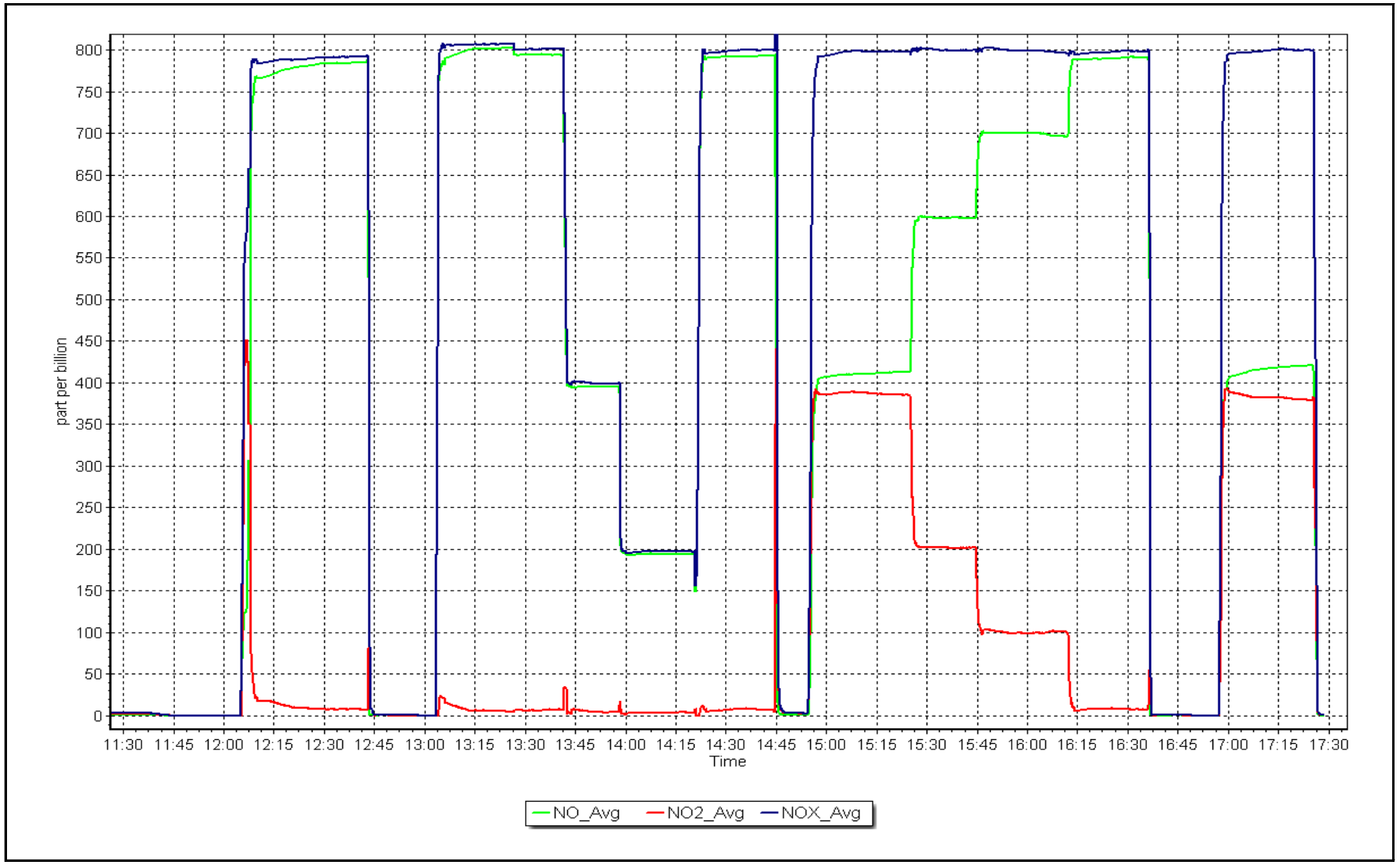
Calibration Date:	February 1, 2023	Previous Calibration:	January 22, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	11:39	End Time (MST):	17:28
Analyzer make:	API T200	Analyzer serial #:	7029

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999896	≥0.995
386.9	385.4	1.0039			
200.5	201.2	0.9965	Slope	0.998942	0.90 - 1.10
103.4	100.3	1.0308			
			Intercept	-0.787844	+/-20



NO_X Calibration Plot Date: February 1, 2023 Location: Kirby North



End of Report