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

Original report release data: June 30, 2023

Revised report release date: August 30, 2023

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

The Patricia McInnes air monitoring station (AMS06) collected H_2S data from January 3, 2023, to June 12, 2023, but it was reported as TRS. On August 30, 2023, the data was resubmitted as H_2S to the Electronic Transfer System (ETS) and the TRS data was revised. The monthly report cover letter, station summary, network summary, and calibration report contained within have been revised to reflect the change.

WOOD BUFFALO
ENVIRONMENTAL ASSOCIATION

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Wood Buffalo Environmental Association

MAY 2023

MONTHLY CALIBRATION REPORT

CONTINUOUS MONITORING

August 30, 2023

Revision 01

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS01
BERTHA GANTER - FORT MCKAY
MAY 2023

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

June 30, 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:	May 1, 2023	Last Cal Date:	April 24, 2023
Start time (MST):	10:14	End time (MST):	16:22
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:	0.998615	1.000343	Backgd or Offset:	19.2	19.4
Calibration intercept:	0.106886	0.027099	Coeff or Slope:	0.889	0.893

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.2	----
as found span	4918	81.3	799.9	796.9	1.004
as found 2nd point	4959	40.7	400.4	398.2	1.006
as found 3rd point	4979	20.3	199.7	198.0	1.009
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4918	81.3	799.9	800.7	0.999
second point	4959	40.7	400.4	399.4	1.003
third point	4979	20.3	199.7	200.4	0.997
as left zero	5000	0.0	0.0	0.4	----
as left span	4918	81.3	799.9	799.9	1.000
				Average Correction Factor	0.999

Baseline Corr As found:	796.70	Previous response	798.94	*% change	-0.3%
Baseline Corr 2nd AF pt:	398.00	AF Slope:	0.996317	AF Intercept:	-0.413604
Baseline Corr 3rd AF pt:	197.80	AF Correlation:	0.999997		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

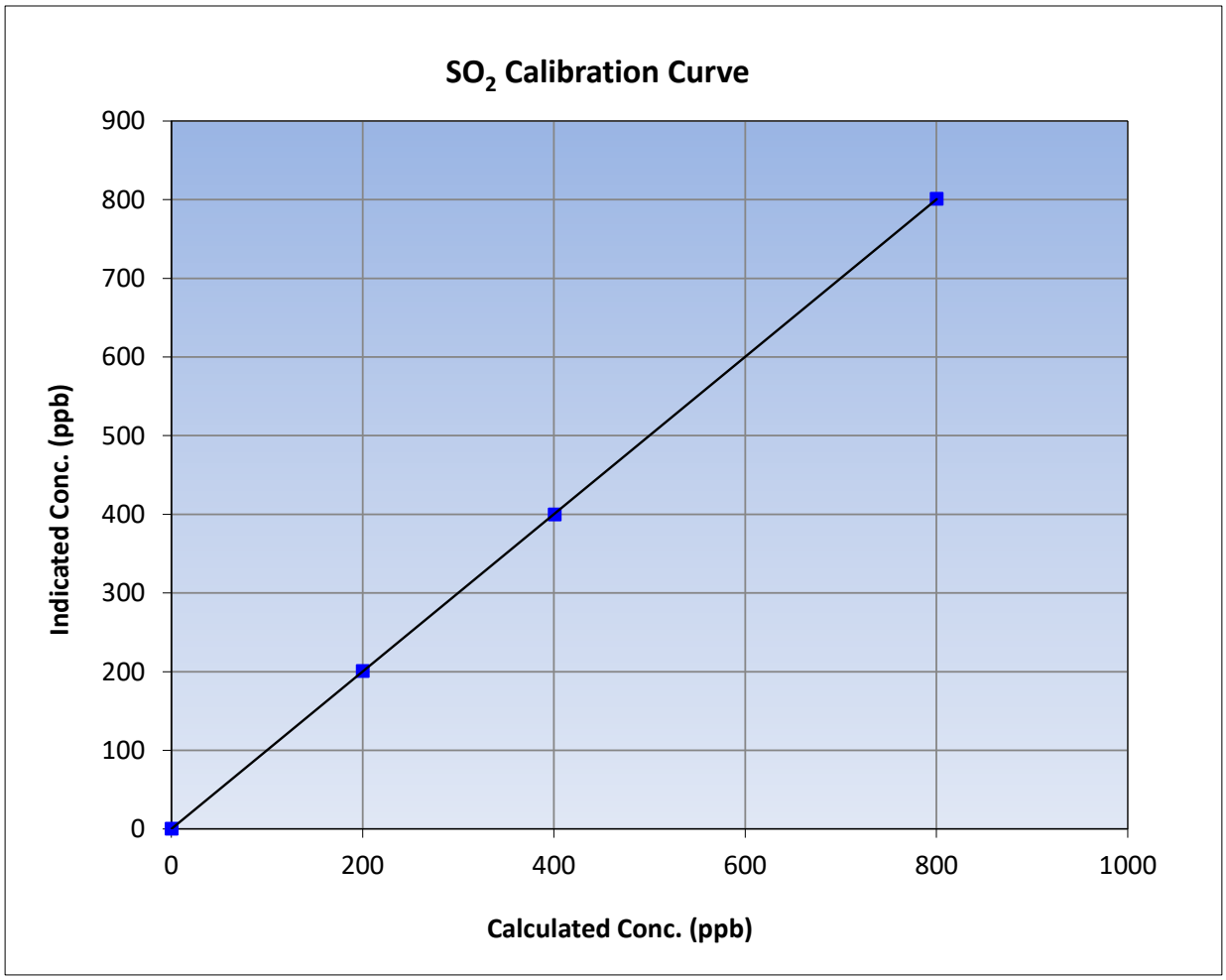
Station Information

Calibration Date:	May 1, 2023	Previous Calibration:	April 24, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:14	End Time (MST):	16:22
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301448

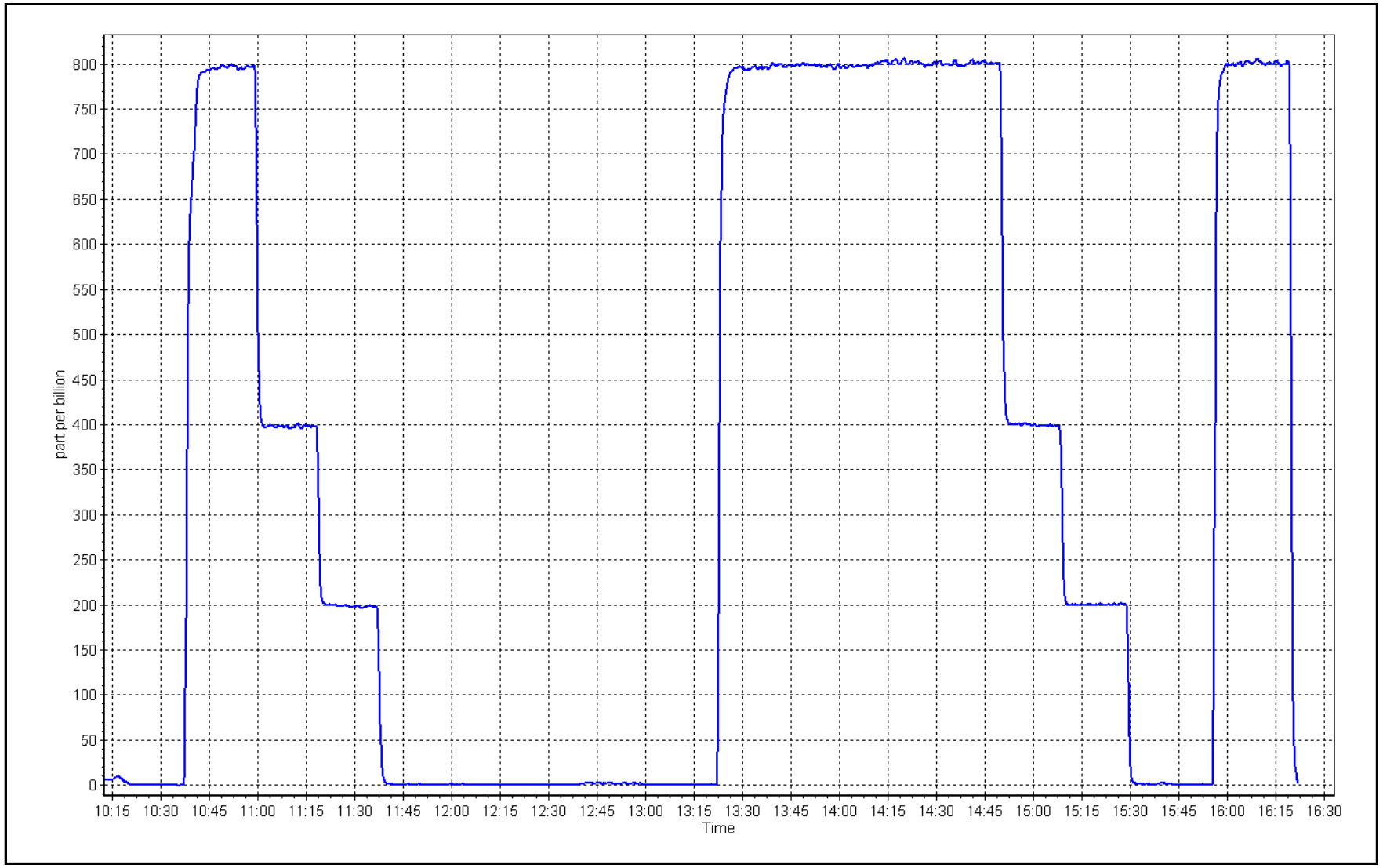
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
799.9	800.7	0.9991
400.4	399.4	1.0026
199.7	200.4	0.9967

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999994	*≥0.995*
Slope	1.000343	*0.90 - 1.10*
Intercept	0.027099	*+/-30*



SO2 Calibration Plot Date: May 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:	May 16, 2023	Last Cal Date:	April 21, 2023
Start time (MST):	8:59	End time (MST):	14:26
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:	0.999078	0.993792	Backgd or Offset:	2.26	2.27
Calibration intercept:	0.160000	0.220000	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	77.6	1.032
as found 2nd point	4960	39.2	40.0	39.4	1.018
as found 3rd point	4980	19.6	20.0	19.9	1.010
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4921	78.4	80.0	79.7	1.004
second point	4960	39.2	40.0	40.0	1.000
third point	4980	19.6	20.0	20.1	0.995
as left zero	5000	0.0	0.0	0.3	----
as left span	4921	78.4	80.0	79.2	1.010
SO2 Scrubber Check	4919	81.3	813.0	0.0	----
Date of last scrubber change:		December 17, 2021		Ave Corr Factor	1.000
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	77.5	Prev response:	80.08	*% change:	-3.3%
Baseline Corr 2nd AF pt:	39.3	AF Slope:	0.967790	AF Intercept:	0.379996
Baseline Corr 3rd AF pt:	19.8	AF Correlation:	0.999926		

* = > +/-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

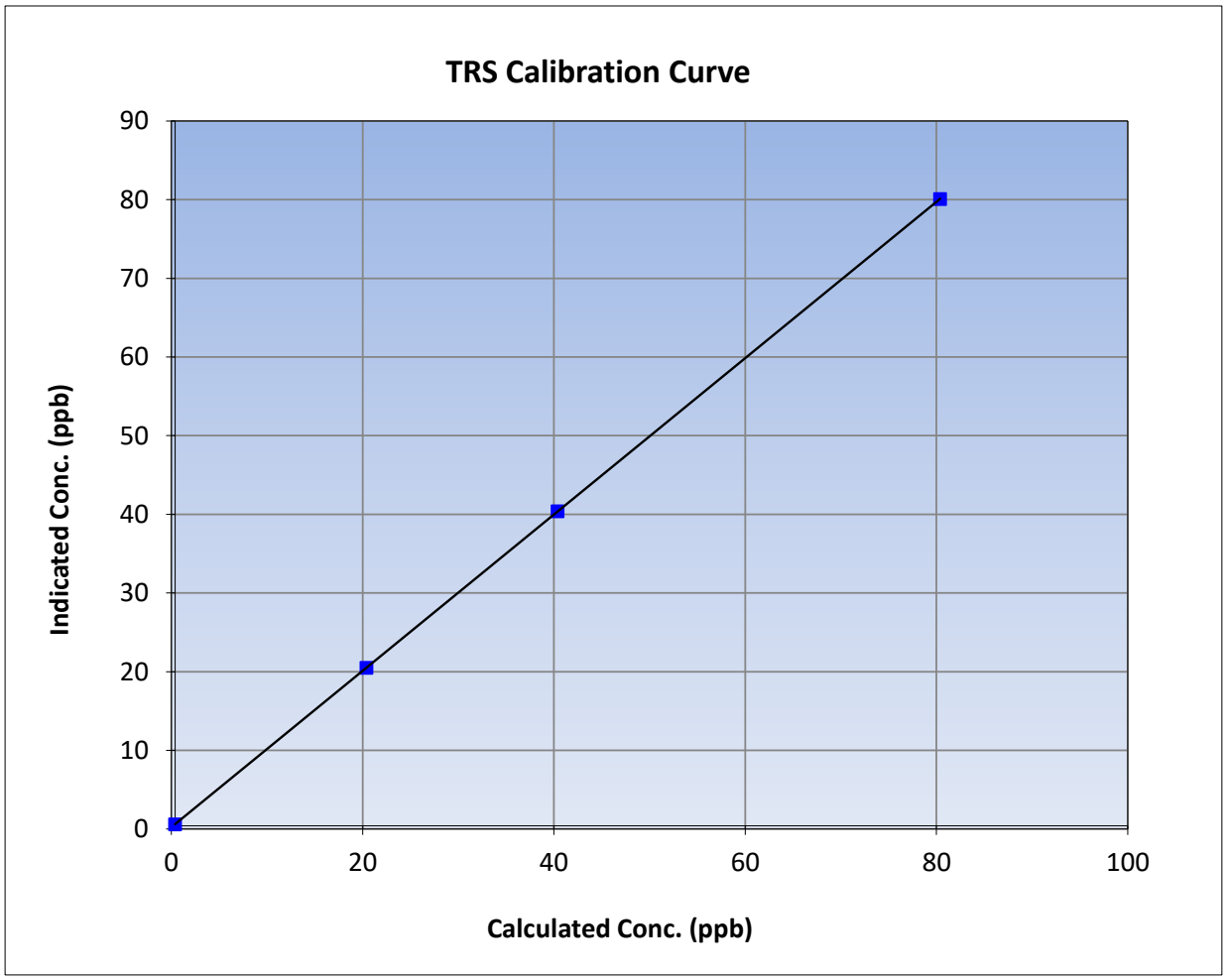
Station Information

Calibration Date:	May 16, 2023	Previous Calibration:	April 21, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	8:59	End Time (MST):	14:26
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153461

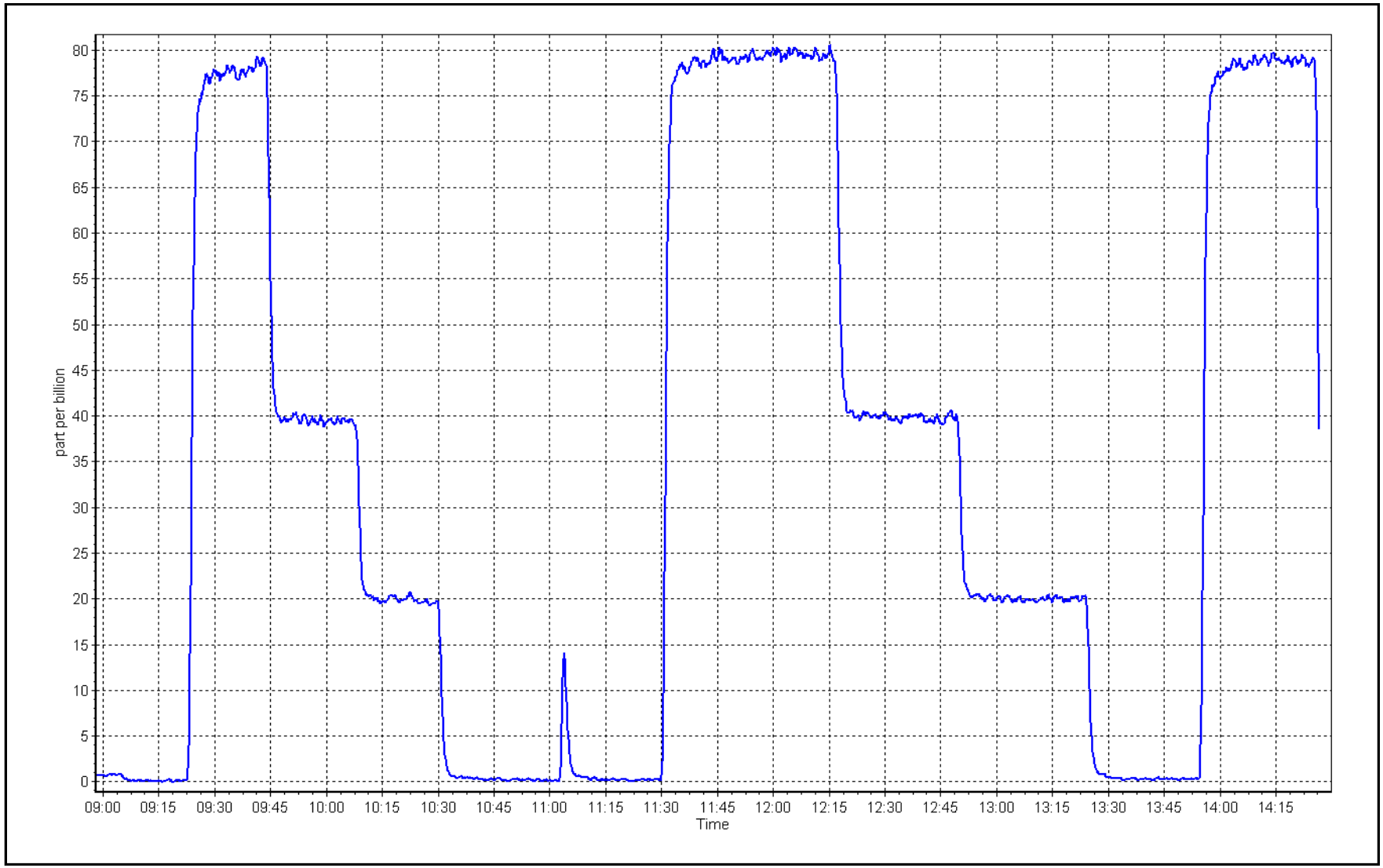
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	79.7	1.0037
40.0	40.0	1.0000
20.0	20.1	0.9949

Statistical Evaluation		*Limits*
Correlation Coefficient	1.000000	*≥0.995*
Slope	0.993792	*0.90 - 1.10*
Intercept	0.220000	*+/-3*



TRS Calibration Plot Date: May 16, 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:	May 16, 2023	Last Cal Date:	April 21, 2023
Start time (MST):	8:59	End time (MST):	14:26
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:	0.993089	1.001375	Backgd or Offset:	1.90	1.92
Calibration intercept:	0.521594	0.081613	Coeff or Slope:	1.001	1.001

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.2	----
as found span	4921	78.4	80.0	80.7	0.989
as found 2nd point	4960	39.2	40.0	40.3	0.987
as found 3rd point	4980	19.6	20.0	20.1	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	0.0	----
high point	4921	78.4	80.0	80.1	0.999
second point	4961	39.2	40.0	40.3	0.992
third point	4980	19.6	20.0	20.1	0.995
as left zero	5000	0.0	0.0	0.6	----
as left span	4921	78.4	80.0	78.7	1.016
SO2 Scrubber Check	4919	81.3	813.0	0.1	----
Date of last scrubber change:		March 21, 2022		Ave Corr Factor	0.995
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.9	Prev response:	79.95	*% change:	1.2%
Baseline Corr 2nd AF pt:	40.5	AF Slope:	1.011277	AF Intercept:	-0.160000
Baseline Corr 3rd AF pt:	20.3	AF Correlation:	0.999999		

* = > +/-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

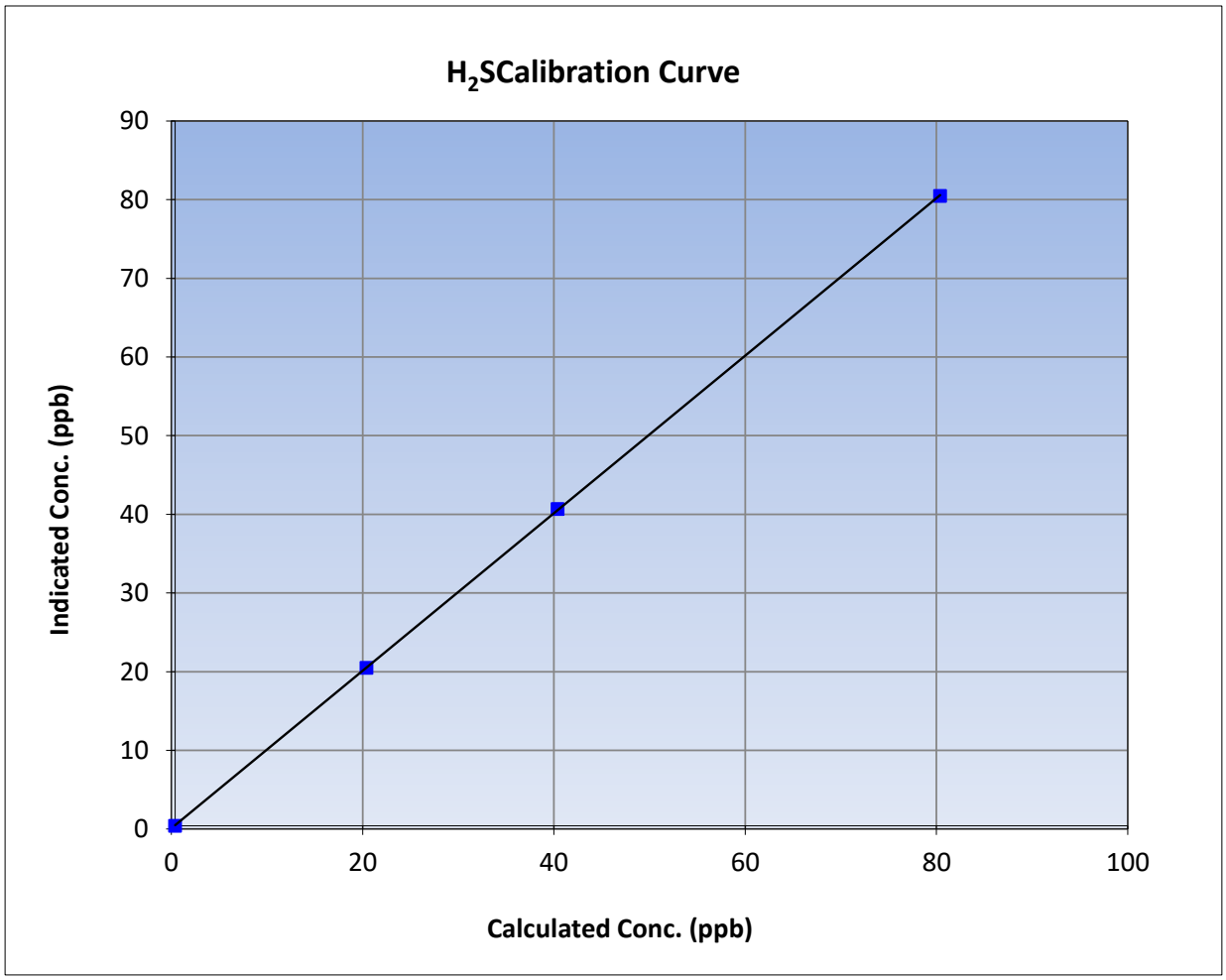
Station Information

Calibration Date:	May 16, 2023	Previous Calibration:	April 21, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	8:59	End Time (MST):	14:26
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1200326167

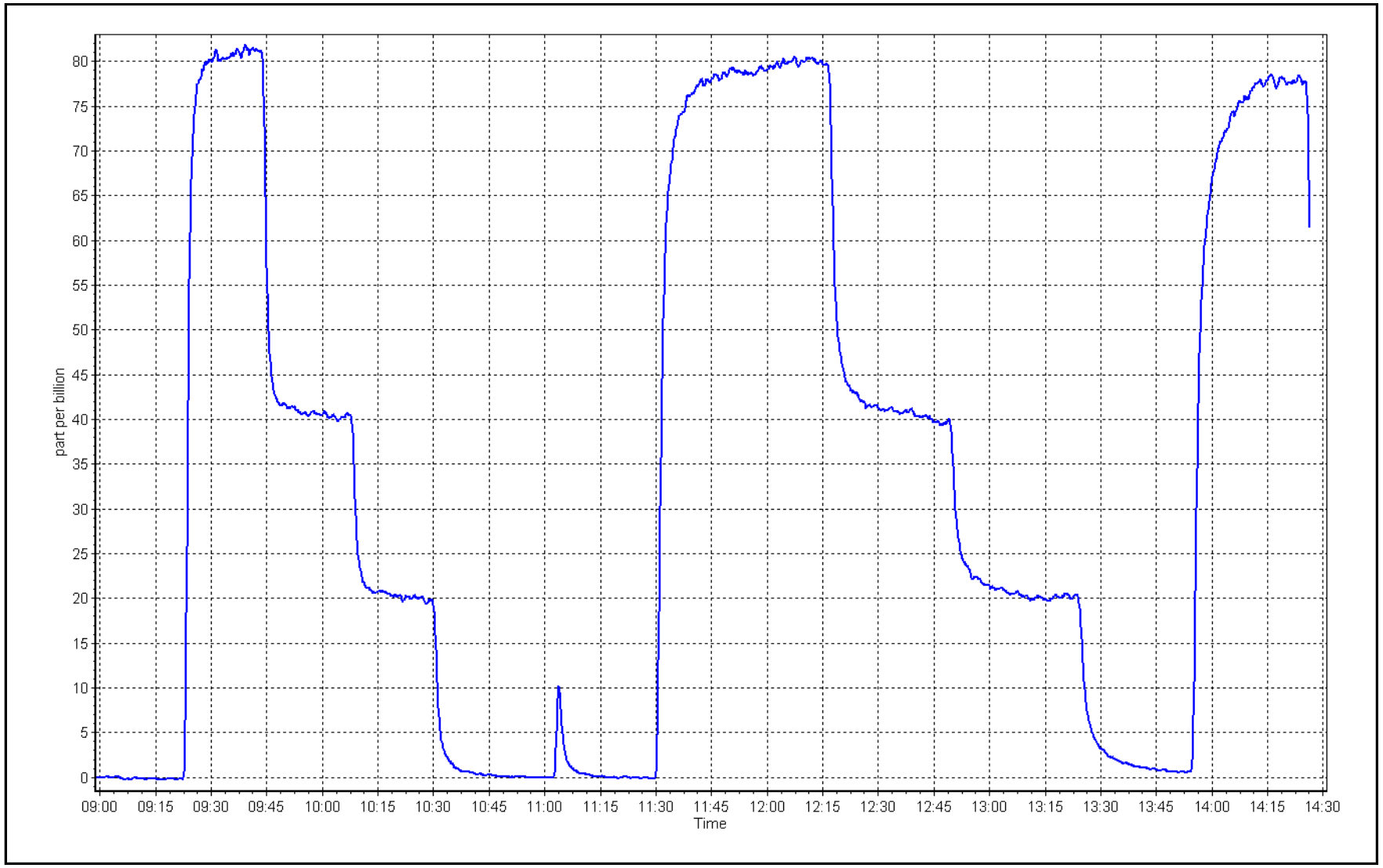
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.1	0.9987
40.0	40.3	0.9923
20.0	20.1	0.9949

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999987	*≥0.995*
Slope	1.001375	*0.90 - 1.10*
Intercept	0.081613	*+/-3*



H_2S Calibration Plot Date: May 16, 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:	May 1, 2023	Last Cal Date:	April 26, 2023
Start time (MST):	10:14	End time (MST):	16:22
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:	2.82E-04	3.00E-04	NMHC SP Ratio:	6.11E-05	6.36E-05
CH4 Retention time:	14.6	14.6	NMHC Peak Area:	150450	144534

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	17.04	1.015
as found 2nd point	4959	40.7	8.65	8.42	1.027
as found 3rd point	4980	20.3	4.32	4.19	1.029
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4918	81.3	17.29	17.28	1.000
second point	4959	40.7	8.65	8.64	1.001
third point	4980	20.3	4.32	4.37	0.988
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	17.29	17.91	0.966
				Average Correction Factor	0.997

Baseline Corr AF:	17.04	Prev response	17.27	*% change	-1.3%
Baseline Corr 2nd AF:	8.4	AF Slope:	0.986010	AF Intercept:	-0.045298
Baseline Corr 3rd AF:	4.2	AF Correlation:	0.999950	* = > +/-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	9.08	1.013
as found 2nd point	4959	40.7	4.60	4.53	1.016
as found 3rd point	4980	20.3	2.30	2.28	1.008
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4918	81.3	9.19	9.19	1.001
second point	4959	40.7	4.60	4.63	0.993
third point	4980	20.3	2.30	2.36	0.975
as left zero	5000	0	0.00	0.00	----
as left span	4918	81.3	9.19	9.60	0.957
				Average Correction Factor	0.990
Baseline Corr AF:	9.08	Prev response	9.21	*% change	-1.5%
Baseline Corr 2nd AF:	4.5	AF Slope:	0.986667	AF Intercept:	0.001464
Baseline Corr 3rd AF:	2.3	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	4918	81.3	8.09	7.96	1.017
as found 2nd point	4959	40.7	4.05	3.89	1.041
as found 3rd point	4980	20.3	2.02	1.92	1.055
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4918	81.3	8.09	8.09	1.000
second point	4959	40.7	4.05	4.01	1.010
third point	4980	20.3	2.02	2.01	1.004
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	8.09	8.30	0.975
				Average Correction Factor	1.005
Baseline Corr AF:	7.96	Prev response	8.06	*% change	-1.2%
Baseline Corr 2nd AF:	3.89	AF Slope:	0.985108	AF Intercept:	-0.046961
Baseline Corr 3rd AF:	1.92	AF Correlation:	0.999807	* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000528	0.998379
THC Cal Offset:	-0.030303	0.020702
CH4 Cal Slope:	0.999037	0.999517
CH4 Cal Offset:	-0.028760	-0.010960
NMHC Cal Slope:	1.001827	0.997203
NMHC Cal Offset:	-0.001743	0.031861

Notes: Changed the inlet filter and H2/N2 cylinders after as founds. Performed an input board calibration. Adjusted H2, N2, and air flow rates. Captured a new zero chromatogram. Adjusted span.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

THC Calibration Summary

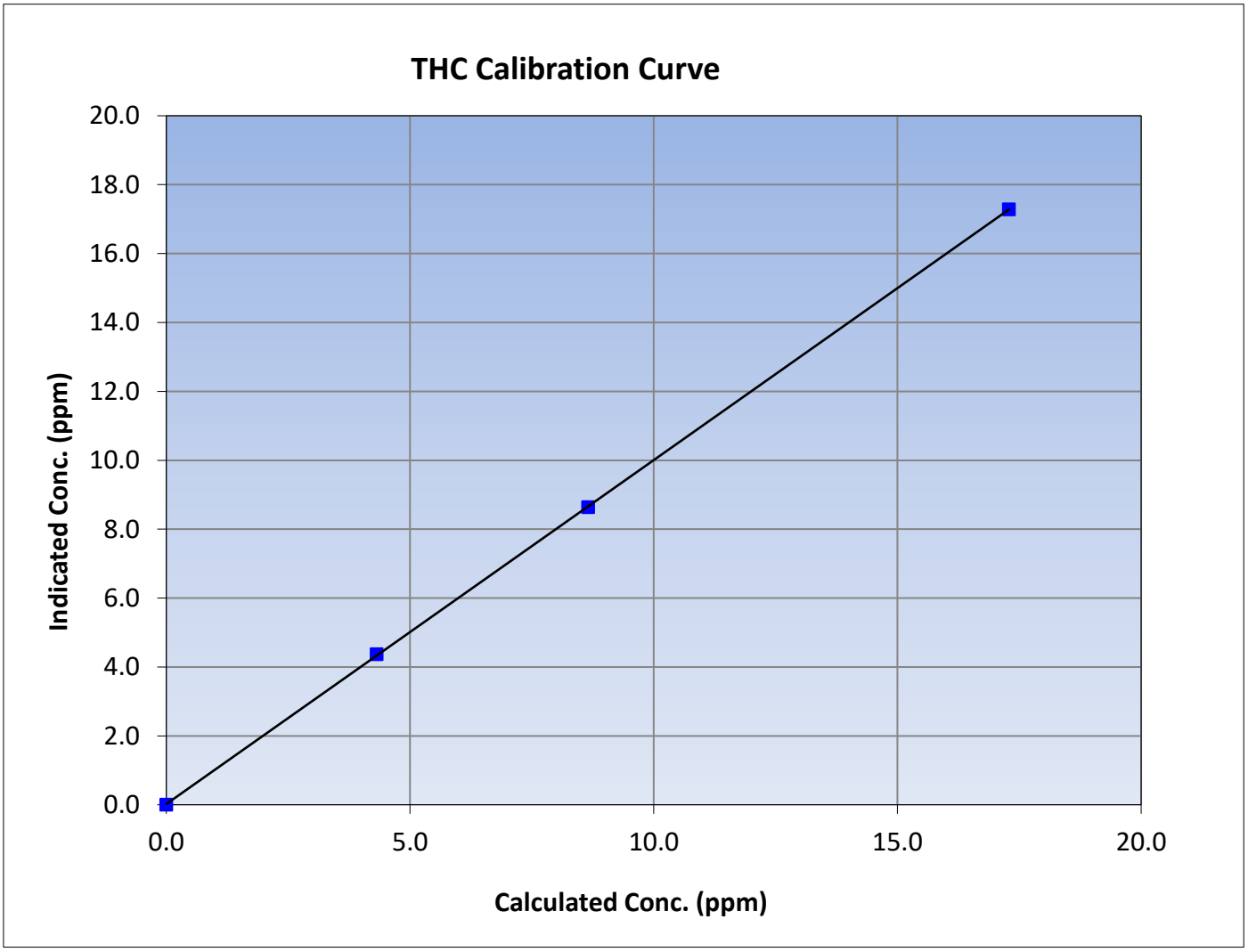
Version-01-2020

Station Information

Calibration Date:	May 1, 2023	Previous Calibration:	April 26, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:14	End Time (MST):	16:22
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	0.999986	≥0.995
17.29	17.28	1.0005			
8.65	8.64	1.0012	Slope	0.998379	0.90 - 1.10
4.32	4.37	0.9879			
			Intercept	0.020702	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

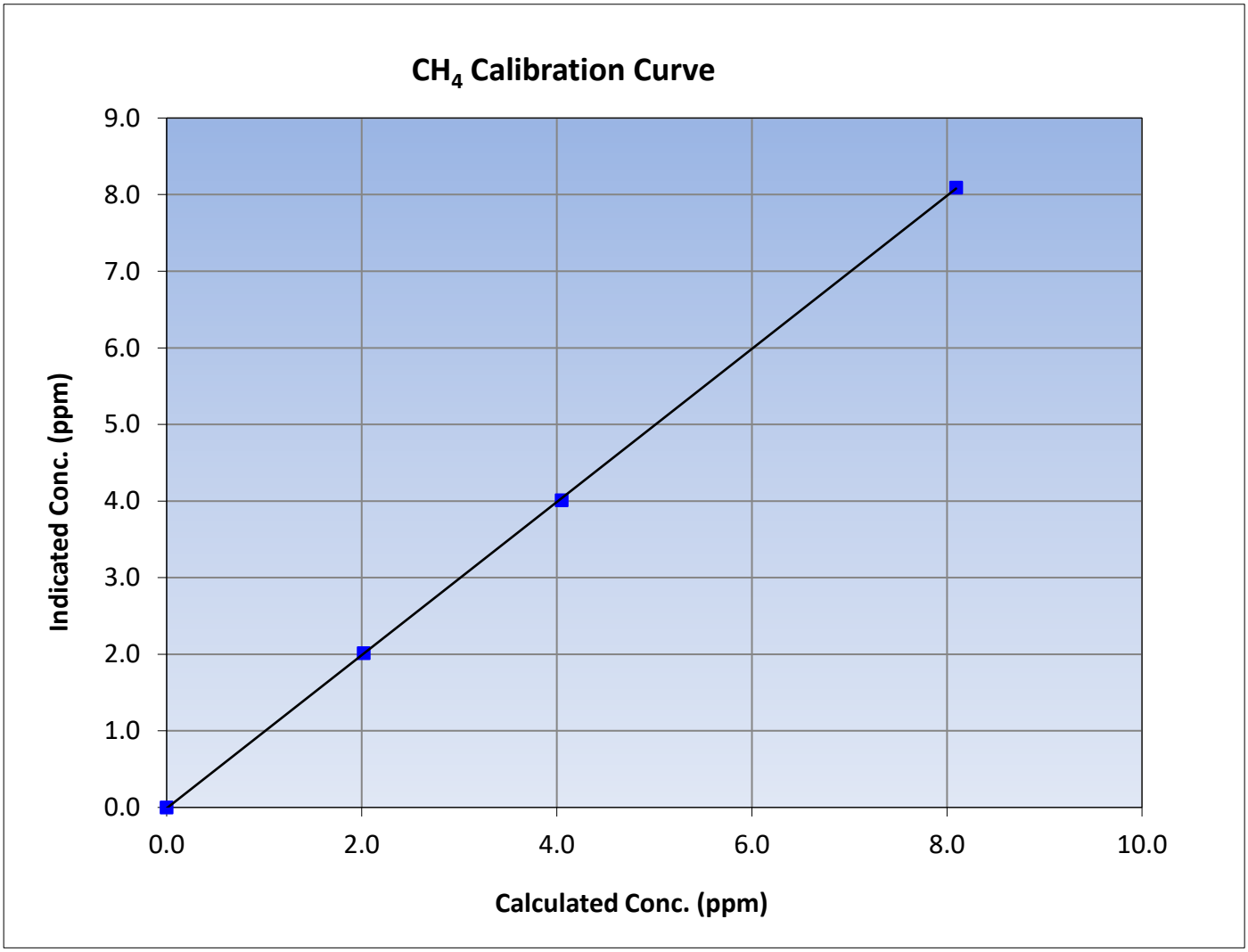
Version-01-2020

Station Information

Calibration Date:	May 1, 2023	Previous Calibration:	April 26, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:14	End Time (MST):	16:22
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	0.999969	*≥0.995*
8.09	8.09	1.0002			
4.05	4.01	1.0103	Slope	0.999517	*0.90 - 1.10*
2.02	2.01	1.0038			
			Intercept	-0.010960	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

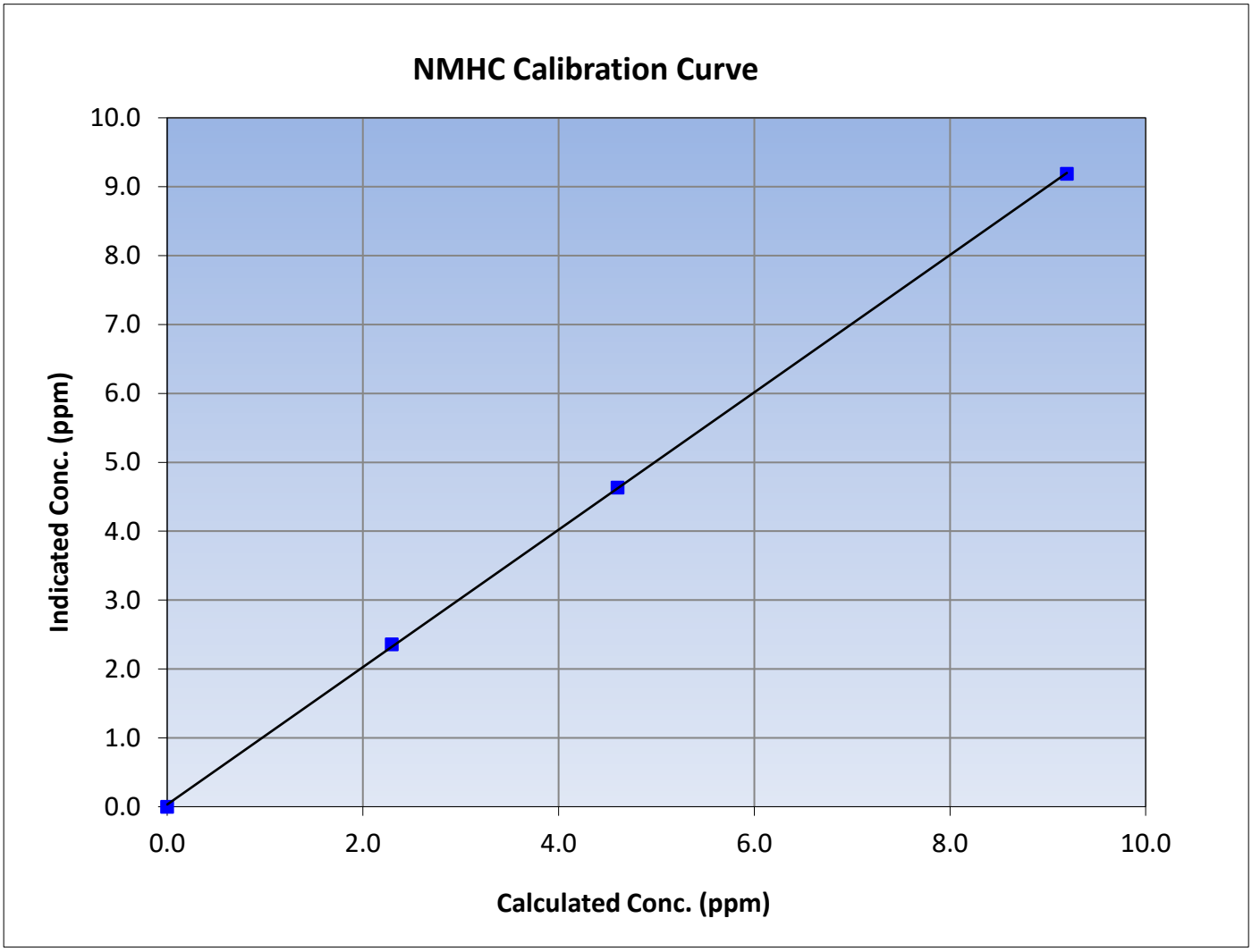
Version-01-2020

Station Information

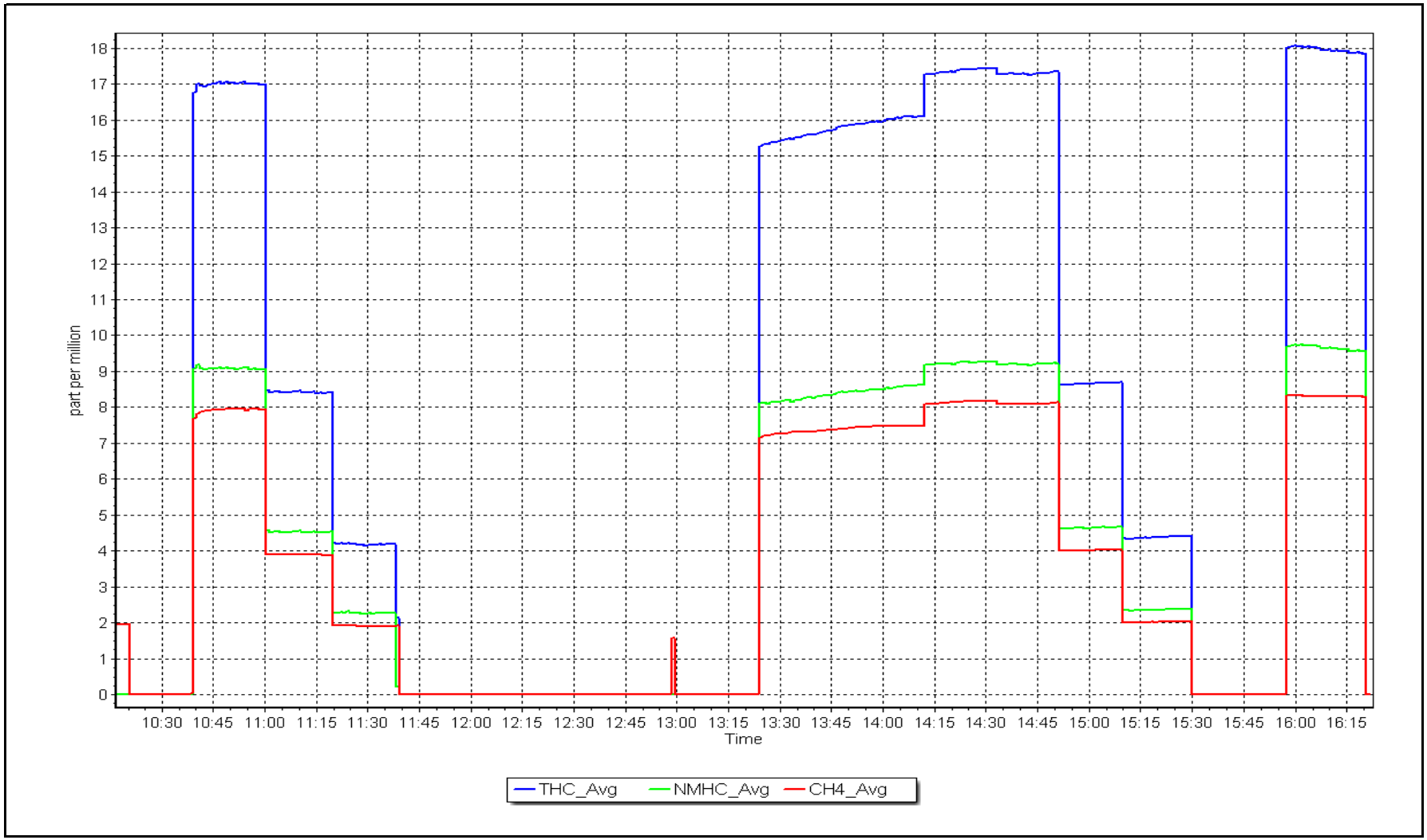
Calibration Date:	May 1, 2023	Previous Calibration:	April 26, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:14	End Time (MST):	16:22
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320040

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999944	≥0.995
9.19	9.19	1.0009			
4.60	4.63	0.9932	Slope	0.997203	0.90 - 1.10
2.30	2.36	0.9747			
			Intercept	0.031861	+/-0.5



NMHC Calibration Plot Date: May 1, 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:	May 18, 2023	Last Cal Date:	April 18, 2023
Start time (MST):	8:33	End time (MST):	13:28
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:	1.498	1.465	NO bkgnd or offset:	7.1	7.4
NOX coeff or slope:	0.990	0.991	NOX bkgnd or offset:	7.2	7.6
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	201.6	201.9

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999185	0.999073
NO_X Cal Offset:	0.160000	0.200000
NO Cal Slope:	0.999572	0.999971
NO Cal Offset:	-0.480000	-0.620000
NO_2 Cal Slope:	0.999865	1.001305
NO_2 Cal Offset:	-0.124708	0.605886

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	0.5	0.4	0.1	----	----
as found span	4920	80.0	813.4	800.6	12.8	834.3	819.2	15.1	0.9750	0.9773
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.6	0.4	0.2	----	----
high point	4920	80.0	813.4	800.6	12.8	813.0	800.3	12.8	1.0005	1.0004
second point	4960	40.0	406.7	400.3	6.4	406.6	399.8	6.8	1.0003	1.0013
third point	4980	20.0	203.4	200.2	3.2	202.8	198.1	4.7	1.0028	1.0104
as left zero	5000	0.0	0.0	0.0	0.0	0.1	-0.1	0.2	----	----
as left span	4920	80.0	813.4	396.0	417.4	811.5	395.7	415.7	1.0024	1.0009
								Average Correction Factor	1.0012	1.0040

Corrected As found NO_X = 833.8 ppb NO = 818.8 ppb

Previous Response NO_X = 812.9 ppb NO = 799.8 ppb

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

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

* = > +/-5% change initiates investigation

*Percent Change NO_X = 2.5%

*Percent Change NO = 2.3%

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)	796.5	391.9	417.4	418.5	0.9974	100.3%
2nd GPT point (200 ppb O3)	796.5	591.2	218.1	218.7	0.9973	100.3%
3rd GPT point (100 ppb O3)	796.5	696.3	113.0	114.5	0.9869	101.3%
				Average Correction Factor	0.9938	100.6%

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

NO_X Calibration Summary

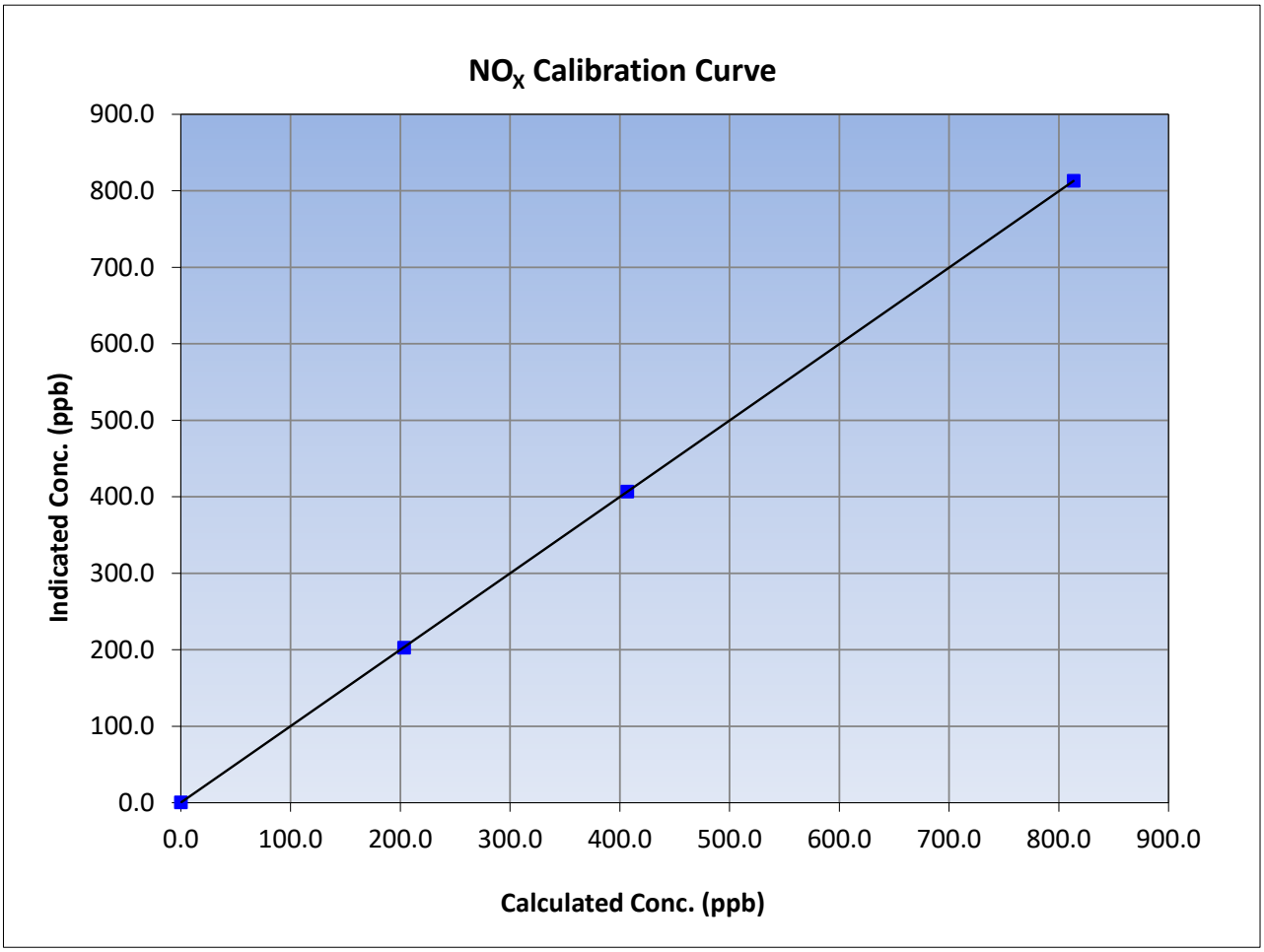
Version-04-2020

Station Information

Calibration Date:	May 18, 2023	Previous Calibration:	April 18, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	8:33	End Time (MST):	13:28
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	0.6	----	Correlation Coefficient	0.999999	*≥0.995*
813.4	813.0	1.0005			
406.7	406.6	1.0003	Slope	0.999073	*0.90 - 1.10*
203.4	202.8	1.0028			
			Intercept	0.200000	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

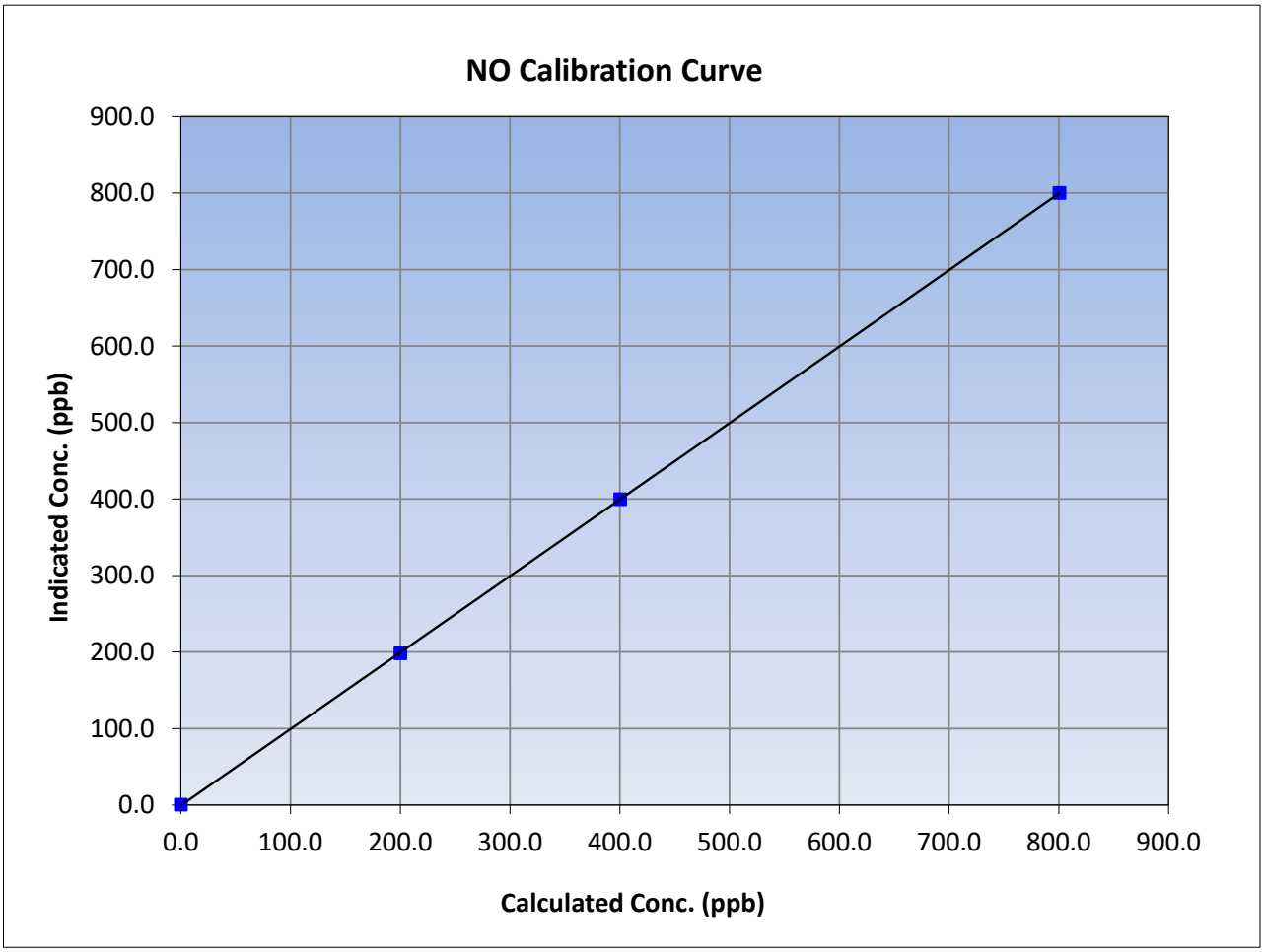
Version-04-2020

Station Information

Calibration Date:	May 18, 2023	Previous Calibration:	April 18, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	8:33	End Time (MST):	13:28
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.4	----	Correlation Coefficient	0.999991	≥0.995
800.6	800.3	1.0004			
400.3	399.8	1.0013	Slope	0.999971	0.90 - 1.10
200.2	198.1	1.0104			
			Intercept	-0.620000	+/-20



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NO_2 Calibration Summary

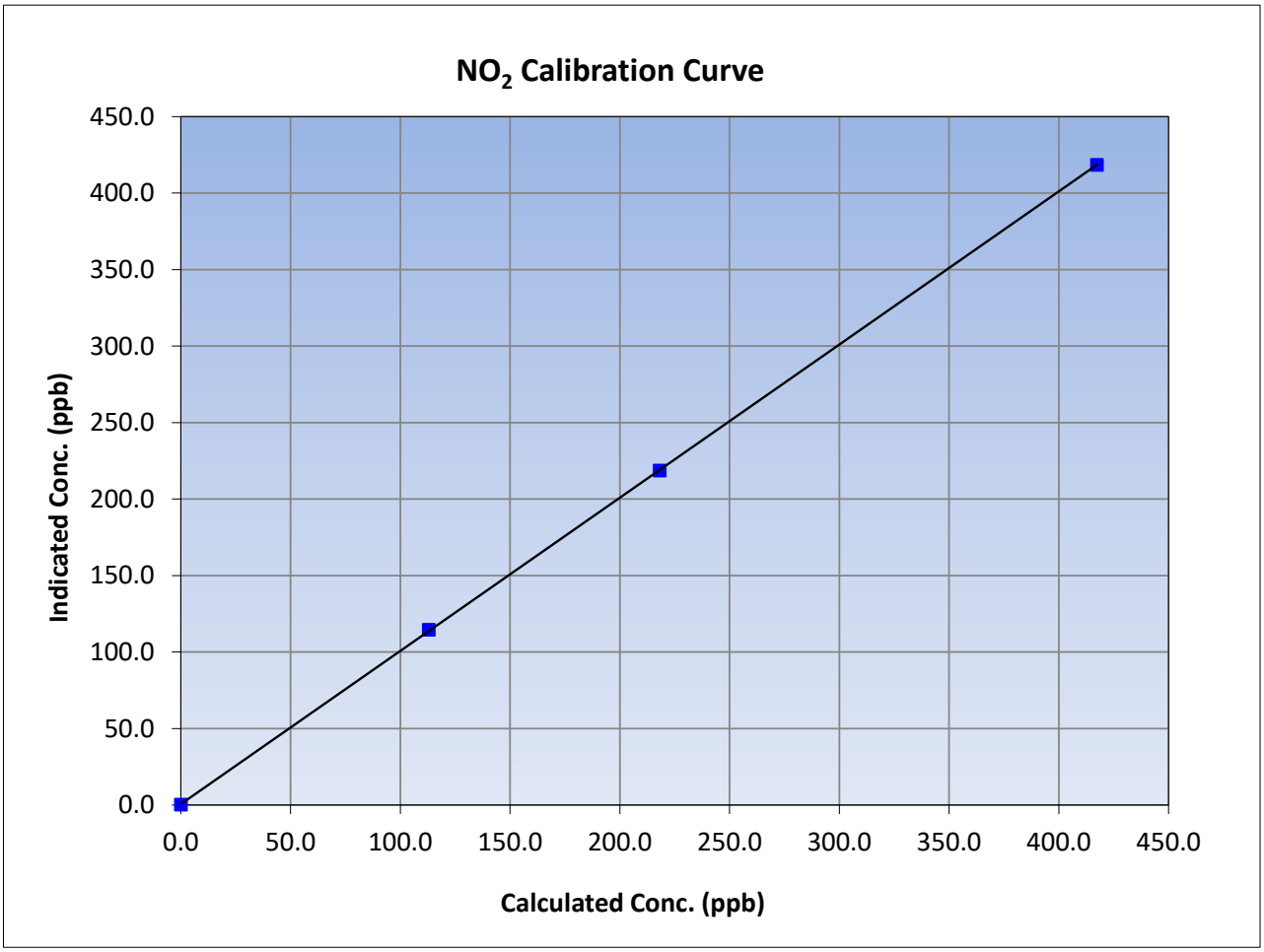
Version-04-2020

Station Information

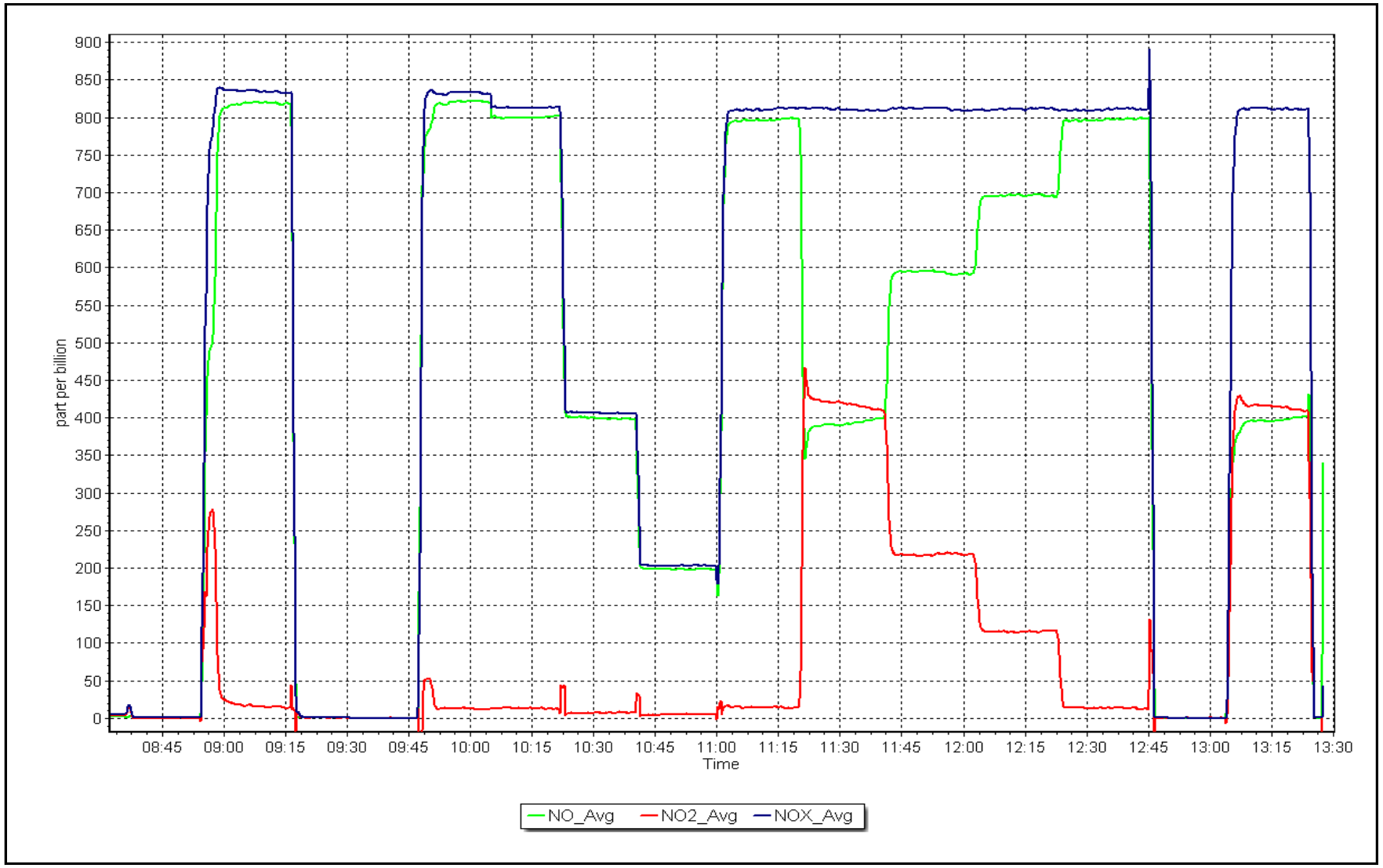
Calibration Date:	May 18, 2023	Previous Calibration:	April 18, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	8:33	End Time (MST):	13:28
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999991	≥0.995
417.4	418.5	0.9974			
218.1	218.7	0.9973	Slope	1.001305	0.90 - 1.10
113.0	114.5	0.9869			
			Intercept	0.605886	+/-20



NO_X Calibration Plot Date: May 18, 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:	May 4, 2023	Last Cal Date:	April 5, 2023
Start time (MST):	9:36	End time (MST):	13:02
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:	1.001057	0.999429	Backgd or Offset:	2.5	3.2
Calibration intercept:	0.440000	0.500000	Coeff or Slope:	1.040	1.010

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	0.6	----
as found span	5000	855.5	400.0	414.8	0.964
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.5	----
high point	5000	858.8	400.0	400.2	1.000
second point	5000	743.1	200.0	200.6	0.997
third point	5000	653.5	100.0	100.3	0.997
as left zero	5000	0.0	0.0	-0.2	----
as left span	5000	858.8	400.0	402.0	0.995
				Average Correction Factor	0.998

Baseline Corr As found:	414.2	Previous response	400.9	*% 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 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

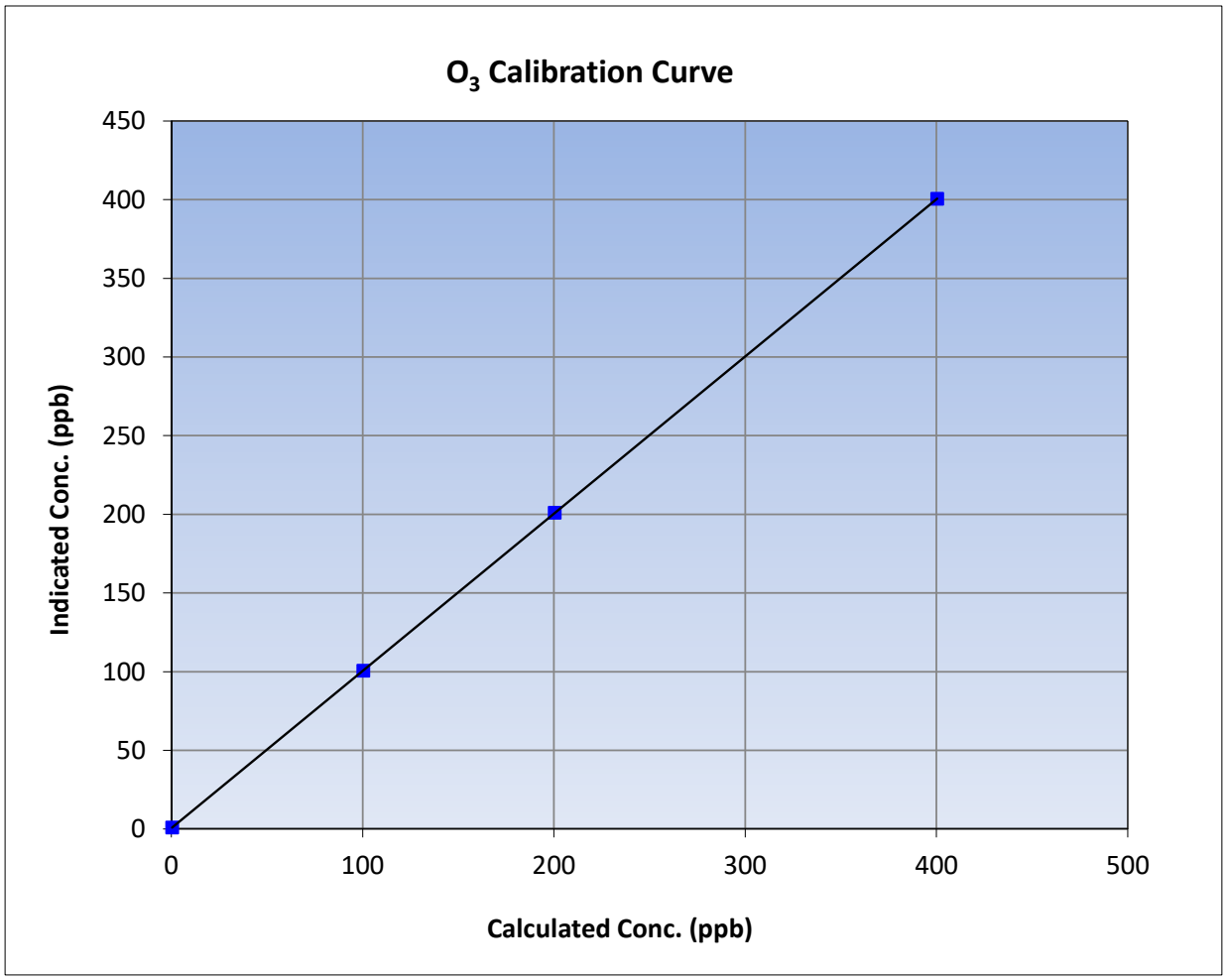
Station Information

Calibration Date:	May 4, 2023	Previous Calibration:	April 5, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:36	End Time (MST):	13:02
Analyzer make:	Teledyne API T400	Analyzer serial #:	1107

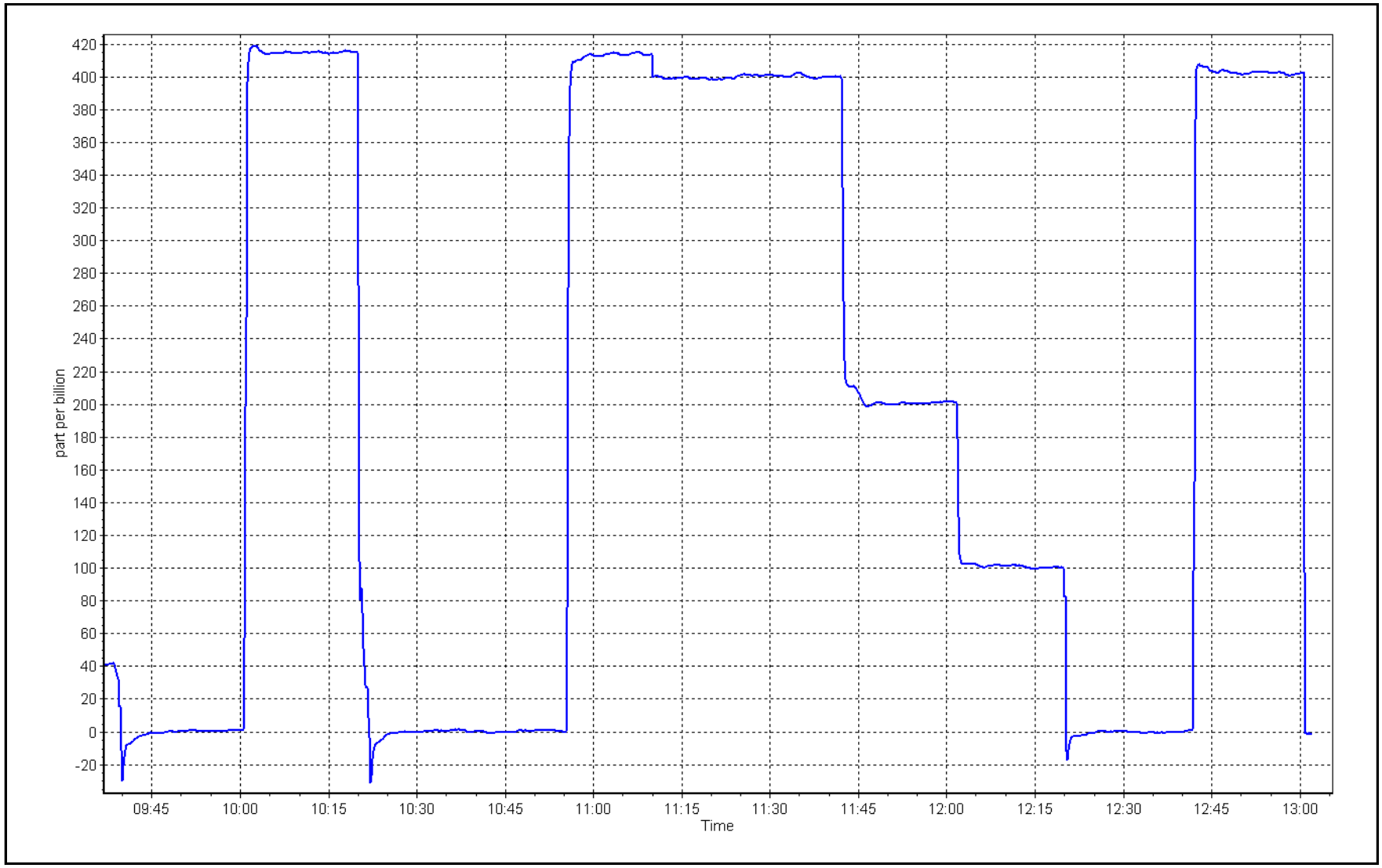
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
400.0	400.2	0.9995
200.0	200.6	0.9970
100.0	100.3	0.9970

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	0.999429	*0.90 - 1.10*
Intercept	0.500000	*+/- 5*



O_3 Calibration Plot Date: May 4, 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:	May 15, 2023	Last Cal Date:	April 20, 2023
Start time (MST):	9:50	End time (MST):	11:50
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)	24.7	24.4	24.7	☐	+/- 2 ^{o}C
P (mmHg)	735.9	739	735.9	☐	+/- 10 mmHg
flow (LPM)	5.02	4.98	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: May 15, 2023 Last Cal Date: April 20, 2023

PM w/o HEPA: 3.2 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	6	-60	10.9	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 3.2 w/ HEPA: 0 <0.2 ug/m3

Date Optical Chamber Cleaned: May 15, 2023

Disposable Filter Changed: May 15, 2023

Annual Maintenance

Date Sample Tube Cleaned: August 31, 2022

Date RH/T Sensor Cleaned: May 15, 2023

Notes: Verified flow, temperature, and pressure. Leak check passed. PMT peak test was low. Cleaned the optical chamber and RH/T sensor. Replaced the disposable filter. Inlet head cleaned. Post maintenance PMT peak test was displaying -60 peaks. Removing the instrument.

Calibration by: Rene Chamberland

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:	May 15, 2023	Last Cal Date:	NA
Start time (MST):	12:00	End time (MST):	13:15
Analyzer Make:	API T640	S/N:	328
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)	26.5	25.7	26.5	☐	+/- 2 ^{o}C
P (mmHg)	736.1	738	736.1	☐	+/- 10 mmHg
flow (LPM)	5.00	5.02	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: May 15, 2023 Last Cal Date: NA

PM w/o HEPA: 60.2 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	10.9		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: _____

Date RH/T Sensor Cleaned: _____

Notes: Installing a new T640 instrument. Flow, temperature, and pressure all within limits. Leak check passed. PMT peak test within limits.

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:	May 23, 2023	Last Cal Date:	April 27, 2023
Start time (MST):	10:10	End time (MST):	14:30
NH3 Cal Date:	May 23, 2023	Last Cal Date:	April 28, 2023
Start time (MST):	14:55	End time (MST):	18:40
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer model:	Teledyne API T201	Analyzer serial #:	808
Converter model:	Teledyne API T501	Converter serial #:	824
NH3 Range (ppb):	0 - 2000 ppb	Reaction cell Press:	5.20
NOX Range (ppb):	0 - 1000 ppb	Sample Flow:	472

	Start	*Finish*		*Start*	*Finish*
NO coefficient:	0.834	0.834	TN coefficient:	0.836	0.836
NOX coefficient:	0.839	0.839	NO bkgrnd:	-0.626	-0.626
NO2 coefficient:	1.000	1.000	NOX bkgrnd:	-0.402	-0.402
NH3 coefficient:	0.937	0.937	TN bkgrnd:	1.871	1.871

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	1.005241	1.000126
NO_X Cal Offset:	-0.420000	-0.900000
NO Cal Slope:	1.000685	1.000043
NO Cal Offset:	-2.020000	-1.820000
NO_2 Cal Slope:	1.007356	1.005118
NO_2 Cal Offset:	1.516016	-0.102116
NH3 Cal Slope:	1.005229	1.002401
NH3 Cal Offset:	-3.943276	-1.184396
TN Cal Slope:	1.009496	1.006409
TN Cal Offset:	-3.914715	-1.167305

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	-0.1	-0.1	-0.1	----	----
as found NO	4920	80.0	813.4	813.4	----	812.7	812.7	0.0	1.001	----
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.1	----	----
high NO point	4920	80.0	813.4	813.4	----	813.9	813.3	0.6	0.999	----
NO/O3 point	4920	80.0	813.4	813.4	----	812.1	811.0	1.2	1.002	----
as found NH3	3413	86.4	1800.6	----	1800.6	1817.2	----	1810.0	0.991	0.995
new NH3 cyl rp							----			
first NH3	3413	86.4	1800.6	----	1800.6	1817.2	----	1810.0	0.991	0.995
second NH3	3452	48.0	1000.2	----	1000.2	990.5	----	986.5	1.010	1.014
third NH3	3476	24.0	500.1	----	500.1	509.7	----	507.5	0.981	0.985
								Average Correction Factor	1.0005	0.9980

Corrected As found TN = 812.8 ppb NO_X = 812.8 ppb NH3 = 1810.1 ppb *Percent Change TN = -0.5%

Previous Response TN = 817.3 ppb NO_X = 817.3 ppb NH3 = 1806.1 ppb *Percent Change NO_X = -0.6%

*Percent Change NH3 = 0.2%

* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 93.7%

NH3 Current Converter Efficiency = 93.7%

Wood Buffalo Environmental Association

NO_X - NO - NO_2 Calibration Report

Version-11-2021

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.1	----	----
as found span	4920	80.0	813.4	800.6	813.4	812.7	792.6	812.7	1.0009	1.0101
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	0.0	----	----
high point	4920	80.0	813.4	800.6	813.4	813.3	800.0	813.9	1.0002	1.0008
second point	4960	40.0	406.7	400.3	406.7	404.8	397.0	404.3	1.0047	1.0084
third point	4980	20.0	203.4	200.2	203.4	202.0	196.8	202.4	1.0067	1.0171
								Average Correction Factor	1.0039	1.0087

Baseline Corr As fnd	TN =	812.8 ppb	NO_X =	812.8 ppb	NO =	792.8 ppb	*Percent Change TN = -0.5%
Previous Response	TN =	817.3 ppb	NO_X =	817.3 ppb	NO =	799.2 ppb	*Percent Change NO_X = -0.6%
							*Percent Change NO = -0.8%

* = > +/-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)	796.1	397.3	411.6	413.8	0.9947	100.5%
2nd GPT point (200 ppb O3)	796.1	593.4	215.5	215.8	0.9986	100.1%
3rd GPT point (100 ppb O3)	796.1	691.9	117.0	118.1	0.9907	100.9%
				Average Correction Factor	0.9947	100.5%

Notes: Changed the inlet filter. No adjustments made.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TN Calibration Summary

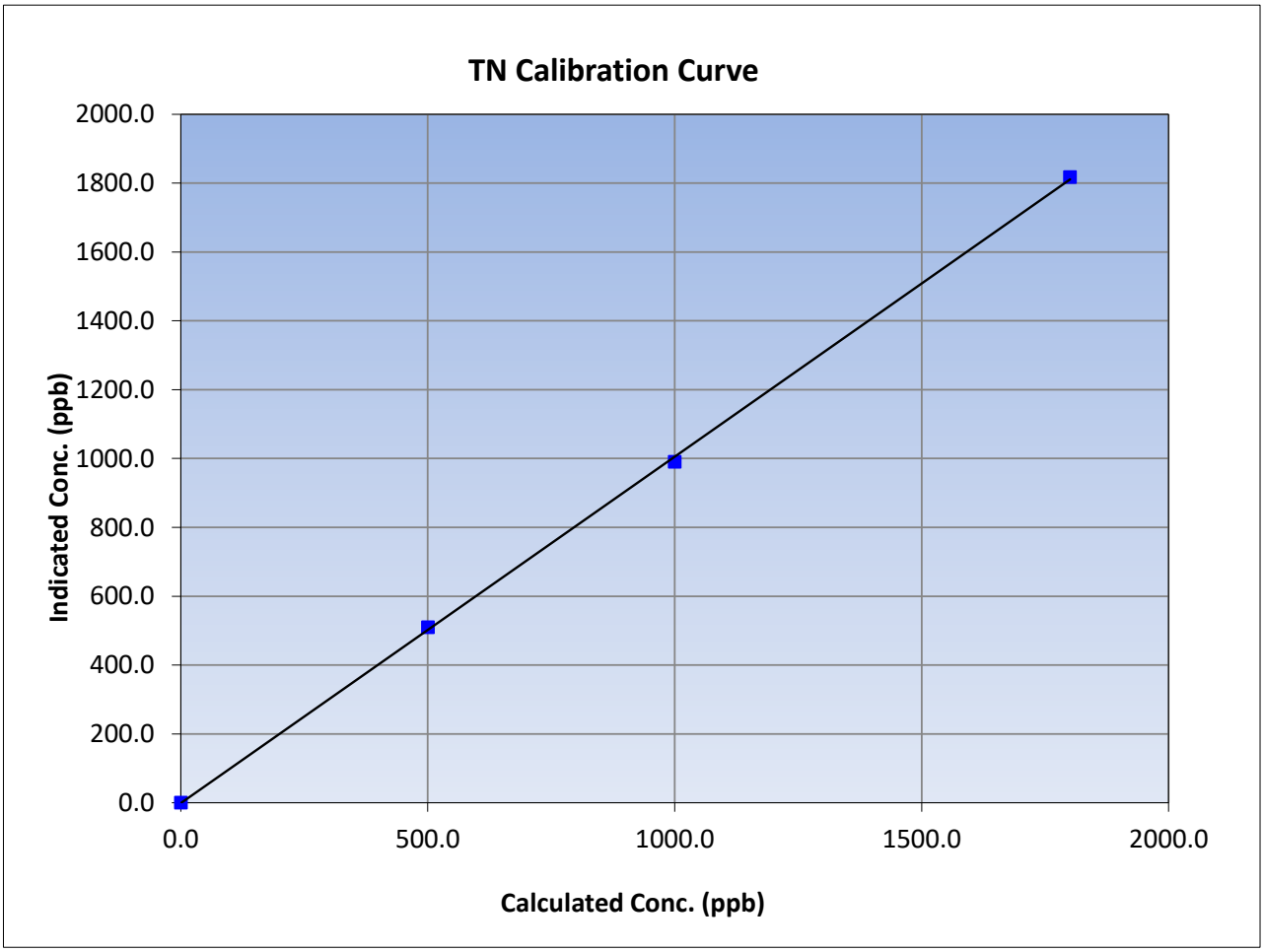
Version-11-2021

Station Information

Calibration Date:	May 23, 2023	Previous Calibration:	April 27, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:10	End Time (MST):	14:30
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	0.999822	≥0.995
1800.6	1817.2	0.9909			
1000.2	990.5	1.0098	Slope	1.006409	0.90 - 1.10
500.1	509.7	0.9811			
			Intercept	-1.167305	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

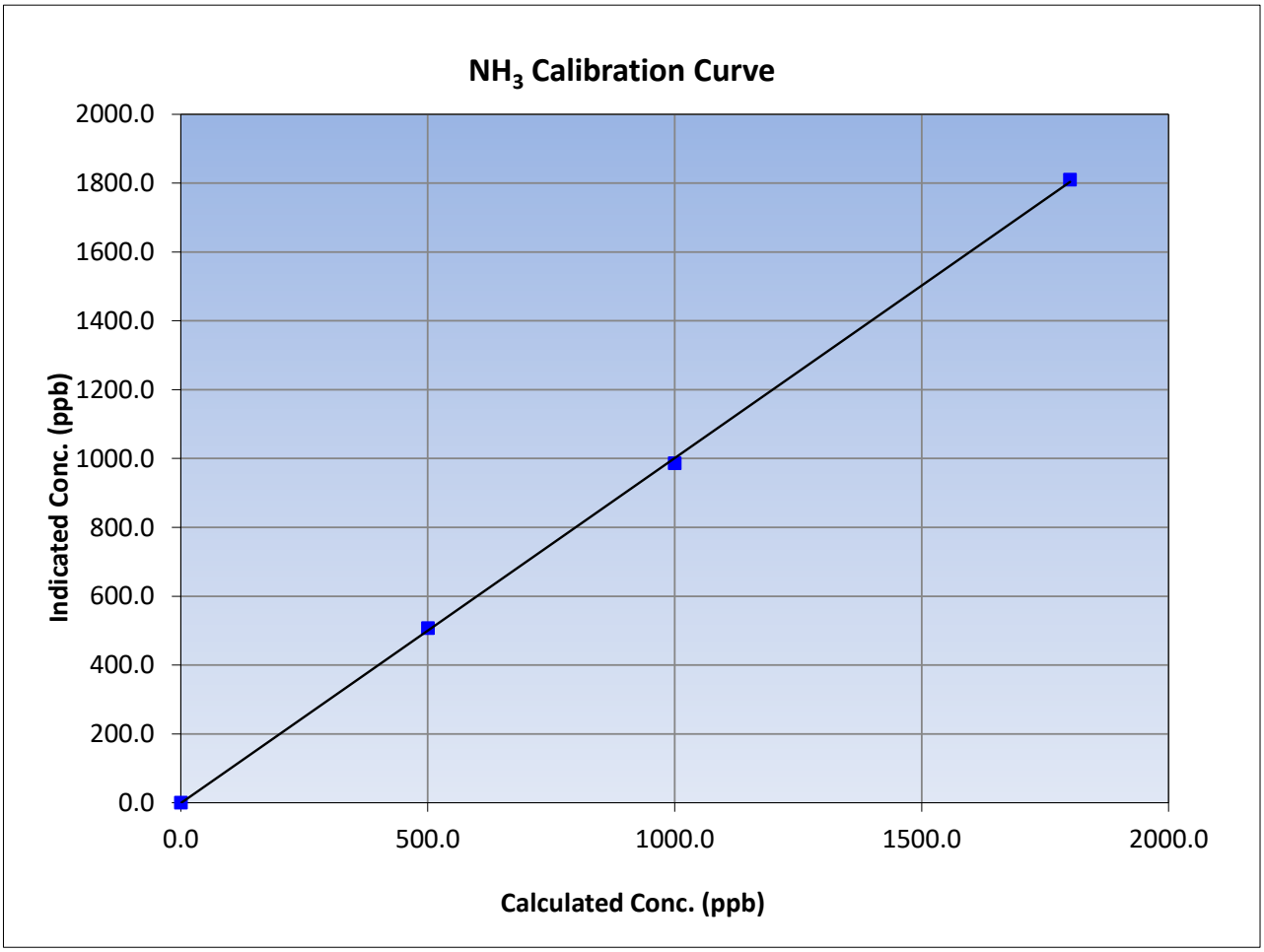
Version-11-2021

Station Information

Calibration Date:	May 23, 2023	Previous Calibration:	April 27, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:10	End Time (MST):	14:30
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	0.999822	≥0.995
1800.6	1810.0	0.9948			
1000.2	986.5	1.0139	Slope	1.002401	0.90 - 1.10
500.1	507.5	0.9854			
			Intercept	-1.184396	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

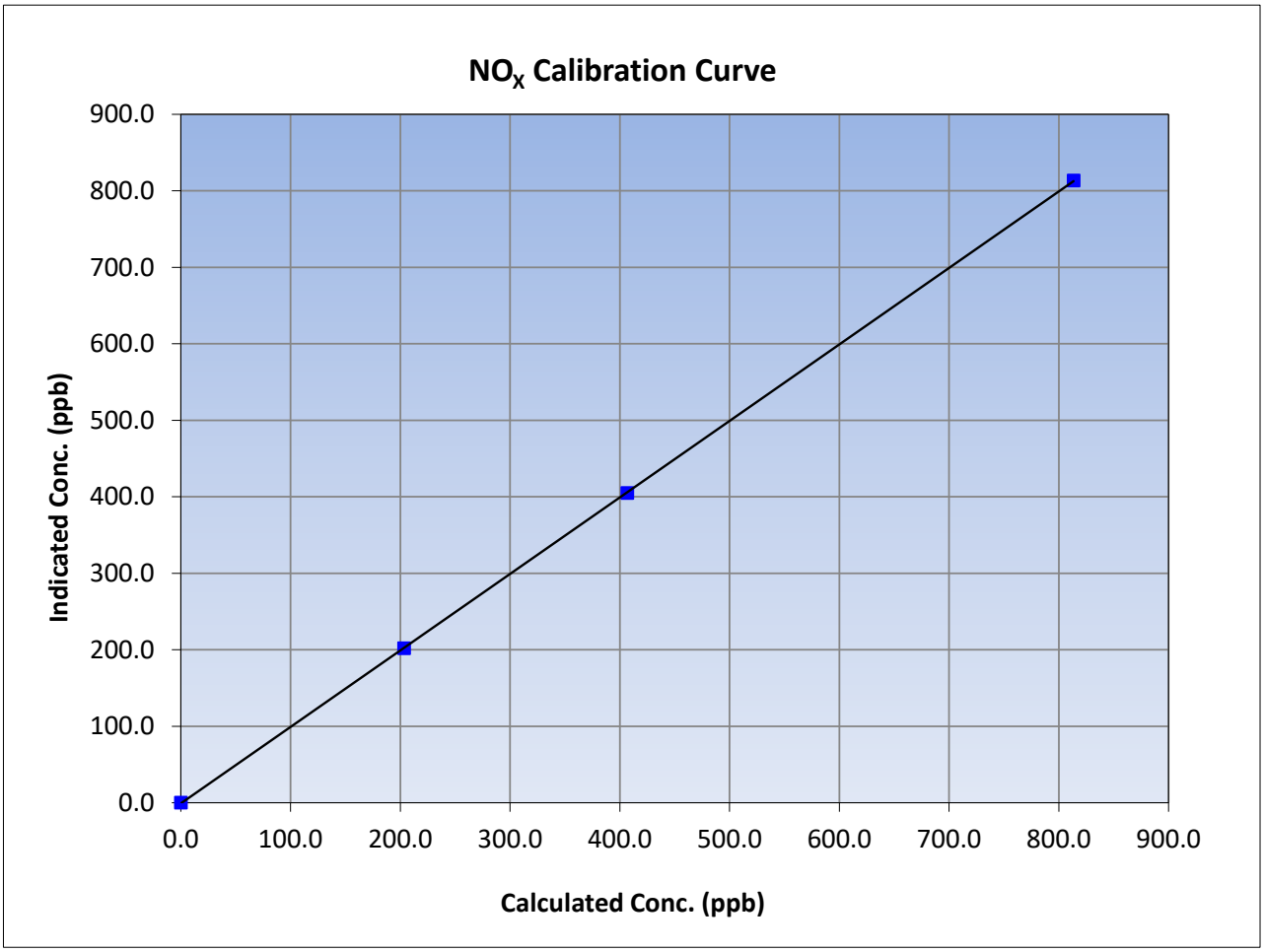
Version-11-2021

Station Information

Calibration Date:	May 23, 2023	Previous Calibration:	April 27, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:10	End Time (MST):	14:30
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	0.999993	≥0.995
813.4	813.3	1.0002			
406.7	404.8	1.0047	Slope	1.000126	0.90 - 1.10
203.4	202.0	1.0067			
			Intercept	-0.900000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

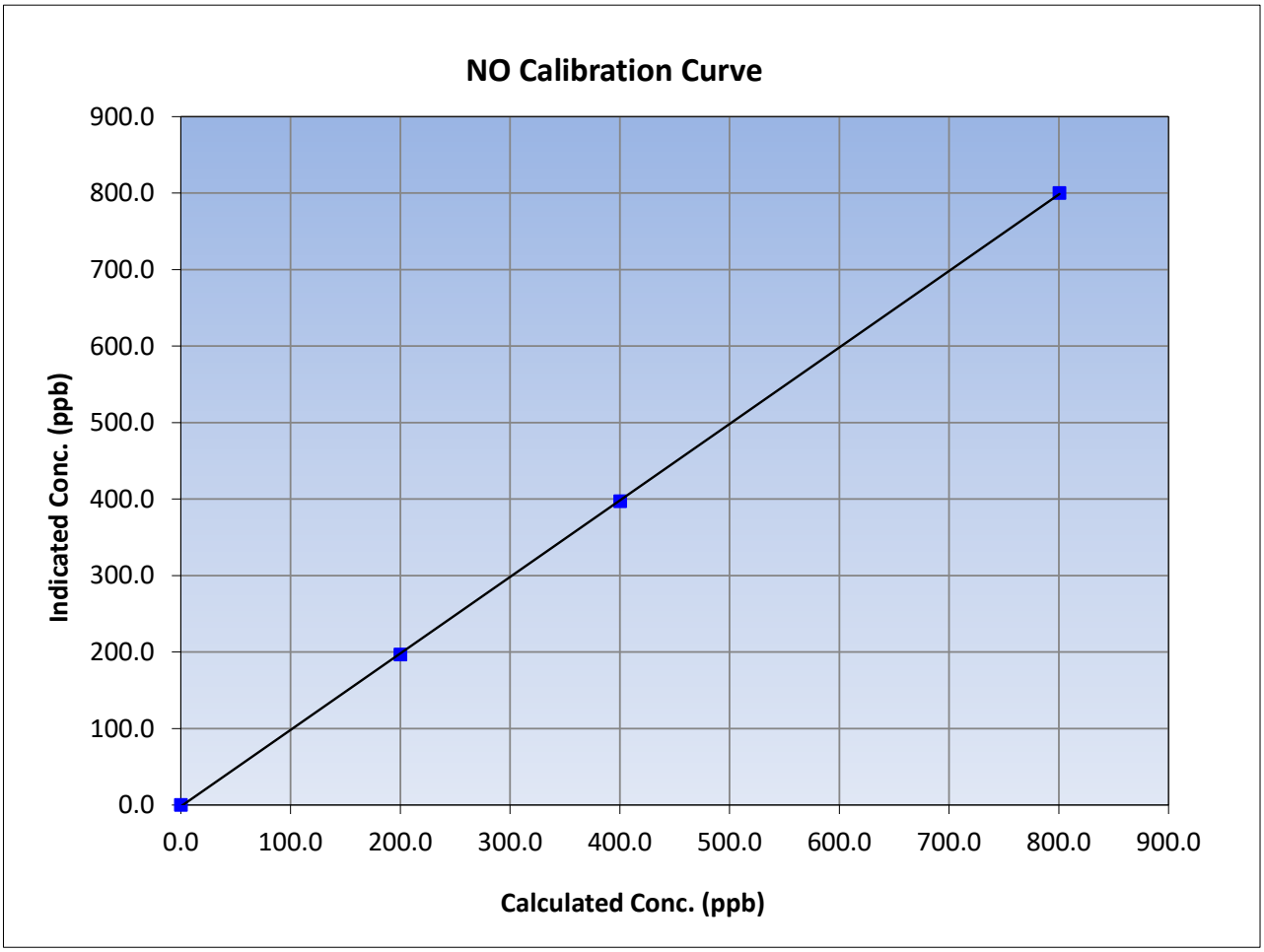
Version-11-2021

Station Information

Calibration Date:	May 23, 2023	Previous Calibration:	April 27, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:10	End Time (MST):	14:30
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	0.999972	≥0.995
800.6	800.0	1.0008			
400.3	397.0	1.0084	Slope	1.000043	0.90 - 1.10
200.2	196.8	1.0171			
			Intercept	-1.820000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

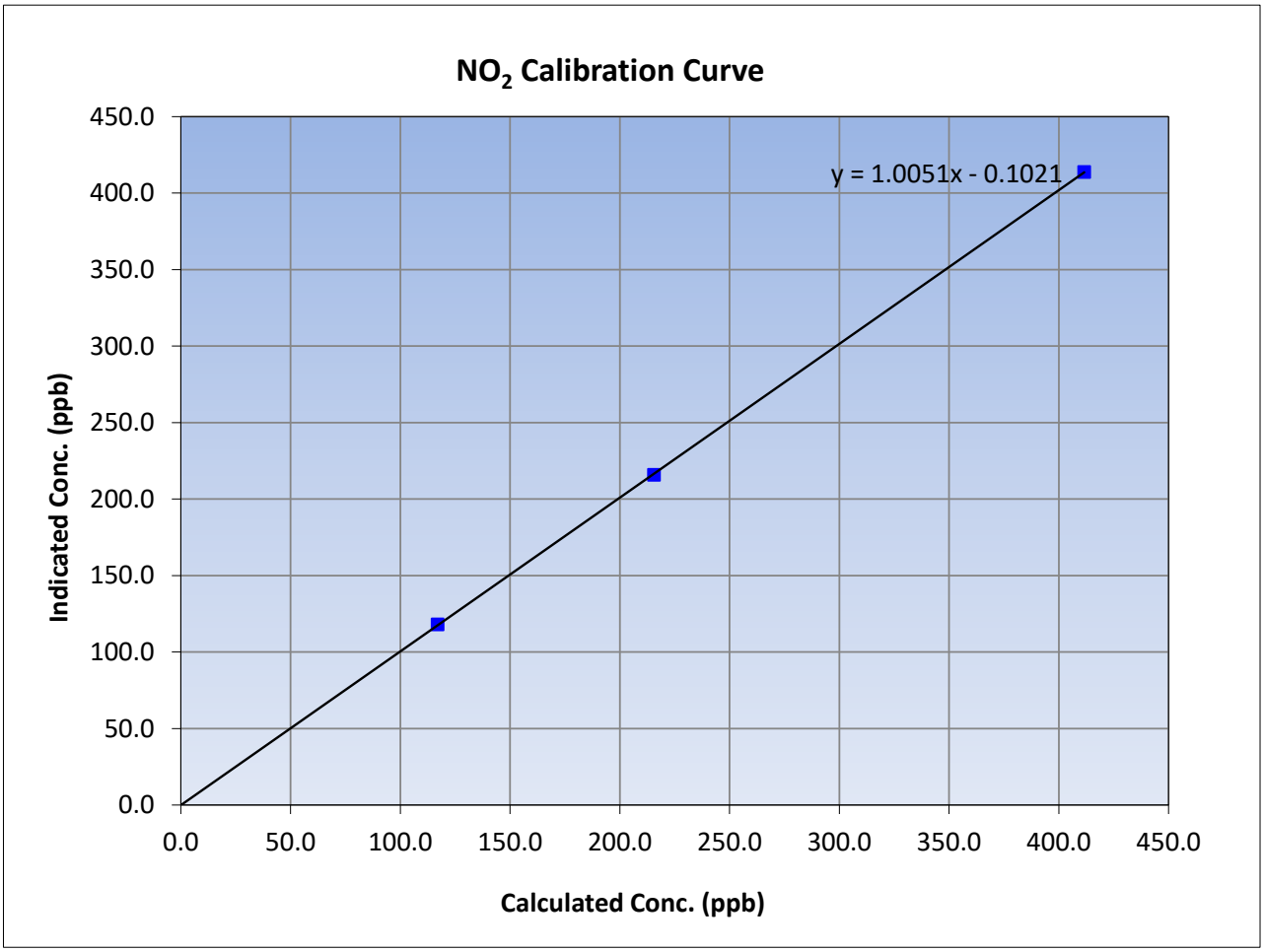
Version-11-2021

Station Information

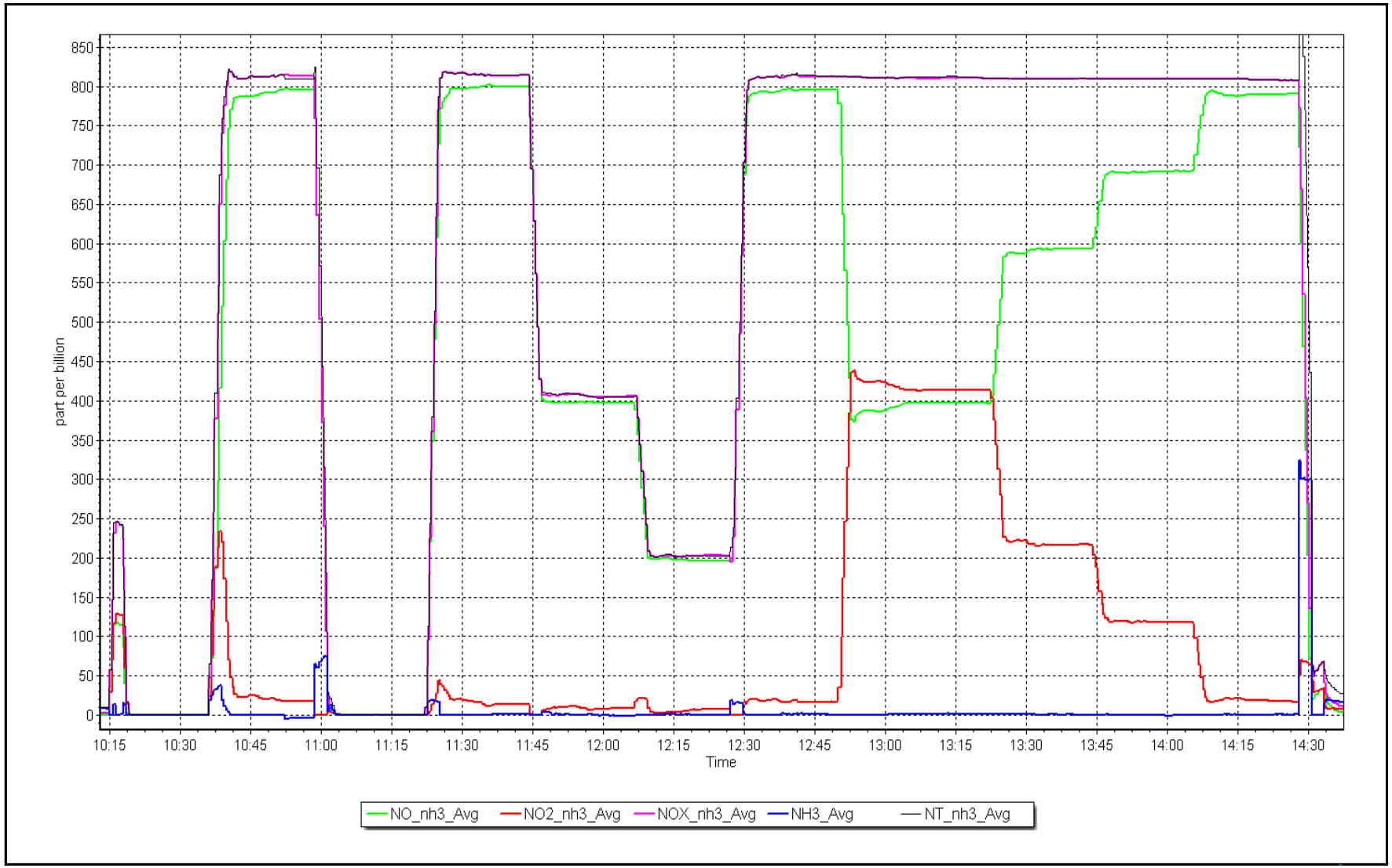
Calibration Date:	May 23, 2023	Previous Calibration:	April 27, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:10	End Time (MST):	14:30
Analyzer make:	Teledyne API T201	Analyzer serial #:	808

Calibration Data

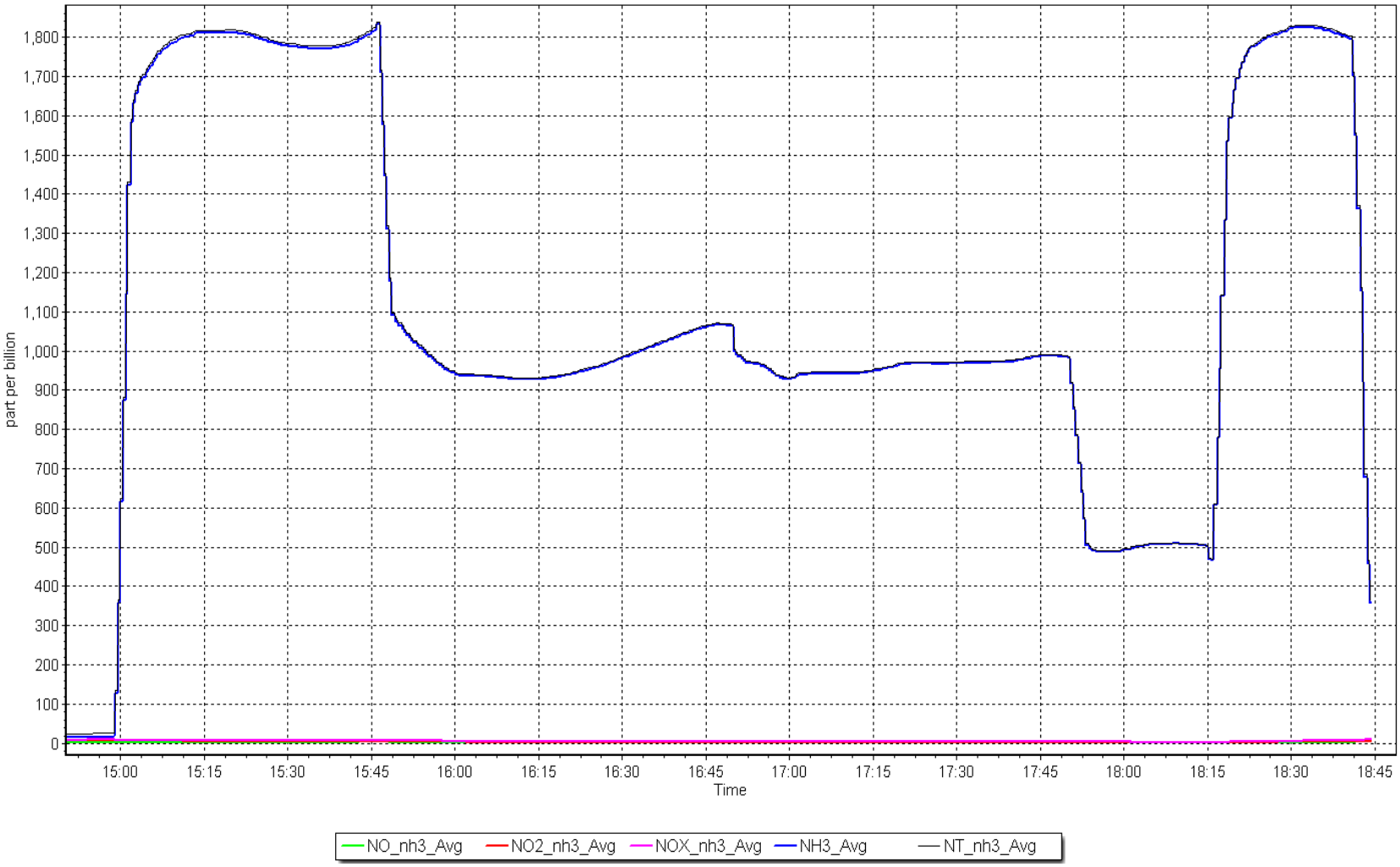
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.2	----	Correlation Coefficient	0.999990	*≥0.995*
411.6	413.8	0.9947			
215.5	215.8	0.9986	Slope	1.005118	*0.90 - 1.10*
117.0	118.1	0.9907			
			Intercept	-0.102116	*+/-20*



NO_X Calibration Plot Date: May 23, 2023 Location: Bertha Ganter-Fort McKay



NH_3 Calibration Plot Date: May 23, 2023 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

TN - NO_X - NH_3 Calibration Report

Version-05-2023

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
NOX Cal Date:	May 29, 2023	Last Cal Date:	May 23, 2023
Start time (MST):	8:39	End time (MST):	12:00
NH3 Cal Date:	May 29, 2023	Last Cal Date:	May 23, 2023
Start time (MST):	12:23	End time (MST):	14:01
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 T201	Analyzer serial #:	808
Converter model:	Teledyne API T501	Converter serial #:	824
NH3 Range (ppb):	0 - 2000 ppb	Reaction cell Press:	5.20
NOX Range (ppb):	0 - 1000 ppb	Sample Flow:	486

	Start	*Finish*		*Start*	*Finish*
NO coefficient:	0.834		TN coefficient:	0.836	
NOX coefficient:	0.839		NO bkgrnd:	-0.626	
NO2 coefficient:	1.000		NOX bkgrnd:	-0.402	
NH3 coefficient:	0.937		TN bkgrnd:	1.871	

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	1.000126	1.003836
NO_X Cal Offset:	-0.900000	-1.320000
NO Cal Slope:	1.000043	0.997074
NO Cal Offset:	-1.820000	-1.380000
NO_2 Cal Slope:	1.005118	1.006204
NO_2 Cal Offset:	-0.102116	0.774028
NH3 Cal Slope:	1.002401	1.000316
NH3 Cal Offset:	-1.184396	7.361047
TN Cal Slope:	1.006409	1.004132
TN Cal Offset:	-1.167305	7.636840

Wood Buffalo Environmental Association

TN - NOX - NH_3 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated TN concentration (ppb) (Cc)	Calculated NOX concentration (ppb) (Cc)	Calculated NH3 concentration (ppb) (Cc)	Indicated TN concentration (ppb) (Ic)	Indicated NOX concentration (ppb) (Ic)	Indicated NH3 concentration (ppb) (Ic)	TN Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NH3 Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	----	----
as found NO	4920	80.0	813.4	813.4	----	816.1	816.1	0.0	0.997	----
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	----	----
high NO point	4920	80.0	813.4	813.4	----	816.1	816.1	0.0	0.997	----
NO/O3 point	4920	80.0	813.4	813.4	----	812.5	811.2	1.1	1.001	----
as found NH3	3413	86.4	1800.6	----	1800.6	1809.8	----	1802.8	0.995	0.999
new NH3 cyl rp							----			
first NH3	3413	86.4	1800.6	----	1800.6	1809.8	----	1802.8	0.995	0.999
second NH3	3452	48.0	1000.2	----	1000.2	1019.6	----	1015.4	0.981	0.985
third NH3	3476	24.0	500.1	----	500.1	515.8	----	513.3	0.970	0.974
								Average Correction Factor	0.9989	0.9860

Corrected As found TN = 816.2 ppb NO_X = 816.2 ppb NH3 = 1802.9 ppb

Previous Response TN = 817.5 ppb NO_X = 812.6 ppb NH3 = 1803.8 ppb

*Percent Change TN = -0.2%

*Percent Change NO_X = 0.4%

*Percent Change NH3 = 0.0%

* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 93.7%

NH3 Current Converter Efficiency =

Wood Buffalo Environmental Association

NO_X - NO - NO_2 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.1	----	----
as found span	4920	80.0	813.4	800.6	813.4	816.1	797.3	816.1	0.9967	1.0042
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.1	----	----
high point	4920	80.0	813.4	800.6	813.4	816.1	797.3	816.1	0.9967	1.0042
second point	4960	40.0	406.7	400.3	406.7	405.6	397.8	408.3	1.0028	1.0063
third point	4980	20.0	203.4	200.2	203.4	202.1	196.6	201.5	1.0062	1.0181
								Average Correction Factor	1.0019	1.0095

Baseline Corr As fnd	TN =	816.2 ppb	NO_X =	816.2 ppb	NO =	797.5 ppb	*Percent Change	TN = -0.2%
Previous Response	TN =	817.5 ppb	NO_X =	812.6 ppb	NO =	798.9 ppb	*Percent Change	NO_X = 0.4%
							*Percent Change	NO = -0.2%

* = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated 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)	795.5	393.0	415.3	418.3	0.9928	100.7%
2nd GPT point (200 ppb O3)	795.5	595.6	212.7	215.2	0.9884	101.2%
3rd GPT point (100 ppb O3)	795.5	694.2	114.1	116.1	0.9828	101.8%
				Average Correction Factor	0.9880	101.2%

Notes: Removing the analyzer due to memory issues.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TN Calibration Summary

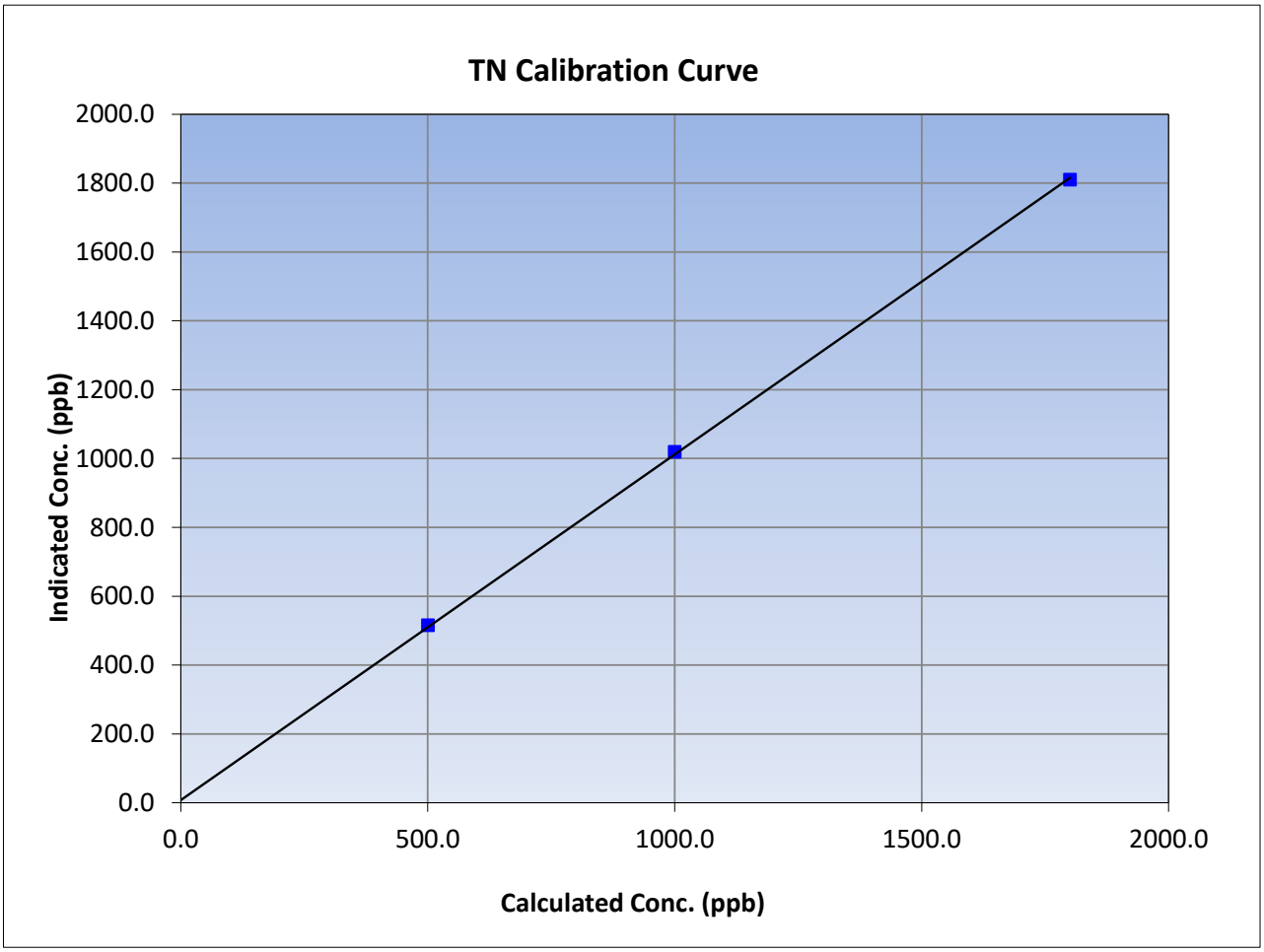
Version-05-2023

Station Information

Calibration Date:	May 29, 2023	Previous Calibration:	May 23, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	8:39	End Time (MST):	12:00
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	0.999894	≥0.995
1800.6	1809.8	0.9949			
1000.2	1019.6	0.9810	Slope	1.004132	0.90 - 1.10
500.1	515.8	0.9695			
			Intercept	7.636840	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

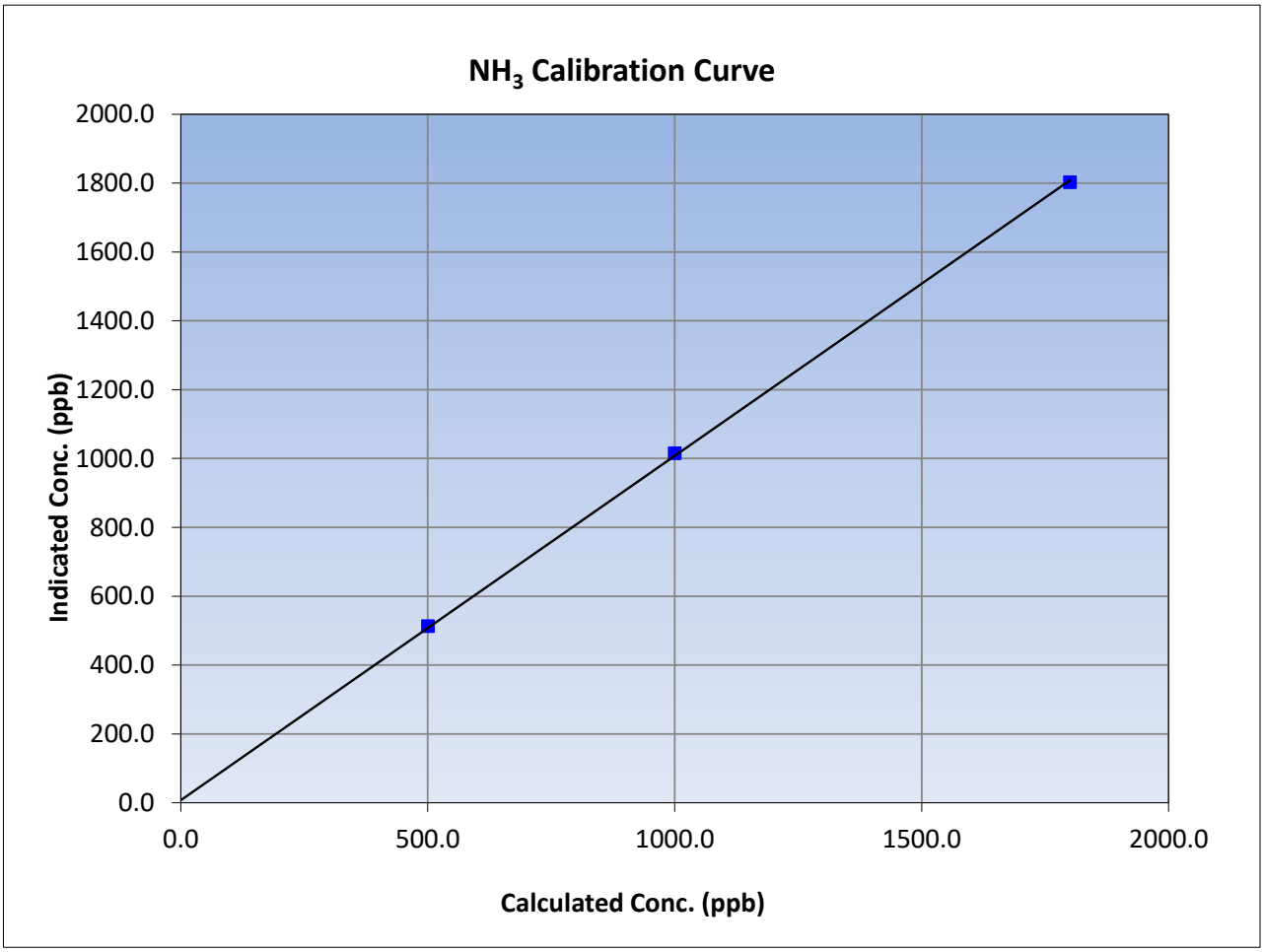
Version-05-2023

Station Information

Calibration Date:	May 29, 2023	Previous Calibration:	May 23, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	8:39	End Time (MST):	12:00
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	0.999899	≥0.995
1800.6	1802.8	0.9988			
1000.2	1015.4	0.9850	Slope	1.000316	0.90 - 1.10
500.1	513.3	0.9743			
			Intercept	7.361047	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

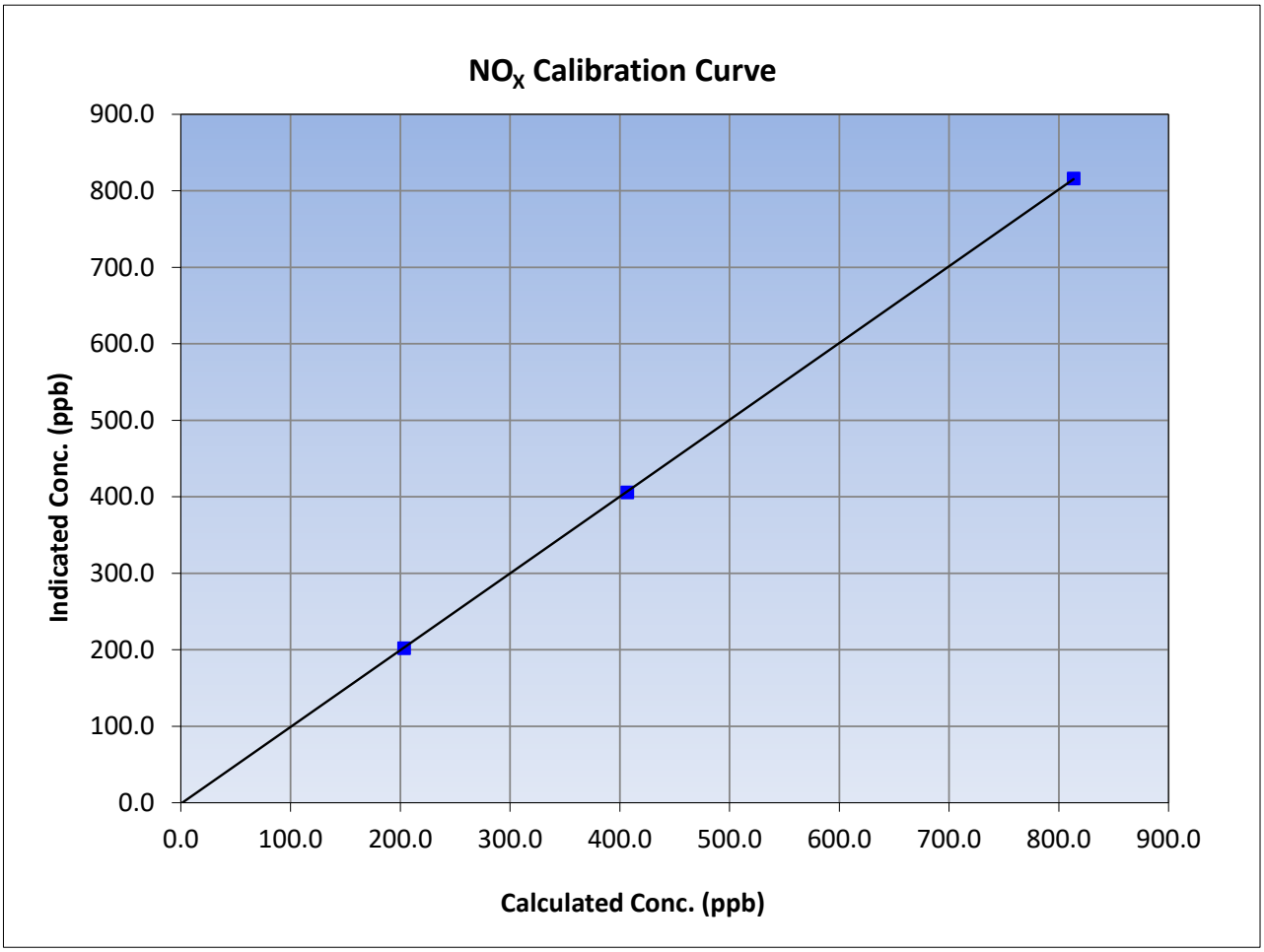
Version-05-2023

Station Information

Calibration Date:	May 29, 2023	Previous Calibration:	May 23, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	8:39	End Time (MST):	12:00
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	0.999987	≥0.995
813.4	816.1	0.9967			
406.7	405.6	1.0028	Slope	1.003836	0.90 - 1.10
203.4	202.1	1.0062			
			Intercept	-1.320000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

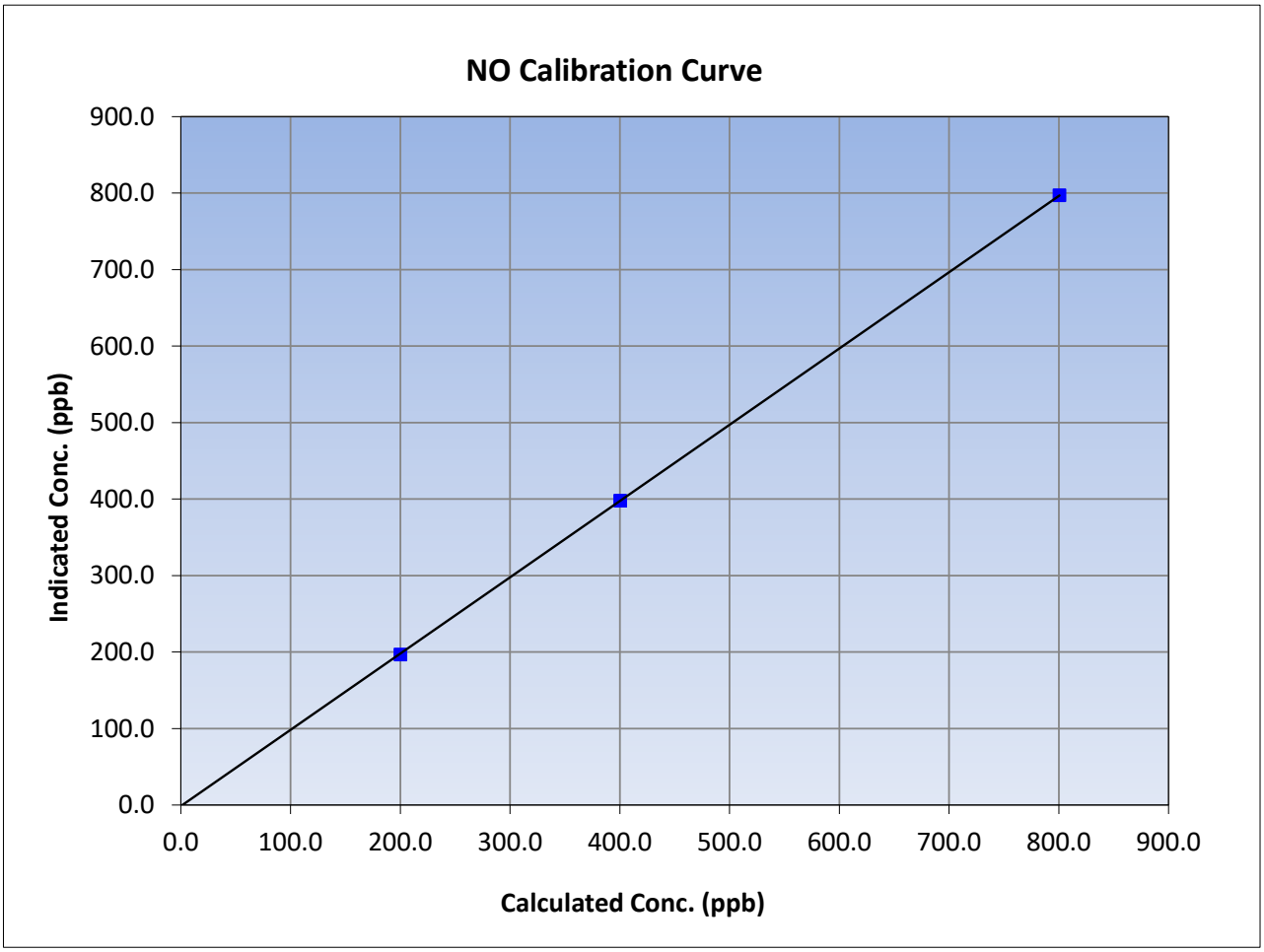
Version-05-2023

Station Information

Calibration Date:	May 29, 2023	Previous Calibration:	May 23, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	8:39	End Time (MST):	12:00
Analyzer make:	Teledyne API T201	Analyzer serial #:	808

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999988	≥0.995
800.6	797.3	1.0042			
400.3	397.8	1.0063	Slope	0.997074	0.90 - 1.10
200.2	196.6	1.0181			
			Intercept	-1.380000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

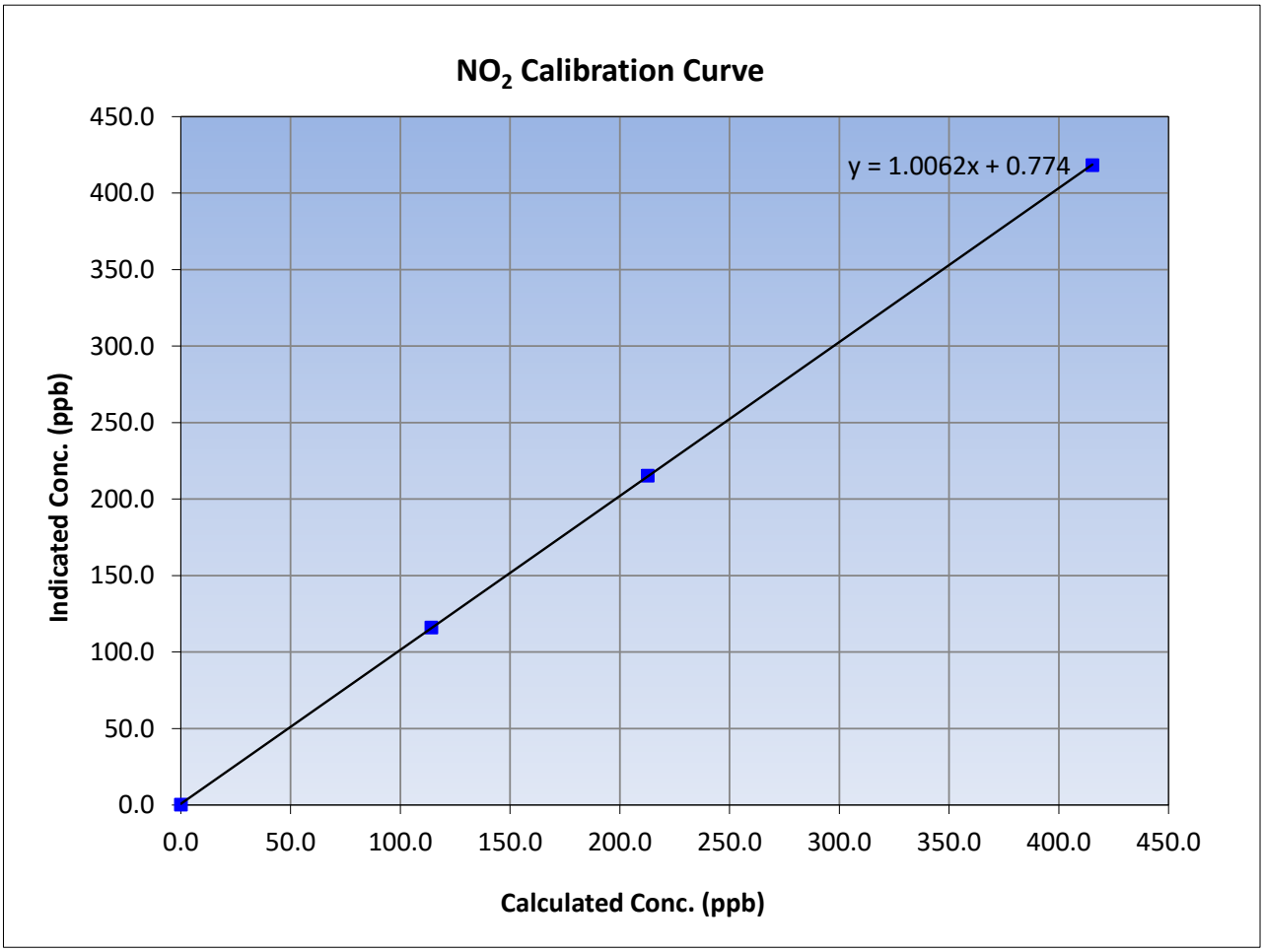
Version-05-2023

Station Information

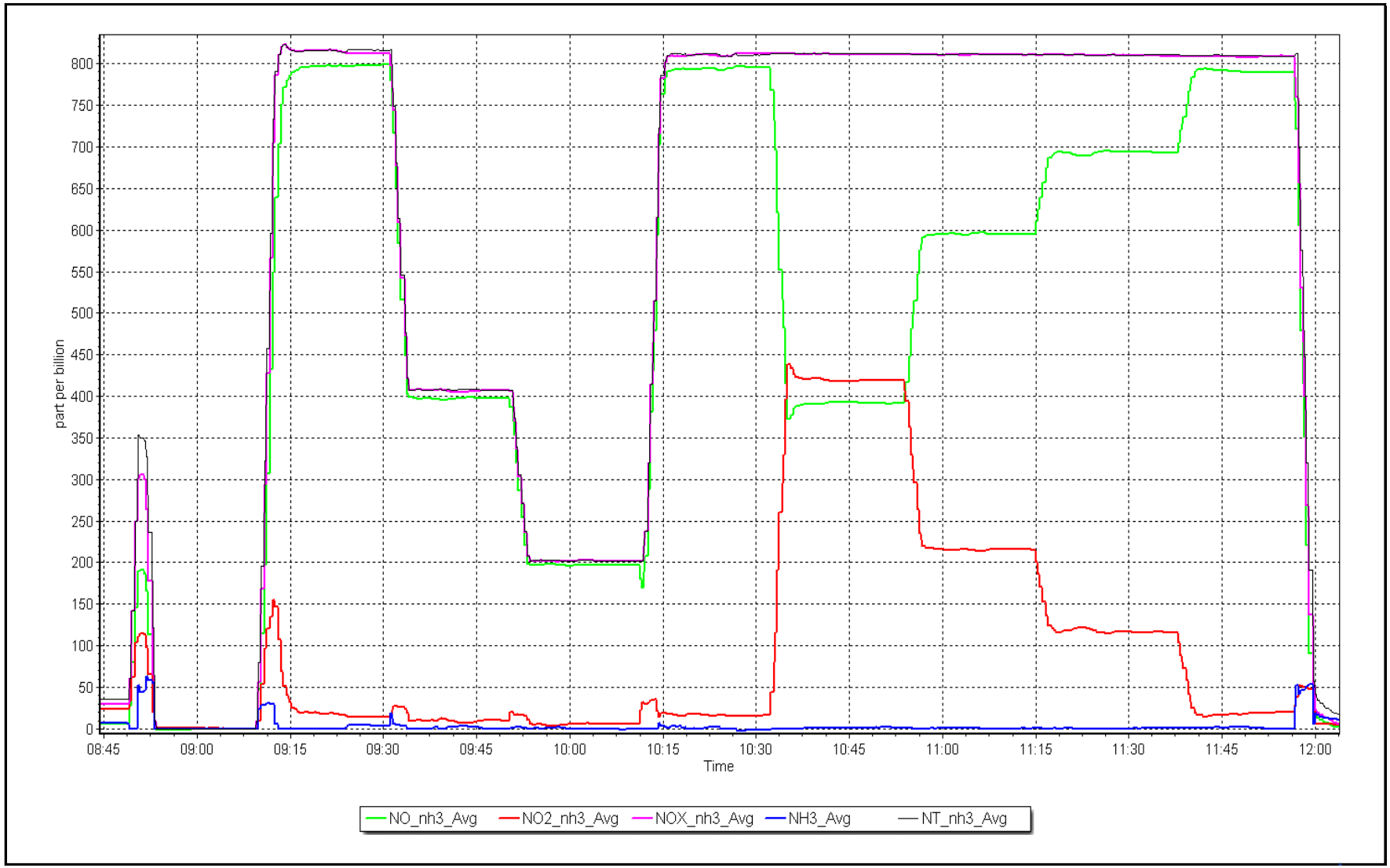
Calibration Date:	May 29, 2023	Previous Calibration:	May 23, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	8:39	End Time (MST):	12:00
Analyzer make:	Teledyne API T201	Analyzer serial #:	808

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999991	≥0.995
415.3	418.3	0.9928			
212.7	215.2	0.9884	Slope	1.006204	0.90 - 1.10
114.1	116.1	0.9828			
			Intercept	0.774028	+/-20



NO_X Calibration Plot Date: May 29, 2023 Location: Bertha Ganter-Fort McKay



NH_3 Calibration Plot Date: May 29, 2023 Location: Bertha Ganter-Fort McKay

Wood Buffalo Environmental Association

TN - NO_X - NH_3 Calibration Report

Version-05-2023

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
NOX Cal Date:	May 30, 2023	Last Cal Date:	May 23, 2023
Start time (MST):	10:03	End time (MST):	14:20
NH3 Cal Date:	May 30, 2023	Last Cal Date:	May 23, 2023
Start time (MST):	14:45	End time (MST):	18:14
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 #:	475
Converter model:	Teledyne API T501	Converter serial #:	824
NH3 Range (ppb):	0 - 2000 ppb	Reaction cell Press:	5.00
NOX Range (ppb):	0 - 1000 ppb	Sample Flow:	511

	Start	*Finish*		*Start*	*Finish*
NO coefficient:		0.986	TN coefficient:		0.984
NOX coefficient:		0.986	NO bkgrnd:		-3.0
NO2 coefficient:		1.000	NOX bkgrnd:		-2.5
NH3 coefficient:		0.941	TN bkgrnd:		1.4

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:		0.998848
NO_X Cal Offset:		-0.520000
NO Cal Slope:		0.998730
NO Cal Offset:		-1.160000
NO_2 Cal Slope:		0.999748
NO_2 Cal Offset:		0.471532
NH3 Cal Slope:		0.998065
NH3 Cal Offset:		-0.656397
TN Cal Slope:		1.001095
TN Cal Offset:		-0.131851

Wood Buffalo Environmental Association

TN - NOX - NH_3 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated TN concentration (ppb) (Cc)	Calculated NOX concentration (ppb) (Cc)	Calculated NH3 concentration (ppb) (Cc)	Indicated TN concentration (ppb) (Ic)	Indicated NOX concentration (ppb) (Ic)	Indicated NH3 concentration (ppb) (Ic)	TN Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NH3 Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.2	0.3	-0.1	----	----
as found NO	4920	80.0	813.4	813.4	----	812.3	812.4	-0.2	1.001	----
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.3	-0.1	----	----
high NO point	4920	80.0	813.4	813.4	----	812.3	812.4	-0.2	1.001	----
NO/O3 point	4920	80.0	813.4	813.4	----	808.0	808.0	-0.5	1.007	----
as found NH3	3413	86.4	1800.6	----	1800.6	1804.7	----	1798.9	0.998	1.001
new NH3 cyl rp							----			
first NH3	3413	86.4	1800.6	----	1800.6	1804.7	----	1798.9	0.998	1.001
second NH3	3452	48.0	1000.2	----	1000.2	995.7	----	991.9	1.005	1.008
third NH3	3476	24.0	500.1	----	500.1	503.4	----	501.2	0.993	0.998
								Average Correction Factor	1.0041	1.0024

Corrected As found TN = 812.1 ppb NO_X = 812.1 ppb NH3 = 1799.0 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 = 94.1%

Wood Buffalo Environmental Association

NO_X - NO - NO_2 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero										
as found span										
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.3	0.3	0.2	----	----
high point	4920	80.0	813.4	800.6	813.4	812.4	799.5	812.3	1.0013	1.0014
second point	4960	40.0	406.7	400.3	406.7	405.3	397.0	404.8	1.0035	1.0084
third point	4980	20.0	203.4	200.2	203.4	201.8	197.9	201.7	1.0077	1.0114
								Average Correction Factor	1.0042	1.0071

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)	795.3	395.2	412.9	413.0	0.9998	100.0%
2nd GPT point (200 ppb O3)	795.3	595.7	212.4	213.2	0.9962	100.4%
3rd GPT point (100 ppb O3)	795.3	693.9	114.2	114.9	0.9939	100.6%
				Average Correction Factor	0.9966	100.3%

Notes: Installing a new NH3 analyzer. Adjusted both zero and span. Used the 2nd GPT reference point due to drift. Adjusted the NH3 span.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TN Calibration Summary

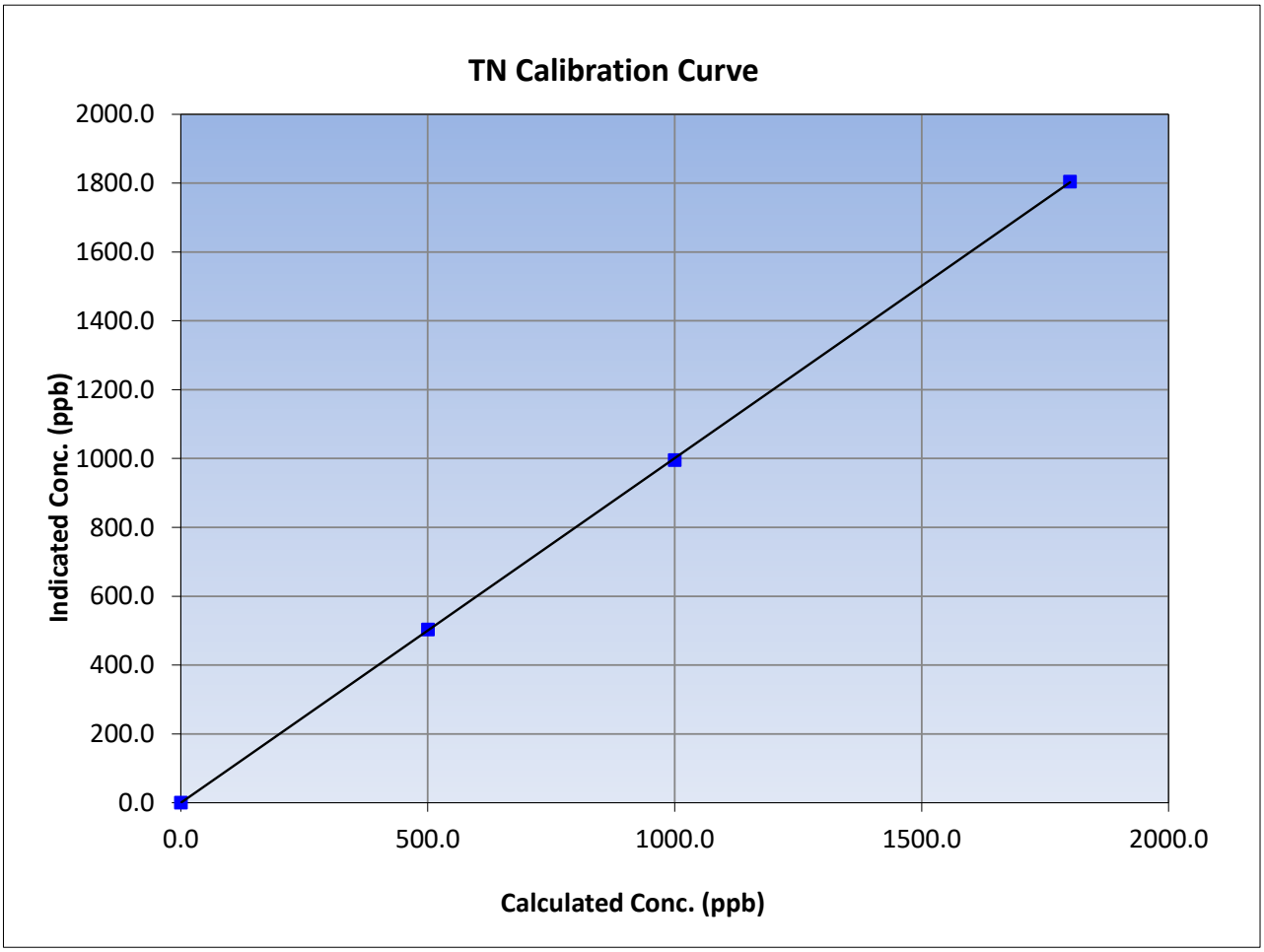
Version-05-2023

Station Information

Calibration Date:	May 30, 2023	Previous Calibration:	May 23, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:03	End Time (MST):	14:20
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999976	≥0.995
1800.6	1804.7	0.9977			
1000.2	995.7	1.0045	Slope	1.001095	0.90 - 1.10
500.1	503.4	0.9934			
			Intercept	-0.131851	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

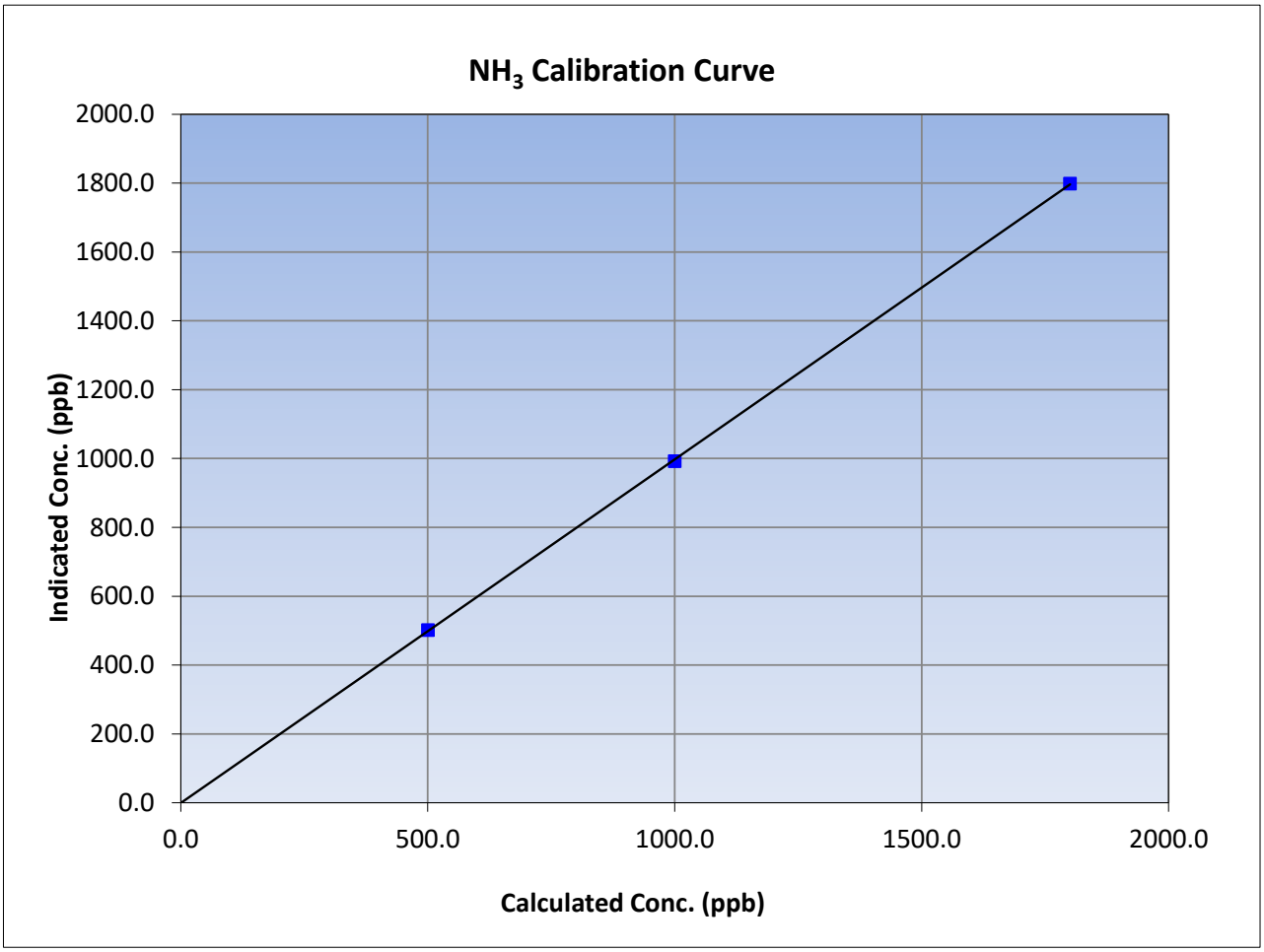
Version-05-2023

Station Information

Calibration Date:	May 30, 2023	Previous Calibration:	May 23, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:03	End Time (MST):	14:20
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999974	≥0.995
1800.6	1798.9	1.0010			
1000.2	991.9	1.0084	Slope	0.998065	0.90 - 1.10
500.1	501.2	0.9978			
			Intercept	-0.656397	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

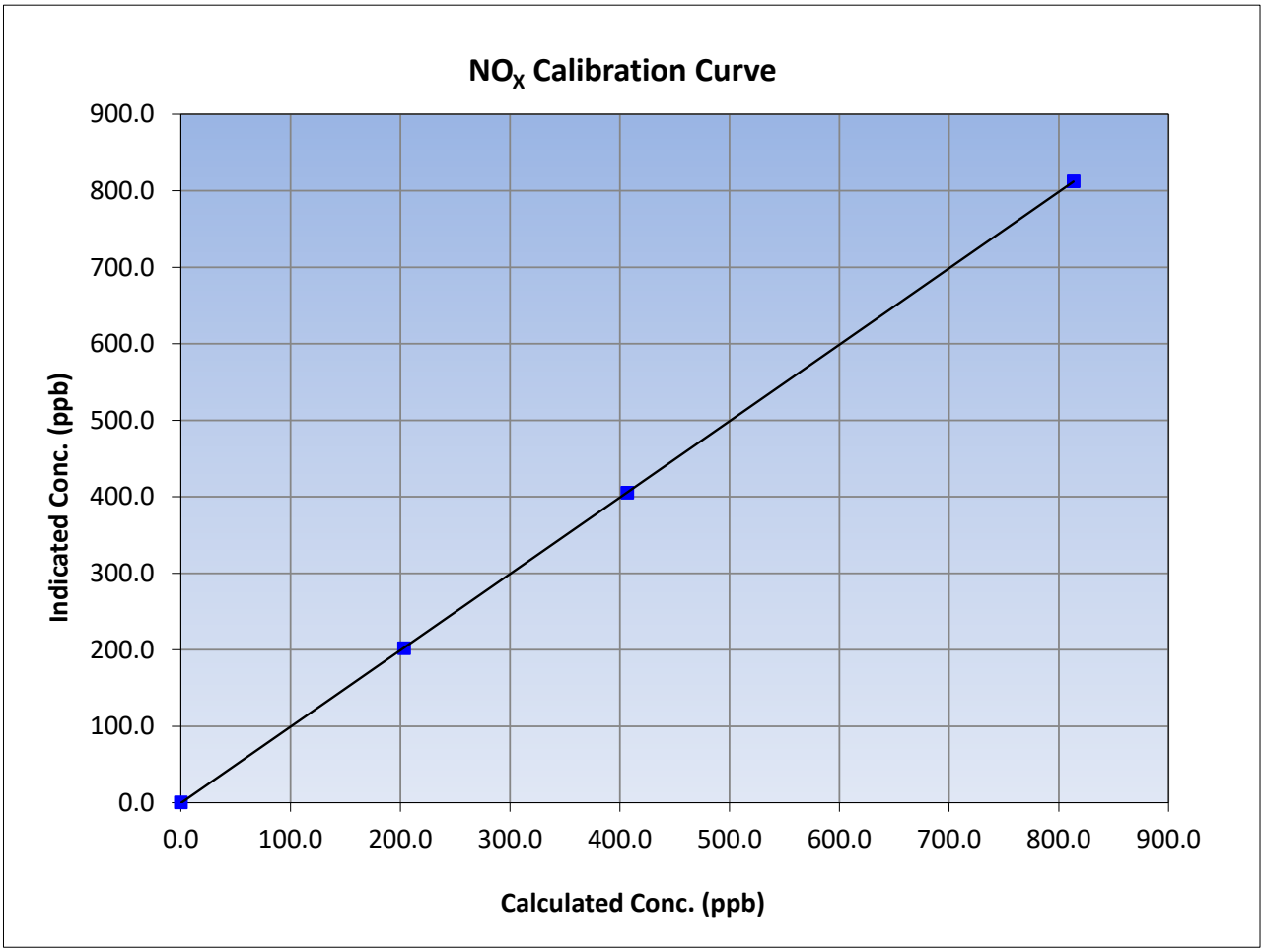
Version-05-2023

Station Information

Calibration Date:	May 30, 2023	Previous Calibration:	May 23, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:03	End Time (MST):	14:20
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.3	----	Correlation Coefficient	0.999995	≥0.995
813.4	812.4	1.0013			
406.7	405.3	1.0035	Slope	0.998848	0.90 - 1.10
203.4	201.8	1.0077			
			Intercept	-0.520000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

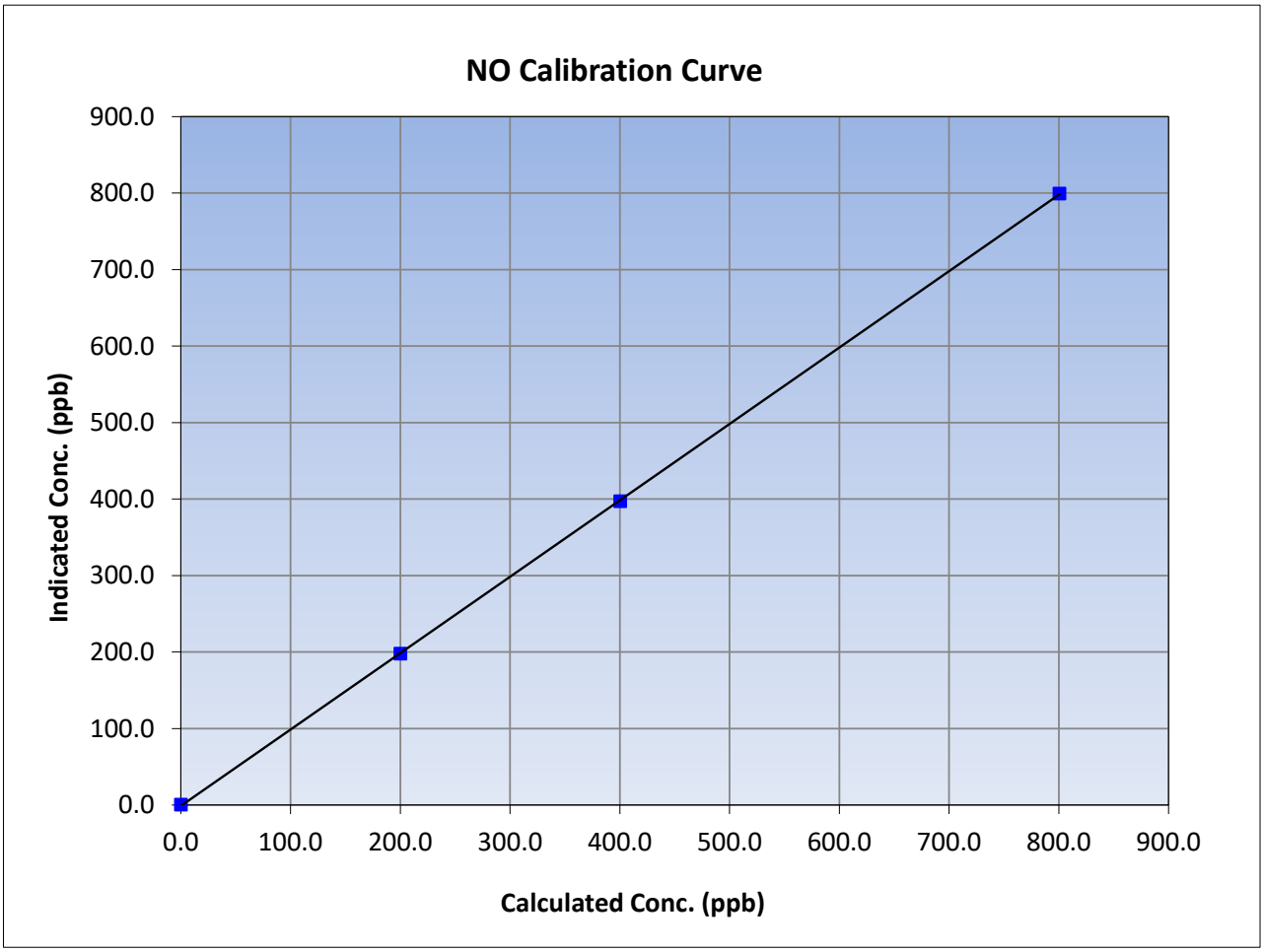
Version-05-2023

Station Information

Calibration Date:	May 30, 2023	Previous Calibration:	May 23, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:03	End Time (MST):	14:20
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.3	----	Correlation Coefficient	0.999981	≥0.995
800.6	799.5	1.0014			
400.3	397.0	1.0084	Slope	0.998730	0.90 - 1.10
200.2	197.9	1.0114			
			Intercept	-1.160000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

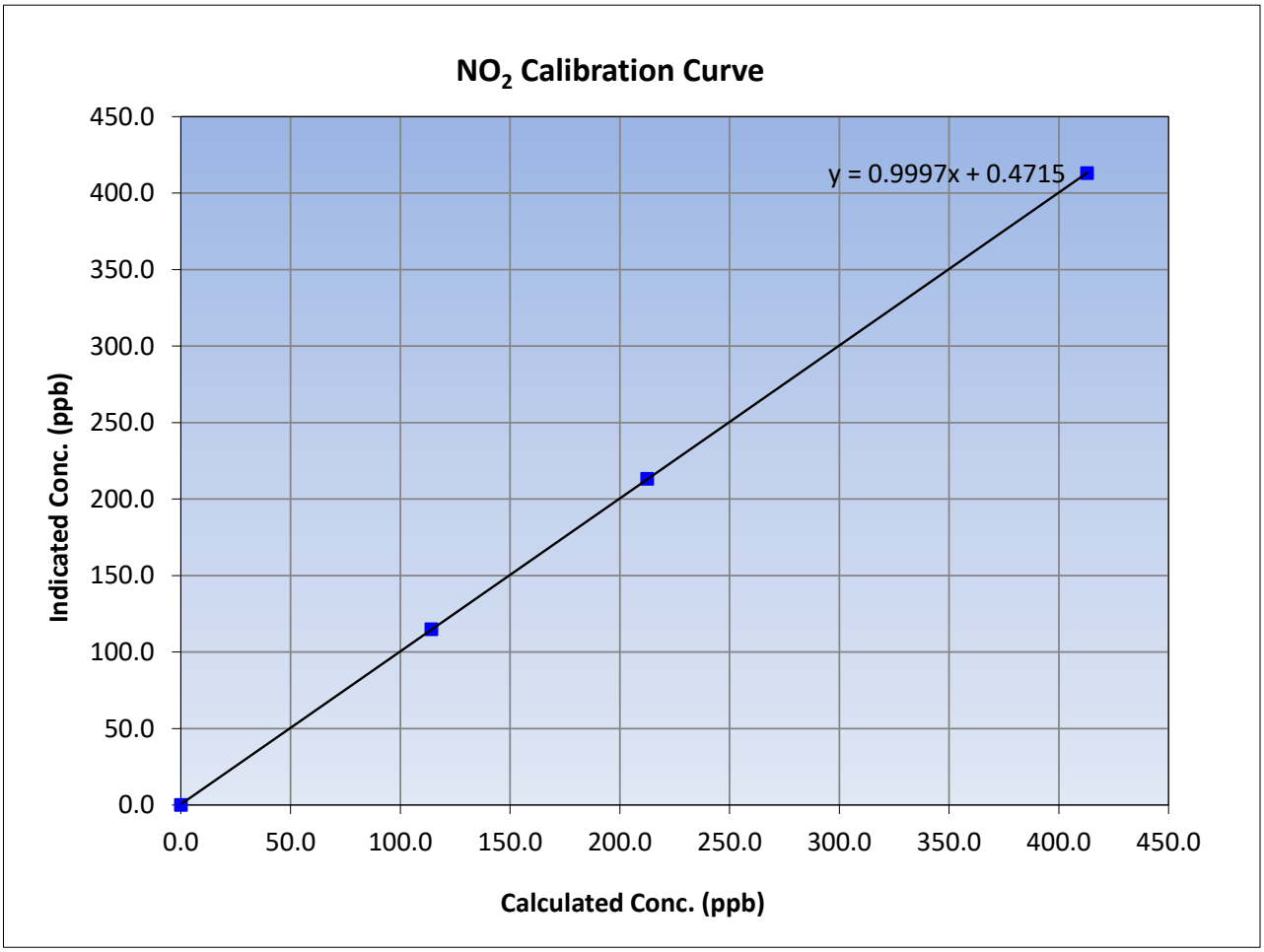
Version-05-2023

Station Information

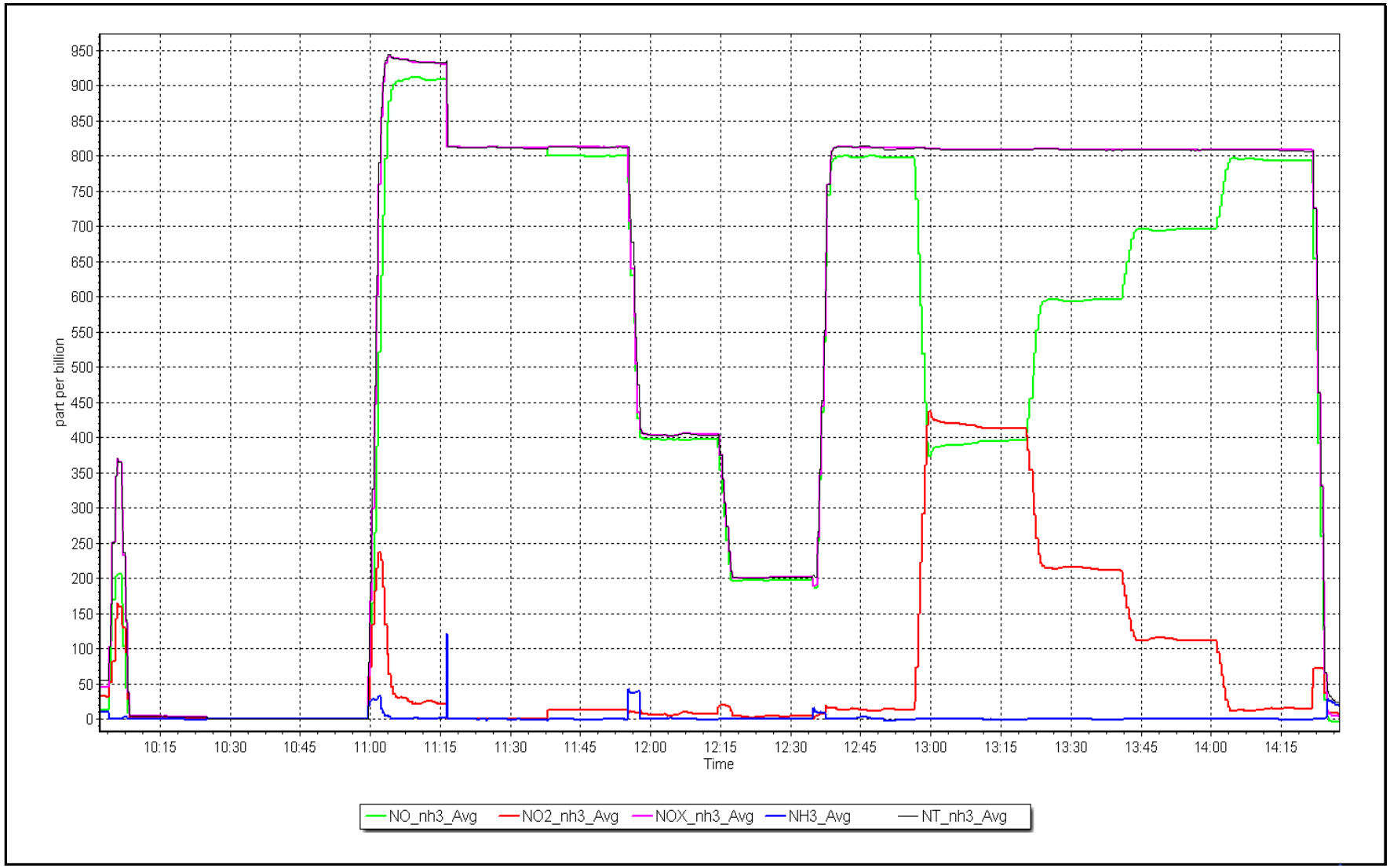
Calibration Date:	May 30, 2023	Previous Calibration:	May 23, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:03	End Time (MST):	14:20
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

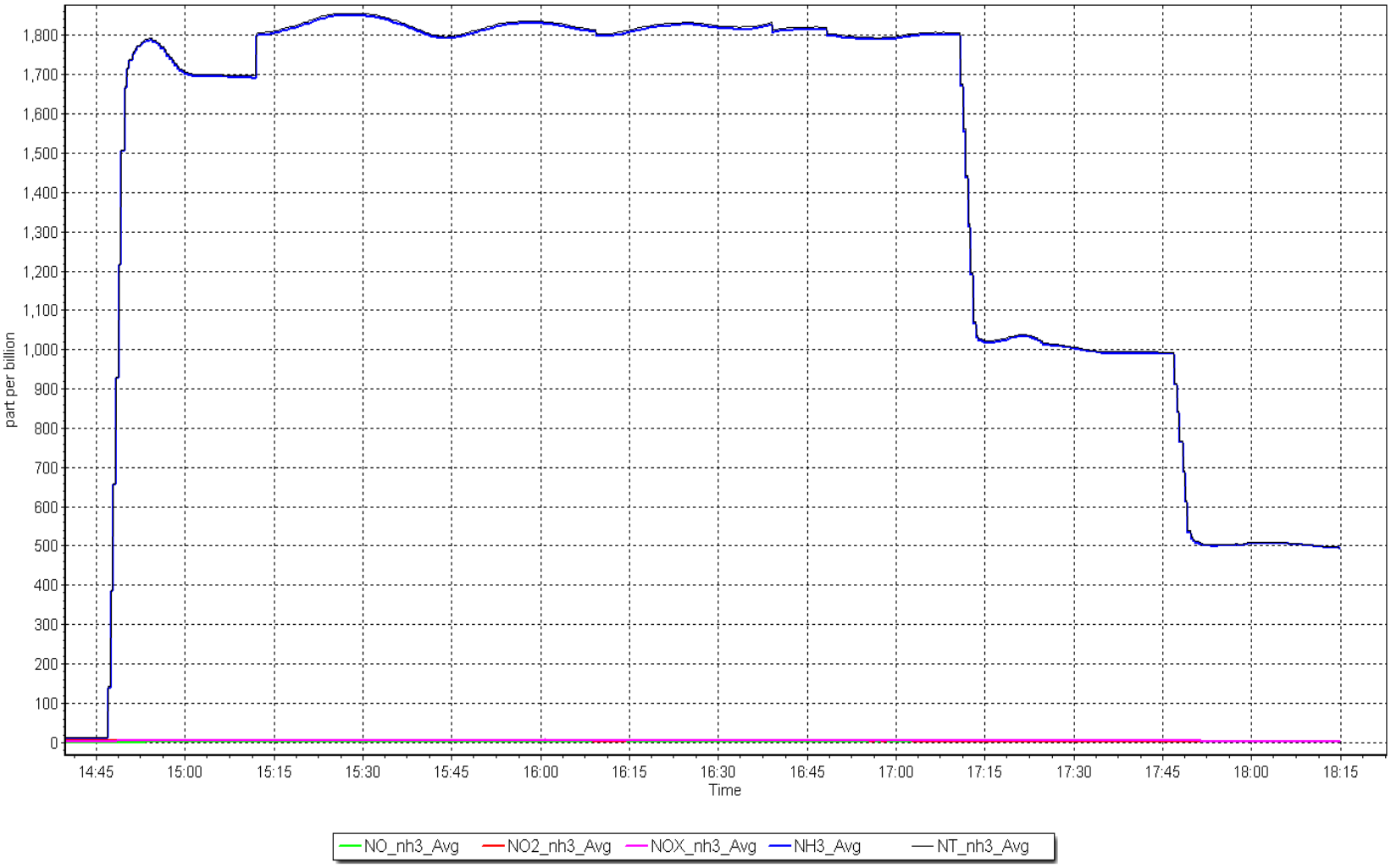
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999995	≥0.995
412.9	413.0	0.9998			
212.4	213.2	0.9962	Slope	0.999748	0.90 - 1.10
114.2	114.9	0.9939			
			Intercept	0.471532	+/-20



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



NH_3 Calibration Plot Date: May 30, 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:	May 11, 2023	Last Cal Date:	April 20, 2023
Start time (MST):	9:51	End time (MST):	13:19
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range: 0 - 50 ppm

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.001765	0.999480	Backgd or Offset:	-0.012	-0.012
Calibration intercept:	0.123811	0.161861	Coeff or Slope:	0.992	0.992

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4933	66.7	40.6	41.2	0.983
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4933	66.7	40.6	40.5	1.000
second point	4966	33.3	20.2	20.7	0.977
third point	4983	16.7	10.2	10.3	0.986
as left zero	5000	0.0	0.0	0.0	----
as left span	2960	40.0	40.5	40.3	1.007
				Average Correction Factor	0.988

Baseline Corr As found:	41.12	Prev response:	40.75	*% change:	0.9%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

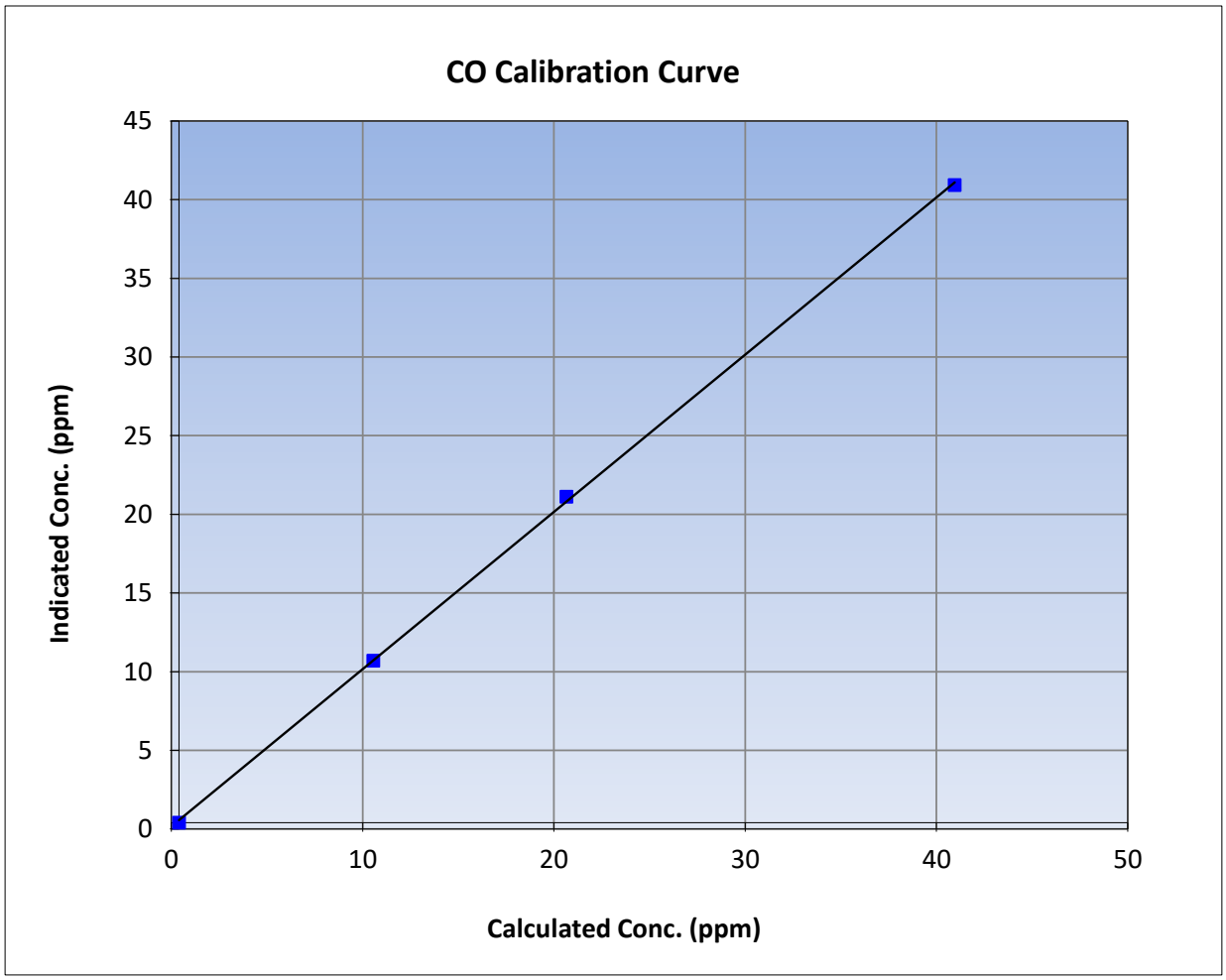
Station Information

Calibration Date:	May 11, 2023	Previous Calibration:	April 20, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:51	End Time (MST):	13:19
Analyzer make:	Teledyne API T300	Analyzer serial #:	3520

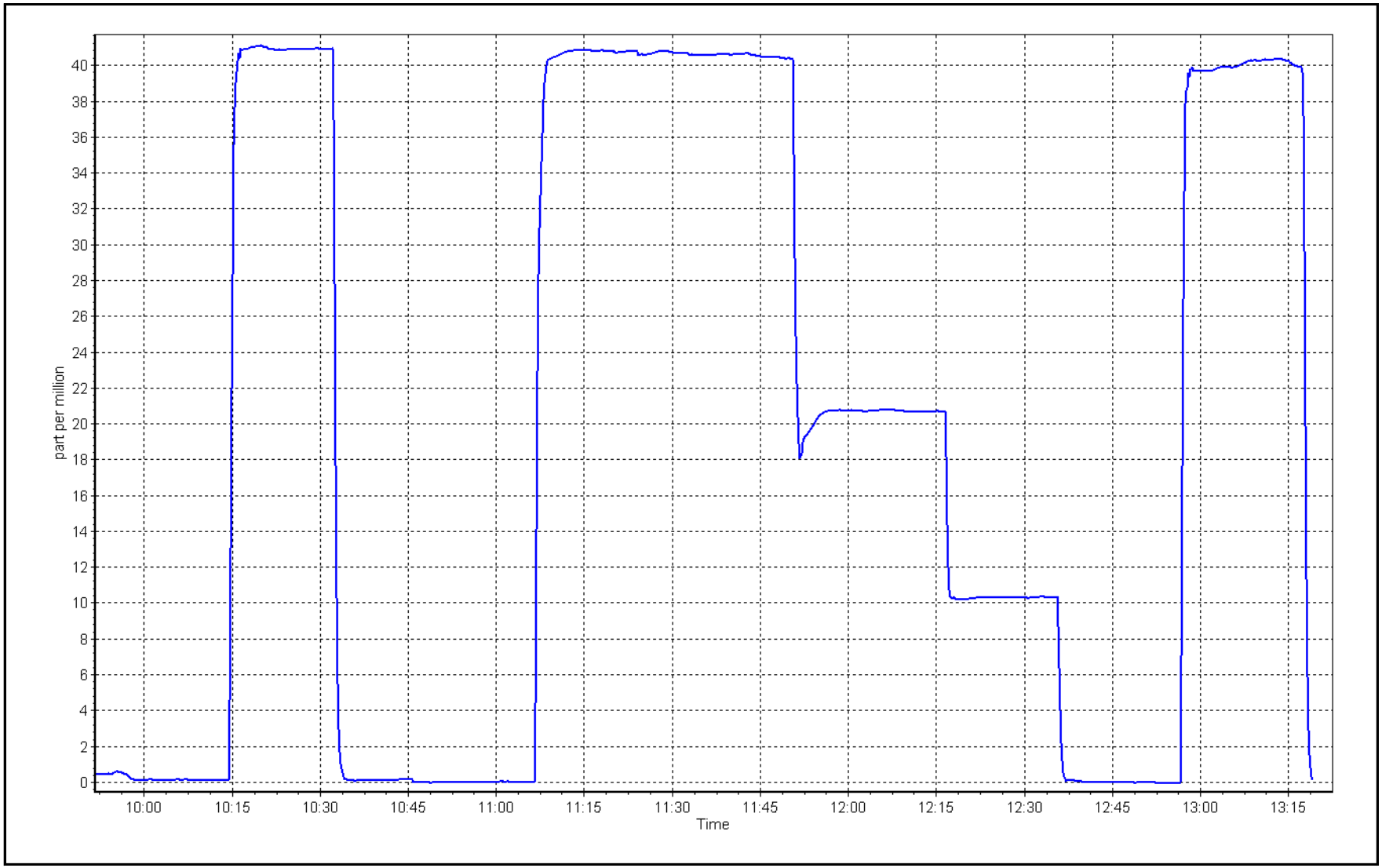
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.6	40.5	1.0004
20.2	20.7	0.9773
10.2	10.3	0.9858

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999833	*≥0.995*
Slope	0.999480	*0.90 - 1.10*
Intercept	0.161861	*+/-1.5*



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



Wood Buffalo Environmental Association

CO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	May 12, 2023	Last Cal Date:	April 19, 2023
Start time (MST):	9:39	End time (MST):	12:40
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:	1.000116	1.002095	Backgd or Offset:	0.037	0.037
Calibration intercept:	-5.740000	-6.580000	Coeff or Slope:	0.880	0.880

CO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	3000	0.0	0.0	-0.7	----
as found span	2920	80.0	1605.3	1597.0	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	-0.3	----
high point	2920	80.0	1605.3	1604.5	1.001
second point	2960	40.0	802.7	796.9	1.007
third point	2980	20.0	401.3	387.8	1.035
as left zero	3000	0.0	0.0	-0.5	----
as left span	2960	40.0	802.7	780.8	1.028
				Average Correction Factor	1.014

Baseline Corr As found:	1597.70	Prev response:	1599.78	*% change:	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

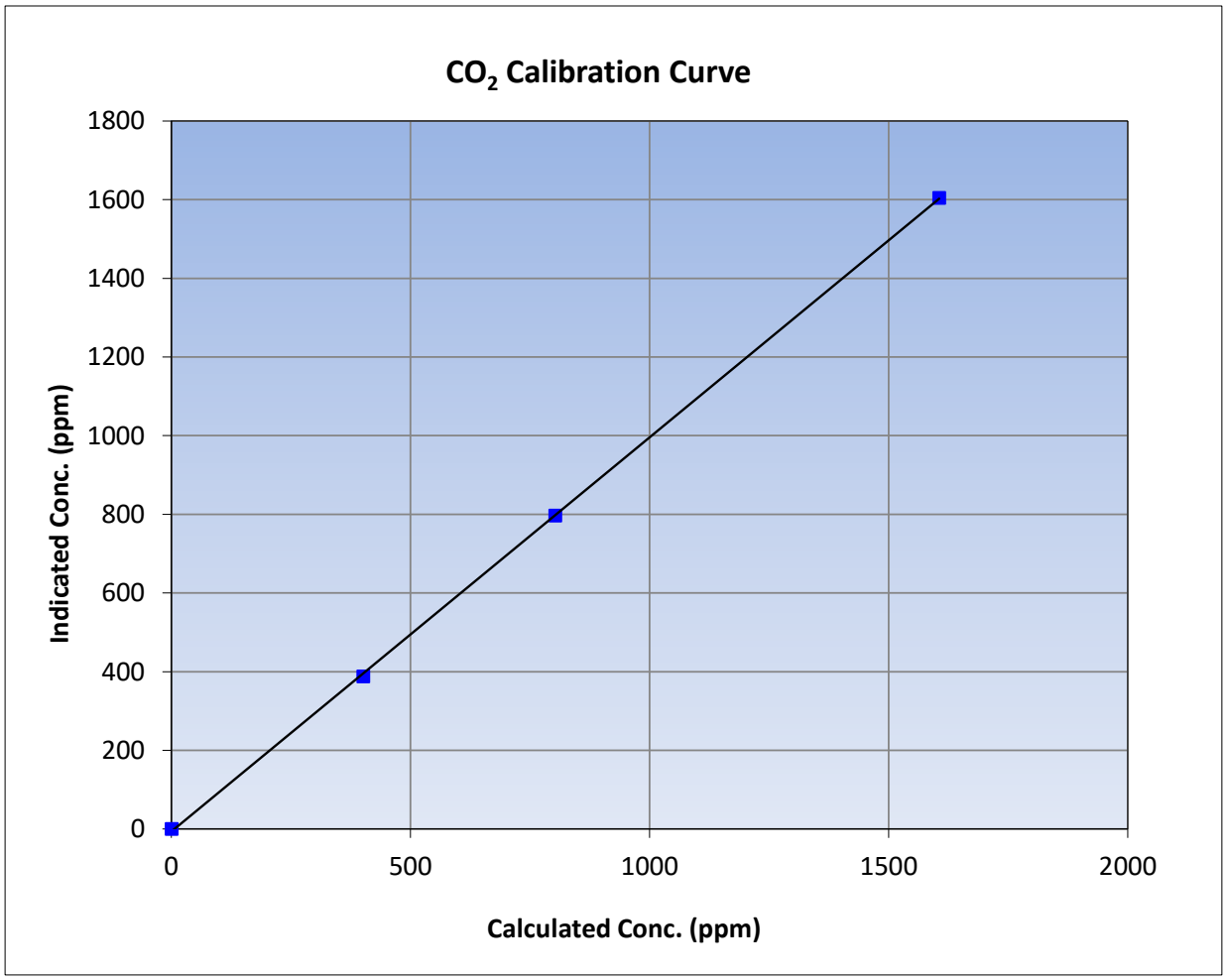
Station Information

Calibration Date	May 12, 2023	Previous Calibration	April 19, 2023
Station Name	Bertha Ganter-Fort McKay	Station Number	AMS01
Start Time (MST)	9:39	End Time (MST)	12:40
Analyzer make	Teledyne API 360	Analyzer serial #	442

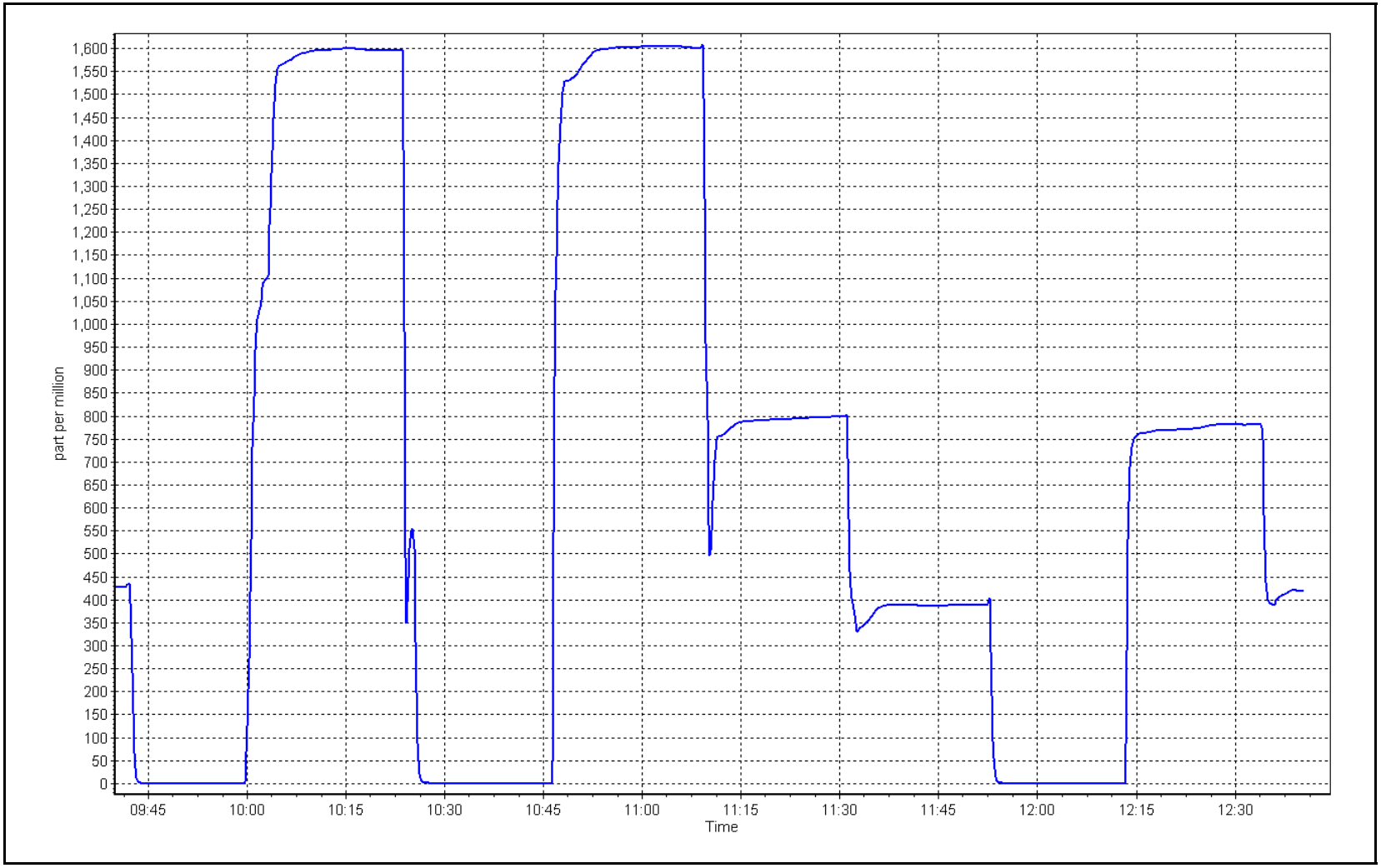
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
1605.3	1604.5	1.0005
802.7	796.9	1.0072
401.3	387.8	1.0349

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999925	*≥0.995*
Slope	1.002095	*0.90 - 1.10*
Intercept	-6.580000	*+/-10*



CO_2 Calibration Plot Date: May 12, 2023 Location: Bertha Ganter-Fort McKay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS02
MILDRED LAKE
MAY 2023

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

June 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Mildred Lake	Station number:	AMS02
Calibration Date:	May 11, 2023	Last Cal Date:	April 13, 2023
Start time (MST):	9:11 AM	End time (MST):	12:31
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:	0.999874	1.000972	Backgd or Offset:	18.3	17.9
Calibration intercept:	-0.805548	-1.065310	Coeff or Slope:	0.805	0.793

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.2	----
as found span	4920	80.2	801.6	813.6	0.985
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4920	80.2	801.6	801.9	1.000
second point	4960	40.1	400.8	399.7	1.003
third point	4980	20.0	199.9	197.8	1.011
as left zero	5000	0.0	0.0	0.0	----
as left span	4920	80.2	801.6	801.6	1.000
				Average Correction Factor	1.004

Baseline Corr As found:	813.80	Previous response	800.74	*% change	1.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

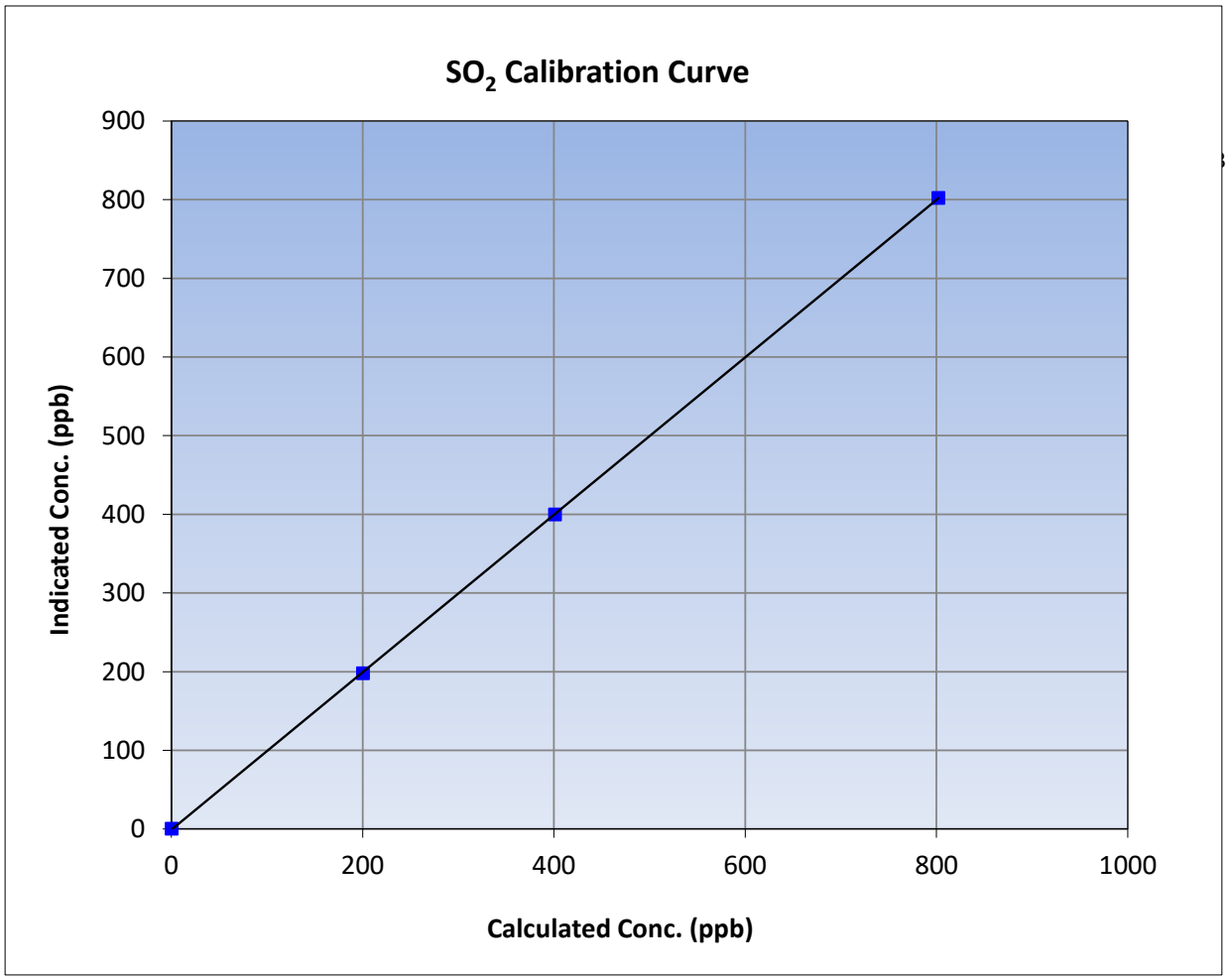
Station Information

Calibration Date:	May 11, 2023	Previous Calibration:	April 13, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:11	End Time (MST):	12:31
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1404901075

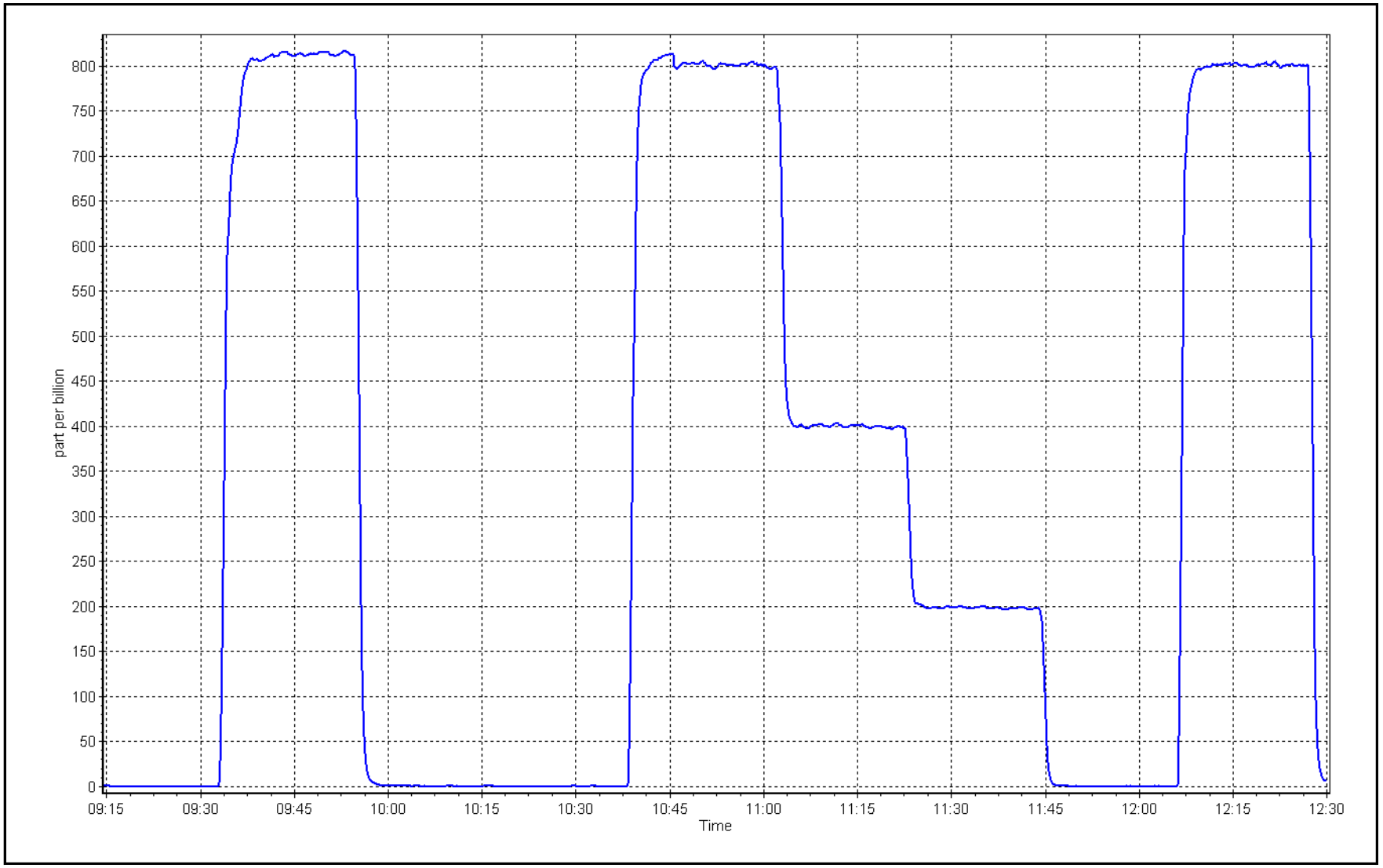
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
801.6	801.9	0.9997
400.8	399.7	1.0028
199.9	197.8	1.0107

Statistical Evaluation		Limits
Correlation Coefficient	0.999990	≥0.995
Slope	1.000972	0.90 - 1.10
Intercept	-1.065310	+/-30



SO2 Calibration Plot Date: May 11, 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:	May 3, 2023	Last Cal Date:	April 5, 2023
Start time (MST):	8:51	End time (MST):	13:08
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:	1.015395	1.006965	Backgd or Offset:	1.75	1.80
Calibration intercept:	-0.059190	-0.239199	Coeff or Slope:	0.823	0.833

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	80.0	1.001
as found 2nd point	4962	37.8	40.0	39.9	1.005
as found 3rd point	4981	18.9	20.0	19.6	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	0.0	----
high point	4924	75.6	80.0	80.4	0.995
second point	4962	37.8	40.0	40.0	1.000
third point	4981	18.9	20.0	19.6	1.020
as left zero	5000	0.0	0.0	0.0	----
as left span	4924	75.6	80.0	80.0	1.000
SO2 Scrubber Check				0.0	
Date of last scrubber change:		12-Sep-22		Ave Corr Factor	1.005
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.9	Prev response:	81.16	*% change:	-1.6%
Baseline Corr 2nd AF pt:	39.8	AF Slope:	1.000679	AF Intercept:	-0.119203
Baseline Corr 3rd AF pt:	19.5	AF Correlation:	0.999961		

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after MPAF's. Ran a SO2 scrubber check after calibrator zero and passed. Adjusted span only.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

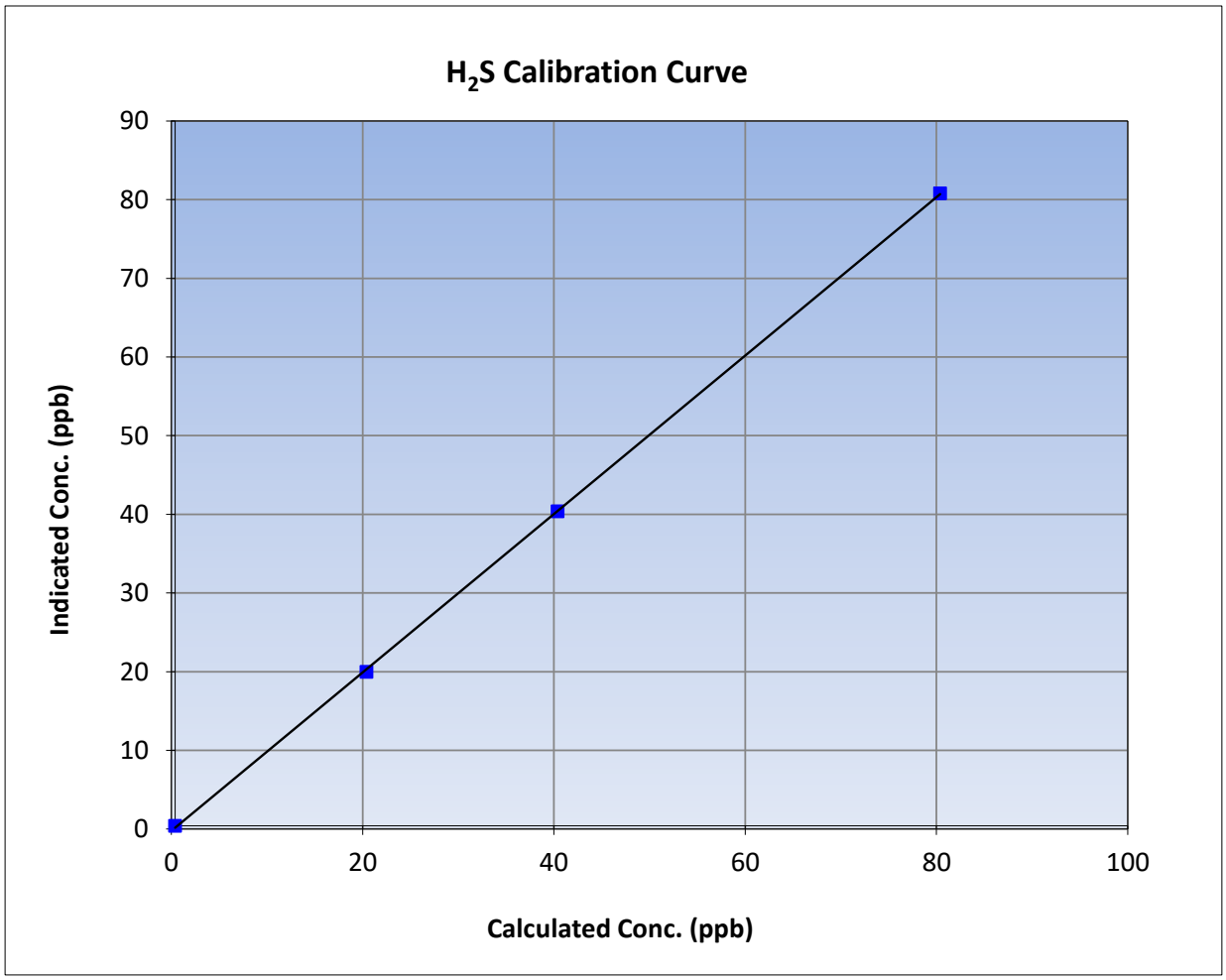
Station Information

Calibration Date:	May 3, 2023	Previous Calibration:	April 5, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	8:51	End Time (MST):	13:08
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	12113311966

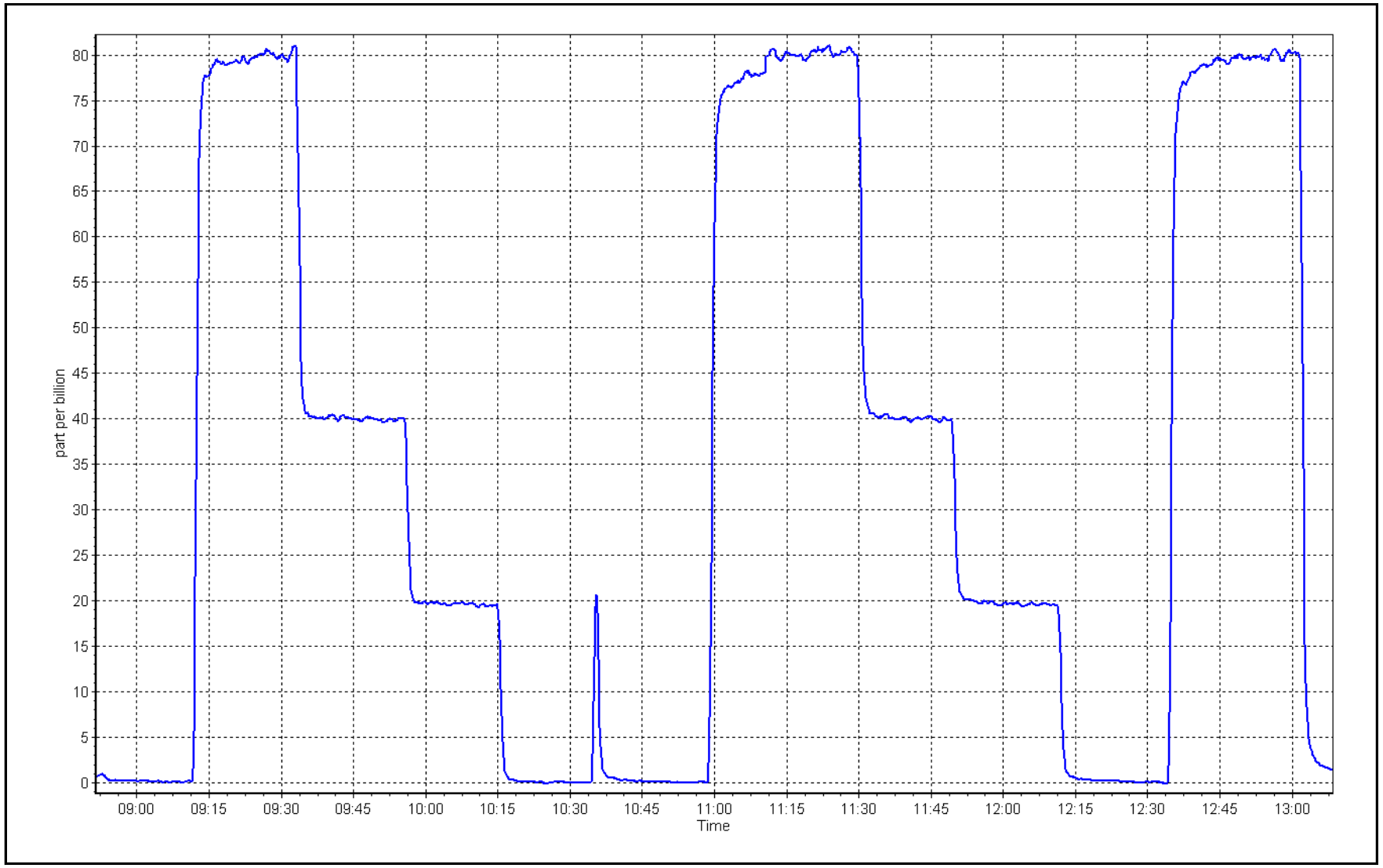
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.4	0.9949
40.0	40.0	0.9998
20.0	19.6	1.0202

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999956	*≥0.995*
Slope	1.006965	*0.90 - 1.10*
Intercept	-0.239199	*+/-3*



H_2S Calibration Plot Date: May 3, 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:	May 11, 2023	Last Cal Date:	April 13, 2023
Start time (MST):	9:11	End time (MST):	12:31
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:	2.86E-04	2.90E-04	NMHC SP Ratio:	4.49E-04	4.54E-04
CH4 Retention time:	14.6	14.6	NMHC Peak Area:	195861	194026
Zero Chromatogram:	ON	ON	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	16.82	16.60	1.013
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	16.82	16.82	1.000
second point	4960	40.1	8.41	8.38	1.003
third point	4980	20.0	4.19	4.17	1.005
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	16.82	16.83	0.999
				Average Correction Factor	1.003

Baseline Corr AF:	16.60	Prev response	16.81	*% change	-1.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	8.80	8.72	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	8.80	8.80	1.000
second point	4960	40.1	4.40	4.40	0.999
third point	4980	20.0	2.19	2.20	0.995
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.80	8.83	0.996
				Average Correction Factor	0.998
Baseline Corr AF:	8.72	Prev response	8.80	*% change	-0.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	8.02	7.88	1.018
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	8.02	8.02	1.000
second point	4960	40.1	4.01	3.98	1.007
third point	4980	20.0	2.00	1.97	1.016
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.02	8.01	1.002
				Average Correction Factor	1.008
Baseline Corr AF:	7.88	Prev response	8.01	*% change	-1.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000482	1.000257
THC Cal Offset:	-0.015912	-0.013510
CH4 Cal Slope:	1.001482	1.000527
CH4 Cal Offset:	-0.021253	-0.017653
NMHC Cal Slope:	0.999608	1.000102
NMHC Cal Offset:	0.004941	0.004544

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

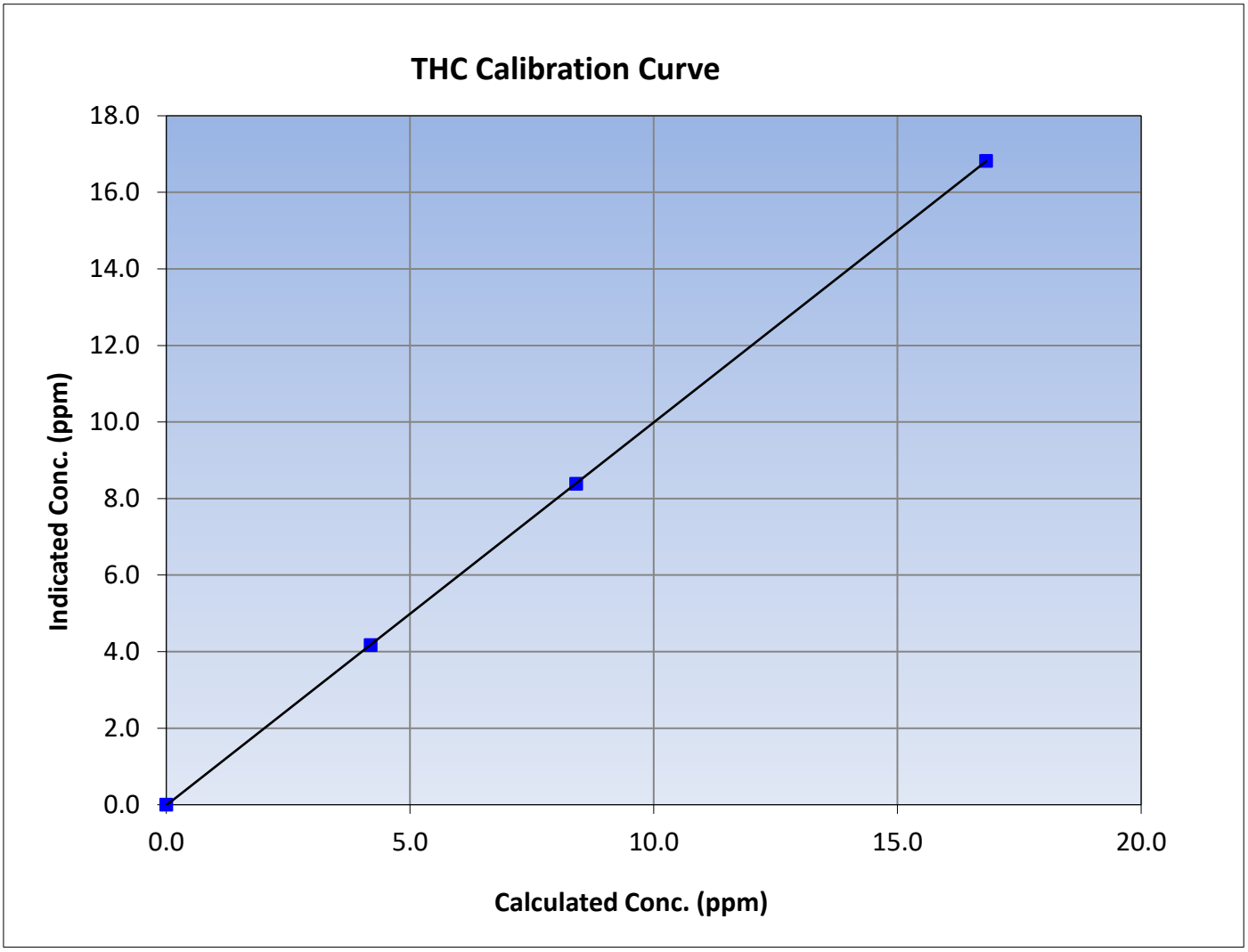
Version-06-2022

Station Information

Calibration Date:	May 11, 2023	Previous Calibration:	April 13, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:11	End Time (MST):	12:31
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320038

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999997	*≥0.995*
16.82	16.82	1.0000			
8.41	8.38	1.0030	Slope	1.000257	*0.90 - 1.10*
4.19	4.17	1.0051			
			Intercept	-0.013510	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

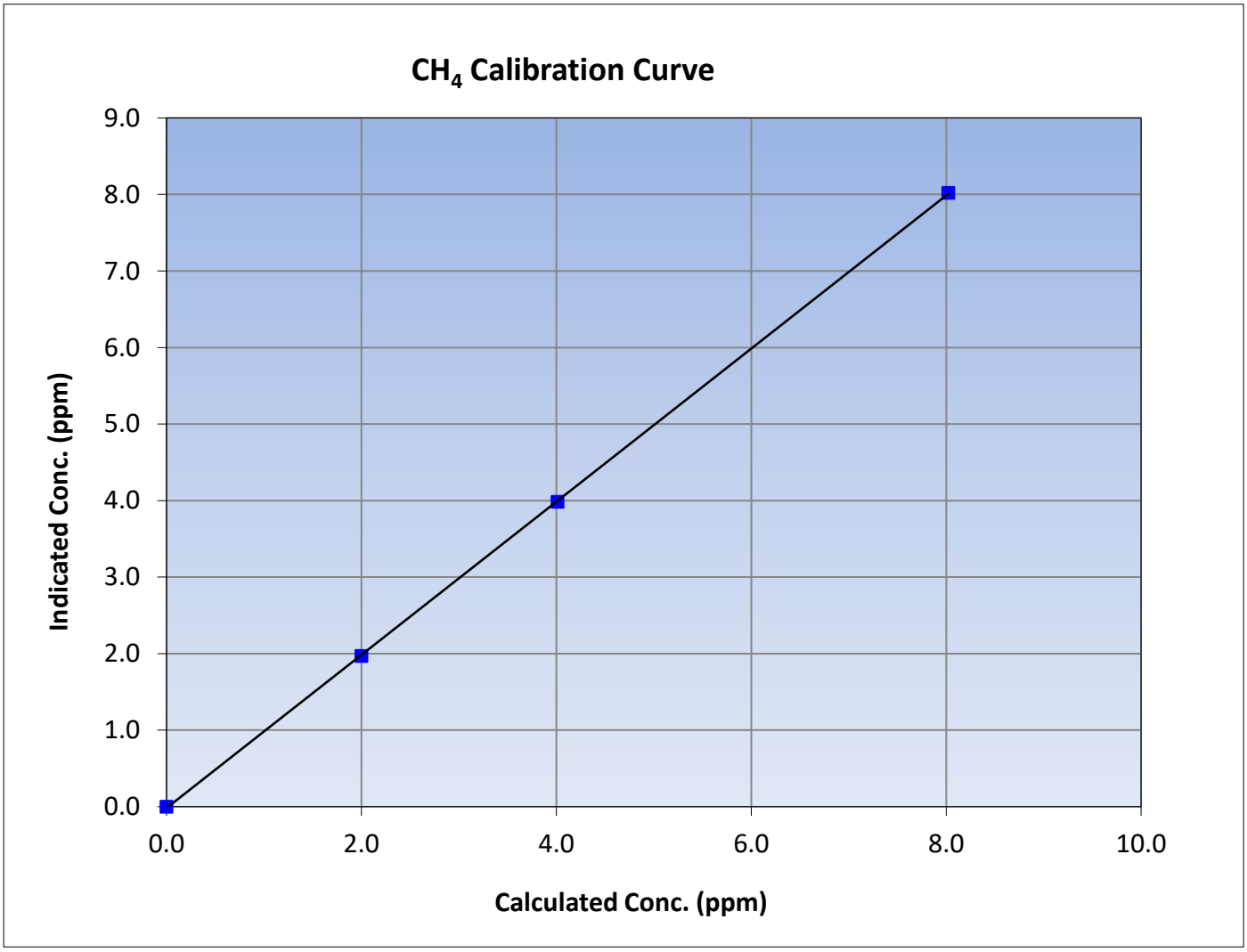
Version-06-2022

Station Information

Calibration Date:	May 11, 2023	Previous Calibration:	April 13, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:11	End Time (MST):	12:31
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	0.999977	*≥0.995*
8.02	8.02	1.0004			
4.01	3.98	1.0074	Slope	1.000527	*0.90 - 1.10*
2.00	1.97	1.0156			
			Intercept	-0.017653	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

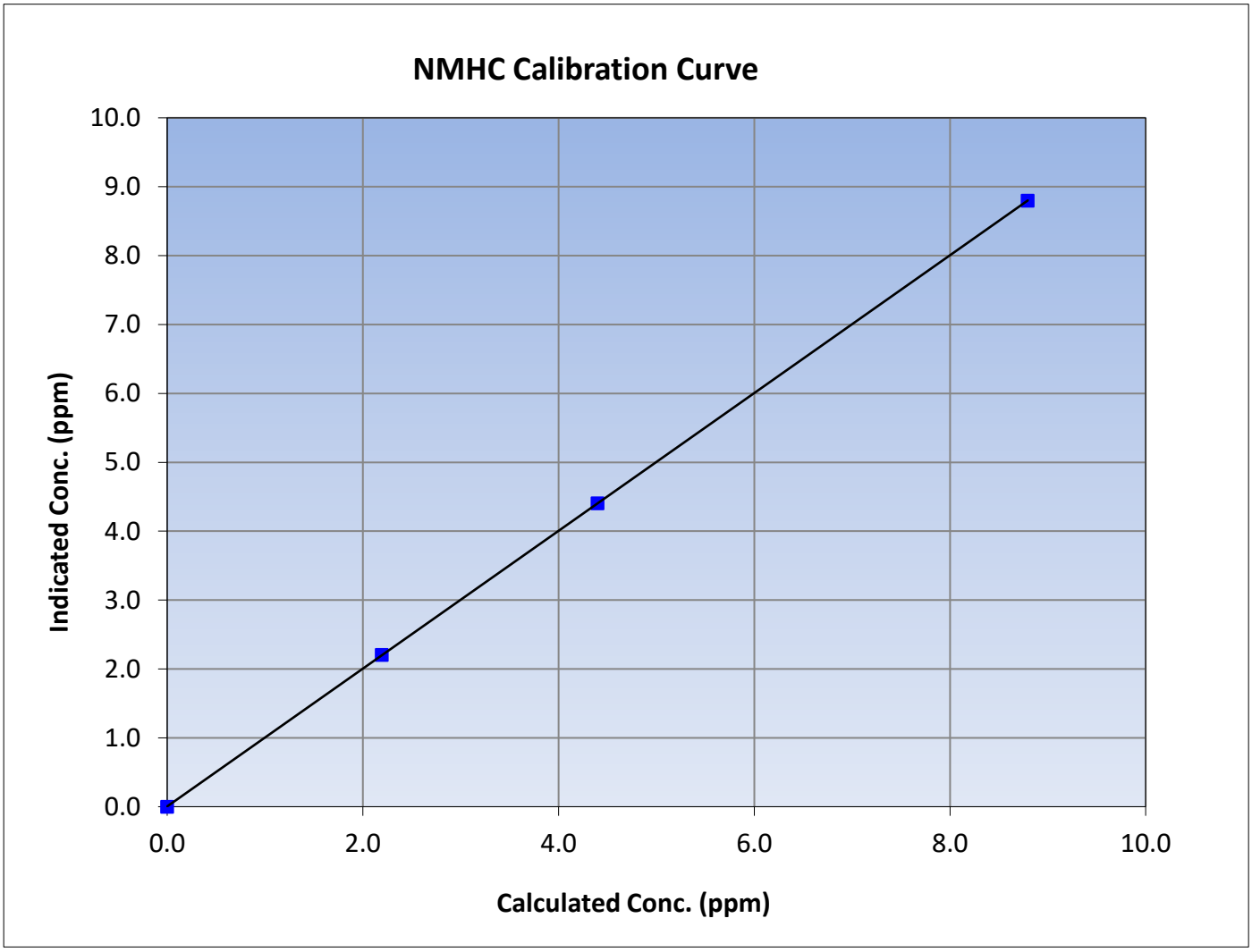
Version-06-2022

Station Information

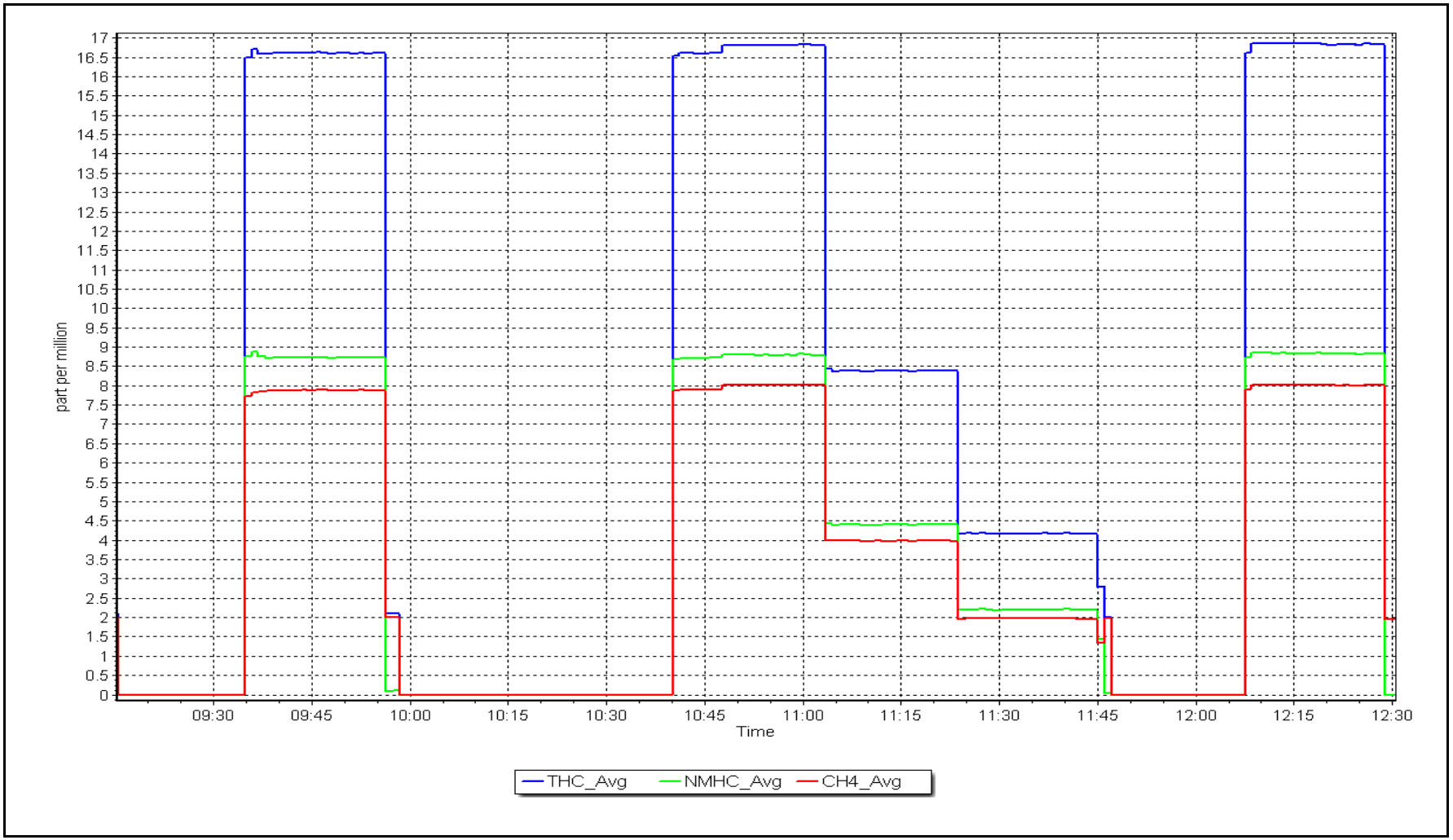
Calibration Date:	May 11, 2023	Previous Calibration:	April 13, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:11	End Time (MST):	12:31
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320038

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999999	*≥0.995*
8.80	8.80	0.9996			
4.40	4.40	0.9988	Slope	1.000102	*0.90 - 1.10*
2.19	2.20	0.9952			
			Intercept	0.004544	*+/-0.5*



NMHC Calibration Plot Date: May 11, 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:	May 30, 2023	Last Cal Date:	May 11, 2023
Start time (MST):	10:00	End time (MST):	14:12
Reason:	Maintenance	troubleshoot elevated daily zero response	

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:	2.86E-04	2.90E-04	NMHC SP Ratio:	4.49E-04	4.54E-04
CH4 Retention time:	14.6	14.6	NMHC Peak Area:	195861	194026
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	0.20	----
as found span	4920	80.2	16.82	16.70	1.007
as found 2nd point	4960	40.1	8.41	8.44	0.996
as found 3rd point	4980	20.0	4.19	4.34	0.967
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	16.82	16.83	0.999
second point	4960	40.1	8.41	8.39	1.003
third point	4980	20.0	4.19	4.18	1.003
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	16.82	16.99	0.990
				Average Correction Factor	1.002

Baseline Corr AF:	16.50	Prev response	16.81	*% change	-1.9%
Baseline Corr 2nd AF:	8.2	AF Slope:	0.980546	AF Intercept:	0.205223
Baseline Corr 3rd AF:	4.1	AF Correlation:	0.999997	* = > +/-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	8.62	1.020
as found 2nd point	4960	40.1	4.40	4.32	1.019
as found 3rd point	4980	20.0	2.19	2.16	1.015
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	8.80	8.80	0.999
second point	4960	40.1	4.40	4.41	0.998
third point	4980	20.0	2.19	2.21	0.994
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.80	8.92	0.986
				Average Correction Factor	0.997
Baseline Corr AF:	8.62	Prev response	8.80	*% change	-2.1%
Baseline Corr 2nd AF:	4.3	AF Slope:	0.979653	AF Intercept:	0.005700
Baseline Corr 3rd AF:	2.2	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	0.20	----
as found span	4920	80.2	8.02	8.08	0.993
as found 2nd point	4960	40.1	4.01	4.13	0.971
as found 3rd point	4980	20.0	2.00	2.18	0.919
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	8.02	8.03	0.999
second point	4960	40.1	4.01	3.98	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	80.2	8.02	8.07	0.994
				Average Correction Factor	1.007
Baseline Corr AF:	7.88	Prev response	8.01	*% change	-1.6%
Baseline Corr 2nd AF:	3.94	AF Slope:	0.981781	AF Intercept:	0.200123
Baseline Corr 3rd AF:	1.98	AF Correlation:	0.999992	* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000257	1.000855
THC Cal Offset:	-0.013510	-0.012905
CH4 Cal Slope:	1.000527	1.001225
CH4 Cal Offset:	-0.017653	-0.018850
NMHC Cal Slope:	1.000102	1.000634
NMHC Cal Offset:	0.004544	0.005745

Notes: Changed zero air generator after as founds to improve daily zero's, span adjustment performed.

Calibration Performed By: Kelly Baragar

Wood Buffalo Environmental Association

THC Calibration Summary

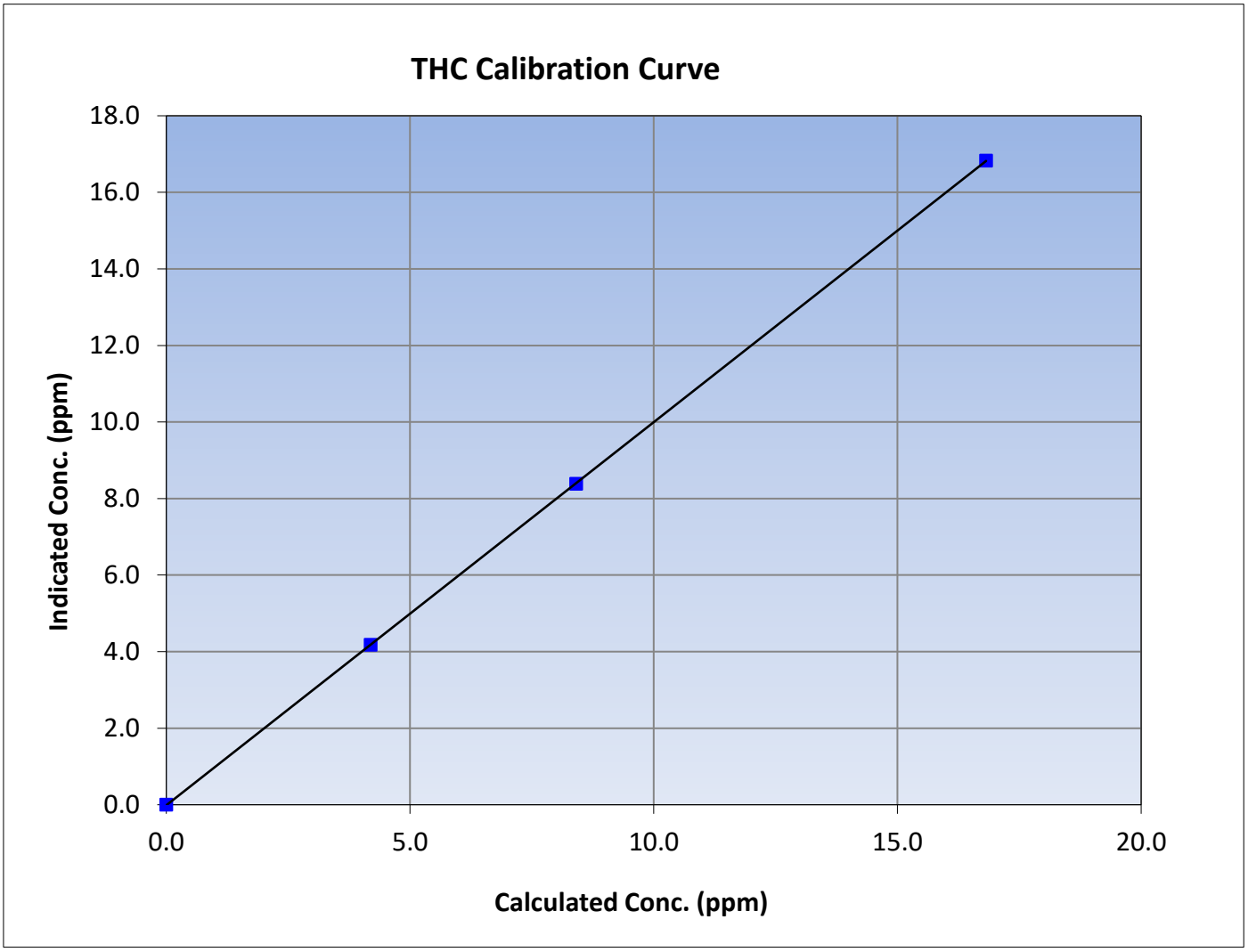
Version-06-2022

Station Information

Calibration Date:	May 30, 2023	Previous Calibration:	May 11, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:00	End Time (MST):	14:12
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	0.999996	*≥0.995*
16.82	16.83	0.9993			
8.41	8.39	1.0029	Slope	1.000855	*0.90 - 1.10*
4.19	4.18	1.0034			
			Intercept	-0.012905	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

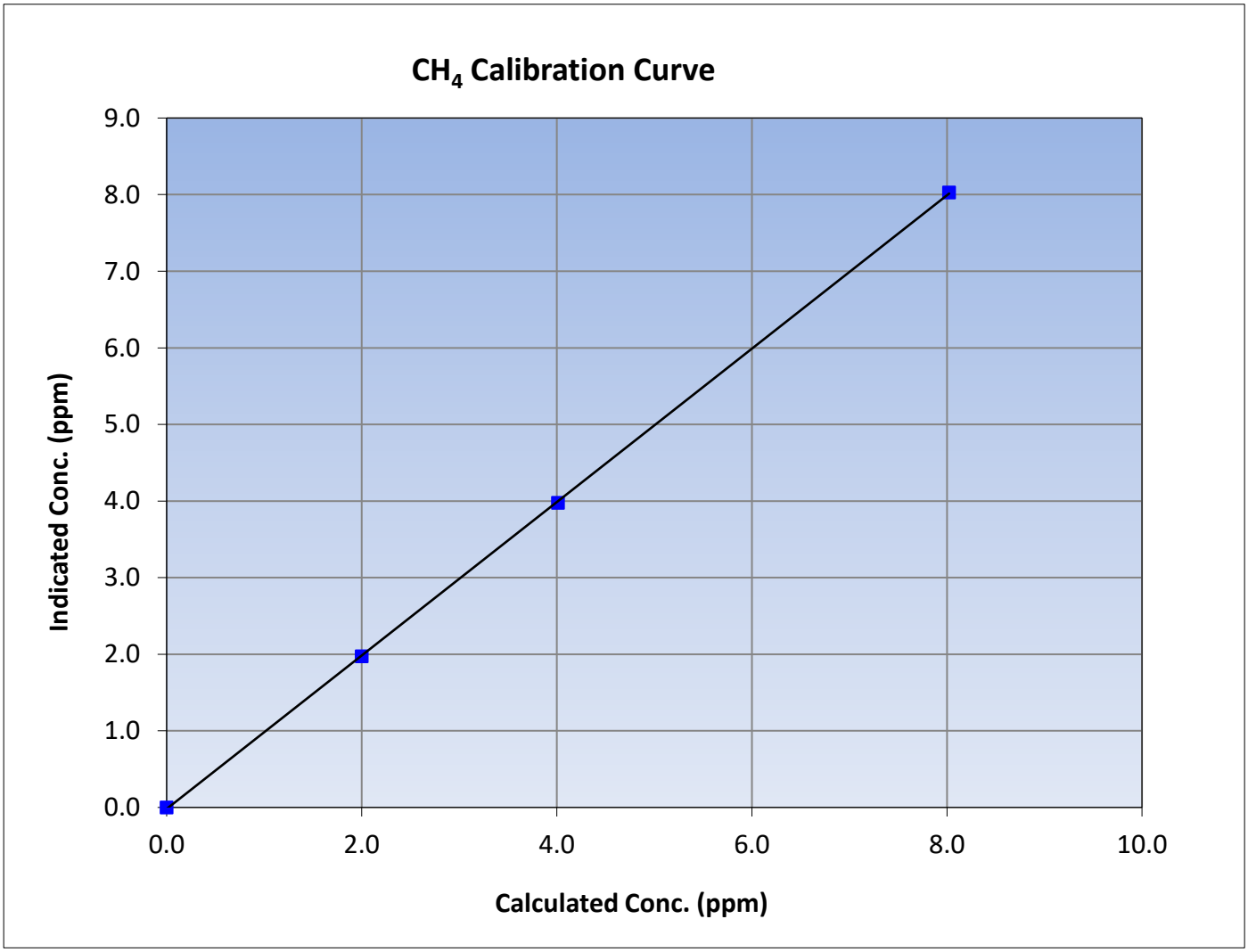
Version-06-2022

Station Information

Calibration Date:	May 30, 2023	Previous Calibration:	May 11, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:00	End Time (MST):	14:12
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	0.999969	*≥0.995*
8.02	8.03	0.9995			
4.01	3.98	1.0087	Slope	1.001225	*0.90 - 1.10*
2.00	1.97	1.0141			
			Intercept	-0.018850	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

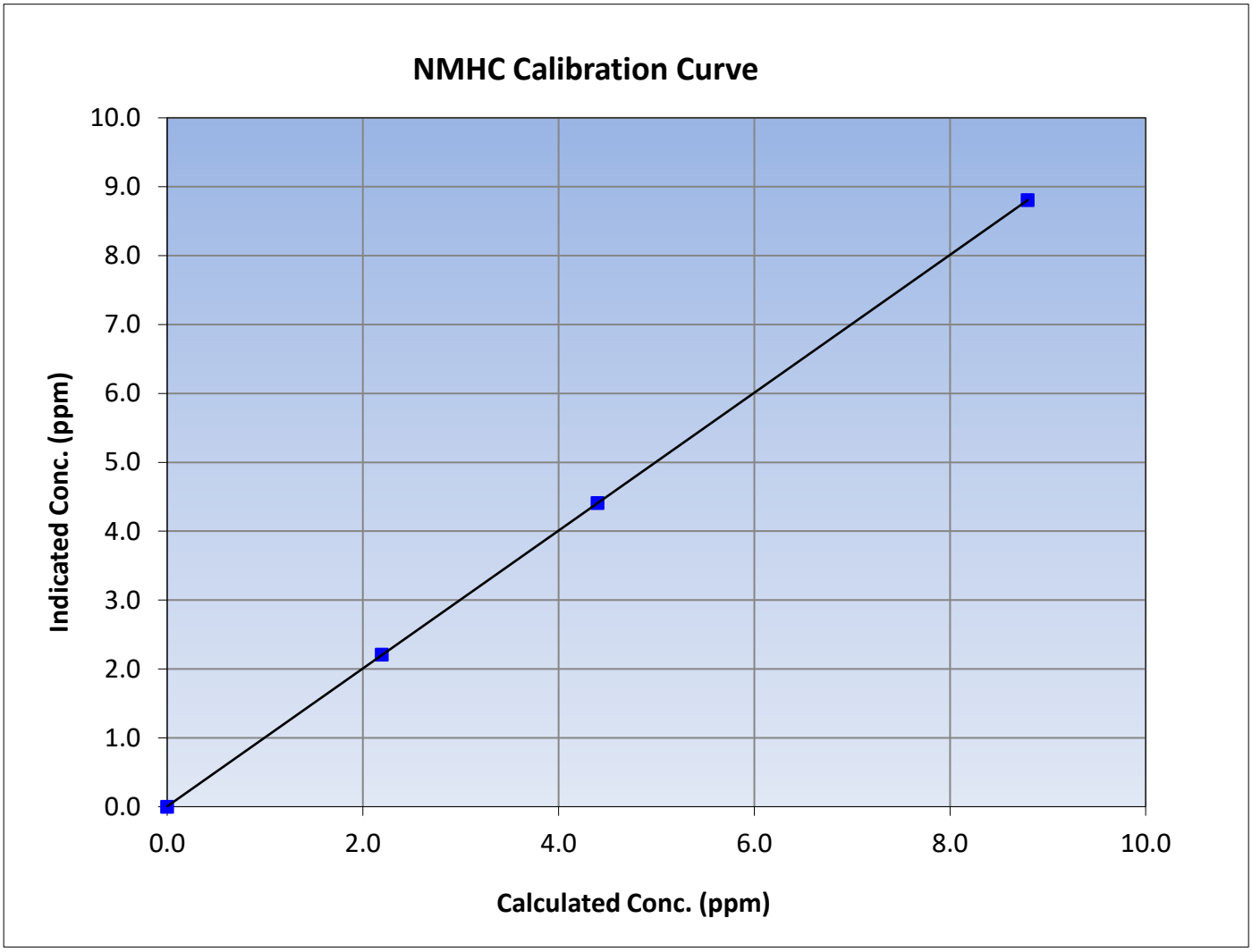
Version-06-2022

Station Information

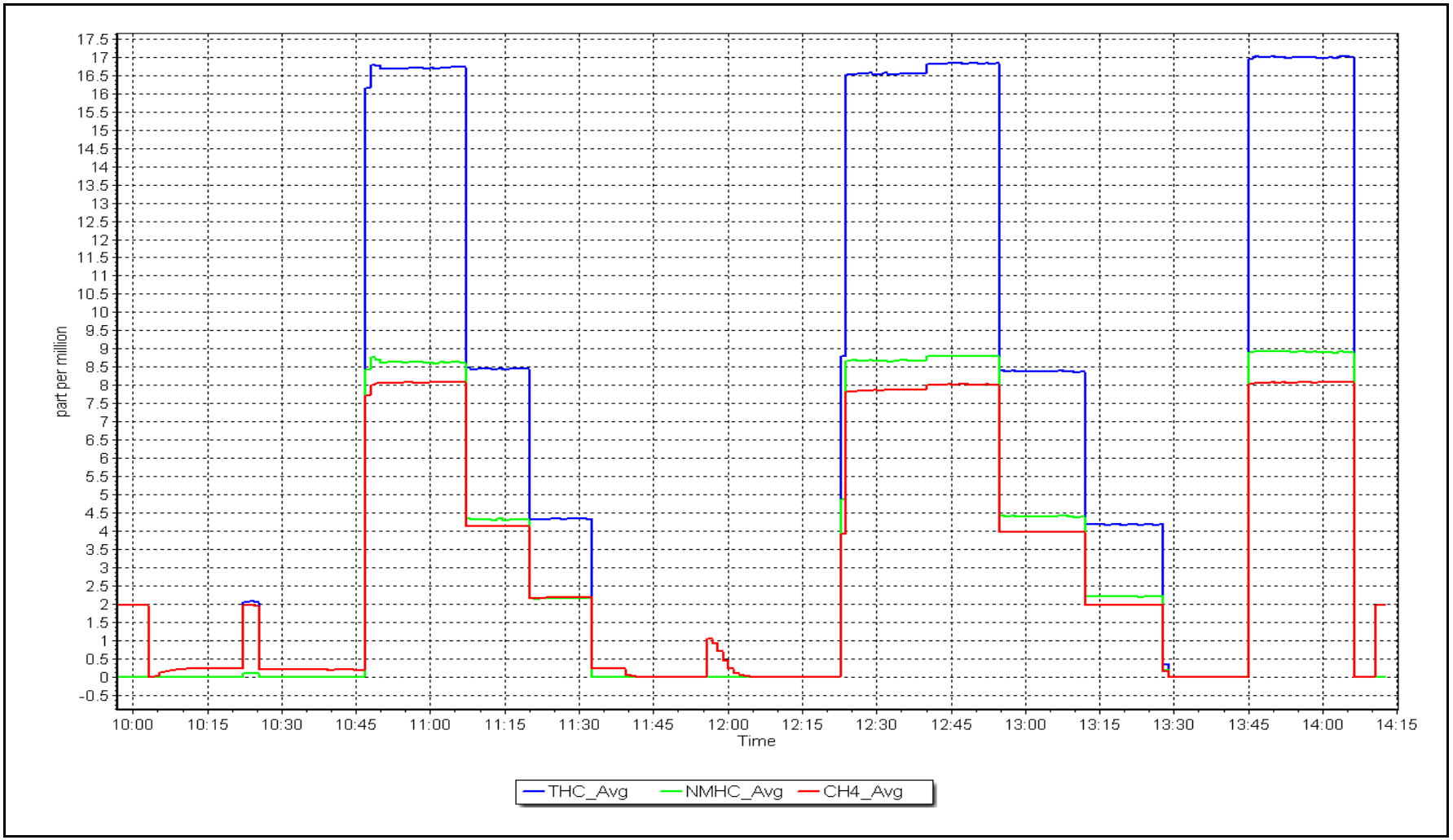
Calibration Date:	May 30, 2023	Previous Calibration:	May 11, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:00	End Time (MST):	14:12
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320038

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999998	≥0.995
8.80	8.80	0.9990			
4.40	4.41	0.9977	Slope	1.000634	0.90 - 1.10
2.19	2.21	0.9938			
			Intercept	0.005745	+/-0.5



NMHC Calibration Plot Date: May 30, 2023 Location: Mildred Lake



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS04
BUFFALO VIEWPOINT
MAY 2023

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

June 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	May 4, 2023	Last Cal Date:	April 13, 2023
Start time (MST):	8:35	End time (MST):	11:18
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.02	ppm	Cal Gas Exp Date:	September 9, 2028
Cal Gas Cylinder #:	CC470284			
Removed Cal Gas Conc:	50.02	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3808
ZAG Make/Model:	API T701		Serial Number:	362

Analyzer Information

Analyzer make: Thermo 43i Analyzer serial #: JC1327300932

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001885	1.003456	Backgd or Offset:	22.1	22.1
Calibration intercept:	-0.100000	0.000000	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	0.1	----
as found span	4920	80.0	800.3	803.5	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.5	----
high point	4920	80.0	800.3	802.9	0.997
second point	4960	40.0	400.2	402.6	0.994
third point	4980	20.0	200.1	199.4	1.003
as left zero	5000	0.0	0.0	0.2	----
as left span	4920	80.0	800.3	803.8	0.996
				Average Correction Factor	0.998

Baseline Corr As found:	803.40	Previous response	801.73	*% change	0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: no maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

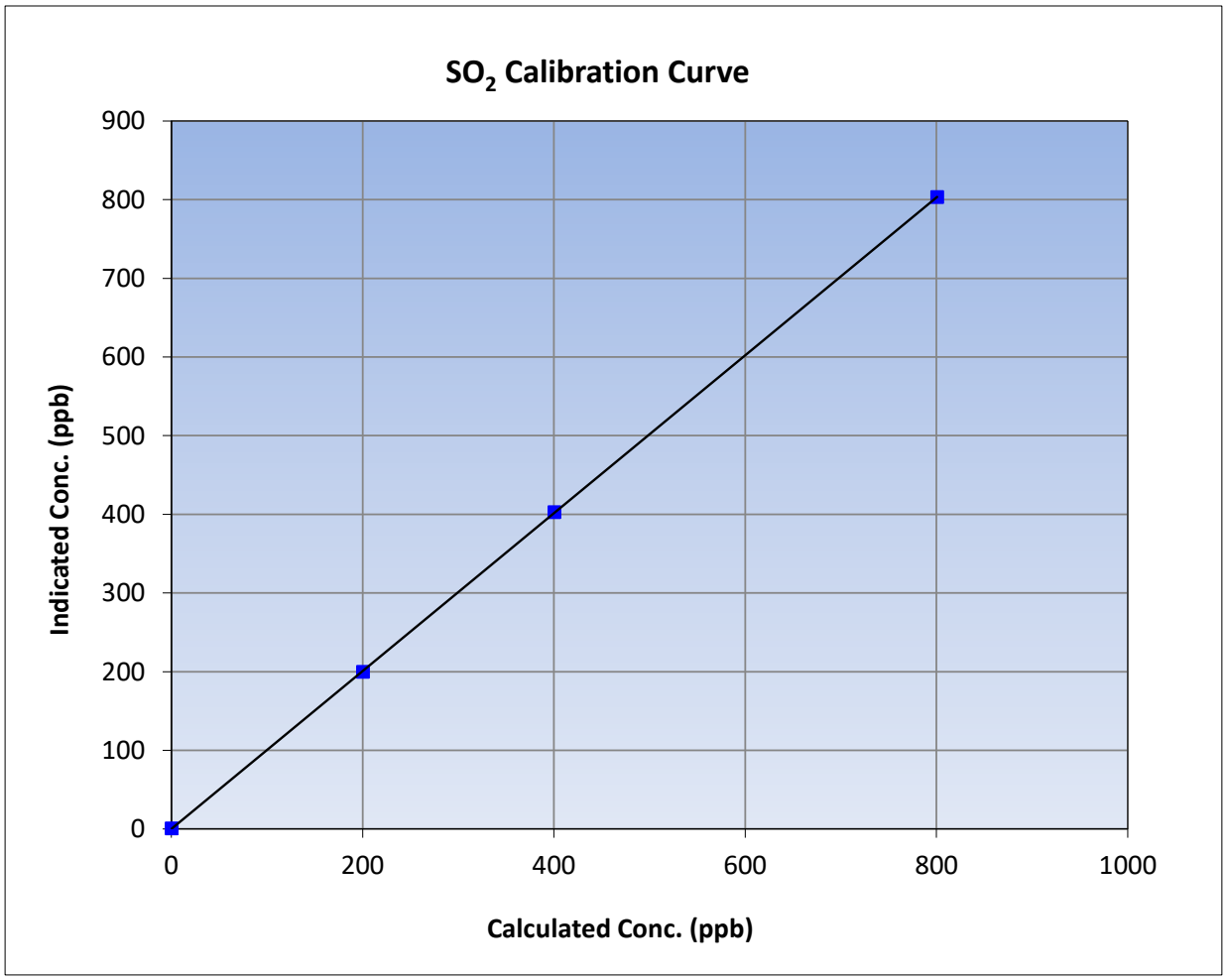
Station Information

Calibration Date:	May 4, 2023	Previous Calibration:	April 13, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:35	End Time (MST):	11:18
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1327300932

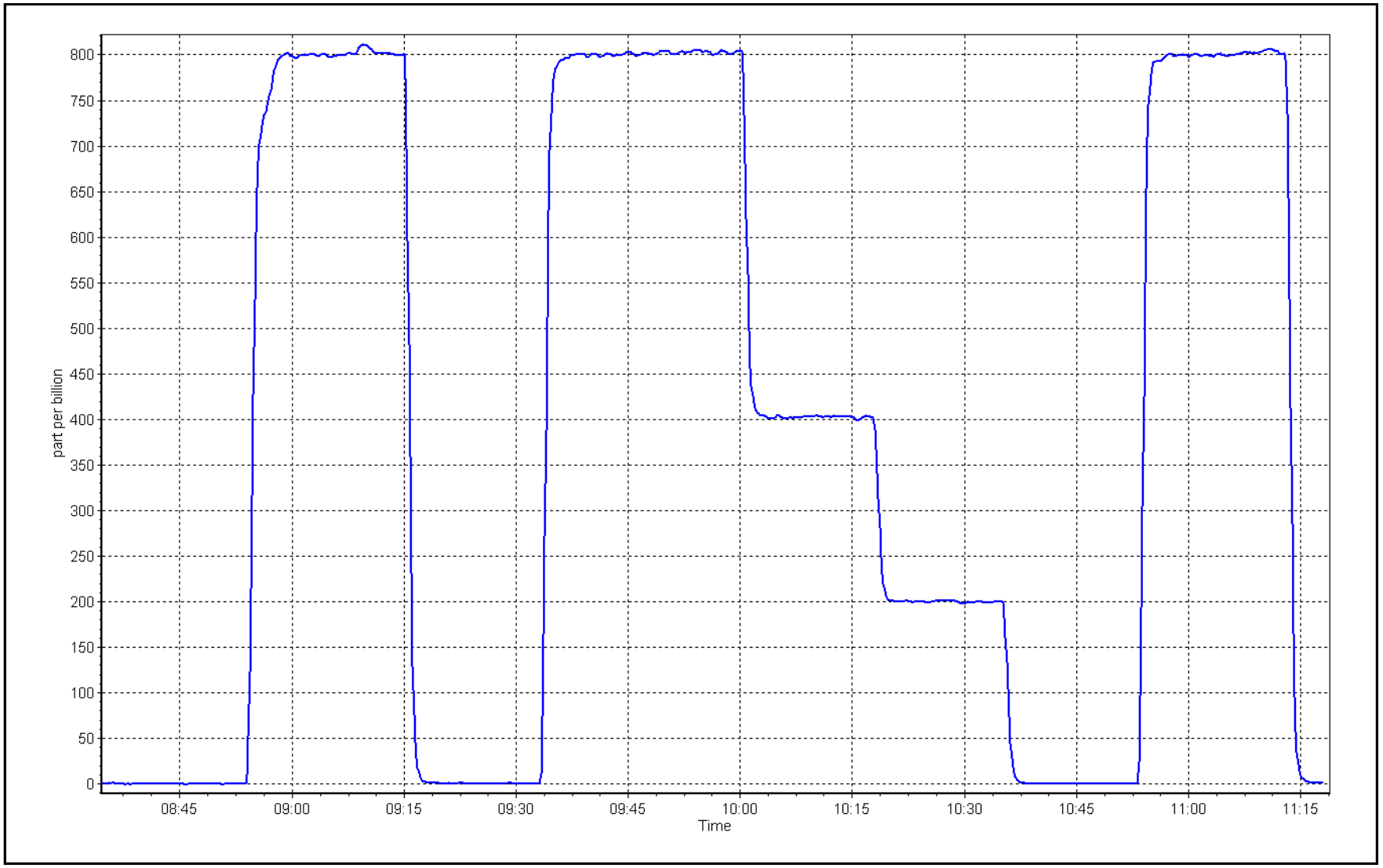
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
800.3	802.9	0.9968
400.2	402.6	0.9939
200.1	199.4	1.0034

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999991	*≥0.995*
Slope	1.003456	*0.90 - 1.10*
Intercept	0.000000	*+/-30*



SO2 Calibration Plot Date: May 4, 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:	May 16, 2023	Last Cal Date:	April 27, 2023
Start time (MST):	6:03	End time (MST):	7:30
Reason:	Removal		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.996073		Backgd or Offset:	19.0	19.0
Calibration intercept:	0.142229		Coeff or Slope:	1.070	1.070

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4926	74.1	80.3	80.4	1.000
as found 2nd point	4963	37.0	40.1	40.5	0.993
as found 3rd point	4982	18.5	20.1	20.0	1.008
new cylinder response					

H_2S Calibration Data

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

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

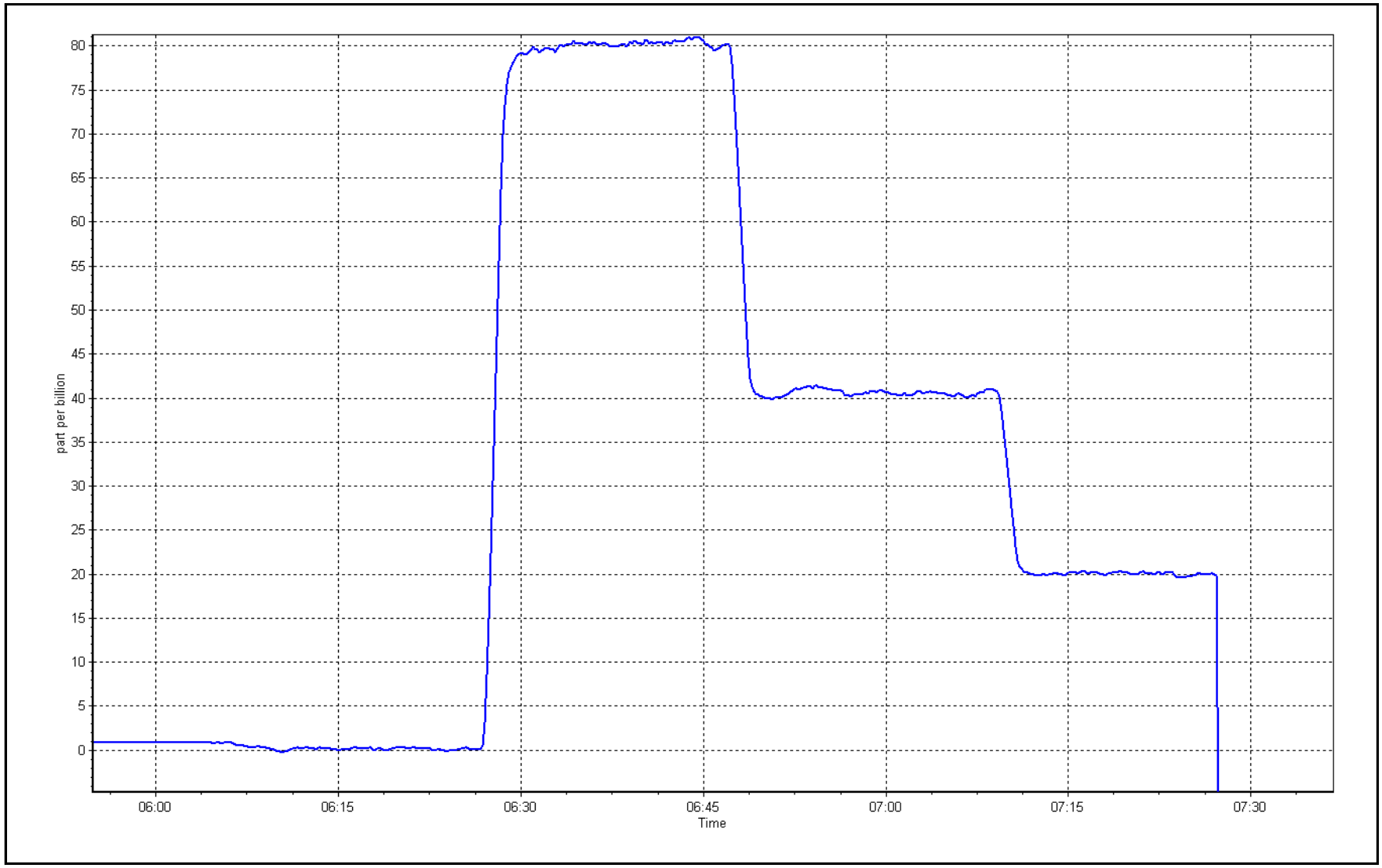
Baseline Corr As found:	80.3	Prev response:	80.15	*% change:	0.2%
Baseline Corr 2nd AF pt:	40.4	AF Slope:	1.000770	AF Intercept:	0.102267
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999971		

* = > +/-5% change initiates investigation

Notes: Removed Due to putting in a H2S external converter and trace level SO2 instead.

Calibration Performed By: Melissa Lemay

H_2S Calibration Plot Date: May 16, 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:	May 16, 2023	Last Cal Date:	
Start time (MST):	8:45	End time (MST):	11:25
Reason:	Install		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:		1.003759	Backgd or Offset:		2.0
Calibration intercept:		-0.177711	Coeff or Slope:		1.067

H_2S As Found Data

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

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4926	74.1	80.3	80.4	0.999
second point	4963	37.0	40.1	40.3	0.995
third point	4982	18.5	20.1	19.7	1.018
as left zero	5000	0.0	0.0	-0.2	----
as left span	4926	74.1	80.3	79.9	1.005
SO2 Scrubber Check	4920	80.0	800.0	0.0	----
Date of last scrubber change:		16-May-23		Ave Corr Factor	1.004
Date of last converter efficiency test:					efficiency

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

* = > +/-5% change initiates investigation

Notes: Install Due to going to external H2S converters. Sox scrubber checked after the calibrator zero. Zero and Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

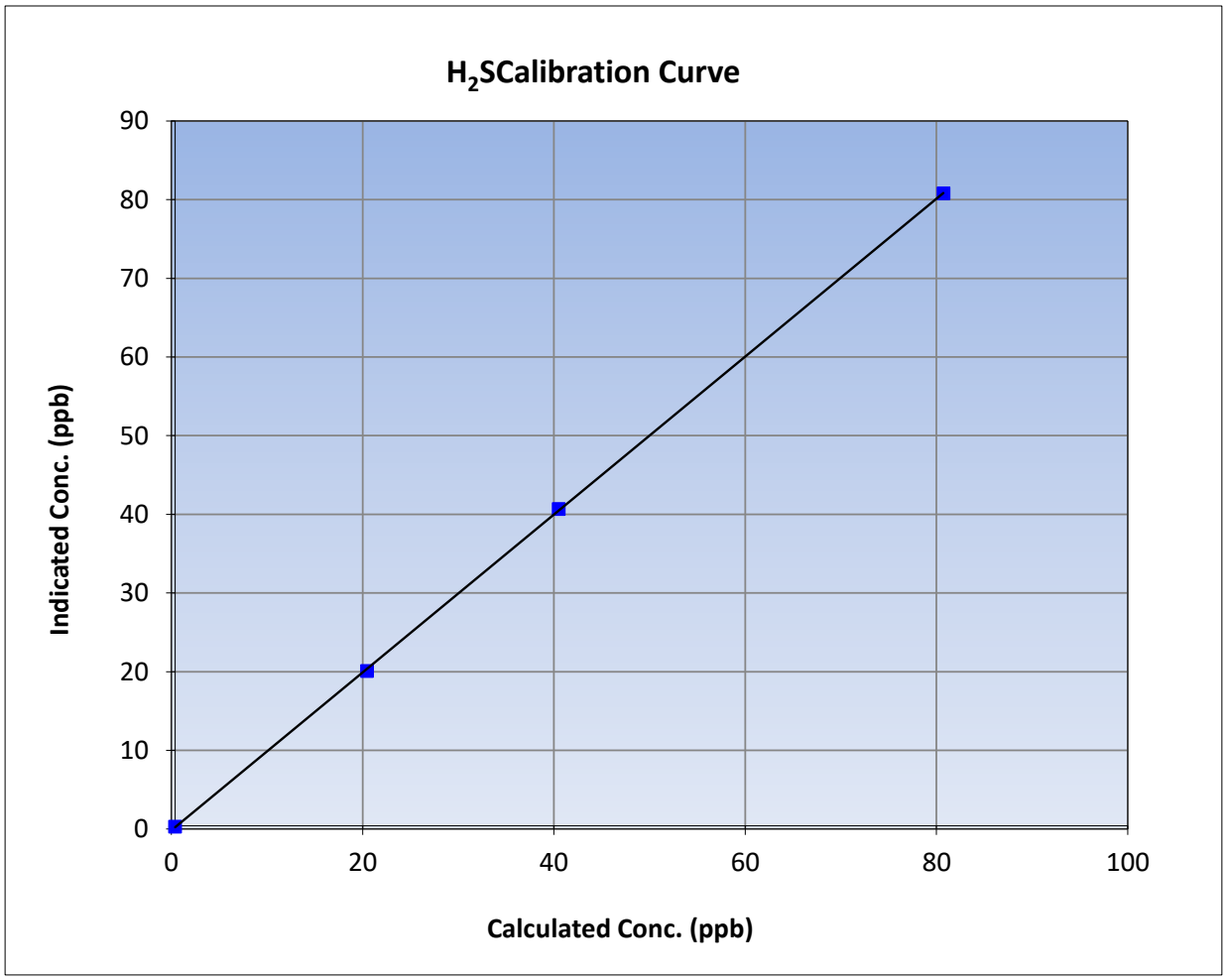
Version-11-2021

Station Information

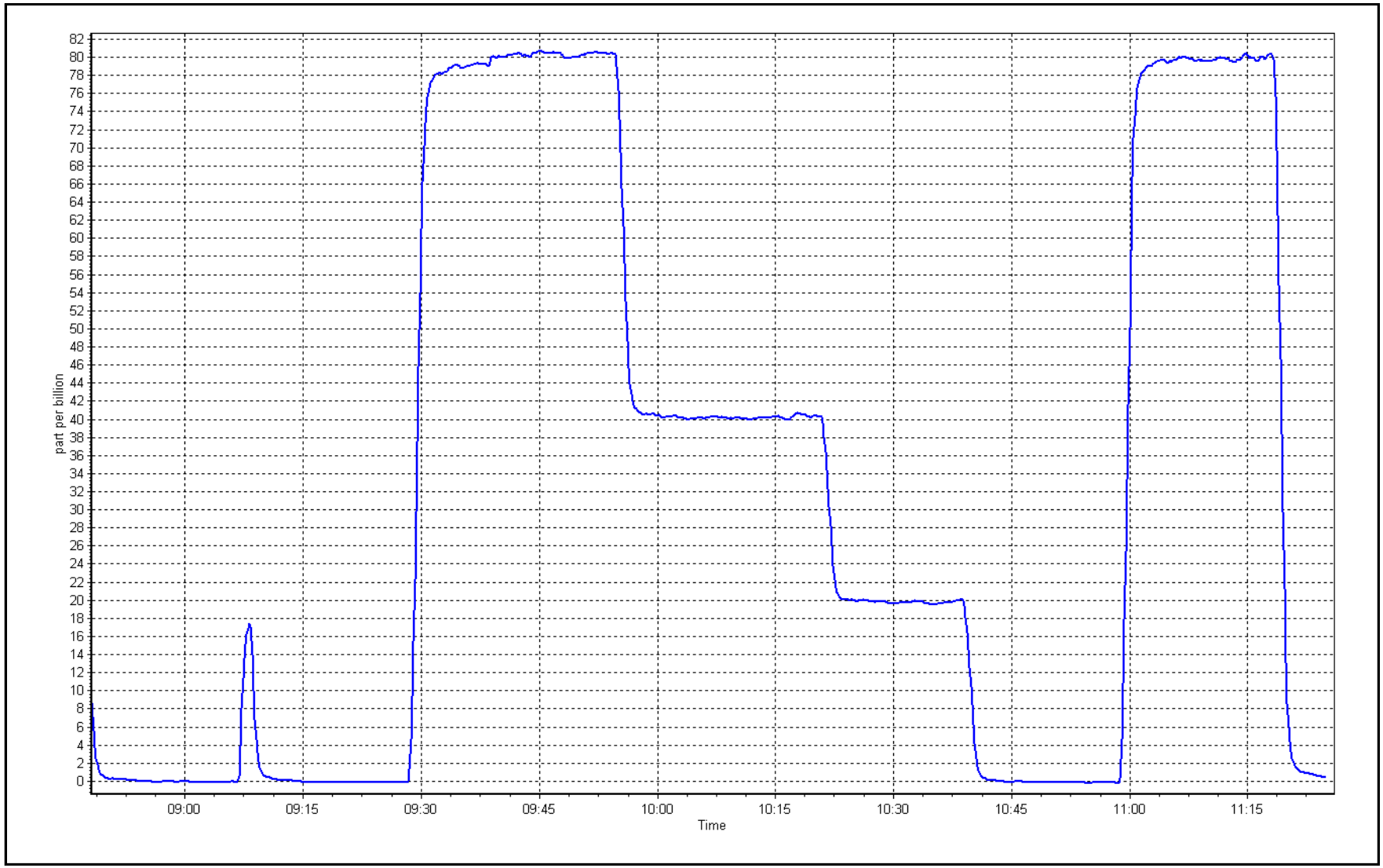
Calibration Date:	May 16, 2023	Previous Calibration:	
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:45	End Time (MST):	11:25
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1008841400

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.1	----	Correlation Coefficient	0.999967	*≥0.995*
80.3	80.4	0.9990			
40.1	40.3	0.9952	Slope	1.003759	*0.90 - 1.10*
20.1	19.7	1.0179			
			Intercept	-0.177711	*+/-3*



H_2S Calibration Plot Date: May 16, 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:	May 4, 2023	Last Cal Date:	April 6, 2023
Start time (MST):	8:35	End time (MST):	11:17
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC470284	Cal Gas Expiry Date:	September 9, 2028	
CH4 Cal Gas Conc.	497.8	ppm	CH4 Equiv Conc.	1062.9	ppm
C3H8 Cal Gas Conc.	205.5	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.8	ppm	CH4 Equiv Conc.	1062.9	ppm
Removed C3H8 Conc.	205.5	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3808	
ZAG make/model:	API T701		Serial Number:	362	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1222762077	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	1.840E-04	1.860E-04	NMHC SP Ratio:	3.820E-05	3.870E-05
CH4 Retention time:	11.8	11.8	NMHC Peak Area:	236377	233712

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	17.01	16.76	1.015
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	17.01	16.98	1.002
second point	4960	40.0	8.50	8.48	1.003
third point	4980	20.0	4.25	4.21	1.010
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	17.01	16.96	1.003
				Average Correction Factor	1.005

Baseline Corr AF:	16.76	Prev response	17.00	*% change	-1.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / 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	8.94	1.011
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	9.04	9.04	1.000
second point	4960	40.0	4.52	4.51	1.002
third point	4980	20.0	2.26	2.24	1.009
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	9.04	9.04	1.000
				Average Correction Factor	1.004
Baseline Corr AF:	8.94	Prev response	9.02	*% change	-0.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	7.96	7.83	1.017
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	7.96	7.94	1.003
second point	4960	40.0	3.98	3.97	1.003
third point	4980	20.0	1.99	1.98	1.006
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	7.96	7.92	1.006
				Average Correction Factor	1.004
Baseline Corr AF:	7.83	Prev response	7.96	*% change	-1.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.001213	0.999063
THC Cal Offset:	-0.032000	-0.016000
CH4 Cal Slope:	1.001406	0.997102
CH4 Cal Offset:	-0.012000	-0.002000
NMHC Cal Slope:	0.999779	1.000411
NMHC Cal Offset:	-0.020000	-0.010000

Notes: Span adjusted. No maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

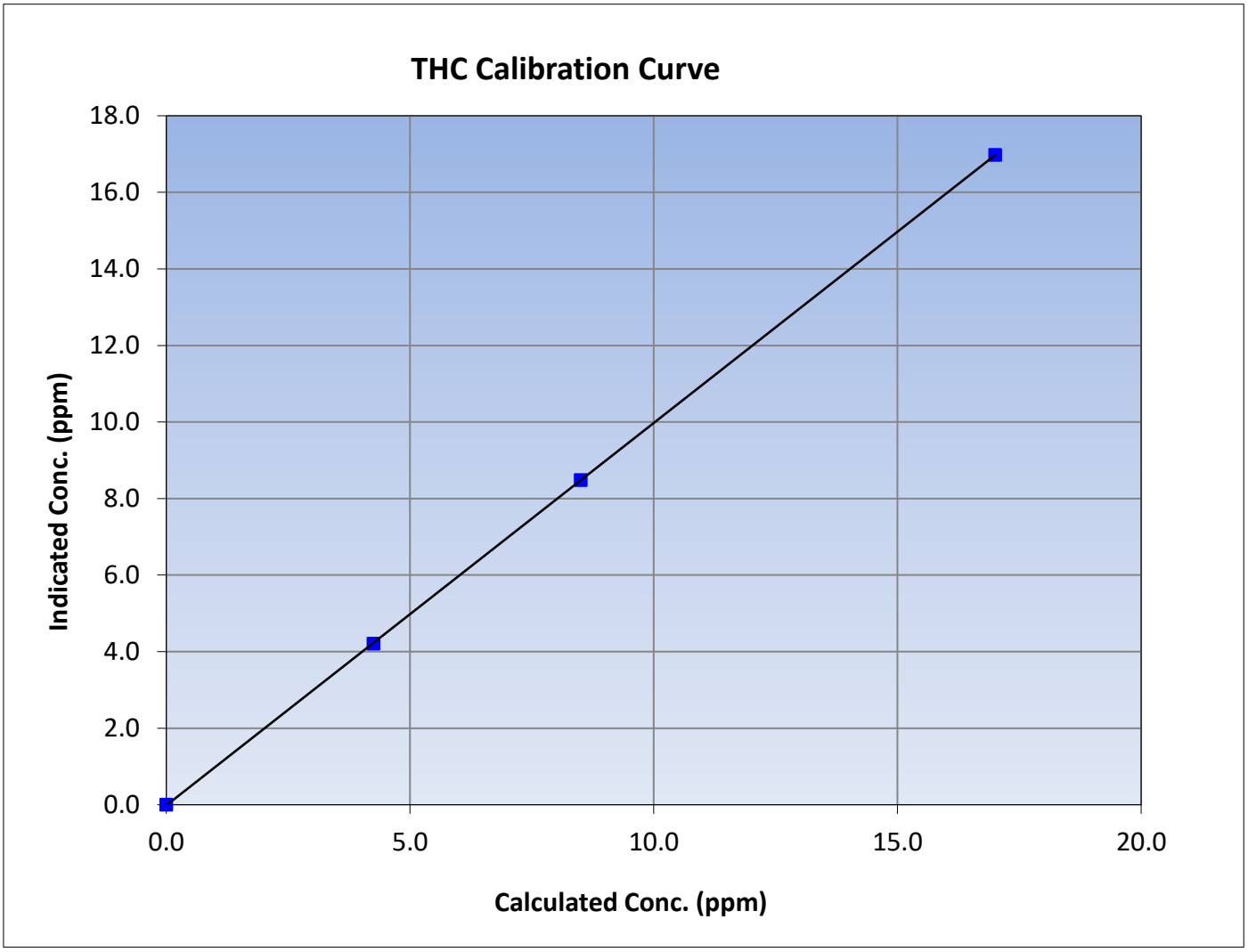
Version-01-2020

Station Information

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

Calibration Data

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



Wood Buffalo Environmental Association

CH_4 Calibration Summary

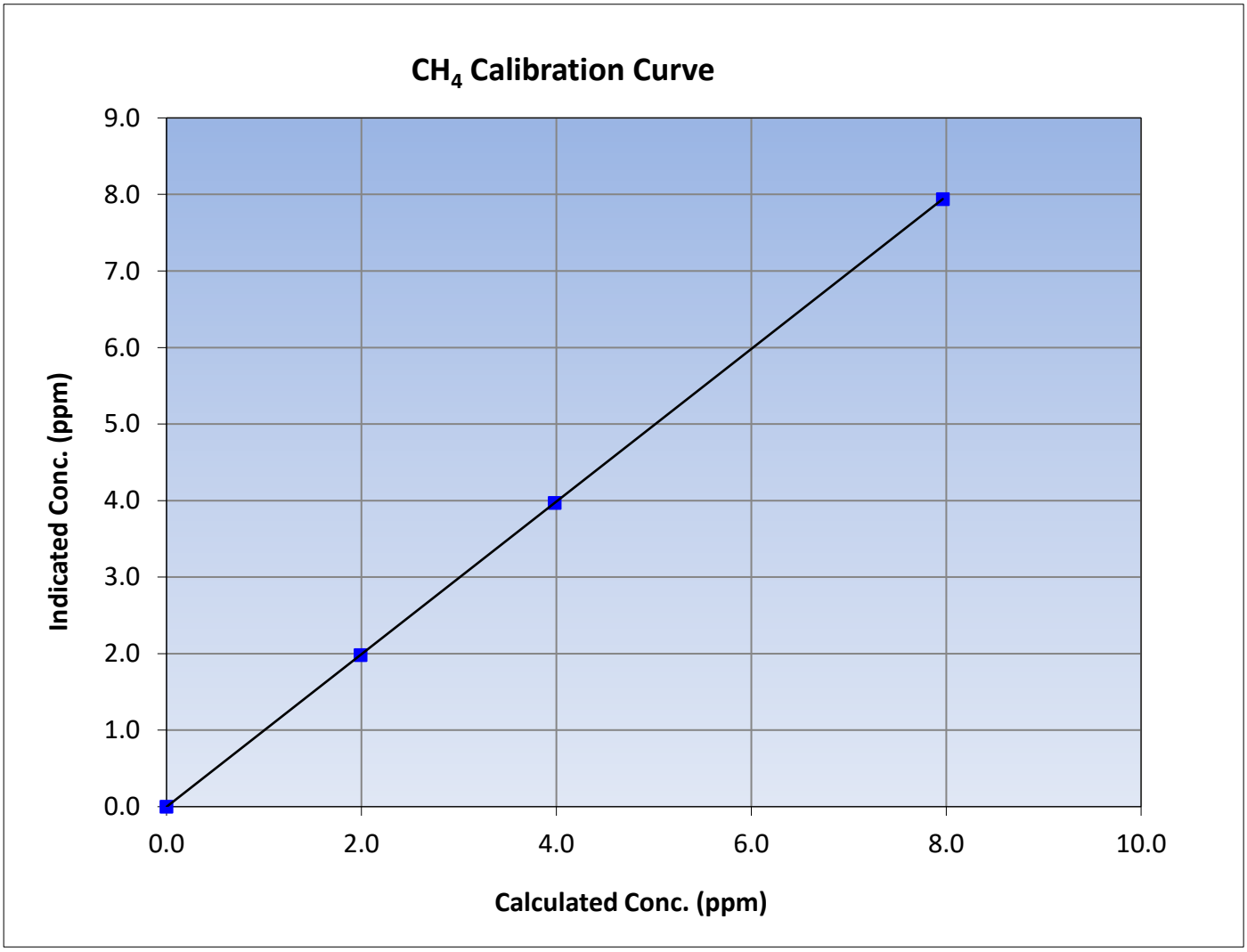
Version-01-2020

Station Information

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

Calibration Data

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



Wood Buffalo Environmental Association

NMHC Calibration Summary

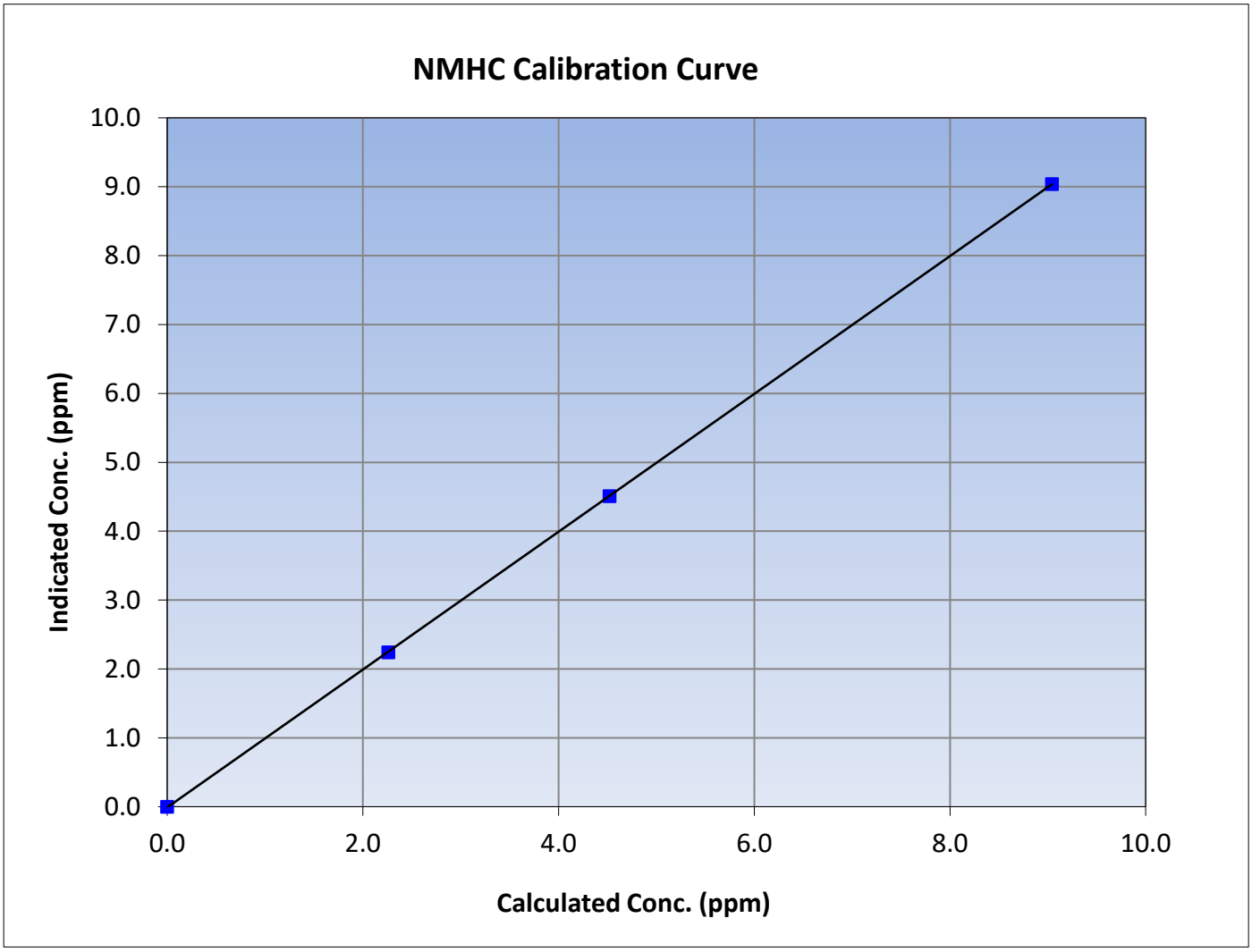
Version-01-2020

Station Information

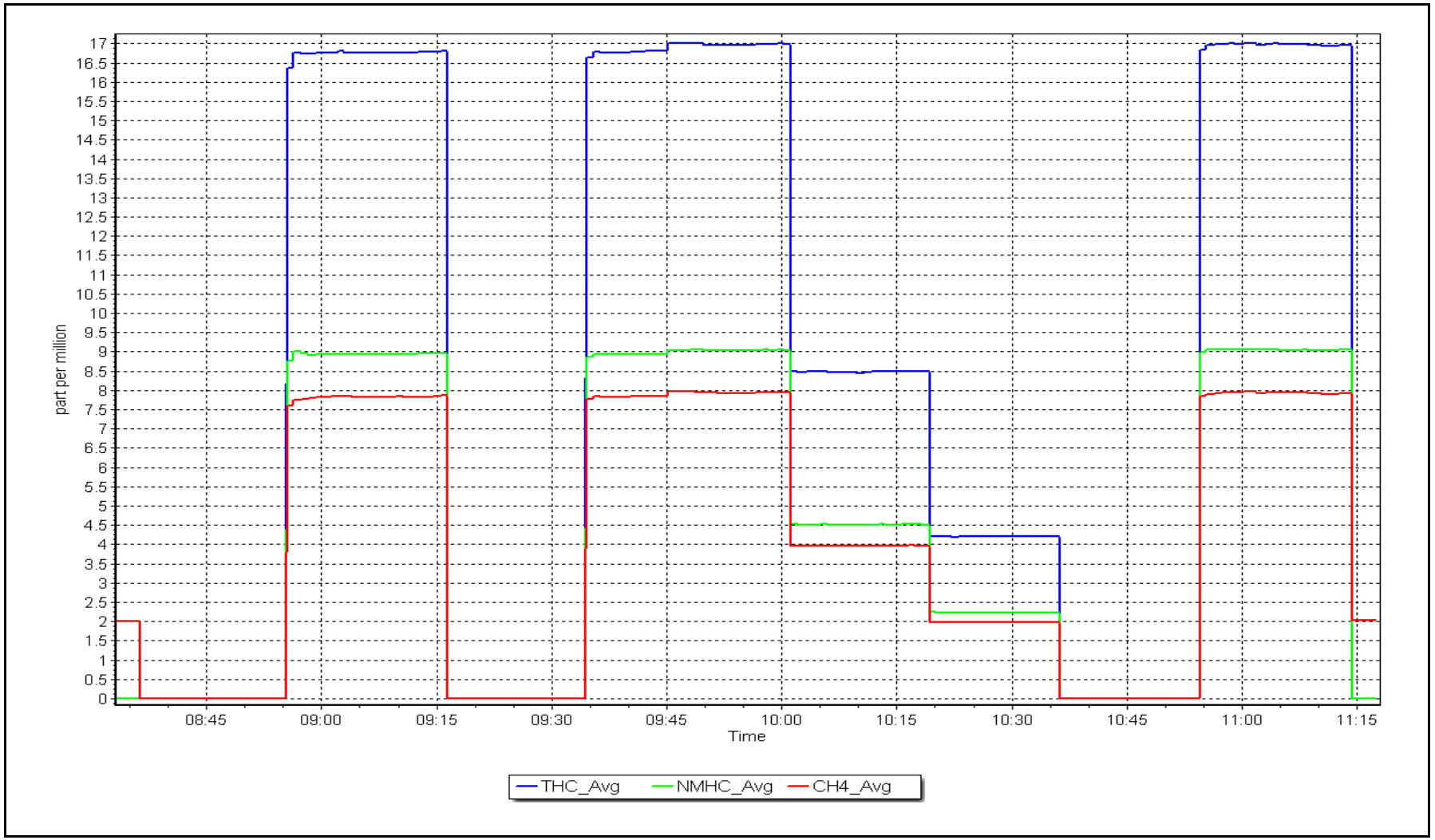
Calibration Date:	May 4, 2023	Previous Calibration:	April 6, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:35	End Time (MST):	11:17
Analyzer make:	Thermo 55i	Analyzer serial #:	1222762077

Calibration Data

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



NMHC Calibration Plot Date: May 4, 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:	May 5, 2023	Last Cal Date:	April 4, 2023
Start time (MST):	6:48	End time (MST):	11:30
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:	3808	
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:	1.014	1.032	NO bkgnd or offset:	-2.1	-0.3
NOX coeff or slope:	1.013	1.032	NOX bkgnd or offset:	-1.7	1.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	7.6	7.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999617	0.998201
NO_X Cal Offset:	-0.133690	-0.313645
NO Cal Slope:	0.998232	1.000170
NO Cal Offset:	-0.993777	-1.493235
NO_2 Cal Slope:	0.984274	0.998883
NO_2 Cal Offset:	-0.102857	1.152412

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	3.0	1.0	1.9	----	----
as found span	4922	78.1	799.1	795.2	3.9	785.1	779.8	5.4	1.0178	1.0197
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.4	0.4	-0.8	----	----
high point	4922	78.1	799.1	795.2	3.9	797.3	795.0	2.3	1.0023	1.0002
second point	4961	39.1	400.1	398.1	2.0	399.1	395.1	4.0	1.0024	1.0076
third point	4981	19.5	199.5	198.5	1.0	198.9	195.6	3.3	1.0030	1.0150
as left zero	5000	0.0	0.0	0.0	0.0	-0.7	0.1	-0.8	----	----
as left span	4922	78.1	799.1	382.7	416.4	801.2	399.3	401.9	0.9974	0.9584
								Average Correction Factor	1.0026	1.0076

Corrected As found	NO_X = 782.1 ppb	NO = 778.8 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-2.1%
Previous Response	NO_X = 798.7 ppb	NO = 792.8 ppb			*Percent Change	NO =	-1.8%
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)	792.4	379.9	416.4	415.8	1.0015	99.9%
2nd GPT point (200 ppb O3)	792.4	583.2	213.1	215.8	0.9875	101.3%
3rd GPT point (100 ppb O3)	792.4	688.0	108.3	110.8	0.9775	102.3%
				Average Correction Factor	0.9888	101.1%

Notes: Zero and Span adjusted. No maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

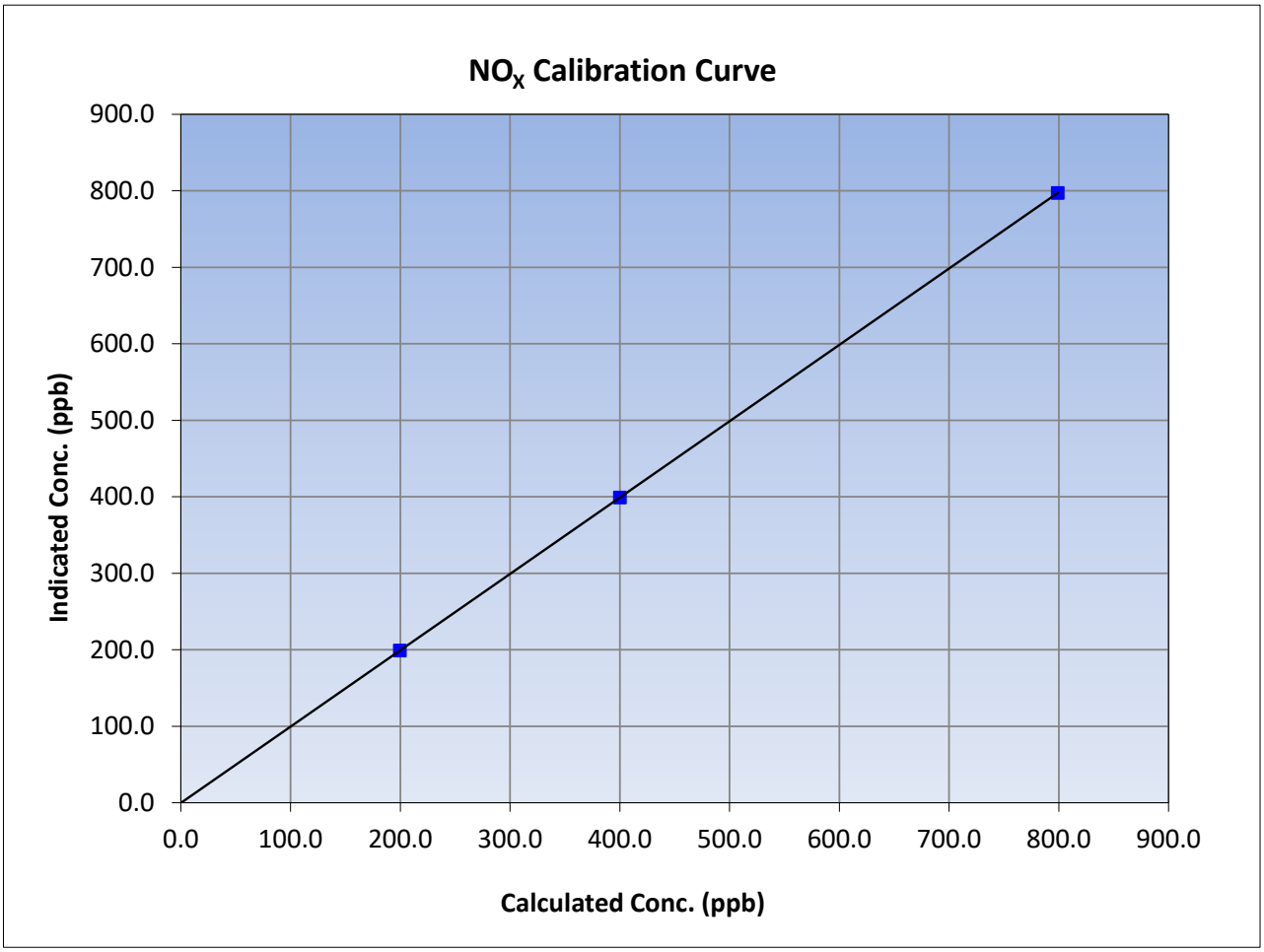
Version-04-2020

Station Information

Calibration Date:	May 5, 2023	Previous Calibration:	April 4, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:48	End Time (MST):	11:30
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	1.000000	≥0.995
799.1	797.3	1.0023			
400.1	399.1	1.0024	Slope	0.998201	0.90 - 1.10
199.5	198.9	1.0030			
			Intercept	-0.313645	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

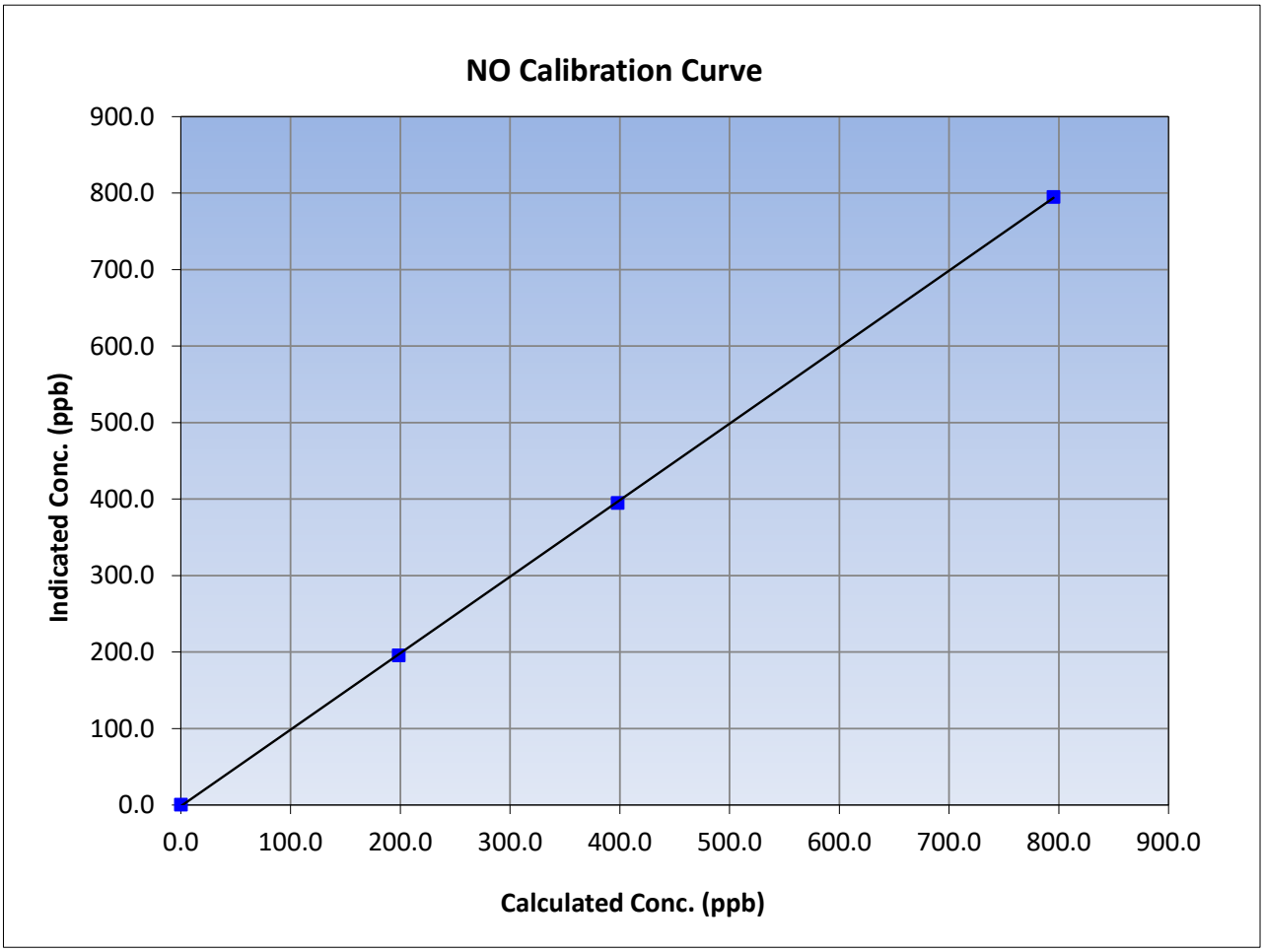
Version-04-2020

Station Information

Calibration Date:	May 5, 2023	Previous Calibration:	April 4, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:48	End Time (MST):	11:30
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	0.999972	≥0.995
795.2	795.0	1.0002			
398.1	395.1	1.0076	Slope	1.000170	0.90 - 1.10
198.5	195.6	1.0150			
			Intercept	-1.493235	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

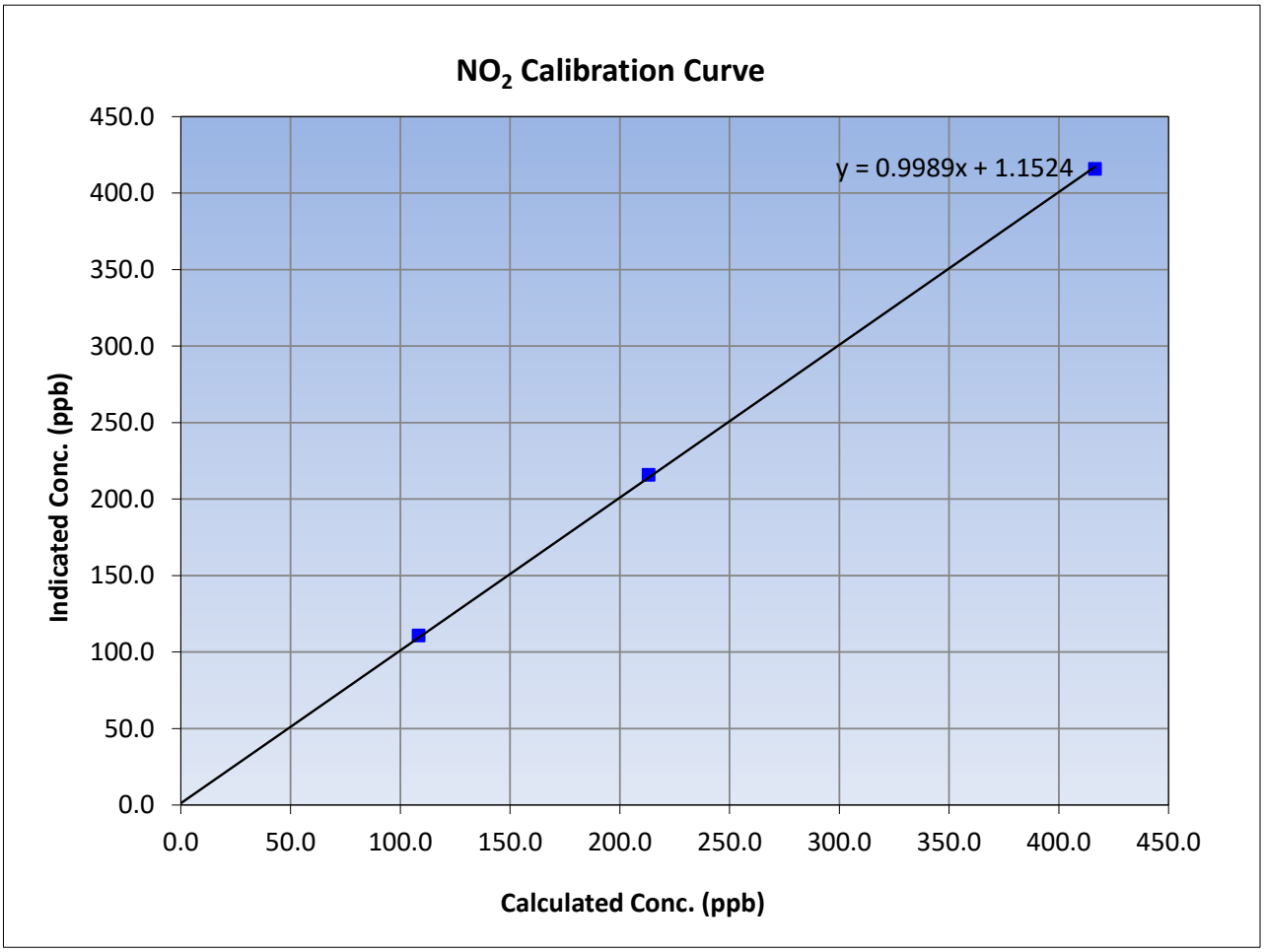
Version-04-2020

Station Information

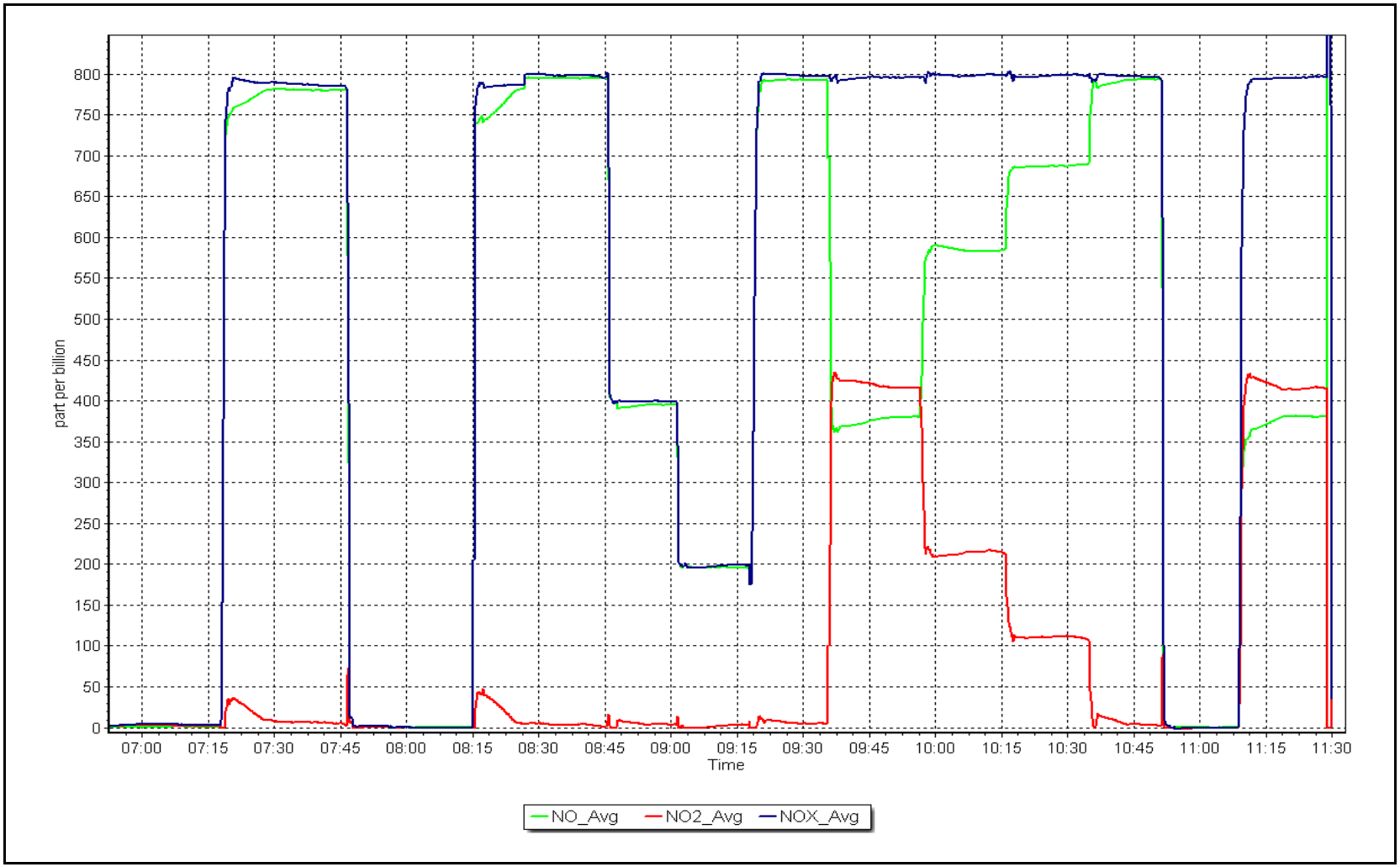
Calibration Date:	May 5, 2023	Previous Calibration:	April 4, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:48	End Time (MST):	11:30
Analyzer make:	API T200	Analyzer serial #:	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.8	----	Correlation Coefficient	0.999885	≥0.995
416.4	415.8	1.0015			
213.1	215.8	0.9875	Slope	0.998883	0.90 - 1.10
108.3	110.8	0.9775			
			Intercept	1.152412	+/-20



NO_X Calibration Plot Date: May 5, 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:	May 18, 2023	Last Cal Date:	May 5, 2023
Start time (MST):	5:50	End time (MST):	9:30
Reason:	As Found	Moly converter changed	

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:	3808	
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:	1.032	1.032	NO bkgnd or offset:	-0.3	-0.3
NOX coeff or slope:	1.032	1.032	NOX bkgnd or offset:	1.8	1.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	7.7	7.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.998201	
NO_X Cal Offset:	-0.313645	
NO Cal Slope:	1.000170	
NO Cal Offset:	-1.493235	
NO_2 Cal Slope:	0.998883	
NO_2 Cal Offset:	1.152412	

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.4	-0.1	0.4	----	----
as found span	4922	78.1	799.1	795.2	3.9	784.1	779.3	4.8	1.0191	1.0204
as found 2nd	4961	39.1	400.1	398.1	2.0	391.6	387.3	4.2	1.0216	1.0279
as found 3rd	4981	19.5	199.5	198.5	1.0	195.0	192.0	3.0	1.0231	1.0340
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 = 783.7 ppb	NO = 779.4 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-1.7%
Previous Response	NO_X = 797.4 ppb	NO = 793.8 ppb			*Percent Change	NO =	-1.9%
Baseline Corr 2nd pt	NO_X = 391.2 ppb	NO = 387.4 ppb	As found	NO_X r^2: 0.999996	Nx Sl: 0.981013	Nx Int:	-0.254
Baseline Corr 3rd pt	NO_X = 194.6 ppb	NO = 192.1 ppb	As found	NO r^2: 0.999979	NO Sl: 0.980801	NO Int:	-1.653
			As found	NO_2 r^2: 0.999914	NO2 Sl: 0.992749	NO_2 Int:	2.088

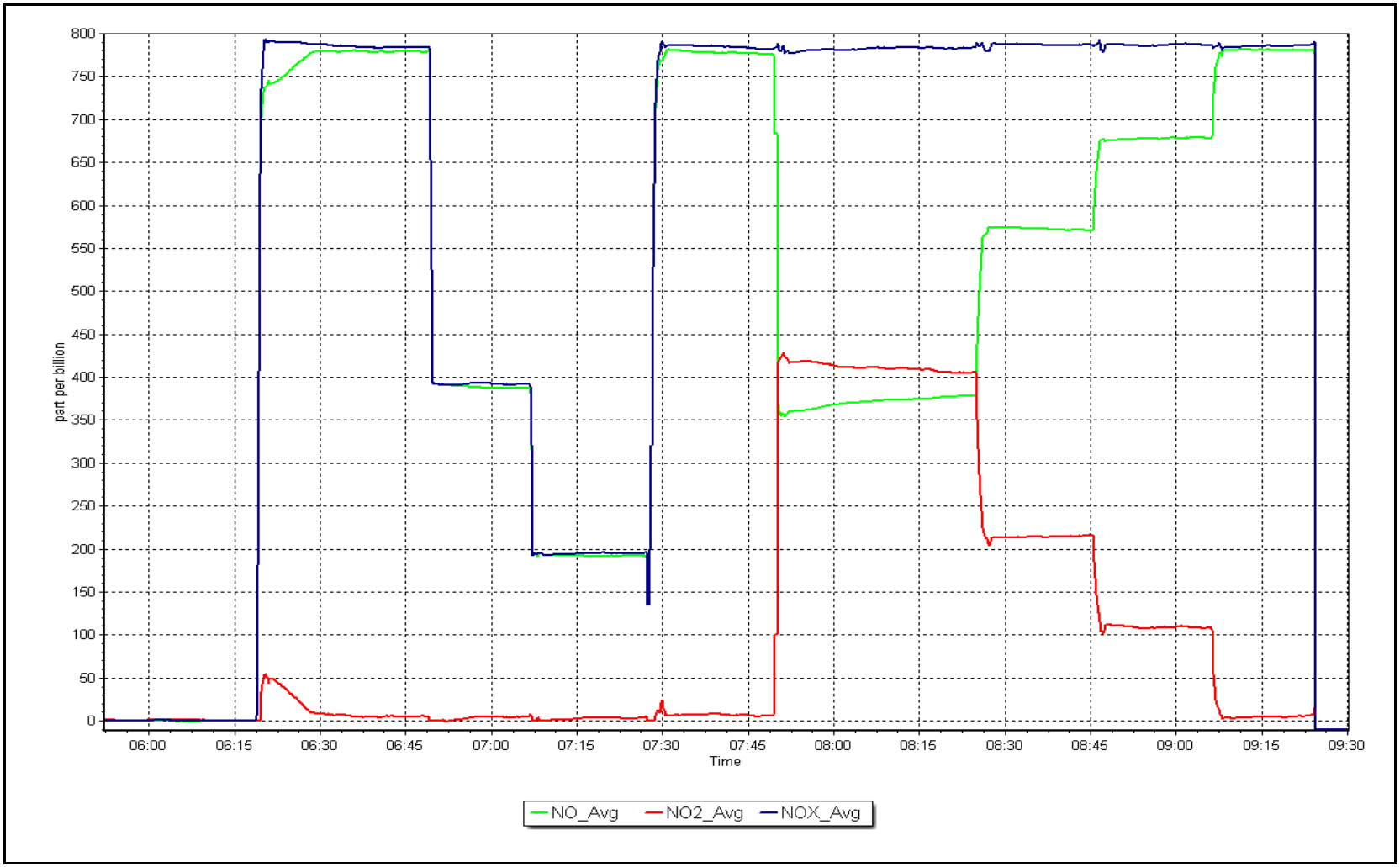
GPT Calibration Data

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	0.4	----	----
as found GPT point (400 ppb NO2)	780.8	377.5	407.2	405.3	1.0047	99.5%
as found GPT point (200 ppb NO2)	780.8	571.5	213.2	215.0	0.9917	100.8%
as found GPT point (100 ppb NO2)	780.8	678.6	106.1	108.9	0.9743	102.6%
1st GPT point (400 ppb O3)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
				Average Correction Factor		

Notes: As founds to change the Moly converter. Due to drifting during the GPT the 2nd NO ref point used.

Calibration Performed By: Melissa Lemay

NO_X Calibration Plot Date: May 18, 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:	May 19, 2023	Last Cal Date:	May 18, 2023
Start time (MST):	5:15	End time (MST):	9:38
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:	3808	
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:	1.032	1.055	NO bkgnd or offset:	-0.3	-0.5
NOX coeff or slope:	1.032	1.056	NOX bkgnd or offset:	1.8	2.7
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	7.7	7.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.998201	0.999316
NO_X Cal Offset:	-0.313645	-0.653591
NO Cal Slope:	1.000170	1.001680
NO Cal Offset:	-1.493235	-1.693638
NO_2 Cal Slope:	0.998883	1.001373
NO_2 Cal Offset:	1.152412	-0.003271

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero										
as found span										
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
high point	4922	78.1	799.1	795.2	3.9	798.3	795.7	2.5	1.0010	0.9994
second point	4961	39.1	400.1	398.1	2.0	398.7	396.2	2.5	1.0034	1.0048
third point	4981	19.5	199.5	198.5	1.0	198.0	195.5	2.6	1.0076	1.0155
as left zero	5000	0.0	0.0	0.0	0.0	-0.9	0.3	-1.2	----	----
as left span	4922	78.1	799.1	387.4	411.7	793.8	382.4	411.4	1.0067	1.0131
								Average Correction Factor	1.0040	1.0066

Corrected As found NO_X = NA ppb NO = NA ppb

Previous Response NO_X = NA ppb NO = NA ppb

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

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

* = > +/-5% change initiates investigation

*Percent Change NO_X = NA

*Percent Change NO = NA

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

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

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

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	791.4	383.6	411.7	412.4	0.9983	100.2%
2nd GPT point (200 ppb O3)	791.4	586.1	209.2	209.2	1.0000	100.0%
3rd GPT point (100 ppb O3)	791.4	688.9	106.4	106.6	0.9982	100.2%
				Average Correction Factor	0.9988	100.1%

Notes: Calibration after moly converter change. Zero air scrubbers changed.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

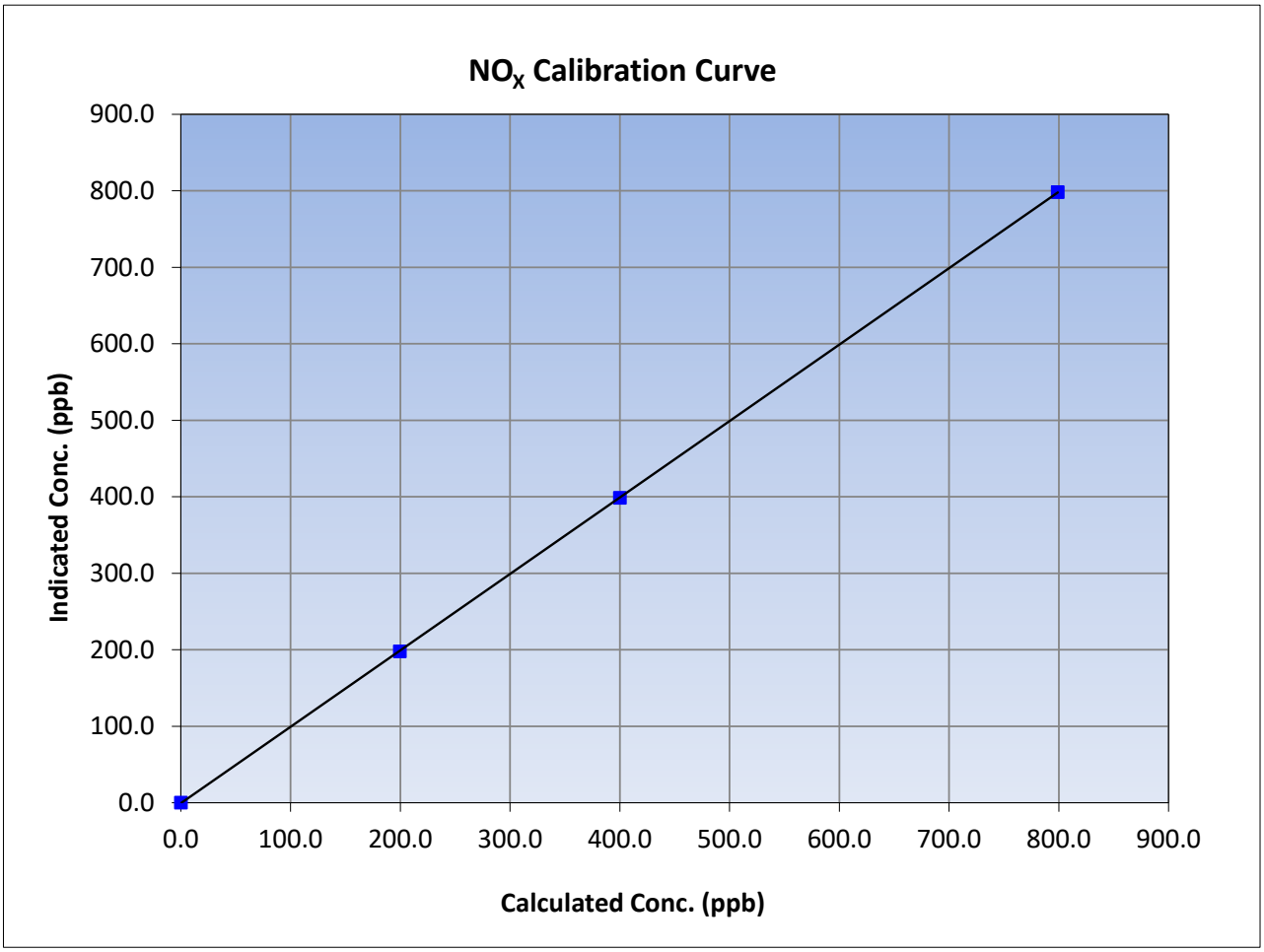
Version-04-2020

Station Information

Calibration Date:	May 19, 2023	Previous Calibration:	May 18, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	5:15	End Time (MST):	9:38
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	0.999996	≥0.995
799.1	798.3	1.0010			
400.1	398.7	1.0034	Slope	0.999316	0.90 - 1.10
199.5	198.0	1.0076			
			Intercept	-0.653591	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

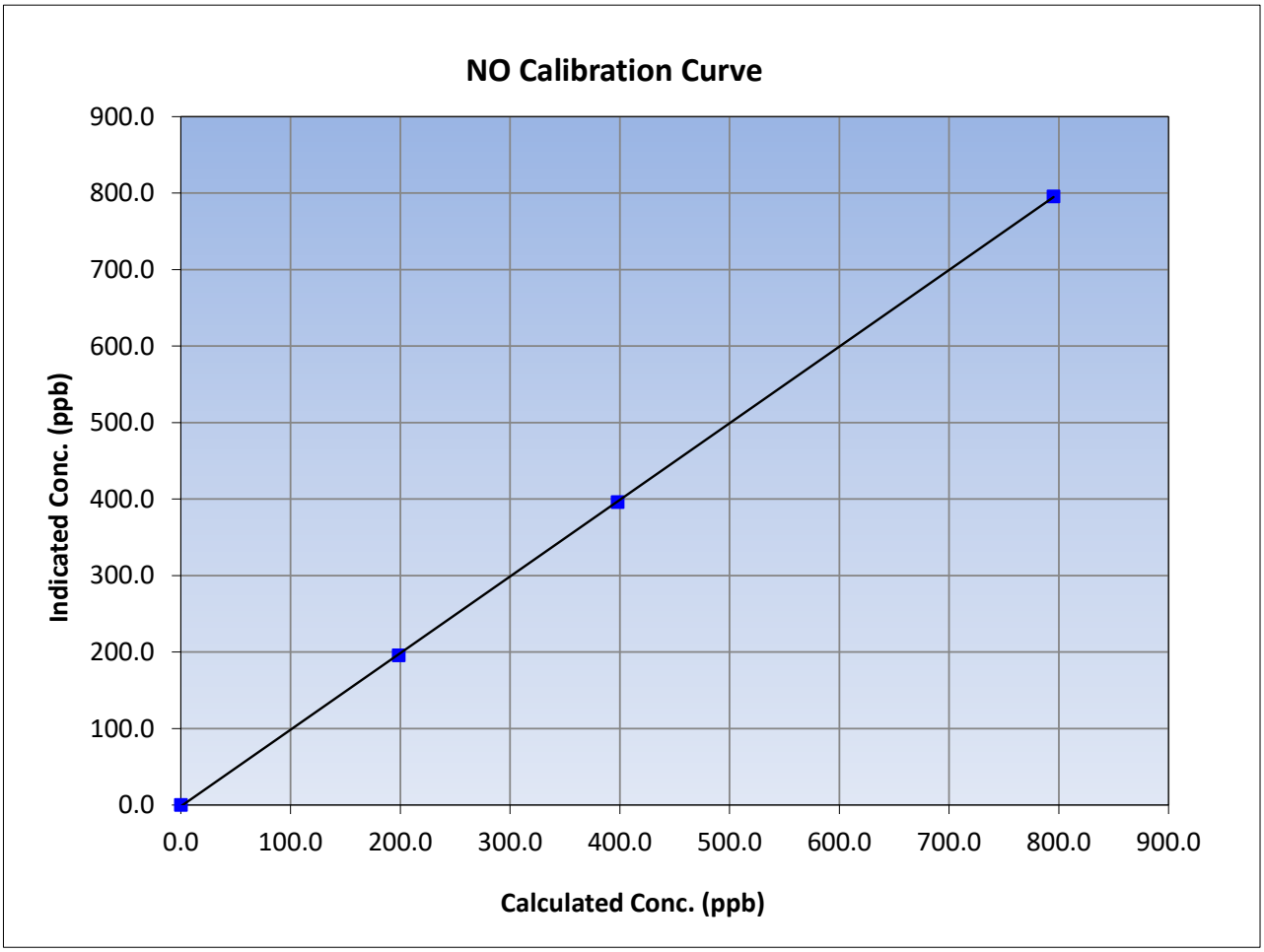
Version-04-2020

Station Information

Calibration Date:	May 19, 2023	Previous Calibration:	May 18, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	5:15	End Time (MST):	9:38
Analyzer make:	API T200	Analyzer serial #:	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999979	≥0.995
795.2	795.7	0.9994			
398.1	396.2	1.0048	Slope	1.001680	0.90 - 1.10
198.5	195.5	1.0155			
			Intercept	-1.693638	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

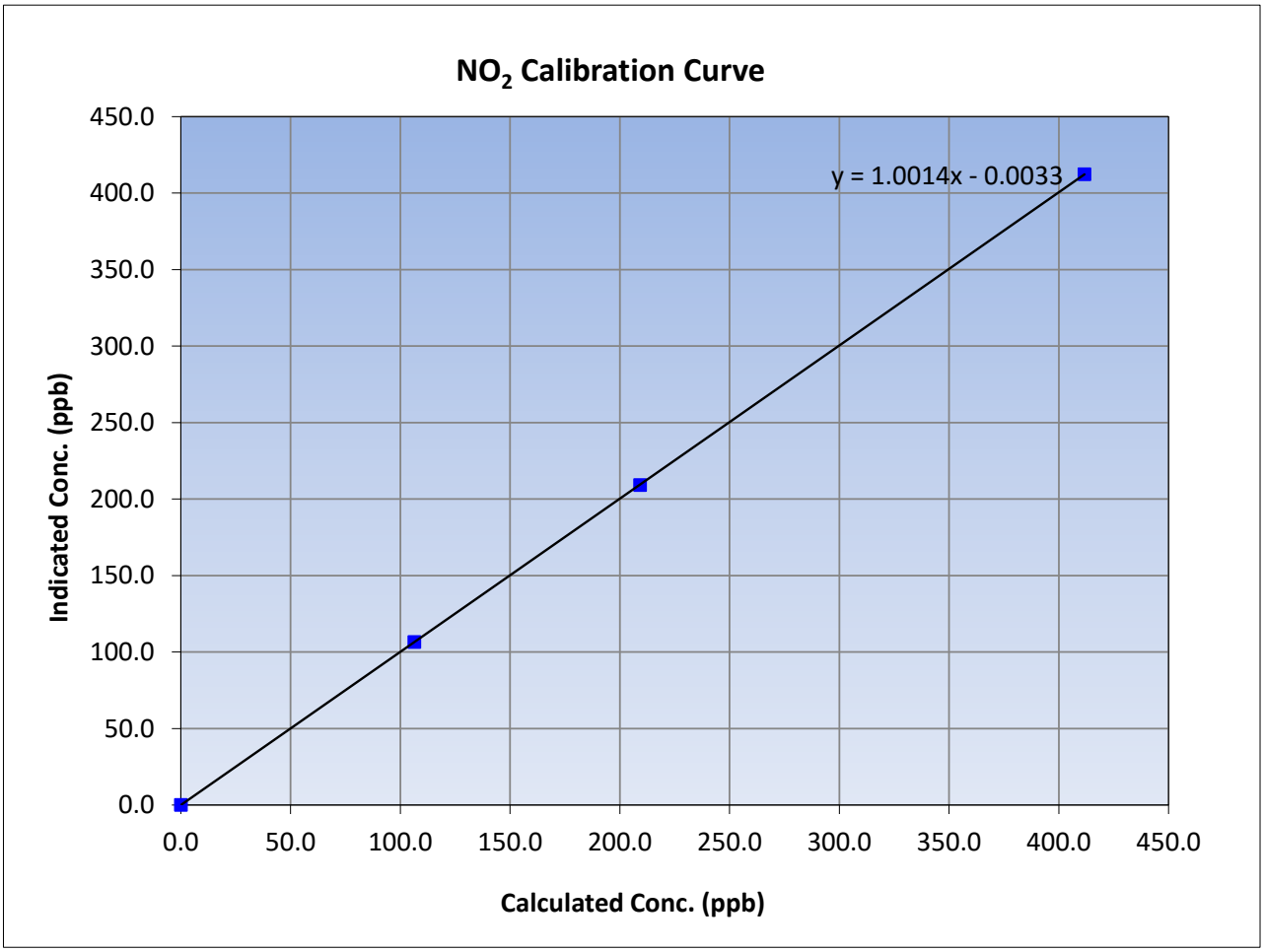
Version-04-2020

Station Information

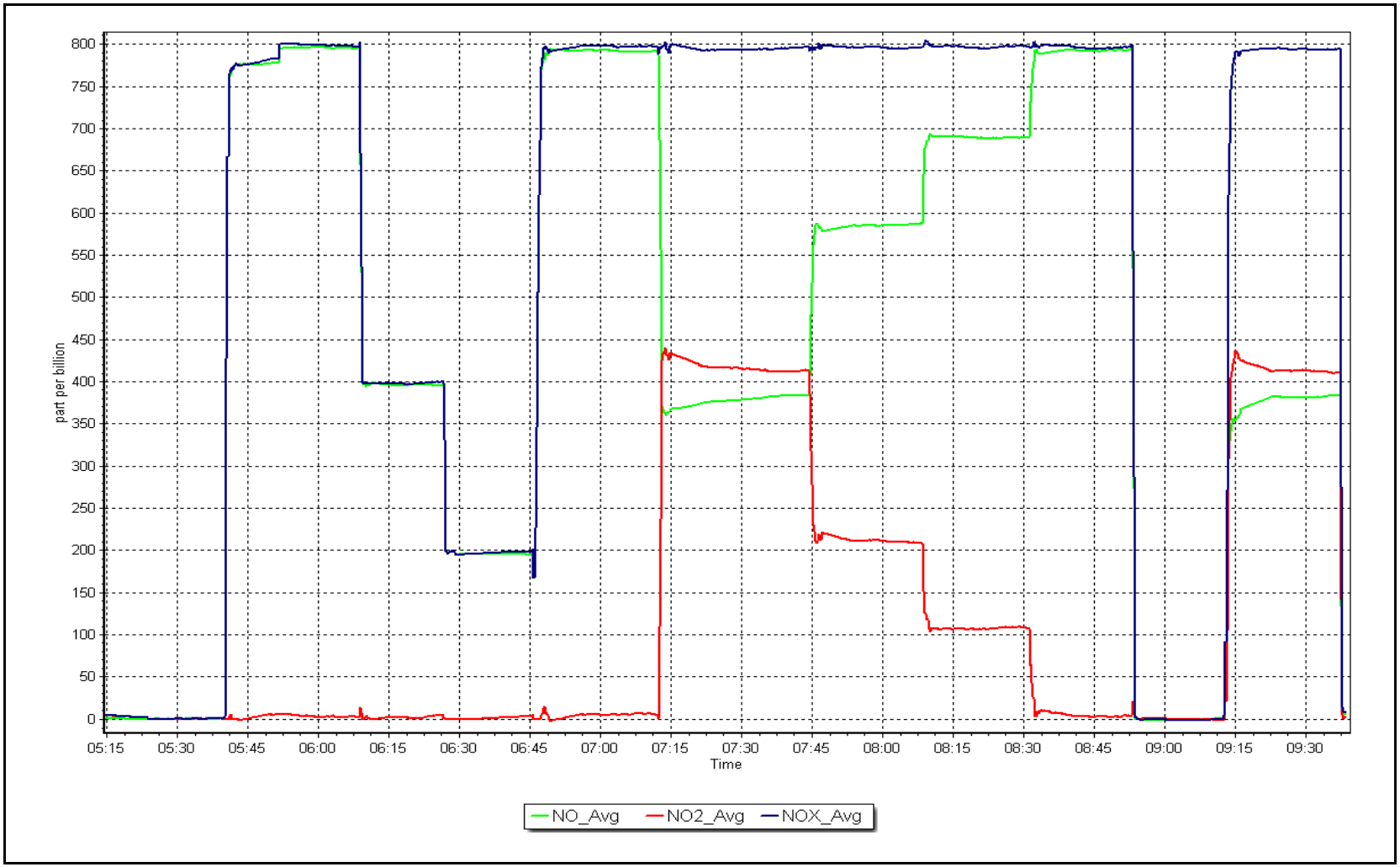
Calibration Date:	May 19, 2023	Previous Calibration:	May 18, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	5:15	End Time (MST):	9:38
Analyzer make:	API T200	Analyzer serial #:	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999999	≥0.995
411.7	412.4	0.9983			
209.2	209.2	1.0000	Slope	1.001373	0.90 - 1.10
106.4	106.6	0.9982			
			Intercept	-0.003271	+/-20



NO_X Calibration Plot Date: May 19, 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:	May 4, 2023	Last Cal Date:	April 3, 2023
Start time (MST):	5:58	End time (MST):	8:37
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000143	0.998743	Backgd or Offset:	-2.7	-2.6
Calibration intercept:	-0.100000	1.020000	Coeff or Slope:	1.035	1.008

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	978.9	400.0	410.7	0.974
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.8	----
high point	5000	981.1	400.0	400.4	0.999
second point	5000	813.4	200.0	200.9	0.996
third point	5000	704.3	100.0	101.1	0.989
as left zero	5000	0.0	0.0	1.1	----
as left span	5000	981.8	400.0	400.8	0.998
				Average Correction Factor	0.995

Baseline Corr As found:	410.6	Previous response	400.0	*% change	2.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No Maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

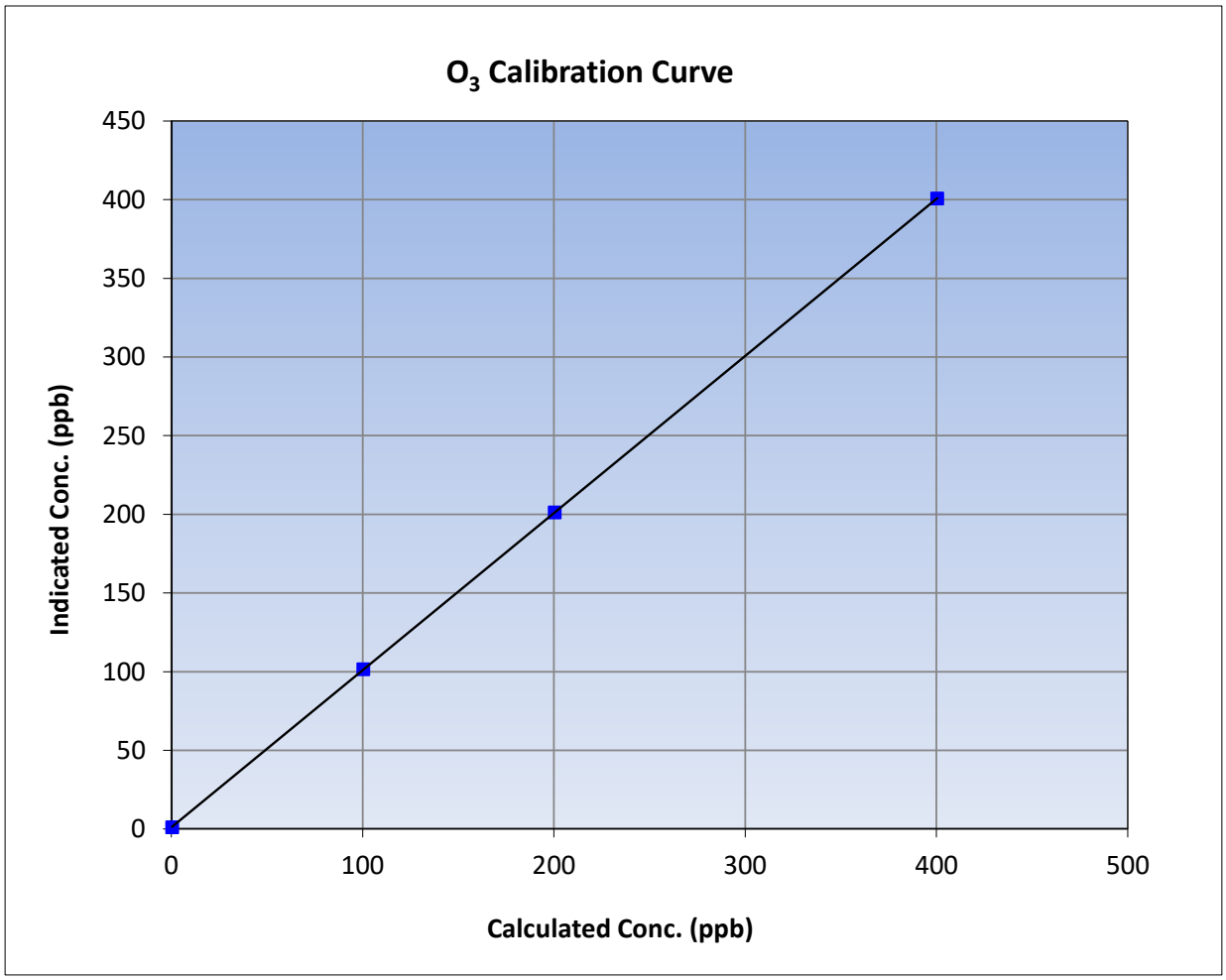
Station Information

Calibration Date:	May 4, 2023	Previous Calibration:	April 3, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	5:58	End Time (MST):	8:37
Analyzer make:	API T400	Analyzer serial #:	2961

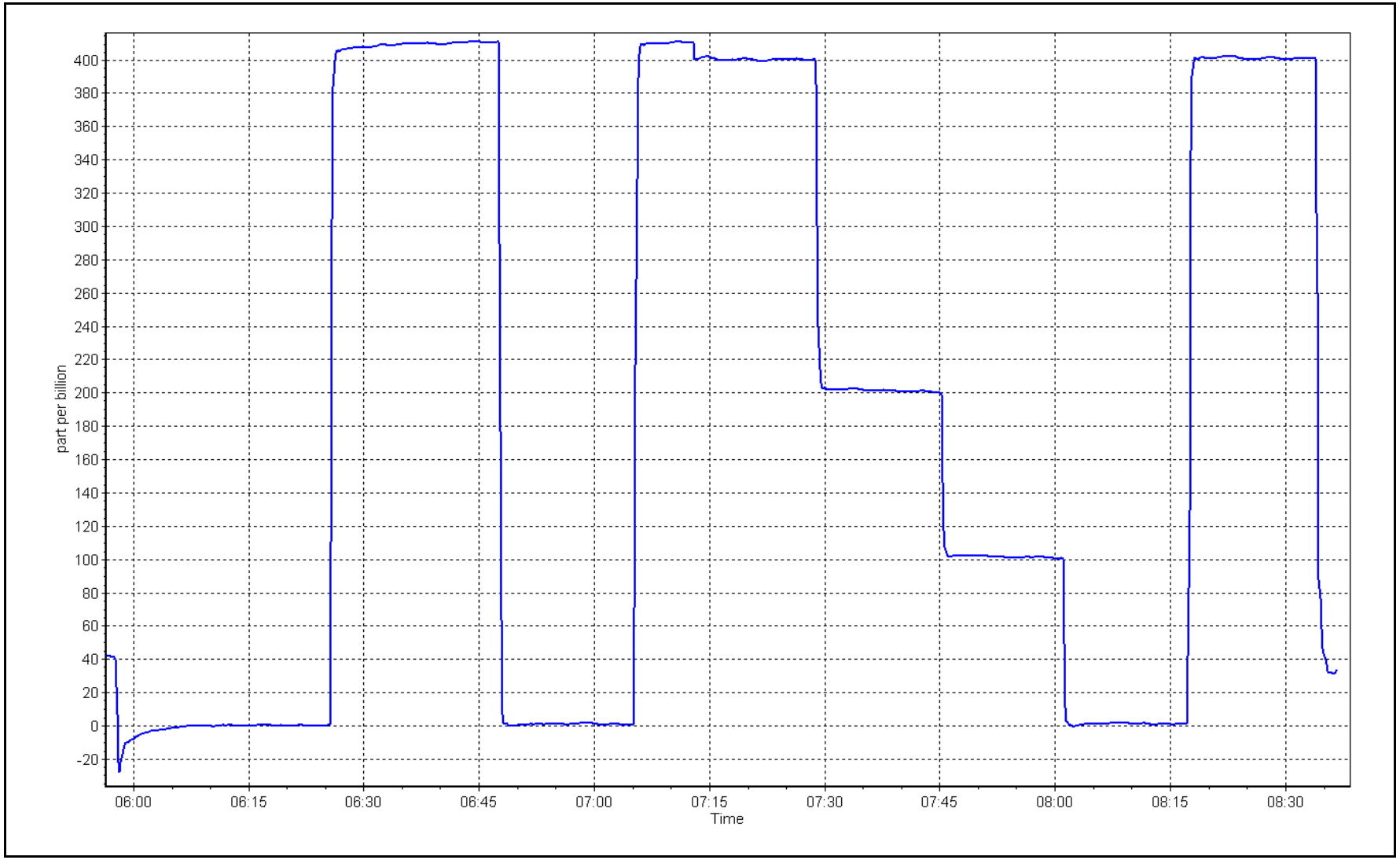
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.8	----
400.0	400.4	0.9990
200.0	200.9	0.9955
100.0	101.1	0.9891

Statistical Evaluation		Limits
Correlation Coefficient	0.999999	≥0.995
Slope	0.998743	0.90 - 1.10
Intercept	1.020000	+/- 5



O_3 Calibration Plot Date: May 4, 2023 Location: Buffalo Viewpoint



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS 04
Calibration Date:	May 16, 2023	Last Cal Date:	April 27, 2023
Start time (MST):	7:16	End time (MST):	7:53
Analyzer Make:	API T640	S/N:	322
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	AliCat	S/N:	228085
Temp/RH standard:	AliCat	S/N:	228085

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	12.9	12.6	12.9	☐	+/- 2 °C
P (mmHg)	731.1	732.8	731.1	☐	+/- 10 mmHg
flow (LPM)	5	4.7	5	☑	+/- 0.25 LPM

Leak Test: Date of check: May 16, 2023 Last Cal Date: April 27, 2023

PM w/o HEPA: 58 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

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

Disposable Filter Changed: March 28, 2023

Annual Maintenance

Date Sample Tube Cleaned: September 15, 2022

Date RH/T Sensor Cleaned: September 15, 2022

Notes: Flow adjusted. Head cleaned. Leak check passed.

Calibration by: Melissa Lemay

Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS 04
Calibration Date:	May 23, 2023	Last Cal Date:	May 16, 2023
Start time (MST):	9:17	End time (MST):	10:41
Analyzer Make:	API T640	S/N:	322
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Deltacal	S/N:	1451
Temp/RH standard:	Deltacal	S/N:	1451

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	10.5	10.8	10.5	☐	+/- 2 °C
P (mmHg)	732.4	733	732.4	☐	+/- 10 mmHg
flow (LPM)	5.03	5.24	5.03	☐	+/- 0.25 LPM

Leak Test: Date of check: May 23, 2023 Last Cal Date: May 16, 2023

PM w/o HEPA: 24.3 PM w/ HEPA: 24.3 <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	5.2	10.8	10.8	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 95.4 w/ HEPA: 0

Date Optical Chamber Cleaned: May 23, 2023 <0.2 ug/m3

Disposable Filter Changed: May 23, 2023

Annual Maintenance

Date Sample Tube Cleaned: May 23, 2023

Date RH/T Sensor Cleaned: May 23, 2023

Notes: Initial leak check is not passing, will proceed with the maintenance. PMT peak test was adjusted. Post-maintenance leak check passed.

Calibration by: Sean Bala

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS05
MANNIX
MAY 2023

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

June 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	May 5, 2023	Last Cal Date:	April 25, 2023
Start time (MST):	12:28	End time (MST):	15:16
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003342	0.990561	Backgd or Offset:	9.0	8.8
Calibration intercept:	0.240000	0.040000	Coeff or Slope:	0.920	0.920

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4920	80.0	800.3	790.6	1.012
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4920	80.0	800.3	792.8	1.009
second point	4960	40.0	400.2	396.7	1.009
third point	4980	20.0	200.1	197.7	1.012
as left zero	5000	0.0	0.0	0.4	----
as left span	4920	80.0	800.3	798.5	1.002
				Average Correction Factor	1.010

Baseline Corr As found:	790.50	Previous response	803.23	*% change	-1.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

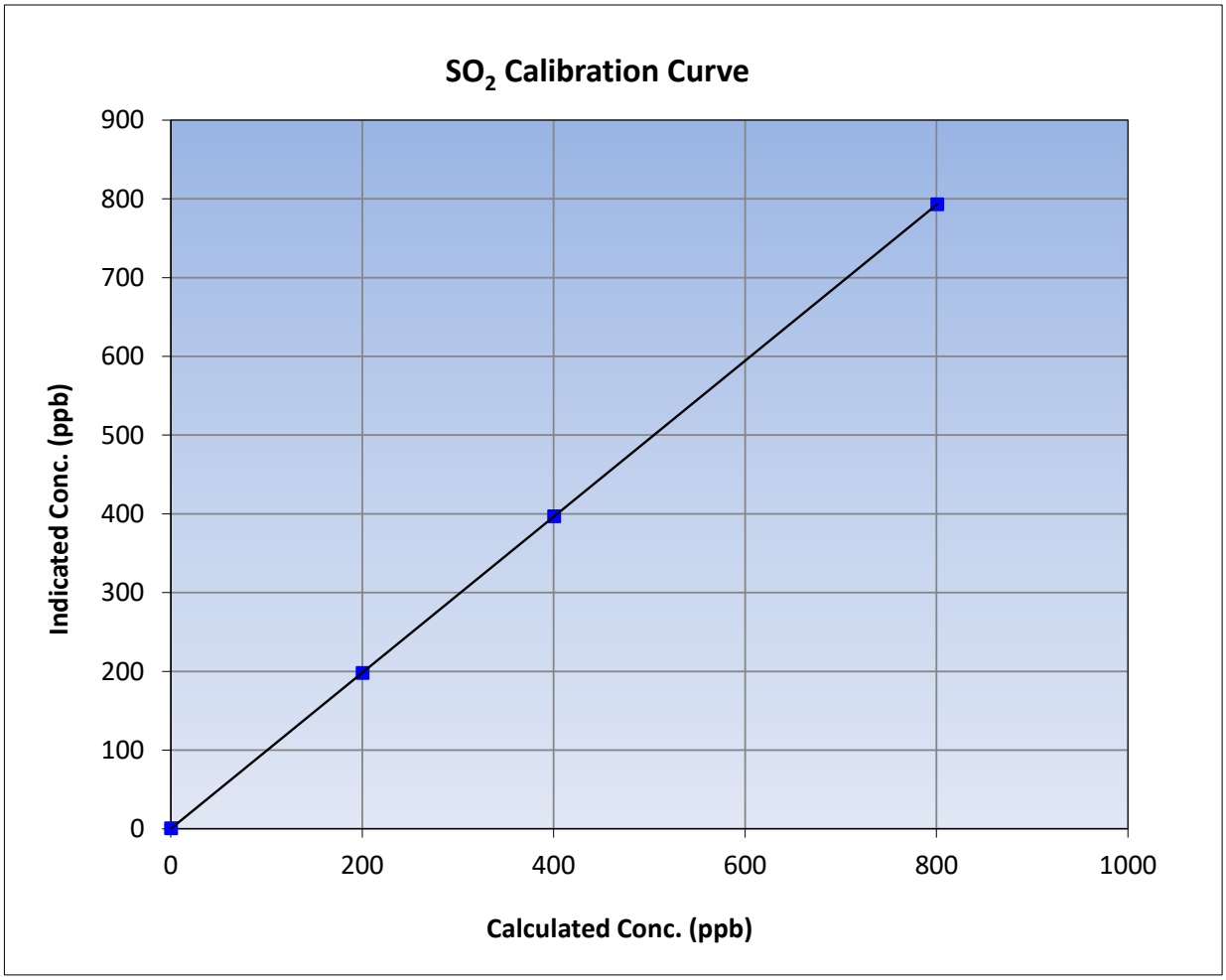
Station Information

Calibration Date:	May 5, 2023	Previous Calibration:	April 25, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	12:28	End Time (MST):	15:16
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841399

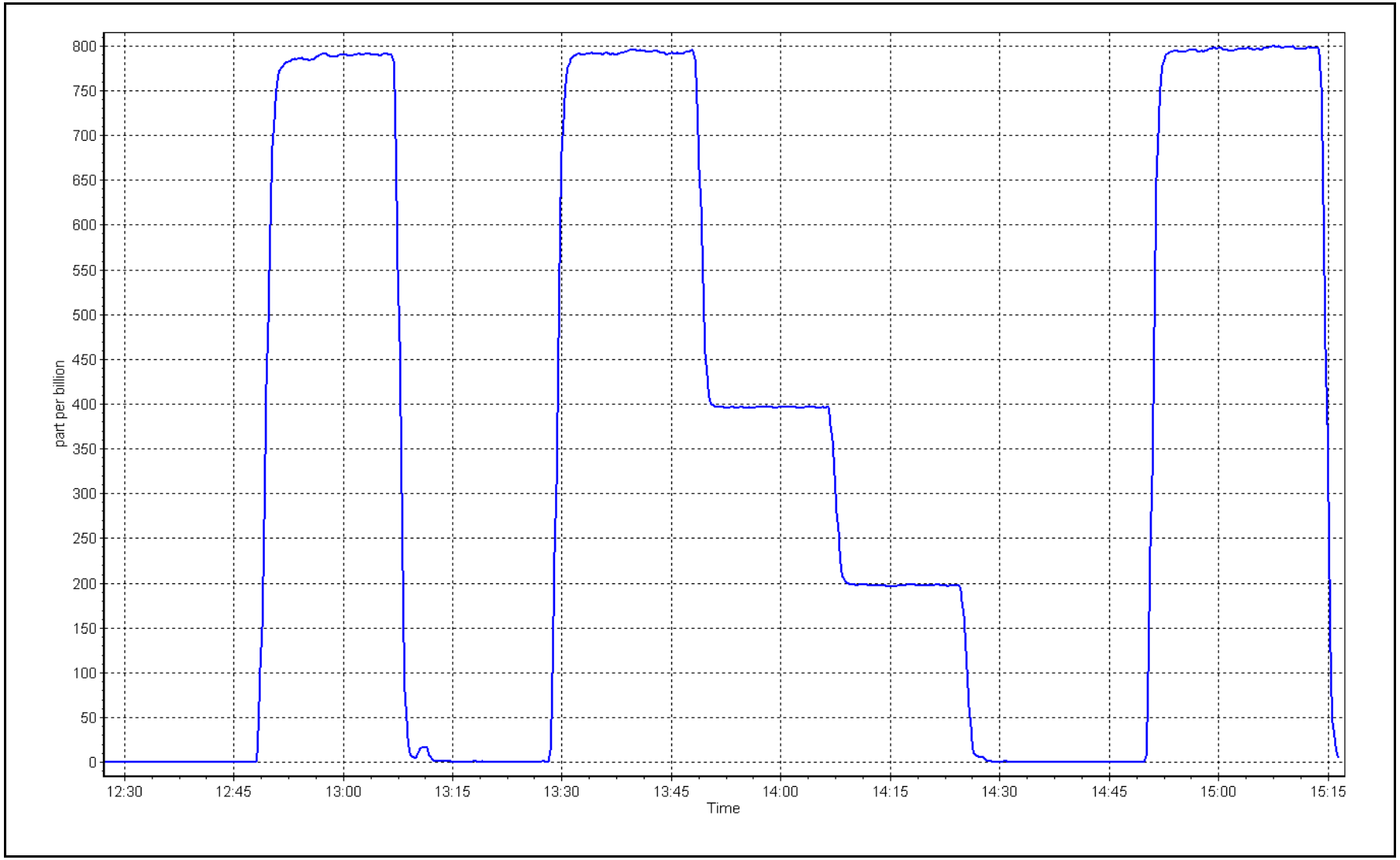
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
800.3	792.8	1.0095
400.2	396.7	1.0087
200.1	197.7	1.0120

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	0.990561	*0.90 - 1.10*
Intercept	0.040000	*+/-30*



SO2 Calibration Plot Date: May 5, 2023 Location: Mannix



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	May 18, 2023	Last Cal Date:	April 17, 2023
Start time (MST):	10:00	End time (MST):	14:51
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:	1.005327	1.005754	Backgd or Offset:	2.17	2.25
Calibration intercept:	0.060642	0.020710	Coeff or Slope:	0.849	0.893

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4919	81.3	80.0	80.1	0.999
as found 2nd point	4960	40.7	40.0	39.5	1.014
as found 3rd point	4980	20.3	20.0	19.5	1.024
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	4919	81.3	80.0	80.5	0.994
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	0.3	----
as left span	4919	81.3	80.0	79.7	1.004
SO2 Scrubber Check	4920	80.0	800.0	0.1	----
Date of last scrubber change:				Ave Corr Factor	0.993
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.1	Prev response:	80.48	*% change:	-0.5%
Baseline Corr 2nd AF pt:	39.5	AF Slope:	1.002610	AF Intercept:	-0.319257
Baseline Corr 3rd AF pt:	19.5	AF Correlation:	0.999915		

* = > +/-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: Mohammed Kashif

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

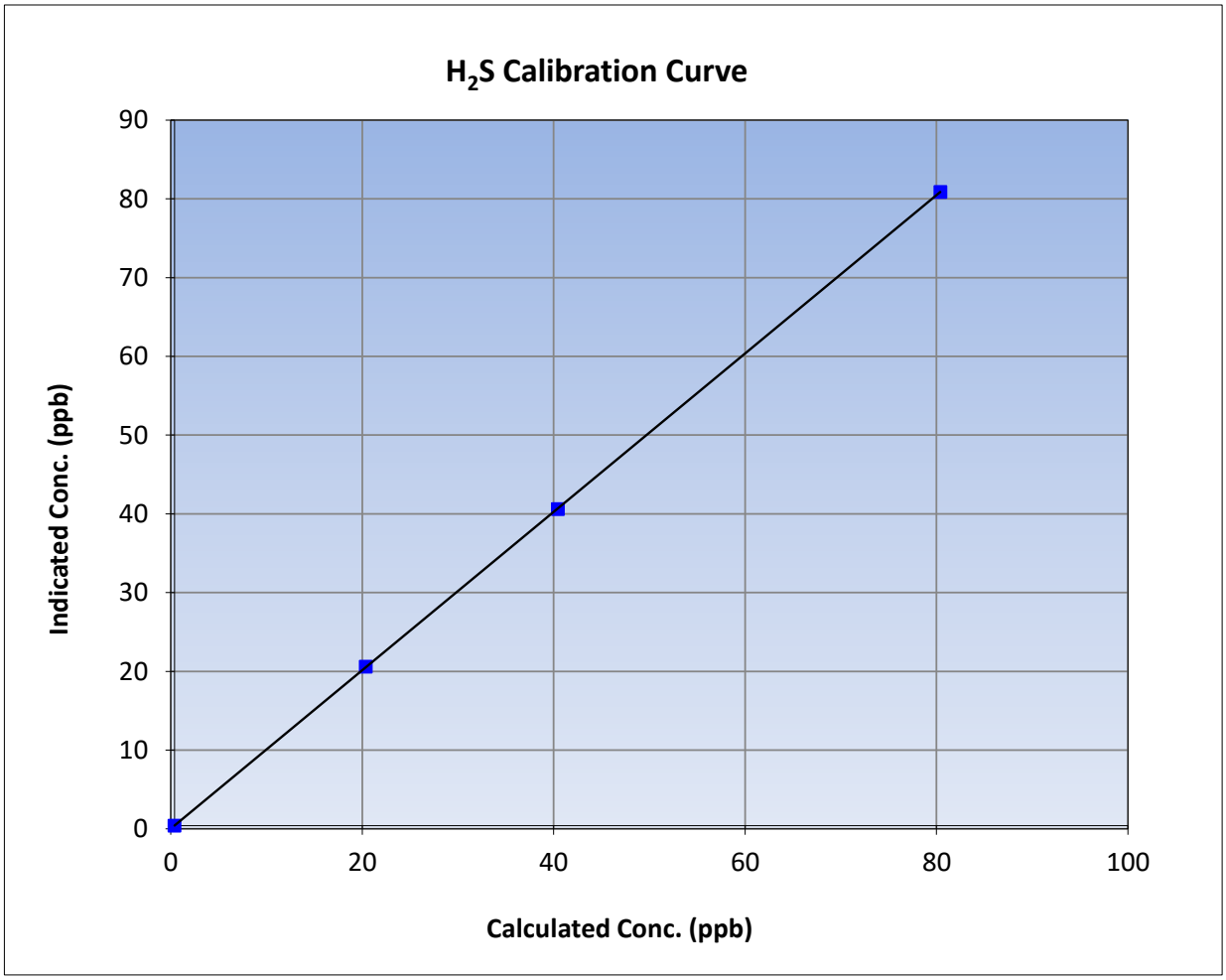
Station Information

Calibration Date:	May 18, 2023	Previous Calibration:	April 17, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	10:00	End Time (MST):	14:51
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1203169745

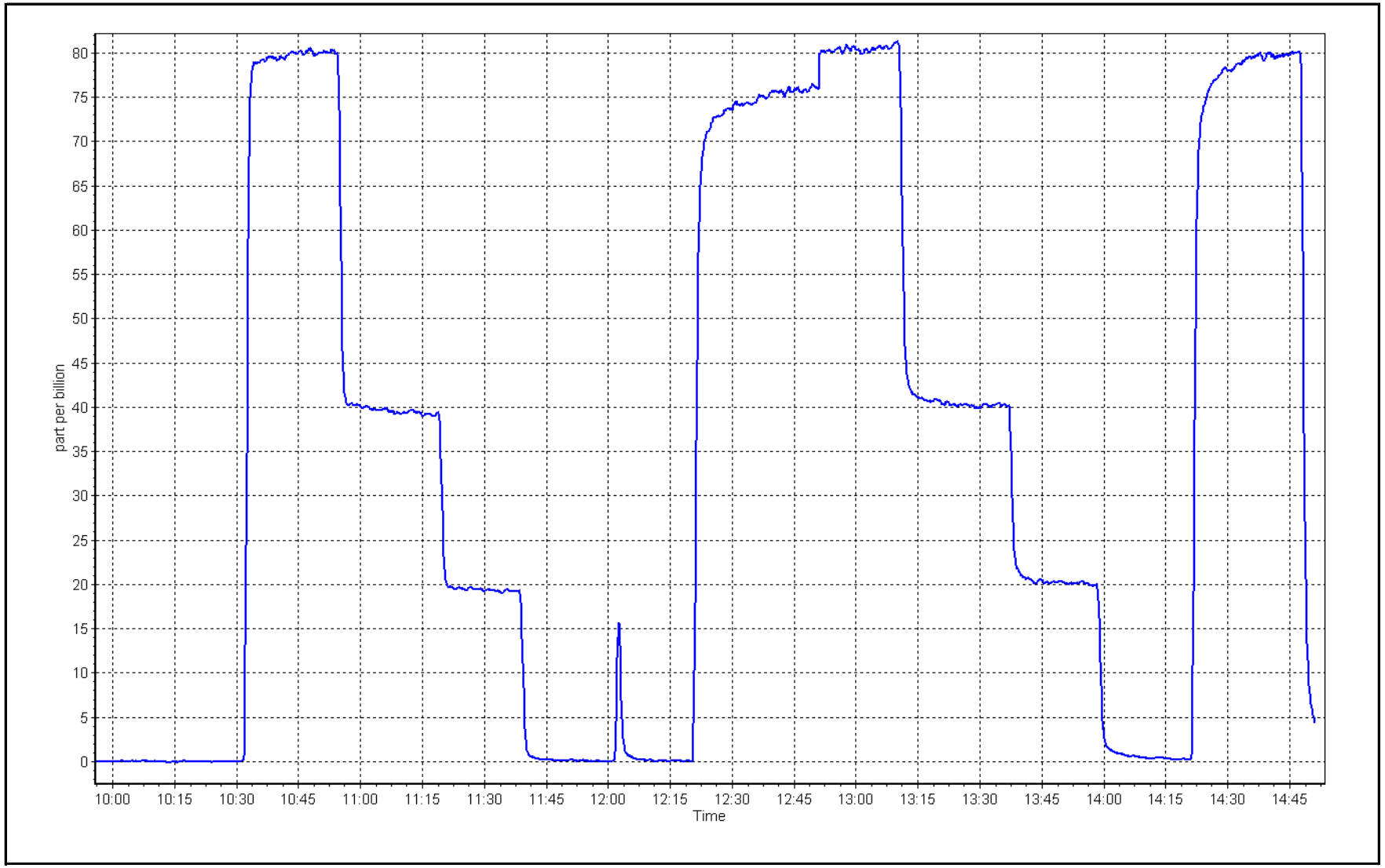
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.5	0.9937
40.0	40.2	0.9961
20.0	20.2	0.9888

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.005754	*0.90 - 1.10*
Intercept	0.020710	*+/-3*



H_2S Calibration Plot Date: May 18, 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:	May 4, 2023	Last Cal Date:	April 25, 2023
Start time (MST):	9:20	End time (MST):	11:03
Reason:	Cylinder Change	Support gas cylinder change out.	

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:	2.65E-04	NA	NMHC SP Ratio:	4.42E-05	NA
CH4 Retention time:	15.00	NA	NMHC Peak Area:	206898	NA

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	17.23	17.41	0.989
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	17.23	17.42	0.989
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.989

Baseline Corr AF:	17.41	Prev response	17.24	*% 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	0.00	0.00	----
as found span	4920	80	9.15	9.22	0.992
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	9.19	0.995
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.995
Baseline Corr AF:	9.22	Prev response	9.17	*% change	0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	8.08	8.19	0.987
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	8.08	8.23	0.982
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.982
Baseline Corr AF:	8.19	Prev response	8.07	*% change	1.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

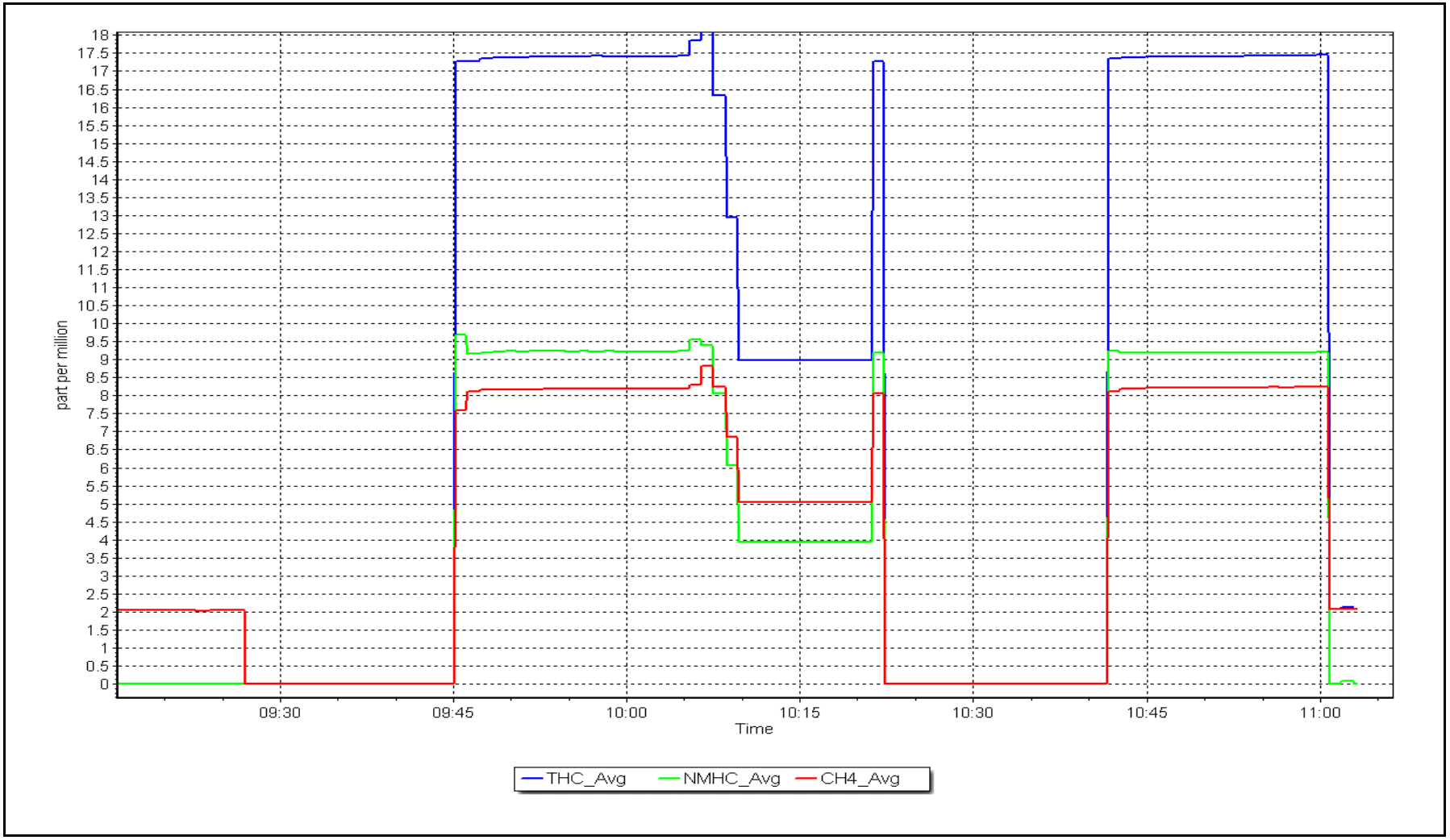
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000899	1.011204
THC Cal Offset:	-0.002400	0.000000
CH4 Cal Slope:	1.000594	1.018642
CH4 Cal Offset:	-0.009400	0.000000
NMHC Cal Slope:	1.001168	1.004854
NMHC Cal Offset:	0.007000	0.000000

Notes: Changed out the Hydrogen cylinder after as founds.

Calibration Performed By: Mohammed Kashif

NMHC Calibration Plot Date: May 4, 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:	May 5, 2023	Last Cal Date:	April 25, 2023
Start time (MST):	12:28	End time (MST):	15:16
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:	2.65E-04	2.65E-04	NMHC SP Ratio:	4.42E-05	4.42E-05
CH4 Retention time:	15.00	15.00	NMHC Peak Area:	206898	206898

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	17.38	0.991
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	17.23	17.24	0.999
second point	4960	40.0	8.61	8.69	0.991
third point	4980	20.0	4.31	4.34	0.993
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	17.23	17.38	0.991
				Average Correction Factor	0.994

Baseline Corr AF:	17.38	Prev response	17.24	*% change	0.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4920	80	9.15	9.20	0.994
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4920	80	9.15	9.16	0.998
second point	4960	40	4.57	4.61	0.992
third point	4980	20	2.29	2.31	0.989
as left zero	5000	0	0.00	0.00	----
as left span	4920	80	9.15	9.21	0.993
				Average Correction Factor	0.993
Baseline Corr AF:	9.20	Prev response	9.17	*% change	0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	8.08	8.19	0.987
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	8.08	8.08	1.000
second point	4960	40.0	4.04	4.08	0.991
third point	4980	20.0	2.02	2.03	0.997
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	8.08	8.17	0.989
				Average Correction Factor	0.996
Baseline Corr AF:	8.19	Prev response	8.07	*% change	1.4%
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:	1.000899	1.000806
THC Cal Offset:	-0.002400	0.024800
CH4 Cal Slope:	1.000594	1.000481
CH4 Cal Offset:	-0.009400	0.009000
NMHC Cal Slope:	1.001168	1.001131
NMHC Cal Offset:	0.007000	0.015400

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

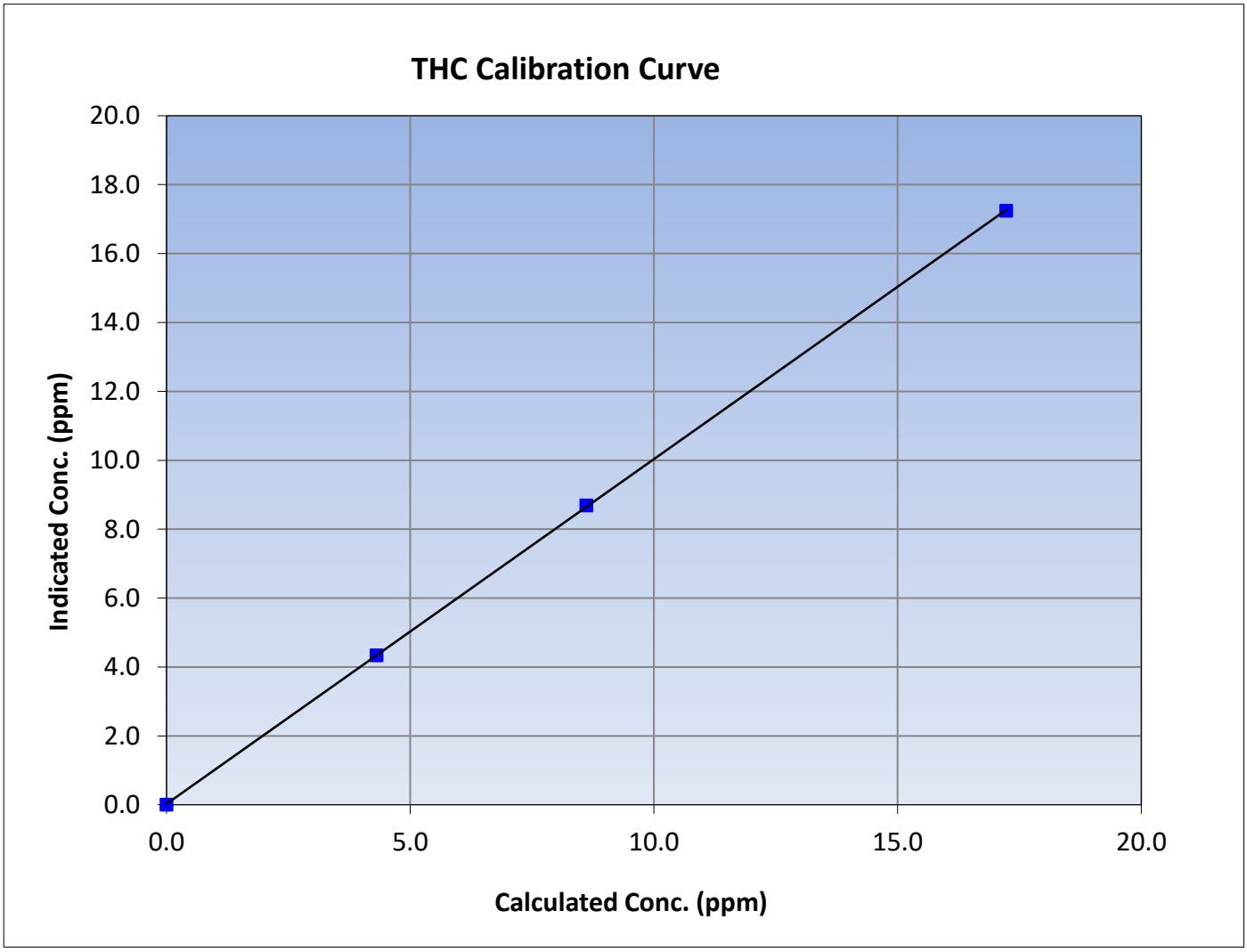
Version-01-2020

Station Information

Calibration Date:	May 5, 2023	Previous Calibration:	April 25, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	12:28	End Time (MST):	15:16
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	0.999981	*≥0.995*
17.23	17.24	0.9991			
8.61	8.69	0.9914	Slope	1.000806	*0.90 - 1.10*
4.31	4.34	0.9925			
			Intercept	0.024800	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

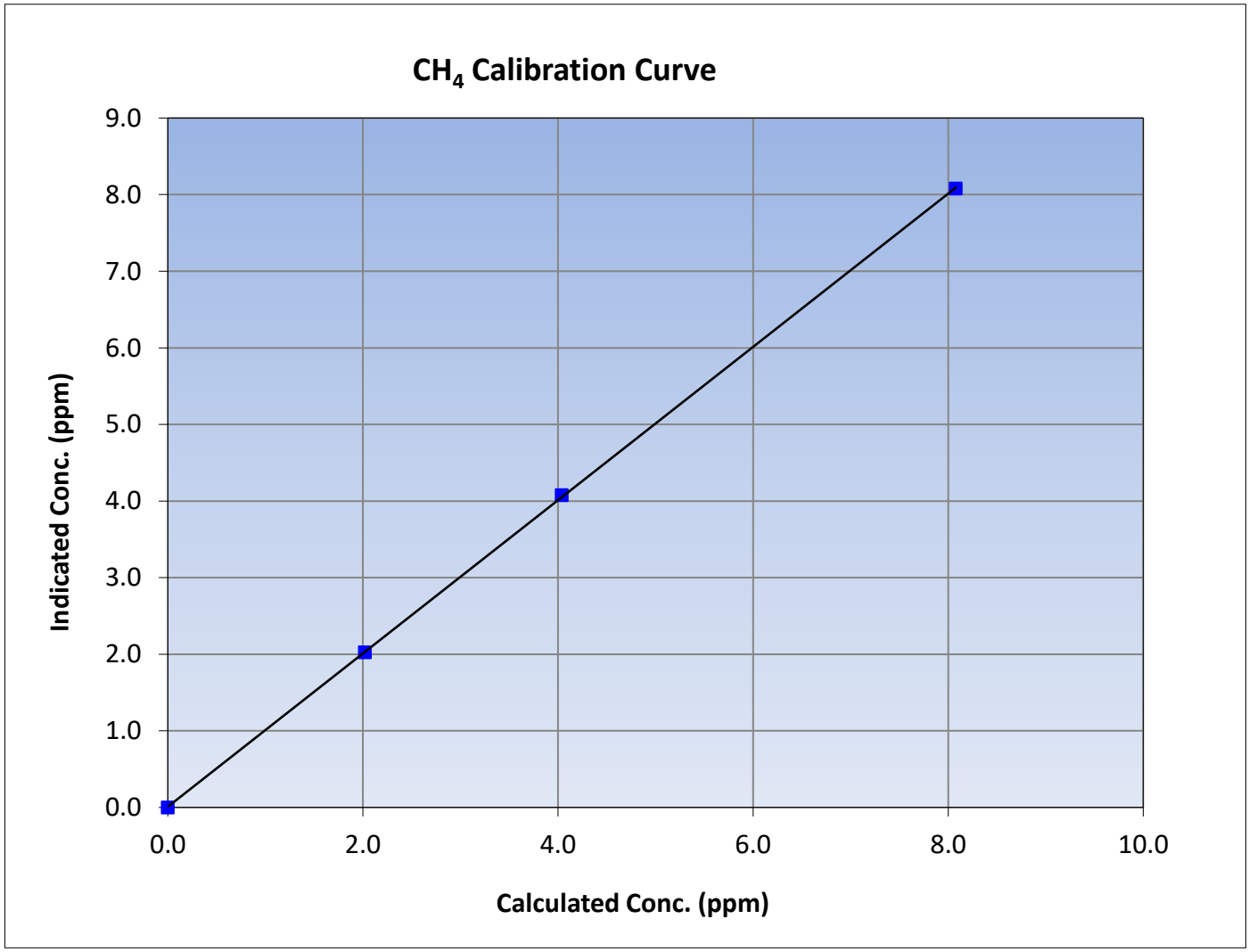
Version-01-2020

Station Information

Calibration Date:	May 5, 2023	Previous Calibration:	April 25, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	12:28	End Time (MST):	15:16
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	0.999976	*≥0.995*
8.08	8.08	0.9998			
4.04	4.08	0.9912	Slope	1.000481	*0.90 - 1.10*
2.02	2.03	0.9973			
			Intercept	0.009000	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

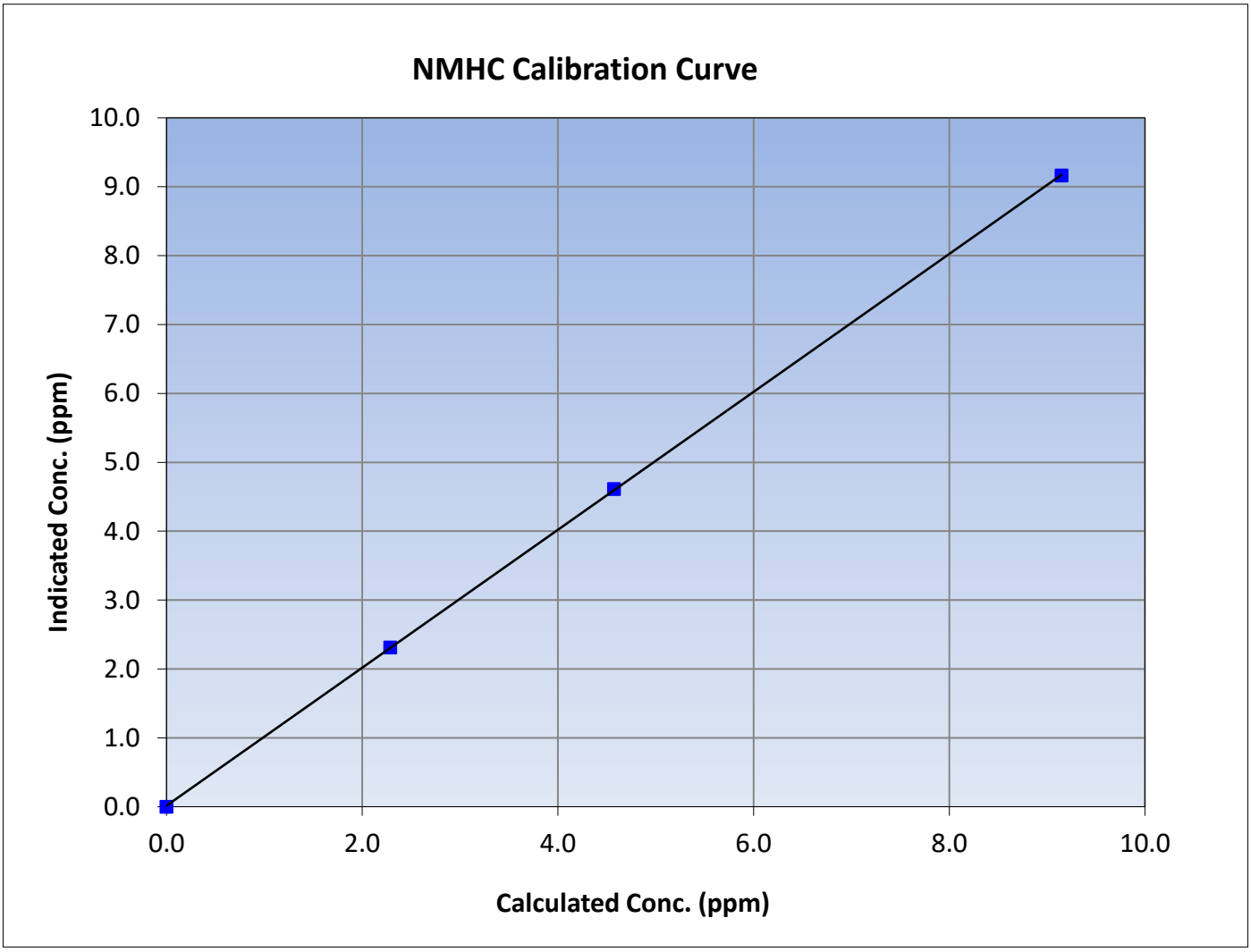
Version-01-2020

Station Information

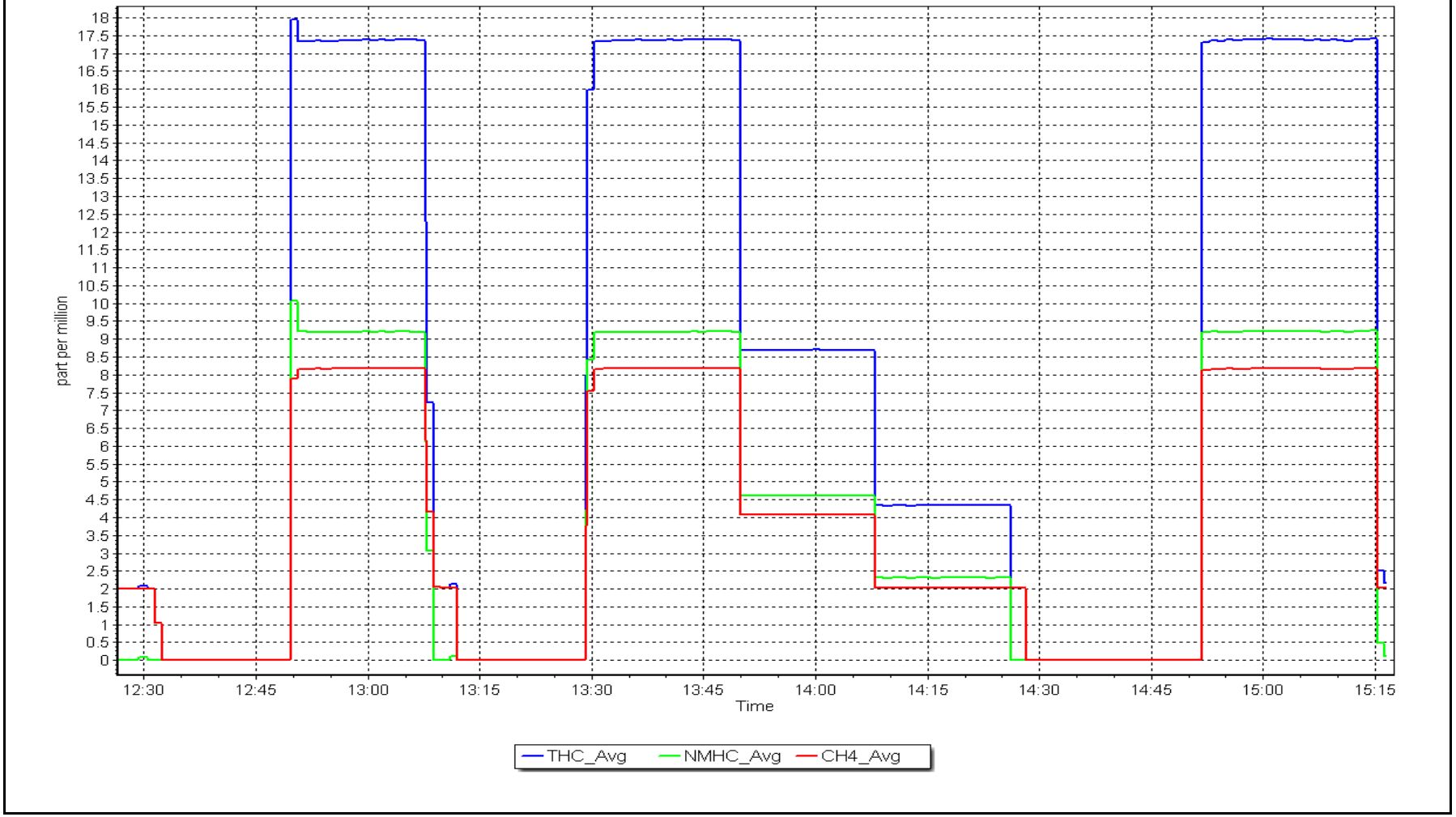
Calibration Date:	May 5, 2023	Previous Calibration:	April 25, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	12:28	End Time (MST):	15:16
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999983	*≥0.995*
9.15	9.16	0.9984			
4.57	4.61	0.9915	Slope	1.001131	*0.90 - 1.10*
2.29	2.31	0.9887			
			Intercept	0.015400	*+/-0.5*



NMHC Calibration Plot Date: May 5, 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:	May 8, 2023	Last Cal Date:	May 5, 2023
Start time (MST):	9:09	End time (MST):	11:50
Reason:	Maintenance		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1152430011	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.65E-04	2.66E-04	NMHC SP Ratio:	4.42E-05	4.41E-05
CH4 Retention time:	15.00	15.20	NMHC Peak Area:	206898	207349

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	17.23	17.26	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	17.23	17.26	0.998
second point	4960	40.0	8.61	8.61	1.000
third point	4980	20.0	4.31	4.31	0.999
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	17.23	17.25	0.998
				Average Correction Factor	0.999

Baseline Corr AF:	17.26	Prev response	17.26	*% 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	0.00	0.00	----
as found span	4920	80	9.15	9.20	0.995
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	9.18	0.997
second point	4960	40	4.57	4.59	0.997
third point	4980	20	2.29	2.30	0.994
as left zero	5000	0	0.00	0.00	----
as left span	4920	80	9.15	9.16	0.998
				Average Correction Factor	0.996
Baseline Corr AF:	9.20	Prev response	9.17	*% change	0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	8.08	8.07	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	8.08	8.08	1.000
second point	4960	40.0	4.04	4.02	1.004
third point	4980	20.0	2.02	2.01	1.005
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	8.08	8.09	0.998
				Average Correction Factor	1.003
Baseline Corr AF:	8.07	Prev response	8.09	*% change	-0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000806	1.001881
THC Cal Offset:	0.024800	-0.005800
CH4 Cal Slope:	1.000481	1.000679
CH4 Cal Offset:	0.009000	-0.008200
NMHC Cal Slope:	1.001131	1.002855
NMHC Cal Offset:	0.015400	0.003000

Notes: Maintenance. Adjusted span only to fix the dipping issue.

Calibration Performed By: Denny Ray estador and Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

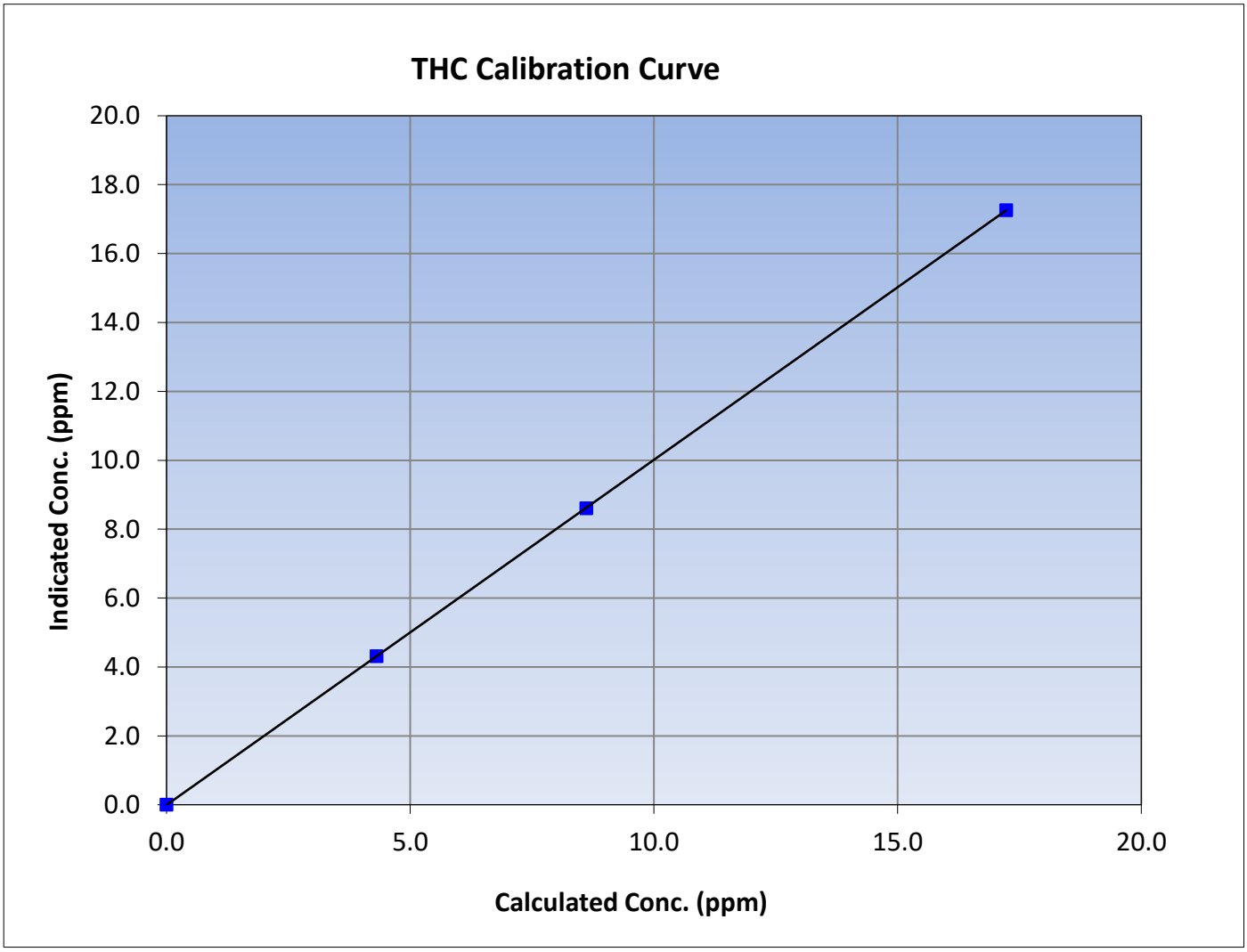
Version-01-2020

Station Information

Calibration Date:	May 8, 2023	Previous Calibration:	May 5, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	9:09	End Time (MST):	11:50
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	17.26	0.9981			
8.61	8.61	1.0003	Slope	1.001881	0.90 - 1.10
4.31	4.31	0.9992			
			Intercept	-0.005800	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

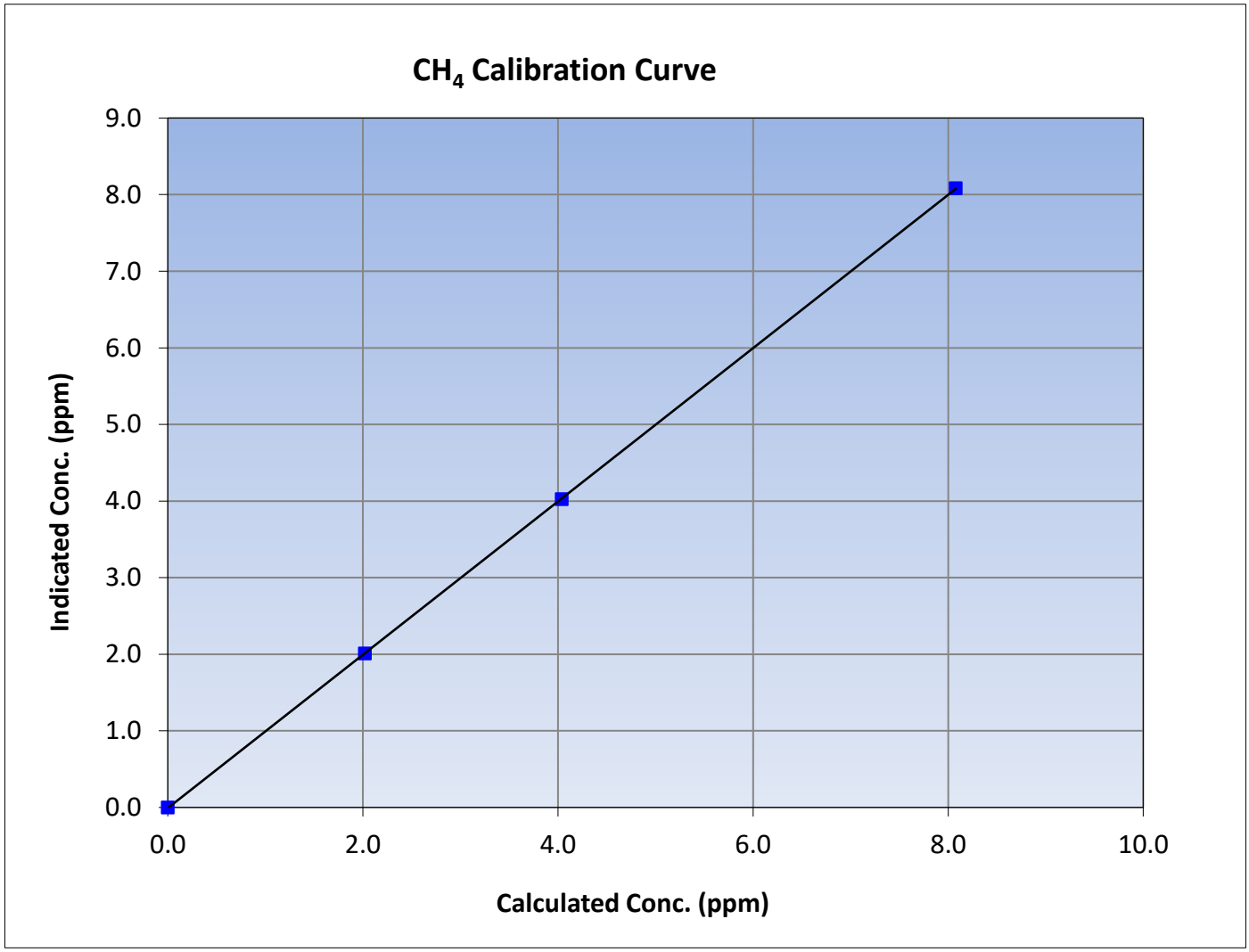
Version-01-2020

Station Information

Calibration Date:	May 8, 2023	Previous Calibration:	May 5, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	9:09	End Time (MST):	11:50
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	0.999993	*≥0.995*
8.08	8.08	0.9996			
4.04	4.02	1.0040	Slope	1.000679	*0.90 - 1.10*
2.02	2.01	1.0053			
			Intercept	-0.008200	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

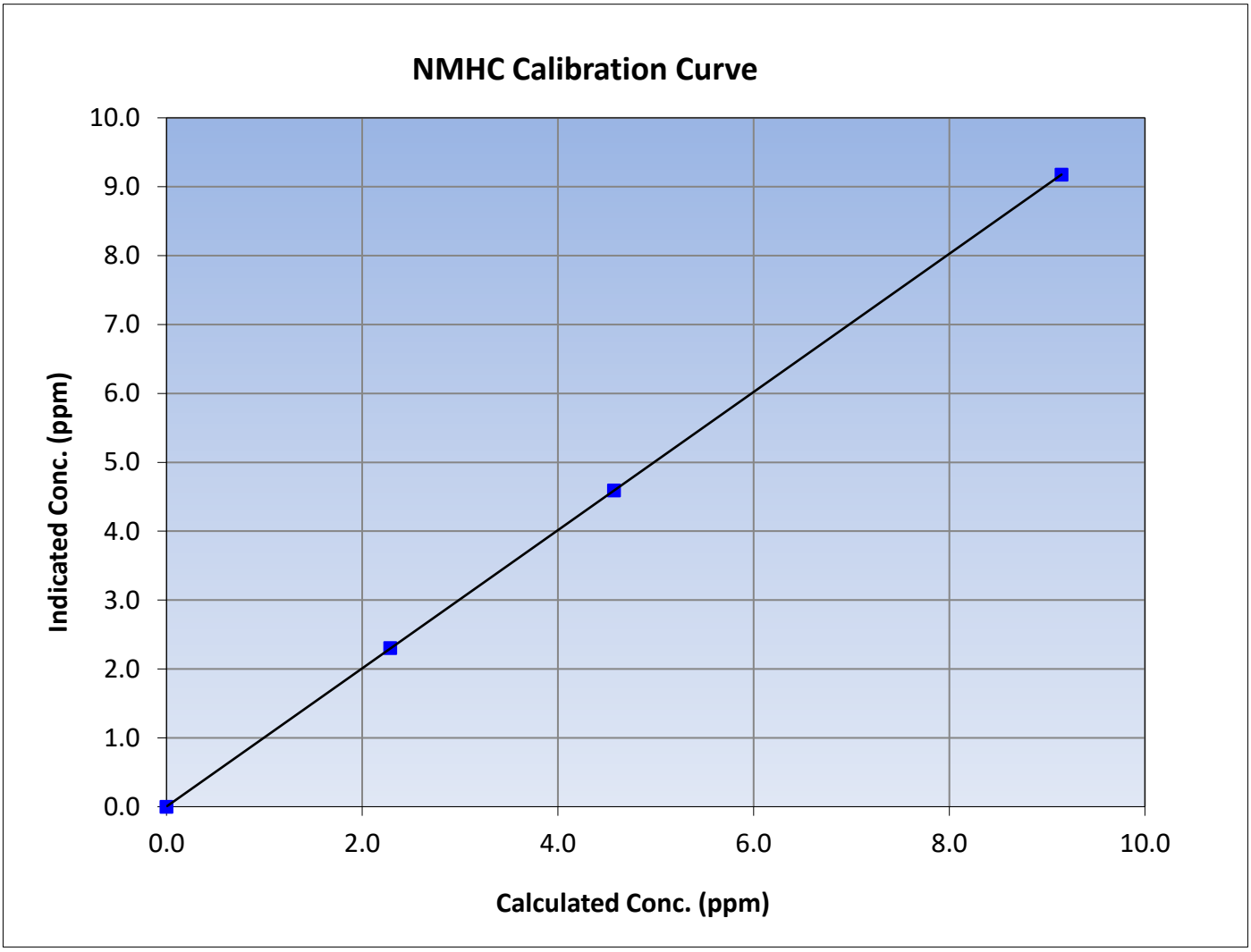
Version-01-2020

Station Information

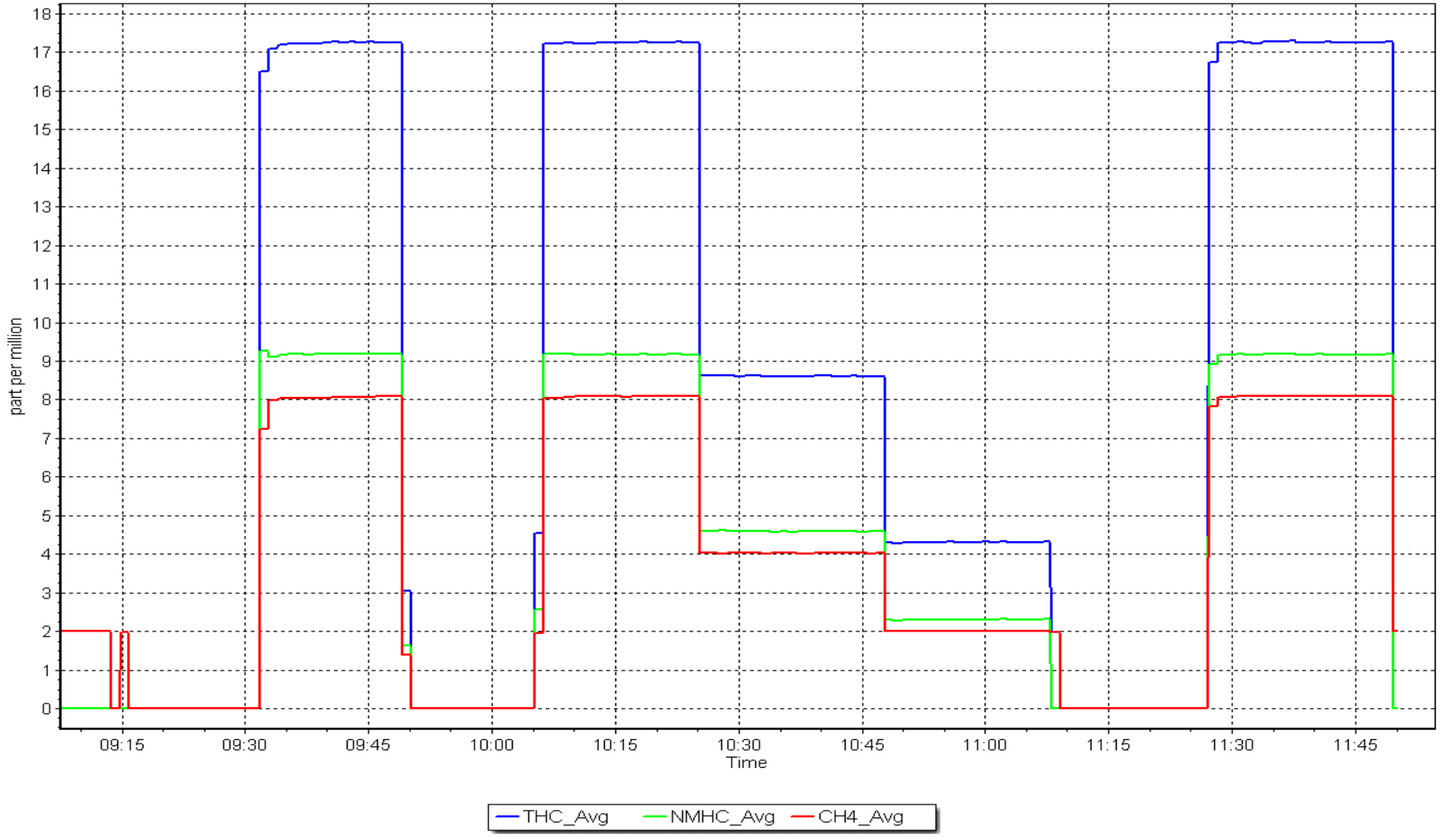
Calibration Date:	May 8, 2023	Previous Calibration:	May 5, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	9:09	End Time (MST):	11:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

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	9.18	0.9969			
4.57	4.59	0.9967	Slope	1.002855	*0.90 - 1.10*
2.29	2.30	0.9939			
			Intercept	0.003000	*+/-0.5*



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



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS06
PATRICIA MCINNES
MAY 2023

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

August 30, 2023

Revision 01

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	May 17, 2023	Last Cal Date:	April 13, 2023
Start time (MST):	8:19	End time (MST):	12:26
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:	1.001234	0.998732	Backgd or Offset:	17.2	17.2
Calibration intercept:	1.539845	1.940243	Coeff or Slope:	0.907	0.901

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4920	80.3	799.5	801.5	0.997
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4920	80.3	799.5	799.5	1.000
second point	4960	40.2	400.2	402.5	0.994
third point	4980	20.1	200.1	203.7	0.982
as left zero	5000	0.0	0.0	-0.2	----
as left span	4920	80.3	799.5	800.3	0.999
				Average Correction Factor	0.992

Baseline Corr As found:	801.60	Previous response	801.99	*% change	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

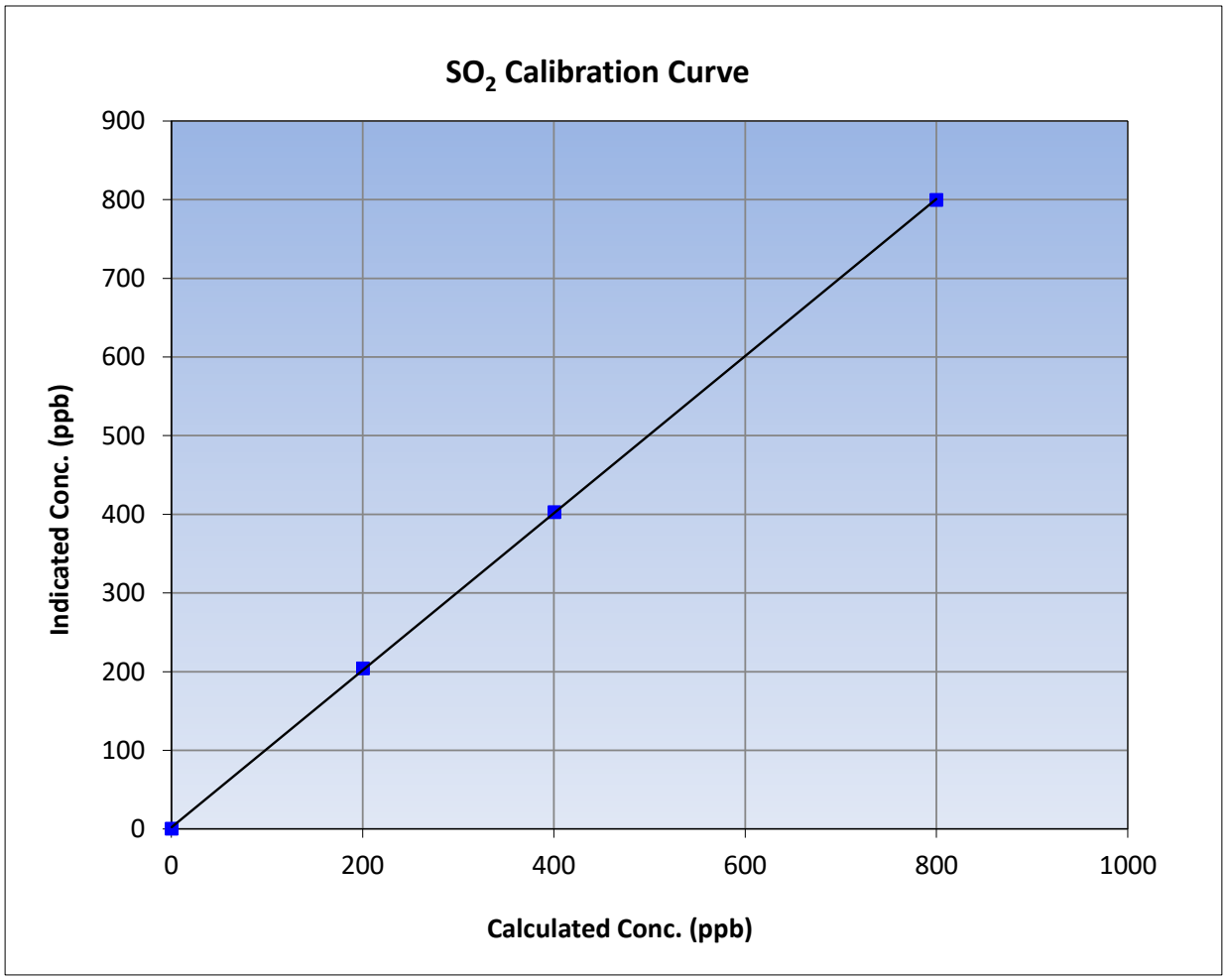
Station Information

Calibration Date:	May 17, 2023	Previous Calibration:	April 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:19	End Time (MST):	12:26
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290013

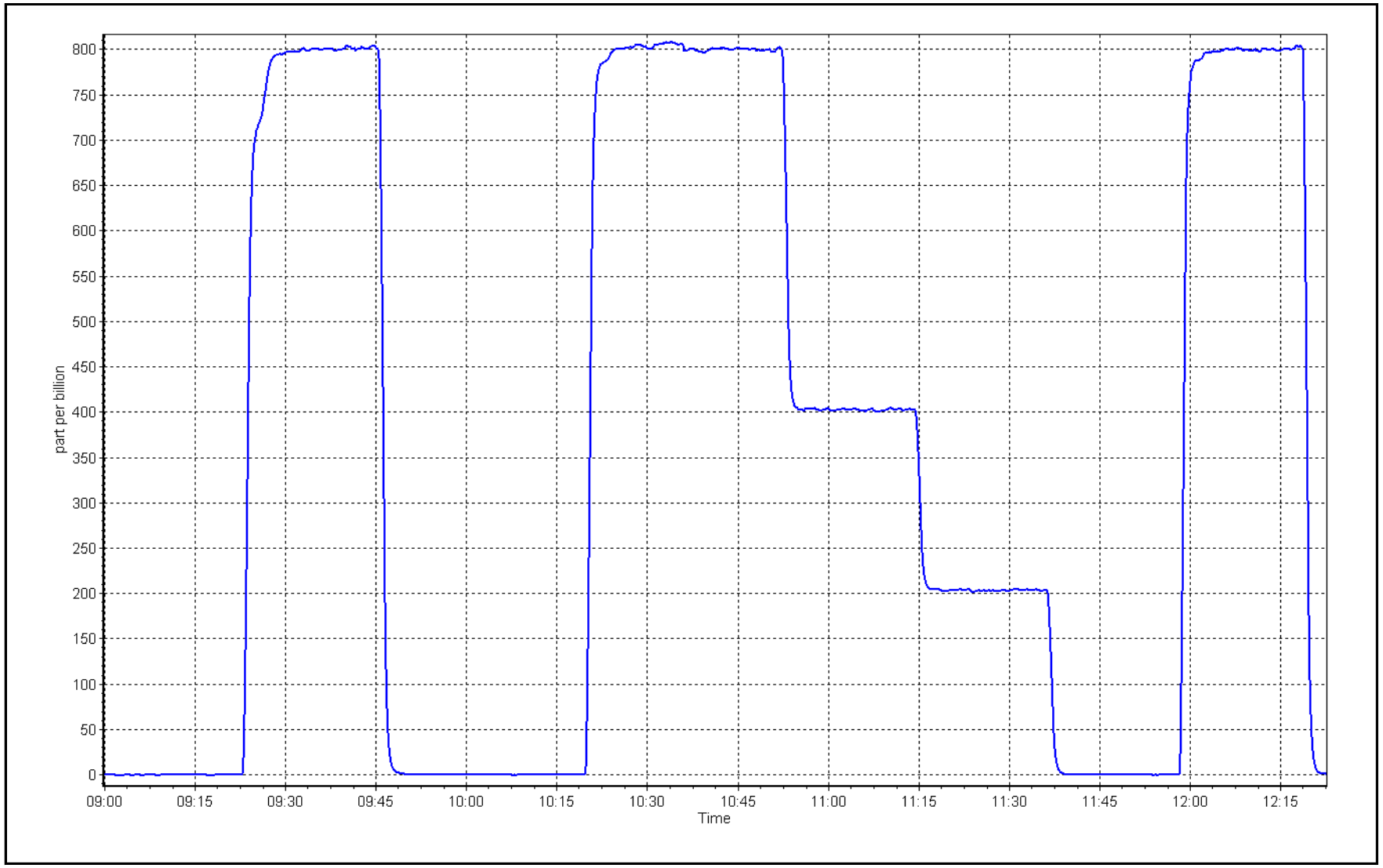
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
799.5	799.5	1.0000
400.2	402.5	0.9944
200.1	203.7	0.9824

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999976	*≥0.995*
Slope	0.998732	*0.90 - 1.10*
Intercept	1.940243	*+/-30*



SO2 Calibration Plot Date: May 17, 2023 Location: Patricia McInnes



Wood Buffalo Environmental Association

H2S Calibration Report

Version-11-2021

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
Calibration Date:	May 3, 2023	Last Cal Date:	April 5, 2023
Start time (MST):	8:14	End time (MST):	14:10
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:	0.992200	0.998919	Backgd or Offset:	1.84	1.91
Calibration intercept:	0.277270	0.217144	Coeff or Slope:	1.070	1.107

H2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4926	74.3	79.9	75.8	1.055
as found 2nd point	4963	37.2	40.0	38.2	1.048
as found 3rd point	4981	18.6	20.0	19.2	1.042
new cylinder response					

H2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4926	74.3	79.9	80.0	0.999
second point	4963	37.2	40.0	40.3	0.993
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	80.6	0.992
SO2 Scrubber Check	4920	80.3	803.0	0.1	----
Date of last scrubber change:		December 20, 2021		Ave Corr Factor	0.993
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	75.8	Prev response:	79.60	*% change:	-5.0%
Baseline Corr 2nd AF pt:	38.2	AF Slope:	0.947594	AF Intercept:	0.138294
Baseline Corr 3rd AF pt:	19.2	AF Correlation:	0.999983		

* = > +/-5% change initiates investigation

Notes: As found span is 5.5% low, suspecting the dry ambient air has caused this change. Changed the inlet filter after as founds and hydrated the scrubber beads for 45 minutes. Ran a SO2 scrubber check after the calibrator zero. Adjusted the span only.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

H2S Calibration Summary

Version-11-2021

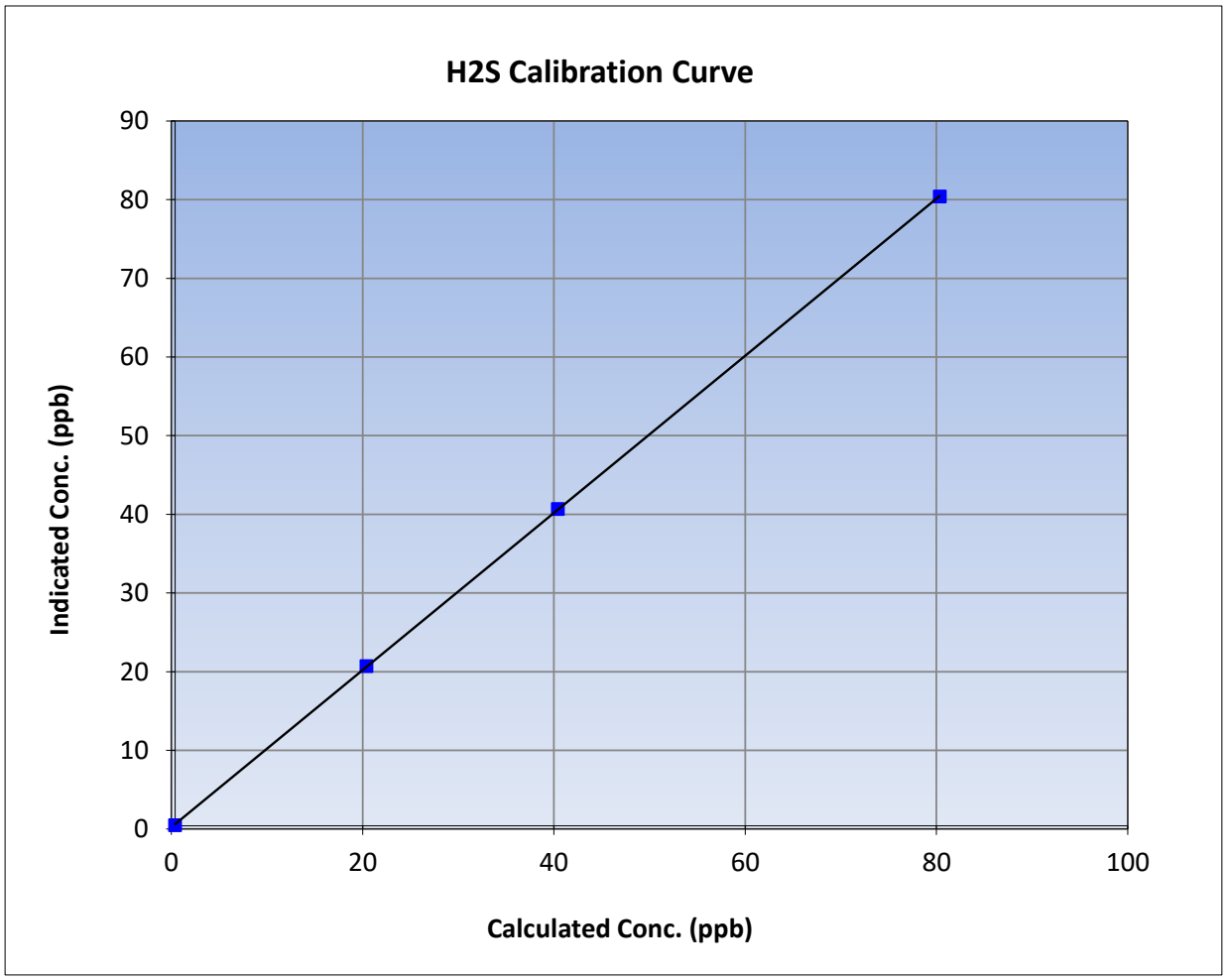
Station Information

Calibration Date:	May 3, 2023	Previous Calibration:	April 5, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:14	End Time (MST):	14:10
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1218153358

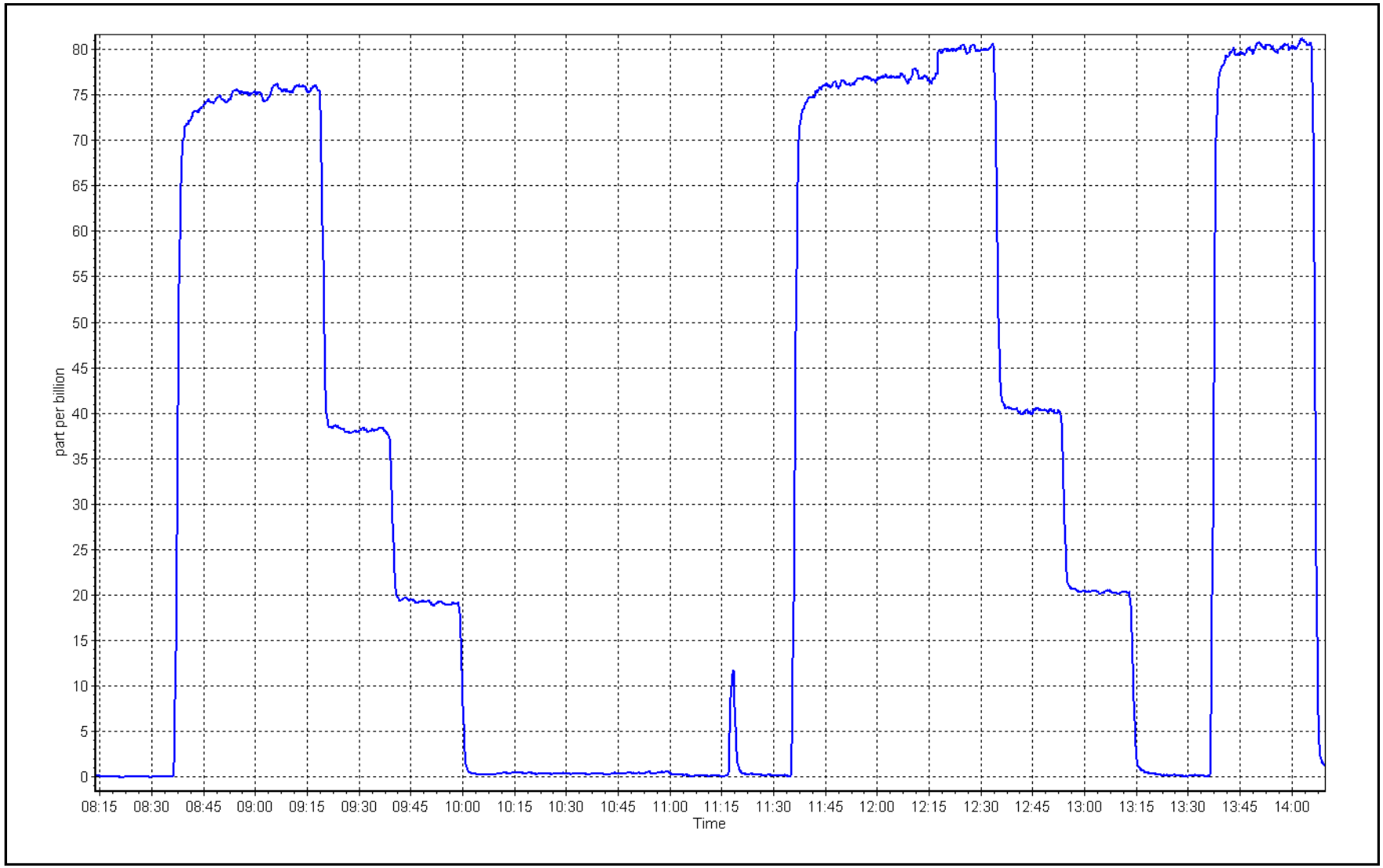
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
79.9	80.0	0.9993
40.0	40.3	0.9932
20.0	20.3	0.9860

Statistical Evaluation		Limits
Correlation Coefficient	0.999989	≥0.995
Slope	0.998919	0.90 - 1.10
Intercept	0.217144	+/-3



H2S Calibration Plot Date: May 3, 2023 Location: Patricia McInnes



Wood Buffalo Environmental Association

H2S Calibration Report

Version-11-2021

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
Calibration Date:	May 8, 2023	Last Cal Date:	May 3, 2023
Start time (MST):	12:13	End time (MST):	14:10
Reason:	Cylinder Change		

Calibration Standards

Cal Gas Concentration:	5.33	ppm	Cal Gas Exp Date:	February 14, 2025
Cal Gas Cylinder #:	CC506659			
Removed Cal Gas Conc:	5.38	ppm	Rem Gas Exp Date:	March 2, 2023
Removed Gas Cyl #:	EY0000809		Diff between cyl:	-2.3%
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:	0.998919		Backgd or Offset:	1.91	1.91
Calibration intercept:	0.217144		Coeff or Slope:	1.107	1.107

H2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4926	74.3	79.9	76.9	1.040
as found 2nd point					
as found 3rd point					
new cylinder response	4925	75.1	80.0	75.3	1.063

H2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *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:	December 20, 2021	Ave Corr Factor	
Date of last converter efficiency test:			efficiency

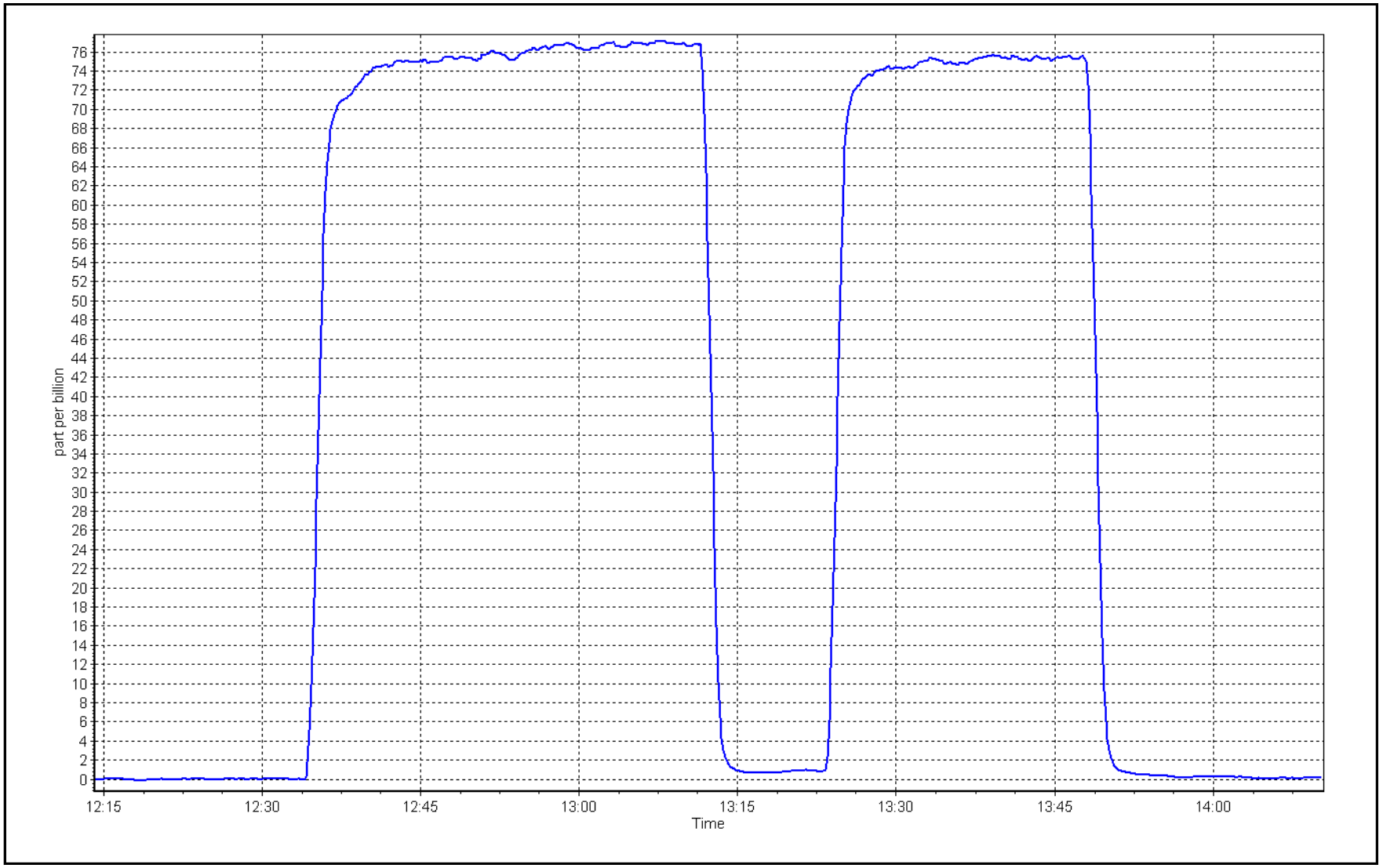
Baseline Corr As found:	76.9	Prev response:	80.07	*% change:	-4.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:	NA	AF Intercept:	NA
Baseline Corr 3rd AF pt:	NA	AF Correlation:	NA		

* = > +/-5% change initiates investigation

Notes: Changed the H2S cylinder after as founds. As found is low, suspecting the scrubber beads are starting to go bad, will be back tomorrow to change the beads.

Calibration Performed By: Max Farrell

H2S Calibration Plot Date: May 8, 2023 Location: Patricia McInnes



Wood Buffalo Environmental Association

H2S Calibration Report

Version-11-2021

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
Calibration Date:	May 9, 2023	Last Cal Date:	May 3, 2023
Start time (MST):	8:21	End time (MST):	13:52
Reason:	Maintenance		

Calibration Standards

Cal Gas Concentration:	5.33	ppm	Cal Gas Exp Date:	February 14, 2025
Cal Gas Cylinder #:	CC506659			
Removed Cal Gas Conc:	5.33	ppm	Rem Gas Exp Date:	February 14, 2025
Removed Gas Cyl #:			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:	0.992200	1.001170	Backgd or Offset:	1.91	2.03
Calibration intercept:	0.277270	0.480293	Coeff or Slope:	1.107	1.186

H2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4925	75.1	80.0	76.7	1.043
as found 2nd point	4963	37.5	40.0	38.5	1.038
as found 3rd point	4981	18.8	20.0	19.3	1.038
new cylinder response					

H2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4925	75.1	80.0	80.3	0.997
second point	4963	37.5	40.0	40.9	0.977
third point	4981	18.8	20.0	20.9	0.959
as left zero	5000	0.0	0.0	0.7	----
as left span	4925	75.1	80.0	80.3	0.997
SO2 Scrubber Check	4920	80.3	803.0	0.1	----
Date of last scrubber change:		December 20, 2021		Ave Corr Factor	0.977
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	76.7	Prev response:	79.68	*% change:	-3.9%
Baseline Corr 2nd AF pt:	38.5	AF Slope:	0.958319	AF Intercept:	0.080219
Baseline Corr 3rd AF pt:	19.3	AF Correlation:	0.999991		

* = > +/-5% change initiates investigation

Notes: The span has drifted down since the last calibration. Completed multipoint as founds and changed the SO2 scrubber beads. Adjusted the span only.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

H2S Calibration Summary

Version-11-2021

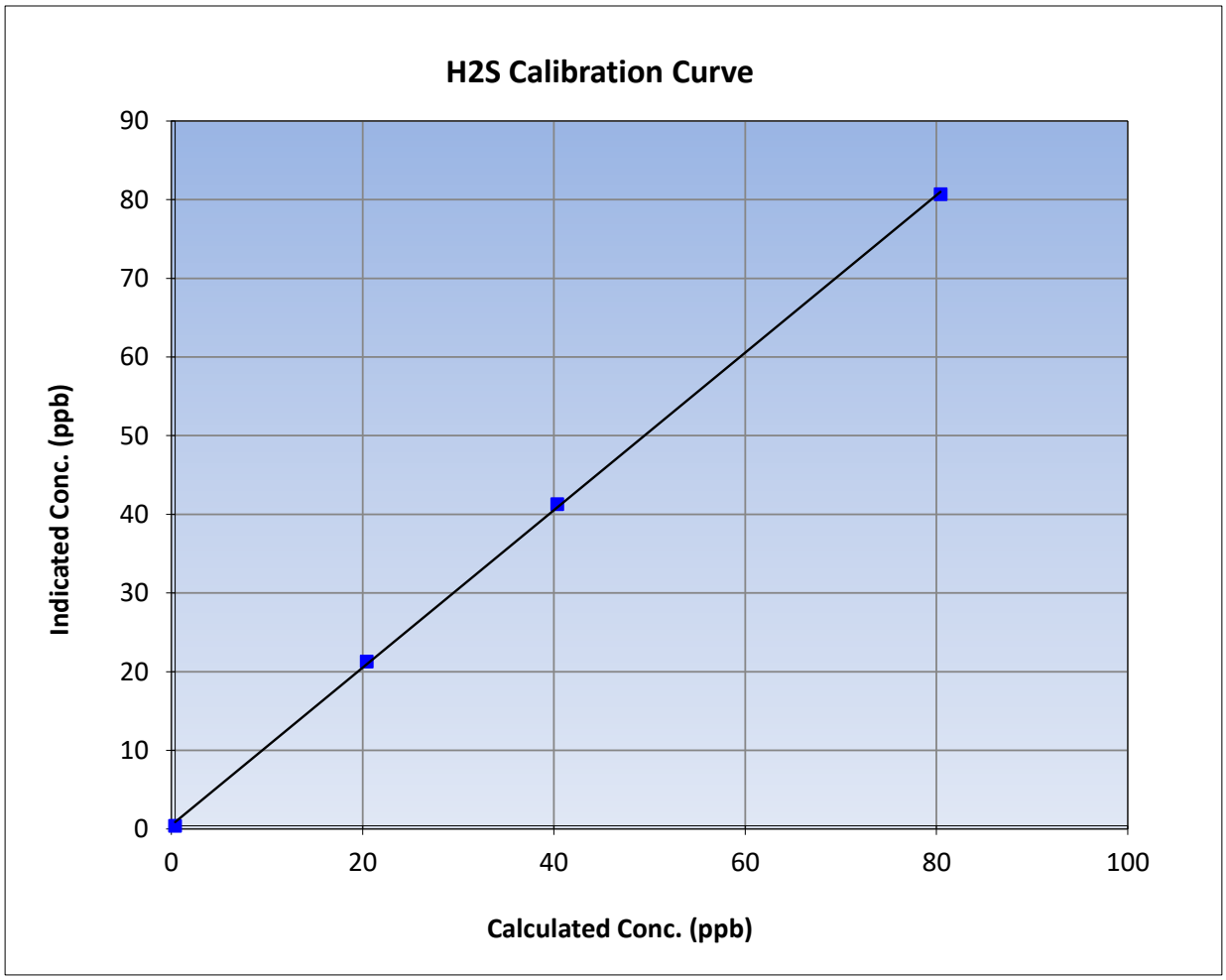
Station Information

Calibration Date:	May 9, 2023	Previous Calibration:	May 3, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:21	End Time (MST):	13:52
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1218153358

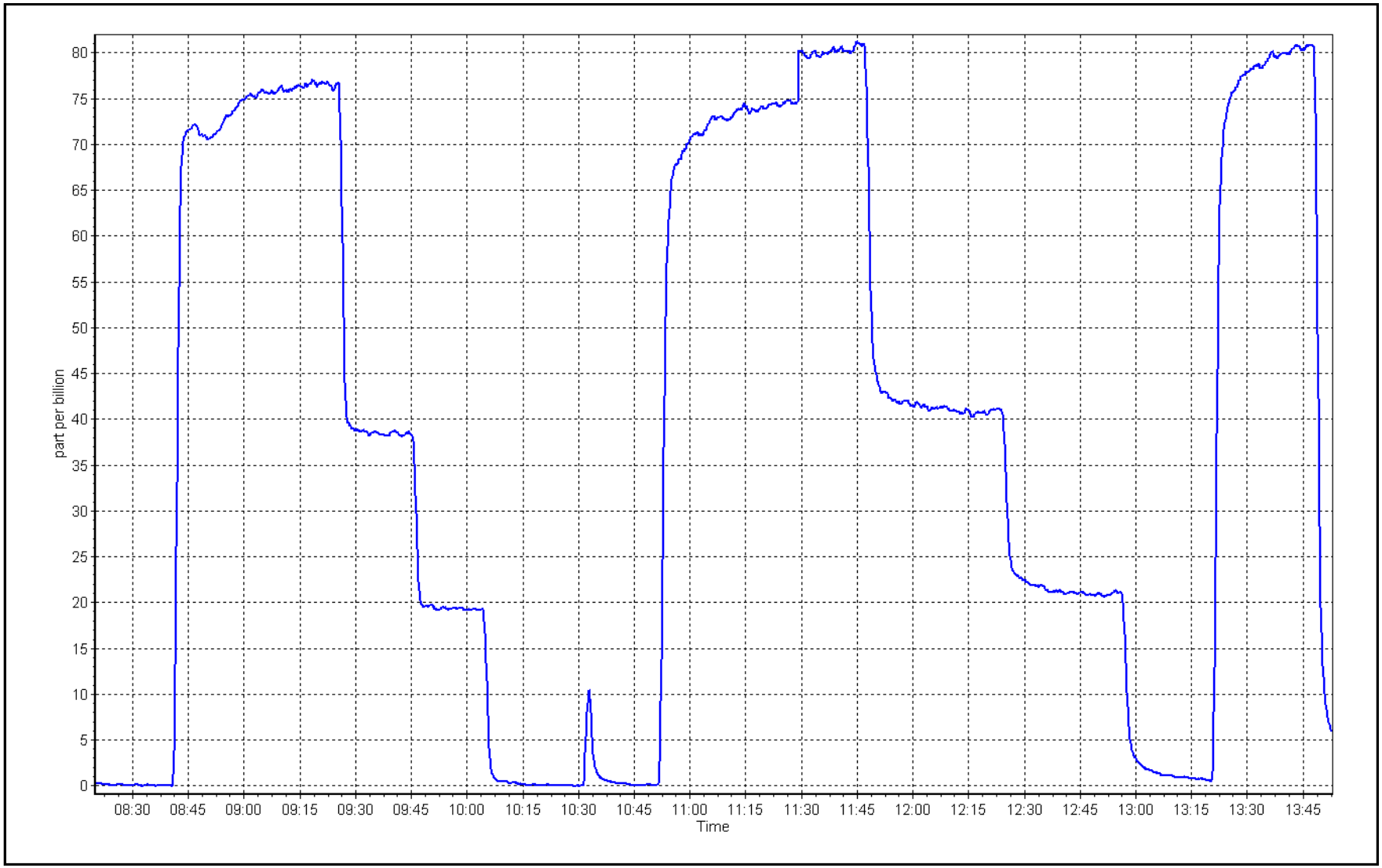
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.3	0.9966
40.0	40.9	0.9769
20.0	20.9	0.9586

Statistical Evaluation		Limits
Correlation Coefficient	0.999822	≥0.995
Slope	1.001170	0.90 - 1.10
Intercept	0.480293	+/-3



H2S Calibration Plot Date: May 9, 2023 Location: Patricia McInnes



Wood Buffalo Environmental Association

H2S Calibration Report

Version-11-2021

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
Calibration Date:	May 12, 2023	Last Cal Date:	May 9, 2023
Start time (MST):	9:12	End time (MST):	12:29
Reason:	Maintenance		

Calibration Standards

Cal Gas Concentration:	5.33	ppm	Cal Gas Exp Date:	February 14, 2025
Cal Gas Cylinder #:	CC506659			
Removed Cal Gas Conc:	5.33	ppm	Rem Gas Exp Date:	February 14, 2025
Removed Gas Cyl #:			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:	1.001170	0.996460	Backgd or Offset:	2.03	1.82
Calibration intercept:	0.480293	0.320162	Coeff or Slope:	1.186	1.069

H2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4925	75.1	80.0	88.8	0.901
as found 2nd point					
as found 3rd point					
new cylinder response					

H2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4925	75.1	80.0	80.0	1.000
second point	4963	37.5	40.0	40.2	0.994
third point	4981	18.8	20.0	20.4	0.982
as left zero	5000	0.0	0.0	0.1	----
as left span	4925	75.1	80.0	79.8	1.003

SO2 Scrubber Check

Date of last scrubber change:	December 20, 2021	Ave Corr Factor	0.992
Date of last converter efficiency test:			efficiency

Baseline Corr As found:	88.8	Prev response:	80.60	*% change:	9.2%
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: The span has drifted up by 9% since the last calibration, it seems that maybe the smoky weather might have caused the drift instead of the scrubber beads. Adjusted the span only.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

H2S Calibration Summary

Version-11-2021

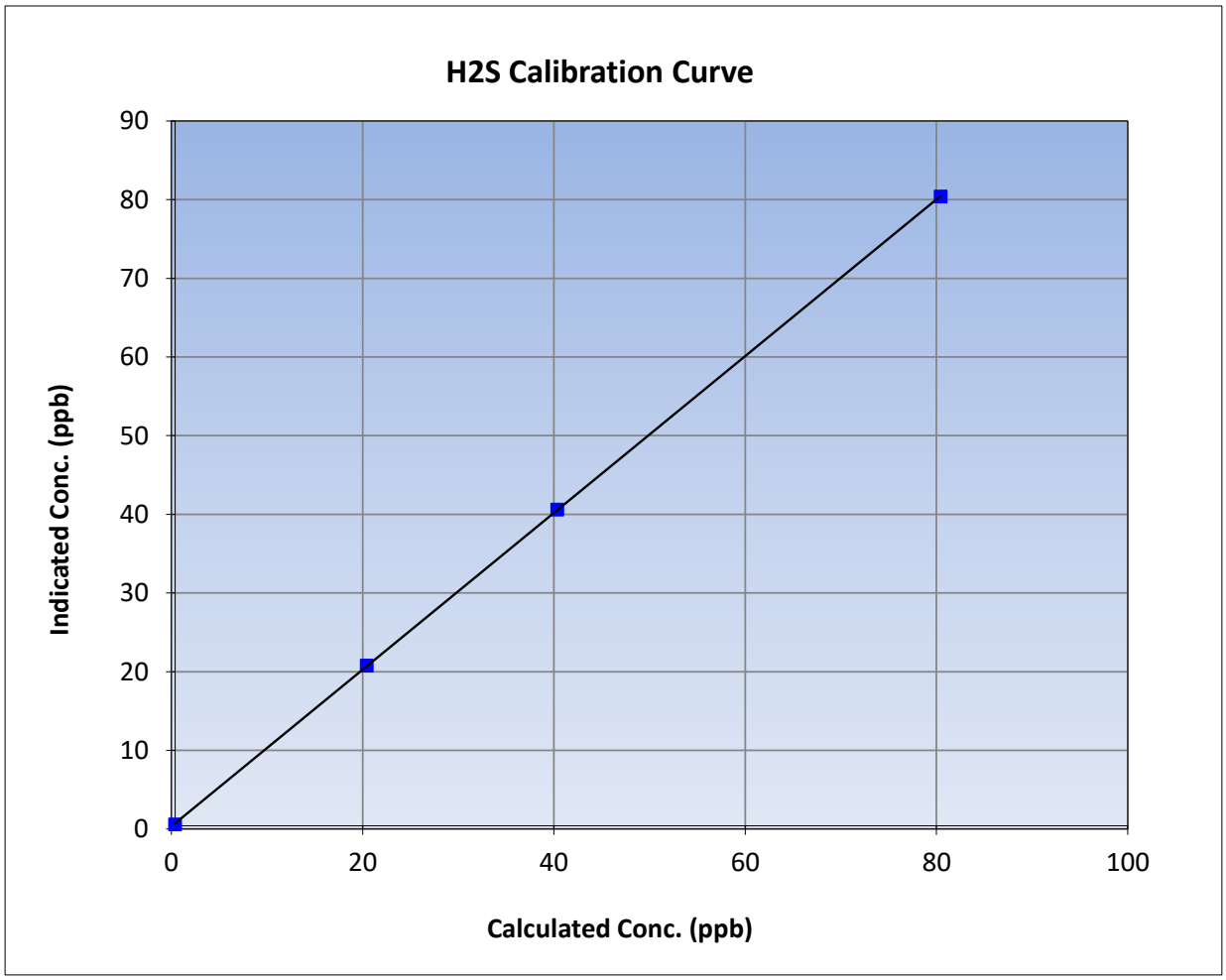
Station Information

Calibration Date:	May 12, 2023	Previous Calibration:	May 9, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:12	End Time (MST):	12:29
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1218153358

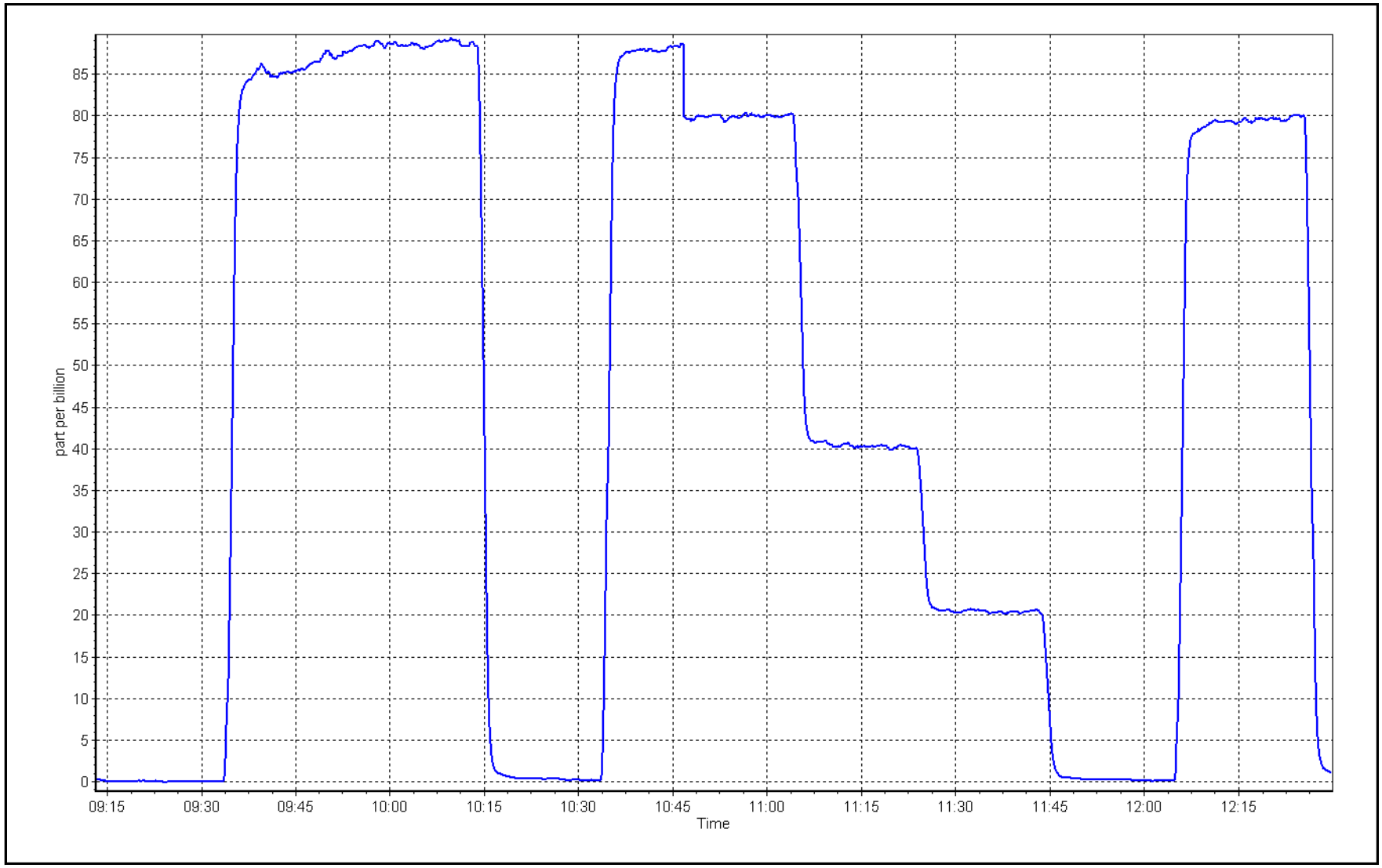
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	80.0	1.0003
40.0	40.2	0.9939
20.0	20.4	0.9821

Statistical Evaluation		Limits
Correlation Coefficient	0.999990	≥0.995
Slope	0.996460	0.90 - 1.10
Intercept	0.320162	+/-3



H2S Calibration Plot Date: May 12, 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:	May 17, 2023	Last Cal Date:	April 13, 2023
Start time (MST):	8:18	End time (MST):	12:26
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320037	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.33E-04	3.57E-04	NMHC SP Ratio:	5.86E-05	5.96E-05
CH4 Retention time:	14	14.6	NMHC Peak Area:	154840	152338

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	16.58	1.033
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	17.12	17.17	0.997
second point	4960	40.2	8.57	8.58	1.000
third point	4980	20.1	4.29	4.32	0.992
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.12	17.03	1.006
				Average Correction Factor	0.996

Baseline Corr AF:	16.58	Prev response	17.02	*% change	-2.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4920	80.3	9.07	8.76	1.035
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	9.10	0.996
second point	4960	40.2	4.54	4.56	0.995
third point	4980	20.1	2.27	2.30	0.988
as left zero	5000	0	0.00	0.00	----
as left span	4920	80.3	9.07	9.04	1.003
				Average Correction Factor	0.993
Baseline Corr AF:	8.76	Prev response	9.05	*% change	-3.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	8.06	7.82	1.030
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	8.06	8.07	0.998
second point	4960	40.2	4.03	4.02	1.004
third point	4980	20.1	2.02	2.02	0.997
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	8.06	7.99	1.009
				Average Correction Factor	1.000
Baseline Corr AF:	7.82	Prev response	7.98	*% change	-2.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.993826	1.002022
THC Cal Offset:	0.007564	0.005131
CH4 Cal Slope:	0.990693	1.001093
CH4 Cal Offset:	-0.004180	-0.003602
NMHC Cal Slope:	0.996672	1.003075
NMHC Cal Offset:	0.010746	0.008332

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

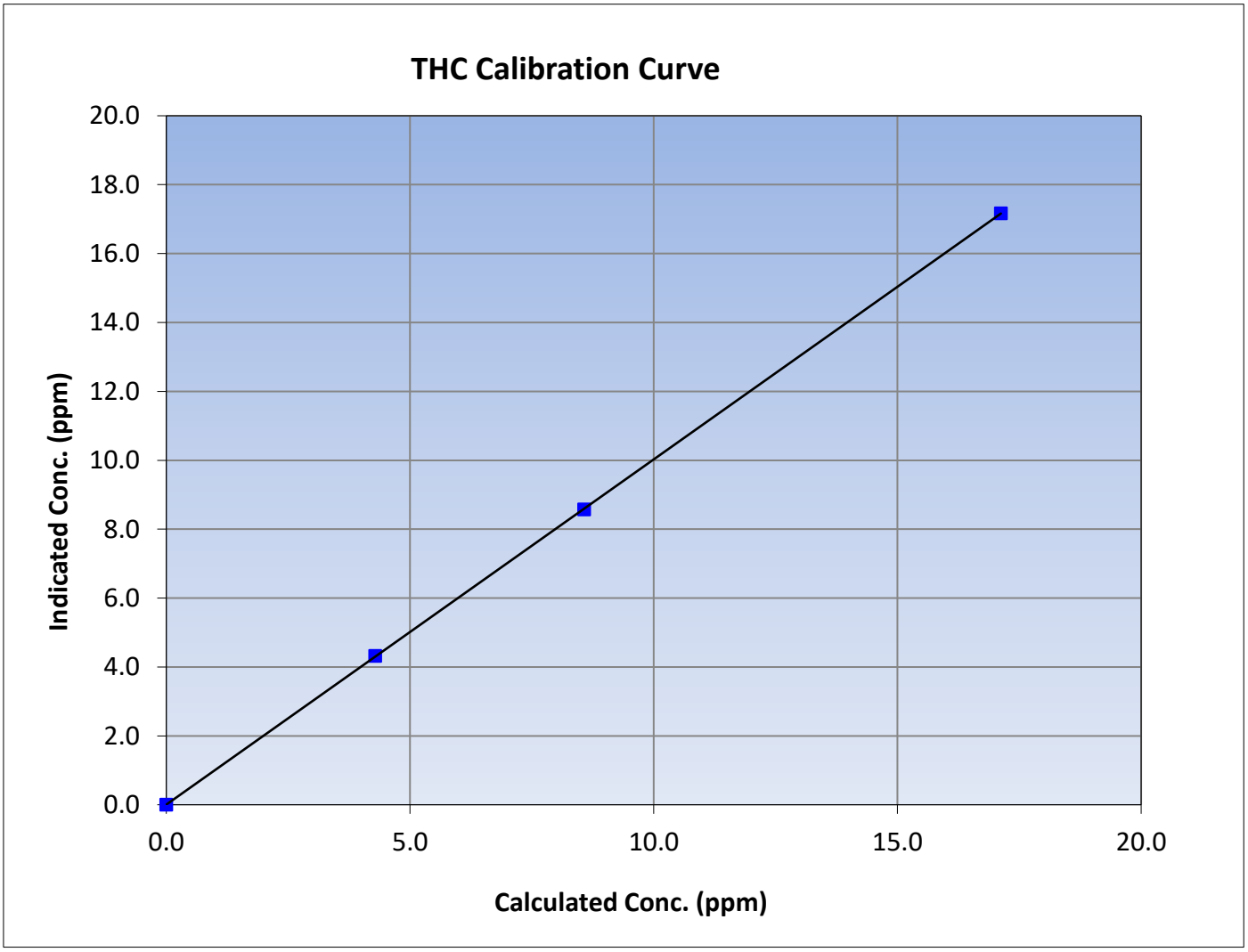
Version-01-2020

Station Information

Calibration Date:	May 17, 2023	Previous Calibration:	April 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:18	End Time (MST):	12:26
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999995	*≥0.995*
17.12	17.17	0.9974			
8.57	8.58	0.9995	Slope	1.002022	*0.90 - 1.10*
4.29	4.32	0.9924			
			Intercept	0.005131	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

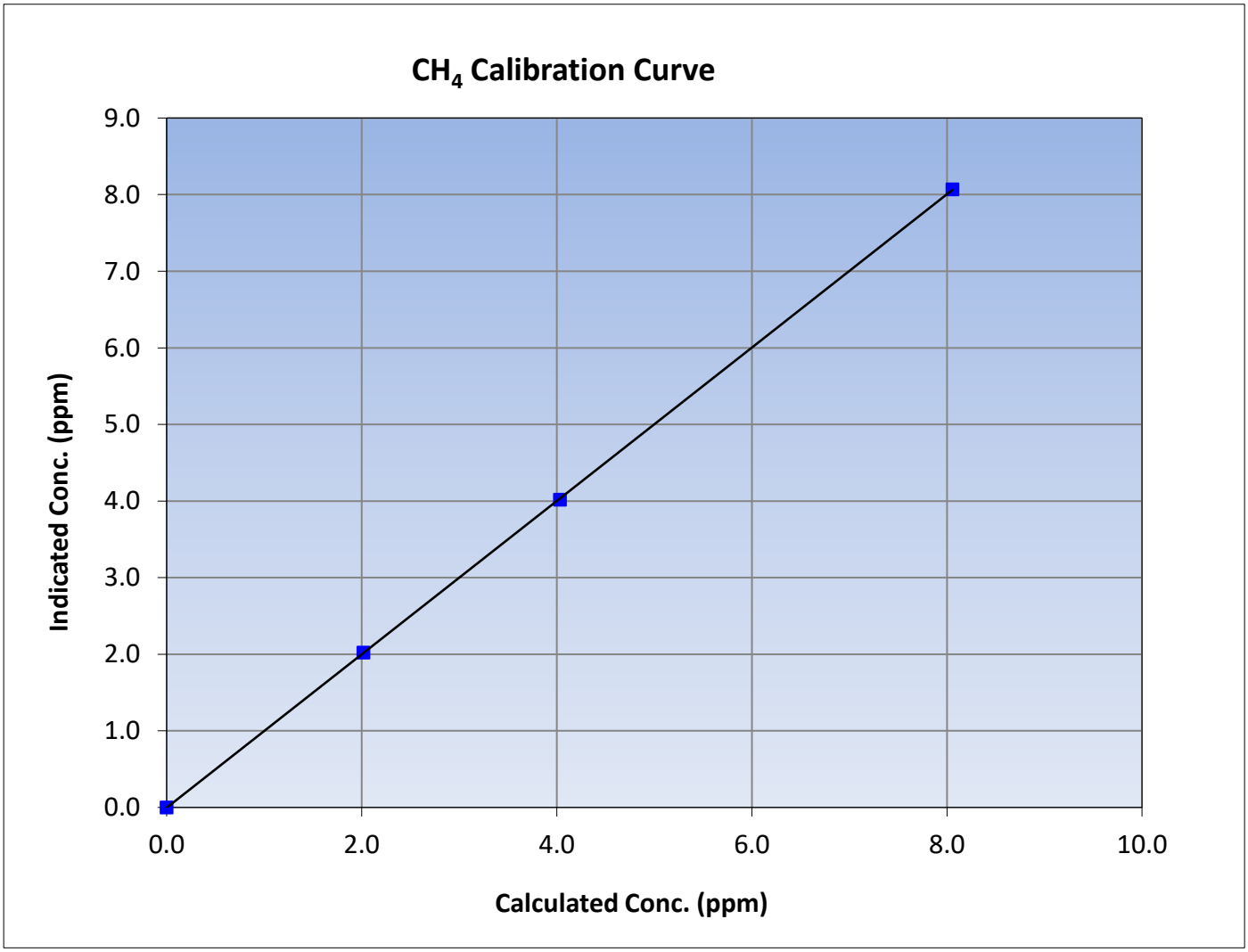
Version-01-2020

Station Information

Calibration Date:	May 17, 2023	Previous Calibration:	April 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:18	End Time (MST):	12:26
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	8.07	0.9985			
4.03	4.02	1.0042	Slope	1.001093	0.90 - 1.10
2.02	2.02	0.9972			
			Intercept	-0.003602	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

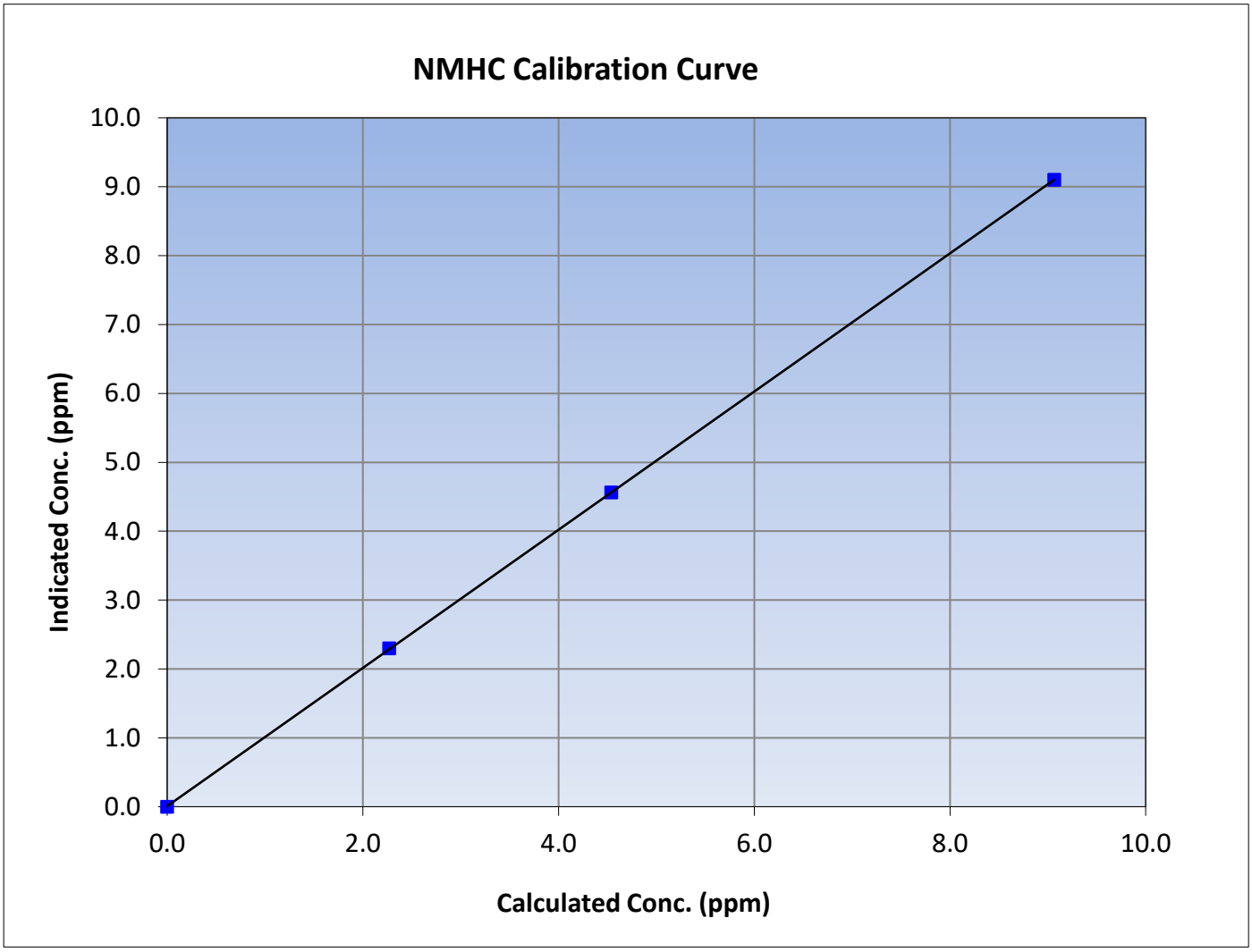
Version-01-2020

Station Information

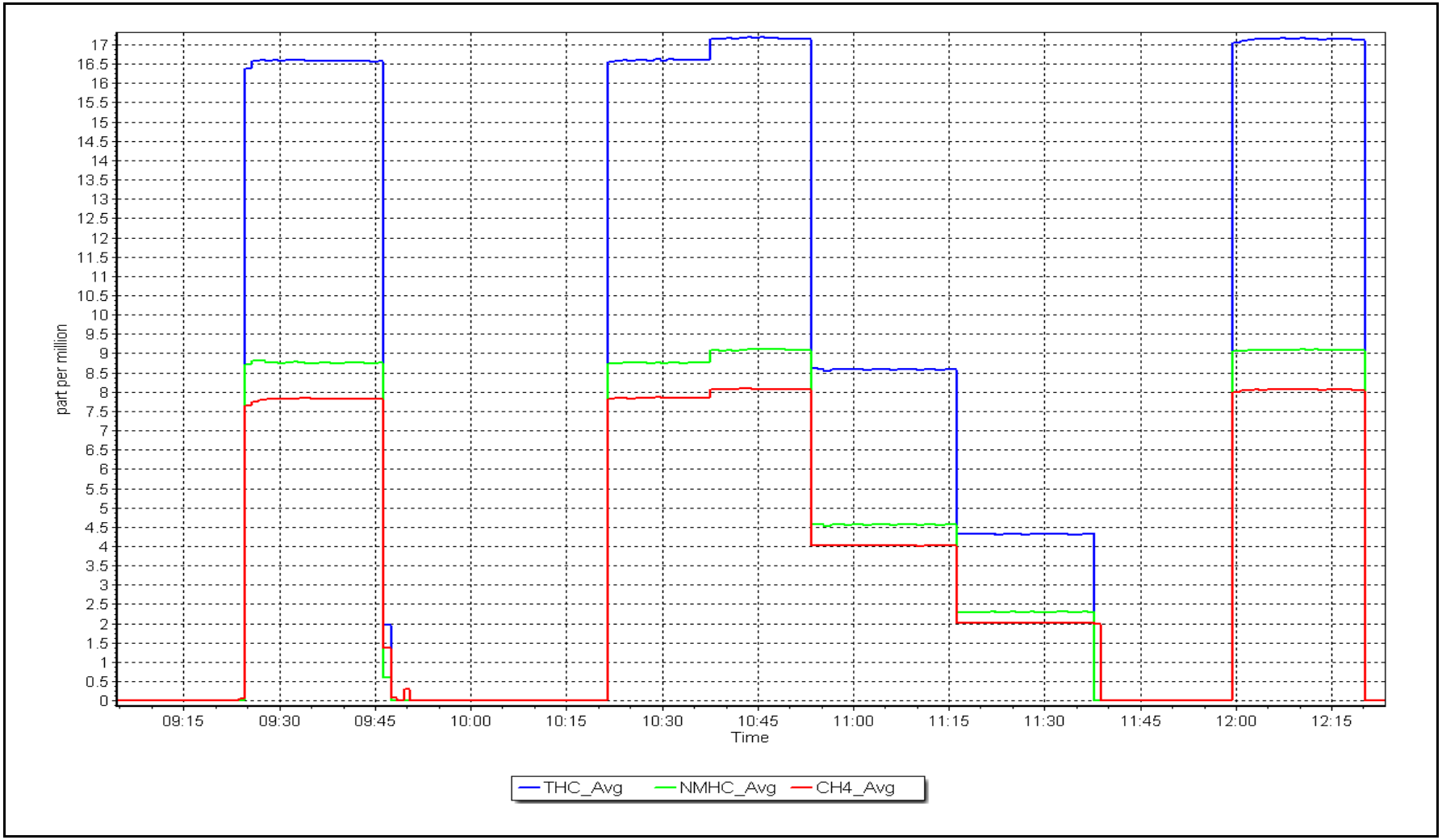
Calibration Date:	May 17, 2023	Previous Calibration:	April 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:18	End Time (MST):	12:26
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999995	≥0.995
9.07	9.10	0.9963			
4.54	4.56	0.9954	Slope	1.003075	0.90 - 1.10
2.27	2.30	0.9881			
			Intercept	0.008332	+/-0.5



NMHC Calibration Plot Date: May 17, 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:	May 1, 2023	Last Cal Date:	April 4, 2023
Start time (MST):	9:03	End time (MST):	13:47
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:	0.835	0.835	NO bkgnd or offset:	3.2	3.2
NOX coeff or slope:	0.996	0.996	NOX bkgnd or offset:	3.9	3.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	155.1	154.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001408	1.001069
NO_X Cal Offset:	2.760164	1.979986
NO Cal Slope:	0.998955	0.998555
NO Cal Offset:	1.840130	1.080026
NO_2 Cal Slope:	1.006294	1.005730
NO_2 Cal Offset:	1.349835	0.795849

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
as found span	4923	76.9	807.6	799.5	8.2	810.9	797.9	13.0	0.9959	1.0019
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	4923	76.9	807.6	799.5	8.2	809.5	798.9	10.6	0.9977	1.0007
second point	4962	38.5	404.3	400.2	4.1	407.7	401.2	6.5	0.9917	0.9976
third point	4981	19.2	201.6	199.6	2.0	205.7	201.4	4.3	0.9803	0.9911
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.2	-0.1	----	----
as left span	4923	76.9	807.6	387.2	420.5	806.0	386.4	419.6	1.0020	1.0019
								Average Correction Factor	0.9899	0.9965

Corrected As found	NO_X = 811.0 ppb	NO = 797.9 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.1%
Previous Response	NO_X = 811.5 ppb	NO = 800.5 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)	796.7	384.4	420.5	422.9	0.9942	100.6%
2nd GPT point (200 ppb O3)	796.7	592.2	212.7	216.1	0.9840	101.6%
3rd GPT point (100 ppb O3)	796.7	694.1	110.8	112.3	0.9862	101.4%
				Average Correction Factor	0.9882	101.2%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

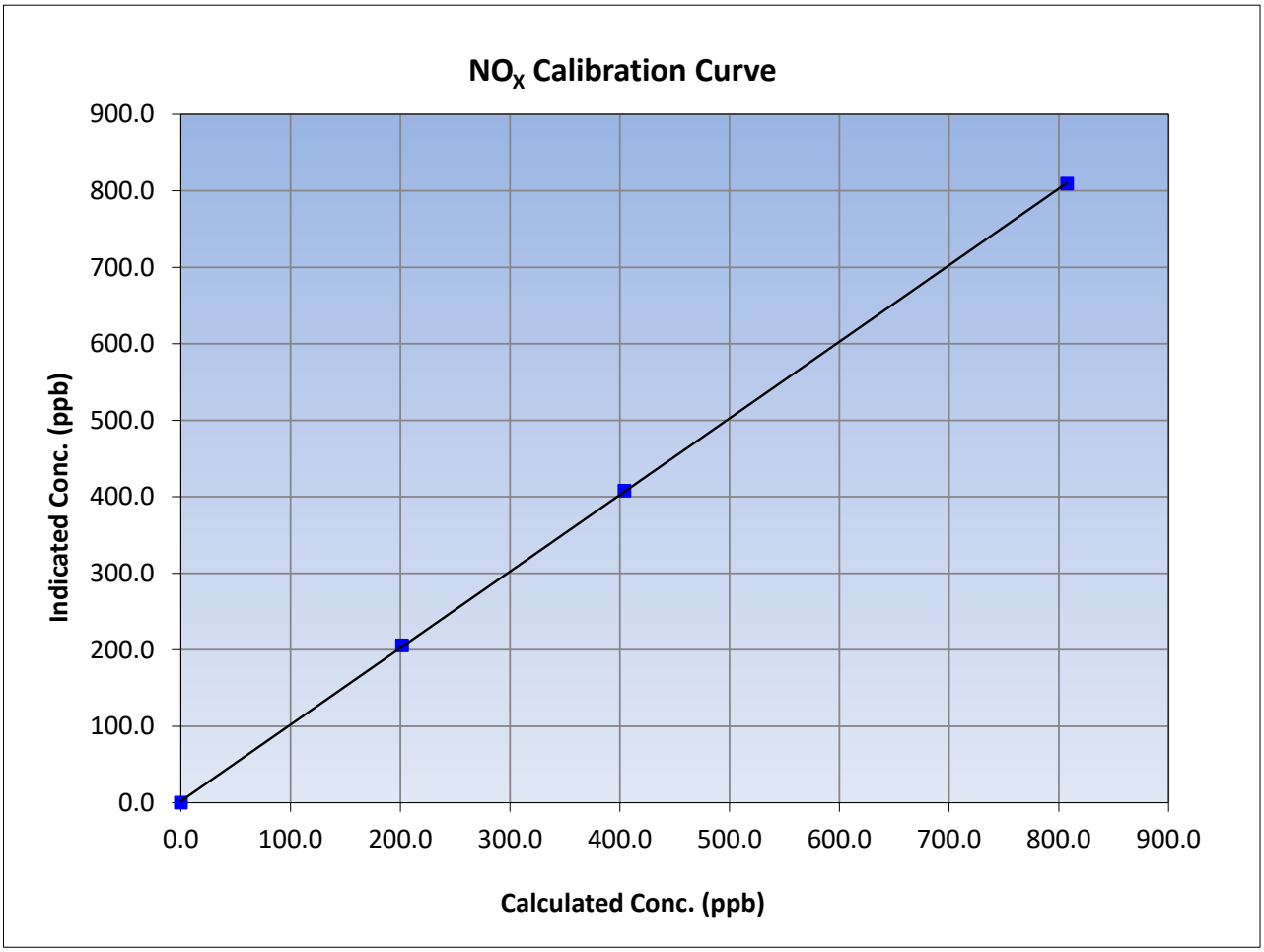
Version-04-2020

Station Information

Calibration Date:	May 1, 2023	Previous Calibration:	April 4, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:03	End Time (MST):	13:47
Analyzer make:	Thermo 42i	Analyzer serial #:	1172750022

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999975	≥0.995
807.6	809.5	0.9977			
404.3	407.7	0.9917	Slope	1.001069	0.90 - 1.10
201.6	205.7	0.9803			
			Intercept	1.979986	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

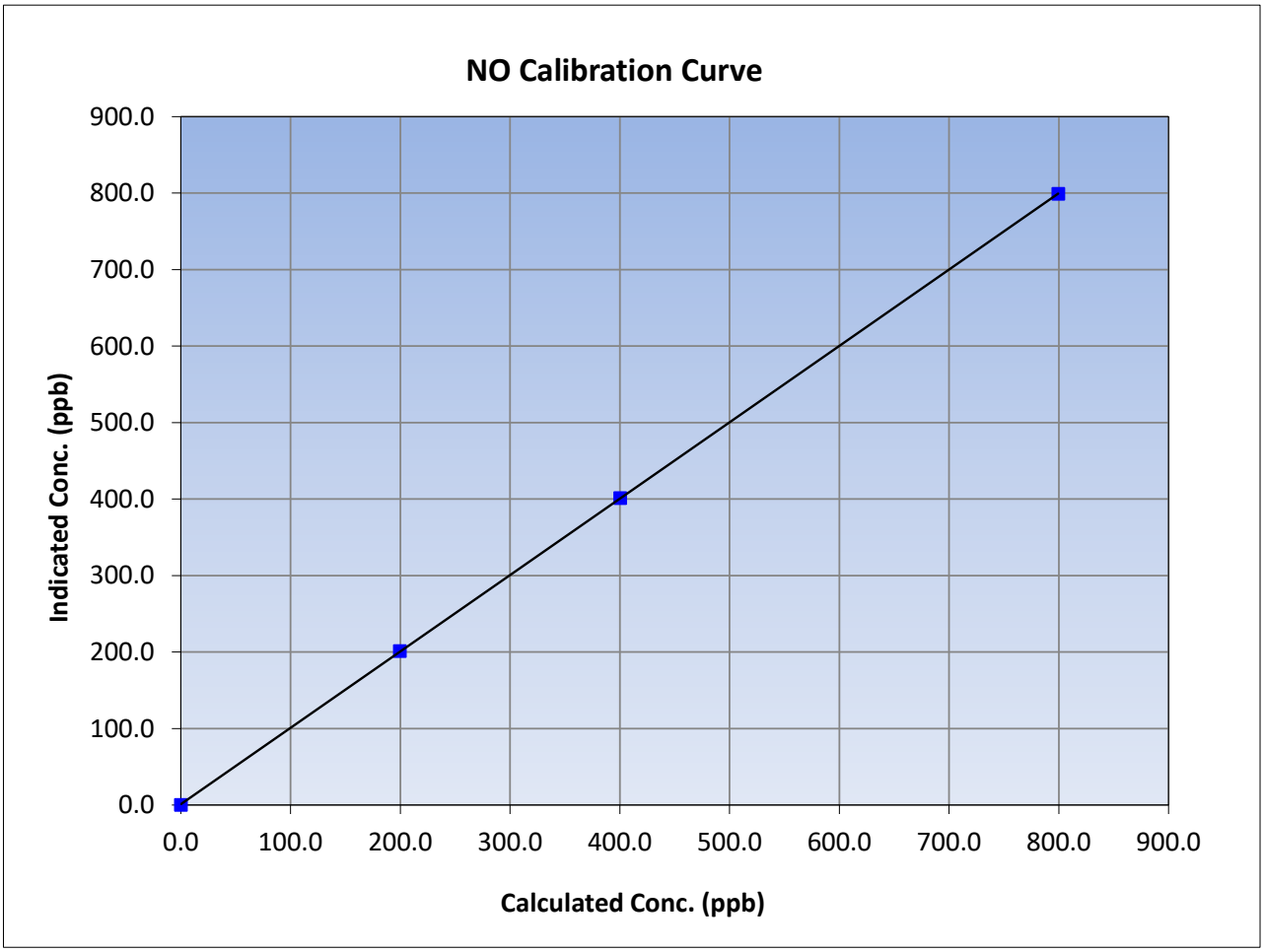
Version-04-2020

Station Information

Calibration Date:	May 1, 2023	Previous Calibration:	April 4, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:03	End Time (MST):	13:47
Analyzer make:	Thermo 42i	Analyzer serial #:	1172750022

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999993	≥0.995
799.5	798.9	1.0007			
400.2	401.2	0.9976	Slope	0.998555	0.90 - 1.10
199.6	201.4	0.9911			
			Intercept	1.080026	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

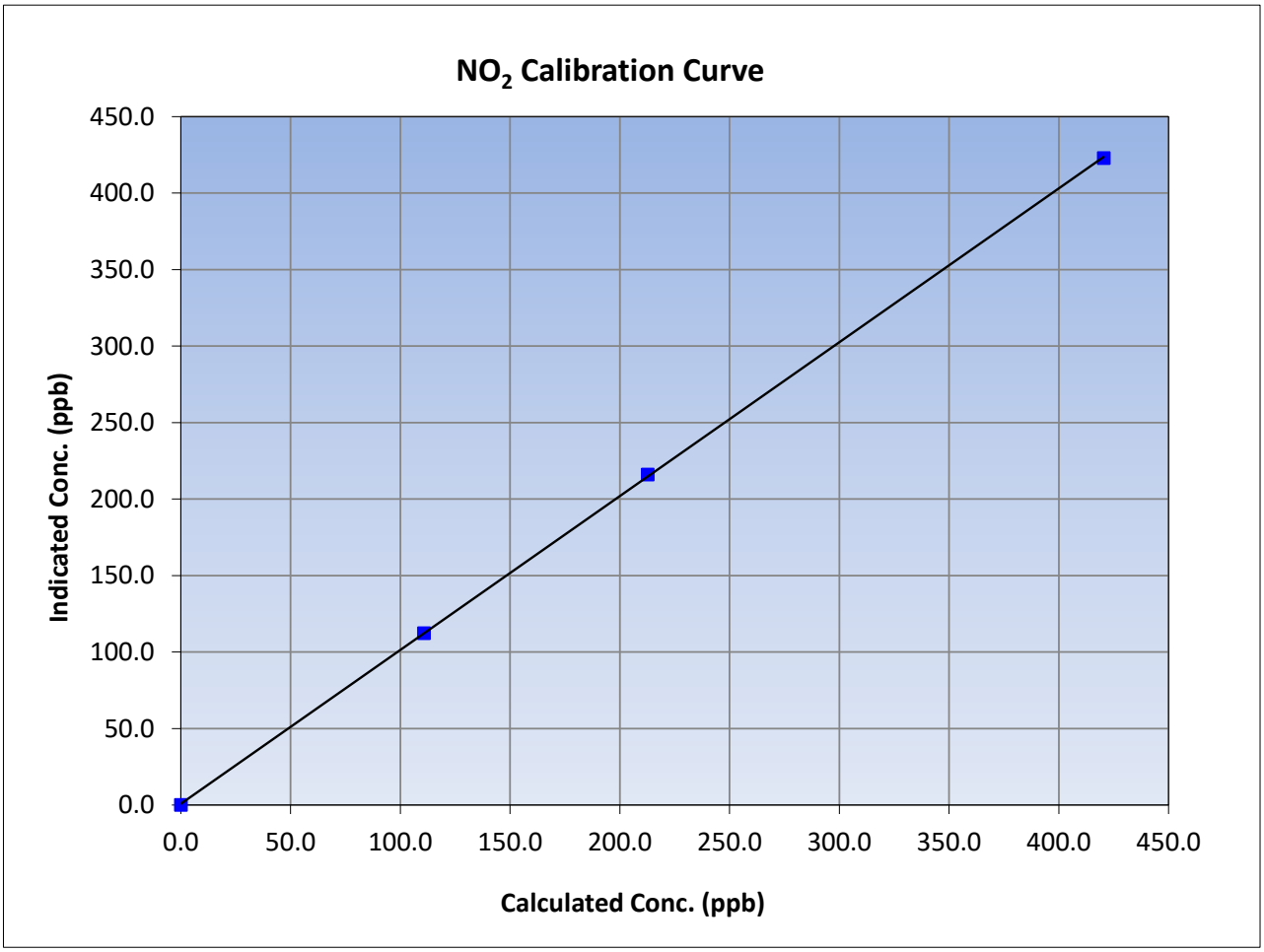
Version-04-2020

Station Information

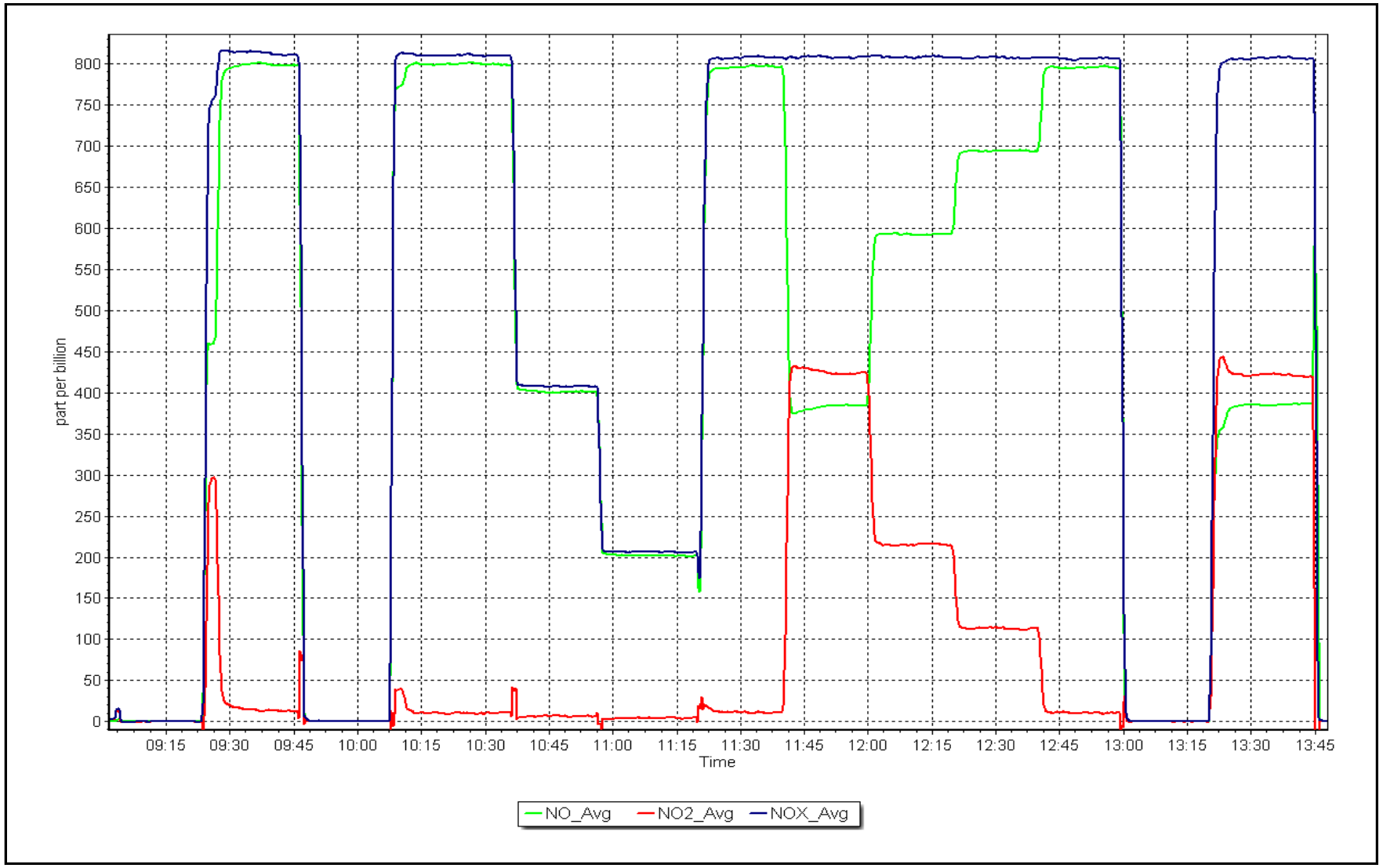
Calibration Date:	May 1, 2023	Previous Calibration:	April 4, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:03	End Time (MST):	13:47
Analyzer make:	Thermo 42i	Analyzer serial #:	1172750022

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999966	*≥0.995*
420.5	422.9	0.9942			
212.7	216.1	0.9840	Slope	1.005730	*0.90 - 1.10*
110.8	112.3	0.9862			
			Intercept	0.795849	*+/-20*



NO_X Calibration Plot Date: May 1, 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:	January 0, 1900	Last Cal Date:	May 1, 2023
Start time (MST):	10:12	End time (MST):	12:04
Reason:	Cylinder Change		

Calibration Standards

NO Gas Cylinder #:	T30YCWN		Cal Gas Expiry Date:	April 11, 2025	
NOX Cal Gas Conc:	47.94	ppm	NO Cal Gas Conc:	46.39	ppm
Removed Cylinder #:	T26D9MR		Removed Gas Exp Date:	August 18, 2023	
Removed Gas NOX Conc:	52.51	ppm	Removed Gas NO Conc:	51.98	ppm
NOX gas Diff:	3.5%		NO gas Diff:	3.6%	
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:	0.835	0.835	NO bkgnd or offset:	3.2	3.2
NOX coeff or slope:	0.996	0.996	NOX bkgnd or offset:	3.9	3.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	154.2	154.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001069	
NO_X Cal Offset:	1.979986	
NO Cal Slope:	0.998555	
NO Cal Offset:	1.080026	
NO_2 Cal Slope:	1.005730	
NO_2 Cal Offset:	0.795849	

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	4923	76.9	807.6	799.5	8.2	810.4	797.4	12.9	0.9965	1.0026
as found 2nd										
as found 3rd										
new cyl resp	4914	86.2	826.5	799.7	26.7	859.9	827.0	32.9	0.9611	0.9670
calibrator zero										
high point										
second point										
third point										
as left zero										
as left span										
								Average Correction Factor		

Corrected As found	NO_X =	810.2 ppb	NO =	797.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.0%
Previous Response	NO_X =	810.4 ppb	NO =	799.4 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:	

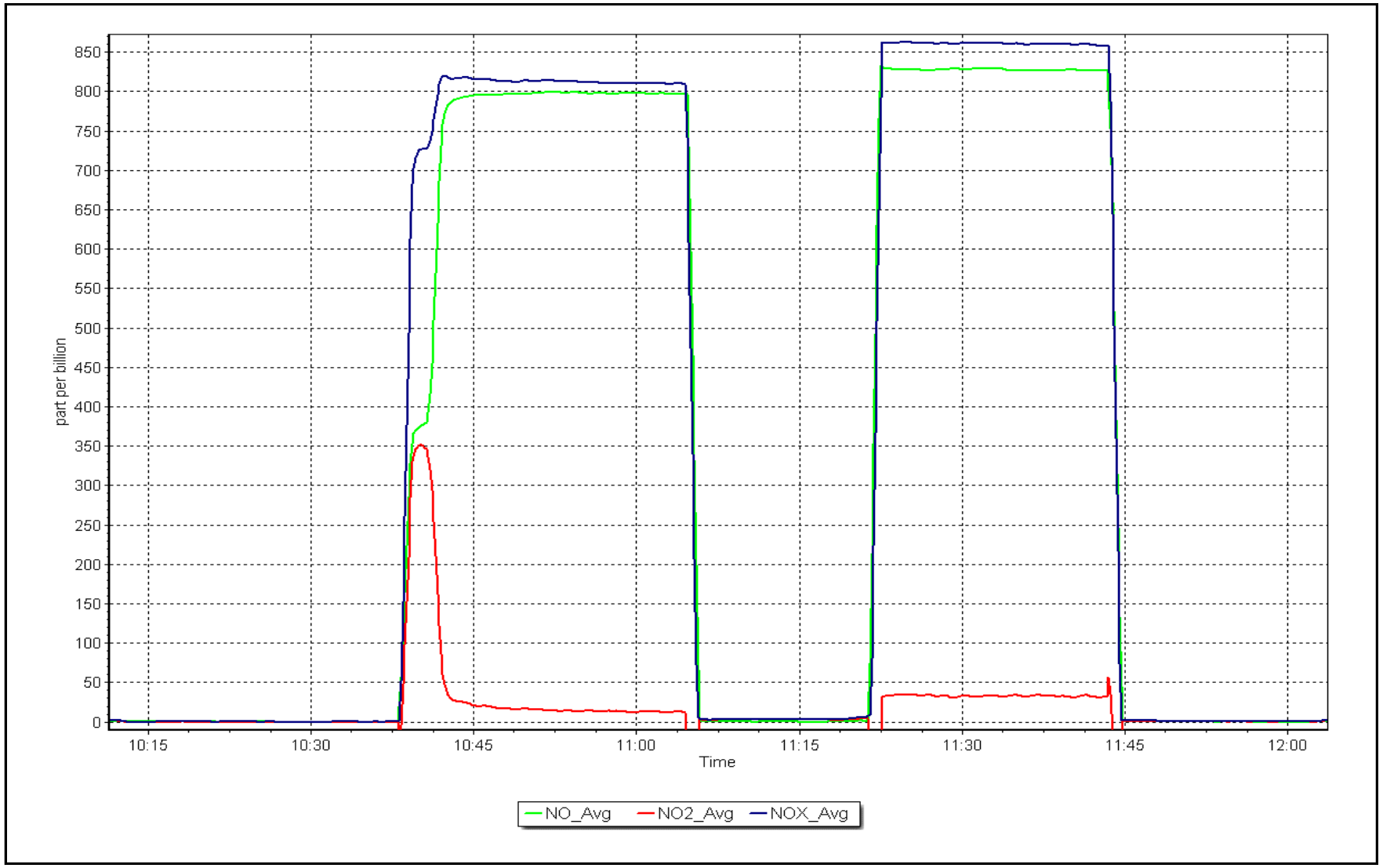
GPT Calibration Data

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)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
				Average Correction Factor		

Notes: Changed the NO cylinder after as founds.

Calibration Performed By: Max Farrell

NO_X Calibration Plot Date: January 0, 1900 Location: Patricia McInnes



Wood Buffalo Environmental Association

TN - NO_X - NH_3 Calibration Report

Version-05-2023

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
NOX Cal Date:	May 8, 2023	Last Cal Date:	April 27, 2023
Start time (MST):	10:12	End time (MST):	12:03
NH3 Cal Date:	April 20, 2023	Last Cal Date:	March 8, 2023
Start time (MST):	13:00	End time (MST):	14:48
Reason:	Cylinder Change	NO cylinder change	

Calibration Standards

NOX Cal Gas Conc:	47.94	ppm	NO Gas Cylinder #:	T30YCWN
NO Cal Gas Conc:	46.39	ppm	NO Cal Gas Expiry:	April 11, 2025
Removed NOX Conc:	52.5	ppm	Removed Cylinder #:	T26D9MR
Removed NO Conc:	52.0	ppm	Removed cyl Expiry:	August 18, 2023
NOX gas Diff:	3.2%		NO gas Diff:	3.7%
NH3 Cal Gas Conc:	77.8	ppm	NH3 Gas Cylinder #:	CC710812
			NH3 Cal Gas Expiry:	March 30, 2023
Removed NH3 Conc:	77.8	ppm	Removed Cylinder #:	
NH3 gas Diff:			Removed cyl Expiry:	
Calibrator Model:	API T700		Serial Number:	3566
ZAG make/model:	API T701		Serial Number:	689

Analyzer Information

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

	Start	*Finish*		*Start*	*Finish*
NO coefficient:	0.833	0.833	TN coefficient:	0.837	0.837
NOX coefficient:	0.839	0.839	NO bkgrnd:	-0.100	-0.1
NO2 coefficient:	1.000	1.000	NOX bkgrnd:	0.000	0.0
NH3 coefficient:	0.951	0.951	TN bkgrnd:	0.000	0.0

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	1.004262	
NO_X Cal Offset:	2.034812	
NO Cal Slope:	1.000294	
NO Cal Offset:	0.654848	
NO_2 Cal Slope:	1.003690	
NO_2 Cal Offset:	0.714817	
NH3 Cal Slope:	1.003144	
NH3 Cal Offset:	4.931327	
TN Cal Slope:	1.008443	
TN Cal Offset:	5.257930	

Wood Buffalo Environmental Association

TN - NOX - NH_3 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated TN concentration (ppb) (Cc)	Calculated NOX concentration (ppb) (Cc)	Calculated NH3 concentration (ppb) (Cc)	Indicated TN concentration (ppb) (Ic)	Indicated NOX concentration (ppb) (Ic)	Indicated NH3 concentration (ppb) (Ic)	TN Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NH3 Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero										
as found NO										
calibrator zero										
high NO point										
NO/O3 point										
as found NH3										
new NH3 cyl rp										
first NH3										
second NH3										
third NH3										
								Average Correction Factor		

Corrected As found	TN =	NA	ppb	NO_X =	NA	ppb	NH3 =	NA	ppb	*Percent Change	TN =	NA
Previous Response	TN =	NA	ppb	NO_X =	NA	ppb	NH3 =	NA	ppb	*Percent Change	NO_X =	NA
										*Percent Change	NH3 =	NA

NH3 Previous Converter Efficiency = 95.1%

NH3 Current Converter Efficiency = 95.1%

* = > +/-5% change initiates investigation

Wood Buffalo Environmental Association

NO_X - NO - NO_2 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.2	0.4	1.0	----	----
as found span	4923	76.9	807.6	799.5	807.6	811.2	794.6	811.0	0.9956	1.0061
new NO cyl rp	4914	86.2	826.5	799.7	826.5	857.9	825.0	857.7	0.9633	0.9694
calibrator zero										
high point										
second point										
third point										
								Average Correction Factor		

Baseline Corr As fnd	TN =	810	ppb	NO_X =	811.0	ppb	NO =	794.2	ppb	*Percent Change TN = -1.2%
Previous Response	TN =	819.7	ppb	NO_X =	813.1	ppb	NO =	800.4	ppb	*Percent Change NO_X = -0.3%
										*Percent Change NO = -0.8%

* = > +/-5% change initiates investigation

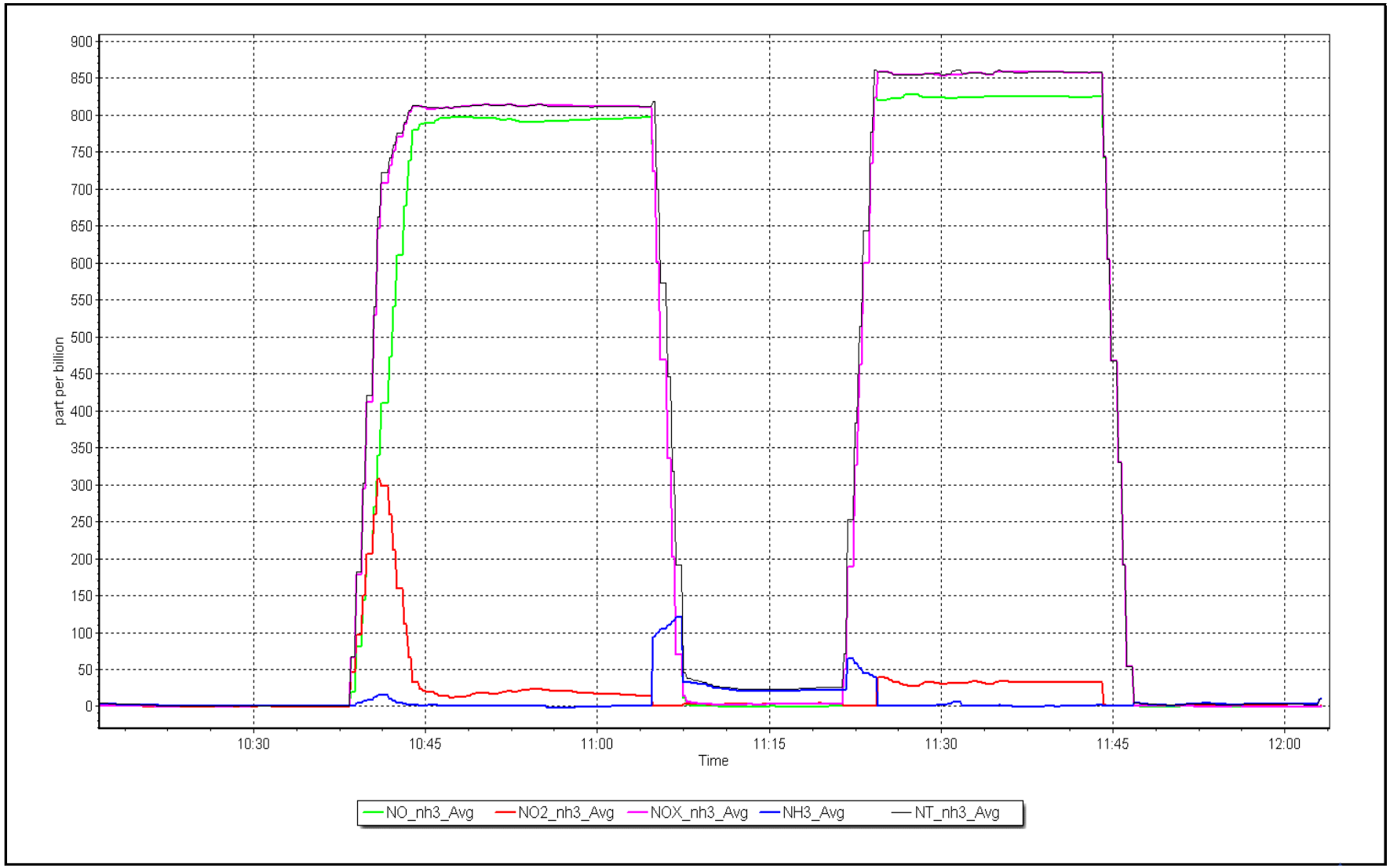
GPT Calibration Data

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						
1st GPT point (400 ppb O3)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
				Average Correction Factor		

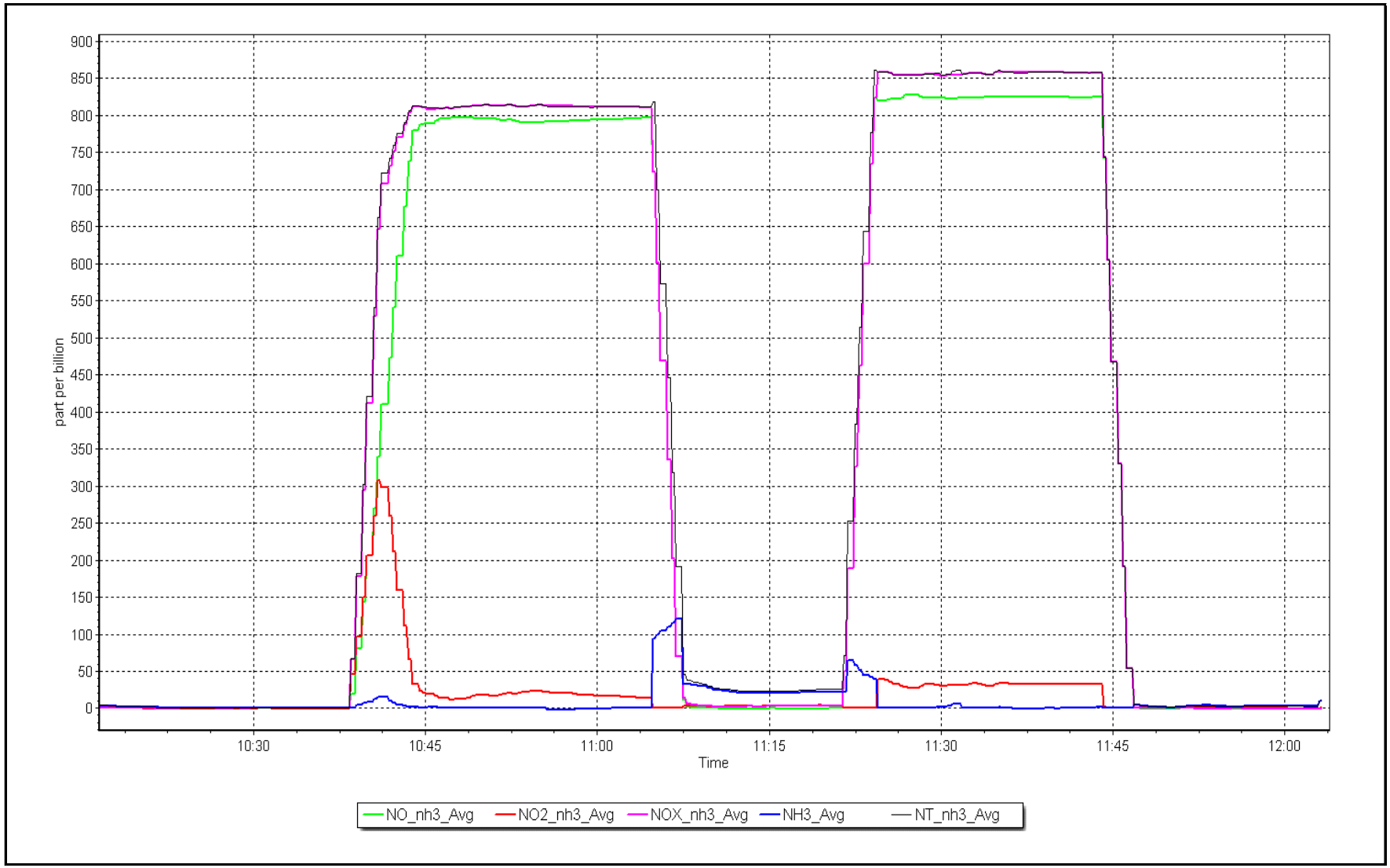
Notes: Changed the NO cylinder after as founds.

Calibration Performed By: Max Farrell

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



NH_3 Calibration Plot Date: April 20, 2023 Location: Patricia McInnes



Wood Buffalo Environmental Association

TN - NO_X - NH_3 Calibration Report

Version-05-2023

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
NOX Cal Date:	May 24, 2023	Last Cal Date:	April 27, 2023
Start time (MST):	7:26	End time (MST):	11:40
NH3 Cal Date:	May 24, 2023	Last Cal Date:	April 27, 2023
Start time (MST):	12:00	End time (MST):	14:20
Reason:	Routine		

Calibration Standards

NOX Cal Gas Conc:	47.94	ppm	NO Gas Cylinder #:	T30YCWN
NO Cal Gas Conc:	46.39	ppm	NO Cal Gas Expiry:	April 11, 2025
Removed NOX Conc:	47.94	ppm	Removed Cylinder #:	
Removed NO Conc:	46.39	ppm	Removed cyl Expiry:	
NOX gas Diff:			NO gas Diff:	
NH3 Cal Gas Conc:	77.8	ppm	NH3 Gas Cylinder #:	CC710812
			NH3 Cal Gas Expiry:	March 30, 2023
Removed NH3 Conc:	77.8	ppm	Removed Cylinder #:	
NH3 gas Diff:			Removed cyl Expiry:	
Calibrator Model:		API T700	Serial Number:	3566
ZAG make/model:		API T701	Serial Number:	689

Analyzer Information

Analyzer model:	API T201	Analyzer serial #:	152
Converter model:	API T501	Converter serial #:	147
NH3 Range (ppb):	0 - 2000 ppb	Reaction cell Press:	6.50
NOX Range (ppb):	0 - 1000 ppb	Sample Flow:	25.3

	Start	*Finish*		*Start*	*Finish*
NO coefficient:	0.833	0.794	TN coefficient:	0.837	0.794
NOX coefficient:	0.839	0.796	NO bkgrnd:	-0.1	-0.1
NO2 coefficient:	1.000	1.000	NOX bkgrnd:	0.0	0.0
NH3 coefficient:	0.951	0.908	TN bkgrnd:	0.0	0.0

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	1.004262	0.995223
NO_X Cal Offset:	2.034812	1.876743
NO Cal Slope:	1.000294	0.994331
NO Cal Offset:	0.654848	1.802690
NO_2 Cal Slope:	1.003690	1.004951
NO_2 Cal Offset:	0.714817	1.630262
NH3 Cal Slope:	1.003144	1.008694
NH3 Cal Offset:	4.931327	6.507686
TN Cal Slope:	1.008443	1.013896
TN Cal Offset:	5.257930	6.739810

Wood Buffalo Environmental Association

TN - NOX - NH_3 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated TN concentration (ppb) (Cc)	Calculated NOX concentration (ppb) (Cc)	Calculated NH3 concentration (ppb) (Cc)	Indicated TN concentration (ppb) (Ic)	Indicated NOX concentration (ppb) (Ic)	Indicated NH3 concentration (ppb) (Ic)	TN Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NH3 Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.9	-0.6	1.5	----	----
as found NO	4914	86.2	826.5	826.5	----	869.3	870.8	-1.4	0.951	----
calibrator zero	5000	0.0	0.0	0.0	0.0	1.6	0.2	1.5	----	----
high NO point	4914	86.2	826.5	826.5	----	827.4	823.6	3.8	0.999	----
NO/O3 point	4914	86.2	826.5	826.5	----	828.5	824.7	3.8	0.998	----
as found NH3	3419	81.0	1800.5	----	1800.5	1730.5	----	1720.5	1.040	1.047
new NH3 cyl rp							----			
first NH3	3419	81.0	1800.5	----	1800.5	1830.5	----	1820.9	0.984	0.989
second NH3	3455	45.0	1000.3	----	1000.3	1020.4	----	1015.1	0.980	0.985
third NH3	3478	22.5	500.1	----	500.1	521.2	----	518.1	0.959	0.965
								Average Correction Factor	0.9982	0.9798

Corrected As found TN = 868.4 ppb NO_X = 871.4 ppb NH3 = 1719.0 ppb *Percent Change TN = 3.4%

Previous Response TN = 838.7 ppb NO_X = 832.0 ppb NH3 = 1811.1 ppb *Percent Change NO_X = 4.5%

*Percent Change NH3 = -5.4%

* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 95.1%

NH3 Current Converter Efficiency = 90.8%

Wood Buffalo Environmental Association

NO_X - NO - NO_2 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.6	-0.2	0.9	----	----
as found span	4914	86.2	826.5	799.7	826.5	870.8	838.2	869.3	0.9491	0.9541
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	1.6	----	----
high point	4914	86.2	826.5	799.7	826.5	823.6	796.9	827.4	1.0035	1.0036
second point	4957	43.1	413.2	399.9	413.2	413.8	397.9	416.9	0.9986	1.0050
third point	4978	21.6	207.1	200.4	207.1	209.8	204.5	210.4	0.9872	0.9801
								Average Correction Factor	0.9964	0.9962

Baseline Corr As fnd	TN =	868.4 ppb	NO_X =	871.4 ppb	NO =	838.4 ppb	*Percent Change	TN = 3.4%
Previous Response	TN =	838.7 ppb	NO_X =	832.0 ppb	NO =	800.6 ppb	*Percent Change	NO_X = 4.5%
							*Percent Change	NO = 4.5%

* = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found zero	----	----	0.0	-0.5	----	----
calibration zero	----	----	0.0	0.2	----	----
1st GPT point (400 ppb O3)	795.4	399.6	422.5	425.1	0.9939	100.6%
2nd GPT point (200 ppb O3)	795.4	600.2	221.9	226.3	0.9806	102.0%
3rd GPT point (100 ppb O3)	795.4	695.7	126.4	129.6	0.9755	102.5%
				Average Correction Factor	0.9834	101.7%

Notes: Changed the inlet filter after as founds. Adjusted both NOX and NH3 span. As found span is close to 5% high due to the recent NO cylinder change.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TN Calibration Summary

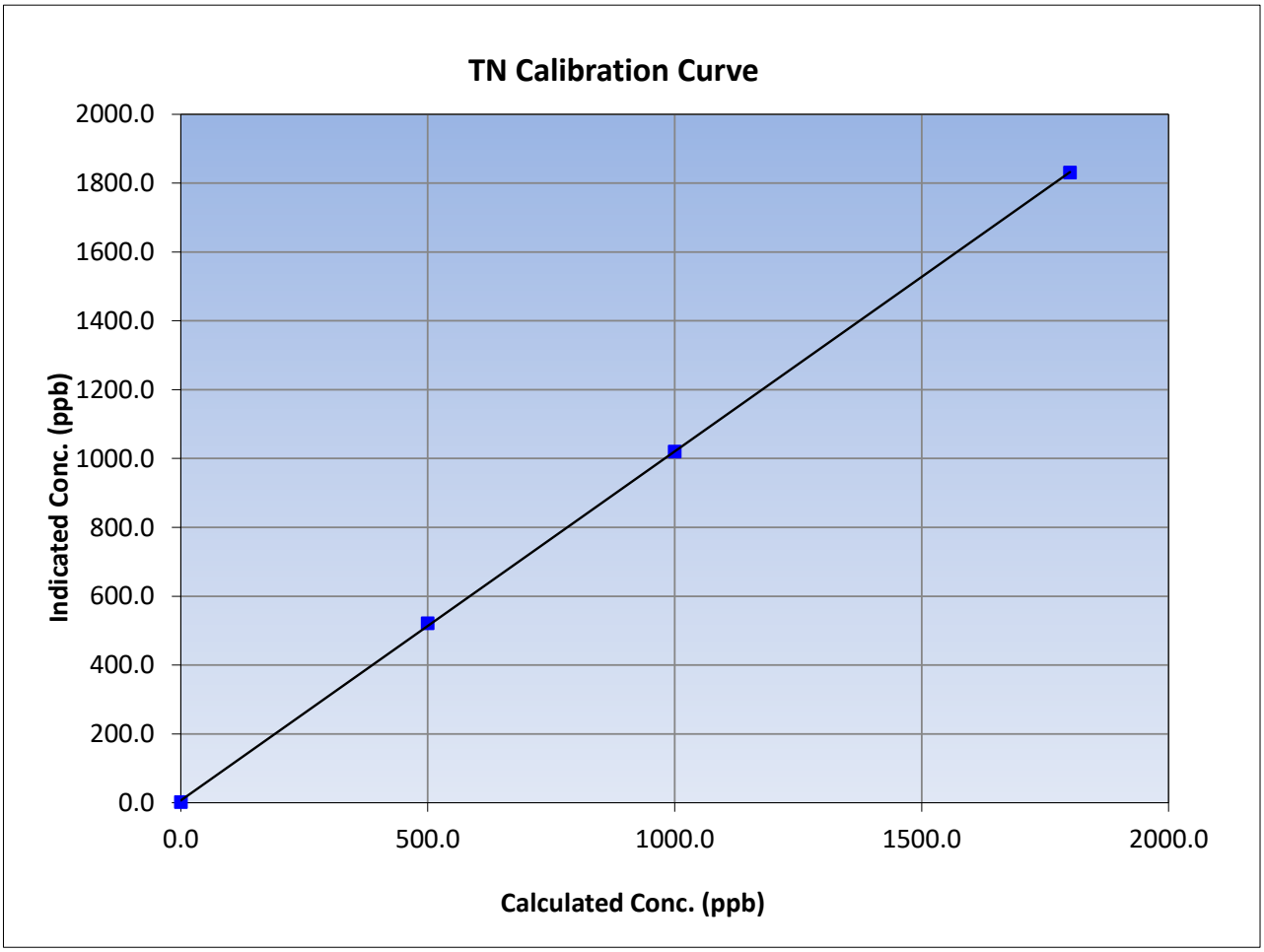
Version-05-2023

Station Information

Calibration Date:	May 24, 2023	Previous Calibration:	April 27, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	7:26	End Time (MST):	11:40
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	1.6	----	Correlation Coefficient	0.999953	≥0.995
1800.5	1830.5	0.9836			
1000.3	1020.4	0.9803	Slope	1.013896	0.90 - 1.10
500.1	521.2	0.9595			
			Intercept	6.739810	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

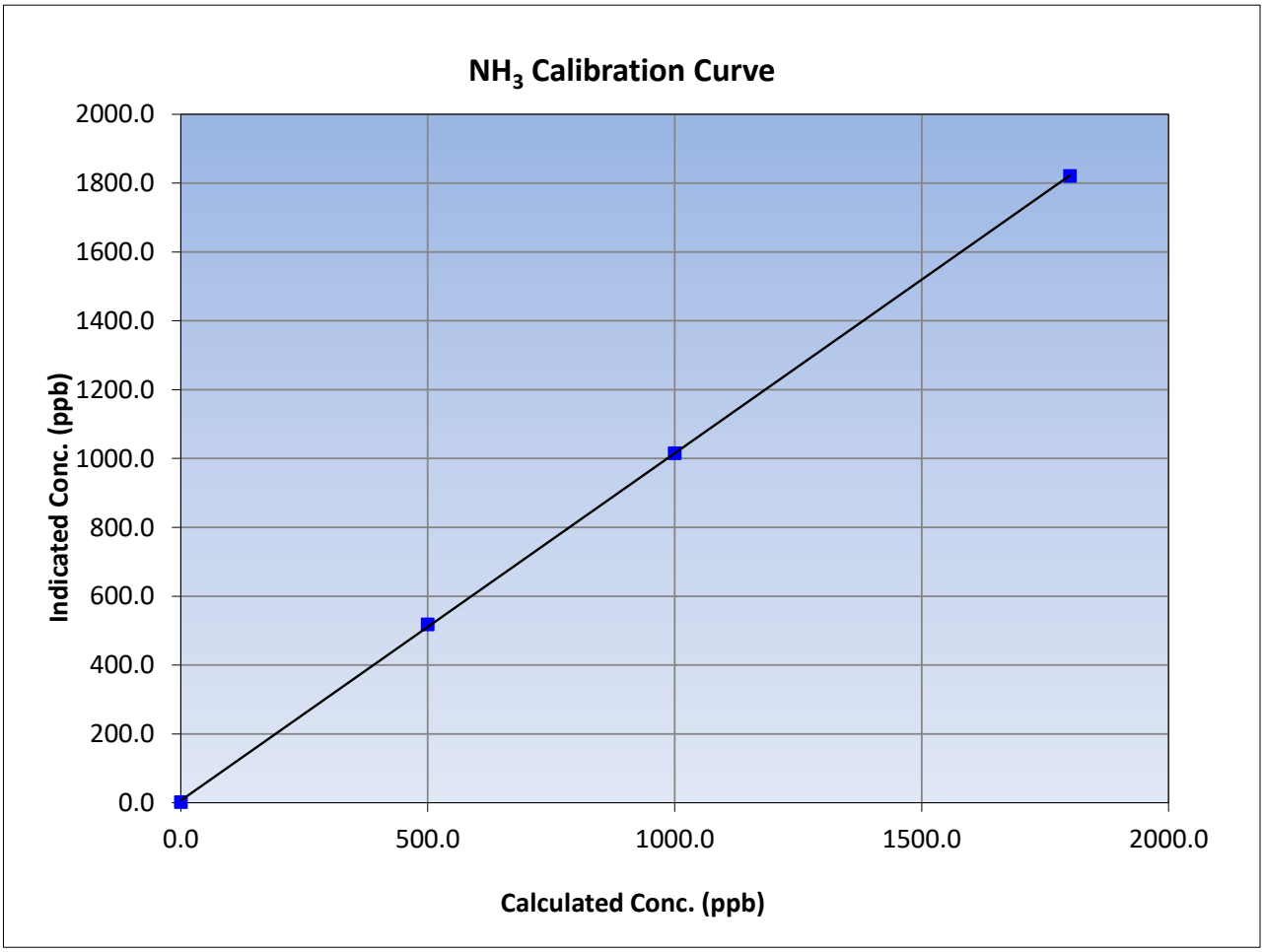
Version-05-2023

Station Information

Calibration Date:	May 24, 2023	Previous Calibration:	April 27, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	7:26	End Time (MST):	11:40
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	1.5	----	Correlation Coefficient	0.999956	≥0.995
1800.5	1820.9	0.9888			
1000.3	1015.1	0.9854	Slope	1.008694	0.90 - 1.10
500.1	518.1	0.9652			
			Intercept	6.507686	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

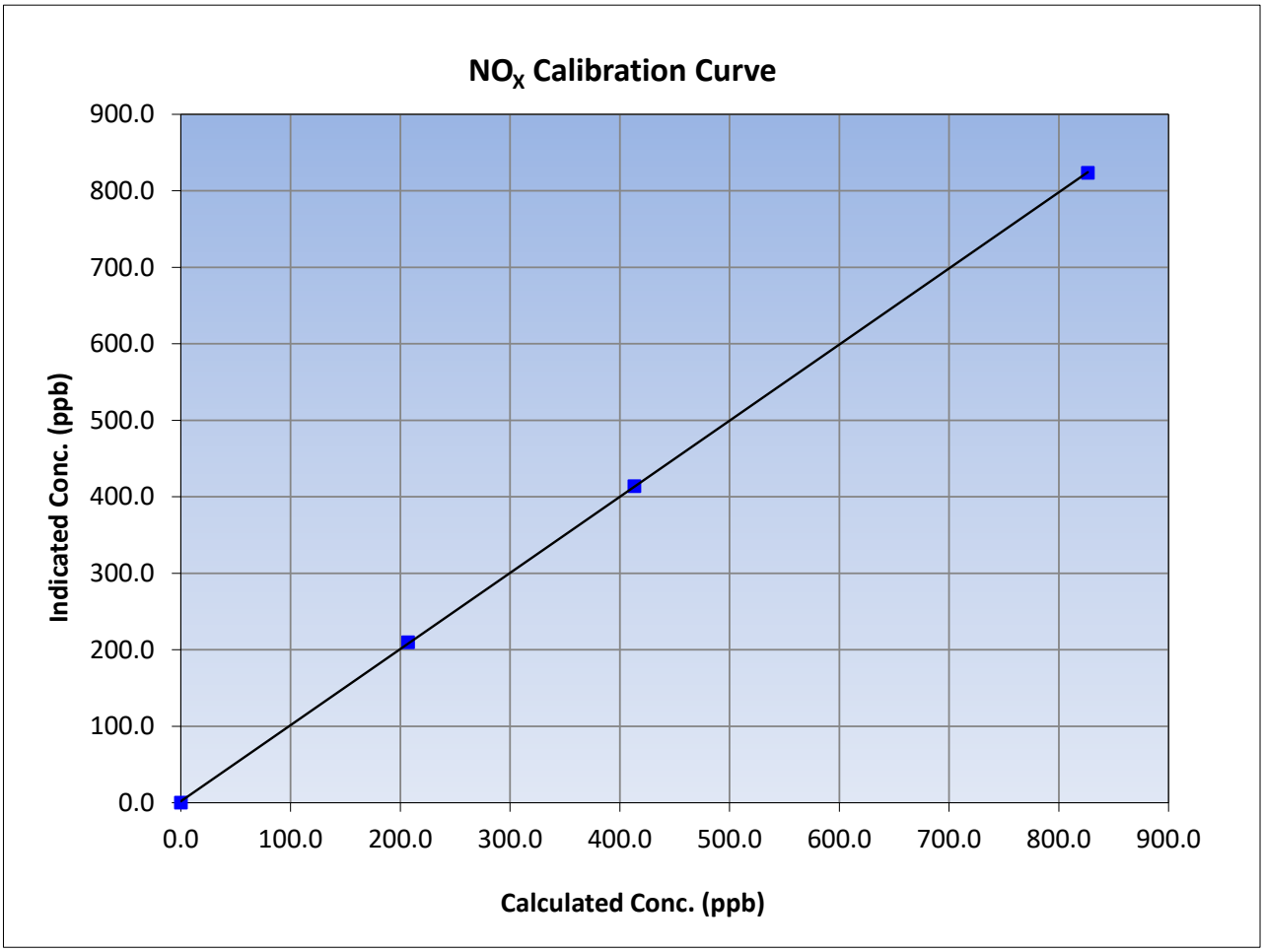
Version-05-2023

Station Information

Calibration Date:	May 24, 2023	Previous Calibration:	April 27, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	7:26	End Time (MST):	11:40
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	0.999981	≥0.995
826.5	823.6	1.0035			
413.2	413.8	0.9986	Slope	0.995223	0.90 - 1.10
207.1	209.8	0.9872			
			Intercept	1.876743	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

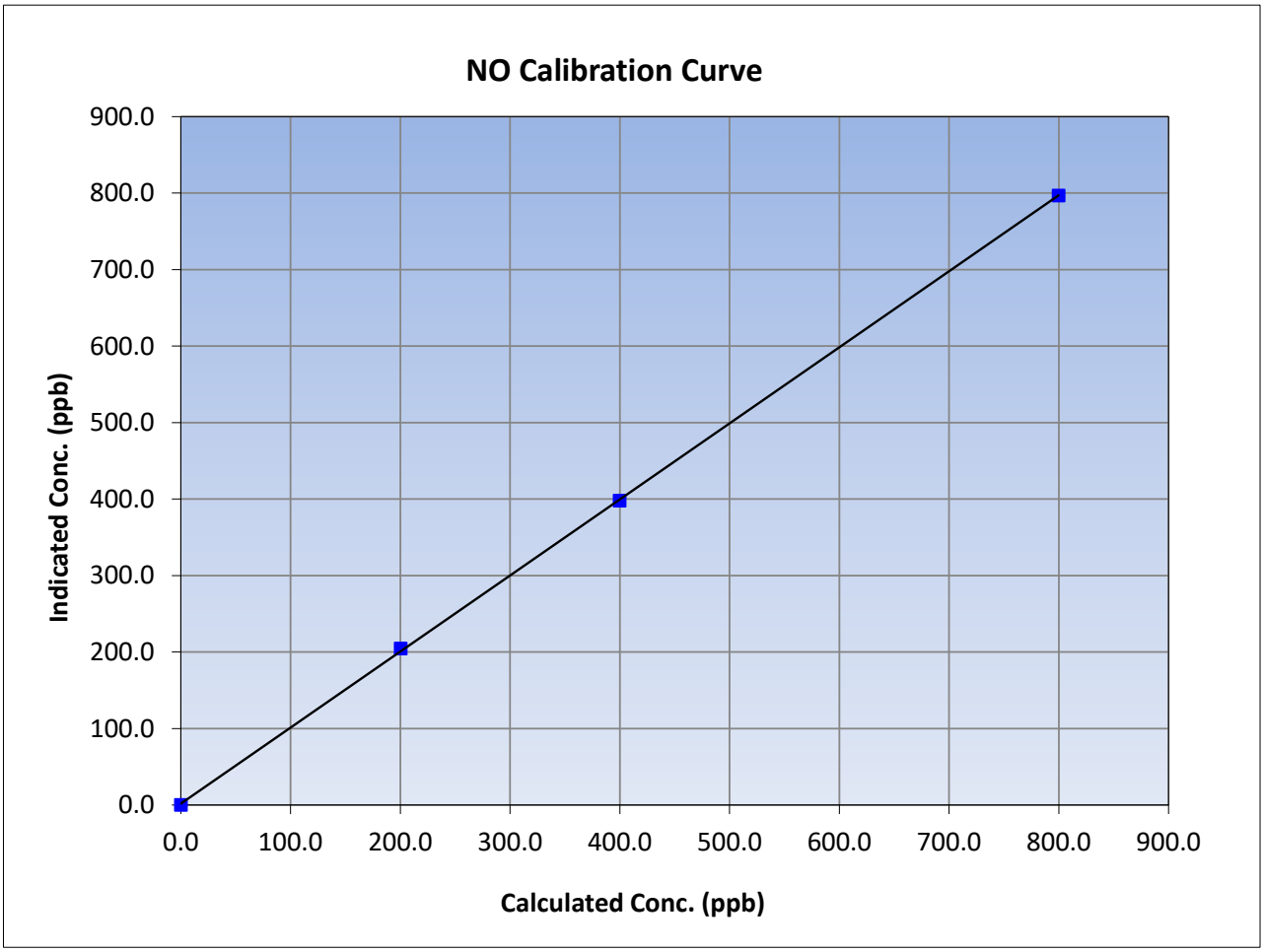
Version-05-2023

Station Information

Calibration Date:	May 24, 2023	Previous Calibration:	April 27, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	7:26	End Time (MST):	11:40
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999950	≥0.995
799.7	796.9	1.0036			
399.9	397.9	1.0050	Slope	0.994331	0.90 - 1.10
200.4	204.5	0.9801			
			Intercept	1.802690	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

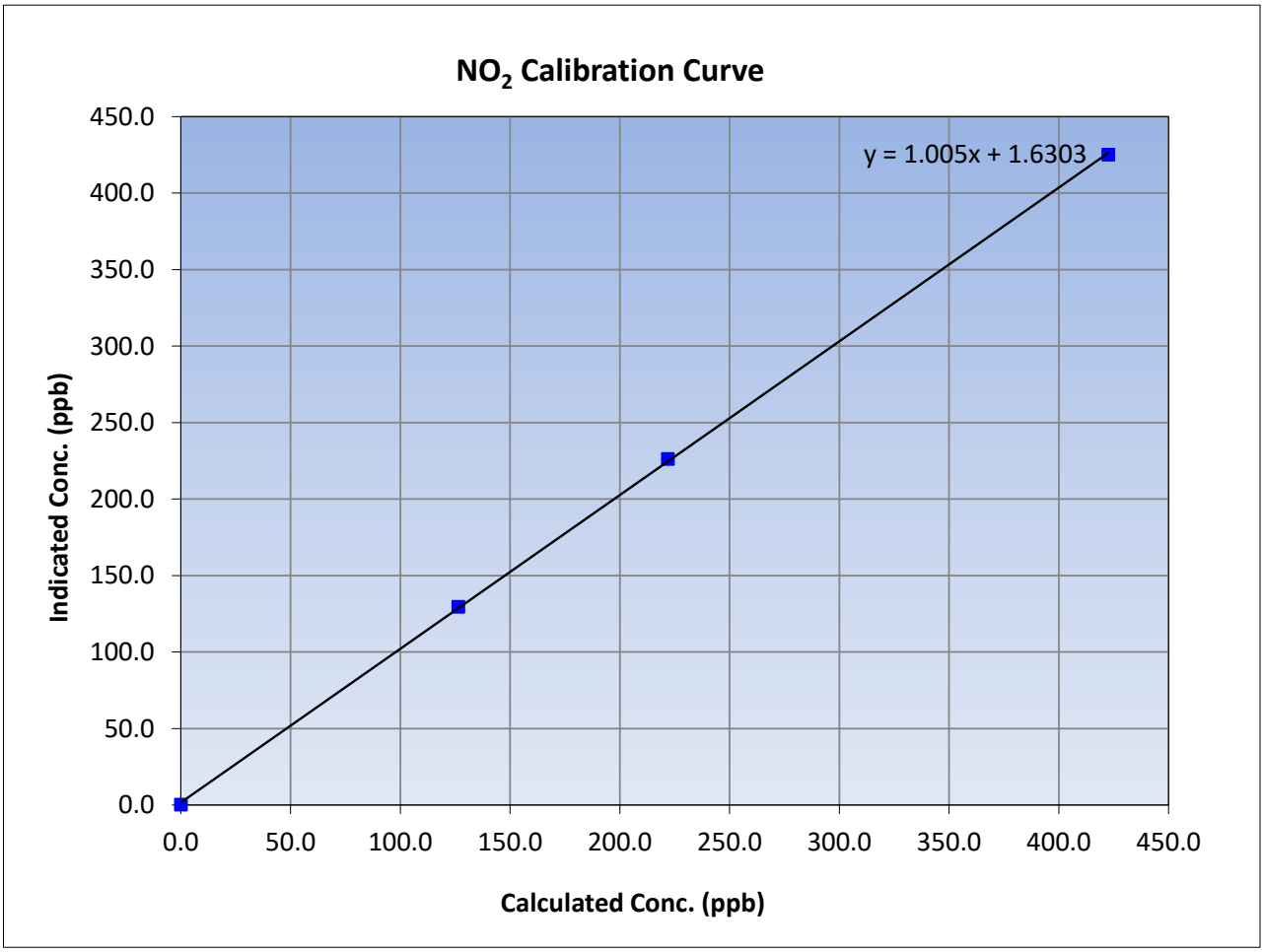
Version-05-2023

Station Information

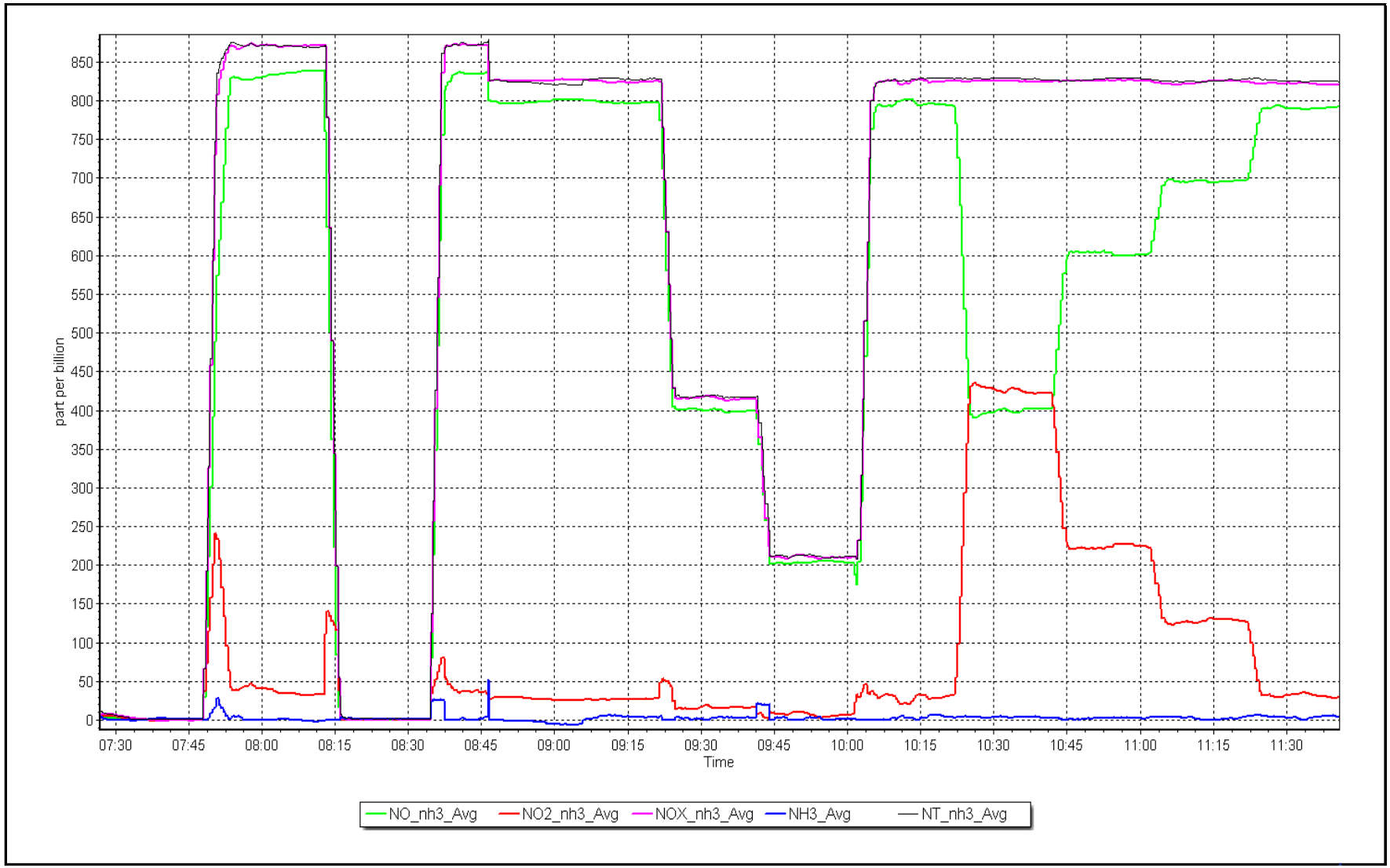
Calibration Date:	May 24, 2023	Previous Calibration:	April 27, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	7:26	End Time (MST):	11:40
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999928	≥0.995
422.5	425.1	0.9939			
221.9	226.3	0.9806	Slope	1.004951	0.90 - 1.10
126.4	129.6	0.9755			
			Intercept	1.630262	+/-20



NO_X Calibration Plot Date: May 24, 2023 Location: Patricia McInnes



NH_3 Calibration Plot Date: May 24, 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:	May 15, 2023	Last Cal Date:	April 3, 2023
Start time (MST):	9:23	End time (MST):	12:35
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:	1.006429	1.001971	Backgd or Offset:	-0.2	-0.2
Calibration intercept:	0.300000	0.480000	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	-1.1	----
as found span	5000	1303.0	400.0	401.4	0.997
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	-0.6	----
high point	5000	1303.0	400.0	400.7	0.998
second point	5000	966.5	200.0	201.5	0.993
third point	5000	794.3	100.0	101.7	0.983
as left zero	5000	800.0	0.0	-0.8	----
as left span	5000	1303.0	400.0	403.6	0.991
				Average Correction Factor	0.991

Baseline Corr As found:	402.5	Previous response	402.9	*% 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: Aswin Sasi Kumar

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

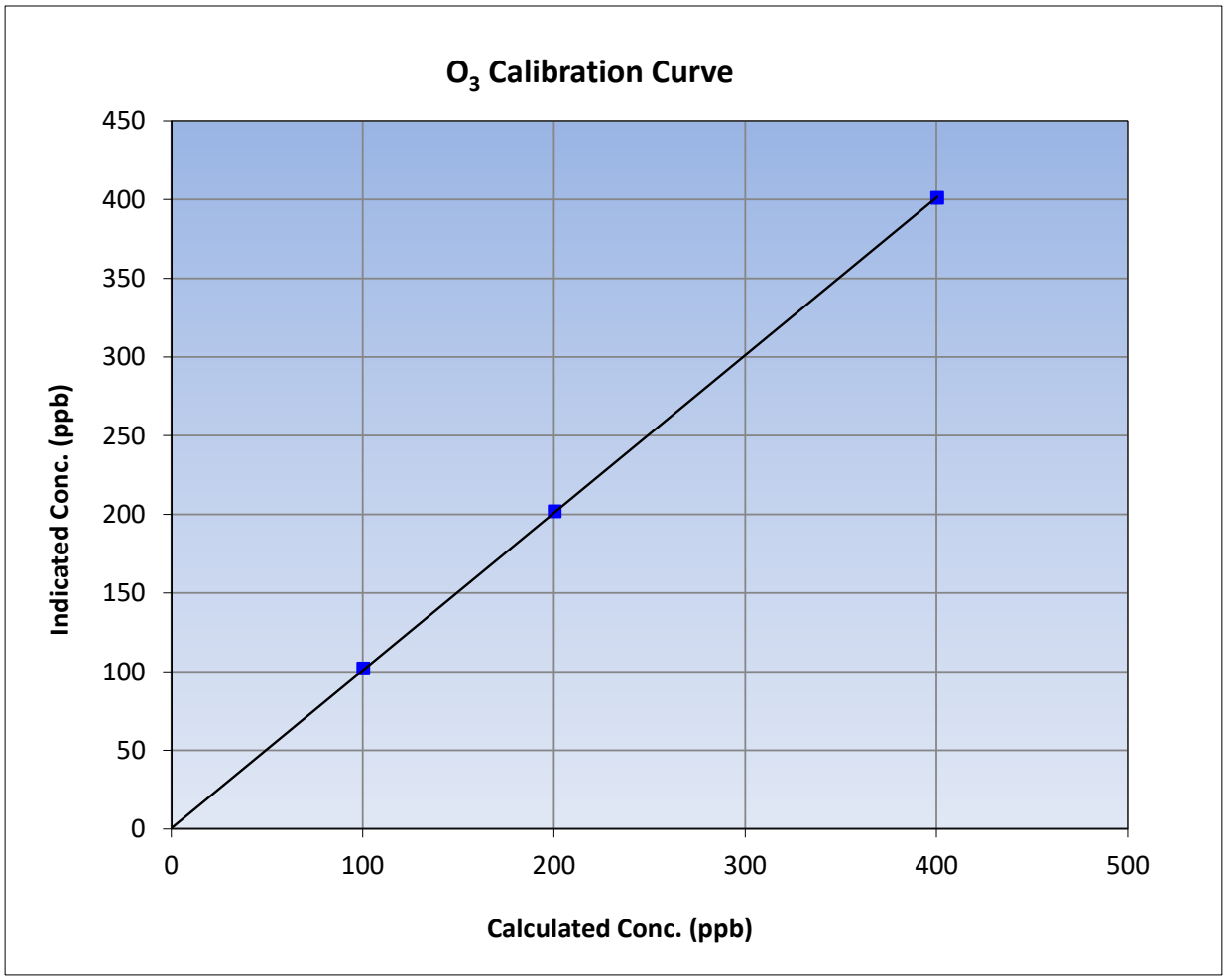
Station Information

Calibration Date:	May 15, 2023	Previous Calibration:	April 3, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:23	End Time (MST):	12:35
Analyzer make:	Thermo 49i	Analyzer serial #:	1300156234

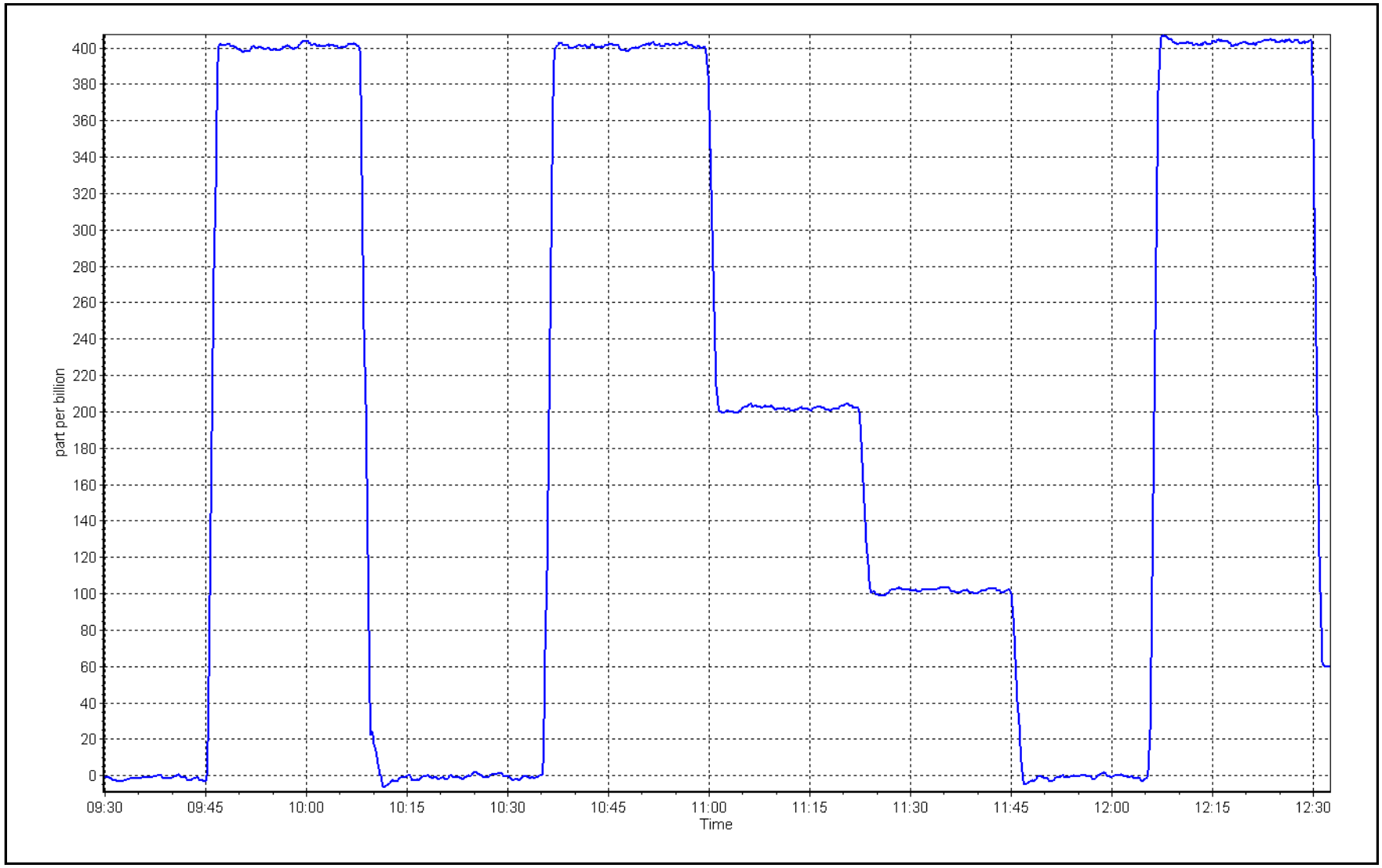
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.6	----
400.0	400.7	0.9983
200.0	201.5	0.9926
100.0	101.7	0.9833

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999967	*≥0.995*
Slope	1.001971	*0.90 - 1.10*
Intercept	0.480000	*+/- 5*



O_3 Calibration Plot Date: May 15, 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:	May 17, 2023	Last Cal Date:	April 13, 2023
Start time (MST):	12:42	End time (MST):	13:42
Analyzer Make:	API T640	S/N:	766
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	ALICAT FP-25	S/N:	388755
Temp/RH standard:	ALICAT FP-25	S/N:	388755

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	8.9	8.66	8.9	☐	+/- 2 °C
P (mmHg)	732.9	733.5	732.9	☐	+/- 10 mmHg
flow (LPM)	4.99	5.11	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: May 17, 2023 Last Cal Date: April 13, 2023

PM w/o HEPA: 16.8 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	10	10	11.1	☑	10.9 +/- 0.5

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

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

Disposable Filter Changed: April 13, 2023

Annual Maintenance

Date Sample Tube Cleaned: April 13, 2023

Date RH/T Sensor Cleaned: April 13, 2023

Notes: "Perform span dust check" alarm was on upon arrival, completed PMT Peak adjustment. Leak check

Calibration by: Max Farrell

Wood Buffalo Environmental Association

TN - NO_X - NH_3 Calibration Report

Version-05-2023

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
NOX Cal Date:	May 24, 2023	Last Cal Date:	April 27, 2023
Start time (MST):	7:26	End time (MST):	11:40
NH3 Cal Date:	May 24, 2023	Last Cal Date:	April 27, 2023
Start time (MST):	12:00	End time (MST):	14:20
Reason:	Routine		

Calibration Standards

NOX Cal Gas Conc:	47.94	ppm	NO Gas Cylinder #:	T30YCWN
NO Cal Gas Conc:	46.39	ppm	NO Cal Gas Expiry:	April 11, 2025
Removed NOX Conc:	47.94	ppm	Removed Cylinder #:	
Removed NO Conc:	46.39	ppm	Removed cyl Expiry:	
NOX gas Diff:			NO gas Diff:	
NH3 Cal Gas Conc:	77.8	ppm	NH3 Gas Cylinder #:	CC710812
			NH3 Cal Gas Expiry:	March 30, 2023
Removed NH3 Conc:	77.8	ppm	Removed Cylinder #:	
NH3 gas Diff:			Removed cyl Expiry:	
Calibrator Model:		API T700	Serial Number:	3566
ZAG make/model:		API T701	Serial Number:	689

Analyzer Information

Analyzer model:	API T201	Analyzer serial #:	152
Converter model:	API T501	Converter serial #:	147
NH3 Range (ppb):	0 - 2000 ppb	Reaction cell Press:	6.50
NOX Range (ppb):	0 - 1000 ppb	Sample Flow:	25.3

	Start	*Finish*		*Start*	*Finish*
NO coefficient:	0.833	0.794	TN coefficient:	0.837	0.794
NOX coefficient:	0.839	0.796	NO bkgrnd:	-0.1	-0.1
NO2 coefficient:	1.000	1.000	NOX bkgrnd:	0.0	0.0
NH3 coefficient:	0.951	0.908	TN bkgrnd:	0.0	0.0

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	1.004262	0.995223
NO_X Cal Offset:	2.034812	1.876743
NO Cal Slope:	1.000294	0.994331
NO Cal Offset:	0.654848	1.802690
NO_2 Cal Slope:	1.003690	1.004951
NO_2 Cal Offset:	0.714817	1.630262
NH3 Cal Slope:	1.003144	1.008694
NH3 Cal Offset:	4.931327	6.507686
TN Cal Slope:	1.008443	1.013896
TN Cal Offset:	5.257930	6.739810

Wood Buffalo Environmental Association

TN - NOX - NH_3 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated TN concentration (ppb) (Cc)	Calculated NOX concentration (ppb) (Cc)	Calculated NH3 concentration (ppb) (Cc)	Indicated TN concentration (ppb) (Ic)	Indicated NOX concentration (ppb) (Ic)	Indicated NH3 concentration (ppb) (Ic)	TN Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NH3 Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.9	-0.6	1.5	----	----
as found NO	4914	86.2	826.5	826.5	----	869.3	870.8	-1.4	0.951	----
calibrator zero	5000	0.0	0.0	0.0	0.0	1.6	0.2	1.5	----	----
high NO point	4914	86.2	826.5	826.5	----	827.4	823.6	3.8	0.999	----
NO/O3 point	4914	86.2	826.5	826.5	----	828.5	824.7	3.8	0.998	----
as found NH3	3419	81.0	1800.5	----	1800.5	1730.5	----	1720.5	1.040	1.047
new NH3 cyl rp							----			
first NH3	3419	81.0	1800.5	----	1800.5	1830.5	----	1820.9	0.984	0.989
second NH3	3455	45.0	1000.3	----	1000.3	1020.4	----	1015.1	0.980	0.985
third NH3	3478	22.5	500.1	----	500.1	521.2	----	518.1	0.959	0.965
								Average Correction Factor	0.9982	0.9798

Corrected As found TN = 868.4 ppb NO_X = 871.4 ppb NH3 = 1719.0 ppb *Percent Change TN = 3.4%

Previous Response TN = 838.7 ppb NO_X = 832.0 ppb NH3 = 1811.1 ppb *Percent Change NO_X = 4.5%

*Percent Change NH3 = -5.4%

* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 95.1%

NH3 Current Converter Efficiency = 90.8%

Wood Buffalo Environmental Association

NO_X - NO - NO_2 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.6	-0.2	0.9	----	----
as found span	4914	86.2	826.5	799.7	826.5	870.8	838.2	869.3	0.9491	0.9541
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	1.6	----	----
high point	4914	86.2	826.5	799.7	826.5	823.6	796.9	827.4	1.0035	1.0036
second point	4957	43.1	413.2	399.9	413.2	413.8	397.9	416.9	0.9986	1.0050
third point	4978	21.6	207.1	200.4	207.1	209.8	204.5	210.4	0.9872	0.9801
								Average Correction Factor	0.9964	0.9962

Baseline Corr As fnd	TN =	868.4 ppb	NO_X =	871.4 ppb	NO =	838.4 ppb	*Percent Change	TN = 3.4%
Previous Response	TN =	838.7 ppb	NO_X =	832.0 ppb	NO =	800.6 ppb	*Percent Change	NO_X = 4.5%
							*Percent Change	NO = 4.5%

* = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found zero	----	----	0.0	-0.5	----	----
calibration zero	----	----	0.0	0.2	----	----
1st GPT point (400 ppb O3)	795.4	399.6	422.5	425.1	0.9939	100.6%
2nd GPT point (200 ppb O3)	795.4	600.2	221.9	226.3	0.9806	102.0%
3rd GPT point (100 ppb O3)	795.4	695.7	126.4	129.6	0.9755	102.5%
				Average Correction Factor	0.9834	101.7%

Notes: Changed the inlet filter after as founds. Adjusted both NOX and NH3 span. As found span is close to 5% high due to the recent NO cylinder change.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TN Calibration Summary

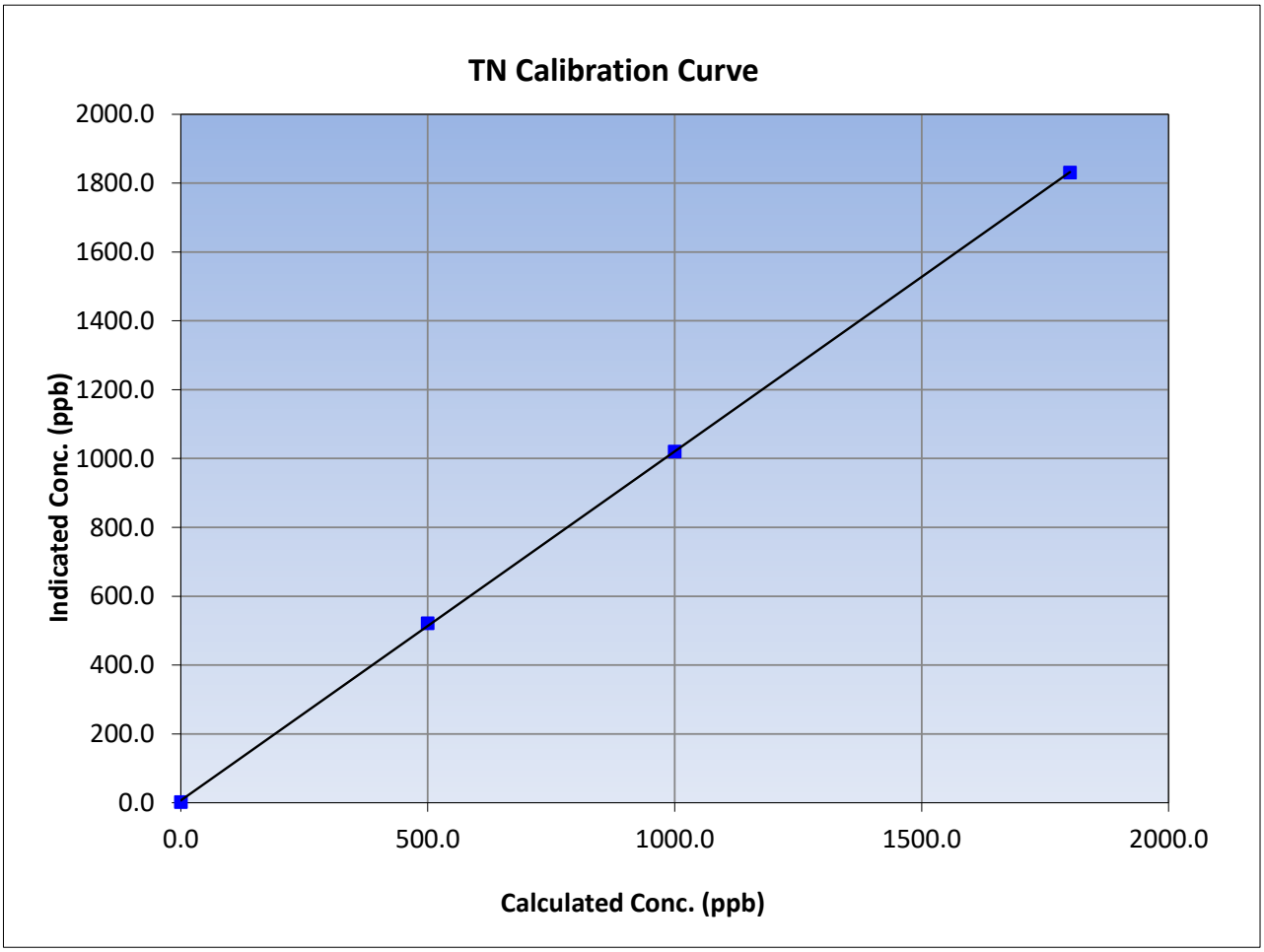
Version-05-2023

Station Information

Calibration Date:	May 24, 2023	Previous Calibration:	April 27, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	7:26	End Time (MST):	11:40
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	1.6	----	Correlation Coefficient	0.999953	≥0.995
1800.5	1830.5	0.9836			
1000.3	1020.4	0.9803	Slope	1.013896	0.90 - 1.10
500.1	521.2	0.9595			
			Intercept	6.739810	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

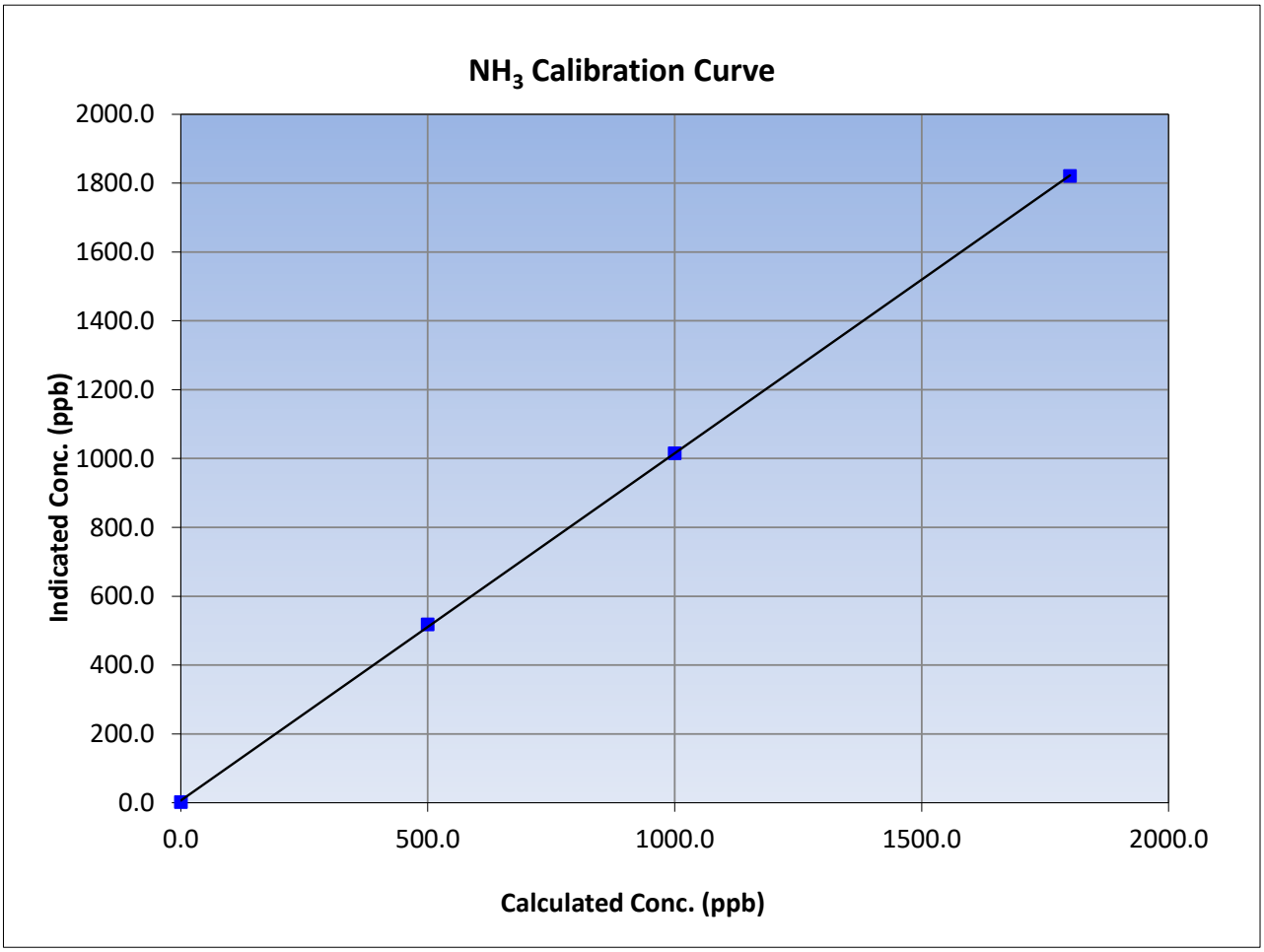
Version-05-2023

Station Information

Calibration Date:	May 24, 2023	Previous Calibration:	April 27, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	7:26	End Time (MST):	11:40
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	1.5	----	Correlation Coefficient	0.999956	≥0.995
1800.5	1820.9	0.9888			
1000.3	1015.1	0.9854	Slope	1.008694	0.90 - 1.10
500.1	518.1	0.9652			
			Intercept	6.507686	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

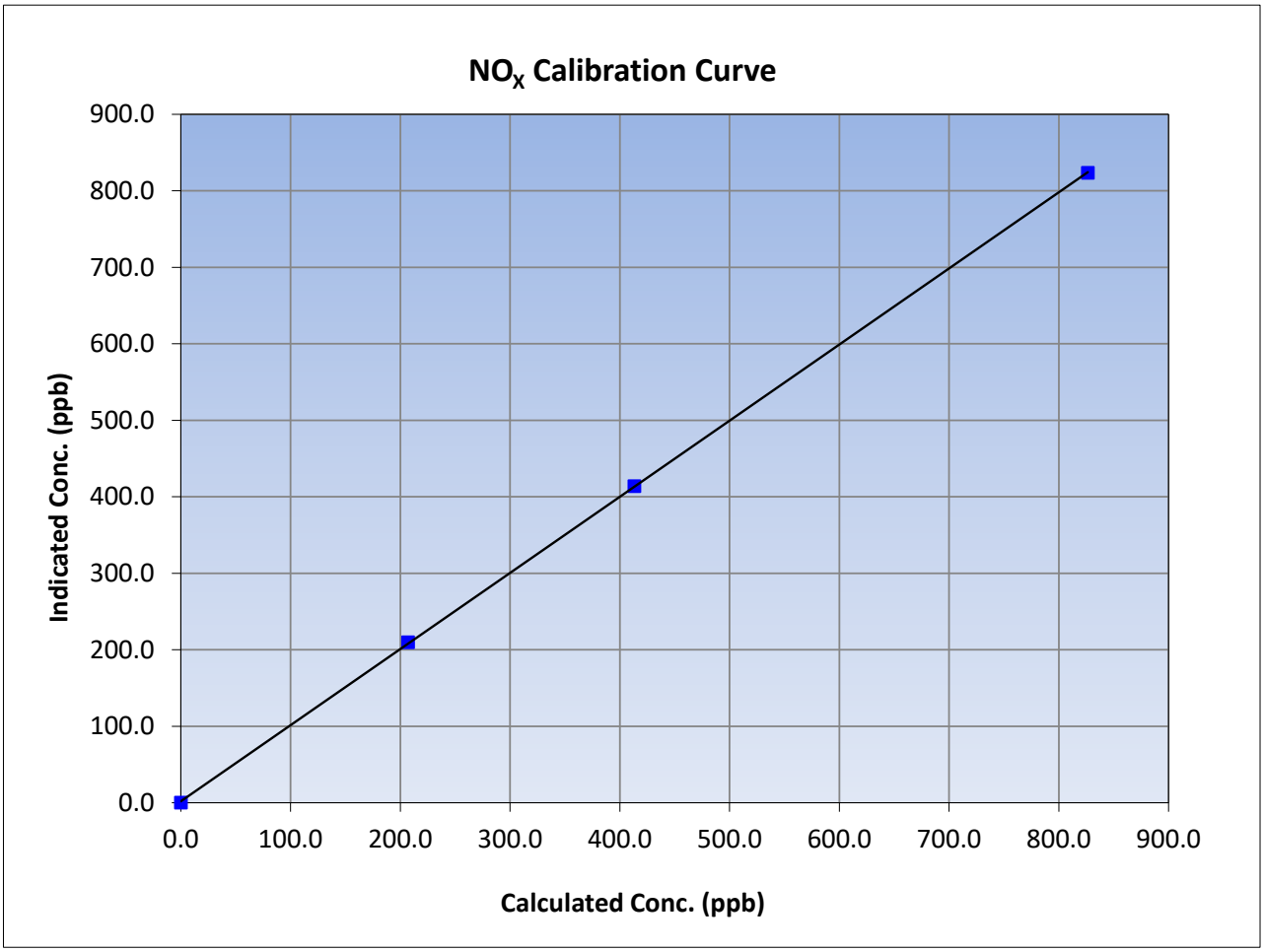
Version-05-2023

Station Information

Calibration Date:	May 24, 2023	Previous Calibration:	April 27, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	7:26	End Time (MST):	11:40
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	0.999981	≥0.995
826.5	823.6	1.0035			
413.2	413.8	0.9986	Slope	0.995223	0.90 - 1.10
207.1	209.8	0.9872			
			Intercept	1.876743	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

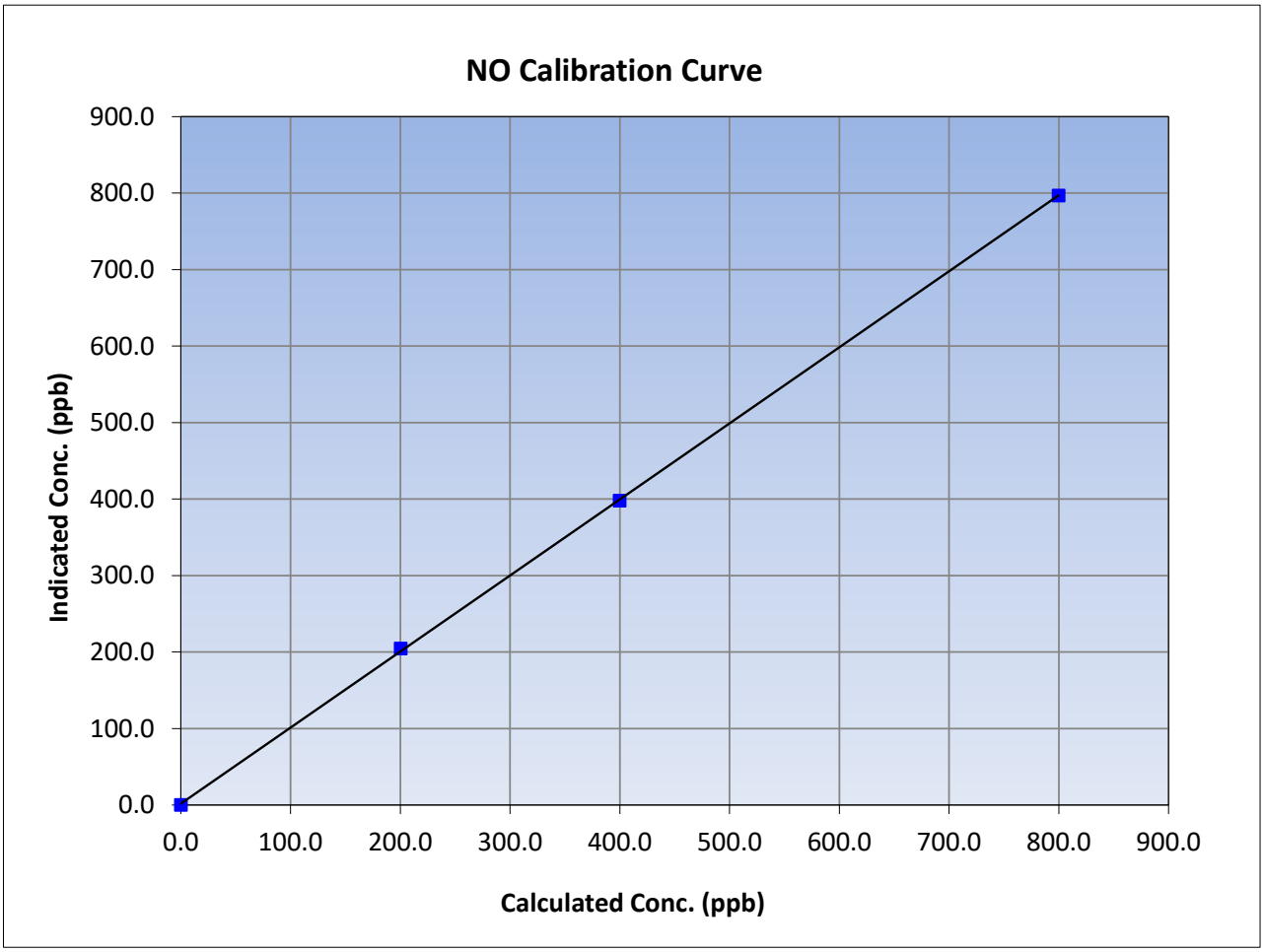
Version-05-2023

Station Information

Calibration Date:	May 24, 2023	Previous Calibration:	April 27, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	7:26	End Time (MST):	11:40
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999950	≥0.995
799.7	796.9	1.0036			
399.9	397.9	1.0050	Slope	0.994331	0.90 - 1.10
200.4	204.5	0.9801			
			Intercept	1.802690	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

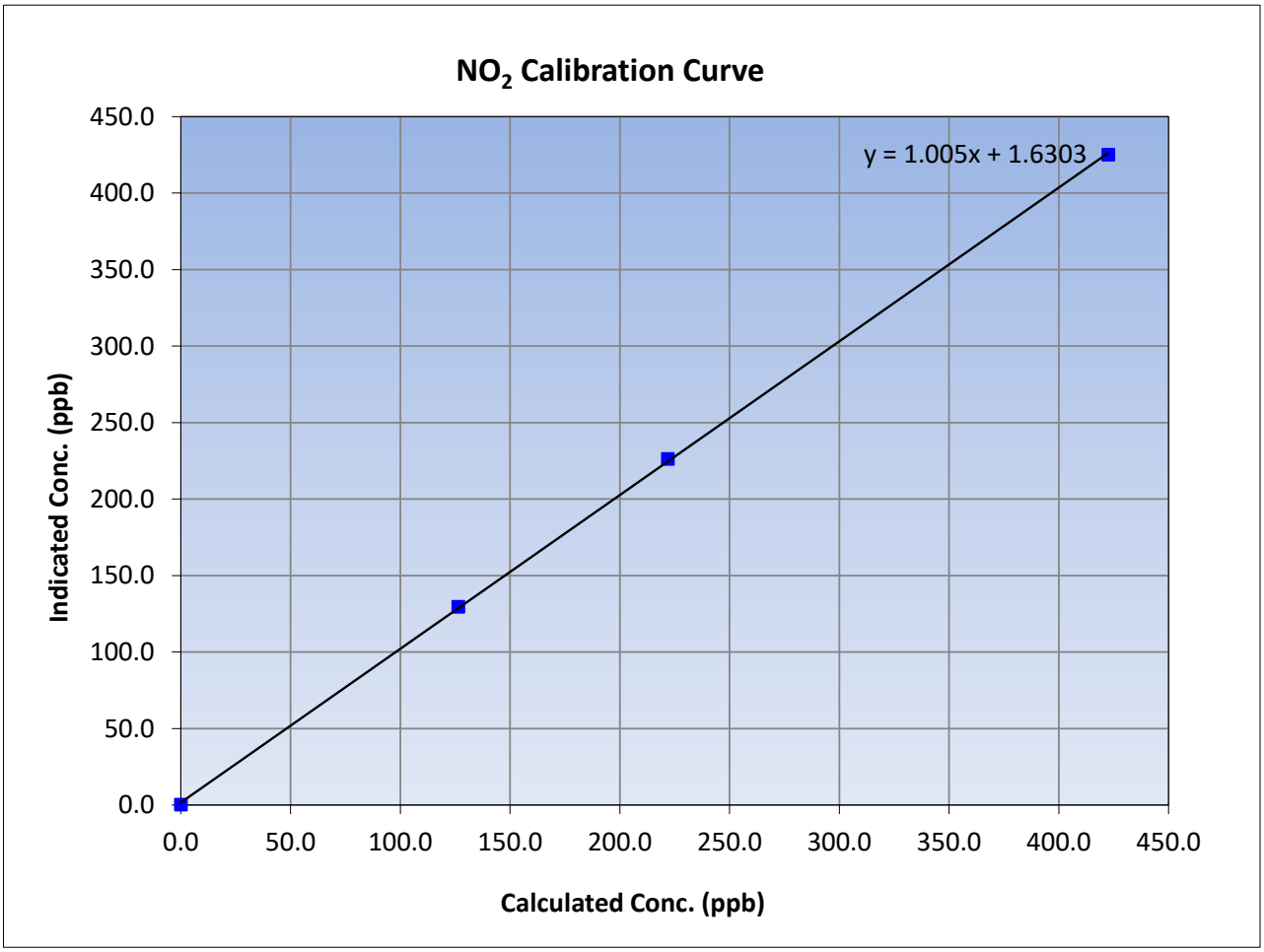
Version-05-2023

Station Information

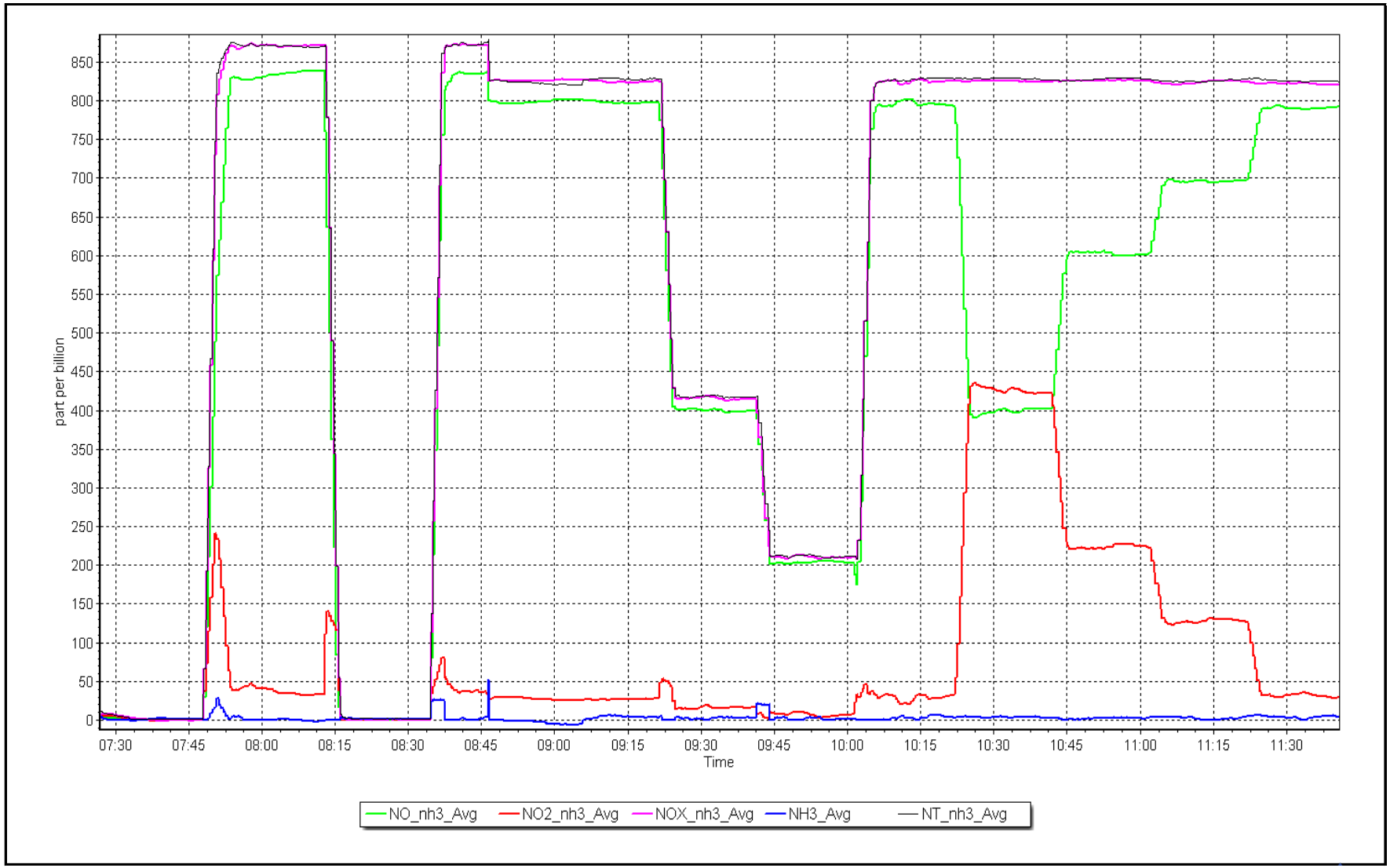
Calibration Date:	May 24, 2023	Previous Calibration:	April 27, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	7:26	End Time (MST):	11:40
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999928	≥0.995
422.5	425.1	0.9939			
221.9	226.3	0.9806	Slope	1.004951	0.90 - 1.10
126.4	129.6	0.9755			
			Intercept	1.630262	+/-20



NO_X Calibration Plot Date: May 24, 2023 Location: Patricia McInnes



NH_3 Calibration Plot Date: May 24, 2023 Location: Patricia McInnes

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS07
ATHABASCA VALLEY
MAY 2023

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

June 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	May 15, 2023	Last Cal Date:	April 19, 2023
Start time (MST):	8:36	End time (MST):	11:19
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003328	1.004627	Backgd or Offset:	2.70	2.70
Calibration intercept:	2.004886	1.624552	Coeff or Slope:	0.857	0.845

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	813.5	0.985
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	805.6	0.995
second point	4960	39.6	400.2	405.0	0.988
third point	4980	19.8	200.1	203.6	0.983
as left zero	5000	0.0	0.0	0.1	----
as left span	4921	79.2	800.2	803.7	0.996
				Average Correction Factor	0.988

Baseline Corr As found:	813.60	Previous response	805.87	*% 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: No adjustments or maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

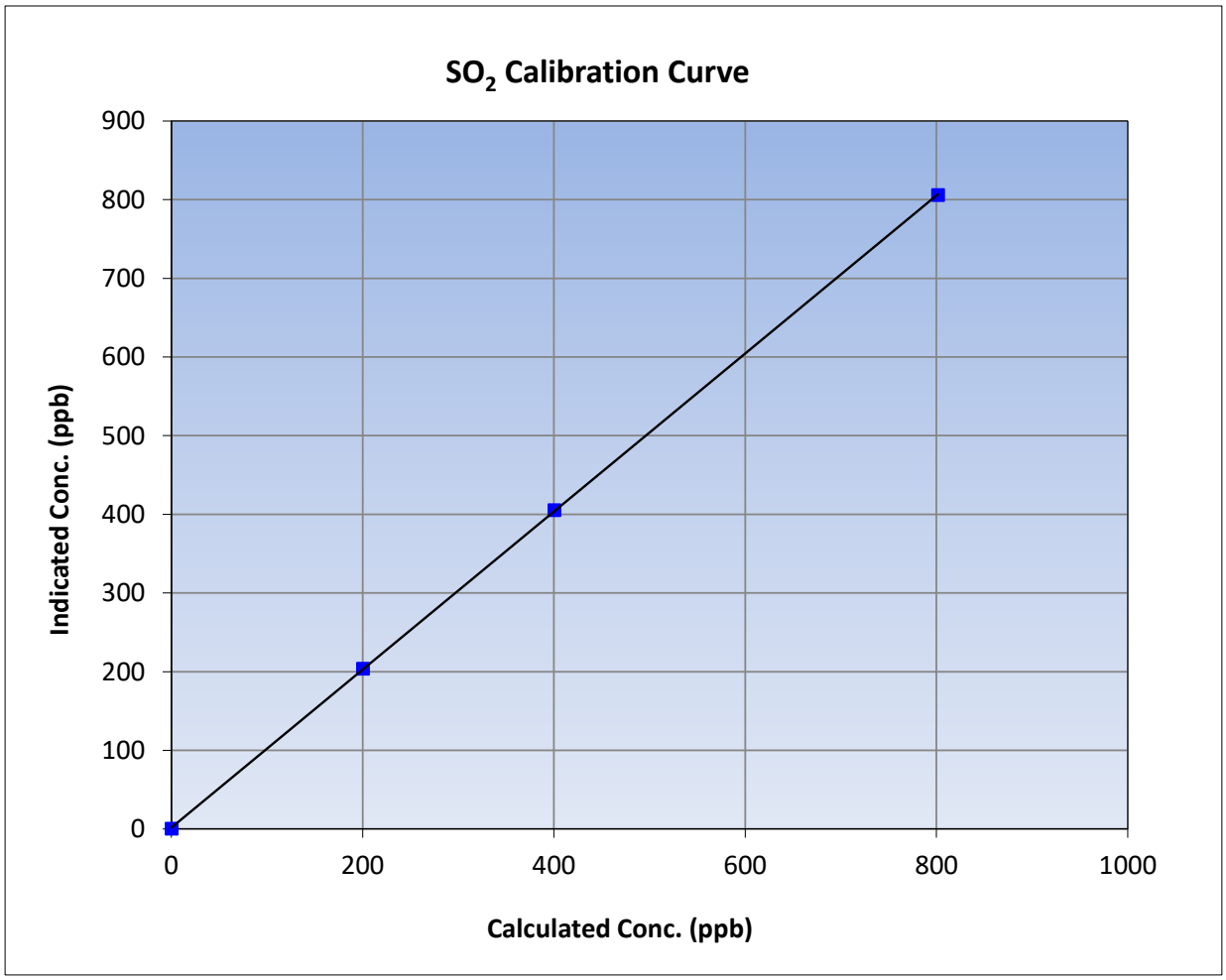
Station Information

Calibration Date:	May 15, 2023	Previous Calibration:	April 19, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	8:36	End Time (MST):	11:19
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1507864683

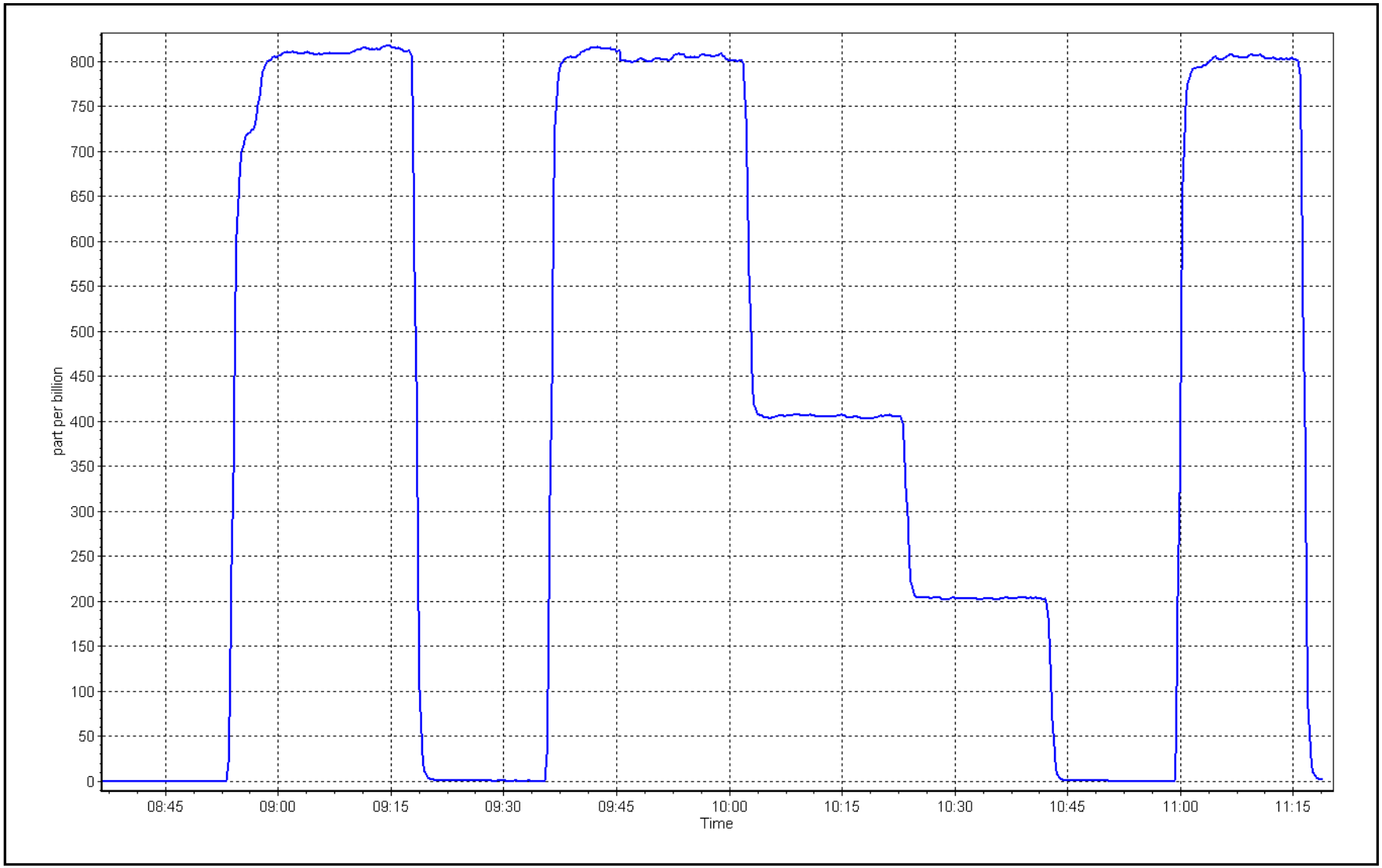
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
801.2	805.6	0.9945
400.2	405.0	0.9880
200.1	203.6	0.9826

Statistical Evaluation		Limits
Correlation Coefficient	0.999984	≥0.995
Slope	1.004627	0.90 - 1.10
Intercept	1.624552	+/-30



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



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	May 10, 2023	Last Cal Date:	April 26, 2023
Start time (MST):	8:30	End time (MST):	13:05
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.25	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC504080			
Removed Cal Gas Conc:	4.94	ppm	Rem Gas Exp Date:	February 9, 2024
Removed Gas Cyl #:	EY0002277		Diff between cyl:	-5.8%
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:	0.993201	1.002951	Backgd or Offset:	2.17	2.29
Calibration intercept:	0.141603	-0.222144	Coeff or Slope:	0.829	0.876

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	81.6	80.6	80.1	1.005
as found 2nd point	4959	40.8	40.3	39.8	1.010
as found 3rd point	4980	20.4	20.2	19.6	1.023
new cylinder response	4925	75.5	79.3	74.5	1.065

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4925	75.5	79.3	79.4	0.999
second point	4962	37.7	39.6	39.5	1.003
third point	4981	18.9	19.9	19.4	1.024
as left zero	5000	0.0	0.0	0.1	----
as left span	4925	75.5	79.3	78.9	1.005
SO2 Scrubber Check	4921	79.2	800.2	0.0	----
Date of last scrubber change:		25-Feb-22		Ave Corr Factor	1.008
Date of last converter efficiency test:		April 22, 2022		92.6%	efficiency

Baseline Corr As found:	80.2	Prev response:	80.22	*% change:	0.0%
Baseline Corr 2nd AF pt:	39.9	AF Slope:	0.995895	AF Intercept:	-0.278401
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999977		

* = > +/-5% change initiates investigation

Notes: Sox scrubber checked after calibrator zero. Span adjusted. Cal gas cylinder repalced after MPAFS.

Calibration Performed By: Karina Fenwick

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

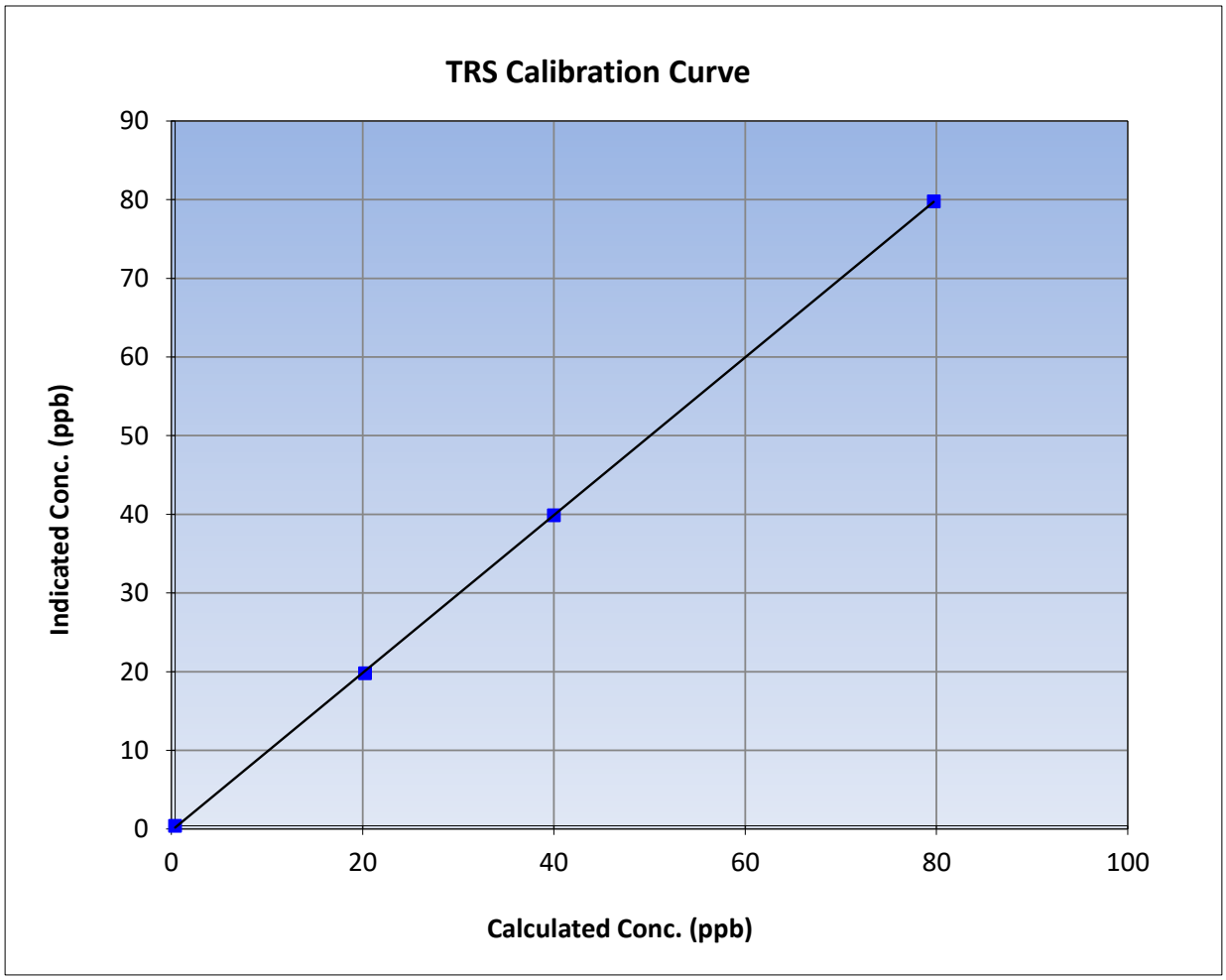
Station Information

Calibration Date:	May 10, 2023	Previous Calibration:	April 26, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	8:30	End Time (MST):	13:05
Analyzer make:	CDN-101	Analyzer serial #:	551

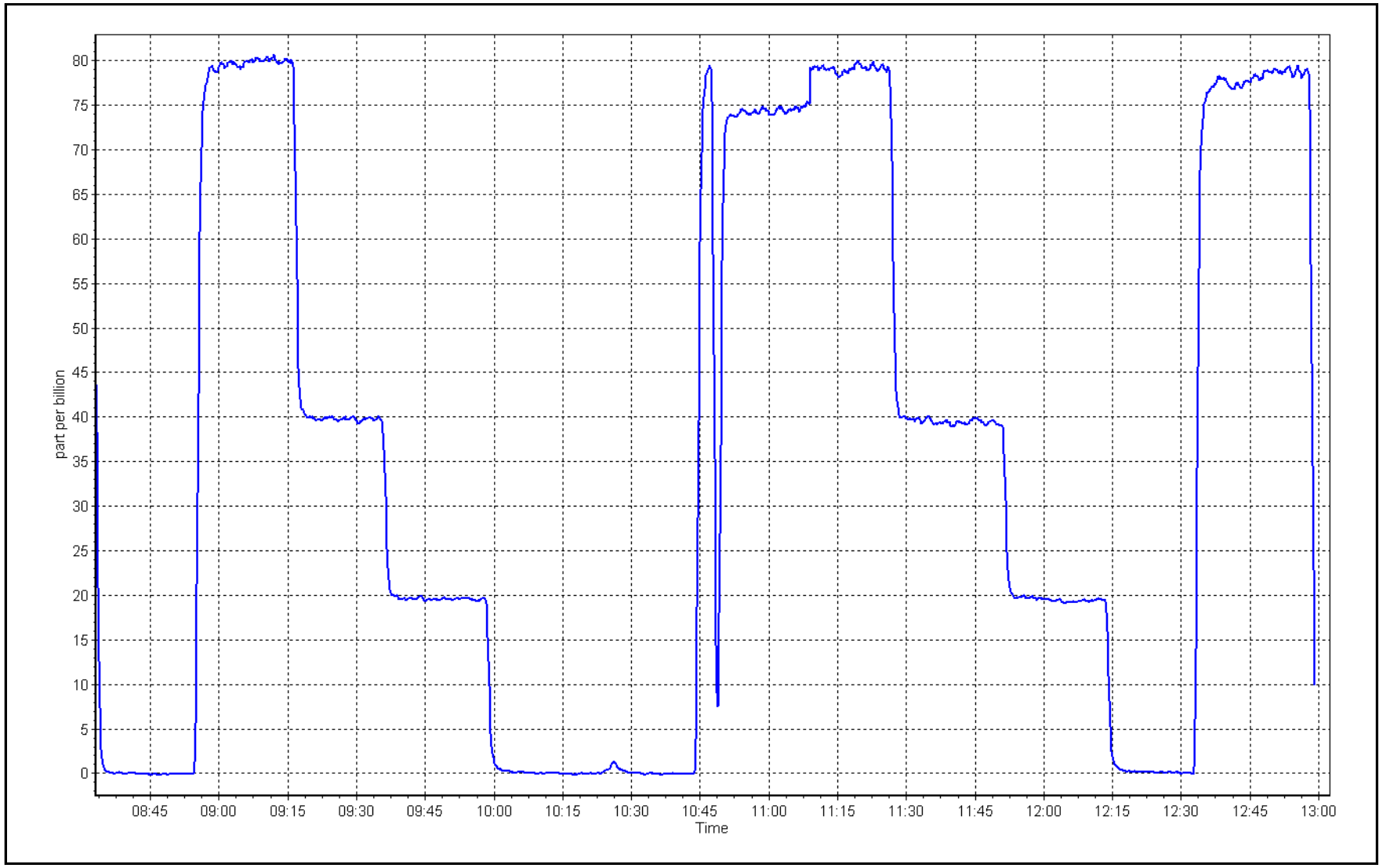
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
79.3	79.4	0.9989
39.6	39.5	1.0028
19.9	19.4	1.0235

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999959	*≥0.995*
Slope	1.002951	*0.90 - 1.10*
Intercept	-0.222144	*+/-3*



TRS Calibration Plot Date: May 10, 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:	May 8, 2023	Last Cal Date:	April 19, 2023
Start time (MST):	6:08	End time (MST):	7:18
Reason:	Cylinder Change	Nitrogen Cylincer change	

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1317958219	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	0.000278	0.000278	NMHC SP Ratio:	4.49E-05	4.49E-05
CH4 Retention time:	13.8	13.8	NMHC Peak Area:	202584	202584

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.3	17.05	16.60	1.027
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.3	17.05	16.61	1.027
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.027

Baseline Corr AF:	16.60	Prev response	17.04	*% change	-2.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4921	79.3	9.10	8.72	1.044
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.3	9.10	8.74	1.041
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.041
Baseline Corr AF:	8.72	Prev response	9.11	*% change	-4.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.3	7.95	7.88	1.009
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.3	7.95	7.87	1.010
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.010
Baseline Corr AF:	7.88	Prev response	7.94	*% change	-0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

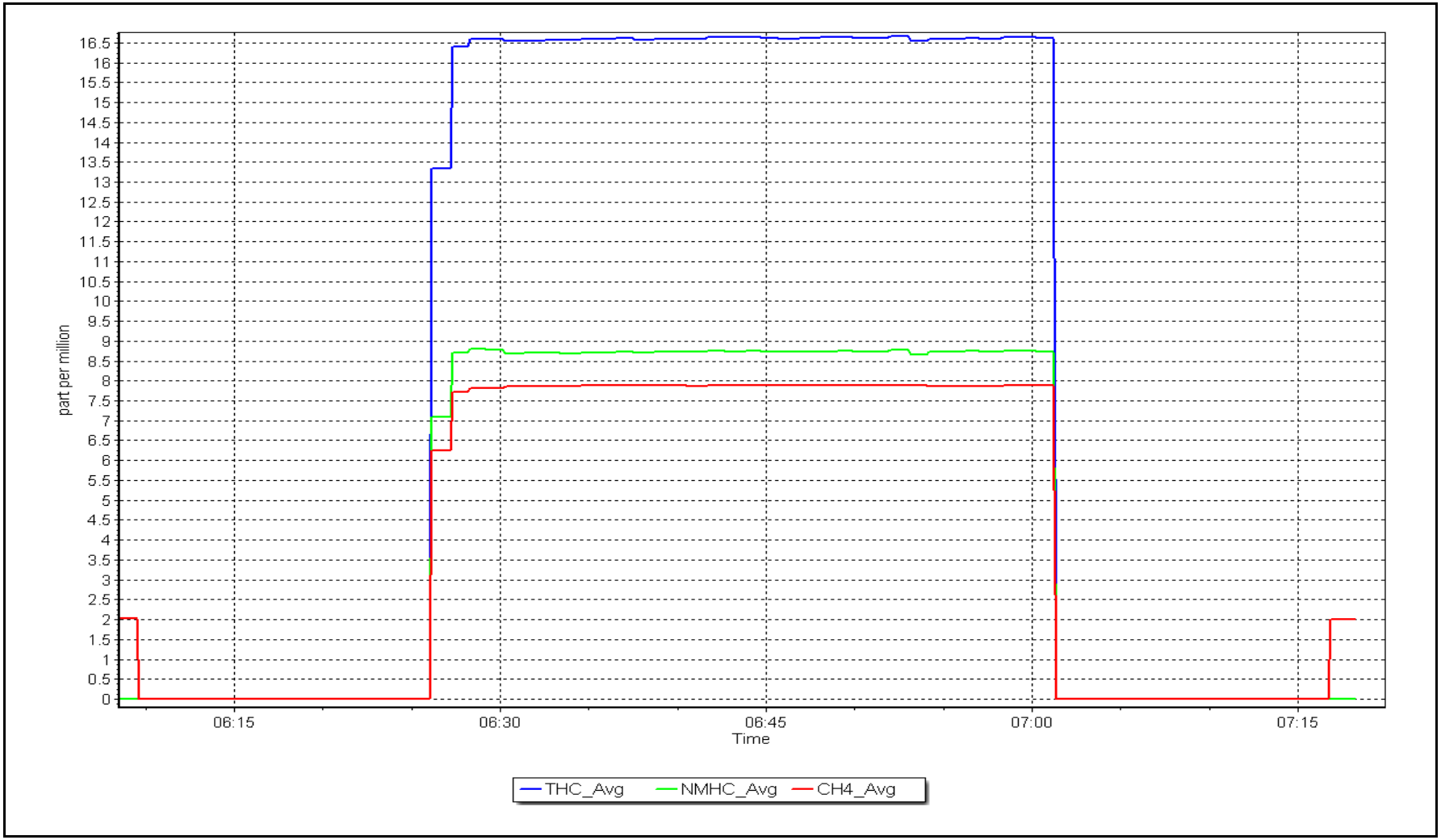
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999083	0.974167
THC Cal Offset:	0.005889	0.000000
CH4 Cal Slope:	0.998961	0.990117
CH4 Cal Offset:	-0.002189	0.000000
NMHC Cal Slope:	0.999315	0.960239
NMHC Cal Offset:	0.010081	0.000000

Notes: Nitrogen Cylinder Change.

Calibration Performed By: Melissa Lemay

NMHC Calibration Plot Date: May 8, 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:	May 15, 2023	Last Cal Date:	April 19, 2023
Start time (MST):	8:36	End time (MST):	11:18
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:	0.000278	0.000280	NMHC SP Ratio:	4.49E-05	4.75E-05
CH4 Retention time:	13.8	13.8	NMHC Peak Area:	202584	191368

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.3	17.05	16.40	1.040
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	17.05	1.000
second point	4960	39.6	8.52	8.52	0.999
third point	4980	19.8	4.26	4.29	0.992
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	17.00	1.002
				Average Correction Factor	0.997
Baseline Corr AF:	16.40	Prev response	17.04	*% change	-3.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4921	79.3	9.10	8.52	1.068
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	9.11	0.999
second point	4960	39.6	4.55	4.57	0.995
third point	4980	19.8	2.27	2.30	0.988
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	9.09	9.08	1.001
				Average Correction Factor	0.994
Baseline Corr AF:	8.52	Prev response	9.11	*% change	-6.9%
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	4921	79.3	7.95	7.88	1.009
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.3	7.95	7.94	1.001
second point	4960	39.6	3.97	3.95	1.005
third point	4980	19.8	1.98	1.98	1.002
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.94	7.93	1.001
				Average Correction Factor	1.003
Baseline Corr AF:	7.88	Prev response	7.94	*% 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:	0.999083	0.999351
THC Cal Offset:	0.005889	0.013892
CH4 Cal Slope:	0.998961	0.998818
CH4 Cal Offset:	-0.002189	-0.004193
NMHC Cal Slope:	0.999315	1.000193
NMHC Cal Offset:	0.010081	0.014085

Notes: NM channel moved a bit since last month, will adjust span and monitor.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

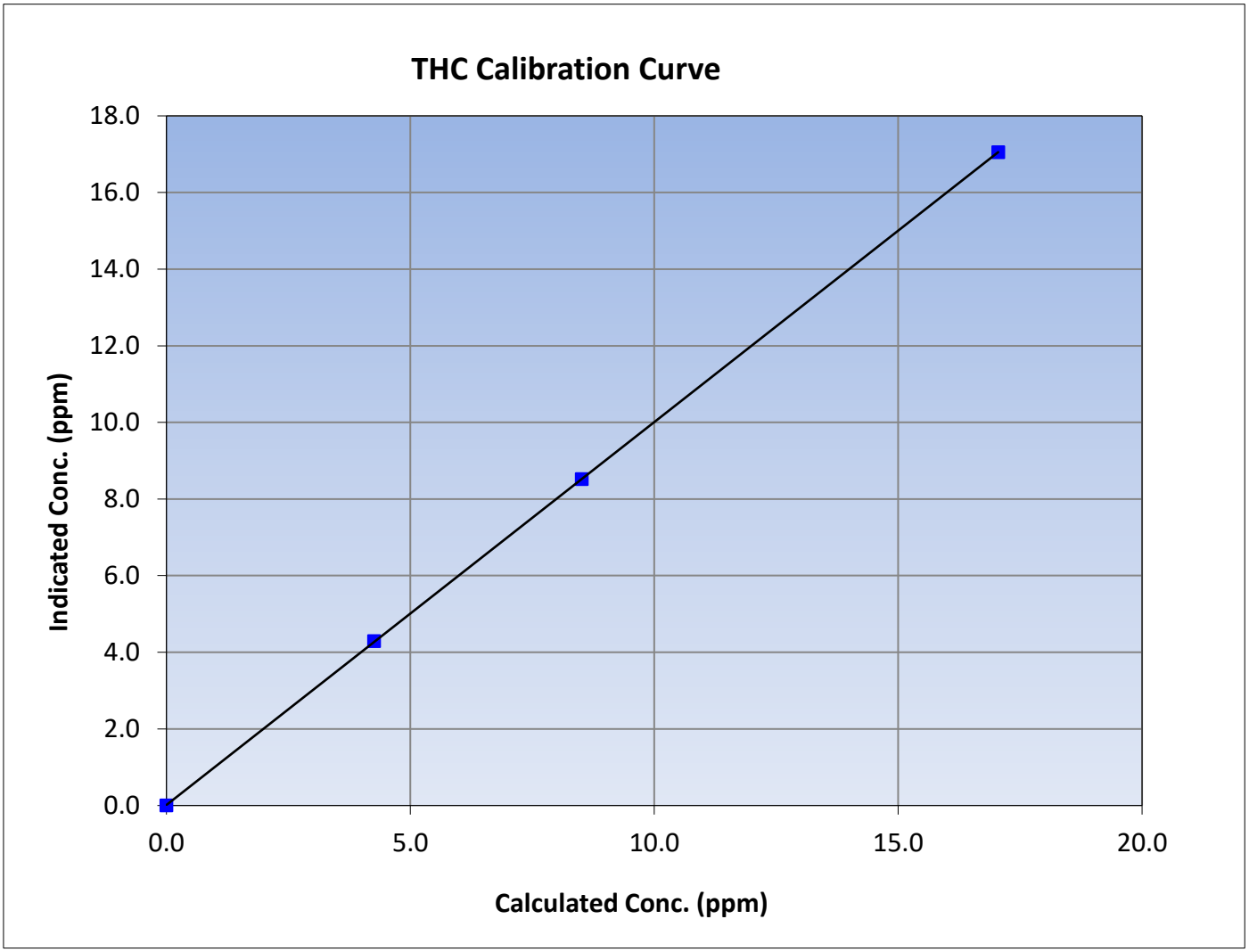
Version-01-2020

Station Information

Calibration Date:	May 15, 2023	Previous Calibration:	April 19, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	8:36	End Time (MST):	11:18
Analyzer make:	Thermo 55i	Analyzer serial #:	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999996	≥0.995
17.05	17.05	1.0000			
8.52	8.52	0.9995	Slope	0.999351	0.90 - 1.10
4.26	4.29	0.9925			
			Intercept	0.013892	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

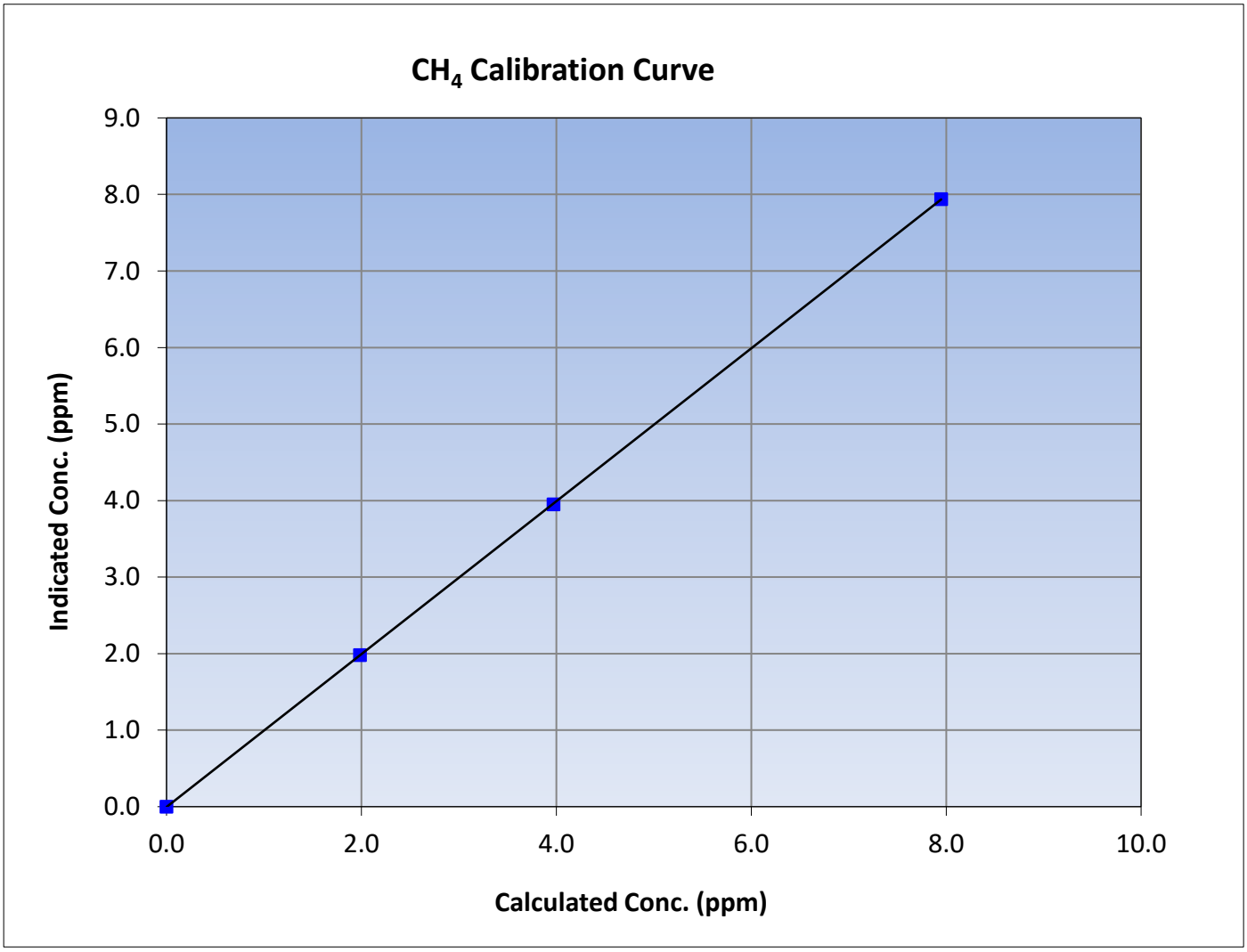
Version-01-2020

Station Information

Calibration Date:	May 15, 2023	Previous Calibration:	April 19, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	8:36	End Time (MST):	11:18
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	0.999995	*≥0.995*
7.95	7.94	1.0011			
3.97	3.95	1.0050	Slope	0.998818	*0.90 - 1.10*
1.98	1.98	1.0024			
			Intercept	-0.004193	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

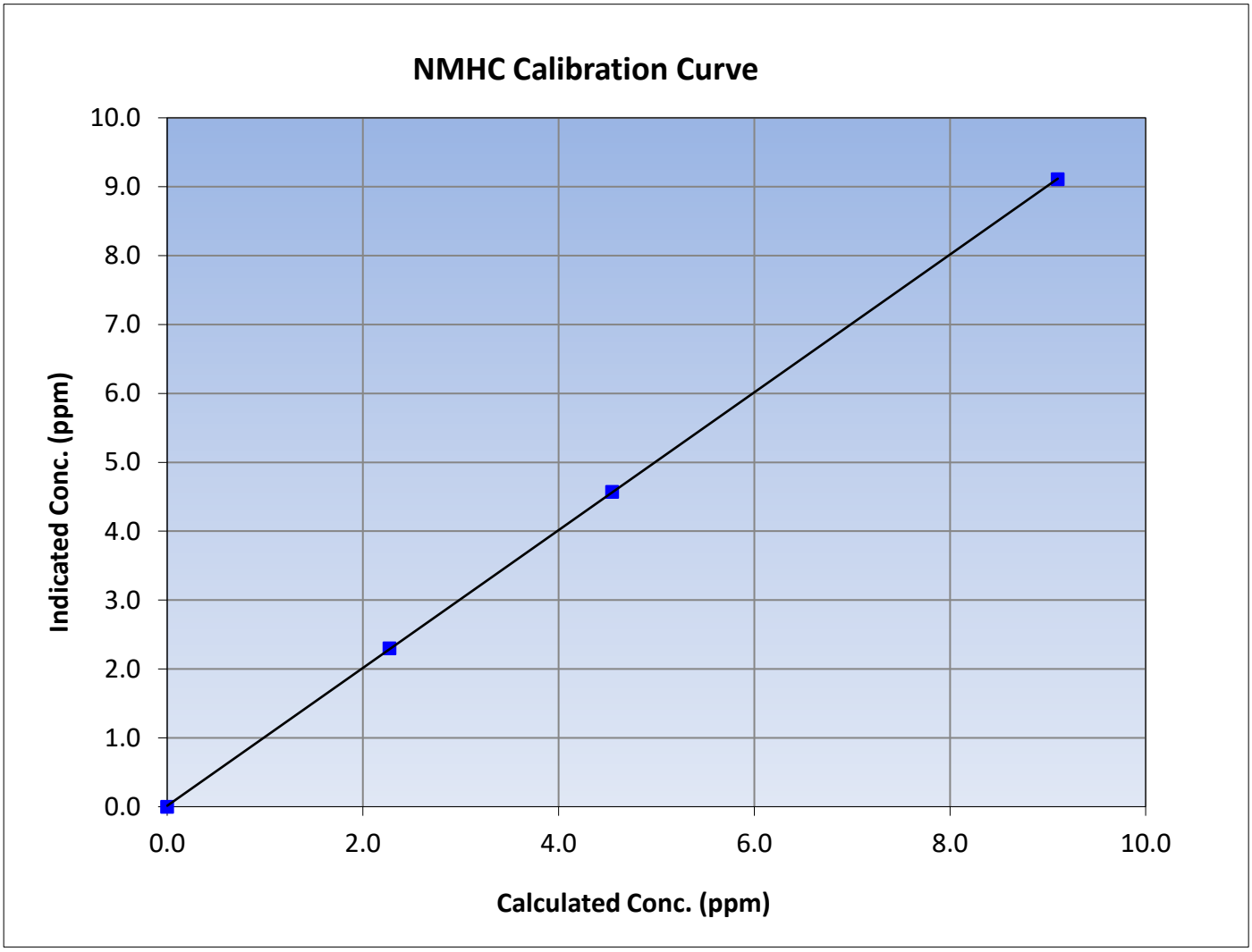
Version-01-2020

Station Information

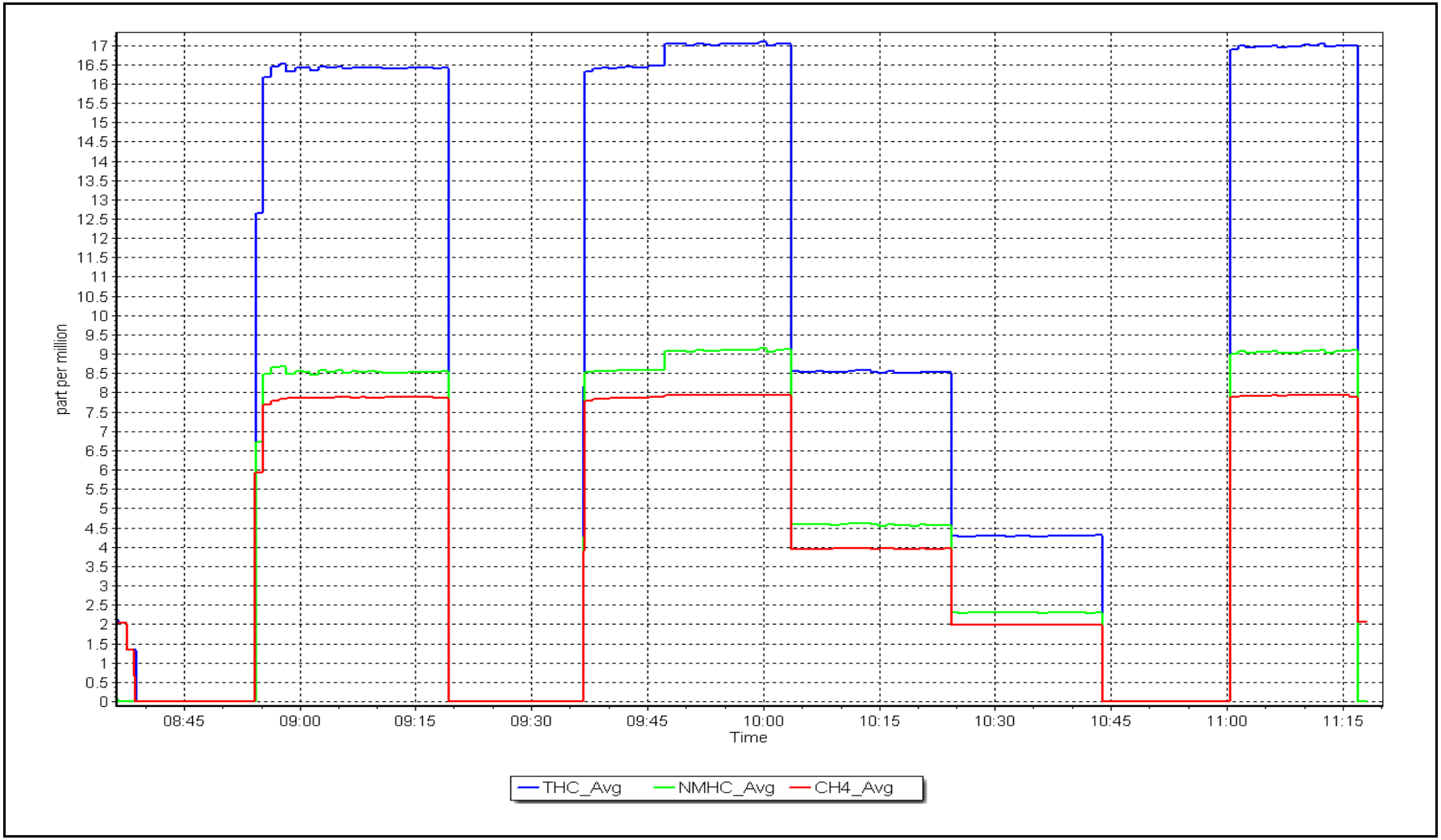
Calibration Date:	May 15, 2023	Previous Calibration:	April 19, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	8:36	End Time (MST):	11:18
Analyzer make:	Thermo 55i	Analyzer serial #:	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999989	≥0.995
9.10	9.11	0.9991			
4.55	4.57	0.9947	Slope	1.000193	0.90 - 1.10
2.27	2.30	0.9882			
			Intercept	0.014085	+/-0.5



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



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	May 8, 2023	Last Cal Date:	April 21, 2023
Start time (MST):	7:15	End time (MST):	11:26
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.048	1.048	NO bkgnd or offset:	7.3	7.3
NOX coeff or slope:	0.995	0.995	NOX bkgnd or offset:	7.5	7.5
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	201.6	201.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001148	0.991417
NO_X Cal Offset:	1.279327	1.497144
NO Cal Slope:	1.000931	0.991499
NO Cal Offset:	1.195212	0.973228
NO_2 Cal Slope:	1.007625	1.004055
NO_2 Cal Offset:	1.013573	0.235209

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.2	----	----
as found span	4920	80.2	816.7	800.7	16.0	810.7	793.7	17.1	1.0074	1.0088
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.5	0.1	0.3	----	----
high point	4920	80.2	816.7	800.7	16.0	810.3	794.0	16.4	1.0079	1.0084
second point	4960	40.1	408.4	400.4	8.0	408.1	399.6	8.6	1.0007	1.0019
third point	4980	20.0	203.7	199.7	4.0	203.6	199.0	4.6	1.0004	1.0034
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.1	----	----
as left span	4920	80.2	816.7	401.9	414.8	811.9	392.5	419.3	1.0059	1.0239
								Average Correction Factor	1.0030	1.0046

Corrected As found	NO_X = 810.6 ppb	NO = 793.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -1.0%
Previous Response	NO_X = 818.9 ppb	NO = 802.6 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)	790.8	392.0	414.8	416.9	0.9951	100.5%
2nd GPT point (200 ppb O3)	790.8	590.0	216.8	217.6	0.9965	100.4%
3rd GPT point (100 ppb O3)	790.8	688.5	118.3	119.2	0.9928	100.7%
				Average Correction Factor	0.9948	100.5%

Notes: No maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

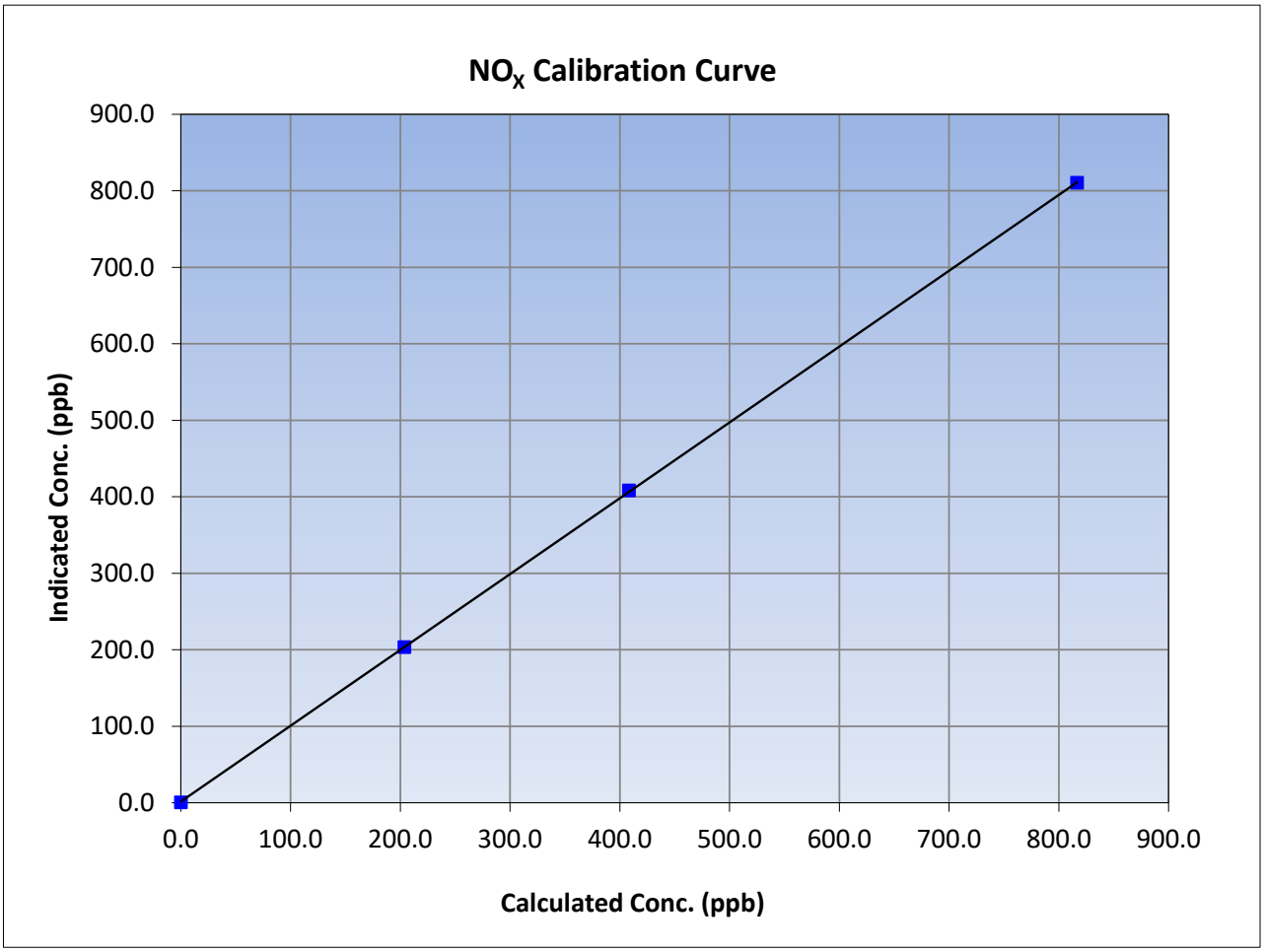
Version-04-2020

Station Information

Calibration Date:	May 8, 2023	Previous Calibration:	April 21, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:15	End Time (MST):	11:26
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	0.5	----	Correlation Coefficient	0.999986	*≥0.995*
816.7	810.3	1.0079			
408.4	408.1	1.0007	Slope	0.991417	*0.90 - 1.10*
203.7	203.6	1.0004			
			Intercept	1.497144	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

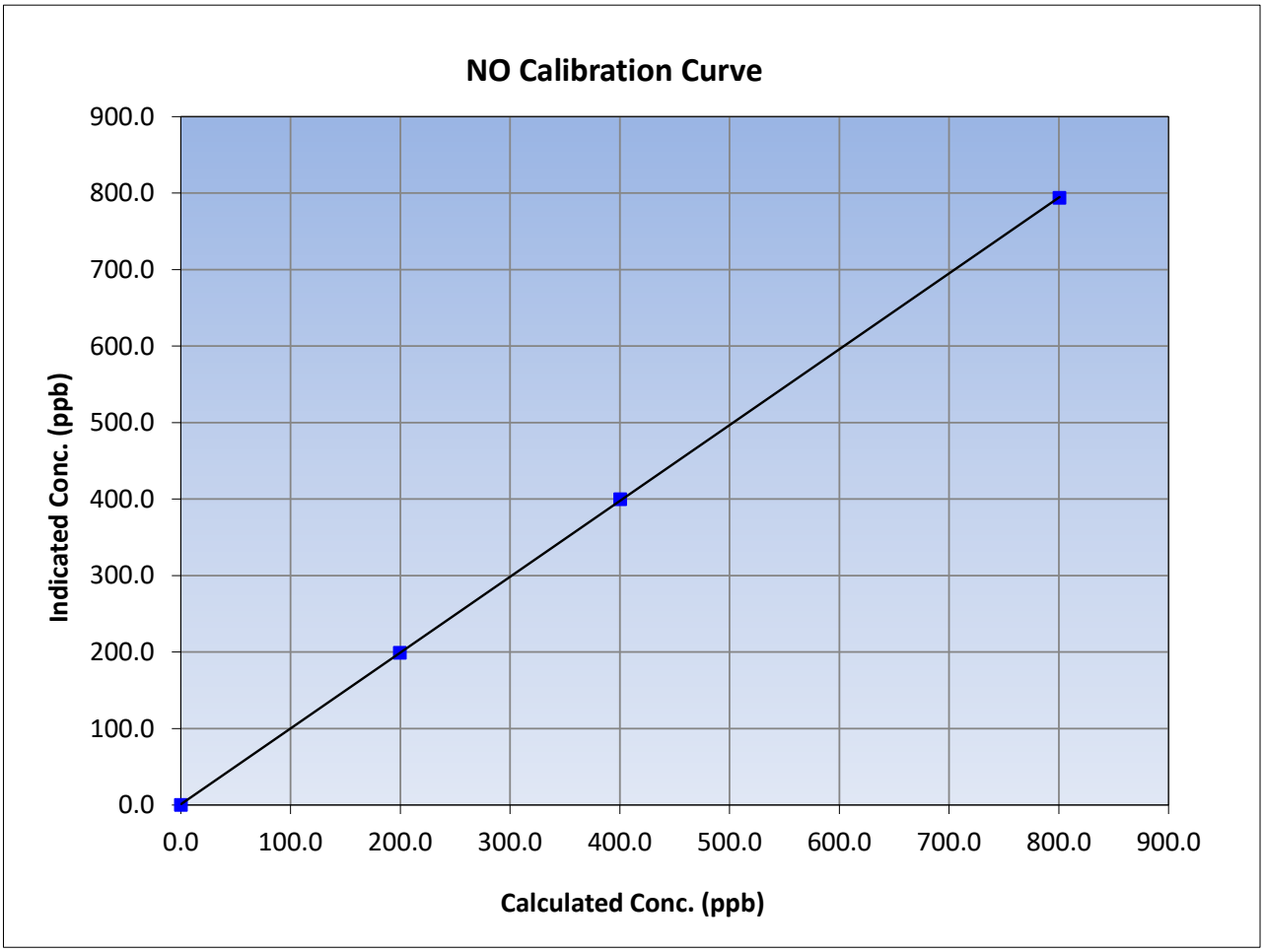
Version-04-2020

Station Information

Calibration Date:	May 8, 2023	Previous Calibration:	April 21, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:15	End Time (MST):	11:26
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999987	≥0.995
800.7	794.0	1.0084			
400.4	399.6	1.0019	Slope	0.991499	0.90 - 1.10
199.7	199.0	1.0034			
			Intercept	0.973228	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

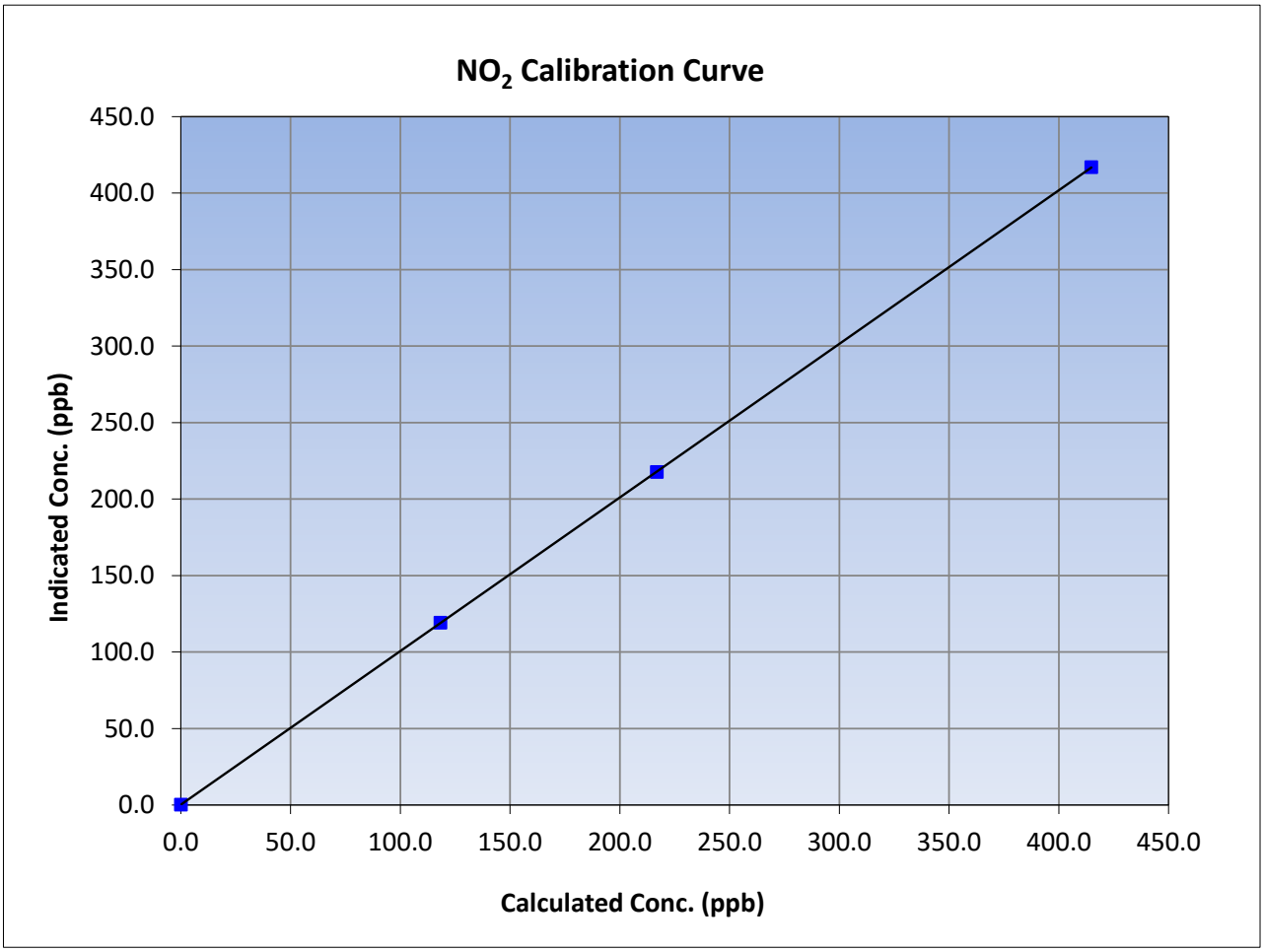
Version-04-2020

Station Information

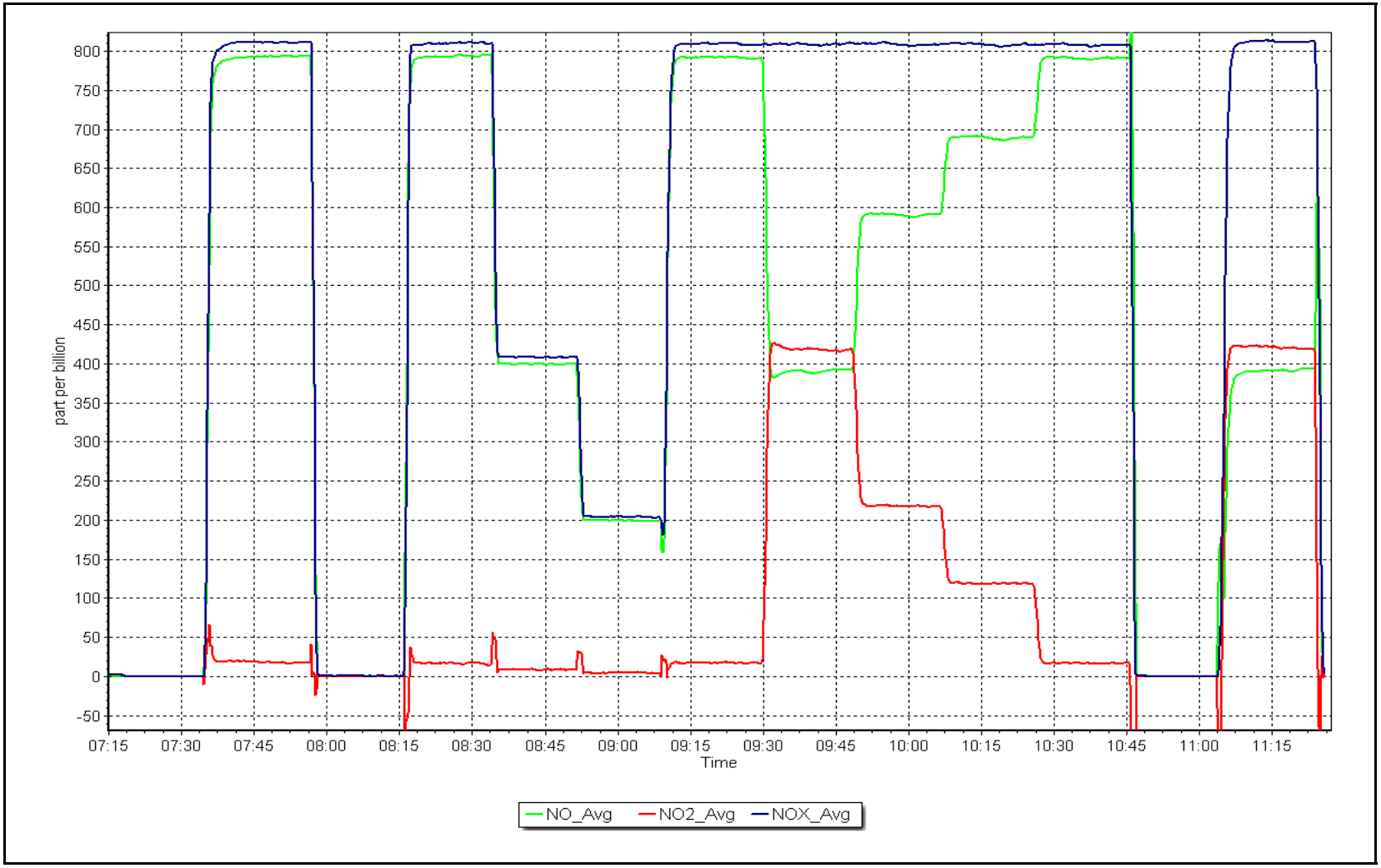
Calibration Date:	May 8, 2023	Previous Calibration:	April 21, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:15	End Time (MST):	11:26
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.3	----	Correlation Coefficient	0.999998	*≥0.995*
414.8	416.9	0.9951			
216.8	217.6	0.9965	Slope	1.004055	*0.90 - 1.10*
118.3	119.2	0.9928			
			Intercept	0.235209	*+/-20*



NO_X Calibration Plot Date: May 8, 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:	May 3, 2023	Last Cal Date:	April 20, 2023
Start time (MST):	9:28	End time (MST):	12:38
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998171	1.000257	Backgd or Offset:	-2.8	-1.3
Calibration intercept:	0.120000	1.380000	Coeff or Slope:	1.435	1.502

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	1403.4	400.0	381.4	1.049
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	1415.0	400.0	400.7	0.998
second point	5000	1035.1	200.0	202.5	0.988
third point	5000	852.2	100.0	102.4	0.977
as left zero	5000	0.0	0.0	-1.3	----
as left span	5000	1406.5	400.0	398.6	1.004
				Average Correction Factor	0.987

Baseline Corr As found:	380.6	Previous response	399.4	*% change	-4.9%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Installed last month. Zero and Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

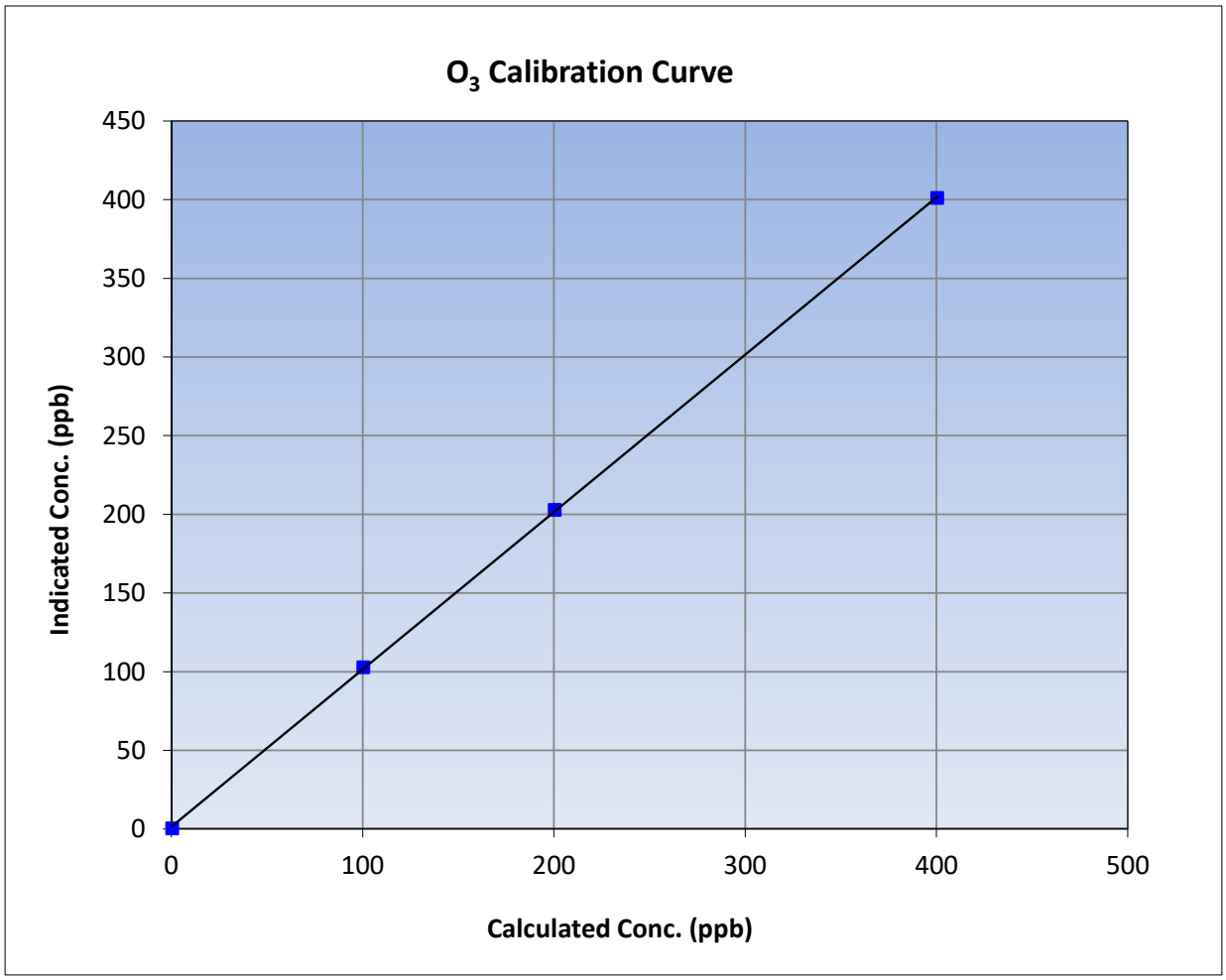
Station Information

Calibration Date:	May 3, 2023	Previous Calibration:	April 20, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:28	End Time (MST):	12:38
Analyzer make:	Thermo 49i	Analyzer serial #:	1152220023

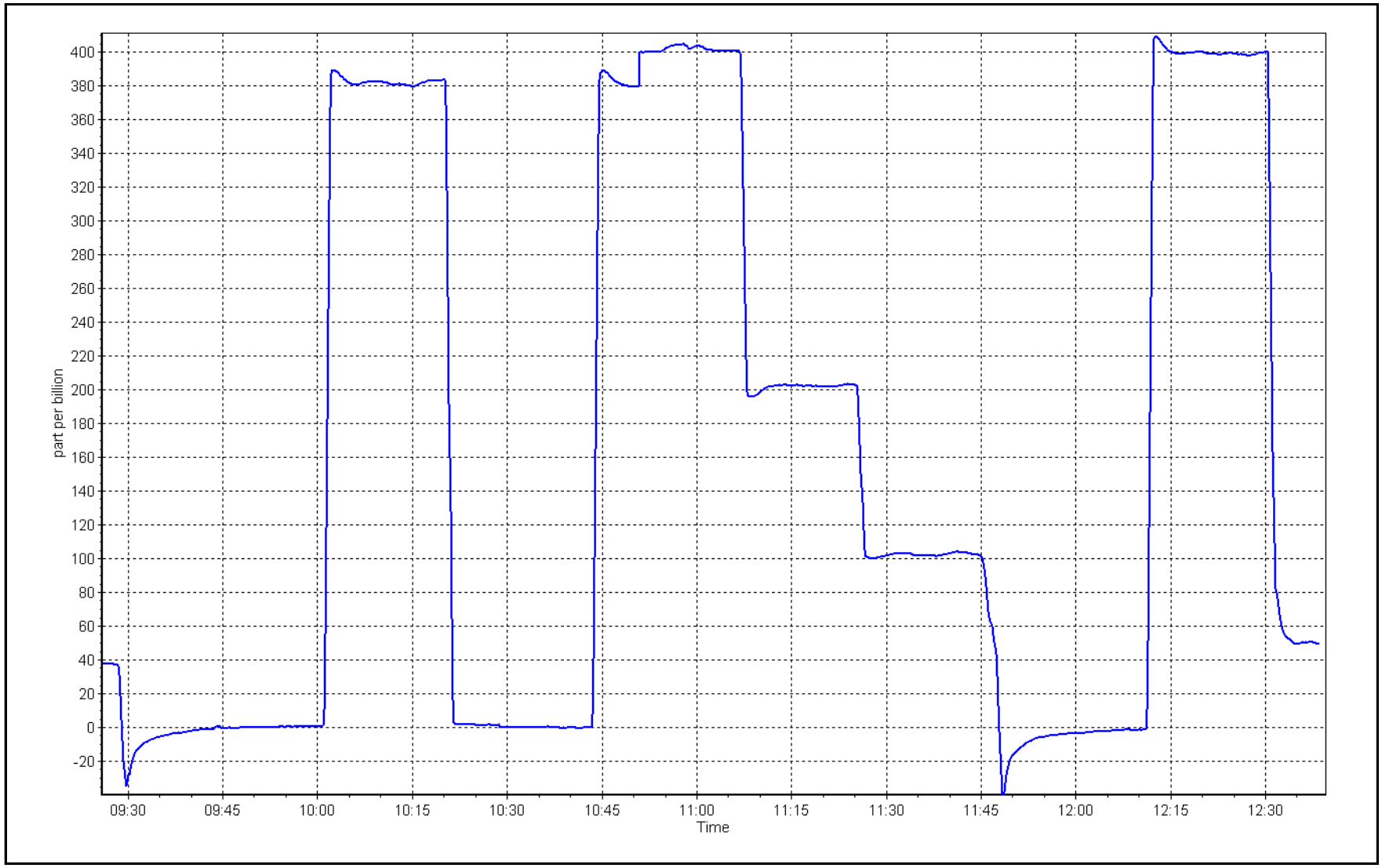
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
400.0	400.7	0.9983
200.0	202.5	0.9877
100.0	102.4	0.9766

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999950	*≥0.995*
Slope	1.000257	*0.90 - 1.10*
Intercept	1.380000	*+/- 5*



O_3 Calibration Plot Date: May 3, 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:	May 23, 2023	Last Cal Date:	
Start time (MST):	7:20	End time (MST):	7:52
Analyzer Make:	API T640	S/N:	871
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)	10.9	10.7	10.9	☐	+/- 2 °C
P (mmHg)	737.5	740.2	737.5	☐	+/- 10 mmHg
flow (LPM)	5	5.11	5	☐	+/- 0.25 LPM

Leak Test: Date of check: May 23, 2023 Last Cal Date: _____

PM w/o HEPA: 101 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	10.2	10.2	11	☑	10.9 +/- 0.5

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

Date Optical Chamber Cleaned: May 23, 2023

Disposable Filter Changed: May 23, 2023

Annual Maintenance

Date Sample Tube Cleaned: December 5, 2022

Date RH/T Sensor Cleaned: December 5, 2022

Notes: Install Due to power issue with removed T640. PMT adjusted. No other adjustments done. Leak check passed.

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:	May 15, 2023	Last Cal Date:	April 25, 2023
Start time (MST):	5:55	End time (MST):	8:39
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:	0.994802	0.991945	Backgd or Offset:	3.896	3.910
Calibration intercept:	0.030541	0.060555	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	39.8	1.006
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	39.7	1.008
second point	4967	33.3	20.0	20.0	0.999
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	39.7	1.008
				Average Correction Factor	1.003

Baseline Corr As found:	39.74	Prev response:	39.84	*% 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 Maintenance done. Zero adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

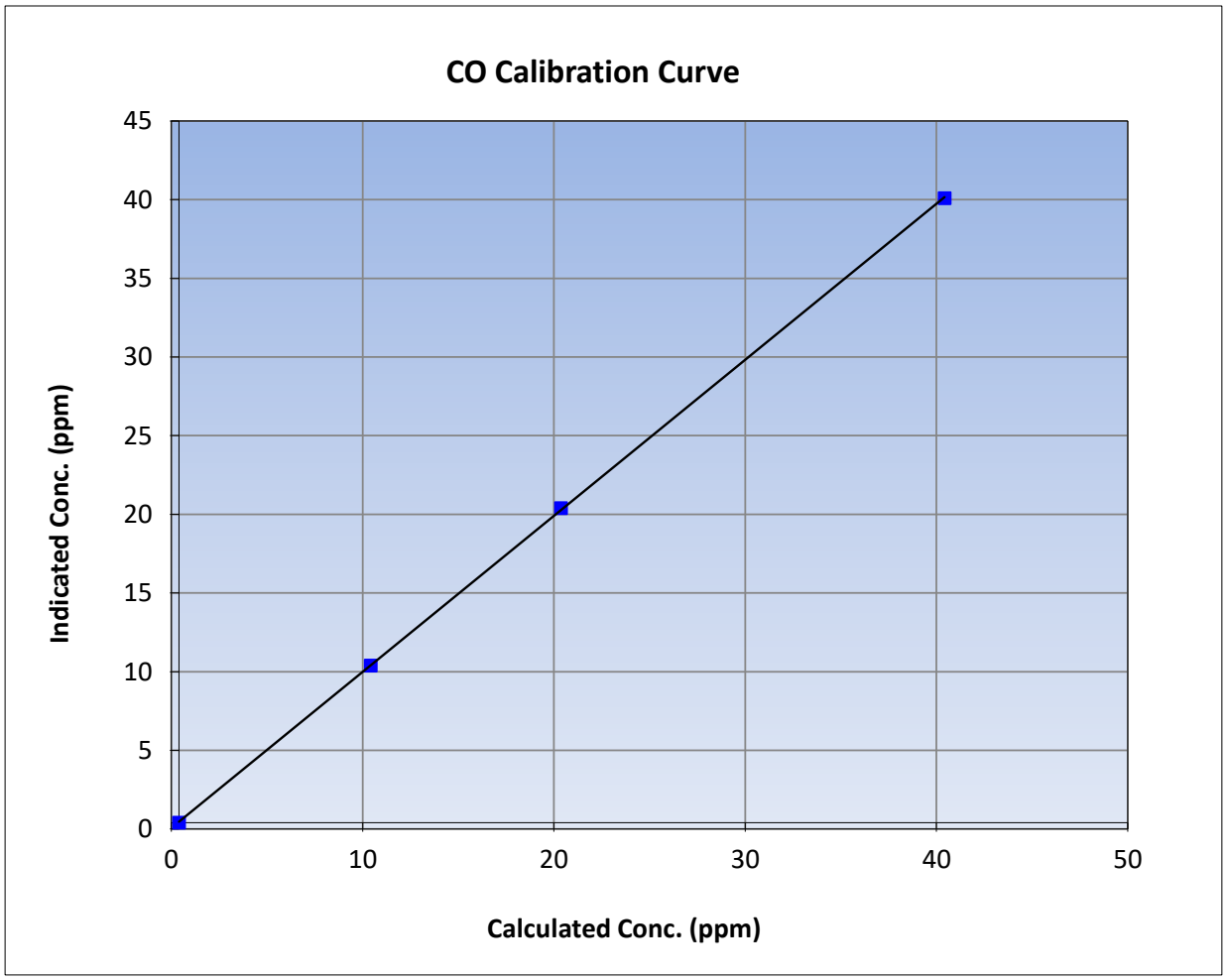
Station Information

Calibration Date:	May 15, 2023	Previous Calibration:	April 25, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	5:55	End Time (MST):	8:39
Analyzer make:	Thermo 48i-LTE	Analyzer serial #:	1408761381

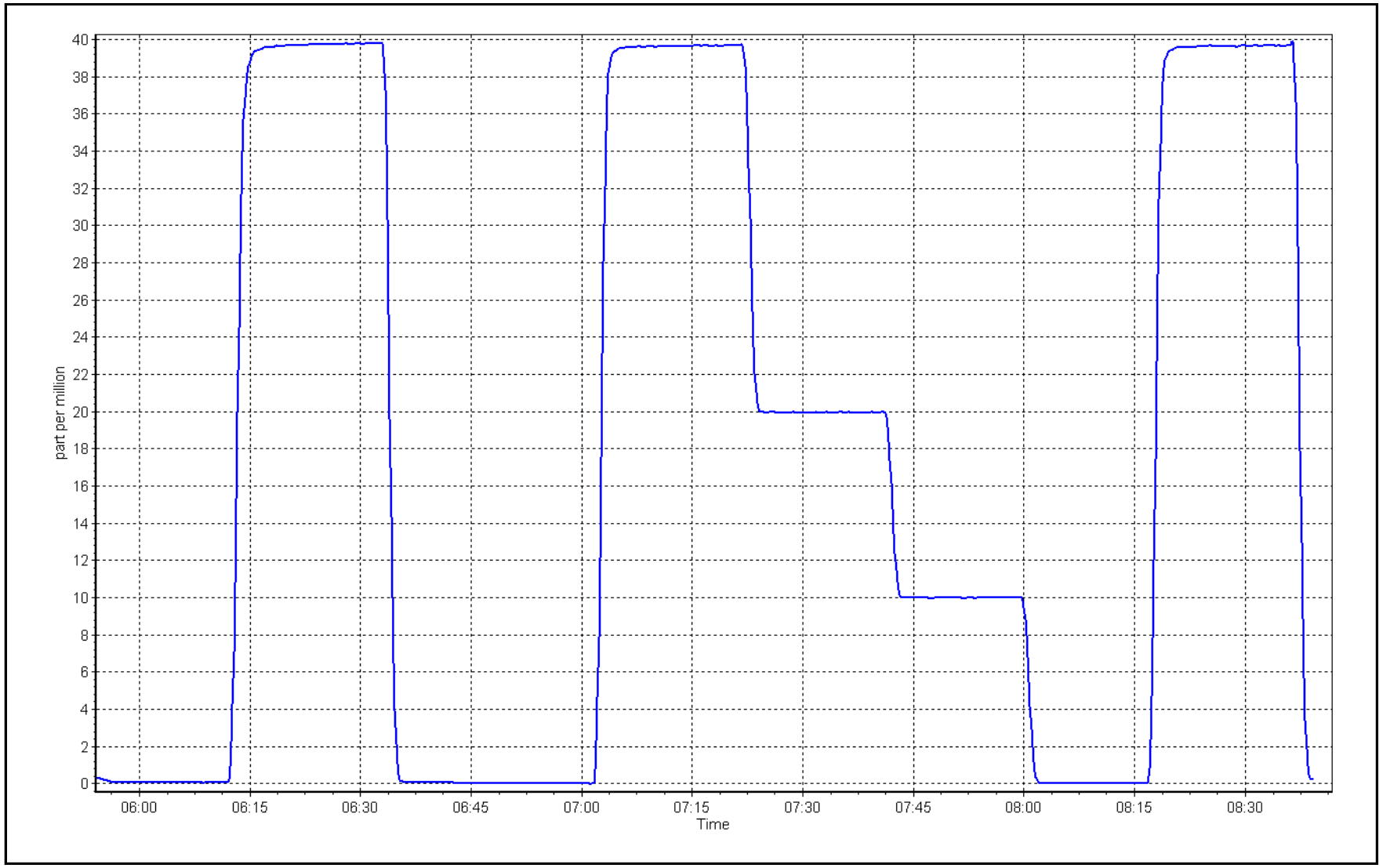
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.0	39.7	1.0081
20.0	20.0	0.9989
10.0	10.0	1.0021

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999974	*≥0.995*
Slope	0.991945	*0.90 - 1.10*
Intercept	0.060555	*+/-1.5*



CO Calibration Plot Date: May 15, 2023 Location: Athabasca Valley



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS08
FORT CHIPEWYAN
MAY 2023

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

June 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	May 8, 2023	Last Cal Date:	April 12, 2023
Start time (MST):	11:11	End time (MST):	15:22
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:	3060
ZAG Make/Model:	Teledyne API T701		Serial Number:	260

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003016	0.999415	Backgd or Offset:	1.29	1.50
Calibration intercept:	1.535287	-1.203236	Coeff or Slope:	1.010	0.877

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	800.4	922.0	0.868
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4920	80.3	800.4	799.5	1.001
second point	4960	40.2	400.7	398.0	1.007
third point	4980	20.1	200.4	198.4	1.010
as left zero	5000	0.0	0.0	-0.1	----
as left span	4920	80.3	800.4	797.3	1.004
				Average Correction Factor	1.006

Baseline Corr As found:	921.70	Previous response	804.33	*% change	12.7%

* = > +/-5% change initiates investigation

Notes: Sample inlet filter changed after as founds. Adjusted the coefficient on analyzer. Adjustments made to zero and span. Changed the calbrator serial # on cal sheet.

Calibration Performed By: Morgan Voyageur, Matthew C

Wood Buffalo Environmental Association

SO_2 Calibration Summary

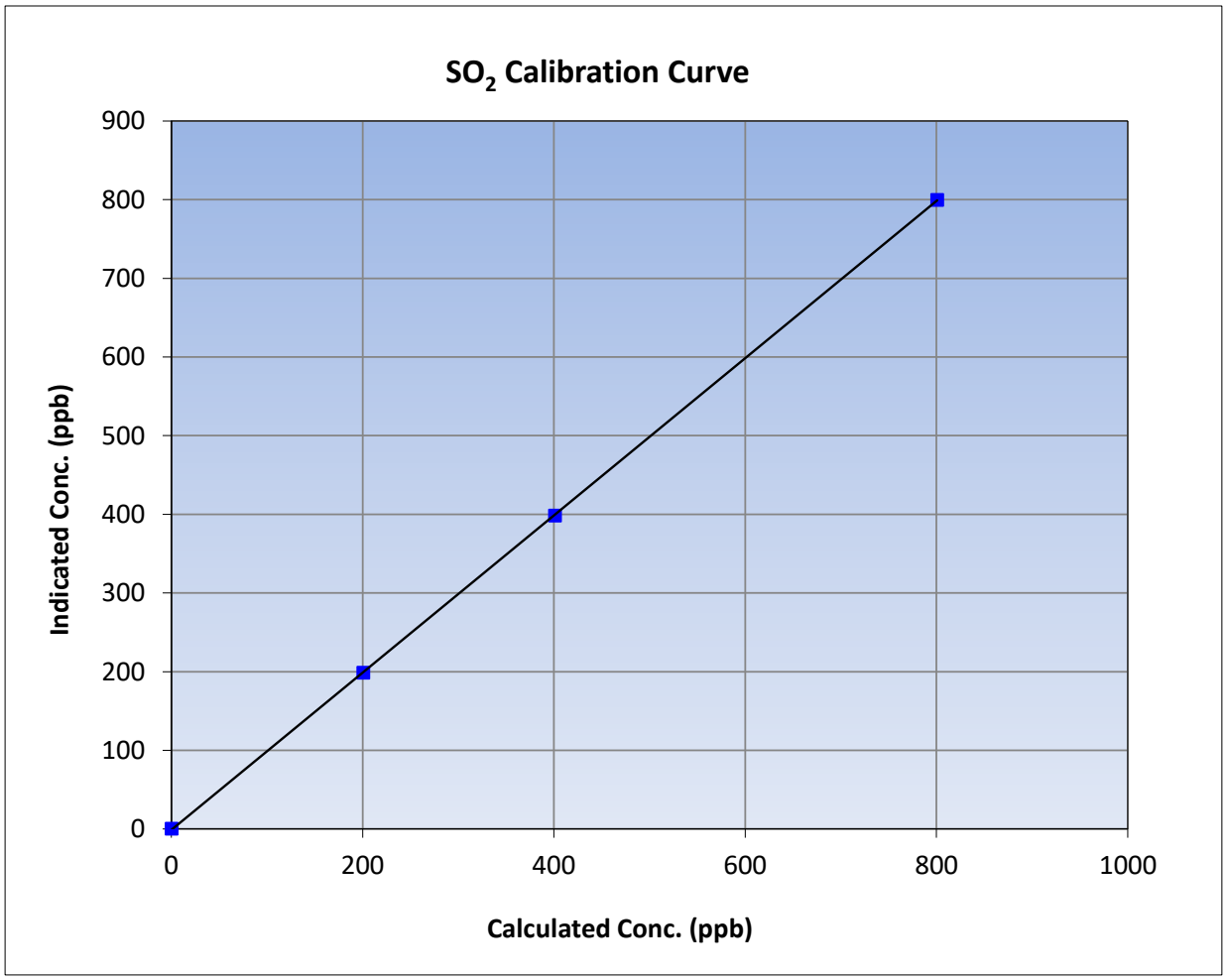
Version-01-2020

Station Information

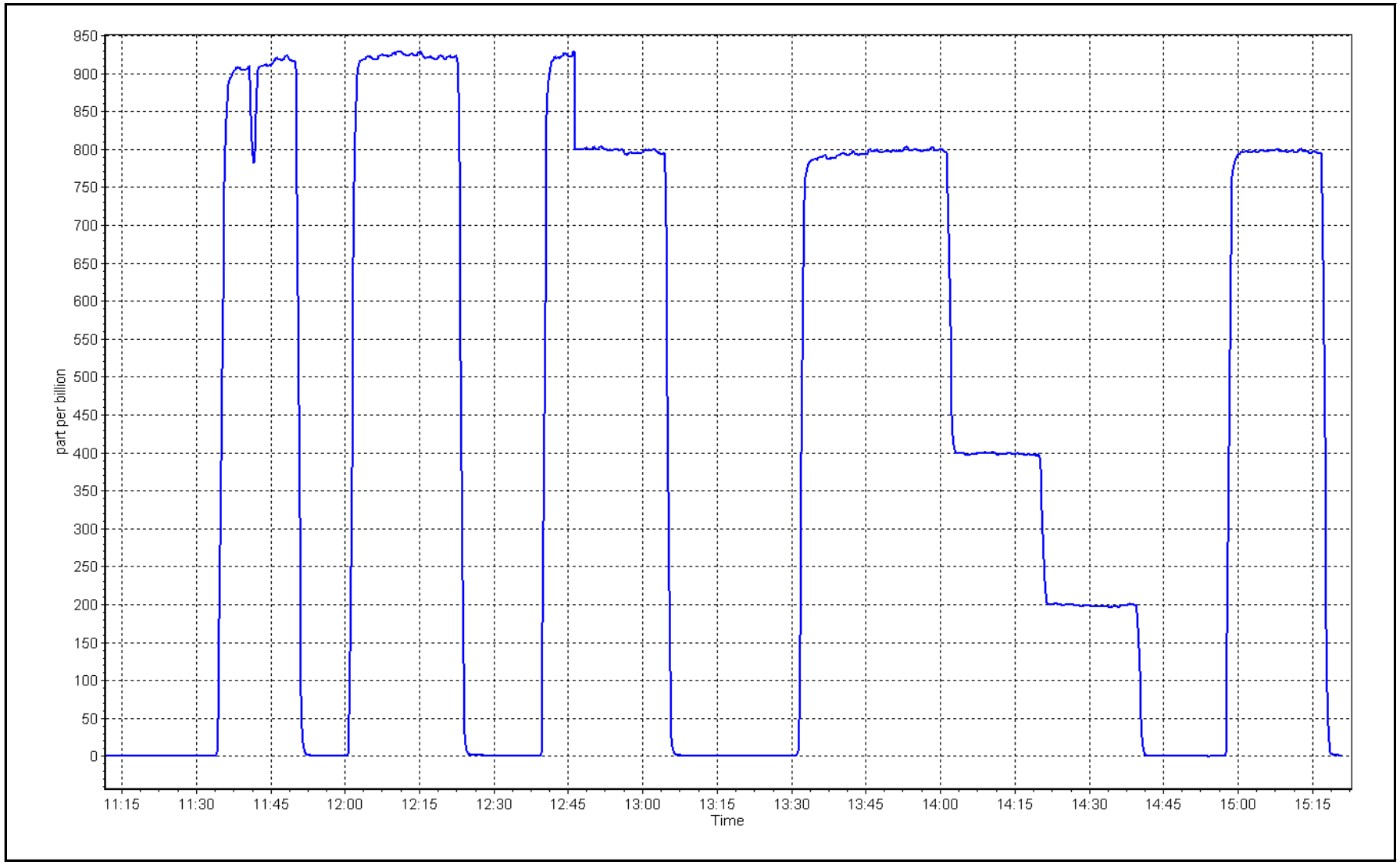
Calibration Date:	May 8, 2023	Previous Calibration:	April 12, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	11:11	End Time (MST):	15:22
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1136451241

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*
800.4	799.5	1.0011			
400.7	398.0	1.0068	Slope	0.999415	*0.90 - 1.10*
200.4	198.4	1.0098			
			Intercept	-1.203236	*+/-30*



SO2 Calibration Plot Date: May 8, 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:	May 29, 2023	Last Cal Date:	April 26, 2023
Start time (MST):	9:45	End time (MST):	13:41
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:	0.994424	0.976855	Backgd or Offset:	0.92	0.93
Calibration intercept:	0.158770	0.498472	Coeff or Slope:	0.694	0.694

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.3	----
as found span	4920	80.5	80.0	79.1	1.015
as found 2nd point	4960	40.2	40.0	39.4	1.022
as found 3rd point	4980	20.1	20.0	19.9	1.019
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.3	----
high point	4920	80.5	80.0	78.5	1.019
second point	4960	40.2	40.0	39.8	1.004
third point	4980	20.1	20.0	20.1	0.994
as left zero	5000	0.0	0.0	0.4	----
as left span	4920	80.5	80.0	79.1	1.011
SO2 Scrubber Check	4919.7	80.3	803.0	0.1	----
Date of last scrubber change:		March 7, 2022		Ave Corr Factor	1.006
Date of last converter efficiency test:		March 15, 2022		100.7%	efficiency

Baseline Corr As found:	78.8	Prev response:	79.72	*% change:	-1.2%
Baseline Corr 2nd AF pt:	39.1	AF Slope:	0.984860	AF Intercept:	0.218396
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999987		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Morgan Voyageur

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

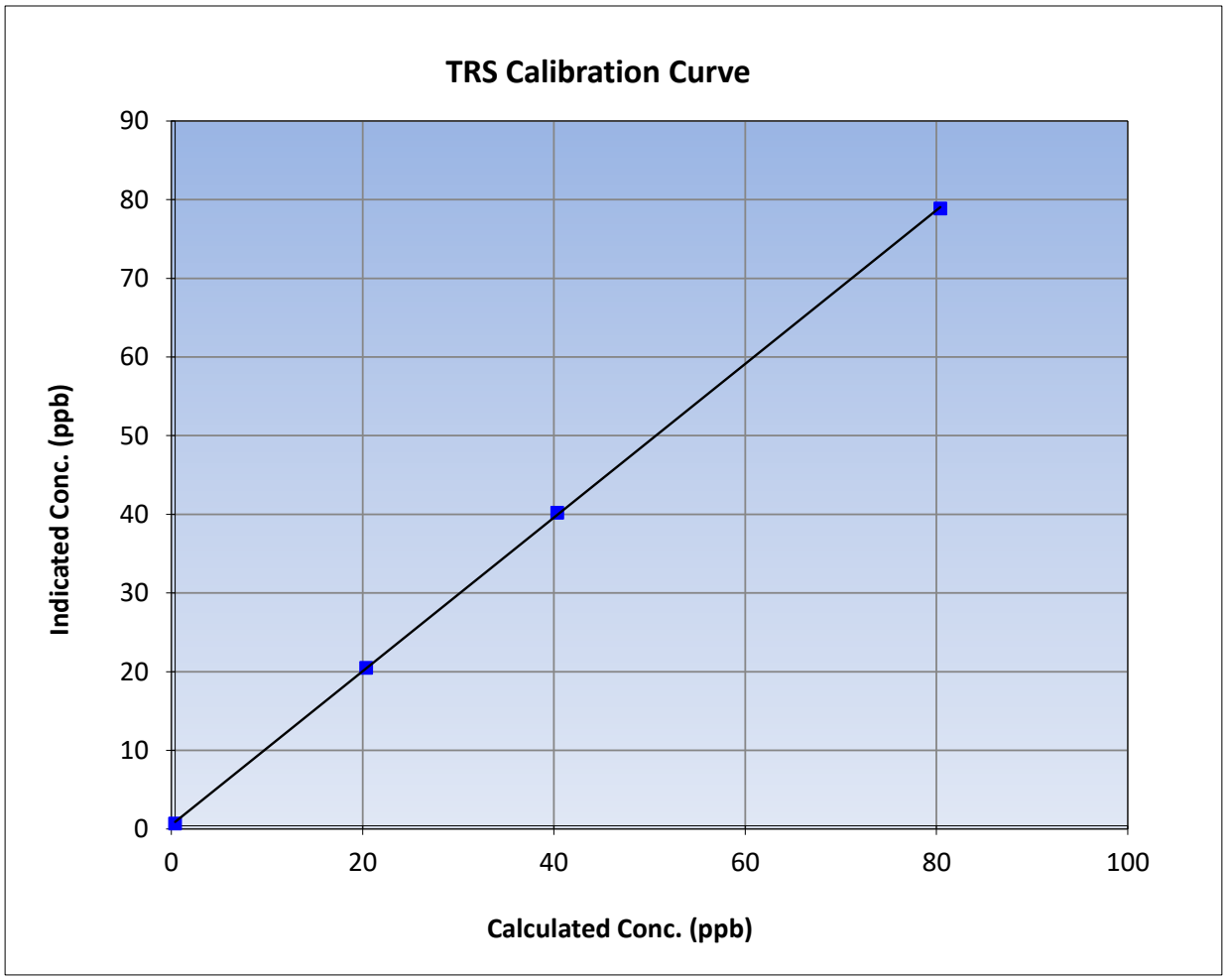
Station Information

Calibration Date:	May 29, 2023	Previous Calibration:	April 26, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	9:45	End Time (MST):	13:41
Analyzer make:	Thermo 43iQ-TL	Analyzer serial #:	1203169744

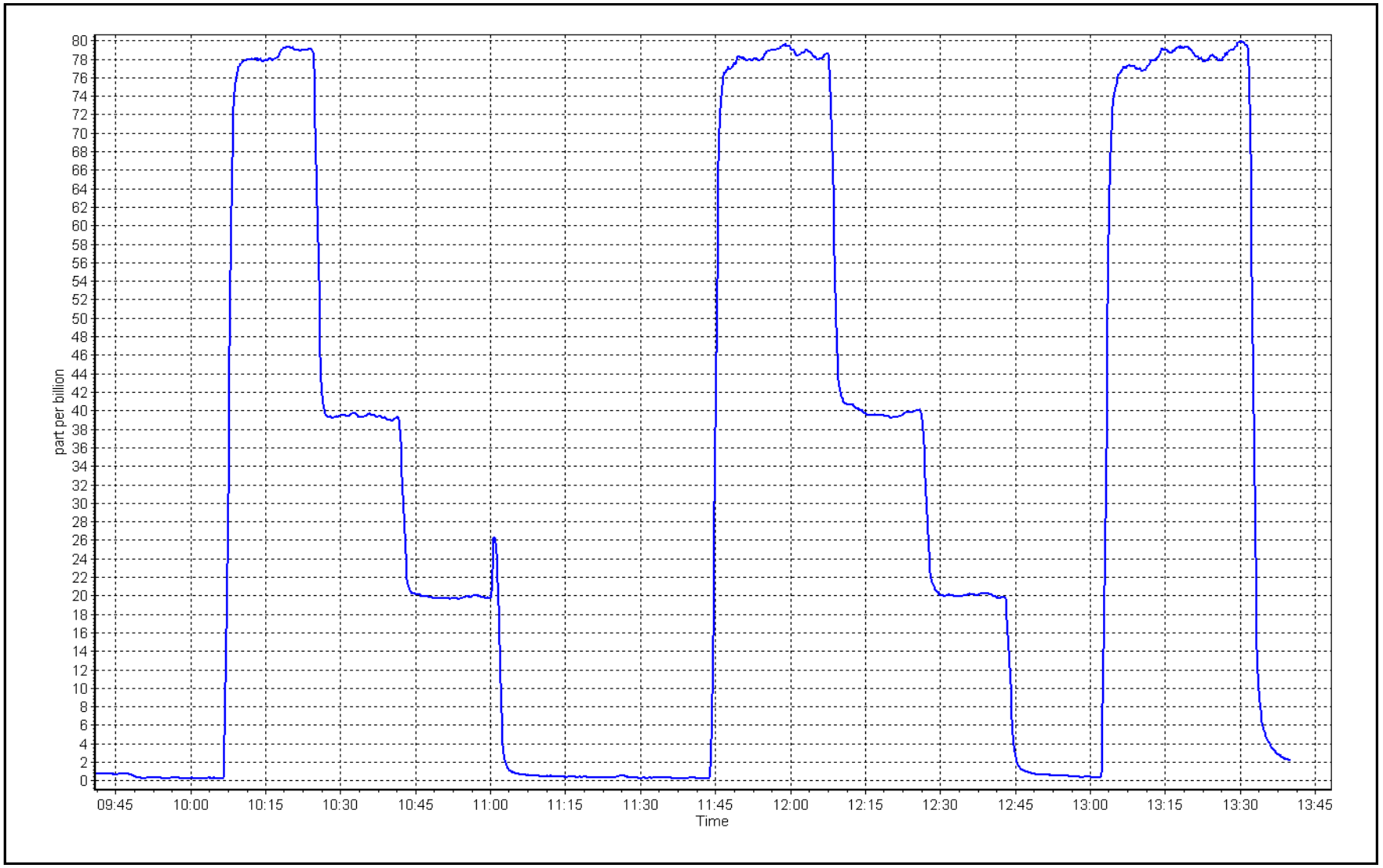
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
80.0	78.5	1.0192
40.0	39.8	1.0039
20.0	20.1	0.9940

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999957	*≥0.995*
Slope	0.976855	*0.90 - 1.10*
Intercept	0.498472	*+/-3*



TRS Calibration Plot Date: May 29, 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:	May 15, 2023	Last Cal Date:	April 13, 2023
Start time (MST):	8:28	End time (MST):	12:54
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.882	1.813	NO bkgnd or offset:	7.9	7.6
NOX coeff or slope:	1.000	0.993	NOX bkgnd or offset:	8.1	7.7
NO2 coeff or slope:	0.995	1.000	Reaction cell Press:	241.1	241.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.996544	0.995016
NO_X Cal Offset:	1.320000	-0.320000
NO Cal Slope:	0.995845	0.998443
NO Cal Offset:	0.740000	-0.920000
NO_2 Cal Slope:	1.003157	0.994665
NO_2 Cal Offset:	0.613431	-1.310360

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
as found span	4918	82.0	800.3	800.3	0.0	829.1	826.7	2.4	0.9653	0.9681
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	4918	82.0	800.3	800.3	0.0	796.3	798.7	-2.4	1.0050	1.0020
second point	4959	41.0	400.2	400.2	0.0	397.4	398.0	-0.6	1.0069	1.0054
third point	4980	20.5	200.1	200.1	0.0	198.5	197.9	0.6	1.0080	1.0110
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as left span	4918	82.0	800.3	432.4	367.9	796.3	437.5	358.7	1.0050	0.9884
								Average Correction Factor	1.0067	1.0062

Corrected As found	NO_X = 829.2 ppb	NO = 826.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = 3.7%		
Previous Response	NO_X = 798.9 ppb	NO = 797.7 ppb		*Percent Change	NO = 3.5%		
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	795.1	427.2	367.9	365.2	1.0074	99.3%
2nd GPT point (200 ppb O3)	795.1	619.0	176.1	173.3	1.0162	98.4%
3rd GPT point (100 ppb O3)	795.1	709.6	85.5	82.4	1.0376	96.4%
				Average Correction Factor	1.0204	98.0%

Notes: Sample inlet filter changed after as founds. Adjustment made to span high point.

Calibration Performed By: Morgan Voyageur, Matthew C

Wood Buffalo Environmental Association

NO_X Calibration Summary

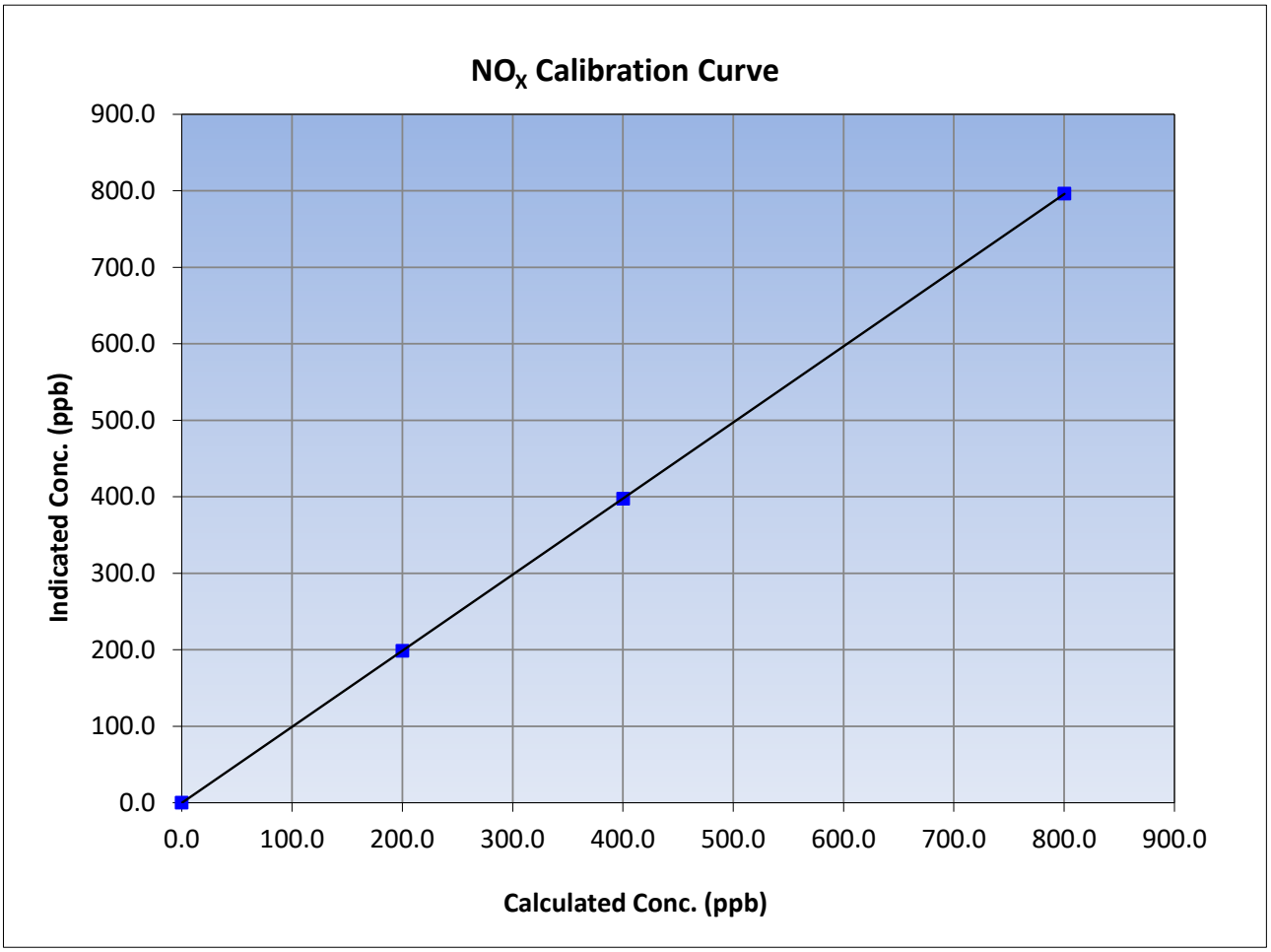
Version-04-2020

Station Information

Calibration Date:	May 15, 2023	Previous Calibration:	April 13, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:28	End Time (MST):	12:54
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999998	≥0.995
800.3	796.3	1.0050			
400.2	397.4	1.0069	Slope	0.995016	0.90 - 1.10
200.1	198.5	1.0080			
			Intercept	-0.320000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

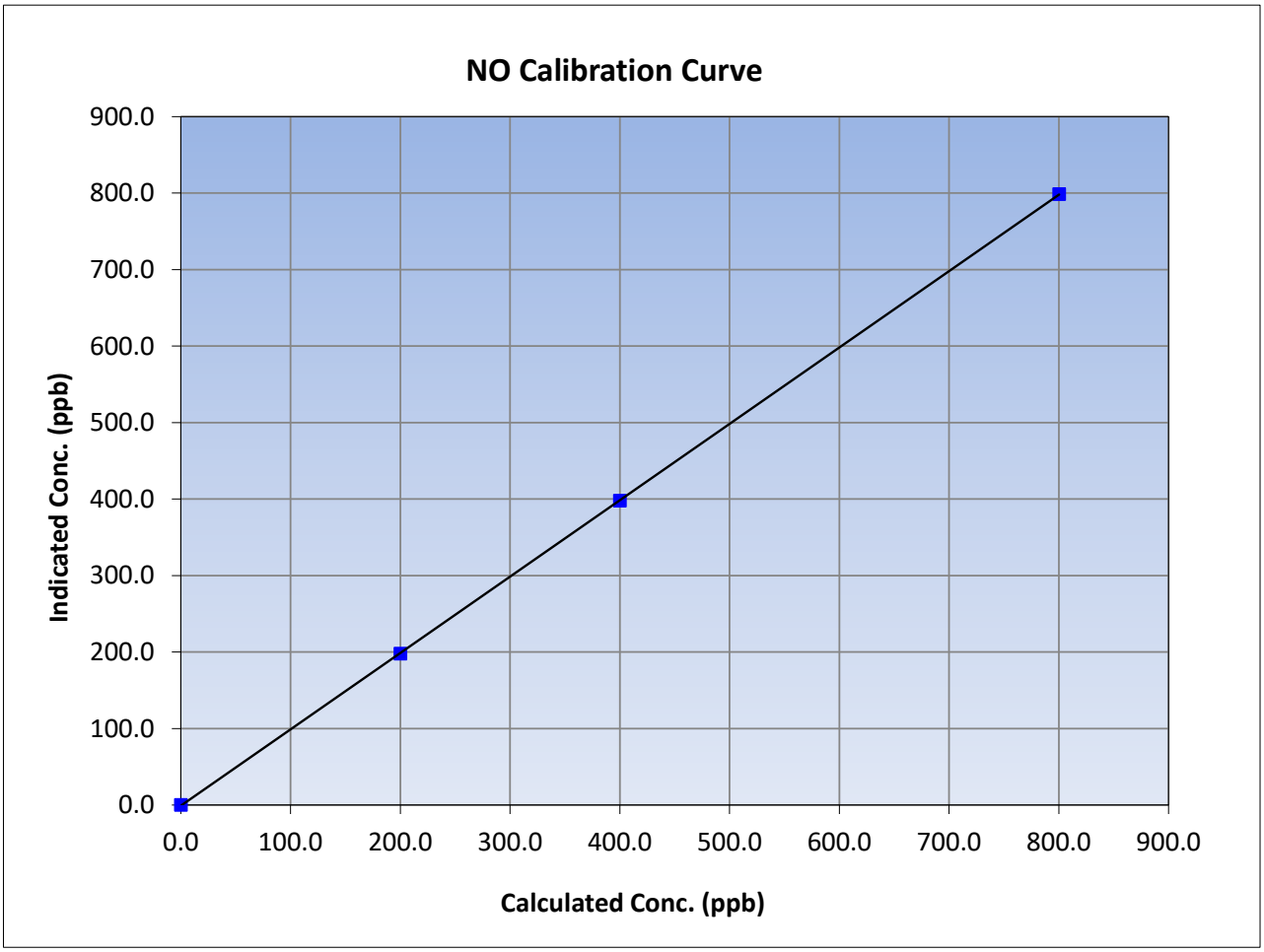
Version-04-2020

Station Information

Calibration Date:	May 15, 2023	Previous Calibration:	April 13, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:28	End Time (MST):	12:54
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999993	≥0.995
800.3	798.7	1.0020			
400.2	398.0	1.0054	Slope	0.998443	0.90 - 1.10
200.1	197.9	1.0110			
			Intercept	-0.920000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

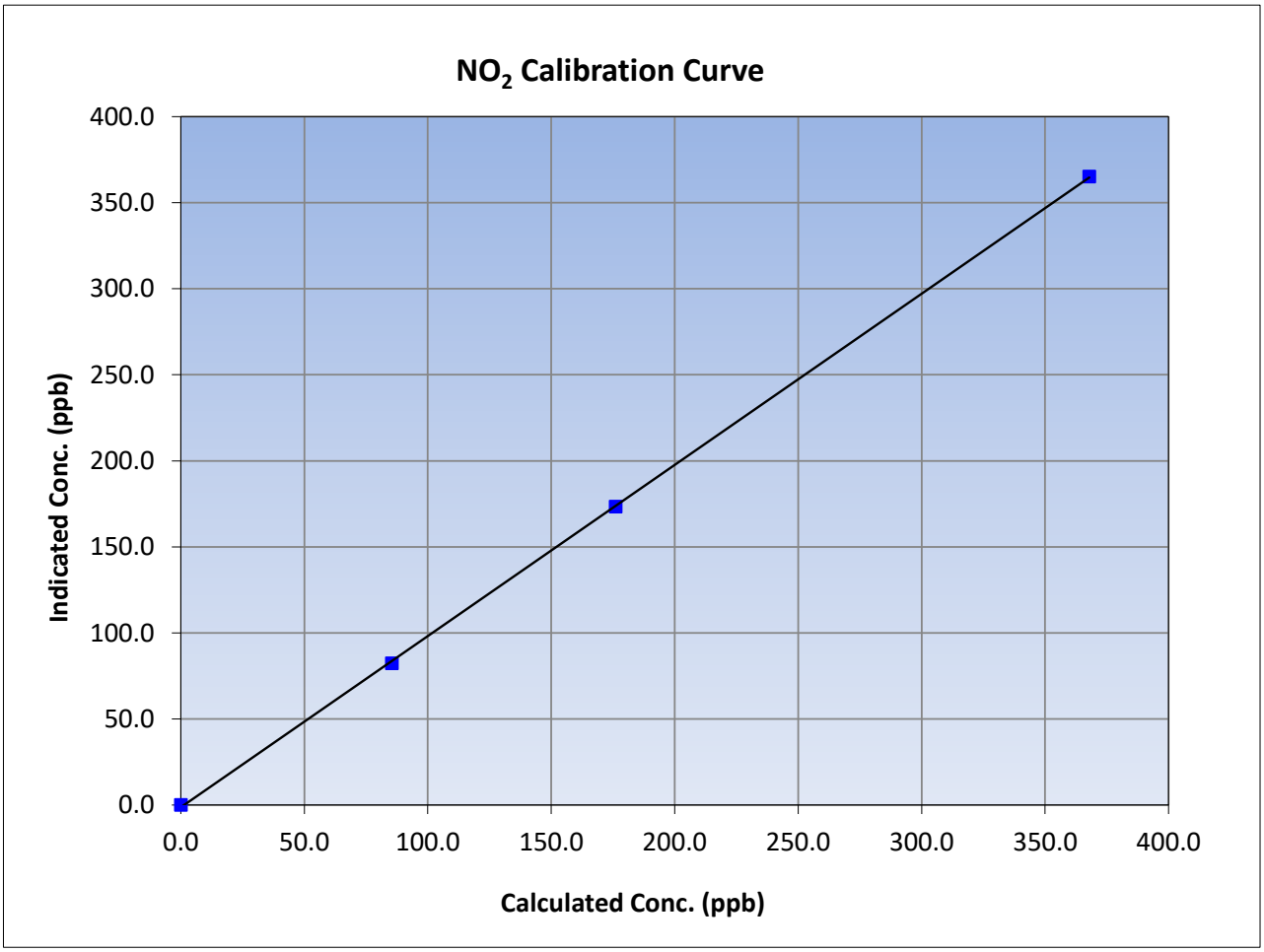
Version-04-2020

Station Information

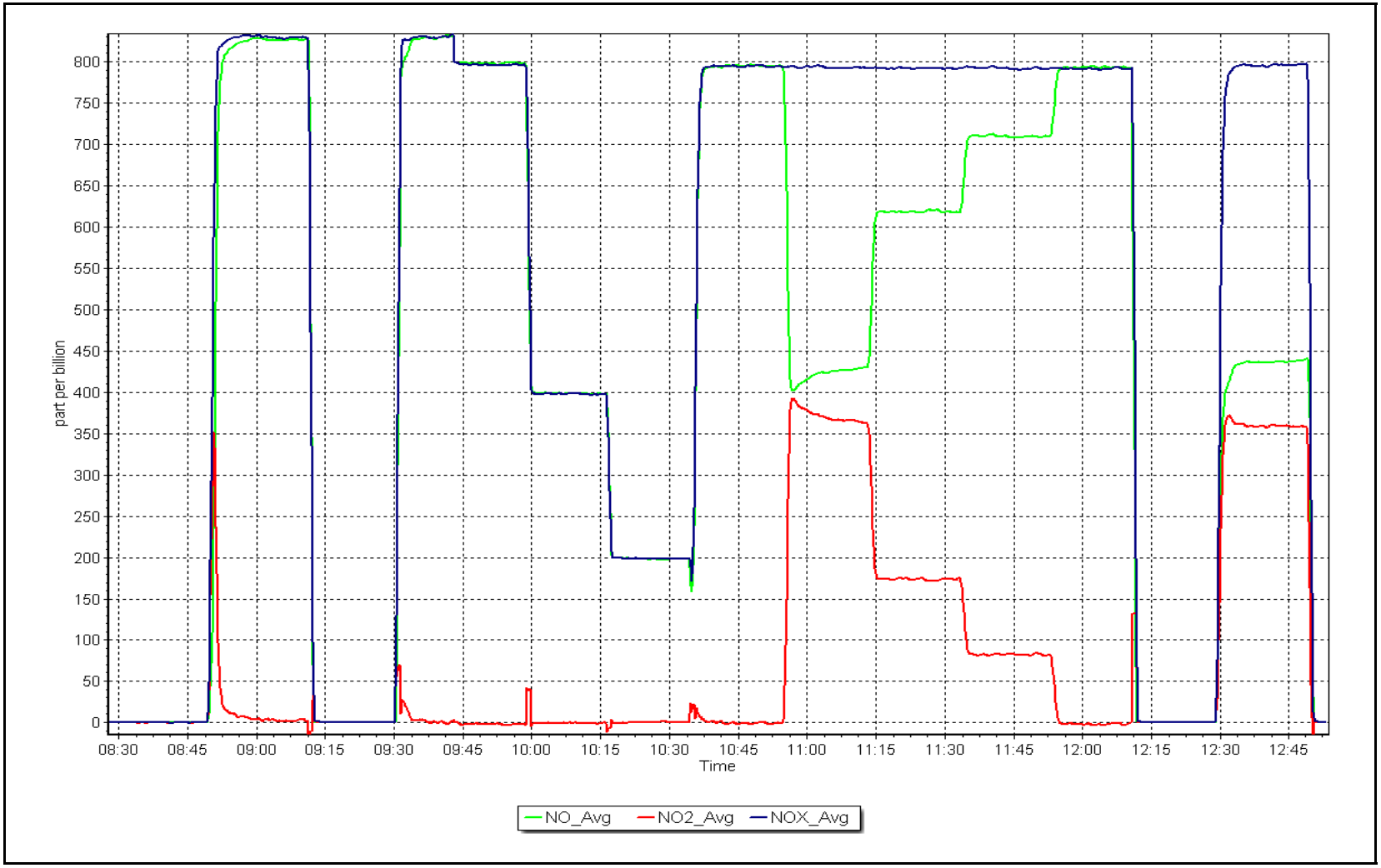
Calibration Date:	May 15, 2023	Previous Calibration:	April 13, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:28	End Time (MST):	12:54
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999944	≥0.995
367.9	365.2	1.0074			
176.1	173.3	1.0162	Slope	0.994665	0.90 - 1.10
85.5	82.4	1.0376			
			Intercept	-1.310360	+/-20



NO_X Calibration Plot Date: May 15, 2023 Location: Fort Chipewyan



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	May 10, 2023	Last Cal Date:	April 12, 2023
Start time (MST):	7:39	End time (MST):	10:33
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.013200	1.007686	Backgd or Offset:	-2.0	-2.0
Calibration intercept:	-0.960000	-2.020000	Coeff or Slope:	1.036	1.036

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	NA	0.0	-0.3	----
as found span	5000	963.6	400.0	399.8	1.001
as found 2nd point					
as found 3rd point					
calibrator zero	5000	NA	0.0	0.4	----
high point	5000	961.7	400.0	402.4	0.994
second point	5000	810.3	200.0	197.9	1.011
third point	5000	701.3	100.0	96.6	1.035
as left zero	5000	NA	0.0	0.3	----
as left span	5000	963.3	400.0	405.2	0.987
				Average Correction Factor	1.013

Baseline Corr As found:	400.1	Previous response	404.3	*% change	-1.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Morgan Voyageur

Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS 08
Calibration Date:	May 29, 2023	Last Cal Date:	April 26, 2023
Start time (MST):	13:33	End time (MST):	15:21
Analyzer Make:	API	S/N:	216
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	1212
Temp/RH standard:	Delta Cal	S/N:	1212

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	18.8	18.5	18.8	☐	+/- 2 °C
P (mmHg)	726.1	717.3	726.1	☐	+/- 10 mmHg
flow (LPM)	5.02	4.49	5.02	☐	+/- 0.25 LPM

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

PM w/o HEPA: 0.1 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

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

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

Disposable Filter Changed: March 13, 2023

Annual Maintenance

Date Sample Tube Cleaned: July 14, 2022

Date RH/T Sensor Cleaned: July 14, 2022

Notes: No adjustments made.

Calibration by: Morgan Voyageur

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	May 17, 2023	Last Cal Date:	April 21, 2023
Start time (MST):	7:41	End time (MST):	10:25
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	3,030	ppm	Cal Gas Exp Date:	December 1, 2028
Cal Gas Cylinder #:	ALM014846			
Removed Cal Gas Conc:	3,030	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3060
ZAG Make/Model:	API T701H		Serial Number:	260

Analyzer Information

Analyzer make:	API T300		Analyzer serial #:	3505	
Analyzer Range:	0 - 50 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997452	0.999682	Backgd or Offset:	-0.014	-0.014
Calibration intercept:	0.118914	0.126989	Coeff or Slope:	1.005	0.968

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	0.00	----
as found span	4933	66.7	40.4	43.0	0.940
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4934	66.7	40.4	40.4	1.000
second point	4967	33.3	20.2	20.5	0.983
third point	4983	16.7	10.1	10.2	0.988
as left zero	5000	0.0	0.0	0.0	----
as left span	2960	40.0	40.4	40.3	1.001
				Average Correction Factor	0.991

Baseline Corr As found:	42.99	Prev response:	40.44	*% change:	5.9%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after as founds. Adjusted span.installed new calibrator prior.

Calibration Performed By: Morgan Voyageur, Matthew Courtoreille

Wood Buffalo Environmental Association

CO Calibration Summary

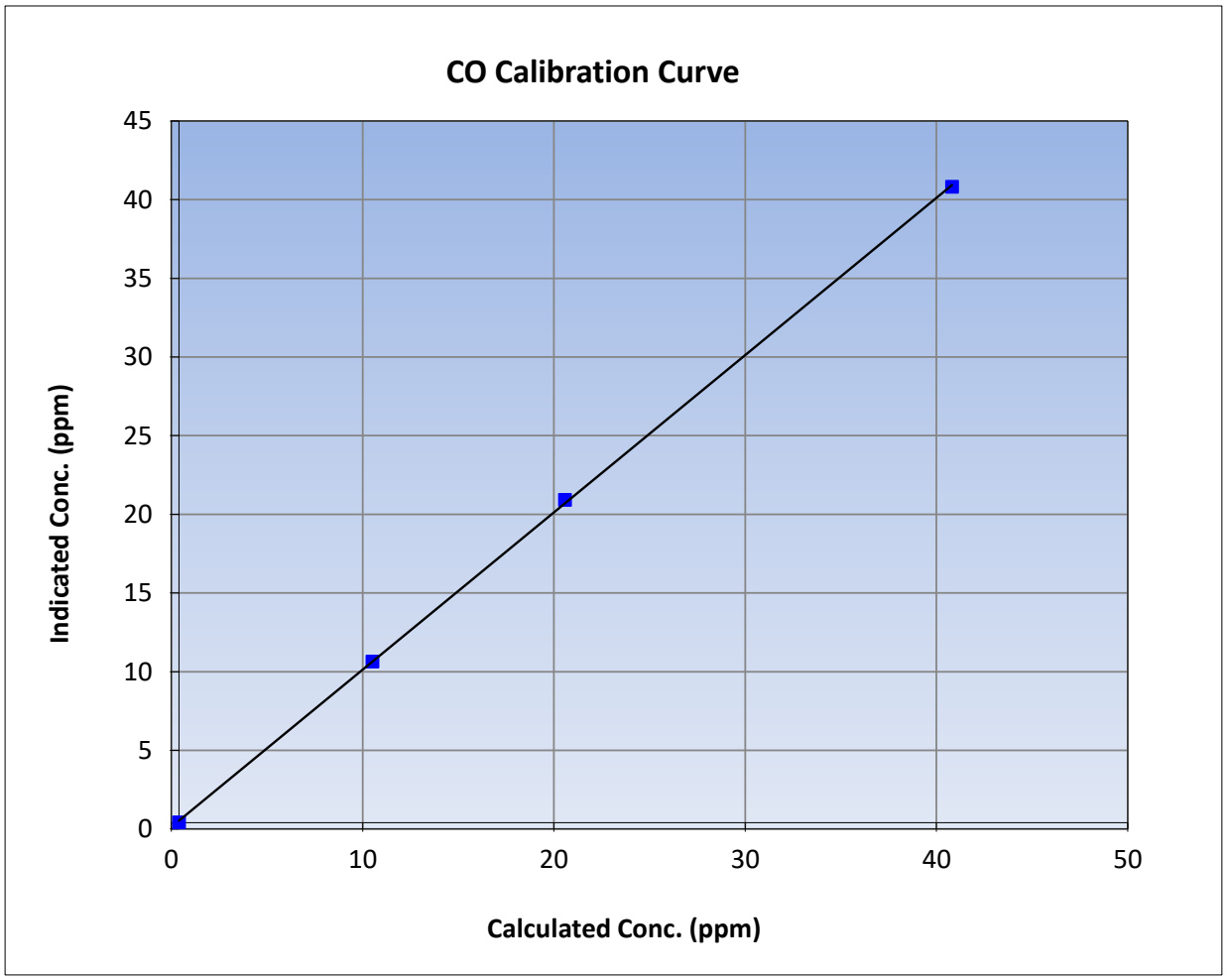
Version-01-2020

Station Information

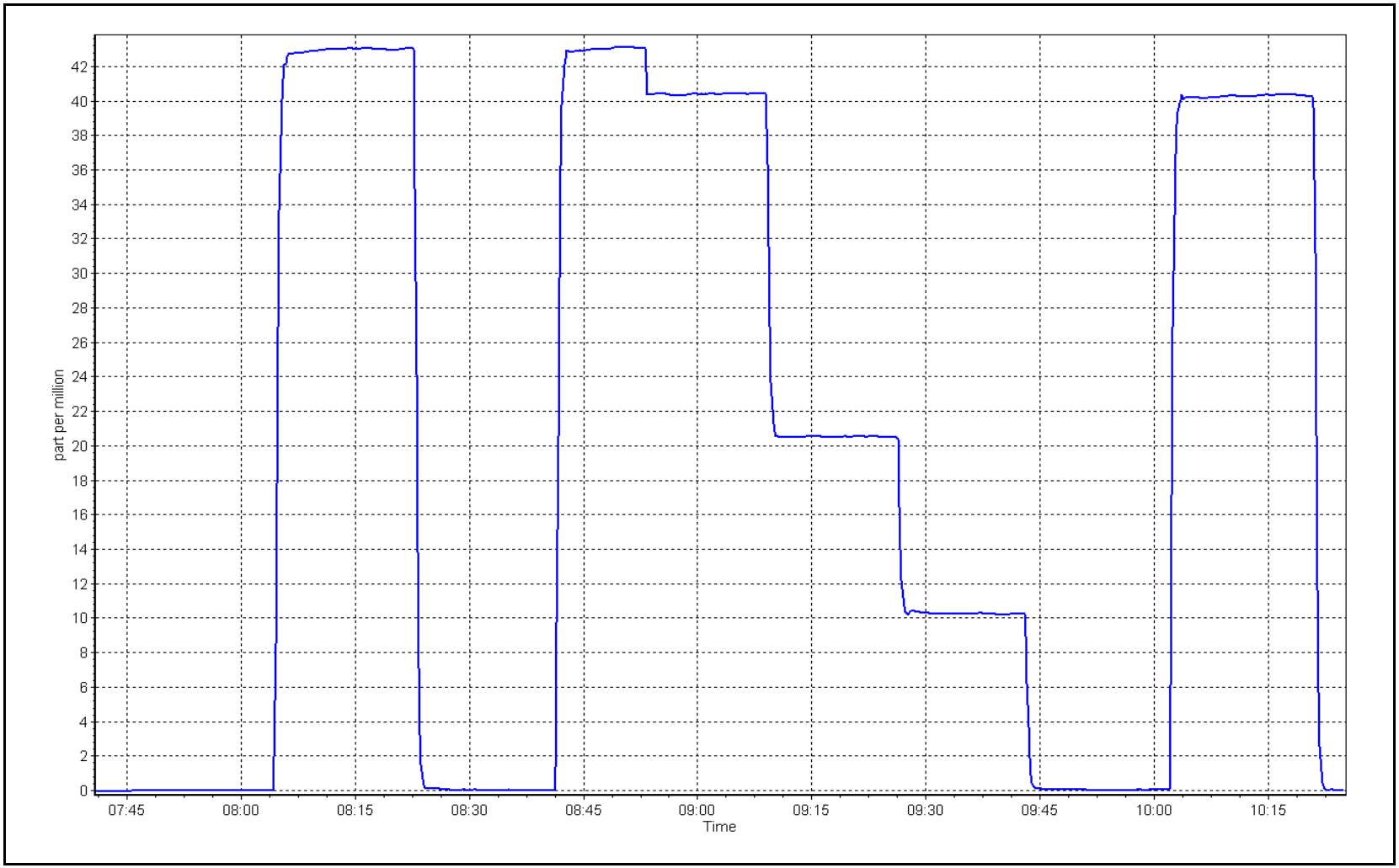
Calibration Date:	May 17, 2023	Previous Calibration:	April 21, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	7:41	End Time (MST):	10:25
Analyzer make:	API T300	Analyzer serial #:	3505

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999920	*≥0.995*
40.4	40.4	0.9999			
20.2	20.5	0.9834	Slope	0.999682	*0.90 - 1.10*
10.1	10.2	0.9883			
			Intercept	0.126989	*+/-1.5*



CO Calibration Plot Date: May 17, 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:	May 17, 2023	Last Cal Date:	April 21, 2023
Start time (MST):	11:14	End time (MST):	16:54
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:	3060
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:	0.992226	0.996425	Backgd or Offset:	0.006	-0.01
Calibration intercept:	-4.080000	-0.680000	Coeff or Slope:	1.018	1.018

CO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	3000	0.0	0.0	0.6	----
as found span	2920	80.0	1605.9	1713.7	0.937
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	0.2	----
high point	2920	80.0	1605.9	1604.4	1.001
second point	2960	40.0	802.9	785.4	1.022
third point	2980	20.0	401.5	407.5	0.985
as left zero	3000	0.0	0.0	26.0	----
as left span					
				Average Correction Factor	1.003

Baseline Corr As found:	1713.10	Prev response:	1589.30	*% change:	7.2%
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. As found points are high due to changing calibrator. Slighty adjusted as found and span points.

Calibration Performed By: Morgan Voyageur, Matthew C

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

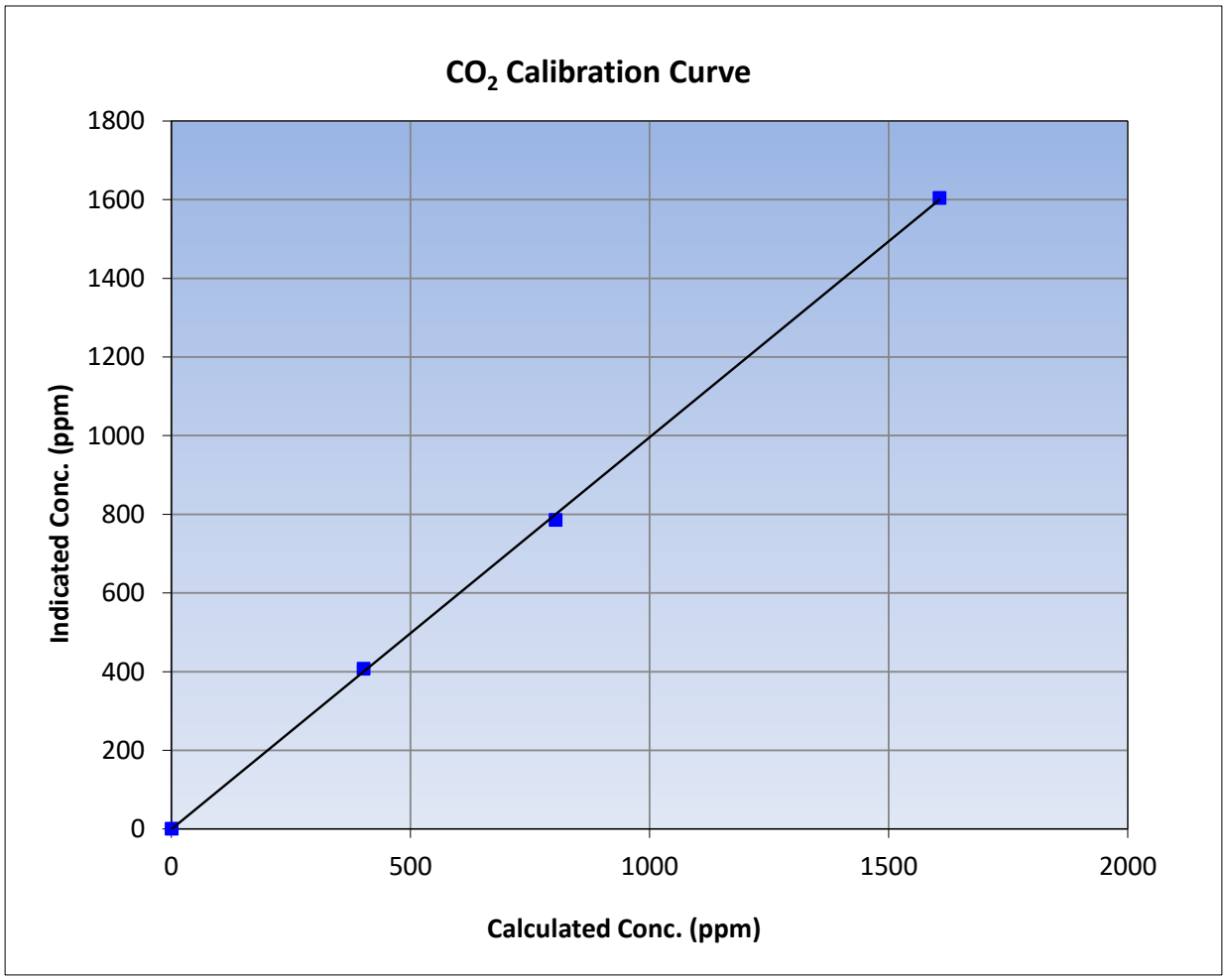
Station Information

Calibration Date	May 17, 2023	Previous Calibration	April 21, 2023
Station Name	Fort Chipewyan	Station Number	AMS08
Start Time (MST)	11:14	End Time (MST)	16:54
Analyzer make	Teledyne API T360	Analyzer serial #	289

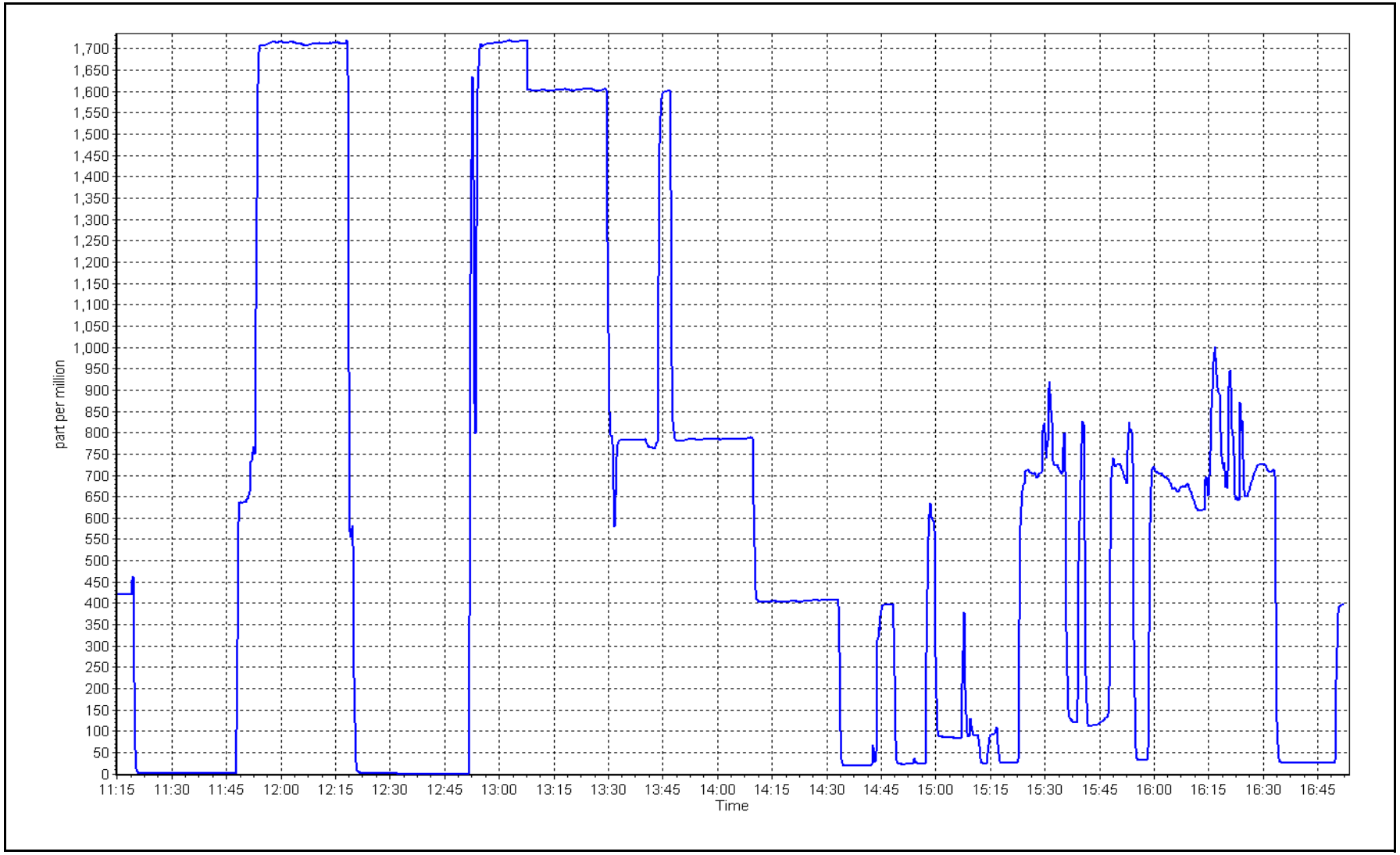
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
1605.9	1604.4	1.0009
802.9	785.4	1.0223
401.5	407.5	0.9852

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999795	*≥0.995*
Slope	0.996425	*0.90 - 1.10*
Intercept	-0.680000	*+/-20*



CO_2 Calibration Plot Date: May 17, 2023 Location: Fort Chipewyan



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS09
BARGE LANDING
MAY 2023

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

June 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	May 8, 2023	Last Cal Date:	April 11, 2023
Start time (MST):	10:36	End time (MST):	13:51
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:	0.998843	0.999100	Backgd or Offset:	9.7	9.9
Calibration intercept:	-0.089025	-0.528972	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	797.5	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4919	80.2	801.5	801.1	1.000
second point	4959	40.1	400.8	398.0	1.007
third point	4980	20.0	199.8	199.4	1.002
as left zero	5000	0.0	0.0	0.2	----
as left span	4919	80.2	801.5	802.0	0.999
				Average Correction Factor	1.003

Baseline Corr As found:	797.40	Previous response	800.47	*% change	-0.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

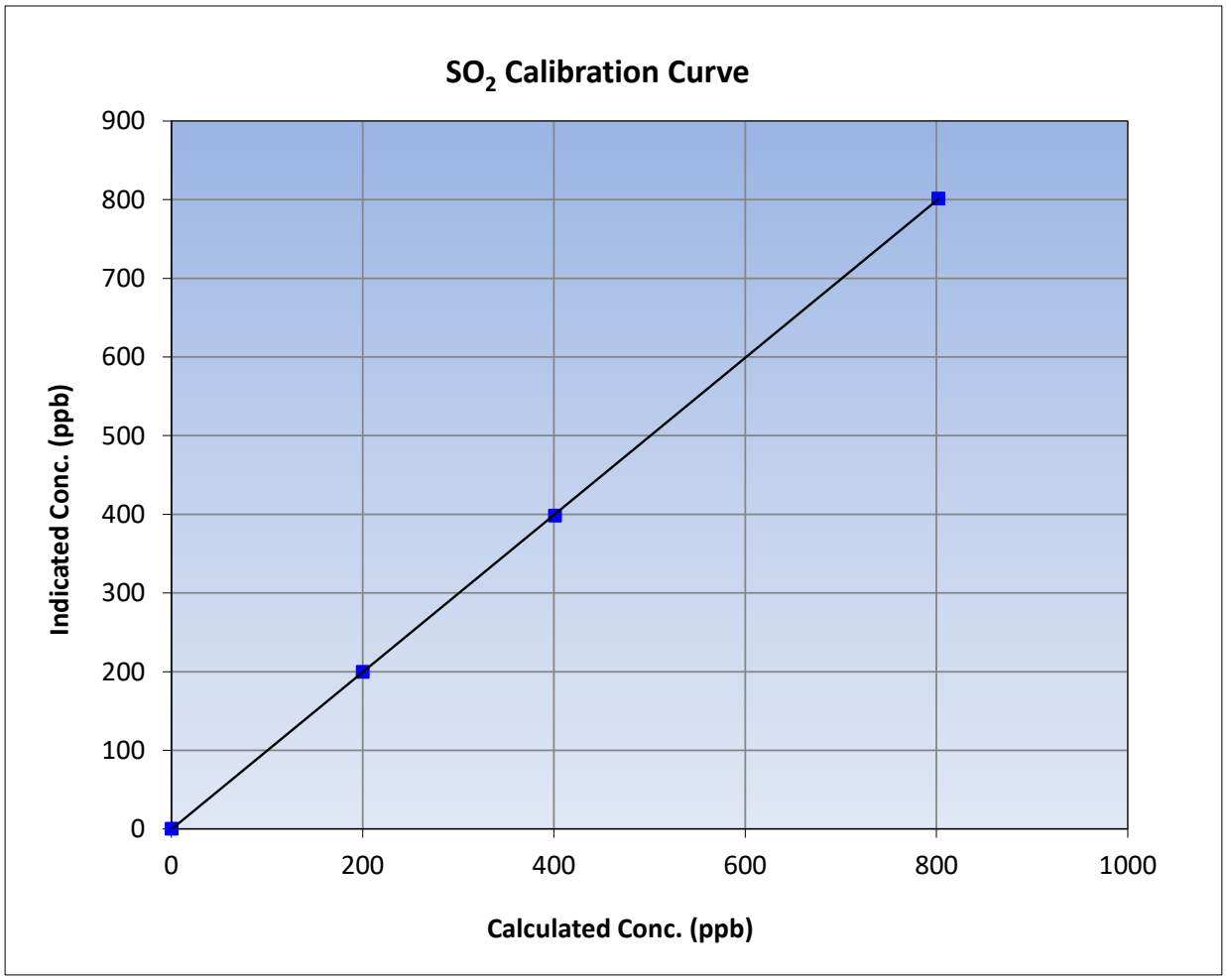
Station Information

Calibration Date:	May 8, 2023	Previous Calibration:	April 11, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:36	End Time (MST):	13:51
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148498

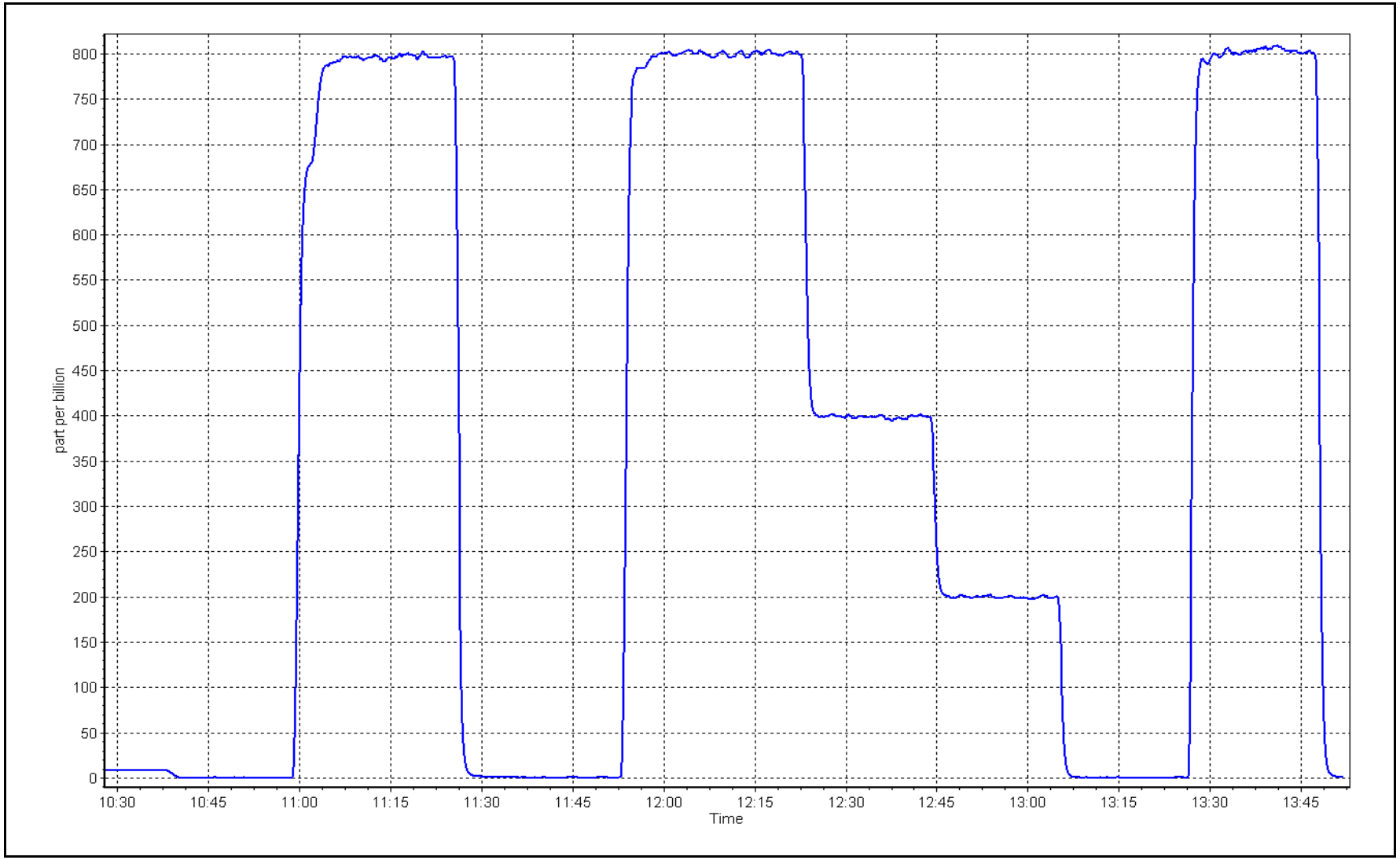
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
801.5	801.1	1.0005
400.8	398.0	1.0069
199.8	199.4	1.0022

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999986	*≥0.995*
Slope	0.999100	*0.90 - 1.10*
Intercept	-0.528972	*+/-30*



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



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	May 3, 2023	Last Cal Date:	April 17, 2023
Start time (MST):	9:47	End time (MST):	14:57
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:	1.008720	1.005434	Backgd or Offset:	2.78	2.82
Calibration intercept:	0.079030	0.019021	Coeff or Slope:	1.137	1.147

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4918	82.1	80.0	77.8	1.028
as found 2nd point	4959	41.1	40.0	39.2	1.021
as found 3rd point	4979	20.5	20.0	19.6	1.019
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	80.4	0.995
second point	4959	41.1	40.0	40.3	0.993
third point	4979	20.5	20.0	20.1	0.993
as left zero	5000	0.0	0.0	0.0	----
as left span	4918	82.1	80.0	81.1	0.986
SO2 Scrubber Check	4920	80.2	802.0	-0.1	----
Date of last scrubber change:		28-Feb-23		Ave Corr Factor	0.994
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	77.8	Prev response:	80.74	*% change:	-3.8%
Baseline Corr 2nd AF pt:	39.2	AF Slope:	0.972568	AF Intercept:	0.119009
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999986		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

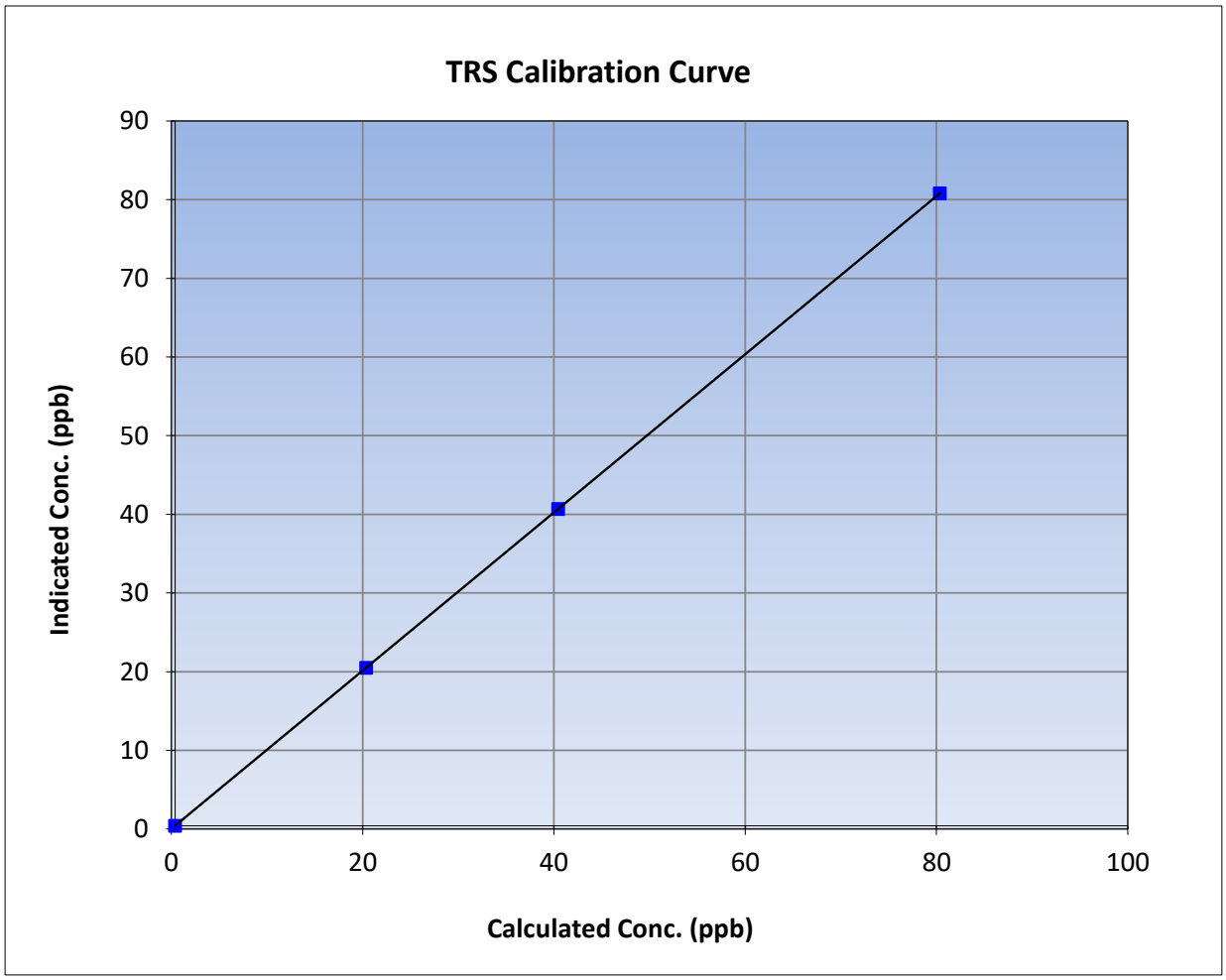
Station Information

Calibration Date:	May 3, 2023	Previous Calibration:	April 17, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:47	End Time (MST):	14:57
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1331259320

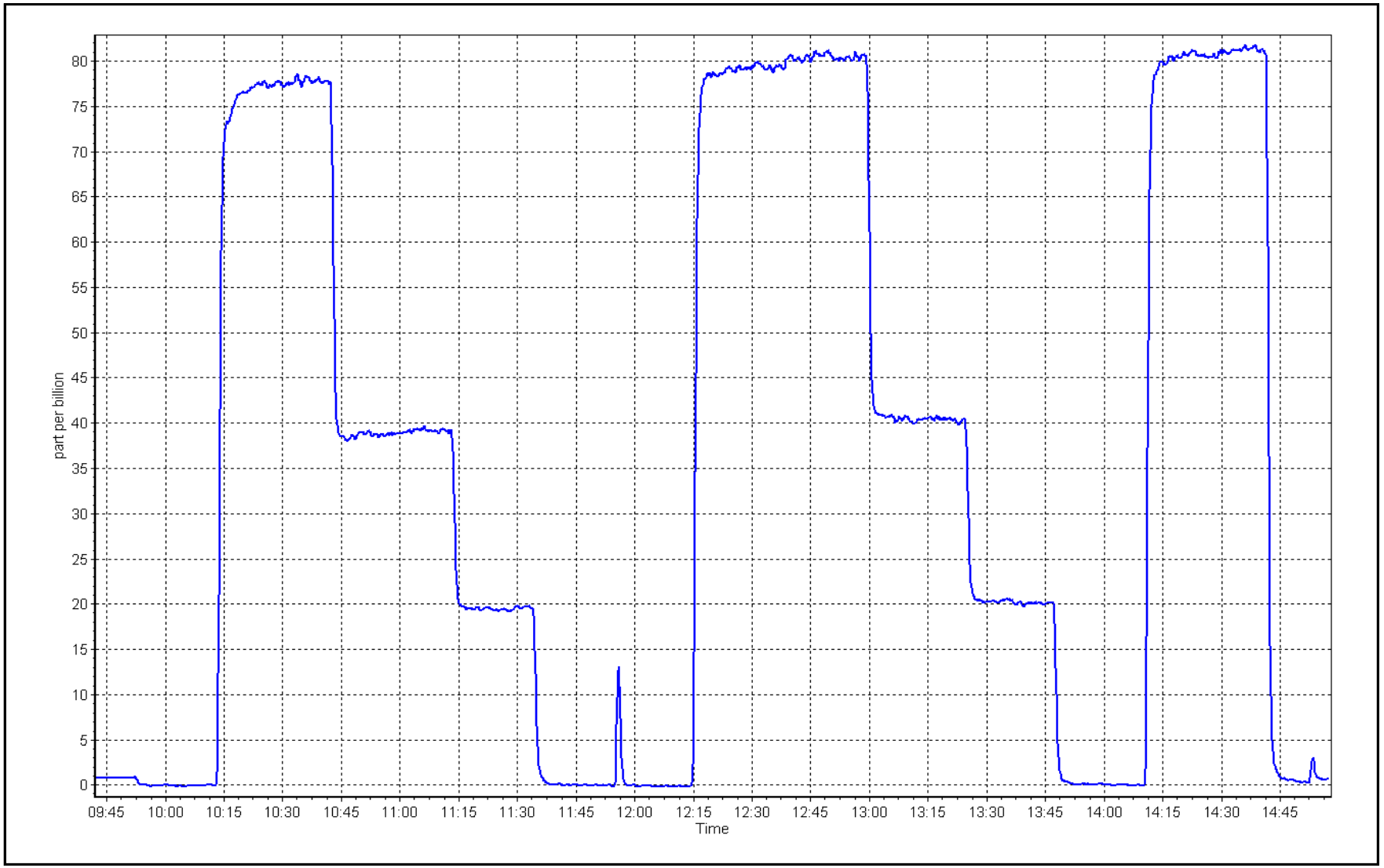
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.4	0.9946
40.0	40.3	0.9933
20.0	20.1	0.9935

Statistical Evaluation		Limits
Correlation Coefficient	1.000000	≥0.995
Slope	1.005434	0.90 - 1.10
Intercept	0.019021	+/-3



TRS Calibration Plot Date: May 3, 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:	May 8, 2023	Last Cal Date:	April 11, 2023
Start time (MST):	10:36	End time (MST):	13:51
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 #:	1193585649	
THC Range (ppm):	0 - 100 ppm				
NMHC Range (ppm):	0 - 50 ppm		CH4 Range (ppm):	0 - 50 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.49E-04	2.50E-04	NMHC SP Ratio:	4.79E-05	4.87E-05
CH4 Retention time:	15.2	15.2	NMHC Peak Area:	190949	187500

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	80.2	17.12	16.99	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	17.12	17.18	0.996
second point	4960	40.1	8.56	8.56	1.000
third point	4980	20.0	4.27	4.28	0.997
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	17.12	17.15	0.998
				Average Correction Factor	0.998
Baseline Corr AF:	16.99	Prev response	17.07	*% 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	0.00	0.0	----
as found span	4919	80.2	9.14	9.03	1.012
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	9.14	9.18	0.995
second point	4960	40.1	4.57	4.59	0.995
third point	4980	20	2.28	2.29	0.994
as left zero	5000	0	0.00	0.00	----
as left span	4919	80.2	9.14	9.17	0.996
				Average Correction Factor	0.995
Baseline Corr AF:	9.03	Prev response	9.07	*% change	-0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	80.2	7.98	7.96	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	7.98	7.99	0.999
second point	4960	40.1	3.99	3.98	1.004
third point	4980	20.0	1.99	1.99	1.001
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	7.98	7.98	1.000
				Average Correction Factor	1.001
Baseline Corr AF:	7.96	Prev response	8.00	*% 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:	0.995837	1.003421
THC Cal Offset:	0.017643	-0.007132
CH4 Cal Slope:	1.000907	1.001195
CH4 Cal Offset:	0.007869	-0.006136
NMHC Cal Slope:	0.991957	1.004627
NMHC Cal Offset:	0.009575	0.001202

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

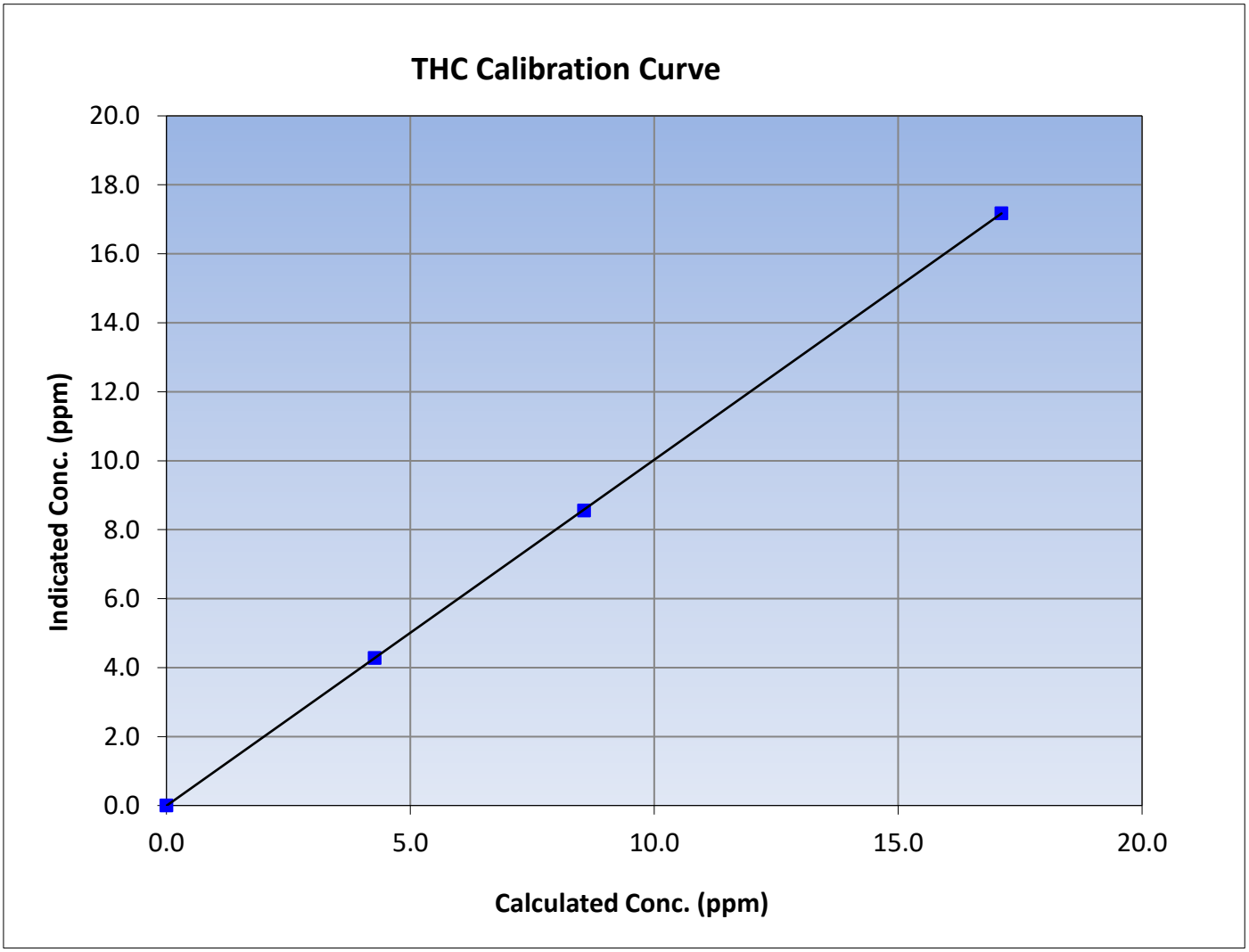
Version-01-2020

Station Information

Calibration Date:	May 8, 2023	Previous Calibration:	April 11, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:36	End Time (MST):	13:51
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999997	*≥0.995*
17.12	17.18	0.9965			
8.56	8.56	0.9998	Slope	1.003421	*0.90 - 1.10*
4.27	4.28	0.9973			
			Intercept	-0.007132	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

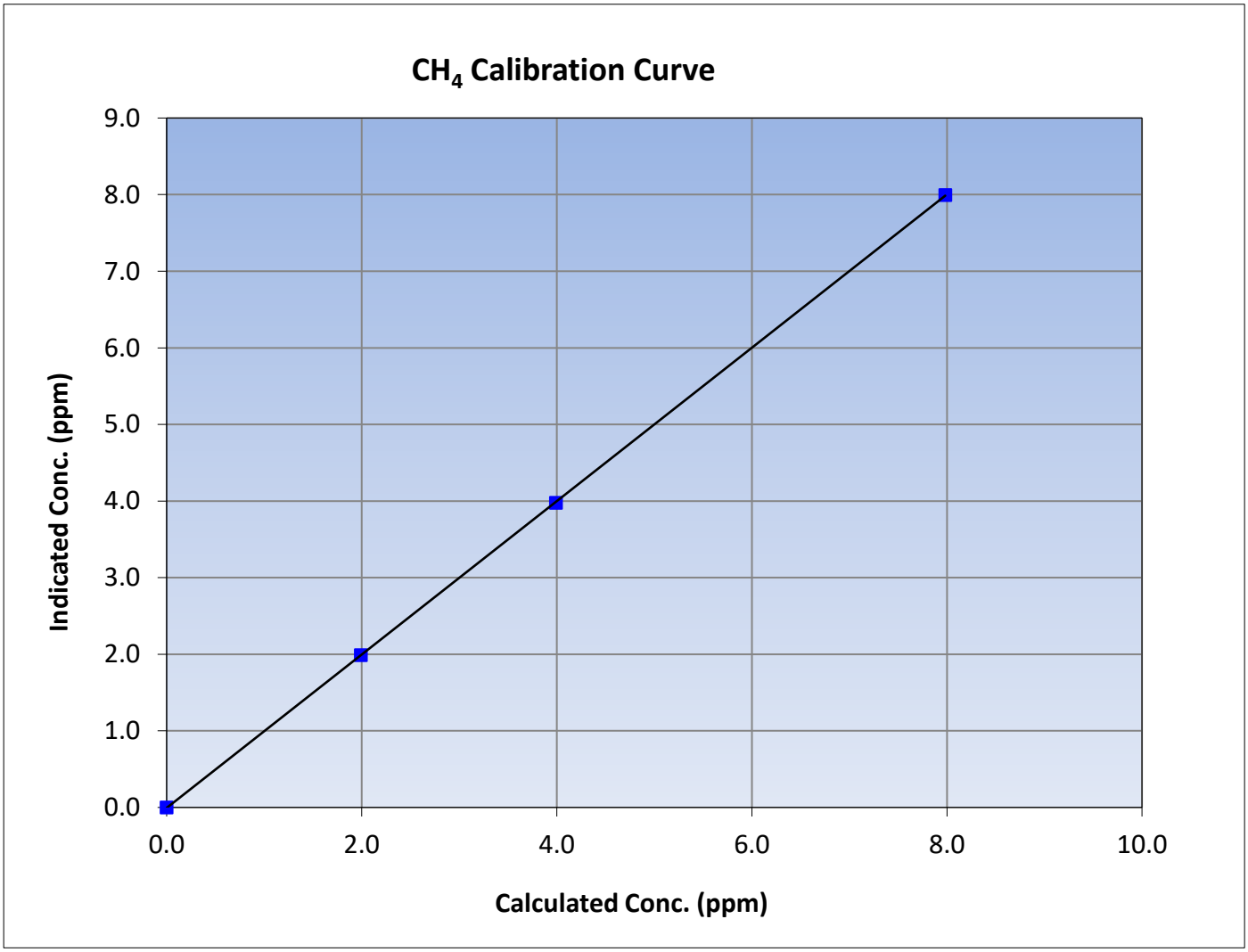
Version-01-2020

Station Information

Calibration Date:	May 8, 2023	Previous Calibration:	April 11, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:36	End Time (MST):	13:51
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999992	*≥0.995*
7.98	7.99	0.9987			
3.99	3.98	1.0039	Slope	1.001195	*0.90 - 1.10*
1.99	1.99	1.0012			
			Intercept	-0.006136	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

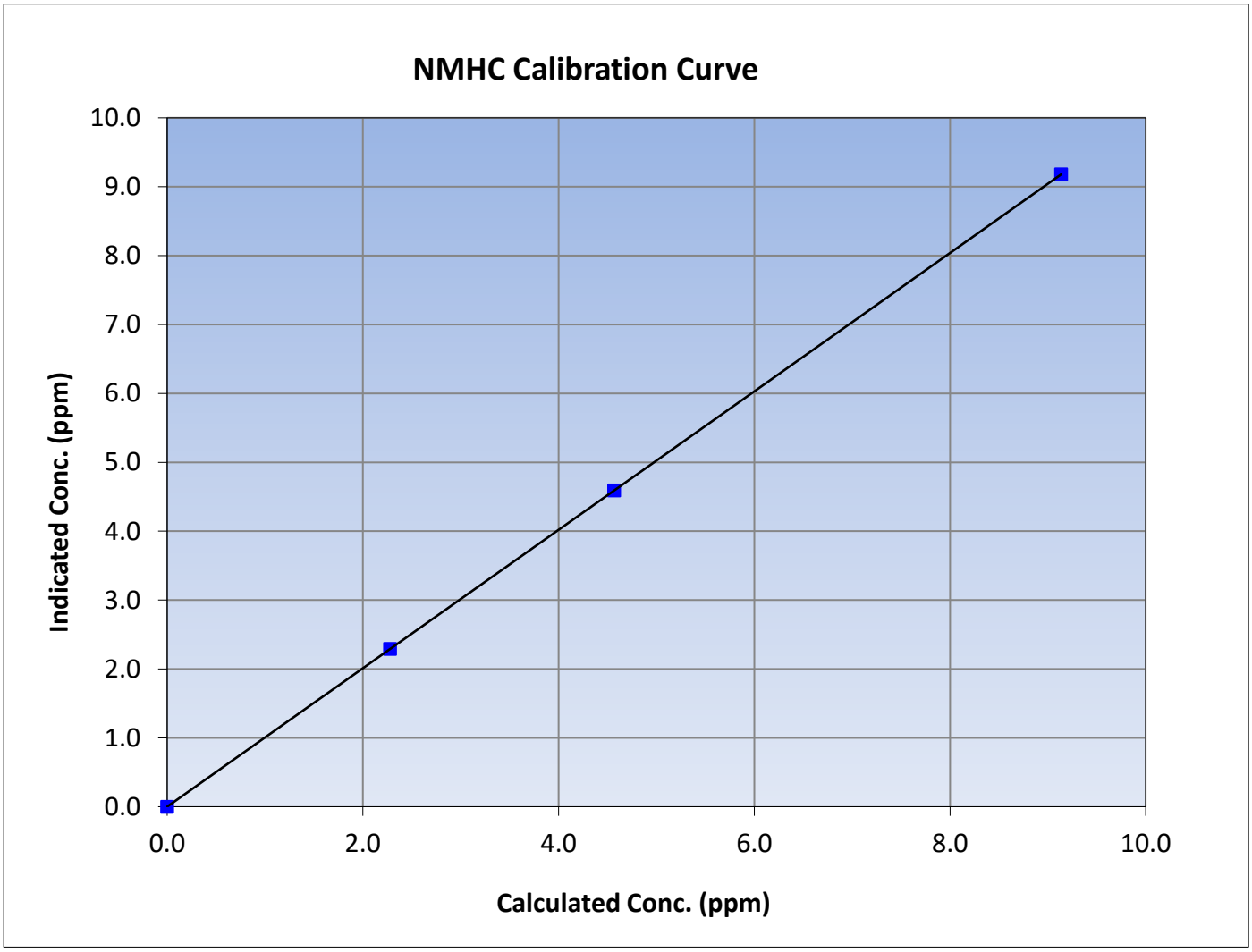
Version-01-2020

Station Information

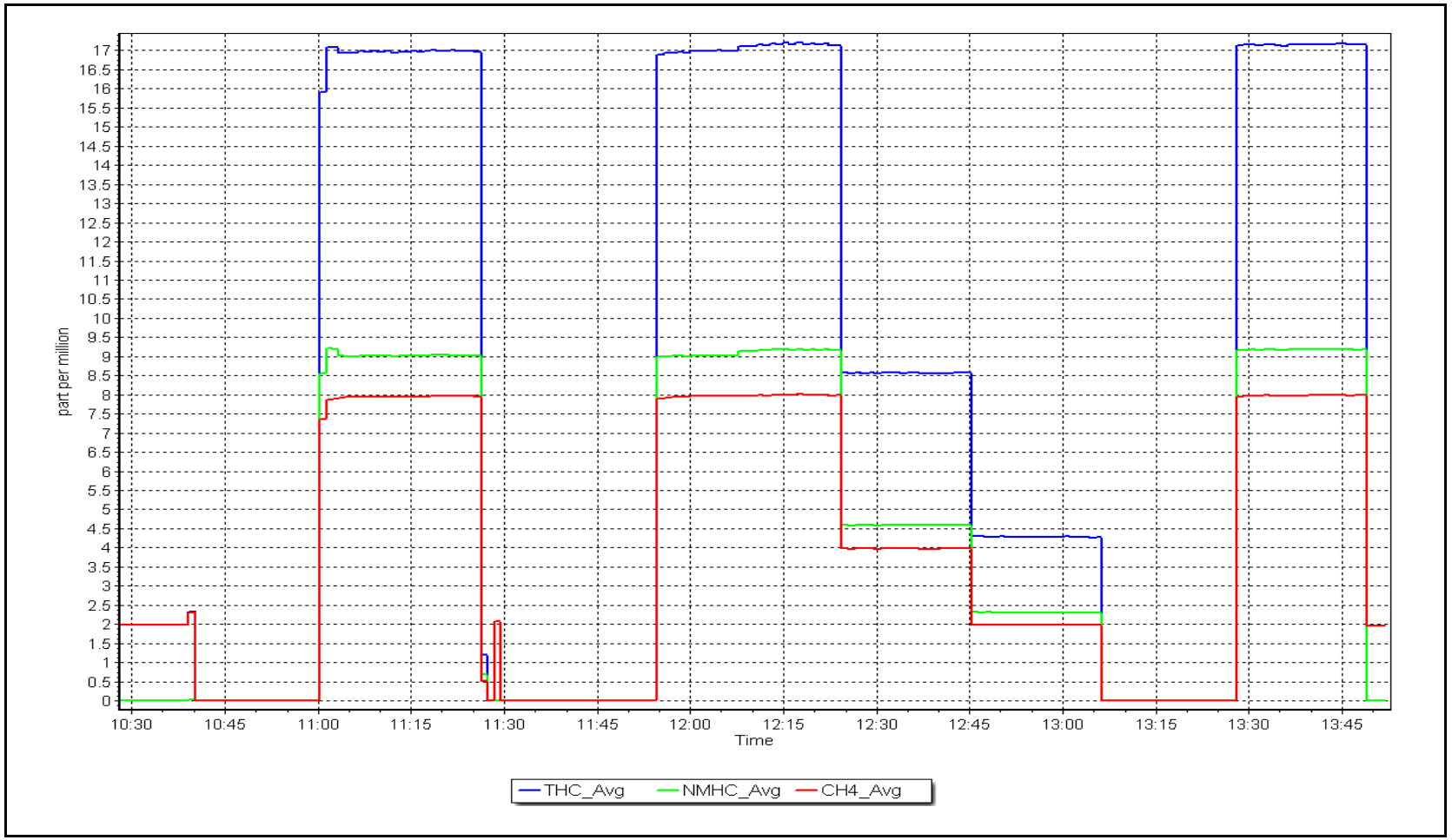
Calibration Date:	May 8, 2023	Previous Calibration:	April 11, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:36	End Time (MST):	13:51
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	1.000000	≥0.995
9.14	9.18	0.9953			
4.57	4.59	0.9953	Slope	1.004627	0.90 - 1.10
2.28	2.29	0.9939			
			Intercept	0.001202	+/-0.5



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



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	May 23, 2023	Last Cal Date:	April 28, 2023
Start time (MST):	9:39	End time (MST):	14:54
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:	1.175	1.175	NO bkgnd or offset:	10.5	10.7
NOX coeff or slope:	0.995	0.995	NOX bkgnd or offset:	10.5	11.0
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	174.9	174.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.997105	1.003622
NO_X Cal Offset:	0.848780	0.329752
NO Cal Slope:	0.996586	1.005383
NO Cal Offset:	-0.413290	-0.991769
NO_2 Cal Slope:	1.003813	0.999175
NO_2 Cal Offset:	0.518213	0.249142

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.4	-0.1	0.5	----	----
as found span	4919	80.5	805.1	800.3	4.8	811.0	804.0	7.3	0.993	0.995
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	----	----
high point	4919	80.5	805.1	800.3	4.8	808.0	804.0	4.5	0.996	0.995
second point	4959	40.2	402.1	399.7	2.4	404.3	400.3	4.0	0.994	0.998
third point	4979	20.1	201.0	199.8	1.2	202.5	199.2	3.3	0.993	1.003
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1	----	----
as left span	4919	80.5	805.1	435.7	369.4	804.0	437.2	367.1	1.001	0.996
								Average Correction Factor	0.995	0.999

Corrected As found	NO_X = 810.6 ppb	NO = 804.1 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = 0.9%		
Previous Response	NO_X = 803.6 ppb	NO = 797.1 ppb		*Percent Change	NO = 0.9%		
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	799.1	434.5	369.4	369.3	1.000	100.0%
2nd GPT point (200 ppb O3)	799.1	658.9	145.0	145.2	0.999	100.1%
3rd GPT point (100 ppb O3)	799.1	727.2	76.7	77.2	0.994	100.6%
				Average Correction Factor	0.998	100.2%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

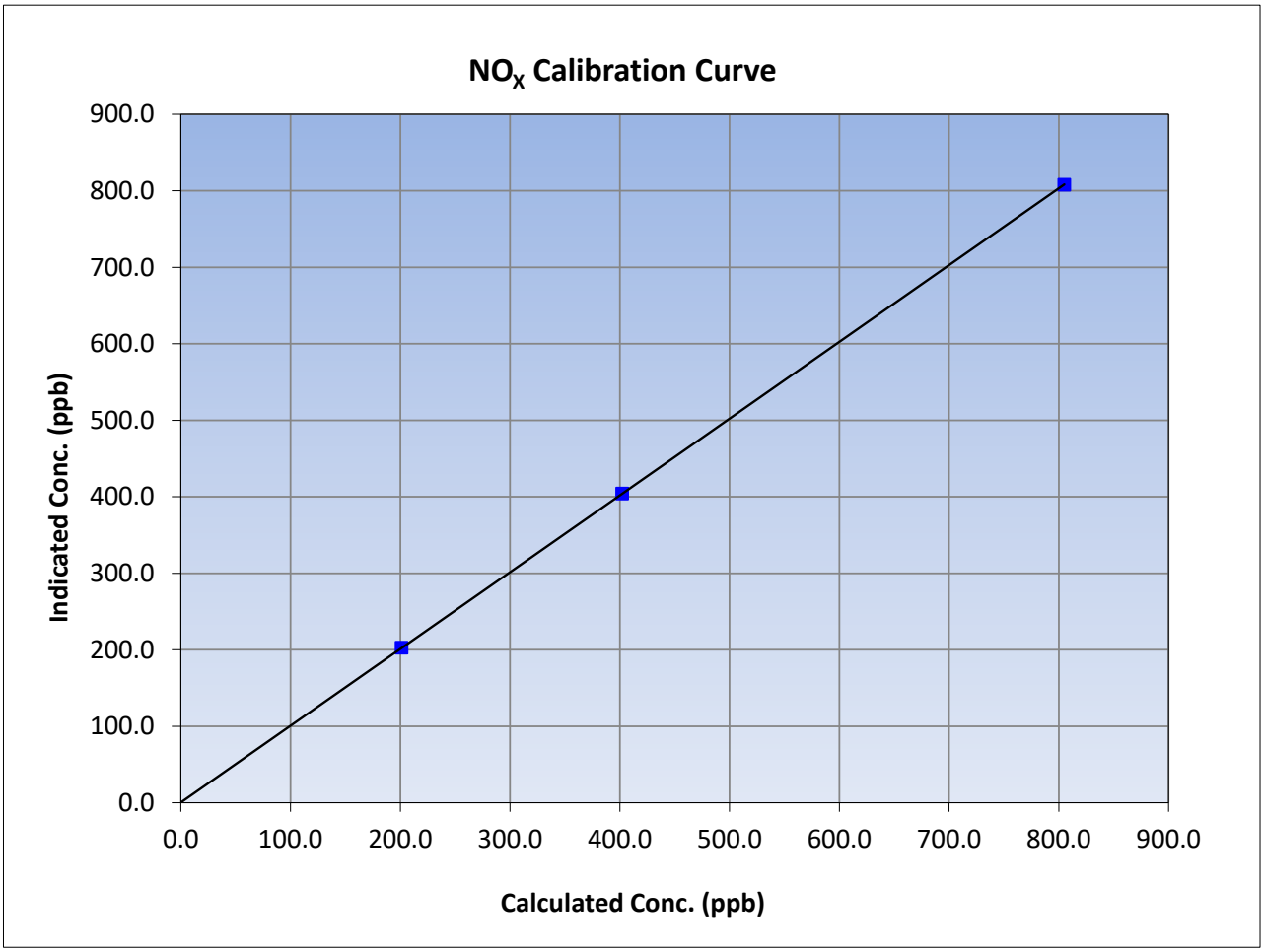
Version-04-2020

Station Information

Calibration Date:	May 23, 2023	Previous Calibration:	April 28, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:39	End Time (MST):	14:54
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999998	≥0.995
805.1	808.0	0.9964			
402.1	404.3	0.9945	Slope	1.003622	0.90 - 1.10
201.0	202.5	0.9928			
			Intercept	0.329752	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

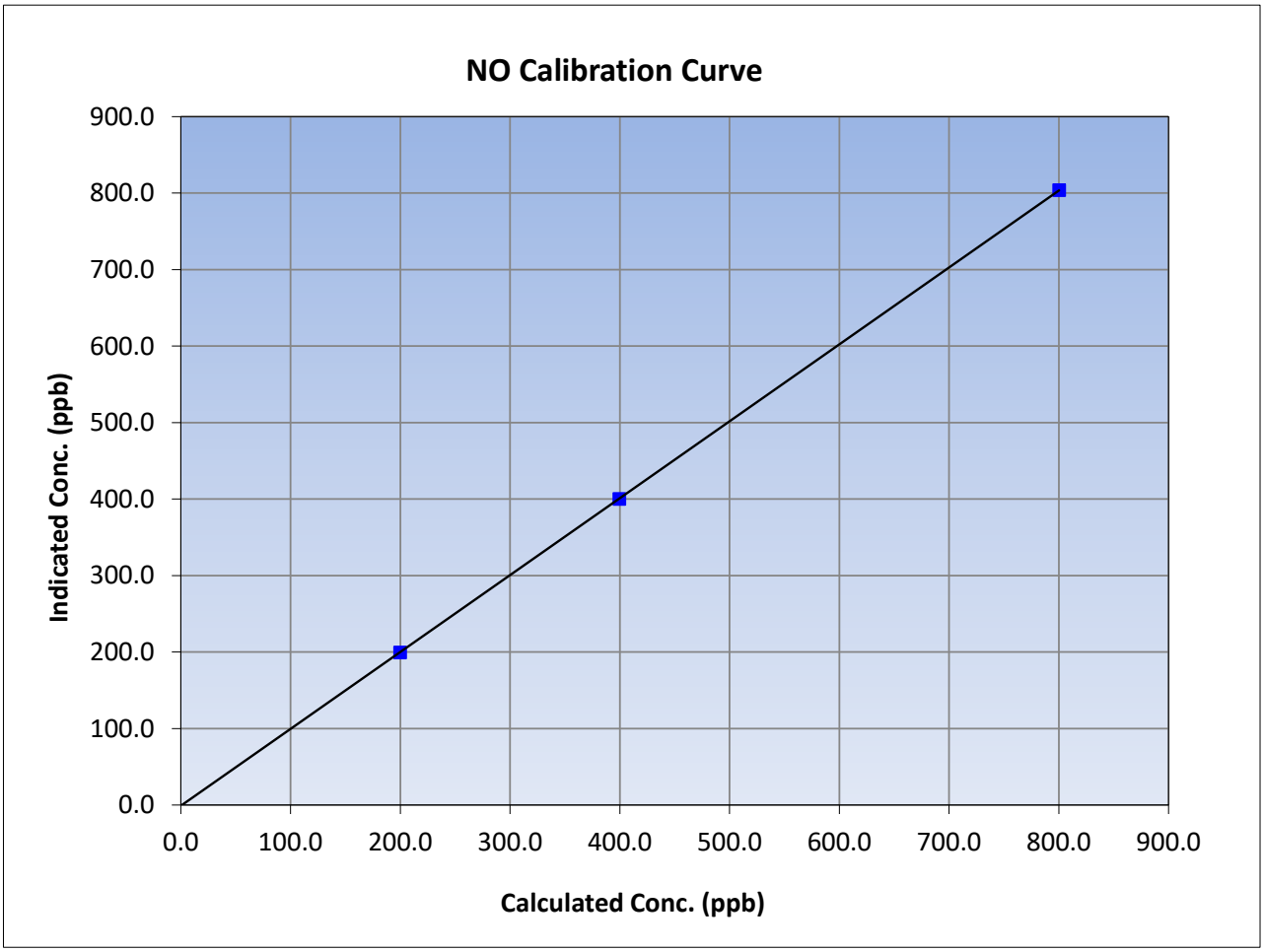
Version-04-2020

Station Information

Calibration Date:	May 23, 2023	Previous Calibration:	April 28, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:39	End Time (MST):	14:54
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999996	≥0.995
800.3	804.0	0.9953			
399.7	400.3	0.9984	Slope	1.005383	0.90 - 1.10
199.8	199.2	1.0032			
			Intercept	-0.991769	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

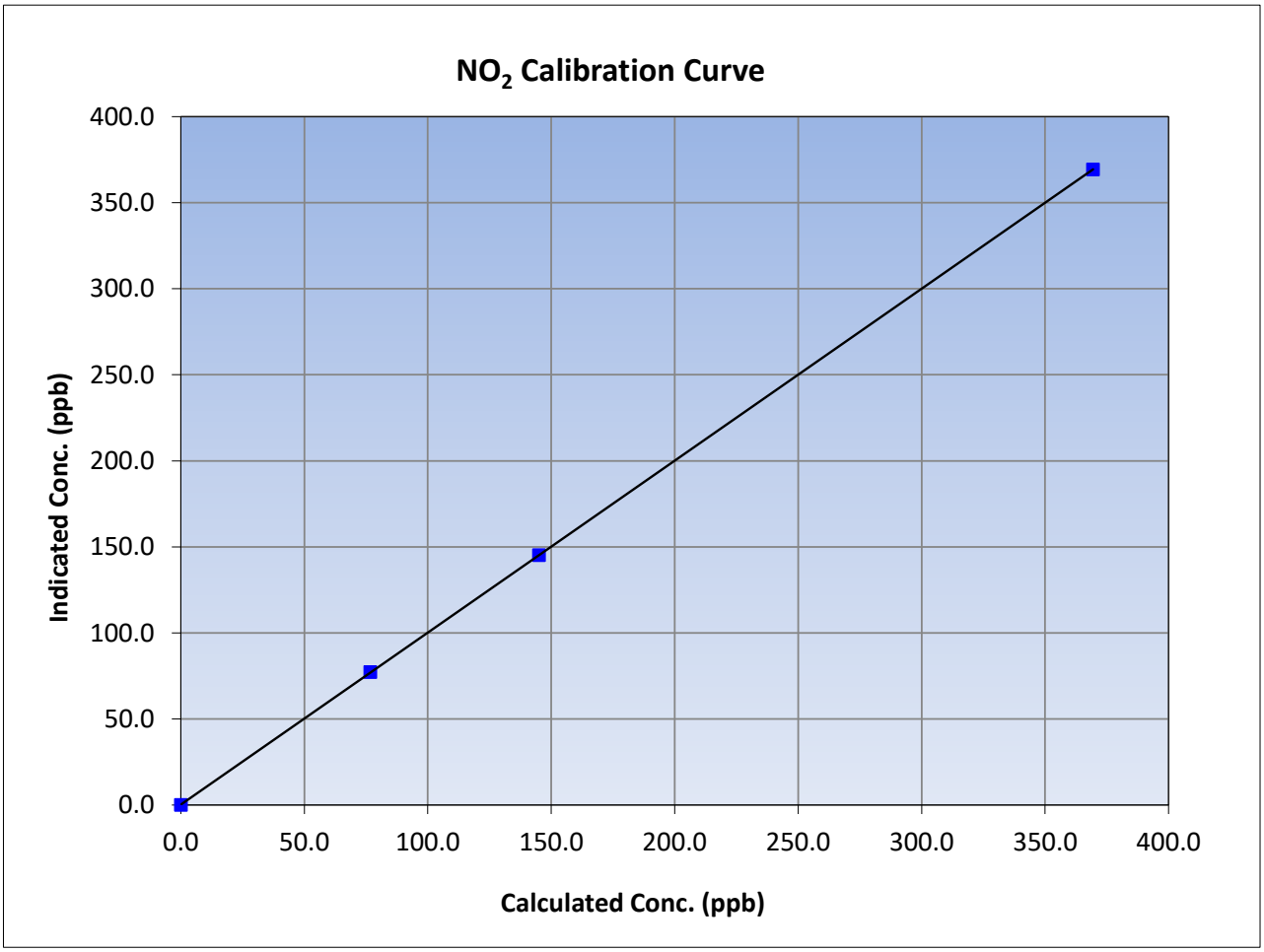
Version-04-2020

Station Information

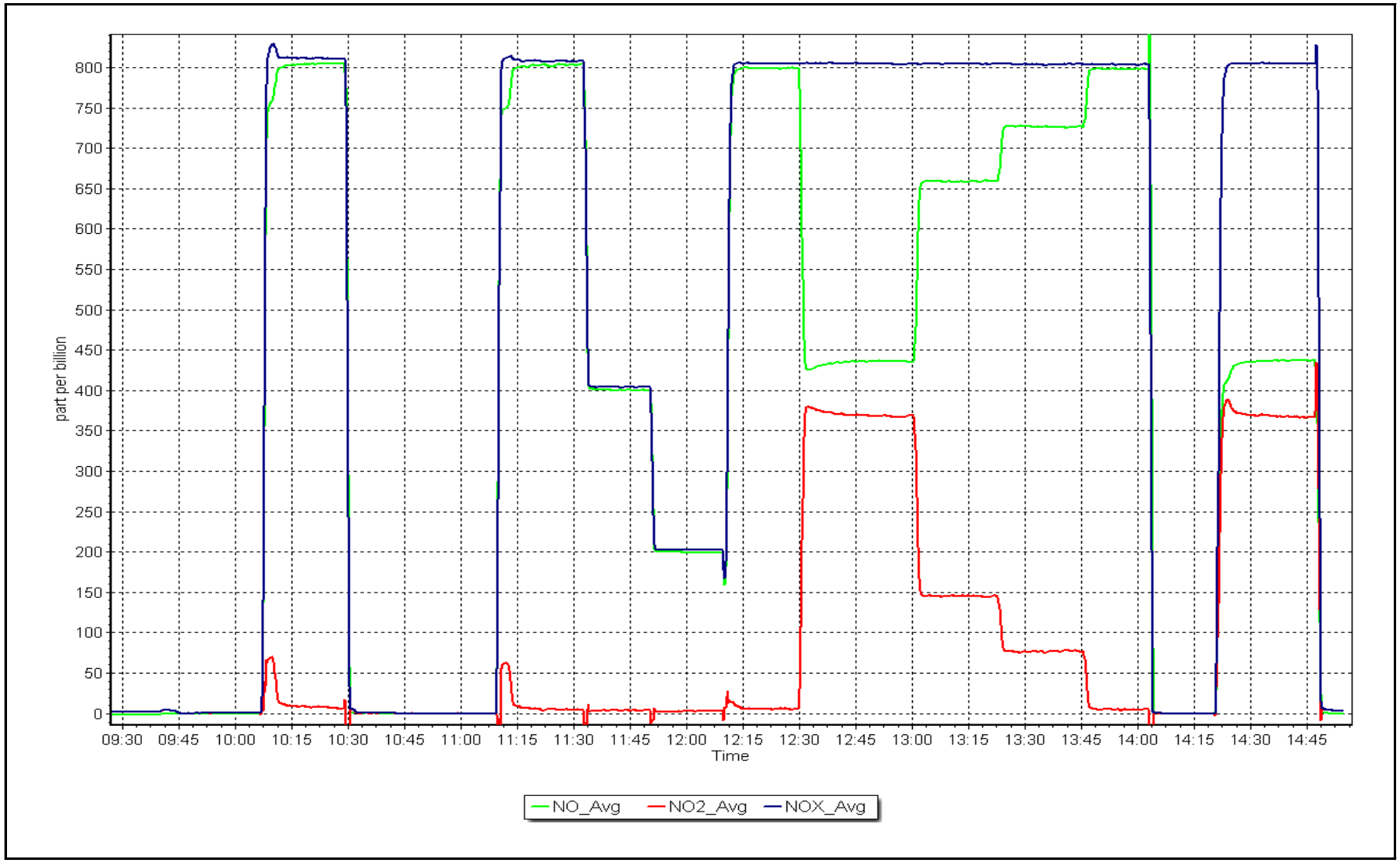
Calibration Date:	May 23, 2023	Previous Calibration:	April 28, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:39	End Time (MST):	14:54
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999998	≥0.995
369.4	369.3	1.0004			
145.0	145.2	0.9988	Slope	0.999175	0.90 - 1.10
76.7	77.2	0.9939			
			Intercept	0.249142	+/-20



NO_X Calibration Plot Date: May 23, 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:	May 23, 2023	Last Cal Date:	April 28, 2023
Start time (MST):	11:43	End time (MST):	13:17
Analyzer Make:	API T640	S/N:	321
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388750
Temp/RH standard:	Alicat FP-25BT	S/N:	388750

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	11.0	10.20	11.0	☐	+/- 2 °C
P (mmHg)	736.9	738.99	736.9	☐	+/- 10 mmHg
flow (LPM)	5.00	5.036	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: May 23, 2023 Last Cal Date: April 28, 2023

PM w/o HEPA: 102 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	10.7	10.8	10.8	☐	11.3 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 121.3 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: May 23, 2023

Disposable Filter Changed: May 23, 2023

Annual Maintenance

Date Sample Tube Cleaned: November 15, 2022

Date RH/T Sensor Cleaned: November 15, 2022

Notes: No adjustments made (Dust standard for PMT peak test is 10.9). Both leak checks passed. Quarterly maintenance completed.

Calibration by: Braiden Boutilier

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS11
LOWER CAMP
MAY 2023

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

June 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Lower Camp	Station number:	AMS11
Calibration Date:	May 15, 2023	Last Cal Date:	April 11, 2023
Start time (MST):	10:13	End time (MST):	13:42
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:	0.995416	0.997114	Backgd or Offset:	14.3	14.6
Calibration intercept:	-0.748519	-0.568654	Coeff or Slope:	1.051	1.034

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.5	----
as found span	4919	81.3	800.8	809.0	0.990
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	798.7	1.003
second point	4959	40.7	400.9	397.5	1.009
third point	4980	20.3	199.9	198.9	1.005
as left zero	5000	0.0	0.0	0.2	----
as left span	4919	81.3	800.8	800.9	1.000
				Average Correction Factor	1.005

Baseline Corr As found:	808.50	Previous response	796.34	*% change	1.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

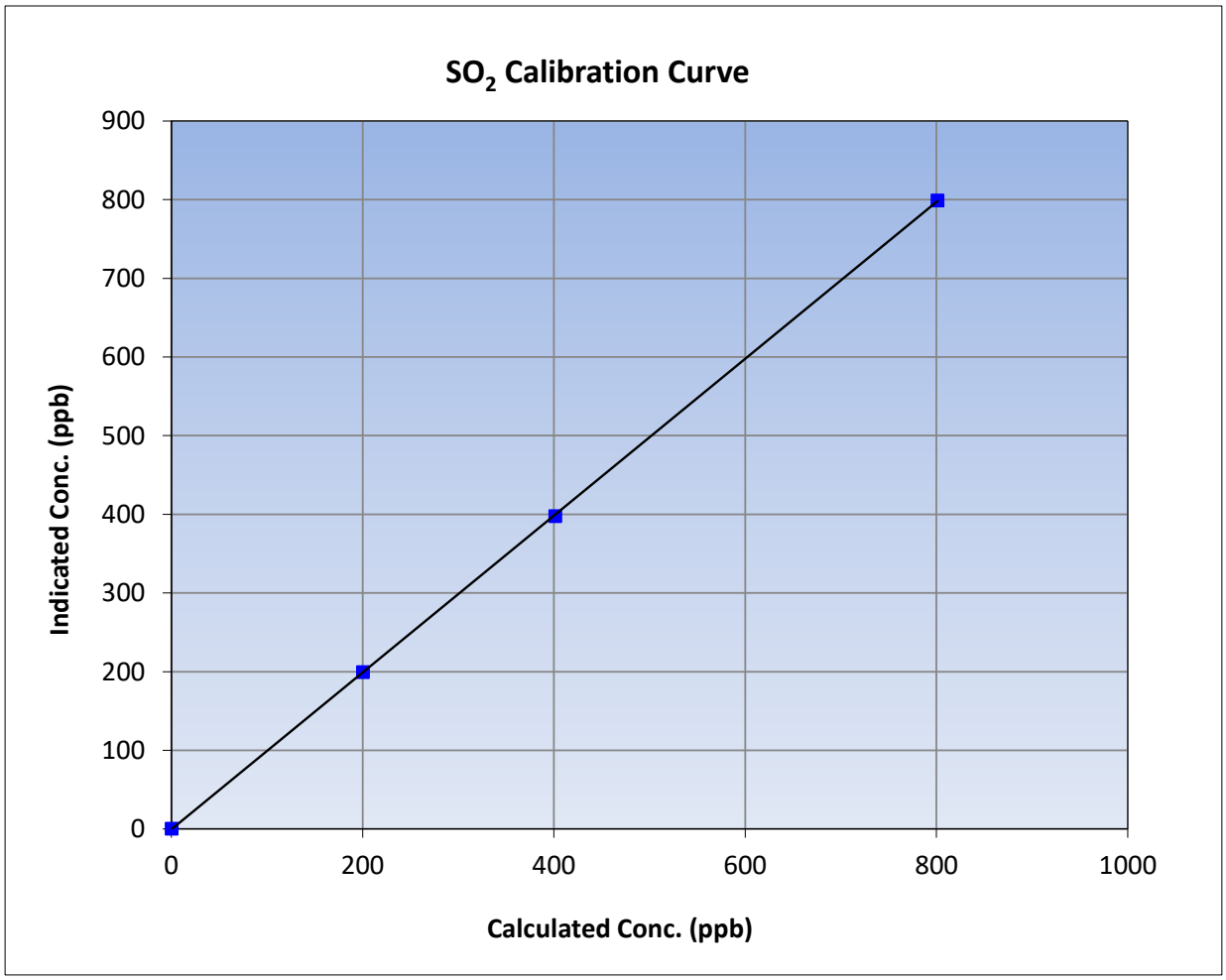
Station Information

Calibration Date:	May 15, 2023	Previous Calibration:	April 11, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:13	End Time (MST):	13:42
Analyzer make:	Thermo 43i	Analyzer serial #:	100841398

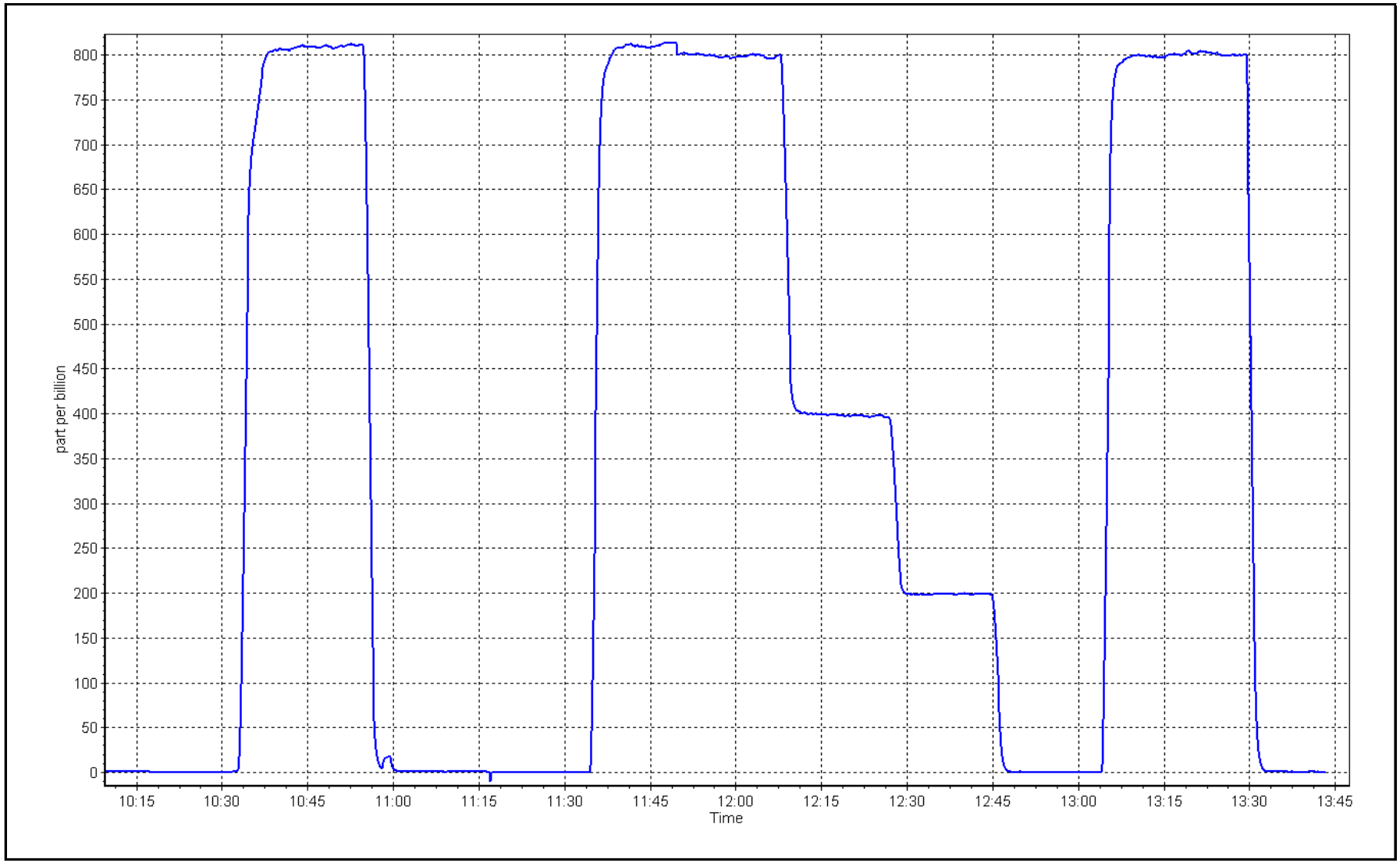
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
800.8	798.7	1.0026
400.9	397.5	1.0086
199.9	198.9	1.0052

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999988	*≥0.995*
Slope	0.997114	*0.90 - 1.10*
Intercept	-0.568654	*+/-30*



SO2 Calibration Plot Date: May 15, 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:	May 16, 2023	Last Cal Date:	April 13, 2023
Start time (MST):	9:15	End time (MST):	13:04
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:	1.015352	1.004895	Backgd or Offset:	14.0	13.3
Calibration intercept:	0.293967	0.035134	Coeff or Slope:	1.043	1.001

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.2	----
as found span	4926	73.6	79.9	83.2	0.963
as found 2nd point	4963	36.8	40.0	41.7	0.963
as found 3rd point	4982	18.6	20.2	20.8	0.980
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4926	73.6	79.9	80.4	0.994
second point	4963	36.8	40.0	40.2	0.994
third point	4982	18.6	20.2	20.1	1.005
as left zero	5000	0.0	0.0	-0.1	----
as left span	4926	73.6	79.9	79.6	1.004
SO2 Scrubber Check	4919	81.1	811.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.998
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	83.0	Prev response:	81.44	*% change:	1.9%
Baseline Corr 2nd AF pt:	41.5	AF Slope:	1.040103	AF Intercept:	0.052205
Baseline Corr 3rd AF pt:	20.6	AF Correlation:	0.999975		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

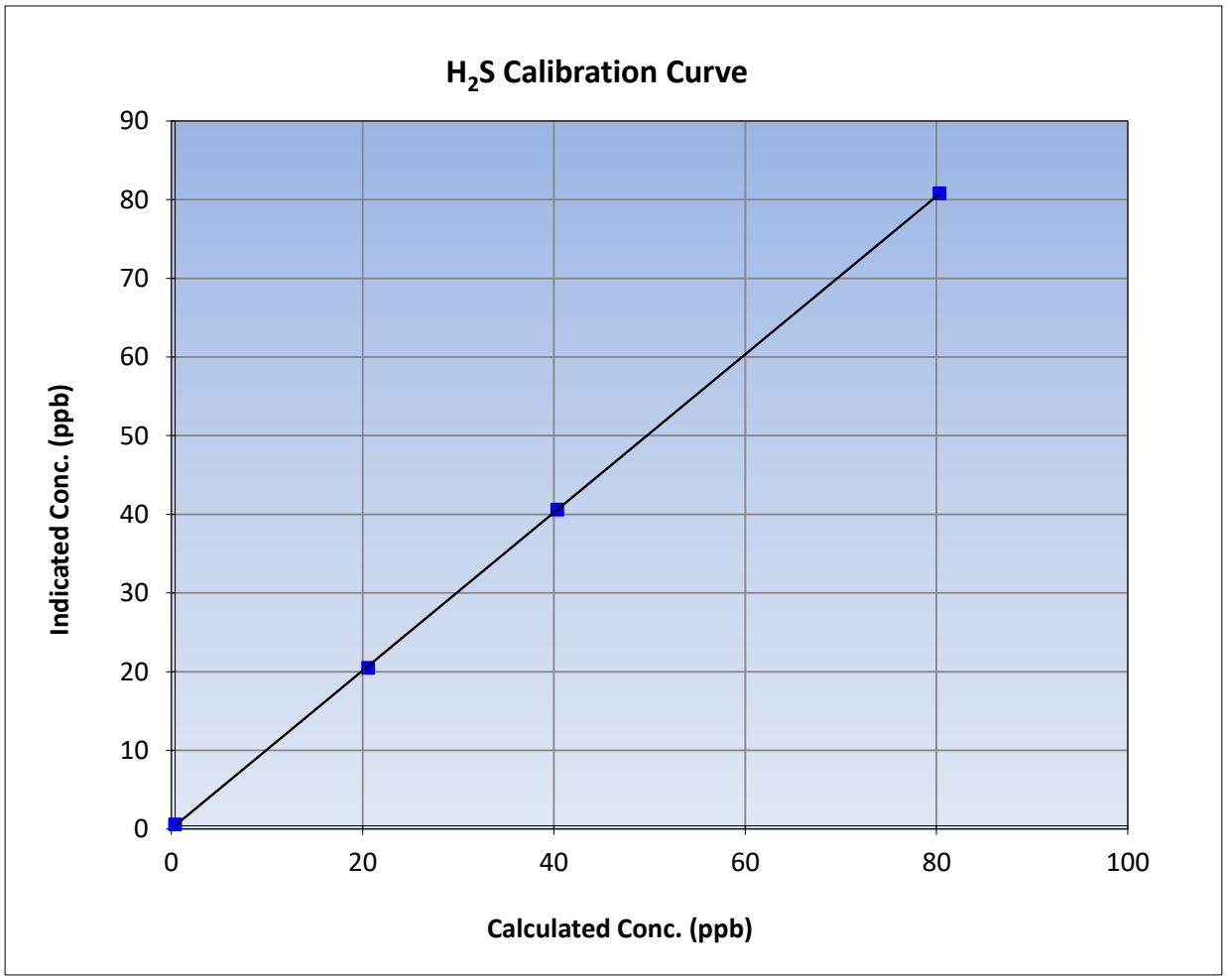
Station Information

Calibration Date:	May 16, 2023	Previous Calibration:	April 13, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:15	End Time (MST):	13:04
Analyzer make:	Thermo 450iQ	Analyzer serial #:	CM20080003

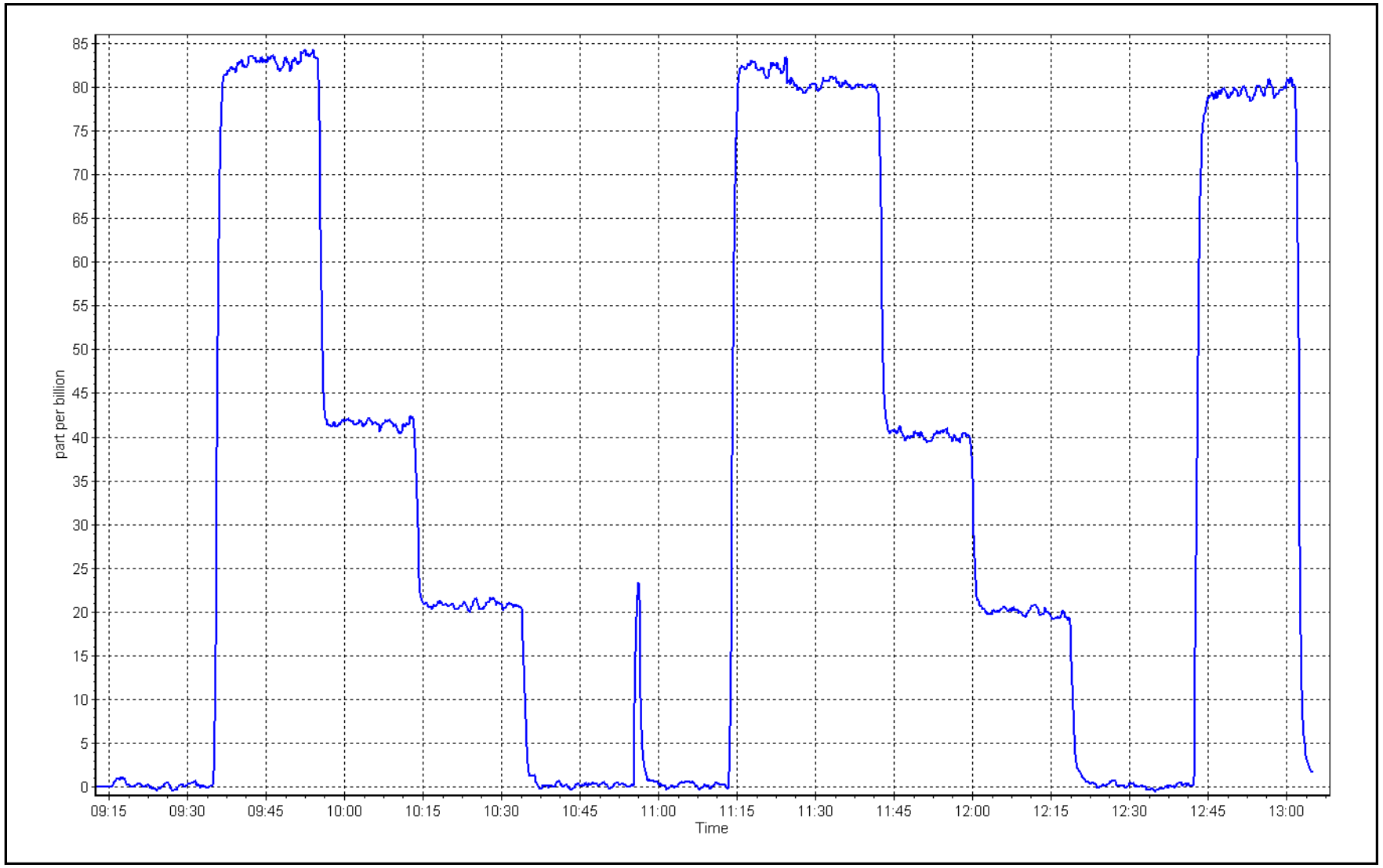
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
79.9	80.4	0.9940
40.0	40.2	0.9940
20.2	20.1	1.0046

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999977	*≥0.995*
Slope	1.004895	*0.90 - 1.10*
Intercept	0.035134	*+/-3*



H_2S Calibration Plot Date: May 16, 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:	May 15, 2023	Last Cal Date:	April 11, 2023
Start time (MST):	10:13	End time (MST):	13:42
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:	3.02E-04	2.99E-04	NMHC SP Ratio:	5.86E-05	5.79E-05
CH4 Retention time:	13.8	14.0	NMHC Peak Area:	156599	158468

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	17.44	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	81.3	17.35	17.29	1.003
second point	4959	40.7	8.69	8.64	1.005
third point	4980	20.3	4.33	4.32	1.002
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	17.35	17.41	0.997
				Average Correction Factor	1.004

Baseline Corr AF:	17.44	Prev response	17.29	*% change	0.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	9.19	9.27	0.991
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	9.17	1.002
second point	4959	40.7	4.60	4.58	1.005
third point	4980	20.3	2.29	2.30	1.000
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	9.19	9.22	0.996
				Average Correction Factor	1.002
Baseline Corr AF:	9.27	Prev response	9.14	*% change	1.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	8.16	8.17	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	81.3	8.16	8.12	1.005
second point	4959	40.7	4.09	4.06	1.006
third point	4980	20.3	2.04	2.03	1.005
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	8.16	8.19	0.997
				Average Correction Factor	1.005
Baseline Corr AF:	8.17	Prev response	8.15	*% change	0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.998101	0.996470
THC Cal Offset:	-0.029983	-0.001598
CH4 Cal Slope:	1.000279	0.994977
CH4 Cal Offset:	-0.017886	-0.000697
NMHC Cal Slope:	0.996415	0.997386
NMHC Cal Offset:	-0.012098	-0.000502

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

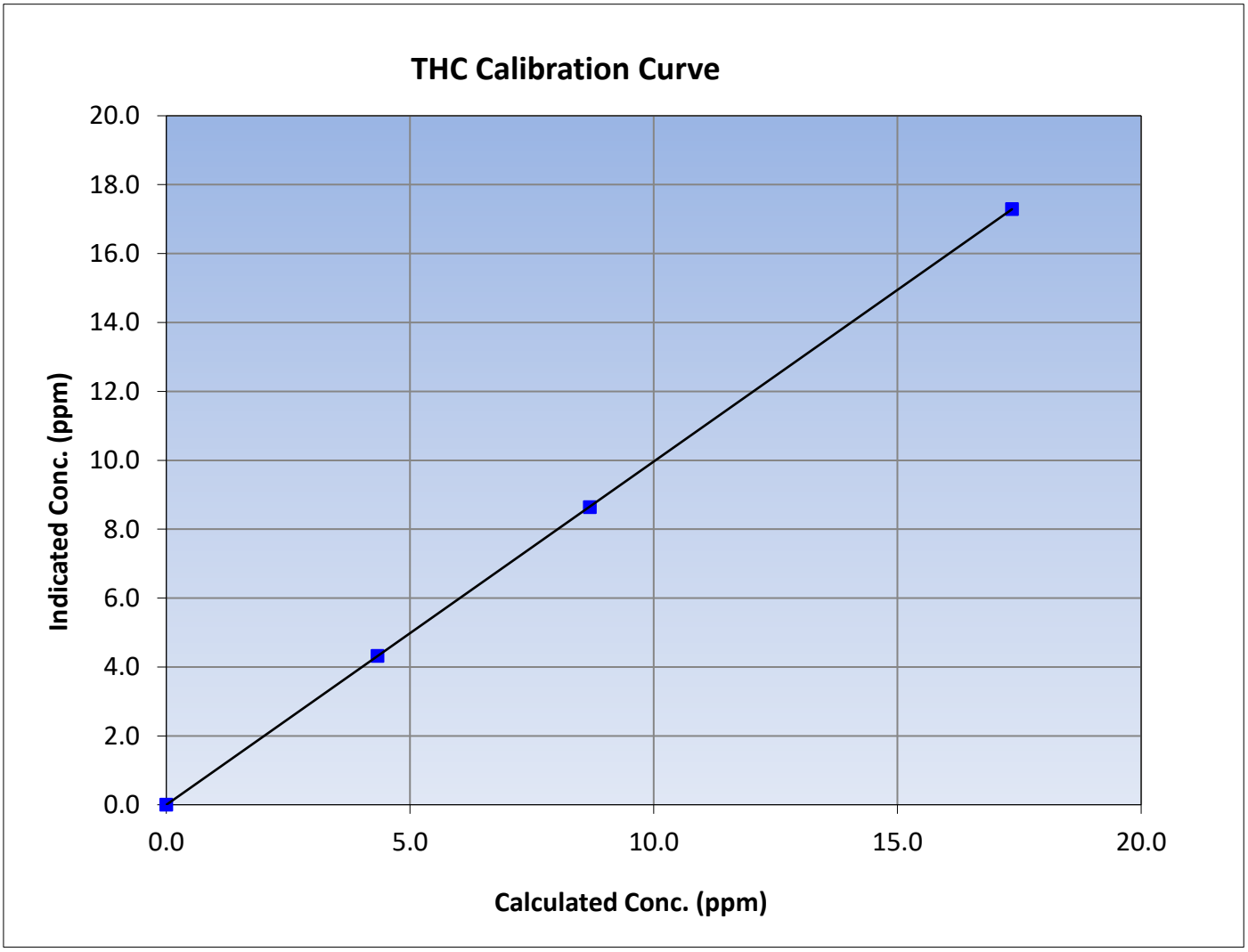
Version-01-2020

Station Information

Calibration Date:	May 15, 2023	Previous Calibration:	April 11, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:13	End Time (MST):	13:42
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	0.999998	*≥0.995*
17.35	17.29	1.0033			
8.69	8.64	1.0054	Slope	0.996470	*0.90 - 1.10*
4.33	4.32	1.0021			
			Intercept	-0.001598	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

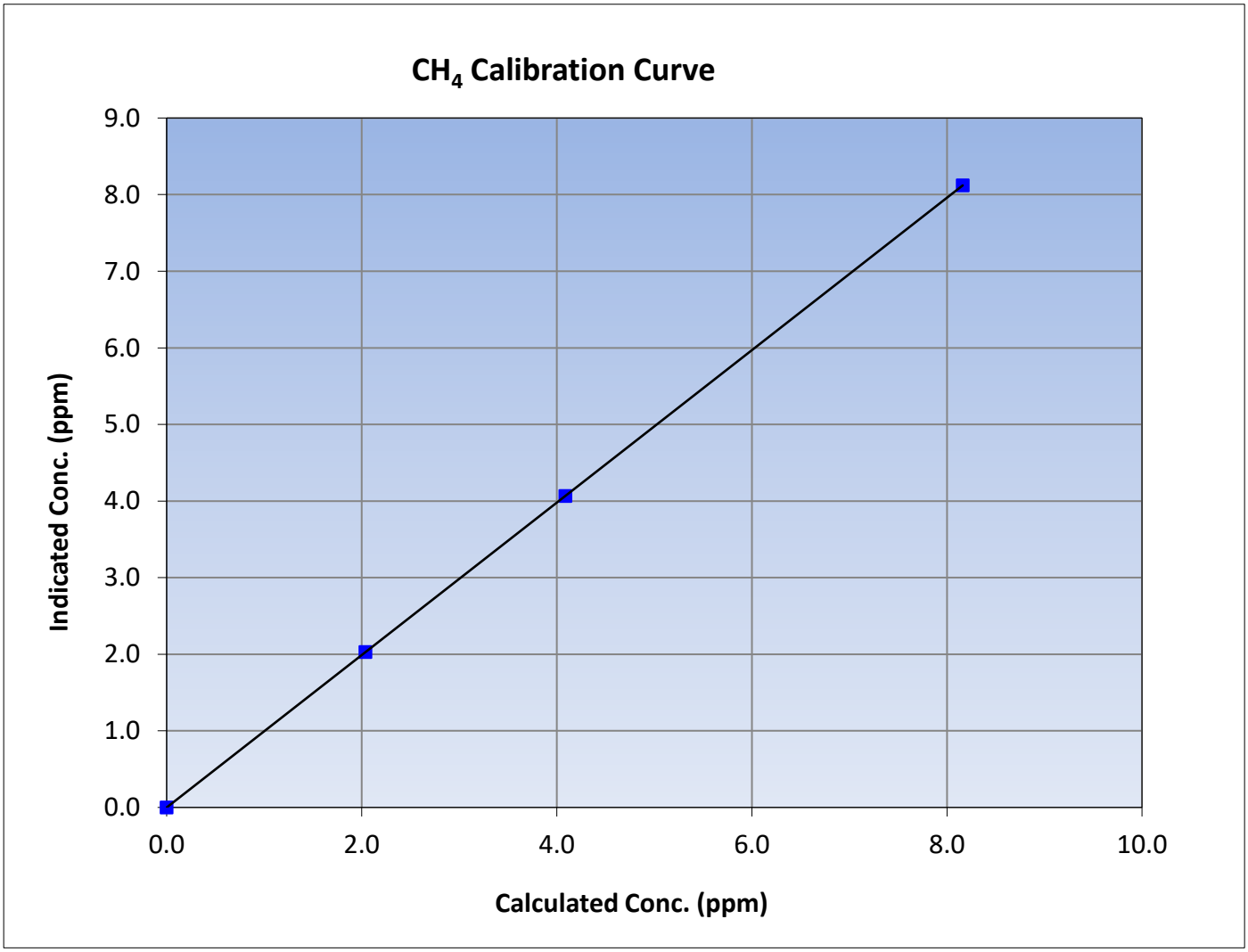
Version-01-2020

Station Information

Calibration Date:	May 15, 2023	Previous Calibration:	April 11, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:13	End Time (MST):	13:42
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	1.000000	≥0.995
8.16	8.12	1.0051			
4.09	4.06	1.0055	Slope	0.994977	0.90 - 1.10
2.04	2.03	1.0054			
			Intercept	-0.000697	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

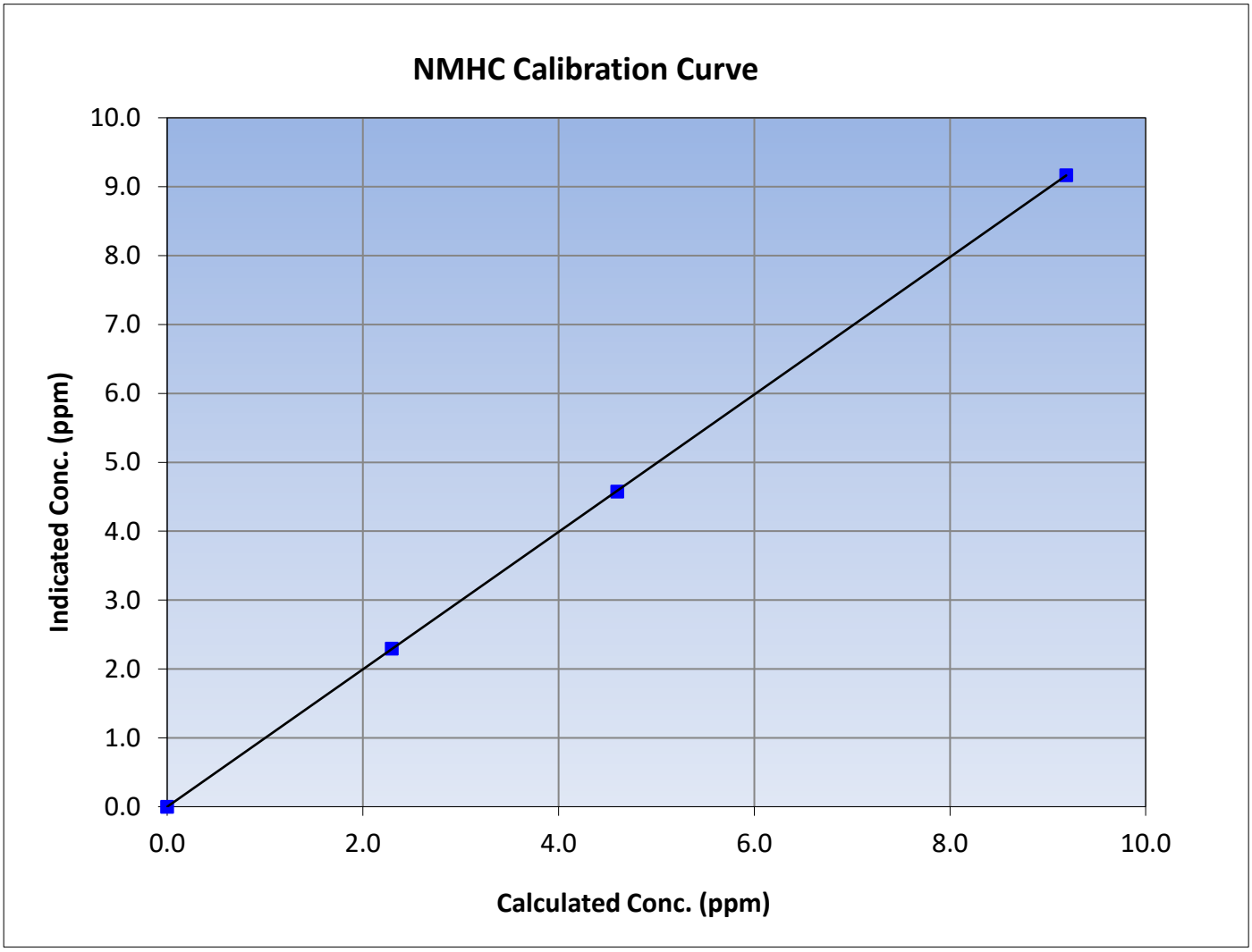
Version-01-2020

Station Information

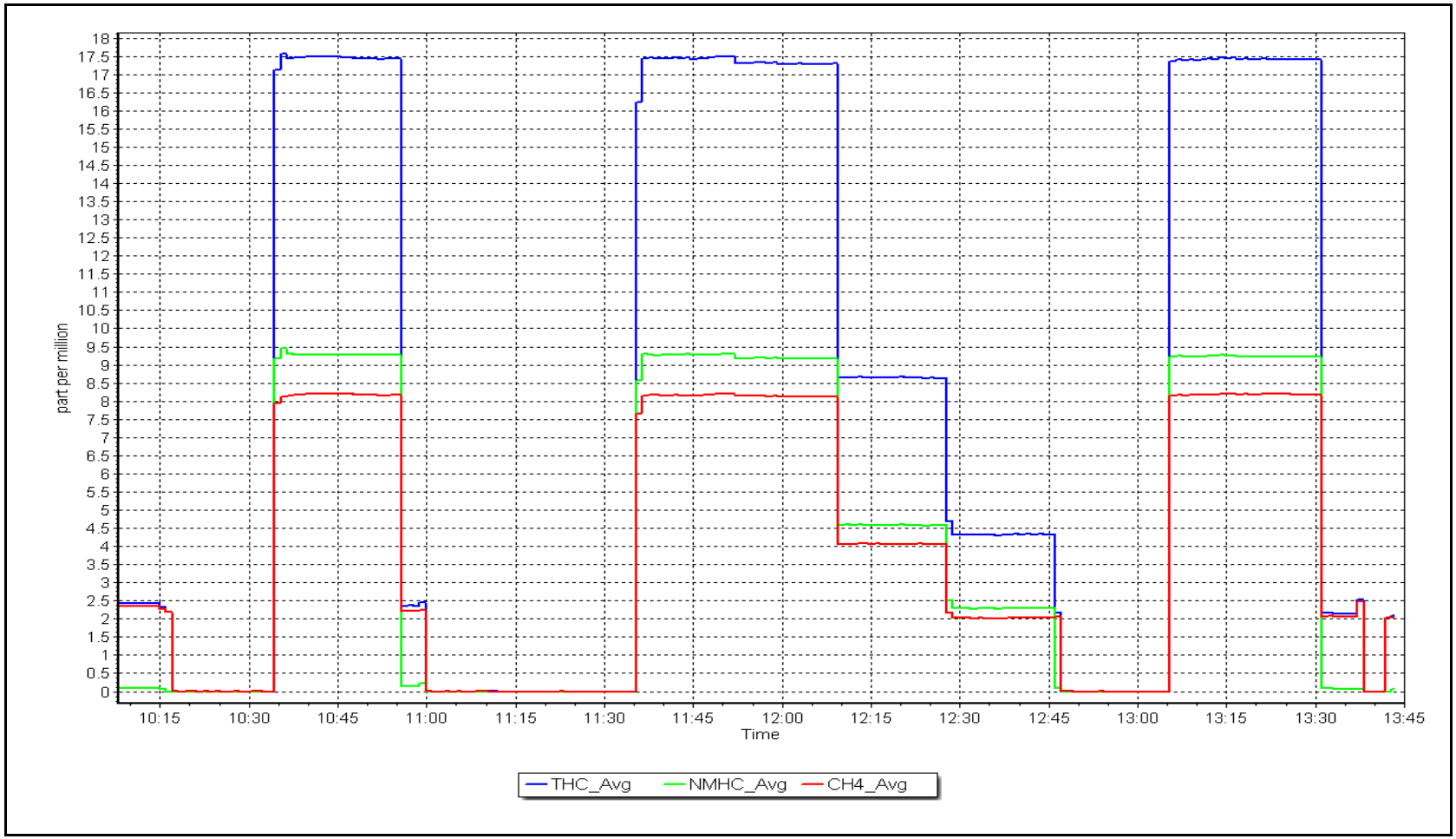
Calibration Date:	May 15, 2023	Previous Calibration:	April 11, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:13	End Time (MST):	13:42
Analyzer make:	Thermo 55i	Analyzer serial #:	1505164381

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999995	*≥0.995*
9.19	9.17	1.0022			
4.60	4.58	1.0053	Slope	0.997386	*0.90 - 1.10*
2.29	2.30	0.9997			
			Intercept	-0.000502	*+/-0.5*



NMHC Calibration Plot Date: May 15, 2023 Location: Lower Camp



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS13
FORT MCKAY SOUTH
MAY 2023

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

June 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	May 17, 2023	Last Cal Date:	April 19, 2023
Start time (MST):	8:37	End time (MST):	11:36
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:	1.002614	1.001326	Backgd or Offset:	80.5	80.5
Calibration intercept:	-2.958216	-1.757849	Coeff or Slope:	0.731	0.725

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.3	----
as found span	4921	79.1	799.7	805.0	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	----
high point	4921	79.1	799.7	799.8	1.000
second point	4961	39.5	399.3	397.8	1.004
third point	4980	19.8	200.2	196.0	1.021
as left zero	5000	0.0	0.0	0.5	----
as left span	4921	79.1	799.7	800.6	0.999
				Average Correction Factor	1.008

Baseline Corr As found:	804.70	Previous response	798.82	*% change	0.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

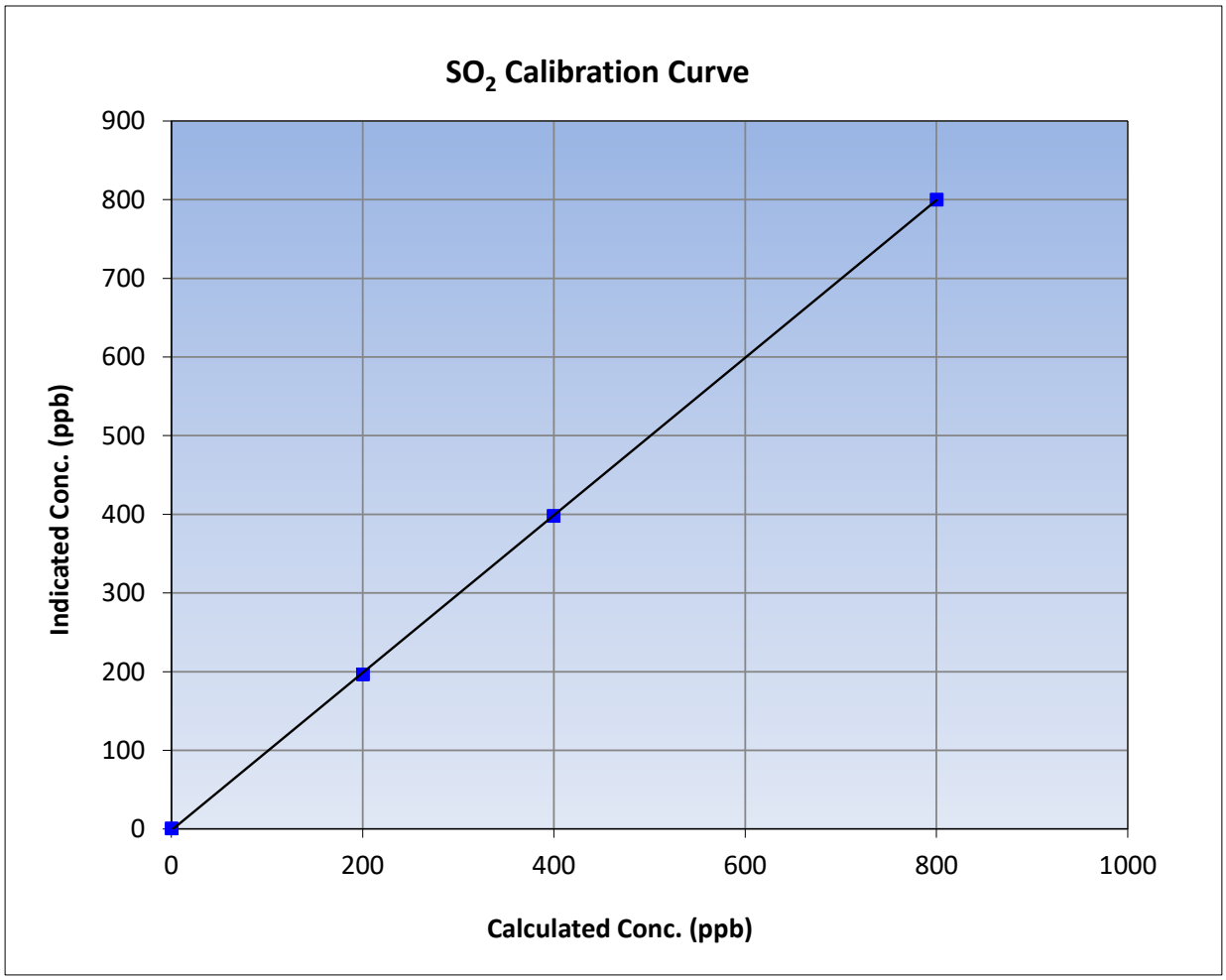
Station Information

Calibration Date:	May 17, 2023	Previous Calibration:	April 19, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:37	End Time (MST):	11:36
Analyzer make:	API T100	Analyzer serial #:	599

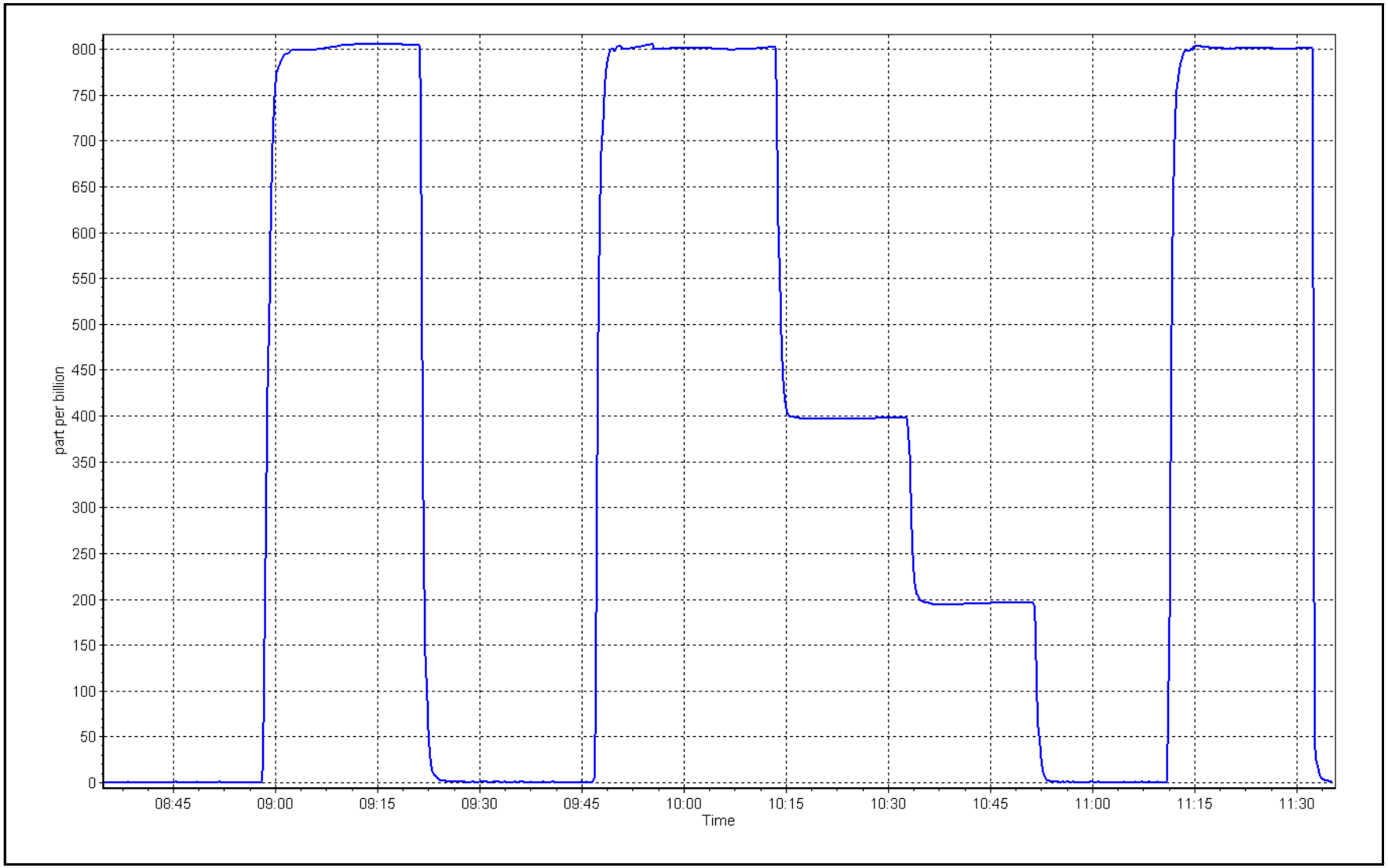
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
799.7	799.8	0.9999
399.3	397.8	1.0038
200.2	196.0	1.0214

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999964	*≥0.995*
Slope	1.001326	*0.90 - 1.10*
Intercept	-1.757849	*+/-30*



SO2 Calibration Plot Date: May 17, 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:	May 2, 2023	Last Cal Date:	April 3, 2023
Start time (MST):	8:38	End time (MST):	12:35
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1180540017	
Converter make:	CDN-101		Converter serial #:	521	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003341	1.005466	Backgd or Offset:	3.71	3.68
Calibration intercept:	-0.062227	-0.262184	Coeff or Slope:	1.120	1.116

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	80.8	0.997
as found 2nd point	4962	37.7	40.3	40.2	0.999
as found 3rd point	4981	18.9	20.2	19.6	1.025
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4925	75.5	80.6	80.9	0.997
second point	4962	37.7	40.3	40.2	1.002
third point	4981	18.9	20.2	19.7	1.025
as left zero	5000	0.0	0.0	0.1	----
as left span	4925	75.5	80.6	81.0	0.995
SO2 Scrubber Check	4921	79.1	791.0	0.0	----
Date of last scrubber change:		20-Mar-20		Ave Corr Factor	1.008
Date of last converter efficiency test:		NA			efficiency

Baseline Corr As found:	80.9	Prev response:	80.83	*% change:	0.1%
Baseline Corr 2nd AF pt:	40.3	AF Slope:	1.005607	AF Intercept:	-0.342143
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999946		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

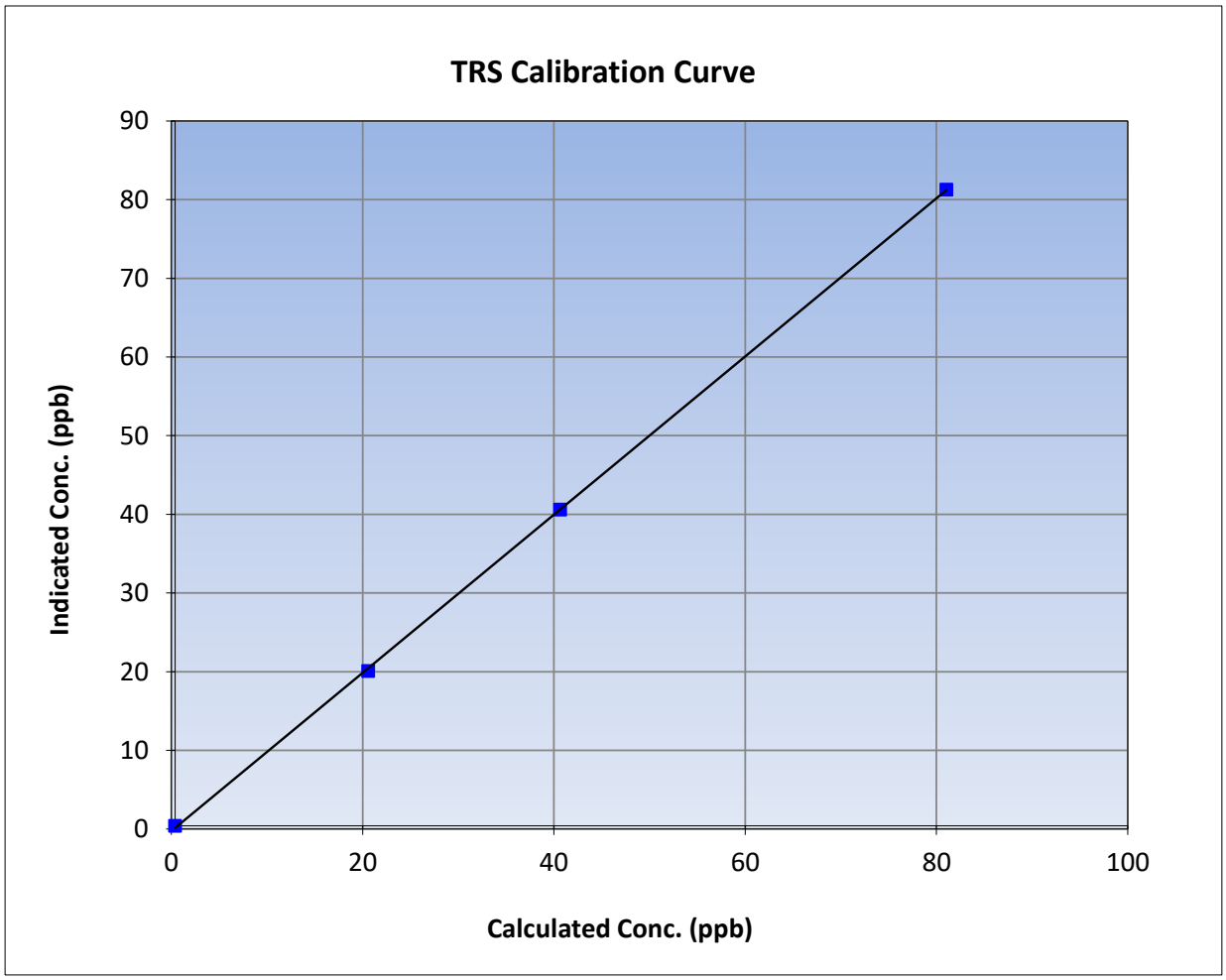
Station Information

Calibration Date:	May 2, 2023	Previous Calibration:	April 3, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:38	End Time (MST):	13:36
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1180540017

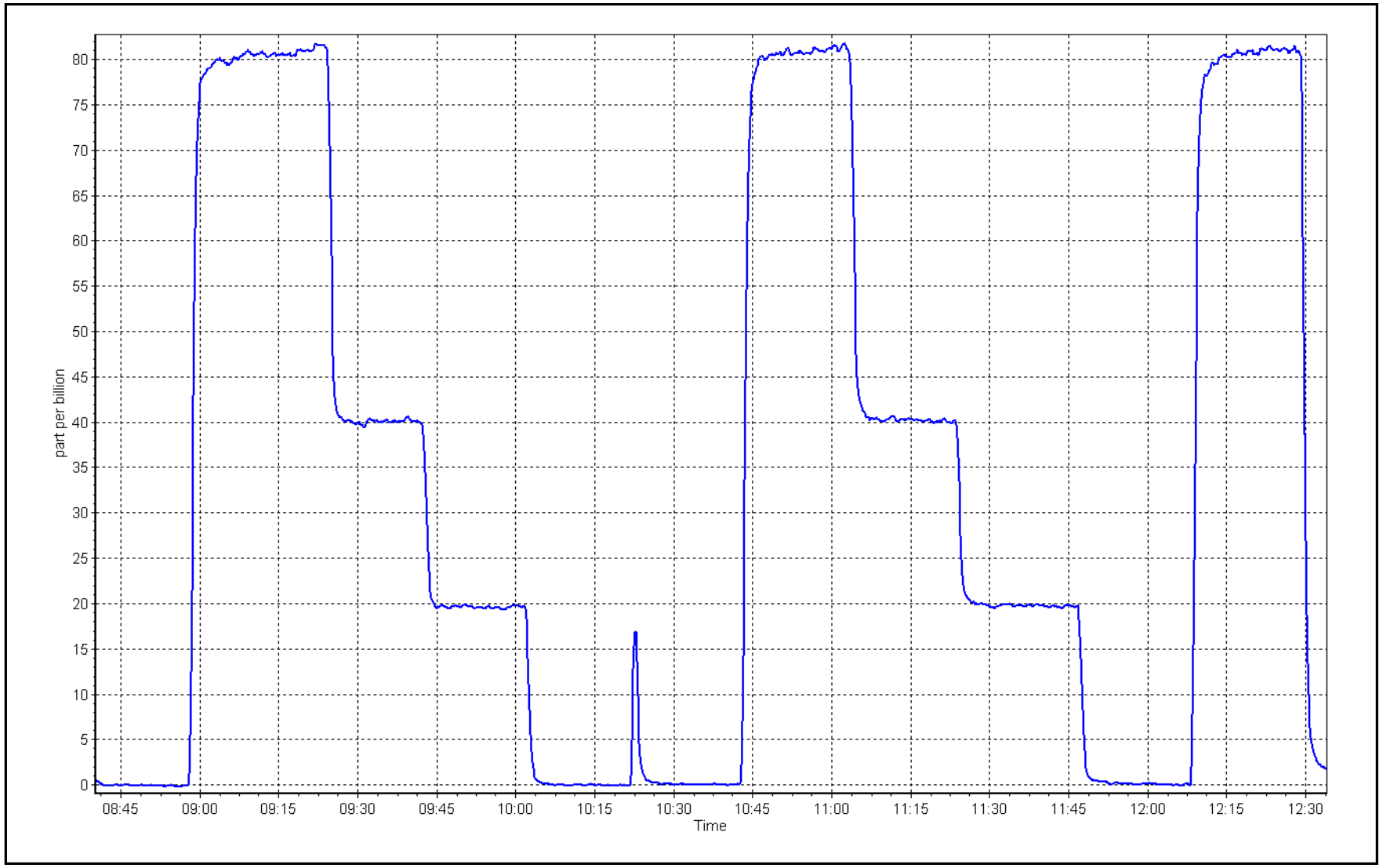
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.6	80.9	0.9966
40.3	40.2	1.0016
20.2	19.7	1.0246

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999947	*≥0.995*
Slope	1.005466	*0.90 - 1.10*
Intercept	-0.262184	*+/-3*



TRS Calibration Plot Date: May 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:	May 17, 2023	Last Cal Date:	April 19, 2023
Start time (MST):	8:37	End time (MST):	11:36
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 #:	1170050130	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.19E-04	2.21E-04	NMHC SP Ratio:	5.04E-04	5.06E-04
CH4 Retention time:	12.8	12.8	NMHC Peak Area:	179990	179419

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	17.02	1.001
second point	4961	39.5	8.51	8.39	1.014
third point	4980	19.8	4.27	4.12	1.036
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	17.05	17.08	0.998
				Average Correction Factor	1.017

Baseline Corr AF:	16.97	Prev response	16.99	*% 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	4921	79.1	9.08	9.03	1.006
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	4960	39.5	4.53	4.48	1.012
third point	4980	19.8	2.27	2.20	1.034
as left zero	5000	0	0.00	0.00	----
as left span	4921	79.1	9.08	9.07	1.001
				Average Correction Factor	1.016
Baseline Corr AF:	9.03	Prev response	9.05	*% change	-0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.1	7.97	7.94	1.003
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	7.96	1.000
second point	4960	39.5	3.98	3.91	1.017
third point	4980	19.8	1.99	1.92	1.039
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	1.019
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:	1.002569	1.000879
THC Cal Offset:	-0.096376	-0.078771
CH4 Cal Slope:	1.003704	1.001767
CH4 Cal Offset:	-0.056151	-0.042148
NMHC Cal Slope:	1.001425	0.999952
NMHC Cal Offset:	-0.040562	-0.036961

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

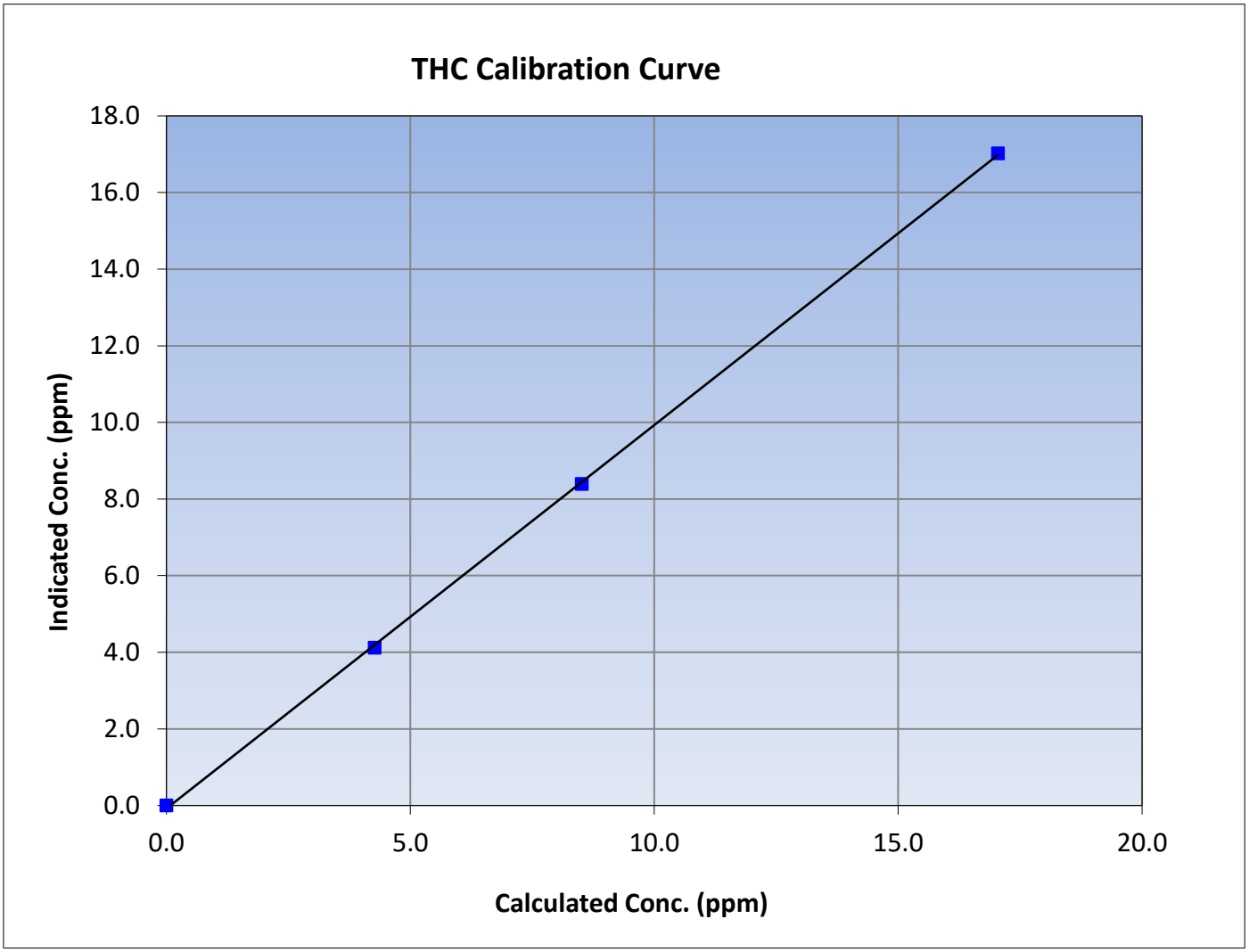
Version-01-2020

Station Information

Calibration Date:	May 17, 2023	Previous Calibration:	April 19, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:37	End Time (MST):	11:36
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050130

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999902	*≥0.995*
17.05	17.02	1.0013			
8.51	8.39	1.0140	Slope	1.000879	*0.90 - 1.10*
4.27	4.12	1.0362			
			Intercept	-0.078771	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

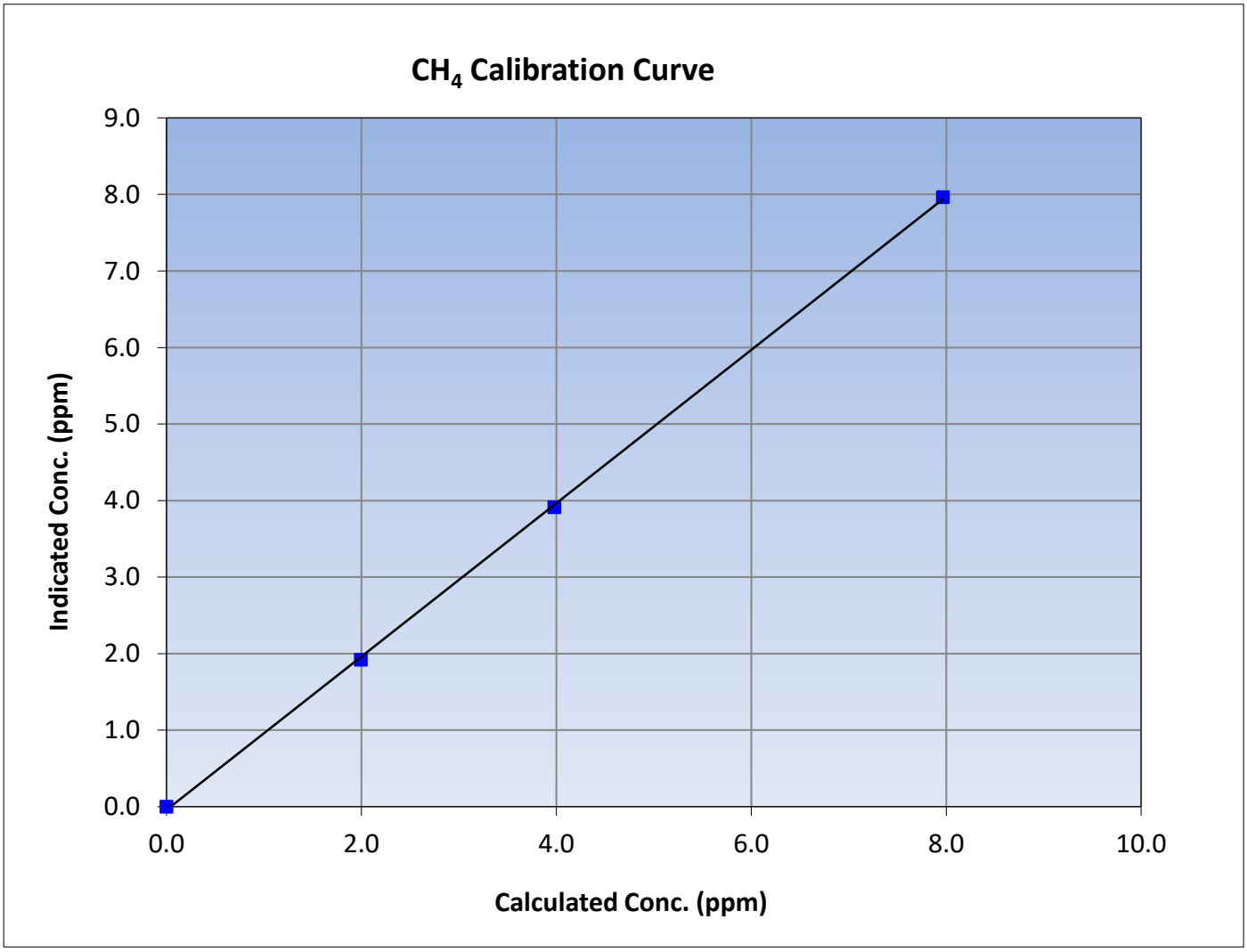
Version-01-2020

Station Information

Calibration Date:	May 17, 2023	Previous Calibration:	April 19, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:37	End Time (MST):	11:36
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050130

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999868	*≥0.995*
7.97	7.96	1.0005			
3.98	3.91	1.0168	Slope	1.001767	*0.90 - 1.10*
1.99	1.92	1.0387			
			Intercept	-0.042148	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

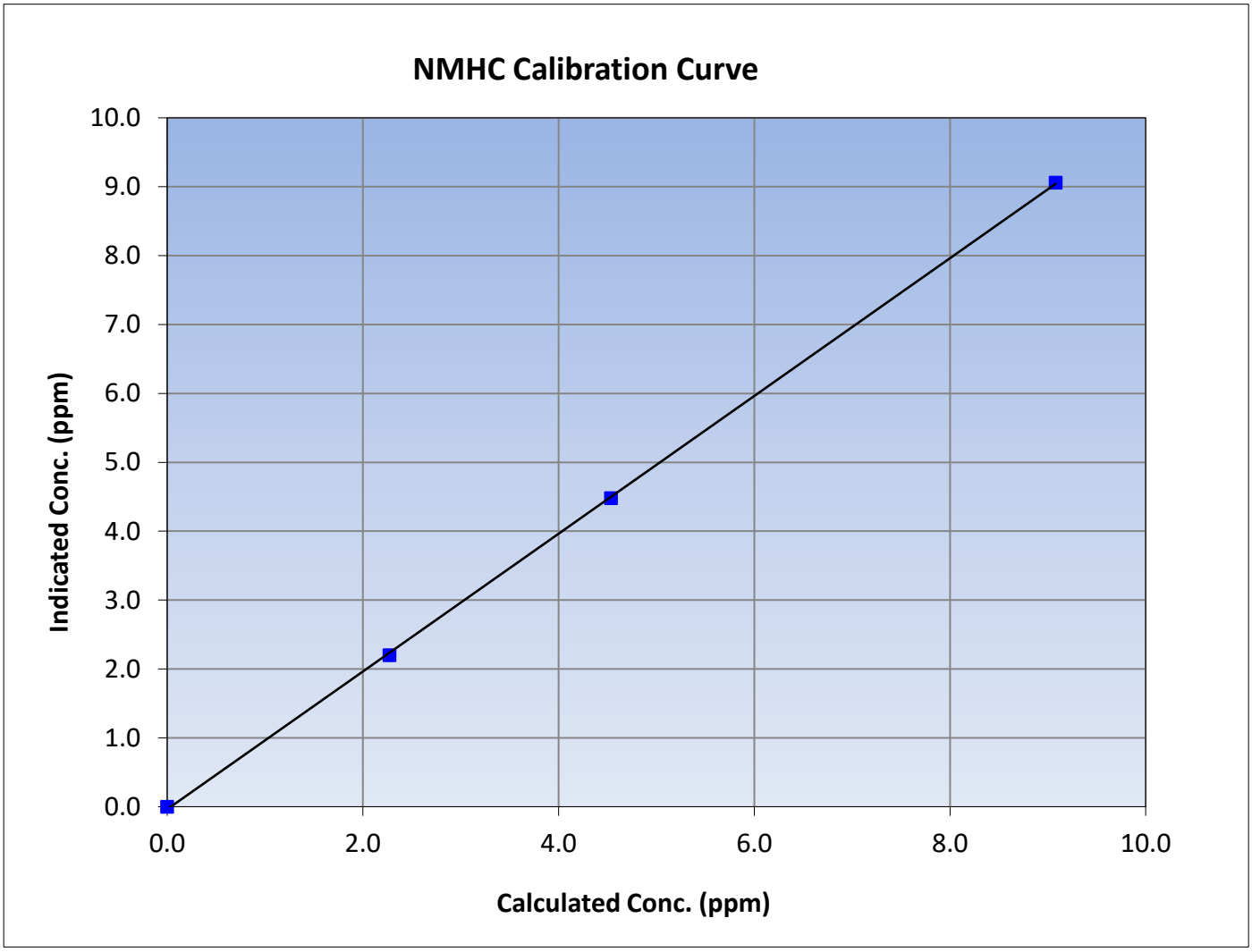
Version-01-2020

Station Information

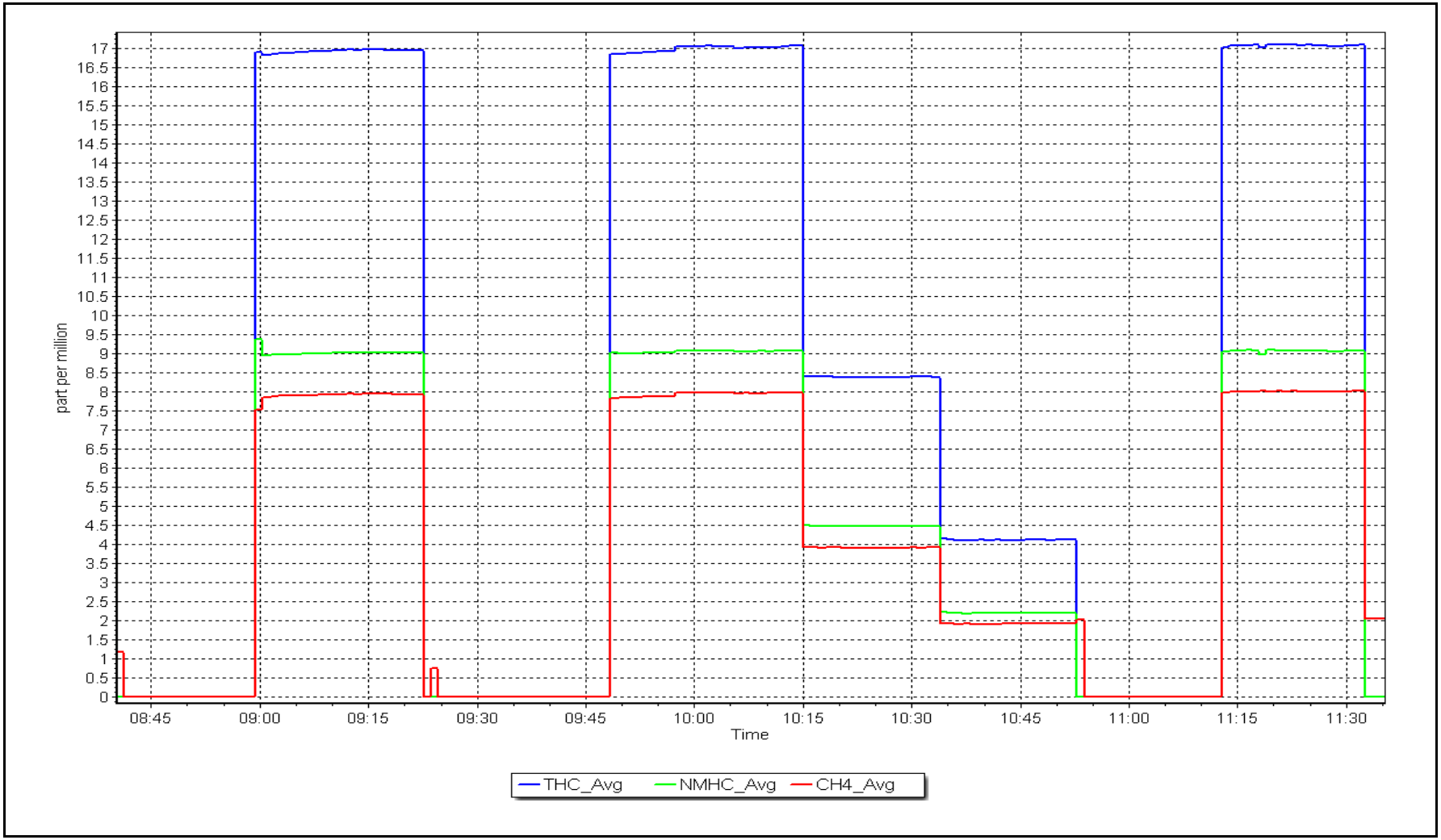
Calibration Date:	May 17, 2023	Previous Calibration:	April 19, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:37	End Time (MST):	11:36
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050130

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999924	≥0.995
9.08	9.06	1.0021			
4.53	4.48	1.0122	Slope	0.999952	0.90 - 1.10
2.27	2.20	1.0340			
			Intercept	-0.036961	+/-0.5



NMHC Calibration Plot Date: May 17, 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:	May 9, 2023	Last Cal Date:	April 12, 2023
Start time (MST):	8:41	End time (MST):	13:15
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:	1.213	1.203	NO bkgnd or offset:	9.6	9.5
NOX coeff or slope:	0.992	0.992	NOX bkgnd or offset:	9.7	9.5
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	195.9	195.9

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001266	0.997742
NO_X Cal Offset:	-2.371415	-1.871090
NO Cal Slope:	1.003448	1.001205
NO Cal Offset:	-3.285243	-2.924978
NO_2 Cal Slope:	0.998635	0.997870
NO_2 Cal Offset:	-0.712517	-1.056811

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	81.1	826.9	800.0	26.9	834.1	805.3	28.8	0.9913	0.9934
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.1	----	----
high point	4919	81.1	826.9	800.0	26.9	824.0	799.4	24.7	1.0035	1.0007
second point	4960	40.6	413.9	400.4	13.5	410.4	396.7	13.7	1.0085	1.0094
third point	4980	20.3	207.0	200.2	6.7	202.6	194.5	8.1	1.0216	1.0294
as left zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
as left span	4919	81.1	826.9	375.2	451.7	835.6	381.0	454.5	0.9896	0.9847
								Average Correction Factor	1.0112	1.0132

Corrected As found	NO_X = 834.1 ppb	NO = 805.3 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	1.0%
Previous Response	NO_X = 825.6 ppb	NO = 799.4 ppb		*Percent Change	NO =	0.7%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found NO r^2:	NO Sl:	NO Int:	
			As found NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.8	373.0	451.7	450.4	1.0029	99.7%
2nd GPT point (200 ppb O3)	797.8	588.1	236.6	234.4	1.0095	99.1%
3rd GPT point (100 ppb O3)	797.8	692.9	131.8	129.3	1.0195	98.1%
				Average Correction Factor	1.0107	99.0%

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

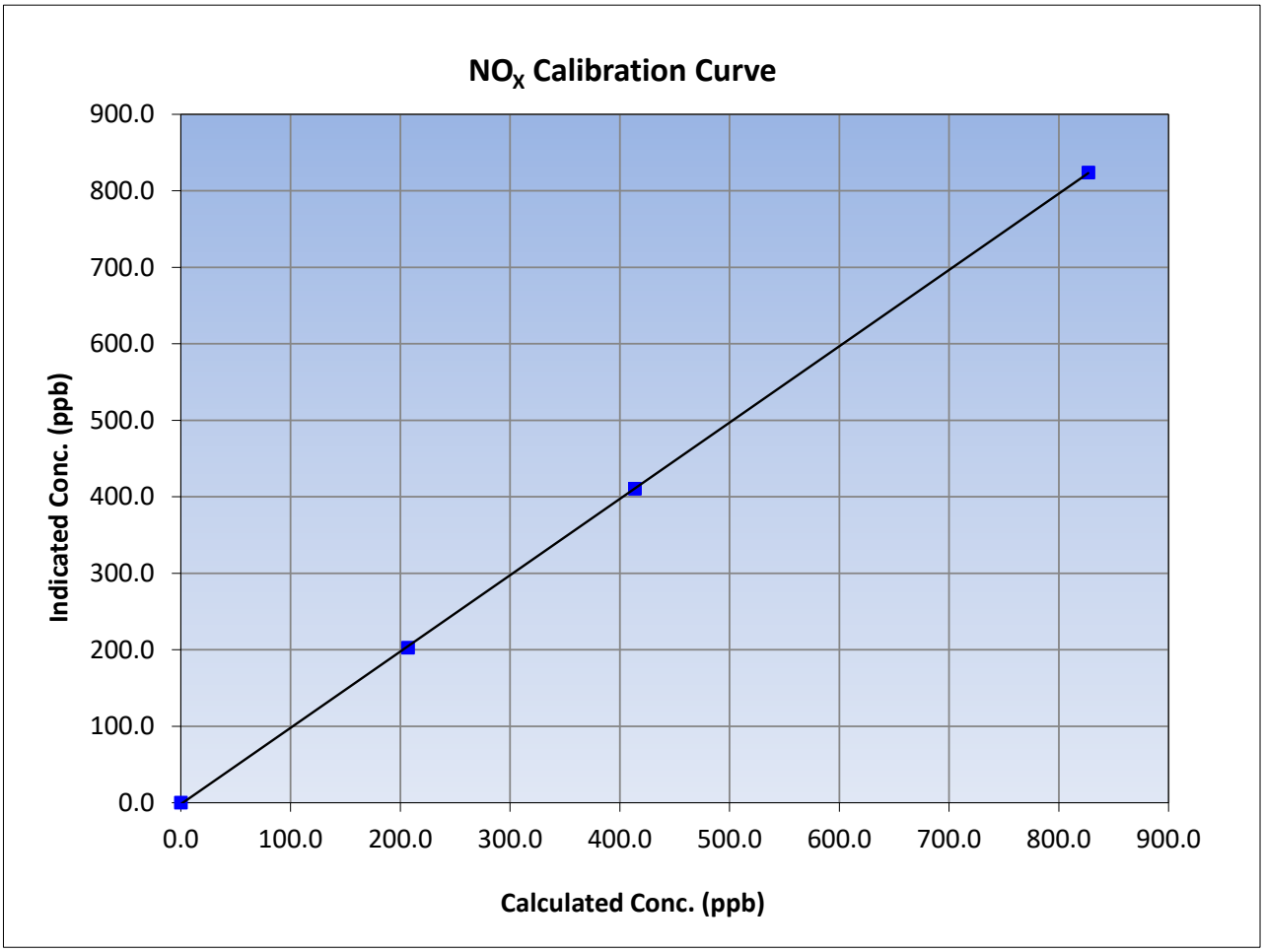
Version-04-2020

Station Information

Calibration Date:	May 9, 2023	Previous Calibration:	April 12, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	8:41	End Time (MST):	13:15
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	0.999976	≥0.995
826.9	824.0	1.0035			
413.9	410.4	1.0085	Slope	0.997742	0.90 - 1.10
207.0	202.6	1.0216			
			Intercept	-1.871090	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

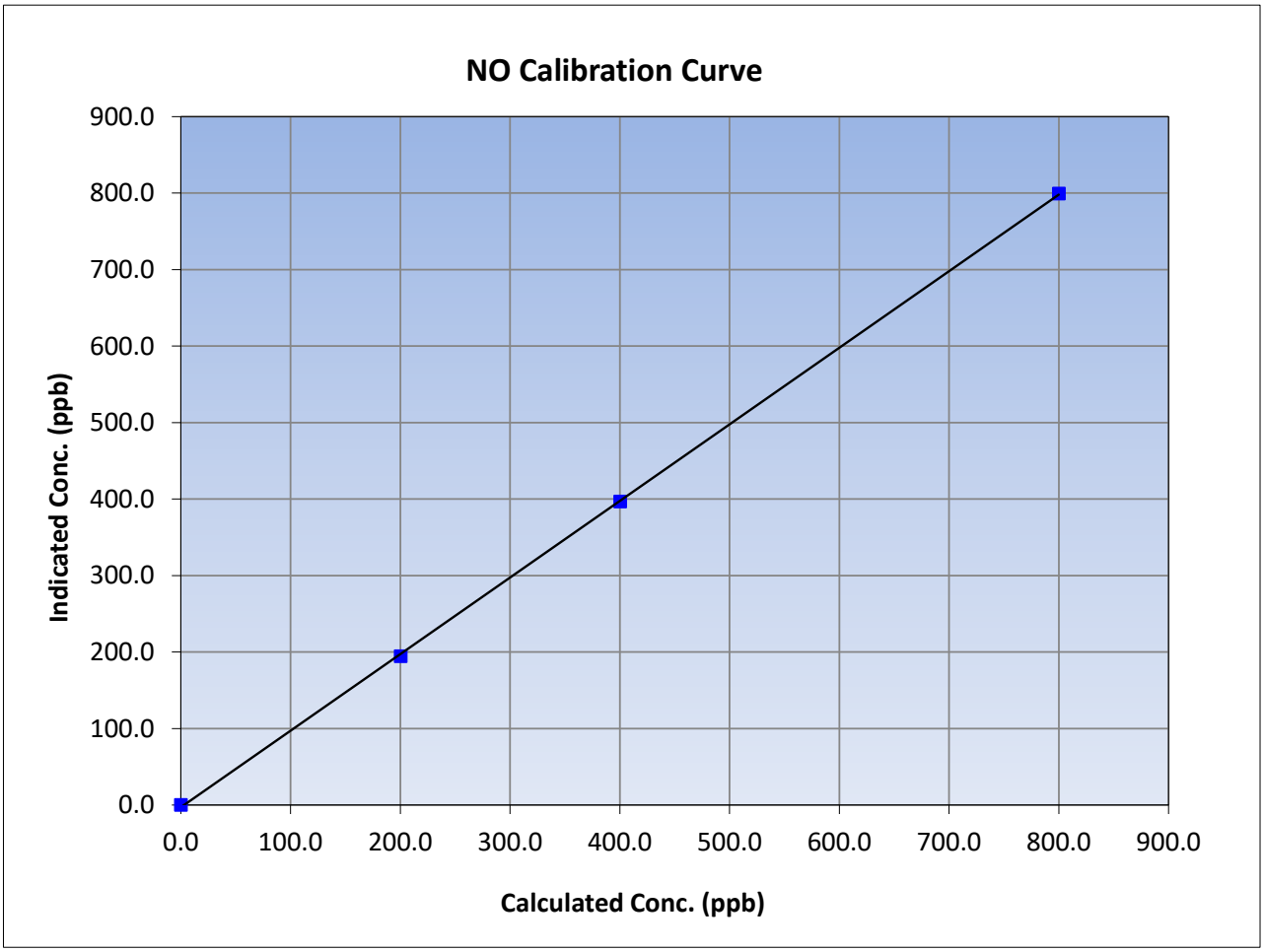
Version-04-2020

Station Information

Calibration Date:	May 9, 2023	Previous Calibration:	April 12, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	8:41	End Time (MST):	13:15
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	0.999939	≥0.995
800.0	799.4	1.0007			
400.4	396.7	1.0094	Slope	1.001205	0.90 - 1.10
200.2	194.5	1.0294			
			Intercept	-2.924978	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

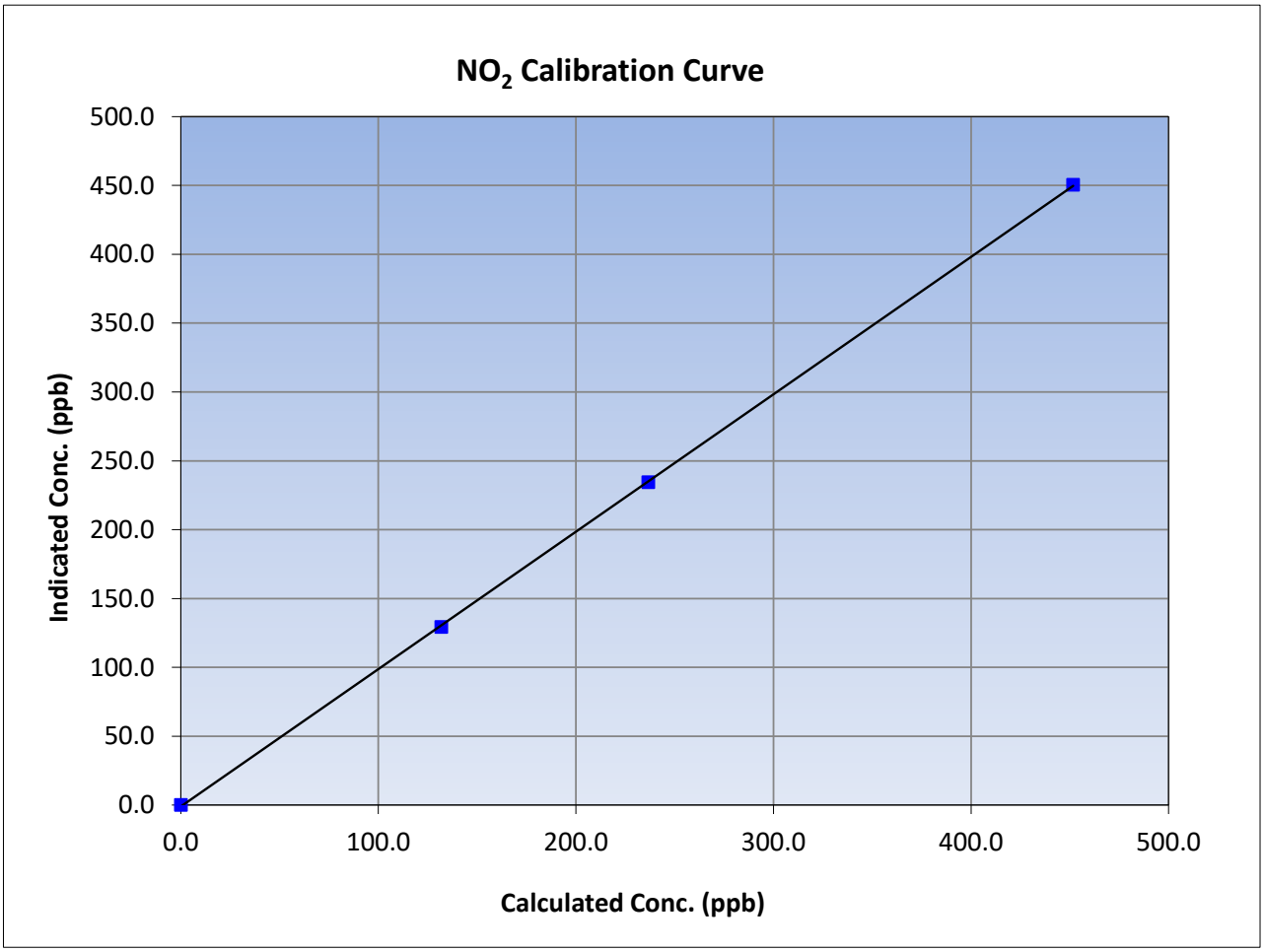
Version-04-2020

Station Information

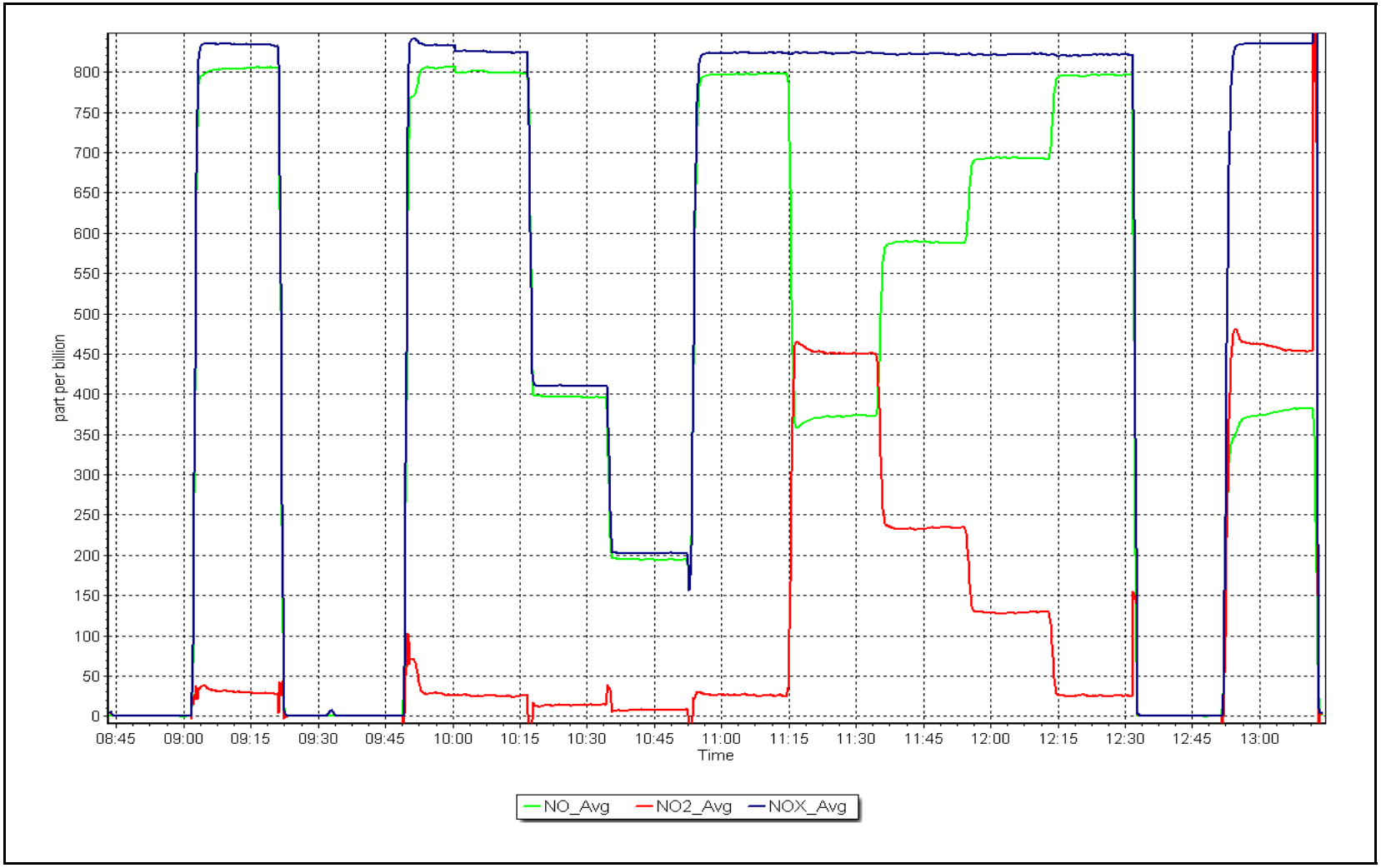
Calibration Date:	May 9, 2023	Previous Calibration:	April 12, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	8:41	End Time (MST):	13:15
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999966	≥0.995
451.7	450.4	1.0029			
236.6	234.4	1.0095	Slope	0.997870	0.90 - 1.10
131.8	129.3	1.0195			
			Intercept	-1.056811	+/-20



NO_X Calibration Plot Date: May 9, 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:	May 29, 2023		Last Cal Date:	May 9, 2023
Start time (MST):	10:13		End time (MST):	15:52
Reason:	Maintenance	Changing pump		

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:	1.203	1.203	NO bkgnd or offset:	9.5	9.5
NOX coeff or slope:	0.992	0.992	NOX bkgnd or offset:	9.5	9.5
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	195.9	195.9

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.997742	
NO_X Cal Offset:	-1.871090	
NO Cal Slope:	1.001205	
NO Cal Offset:	-2.924978	
NO_2 Cal Slope:	0.997870	
NO_2 Cal Offset:	-1.056811	

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	4919	81.1	826.9	800.0	26.9	716.8	690.9	25.9	1.1536	1.1578
as found 2nd	4960	40.6	413.9	400.4	13.5	356.6	342.6	14.0	1.1607	1.1688
as found 3rd	4980	20.3	207.0	200.2	6.7	176.1	168.1	8.1	1.1753	1.1911
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 = 716.6 ppb	NO = 691.0 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-14.9%
Previous Response	NO_X = 823.1 ppb	NO = 798.0 ppb			*Percent Change	NO =	-15.5%
Baseline Corr 2nd pt	NO_X = 356.4 ppb	NO = 342.7 ppb	As found	NO_X r^2: 0.999970	Nx Sl: 0.867747	Nx Int:	-1.646
Baseline Corr 3rd pt	NO_X = 175.9 ppb	NO = 168.2 ppb	As found	NO r^2: 0.999938	NO Sl: 0.865378	NO Int:	-2.640
			As found	NO_2 r^2: 0.999978	NO2 Sl: 0.989898	NO_2 Int:	-0.586

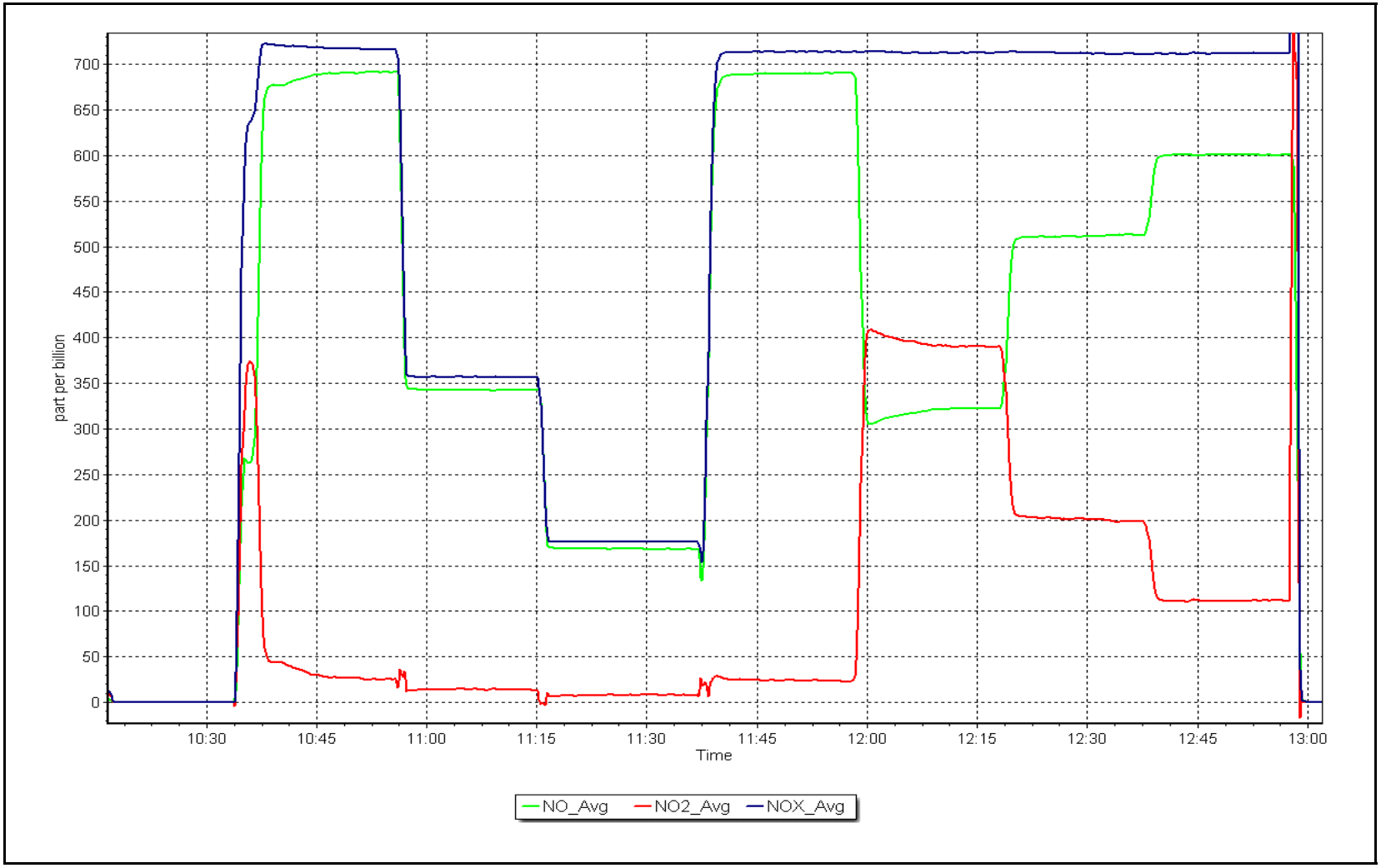
GPT Calibration Data

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)	690.1	322.1	394.9	390.6	1.0111	98.9%
as found GPT point (200 ppb NO2)	690.1	322.1	394.9	390.6	1.0111	98.9%
as found GPT point (100 ppb NO2)	690.1	563.3	153.7	150.3	1.0228	97.8%
1st GPT point (400 ppb O3)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
				Average Correction Factor		

Notes: Here to address the low spans. Changed inlet filter and pump after multi-poins as founds. Will let it settle overnight and continue the calibration tomorrow.

Calibration Performed By: Sean Bala

NO_X Calibration Plot Date: May 29, 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:	May 30, 2023	Last Cal Date:	May 29, 2023
Start time (MST):	8:27	End time (MST):	12:24
Reason:	Maintenance	Continuing calibration after pump change	

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:	1.203	1.168	NO bkgnd or offset:	9.5	9.2
NOX coeff or slope:	0.992	0.988	NOX bkgnd or offset:	9.5	9.6
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	195.9	130.9

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.997742	0.998875
NO_X Cal Offset:	-1.871090	-1.831289
NO Cal Slope:	1.001205	1.003248
NO Cal Offset:	-2.924978	-2.765445
NO_2 Cal Slope:	0.997870	0.991692
NO_2 Cal Offset:	-1.056811	-1.272971

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero										
as found span										
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
high point	4919	81.1	826.9	800.0	26.9	825.0	801.1	23.8	1.0023	0.9986
second point	4960	40.6	413.9	400.4	13.5	410.8	397.8	13.0	1.0076	1.0066
third point	4980	20.3	207.0	200.2	6.7	203.0	195.2	7.7	1.0195	1.0258
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
as left span	4919	80.1	816.8	364.5	452.3	834.7	380.4	454.3	0.9786	0.9583
								Average Correction Factor	1.0098	1.0103

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)	801.1	375.7	452.3	448.1	1.0094	99.1%
2nd GPT point (200 ppb O3)	801.1	593.9	234.1	230.0	1.0179	98.2%
3rd GPT point (100 ppb O3)	801.1	698.1	129.9	126.4	1.0279	97.3%
				Average Correction Factor	1.0184	98.2%

Notes: Adjusted zero and span.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

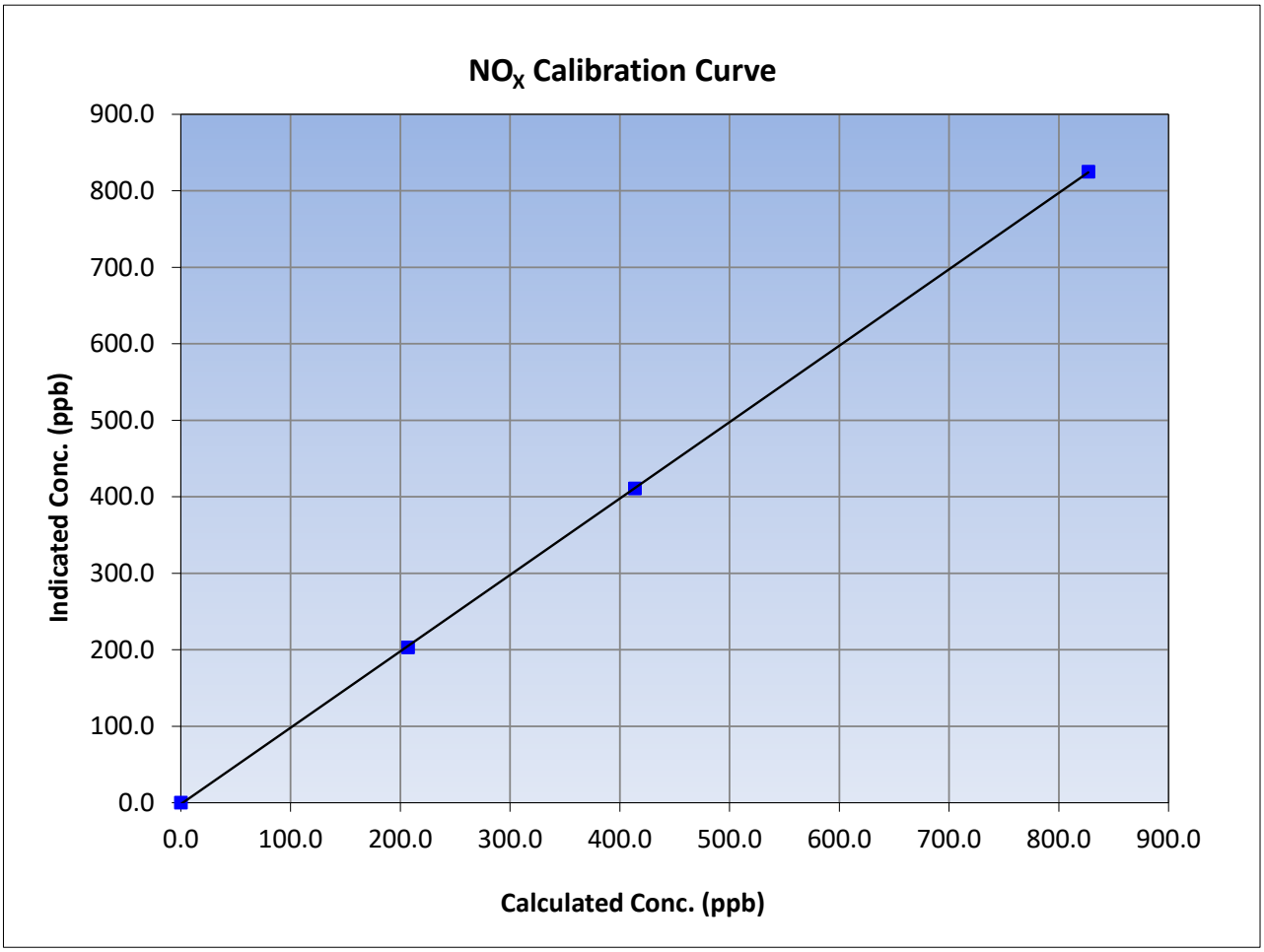
Version-04-2020

Station Information

Calibration Date:	May 30, 2023	Previous Calibration:	May 29, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	8:27	End Time (MST):	12:24
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	0.999977	≥0.995
826.9	825.0	1.0023			
413.9	410.8	1.0076	Slope	0.998875	0.90 - 1.10
207.0	203.0	1.0195			
			Intercept	-1.831289	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

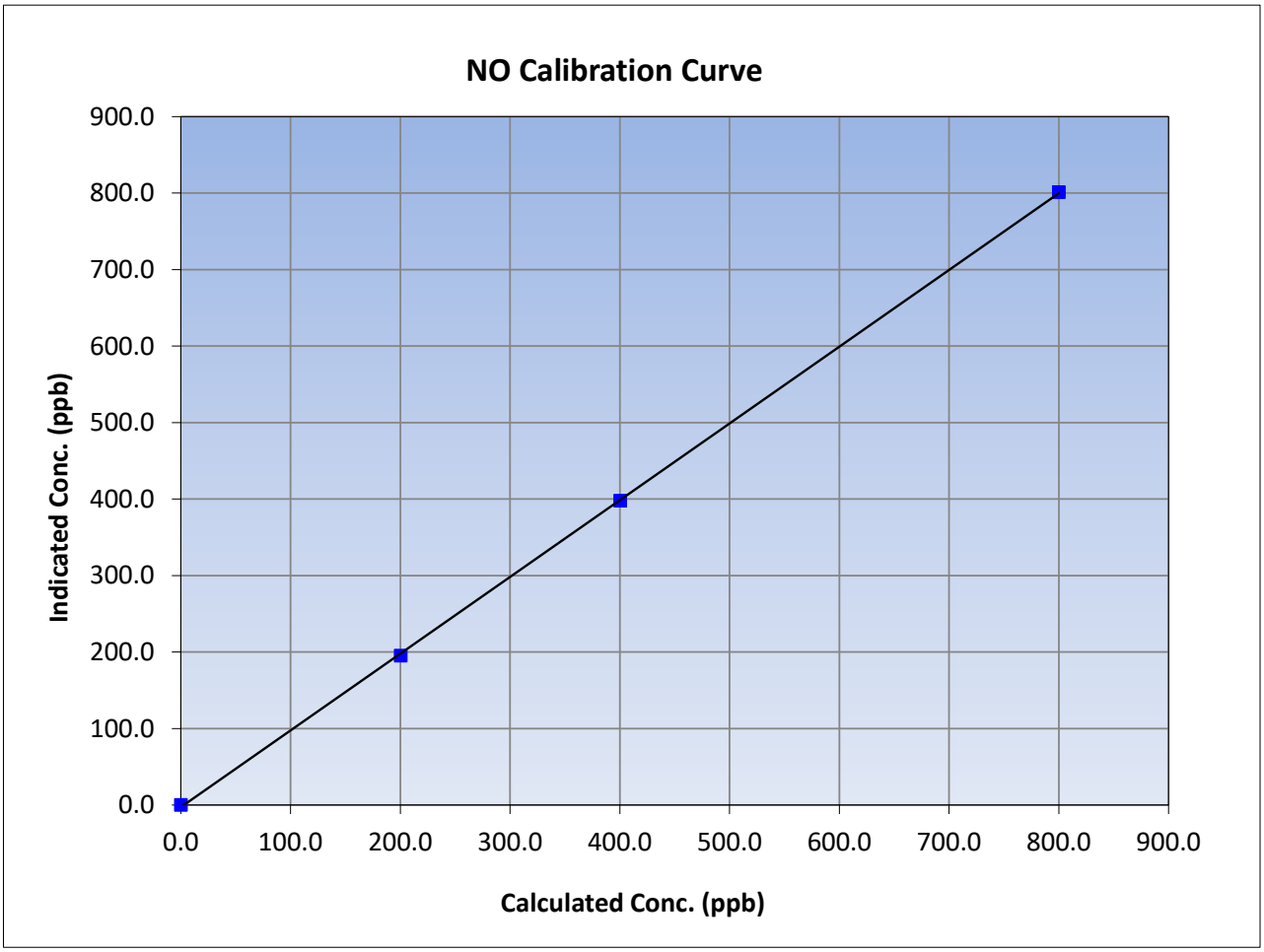
Version-04-2020

Station Information

Calibration Date:	May 30, 2023	Previous Calibration:	May 29, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	8:27	End Time (MST):	12:24
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	0.999945	≥0.995
800.0	801.1	0.9986			
400.4	397.8	1.0066	Slope	1.003248	0.90 - 1.10
200.2	195.2	1.0258			
			Intercept	-2.765445	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

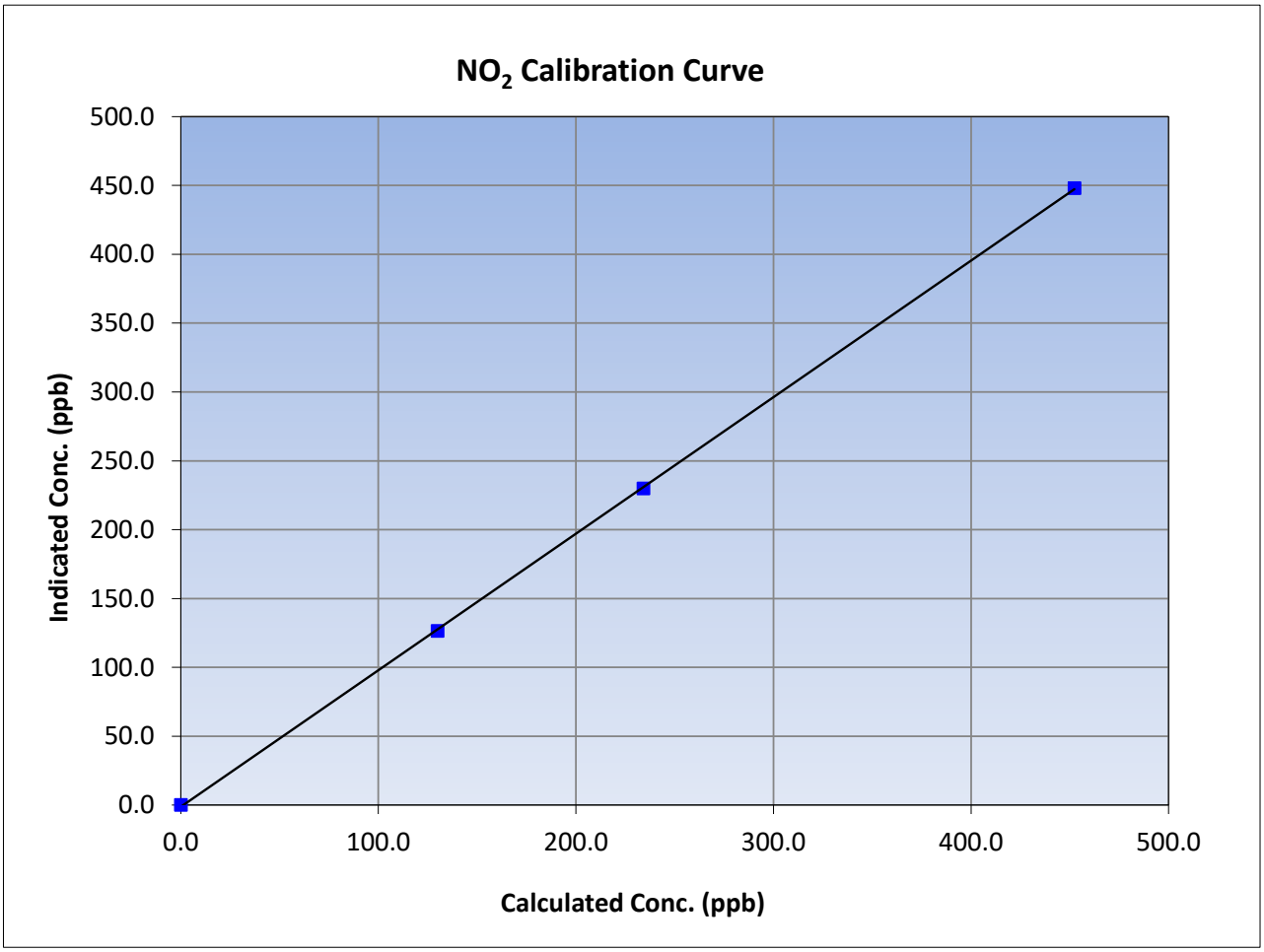
Version-04-2020

Station Information

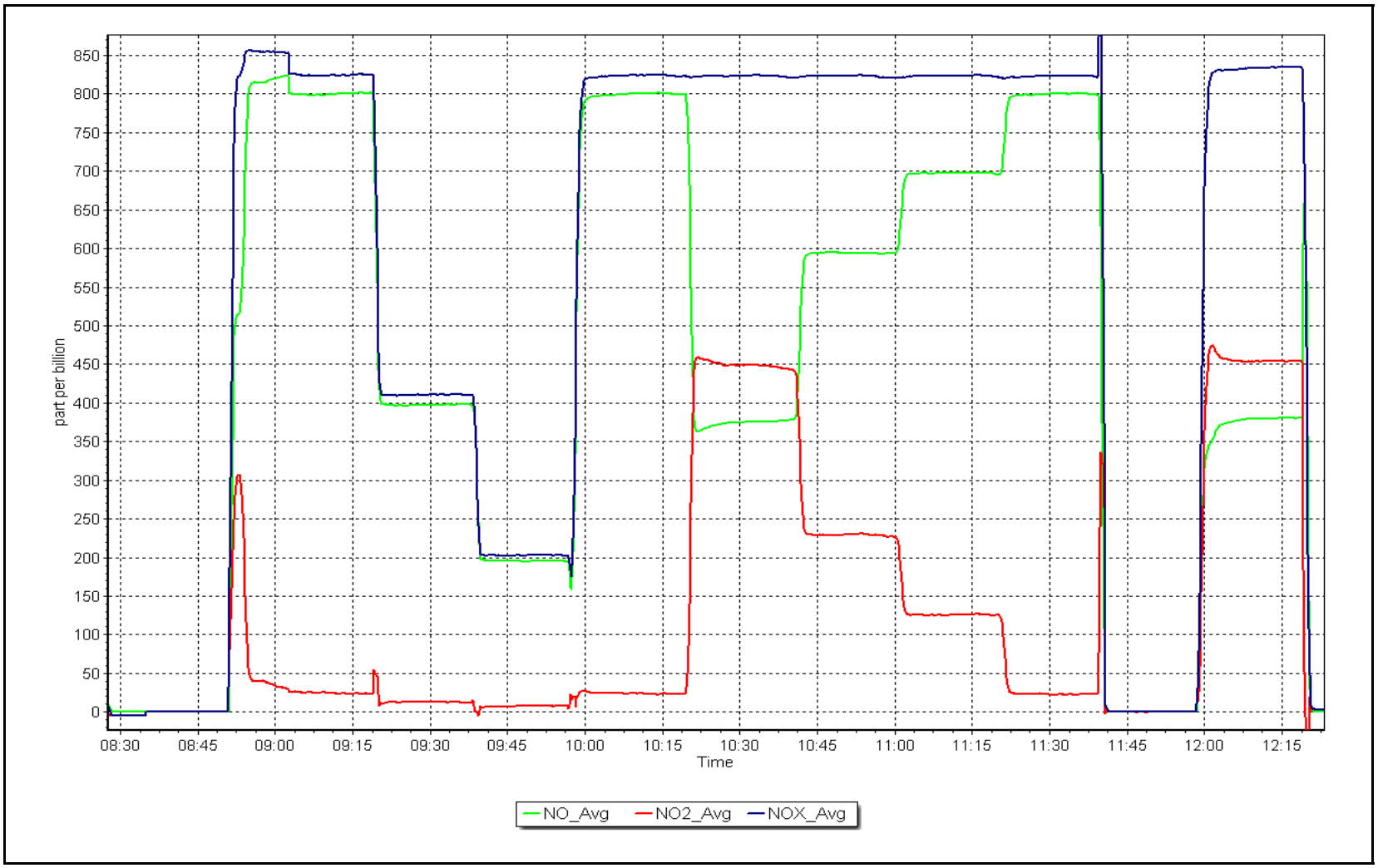
Calibration Date:	May 30, 2023	Previous Calibration:	May 29, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	8:27	End Time (MST):	12:24
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999959	≥0.995
452.3	448.1	1.0094			
234.1	230.0	1.0179	Slope	0.991692	0.90 - 1.10
129.9	126.4	1.0279			
			Intercept	-1.272971	+/-20



NO_X Calibration Plot Date: May 30, 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:	May 8, 2023	Last Cal Date:	April 11, 2023
Start time (MST):	9:46	End time (MST):	13:05
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:	0.997171	1.003343	Backgd or Offset:	3.4	3.4
Calibration intercept:	0.620000	0.440000	Coeff or Slope:	0.963	0.966

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	-0.6	----
as found span	5000	969.9	400.0	398.7	1.003
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.3	----
high point	5000	980.6	400.0	401.5	0.996
second point	5000	838.0	200.0	201.2	0.994
third point	5000	735.3	100.0	101.7	0.983
as left zero	5000	0.0	0.0	-0.4	----
as left span	5000	979.1	400.0	401.8	0.996
				Average Correction Factor	0.991

Baseline Corr As found:	399.3	Previous response	399.5	*% 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. Span adjusted.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

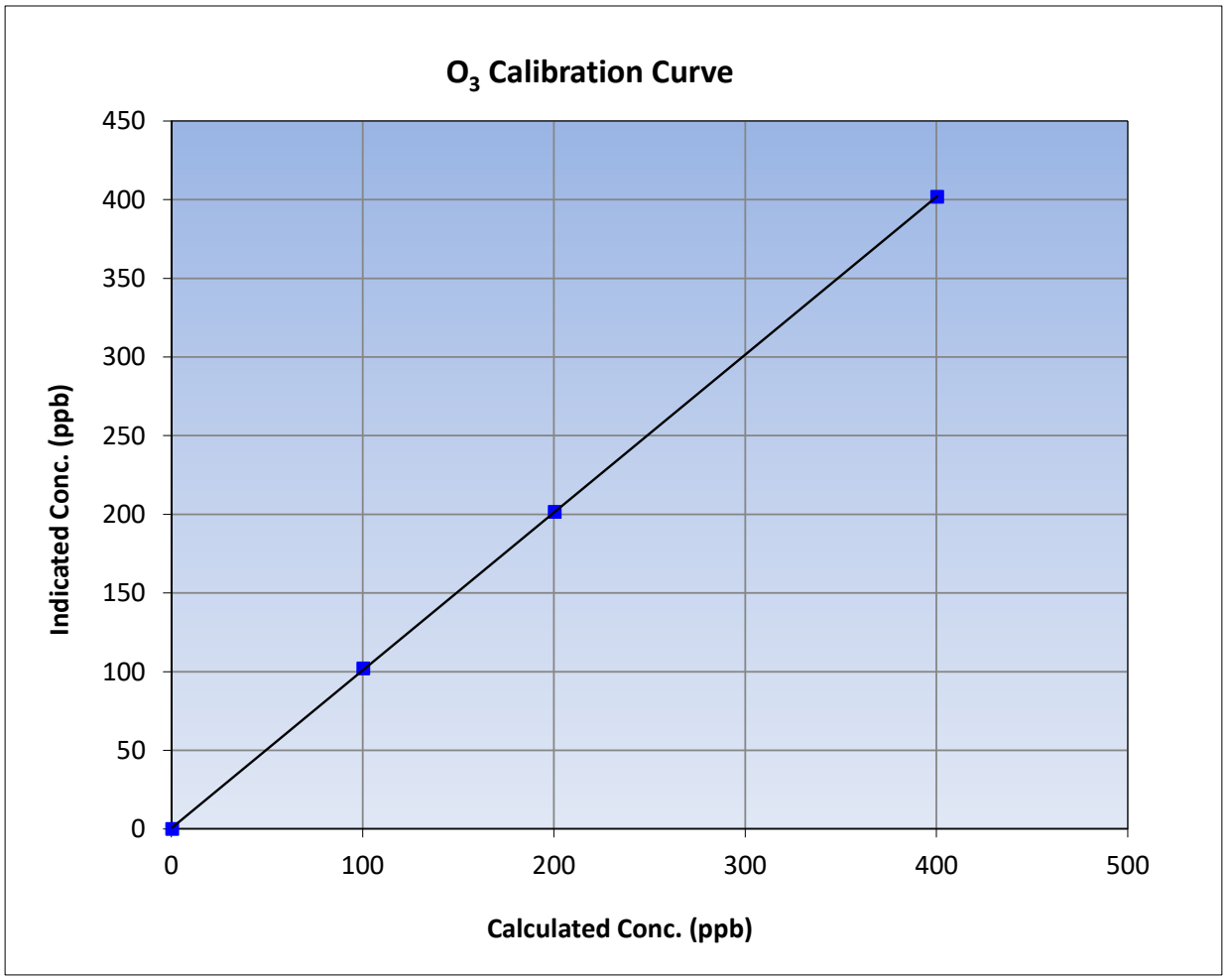
Station Information

Calibration Date:	May 8, 2023	Previous Calibration:	April 11, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	9:46	End Time (MST):	13:05
Analyzer make:	Teledyne API T400	Analyzer serial #:	3871

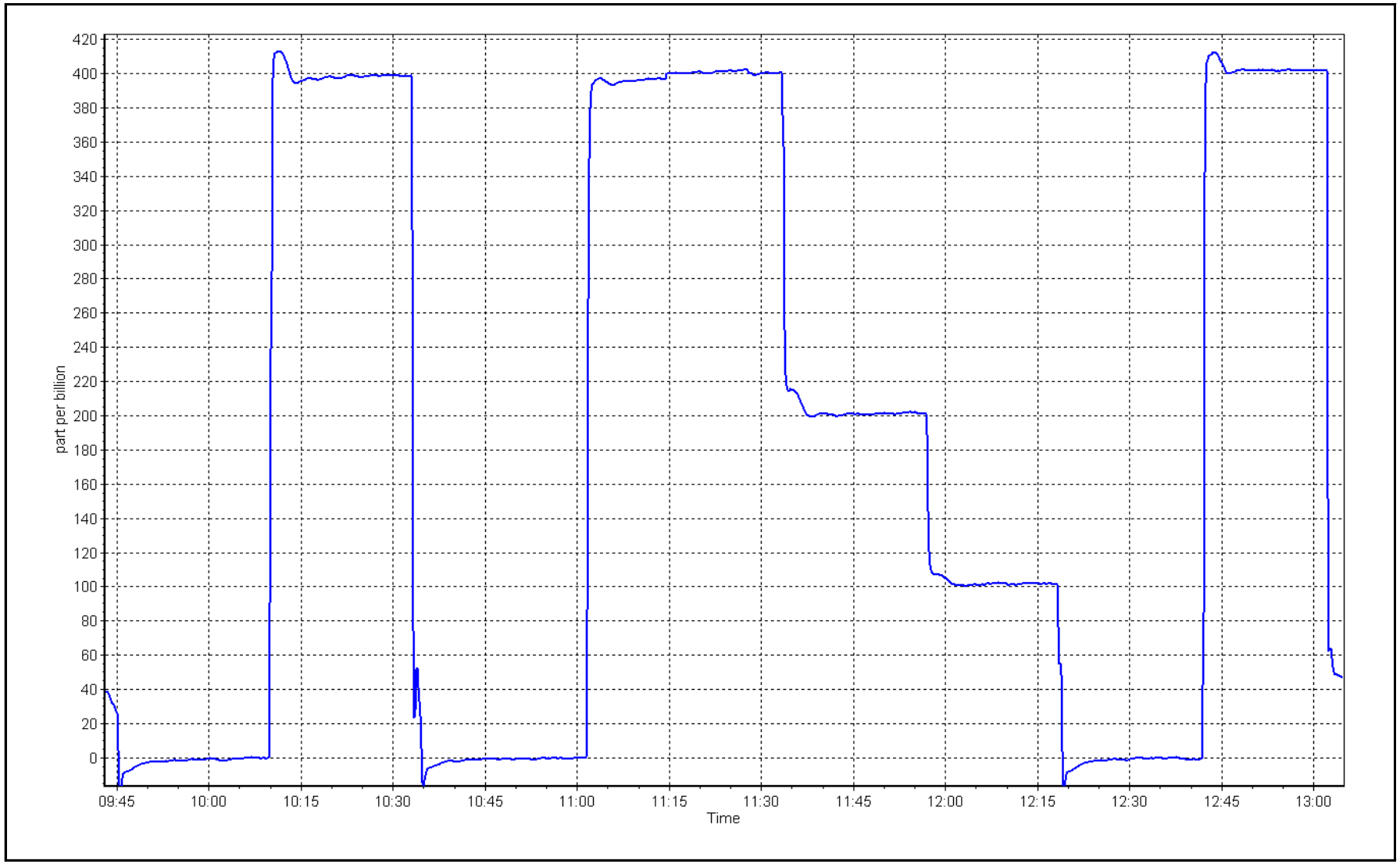
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
400.0	401.5	0.9963
200.0	201.2	0.9940
100.0	101.7	0.9833

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999983	*≥0.995*
Slope	1.003343	*0.90 - 1.10*
Intercept	0.440000	*+/- 5*



O_3 Calibration Plot Date: May 8, 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:	May 9, 2023	Last Cal Date:	April 12, 2023
Start time (MST):	10:52	End time (MST):	11:08
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 (^{o}C)	20.3	21.7	20.3	☐	+/- 2 °C
P (mmHg)	734.1	735.0	734.1	☐	+/- 10 mmHg
flow (LPM)	4.91	5.16	5.16	☑	+/- 0.25 LPM

Leak Test: Date of check: May 9, 2023 Last Cal Date: April 12, 2023

PM w/o HEPA: 17.9 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: April 12, 2023 <0.2 ug/m3

Disposable Filter Changed: March 22, 2023

Annual Maintenance

Date Sample Tube Cleaned: _____

Date RH/T Sensor Cleaned: _____

Inlet head clean and inspected. Flow adjusted.

Notes:

Calibration by: Sean Bala

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS14
ANZAC
MAY 2023

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

June 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	May 2, 2023	Last Cal Date:	April 18, 2023
Start time (MST):	6:40	End time (MST):	9:17
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:	0.997195	0.999181	Backgd or Offset:	25.2	25.2
Calibration intercept:	-0.864371	-0.684110	Coeff or Slope:	0.798	0.798

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.3	----
as found span	4920	80.1	800.2	795.7	1.006
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.6	----
high point	4920	80.1	800.2	799.4	1.001
second point	4960	40.0	399.6	398.2	1.004
third point	4980	20.0	199.8	197.5	1.012
as left zero	5000	0.0	0.0	0.6	----
as left span	4920	80.1	800.2	799.4	1.001
				Average Correction Factor	1.005

Baseline Corr As found:	795.40	Previous response	797.07	*% change	-0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

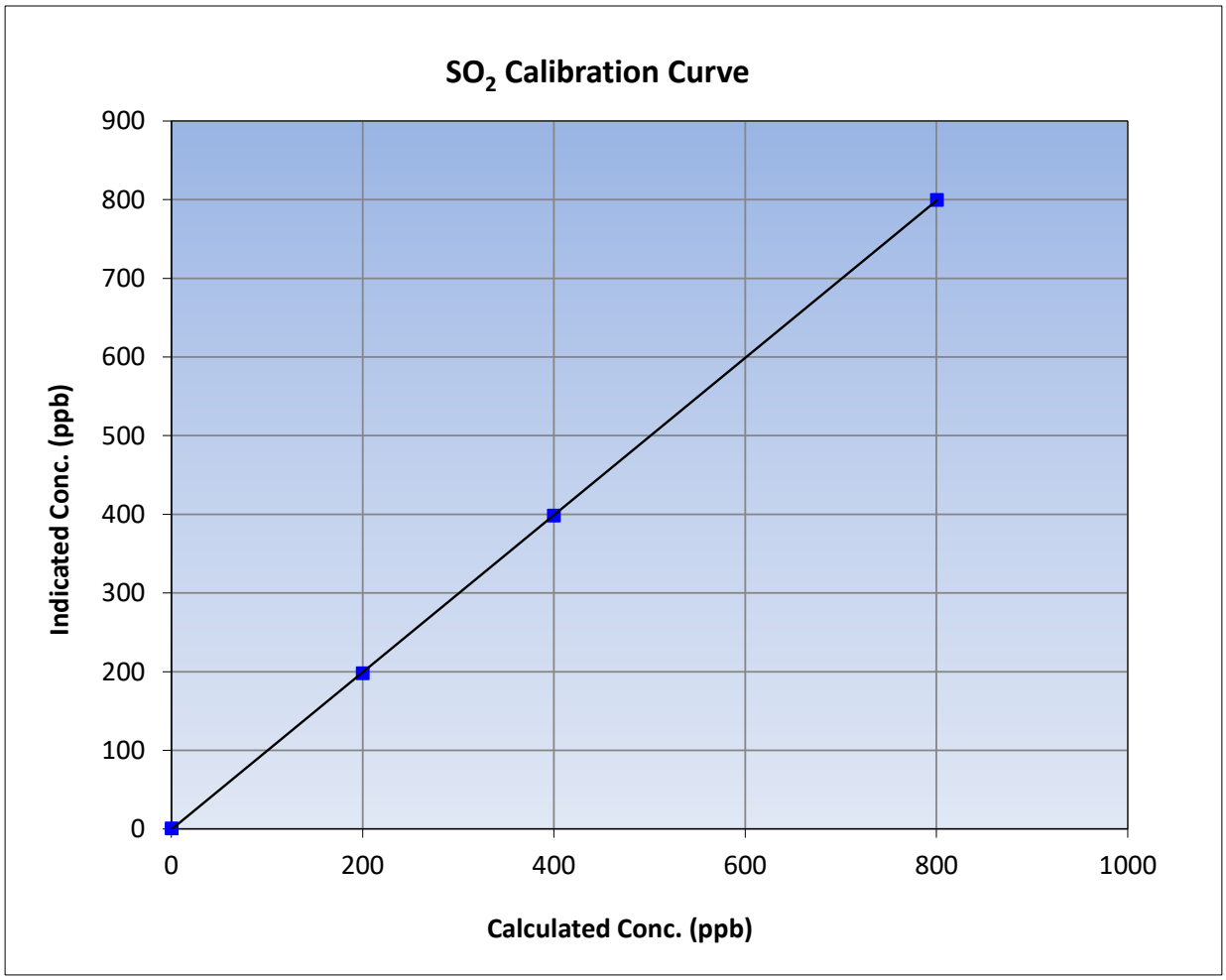
Station Information

Calibration Date:	May 2, 2023	Previous Calibration:	April 18, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	6:40	End Time (MST):	9:17
Analyzer make:	Thermo 43i	Analyzer serial #:	0710321322

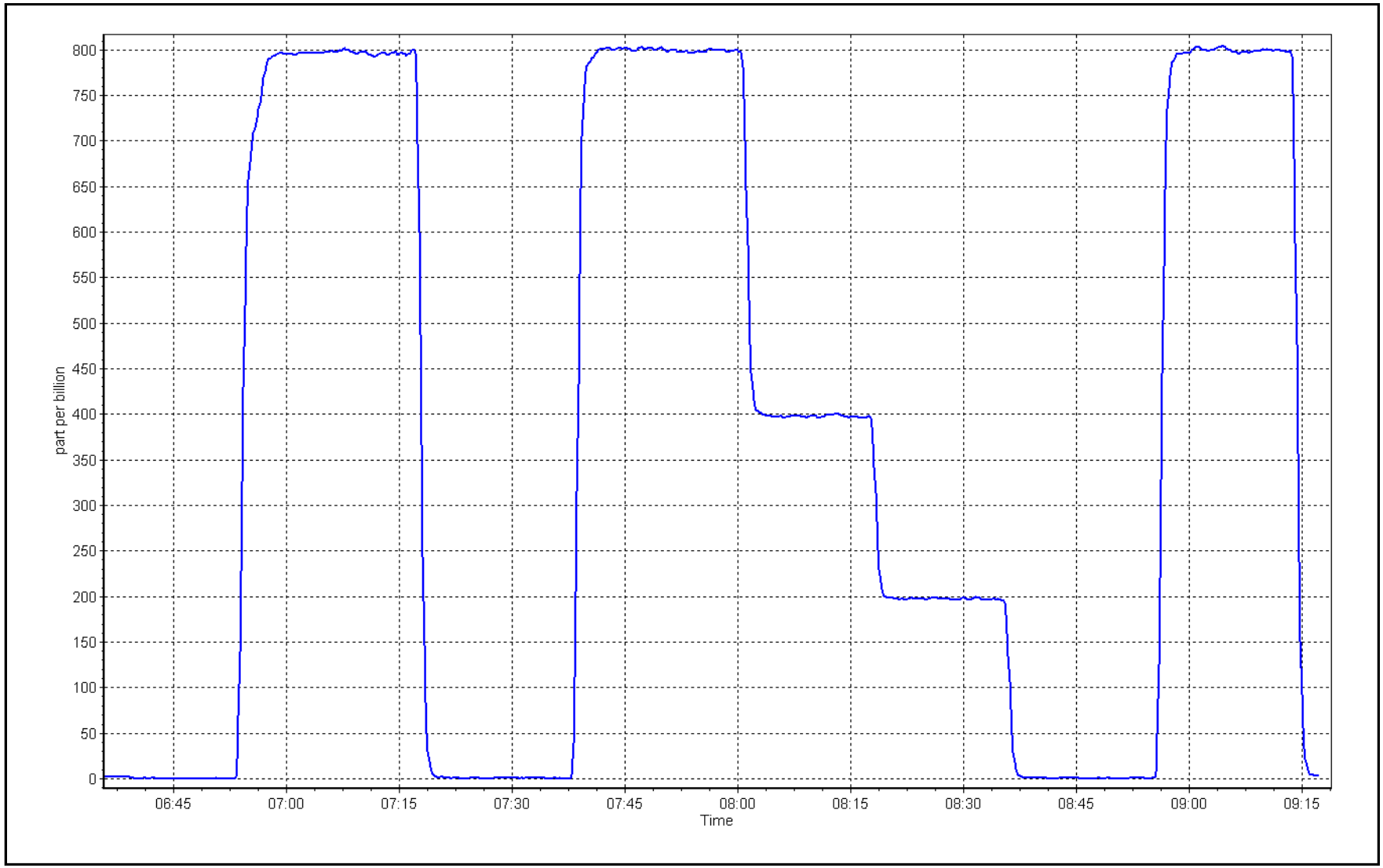
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.6	----
800.2	799.4	1.0010
399.6	398.2	1.0035
199.8	197.5	1.0116

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999988	*≥0.995*
Slope	0.999181	*0.90 - 1.10*
Intercept	-0.684110	*+/-30*



SO2 Calibration Plot Date: May 2, 2023 Location: Anzac



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	May 11, 2023	Last Cal Date:	April 5, 2023
Start time (MST):	7:00	End time (MST):	10:47
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:	5239
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:	1.002553	0.997841	Backgd or Offset:	5.51	5.36
Calibration intercept:	-0.041067	0.098854	Coeff or Slope:	0.993	0.972

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	83.1	0.965
as found 2nd point	4962	37.2	40.0	41.3	0.974
as found 3rd point	4981	18.6	20.0	20.4	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	0.3	----
high point	4925	74.3	80.0	79.9	1.001
second point	4962	37.2	40.0	40.2	0.996
third point	4981	18.6	20.0	19.7	1.016
as left zero	5000	0.0	0.0	0.4	----
as left span	4925	74.3	80.0	79.4	1.007
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:	82.9	Prev response:	80.12	*% change:	3.4%
Baseline Corr 2nd AF pt:	41.1	AF Slope:	1.038574	AF Intercept:	-0.101851
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999939		

* = > +/-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

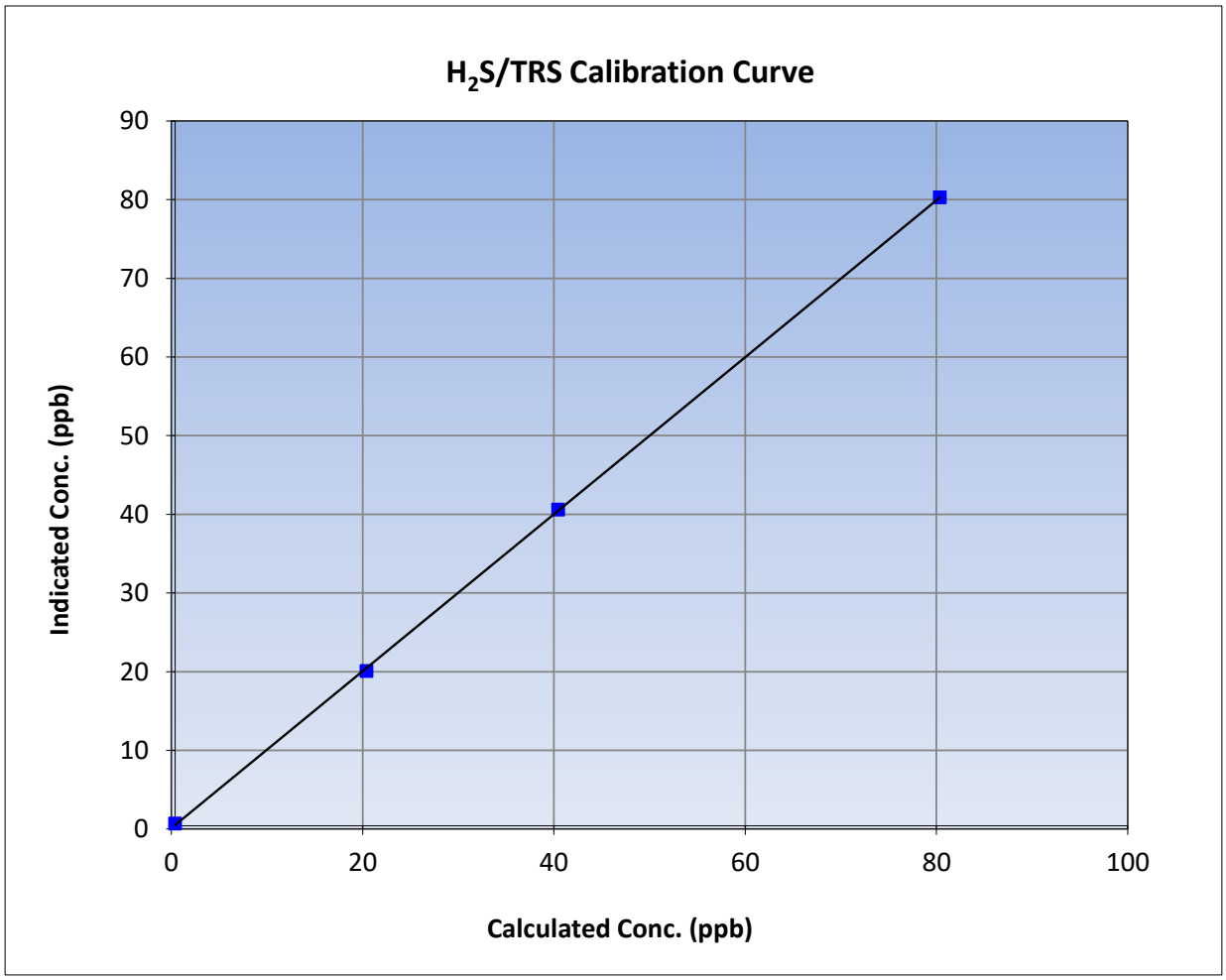
Station Information

Calibration Date:	May 11, 2023	Previous Calibration:	April 5, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	7:00	End Time (MST):	10:47
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1180540019

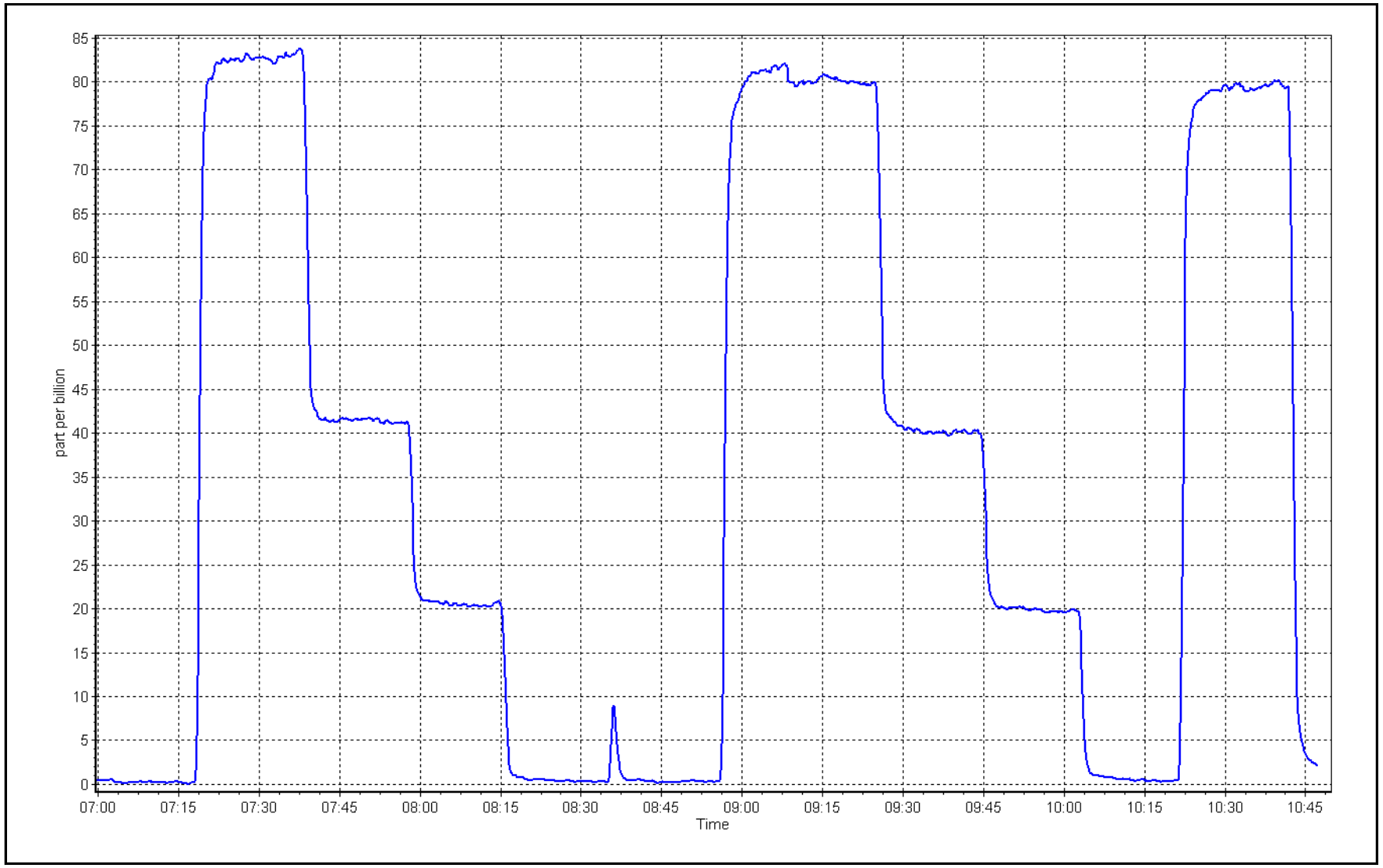
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
80.0	79.9	1.0007
40.0	40.2	0.9959
20.0	19.7	1.0160

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999942	*≥0.995*
Slope	0.997841	*0.90 - 1.10*
Intercept	0.098854	*+/-3*



TRS Calibration Plot Date: May 11, 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:	May 2, 2023	Last Cal Date:	April 18, 2023
Start time (MST):	6:40	End time (MST):	9:18
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:	3.90E-04	3.90E-04	NMHC SP Ratio:	4.53E-05	4.53E-05
CH4 Retention time:	12.20	12.20	NMHC Peak Area:	201206	201206

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	17.12	17.06	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	17.12	17.05	1.004
second point	4960	40.0	8.55	8.53	1.002
third point	4980	20.0	4.28	4.23	1.011
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	1.006
Baseline Corr AF:	17.06	Prev response	17.03	*% 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	0.00	----
as found span	4920	80.1	9.12	9.09	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	9.12	9.08	1.005
second point	4960	40.0	4.56	4.54	1.004
third point	4980	20.0	2.28	2.25	1.012
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.1	9.12	9.07	1.006
				Average Correction Factor	1.007
Baseline Corr AF:	9.09	Prev response	9.11	*% change	-0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	8.00	7.97	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	8.00	7.97	1.004
second point	4960	40.0	3.99	3.99	1.001
third point	4980	20.0	2.00	1.98	1.009
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.1	8.00	7.96	1.005
				Average Correction Factor	1.004
Baseline Corr AF:	7.97	Prev response	7.99	*% change	-0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.994025	0.996430
THC Cal Offset:	0.010201	-0.007805
CH4 Cal Slope:	0.999707	0.996993
CH4 Cal Offset:	-0.004033	-0.002038
NMHC Cal Slope:	0.999569	0.995937
NMHC Cal Offset:	-0.007757	-0.005767

Notes: Hydrogen cylinder changed. No adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

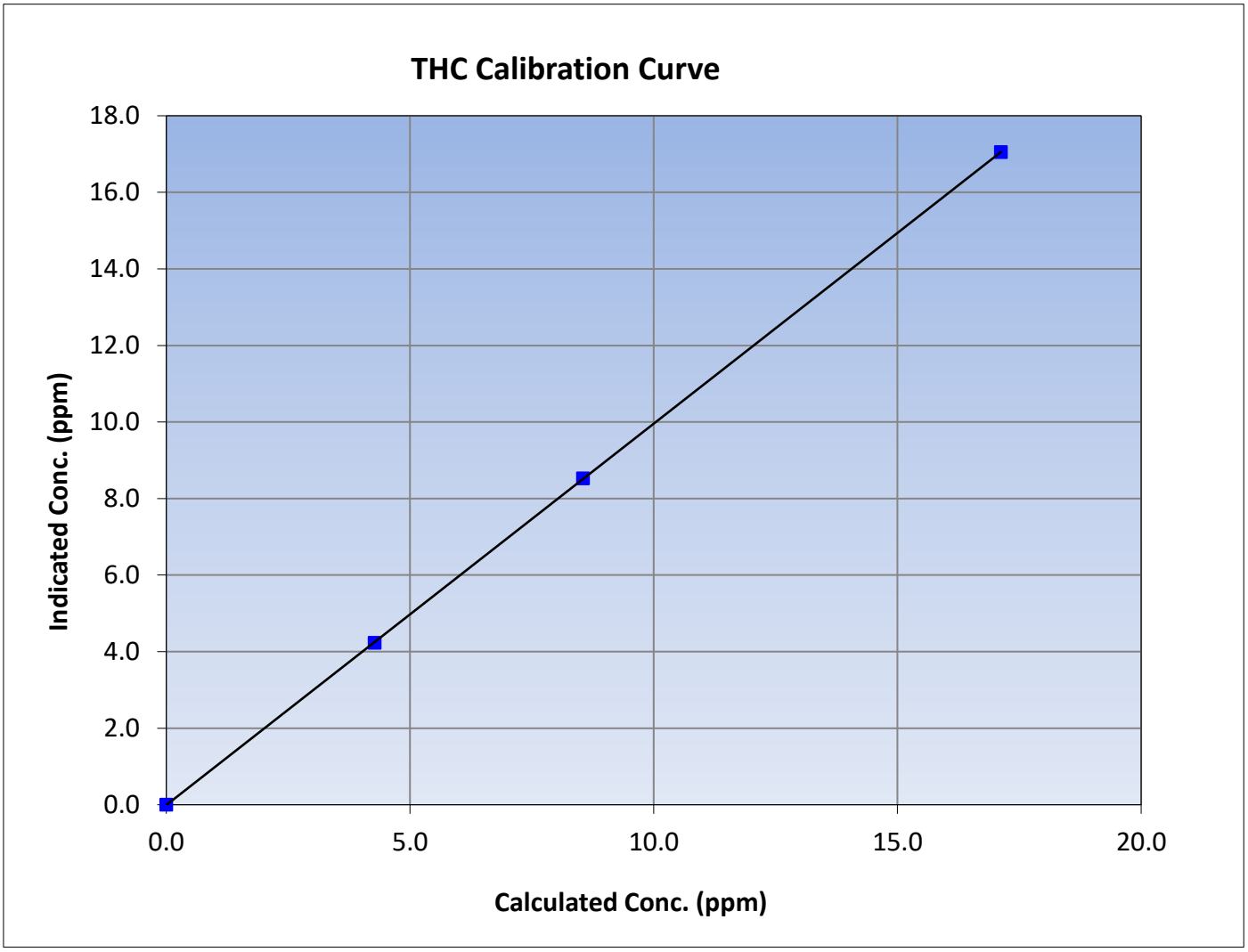
Version-01-2020

Station Information

Calibration Date:	May 2, 2023	Previous Calibration:	April 18, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	6:40	End Time (MST):	9:18
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	0.999994	≥0.995
17.12	17.05	1.0042			
8.55	8.53	1.0024	Slope	0.996430	0.90 - 1.10
4.28	4.23	1.0107			
			Intercept	-0.007805	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

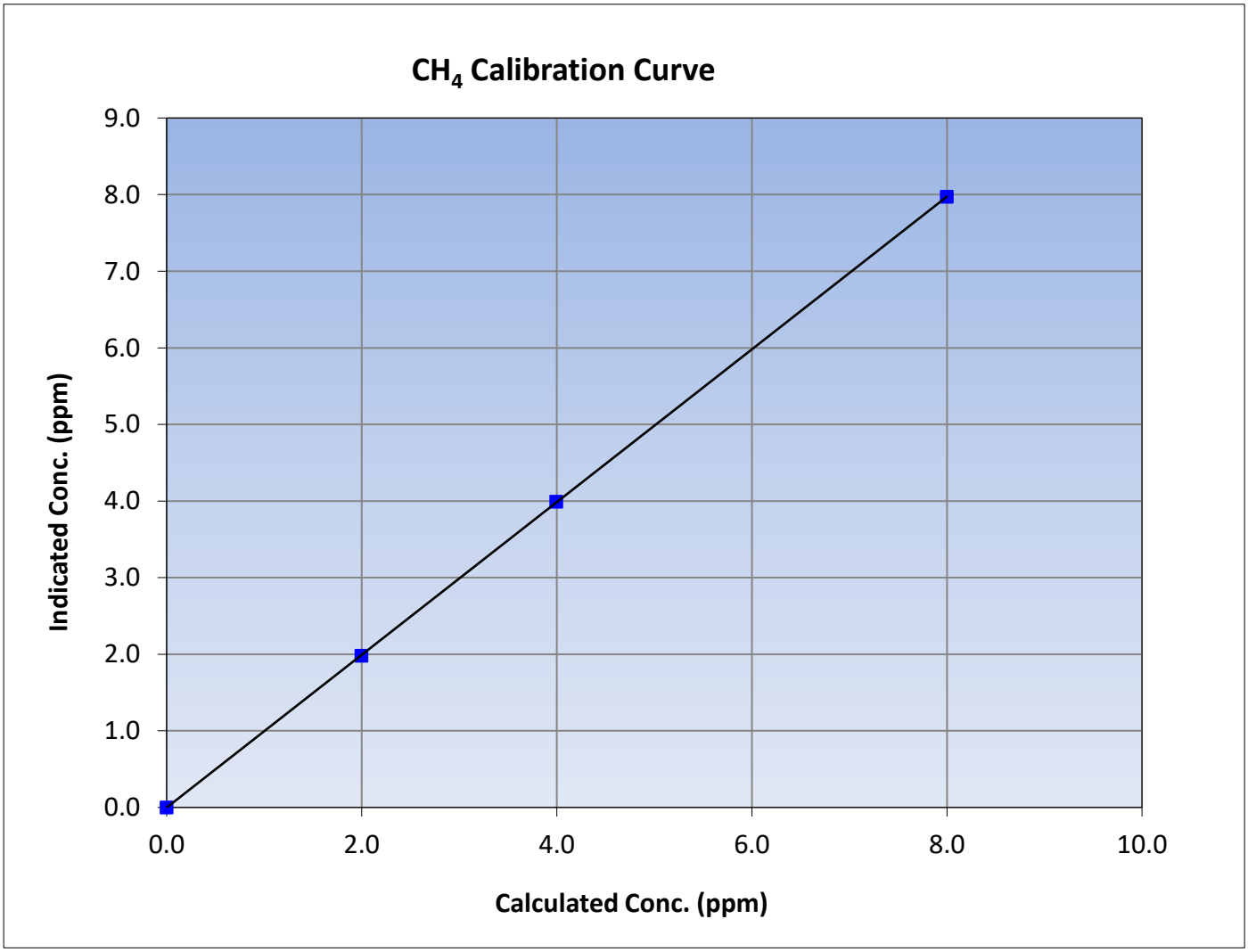
Version-01-2020

Station Information

Calibration Date:	May 2, 2023	Previous Calibration:	April 18, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	6:40	End Time (MST):	9:18
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*
8.00	7.97	1.0036			
3.99	3.99	1.0011	Slope	0.996993	*0.90 - 1.10*
2.00	1.98	1.0087			
			Intercept	-0.002038	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

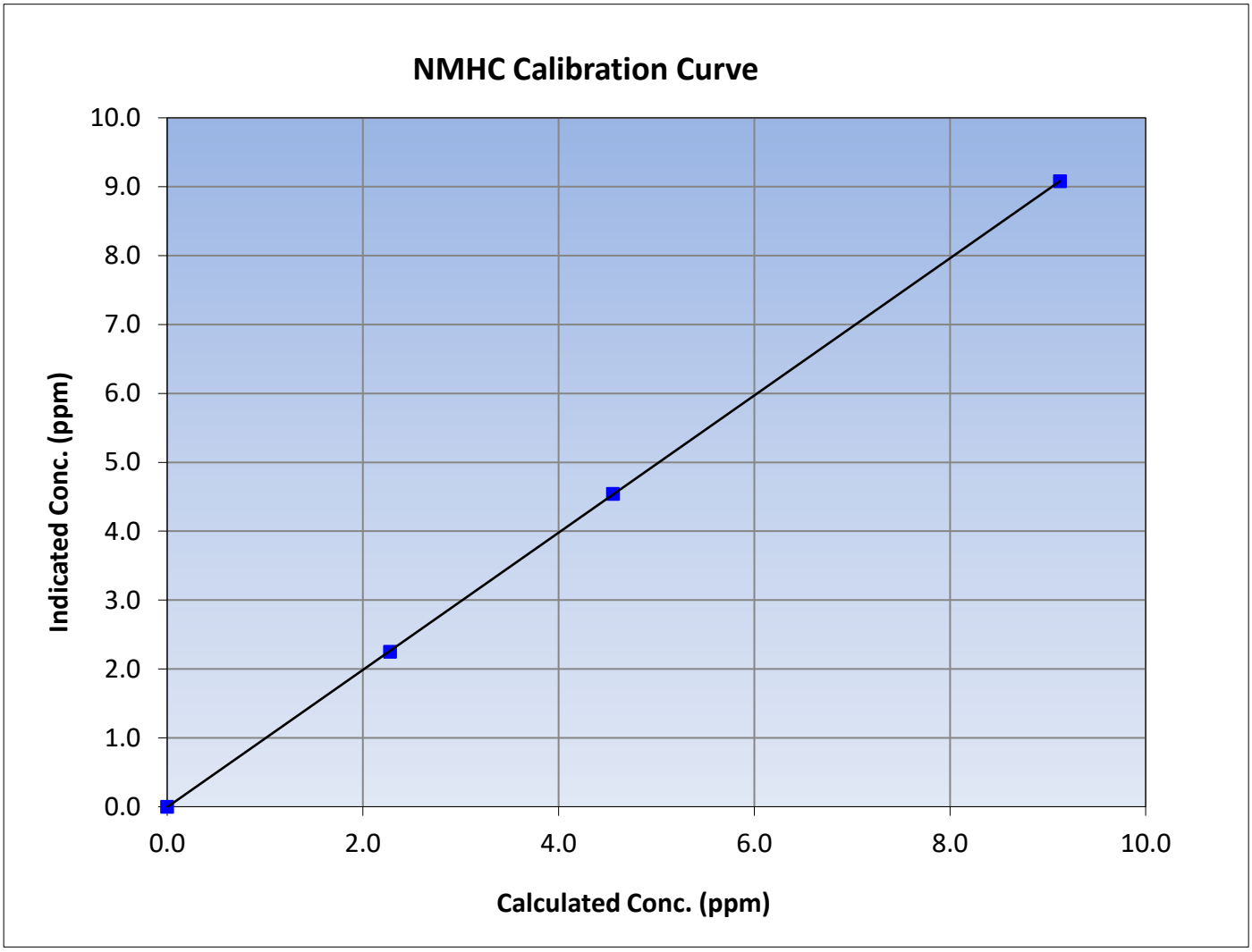
Version-01-2020

Station Information

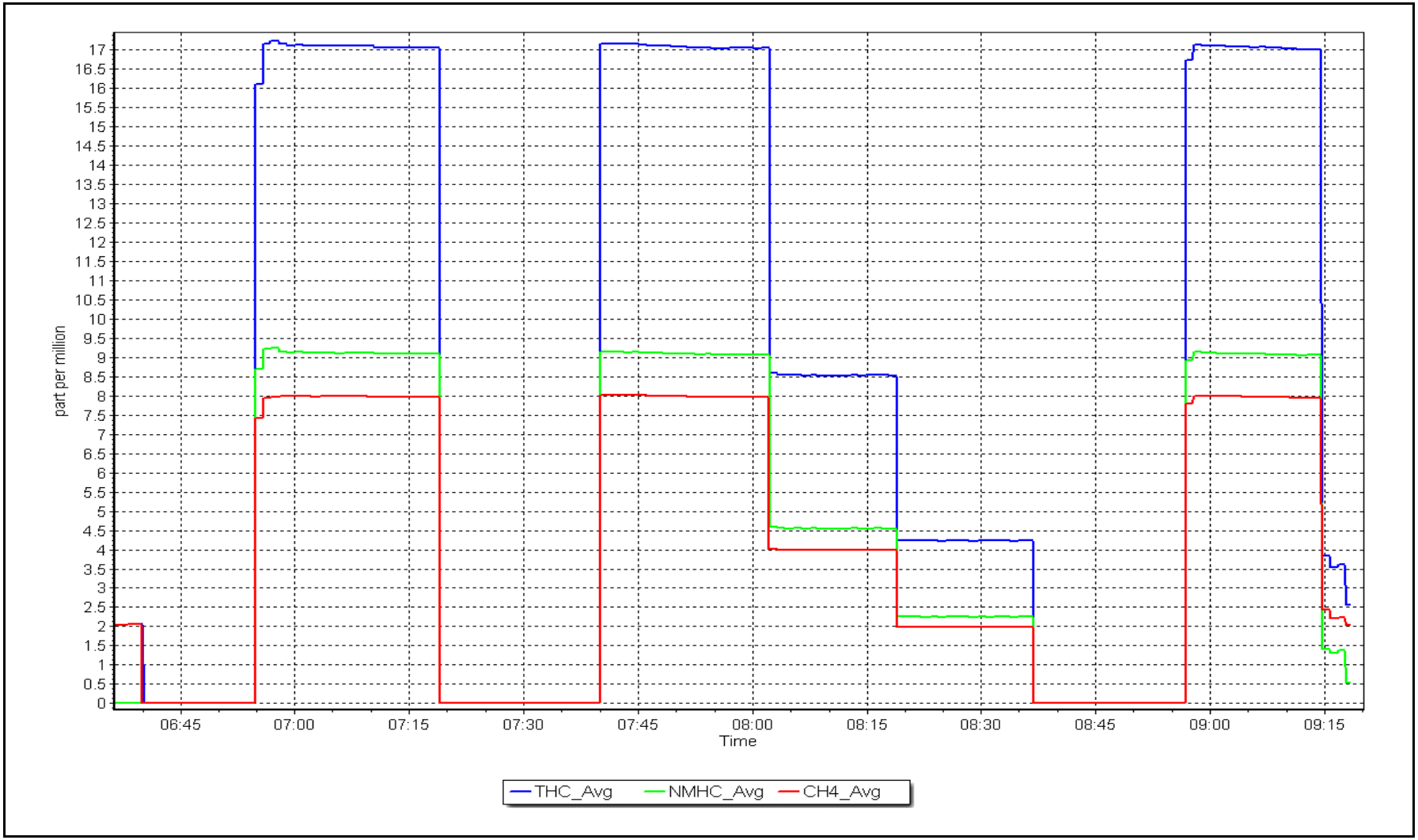
Calibration Date:	May 2, 2023	Previous Calibration:	April 18, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	6:40	End Time (MST):	9:18
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999994	*≥0.995*
9.12	9.08	1.0048			
4.56	4.54	1.0036	Slope	0.995937	*0.90 - 1.10*
2.28	2.25	1.0125			
			Intercept	-0.005767	*+/-0.5*



NMHC Calibration Plot Date: May 2, 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:	May 11, 2023	Last Cal Date:	May 2, 2023
Start time (MST):	5:56	End time (MST):	7:02
Reason:	Cylinder Change	Nitrogen Cylinder change	

Calibration Standards

Gas Cert Reference:		CC279389	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
C3H8 Cal Gas Conc.	207.1	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:		NA
Removed CH4 Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
Removed C3H8 Conc.	207.1	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	5239	
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:	3.90E-04	3.90E-04	NMHC SP Ratio:	4.53E-05	4.53E-05
CH4 Retention time:	12.20	12.20	NMHC Peak Area:	201206	201206

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	17.12	17.15	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	17.12	17.13	1.000
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.000

Baseline Corr AF:	17.15	Prev response	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	5000	0.0	0.00	0.00	----
as found span	4920	80.1	9.12	9.15	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	80.1	9.12	9.13	0.999
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.999
Baseline Corr AF:	9.15	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	5000	0.0	0.00	0.00	----
as found span	4920	80.1	8.00	8.00	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	80.1	8.00	8.00	1.000
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.000
Baseline Corr AF:	8.00	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000454	
THC Cal Offset:	0.000000	
CH4 Cal Slope:	1.000172	
CH4 Cal Offset:	0.000000	
NMHC Cal Slope:	1.000701	
NMHC Cal Offset:	0.000000	

Notes: Nitrogen cylinder change.

Calibration Performed By: Melissa Lemay

NMHC Calibration Plot Date: May 11, 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:	May 1, 2023	Last Cal Date:	April 14, 2023
Start time (MST):	6:45	End time (MST):	11:31
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:	162.7	162.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.002446	0.995080
NO_X Cal Offset:	-0.745161	-0.466631
NO Cal Slope:	1.004625	0.996609
NO Cal Offset:	-2.149028	-1.790505
NO_2 Cal Slope:	1.000896	1.001233
NO_2 Cal Offset:	0.328255	0.590521

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.1	-0.2	0.2	----	----
as found span	4921	78.6	800.5	786.8	13.7	798.0	784.0	14.0	1.0032	1.0036
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	-0.1	0.2	----	----
high point	4921	78.6	800.5	786.8	13.7	796.2	783.1	13.1	1.0054	1.0048
second point	4961	39.3	400.2	393.4	6.8	398.1	389.8	8.3	1.0053	1.0092
third point	4980	19.6	199.6	196.2	3.4	197.2	191.8	5.4	1.0123	1.0230
as left zero	5000	0.0	0.0	0.0	0.0	0.2	-0.1	0.2	----	----
as left span	4921	78.6	800.5	392.1	408.4	794.8	387.9	406.9	1.0072	1.0110
								Average Correction Factor	1.0077	1.0123

Corrected As found	NO_X = 797.9 ppb	NO = 784.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.5%
Previous Response	NO_X = 801.7 ppb	NO = 788.3 ppb		*Percent Change	NO =	-0.5%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found NO r^2:	NO Sl:	NO Int:	
			As found NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	777.7	383.0	408.4	409.3	0.9977	100.2%
2nd GPT point (200 ppb O3)	777.7	577.7	213.7	214.6	0.9957	100.4%
3rd GPT point (100 ppb O3)	777.7	679.1	112.3	113.5	0.9892	101.1%
				Average Correction Factor	0.9942	100.6%

Notes: No maintenance or adjustments done.

Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

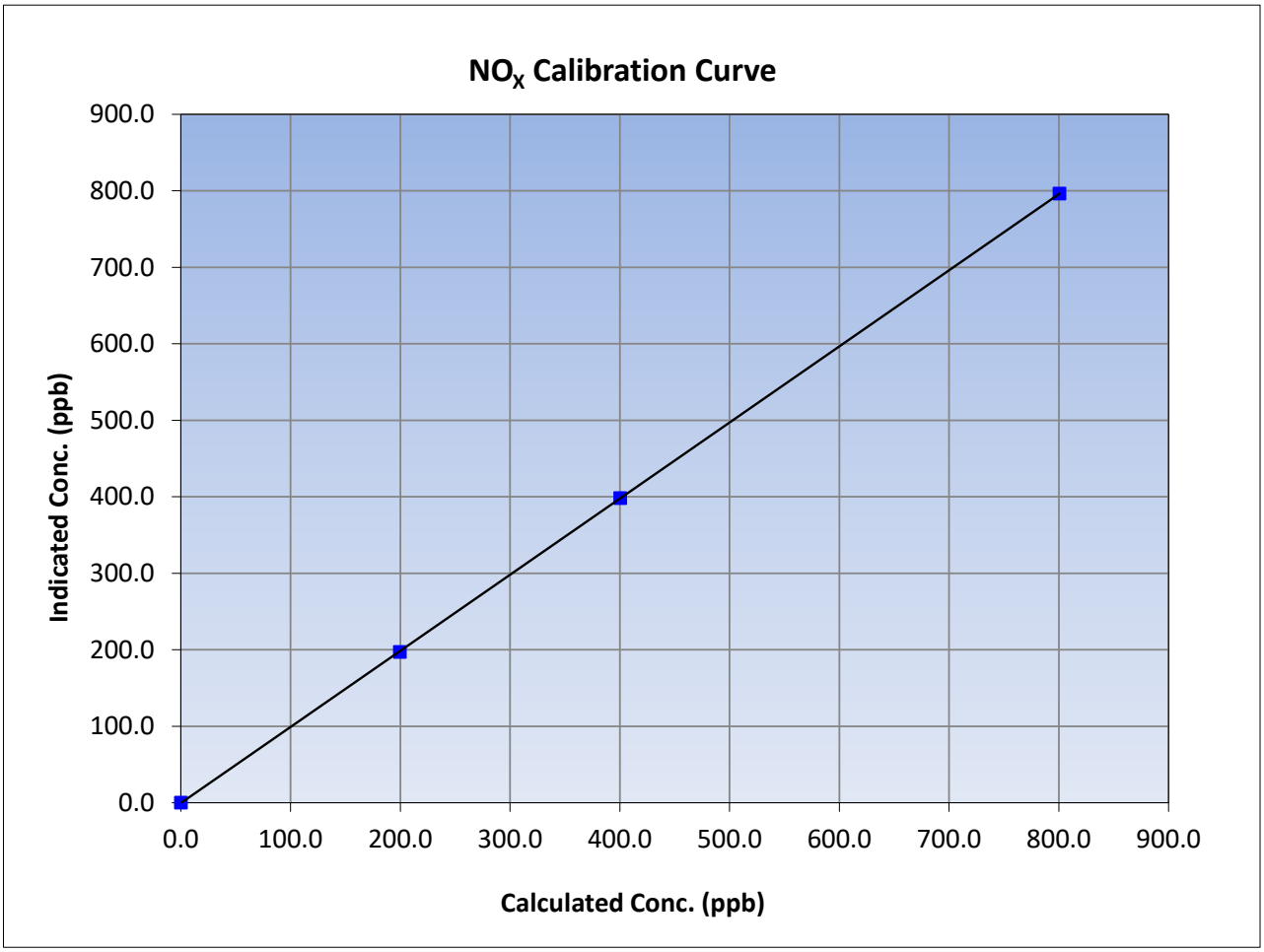
Version-04-2020

Station Information

Calibration Date:	May 1, 2023	Previous Calibration:	April 14, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	6:45	End Time (MST):	11:31
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	0.999996	≥0.995
800.5	796.2	1.0054			
400.2	398.1	1.0053	Slope	0.995080	0.90 - 1.10
199.6	197.2	1.0123			
			Intercept	-0.466631	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

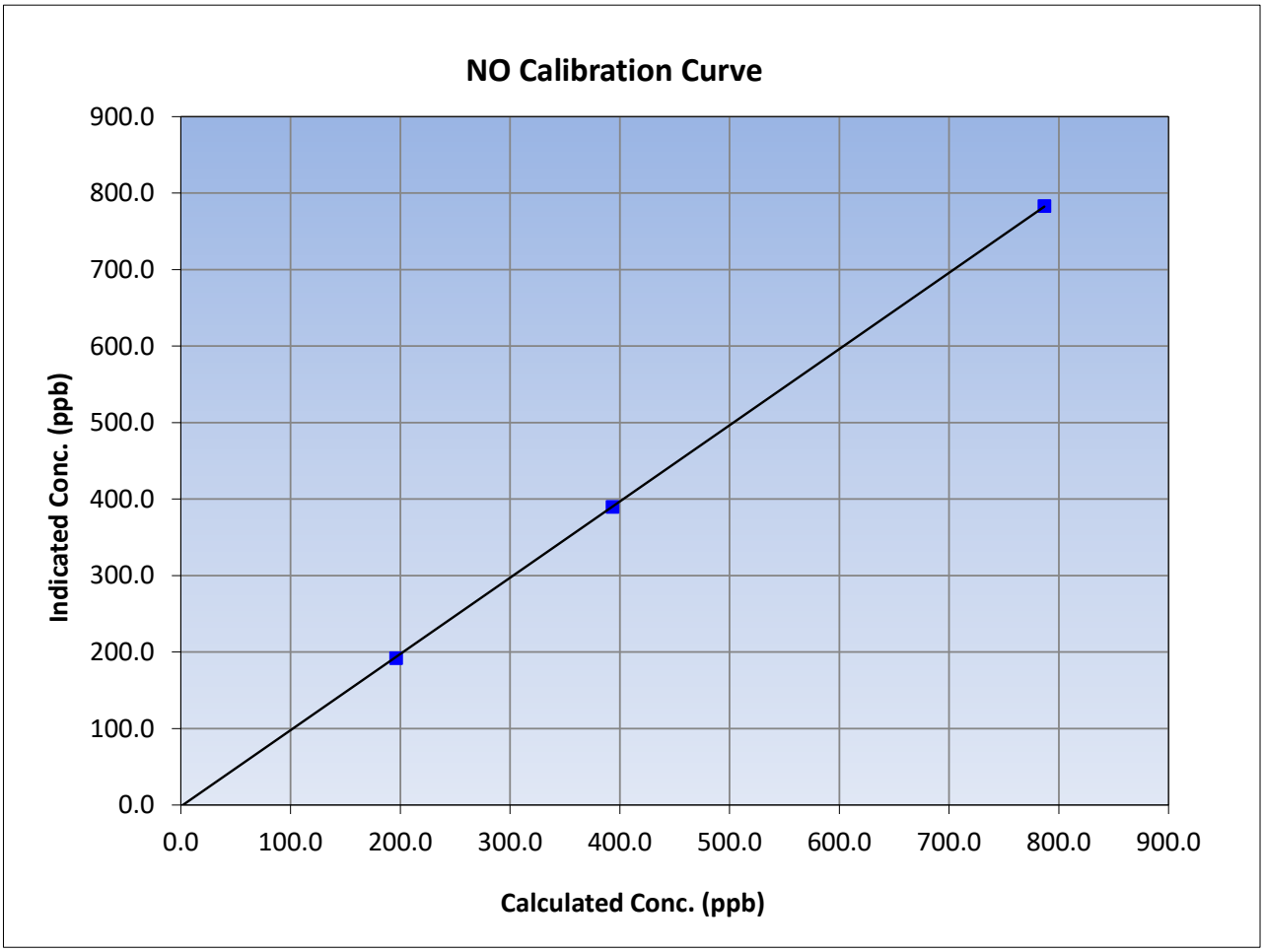
Version-04-2020

Station Information

Calibration Date:	May 1, 2023	Previous Calibration:	April 14, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	6:45	End Time (MST):	11:31
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	0.999978	≥0.995
786.8	783.1	1.0048			
393.4	389.8	1.0092	Slope	0.996609	0.90 - 1.10
196.2	191.8	1.0230			
			Intercept	-1.790505	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

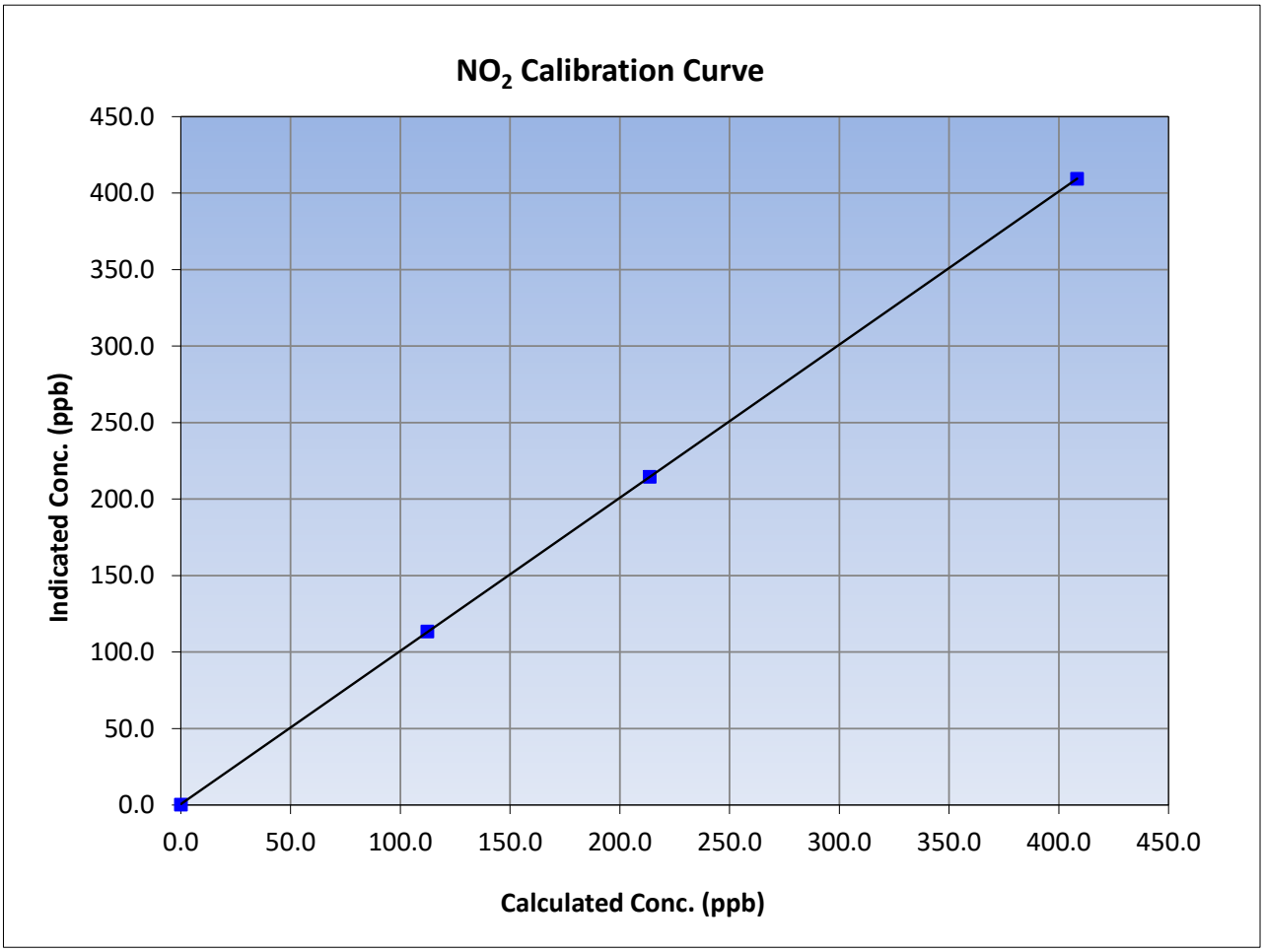
Version-04-2020

Station Information

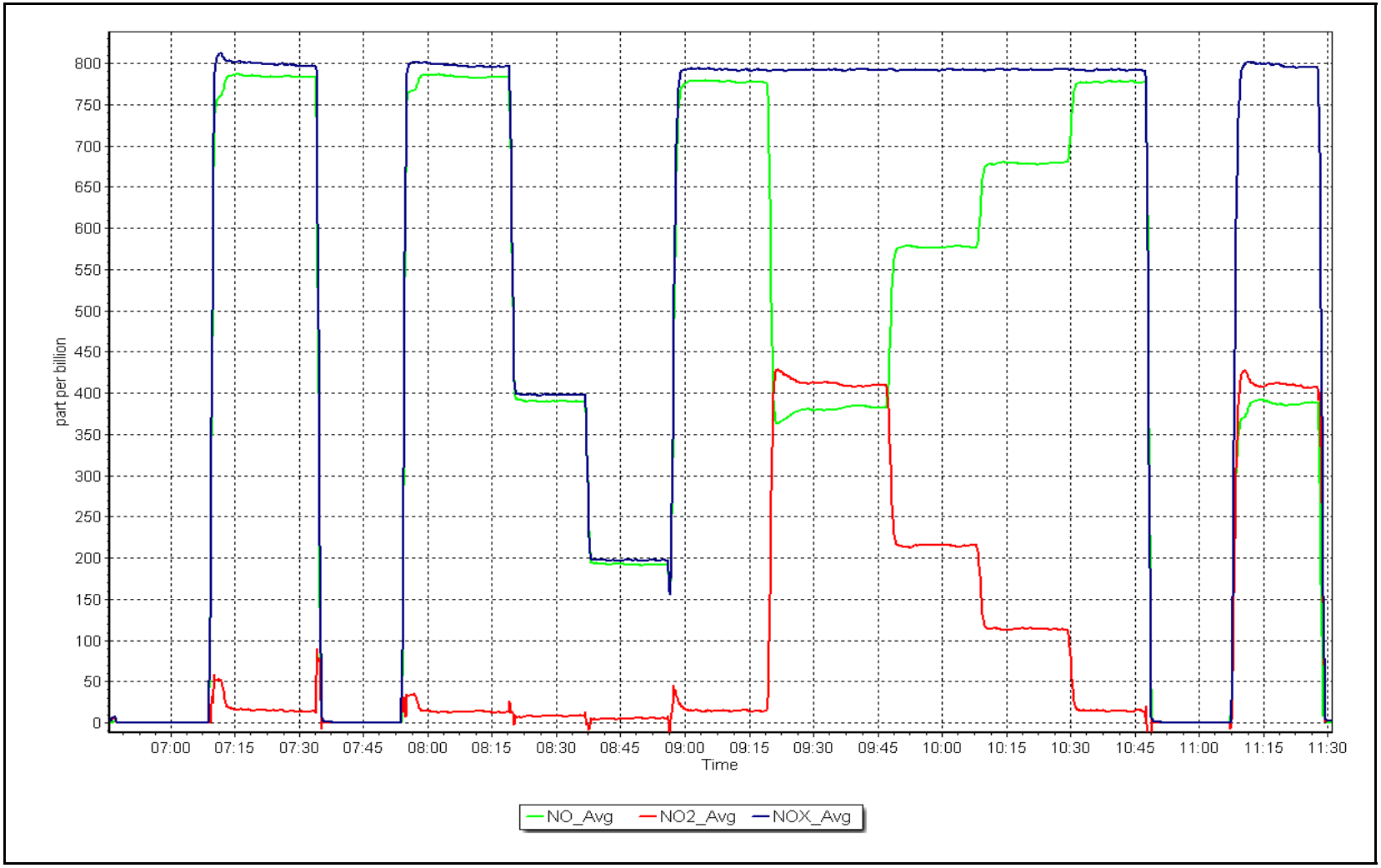
Calibration Date:	May 1, 2023	Previous Calibration:	April 14, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	6:45	End Time (MST):	11:31
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999995	≥0.995
408.4	409.3	0.9977			
213.7	214.6	0.9957	Slope	1.001233	0.90 - 1.10
112.3	113.5	0.9892			
			Intercept	0.590521	+/-20



NO_X Calibration Plot Date: May 1, 2023 Location: Anzac



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	May 2, 2023	Last Cal Date:	April 18, 2023
Start time (MST):	9:15	End time (MST):	11:38
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:	1.000057	1.007857	Backgd or Offset:	1.3	1.3
Calibration intercept:	0.140000	-0.500000	Coeff or Slope:	1.516	1.516

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.2	----
as found span	5000	884.2	400.0	402.9	0.993
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.8	----
high point	5000	884.9	400.0	402.4	0.994
second point	5000	769.3	200.0	201.5	0.993
third point	5000	669.8	100.0	100.4	0.996
as left zero	5000	0.0	0.0	-0.6	----
as left span	5000	883.1	400.0	405.1	0.987
				Average Correction Factor	0.994

Baseline Corr As found:	403.1	Previous response	400.2	*% 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

O_3 Calibration Summary

Version-01-2020

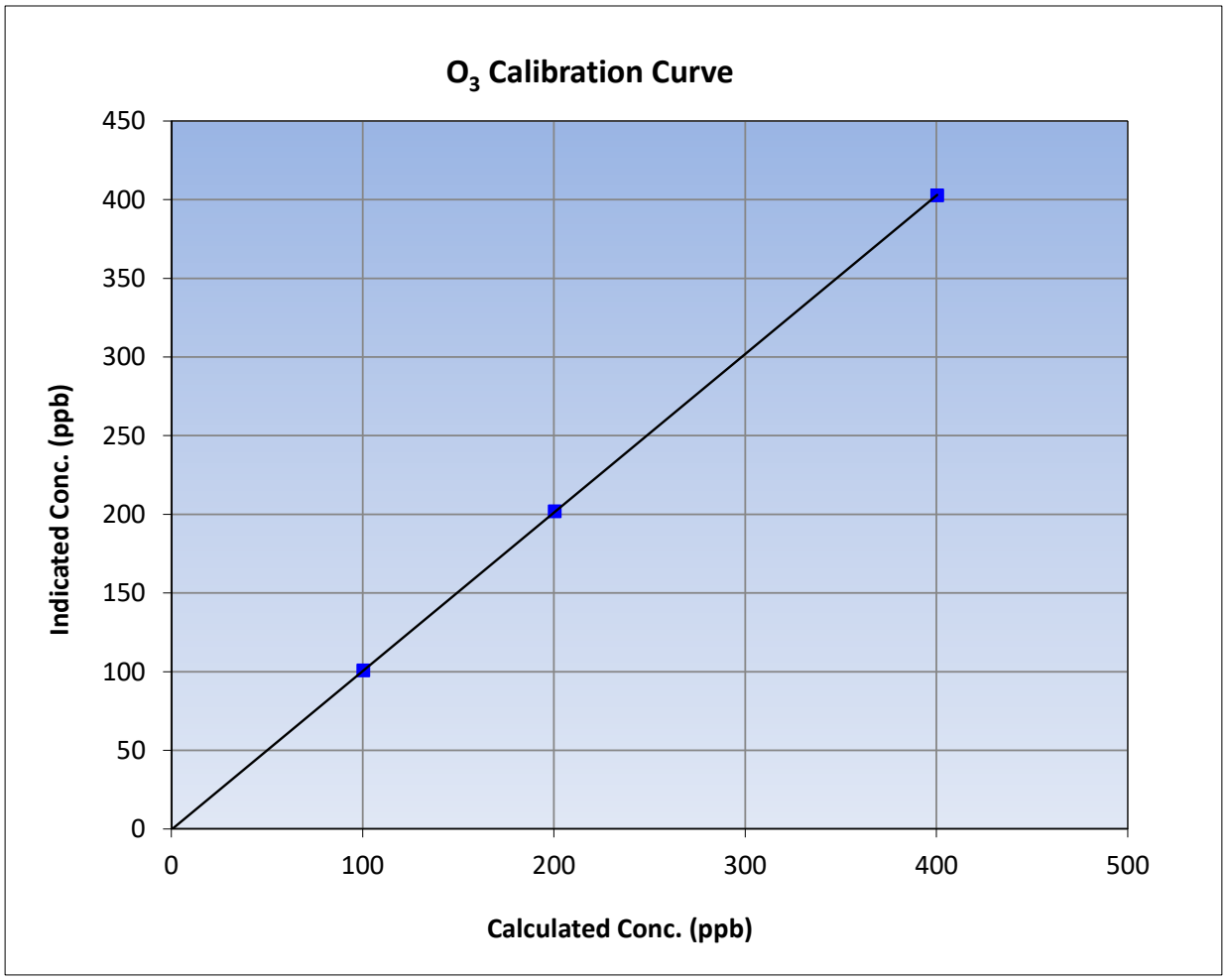
Station Information

Calibration Date:	May 2, 2023	Previous Calibration:	April 18, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	9:15	End Time (MST):	11:38
Analyzer make:	Thermo 49i	Analyzer serial #:	1426262595

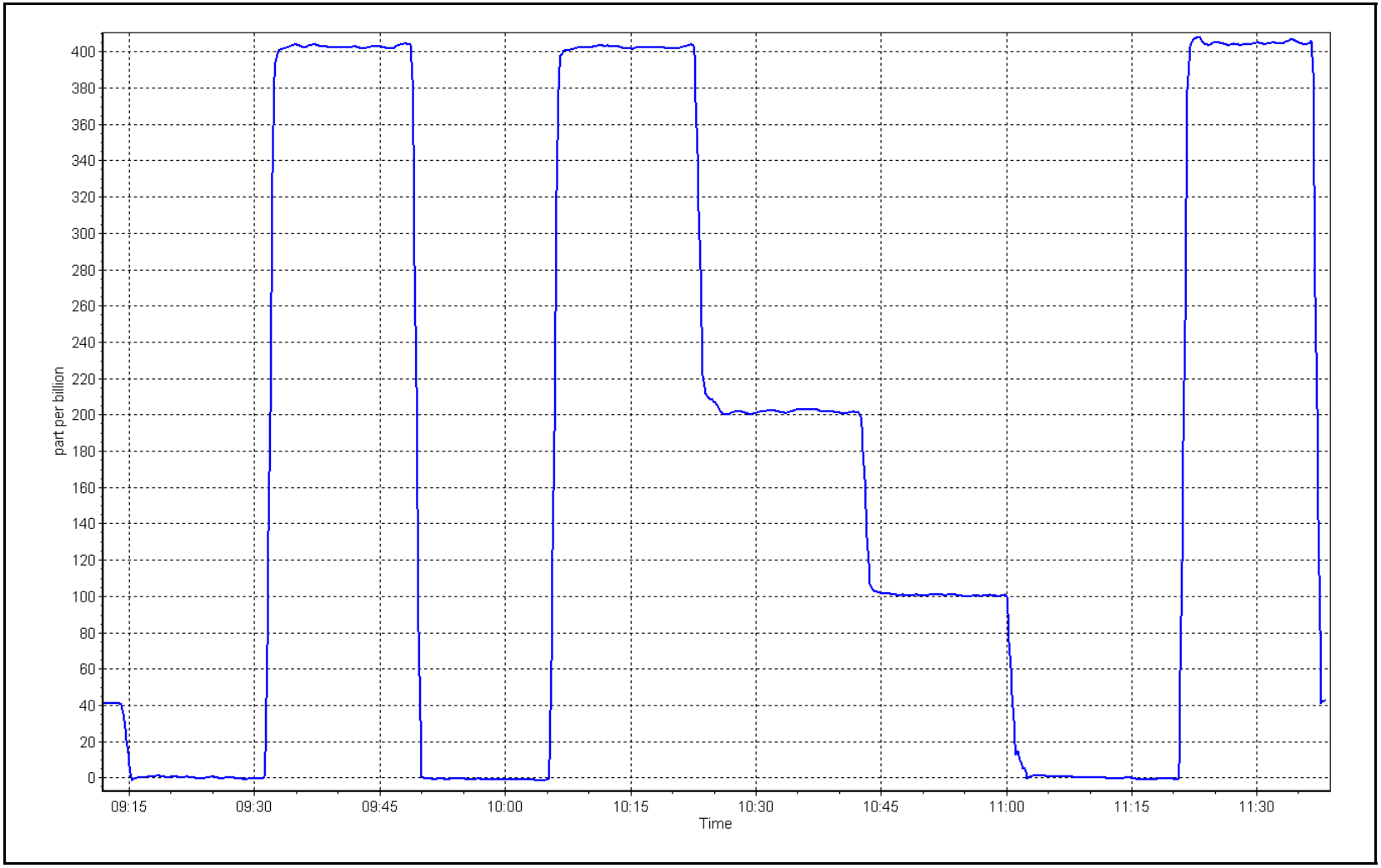
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.8	----
400.0	402.4	0.9940
200.0	201.5	0.9926
100.0	100.4	0.9960

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	1.007857	*0.90 - 1.10*
Intercept	-0.500000	*+/- 5*



O_3 Calibration Plot Date: May 2, 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:	May 30, 2023	Last Cal Date:	April 18, 2023
Start time (MST):	8:26	End time (MST):	8:49
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 (^{o}C)	19.9	20.4	19.9	☐	+/- 2 ^{o}C
P (mmHg)	711.4	712.7	711.4	☐	+/- 10 mmHg
flow (LPM)	5	5.05	5	☐	+/- 0.25 LPM

Leak Test: Date of check: May 30, 2023 Last Cal Date: April 18, 2023

PM w/o HEPA: 44 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

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

Disposable Filter Changed: March 30, 2023

Annual Maintenance

Date Sample Tube Cleaned: June 21, 2022

Date RH/T Sensor Cleaned: June 21, 2022

Notes: No adjustments done. Head Cleaned.

Calibration by: Melissa Lemay

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS17
WAPASU
MAY 2023

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

June 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	May 15, 2023	Last Cal Date:	April 13, 2023
Start time (MST):	9:58	End time (MST):	13:00
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:	0.999723	0.998882	Backgd or Offset:	12.4	12.4
Calibration intercept:	-1.559214	-2.039793	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	-0.3	----
as found span	4921	79.4	800.0	796.6	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	798.5	1.002
second point	4960	39.7	400.0	395.1	1.013
third point	4980	19.8	199.5	196.3	1.016
as left zero	5000	0.0	0.0	0.0	----
as left span	4920	79.4	800.1	801.1	0.999
				Average Correction Factor	1.010

Baseline Corr As found:	796.90	Previous response	798.19	*% change	-0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

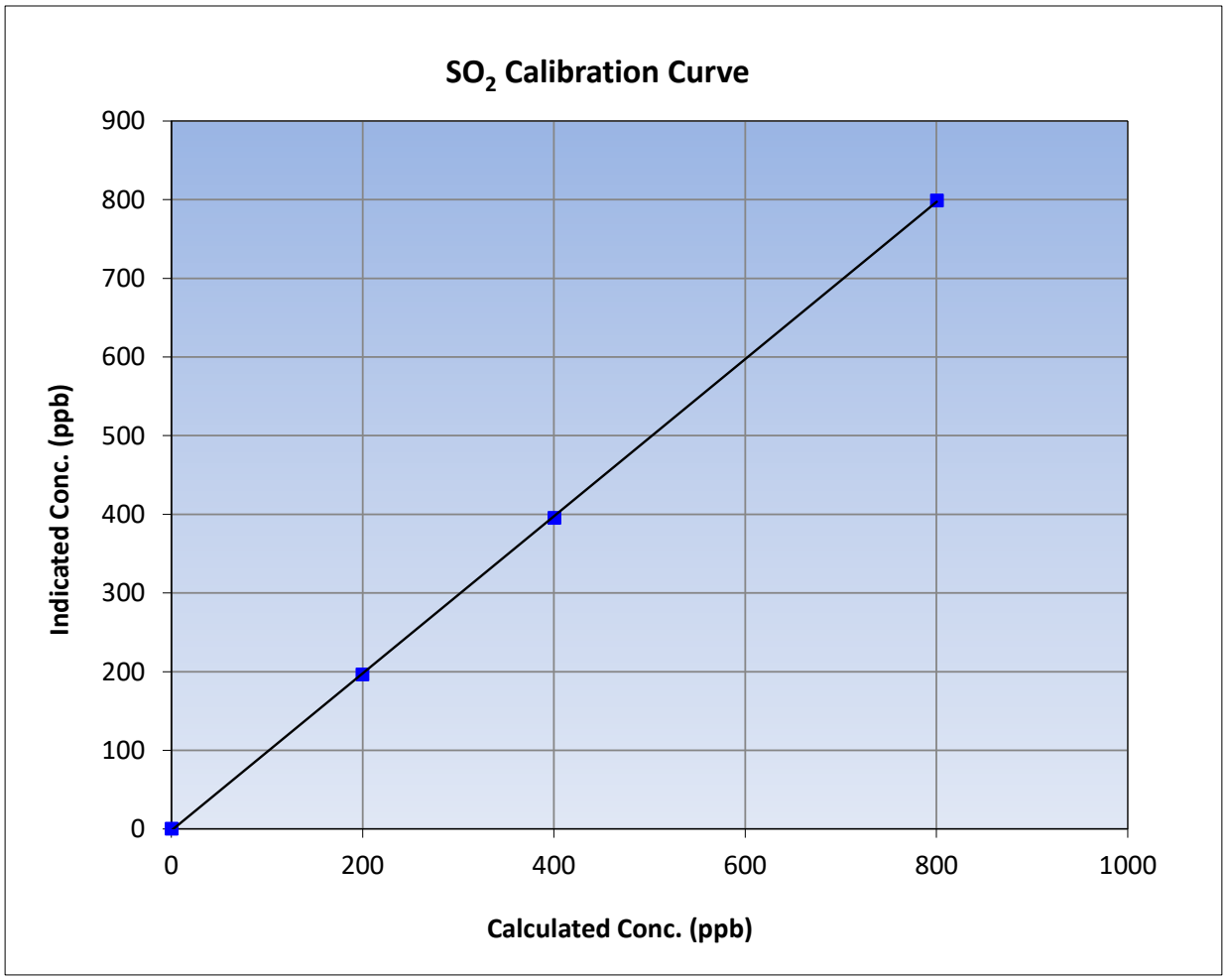
Station Information

Calibration Date:	May 15, 2023	Previous Calibration:	April 13, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:58	End Time (MST):	13:00
Analyzer make:	Thermo 43i	Analyzer serial #:	1218153459

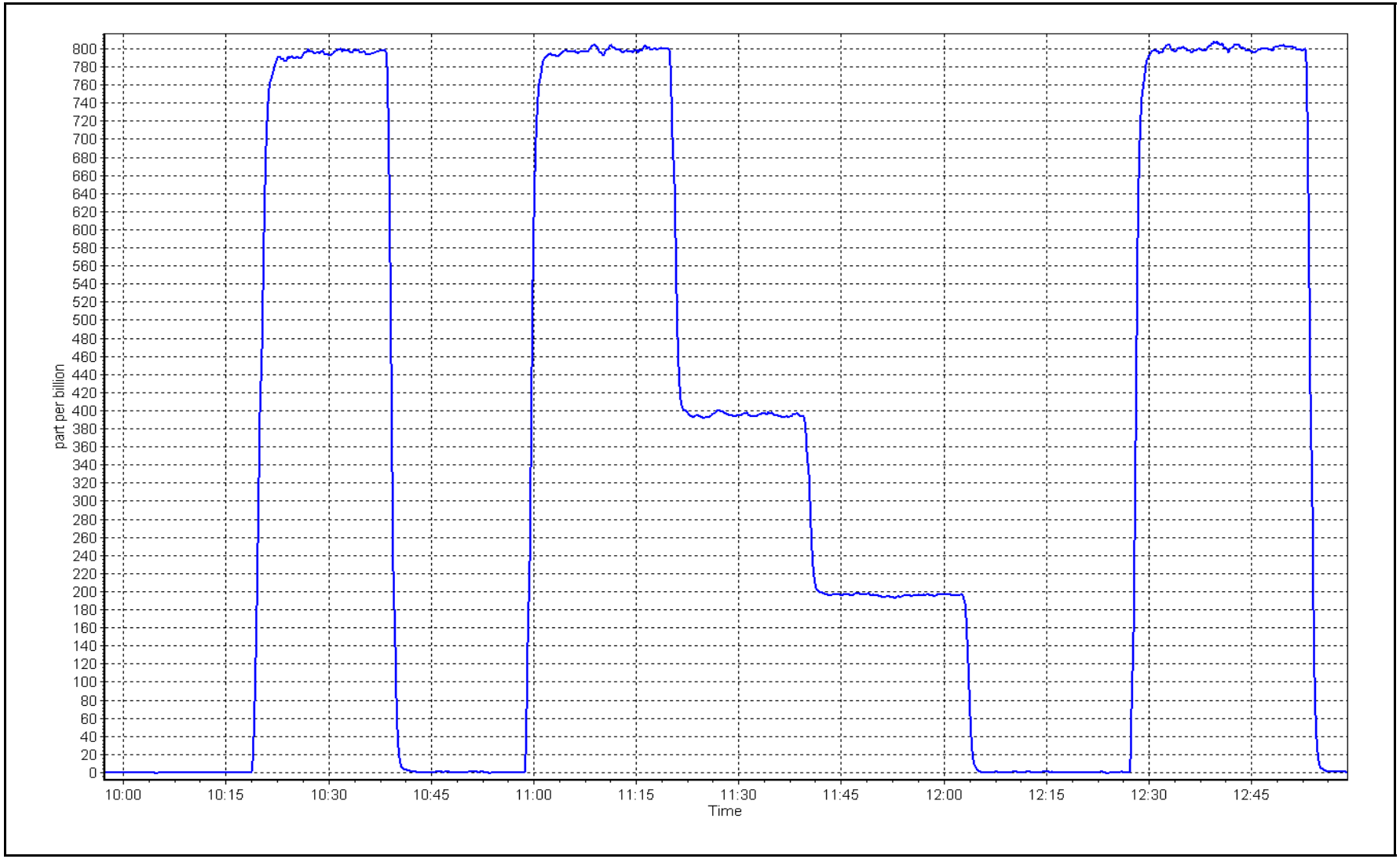
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
800.0	798.5	1.0018
400.0	395.1	1.0125
199.5	196.3	1.0164

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999963	*≥0.995*
Slope	0.998882	*0.90 - 1.10*
Intercept	-2.039793	*+/-30*



SO2 Calibration Plot Date: May 15, 2023 Location: Wapasu



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	May 23, 2023	Last Cal Date:	April 21, 2023
Start time (MST):	10:19	End time (MST):	14:09
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 450i		Analyzer serial #:	1218153583	
Converter make:	n/a		Converter serial #:	n/a	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.990854	0.987854	Backgd or Offset:	12.7	12.7
Calibration intercept:	0.220786	0.100766	Coeff or Slope:	1.085	1.085

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4921	78.8	80.0	79.8	1.004
as found 2nd point	4961	39.4	40.0	39.4	1.018
as found 3rd point	4980	19.7	20.0	19.8	1.015
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.4	----
high point	4921	78.8	80.0	79.4	1.008
second point	4961	39.4	40.0	39.1	1.023
third point	4980	19.7	20.0	19.8	1.010
as left zero	5000	0.0	0.0	0.4	----
as left span	4921	78.8	80.0	78.6	1.018
SO2 Scrubber Check	4921	79.4	800.0	-0.2	----
Date of last scrubber change:		n/a		Ave Corr Factor	1.014
Date of last converter efficiency test:		n/a			efficiency

Baseline Corr As found:	79.7	Prev response:	79.49	*% change:	0.3%
Baseline Corr 2nd AF pt:	39.3	AF Slope:	0.996426	AF Intercept:	-0.099220
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999943		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

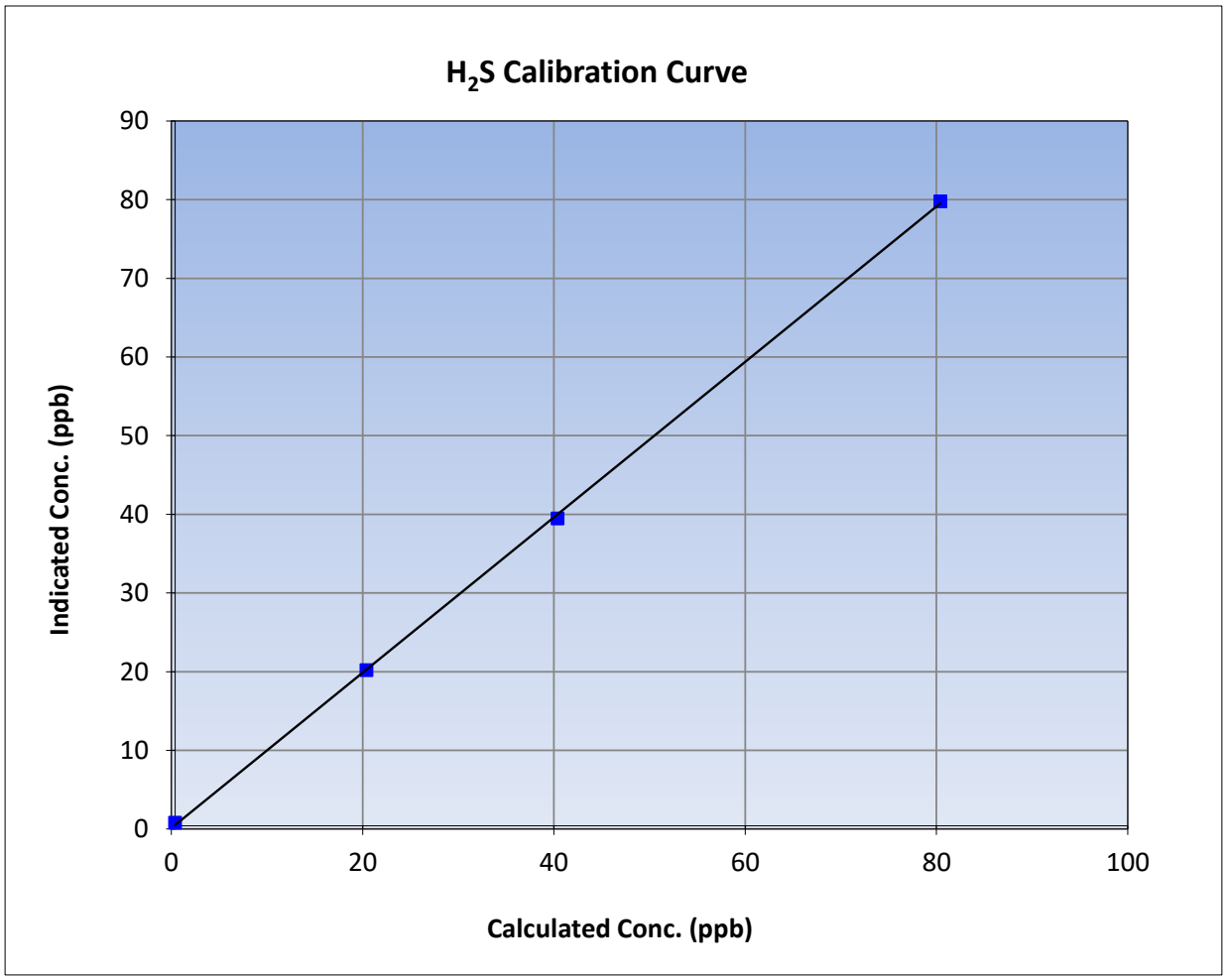
Station Information

Calibration Date:	May 23, 2023	Previous Calibration:	April 21, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:19	End Time (MST):	14:09
Analyzer make:	Thermo 450i	Analyzer serial #:	1218153583

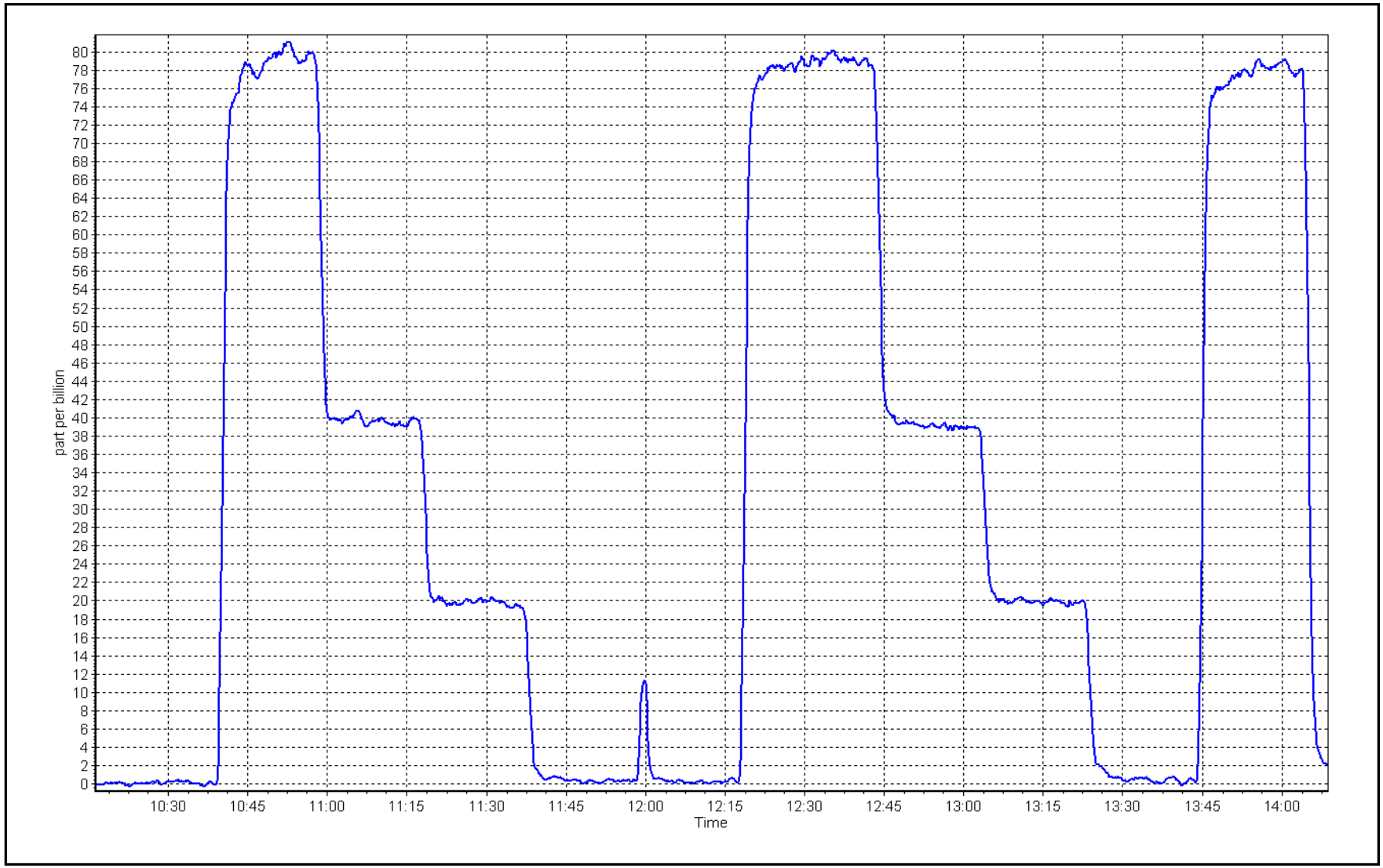
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
80.0	79.4	1.0076
40.0	39.1	1.0229
20.0	19.8	1.0101

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999875	*≥0.995*
Slope	0.987854	*0.90 - 1.10*
Intercept	0.100766	*+/-3*



H_2S Calibration Plot Date: May 23, 2023 Location: Wapasu



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	May 15, 2023	Last Cal Date:	April 13, 2023
Start time (MST):	9:58	End time (MST):	13:00
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:	1.001474	1.004482	Background:	3.070	3.070
Calibration intercept:	-0.066926	-0.015906	Coefficient:	4.296	4.296

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	0.03	----
as found span	4921	79.4	17.09	17.21	0.993
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	17.19	0.994
second point	4960	39.7	8.55	8.48	1.008
third point	4980	19.8	4.26	4.29	0.994
as left zero	5000	0.0	0.00	0.01	----
as left span	4920	79.4	17.09	17.14	0.997
				Average Correction Factor	0.999

Baseline Corr As found:	17.18	Previous response	17.05	*% change	0.8%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

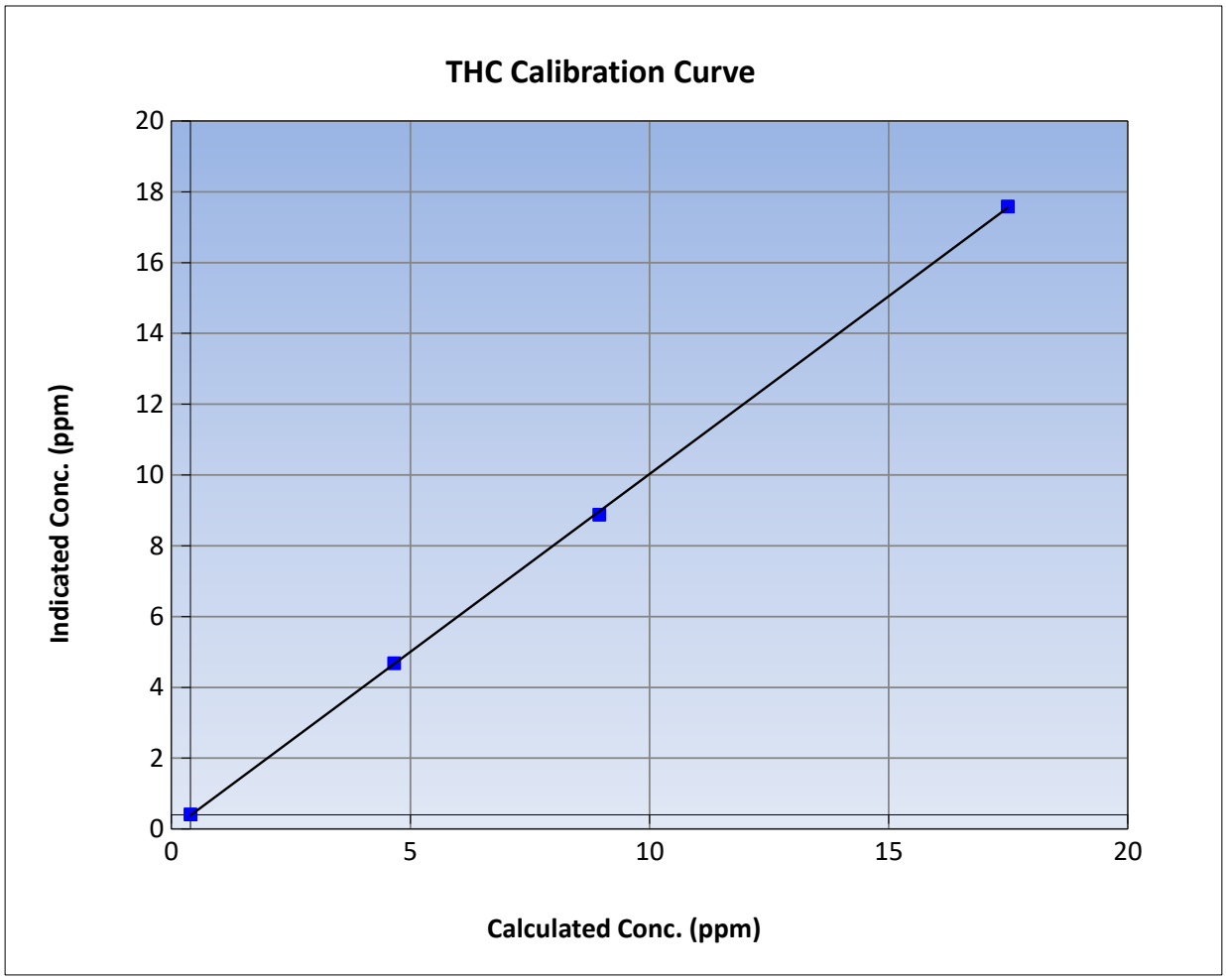
Station Information

Calibration Date:	May 15, 2023	Previous Calibration:	April 13, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:58	End Time (MST):	13:00
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1218153352

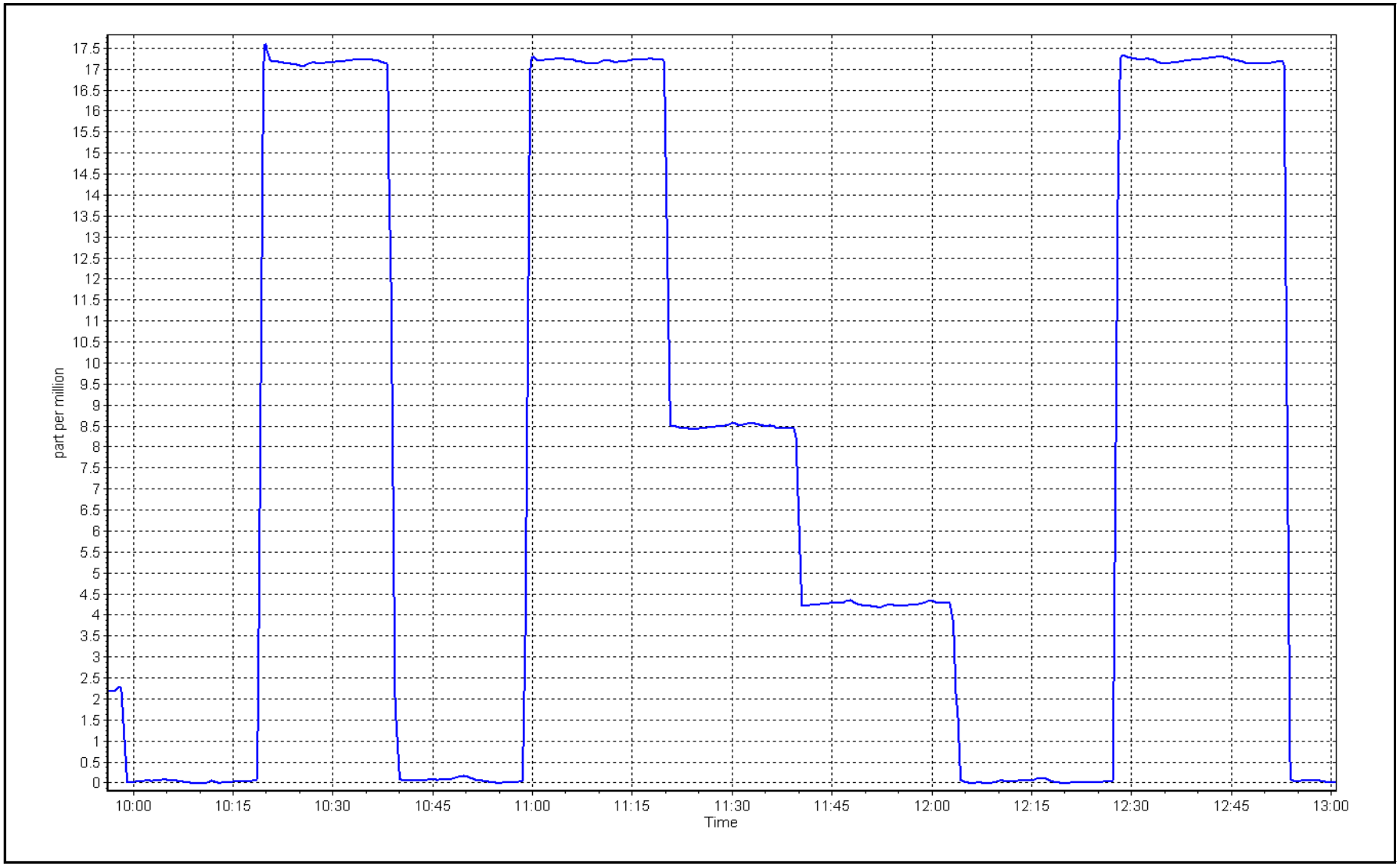
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.01	----
17.09	17.19	0.9942
8.55	8.48	1.0080
4.26	4.29	0.9943

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999932	*≥0.995*
Slope	1.004482	*0.90 - 1.10*
Intercept	-0.015906	*+/-1.5*



THC Calibration Plot Date: May 15, 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:	May 18, 2023	Last Cal Date:	April 25, 2023
Start time (MST):	9:22	End time (MST):	13:46
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:	0.836	0.836	NO bkgnd or offset:	0.1	0.1
NOX coeff or slope:	0.828	0.828	NOX bkgnd or offset:	-0.4	-0.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	4.4	4.4

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001718	1.000389
NO_X Cal Offset:	-1.660000	-0.960000
NO Cal Slope:	1.001759	1.000187
NO Cal Offset:	-1.940000	-1.540000
NO_2 Cal Slope:	0.991719	0.997323
NO_2 Cal Offset:	-0.351144	-0.628631

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	2.3	-0.2	2.5	----	----
as found span	4917	83.2	817.2	799.9	17.3	815.7	799.2	16.7	1.0018	1.0009
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.7	0.1	0.6	----	----
high point	4917	83.2	817.2	799.9	17.3	817.2	799.2	17.9	1.0000	1.0009
second point	4958	41.6	408.6	399.9	8.7	407.5	398.0	9.5	1.0027	1.0049
third point	4979	20.8	204.3	200.0	4.3	201.4	196.6	4.8	1.0144	1.0171
as left zero	5000	0.0	0.0	0.0	0.0	0.4	0.0	0.4	----	----
as left span	4917	83.2	817.2	400.5	416.7	811.6	397.8	413.7	1.0069	1.0067
								Average Correction Factor	1.0057	1.0076

Corrected As found	NO_X = 813.4 ppb	NO = 799.4 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -0.4%
Previous Response	NO_X = 816.9 ppb	NO = 799.4 ppb		*Percent Change	NO = 0.0%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.6	398.2	416.7	416.0	1.0017	99.8%
2nd GPT point (200 ppb O3)	797.6	598.6	216.3	213.4	1.0136	98.7%
3rd GPT point (100 ppb O3)	797.6	699.9	115.0	113.5	1.0133	98.7%
				Average Correction Factor	1.0095	99.1%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

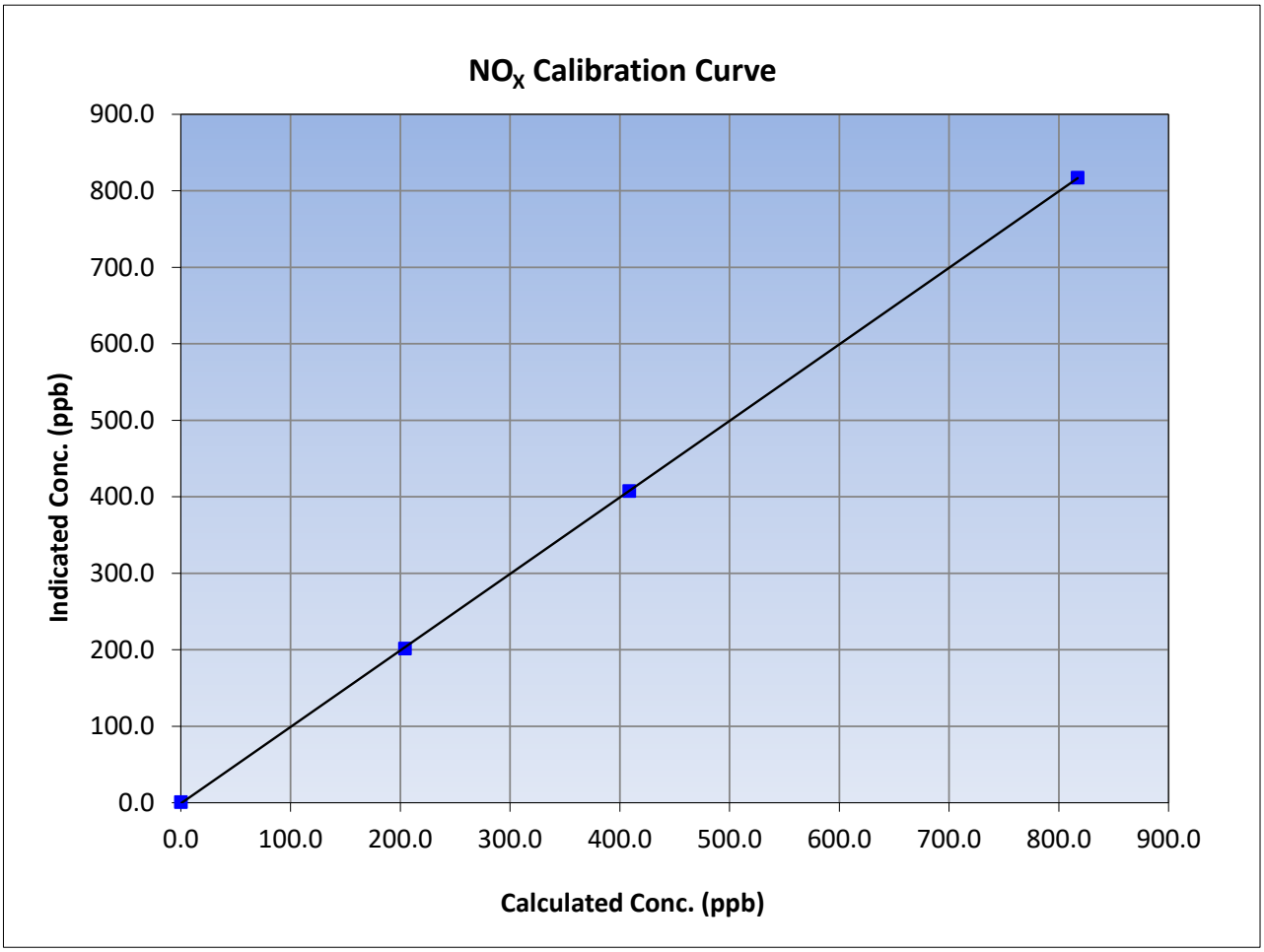
Version-04-2020

Station Information

Calibration Date:	May 18, 2023	Previous Calibration:	April 25, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:22	End Time (MST):	13:46
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	0.7	----	Correlation Coefficient	0.999980	≥0.995
817.2	817.2	1.0000			
408.6	407.5	1.0027	Slope	1.000389	0.90 - 1.10
204.3	201.4	1.0144			
			Intercept	-0.960000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

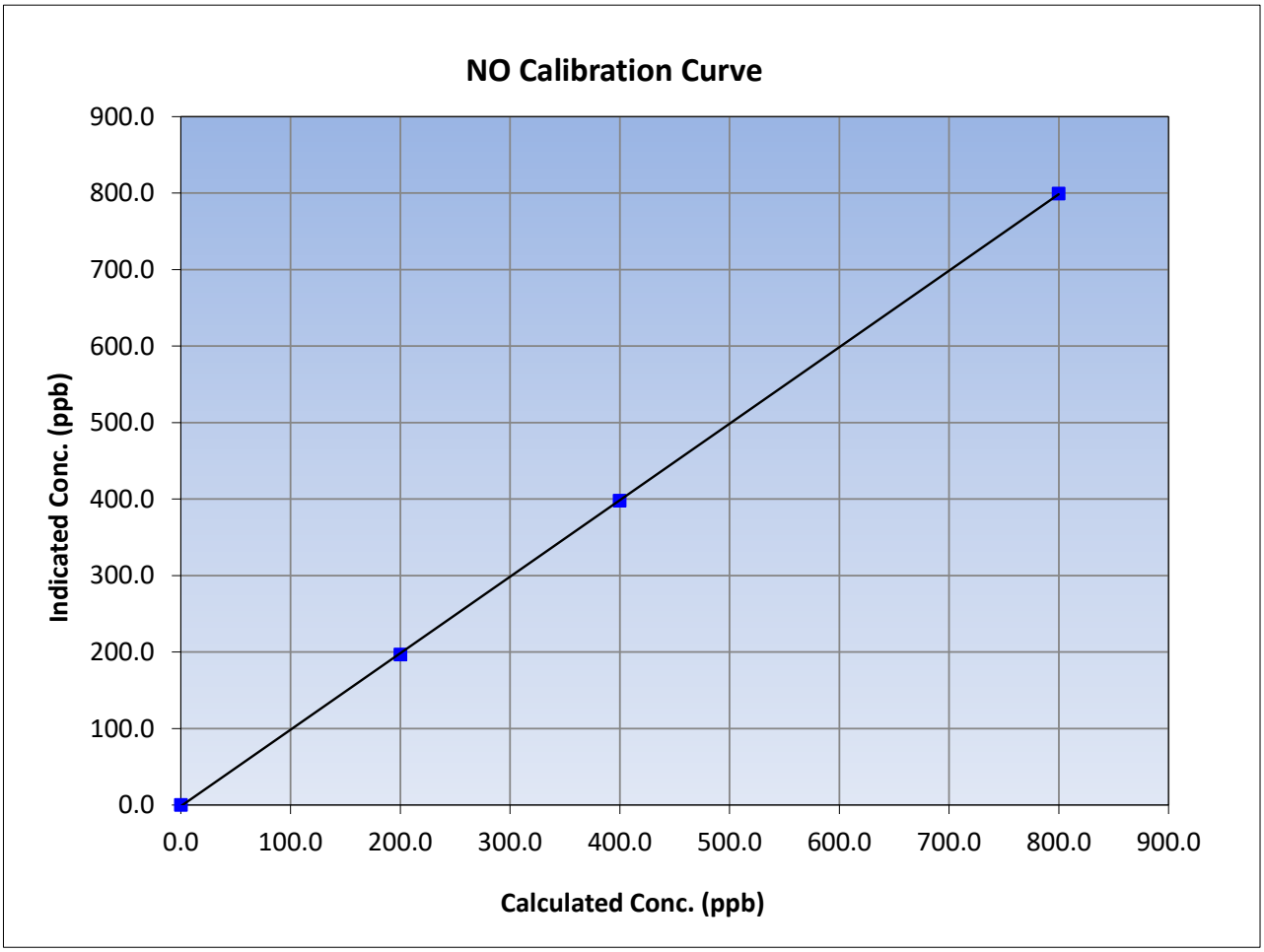
Version-04-2020

Station Information

Calibration Date:	May 18, 2023	Previous Calibration:	April 25, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:22	End Time (MST):	13:46
Analyzer make:	Teledyne API T200	Analyzer serial #:	833

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999980	≥0.995
799.9	799.2	1.0009			
399.9	398.0	1.0049	Slope	1.000187	0.90 - 1.10
200.0	196.6	1.0171			
			Intercept	-1.540000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

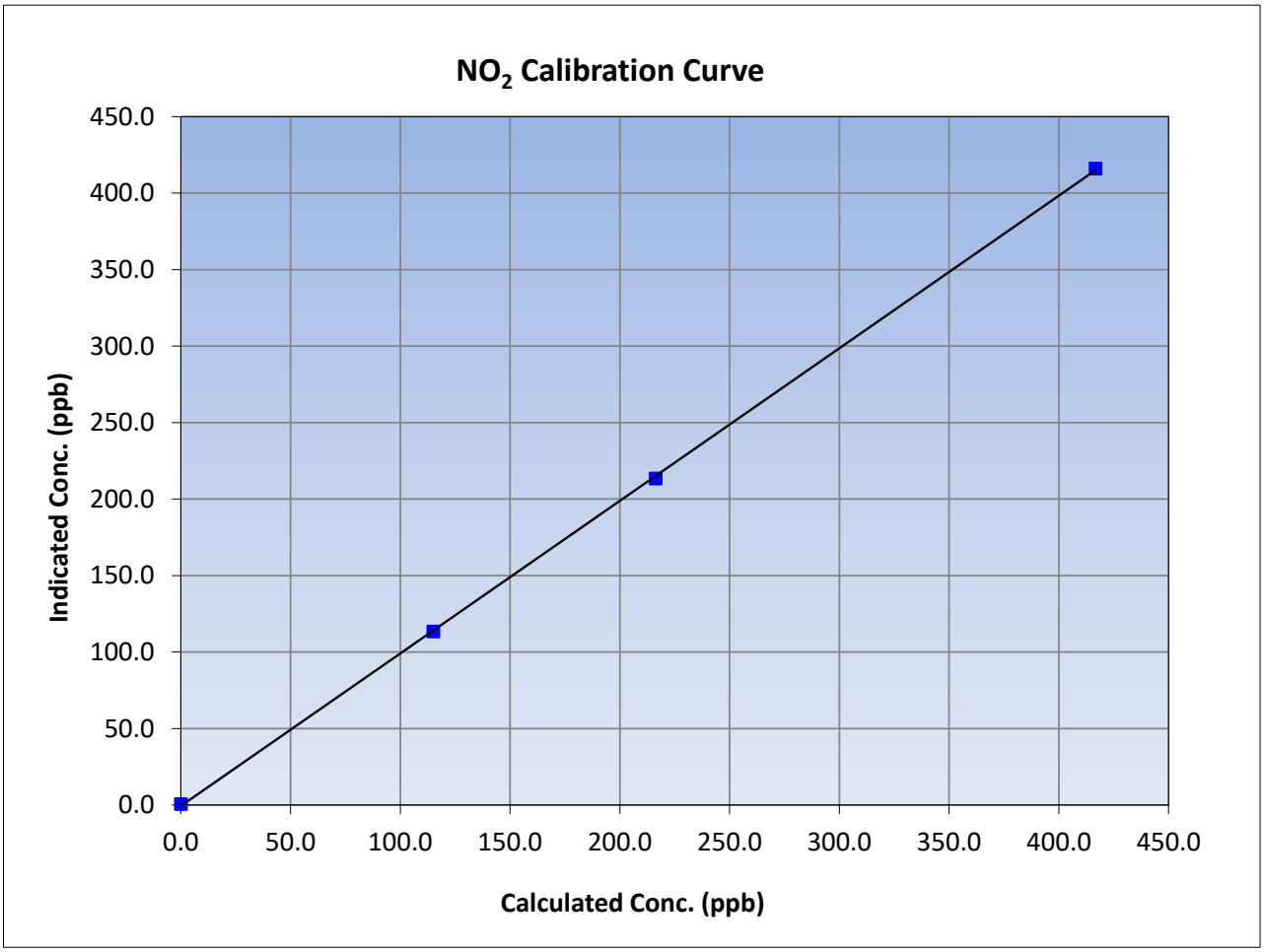
Version-04-2020

Station Information

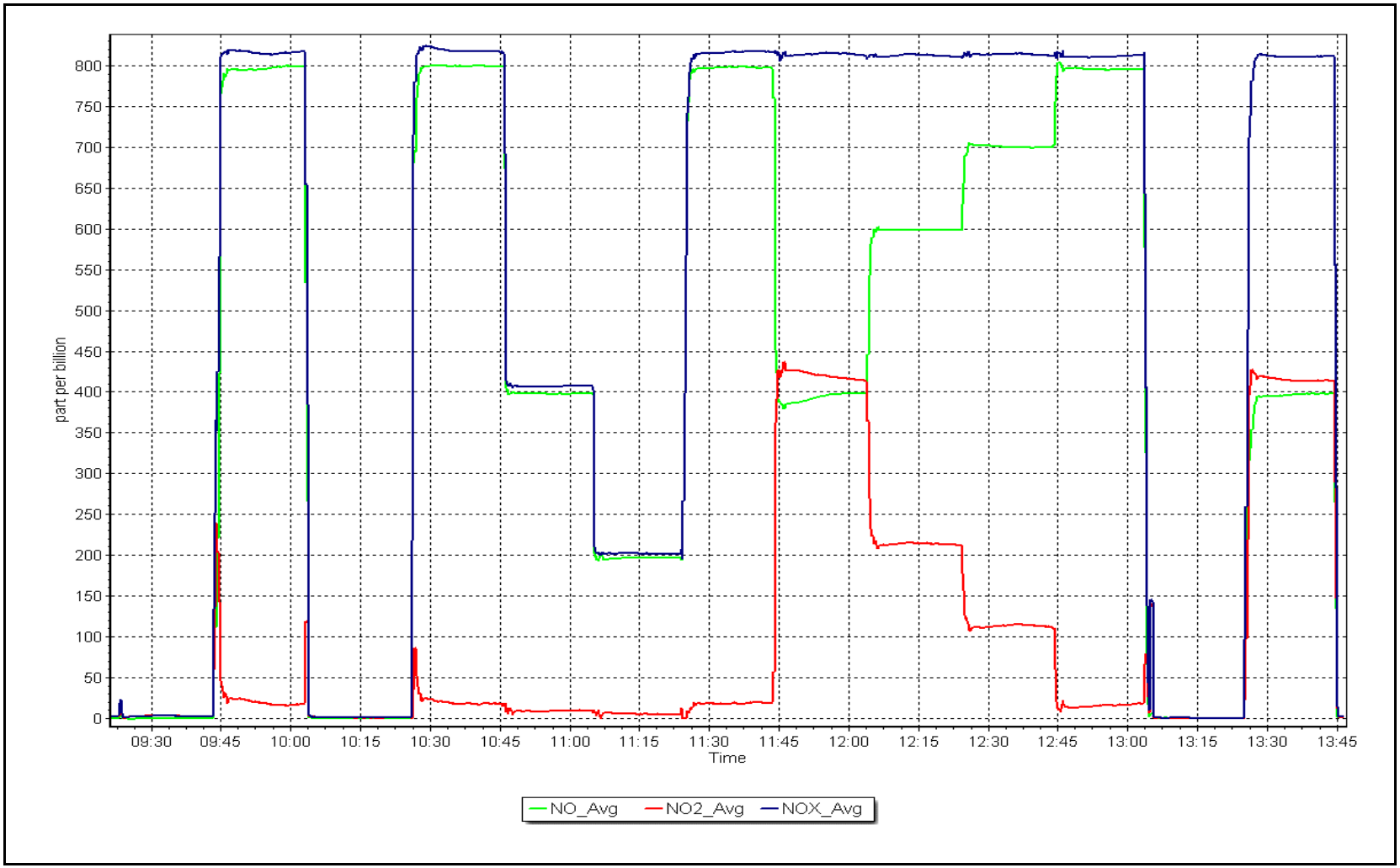
Calibration Date:	May 18, 2023	Previous Calibration:	April 25, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:22	End Time (MST):	13:46
Analyzer make:	Teledyne API T200	Analyzer serial #:	833

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.6	----	Correlation Coefficient	0.999938	≥0.995
416.7	416.0	1.0017			
216.3	213.4	1.0136	Slope	0.997323	0.90 - 1.10
115.0	113.5	1.0133			
			Intercept	-0.628631	+/-20



NO_X Calibration Plot Date: May 18, 2023 Location: Wapasu



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	May 5, 2023	Last Cal Date:	April 11, 2023
Start time (MST):	9:55	End time (MST):	12:38
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:	1.008600	1.008857	Backgd or Offset:	-1.8	-1.8
Calibration intercept:	-0.380000	-0.600000	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	403.9	0.990
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	1077.3	400.0	403.1	0.992
second point	5000	900.3	200.0	201.2	0.994
third point	5000	789.5	100.0	99.6	1.004
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	1077.3	400.0	405.6	0.986
				Average Correction Factor	0.997

Baseline Corr As found:	404.0	Previous response	403.1	*% change	0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed 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

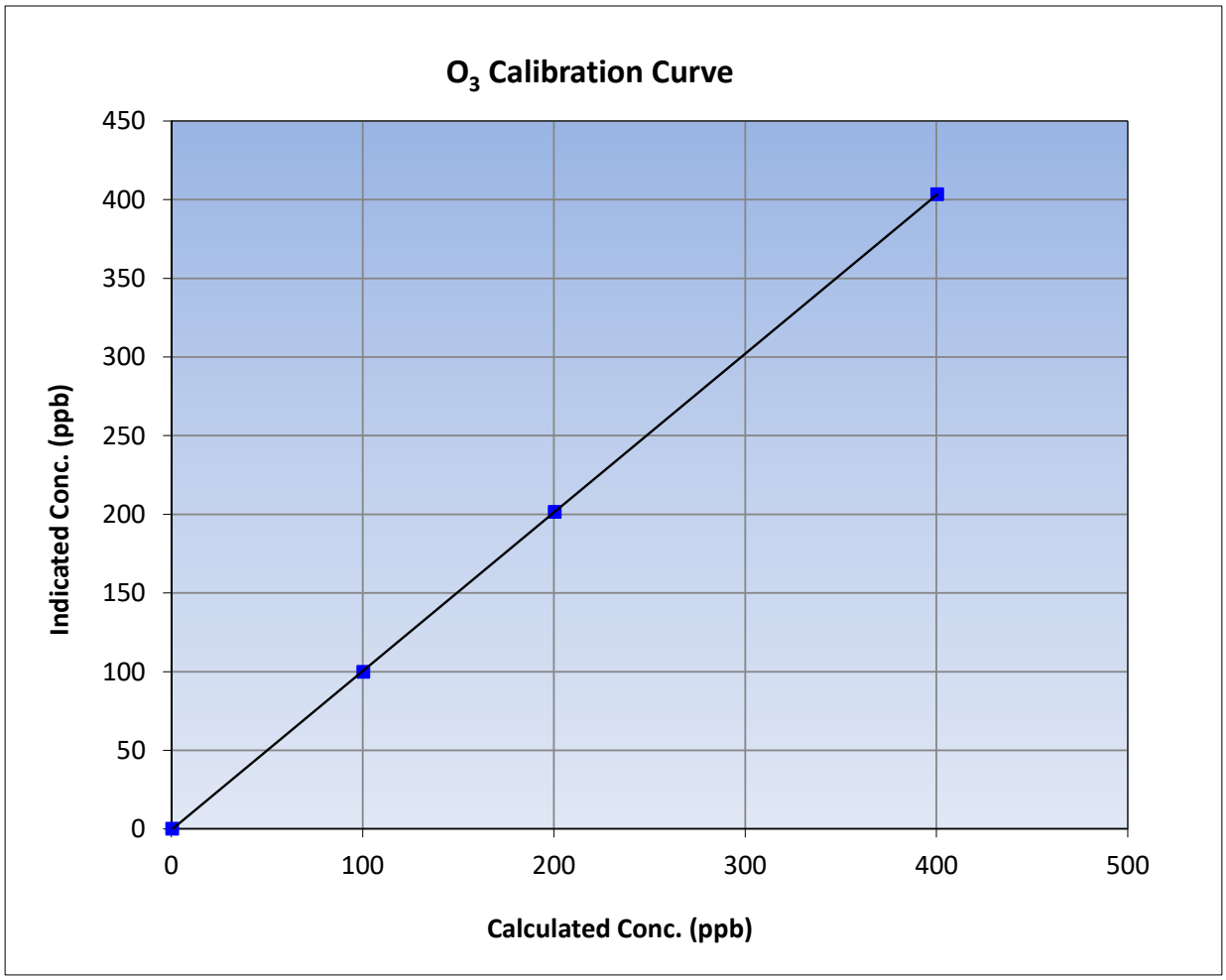
Station Information

Calibration Date:	May 5, 2023	Previous Calibration:	April 11, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:55	End Time (MST):	12:38
Analyzer make:	API T400	Analyzer serial #:	3870

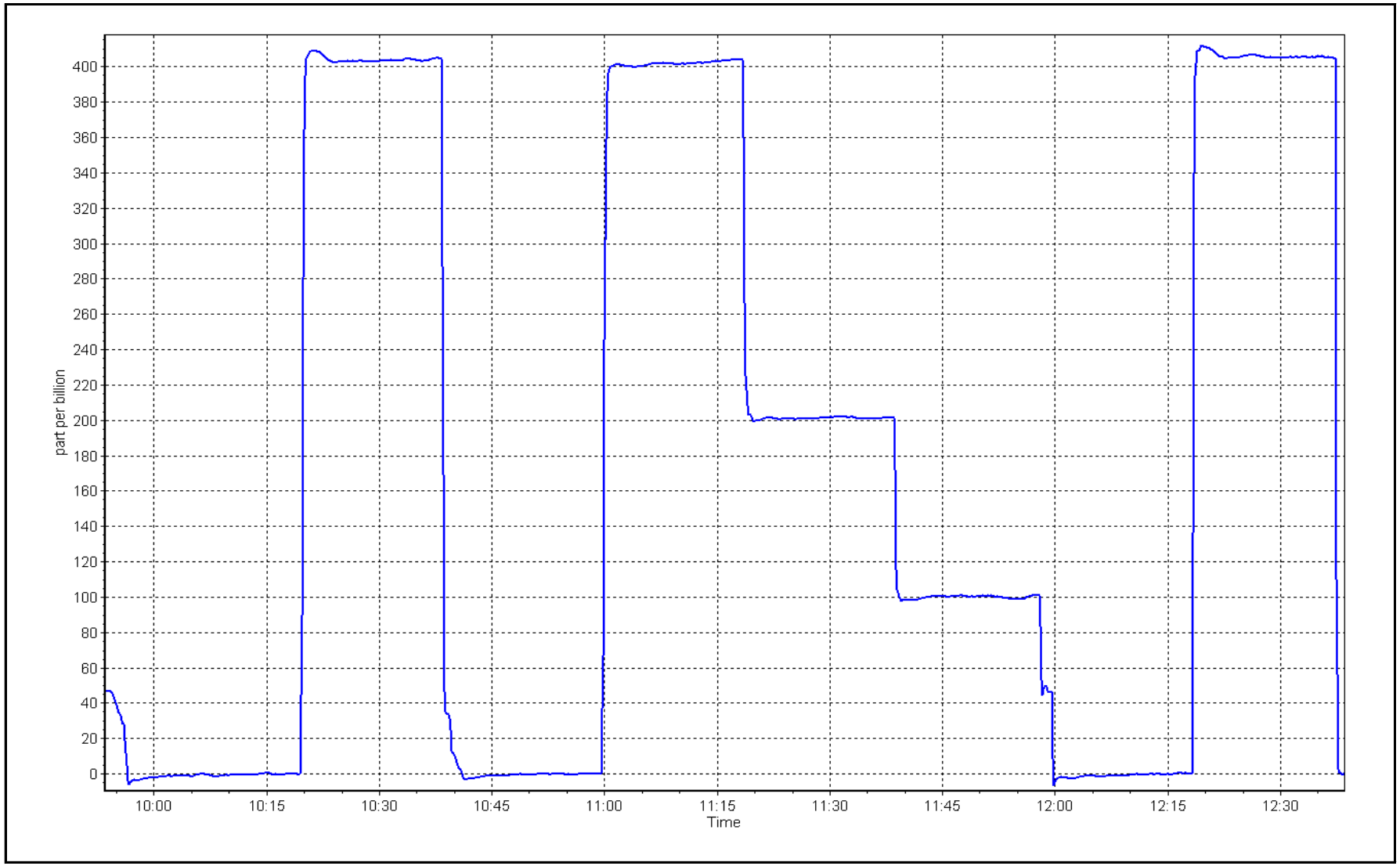
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
400.0	403.1	0.9923
200.0	201.2	0.9940
100.0	99.6	1.0040

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	1.008857	*0.90 - 1.10*
Intercept	-0.600000	*+/- 5*



O_3 Calibration Plot Date: May 5, 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:	May 23, 2023	Last Cal Date:	April 25, 2023
Start time (MST):	13:27	End time (MST):	13:57
Analyzer Make:	API T640	S/N:	1183
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388755
Temp/RH standard:	Alicat FP-25BT	S/N:	388755

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	6.8	6.3	6.8	☐	+/- 2 °C
P (mmHg)	717.1	719.7	717.1	☐	+/- 10 mmHg
flow (LPM)	5.01	5.15	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: May 23, 2023 Last Cal Date: April 25, 2023

PM w/o HEPA: 81.8 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	10.0	10	11.1	☑	10.9 +/- 0.5

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

Date Optical Chamber Cleaned: March 23, 2023 <0.2 ug/m3

Disposable Filter Changed: March 23, 2023

Annual Maintenance

Date Sample Tube Cleaned: _____

Date RH/T Sensor Cleaned: _____

Notes: Adjusted the PMT peak. Leak check passed.

Calibration by: Max Farrell

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS18
STONY MOUNTAIN
MAY 2023

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

June 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	May 8, 2023	Last Cal Date:	April 27, 2023
Start time (MST):	9:55	End time (MST):	13:38
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997063	1.000576	Backgd or Offset:	22.6	22.6
Calibration intercept:	0.035860	-1.343541	Coeff or Slope:	0.808	0.808

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	-0.1	----
as found span	4919	81.0	800.3	796.1	1.005
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	800.1	1.000
second point	4959	40.5	400.2	398.2	1.005
third point	4979	20.2	199.6	197.3	1.012
as left zero	5000	0.0	0.0	-0.2	----
as left span	4919	81.0	800.3	799.1	1.001
				Average Correction Factor	1.006

Baseline Corr As found:	796.20	Previous response	797.97	*% change	-0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

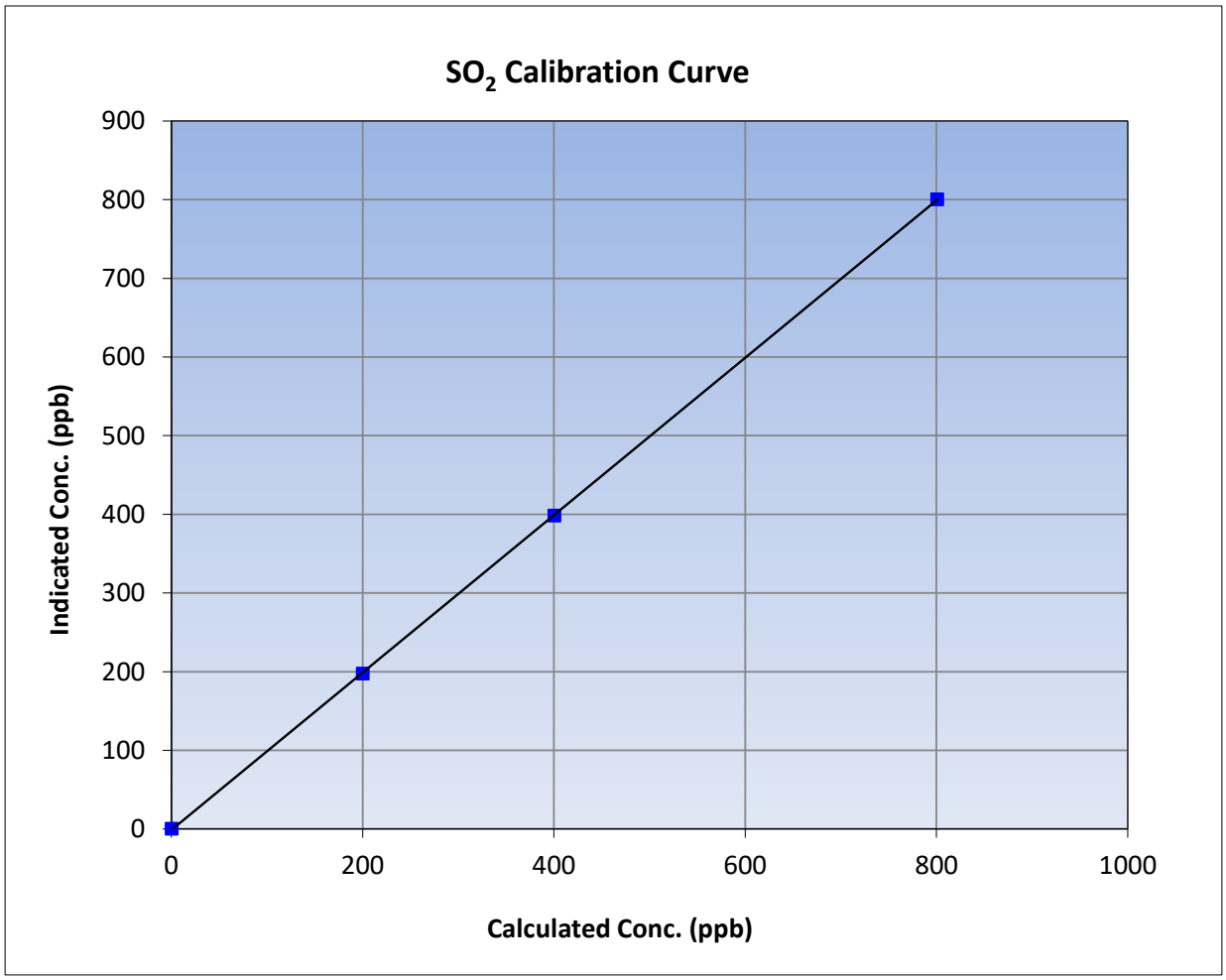
Station Information

Calibration Date:	May 8, 2023	Previous Calibration:	April 27, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:55	End Time (MST):	13:38
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301453

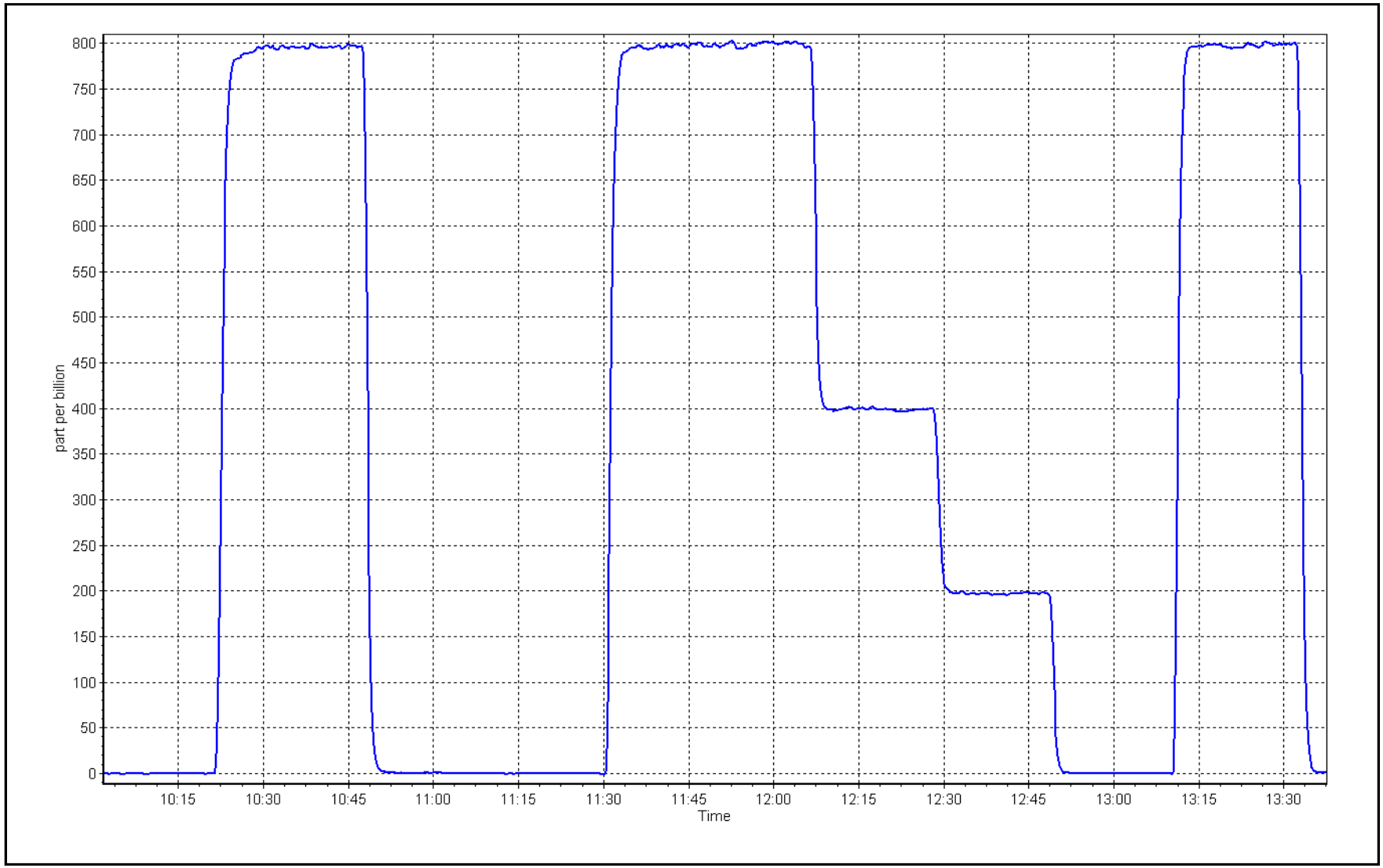
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
800.3	800.1	1.0002
400.2	398.2	1.0050
199.6	197.3	1.0117

Statistical Evaluation		Limits
Correlation Coefficient	0.999989	≥0.995
Slope	1.000576	0.90 - 1.10
Intercept	-1.343541	+/-30



SO2 Calibration Plot Date: May 8, 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:	May 16, 2023	Last Cal Date:	April 26, 2023
Start time (MST):	10:22	End time (MST):	15:30
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:	0.994871	1.001444	Backgd or Offset:	2.60	2.59
Calibration intercept:	0.321057	0.240955	Coeff or Slope:	1.151	1.159

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	77.7	1.031
as found 2nd point	4964	36.5	40.0	38.9	1.031
as found 3rd point	4983	18.3	20.0	19.0	1.061
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	80.3	0.996
second point	4964	36.5	40.0	40.4	0.990
third point	4983	18.3	20.0	20.3	0.988
as left zero	5000	0.0	0.0	0.4	----
as left span	4927	73.0	80.0	80.3	0.996
SO2 Scrubber Check	4923	77.1	771.0	0.0	----
Date of last scrubber change:		17-Dec-21		Ave Corr Factor	0.991
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	77.6	Prev response:	79.90	*% change:	-3.0%
Baseline Corr 2nd AF pt:	38.8	AF Slope:	0.972430	AF Intercept:	-0.118314
Baseline Corr 3rd AF pt:	18.9	AF Correlation:	0.999937		

* = > +/-5% change initiates investigation

Notes: Sample inlet filter changed after as founds. Scrubber check completed after calibrator zero. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

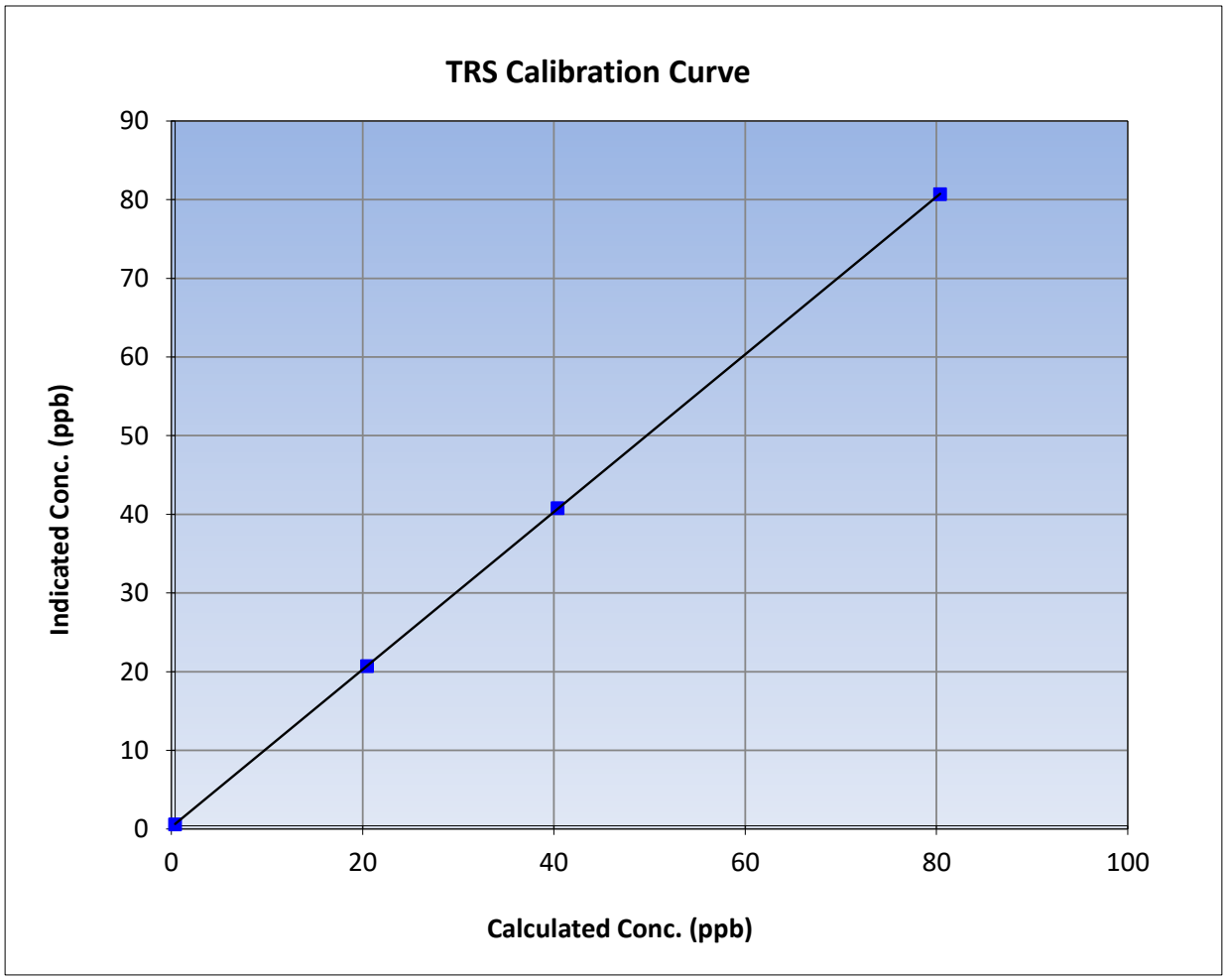
Station Information

Calibration Date:	May 16, 2023	Previous Calibration:	April 26, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	10:22	End Time (MST):	15:30
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153359

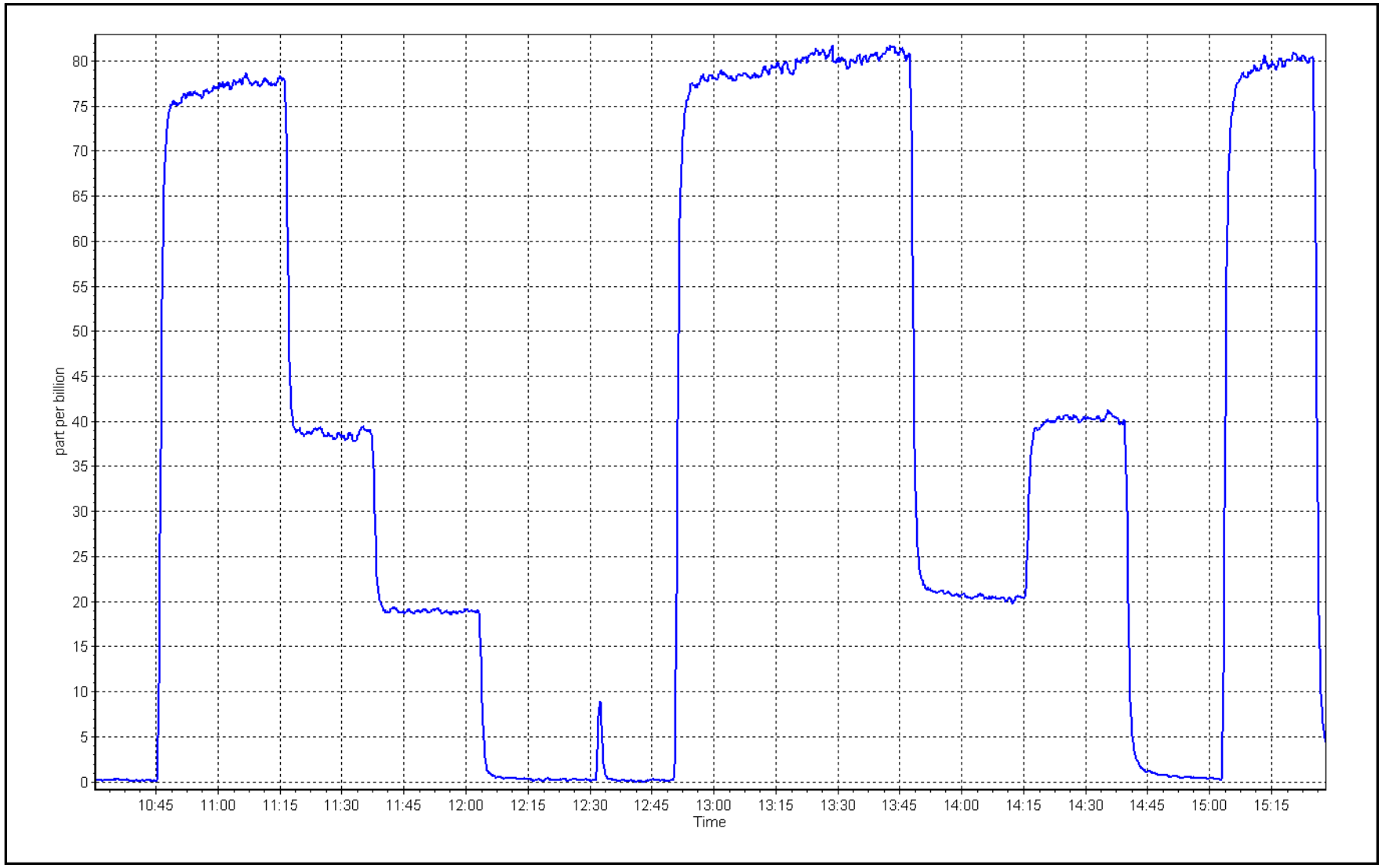
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	80.3	0.9962
40.0	40.4	0.9899
20.0	20.3	0.9876

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.001444	*0.90 - 1.10*
Intercept	0.240955	*+/-3*



TRS Calibration Plot Date: May 16, 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:	May 8, 2023	Last Cal Date:	April 27, 2023
Start time (MST):	9:55	End time (MST):	13:38
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	3.10E-04	NMHC SP Ratio:	5.73E-05	5.89E-05
CH4 Retention time:	14.60	14.60	NMHC Peak Area:	159925	155690

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	17.02	1.016
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.0	17.28	17.27	1.001
second point	4959	40.5	8.64	8.61	1.003
third point	4979	20.2	4.31	4.28	1.006
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	1.003

Baseline Corr AF:	17.02	Prev response	17.27	*% change	-1.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	9.17	8.96	1.023
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.0	9.17	9.16	1.001
second point	4959	40.5	4.58	4.57	1.002
third point	4979	20.2	2.29	2.28	1.002
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81	9.17	9.19	0.998
				Average Correction Factor	1.002
Baseline Corr AF:	8.96	Prev response	9.17	*% change	-2.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	8.11	8.06	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.0	8.11	8.11	1.000
second point	4959	40.5	4.06	4.04	1.004
third point	4979	20.2	2.02	2.00	1.011
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	8.11	8.14	0.997
				Average Correction Factor	1.005
Baseline Corr AF:	8.06	Prev response	8.10	*% change	-0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999520	0.999626
THC Cal Offset:	-0.003183	-0.013988
CH4 Cal Slope:	0.999834	1.000468
CH4 Cal Offset:	-0.012012	-0.012012
NMHC Cal Slope:	0.999279	0.998732
NMHC Cal Offset:	0.008428	-0.001376

Notes: Sample inlet filter changed after as founds. N2 cylinder changed after as founds. Adjusted the span only.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

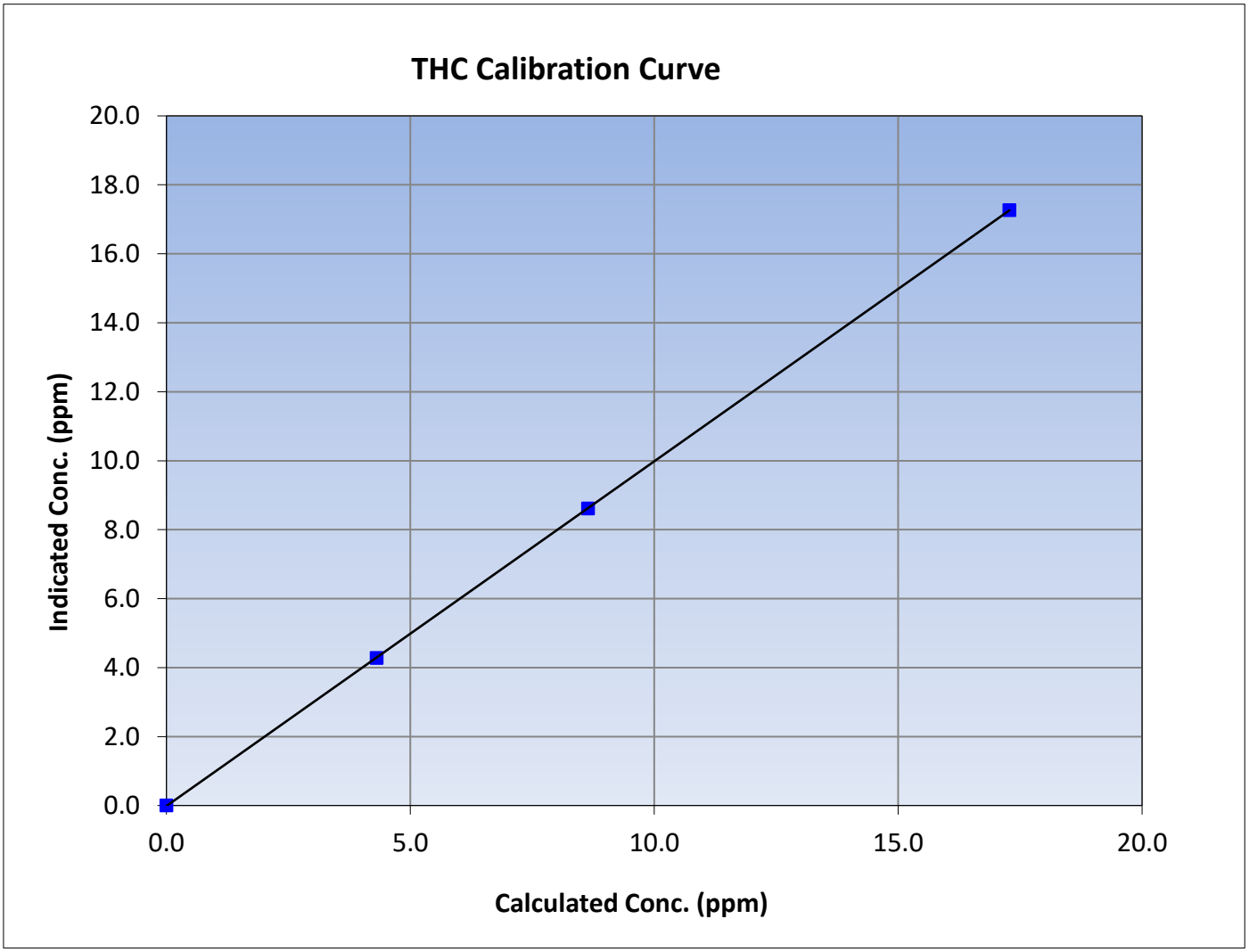
Version-01-2020

Station Information

Calibration Date:	May 8, 2023	Previous Calibration:	April 27, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:55	End Time (MST):	13:38
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999997	*≥0.995*
17.28	17.27	1.0007			
8.64	8.61	1.0032	Slope	0.999626	*0.90 - 1.10*
4.31	4.28	1.0064			
			Intercept	-0.013988	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

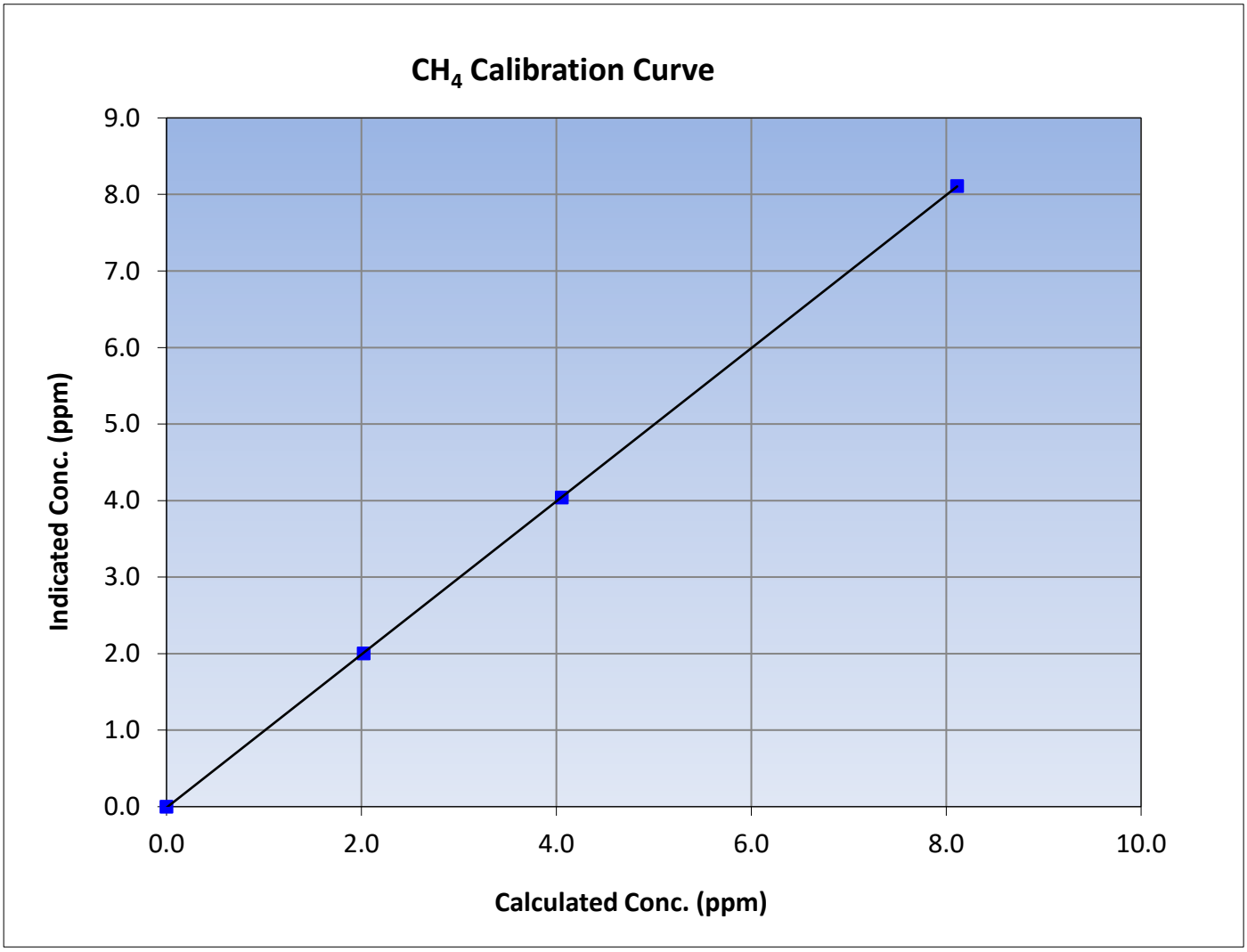
Version-01-2020

Station Information

Calibration Date:	May 8, 2023	Previous Calibration:	April 27, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:55	End Time (MST):	13:38
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	0.999990	*≥0.995*
8.11	8.11	1.0002			
4.06	4.04	1.0042	Slope	1.000468	*0.90 - 1.10*
2.02	2.00	1.0113			
			Intercept	-0.012012	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

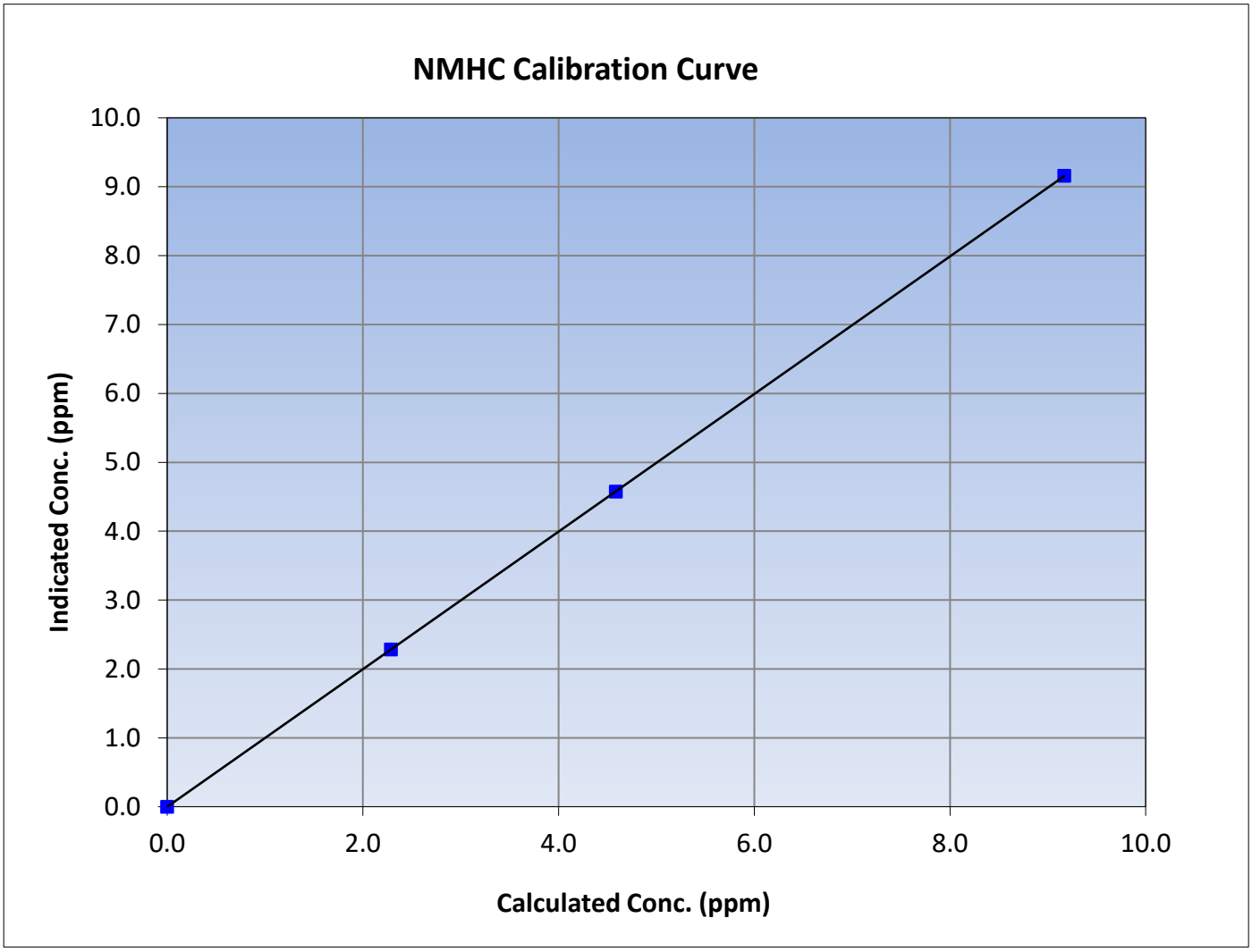
Version-01-2020

Station Information

Calibration Date:	May 8, 2023	Previous Calibration:	April 27, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:55	End Time (MST):	13:38
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	1.000000	≥0.995
9.17	9.16	1.0012			
4.58	4.57	1.0023	Slope	0.998732	0.90 - 1.10
2.29	2.28	1.0017			
			Intercept	-0.001376	+/-0.5



NMHC Calibration Plot Date: May 8, 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:	May 13, 2023	Last Cal Date:	May 8, 2023
Start time (MST):	11:03	End time (MST):	14:21
Reason:	Maintenance		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	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:	3.10E-04	3.15E-04	NMHC SP Ratio:	5.89E-05	5.66E-05
CH4 Retention time:	14.60	15.20	NMHC Peak Area:	155690	161883

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	17.18	1.006
as found 2nd point	4959	40.5	8.64	8.56	1.010
as found 3rd point	4979	20.2	4.31	4.26	1.012
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.0	17.28	17.27	1.001
second point	4959	40.5	8.64	8.64	1.000
third point	4979	20.2	4.31	4.29	1.005
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	17.28	17.27	1.000
				Average Correction Factor	1.002

Baseline Corr AF:	17.18	Prev response	17.26	*% change	-0.4%
Baseline Corr 2nd AF:	8.6	AF Slope:	0.994661	AF Intercept:	-0.018206
Baseline Corr 3rd AF:	4.3	AF Correlation:	0.999993	* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	9.17	9.25	0.992
as found 2nd point	4959	40.5	4.58	4.62	0.993
as found 3rd point	4979	20.2	2.29	2.31	0.992
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.0	9.17	9.16	1.001
second point	4959	40.5	4.58	4.60	0.997
third point	4979	20.2	2.29	2.28	1.001
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81	9.17	9.14	1.004
				Average Correction Factor	1.000
Baseline Corr AF:	9.25	Prev response	9.16	*% change	1.0%
Baseline Corr 2nd AF:	4.6	AF Slope:	1.008316	AF Intercept:	-0.001557
Baseline Corr 3rd AF:	2.3	AF Correlation:	0.999999	* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	8.11	7.94	1.022
as found 2nd point	4959	40.5	4.06	3.94	1.030
as found 3rd point	4979	20.2	2.02	1.95	1.036
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.0	8.11	8.11	1.000
second point	4959	40.5	4.06	4.04	1.003
third point	4979	20.2	2.02	2.00	1.010
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	8.11	8.13	0.998
				Average Correction Factor	1.005
Baseline Corr AF:	7.94	Prev response	8.10	*% change	-2.1%
Baseline Corr 2nd AF:	3.94	AF Slope:	0.978891	AF Intercept:	-0.016450
Baseline Corr 3rd AF:	1.95	AF Correlation:	0.999978	* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999626	0.999792
THC Cal Offset:	-0.013988	-0.006990
CH4 Cal Slope:	1.000468	1.000313
CH4 Cal Offset:	-0.012012	-0.010212
NMHC Cal Slope:	0.998732	0.998770
NMHC Cal Offset:	-0.001376	0.004221

Notes: Instrument started dipping this morning. After as founds checked the operation of the actuator. It was a little sticky so replaced it. Adjusted the span.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

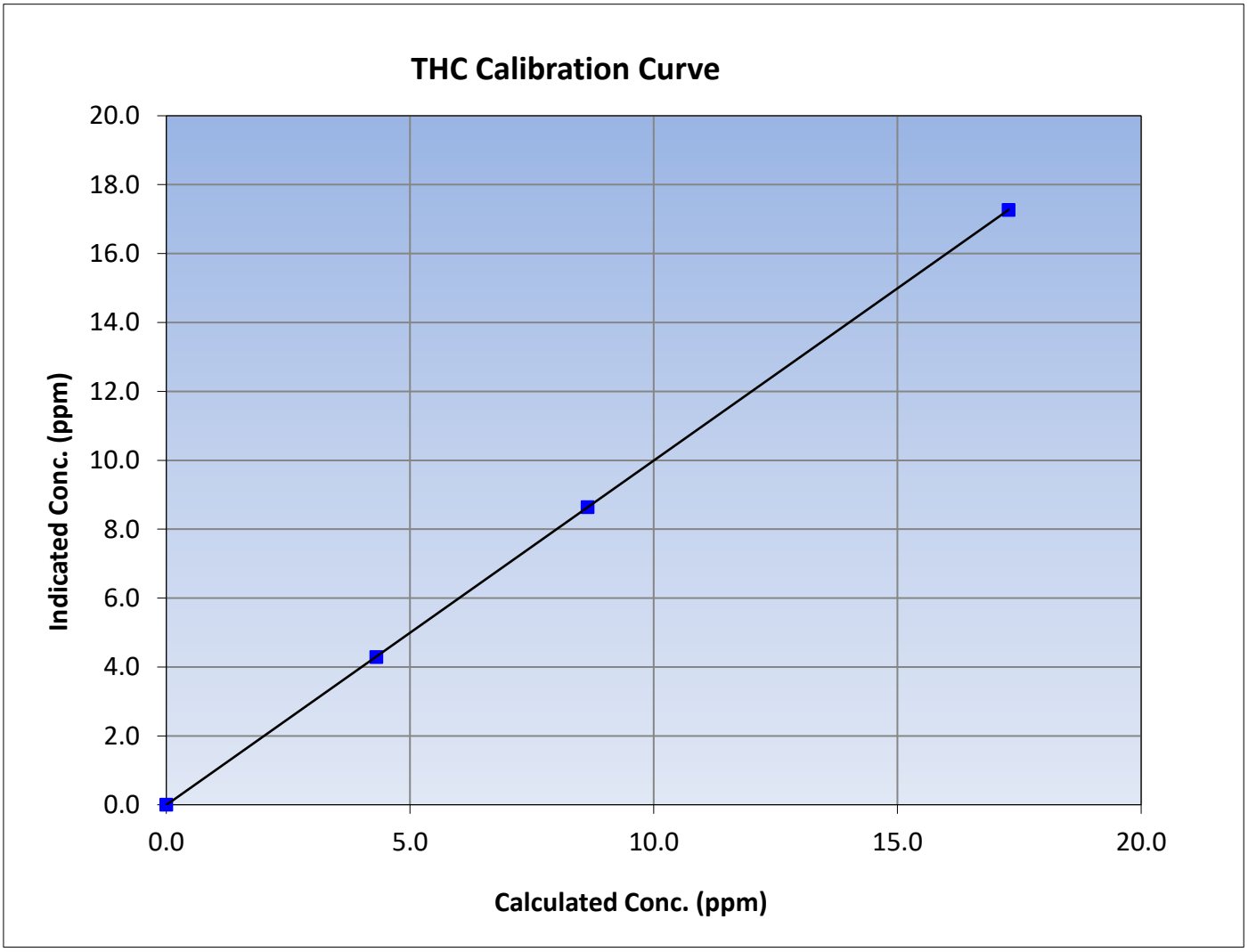
Version-01-2020

Station Information

Calibration Date:	May 13, 2023	Previous Calibration:	May 8, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:03	End Time (MST):	14:21
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	17.27	1.0007			
8.64	8.64	0.9999	Slope	0.999792	0.90 - 1.10
4.31	4.29	1.0054			
			Intercept	-0.006990	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

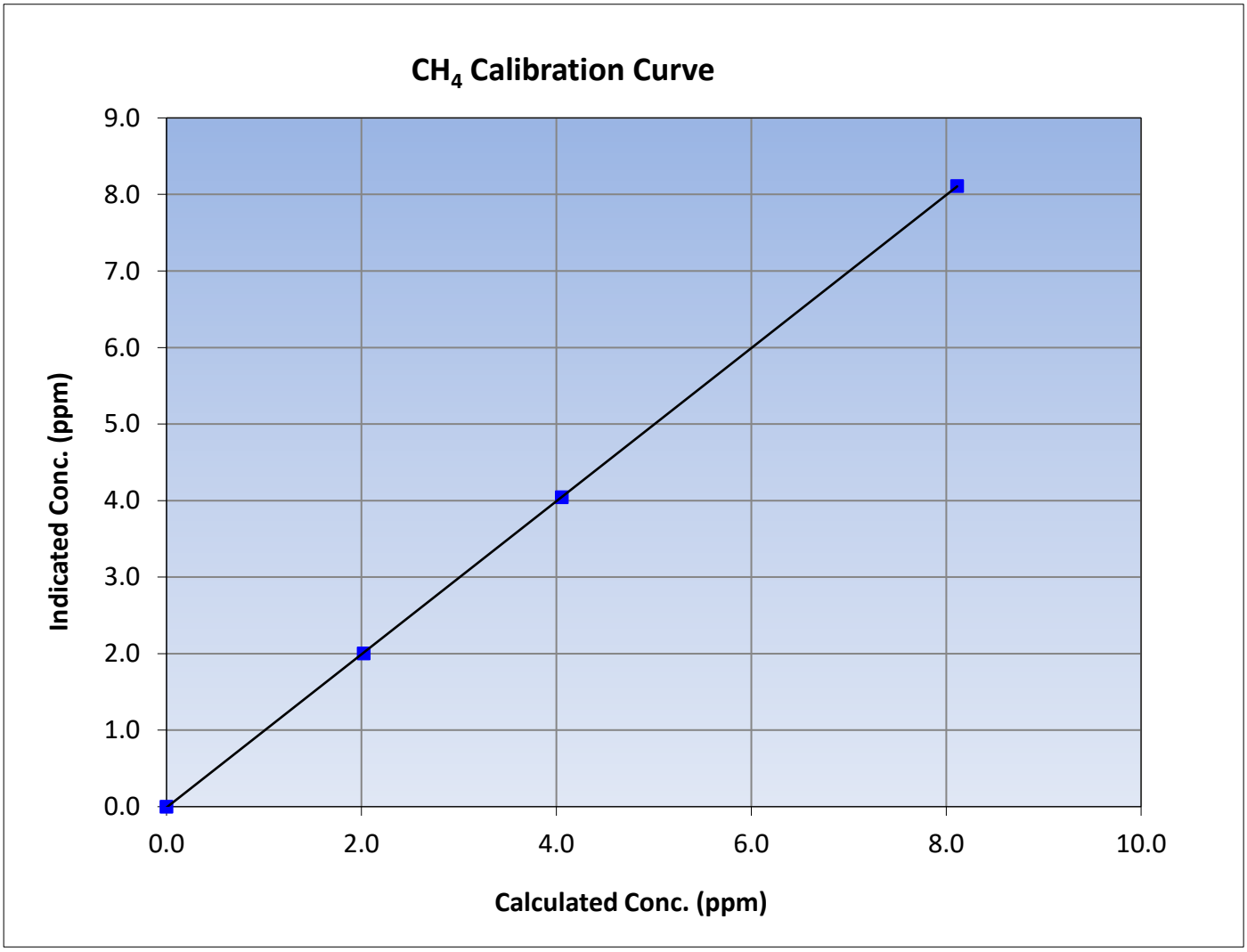
Version-01-2020

Station Information

Calibration Date:	May 13, 2023	Previous Calibration:	May 8, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:03	End Time (MST):	14:21
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*
8.11	8.11	1.0004			
4.06	4.04	1.0032	Slope	1.000313	*0.90 - 1.10*
2.02	2.00	1.0103			
			Intercept	-0.010212	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

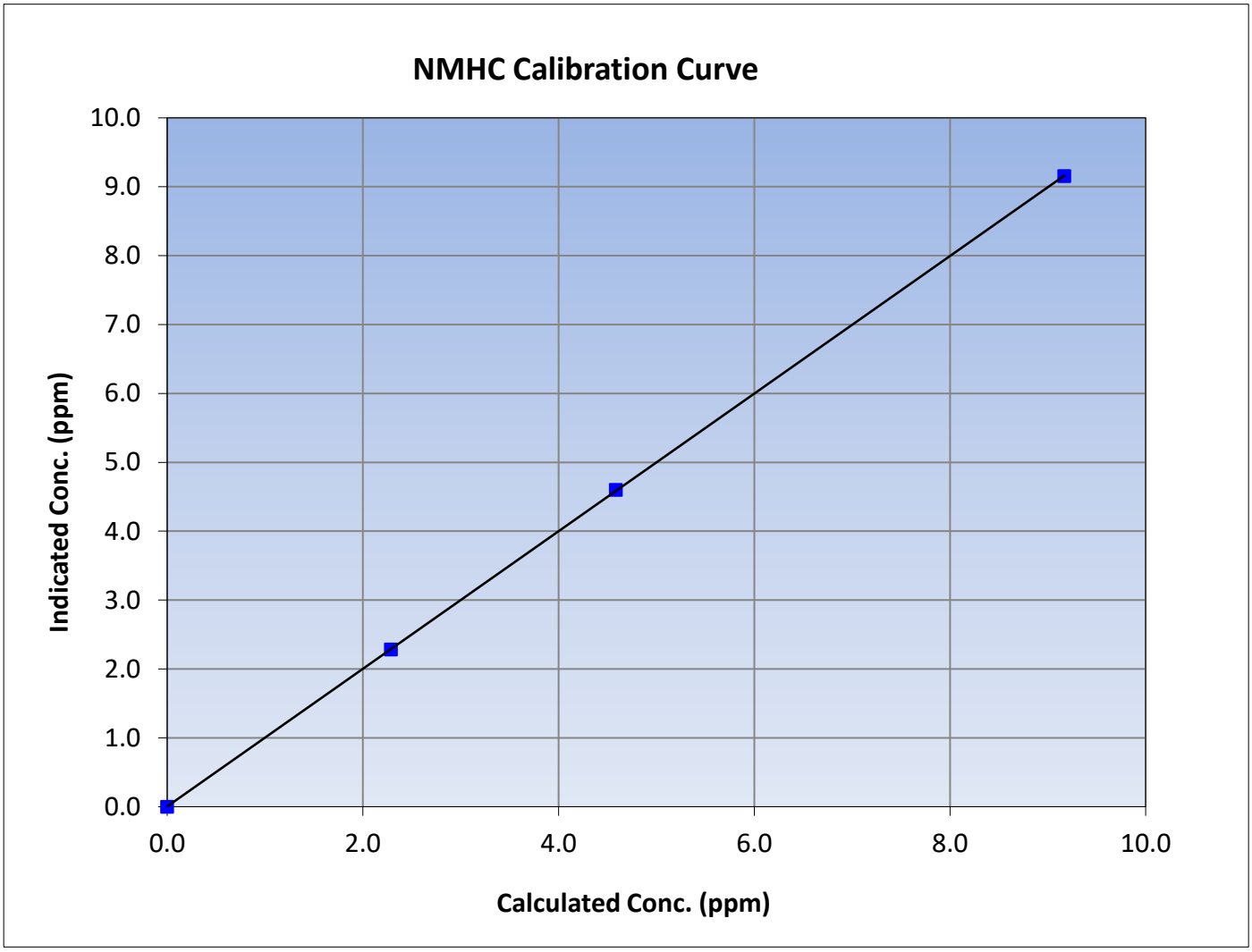
Version-01-2020

Station Information

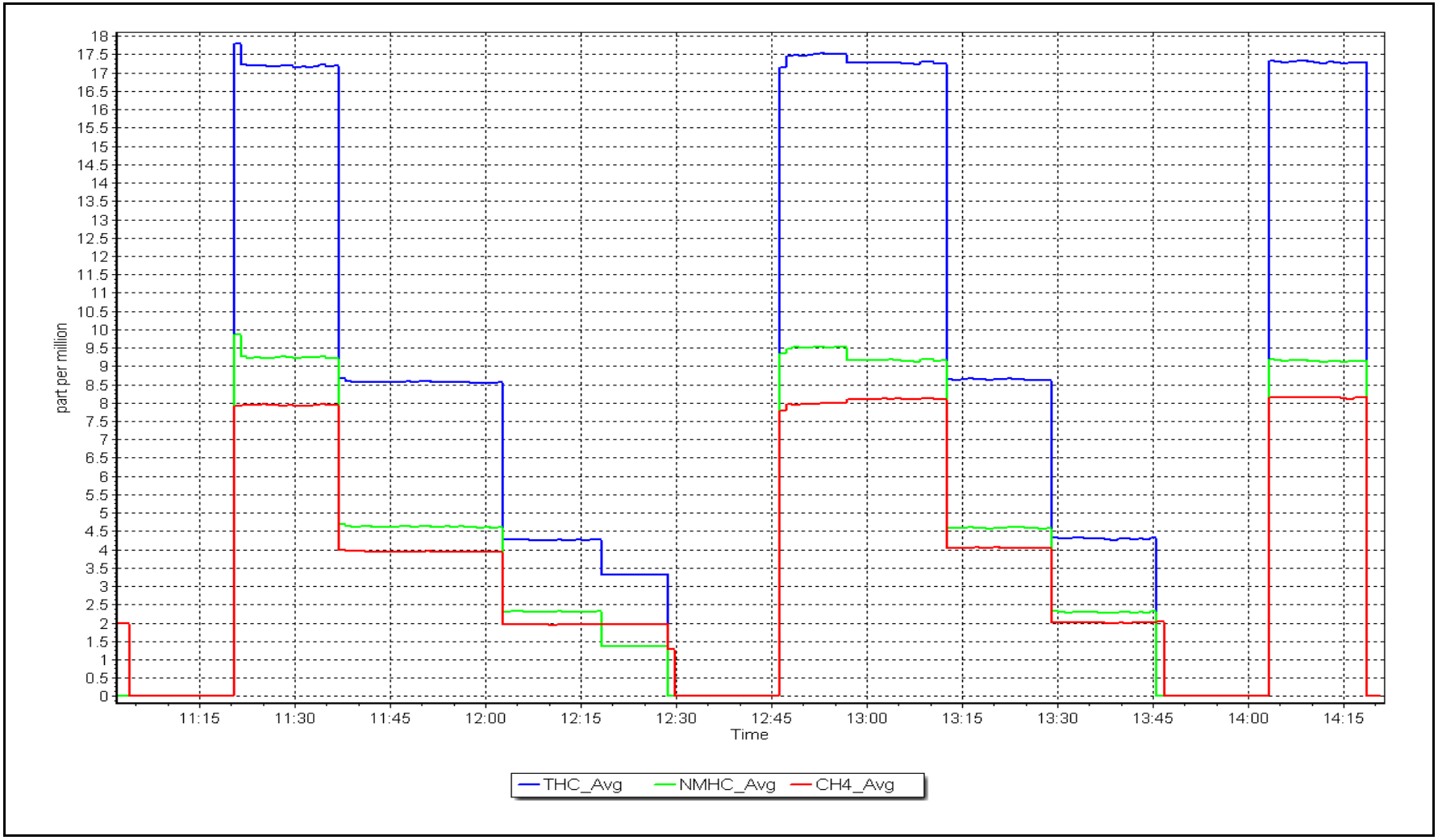
Calibration Date:	May 13, 2023	Previous Calibration:	May 8, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:03	End Time (MST):	14:21
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999994	≥0.995
9.17	9.16	1.0015			
4.58	4.60	0.9971	Slope	0.998770	0.90 - 1.10
2.29	2.28	1.0012			
			Intercept	0.004221	+/-0.5



NMHC Calibration Plot Date: May 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:	May 25, 2023	Last Cal Date:	May 13, 2023
Start time (MST):	10:05	End time (MST):	11:18
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:	3.15E-04	3.15E-04	NMHC SP Ratio:	5.66E-05	5.66E-05
CH4 Retention time:	15.20	15.20	NMHC Peak Area:	161883	161883

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.01	----
as found span	4919	81.0	17.28	17.11	1.010
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.01	----
high point	4919	81.0	17.28	17.10	1.011
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.011

Baseline Corr AF:	17.10	Prev response	17.27	*% 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	4919	81.0	9.17	8.94	1.026
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.0	9.17	8.91	1.029
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.029
Baseline Corr AF:	8.94	Prev response	9.16	*% change	-2.5%
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	0.01	----
as found span	4919	81.0	8.11	8.17	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.01	----
high point	4919	81.0	8.11	8.19	0.991
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.991
Baseline Corr AF:	8.17	Prev response	8.11	*% change	0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

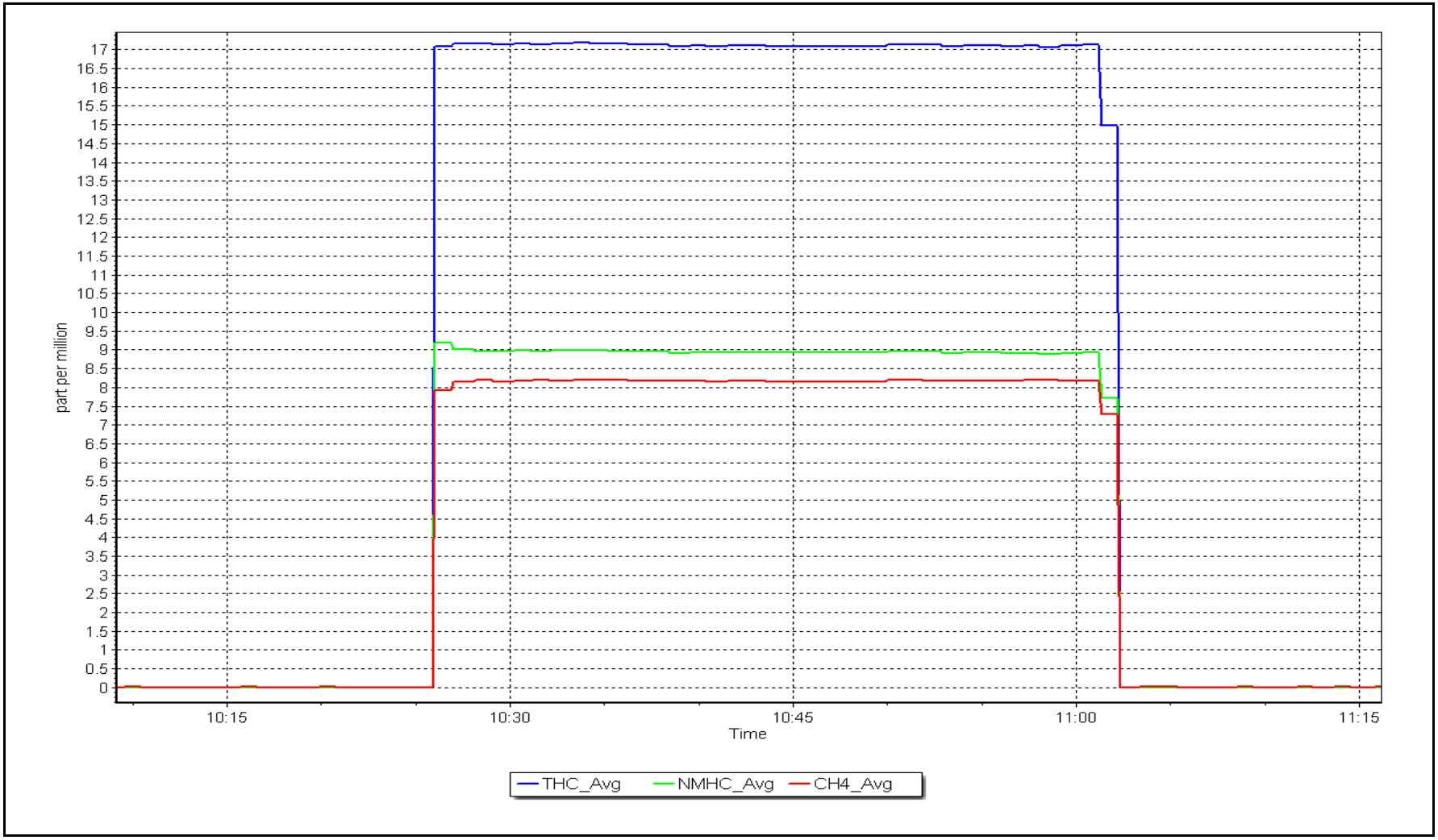
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999792	0.988812
THC Cal Offset:	-0.006990	0.008000
CH4 Cal Slope:	1.000313	1.008017
CH4 Cal Offset:	-0.010212	0.008000
NMHC Cal Slope:	0.998770	0.971926
NMHC Cal Offset:	0.004221	0.000000

Notes: N2 cylinder change. No change in response.

Calibration Performed By: Aswin Sasi Kumar

NMHC Calibration Plot Date: May 25, 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:	May 31, 2023	Last Cal Date:	May 25, 2023
Start time (MST):	10:43	End time (MST):	12:06
Reason:	Cylinder Change	H2 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:	3.15E-04	3.15E-04	NMHC SP Ratio:	5.66E-05	5.66E-05
CH4 Retention time:	15.20	15.20	NMHC Peak Area:	161883	161883

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	17.28	16.89	1.023
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.01	----
high point	4919	81.0	17.28	16.82	1.027
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.027

Baseline Corr AF:	16.89	Prev response	17.27	*% 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	0.00	0.00	----
as found span	4919	81.0	9.17	8.76	1.047
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.0	9.17	8.74	1.049
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.049
Baseline Corr AF:	8.76	Prev response	9.16	*% change	-4.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	8.11	8.13	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.01	----
high point	4919	81.0	8.11	8.09	1.003
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.003
Baseline Corr AF:	8.13	Prev response	8.11	*% change	0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

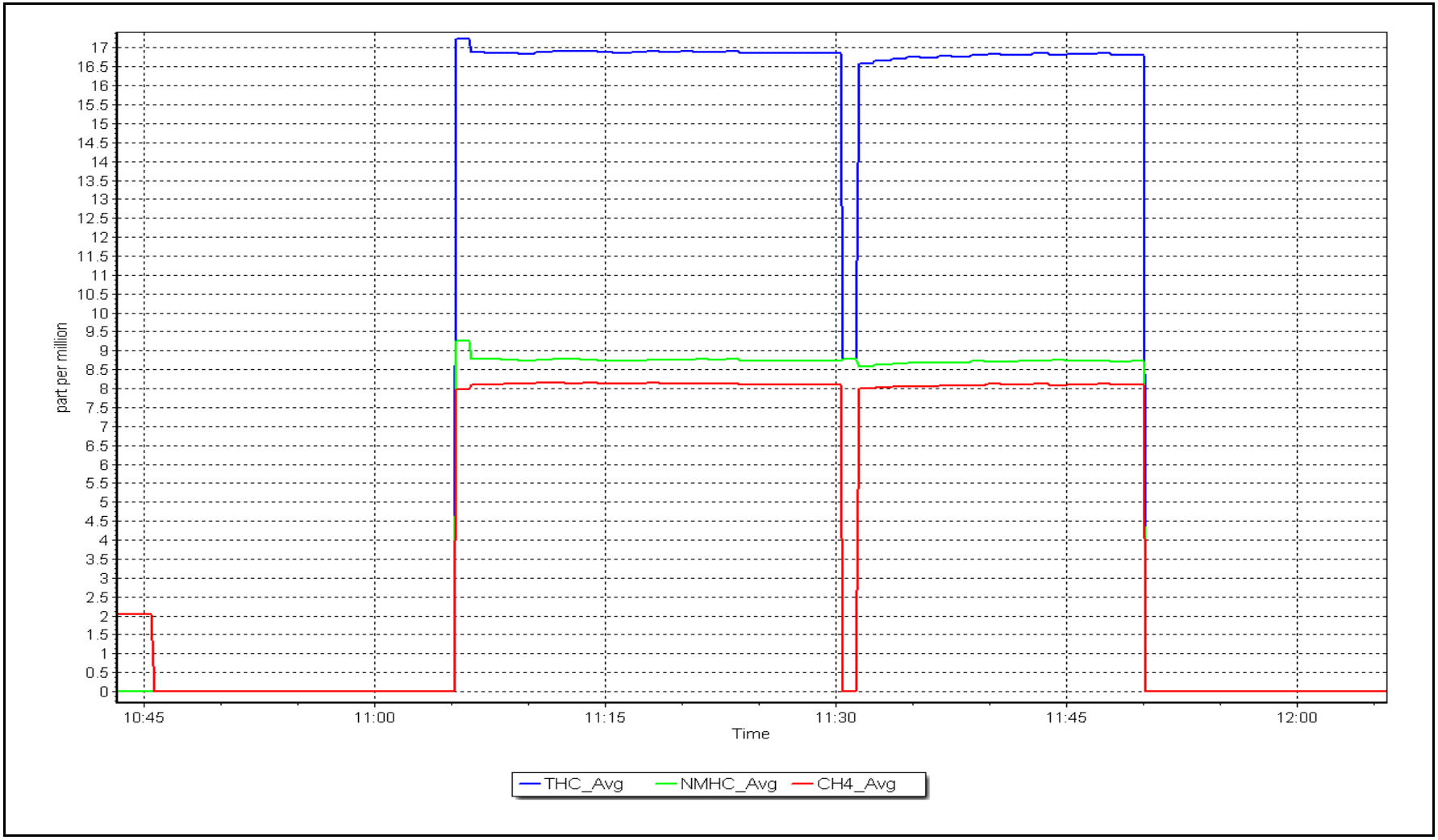
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999792	0.972841
THC Cal Offset:	-0.006990	0.008000
CH4 Cal Slope:	1.000313	0.996184
CH4 Cal Offset:	-0.010212	0.008000
NMHC Cal Slope:	0.998770	0.953275
NMHC Cal Offset:	0.004221	0.000000

Notes: H2 Cylinder change.

Calibration Performed By: Max Farrell

NMHC Calibration Plot Date: May 31, 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:	May 10, 2023	Last Cal Date:	April 20, 2023
Start time (MST):	10:16	End time (MST):	15:21
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2XX7ME		Cal Gas Expiry Date:	January 14, 2024	
NOX Cal Gas Conc:	50.48	ppm	NO Cal Gas Conc:	49.22	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	50.48	ppm	Removed Gas NO Conc:	49.22	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API 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:	1.062	1.035	NO bkgnd or offset:	3.0	2.9
NOX coeff or slope:	0.984	0.986	NOX bkgnd or offset:	3.0	2.9
NO2 coeff or slope:	0.999	0.999	Reaction cell Press:	230.2	220.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.993566	1.000165
NO_X Cal Offset:	0.129802	0.109832
NO Cal Slope:	0.995555	0.999810
NO Cal Offset:	-1.209770	-1.249778
NO_2 Cal Slope:	0.999137	0.999469
NO_2 Cal Offset:	0.306137	1.142324

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
as found span	4919	81.3	820.8	800.3	20.5	841.0	818.1	23.1	0.9759	0.9782
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.1	----	----
high point	4919	81.3	820.8	800.3	20.5	820.9	799.4	21.5	0.9998	1.0011
second point	4959	40.7	410.9	400.7	10.3	411.5	399.0	12.5	0.9986	1.0042
third point	4980	20.3	204.9	199.8	5.1	204.7	197.1	7.6	1.0012	1.0138
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.2	----	----
as left span	4919	81.3	820.8	357.7	463.1	825.4	360.5	465.0	0.9944	0.9921
								Average Correction Factor	0.9999	1.0064

Corrected As found	NO_X = 841.0 ppb	NO = 818.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	3.0%
Previous Response	NO_X = 815.6 ppb	NO = 795.5 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)	799.0	356.4	463.1	463.5	0.9991	100.1%
2nd GPT point (200 ppb O3)	799.0	595.1	224.4	225.8	0.9937	100.6%
3rd GPT point (100 ppb O3)	799.0	699.6	119.9	122.1	0.9819	101.8%
				Average Correction Factor	0.9916	100.9%

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

NO_X Calibration Summary

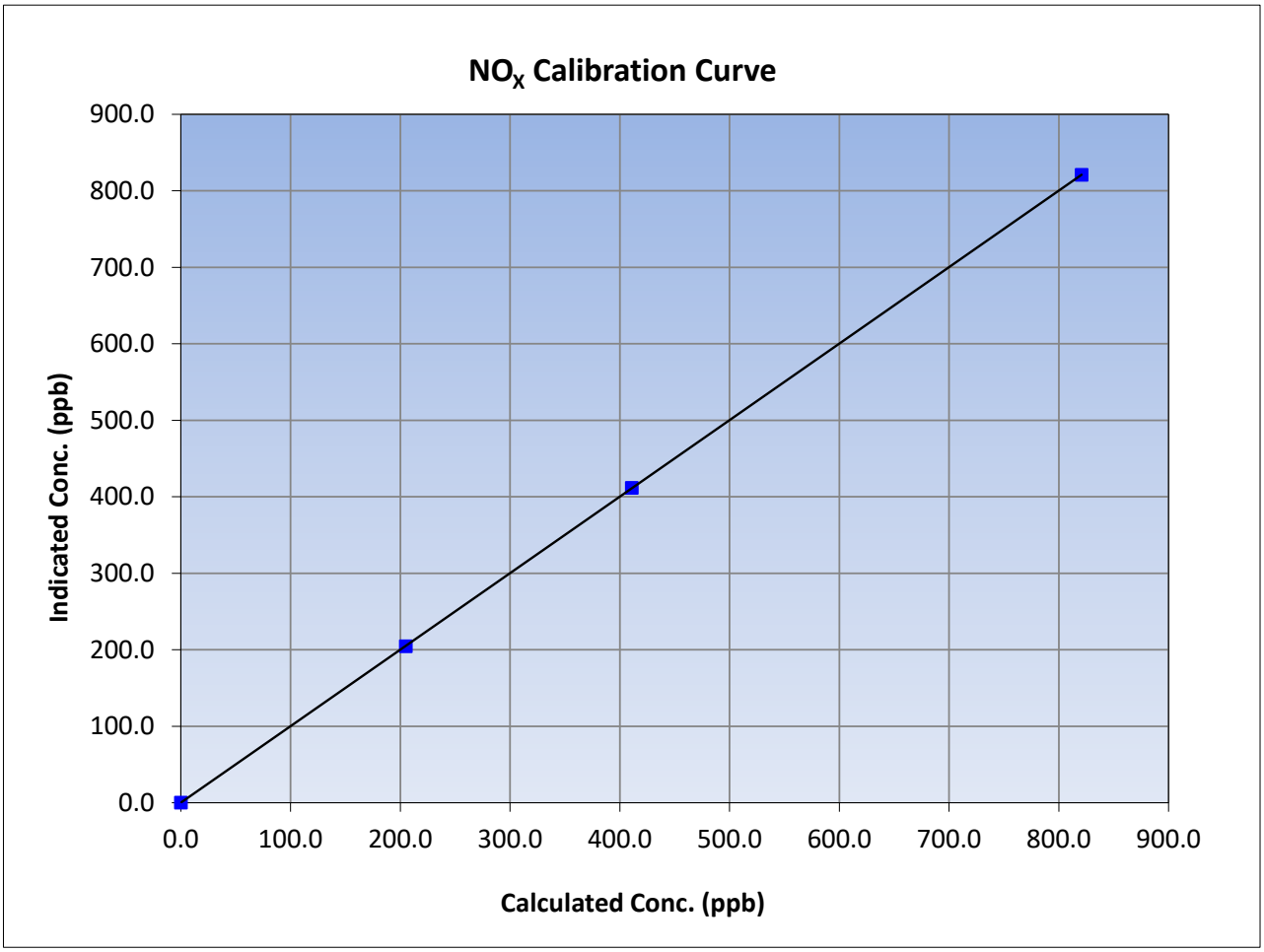
Version-04-2020

Station Information

Calibration Date:	May 10, 2023	Previous Calibration:	April 20, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:16	End Time (MST):	15:21
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.2	----	Correlation Coefficient	0.999999	*≥0.995*
820.8	820.9	0.9998			
410.9	411.5	0.9986	Slope	1.000165	*0.90 - 1.10*
204.9	204.7	1.0012			
			Intercept	0.109832	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

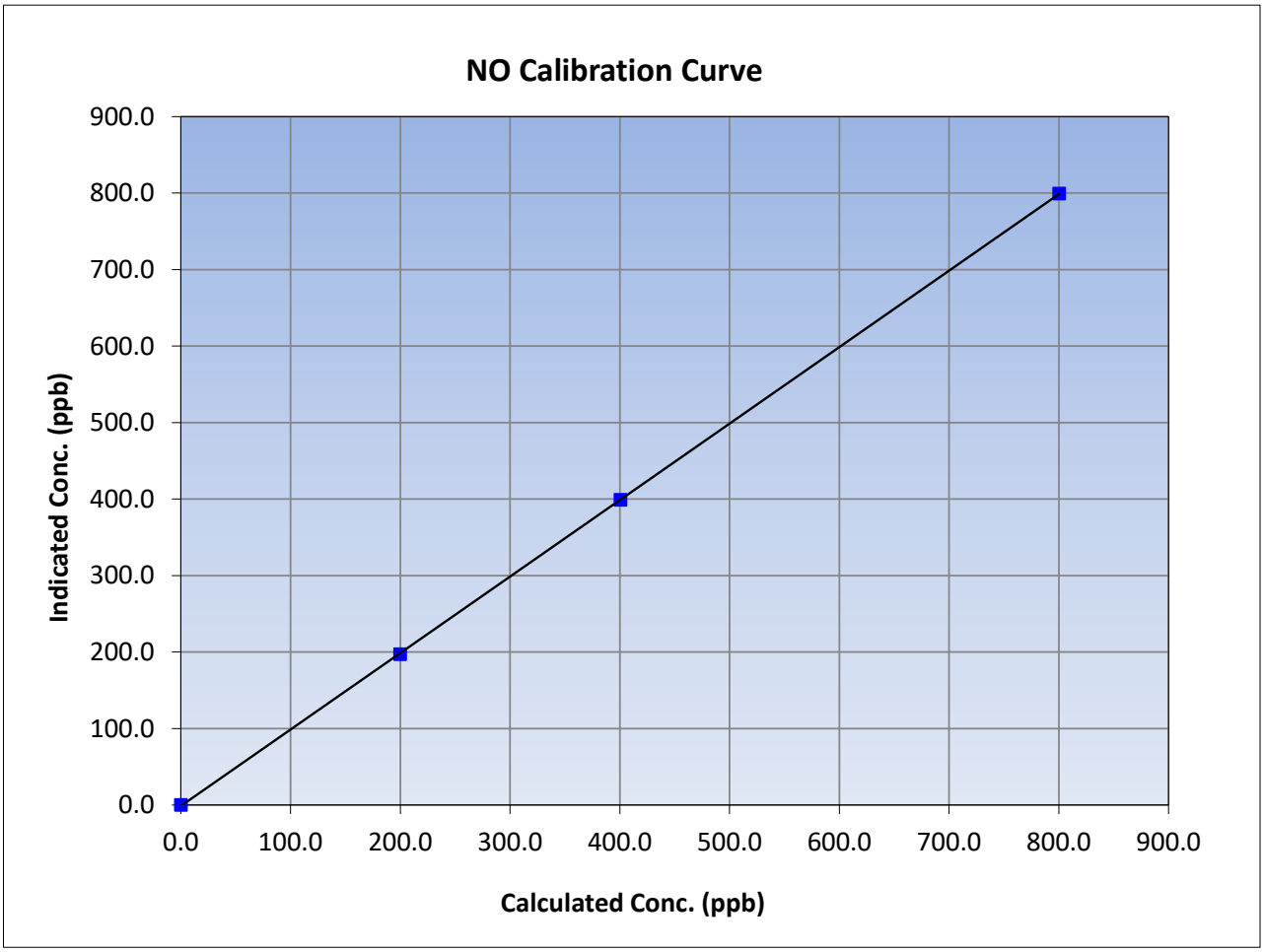
Version-04-2020

Station Information

Calibration Date:	May 10, 2023	Previous Calibration:	April 20, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:16	End Time (MST):	15:21
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999989	≥0.995
800.3	799.4	1.0011			
400.7	399.0	1.0042	Slope	0.999810	0.90 - 1.10
199.8	197.1	1.0138			
			Intercept	-1.249778	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

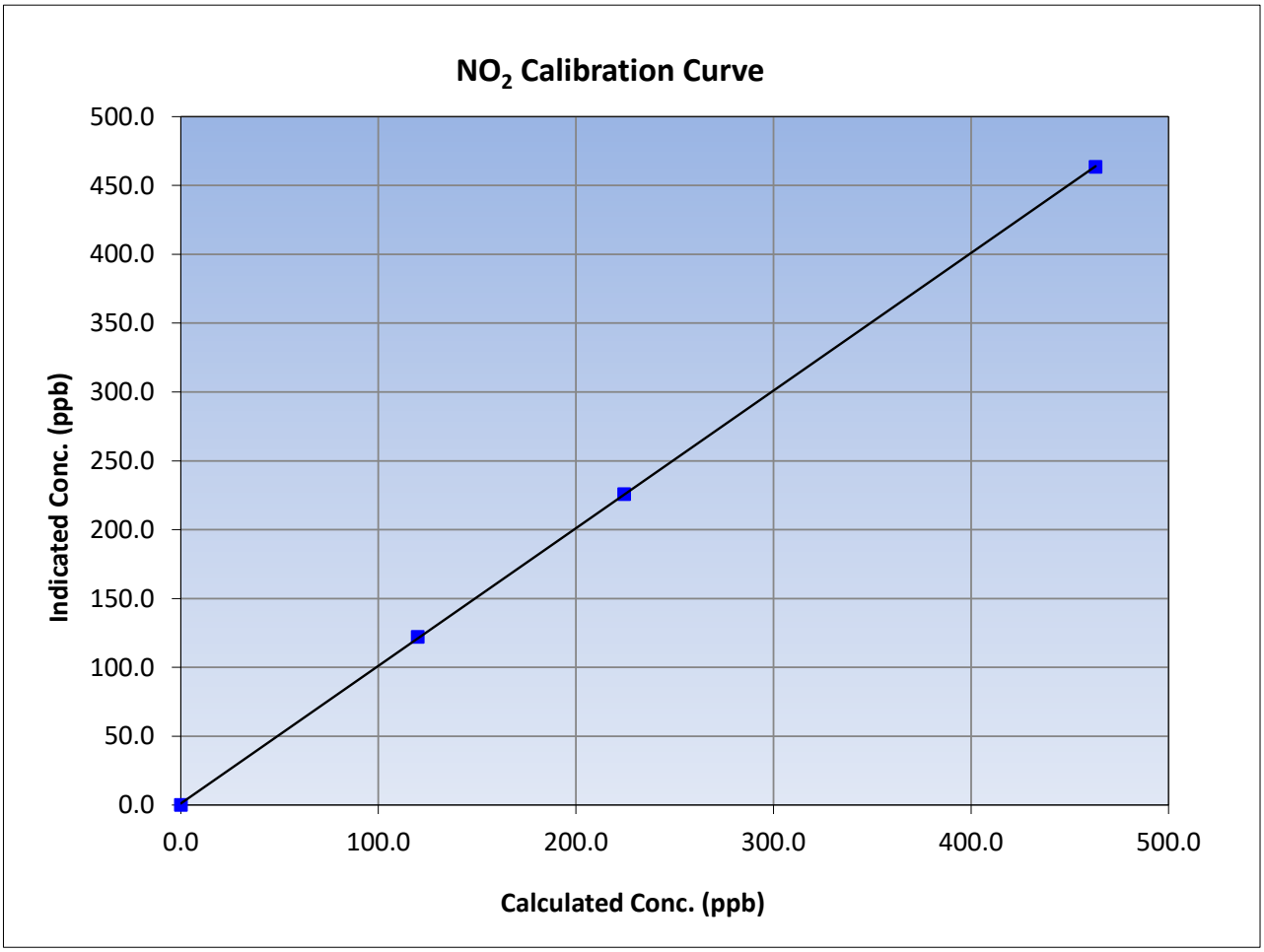
Version-04-2020

Station Information

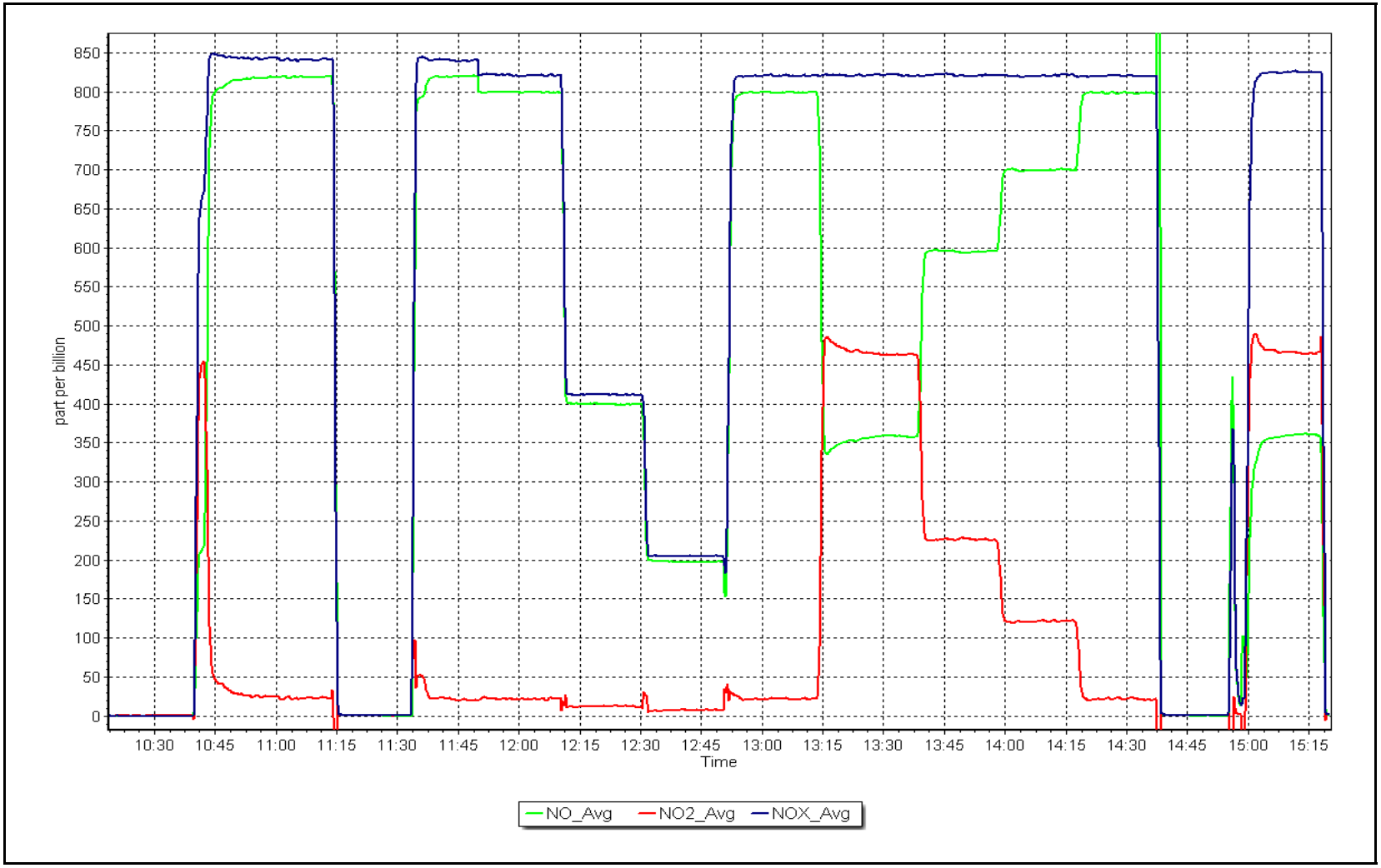
Calibration Date:	May 10, 2023	Previous Calibration:	April 20, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:16	End Time (MST):	15:21
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999976	≥0.995
463.1	463.5	0.9991			
224.4	225.8	0.9937	Slope	0.999469	0.90 - 1.10
119.9	122.1	0.9819			
			Intercept	1.142324	+/-20



NO_X Calibration Plot Date: May 10, 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:	May 4, 2023	Last Cal Date:	April 4, 2023
Start time (MST):	9:50	End time (MST):	13:29
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:	0.999114	0.998229	Backgd or Offset:	1.000	1.000
Calibration intercept:	-0.420000	-0.340000	Coeff or Slope:	0.993	0.987

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	800.0	0.0	0.2	----
as found span	4888	1096.9	400.0	405.5	0.986
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	0.1	----
high point	4888	1101.7	400.0	399.3	1.002
second point	4888	863.9	200.0	198.7	1.007
third point	4888	741.4	100.0	99.3	1.007
as left zero	5000	800.0	0.0	0.4	----
as left span	4812	1097.9	400.0	404.0	0.990
				Average Correction Factor	1.005

Baseline Corr As found:	405.3	Previous response	399.2	*% change	1.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

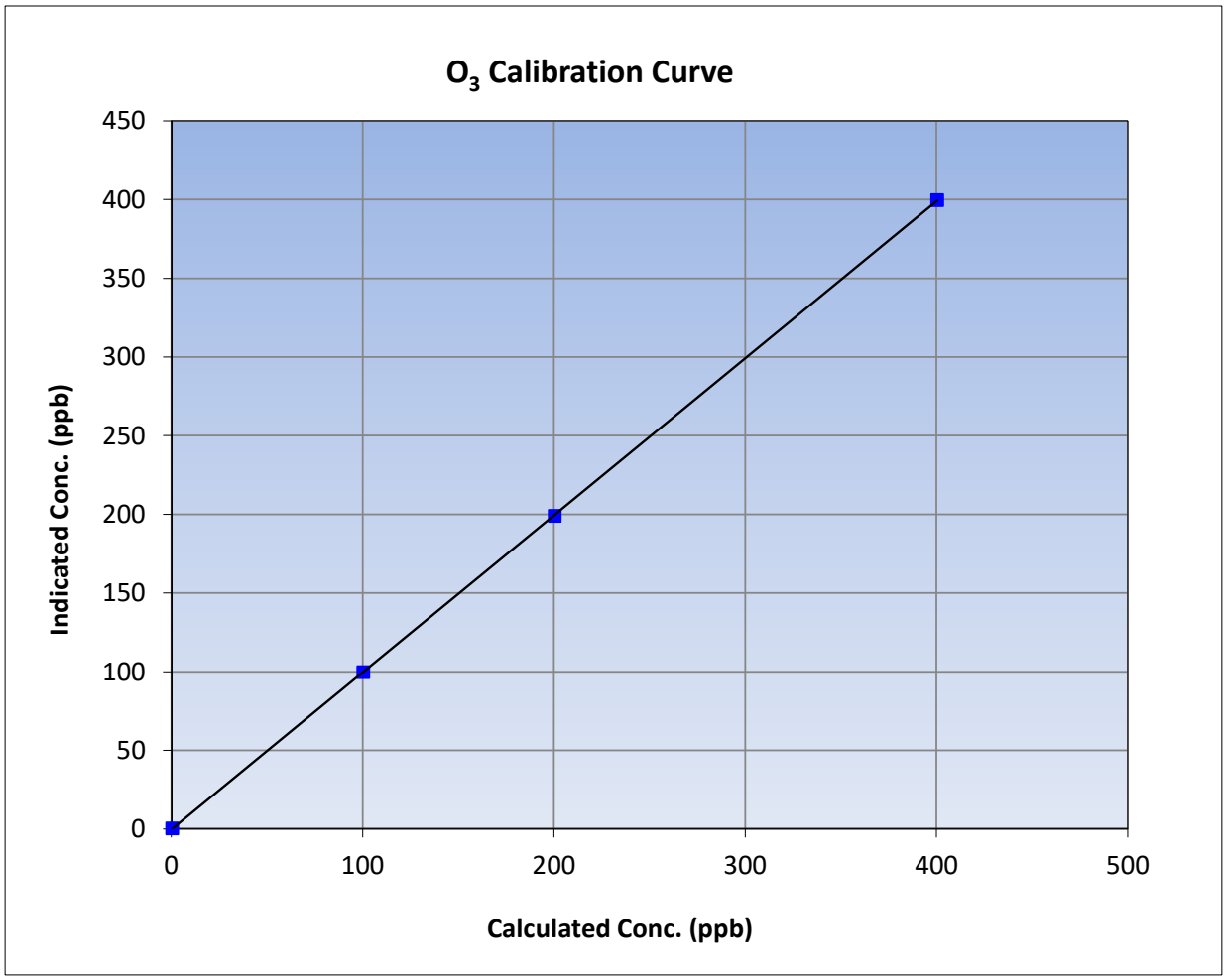
Station Information

Calibration Date:	May 4, 2023	Previous Calibration:	April 4, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	9:50	End Time (MST):	13:29
Analyzer make:	API T400	Analyzer serial #:	825

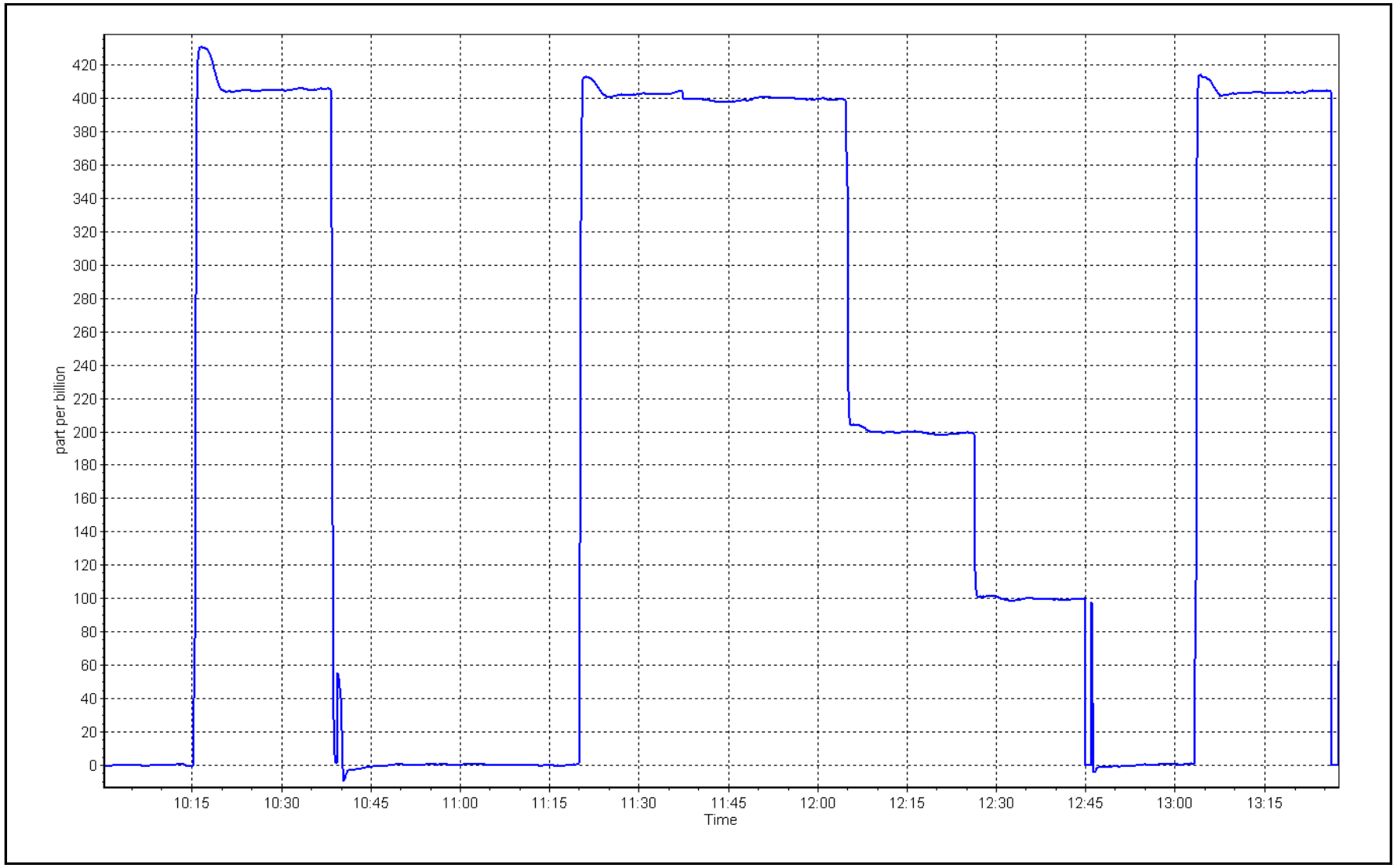
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
400.0	399.3	1.0018
200.0	198.7	1.0065
100.0	99.3	1.0070

Statistical Evaluation		Limits
Correlation Coefficient	0.999992	≥0.995
Slope	0.998229	0.90 - 1.10
Intercept	-0.340000	+/- 5



O_3 Calibration Plot Date: May 4, 2023 Location: Stony Mountain



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	May 16, 2023	Last Cal Date:	April 19, 2023
Start time (MST):	13:55	End time (MST):	14:24
Analyzer Make:	API T640	S/N:	1162
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388748
Temp/RH standard:	Alicat FP-25BT	S/N:	388748

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	13.8	13.65	13.8	☐	+/- 2 °C
P (mmHg)	704.8	704.54	704.8	☐	+/- 10 mmHg
flow (LPM)	5	5.016	5	☐	+/- 0.25 LPM

Leak Test: Date of check: May 16, 2023 Last Cal Date: April 19, 2023

PM w/o HEPA: 29.4 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: March 22, 2023 <0.2 ug/m3

Disposable Filter Changed: March 22, 2023

Annual Maintenance

Date Sample Tube Cleaned: August 30, 2022

Date RH/T Sensor Cleaned: August 30, 2022

Notes: No adjustments needed. Leak check passed.

Calibration by: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	May 9, 2023	Last Cal Date:	April 12, 2023
Start time (MST):	10:05	End time (MST):	13:03
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:	1.011069	1.000645	Backgd or Offset:	-0.012	-0.009
Calibration intercept:	0.019763	0.127800	Coeff or Slope:	0.912	0.905

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	41.4	0.984
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	40.8	0.998
second point	4966	33.3	20.3	20.7	0.984
third point	4983	16.7	10.2	10.3	0.992
as left zero	3000	0.0	0.0	0.1	----
as left span	2920	80.0	81.3	80.6	1.009
				Average Correction Factor	0.991

Baseline Corr As found:	41.30	Prev response:	41.16	*% 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: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

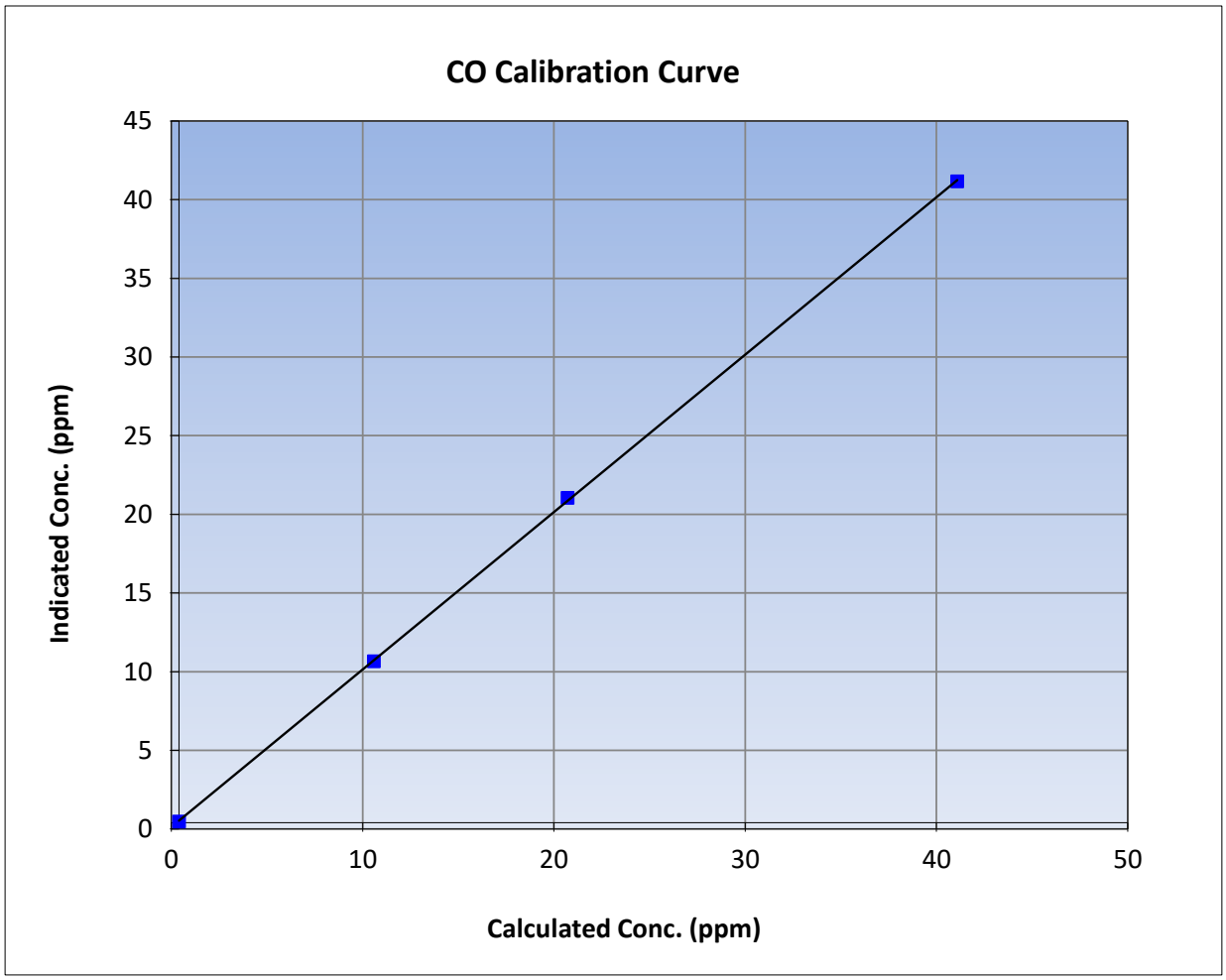
Station Information

Calibration Date:	May 9, 2023	Previous Calibration:	April 12, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:05	End Time (MST):	13:03
Analyzer make:	API T300	Analyzer serial #:	3504

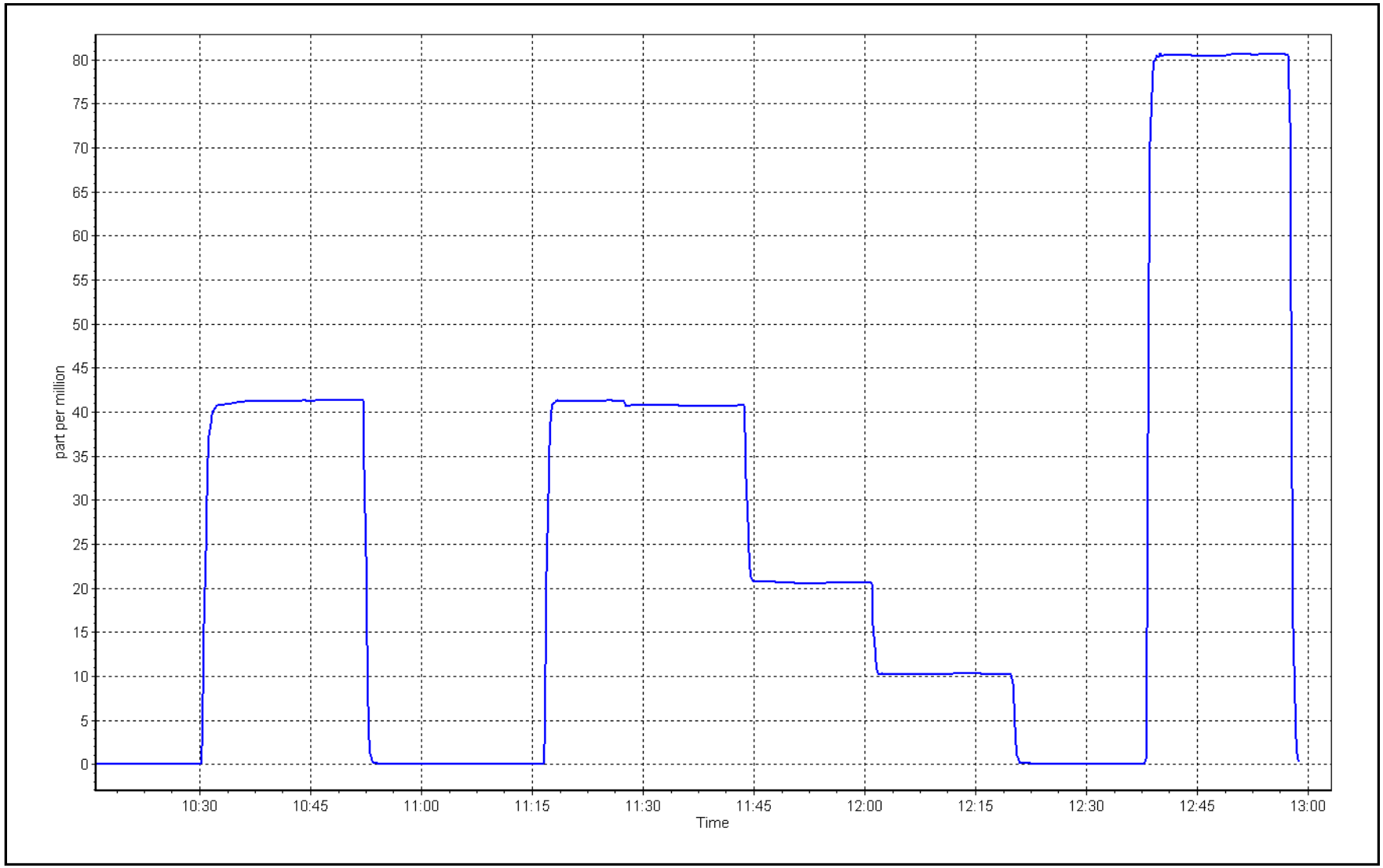
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
40.7	40.8	0.9983
20.3	20.7	0.9838
10.2	10.3	0.9920

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999944	*≥0.995*
Slope	1.000645	*0.90 - 1.10*
Intercept	0.127800	*+/-1.5*



CO Calibration Plot Date: May 9, 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:	May 12, 2023	Last Cal Date:	April 19, 2023
Start time (MST):	10:12	End time (MST):	13:35
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	60,220	ppm	Cal Gas Exp Date:	December 1, 2026
Cal Gas Cylinder #:	ALM063503			
Removed Cal Gas Conc:	60,220	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	2658
N2 Gen Make/Model:	Peak Scientific		Serial Number:	771048317

Analyzer Information

Analyzer make: API T360 — Analyzer serial #: 283

Analyzer Range 0 - 2,000 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.012352	0.997386	Backgd or Offset:	-0.069	-0.081
Calibration intercept:	0.980000	-0.780000	Coeff or Slope:	1.076	1.085

CO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	3000	0.0	0.0	0.7	----
as found span	2920	80.0	1605.9	1625.0	0.988
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	-0.1	----
high point	2920	80.0	1605.9	1599.1	1.004
second point	2960	40.0	802.9	806.1	0.996
third point	2980	20.0	401.5	394.7	1.017
as left zero	3000	0.0	0.0	0.4	----
as left span	2930	80.0	1600.5	1599.0	1.001
				Average Correction Factor	1.006

Baseline Corr As found:	1624.30	Prev response:	1626.68	*% 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. Zero and span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

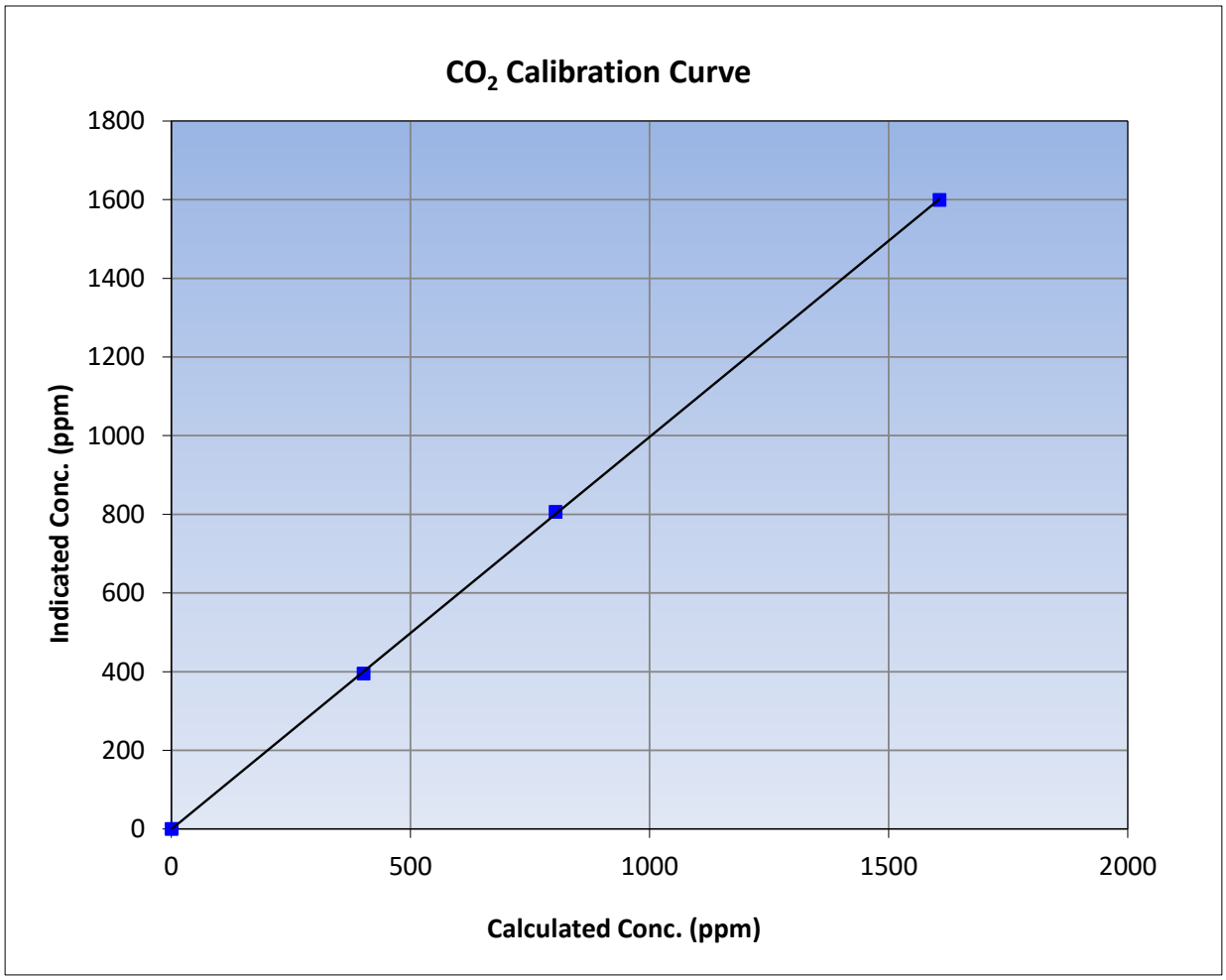
Station Information

Calibration Date	May 12, 2023	Previous Calibration	April 19, 2023
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:12	End Time (MST)	13:35
Analyzer make	API T360	Analyzer serial #	283

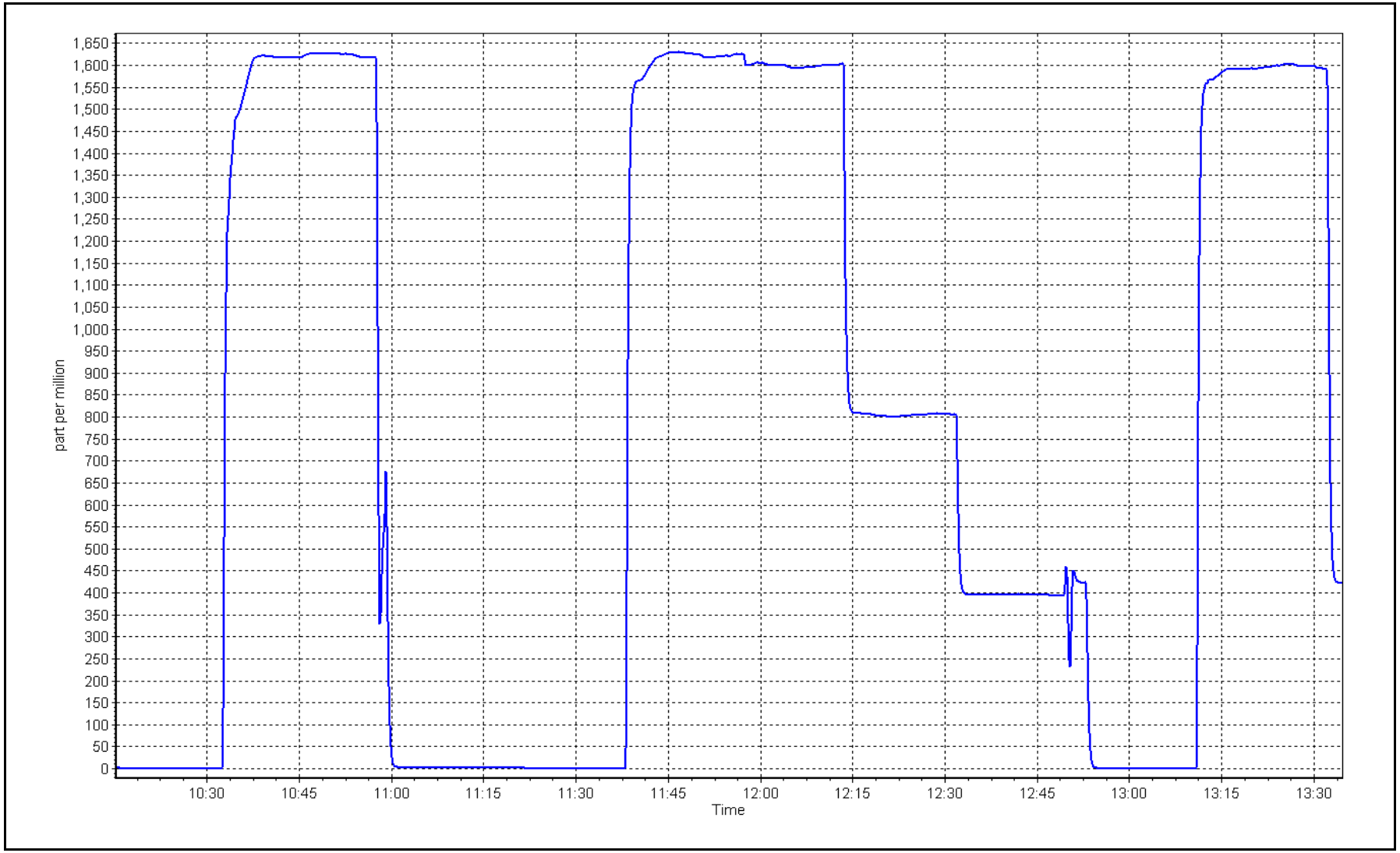
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
1605.9	1599.1	1.0042
802.9	806.1	0.9961
401.5	394.7	1.0171

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999954	*≥0.995*
Slope	0.997386	*0.90 - 1.10*
Intercept	-0.780000	*+/-10*



CO_2 Calibration Plot Date: May 12, 2023 Location: Stony Mountain



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS19
FIREBAG
MAY 2023

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

June 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	May 1, 2023	Last Cal Date:	April 14, 2023
Start time (MST):	10:20	End time (MST):	13:51
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.29	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC716618			
Removed Cal Gas Conc:	49.29	ppm	Rem Gas Exp Date:	
Removed Gas Cyl #:			Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	1607
ZAG Make/Model:	API T701		Serial Number:	1118

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1410661308

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000391	0.994974	Backgd or Offset:	10.2	10.2
Calibration intercept:	-0.421893	0.198788	Coeff or Slope:	0.992	0.992

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	4999	0.0	0.0	-0.3	----
as found span	4919	81.1	799.5	795.1	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	4999	0.0	0.0	0.0	----
high point	4919	81.1	799.5	795.4	1.005
second point	4959	40.6	400.3	399.0	1.003
third point	4980	20.3	200.1	199.2	1.005
as left zero	4999	0.0	0.0	0.0	----
as left span	4919	81.1	799.5	792.4	1.009
				Average Correction Factor	1.004

Baseline Corr As found:	795.36	Previous response	799.36	*% 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

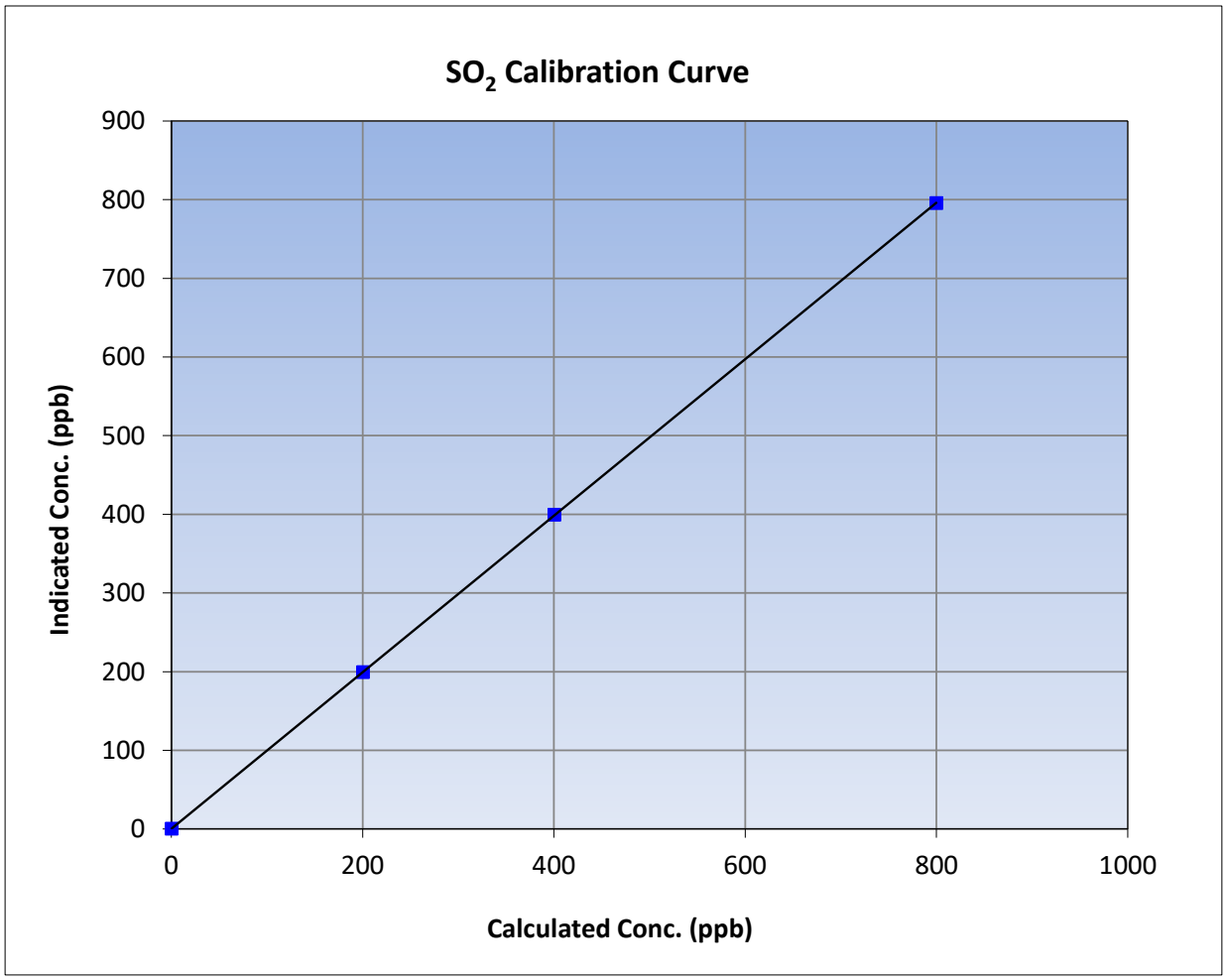
Station Information

Calibration Date:	May 1, 2023	Previous Calibration:	April 14, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:20	End Time (MST):	13:51
Analyzer make:	Thermo 43i	Analyzer serial #:	1410661308

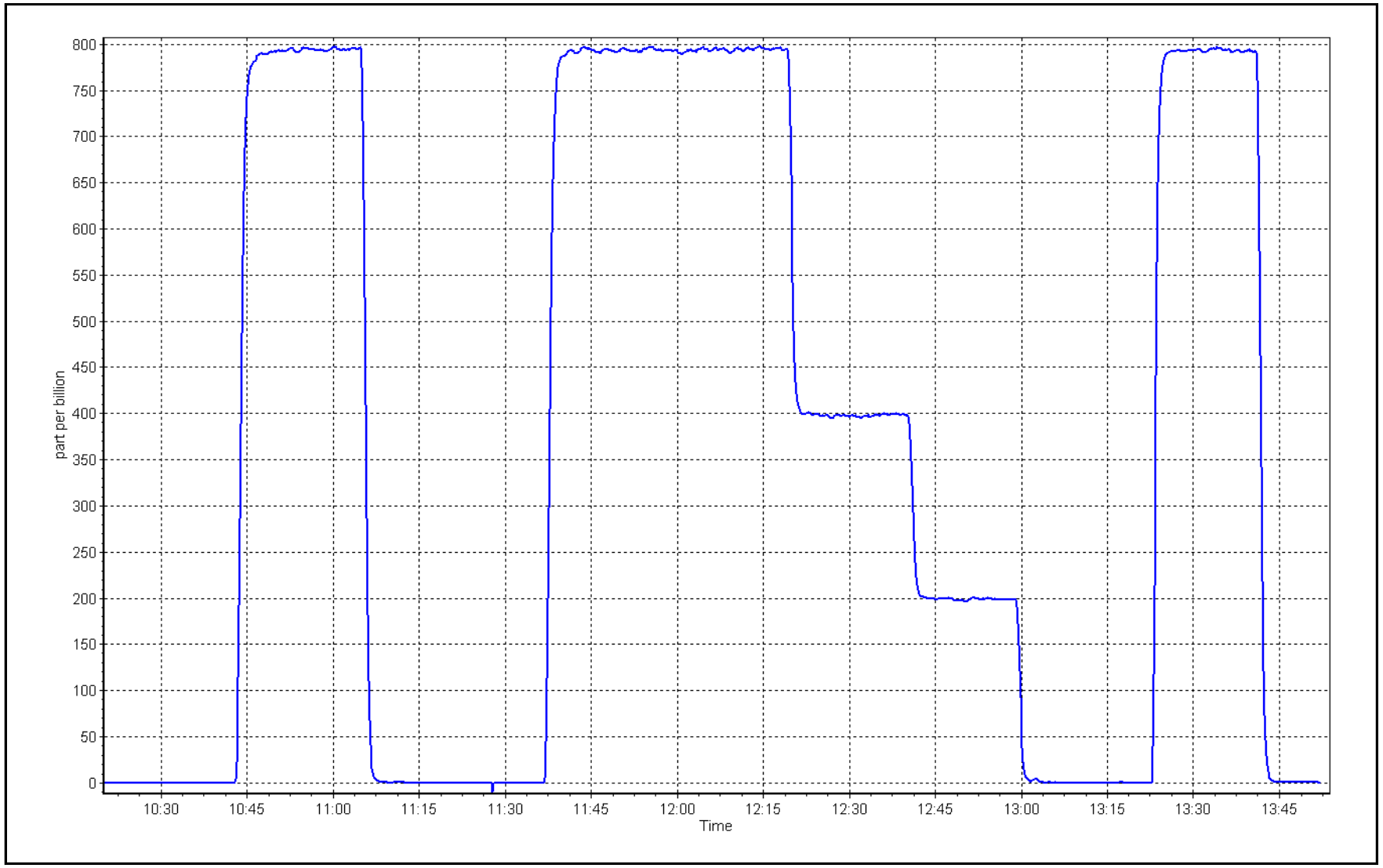
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
799.5	795.4	1.0051
400.3	399.0	1.0032
200.1	199.2	1.0045

Statistical Evaluation		Limits
Correlation Coefficient	0.999999	≥0.995
Slope	0.994974	0.90 - 1.10
Intercept	0.198788	+/-30



SO2 Calibration Plot Date: May 1, 2023 Location: Firebag



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Firebag	Station number:	AMS19
Calibration Date:	May 2, 2023	Last Cal Date:	April 3, 2023
Start time (MST):	10:04	End time (MST):	14:42
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:	1.003054	1.008056	Backgd or Offset:	3.12	3.11
Calibration intercept:	0.038381	-0.061725	Coeff or Slope:	0.990	0.983

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	81.0	0.986
as found 2nd point	4961	39.1	40.0	40.5	0.985
as found 3rd point	4980	19.6	20.0	20.2	0.988
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4922	78.2	80.0	80.6	0.992
second point	4961	39.1	40.0	40.2	0.995
third point	4980	19.6	20.0	20.1	0.997
as left zero	5000	0.0	0.0	0.0	----
as left span	4922	78.2	80.0	80.4	0.995
SO2 Scrubber Check	4922	78.3	800.2	0.0	----
Date of last scrubber change:		January 18, 2023		Ave Corr Factor	0.995
Date of last converter efficiency test:		n/a			efficiency

Baseline Corr As found:	81.1	Prev response:	80.26	*% change:	1.0%
Baseline Corr 2nd AF pt:	40.6	AF Slope:	1.014202	AF Intercept:	-0.101867
Baseline Corr 3rd AF pt:	20.3	AF Correlation:	0.999999		

* = > +/-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

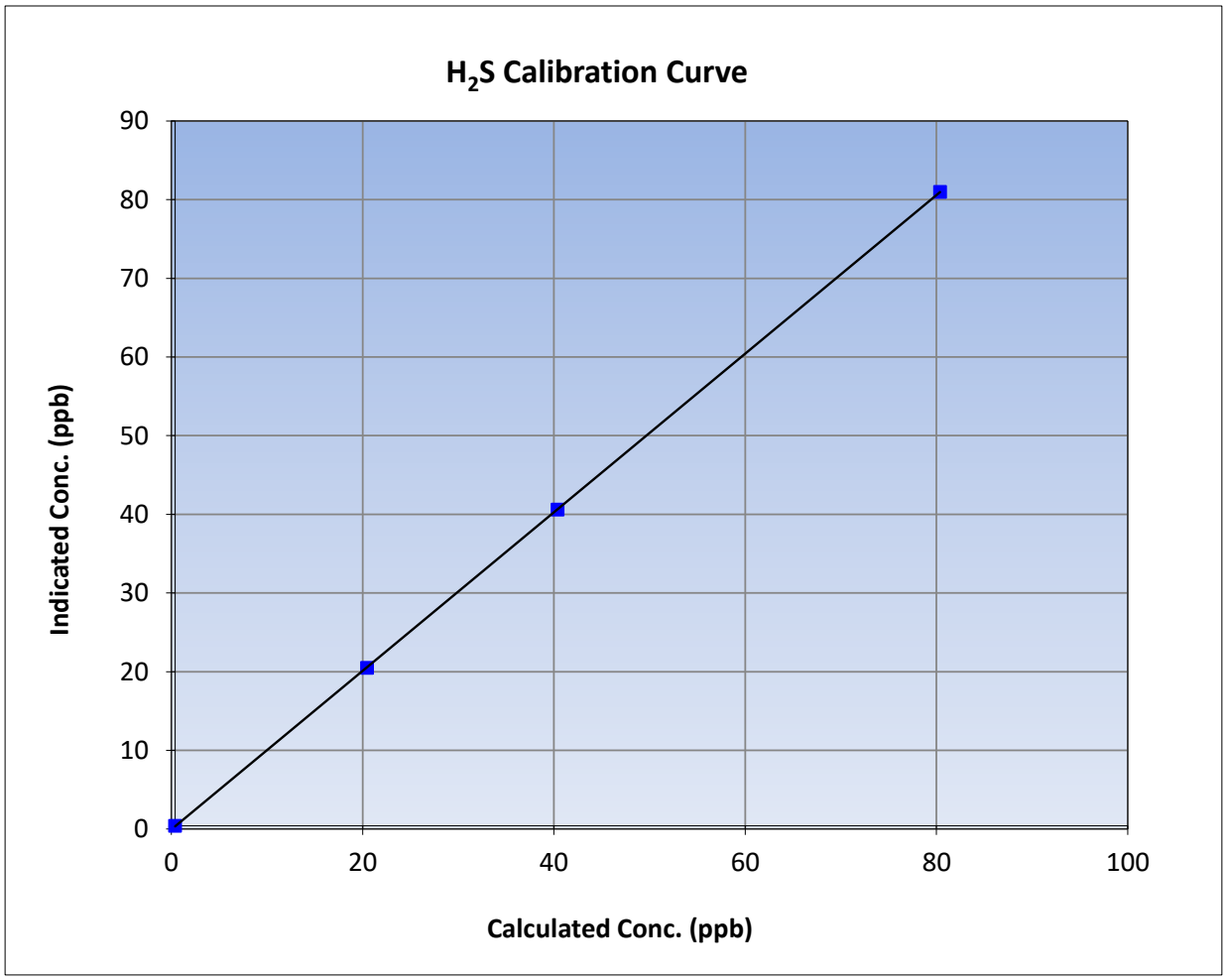
Station Information

Calibration Date:	May 2, 2023	Previous Calibration:	April 3, 2023
Station Name:	Firebag	Station Number:	AMS19
Start Time (MST):	10:04	End Time (MST):	14:42
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1336160090

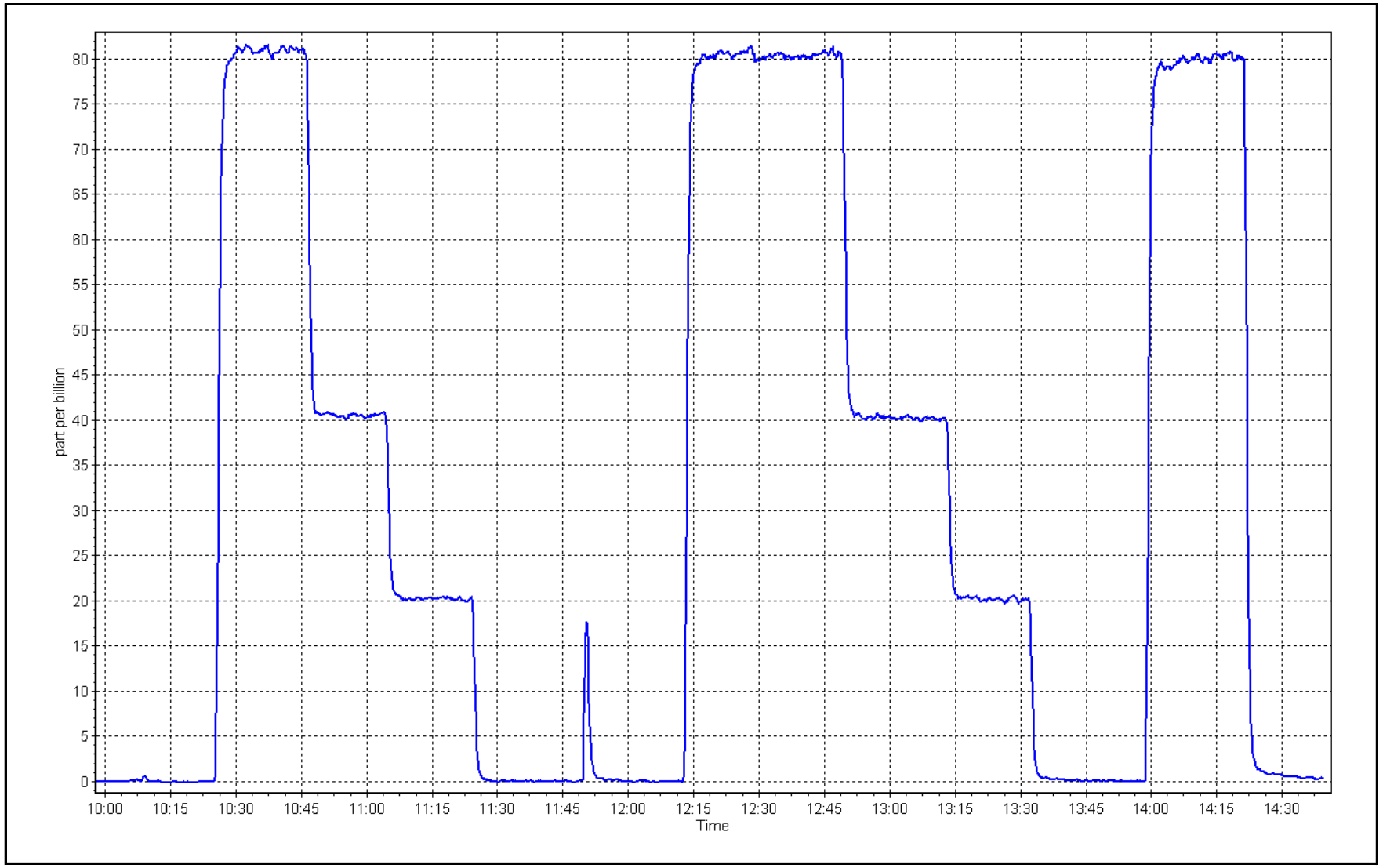
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.6	0.9923
40.0	40.2	0.9948
20.0	20.1	0.9974

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999997	*≥0.995*
Slope	1.008056	*0.90 - 1.10*
Intercept	-0.061725	*+/-3*



H_2S Calibration Plot Date: May 2, 2023 Location: Firebag



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	May 1, 2023	Last Cal Date:	April 14, 2023
Start time (MST):	10:20	End time (MST):	13:51
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 51i-LT		Analyzer serial #:	1336160089	
Analyzer Range:	0 - 20 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997928	0.994758	Background:	2.62	2.37
Calibration intercept:	-0.020741	0.018270	Coefficient:	3.815	3.846

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	-0.26	----
as found span	4919	81.1	17.31	16.88	1.025
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	4999	0.0	0.00	0.02	----
high point	4919	81.1	17.31	17.25	1.003
second point	4959	40.6	8.66	8.59	1.009
third point	4980	20.3	4.33	4.35	0.995
as left zero	5000	0.0	0.00	0.04	----
as left span	4919	81.1	17.31	17.40	0.995
				Average Correction Factor	1.002

Baseline Corr As found:	17.14	Previous response	17.25	*% change	-0.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed 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

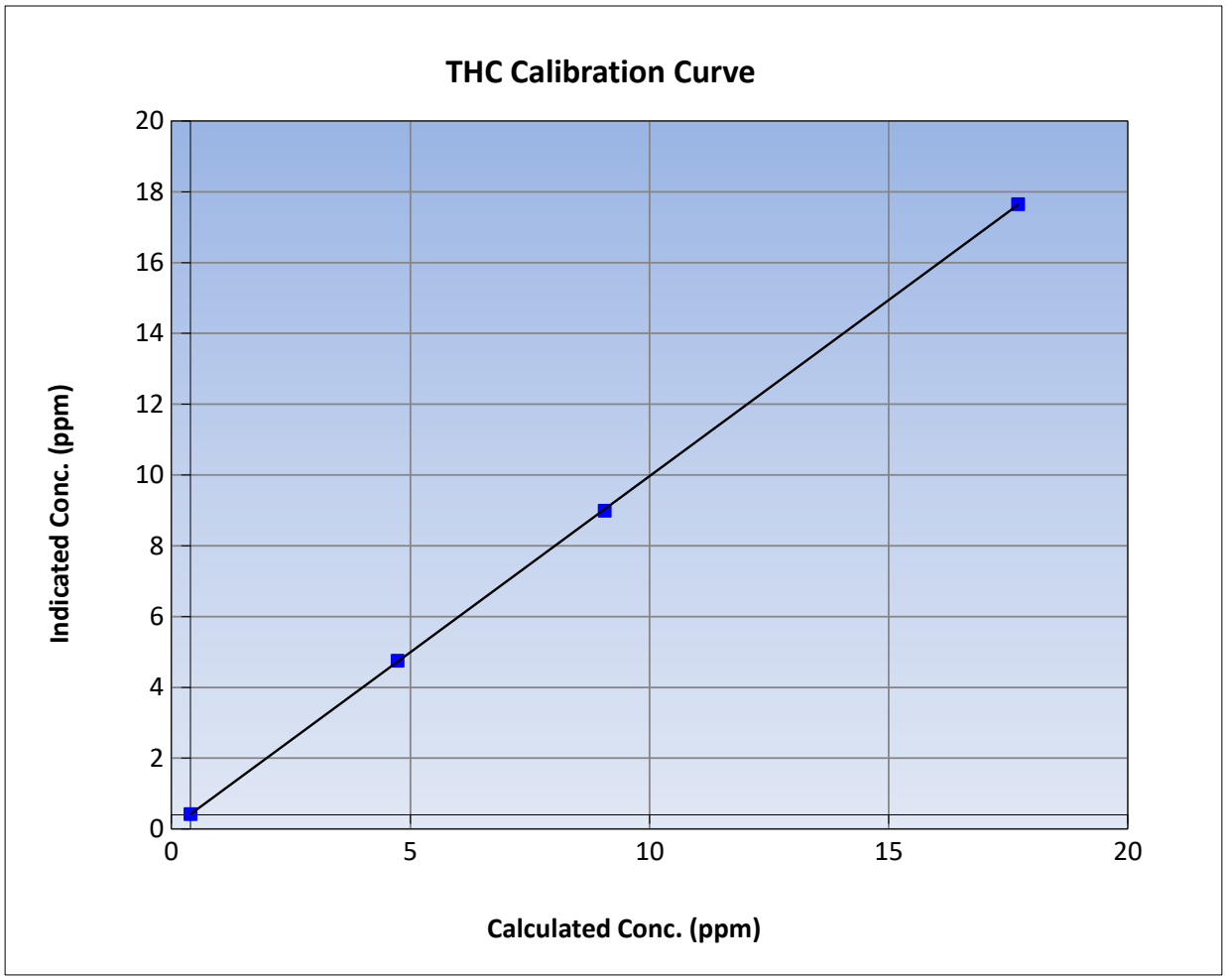
Station Information

Calibration Date:	May 1, 2023	Previous Calibration:	April 14, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:20	End Time (MST):	13:51
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1336160089

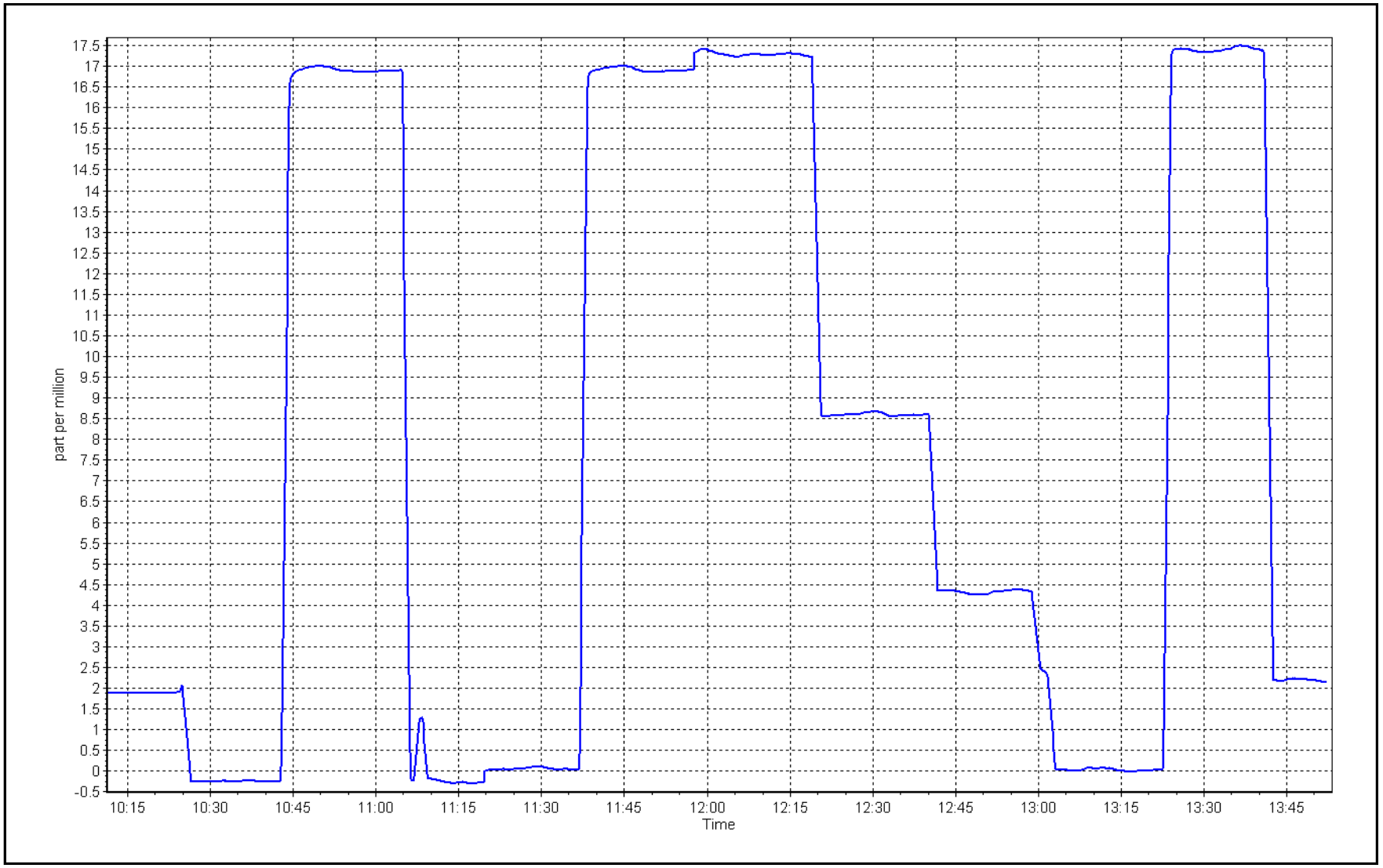
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.02	----
17.31	17.25	1.0032
8.66	8.59	1.0086
4.33	4.35	0.9953

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999981	*≥0.995*
Slope	0.994758	*0.90 - 1.10*
Intercept	0.018270	*+/-1.5*



THC Calibration Plot Date: May 1, 2023 Location: Firebag



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	May 24, 2023	Last Cal Date:	May 1, 2023
Start time (MST):	10:05	End time (MST):	12:40
Reason:	Cylinder Change		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 51i-LT		Analyzer serial #:	1336160089	
Analyzer Range:	0 - 20 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.994758		Background:	2.37	2.37
Calibration intercept:	0.018270		Coefficient:	3.846	3.846

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	-0.32	----
as found span	4919	81.1	17.31	16.91	1.023
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	4999	0.0	0.00	0.06	----
high point	4919	81.1	17.31	17.31	1.000
second point					
third point					
as left zero	5000	0.0	0.00	0.14	----
as left span	4919	81.1	17.31	17.37	0.996
				Average Correction Factor	1.000

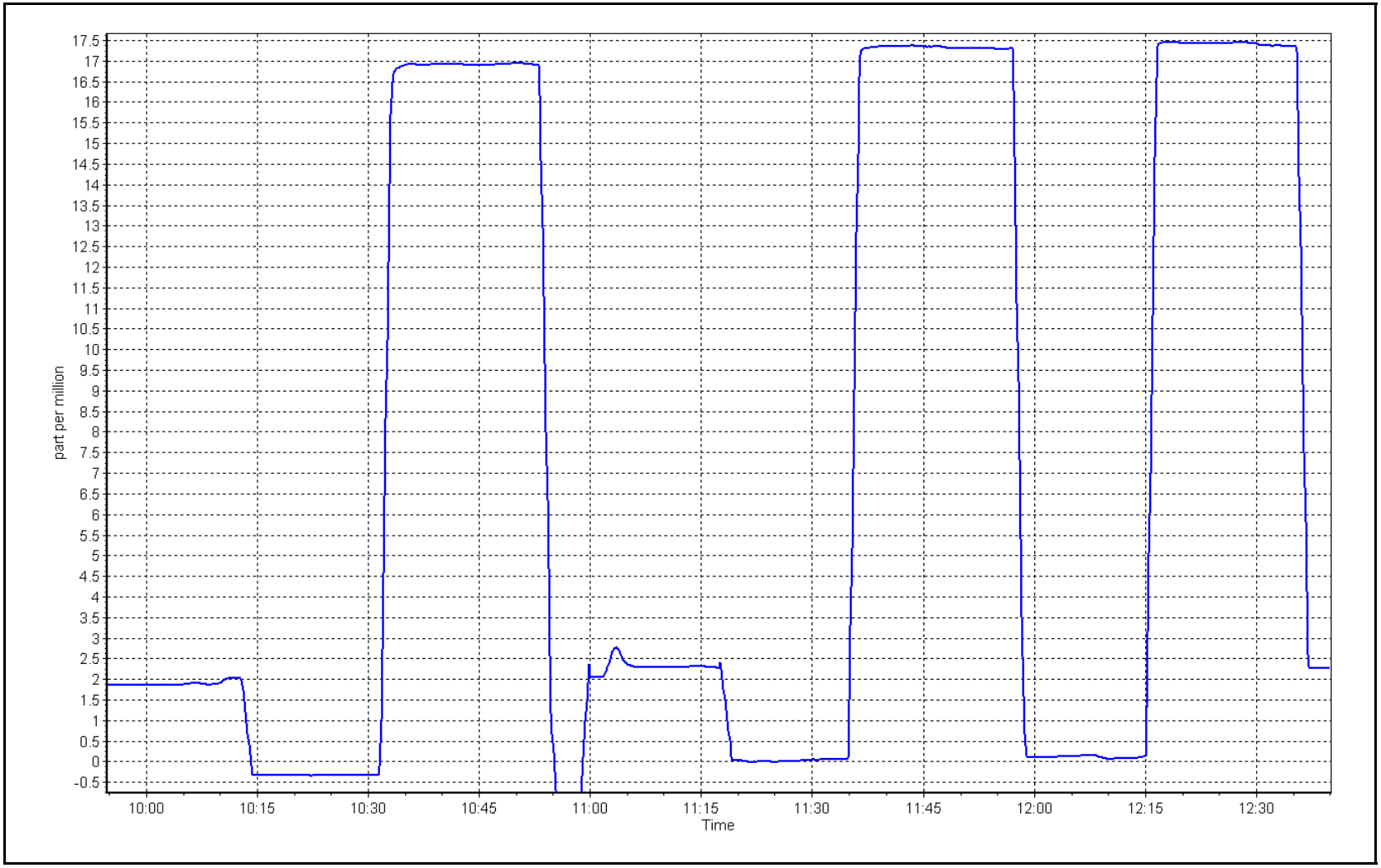
Baseline Corr As found:	17.23	Previous response	17.23	*% change	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed hydrogen cylinder. Checked zero and span response after the cylinder was swapped. No adjustment needed.

Calibration Performed By: Braiden Boutilier

THC Calibration Plot Date: May 24, 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:	May 4, 2023	Last Cal Date:	April 4, 2023
Start time (MST):	10:14	End time (MST):	14:59
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	1.078	NO bkgnd or offset:	7.3	7.5
NOX coeff or slope:	0.996	0.995	NOX bkgnd or offset:	7.3	7.5
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	210.9	210.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.991227	0.999367
NO_X Cal Offset:	0.554416	0.856331
NO Cal Slope:	0.991132	1.001140
NO Cal Offset:	-0.133220	-0.011041
NO_2 Cal Slope:	0.999545	0.998524
NO_2 Cal Offset:	-0.476369	-0.233199

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	0.0	----	----
as found span	4919	81.0	828.1	800.3	27.9	802.0	772.9	29.4	1.0326	1.0354
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	828.0	801.0	26.6	1.0002	0.9991
second point	4960	40.5	414.0	400.1	13.9	415.2	401.0	14.2	0.9972	0.9978
third point	4980	20.2	206.5	199.6	6.9	208.0	199.6	8.4	0.9929	0.9998
as left zero	4999	0.0	0.0	0.0	0.0	-0.1	-0.2	0.1	----	----
as left span	4919	81.0	828.1	359.9	468.3	831.0	360.5	470.8	0.9966	0.9983
								Average Correction Factor	0.9967	0.9989

Corrected As found	NO_X = 802.1 ppb	NO = 773.1 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-2.4%
Previous Response	NO_X = 821.4 ppb	NO = 793.0 ppb		*Percent Change	NO =	-2.6%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	801.0	360.6	468.3	467.6	1.0014	99.9%
2nd GPT point (200 ppb O3)	801.0	580.7	248.2	247.2	1.0039	99.6%
3rd GPT point (100 ppb O3)	801.0	691.9	137.0	136.3	1.0049	99.5%
				Average Correction Factor	1.0034	99.7%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

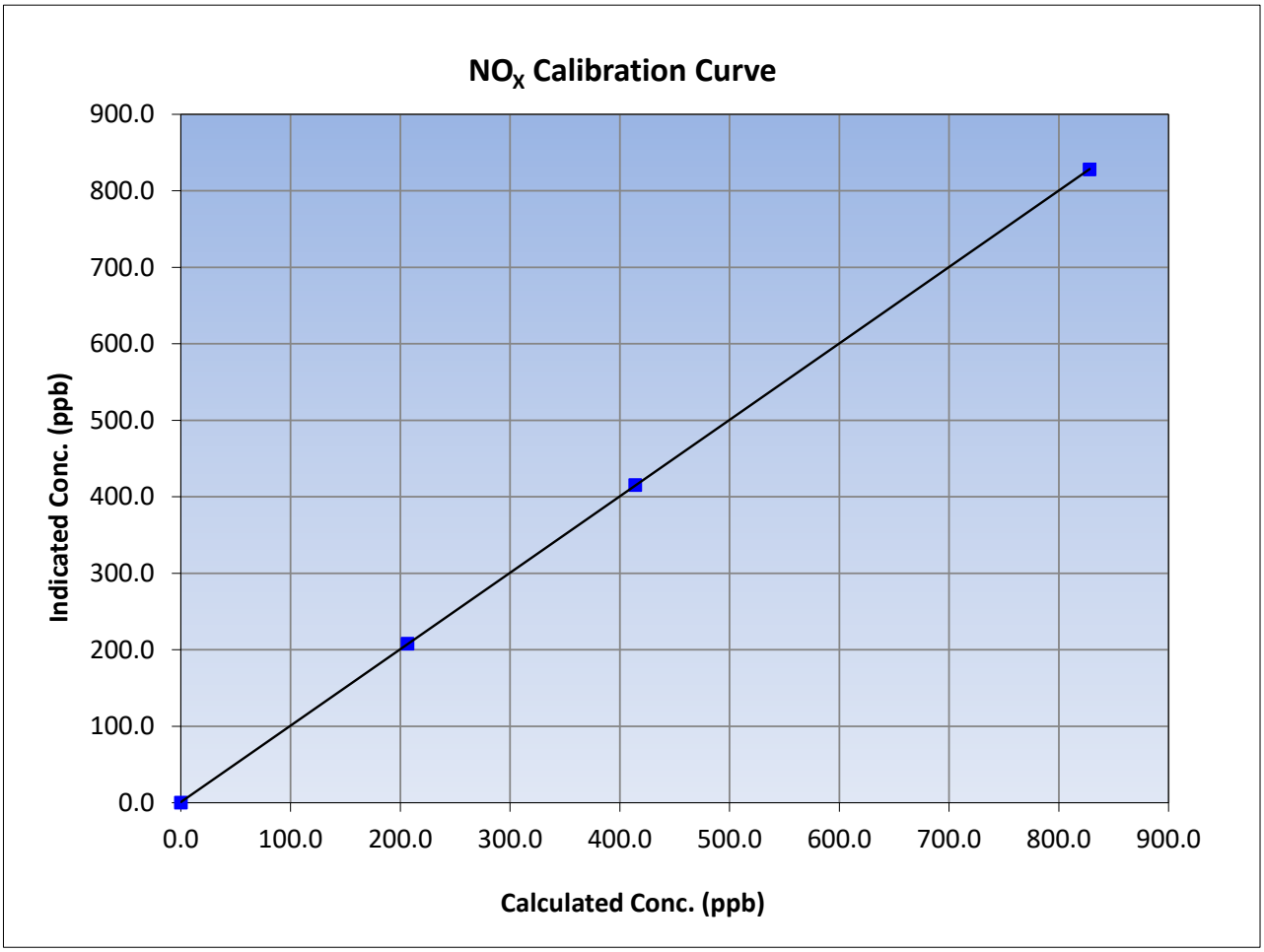
Version-04-2020

Station Information

Calibration Date:	May 4, 2023	Previous Calibration:	April 4, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:14	End Time (MST):	14:59
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999995	*≥0.995*
828.1	828.0	1.0002			
414.0	415.2	0.9972	Slope	0.999367	*0.90 - 1.10*
206.5	208.0	0.9929			
			Intercept	0.856331	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

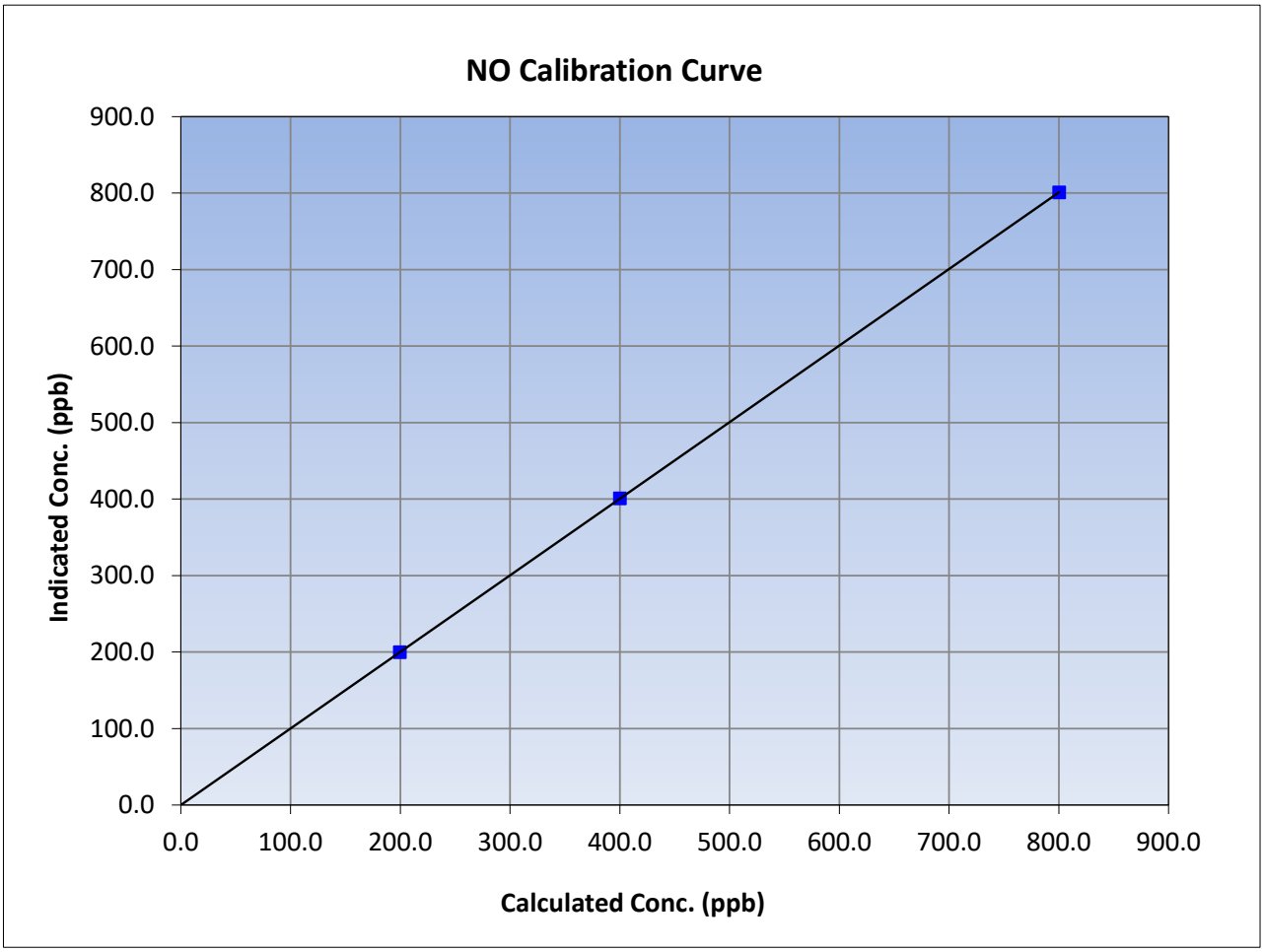
Version-04-2020

Station Information

Calibration Date:	May 4, 2023	Previous Calibration:	April 4, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:14	End Time (MST):	14:59
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999999	≥0.995
800.3	801.0	0.9991			
400.1	401.0	0.9978	Slope	1.001140	0.90 - 1.10
199.6	199.6	0.9998			
			Intercept	-0.011041	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

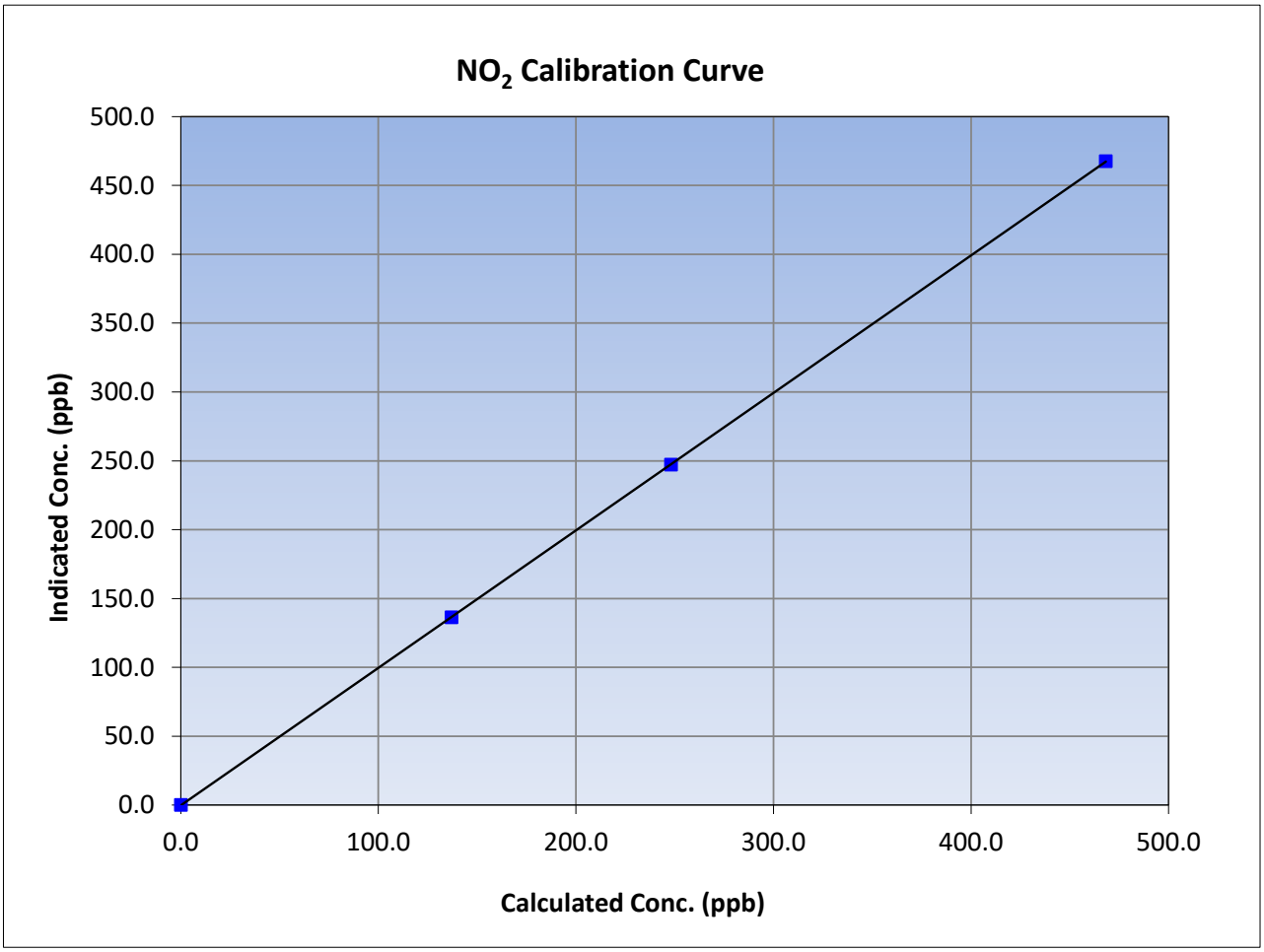
Version-04-2020

Station Information

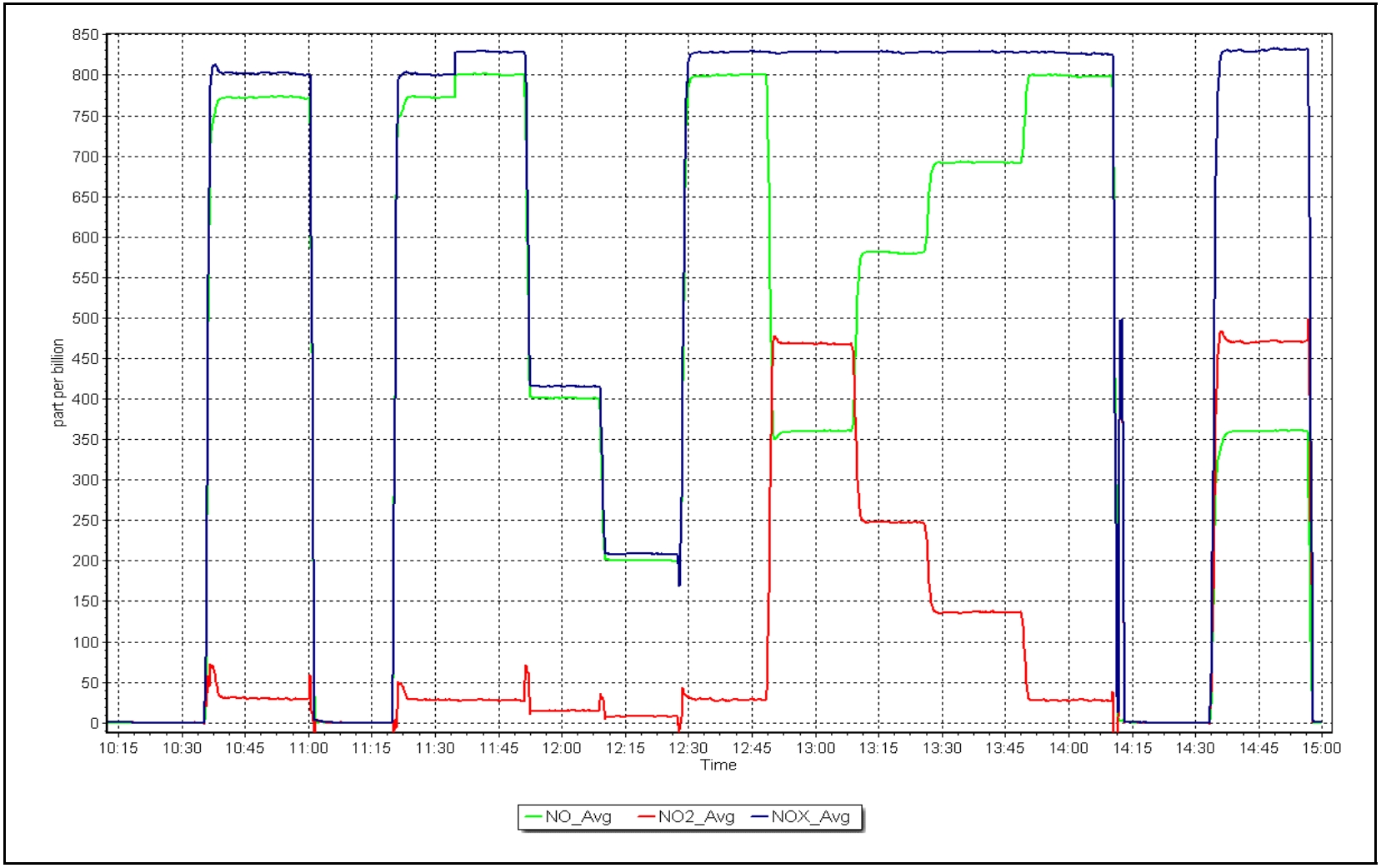
Calibration Date:	May 4, 2023	Previous Calibration:	April 4, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:14	End Time (MST):	14:59
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999997	≥0.995
468.3	467.6	1.0014			
248.2	247.2	1.0039	Slope	0.998524	0.90 - 1.10
137.0	136.3	1.0049			
			Intercept	-0.233199	+/-20



NO_X Calibration Plot Date: May 4, 2023 Location: Firebag



Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Firebag	Station Number:	AMS 19
Calibration Date:	May 1, 2023	Prev Cal Date:	July 4, 2022
Start Time (MST):	13:40	End Time (MST):	15:12
Tower Height (m):	10.0	Reason:	Routine

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	W15276
WS Calibrator:	MetOne 053	Serial Number:	CA 03845

Shaft RPM	Calculated Speed (K/hr) (Cv)	Indicated Speed (K/hr) (Iv)	% Error *Limit = +/- 1.5%*
0	0.0	0.0	---
200	20.2	20.1	-0.3%
400	39.4	39.4	0.1%
600	58.6	58.6	0.0%
800	77.8	77.7	-0.1%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)		0.999999	*≥0.9995*
Calculated slope		1.000283	*0.90 - 1.10*
Calculated intercept		0.005312	*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	U11347
As Found Declination (deg east of True North):	28	As Left Declination (deg east of True North):	15
Solar noon time (MST):	12:20	Calc Declination*:	15.44 Degrees
Deadband calc:	4.4 degrees (*Limit 4 deg*)		* - calculated declination as per NOAA website

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	% Error (based on 357° FS) *Limit = +/- 1.0%*
2	3.4	---
90	89.2	-0.2%
180	178.4	-0.4%
270	267.6	-0.7%
357	356.0	-0.3%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)			*≥0.9995*
Calculated slope		1.007234	*0.90 - 1.10*
Calculated intercept		-0.418403	*+/- 4*

Notes: Adjusted tower crossarm to proper orientation. Adjusted using a compass. Deadband out of compliance limits, will return with a replacement sensor.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Firebag	Station Number:	AMS 19
Calibration Date:	May 4, 2023	Prev Cal Date:	May 1, 2023
Start Time (MST):	13:22	End Time (MST):	14:40
Tower Height (m):	10.0	Reason:	Removal

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	W15276
WS Calibrator:	MetOne 053	Serial Number:	CA 03845

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

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

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	U11347
As Found Declination (deg east of True North):	14	As Left Declination (deg east of True North):	15
Solar noon time (MST):	12:20	Calc Declination*:	15.44 Degrees
Deadband calc:	5.2 degrees (*Limit 4 deg*)		* - calculated declination as per NOAA website

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	% Error (based on 357° FS) *Limit = +/- 1.0%*
2	3.2	---
90	89.3	-0.2%
180	178.3	-0.5%
270	267.5	-0.7%
357	355.0	-0.6%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)			*≥0.9995*
Calculated slope		1.009250	*0.90 - 1.10*
Calculated intercept		-0.503217	*+/- 4*

Notes: Deadband out of compliance from the calibration done on May 1, 2023. As founds done before removing the WD sensor.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Firebag	Station Number:	AMS 19
Calibration Date:	May 4, 2023	Prev Cal Date:	May 1, 2023
Start Time (MST):	13:40	End Time (MST):	15:12
Tower Height (m):	10.0	Reason:	Install

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	W15276
WS Calibrator:	MetOne 053	Serial Number:	CA 03845

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

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

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	A23968
As Found Declination (deg east of True North):	14	As Left Declination (deg east of True North):	15
Solar noon time (MST):	12:20	Calc Declination*:	15.44 Degrees
Deadband calc:	1.6 degrees (*Limit 4 deg*)		* - calculated declination as per NOAA website

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	% Error (based on 357° FS) *Limit = +/- 1.0%*
2	4.0	---
90	88.8	-0.3%
180	181.7	0.5%
270	272.1	0.6%
357	359.4	0.7%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)			*≥0.9995*
Calculated slope		0.995367	*0.90 - 1.10*
Calculated intercept		-0.576136	*+/- 4*

Notes: Deadband out of compliance from the calibration done on May 1, 2023. New WD sensor installed. Aligned tower using solar noon.

Calibration Performed By: Braiden Boutilier

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS20
MACKAY RIVER
MAY 2023

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

June 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	May 2, 2023	Last Cal Date:	April 3, 2023
Start time (MST):	9:55	End time (MST):	12:35
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:	1.005548	1.007790	Backgd or Offset:	18.9	18.8
Calibration intercept:	0.790939	2.430853	Coeff or Slope:	0.974	0.974

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4919	81.3	800.3	805.6	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	----
high point	4919	81.3	800.3	808.2	0.990
second point	4959	40.7	400.7	406.4	0.986
third point	4980	20.3	199.8	206.4	0.968
as left zero	5000	0.0	0.0	0.3	----
as left span	4919	81.3	800.3	814.5	0.983
				Average Correction Factor	0.981

Baseline Corr As found:	805.50	Previous response	805.50	*% change	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

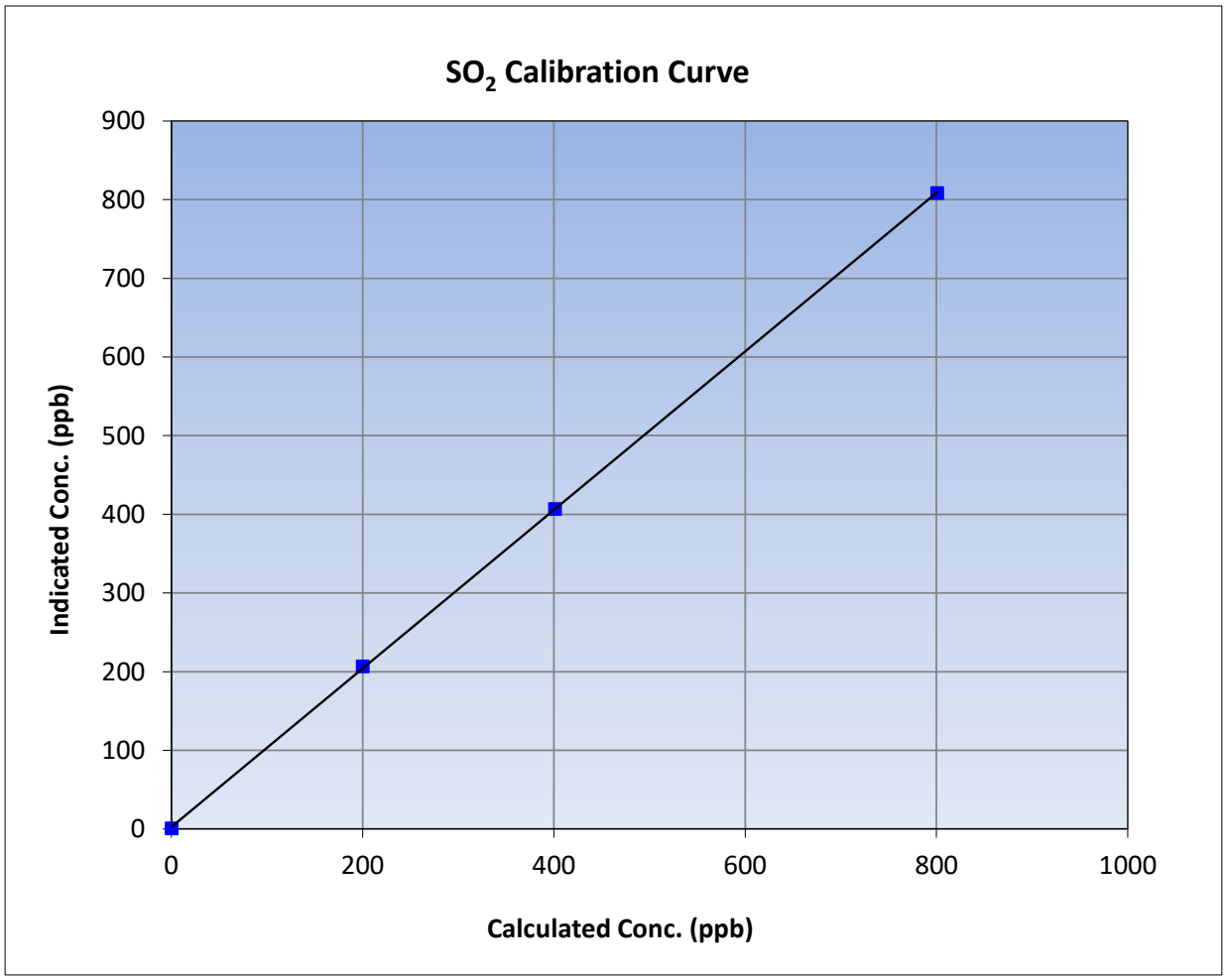
Station Information

Calibration Date:	May 2, 2023	Previous Calibration:	April 3, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	9:55	End Time (MST):	12:35
Analyzer make:	Thermo 43i	Analyzer serial #:	1501301450

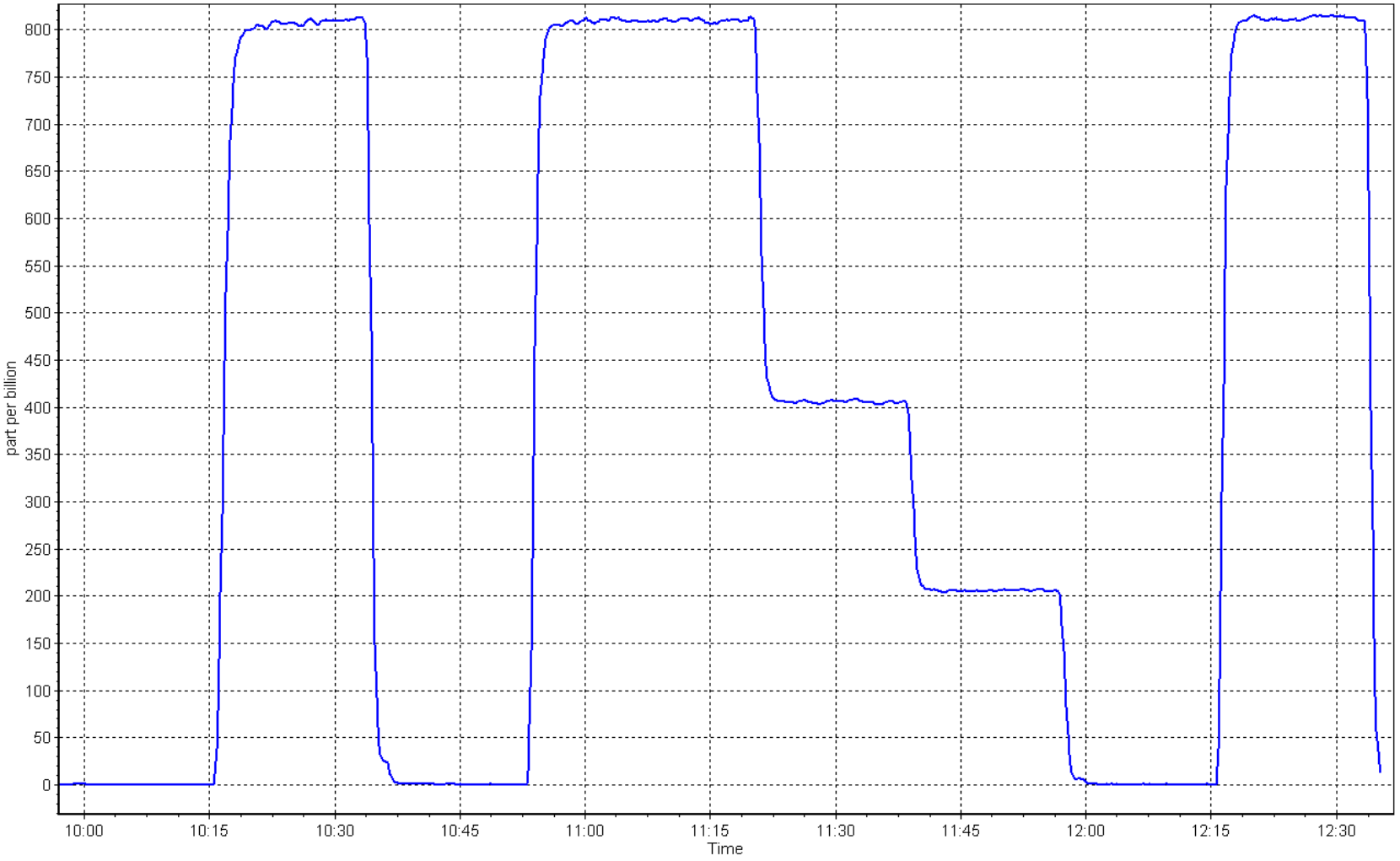
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
800.3	808.2	0.9902
400.7	406.4	0.9859
199.8	206.4	0.9681

Statistical Evaluation		Limits
Correlation Coefficient	0.999968	≥0.995
Slope	1.007790	0.90 - 1.10
Intercept	2.430853	+/-30



SO2 Calibration Plot Date: May 2, 2023 Location: MacKay River



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	May 24, 2023	Last Cal Date:	April 4, 2023
Start time (MST):	9:56	End time (MST):	13:27
Reason:	Removal and cal gas cylinder change		

Calibration Standards

Cal Gas Concentration:	5.12	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC515997			
Removed Cal Gas Conc:	4.87	ppm	Rem Gas Exp Date:	May 5, 2023
Removed Gas Cyl #:	EY0001922		Diff between cyl:	-2.5%
Calibrator Make/Model:	Teledyne API T700		Serial Number:	1220
ZAG Make/Model:	Teledyne API 701		Serial Number:	4522

Analyzer Information

Analyzer make:	Teledyne API T101		Analyzer serial #:	196	
Converter make:	Internal		Converter serial #:	NA	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003004	NA	Backgd or Offset:	46.3	NA
Calibration intercept:	0.079047	NA	Coeff or Slope:	0.987	NA

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	82.1	0.981
as found 2nd point	4959	41.1	40.0	41.5	0.979
as found 3rd point	4979	20.5	20.0	21.1	0.974
new cylinder response	4922	78.1	80.0	80.1	0.999

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	4919	80.0	800.2		----
Date of last scrubber change:		December 15, 2020		Ave Corr Factor	
Date of last converter efficiency test:					efficiency

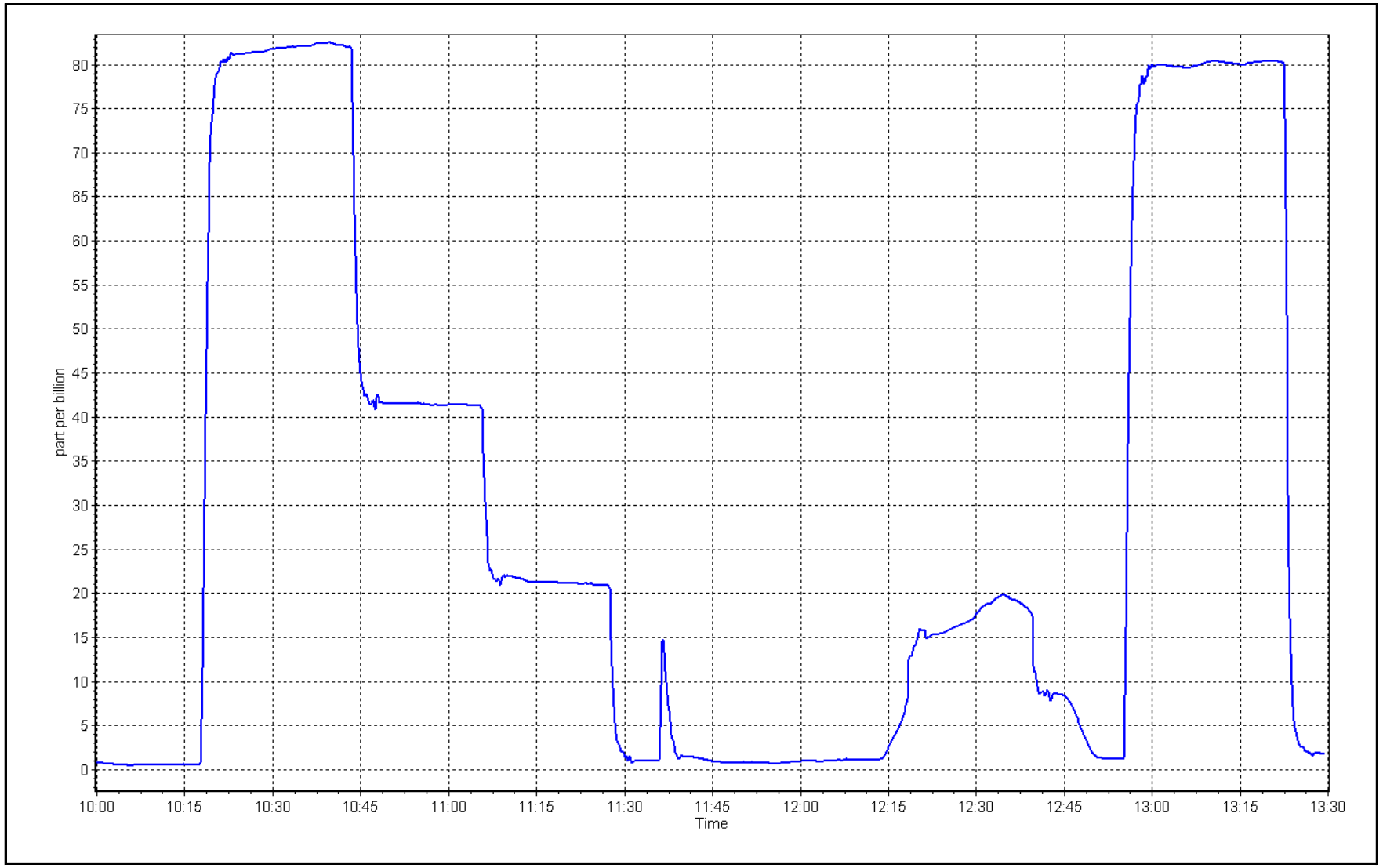
Baseline Corr As found:	81.5	Prev response:	80.28	*% change:	1.5%
Baseline Corr 2nd AF pt:	40.9	AF Slope:	1.018723	AF Intercept:	0.679021
Baseline Corr 3rd AF pt:	20.5	AF Correlation:	0.999996		

* = > +/-5% change initiates investigation

Notes: Removal calibration for instrument change out. Scrubber check completed after third point, it passed; and then changed calibration gas cylinder

Calibration Performed By: Mohammed Kashif

H_2S Calibration Plot Date: May 24, 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:	May 25, 2023	Last Cal Date:	NA
Start time (MST):	10:33	End time (MST):	13:25
Reason:	Install		

Calibration Standards

Cal Gas Concentration:	5.12	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC515997			
Removed Cal Gas Conc:	5.12	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	1220
ZAG Make/Model:	Teledyne API 701		Serial Number:	4522

Analyzer Information

Analyzer make:	Thermo 43iQ TLE		Analyzer serial #:	12124313139	
Converter make:	Global		Converter serial #:	2022-226	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	NA	1.006091	Backgd or Offset:	NA	1.92
Calibration intercept:	NA	-0.292887	Coeff or Slope:	NA	0.619

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	78.1	80.0	80.3	0.997
second point	4961	39.0	40.0	39.8	1.004
third point	4980	19.5	20.0	19.8	1.011
as left zero	5000	0.0	0.0	-0.5	----
as left span	4922	78.1	80.0	79.9	1.002
SO2 Scrubber Check	4919	80.0	800.2	-0.1	----
Date of last scrubber change:		May 25, 2023		Ave Corr Factor	1.004
Date of last converter efficiency test:					efficiency

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

* = > +/-5% change initiates investigation

Notes: Install calibration. Scrubber check completed after calibrator zero. Adjusted zero and span.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

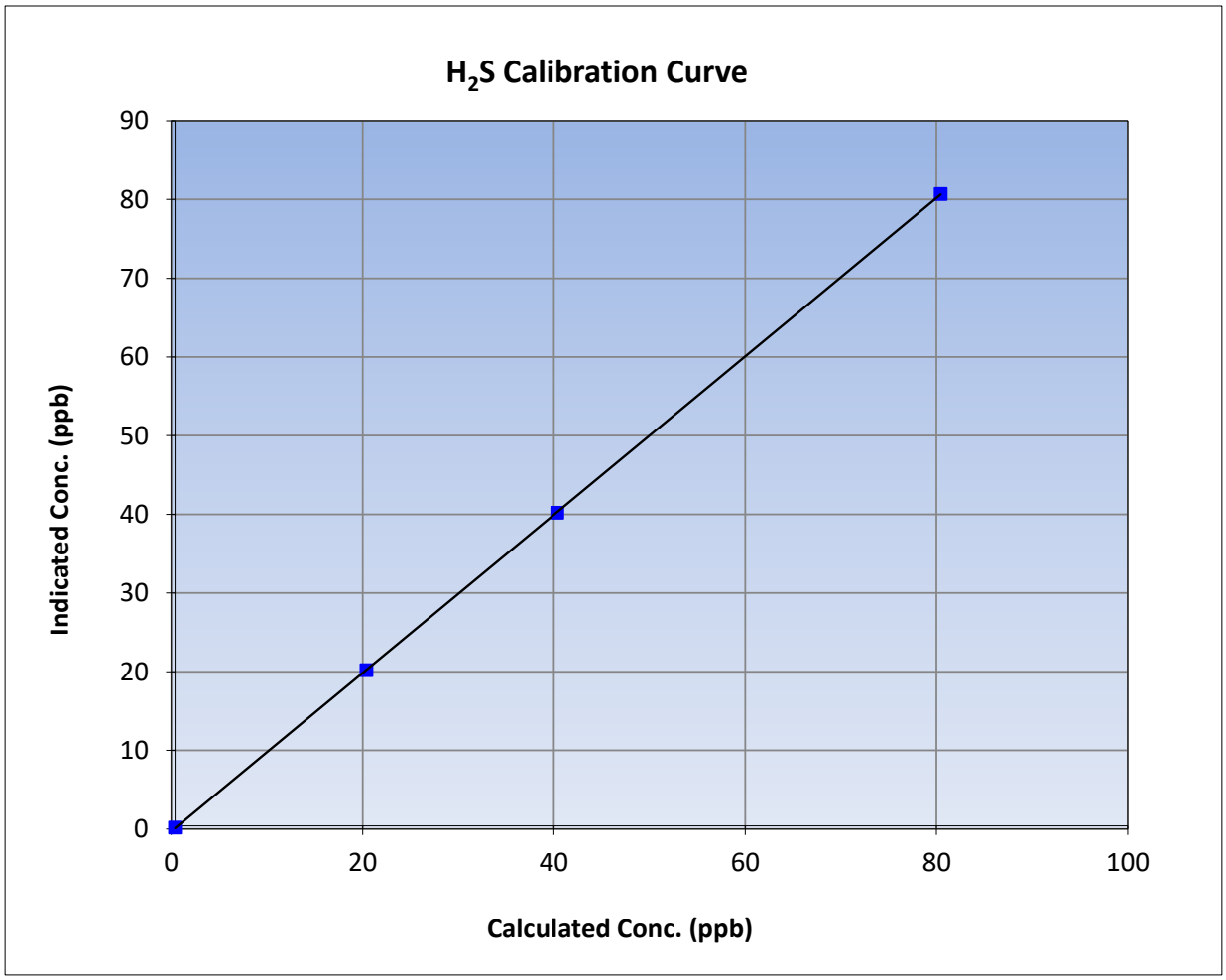
Station Information

Calibration Date:	May 25, 2023	Previous Calibration:	NA
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	10:33	End Time (MST):	13:25
Analyzer make:	Thermo 43iQ TLE	Analyzer serial #:	12124313139

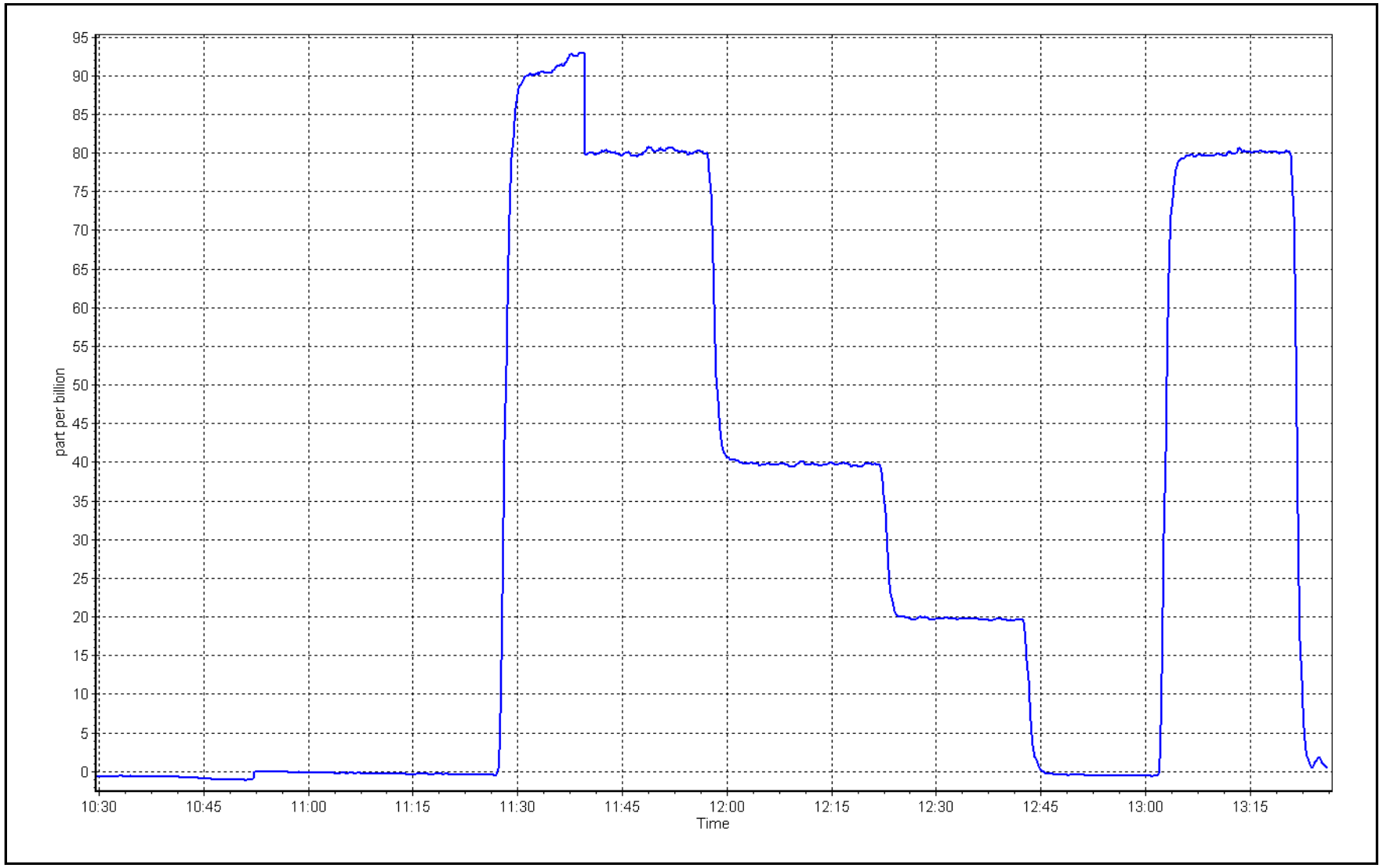
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
80.0	80.3	0.9967
40.0	39.8	1.0042
20.0	19.8	1.0109

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	1.006091	*0.90 - 1.10*
Intercept	-0.292887	*+/-3*



H_2S Calibration Plot Date: May 25, 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:	May 2, 2023	Last Cal Date:	April 3, 2023
Start time (MST):	9:55	End time (MST):	12:35
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:	0.995858	1.004428	Background:	3.160	3.250
Calibration intercept:	-0.025166	-0.093194	Coefficient:	5.328	5.488

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	4919	81.3	17.34	16.89	1.027
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.14	----
high point	4919	81.3	17.34	17.31	1.002
second point	4959	40.7	8.68	8.63	1.006
third point	4980	20.3	4.33	4.32	1.003
as left zero	5000	0.0	0.00	-0.10	----
as left span	4919	81.3	17.34	17.43	0.995
				Average Correction Factor	1.004

Baseline Corr As found:	17.02	Previous response	17.24	*% change	-1.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

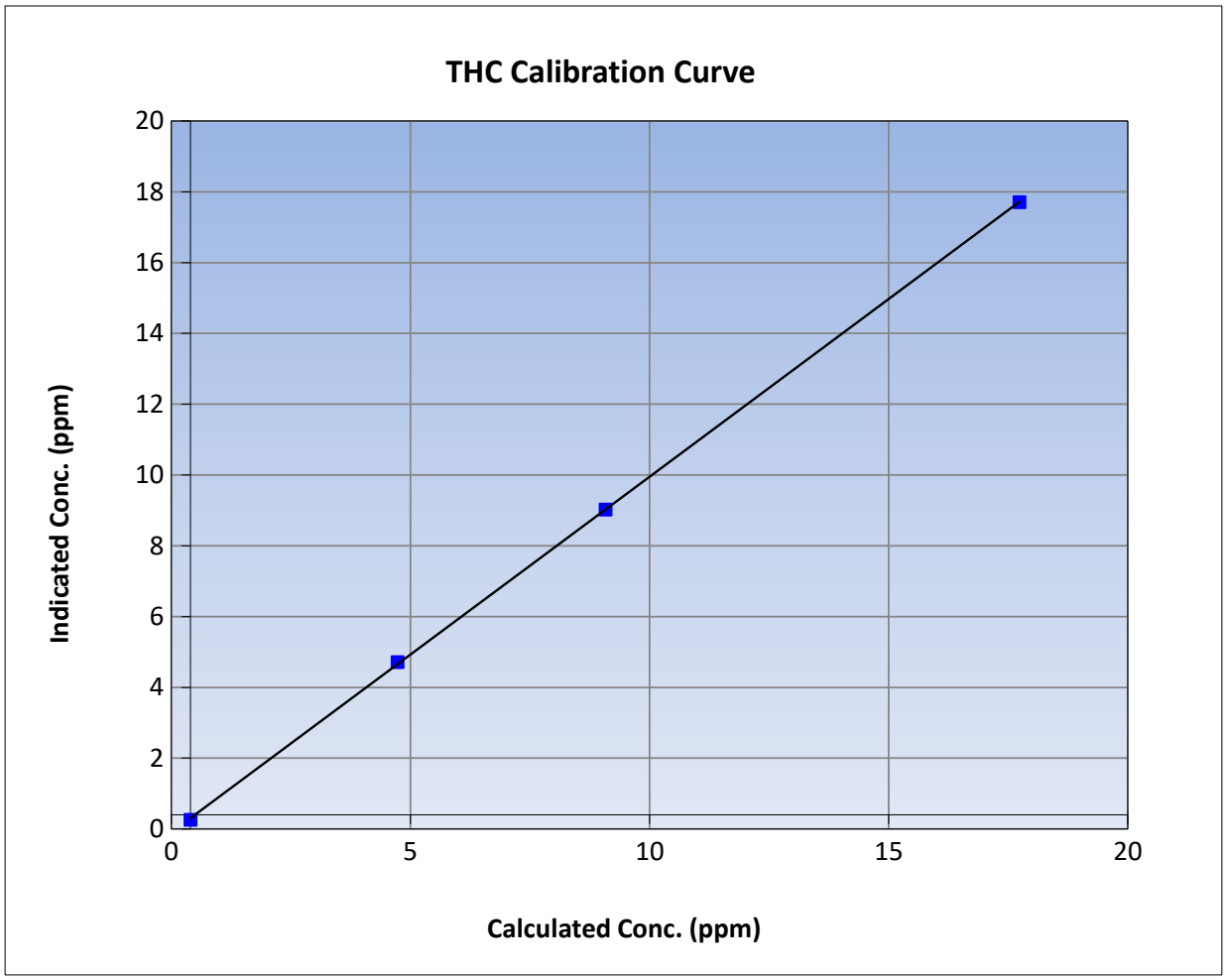
Station Information

Calibration Date:	May 2, 2023	Previous Calibration:	April 3, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	9:55	End Time (MST):	12:35
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1501663727

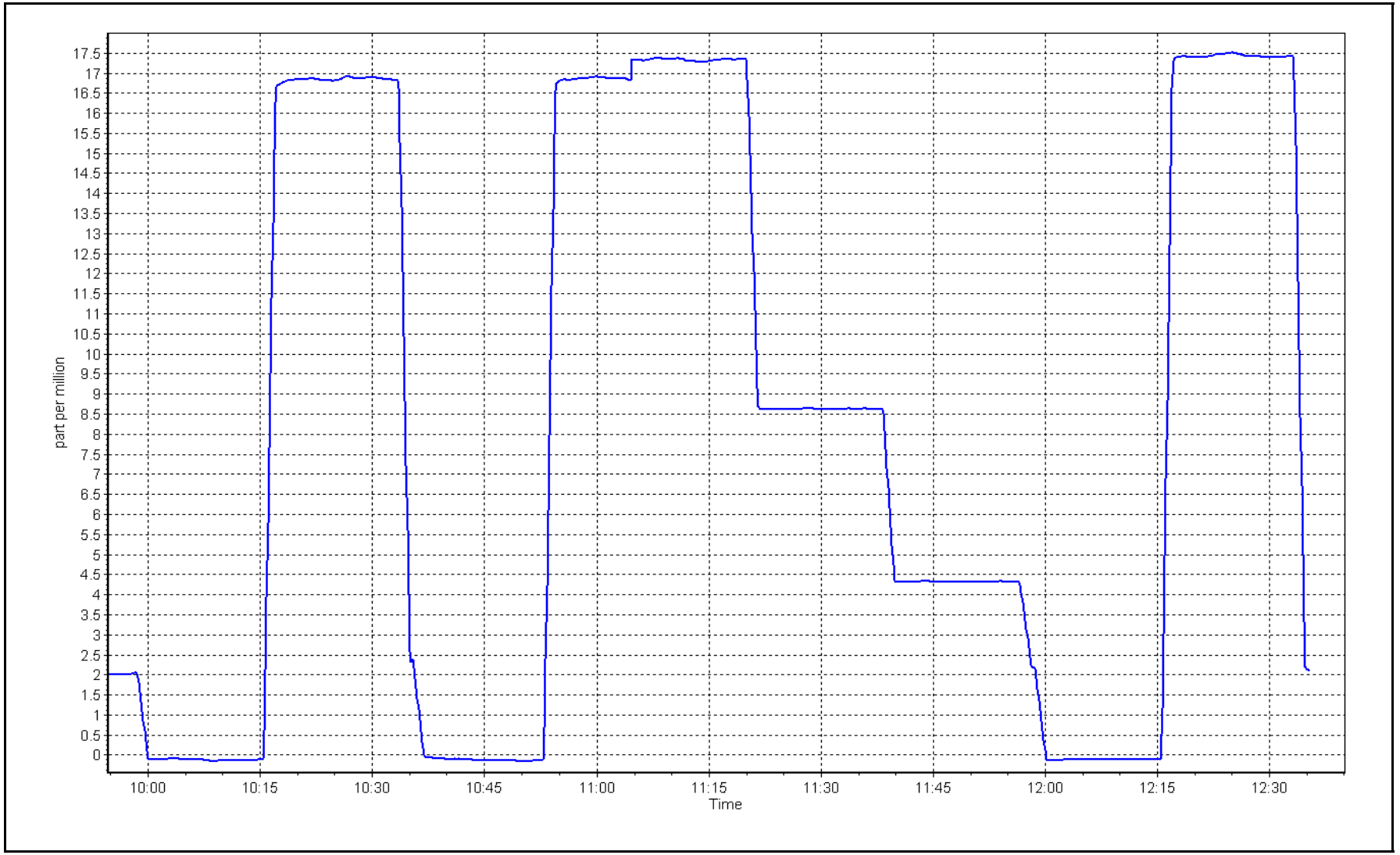
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.14	----
17.34	17.31	1.0018
8.68	8.63	1.0064
4.33	4.32	1.0029

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999963	*≥0.995*
Slope	1.004428	*0.90 - 1.10*
Intercept	-0.093194	*+/-1.5*



THC Calibration Plot Date: May 2, 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:	May 11, 2023	Last Cal Date:	April 19, 2023
Start time (MST):	9:15	End time (MST):	13:21
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T376265		Cal Gas Expiry Date:	April 13, 2025	
NOX Cal Gas Conc:	49.19	ppm	NO Cal Gas Conc:	48.04	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	49.19	ppm	Removed Gas NO Conc:	48.04	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	1220	
ZAG make/model:	Teledyne API 701		Serial Number:	4522	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1505164379	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.459	1.459	NO bkgnd or offset:	4.0	4.0
NOX coeff or slope:	0.990	0.990	NOX bkgnd or offset:	4.0	4.0
NO2 coeff or slope:	0.995	0.995	Reaction cell Press:	181.9	180.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.996899	0.981506
NO_X Cal Offset:	1.929986	1.850414
NO Cal Slope:	0.999776	0.983542
NO Cal Offset:	0.730780	0.691620
NO_2 Cal Slope:	0.995110	1.000887
NO_2 Cal Offset:	-1.870675	-0.270425

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	0.1	----	----
as found span	4917	83.3	819.5	800.3	19.2	807.7	788.3	19.4	1.0146	1.0152
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
high point	4917	83.3	819.5	800.3	19.2	805.5	787.7	17.9	1.0173	1.0160
second point	4956	41.7	410.4	400.8	9.6	404.9	394.6	10.3	1.0137	1.0158
third point	4979	20.8	204.6	199.9	4.8	204.9	198.4	6.5	0.9987	1.0073
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	447.1	372.4	809.1	434.1	375.0	1.0128	1.0299
								Average Correction Factor	1.0099	1.0130

Corrected As found	NO_X = 807.8 ppb	NO = 788.4 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-1.4%
Previous Response	NO_X = 818.8 ppb	NO = 800.8 ppb		*Percent Change	NO =	-1.6%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	785.6	432.4	372.4	372.6	0.9994	100.1%
2nd GPT point (200 ppb O3)	785.6	603.4	201.4	201.2	1.0008	99.9%
3rd GPT point (100 ppb O3)	785.6	692.5	112.3	111.6	1.0059	99.4%
				Average Correction Factor	1.0020	99.8%

Notes: No adjustments made.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

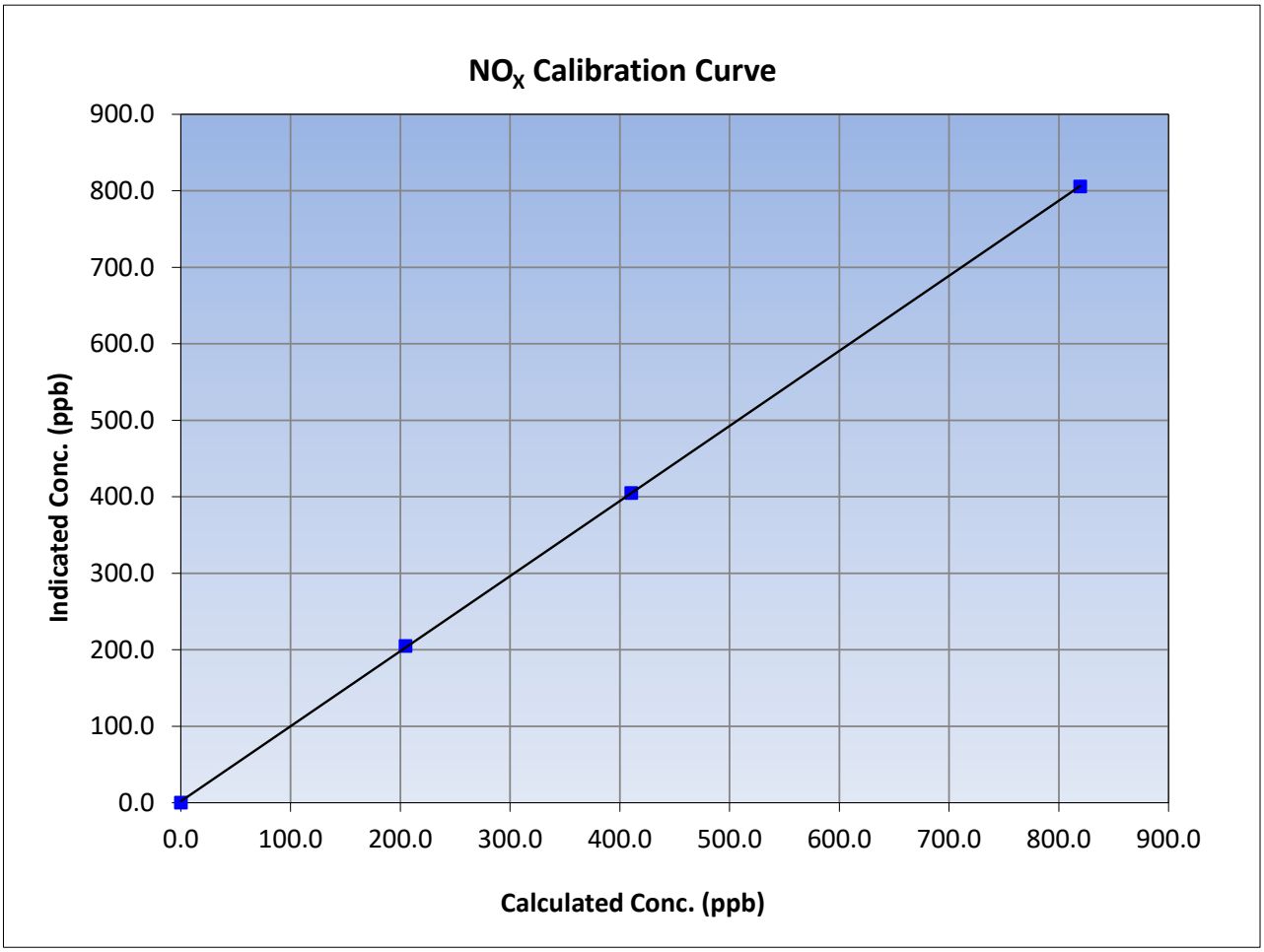
Version-04-2020

Station Information

Calibration Date:	May 11, 2023	Previous Calibration:	April 19, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	9:15	End Time (MST):	13:21
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	0.999976	*≥0.995*
819.5	805.5	1.0173			
410.4	404.9	1.0137	Slope	0.981506	*0.90 - 1.10*
204.6	204.9	0.9987			
			Intercept	1.850414	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

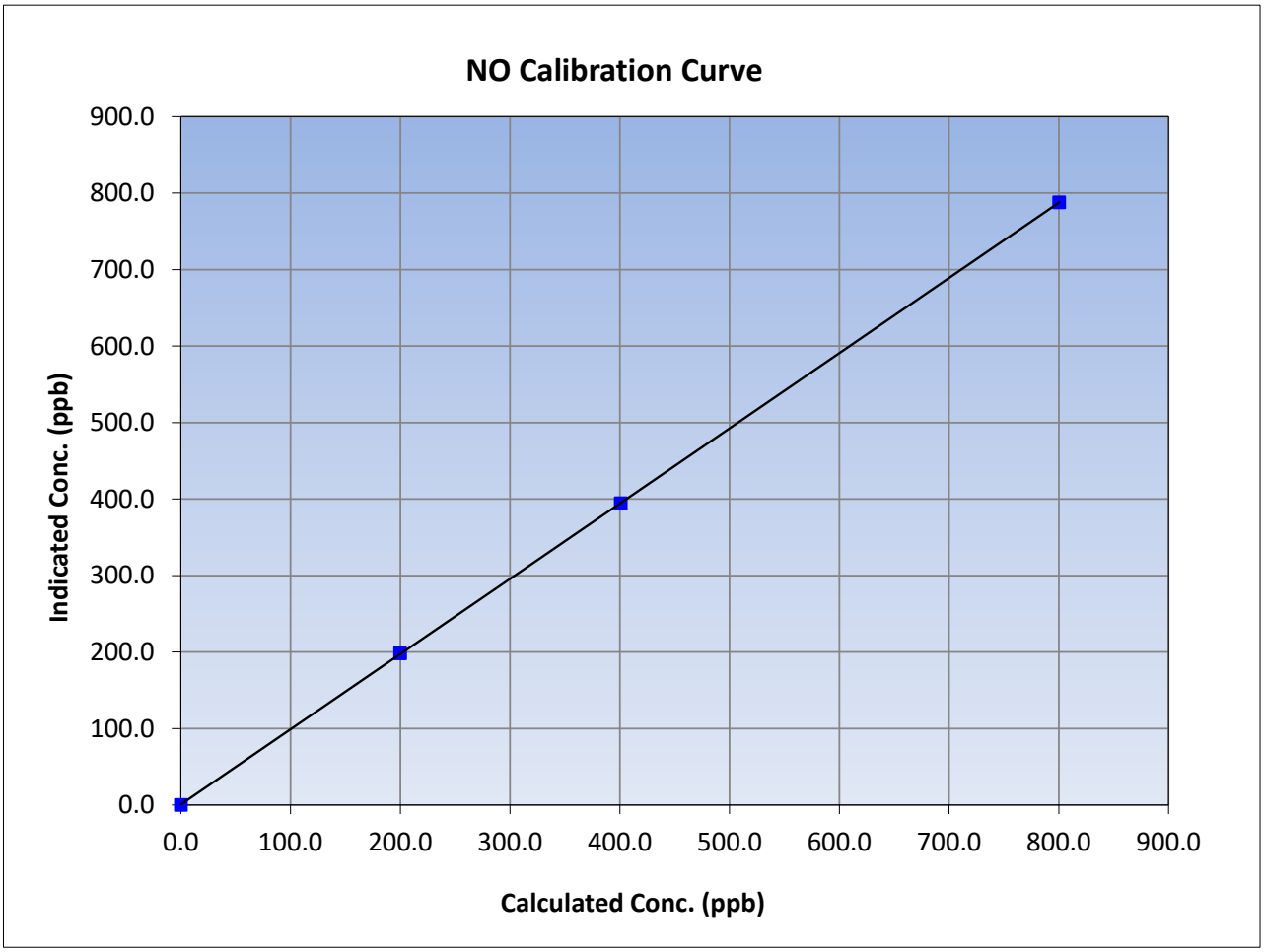
Version-04-2020

Station Information

Calibration Date:	May 11, 2023	Previous Calibration:	April 19, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	9:15	End Time (MST):	13:21
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	0.999994	≥0.995
800.3	787.7	1.0160			
400.8	394.6	1.0158	Slope	0.983542	0.90 - 1.10
199.9	198.4	1.0073			
			Intercept	0.691620	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

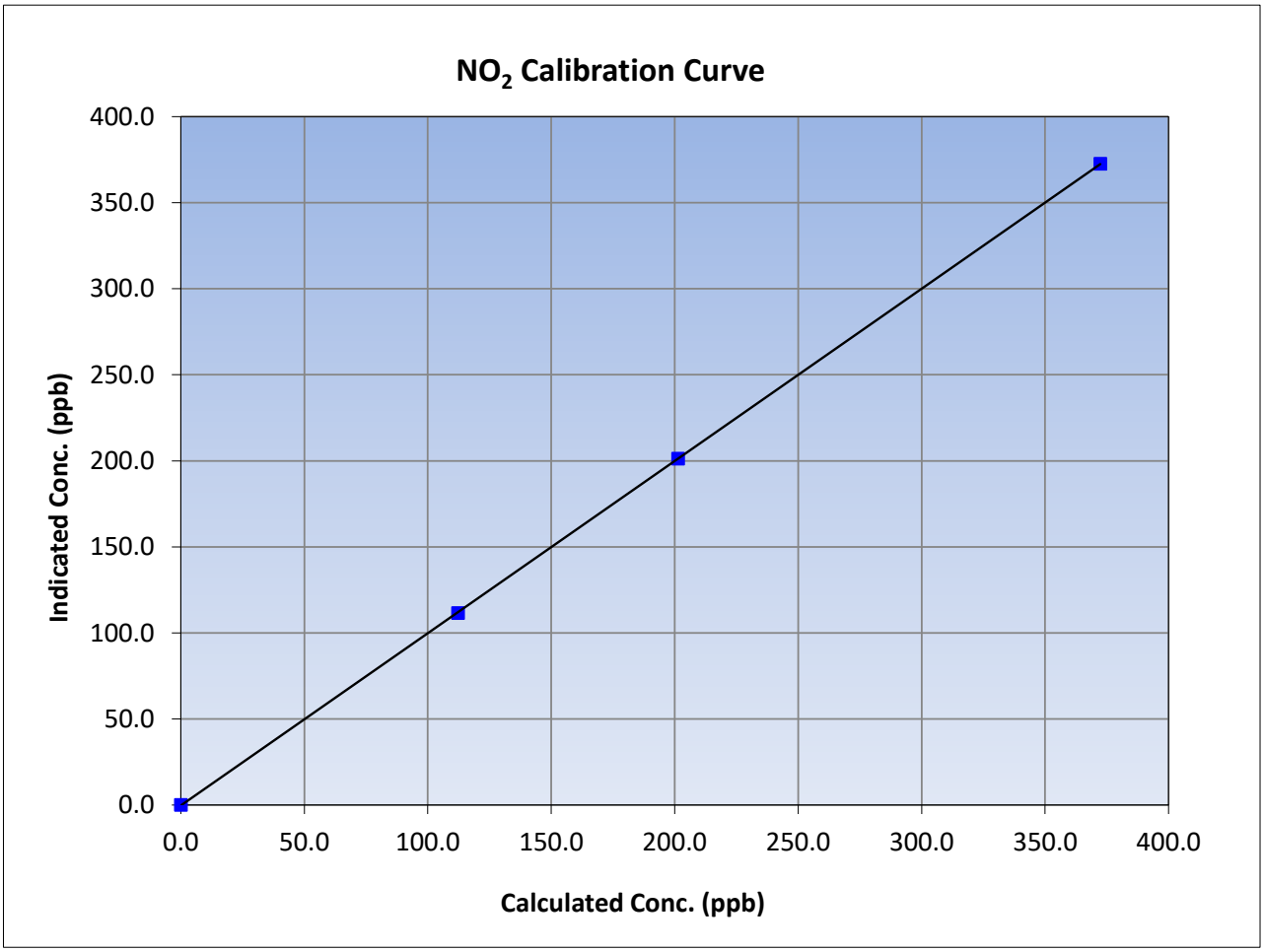
Version-04-2020

Station Information

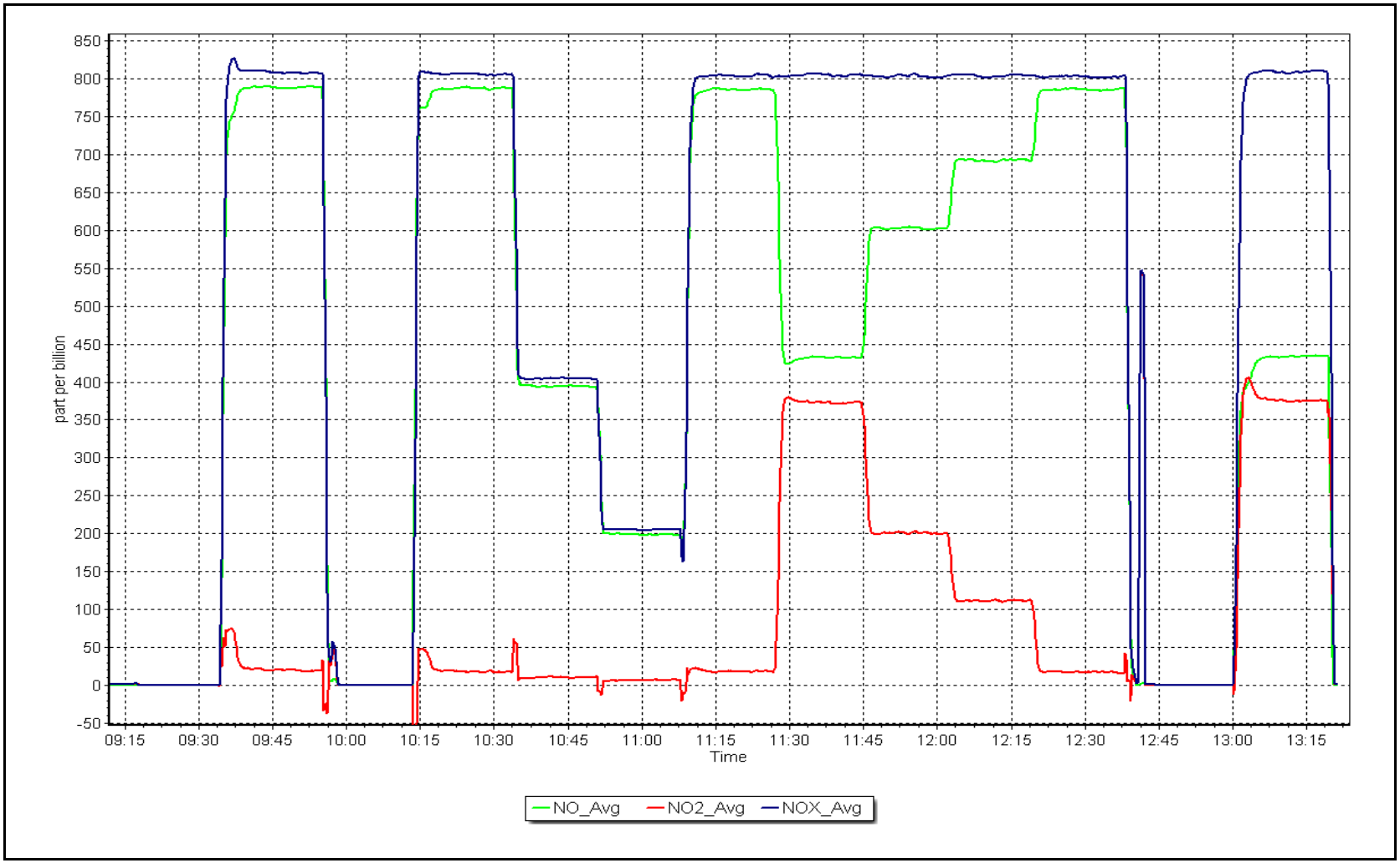
Calibration Date:	May 11, 2023	Previous Calibration:	April 19, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	9:15	End Time (MST):	13:21
Analyzer make:	Thermo 42i	Analyzer serial #:	1505164379

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999994	≥0.995
372.4	372.6	0.9994			
201.4	201.2	1.0008	Slope	1.000887	0.90 - 1.10
112.3	111.6	1.0059			
			Intercept	-0.270425	+/-20



NO_X Calibration Plot Date: May 11, 2023 Location: MacKay River



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS21
CONKLIN
MAY 2023

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

June 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	May 3, 2023	Last Cal Date:	April 13, 2023
Start time (MST):	9:41	End time (MST):	12:41
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:	691

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1428701363

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.015856	1.015485	Backgd or Offset:	28.4	28.4
Calibration intercept:	0.896430	1.176454	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	812.9	0.985
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5005	0.0	0.0	0.1	----
high point	4920	80.2	800.8	814.0	0.984
second point	4960	40.1	400.4	408.0	0.981
third point	4980	20.0	200.1	205.7	0.973
as left zero	5005	0.0	0.0	0.1	----
as left span	4920	80.2	800.8	817.0	0.980
				Average Correction Factor	0.979

Baseline Corr As found:	812.80	Previous response	814.44	*% change	-0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments have been made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

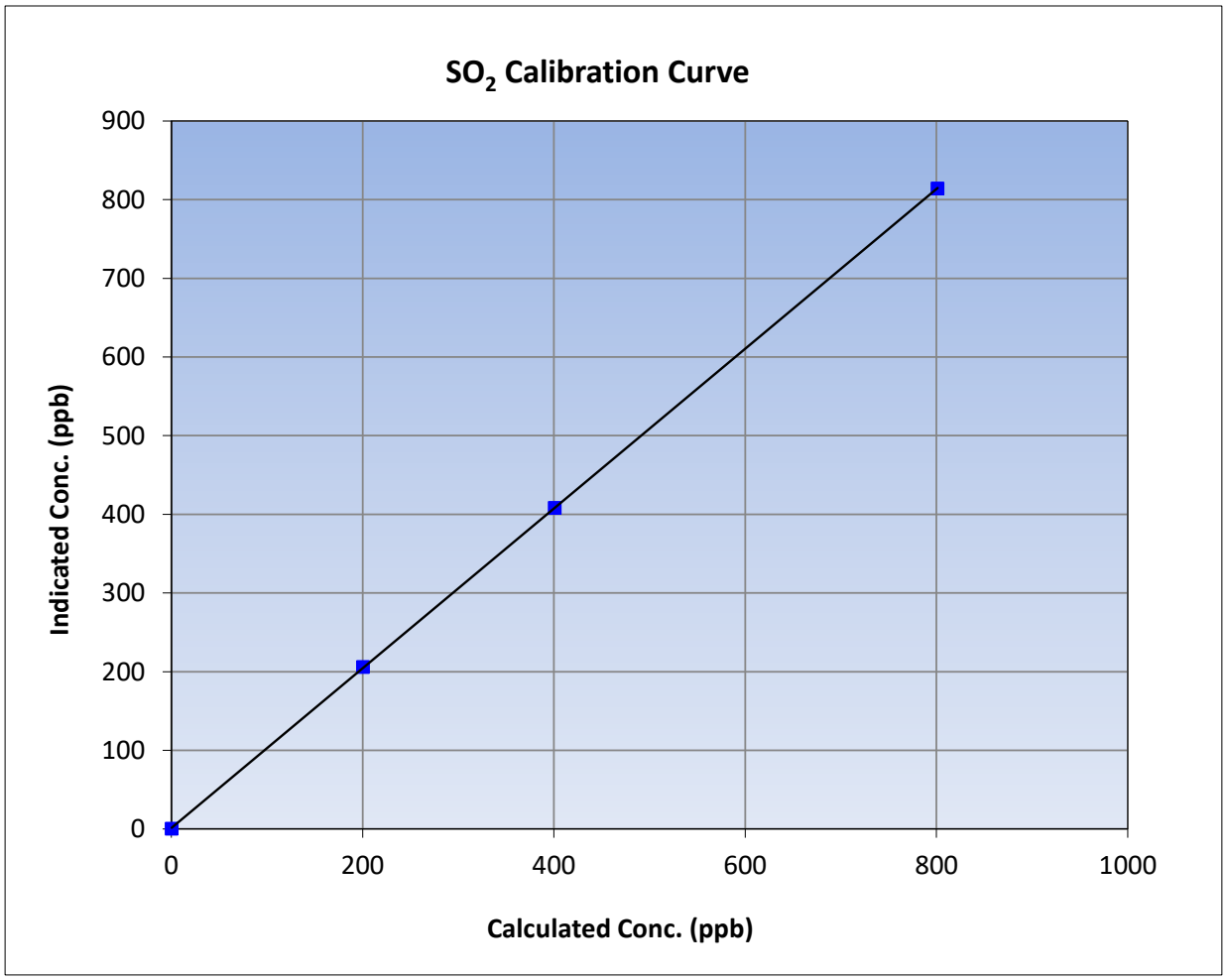
Station Information

Calibration Date:	May 3, 2023	Previous Calibration:	April 13, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:41	End Time (MST):	12:41
Analyzer make:	Thermo 43i	Analyzer serial #:	1428701363

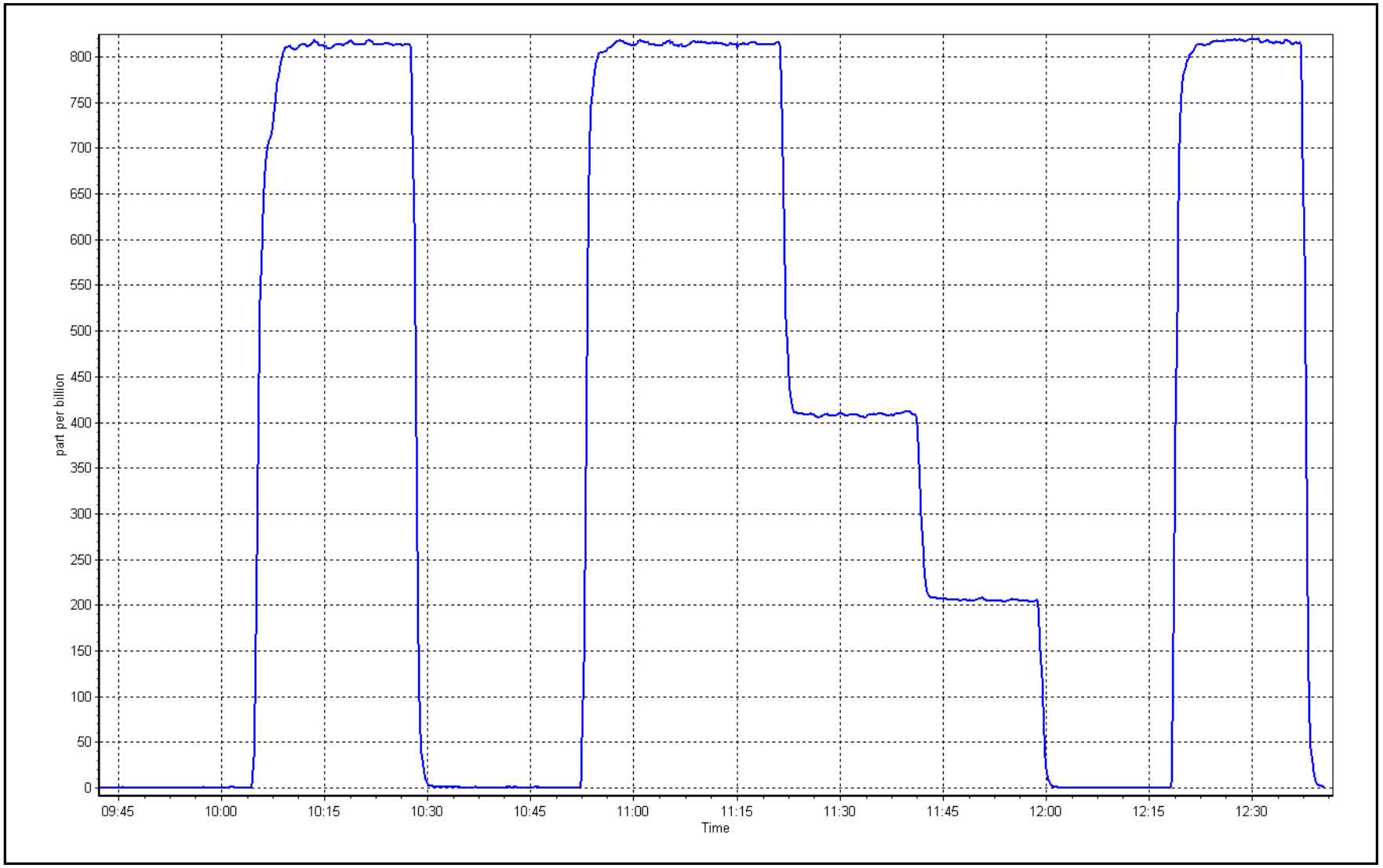
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
800.8	814.0	0.9838
400.4	408.0	0.9814
200.1	205.7	0.9729

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999991	*≥0.995*
Slope	1.015485	*0.90 - 1.10*
Intercept	1.176454	*+/-30*



SO2 Calibration Plot Date: May 3, 2023 Location: Conklin



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	May 30, 2023	Last Cal Date:	April 26, 2023
Start time (MST):	9:32	End time (MST):	14:00
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.00	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC501204			
Removed Cal Gas Conc:	5.03	ppm	Rem Gas Exp Date:	April 16, 2022
Removed Gas Cyl #:	CC505493		Diff between cyl:	-0.8%
Calibrator Make/Model:	API T700		Serial Number:	3810
ZAG Make/Model:	API 701H		Serial Number:	691

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1236656116	
Converter make:	CD-Nova 101		Converter serial #:	NA	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.009291	1.000000	Backgd or Offset:	2.8	2.9
Calibration intercept:	-0.082550	0.000000	Coeff or Slope:	0.974	0.974

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.4	----
as found span	4921	79.5	80.0	81.3	0.978
as found 2nd point	4960	39.8	40.0	41.0	0.966
as found 3rd point	4980	19.9	20.0	20.2	0.970
new cylinder response	4920	80.0	80.0	80.7	0.991

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	80.0	80.0	80.0	1.000
second point	4960	40.0	40.0	40.0	1.000
third point	4980	20.0	20.0	20.0	1.000
as left zero	5000	0.0	0.0	0.0	----
as left span	4920	80.0	80.0	79.9	1.001
SO2 Scrubber Check	4920	80.2	802.0	-0.3	----
Date of last scrubber change:				Ave Corr Factor	1.000
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.7	Prev response:	80.63	*% change:	1.3%
Baseline Corr 2nd AF pt:	41.4	AF Slope:	1.022026	AF Intercept:	-0.260878
Baseline Corr 3rd AF pt:	20.6	AF Correlation:	0.999953		

* = > +/-5% change initiates investigation

Notes: No adjustments made. Replaced H2S gas.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

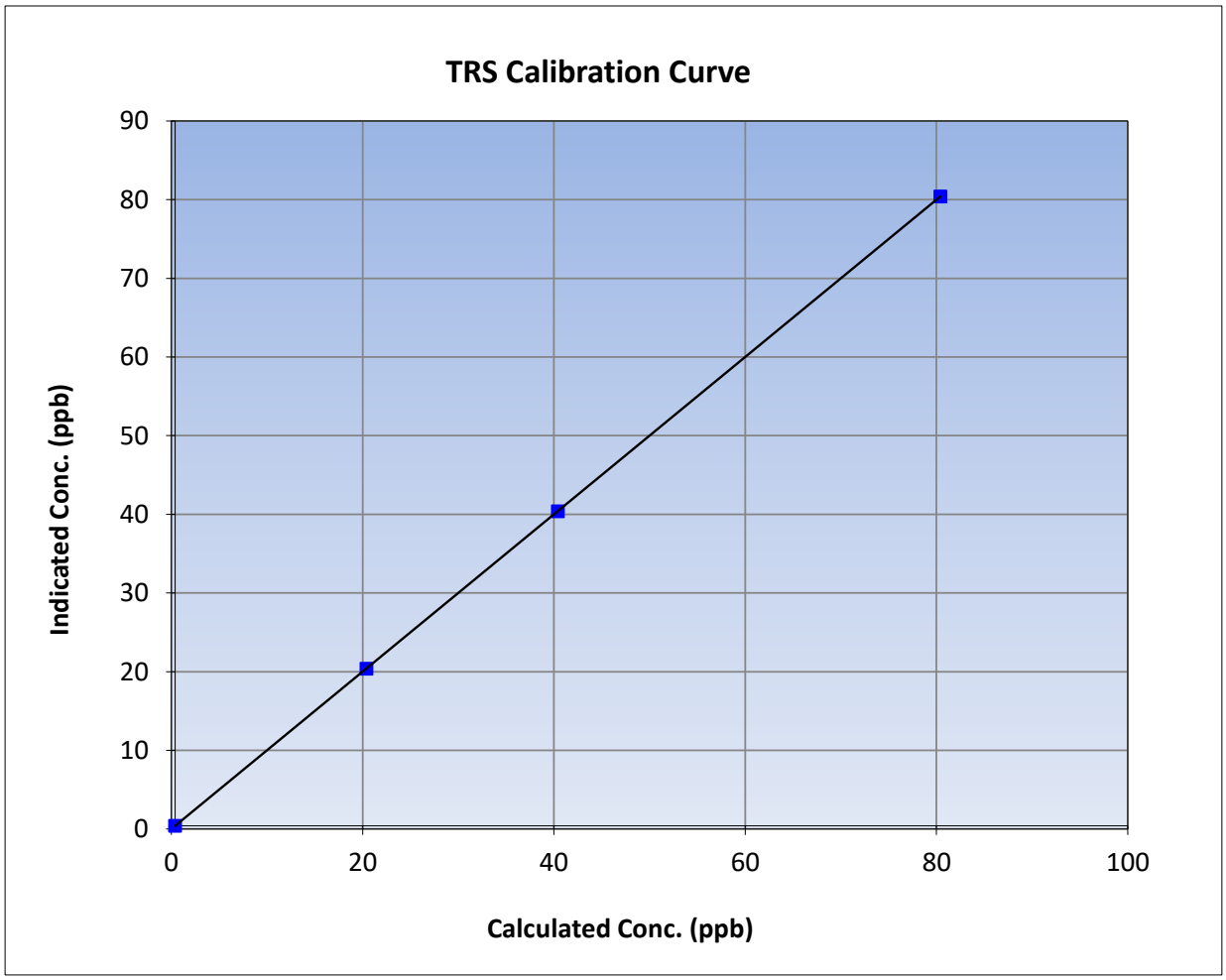
Station Information

Calibration Date:	May 30, 2023	Previous Calibration:	April 26, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:32	End Time (MST):	14:00
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1236656116

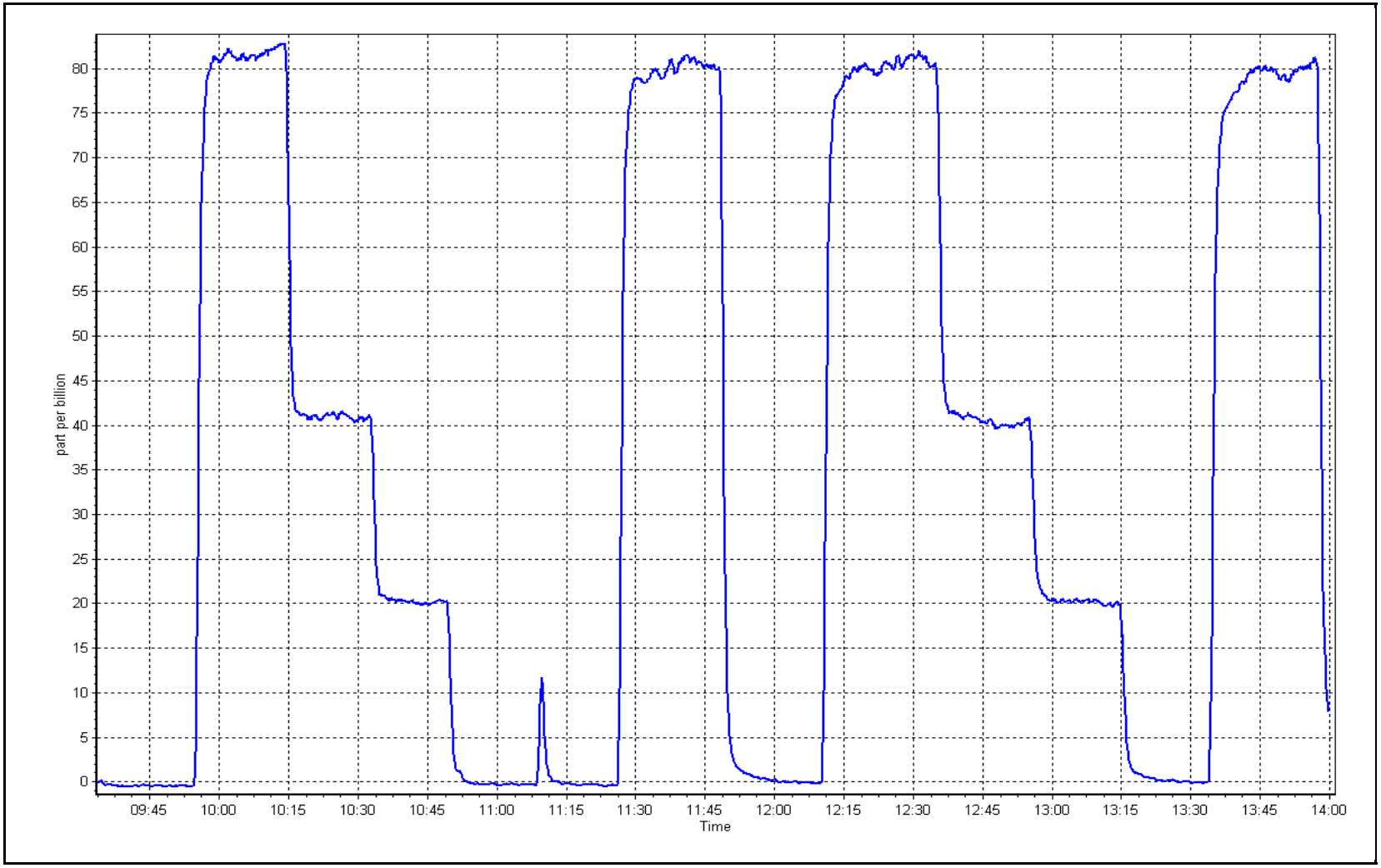
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.0	1.0000
40.0	40.0	1.0000
20.0	20.0	1.0000

Statistical Evaluation		*Limits*
Correlation Coefficient	1.000000	*≥0.995*
Slope	1.000000	*0.90 - 1.10*
Intercept	0.000000	*+/-3*



TRS Calibration Plot Date: May 30, 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:	May 3, 2023	Last Cal Date:	April 18, 2023
Start time (MST):	9:41	End time (MST):	12:41
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 #:	1331259521	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.16E-04	2.22E-04	NMHC SP Ratio:	4.66E-05	4.83E-05
CH4 Retention time:	12.00	12.00	NMHC Peak Area:	196084	189107

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	17.13	16.59	1.033
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	17.13	17.13	1.000
second point	4960	40.1	8.56	8.59	0.997
third point	4980	20.0	4.27	4.33	0.987
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	17.13	17.15	0.999
				Average Correction Factor	0.994
Baseline Corr AF:	16.59	Prev response	17.16	*% change	-3.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	9.14	8.82	1.036
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	9.14	9.14	1.000
second point	4960	40.1	4.57	4.59	0.995
third point	4980	20.0	2.28	2.32	0.984
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	9.14	9.15	0.999
				Average Correction Factor	0.993
Baseline Corr AF:	8.82	Prev response	9.16	*% change	-3.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	7.99	7.77	1.028
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	7.99	7.99	1.000
second point	4960	40.1	3.99	3.99	1.000
third point	4980	20.0	1.99	2.01	0.989
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	7.99	7.99	0.999
				Average Correction Factor	0.996
Baseline Corr AF:	7.77	Prev response	8.00	*% 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:	0.999574	0.999175
THC Cal Offset:	0.045989	0.027981
CH4 Cal Slope:	0.999808	0.999308
CH4 Cal Offset:	0.019754	0.008750
NMHC Cal Slope:	0.999495	0.998771
NMHC Cal Offset:	0.026235	0.019631

Notes: Replaced N2 cylinder after the as founds. Adjusted the span only.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

THC Calibration Summary

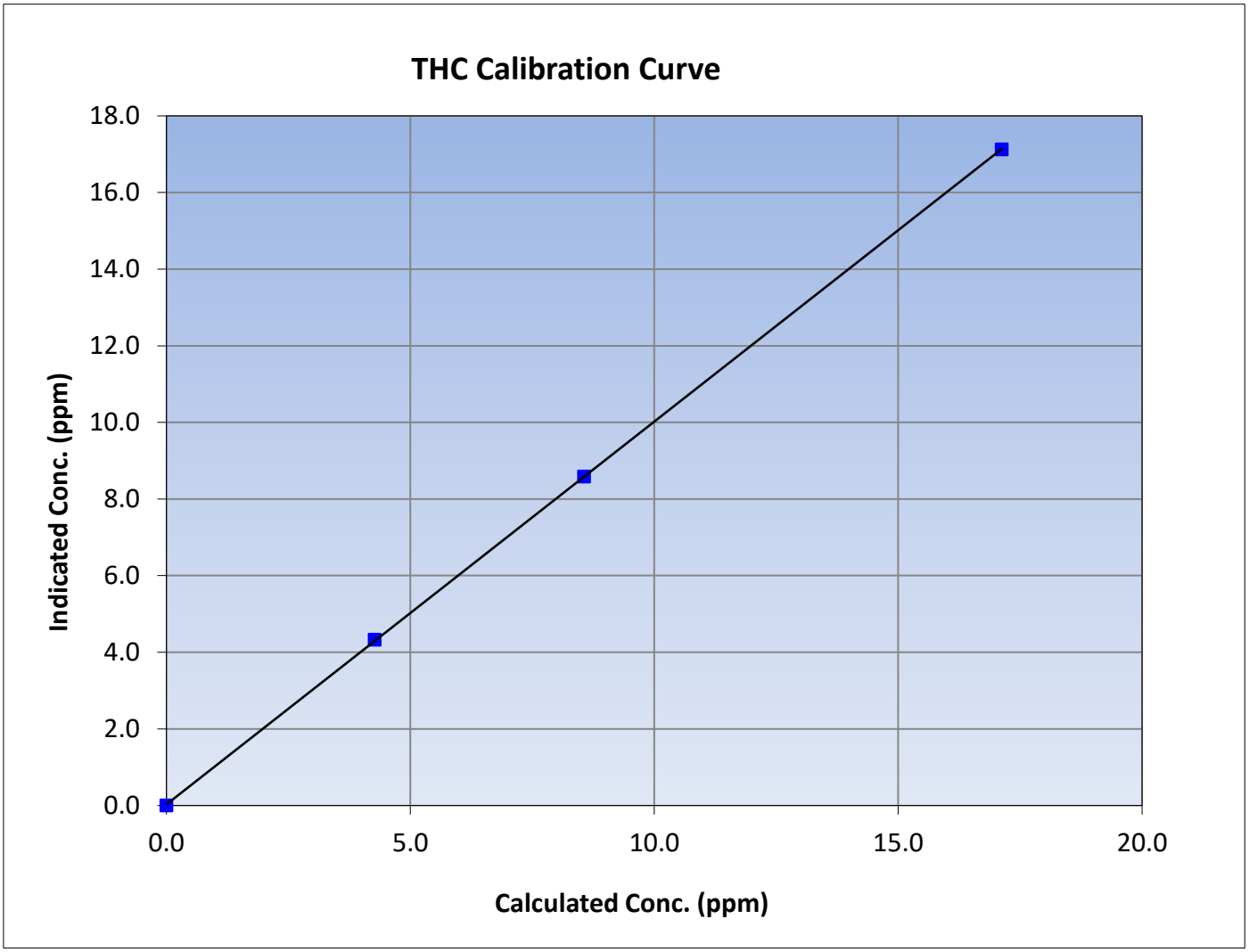
Version-06-2022

Station Information

Calibration Date:	May 3, 2023	Previous Calibration:	April 18, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:41	End Time (MST):	12:41
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999987	≥0.995
17.13	17.13	0.9998			
8.56	8.59	0.9969	Slope	0.999175	0.90 - 1.10
4.27	4.33	0.9866			
			Intercept	0.027981	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

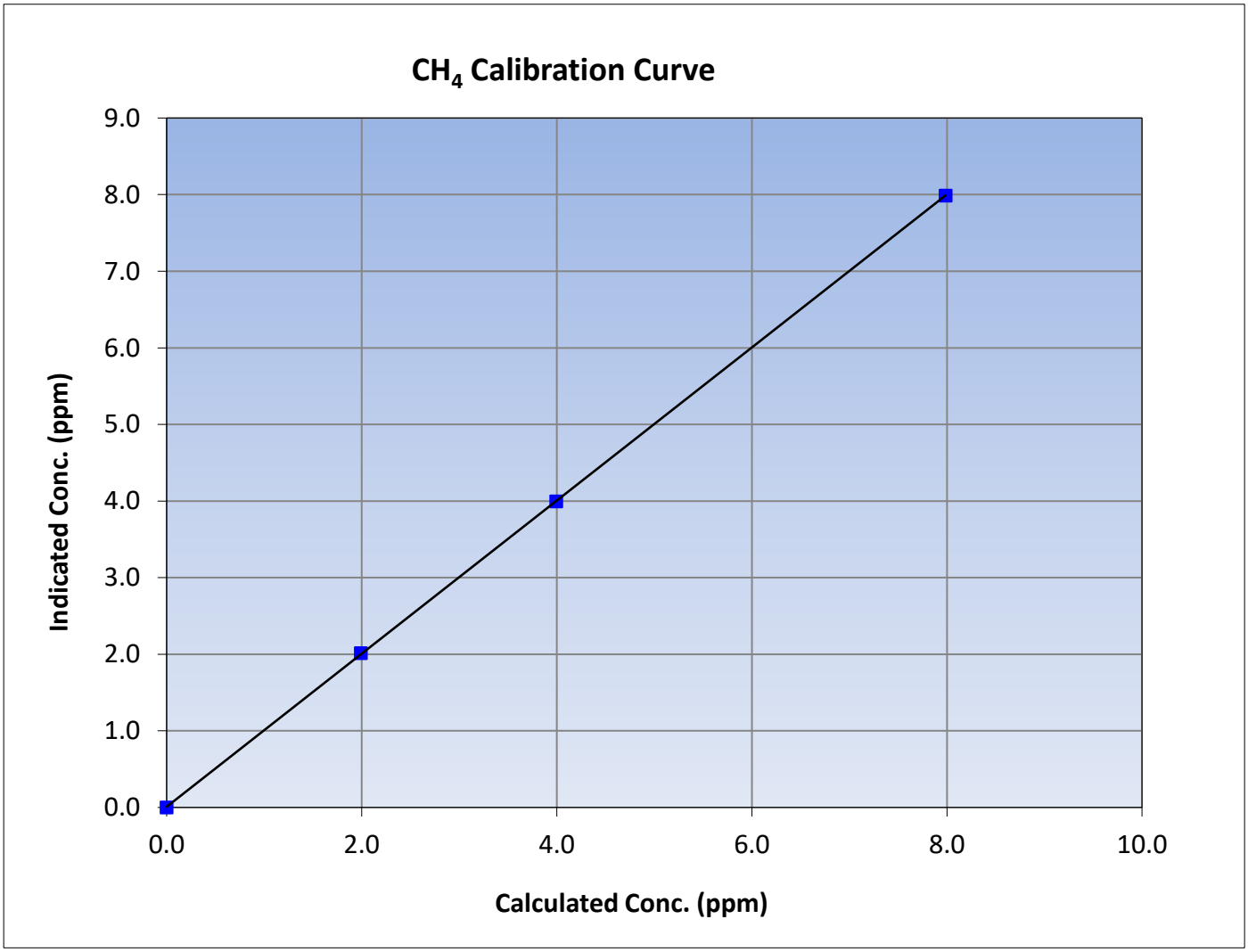
Version-06-2022

Station Information

Calibration Date:	May 3, 2023	Previous Calibration:	April 18, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:41	End Time (MST):	12:41
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999991	≥0.995
7.99	7.99	0.9997			
3.99	3.99	0.9998	Slope	0.999308	0.90 - 1.10
1.99	2.01	0.9889			
			Intercept	0.008750	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

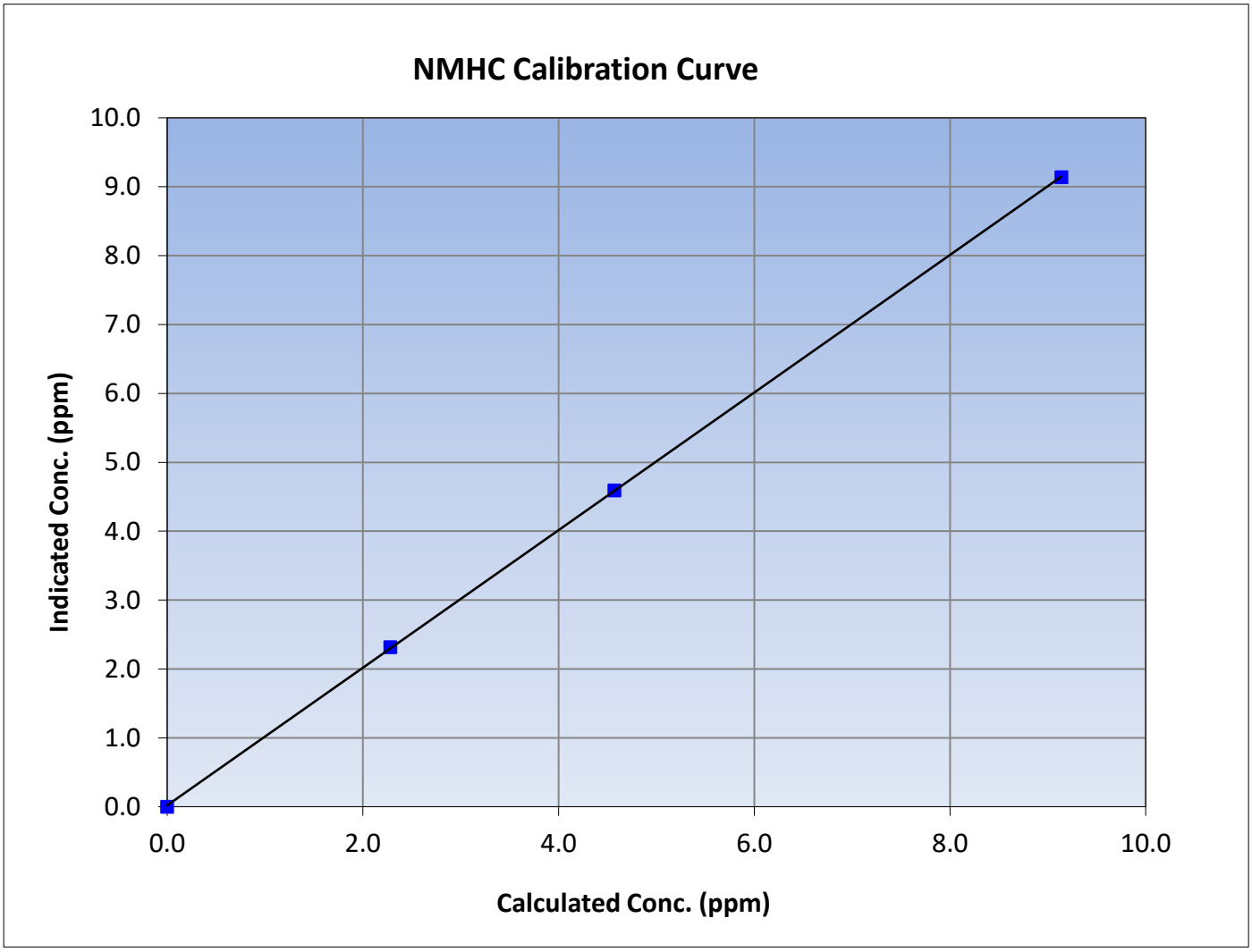
Version-06-2022

Station Information

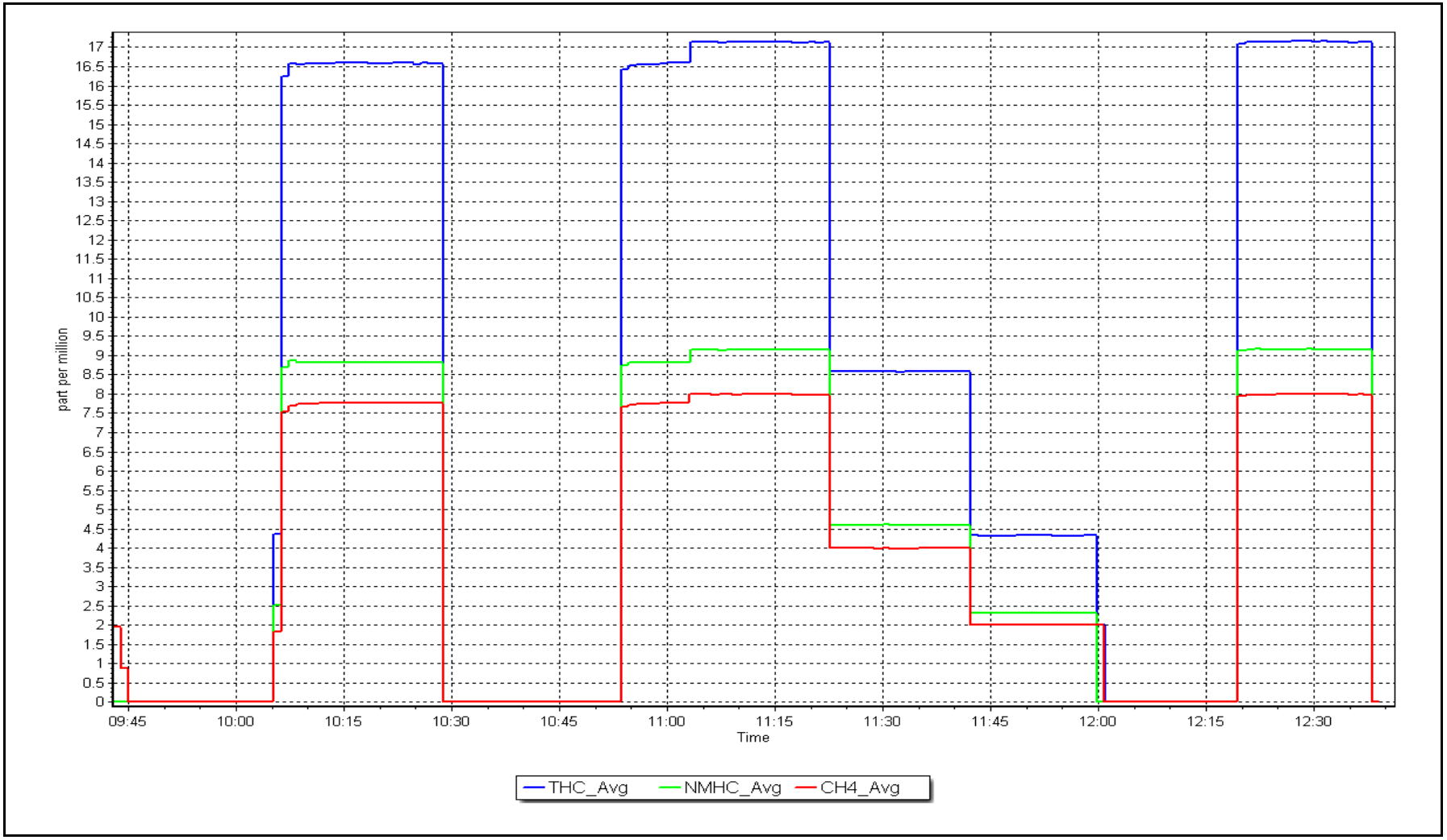
Calibration Date:	May 3, 2023	Previous Calibration:	April 18, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:41	End Time (MST):	12:41
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999979	≥0.995
9.14	9.14	1.0001			
4.57	4.59	0.9949	Slope	0.998771	0.90 - 1.10
2.28	2.32	0.9841			
			Intercept	0.019631	+/-0.5



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



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	May 24, 2023	Last Cal Date:	May 3, 2023
Start time (MST):	10:17	End time (MST):	11:55
Reason:	Cylinder Change		

Calibration Standards

Gas Cert Reference:		CC259455	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
C3H8 Cal Gas Conc.	207.2	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
Removed C3H8 Conc.	207.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	3810	
ZAG make/model:	Teledyne API 701H		Serial Number:	691	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1331259521	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.22E-04	2.22E-04	NMHC SP Ratio:	4.83E-05	4.83E-05
CH4 Retention time:	12.00	12.00	NMHC Peak Area:	189107	189107

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	17.13	16.91	1.013
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	17.13	16.85	1.016
				Average Correction Factor	
Baseline Corr AF:	16.91	Prev response	17.14	*% change	-1.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	9.14	8.99	1.017
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	9.14	8.94	1.022
				Average Correction Factor	
Baseline Corr AF:	8.99	Prev response	9.15	*% change	-1.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	7.99	7.92	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	7.99	7.91	1.009
				Average Correction Factor	
Baseline Corr AF:	7.92	Prev response	7.99	*% change	-0.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

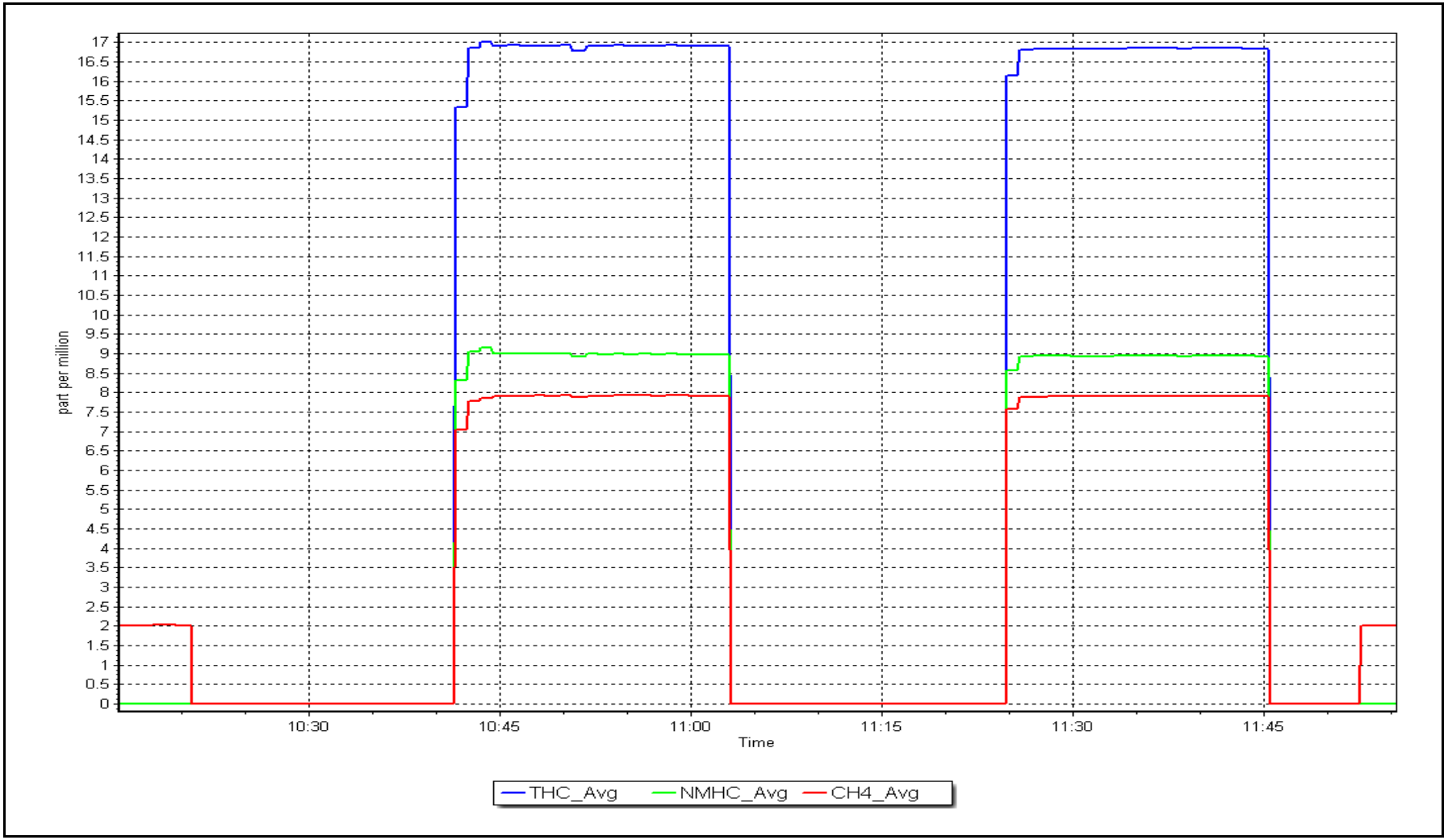
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999175	
THC Cal Offset:	0.027981	
CH4 Cal Slope:	0.999308	
CH4 Cal Offset:	0.008750	
NMHC Cal Slope:	0.998771	
NMHC Cal Offset:	0.019631	

Notes: Changed H2 cylinder.

Calibration Performed By: Denny Ray Estador

NMHC Calibration Plot Date: May 24, 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:	May 16, 2023	Last Cal Date:	April 28, 2023
Start time (MST):	9:41	End time (MST):	13:35
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2Y1P1H		Cal Gas Expiry Date:	December 11, 2023	
NOX Cal Gas Conc:	51.09	ppm	NO Cal Gas Conc:	50.39	ppm
Removed Cylinder #:	n/a		Removed Gas Exp Date:	n/a	
Removed Gas NOX Conc:	51.09	ppm	Removed Gas NO Conc:	50.39	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	3810	
ZAG make/model:	Teledyne API T701H		Serial Number:	691	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1501663731
NOX Range (ppb):	0 - 1000 ppb			

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.144	1.144	NO bkgnd or offset:	11.6	11.6
NOX coeff or slope:	1.001	1.001	NOX bkgnd or offset:	11.8	11.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	219.5	220.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.010616	1.001335
NO_X Cal Offset:	2.246244	2.164394
NO Cal Slope:	1.008763	1.000766
NO Cal Offset:	1.982980	1.181398
NO_2 Cal Slope:	1.003351	1.002657
NO_2 Cal Offset:	-0.204066	-0.146701

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.0	-0.2	0.1	----	----
as found span	4921	79.4	811.2	800.1	11.1	813.3	800.0	13.4	0.9975	1.0001
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	4921	79.4	811.2	800.1	11.1	813.5	801.3	12.1	0.9972	0.9985
second point	4960	39.7	405.7	400.1	5.6	409.4	402.3	7.1	0.9909	0.9946
third point	4980	19.8	202.3	199.6	2.8	206.7	202.0	4.7	0.9788	0.9879
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as left span	4921	79.4	811.2	379.2	432.0	814.0	385.2	428.9	0.9966	0.9845
								Average Correction Factor	0.9890	0.9937

Corrected As found	NO_X = 813.3 ppb	NO = 800.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-1.1%
Previous Response	NO_X = 822.1 ppb	NO = 809.1 ppb		*Percent Change	NO =	-1.1%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found NO r^2:	NO Sl:	NO Int:	
			As found NO_2 r^2:	NO2 Sl: ;	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	799.5	378.6	432.0	432.9	0.9980	100.2%
2nd GPT point (200 ppb O3)	799.5	590.9	219.7	220.9	0.9946	100.5%
3rd GPT point (100 ppb O3)	799.5	694.0	116.6	115.8	1.0070	99.3%
				Average Correction Factor	0.9999	100.0%

Notes: No adjustments required.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

NO_X Calibration Summary

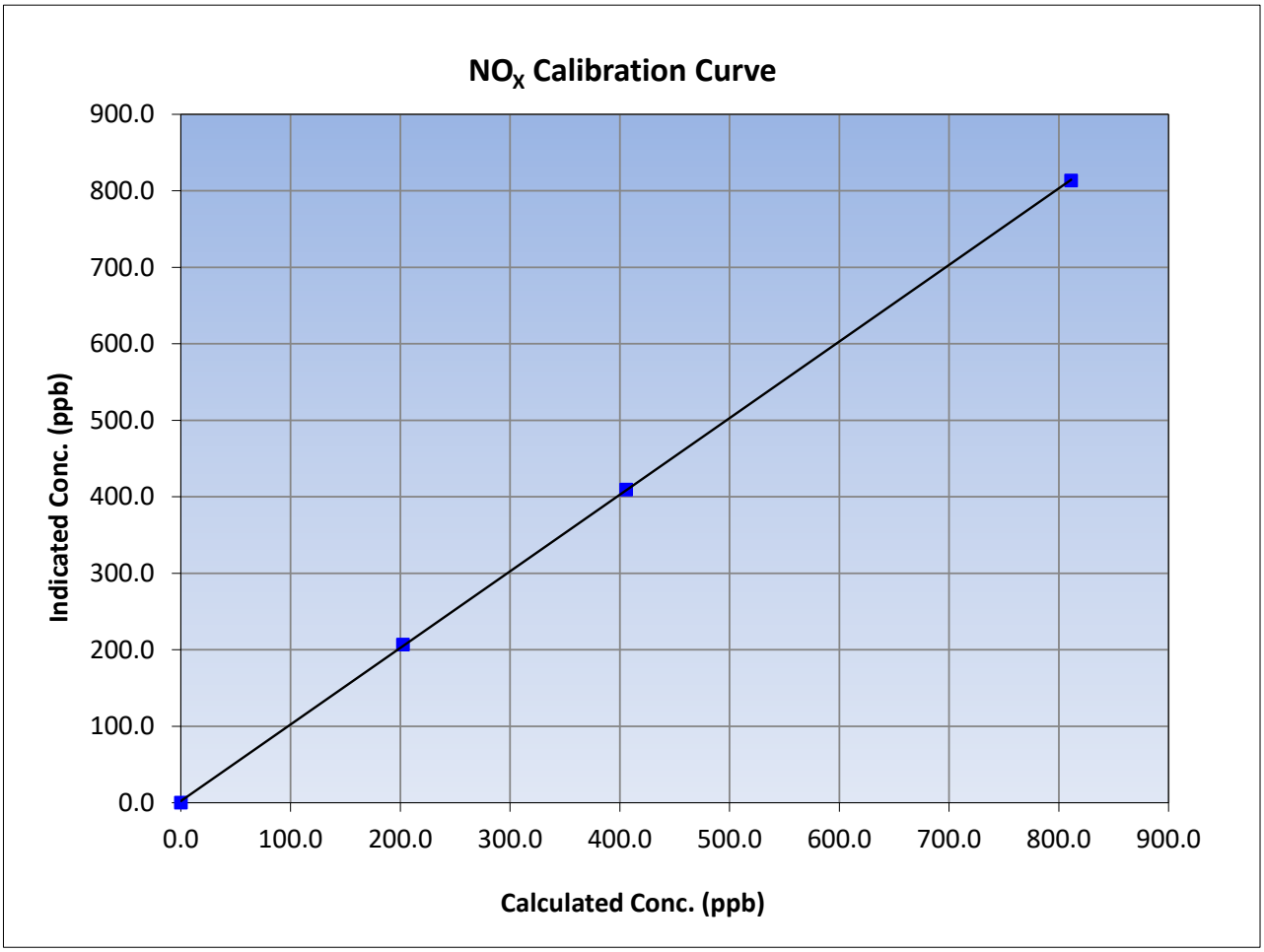
Version-04-2020

Station Information

Calibration Date:	May 16, 2023	Previous Calibration:	April 28, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:41	End Time (MST):	13:35
Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999973	≥0.995
811.2	813.5	0.9972			
405.7	409.4	0.9909	Slope	1.001335	0.90 - 1.10
202.3	206.7	0.9788			
			Intercept	2.164394	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

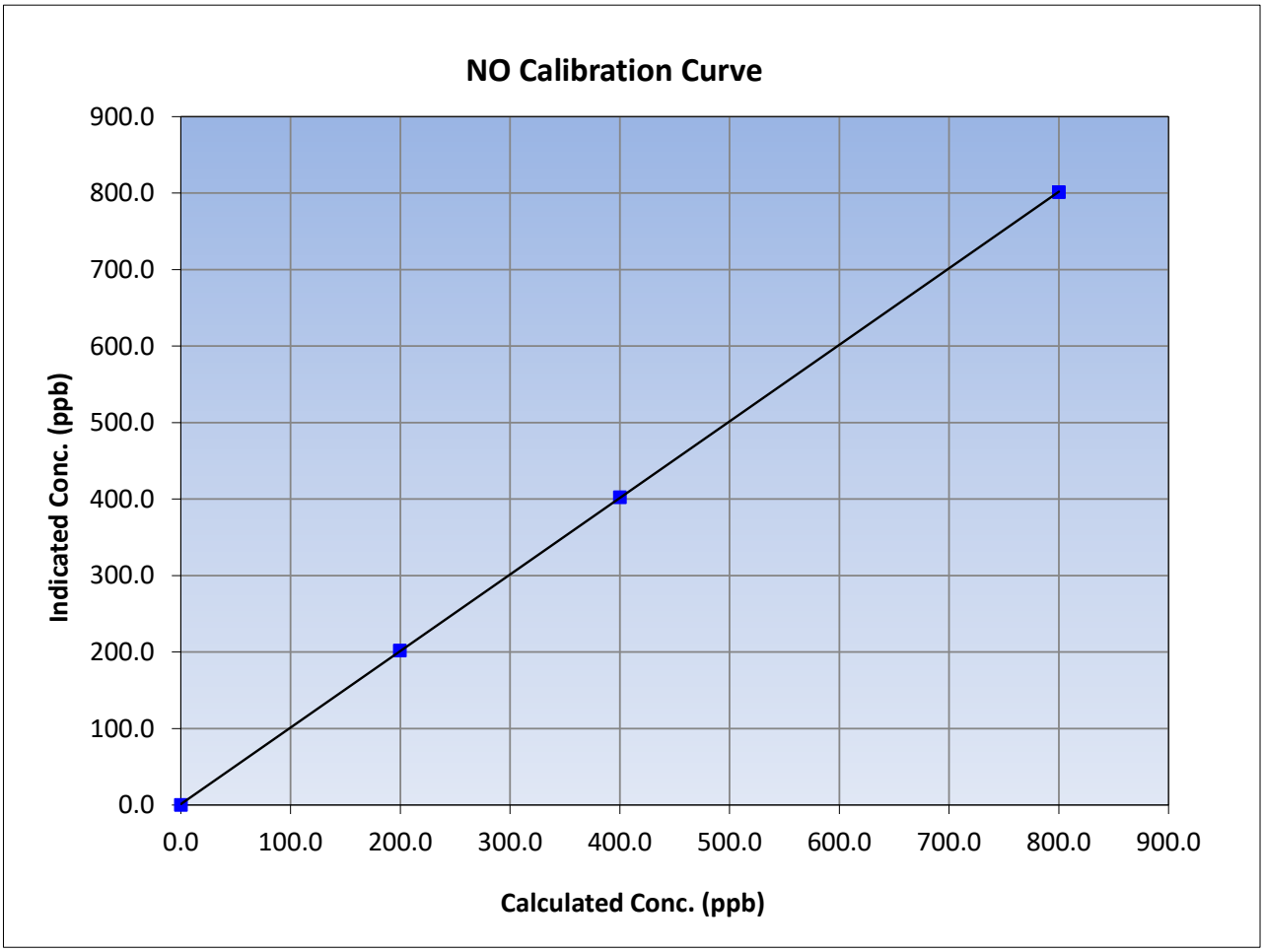
Version-04-2020

Station Information

Calibration Date:	May 16, 2023	Previous Calibration:	April 28, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:41	End Time (MST):	13:35
Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999990	≥0.995
800.1	801.3	0.9985			
400.1	402.3	0.9946	Slope	1.000766	0.90 - 1.10
199.6	202.0	0.9879			
			Intercept	1.181398	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

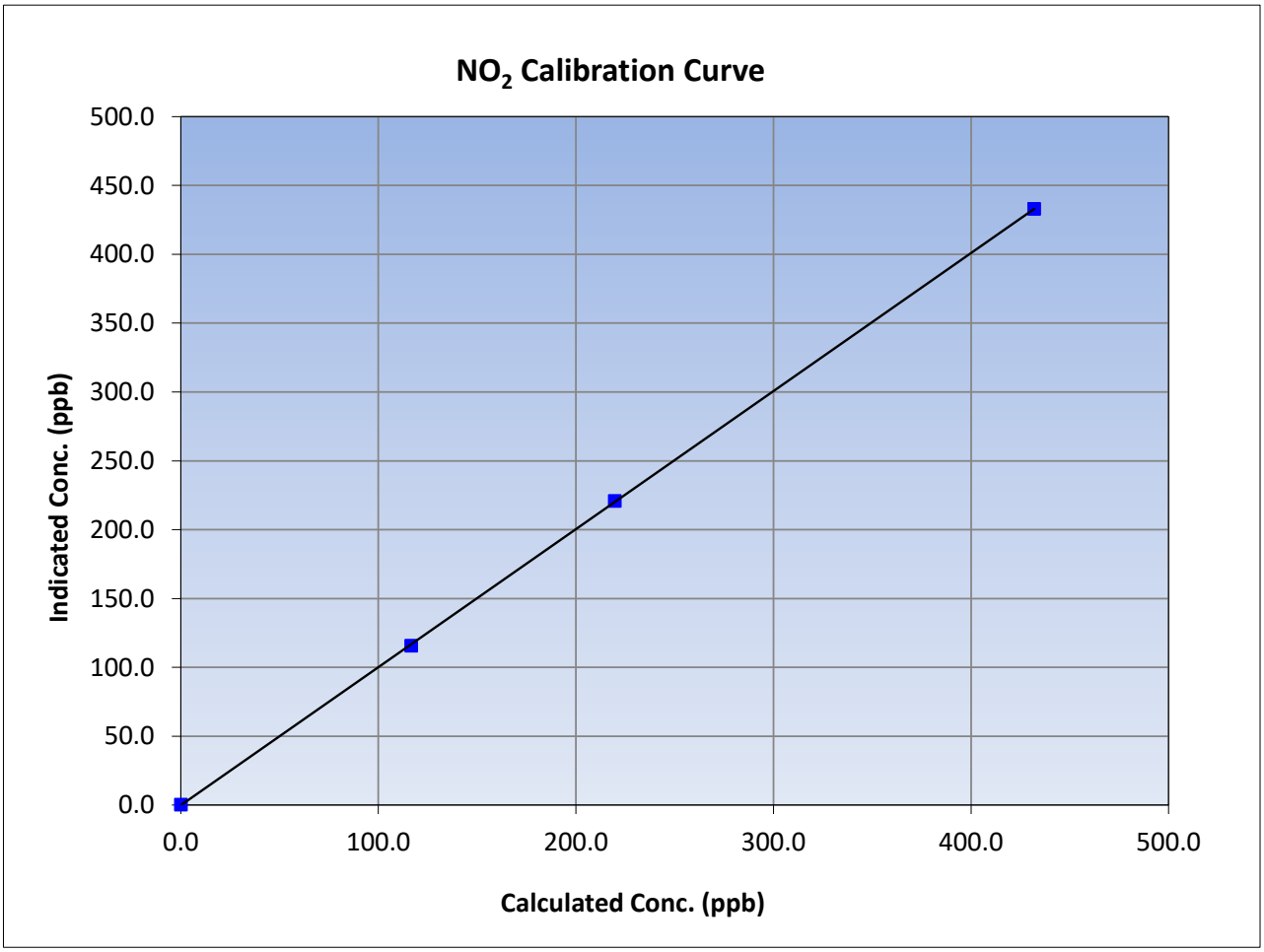
Version-04-2020

Station Information

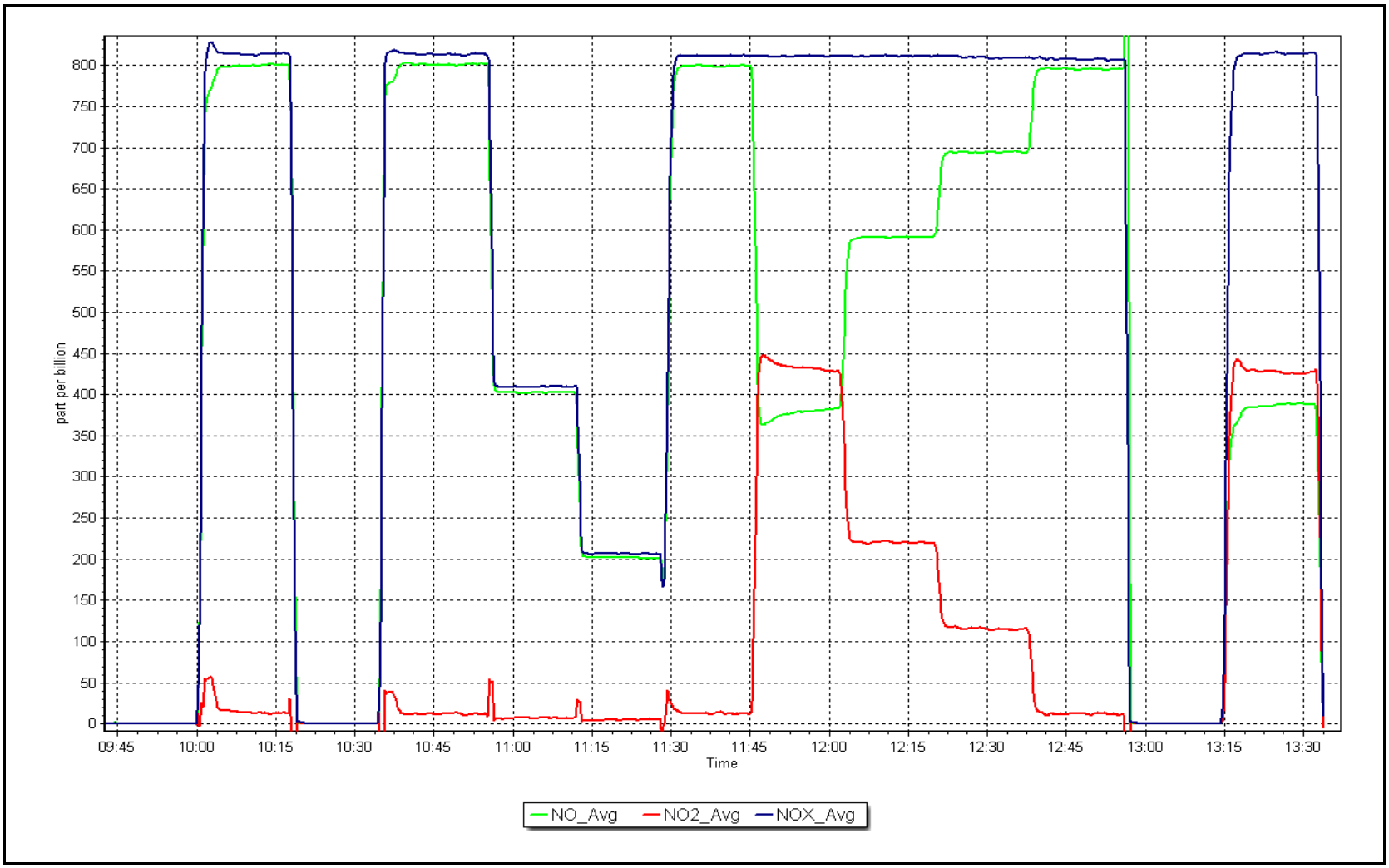
Calibration Date:	May 16, 2023	Previous Calibration:	April 28, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:41	End Time (MST):	13:35
Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999984	≥0.995
432.0	432.9	0.9980			
219.7	220.9	0.9946	Slope	1.002657	0.90 - 1.10
116.6	115.8	1.0070			
			Intercept	-0.146701	+/-20



NO_X Calibration Plot Date: May 16, 2023 Location: Conklin



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	May 9, 2023	Last Cal Date:	April 14, 2023
Start time (MST):	9:02	End time (MST):	12:05
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	Teledyne API T700	Serial Number:	3810
ZAG Make/Model:	Teledyne API 701H	Serial Number:	691

Analyzer Information

Analyzer make:	Thermo 49i	Analyzer serial #:	1501663734
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999857	1.002194	Backgd or Offset:	-1.2	-1.2
Calibration intercept:	0.700000	0.656000	Coeff or Slope:	1.002	1.002

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.1	----
as found span	5000	944.3	400.0	400.1	1.000
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	946.2	400.0	401.0	0.998
second point	5000	803.2	200.0	201.9	0.991
third point	5000	705.0	100.0	101.4	0.986
as left zero	5000	0.0	0.0	-0.3	----
as left span	5000	936.0	400.0	401.0	0.998
				Average Correction Factor	0.991

Baseline Corr As found:	400.2	Previous response	400.6	*% change	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

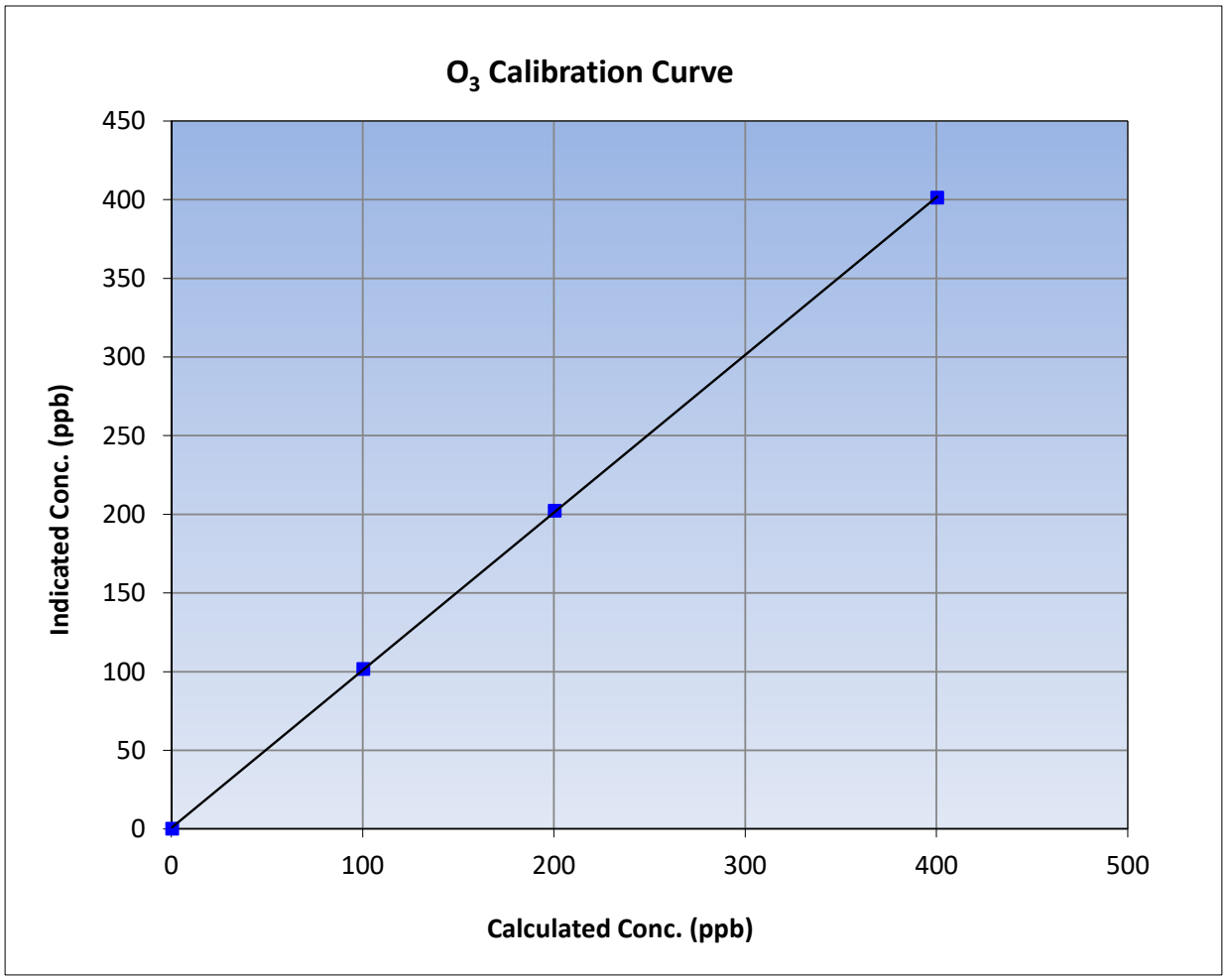
Station Information

Calibration Date:	May 9, 2023	Previous Calibration:	April 14, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:02	End Time (MST):	12:05
Analyzer make:	Thermo 49i	Analyzer serial #:	1501663734

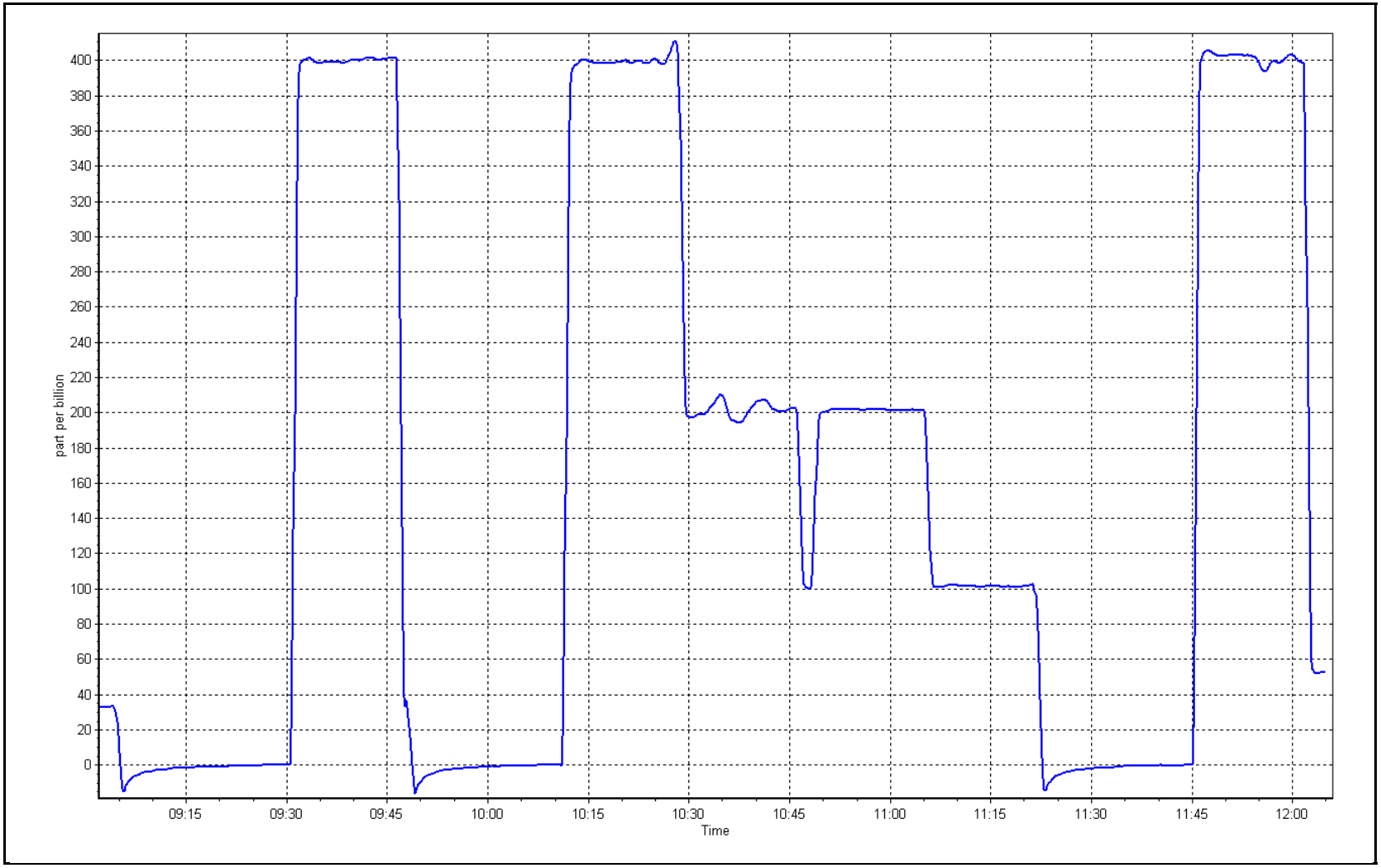
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
400.0	401.0	0.9975
200.0	201.9	0.9906
100.0	101.4	0.9862

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999979	*≥0.995*
Slope	1.002194	*0.90 - 1.10*
Intercept	0.656000	*+/- 5*



O_3 Calibration Plot Date: May 9, 2023 Location: Conklin



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Conklin	Station number:	AMS 21
Calibration Date:	May 23, 2023	Last Cal Date:	April 28, 2023
Start time (MST):	12:00	End time (MST):	12:25
Analyzer Make:	API T640X	S/N:	1597
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)	8.4	8.1	8.4	☐	+/- 2 °C
P (mmHg)	710.1	710.5	710.1	☐	+/- 10 mmHg
flow (LPM)	5.03	5.08	5.03	☐	+/- 0.25 LPM

Leak Test: Date of check: May 23, 2023 Last Cal Date: May 23, 2023

PM w/o HEPA: 23.1 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: _____

Disposable Filter Changed: _____

Annual Maintenance

Date Sample Tube Cleaned: _____

Date RH/T Sensor Cleaned: _____

Notes: Install Calibration. No adjustments made. Inspected inlet head; relatively clean.

Calibration by: Denny Ray Estador

Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Conklin	Station number:	AMS 21
Calibration Date:	May 24, 2023	Last Cal Date:	May 23, 2023
Start time (MST):	11:25	End time (MST):	11:40
Analyzer Make:	API T640X	S/N:	1597
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 (^{o}C)	15.9	15.8	15.9	☐	+/- 2 ^{o}C
P (mmHg)	707.4	708	707.4	☐	+/- 10 mmHg
flow (LPM)	5	5.03	5	☐	+/- 0.25 LPM

Leak Test: Date of check: May 24, 2023 Last Cal Date: May 23, 2023

PM w/o HEPA: 20.1 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

Post-maintenance leak check: PM w/o HEPA: 20.1 w/ HEPA: 0 <0.2 ug/m3

Date Optical Chamber Cleaned: NA

Disposable Filter Changed: NA

Annual Maintenance

Date Sample Tube Cleaned:

Date RH/T Sensor Cleaned:

Notes: No adjustments made. Inspected inlet head; relatively clean.

Calibration by: Denny Ray Estador

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS22
JANVIER
MAY 2023

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

June 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	May 17, 2023	Last Cal Date:	April 26, 2023
Start time (MST):	10:24	End time (MST):	13:45
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.11	ppm	Cal Gas Exp Date:	January 18, 2029
Cal Gas Cylinder #:	CC281519			
Removed Cal Gas Conc:	50.11	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3806
ZAG Make/Model:	Teledyne API T701		Serial Number:	4890

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1152430006

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998121	1.000578	Backgd or Offset:	21.8	21.3
Calibration intercept:	0.804418	0.744403	Coeff or Slope:	1.003	0.998

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.2	----
as found span	4920	79.8	799.8	801.1	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	----
high point	4920	79.8	799.8	800.5	0.999
second point	4960	39.9	399.9	402.0	0.995
third point	4980	20.0	200.4	201.0	0.997
as left zero	5000	0.0	0.0	0.5	----
as left span	4920	79.8	799.8	803.4	0.996
				Average Correction Factor	0.997

Baseline Corr As found:	800.90	Previous response	799.09	*% change	0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Inlet filter changed after as founds. Adjusted span only.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

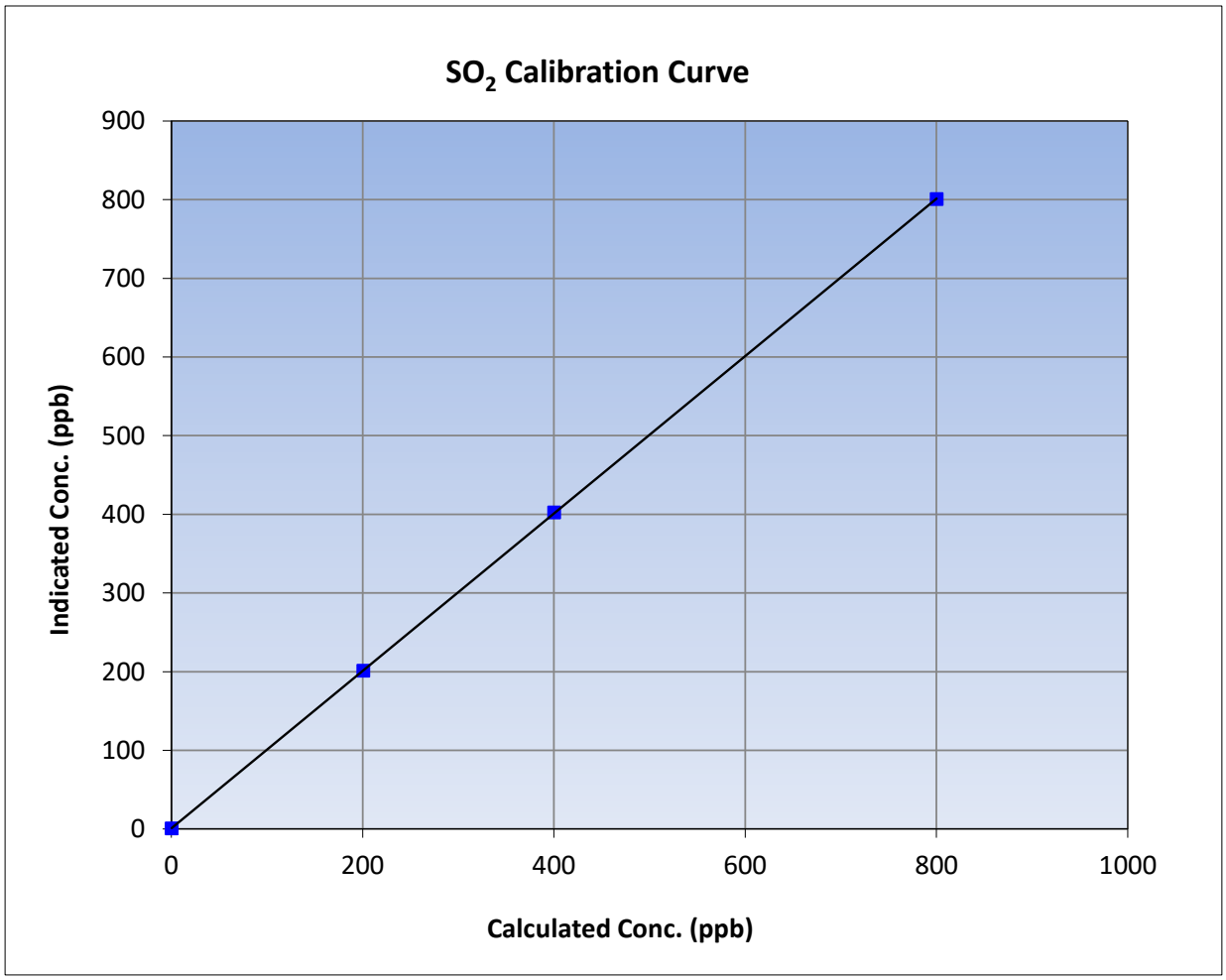
Station Information

Calibration Date:	May 17, 2023	Previous Calibration:	April 26, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:24	End Time (MST):	13:45
Analyzer make:	Thermo 43i	Analyzer serial #:	1152430006

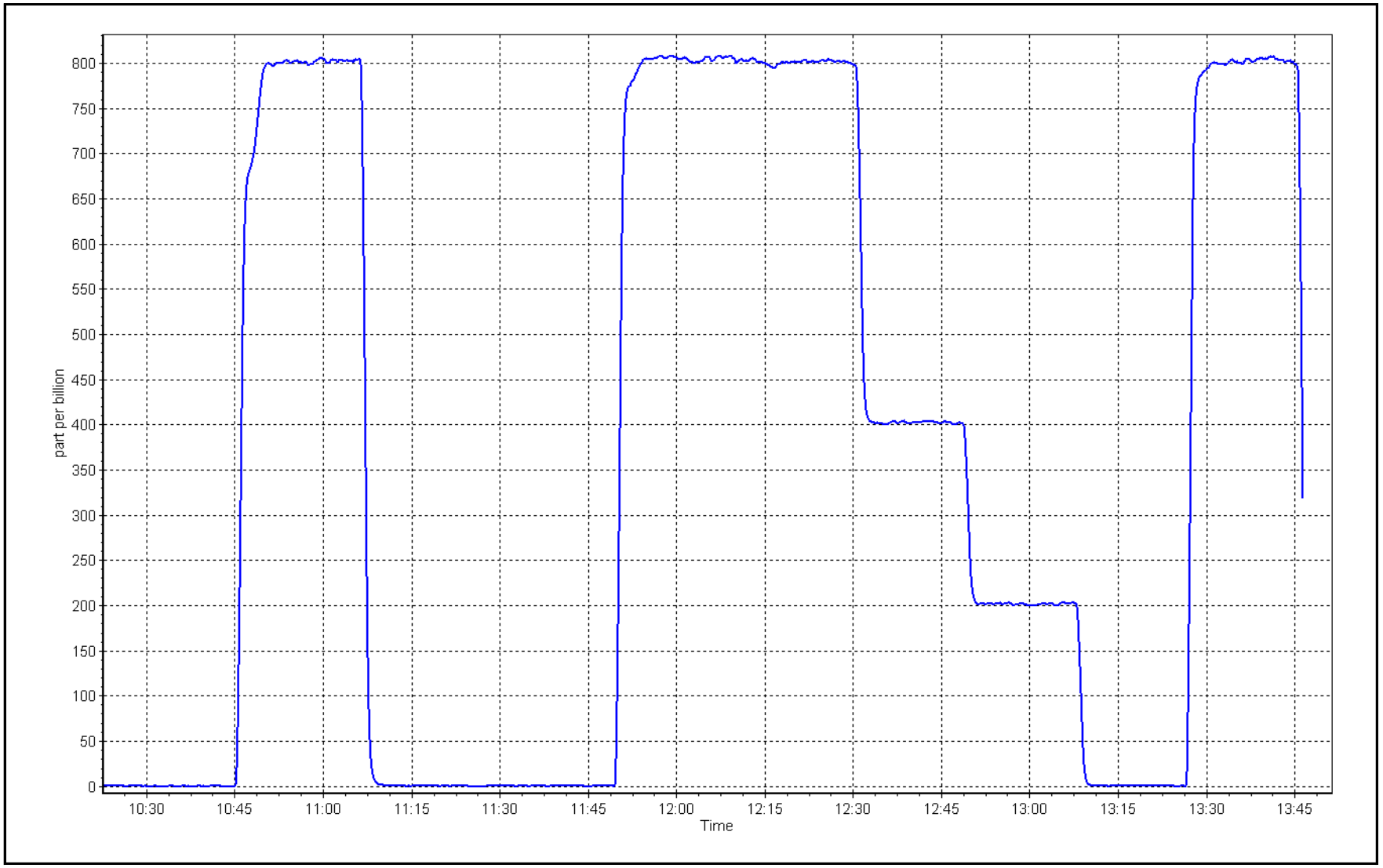
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
799.8	800.5	0.9991
399.9	402.0	0.9947
200.4	201.0	0.9972

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.000578	*0.90 - 1.10*
Intercept	0.744403	*+/-30*



SO2 Calibration Plot Date: May 17, 2023 Location: Janvier



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Janvier	Station number:	AMS22
Calibration Date:	May 24, 2023	Last Cal Date:	April 25, 2023
Start time (MST):	10:30	End time (MST):	15:18
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.03	ppm	Cal Gas Exp Date:	April 16, 2022
Cal Gas Cylinder #:	DT0018680			
Removed Cal Gas Conc:	5.03	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3806
ZAG Make/Model:	Teledyne API T701		Serial Number:	4890

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1151680031	
Converter make:	CDN-101		Converter serial #:	587	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999363	0.997220	Backgd or Offset:	5.95	6.33
Calibration intercept:	-0.038984	0.161030	Coeff or Slope:	1.071	1.022

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	0.7	----
as found span	4920	79.5	80.0	84.1	0.959
as found 2nd point	4960	39.8	40.0	42.9	0.949
as found 3rd point	4980	19.9	20.0	21.8	0.949
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4920	79.5	80.0	79.9	1.001
second point	4960	39.8	40.0	40.1	0.999
third point	4980	19.9	20.0	20.2	0.991
as left zero	5000	0.0	0.0	0.2	----
as left span	4920	79.5	80.0	79.8	1.002
SO2 Scrubber Check	4920	79.8	798.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.997
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	83.4	Prev response:	79.90	*% change:	4.2%
Baseline Corr 2nd AF pt:	42.2	AF Slope:	1.042376	AF Intercept:	0.880046
Baseline Corr 3rd AF pt:	21.1	AF Correlation:	0.999963		

* = > +/-5% change initiates investigation

Notes: Changed out the inlet filter after as founds. Scrubber check passed. Adjusted both zero and span.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

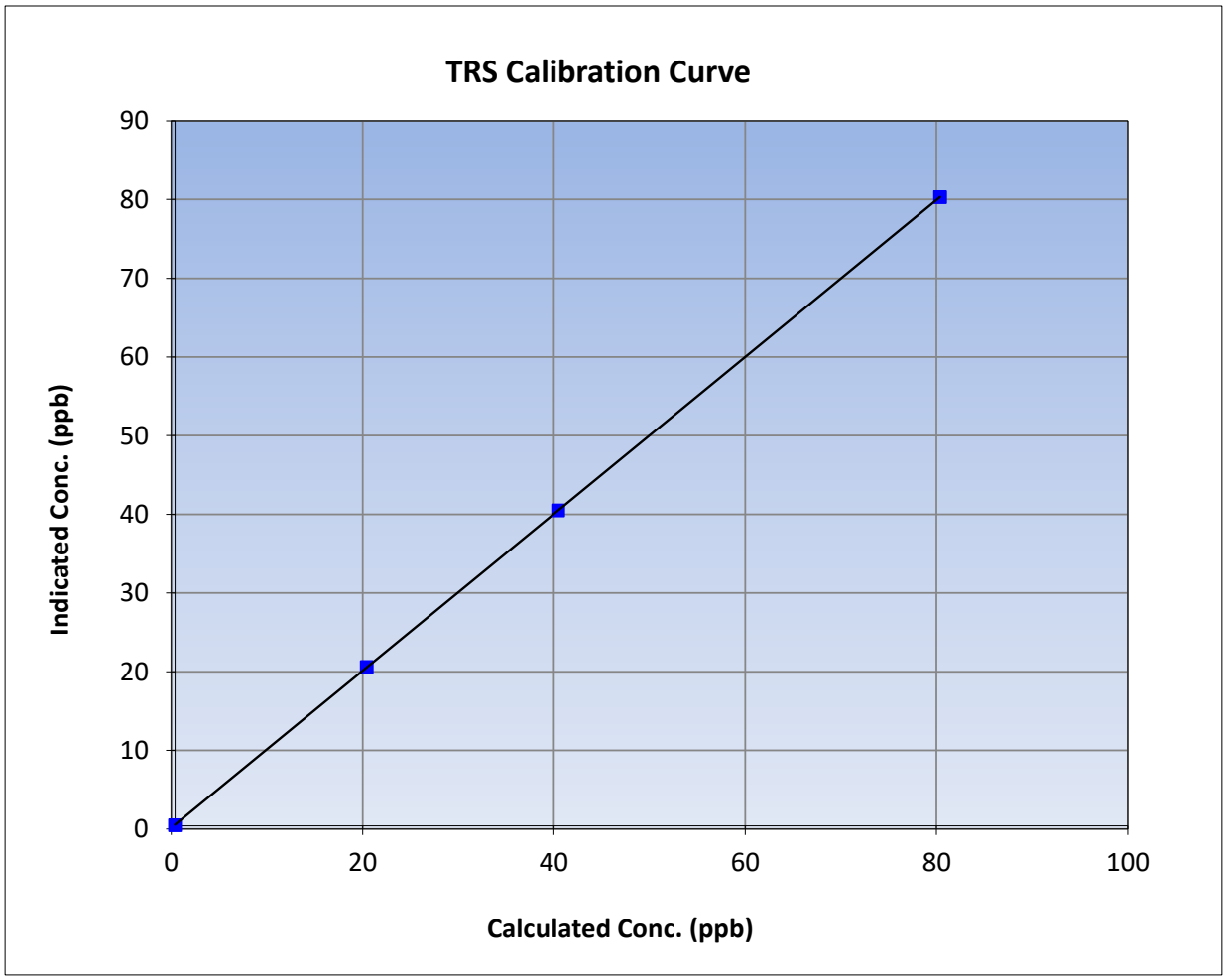
Station Information

Calibration Date:	May 24, 2023	Previous Calibration:	April 25, 2023
Station Name:	Janvier	Station Number:	AMS22
Start Time (MST):	10:30	End Time (MST):	15:18
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1151680031

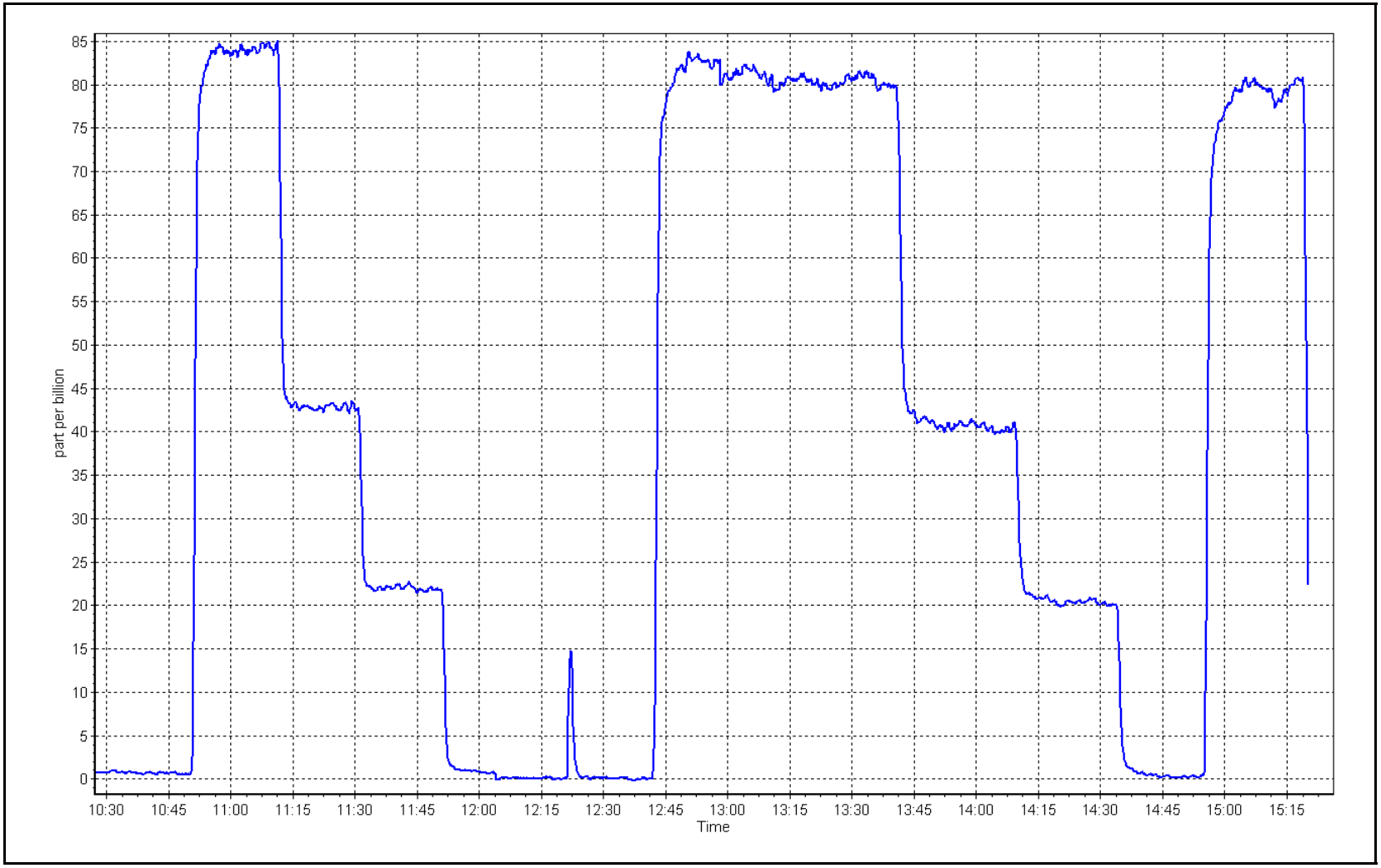
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	79.9	1.0011
40.0	40.1	0.9985
20.0	20.2	0.9911

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999997	*≥0.995*
Slope	0.997220	*0.90 - 1.10*
Intercept	0.161030	*+/-3*



TRS Calibration Plot Date: May 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:	May 17, 2023	Last Cal Date:	April 26, 2023
Start time (MST):	10:24	End time (MST):	13:45
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:	2.150E-04	2.160E-04	NMHC SP Ratio:	4.45E-05	4.48E-05
CH4 Retention time:	13.20	13.40	NMHC Peak Area:	205602	204301

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	17.38	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	79.8	17.17	17.19	0.999
second point	4960	39.9	8.59	8.59	1.000
third point	4980	20.0	4.30	4.28	1.006
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	17.17	17.19	0.999
				Average Correction Factor	1.002

Baseline Corr AF:	17.38	Prev response	17.19	*% 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	0.00	0.00	----
as found span	4920	79.8	9.15	9.20	0.995
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	9.14	1.001
second point	4960	39.9	4.57	4.57	1.002
third point	4980	20.0	2.29	2.27	1.012
as left zero	5000	0	0.00	0.00	----
as left span	4920	79.8	9.15	9.09	1.007
				Average Correction Factor	1.005
Baseline Corr AF:	9.20	Prev response	9.15	*% change	0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	79.8	8.03	8.18	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	79.8	8.03	8.06	0.996
second point	4960	39.9	4.01	4.02	0.998
third point	4980	20.0	2.01	2.01	1.000
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	8.03	8.10	0.991
				Average Correction Factor	0.998
Baseline Corr AF:	8.18	Prev response	8.05	*% change	1.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.002618	1.001793
THC Cal Offset:	-0.031798	-0.014598
CH4 Cal Slope:	1.004358	1.004345
CH4 Cal Offset:	-0.017966	-0.005170
NMHC Cal Slope:	1.001328	0.999528
NMHC Cal Offset:	-0.014032	-0.009829

Notes: Changed the inlet filter and N2/H2 cylinders after as founds. Adjusted span only.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

THC Calibration Summary

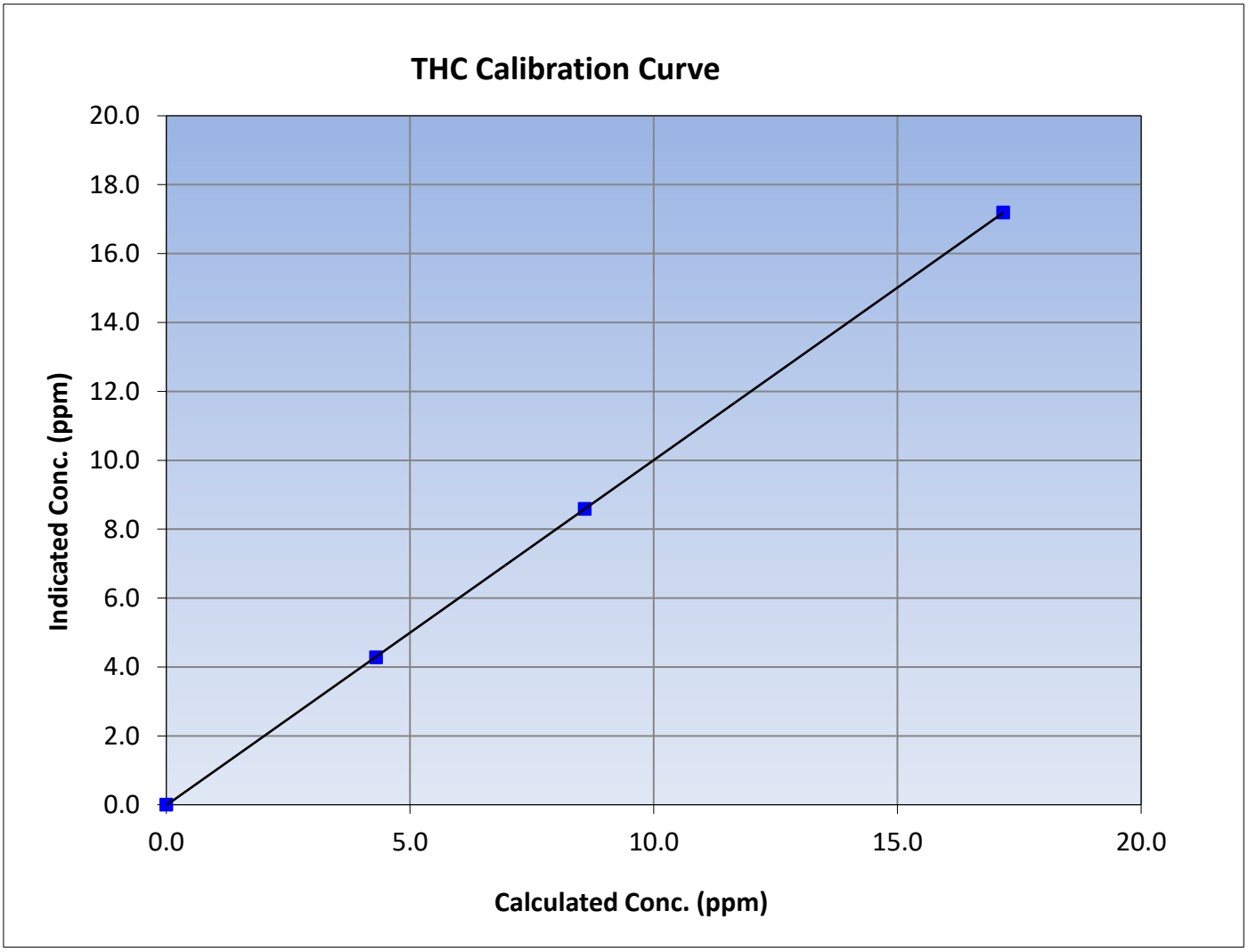
Version-01-2020

Station Information

Calibration Date:	May 17, 2023	Previous Calibration:	April 26, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:24	End Time (MST):	13:45
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750023

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999996	≥0.995
17.17	17.19	0.9988			
8.59	8.59	0.9999	Slope	1.001793	0.90 - 1.10
4.30	4.28	1.0062			
			Intercept	-0.014598	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

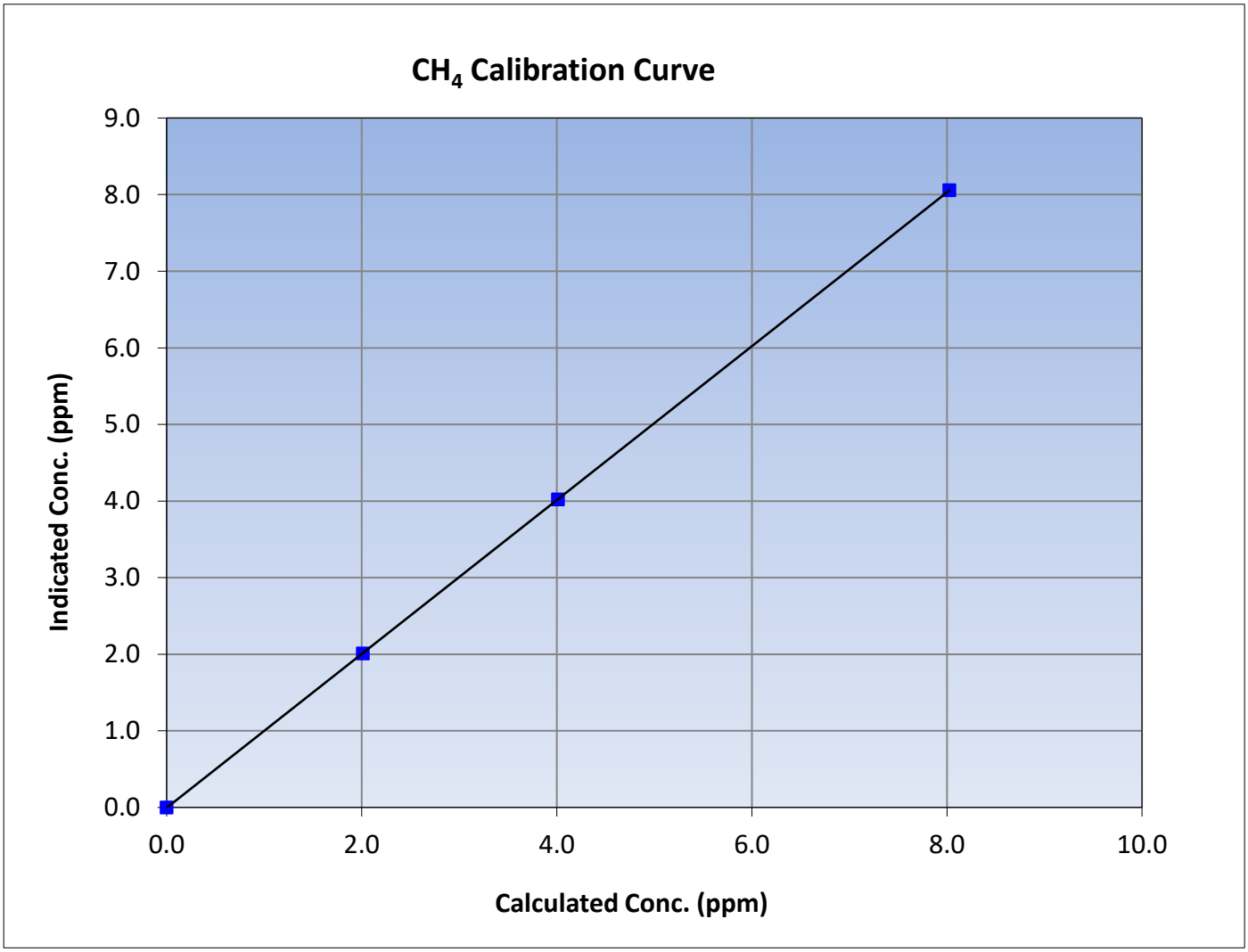
Version-01-2020

Station Information

Calibration Date:	May 17, 2023	Previous Calibration:	April 26, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:24	End Time (MST):	13:45
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750023

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999998	*≥0.995*
8.03	8.06	0.9959			
4.01	4.02	0.9981	Slope	1.004345	*0.90 - 1.10*
2.01	2.01	1.0001			
			Intercept	-0.005170	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

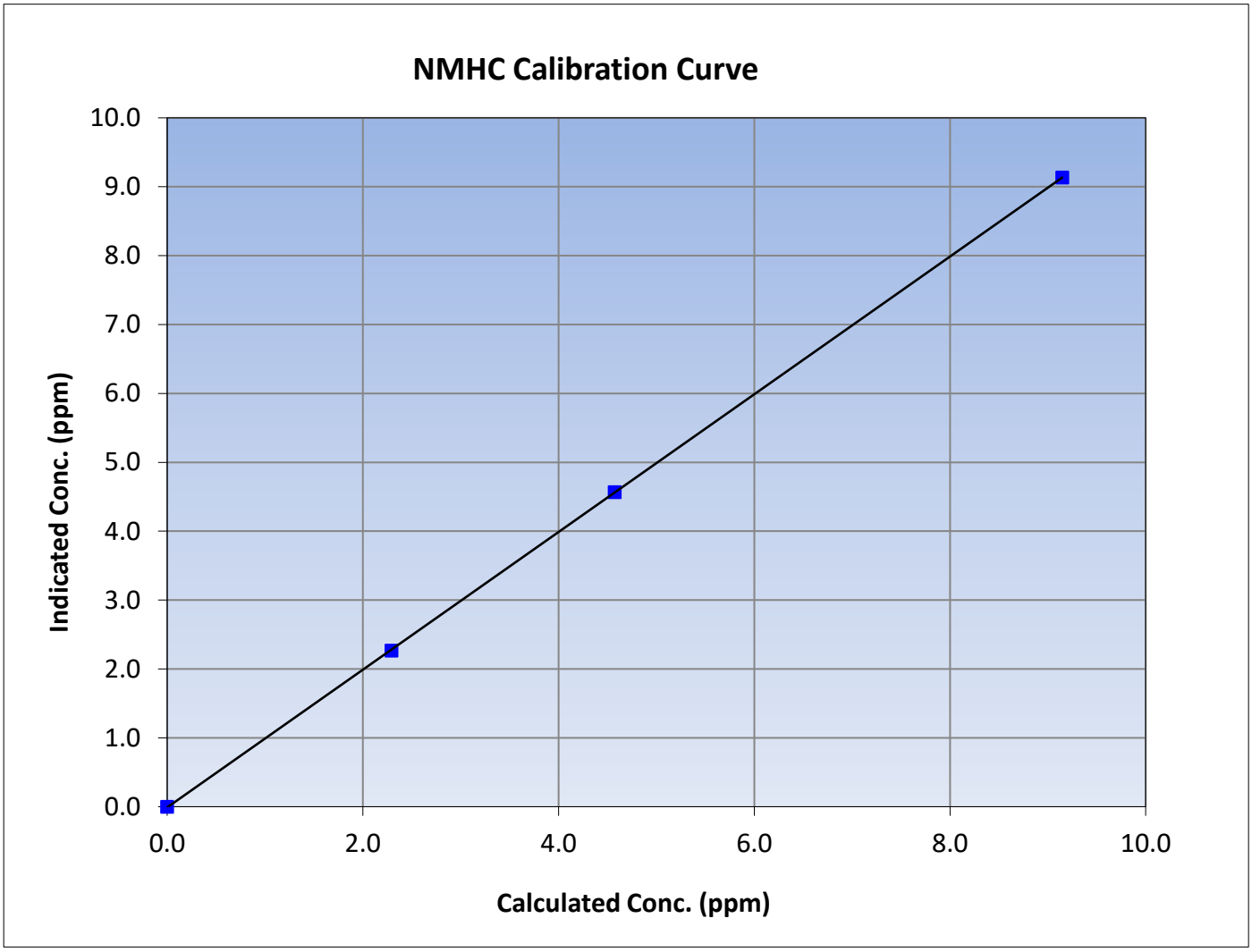
Version-01-2020

Station Information

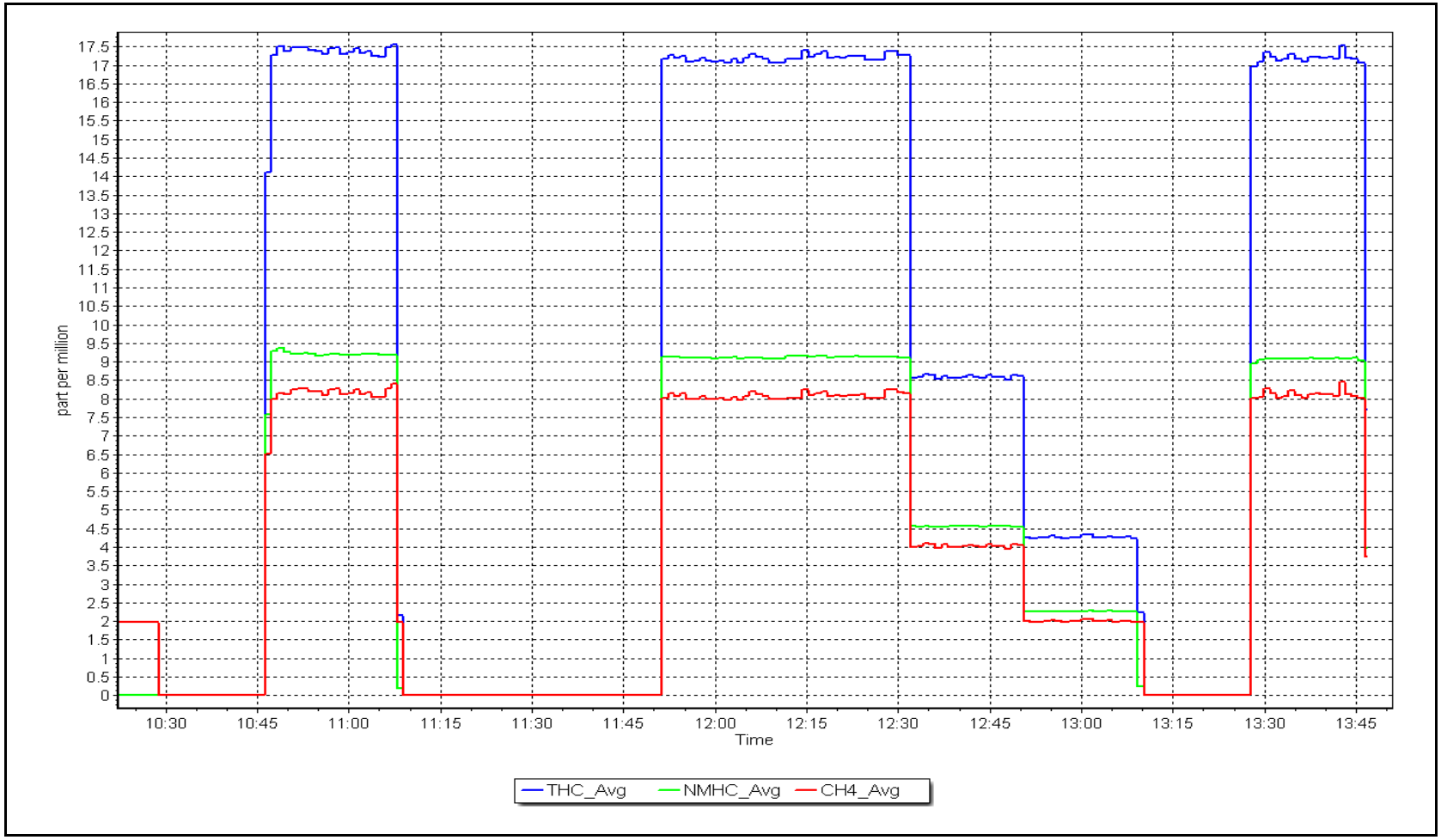
Calibration Date:	May 17, 2023	Previous Calibration:	April 26, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:24	End Time (MST):	13:45
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750023

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999992	*≥0.995*
9.15	9.14	1.0013			
4.57	4.57	1.0018	Slope	0.999528	*0.90 - 1.10*
2.29	2.27	1.0117			
			Intercept	-0.009829	*+/-0.5*



NMHC Calibration Plot Date: May 17, 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:	May 2, 2023	Last Cal Date:	April 27, 2023
Start time (MST):	10:28	End time (MST):	16:02
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:	1.012	1.013	NO bkgnd or offset:	4.8	0.6
NOX coeff or slope:	1.002	1.002	NOX bkgnd or offset:	5.9	2.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	5.1	5.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999487	0.999801
NO_X Cal Offset:	0.688544	0.228682
NO Cal Slope:	0.999800	0.999815
NO Cal Offset:	-0.271133	-0.151058
NO_2 Cal Slope:	1.003470	1.001797
NO_2 Cal Offset:	0.116060	0.161197

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	2.3	-2.4	4.7	----	----
as found span	4918	82.3	799.9	799.9	0.0	799.9	794.1	5.9	1.0000	1.0073
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	4918	82.3	799.9	799.9	0.0	799.8	799.7	0.1	1.0001	1.0003
second point	4959	41.2	400.4	400.4	0.0	400.8	400.0	0.8	0.9991	1.0011
third point	4980	20.6	200.2	200.2	0.0	200.7	200.1	0.7	0.9975	1.0005
as left zero	5000	0.0	0.0	0.0	0.0	0.0	-0.2	0.2	----	----
as left span	4918	82.3	799.9	399.8	400.1	797.4	397.7	399.7	1.0031	1.0053
								Average Correction Factor	0.9989	1.0006

Corrected As found	NO_X = 797.6 ppb	NO = 796.5 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -0.3%		
Previous Response	NO_X = 800.2 ppb	NO = 799.5 ppb		*Percent Change	NO = -0.4%		
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	796.2	396.1	400.1	400.9	0.9980	100.2%
2nd GPT point (200 ppb O3)	796.2	597.2	199.0	199.6	0.9970	100.3%
3rd GPT point (100 ppb O3)	796.2	696.8	99.4	99.9	0.9950	100.5%
				Average Correction Factor	0.9967	100.3%

Notes: Changed the inlet filter after as founds. Changed out the ZAG charcoal and purafil scrubbers. Adjusted both zero and span.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

NO_X Calibration Summary

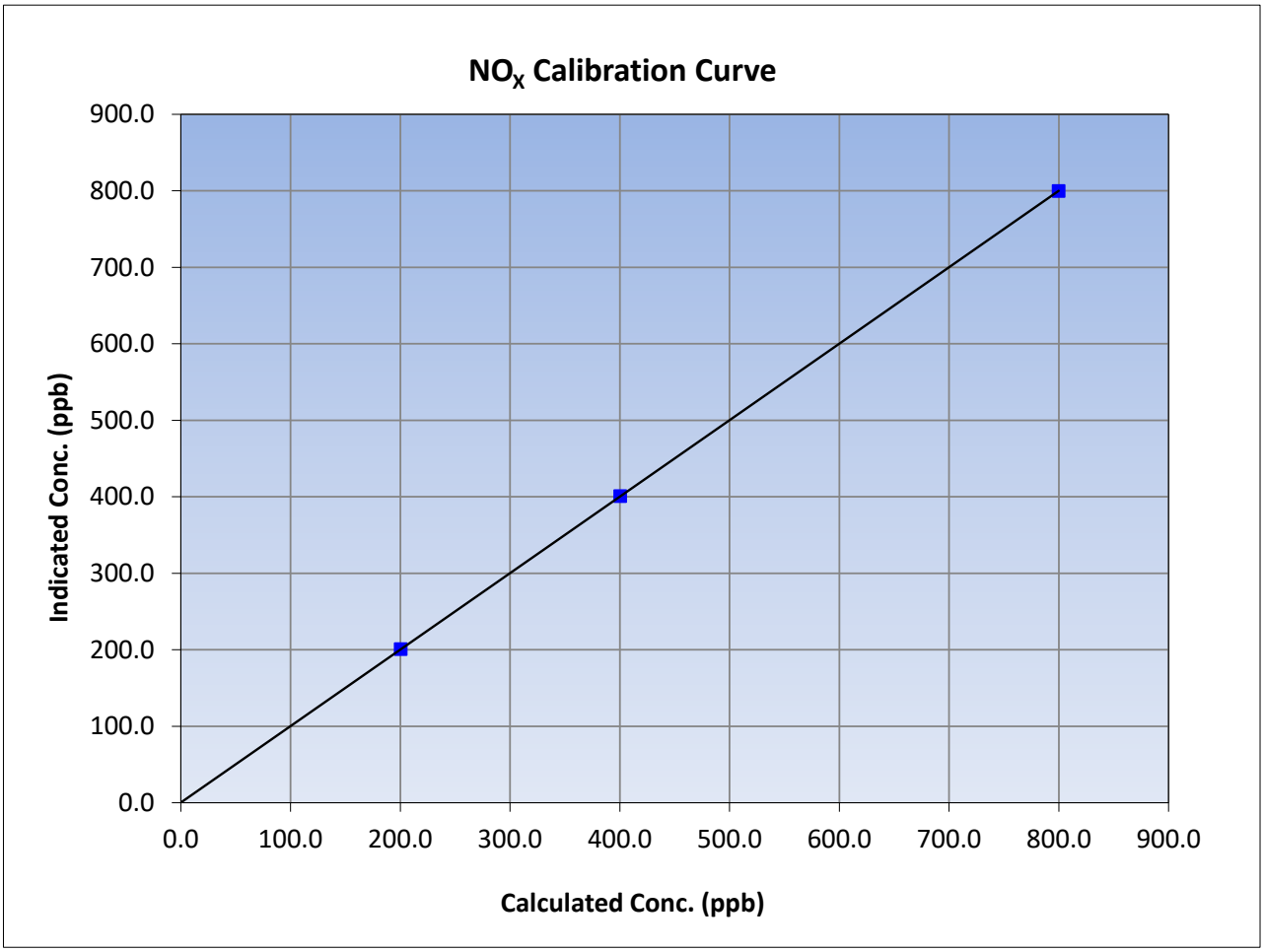
Version-04-2020

Station Information

Calibration Date:	May 2, 2023	Previous Calibration:	April 27, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:28	End Time (MST):	16:02
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	0.999999	*≥0.995*
799.9	799.8	1.0001			
400.4	400.8	0.9991	Slope	0.999801	*0.90 - 1.10*
200.2	200.7	0.9975			
			Intercept	0.228682	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

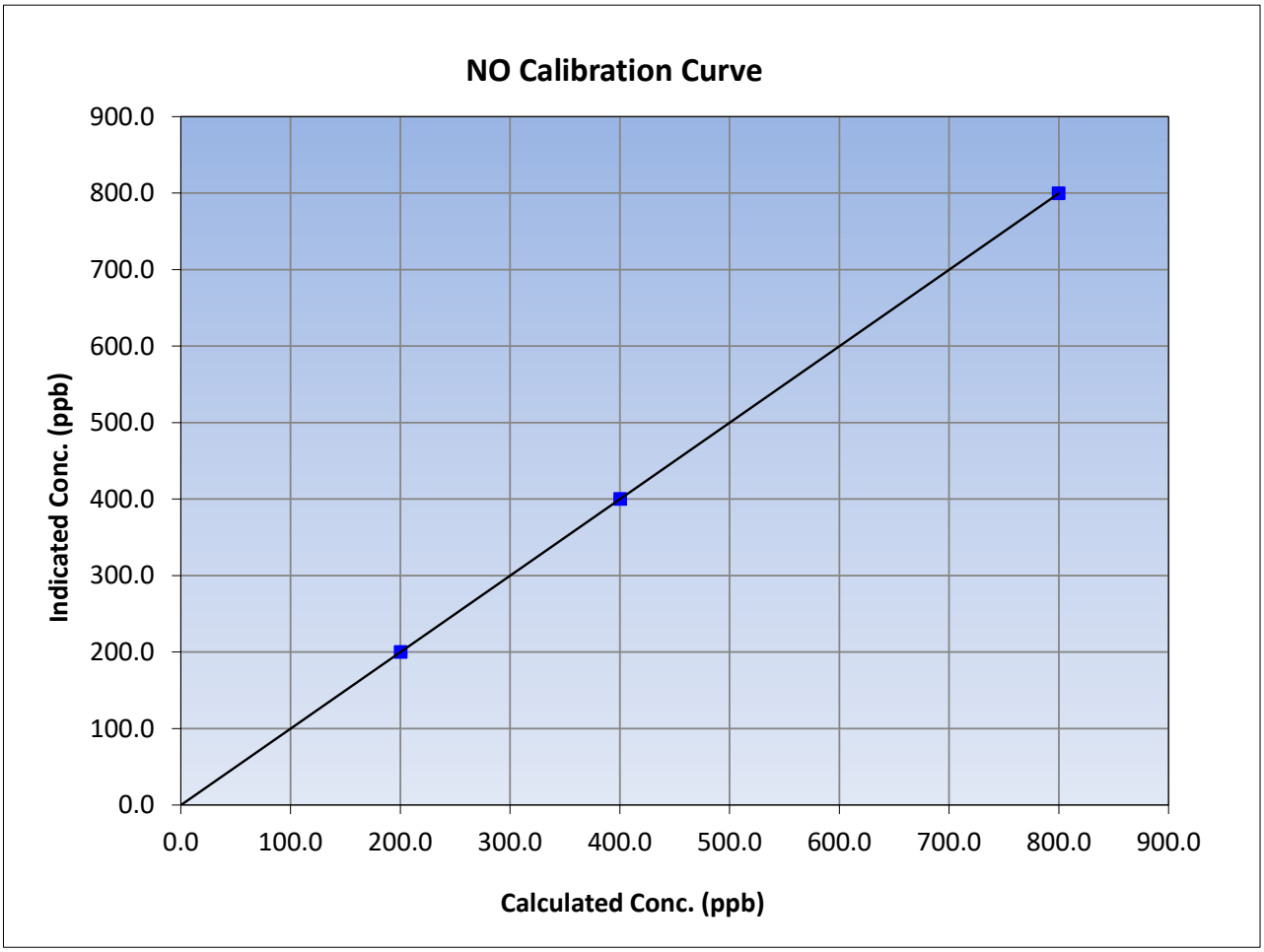
Version-04-2020

Station Information

Calibration Date:	May 2, 2023	Previous Calibration:	April 27, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:28	End Time (MST):	16:02
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	799.7	1.0003			
400.4	400.0	1.0011	Slope	0.999815	0.90 - 1.10
200.2	200.1	1.0005			
			Intercept	-0.151058	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

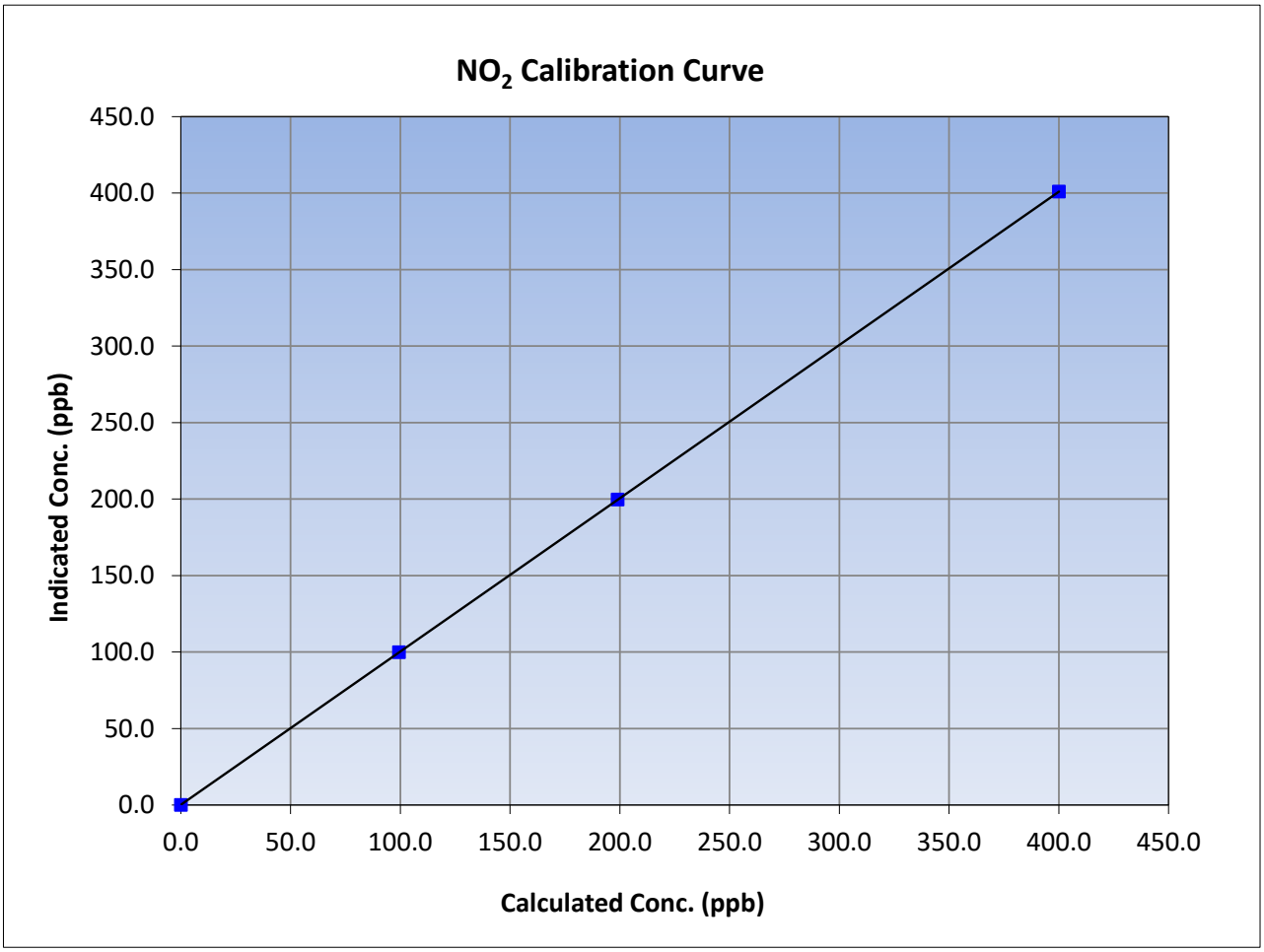
Version-04-2020

Station Information

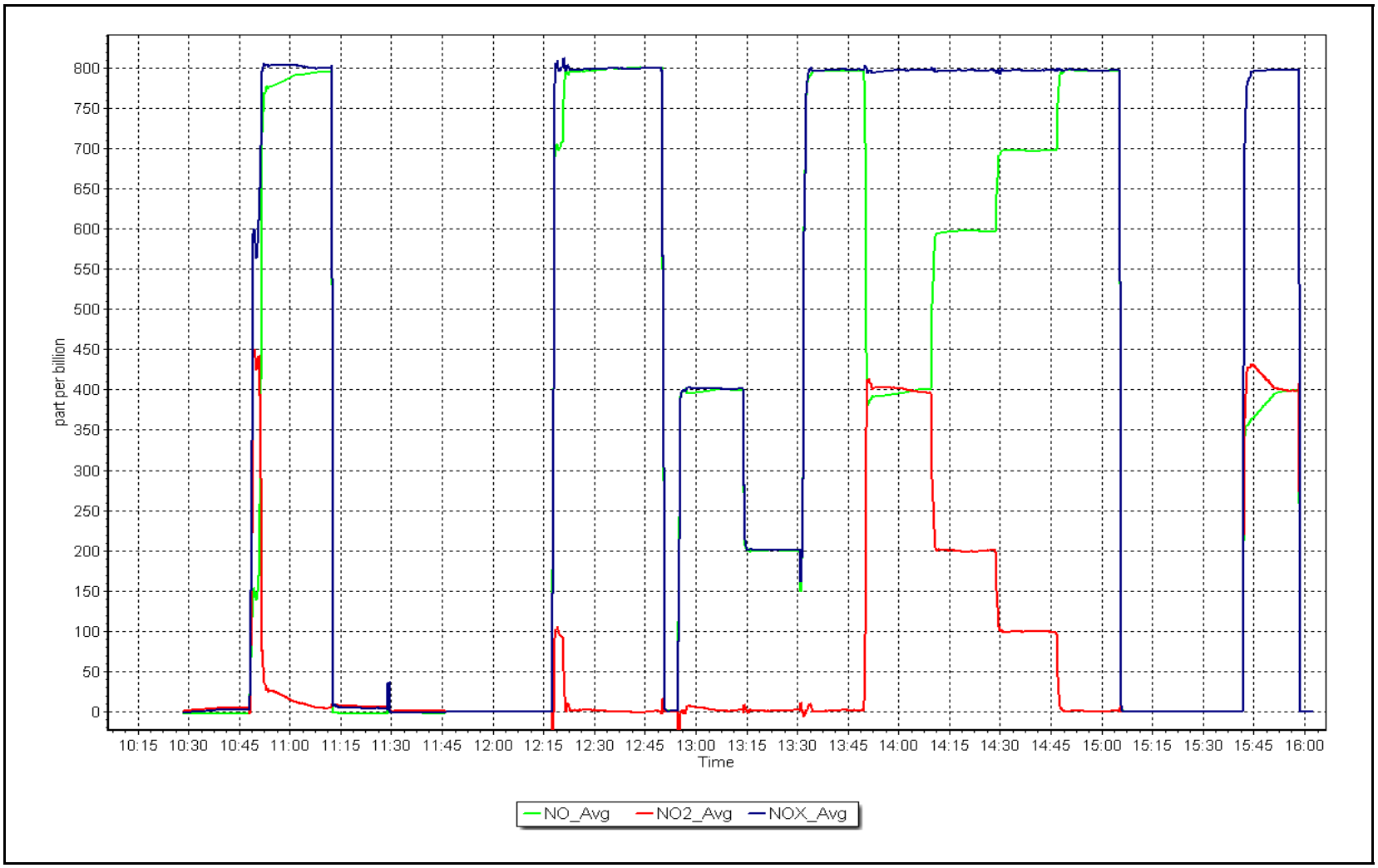
Calibration Date:	May 2, 2023	Previous Calibration:	April 27, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:28	End Time (MST):	16:02
Analyzer make:	Teledyne API T200	Analyzer serial #:	7117

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999999	≥0.995
400.1	400.9	0.9980			
199.0	199.6	0.9970	Slope	1.001797	0.90 - 1.10
99.4	99.9	0.9950			
			Intercept	0.161197	+/-20



NO_X Calibration Plot Date: May 2, 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:	May 3, 2023	Last Cal Date:	NA
Start time (MST):	10:09	End time (MST):	15:42
Reason:	Install		

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:	Thermo 42i	Analyzer serial #:	1218153460
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:		1.303	NO bkgnd or offset:		3.4
NOX coeff or slope:		0.988	NOX bkgnd or offset:		4.3
NO2 coeff or slope:		1.000	Reaction cell Press:		189.8

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:		0.999560
NO_X Cal Offset:		1.487988
NO Cal Slope:		0.999544
NO Cal Offset:		0.468701
NO_2 Cal Slope:		0.998379
NO_2 Cal Offset:		0.058523

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero										
as found span										
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
high point	4918	82.3	799.9	799.9	0.0	800.1	799.8	0.2	0.9998	1.0001
second point	4959	41.2	400.4	400.4	0.0	403.0	400.9	2.1	0.9937	0.9989
third point	4980	20.6	200.2	200.2	0.0	202.9	201.1	1.8	0.9867	0.9956
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
as left span	4918	82.3	799.9	397.1	402.8	803.0	399.0	404.1	0.9961	0.9953
								Average Correction Factor	0.9934	0.9982

Corrected As found NO_X = NA ppb NO = NA ppb

Previous Response NO_X = NA ppb NO = NA ppb

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

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

* = > +/-5% change initiates investigation

*Percent Change NO_X = NA

*Percent Change NO = NA

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

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

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

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	799.3	396.5	402.8	402.2	1.0015	99.9%
2nd GPT point (200 ppb O3)	799.3	600.1	199.2	198.8	1.0020	99.8%
3rd GPT point (100 ppb O3)	799.3	701.8	97.5	97.7	0.9980	100.2%
				Average Correction Factor	1.0005	100.0%

Notes: Installing a new NOx analyzer due to unstable zeros. Inlet filter was changed yesterday. Adjusted both zero and span.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

NO_X Calibration Summary

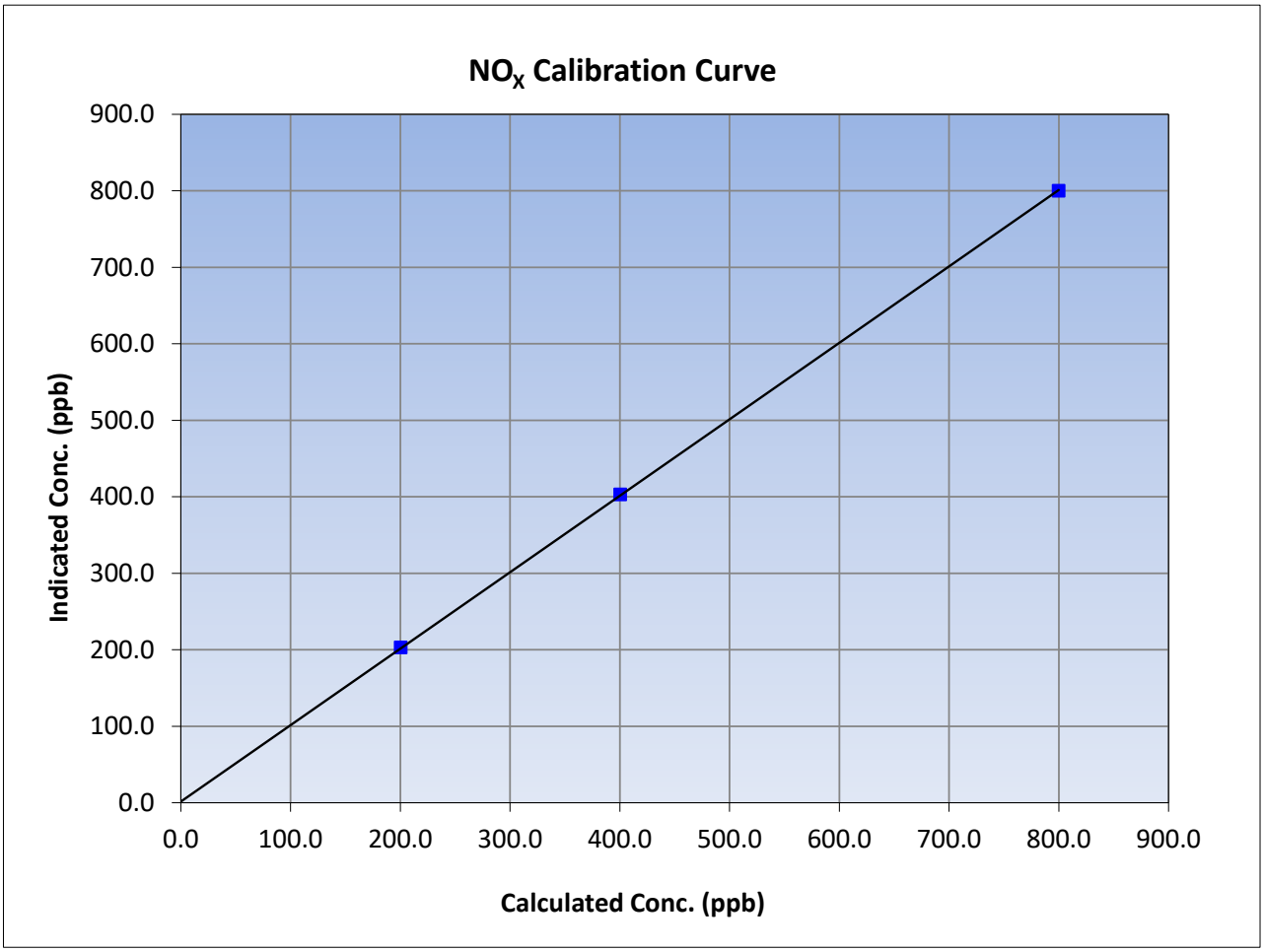
Version-04-2020

Station Information

Calibration Date:	May 3, 2023	Previous Calibration:	NA
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:09	End Time (MST):	15:42
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153460

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999981	≥0.995
799.9	800.1	0.9998			
400.4	403.0	0.9937	Slope	0.999560	0.90 - 1.10
200.2	202.9	0.9867			
			Intercept	1.487988	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

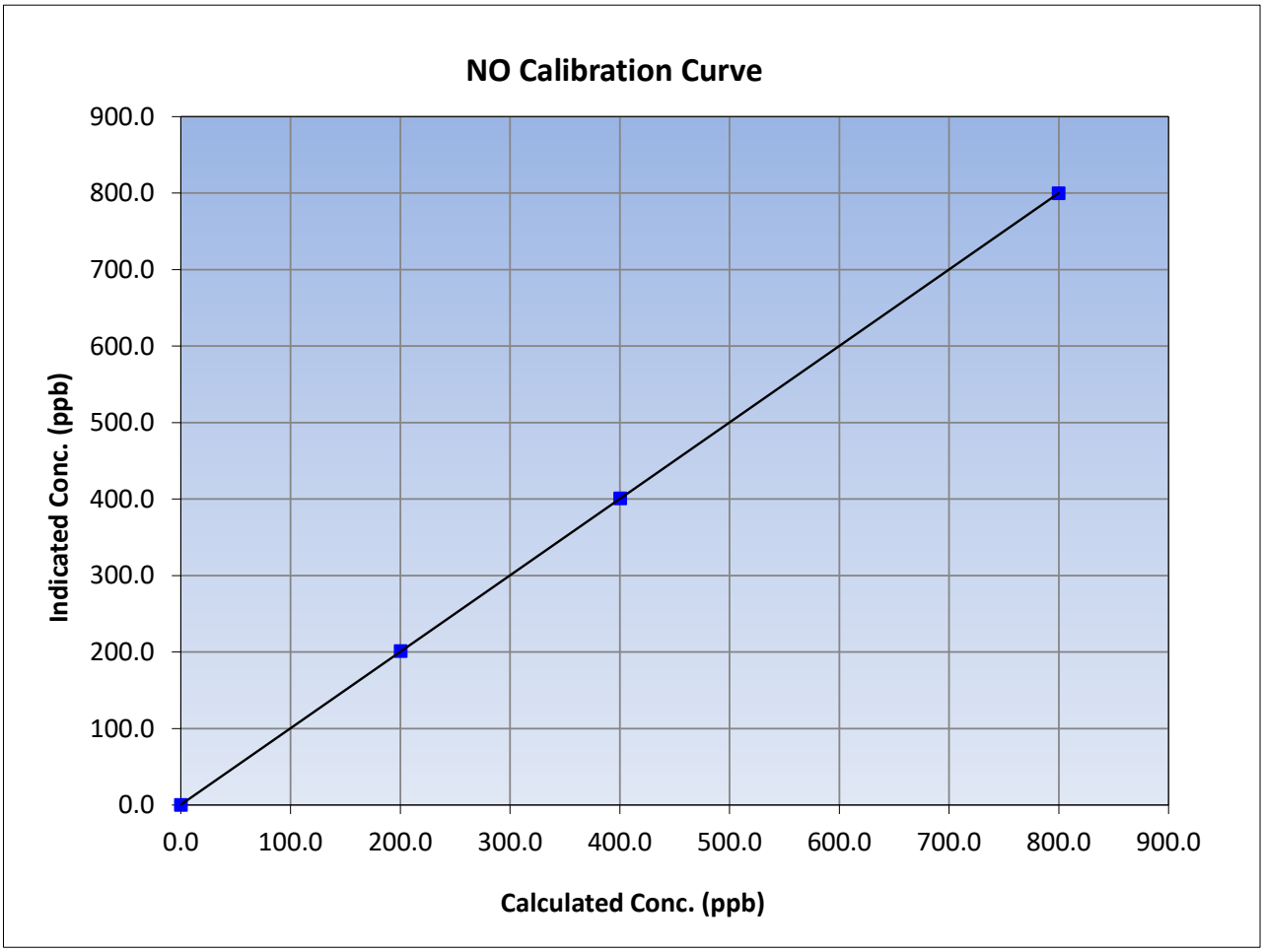
Version-04-2020

Station Information

Calibration Date:	May 3, 2023	Previous Calibration:	NA
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:09	End Time (MST):	15:42
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153460

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999998	≥0.995
799.9	799.8	1.0001			
400.4	400.9	0.9989	Slope	0.999544	0.90 - 1.10
200.2	201.1	0.9956			
			Intercept	0.468701	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

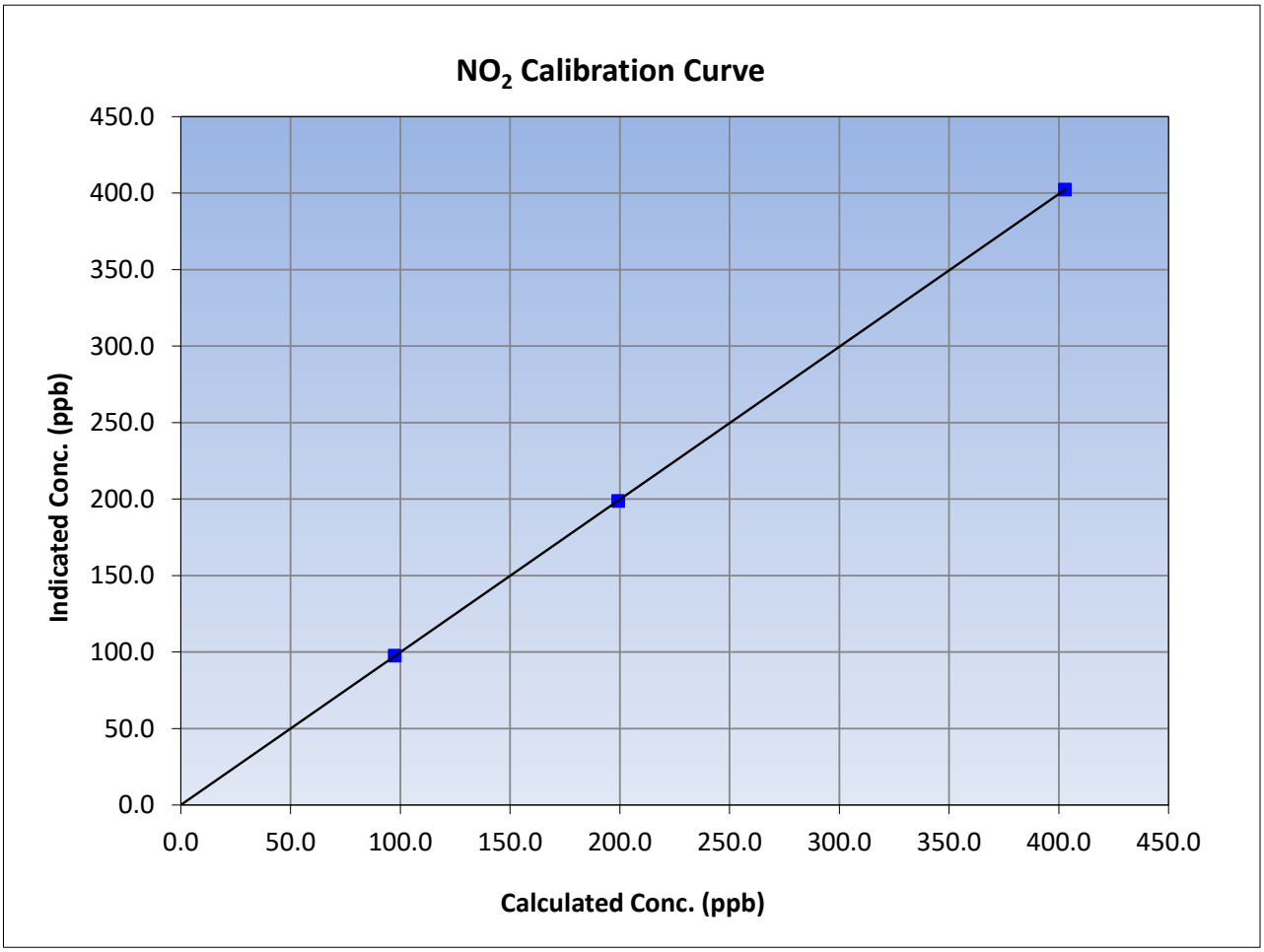
Version-04-2020

Station Information

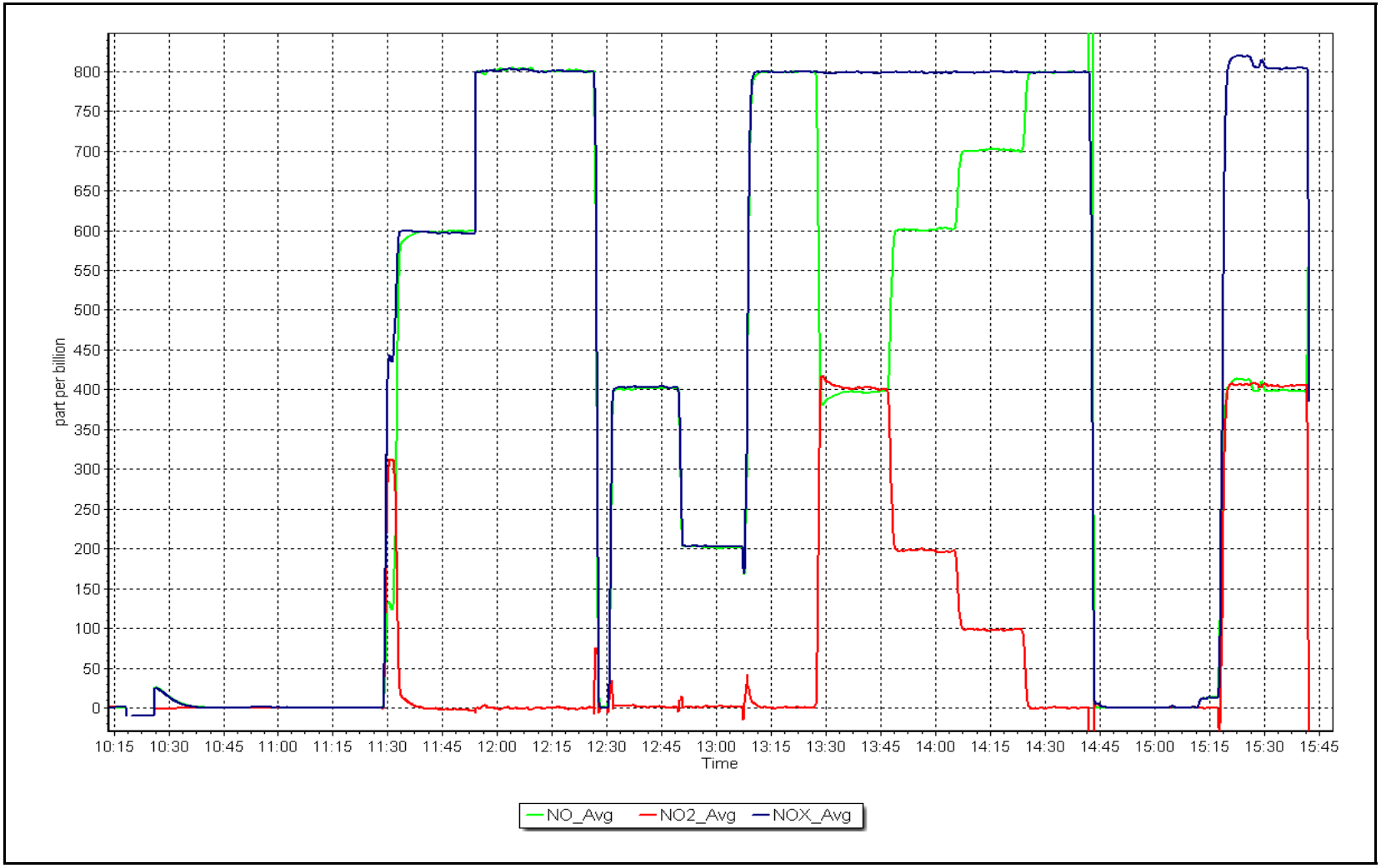
Calibration Date:	May 3, 2023	Previous Calibration:	NA
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:09	End Time (MST):	15:42
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153460

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*
402.8	402.2	1.0015			
199.2	198.8	1.0020	Slope	0.998379	*0.90 - 1.10*
97.5	97.7	0.9980			
			Intercept	0.058523	*+/-20*



NO_X Calibration Plot Date: May 3, 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:	May 30, 2023	Last Cal Date:	April 26, 2023
Start time (MST):	10:08	End time (MST):	13:23
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	Teledyne API T700	Serial Number:	3806
ZAG Make/Model:	Teledyne API T701	Serial Number:	201

Analyzer Information

Analyzer make:	Teledyne API T400	Analyzer serial #:	3869
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.007857	1.006657	Backgd or Offset:	-2.0	-2.0
Calibration intercept:	0.800000	0.560000	Coeff or Slope:	1.011	1.011

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	800.0	0.0	-0.1	----
as found span	4893	899.1	400.0	402.9	0.993
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	-0.1	----
high point	4893	899.1	400.0	402.8	0.993
second point	4893	753.4	200.0	202.5	0.988
third point	4893	655.7	100.0	101.7	0.983
as left zero	5000	800.0	0.0	0.2	----
as left span	4816	899.1	400.0	406.9	0.983
				Average Correction Factor	0.988

Baseline Corr As found:	403.0	Previous response	403.9	*% change	-0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

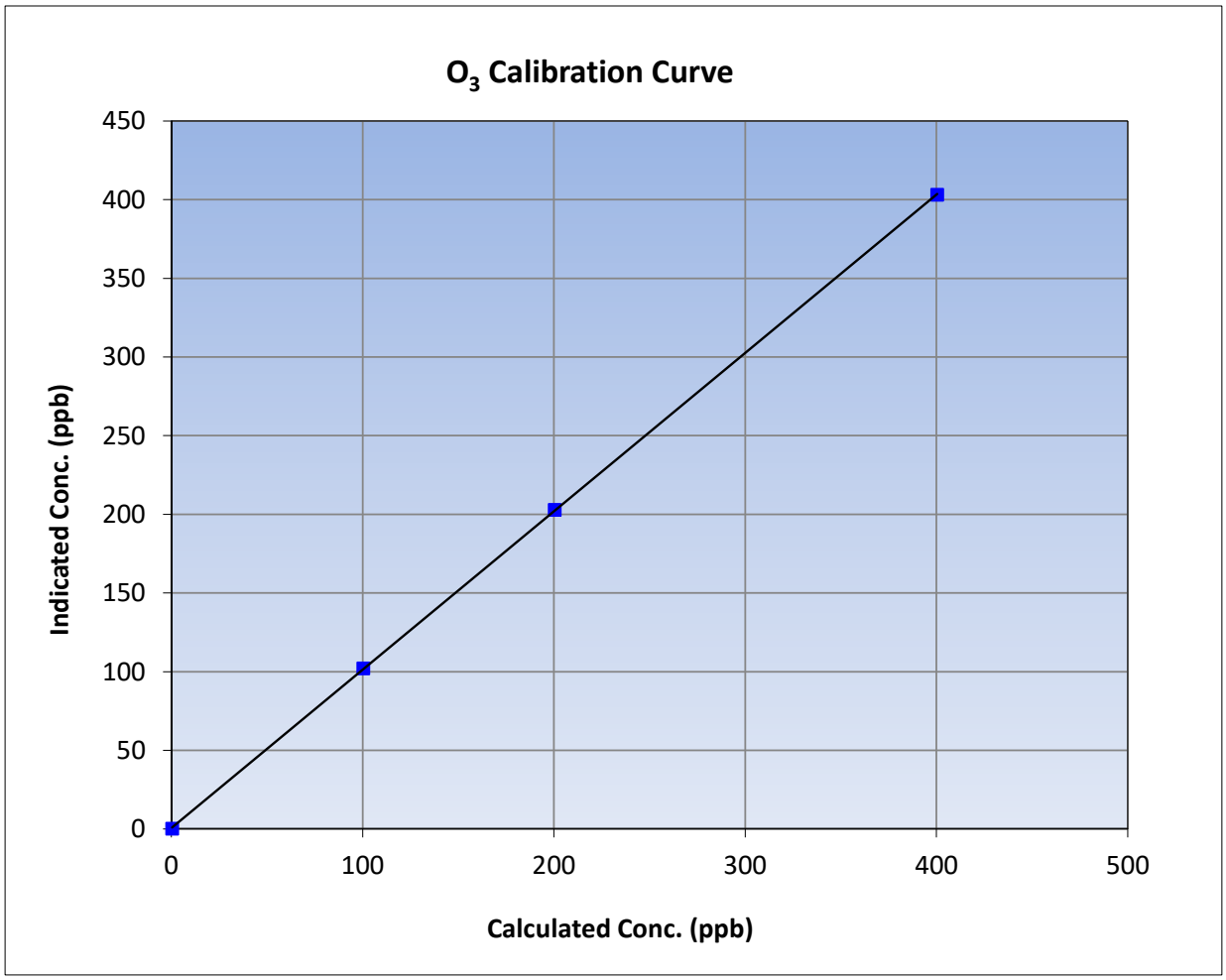
Station Information

Calibration Date:	May 30, 2023	Previous Calibration:	April 26, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:08	End Time (MST):	13:23
Analyzer make:	Teledyne API T400	Analyzer serial #:	3869

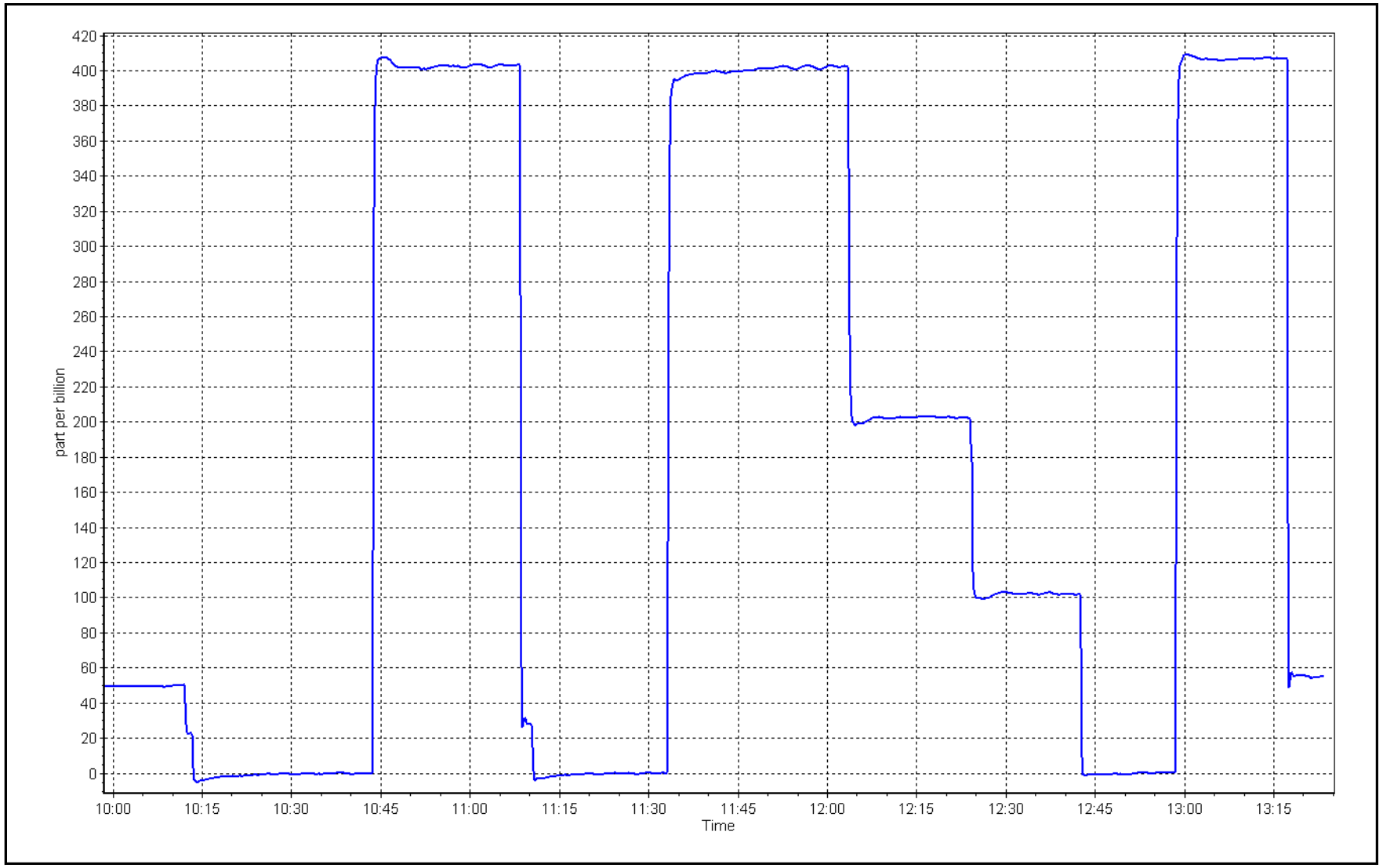
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
400.0	402.8	0.9930
200.0	202.5	0.9877
100.0	101.7	0.9833

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999986	*≥0.995*
Slope	1.006657	*0.90 - 1.10*
Intercept	0.560000	*+/- 5*



O_3 Calibration Plot Date: May 30, 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:	May 30, 2023	Last Cal Date:	April 27, 2023
Start time (MST):	11:15	End time (MST):	13:28
Analyzer Make:	Teledyne API T640	S/N:	325
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25	S/N:	388750
Temp/RH standard:	Alicat FP-25	S/N:	388750

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	23.8	23.62	23.8	☐	+/- 2 °C
P (mmHg)	712.5	713.29	712.5	☐	+/- 10 mmHg
flow (LPM)	5.02	5.080	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: May 30, 2023 Last Cal Date: April 27, 2023

PM w/o HEPA: 12.6 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: April 27, 2023 <0.2 ug/m3

Disposable Filter Changed: April 27, 2023

Annual Maintenance

Date Sample Tube Cleaned: October 6, 2022

Date RH/T Sensor Cleaned: October 6, 2022

Notes: Verified flow, temperature, and pressure. No adjustments made. Leak test passed.

Calibration by: Braiden Boutilier

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS23
FORT HILLS
MAY 2023

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

June 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	May 10, 2023	Last Cal Date:	April 14, 2023
Start time (MST):	9:24	End time (MST):	12:35
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.76	ppm	Cal Gas Exp Date:	January 5, 2025
Cal Gas Cylinder #:	CC281425			
Removed Cal Gas Conc:	49.76	ppm	Rem Gas Exp Date:	N/A
Removed Gas Cyl #:	N/A		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	451
ZAG Make/Model:	API T701		Serial Number:	5611

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1160290012

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.007702	1.001510	Backgd or Offset:	18.5	17.8
Calibration intercept:	-1.064774	-0.523913	Coeff or Slope:	1.053	1.040

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	799.1	808.4	0.988
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	800.0	0.999
second point	4960	40.2	400.1	399.8	1.001
third point	4980	20.1	200.0	199.6	1.002
as left zero	5000	0.0	0.0	0.0	----
as left span	4920	80.3	799.1	802.0	0.996
				Average Correction Factor	1.001

Baseline Corr As found:	808.70	Previous response	804.19	*% change	0.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

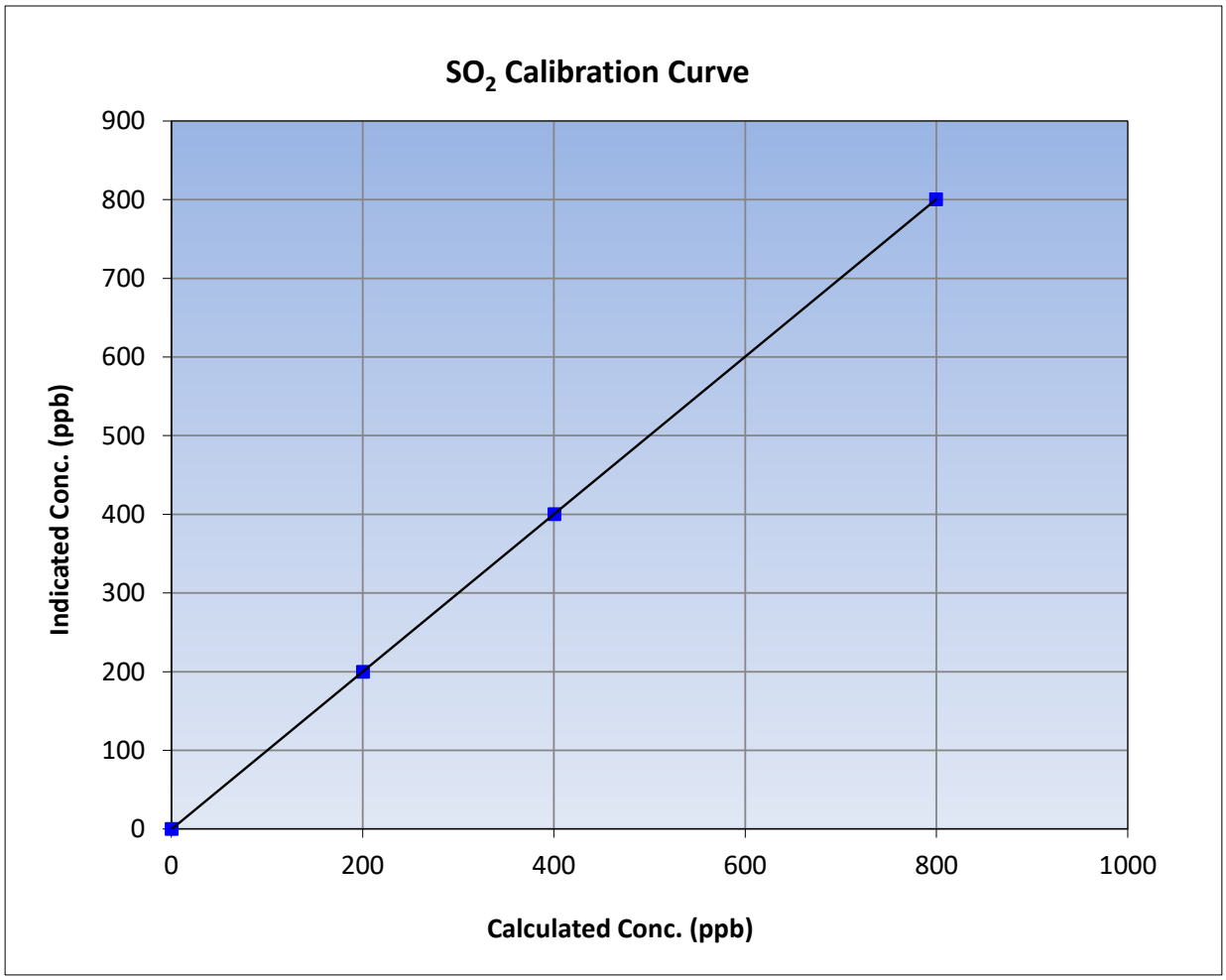
Station Information

Calibration Date:	May 10, 2023	Previous Calibration:	April 14, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:24	End Time (MST):	12:35
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290012

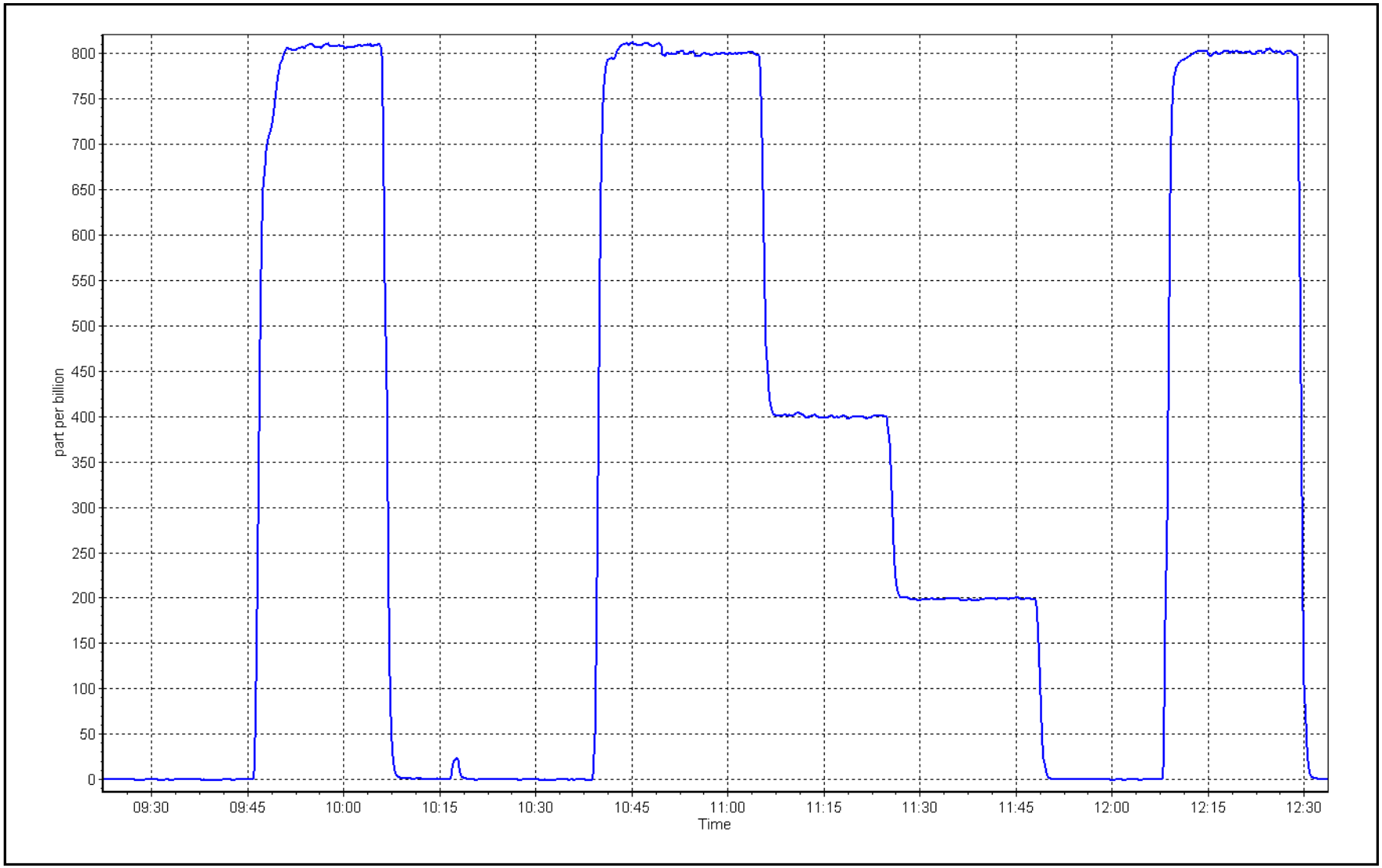
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
799.1	800.0	0.9989
400.1	399.8	1.0006
200.0	199.6	1.0022

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	1.001510	*0.90 - 1.10*
Intercept	-0.523913	*+/-30*



SO2 Calibration Plot Date: May 10, 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:	May 25, 2023	Last Cal Date:	April 5, 2023
Start time (MST):	9:24	End time (MST):	13:29
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.20	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517372			
Removed Cal Gas Conc:	5.20	ppm	Rem Gas Exp Date:	N/A
Removed Gas Cyl #:	N/A		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	451
ZAG Make/Model:	API T701		Serial Number:	5611

Analyzer Information

Analyzer make:	Thermo 43iQ TLE		Analyzer serial #:	1300156232	
Converter make:	CDN-101		Converter serial #:	594	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003023	1.005029	Backgd or Offset:	1.92	1.92
Calibration intercept:	0.182125	-0.038092	Coeff or Slope:	1.132	1.132

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4923	77.0	80.0	79.3	1.008
as found 2nd point	4962	38.5	40.0	39.7	1.005
as found 3rd point	4981	19.2	19.9	19.7	1.007
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4923	77.0	80.0	80.3	0.996
second point	4962	38.5	40.0	40.4	0.990
third point	4981	19.2	19.9	19.8	1.007
as left zero	5000	0.0	0.0	0.7	----
as left span	4923	77.0	80.0	80.4	0.995
SO2 Scrubber Check	4920	80.3	803.0	-0.1	----
Date of last scrubber change:				Ave Corr Factor	0.998
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.4	Prev response:	80.43	*% change:	-1.3%
Baseline Corr 2nd AF pt:	39.8	AF Slope:	0.992601	AF Intercept:	-0.078272
Baseline Corr 3rd AF pt:	19.8	AF Correlation:	0.999998		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

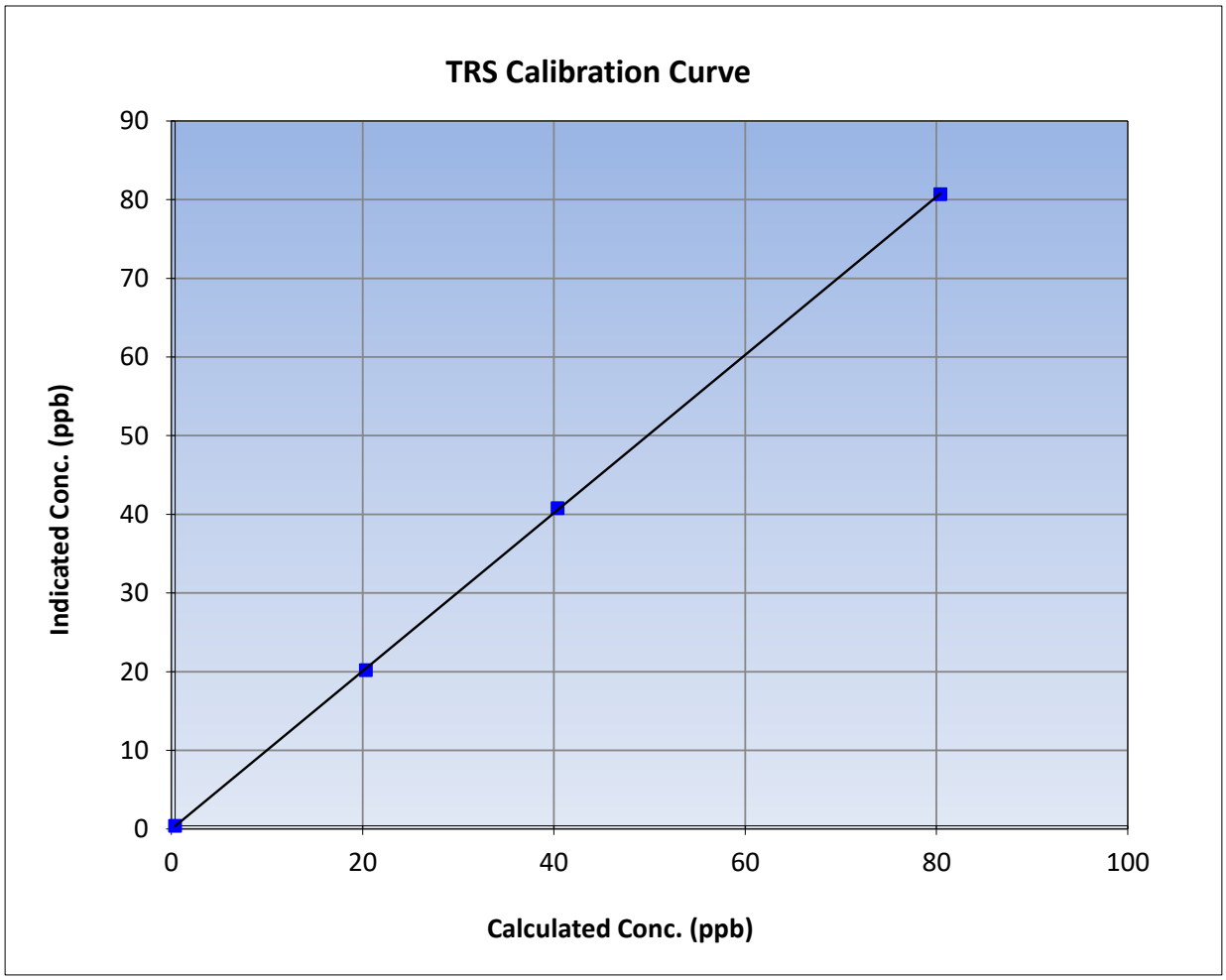
Station Information

Calibration Date:	May 25, 2023	Previous Calibration:	April 5, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:24	End Time (MST):	13:29
Analyzer make:	Thermo 43iQ TLE	Analyzer serial #:	1300156232

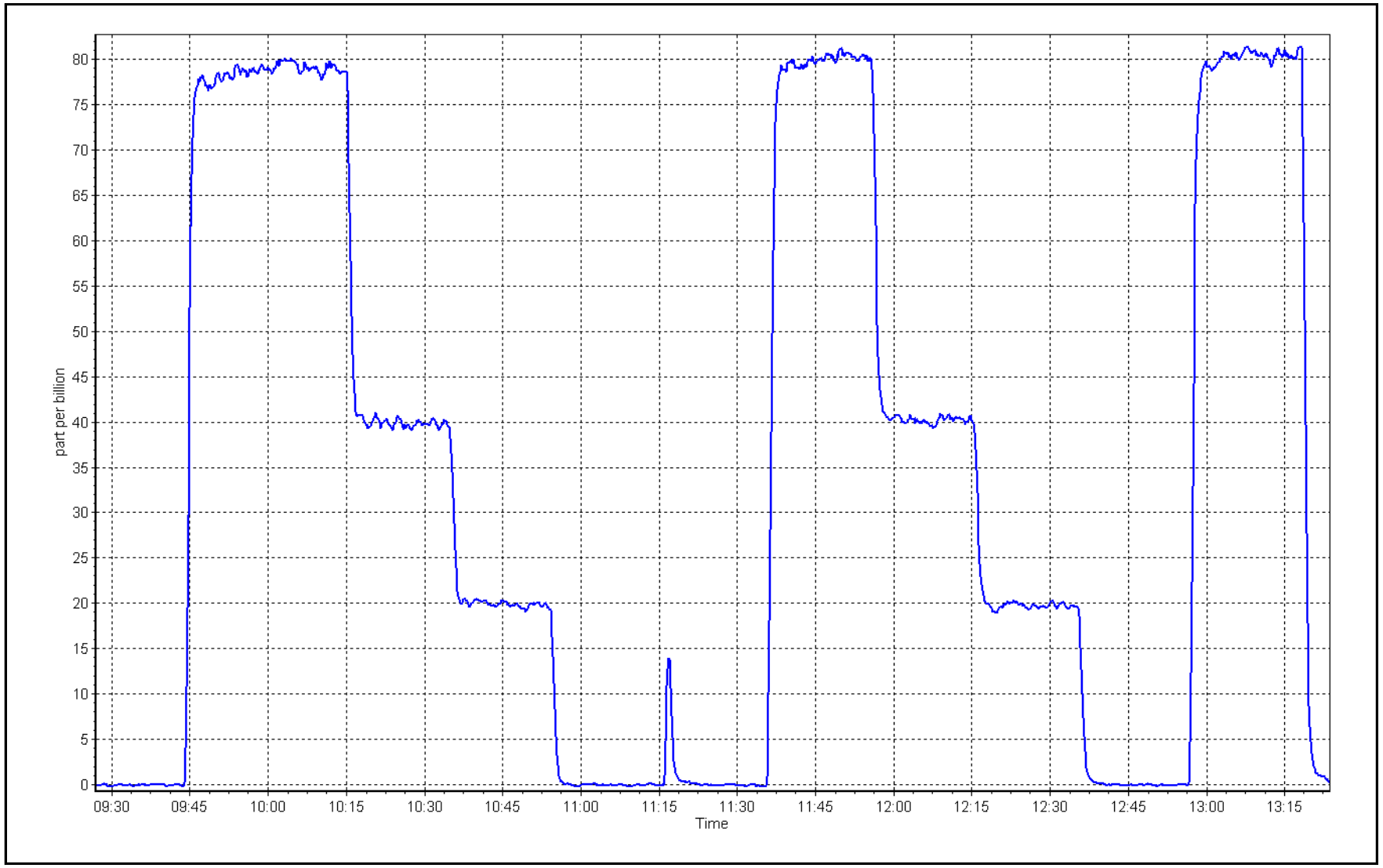
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.3	0.9963
40.0	40.4	0.9900
19.9	19.8	1.0075

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999970	*≥0.995*
Slope	1.005029	*0.90 - 1.10*
Intercept	-0.038092	*+/-3*



TRS Calibration Plot Date: May 25, 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:	May 10, 2023	Last Cal Date:	April 14, 2023
Start time (MST):	9:24	End time (MST):	12:35
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC281425	Cal Gas Expiry Date:	January 5, 2025	
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:	2.32E-04	2.32E-04	NMHC SP Ratio:	5.06E-05	5.06E-05
CH4 Retention time:	13.0	13.0	NMHC Peak Area:	181940	181940

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	17.21	0.999
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	17.19	17.19	1.000
second point	4960	40.2	8.61	8.56	1.005
third point	4980	20.1	4.30	4.29	1.003
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.19	17.15	1.003
				Average Correction Factor	1.003
Baseline Corr AF:	17.21	Prev response	17.26	*% change	-0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / 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	9.15	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	9.16	9.14	1.003
second point	4960	40.2	4.59	4.60	0.997
third point	4980	20.1	2.29	2.32	0.990
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	9.16	9.12	1.004
				Average Correction Factor	0.997
Baseline Corr AF:	9.15	Prev response	9.20	*% change	-0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	8.03	8.07	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	8.03	8.05	0.997
second point	4960	40.2	4.02	3.96	1.015
third point	4980	20.1	2.01	1.98	1.017
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	8.03	8.02	1.001
				Average Correction Factor	1.010
Baseline Corr AF:	8.07	Prev response	8.06	*% change	0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.002839	0.999810
THC Cal Offset:	0.020787	-0.013170
CH4 Cal Slope:	1.005380	1.003198
CH4 Cal Offset:	-0.017654	-0.029231
NMHC Cal Slope:	1.000647	0.996713
NMHC Cal Offset:	0.038041	0.016062

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

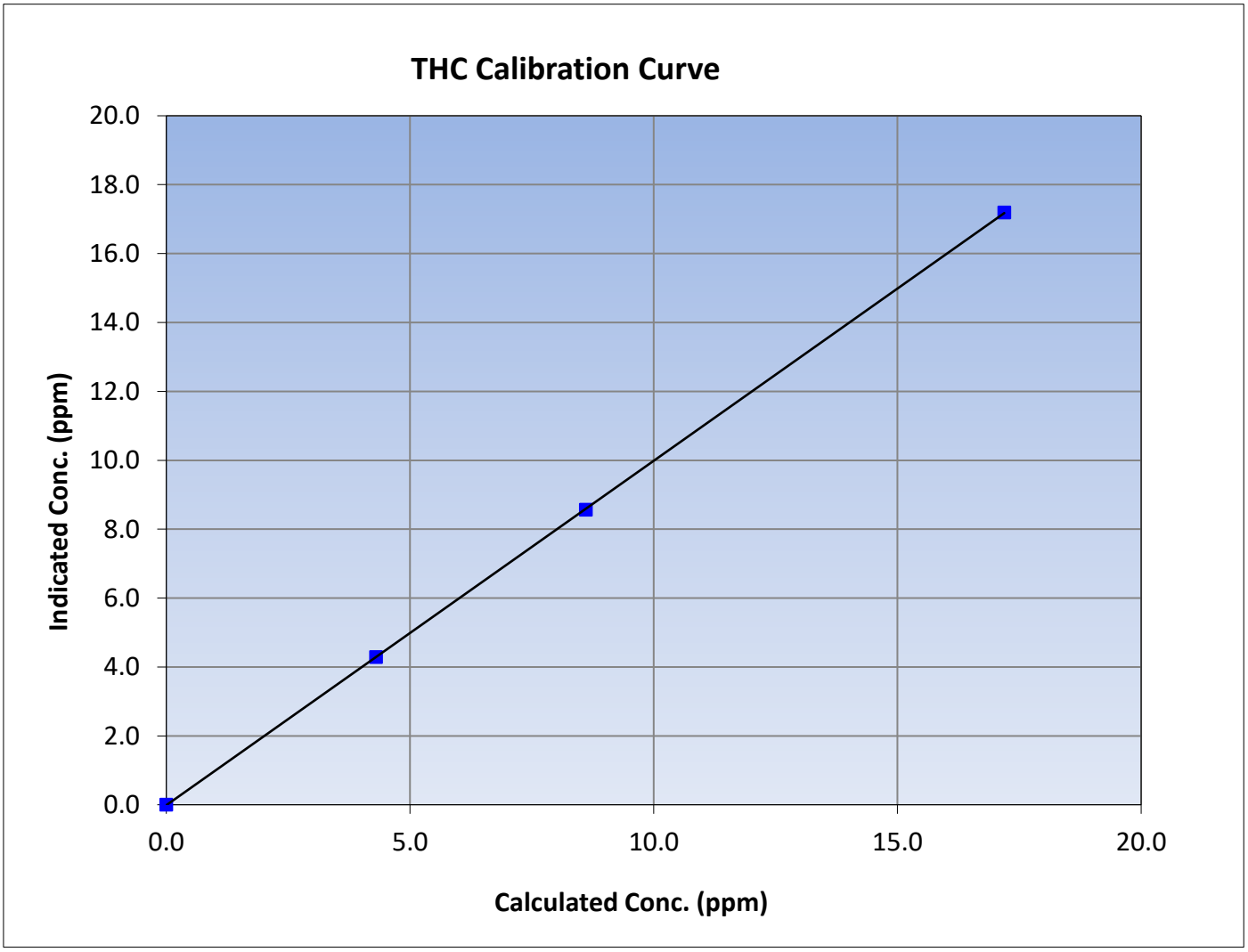
Version-01-2020

Station Information

Calibration Date:	May 10, 2023	Previous Calibration:	April 14, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:24	End Time (MST):	12:35
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585648

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999992	*≥0.995*
17.19	17.19	1.0001			
8.61	8.56	1.0052	Slope	0.999810	*0.90 - 1.10*
4.30	4.29	1.0027			
			Intercept	-0.013170	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

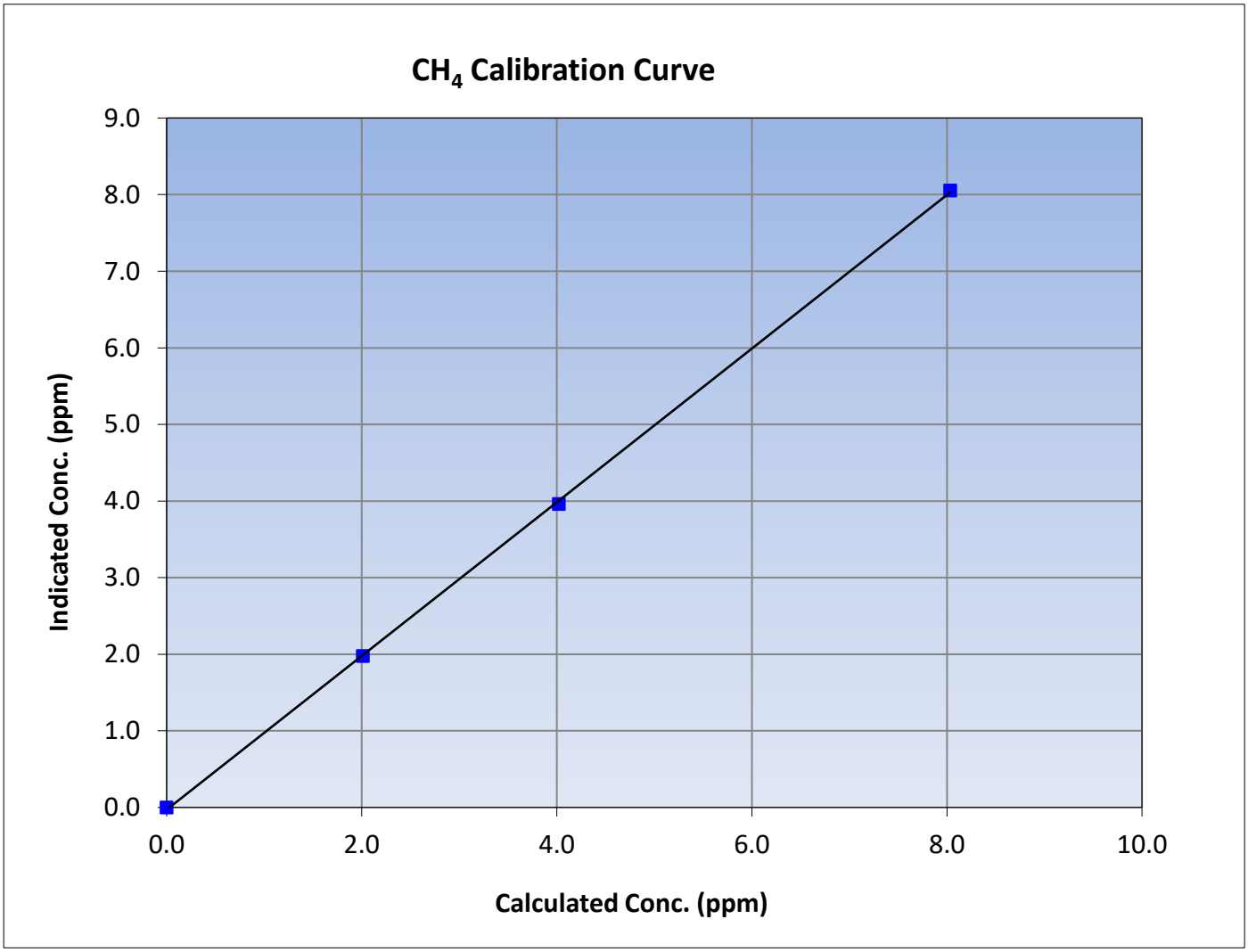
Version-01-2020

Station Information

Calibration Date:	May 10, 2023	Previous Calibration:	April 14, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:24	End Time (MST):	12:35
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585648

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999907	*≥0.995*
8.03	8.05	0.9975			
4.02	3.96	1.0147	Slope	1.003198	*0.90 - 1.10*
2.01	1.98	1.0171			
			Intercept	-0.029231	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

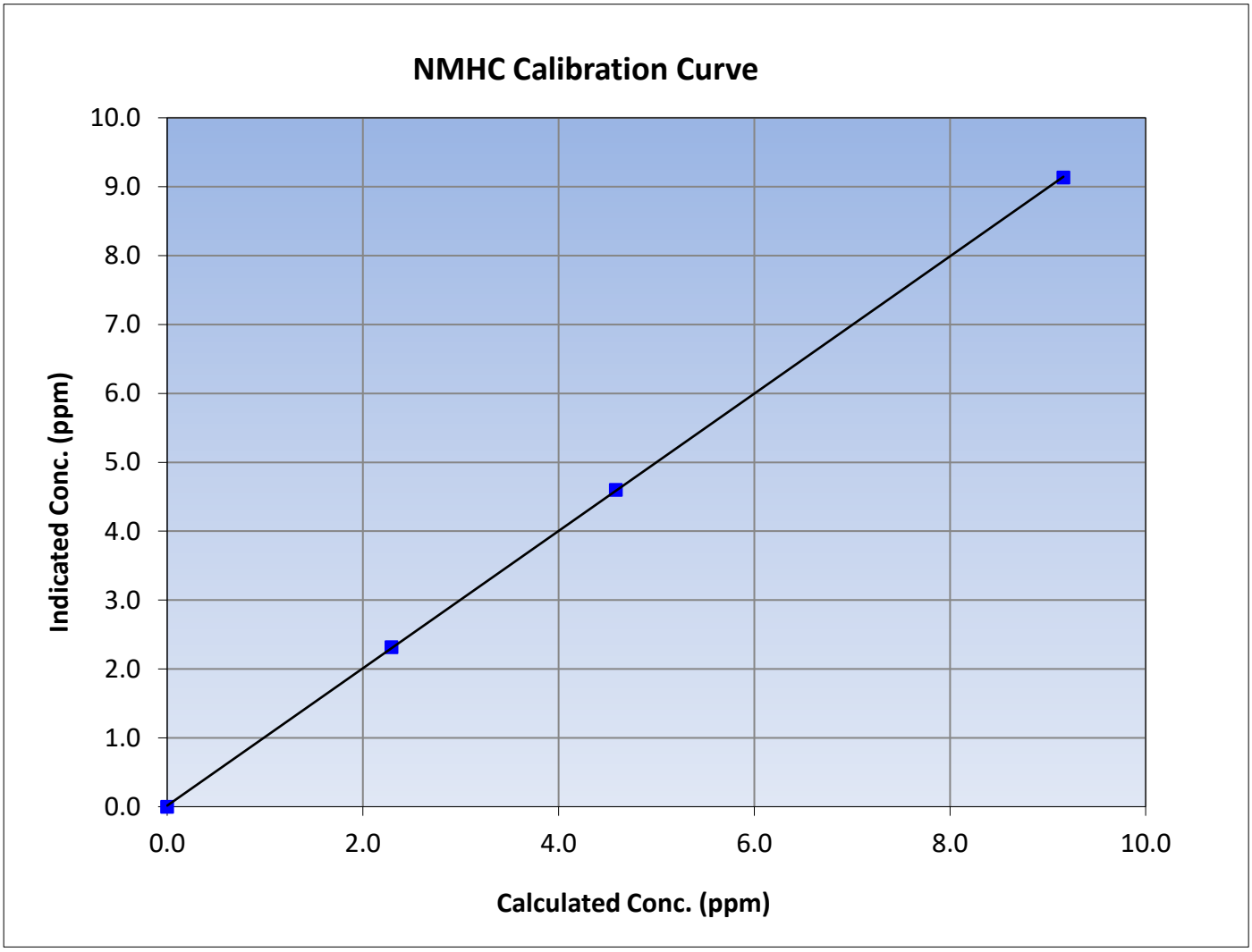
Version-01-2020

Station Information

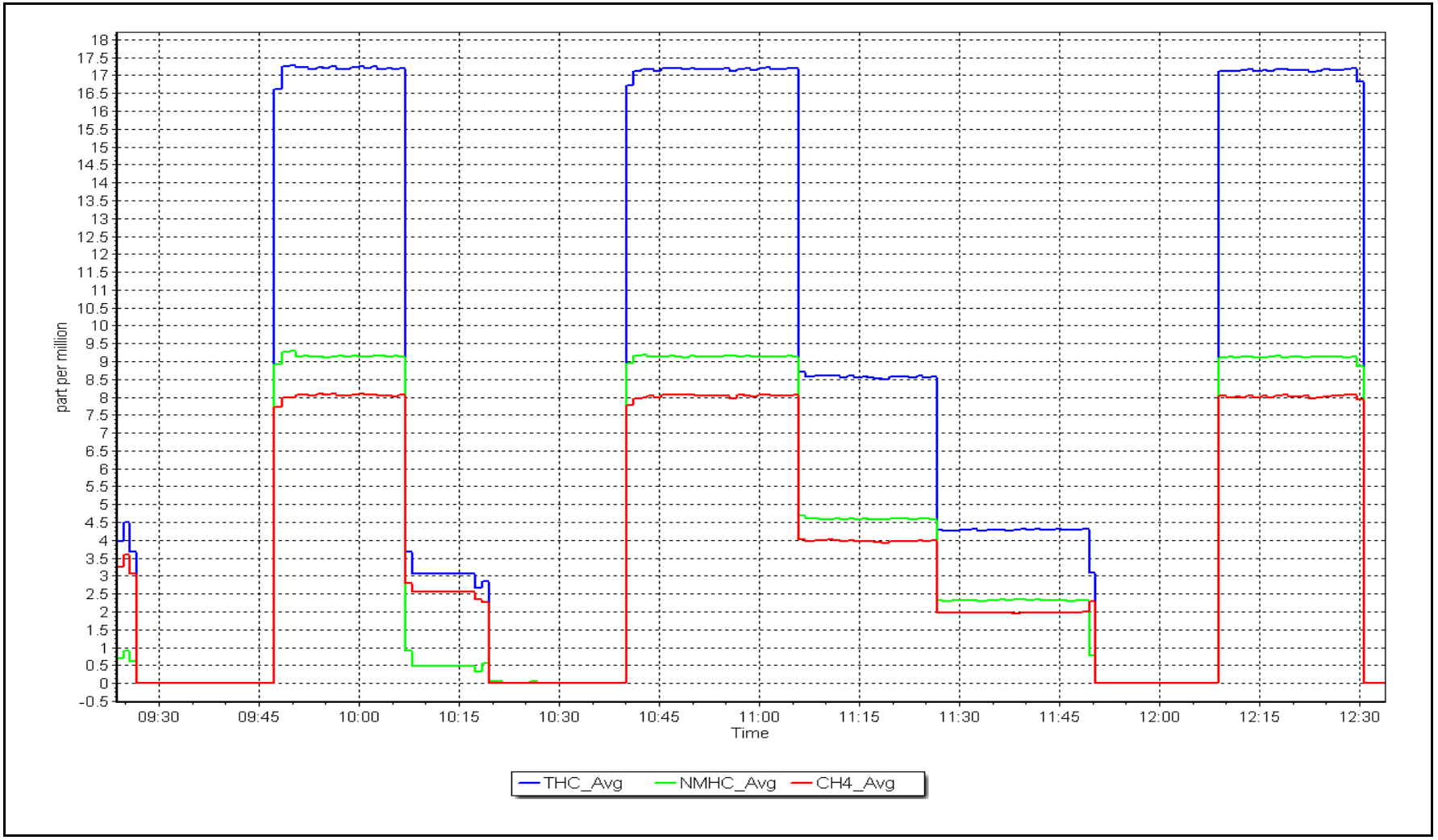
Calibration Date:	May 10, 2023	Previous Calibration:	April 14, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:24	End Time (MST):	12:35
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585648

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999985	≥0.995
9.16	9.14	1.0025			
4.59	4.60	0.9973	Slope	0.996713	0.90 - 1.10
2.29	2.32	0.9904			
			Intercept	0.016062	+/-0.5



NMHC Calibration Plot Date: May 10, 2023 Location: Fort Hills



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	May 16, 2023	Last Cal Date:	April 21, 2023
Start time (MST):	9:08	End time (MST):	13:55
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:	1.065	1.049	NO bkgnd or offset:	2.9	2.9
NOX coeff or slope:	0.995	0.995	NOX bkgnd or offset:	3.2	3.1
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	158.3	160.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.003237	0.999094
NO_X Cal Offset:	0.084507	1.084161
NO Cal Slope:	1.004153	1.000637
NO Cal Offset:	-1.236008	-0.356041
NO_2 Cal Slope:	1.006445	1.001549
NO_2 Cal Offset:	0.589439	-0.718730

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	-0.1	0.8	----	----
as found span	4920	80.5	800.2	800.2	0.0	813.3	810.3	3.0	0.984	0.987
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.6	0.0	0.5	----	----
high point	4920	80.5	800.2	800.2	0.0	799.8	800.1	-0.3	1.000	1.000
second point	4960	40.2	399.6	399.6	0.0	402.0	400.5	1.5	0.994	0.998
third point	4980	20.1	199.8	199.8	0.0	200.2	198.4	1.8	0.998	1.007
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as left span	4920	80.5	800.2	441.3	358.9	797.1	439.2	357.9	1.004	1.005
								Average Correction Factor	0.997	1.002

Corrected As found	NO_X = 812.6 ppb	NO = 810.4 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	1.2%
Previous Response	NO_X = 802.8 ppb	NO = 802.3 ppb		*Percent Change	NO =	1.0%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	799.6	440.7	358.9	359.5	0.998	100.2%
2nd GPT point (200 ppb O3)	799.6	621.2	178.4	176.9	1.008	99.2%
3rd GPT point (100 ppb O3)	799.6	707.5	92.1	90.6	1.017	98.4%
				Average Correction Factor	1.008	99.2%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

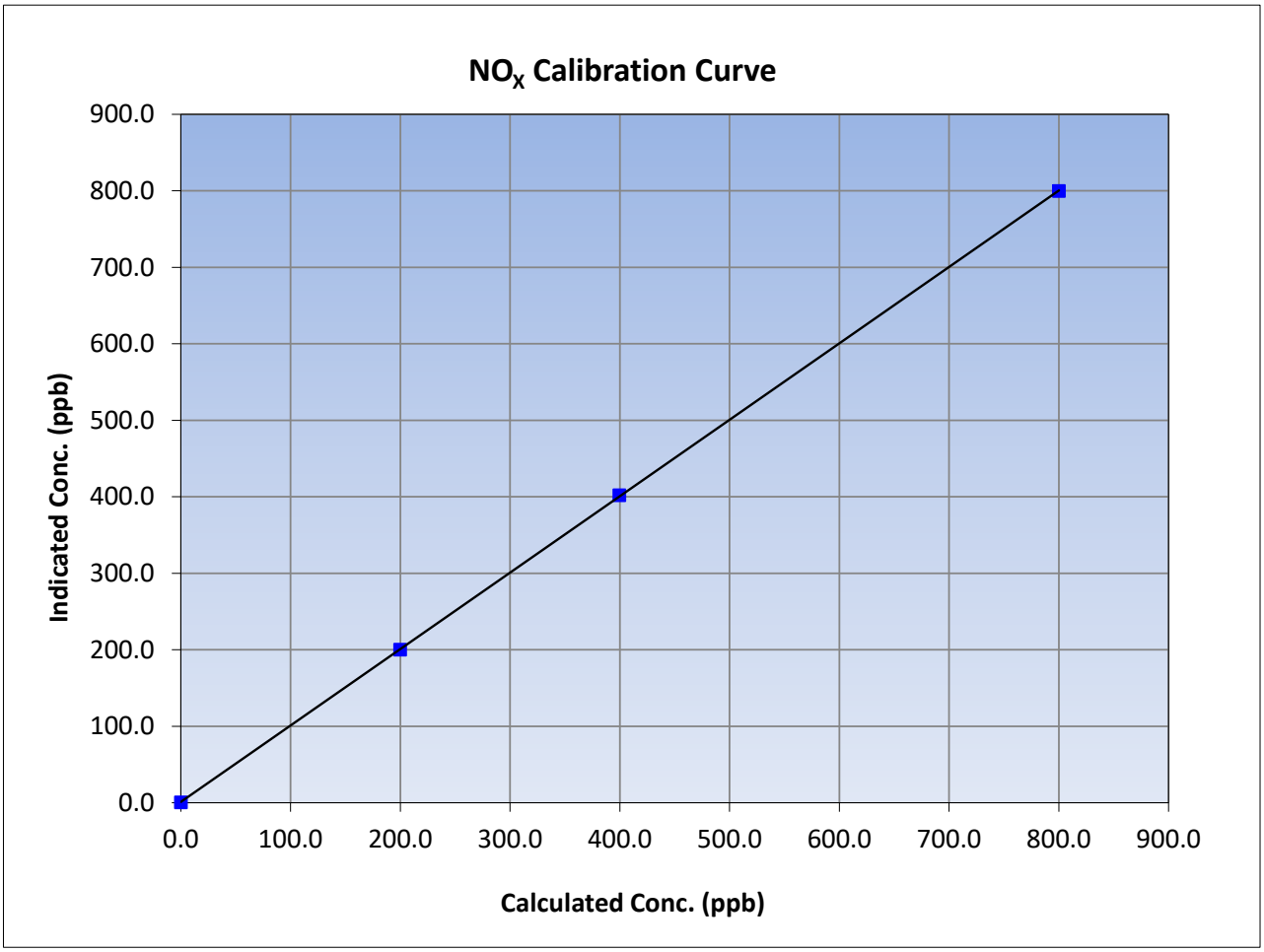
Version-04-2020

Station Information

Calibration Date:	May 16, 2023	Previous Calibration:	April 21, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:08	End Time (MST):	13:55
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	0.6	----	Correlation Coefficient	0.999989	*≥0.995*
800.2	799.8	1.0005			
399.6	402.0	0.9940	Slope	0.999094	*0.90 - 1.10*
199.8	200.2	0.9980			
			Intercept	1.084161	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

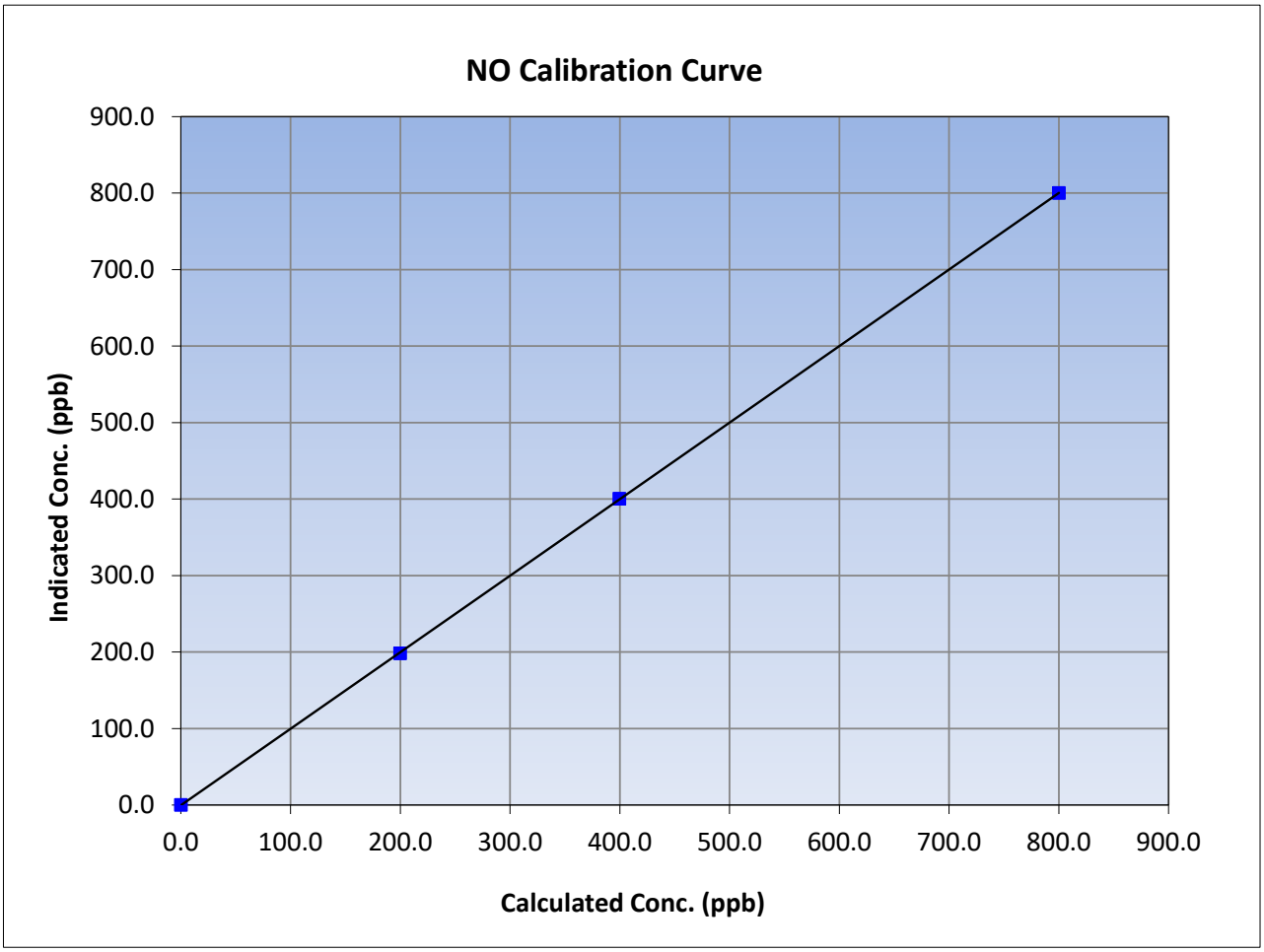
Version-04-2020

Station Information

Calibration Date:	May 16, 2023	Previous Calibration:	April 21, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:08	End Time (MST):	13:55
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	0.999993	≥0.995
800.2	800.1	1.0001			
399.6	400.5	0.9977	Slope	1.000637	0.90 - 1.10
199.8	198.4	1.0070			
			Intercept	-0.356041	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

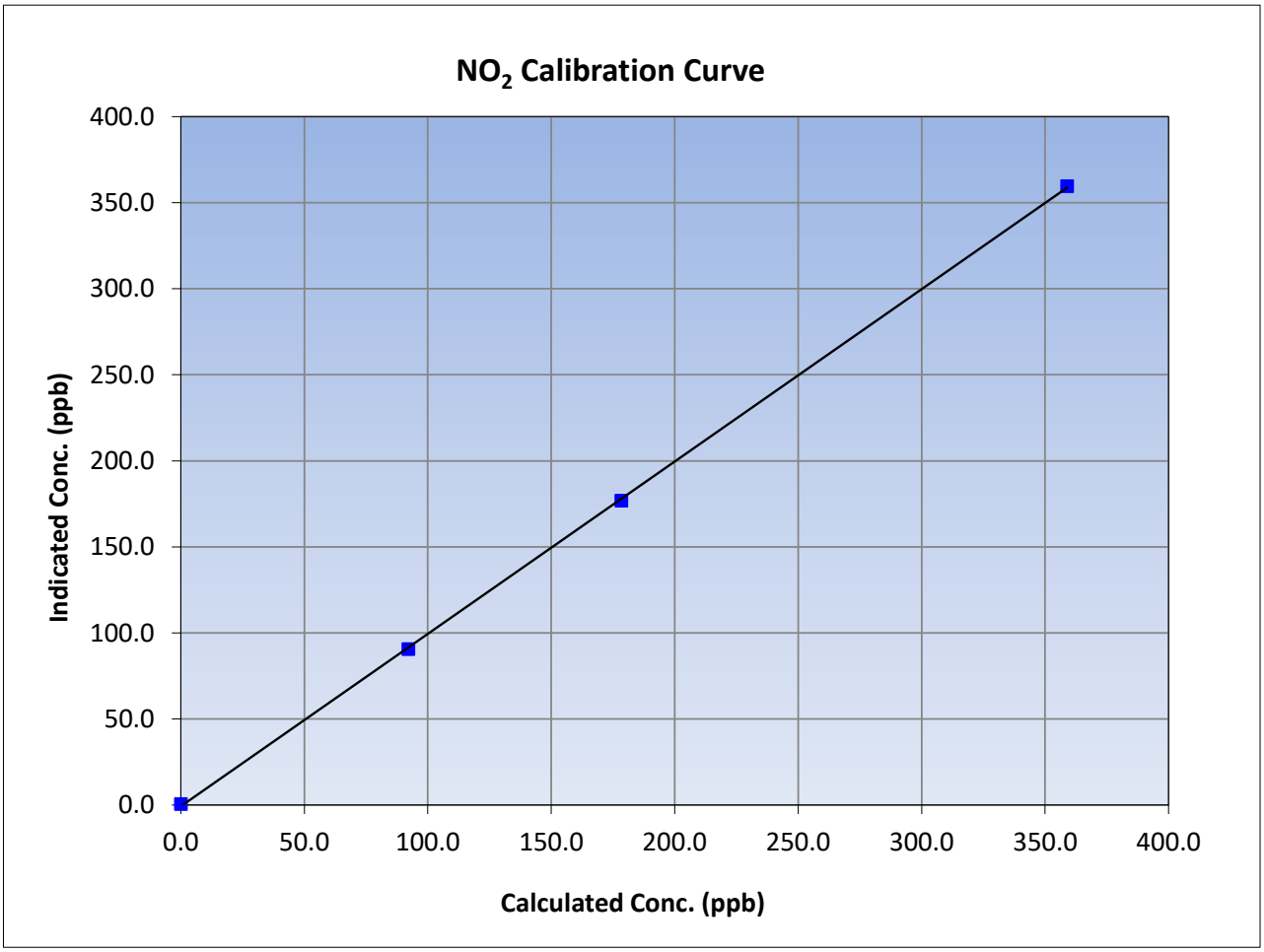
Version-04-2020

Station Information

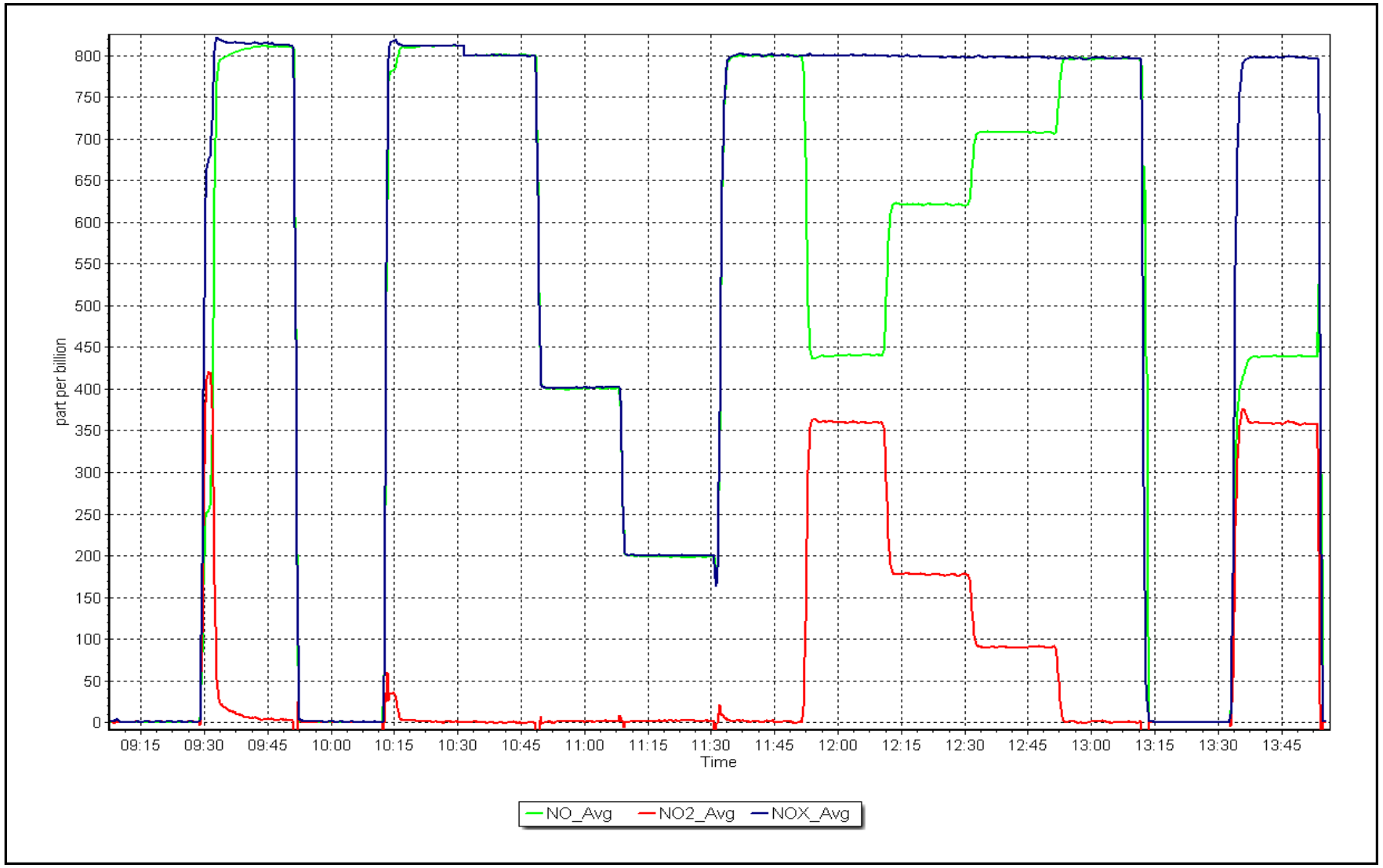
Calibration Date:	May 16, 2023	Previous Calibration:	April 21, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:08	End Time (MST):	13:55
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.5	----	Correlation Coefficient	0.999943	≥0.995
358.9	359.5	0.9983			
178.4	176.9	1.0085	Slope	1.001549	0.90 - 1.10
92.1	90.6	1.0166			
			Intercept	-0.718730	+/-20



NO_X Calibration Plot Date: May 16, 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:	May 10, 2023	Last Cal Date:	April 21, 2023
Start time (MST):	12:41	End time (MST):	14:00
Analyzer Make:	API T640	S/N:	1546
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388755
Temp/RH standard:	Alicat FP-25BT	S/N:	388755

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	24.2	23.27	24.2	☐	+/- 2 °C
P (mmHg)	735.06	733.4	735.06	☐	+/- 10 mmHg
flow (LPM)	5.07	5.14	5.07	☐	+/- 0.25 LPM

Leak Test: Date of check: May 10, 2023 Last Cal Date: April 21, 2023

PM w/o HEPA: 90.1 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	10.8	11	11	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 80.7 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: May 10, 2023

Disposable Filter Changed: May 10, 2023

Annual Maintenance

Date Sample Tube Cleaned: May 10, 2023

Date RH/T Sensor Cleaned: May 10, 2023

Notes: Leak check passed, no adjustments needed. Completed quarterly and annual mainenance.

Calibration by: Max Farrell

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS25
WASKŌW OHCI PIMÂTISIWIN
MAY 2023

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

June 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Waskow ohci Pimatisiwin	Station number:	AMS25
Calibration Date:	May 10, 2023	Last Cal Date:	April 11, 2023
Start time (MST):	9:44	End time (MST):	12:20
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.54	ppm	Cal Gas Exp Date:	December 29, 2028
Cal Gas Cylinder #:	CC437219			
Removed Cal Gas Conc:	50.5	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	747
ZAG Make/Model:	API T701		Serial Number:	261

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1118148497

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998563	1.000277	Backgd or Offset:	10.0	9.7
Calibration intercept:	0.983970	0.283925	Coeff or Slope:	1.008	0.983

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	----
as found span	4921	79.2	800.5	819.1	0.977
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4921	79.2	800.5	800.5	1.000
second point	4960	39.6	400.3	402.3	0.995
third point	4980	19.8	200.1	199.4	1.004
as left zero	5000	0.0	0.0	0.2	----
as left span	4921	79.2	800.5	802.8	0.997
				Average Correction Factor	1.000

Baseline Corr As found:	819.10	Previous response	800.36	*% change	2.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Calibration Gas Changed. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

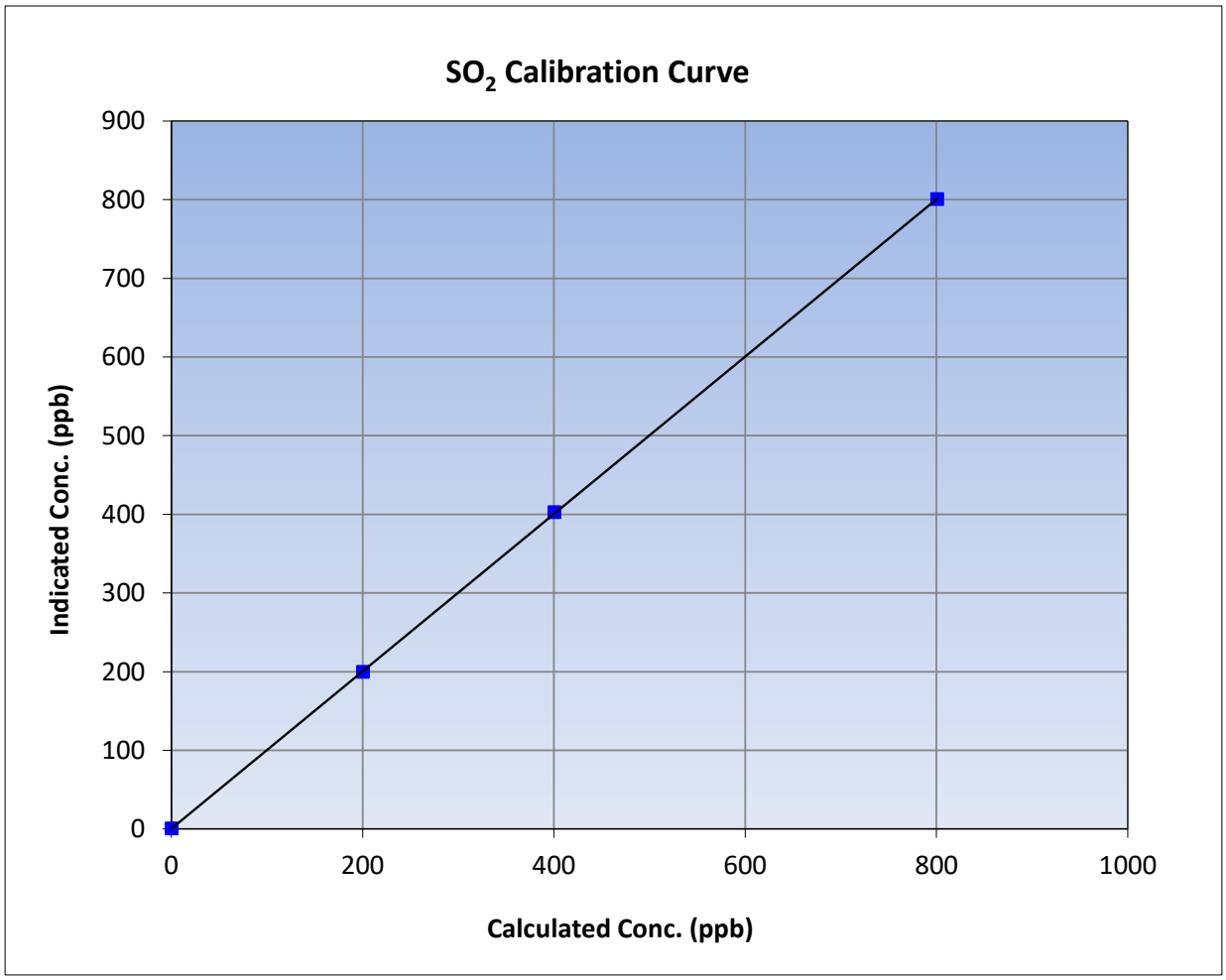
Station Information

Calibration Date:	May 10, 2023	Previous Calibration:	April 11, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	9:44	End Time (MST):	12:20
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148497

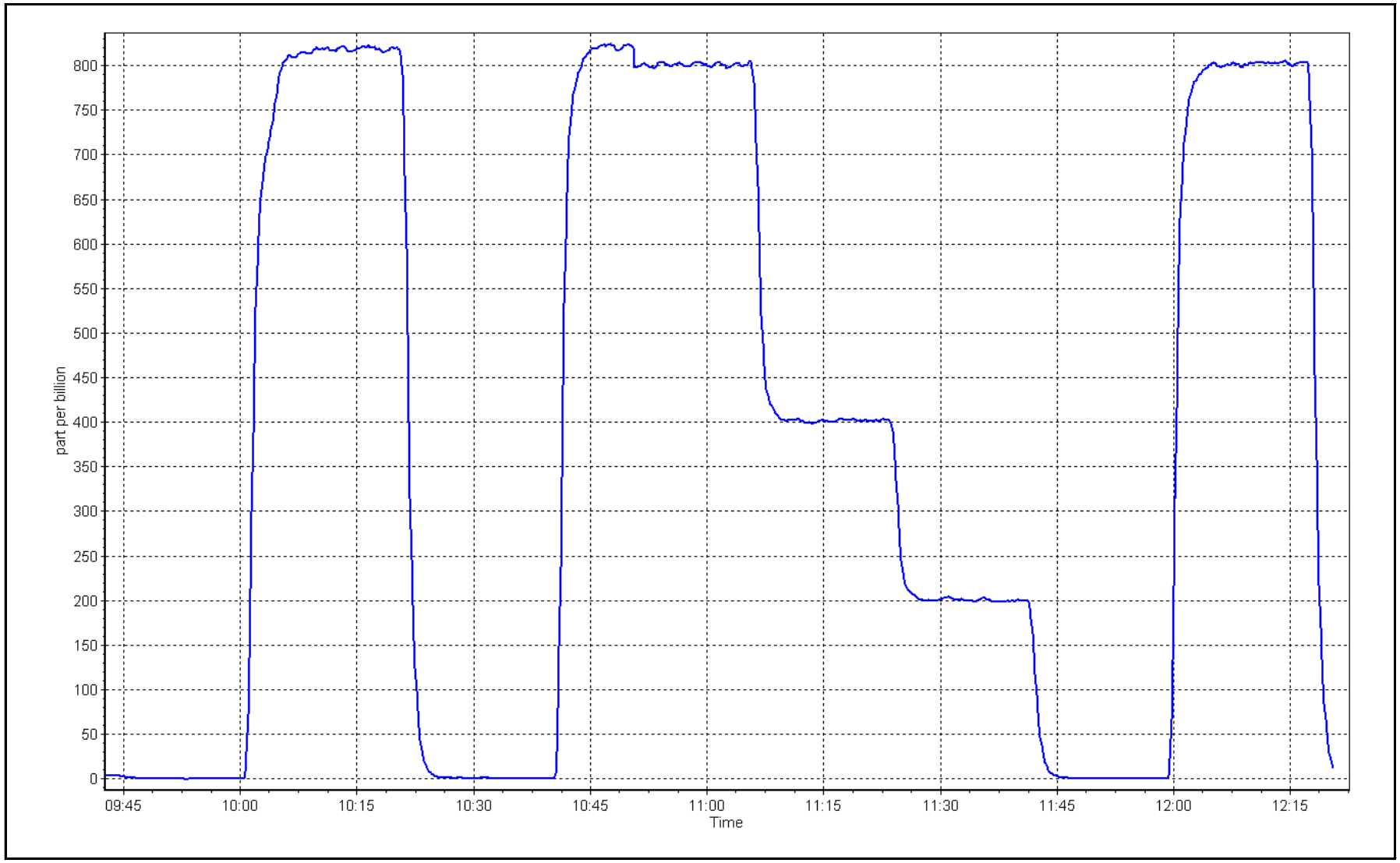
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
800.5	800.5	1.0000
400.3	402.3	0.9951
200.1	199.4	1.0037

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999989	*≥0.995*
Slope	1.000277	*0.90 - 1.10*
Intercept	0.283925	*+/-30*



SO2 Calibration Plot Date: May 10, 2023 Location: Waskow ohci Pimatisiwin



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Waskow ohci Pimatisiwin	Station number:	AMS25
Calibration Date:	May 17, 2023	Last Cal Date:	April 12, 2023
Start time (MST):	6:05	End time (MST):	10:24
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	4.97	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC517099			
Removed Cal Gas Conc:	4.97	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	747
ZAG Make/Model:	API T701		Serial Number:	261

Analyzer Information

Analyzer make:	Thermo 43i-LTE		Analyzer serial #:	1170050146	
Converter make:	Thermo 43C		Converter serial #:	328702539	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.014757	1.021518	Backgd or Offset:	3.4	3.4
Calibration intercept:	0.200000	0.240000	Coeff or Slope:	1.108	1.108

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4918	81.6	81.1	81.2	0.999
as found 2nd point	4959	40.8	40.5	40.7	0.997
as found 3rd point	4980	20.4	20.3	20.5	0.993
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4920	80.0	79.5	81.4	0.976
second point	4960	40.0	39.7	40.8	0.974
third point	4980	20.0	19.9	20.6	0.964
as left zero	5000	0.0	0.0	0.2	----
as left span	4912	88.3	800.0	826.0	0.969
SO2 Scrubber Check	4924	76.3	800.0	0.0	----
Date of last scrubber change:		19-Jul-10		Ave Corr Factor	0.971
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.1	Prev response:	82.45	*% change:	-1.7%
Baseline Corr 2nd AF pt:	40.6	AF Slope:	1.000170	AF Intercept:	0.167624
Baseline Corr 3rd AF pt:	20.4	AF Correlation:	0.999997		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

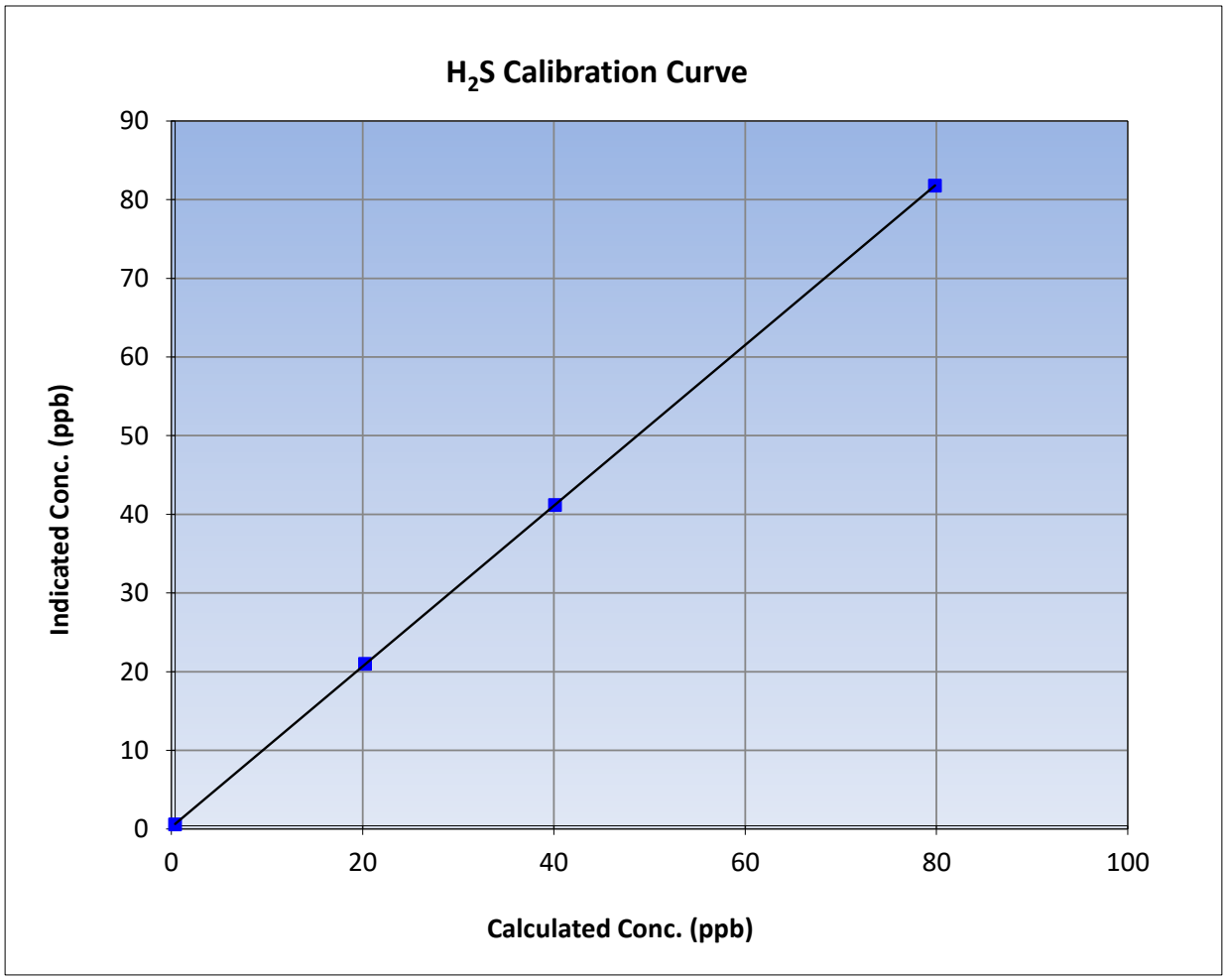
Station Information

Calibration Date:	May 17, 2023	Previous Calibration:	April 12, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	6:05	End Time (MST):	10:24
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1170050146

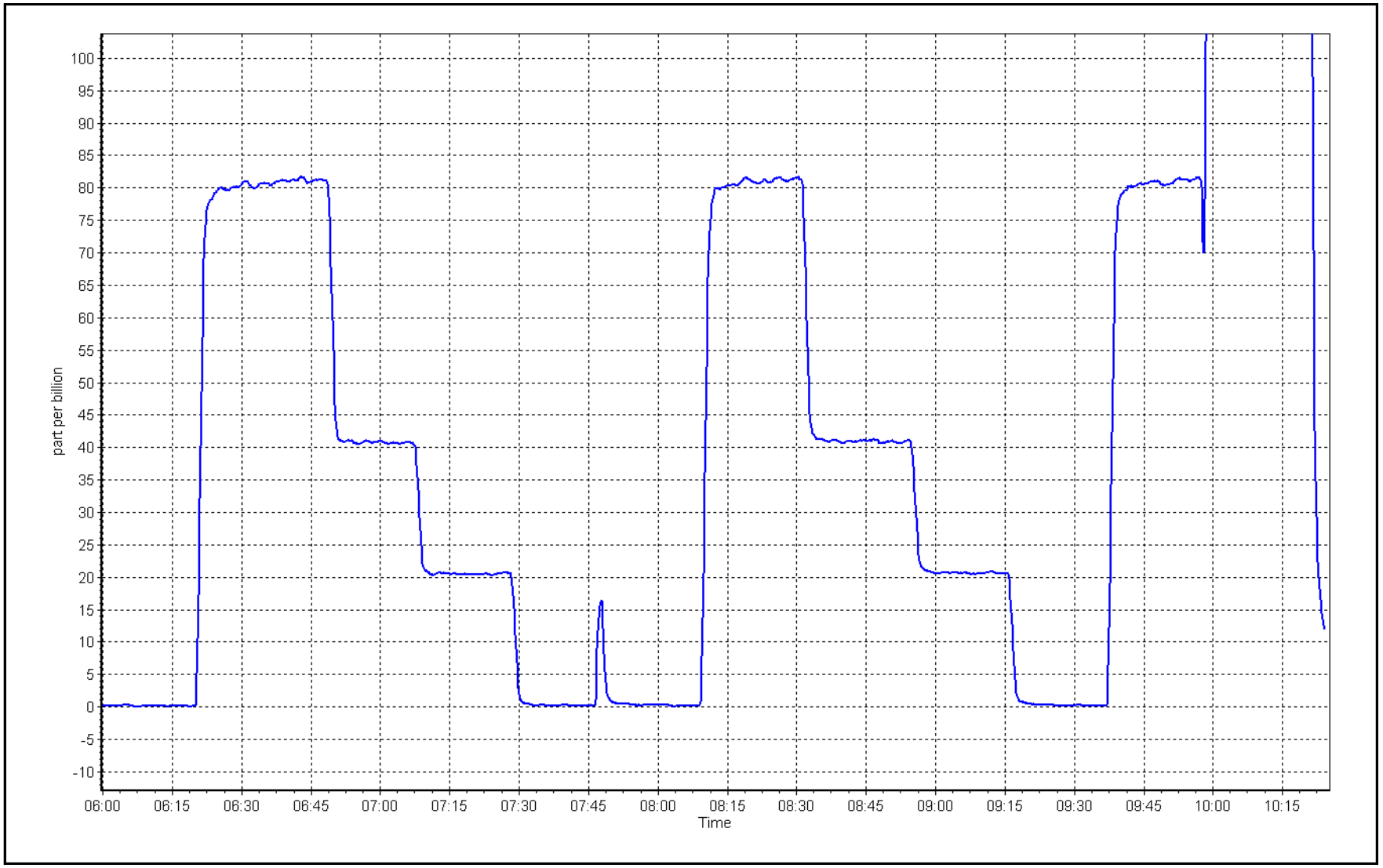
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
79.5	81.4	0.9761
39.7	40.8	0.9737
19.9	20.6	0.9643

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.021518	*0.90 - 1.10*
Intercept	0.240000	*+/-3*



H_2S Calibration Plot Date: May 17, 2023 Location: Waskow ohci Pimatisiwin



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Waskow ohci Pimatisiwin	Station number:	AMS25
Calibration Date:	May 26, 2023	Last Cal Date:	May 17, 2023
Start time (MST):	5:50	End time (MST):	9:52
Reason:	Maintenance	Calibration and SOx scrubber check after Sulphur Study	

Calibration Standards

Cal Gas Concentration:	4.97	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC517099			
Removed Cal Gas Conc:	4.97	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	747
ZAG Make/Model:	API T701		Serial Number:	261

Analyzer Information

Analyzer make:	Thermo 43i-LTE		Analyzer serial #:	1170050146	
Converter make:	Thermo 43C		Converter serial #:	328702539	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.021518	1.005984	Backgd or Offset:	3.4	3.3
Calibration intercept:	0.240000	0.180000	Coeff or Slope:	1.108	1.079

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.2	----
as found span	4920	80.0	79.5	81.6	0.976
as found 2nd point	4960	40.0	39.7	41.0	0.974
as found 3rd point	4980	20.0	19.9	20.6	0.974
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4920	80.0	79.5	80.1	0.992
second point	4960	40.0	39.7	40.2	0.988
third point	4980	20.0	19.9	20.1	0.988
as left zero	5000	0.0	0.0	0.2	----
as left span	4912	88.3	800.0	808.9	0.989
SO2 Scrubber Check	4924	76.3	800.0	0.0	----
Date of last scrubber change:		19-Jul-10		Ave Corr Factor	0.989
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.4	Prev response:	81.41	*% change:	0.0%
Baseline Corr 2nd AF pt:	40.8	AF Slope:	1.024394	AF Intercept:	0.240000
Baseline Corr 3rd AF pt:	20.4	AF Correlation:	0.999998		

* = > +/-5% change initiates investigation

Notes: Calibration and SOx scrubber check after the Sulphur Study test. Sox scrubber checked after the calibrator zero. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

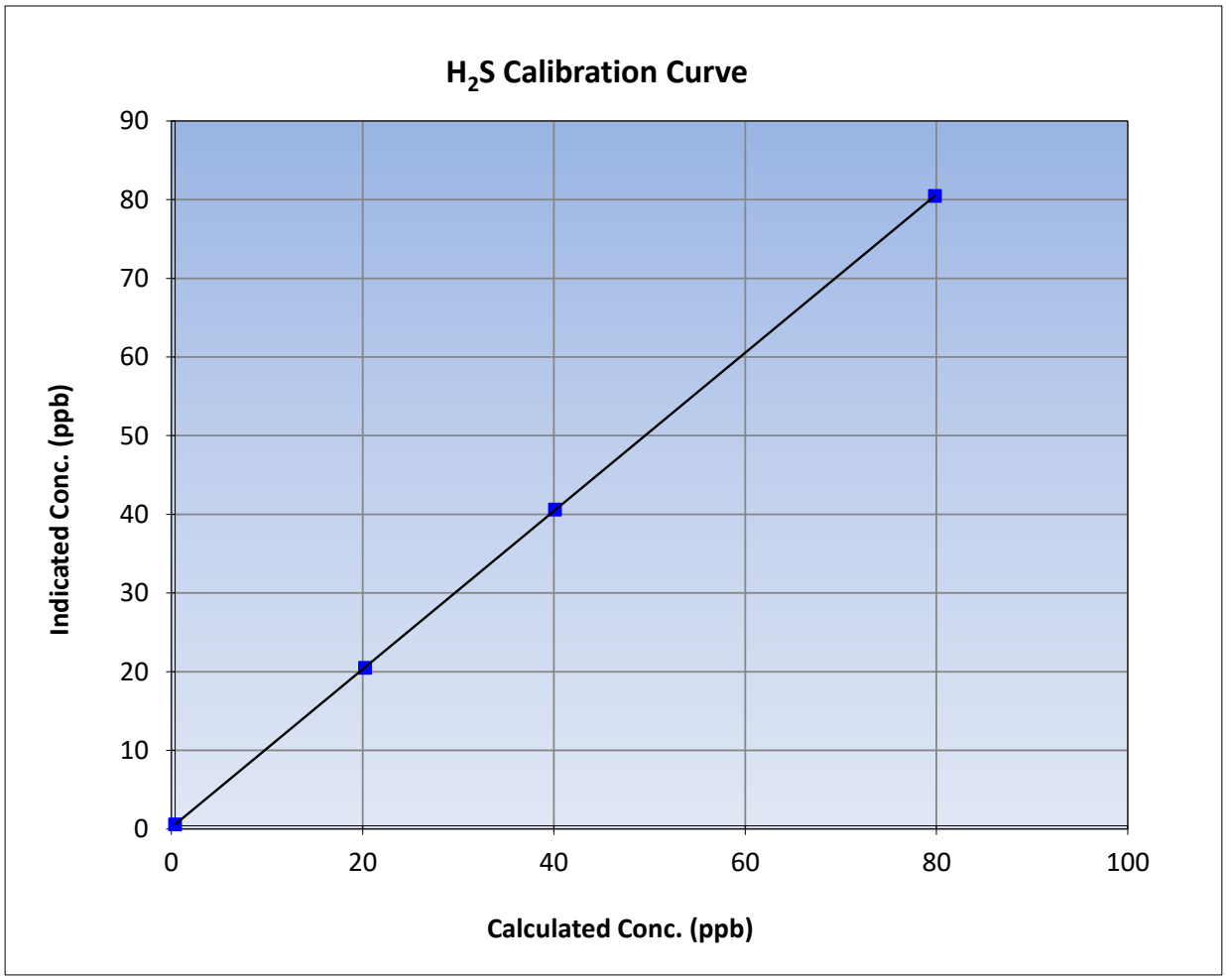
Station Information

Calibration Date:	May 26, 2023	Previous Calibration:	May 17, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	5:50	End Time (MST):	9:52
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1170050146

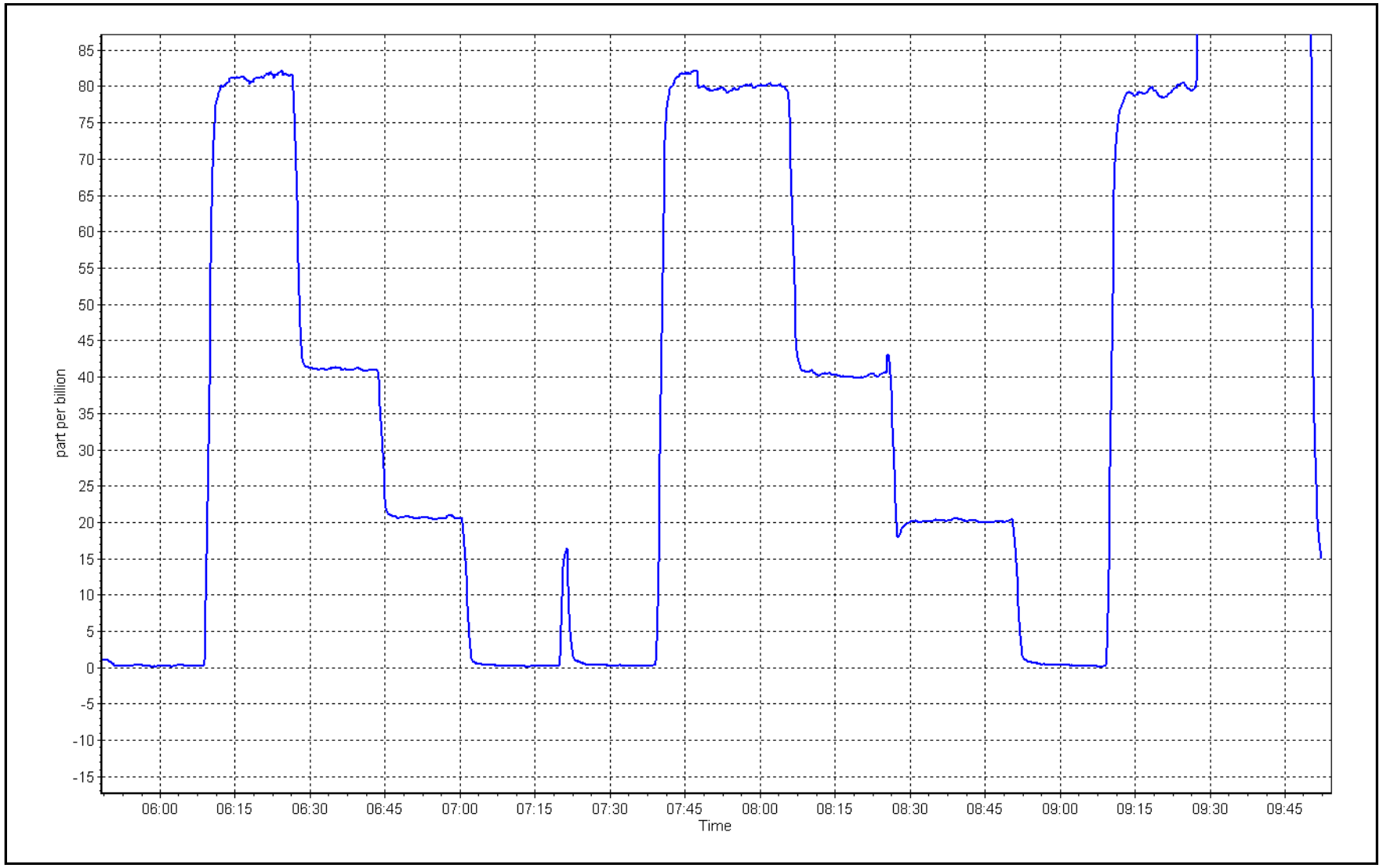
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
79.5	80.1	0.9920
39.7	40.2	0.9883
19.9	20.1	0.9883

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.005984	*0.90 - 1.10*
Intercept	0.180000	*+/-3*



H_2S Calibration Plot Date: May 26, 2023 Location: Waskow ohci Pimatisiwin



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS26
CHRISTINA LAKE
MAY 2023

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

June 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Christina Lake	Station number:	AMS 26
Calibration Date:	May 9, 2023	Last Cal Date:	April 27, 2023
Start time (MST):	10:11	End time (MST):	12:54
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:	1.010951	1.017133	Backgd or Offset:	16.5	16.6
Calibration intercept:	-2.757950	-1.819322	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	0.2	----
as found span	4919	80.6	799.0	810.7	0.986
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	811.6	0.984
second point	4960	40.3	399.4	404.2	0.988
third point	4980	20.2	200.2	199.3	1.005
as left zero	5000	0.0	0.0	0.3	----
as left span	4919	80.6	799.0	807.7	0.989
				Average Correction Factor	0.992

Baseline Corr As found:	810.50	Previous response	804.96	*% 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. No adjustments made.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

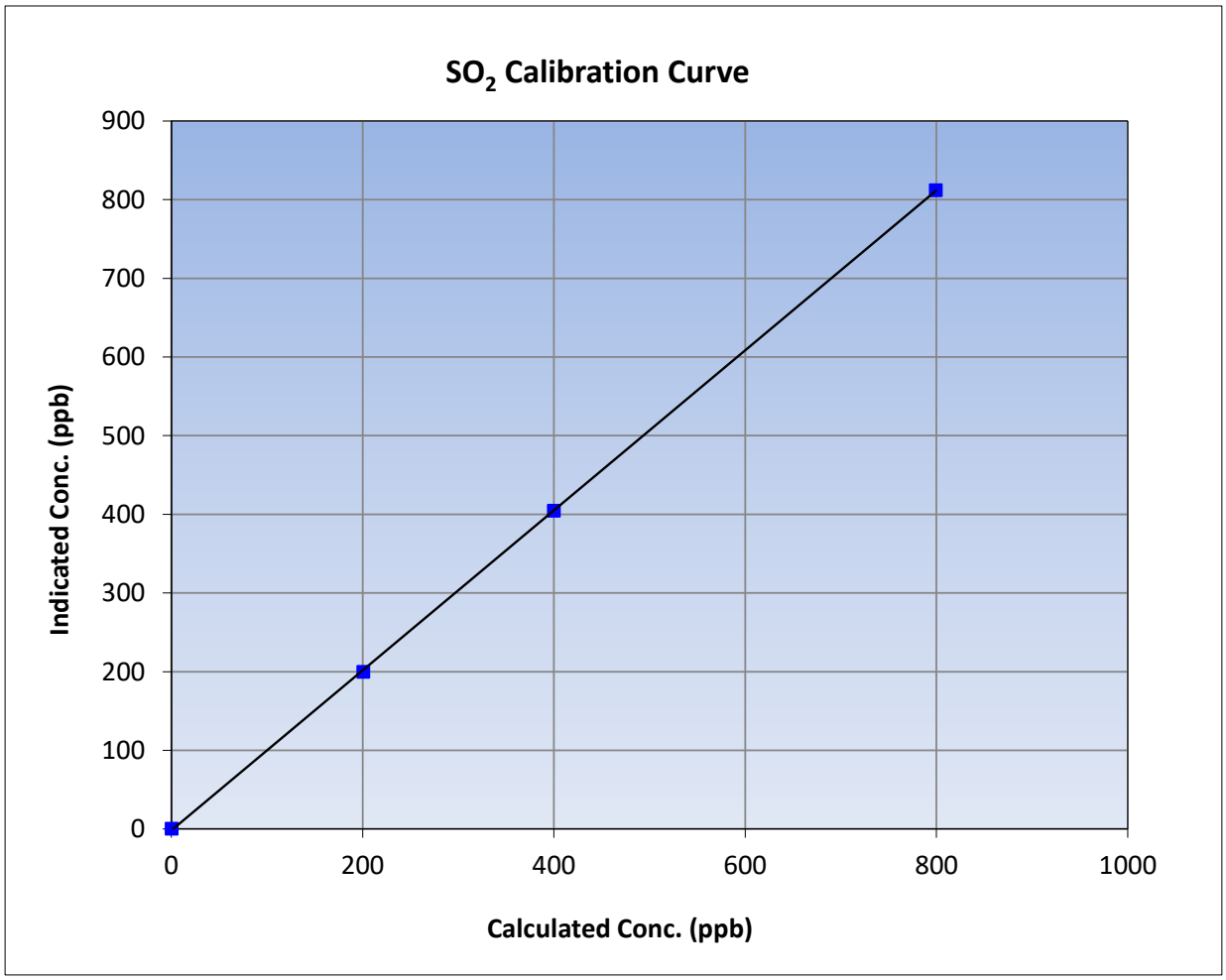
Station Information

Calibration Date:	May 9, 2023	Previous Calibration:	April 27, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	10:11	End Time (MST):	12:54
Analyzer make:	Thermo 43i	Analyzer serial #:	1173410001

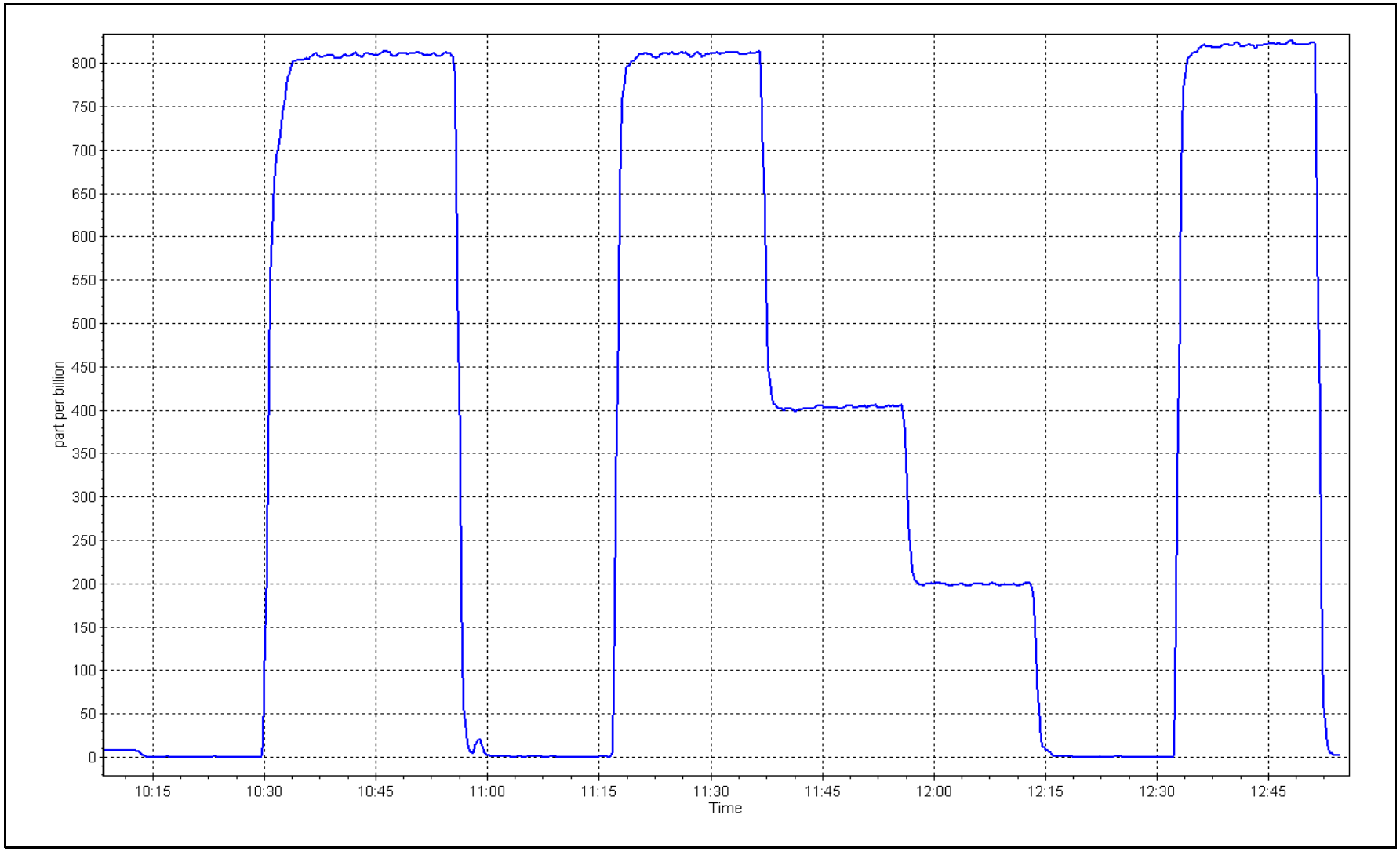
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
799.0	811.6	0.9844
399.4	404.2	0.9882
200.2	199.3	1.0046

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999969	*≥0.995*
Slope	1.017133	*0.90 - 1.10*
Intercept	-1.819322	*+/-30*



SO2 Calibration Plot Date: May 9, 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:	May 30, 2023	Last Cal Date:	April 25, 2023
Start time (MST):	16:15	End time (MST):	20:04
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	4.89	ppm	Cal Gas Exp Date:	February 9, 2024
Cal Gas Cylinder #:	EY0002466			
Removed Cal Gas Conc:	4.89	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	2447
ZAG Make/Model:	API T701H		Serial Number:	832

Analyzer Information

Analyzer make:	Thermo 450i		Analyzer serial #:	1180030032
Converter make:	NA		Converter serial #:	NA
Analyzer Range	0 - 100 ppb			

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005611	1.035031	Backgd or Offset:	35.4	35.4
Calibration intercept:	-0.360862	-0.240256	Coeff or Slope:	1.125	1.125

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.3	----
as found span	4918	81.8	80.0	82.7	0.964
as found 2nd point	4959	40.9	40.0	41.0	0.969
as found 3rd point	4979	20.4	20.0	20.1	0.978
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4918	81.8	80.0	82.6	0.969
second point	4959	40.9	40.0	41.1	0.973
third point	4979	20.4	20.0	20.4	0.978
as left zero	5000	0.0	0.0	-0.1	----
as left span	4918	81.8	80.0	82.5	0.970
SO2 Scrubber Check	4919	80.6	806.1	-0.1	----
Date of last scrubber change:		27-Feb-19		Ave Corr Factor	0.973
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	83.0	Prev response:	80.09	*% change:	3.5%
Baseline Corr 2nd AF pt:	41.3	AF Slope:	1.038460	AF Intercept:	-0.460261
Baseline Corr 3rd AF pt:	20.4	AF Correlation:	0.999983		

* = > +/-5% change initiates investigation

Notes: Installed new zero air generator. Changed sample inlet filter after MAF's. Ran scrubber check after calibrator zero. No adjustments made.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

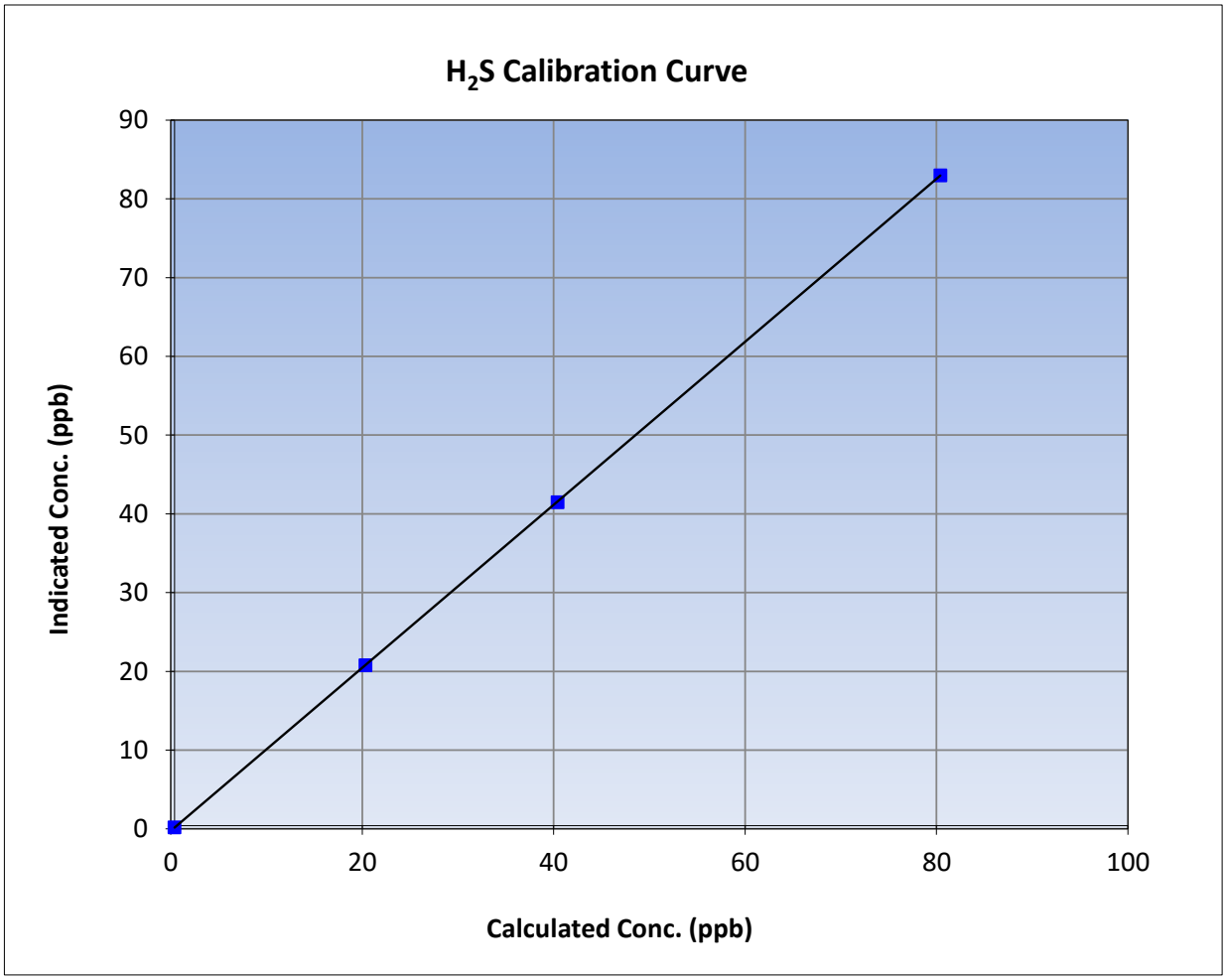
Station Information

Calibration Date:	May 30, 2023	Previous Calibration:	April 25, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	16:15	End Time (MST):	20:04
Analyzer make:	Thermo 450i	Analyzer serial #:	1180030032

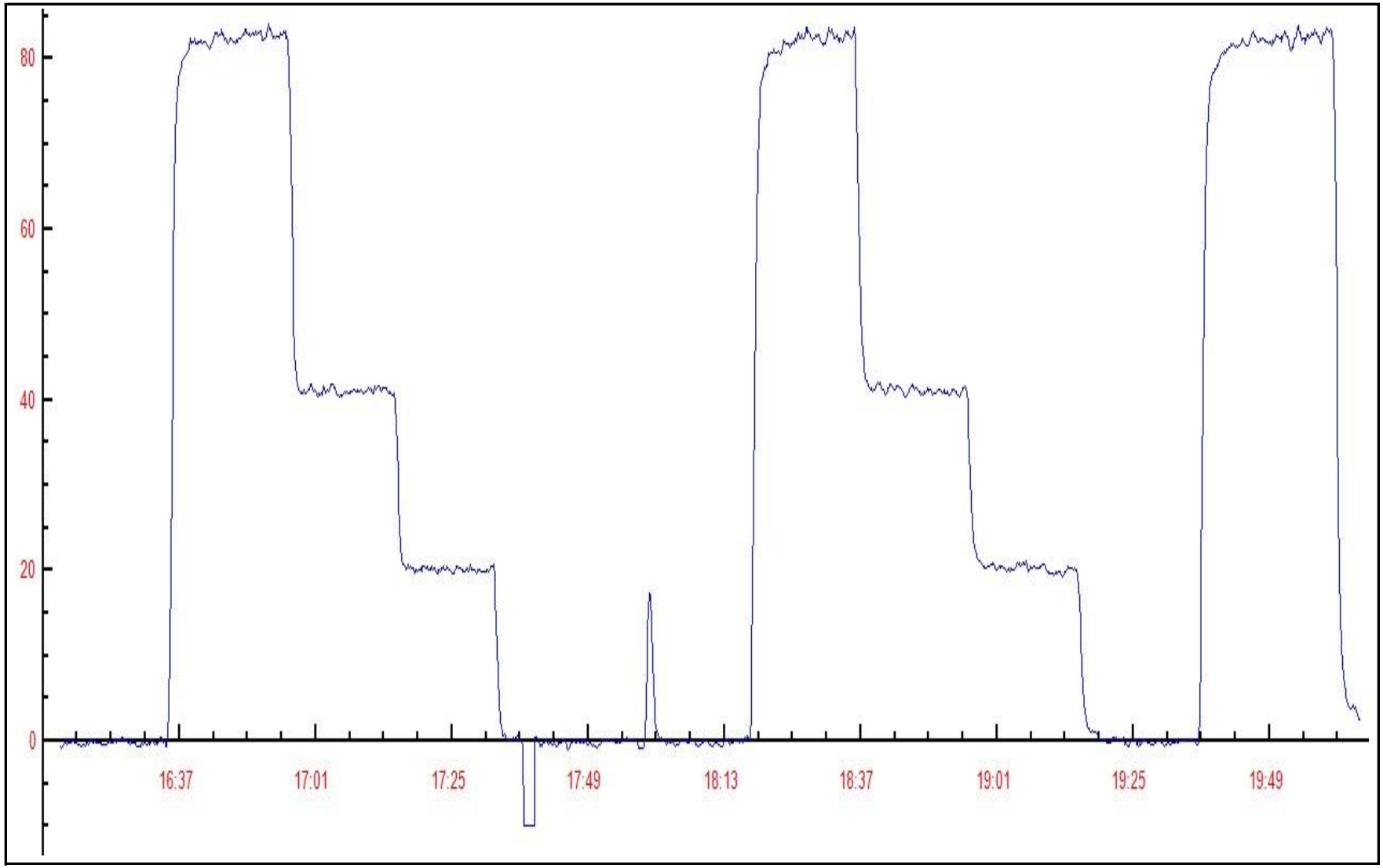
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
80.0	82.6	0.9686
40.0	41.1	0.9733
20.0	20.4	0.9781

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.035031	*0.90 - 1.10*
Intercept	-0.240256	*+/-3*



H_2S Calibration Plot Date: May 30, 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:	May 31, 2023	Last Cal Date:	April 26, 2023
Start time (MST):	8:11	End time (MST):	13:18
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 T701H		Serial Number:	832	

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.762	1.795	NO bkgnd or offset:	2.9	3.4
NOX coeff or slope:	0.997	0.997	NOX bkgnd or offset:	3.0	4.0
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	198.6	202.8

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999958	1.003078
NO_X Cal Offset:	-1.700000	-1.760000
NO Cal Slope:	0.999786	1.002199
NO Cal Offset:	-2.340000	-2.660000
NO_2 Cal Slope:	1.003094	1.007991
NO_2 Cal Offset:	0.778854	0.778153

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.8	0.3	0.5	----	----
as found span	4920	80.0	813.1	800.3	12.8	801.4	784.6	16.9	1.0146	1.0200
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	4920	80.0	813.1	800.3	12.8	814.7	800.8	13.9	0.9981	0.9994
second point	4960	40.0	406.6	400.2	6.4	405.3	396.9	8.4	1.0031	1.0082
third point	4980	20.0	203.3	200.1	3.2	200.3	195.3	5.1	1.0149	1.0245
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	0.1	-0.2	----	----
as left span	4920	80.0	813.1	395.5	417.6	817.9	399.3	418.7	0.9942	0.9905
								Average Correction Factor	1.0053	1.0107

Corrected As found	NO_X = 800.6 ppb	NO = 784.3 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -1.3%		
Previous Response	NO_X = 811.4 ppb	NO = 797.8 ppb		*Percent Change	NO = -1.7%		
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	799.6	394.8	417.6	421.4	0.9910	100.9%
2nd GPT point (200 ppb O3)	799.6	593.8	218.6	221.2	0.9882	101.2%
3rd GPT point (100 ppb O3)	799.6	699.3	113.1	115.8	0.9767	102.4%
				Average Correction Factor	0.9853	101.5%

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

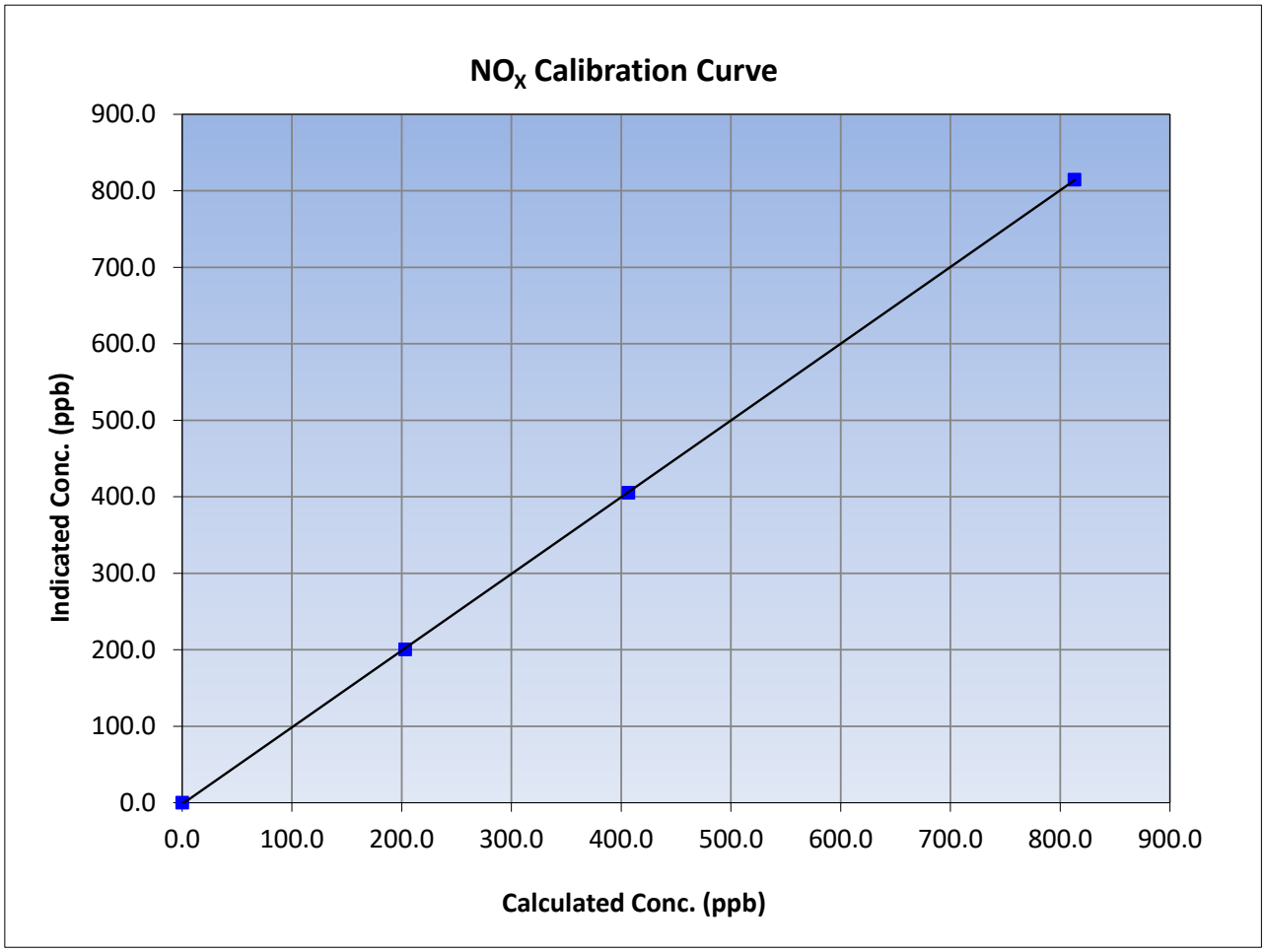
Version-04-2020

Station Information

Calibration Date:	May 31, 2023	Previous Calibration:	April 26, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	8:11	End Time (MST):	13:18
Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999979	*≥0.995*
813.1	814.7	0.9981			
406.6	405.3	1.0031	Slope	1.003078	*0.90 - 1.10*
203.3	200.3	1.0149			
			Intercept	-1.760000	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

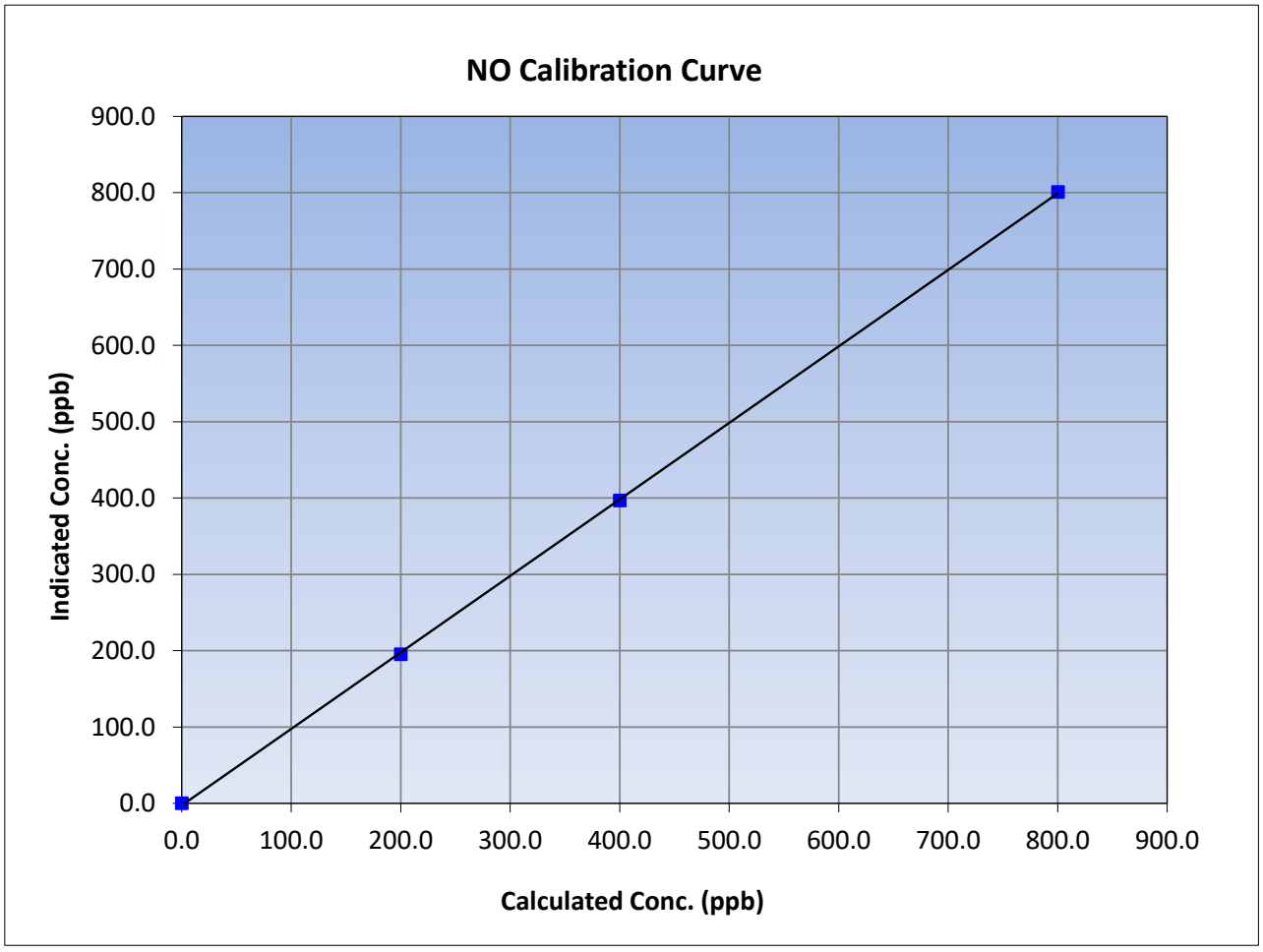
Version-04-2020

Station Information

Calibration Date:	May 31, 2023	Previous Calibration:	April 26, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	8:11	End Time (MST):	13:18
Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999950	*≥0.995*
800.3	800.8	0.9994			
400.2	396.9	1.0082	Slope	1.002199	*0.90 - 1.10*
200.1	195.3	1.0245			
			Intercept	-2.660000	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

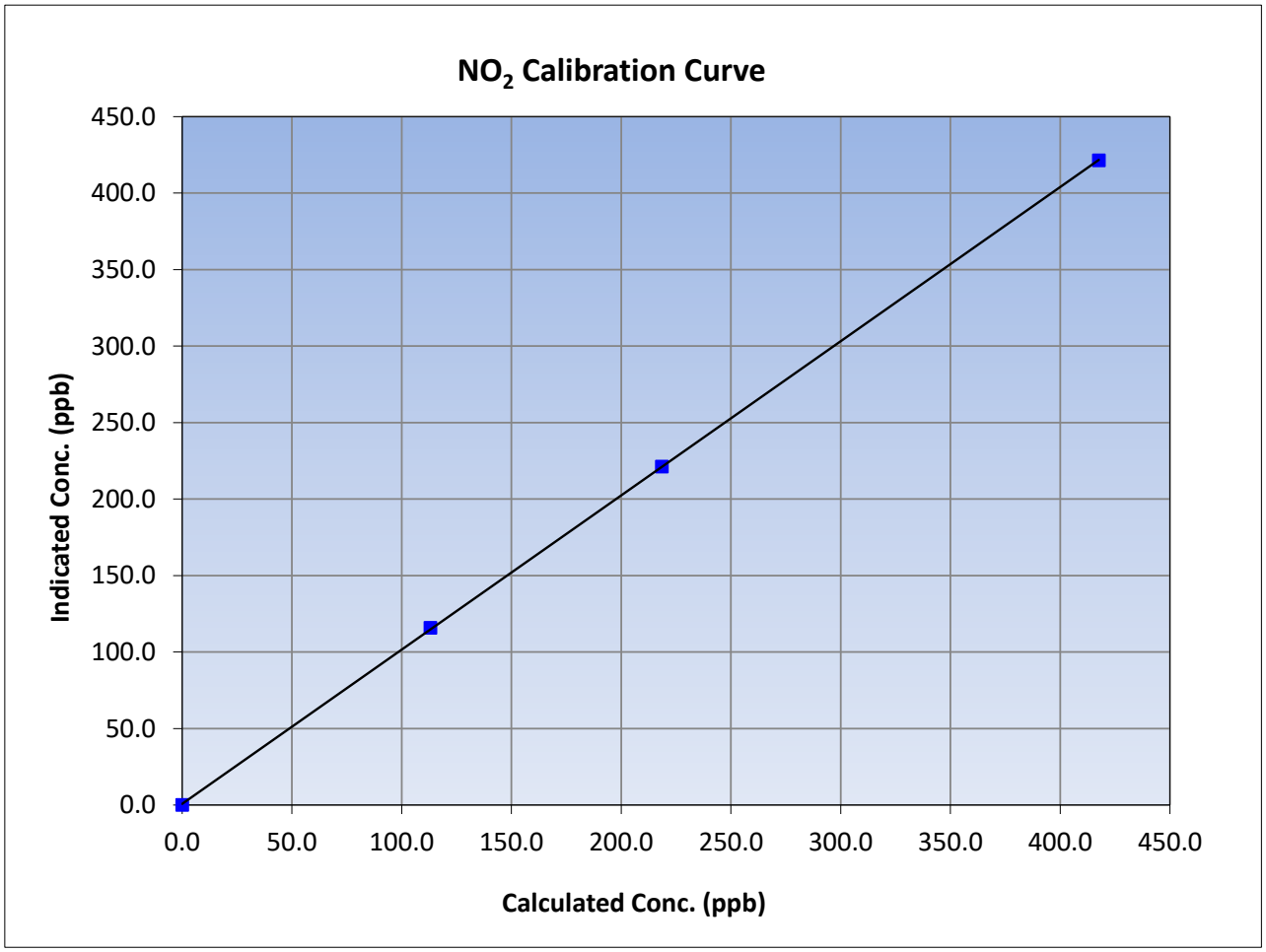
Version-04-2020

Station Information

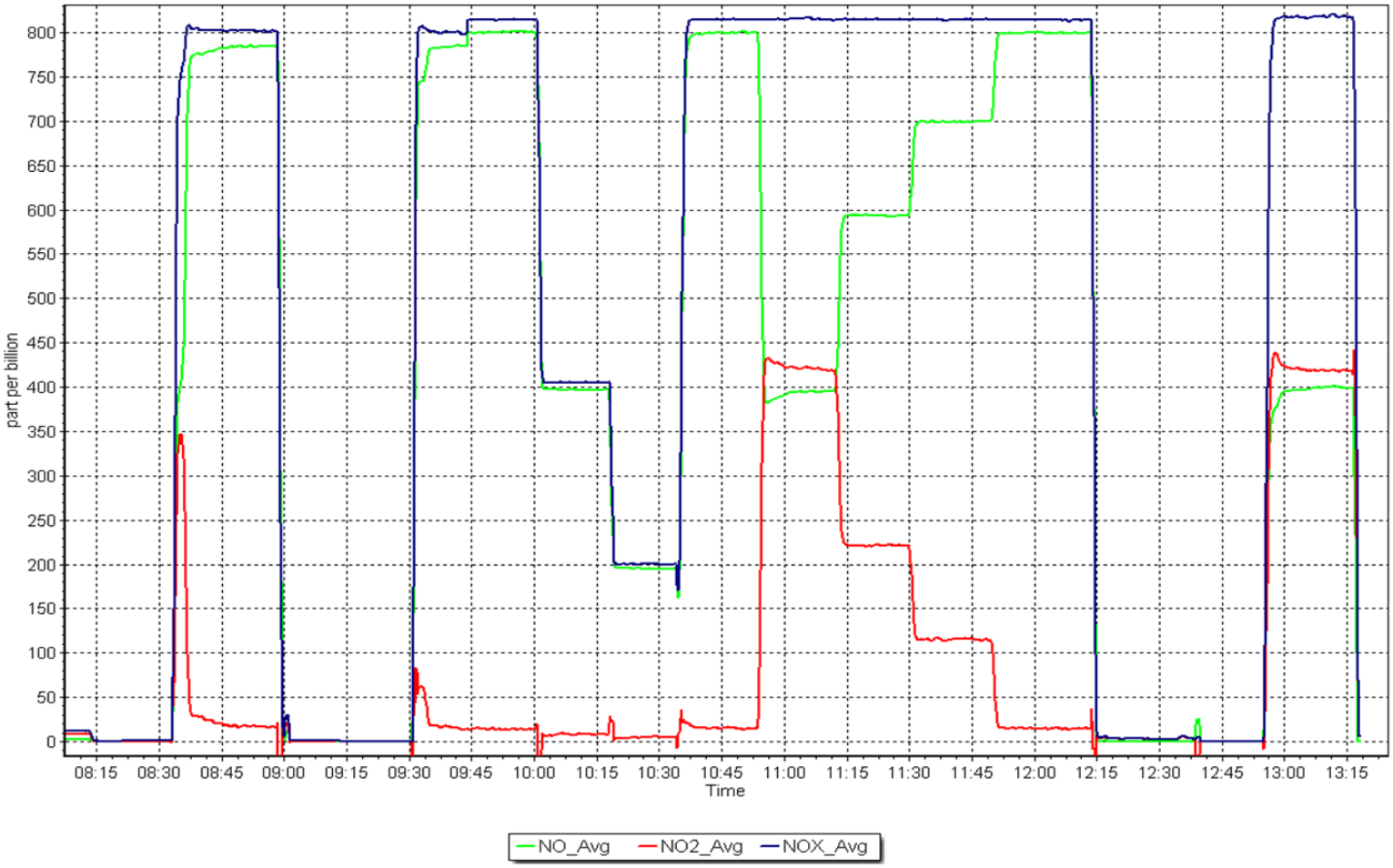
Calibration Date:	May 31, 2023	Previous Calibration:	April 26, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	8:11	End Time (MST):	13:18
Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999982	≥0.995
417.6	421.4	0.9910			
218.6	221.2	0.9882	Slope	1.007991	0.90 - 1.10
113.1	115.8	0.9767			
			Intercept	0.778153	+/-20



NO_X Calibration Plot Date: May 31, 2023 Location: Christina Lake



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS27
JACKFISH 2/3
MAY 2023

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

June 30, 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:	May 1, 2023	Last Cal Date:	April 4, 2023
Start time (MST):	10:41	End time (MST):	13:12
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:	135

Analyzer Information

Analyzer make: Thero 43iQ — Analyzer serial #: 12124313138

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.012431	1.022106	Backgd or Offset:	7.9	7.9
Calibration intercept:	-1.377395	-1.838756	Coeff or Slope:	0.990	0.990

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	----
as found span	4921	79.1	800.2	813.0	0.984
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4921	79.1	800.2	817.1	0.979
second point	4961	39.5	399.5	405.1	0.986
third point	4980	19.8	200.3	201.4	0.995
as left zero	5000	0.0	0.0	0.0	----
as left span	4921	79.1	800.2	817.1	0.979
				Average Correction Factor	0.987

Baseline Corr As found:	813.00	Previous response	808.73	*% change	0.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

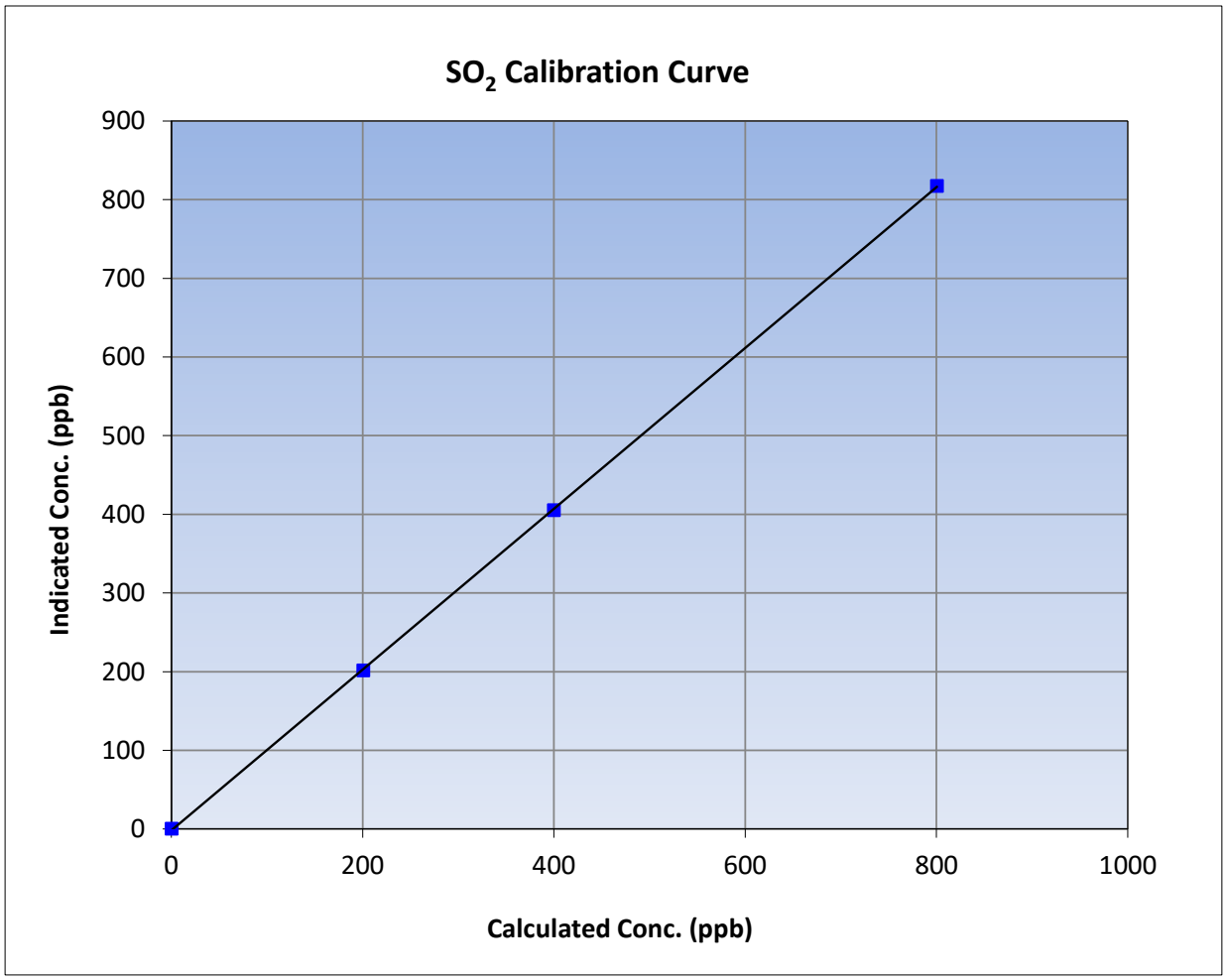
Station Information

Calibration Date:	May 1, 2023	Previous Calibration:	April 4, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS 27
Start Time (MST):	10:41	End Time (MST):	13:12
Analyzer make:	Thero 43iQ	Analyzer serial #:	12124313138

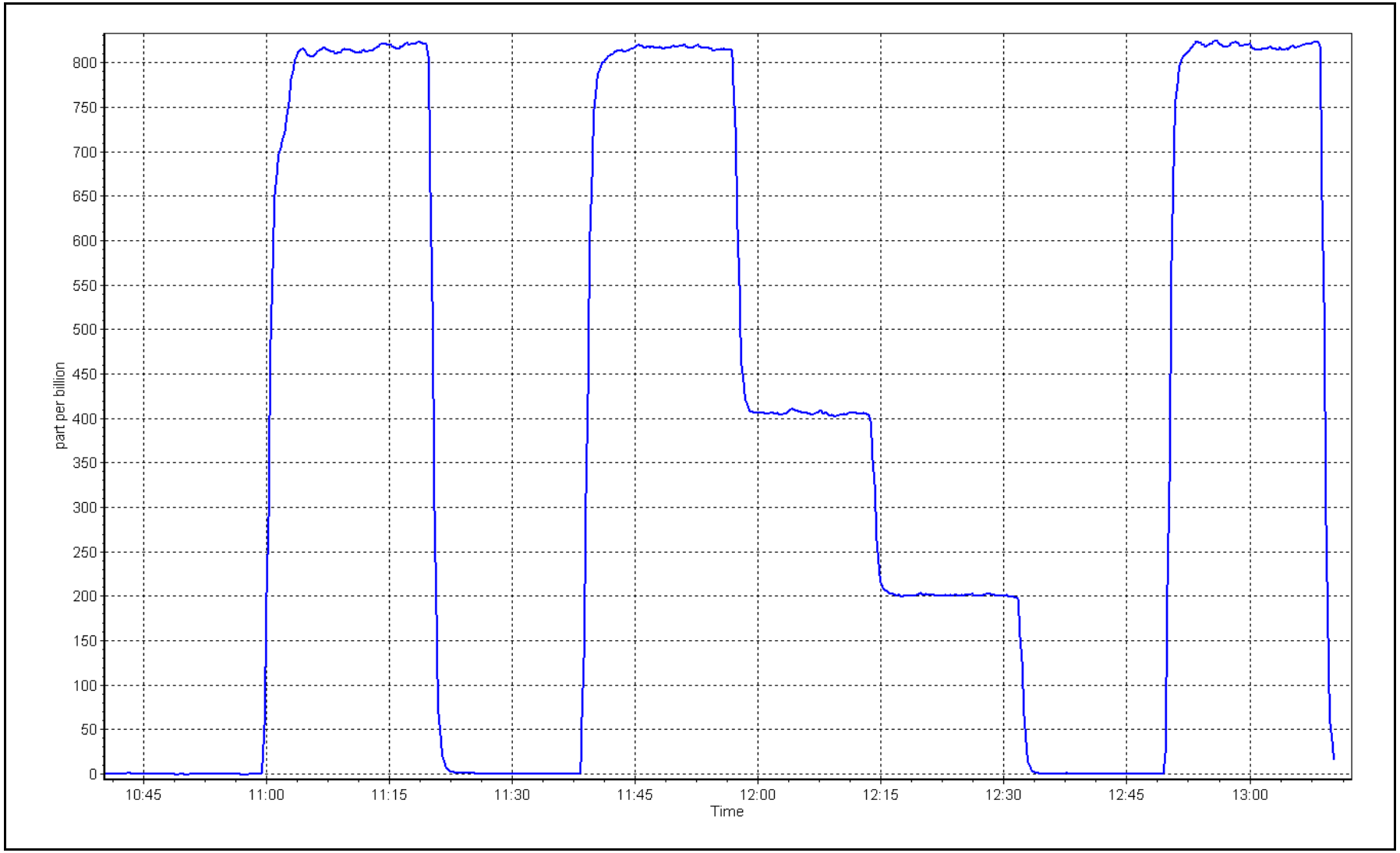
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
800.2	817.1	0.9793
399.5	405.1	0.9863
200.3	201.4	0.9946

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999976	*≥0.995*
Slope	1.022106	*0.90 - 1.10*
Intercept	-1.838756	*+/-30*



SO2 Calibration Plot Date: May 1, 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:	May 18, 2023	Last Cal Date:	April 27, 2023
Start time (MST):	6:53	End time (MST):	10:25
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.41	ppm	Cal Gas Exp Date:	January 4, 2025
Cal Gas Cylinder #:	CC345023			
Removed Cal Gas Conc:	5.41	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3811
ZAG Make/Model:	API 701		Serial Number:	135

Analyzer Information

Analyzer make:	API T101		Analyzer serial #:	621	
Converter make:			Converter serial #:		
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000342	1.000198	Backgd or Offset:	25.7	25.7
Calibration intercept:	-0.217897	-0.137827	Coeff or Slope:	0.970	0.970

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4926	74.1	80.2	81.0	0.990
as found 2nd point	4963	37.0	40.0	40.3	0.993
as found 3rd point	4982	18.5	20.0	19.6	1.021
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	80.0	1.002
second point	4963	37.0	40.0	40.2	0.996
third point	4982	18.5	20.0	19.5	1.026
as left zero	5000	0.0	0.0	0.1	----
as left span	4926	74.1	80.2	79.7	1.006
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:	81.0	Prev response:	79.98	*% change:	1.3%
Baseline Corr 2nd AF pt:	40.3	AF Slope:	1.012745	AF Intercept:	-0.277693
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999934		

* = > +/-5% change initiates investigation

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

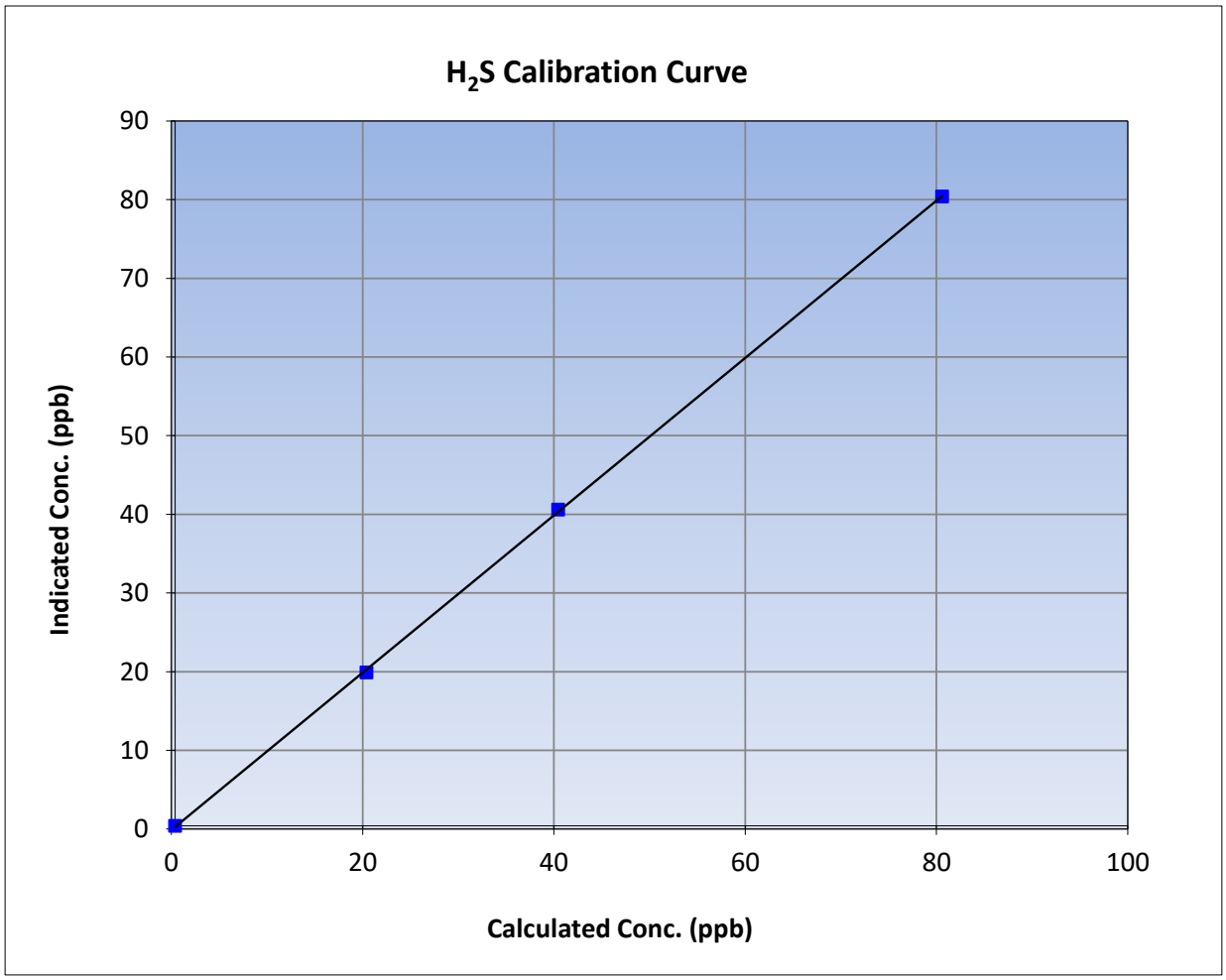
Station Information

Calibration Date:	May 18, 2023	Previous Calibration:	April 27, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	6:53	End Time (MST):	10:25
Analyzer make:	API T101	Analyzer serial #:	621

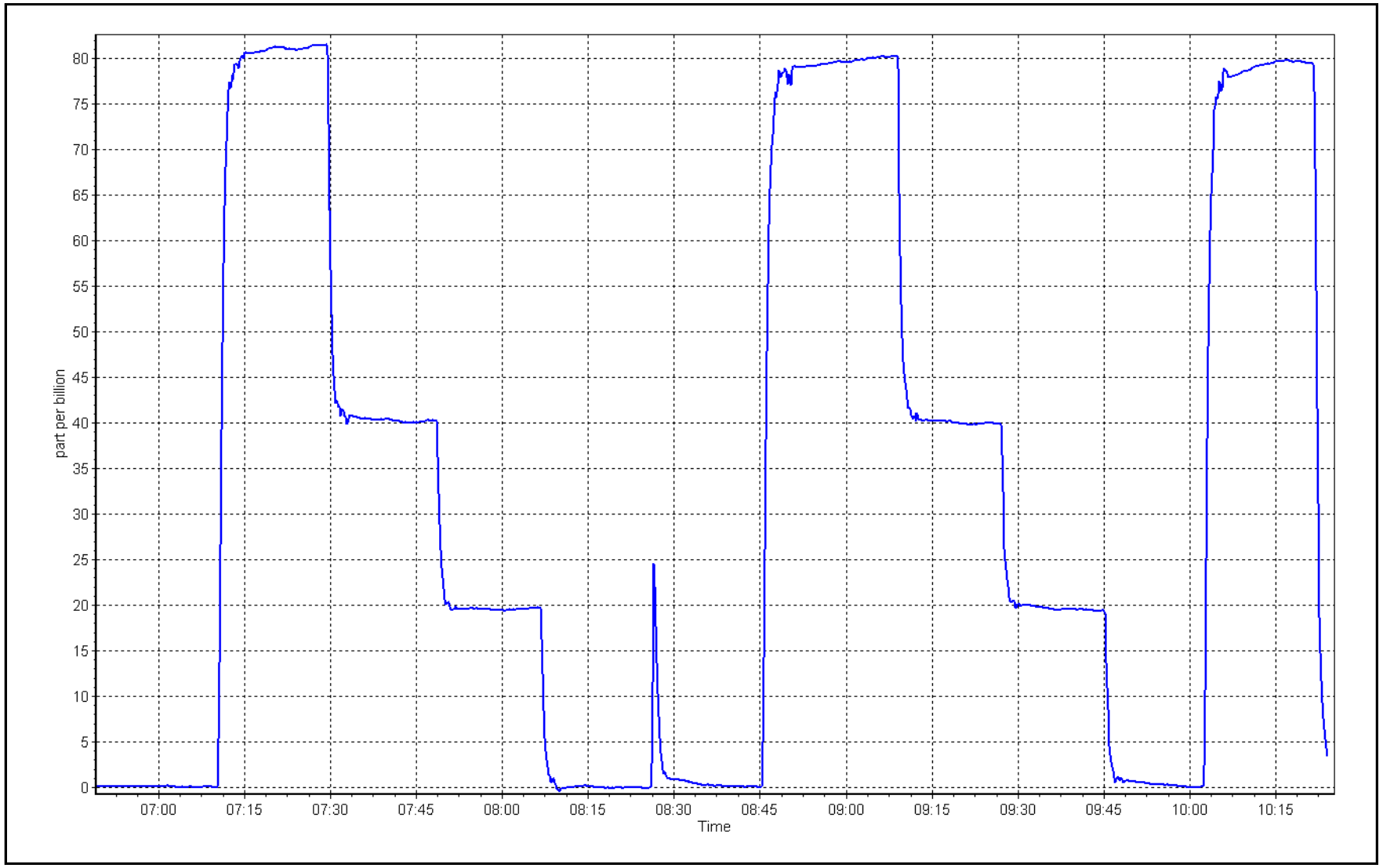
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.2	80.0	1.0022
40.0	40.2	0.9959
20.0	19.5	1.0264

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999928	*≥0.995*
Slope	1.000198	*0.90 - 1.10*
Intercept	-0.137827	*+/-3*



H_2S Calibration Plot Date: May 18, 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:	May 25, 2023	Last Cal Date:	April 20, 2023
Start time (MST):	9:40	End time (MST):	14:18
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2Y1P35		Cal Gas Expiry Date:	December 11, 2023	
NOX Cal Gas Conc:	51.44	ppm	NO Cal Gas Conc:	50.40	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	51.44	ppm	Removed Gas NO Conc:	50.40	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3811	
ZAG make/model:	API T701		Serial Number:	135	

Analyzer Information

Analyzer make:	API T200	Analyzer serial #:	722
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.003	1.080	NO bkgnd or offset:	-3.0	0.7
NOX coeff or slope:	1.005	1.072	NOX bkgnd or offset:	-2.6	0.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	4.4	4.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.005888	1.004933
NO_X Cal Offset:	-2.995962	-2.155062
NO Cal Slope:	1.002272	1.007298
NO Cal Offset:	-2.840268	-2.599343
NO_2 Cal Slope:	0.996178	0.999563
NO_2 Cal Offset:	1.252891	0.617993

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	1.0	0.7	0.3	----	----
as found span	4921	79.4	816.8	800.3	16.5	767.2	744.3	22.9	1.0647	1.0752
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	4921	79.4	816.8	800.3	16.5	819.9	804.3	15.5	0.9962	0.9950
second point	4960	39.7	408.5	400.2	8.3	406.5	400.5	6.0	1.0048	0.9993
third point	4980	19.8	203.7	199.6	4.1	201.3	195.4	5.9	1.0120	1.0215
as left zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
as left span	4921	79.4	816.8	415.1	413.0	819.0	417.2	401.7	0.9973	0.9950
								Average Correction Factor	1.0043	1.0052

Corrected As found	NO_X = 766.2 ppb	NO = 743.6 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-6.8%
Previous Response	NO_X = 818.6 ppb	NO = 799.3 ppb			*Percent Change	NO =	-7.5%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	803.2	406.7	413.0	413.1	0.9998	100.0%
2nd GPT point (200 ppb O3)	803.2	619.9	199.8	200.8	0.9951	100.5%
3rd GPT point (100 ppb O3)	803.2	714.3	105.4	106.5	0.9898	101.0%
				Average Correction Factor	0.9949	100.5%

Notes: Adjusted both zero and span. As founds are 7% low; due to low pump issue.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

NO_X Calibration Summary

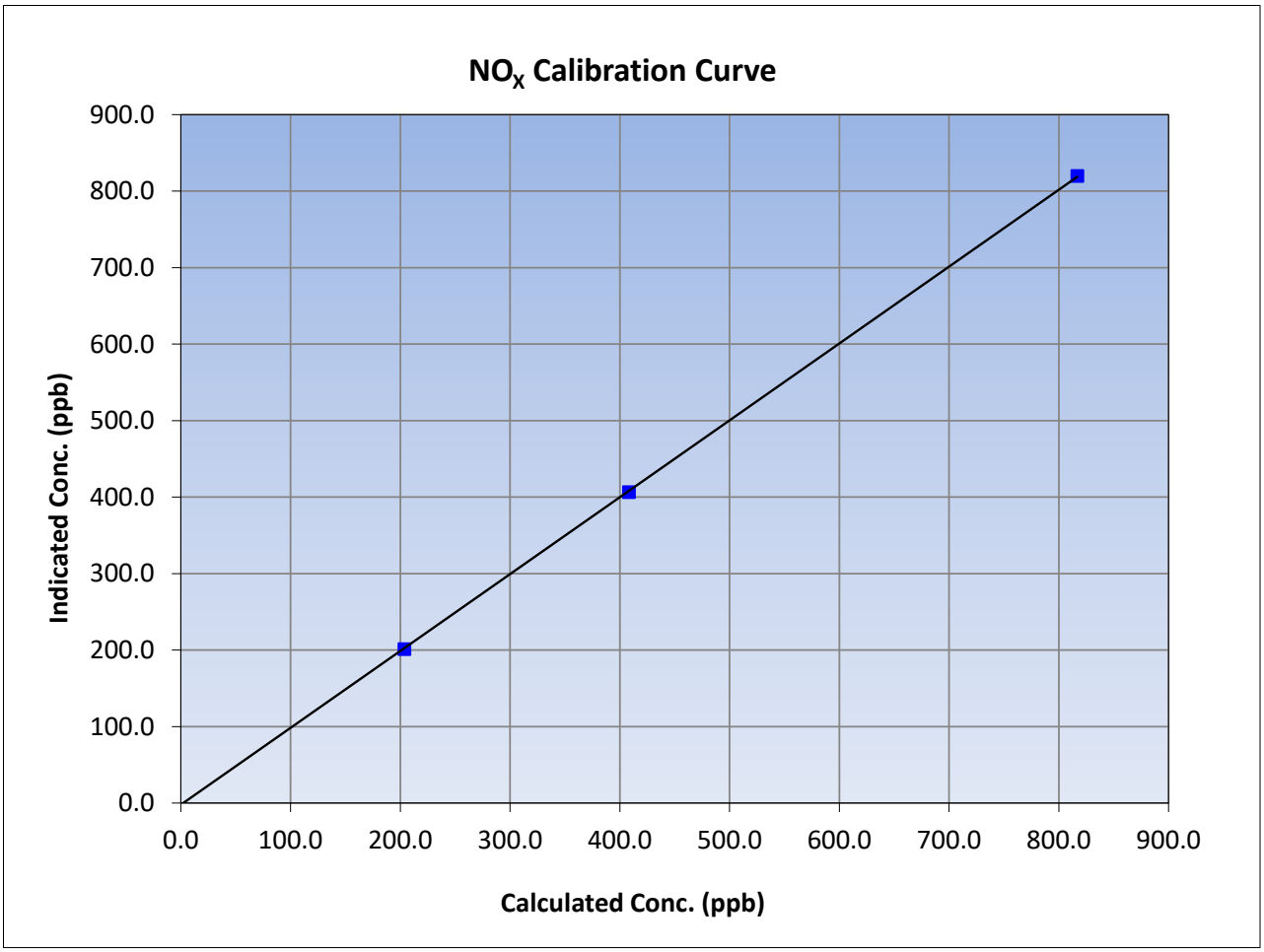
Version-04-2020

Station Information

Calibration Date:	May 25, 2023	Previous Calibration:	April 20, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:40	End Time (MST):	14:18
Analyzer make:	API T200	Analyzer serial #:	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.3	----	Correlation Coefficient	0.999973	≥0.995
816.8	819.9	0.9962			
408.5	406.5	1.0048	Slope	1.004933	0.90 - 1.10
203.7	201.3	1.0120			
			Intercept	-2.155062	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

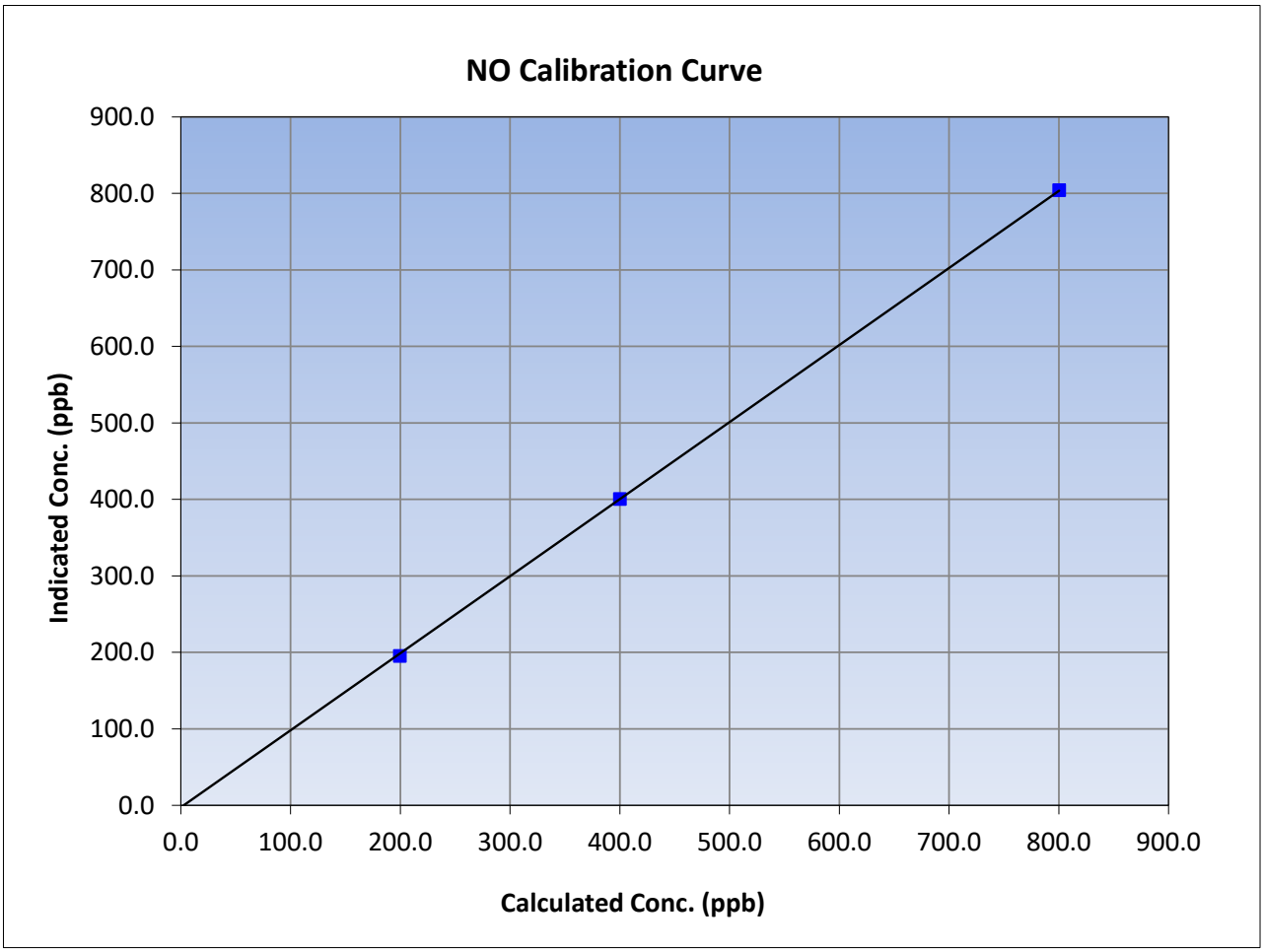
Version-04-2020

Station Information

Calibration Date:	May 25, 2023	Previous Calibration:	April 20, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:40	End Time (MST):	14:18
Analyzer make:	API T200	Analyzer serial #:	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.3	----	Correlation Coefficient	0.999957	*≥0.995*
800.3	804.3	0.9950			
400.2	400.5	0.9993	Slope	1.007298	*0.90 - 1.10*
199.6	195.4	1.0215			
			Intercept	-2.599343	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

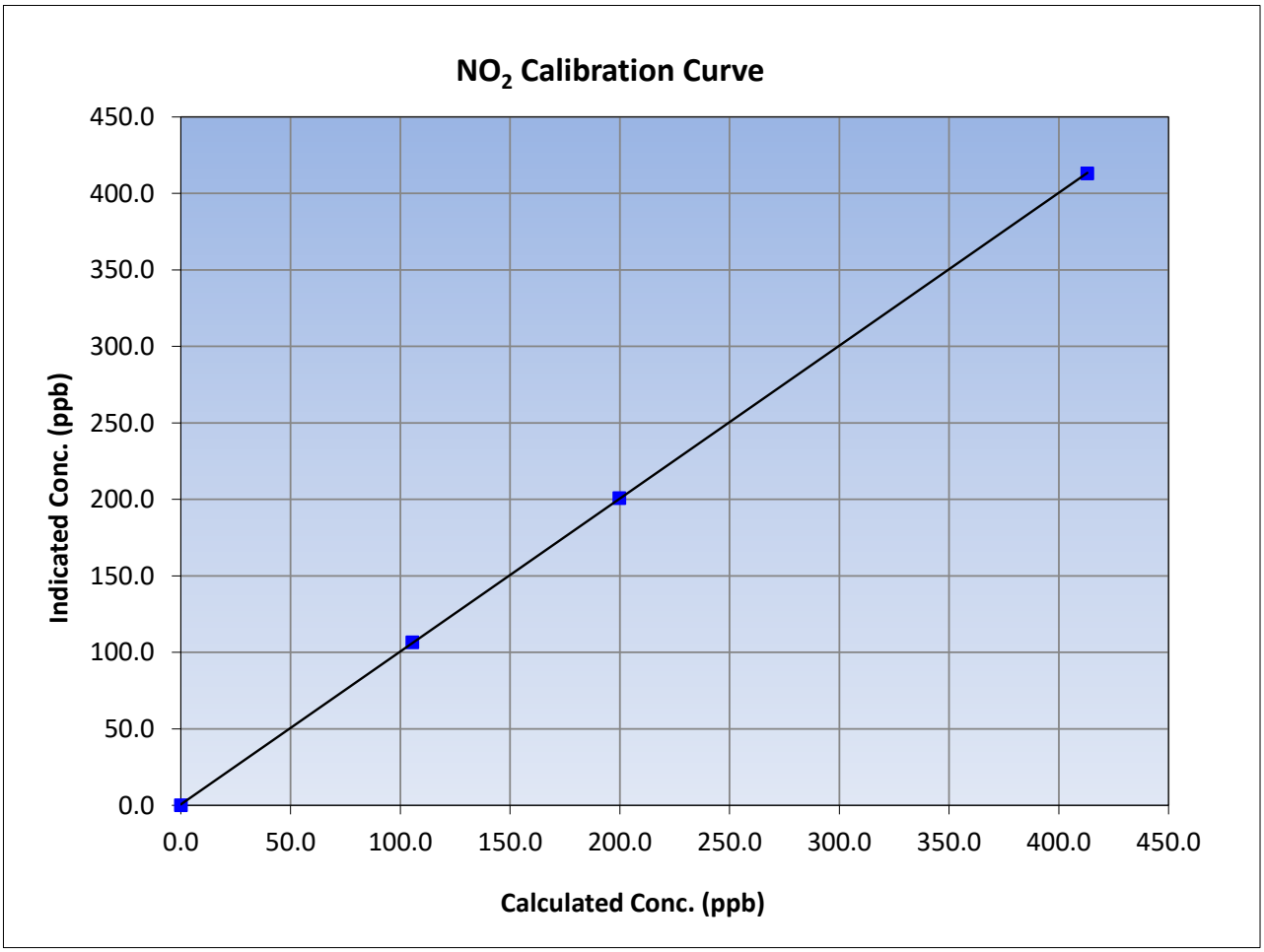
Version-04-2020

Station Information

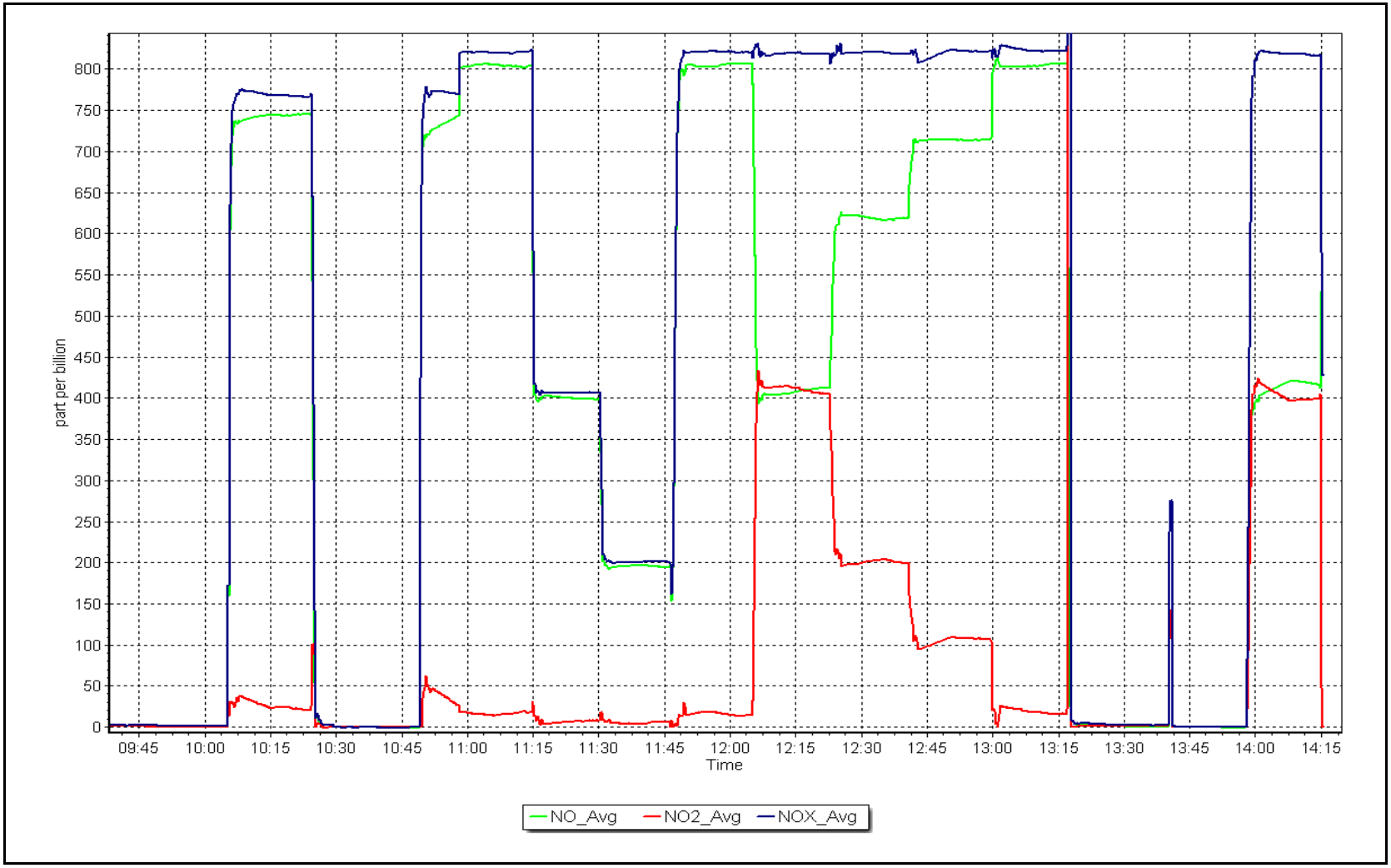
Calibration Date:	May 25, 2023	Previous Calibration:	April 20, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:40	End Time (MST):	14:18
Analyzer make:	API T200	Analyzer serial #:	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999989	≥0.995
413.0	413.1	0.9998			
199.8	200.8	0.9951	Slope	0.999563	0.90 - 1.10
105.4	106.5	0.9898			
			Intercept	0.617993	+/-20



NO_X Calibration Plot Date: May 25, 2023 Location: Jackfish 2/3



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS29
SURMONT 2
MAY 2023

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

June 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	May 9, 2023	Last Cal Date:	April 13, 2023
Start time (MST):	9:51	End time (MST):	11:31
Reason:	As Found		

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:	0.998958		Backgd or Offset:	12.3	12.2
Calibration intercept:	-0.765478		Coeff or Slope:	0.922	0.922

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.3	----
as found span	4919	81.3	800.1	799.0	1.001
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	-0.1	----
as left span	4919	81.3	800.1	801.0	0.999
				Average Correction Factor	

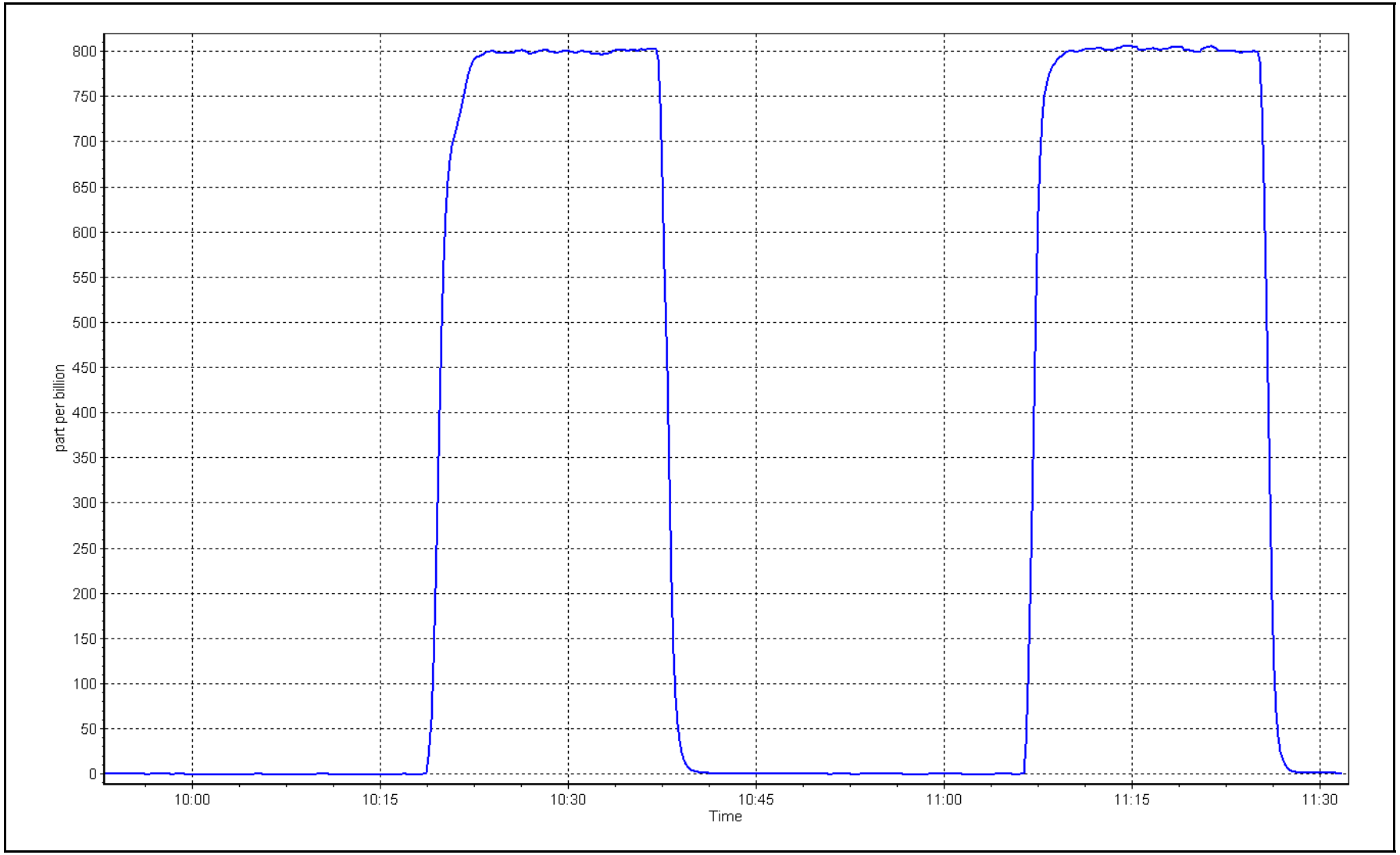
Baseline Corr As found:	799.30	Previous response	798.51	*% change	0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: As founds completed. THC maintenance required and will be done May 10.

Calibration Performed By: Braiden Boutilier

SO2 Calibration Plot Date: May 9, 2023 Location: Surmont 2



Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	May 10, 2023	Last Cal Date:	May 9, 2023
Start time (MST):	10:15	End time (MST):	15:20
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:	0.998958	1.002228	Backgd or Offset:	12.2	12.1
Calibration intercept:	-0.765478	-1.885142	Coeff or Slope:	0.922	0.916

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	800.1	803.0	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.3	----
high point	4919	81.3	800.1	801.0	0.999
second point	4959	40.7	400.6	398.2	1.006
third point	4979	20.3	199.8	197.2	1.013
as left zero	5000	0.0	0.0	0.0	----
as left span	4919	81.3	800.1	801.0	0.999
				Average Correction Factor	1.006

Baseline Corr As found:	803.30	Previous response	798.51	*% change	0.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

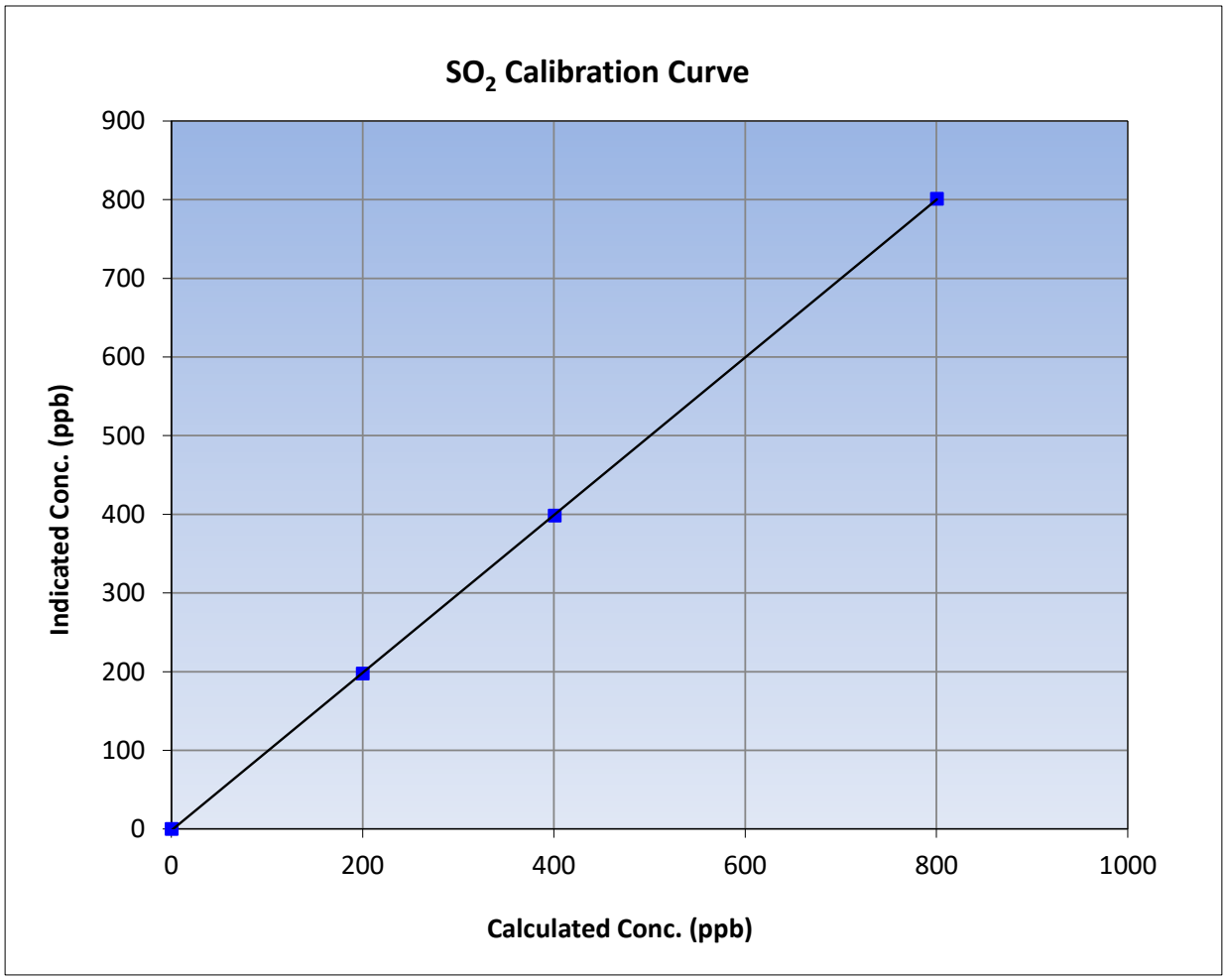
Station Information

Calibration Date:	May 10, 2023	Previous Calibration:	May 9, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:15	End Time (MST):	15:20
Analyzer make:	Thermo 43i	Analyzer serial #:	1170050150

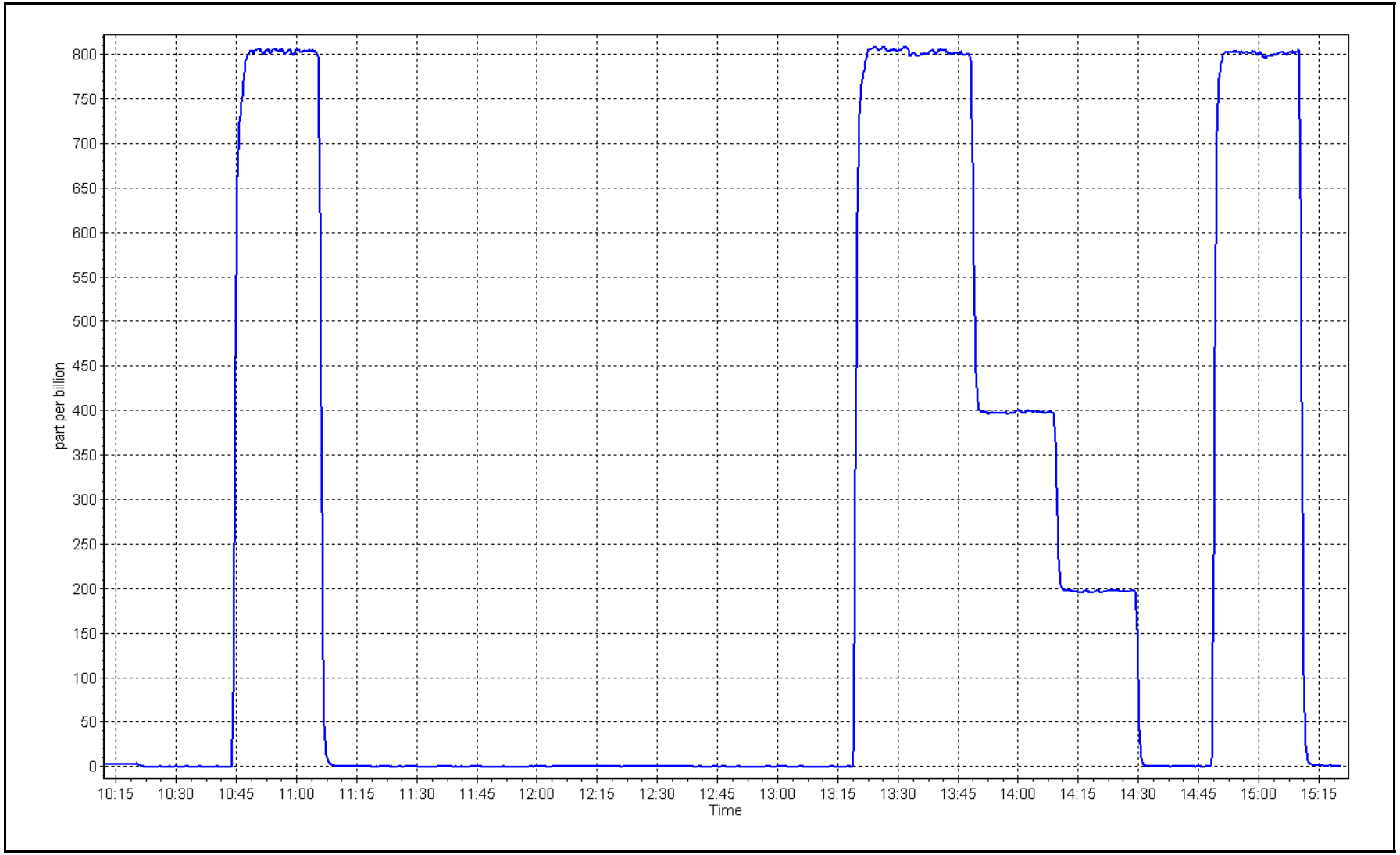
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
800.1	801.0	0.9989
400.6	398.2	1.0060
199.8	197.2	1.0133

Statistical Evaluation		Limits
Correlation Coefficient	0.999980	≥0.995
Slope	1.002228	0.90 - 1.10
Intercept	-1.885142	+/-30



SO2 Calibration Plot Date: May 10, 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:	May 9, 2023	Last Cal Date:	April 12, 2023
Start time (MST):	11:15	End time (MST):	15:52
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.391	ppm	Cal Gas Exp Date:	January 4, 2025
Cal Gas Cylinder #:	CC508338			
Removed Cal Gas Conc:	5.391	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	CC508338		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5258
ZAG Make/Model:	Teledyne API T701		Serial Number:	4297

Analyzer Information

Analyzer make:	Thermo 43iQ-TLE		Analyzer serial #:	1200326170	
Converter make:	Global		Converter serial #:	2022-223	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999326	1.008319	Backgd or Offset:	0.82	0.82
Calibration intercept:	-0.142577	-0.382705	Coeff or Slope:	1.043	1.034

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4926	74.2	80.0	80.1	0.998
as found 2nd point	4963	37.2	40.1	39.8	1.005
as found 3rd point	4982	18.6	20.1	19.8	1.008
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4926	74.2	80.0	80.5	0.994
second point	4963	37.2	40.1	39.7	1.010
third point	4982	18.6	20.1	19.7	1.018
as left zero	5000	0.0	0.0	0.0	----
as left span	4926	74.2	80.0	79.3	1.009
SO2 Scrubber Check	4919	81.3	813.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.007
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.2	Prev response:	79.81	*% change:	0.5%
Baseline Corr 2nd AF pt:	39.9	AF Slope:	1.002897	AF Intercept:	-0.242699
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999980		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

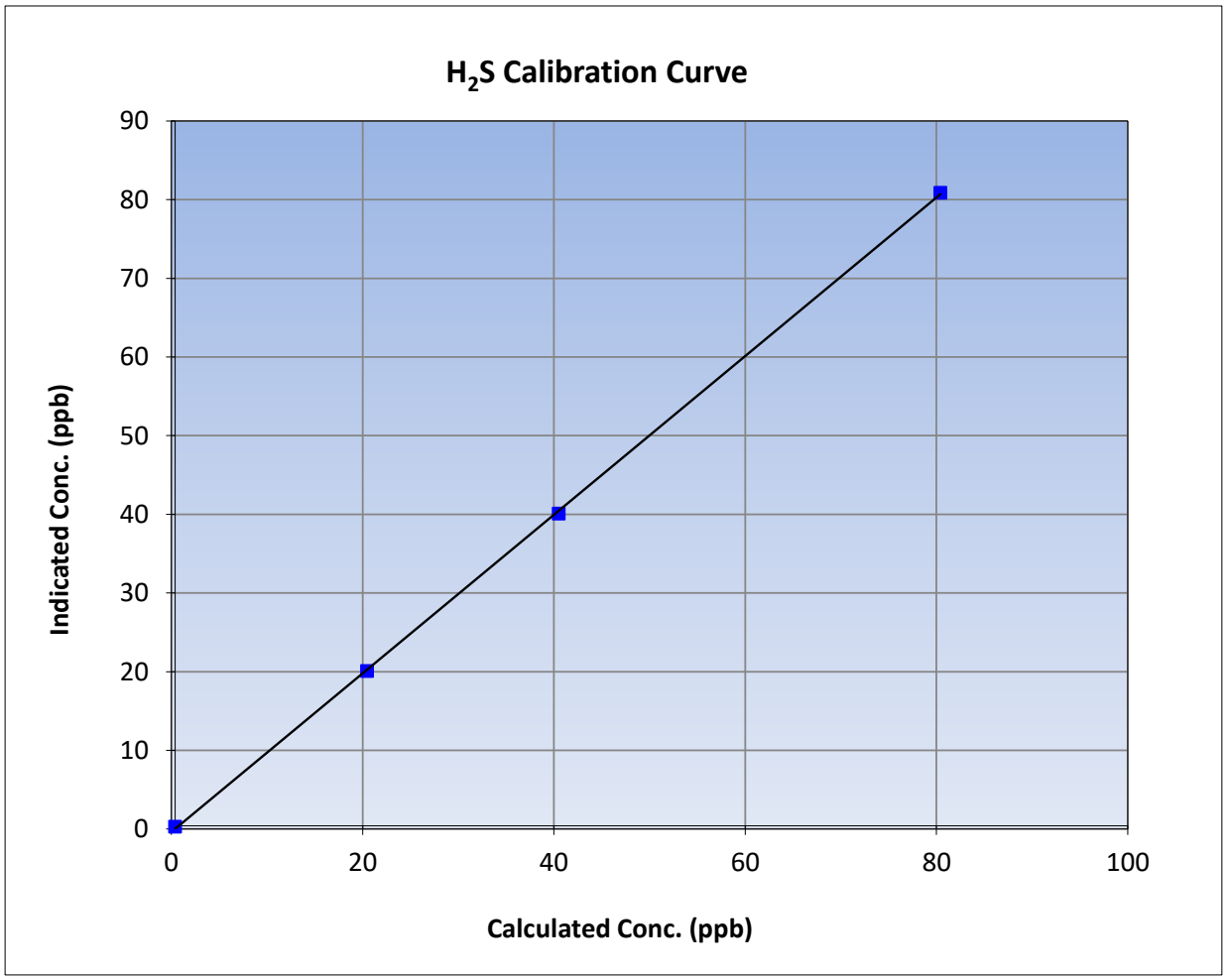
Station Information

Calibration Date:	May 9, 2023	Previous Calibration:	April 12, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	11:15	End Time (MST):	15:52
Analyzer make:	Thermo 43iQ-TLE	Analyzer serial #:	1200326170

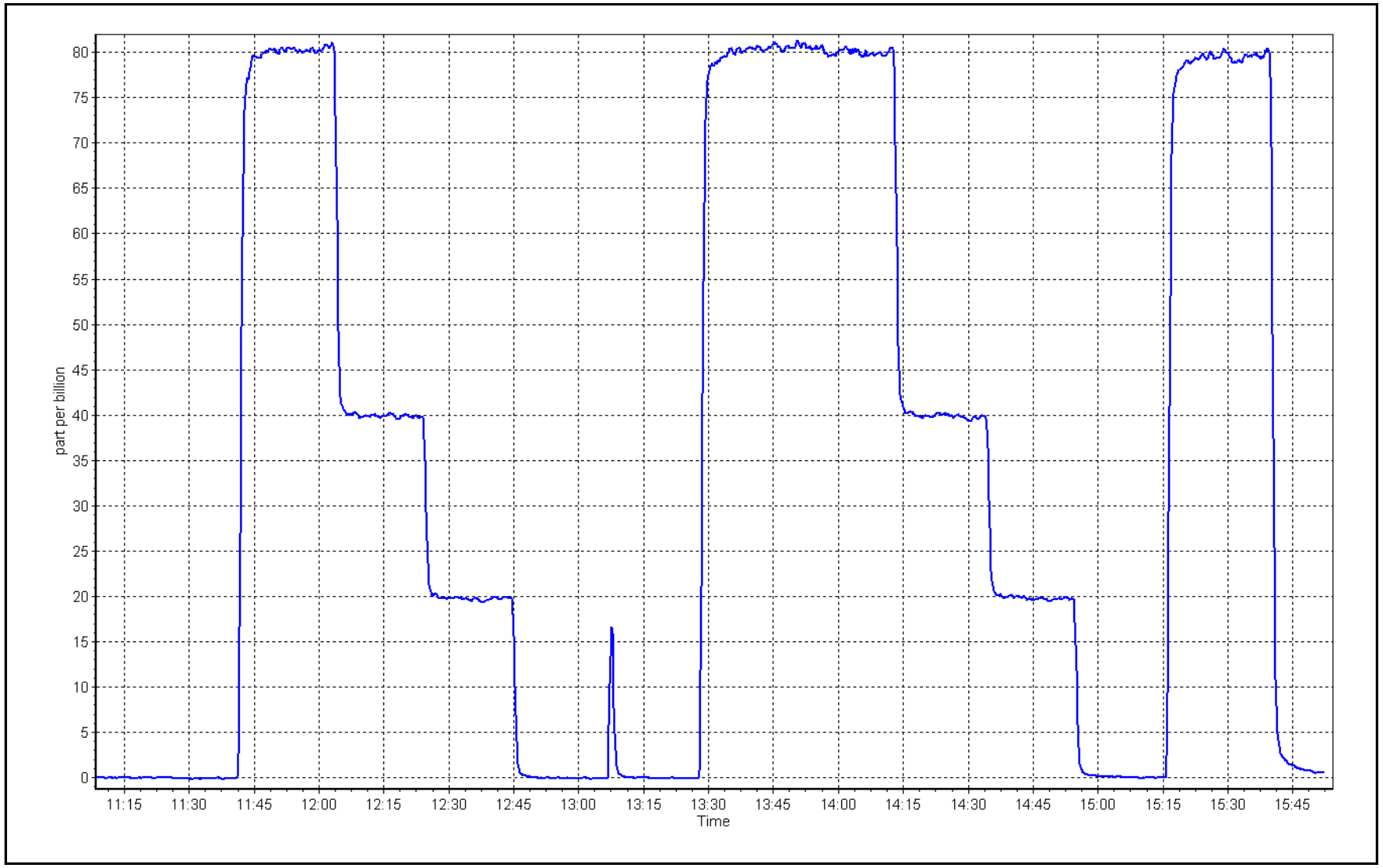
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.5	0.9938
40.1	39.7	1.0103
20.1	19.7	1.0180

Statistical Evaluation		Limits
Correlation Coefficient	0.999923	≥0.995
Slope	1.008319	0.90 - 1.10
Intercept	-0.382705	+/-3



H_2S Calibration Plot Date: May 9, 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:	May 9, 2023	Last Cal Date:	April 13, 2023
Start time (MST):	9:51	End time (MST):	11:31
Reason:	As Found		

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:	1.000707		Background:	4.62	4.62
Calibration intercept:	-0.035654		Coefficient:	5.286	5.286

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	0.01	----
as found span	4918	81.3	17.31	16.32	1.061
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	17.31	16.36	1.058
				Average Correction Factor	

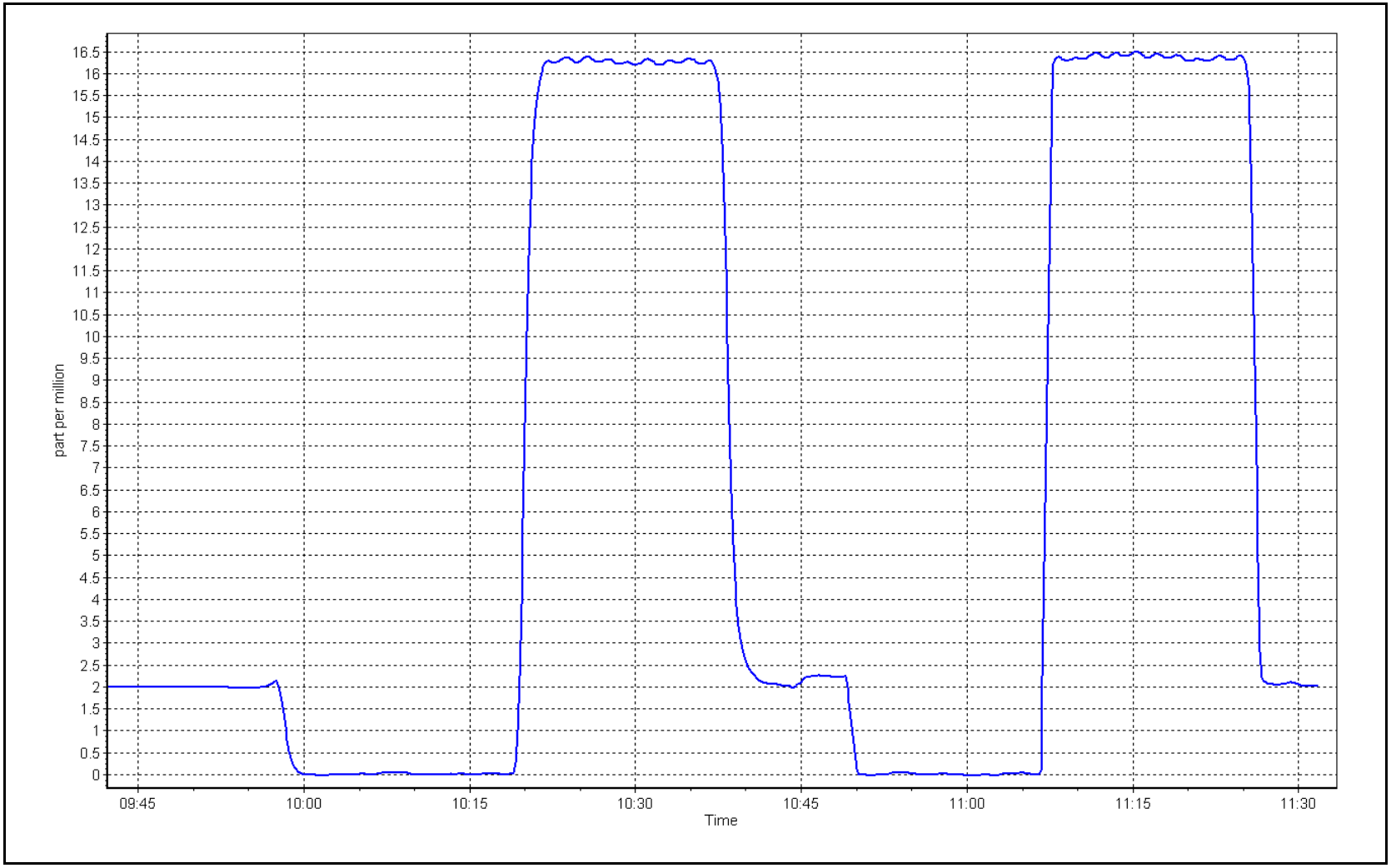
Baseline Corr As found:	16.31	Previous response	17.29	*% change	-6.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: As founds completed. A large adjustment was needed, potential reasons: the pump needs a changeout, or the hydrogen cylinder level is too low. Both will be tested May 10.

Calibration Performed By: Braiden Boutilier

THC Calibration Plot Date: May 9, 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:	May 10, 2023	Last Cal Date:	May 9, 2023
Start time (MST):	10:15	End time (MST):	15:20
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:	1.000707	1.002670	Background:	4.62	4.88
Calibration intercept:	-0.035654	-0.072027	Coefficient:	5.286	5.485

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	0.04	----
as found span	4918	81.3	17.31	16.33	1.060
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.05	----
high point	4918	81.3	17.31	17.32	1.000
second point	4959	40.7	8.67	8.55	1.014
third point	4979	20.3	4.32	4.27	1.012
as left zero	5000	0.0	0.00	-0.15	----
as left span	4918	81.3	17.31	17.43	0.993
				Average Correction Factor	1.008

Baseline Corr As found:	16.29	Previous response	17.29	*% change	-6.1%
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. Changed hydrogen cylinder. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

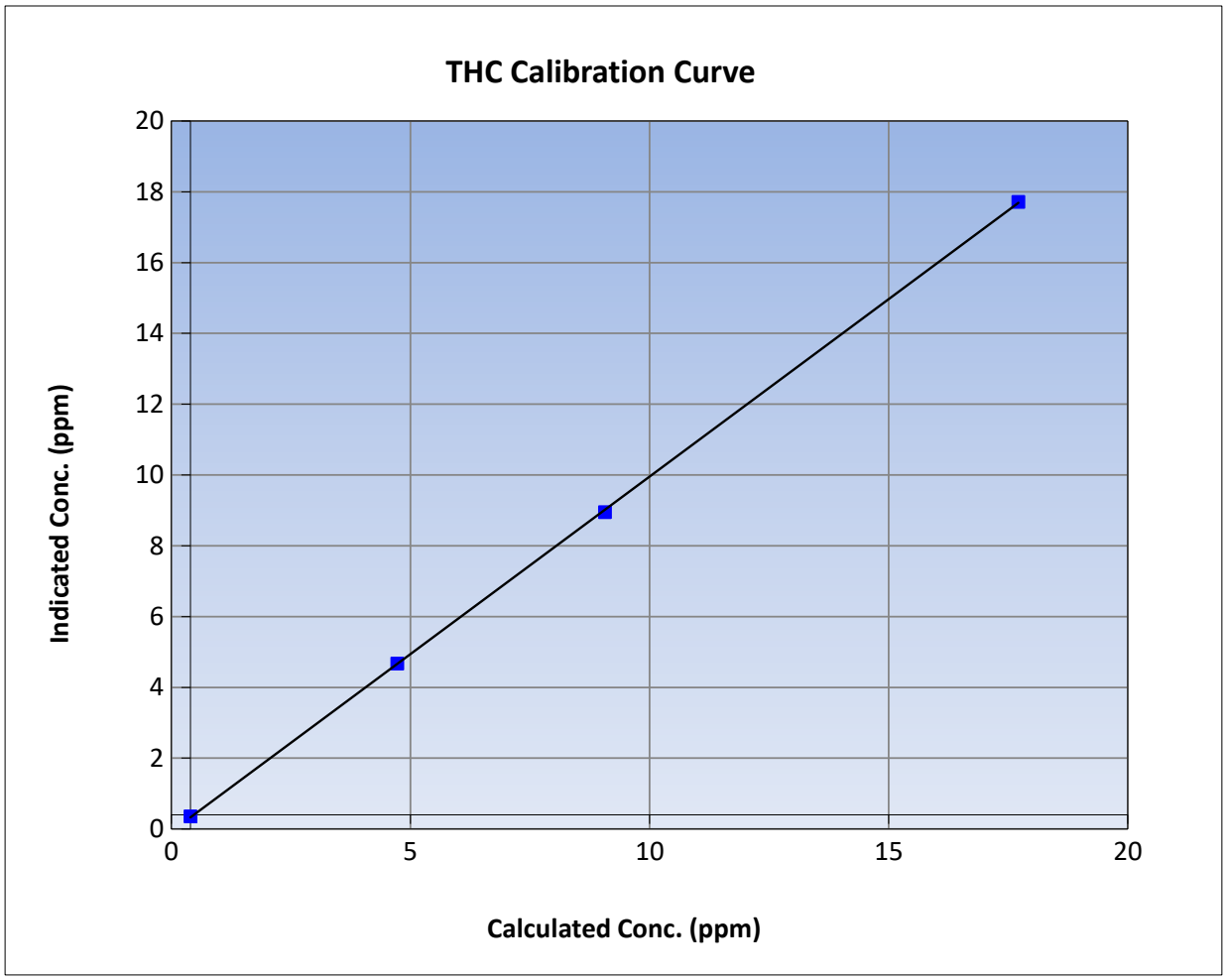
Station Information

Calibration Date:	May 10, 2023	Previous Calibration:	May 9, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:15	End Time (MST):	15:20
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1170050149

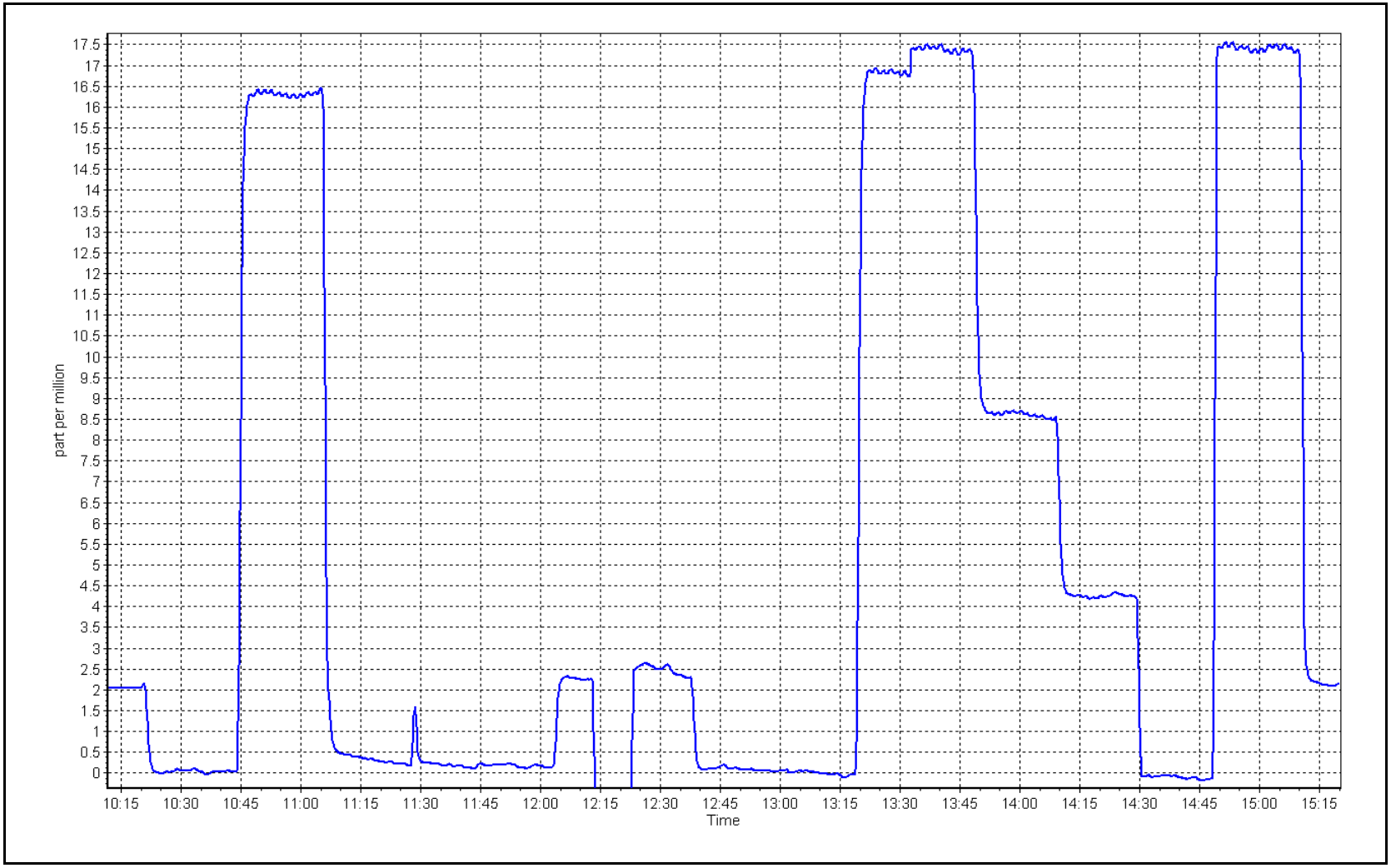
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.05	----
17.31	17.32	0.9997
8.67	8.55	1.0137
4.32	4.27	1.0120

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999961	*≥0.995*
Slope	1.002670	*0.90 - 1.10*
Intercept	-0.072027	*+/-1.5*



THC Calibration Plot Date: May 10, 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:	May 11, 2023	Last Cal Date:	April 26, 2023
Start time (MST):	9:25	End time (MST):	15:02
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:		T12YYFE	Cal Gas Expiry Date:	October 30, 2024	
NOX Cal Gas Conc:	47.46	ppm	NO Cal Gas Conc:	47.46	ppm
Removed Cylinder #:		NA	Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	47.46	ppm	Removed Gas NO Conc:	47.46	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	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:	1.370	1.370	NO bkgnd or offset:	1.3	1.3
NOX coeff or slope:	0.995	0.995	NOX bkgnd or offset:	1.4	1.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	173.2	173.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000252	1.002627
NO_X Cal Offset:	-0.432516	-0.313069
NO Cal Slope:	0.999765	1.004857
NO Cal Offset:	-1.012030	-1.492939
NO_2 Cal Slope:	0.997717	0.995411
NO_2 Cal Offset:	0.172614	-0.294557

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	4916	84.2	799.2	799.2	0.0	803.0	804.0	-1.0	0.9953	0.9940
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	4916	84.2	799.2	799.2	0.0	801.0	802.0	-0.4	0.9977	0.9965
second point	4958	42.1	399.6	399.6	0.0	400.8	400.3	0.6	0.9970	0.9983
third point	4979	21.1	200.3	200.3	0.0	199.5	197.6	1.9	1.0039	1.0135
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.2	----	----
as left span	4916	84.2	799.2	388.2	411.0	797.8	383.4	414.4	1.0017	1.0125
								Average Correction Factor	0.9996	1.0028

Corrected As found	NO_X = 803.0 ppb	NO = 804.1 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.5%
Previous Response	NO_X = 799.0 ppb	NO = 798.0 ppb		*Percent Change	NO =	0.8%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	795.9	384.9	411.0	408.8	1.0054	99.5%
2nd GPT point (200 ppb O3)	795.9	592.1	203.8	203.2	1.0030	99.7%
3rd GPT point (100 ppb O3)	795.9	686.9	109.0	107.1	1.0177	98.3%
				Average Correction Factor	1.0087	99.1%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

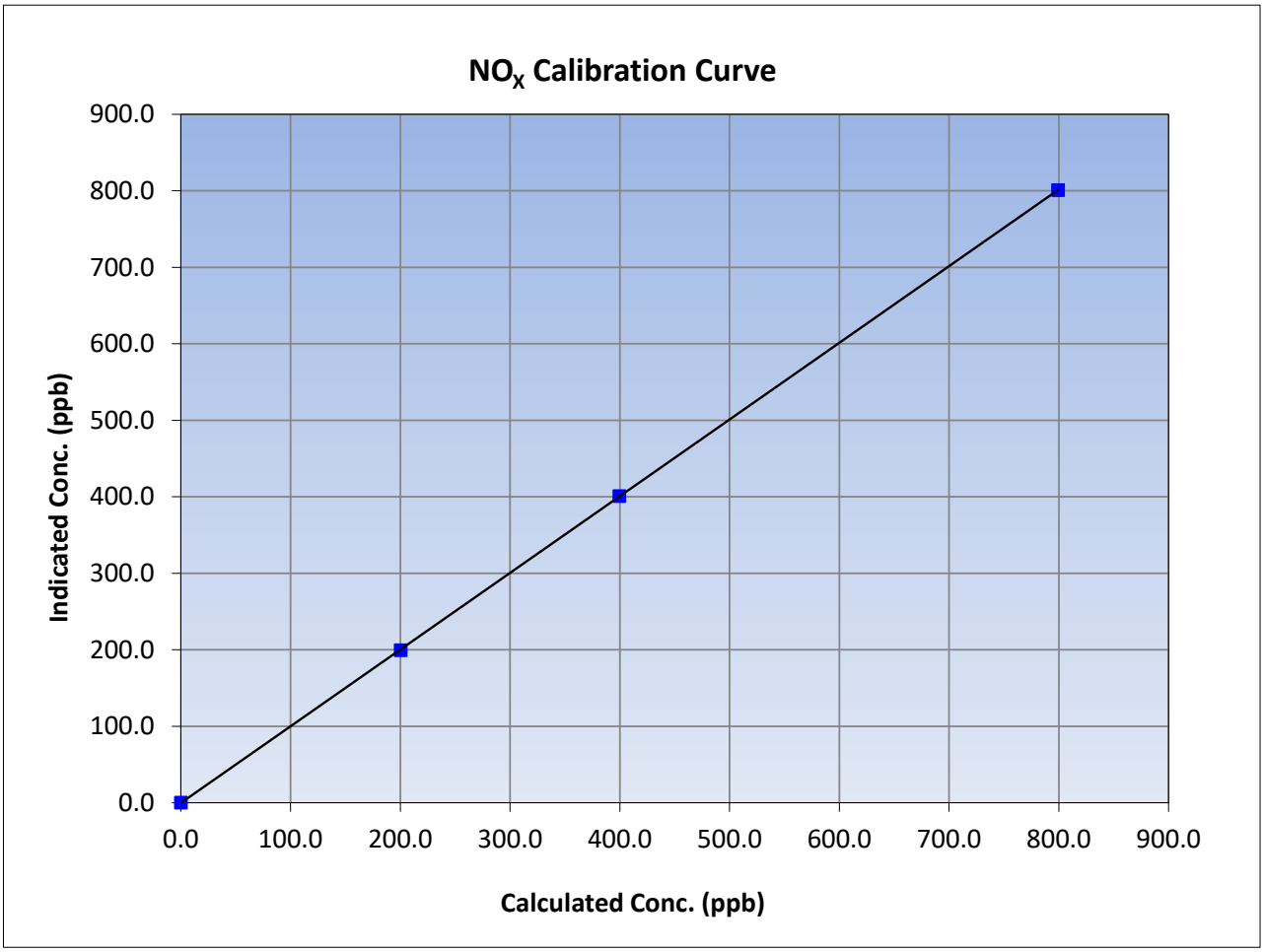
Version-04-2020

Station Information

Calibration Date:	May 11, 2023	Previous Calibration:	April 26, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:25	End Time (MST):	15:02
Analyzer make:	Thermo 42i	Analyzer serial #:	1170050148

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999996	≥0.995
799.2	801.0	0.9977			
399.6	400.8	0.9970	Slope	1.002627	0.90 - 1.10
200.3	199.5	1.0039			
			Intercept	-0.313069	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

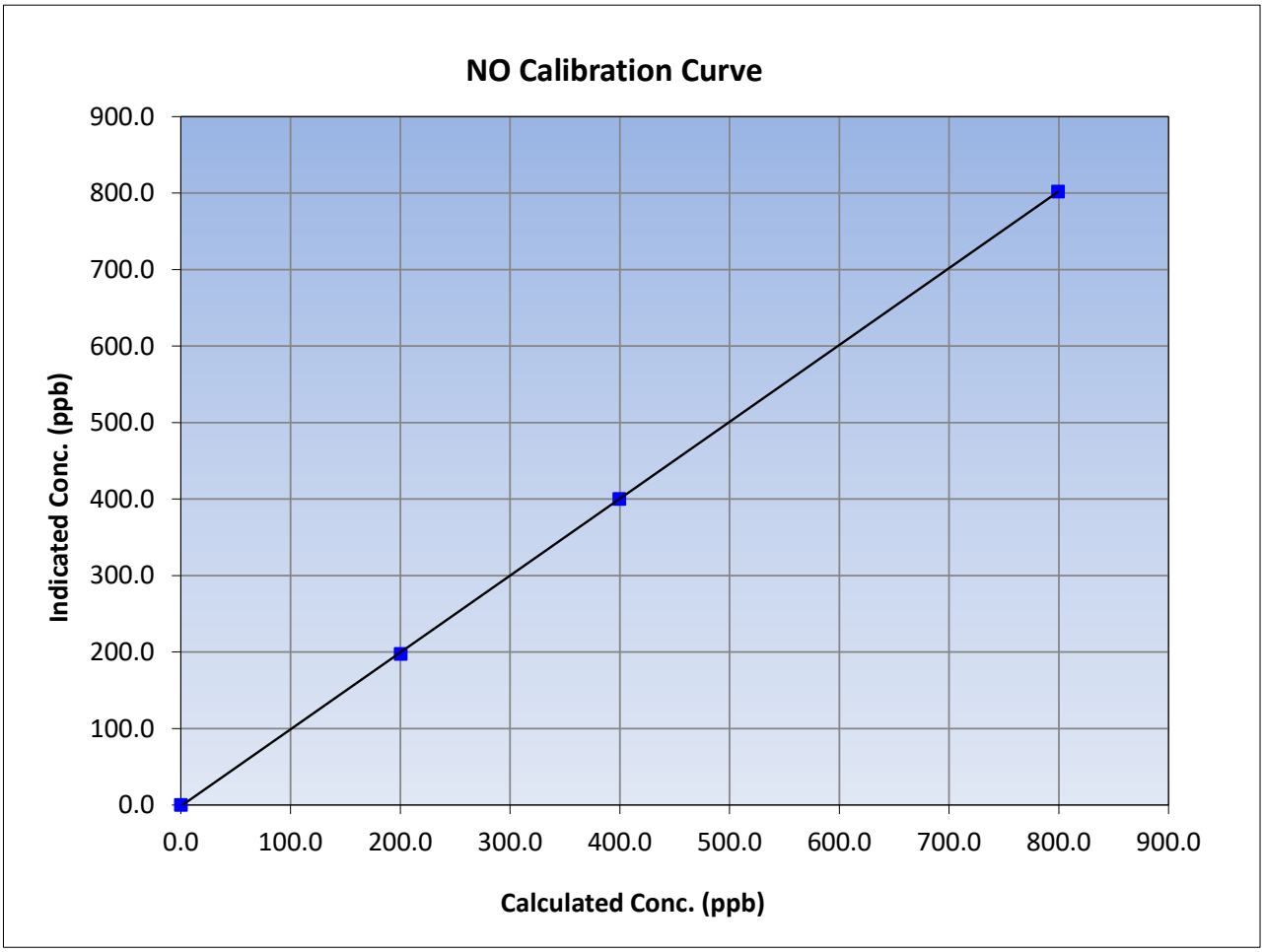
Version-04-2020

Station Information

Calibration Date:	May 11, 2023	Previous Calibration:	April 26, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:25	End Time (MST):	15:02
Analyzer make:	Thermo 42i	Analyzer serial #:	1170050148

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999980	≥0.995
799.2	802.0	0.9965			
399.6	400.3	0.9983	Slope	1.004857	0.90 - 1.10
200.3	197.6	1.0135			
			Intercept	-1.492939	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

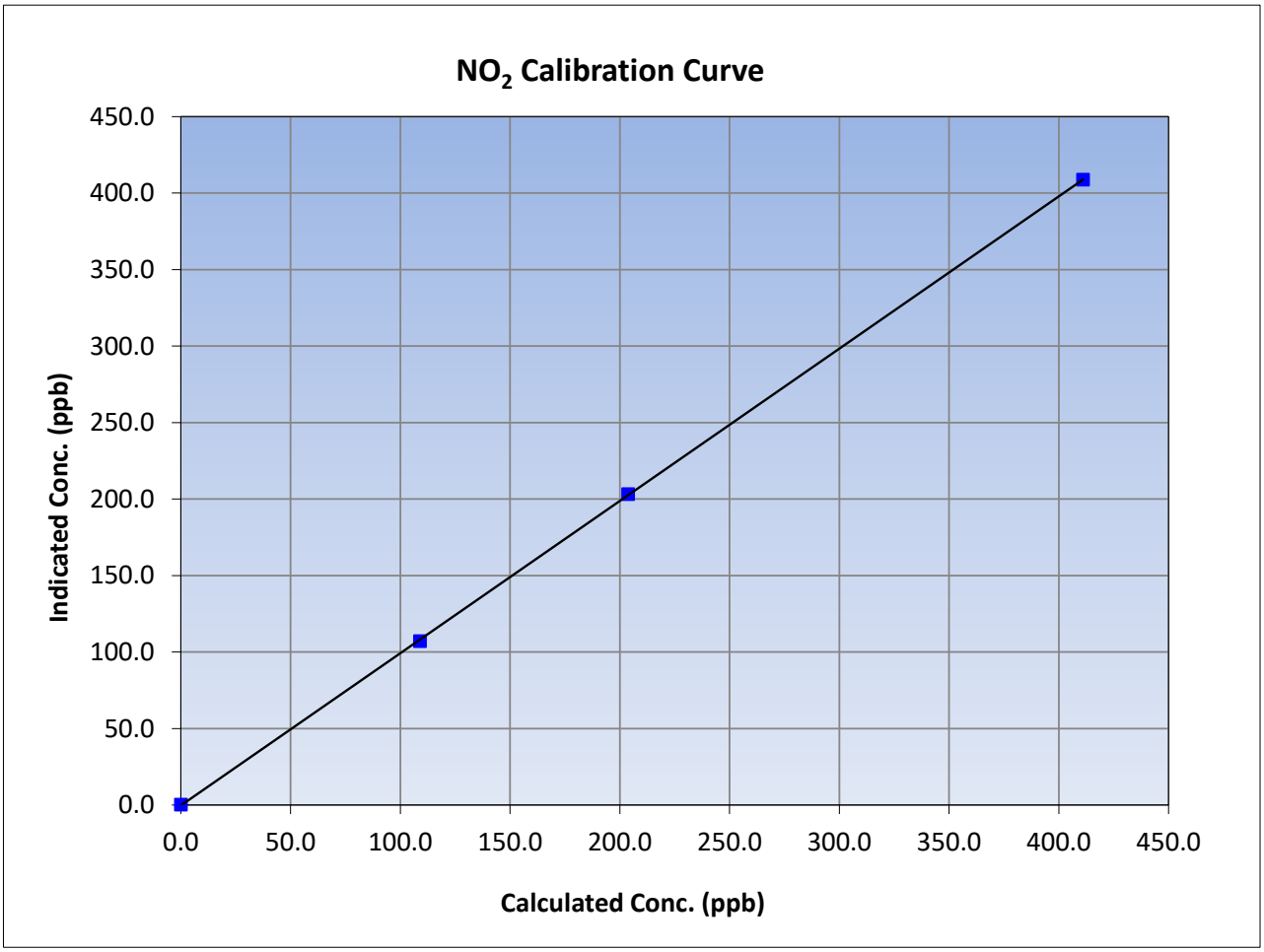
Version-04-2020

Station Information

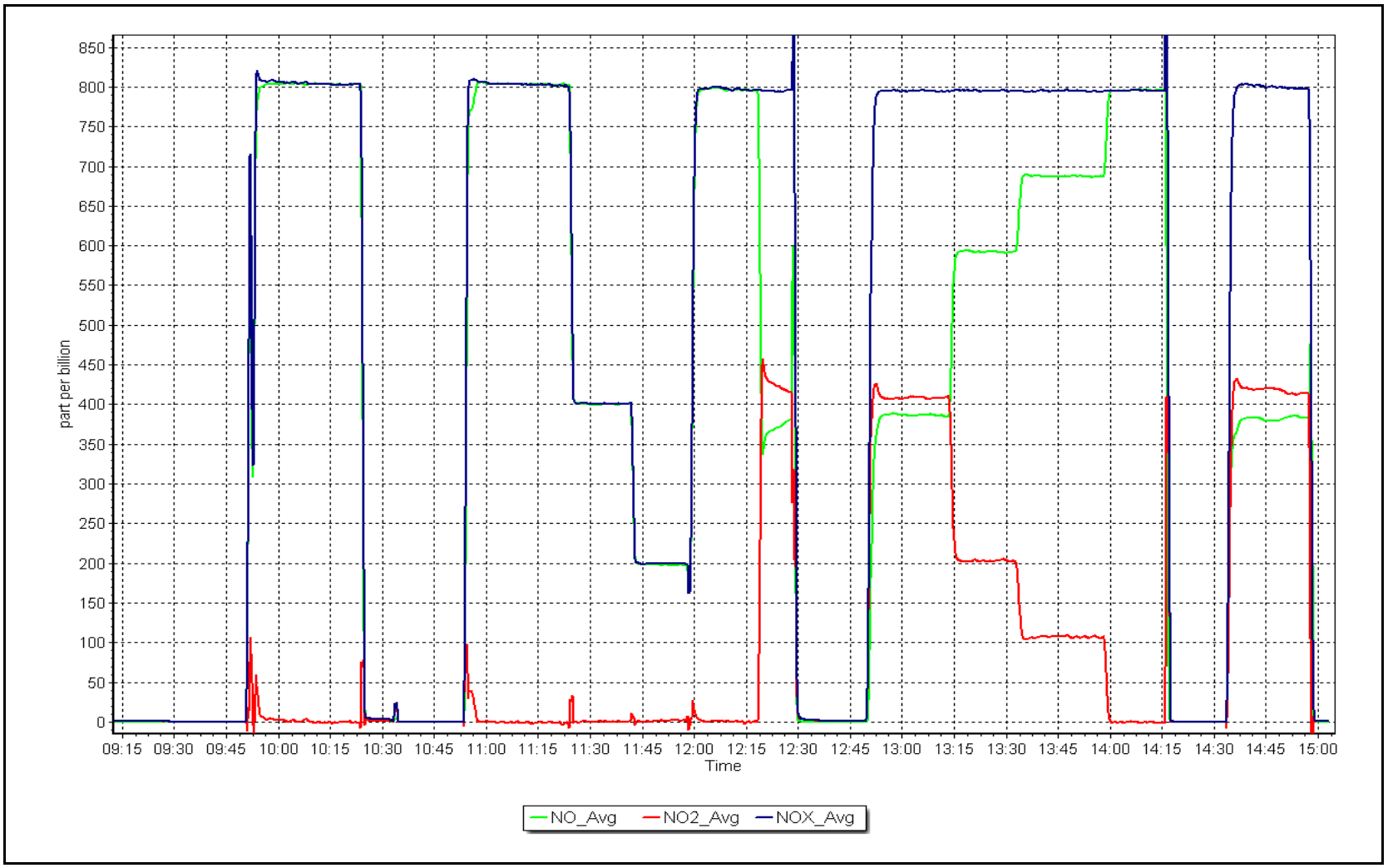
Calibration Date:	May 11, 2023	Previous Calibration:	April 26, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:25	End Time (MST):	15:02
Analyzer make:	Thermo 42i	Analyzer serial #:	1170050148

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999979	≥0.995
411.0	408.8	1.0054			
203.8	203.2	1.0030	Slope	0.995411	0.90 - 1.10
109.0	107.1	1.0177			
			Intercept	-0.294557	+/-20



NO_X Calibration Plot Date: May 11, 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:	May 11, 2023	Last Cal Date:	April 26, 2023
Start time (MST):	12:21	End time (MST):	14:17
Analyzer Make:	API T640	S/N:	253
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388750
Temp/RH standard:	Alicat FP-25BT	S/N:	388750

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	18.1	18.38	18.1	☐	+/- 2 °C
P (mmHg)	714.5	715.93	714.5	☐	+/- 10 mmHg
flow (LPM)	5.00	4.899	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: May 11, 2023 Last Cal Date: April 26, 2023

PM w/o HEPA: 13.1 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	11.0	11.0	11.0	☐	11.3 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 8.9 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: May 11, 2023

Disposable Filter Changed: May 11, 2023

Annual Maintenance

Date Sample Tube Cleaned: September 30, 2022

Date RH/T Sensor Cleaned: October 6, 2022

Notes: Quarterly maintenance completed. No adjustments made.

Calibration by: Braiden Boutilier

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS30
ELLS RIVER
MAY 2023

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

June 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Ells River	Station number:	AMS 30
Calibration Date:	May 5, 2023	Last Cal Date:	April 11, 2023
Start time (MST):	9:53	End time (MST):	12:35
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:	1.003073	1.008699	Backgd or Offset:	9.0	8.9
Calibration intercept:	-2.075962	-2.796032	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	0.0	----
as found span	4921	79.2	800.4	803.1	0.997
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4921	79.2	800.4	806.0	0.993
second point	4960	39.6	400.2	399.6	1.002
third point	4980	19.8	200.1	195.8	1.022
as left zero	5000	0.0	0.0	0.0	----
as left span	4921	79.2	800.4	806.0	0.993
				Average Correction Factor	1.006

Baseline Corr As found:	803.10	Previous response	800.75	*% 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 made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

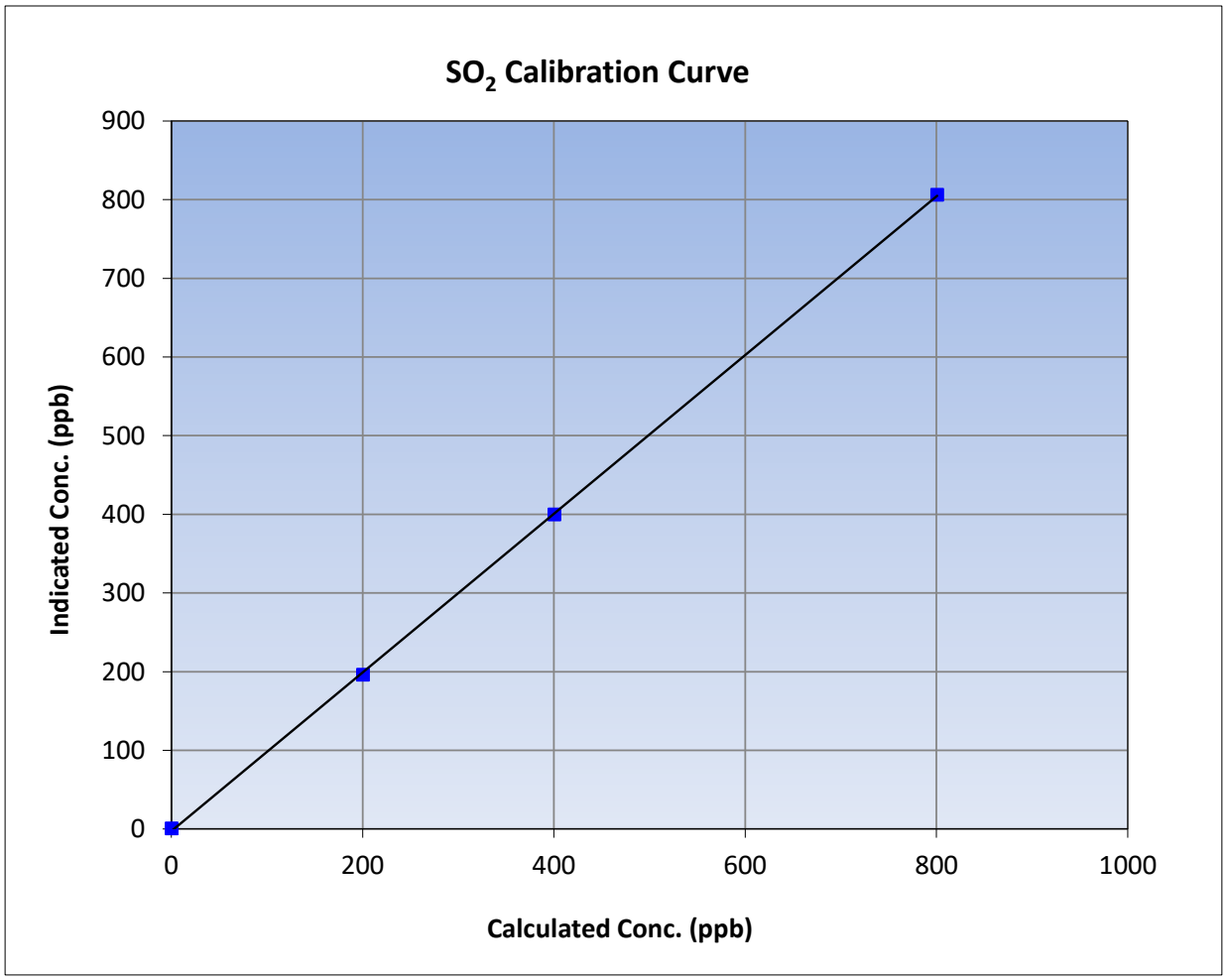
Station Information

Calibration Date:	May 5, 2023	Previous Calibration:	April 11, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:53	End Time (MST):	12:35
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841397

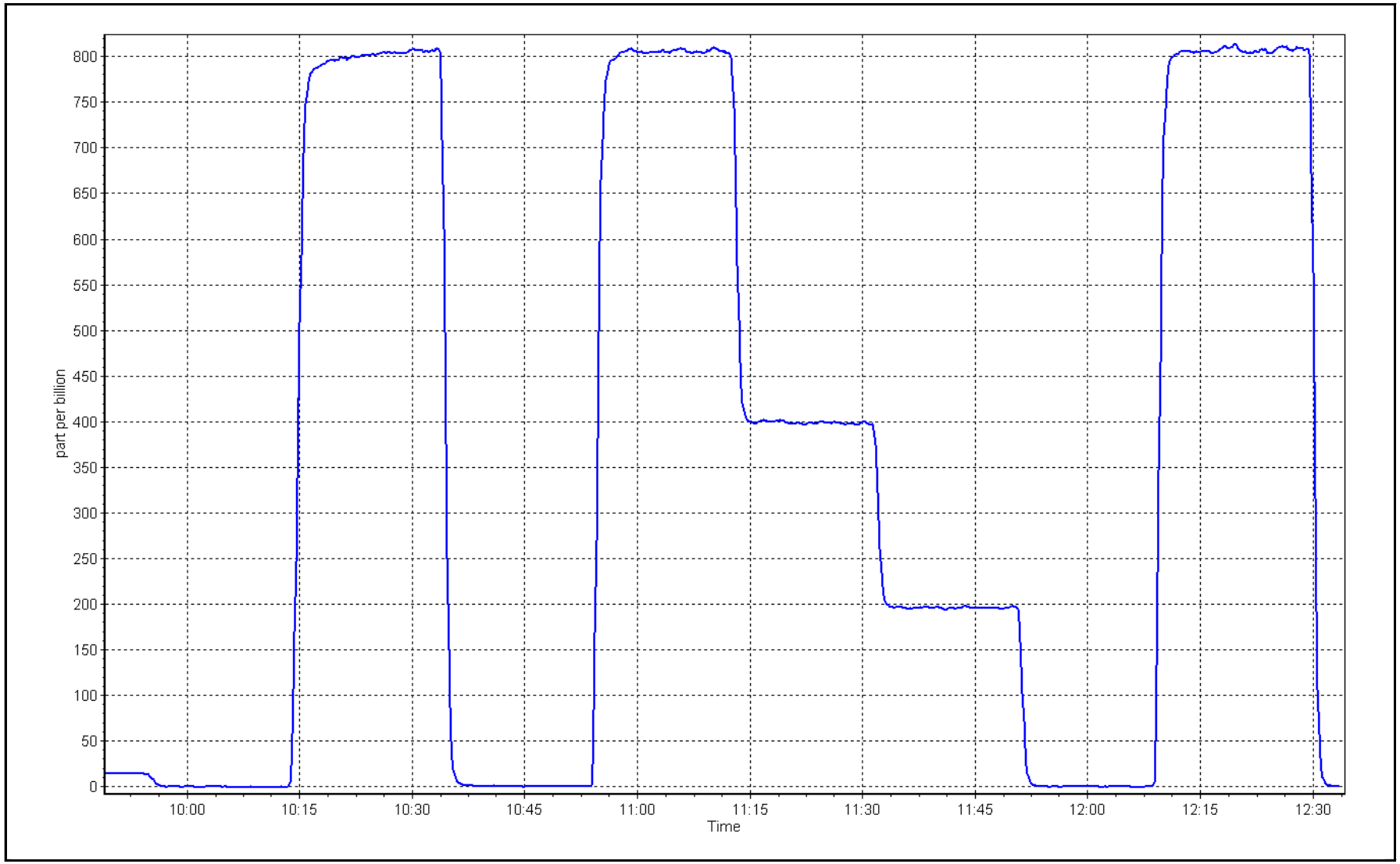
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
800.4	806.0	0.9930
400.2	399.6	1.0016
200.1	195.8	1.0220

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999933	*≥0.995*
Slope	1.008699	*0.90 - 1.10*
Intercept	-2.796032	*+/-30*



SO2 Calibration Plot Date: May 5, 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:	May 10, 2023	Last Cal Date:	April 3, 2023
Start time (MST):	9:00	End time (MST):	13:00
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.08	ppm	Cal Gas Exp Date:	February 9, 2024
Cal Gas Cylinder #:	EY0002443			
Removed Cal Gas Conc:	5.08	ppm	Rem Gas Exp Date:	
Removed Gas Cyl #:			Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3061
ZAG Make/Model:	API T701H		Serial Number:	358

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1410661331	
Converter make:	CDN - 101		Converter serial #:	562	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000494	1.007352	Backgd or Offset:	1.55	1.58
Calibration intercept:	-0.019196	-0.159242	Coeff or Slope:	1.092	1.107

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	78.3	1.021
as found 2nd point	4961	39.4	40.0	38.9	1.029
as found 3rd point	4980	19.7	20.0	19.4	1.032
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	78.7	80.0	80.5	0.993
second point	4961	39.4	40.0	40.0	1.001
third point	4980	19.7	20.0	19.9	1.006
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:	78.3	Prev response:	79.98	*% change:	-2.2%
Baseline Corr 2nd AF pt:	38.9	AF Slope:	0.979624	AF Intercept:	-0.138713
Baseline Corr 3rd AF pt:	19.4	AF Correlation:	0.999981		

* = > +/-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

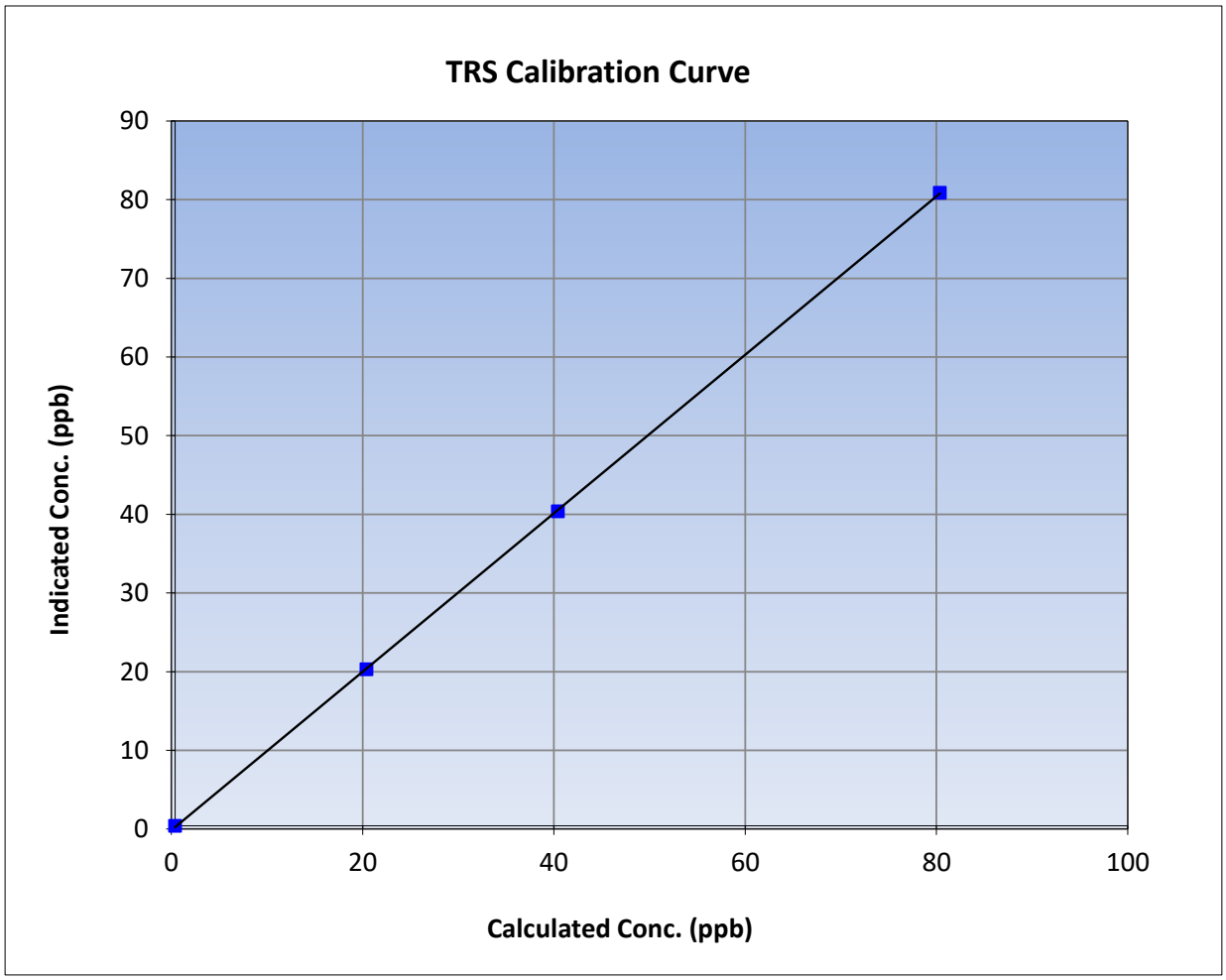
Station Information

Calibration Date:	May 10, 2023	Previous Calibration:	April 3, 2023
Station Name:	Ells River	Station Number:	AMS30
Start Time (MST):	9:00	End Time (MST):	13:00
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1410661331

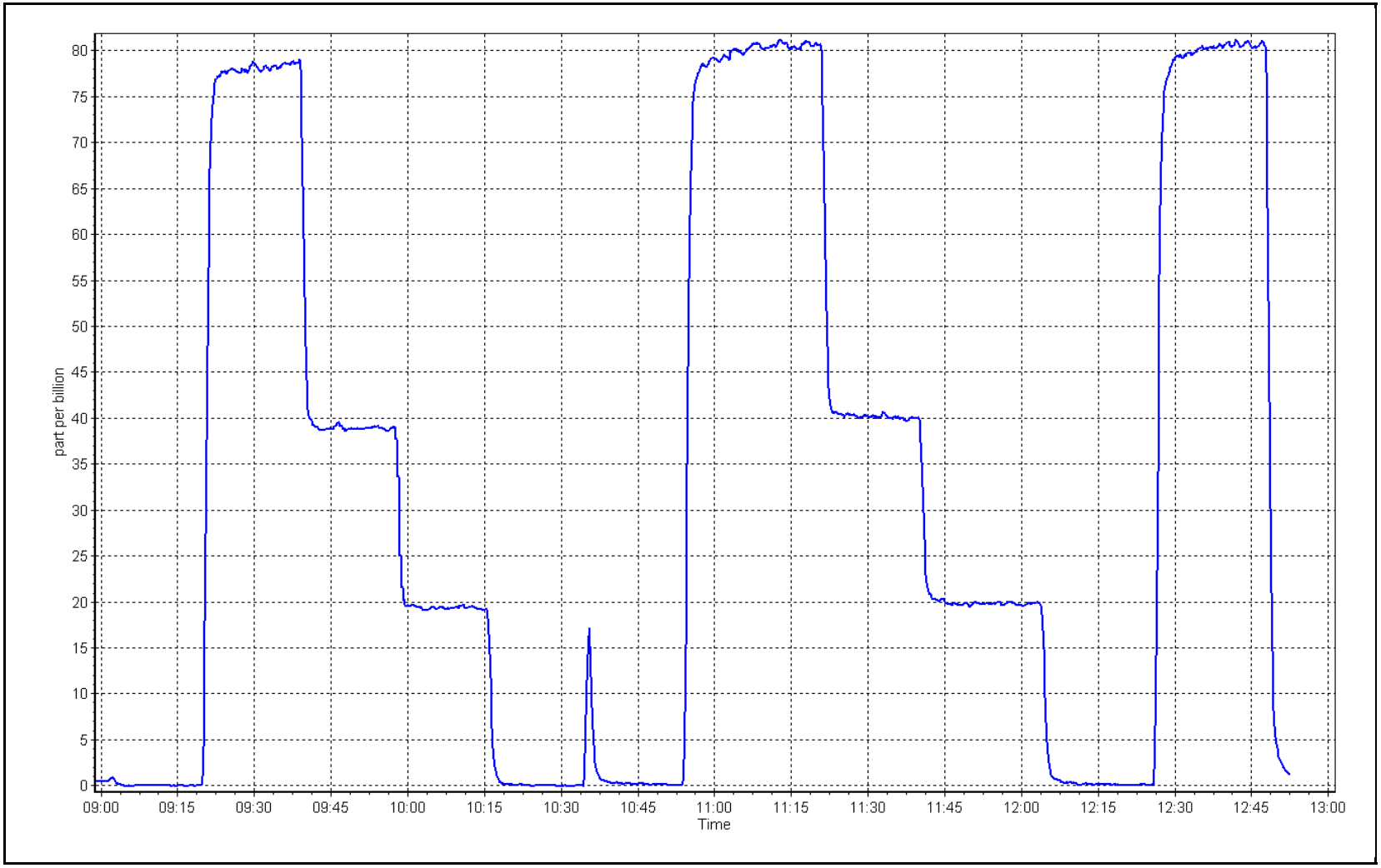
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.5	0.9933
40.0	40.0	1.0007
20.0	19.9	1.0058

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999979	*≥0.995*
Slope	1.007352	*0.90 - 1.10*
Intercept	-0.159242	*+/-3*



TRS Calibration Plot Date: May 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:	May 5, 2023	Last Cal Date:	April 11, 2023
Start time (MST):	9:53	End time (MST):	12:35
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC494126	Cal Gas Expiry Date:	December 29, 2028	
CH4 Cal Gas Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm
C3H8 Cal Gas Conc.	209.2	ppm			
Removed Gas Cert:			Removed Gas Expiry:		
Removed CH4 Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm
Removed C3H8 Conc.	209.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3061	
ZAG make/model:	API T701H		Serial Number:	358	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1181490018	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	0.000238	0.000238	NMHC SP Ratio:	4.39E-05	4.39E-05
CH4 Retention time:	14.2	14.2	NMHC Peak Area:	207620	207620

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	17.02	1.000
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	8.45	1.008
third point	4980	19.8	4.26	4.17	1.021
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	17.10	0.996
				Average Correction Factor	1.010

Baseline Corr AF:	17.02	Prev response	16.95	*% 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	4921	79.2	9.11	9.15	0.996
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	9.15	0.996
second point	4960	39.6	4.56	4.55	1.002
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	9.20	0.991
				Average Correction Factor	1.005
Baseline Corr AF:	9.15	Prev response	9.09	*% change	0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	7.91	7.87	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	79.2	7.91	7.87	1.005
second point	4960	39.6	3.96	3.90	1.014
third point	4980	19.8	1.98	1.93	1.025
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.91	7.90	1.002
				Average Correction Factor	1.015
Baseline Corr AF:	7.87	Prev response	7.86	*% 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:	0.998335	1.000973
THC Cal Offset:	-0.048138	-0.047539
CH4 Cal Slope:	0.996510	0.995687
CH4 Cal Offset:	-0.029356	-0.021757
NMHC Cal Slope:	0.999568	1.005200
NMHC Cal Offset:	-0.018381	-0.024582

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

THC Calibration Summary

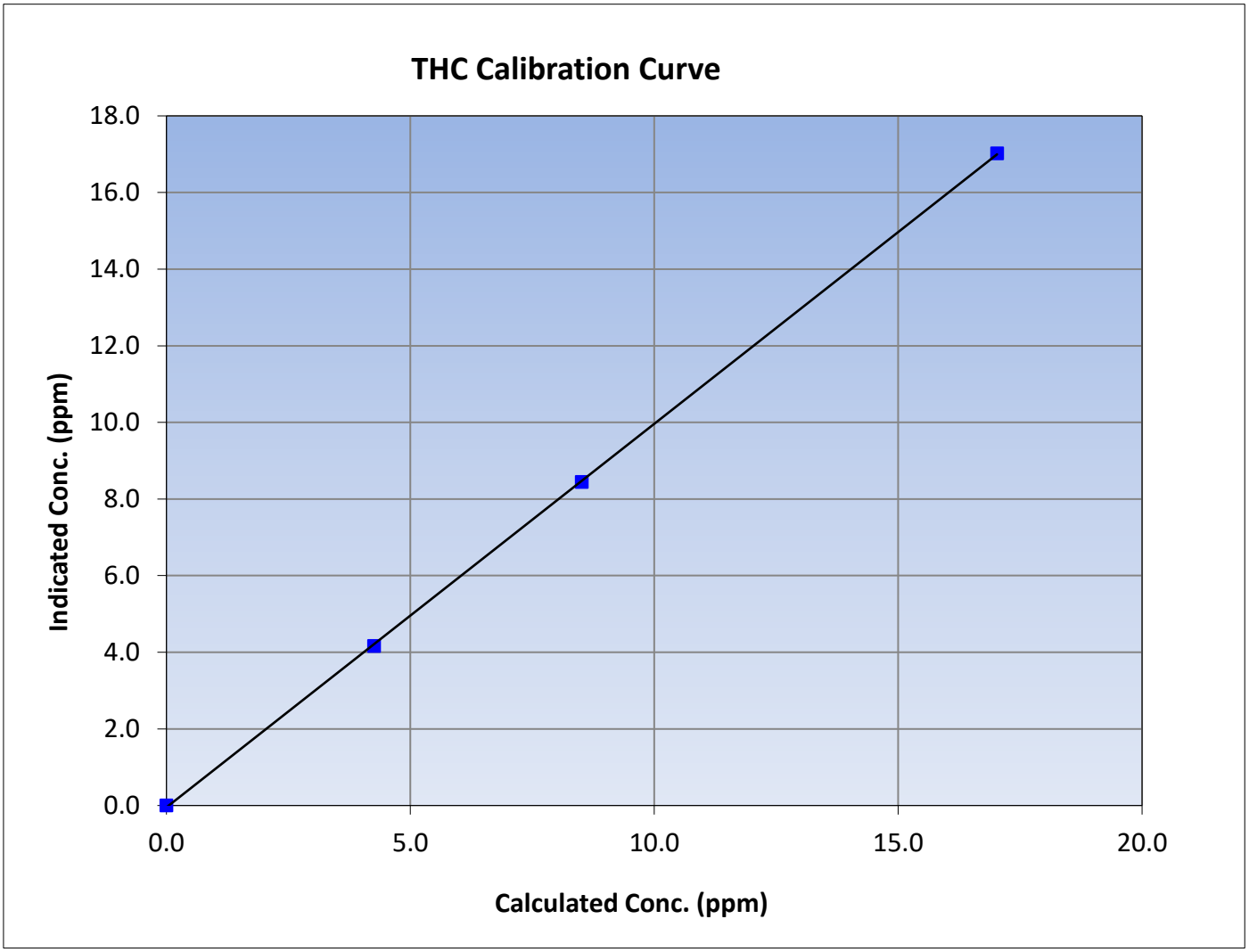
Version-01-2020

Station Information

Calibration Date:	May 5, 2023	Previous Calibration:	April 11, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:53	End Time (MST):	12:35
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	0.999964	*≥0.995*
17.03	17.02	1.0004			
8.51	8.45	1.0078	Slope	1.000973	*0.90 - 1.10*
4.26	4.17	1.0214			
			Intercept	-0.047539	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

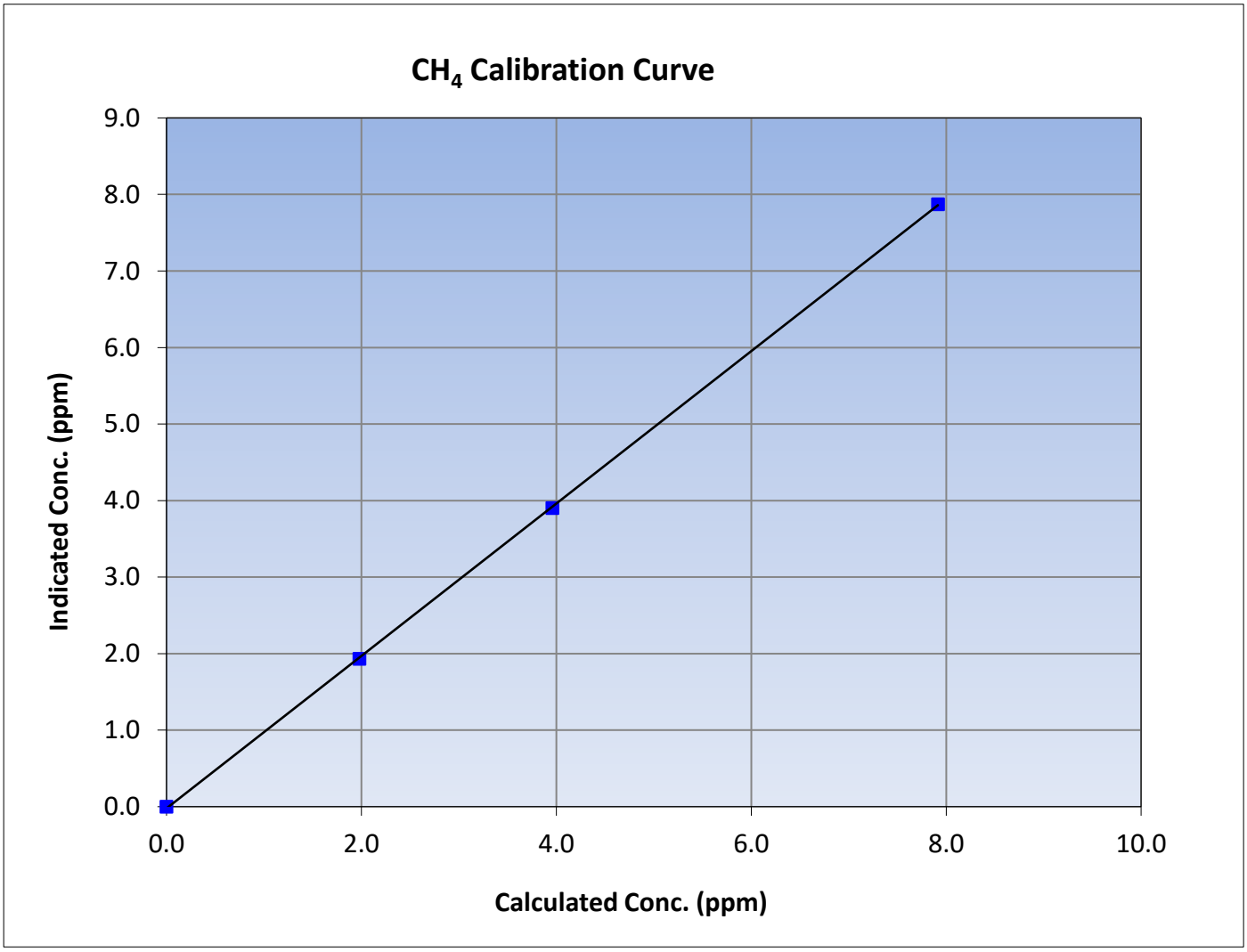
Version-01-2020

Station Information

Calibration Date:	May 5, 2023	Previous Calibration:	April 11, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:53	End Time (MST):	12:35
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	0.999963	*≥0.995*
7.91	7.87	1.0055			
3.96	3.90	1.0143	Slope	0.995687	*0.90 - 1.10*
1.98	1.93	1.0248			
			Intercept	-0.021757	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

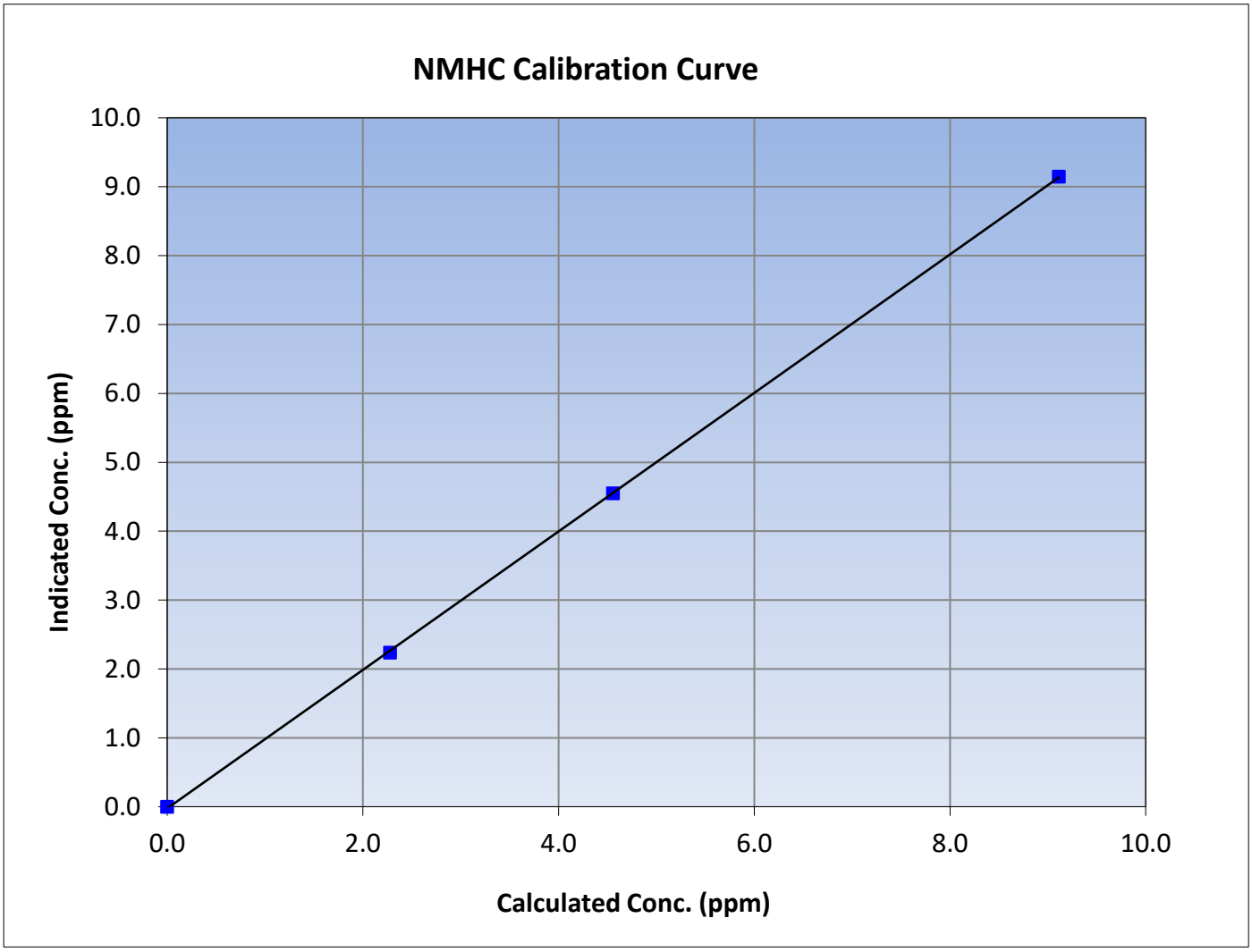
Version-01-2020

Station Information

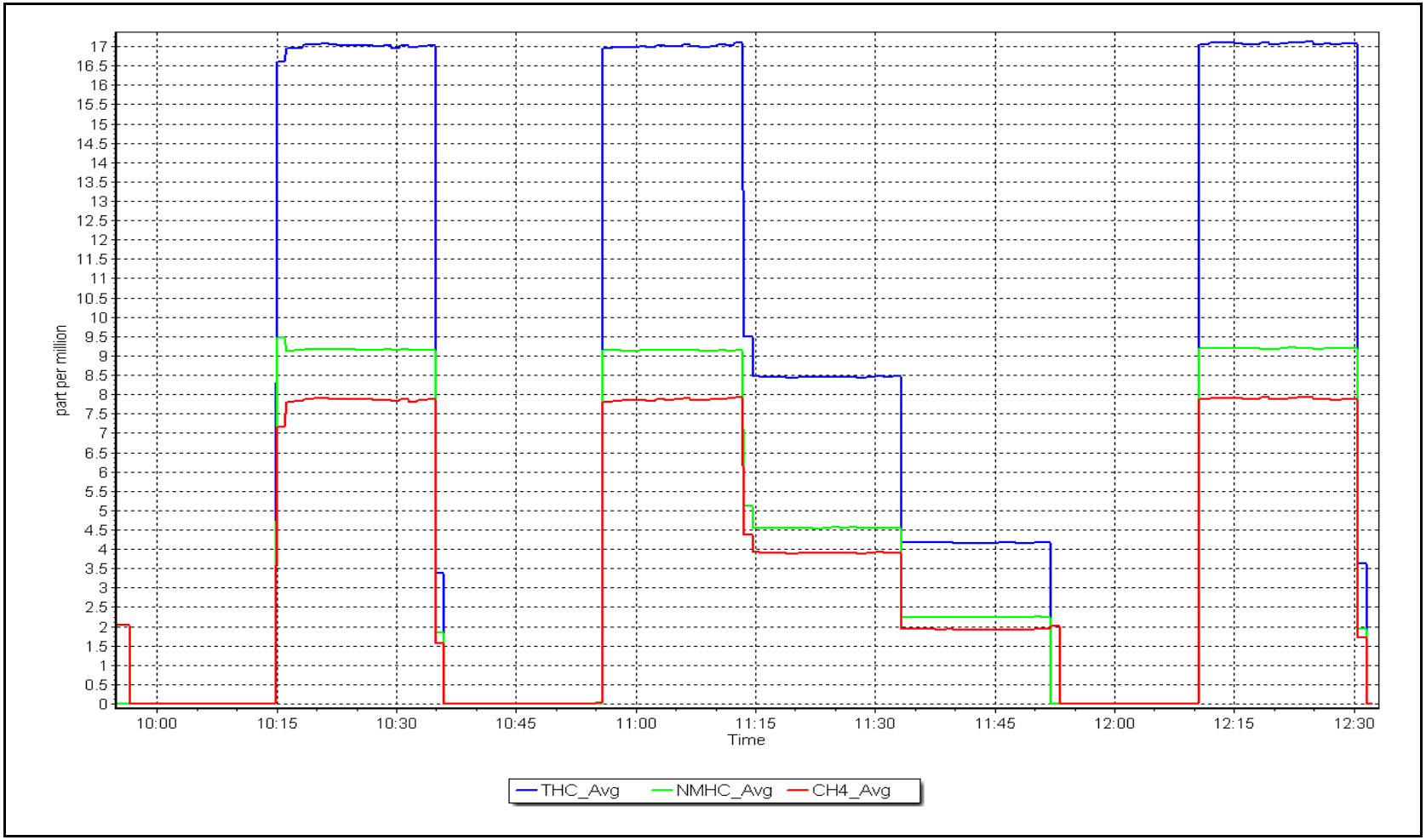
Calibration Date:	May 5, 2023	Previous Calibration:	April 11, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:53	End Time (MST):	12:35
Analyzer make:	Thermo 55i	Analyzer serial #:	1181490018

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999966	≥0.995
9.11	9.15	0.9963			
4.56	4.55	1.0019	Slope	1.005200	0.90 - 1.10
2.28	2.24	1.0180			
			Intercept	-0.024582	+/-0.5



NMHC Calibration Plot Date: May 5, 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:	May 26, 2023	Last Cal Date:	May 5, 2023
Start time (MST):	11:54	End time (MST):	13:07
Reason:	Cylinder Change		

Calibration Standards

Gas Cert Reference:		CC494126	Cal Gas Expiry Date:	December 29, 2028	
CH4 Cal Gas Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm
C3H8 Cal Gas Conc.	209.2	ppm			
Removed Gas Cert:			Removed Gas Expiry:		
Removed CH4 Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm
Removed C3H8 Conc.	209.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3061	
ZAG make/model:	API T701H		Serial Number:	358	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1181490018	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	0.000238	0.000238	NMHC SP Ratio:	4.39E-05	4.39E-05
CH4 Retention time:	14.2	14.2	NMHC Peak Area:	207620	207620

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	16.83	1.012
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	4921	79.2	17.03	16.86	1.010
				Average Correction Factor	
Baseline Corr AF:	16.83	Prev response	17.00	*% change	-1.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / 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	9.09	1.002
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	4921	79.2	9.11	9.07	1.005
				Average Correction Factor	
Baseline Corr AF:	9.09	Prev response	9.14	*% 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	79.2	7.91	7.74	1.023
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	4921	79.2	7.91	7.79	1.016
				Average Correction Factor	
Baseline Corr AF:	7.74	Prev response	7.86	*% change	-1.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

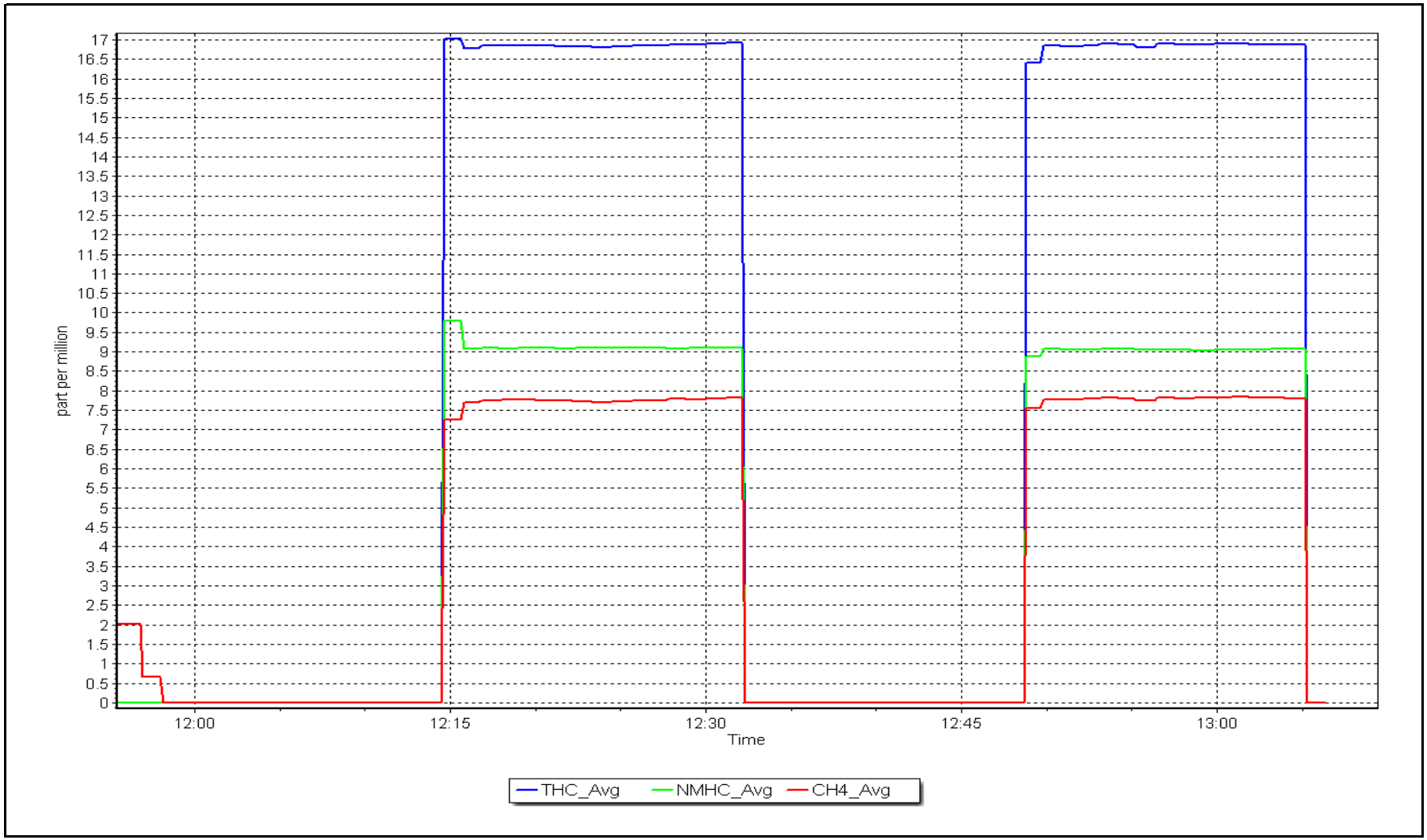
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000973	
THC Cal Offset:	-0.047539	
CH4 Cal Slope:	0.995687	
CH4 Cal Offset:	-0.021757	
NMHC Cal Slope:	1.005200	
NMHC Cal Offset:	-0.024582	

Notes: Replaced N2 cylinder.

Calibration Performed By: Denny Ray Estador

NMHC Calibration Plot Date: May 26, 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:	May 11, 2023	Last Cal Date:	April 5, 2023
Start time (MST):	8:51	End time (MST):	13:43
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	1.051	NO bkgnd or offset:	12.5	12.7
NOX coeff or slope:	0.992	0.990	NOX bkgnd or offset:	12.5	12.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	183.6	181.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000576	1.000351
NO_X Cal Offset:	-1.140000	-1.160000
NO Cal Slope:	0.998571	1.001858
NO Cal Offset:	-1.840000	-2.240000
NO_2 Cal Slope:	1.002663	0.998225
NO_2 Cal Offset:	0.679699	0.085999

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	4920	80.0	813.3	799.5	13.8	803.0	786.9	16.1	1.0128	1.0160
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	4920	80.0	813.3	799.5	13.8	813.0	799.9	13.2	1.0003	0.9995
second point	4960	40.0	406.6	399.8	6.9	405.0	397.1	7.9	1.0040	1.0067
third point	4980	20.0	203.3	199.9	3.4	201.1	195.8	5.2	1.0110	1.0208
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	427.5	385.8	816.7	428.4	388.2	0.9958	0.9979
								Average Correction Factor	1.0051	1.0090

Corrected As found	NO_X = 802.9 ppb	NO = 787.0 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-1.2%
Previous Response	NO_X = 812.6 ppb	NO = 796.5 ppb		*Percent Change	NO =	-1.2%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.5	425.5	385.8	385.0	1.0020	99.8%
2nd GPT point (200 ppb O3)	797.5	615.1	196.2	196.3	0.9993	100.1%
3rd GPT point (100 ppb O3)	797.5	703.6	107.7	107.4	1.0024	99.8%
				Average Correction Factor	1.0012	99.9%

Notes: Both zero and span was adjusted.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

NO_X Calibration Summary

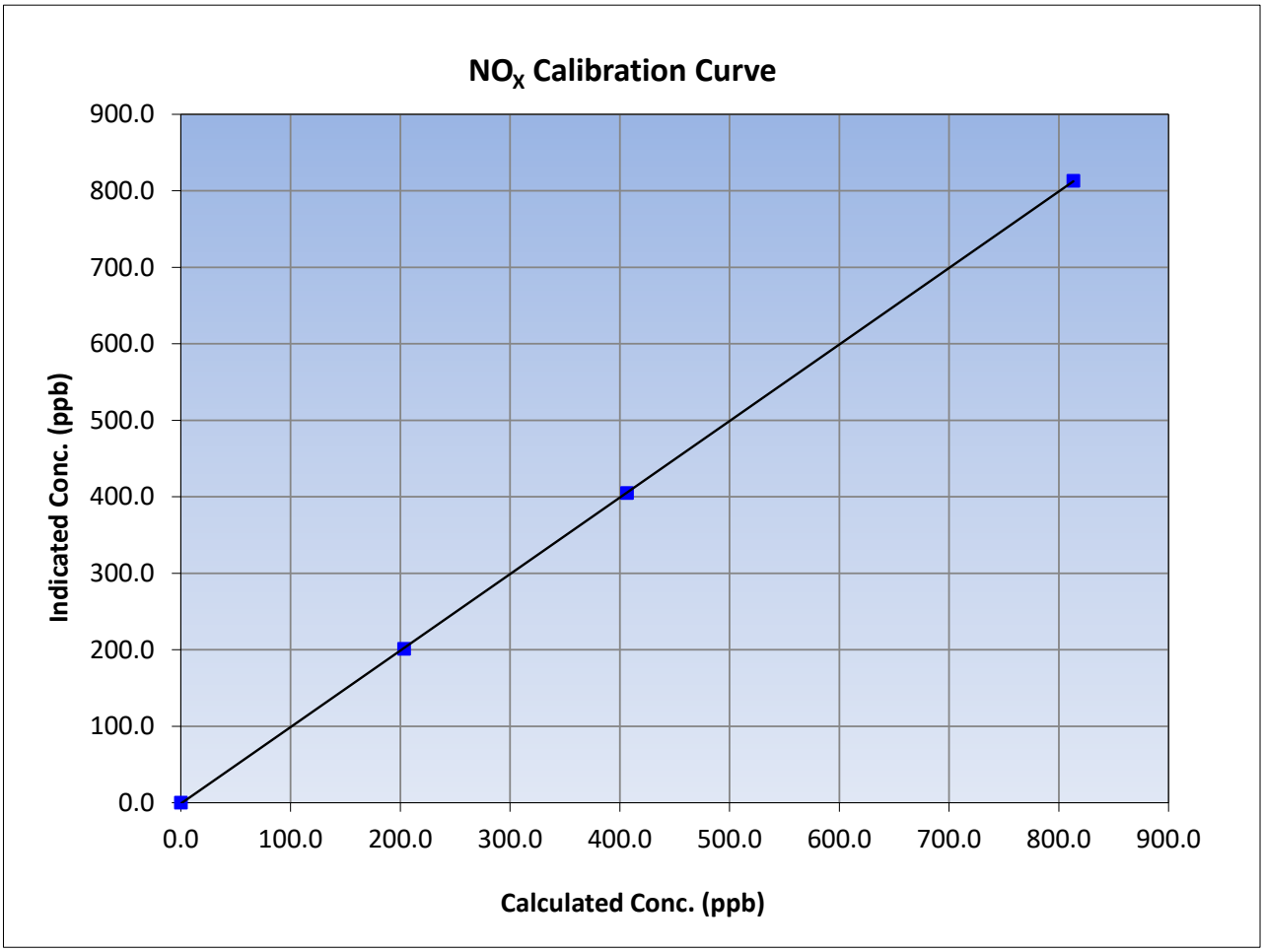
Version-04-2020

Station Information

Calibration Date:	May 11, 2023	Previous Calibration:	April 5, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	8:51	End Time (MST):	13:43
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	0.999991	≥0.995
813.3	813.0	1.0003			
406.6	405.0	1.0040	Slope	1.000351	0.90 - 1.10
203.3	201.1	1.0110			
			Intercept	-1.160000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

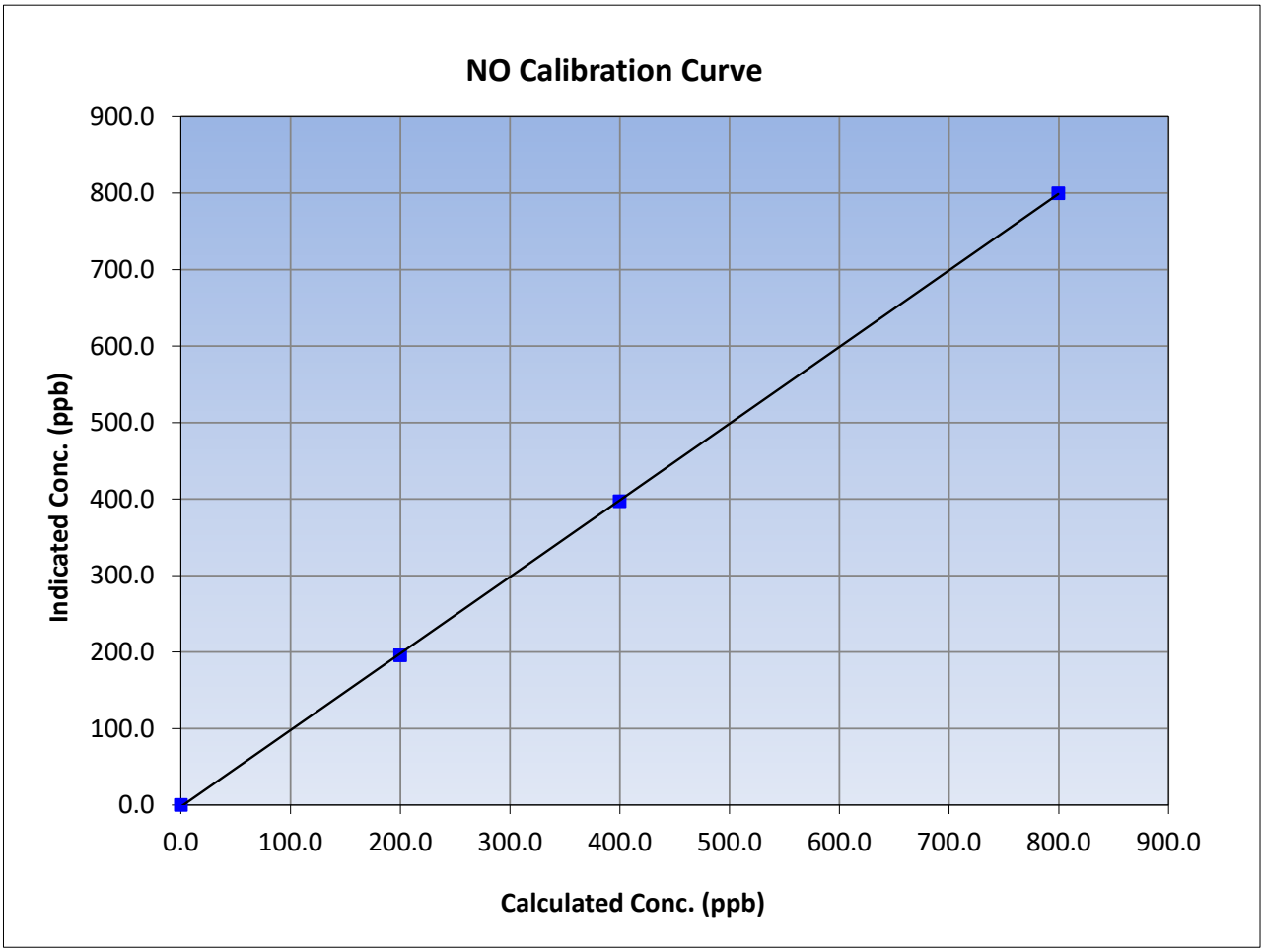
Version-04-2020

Station Information

Calibration Date:	May 11, 2023	Previous Calibration:	April 5, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	8:51	End Time (MST):	13:43
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	0.999964	≥0.995
799.5	799.9	0.9995			
399.8	397.1	1.0067	Slope	1.001858	0.90 - 1.10
199.9	195.8	1.0208			
			Intercept	-2.240000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

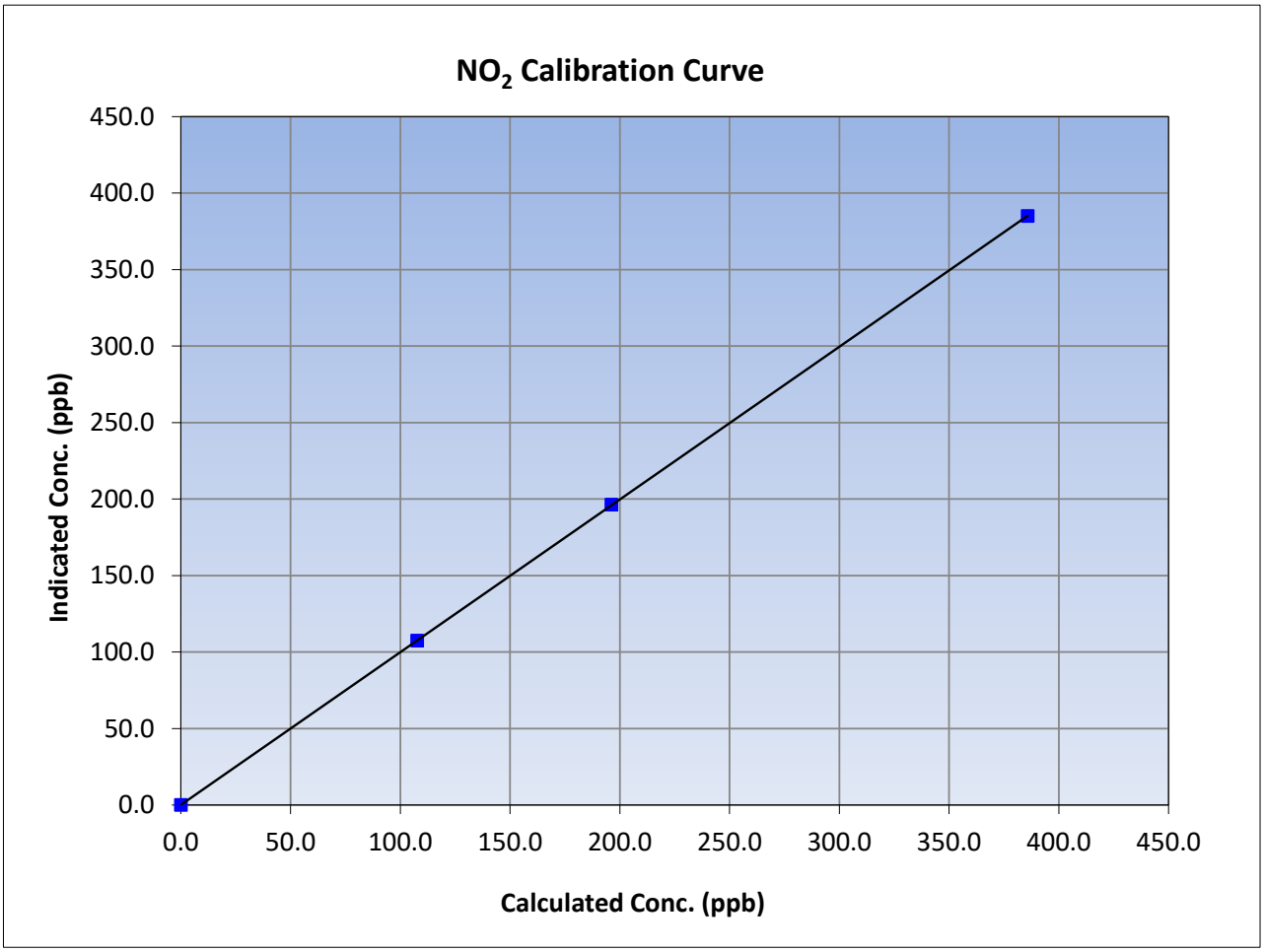
Version-04-2020

Station Information

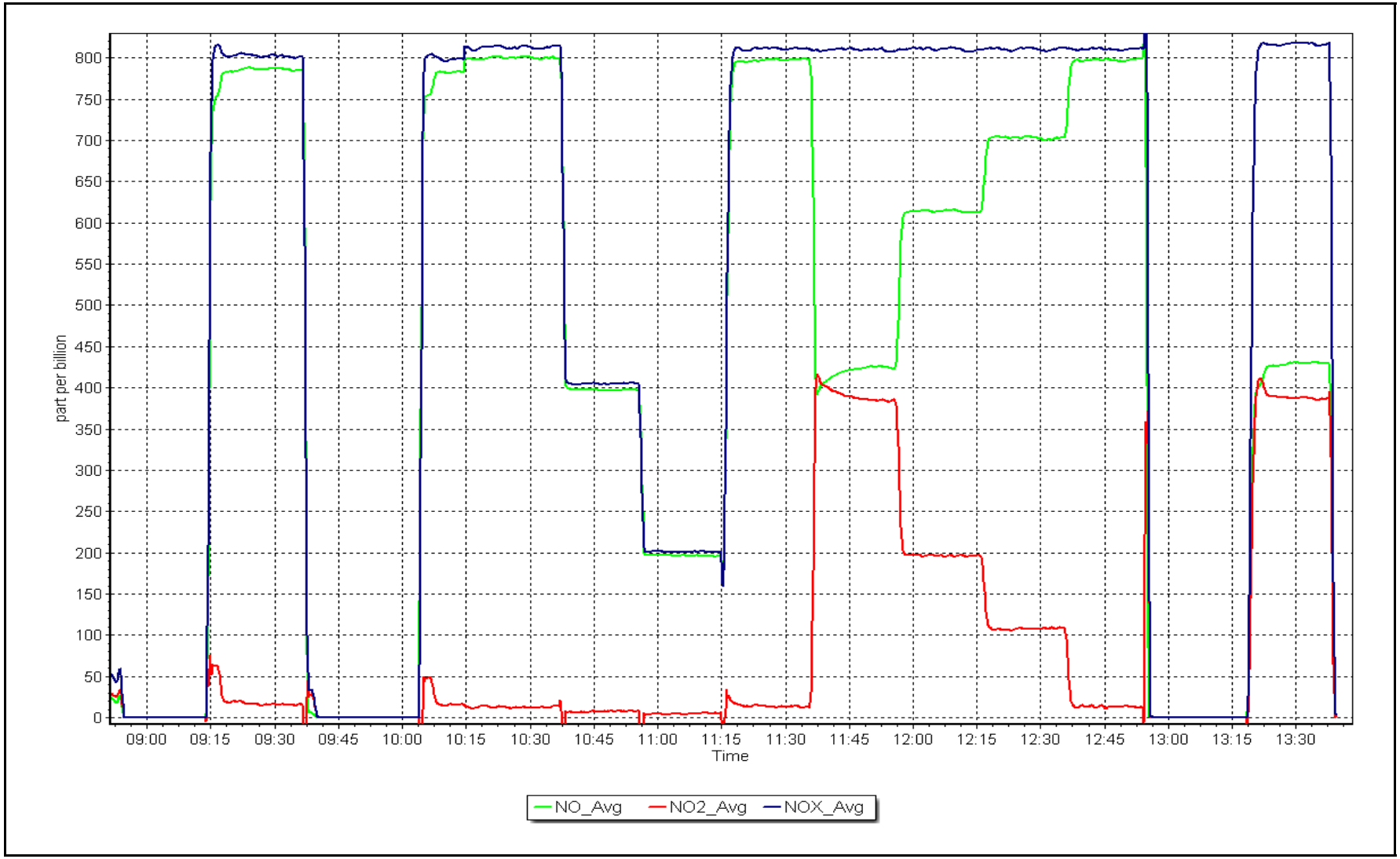
Calibration Date:	May 11, 2023	Previous Calibration:	April 5, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	8:51	End Time (MST):	13:43
Analyzer make:	Thermo 42i	Analyzer serial #:	710321429

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999997	≥0.995
385.8	385.0	1.0020			
196.2	196.3	0.9993	Slope	0.998225	0.90 - 1.10
107.7	107.4	1.0024			
			Intercept	0.085999	+/-20



NO_X Calibration Plot Date: May 11, 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:	May 10, 2023	Last Cal Date:	April 11, 2023
Start time (MST):	9:26	End time (MST):	9:48
Analyzer Make:	API T640	S/N:	875
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	954
Temp/RH standard:	Delta Cal	S/N:	954

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	18.2	17.5	18.2	☐	+/- 2 °C
P (mmHg)	732.4	732.5	732.4	☐	+/- 10 mmHg
flow (LPM)	5.01	5	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: May 10, 2023 Last Cal Date: April 11, 2023

PM w/o HEPA: 9.9 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

Post-maintenance leak check: PM w/o HEPA: _____ w/ HEPA: _____ <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. Inlet head still clean.

Calibration by: Denny Ray Estador

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS506
JACKFISH 1
MAY 2023

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

June 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Jackfish 1	Station number:	AMS 506
Calibration Date:	May 18, 2023	Last Cal Date:	April 20, 2023
Start time (MST):	9:06	End time (MST):	11:54
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:	1.003357	1.003957	Backgd or Offset:	18.7	18.7
Calibration intercept:	-1.656062	-1.916022	Coeff or Slope:	0.949	0.946

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	802.7	0.997
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.3	----
high point	4921	79.2	800.2	802.1	0.998
second point	4960	39.6	400.2	399.5	1.002
third point	4980	19.8	200.1	197.0	1.016
as left zero	5000	0.0	0.0	-0.5	----
as left span	4921	79.2	800.2	801.9	0.998
				Average Correction Factor	1.005

Baseline Corr As found:	803.40	Previous response	801.24	*% 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

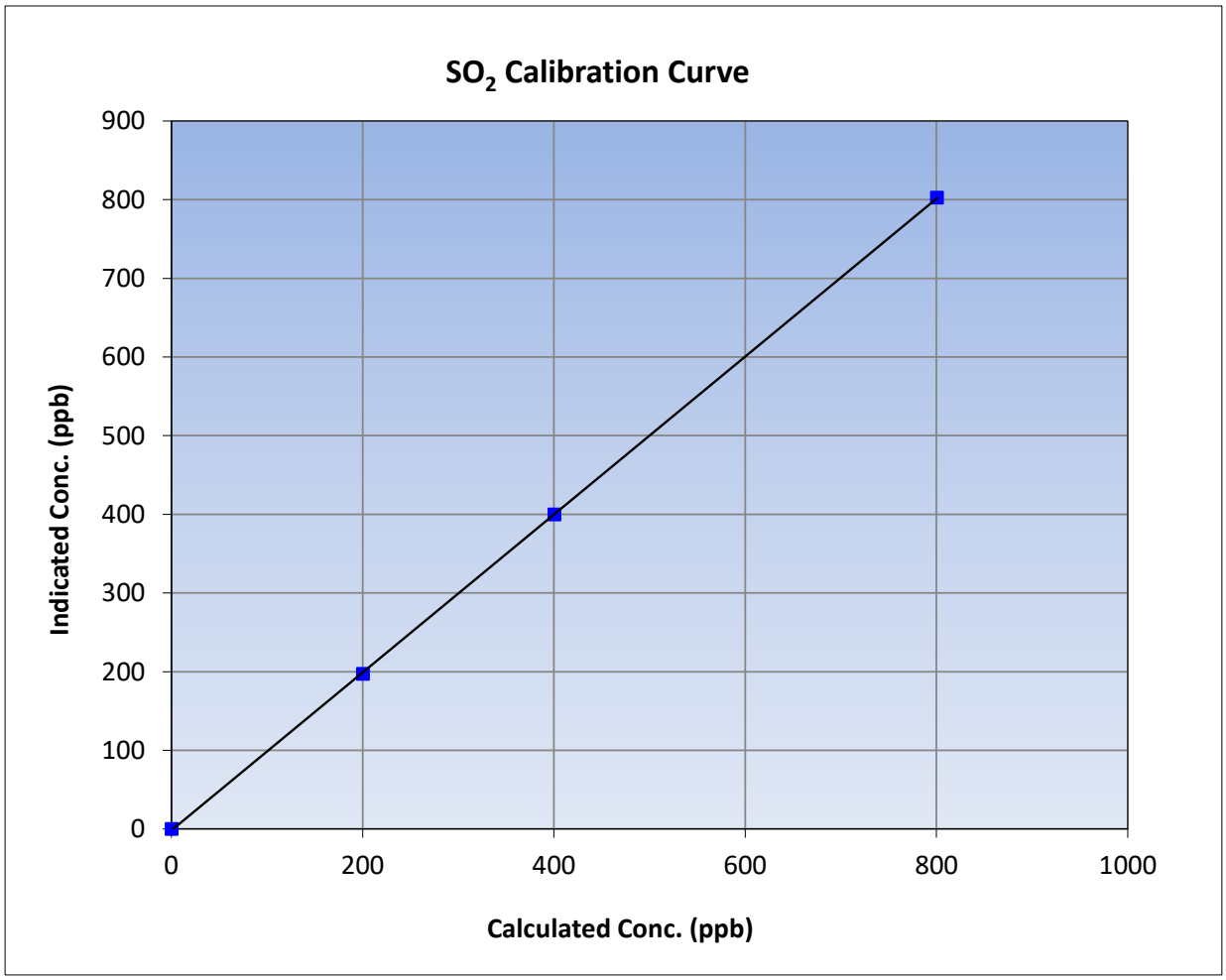
Station Information

Calibration Date:	May 18, 2023	Previous Calibration:	April 20, 2023
Station Name:	Jackfish 1	Station Number:	AMS 506
Start Time (MST):	9:06	End Time (MST):	11:54
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290011

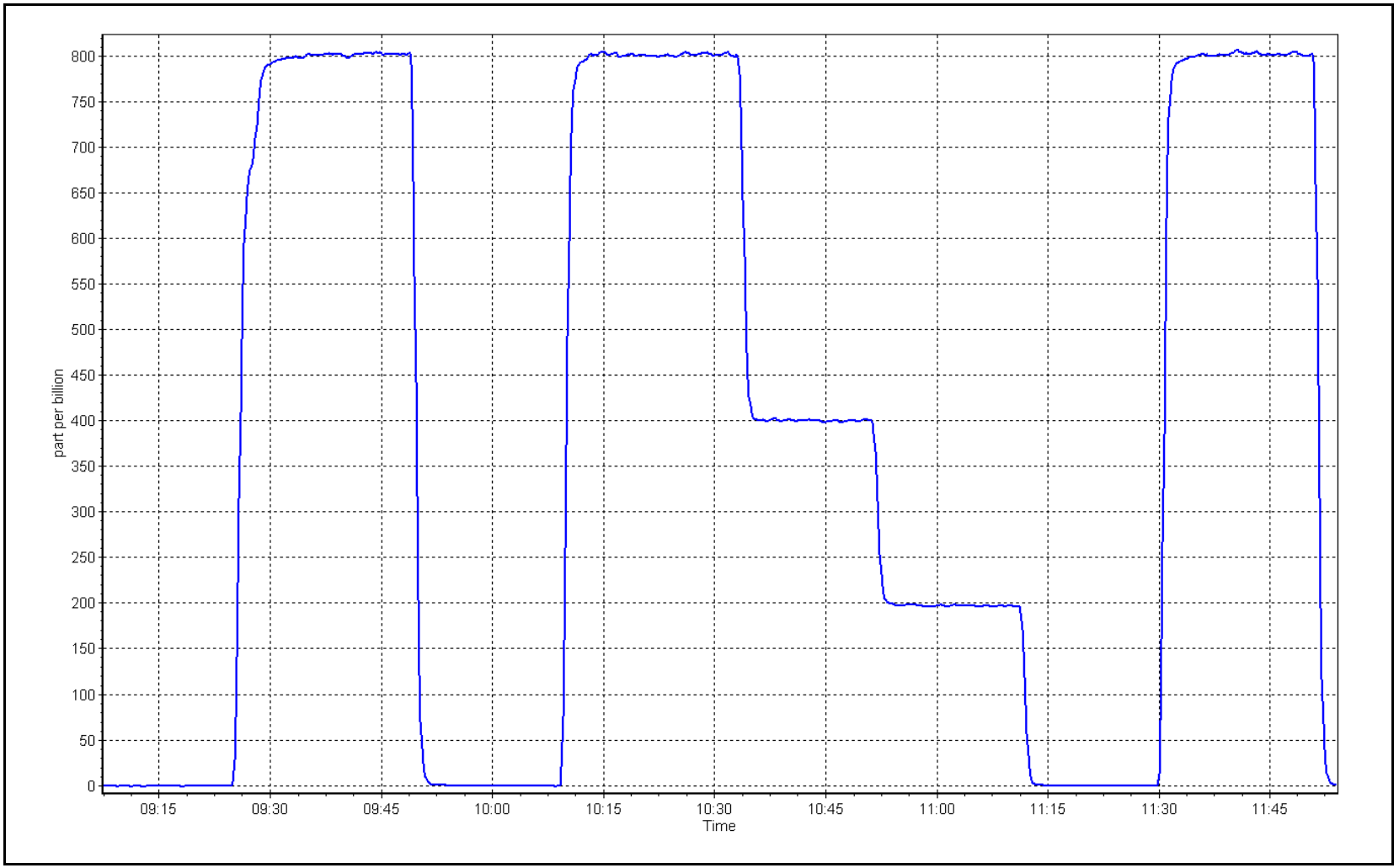
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
800.2	802.1	0.9976
400.2	399.5	1.0016
200.1	197.0	1.0156

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999980	*≥0.995*
Slope	1.003957	*0.90 - 1.10*
Intercept	-1.916022	*+/-30*



SO2 Calibration Plot Date: May 18, 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:	May 25, 2023	Last Cal Date:	April 25, 2023
Start time (MST):	8:16	End time (MST):	12:03
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.14	ppm	Cal Gas Exp Date:	September 16, 2024
Cal Gas Cylinder #:	CC511843			
Removed Cal Gas Conc:	5.14	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	2659
ZAG Make/Model:	API 701		Serial Number:	4427

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1180540020	
Converter make:	Global G150		Converter serial #:	2022-218	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999860	1.015003	Backgd or Offset:	3.37	3.33
Calibration intercept:	-0.298400	-0.378084	Coeff or Slope:	1.066	1.066

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.3	----
as found span	4922	77.8	80.0	80.3	0.992
as found 2nd point	4961	38.9	40.0	39.9	0.995
as found 3rd point	4981	19.4	19.9	19.4	1.012
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.3	----
high point	4922	77.8	80.0	80.8	0.990
second point	4961	38.9	40.0	40.3	0.992
third point	4981	19.4	19.9	19.7	1.012
as left zero	5000	0.0	0.0	-0.3	----
as left span	4922	77.8	80.0	79.9	1.001
SO2 Scrubber Check	4921	79.2	792.0	0.0	----
Date of last scrubber change:		24-Feb-23		Ave Corr Factor	0.998
Date of last converter efficiency test:		December 1, 2022			efficiency

Baseline Corr As found:	80.6	Prev response:	79.67	*% change:	1.2%
Baseline Corr 2nd AF pt:	40.2	AF Slope:	1.009290	AF Intercept:	-0.478254
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999973		

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after multi-point as founds. Scrubber test done and passed after calibrator zero. No adjustment made.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

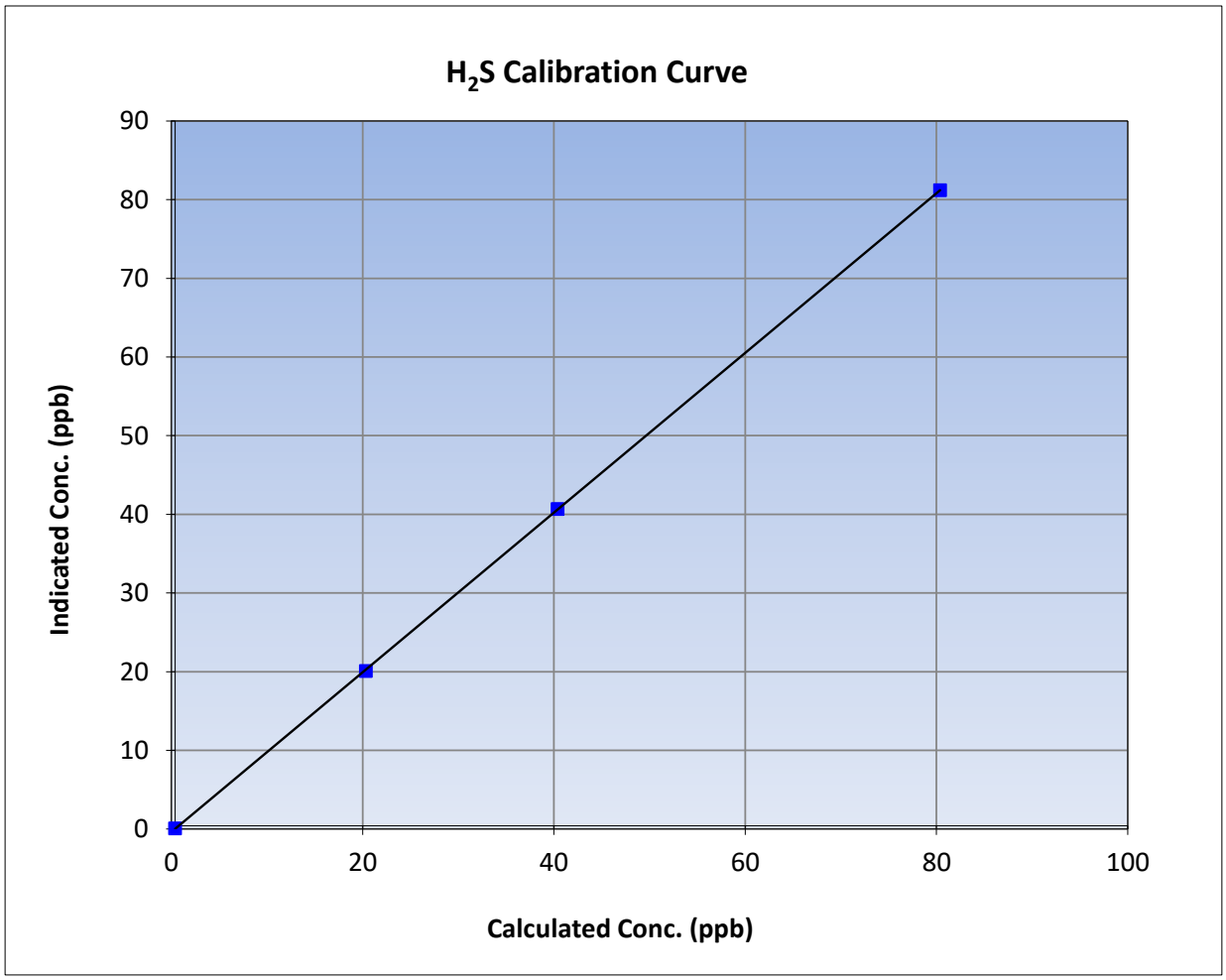
Station Information

Calibration Date:	May 25, 2023	Previous Calibration:	April 25, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	8:16	End Time (MST):	12:03
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1180540020

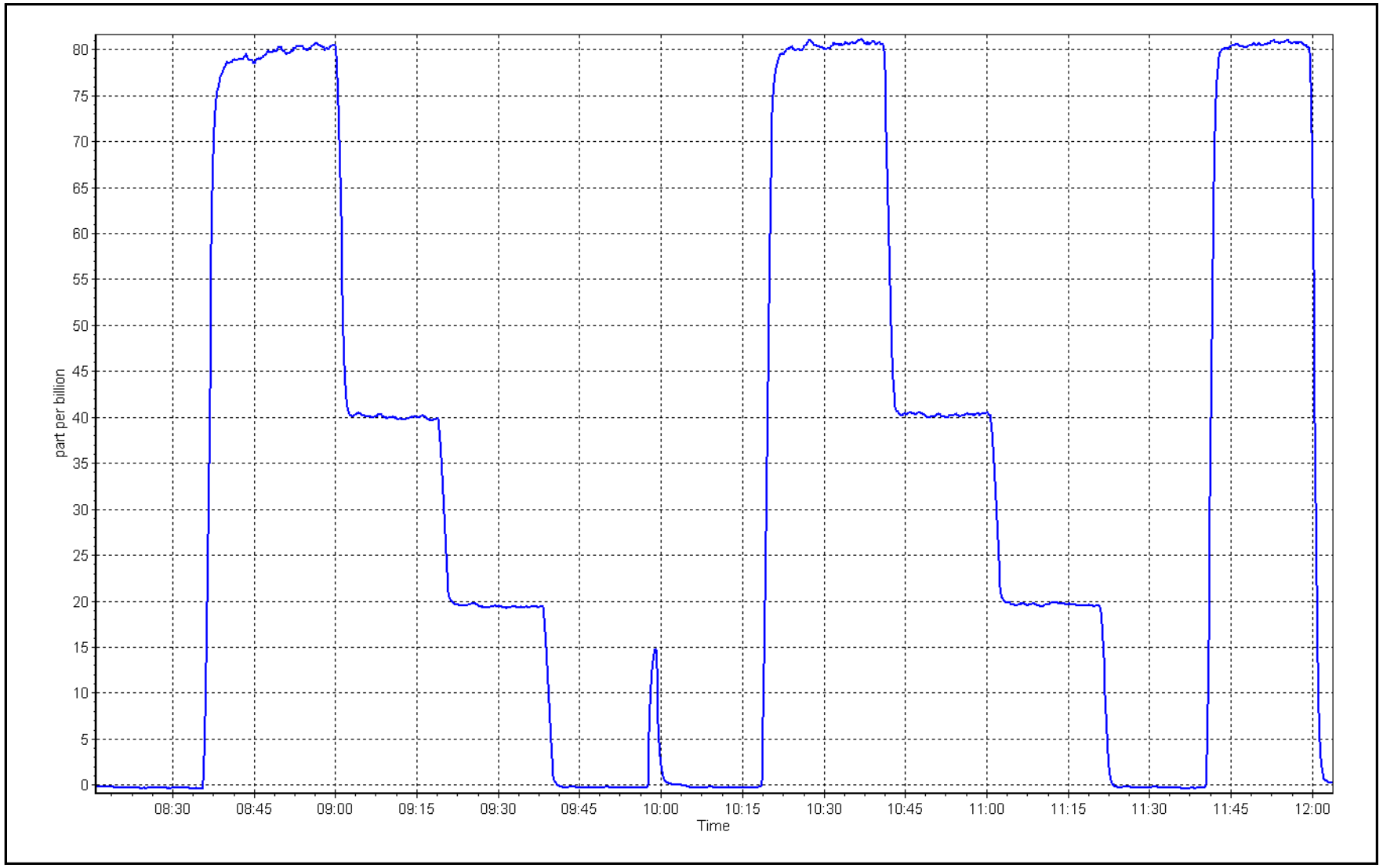
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
80.0	80.8	0.9899
40.0	40.3	0.9923
19.9	19.7	1.0123

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999989	*≥0.995*
Slope	1.015003	*0.90 - 1.10*
Intercept	-0.378084	*+/-3*



H_2S Calibration Plot Date: May 25, 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:	May 26, 2023	Last Cal Date:	April 26, 2023
Start time (MST):	8:06	End time (MST):	12:25
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:	1.143	1.142	NO bkgnd or offset:	3.3	3.7
NOX coeff or slope:	0.993	0.991	NOX bkgnd or offset:	3.4	3.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	172.5	173.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001147	1.000448
NO_X Cal Offset:	-0.448022	-1.727986
NO Cal Slope:	0.999625	1.001597
NO Cal Offset:	-1.447978	-2.987959
NO_2 Cal Slope:	1.006063	1.000773
NO_2 Cal Offset:	0.960980	-1.046494

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.4	0.3	0.1	----	----
as found span	4916	84.4	801.1	799.9	1.2	806.6	800.4	6.1	0.9931	0.9993
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high point	4916	84.4	801.1	799.9	1.2	800.3	799.4	0.8	1.0010	1.0006
second point	4958	42.2	400.5	400.0	0.6	398.8	396.8	2.0	1.0044	1.0080
third point	4979	21.1	200.3	200.0	0.3	196.6	194.0	2.6	1.0187	1.0308
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as left span	4916	84.4	801.1	405.9	395.2	788.3	402.3	386.0	1.0162	1.0089
								Average Correction Factor	1.0080	1.0131

Corrected As found	NO_X = 806.2 ppb	NO = 800.1 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.6%
Previous Response	NO_X = 801.5 ppb	NO = 798.1 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)	791.6	397.6	395.2	394.7	1.0012	99.9%
2nd GPT point (200 ppb O3)	791.6	594.4	198.4	197.9	1.0024	99.8%
3rd GPT point (100 ppb O3)	791.6	685.5	107.3	104.6	1.0256	97.5%
				Average Correction Factor	1.0098	99.0%

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

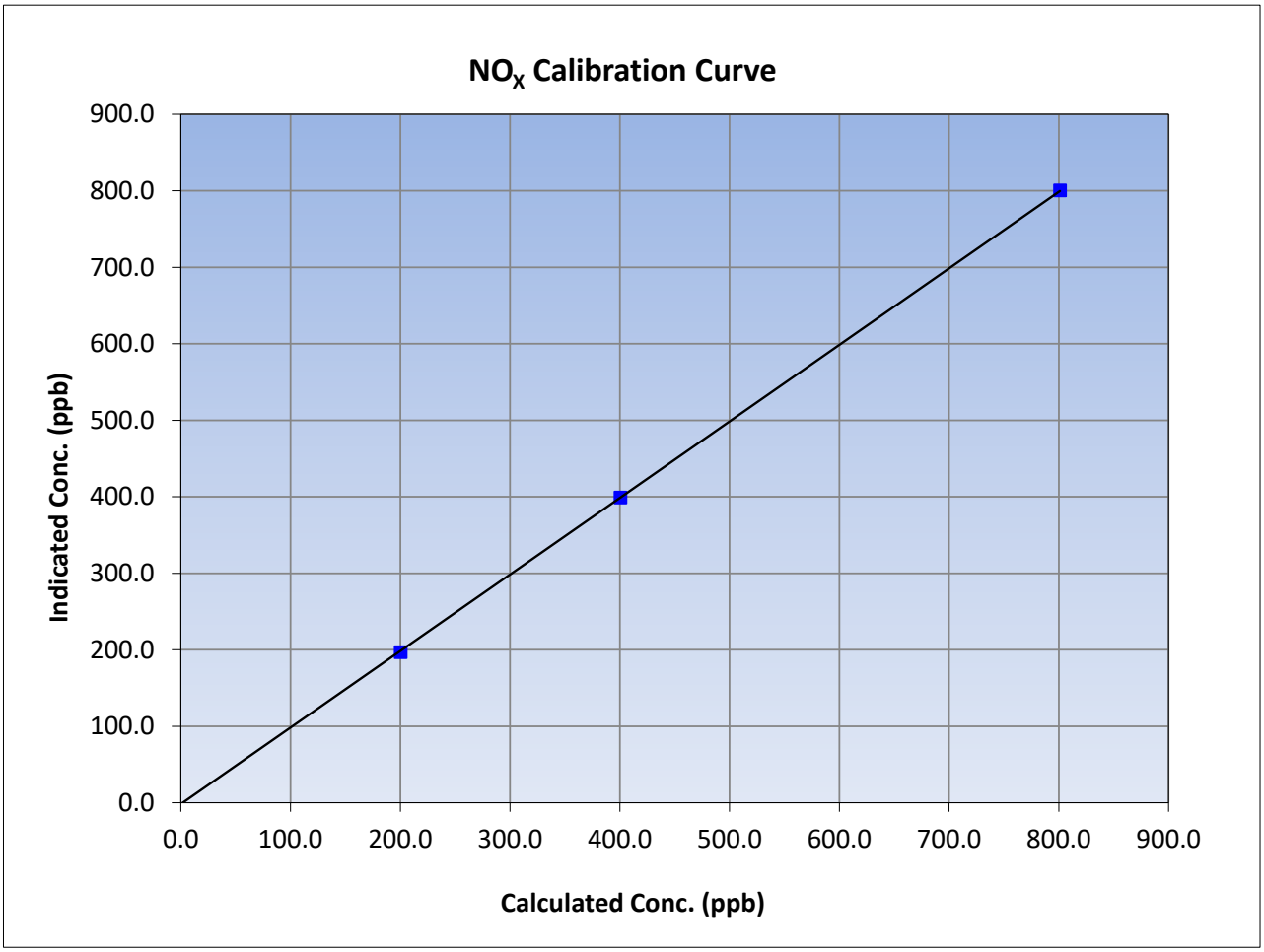
Version-04-2020

Station Information

Calibration Date:	May 26, 2023	Previous Calibration:	April 26, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	8:06	End Time (MST):	12:25
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	0.999979	*≥0.995*
801.1	800.3	1.0010			
400.5	398.8	1.0044	Slope	1.000448	*0.90 - 1.10*
200.3	196.6	1.0187			
			Intercept	-1.727986	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

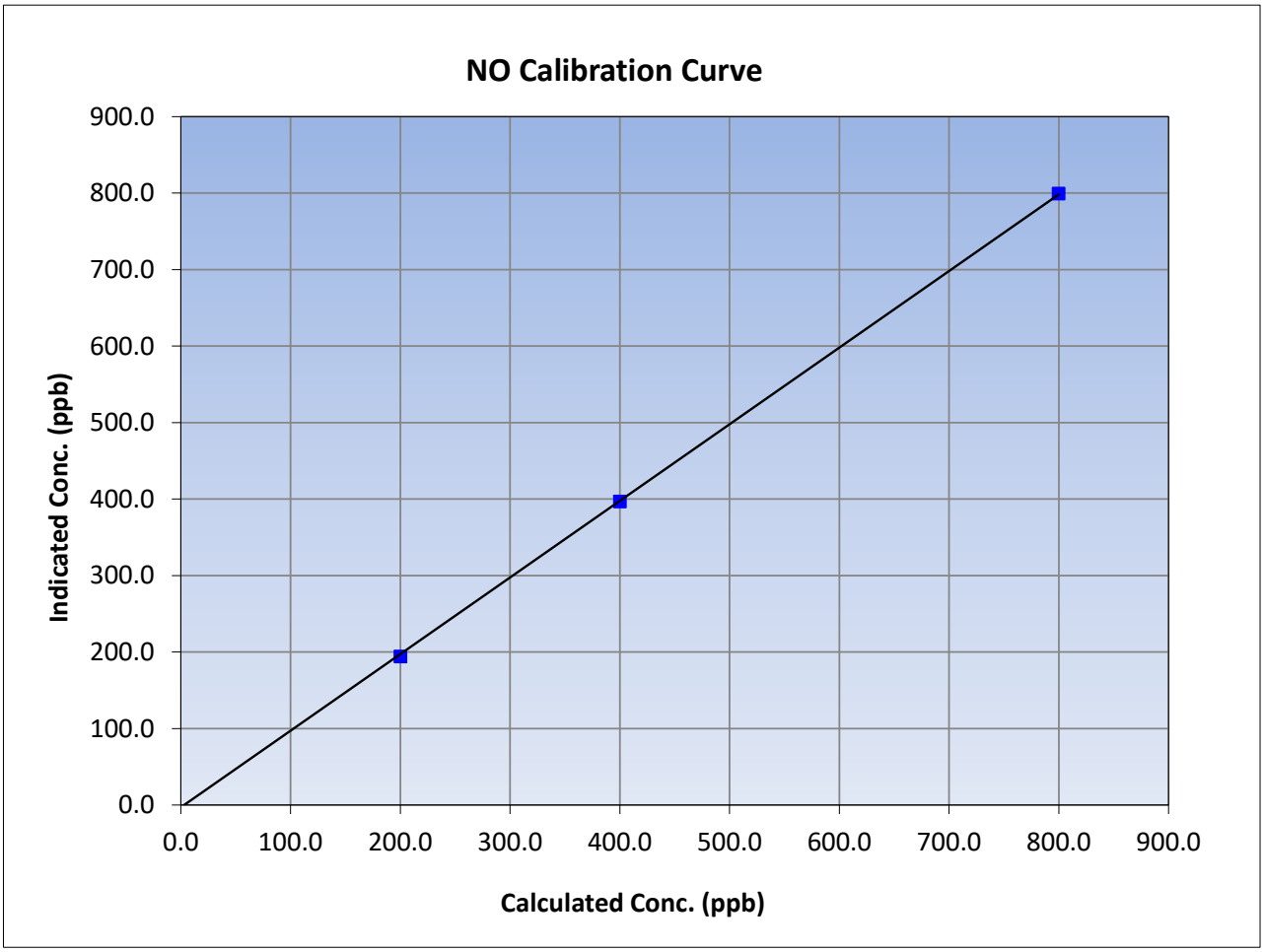
Version-04-2020

Station Information

Calibration Date:	May 26, 2023	Previous Calibration:	April 26, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	8:06	End Time (MST):	12:25
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	0.999939	≥0.995
799.9	799.4	1.0006			
400.0	396.8	1.0080	Slope	1.001597	0.90 - 1.10
200.0	194.0	1.0308			
			Intercept	-2.987959	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

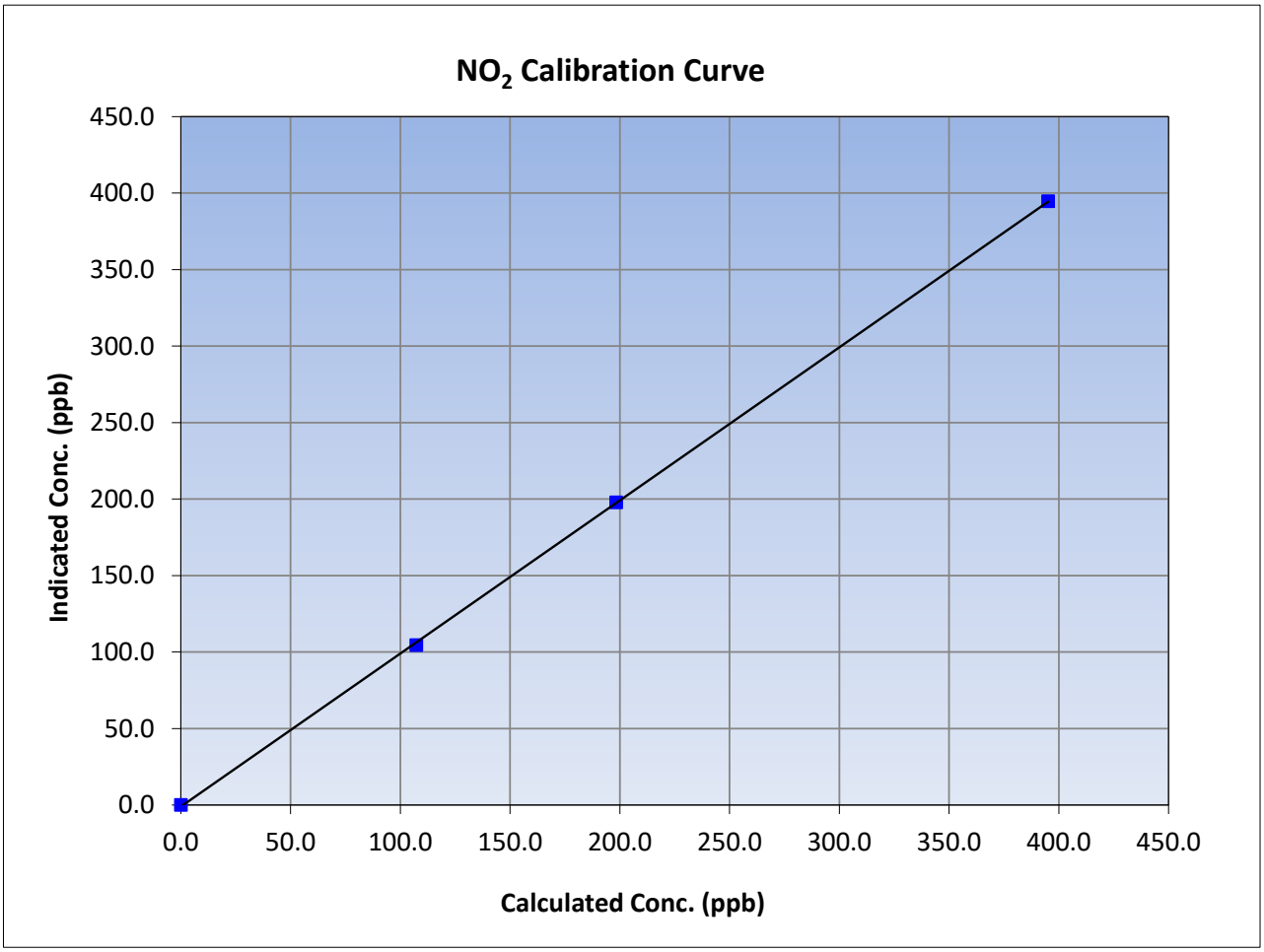
Version-04-2020

Station Information

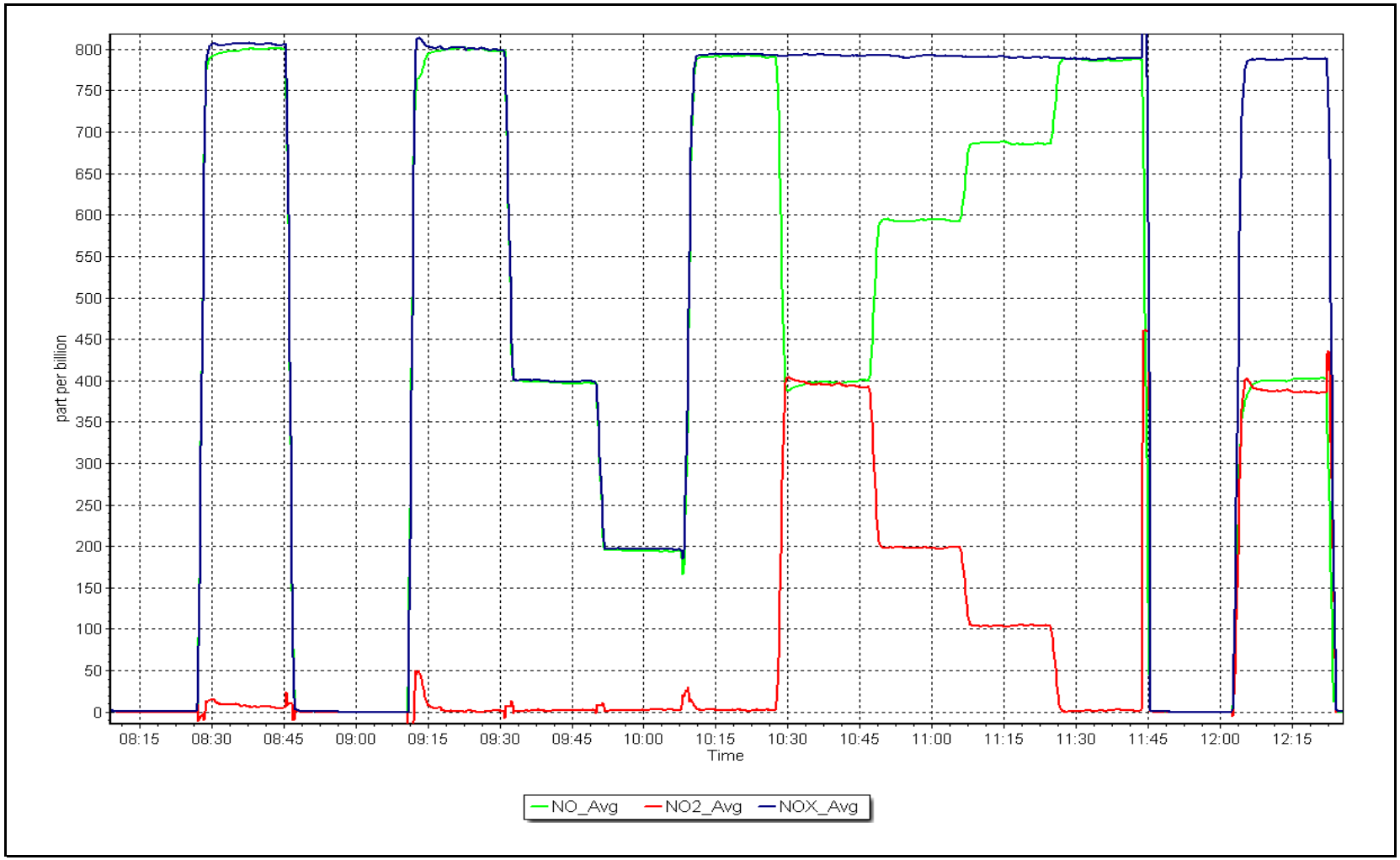
Calibration Date:	May 26, 2023	Previous Calibration:	April 26, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	8:06	End Time (MST):	12:25
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999949	*≥0.995*
395.2	394.7	1.0012			
198.4	197.9	1.0024	Slope	1.000773	*0.90 - 1.10*
107.3	104.6	1.0256			
			Intercept	-1.046494	*+/-20*



NO_X Calibration Plot Date: May 26, 2023 Location: Jackfish 1



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS508
KIRBY NORTH
MAY 2023

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

June 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Kirby North	Station number:	AMS508
Calibration Date:	May 18, 2023	Last Cal Date:	April 21, 2023
Start time (MST):	7:42	End time (MST):	11:39
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:	0.997420	1.006620	Backgd or Offset:	19.5	19.1
Calibration intercept:	-0.728926	-0.948262	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	-0.6	----
as found span	4919	81.3	799.6	801.0	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4919	81.3	799.6	805.0	0.993
second point	4959	40.7	400.3	399.7	1.002
third point	4980	20.3	199.7	200.6	0.995
as left zero	5000	0.0	0.0	0.0	----
as left span	4919	81.3	799.6	805.0	0.993
				Average Correction Factor	0.997

Baseline Corr As found:	801.60	Previous response	796.83	*% change	0.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

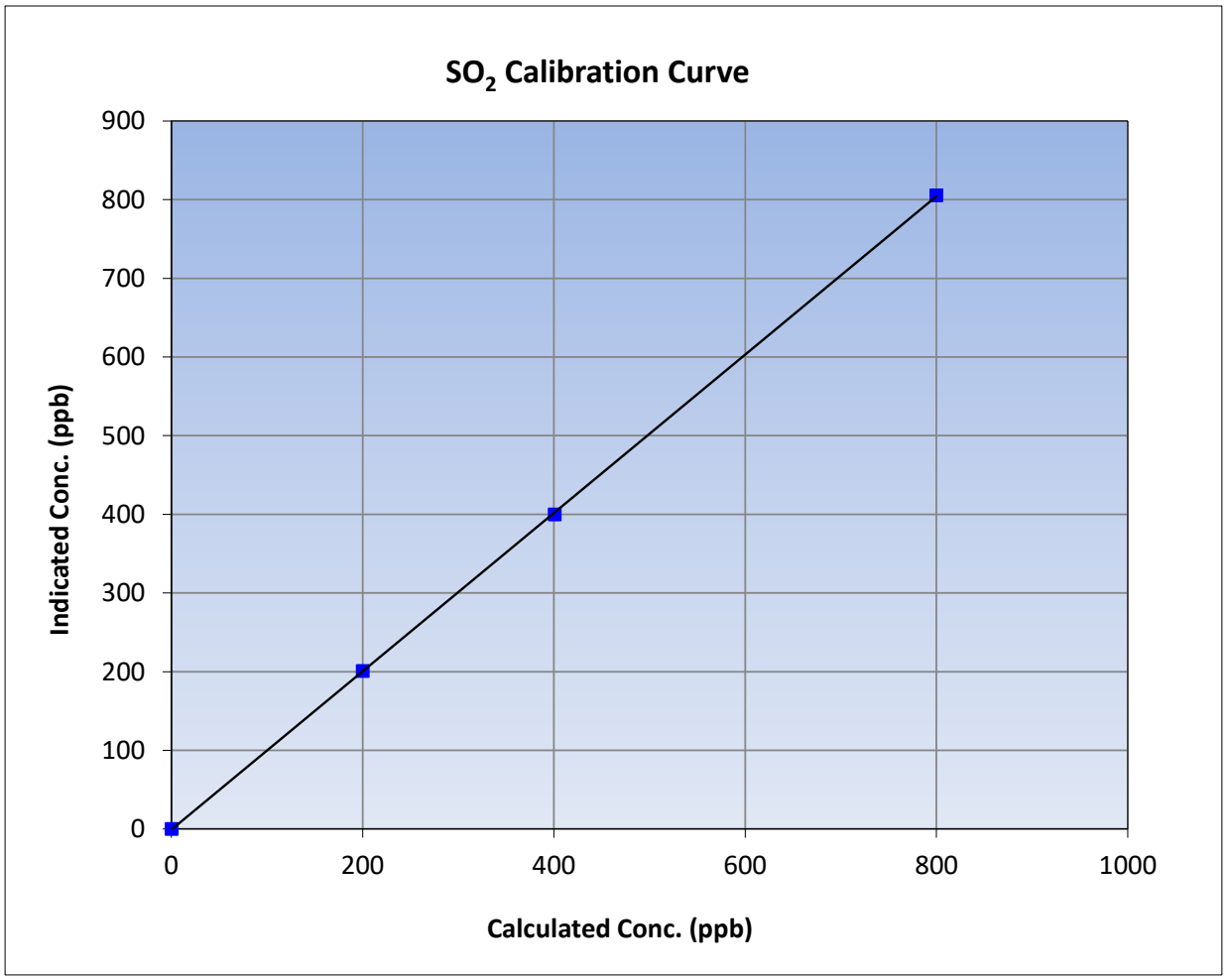
Station Information

Calibration Date:	May 18, 2023	Previous Calibration:	April 21, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	7:42	End Time (MST):	11:39
Analyzer make:	Thermo 43iQ	Analyzer serial #:	1182340007

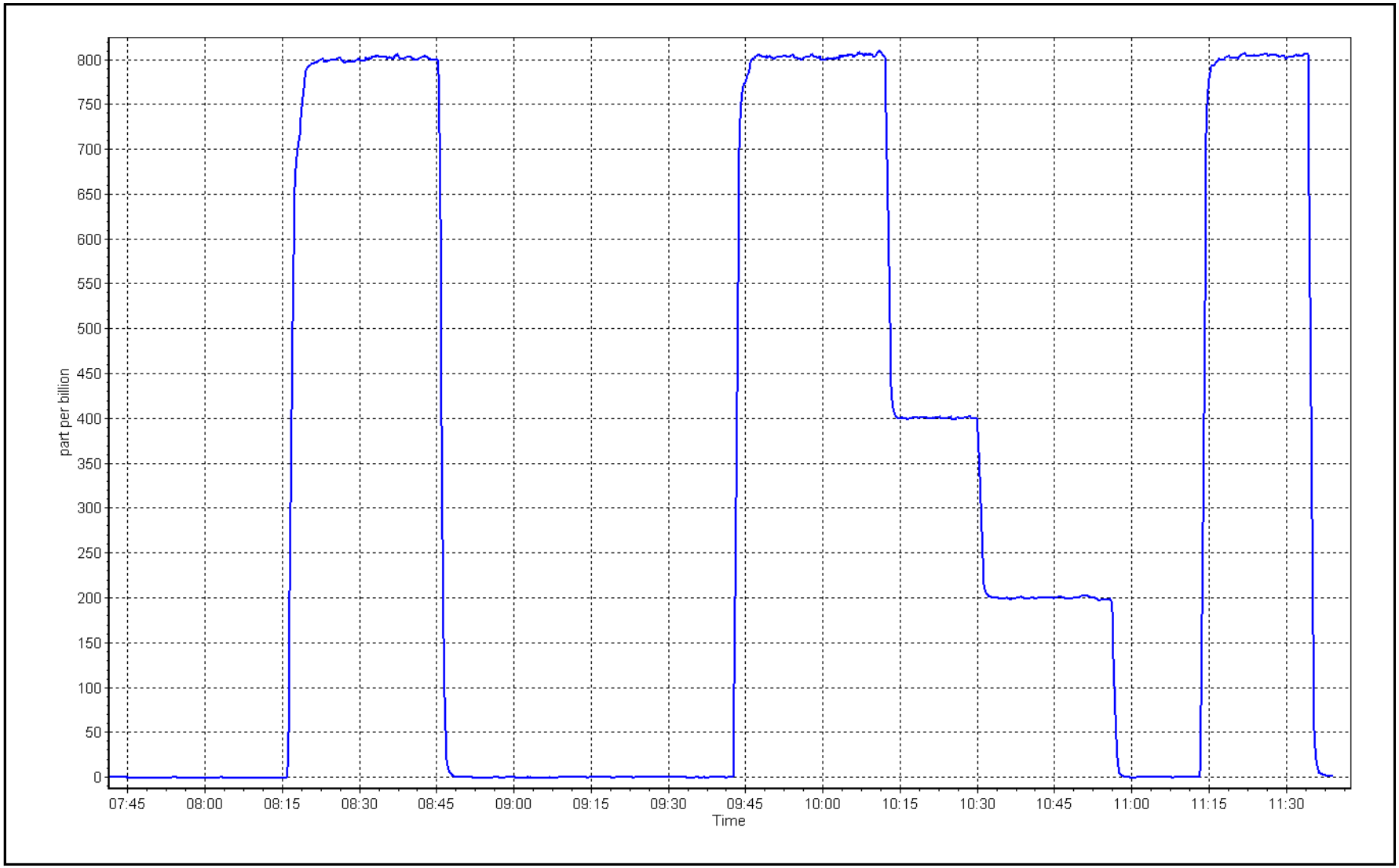
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
799.6	805.0	0.9933
400.3	399.7	1.0016
199.7	200.6	0.9953

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999979	*≥0.995*
Slope	1.006620	*0.90 - 1.10*
Intercept	-0.948262	*+/-30*



SO2 Calibration Plot Date: May 18, 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:	May 17, 2023	Last Cal Date:	April 20, 2023
Start time (MST):	10:58	End time (MST):	17:13
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.167	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517378			
Removed Cal Gas Conc:	5.167	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3804
ZAG Make/Model:	API T701H		Serial Number:	880

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1150840012	
Converter make:	Global		Converter serial #:	2022-197	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001312	1.003026	Backgd or Offset:	1.60	1.58
Calibration intercept:	-0.100838	-0.160868	Coeff or Slope:	1.046	1.027

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	79.8	1.001
as found 2nd point	4961	38.8	40.1	39.7	1.007
as found 3rd point	4981	19.3	19.9	19.6	1.012
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4923	77.4	80.0	80.2	0.997
second point	4961	38.8	40.1	39.8	1.007
third point	4981	19.3	19.9	19.8	1.007
as left zero	5000	0.0	0.0	0.1	----
as left span	4923	77.4	80.0	79.9	1.001
SO2 Scrubber Check				0.0	
Date of last scrubber change:		19-Apr-23		Ave Corr Factor	1.004
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:	39.8	AF Slope:	0.999603	AF Intercept:	-0.241018
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999984		

* = > +/-5% change initiates investigation

Notes: Adjusted span. Moved scrubber outside of the Global Converter after MPAF's.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

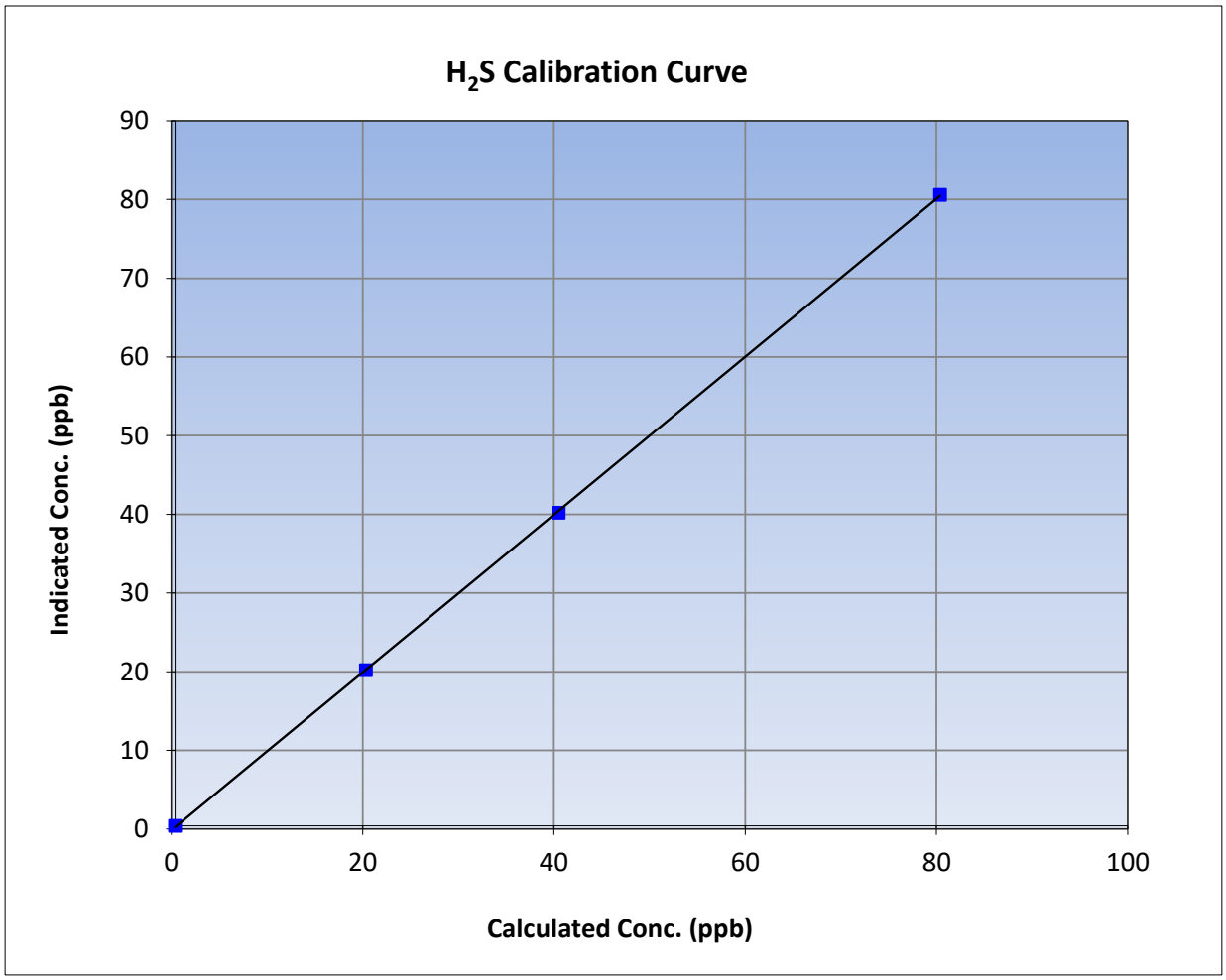
Station Information

Calibration Date:	May 17, 2023	Previous Calibration:	April 20, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	10:58	End Time (MST):	17:13
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1150840012

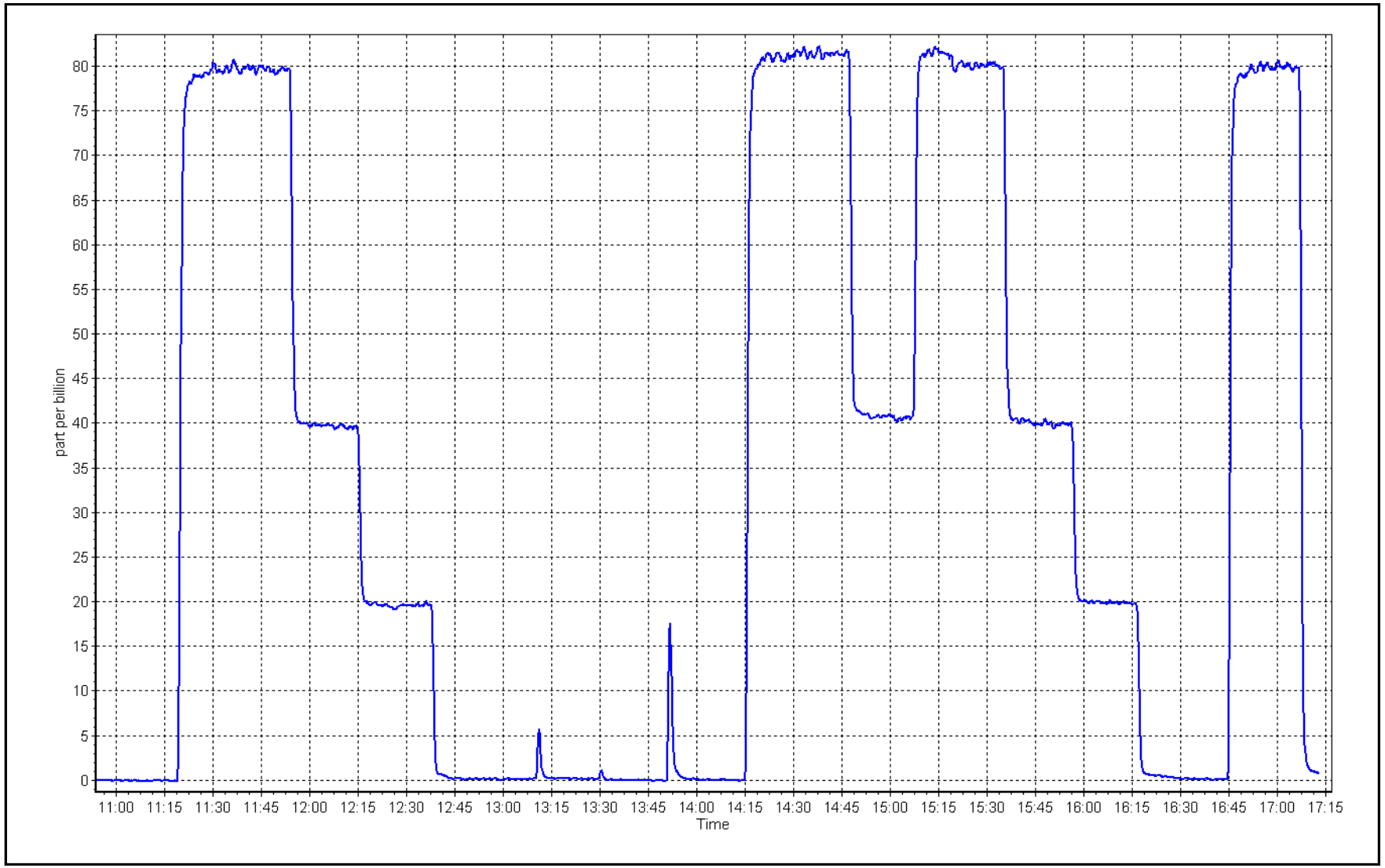
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.2	0.9972
40.1	39.8	1.0075
19.9	19.8	1.0072

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999968	*≥0.995*
Slope	1.003026	*0.90 - 1.10*
Intercept	-0.160868	*+/-3*



H_2S Calibration Plot Date: May 17, 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:	May 18, 2023	Last Cal Date:	April 21, 2023
Start time (MST):	7:42	End time (MST):	11:39
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:	0.994800	1.009048	Background:	2.62	2.66
Calibration intercept:	0.044805	-0.160831	Coefficient:	3.695	3.753

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	-0.05	----
as found span	4919	81.3	17.26	17.14	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.12	----
high point	4919	81.3	17.26	17.27	1.000
second point	4959	40.7	8.64	8.57	1.009
third point	4980	20.3	4.31	4.12	1.046
as left zero	5000	0.0	0.00	-0.12	----
as left span	4919	81.3	17.26	17.30	0.998
				Average Correction Factor	1.018

Baseline Corr As found:	17.19	Previous response	17.22	*% 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 span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

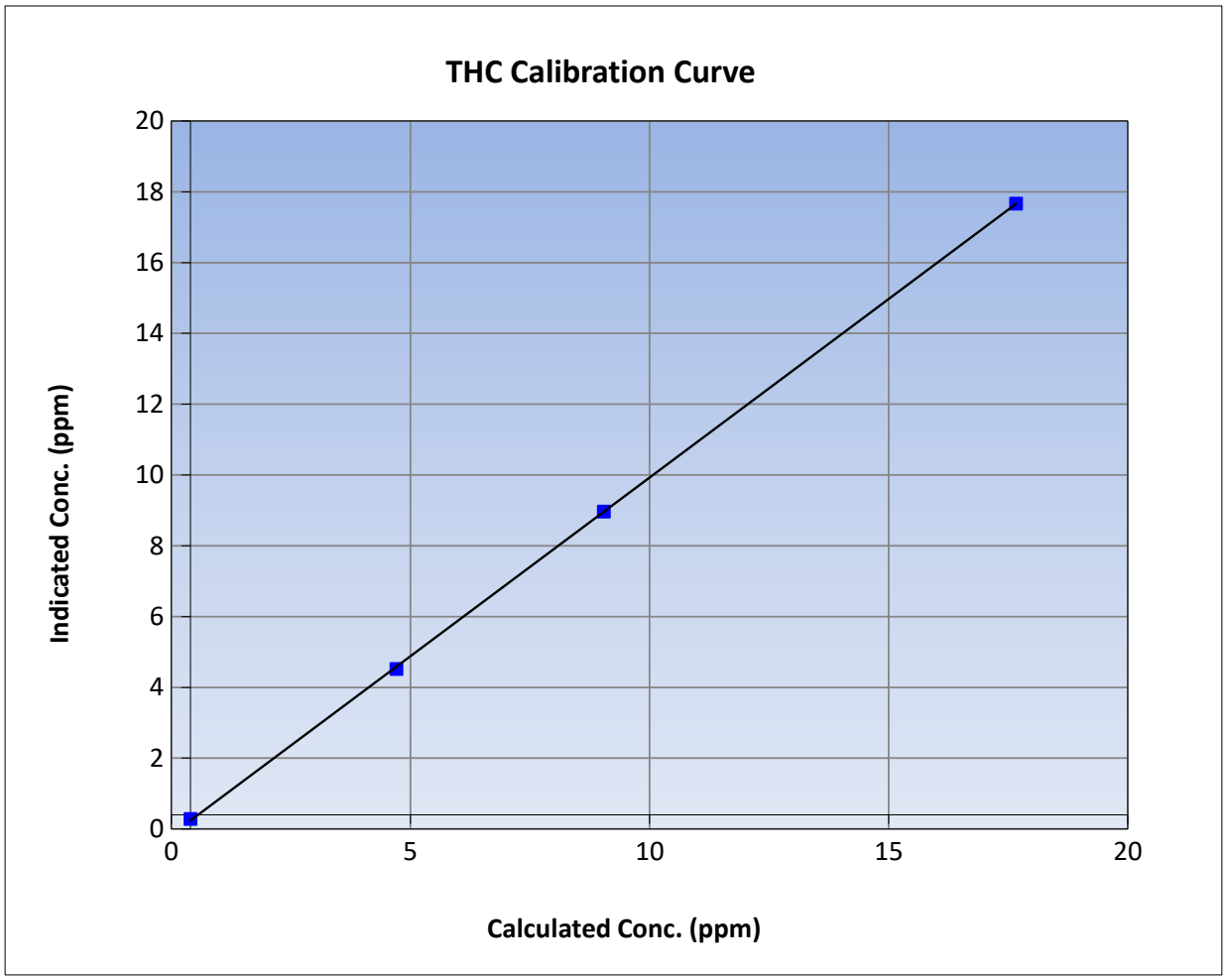
Station Information

Calibration Date:	May 18, 2023	Previous Calibration:	April 21, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	7:42	End Time (MST):	11:39
Analyzer make:	Thermo 51i	Analyzer serial #:	1182340005

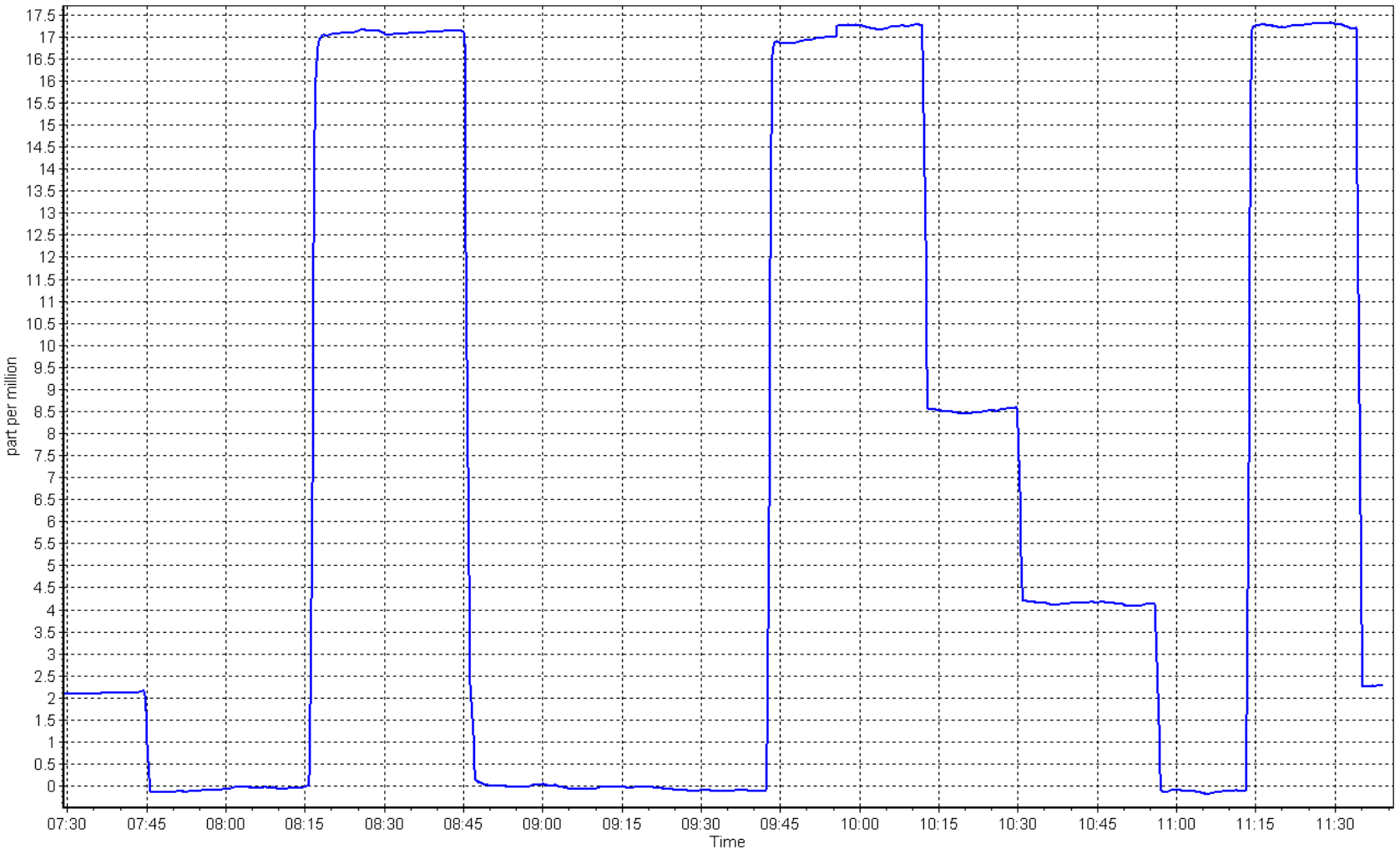
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.12	----
17.26	17.27	0.9996
8.64	8.57	1.0085
4.31	4.12	1.0459

Statistical Evaluation		Limits
Correlation Coefficient	0.999958	≥0.995
Slope	1.009048	0.90 - 1.10
Intercept	-0.160831	+/-1.5



THC Calibration Plot Date: May 18, 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:	May 15, 2023	Last Cal Date:	April 20, 2023
Start time (MST):	10:11	End time (MST):	15:07
Reason:	As Found		

Calibration Standards

NO Gas Cylinder #:		T34ULGL	Cal Gas Expiry Date:	March 8, 2025	
NOX Cal Gas Conc:	49.39	ppm	NO Cal Gas Conc:	49.02	ppm
Removed Cylinder #:		NA	Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	49.39	ppm	Removed Gas NO Conc:	49.02	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3804	
ZAG make/model:	API 701H		Serial Number:	880	

Analyzer Information

Analyzer make:	API T200	Analyzer serial #:	7029
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.026	1.026	NO bkgnd or offset:	0.1	0.1
NOX coeff or slope:	1.023	1.023	NOX bkgnd or offset:	0.3	0.3
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	5.0	5.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999458	
NO_X Cal Offset:	-0.151623	
NO Cal Slope:	1.001479	
NO Cal Offset:	-1.633427	
NO_2 Cal Slope:	1.001970	
NO_2 Cal Offset:	1.001988	

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	0.5	0.0	0.5	----	----
as found span	4919	81.0	800.1	794.1	6.0	798.2	788.3	9.9	1.0024	1.0074
as found 2nd	4960	40.5	400.0	397.0	3.0	397.0	392.3	4.7	1.0076	1.0120
as found 3rd	4980	20.2	199.5	198.0	1.5	197.0	192.7	4.3	1.0128	1.0277
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 = 797.7 ppb	NO = 788.3 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-0.2%
Previous Response	NO_X = 799.5 ppb	NO = 793.7 ppb			*Percent Change	NO =	-0.7%
Baseline Corr 2nd pt	NO_X = 396.5 ppb	NO = 392.3 ppb	As found	NO_X r^2: 0.999984	Nx Sl: 0.997689	Nx Int:	-0.932
Baseline Corr 3rd pt	NO_X = 196.5 ppb	NO = 192.7 ppb	As found	NO r^2: 0.999972	NO Sl: 0.994084	NO Int:	-1.915
			As found	NO_2 r^2: 0.999985	NO2 Sl: 1.003303	NO_2 Int:	1.154

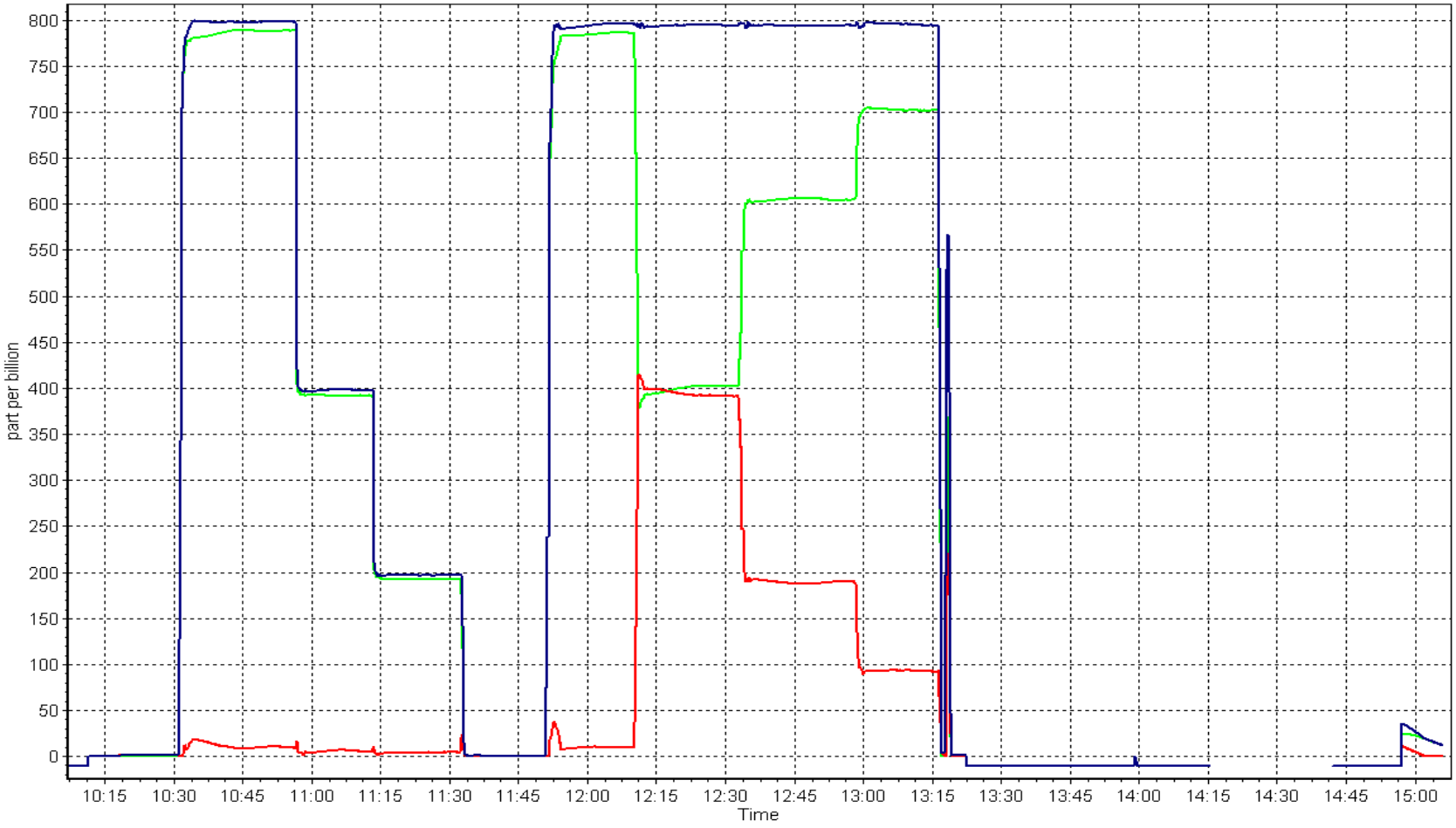
GPT Calibration Data

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	0.5	----	----
as found GPT point (400 ppb NO2)	785.8	402.2	389.6	391.6	0.9949	100.5%
as found GPT point (200 ppb NO2)	785.8	604.4	187.4	189.9	0.9868	101.3%
as found GPT point (100 ppb NO2)	785.8	701.9	89.9	91.7	0.9803	102.0%
1st GPT point (400 ppb O3)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
				Average Correction Factor		

Notes: Planned to change the analyzer due to a memory error. Could not complete as communication issues occurred with the new analyzer. Deleted datalog on the DAS (potential fix for memory issue). Will finish the work May 16.

Calibration Performed By: Braiden Boutilier

NO_X Calibration Plot Date: May 15, 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:	May 16, 2023	Last Cal Date:	May 15, 2023
Start time (MST):	9:58	End time (MST):	14:18
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:		T34ULGL	Cal Gas Expiry Date:	March 8, 2025	
NOX Cal Gas Conc:	49.39	ppm	NO Cal Gas Conc:	49.02	ppm
Removed Cylinder #:		NA	Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	49.39	ppm	Removed Gas NO Conc:	49.02	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3804	
ZAG make/model:	API 701H		Serial Number:	880	

Analyzer Information

Analyzer make:	API T200	Analyzer serial #:	7029
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.026	1.038	NO bkgnd or offset:	0.1	-0.1
NOX coeff or slope:	1.023	1.034	NOX bkgnd or offset:	0.3	3.6
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	5.1	5.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999458	1.001459
NO_X Cal Offset:	-0.151623	-2.051855
NO Cal Slope:	1.001479	1.000875
NO Cal Offset:	-1.633427	-1.873766
NO_2 Cal Slope:	1.001970	0.995418
NO_2 Cal Offset:	1.001988	-0.467650

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	0.0	-0.4	----	----
high point	4919	81.0	800.1	794.1	6.0	800.0	793.7	6.7	1.0001	1.0005
second point	4960	40.5	400.0	397.0	3.0	397.9	395.1	2.8	1.0053	1.0049
third point	4980	20.2	199.5	198.0	1.5	196.0	194.1	1.9	1.0180	1.0203
as left zero	5000	0.0	0.0	0.0	0.0	-1.5	0.2	-1.6	----	----
as left span	4919	81.0	800.1	406.1	394.0	793.6	404.9	388.7	1.0082	1.0030
								Average Correction Factor	1.0078	1.0086

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)	791.9	403.9	394.0	392.1	1.0048	99.5%
2nd GPT point (200 ppb O3)	791.9	620.6	177.3	174.8	1.0143	98.6%
3rd GPT point (100 ppb O3)	791.9	711.9	86.0	85.9	1.0011	99.9%
				Average Correction Factor	1.0067	99.3%

Notes: Calibration completed after as founds and maintenance done yesterday. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

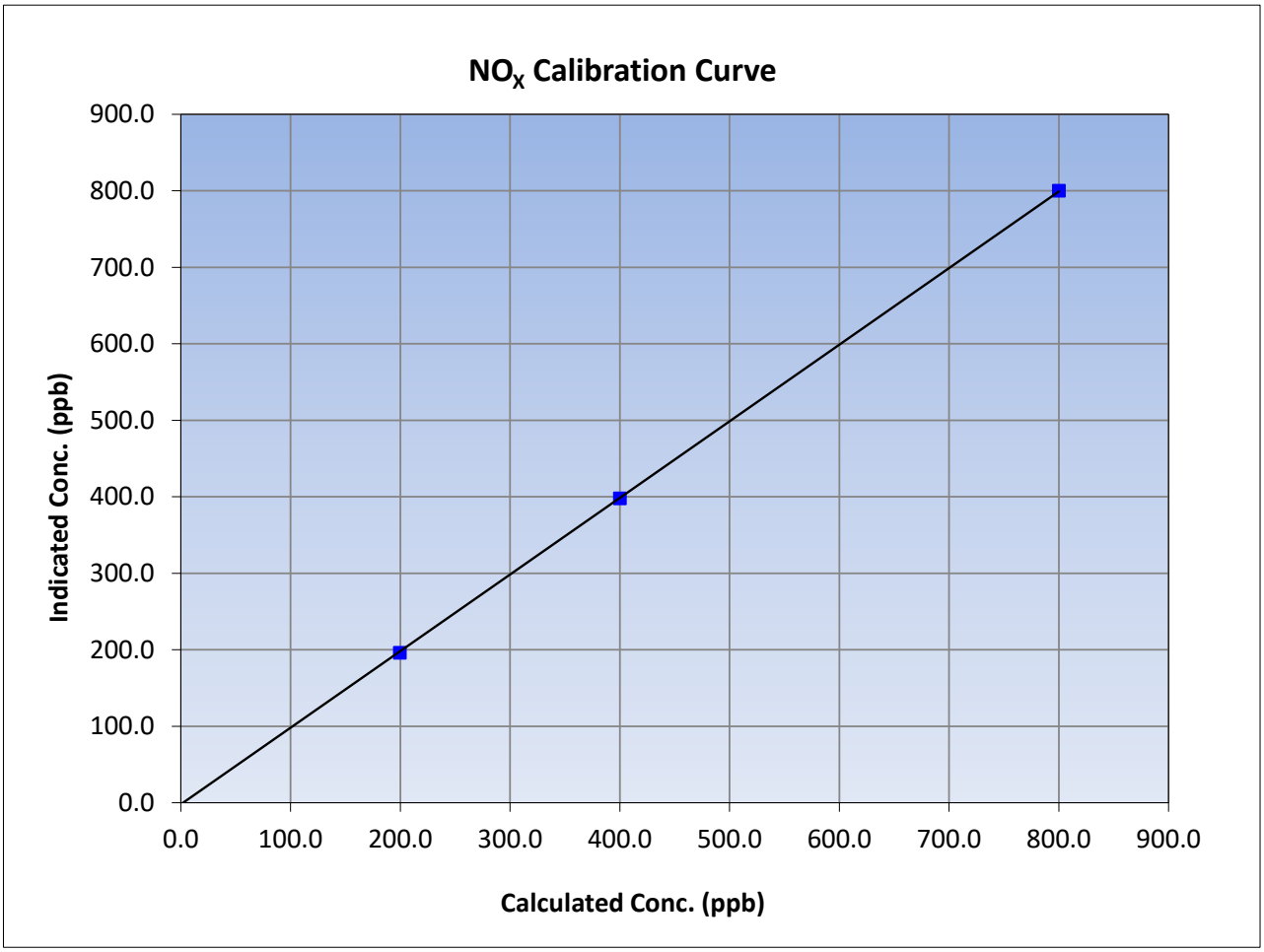
Version-04-2020

Station Information

Calibration Date:	May 16, 2023	Previous Calibration:	May 15, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	9:58	End Time (MST):	14:18
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	-0.4	----	Correlation Coefficient	0.999980	≥0.995
800.1	800.0	1.0001			
400.0	397.9	1.0053	Slope	1.001459	0.90 - 1.10
199.5	196.0	1.0180			
			Intercept	-2.051855	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

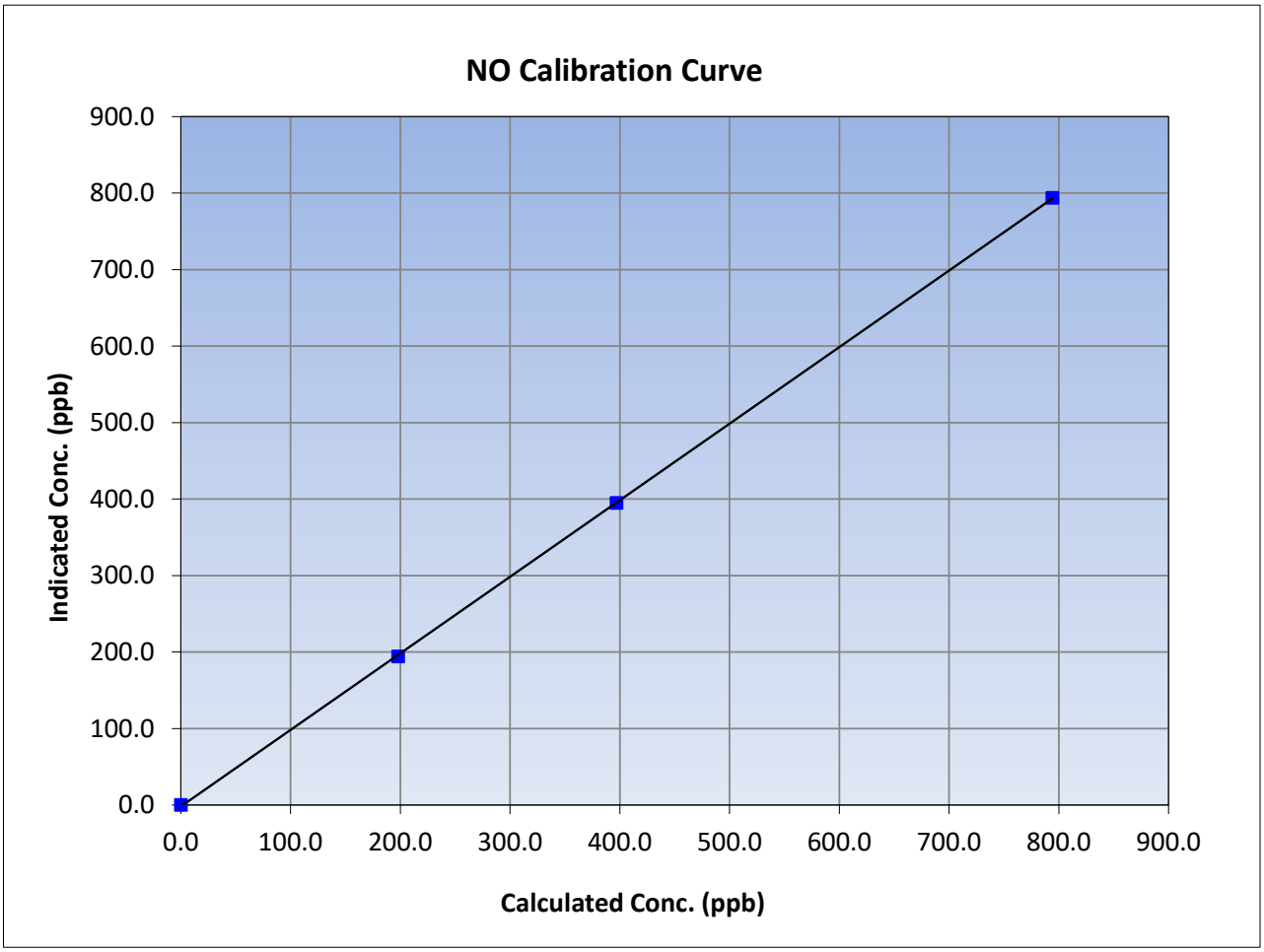
Version-04-2020

Station Information

Calibration Date:	May 16, 2023	Previous Calibration:	May 15, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	9:58	End Time (MST):	14:18
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	0.999973	≥0.995
794.1	793.7	1.0005			
397.0	395.1	1.0049	Slope	1.000875	0.90 - 1.10
198.0	194.1	1.0203			
			Intercept	-1.873766	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

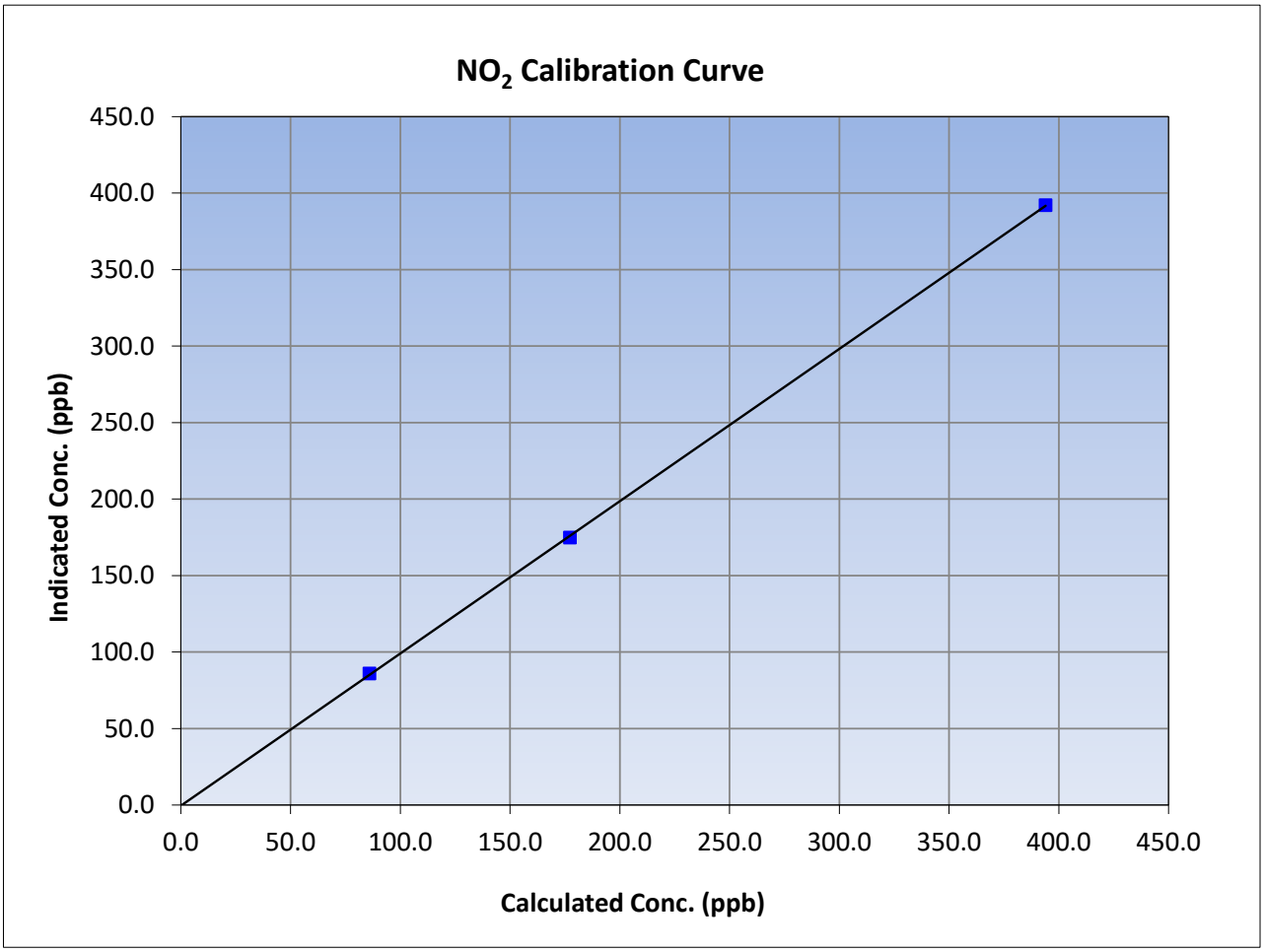
Version-04-2020

Station Information

Calibration Date:	May 16, 2023	Previous Calibration:	May 15, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	9:58	End Time (MST):	14:18
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	-0.4	----	Correlation Coefficient	0.999974	≥0.995
394.0	392.1	1.0048			
177.3	174.8	1.0143	Slope	0.995418	0.90 - 1.10
86.0	85.9	1.0011			
			Intercept	-0.467650	+/-20



NO_X Calibration Plot Date: May 16, 2023 Location: Kirby North

End of Report