WOOD BUFFALO
ENVIRONMENTAL ASSOCIATION

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Wood Buffalo Environmental Association

APRIL 2023

MONTHLY CALIBRATION REPORT

CONTINUOUS MONITORING

May 31, 2023

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS01
BERTHA GANTER - FORT MCKAY
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	April 24, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	10:50	End time (MST):	15:48
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:	1.000943	0.998615	Backgd or Offset:	19.4	19.2
Calibration intercept:	-0.132808	0.106886	Coeff or Slope:	0.897	0.889

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	4918	81.3	799.9	804.4	0.994
as found 2nd point	4959	40.7	400.4	400.7	0.999
as found 3rd point	4979	20.3	199.7	199.3	1.002
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4918	81.3	799.9	799.3	1.001
second point	4959	40.7	400.4	399.1	1.003
third point	4979	20.3	199.7	199.9	0.999
as left zero	5000	0.0	0.0	0.6	----
as left span	4918	81.3	799.9	799.9	1.000
				Average Correction Factor	1.001

Baseline Corr As found:	804.10	Previous response	800.56	*% change	0.4%
Baseline Corr 2nd AF pt:	400.40	AF Slope:	1.005658	AF Intercept:	-0.833202
Baseline Corr 3rd AF pt:	199.00	AF Correlation:	0.999989		

* = > +/-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

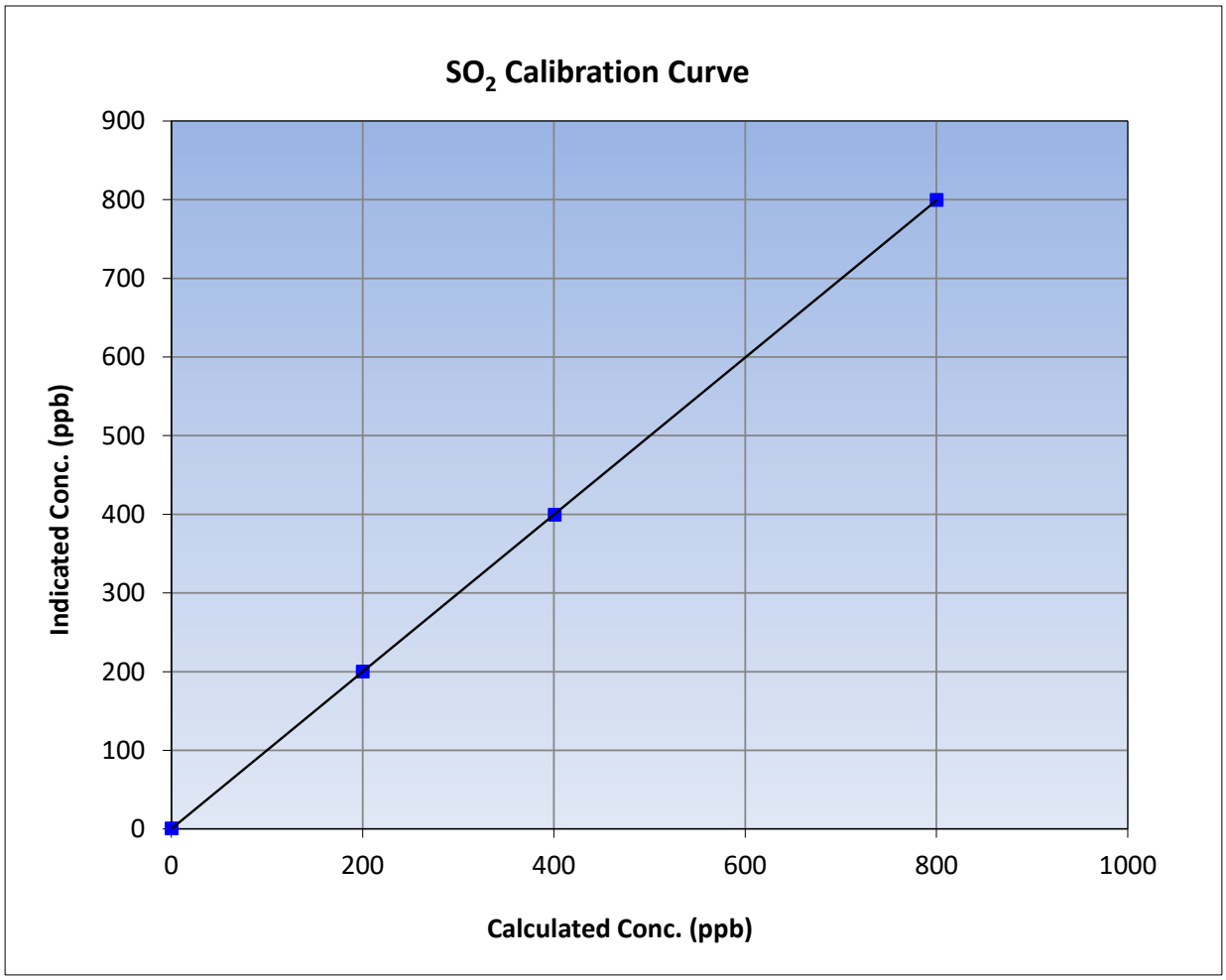
Station Information

Calibration Date:	April 24, 2023	Previous Calibration:	March 13, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:50	End Time (MST):	15:48
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301448

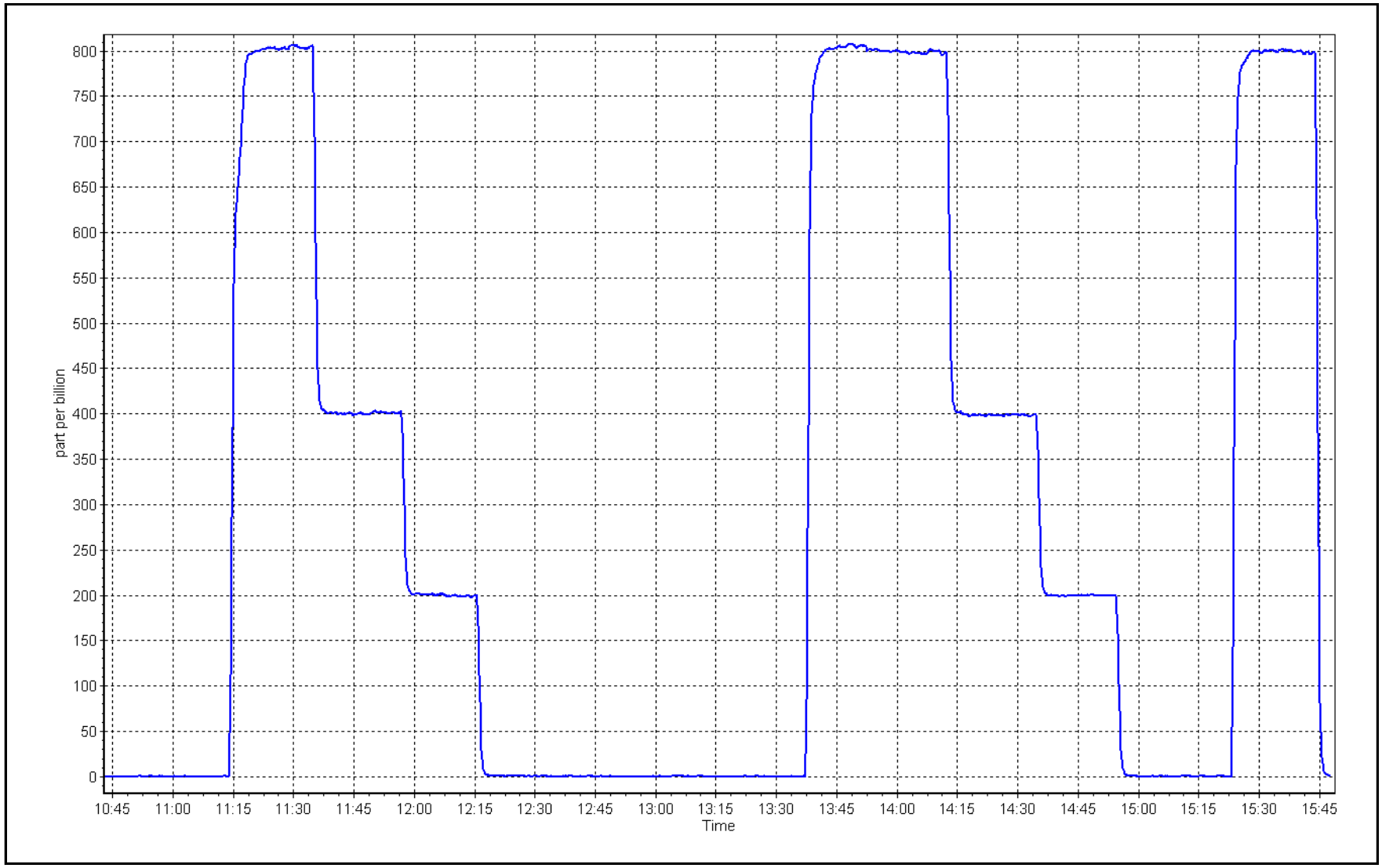
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
799.9	799.3	1.0008
400.4	399.1	1.0033
199.7	199.9	0.9992

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999997	*≥0.995*
Slope	0.998615	*0.90 - 1.10*
Intercept	0.106886	*+/-30*



SO2 Calibration Plot Date: April 24, 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:	April 21, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	9:26	End time (MST):	15:04
Reason:	Maintenance		

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:	1.000364	0.999078	Backgd or Offset:	2.27	2.26
Calibration intercept:	0.439997	0.160000	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	80.1	1.000
as found 2nd point	4960	39.2	40.0	40.1	1.000
as found 3rd point	4980	19.6	20.0	20.0	1.005
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4921	78.4	80.0	80.1	0.999
second point	4960	39.2	40.0	40.1	0.997
third point	4980	19.6	20.0	20.1	0.995
as left zero	5000	0.0	0.0	0.2	----
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	0.997
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.0	Prev response:	80.46	*% change:	-0.6%
Baseline Corr 2nd AF pt:	40.0	AF Slope:	1.000507	AF Intercept:	0.059999
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999998		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

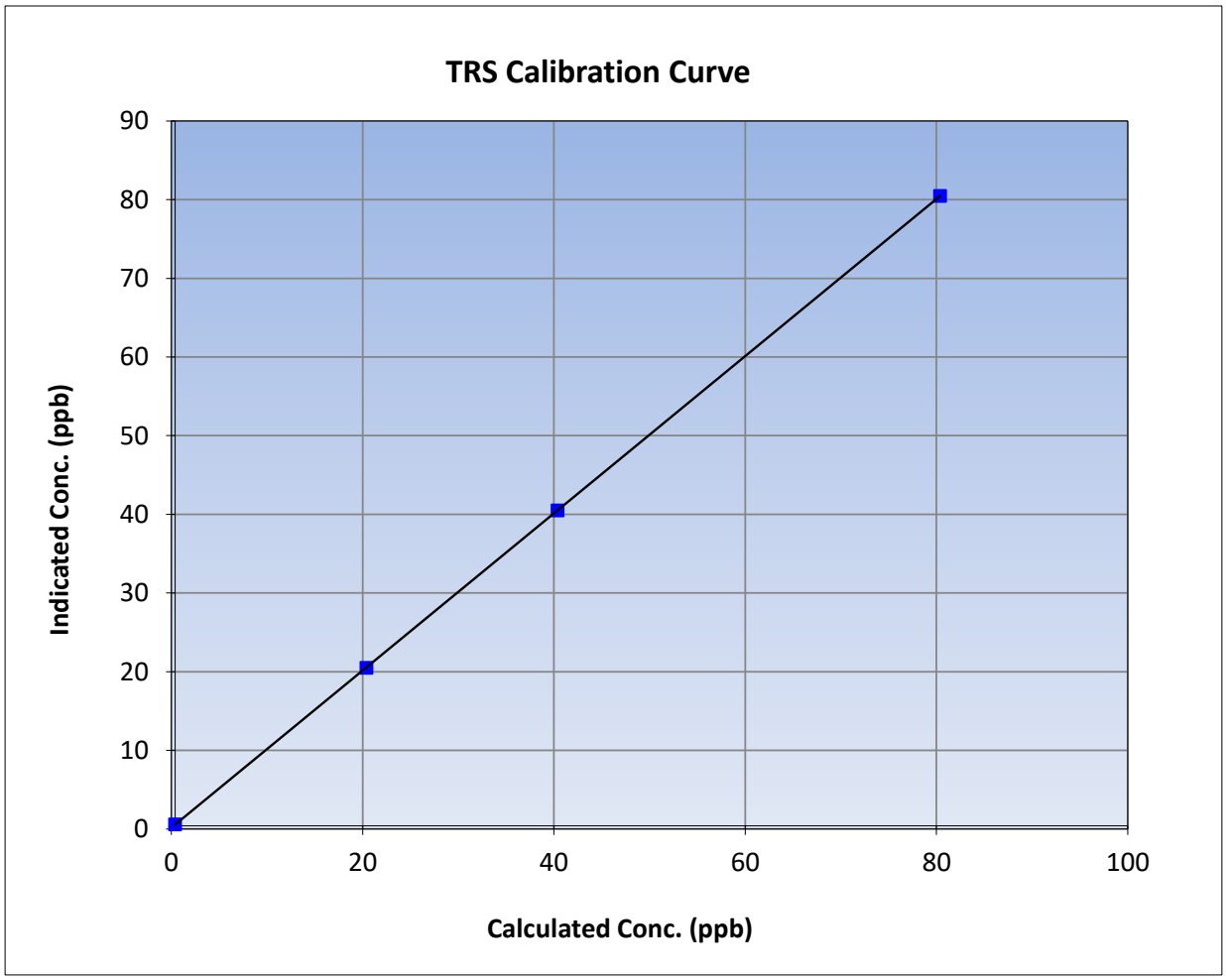
Station Information

Calibration Date:	April 21, 2023	Previous Calibration:	March 13, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:26	End Time (MST):	15:04
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153461

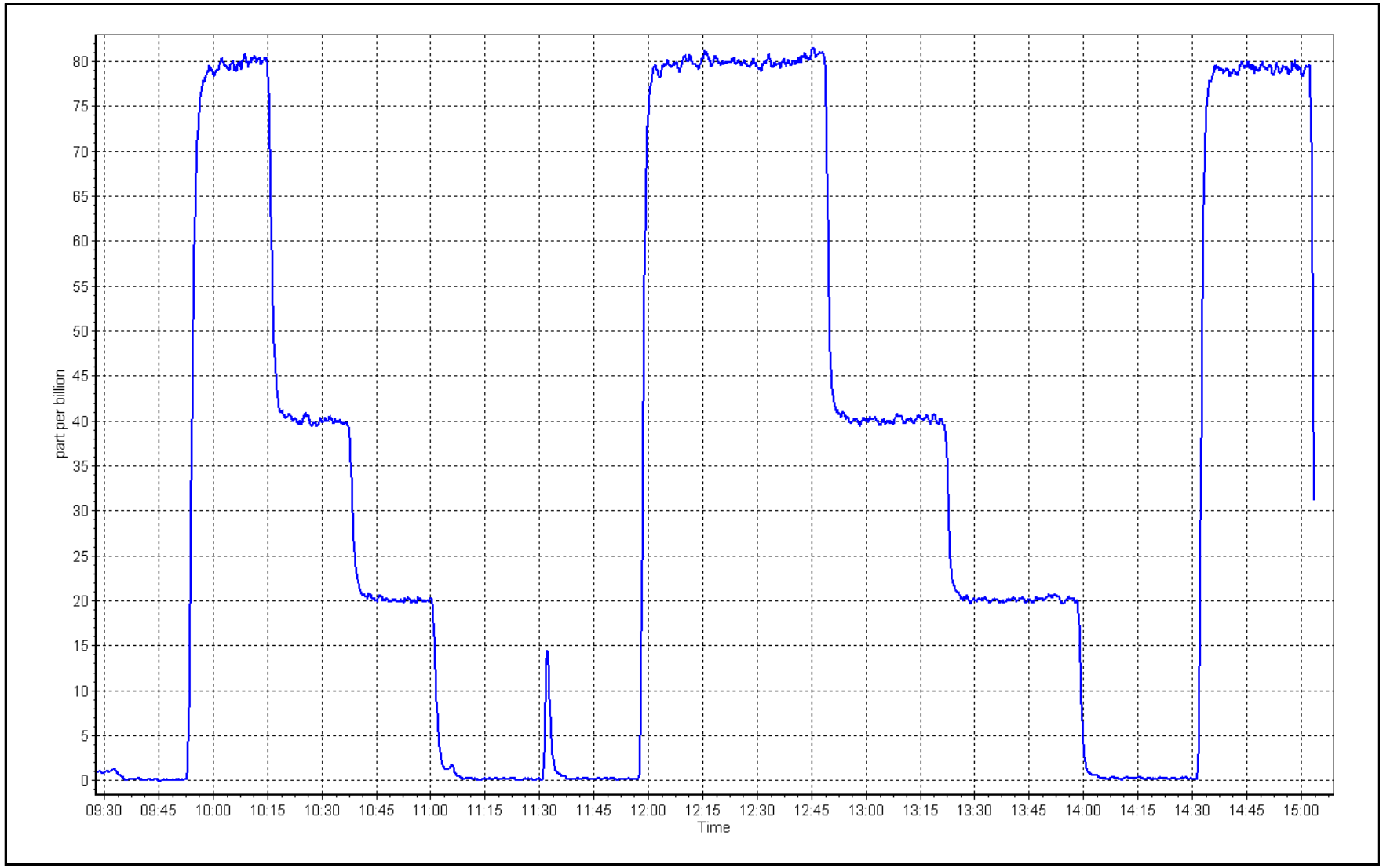
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	80.1	0.9987
40.0	40.1	0.9975
20.0	20.1	0.9949

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	0.999078	*0.90 - 1.10*
Intercept	0.160000	*+/-3*



TRS Calibration Plot Date: April 21, 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:	April 21, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	9:26	End time (MST):	15:04
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:	0.996518	0.993089	Backgd or Offset:	1.94	1.90
Calibration intercept:	0.401597	0.521594	Coeff or Slope:	1.014	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	0.0	----
as found span	4921	78.4	80.0	81.7	0.979
as found 2nd point	4960	39.2	40.0	41.2	0.971
as found 3rd point	4980	19.6	20.0	20.4	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	0.4	----
high point	4921	78.4	80.0	79.9	1.001
second point	4961	39.2	40.0	40.3	0.992
third point	4980	19.6	20.0	20.5	0.975
as left zero	5000	0.0	0.0	0.7	----
as left span	4921	78.4	80.0	78.7	1.016
SO2 Scrubber Check	4919	81.3	813.0	-0.2	----
Date of last scrubber change:		March 21, 2022		Ave Corr Factor	0.990
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.7	Prev response:	80.10	*% change:	2.0%
Baseline Corr 2nd AF pt:	41.2	AF Slope:	1.022138	AF Intercept:	0.059995
Baseline Corr 3rd AF pt:	20.4	AF Correlation:	0.999974		

* = > +/-5% change initiates investigation

Notes: Inlet filter change and scrubber check completed after as founds. Adjusted span only.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

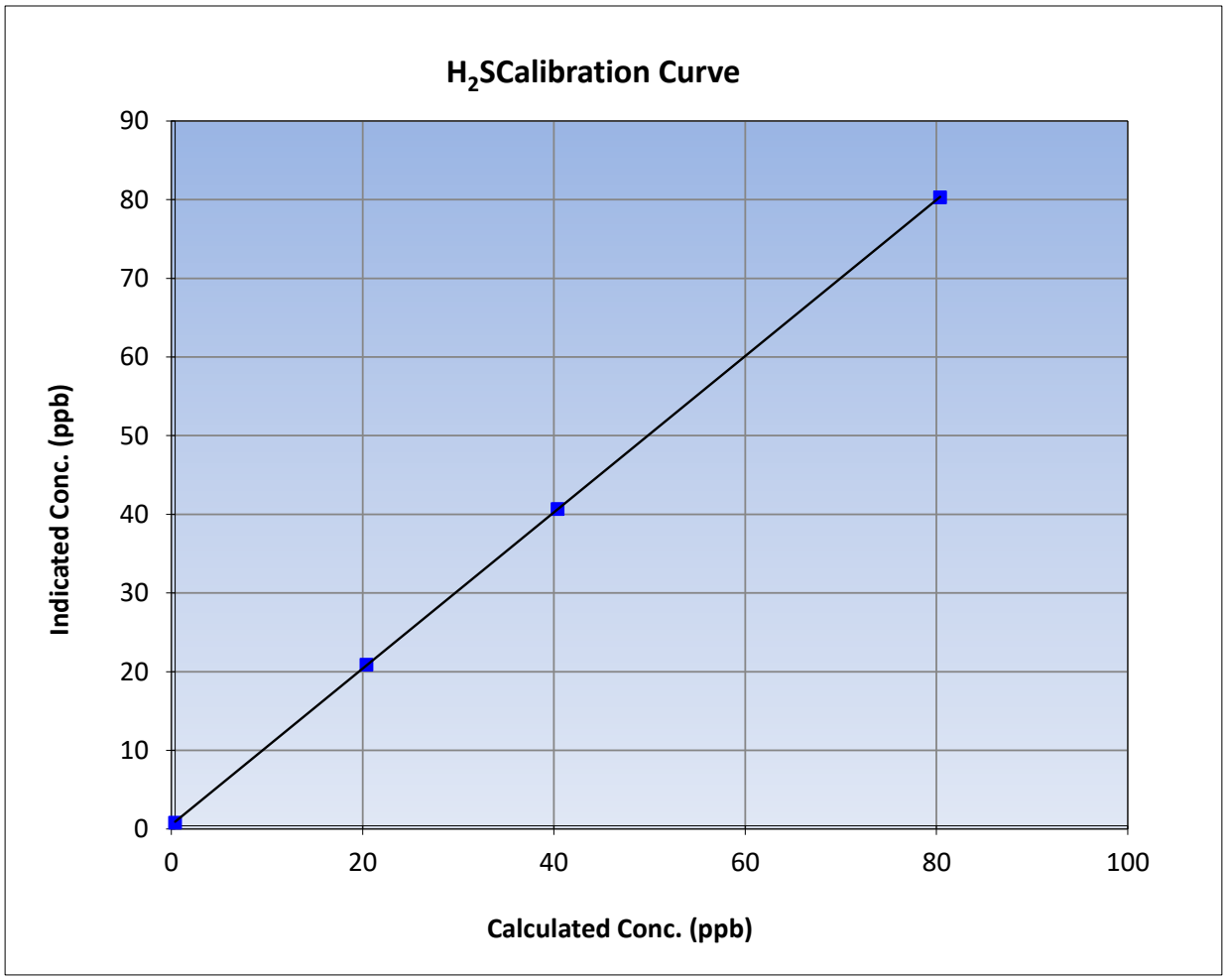
Station Information

Calibration Date:	April 21, 2023	Previous Calibration:	March 13, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:26	End Time (MST):	15:04
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1200326167

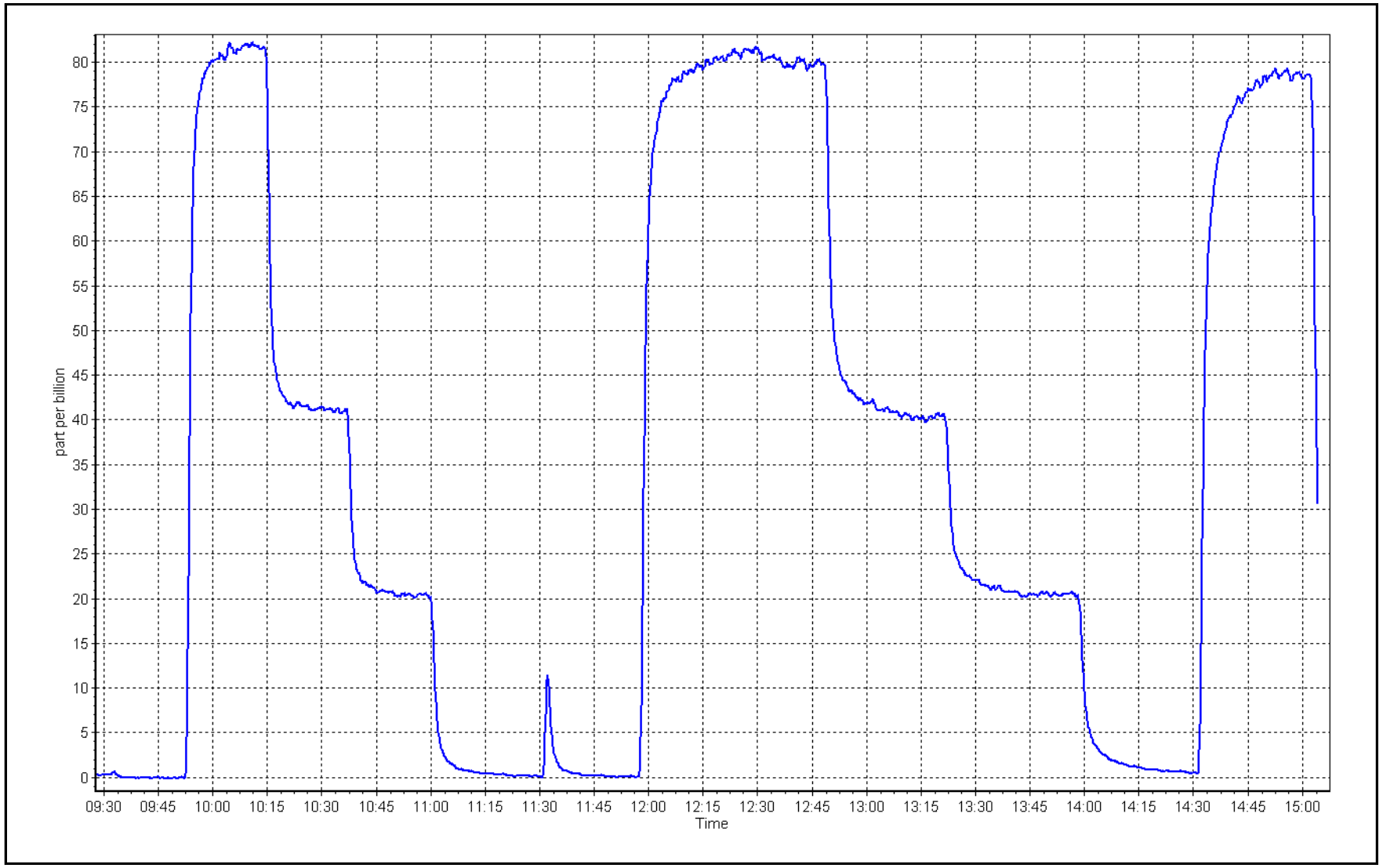
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
80.0	79.9	1.0012
40.0	40.3	0.9923
20.0	20.5	0.9755

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999989	*≥0.995*
Slope	0.993089	*0.90 - 1.10*
Intercept	0.521594	*+/-3*



H_2S Calibration Plot Date: April 21, 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:	April 24, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	10:50	End time (MST):	15:48
Reason:	Maintenance		

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:	2.64E-04	2.78E-04	NMHC SP Ratio:	5.52E-05	6.06E-05
CH4 Retention time:	14.4	14.4	NMHC Peak Area:	166551	151639

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4918	81.3	17.29	16.12	1.072
as found 2nd point	4959	40.7	8.65	7.97	1.085
as found 3rd point	4980	20.3	4.32	3.98	1.084
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4918	81.3	17.29	17.37	0.995
second point	4959	40.7	8.65	8.63	1.003
third point	4980	20.3	4.32	4.32	0.998
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	17.29	17.36	0.996
				Average Correction Factor	0.999

Baseline Corr AF:	16.12	Prev response	17.31	*% change	-7.4%
Baseline Corr 2nd AF:	8.0	AF Slope:	0.932699	AF Intercept:	-0.036523
Baseline Corr 3rd AF:	4.0	AF Correlation:	0.999956	* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4918	81.3	9.19	8.47	1.086
as found 2nd point	4959	40.7	4.60	4.21	1.093
as found 3rd point	4980	20.3	2.30	2.11	1.087
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4918	81.3	9.19	9.25	0.994
second point	4959	40.7	4.60	4.63	0.995
third point	4980	20.3	2.30	2.33	0.984
as left zero	5000	0	0.00	0.00	----
as left span	4918	81.3	9.19	9.27	0.992
				Average Correction Factor	0.991
Baseline Corr AF:	8.47	Prev response	9.21	*% change	-8.8%
Baseline Corr 2nd AF:	4.2	AF Slope:	0.920790	AF Intercept:	-0.006752
Baseline Corr 3rd AF:	2.1	AF Correlation:	0.999984	* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4918	81.3	8.09	7.65	1.058
as found 2nd point	4959	40.7	4.05	3.76	1.076
as found 3rd point	4980	20.3	2.02	1.87	1.081
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4918	81.3	8.09	8.12	0.996
second point	4959	40.7	4.05	4.00	1.012
third point	4980	20.3	2.02	1.99	1.015
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	8.09	8.08	1.001
				Average Correction Factor	1.008
Baseline Corr AF:	7.65	Prev response	8.09	*% change	-5.8%
Baseline Corr 2nd AF:	3.76	AF Slope:	0.946229	AF Intercept:	-0.029771
Baseline Corr 3rd AF:	1.87	AF Correlation:	0.999901	* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.001736	1.004703
THC Cal Offset:	-0.010696	-0.018891
CH4 Cal Slope:	1.001692	1.004303
CH4 Cal Offset:	-0.013161	-0.027159
NMHC Cal Slope:	1.001763	1.005180
NMHC Cal Offset:	0.002265	0.008268

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

THC Calibration Summary

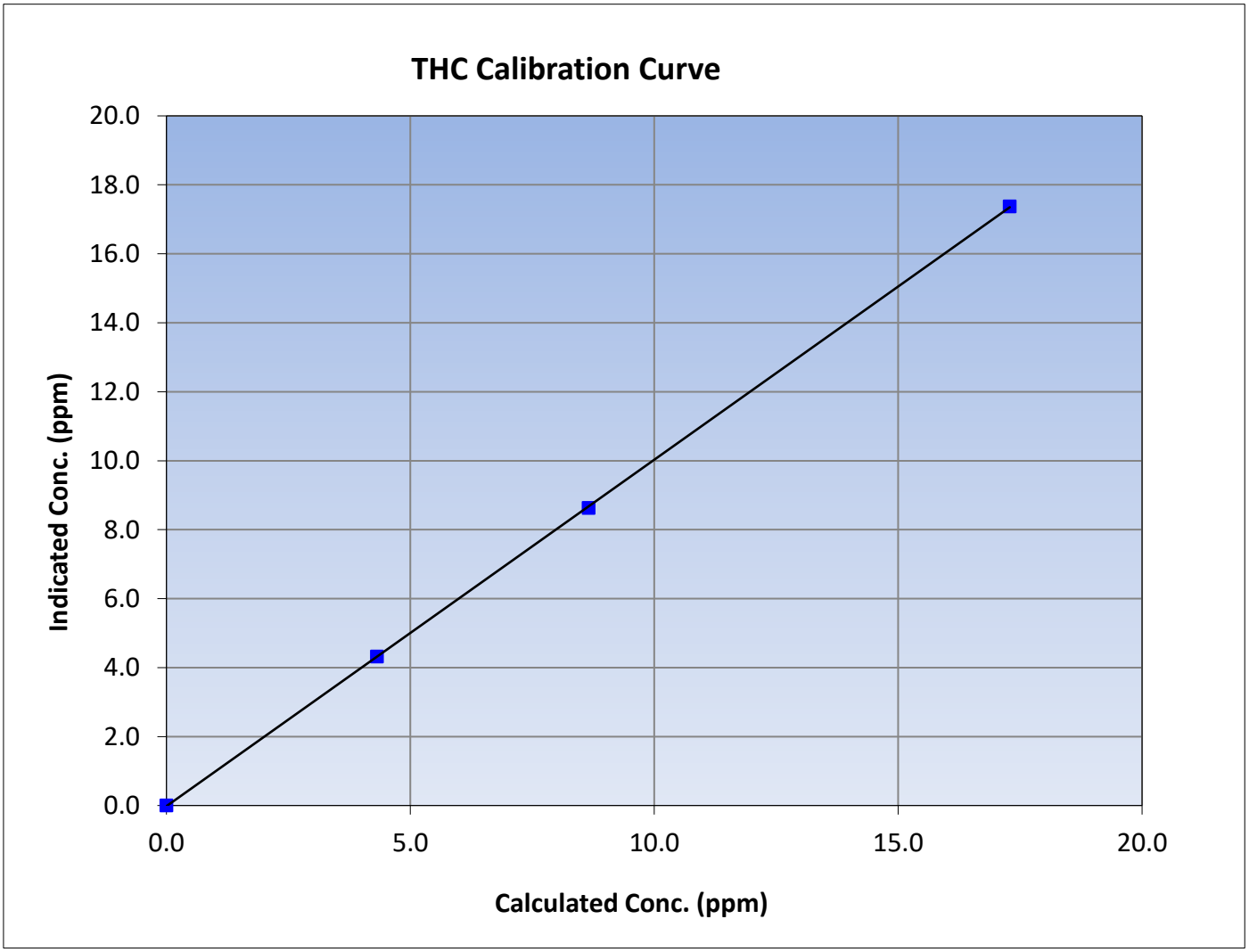
Version-01-2020

Station Information

Calibration Date:	April 24, 2023	Previous Calibration:	March 13, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:50	End Time (MST):	15:48
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	0.999981	≥0.995
17.29	17.37	0.9951			
8.65	8.63	1.0030	Slope	1.004703	0.90 - 1.10
4.32	4.32	0.9982			
			Intercept	-0.018891	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

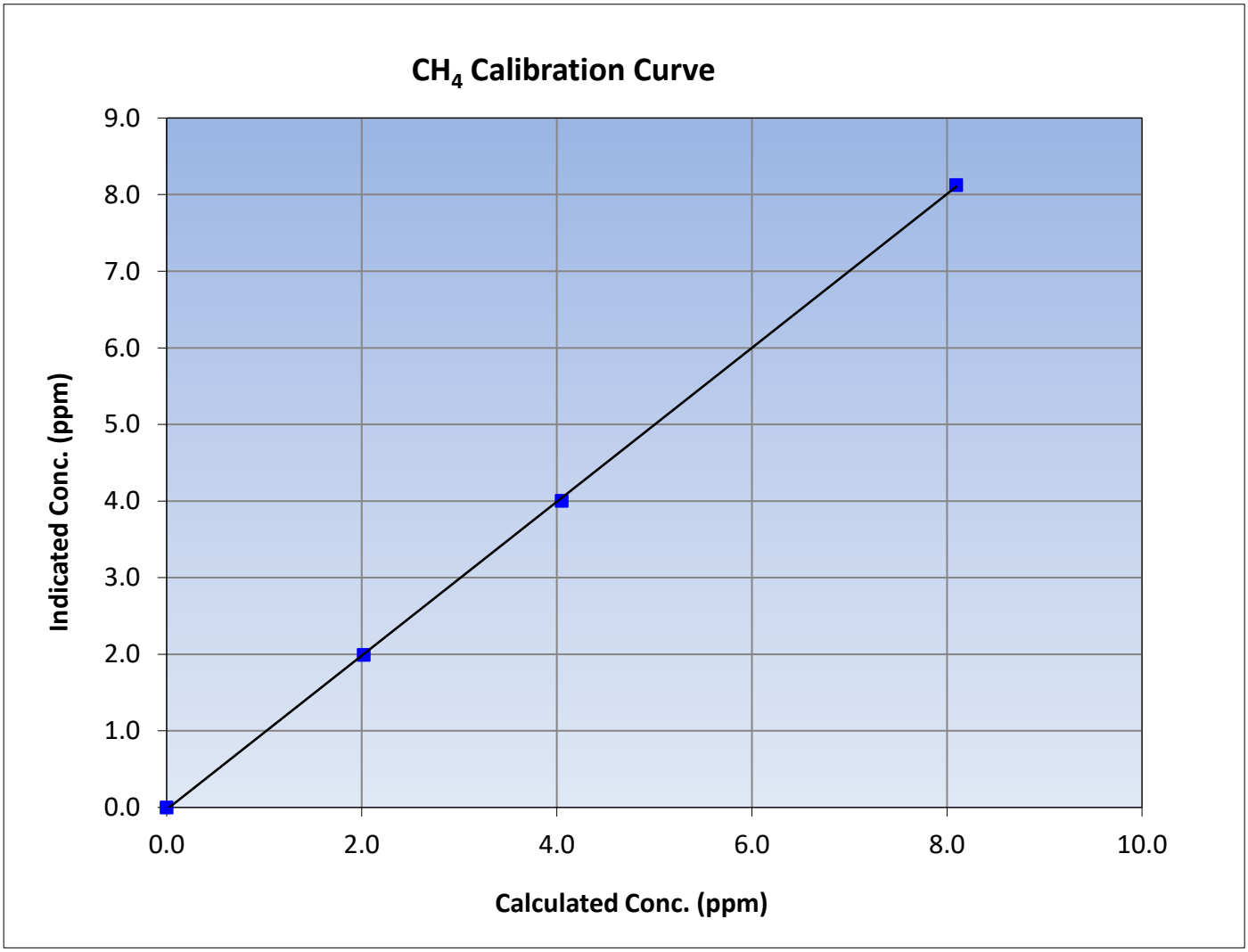
Version-01-2020

Station Information

Calibration Date:	April 24, 2023	Previous Calibration:	March 13, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:50	End Time (MST):	15:48
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	0.999924	*≥0.995*
8.09	8.12	0.9964			
4.05	4.00	1.0118	Slope	1.004303	*0.90 - 1.10*
2.02	1.99	1.0149			
			Intercept	-0.027159	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

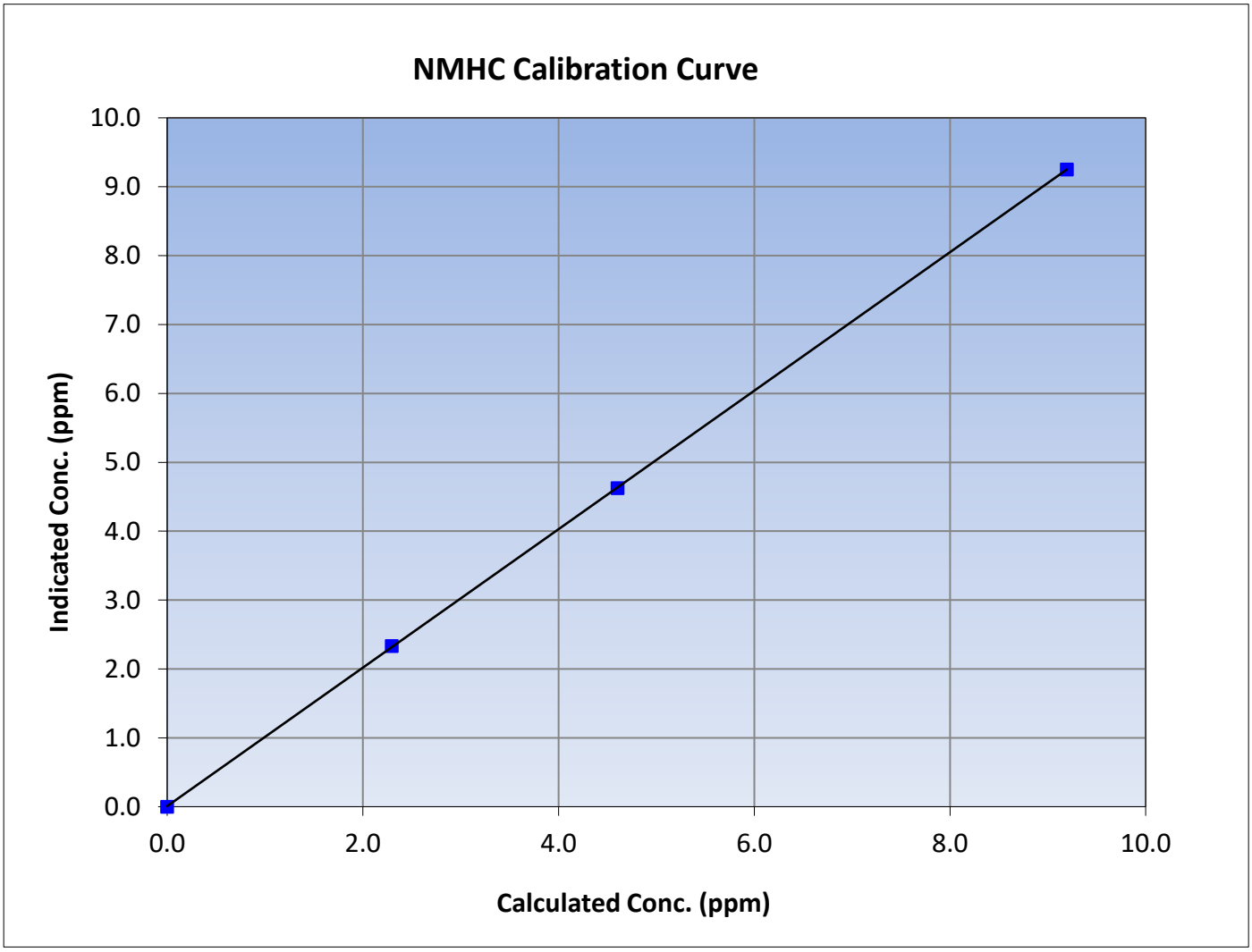
Version-01-2020

Station Information

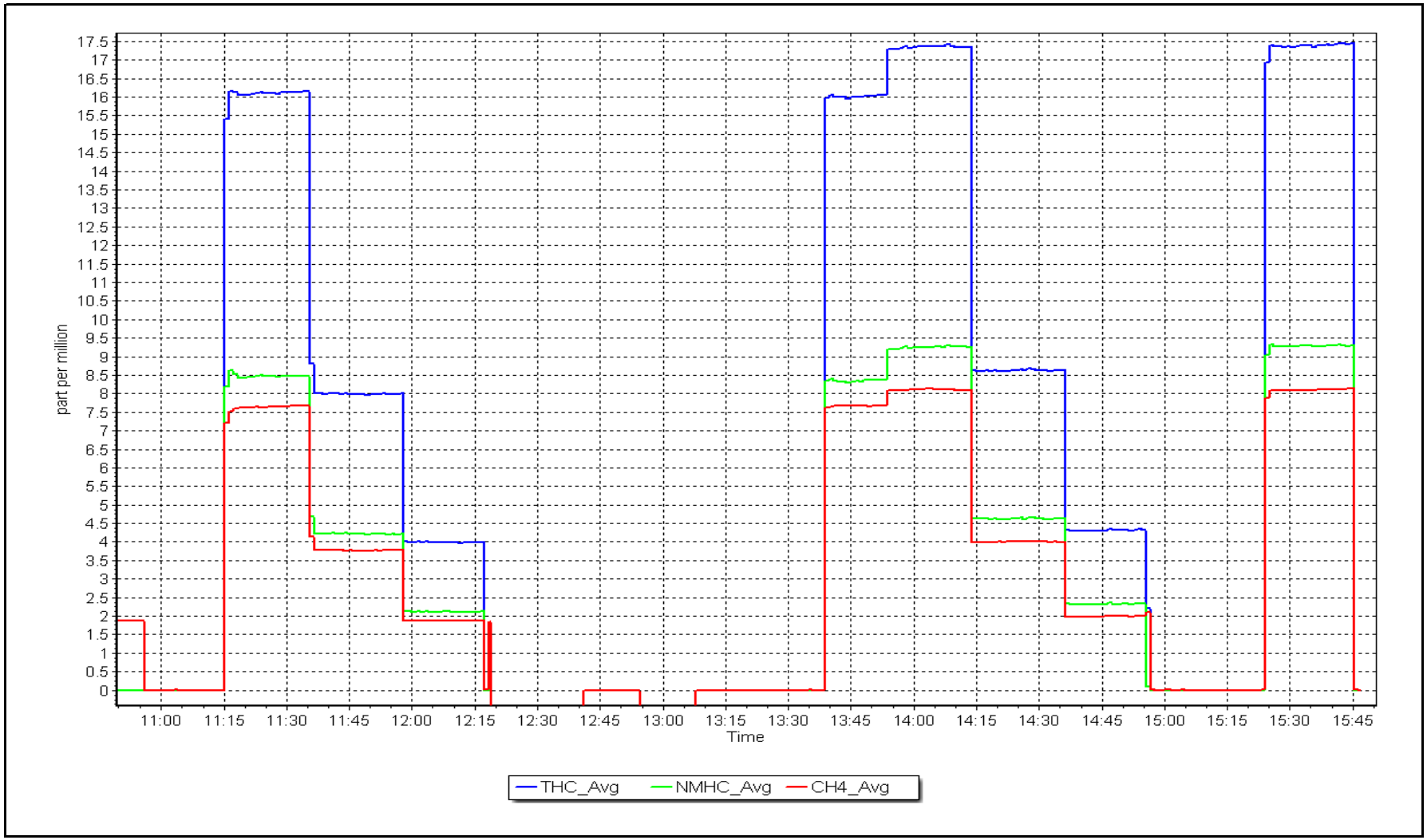
Calibration Date:	April 24, 2023	Previous Calibration:	March 13, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:50	End Time (MST):	15:48
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320040

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999990	≥0.995
9.19	9.25	0.9939			
4.60	4.63	0.9951	Slope	1.005180	0.90 - 1.10
2.30	2.33	0.9839			
			Intercept	0.008268	+/-0.5



NMHC Calibration Plot Date: April 24, 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:	April 26, 2023	Last Cal Date:	April 24, 2023
Start time (MST):	10:09	End time (MST):	15:09
Reason:	Maintenance	Re-calibrating instrument due to drift	

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:	2.78E-04	2.82E-04	NMHC SP Ratio:	6.06E-05	6.11E-05
CH4 Retention time:	14.4	14.6	NMHC Peak Area:	151639	150450

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	17.12	1.010
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4918	81.3	17.29	17.29	1.000
second point	4959	40.7	8.65	8.59	1.007
third point	4980	20.3	4.32	4.27	1.010
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	17.29	17.30	0.999
				Average Correction Factor	1.006

Baseline Corr AF:	17.12	Prev response	17.35	*% change	-1.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4918	81.3	9.19	9.16	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4918	81.3	9.19	9.21	0.998
second point	4959	40.7	4.60	4.61	0.998
third point	4980	20.3	2.30	2.30	1.000
as left zero	5000	0	0.00	0.00	----
as left span	4918	81.3	9.19	9.20	0.999
				Average Correction Factor	0.999
Baseline Corr AF:	9.16	Prev response	9.25	*% change	-1.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4918	81.3	8.09	7.96	1.017
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4918	81.3	8.09	8.08	1.002
second point	4959	40.7	4.05	3.98	1.018
third point	4980	20.3	2.02	1.98	1.022
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	8.09	8.10	0.999
				Average Correction Factor	1.014
Baseline Corr AF:	7.96	Prev response	8.10	*% change	-1.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.004703	1.000528
THC Cal Offset:	-0.018891	-0.030303
CH4 Cal Slope:	1.004303	0.999037
CH4 Cal Offset:	-0.027159	-0.028760
NMHC Cal Slope:	1.005180	1.001827
NMHC Cal Offset:	0.008268	-0.001743

Notes: Re-calibrating instrument to possible resolve dipping issues after routine calibration completed on April 23, 2023. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

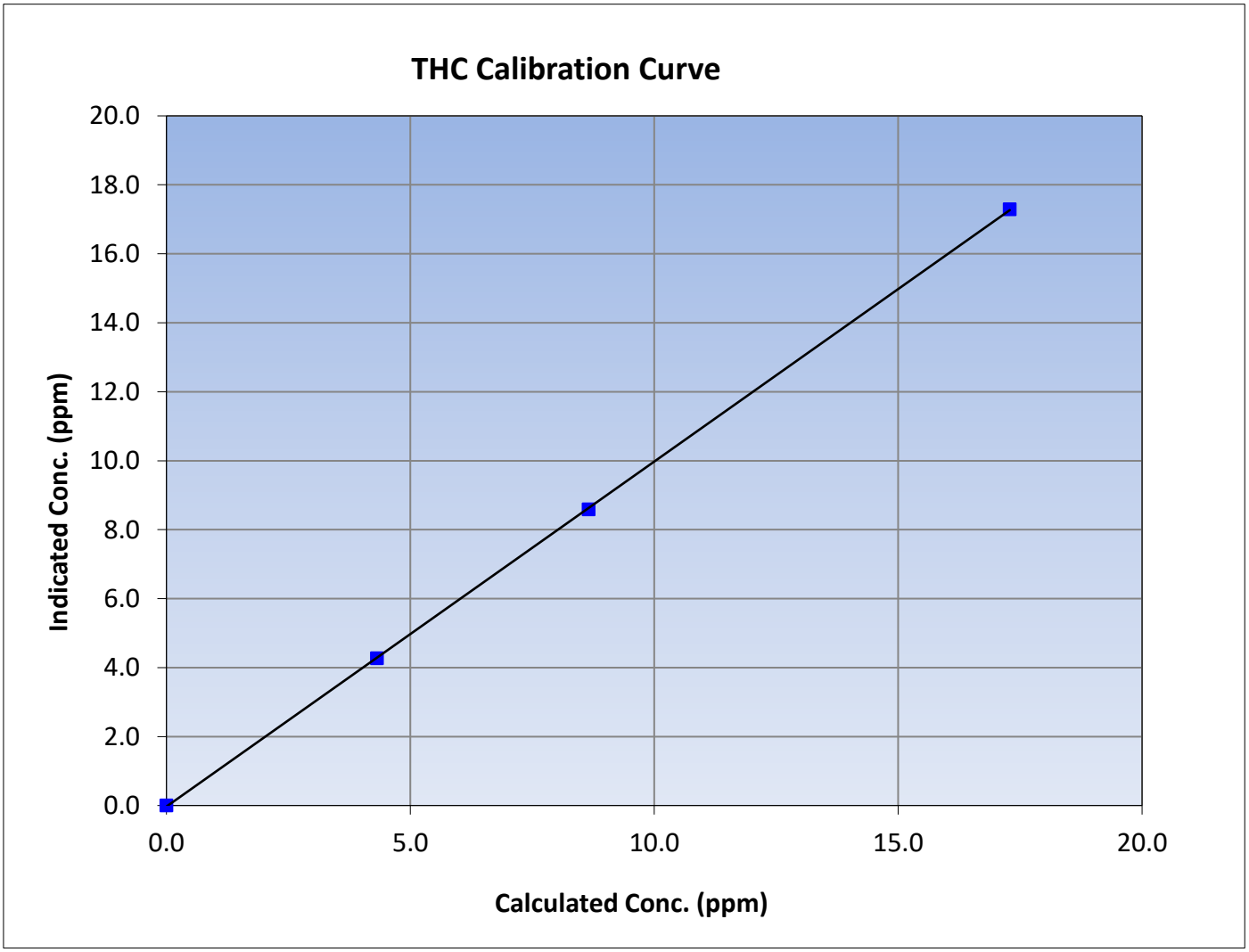
Version-01-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	April 24, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:09	End Time (MST):	15:09
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	0.999981	*≥0.995*
17.29	17.29	0.9999			
8.65	8.59	1.0074	Slope	1.000528	*0.90 - 1.10*
4.32	4.27	1.0101			
			Intercept	-0.030303	*+/-0.5*



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CH_4 Calibration Summary

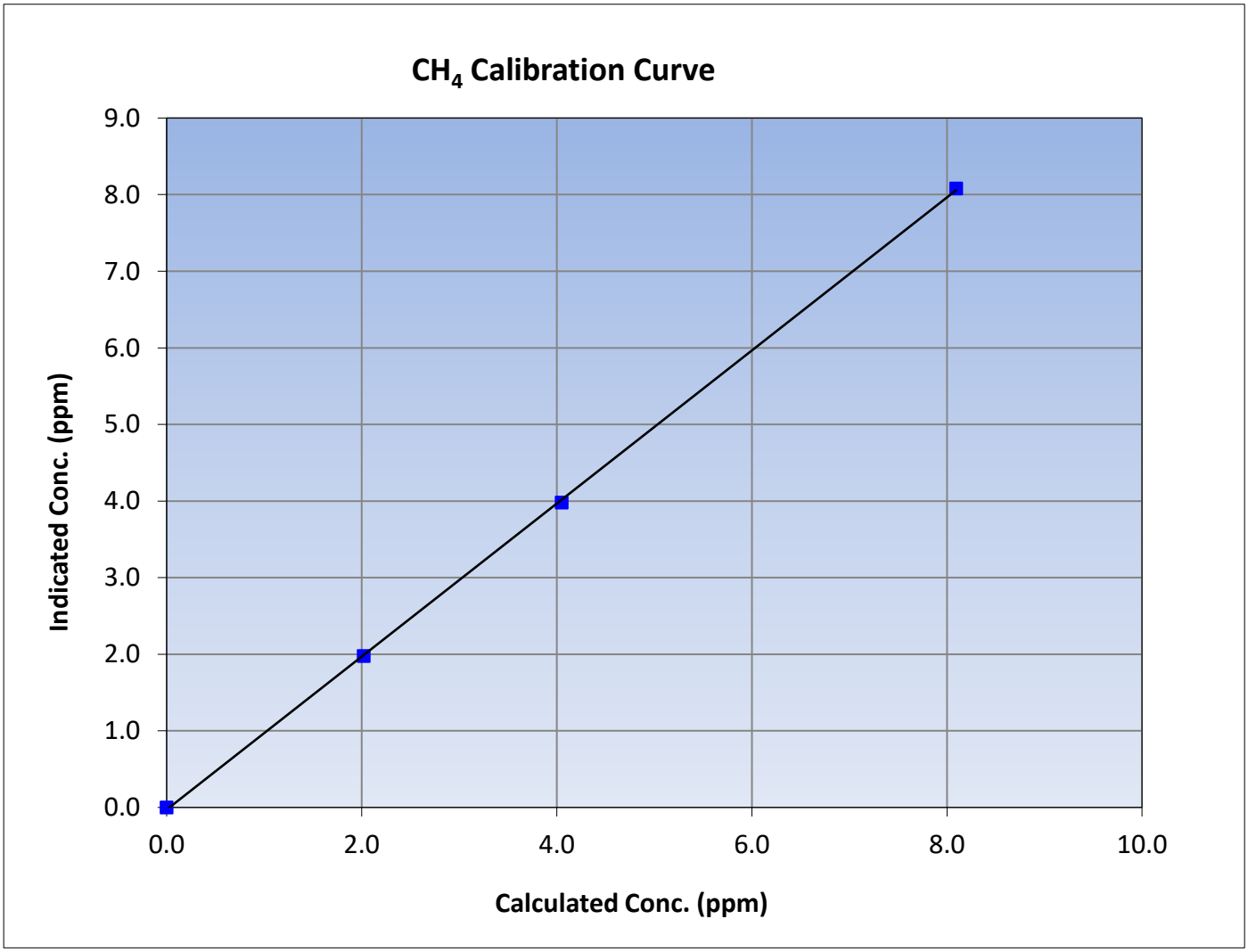
Version-01-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	April 24, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:09	End Time (MST):	15:09
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	0.999914	*≥0.995*
8.09	8.08	1.0017			
4.05	3.98	1.0182	Slope	0.999037	*0.90 - 1.10*
2.02	1.98	1.0216			
			Intercept	-0.028760	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

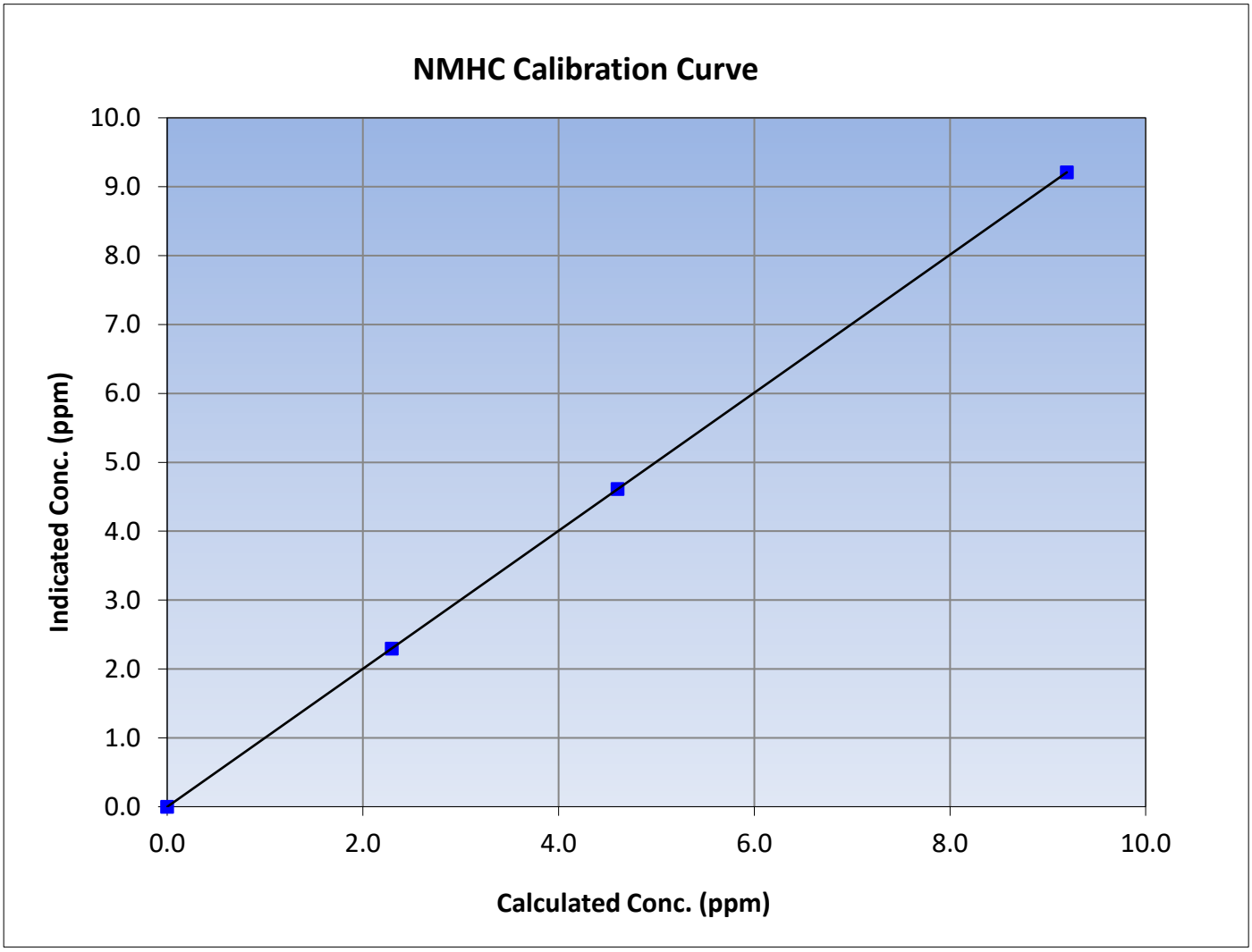
Version-01-2020

Station Information

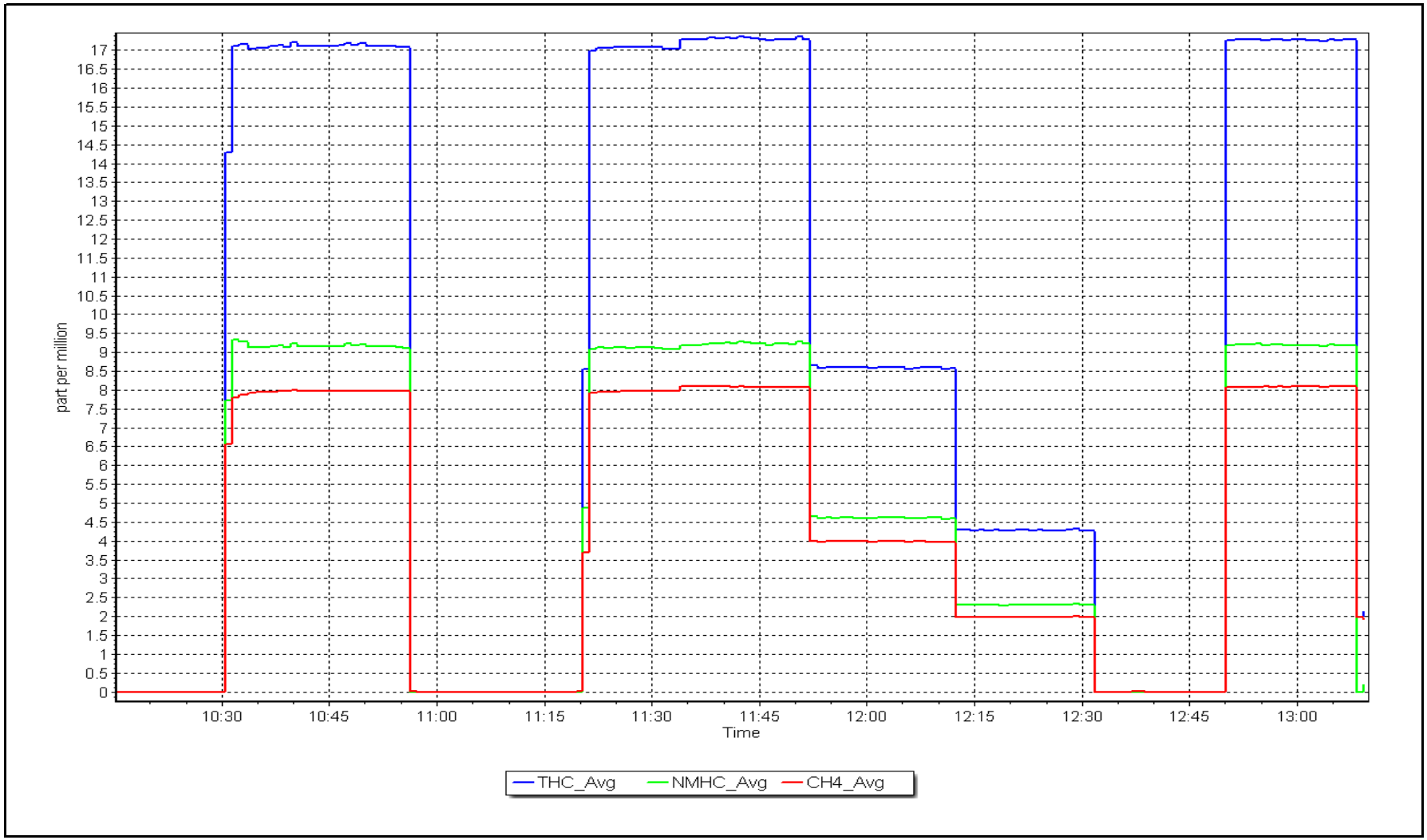
Calibration Date:	April 26, 2023	Previous Calibration:	April 24, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:09	End Time (MST):	15:09
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320040

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	1.000000	*≥0.995*
9.19	9.21	0.9983			
4.60	4.61	0.9983	Slope	1.001827	*0.90 - 1.10*
2.30	2.30	1.0002			
			Intercept	-0.001743	*+/-0.5*



NMHC Calibration Plot Date: April 26, 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:	April 18, 2023	Last Cal Date:	March 3, 2023
Start time (MST):	9:46	End time (MST):	14:17
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:	1.458	1.498	NO bkgnd or offset:	6.9	7.1
NOX coeff or slope:	0.990	0.990	NOX bkgnd or offset:	7.0	7.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	194.8	194.8

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999171	0.999185
NO_X Cal Offset:	-0.060000	0.160000
NO Cal Slope:	1.000071	0.999572
NO Cal Offset:	-0.880000	-0.480000
NO_2 Cal Slope:	0.998181	0.999865
NO_2 Cal Offset:	-0.132907	-0.124708

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	791.1	775.3	15.7	1.0282	1.0327
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	813.2	800.3	12.8	1.0003	1.0004
second point	4960	40.0	406.7	400.3	6.4	406.2	399.1	7.1	1.0013	1.0031
third point	4980	20.0	203.4	200.2	3.2	203.0	198.8	4.2	1.0018	1.0068
as left zero	5000	0.0	0.0	0.0	0.0	0.7	0.2	0.5	----	----
as left span	4920	80.0	813.4	401.2	412.2	812.5	398.9	413.6	1.0012	1.0059
								Average Correction Factor	1.0011	1.0034

Corrected As found	NO_X = 790.6 ppb	NO = 774.9 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-2.8%
Previous Response	NO_X = 812.7 ppb	NO = 799.8 ppb		*Percent Change	NO =	-3.2%
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)	797.9	398.5	412.2	412.2	1.0000	100.0%
2nd GPT point (200 ppb O3)	797.9	589.3	221.4	221.1	1.0014	99.9%
3rd GPT point (100 ppb O3)	797.9	693.6	117.1	116.6	1.0043	99.6%
				Average Correction Factor	1.0019	99.8%

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

NO_X Calibration Summary

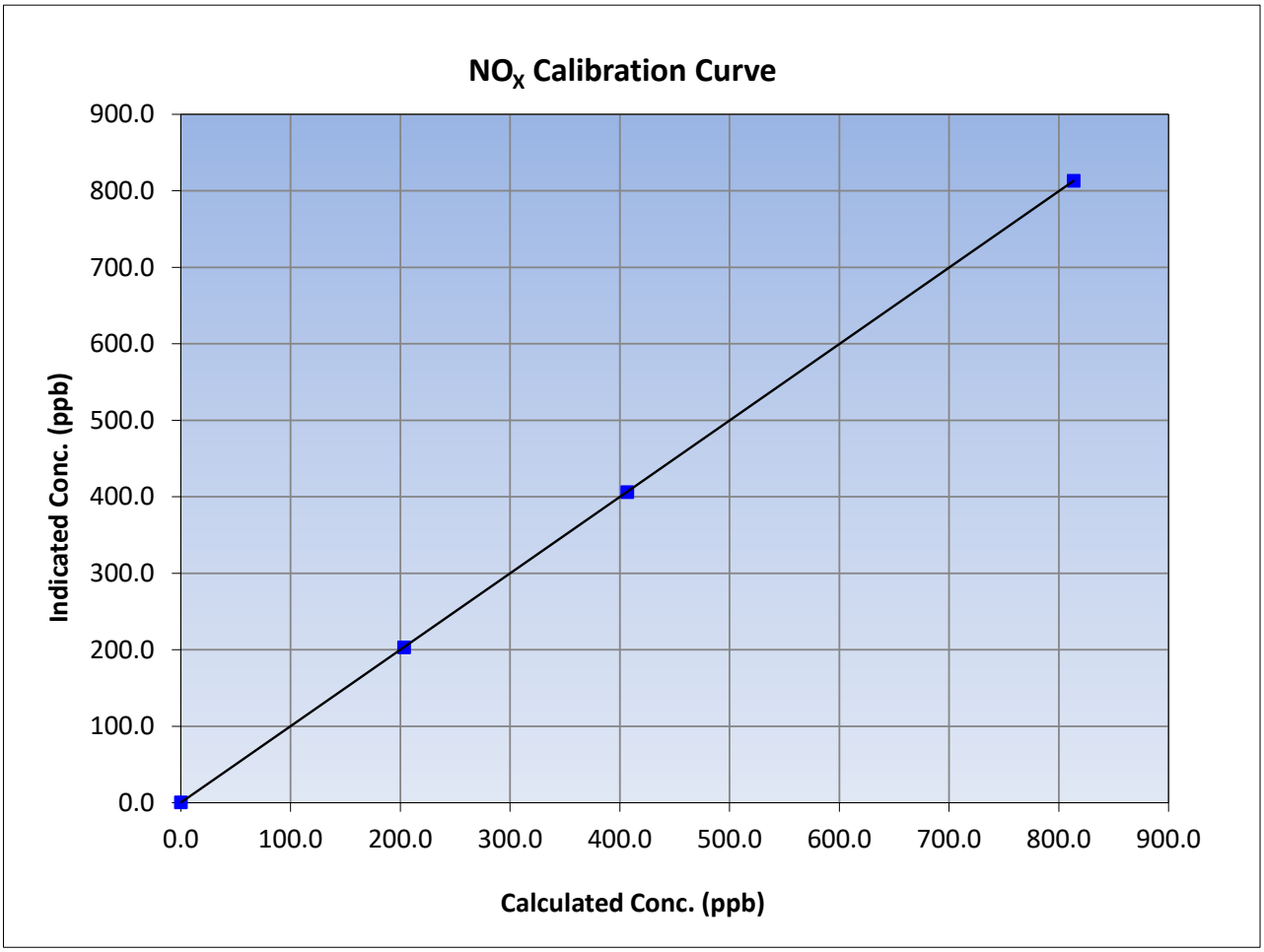
Version-04-2020

Station Information

Calibration Date:	April 18, 2023	Previous Calibration:	March 3, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:46	End Time (MST):	14:17
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	813.2	1.0003			
406.7	406.2	1.0013	Slope	0.999185	0.90 - 1.10
203.4	203.0	1.0018			
			Intercept	0.160000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

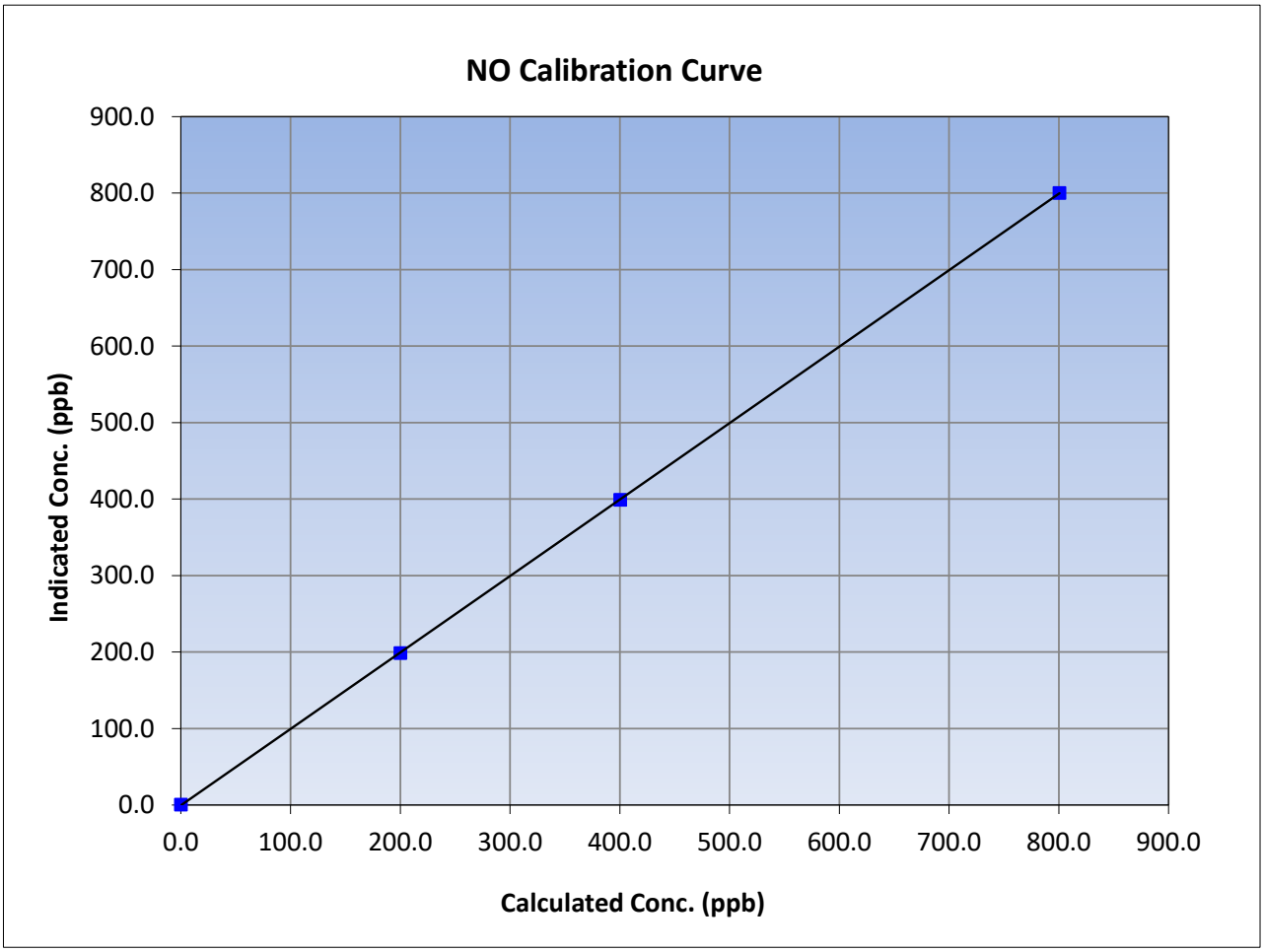
Version-04-2020

Station Information

Calibration Date:	April 18, 2023	Previous Calibration:	March 3, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:46	End Time (MST):	14:17
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	0.999994	≥0.995
800.6	800.3	1.0004			
400.3	399.1	1.0031	Slope	0.999572	0.90 - 1.10
200.2	198.8	1.0068			
			Intercept	-0.480000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

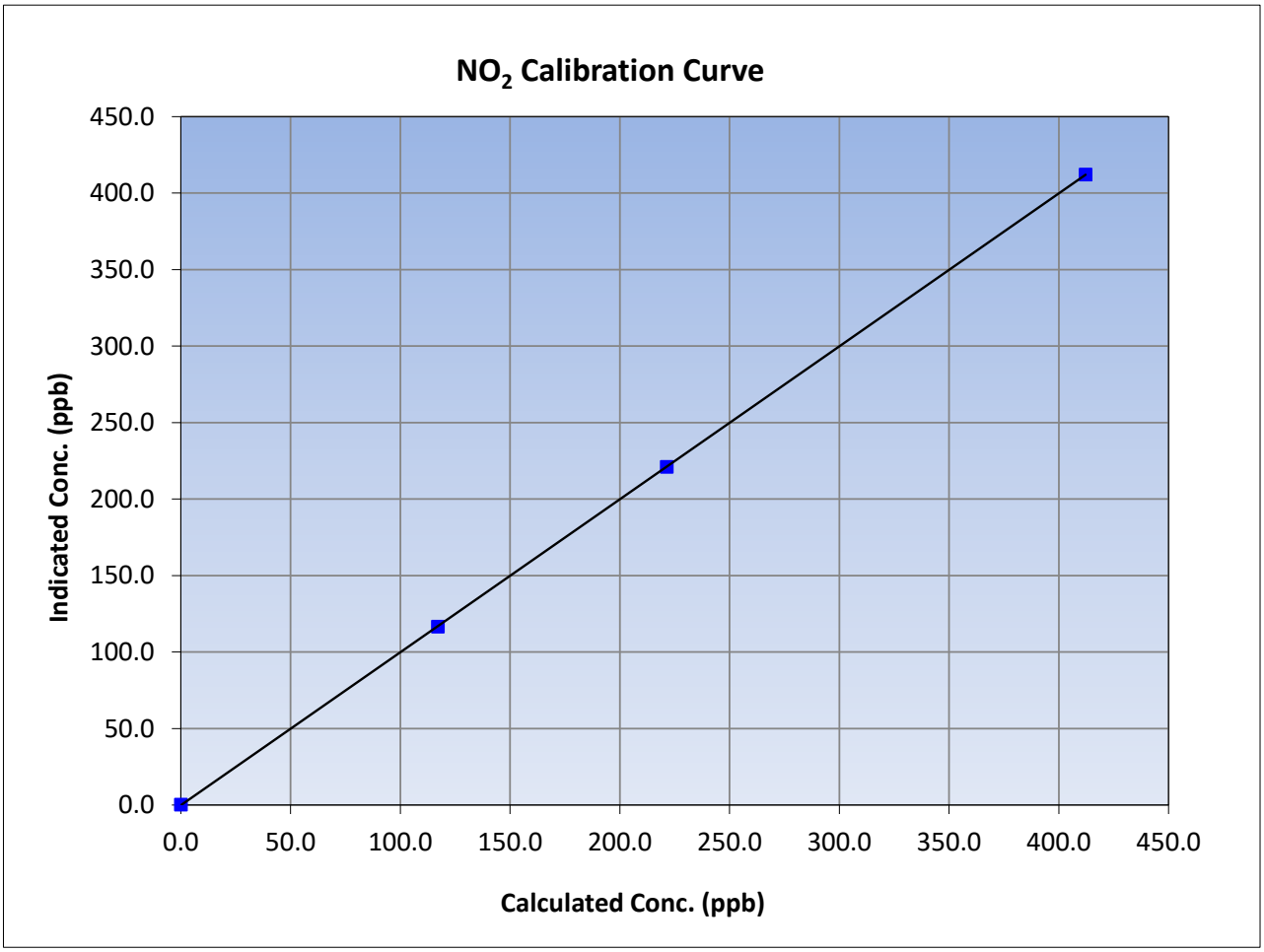
Version-04-2020

Station Information

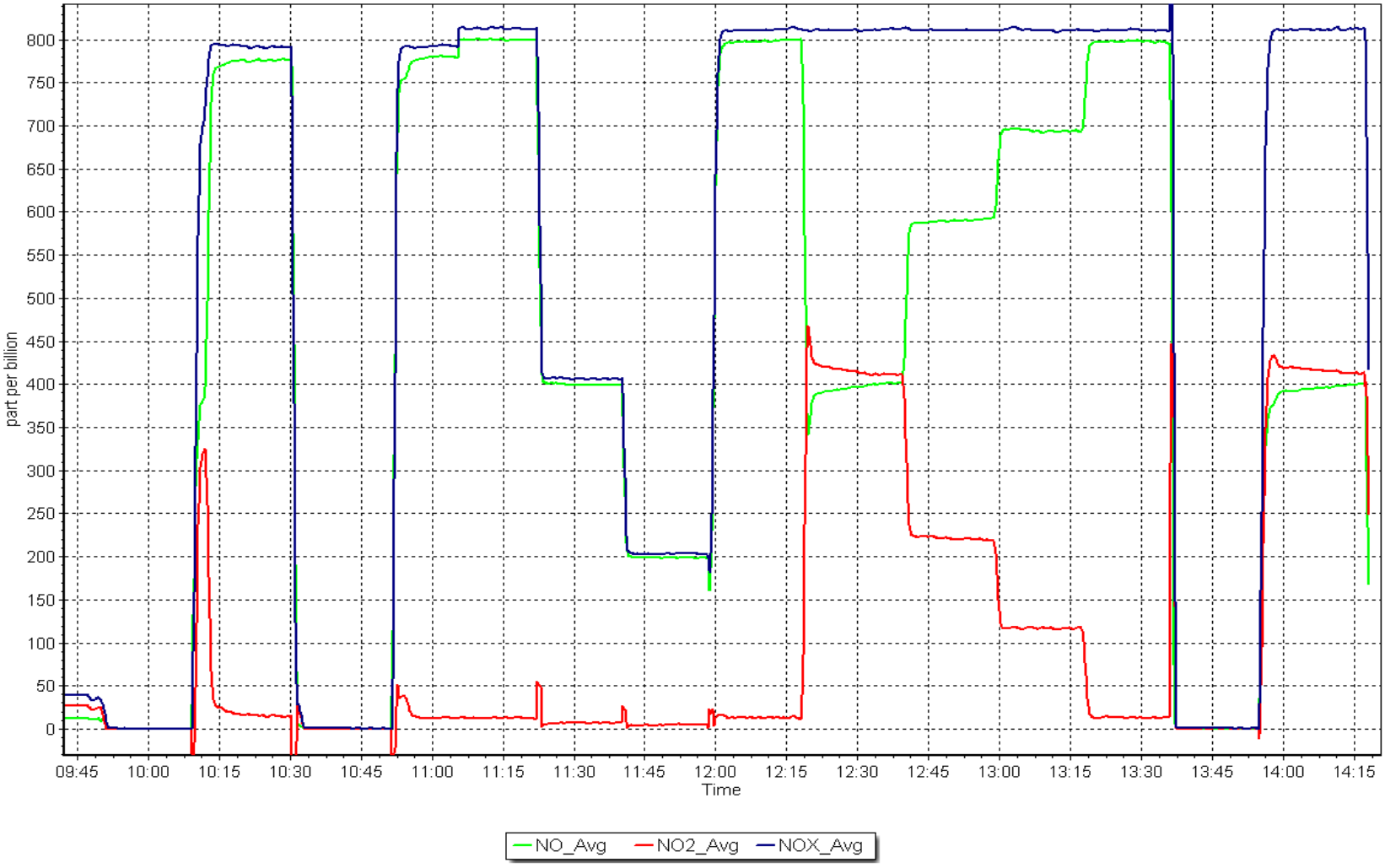
Calibration Date:	April 18, 2023	Previous Calibration:	March 3, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:46	End Time (MST):	14:17
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999997	≥0.995
412.2	412.2	1.0000			
221.4	221.1	1.0014	Slope	0.999865	0.90 - 1.10
117.1	116.6	1.0043			
			Intercept	-0.124708	+/-20



NO_X Calibration Plot Date: April 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:	April 5, 2023	Last Cal Date:	March 1, 2023
Start time (MST):	10:08	End time (MST):	13:22
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:	0.999829	1.001057	Backgd or Offset:	2.5	2.5
Calibration intercept:	0.780000	0.440000	Coeff or Slope:	1.025	1.040

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	0.0	----
as found span	5000	855.5	400.0	397.7	1.006
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	855.5	400.0	400.8	0.998
second point	5000	738.6	200.0	200.6	0.997
third point	5000	649.2	100.0	100.9	0.991
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	855.5	400.0	400.5	0.999
				Average Correction Factor	0.995

Baseline Corr As found:	397.7	Previous response	400.7	*% change	-0.8%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

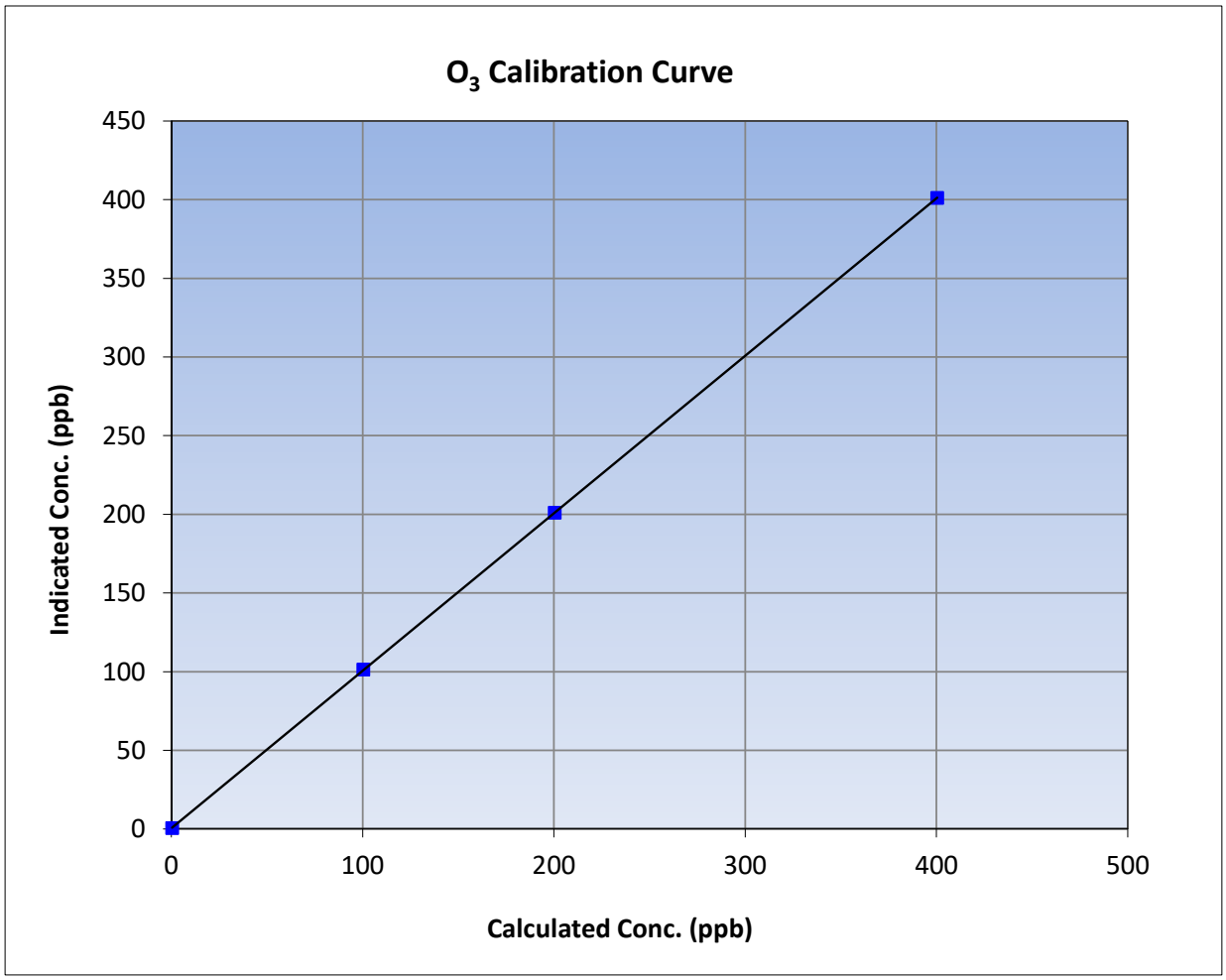
Station Information

Calibration Date:	April 5, 2023	Previous Calibration:	March 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:08	End Time (MST):	13:22
Analyzer make:	Teledyne API T400	Analyzer serial #:	1107

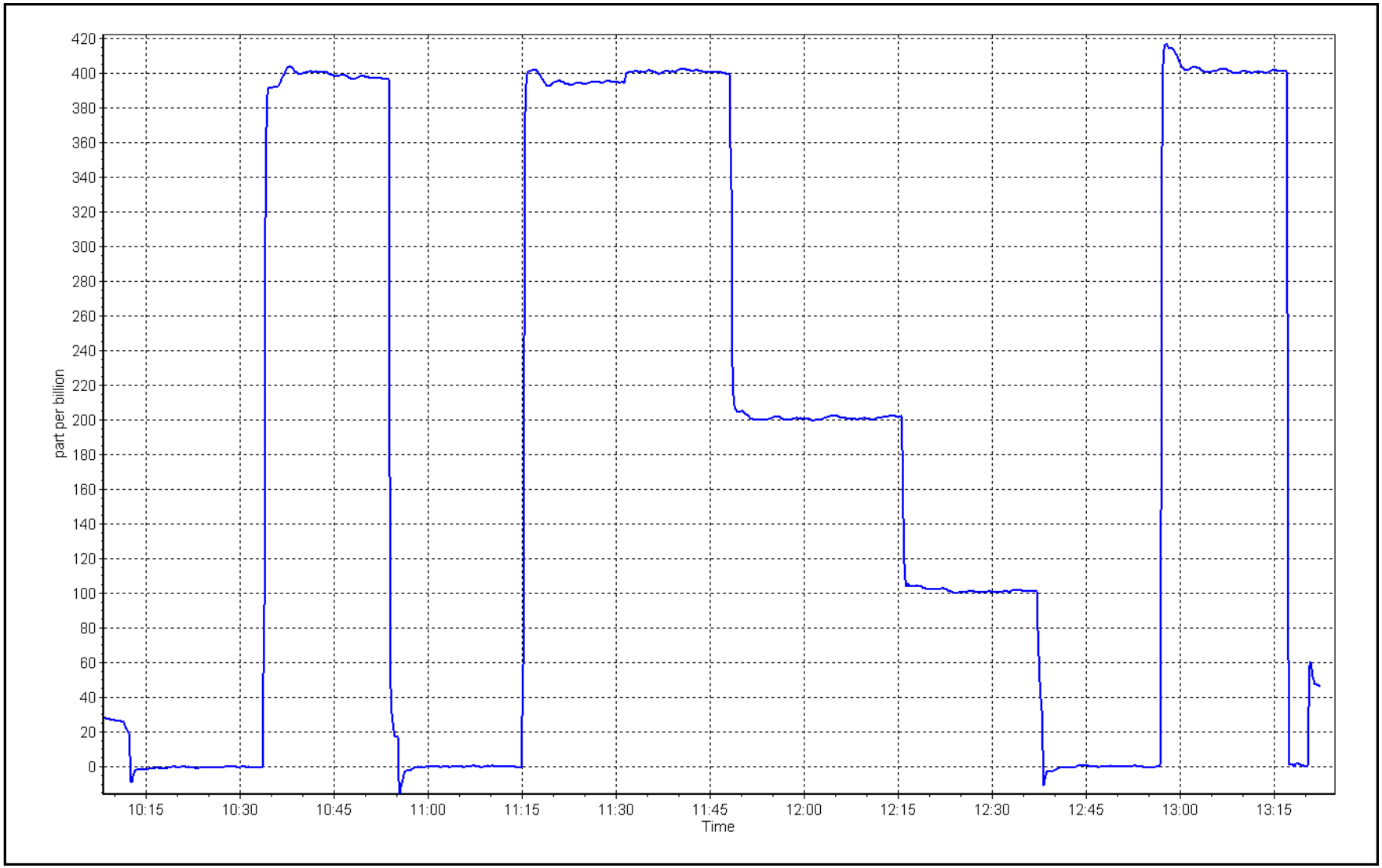
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
400.0	400.8	0.9980
200.0	200.6	0.9970
100.0	100.9	0.9911

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.001057	*0.90 - 1.10*
Intercept	0.440000	*+/- 5*



O_3 Calibration Plot Date: April 5, 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:	April 20, 2023	Last Cal Date:	March 30, 2023
Start time (MST):	11:23	End time (MST):	13:07
Analyzer Make:	API T640	S/N:	306
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	1450
Temp/RH standard:	Delta Cal	S/N:	1450

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	7.6	8.5	8.9	☐	+/- 2 °C
P (mmHg)	746.2	747.5	745.6	☐	+/- 10 mmHg
flow (LPM)	4.93	5.00	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: April 20, 2023 Last Cal Date: March 30, 2023

PM w/o HEPA: 5.6 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	9	11.8	11.1	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 5.6 w/ HEPA: 0

Date Optical Chamber Cleaned: April 20, 2023 <0.2 ug/m3

Disposable Filter Changed: March 30, 2023

Annual Maintenance

Date Sample Tube Cleaned: August 31, 2022

Date RH/T Sensor Cleaned: December 19, 2022

Notes: Flow, temperature and pressure verified. Leak check passed. Replaced the pump. Optical chamber cleaned. PMT peak voltage lowered from 1390V to 1386V.

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:	April 27, 2023	Last Cal Date:	March 30, 2023
Start time (MST):	9:32	End time (MST):	14:27
NH3 Cal Date:	April 28, 2023	Last Cal Date:	March 30, 2023
Start time (MST):	9:29	End time (MST):	12:30
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:	470

	Start	*Finish*		*Start*	*Finish*
NO coefficient:	0.850	0.834	TN coefficient:	0.850	0.836
NOX coefficient:	0.854	0.839	NO bkgrnd:	-1.529	-0.626
NO2 coefficient:	1.000	1.000	NOX bkgrnd:	-1.049	-0.402
NH3 coefficient:	0.937	0.937	TN bkgrnd:	3.877	1.871

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	1.003400	1.005241
NO_X Cal Offset:	-1.540000	-0.420000
NO Cal Slope:	0.999800	1.000685
NO Cal Offset:	-1.960000	-2.020000
NO_2 Cal Slope:	1.014549	1.007356
NO_2 Cal Offset:	0.808984	1.516016
NH3 Cal Slope:	0.996086	1.005229
NH3 Cal Offset:	-1.322705	-3.943276
TN Cal Slope:	0.999769	1.009496
TN Cal Offset:	-1.287257	-3.914715

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	-0.9	-0.1	-0.8	----	----
as found NO	4920	80.0	813.4	813.4	----	812.2	813.0	-0.8	1.002	----
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.4	0.0	-0.4	----	----
high NO point	4920	80.0	813.4	813.4	----	815.5	817.2	-1.7	0.997	----
NO/O3 point	4920	80.0	813.4	813.4	----	812.9	811.5	1.2	1.001	----
as found NH3	3413	86.4	1800.6	----	1800.6	1813.7	----	1806.0	0.993	0.997
new NH3 cyl rp							----			
first NH3	3413	86.4	1800.6	----	1800.6	1813.7	----	1806.0	0.993	0.997
second NH3	3452	48.0	1000.2	----	1000.2	1009.6	----	1005.3	0.991	0.995
third NH3	3476	24.0	500.1	----	500.1	493.7	----	491.5	1.013	1.017
								Average Correction Factor	0.9991	1.0031

Corrected As found TN = 813.1 ppb NO_X = 813.1 ppb NH3 = 1806.8 ppb

Previous Response TN = 812 ppb NO_X = 814.7 ppb NH3 = 1792.3 ppb

*Percent Change TN = 0.1%

*Percent Change NO_X = -0.2%

*Percent Change NH3 = 0.8%

* = > +/-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	0.0	0.1	-2.0	----	----
as found span	4920	80.0	813.4	800.6	813.4	833.0	814.5	828.0	0.9765	0.9830
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.2	-0.4	----	----
high point	4920	80.0	813.4	800.6	813.4	817.2	800.5	815.5	0.9954	1.0002
second point	4960	40.0	406.7	400.3	406.7	409.1	396.4	407.5	0.9942	1.0099
third point	4980	20.0	203.4	200.2	203.4	203.0	197.3	203.1	1.0018	1.0145
								Average Correction Factor	0.9971	1.0082

Baseline Corr As fnd	TN =	830	ppb	NO_X =	833.0	ppb	NO =	814.4	ppb	*Percent Change TN = 2.2%
Previous Response	TN =	812	ppb	NO_X =	814.7	ppb	NO =	798.5	ppb	*Percent Change NO_X = 2.2%
										*Percent Change NO = 1.9%

* = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found zero	----	----	0.0	-0.1	----	----
calibration zero	----	----	0.0	0.2	----	----
1st GPT point (400 ppb O3)	795.4	389.4	418.8	422.7	0.9908	100.9%
2nd GPT point (200 ppb O3)	795.4	589.8	218.4	222.1	0.9833	101.7%
3rd GPT point (100 ppb O3)	795.4	692.8	115.4	119.2	0.9681	103.3%
				Average Correction Factor	0.9807	102.0%

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

Calibration Performed By: Aswin Sasi Kumar & Rene Chamberland

Wood Buffalo Environmental Association

TN Calibration Summary

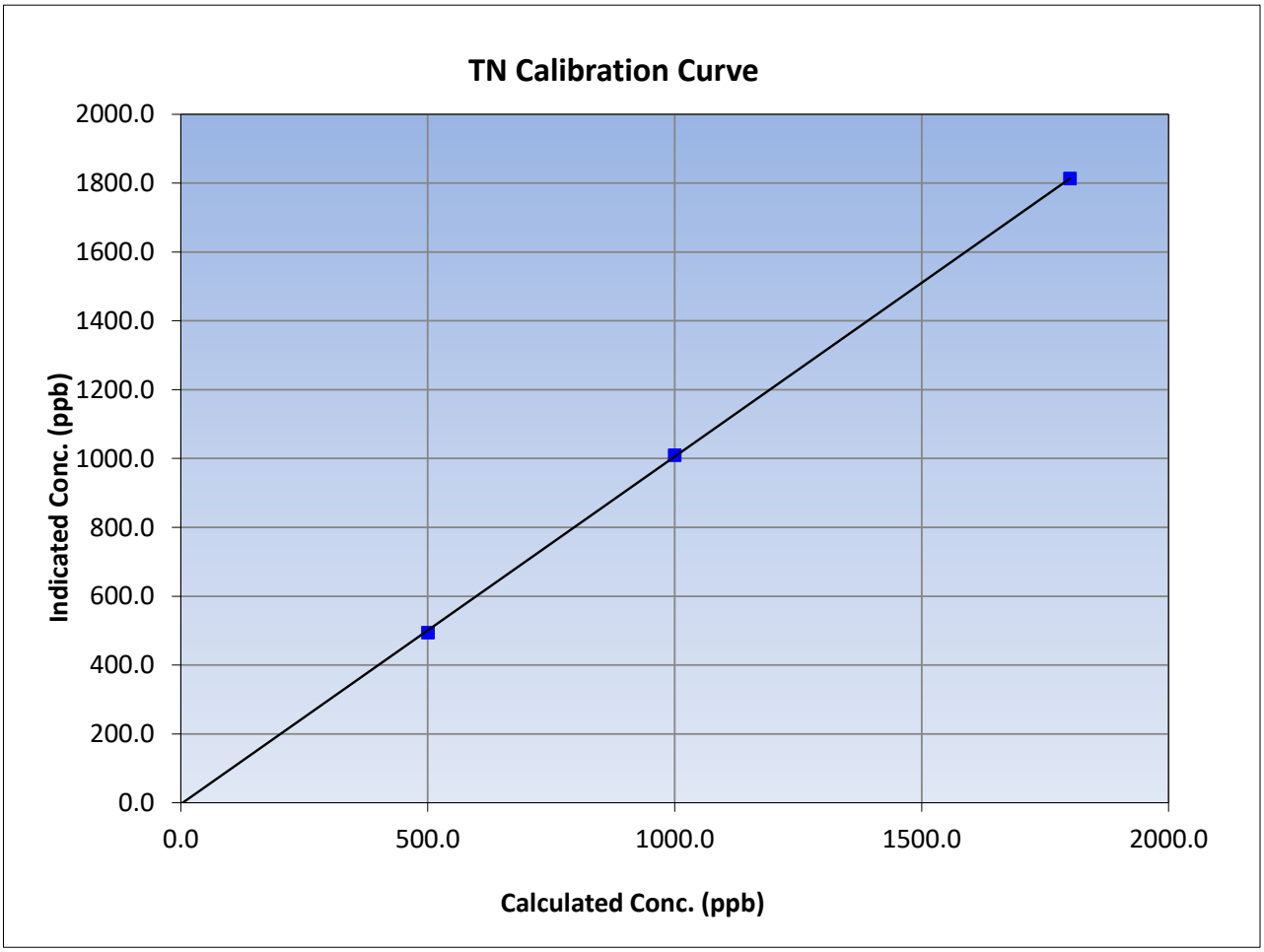
Version-11-2021

Station Information

Calibration Date:	April 28, 2023	Previous Calibration:	March 30, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:32	End Time (MST):	14:27
Analyzer make:	Teledyne API T201	Analyzer serial #:	808

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.4	----	Correlation Coefficient	0.999956	≥0.995
1800.6	1813.7	0.9928			
1000.2	1009.6	0.9907	Slope	1.009496	0.90 - 1.10
500.1	493.7	1.0129			
			Intercept	-3.914715	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

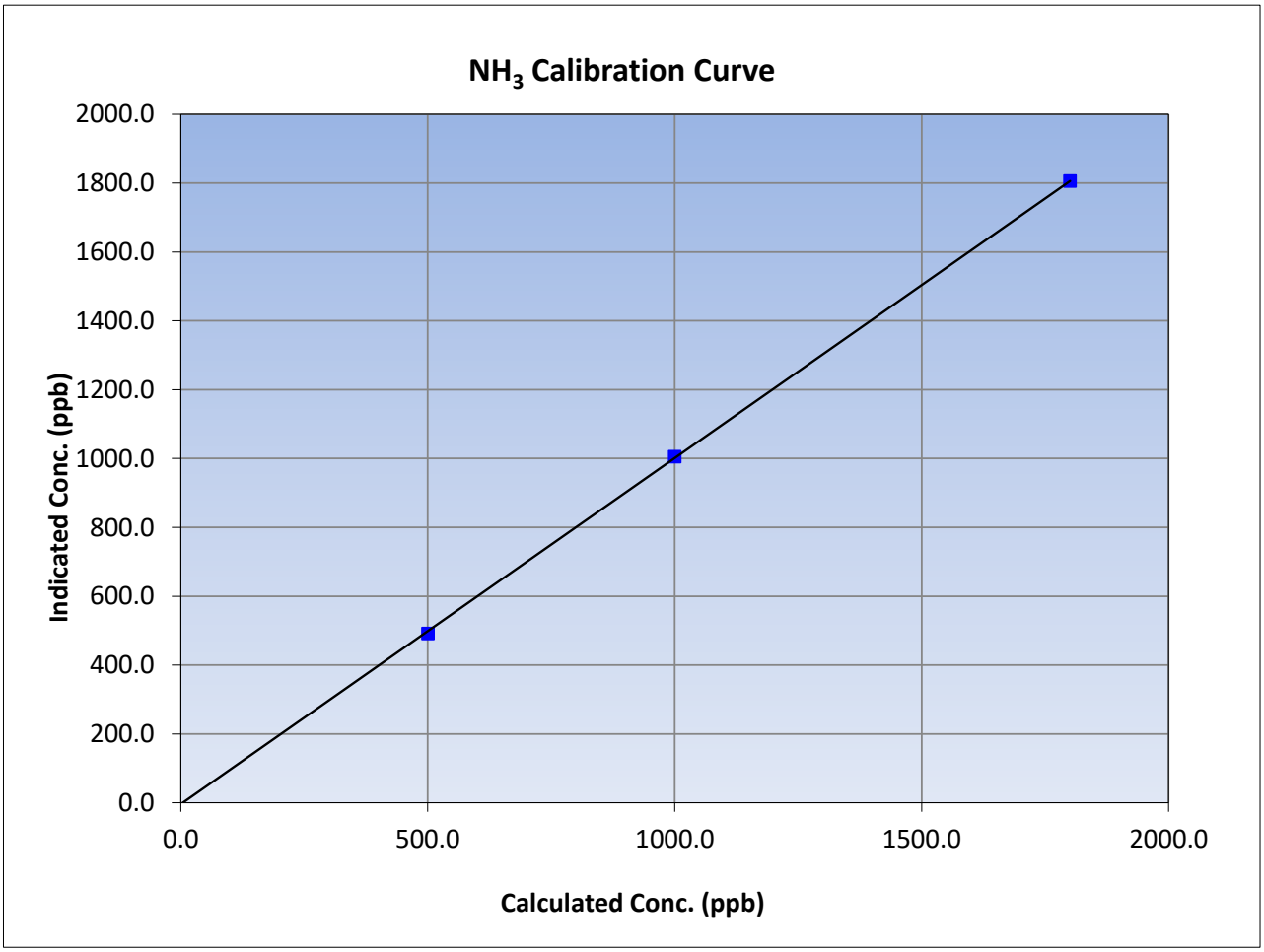
Version-11-2021

Station Information

Calibration Date:	April 28, 2023	Previous Calibration:	March 30, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:32	End Time (MST):	14:27
Analyzer make:	Teledyne API T201	Analyzer serial #:	808

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.4	----	Correlation Coefficient	0.999955	≥0.995
1800.6	1806.0	0.9970			
1000.2	1005.3	0.9949	Slope	1.005229	0.90 - 1.10
500.1	491.5	1.0175			
			Intercept	-3.943276	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

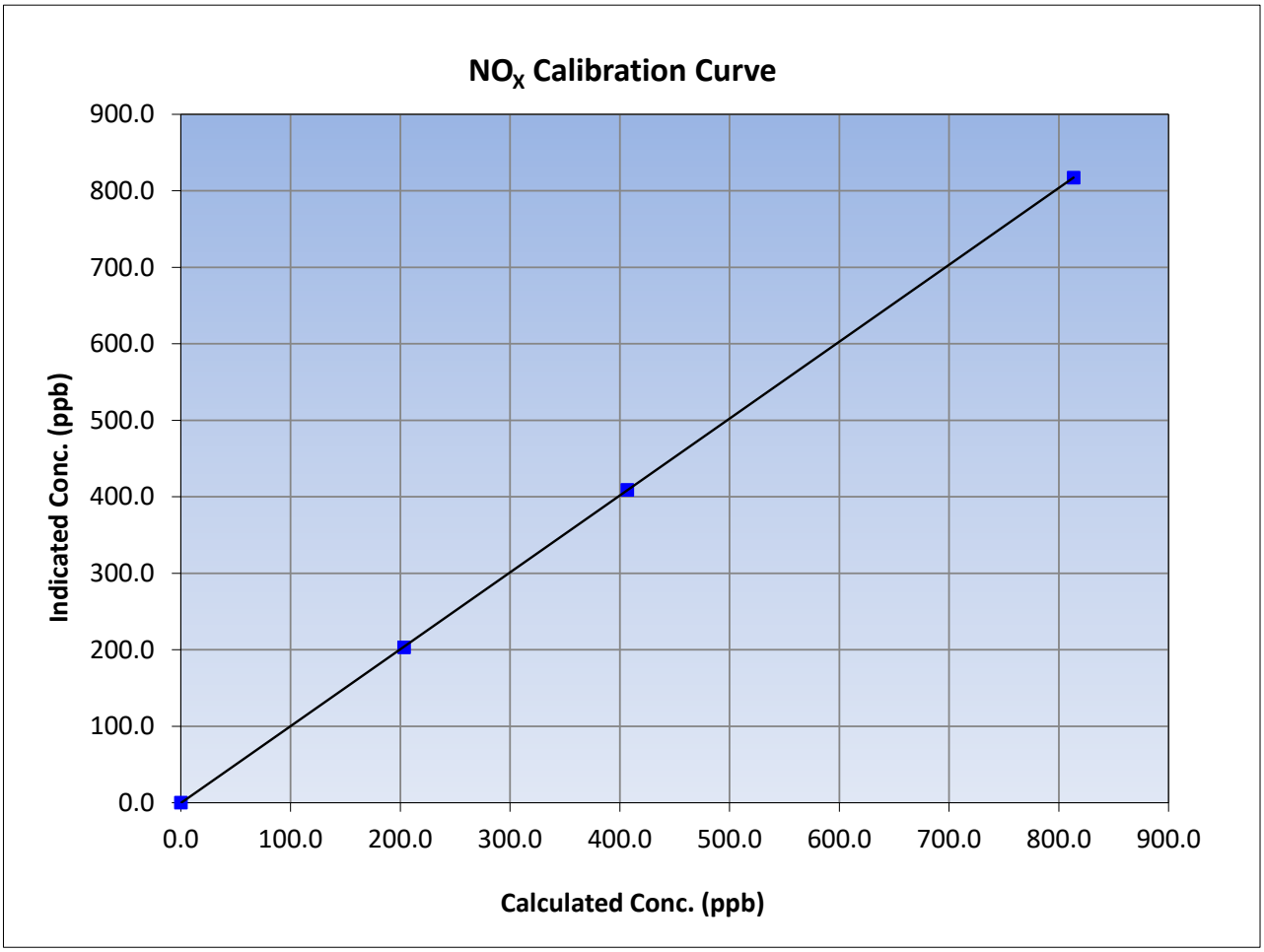
Version-11-2021

Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 30, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:32	End Time (MST):	14:27
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	0.999996	≥0.995
813.4	817.2	0.9954			
406.7	409.1	0.9942	Slope	1.005241	0.90 - 1.10
203.4	203.0	1.0018			
			Intercept	-0.420000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

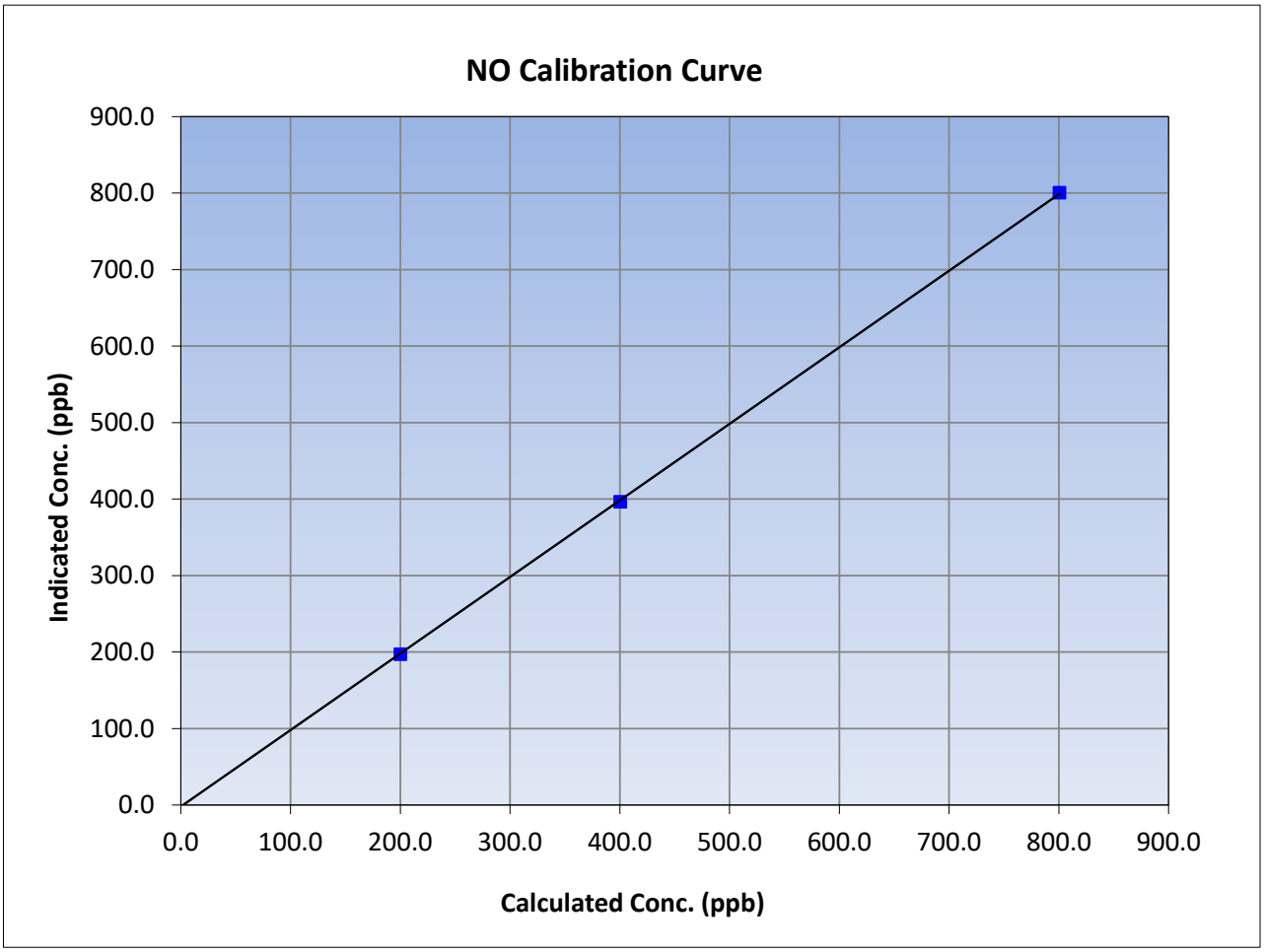
Version-11-2021

Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 30, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:32	End Time (MST):	14:27
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	0.999969	≥0.995
800.6	800.5	1.0002			
400.3	396.4	1.0099	Slope	1.000685	0.90 - 1.10
200.2	197.3	1.0145			
			Intercept	-2.020000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

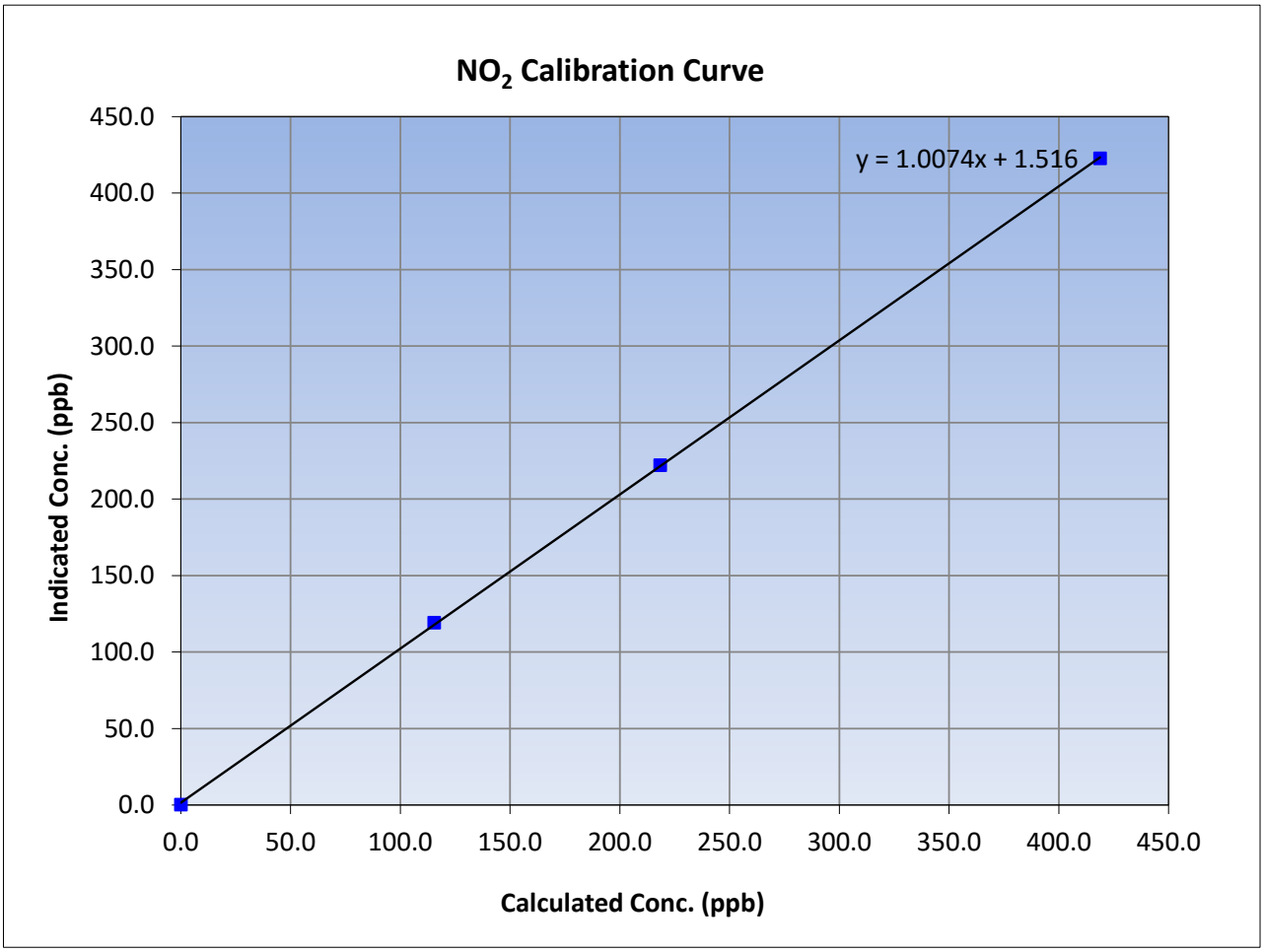
Version-11-2021

Station Information

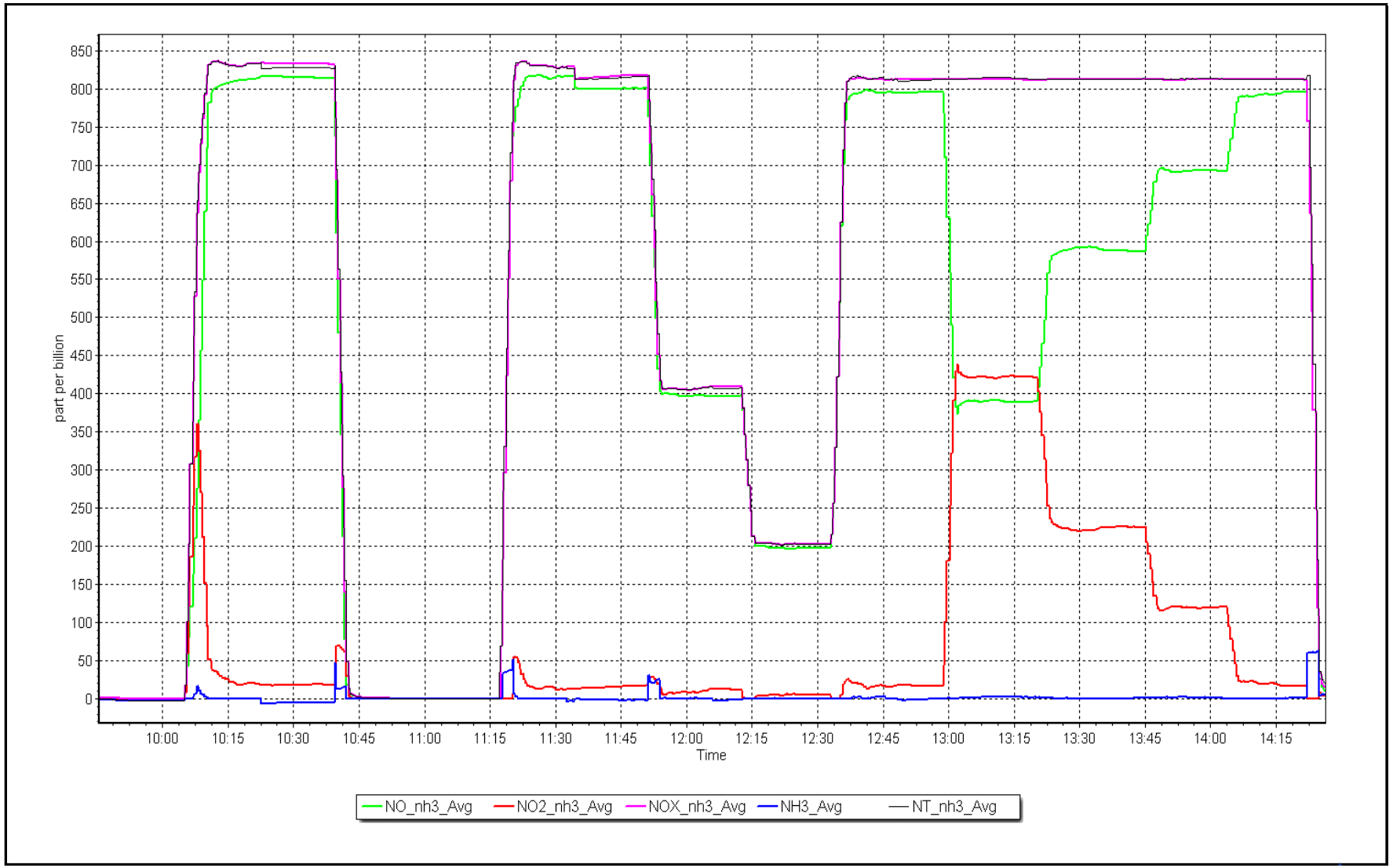
Calibration Date:	April 27, 2023	Previous Calibration:	March 30, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:32	End Time (MST):	14:27
Analyzer make:	Teledyne API T201	Analyzer serial #:	808

Calibration Data

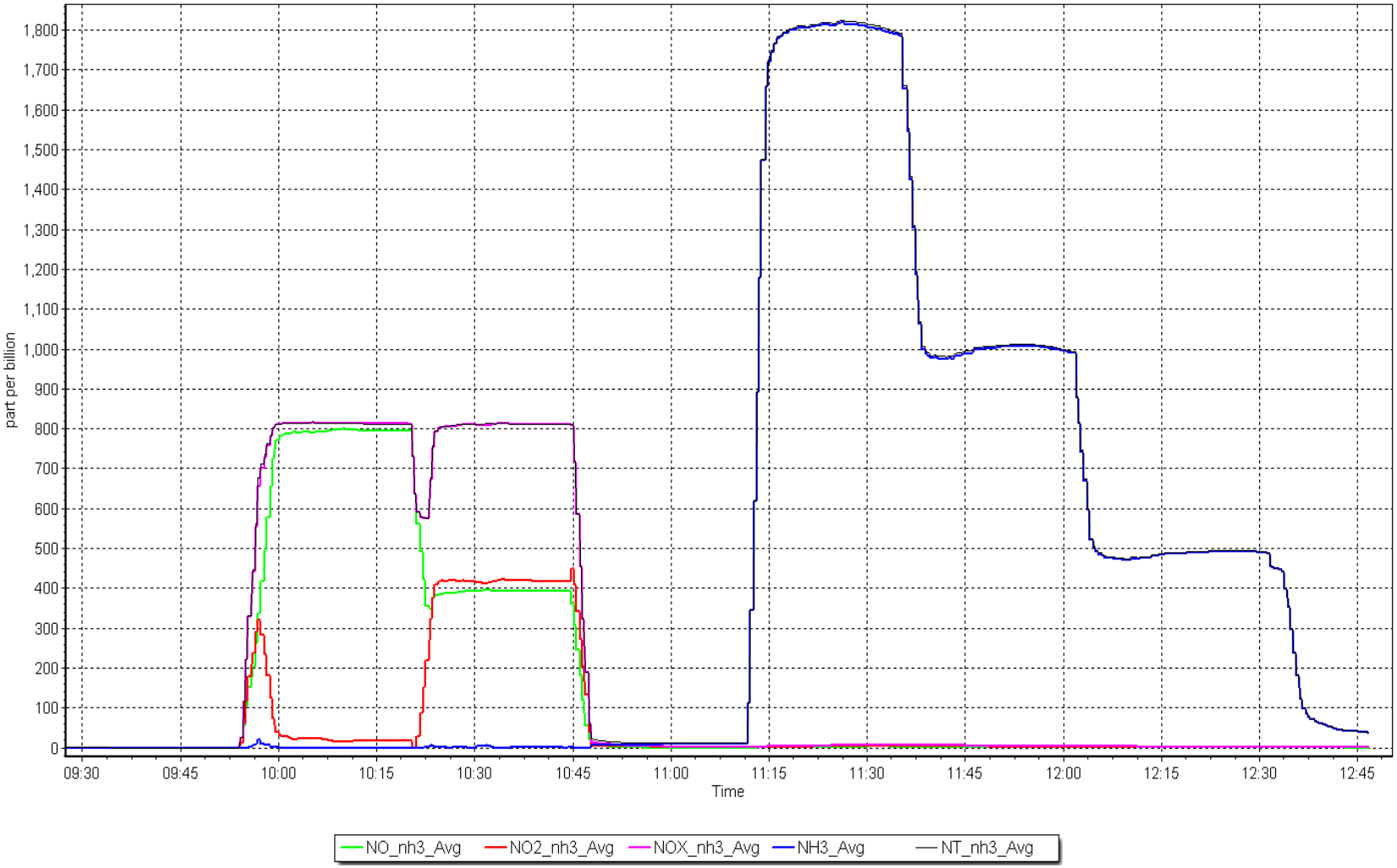
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999952	≥0.995
418.8	422.7	0.9908			
218.4	222.1	0.9833	Slope	1.007356	0.90 - 1.10
115.4	119.2	0.9681			
			Intercept	1.516016	+/-20



NO_X Calibration Plot Date: April 27, 2023 Location: Bertha Ganter-Fort McKay



NH_3 Calibration Plot Date: April 28, 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:	April 20, 2023	Last Cal Date:	March 8, 2023
Start time (MST):	11:06	End time (MST):	14:15
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:	1.002977	1.001765	Backgd or Offset:	-0.012	-0.012
Calibration intercept:	0.109828	0.123811	Coeff or Slope:	0.996	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	0.2	----
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	40.6	0.998
second point	4966	33.3	20.2	20.6	0.981
third point	4983	16.7	10.2	10.3	0.988
as left zero	5000	0.0	0.0	0.0	----
as left span	2960	40.0	40.5	40.2	1.009
				Average Correction Factor	0.989

Baseline Corr As found:	41.02	Prev response:	40.79	*% 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 both zero and span.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO Calibration Summary

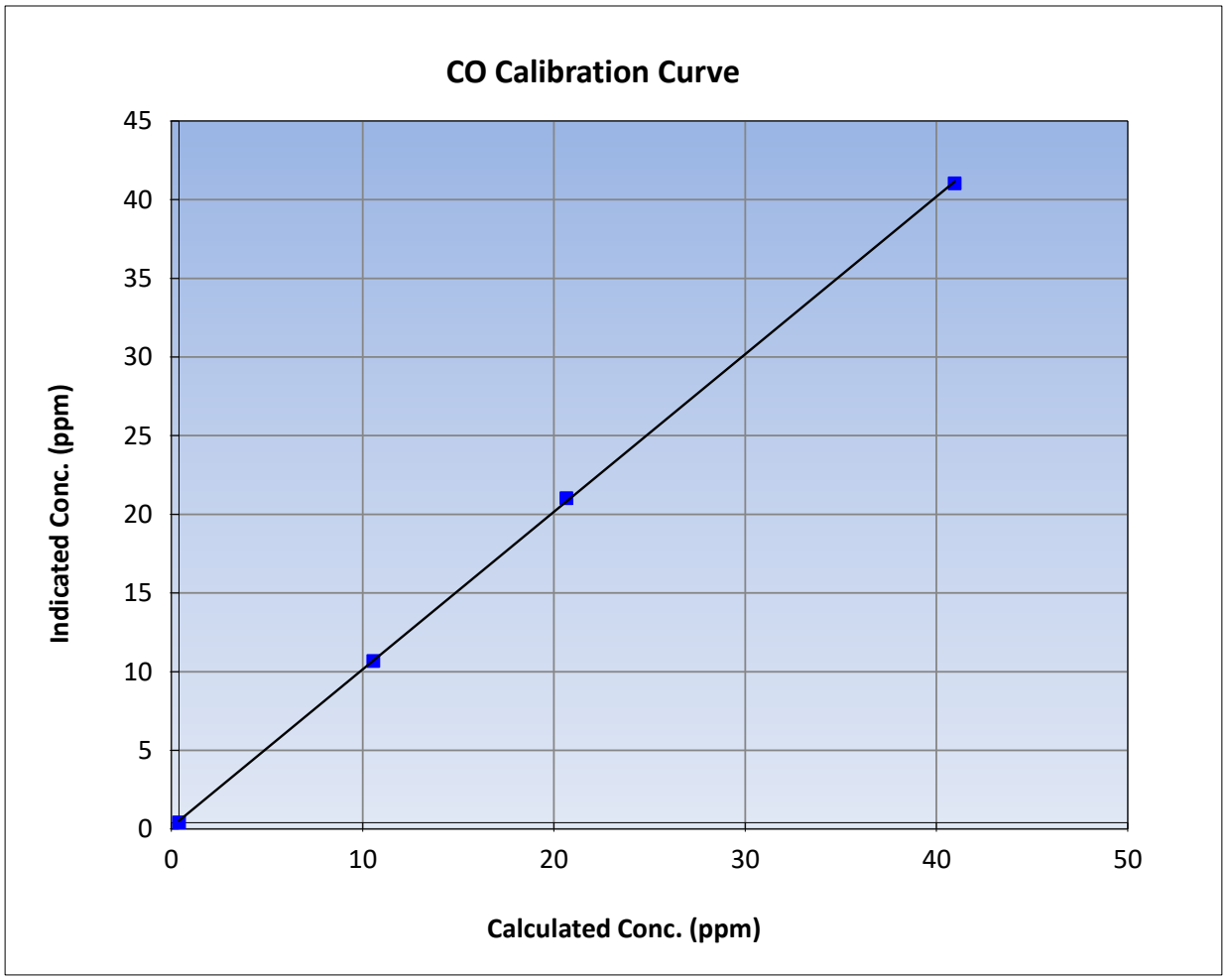
Version-01-2020

Station Information

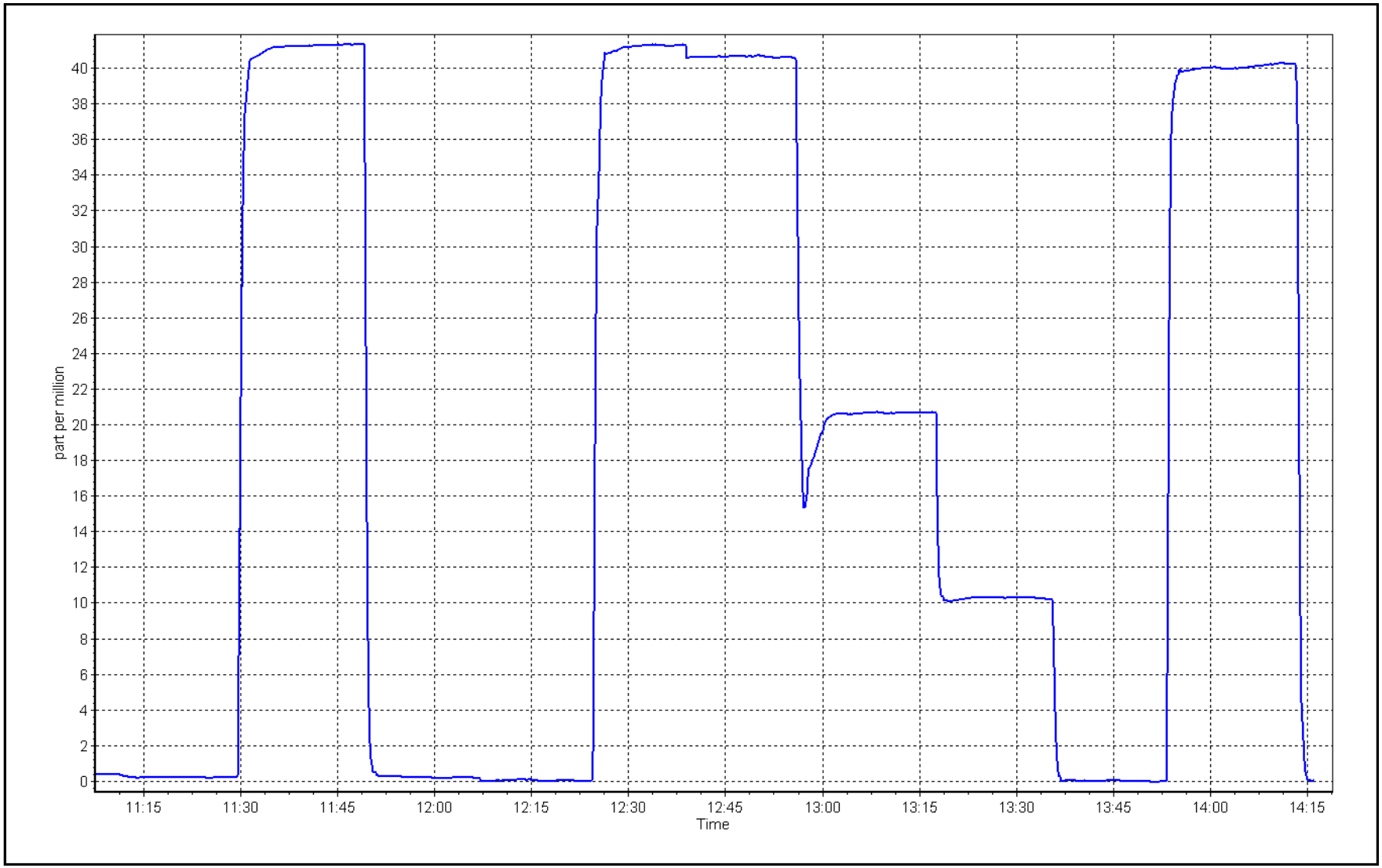
Calibration Date:	April 20, 2023	Previous Calibration:	March 8, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	11:06	End Time (MST):	14:15
Analyzer make:	Teledyne API T300	Analyzer serial #:	3520

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999915	*≥0.995*
40.6	40.6	0.9979			
20.2	20.6	0.9811	Slope	1.001765	*0.90 - 1.10*
10.2	10.3	0.9878			
			Intercept	0.123811	*+/-1.5*



CO Calibration Plot Date: April 20, 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:	April 19, 2023	Last Cal Date:	March 7, 2023
Start time (MST):	9:57	End time (MST):	13:24
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:	1.002067	1.000116	Backgd or Offset:	0.037	0.037
Calibration intercept:	-4.460000	-5.740000	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	-0.6	----
as found span	2920	80.0	1605.3	1617.9	0.992
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	-0.2	----
high point	2920	80.0	1605.3	1602.3	1.002
second point	2960	40.0	802.7	795.0	1.010
third point	2980	20.0	401.3	389.6	1.030
as left zero	3000	0.0	0.0	-0.4	----
as left span	2960	40.0	802.7	782.8	1.025
				Average Correction Factor	1.014

Baseline Corr As found:	1618.50	Prev response:	1604.19	*% 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. Cycled power to the analyzer. No adjustments made.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

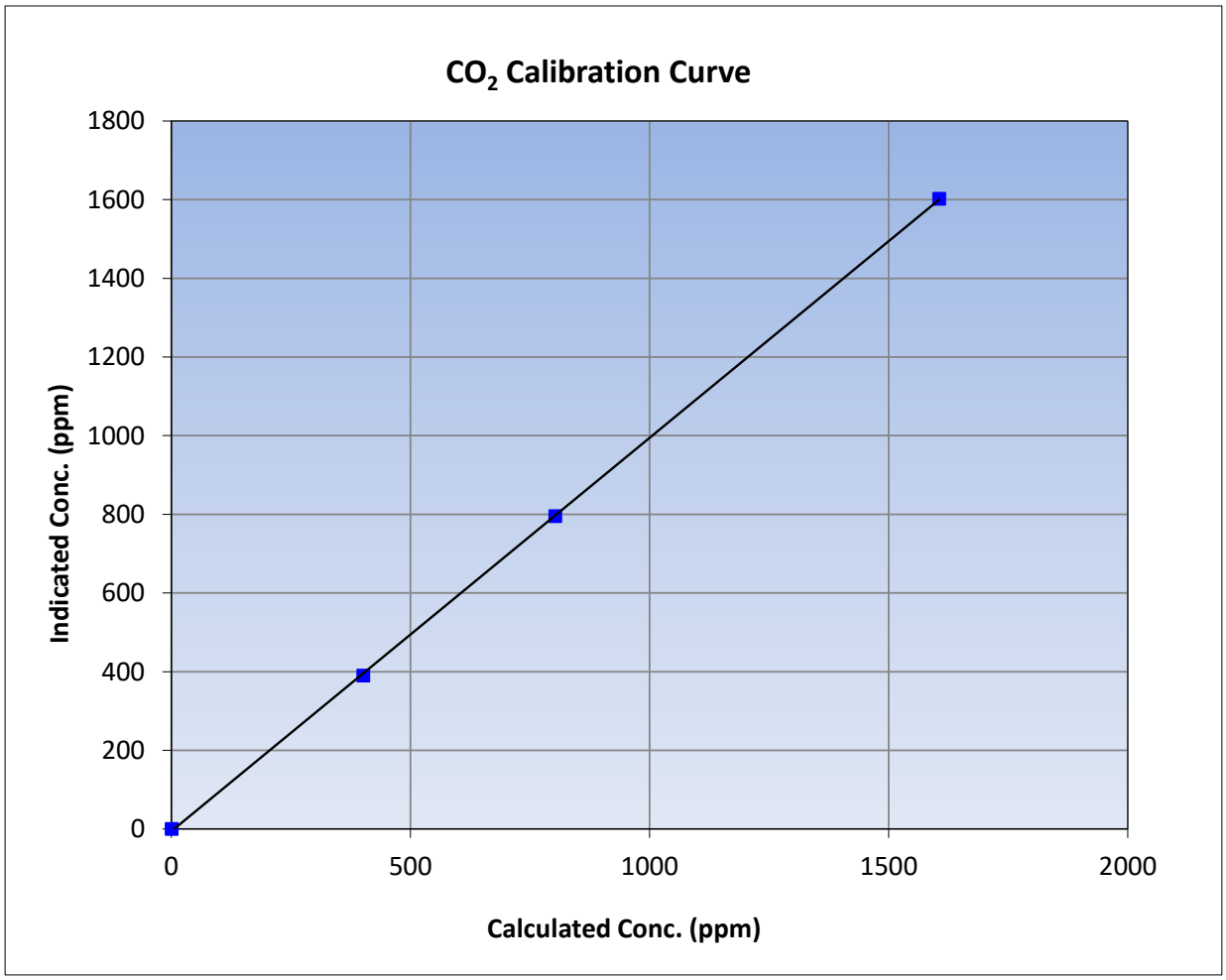
Station Information

Calibration Date	April 19, 2023	Previous Calibration	March 7, 2023
Station Name	Bertha Ganter-Fort McKay	Station Number	AMS01
Start Time (MST)	9:57	End Time (MST)	13:24
Analyzer make	Teledyne API 360	Analyzer serial #	442

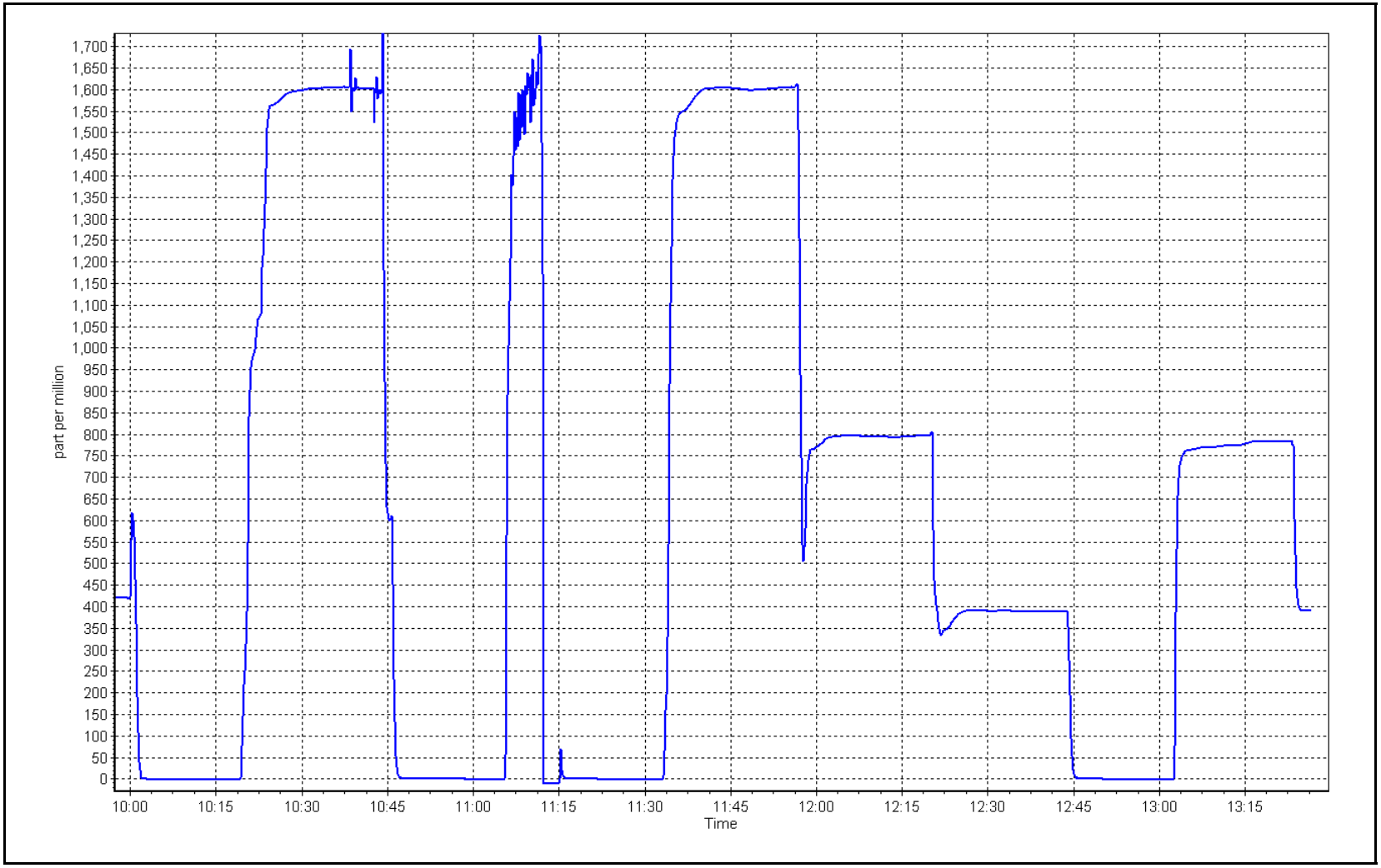
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
1605.3	1602.3	1.0019
802.7	795.0	1.0096
401.3	389.6	1.0301

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999945	*≥0.995*
Slope	1.000116	*0.90 - 1.10*
Intercept	-5.740000	*+/-10*



CO_2 Calibration Plot Date: April 19, 2023 Location: Bertha Ganter-Fort McKay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS02
MILDRED LAKE
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Mildred Lake	Station number:	AMS02
Calibration Date:	April 13, 2023	Last Cal Date:	March 8, 2023
Start time (MST):	10:42 AM	End time (MST):	13:32
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.002096	0.999874	Backgd or Offset:	18.0	18.3
Calibration intercept:	-0.984595	-0.805548	Coeff or Slope:	0.811	0.805

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	809.6	0.990
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	801.0	1.001
second point	4960	40.1	400.8	400.1	1.002
third point	4980	20.0	199.9	197.8	1.011
as left zero	5000	0.0	0.0	-0.1	----
as left span	4920	80.2	801.6	802.5	0.999
				Average Correction Factor	1.004

Baseline Corr As found:	809.80	Previous response	802.34	*% change	0.9%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

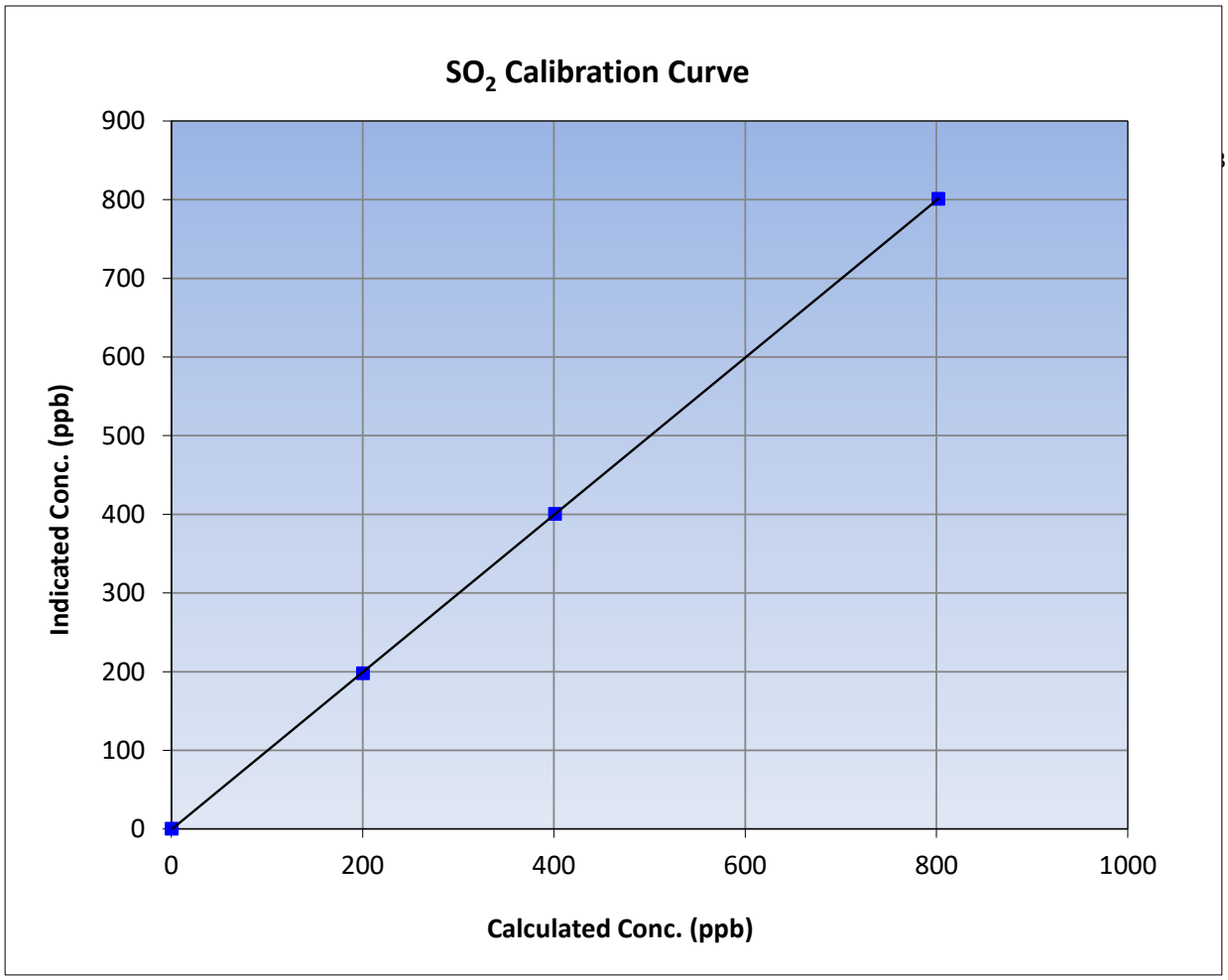
Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 8, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:42	End Time (MST):	13:32
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1404901075

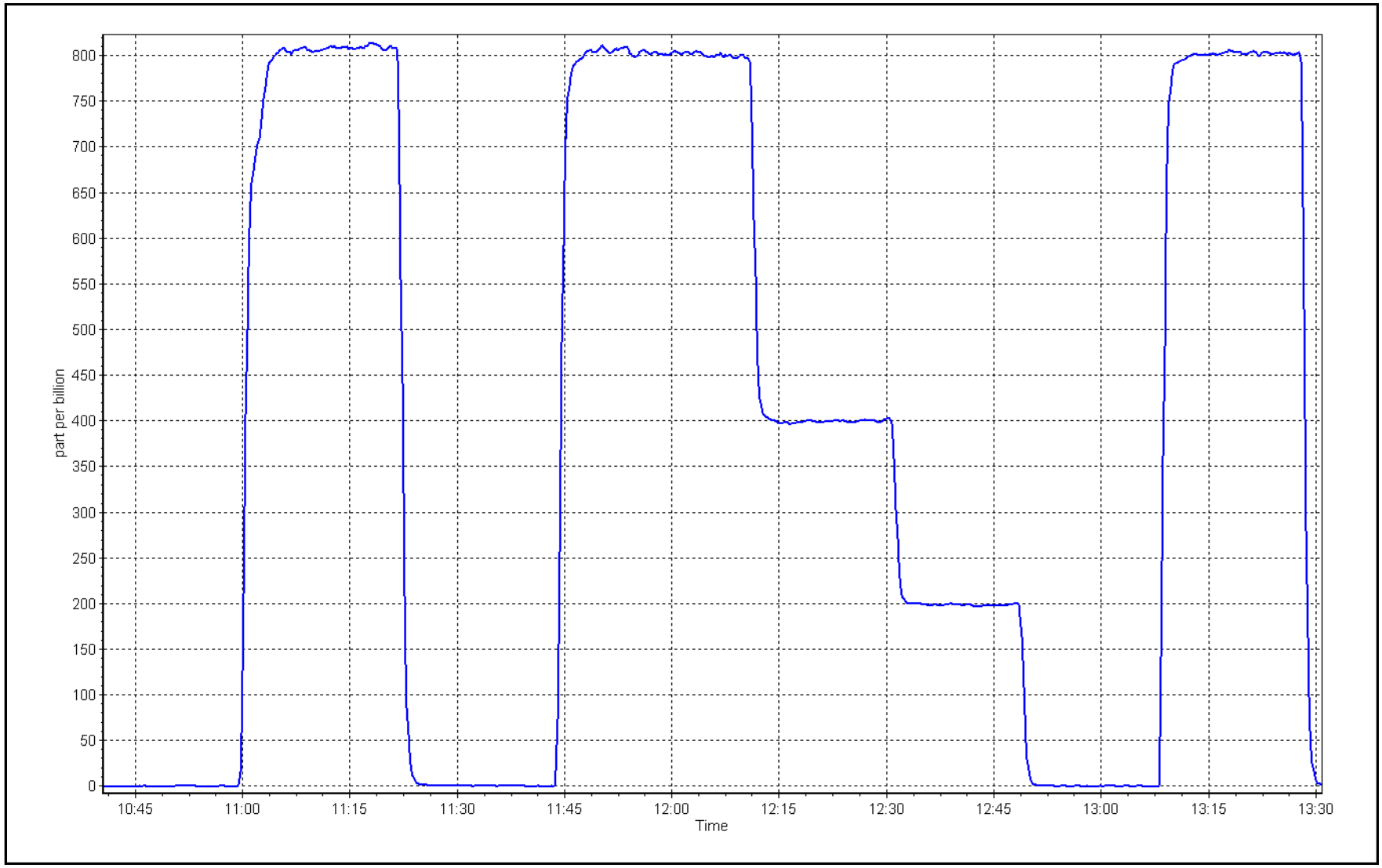
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
801.6	801.0	1.0008
400.8	400.1	1.0018
199.9	197.8	1.0107

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999993	*≥0.995*
Slope	0.999874	*0.90 - 1.10*
Intercept	-0.805548	*+/-30*



SO2 Calibration Plot Date: April 13, 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:	April 4, 2023	Last Cal Date:	March 16, 2023
Start time (MST):	9:03	End time (MST):	13:23
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:	1.007251	0.993678	Backgd or Offset:	1.83	1.75
Calibration intercept:	0.000807	0.100794	Coeff or Slope:	0.844	0.823

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4924	75.6	80.0	81.2	0.986
as found 2nd point	4962	37.8	40.0	40.8	0.983
as found 3rd point	4981	18.9	20.0	20.4	0.985
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4924	75.6	80.0	79.6	1.005
second point	4962	37.8	40.0	39.9	1.002
third point	4981	18.9	20.0	19.8	1.010
as left zero	5000	0.0	0.0	0.2	----
as left span	4924	75.6	80.0	79.9	1.001
SO2 Scrubber Check	4920	80.2	802.0	0.0	----
Date of last scrubber change:		12-Sep-22		Ave Corr Factor	1.006
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.1	Prev response:	80.57	*% change:	0.7%
Baseline Corr 2nd AF pt:	40.7	AF Slope:	1.013966	AF Intercept:	0.140813
Baseline Corr 3rd AF pt:	20.3	AF Correlation:	0.999996		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

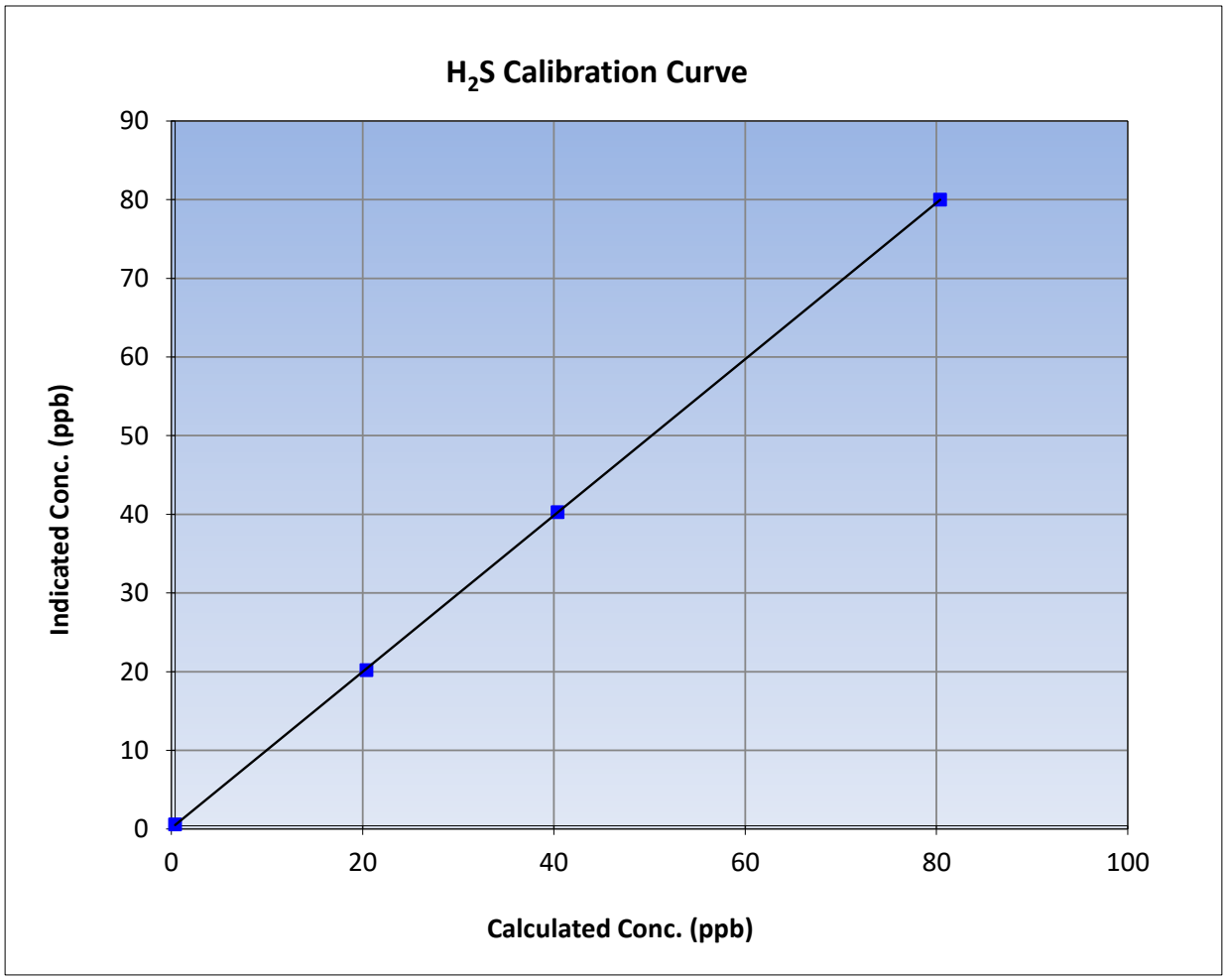
Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 16, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:03	End Time (MST):	13:23
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	12113311966

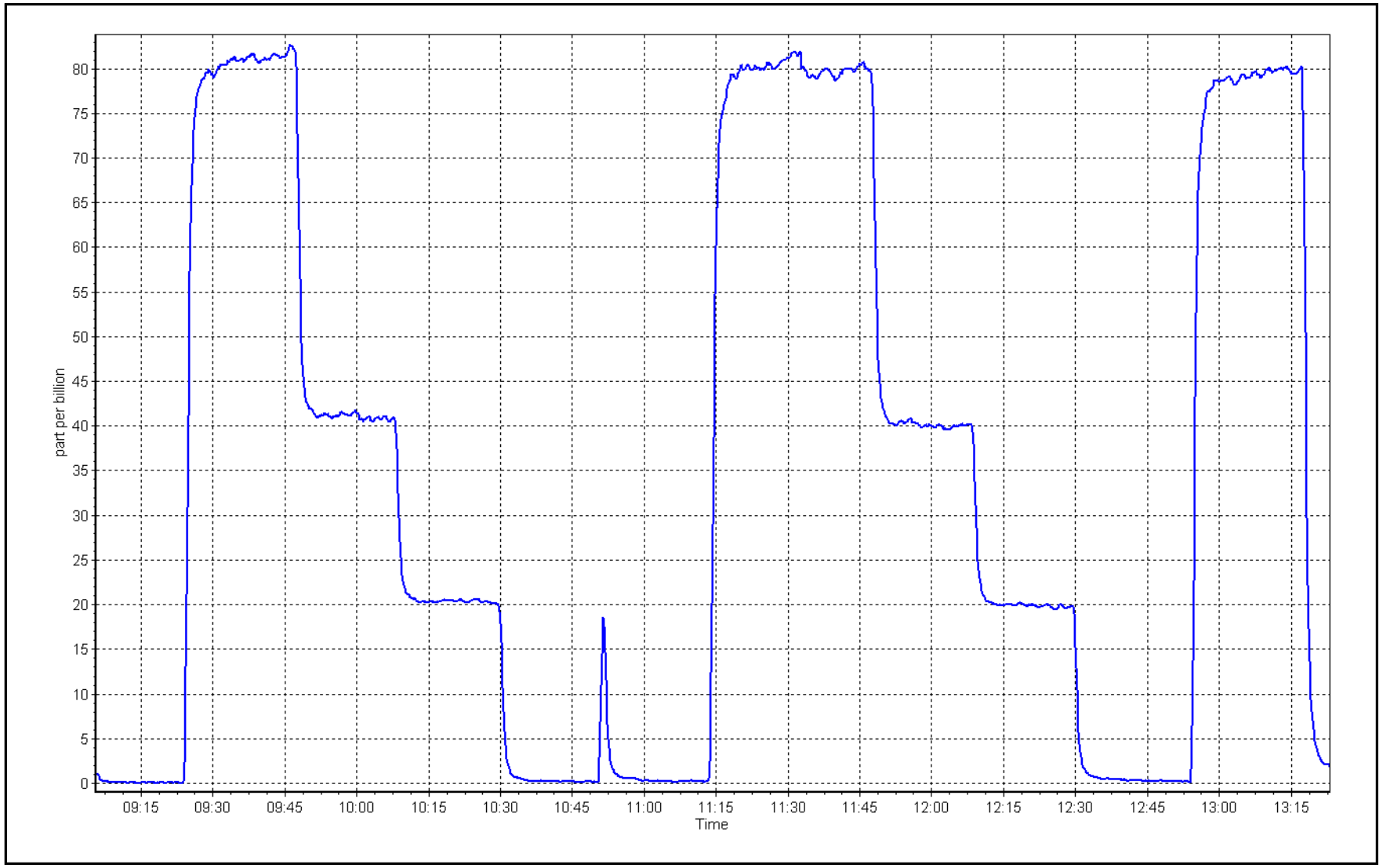
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	79.6	1.0049
40.0	39.9	1.0024
20.0	19.8	1.0099

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999988	*≥0.995*
Slope	0.993678	*0.90 - 1.10*
Intercept	0.100794	*+/-3*



H_2S Calibration Plot Date: April 4, 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:	April 5, 2023	Last Cal Date:	April 4, 2023
Start time (MST):	8:55	End time (MST):	11:58
Reason:	Maintenance	will swap the pump (low flow)	

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43iQTL		Analyzer serial #:	12113311966	
Converter make:	Global G150		Converter serial #:	2022-198	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.993678	1.015395	Backgd or Offset:	1.75	1.75
Calibration intercept:	0.100794	-0.059190	Coeff or Slope:	0.823	0.823

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	80.2	0.999
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	4924	75.6	80.0	81.2	0.985
second point	4962	37.8	40.0	40.6	0.985
third point	4981	18.9	20.0	20.0	1.000
as left zero	5000	0.0	0.0	0.1	----
as left span	4924	75.6	80.0	80.8	0.990

SO2 Scrubber Check

Date of last scrubber change:	12-Sep-22	Ave Corr Factor	0.990
Date of last converter efficiency test:			efficiency

Baseline Corr As found:	80.1	Prev response:	79.59	*% change:	0.6%
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: Pump changed after as founds. No adjustment made.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

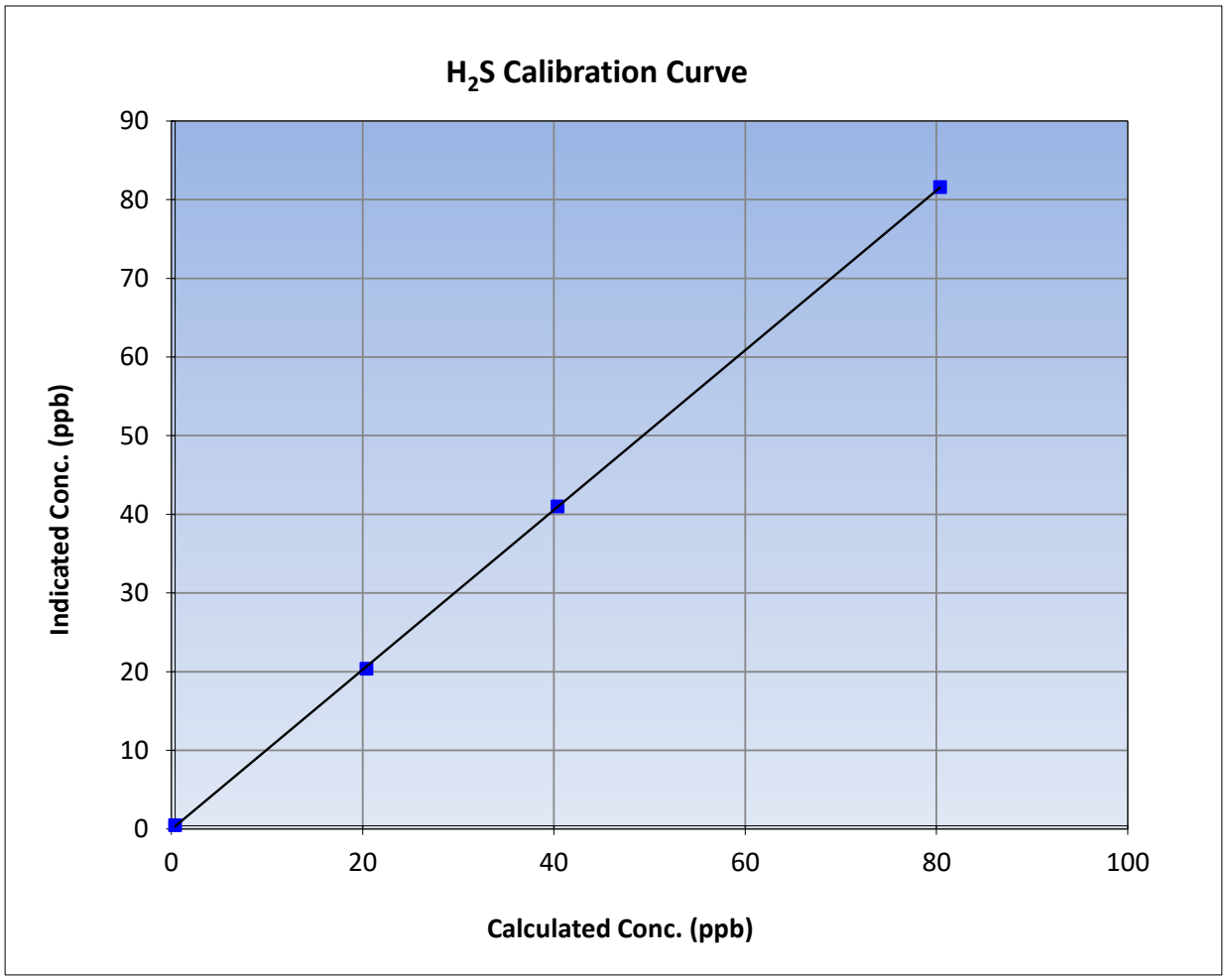
Station Information

Calibration Date:	April 5, 2023	Previous Calibration:	April 4, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	8:55	End Time (MST):	11:58
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	12113311966

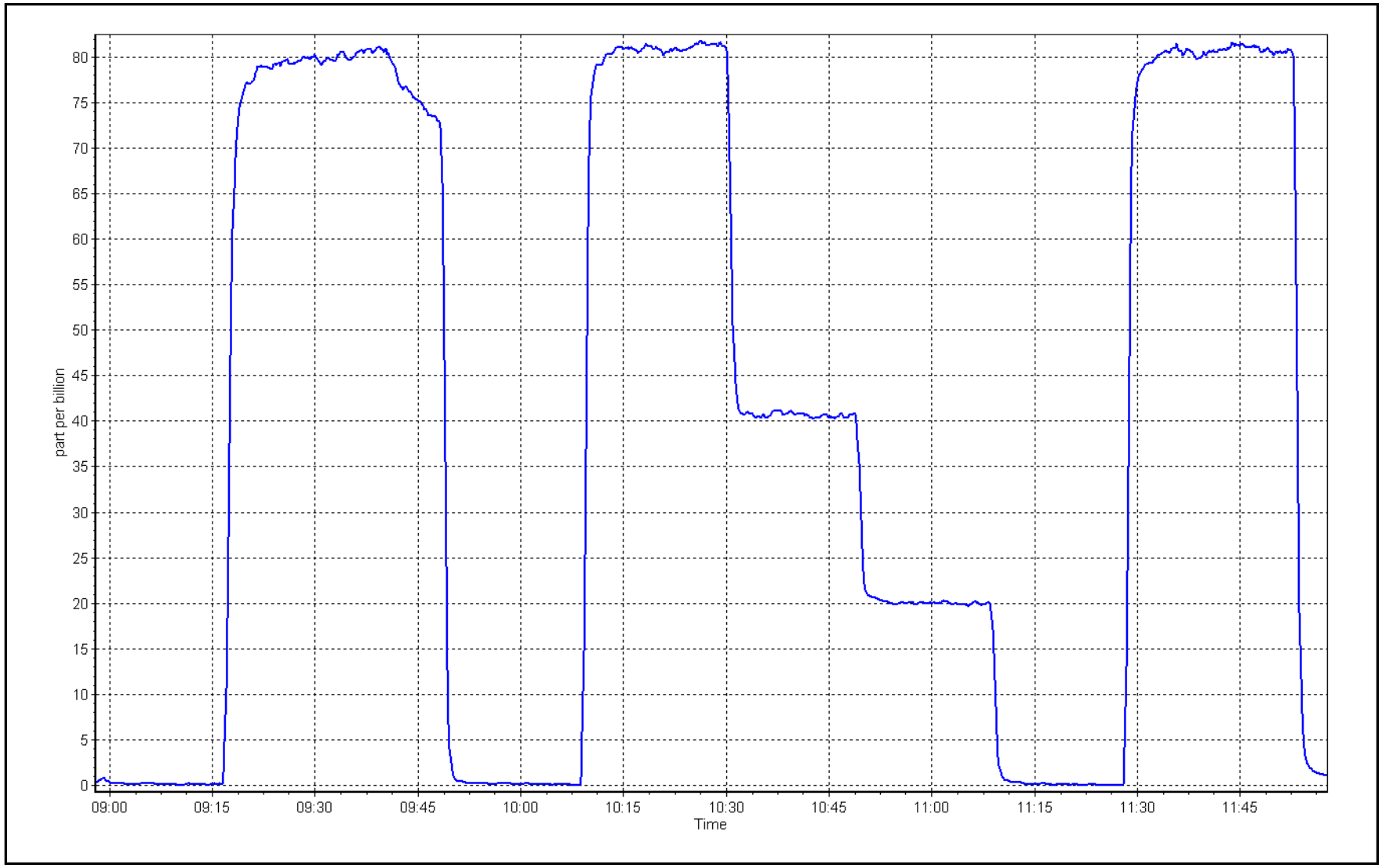
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	81.2	0.9851
40.0	40.6	0.9851
20.0	20.0	0.9998

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999975	*≥0.995*
Slope	1.015395	*0.90 - 1.10*
Intercept	-0.059190	*+/-3*



H_2S Calibration Plot Date: April 5, 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:	April 13, 2023	Last Cal Date:	March 8, 2023
Start time (MST):	10:42	End time (MST):	13:32
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:	2.84E-04	2.86E-04	NMHC SP Ratio:	4.45E-04	4.49E-04
CH4 Retention time:	14.6	14.6	NMHC Peak Area:	197833	195861
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	16.71	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	16.82	16.82	1.000
second point	4960	40.1	8.41	8.39	1.003
third point	4980	20.0	4.19	4.17	1.007
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	16.82	16.88	0.997
				Average Correction Factor	1.003
Baseline Corr AF:	16.71	Prev response	16.80	*% change	-0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	8.80	8.72	1.009
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	8.80	8.79	1.000
second point	4960	40.1	4.40	4.41	0.998
third point	4980	20.0	2.19	2.20	0.997
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	8.79	*% change	-0.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	8.02	7.99	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	80.2	8.02	8.03	1.000
second point	4960	40.1	4.01	3.98	1.008
third point	4980	20.0	2.00	1.97	1.018
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.02	8.05	0.997
				Average Correction Factor	1.009
Baseline Corr AF:	7.99	Prev response	8.01	*% 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:	1.000469	1.000482
THC Cal Offset:	-0.025314	-0.015912
CH4 Cal Slope:	1.001069	1.001482
CH4 Cal Offset:	-0.023053	-0.021253
NMHC Cal Slope:	0.999791	0.999608
NMHC Cal Offset:	-0.002261	0.004941

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

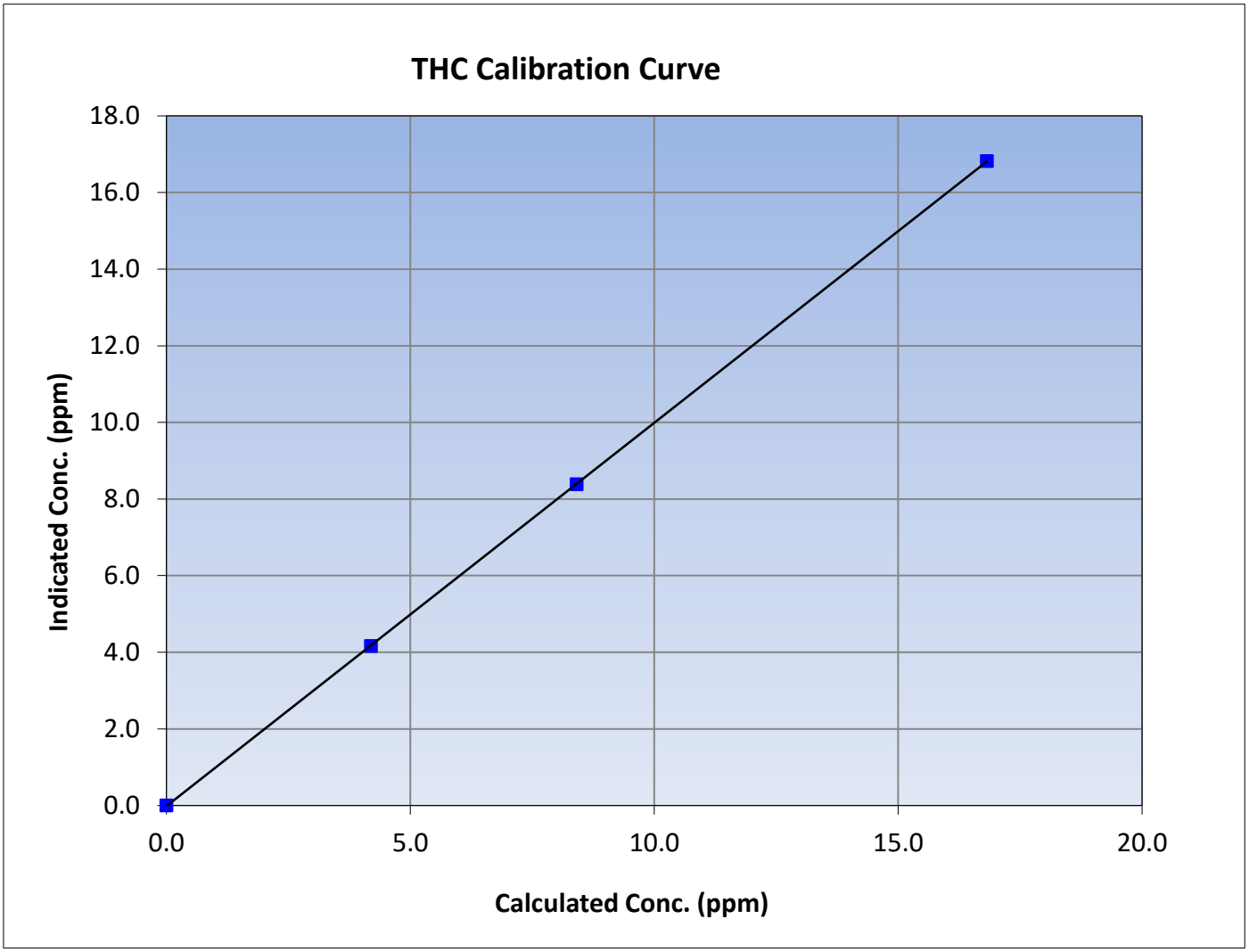
Version-06-2022

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 8, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:42	End Time (MST):	13:32
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	16.82	0.9999			
8.41	8.39	1.0026	Slope	1.000482	*0.90 - 1.10*
4.19	4.17	1.0068			
			Intercept	-0.015912	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

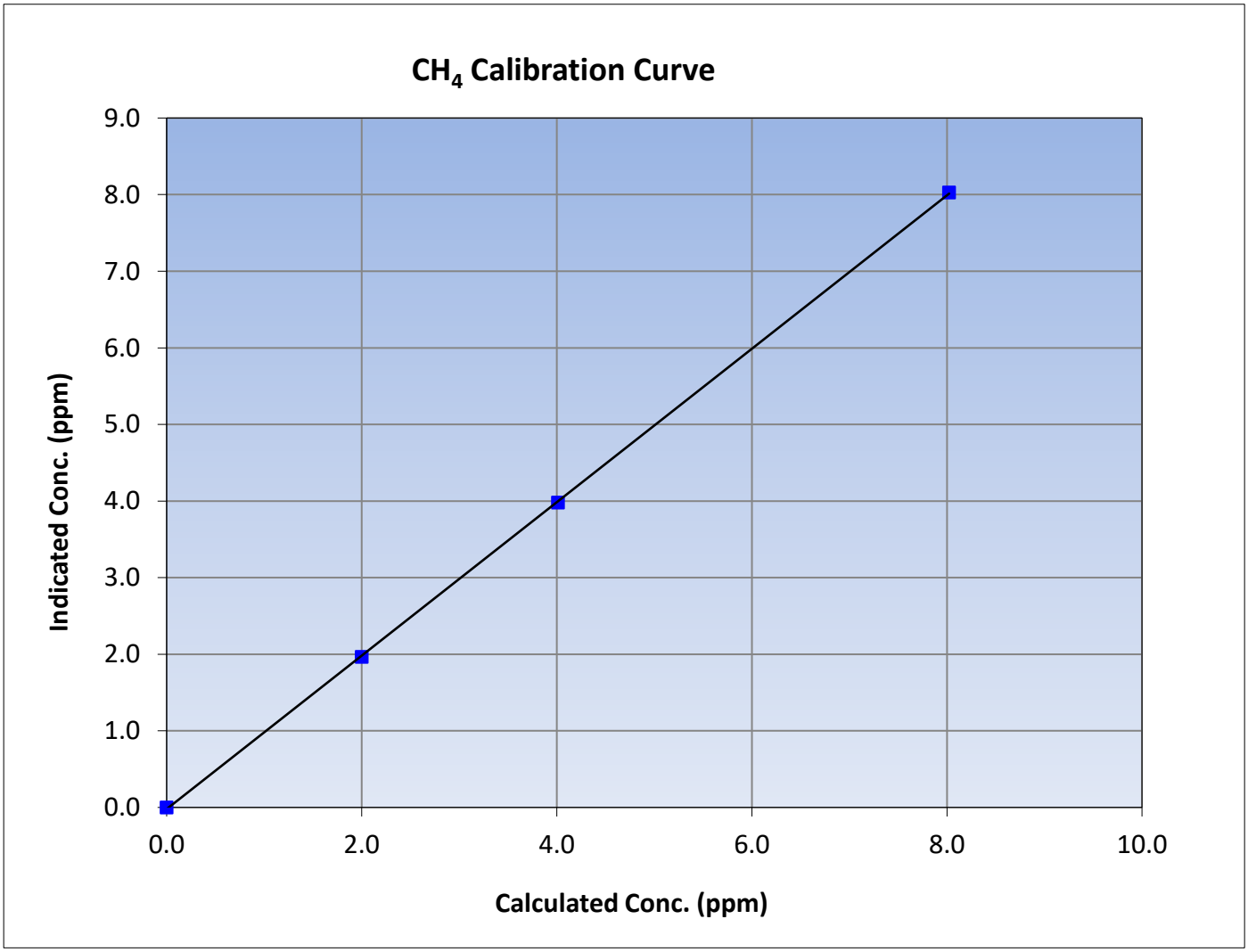
Version-06-2022

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 8, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:42	End Time (MST):	13:32
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	0.999967	*≥0.995*
8.02	8.03	0.9996			
4.01	3.98	1.0079	Slope	1.001482	*0.90 - 1.10*
2.00	1.97	1.0182			
			Intercept	-0.021253	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

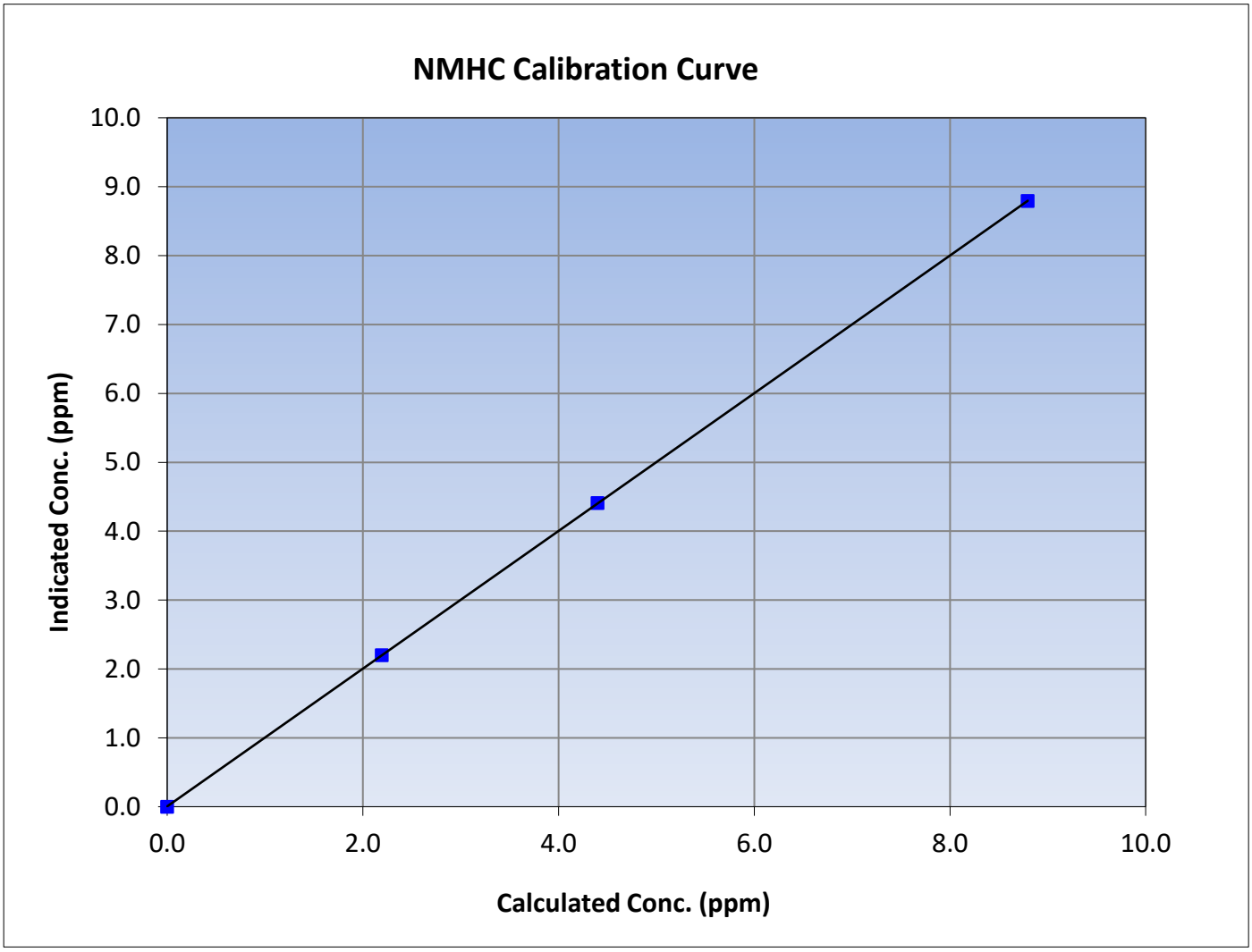
Version-06-2022

Station Information

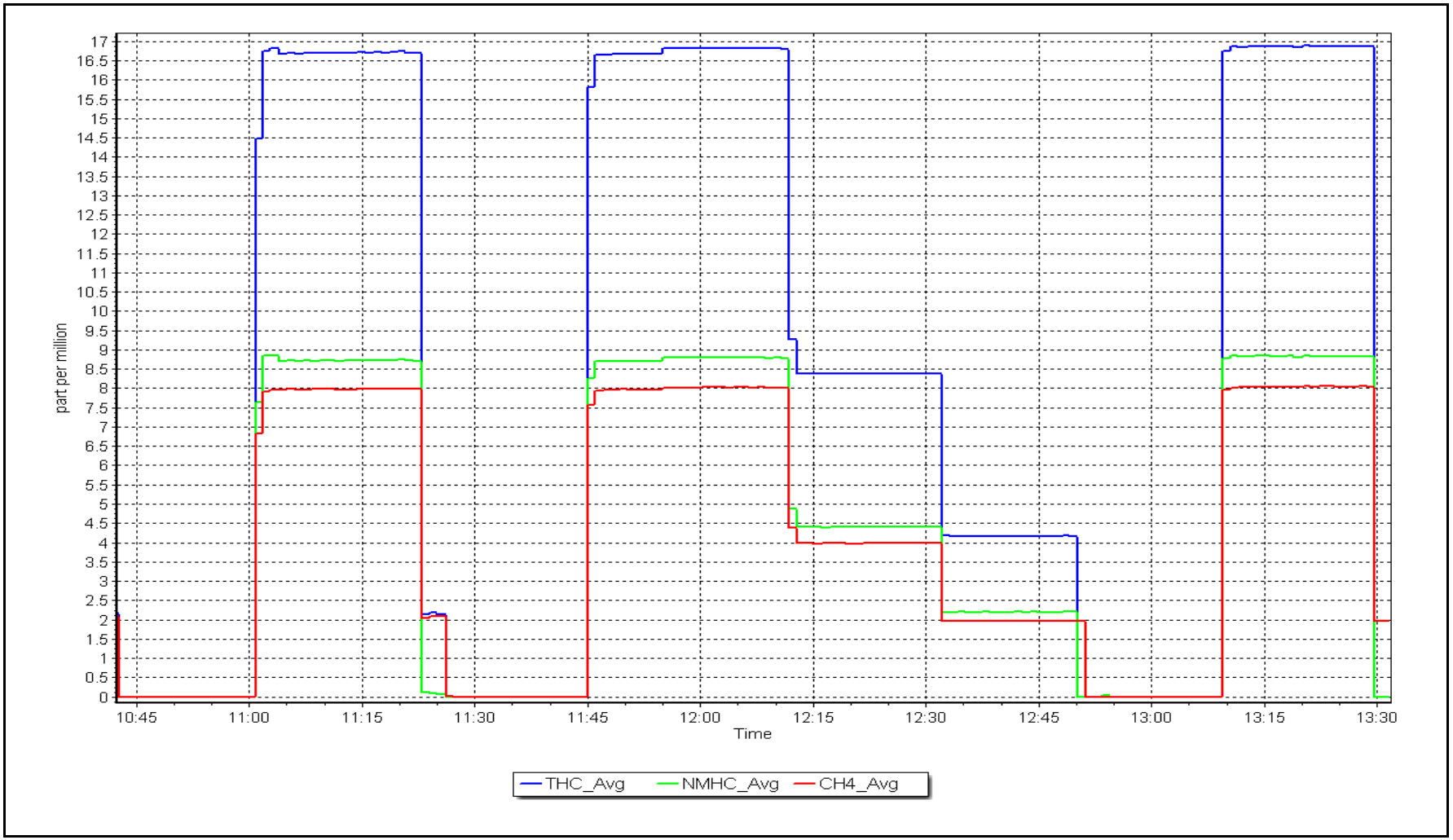
Calibration Date:	April 13, 2023	Previous Calibration:	March 8, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:42	End Time (MST):	13:32
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320038

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	8.79	1.0002			
4.40	4.41	0.9979	Slope	0.999608	0.90 - 1.10
2.19	2.20	0.9970			
			Intercept	0.004941	+/-0.5



NMHC Calibration Plot Date: April 13, 2023 Location: Mildred Lake



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS04
BUFFALO VIEWPOINT
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	April 13, 2023	Last Cal Date:	March 28, 2023
Start time (MST):	7:42	End time (MST):	11:14
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.996516	1.001885	Backgd or Offset:	22.1	22.1
Calibration intercept:	-0.920000	-0.100000	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	0.2	----
as found span	4920	80.0	800.3	797.2	1.004
as found 2nd point	4960	40.0	400.2	399.9	1.001
as found 3rd point	4980	20.0	200.1	198.9	1.006
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	----
high point	4920	80.0	800.3	801.7	0.998
second point	4960	40.0	400.2	401.4	0.997
third point	4980	20.0	200.1	199.3	1.004
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	80.0	800.3	801.8	0.998
				Average Correction Factor	1.000

Baseline Corr As found:	797.00	Previous response	796.61	*% change	0.0%
Baseline Corr 2nd AF pt:	399.70	AF Slope:	0.996259	AF Intercept:	0.220000
Baseline Corr 3rd AF pt:	198.70	AF Correlation:	0.999995		

* = > +/-5% change initiates investigation

Notes: Analyzer moved to bottom shelf for more room for H2S analyzer. Sample line replaced to a longer line. Exhaust line extended. No adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

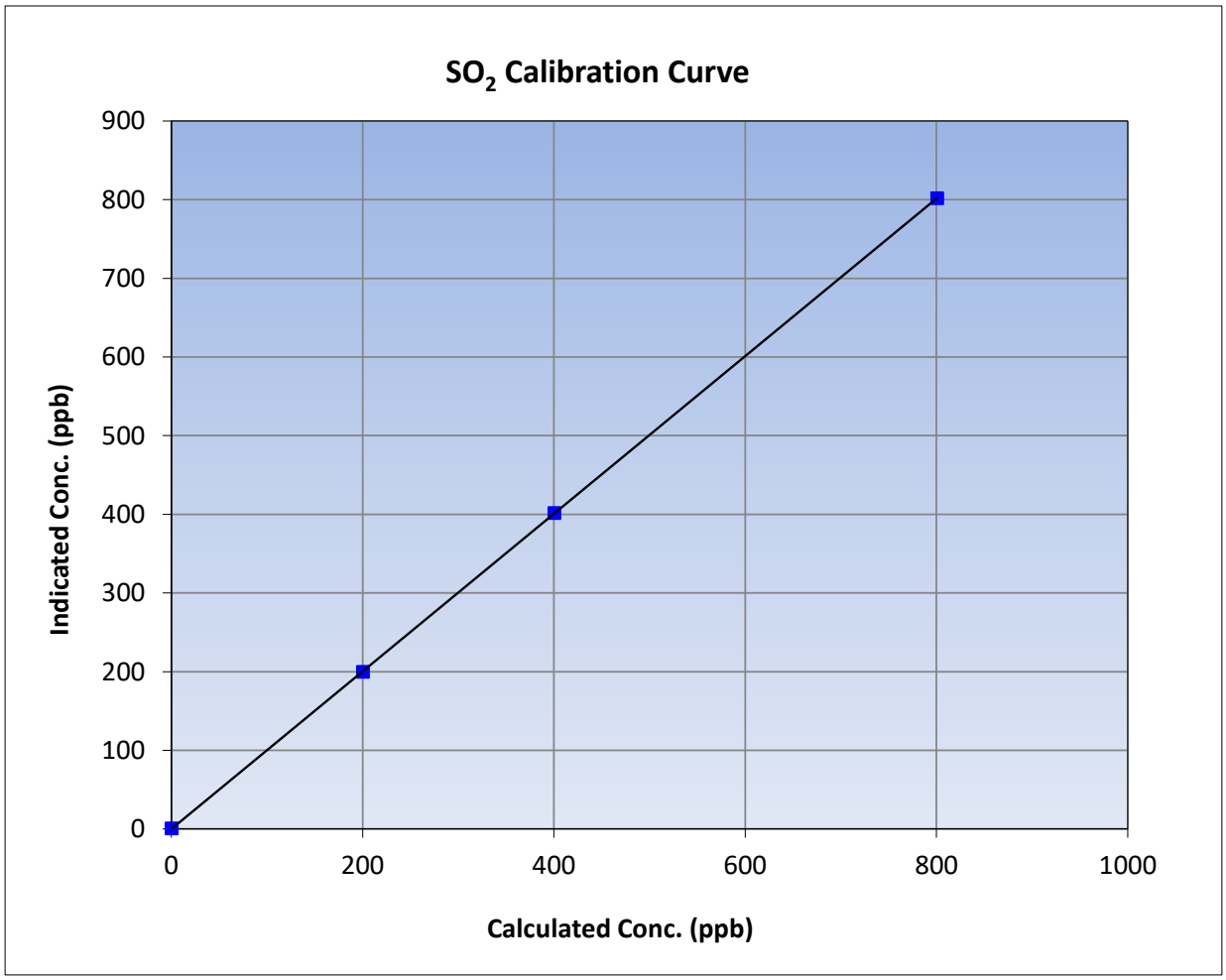
Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 28, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:42	End Time (MST):	11:14
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1327300932

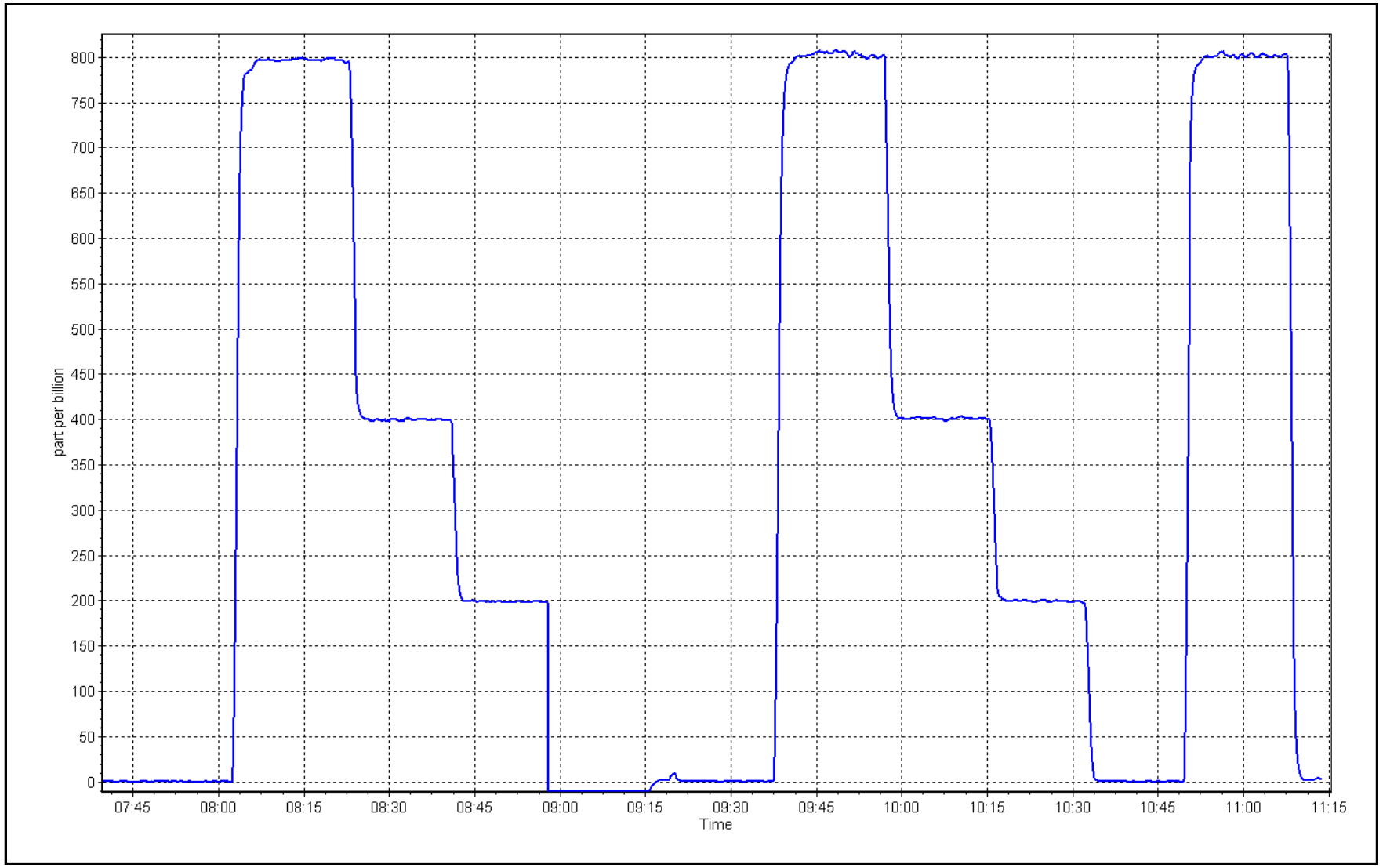
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
800.3	801.7	0.9983
400.2	401.4	0.9969
200.1	199.3	1.0039

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.001885	*0.90 - 1.10*
Intercept	-0.100000	*+/-30*



SO2 Calibration Plot Date: April 13, 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:	April 27, 2023	Last Cal Date:	March 8, 2023
Start time (MST):	6:42	End time (MST):	10:38
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 450i		Analyzer serial #:	1336160094	
Converter make:	NA		Converter serial #:	NA	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.995796	0.996073	Backgd or Offset:	18.7	19.0
Calibration intercept:	0.201944	0.142229	Coeff or Slope:	1.080	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	0.4	----
as found span	4926	74.1	80.3	81.1	0.995
as found 2nd point	4963	37.0	40.1	40.9	0.990
as found 3rd point	4982	18.5	20.1	20.4	1.003
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	80.0	1.004
second point	4963	37.0	40.1	40.5	0.990
third point	4982	18.5	20.1	19.9	1.008
as left zero	5000	0.0	0.0	0.4	----
as left span	4926	74.1	80.3	80.1	1.003
SO2 Scrubber Check	4920	80.0	800.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.001
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.7	Prev response:	80.19	*% change:	0.6%
Baseline Corr 2nd AF pt:	40.5	AF Slope:	1.005608	AF Intercept:	0.382341
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999983		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

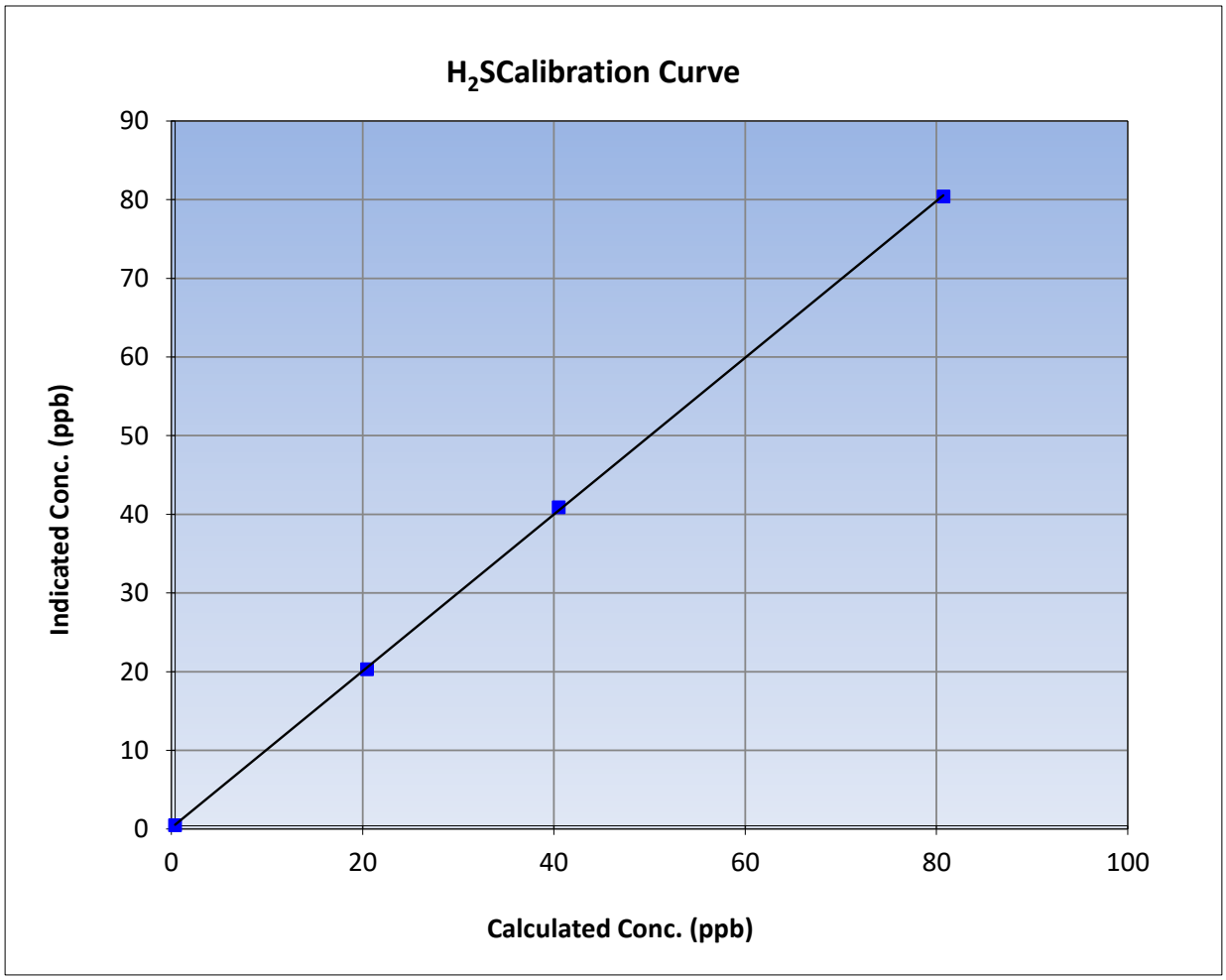
Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 8, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:42	End Time (MST):	10:38
Analyzer make:	Thermo 450i	Analyzer serial #:	1336160094

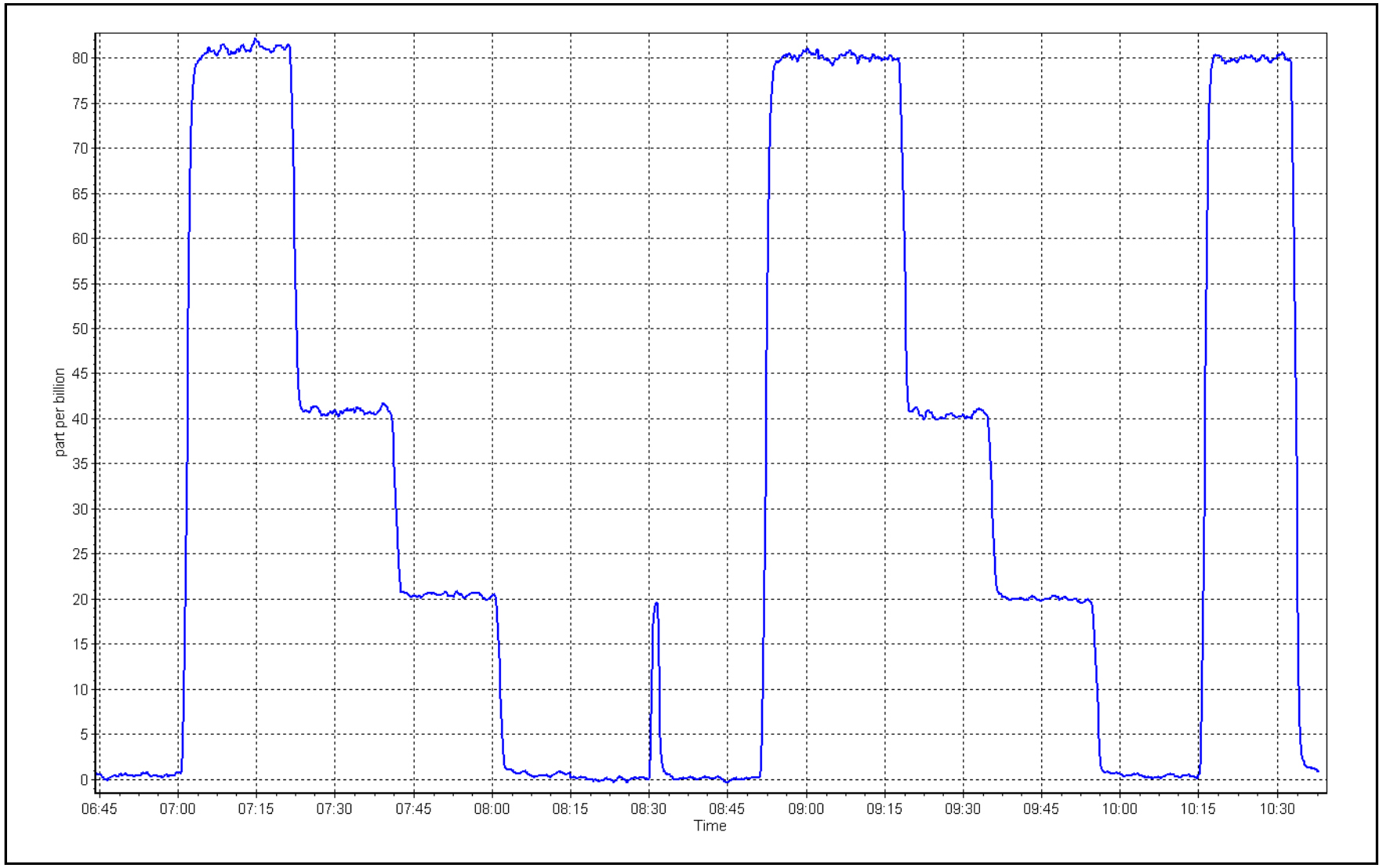
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.3	80.0	1.0040
40.1	40.5	0.9903
20.1	19.9	1.0076

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999932	*≥0.995*
Slope	0.996073	*0.90 - 1.10*
Intercept	0.142229	*+/-3*



H_2S Calibration Plot Date: April 27, 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

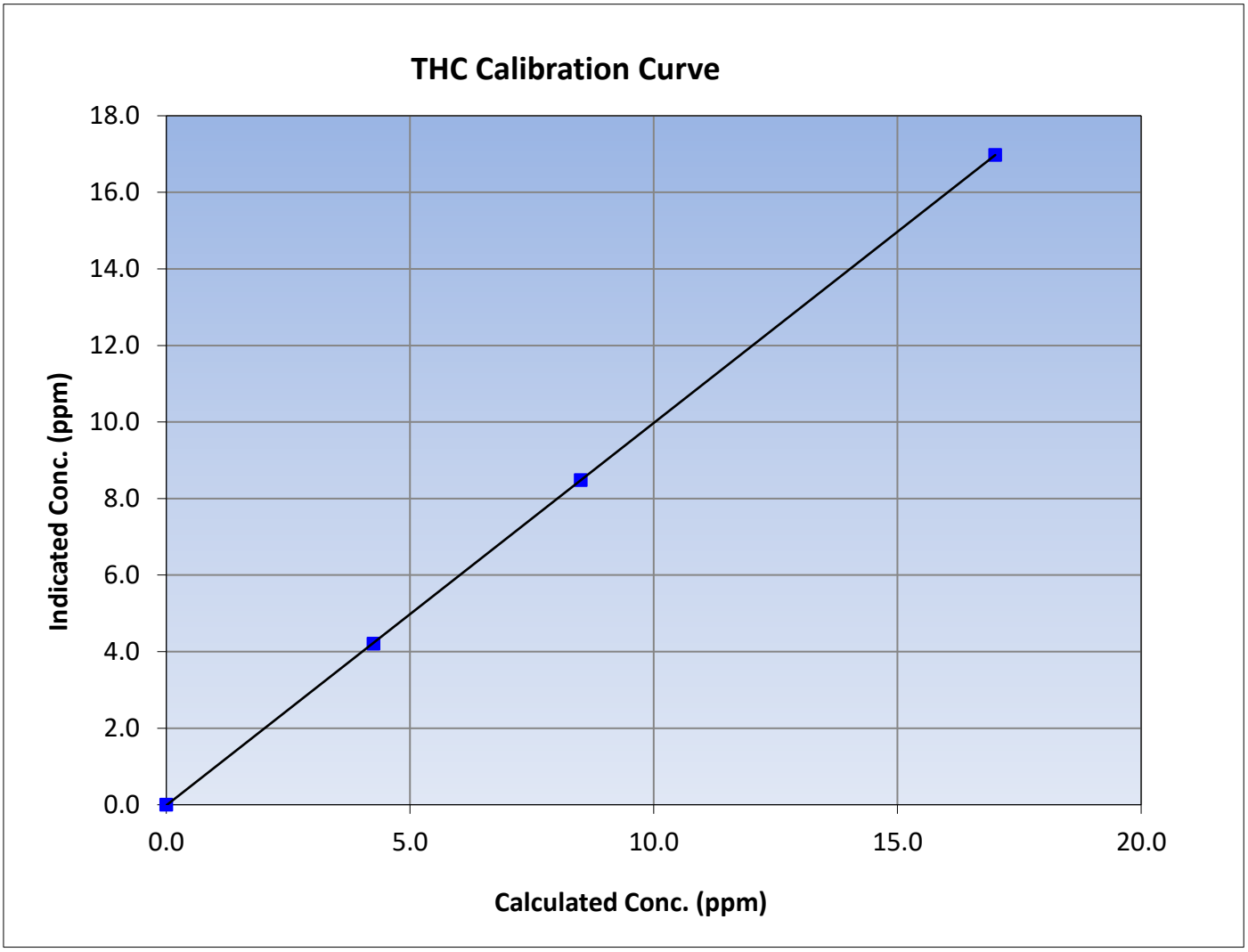
Version-01-2020

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

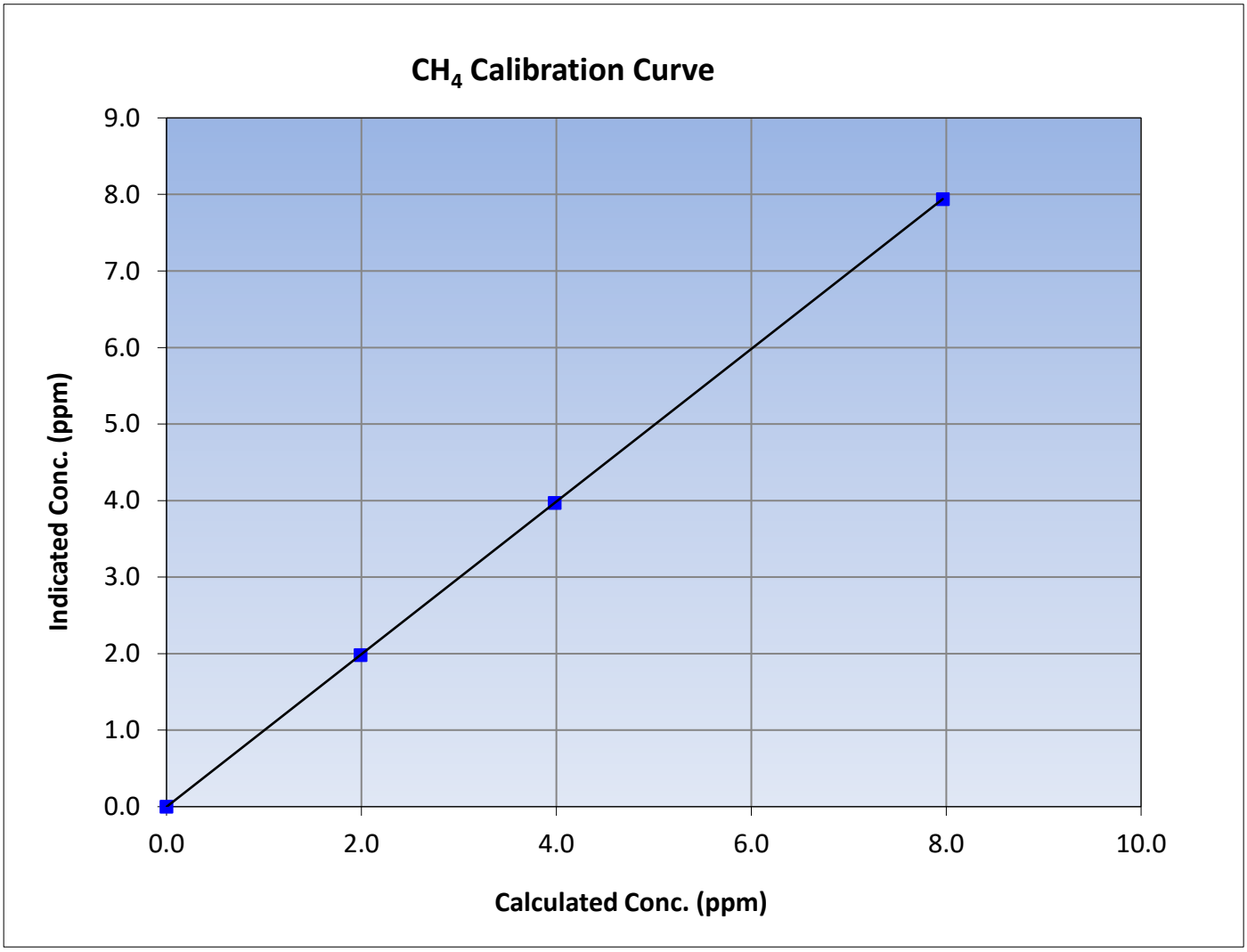
Version-01-2020

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

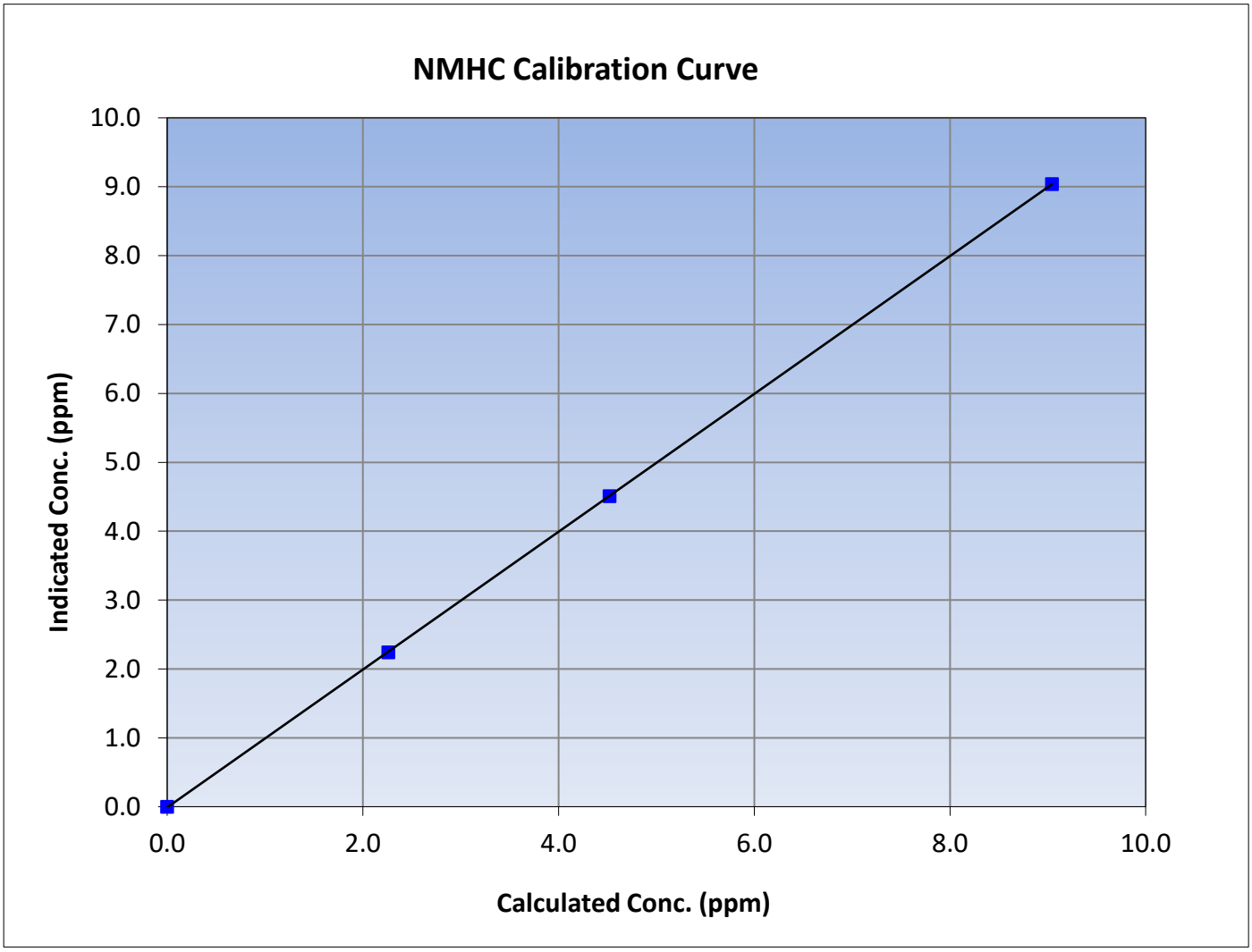
Version-01-2020

Station Information

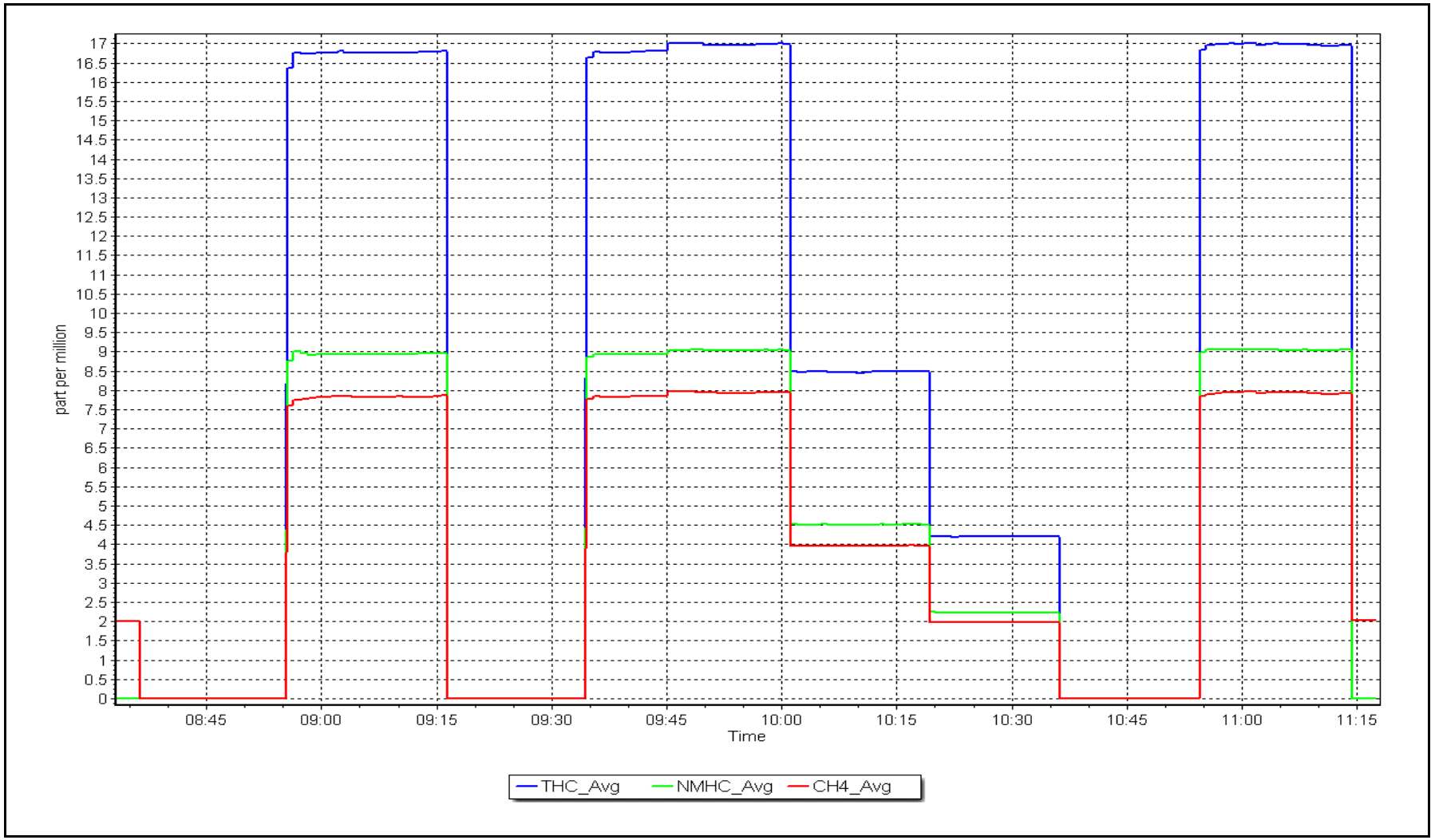
Calibration Date:	May 4, 2023	Previous Calibration:	April 6, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:35	End Time (MST):	11:17
Analyzer make:	Thermo 55i	Analyzer serial #:	1222762077

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

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	April 13, 2023	Last Cal Date:	April 5, 2023
Start time (MST):	6:15	End time (MST):	7:44
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	1.840E-04	NMHC SP Ratio:	3.820E-05	3.820E-05
CH4 Retention time:	11.8	11.8	NMHC Peak Area:	236377	236377

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	16.82	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	17.01	16.81	1.012
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.012

Baseline Corr AF:	16.82	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	0.00	0.00	
as found span	4920	80.0	9.04	8.97	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	9.04	8.96	1.009
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.009
Baseline Corr AF:	8.97	Prev response	9.02	*% 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	7.96	7.85	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	7.96	7.85	1.015
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.015
Baseline Corr AF:	7.85	Prev response	7.96	*% change	-1.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

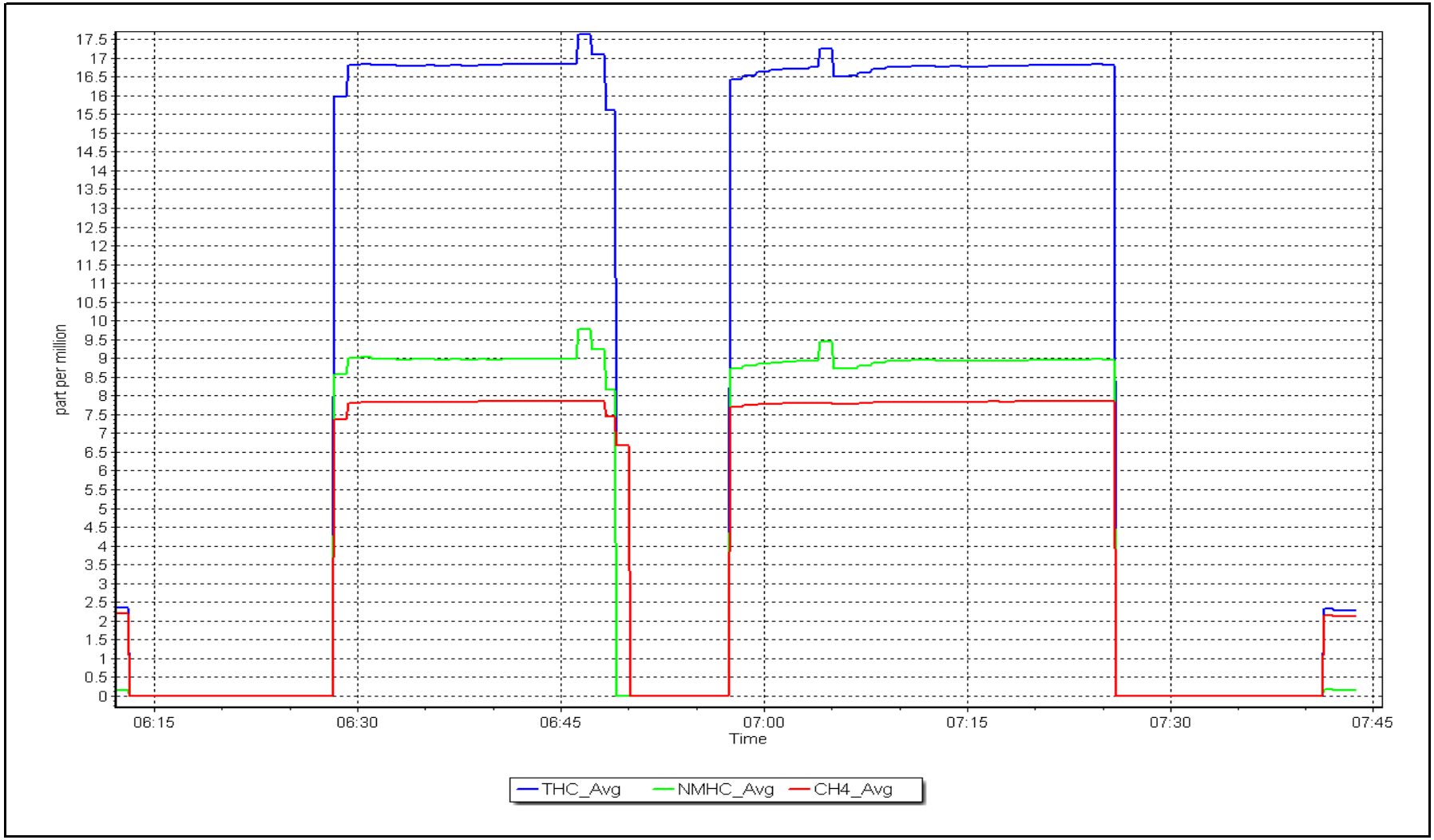
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.001213	0.988428
THC Cal Offset:	-0.032000	0.000000
CH4 Cal Slope:	1.001406	0.985587
CH4 Cal Offset:	-0.012000	0.000000
NMHC Cal Slope:	0.999779	0.990931
NMHC Cal Offset:	-0.020000	0.000000

Notes: Hydrogen and Nitrogen cylinder change.

Calibration Performed By: Melissa Lemay

NMHC Calibration Plot Date: April 13, 2023 Location: Buffalo Viewpoint



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	April 4, 2023	Last Cal Date:	March 3, 2023
Start time (MST):	6:20	End time (MST):	11:26
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	0.998	1.014	NO bkgnd or offset:	-2.1	-2.1
NOX coeff or slope:	0.992	1.013	NOX bkgnd or offset:	-1.7	-1.7
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	7.7	7.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.998743	0.999617
NO_X Cal Offset:	0.546857	-0.133690
NO Cal Slope:	1.004711	0.998232
NO Cal Offset:	-0.973240	-0.993777
NO_2 Cal Slope:	0.992216	0.984274
NO_2 Cal Offset:	0.603575	-0.102857

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	0.3	----	----
as found span	4922	78.1	799.1	795.2	3.9	782.1	780.8	1.3	1.0217	1.0184
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.4	0.5	-0.1	----	----
high point	4922	78.1	799.1	795.2	3.9	798.9	793.5	5.4	1.0003	1.0021
second point	4961	39.1	400.1	398.1	2.0	399.6	395.8	3.8	1.0012	1.0058
third point	4981	19.5	199.5	198.5	1.0	198.7	195.6	3.1	1.0040	1.0150
as left zero	5000	0.0	0.0	0.0	0.0	0.8	0.9	-0.1	----	----
as left span	4922	78.1	799.1	376.0	423.1	798.0	385.5	412.5	1.0014	0.9754
								Average Correction Factor	1.0018	1.0076

Corrected As found	NO_X = 782.0 ppb	NO = 781.0 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -2.1%
Previous Response	NO_X = 798.6 ppb	NO = 798.0 ppb		*Percent Change	NO = -2.2%
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)	797.1	377.9	423.1	416.4	1.0161	98.4%
2nd GPT point (200 ppb O3)	797.1	581.4	219.6	215.9	1.0172	98.3%
3rd GPT point (100 ppb O3)	797.1	686.8	114.2	112.4	1.0161	98.4%
				Average Correction Factor	1.0164	98.4%

Notes: No maintenance done. Span adjusted. Due to drifting during the GPT the 2nd NO ref point used.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

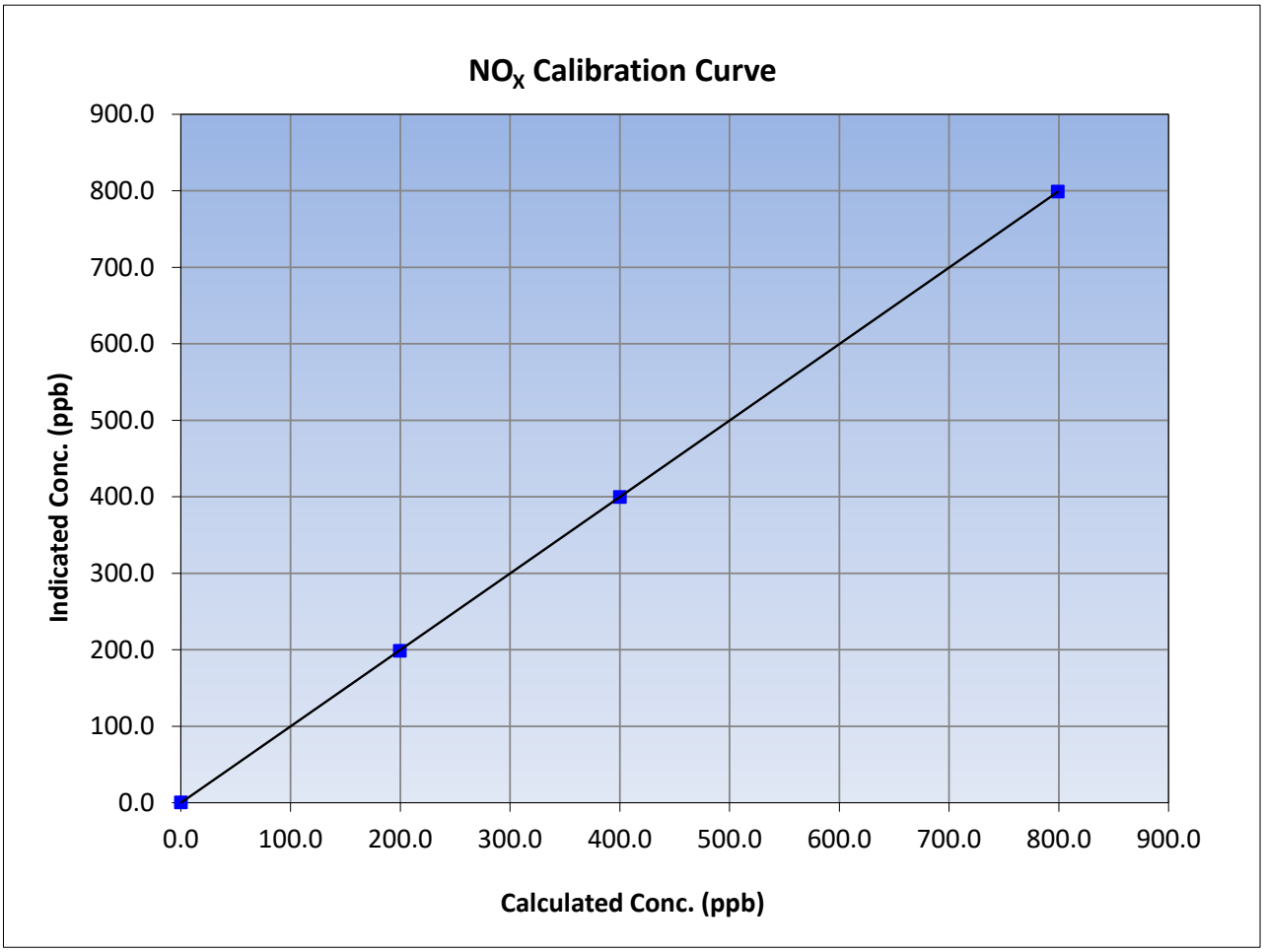
Version-04-2020

Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 3, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:20	End Time (MST):	11:26
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	0.999998	≥0.995
799.1	798.9	1.0003			
400.1	399.6	1.0012	Slope	0.999617	0.90 - 1.10
199.5	198.7	1.0040			
			Intercept	-0.133690	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

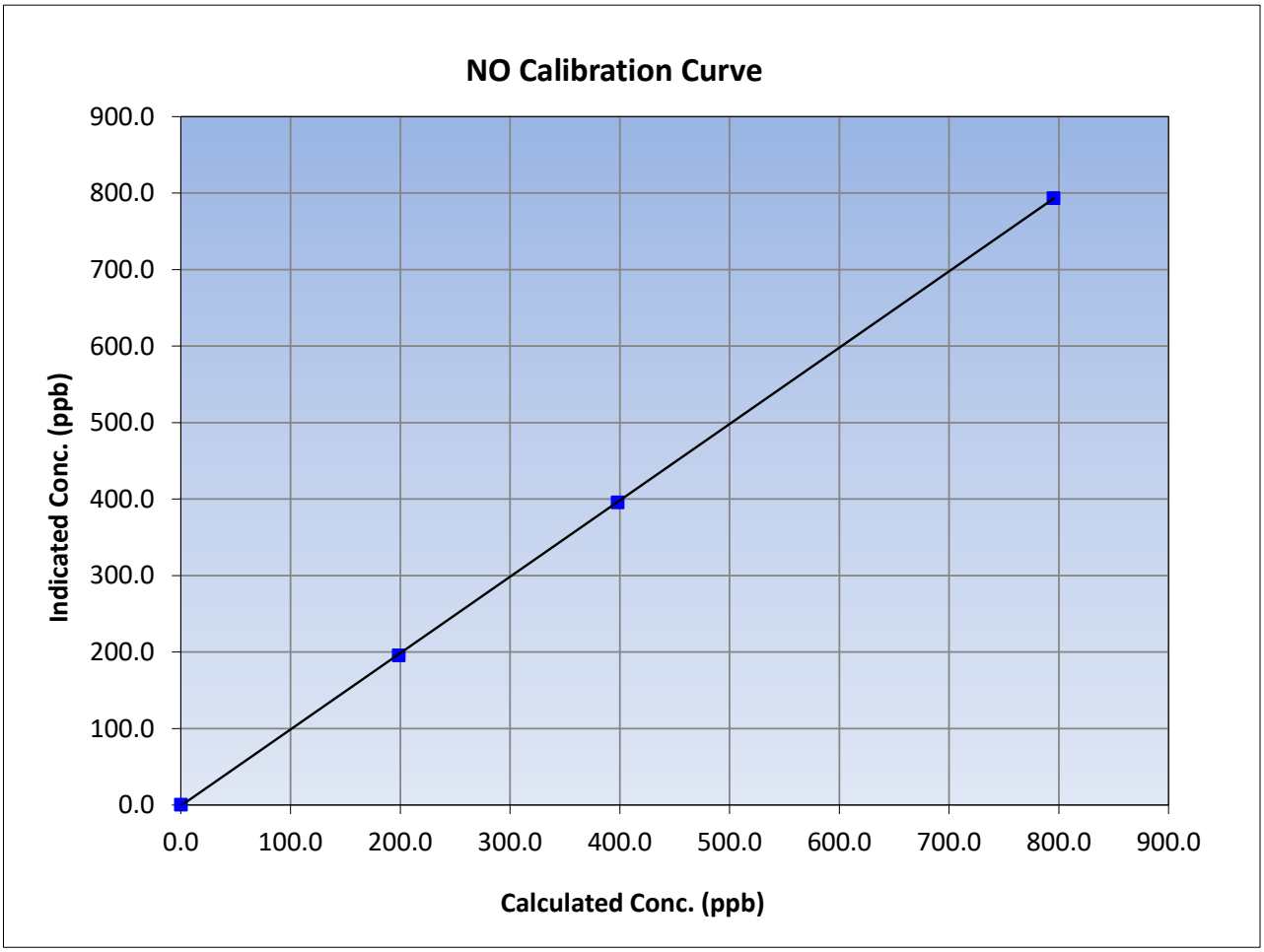
Version-04-2020

Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 3, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:20	End Time (MST):	11:26
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	0.5	----	Correlation Coefficient	0.999984	≥0.995
795.2	793.5	1.0021			
398.1	395.8	1.0058	Slope	0.998232	0.90 - 1.10
198.5	195.6	1.0150			
			Intercept	-0.993777	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

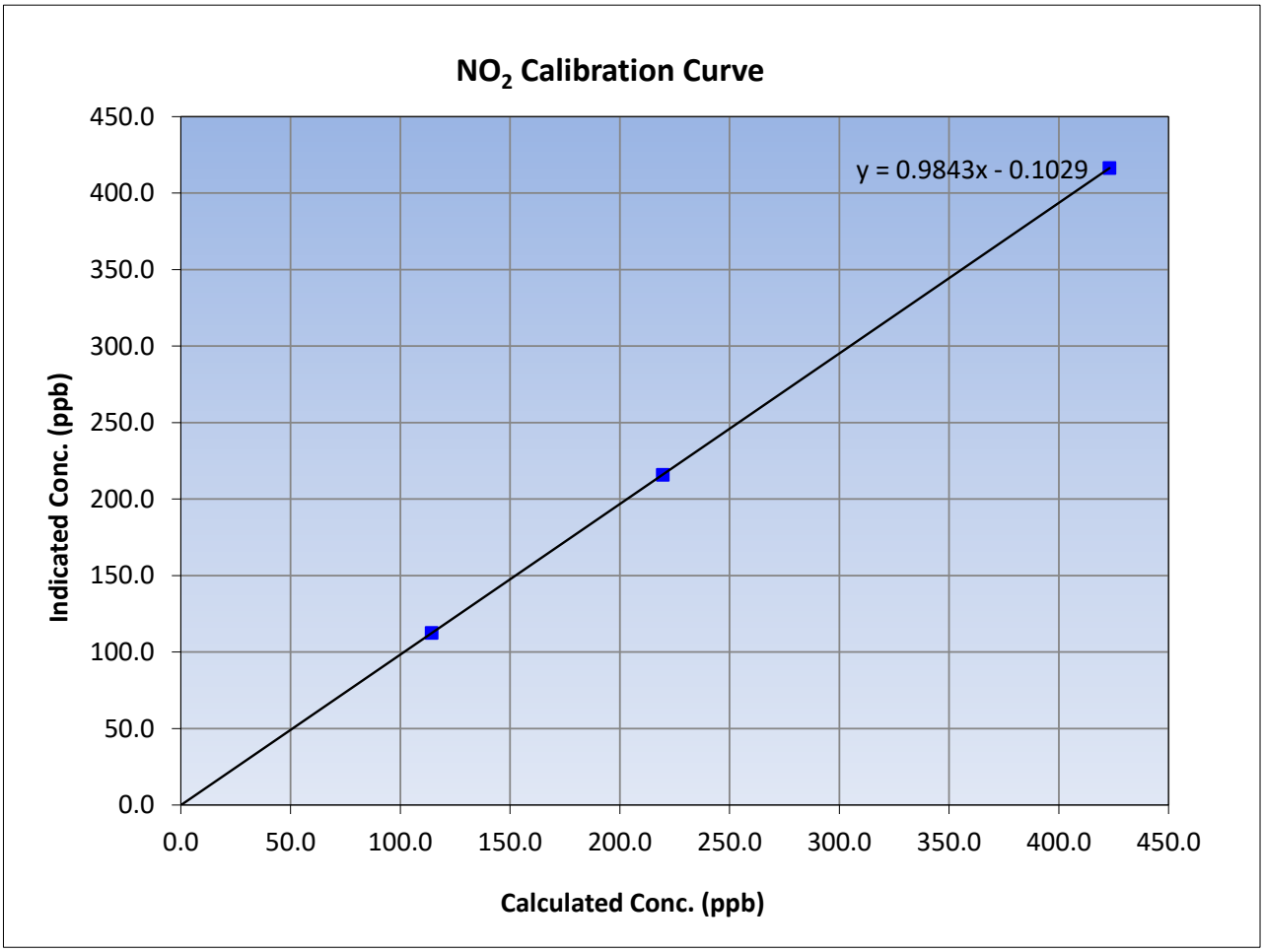
Version-04-2020

Station Information

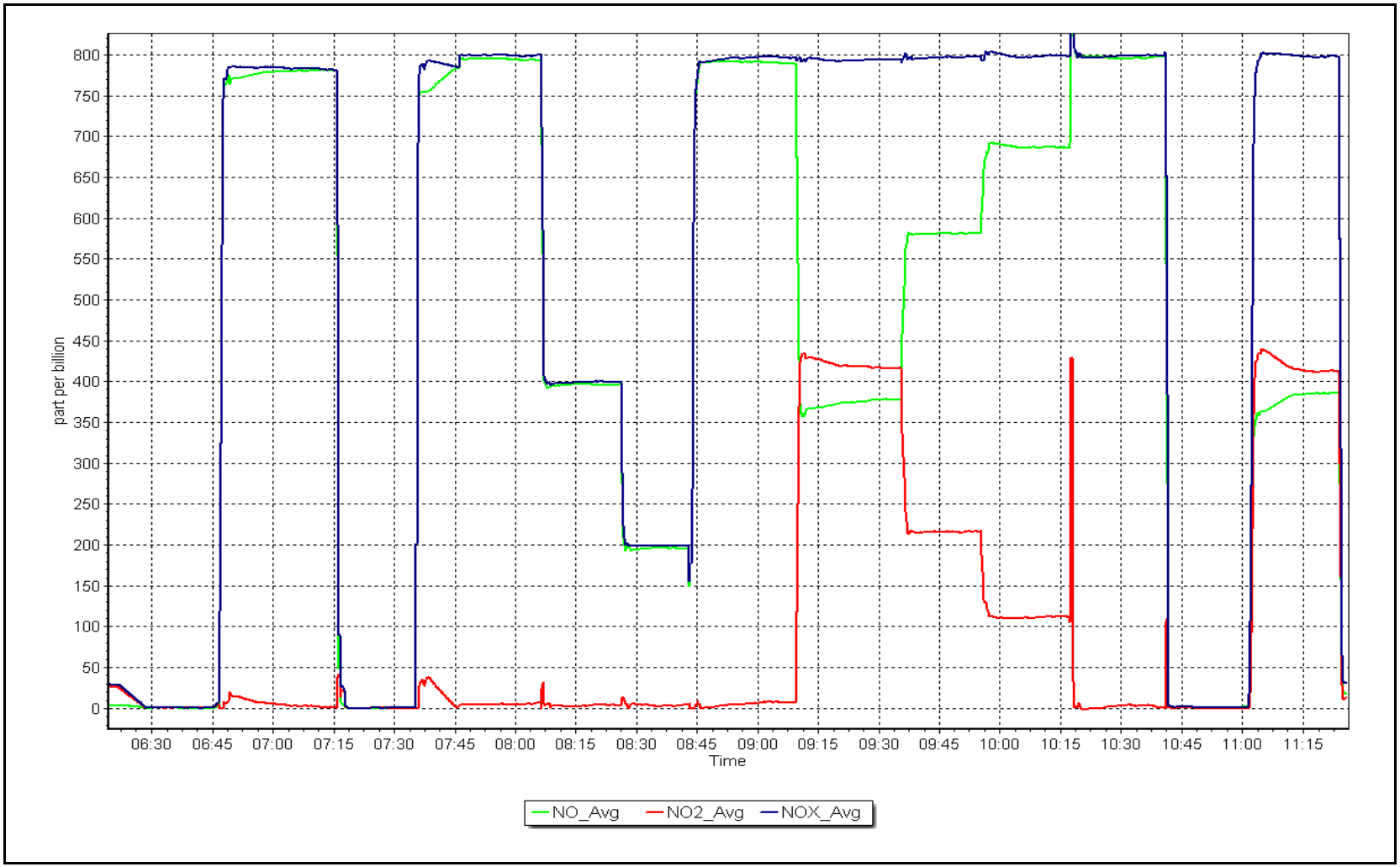
Calibration Date:	April 4, 2023	Previous Calibration:	March 3, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:20	End Time (MST):	11:26
Analyzer make:	API T200	Analyzer serial #:	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	1.000000	≥0.995
423.1	416.4	1.0161			
219.6	215.9	1.0172	Slope	0.984274	0.90 - 1.10
114.2	112.4	1.0161			
			Intercept	-0.102857	+/-20



NO_X Calibration Plot Date: April 4, 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:	April 3, 2023	Last Cal Date:	March 7, 2023
Start time (MST):	6:20	End time (MST):	11:19
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.996114	1.000143	Backgd or Offset:	-5.3	-2.7
Calibration intercept:	1.880000	-0.100000	Coeff or Slope:	1.178	1.035

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	1.4	----
as found span	5000	976.7	400.0	407.7	0.981
as found 2nd point	5000	809.9	200.0	207.0	0.966
as found 3rd point	5000	702.3	100.0	106.4	0.940
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	979.7	400.0	400.1	1.000
second point	5000	813.9	200.0	199.7	1.002
third point	5000	705.6	100.0	99.8	1.002
as left zero	5000	0.0	0.0	-0.6	----
as left span	5000	980.1	400.0	401.5	0.996
				Average Correction Factor	1.001

Baseline Corr As found:	406.3	Previous response	400.3	*% change	1.5%
Baseline Corr 2nd AF pt:	-200.7	AF Slope:	1.013514	AF Intercept:	3.260000
Baseline Corr 3rd AF pt:	-100.6	AF Correlation:	0.999904		

* = > +/-5% change initiates investigation

Notes: O3 scrubber replaced. Zero and Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

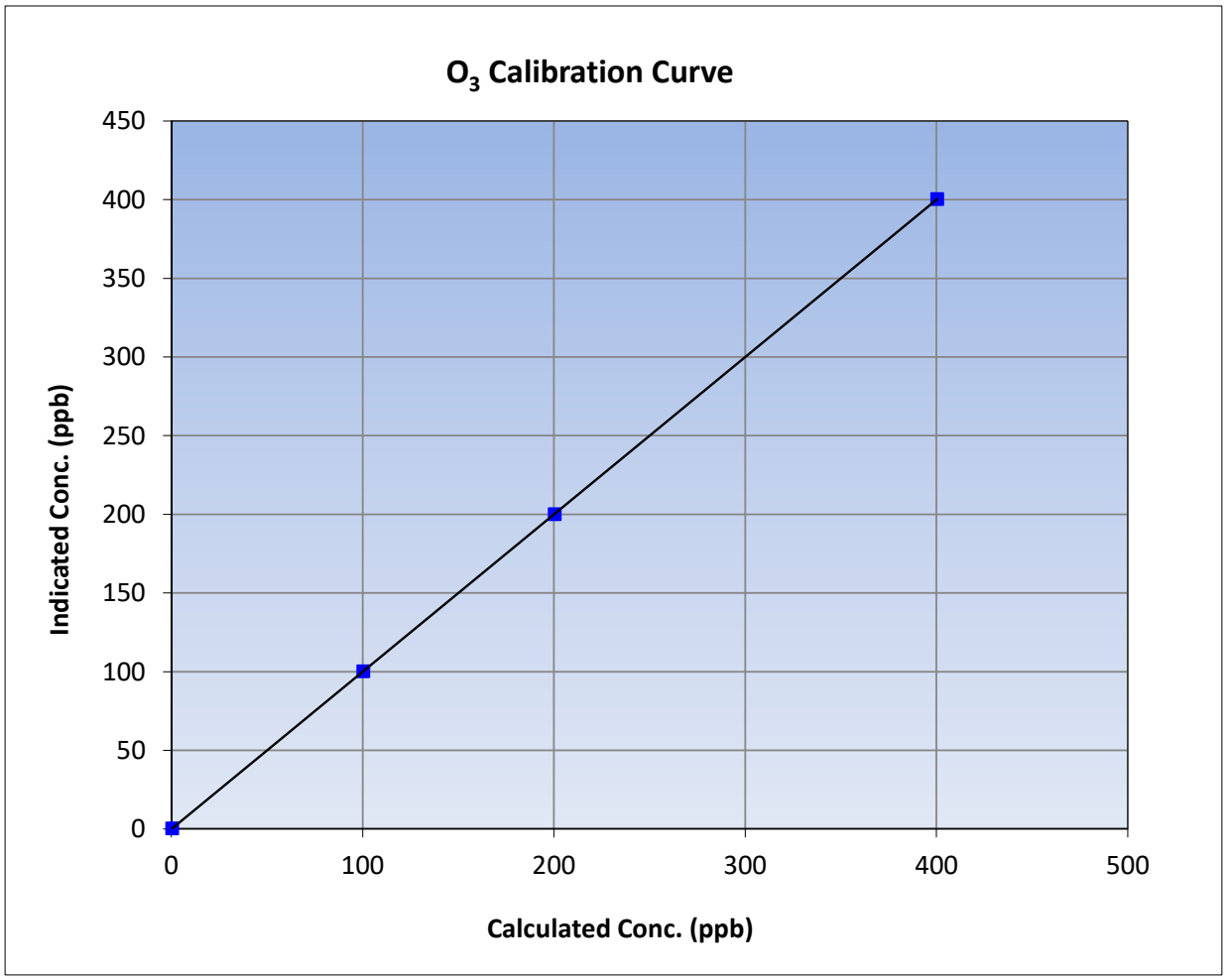
Station Information

Calibration Date:	April 3, 2023	Previous Calibration:	March 7, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:20	End Time (MST):	11:19
Analyzer make:	API T400	Analyzer serial #:	2961

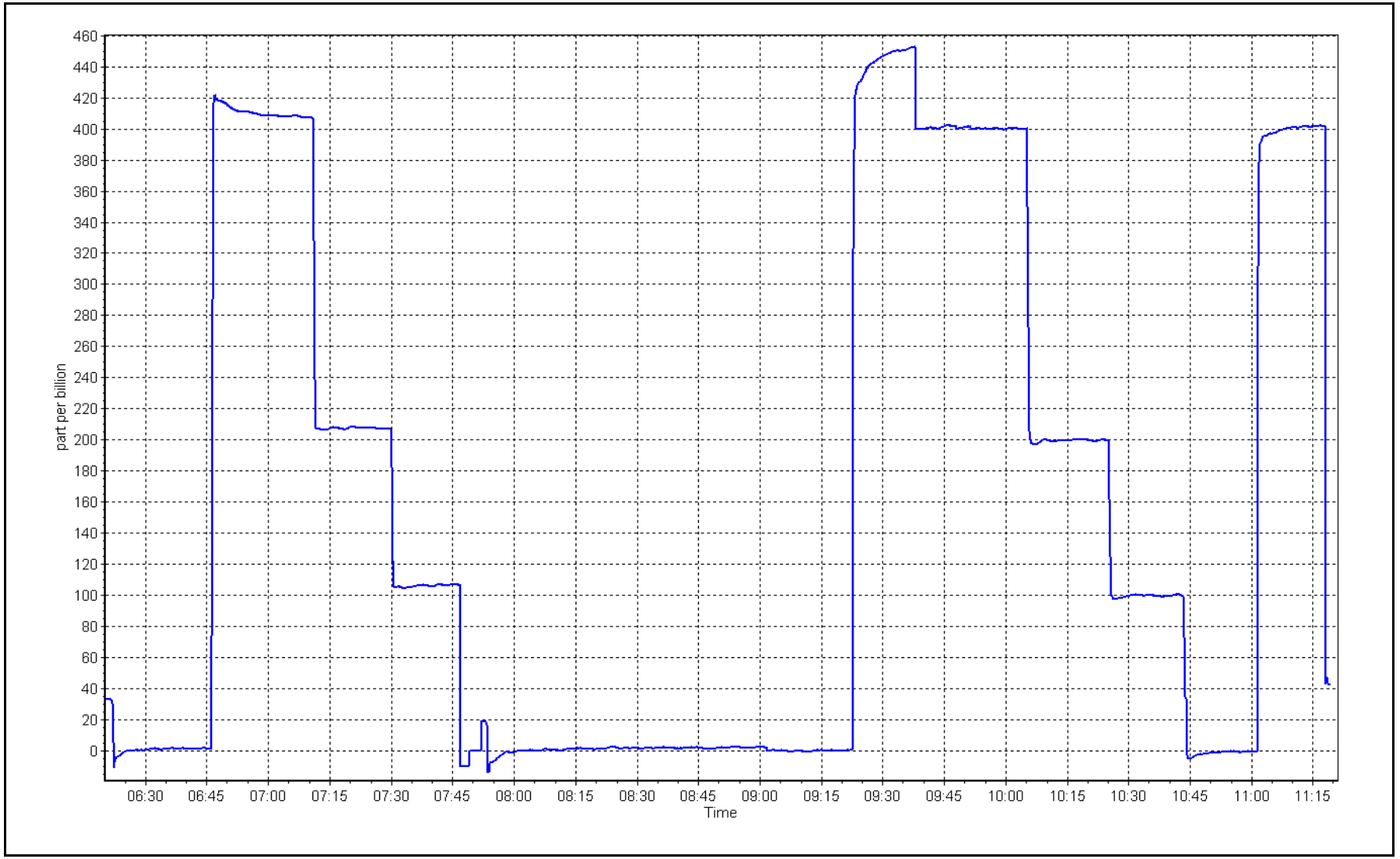
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
400.0	400.1	0.9998
200.0	199.7	1.0015
100.0	99.8	1.0020

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	1.000143	*0.90 - 1.10*
Intercept	-0.100000	*+/- 5*



O_3 Calibration Plot Date: April 3, 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:	April 27, 2023	Last Cal Date:	March 29, 2023
Start time (MST):	6:15	End time (MST):	6:40
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)	1.8	1.4	1.8	☐	+/- 2 °C
P (mmHg)	730	731.1	730	☐	+/- 10 mmHg
flow (LPM)	5	4.98	5	☐	+/- 0.25 LPM

Leak Test: Date of check: April 27, 2023 Last Cal Date: March 29, 2023

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

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test		---		☐	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: No adjustments done. Head Cleaned.

Calibration by: Melissa Lemay

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS05
MANNIX
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	April 25, 2023	Last Cal Date:	March 2, 2023
Start time (MST):	8:06	End time (MST):	11:15
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999400	1.003342	Backgd or Offset:	9.1	9.0
Calibration intercept:	-0.280000	0.240000	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	0.2	----
as found span	4920	80.0	800.3	800.6	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.5	----
high point	4920	80.0	800.3	803.5	0.996
second point	4960	40.0	400.2	401.2	0.997
third point	4980	20.0	200.1	201.0	0.995
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	80.0	800.3	806.3	0.993
				Average Correction Factor	0.996

Baseline Corr As found:	800.40	Previous response	799.56	*% change	0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

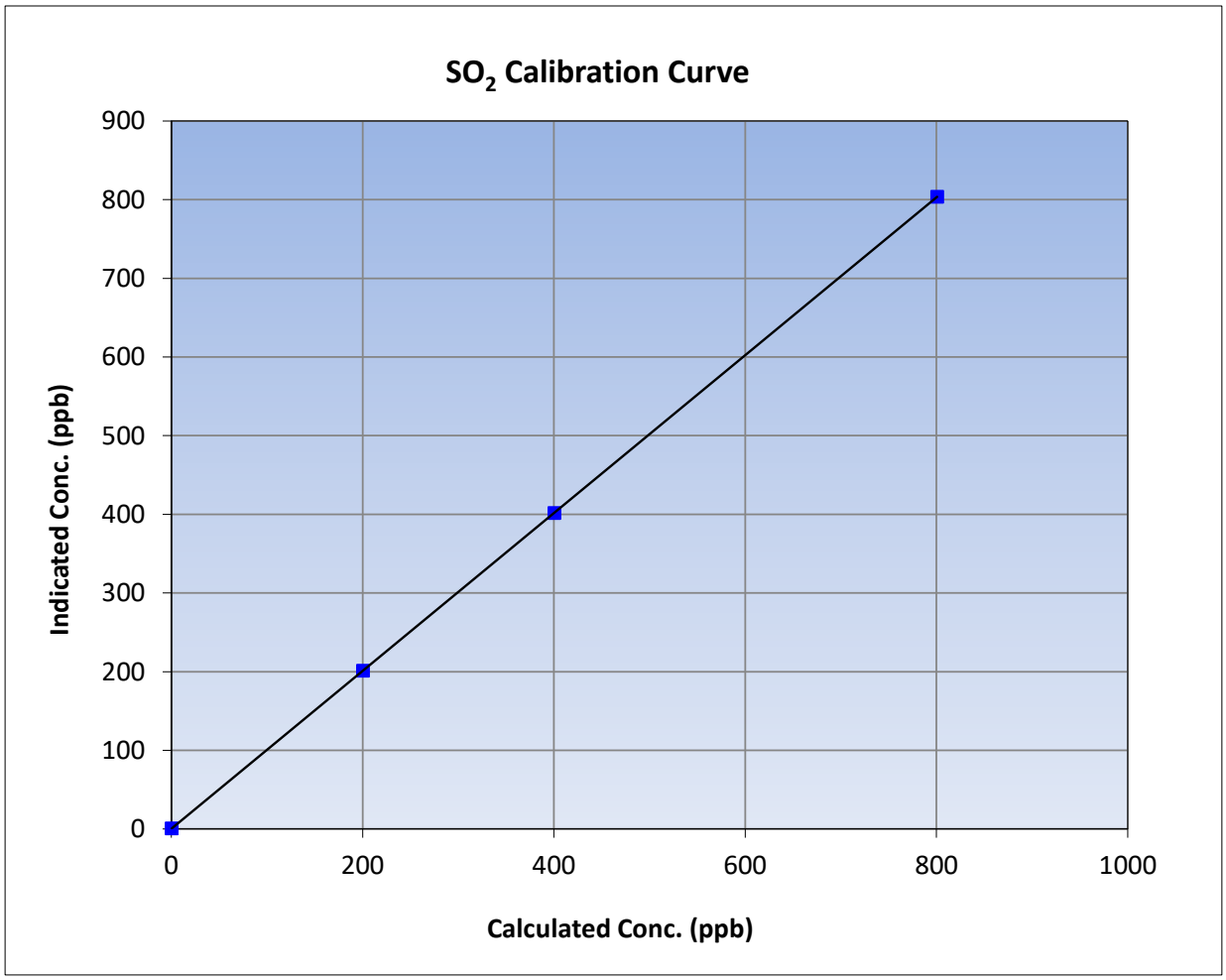
Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	March 2, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	8:06	End Time (MST):	11:15
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841399

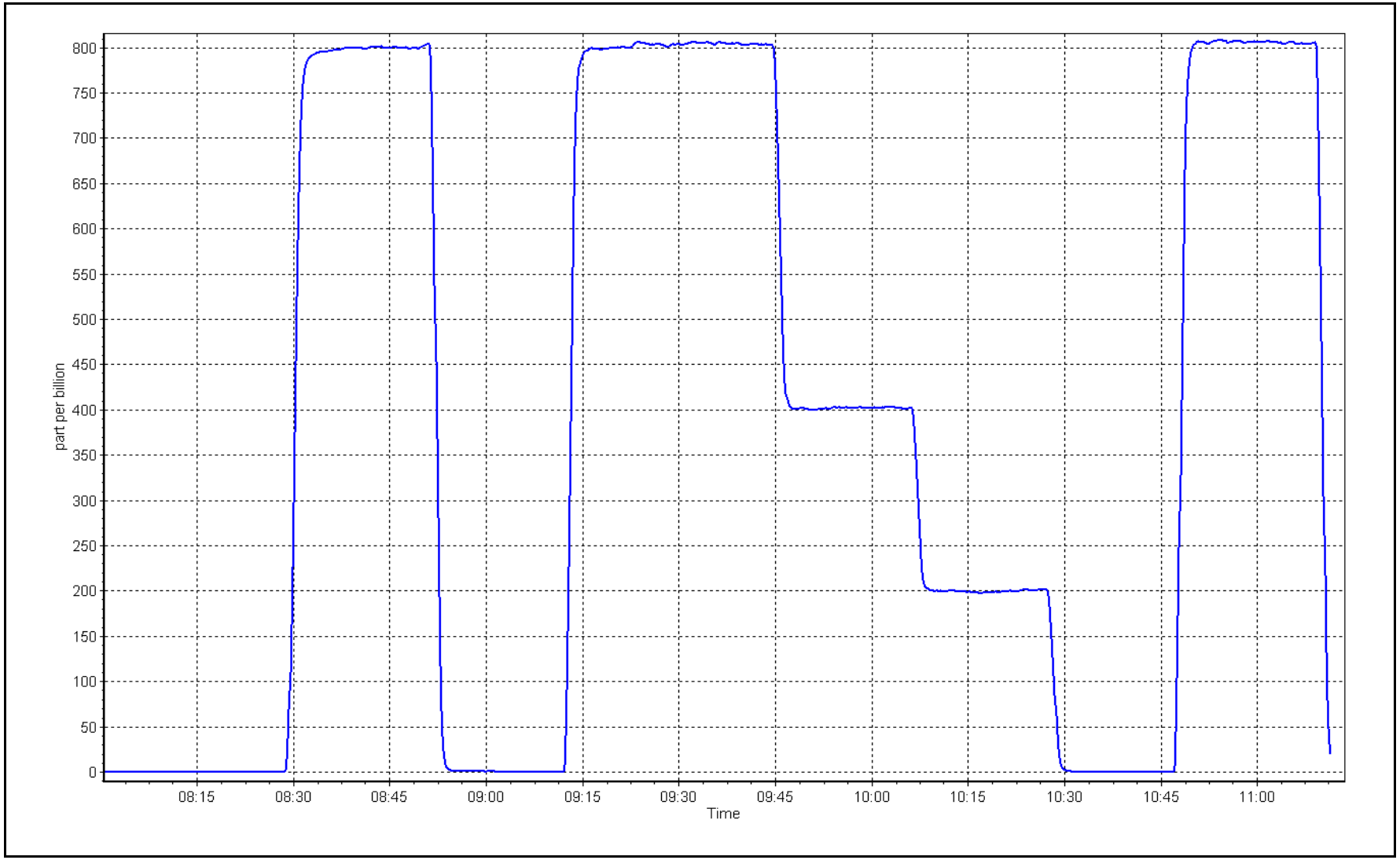
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
800.3	803.5	0.9960
400.2	401.2	0.9974
200.1	201.0	0.9954

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	1.003342	*0.90 - 1.10*
Intercept	0.240000	*+/-30*



SO2 Calibration Plot Date: April 25, 2023 Location: Mannix



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	April 17, 2023	Last Cal Date:	March 15, 2023
Start time (MST):	9:10	End time (MST):	13:55
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43iQTL		Analyzer serial #:	1203169745	
Converter make:	Global		Converter serial #:	2022-196	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.988329	1.005327	Backgd or Offset:	2.07	2.17
Calibration intercept:	0.380632	0.060642	Coeff or Slope:	0.822	0.849

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	79.1	1.011
as found 2nd point	4960	40.7	40.0	39.6	1.011
as found 3rd point	4980	20.3	20.0	19.6	1.019
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4919	81.3	80.0	80.5	0.994
second point	4960	40.7	40.0	40.3	0.994
third point	4980	20.3	20.0	20.1	0.994
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	0.2	----
Date of last scrubber change:				Ave Corr Factor	0.994
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.1	Prev response:	79.44	*% change:	-0.4%
Baseline Corr 2nd AF pt:	39.6	AF Slope:	0.989473	AF Intercept:	-0.059409
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999995		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

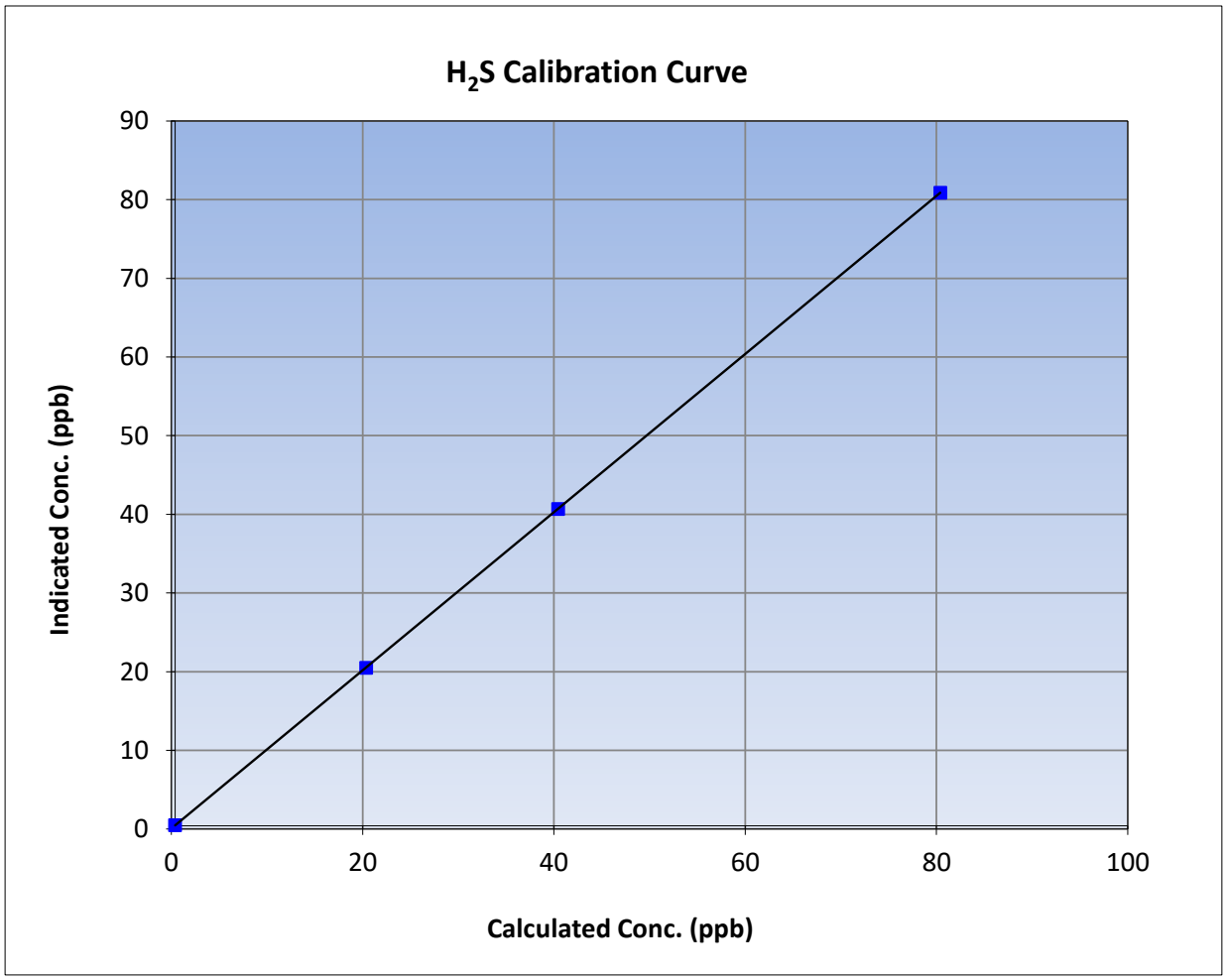
Station Information

Calibration Date:	April 17, 2023	Previous Calibration:	March 15, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	9:10	End Time (MST):	13:55
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1203169745

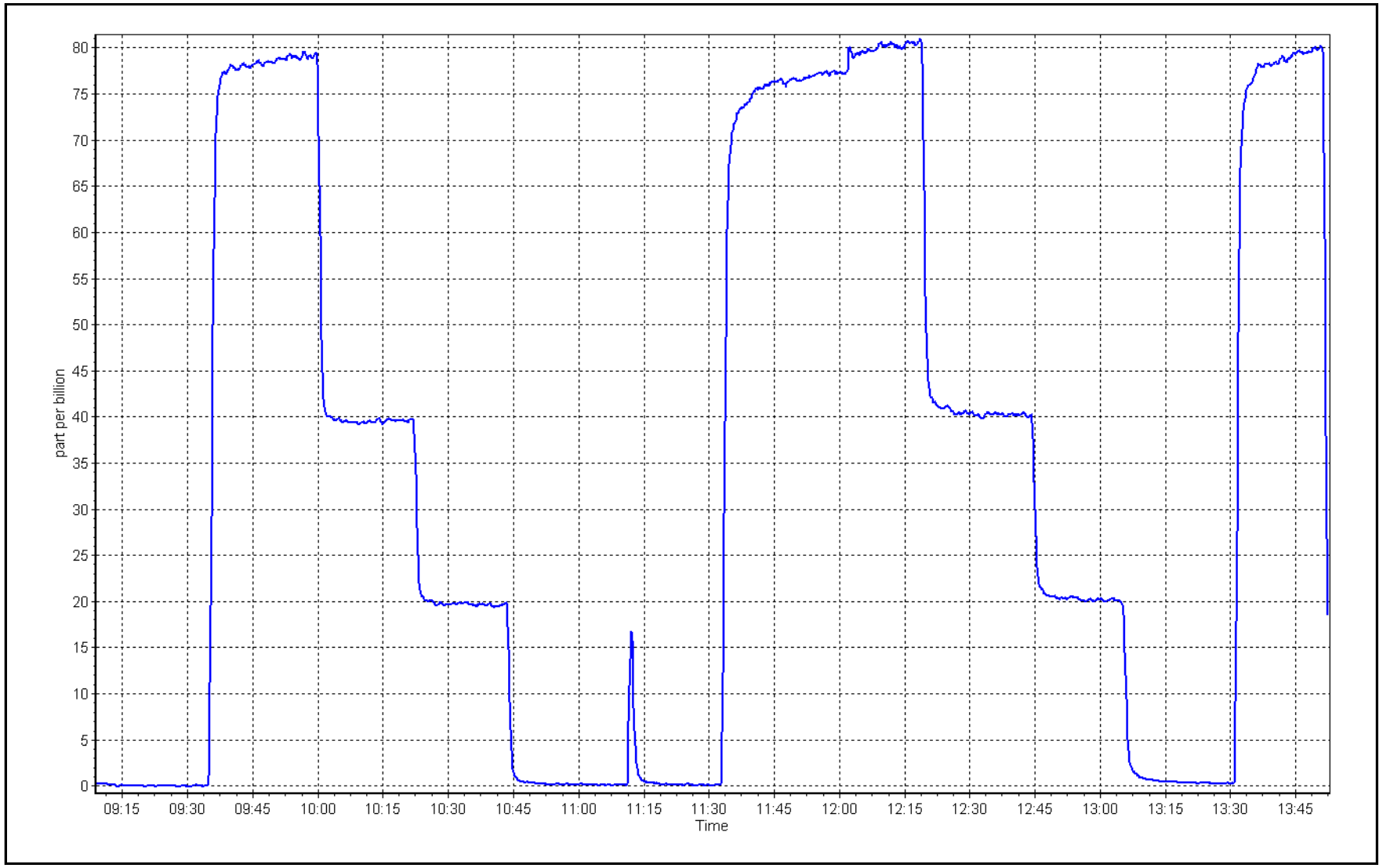
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.5	0.9937
40.0	40.3	0.9936
20.0	20.1	0.9937

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	1.005327	*0.90 - 1.10*
Intercept	0.060642	*+/-3*



H_2S Calibration Plot Date: April 17, 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:	April 25, 2023	Last Cal Date:	March 2, 2023
Start time (MST):	8:06	End time (MST):	11:15
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:	2.58E-04	2.65E-04	NMHC SP Ratio:	4.50E-05	4.42E-05
CH4 Retention time:	15.00	15.00	NMHC Peak Area:	203233	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	17.19	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	17.23	17.24	0.999
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	17.29	0.997
				Average Correction Factor	1.000

Baseline Corr AF:	17.19	Prev response	17.22	*% 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	4920	80	9.15	9.35	0.979
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4920	80	9.15	9.16	0.998
second point	4960	40	4.57	4.59	0.997
third point	4980	20	2.29	2.30	0.993
as left zero	5000	0	0.00	0.00	----
as left span	4920	80	9.15	9.20	0.994
				Average Correction Factor	0.996
Baseline Corr AF:	9.35	Prev response	9.16	*% change	2.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	8.08	7.84	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	80.0	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	1.007
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	8.08	8.08	1.000
				Average Correction Factor	1.004
Baseline Corr AF:	7.84	Prev response	8.06	*% change	-2.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000262	1.000899
THC Cal Offset:	-0.006600	-0.002400
CH4 Cal Slope:	0.999646	1.000594
CH4 Cal Offset:	-0.011800	-0.009400
NMHC Cal Slope:	1.000469	1.001168
NMHC Cal Offset:	0.005800	0.007000

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

THC Calibration Summary

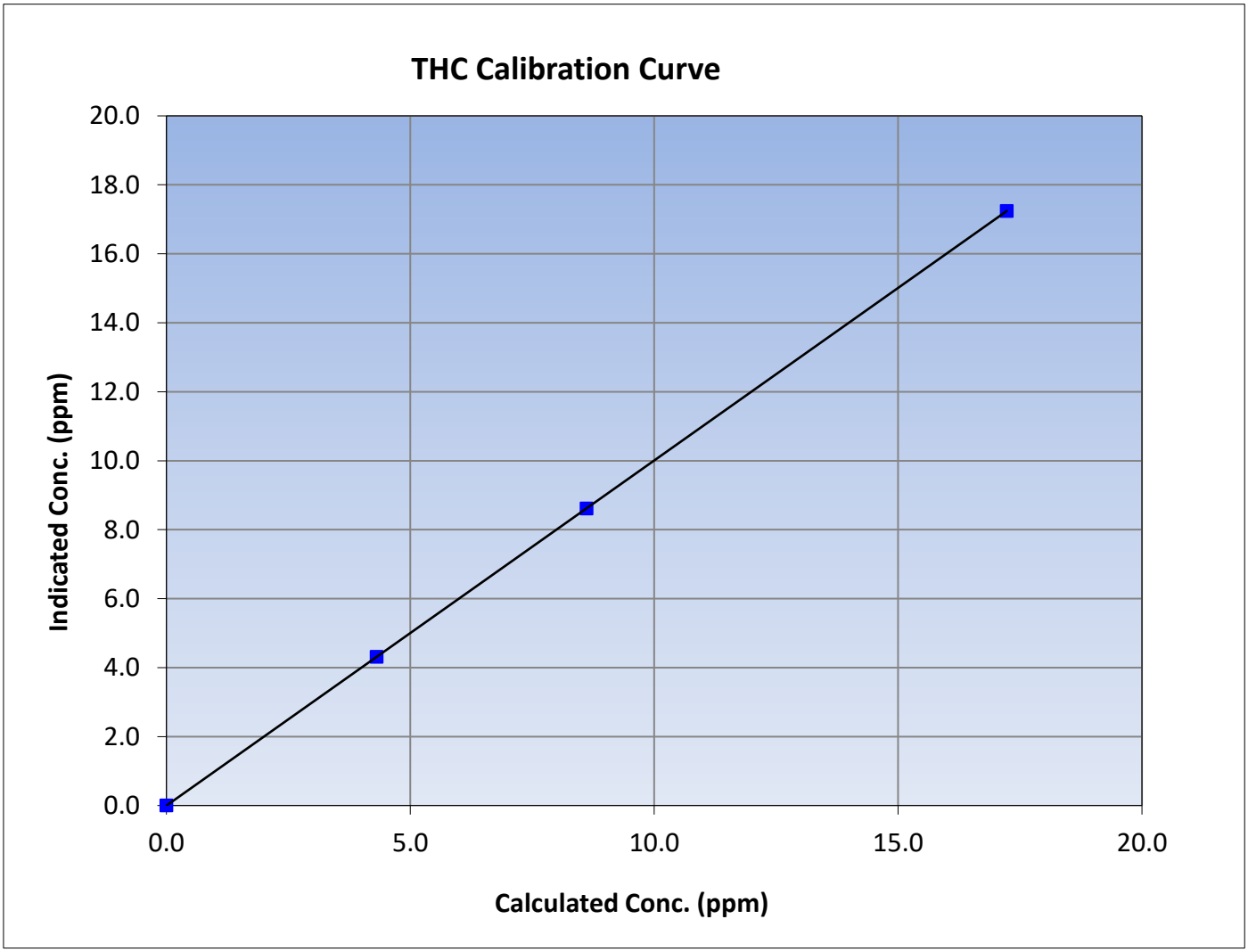
Version-01-2020

Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	March 2, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	8:06	End Time (MST):	11:15
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	1.000000	≥0.995
17.23	17.24	0.9991			
8.61	8.61	1.0001	Slope	1.000899	0.90 - 1.10
4.31	4.31	0.9994			
			Intercept	-0.002400	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

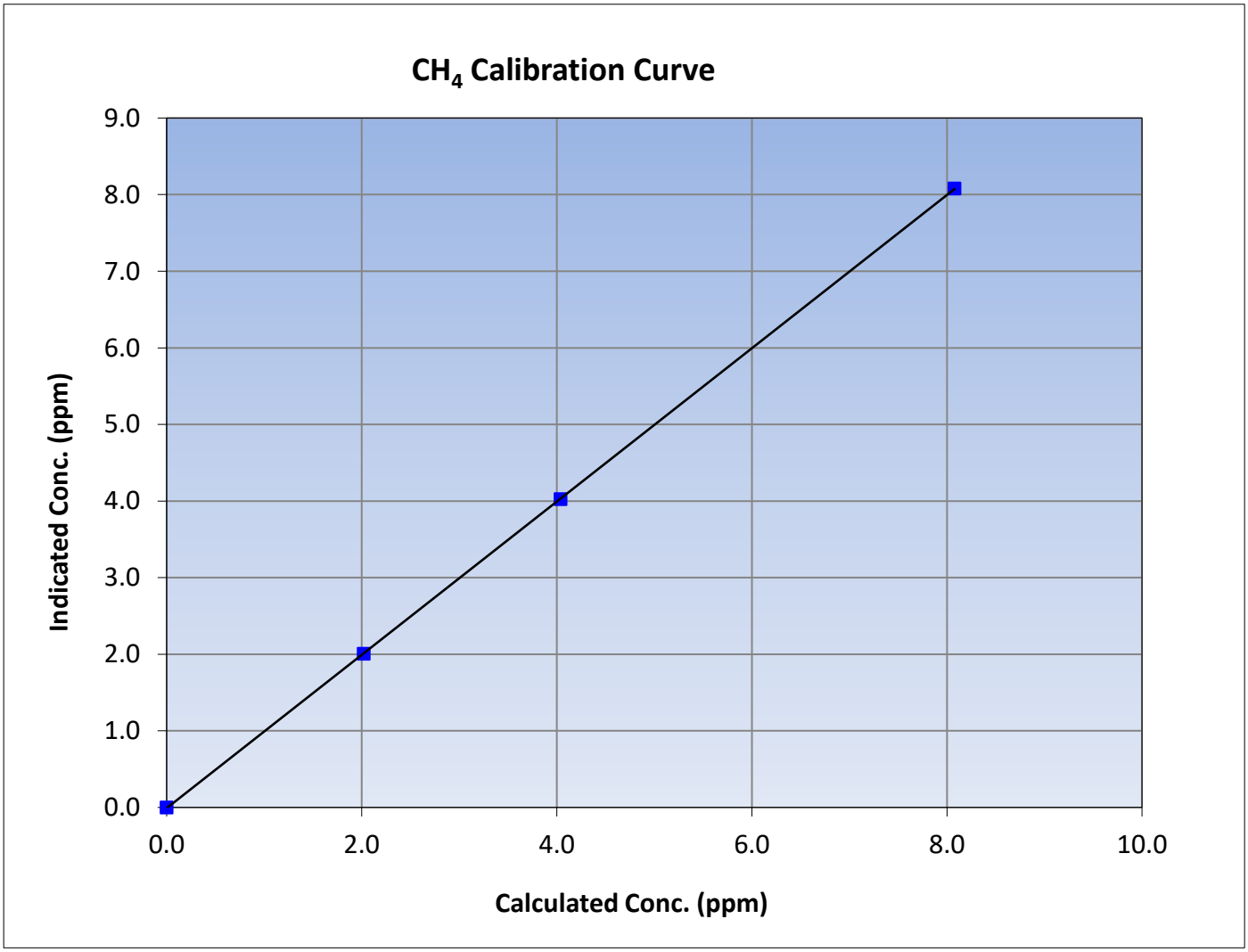
Version-01-2020

Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	March 2, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	8:06	End Time (MST):	11:15
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	0.9998			
4.04	4.02	1.0040	Slope	1.000594	*0.90 - 1.10*
2.02	2.01	1.0073			
			Intercept	-0.009400	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

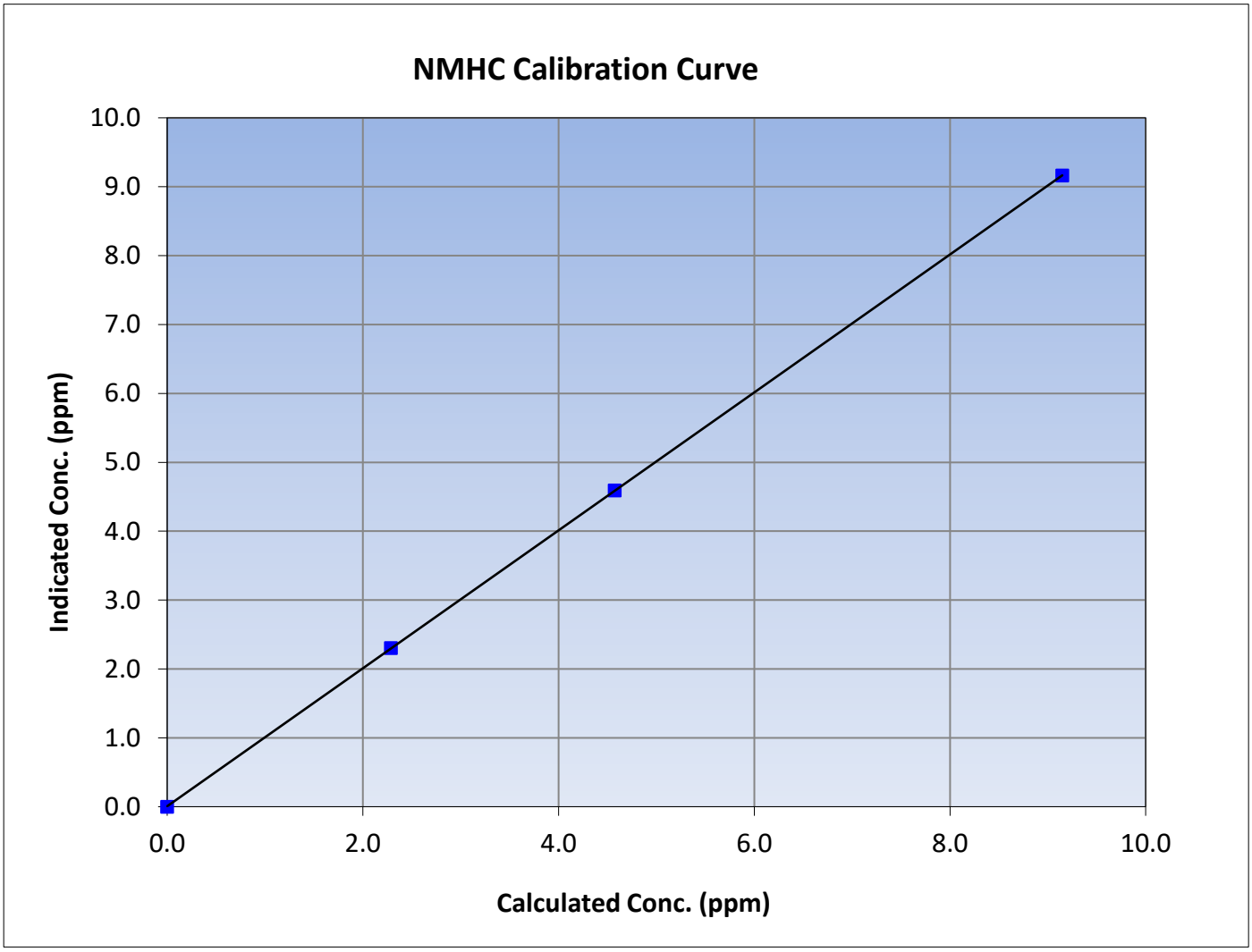
Version-01-2020

Station Information

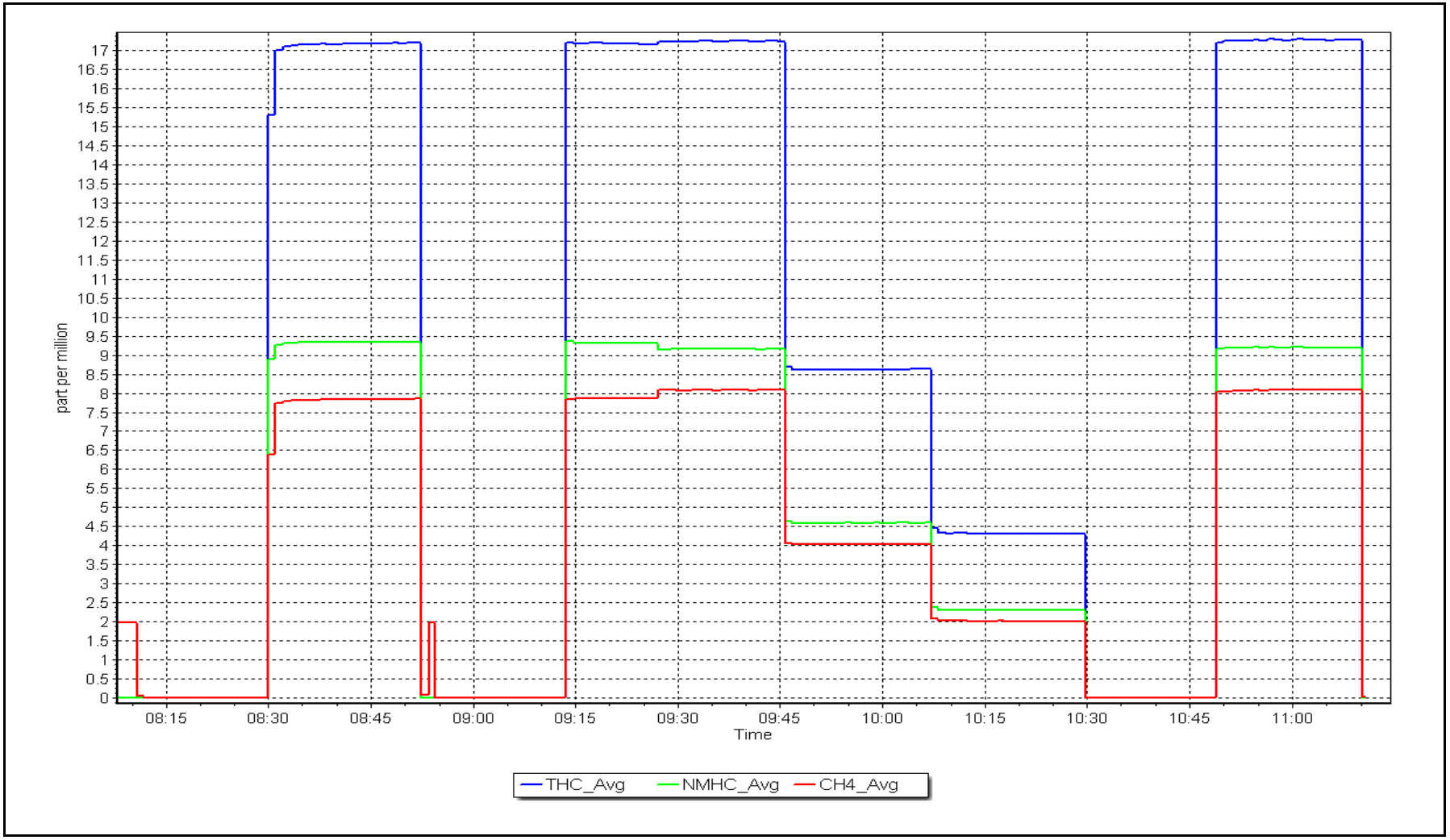
Calibration Date:	April 25, 2023	Previous Calibration:	March 2, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	8:06	End Time (MST):	11:15
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999997	≥0.995
9.15	9.16	0.9984			
4.57	4.59	0.9967	Slope	1.001168	0.90 - 1.10
2.29	2.30	0.9926			
			Intercept	0.007000	+/-0.5



NMHC Calibration Plot Date: April 25, 2023 Location: Mannix



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS06
PATRICIA MCINNES
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	April 13, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	8:55	End time (MST):	11:50
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.991070	1.001234	Backgd or Offset:	17.2	17.2
Calibration intercept:	1.621614	1.539845	Coeff or Slope:	0.907	0.907

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4920	80.3	799.5	803.0	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4920	80.3	799.5	801.2	0.998
second point	4960	40.2	400.2	403.1	0.993
third point	4980	20.1	200.1	203.4	0.984
as left zero	5000	0.0	0.0	0.1	----
as left span	4920	80.3	799.5	806.7	0.991
				Average Correction Factor	0.992

Baseline Corr As found:	803.10	Previous response	793.95	*% change	1.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed 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

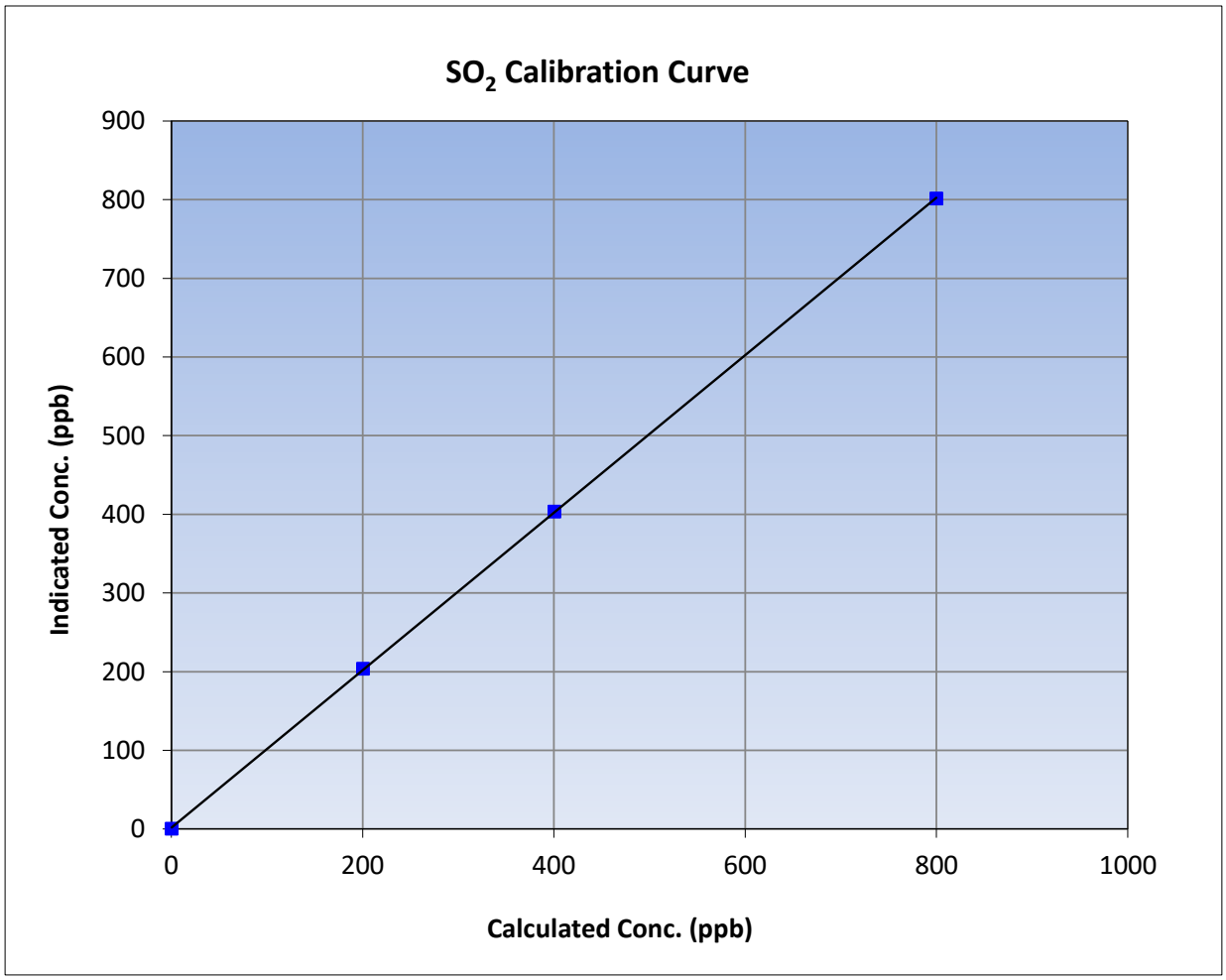
Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:55	End Time (MST):	11:50
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290013

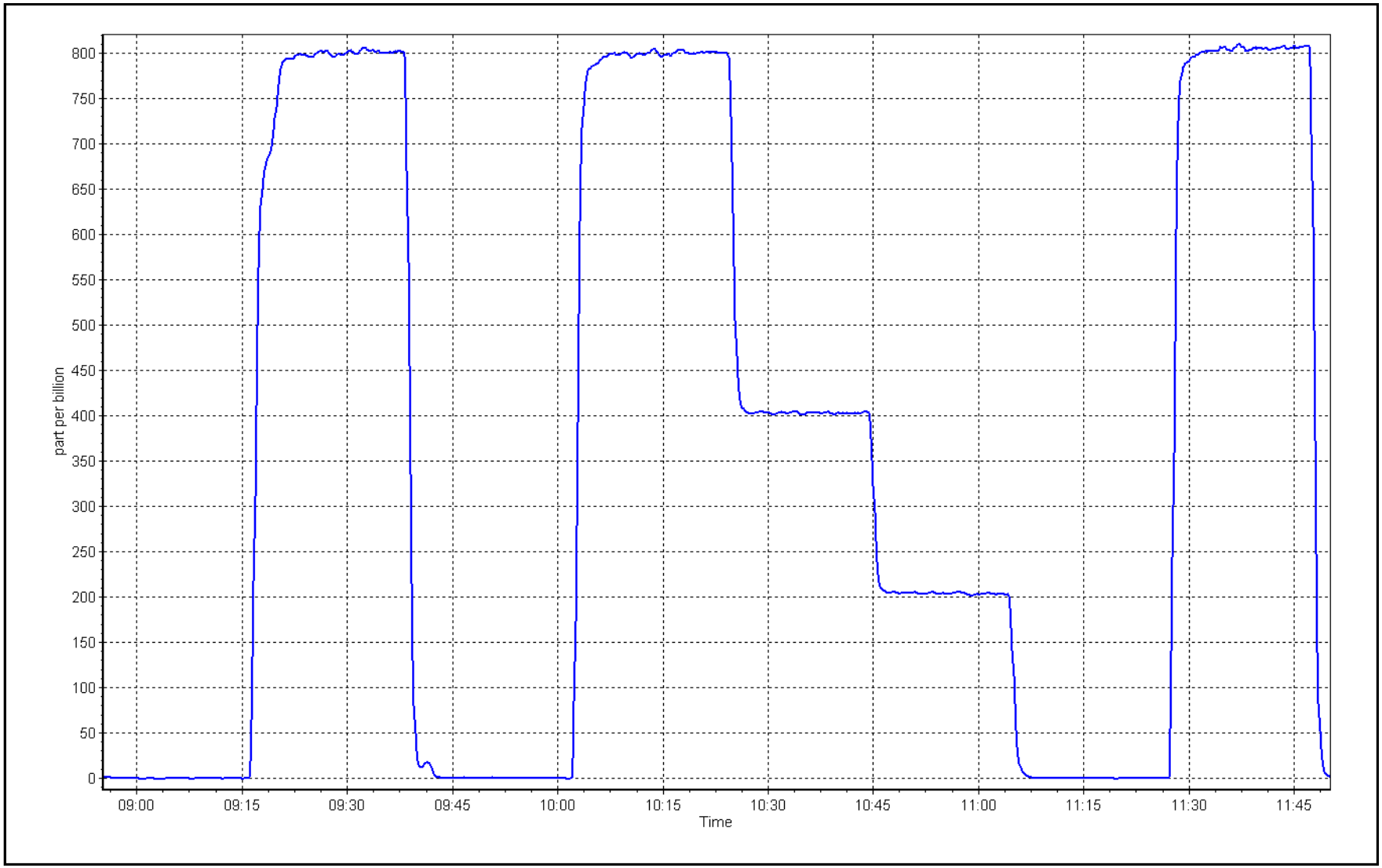
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
799.5	801.2	0.9978
400.2	403.1	0.9929
200.1	203.4	0.9839

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999983	*≥0.995*
Slope	1.001234	*0.90 - 1.10*
Intercept	1.539845	*+/-30*



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



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
Calibration Date:	April 5, 2023	Last Cal Date:	March 15, 2023
Start time (MST):	9:22	End time (MST):	13:55
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:	0.997060	0.992200	Backgd or Offset:	1.84	1.84
Calibration intercept:	0.257193	0.277270	Coeff or Slope:	1.070	1.070

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4926	74.3	79.9	79.1	1.011
as found 2nd point	4963	37.2	40.0	39.6	1.011
as found 3rd point	4981	18.6	20.0	20.0	1.001
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4926	74.3	79.9	79.5	1.006
second point	4963	37.2	40.0	40.1	0.998
third point	4981	18.6	20.0	20.3	0.986
as left zero	5000	0.0	0.0	0.2	----
as left span	4926	74.3	79.9	79.9	1.001
SO2 Scrubber Check	4920	80.3	803.0	0.0	----
Date of last scrubber change:		December 20, 2021		Ave Corr Factor	0.997
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.1	Prev response:	79.96	*% change:	-1.1%
Baseline Corr 2nd AF pt:	39.6	AF Slope:	0.988623	AF Intercept:	0.077446
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999992		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

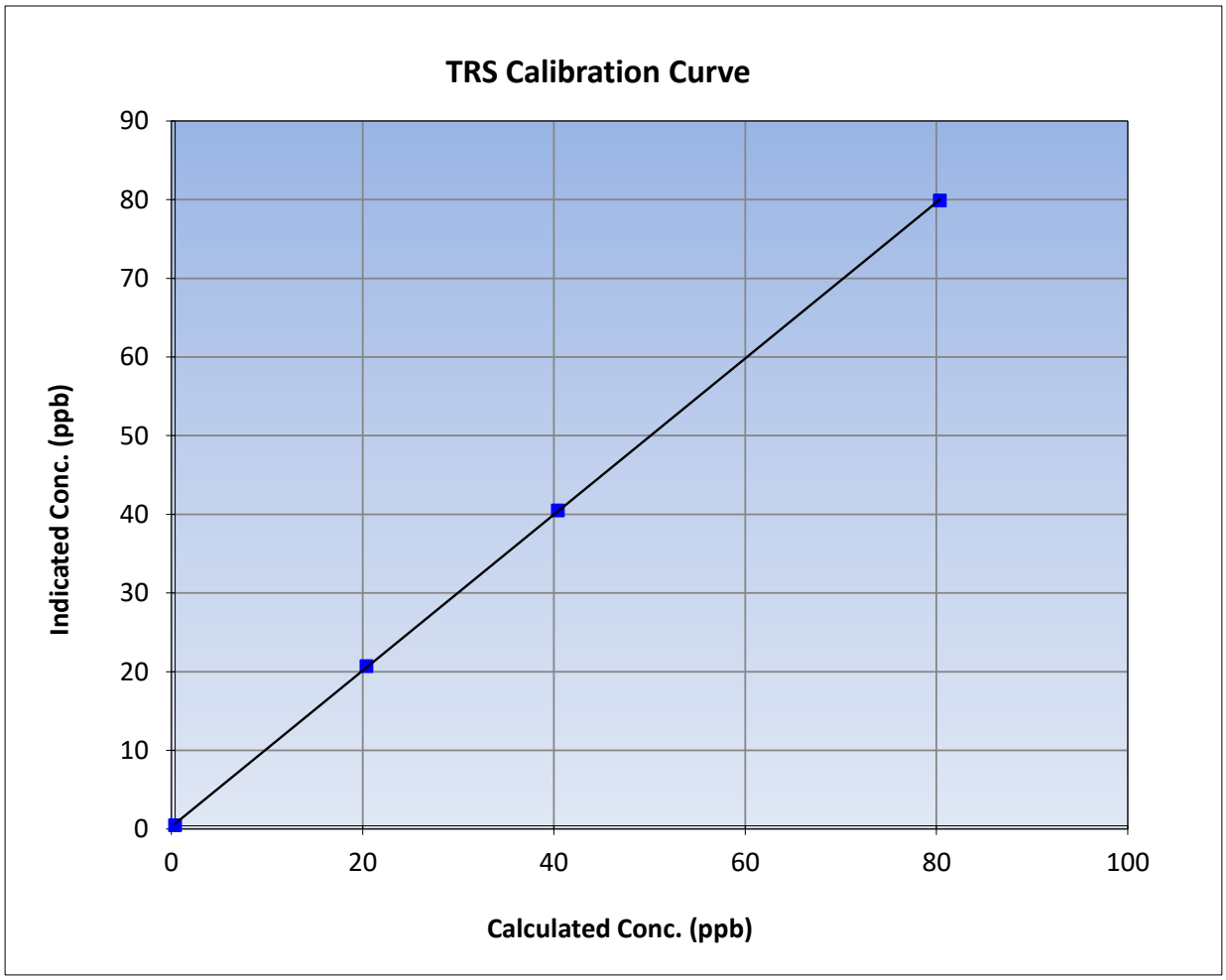
Station Information

Calibration Date:	April 5, 2023	Previous Calibration:	March 15, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:22	End Time (MST):	13:55
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1218153358

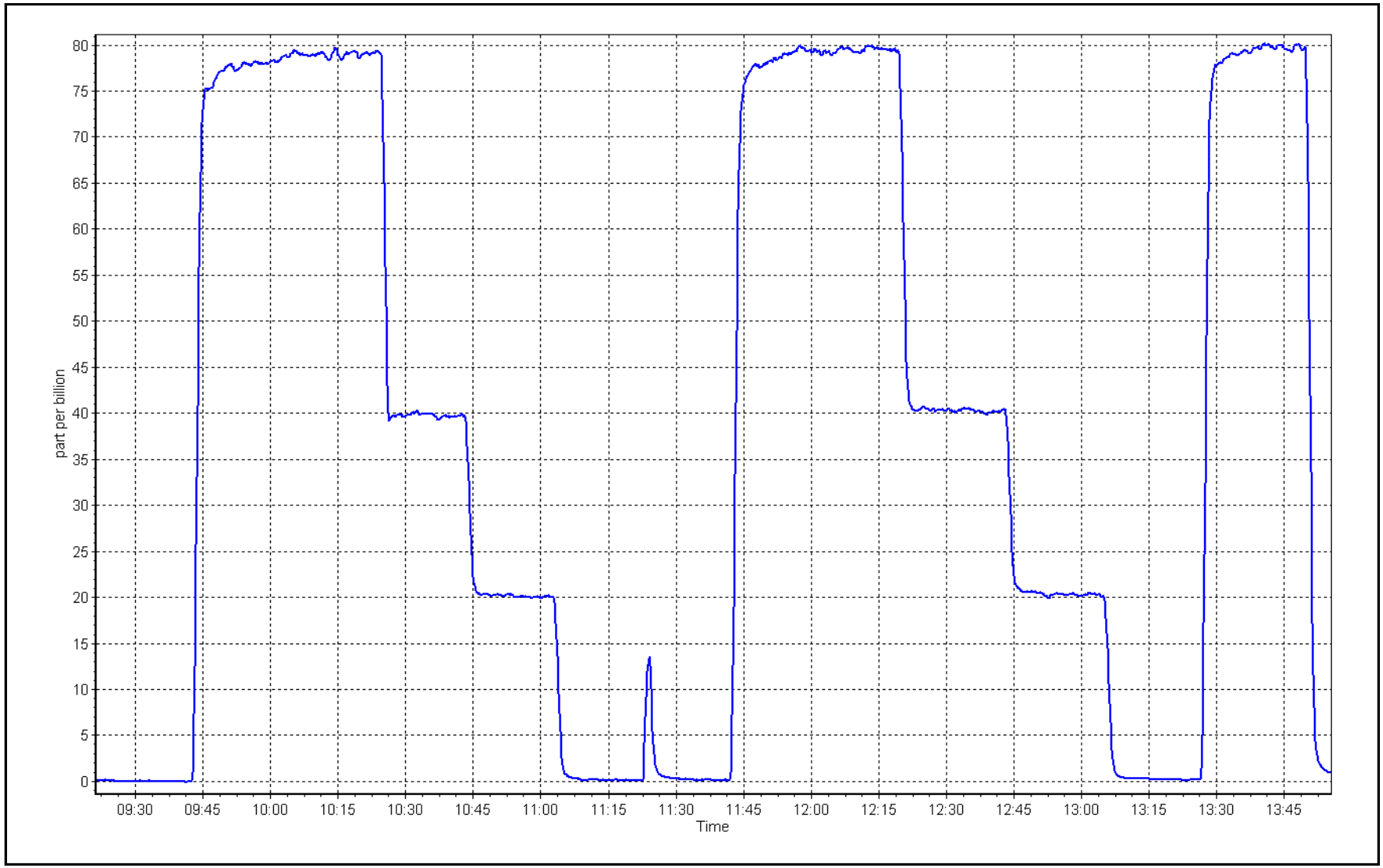
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
79.9	79.5	1.0056
40.0	40.1	0.9981
20.0	20.3	0.9860

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999977	*≥0.995*
Slope	0.992200	*0.90 - 1.10*
Intercept	0.277270	*+/-3*



TRS Calibration Plot Date: April 5, 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:	April 13, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	8:56	End time (MST):	11:50
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320037	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.33E-04	3.33E-04	NMHC SP Ratio:	5.86E-05	5.86E-05
CH4 Retention time:	14	14.0	NMHC Peak Area:	154840	154840

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	17.12	17.08	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	17.12	17.03	1.006
second point	4960	40.2	8.57	8.51	1.007
third point	4980	20.1	4.29	4.29	1.000
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	1.004
Baseline Corr AF:	17.08	Prev response	17.15	*% 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	4920	80.3	9.07	9.06	1.000
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	9.04	1.003
second point	4960	40.2	4.54	4.54	1.001
third point	4980	20.1	2.27	2.29	0.992
as left zero	5000	0	0.00	0.00	----
as left span	4920	80.3	9.07	9.04	1.003
				Average Correction Factor	0.999
Baseline Corr AF:	9.06	Prev response	9.08	*% 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	80.3	8.06	8.01	1.006
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	8.06	7.98	1.009
second point	4960	40.2	4.03	3.97	1.015
third point	4980	20.1	2.02	2.00	1.008
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	1.011
Baseline Corr AF:	8.01	Prev response	8.06	*% change	-0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000848	0.993826
THC Cal Offset:	0.007935	0.007564
CH4 Cal Slope:	1.001093	0.990693
CH4 Cal Offset:	-0.000603	-0.004180
NMHC Cal Slope:	1.000428	0.996672
NMHC Cal Offset:	0.009337	0.010746

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

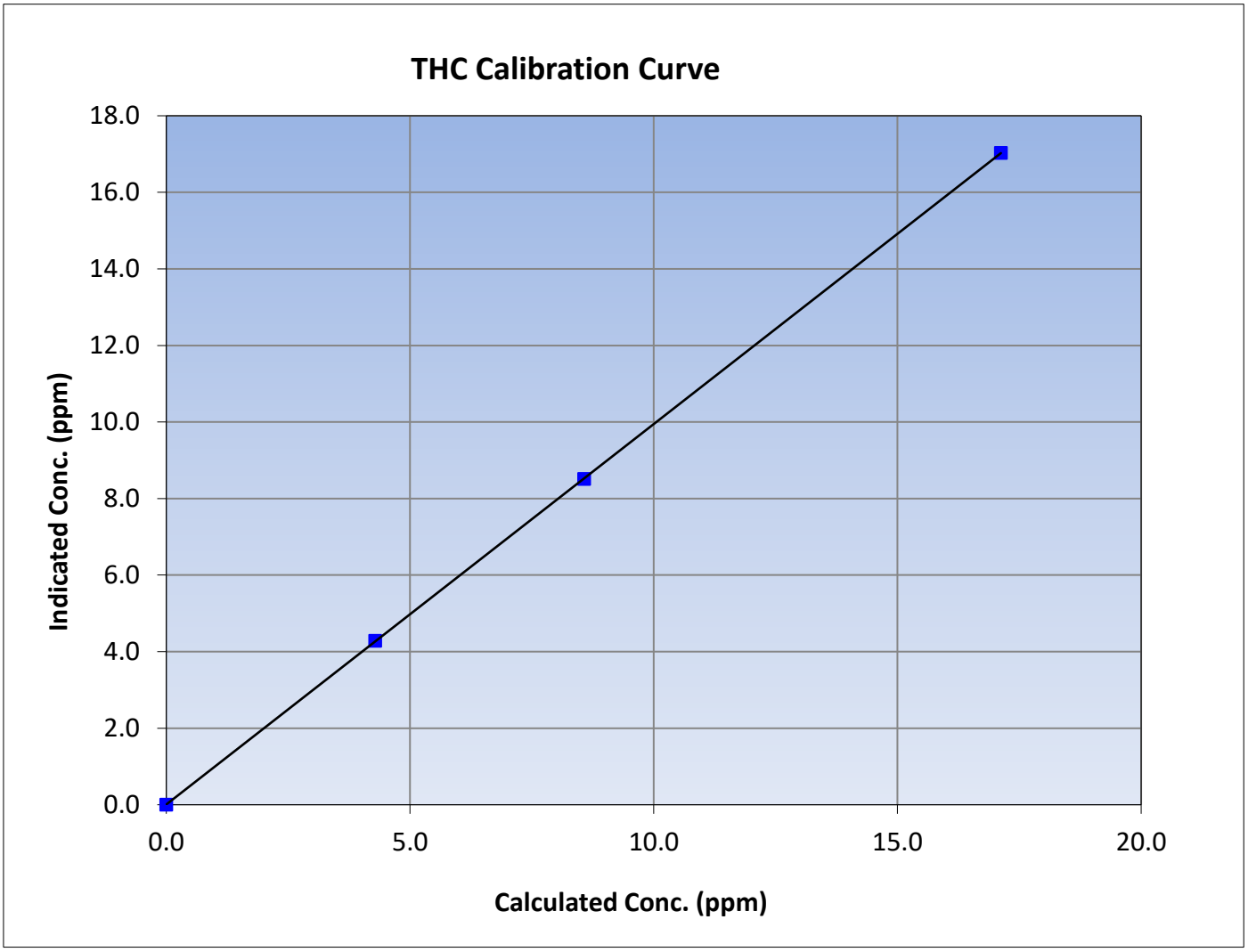
Version-01-2020

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:56	End Time (MST):	11:50
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	0.999996	*≥0.995*
17.12	17.03	1.0056			
8.57	8.51	1.0071	Slope	0.993826	*0.90 - 1.10*
4.29	4.29	0.9998			
			Intercept	0.007564	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

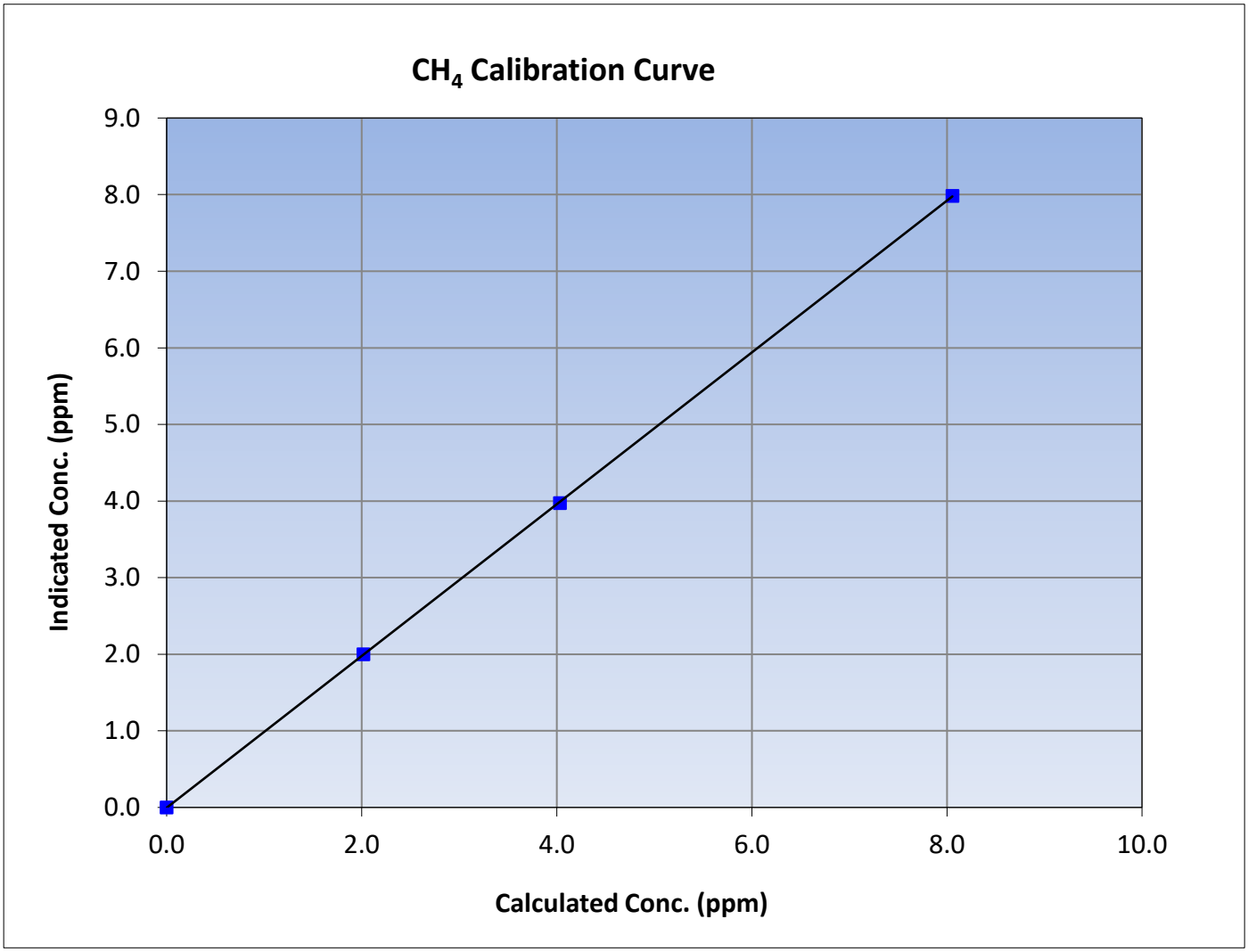
Version-01-2020

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:56	End Time (MST):	11:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999987	≥0.995
8.06	7.98	1.0090			
4.03	3.97	1.0151	Slope	0.990693	0.90 - 1.10
2.02	2.00	1.0082			
			Intercept	-0.004180	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

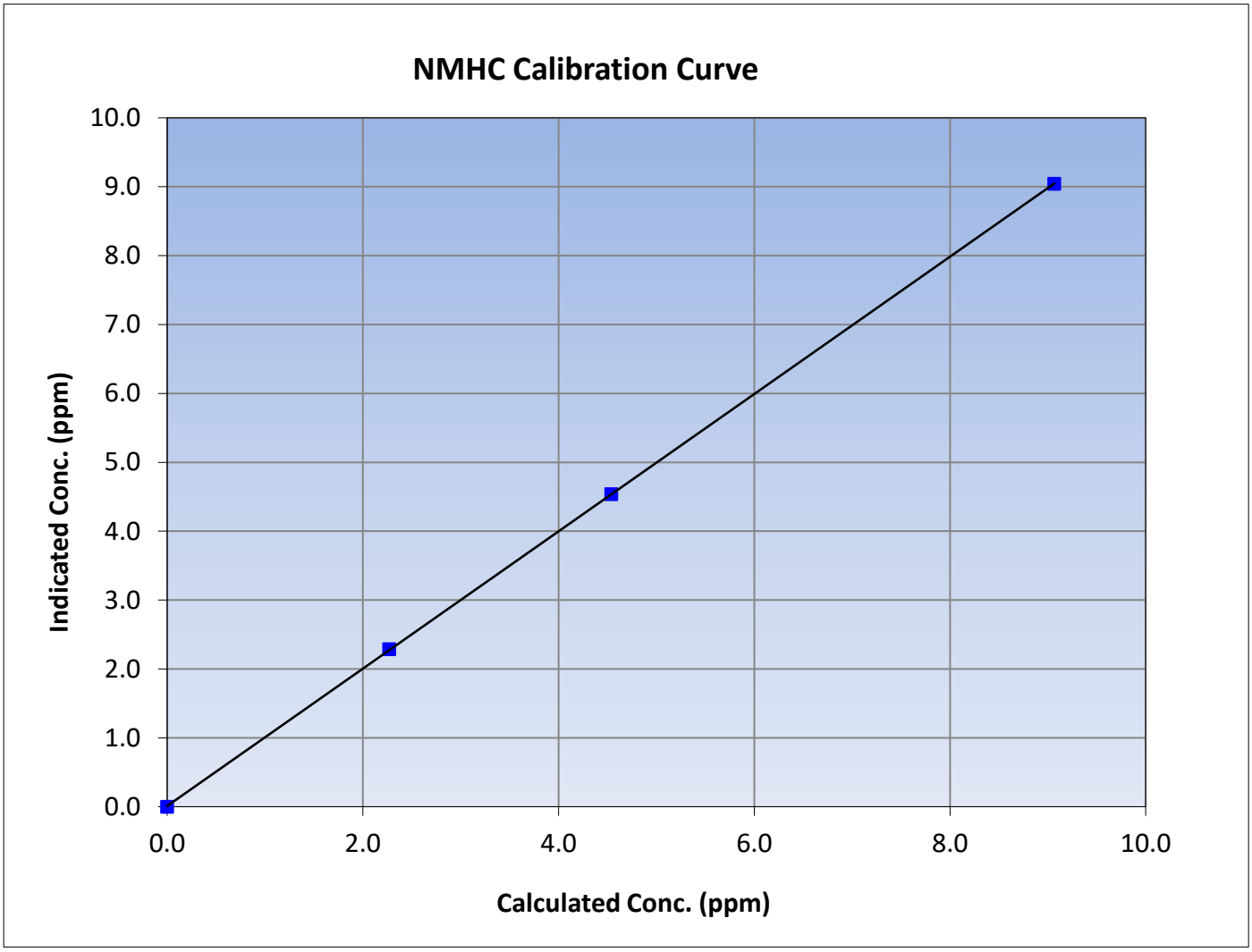
Version-01-2020

Station Information

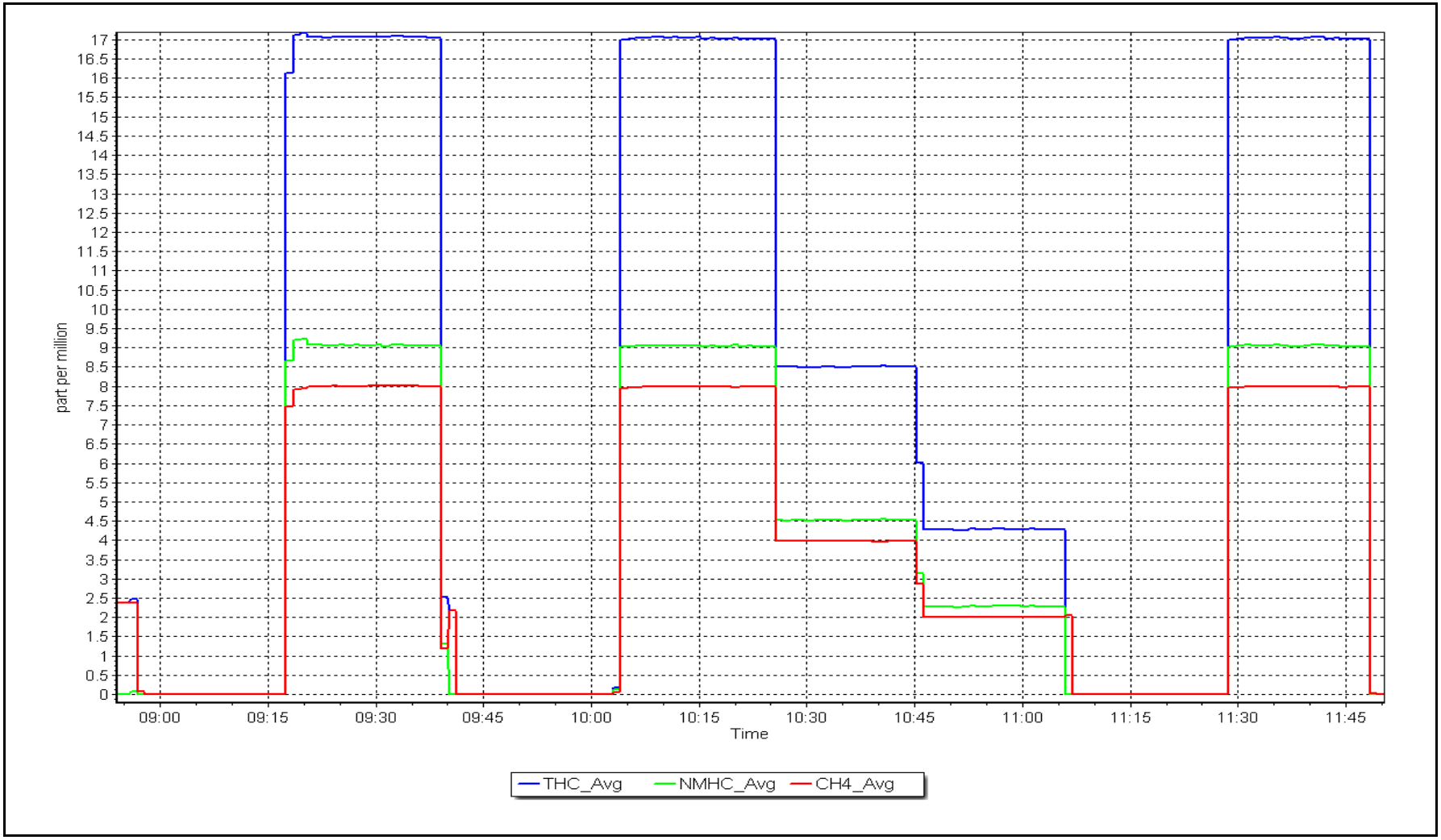
Calibration Date:	April 13, 2023	Previous Calibration:	March 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:56	End Time (MST):	11:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999993	≥0.995
9.07	9.04	1.0026			
4.54	4.54	1.0009	Slope	0.996672	0.90 - 1.10
2.27	2.29	0.9924			
			Intercept	0.010746	+/-0.5



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



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	April 25, 2023	Last Cal Date:	April 13, 2023
Start time (MST):	8:18	End time (MST):	12:15
Reason:	Maintenance		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320037	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.33E-04	3.47E-04	NMHC SP Ratio:	5.86E-05	5.75E-05
CH4 Retention time:	14	14.4	NMHC Peak Area:	154840	158039

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	17.12	16.74	1.023
as found 2nd point	4960	40.2	8.57	8.36	1.026
as found 3rd point	4980	20.1	4.29	4.21	1.019
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	17.12	17.11	1.001
second point	4960	40.2	8.57	8.53	1.005
third point	4980	20.1	4.29	4.29	0.998
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.12	17.03	1.005
				Average Correction Factor	1.001

Baseline Corr AF:	16.74	Prev response	17.02	*% change	-1.7%
Baseline Corr 2nd AF:	8.4	AF Slope:	0.977199	AF Intercept:	0.001439
Baseline Corr 3rd AF:	4.2	AF Correlation:	0.999996	* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4920	80.3	9.07	8.94	1.014
as found 2nd point	4960	40.2	4.54	4.47	1.015
as found 3rd point	4980	20.1	2.27	2.25	1.009
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4920	80.3	9.07	9.07	1.000
second point	4960	40.2	4.54	4.53	1.002
third point	4980	20.1	2.27	2.28	0.996
as left zero	5000	0	0.00	0.00	----
as left span	4920	80.3	9.07	9.05	1.002
				Average Correction Factor	0.999
Baseline Corr AF:	8.94	Prev response	9.05	*% change	-1.2%
Baseline Corr 2nd AF:	4.5	AF Slope:	0.985465	AF Intercept:	0.003975
Baseline Corr 3rd AF:	2.3	AF Correlation:	0.999997	* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	8.06	7.80	1.032
as found 2nd point	4960	40.2	4.03	3.89	1.038
as found 3rd point	4980	20.1	2.02	1.96	1.031
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	8.06	8.05	1.000
second point	4960	40.2	4.03	4.00	1.009
third point	4980	20.1	2.02	2.01	1.002
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	8.06	7.99	1.008
				Average Correction Factor	1.004
Baseline Corr AF:	7.80	Prev response	7.98	*% change	-2.2%
Baseline Corr 2nd AF:	3.89	AF Slope:	0.968249	AF Intercept:	-0.003536
Baseline Corr 3rd AF:	1.96	AF Correlation:	0.999989	* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.993826	0.999051
THC Cal Offset:	0.007564	-0.003849
CH4 Cal Slope:	0.990693	0.999177
CH4 Cal Offset:	-0.004180	-0.007594
NMHC Cal Slope:	0.996672	0.999419
NMHC Cal Offset:	0.010746	0.002345

Notes: Completed multipoint as founds. Changed the actuator after the as founds to fix the dipping issue. New actuator fixed the issue. Adjusted the span only.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

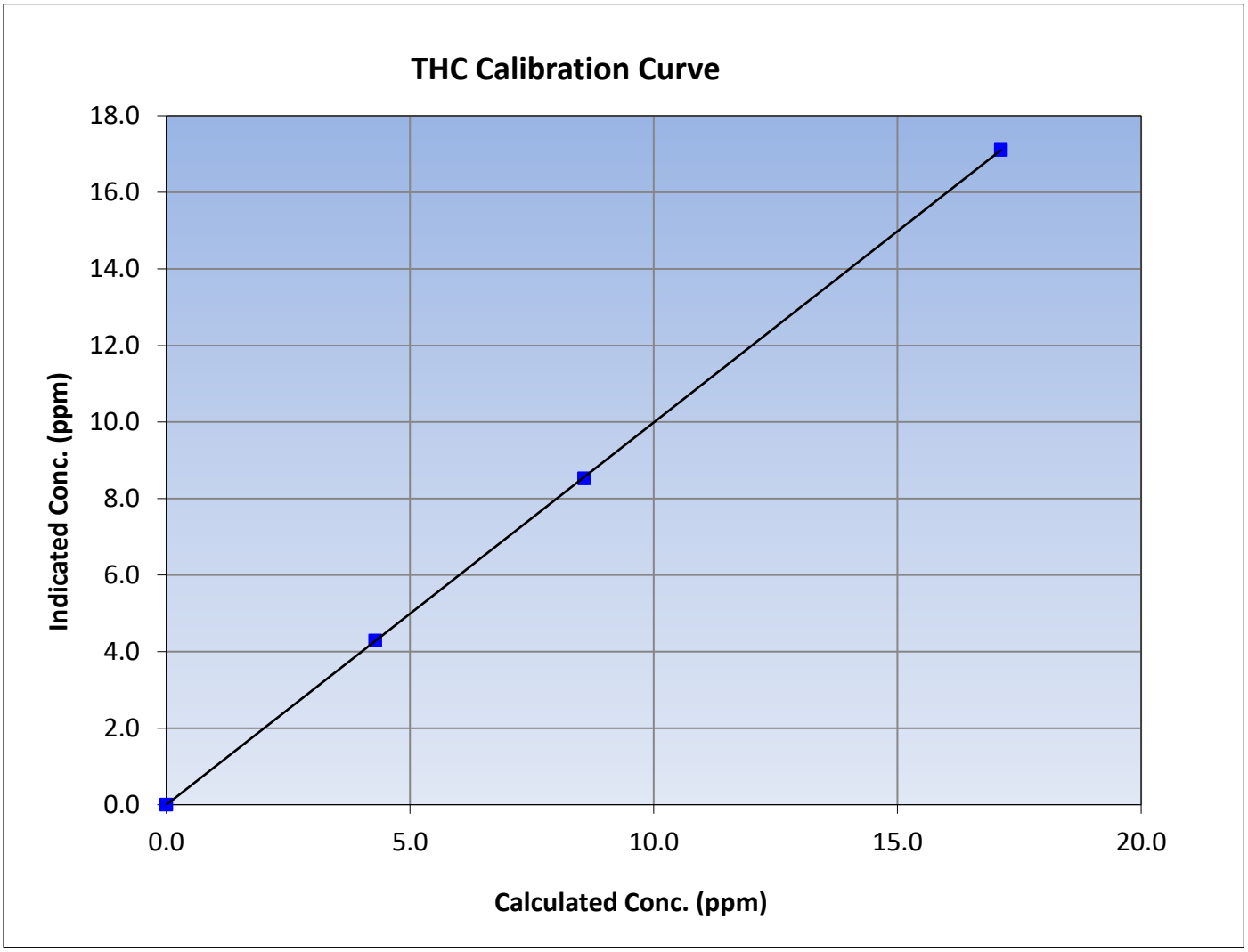
Version-01-2020

Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	April 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:18	End Time (MST):	12:15
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999992	≥0.995
17.12	17.11	1.0005			
8.57	8.53	1.0049	Slope	0.999051	0.90 - 1.10
4.29	4.29	0.9984			
			Intercept	-0.003849	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

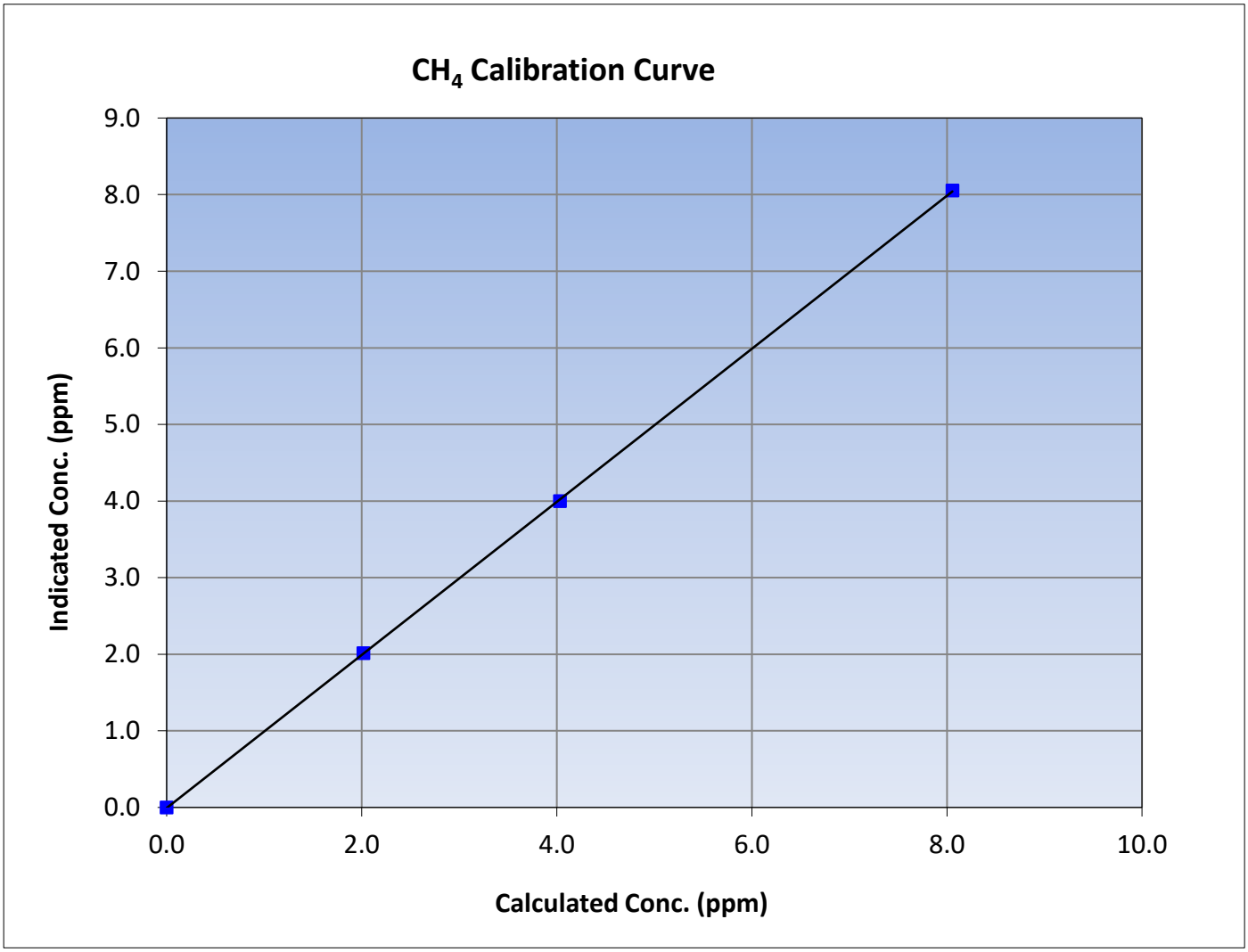
Version-01-2020

Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	April 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:18	End Time (MST):	12:15
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	0.999978	≥0.995
8.06	8.05	1.0005			
4.03	4.00	1.0087	Slope	0.999177	0.90 - 1.10
2.02	2.01	1.0017			
			Intercept	-0.007594	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

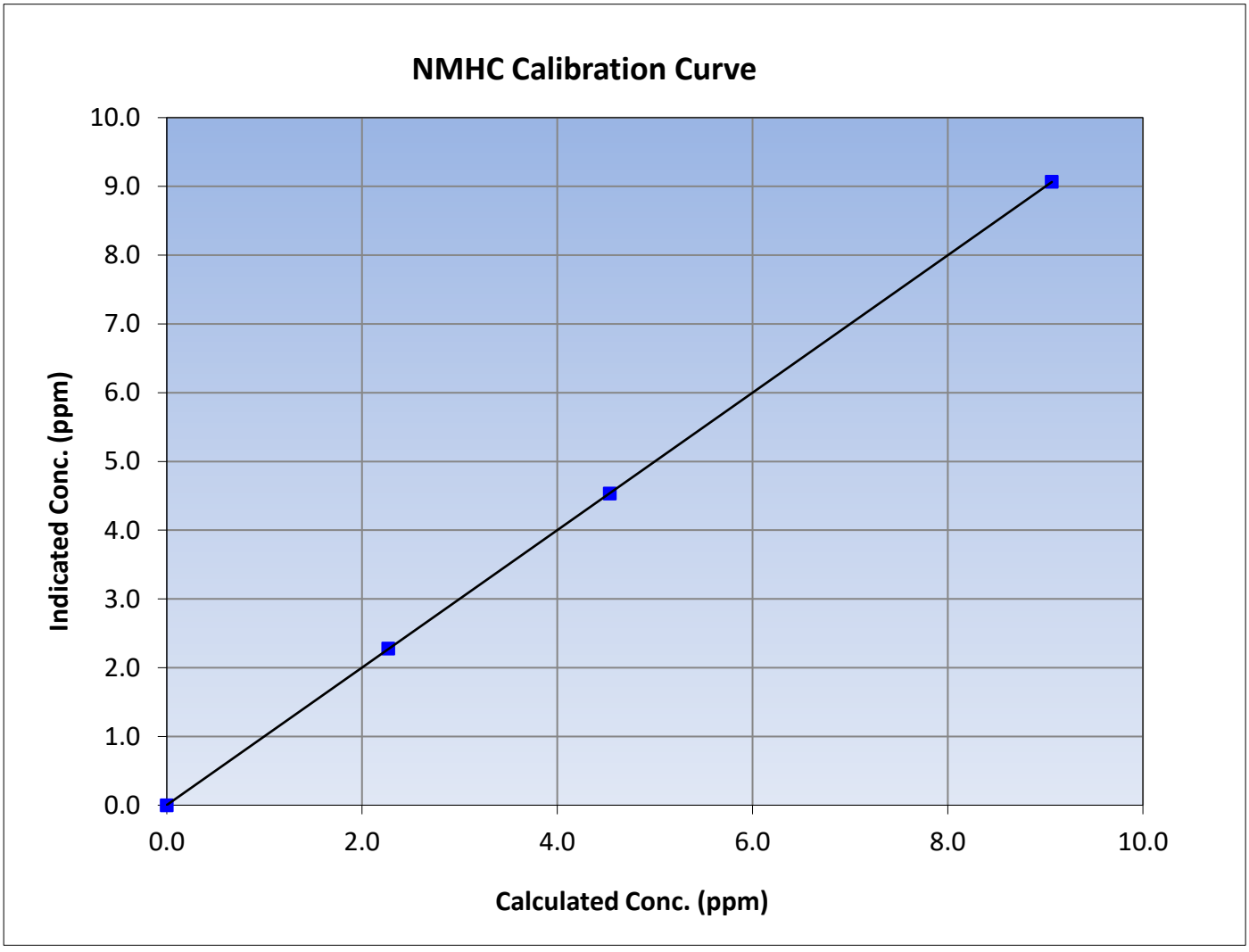
Version-01-2020

Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	April 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:18	End Time (MST):	12:15
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999997	≥0.995
9.07	9.07	1.0001			
4.54	4.53	1.0018	Slope	0.999419	0.90 - 1.10
2.27	2.28	0.9959			
			Intercept	0.002345	+/-0.5



NMHC Calibration Plot Date: April 25, 2023 Location: Patricia McInnes

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	April 4, 2023	Last Cal Date:	March 7, 2023
Start time (MST):	8:40	End time (MST):	13:32
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1172750022	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	0.818	0.835	NO bkgnd or offset:	3.2	3.2
NOX coeff or slope:	0.996	0.996	NOX bkgnd or offset:	3.8	3.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	155.1	155.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.993329	1.001408
NO_X Cal Offset:	2.240132	2.760164
NO Cal Slope:	0.991966	0.998955
NO Cal Offset:	1.559980	1.840130
NO_2 Cal Slope:	1.003238	1.006294
NO_2 Cal Offset:	1.111866	1.349835

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
as found span	4923	76.9	807.6	799.5	8.2	796.7	784.0	12.7	1.0137	1.0197
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.2	0.1	----	----
high point	4923	76.9	807.6	799.5	8.2	810.3	799.7	10.4	0.9967	0.9997
second point	4962	38.5	404.3	400.2	4.1	408.7	402.3	6.4	0.9893	0.9949
third point	4981	19.2	201.6	199.6	2.0	207.4	203.0	4.4	0.9722	0.9833
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.3	-0.2	----	----
as left span	4923	76.9	807.6	390.6	417.1	813.0	390.8	422.0	0.9934	0.9994
								Average Correction Factor	0.9861	0.9926

Corrected As found	NO_X = 796.6 ppb	NO = 783.9 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-1.0%
Previous Response	NO_X = 804.5 ppb	NO = 794.6 ppb		*Percent Change	NO =	-1.4%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	800.5	391.6	417.1	420.8	0.9911	100.9%
2nd GPT point (200 ppb O3)	800.5	391.6	417.1	420.8	0.9911	100.9%
3rd GPT point (100 ppb O3)	800.5	697.9	110.8	114.5	0.9673	103.4%
				Average Correction Factor	0.9831	101.7%

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

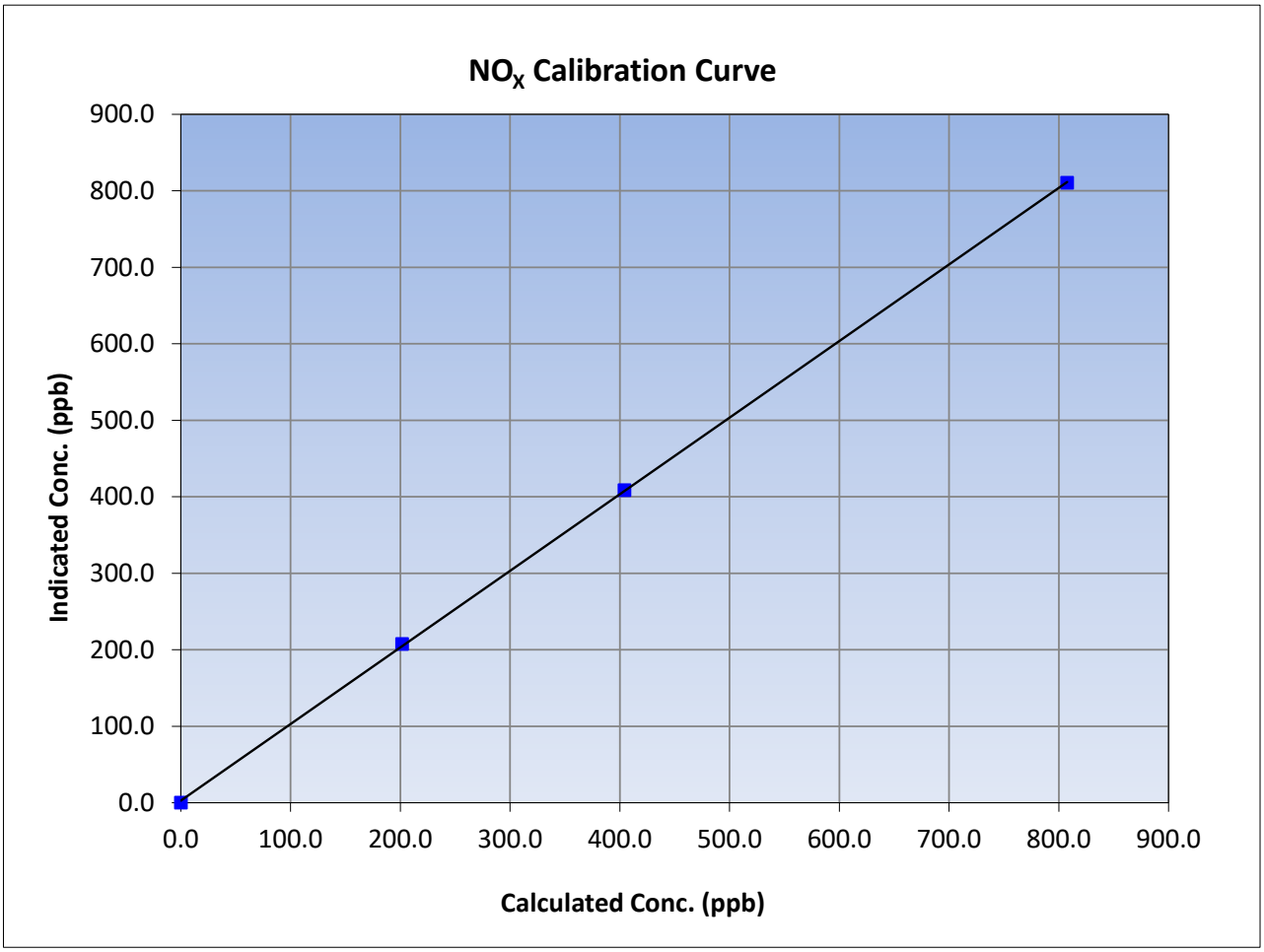
Version-04-2020

Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 7, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:40	End Time (MST):	13:32
Analyzer make:	Thermo 42i	Analyzer serial #:	1172750022

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.2	----	Correlation Coefficient	0.999954	*≥0.995*
807.6	810.3	0.9967			
404.3	408.7	0.9893	Slope	1.001408	*0.90 - 1.10*
201.6	207.4	0.9722			
			Intercept	2.760164	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

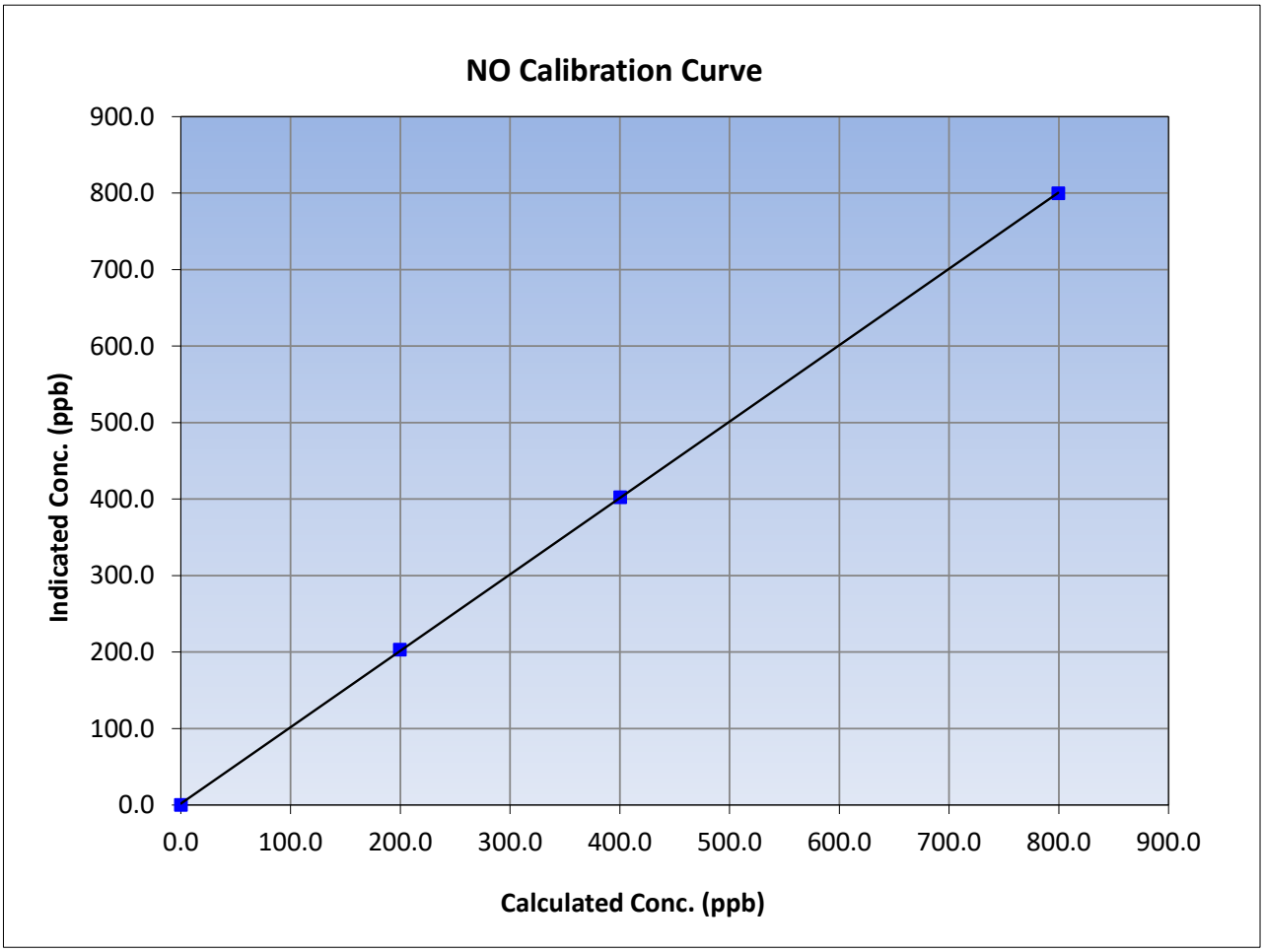
Version-04-2020

Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 7, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:40	End Time (MST):	13:32
Analyzer make:	Thermo 42i	Analyzer serial #:	1172750022

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999981	≥0.995
799.5	799.7	0.9997			
400.2	402.3	0.9949	Slope	0.998955	0.90 - 1.10
199.6	203.0	0.9833			
			Intercept	1.840130	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

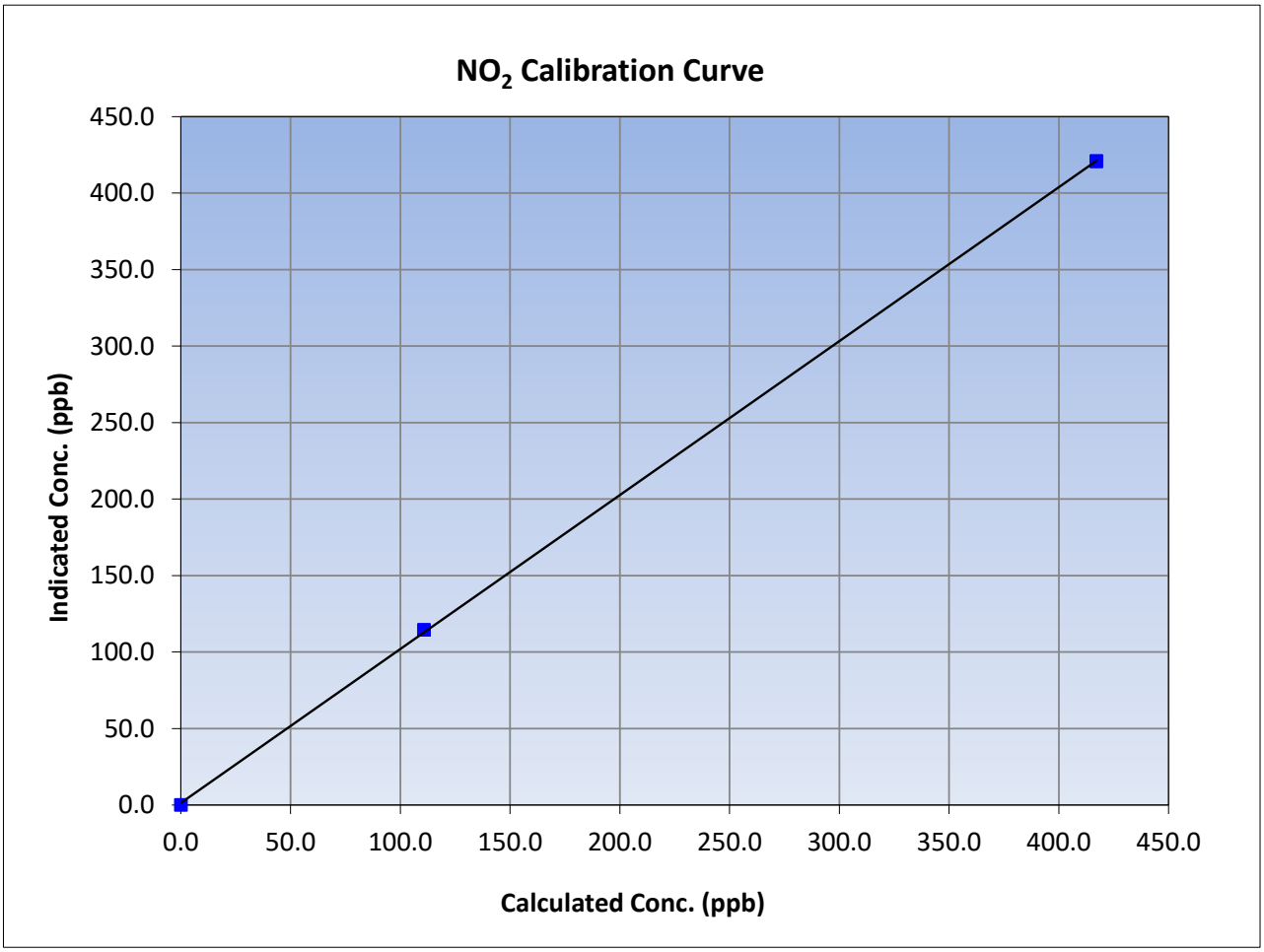
Version-04-2020

Station Information

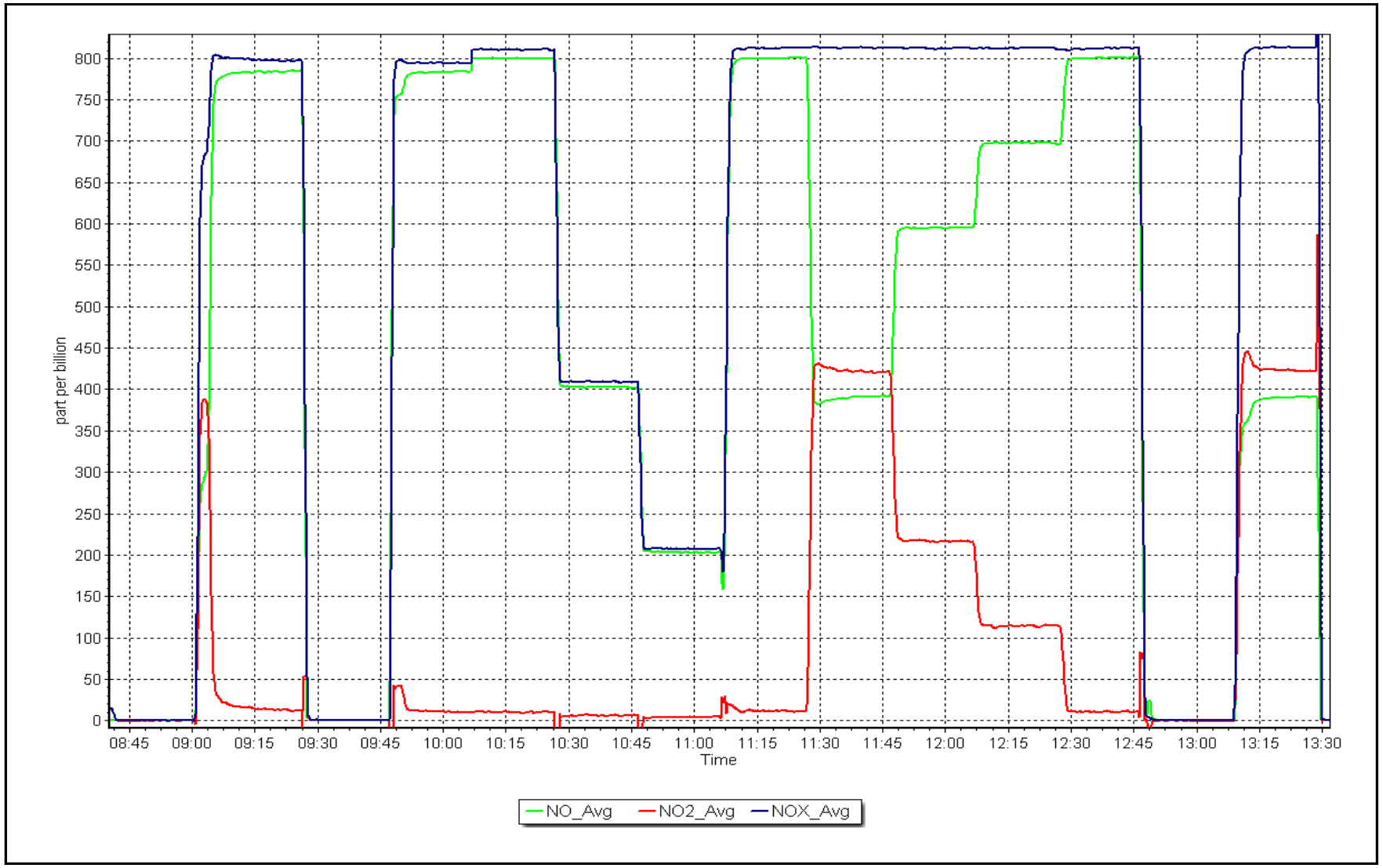
Calibration Date:	April 4, 2023	Previous Calibration:	March 7, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:40	End Time (MST):	13:32
Analyzer make:	Thermo 42i	Analyzer serial #:	1172750022

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999967	≥0.995
417.1	420.8	0.9911			
417.1	420.8	0.9911	Slope	1.006294	0.90 - 1.10
110.8	114.5	0.9673			
			Intercept	1.349835	+/-20



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



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	April 3, 2023	Last Cal Date:	March 9, 2023
Start time (MST):	9:15	End time (MST):	12:58
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:	1.005771	1.006429	Backgd or Offset:	-1.2	-0.2
Calibration intercept:	0.940000	0.300000	Coeff or Slope:	1.019	1.019

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	800.0	0.0	0.5	----
as found span	5000	1303.0	400.0	403.9	0.990
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	-0.2	----
high point	5000	1303.0	400.0	402.7	0.993
second point	5000	966.5	200.0	201.6	0.992
third point	5000	794.3	100.0	101.6	0.984
as left zero	5000	800.0	0.0	0.1	----
as left span	5000	1303.0	400.0	403.6	0.991
				Average Correction Factor	0.990

Baseline Corr As found:	403.4	Previous response	403.2	*% 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 zero only.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

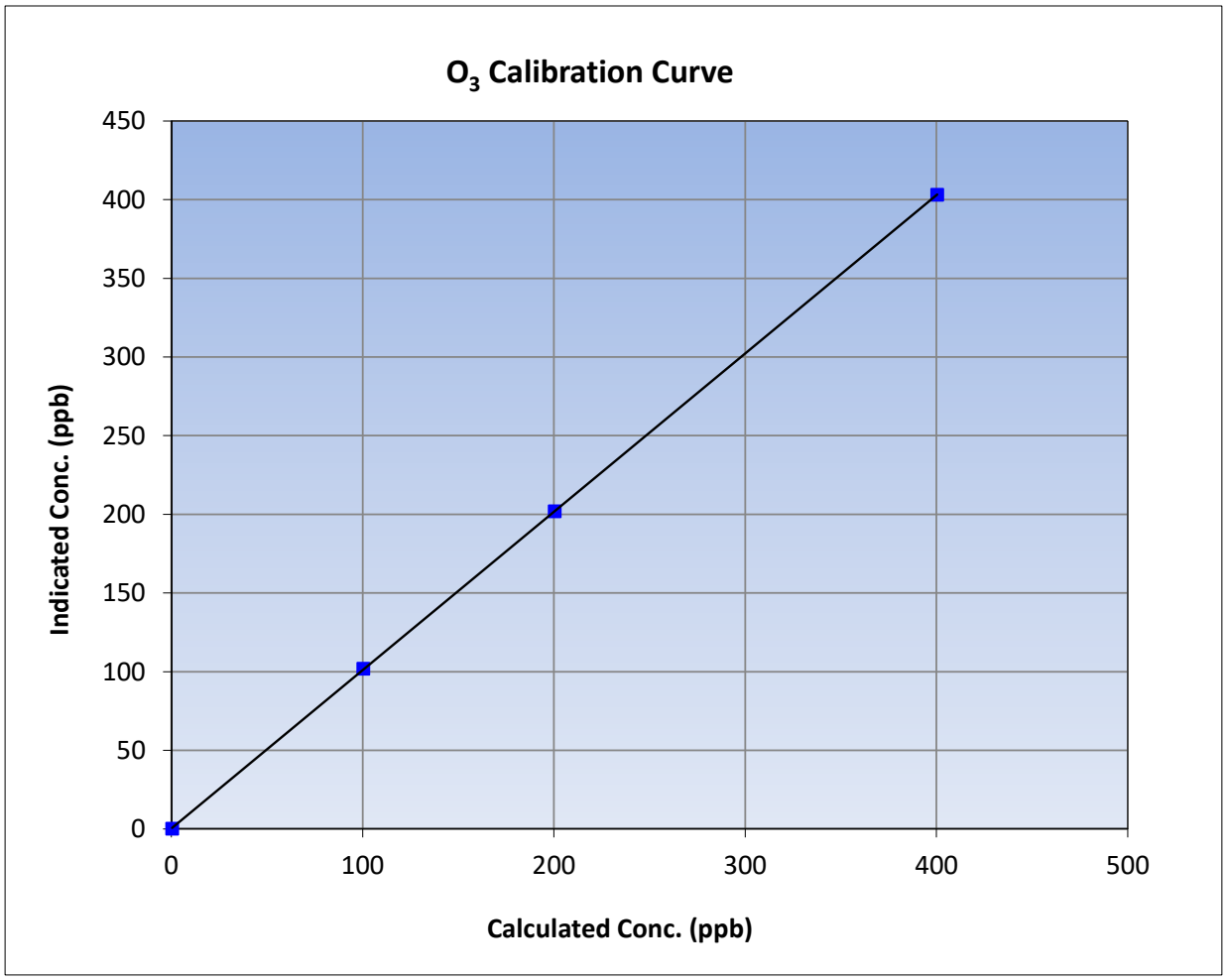
Station Information

Calibration Date:	April 3, 2023	Previous Calibration:	March 9, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:15	End Time (MST):	12:58
Analyzer make:	Thermo 49i	Analyzer serial #:	1300156234

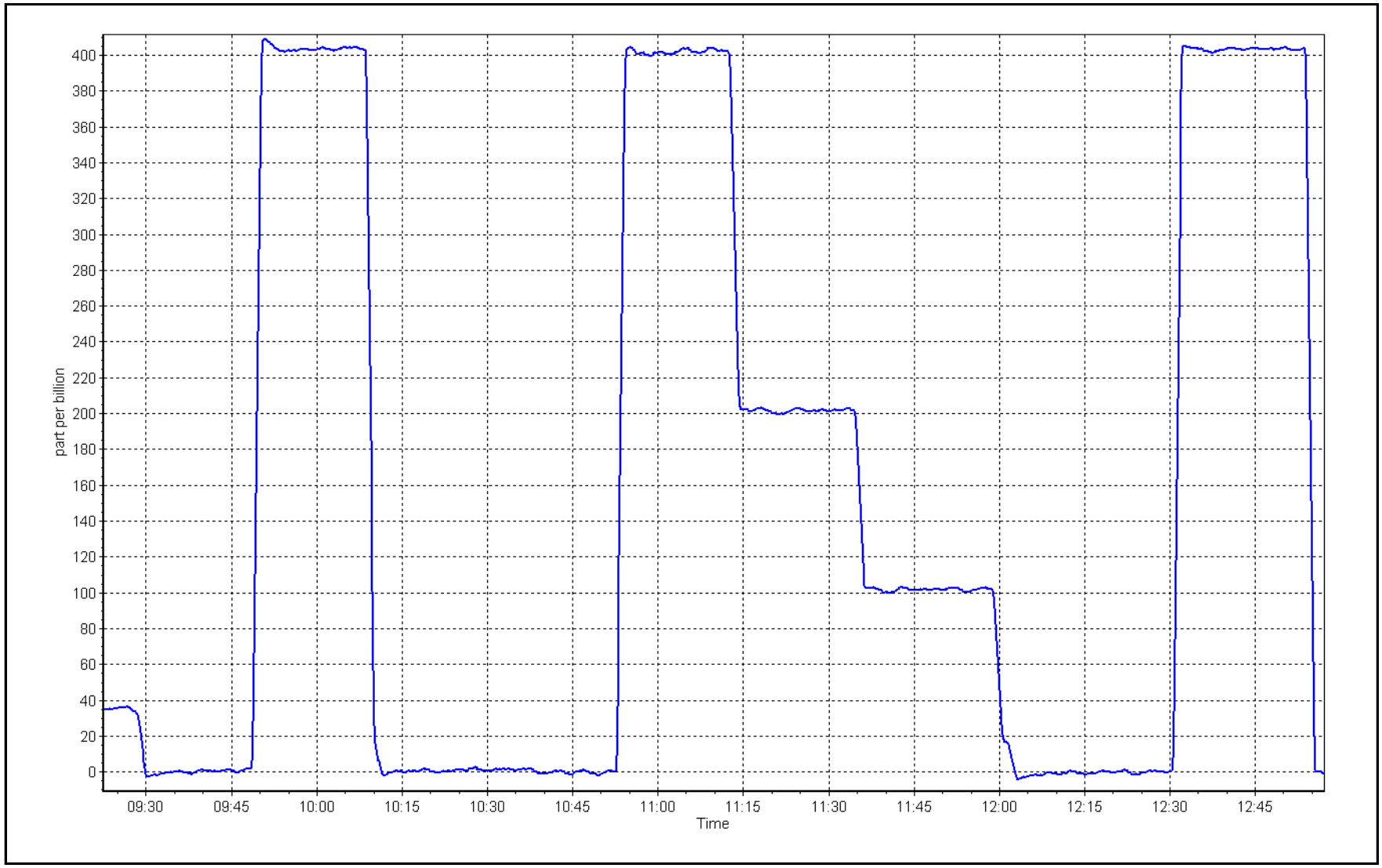
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
400.0	402.7	0.9933
200.0	201.6	0.9921
100.0	101.6	0.9843

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	1.006429	*0.90 - 1.10*
Intercept	0.300000	*+/- 5*



O_3 Calibration Plot Date: April 3, 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:	April 13, 2023	Last Cal Date:	March 15, 2023
Start time (MST):	12:12	End time (MST):	13:02
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)	10.5	10.9	10.5	☐	+/- 2 °C
P (mmHg)	722	722.4	722	☐	+/- 10 mmHg
flow (LPM)	4.99	5.14	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: April 13, 2023 Last Cal Date: March 15, 2023

PM w/o HEPA: 5.6 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	11	11	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 10.4 w/ HEPA: 0

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

Calibration by: Max Farrell

Wood Buffalo Environmental Association

TN - NO_X - NH_3 Calibration Report

Version-11-2021

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
NOX Cal Date:	April 20, 2023	Last Cal Date:	March 8, 2023
Start time (MST):	8:10	End time (MST):	12:00
NH3 Cal Date:	April 20, 2023	Last Cal Date:	March 8, 2023
Start time (MST):	8:10	End time (MST):	12:00
Reason:	Cylinder Change	NH3 cylinder swap	

Calibration Standards

NOX Cal Gas Conc:	52.51	ppm	NO Gas Cylinder #:	T26D9MR
NO Cal Gas Conc:	51.98	ppm	NO Cal Gas Expiry:	August 18, 2023
Removed NOX Conc:	52.51	ppm	Removed Cylinder #:	N/A
Removed NO Conc:	51.98	ppm	Removed cyl Expiry:	N/A
NOX gas Diff:			NO gas Diff:	
NH3 Cal Gas Conc:	77.8	ppm	NH3 Gas Cylinder #:	CC710812
			NH3 Cal Gas Expiry:	March 30, 2023
Removed NH3 Conc:	73.9	ppm	Removed Cylinder #:	CC430800
NH3 gas Diff:	-2.7%		Removed cyl Expiry:	January 7, 2023
Calibrator Model:	API T700		Serial Number:	3566
ZAG make/model:	API T701		Serial Number:	689

Analyzer Information

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

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

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	0.999337	
NO_X Cal Offset:	1.041887	
NO Cal Slope:	0.997013	
NO Cal Offset:	2.119639	
NO_2 Cal Slope:	0.993721	
NO_2 Cal Offset:	-1.386593	
NH3 Cal Slope:	1.005985	
NH3 Cal Offset:	7.240605	
TN Cal Slope:	1.011422	
TN Cal Offset:	7.102178	

Wood Buffalo Environmental Association

TN - NOX - NH_3 Calibration Report

Version-11-2021

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated TN concentration (ppb) (Cc)	Calculated NOX concentration (ppb) (Cc)	Calculated NH3 concentration (ppb) (Cc)	Indicated TN concentration (ppb) (Ic)	Indicated NOX concentration (ppb) (Ic)	Indicated NH3 concentration (ppb) (Ic)	TN Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NH3 Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero										
as found NO										
calibrator zero										
high NO point										
NO/O3 point										
as found NH3	3415	85.3	1801.0	----	1801.0	1811.9	----	1802.0	0.994	0.999
new NH3 cyl rp	3419	81.2	1805.1	----	1805.1	1767.2		1758.2	1.021	1.027
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 =	1819.1	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-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	-0.5	-0.4	0.5	----	----
as found span	4923	76.9	807.6	799.5	807.6	809.6	797.5	811.1	0.9975	1.0024
new NO cyl rp										
calibrator zero										
high point										
second point										
third point										
								Average Correction Factor		

Baseline Corr As fnd	TN =	810.6	ppb	NO_X =	810.1	ppb	NO =	797.9	ppb	*Percent Change TN = -1.6%
Previous Response	TN =	823.9	ppb	NO_X =	808.1	ppb	NO =	799.2	ppb	*Percent Change NO_X = 0.2%
										*Percent Change NO = -0.2%

* = > +/-5% change initiates investigation

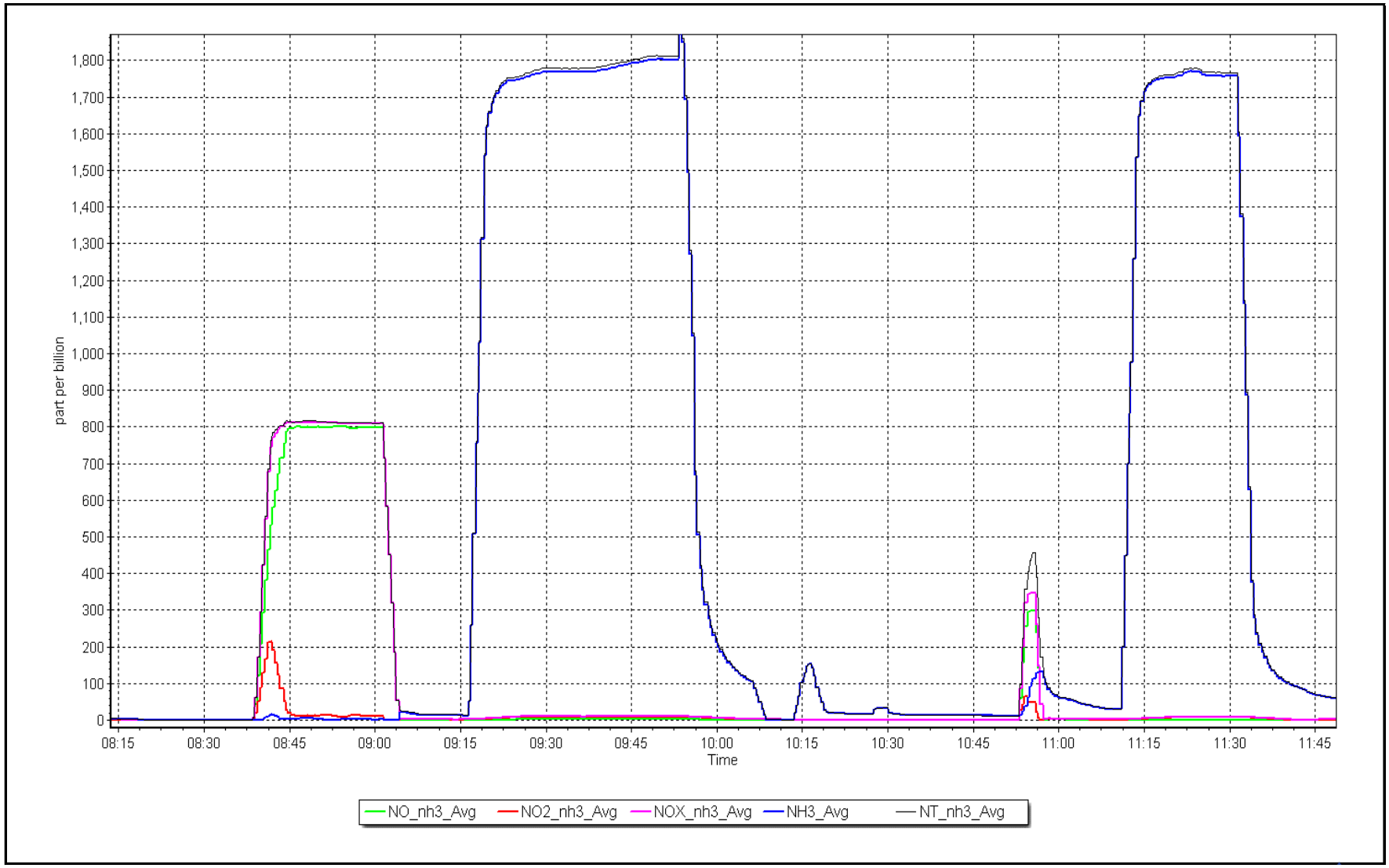
GPT Calibration Data

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	-0.1	----	----
calibration zero						
1st GPT point (400 ppb O3)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
				Average Correction Factor		

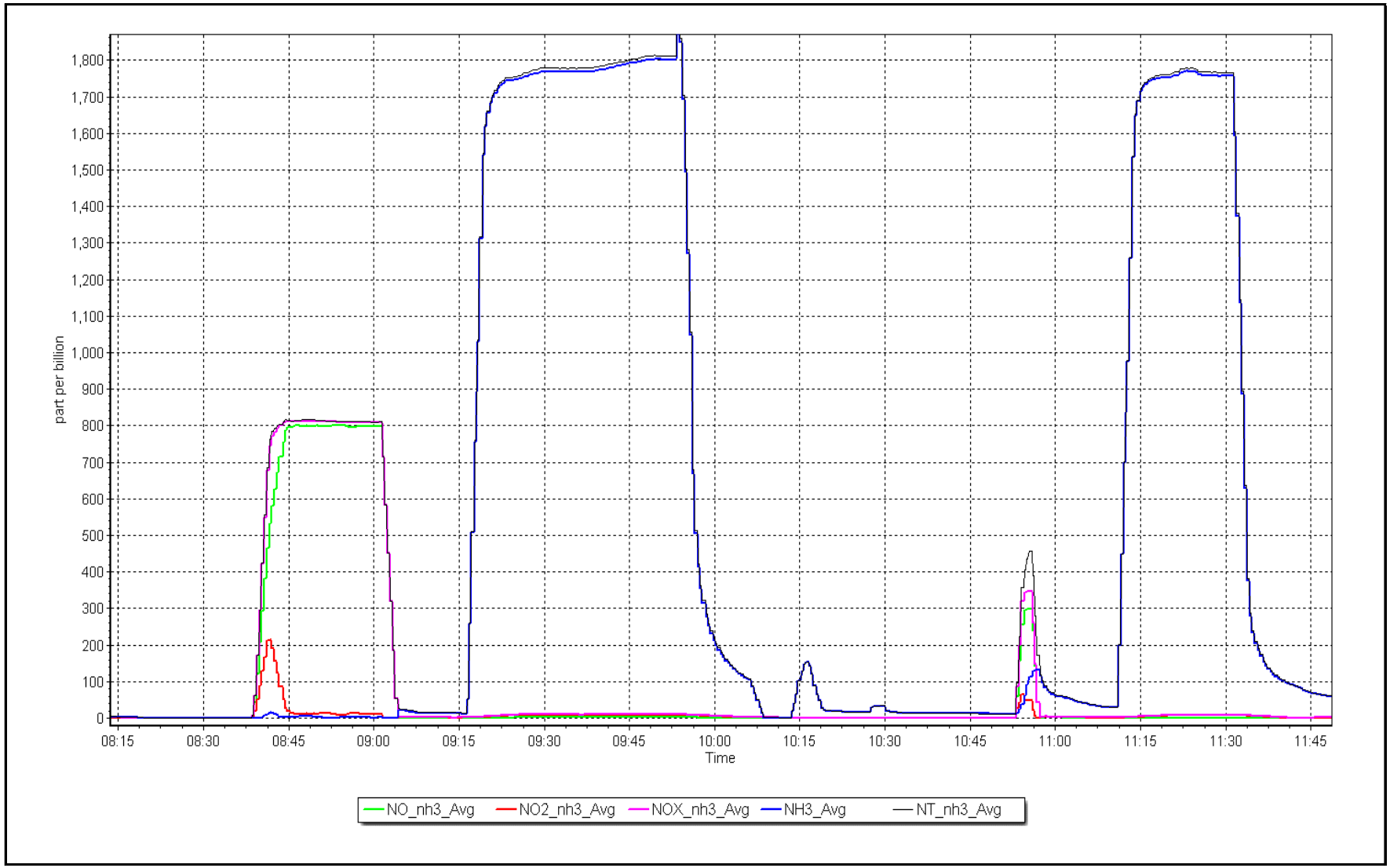
Notes: Changing out the NH3 cal gas cylinder. Completed as founds and swapped out the NH3 cylinder. Completed NH3 span for comparison. Will complete a full calibration tomorrow.

Calibration Performed By: Max Farrell

NO_X Calibration Plot Date: April 20, 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-11-2021

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
NOX Cal Date:	April 27, 2023	Last Cal Date:	March 8, 2023
Start time (MST):	8:10	End time (MST):	12:39
NH3 Cal Date:	April 27, 2023	Last Cal Date:	March 8, 2023
Start time (MST):	13:00	End time (MST):	14:48
Reason:	Routine		

Calibration Standards

NOX Cal Gas Conc:	52.51	ppm	NO Gas Cylinder #:	T26D9MR
NO Cal Gas Conc:	51.98	ppm	NO Cal Gas Expiry:	August 18, 2023
Removed NOX Conc:	52.51	ppm	Removed Cylinder #:	N/A
Removed NO Conc:	51.98	ppm	Removed cyl Expiry:	N/A
NOX gas Diff:			NO gas Diff:	
NH3 Cal Gas Conc:	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:	531

	Start	*Finish*		*Start*	*Finish*
NO coefficient:	0.823	0.833	TN coefficient:	0.822	0.837
NOX coefficient:	0.824	0.839	NO bkgrnd:	-0.1	-0.1
NO2 coefficient:	1.000	1.000	NOX bkgrnd:	0.0	0.0
NH3 coefficient:	0.951	0.951	TN bkgrnd:	0.0	0.0

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	0.999337	1.004262
NO_X Cal Offset:	1.041887	2.034812
NO Cal Slope:	0.997013	1.000294
NO Cal Offset:	2.119639	0.654848
NO_2 Cal Slope:	0.993721	1.003690
NO_2 Cal Offset:	-1.386593	0.714817
NH3 Cal Slope:	1.005985	1.003144
NH3 Cal Offset:	7.240605	4.931327
TN Cal Slope:	1.011422	1.008443
TN Cal Offset:	7.102178	5.257930

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	0.6	-0.7	1.3	----	----
as found NO	4923	76.9	807.6	807.6	----	791.1	794.2	-3.1	1.021	----
calibrator zero	5000	0.0	0.0	0.0	0.0	1.1	0.1	1.0	----	----
high NO point	4923	76.9	807.6	807.6	----	812.2	812.2	-0.2	0.994	----
NO/O3 point	4923	76.9	807.6	807.6	----	807.0	807.8	-0.8	1.001	----
as found NH3	3419	81.0	1800.7	----	1800.7	1818.5	----	1808.9	0.990	0.995
new NH3 cyl rp							----			
first NH3	3419	81.0	1800.7	----	1800.7	1818.5	----	1808.9	0.990	0.995
second NH3	3455	45.0	1000.4	----	1000.4	1017.0	----	1010.9	0.984	0.990
third NH3	3478	22.5	500.1	----	500.1	513.6	----	510.6	0.974	0.980
								Average Correction Factor	0.9976	0.9882

Corrected As found TN = 790.5 ppb NO_X = 794.9 ppb NH3 = 1807.6 ppb *Percent Change TN = -4.2%

Previous Response TN = 823.9 ppb NO_X = 808.1 ppb NH3 = 1818.8 ppb *Percent Change NO_X = -1.7%

*Percent Change NH3 = -0.6%

* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 95.1%

NH3 Current Converter Efficiency = 95.1%

Wood Buffalo Environmental Association

NO_X - NO - NO_2 Calibration Report

Version-11-2021

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.7	-0.2	0.6	----	----
as found span	4923	76.9	807.6	799.5	807.6	794.2	787.4	791.1	1.0169	1.0153
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	1.1	----	----
high point	4923	76.9	807.6	799.5	807.6	812.2	800.3	812.2	0.9944	0.9990
second point	4962	38.5	404.3	400.2	404.3	408.8	400.6	408.4	0.9890	0.9990
third point	4981	19.2	201.6	199.6	201.6	206.6	201.3	207.0	0.9759	0.9915
								Average Correction Factor	0.9864	0.9965

Baseline Corr As fnd	TN =	790.5 ppb	NO_X =	794.9 ppb	NO =	787.6 ppb	*Percent Change TN = -4.2%
Previous Response	TN =	823.9 ppb	NO_X =	808.1 ppb	NO =	799.2 ppb	*Percent Change NO_X = -1.7%
							*Percent Change NO = -1.5%

* = > +/-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	-0.4	----	----
calibration zero	----	----	0.0	0.0	----	----
1st GPT point (400 ppb O3)	798.1	380.9	425.4	427.0	0.9961	100.4%
2nd GPT point (200 ppb O3)	798.1	589.1	217.2	219.8	0.9880	101.2%
3rd GPT point (100 ppb O3)	798.1	693.7	112.6	113.9	0.9882	101.2%
				Average Correction Factor	0.9908	100.9%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TN Calibration Summary

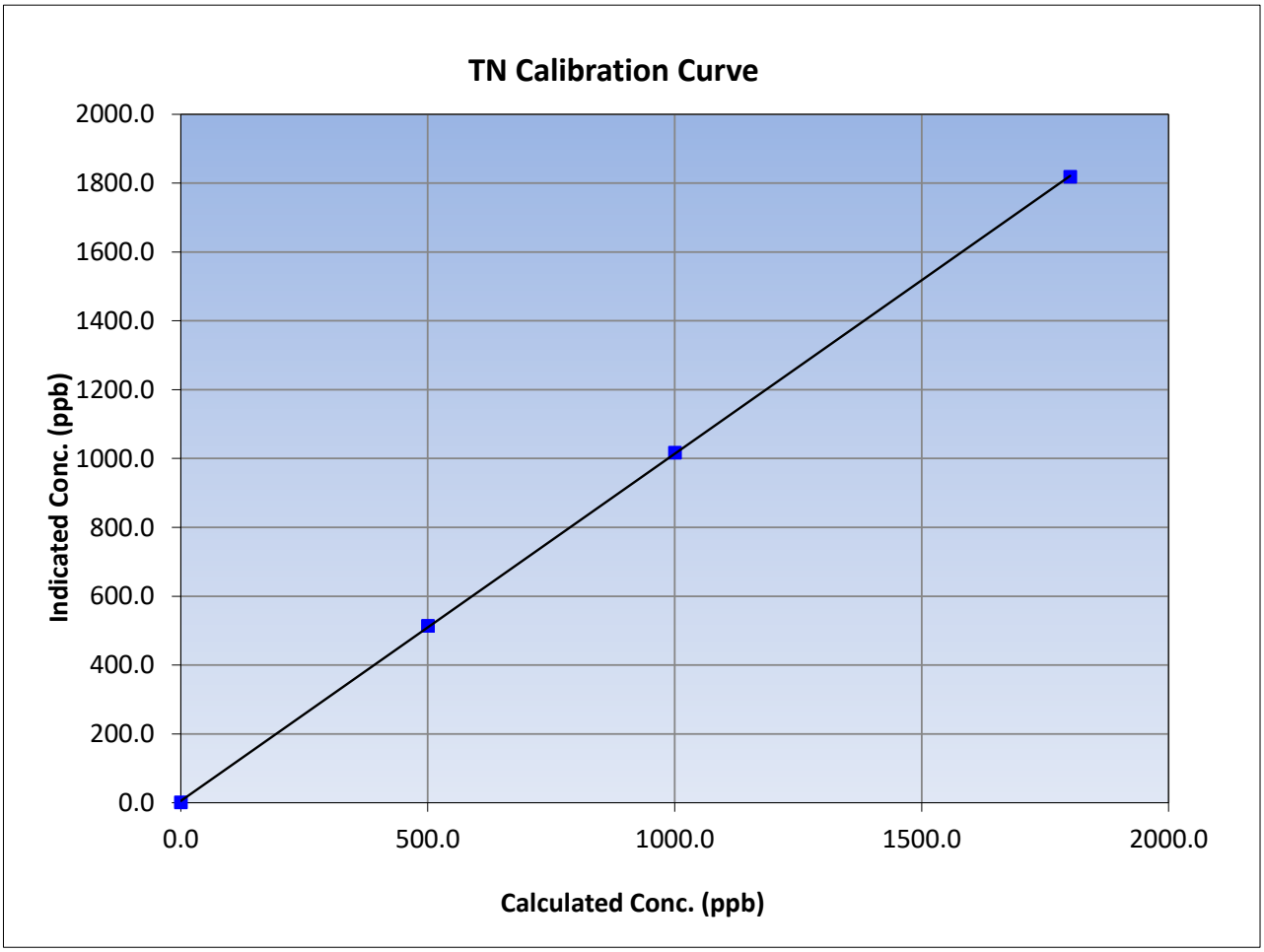
Version-11-2021

Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 8, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:10	End Time (MST):	12:39
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	1.1	----	Correlation Coefficient	0.999973	≥0.995
1800.7	1818.5	0.9902			
1000.4	1017.0	0.9837	Slope	1.008443	0.90 - 1.10
500.1	513.6	0.9738			
			Intercept	5.257930	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

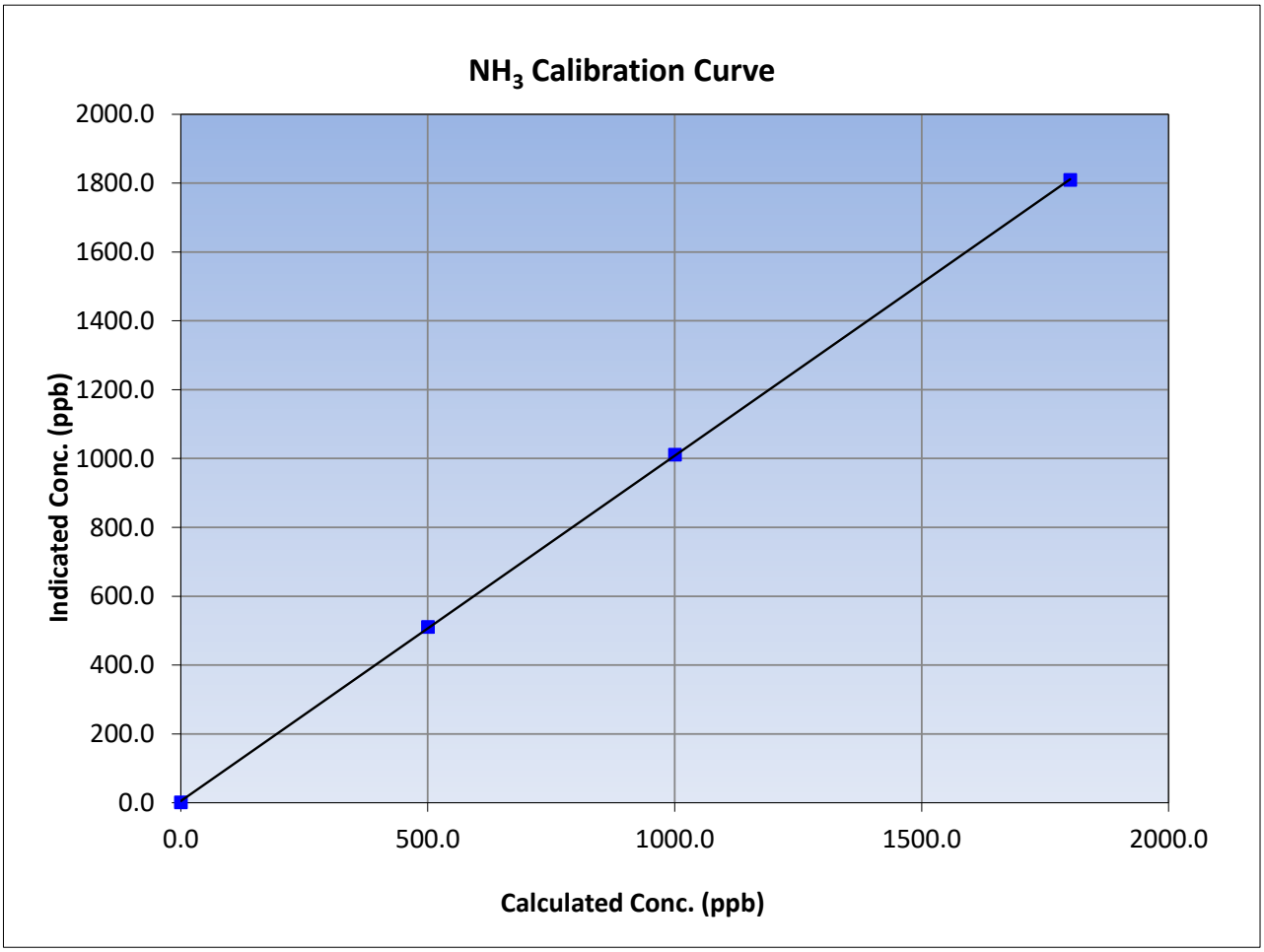
Version-11-2021

Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 8, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:10	End Time (MST):	12:39
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	1.0	----	Correlation Coefficient	0.999976	≥0.995
1800.7	1808.9	0.9955			
1000.4	1010.9	0.9896	Slope	1.003144	0.90 - 1.10
500.1	510.6	0.9795			
			Intercept	4.931327	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

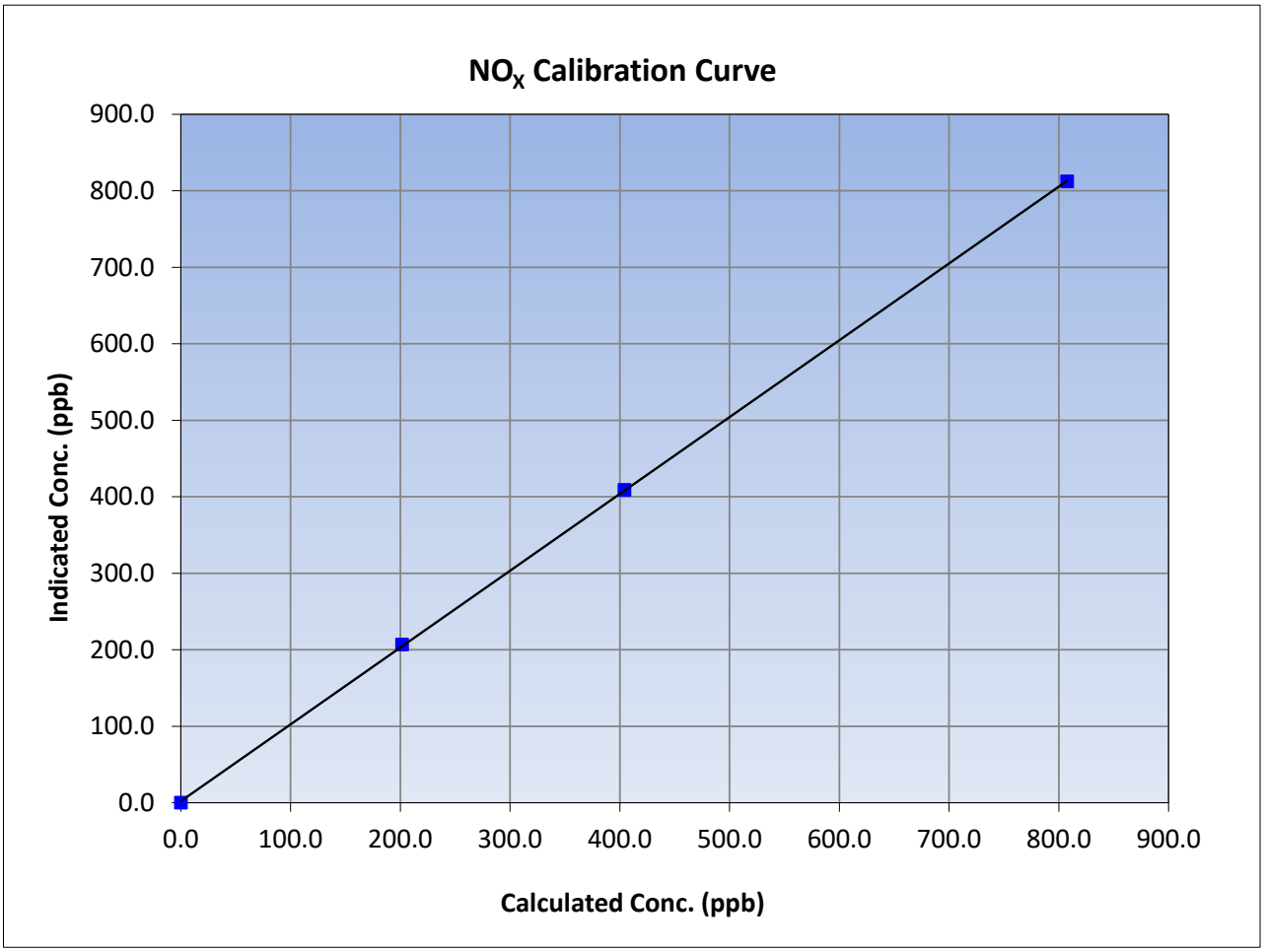
Version-11-2021

Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 8, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:10	End Time (MST):	12:39
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999974	≥0.995
807.6	812.2	0.9944			
404.3	408.8	0.9890	Slope	1.004262	0.90 - 1.10
201.6	206.6	0.9759			
			Intercept	2.034812	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

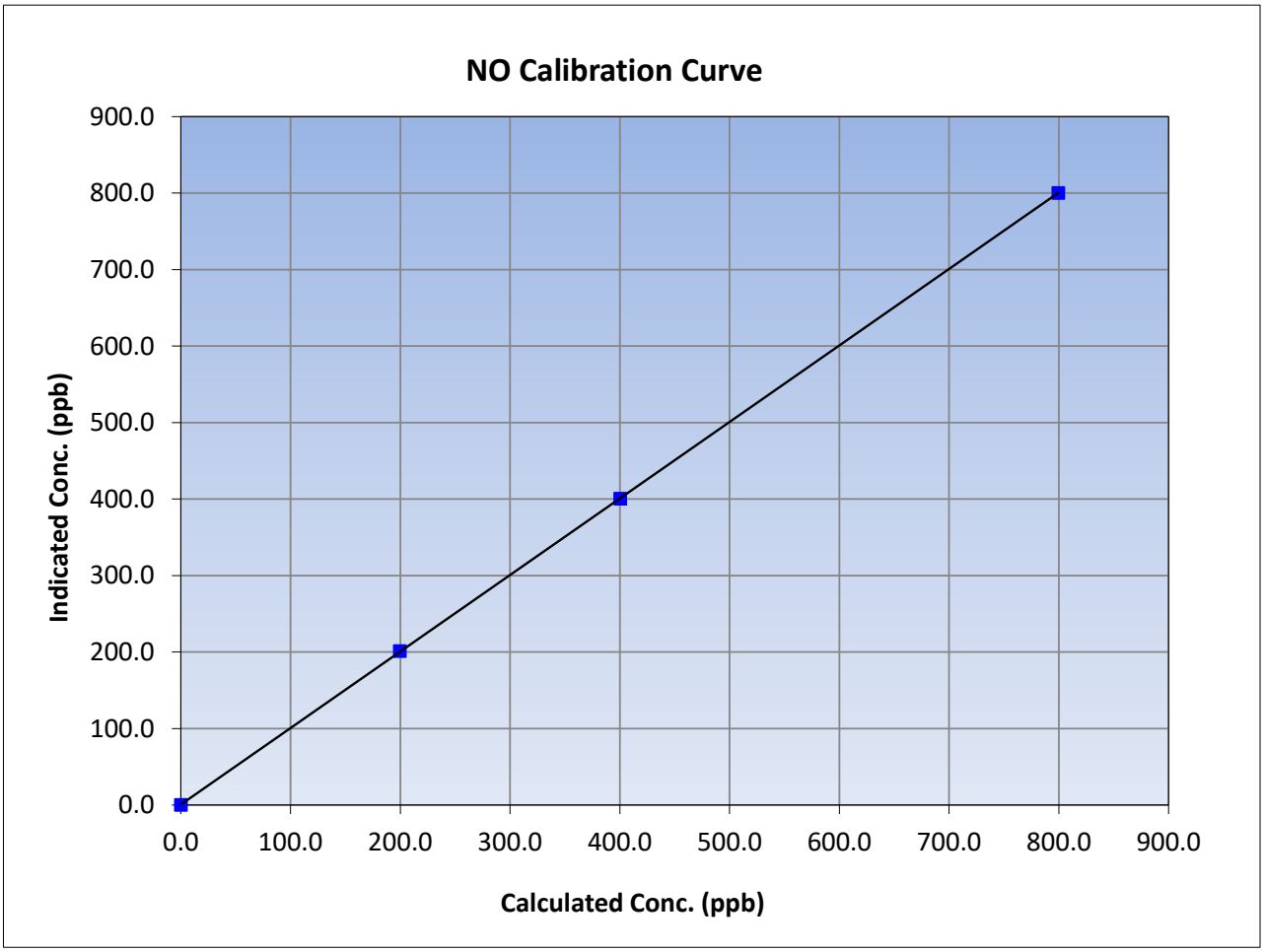
Version-11-2021

Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 8, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:10	End Time (MST):	12:39
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999996	≥0.995
799.5	800.3	0.9990			
400.2	400.6	0.9990	Slope	1.000294	0.90 - 1.10
199.6	201.3	0.9915			
			Intercept	0.654848	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

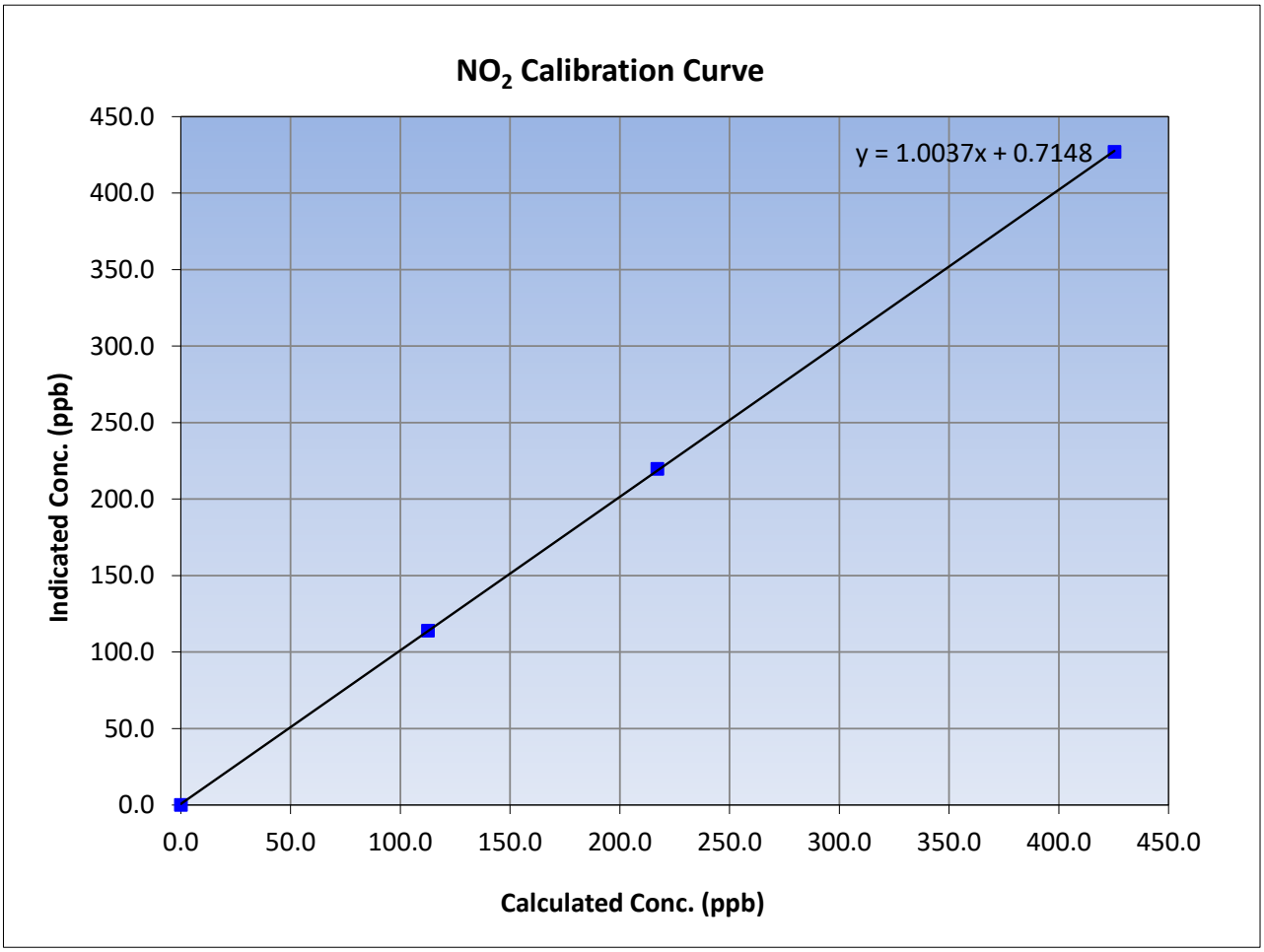
Version-11-2021

Station Information

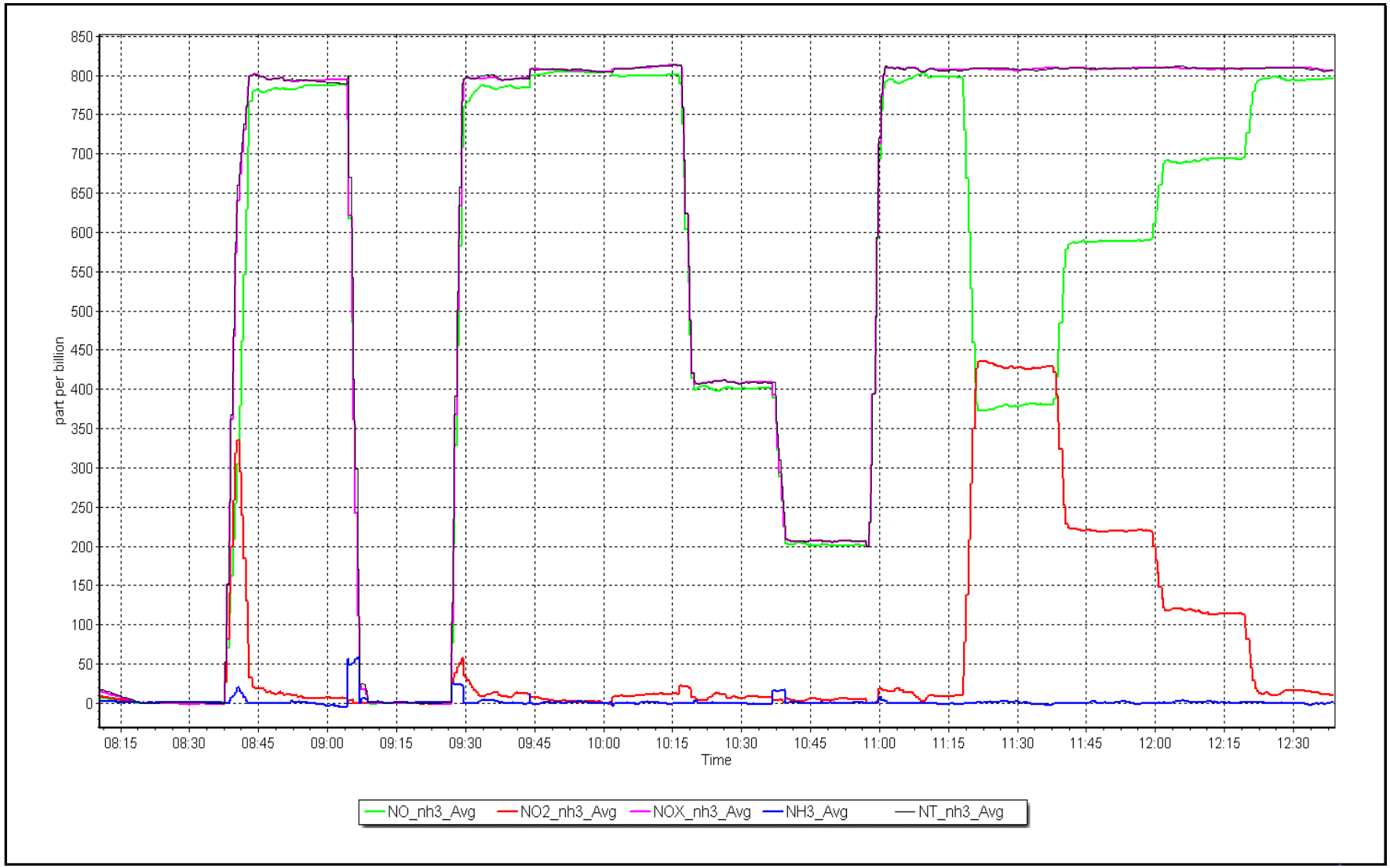
Calibration Date:	April 27, 2023	Previous Calibration:	March 8, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:10	End Time (MST):	12:39
Analyzer make:	API T201	Analyzer serial #:	152

Calibration Data

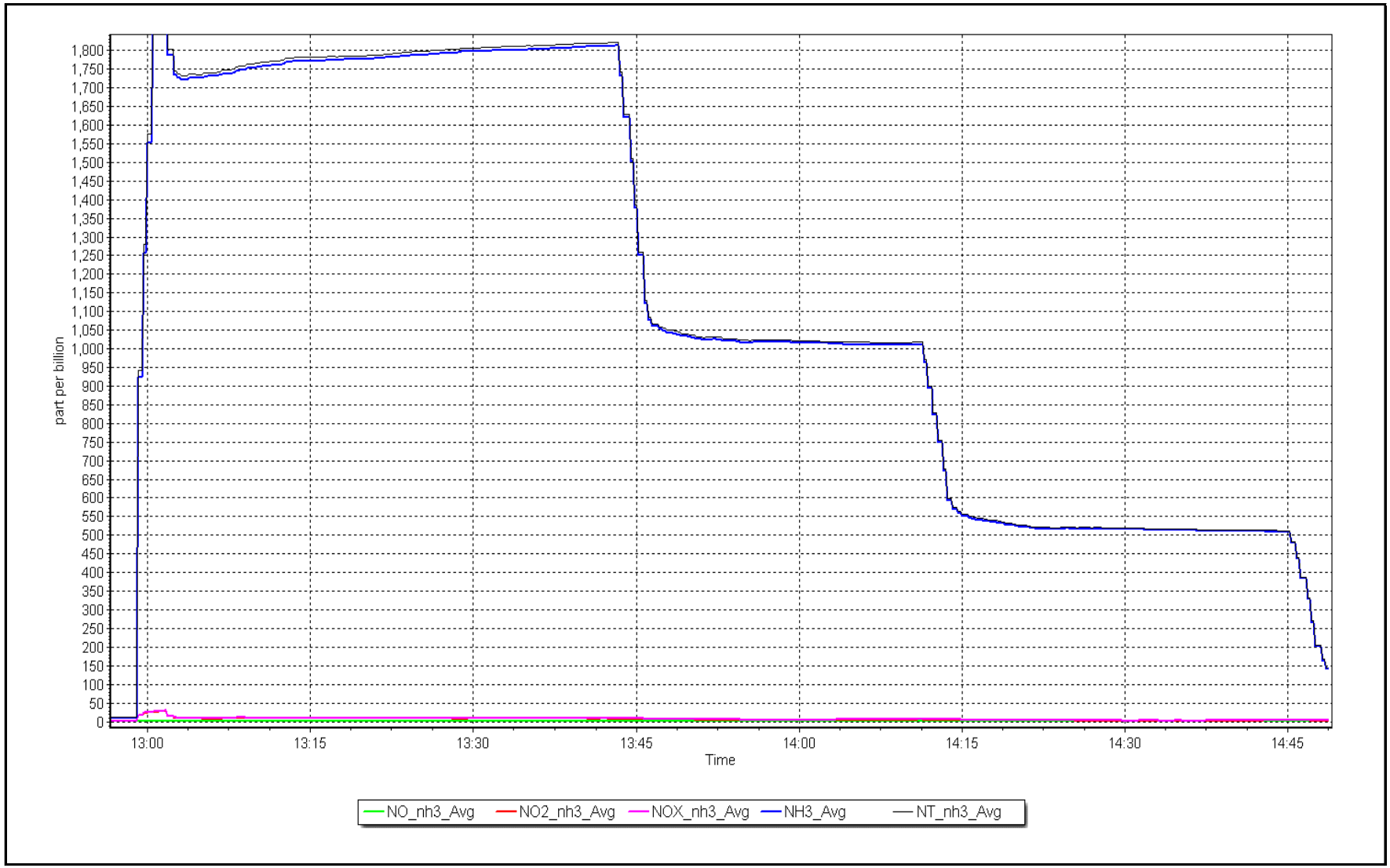
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999977	≥0.995
425.4	427.0	0.9961			
217.2	219.8	0.9880	Slope	1.003690	0.90 - 1.10
112.6	113.9	0.9882			
			Intercept	0.714817	+/-20



NO_X Calibration Plot Date: April 27, 2023 Location: Patricia McInnes



NH_3 Calibration Plot Date: April 27, 2023 Location: Patricia McInnes



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS07
ATHABASCA VALLEY
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	April 19, 2023	Last Cal Date:	March 9, 2023
Start time (MST):	7:10	End time (MST):	9:58
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.995896	1.003328	Backgd or Offset:	2.70	2.70
Calibration intercept:	2.083550	2.004886	Coeff or Slope:	0.857	0.857

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	----
as found span	4921	79.3	801.2	804.3	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4921	79.3	801.2	804.3	0.996
second point	4960	39.6	400.2	406.3	0.985
third point	4980	19.8	200.1	203.4	0.984
as left zero	5000	0.0	0.0	0.2	----
as left span	4921	79.2	800.2	806.3	0.992
				Average Correction Factor	0.988

Baseline Corr As found:	804.30	Previous response	799.99	*% 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 or maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

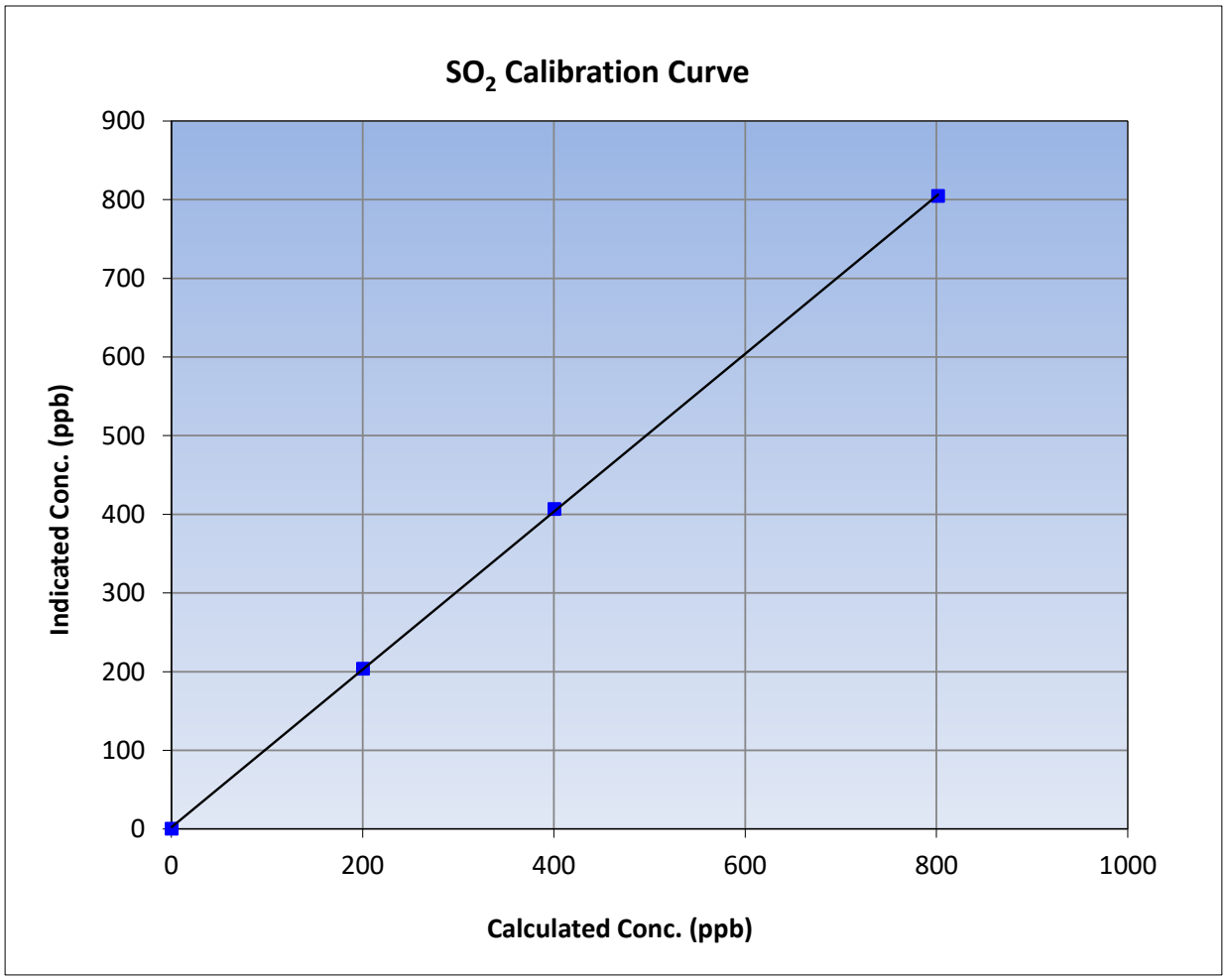
Station Information

Calibration Date:	April 19, 2023	Previous Calibration:	March 9, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:10	End Time (MST):	9:58
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1507864683

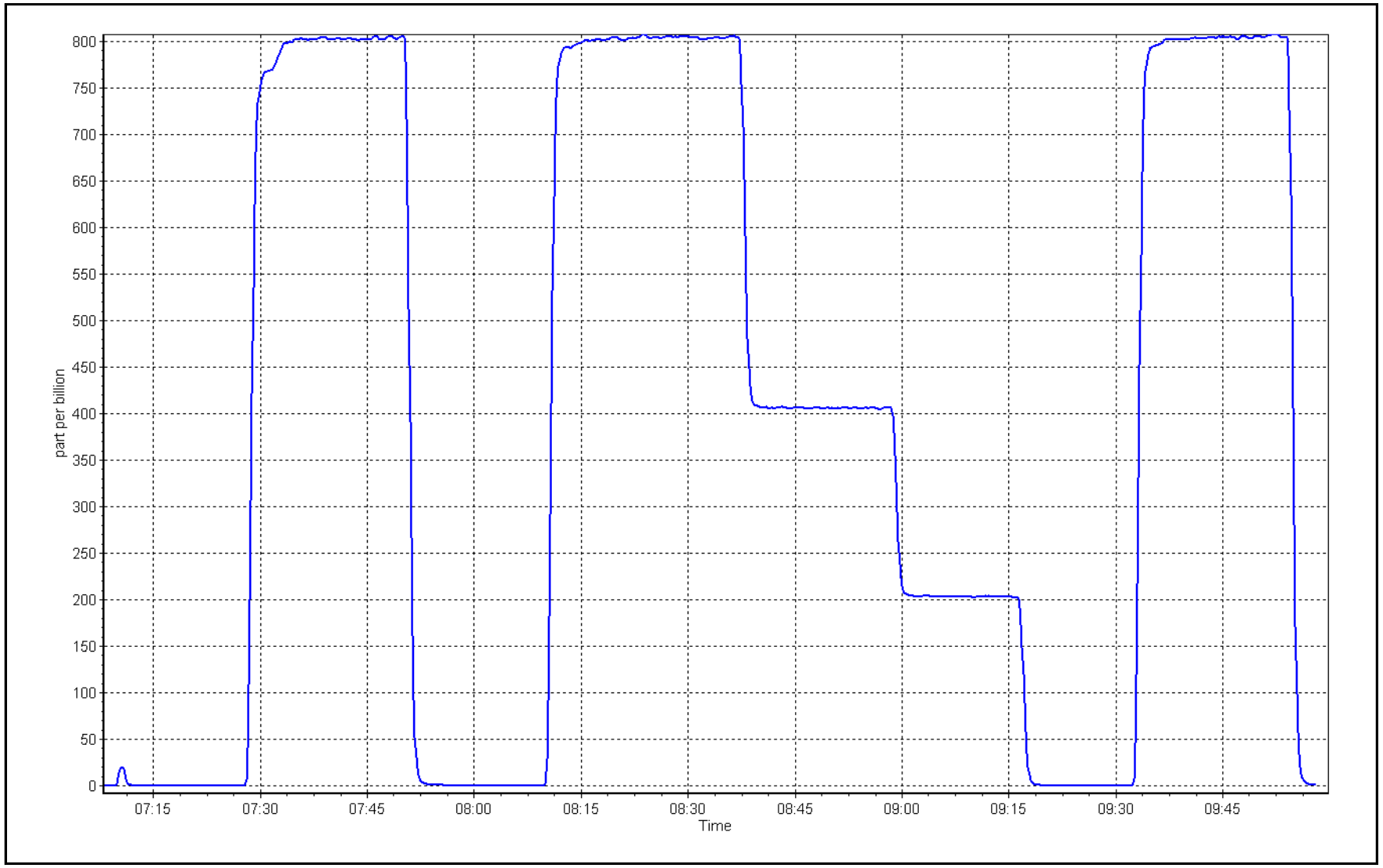
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
801.2	804.3	0.9961
400.2	406.3	0.9849
200.1	203.4	0.9836

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999959	*≥0.995*
Slope	1.003328	*0.90 - 1.10*
Intercept	2.004886	*+/-30*



SO2 Calibration Plot Date: April 19, 2023 Location: Athabasca Valley



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	April 26, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	6:18	End time (MST):	10:29
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i LTE		Analyzer serial #:	1180540018	
Converter make:	CDN-101		Converter serial #:	551	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.993485	0.993201	Backgd or Offset:	2.20	2.17
Calibration intercept:	0.081597	0.141603	Coeff or Slope:	0.841	0.829

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	81.2	0.992
as found 2nd point	4959	40.8	40.3	40.5	0.993
as found 3rd point	4980	20.4	20.2	20.0	1.003
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	4918	81.6	80.6	80.2	1.005
second point	4959	40.8	40.3	40.2	1.003
third point	4980	20.4	20.2	20.2	0.998
as left zero	5000	0.0	0.0	0.6	----
as left span	4918	81.6	80.6	79.8	1.010
SO2 Scrubber Check	4921	79.2	800.2	0.0	----
Date of last scrubber change:		25-Feb-22		Ave Corr Factor	1.002
Date of last converter efficiency test:		April 22, 2022		98.5%	efficiency

Baseline Corr As found:	81.3	Prev response:	80.18	*% change:	1.4%
Baseline Corr 2nd AF pt:	40.6	AF Slope:	1.009218	AF Intercept:	-0.198377
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999992		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

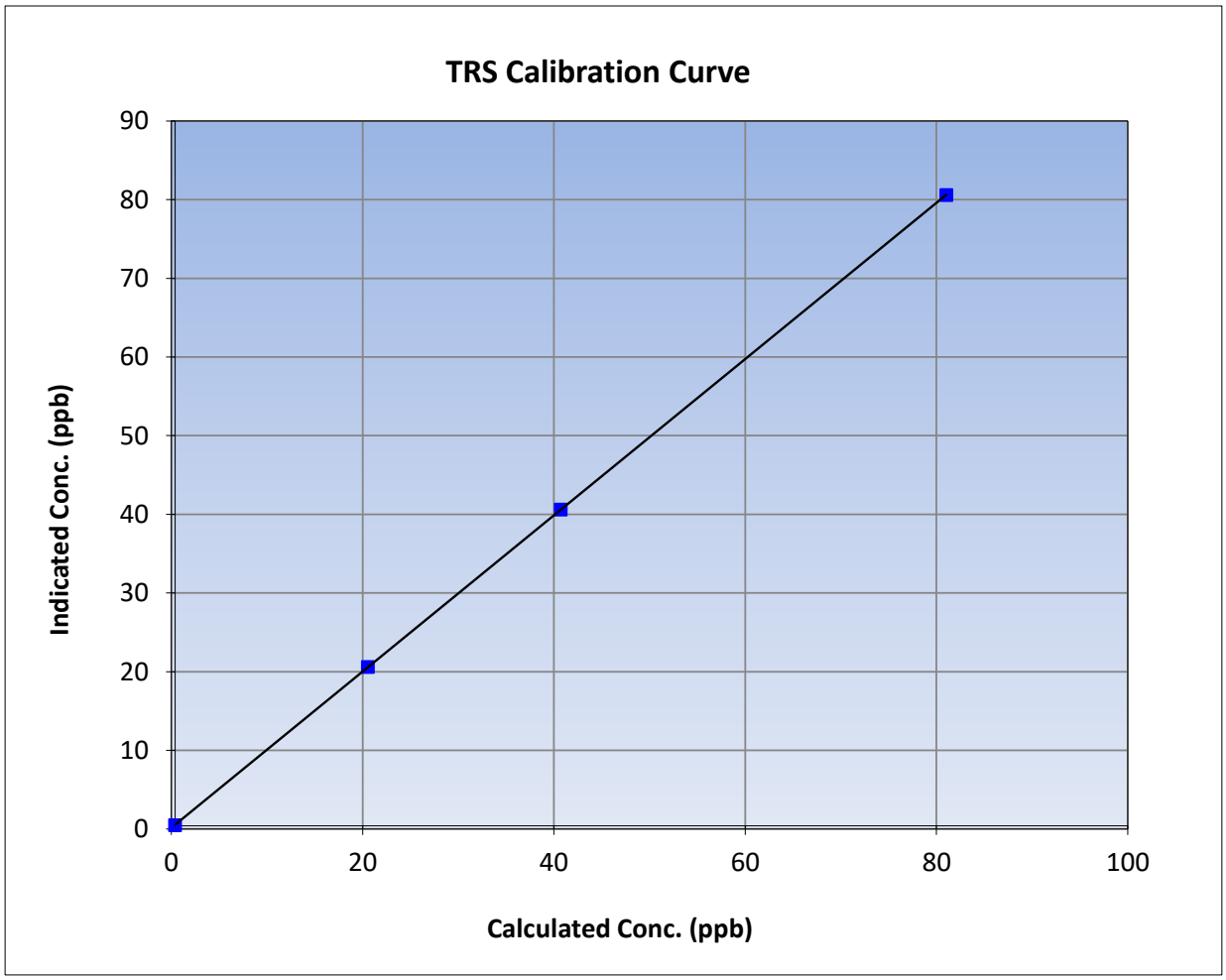
Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 13, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	6:18	End Time (MST):	10:29
Analyzer make:	CDN-101	Analyzer serial #:	551

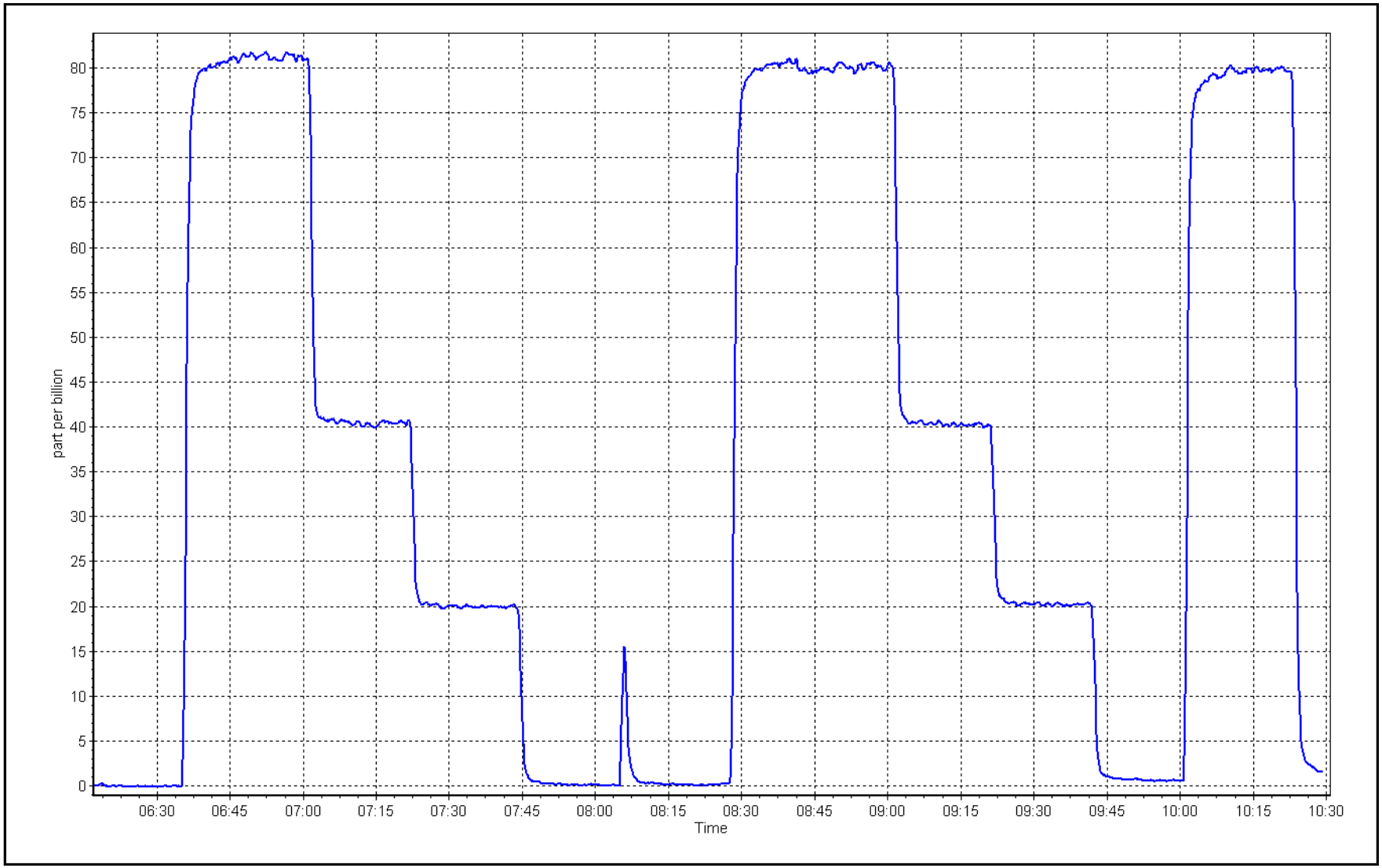
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.6	80.2	1.0053
40.3	40.2	1.0028
20.2	20.2	0.9977

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	0.993201	*0.90 - 1.10*
Intercept	0.141603	*+/-3*



TRS Calibration Plot Date: April 26, 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:	April 19, 2023	Last Cal Date:	March 9, 2023
Start time (MST):	7:10	End time (MST):	9:57
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1317958219	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	0.000270	0.000278	NMHC SP Ratio:	4.42E-05	4.49E-05
CH4 Retention time:	13.4	13.8	NMHC Peak Area:	205840	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	16.67	1.023
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.3	17.05	17.04	1.001
second point	4960	39.6	8.52	8.51	1.001
third point	4980	19.8	4.26	4.27	0.997
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	17.00	1.002
				Average Correction Factor	0.999
Baseline Corr AF:	16.67	Prev response	16.97	*% change	-1.9%
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	8.95	1.017
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	9.10	1.000
second point	4960	39.6	4.55	4.56	0.997
third point	4980	19.8	2.27	2.29	0.993
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	9.09	9.07	1.002
				Average Correction Factor	0.997
Baseline Corr AF:	8.95	Prev response	9.13	*% change	-2.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.3	7.95	7.72	1.030
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	3.96	1.002
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	1.002
Baseline Corr AF:	7.72	Prev response	7.86	*% change	-1.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.994780	0.999083
THC Cal Offset:	0.013474	0.005889
CH4 Cal Slope:	0.988322	0.998961
CH4 Cal Offset:	-0.000211	-0.002189
NMHC Cal Slope:	1.001323	0.999315
NMHC Cal Offset:	0.012086	0.010081

Notes: CH4 channel is dipping a bit. Flame temp is a bit lower then last month. RT has moved. Span adjusted. No maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

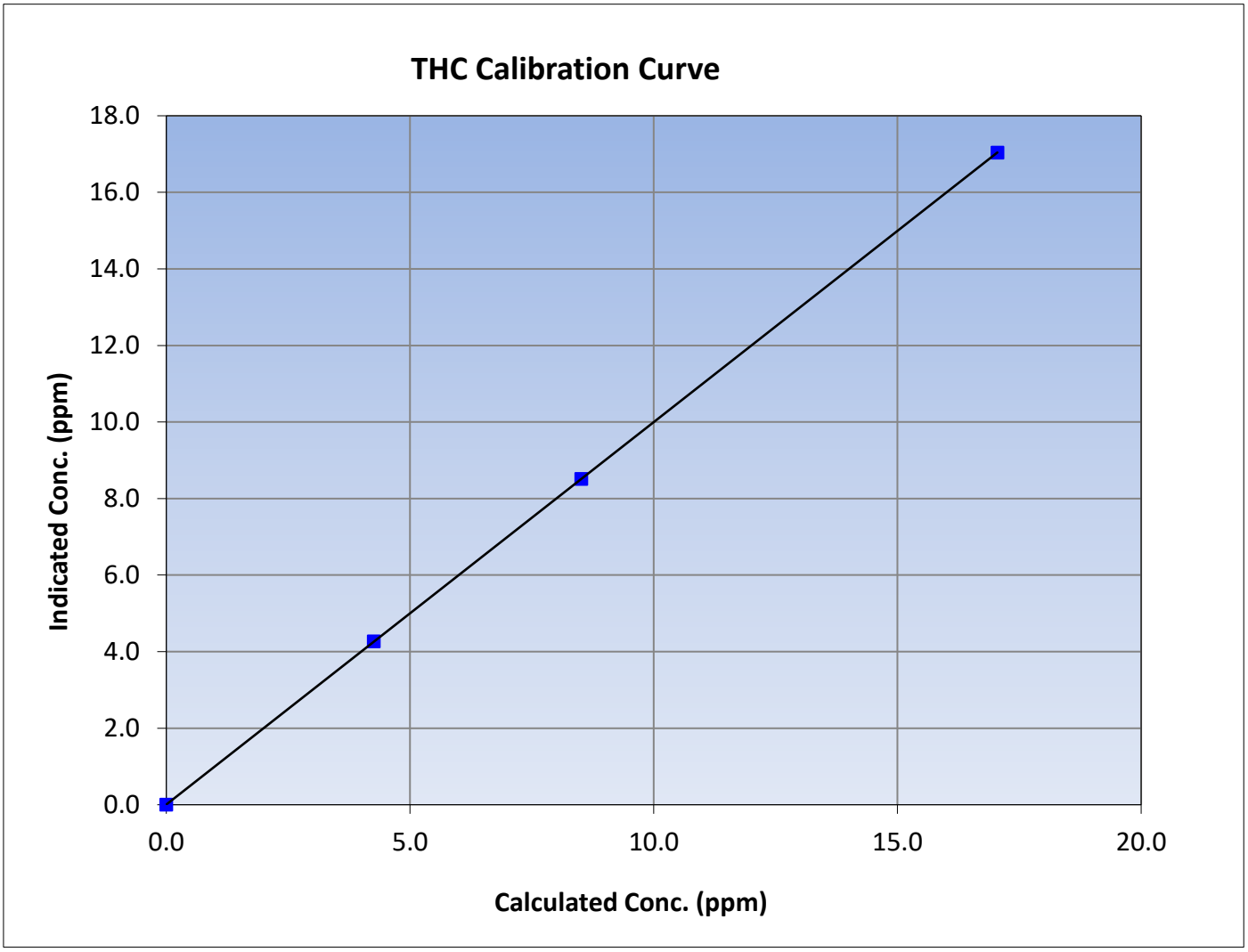
Version-01-2020

Station Information

Calibration Date:	April 19, 2023	Previous Calibration:	March 9, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:10	End Time (MST):	9:57
Analyzer make:	Thermo 55i	Analyzer serial #:	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999999	≥0.995
17.05	17.04	1.0006			
8.52	8.51	1.0007	Slope	0.999083	0.90 - 1.10
4.26	4.27	0.9971			
			Intercept	0.005889	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

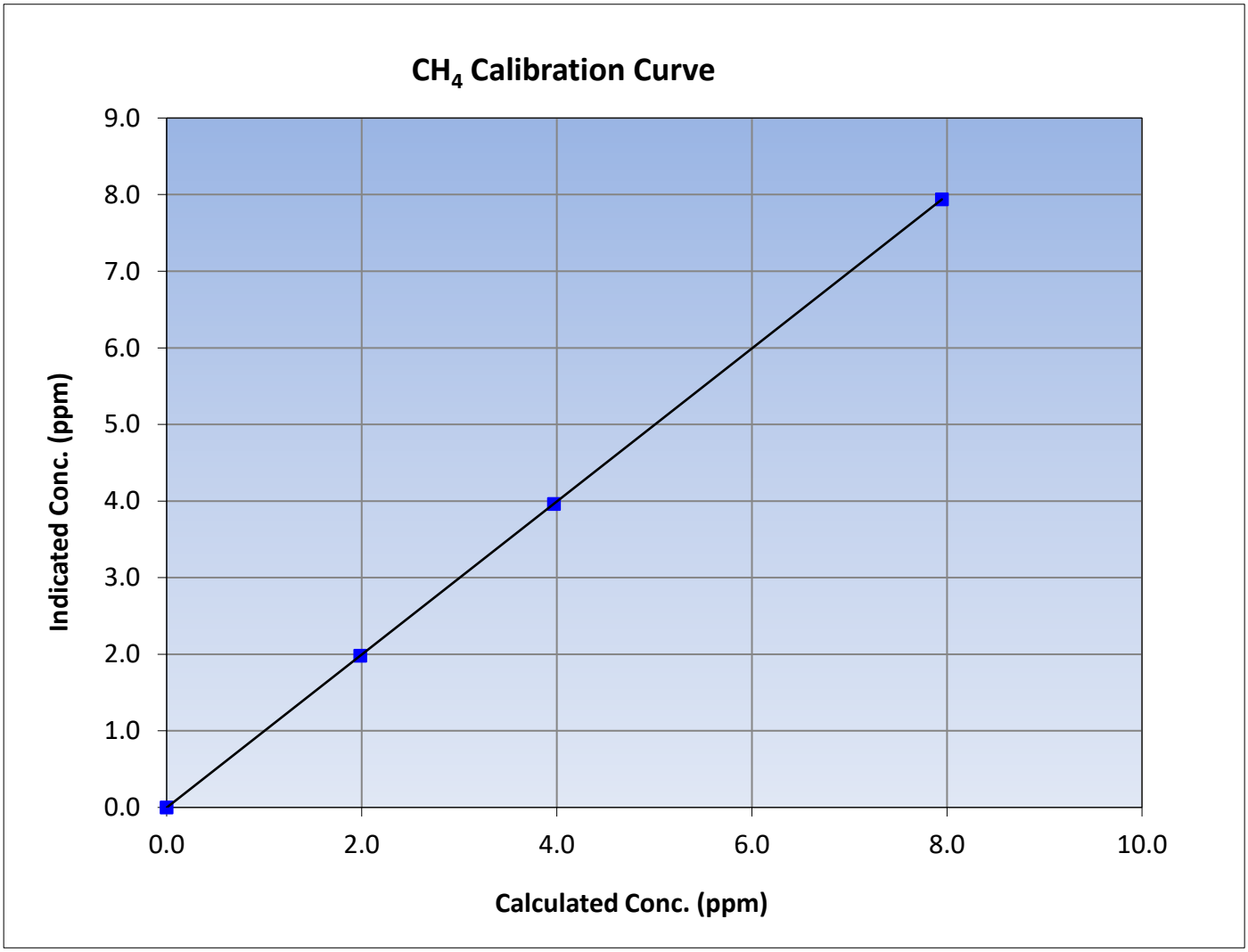
Version-01-2020

Station Information

Calibration Date:	April 19, 2023	Previous Calibration:	March 9, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:10	End Time (MST):	9:57
Analyzer make:	Thermo 55i	Analyzer serial #:	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999999	*≥0.995*
7.95	7.94	1.0011			
3.97	3.96	1.0025	Slope	0.998961	*0.90 - 1.10*
1.98	1.98	1.0024			
			Intercept	-0.002189	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

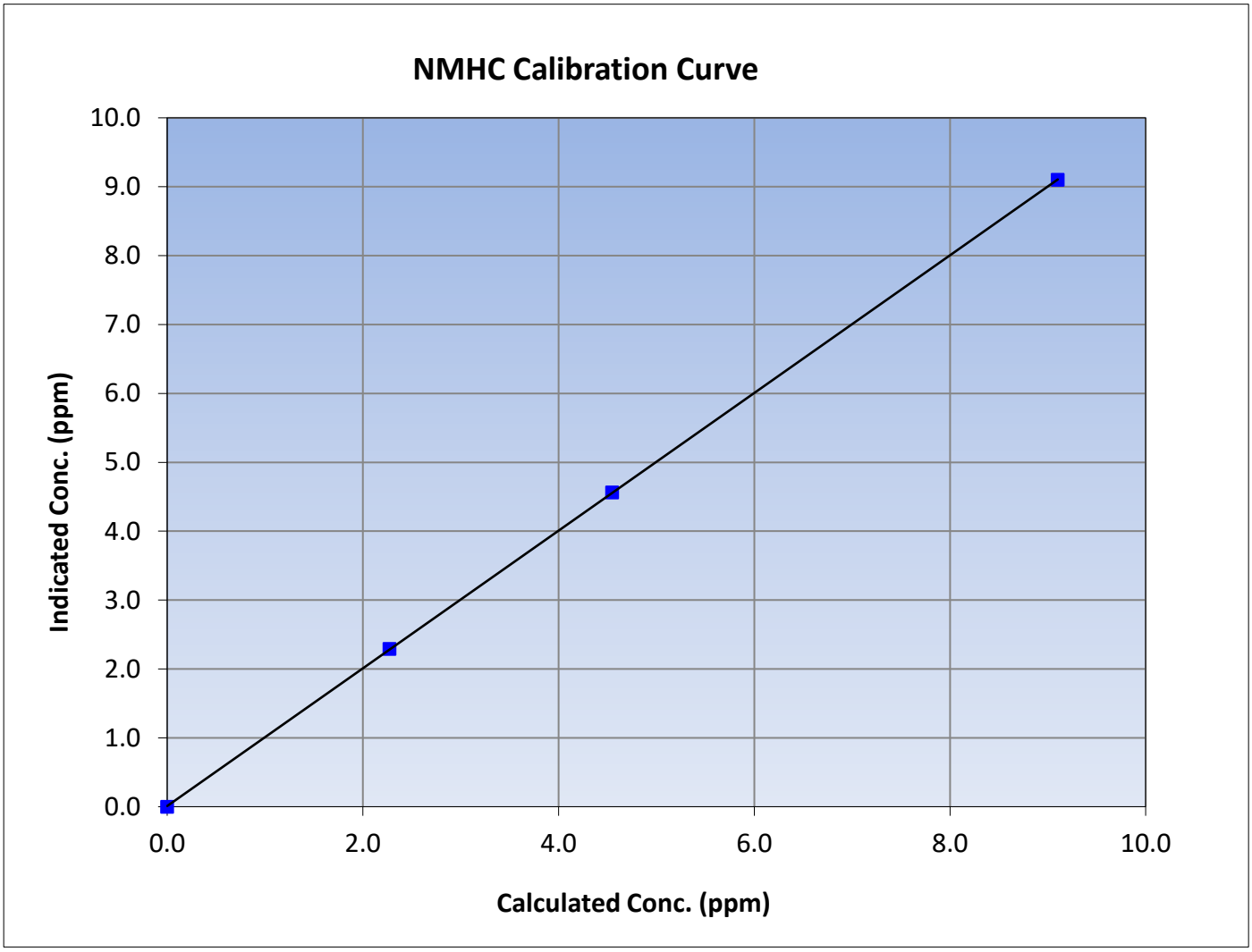
Version-01-2020

Station Information

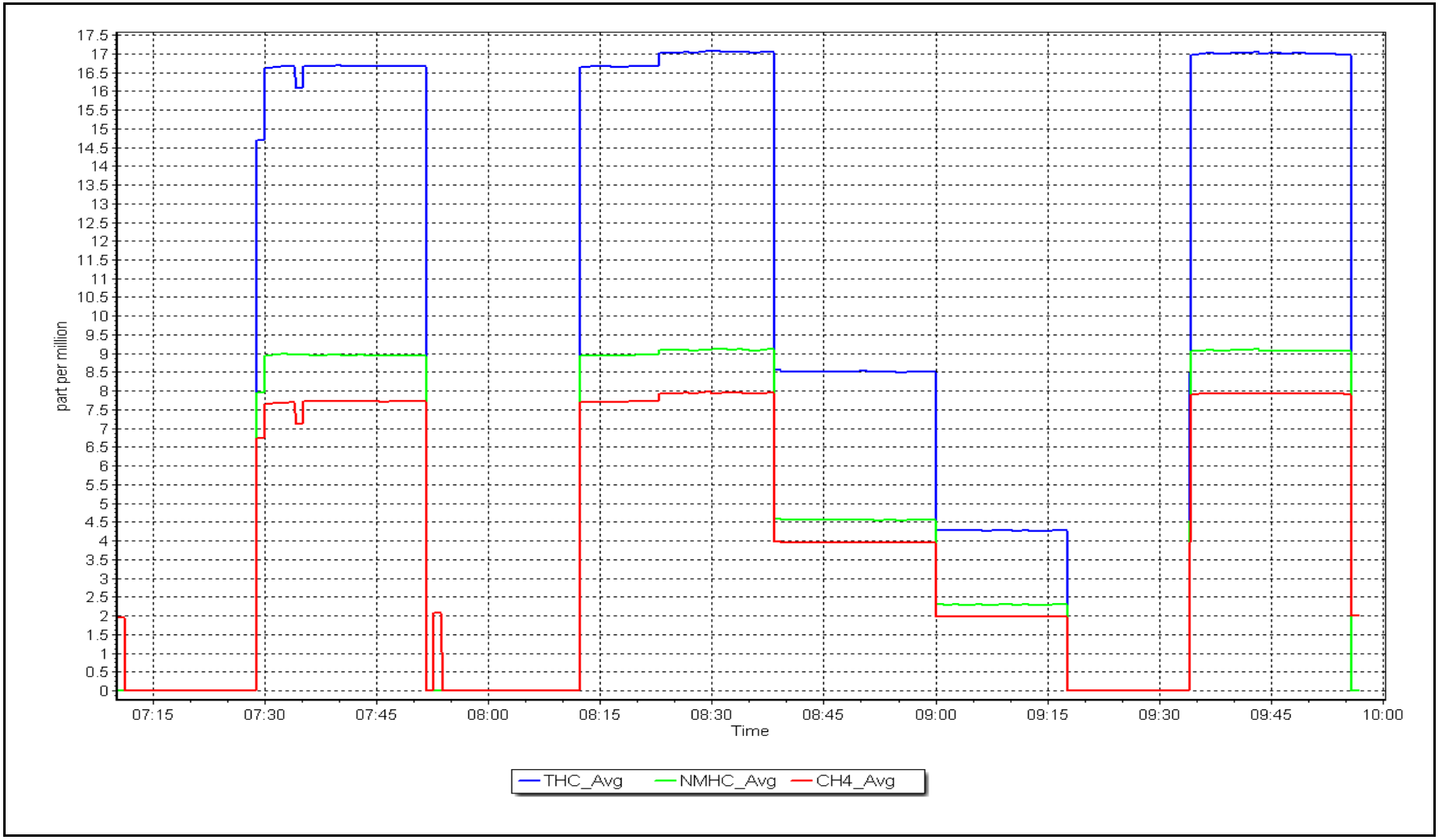
Calibration Date:	April 19, 2023	Previous Calibration:	March 9, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:10	End Time (MST):	9:57
Analyzer make:	Thermo 55i	Analyzer serial #:	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999994	≥0.995
9.10	9.10	1.0002			
4.55	4.56	0.9969	Slope	0.999315	0.90 - 1.10
2.27	2.29	0.9925			
			Intercept	0.010081	+/-0.5



NMHC Calibration Plot Date: April 19, 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:	April 21, 2023	Last Cal Date:	March 10, 2023
Start time (MST):	5:48	End time (MST):	10:18
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:	203.5	203.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.997475	1.001476
NO_X Cal Offset:	1.358498	1.279327
NO Cal Slope:	0.997406	1.000931
NO Cal Offset:	1.054447	1.195212
NO_2 Cal Slope:	1.001683	1.007625
NO_2 Cal Offset:	0.681681	1.013573

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as found span	4920	80.2	816.7	800.7	16.0	818.2	800.9	17.4	0.9982	0.9997
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	4920	80.2	816.7	800.7	16.0	818.4	801.8	16.5	0.9980	0.9986
second point	4960	40.1	408.4	400.4	8.0	411.6	403.4	8.2	0.9922	0.9924
third point	4980	20.0	203.7	199.7	4.0	205.8	201.4	4.3	0.9897	0.9915
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	-0.1	----	----
as left span	4920	80.2	816.7	397.4	419.3	825.1	398.1	427.0	0.9898	0.9982
								Average Correction Factor	0.9933	0.9942

Corrected As found	NO_X = 818.3 ppb	NO = 801.0 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	0.3%
Previous Response	NO_X = 816.0 ppb	NO = 799.7 ppb			*Percent Change	NO =	0.2%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	798.9	395.6	419.3	423.0	0.9913	100.9%
2nd GPT point (200 ppb O3)	798.9	598.7	216.2	219.4	0.9856	101.5%
3rd GPT point (100 ppb O3)	798.9	699.4	115.5	118.5	0.9750	102.6%
				Average Correction Factor	0.9840	101.6%

Notes: No maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

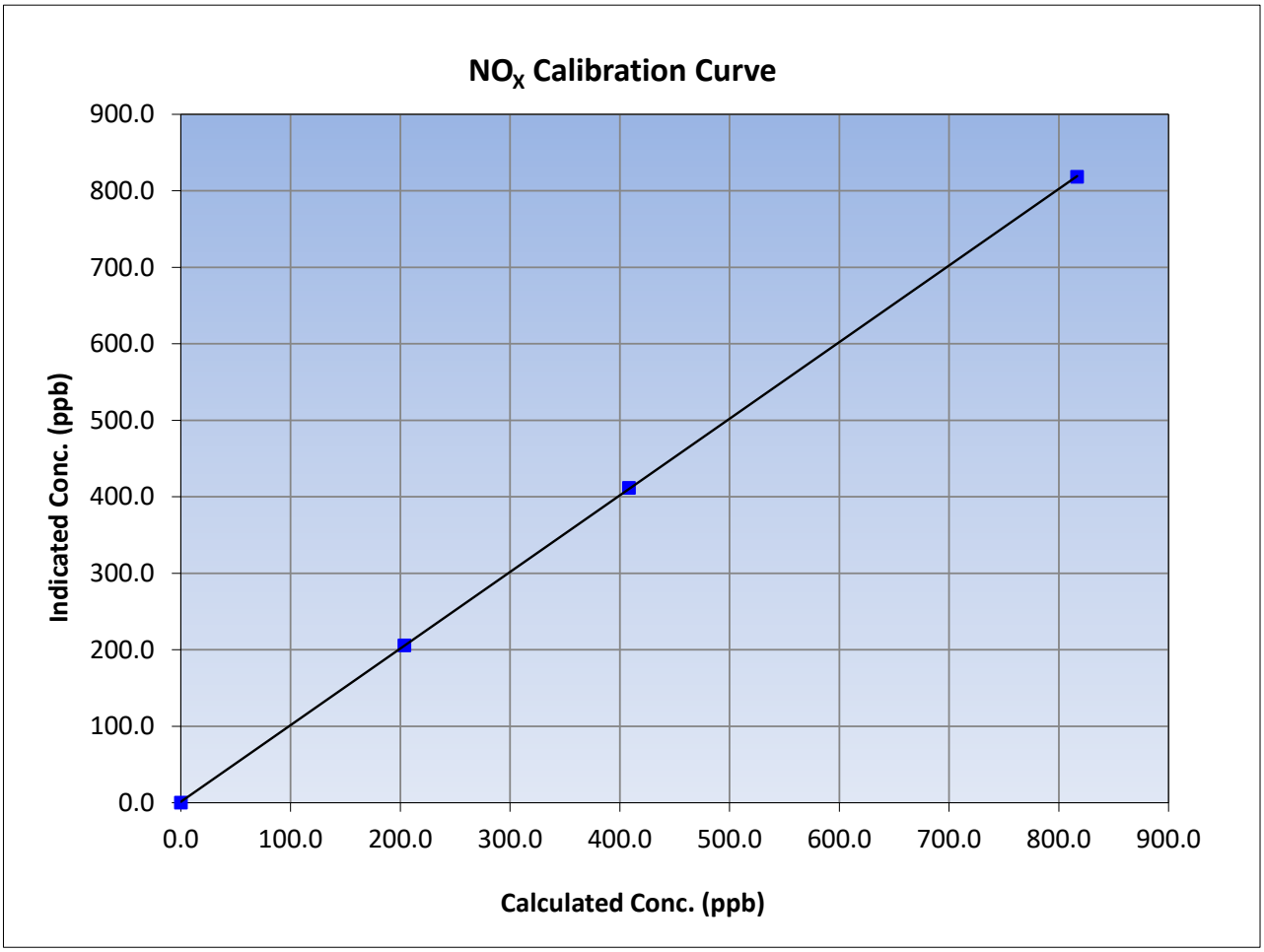
Version-04-2020

Station Information

Calibration Date:	April 21, 2023	Previous Calibration:	March 10, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	5:48	End Time (MST):	10:18
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.2	----	Correlation Coefficient	0.999989	*≥0.995*
816.7	818.4	0.9980			
408.4	411.6	0.9922	Slope	1.001476	*0.90 - 1.10*
203.7	205.8	0.9897			
			Intercept	1.279327	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

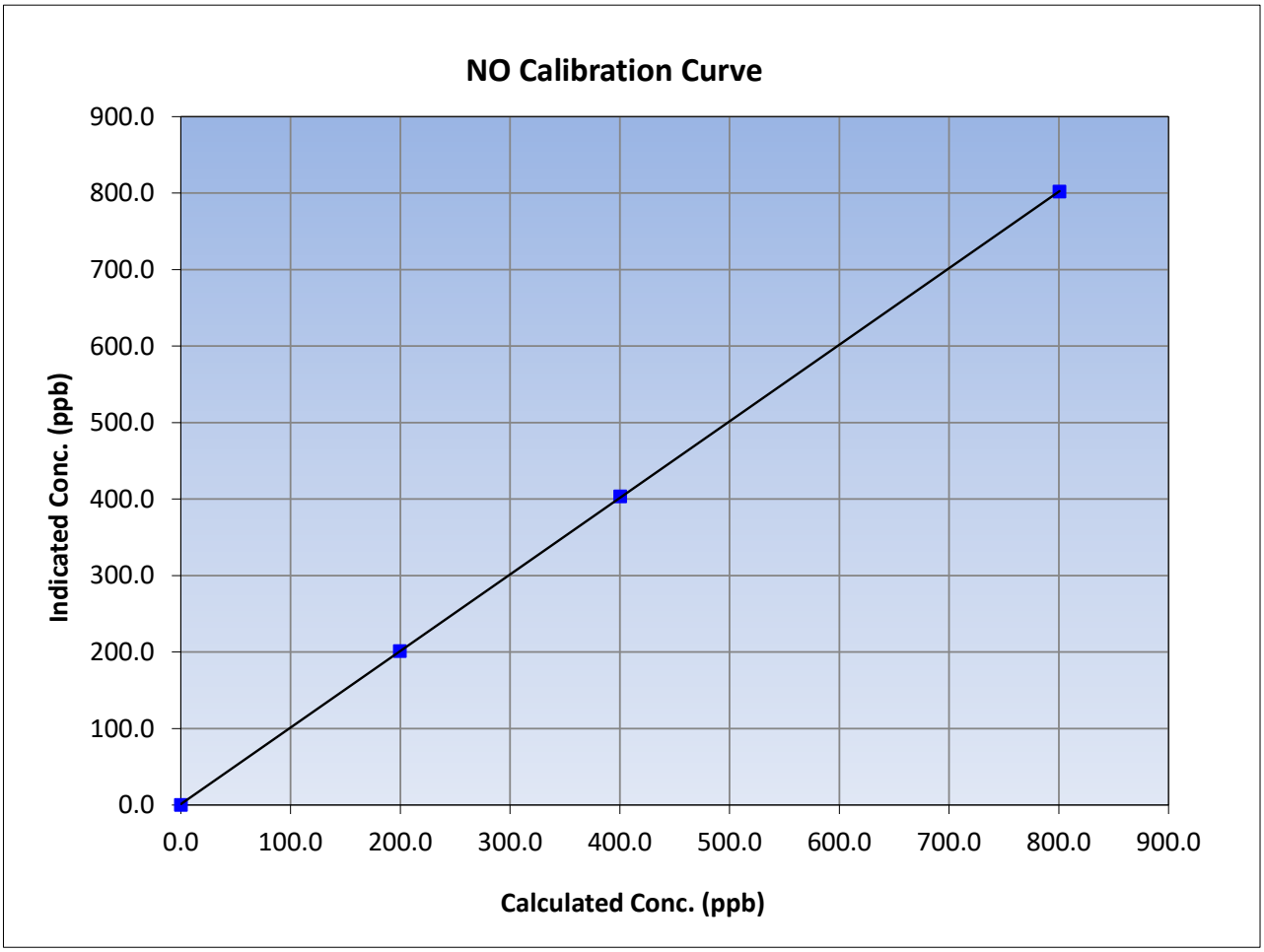
Version-04-2020

Station Information

Calibration Date:	April 21, 2023	Previous Calibration:	March 10, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	5:48	End Time (MST):	10:18
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999989	≥0.995
800.7	801.8	0.9986			
400.4	403.4	0.9924	Slope	1.000931	0.90 - 1.10
199.7	201.4	0.9915			
			Intercept	1.195212	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

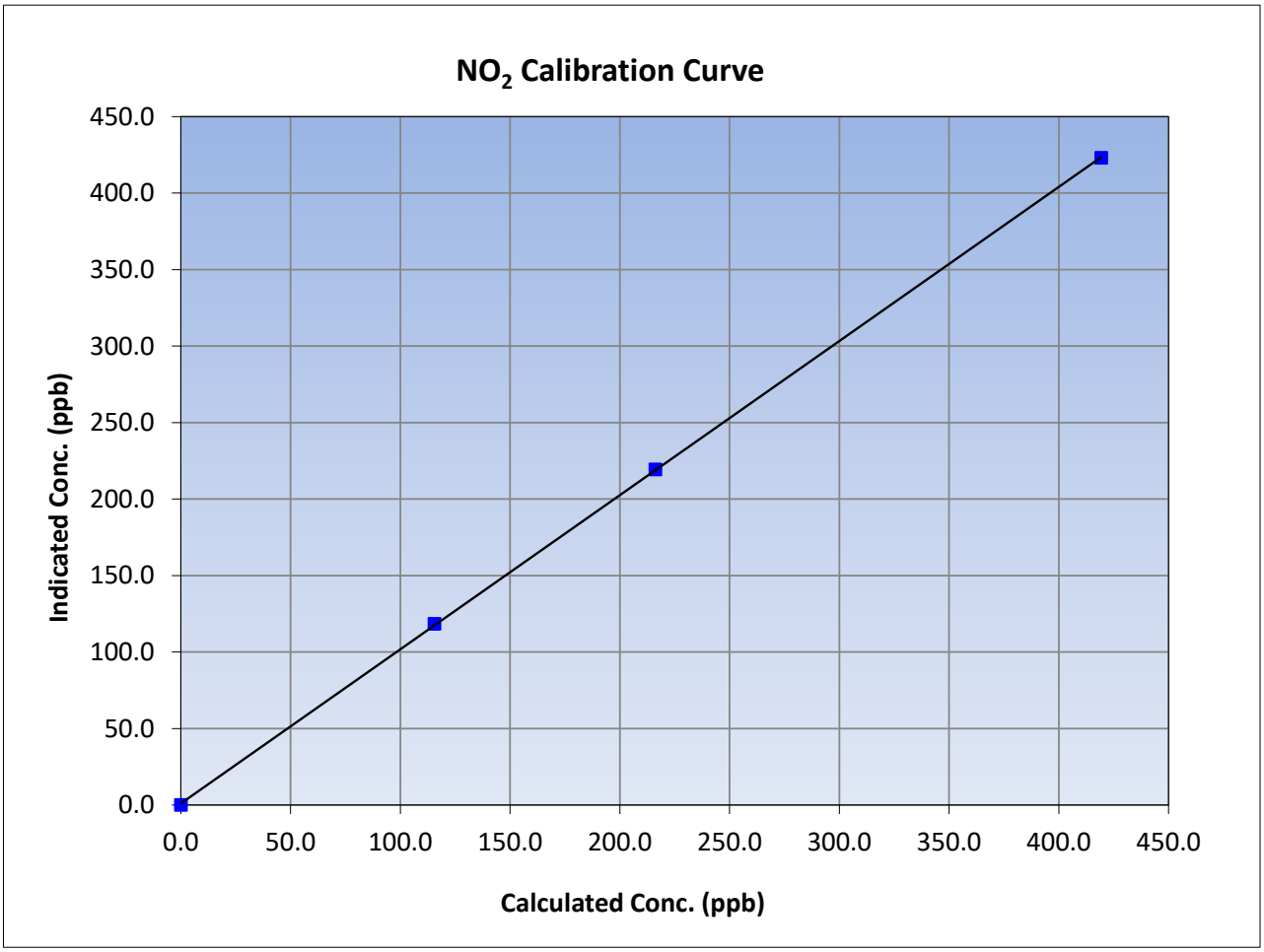
Version-04-2020

Station Information

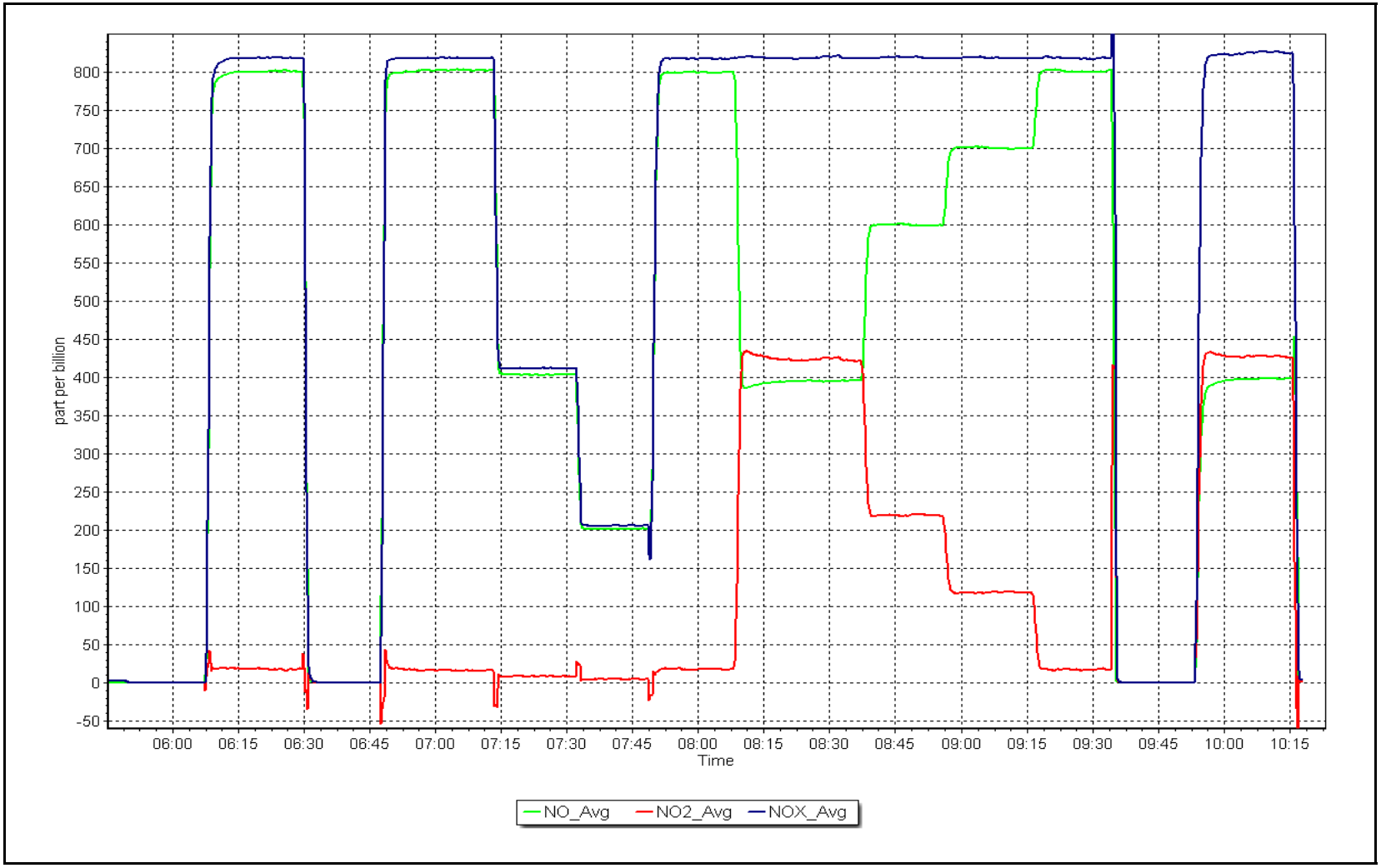
Calibration Date:	April 21, 2023	Previous Calibration:	March 10, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	5:48	End Time (MST):	10:18
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999972	*≥0.995*
419.3	423.0	0.9913			
216.2	219.4	0.9856	Slope	1.007625	*0.90 - 1.10*
115.5	118.5	0.9750			
			Intercept	1.013573	*+/-20*



NO_X Calibration Plot Date: April 21, 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:	April 19, 2023	Last Cal Date:	March 9, 2023
Start time (MST):	9:55	End time (MST):	12:12
Reason:	Removal		

Calibration Standards

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

Analyzer Information

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

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

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	1.9	----
as found span	5000	1400.0	400.0	365.2	1.095
as found 2nd point	5000	1029.9	200.0	184.6	1.083
as found 3rd point	5000	848.3	100.0	93.9	1.065
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	

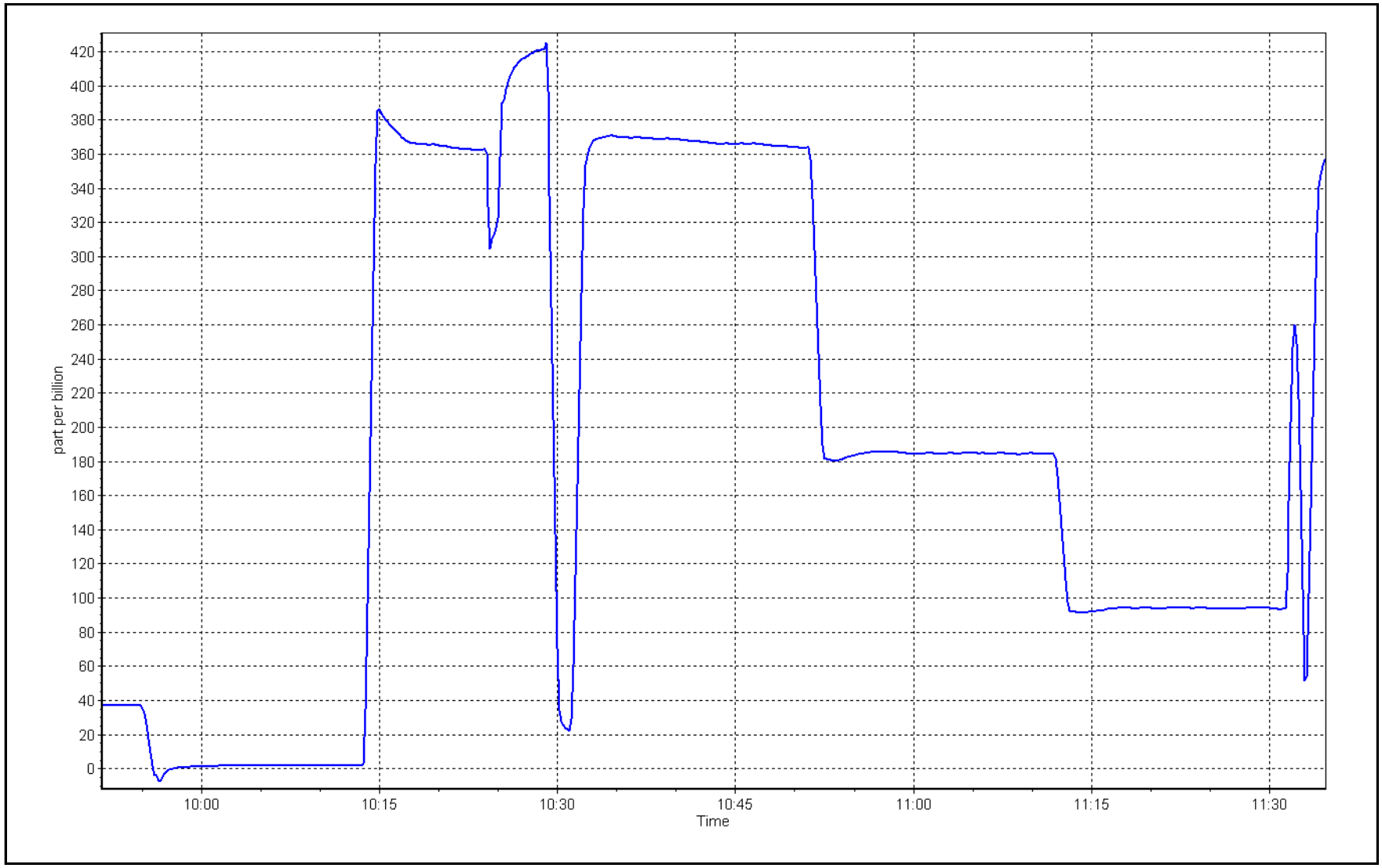
Baseline Corr As found:	363.3	Previous response	400.0	*% change	-10.1%
Baseline Corr 2nd AF pt:	-180.6	AF Slope:	0.907543	AF Intercept:	2.580000
Baseline Corr 3rd AF pt:	-90.7	AF Correlation:	0.999983		

* = > +/-5% change initiates investigation

Notes: Removed due to leak in the solenoids

Calibration Performed By: Melissa Lemay

O_3 Calibration Plot Date: April 19, 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:	April 20, 2023	Last Cal Date:	April 19, 2023
Start time (MST):	10:28	End time (MST):	12:37
Reason:	Install		

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	Backgd or Offset:		-2.8
Calibration intercept:		0.120000	Coeff or Slope:		1.435

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	1391.3	400.0	399.5	1.001
second point	5000	1026.7	200.0	199.3	1.004
third point	5000	848.3	100.0	100.4	0.996
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	1392.4	400.0	395.0	1.013
				Average Correction Factor	1.000

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

* = > +/-5% change initiates investigation

Notes: Install due to suspected leak in old O3 analyzer.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

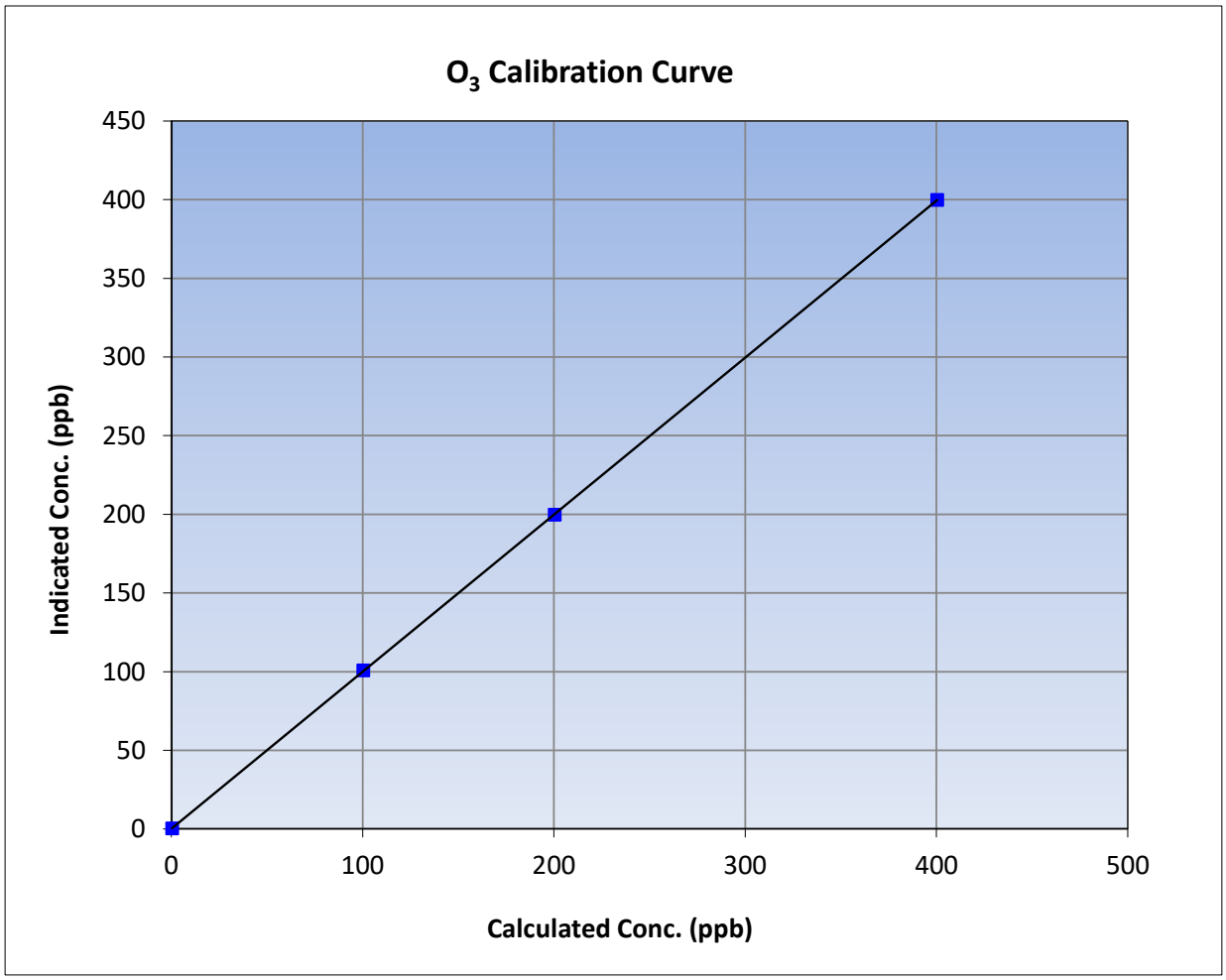
Station Information

Calibration Date:	April 20, 2023	Previous Calibration:	April 19, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:28	End Time (MST):	12:37
Analyzer make:	Thermo 49i	Analyzer serial #:	1152220023

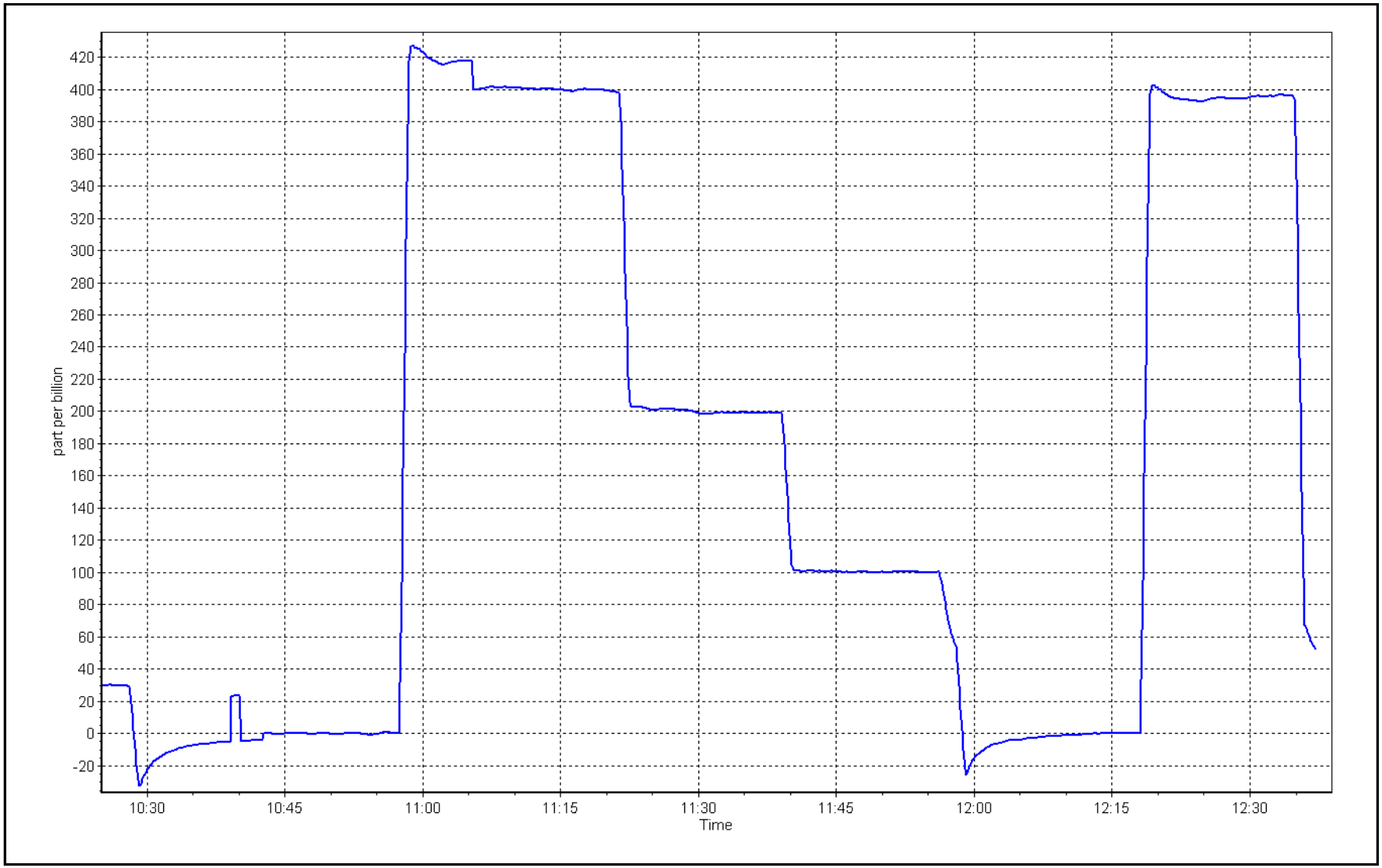
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
400.0	399.5	1.0013
200.0	199.3	1.0035
100.0	100.4	0.9960

Statistical Evaluation		Limits
Correlation Coefficient	0.999995	≥0.995
Slope	0.998171	0.90 - 1.10
Intercept	0.120000	+/- 5



O_3 Calibration Plot Date: April 20, 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:	April 26, 2023	Last Cal Date:	March 31, 2023
Start time (MST):	10:32	End time (MST):	11:04
Analyzer Make:	API T640	S/N:	645
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388753
Temp/RH standard:	Alicat FP-25BT	S/N:	388753

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	6.6	6.68	6.6	☐	+/- 2 °C
P (mmHg)	735.8	734.7	735.8	☐	+/- 10 mmHg
flow (LPM)	5	5.14	5	☐	+/- 0.25 LPM

Leak Test: Date of check: April 26, 2023 Last Cal Date: March 31, 2023

PM w/o HEPA: 3.8 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

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

Disposable Filter Changed: February 1, 2023

Annual Maintenance

Date Sample Tube Cleaned: December 5, 2022

Date RH/T Sensor Cleaned: December 5, 2022

Notes: No adjustments done. Head cleaned.

Calibration by: Melissa Lemay

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	April 25, 2023	Last Cal Date:	March 14, 2023
Start time (MST):	5:58	End time (MST):	8:51
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range: 0 - 50 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998030	0.994802	Backgd or Offset:	0.000	3.896
Calibration intercept:	0.026535	0.030541	Coeff or Slope:	1.079	1.079

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4933	66.7	40.0	40.2	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4933	66.7	40.0	39.8	1.006
second point	4967	33.3	20.0	20.0	0.999
third point	4983	16.7	10.0	10.0	1.003
as left zero	5000	0.0	0.0	0.0	----
as left span	4933	66.7	40.0	39.7	1.007
				Average Correction Factor	1.003

Baseline Corr As found:	40.05	Prev response:	39.97	*% 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: No Maintenance done. Zero adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

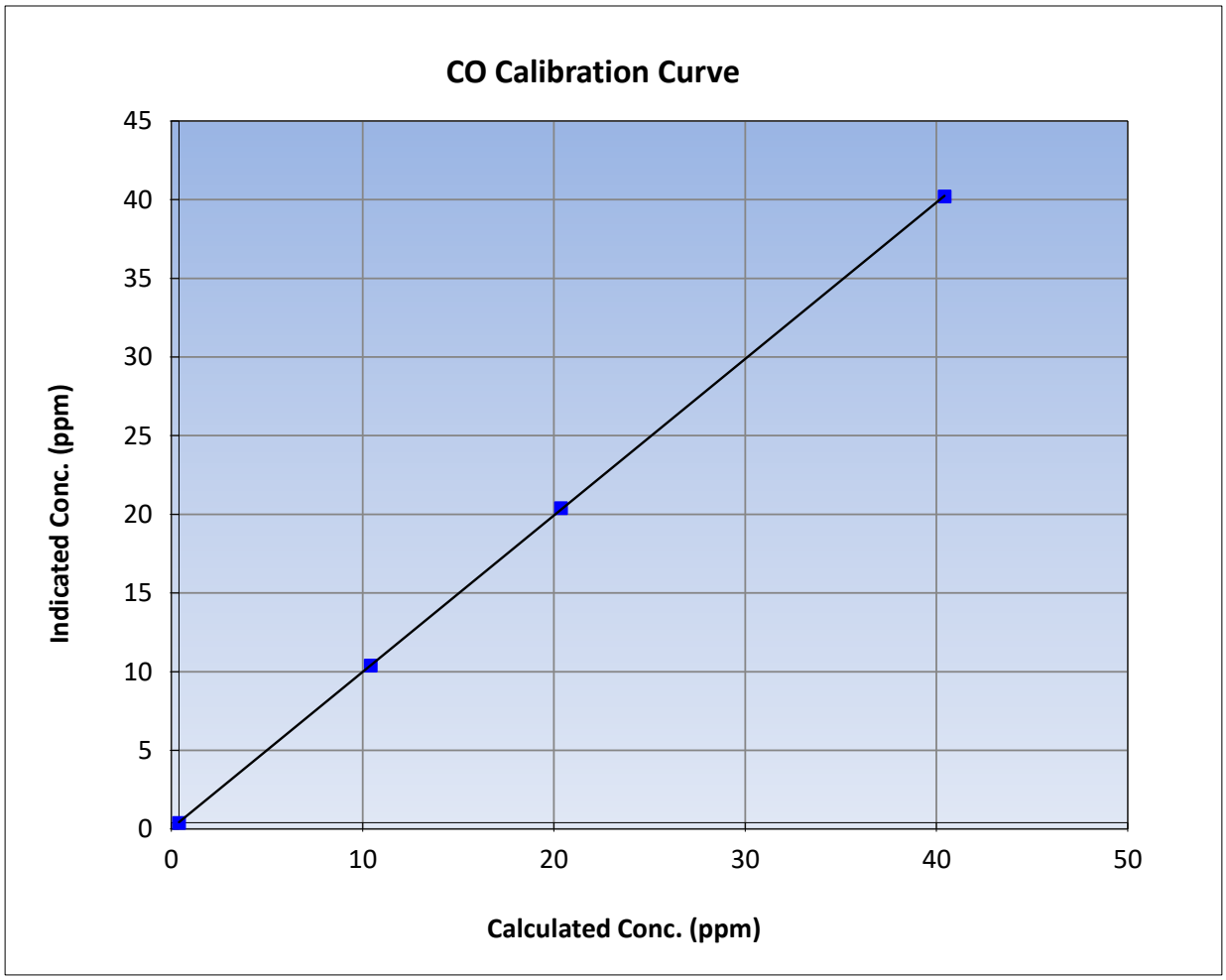
Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	March 14, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	5:58	End Time (MST):	8:51
Analyzer make:	Thermo 48i-LTE	Analyzer serial #:	1408761381

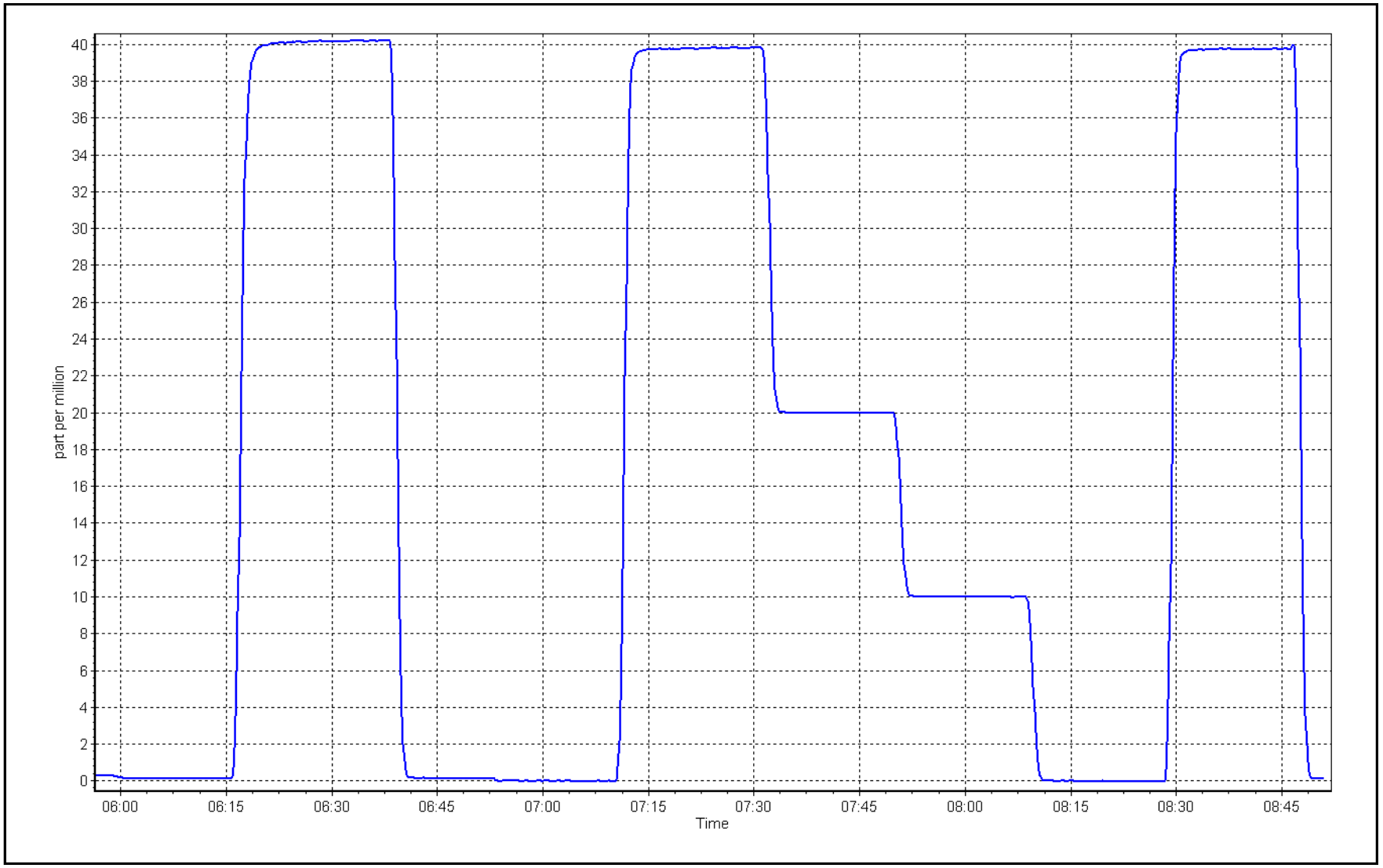
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.0	39.8	1.0056
20.0	20.0	0.9989
10.0	10.0	1.0031

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999985	*≥0.995*
Slope	0.994802	*0.90 - 1.10*
Intercept	0.030541	*+/-1.5*



CO Calibration Plot Date: April 25, 2023 Location: Athabasca Valley



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS08
FORT CHIPEWYAN
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	April 12, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	10:22	End time (MST):	13:13
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.996661	1.003016	Backgd or Offset:	1.27	1.29
Calibration intercept:	1.336570	1.535287	Coeff or Slope:	0.981	1.010

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4920	80.3	800.4	778.6	1.028
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4920	80.3	800.4	804.4	0.995
second point	4960	40.2	400.7	402.0	0.997
third point	4980	20.1	200.4	205.1	0.977
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	80.3	800.4	805.3	0.994
				Average Correction Factor	0.990

Baseline Corr As found:	778.50	Previous response	799.05	*% change	-2.6%

* = > +/-5% change initiates investigation

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

Calibration Performed By: Morgan Voyageur

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

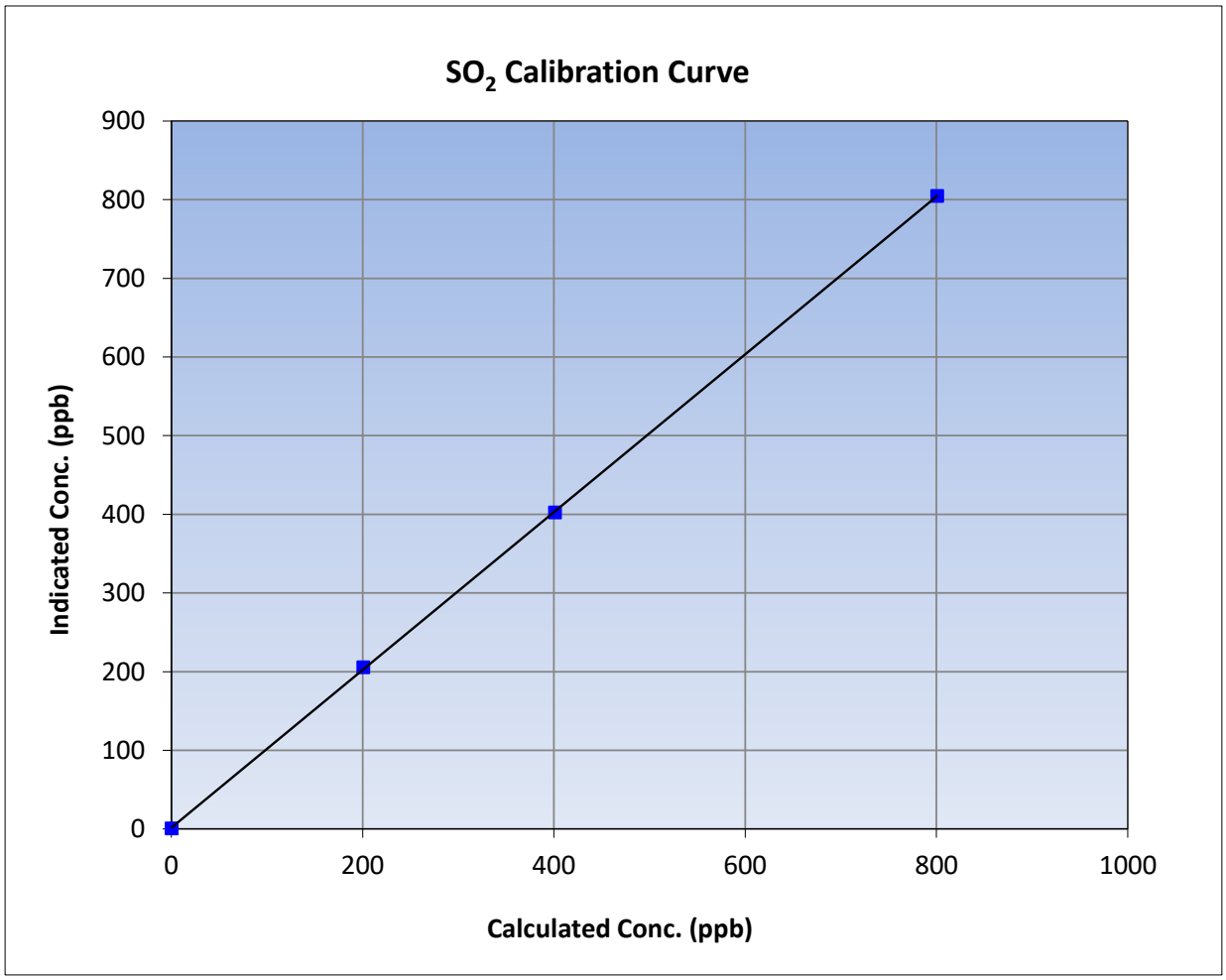
Station Information

Calibration Date:	April 12, 2023	Previous Calibration:	March 13, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	10:22	End Time (MST):	13:13
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1136451241

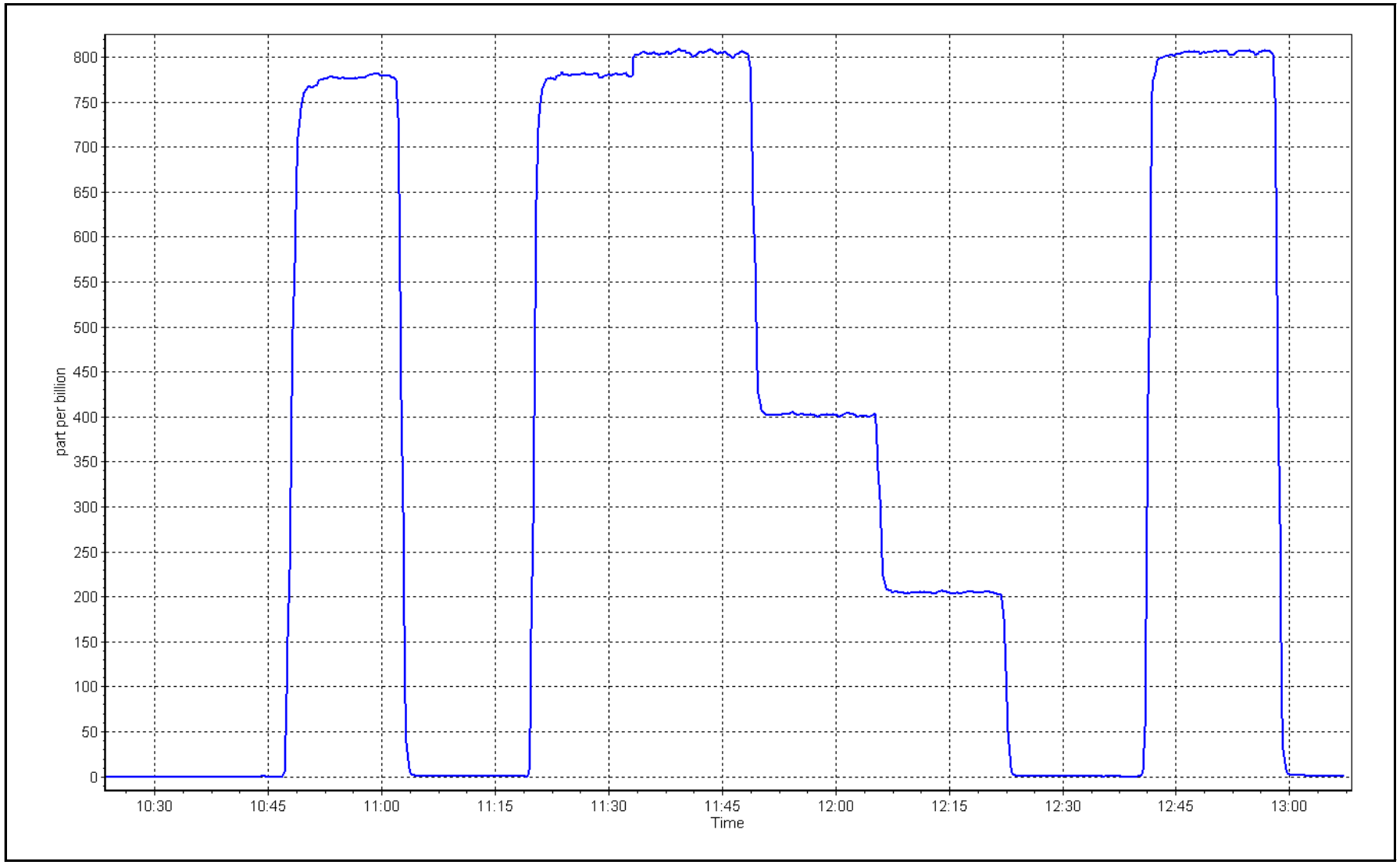
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
800.4	804.4	0.9950
400.7	402.0	0.9968
200.4	205.1	0.9769

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999970	*≥0.995*
Slope	1.003016	*0.90 - 1.10*
Intercept	1.535287	*+/-30*



SO2 Calibration Plot Date: April 12, 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:	April 26, 2023	Last Cal Date:	March 12, 2023
Start time (MST):	9:05	End time (MST):	13:10
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:	0.995571	0.994424	Backgd or Offset:	1.37	0.92
Calibration intercept:	0.018651	0.158770	Coeff or Slope:	0.717	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	-0.5	----
as found span	4920	80.5	80.0	82.6	0.963
as found 2nd point	4960	40.2	40.0	40.9	0.965
as found 3rd point	4980	20.1	20.0	20.3	0.961
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4920	80.5	80.0	79.6	1.005
second point	4960	40.2	40.0	40.1	0.996
third point	4980	20.1	20.0	20.1	0.994
as left zero	5000	0.0	0.0	0.1	----
as left span	4920	80.5	80.0	79.3	1.009
SO2 Scrubber Check	4919.7	80.3	803.0	0.0	----
Date of last scrubber change:		March 7, 2022		Ave Corr Factor	0.999
Date of last converter efficiency test:		March 15, 2022		100.7%	efficiency

Baseline Corr As found:	83.1	Prev response:	79.67	*% change:	4.1%
Baseline Corr 2nd AF pt:	41.4	AF Slope:	1.038279	AF Intercept:	-0.500550
Baseline Corr 3rd AF pt:	20.8	AF Correlation:	0.999997		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Morgan Voyageur

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

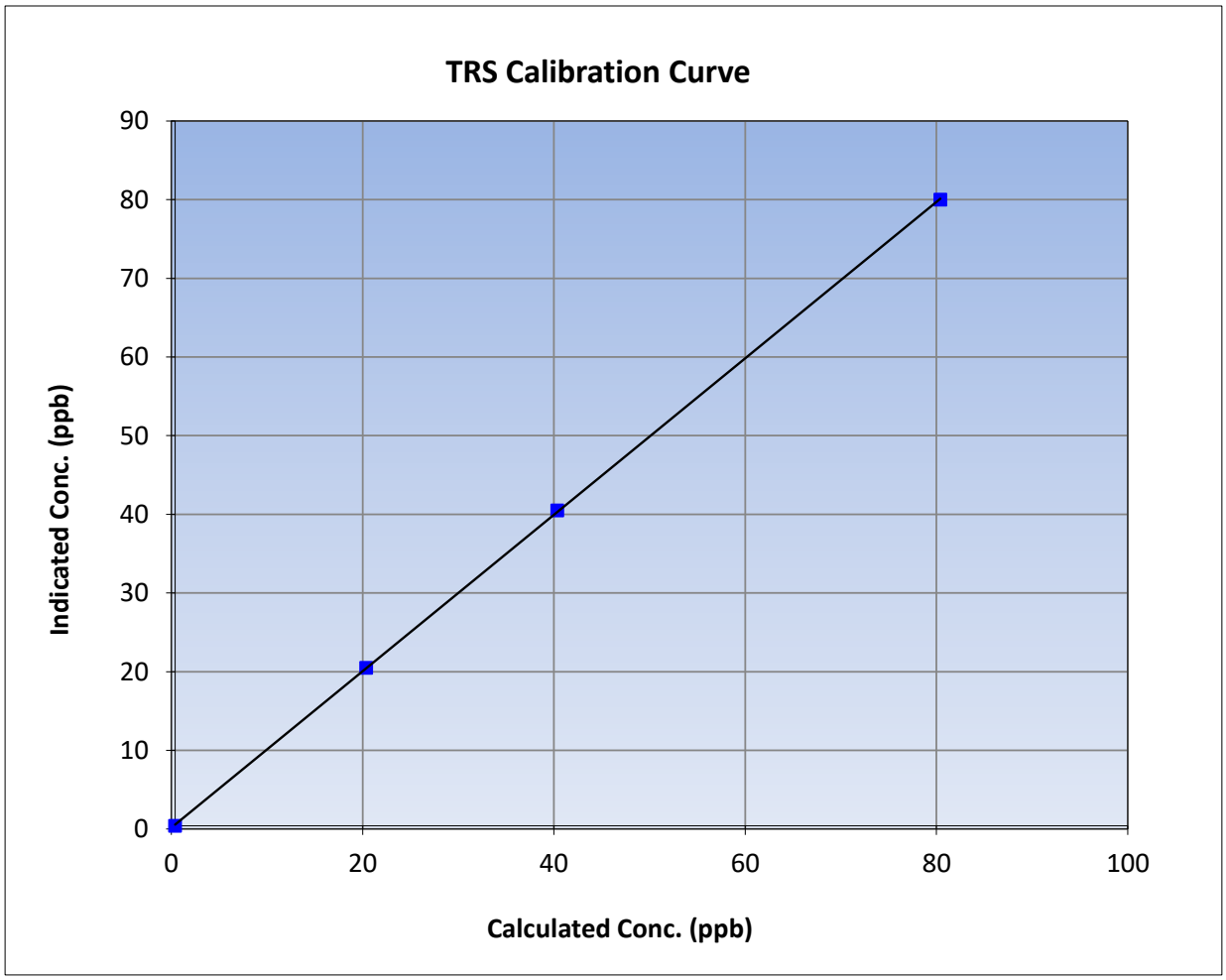
Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 12, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	9:05	End Time (MST):	13:10
Analyzer make:	Thermo 43iQ-TL	Analyzer serial #:	1203169744

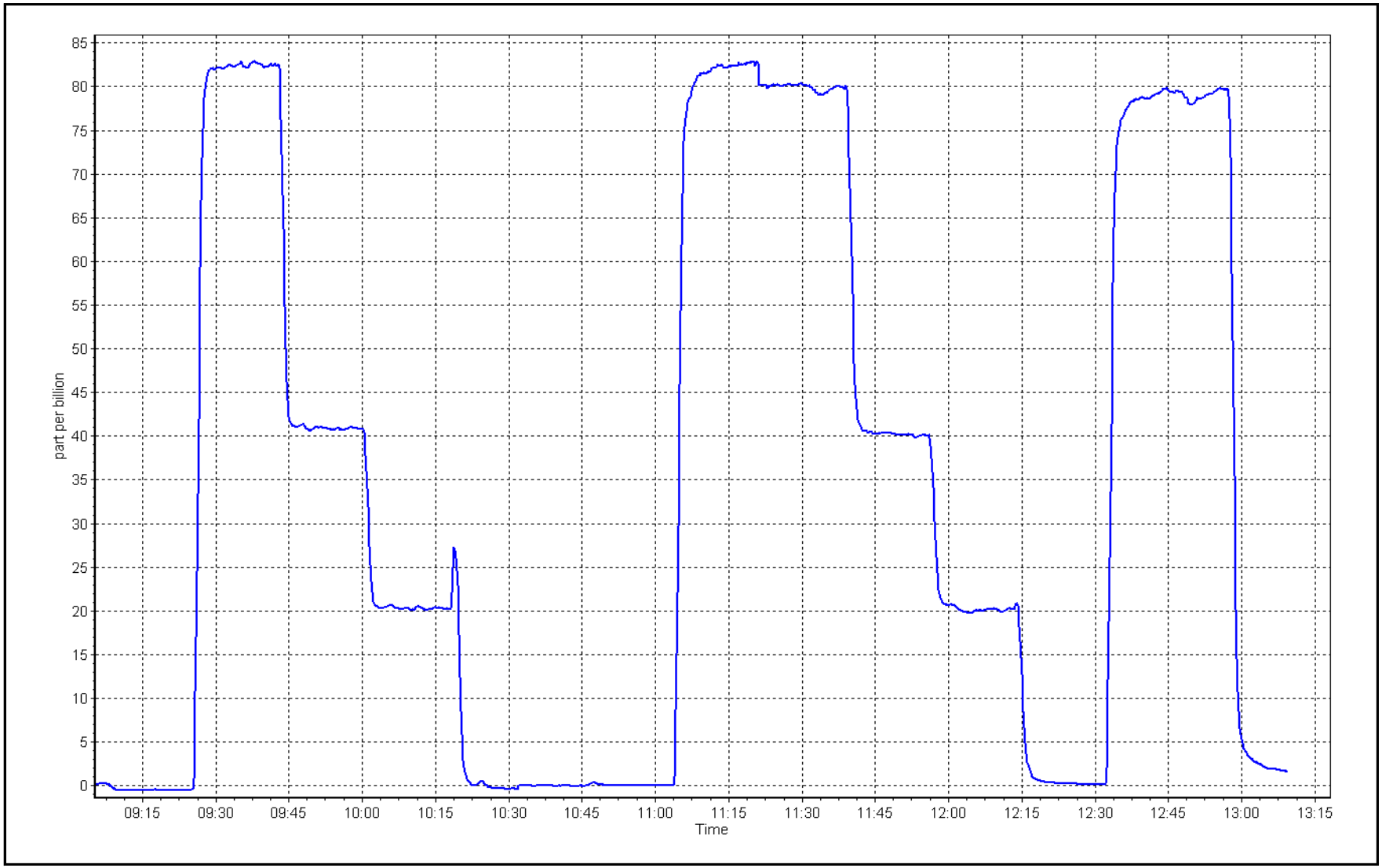
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	79.6	1.0051
40.0	40.1	0.9964
20.0	20.1	0.9940

Statistical Evaluation		Limits
Correlation Coefficient	0.999975	≥0.995
Slope	0.994424	0.90 - 1.10
Intercept	0.158770	+/-3



TRS Calibration Plot Date: April 26, 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:	April 13, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	8:28	End time (MST):	12:48
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1426262592	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.844	1.882	NO bkgnd or offset:	7.9	7.9
NOX coeff or slope:	0.993	1.000	NOX bkgnd or offset:	8.1	8.1
NO2 coeff or slope:	1.000	0.995	Reaction cell Press:	256.6	241.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000657	0.996544
NO_X Cal Offset:	0.680000	1.320000
NO Cal Slope:	1.001428	0.995845
NO Cal Offset:	0.260000	0.740000
NO_2 Cal Slope:	1.016898	1.003157
NO_2 Cal Offset:	0.900918	0.613431

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.1	-0.1	----	----
as found span	4918	82.0	800.3	800.3	0.0	799.1	795.6	3.4	1.0015	1.0059
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	82.0	800.3	800.3	0.0	798.1	797.3	0.7	1.0028	1.0038
second point	4959	41.0	400.2	400.2	0.0	401.0	399.8	1.3	0.9979	1.0009
third point	4980	20.5	200.1	200.1	0.0	202.0	200.6	1.3	0.9905	0.9974
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	0.0	-0.1	----	----
as left span	4918	82.0	800.3	407.9	392.4	801.6	406.6	395.1	0.9984	1.0032
								Average Correction Factor	0.9971	1.0007

Corrected As found	NO_X = 799.4 ppb	NO = 795.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -0.3%
Previous Response	NO_X = 801.5 ppb	NO = 801.7 ppb		*Percent Change	NO = -0.8%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	794.4	402.0	392.4	394.1	0.9957	100.4%
2nd GPT point (200 ppb O3)	794.4	601.3	193.1	194.1	0.9948	100.5%
3rd GPT point (100 ppb O3)	794.4	700.0	94.4	96.4	0.9793	102.1%
				Average Correction Factor	0.9899	101.0%

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

Calibration Performed By: Morgan Voyageur

Wood Buffalo Environmental Association

NO_X Calibration Summary

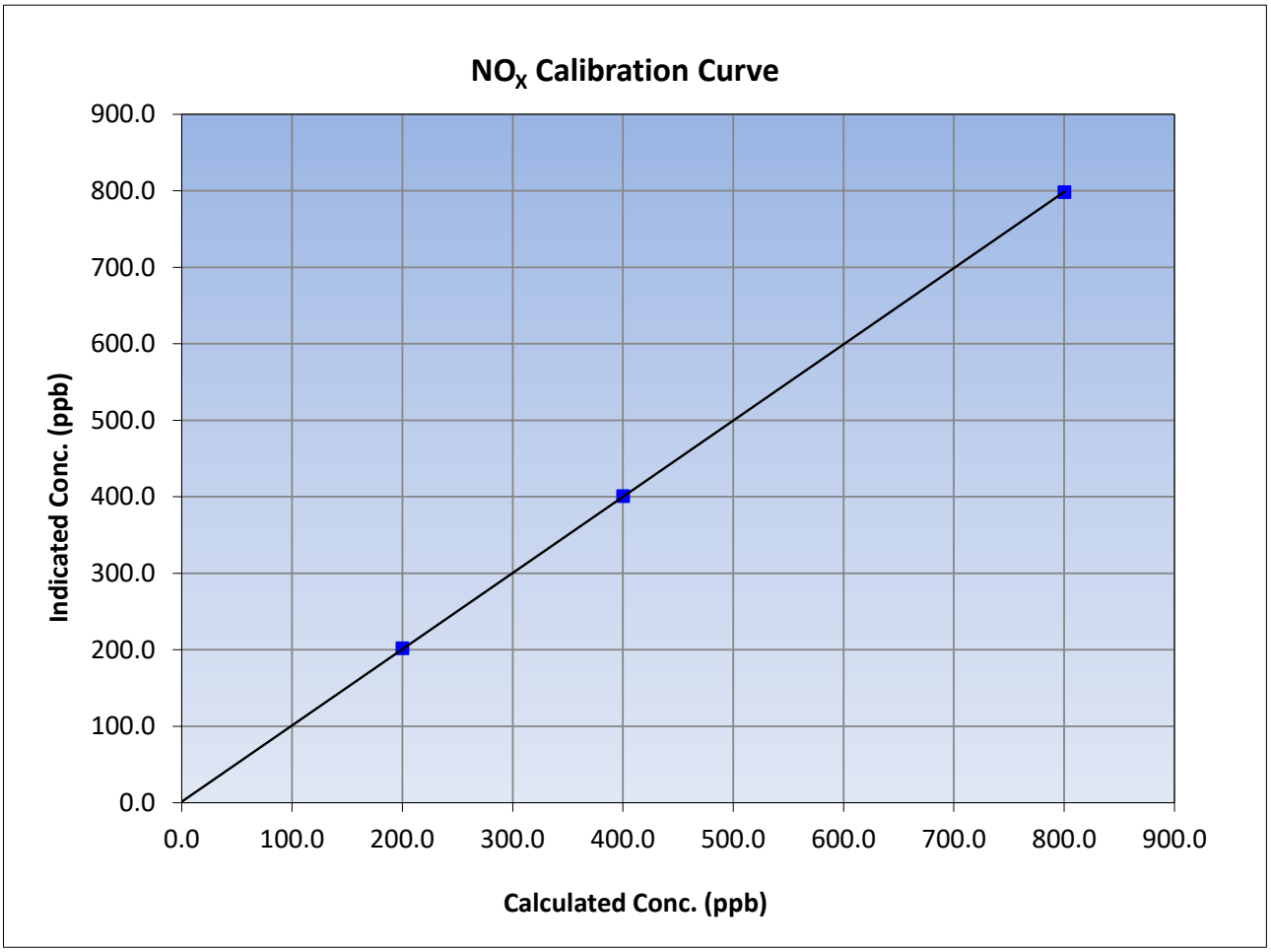
Version-04-2020

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 13, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:28	End Time (MST):	12:48
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	0.999985	≥0.995
800.3	798.1	1.0028			
400.2	401.0	0.9979	Slope	0.996544	0.90 - 1.10
200.1	202.0	0.9905			
			Intercept	1.320000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

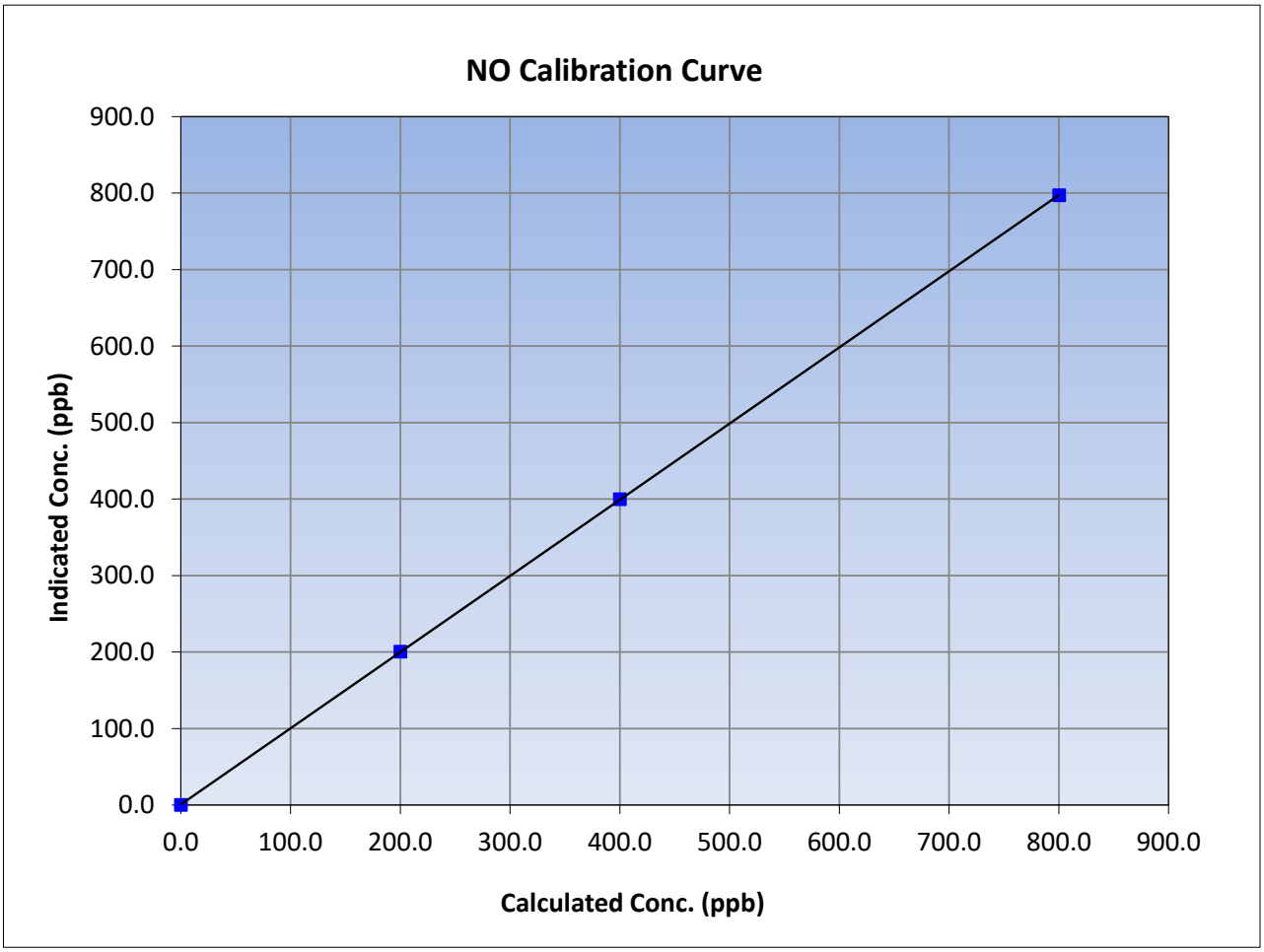
Version-04-2020

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 13, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:28	End Time (MST):	12:48
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	0.999996	≥0.995
800.3	797.3	1.0038			
400.2	399.8	1.0009	Slope	0.995845	0.90 - 1.10
200.1	200.6	0.9974			
			Intercept	0.740000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

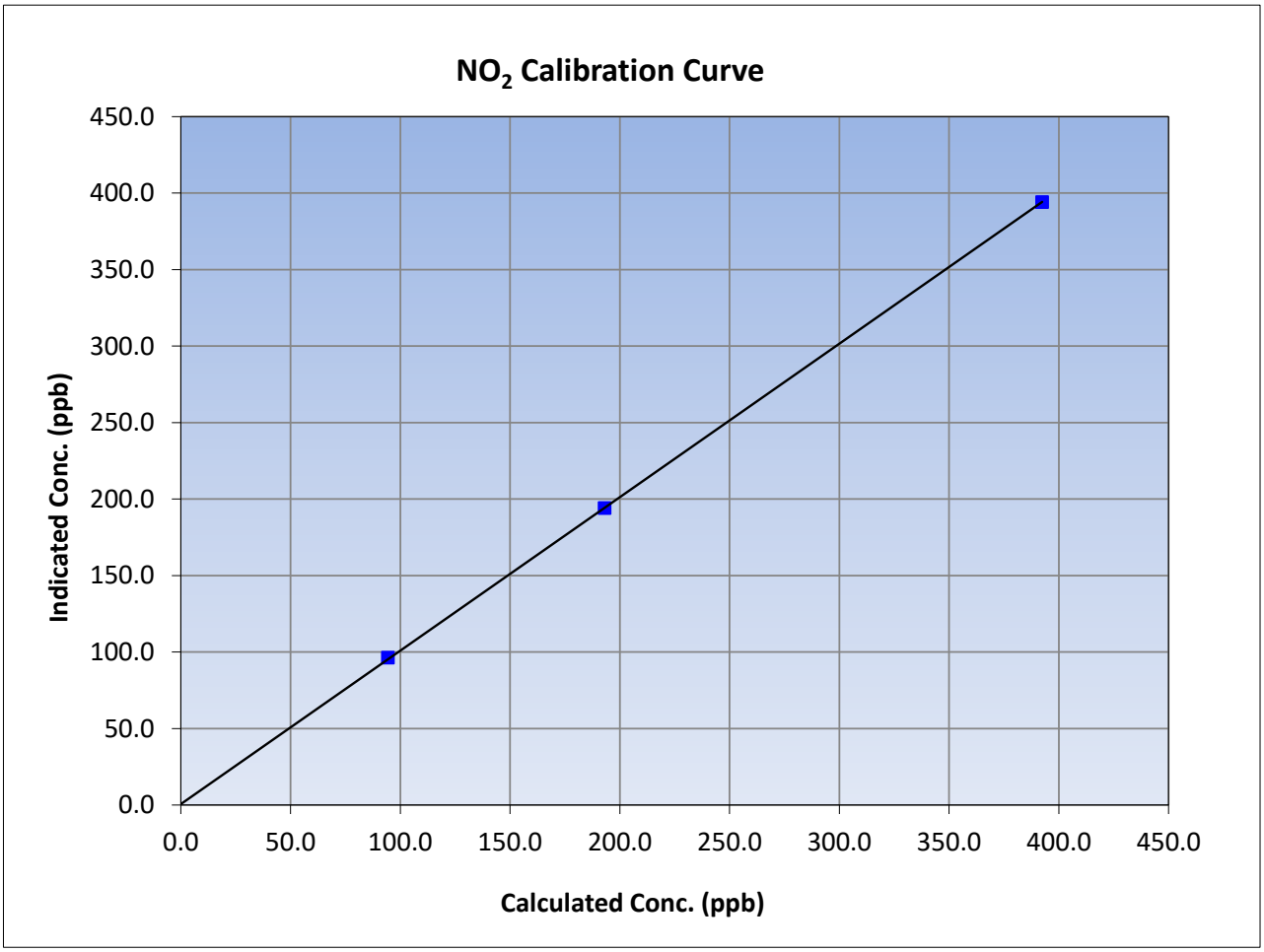
Version-04-2020

Station Information

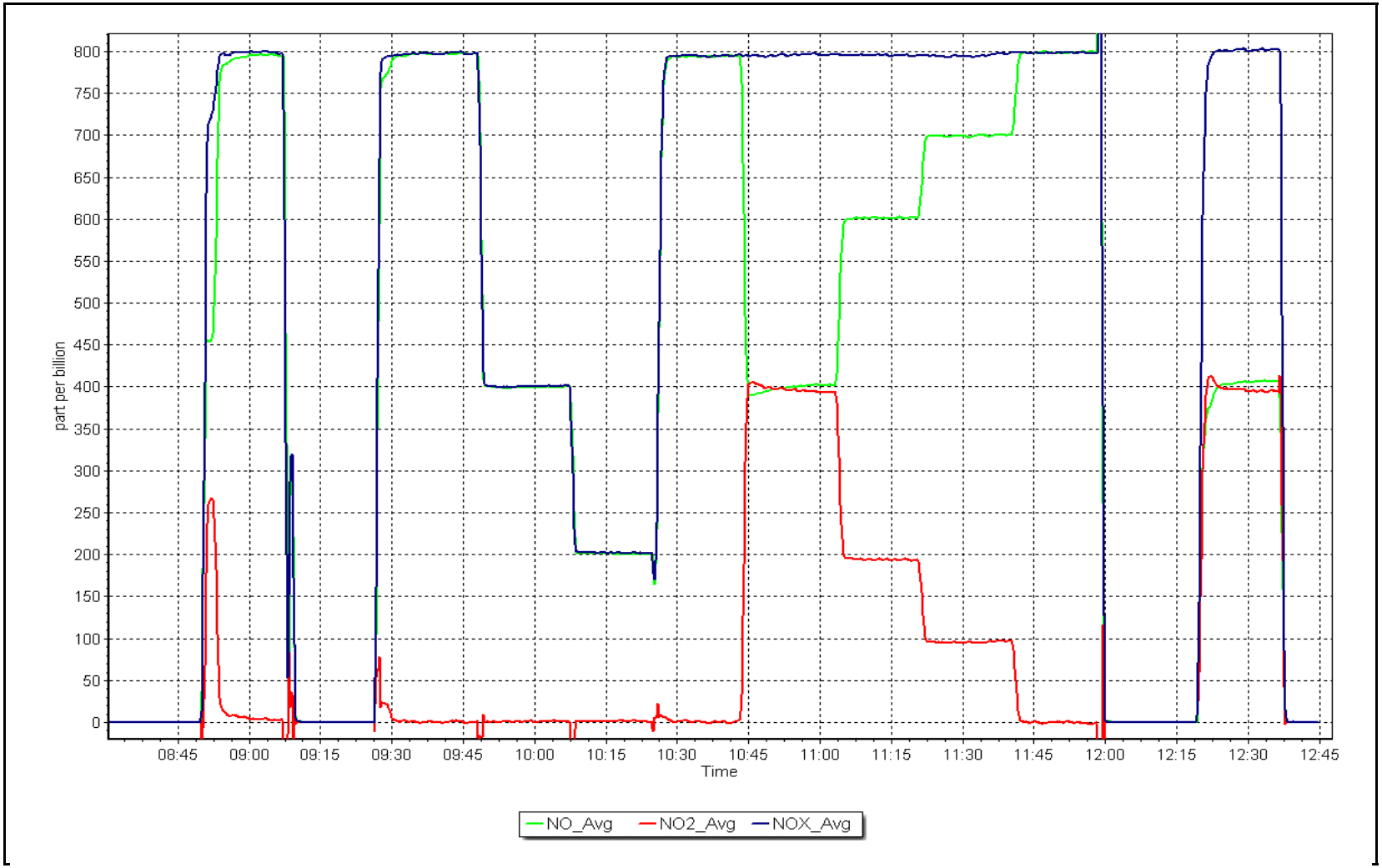
Calibration Date:	April 13, 2023	Previous Calibration:	March 13, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:28	End Time (MST):	12:48
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999979	≥0.995
392.4	394.1	0.9957			
193.1	194.1	0.9948	Slope	1.003157	0.90 - 1.10
94.4	96.4	0.9793			
			Intercept	0.613431	+/-20



NO_X Calibration Plot Date: April 13, 2023 Location: Fort Chipewyan



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	April 12, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	7:52	End time (MST):	10:19
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:	1.002171	1.013200	Backgd or Offset:	-2.0	-2.0
Calibration intercept:	-0.880000	-0.960000	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	0.2	----
as found span	5000	963.6	400.0	405.9	0.985
as found 2nd point					
as found 3rd point					
calibrator zero	5000	NA	0.0	0.3	----
high point	5000	961.7	400.0	404.9	0.988
second point	5000	810.3	200.0	201.2	0.994
third point	5000	701.3	100.0	99.0	1.010
as left zero	5000	NA	0.0	0.4	----
as left span	5000	963.3	400.0	405.9	0.985
				Average Correction Factor	0.997

Baseline Corr As found:	405.7	Previous response	400.0	*% change	1.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Morgan Voyageur

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

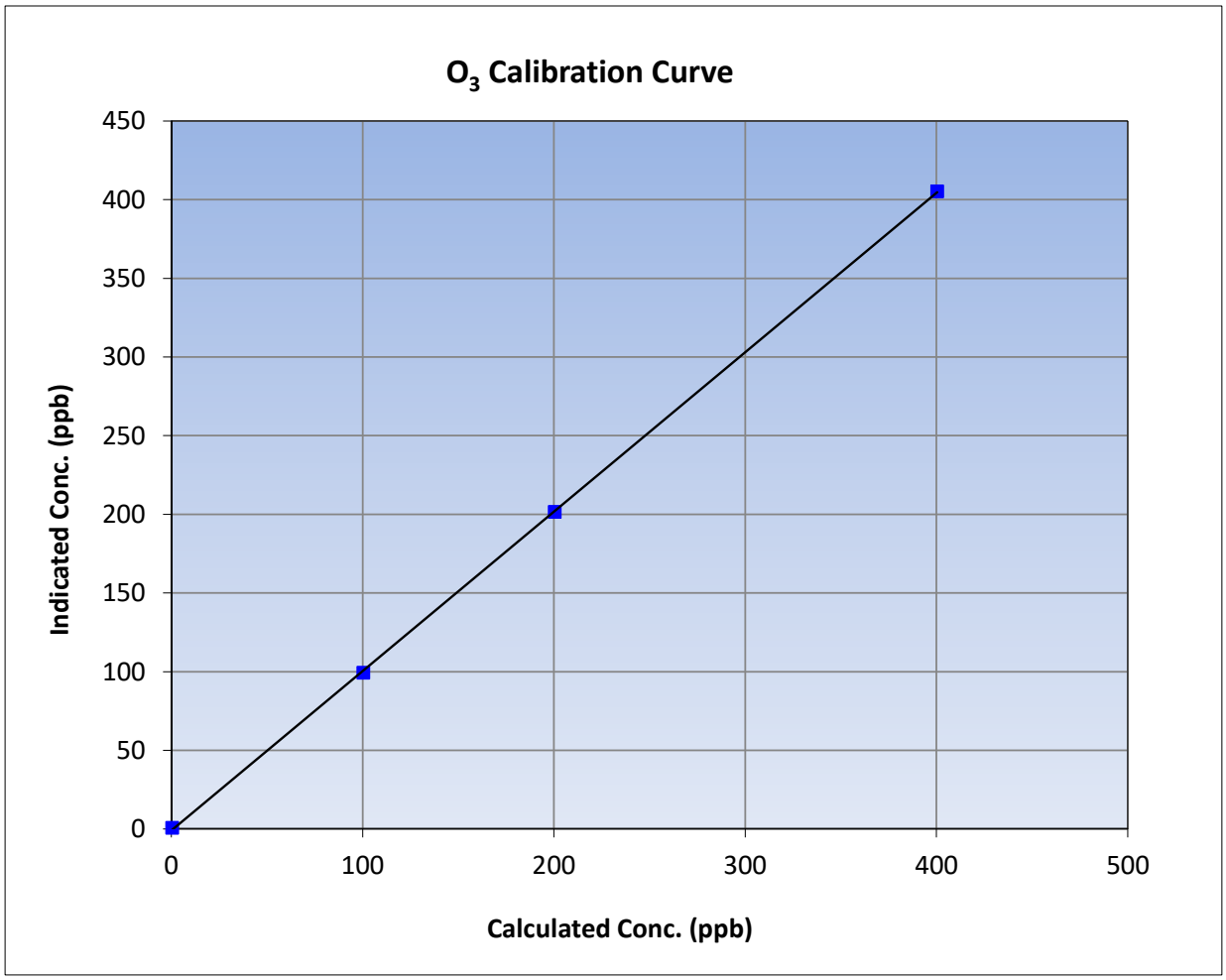
Station Information

Calibration Date:	April 12, 2023	Previous Calibration:	March 13, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	7:52	End Time (MST):	10:19
Analyzer make:	Teledyne API T400	Analyzer serial #:	3872

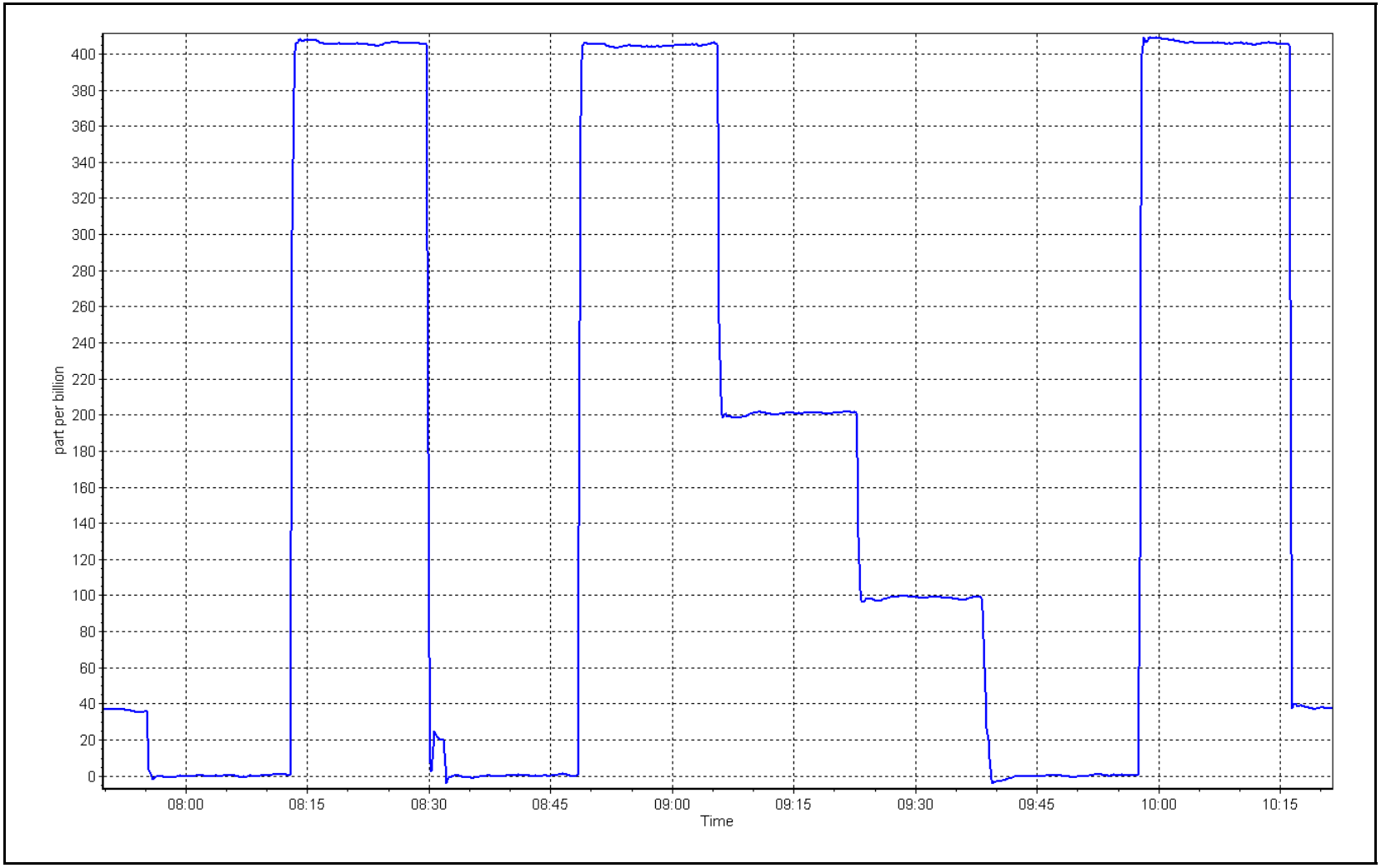
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
400.0	404.9	0.9879
200.0	201.2	0.9940
100.0	99.0	1.0101

Statistical Evaluation		Limits
Correlation Coefficient	0.999955	≥0.995
Slope	1.013200	0.90 - 1.10
Intercept	-0.960000	+/- 5



O_3 Calibration Plot Date: April 12, 2023 Location: Fort Chipewyan



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS 08
Calibration Date:	April 26, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	12:41	End time (MST):	11:24
Analyzer Make:	API	S/N:	216
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	1212
Temp/RH standard:	Delta Cal	S/N:	1212

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	2.9	2.7	2.9	☐	+/- 2 °C
P (mmHg)	733.0	724.3	733.0	☐	+/- 10 mmHg
flow (LPM)	4.99	4.33	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: April 26, 2023 Last Cal Date: March 13, 2023

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: w/ HEPA:

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:	April 21, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	7:44	End time (MST):	12:42
Reason:	Maintenance		

Calibration Standards

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

Analyzer Information

Analyzer make: API T300 — Analyzer serial #: 3505

Analyzer Range: 0 - 50 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998892	0.997452	Backgd or Offset:	-0.014	-0.014
Calibration intercept:	0.030961	0.118914	Coeff or Slope:	0.996	1.005

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	-0.18	----
as found span	4933	66.7	40.4	40.6	0.996
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	1.001
second point	4967	33.3	20.2	20.4	0.991
third point	4983	16.7	10.1	10.3	0.985
as left zero	5000	0.0	0.0	0.0	----
as left span	2960	40.0	40.4	40.1	1.007
				Average Correction Factor	0.993

Baseline Corr As found:	40.78	Prev response:	40.41	*% change:	0.9%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after as founds. Adjusted the zero and span. Pump failed on multi-point as found, replaced pump.

Calibration Performed By: Morgan Voyageur

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

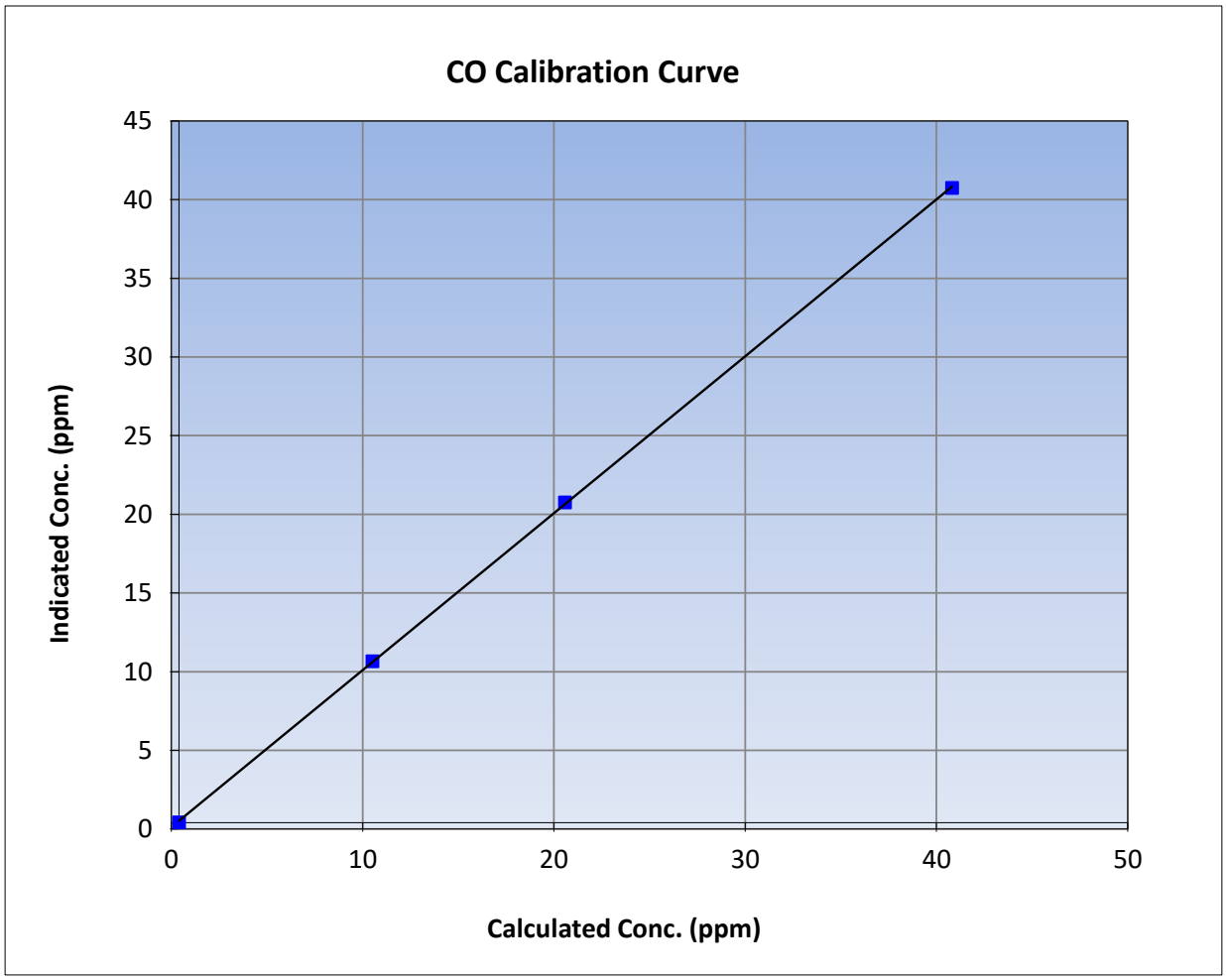
Station Information

Calibration Date:	April 21, 2023	Previous Calibration:	March 13, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	7:44	End Time (MST):	12:42
Analyzer make:	API T300	Analyzer serial #:	3505

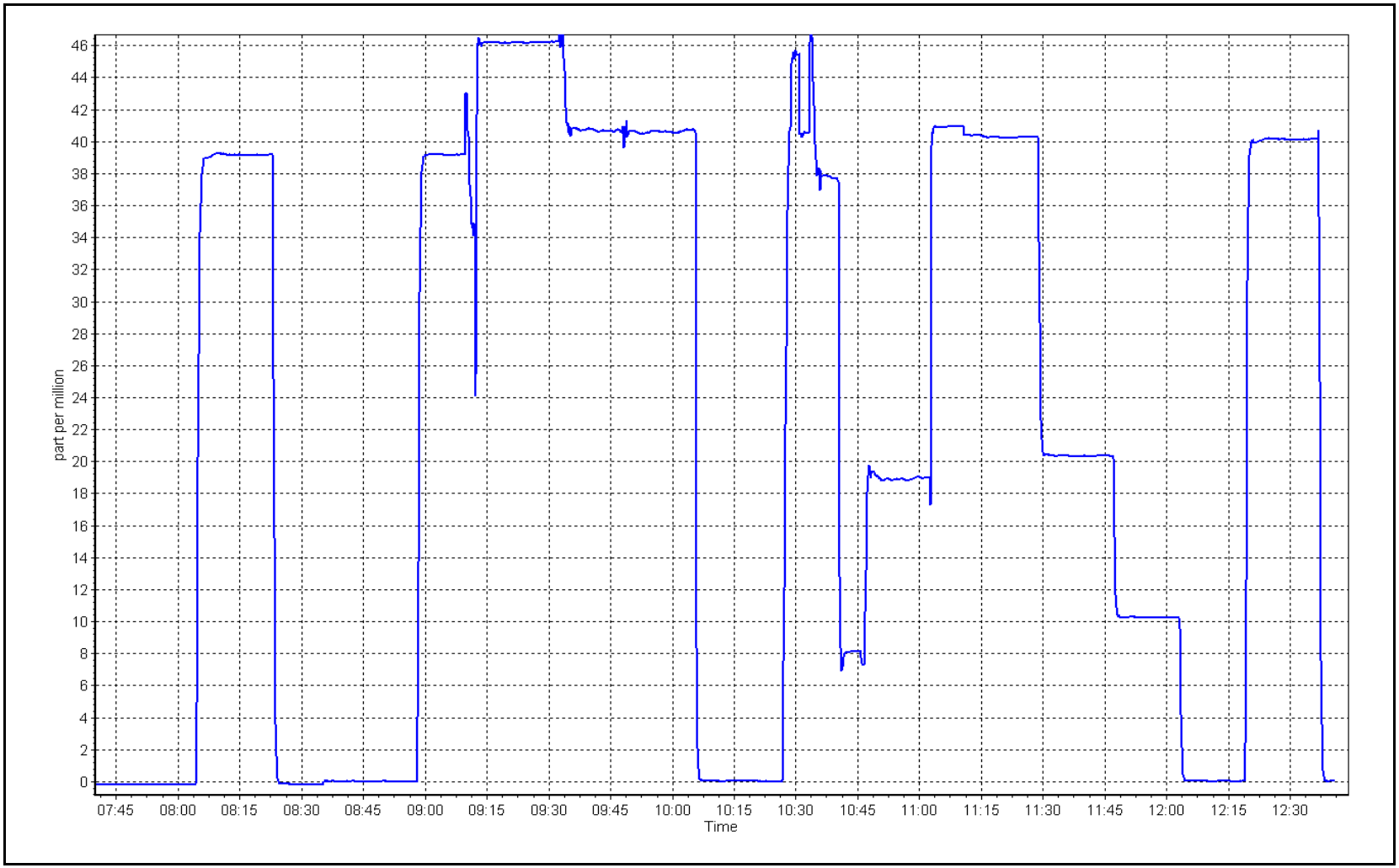
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.4	40.4	1.0014
20.2	20.4	0.9911
10.1	10.3	0.9854

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999965	*≥0.995*
Slope	0.997452	*0.90 - 1.10*
Intercept	0.118914	*+/-1.5*



CO Calibration Plot Date: April 21, 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:	April 21, 2023	Last Cal Date:	March 12, 2023
Start time (MST):	12:55	End time (MST):	15:39
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 2,000 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998937	0.992226	Backgd or Offset:	0.006	0.006
Calibration intercept:	-4.820000	-4.080000	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	0.0	----
as found span	2920	80.0	1605.9	1594.0	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	0.6	----
high point	2920	80.0	1605.9	1595.4	1.007
second point	2960	40.0	802.9	779.0	1.031
third point	2980	20.0	401.5	397.1	1.011
as left zero	3000	0.0	0.0	0.2	----
as left span	2960	40.0	802.9	774.8	1.036
				Average Correction Factor	1.016

Baseline Corr As found:	1594.00	Prev response:	1599.34	*% change:	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Morgan Voyageur

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

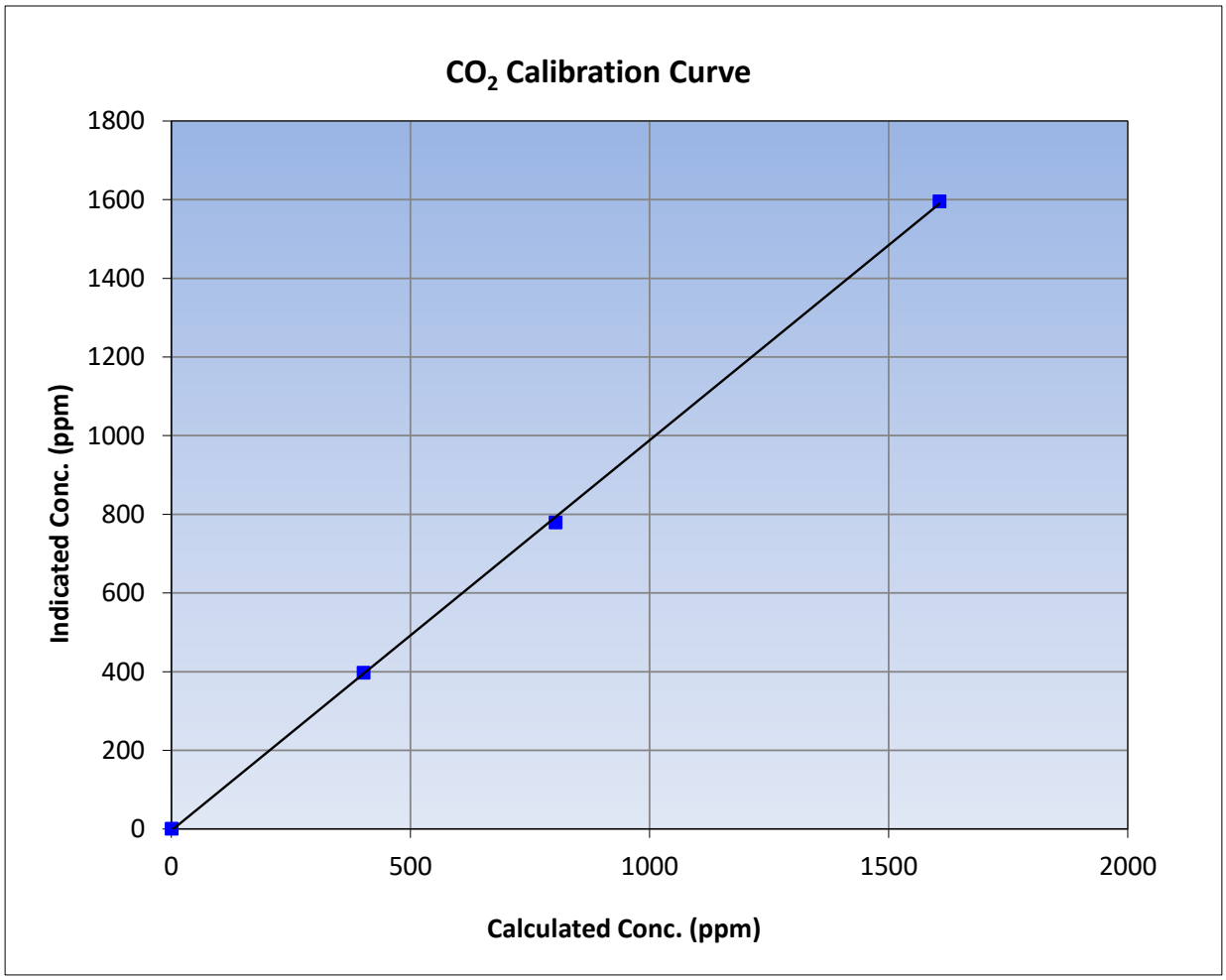
Station Information

Calibration Date	April 21, 2023	Previous Calibration	March 12, 2023
Station Name	Fort Chipewyan	Station Number	AMS08
Start Time (MST)	12:55	End Time (MST)	15:39
Analyzer make	Teledyne API T360	Analyzer serial #	289

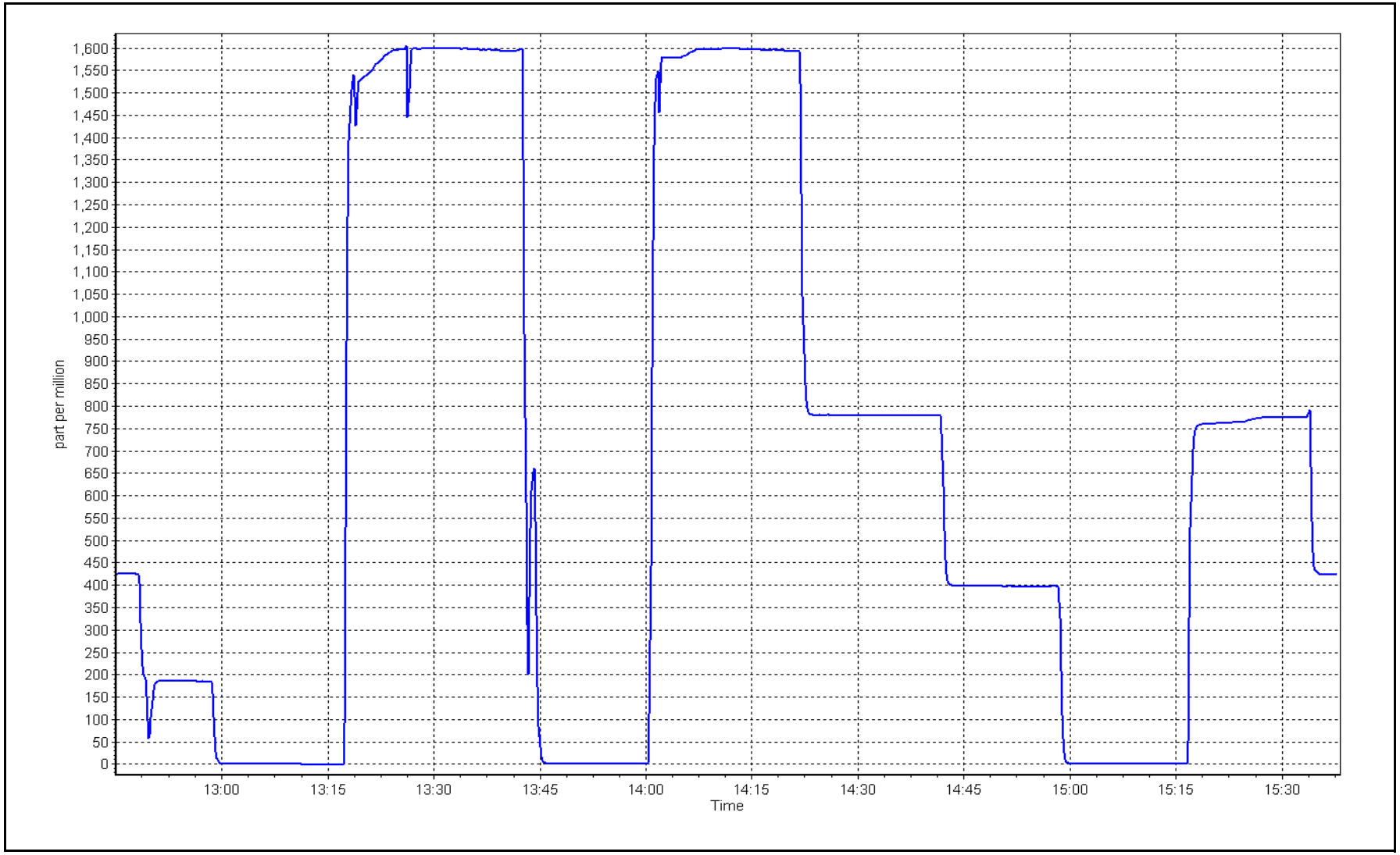
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.6	----
1605.9	1595.4	1.0066
802.9	779.0	1.0307
401.5	397.1	1.0110

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999818	*≥0.995*
Slope	0.992226	*0.90 - 1.10*
Intercept	-4.080000	*+/-20*



CO_2 Calibration Plot Date: April 21, 2023 Location: Fort Chipewyan



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS09
BARGE LANDING
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	April 11, 2023	Last Cal Date:	March 10, 2023
Start time (MST):	9:28	End time (MST):	13:11
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001709	0.998843	Backgd or Offset:	9.7	9.7
Calibration intercept:	0.631572	-0.089025	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	798.6	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4919	80.2	801.5	801.0	1.001
second point	4959	40.1	400.8	399.0	1.004
third point	4980	20.0	199.8	199.8	1.000
as left zero	5000	0.0	0.0	0.3	----
as left span	4919	80.2	801.5	795.7	1.007
				Average Correction Factor	1.002

Baseline Corr As found:	798.50	Previous response	803.49	*% 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. No adjustments made.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

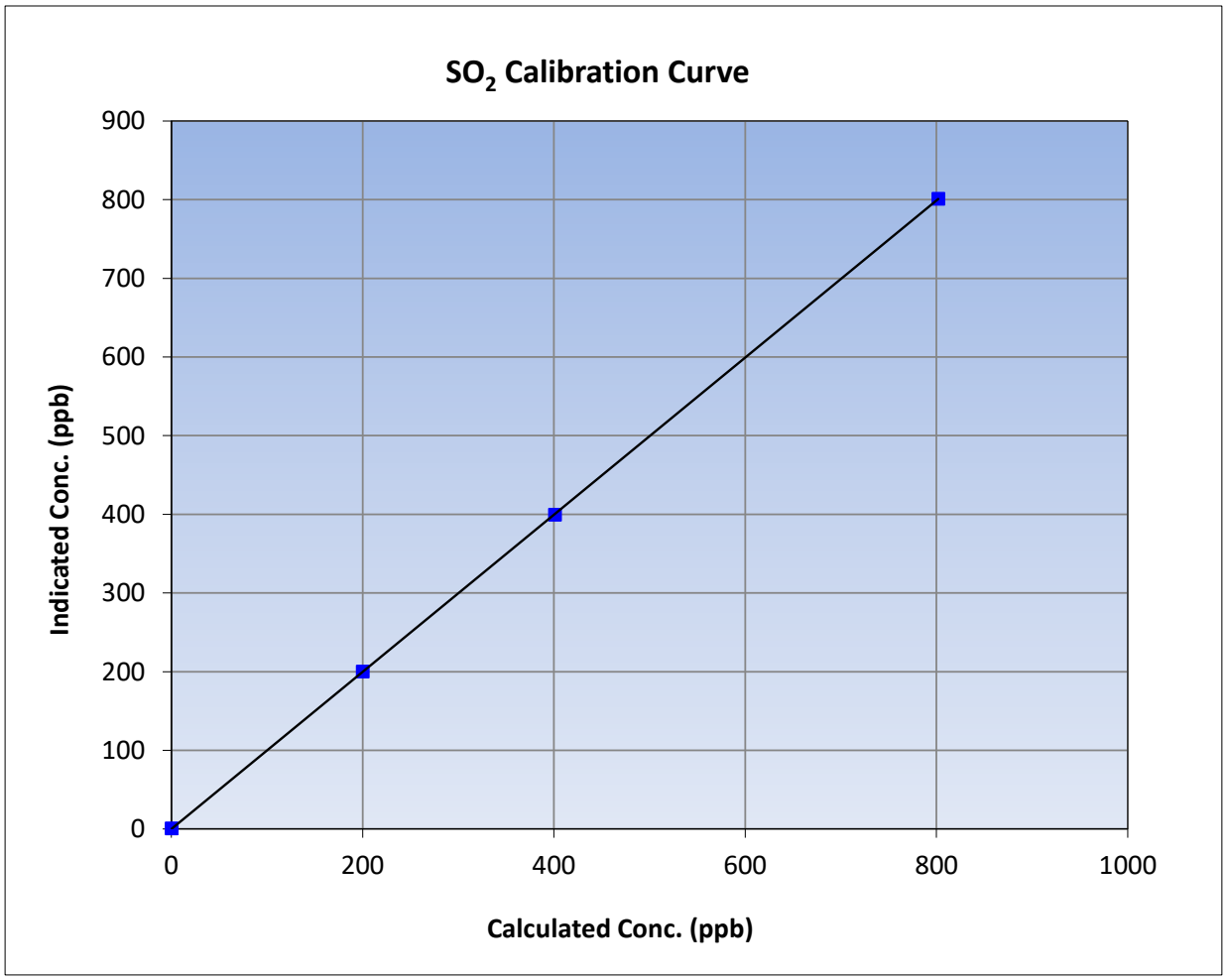
Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 10, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:28	End Time (MST):	13:11
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148498

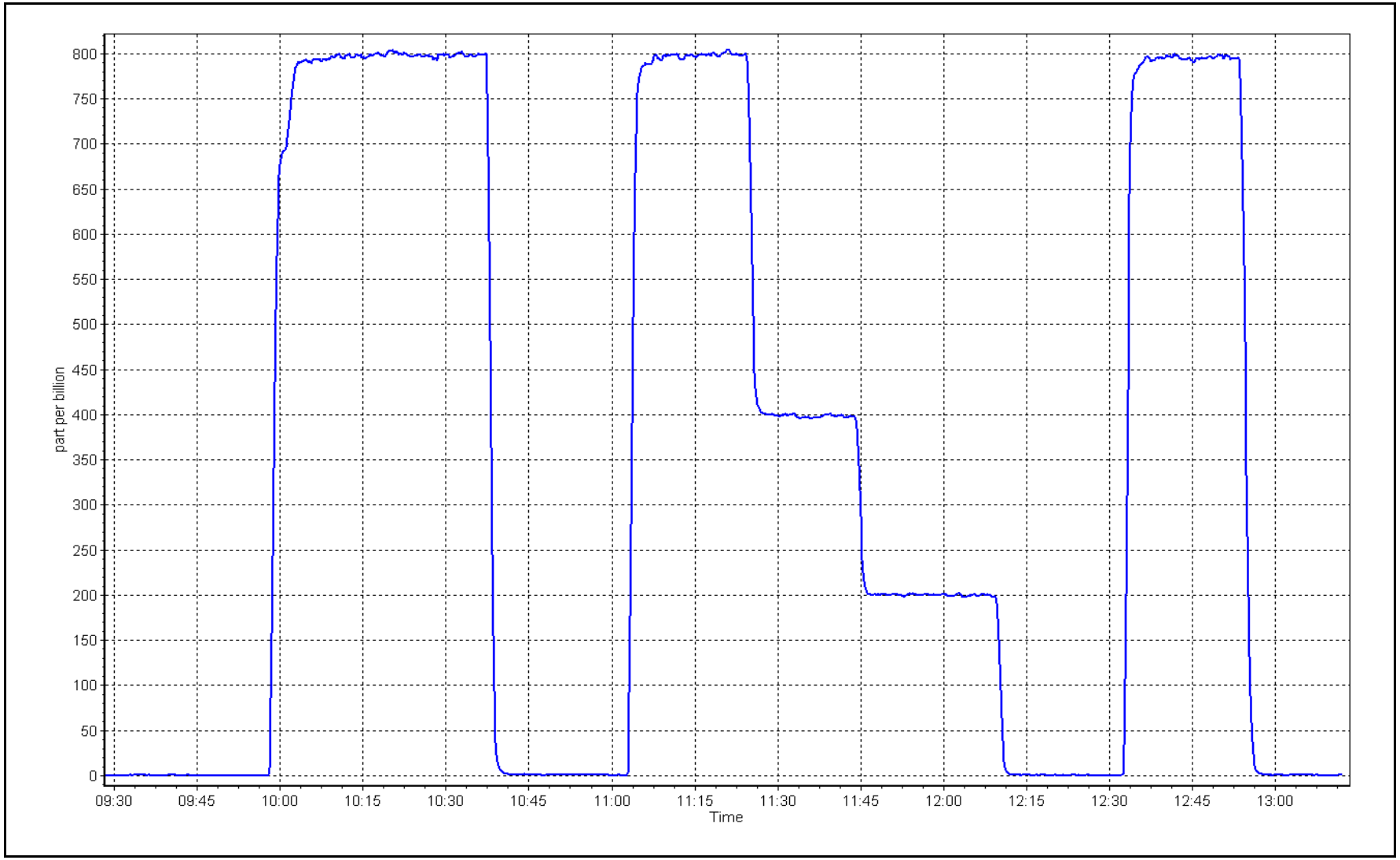
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
801.5	801.0	1.0006
400.8	399.0	1.0044
199.8	199.8	1.0002

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999994	*≥0.995*
Slope	0.998843	*0.90 - 1.10*
Intercept	-0.089025	*+/-30*



SO2 Calibration Plot Date: April 11, 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:	April 17, 2023	Last Cal Date:	March 23, 2023
Start time (MST):	9:36	End time (MST):	15:01
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:	1.006146	1.008720	Backgd or Offset:	2.76	2.78
Calibration intercept:	0.019102	0.079030	Coeff or Slope:	1.130	1.137

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	78.6	1.017
as found 2nd point	4959	41.1	40.0	39.3	1.019
as found 3rd point	4979	20.5	20.0	19.7	1.014
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	80.7	0.991
second point	4959	41.1	40.0	40.5	0.988
third point	4979	20.5	20.0	20.3	0.984
as left zero	5000	0.0	0.0	0.0	----
as left span	4918	82.1	80.0	80.6	0.992
SO2 Scrubber Check	4920	80.2	802.0	-0.1	----
Date of last scrubber change:		28-Feb-23		Ave Corr Factor	0.988
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.6	Prev response:	80.47	*% change:	-2.4%
Baseline Corr 2nd AF pt:	39.3	AF Slope:	0.982568	AF Intercept:	0.019097
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999998		

* = > +/-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

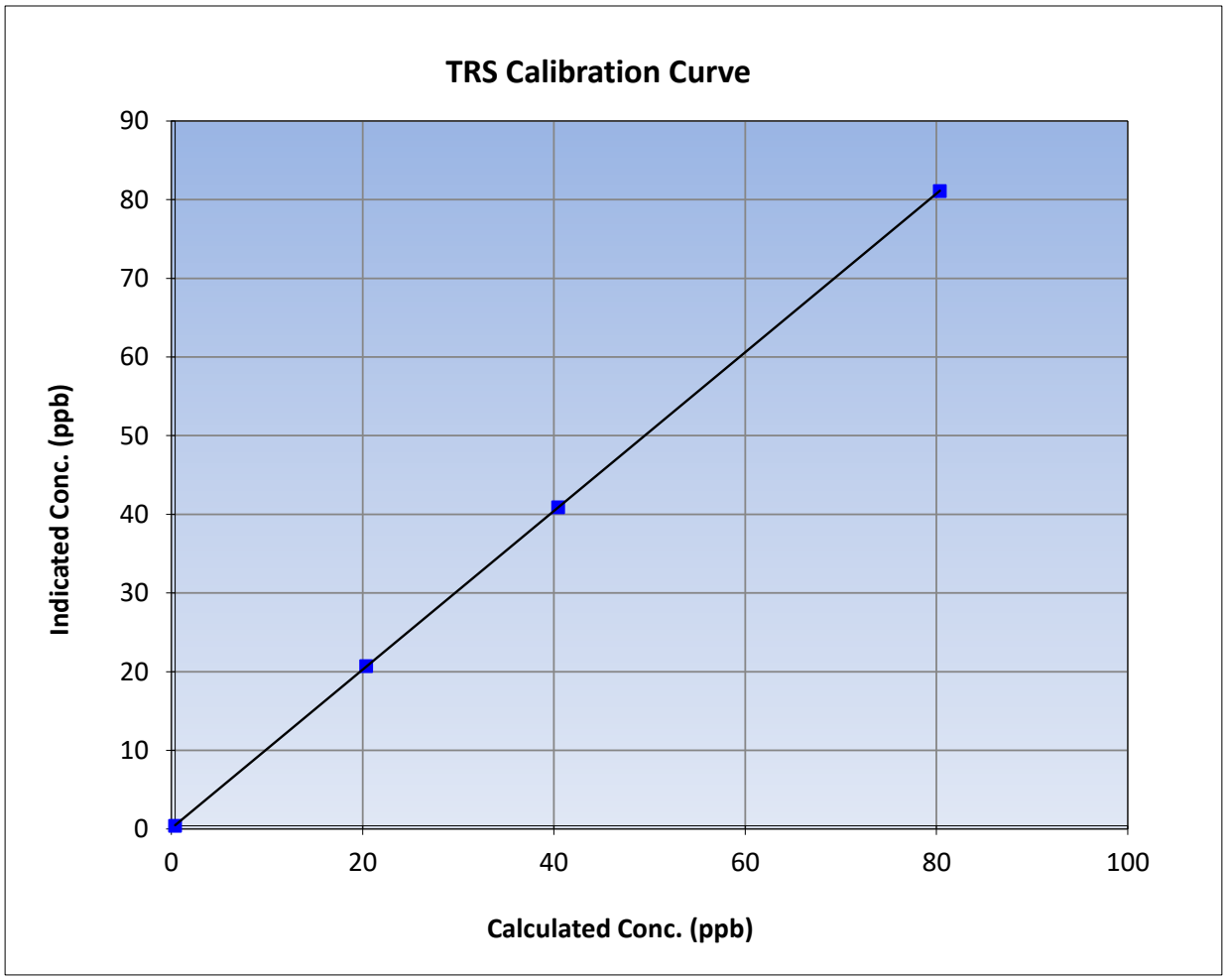
Station Information

Calibration Date:	April 17, 2023	Previous Calibration:	March 23, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:36	End Time (MST):	15:01
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1331259320

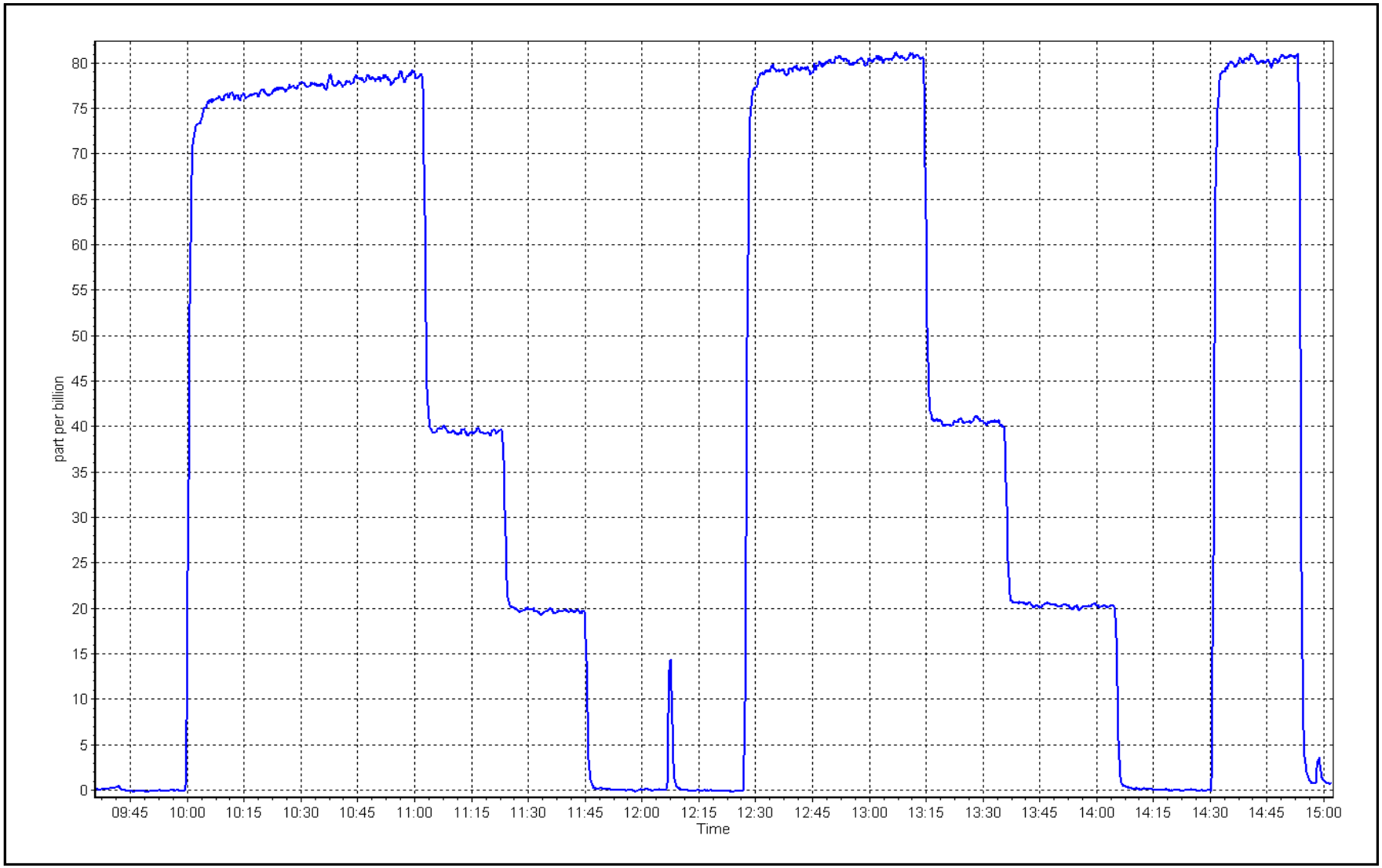
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.7	0.9909
40.0	40.5	0.9884
20.0	20.3	0.9837

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	1.008720	*0.90 - 1.10*
Intercept	0.079030	*+/-3*



TRS Calibration Plot Date: April 17, 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:	April 11, 2023	Last Cal Date:	March 28, 2023
Start time (MST):	9:28	End time (MST):	13:11
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	2.49E-04	NMHC SP Ratio:	4.79E-05	4.79E-05
CH4 Retention time:	15.2	15.2	NMHC Peak Area:	190949	190949

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	80.2	17.12	17.07	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	17.12	17.06	1.003
second point	4960	40.1	8.56	8.54	1.002
third point	4980	20.0	4.27	4.29	0.995
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	17.12	17.18	0.996
				Average Correction Factor	1.000

Baseline Corr AF:	17.07	Prev response	17.08	*% change	-0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.0	----
as found span	4919	80.2	9.14	9.08	1.006
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	9.14	9.07	1.007
second point	4960	40.1	4.57	4.54	1.006
third point	4980	20	2.28	2.28	0.998
as left zero	5000	0	0.00	0.00	----
as left span	4919	80.2	9.14	9.10	1.004
				Average Correction Factor	1.004
Baseline Corr AF:	9.08	Prev response	9.13	*% 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	7.99	0.999
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	7.98	8.00	0.998
second point	4960	40.1	3.99	4.00	0.997
third point	4980	20.0	1.99	2.01	0.990
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	7.98	8.08	0.988
				Average Correction Factor	0.995
Baseline Corr AF:	7.99	Prev response	7.95	*% change	0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.997787	0.995837
THC Cal Offset:	0.002047	0.017643
CH4 Cal Slope:	0.996643	1.000907
CH4 Cal Offset:	-0.003745	0.007869
NMHC Cal Slope:	0.998523	0.991957
NMHC Cal Offset:	0.006592	0.009575

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

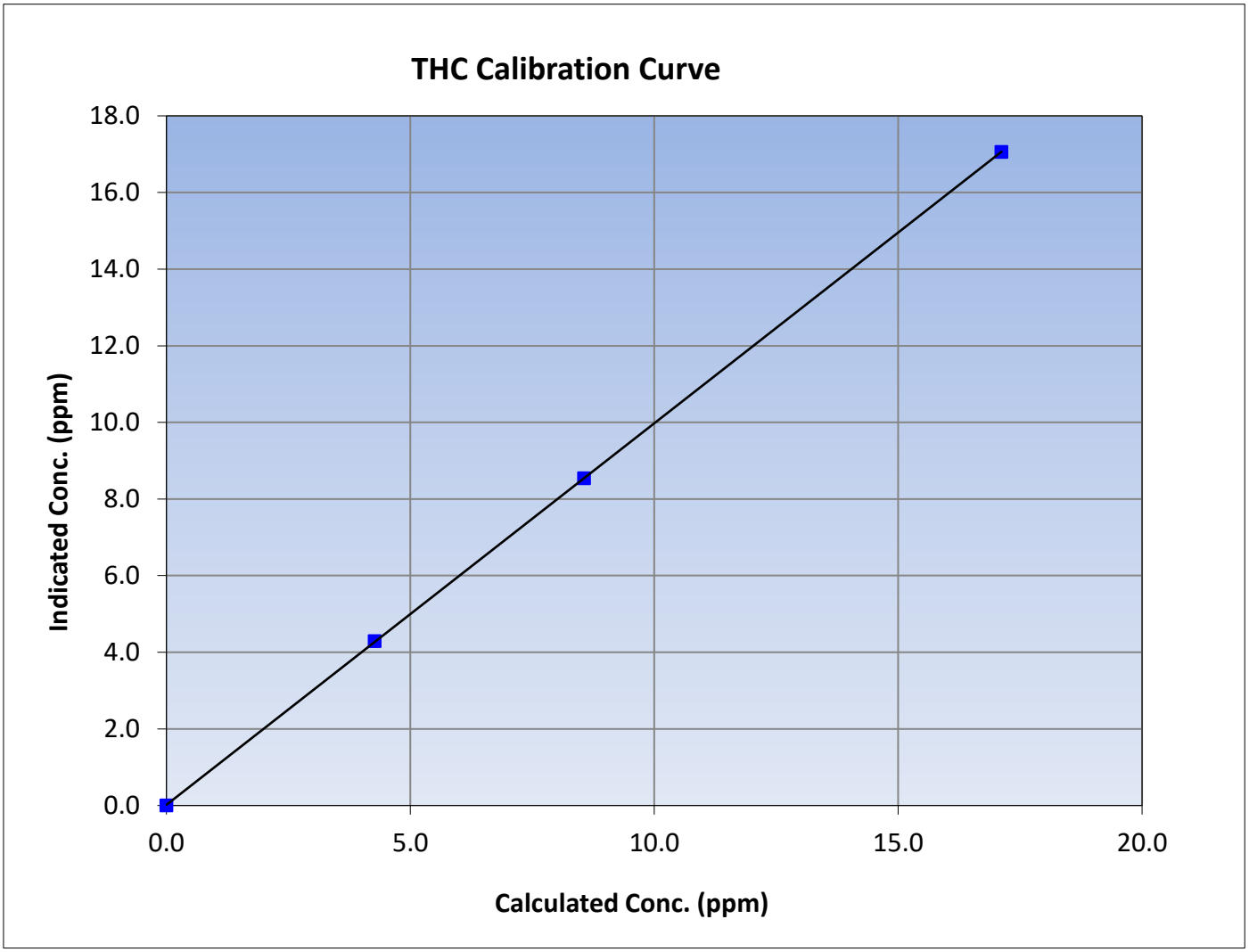
Version-01-2020

Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 28, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:28	End Time (MST):	13:11
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999994	*≥0.995*
17.12	17.06	1.0035			
8.56	8.54	1.0021	Slope	0.995837	*0.90 - 1.10*
4.27	4.29	0.9945			
			Intercept	0.017643	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

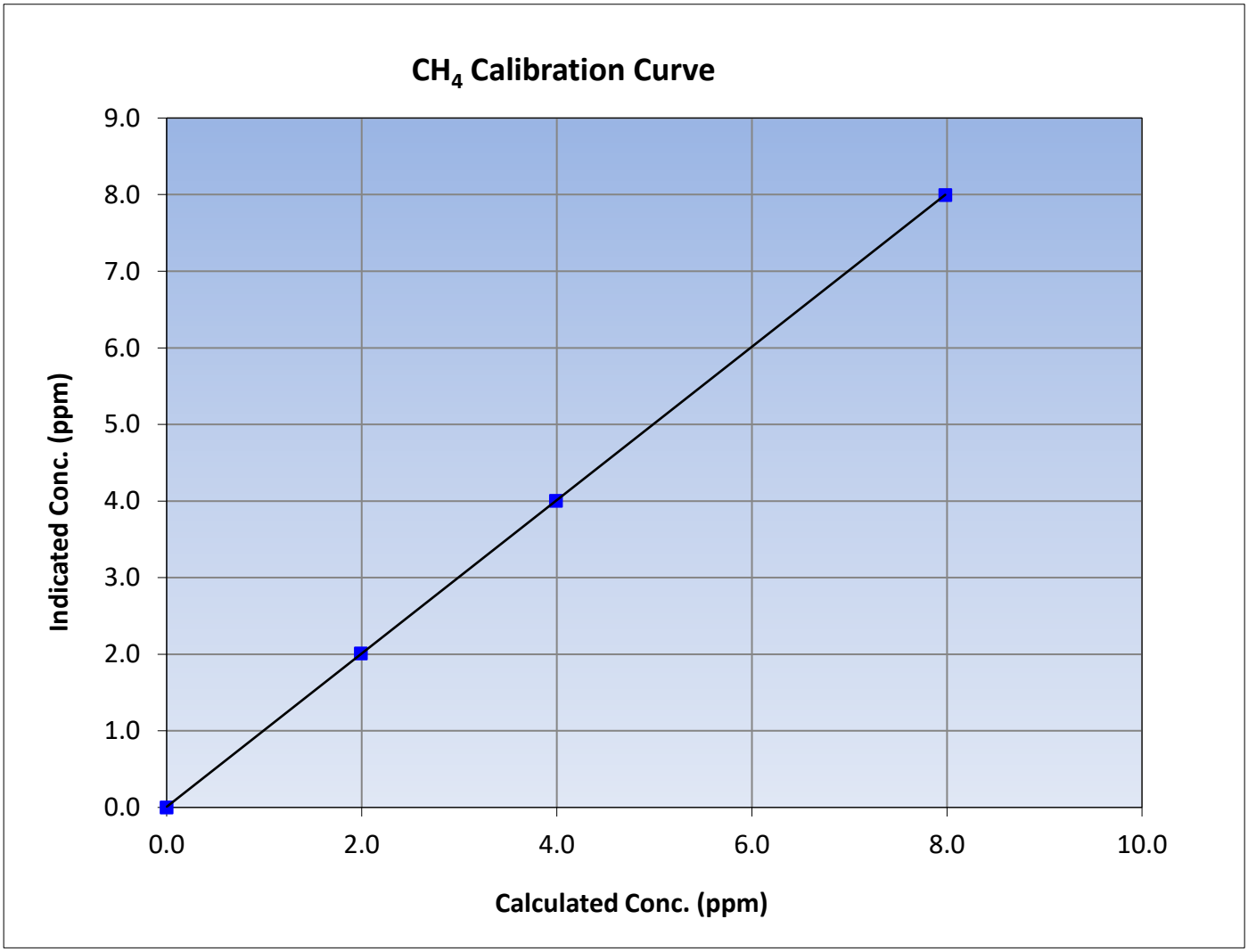
Version-01-2020

Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 28, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:28	End Time (MST):	13:11
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999995	*≥0.995*
7.98	8.00	0.9985			
3.99	4.00	0.9969	Slope	1.000907	*0.90 - 1.10*
1.99	2.01	0.9902			
			Intercept	0.007869	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

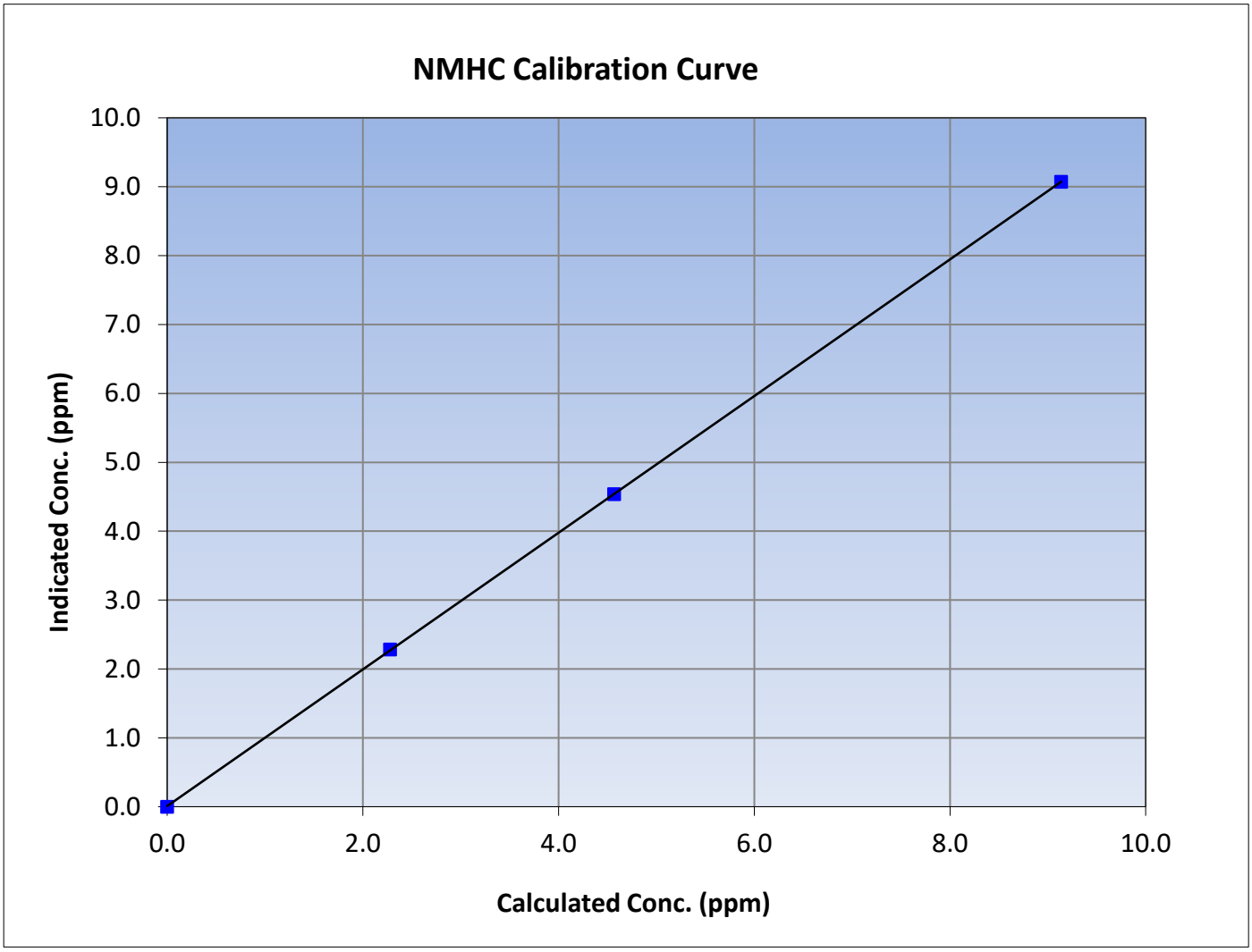
Version-01-2020

Station Information

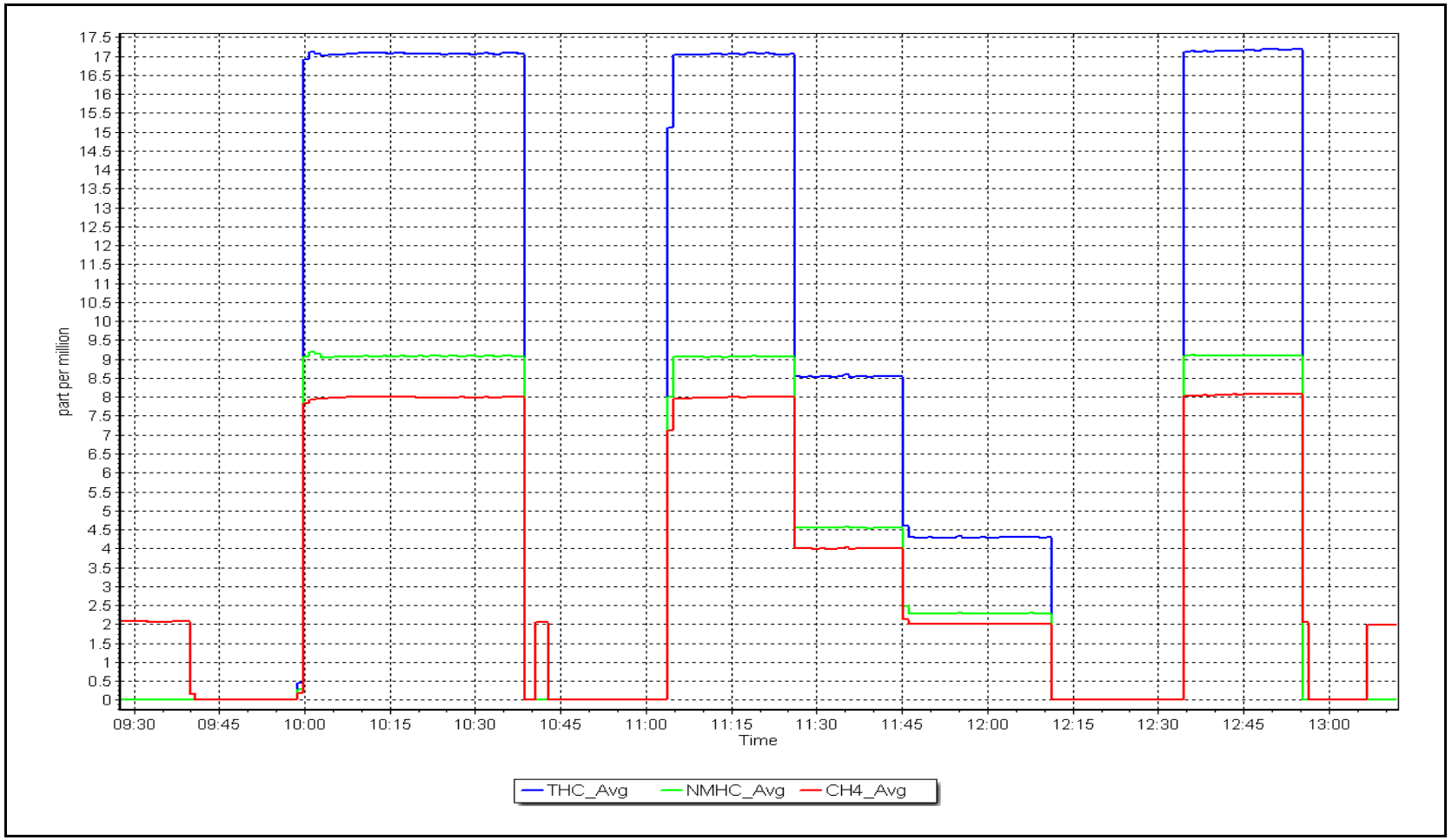
Calibration Date:	April 11, 2023	Previous Calibration:	March 28, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:28	End Time (MST):	13:11
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999994	*≥0.995*
9.14	9.07	1.0073			
4.57	4.54	1.0063	Slope	0.991957	*0.90 - 1.10*
2.28	2.28	0.9979			
			Intercept	0.009575	*+/-0.5*



NMHC Calibration Plot Date: April 11, 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:	April 28, 2023	Last Cal Date:	March 15, 2023
Start time (MST):	9:38	End time (MST):	14:32
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	10.5
NOX coeff or slope:	0.995	0.995	NOX bkgnd or offset:	10.6	10.5
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	179.2	174.9

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.998241	0.997105
NO_X Cal Offset:	0.748819	0.848780
NO Cal Slope:	1.000056	0.996586
NO Cal Offset:	-0.352413	-0.413290
NO_2 Cal Slope:	1.001921	1.003813
NO_2 Cal Offset:	-0.892005	0.518213

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	80.5	805.1	800.3	4.8	805.0	797.1	7.5	1.000	1.004
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
high point	4919	80.5	805.1	800.3	4.8	803.0	797.4	5.5	1.003	1.004
second point	4959	40.2	402.1	399.7	2.4	402.7	397.5	5.2	0.998	1.005
third point	4979	20.1	201.0	199.8	1.2	201.8	198.3	3.6	0.996	1.008
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as left span	4919	80.5	805.1	436.9	368.2	802.0	432.9	368.7	1.004	1.009
								Average Correction Factor	0.999	1.006

Corrected As found	NO_X = 805.0 ppb	NO = 797.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = 0.1%		
Previous Response	NO_X = 804.4 ppb	NO = 799.9 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)	795.0	431.6	368.2	369.9	0.995	100.5%
2nd GPT point (200 ppb O3)	795.0	656.9	142.9	144.4	0.990	101.0%
3rd GPT point (100 ppb O3)	795.0	724.6	75.2	76.5	0.983	101.7%
				Average Correction Factor	0.990	101.1%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

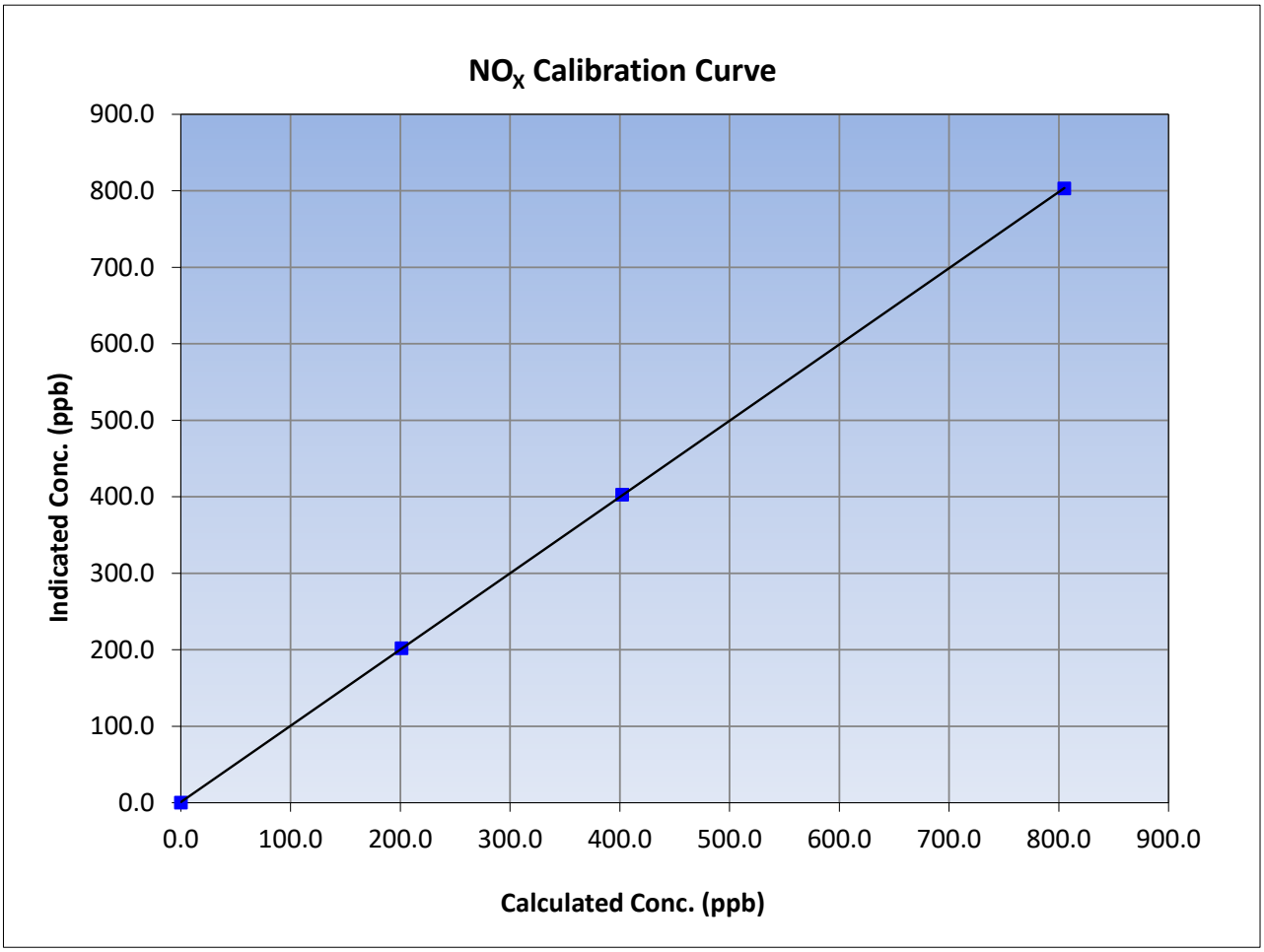
Version-04-2020

Station Information

Calibration Date:	April 28, 2023	Previous Calibration:	March 15, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:38	End Time (MST):	14:32
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	0.999994	≥0.995
805.1	803.0	1.0026			
402.1	402.7	0.9984	Slope	0.997105	0.90 - 1.10
201.0	201.8	0.9962			
			Intercept	0.848780	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

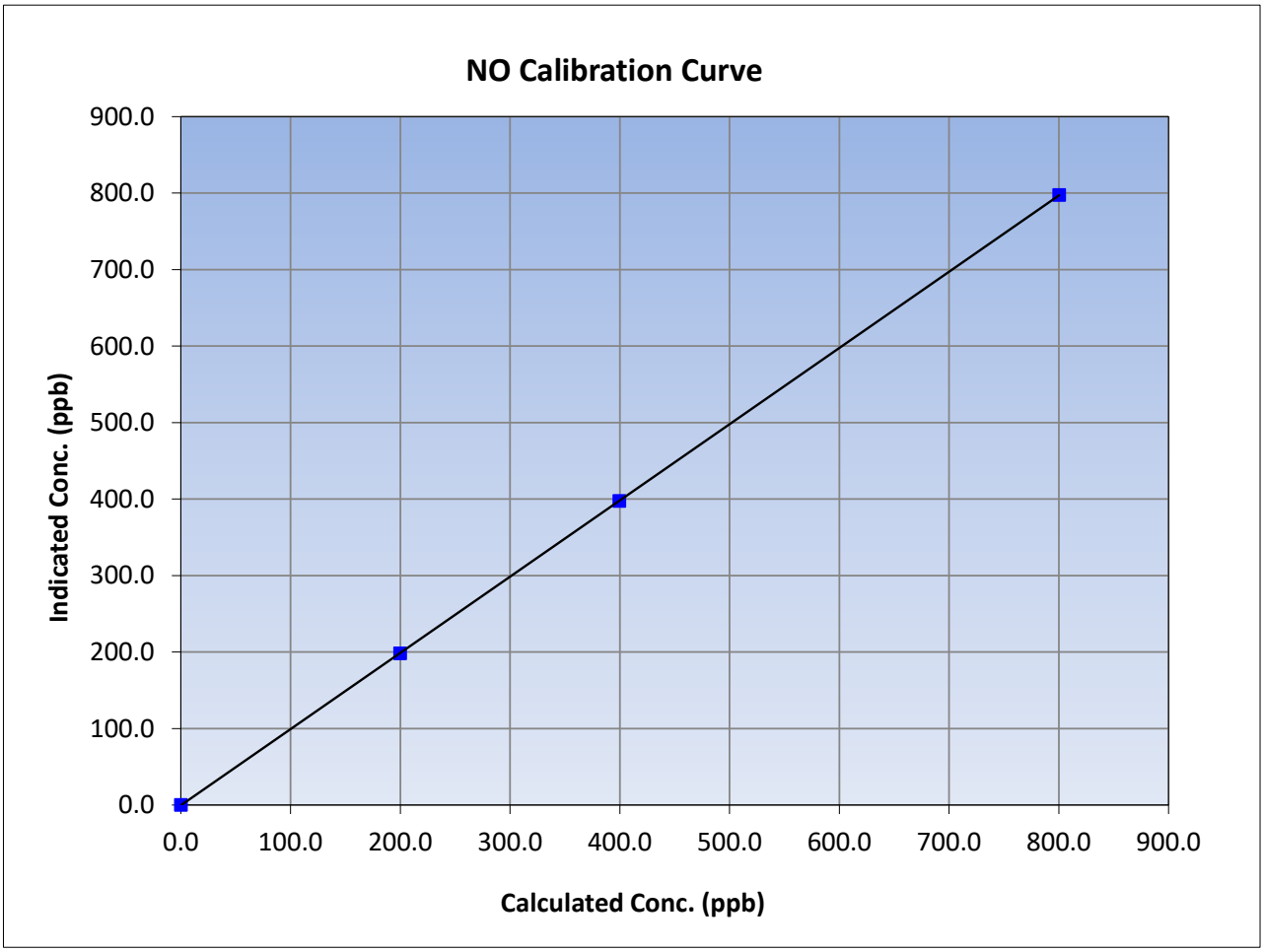
Version-04-2020

Station Information

Calibration Date:	April 28, 2023	Previous Calibration:	March 15, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:38	End Time (MST):	14:32
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999998	≥0.995
800.3	797.4	1.0036			
399.7	397.5	1.0054	Slope	0.996586	0.90 - 1.10
199.8	198.3	1.0077			
			Intercept	-0.413290	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

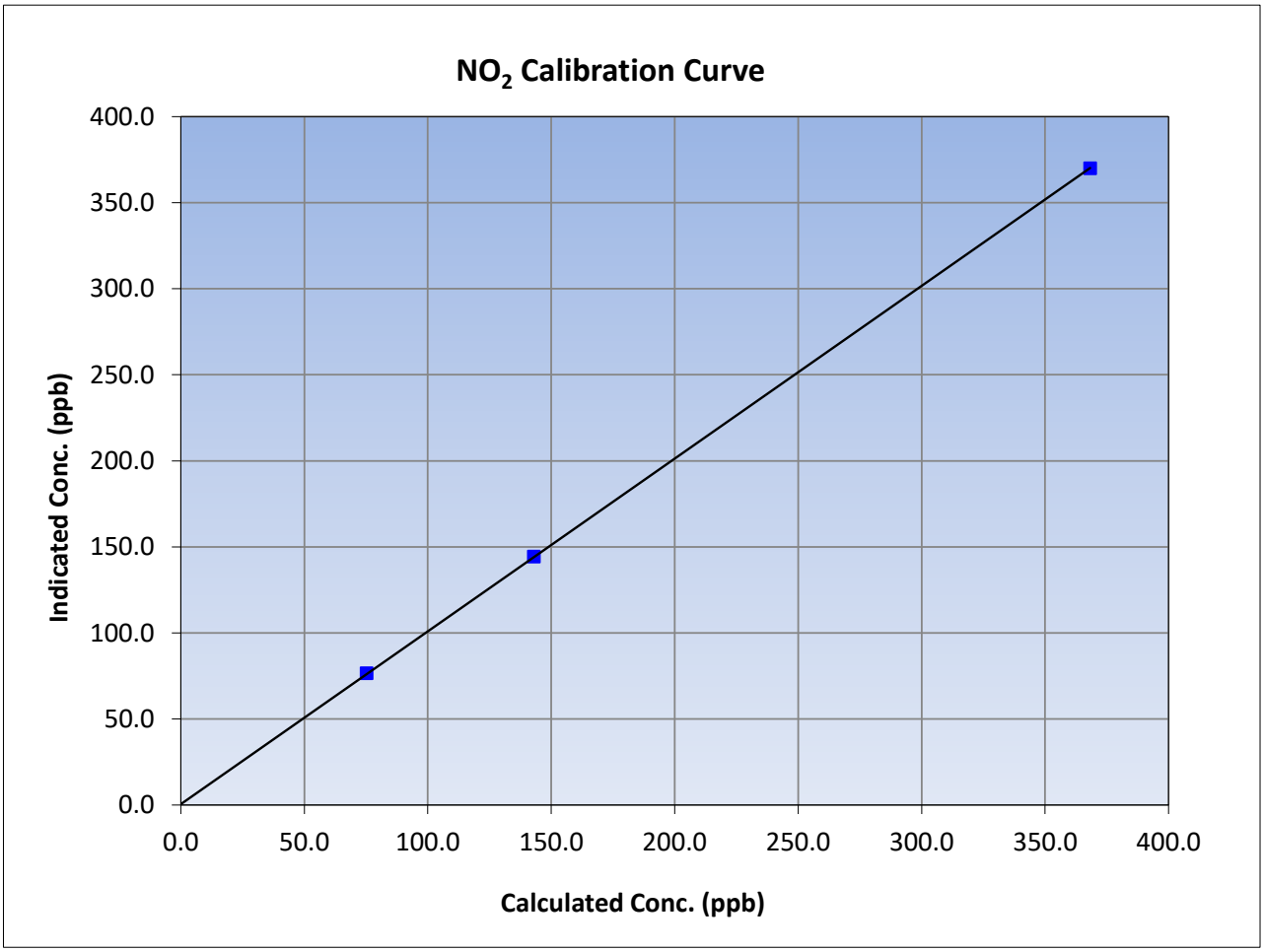
Version-04-2020

Station Information

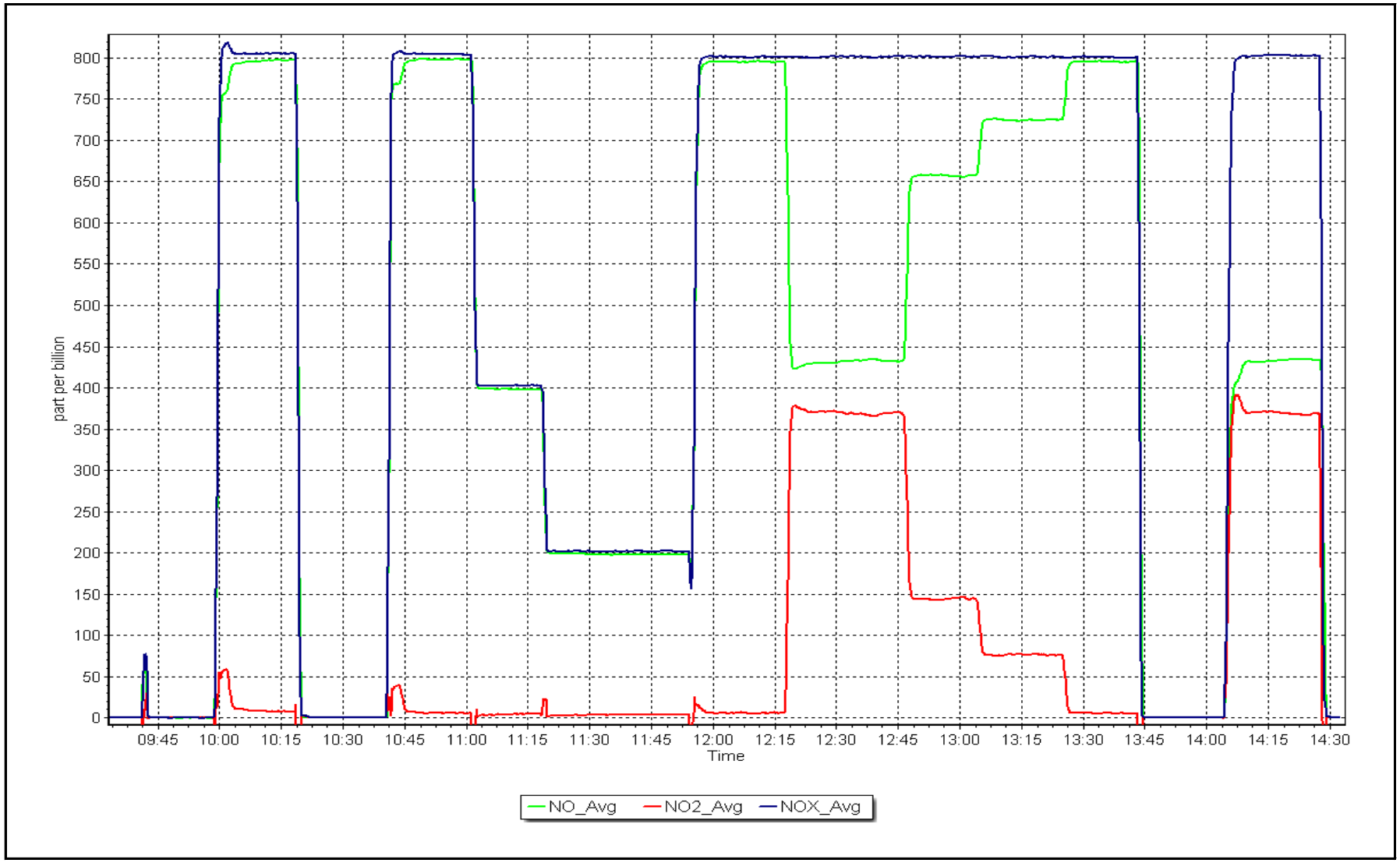
Calibration Date:	April 28, 2023	Previous Calibration:	March 15, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:38	End Time (MST):	14:32
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999989	≥0.995
368.2	369.9	0.9955			
142.9	144.4	0.9898	Slope	1.003813	0.90 - 1.10
75.2	76.5	0.9834			
			Intercept	0.518213	+/-20



NO_X Calibration Plot Date: April 28, 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:	April 28, 2023	Last Cal Date:	March 23, 2023
Start time (MST):	11:18	End time (MST):	11:48
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 (^{o}C)	14.3	15.60	14.3	☐	+/- 2 ^{o}C
P (mmHg)	733.8	735.67	733.8	☐	+/- 10 mmHg
flow (LPM)	5.00	4.901	5.00	☐	+/- 0.25 LPM

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

PM w/o HEPA: 1.8 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

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

Disposable Filter Changed: February 28, 2023

Annual Maintenance

Date Sample Tube Cleaned: November 15, 2022

Date RH/T Sensor Cleaned: November 15, 2022

Notes: No adjustments made. Cleaned inlet head. Leak check passed.

Calibration by: Braiden Boutilier

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS11
LOWER CAMP
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Lower Camp	Station number:	AMS11
Calibration Date:	April 11, 2023	Last Cal Date:	March 7, 2023
Start time (MST):	9:50	End time (MST):	12:47
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:	0.995374	0.995416	Backgd or Offset:	14.0	14.3
Calibration intercept:	-0.208611	-0.748519	Coeff or Slope:	1.051	1.051

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.3	----
as found span	4919	81.3	800.8	793.7	1.009
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.6	----
high point	4919	81.3	800.8	797.5	1.004
second point	4959	40.7	400.9	396.2	1.012
third point	4980	20.3	199.9	197.9	1.010
as left zero	5000	0.0	0.0	0.6	----
as left span	4919	81.3	800.8	794.2	1.008
				Average Correction Factor	1.009

Baseline Corr As found:	793.40	Previous response	796.84	*% change	-0.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

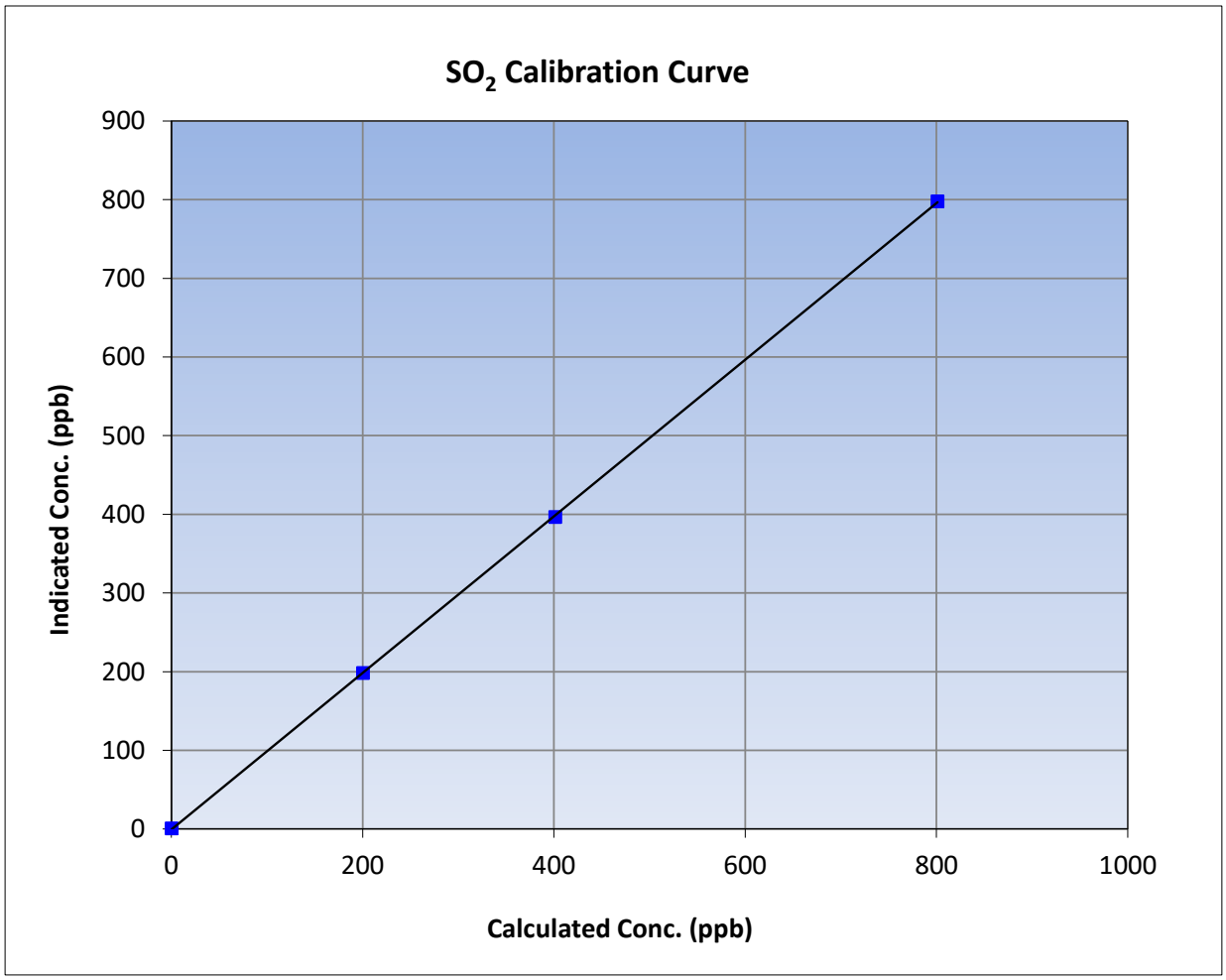
Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 7, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:50	End Time (MST):	12:47
Analyzer make:	Thermo 43i	Analyzer serial #:	100841398

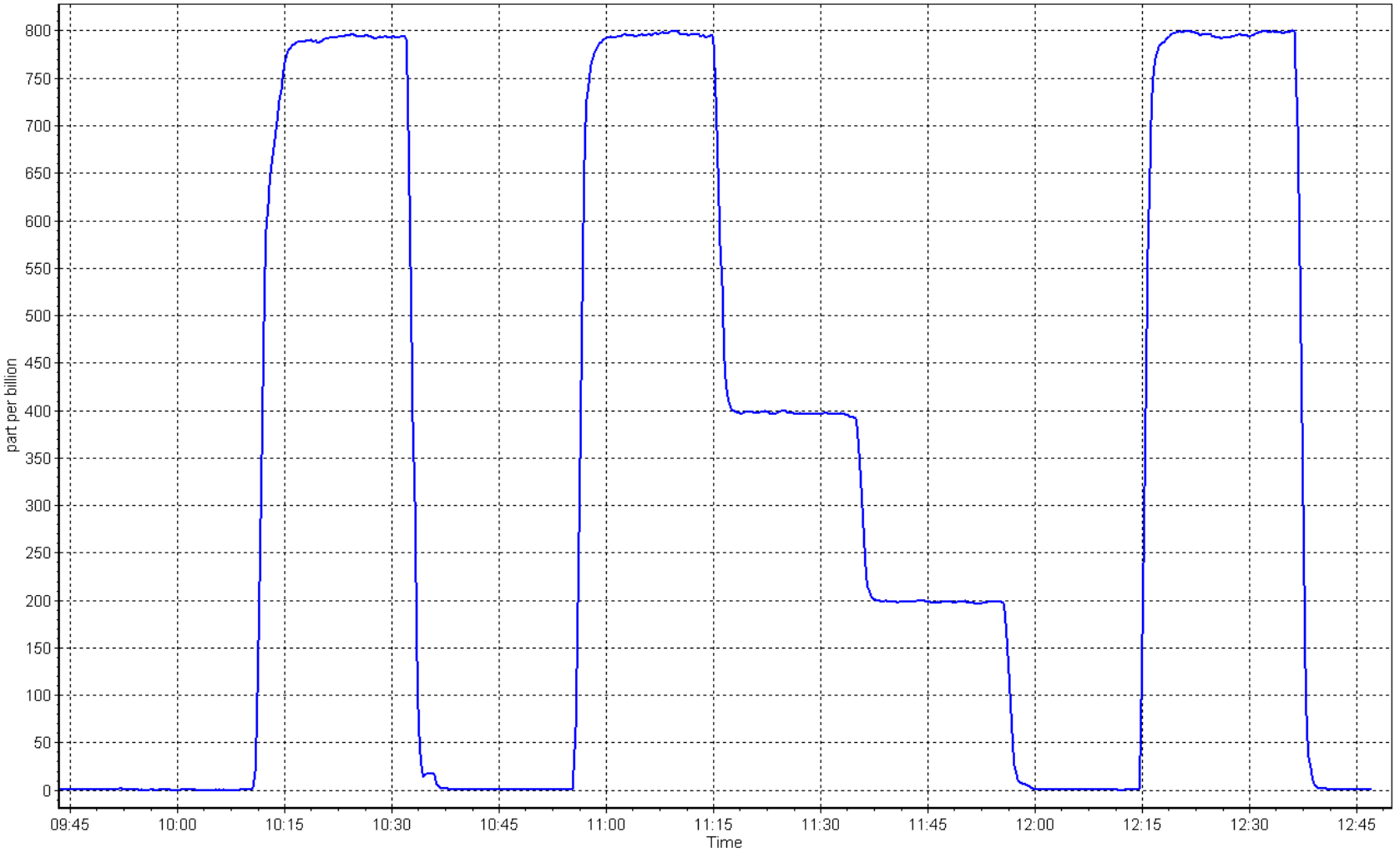
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.6	----
800.8	797.5	1.0041
400.9	396.2	1.0119
199.9	197.9	1.0103

Statistical Evaluation		Limits
Correlation Coefficient	0.999977	≥0.995
Slope	0.995416	0.90 - 1.10
Intercept	-0.748519	+/-30



SO2 Calibration Plot Date: April 11, 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:	April 13, 2023	Last Cal Date:	March 28, 2023
Start time (MST):	8:42	End time (MST):	12:19
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:	1.026375	1.015352	Backgd or Offset:	13.9	14.0
Calibration intercept:	0.532956	0.293967	Coeff or Slope:	1.043	1.043

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.3	----
as found span	4926	73.6	79.9	80.8	0.993
as found 2nd point	4963	36.8	40.0	40.4	0.996
as found 3rd point	4982	18.6	20.2	20.3	1.010
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.4	----
high point	4926	73.6	79.9	81.5	0.981
second point	4963	36.8	40.0	40.8	0.979
third point	4982	18.6	20.2	20.7	0.976
as left zero	5000	0.0	0.0	0.5	----
as left span	4926	73.6	79.9	81.4	0.982
SO2 Scrubber Check	4919	81.1	811.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.979
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.5	Prev response:	82.56	*% change:	-2.6%
Baseline Corr 2nd AF pt:	40.1	AF Slope:	1.008475	AF Intercept:	0.134769
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999980		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

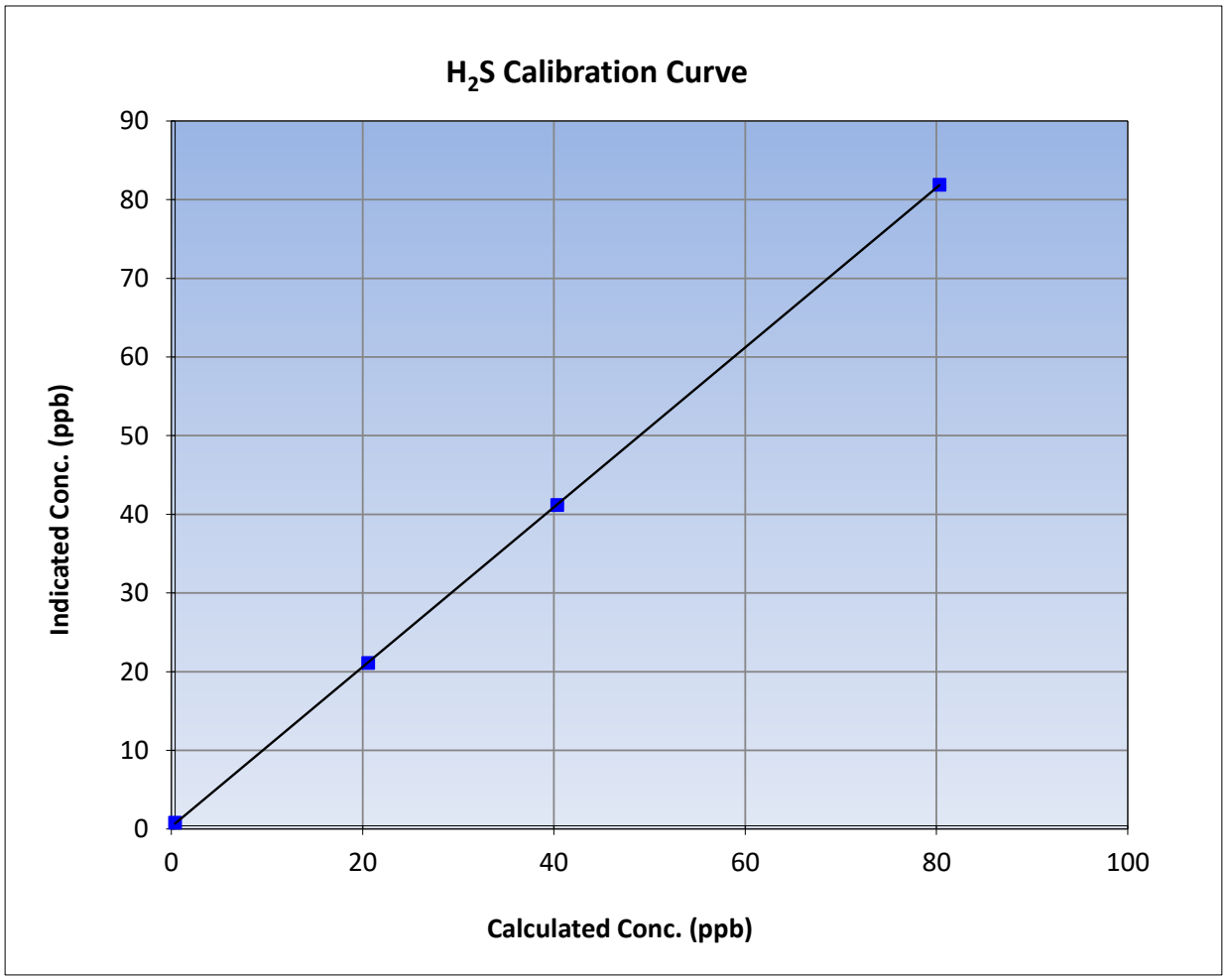
Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 28, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	8:42	End Time (MST):	12:19
Analyzer make:	Thermo 450iQ	Analyzer serial #:	CM20080003

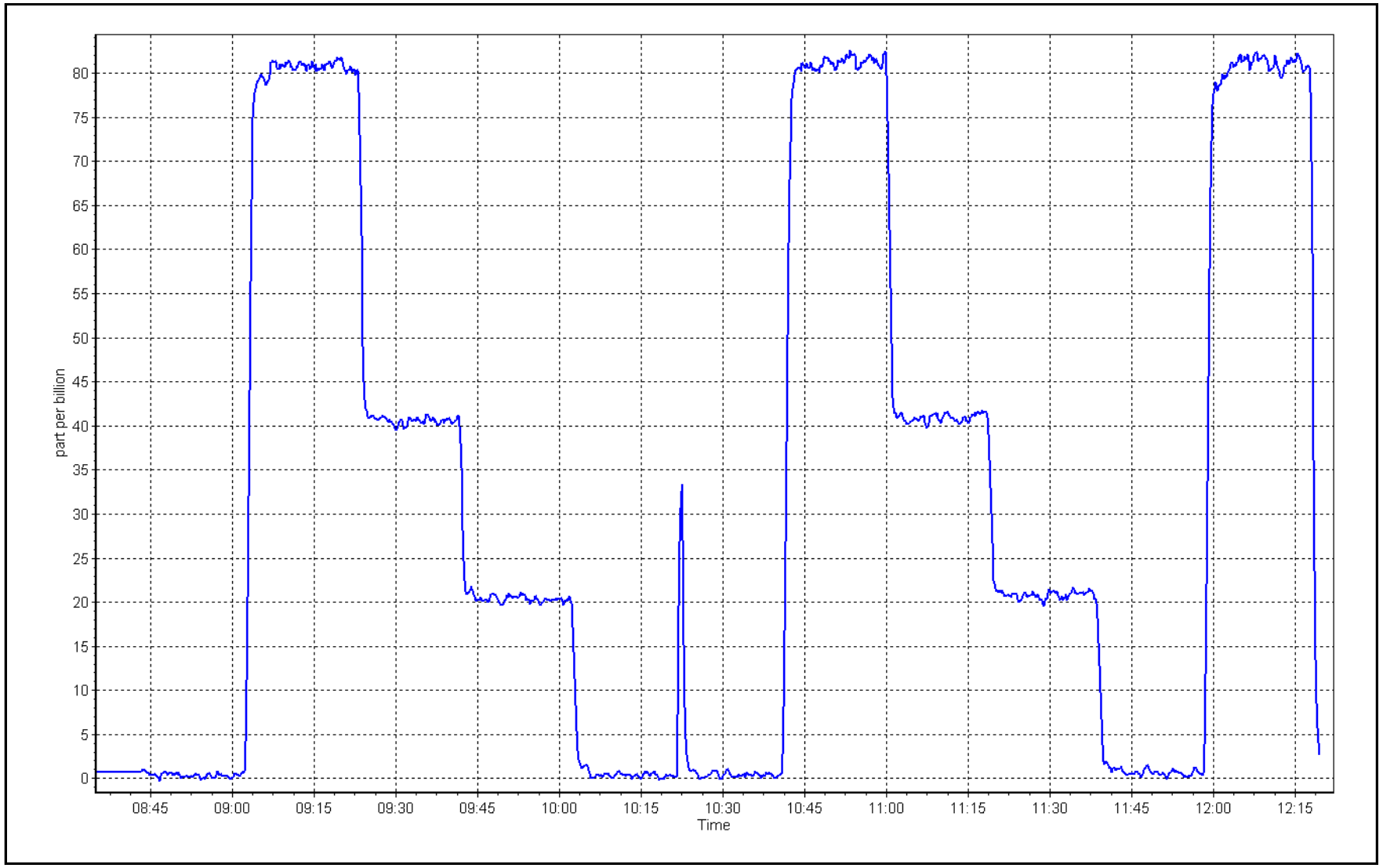
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
79.9	81.5	0.9806
40.0	40.8	0.9794
20.2	20.7	0.9755

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	1.015352	*0.90 - 1.10*
Intercept	0.293967	*+/-3*



H_2S Calibration Plot Date: April 13, 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:	April 11, 2023	Last Cal Date:	March 7, 2023
Start time (MST):	9:50	End time (MST):	12:47
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	3.02E-04	NMHC SP Ratio:	5.86E-05	5.86E-05
CH4 Retention time:	13.8	13.8	NMHC Peak Area:	156599	156599

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	17.35	17.22	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	81.3	17.35	17.32	1.002
second point	4959	40.7	8.69	8.59	1.011
third point	4980	20.3	4.33	4.29	1.011
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	17.35	17.33	1.001
				Average Correction Factor	1.008

Baseline Corr AF:	17.22	Prev response	17.30	*% 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	0.00	----
as found span	4919	81.3	9.19	9.12	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.3	9.19	9.16	1.004
second point	4959	40.7	4.60	4.55	1.011
third point	4980	20.3	2.29	2.27	1.009
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	9.19	9.18	1.001
				Average Correction Factor	1.008
Baseline Corr AF:	9.12	Prev response	9.15	*% 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	4919	81.3	8.16	8.10	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	81.3	8.16	8.16	1.000
second point	4959	40.7	4.09	4.04	1.011
third point	4980	20.3	2.04	2.01	1.013
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	8.16	8.16	1.001
				Average Correction Factor	1.008
Baseline Corr AF:	8.10	Prev response	8.15	*% 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:	0.998030	0.998101
THC Cal Offset:	-0.019190	-0.029983
CH4 Cal Slope:	1.000126	1.000279
CH4 Cal Offset:	-0.010089	-0.017886
NMHC Cal Slope:	0.996404	0.996415
NMHC Cal Offset:	-0.009301	-0.012098

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

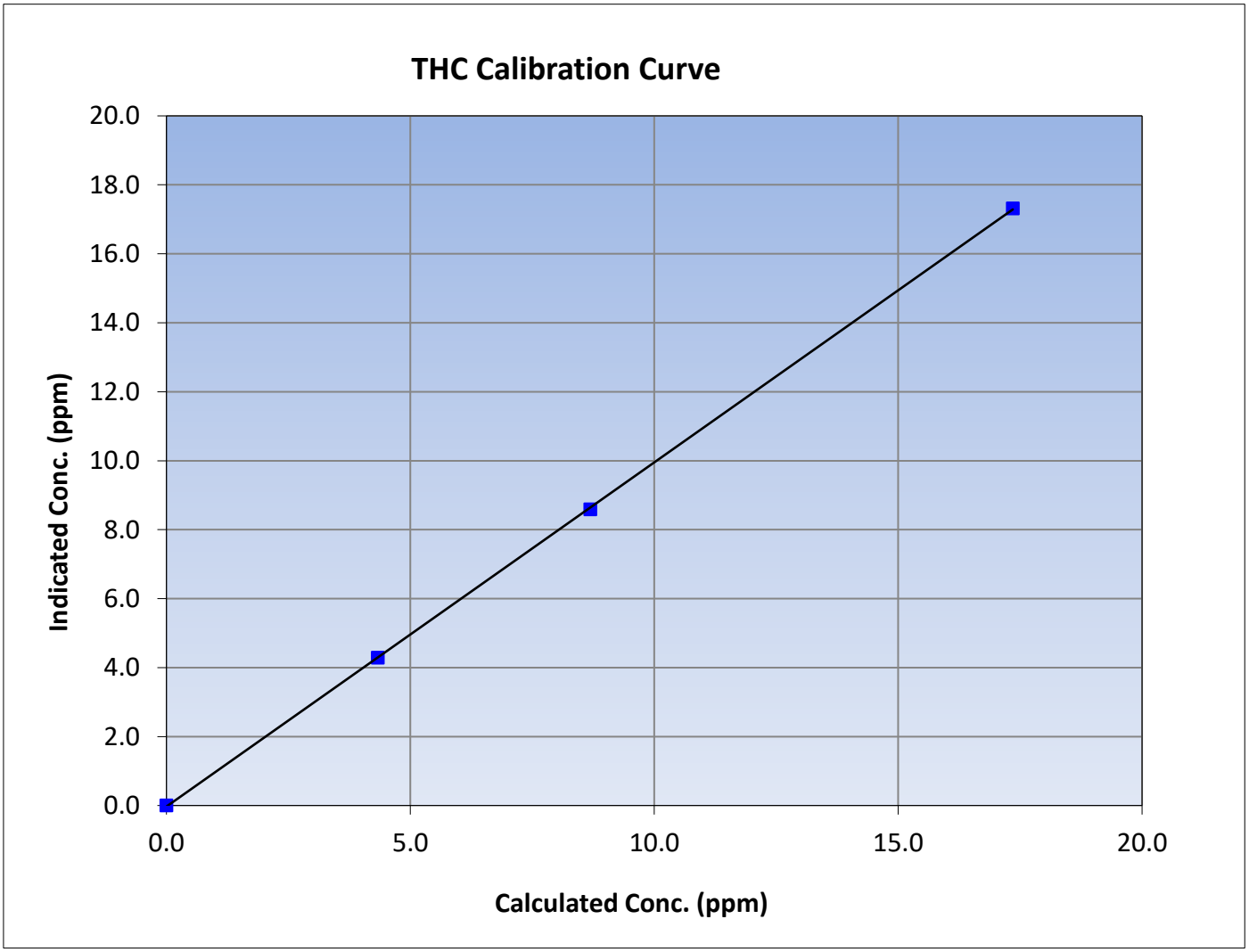
Version-01-2020

Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 7, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:50	End Time (MST):	12:47
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	0.999973	*≥0.995*
17.35	17.32	1.0020			
8.69	8.59	1.0113	Slope	0.998101	*0.90 - 1.10*
4.33	4.29	1.0110			
			Intercept	-0.029983	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

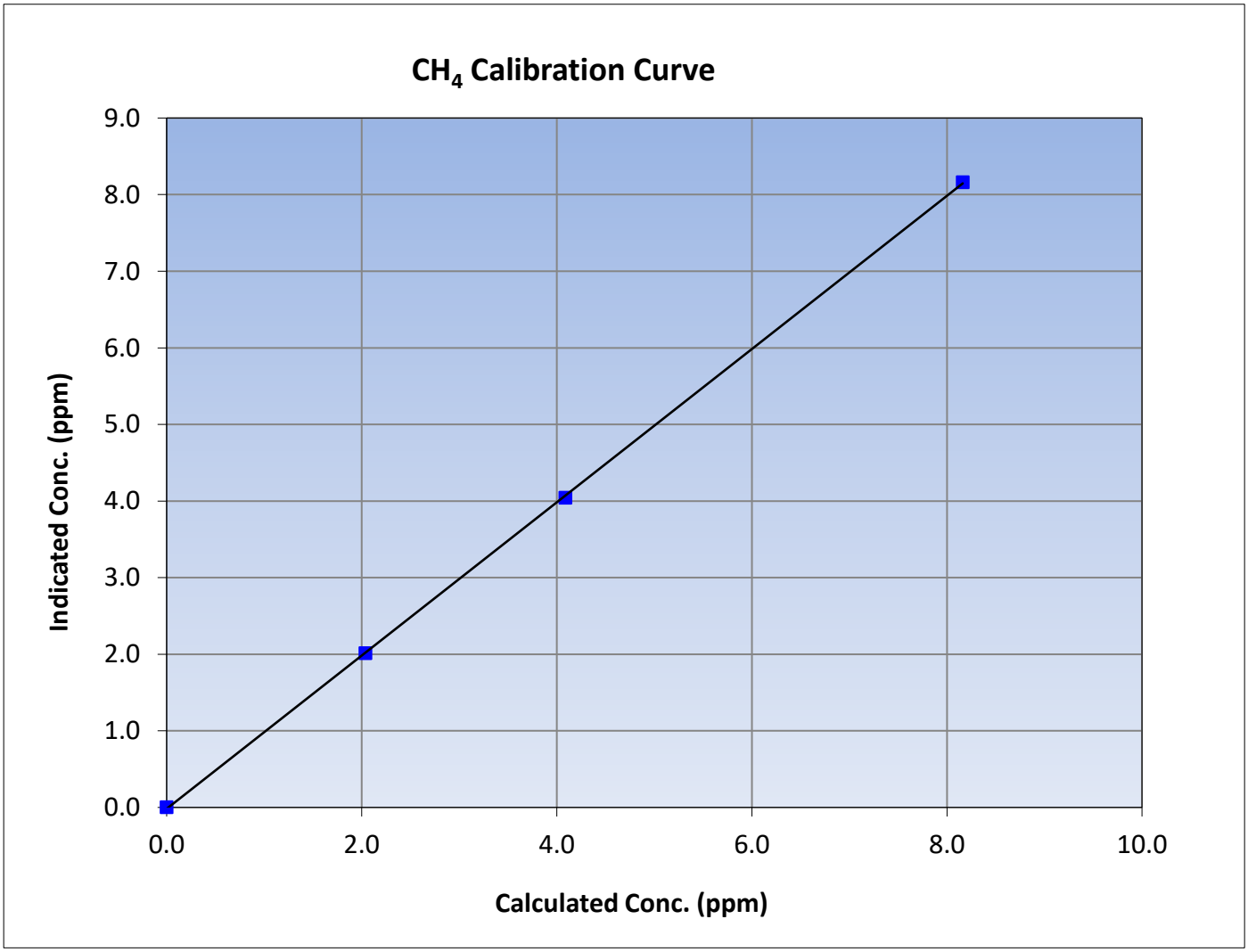
Version-01-2020

Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 7, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:50	End Time (MST):	12:47
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	0.999961	*≥0.995*
8.16	8.16	1.0000			
4.09	4.04	1.0108	Slope	1.000279	*0.90 - 1.10*
2.04	2.01	1.0129			
			Intercept	-0.017886	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

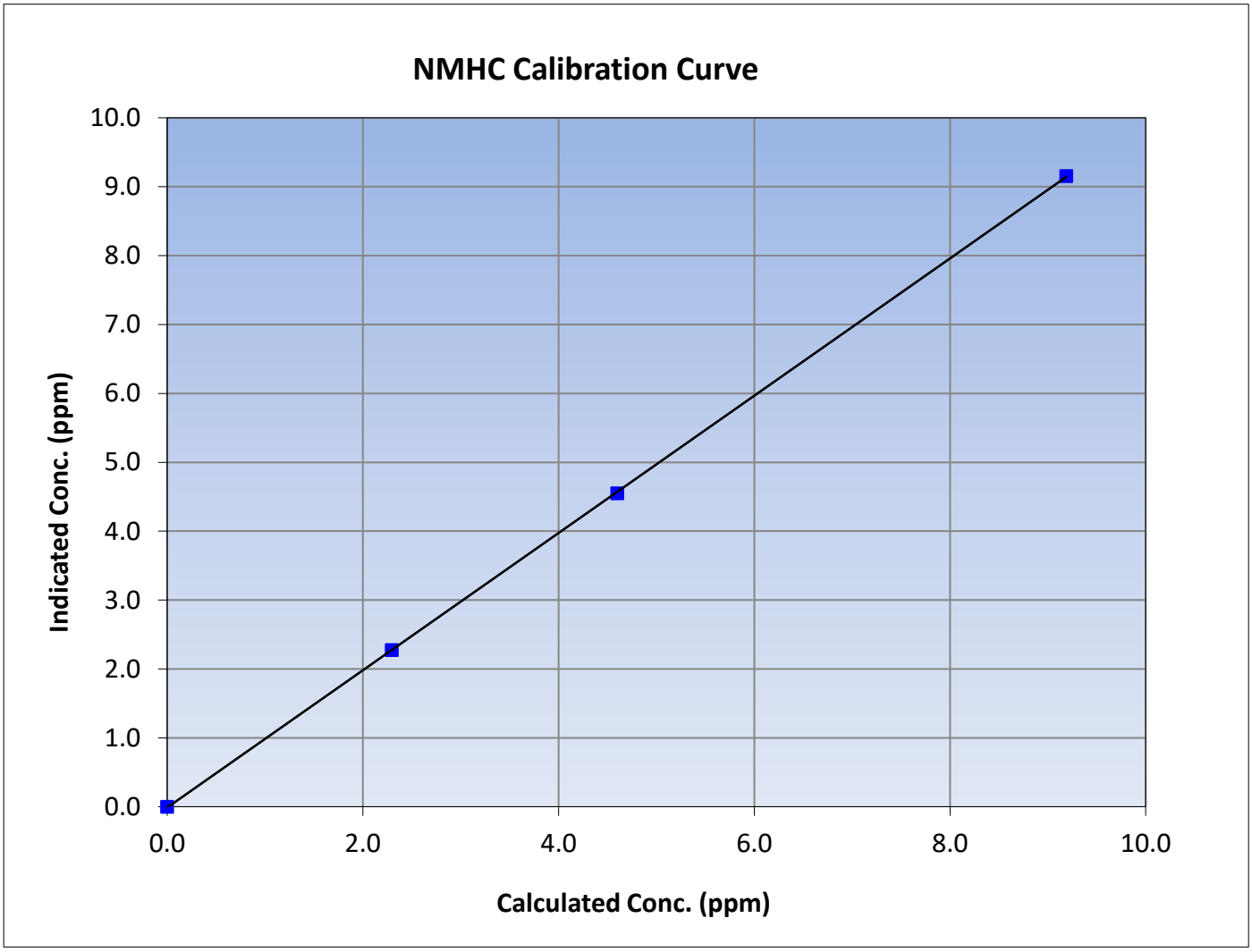
Version-01-2020

Station Information

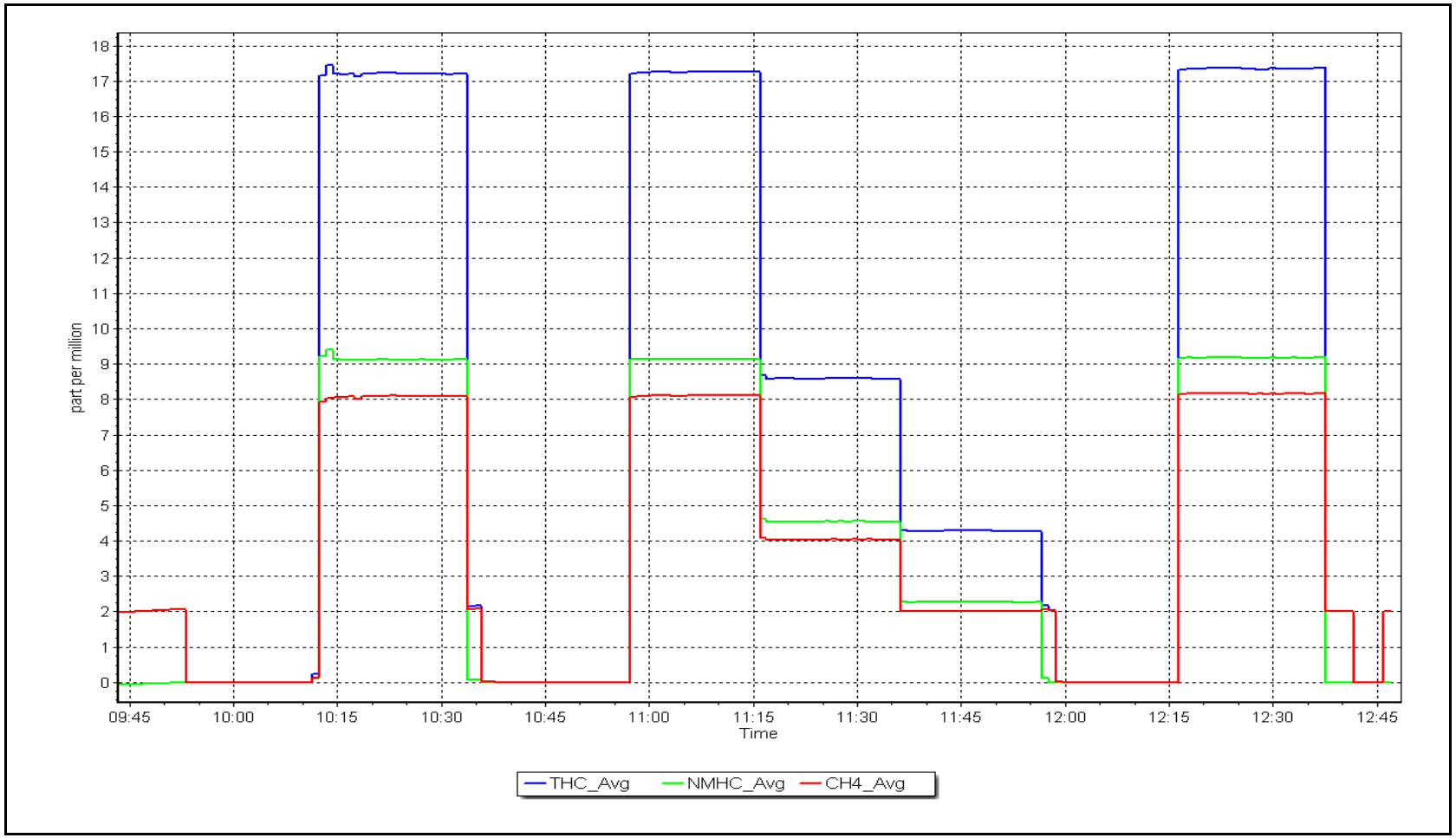
Calibration Date:	April 11, 2023	Previous Calibration:	March 7, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:50	End Time (MST):	12:47
Analyzer make:	Thermo 55i	Analyzer serial #:	1505164381

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999982	≥0.995
9.19	9.16	1.0036			
4.60	4.55	1.0113	Slope	0.996415	0.90 - 1.10
2.29	2.27	1.0094			
			Intercept	-0.012098	+/-0.5



NMHC Calibration Plot Date: April 11, 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:	April 27, 2023	Last Cal Date:	April 11, 2023
Start time (MST):	9:21	End time (MST):	11:04
Reason:	Cylinder Change		

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	3.02E-04	NMHC SP Ratio:	5.86E-05	5.86E-05
CH4 Retention time:	13.8	13.8	NMHC Peak Area:	156599	156599

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	17.35	17.34	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.3	17.35	17.31	1.002
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.002

Baseline Corr AF:	17.34	Prev response	17.29	*% 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	4919	81.3	9.19	9.16	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.3	9.19	9.15	1.004
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.004
Baseline Corr AF:	9.16	Prev response	9.14	*% change	0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	8.16	8.18	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.3	8.16	8.16	1.000
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.000
Baseline Corr AF:	8.18	Prev response	8.15	*% change	0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

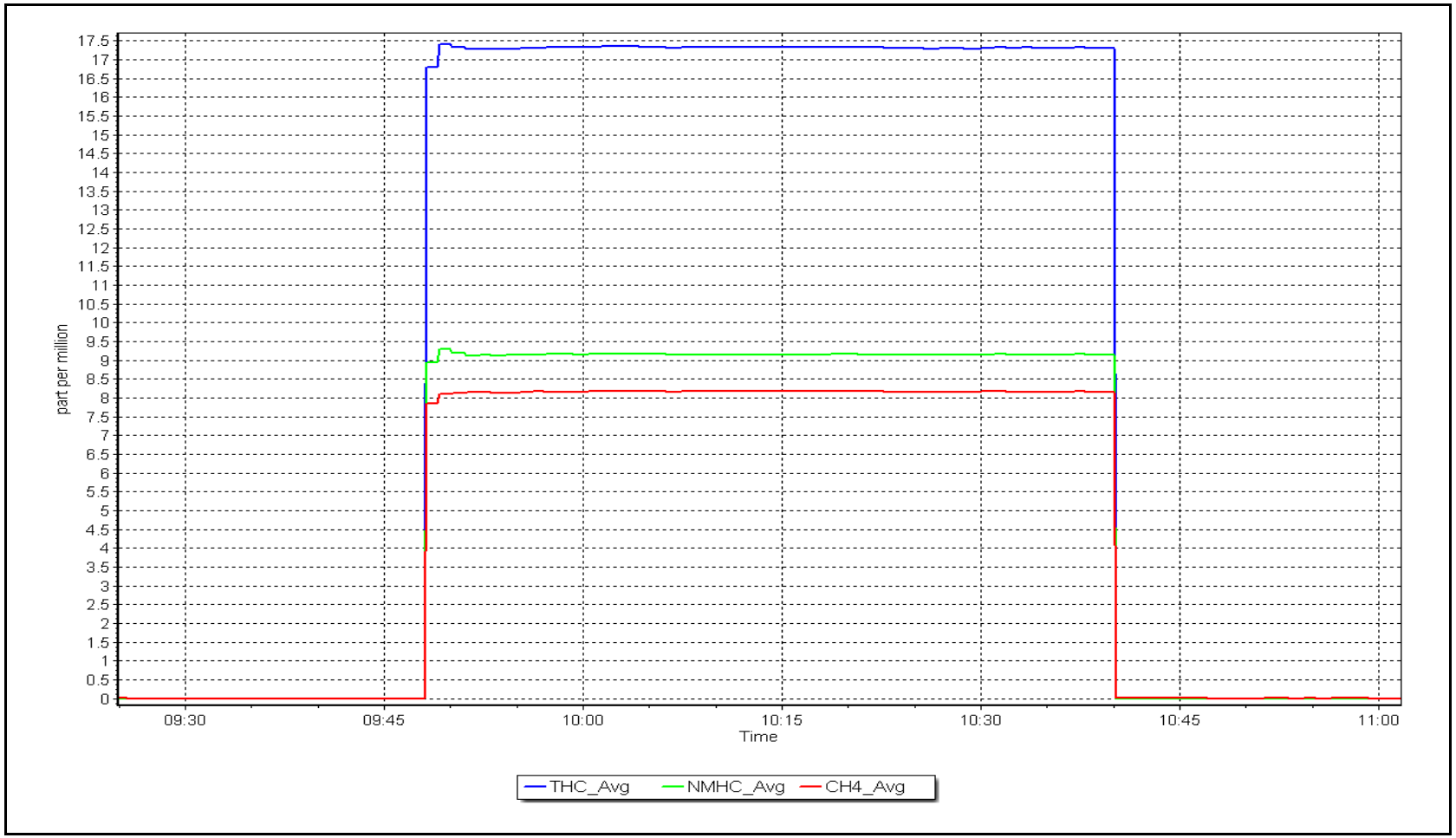
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.998101	0.997440
THC Cal Offset:	-0.029983	0.004000
CH4 Cal Slope:	1.000279	0.999139
CH4 Cal Offset:	-0.017886	0.004000
NMHC Cal Slope:	0.996415	0.995714
NMHC Cal Offset:	-0.012098	0.000000

Notes: Changed N2 cylinder after as founds.

Calibration Performed By: Sean Bala

NMHC Calibration Plot Date: April 27, 2023 Location: Lower Camp



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS13
FORT MCKAY SOUTH
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	April 19, 2023	Last Cal Date:	March 2, 2023
Start time (MST):	8:54	End time (MST):	12:04
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make: API T100 Analyzer serial #: 599

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001413	1.002614	Backgd or Offset:	77.5	80.5
Calibration intercept:	-2.738219	-2.958216	Coeff or Slope:	0.735	0.731

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	804.5	0.994
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4921	79.1	799.7	800.1	0.999
second point	4961	39.5	399.3	396.3	1.008
third point	4980	19.8	200.2	194.8	1.028
as left zero	5000	0.0	0.0	-0.2	----
as left span	4921	79.1	799.7	798.5	1.001
				Average Correction Factor	1.012

Baseline Corr As found:	804.80	Previous response	798.08	*% change	0.8%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed 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

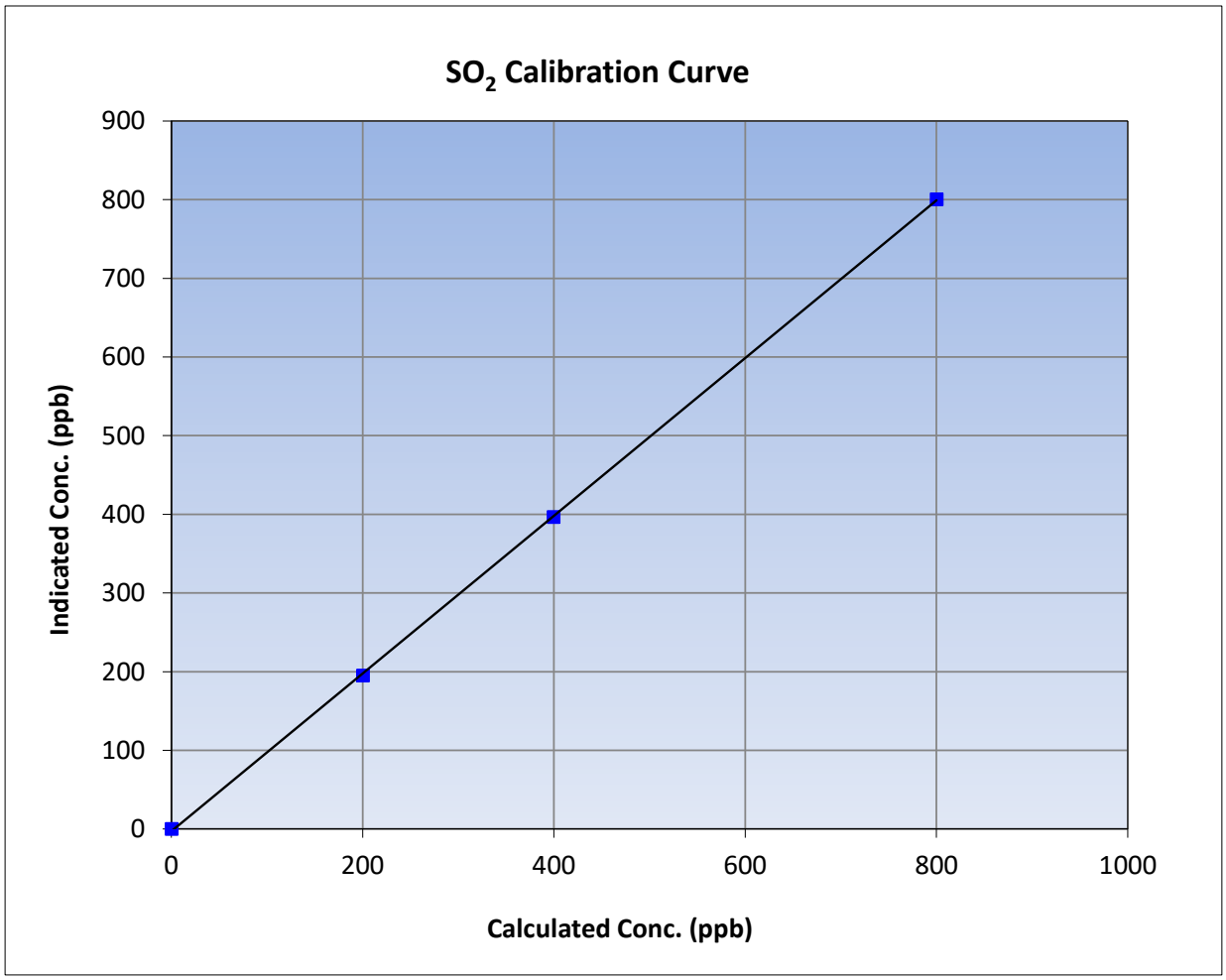
Station Information

Calibration Date:	April 19, 2023	Previous Calibration:	March 2, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:54	End Time (MST):	12:04
Analyzer make:	API T100	Analyzer serial #:	599

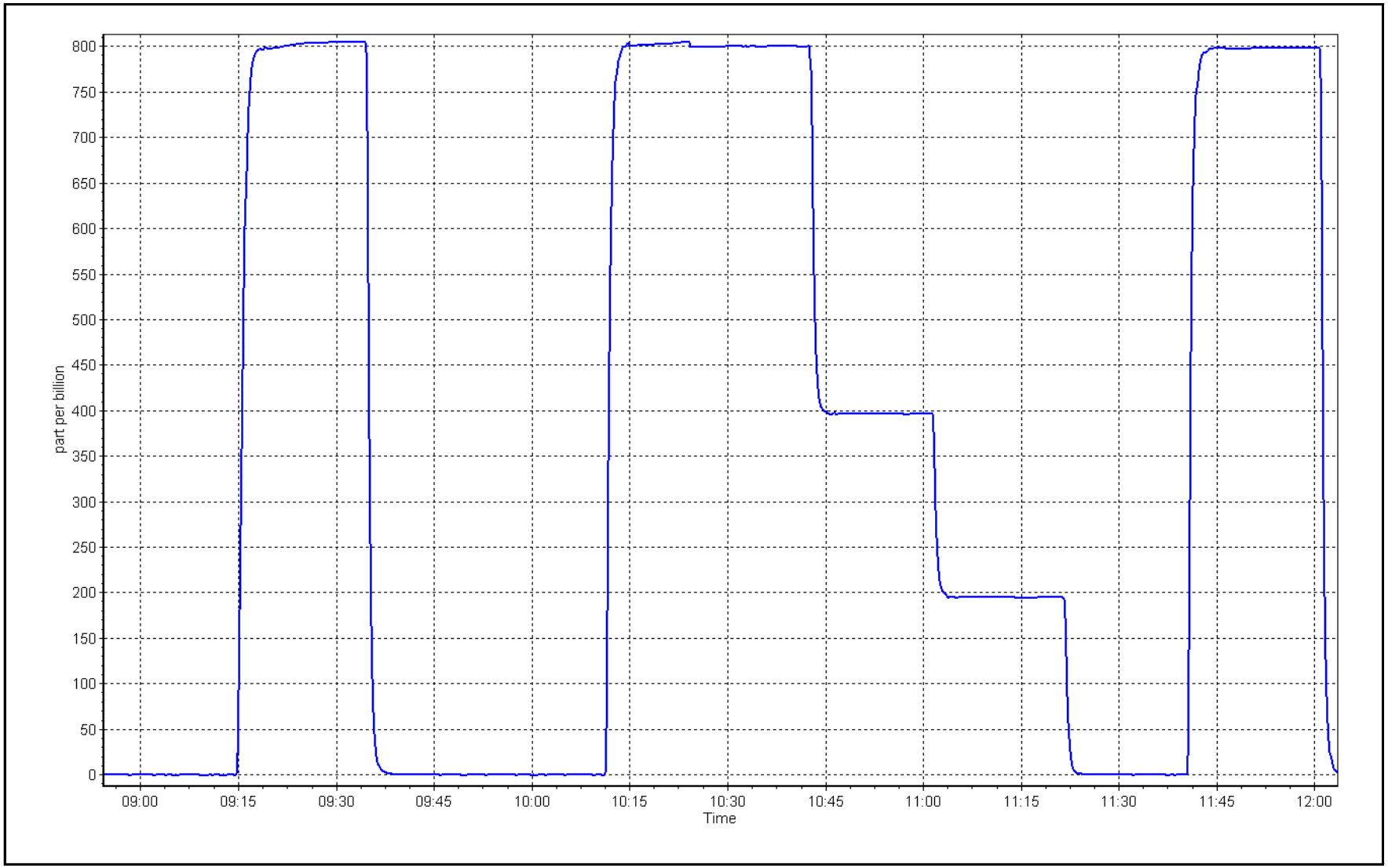
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
799.7	800.1	0.9995
399.3	396.3	1.0076
200.2	194.8	1.0276

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999946	*≥0.995*
Slope	1.002614	*0.90 - 1.10*
Intercept	-2.958216	*+/-30*



SO2 Calibration Plot Date: April 19, 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:	April 3, 2023	Last Cal Date:	March 1, 2023
Start time (MST):	9:23	End time (MST):	13:20
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1180540017	
Converter make:	CDN-101		Converter serial #:	521	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.987178	1.003341	Backgd or Offset:	3.69	3.71
Calibration intercept:	0.057822	-0.062227	Coeff or Slope:	1.120	1.120

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4925	75.5	80.6	80.8	0.999
as found 2nd point	4962	37.7	40.3	40.3	1.002
as found 3rd point	4981	18.9	20.2	19.7	1.030
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4925	75.5	80.6	80.9	0.997
second point	4962	37.7	40.3	40.3	0.999
third point	4981	18.9	20.2	20.0	1.009
as left zero	5000	0.0	0.0	0.2	----
as left span	4925	75.5	80.6	80.6	1.000
SO2 Scrubber Check	4921	79.1	791.0	0.1	----
Date of last scrubber change:		20-Mar-20		Ave Corr Factor	1.002
Date of last converter efficiency test:		NA			efficiency

Baseline Corr As found:	80.7	Prev response:	79.65	*% change:	1.3%
Baseline Corr 2nd AF pt:	40.2	AF Slope:	1.003338	AF Intercept:	-0.162123
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999936		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

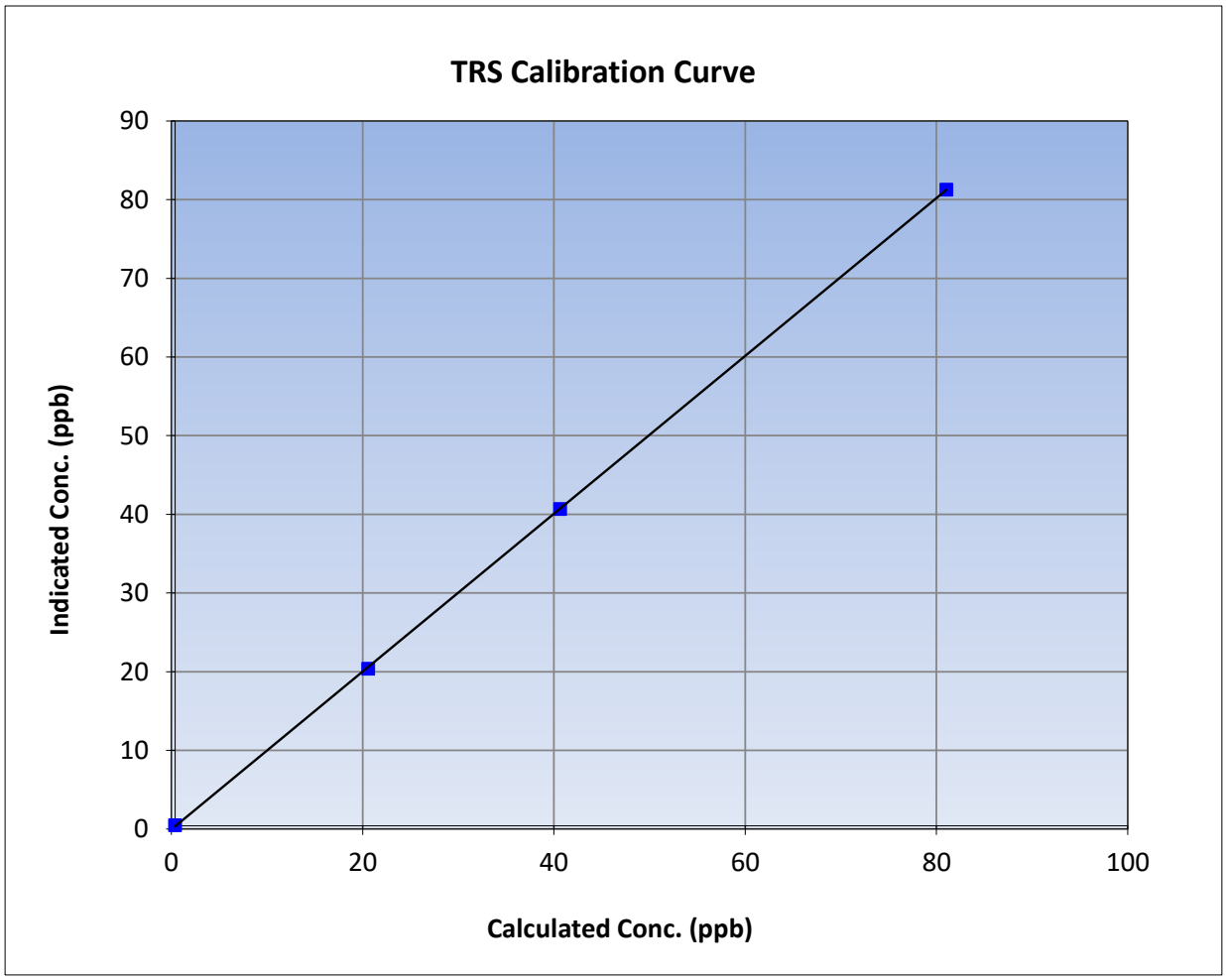
Station Information

Calibration Date:	April 3, 2023	Previous Calibration:	March 1, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	9:23	End Time (MST):	13:36
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1180540017

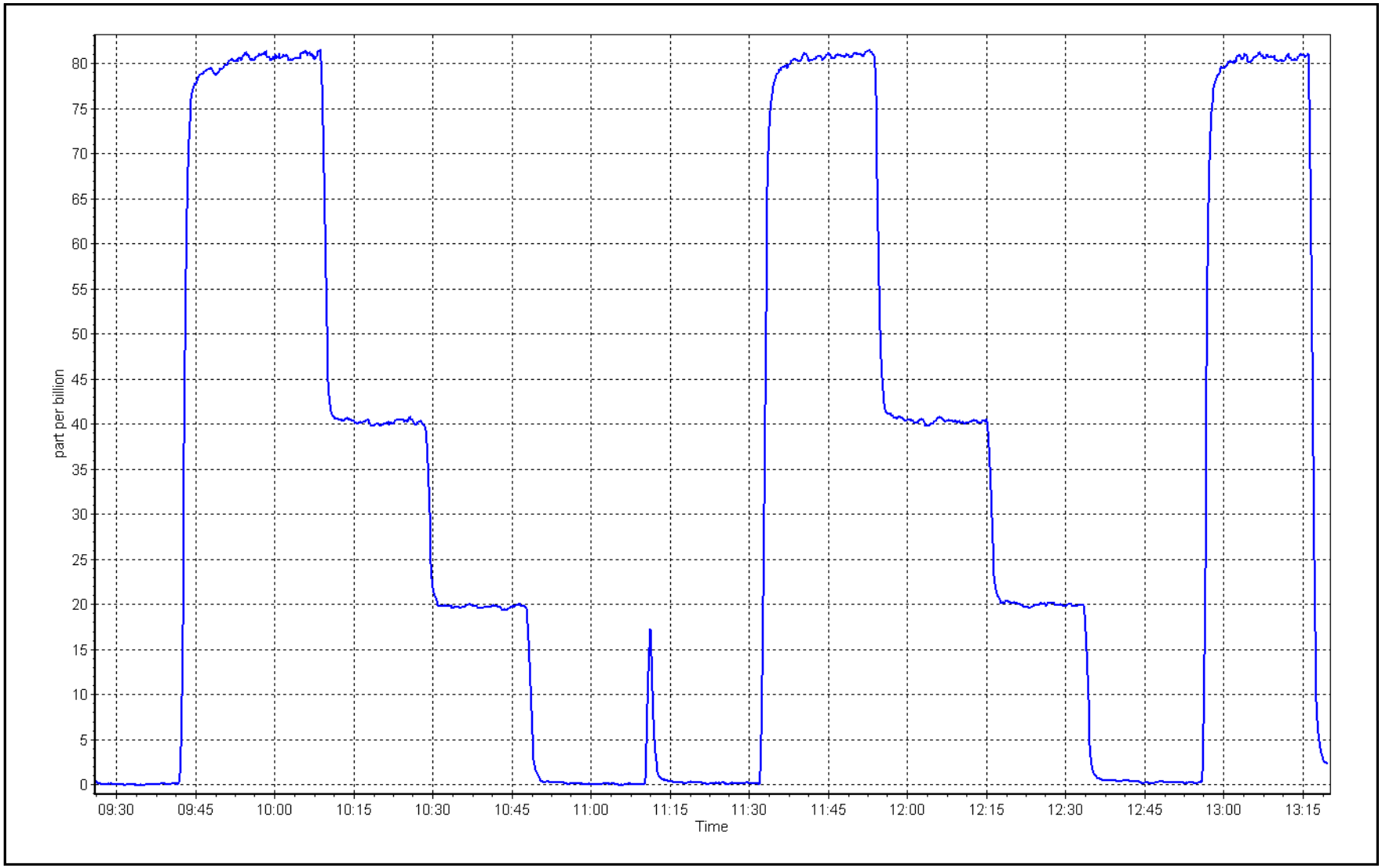
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.6	80.9	0.9966
40.3	40.3	0.9992
20.2	20.0	1.0093

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999981	*≥0.995*
Slope	1.003341	*0.90 - 1.10*
Intercept	-0.062227	*+/-3*



TRS Calibration Plot Date: April 3, 2023 Location: Fort McKay South



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	April 19, 2023	Last Cal Date:	March 3, 2023
Start time (MST):	8:54	End time (MST):	12:04
Reason:	Install		

Calibration Standards

Gas Cert Reference:		CC260812	Cal Gas Expiry Date:	December 29, 2028	
CH4 Cal Gas Conc.	503.6	ppm	CH4 Equiv Conc.	1077.5	ppm
C3H8 Cal Gas Conc.	208.7	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	503.6	ppm	CH4 Equiv Conc.	1077.5	ppm
Removed C3H8 Conc.	208.7	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	2448	
ZAG make/model:	API 701		Serial Number:	1117	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1170050130	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.16E-04	2.19E-04	NMHC SP Ratio:	5.11E-04	5.04E-04
CH4 Retention time:	12.8	12.8	NMHC Peak Area:	177635	179990

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.1	17.05	17.09	0.997
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.1	17.05	17.05	1.000
second point	4961	39.5	8.51	8.38	1.016
third point	4980	19.8	4.27	4.09	1.042
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	17.05	17.11	0.996
				Average Correction Factor	1.019

Baseline Corr AF:	17.09	Prev response	17.06	*% 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	9.20	0.987
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4921	79.1	9.08	9.07	1.001
second point	4960	39.5	4.53	4.48	1.012
third point	4980	19.8	2.27	2.20	1.035
as left zero	5000	0	0.00	0.00	----
as left span	4921	79.1	9.08	9.12	0.996
				Average Correction Factor	1.016
Baseline Corr AF:	9.20	Prev response	9.10	*% change	1.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.1	7.97	7.89	1.010
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.1	7.97	7.97	0.999
second point	4960	39.5	3.98	3.90	1.022
third point	4980	19.8	1.99	1.90	1.050
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	7.97	7.99	0.997
				Average Correction Factor	1.024
Baseline Corr AF:	7.89	Prev response	7.95	*% change	-0.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.005694	1.002569
THC Cal Offset:	-0.086175	-0.096376
CH4 Cal Slope:	1.003875	1.003704
CH4 Cal Offset:	-0.046747	-0.056151
NMHC Cal Slope:	1.007142	1.001425
NMHC Cal Offset:	-0.039766	-0.040562

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

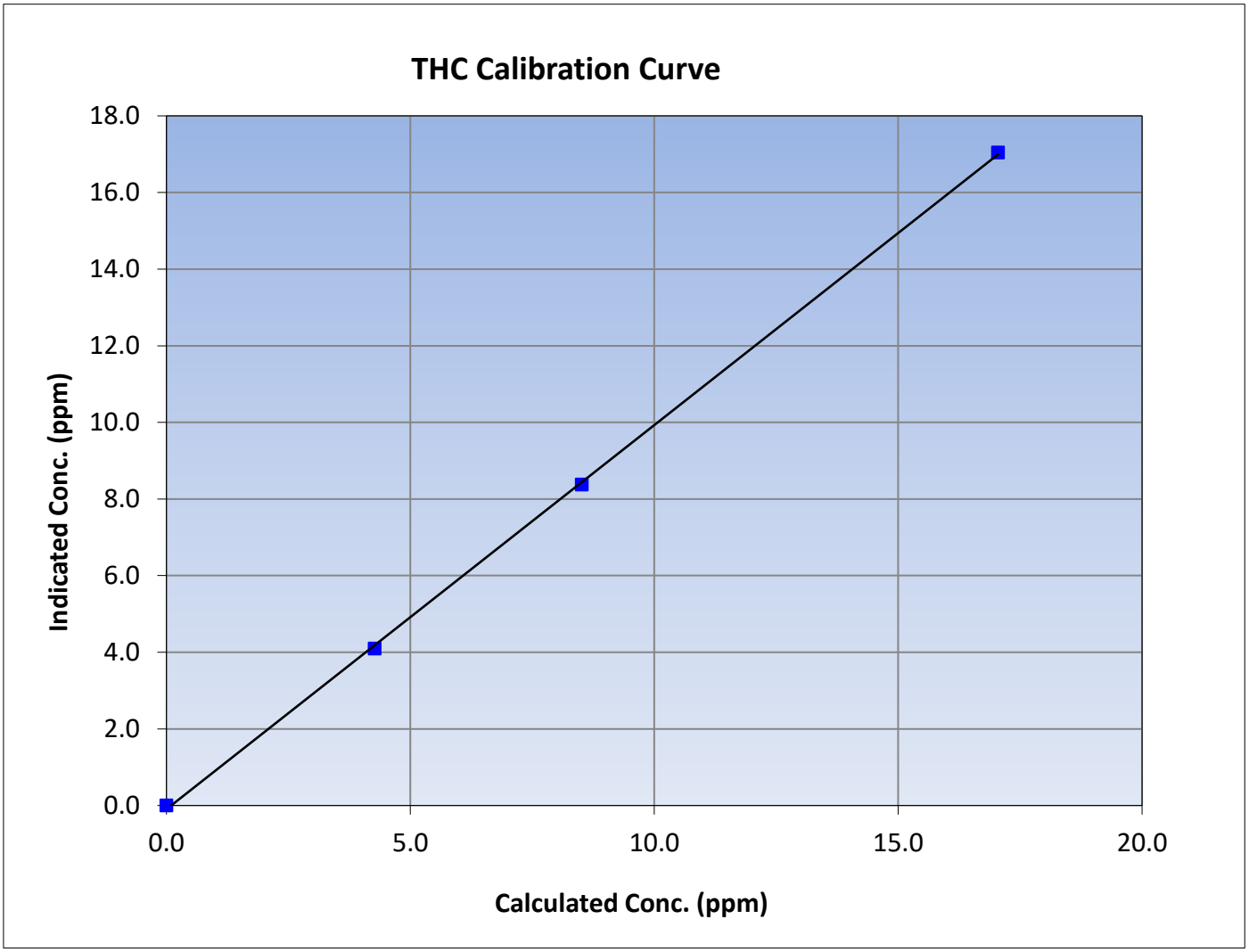
Version-01-2020

Station Information

Calibration Date:	April 19, 2023	Previous Calibration:	March 3, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:54	End Time (MST):	12:04
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	0.999853	*≥0.995*
17.05	17.05	1.0000			
8.51	8.38	1.0162	Slope	1.002569	*0.90 - 1.10*
4.27	4.09	1.0423			
			Intercept	-0.096376	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

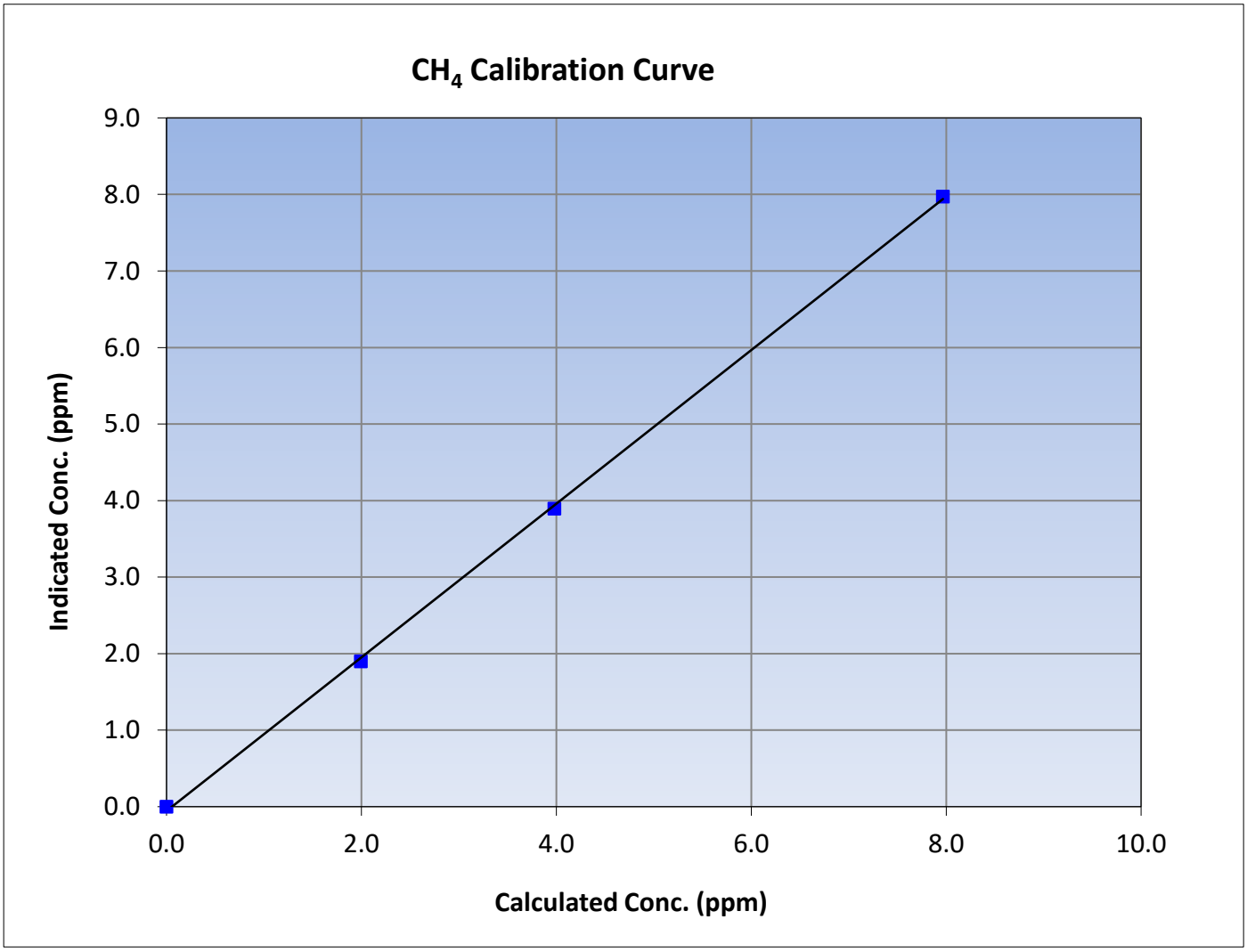
Version-01-2020

Station Information

Calibration Date:	April 19, 2023	Previous Calibration:	March 3, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:54	End Time (MST):	12:04
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	0.999765	*≥0.995*
7.97	7.97	0.9992			
3.98	3.90	1.0215	Slope	1.003704	*0.90 - 1.10*
1.99	1.90	1.0502			
			Intercept	-0.056151	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

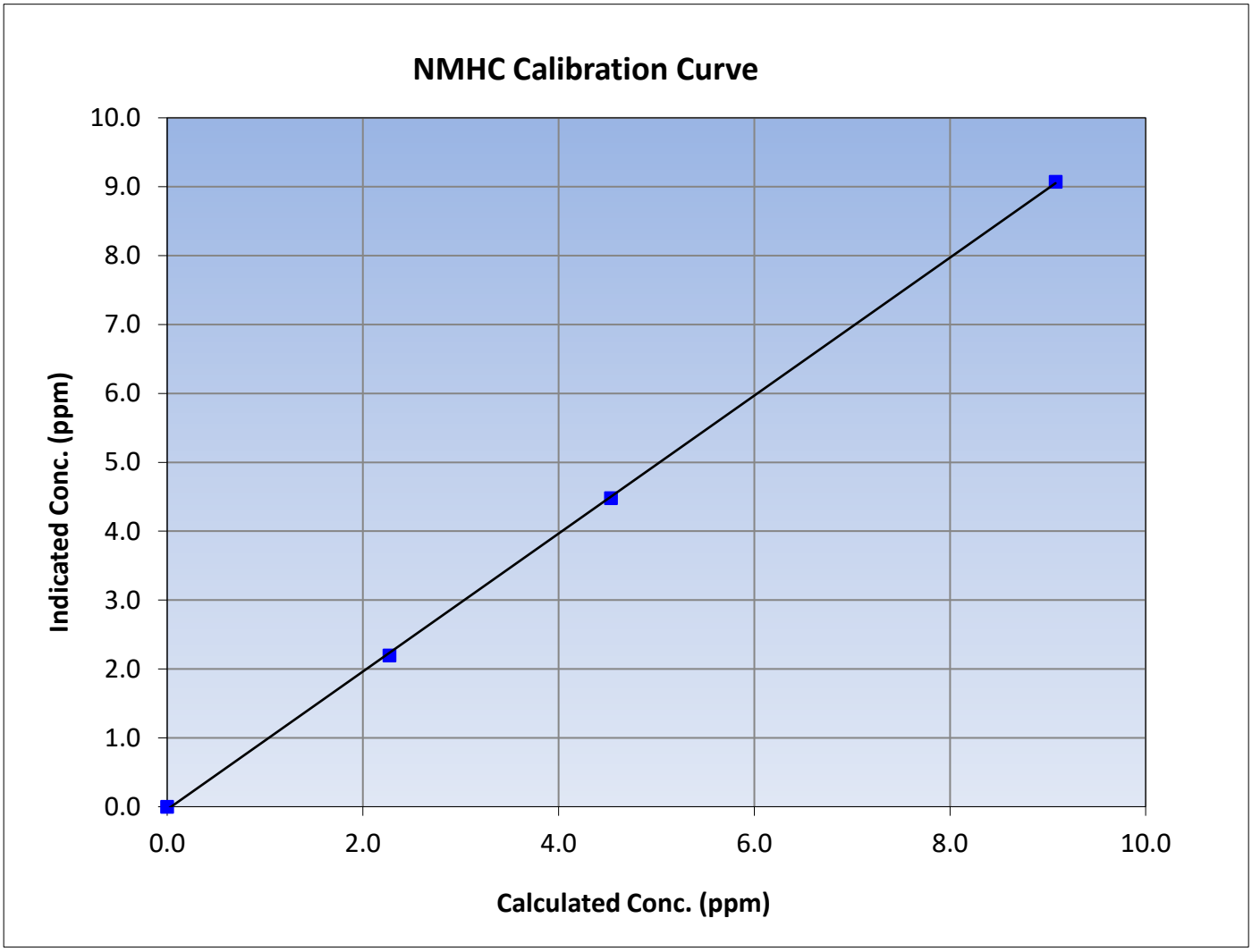
Version-01-2020

Station Information

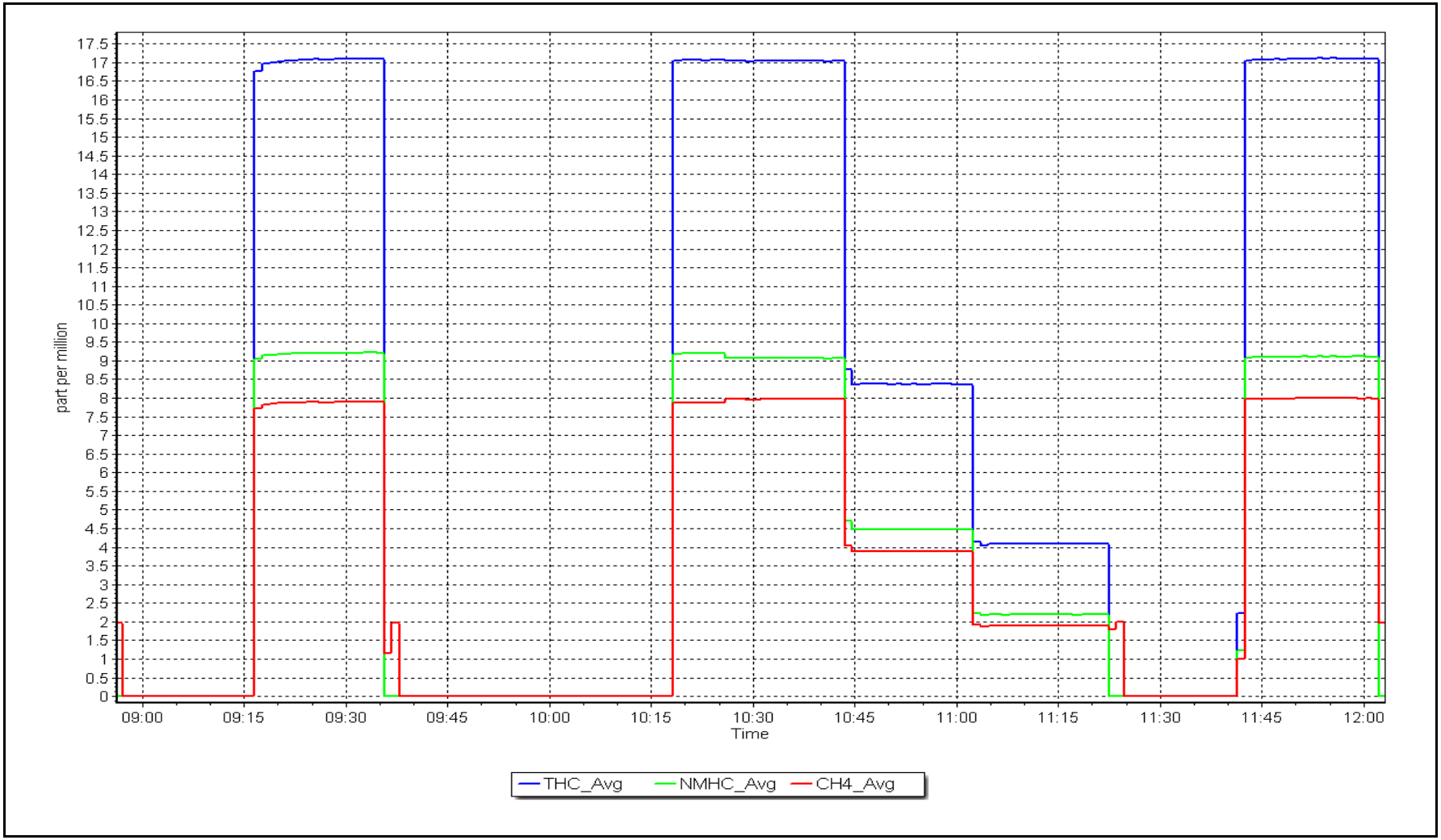
Calibration Date:	April 19, 2023	Previous Calibration:	March 3, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:54	End Time (MST):	12:04
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050130

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999909	≥0.995
9.08	9.07	1.0008			
4.53	4.48	1.0122	Slope	1.001425	0.90 - 1.10
2.27	2.20	1.0355			
			Intercept	-0.040562	+/-0.5



NMHC Calibration Plot Date: April 19, 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:	April 12, 2023	Last Cal Date:	March 23, 2023
Start time (MST):	8:34	End time (MST):	12:42
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	1.213	NO bkgnd or offset:	9.7	9.6
NOX coeff or slope:	0.992	0.992	NOX bkgnd or offset:	9.7	9.7
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	196.2	195.9

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000036	1.001266
NO_X Cal Offset:	-2.351272	-2.371415
NO Cal Slope:	1.002705	1.003448
NO Cal Offset:	-3.225164	-3.285243
NO_2 Cal Slope:	0.998357	0.998635
NO_2 Cal Offset:	-0.332208	-0.712517

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	0.1	----	----
as found span	4919	81.1	826.9	800.0	26.9	827.9	801.0	27.1	0.9988	0.9987
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	----	----
high point	4919	81.1	826.9	800.0	26.9	826.8	801.0	25.6	1.0001	0.9987
second point	4960	40.6	413.9	400.4	13.5	410.7	397.0	13.7	1.0078	1.0086
third point	4980	20.3	207.0	200.2	6.7	202.6	194.4	8.1	1.0216	1.0300
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as left span	4919	81.1	826.9	378.3	448.6	838.0	382.2	455.7	0.9867	0.9897
								Average Correction Factor	1.0098	1.0124

Corrected As found	NO_X = 828.0 ppb	NO = 801.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.4%
Previous Response	NO_X = 824.6 ppb	NO = 798.9 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)	798.2	376.5	448.6	447.6	1.0023	99.8%
2nd GPT point (200 ppb O3)	798.2	585.0	240.1	239.1	1.0043	99.6%
3rd GPT point (100 ppb O3)	798.2	690.5	134.6	132.7	1.0145	98.6%
				Average Correction Factor	1.0070	99.3%

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

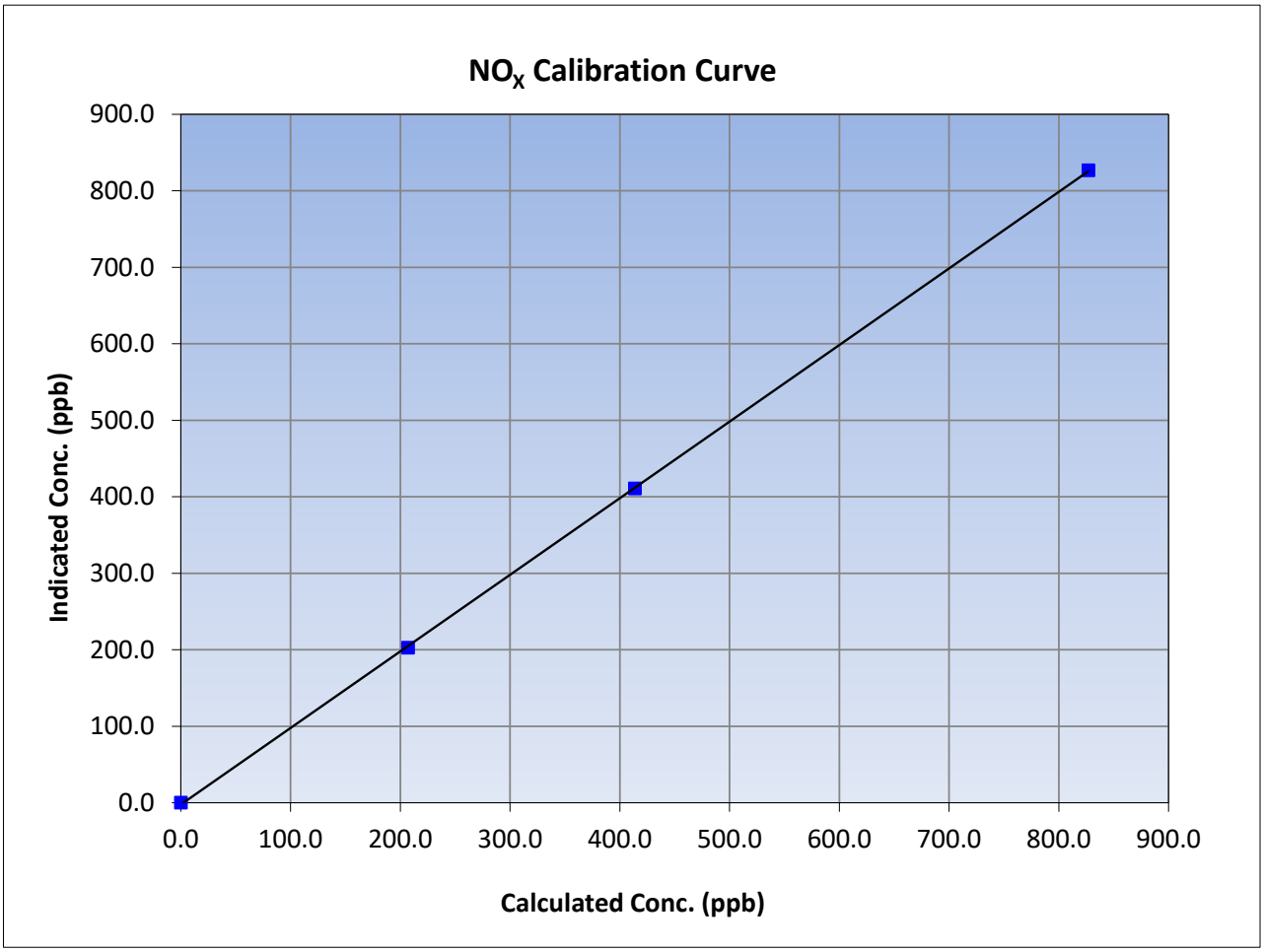
Version-04-2020

Station Information

Calibration Date:	April 12, 2023	Previous Calibration:	March 23, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	8:34	End Time (MST):	12:42
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999962	*≥0.995*
826.9	826.8	1.0001			
413.9	410.7	1.0078	Slope	1.001266	*0.90 - 1.10*
207.0	202.6	1.0216			
			Intercept	-2.371415	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

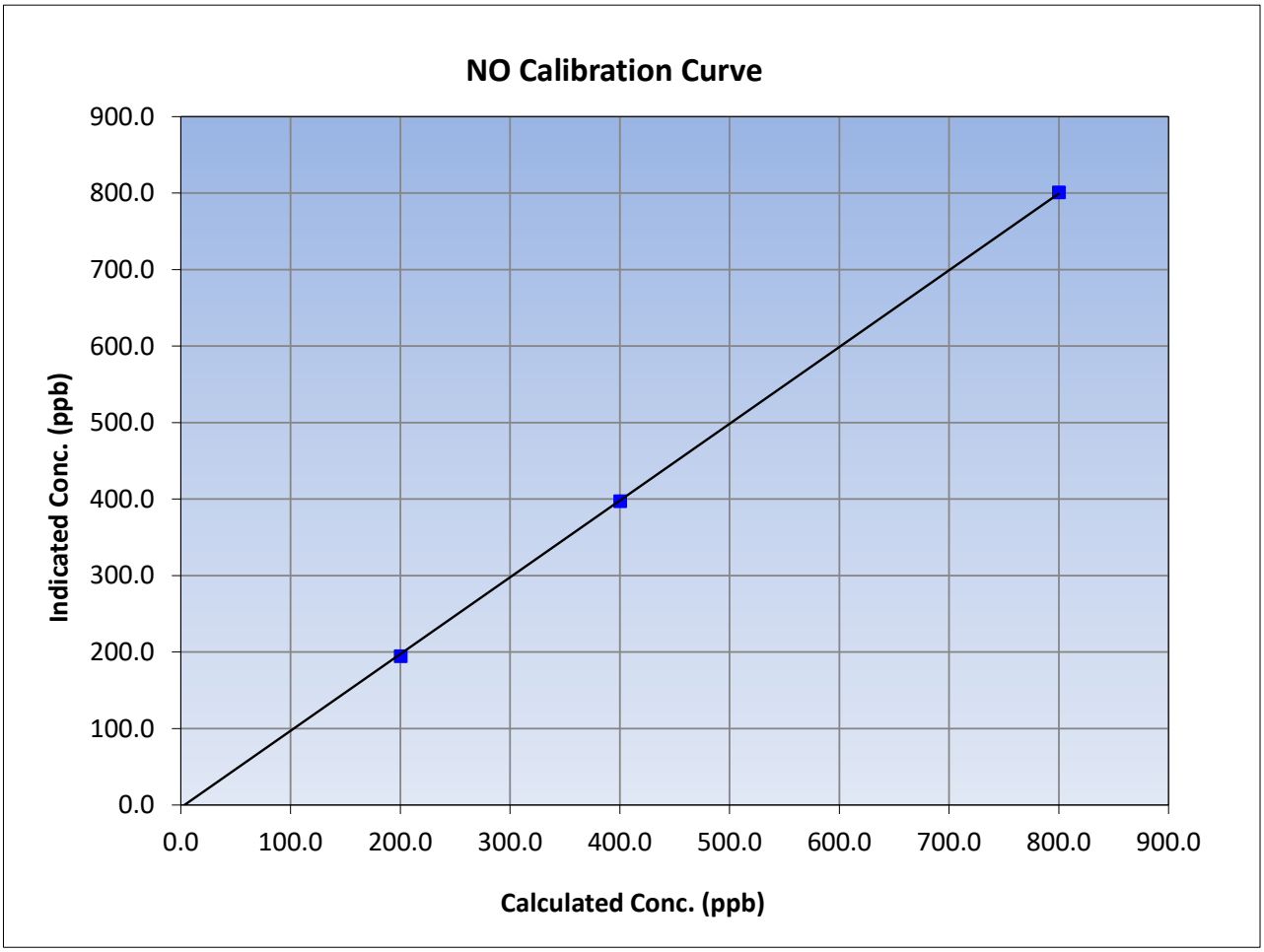
Version-04-2020

Station Information

Calibration Date:	April 12, 2023	Previous Calibration:	March 23, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	8:34	End Time (MST):	12:42
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.1	----	Correlation Coefficient	0.999928	*≥0.995*
800.0	801.0	0.9987			
400.4	397.0	1.0086	Slope	1.003448	*0.90 - 1.10*
200.2	194.4	1.0300			
			Intercept	-3.285243	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

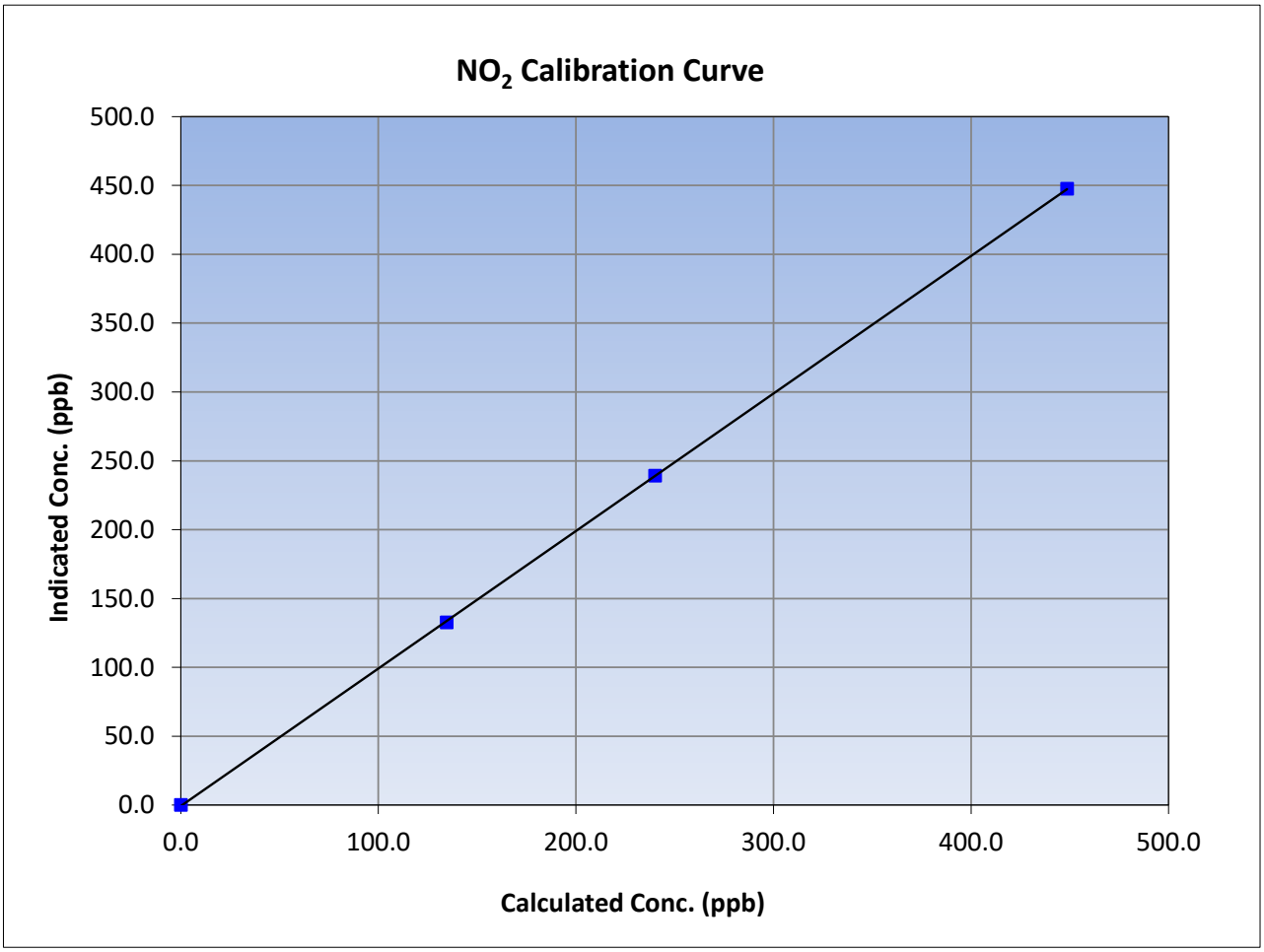
Version-04-2020

Station Information

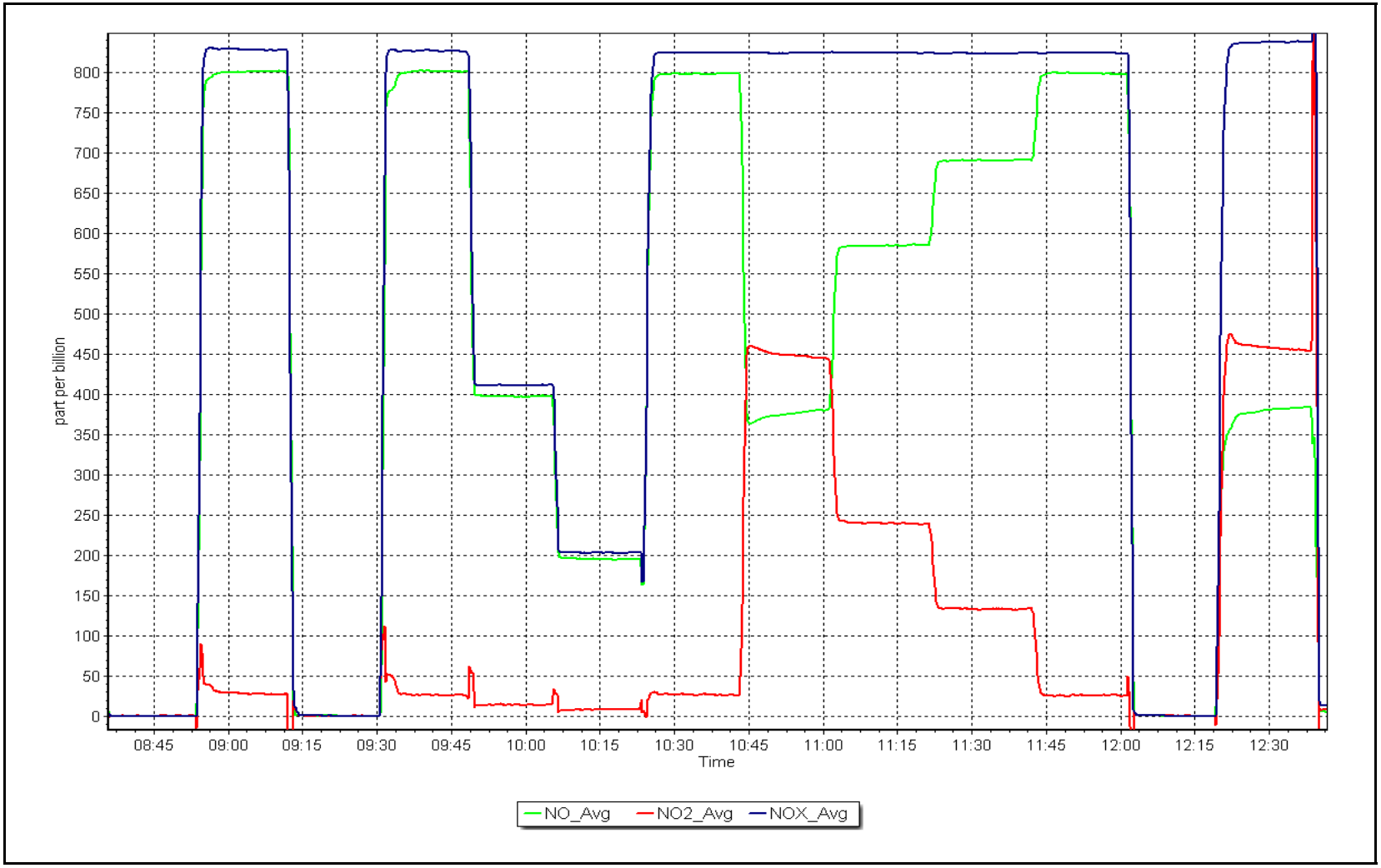
Calibration Date:	April 12, 2023	Previous Calibration:	March 23, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	8:34	End Time (MST):	12:42
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999985	≥0.995
448.6	447.6	1.0023			
240.1	239.1	1.0043	Slope	0.998635	0.90 - 1.10
134.6	132.7	1.0145			
			Intercept	-0.712517	+/-20



NO_X Calibration Plot Date: April 12, 2023 Location: Fort McKay South



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	April 11, 2023	Last Cal Date:	March 22, 2023
Start time (MST):	9:09	End time (MST):	12:21
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:	0.997886	0.997171	Backgd or Offset:	3.7	3.4
Calibration intercept:	0.320000	0.620000	Coeff or Slope:	0.964	0.963

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-1.1	----
as found span	5000	969.9	400.0	399.3	1.002
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	980.6	400.0	399.1	1.002
second point	5000	838.0	200.0	200.4	0.998
third point	5000	735.3	100.0	101.2	0.988
as left zero	5000	0.0	0.0	-0.4	----
as left span	5000	979.1	400.0	401.6	0.996
				Average Correction Factor	0.996

Baseline Corr As found:	400.4	Previous response	399.5	*% change	0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

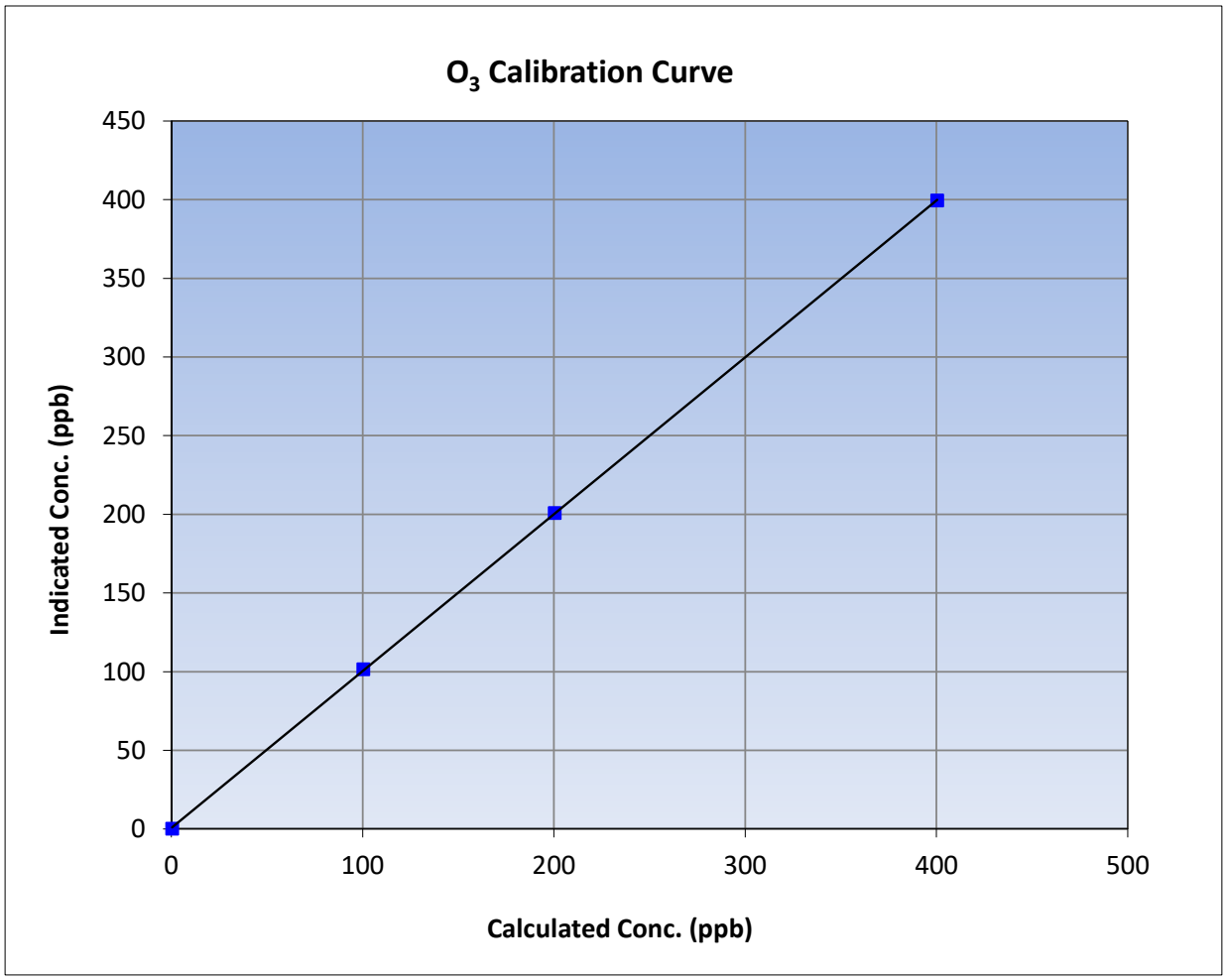
Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 22, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	9:09	End Time (MST):	12:21
Analyzer make:	Teledyne API T400	Analyzer serial #:	3871

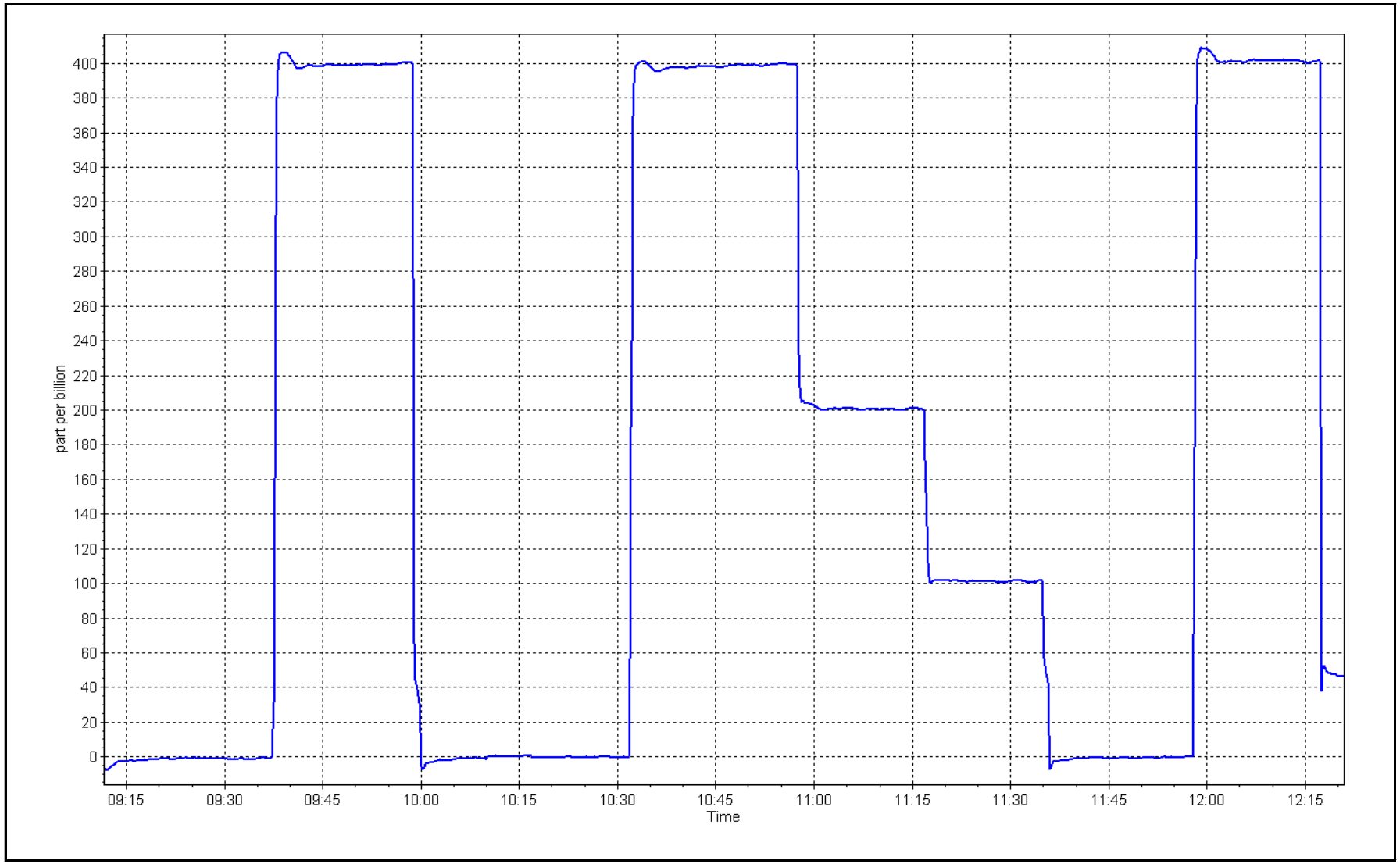
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
400.0	399.1	1.0023
200.0	200.4	0.9980
100.0	101.2	0.9881

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999981	*≥0.995*
Slope	0.997171	*0.90 - 1.10*
Intercept	0.620000	*+/- 5*



O_3 Calibration Plot Date: April 11, 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:	April 12, 2023	Last Cal Date:	March 22, 2023
Start time (MST):	10:56	End time (MST):	11:56
Analyzer Make:	API T640	S/N:	319
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	141229
Temp/RH standard:	Delta Cal	S/N:	141229

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	4.5	4.5	4.5	☐	+/- 2 °C
P (mmHg)	729.3	730	729.3	☐	+/- 10 mmHg
flow (LPM)	5.03	5.04	5.03	☐	+/- 0.25 LPM

Leak Test: Date of check: April 12, 2023 Last Cal Date: March 22, 2023

PM w/o HEPA: 2.6 PM w/ HEPA: 2.5 <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: 8.9 w/ HEPA: 0.0

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:

Notes: Inlet head clean and inspected. Leak check is not passing at first. Optical chamber cleaning was done, and tubing was inspected and making sure that screws, clamps are tight. 2nd leak checked passed.

Calibration by: Sean Bala

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS14
ANZAC
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	April 18, 2023	Last Cal Date:	March 17, 2023
Start time (MST):	7:55	End time (MST):	10:21
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:	0.997012	0.997195	Backgd or Offset:	25.1	25.2
Calibration intercept:	-1.625104	-0.864371	Coeff or Slope:	0.795	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	0.2	----
as found span	4920	80.1	800.2	794.6	1.007
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	797.5	1.003
second point	4960	40.0	399.6	397.8	1.005
third point	4980	20.0	199.8	196.3	1.018
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	80.1	800.2	799.9	1.000
				Average Correction Factor	1.009

Baseline Corr As found:	794.40	Previous response	796.17	*% 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 done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

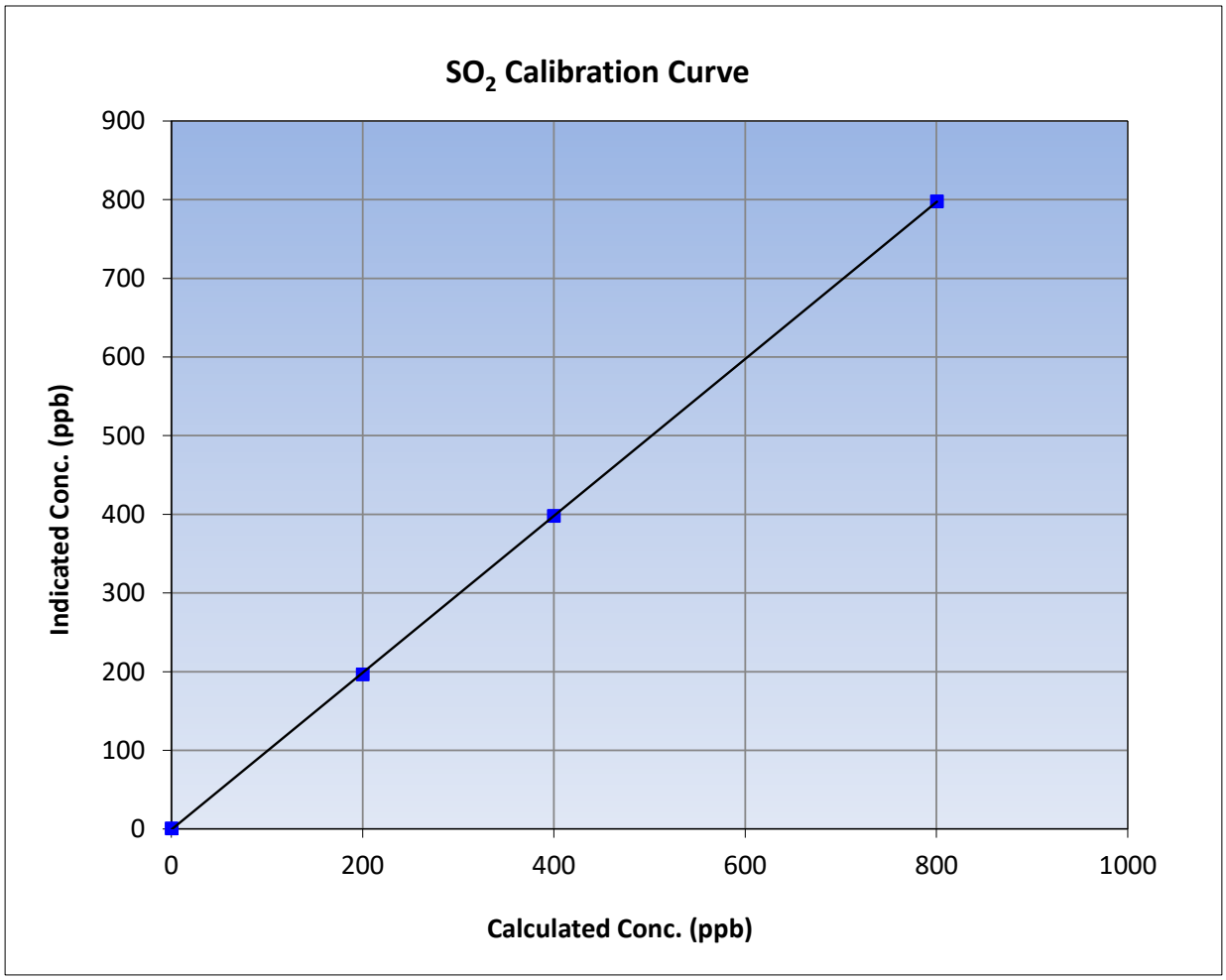
Station Information

Calibration Date:	April 18, 2023	Previous Calibration:	March 17, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	7:55	End Time (MST):	10:21
Analyzer make:	Thermo 43i	Analyzer serial #:	0710321322

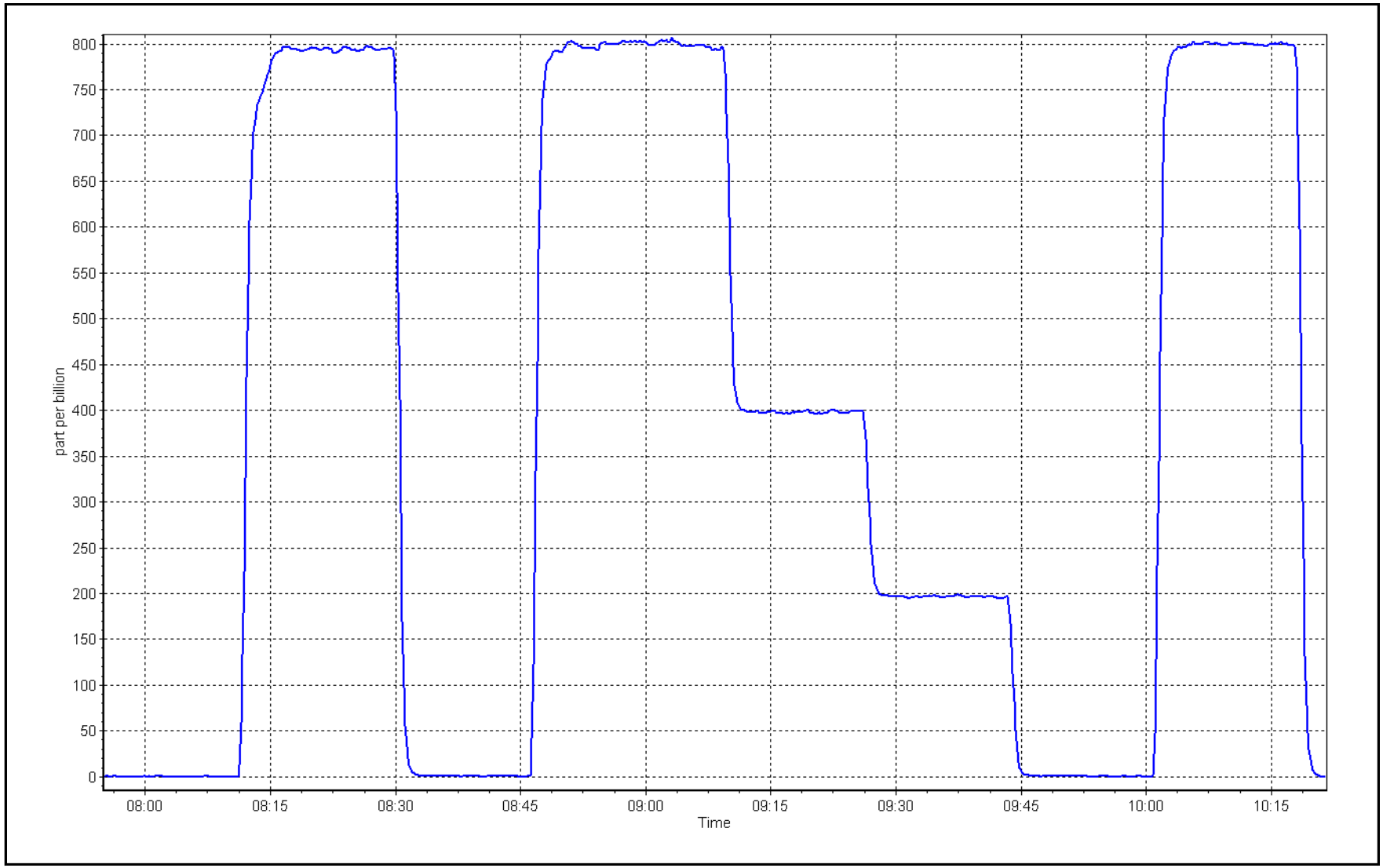
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.6	----
800.2	797.5	1.0034
399.6	397.8	1.0045
199.8	196.3	1.0178

Statistical Evaluation		Limits
Correlation Coefficient	0.999981	≥0.995
Slope	0.997195	0.90 - 1.10
Intercept	-0.864371	+/-30



SO2 Calibration Plot Date: April 18, 2023 Location: Anzac



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	April 5, 2023	Last Cal Date:	March 1, 2023
Start time (MST):	7:43	End time (MST):	11:50
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1180540019	
Converter make:	CD Nova CDN-101		Converter serial #:	503	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.004840	1.002553	Backgd or Offset:	5.76	5.51
Calibration intercept:	0.178882	-0.041067	Coeff or Slope:	1.031	0.993

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.3	----
as found span	4925	74.3	80.0	83.9	0.956
as found 2nd point	4962	37.2	40.0	41.8	0.965
as found 3rd point	4981	18.6	20.0	20.6	0.986
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	80.3	0.996
second point	4962	37.2	40.0	39.9	1.003
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	79.5	1.006
SO2 Scrubber Check	4920	80.0	800.0	0.1	----
Date of last scrubber change:				Ave Corr Factor	1.005
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	83.6	Prev response:	80.52	*% change:	3.7%
Baseline Corr 2nd AF pt:	41.5	AF Slope:	1.047722	AF Intercept:	-0.022058
Baseline Corr 3rd AF pt:	20.3	AF Correlation:	0.999932		

* = > +/-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

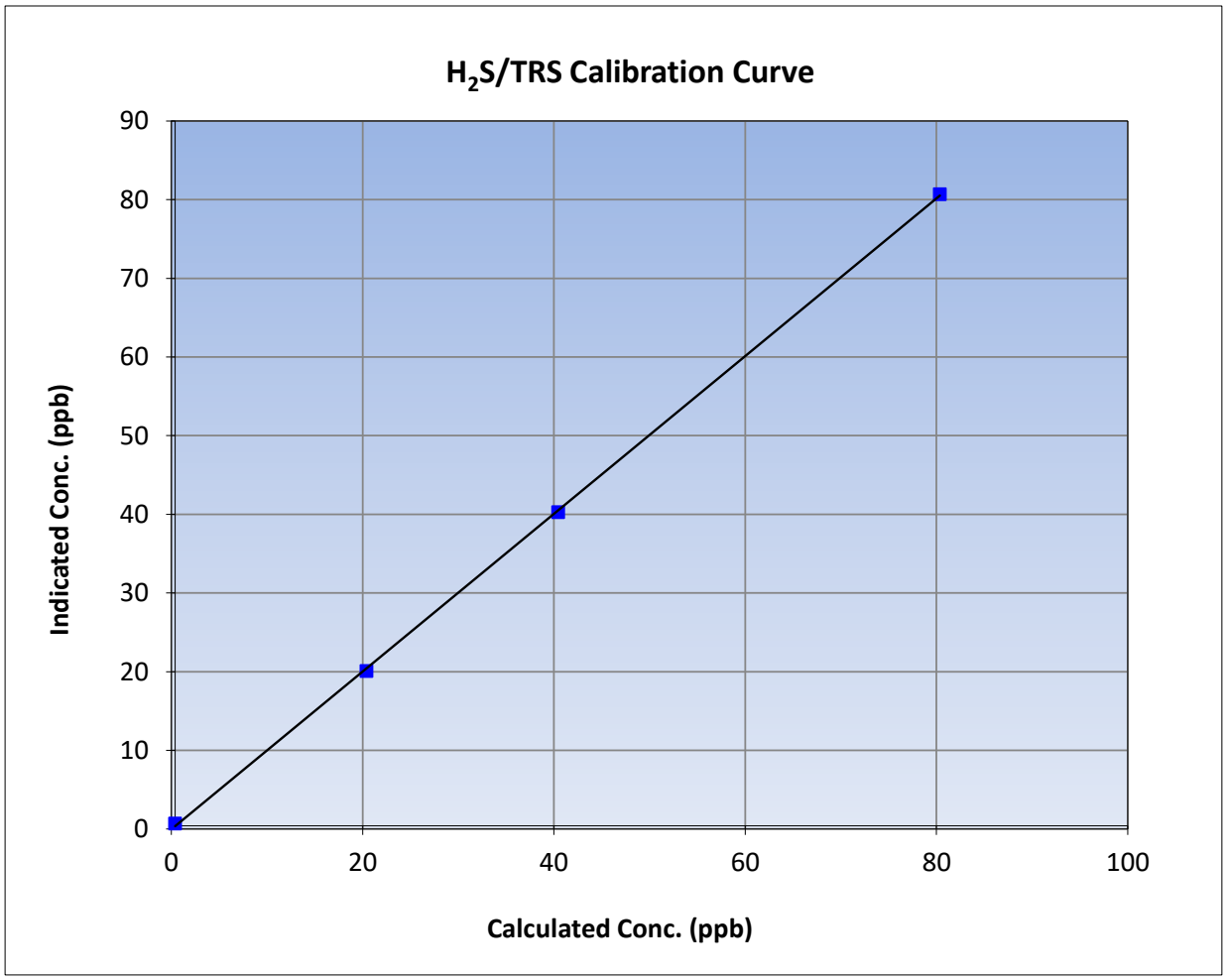
Station Information

Calibration Date:	April 5, 2023	Previous Calibration:	March 1, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	7:43	End Time (MST):	11:50
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1180540019

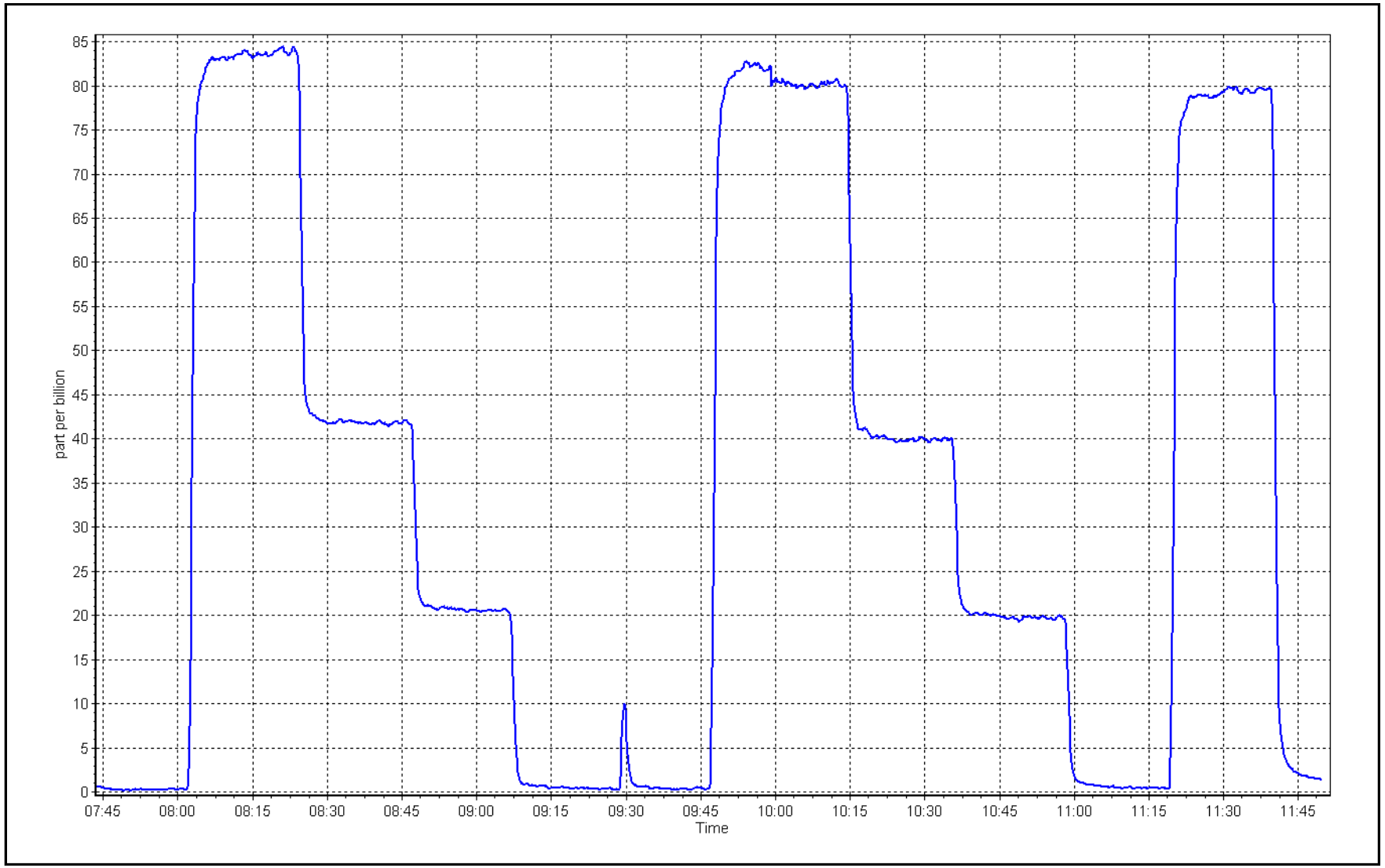
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
80.0	80.3	0.9957
40.0	39.9	1.0033
20.0	19.7	1.0160

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999917	*≥0.995*
Slope	1.002553	*0.90 - 1.10*
Intercept	-0.041067	*+/-3*



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



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	April 5, 2023	Last Cal Date:	March 17, 2023
Start time (MST):	6:40	End time (MST):	7:45
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:	5252	
ZAG make/model:	API 701H		Serial Number:	357	

Analyzer Information

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

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	17.12	16.99	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	17.12	16.89	1.014
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.014

Baseline Corr AF:	16.99	Prev response	17.03	*% 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	80.1	9.12	9.07	1.006
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	9.12	9.02	1.011
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.011
Baseline Corr AF:	9.07	Prev response	9.10	*% change	-0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	8.00	7.92	1.010
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	8.00	7.87	1.016
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.016
Baseline Corr AF:	7.92	Prev response	7.94	*% change	-0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

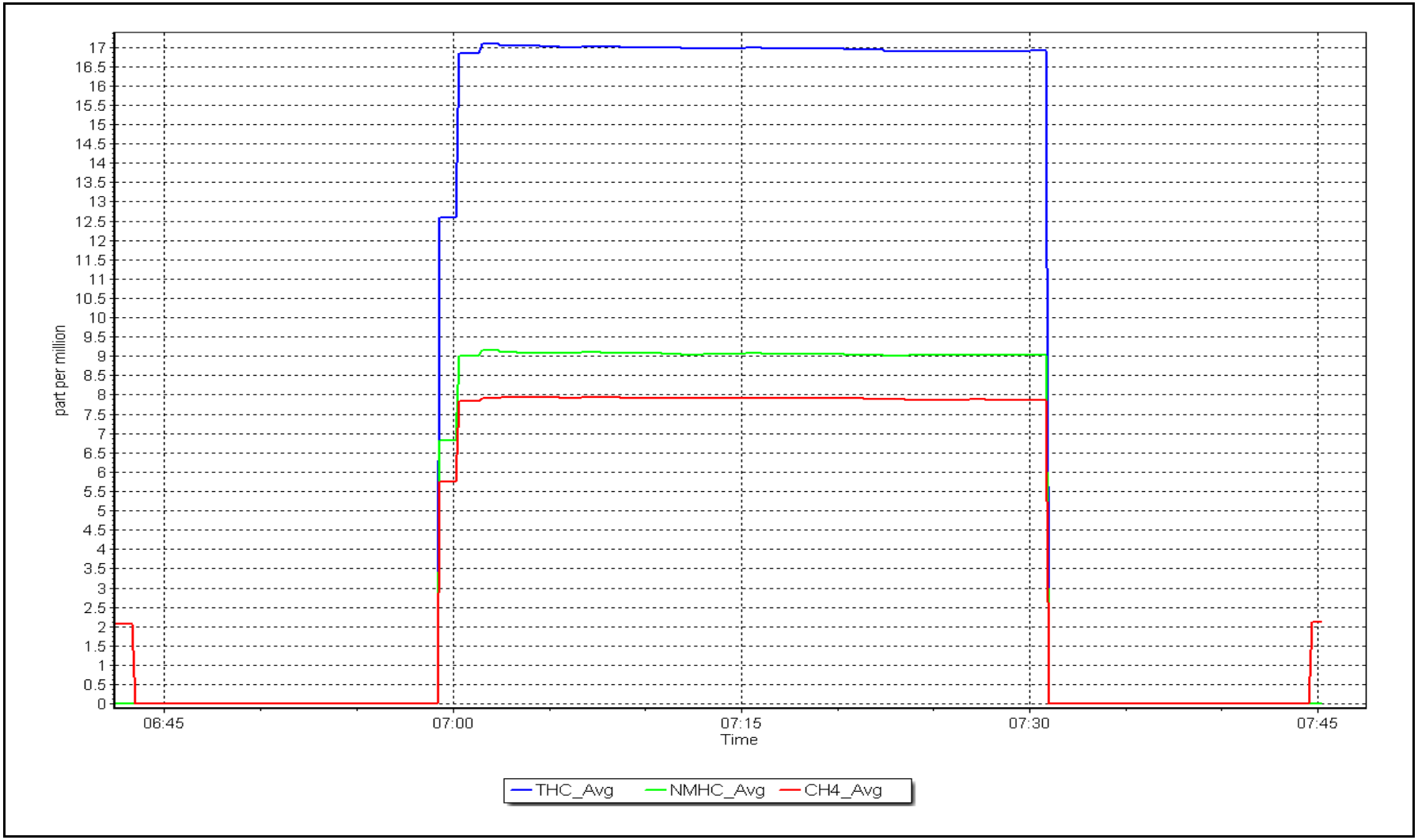
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.996031	0.986437
THC Cal Offset:	-0.019815	0.000000
CH4 Cal Slope:	0.993278	0.983919
CH4 Cal Offset:	-0.004047	0.000000
NMHC Cal Slope:	0.998568	0.988644
NMHC Cal Offset:	-0.013765	0.000000

Notes: Nitrogen Cylinder Change.

Calibration Performed By: Melissa Lemay

NMHC Calibration Plot Date: April 5, 2023 Location: Anzac



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	April 18, 2023	Last Cal Date:	March 17, 2023
Start time (MST):	7:55	End time (MST):	10:20
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC279389	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
C3H8 Cal Gas Conc.	207.1	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:		NA
Removed CH4 Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
Removed C3H8 Conc.	207.1	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	5252	
ZAG make/model:	API 701H		Serial Number:	357	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1118148494	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.85E-04	3.90E-04	NMHC SP Ratio:	4.46E-05	4.53E-05
CH4 Retention time:	12.00	12.20	NMHC Peak Area:	204554	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	16.85	1.016
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	17.01	1.007
second point	4960	40.0	8.55	8.56	0.999
third point	4980	20.0	4.28	4.24	1.008
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.1	17.12	17.11	1.001
				Average Correction Factor	1.005
Baseline Corr AF:	16.85	Prev response	17.03	*% change	-1.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	9.12	8.97	1.017
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	9.12	9.11	1.001
second point	4960	40.0	4.56	4.56	0.999
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	9.12	1.000
				Average Correction Factor	1.004
Baseline Corr AF:	8.97	Prev response	9.10	*% 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	4920	80.1	8.00	7.89	1.014
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	8.00	7.99	1.001
second point	4960	40.0	3.99	4.00	0.999
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	8.00	1.000
				Average Correction Factor	1.003
Baseline Corr AF:	7.89	Prev response	7.94	*% change	-0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.996031	0.994025
THC Cal Offset:	-0.019815	0.010201
CH4 Cal Slope:	0.993278	0.999707
CH4 Cal Offset:	-0.004047	-0.004033
NMHC Cal Slope:	0.998568	0.999569
NMHC Cal Offset:	-0.013765	-0.007757

Notes: No Maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

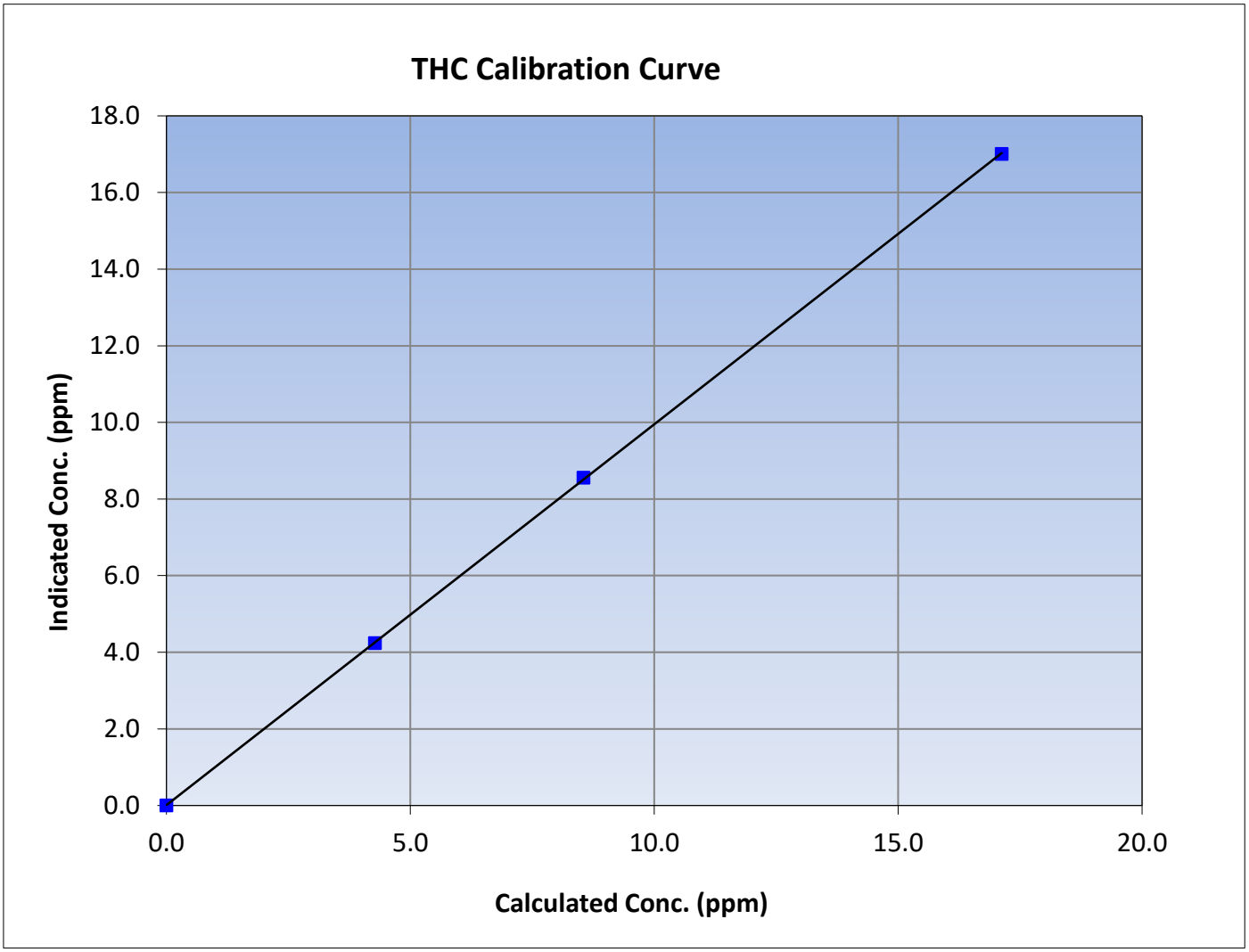
Version-01-2020

Station Information

Calibration Date:	April 18, 2023	Previous Calibration:	March 17, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	7:55	End Time (MST):	10:20
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999978	*≥0.995*
17.12	17.01	1.0066			
8.55	8.56	0.9989	Slope	0.994025	*0.90 - 1.10*
4.28	4.24	1.0083			
			Intercept	0.010201	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

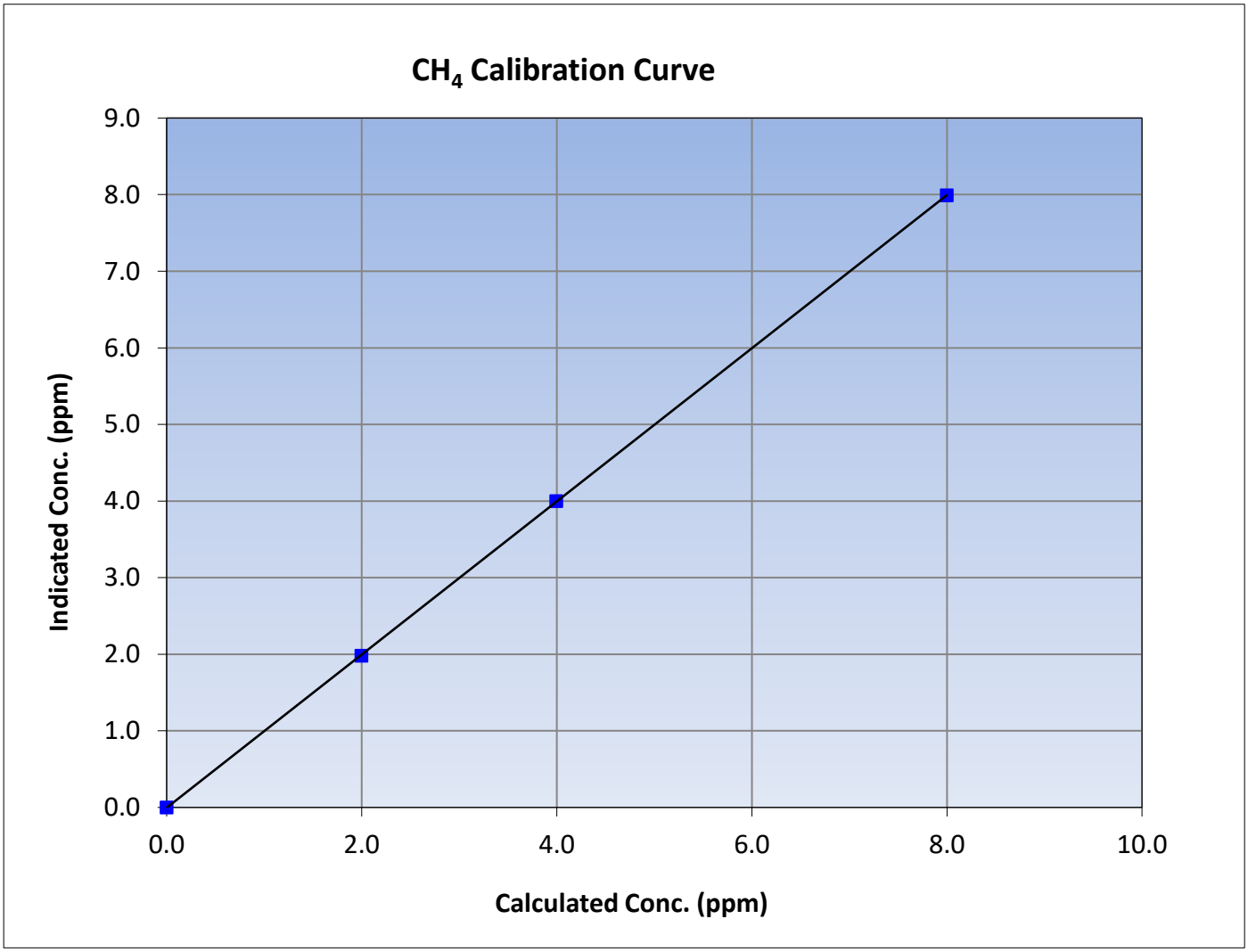
Version-01-2020

Station Information

Calibration Date:	April 18, 2023	Previous Calibration:	March 17, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	7:55	End Time (MST):	10:20
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999992	*≥0.995*
8.00	7.99	1.0011			
3.99	4.00	0.9986	Slope	0.999707	*0.90 - 1.10*
2.00	1.98	1.0087			
			Intercept	-0.004033	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

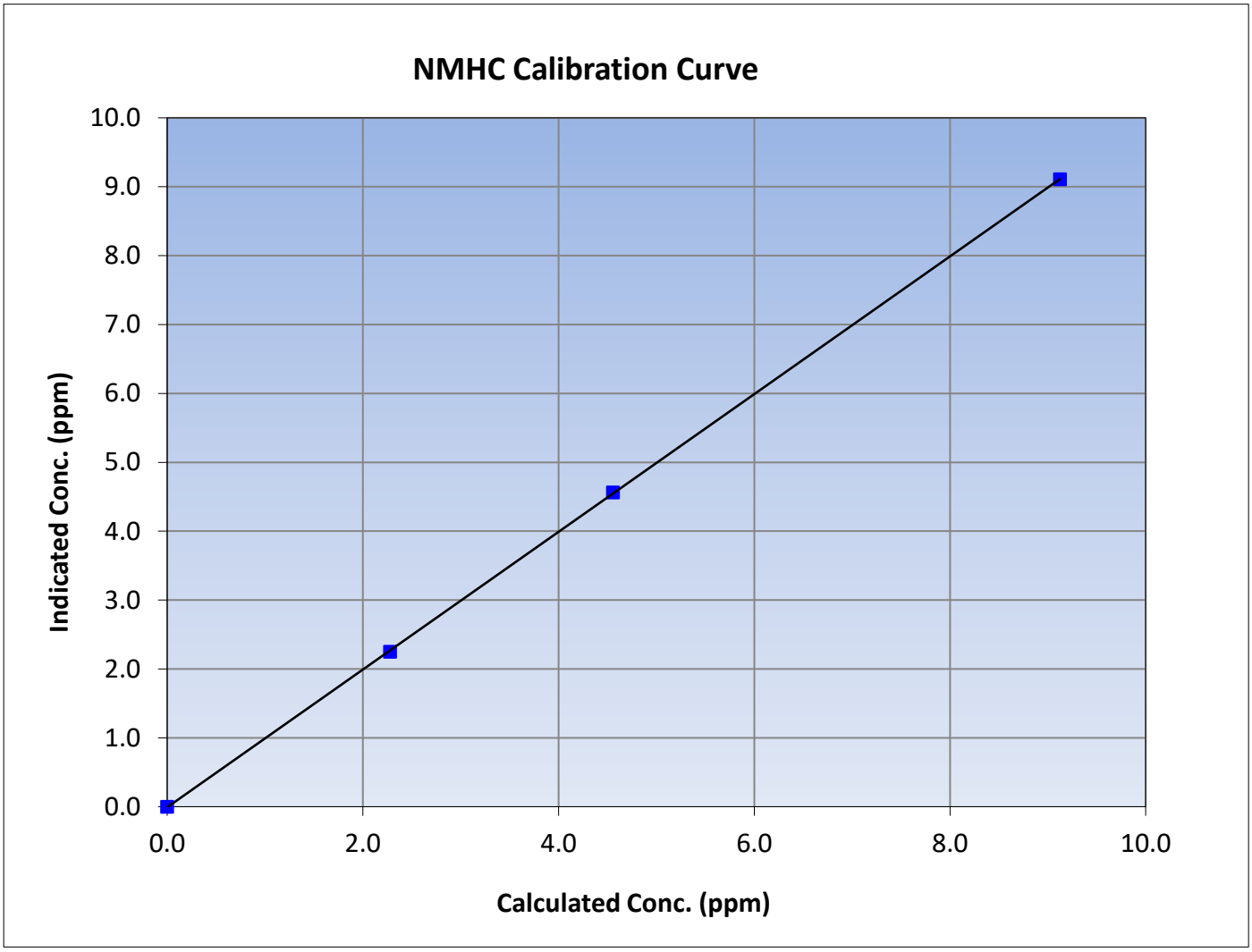
Version-01-2020

Station Information

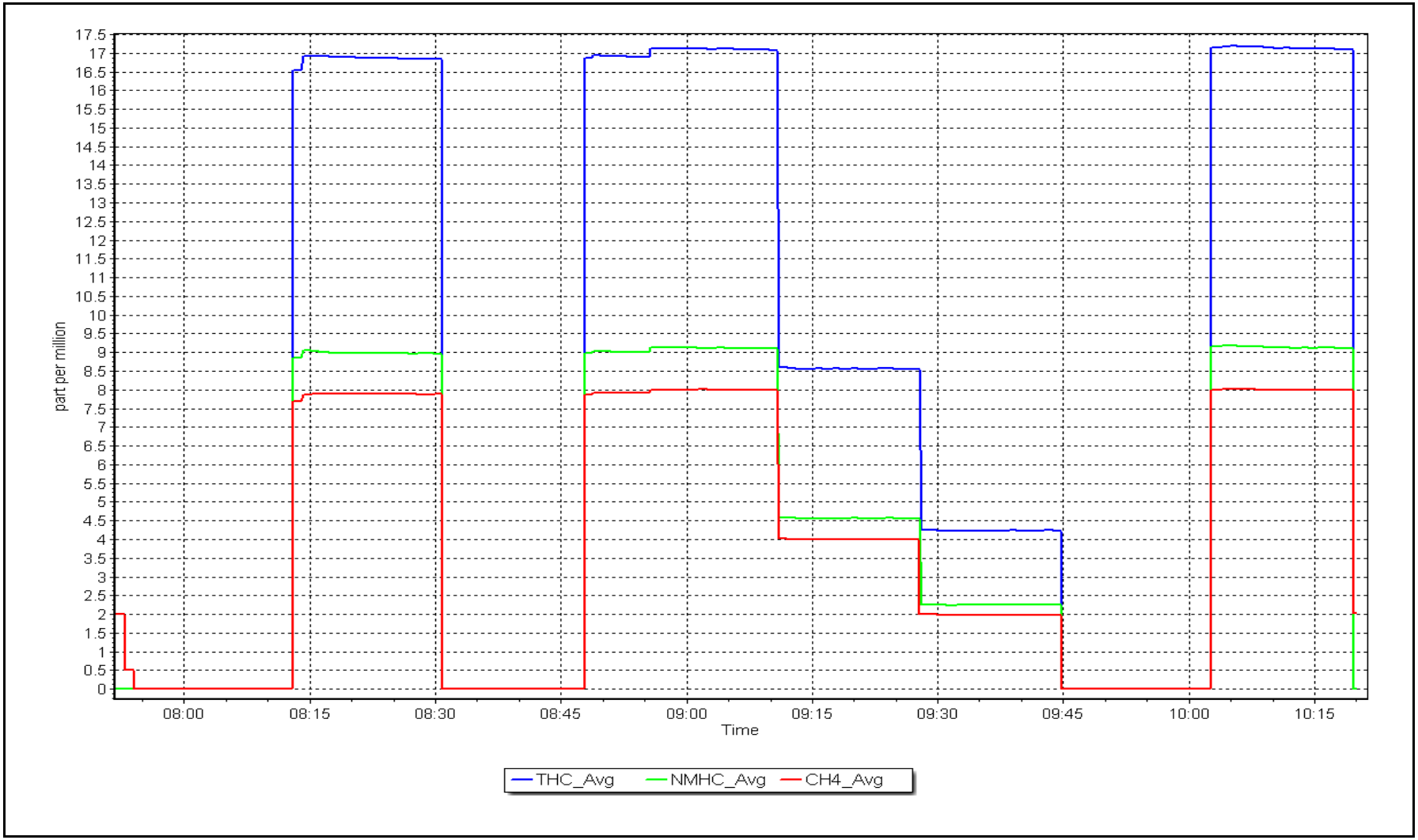
Calibration Date:	April 18, 2023	Previous Calibration:	March 17, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	7:55	End Time (MST):	10:20
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999986	*≥0.995*
9.12	9.11	1.0015			
4.56	4.56	0.9992	Slope	0.999569	*0.90 - 1.10*
2.28	2.25	1.0125			
			Intercept	-0.007757	*+/-0.5*



NMHC Calibration Plot Date: April 18, 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:	April 14, 2023	Last Cal Date:	March 2, 2023
Start time (MST):	8:45	End time (MST):	11:32
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:	163.0	163.0

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.993239	1.002446
NO_X Cal Offset:	-0.747177	-0.745161
NO Cal Slope:	0.995505	1.004625
NO Cal Offset:	-2.010875	-2.149028
NO_2 Cal Slope:	0.999852	1.000896
NO_2 Cal Offset:	0.368111	0.328255

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	0.3	----	----
as found span	4921	78.6	800.5	786.8	13.7	803.7	788.7	15.0	0.9961	0.9977
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	802.0	789.2	12.8	0.9982	0.9970
second point	4961	39.3	400.2	393.4	6.8	400.5	392.5	8.0	0.9993	1.0022
third point	4980	19.6	199.6	196.2	3.4	198.2	192.6	5.6	1.0072	1.0188
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.2	----	----
as left span	4921	78.6	800.5	393.6	406.9	796.3	386.5	409.8	1.0053	1.0185
								Average Correction Factor	1.0015	1.0060

Corrected As found	NO_X = 803.6 ppb	NO = 788.9 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	1.1%
Previous Response	NO_X = 794.4 ppb	NO = 781.3 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)	782.7	389.5	406.9	407.3	0.9990	100.1%
2nd GPT point (200 ppb O3)	782.7	584.7	211.7	212.4	0.9966	100.3%
3rd GPT point (100 ppb O3)	782.7	684.2	112.2	113.2	0.9910	100.9%
				Average Correction Factor	0.9955	100.5%

Notes: No maintenance or adjustments done.

Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

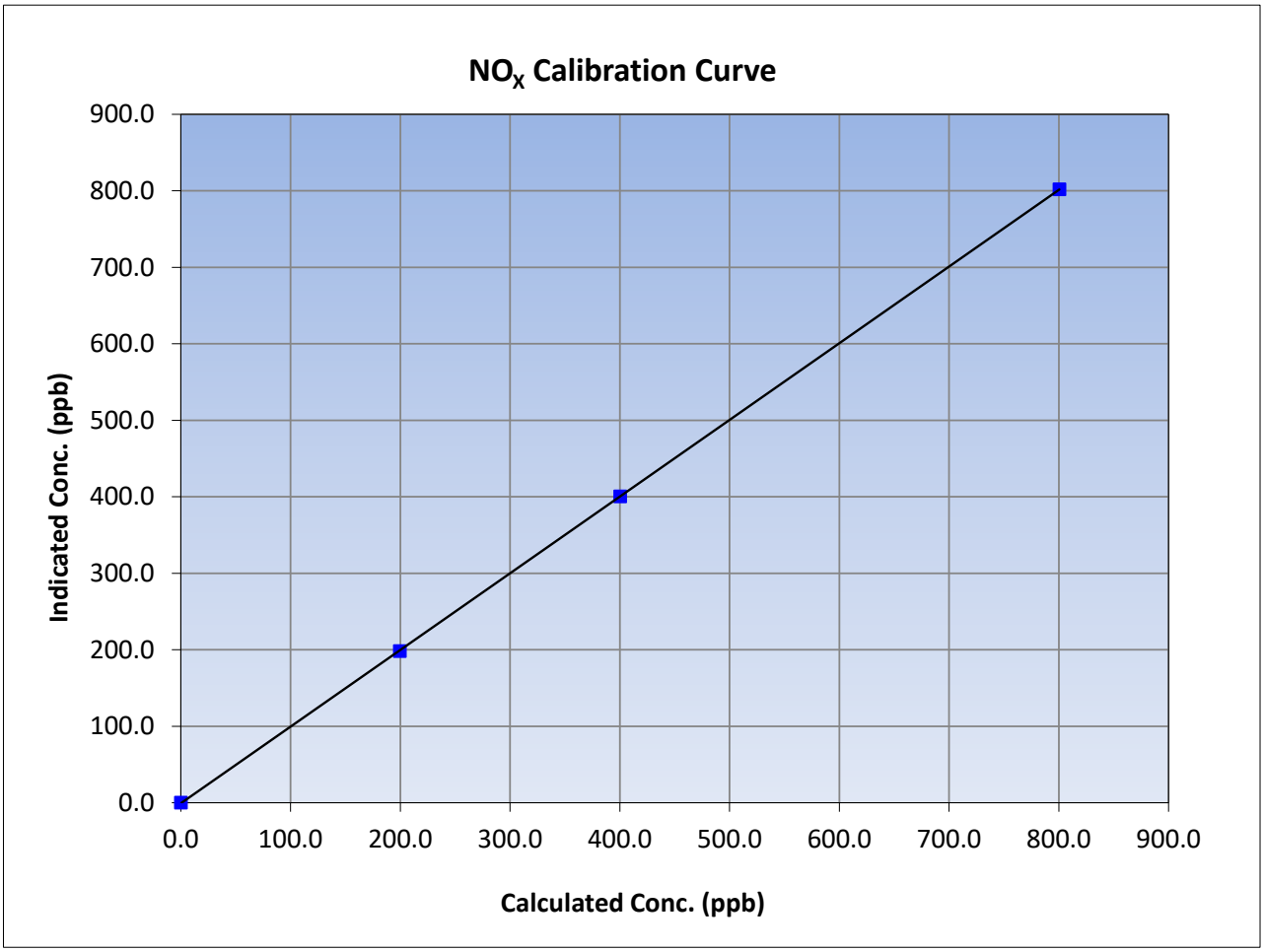
Version-04-2020

Station Information

Calibration Date:	April 14, 2023	Previous Calibration:	March 2, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	8:45	End Time (MST):	11:32
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999994	≥0.995
800.5	802.0	0.9982			
400.2	400.5	0.9993	Slope	1.002446	0.90 - 1.10
199.6	198.2	1.0072			
			Intercept	-0.745161	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

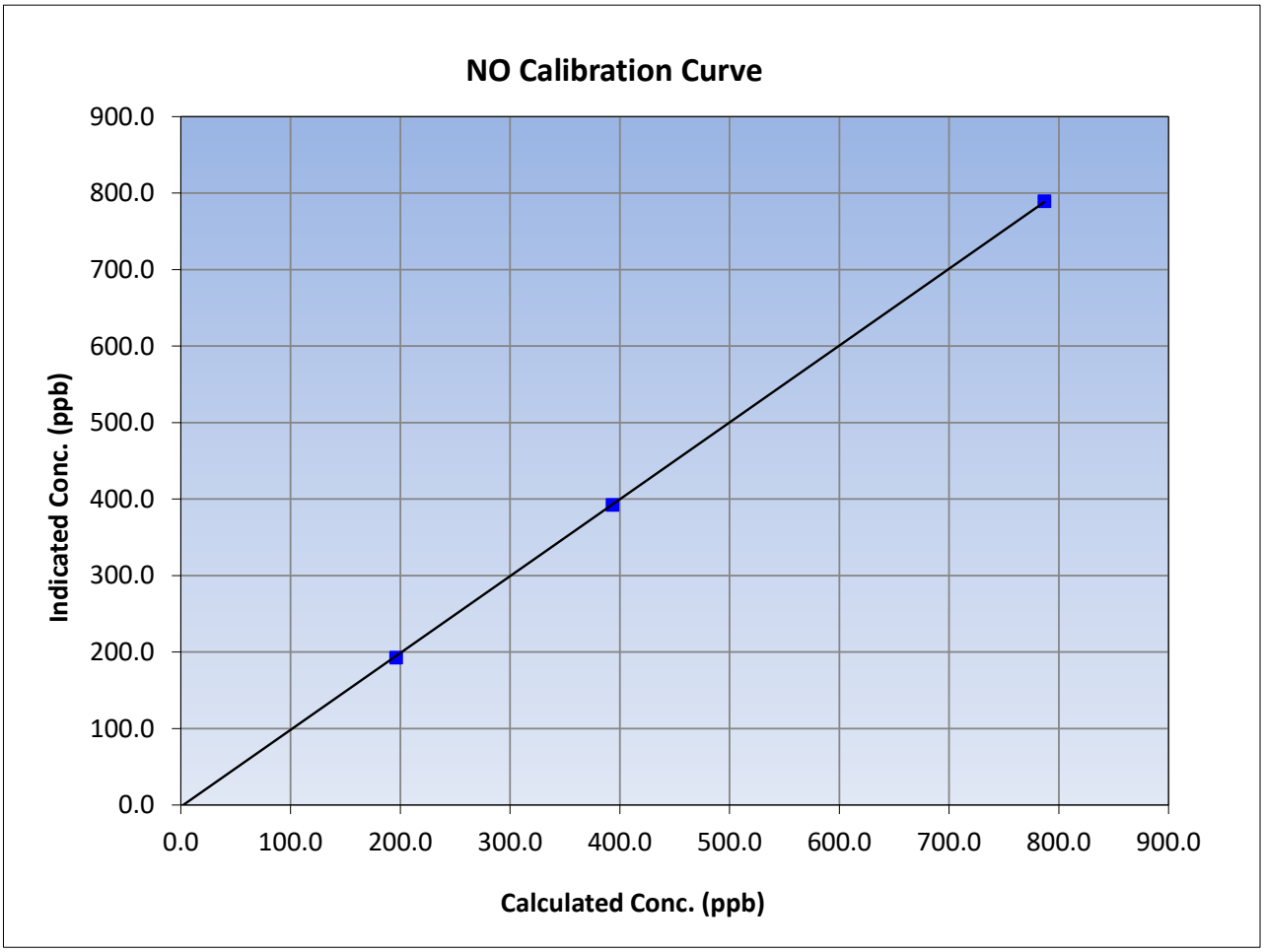
Version-04-2020

Station Information

Calibration Date:	April 14, 2023	Previous Calibration:	March 2, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	8:45	End Time (MST):	11:32
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999968	≥0.995
786.8	789.2	0.9970			
393.4	392.5	1.0022	Slope	1.004625	0.90 - 1.10
196.2	192.6	1.0188			
			Intercept	-2.149028	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

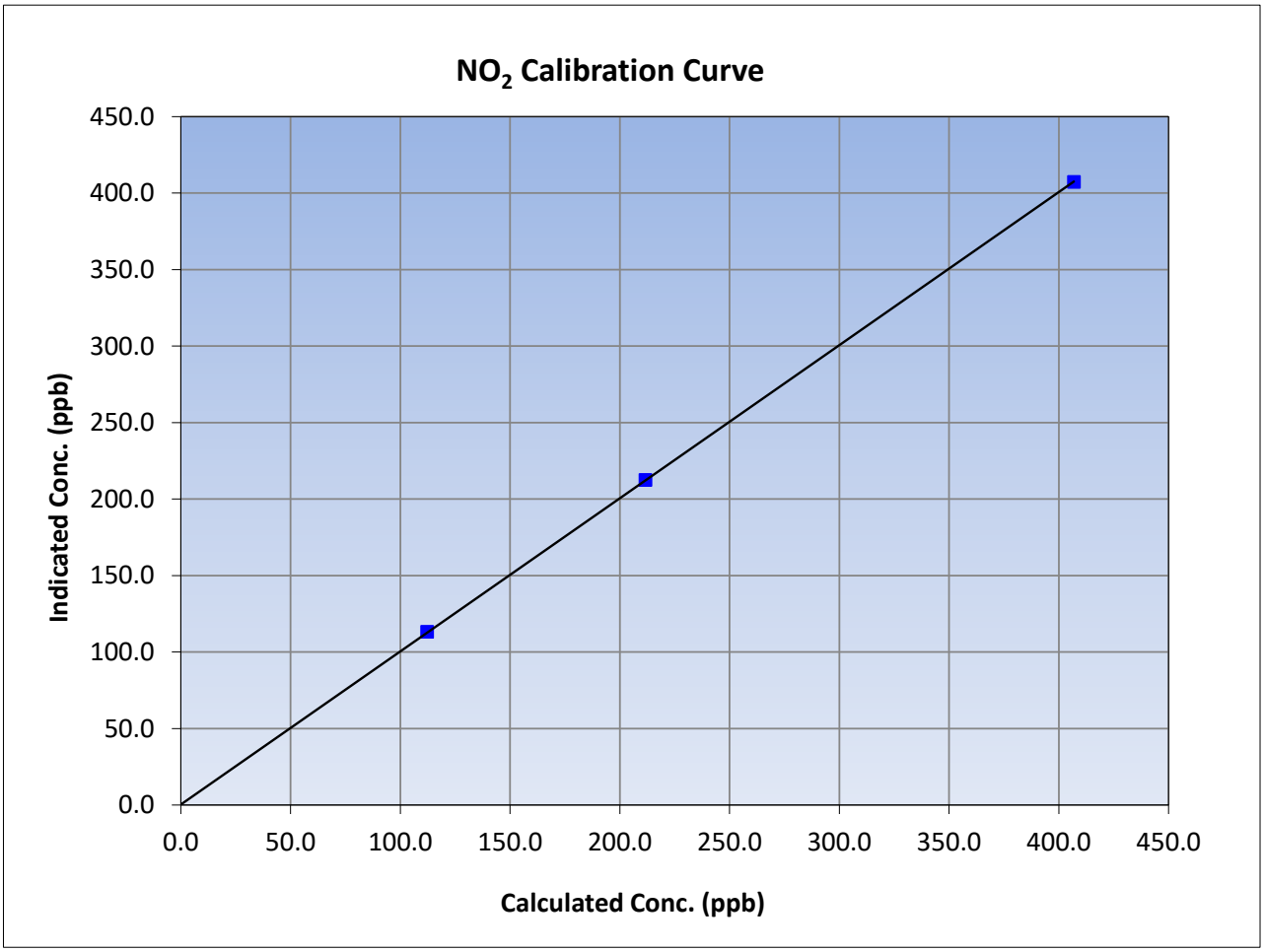
Version-04-2020

Station Information

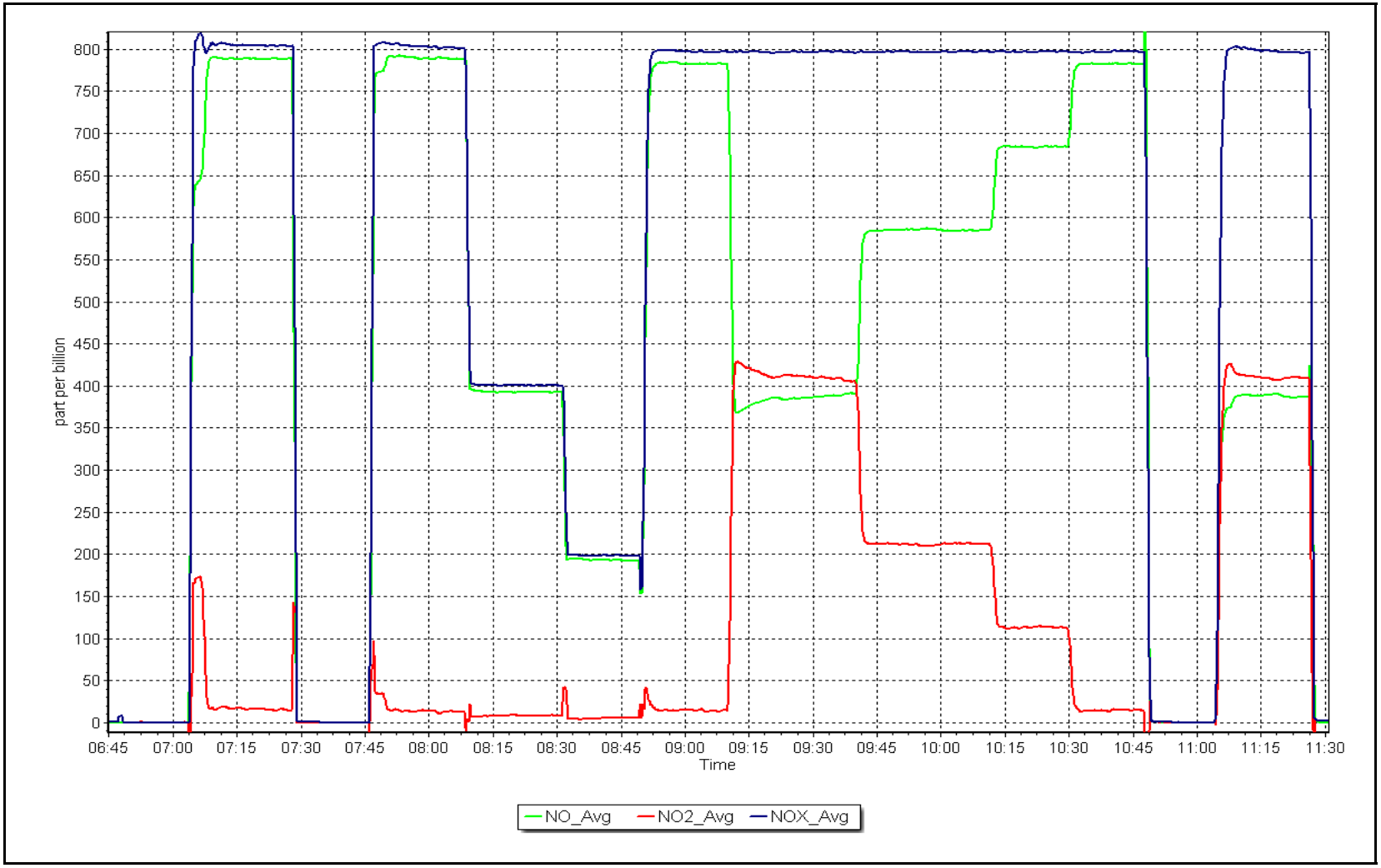
Calibration Date:	April 14, 2023	Previous Calibration:	March 2, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	8:45	End Time (MST):	11:32
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999992	≥0.995
406.9	407.3	0.9990			
211.7	212.4	0.9966	Slope	1.000896	0.90 - 1.10
112.2	113.2	0.9910			
			Intercept	0.328255	+/-20



NO_X Calibration Plot Date: April 14, 2023 Location: Anzac



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	April 18, 2023	Last Cal Date:	March 30, 2023
Start time (MST):	6:45	End time (MST):	12:07
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:	1.001686	1.000057	Backgd or Offset:	0.9	1.3
Calibration intercept:	0.080000	0.140000	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	0.3	----
as found span	5000	884.8	400.0	401.9	0.995
as found 2nd point	5000	771.6	200.0	201.1	0.995
as found 3rd point	5000	672.9	100.0	100.7	0.993
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	886.1	400.0	400.1	1.000
second point	5000	772.1	200.0	200.1	1.000
third point	5000	671.5	100.0	100.5	0.995
as left zero	5000	0.0	0.0	-0.9	----
as left span	5000	885.7	400.0	401.4	0.997
				Average Correction Factor	0.998

Baseline Corr As found:	401.6	Previous response	400.8	*% change	0.2%
Baseline Corr 2nd AF pt:	200.8	AF Slope:	1.004000	AF Intercept:	0.300000
Baseline Corr 3rd AF pt:	100.4	AF Correlation:	1.000000		

* = > +/-5% change initiates investigation

Notes: Ozone Scrubber Replaced. Zero adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

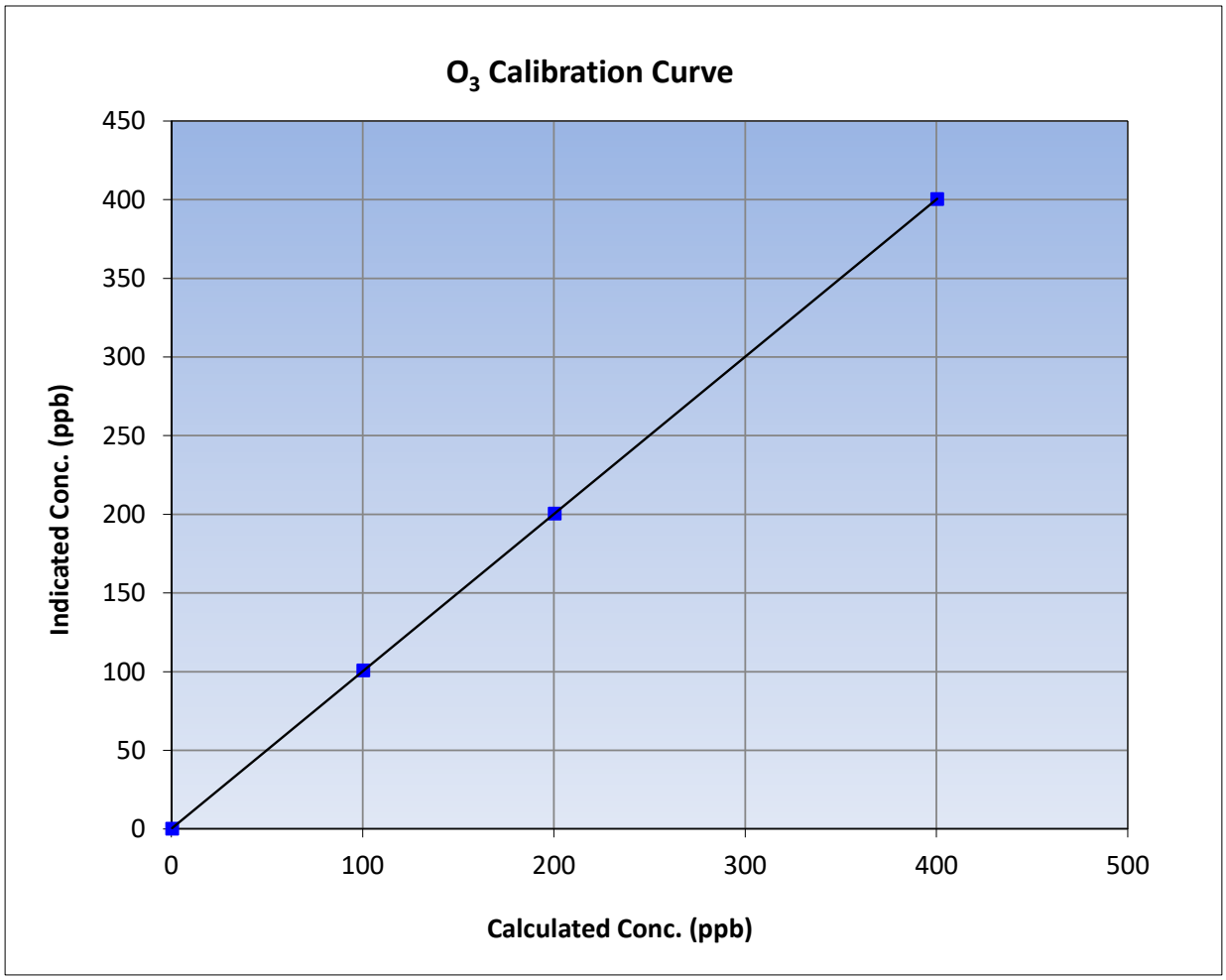
Station Information

Calibration Date:	April 18, 2023	Previous Calibration:	March 30, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	6:45	End Time (MST):	12:07
Analyzer make:	Thermo 49i	Analyzer serial #:	1426262595

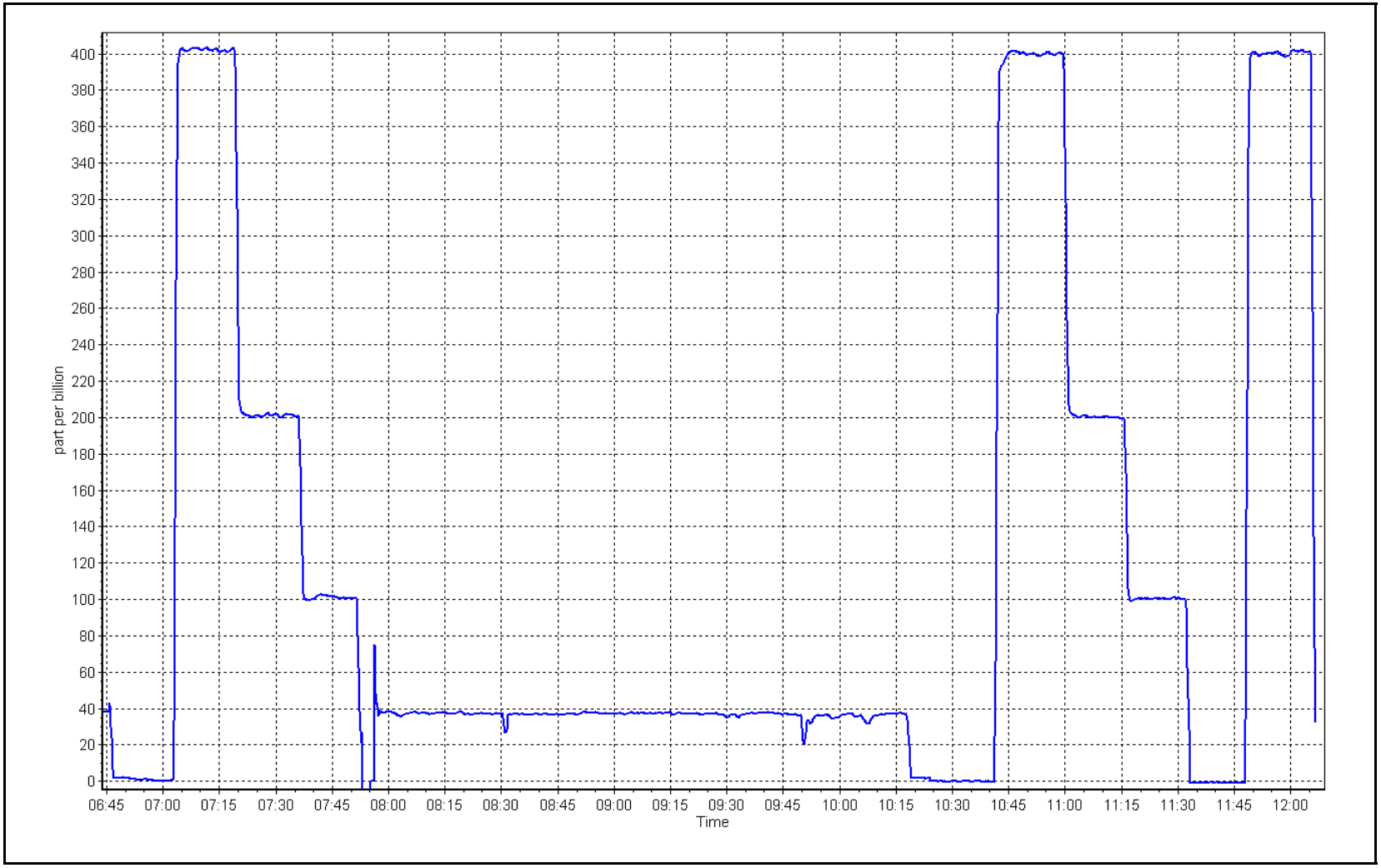
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
400.0	400.1	0.9998
200.0	200.1	0.9995
100.0	100.5	0.9950

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.000057	*0.90 - 1.10*
Intercept	0.140000	*+/- 5*



O_3 Calibration Plot Date: April 18, 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:	April 18, 2023	Last Cal Date:	March 30, 2023
Start time (MST):	7:03	End time (MST):	7:25
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)	2.5	2.8	2.5	☐	+/- 2 ^{o}C
P (mmHg)	708.6	709.7	708.6	☐	+/- 10 mmHg
flow (LPM)	5	5.08	5	☐	+/- 0.25 LPM

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

PM w/o HEPA: 2.8 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: 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
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	April 13, 2023	Last Cal Date:	March 9, 2023
Start time (MST):	9:10	End time (MST):	12:40
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:	0.999724	0.999723	Backgd or Offset:	12.4	12.4
Calibration intercept:	-1.859598	-1.559214	Coeff or Slope:	1.099	1.099

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4921	79.4	800.0	794.5	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4921	79.4	800.0	799.6	1.000
second point	4960	39.7	400.0	395.6	1.011
third point	4980	19.8	199.5	197.8	1.009
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	79.4	800.1	799.9	1.000
				Average Correction Factor	1.007

Baseline Corr As found:	794.60	Previous response	797.89	*% change	-0.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

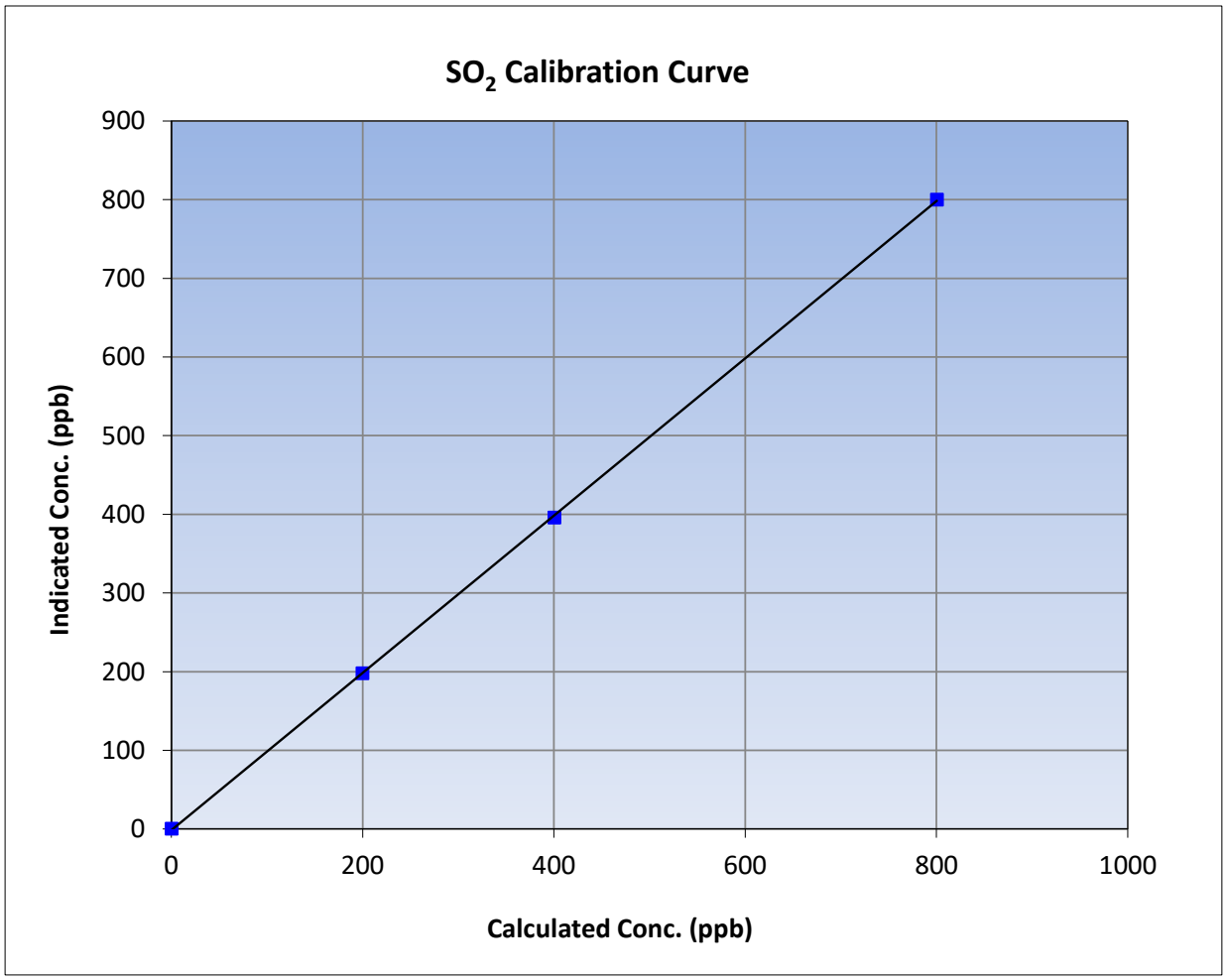
Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 9, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:10	End Time (MST):	12:40
Analyzer make:	Thermo 43i	Analyzer serial #:	1218153459

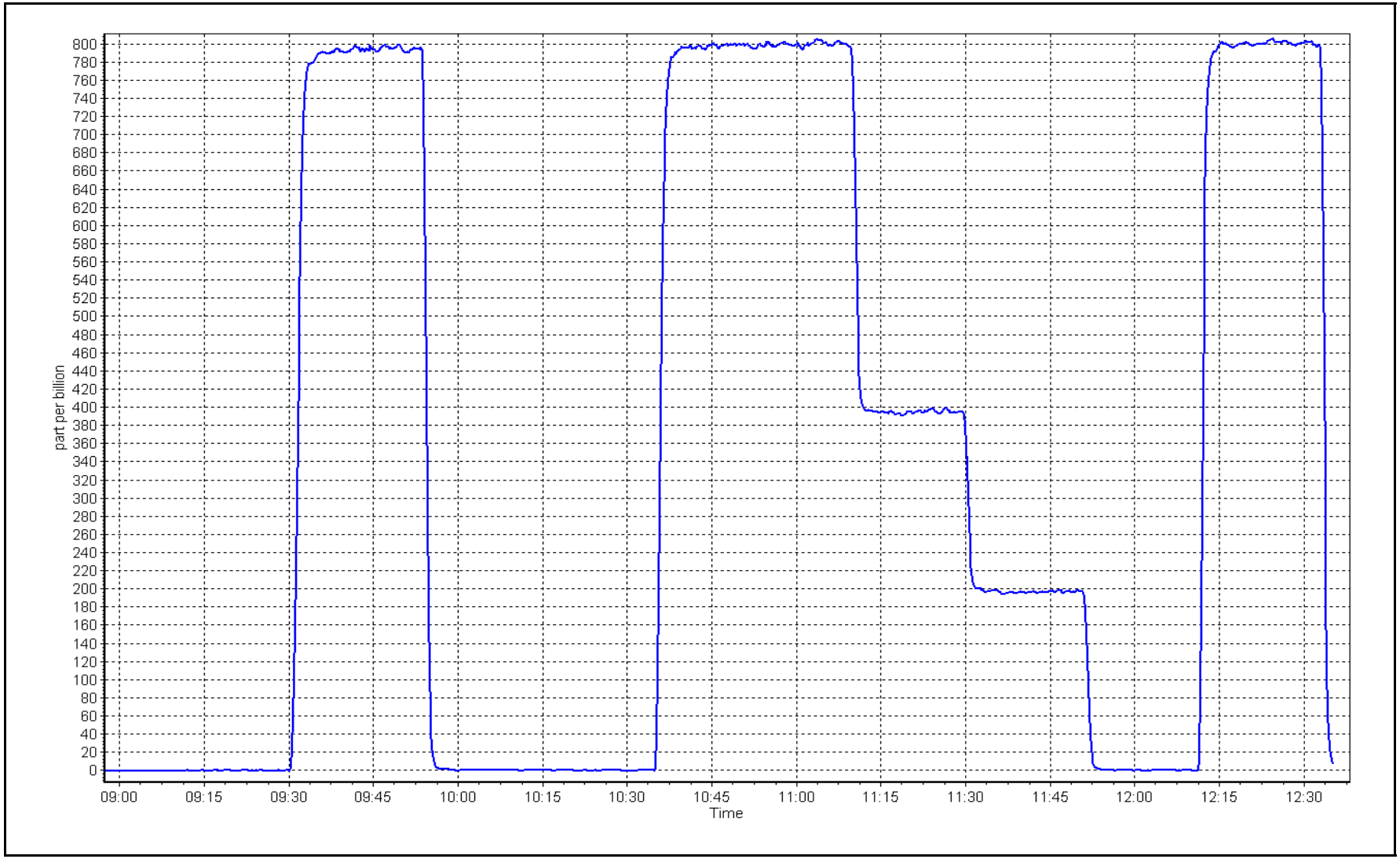
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
800.0	799.6	1.0005
400.0	395.6	1.0112
199.5	197.8	1.0087

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999966	*≥0.995*
Slope	0.999723	*0.90 - 1.10*
Intercept	-1.559214	*+/-30*



SO2 Calibration Plot Date: April 13, 2023 Location: Wapasu



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	April 21, 2023	Last Cal Date:	March 8, 2023
Start time (MST):	9:02	End time (MST):	13:23
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:	0.990568	0.990854	Backgd or Offset:	12.7	12.7
Calibration intercept:	0.180784	0.220786	Coeff or Slope:	1.085	1.085

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4921	78.8	80.0	79.7	1.005
as found 2nd point	4961	39.4	40.0	39.8	1.007
as found 3rd point	4980	19.7	20.0	20.0	1.005
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.4	----
high point	4921	78.8	80.0	79.6	1.005
second point	4961	39.4	40.0	39.7	1.007
third point	4980	19.7	20.0	19.9	1.005
as left zero	5000	0.0	0.0	0.5	----
as left span	4921	78.8	80.0	78.1	1.024
SO2 Scrubber Check	4921	79.4	800.0	0.1	----
Date of last scrubber change:		n/a		Ave Corr Factor	1.006
Date of last converter efficiency test:		n/a			efficiency

Baseline Corr As found:	79.6	Prev response:	79.43	*% change:	0.2%
Baseline Corr 2nd AF pt:	39.7	AF Slope:	0.994854	AF Intercept:	0.080792
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999998		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

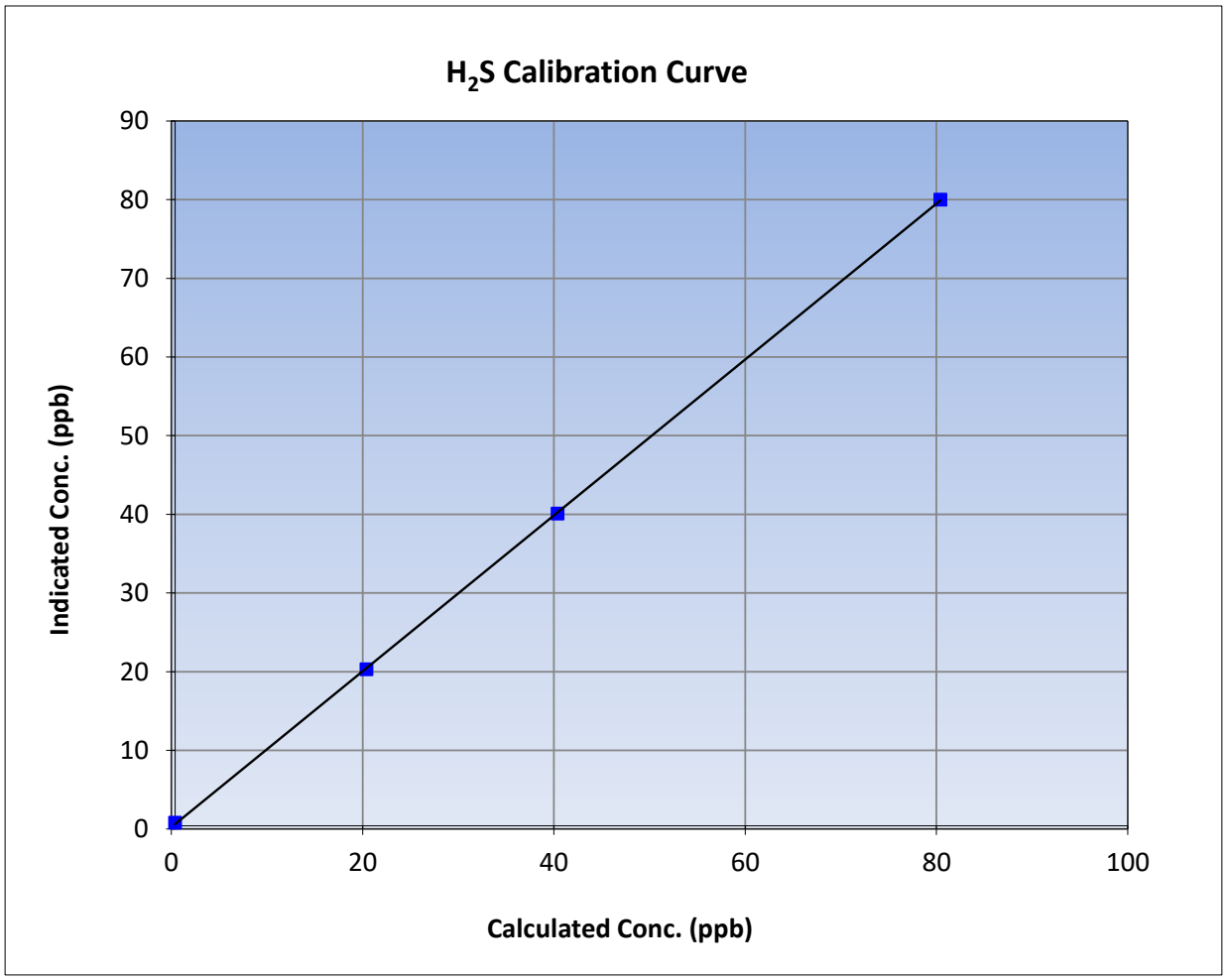
Station Information

Calibration Date:	April 21, 2023	Previous Calibration:	March 8, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:02	End Time (MST):	13:23
Analyzer make:	Thermo 450i	Analyzer serial #:	1218153583

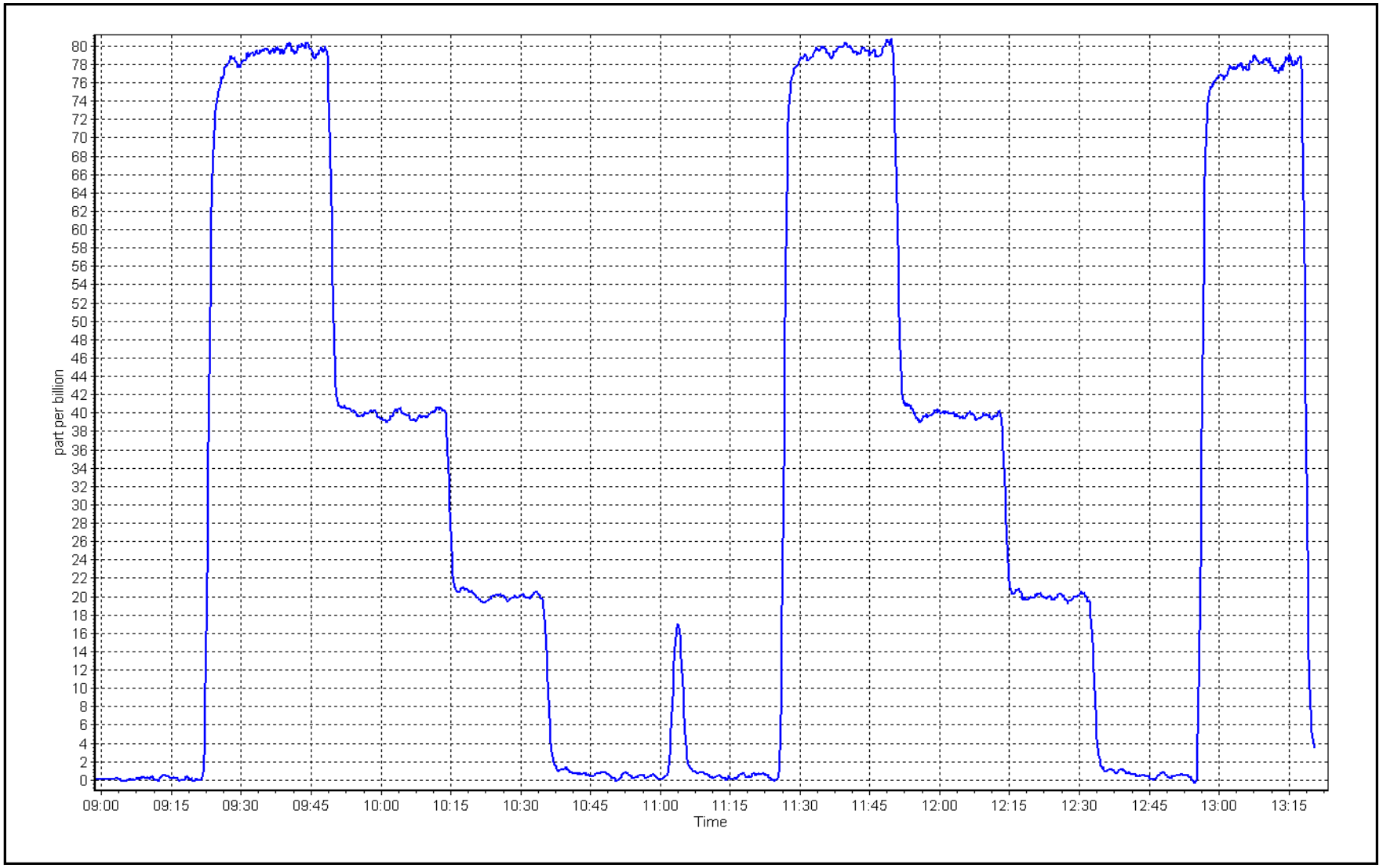
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
80.0	79.6	1.0050
40.0	39.7	1.0074
20.0	19.9	1.0051

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999975	*≥0.995*
Slope	0.990854	*0.90 - 1.10*
Intercept	0.220786	*+/-3*



H_2S Calibration Plot Date: April 21, 2023 Location: Wapasu



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	April 13, 2023	Last Cal Date:	March 9, 2023
Start time (MST):	9:10	End time (MST):	12:40
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:	1.000425	1.001474	Background:	3.140	3.070
Calibration intercept:	-0.058335	-0.066926	Coefficient:	4.250	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	-0.11	----
as found span	4921	79.4	17.09	16.82	1.016
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.03	----
high point	4921	79.4	17.09	17.09	1.000
second point	4960	39.7	8.55	8.41	1.016
third point	4980	19.8	4.26	4.21	1.013
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.4	17.09	17.13	0.998
				Average Correction Factor	1.010

Baseline Corr As found:	16.93	Previous response	17.04	*% change	-0.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

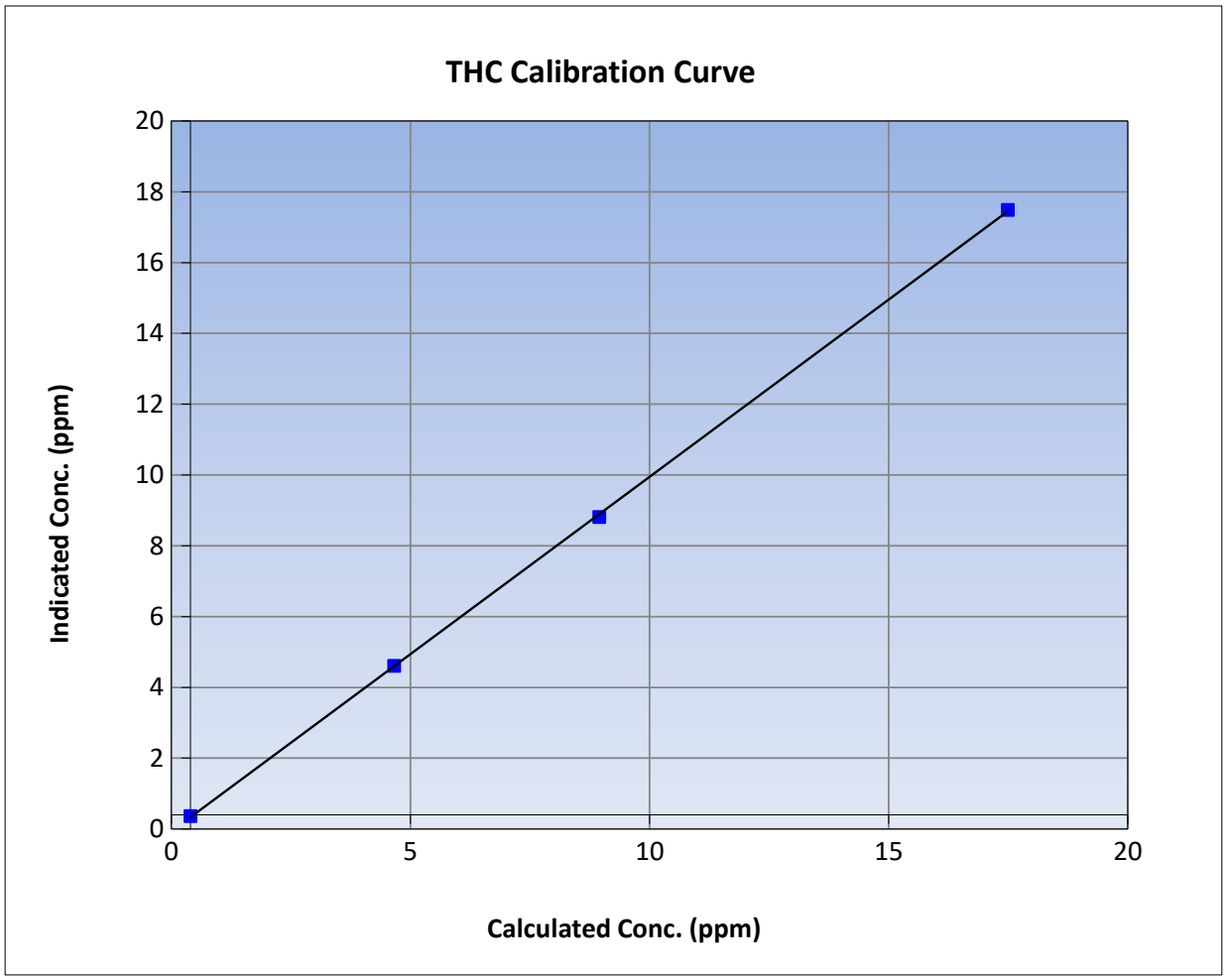
Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 9, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:10	End Time (MST):	12:40
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1218153352

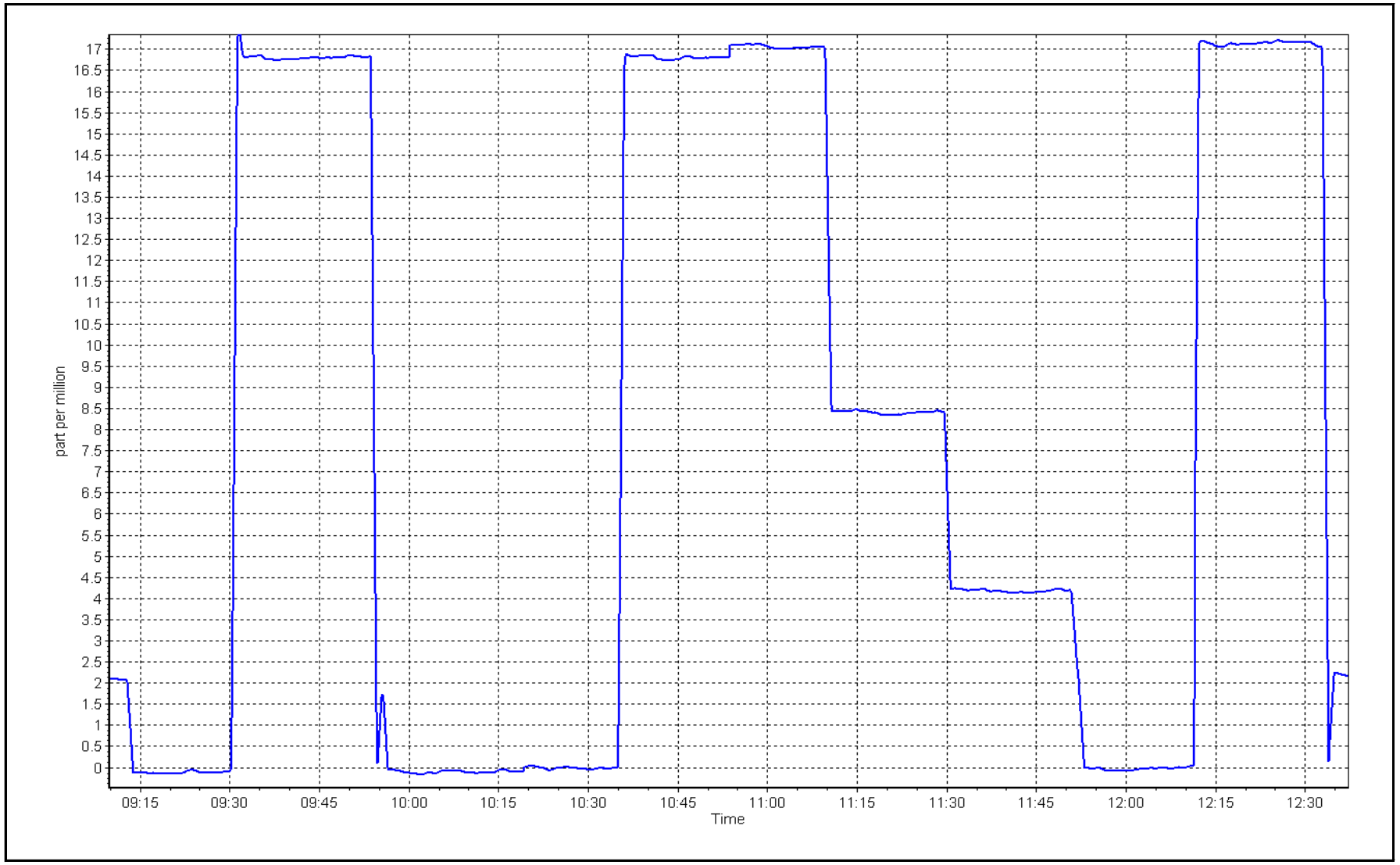
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.03	----
17.09	17.09	1.0002
8.55	8.41	1.0159
4.26	4.21	1.0129

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999944	*≥0.995*
Slope	1.001474	*0.90 - 1.10*
Intercept	-0.066926	*+/-1.5*



THC Calibration Plot Date: April 13, 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:	April 25, 2023	Last Cal Date:	March 23, 2023
Start time (MST):	10:10	End time (MST):	15:05
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T375YK8		Cal Gas Expiry Date:	April 13, 2025	
NOX Cal Gas Conc:	49.11	ppm	NO Cal Gas Conc:	48.07	ppm
Removed Cylinder #:			Removed Gas Exp Date:		
Removed Gas NOX Conc:	49.11	ppm	Removed Gas NO Conc:	48.07	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	2449	
ZAG make/model:	API T701H		Serial Number:	359	

Analyzer Information

Analyzer make:	Teledyne API T200	Analyzer serial #:	833
NOX Range (ppb):	0 - 1000 ppb		

	Start	*Finish*		*Start*	*Finish*
NO coeff or slope:	0.820	0.836	NO bkgnd or offset:	0.1	0.1
NOX coeff or slope:	0.812	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:	0.987970	1.001718
NO_X Cal Offset:	-1.020000	-1.660000
NO Cal Slope:	0.989414	1.001759
NO Cal Offset:	-1.920000	-1.940000
NO_2 Cal Slope:	0.999015	0.991719
NO_2 Cal Offset:	0.401105	-0.351144

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	4917	83.2	817.2	799.9	17.3	799.3	780.8	18.5	1.0224	1.0244
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	-0.2	0.4	----	----
high point	4917	83.2	817.2	799.9	17.3	818.0	800.0	17.7	0.9990	0.9999
second point	4958	41.6	408.6	399.9	8.7	406.2	398.5	7.6	1.0059	1.0036
third point	4979	20.8	204.3	200.0	4.3	201.6	196.2	5.4	1.0134	1.0192
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.2	----	----
as left span	4917	83.2	817.2	399.1	418.1	810.0	398.3	411.8	1.0089	1.0020
								Average Correction Factor	1.0061	1.0076

Corrected As found	NO_X = 798.8 ppb	NO = 780.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.9%
Previous Response	NO_X = 806.3 ppb	NO = 789.5 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)	798.5	397.7	418.1	414.7	1.0082	99.2%
2nd GPT point (200 ppb O3)	798.5	599.3	216.5	214.0	1.0117	98.8%
3rd GPT point (100 ppb O3)	798.5	700.2	115.6	113.5	1.0186	98.2%
				Average Correction Factor	1.0128	98.7%

Notes: Sample inlet filter changed after as founds. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

NO_X Calibration Summary

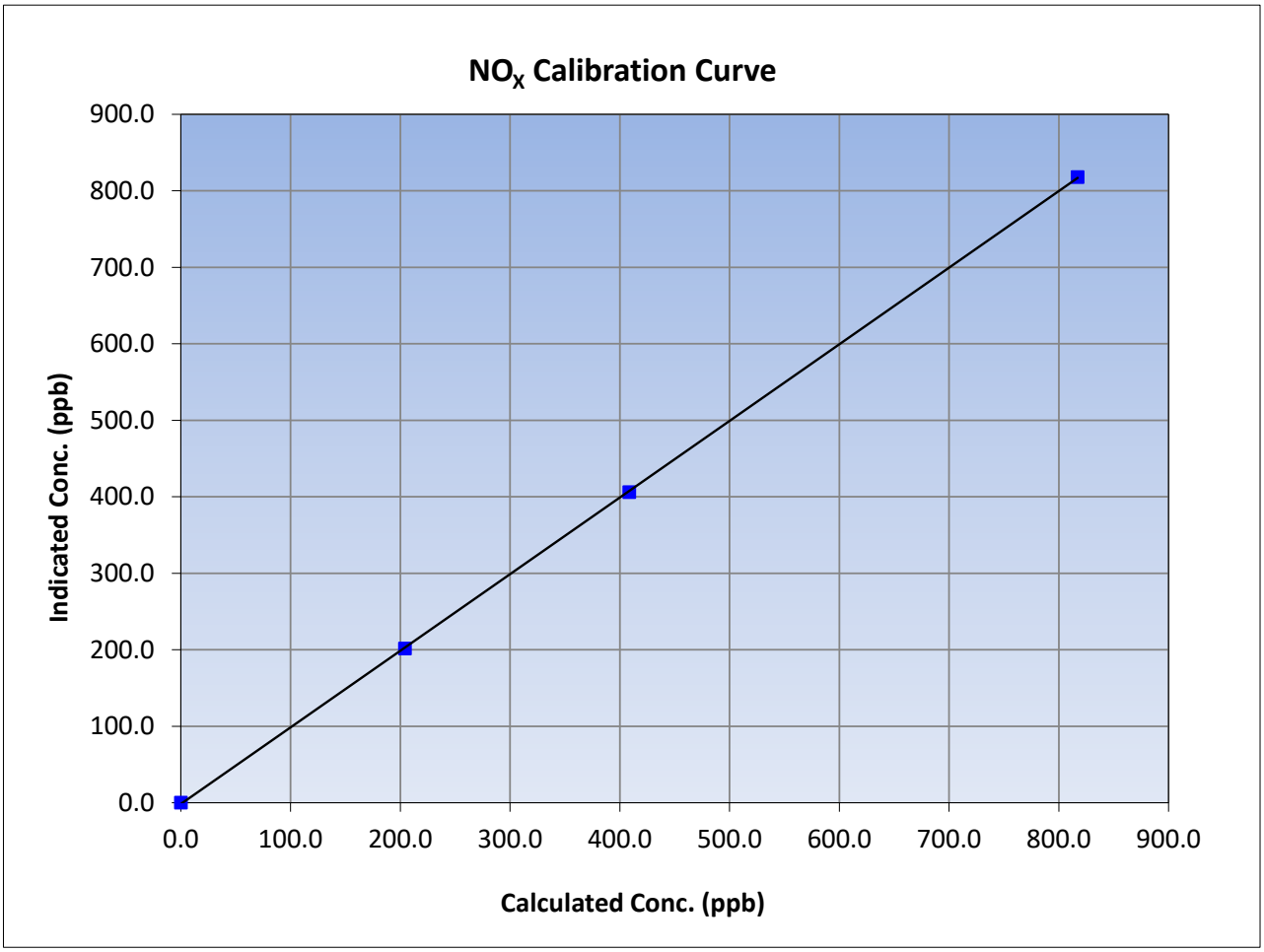
Version-04-2020

Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	March 23, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:10	End Time (MST):	15:05
Analyzer make:	Teledyne API T200	Analyzer serial #:	833

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999978	≥0.995
817.2	818.0	0.9990			
408.6	406.2	1.0059	Slope	1.001718	0.90 - 1.10
204.3	201.6	1.0134			
			Intercept	-1.660000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

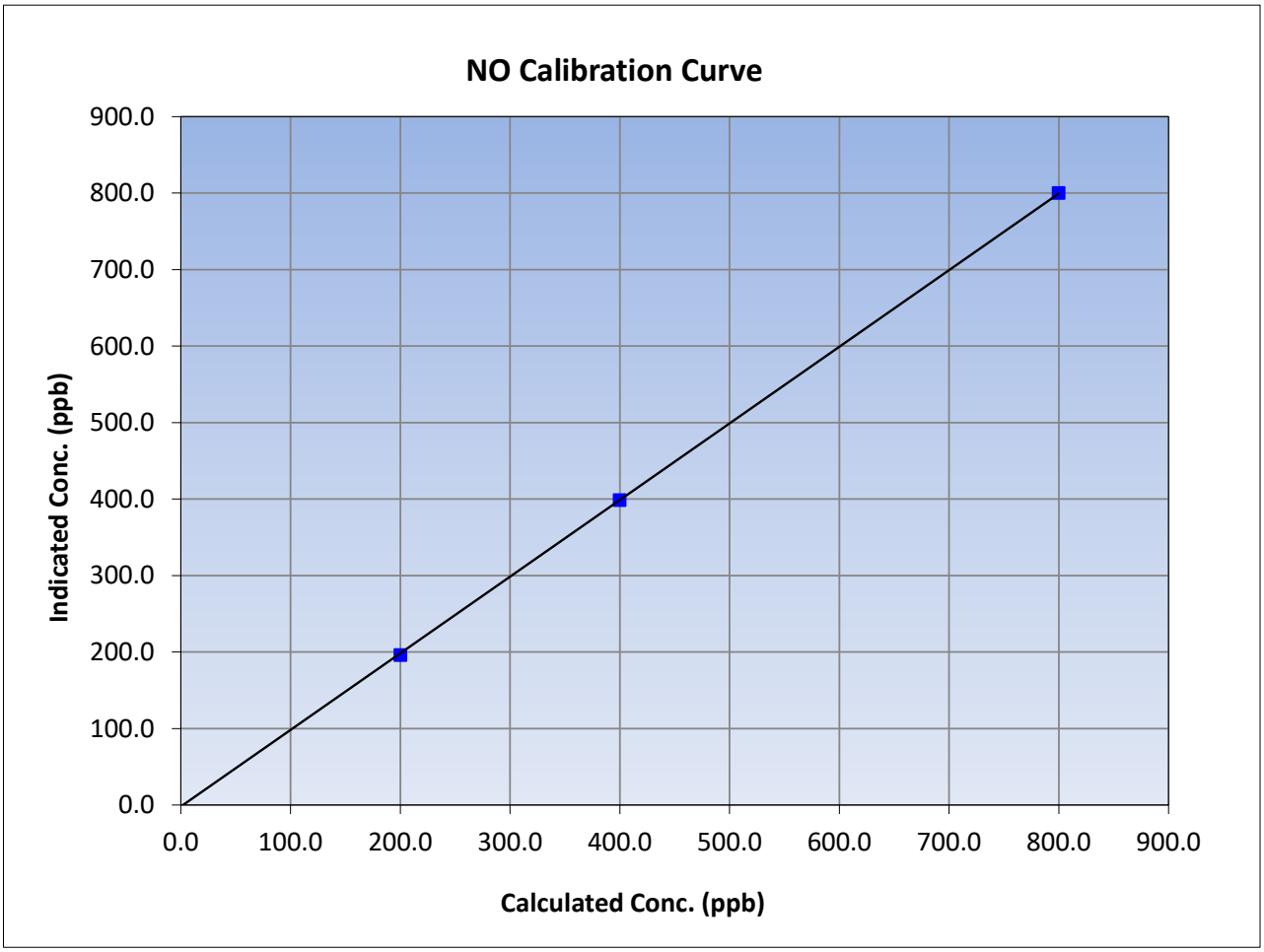
Version-04-2020

Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	March 23, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:10	End Time (MST):	15:05
Analyzer make:	Teledyne API T200	Analyzer serial #:	833

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999976	≥0.995
799.9	800.0	0.9999			
399.9	398.5	1.0036	Slope	1.001759	0.90 - 1.10
200.0	196.2	1.0192			
			Intercept	-1.940000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

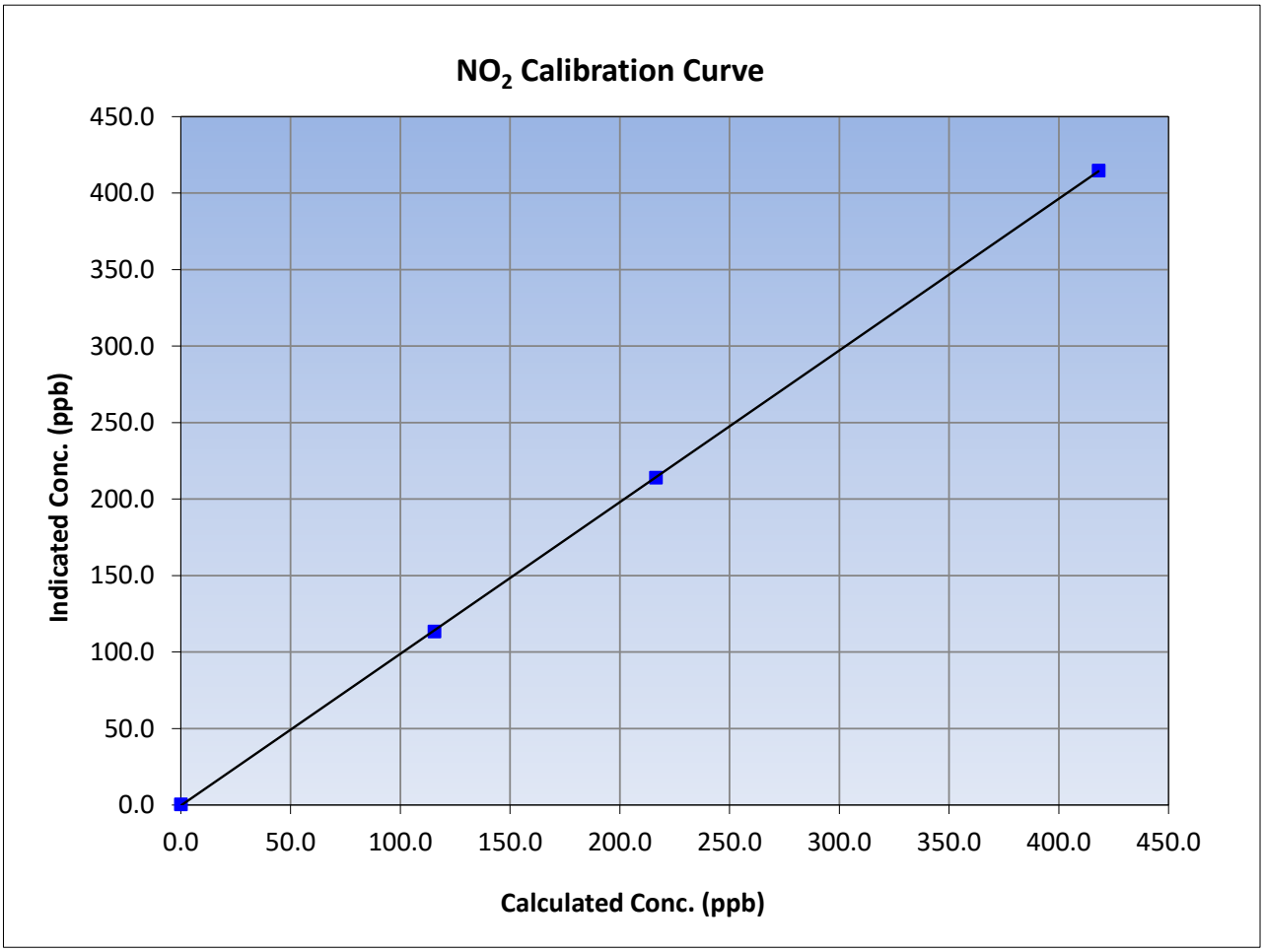
Version-04-2020

Station Information

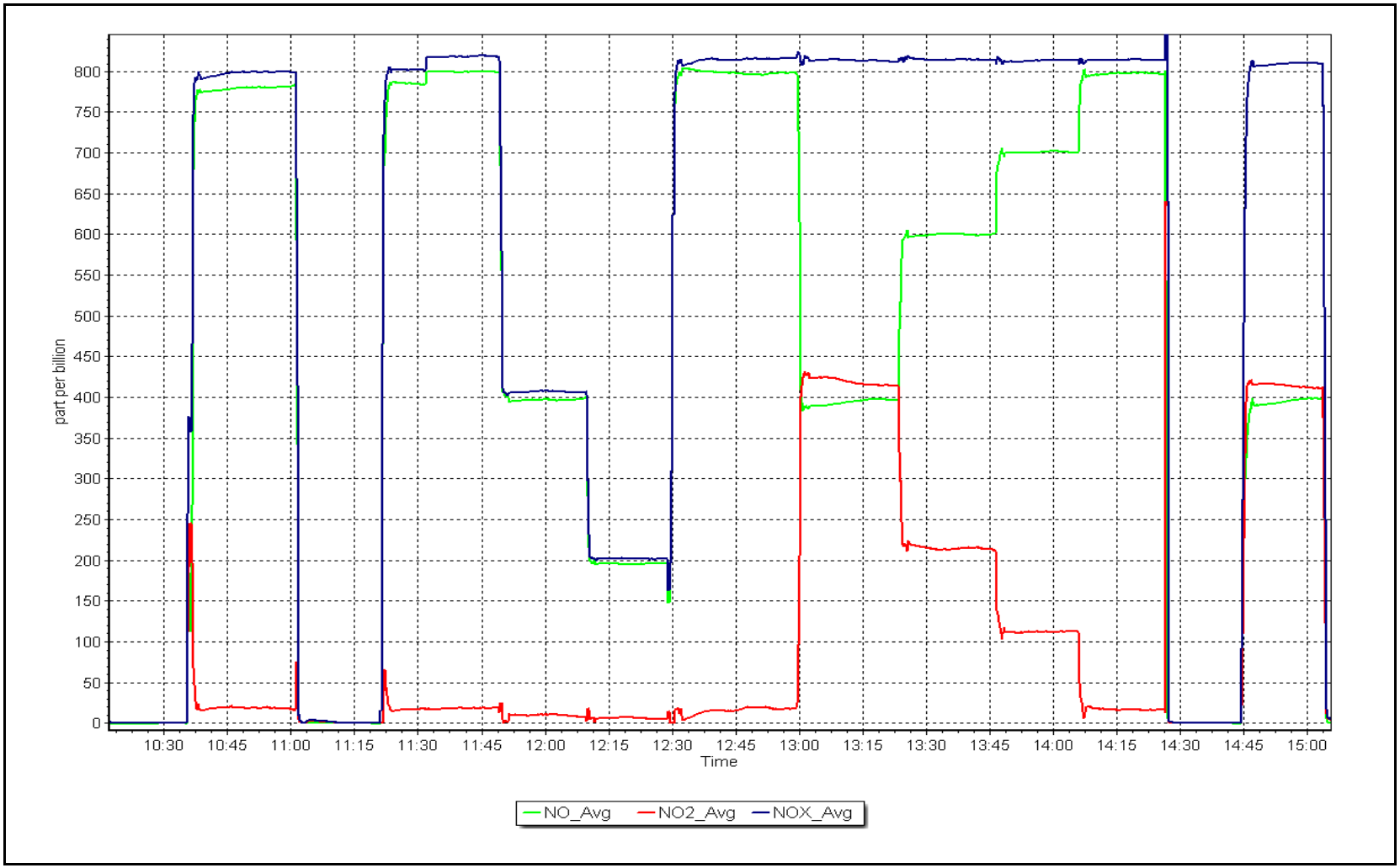
Calibration Date:	April 25, 2023	Previous Calibration:	March 23, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:10	End Time (MST):	15:05
Analyzer make:	Teledyne API T200	Analyzer serial #:	833

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.4	----	Correlation Coefficient	0.999984	≥0.995
418.1	414.7	1.0082			
216.5	214.0	1.0117	Slope	0.991719	0.90 - 1.10
115.6	113.5	1.0186			
			Intercept	-0.351144	+/-20



NO_X Calibration Plot Date: April 25, 2023 Location: Wapasu



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	April 11, 2023	Last Cal Date:	March 3, 2023
Start time (MST):	9:55	End time (MST):	13:13
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:	1.006086	1.008600	Backgd or Offset:	-1.8	-1.8
Calibration intercept:	-0.540000	-0.380000	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	403.6	0.991
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	1077.3	400.0	403.2	0.992
second point	5000	900.3	200.0	201.4	0.993
third point	5000	789.5	100.0	99.8	1.002
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	1077.3	400.0	405.8	0.986
				Average Correction Factor	0.996

Baseline Corr As found:	403.5	Previous response	401.9	*% change	0.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

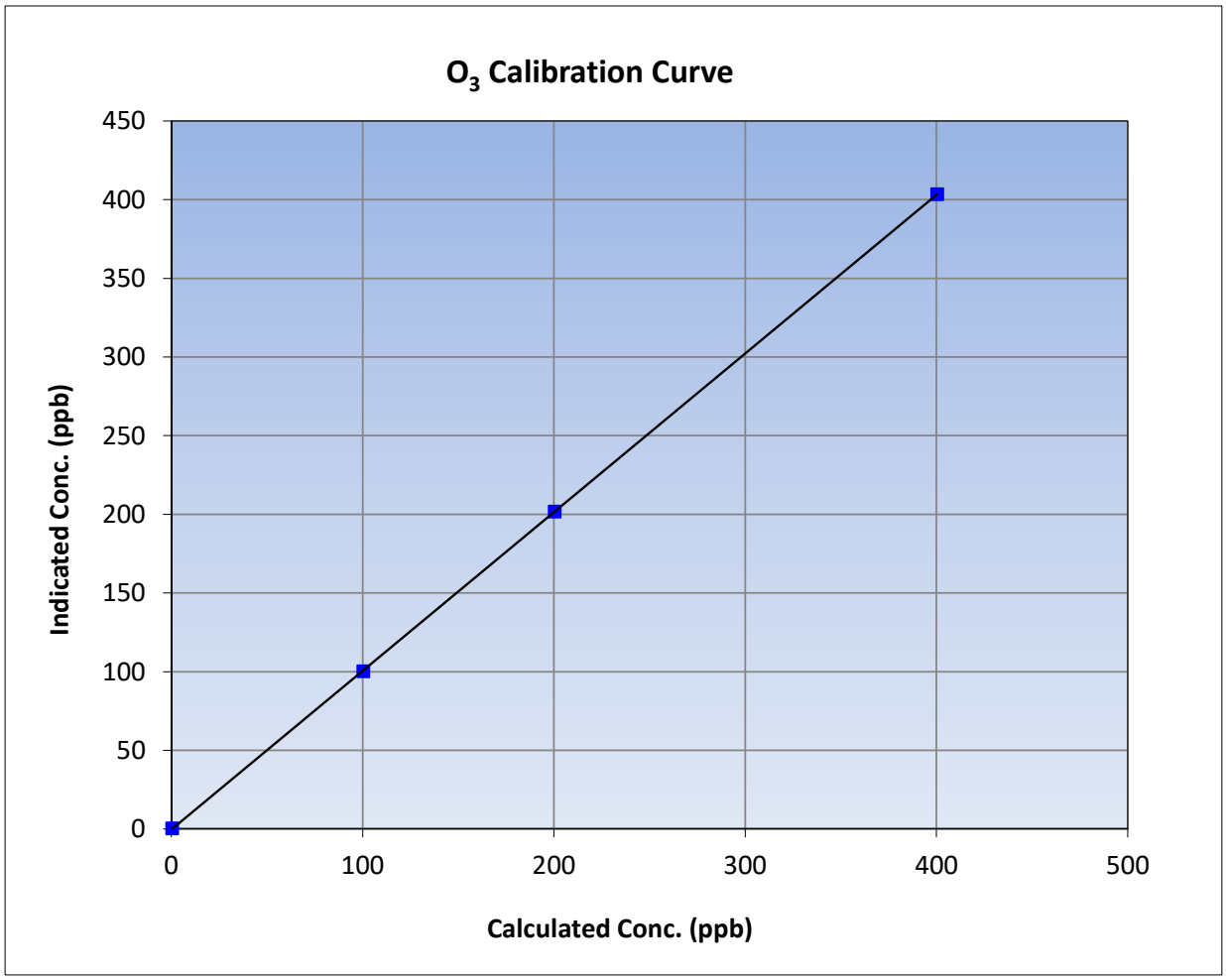
Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 3, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:55	End Time (MST):	13:13
Analyzer make:	API T400	Analyzer serial #:	3870

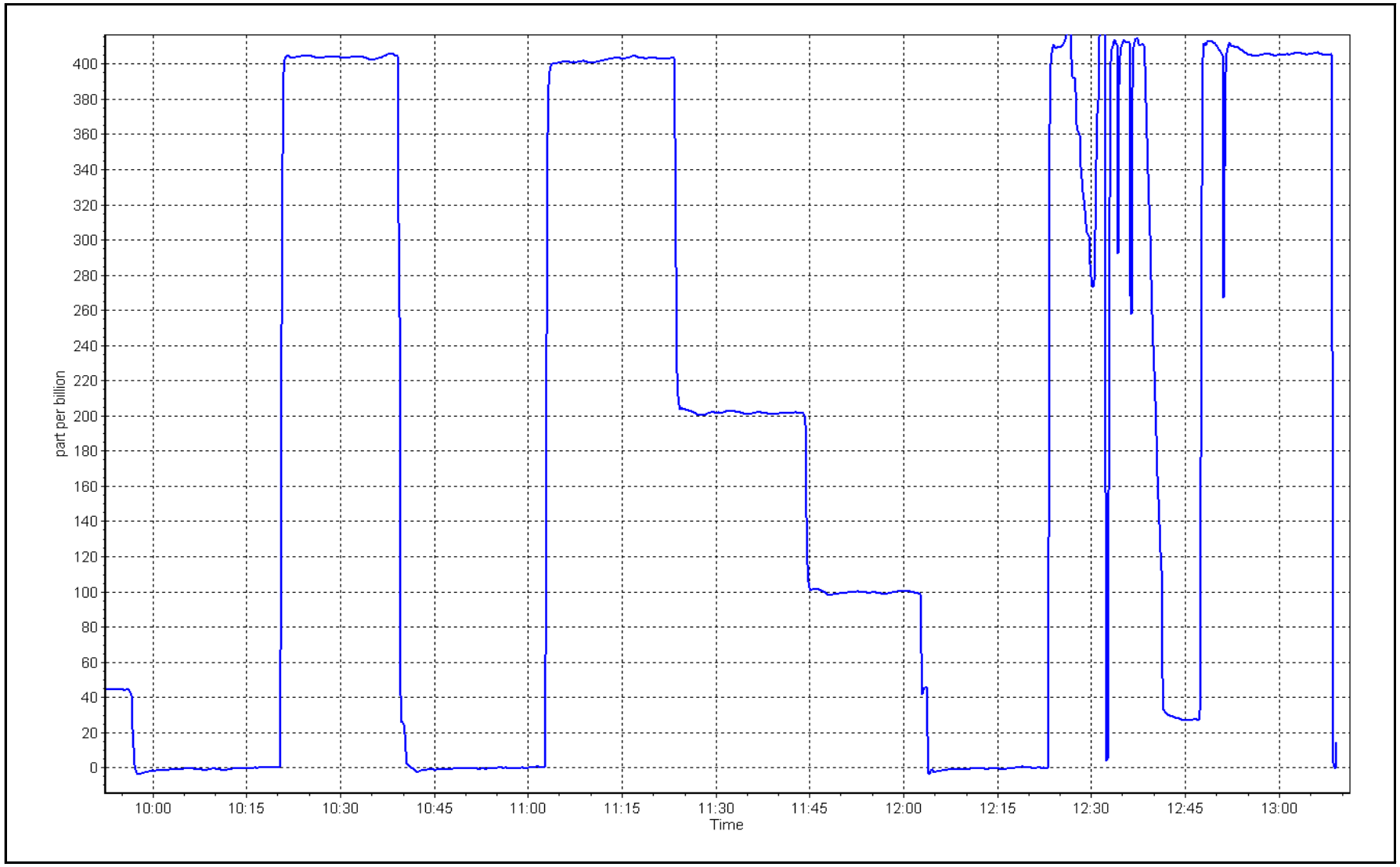
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
400.0	403.2	0.9921
200.0	201.4	0.9930
100.0	99.8	1.0020

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	1.008600	*0.90 - 1.10*
Intercept	-0.380000	*+/- 5*



O_3 Calibration Plot Date: April 11, 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:	April 25, 2023	Last Cal Date:	March 23, 2023
Start time (MST):	13:15	End time (MST):	14:34
Analyzer Make:	API T640	S/N:	1183
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388754
Temp/RH standard:	Alicat FP-25BT	S/N:	388754

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	4.60	4.06	4.60	☐	+/- 2 °C
P (mmHg)	710.00	712.43	710.00	☐	+/- 10 mmHg
flow (LPM)	5.00	5.05	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: April 25, 2023 Last Cal Date: March 23, 2023

PM w/o HEPA: 6.9 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: March 23, 2023 <0.2 ug/m3

Disposable Filter Changed: March 23, 2023

Annual Maintenance

Date Sample Tube Cleaned: _____

Date RH/T Sensor Cleaned: _____

Notes: No adjustments made. Leak check passed.

Calibration by: Aswin Sasi Kumar

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS18
STONY MOUNTAIN
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	April 27, 2023	Last Cal Date:	March 30, 2023
Start time (MST):	9:50	End time (MST):	12:48
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.006974	0.997063	Backgd or Offset:	22.9	22.6
Calibration intercept:	-1.482948	0.035860	Coeff or Slope:	0.817	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	-0.2	----
as found span	4919	81.0	800.3	805.9	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4919	81.0	800.3	797.6	1.003
second point	4959	40.5	400.2	400.2	1.000
third point	4979	20.2	199.6	198.2	1.007
as left zero	5000	0.0	0.0	0.0	----
as left span	4919	81.0	800.3	799.2	1.001
				Average Correction Factor	1.003

Baseline Corr As found:	806.10	Previous response	804.38	*% 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. Adjusted the span only.

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

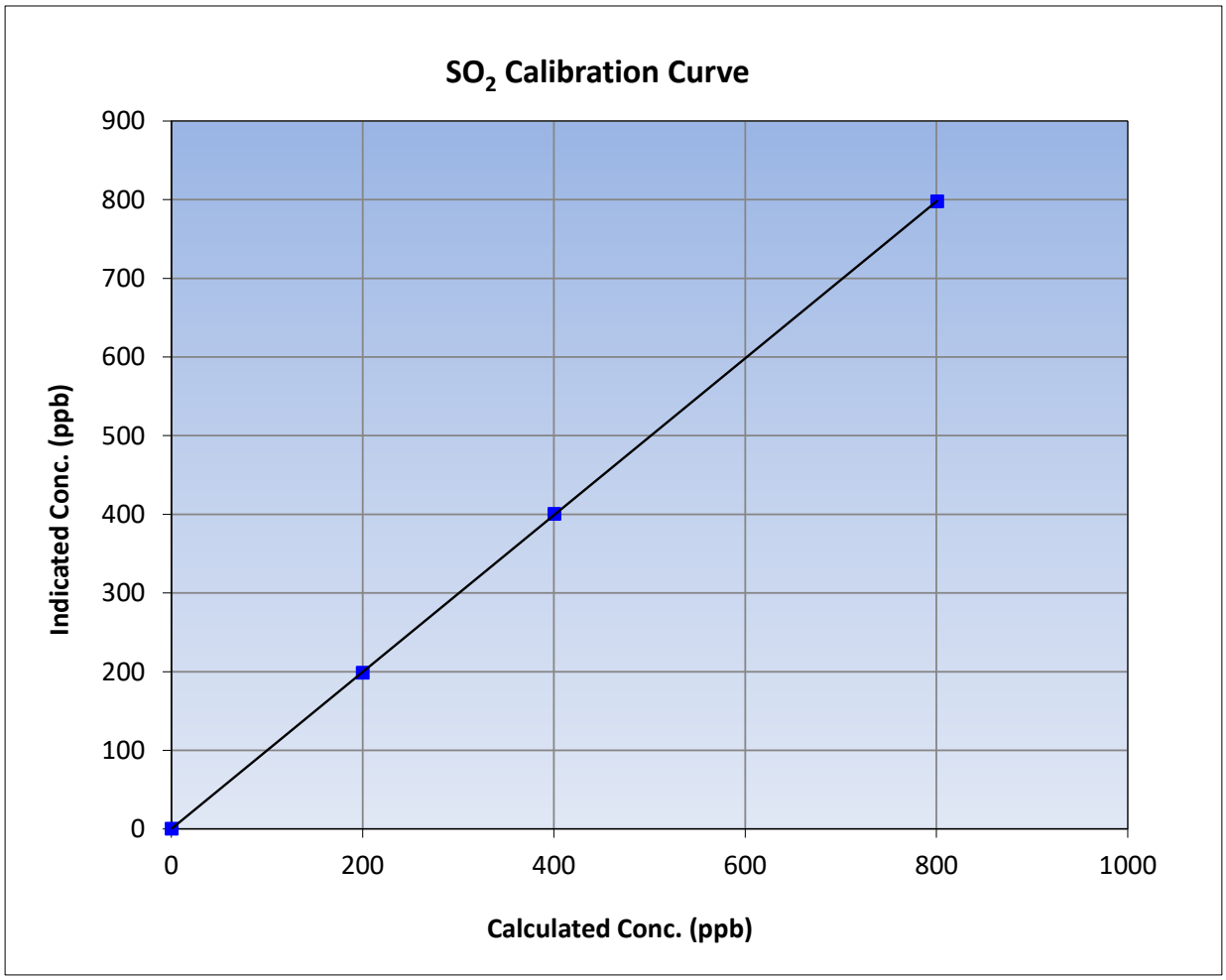
Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 30, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:50	End Time (MST):	12:48
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301453

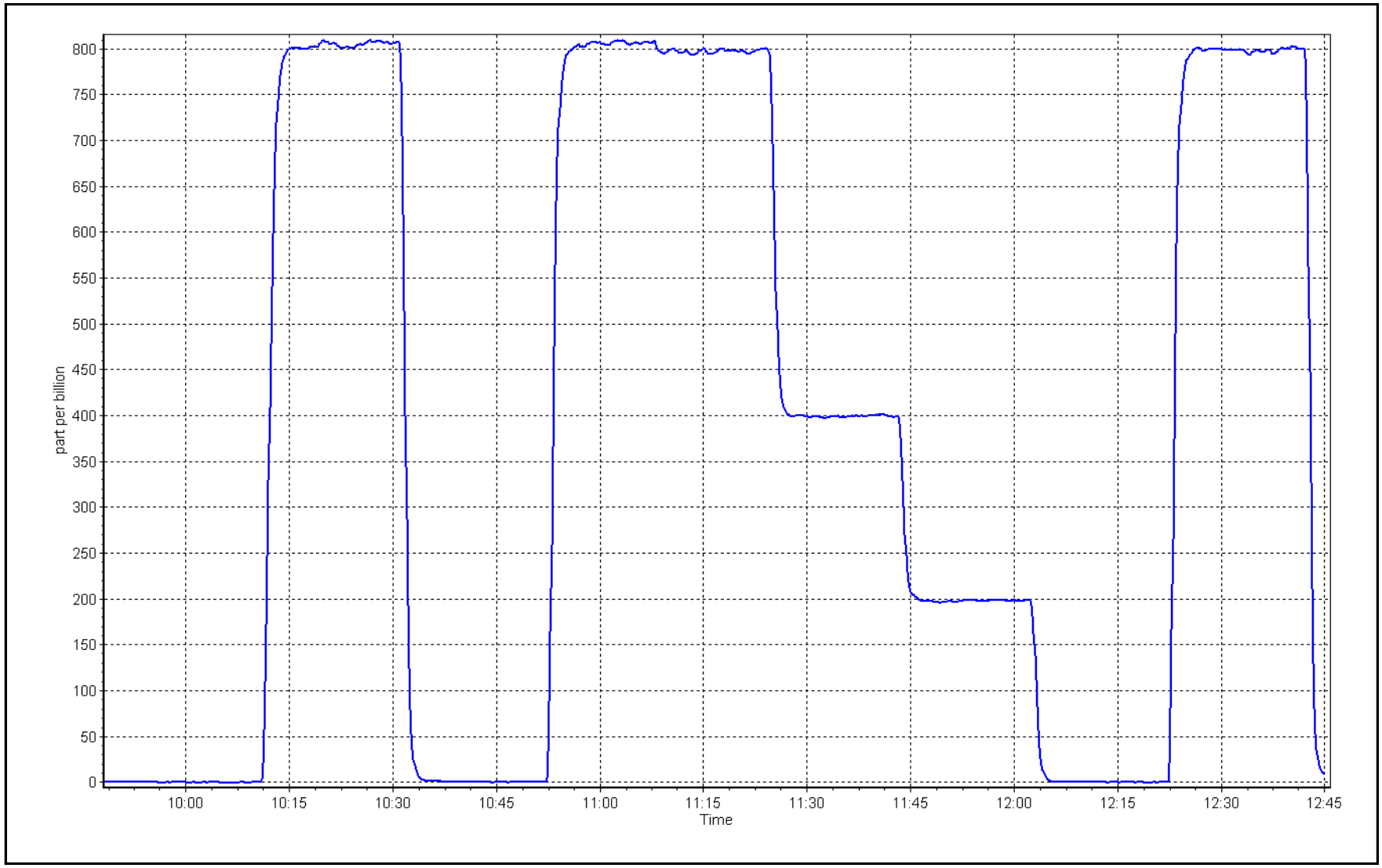
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
800.3	797.6	1.0034
400.2	400.2	1.0000
199.6	198.2	1.0071

Statistical Evaluation		Limits
Correlation Coefficient	0.999994	≥0.995
Slope	0.997063	0.90 - 1.10
Intercept	0.035860	+/-30



SO2 Calibration Plot Date: April 27, 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:	April 26, 2023	Last Cal Date:	March 7, 2023
Start time (MST):	9:37	End time (MST):	14:00
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.479	ppm	Cal Gas Exp Date:	January 4, 2025
Cal Gas Cylinder #:	CC500395			
Removed Cal Gas Conc:	5.479	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	2658
ZAG Make/Model:	Teledyne API T701		Serial Number:	360

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1218153359	
Converter make:	CD Nova CDN-101		Converter serial #:	555	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005159	0.994871	Backgd or Offset:	2.56	2.60
Calibration intercept:	0.260882	0.321057	Coeff or Slope:	1.151	1.151

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4927	73.0	80.0	78.6	1.019
as found 2nd point	4964	36.5	40.0	39.6	1.012
as found 3rd point	4983	18.3	20.0	19.5	1.033
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	79.8	1.002
second point	4964	36.5	40.0	40.3	0.992
third point	4983	18.3	20.0	20.3	0.988
as left zero	5000	0.0	0.0	0.3	----
as left span	4927	73.0	80.0	79.7	1.004
SO2 Scrubber Check	4923	77.1	771.0	0.0	----
Date of last scrubber change:		17-Dec-21		Ave Corr Factor	0.994
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.5	Prev response:	80.67	*% change:	-2.8%
Baseline Corr 2nd AF pt:	39.5	AF Slope:	0.982863	AF Intercept:	0.041427
Baseline Corr 3rd AF pt:	19.4	AF Correlation:	0.999961		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

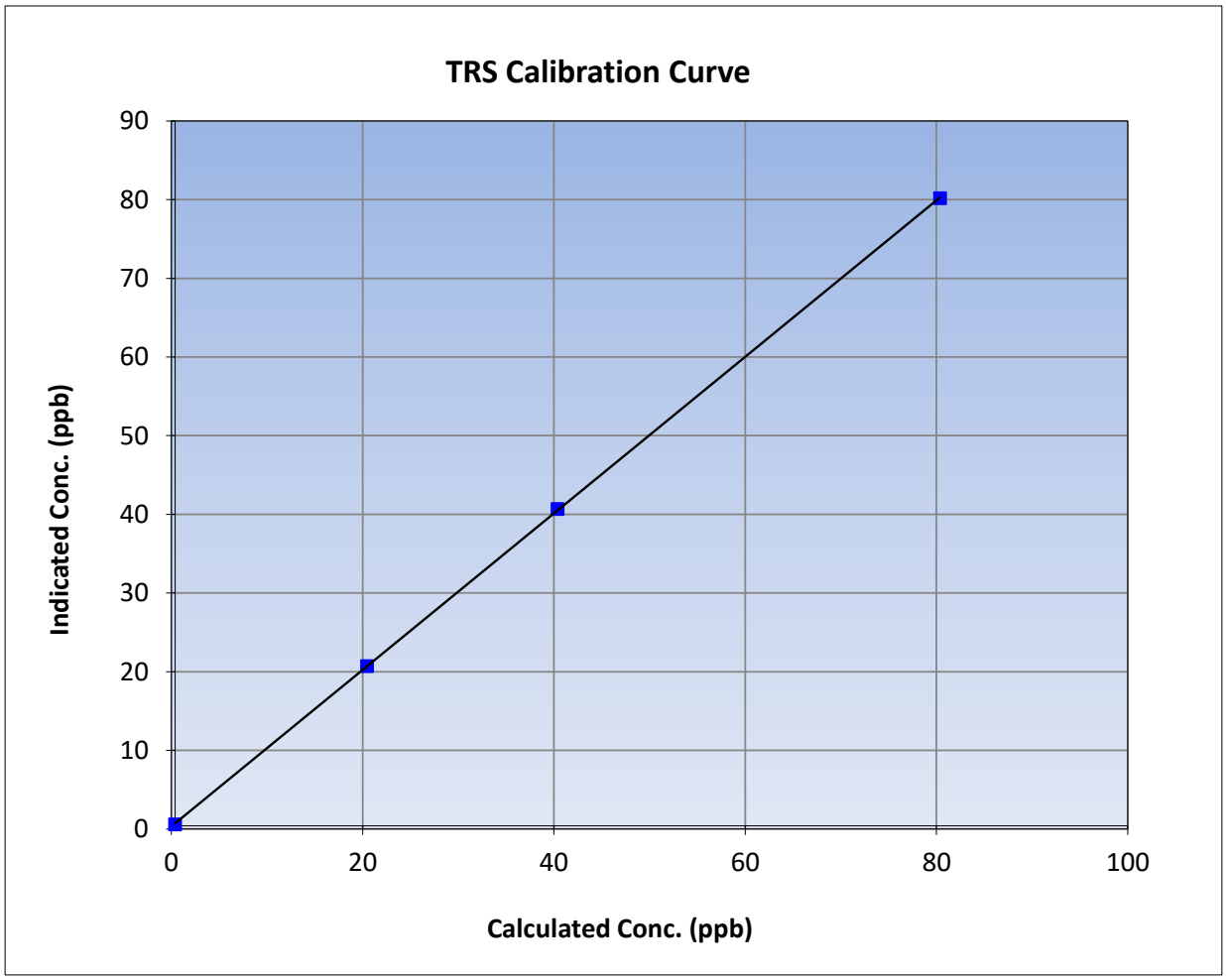
Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 7, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	9:37	End Time (MST):	14:00
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153359

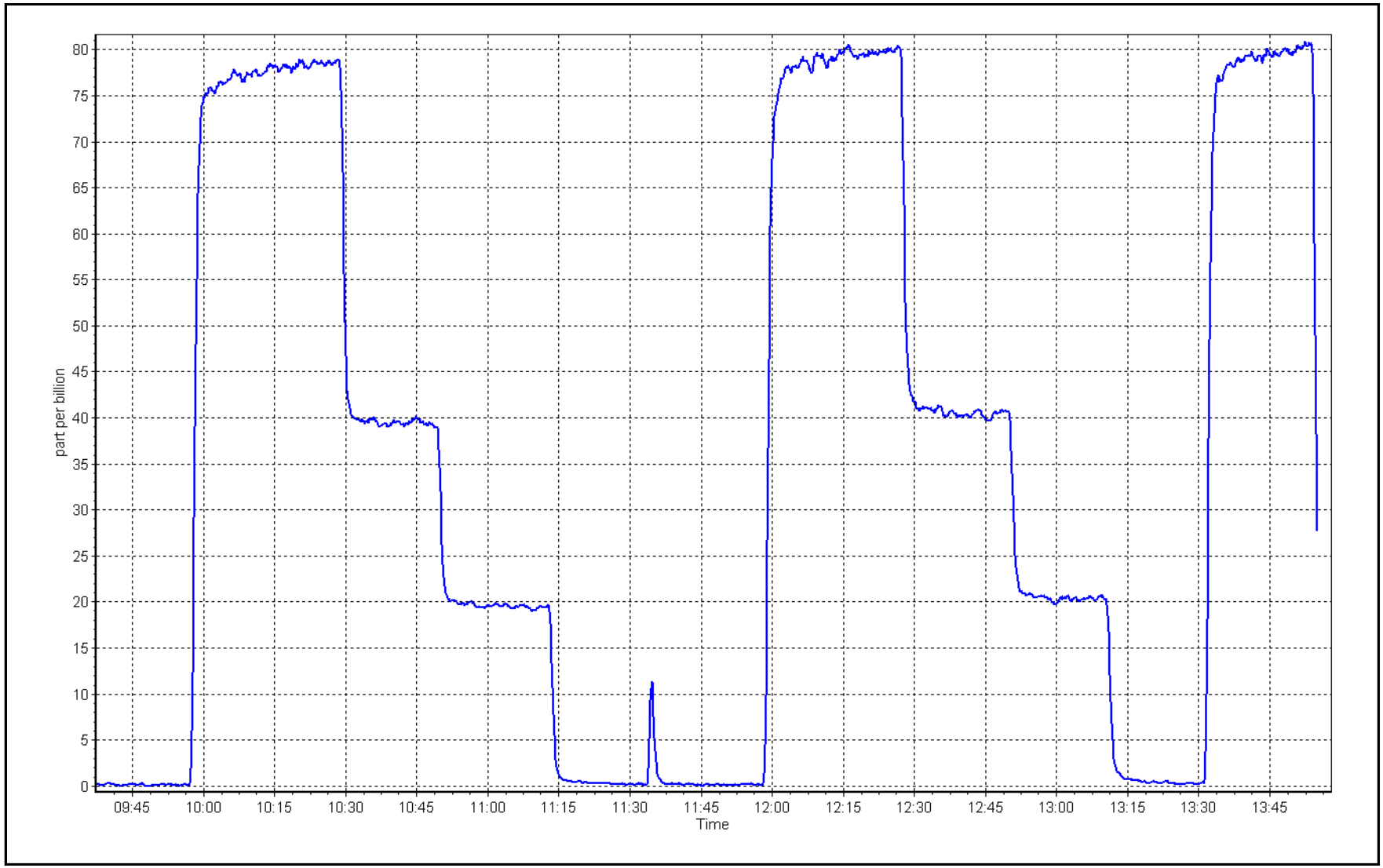
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	79.8	1.0024
40.0	40.3	0.9924
20.0	20.3	0.9876

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999982	*≥0.995*
Slope	0.994871	*0.90 - 1.10*
Intercept	0.321057	*+/-3*



TRS Calibration Plot Date: April 26, 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:	April 27, 2023	Last Cal Date:	March 30, 2023
Start time (MST):	9:50	End time (MST):	12:48
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320039	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.06E-04	3.06E-04	NMHC SP Ratio:	5.66E-05	5.73E-05
CH4 Retention time:	14.60	14.60	NMHC Peak Area:	162130	159925

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	17.12	1.009
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.0	17.28	17.27	1.000
second point	4959	40.5	8.64	8.63	1.002
third point	4979	20.2	4.31	4.31	1.001
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	1.001

Baseline Corr AF:	17.12	Prev response	17.22	*% change	-0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	9.17	9.03	1.015
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.0	9.17	9.17	1.000
second point	4959	40.5	4.58	4.59	0.998
third point	4979	20.2	2.29	2.30	0.993
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81	9.17	9.19	0.998
				Average Correction Factor	0.997
Baseline Corr AF:	9.03	Prev response	9.11	*% change	-0.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	8.11	8.09	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.0	8.11	8.11	1.001
second point	4959	40.5	4.06	4.03	1.006
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	1.006
Baseline Corr AF:	8.09	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:	0.997054	0.999520
THC Cal Offset:	-0.008797	-0.003183
CH4 Cal Slope:	1.001440	0.999834
CH4 Cal Offset:	-0.011209	-0.012012
NMHC Cal Slope:	0.992924	0.999279
NMHC Cal Offset:	0.002412	0.008428

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

THC Calibration Summary

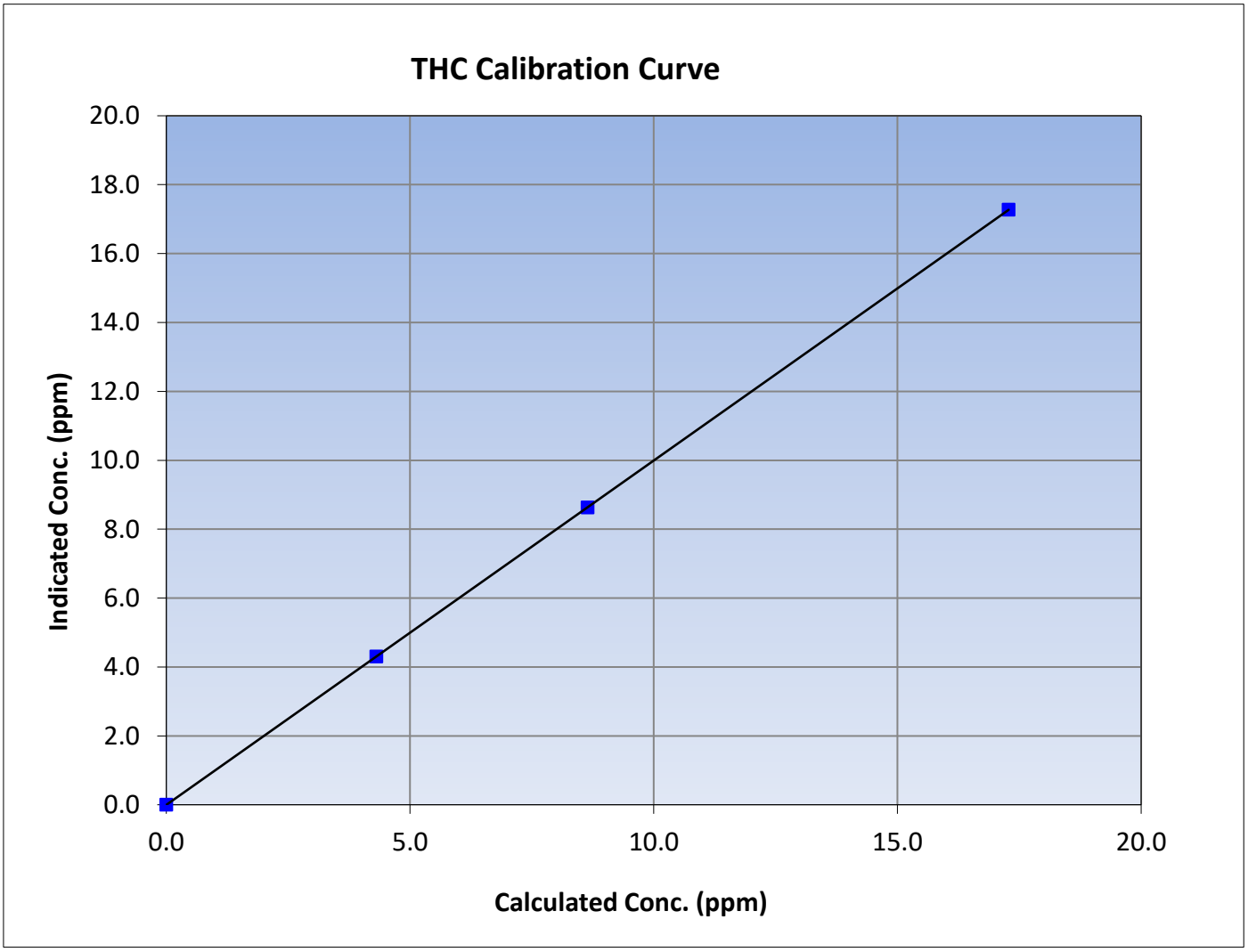
Version-01-2020

Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 30, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:50	End Time (MST):	12:48
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*
17.28	17.27	1.0005			
8.64	8.63	1.0016	Slope	0.999520	*0.90 - 1.10*
4.31	4.31	1.0012			
			Intercept	-0.003183	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

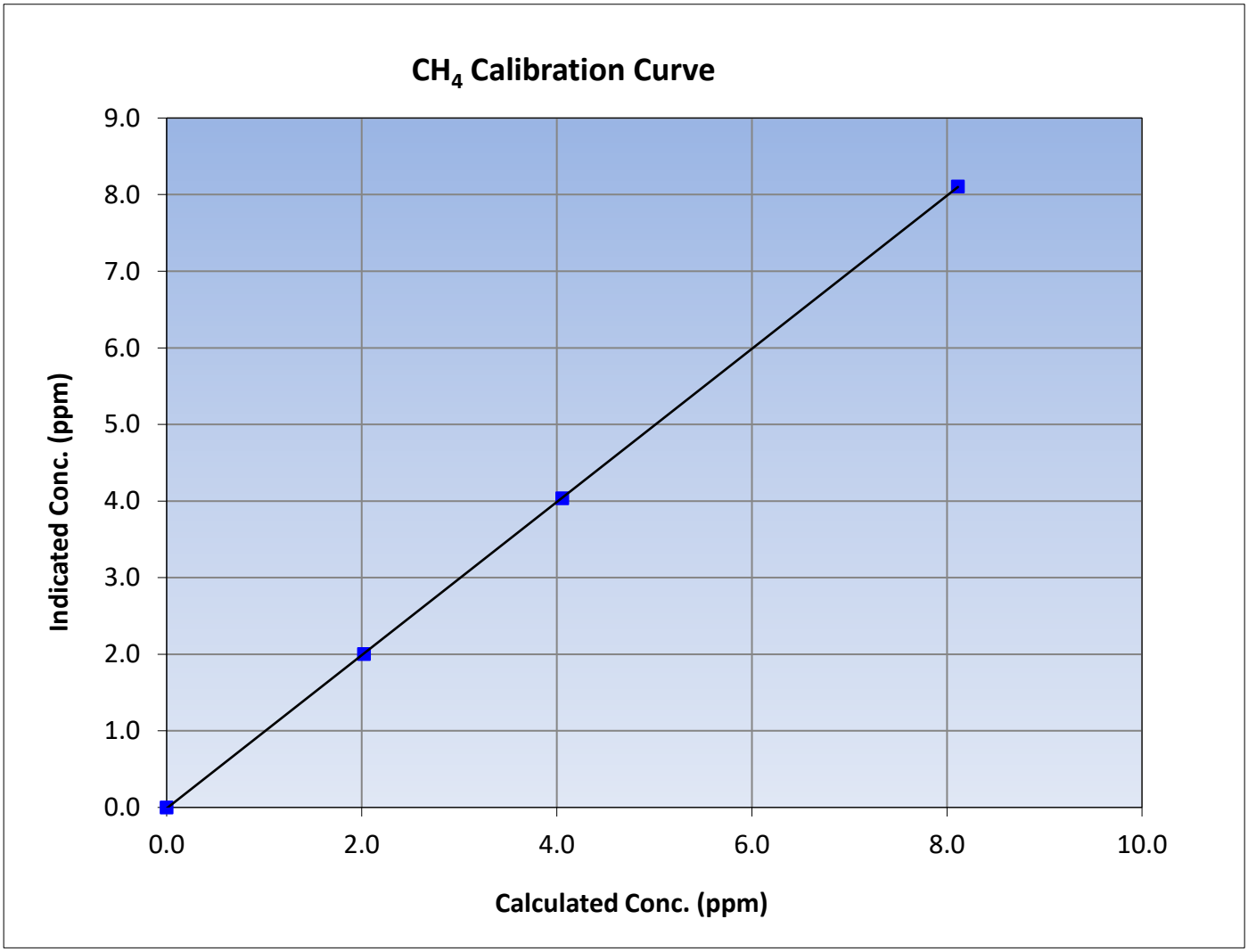
Version-01-2020

Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 30, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:50	End Time (MST):	12:48
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999989	≥0.995
8.11	8.11	1.0007			
4.06	4.03	1.0057	Slope	0.999834	0.90 - 1.10
2.02	2.00	1.0108			
			Intercept	-0.012012	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

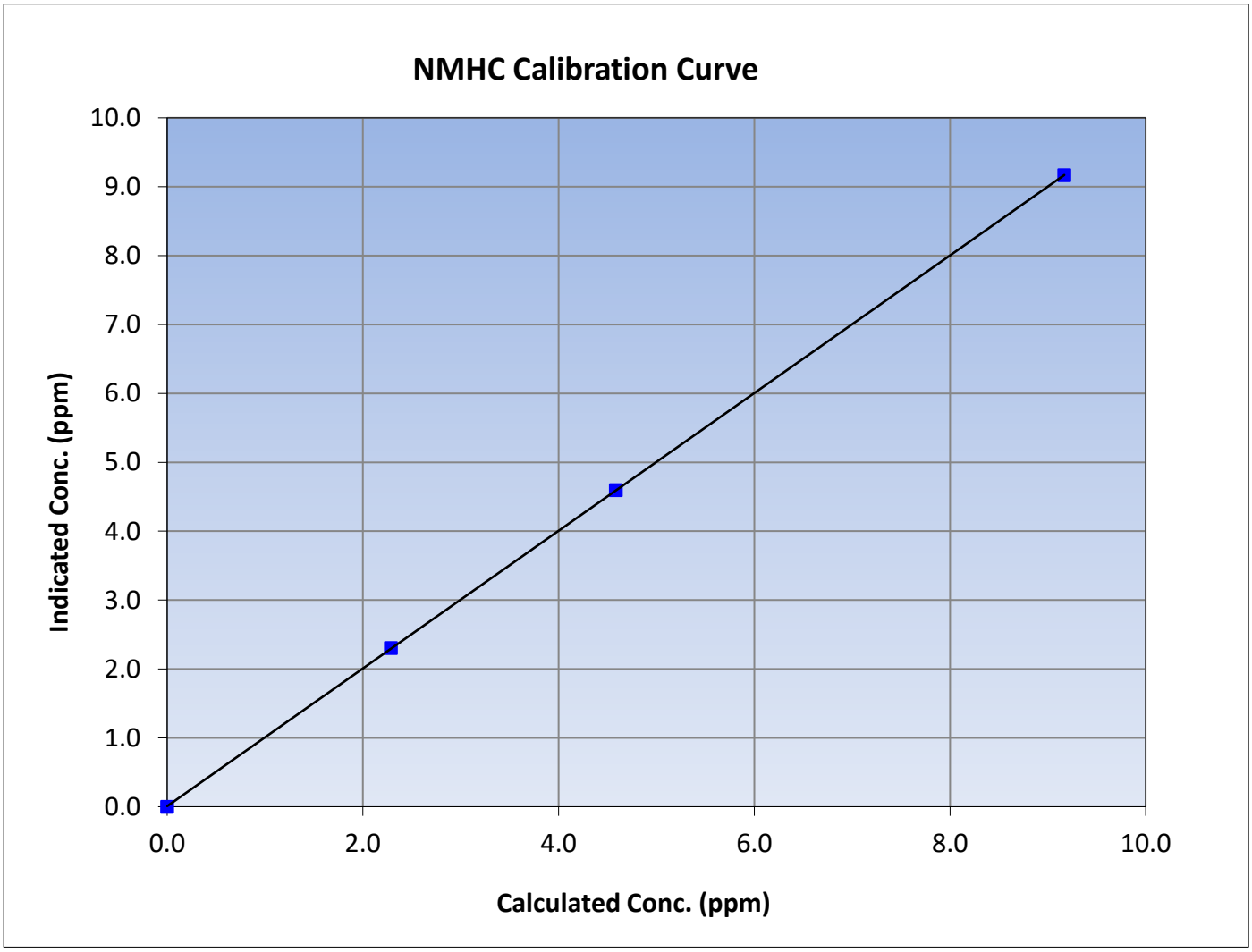
Version-01-2020

Station Information

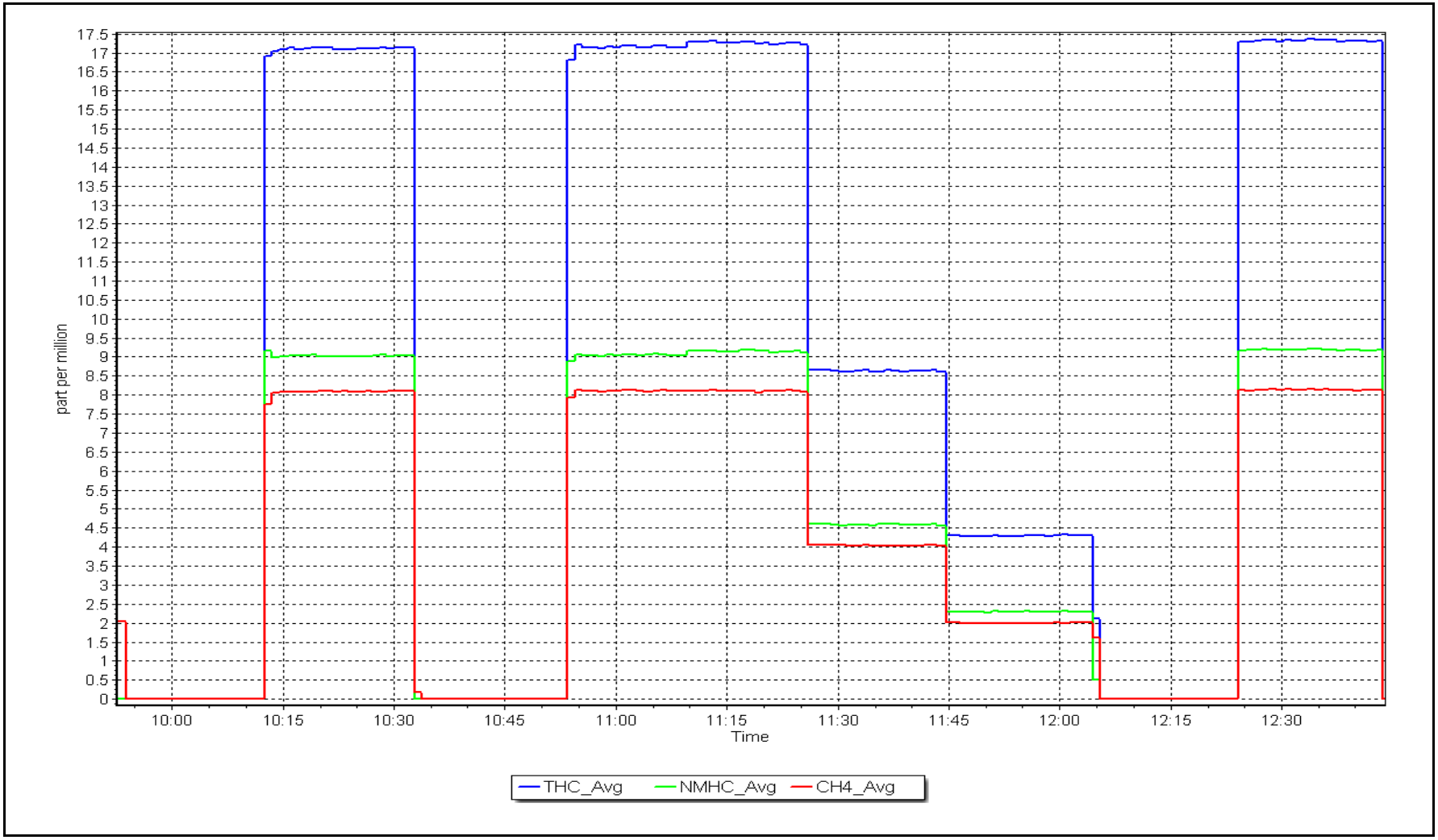
Calibration Date:	April 27, 2023	Previous Calibration:	March 30, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:50	End Time (MST):	12:48
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999996	≥0.995
9.17	9.17	1.0003			
4.58	4.59	0.9980	Slope	0.999279	0.90 - 1.10
2.29	2.30	0.9934			
			Intercept	0.008428	+/-0.5



NMHC Calibration Plot Date: April 27, 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:	April 20, 2023	Last Cal Date:	March 22, 2023
Start time (MST):	9:18	End time (MST):	13:45
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	1.062	NO bkgnd or offset:	3.0	3.0
NOX coeff or slope:	0.984	0.984	NOX bkgnd or offset:	3.0	3.0
NO2 coeff or slope:	0.999	0.999	Reaction cell Press:	223.9	230.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999873	0.993566
NO_X Cal Offset:	-0.210265	0.129802
NO Cal Slope:	1.002239	0.995555
NO Cal Offset:	-0.950426	-1.209770
NO_2 Cal Slope:	0.999365	0.999137
NO_2 Cal Offset:	-0.185598	0.306137

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as found span	4919	81.3	820.8	800.3	20.5	815.7	793.7	22.1	1.0062	1.0083
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
high point	4919	81.3	820.8	800.3	20.5	815.4	796.0	19.3	1.0066	1.0054
second point	4959	40.7	410.9	400.7	10.3	409.0	397.4	11.6	1.0047	1.0082
third point	4980	20.3	204.9	199.8	5.1	203.4	196.3	7.1	1.0076	1.0179
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.1	----	----
as left span	4919	81.3	820.8	380.5	440.3	818.6	374.0	444.7	1.0026	1.0173
								Average Correction Factor	1.0063	1.0105

Corrected As found	NO_X = 815.8 ppb	NO = 793.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.6%
Previous Response	NO_X = 820.4 ppb	NO = 801.1 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)	794.8	375.0	440.3	440.2	1.0002	100.0%
2nd GPT point (200 ppb O3)	794.8	584.8	230.5	230.4	1.0004	100.0%
3rd GPT point (100 ppb O3)	794.8	693.5	121.8	122.4	0.9950	100.5%
				Average Correction Factor	0.9985	100.1%

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

NO_X Calibration Summary

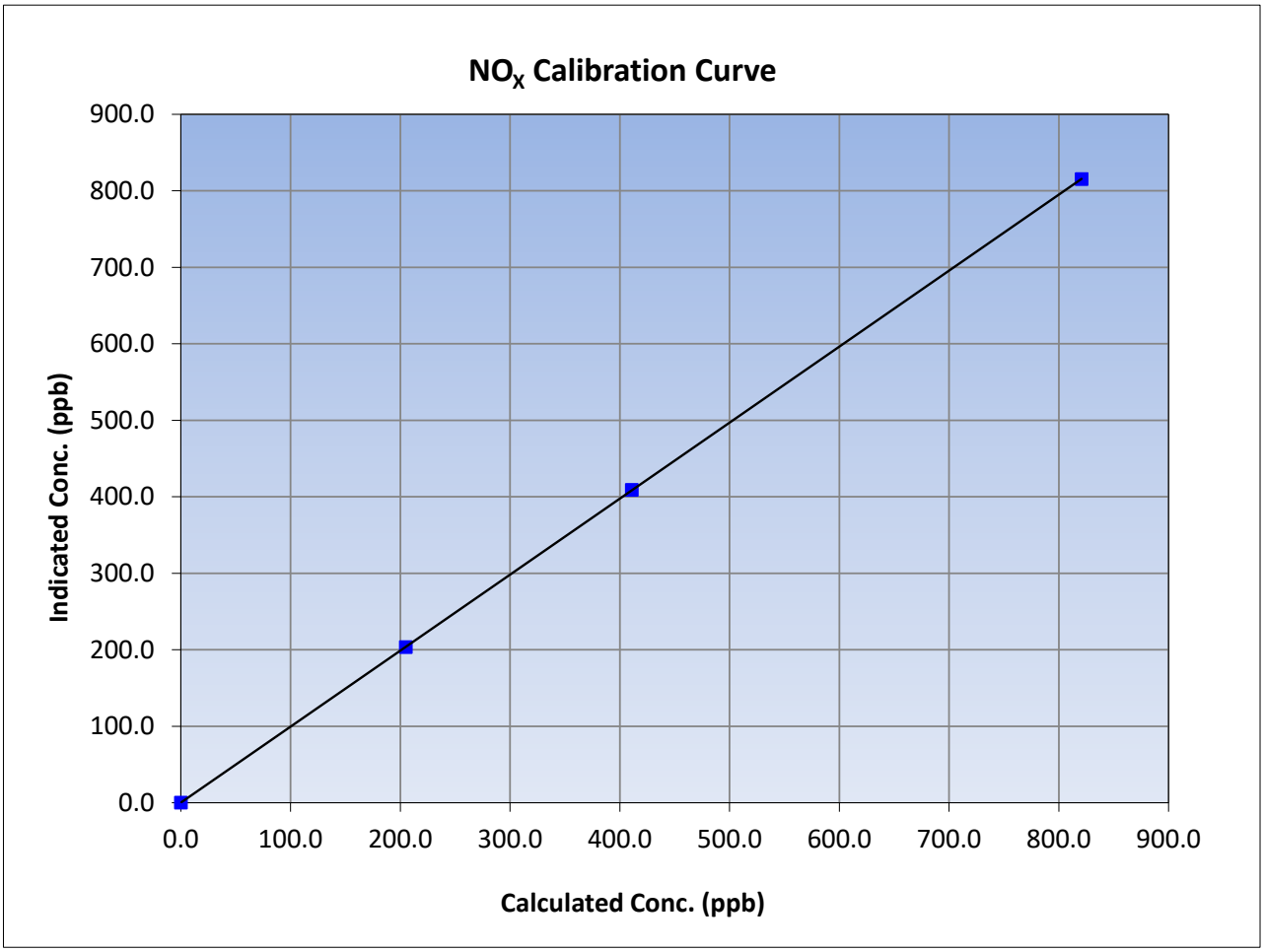
Version-04-2020

Station Information

Calibration Date:	April 20, 2023	Previous Calibration:	March 22, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:18	End Time (MST):	13:45
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.1	----	Correlation Coefficient	0.999999	*≥0.995*
820.8	815.4	1.0066			
410.9	409.0	1.0047	Slope	0.993566	*0.90 - 1.10*
204.9	203.4	1.0076			
			Intercept	0.129802	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

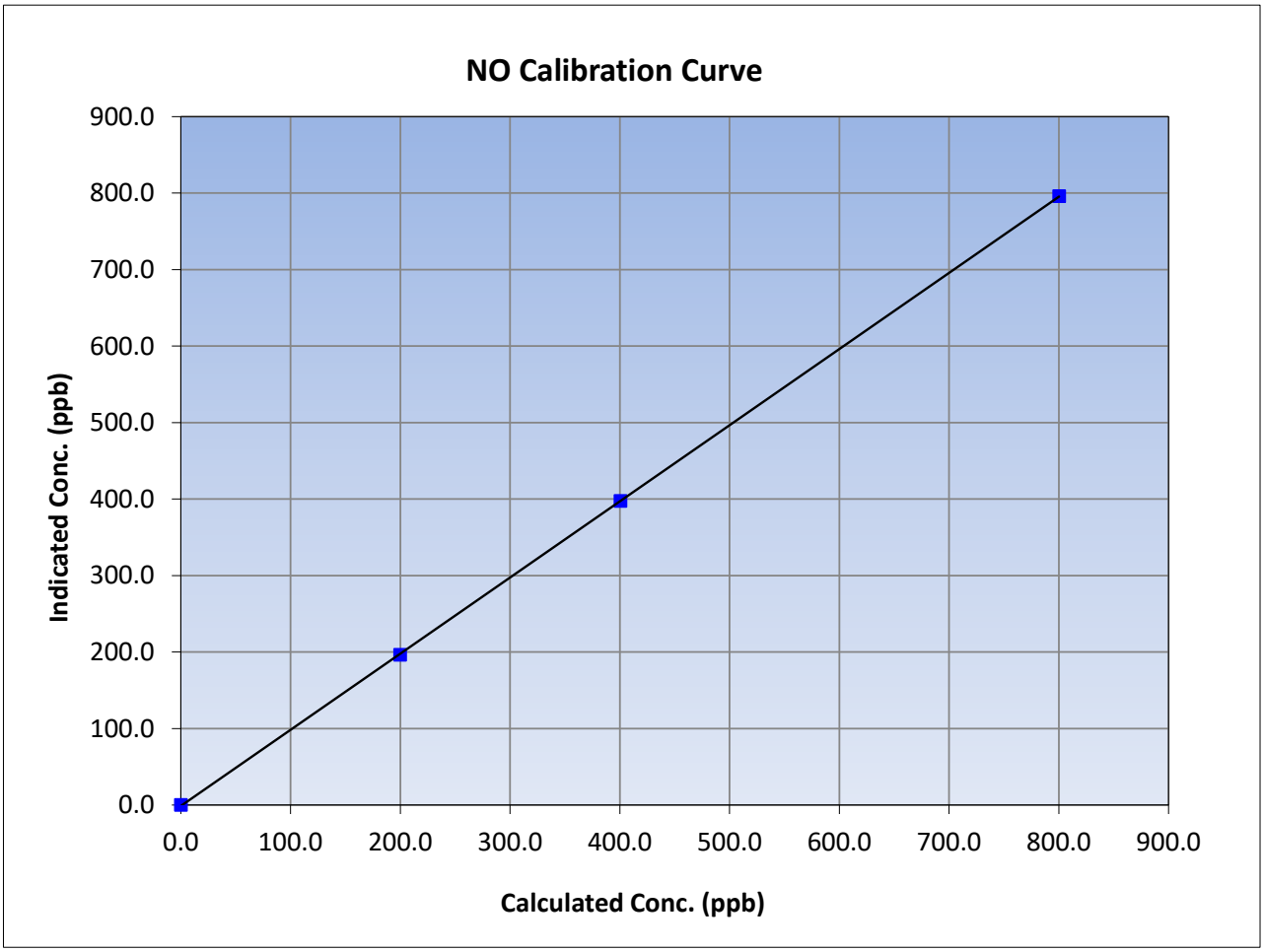
Version-04-2020

Station Information

Calibration Date:	April 20, 2023	Previous Calibration:	March 22, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:18	End Time (MST):	13:45
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	796.0	1.0054			
400.7	397.4	1.0082	Slope	0.995555	0.90 - 1.10
199.8	196.3	1.0179			
			Intercept	-1.209770	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

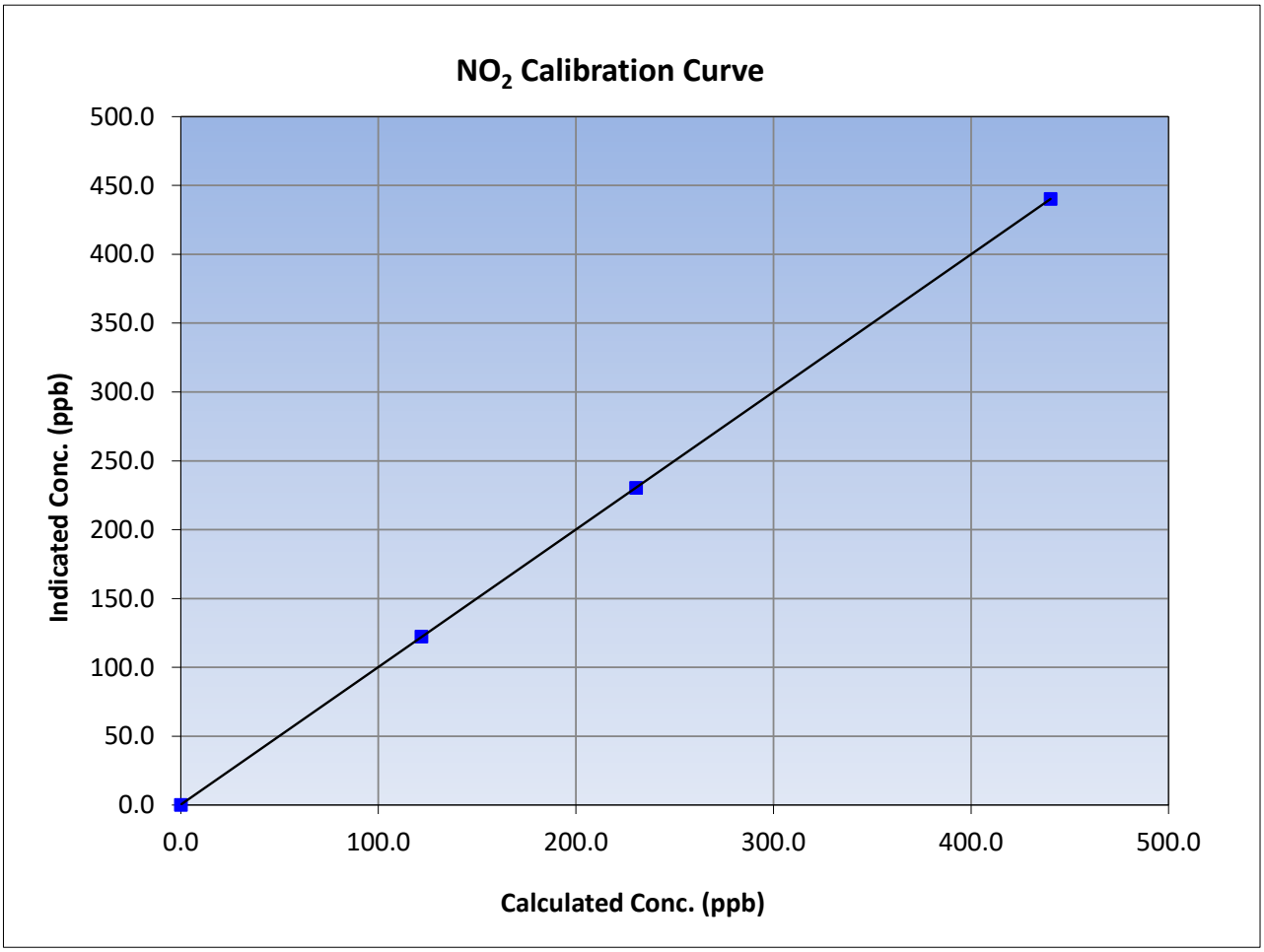
Version-04-2020

Station Information

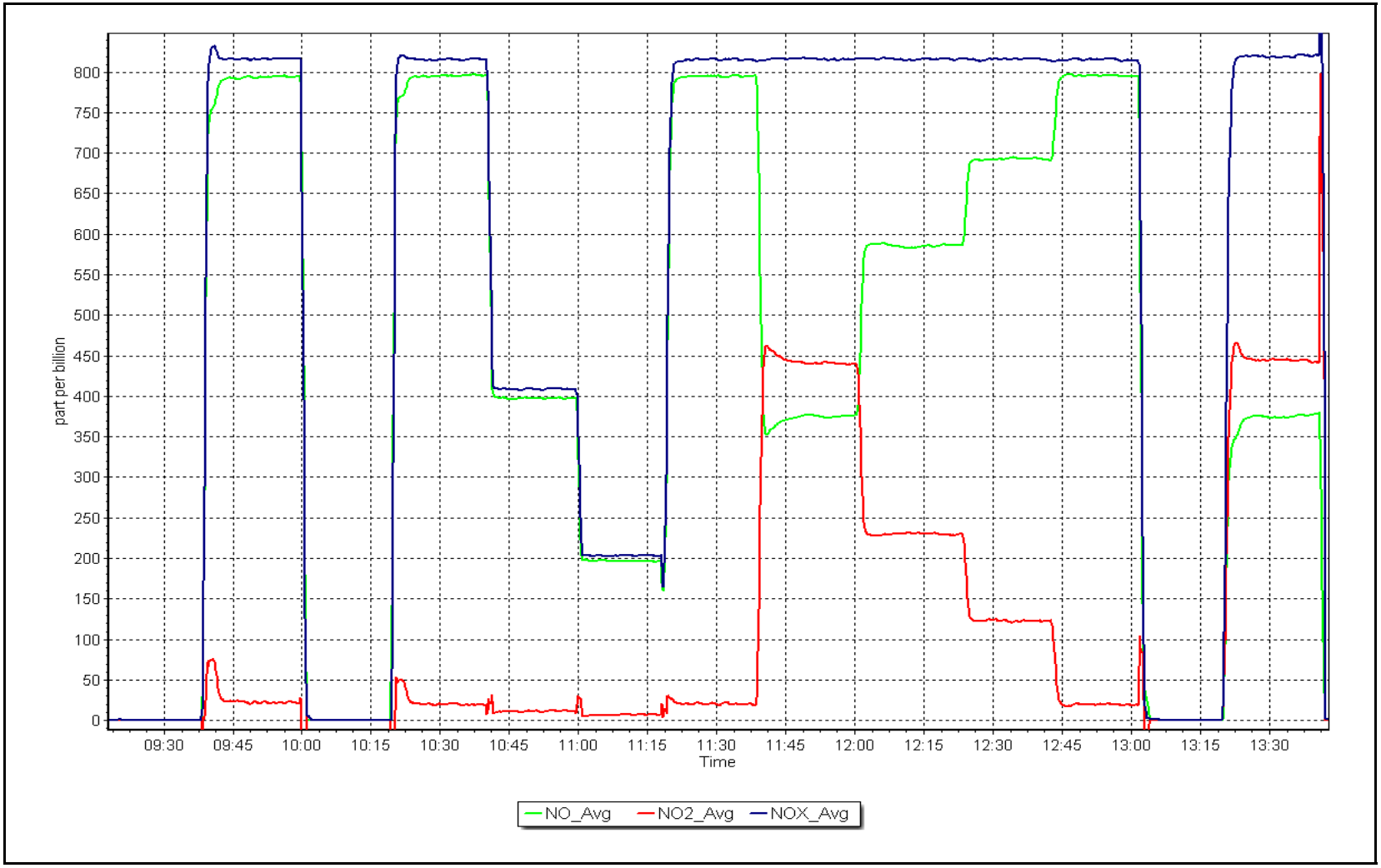
Calibration Date:	April 20, 2023	Previous Calibration:	March 22, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:18	End Time (MST):	13:45
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999998	≥0.995
440.3	440.2	1.0002			
230.5	230.4	1.0004	Slope	0.999137	0.90 - 1.10
121.8	122.4	0.9950			
			Intercept	0.306137	+/-20



NO_X Calibration Plot Date: April 20, 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:	April 4, 2023	Last Cal Date:	March 1, 2023
Start time (MST):	9:28	End time (MST):	12:50
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:	0.993829	0.999114	Backgd or Offset:	1.000	1.000
Calibration intercept:	0.180000	-0.420000	Coeff or Slope:	0.993	0.993

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	800.0	0.0	-0.3	----
as found span	4888	1096.9	400.0	401.1	0.997
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	-0.3	----
high point	4888	1101.7	400.0	399.3	1.002
second point	4888	863.9	200.0	199.3	1.004
third point	4888	741.4	100.0	99.4	1.006
as left zero	5000	800.0	0.0	0.1	----
as left span	4812	1097.9	400.0	400.6	0.999
				Average Correction Factor	1.004

Baseline Corr As found:	401.4	Previous response	397.7	*% change	0.9%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

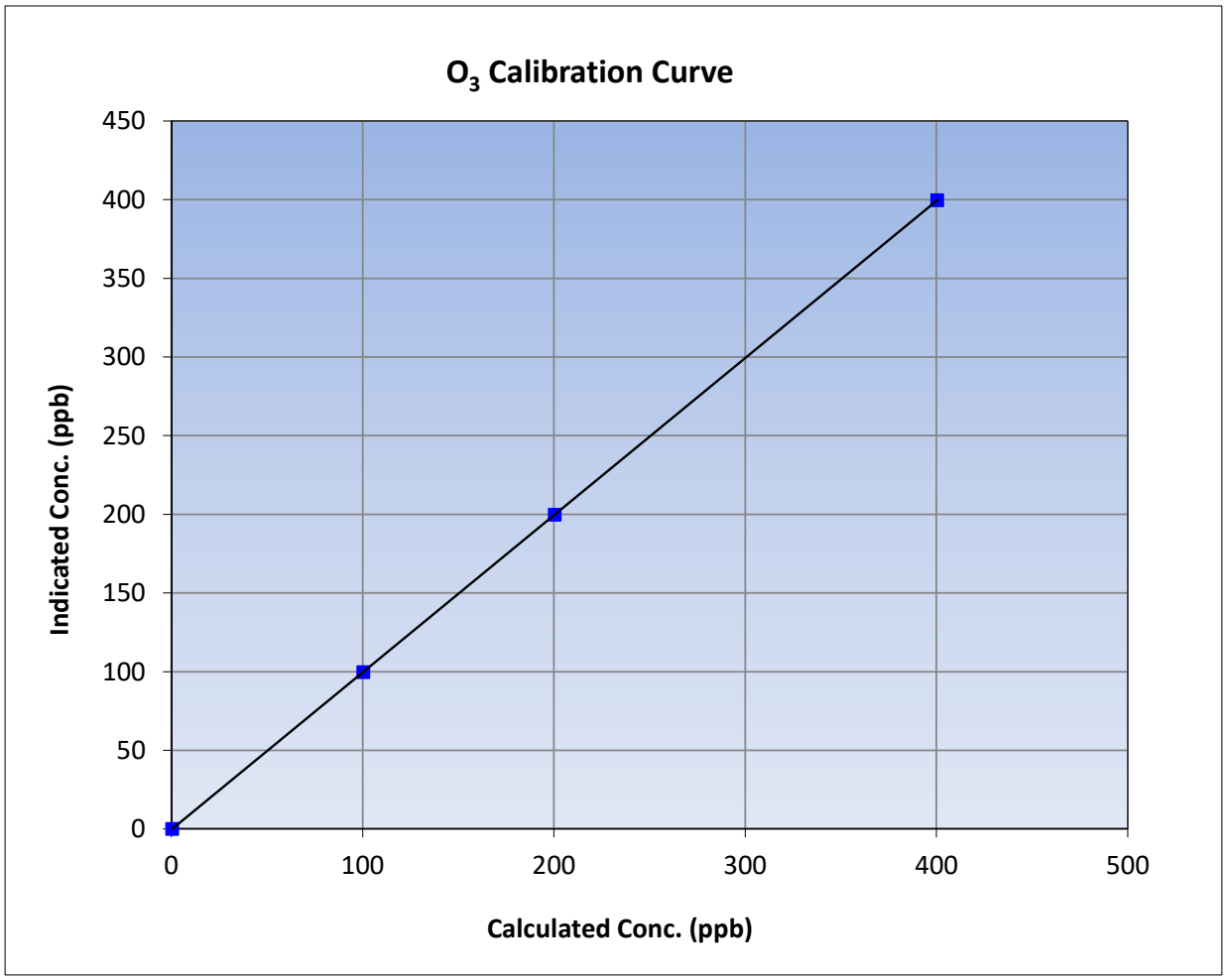
Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 1, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	9:28	End Time (MST):	12:50
Analyzer make:	API T400	Analyzer serial #:	825

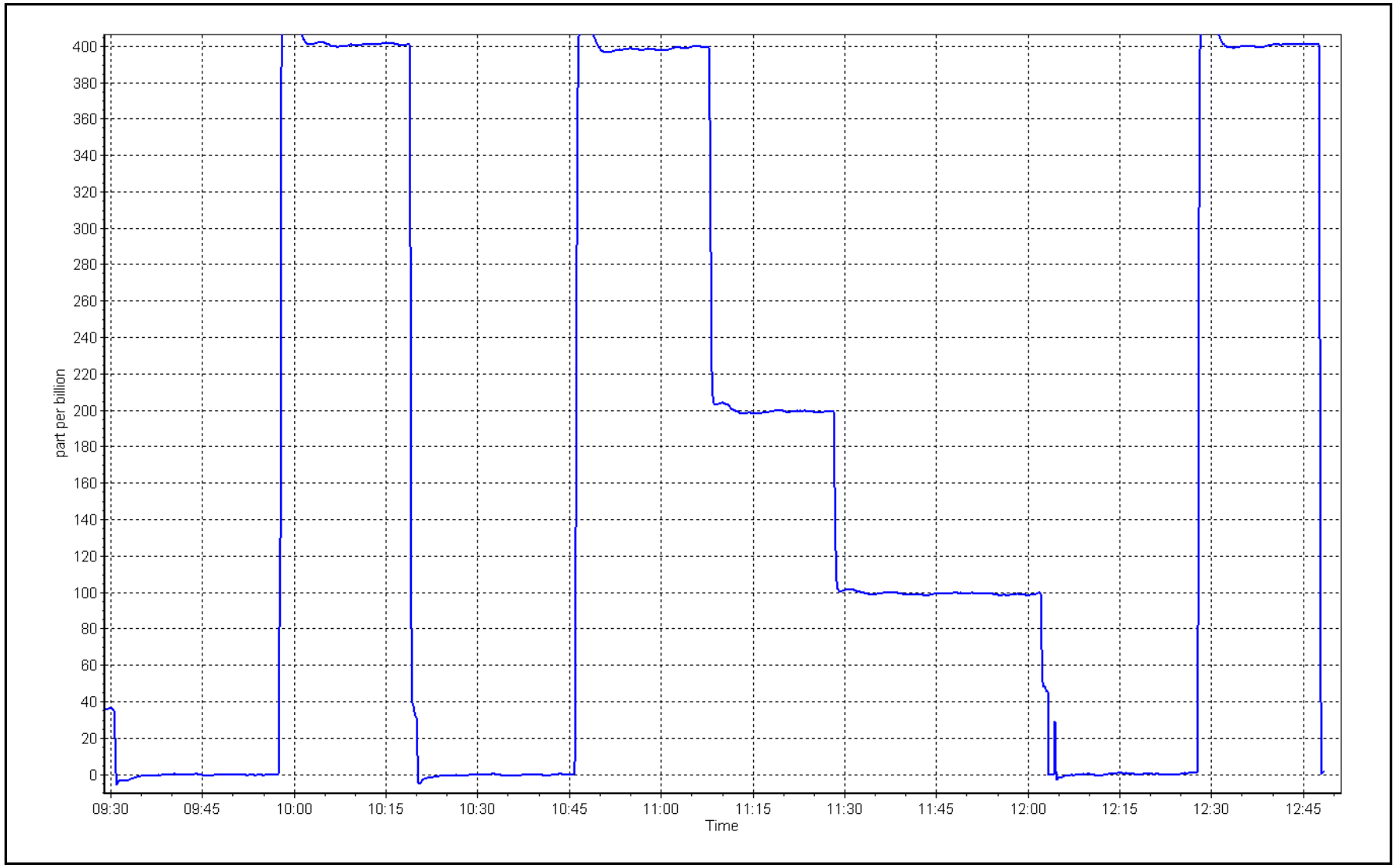
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
400.0	399.3	1.0018
200.0	199.3	1.0035
100.0	99.4	1.0060

Statistical Evaluation		*Limits*
Correlation Coefficient	1.000000	*≥0.995*
Slope	0.999114	*0.90 - 1.10*
Intercept	-0.420000	*+/- 5*



O_3 Calibration Plot Date: April 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:	April 19, 2023	Last Cal Date:	March 22, 2023
Start time (MST):	10:23	End time (MST):	10:45
Analyzer Make:	API T640	S/N:	1335
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	1102
Temp/RH standard:	Delta Cal	S/N:	1102

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	0.5	0.7	0.5	☐	+/- 2 °C
P (mmHg)	701.5	703.2	701.5	☐	+/- 10 mmHg
flow (LPM)	5.01	4.92	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: April 19, 2023 Last Cal Date: March 22, 2023

PM w/o HEPA: 0.7 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	-37.0			☐	10.9 +/- 0.5

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

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: Removal checks for instrument change out.

Calibration by: Karan Pandit

Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	April 19, 2023	Last Cal Date:	NA
Start time (MST):	10:50	End time (MST):	11:22
Analyzer Make:	API T640	S/N:	1162
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	1102
Temp/RH standard:	Delta Cal	S/N:	1102

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	0.9	0.8	0.9	☐	+/- 2 °C
P (mmHg)	704.1	704.6	704.1	☐	+/- 10 mmHg
flow (LPM)	4.99	4.71	4.99	☑	+/- 0.25 LPM

Leak Test: Date of check: April 19, 2023 Last Cal Date: NA

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

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

Post-maintenance leak check: PM w/o HEPA: 4.8 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: March 22, 2023

Disposable Filter Changed: March 22, 2023

Annual Maintenance

Date Sample Tube Cleaned: August 30, 2022

Date RH/T Sensor Cleaned: August 30, 2022

Notes: Install calibration. Adjusted the flow only. Leak check passed. No PMT adjustments made.

Calibration by: Karan Pandit

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	April 12, 2023	Last Cal Date:	March 24, 2023
Start time (MST):	9:32	End time (MST):	12:10
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:	1.002302	1.011069	Backgd or Offset:	-0.009	-0.012
Calibration intercept:	0.205803	0.019763	Coeff or Slope:	0.904	0.912

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.2	----
as found span	4933	66.7	40.7	41.1	0.990
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4933	66.7	40.7	41.1	0.990
second point	4966	33.3	20.3	20.7	0.981
third point	4983	16.7	10.2	10.3	0.991
as left zero	3000	0.0	0.0	0.0	----
as left span	2960	40.0	40.7	41.2	0.987
				Average Correction Factor	0.987

Baseline Corr As found:	40.87	Prev response:	40.99	*% change:	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

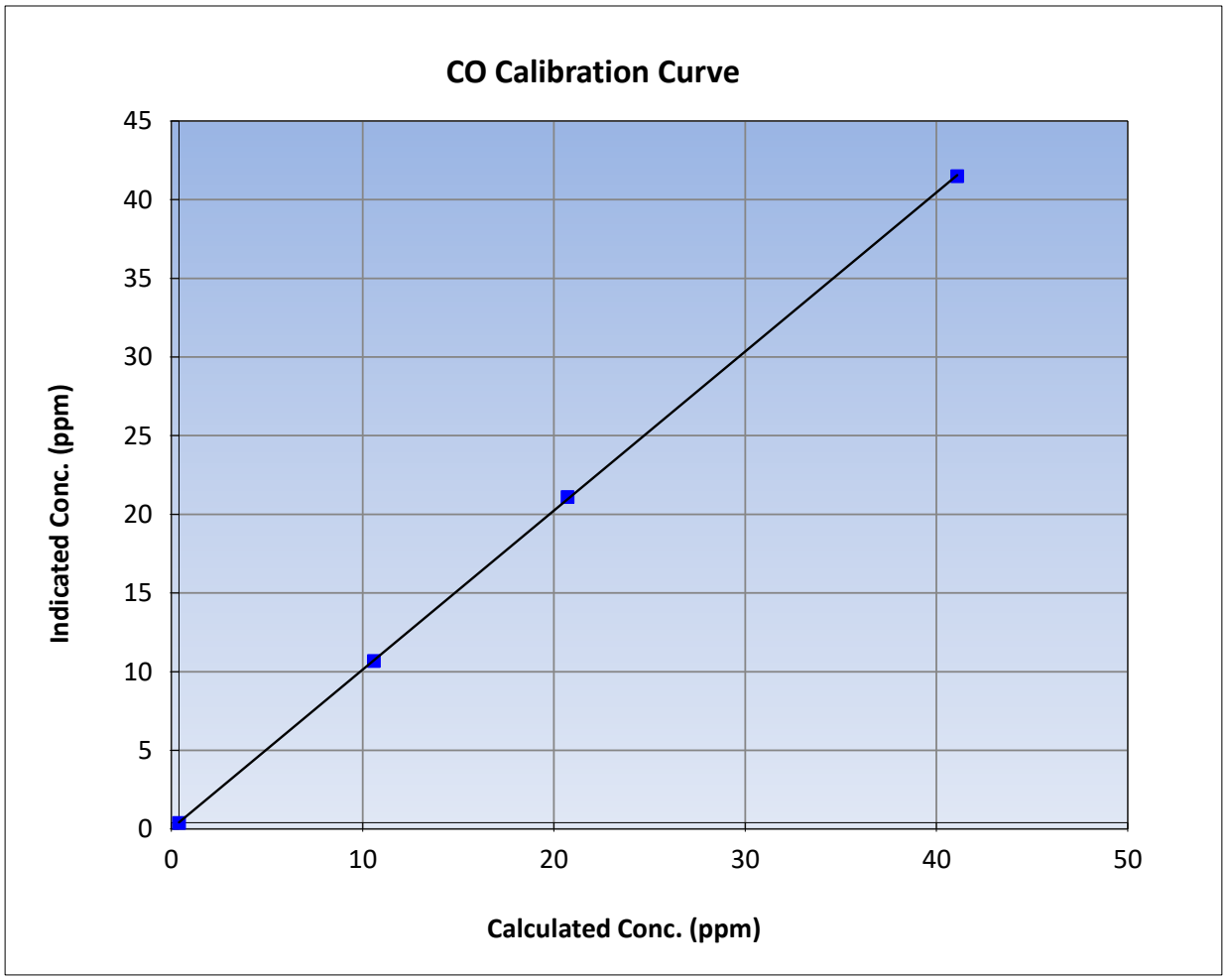
Station Information

Calibration Date:	April 12, 2023	Previous Calibration:	March 24, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:32	End Time (MST):	12:10
Analyzer make:	API T300	Analyzer serial #:	3504

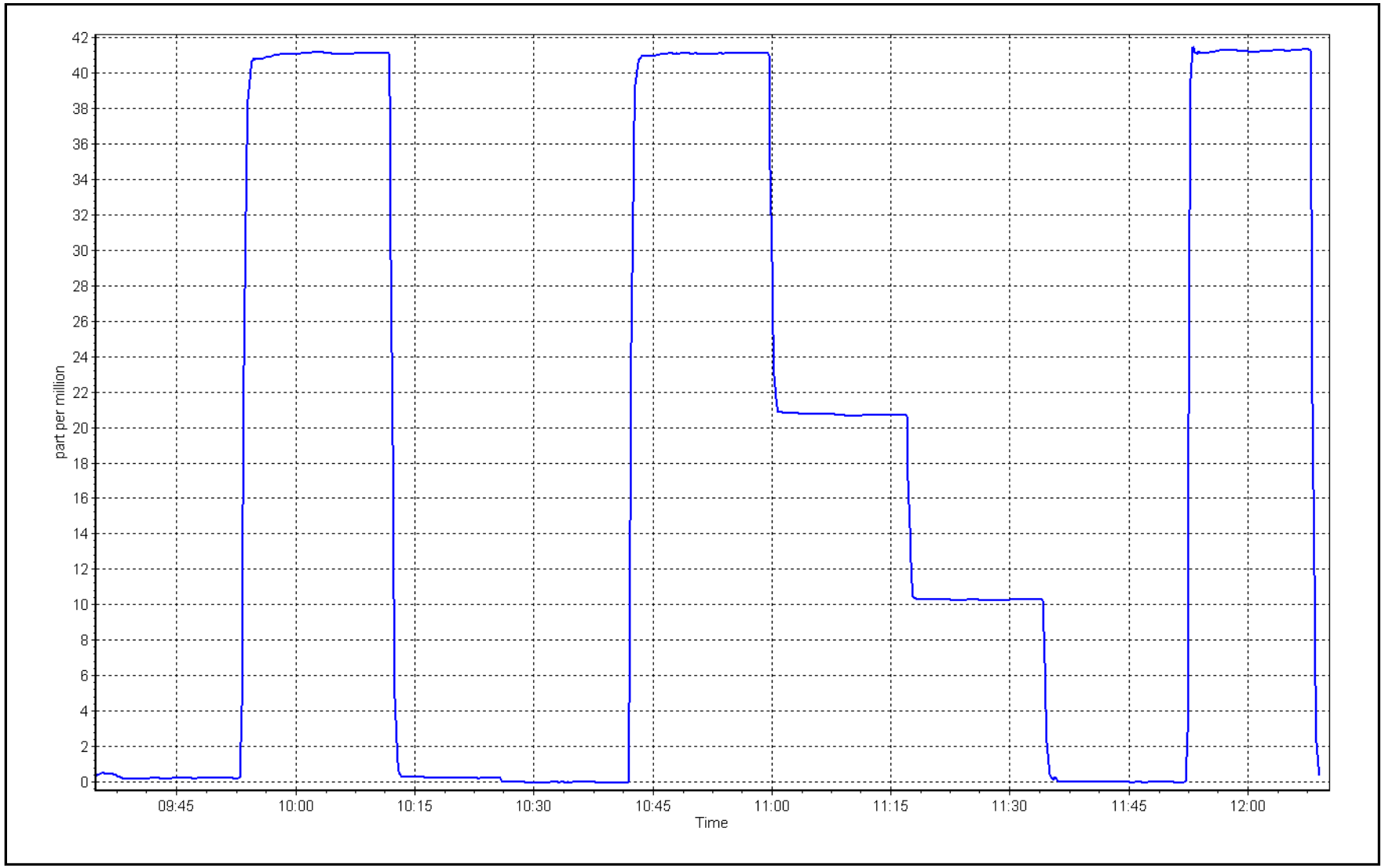
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.7	41.1	0.9900
20.3	20.7	0.9814
10.2	10.3	0.9910

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999972	*≥0.995*
Slope	1.011069	*0.90 - 1.10*
Intercept	0.019763	*+/-1.5*



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



Wood Buffalo Environmental Association

CO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	April 19, 2023	Last Cal Date:	March 29, 2023
Start time (MST):	10:02	End time (MST):	13:12
Reason:	Maintenance		

Calibration Standards

Cal Gas Concentration:	60,220	ppm	Cal Gas Exp Date:	December 1, 2026
Cal Gas Cylinder #:	ALM063503			
Removed Cal Gas Conc:	60,220	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	2658
N2 Gen Make/Model:	Peak Scientific		Serial Number:	771048317

Analyzer Information

Analyzer make: API T360 — Analyzer serial #: 283

Analyzer Range 0 - 2,000 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.008751	1.012352	Backgd or Offset:	-0.059	-0.069
Calibration intercept:	4.460000	0.980000	Coeff or Slope:	1.066	1.076

CO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	3000	0.0	0.0	0.6	----
as found span	2920	80.0	1605.9	1612.7	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	-0.1	----
high point	2920	80.0	1605.9	1624.1	0.989
second point	2960	40.0	802.9	820.5	0.979
third point	2980	20.0	401.5	404.4	0.993
as left zero	3000	0.0	0.0	0.5	----
as left span	2930	80.0	1600.5	1621.9	0.987
				Average Correction Factor	0.987

Baseline Corr As found:	1612.10	Prev response:	1624.38	*% change:	-0.8%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

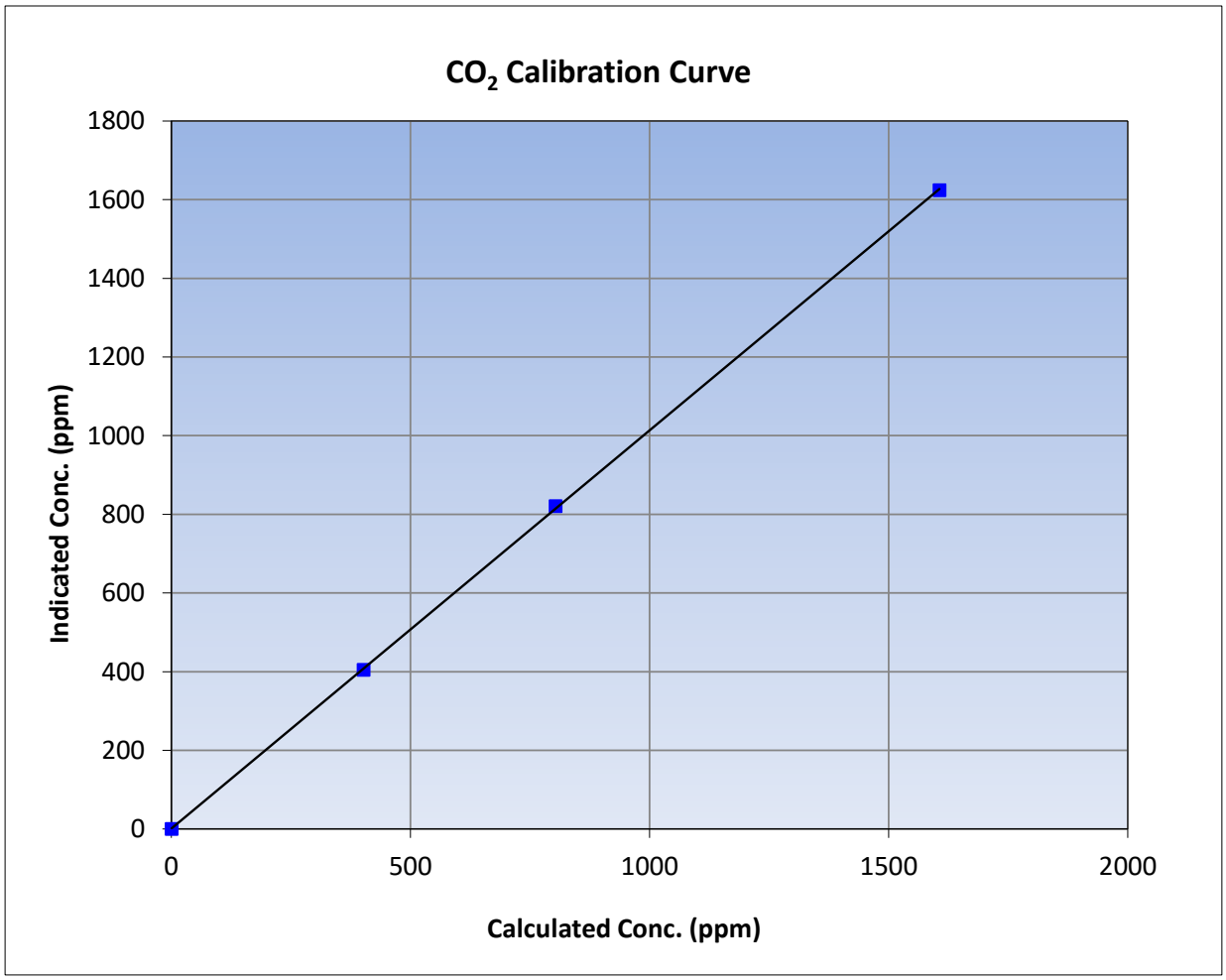
Station Information

Calibration Date	April 19, 2023	Previous Calibration	March 29, 2023
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:02	End Time (MST)	13:12
Analyzer make	API T360	Analyzer serial #	283

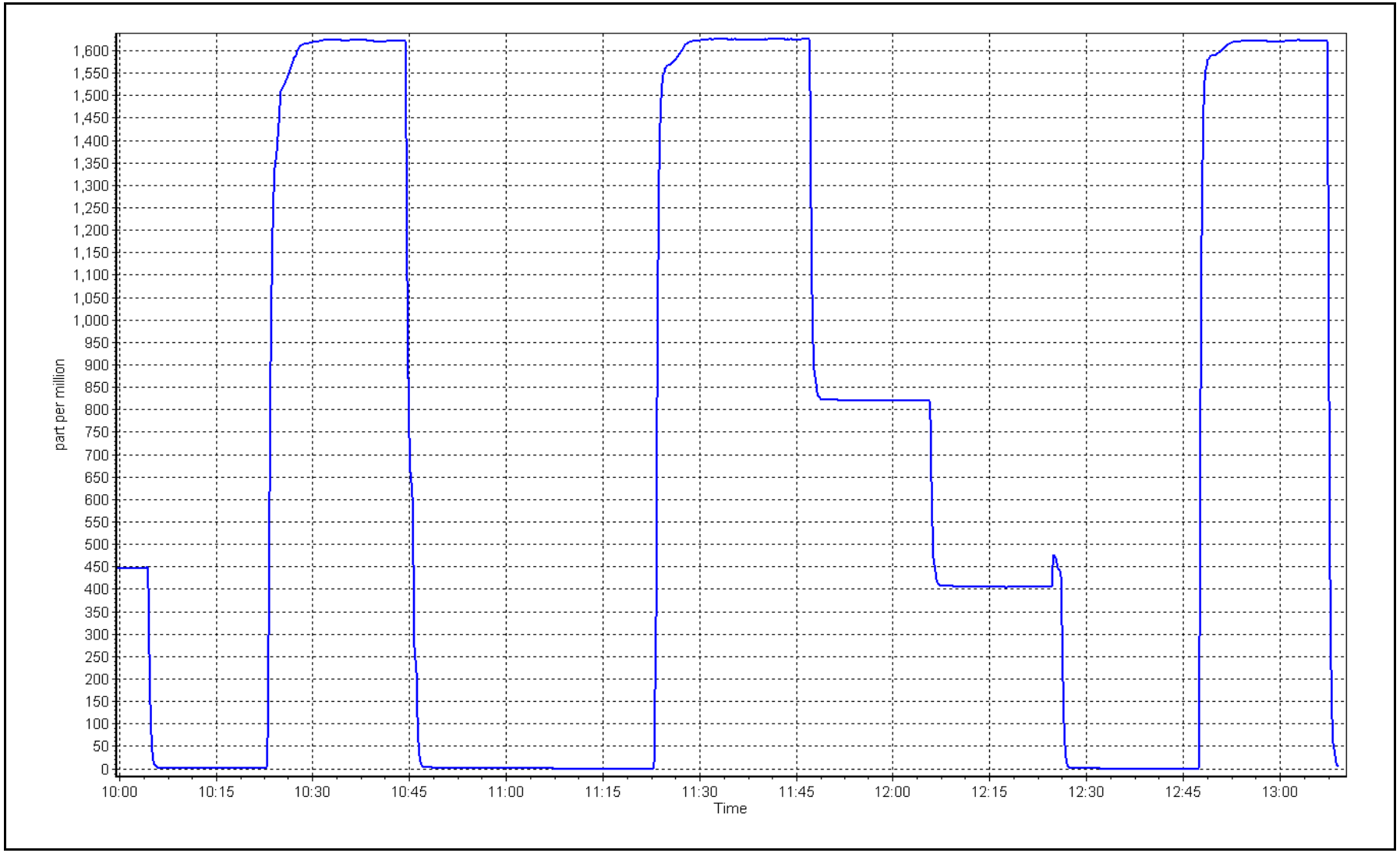
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
1605.9	1624.1	0.9888
802.9	820.5	0.9786
401.5	404.4	0.9927

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999958	*≥0.995*
Slope	1.012352	*0.90 - 1.10*
Intercept	0.980000	*+/-10*



CO_2 Calibration Plot Date: April 19, 2023 Location: Stony Mountain



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS19
FIREBAG
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	April 14, 2023	Last Cal Date:	March 7, 2023
Start time (MST):	10:45	End time (MST):	14:48
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:	1.000420	1.000391	Backgd or Offset:	10.0	10.2
Calibration intercept:	-0.181972	-0.421893	Coeff or Slope:	0.976	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	-0.5	----
as found span	4919	81.1	799.5	786.1	1.017
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	4999	0.0	0.0	-0.2	----
high point	4919	81.1	799.5	799.5	1.000
second point	4959	40.6	400.3	399.8	1.001
third point	4980	20.3	200.1	199.6	1.003
as left zero	4999	0.0	0.0	-0.2	----
as left span	4919	81.1	799.5	800.0	0.999
				Average Correction Factor	1.001

Baseline Corr As found:	786.60	Previous response	799.62	*% change	-1.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

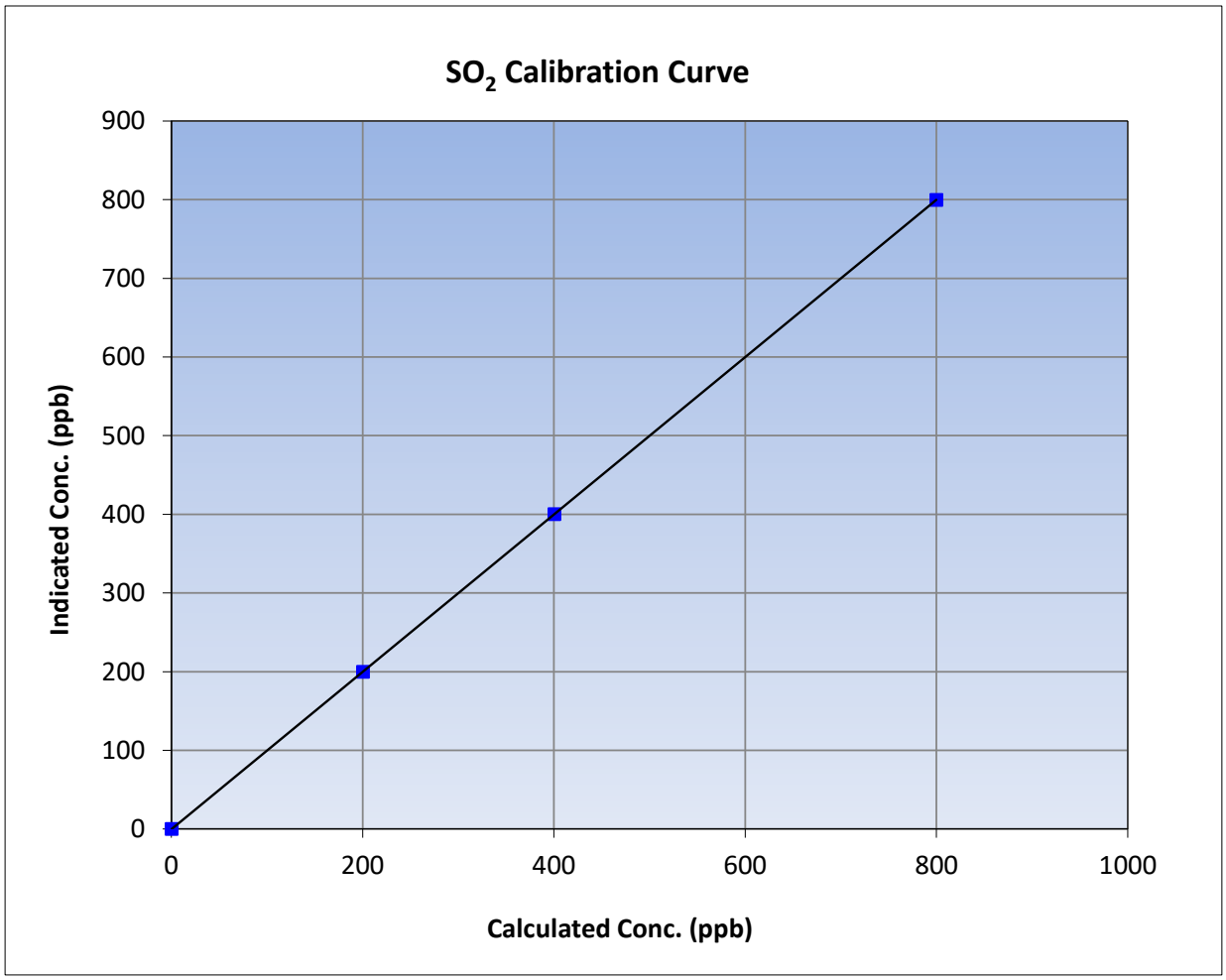
Station Information

Calibration Date:	April 14, 2023	Previous Calibration:	March 7, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:45	End Time (MST):	14:48
Analyzer make:	Thermo 43i	Analyzer serial #:	1410661308

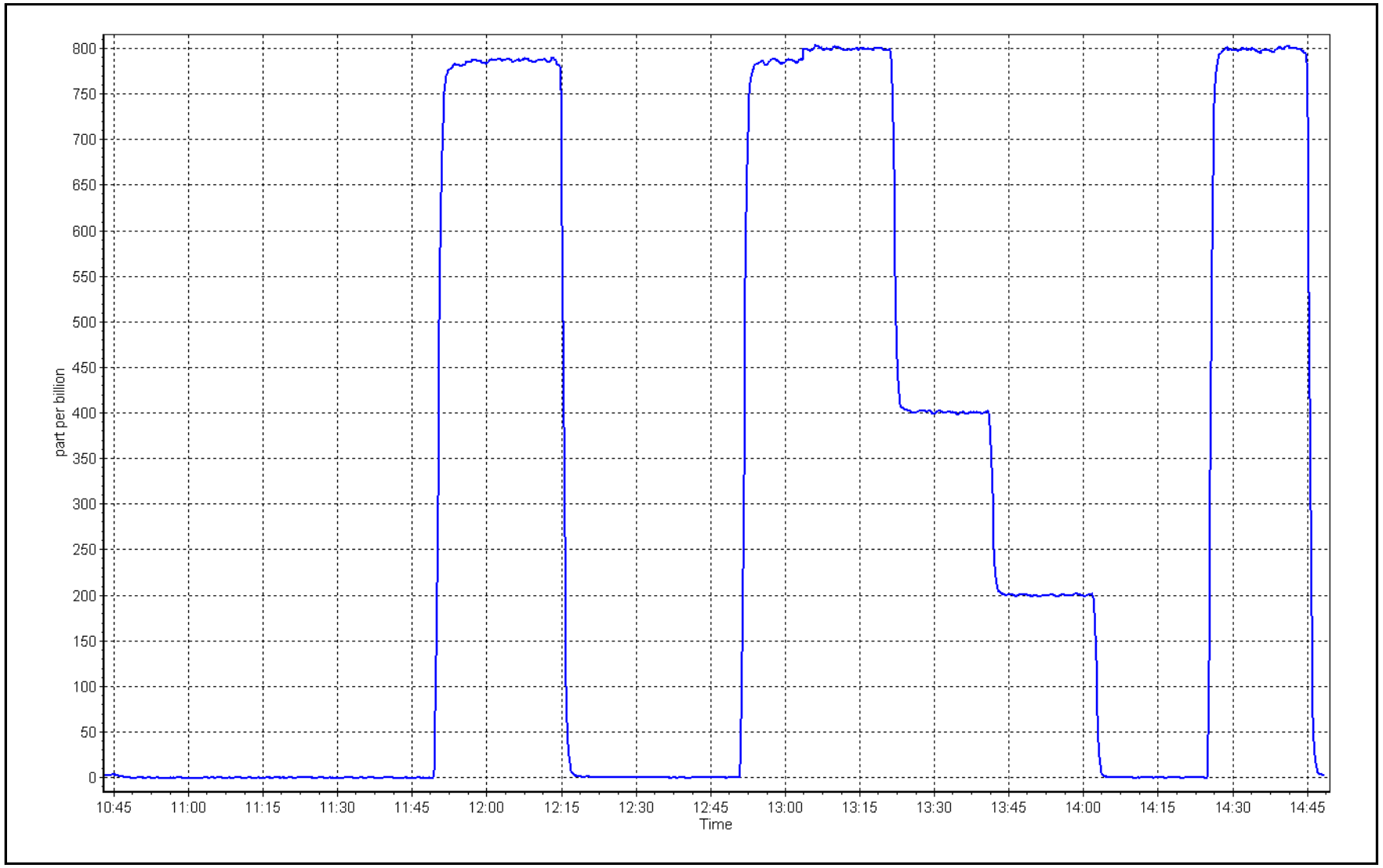
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
799.5	799.5	1.0000
400.3	399.8	1.0012
200.1	199.6	1.0025

Statistical Evaluation		*Limits*
Correlation Coefficient	1.000000	*≥0.995*
Slope	1.000391	*0.90 - 1.10*
Intercept	-0.421893	*+/-30*



SO2 Calibration Plot Date: April 14, 2023 Location: Firebag



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Firebag	Station number:	AMS19
Calibration Date:	April 3, 2023	Last Cal Date:	March 2, 2023
Start time (MST):	10:02	End time (MST):	13:40
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1336160090	
Converter make:	Global		Converter serial #:	2022-222	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003769	1.003054	Backgd or Offset:	3.18	3.12
Calibration intercept:	0.038321	0.038381	Coeff or Slope:	0.990	0.990

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4922	78.2	80.0	80.3	0.995
as found 2nd point	4961	39.1	40.0	40.1	0.995
as found 3rd point	4980	19.6	20.0	20.0	0.997
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4922	78.2	80.0	80.2	0.997
second point	4961	39.1	40.0	40.3	0.992
third point	4980	19.6	20.0	20.1	0.997
as left zero	5000	0.0	0.0	0.1	----
as left span	4922	78.2	80.0	80.0	1.000
SO2 Scrubber Check	4922	78.3	800.2	0.0	----
Date of last scrubber change:		January 18, 2023		Ave Corr Factor	0.996
Date of last converter efficiency test:		n/a			efficiency

Baseline Corr As found:	80.4	Prev response:	80.32	*% change:	0.1%
Baseline Corr 2nd AF pt:	40.2	AF Slope:	1.005483	AF Intercept:	-0.121676
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999999		

* = > +/-5% change initiates investigation

Notes: SOx scrubber check done after calibrator zero. No adjustments made. Changed sample inlet filter after MPAF's.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

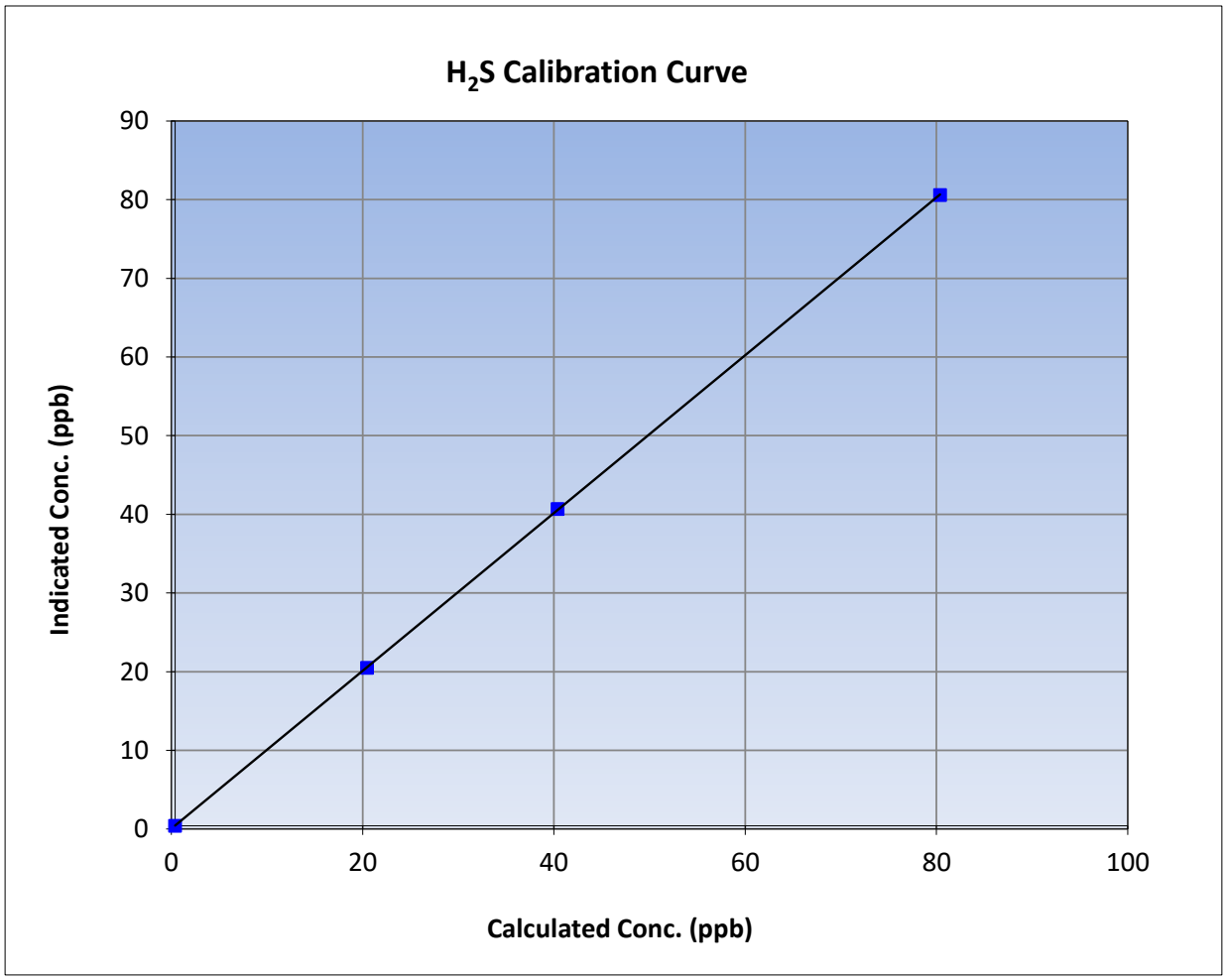
Station Information

Calibration Date:	April 3, 2023	Previous Calibration:	March 2, 2023
Station Name:	Firebag	Station Number:	AMS19
Start Time (MST):	10:02	End Time (MST):	13:40
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1336160090

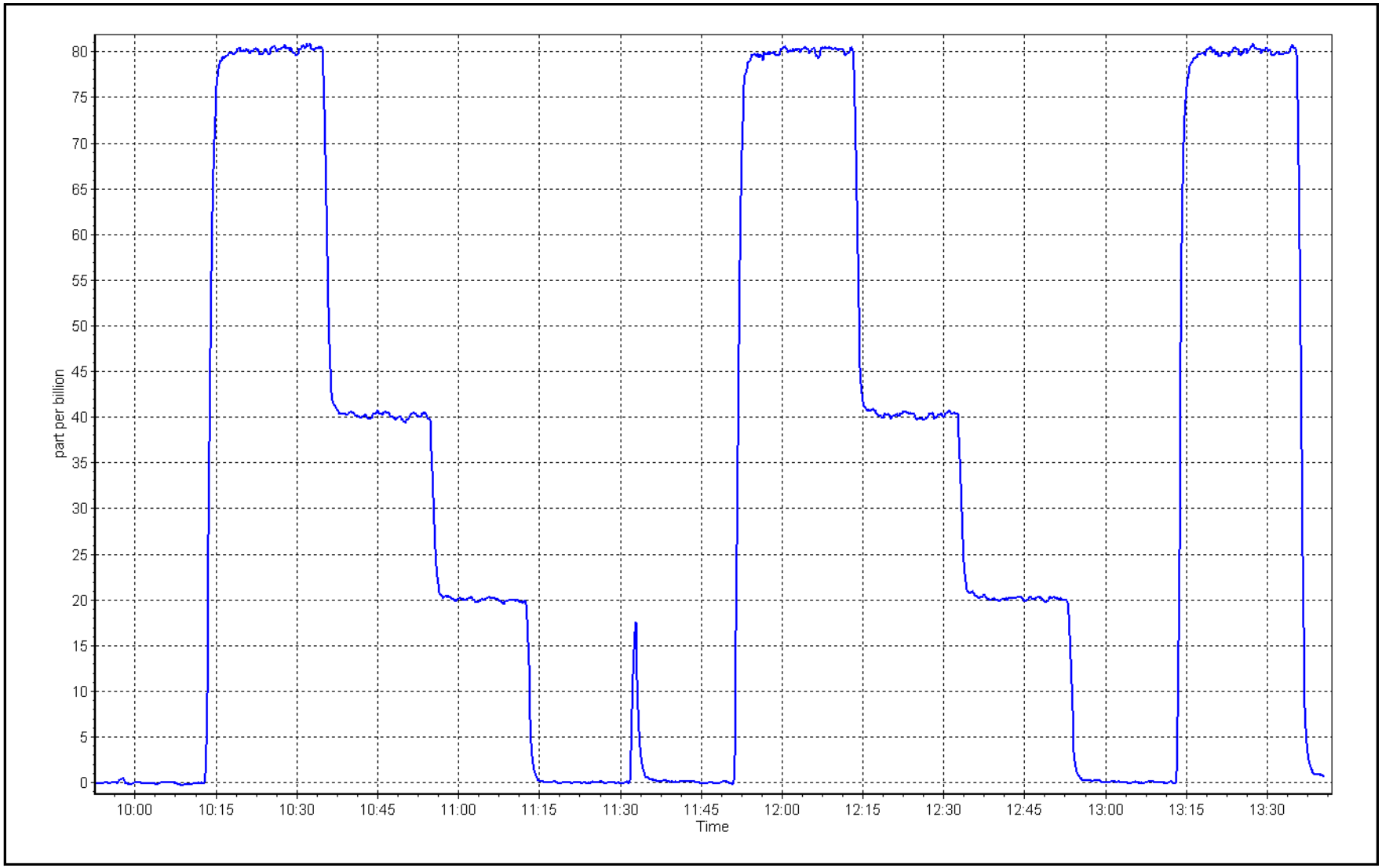
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.2	0.9973
40.0	40.3	0.9923
20.0	20.1	0.9974

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	1.003054	*0.90 - 1.10*
Intercept	0.038381	*+/-3*



H_2S Calibration Plot Date: April 3, 2023 Location: Firebag



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	April 14, 2023	Last Cal Date:	March 7, 2023
Start time (MST):	10:45	End time (MST):	14:48
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:	0.998521	0.997928	Background:	2.24	2.62
Calibration intercept:	-0.017736	-0.020741	Coefficient:	3.732	3.815

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	0.44	----
as found span	4919	81.1	17.31	17.27	1.002
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	17.27	1.002
second point	4959	40.6	8.66	8.60	1.007
third point	4980	20.3	4.33	4.27	1.015
as left zero	5000	0.0	0.00	-0.08	----
as left span	4919	81.1	17.31	17.23	1.004
				Average Correction Factor	1.008

Baseline Corr As found:	16.83	Previous response	17.26	*% 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: Reset 51i initially as it was frozen and not communicating. 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

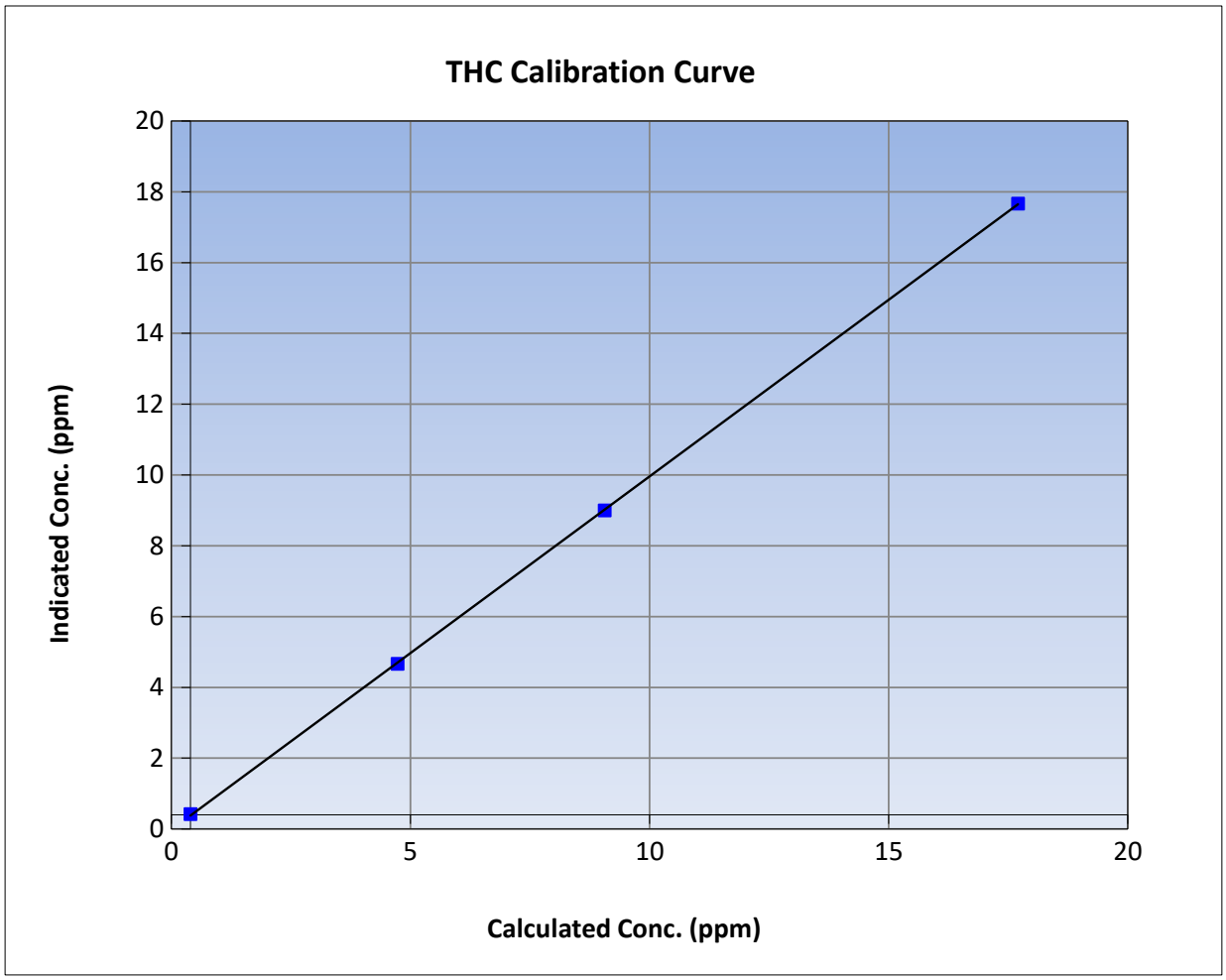
Station Information

Calibration Date:	April 14, 2023	Previous Calibration:	March 7, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:45	End Time (MST):	14:48
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1336160089

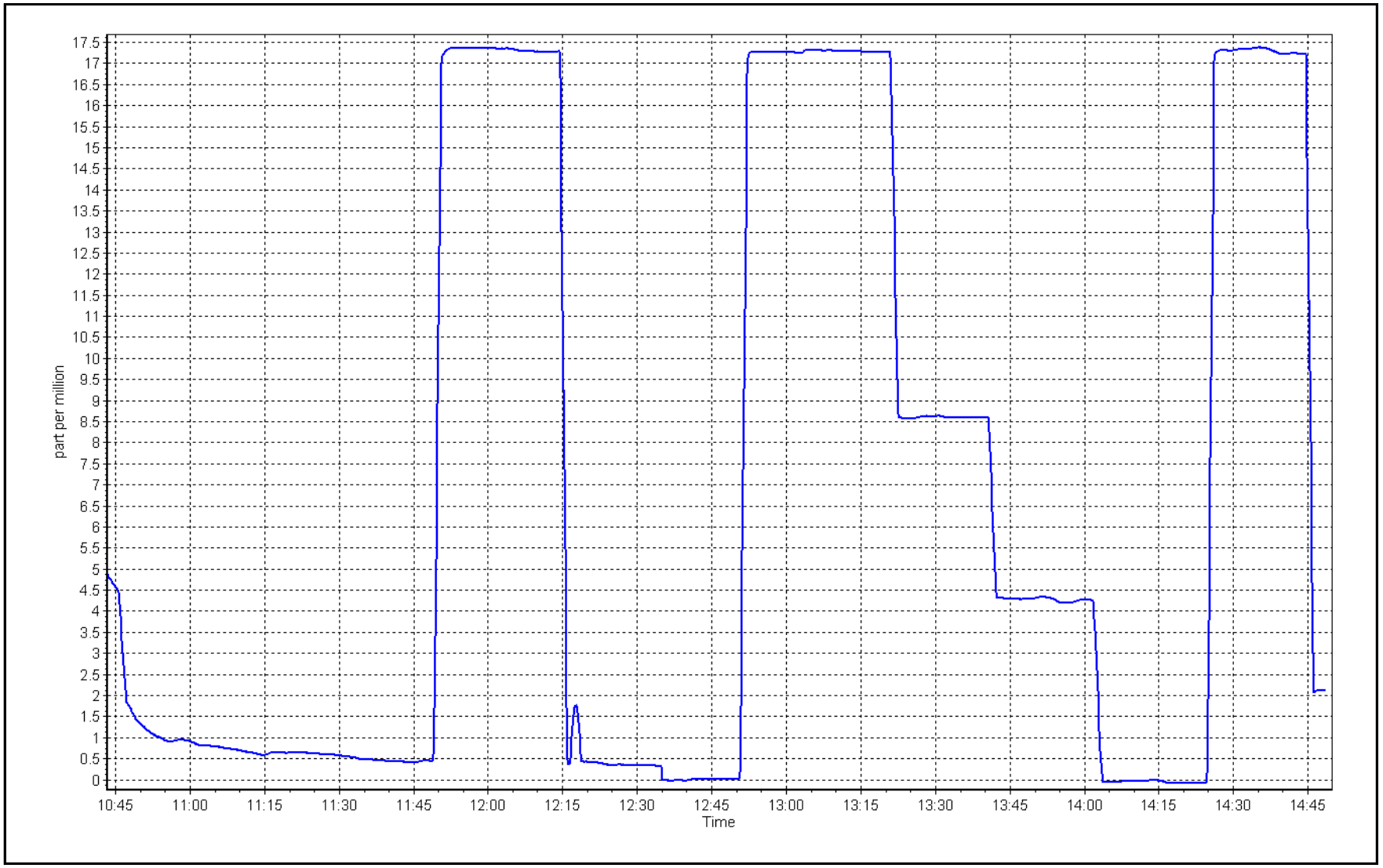
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.02	----
17.31	17.27	1.0020
8.66	8.60	1.0075
4.33	4.27	1.0151

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999977	*≥0.995*
Slope	0.997928	*0.90 - 1.10*
Intercept	-0.020741	*+/-1.5*



THC Calibration Plot Date: April 14, 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:	April 4, 2023	Last Cal Date:	March 3, 2023
Start time (MST):	10:06	End time (MST):	14:32
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2Y1K63		Cal Gas Expiry Date:	November 30, 2023	
NOX Cal Gas Conc:	51.12	ppm	NO Cal Gas Conc:	49.40	ppm
Removed Cylinder #:	n/a		Removed Gas Exp Date:	n/a	
Removed Gas NOX Conc:	51.12	ppm	Removed Gas NO Conc:	49.40	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	1607	
ZAG make/model:	Teledyne API T701		Serial Number:	1118	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1410661309	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.041	1.041	NO bkgnd or offset:	7.2	7.3
NOX coeff or slope:	0.996	0.996	NOX bkgnd or offset:	7.3	7.3
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	206.6	210.9

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.994815	0.991227
NO_X Cal Offset:	0.755137	0.554416
NO Cal Slope:	0.993858	0.991132
NO Cal Offset:	0.287575	-0.133220
NO_2 Cal Slope:	1.003159	0.999545
NO_2 Cal Offset:	0.561215	-0.476369

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	4999	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	----	----
as found span	4919	81.0	828.1	800.3	27.9	826.0	794.5	31.5	1.0026	1.0073
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	4999	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high point	4919	81.0	828.1	800.3	27.9	821.0	792.9	28.2	1.0087	1.0093
second point	4960	40.5	414.0	400.1	13.9	411.6	396.9	14.6	1.0059	1.0081
third point	4980	20.2	206.5	199.6	6.9	205.7	197.3	8.4	1.0040	1.0115
as left zero	4999	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
as left span	4919	81.0	828.1	362.7	465.5	825.0	356.7	468.4	1.0038	1.0168
								Average Correction Factor	1.0062	1.0096

Corrected As found	NO_X = 826.2 ppb	NO = 794.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.2%
Previous Response	NO_X = 824.6 ppb	NO = 795.7 ppb		*Percent Change	NO =	-0.1%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found NO r^2:	NO Sl:	NO Int:	
			As found NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	790.5	352.9	465.5	465.1	1.0008	99.9%
2nd GPT point (200 ppb O3)	790.5	570.6	247.8	246.8	1.0039	99.6%
3rd GPT point (100 ppb O3)	790.5	682.1	136.3	135.3	1.0071	99.3%
				Average Correction Factor	1.0039	99.6%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

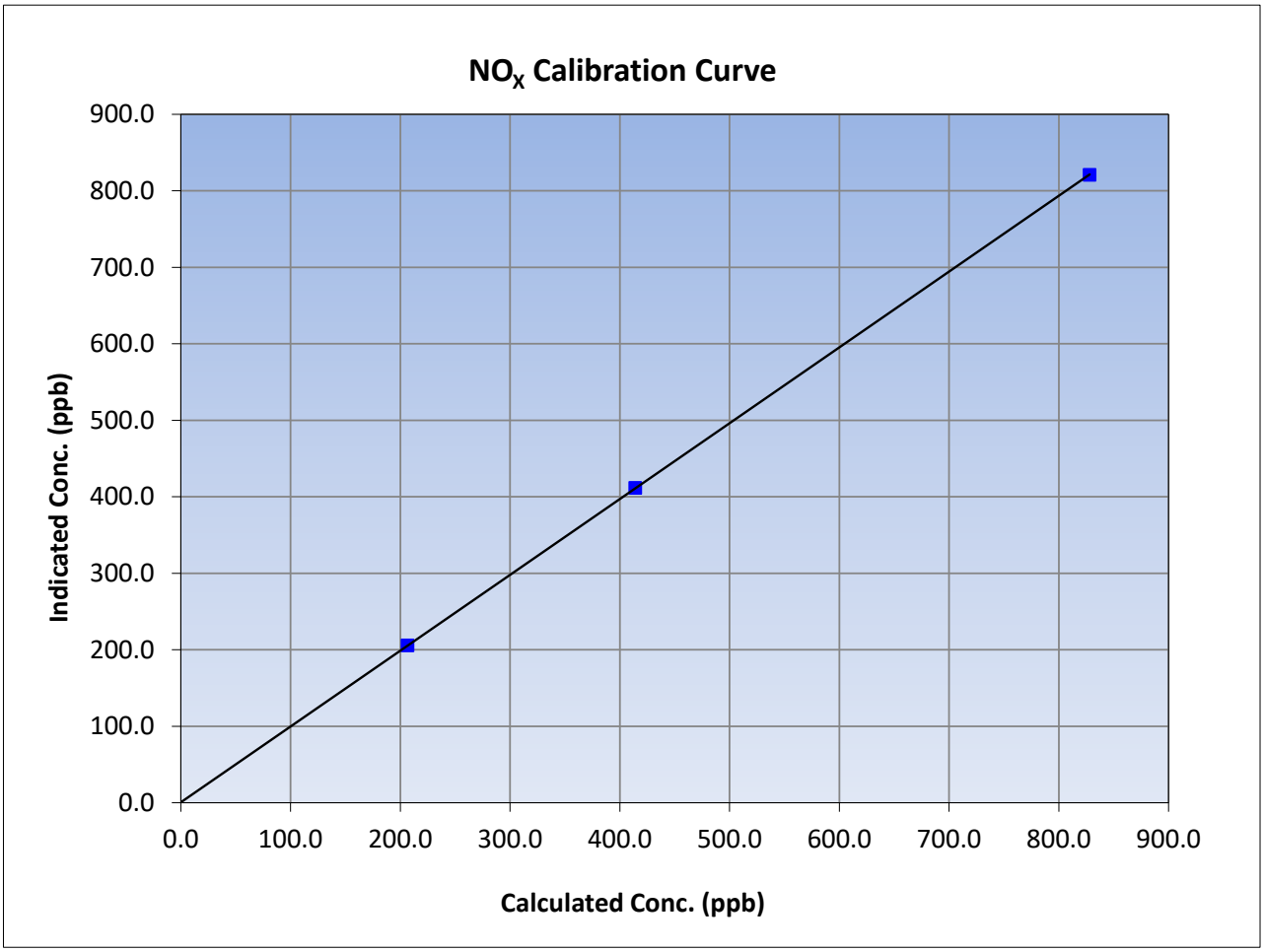
Version-04-2020

Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 3, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:06	End Time (MST):	14:32
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
828.1	821.0	1.0087			
414.0	411.6	1.0059	Slope	0.991227	0.90 - 1.10
206.5	205.7	1.0040			
			Intercept	0.554416	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

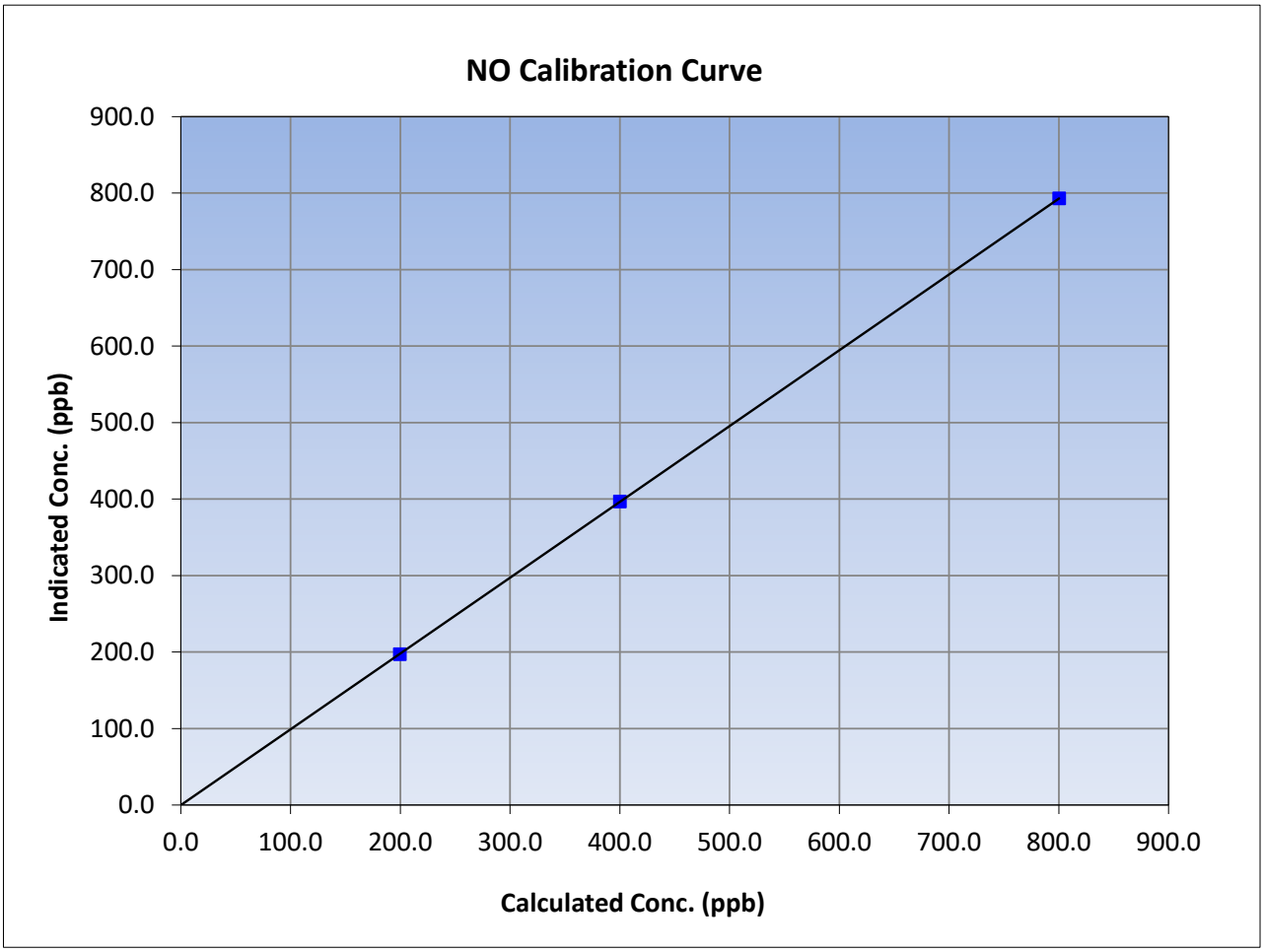
Version-04-2020

Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 3, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:06	End Time (MST):	14:32
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	792.9	1.0093			
400.1	396.9	1.0081	Slope	0.991132	0.90 - 1.10
199.6	197.3	1.0115			
			Intercept	-0.133220	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

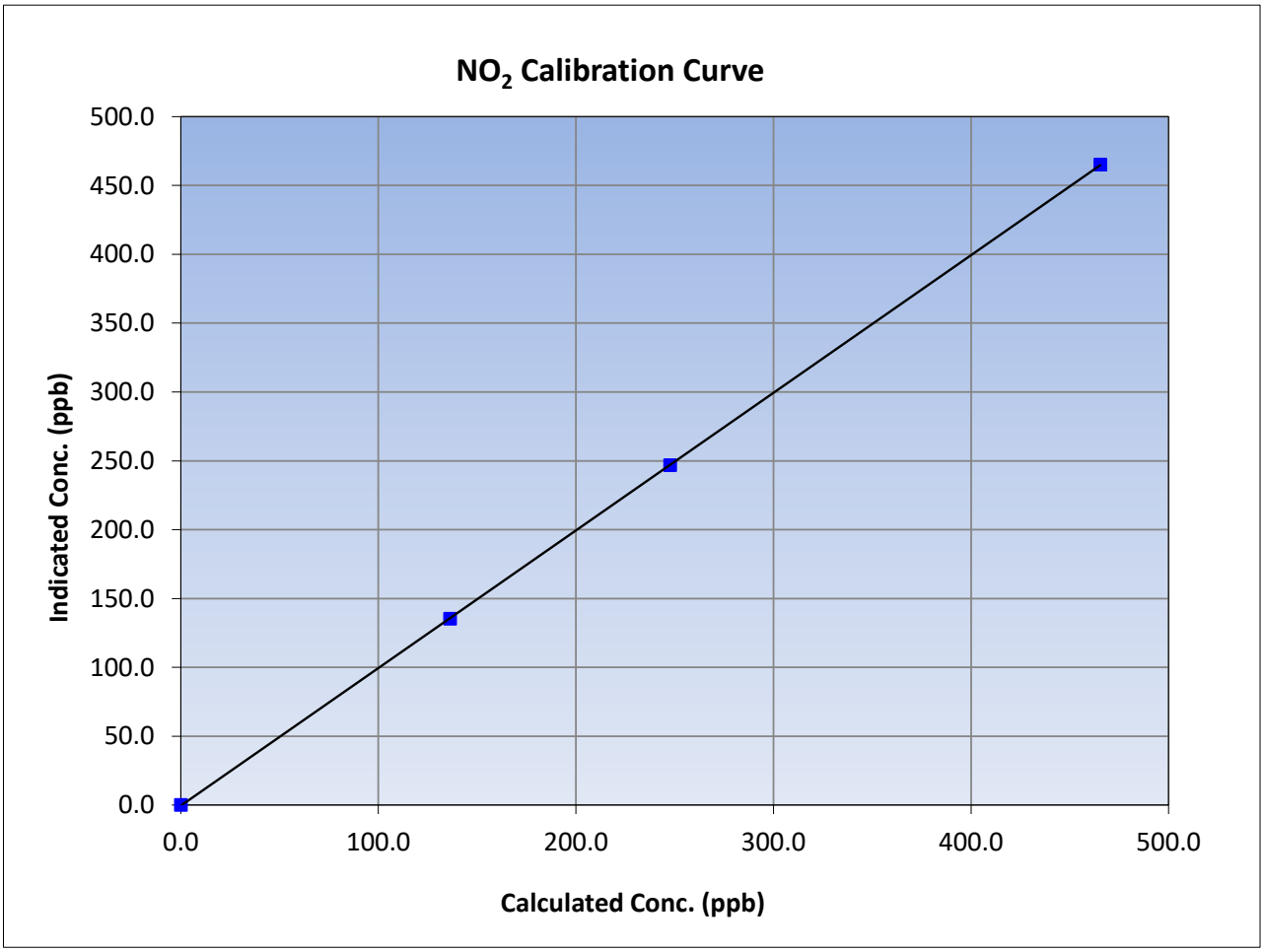
Version-04-2020

Station Information

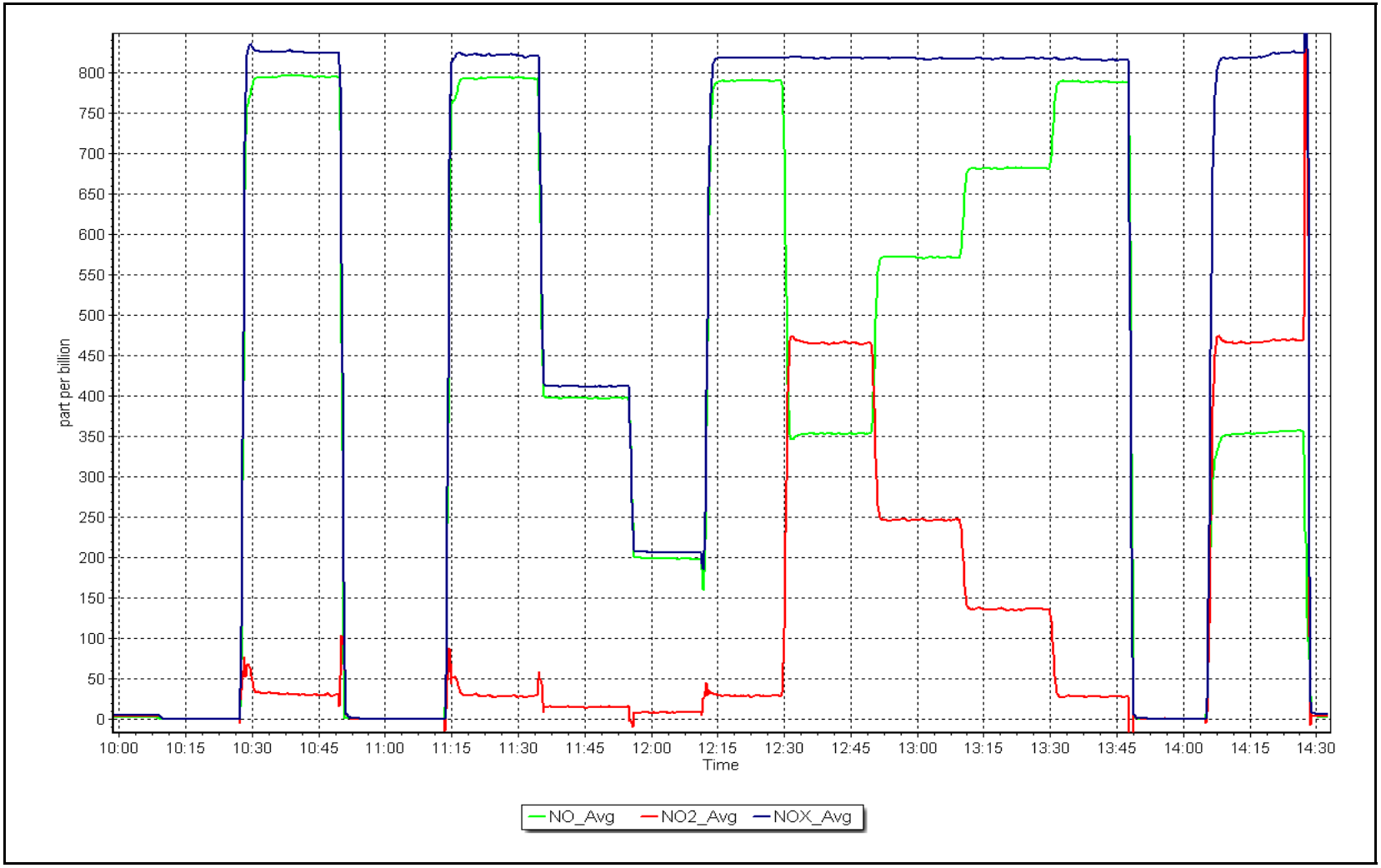
Calibration Date:	April 4, 2023	Previous Calibration:	March 3, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:06	End Time (MST):	14:32
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999994	≥0.995
465.5	465.1	1.0008			
247.8	246.8	1.0039	Slope	0.999545	0.90 - 1.10
136.3	135.3	1.0071			
			Intercept	-0.476369	+/-20



NO_X Calibration Plot Date: April 4, 2023 Location: Firebag



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS20
MACKAY RIVER
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	April 3, 2023	Last Cal Date:	March 1, 2023
Start time (MST):	10:04	End time (MST):	13:02
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.22 ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC306868		
Removed Cal Gas Conc:	49.22 ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA	Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700	Serial Number:	1220
ZAG Make/Model:	Teledyne API 701	Serial Number:	4522

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1501301450

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.992140	1.005548	Backgd or Offset:	19.1	18.9
Calibration intercept:	3.311046	0.790939	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	0.0	----
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	0.2	----
high point	4919	81.3	800.3	805.5	0.994
second point	4959	40.7	400.7	403.1	0.994
third point	4980	20.3	199.8	202.9	0.985
as left zero	5000	0.0	0.0	0.3	----
as left span	4919	81.3	800.3	804.8	0.994
				Average Correction Factor	0.991

Baseline Corr As found:	805.60	Previous response	797.29	*% change	1.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

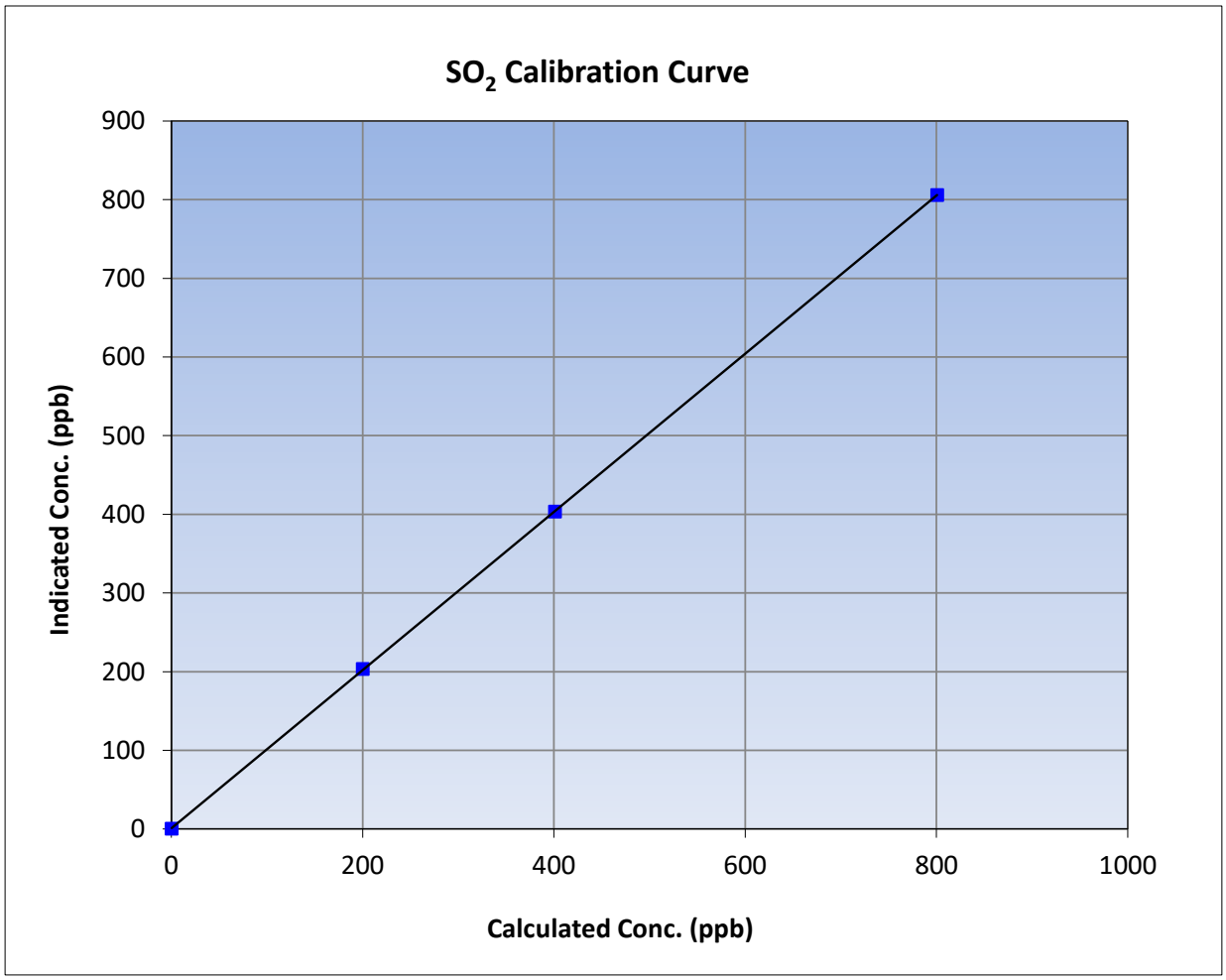
Station Information

Calibration Date:	April 3, 2023	Previous Calibration:	March 1, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	10:04	End Time (MST):	13:02
Analyzer make:	Thermo 43i	Analyzer serial #:	1501301450

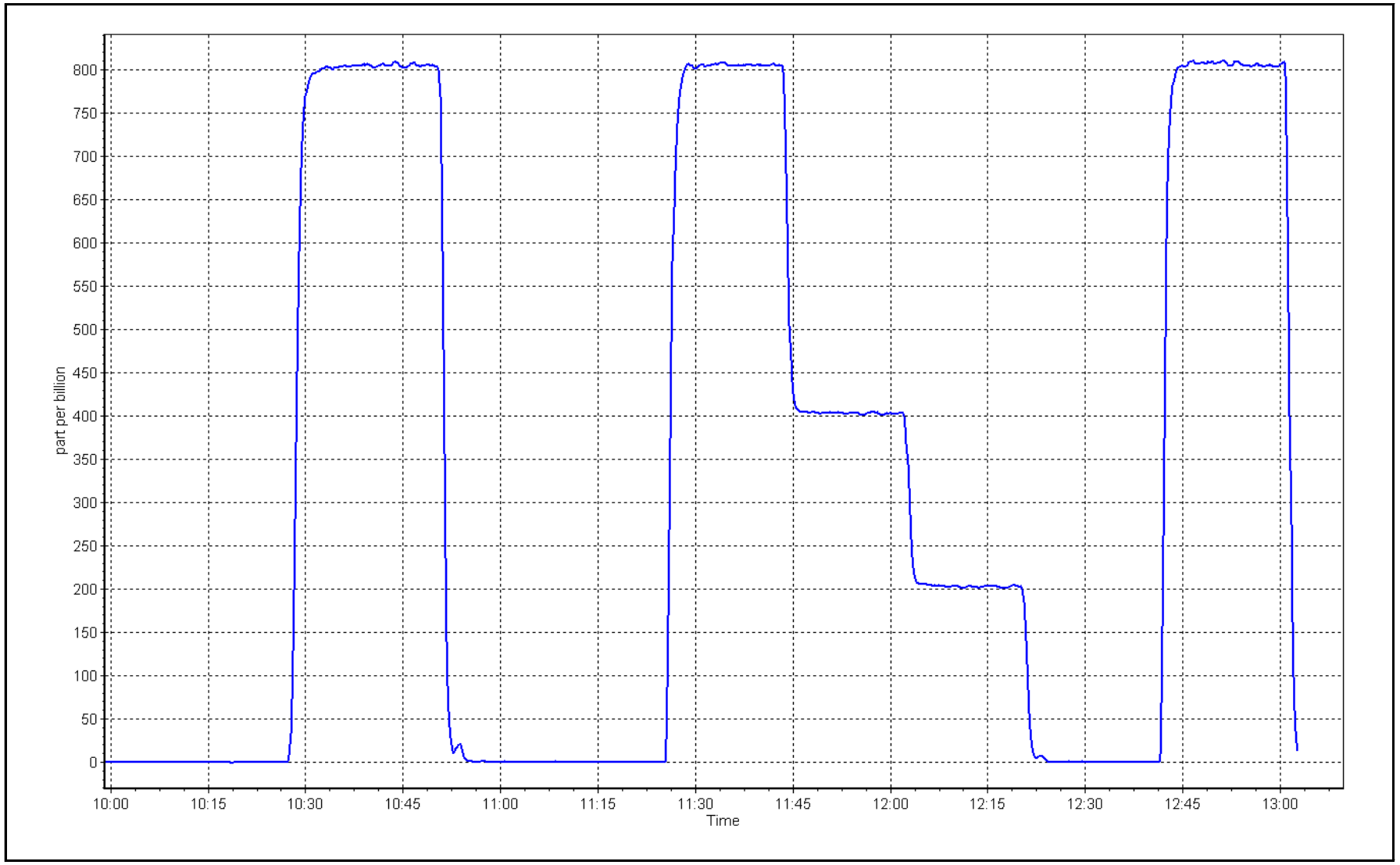
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
800.3	805.5	0.9935
400.7	403.1	0.9940
199.8	202.9	0.9848

Statistical Evaluation		Limits
Correlation Coefficient	0.999994	≥0.995
Slope	1.005548	0.90 - 1.10
Intercept	0.790939	+/-30



SO2 Calibration Plot Date: April 3, 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:	April 4, 2023	Last Cal Date:	March 8, 2023
Start time (MST):	9:59	End time (MST):	14:52
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	4.87	ppm	Cal Gas Exp Date:	May 5, 2023
Cal Gas Cylinder #:	EY0001922			
Removed Cal Gas Conc:	4.87	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	1220
ZAG Make/Model:	Teledyne API 701		Serial Number:	4522

Analyzer Information

Analyzer make:	Teledyne API T101		Analyzer serial #:	196	
Converter make:	Internal		Converter serial #:	NA	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999432	1.003004	Backgd or Offset:	44.9	46.3
Calibration intercept:	0.479018	0.079047	Coeff or Slope:	1.008	0.987

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	83.1	0.969
as found 2nd point	4959	41.1	40.0	42.1	0.965
as found 3rd point	4979	20.5	20.0	21.4	0.960
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4918	82.1	80.0	80.2	0.997
second point	4959	41.1	40.0	40.3	0.993
third point	4979	20.5	20.0	20.3	0.984
as left zero	5000	0.0	0.0	0.0	----
as left span	4918	82.1	80.0	79.5	1.006
SO2 Scrubber Check	4919	80.0	800.2	0.1	----
Date of last scrubber change:		December 15, 2020		Ave Corr Factor	0.991
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	82.5	Prev response:	80.40	*% change:	2.5%
Baseline Corr 2nd AF pt:	41.5	AF Slope:	1.031156	AF Intercept:	0.718981
Baseline Corr 3rd AF pt:	20.8	AF Correlation:	0.999990		

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after multi point as founds. Performed scrubber test after calibrator zero. Adjusted zero and span.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

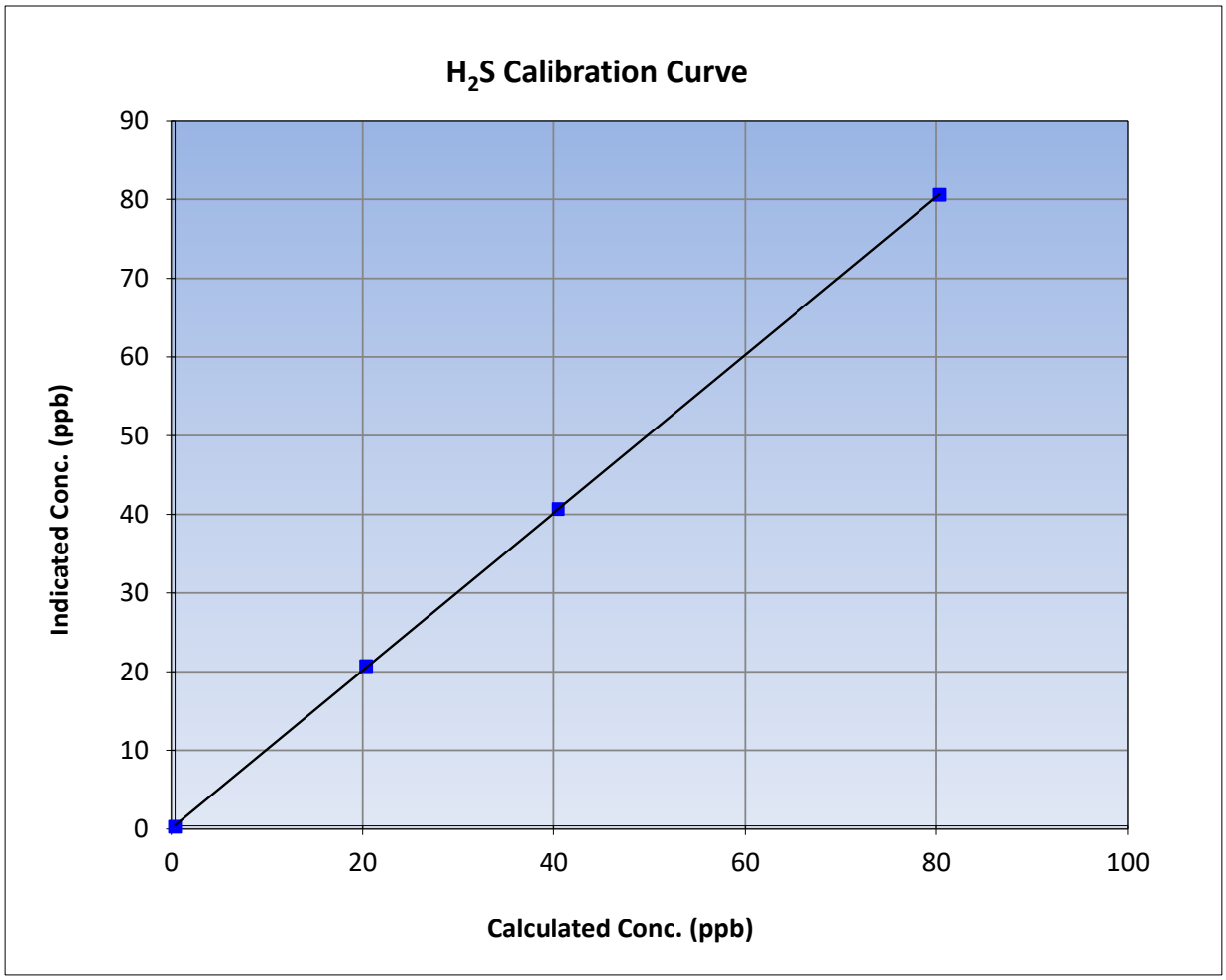
Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 8, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	9:59	End Time (MST):	14:52
Analyzer make:	Teledyne API T101	Analyzer serial #:	196

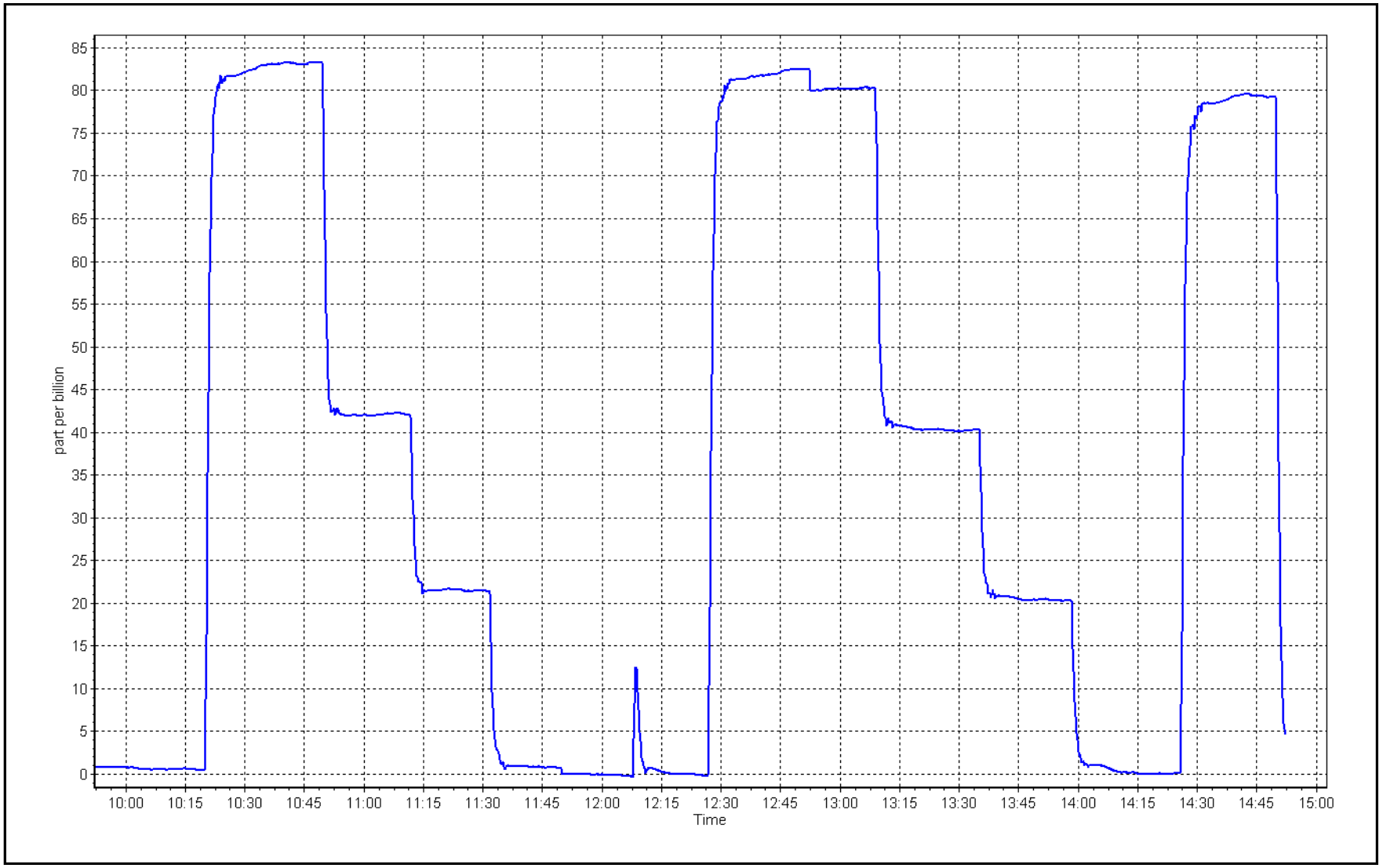
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.2	0.9971
40.0	40.3	0.9933
20.0	20.3	0.9837

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999977	*≥0.995*
Slope	1.003004	*0.90 - 1.10*
Intercept	0.079047	*+/-3*



H_2S Calibration Plot Date: April 4, 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:	April 3, 2023	Last Cal Date:	March 1, 2023
Start time (MST):	10:04	End time (MST):	13:02
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:	0.993043	0.995858	Background:	2.870	3.160
Calibration intercept:	0.145942	-0.025166	Coefficient:	5.253	5.328

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	0.25	----
as found span	4919	81.3	17.34	17.14	1.012
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.03	----
high point	4919	81.3	17.34	17.26	1.005
second point	4959	40.7	8.68	8.57	1.014
third point	4980	20.3	4.33	4.34	0.999
as left zero	5000	0.0	0.00	-0.02	----
as left span	4919	81.3	17.34	17.06	1.017
				Average Correction Factor	1.006

Baseline Corr As found:	16.88	Previous response	17.36	*% change	-2.9%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

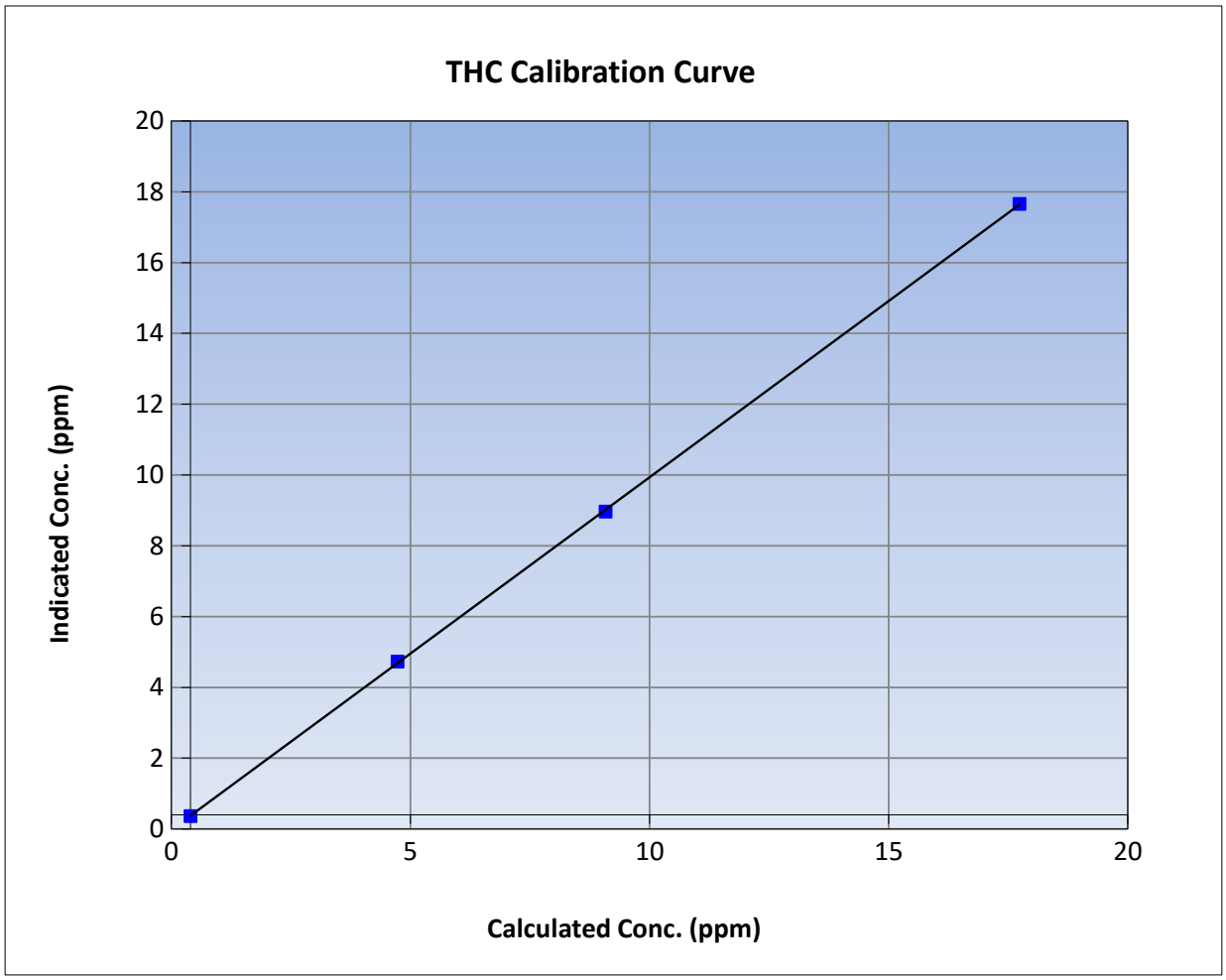
Station Information

Calibration Date:	April 3, 2023	Previous Calibration:	March 1, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	10:04	End Time (MST):	13:02
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1501663727

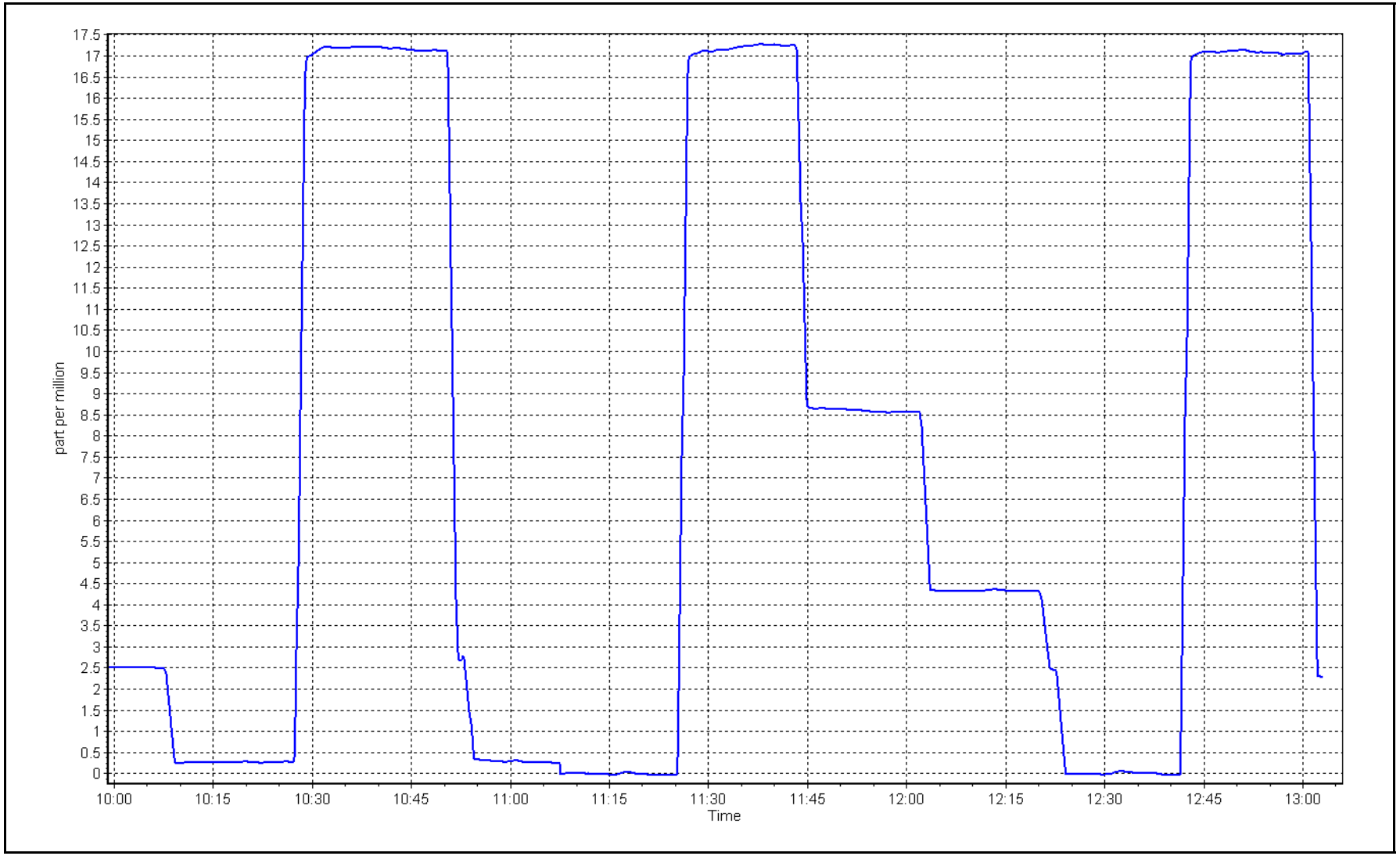
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.03	----
17.34	17.26	1.0047
8.68	8.57	1.0136
4.33	4.34	0.9987

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999965	*≥0.995*
Slope	0.995858	*0.90 - 1.10*
Intercept	-0.025166	*+/-1.5*



THC Calibration Plot Date: April 3, 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:	April 19, 2023	Last Cal Date:	March 9, 2023
Start time (MST):	9:47	End time (MST):	14:26
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:	1.412	1.459	NO bkgnd or offset:	3.9	4.0
NOX coeff or slope:	0.990	0.990	NOX bkgnd or offset:	3.9	4.0
NO2 coeff or slope:	0.995	0.995	Reaction cell Press:	182.5	181.9

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000735	0.996899
NO_X Cal Offset:	3.529487	1.929986
NO Cal Slope:	1.004217	0.999776
NO Cal Offset:	2.250337	0.730780
NO_2 Cal Slope:	1.000187	0.995110
NO_2 Cal Offset:	-1.449451	-1.870675

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as found span	4917	83.3	819.5	800.3	19.2	796.4	775.6	20.8	1.0290	1.0318
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	818.3	800.7	17.7	1.0014	0.9995
second point	4956	41.7	410.4	400.8	9.6	410.9	401.2	9.7	0.9989	0.9991
third point	4979	20.8	204.6	199.9	4.8	208.5	201.7	6.7	0.9815	0.9908
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.1	----	----
as left span	4917	83.3	819.5	457.8	361.7	819.5	456.8	362.7	0.9999	1.0022
								Average Correction Factor	0.9939	0.9965

Corrected As found	NO_X = 796.5 ppb	NO = 775.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-3.4%
Previous Response	NO_X = 823.6 ppb	NO = 805.9 ppb		*Percent Change	NO =	-3.9%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	798.3	455.8	361.7	359.4	1.0063	99.4%
2nd GPT point (200 ppb O3)	798.3	619.0	198.5	194.2	1.0219	97.9%
3rd GPT point (100 ppb O3)	798.3	704.6	112.9	108.5	1.0402	96.1%
				Average Correction Factor	1.0228	97.8%

Notes: Adjusted span only.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

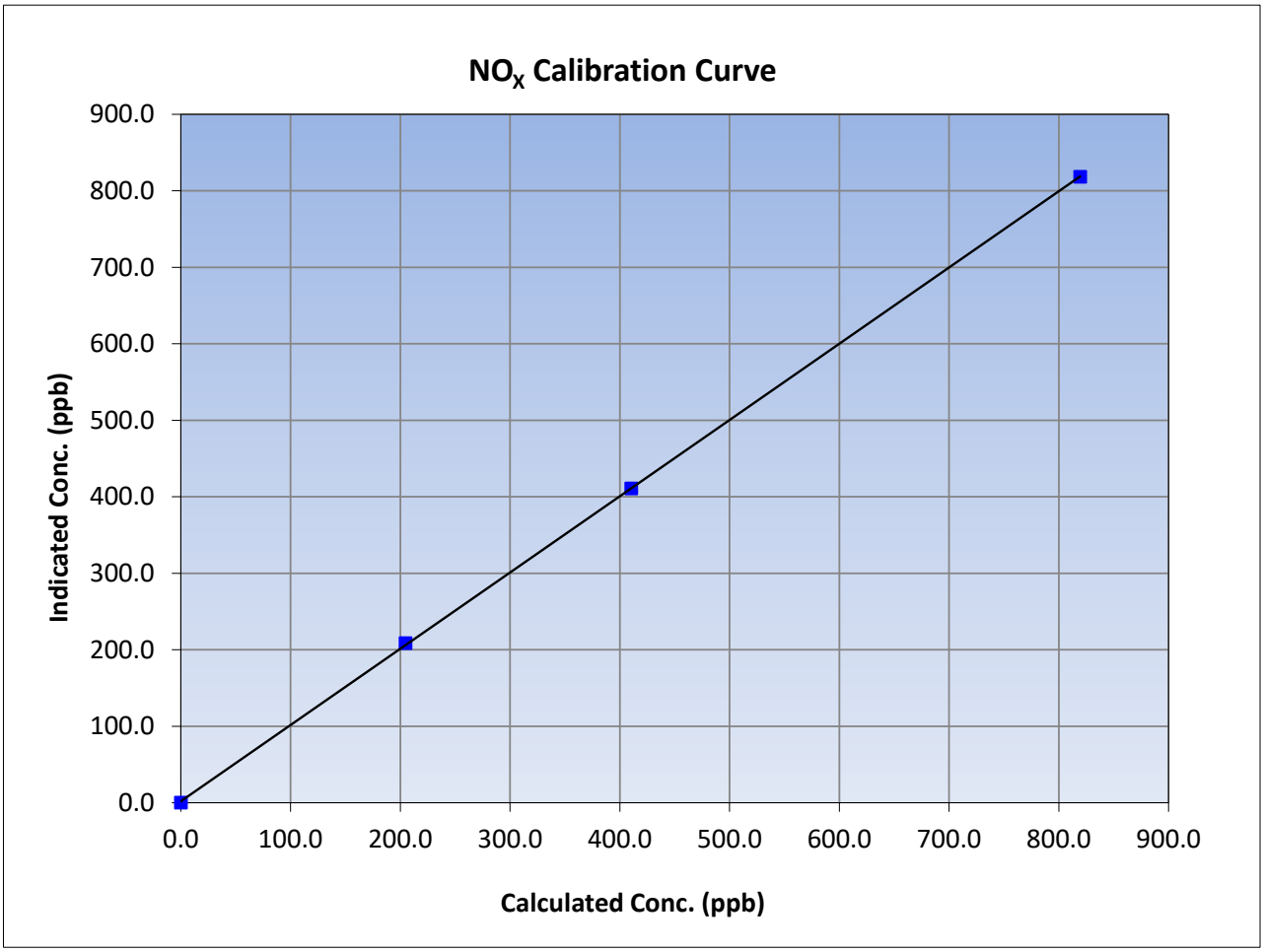
Version-04-2020

Station Information

Calibration Date:	April 19, 2023	Previous Calibration:	March 9, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	9:47	End Time (MST):	14:26
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	0.999972	*≥0.995*
819.5	818.3	1.0014			
410.4	410.9	0.9989	Slope	0.996899	*0.90 - 1.10*
204.6	208.5	0.9815			
			Intercept	1.929986	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

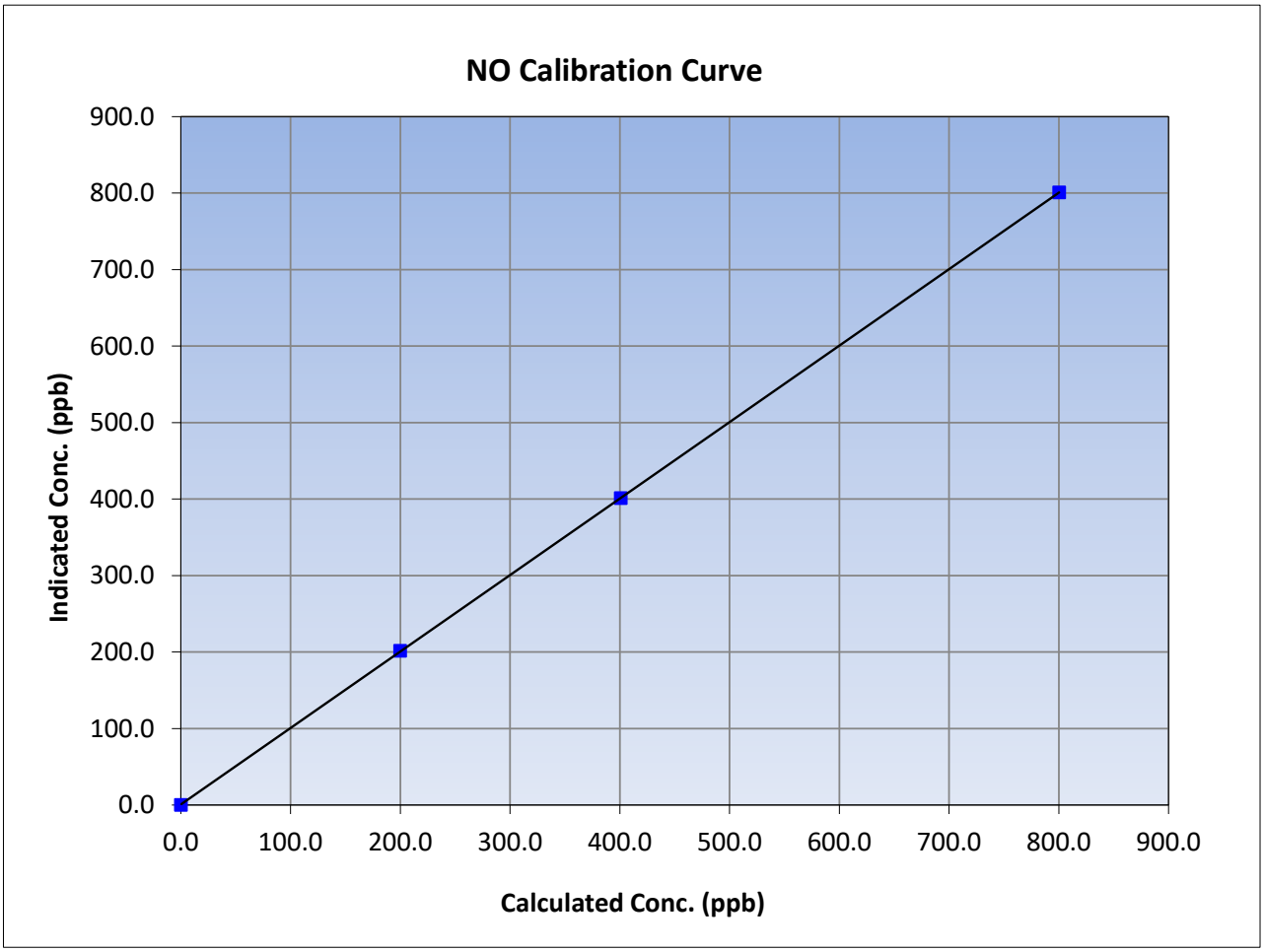
Version-04-2020

Station Information

Calibration Date:	April 19, 2023	Previous Calibration:	March 9, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	9:47	End Time (MST):	14:26
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	800.7	0.9995			
400.8	401.2	0.9991	Slope	0.999776	0.90 - 1.10
199.9	201.7	0.9908			
			Intercept	0.730780	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

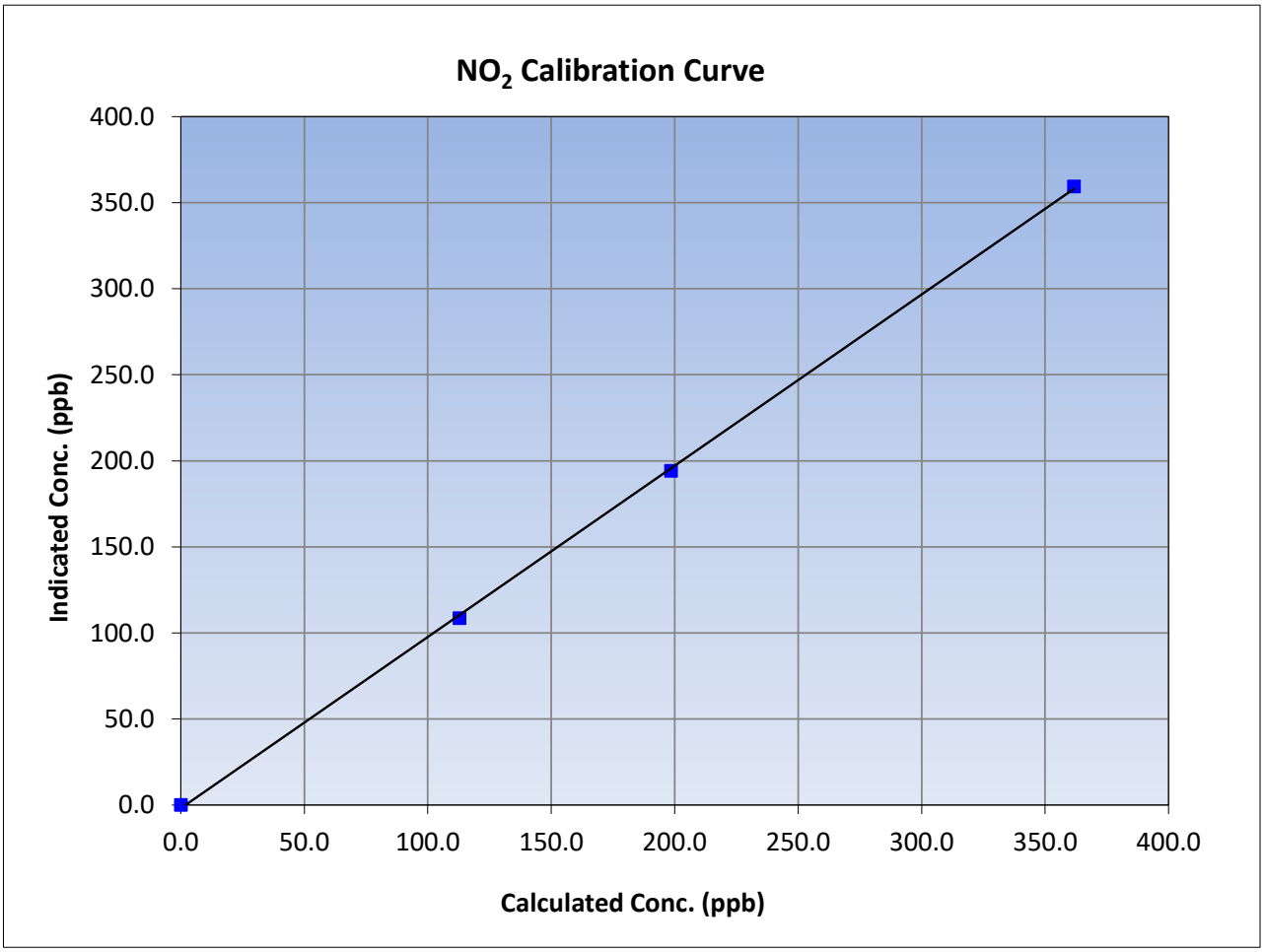
Version-04-2020

Station Information

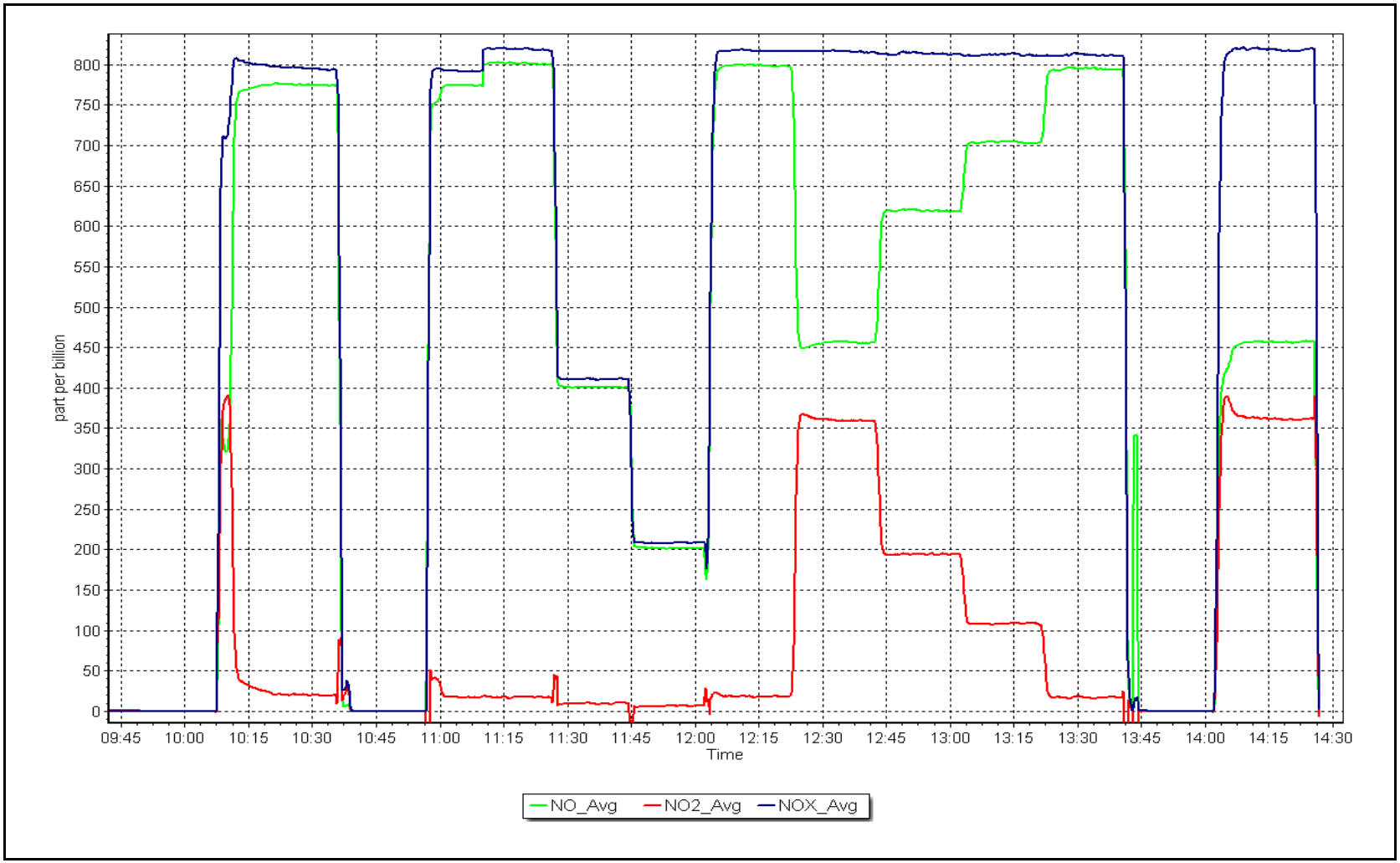
Calibration Date:	April 19, 2023	Previous Calibration:	March 9, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	9:47	End Time (MST):	14:26
Analyzer make:	Thermo 42i	Analyzer serial #:	1505164379

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999833	≥0.995
361.7	359.4	1.0063			
198.5	194.2	1.0219	Slope	0.995110	0.90 - 1.10
112.9	108.5	1.0402			
			Intercept	-1.870675	+/-20



NO_X Calibration Plot Date: April 19, 2023 Location: MacKay River



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS21
CONKLIN
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	April 13, 2023	Last Cal Date:	March 3, 2023
Start time (MST):	9:14	End time (MST):	12:00
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.93	ppm	Cal Gas Exp Date:	January 5, 2025
Cal Gas Cylinder #:	CC259455			
Removed Cal Gas Conc:	49.93	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:			Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3810
ZAG Make/Model:	Teledyne API 701		Serial Number:	262

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1428701363

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005625	1.015856	Backgd or Offset:	28.6	28.4
Calibration intercept:	0.356047	0.896430	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	0.0	----
as found span	4920	80.2	800.8	812.0	0.986
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	814.1	0.984
second point	4960	40.1	400.4	407.9	0.982
third point	4980	20.0	200.1	205.1	0.976
as left zero	5005	0.0	0.0	0.0	----
as left span	4920	80.2	800.8	813.0	0.985
				Average Correction Factor	0.980

Baseline Corr As found:	812.00	Previous response	805.71	*% change	0.8%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

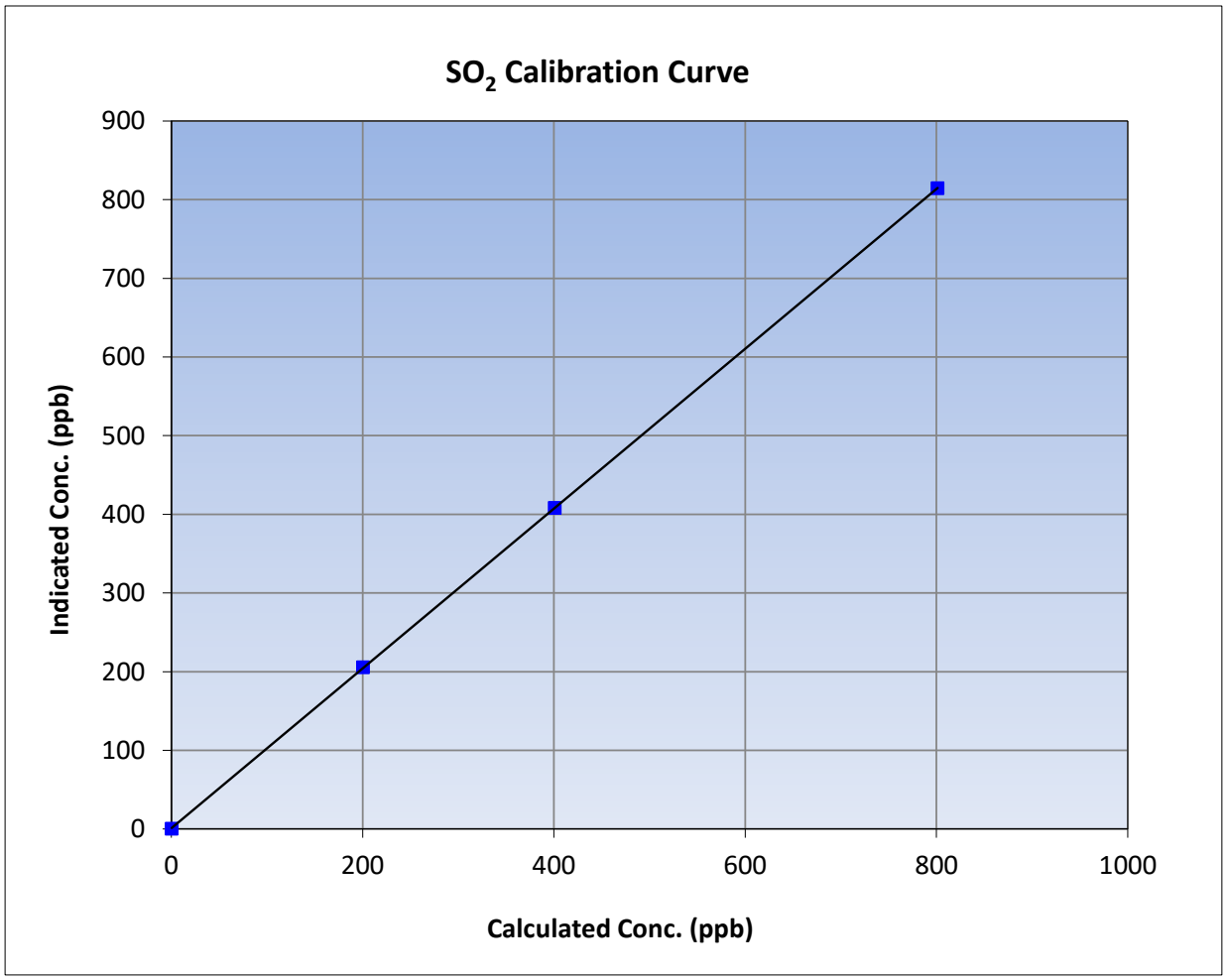
Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 3, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:14	End Time (MST):	12:00
Analyzer make:	Thermo 43i	Analyzer serial #:	1428701363

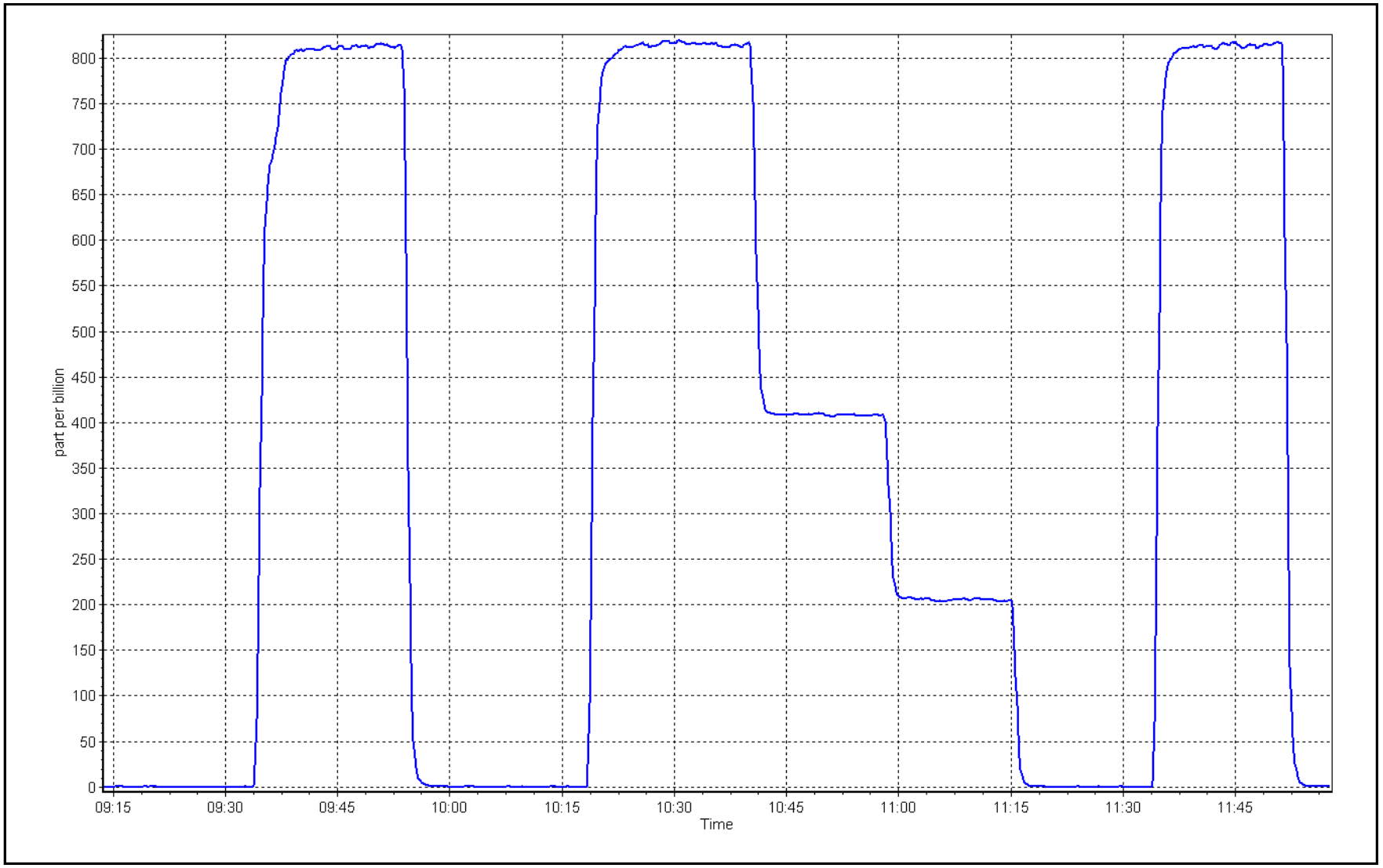
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
800.8	814.1	0.9837
400.4	407.9	0.9817
200.1	205.1	0.9757

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.015856	*0.90 - 1.10*
Intercept	0.896430	*+/-30*



SO2 Calibration Plot Date: April 13, 2023 Location: Conklin



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	April 26, 2023	Last Cal Date:	March 22, 2023
Start time (MST):	9:17	End time (MST):	13:05
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.03	ppm	Cal Gas Exp Date:	April 16, 2022
Cal Gas Cylinder #:	CC505493			
Removed Cal Gas Conc:	5.03	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3810
ZAG Make/Model:	API 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:	1.019442	1.009291	Backgd or Offset:	2.9	2.8
Calibration intercept:	0.237078	-0.082550	Coeff or Slope:	0.991	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	81.9	0.972
as found 2nd point	4960	39.8	40.0	41.1	0.965
as found 3rd point	4980	19.9	20.0	20.5	0.958
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	4921	79.5	80.0	80.5	0.993
second point	4960	39.8	40.0	40.5	0.989
third point	4980	19.9	20.0	20.3	0.986
as left zero	5000	0.0	0.0	0.0	----
as left span	4921	79.5	80.0	80.5	0.993
SO2 Scrubber Check	4920	80.2	802.0	0.1	----
Date of last scrubber change:				Ave Corr Factor	0.989
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	82.3	Prev response:	81.76	*% change:	0.7%
Baseline Corr 2nd AF pt:	41.5	AF Slope:	1.028298	AF Intercept:	-0.222949
Baseline Corr 3rd AF pt:	20.9	AF Correlation:	0.999977		

* = > +/-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

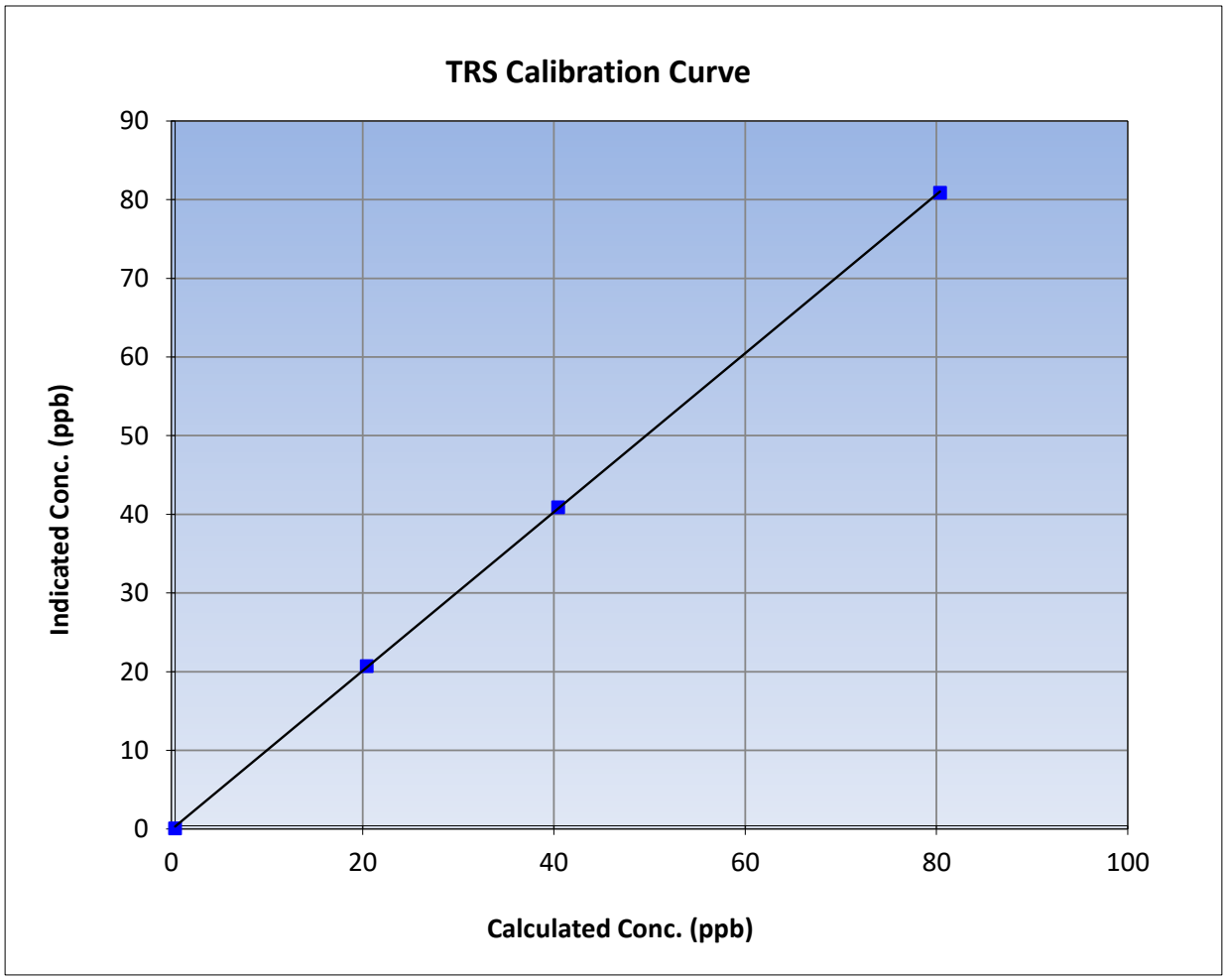
Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 22, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:17	End Time (MST):	13:05
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1236656116

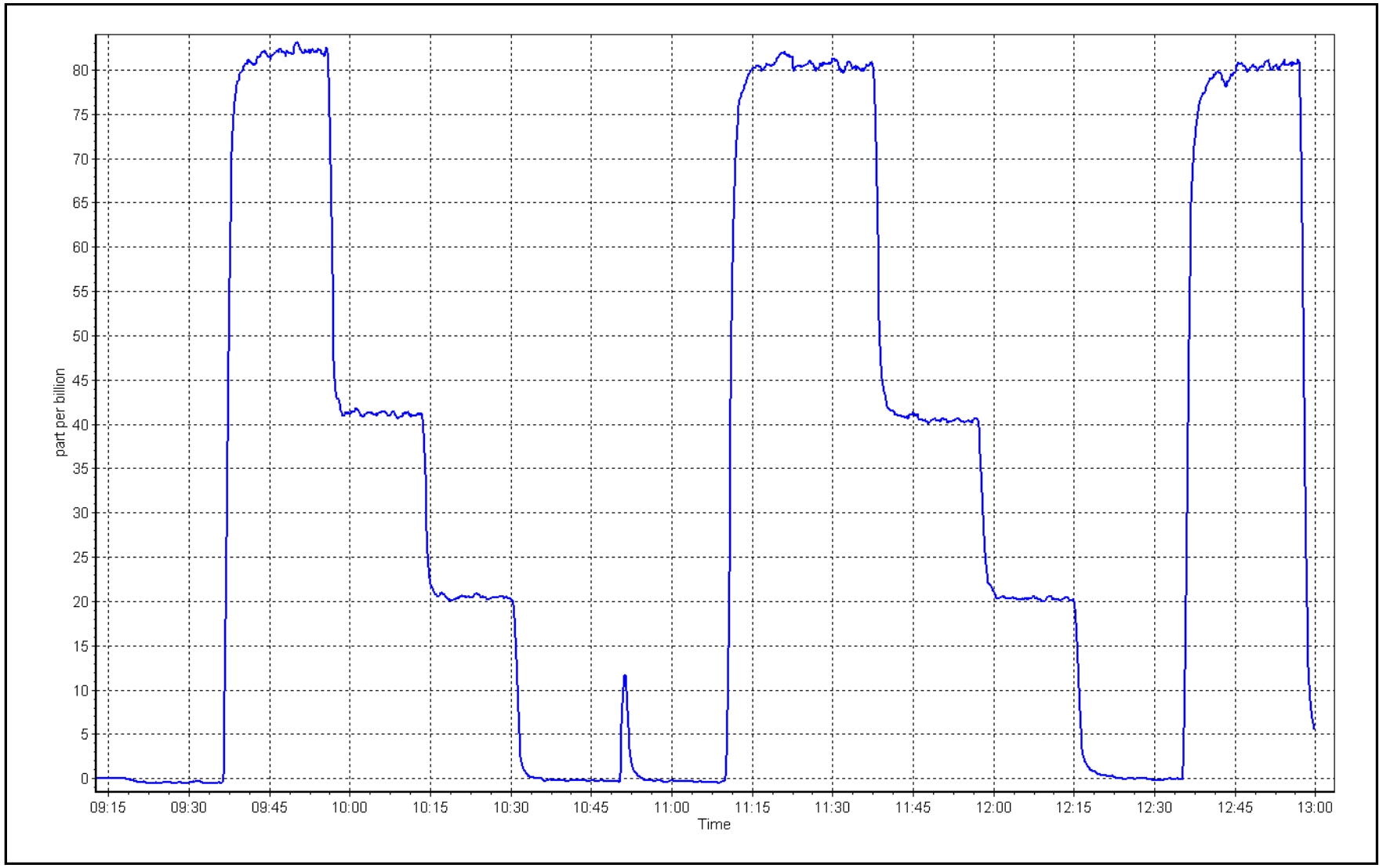
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
80.0	80.5	0.9934
40.0	40.5	0.9887
20.0	20.3	0.9862

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999965	*≥0.995*
Slope	1.009291	*0.90 - 1.10*
Intercept	-0.082550	*+/-3*



TRS Calibration Plot Date: April 26, 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:	April 13, 2023	Last Cal Date:	March 3, 2023
Start time (MST):	9:14	End time (MST):	12:00
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC259455	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
C3H8 Cal Gas Conc.	207.2	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
Removed C3H8 Conc.	207.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	3810	
ZAG make/model:	Teledyne API 701		Serial Number:	691	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	118148495	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	1.86E-04	1.86E-04	NMHC SP Ratio:	4.56E-05	4.56E-05
CH4 Retention time:	12.60	12.60	NMHC Peak Area:	200658	200658

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	17.13	17.19	0.996
as found 2nd point	4960	40.1	8.56		
as found 3rd point	4980	20.0	4.27		
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	17.13	17.16	0.998
second point	4960	40.1	8.56	8.62	0.994
third point	4980	20.0	4.27	4.34	0.984
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	17.13	17.05	1.004
				Average Correction Factor	0.992
Baseline Corr AF:	17.19	Prev response	17.21	*% change	-0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	9.14	9.19	0.994
as found 2nd point	4960	40.1	4.57		
as found 3rd point	4980	20.0	2.28		
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	9.14	9.19	0.994
second point	4960	40.1	4.57	4.60	0.993
third point	4980	20.0	2.28	2.32	0.982
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	9.14	9.07	1.007
				Average Correction Factor	0.990
Baseline Corr AF:	9.19	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	80.2	7.99	8.00	0.998
as found 2nd point	4960	40.1	3.99		
as found 3rd point	4980	20.0	1.99		
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	7.99	7.97	1.002
second point	4960	40.1	3.99	4.02	0.994
third point	4980	20.0	1.99	2.02	0.986
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	7.99	7.98	1.001
				Average Correction Factor	0.994
Baseline Corr AF:	8.00	Prev response	8.04	*% change	-0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.003632	1.000983
THC Cal Offset:	0.026595	0.032189
CH4 Cal Slope:	1.005332	0.996933
CH4 Cal Offset:	0.011959	0.019545
NMHC Cal Slope:	1.002247	1.004534
NMHC Cal Offset:	0.014236	0.012844

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

THC Calibration Summary

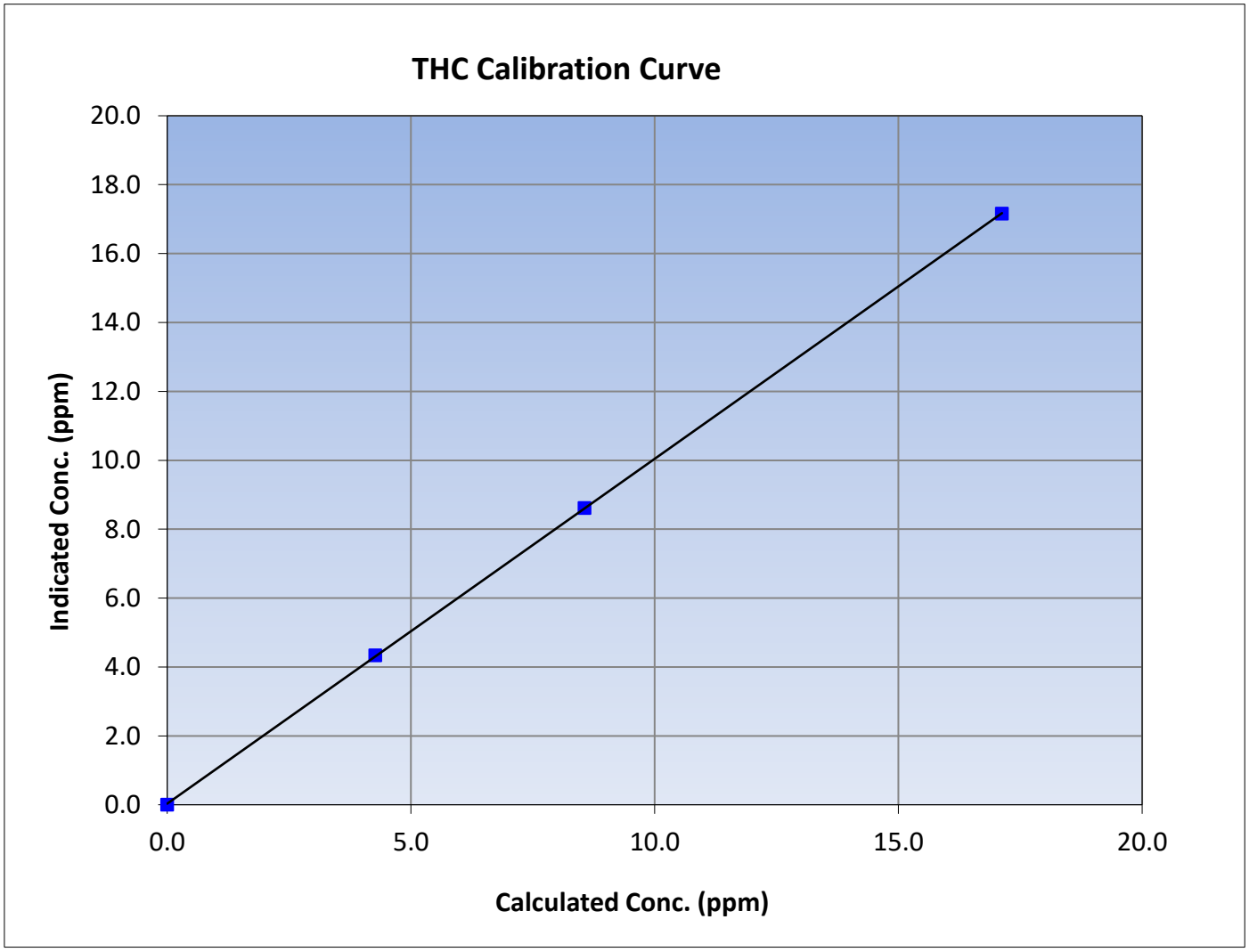
Version-06-2022

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 3, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:14	End Time (MST):	12:00
Analyzer make:	Thermo 55i	Analyzer serial #:	118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999984	≥0.995
17.13	17.16	0.9980			
8.56	8.62	0.9937	Slope	1.000983	0.90 - 1.10
4.27	4.34	0.9838			
			Intercept	0.032189	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

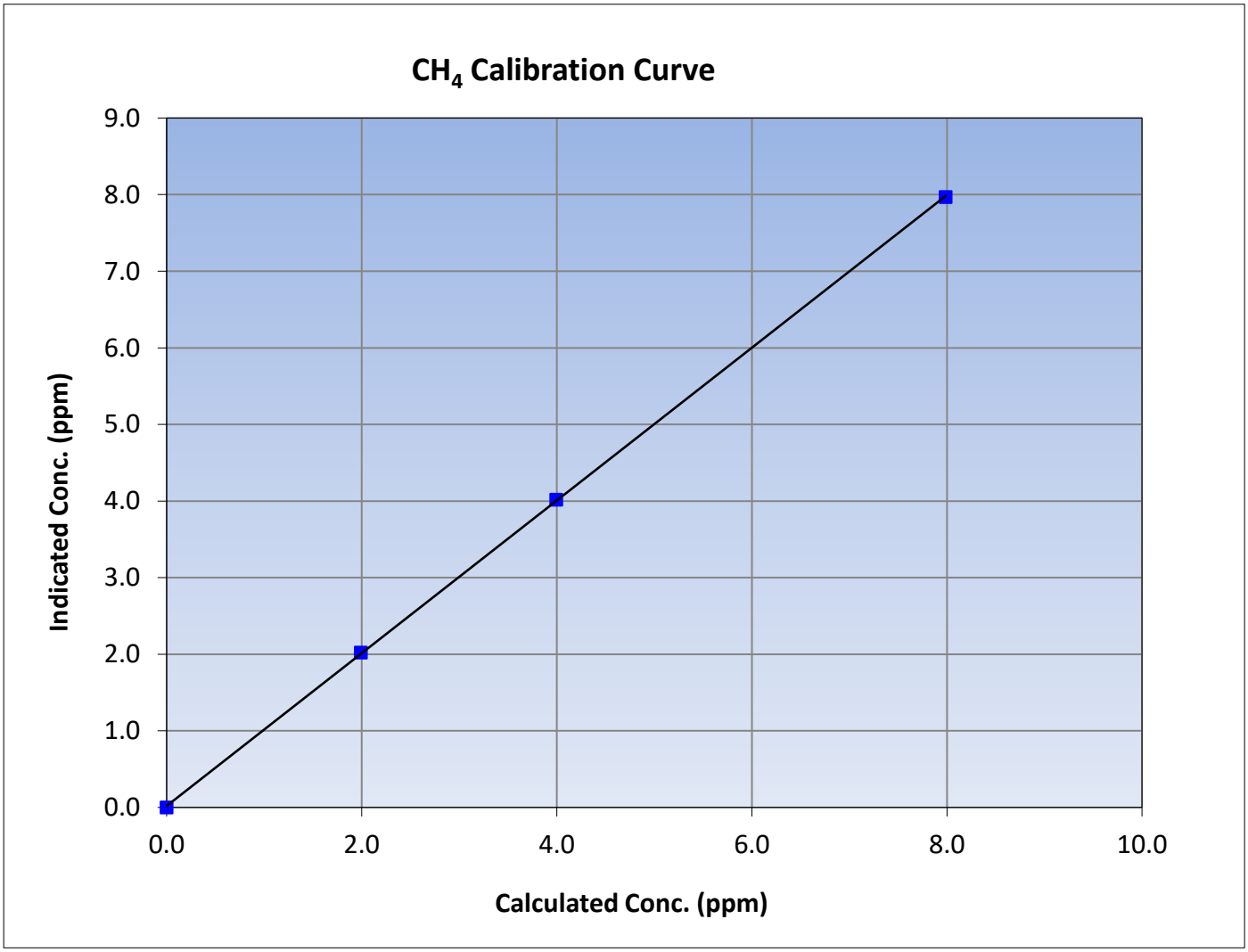
Version-06-2022

Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 3, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:14	End Time (MST):	12:00
Analyzer make:	Thermo 55i	Analyzer serial #:	118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999970	*≥0.995*
7.99	7.97	1.0021			
3.99	4.02	0.9940	Slope	0.996933	*0.90 - 1.10*
1.99	2.02	0.9859			
			Intercept	0.019545	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

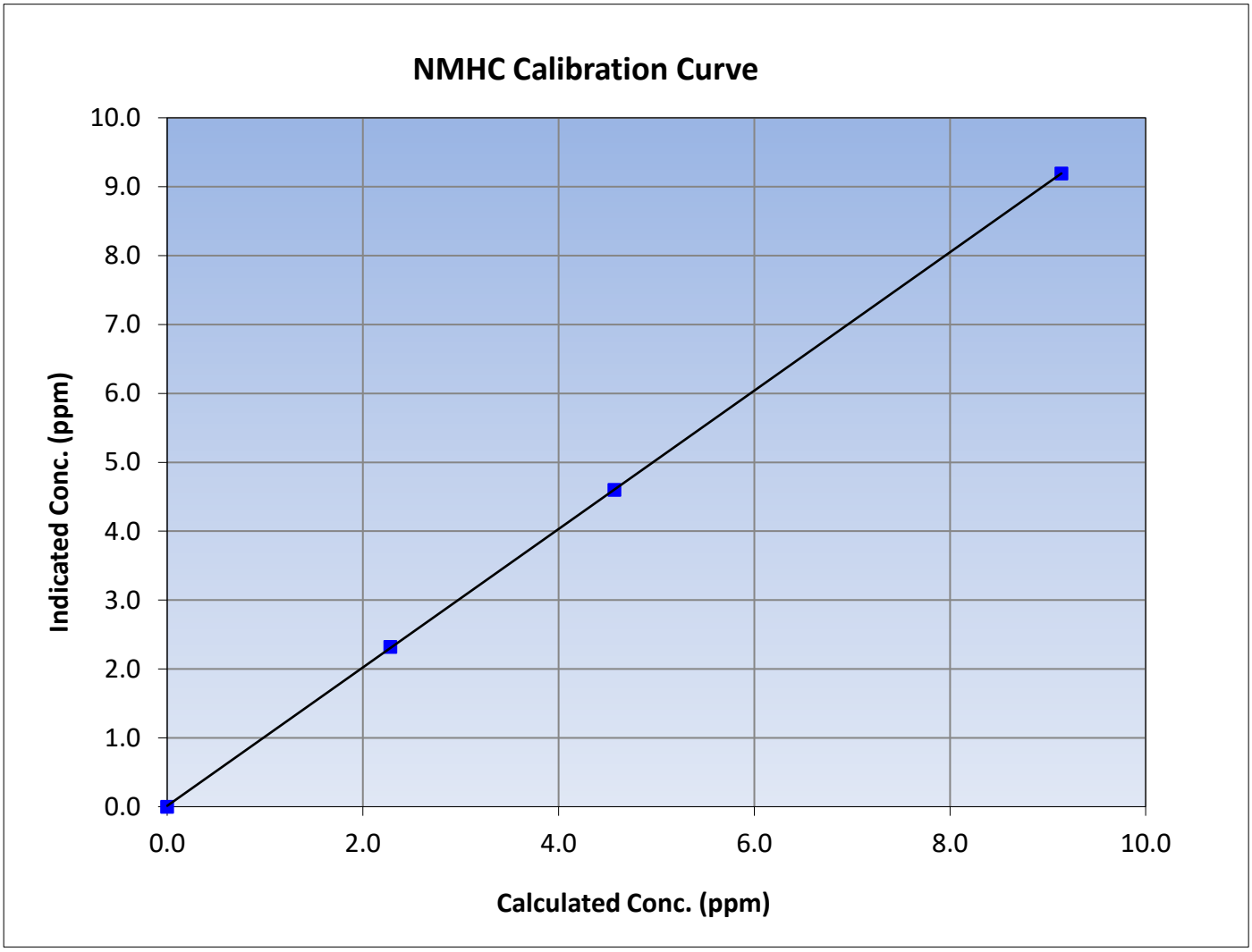
Version-06-2022

Station Information

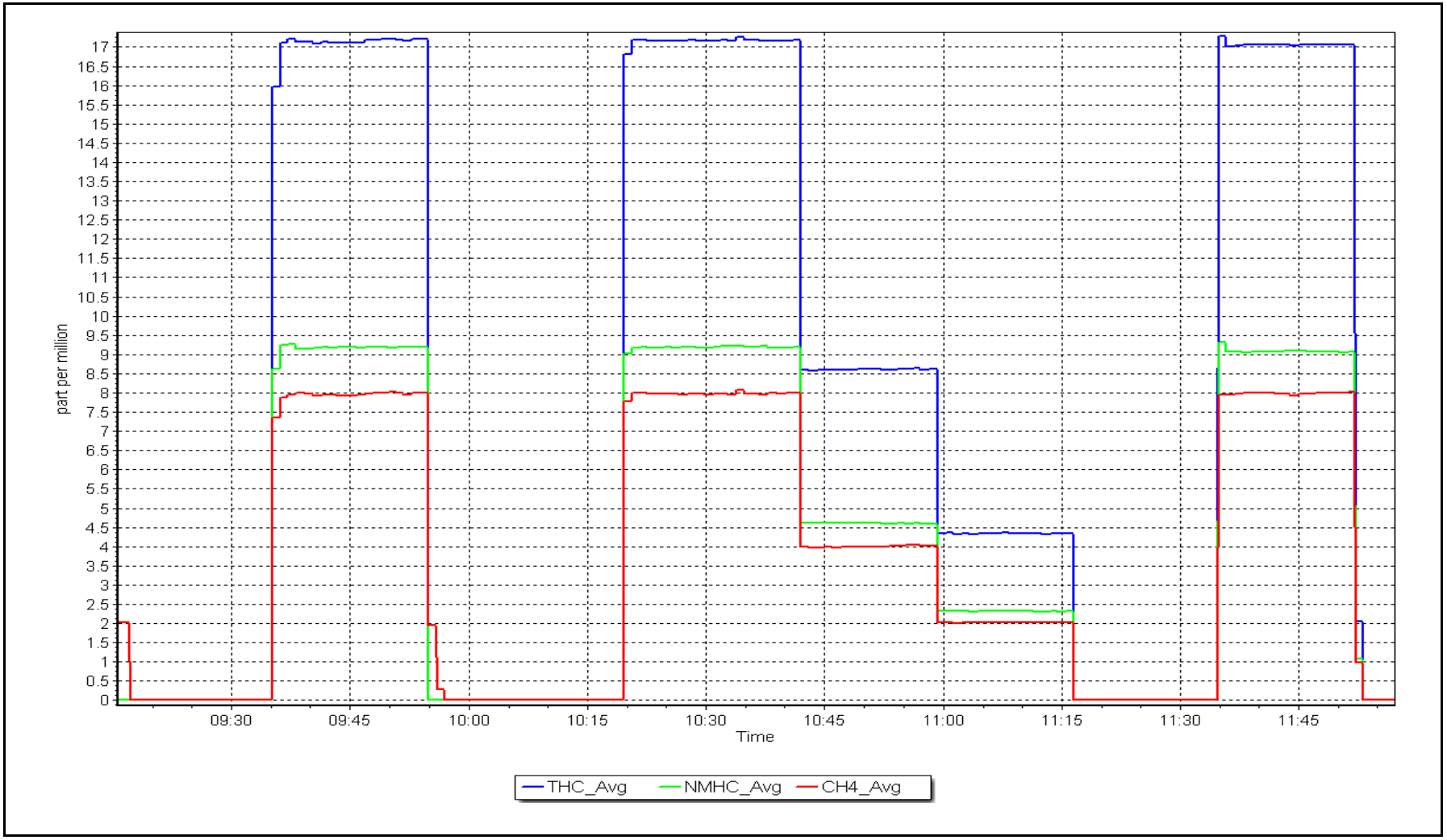
Calibration Date:	April 13, 2023	Previous Calibration:	March 3, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:14	End Time (MST):	12:00
Analyzer make:	Thermo 55i	Analyzer serial #:	118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999989	≥0.995
9.14	9.19	0.9945			
4.57	4.60	0.9932	Slope	1.004534	0.90 - 1.10
2.28	2.32	0.9820			
			Intercept	0.012844	+/-0.5



NMHC Calibration Plot Date: April 13, 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:	April 16, 2023	Last Cal Date:	April 13, 2023
Start time (MST):	10:14	End time (MST):	12:50
Reason:	Maintenance		

Calibration Standards

Gas Cert Reference:		CC259455	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
C3H8 Cal Gas Conc.	207.2	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
Removed C3H8 Conc.	207.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	3810	
ZAG make/model:	Teledyne API 701		Serial Number:	691	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	118148495	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	1.86E-04	1.82E-04	NMHC SP Ratio:	4.56E-05	4.58E-05
CH4 Retention time:	12.60	12.20	NMHC Peak Area:	200658	199772

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	17.13	17.24	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	17.13	17.16	0.998
second point	4960	40.1	8.56	8.61	0.994
third point	4980	20.0	4.27	4.32	0.988
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	17.13	16.86	1.016
				Average Correction Factor	0.993
Baseline Corr AF:	17.24	Prev response	17.17	*% change	0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	9.14	9.10	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	80.2	9.14	9.13	1.001
second point	4960	40.1	4.57	4.61	0.992
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	8.98	1.018
				Average Correction Factor	0.992
Baseline Corr AF:	9.10	Prev response	9.19	*% change	-1.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	7.99	8.14	0.981
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	7.99	8.03	0.995
second point	4960	40.1	3.99	4.01	0.997
third point	4980	20.0	1.99	2.01	0.992
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	7.99	7.88	1.013
				Average Correction Factor	0.994
Baseline Corr AF:	8.14	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:	1.000983	1.001470
THC Cal Offset:	0.032189	0.023785
CH4 Cal Slope:	0.996933	1.005018
CH4 Cal Offset:	0.019545	0.000556
NMHC Cal Slope:	1.004534	0.998508
NMHC Cal Offset:	0.012844	0.023429

Notes: Analyzer was having dipping issue and had to recalibrate. Adjusted the span.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

THC Calibration Summary

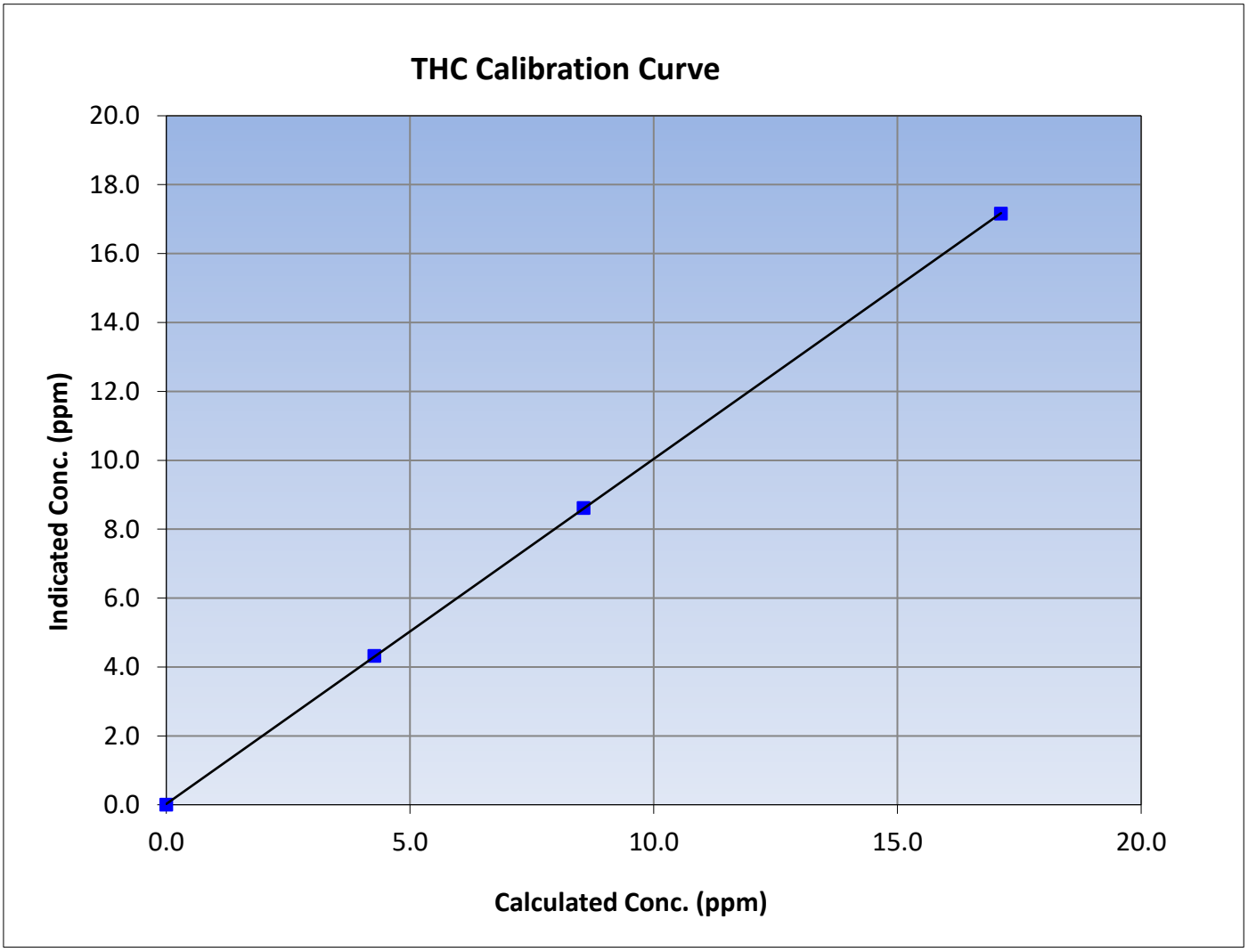
Version-06-2022

Station Information

Calibration Date:	April 16, 2023	Previous Calibration:	April 13, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:14	End Time (MST):	12:50
Analyzer make:	Thermo 55i	Analyzer serial #:	118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999991	*≥0.995*
17.13	17.16	0.9979			
8.56	8.61	0.9943	Slope	1.001470	*0.90 - 1.10*
4.27	4.32	0.9877			
			Intercept	0.023785	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

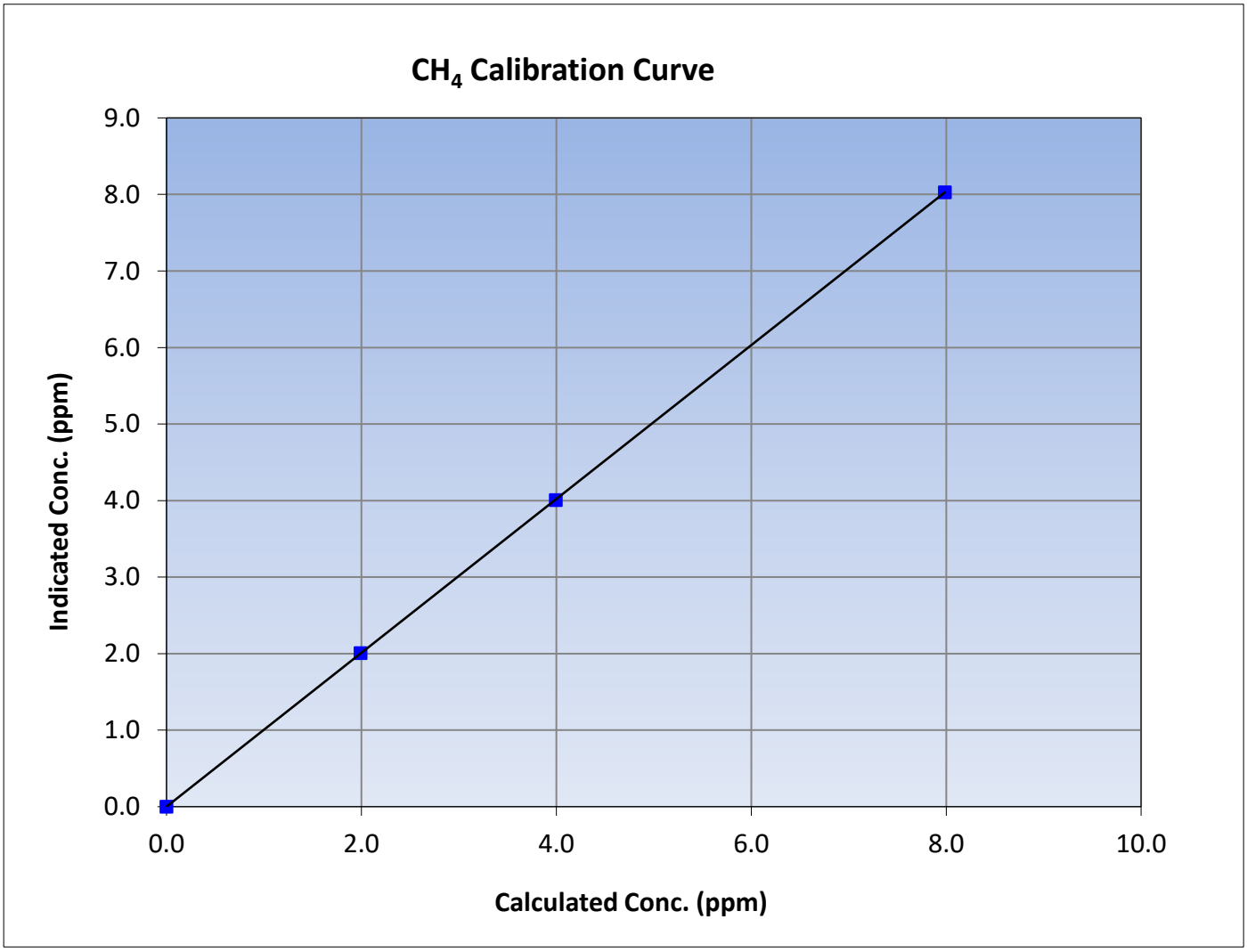
Version-06-2022

Station Information

Calibration Date:	April 16, 2023	Previous Calibration:	April 13, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:14	End Time (MST):	12:50
Analyzer make:	Thermo 55i	Analyzer serial #:	118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999997	*≥0.995*
7.99	8.03	0.9946			
3.99	4.01	0.9968	Slope	1.005018	*0.90 - 1.10*
1.99	2.01	0.9918			
			Intercept	0.000556	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

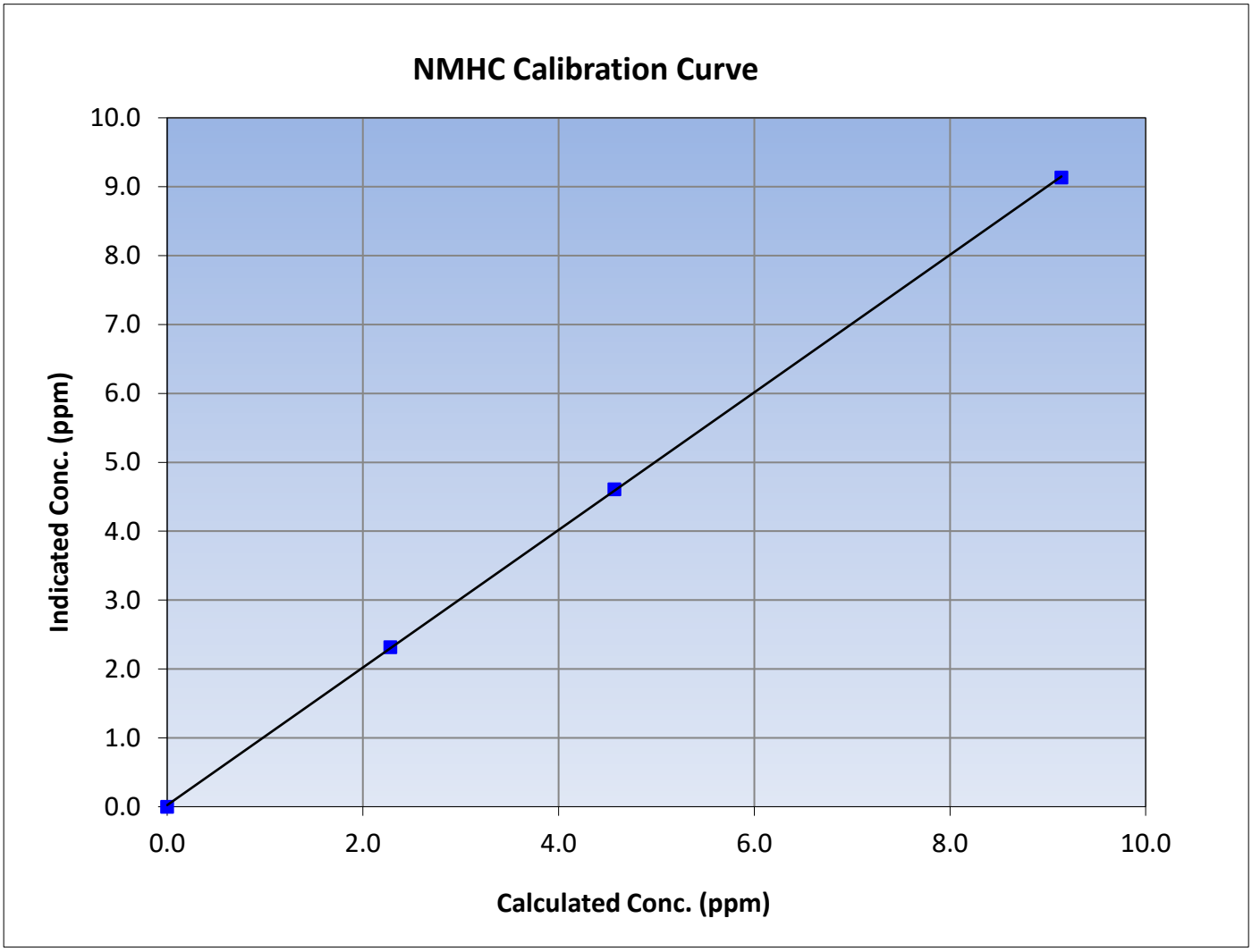
Version-06-2022

Station Information

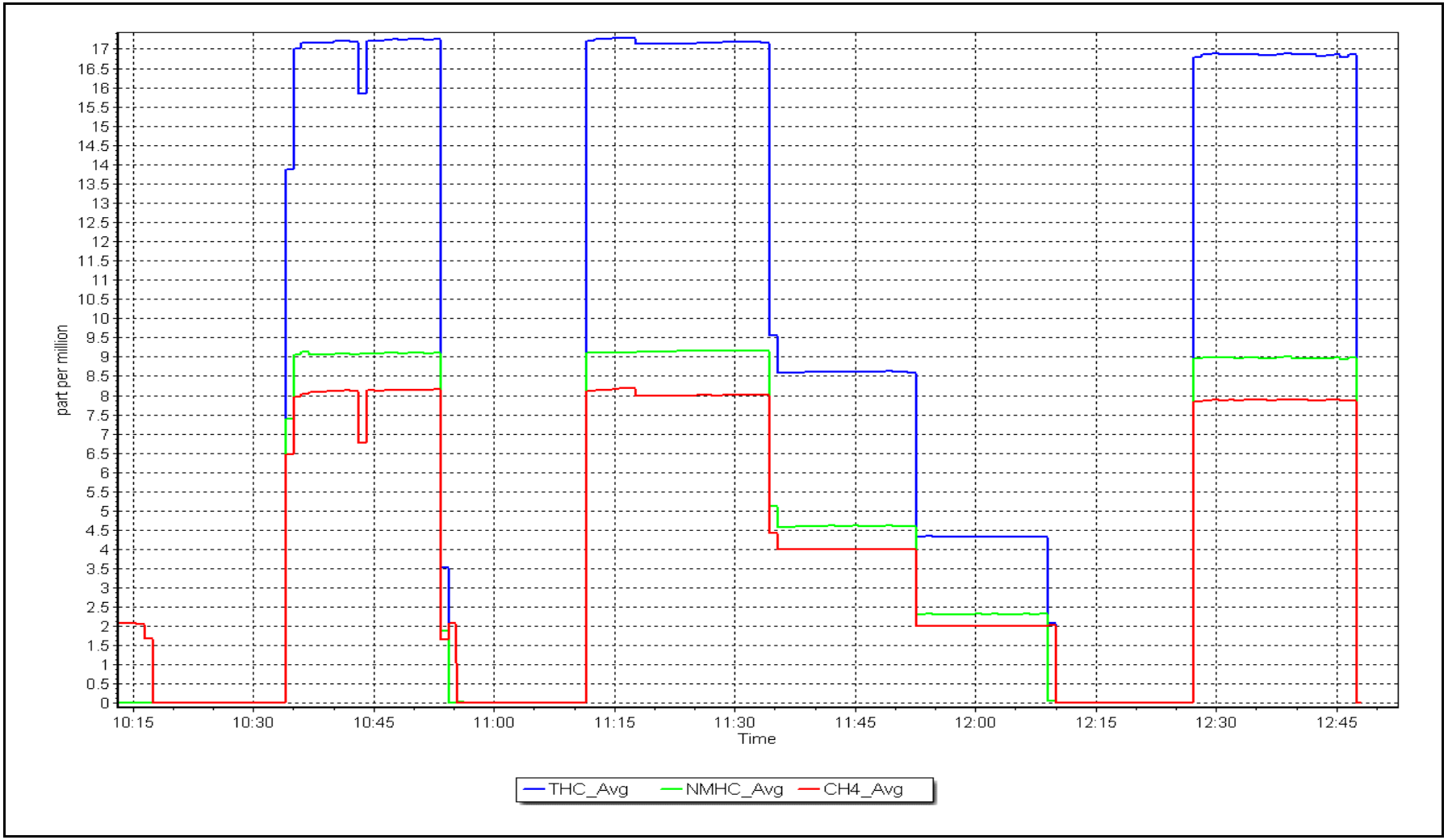
Calibration Date:	April 16, 2023	Previous Calibration:	April 13, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:14	End Time (MST):	12:50
Analyzer make:	Thermo 55i	Analyzer serial #:	118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999967	≥0.995
9.14	9.13	1.0006			
4.57	4.61	0.9917	Slope	0.998508	0.90 - 1.10
2.28	2.32	0.9841			
			Intercept	0.023429	+/-0.5



NMHC Calibration Plot Date: April 16, 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:	April 18, 2023	Last Cal Date:	April 16, 2023
Start time (MST):	9:50	End time (MST):	11:10
Reason:	Removal		

Calibration Standards

Gas Cert Reference:		CC259455	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
C3H8 Cal Gas Conc.	207.2	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
Removed C3H8 Conc.	207.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	3810	
ZAG make/model:	Teledyne API 701		Serial Number:	691	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	118148495	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	1.82E-04	NA	NMHC SP Ratio:	4.58E-05	NA
CH4 Retention time:	12.20	NA	NMHC Peak Area:	199772	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	80.2	17.13	17.02	1.006
as found 2nd point	4960	40.1	8.56	8.51	1.006
as found 3rd point	4980	20.0	4.27	4.28	0.998
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	

Baseline Corr AF:	17.02	Prev response	17.17	*% change	-0.9%
Baseline Corr 2nd AF:	8.5	AF Slope:	0.993144	AF Intercept:	0.014151
Baseline Corr 3rd AF:	4.3	AF Correlation:	0.999995	* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	9.14	9.18	0.996
as found 2nd point	4960	40.1	4.57	4.59	0.996
as found 3rd point	4980	20.0	2.28	2.31	0.987
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	9.18	Prev response	9.19	*% change	-0.1%
Baseline Corr 2nd AF:	4.6	AF Slope:	1.003685	AF Intercept:	0.008240
Baseline Corr 3rd AF:	2.3	AF Correlation:	0.999994	* = > +/-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	7.84	1.019
as found 2nd point	4960	40.1	3.99	3.92	1.019
as found 3rd point	4980	20.0	1.99	1.97	1.011
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	7.84	Prev response	7.98	*% change	-1.8%
Baseline Corr 2nd AF:	3.92	AF Slope:	0.981080	AF Intercept:	0.005912
Baseline Corr 3rd AF:	1.97	AF Correlation:	0.999996	* = > +/-5% change initiates investigation	

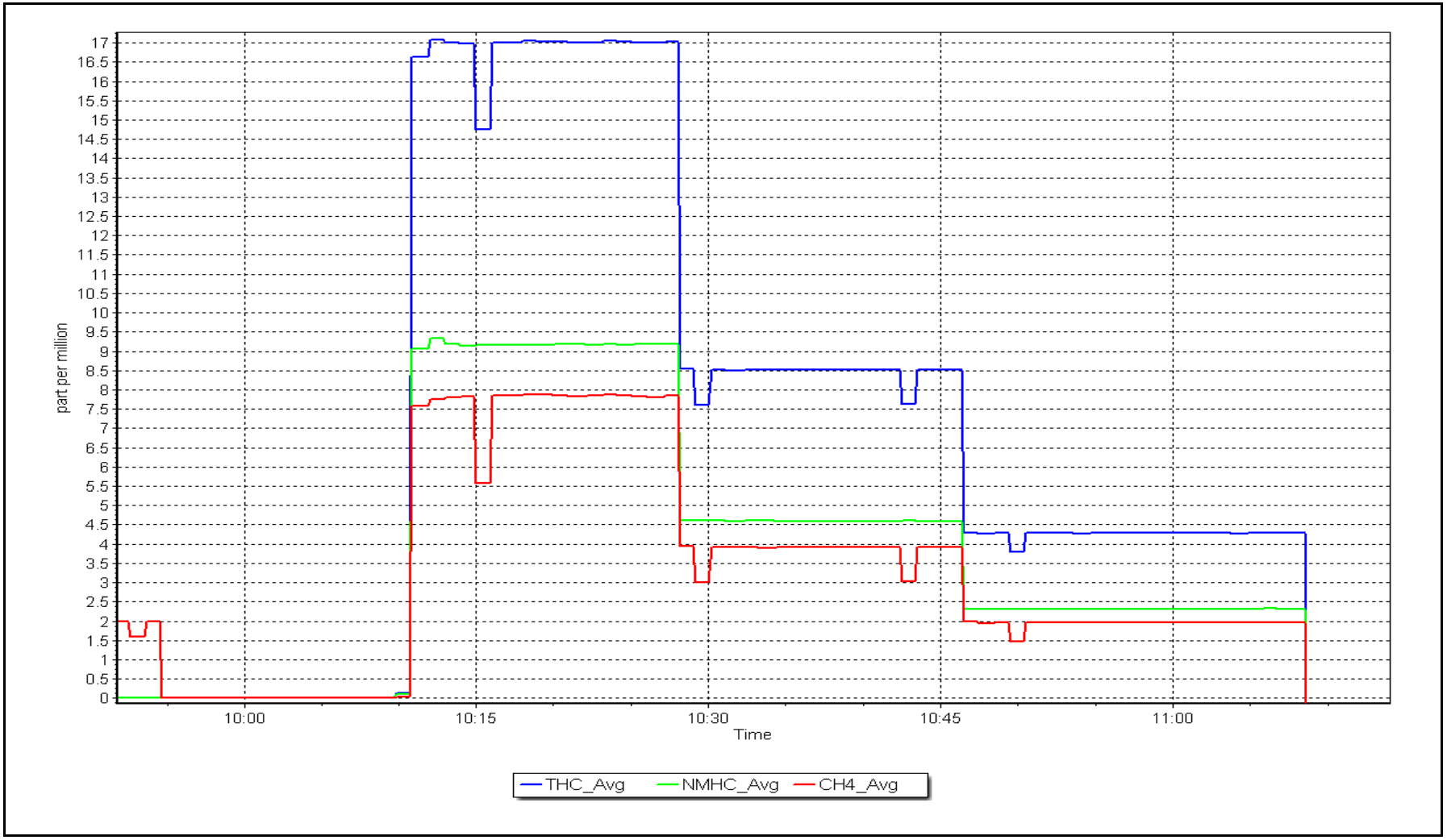
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000983	
THC Cal Offset:	0.032189	
CH4 Cal Slope:	0.996933	
CH4 Cal Offset:	0.019545	
NMHC Cal Slope:	1.004534	
NMHC Cal Offset:	0.012844	

Notes: Removal calibration for instrument change out.

Calibration Performed By: Karan Pandit

NMHC Calibration Plot Date: April 18, 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:	April 18, 2023	Last Cal Date:	NA
Start time (MST):	11:55	End time (MST):	14:29
Reason:	Install		

Calibration Standards

Gas Cert Reference:		CC259455	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
C3H8 Cal Gas Conc.	207.2	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
Removed C3H8 Conc.	207.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	3810	
ZAG make/model:	Teledyne API 701		Serial Number:	691	

Analyzer Information

Analyzer make:	Thermo 55i	Analyzer serial #:	118148495
THC Range (ppm):	0 - 20 ppm		
NMHC Range (ppm):	0 - 10 ppm	CH4 Range (ppm):	0 - 10 ppm

	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	NA	2.16E-04	NMHC SP Ratio:	NA	4.66E-05
CH4 Retention time:	NA	12.00	NMHC Peak Area:	NA	196084

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	17.13	17.14	0.999
second point	4960	40.1	8.56	8.63	0.992
third point	4980	20.0	4.27	4.36	0.979
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	17.13	17.18	0.997
				Average Correction Factor	0.990

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

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	9.14	9.15	0.999
second point	4960	40.1	4.57	4.61	0.991
third point	4980	20.0	2.28	2.33	0.979
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	9.14	9.18	0.996
				Average Correction Factor	0.990
Baseline Corr AF:	NA	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	7.99	8.00	0.999
second point	4960	40.1	3.99	4.02	0.993
third point	4980	20.0	1.99	2.03	0.980
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	7.99	8.00	0.998
				Average Correction Factor	0.991
Baseline Corr AF:	NA	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	NA	0.999574
THC Cal Offset:	NA	0.045989
CH4 Cal Slope:	NA	0.999808
CH4 Cal Offset:	NA	0.019754
NMHC Cal Slope:	NA	0.999495
NMHC Cal Offset:	NA	0.026235

Notes: Install calibration.

Calibration Performed By: Karan Pandit

Wood Buffalo Environmental Association

THC Calibration Summary

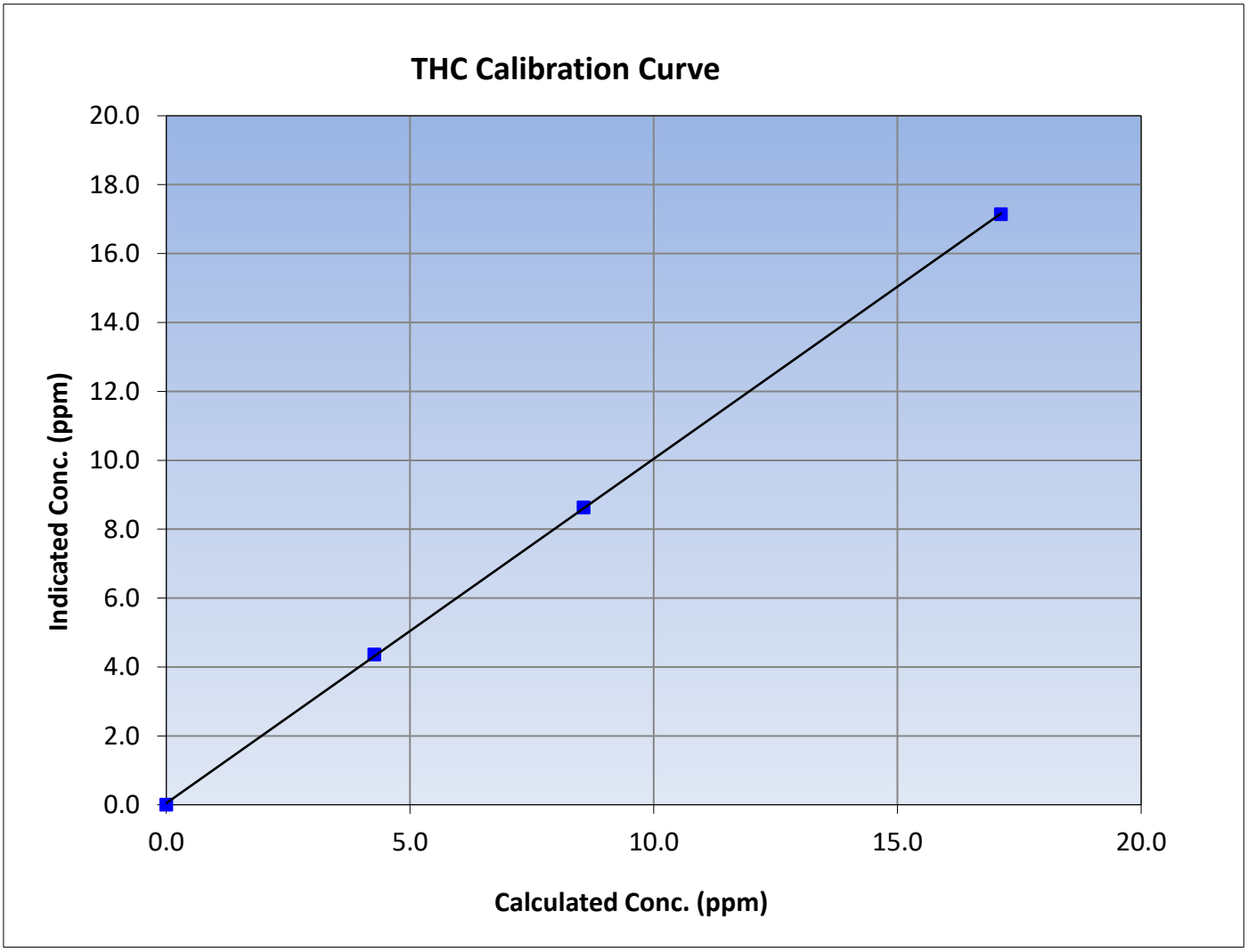
Version-06-2022

Station Information

Calibration Date:	April 18, 2023	Previous Calibration:	NA
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:55	End Time (MST):	14:29
Analyzer make:	Thermo 55i	Analyzer serial #:	118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999967	≥0.995
17.13	17.14	0.9991			
8.56	8.63	0.9924	Slope	0.999574	0.90 - 1.10
4.27	4.36	0.9793			
			Intercept	0.045989	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

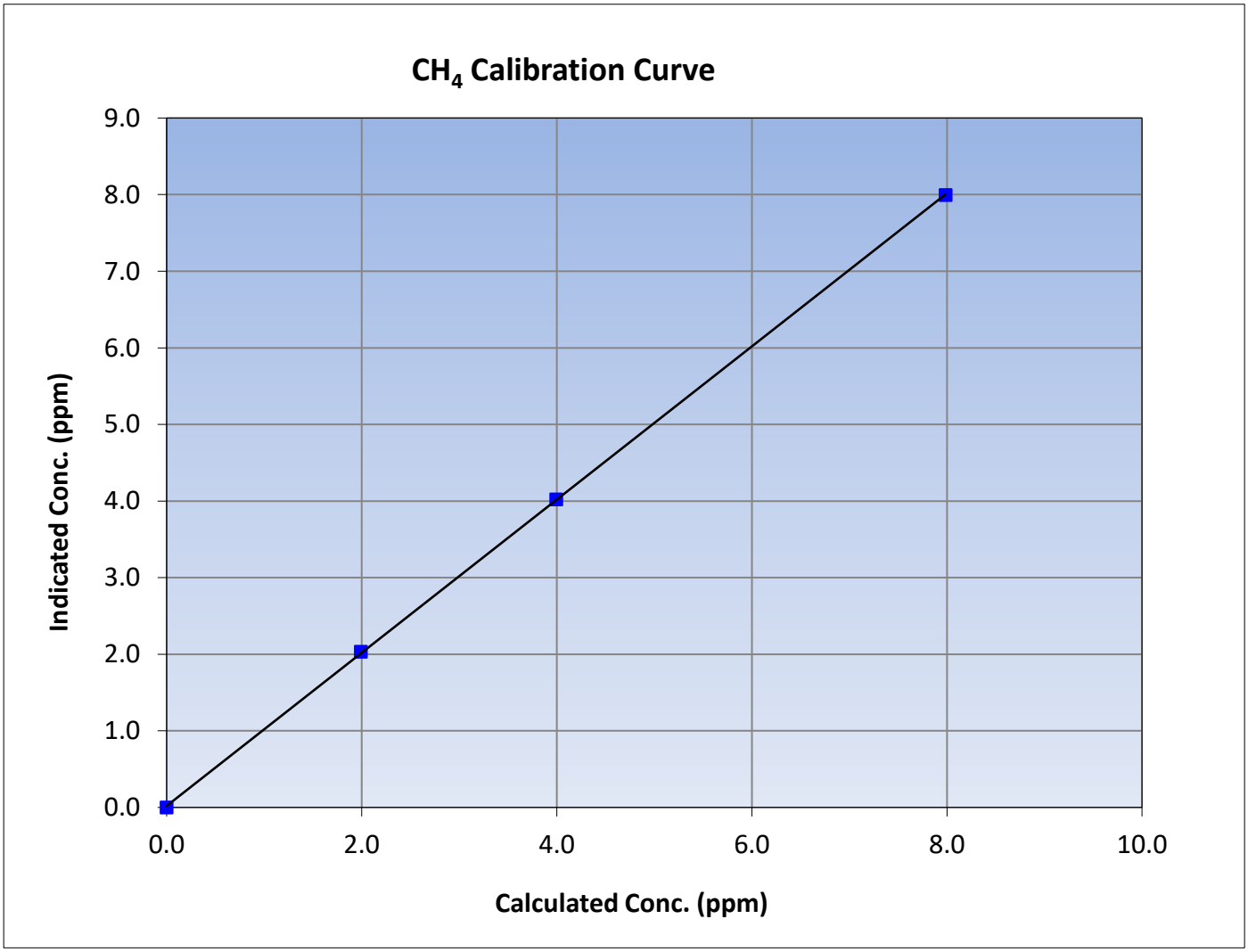
Version-06-2022

Station Information

Calibration Date:	April 18, 2023	Previous Calibration:	NA
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:55	End Time (MST):	14:29
Analyzer make:	Thermo 55i	Analyzer serial #:	118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999972	*≥0.995*
7.99	8.00	0.9989			
3.99	4.02	0.9933	Slope	0.999808	*0.90 - 1.10*
1.99	2.03	0.9801			
			Intercept	0.019754	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

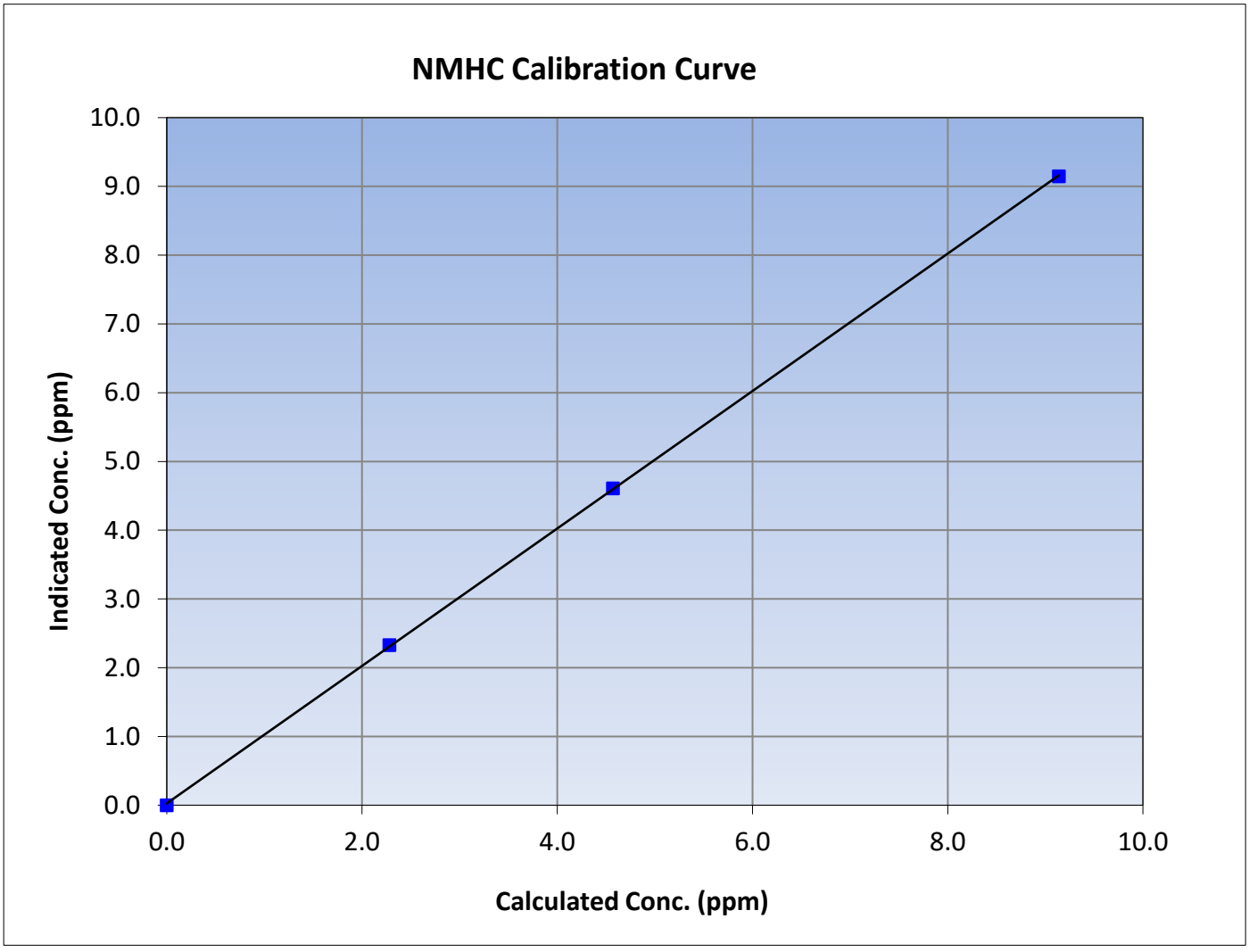
Version-06-2022

Station Information

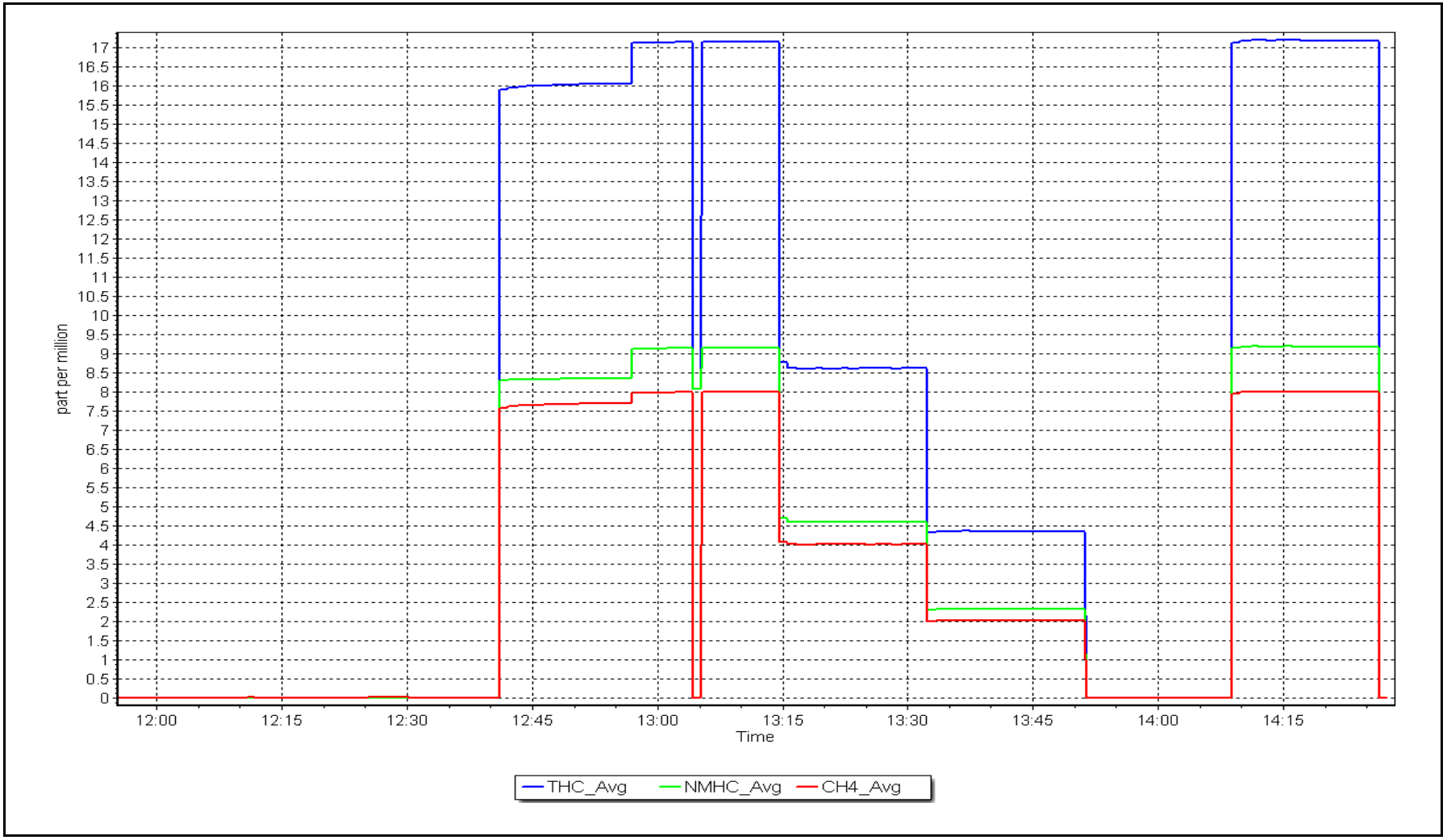
Calibration Date:	April 18, 2023	Previous Calibration:	NA
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:55	End Time (MST):	14:29
Analyzer make:	Thermo 55i	Analyzer serial #:	118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999962	*≥0.995*
9.14	9.15	0.9992			
4.57	4.61	0.9915	Slope	0.999495	*0.90 - 1.10*
2.28	2.33	0.9786			
			Intercept	0.026235	*+/-0.5*



NMHC Calibration Plot Date: April 18, 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:	April 28, 2023	Last Cal Date:	March 29, 2023
Start time (MST):	8:34	End time (MST):	12:30
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:	220.7	219.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.009334	1.010616
NO_X Cal Offset:	2.026079	2.246244
NO Cal Slope:	1.010890	1.008763
NO Cal Offset:	0.963352	1.982980
NO_2 Cal Slope:	1.002951	1.003351
NO_2 Cal Offset:	-0.706596	-0.204066

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	-0.1	----	----
as found span	4921	79.4	811.2	800.1	11.1	820.4	807.4	13.1	0.9888	0.9910
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	4921	79.4	811.2	800.1	11.1	820.9	807.9	13.0	0.9882	0.9904
second point	4960	39.7	405.7	400.1	5.6	413.5	407.3	6.3	0.9811	0.9824
third point	4980	19.8	202.3	199.6	2.8	209.0	204.8	4.2	0.9681	0.9744
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as left span	4921	79.4	811.2	377.3	433.9	821.8	390.1	431.7	0.9872	0.9673
								Average Correction Factor	0.9791	0.9824

Corrected As found	NO_X = 820.6 ppb	NO = 807.6 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.0%
Previous Response	NO_X = 820.8 ppb	NO = 809.8 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)	808.0	385.2	433.9	434.9	0.9977	100.2%
2nd GPT point (200 ppb O3)	808.0	602.5	216.6	218.1	0.9932	100.7%
3rd GPT point (100 ppb O3)	808.0	702.4	116.7	116.1	1.0053	99.5%
				Average Correction Factor	0.9987	100.1%

Notes: No adjustments required.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

NO_X Calibration Summary

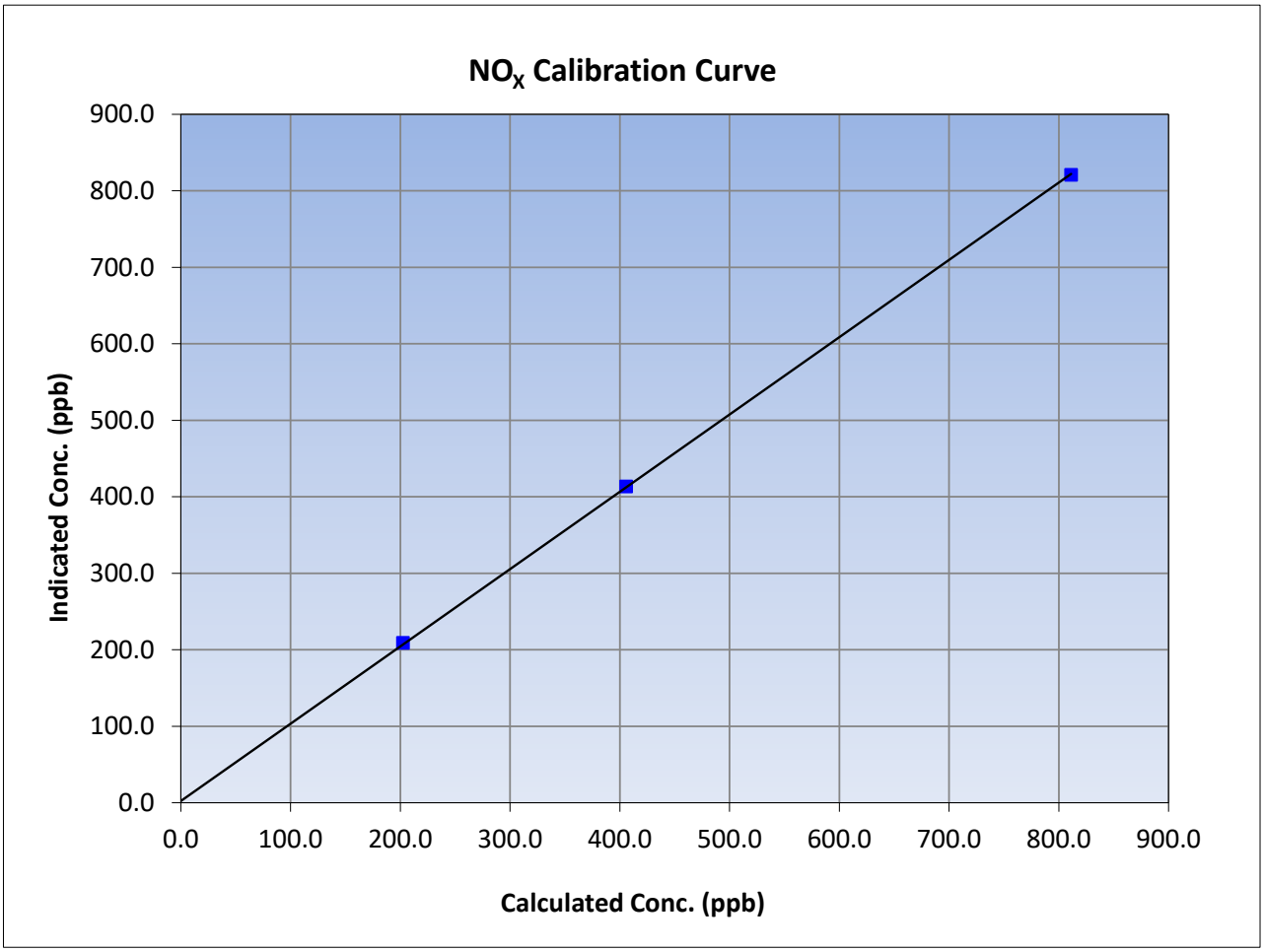
Version-04-2020

Station Information

Calibration Date:	April 28, 2023	Previous Calibration:	March 29, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	8:34	End Time (MST):	12:30
Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999963	≥0.995
811.2	820.9	0.9882			
405.7	413.5	0.9811	Slope	1.010616	0.90 - 1.10
202.3	209.0	0.9681			
			Intercept	2.246244	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

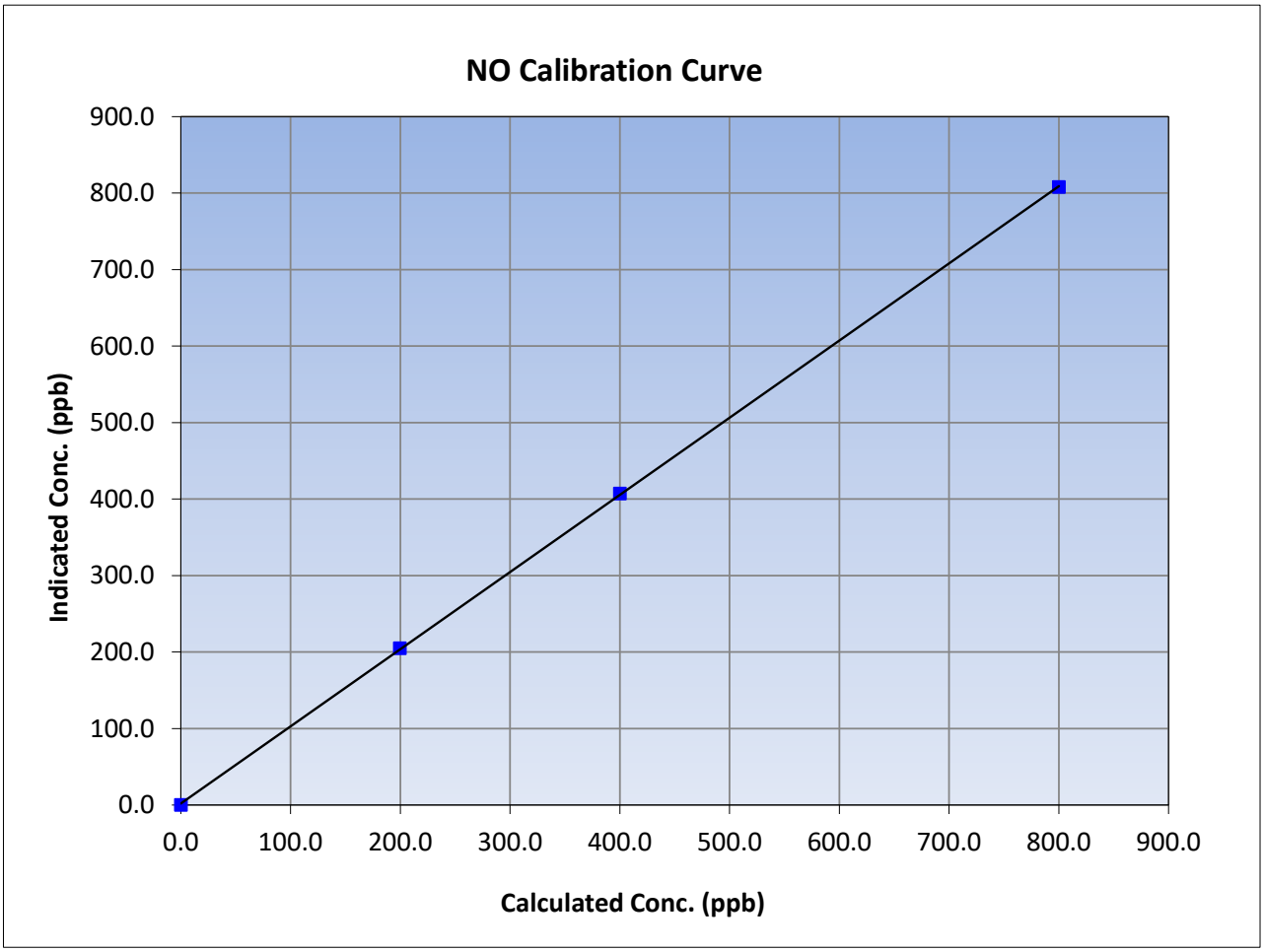
Version-04-2020

Station Information

Calibration Date:	April 28, 2023	Previous Calibration:	March 29, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	8:34	End Time (MST):	12:30
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	0.999970	≥0.995
800.1	807.9	0.9904			
400.1	407.3	0.9824	Slope	1.008763	0.90 - 1.10
199.6	204.8	0.9744			
			Intercept	1.982980	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

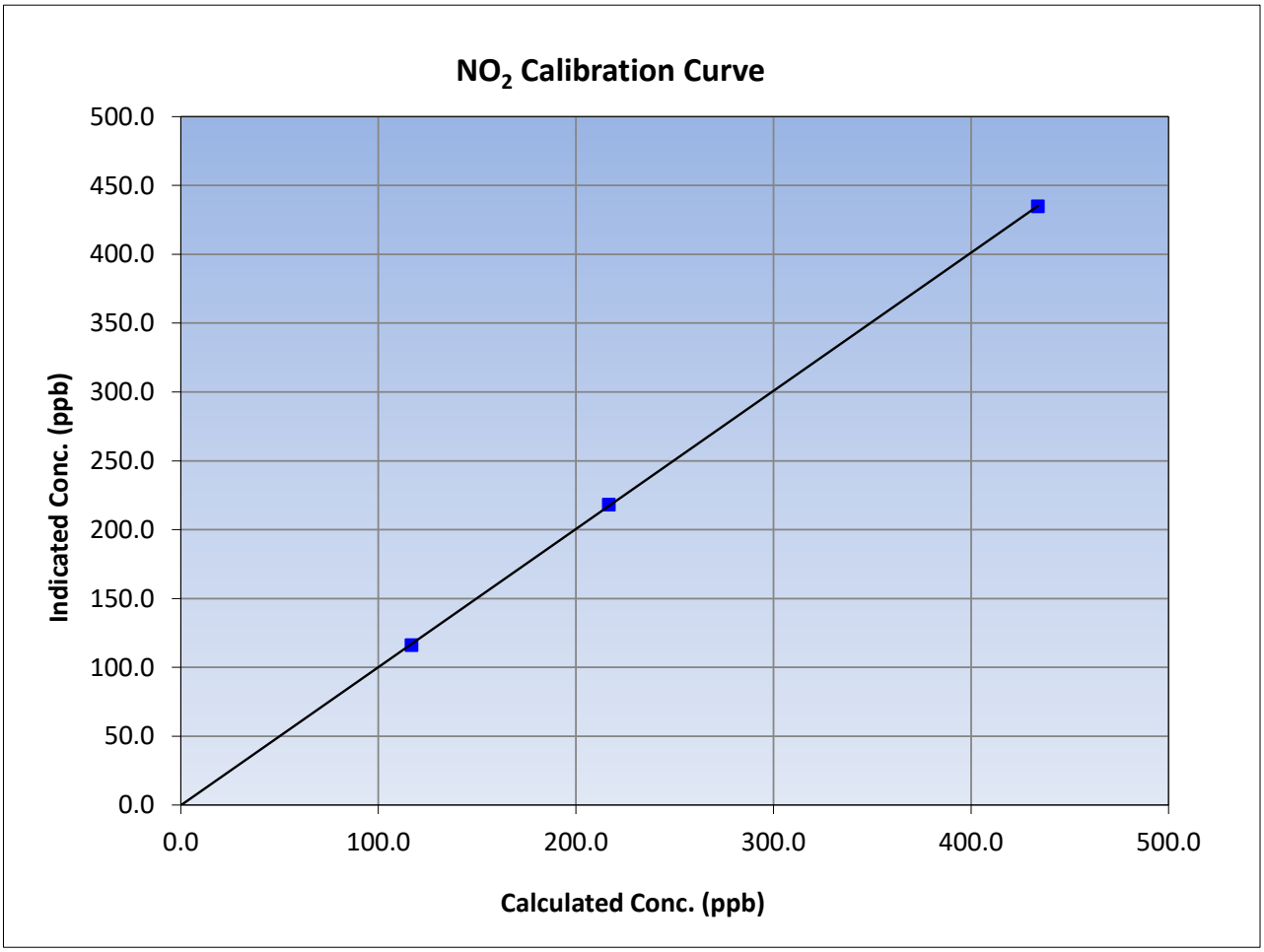
Version-04-2020

Station Information

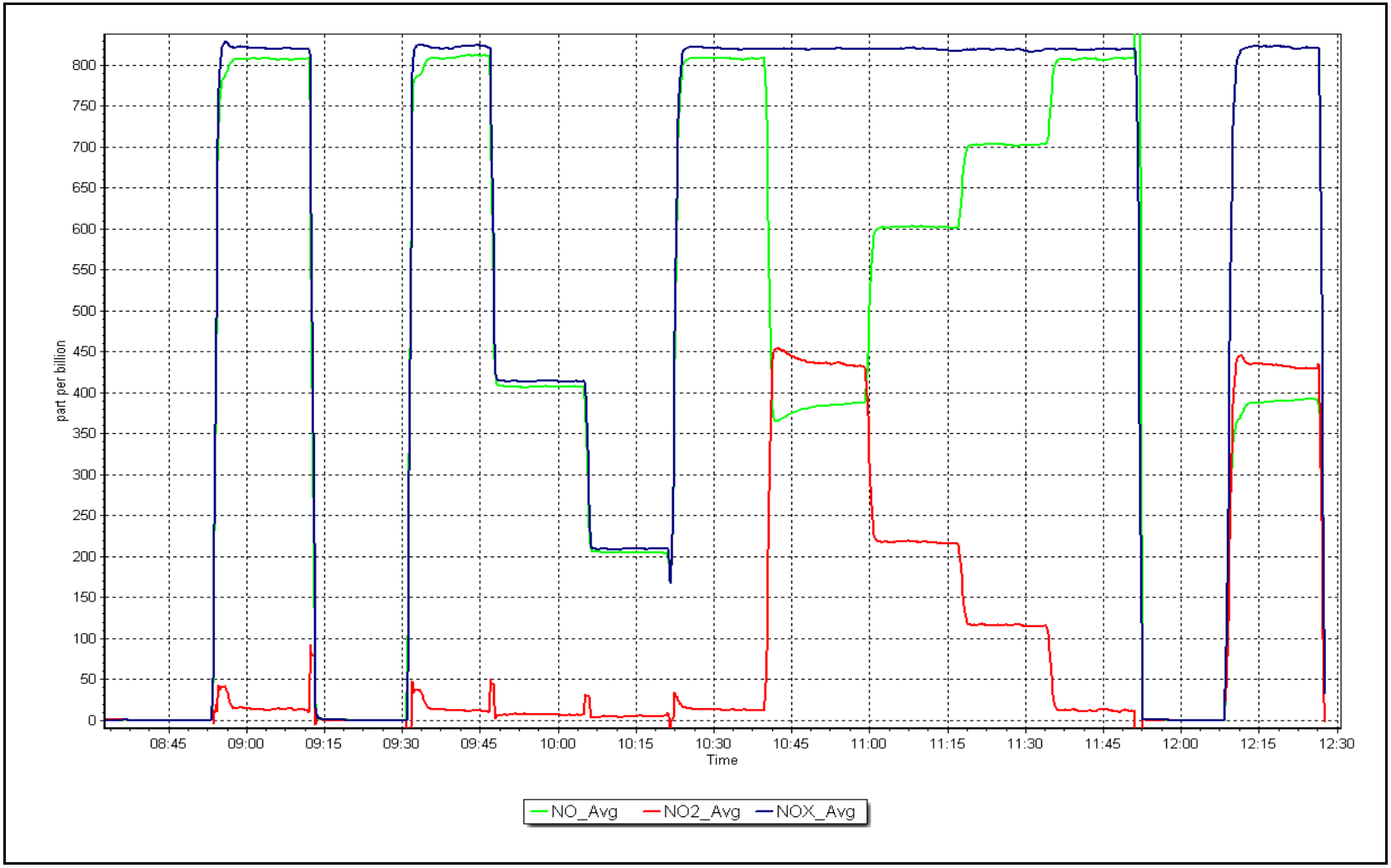
Calibration Date:	April 28, 2023	Previous Calibration:	March 29, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	8:34	End Time (MST):	12:30
Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.1	----	Correlation Coefficient	0.999984	*≥0.995*
433.9	434.9	0.9977			
216.6	218.1	0.9932	Slope	1.003351	*0.90 - 1.10*
116.7	116.1	1.0053			
			Intercept	-0.204066	*+/-20*



NO_X Calibration Plot Date: April 28, 2023 Location: Conklin



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	April 14, 2023	Last Cal Date:	March 9, 2023
Start time (MST):	9:02	End time (MST):	11:51
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	Teledyne API T700	Serial Number:	3810
ZAG Make/Model:	Teledyne API 701	Serial Number:	263

Analyzer Information

Analyzer make:	Thermo 49i	Analyzer serial #:	1501663734
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000343	0.999857	Backgd or Offset:	-0.7	-1.2
Calibration intercept:	0.240000	0.700000	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	-1.1	----
as found span	5000	944.3	400.0	400.0	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	400.0	1.000
second point	5000	803.2	200.0	202.0	0.990
third point	5000	705.0	100.0	100.6	0.994
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	936.0	400.0	404.7	0.988
				Average Correction Factor	0.995

Baseline Corr As found:	401.1	Previous response	400.4	*% 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: Adjusted the zero.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

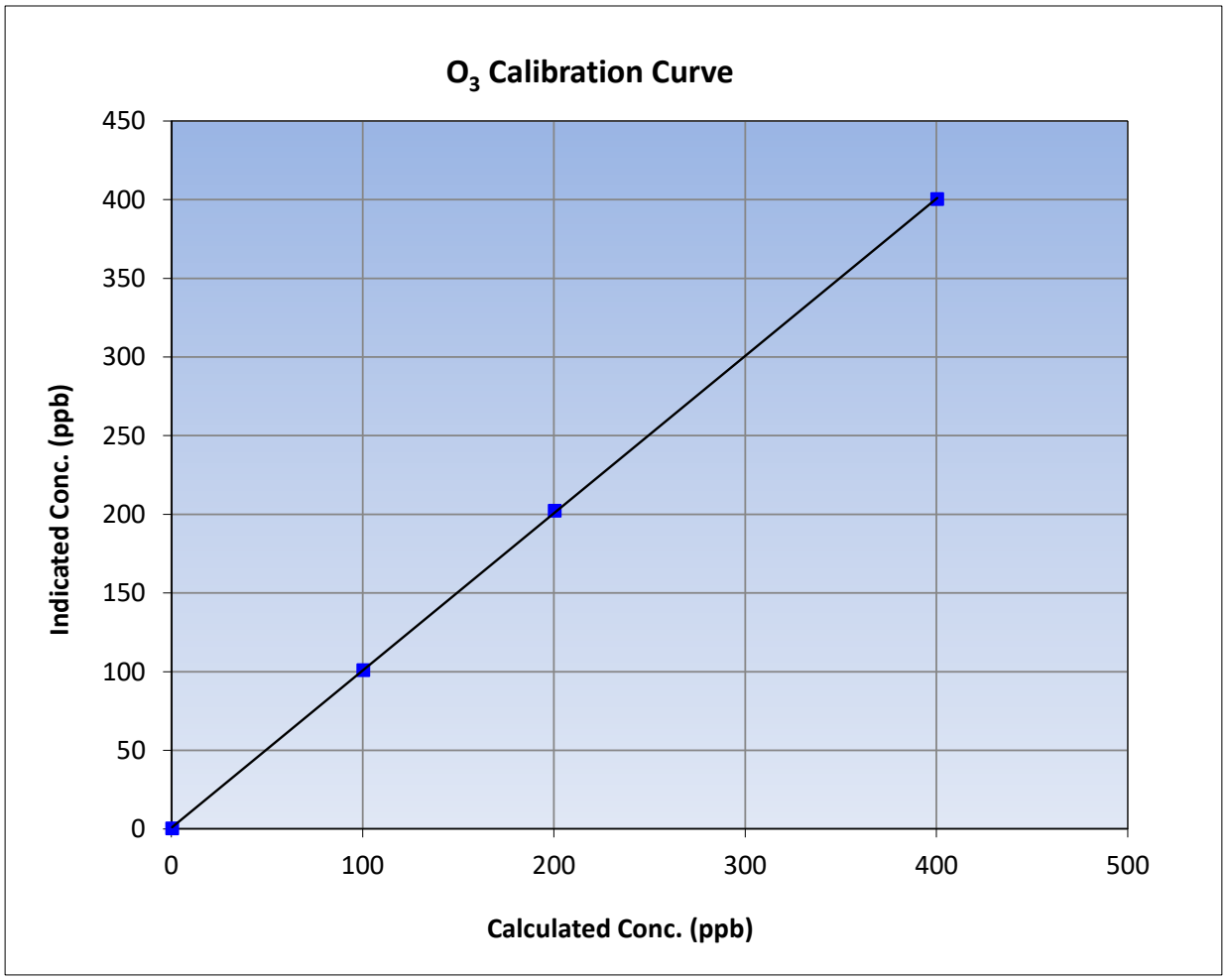
Station Information

Calibration Date:	April 14, 2023	Previous Calibration:	March 9, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:02	End Time (MST):	11:51
Analyzer make:	Thermo 49i	Analyzer serial #:	1501663734

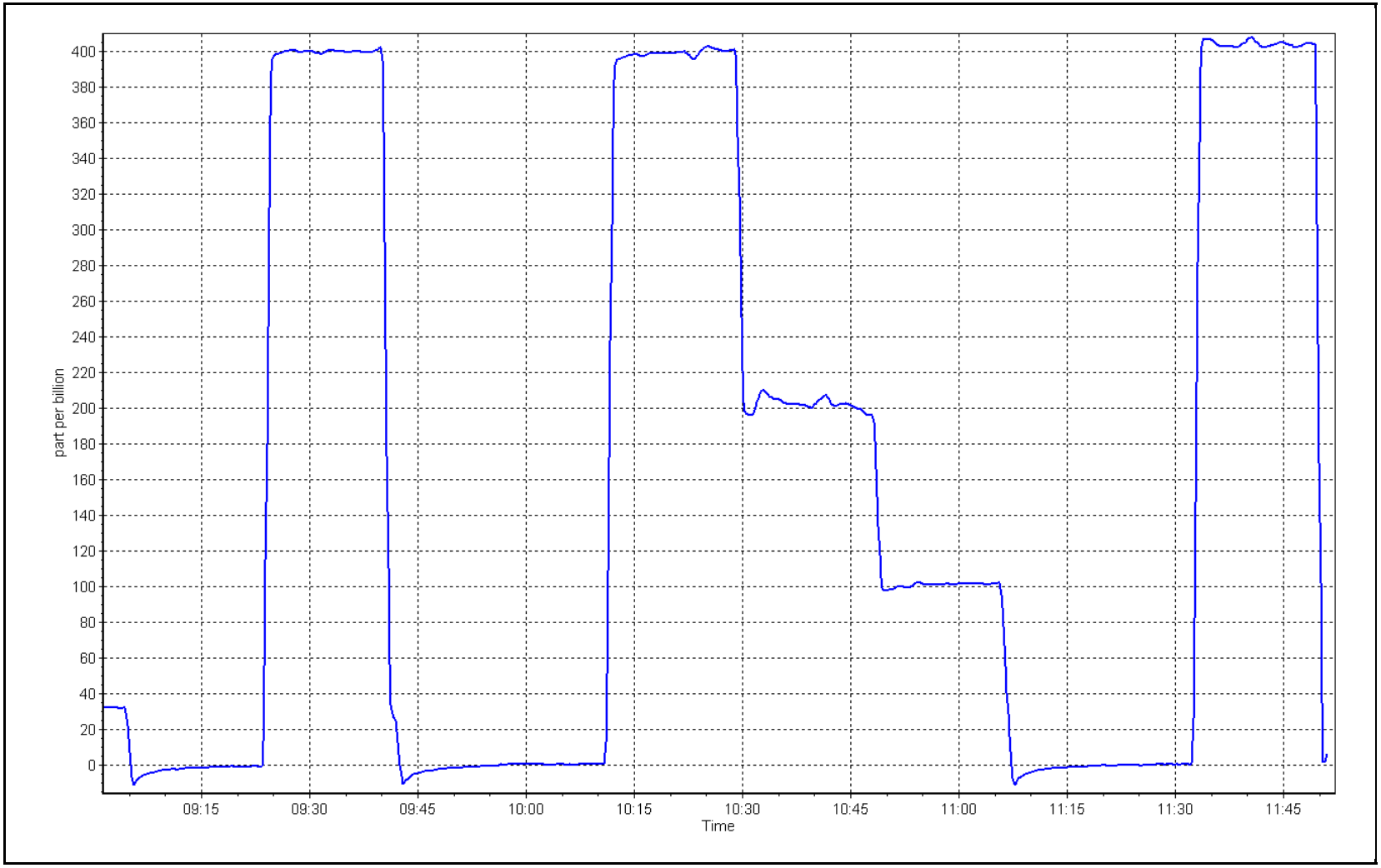
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
400.0	400.0	1.0000
200.0	202.0	0.9901
100.0	100.6	0.9940

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999971	*≥0.995*
Slope	0.999857	*0.90 - 1.10*
Intercept	0.700000	*+/- 5*



O_3 Calibration Plot Date: April 14, 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:	April 28, 2023	Last Cal Date:	March 29, 2023
Start time (MST):	9:52	End time (MST):	10:10
Analyzer Make:	API T640	S/N:	1547
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	DeltaCal	S/N:	954
Temp/RH standard:	DeltaCal	S/N:	954

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (^{o}C)	14	14.5	14	☐	+/- 2 ^{o}C
P (mmHg)	712.8	710	712.8	☐	+/- 10 mmHg
flow (LPM)	5.01	5.09	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: April 28, 2023 Last Cal Date: March 29, 2023

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

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test				☐	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. Inspected inlet head; relatively clean.

Calibration by: Denny Ray Estador

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS22
JANVIER
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	April 26, 2023	Last Cal Date:	March 15, 2023
Start time (MST):	10:44	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:	0.998449	0.998121	Backgd or Offset:	21.6	21.8
Calibration intercept:	0.464715	0.804418	Coeff or Slope:	1.022	1.003

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	4920	79.8	799.8	812.2	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	79.8	799.8	798.7	1.001
second point	4960	39.9	399.9	400.4	0.999
third point	4980	20.0	200.4	201.5	0.995
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	79.8	799.8	800.6	0.999
				Average Correction Factor	0.998

Baseline Corr As found:	811.60	Previous response	799.01	*% 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: Inlet filter changed after as founds. Adjusted both zero and span.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

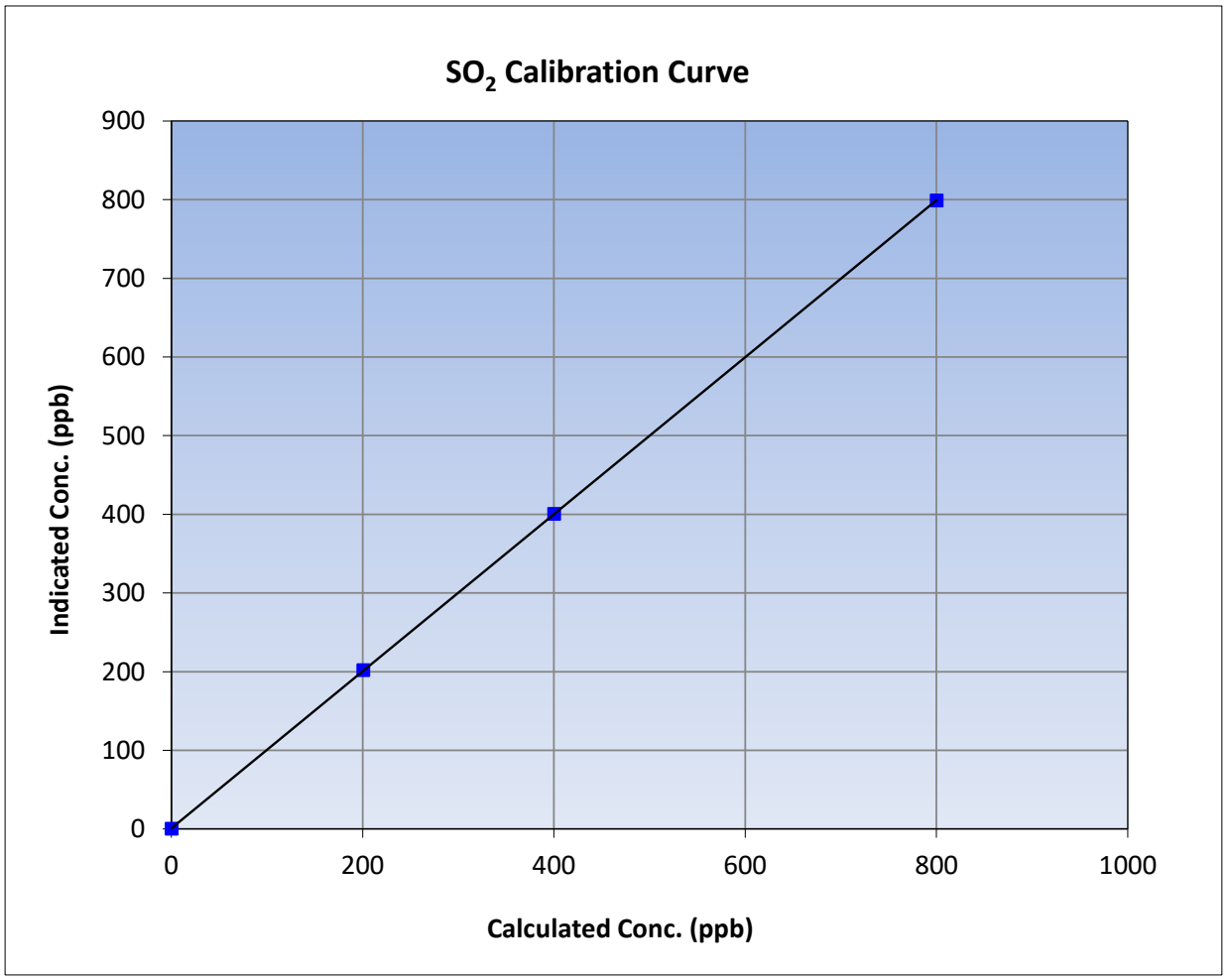
Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 15, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:44	End Time (MST):	13:45
Analyzer make:	Thermo 43i	Analyzer serial #:	1152430006

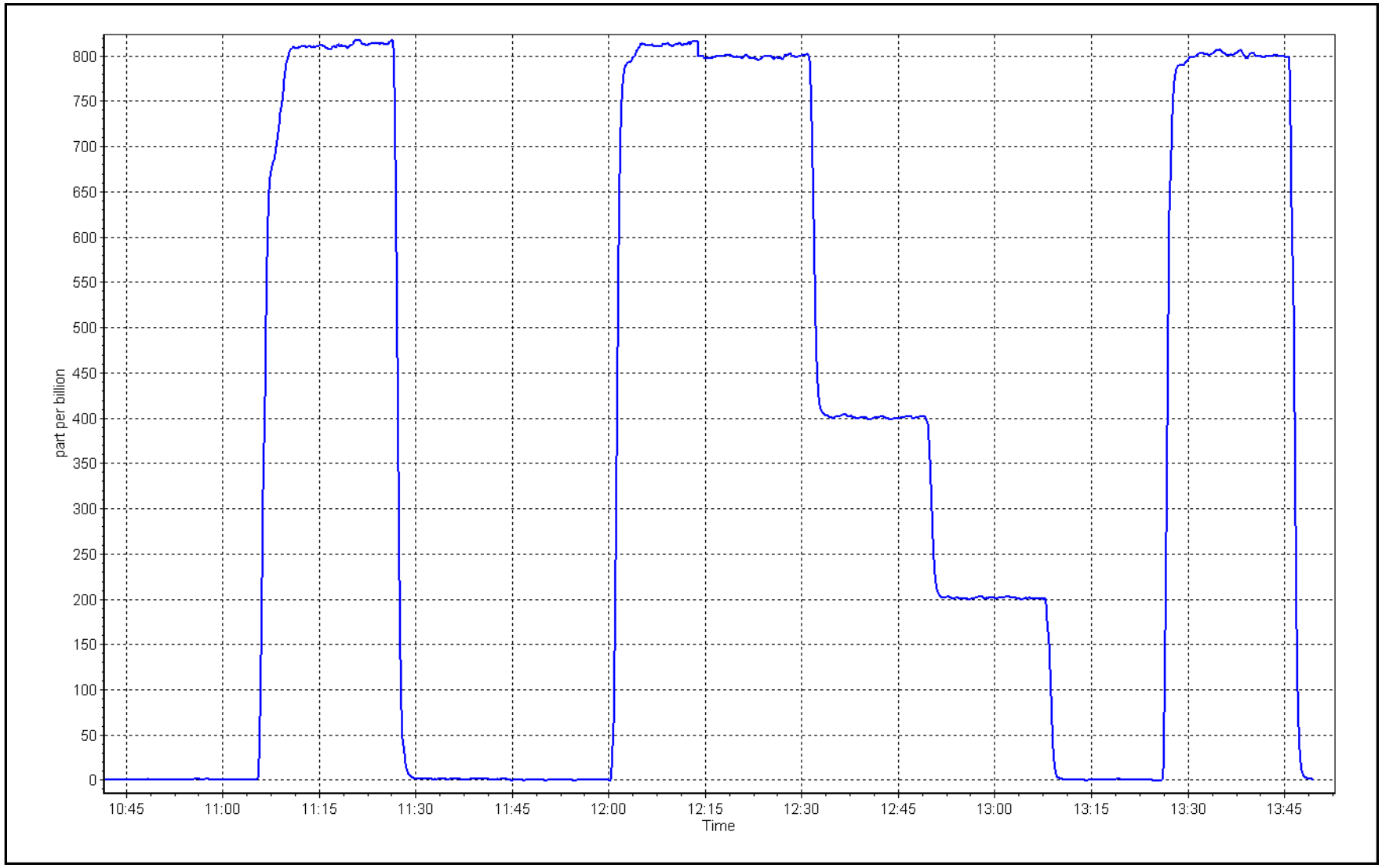
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
799.8	798.7	1.0014
399.9	400.4	0.9987
200.4	201.5	0.9947

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	0.998121	*0.90 - 1.10*
Intercept	0.804418	*+/-30*



SO2 Calibration Plot Date: April 26, 2023 Location: Janvier



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Janvier	Station number:	AMS22
Calibration Date:	April 25, 2023	Last Cal Date:	March 29, 2023
Start time (MST):	10:33	End time (MST):	16:35
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:	0.999222	0.999363	Backgd or Offset:	3.50	5.95
Calibration intercept:	0.140953	-0.038984	Coeff or Slope:	1.220	1.071

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	0.9	----
as found span	4920	79.5	80.0	87.6	0.923
as found 2nd point	4960	39.8	40.0	45.0	0.908
as found 3rd point	4980	19.9	20.0	23.0	0.906
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4920	79.5	80.0	79.9	1.001
second point	4960	39.8	40.0	40.0	1.001
third point	4980	19.9	20.0	19.9	1.006
as left zero	5000	0.0	0.0	0.0	----
as left span	4920	79.5	80.0	79.4	1.007
SO2 Scrubber Check	4920	79.8	798.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.003
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	86.7	Prev response:	80.06	*% change:	7.7%
Baseline Corr 2nd AF pt:	44.1	AF Slope:	1.083245	AF Intercept:	1.199186
Baseline Corr 3rd AF pt:	22.1	AF Correlation:	0.999916		

* = > +/-5% change initiates investigation

Notes: Changed out the inlet filter and flash lamp after as founds. Adjusted the flash lamp voltage and PMT voltage. Scrubber check passed. Adjusted both zero and span.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

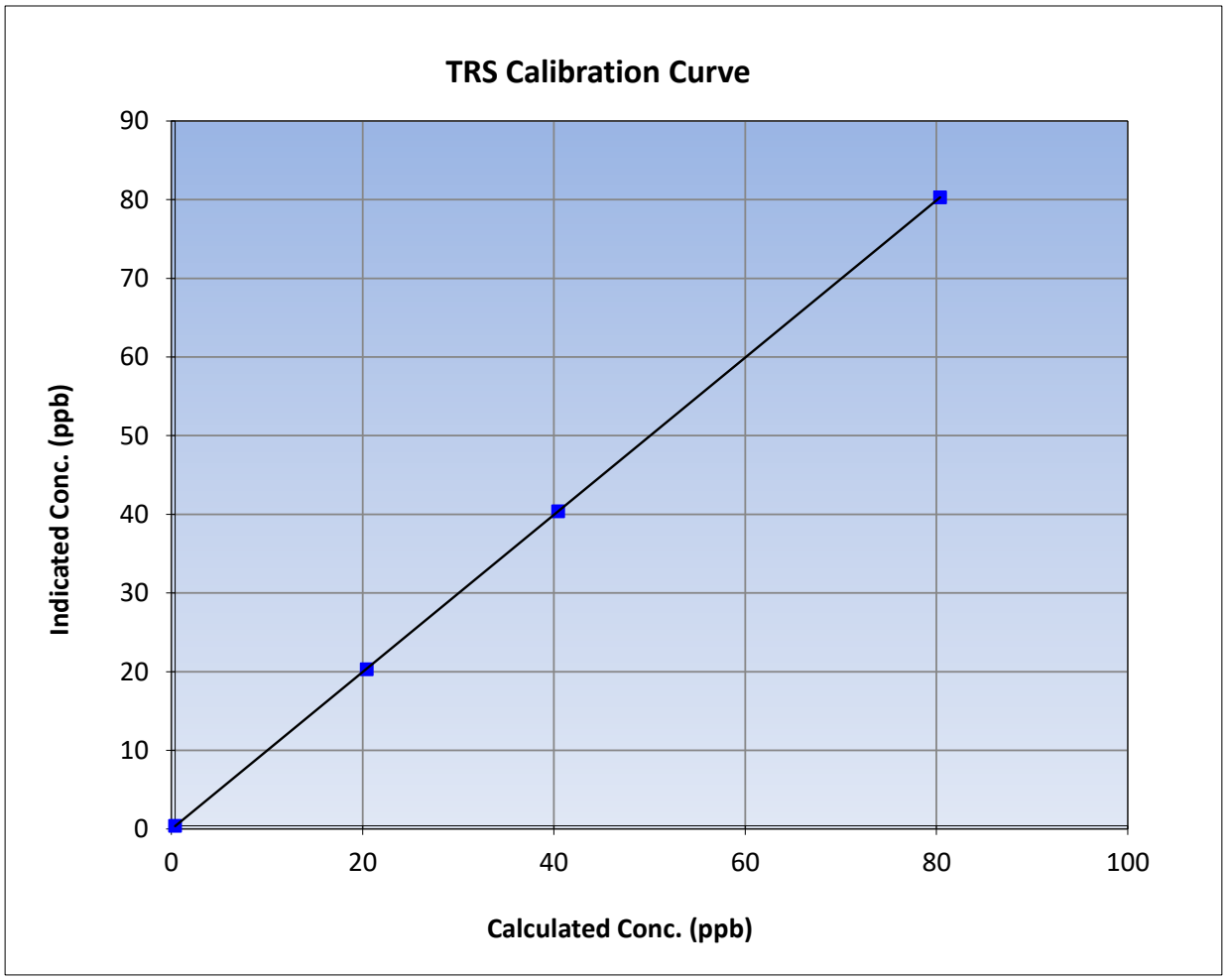
Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	March 29, 2023
Station Name:	Janvier	Station Number:	AMS22
Start Time (MST):	10:33	End Time (MST):	16:35
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1151680031

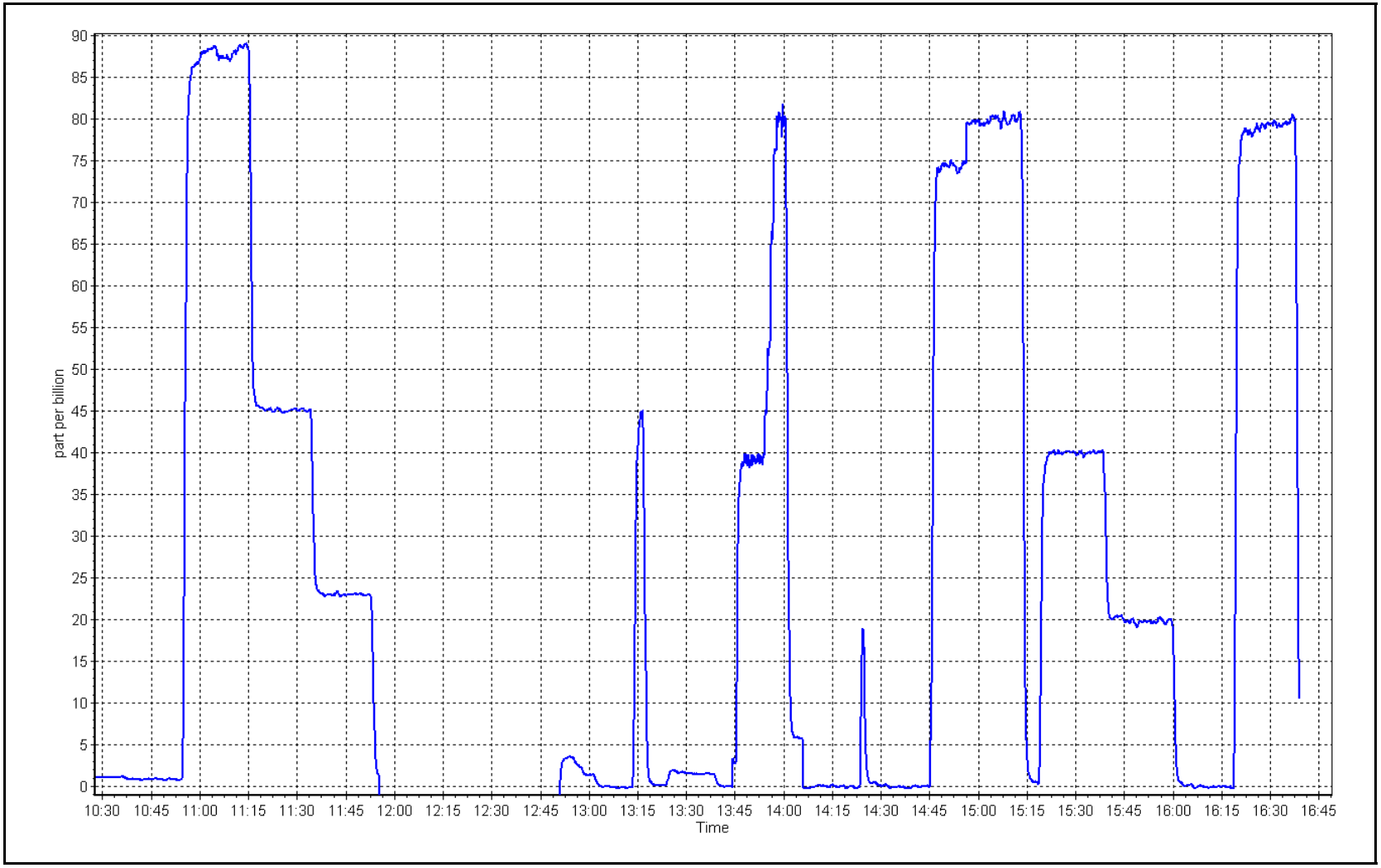
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	79.9	1.0011
40.0	40.0	1.0010
20.0	19.9	1.0060

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	0.999363	*0.90 - 1.10*
Intercept	-0.038984	*+/-3*



TRS Calibration Plot Date: April 25, 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:	April 26, 2023	Last Cal Date:	March 15, 2023
Start time (MST):	10:44	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	2.150E-04	NMHC SP Ratio:	4.51E-05	4.45E-05
CH4 Retention time:	13.20	13.20	NMHC Peak Area:	202703	205602

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	17.54	0.979
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	79.8	17.17	17.20	0.998
second point	4960	39.9	8.59	8.56	1.004
third point	4980	20.0	4.30	4.26	1.011
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	17.17	17.10	1.004
				Average Correction Factor	1.004

Baseline Corr AF:	17.54	Prev response	17.15	*% change	2.2%
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	4920	79.8	9.15	9.30	0.983
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	9.15	1.000
second point	4960	39.9	4.57	4.56	1.003
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	9.11	1.005
				Average Correction Factor	1.005
Baseline Corr AF:	9.30	Prev response	9.10	*% change	2.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	79.8	8.03	8.23	0.975
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	8.05	0.996
second point	4960	39.9	4.01	3.99	1.005
third point	4980	20.0	2.01	1.99	1.011
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	8.03	7.99	1.004
				Average Correction Factor	1.004
Baseline Corr AF:	8.23	Prev response	8.05	*% change	2.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000168	1.002618
THC Cal Offset:	-0.027388	-0.031798
CH4 Cal Slope:	1.005284	1.004358
CH4 Cal Offset:	-0.018965	-0.017966
NMHC Cal Slope:	0.995905	1.001328
NMHC Cal Offset:	-0.008823	-0.014032

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

THC Calibration Summary

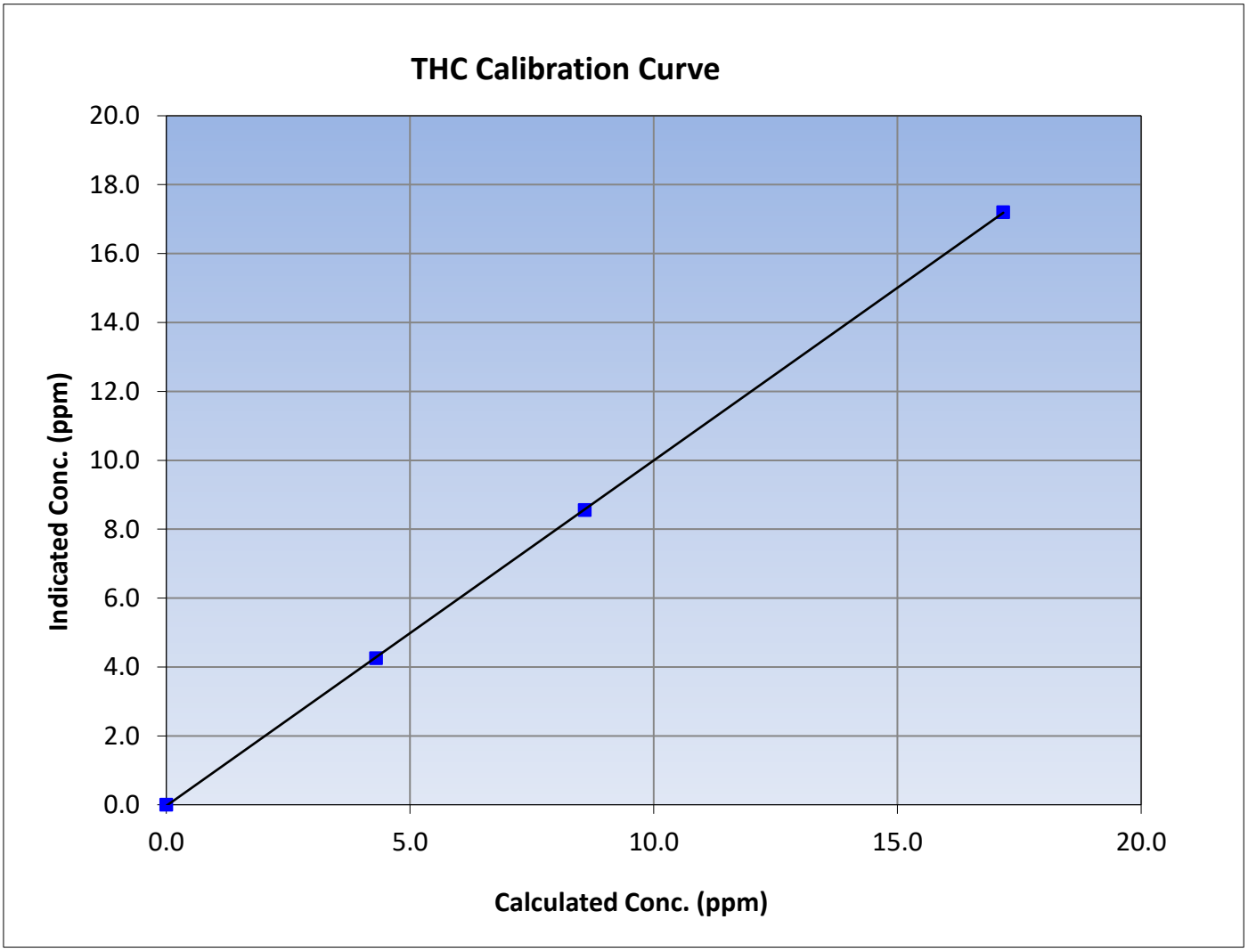
Version-01-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 15, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:44	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	0.999984	≥0.995
17.17	17.20	0.9982			
8.59	8.56	1.0036	Slope	1.002618	0.90 - 1.10
4.30	4.26	1.0114			
			Intercept	-0.031798	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

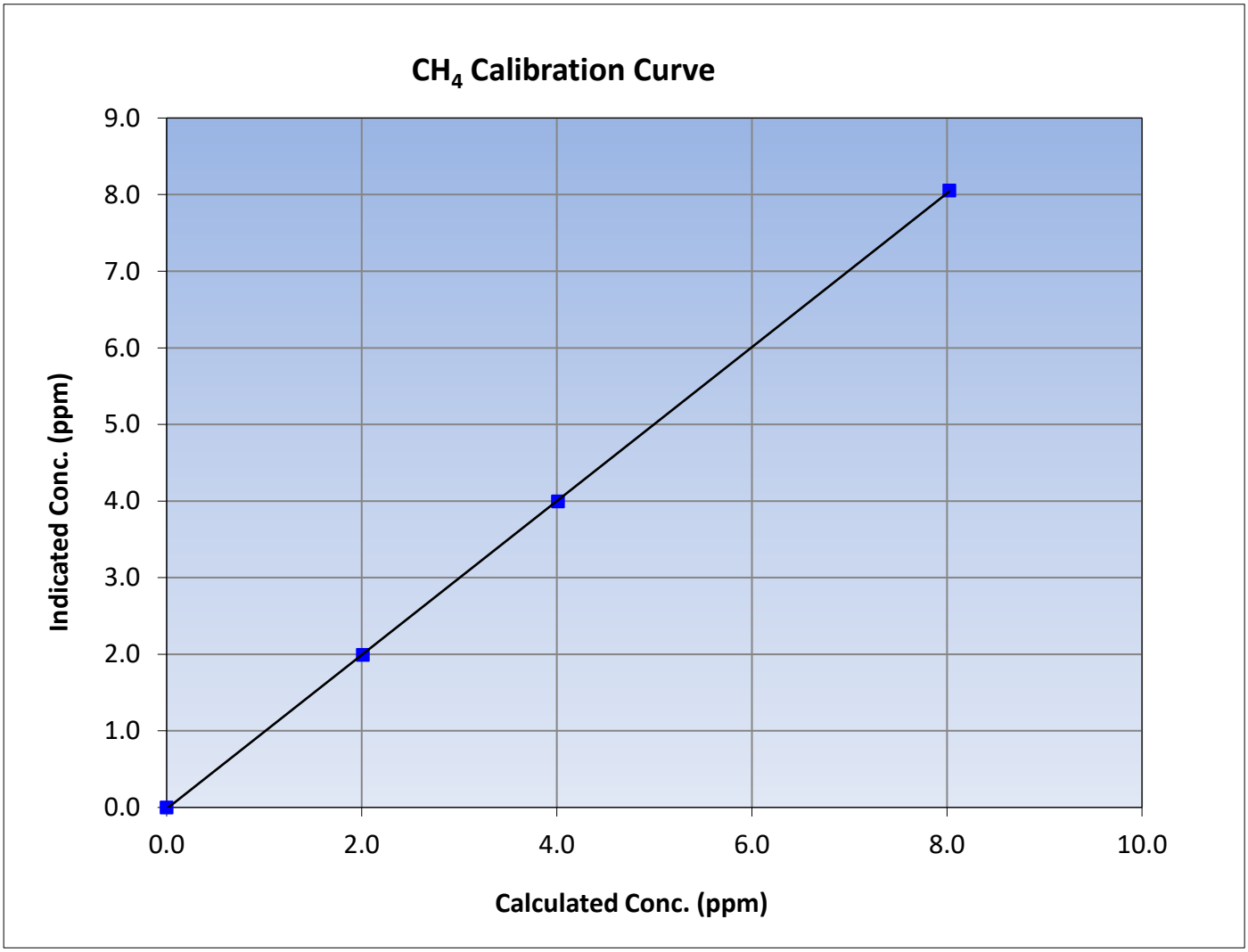
Version-01-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 15, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:44	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	0.999974	≥0.995
8.03	8.05	0.9964			
4.01	3.99	1.0046	Slope	1.004358	0.90 - 1.10
2.01	1.99	1.0107			
			Intercept	-0.017966	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

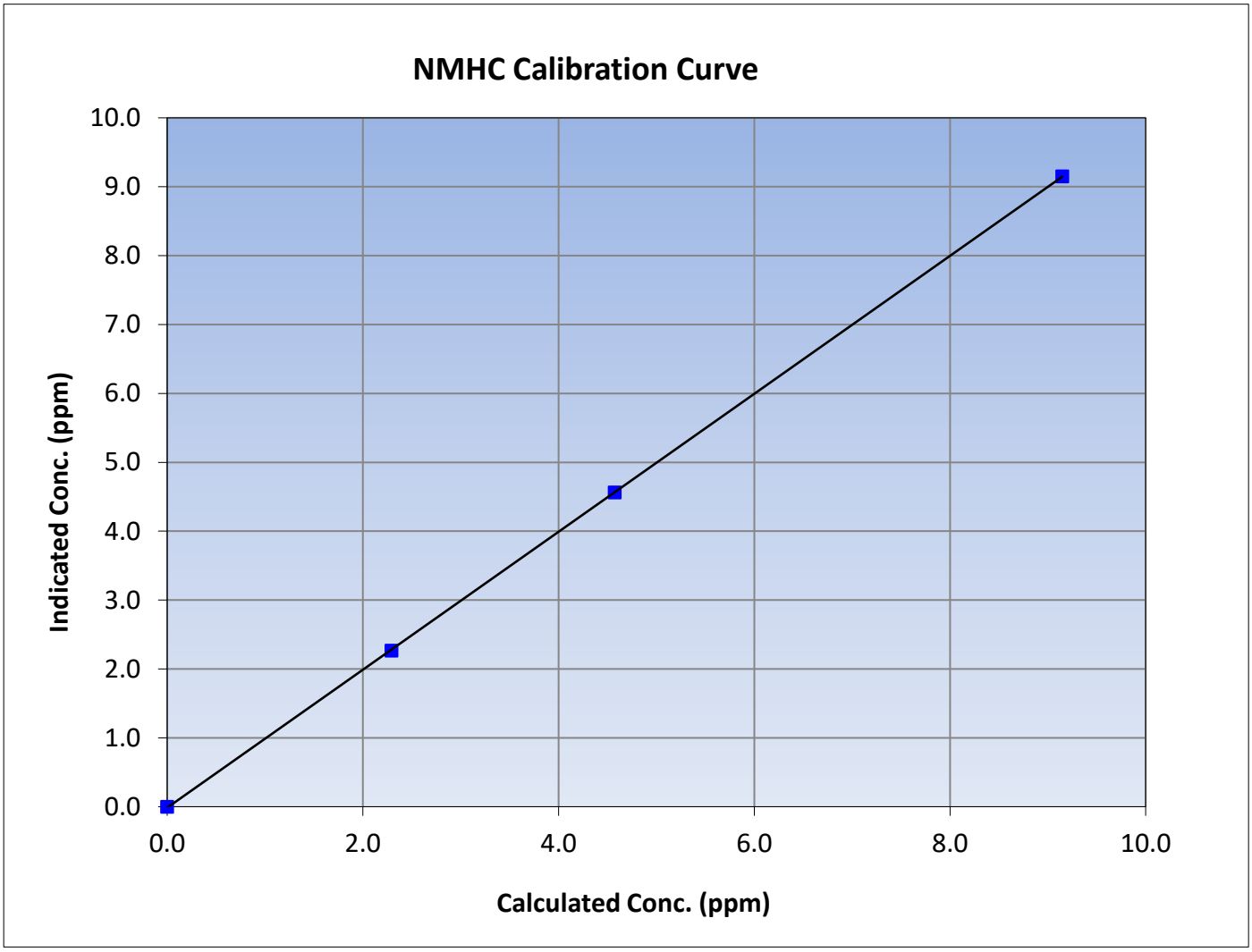
Version-01-2020

Station Information

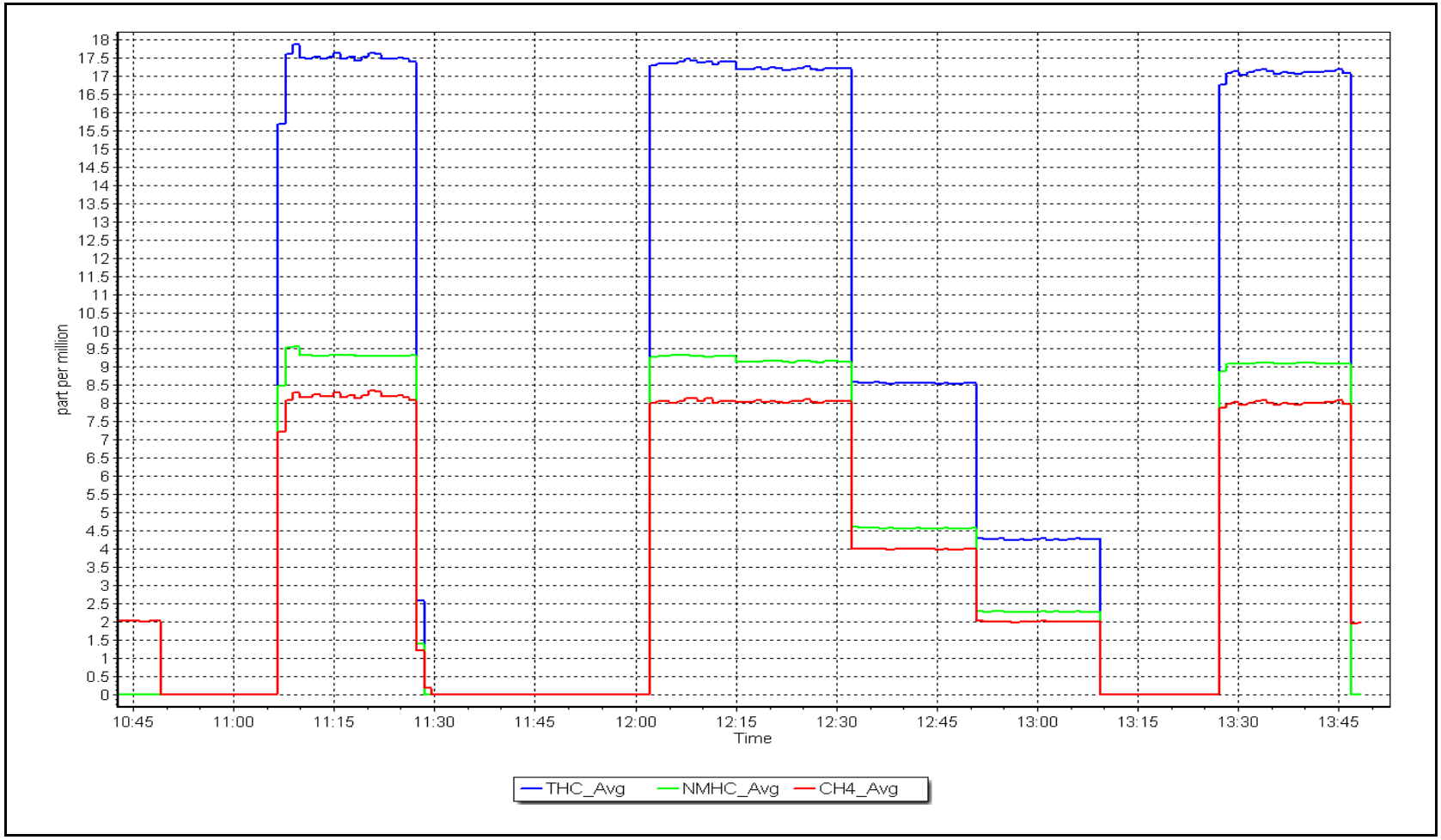
Calibration Date:	April 26, 2023	Previous Calibration:	March 15, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:44	End Time (MST):	13:45
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750023

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999989	≥0.995
9.15	9.15	0.9996			
4.57	4.56	1.0025	Slope	1.001328	0.90 - 1.10
2.29	2.27	1.0121			
			Intercept	-0.014032	+/-0.5



NMHC Calibration Plot Date: April 26, 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:	April 27, 2023	Last Cal Date:	March 9, 2023
Start time (MST):	11:33	End time (MST):	16:55
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	CC424183		Cal Gas Expiry Date:	April 16, 2023	
NOX Cal Gas Conc:	48.60	ppm	NO Cal Gas Conc:	48.60	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	48.60	ppm	Removed Gas NO Conc:	48.60	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	3806	
ZAG make/model:	Teledyne API T701		Serial Number:	4890	

Analyzer Information

Analyzer make:	Teledyne API T200	Analyzer serial #:	7117
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.019	1.012	NO bkgnd or offset:	-0.3	4.8
NOX coeff or slope:	1.009	1.002	NOX bkgnd or offset:	0.4	5.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	5.1	5.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001316	0.999487
NO_X Cal Offset:	0.648371	0.688544
NO Cal Slope:	1.001644	0.999800
NO Cal Offset:	0.008462	-0.271133
NO_2 Cal Slope:	1.000730	1.003470
NO_2 Cal Offset:	0.876715	0.116060

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	4.1	2.2	1.9	----	----
as found span	4918	82.3	799.9	799.9	0.0	809.4	803.9	5.7	0.9883	0.9950
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	799.8	799.5	0.3	1.0001	1.0005
second point	4959	41.2	400.4	400.4	0.0	401.3	400.3	1.0	0.9979	1.0004
third point	4980	20.6	200.2	200.2	0.0	201.6	199.4	2.3	0.9931	1.0041
as left zero	5000	0.0	0.0	0.0	0.0	-1.5	-1.3	-0.2	----	----
as left span	4918	82.3	799.9	400.3	399.6	795.2	398.0	397.2	1.0059	1.0058
								Average Correction Factor	0.9970	1.0016

Corrected As found	NO_X = 805.3 ppb	NO = 801.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = 0.5%
Previous Response	NO_X = 801.6 ppb	NO = 801.2 ppb		*Percent Change	NO = 0.1%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	796.2	396.6	399.6	400.9	0.9968	100.3%
2nd GPT point (200 ppb O3)	796.2	595.2	201.0	202.2	0.9941	100.6%
3rd GPT point (100 ppb O3)	796.2	694.8	101.4	101.9	0.9951	100.5%
				Average Correction Factor	0.9953	100.5%

Notes: Changed the inlet filter after as founds. Changed out the ZAG charcoal scrubbers. Adjusted both zero and span.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

NO_X Calibration Summary

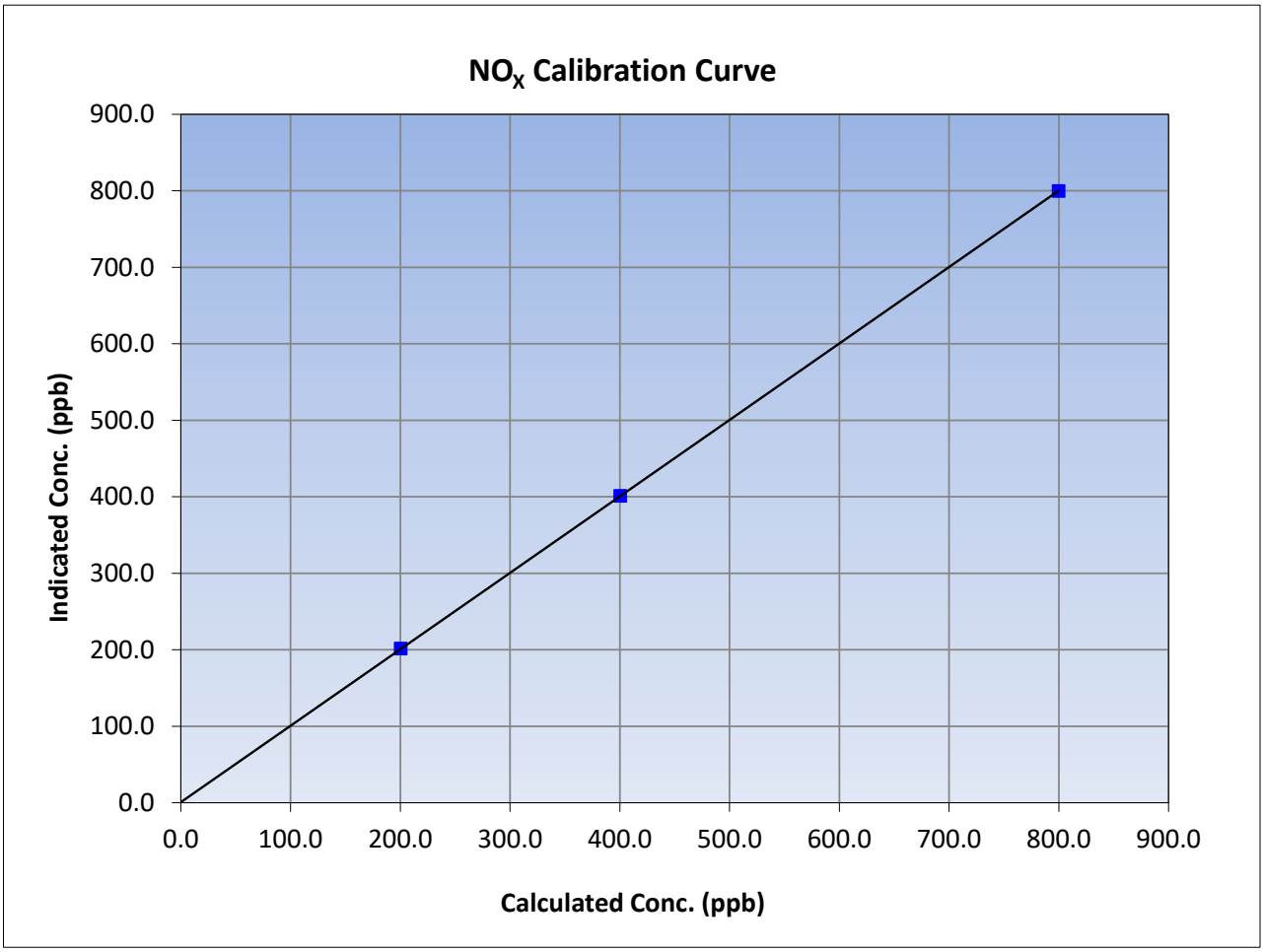
Version-04-2020

Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 9, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	11:33	End Time (MST):	16:55
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	0.999996	≥0.995
799.9	799.8	1.0001			
400.4	401.3	0.9979	Slope	0.999487	0.90 - 1.10
200.2	201.6	0.9931			
			Intercept	0.688544	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

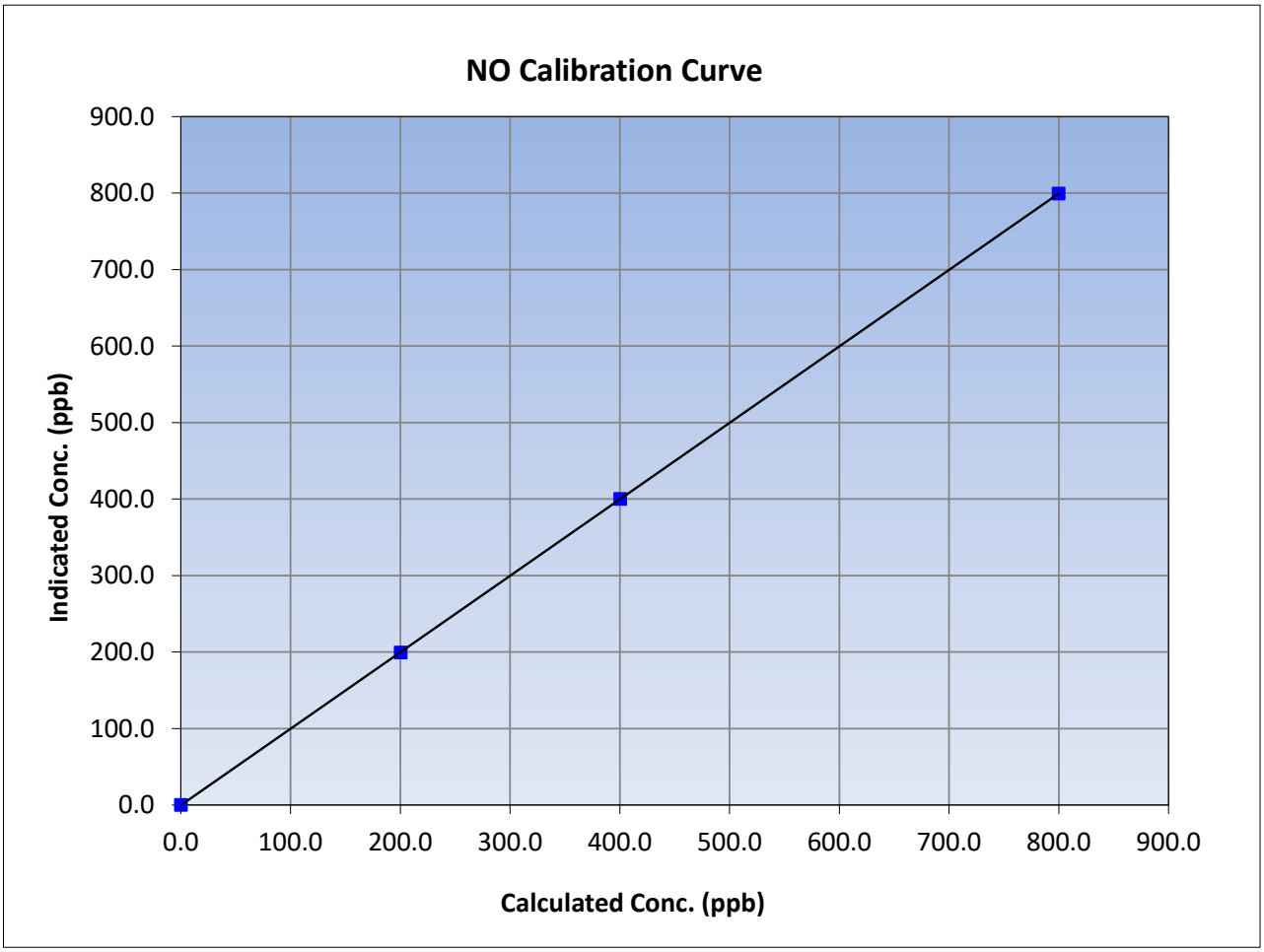
Version-04-2020

Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 9, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	11:33	End Time (MST):	16:55
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
799.9	799.5	1.0005			
400.4	400.3	1.0004	Slope	0.999800	0.90 - 1.10
200.2	199.4	1.0041			
			Intercept	-0.271133	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

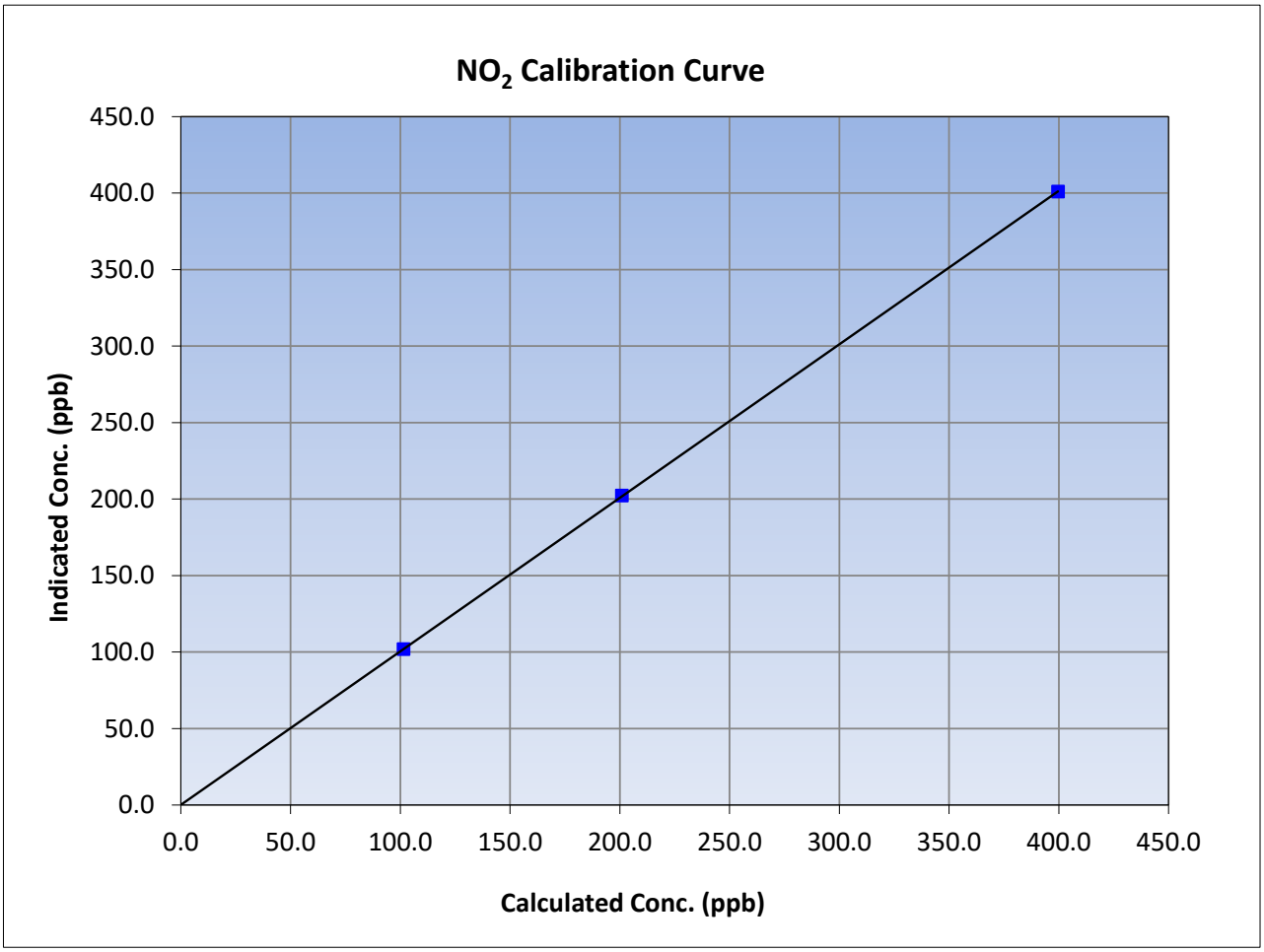
Version-04-2020

Station Information

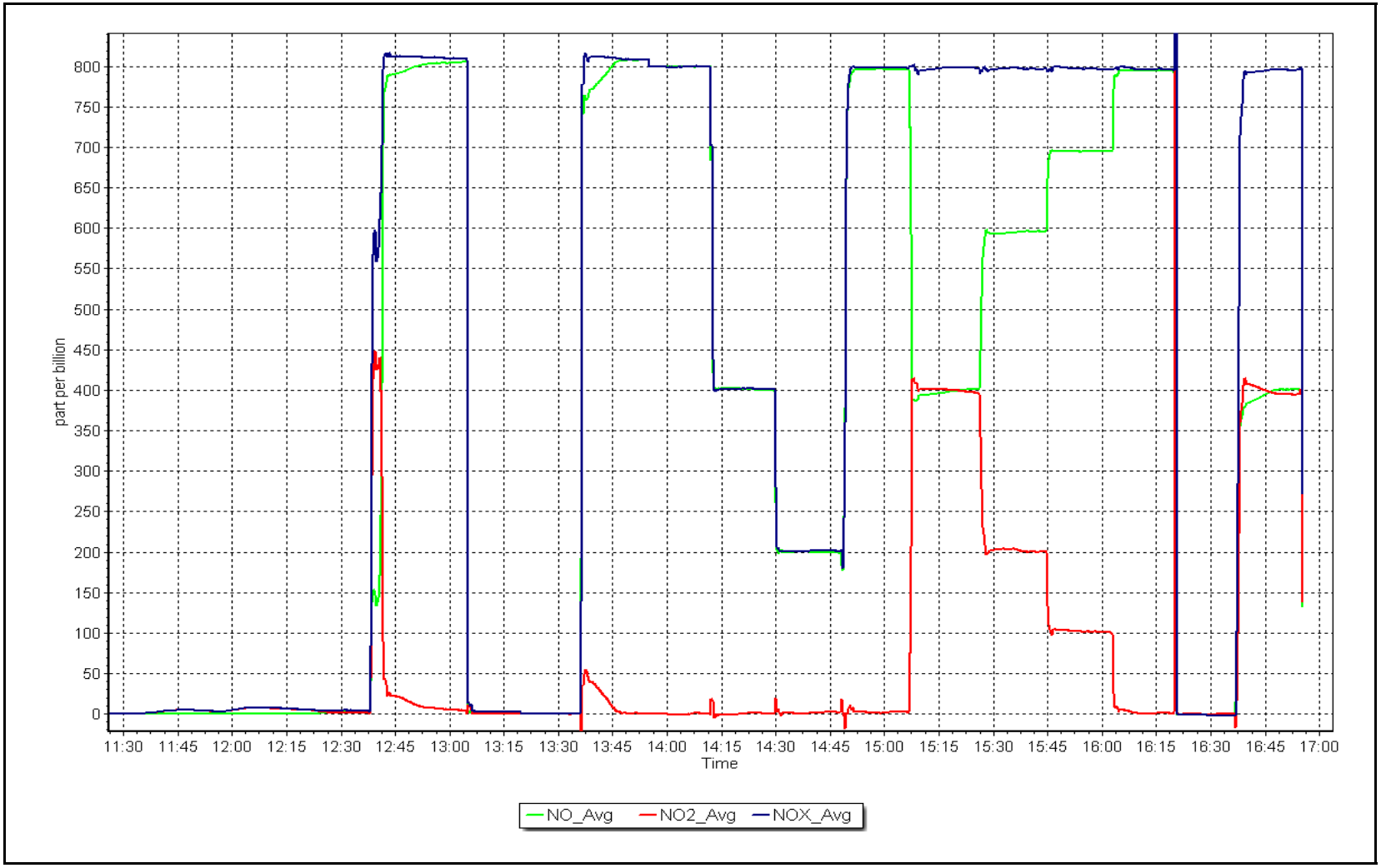
Calibration Date:	April 27, 2023	Previous Calibration:	March 9, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	11:33	End Time (MST):	16:55
Analyzer make:	Teledyne API T200	Analyzer serial #:	7117

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999997	≥0.995
399.6	400.9	0.9968			
201.0	202.2	0.9941	Slope	1.003470	0.90 - 1.10
101.4	101.9	0.9951			
			Intercept	0.116060	+/-20



NO_X Calibration Plot Date: April 27, 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:	April 26, 2023	Last Cal Date:	March 28, 2023
Start time (MST):	13:45	End time (MST):	17:04
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:	1.000429	1.007857	Backgd or Offset:	-2.0	-2.0
Calibration intercept:	0.000000	0.800000	Coeff or Slope:	1.011	1.011

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	800.0	0.0	-0.5	----
as found span	4893	899.1	400.0	401.1	0.997
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	-0.3	----
high point	4893	899.1	400.0	403.4	0.992
second point	4893	753.4	200.0	202.9	0.986
third point	4893	655.7	100.0	102.7	0.974
as left zero	5000	800.0	0.0	-0.2	----
as left span	4816	899.1	400.0	404.7	0.988
				Average Correction Factor	0.984

Baseline Corr As found:	401.6	Previous response	400.2	*% change	0.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

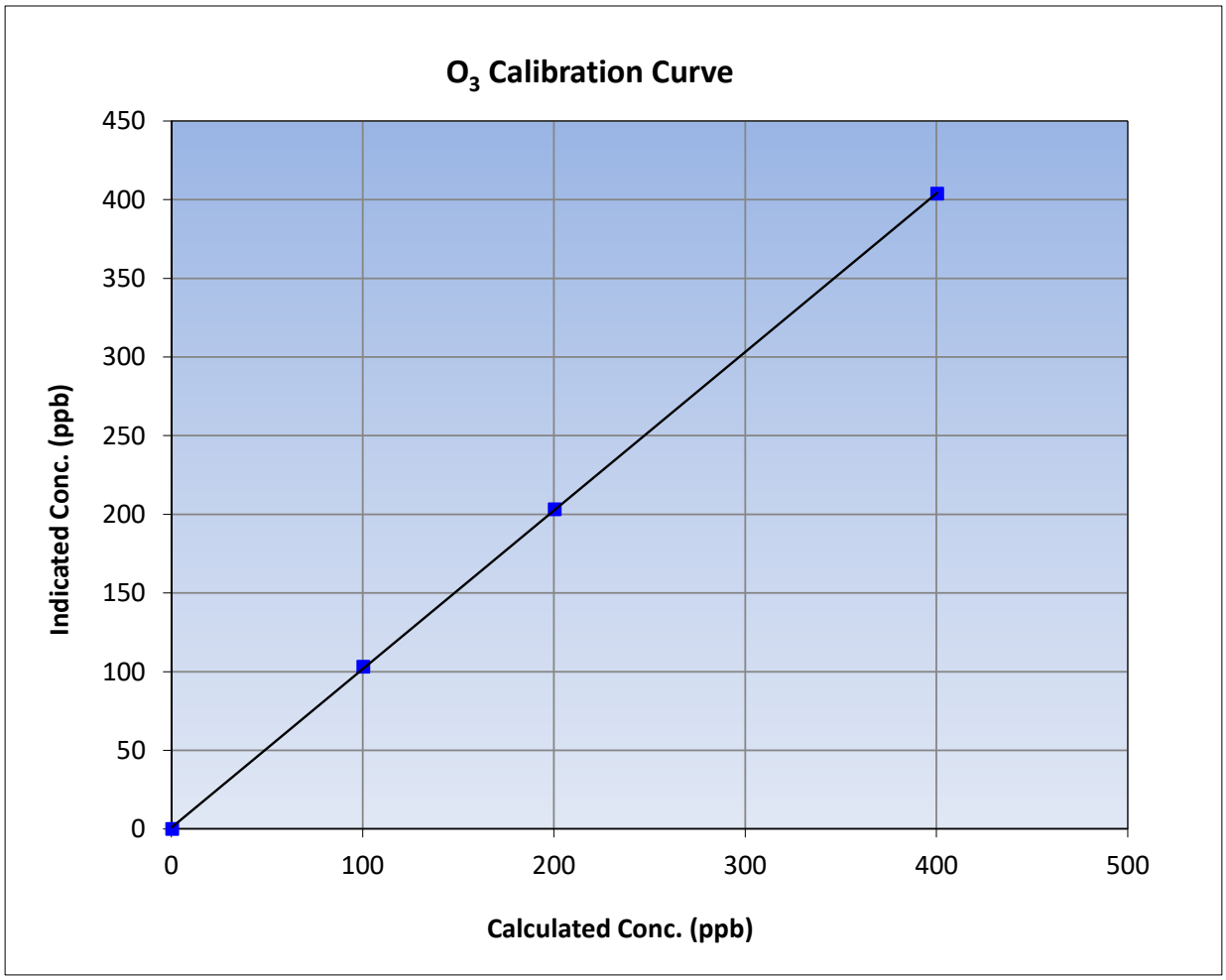
Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 28, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	13:45	End Time (MST):	17:04
Analyzer make:	Teledyne API T400	Analyzer serial #:	3869

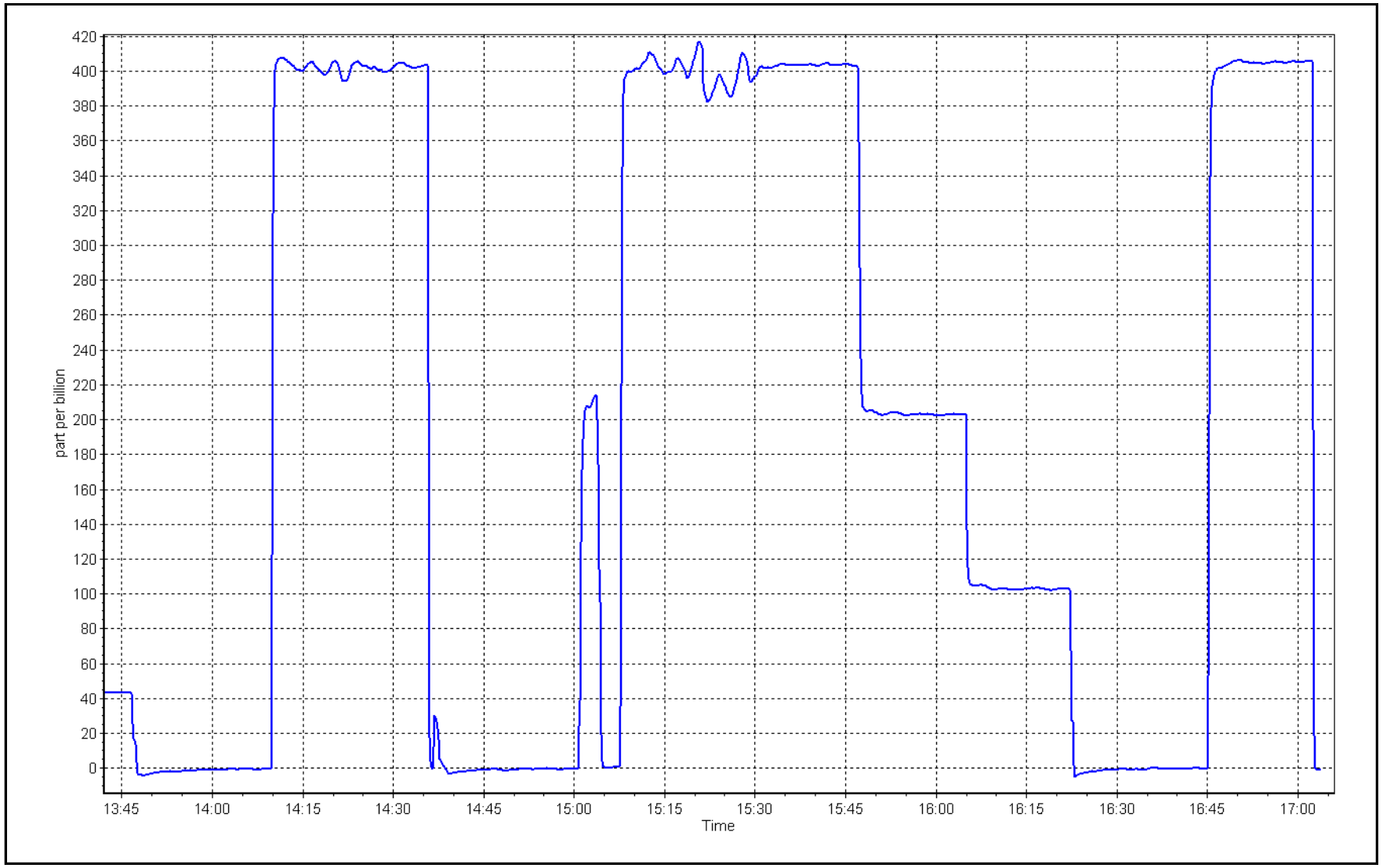
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
400.0	403.4	0.9916
200.0	202.9	0.9857
100.0	102.7	0.9737

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999966	*≥0.995*
Slope	1.007857	*0.90 - 1.10*
Intercept	0.800000	*+/- 5*



O_3 Calibration Plot Date: April 26, 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:	April 27, 2023	Last Cal Date:	March 29, 2023
Start time (MST):	13:00	End time (MST):	14:26
Analyzer Make:	Teledyne API T640	S/N:	325
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	1450
Temp/RH standard:	Delta Cal	S/N:	1450

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	11.7	11.8	12.8	☐	+/- 2 °C
P (mmHg)	718.6	719	718.6	☐	+/- 10 mmHg
flow (LPM)	5.01	4.97	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: April 27, 2023 Last Cal Date: March 29, 2023

PM w/o HEPA: 3.8 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	10.2	11.8	11.1	☑	11.3 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 6.5 w/ HEPA: 0 <0.2 ug/m3

Date Optical Chamber Cleaned: April 27, 2023

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. Leak test passed. Adjusted PMT peak voltage from 1385V to 1380V. Optical chamber cleaned and disposable filter changed. Inlet head cleaned.

Calibration by: Rene Chamberland

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS23
FORT HILLS
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	April 14, 2023	Last Cal Date:	March 2, 2023
Start time (MST):	9:37	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:	0.995960	1.007702	Backgd or Offset:	18.5	18.5
Calibration intercept:	-0.582785	-1.064774	Coeff or Slope:	1.053	1.053

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.2	----
as found span	4920	80.3	799.1	803.0	0.995
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4920	80.3	799.1	804.8	0.993
second point	4960	40.2	400.1	401.4	0.997
third point	4980	20.1	200.0	199.4	1.003
as left zero	5000	0.0	0.0	-0.1	----
as left span	4920	80.3	799.1	805.5	0.992
				Average Correction Factor	0.998

Baseline Corr As found:	803.20	Previous response	795.29	*% change	1.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed 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

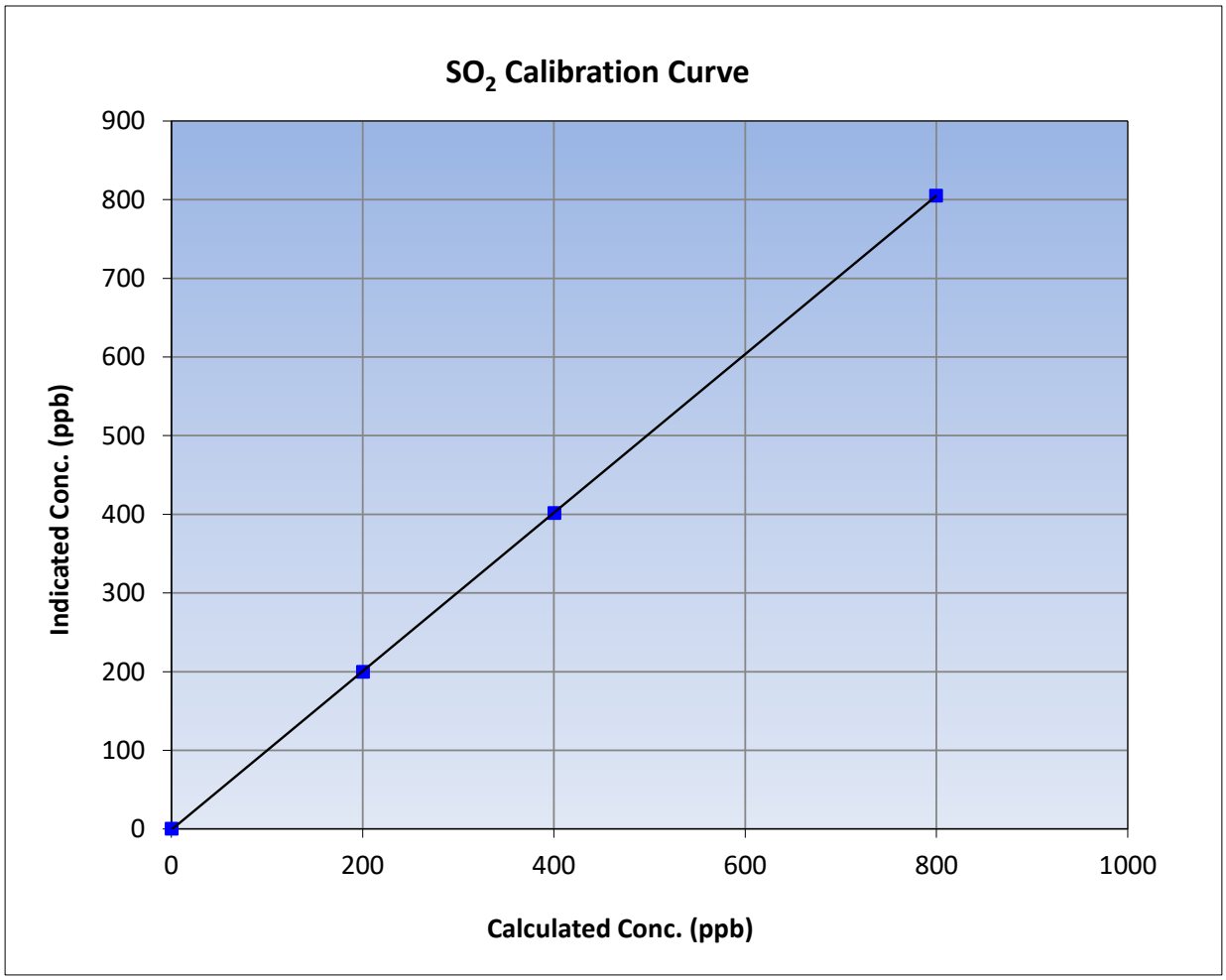
Station Information

Calibration Date:	April 14, 2023	Previous Calibration:	March 2, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:37	End Time (MST):	12:35
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290012

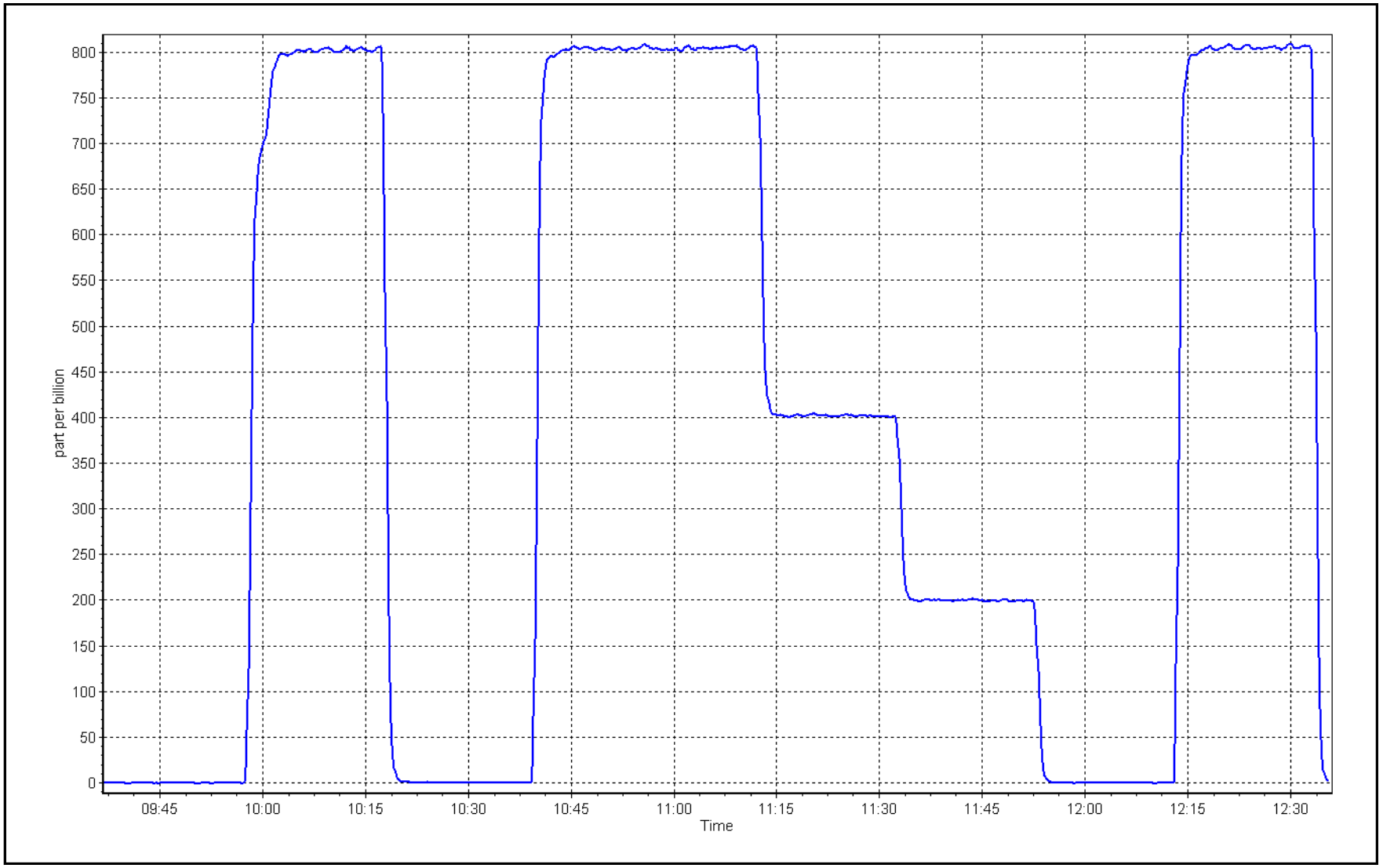
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
799.1	804.8	0.9929
400.1	401.4	0.9966
200.0	199.4	1.0032

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999990	*≥0.995*
Slope	1.007702	*0.90 - 1.10*
Intercept	-1.064774	*+/-30*



SO2 Calibration Plot Date: April 14, 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:	April 5, 2023	Last Cal Date:	March 17, 2023
Start time (MST):	10:04	End time (MST):	14:30
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.20	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517372			
Removed Cal Gas Conc:	5.20	ppm	Rem Gas Exp Date:	N/A
Removed Gas Cyl #:	N/A		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	451
ZAG Make/Model:	API T701		Serial Number:	5611

Analyzer Information

Analyzer make:	Thermo 43iQ TLE		Analyzer serial #:	1300156232	
Converter make:	CDN-101		Converter serial #:	594	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998462	1.003023	Backgd or Offset:	1.75	1.92
Calibration intercept:	-0.258331	0.182125	Coeff or Slope:	1.031	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	0.0	----
as found span	4923	77.0	80.0	71.8	1.114
as found 2nd point	4962	38.5	40.0	36.0	1.111
as found 3rd point	4981	19.2	19.9	17.8	1.121
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	80.4	0.995
second point	4962	38.5	40.0	40.2	0.995
third point	4981	19.2	19.9	20.5	0.973
as left zero	5000	0.0	0.0	0.7	----
as left span	4923	77.0	80.0	81.1	0.986
SO2 Scrubber Check	4920	80.3	803.0	0.1	----
Date of last scrubber change:				Ave Corr Factor	0.988
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	71.8	Prev response:	79.62	*% change:	-10.9%
Baseline Corr 2nd AF pt:	36.0	AF Slope:	0.898055	AF Intercept:	-0.020379
Baseline Corr 3rd AF pt:	17.8	AF Correlation:	0.999993		

* = > +/-5% change initiates investigation

Notes: Calibrated due to a large span shift seen during a nightly span. Adjusted span. SOx scrubber check done after calibrator zero.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

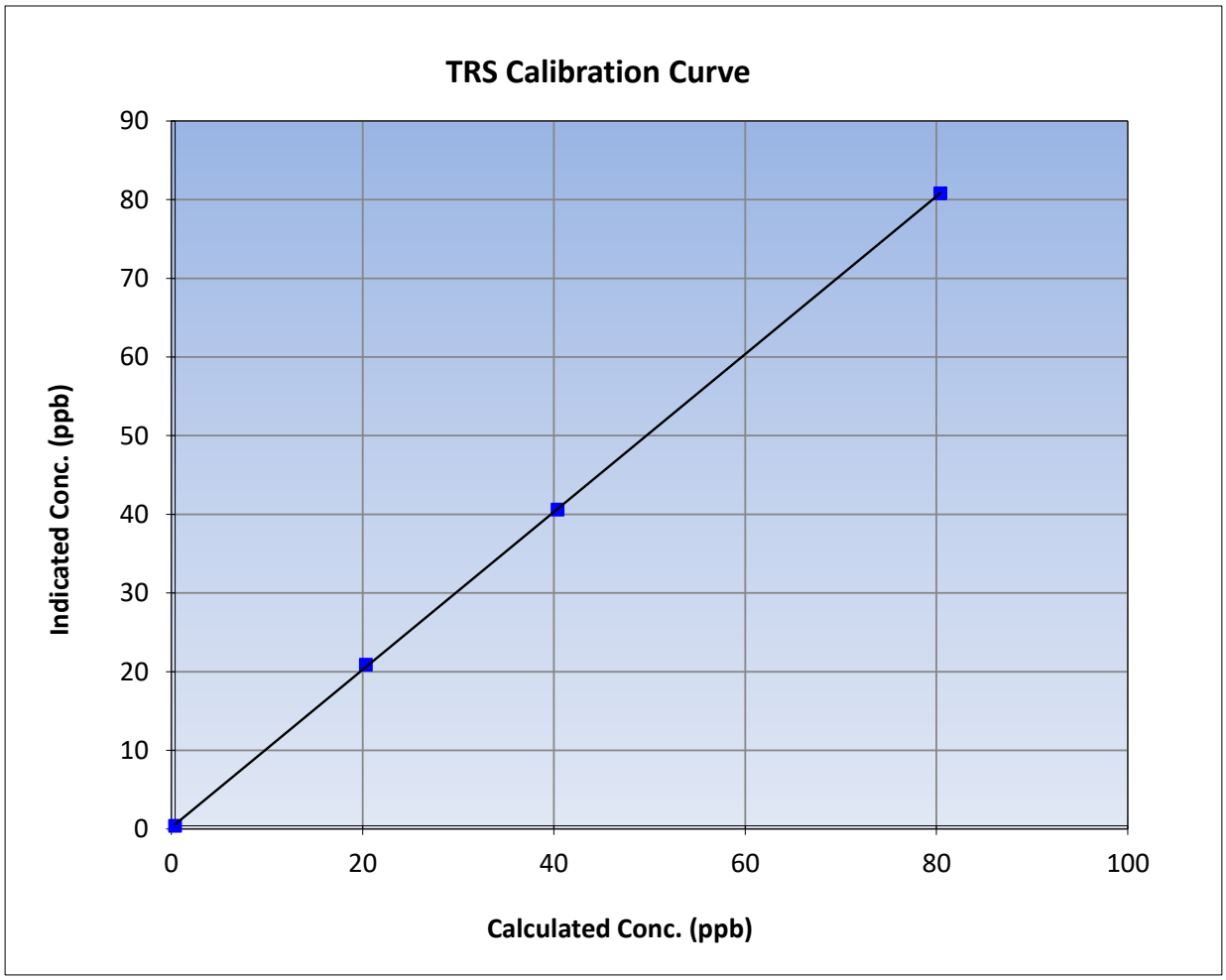
Station Information

Calibration Date:	April 5, 2023	Previous Calibration:	March 17, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:04	End Time (MST):	14:30
Analyzer make:	Thermo 43iQ TLE	Analyzer serial #:	1300156232

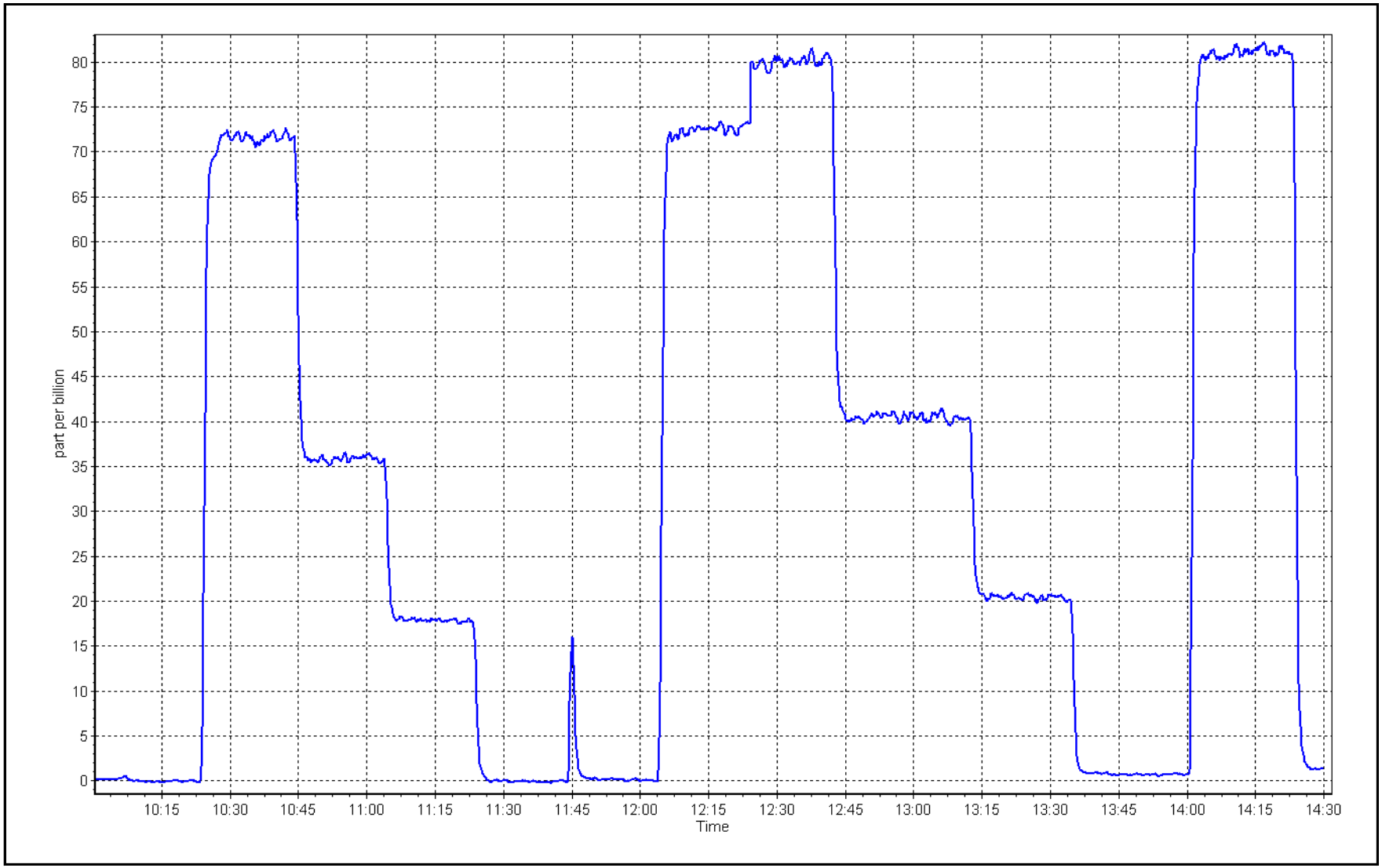
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.4	0.9951
40.0	40.2	0.9950
19.9	20.5	0.9731

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999960	*≥0.995*
Slope	1.003023	*0.90 - 1.10*
Intercept	0.182125	*+/-3*



TRS Calibration Plot Date: April 5, 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

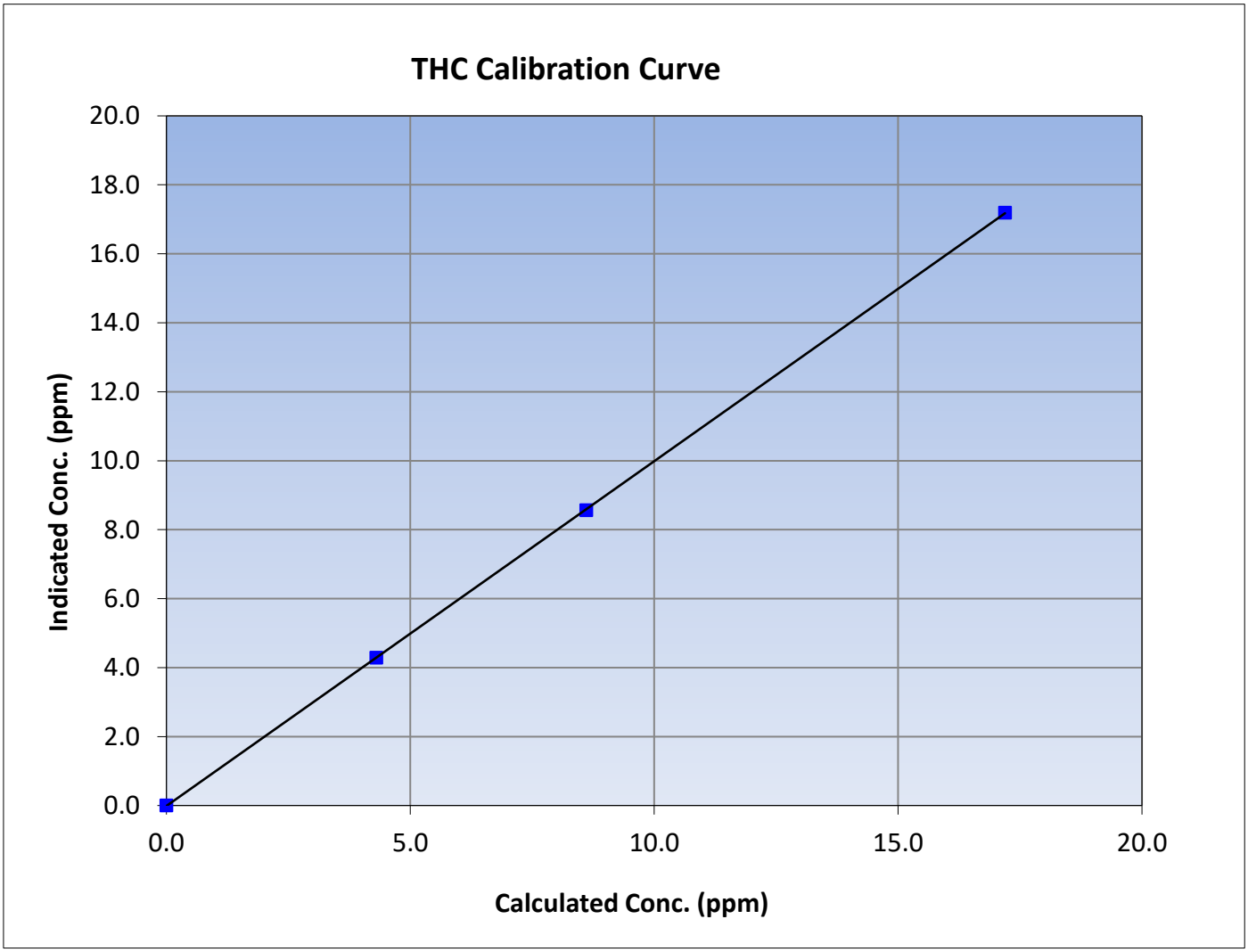
Version-01-2020

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

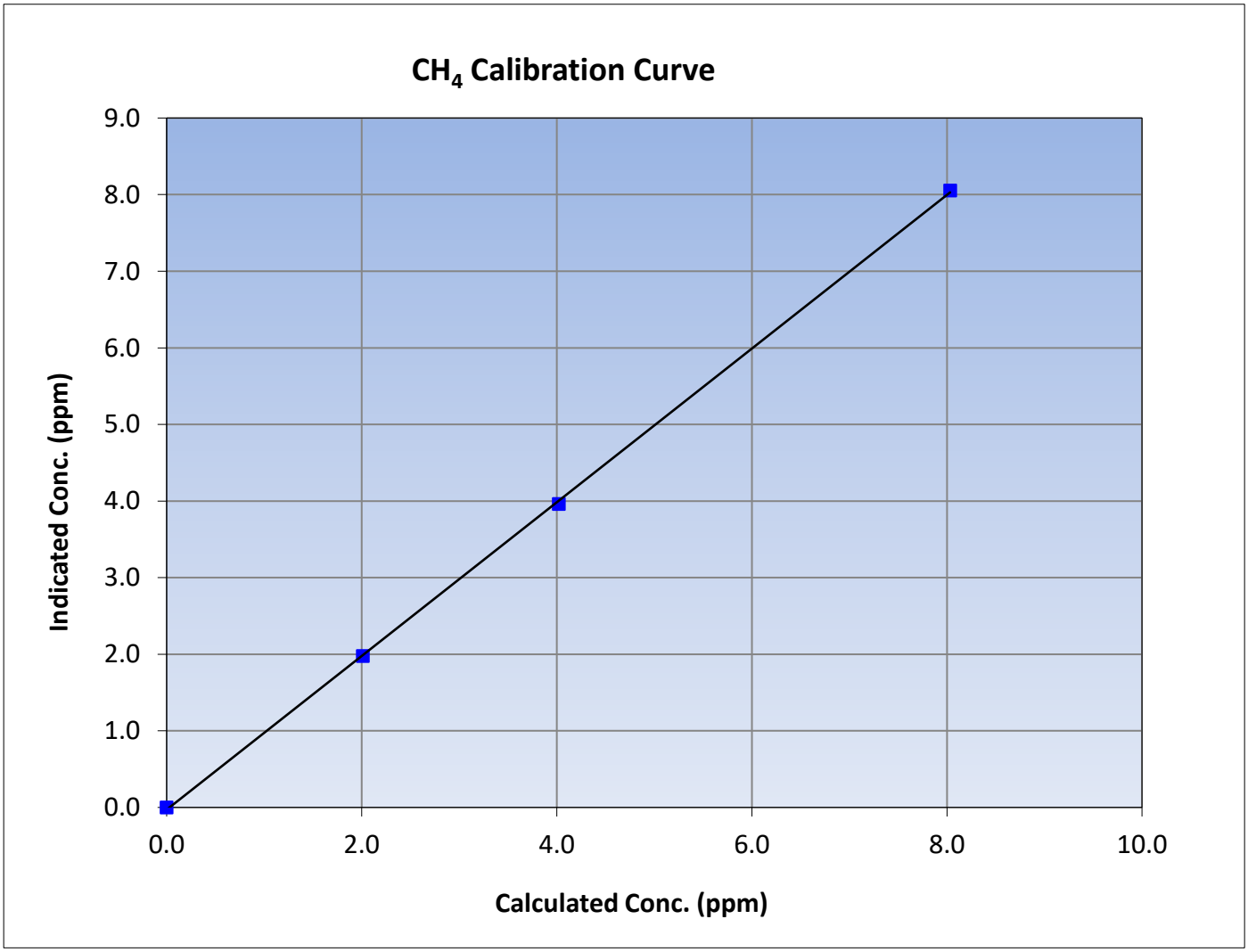
Version-01-2020

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

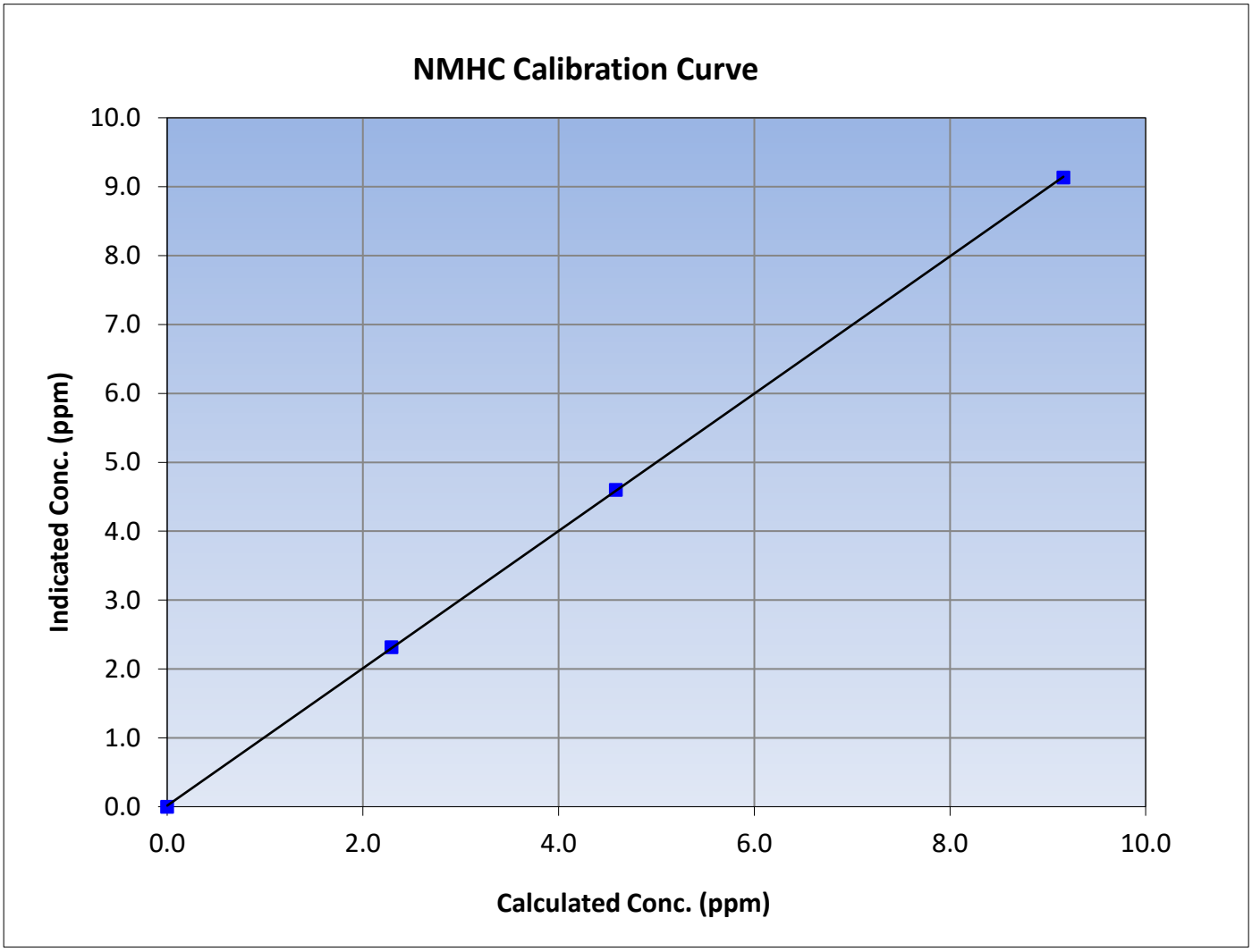
Version-01-2020

Station Information

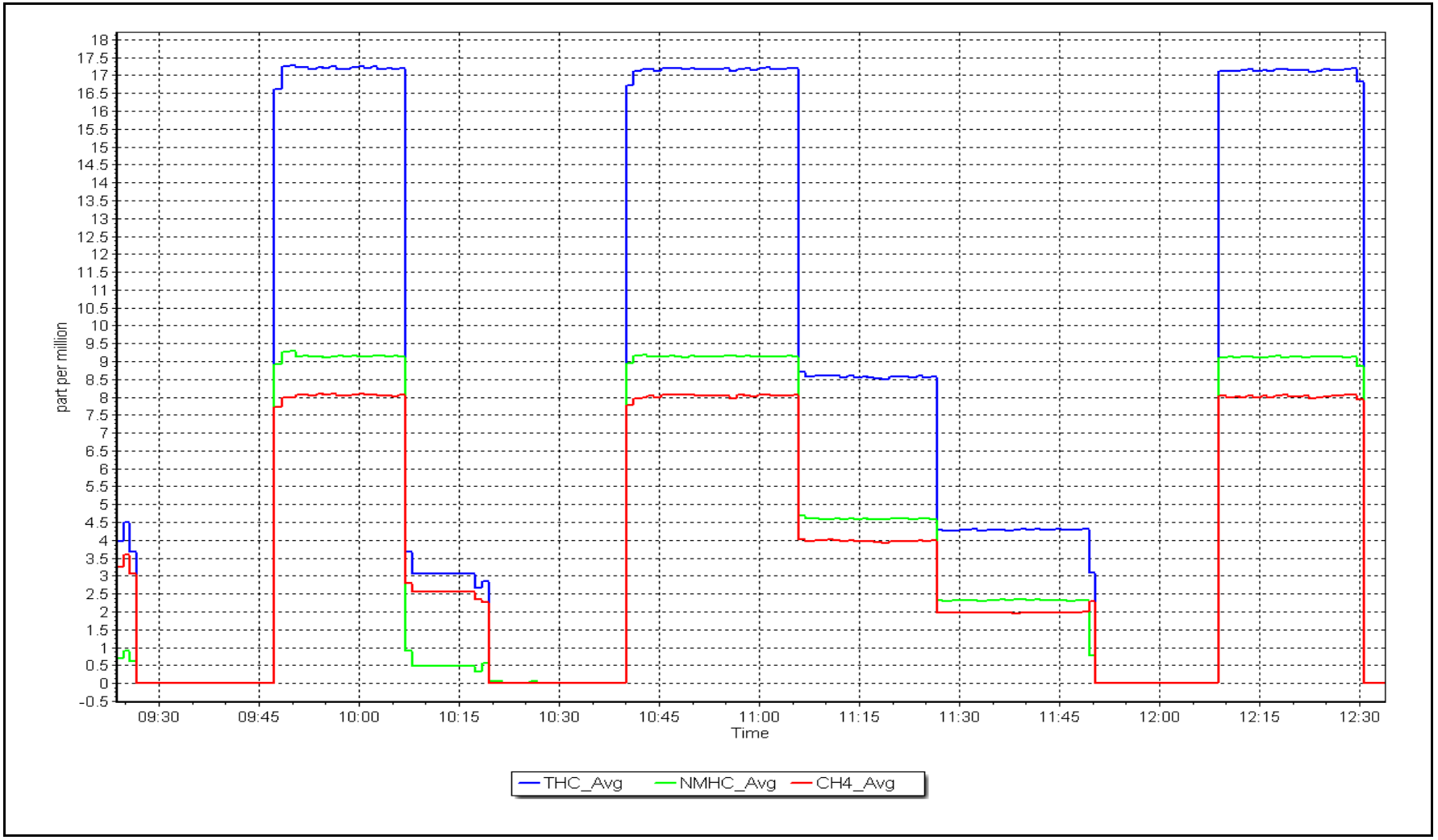
Calibration Date:	May 10, 2023	Previous Calibration:	April 14, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:24	End Time (MST):	12:35
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585648

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:	April 21, 2023	Last Cal Date:	March 1, 2023
Start time (MST):	8:48	End time (MST):	13:36
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:	1.025	1.065	NO bkgnd or offset:	2.8	2.9
NOX coeff or slope:	0.995	0.995	NOX bkgnd or offset:	3.1	3.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	155.0	158.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.992756	1.003237
NO_X Cal Offset:	0.201484	0.084507
NO Cal Slope:	0.995756	1.004153
NO Cal Offset:	-1.598210	-1.236008
NO_2 Cal Slope:	0.998881	1.006445
NO_2 Cal Offset:	0.599000	0.589439

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
as found span	4920	80.5	800.2	800.2	0.0	775.9	771.5	4.4	1.031	1.037
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
high point	4920	80.5	800.2	800.2	0.0	802.6	802.7	-0.1	0.997	0.997
second point	4960	40.2	399.6	399.6	0.0	401.7	399.9	1.8	0.995	0.999
third point	4980	20.1	199.8	199.8	0.0	200.0	197.8	2.2	0.999	1.010
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as left span	4920	80.5	800.2	440.0	360.2	797.8	435.7	362.1	1.003	1.010
								Average Correction Factor	0.997	1.002

Corrected As found	NO_X = 775.9 ppb	NO = 771.6 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-2.4%
Previous Response	NO_X = 794.6 ppb	NO = 795.2 ppb		*Percent Change	NO =	-3.1%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found NO r^2:	NO Sl:	NO Int:	
			As found NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	798.0	437.8	360.2	362.7	0.993	100.7%
2nd GPT point (200 ppb O3)	798.0	621.0	177.0	179.5	0.986	101.4%
3rd GPT point (100 ppb O3)	798.0	708.0	90.0	91.3	0.986	101.4%
				Average Correction Factor	0.988	101.2%

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

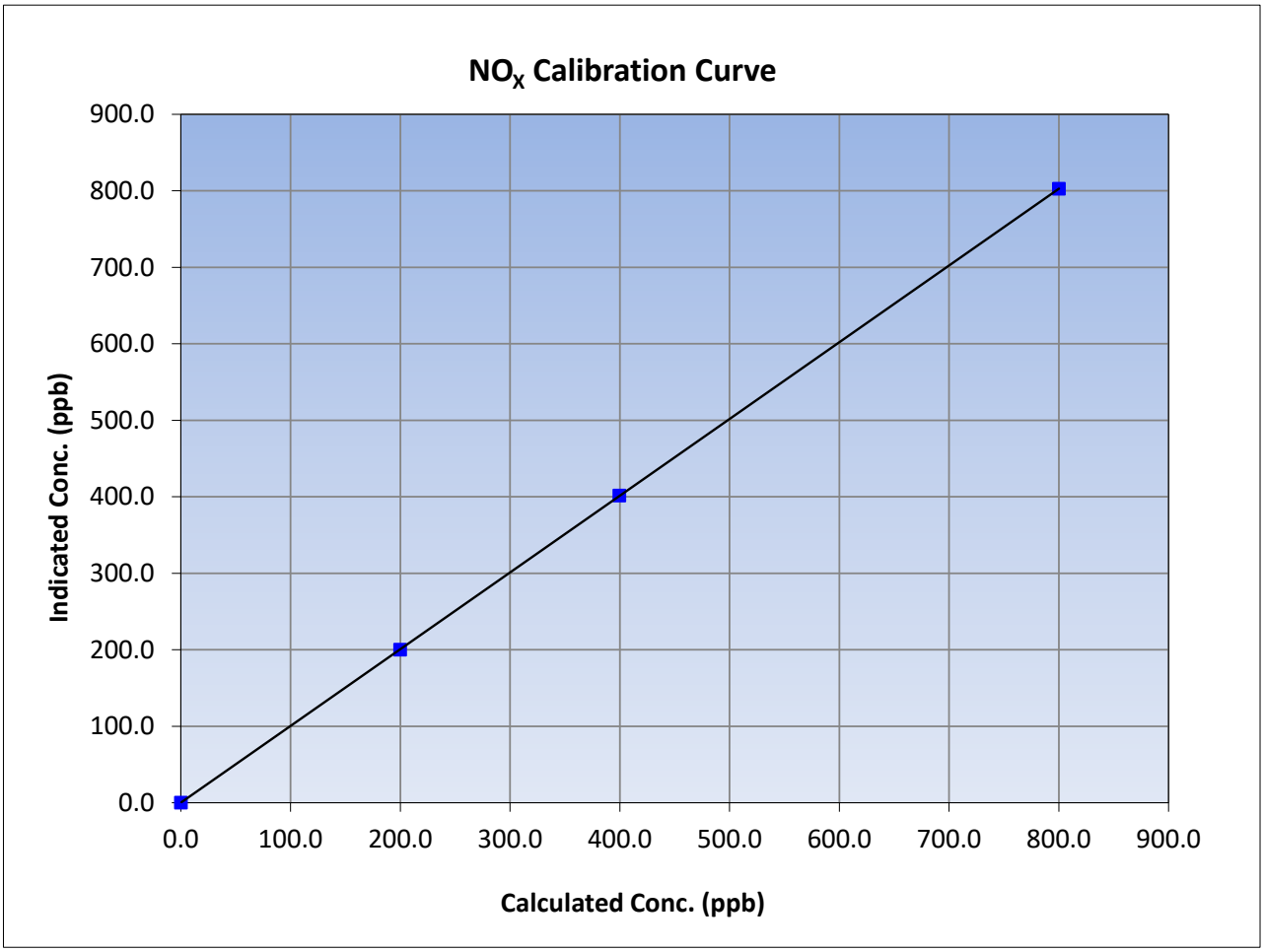
Version-04-2020

Station Information

Calibration Date:	April 21, 2023	Previous Calibration:	March 1, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:48	End Time (MST):	13:36
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.1	----	Correlation Coefficient	0.999997	*≥0.995*
800.2	802.6	0.9970			
399.6	401.7	0.9947	Slope	1.003237	*0.90 - 1.10*
199.8	200.0	0.9990			
			Intercept	0.084507	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

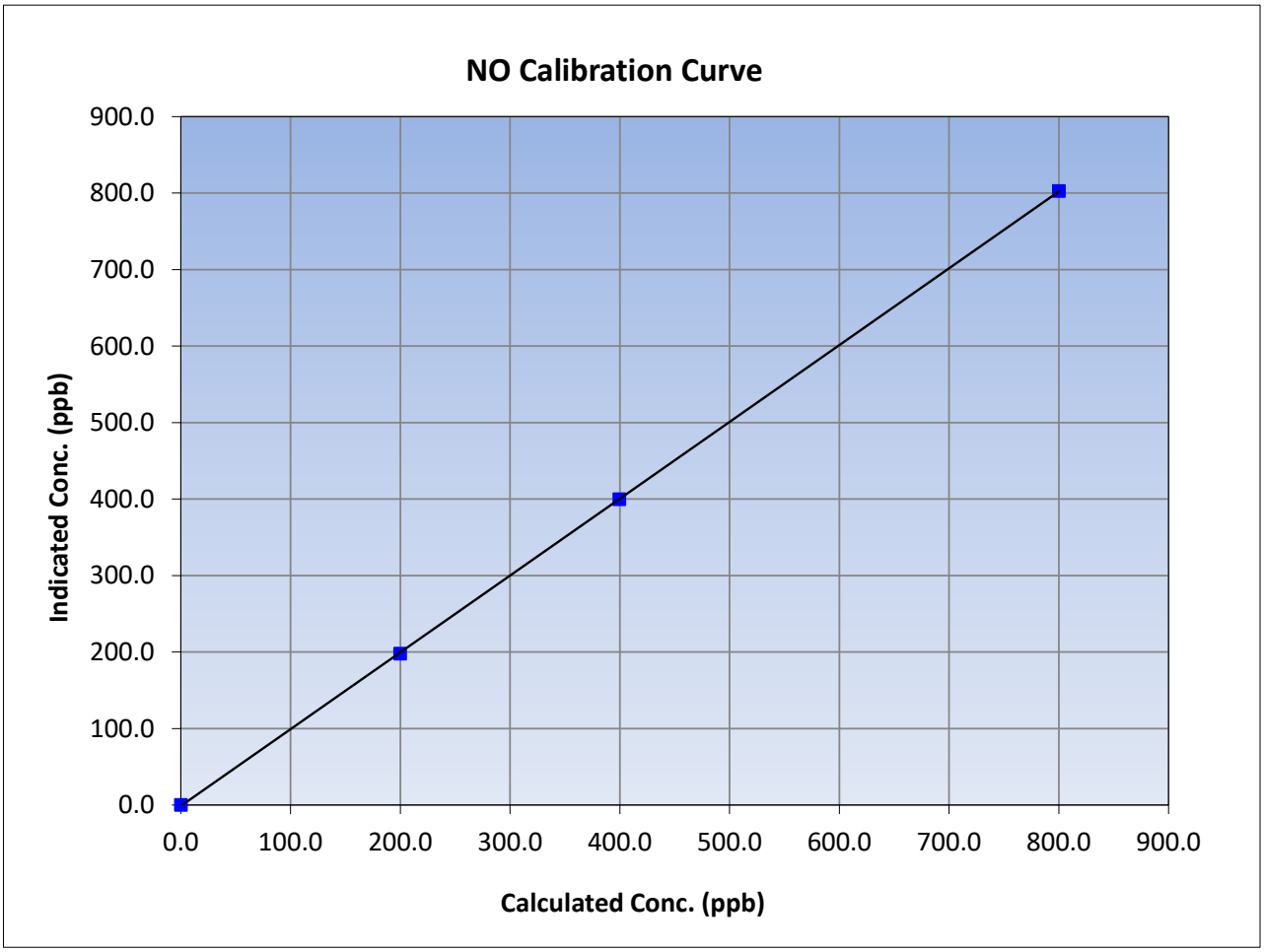
Version-04-2020

Station Information

Calibration Date:	April 21, 2023	Previous Calibration:	March 1, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:48	End Time (MST):	13:36
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	0.999988	*≥0.995*
800.2	802.7	0.9968			
399.6	399.9	0.9992	Slope	1.004153	*0.90 - 1.10*
199.8	197.8	1.0101			
			Intercept	-1.236008	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

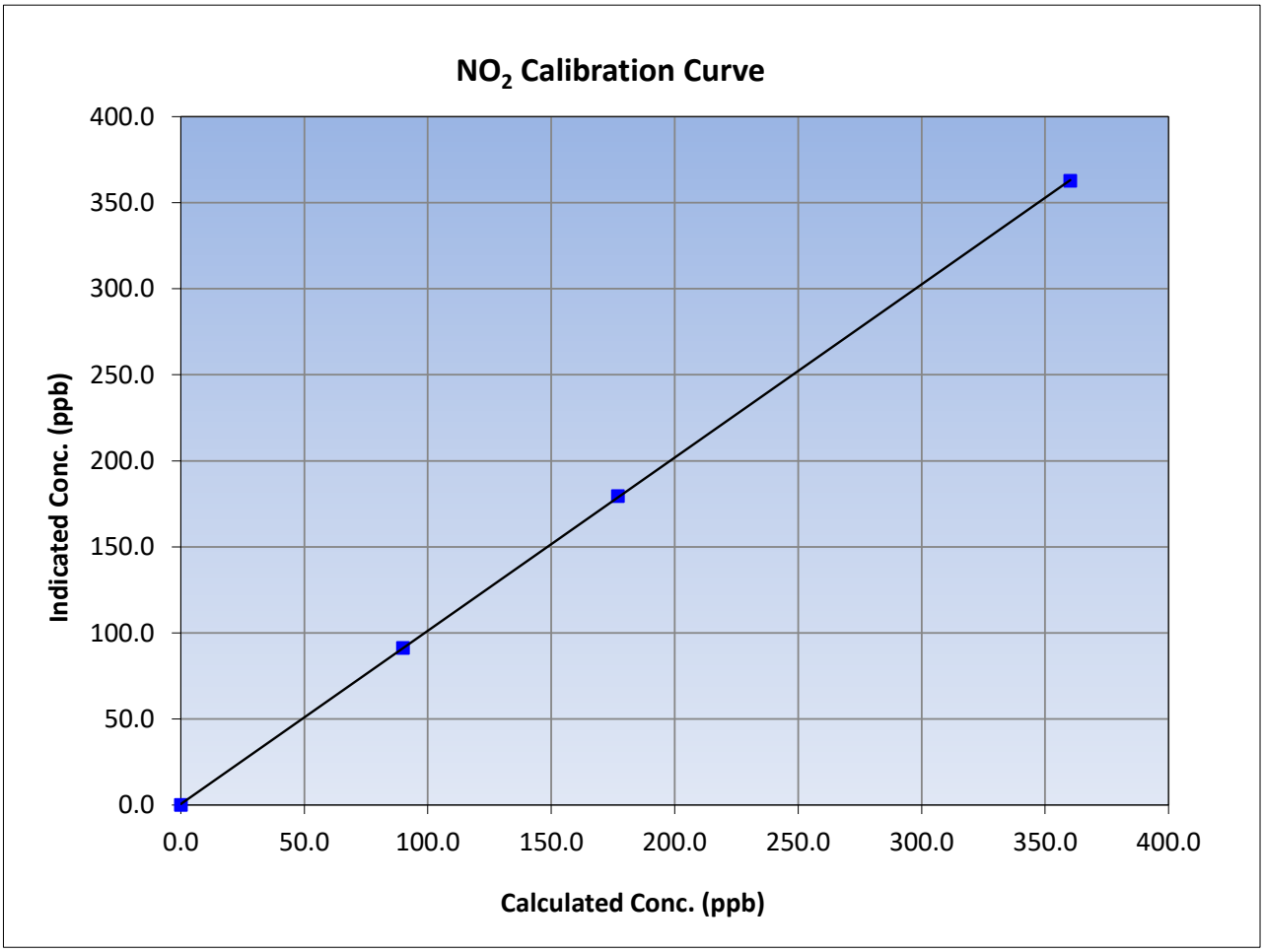
Version-04-2020

Station Information

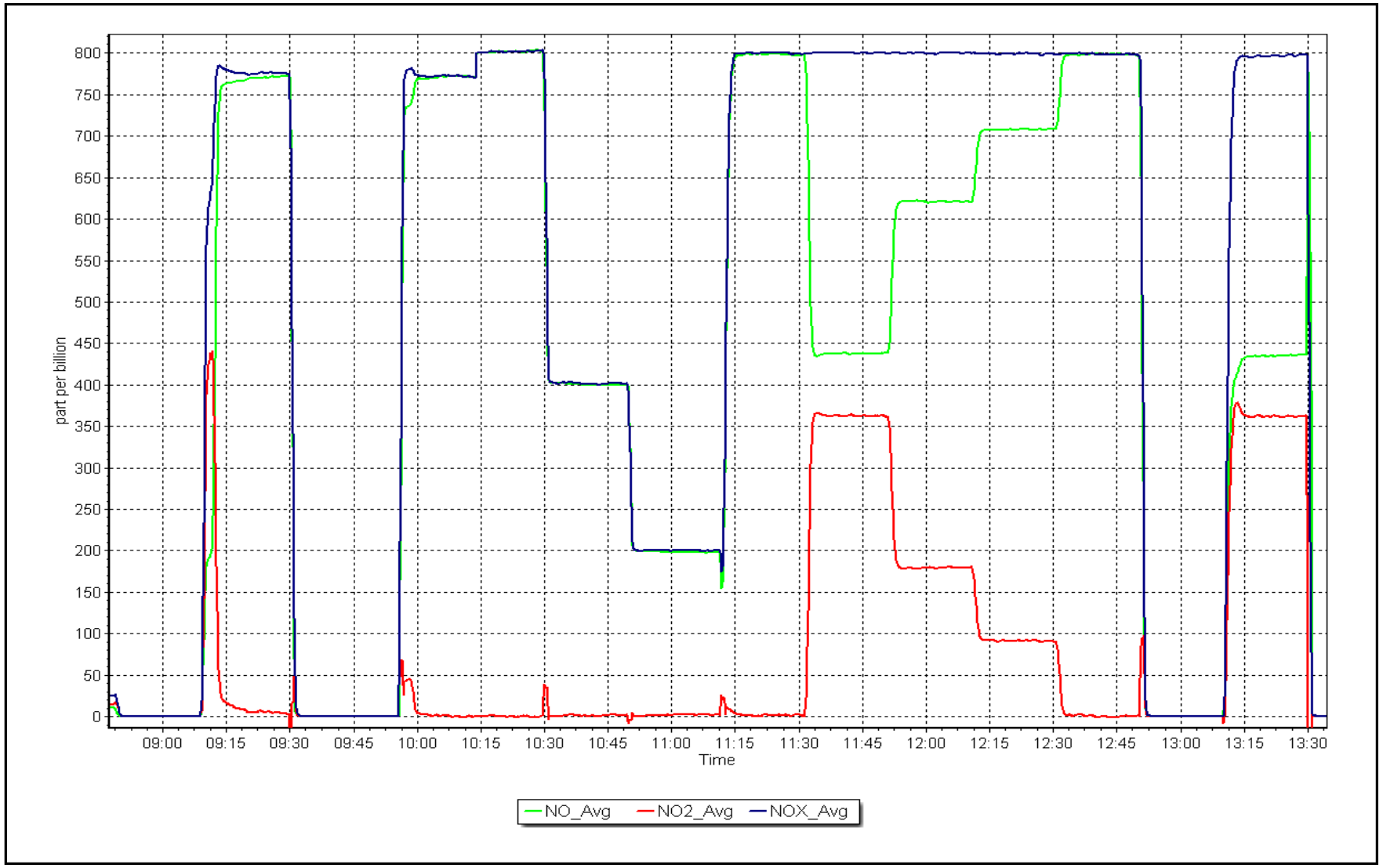
Calibration Date:	April 21, 2023	Previous Calibration:	March 1, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:48	End Time (MST):	13:36
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999986	≥0.995
360.2	362.7	0.9931			
177.0	179.5	0.9861	Slope	1.006445	0.90 - 1.10
90.0	91.3	0.9858			
			Intercept	0.589439	+/-20



NO_X Calibration Plot Date: April 21, 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:	April 21, 2023	Last Cal Date:	March 18, 2023
Start time (MST):	13:12	End time (MST):	13:41
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)	9.6	10.8	9.6	☐	+/- 2 °C
P (mmHg)	747.10	746.3	747.10	☐	+/- 10 mmHg
flow (LPM)	4.97	5.05	4.97	☐	+/- 0.25 LPM

Leak Test: Date of check: April 21, 2023 Last Cal Date: March 18, 2023

PM w/o HEPA: 7 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: March 18, 2023 <0.2 ug/m3

Disposable Filter Changed: March 18, 2023

Annual Maintenance

Date Sample Tube Cleaned: September 26, 2022

Date RH/T Sensor Cleaned: September 26, 2022

Notes: Leak check passed, no adjustments needed.

Calibration by: Max Farrell

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS25
WASKŌW OHCI PIMÂTISIWIN
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Waskow ohci Pimatisiwin	Station number:	AMS25
Calibration Date:	April 11, 2023	Last Cal Date:	March 15, 2023
Start time (MST):	7:10	End time (MST):	10:54
Reason:	Install		

Calibration Standards

Cal Gas Concentration:	50.54	ppm	Cal Gas Exp Date:	December 29, 2028
Cal Gas Cylinder #:	CC437219			
Removed Cal Gas Conc:	52.4	ppm	Rem Gas Exp Date:	October 19, 2022
Removed Gas Cyl #:	ET0016672		Diff between cyl:	3.2%
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:	1.043841	0.998563	Backgd or Offset:	10.1	10.0
Calibration intercept:	-0.116149	0.983970	Coeff or Slope:	1.039	1.008

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	4924	76.3	799.6	798.0	1.002
as found 2nd point					
as found 3rd point					
new cylinder response	4921	79.2	800.5	825.3	0.970
calibrator zero	5000	0.0	0.0	0.4	----
high point	4921	79.2	800.5	799.9	1.001
second point	4960	39.6	400.3	401.5	0.997
third point	4980	19.8	200.1	201.1	0.995
as left zero	5000	0.0	0.0	0.3	----
as left span	4921	79.2	800.5	803.2	0.997
				Average Correction Factor	0.998

Baseline Corr As found:	797.90	Previous response	834.51	*% change	-4.6%
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

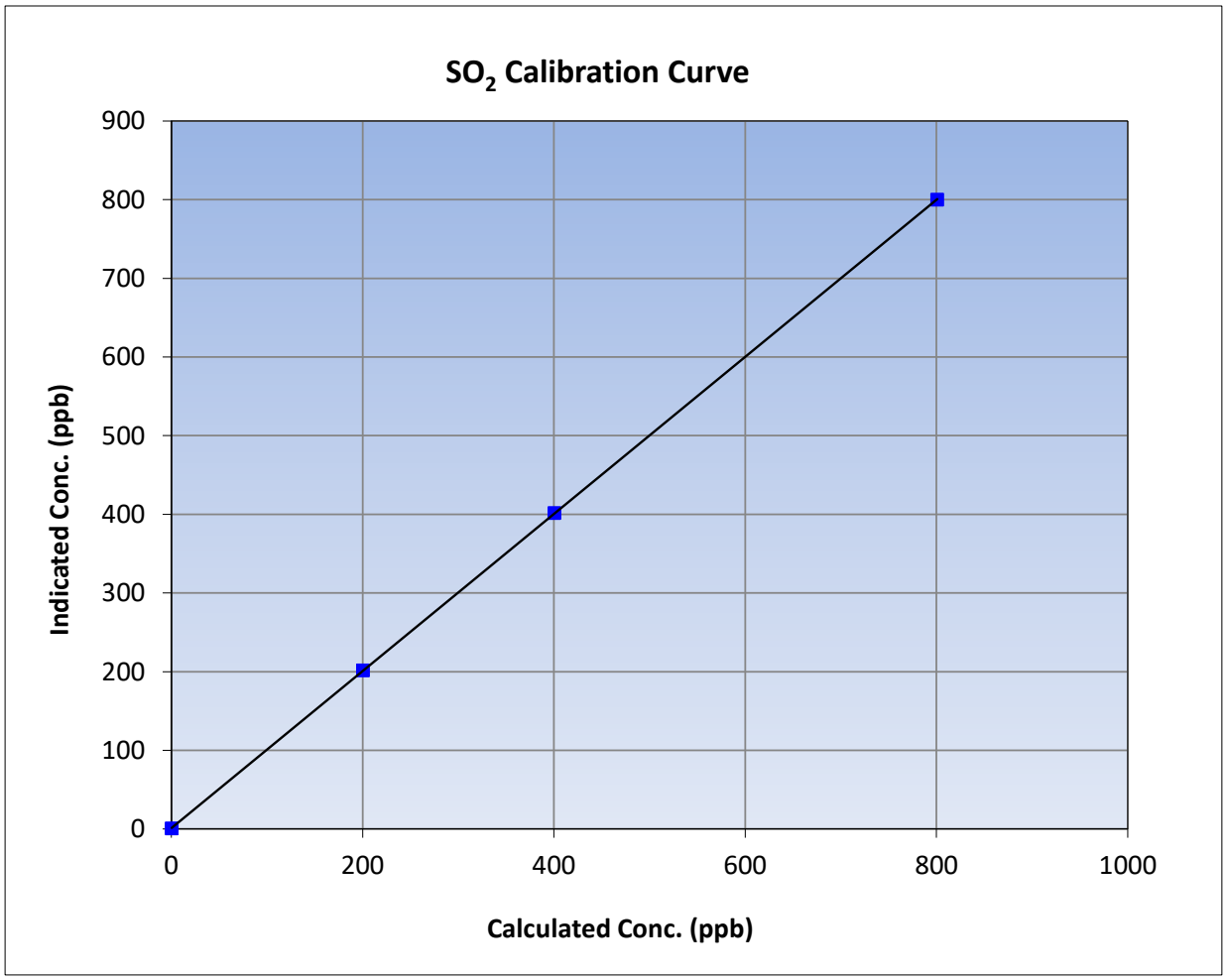
Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 15, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	7:10	End Time (MST):	10:54
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148497

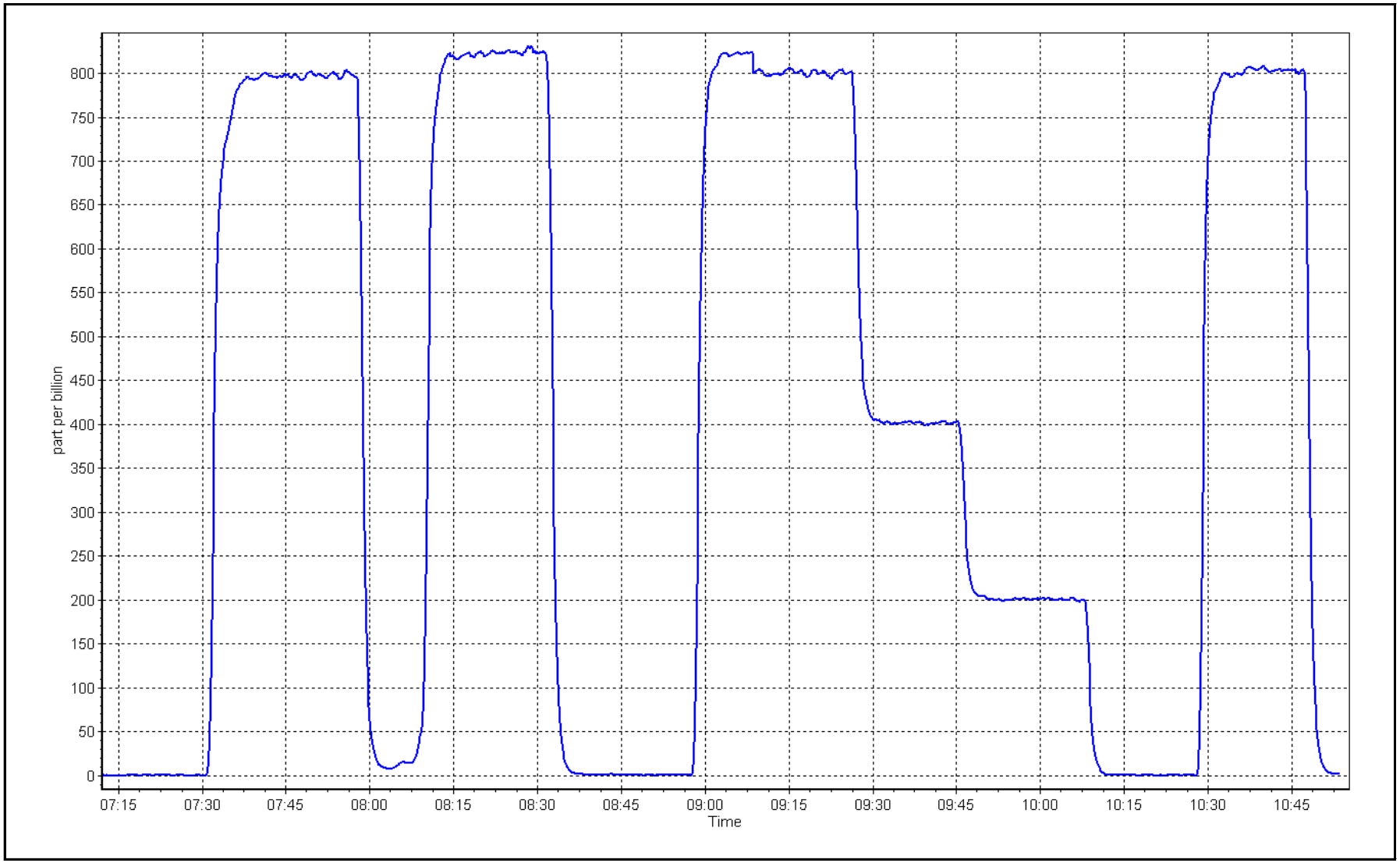
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
800.5	799.9	1.0008
400.3	401.5	0.9970
200.1	201.1	0.9953

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	0.998563	*0.90 - 1.10*
Intercept	0.983970	*+/-30*



SO2 Calibration Plot Date: April 11, 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:	April 12, 2023	Last Cal Date:	March 16, 2023
Start time (MST):	6:25	End time (MST):	11:17
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:	4.90	ppm	Rem Gas Exp Date:	May 5, 2023
Removed Gas Cyl #:	LL119538		Diff between cyl:	-0.9%
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:	1.003738	1.014757	Backgd or Offset:	3.3	3.4
Calibration intercept:	0.281608	0.200000	Coeff or Slope:	1.085	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	80.0	79.9	1.002
as found 2nd point	4959	40.8	40.0	40.1	1.000
as found 3rd point	4980	20.4	20.0	20.1	1.000
new cylinder response	4920	80.0	79.5	78.7	1.010

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	80.8	0.983
second point	4960	40.0	39.7	40.6	0.979
third point	4980	20.0	19.9	20.3	0.979
as left zero	5000	0.0	0.0	0.2	----
as left span	4912	88.3	800.0	841.0	0.951
SO2 Scrubber Check	4924	76.3	800.0	0.1	----
Date of last scrubber change:		19-Jul-10		Ave Corr Factor	0.980
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.8	Prev response:	80.55	*% change:	-0.9%
Baseline Corr 2nd AF pt:	40.0	AF Slope:	0.997736	AF Intercept:	0.141597
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999998		

* = > +/-5% change initiates investigation

Notes: Sox scrubber checked after the calibrator zero. H2S calibration Gas changed. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

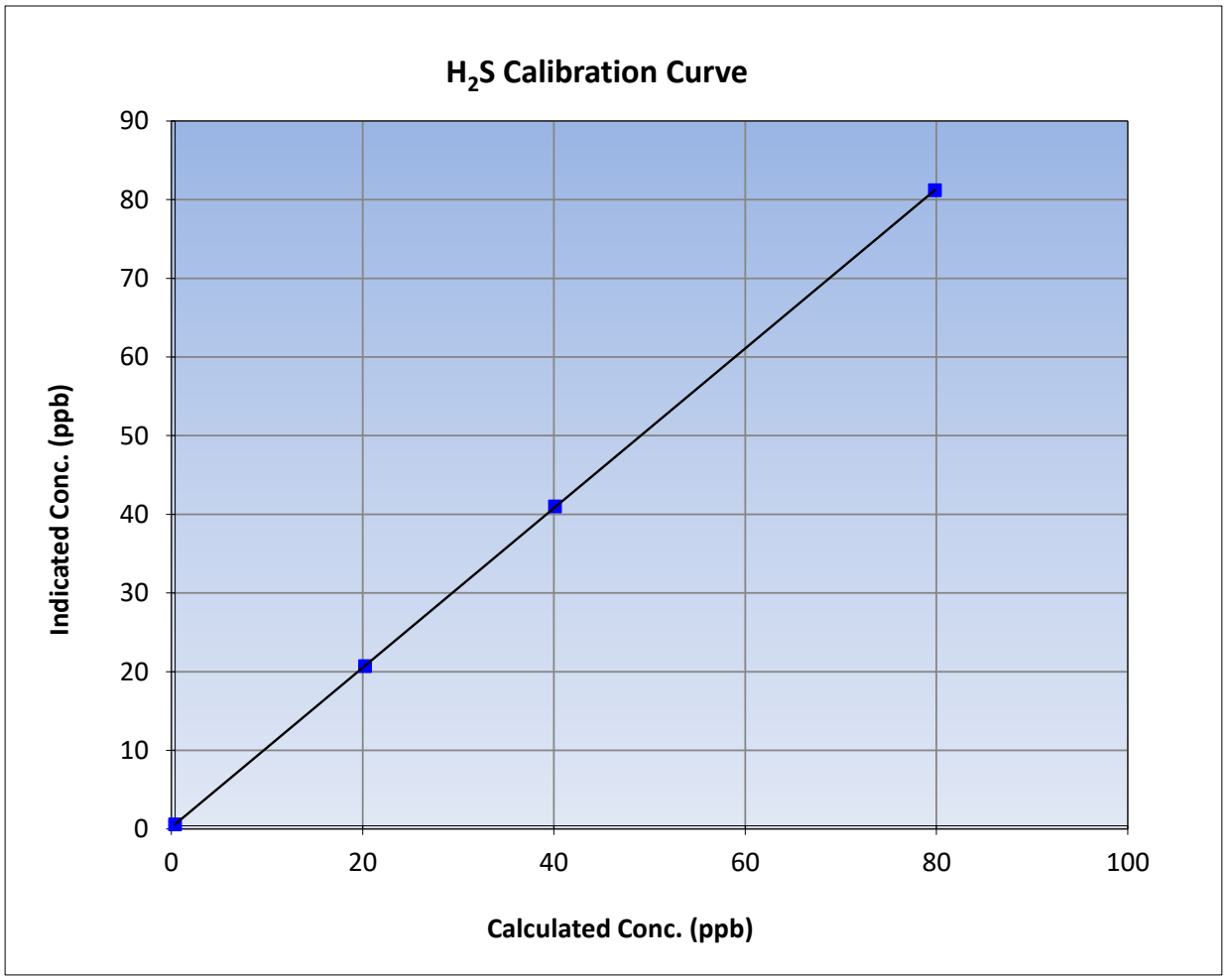
Station Information

Calibration Date:	April 12, 2023	Previous Calibration:	March 16, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	6:25	End Time (MST):	11:17
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1170050146

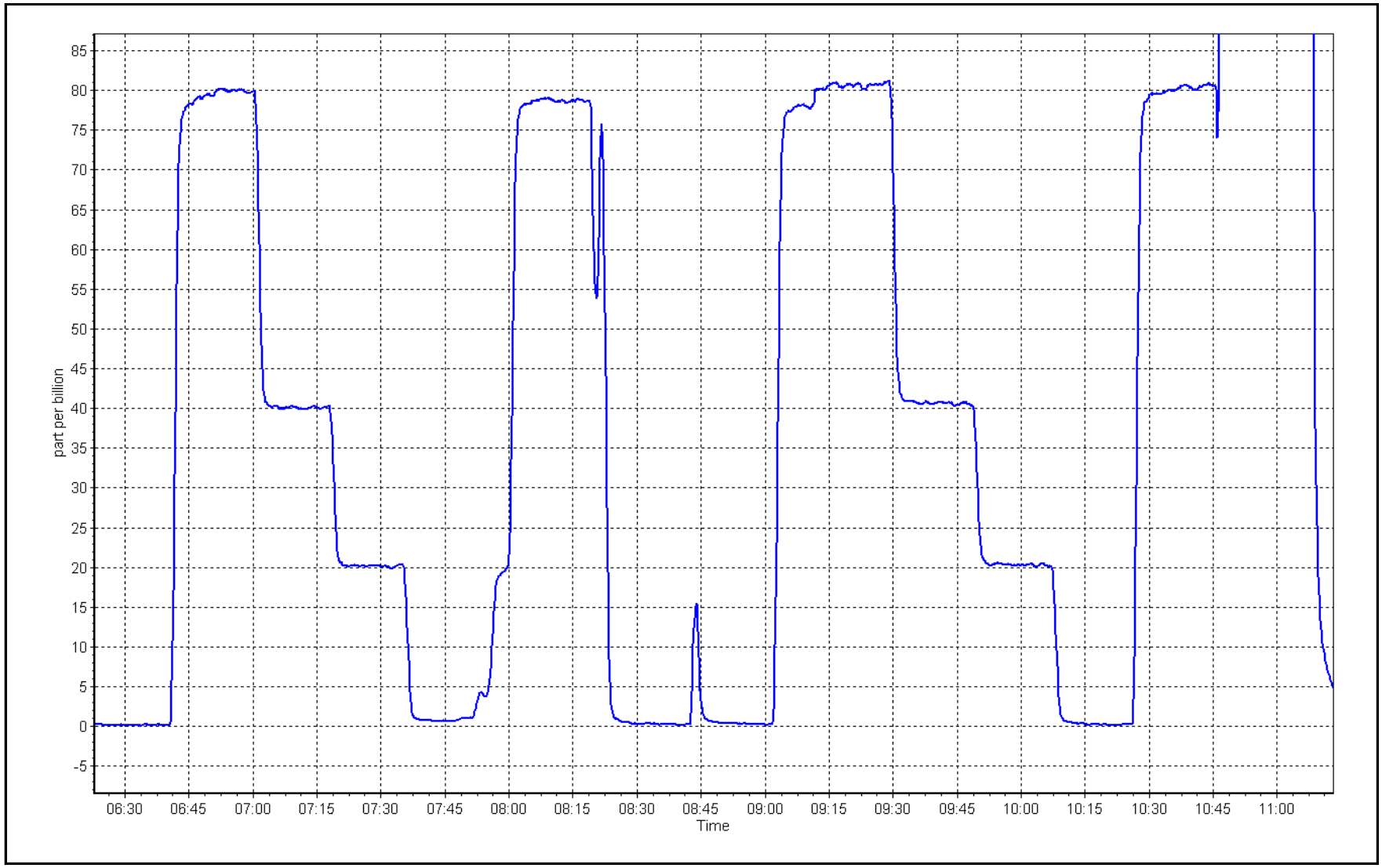
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
79.5	80.8	0.9834
39.7	40.6	0.9785
19.9	20.3	0.9785

Statistical Evaluation		Limits
Correlation Coefficient	0.999997	≥0.995
Slope	1.014757	0.90 - 1.10
Intercept	0.200000	+/-3



H_2S Calibration Plot Date: April 12, 2023 Location: Waskow ohci Pimatisiwin



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS26
CHRISTINA LAKE
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Christina Lake	Station number:	AMS 26
Calibration Date:	April 27, 2023	Last Cal Date:	March 23, 2023
Start time (MST):	7:23	End time (MST):	9:56
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.56	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC362134			
Removed Cal Gas Conc:	49.56	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	2447
ZAG Make/Model:	API T701		Serial Number:	953

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1173410001

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.990536	1.010951	Backgd or Offset:	16.5	16.5
Calibration intercept:	-2.994790	-2.757950	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	0.5	----
as found span	4919	80.6	799.0	807.8	0.989
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	----
high point	4919	80.6	799.0	806.5	0.991
second point	4960	40.3	399.4	399.6	1.000
third point	4980	20.2	200.2	196.4	1.019
as left zero	5000	0.0	0.0	0.4	----
as left span	4919	80.6	799.0	807.7	0.989
				Average Correction Factor	1.003

Baseline Corr As found:	807.30	Previous response	788.42	*% 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: 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

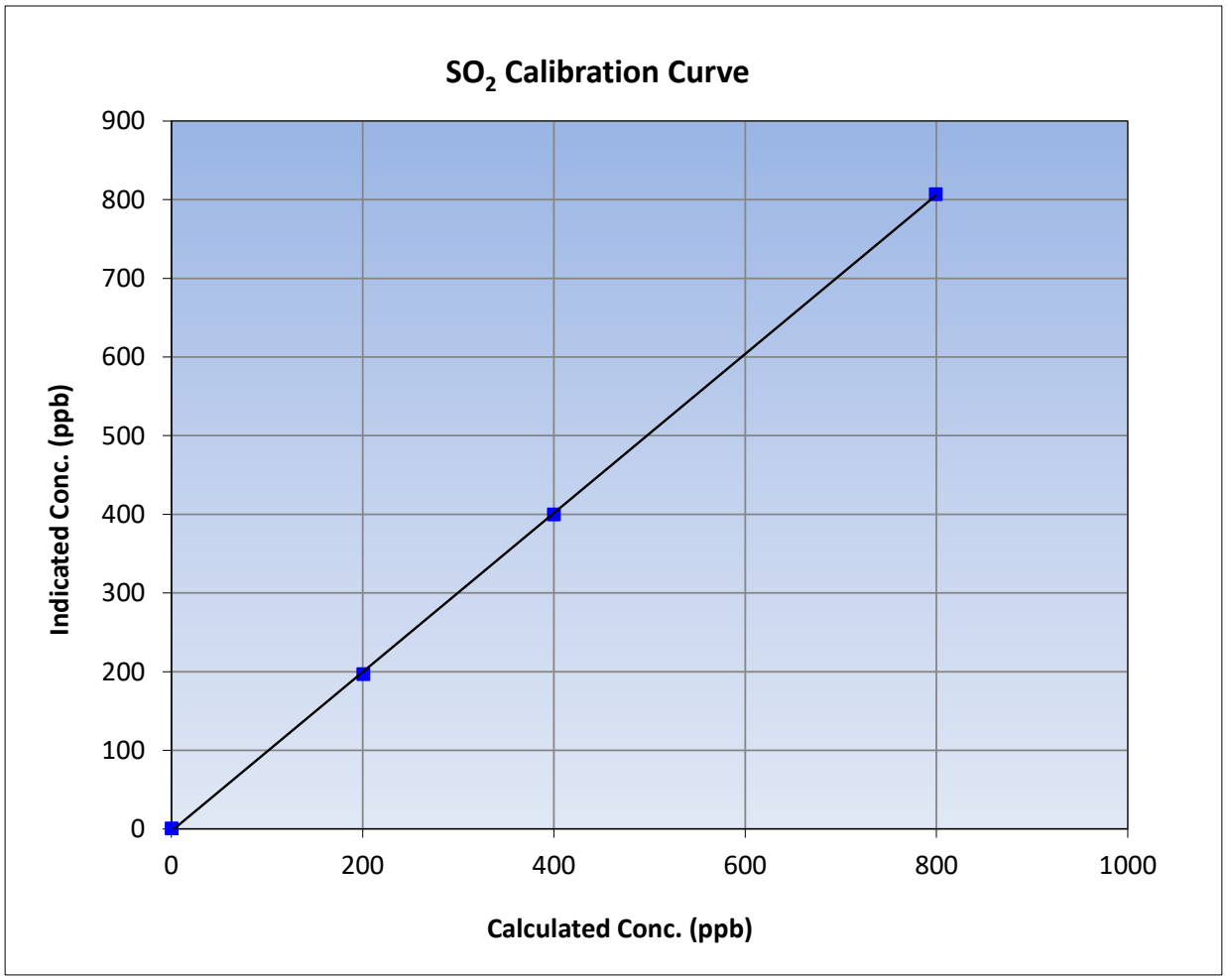
Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 23, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	7:23	End Time (MST):	9:56
Analyzer make:	Thermo 43i	Analyzer serial #:	1173410001

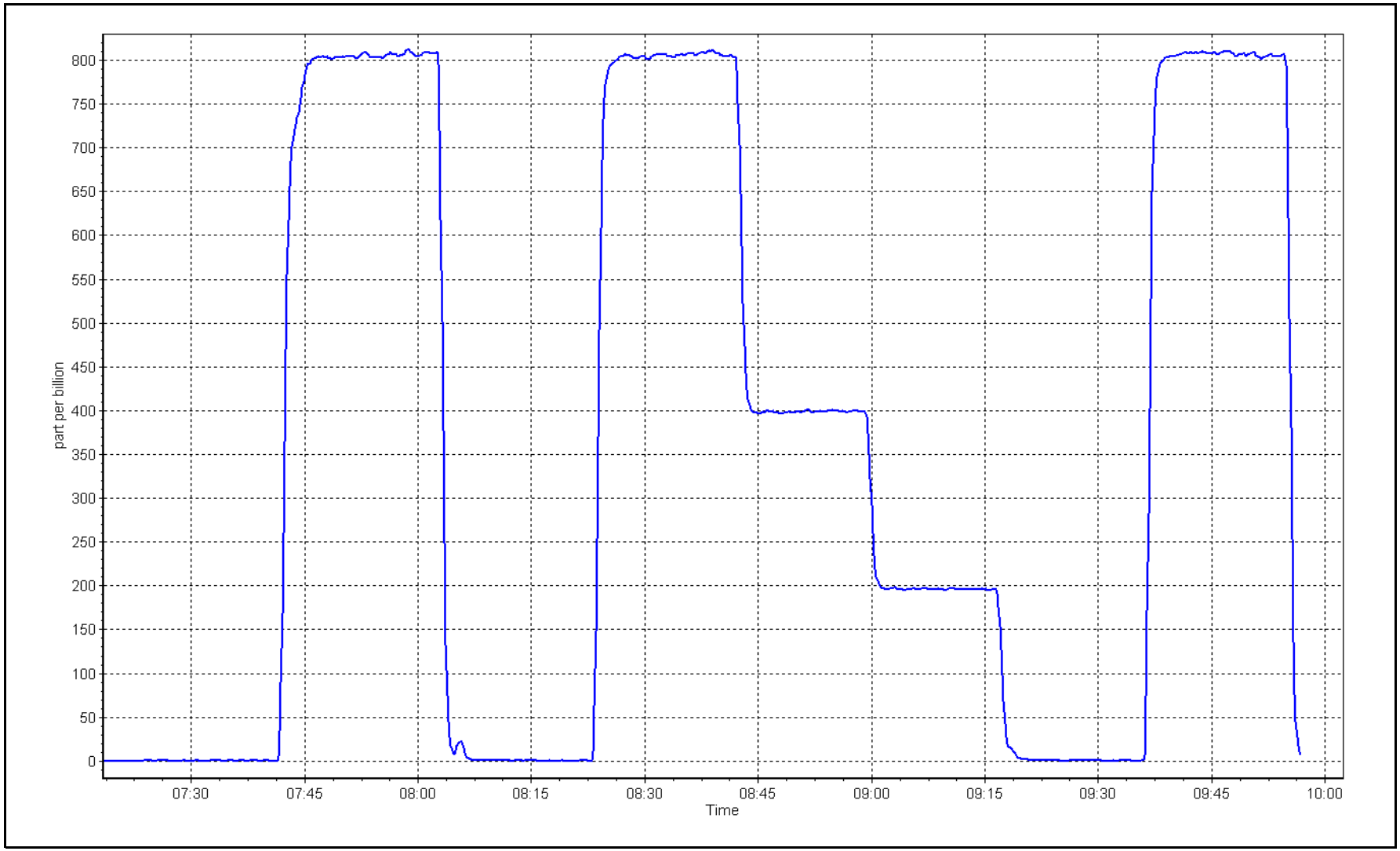
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
799.0	806.5	0.9907
399.4	399.6	0.9996
200.2	196.4	1.0194

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999930	*≥0.995*
Slope	1.010951	*0.90 - 1.10*
Intercept	-2.757950	*+/-30*



SO2 Calibration Plot Date: April 27, 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:	April 25, 2023	Last Cal Date:	March 22, 2023
Start time (MST):	11:18	End time (MST):	15:02
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	4.89	ppm	Cal Gas Exp Date:	February 9, 2024
Cal Gas Cylinder #:	EY0002466			
Removed Cal Gas Conc:	4.89	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	2447
ZAG Make/Model:	API T701		Serial Number:	953

Analyzer Information

Analyzer make:	Thermo 450i		Analyzer serial #:	1180030032	
Converter make:	NA		Converter serial #:	NA	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.979904	1.005611	Backgd or Offset:	33.6	35.4
Calibration intercept:	0.438608	-0.360862	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	1.3	----
as found span	4918	81.8	80.0	82.4	0.986
as found 2nd point	4959	40.9	40.0	41.4	0.998
as found 3rd point	4979	20.4	20.0	21.1	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	-0.2	----
high point	4918	81.8	80.0	80.2	0.998
second point	4959	40.9	40.0	39.7	1.008
third point	4979	20.4	20.0	19.6	1.018
as left zero	5000	0.0	0.0	-0.2	----
as left span	4918	81.8	80.0	81.3	0.984
SO2 Scrubber Check	4919	80.6	806.1	0.0	----
Date of last scrubber change:		27-Feb-19		Ave Corr Factor	1.008
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.1	Prev response:	78.83	*% change:	2.8%
Baseline Corr 2nd AF pt:	40.1	AF Slope:	1.014895	AF Intercept:	1.039275
Baseline Corr 3rd AF pt:	19.8	AF Correlation:	0.999948		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after MAF's. Ran scrubber check after calibrator zero. Adjusted zero only.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

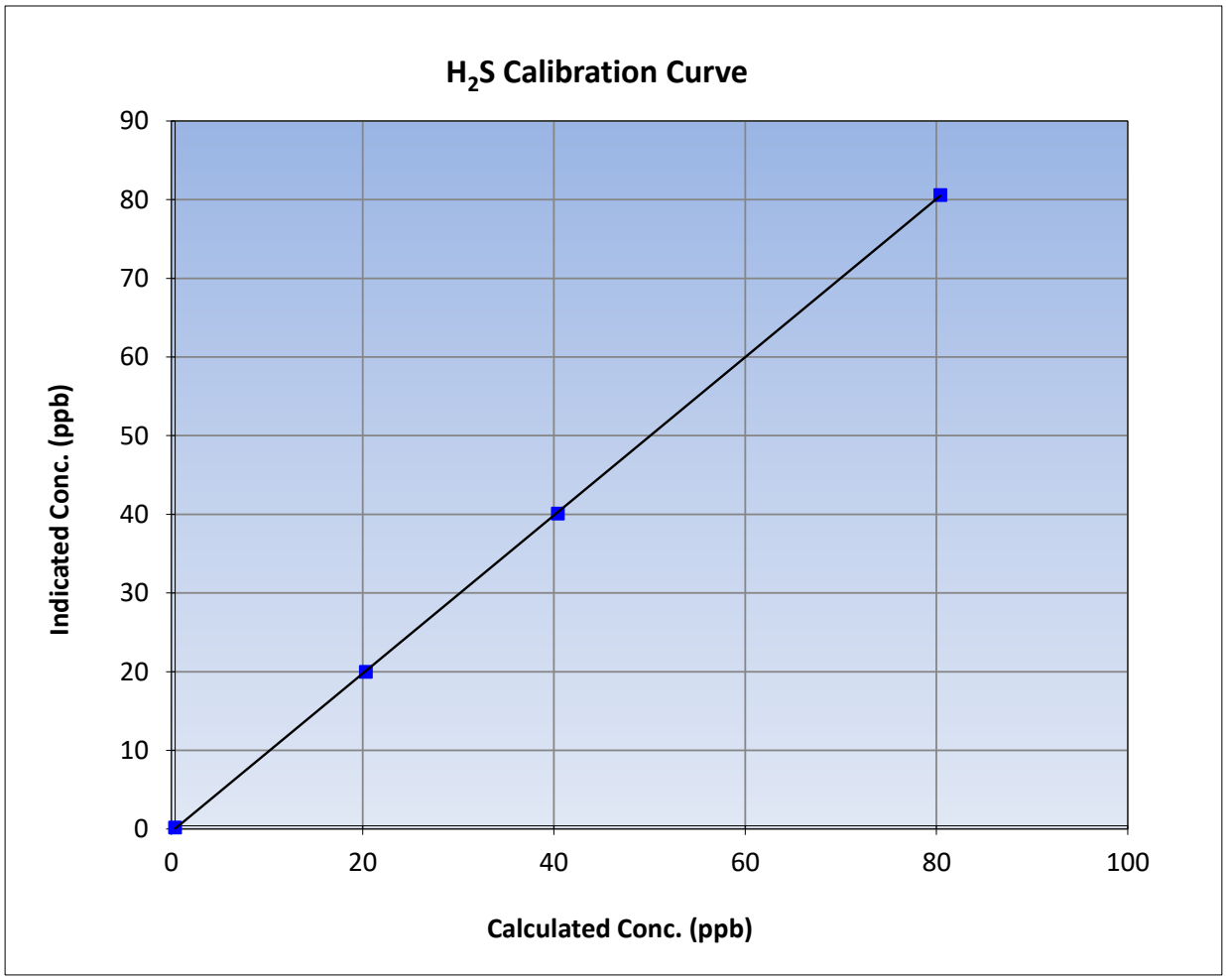
Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	March 22, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	11:18	End Time (MST):	15:02
Analyzer make:	Thermo 450i	Analyzer serial #:	1180030032

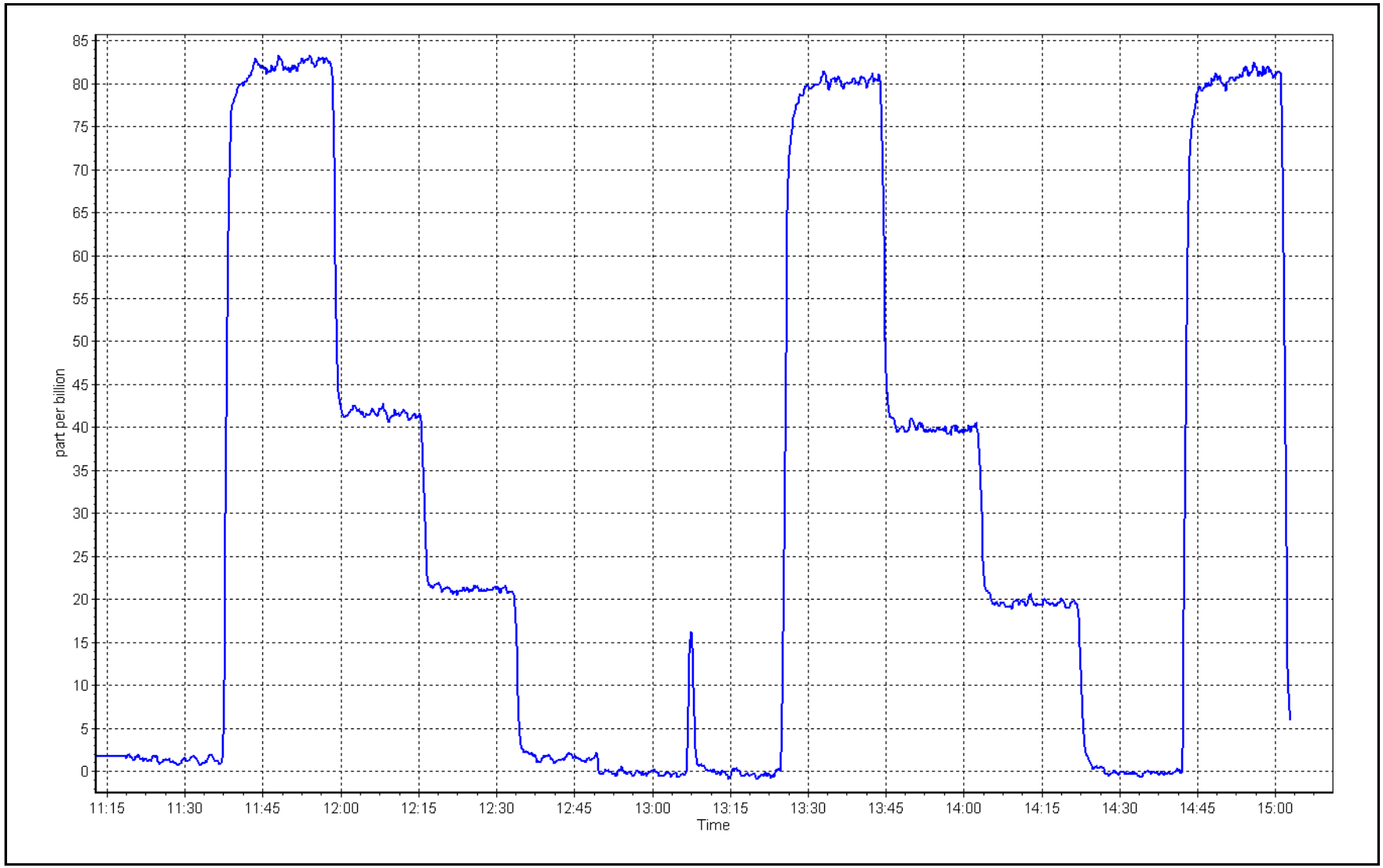
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
80.0	80.2	0.9976
40.0	39.7	1.0076
20.0	19.6	1.0180

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999979	*≥0.995*
Slope	1.005611	*0.90 - 1.10*
Intercept	-0.360862	*+/-3*



H_2S Calibration Plot Date: April 25, 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:	April 26, 2023	Last Cal Date:	March 29, 2023
Start time (MST):	10:16	End time (MST):	16:57
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2Y1P4C		Cal Gas Expiry Date:	November 12, 2023	
NOX Cal Gas Conc:	50.82	ppm	NO Cal Gas Conc:	50.02	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	50.82	ppm	Removed Gas NO Conc:	50.02	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	2447	
ZAG make/model:	API T701		Serial Number:	953	

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.713	1.762	NO bkgnd or offset:	2.9	2.9
NOX coeff or slope:	0.996	0.997	NOX bkgnd or offset:	2.9	3.0
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	191.9	198.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.989754	0.999958
NO_X Cal Offset:	-1.920000	-1.700000
NO Cal Slope:	0.990261	0.999786
NO Cal Offset:	-2.780000	-2.340000
NO_2 Cal Slope:	1.001972	1.003094
NO_2 Cal Offset:	0.216428	0.778854

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as found span	4920	80.0	813.1	800.3	12.8	796.4	781.2	15.2	1.0210	1.0245
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
high point	4920	80.0	813.1	800.3	12.8	812.2	798.9	13.4	1.0011	1.0018
second point	4960	40.0	406.6	400.2	6.4	404.2	396.8	7.3	1.0058	1.0085
third point	4980	20.0	203.3	200.1	3.2	199.6	195.2	4.5	1.0184	1.0250
as left zero	5000	0.0	0.0	0.0	0.0	0.3	0.2	0.1	----	----
as left span	4920	80.0	813.1	397.1	416.0	815.5	399.3	416.2	0.9971	0.9945
								Average Correction Factor	1.0085	1.0117

Corrected As found	NO_X = 796.5 ppb	NO = 781.3 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -0.8%
Previous Response	NO_X = 802.9 ppb	NO = 789.7 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)	798.2	395.0	416.0	417.6	0.9962	100.4%
2nd GPT point (200 ppb O3)	798.2	597.2	213.8	215.9	0.9903	101.0%
3rd GPT point (100 ppb O3)	798.2	702.3	108.7	110.3	0.9855	101.5%
				Average Correction Factor	0.9906	100.9%

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

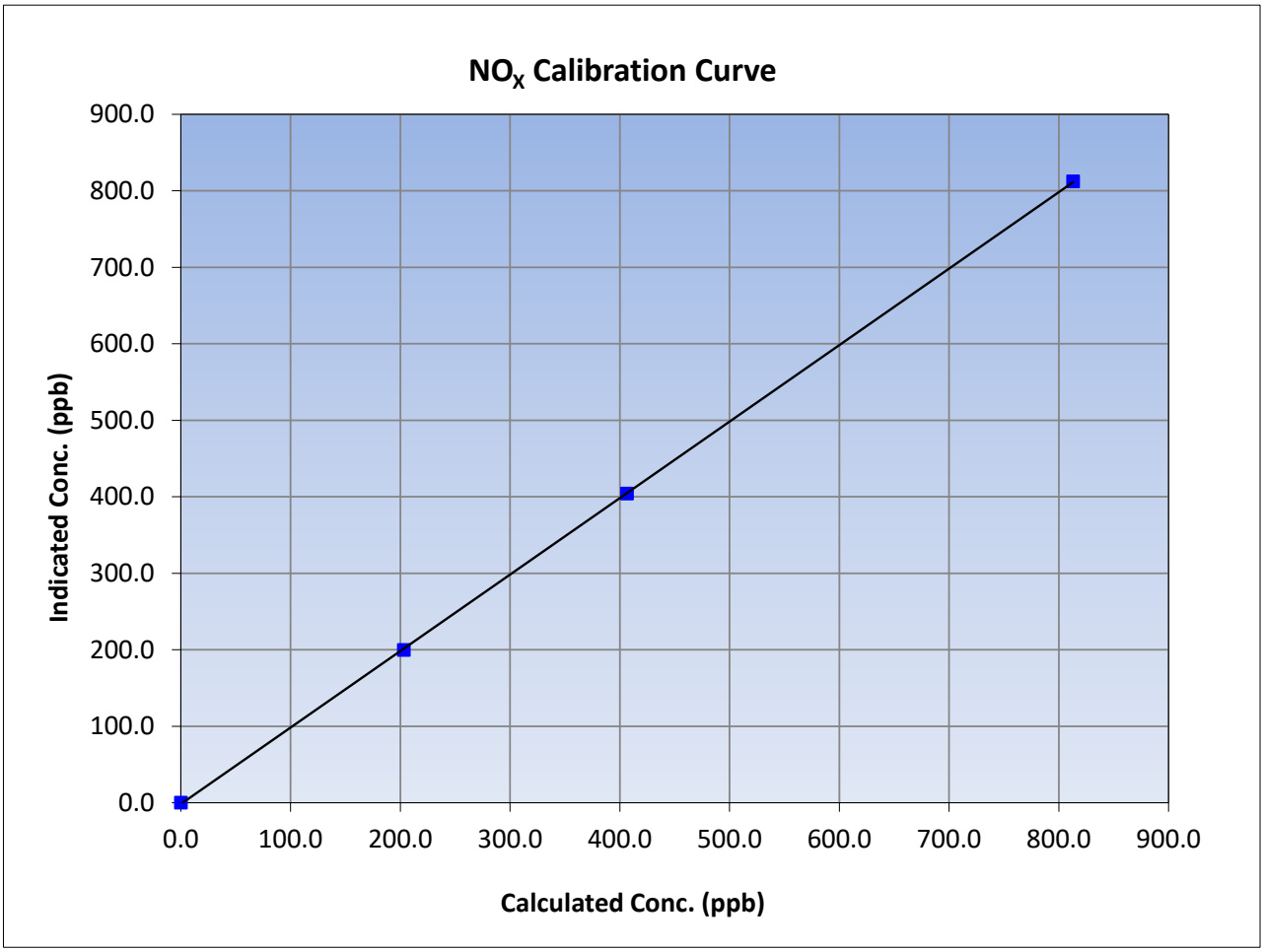
Version-04-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 29, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	10:16	End Time (MST):	16:57
Analyzer make:	Thermo 42i	Analyzer serial #:	14:00

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999977	≥0.995
813.1	812.2	1.0011			
406.6	404.2	1.0058	Slope	0.999958	0.90 - 1.10
203.3	199.6	1.0184			
			Intercept	-1.700000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

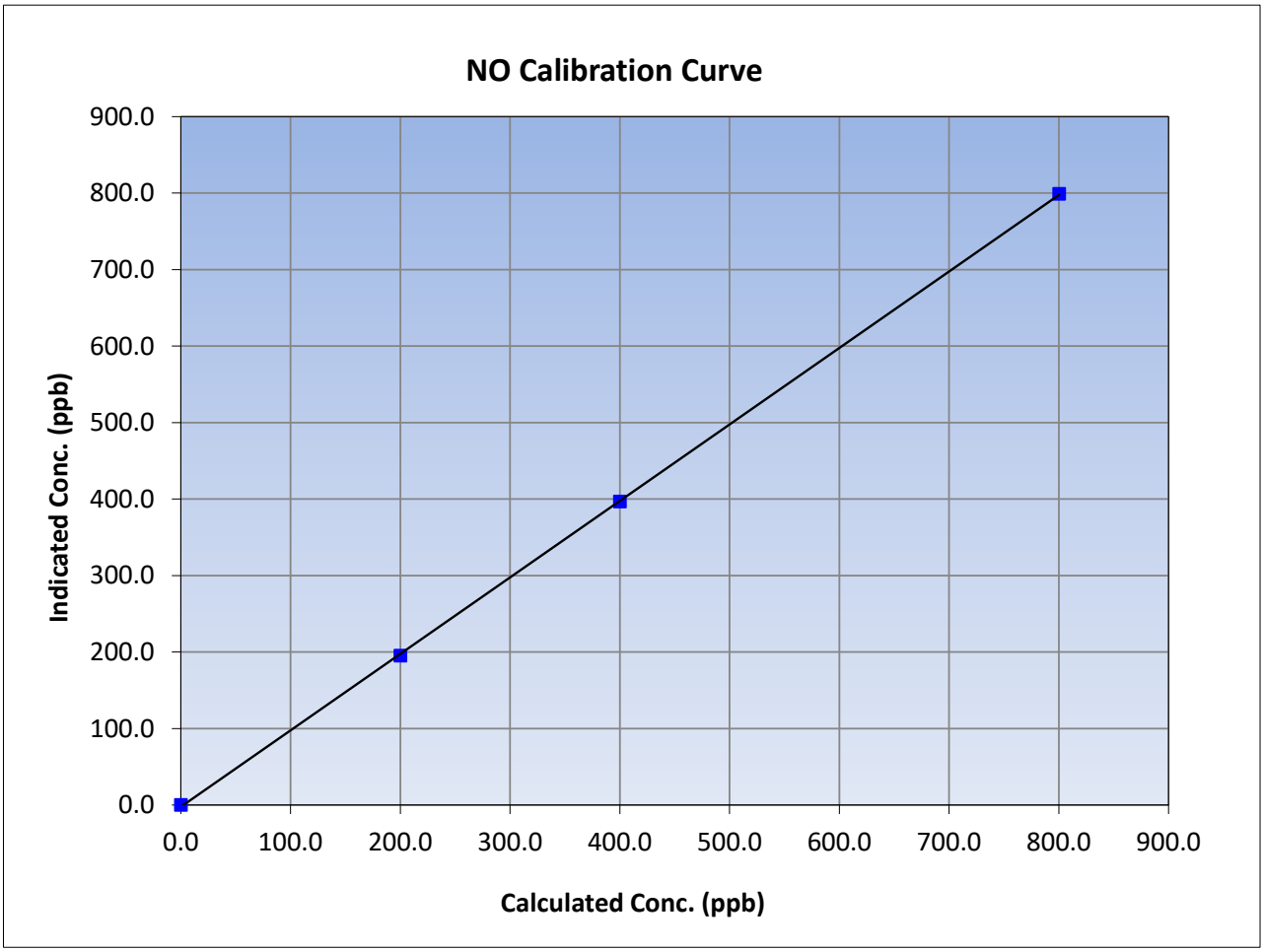
Version-04-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 29, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	10:16	End Time (MST):	16:57
Analyzer make:	Thermo 42i	Analyzer serial #:	14:00

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999961	≥0.995
800.3	798.9	1.0018			
400.2	396.8	1.0085	Slope	0.999786	0.90 - 1.10
200.1	195.2	1.0250			
			Intercept	-2.340000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

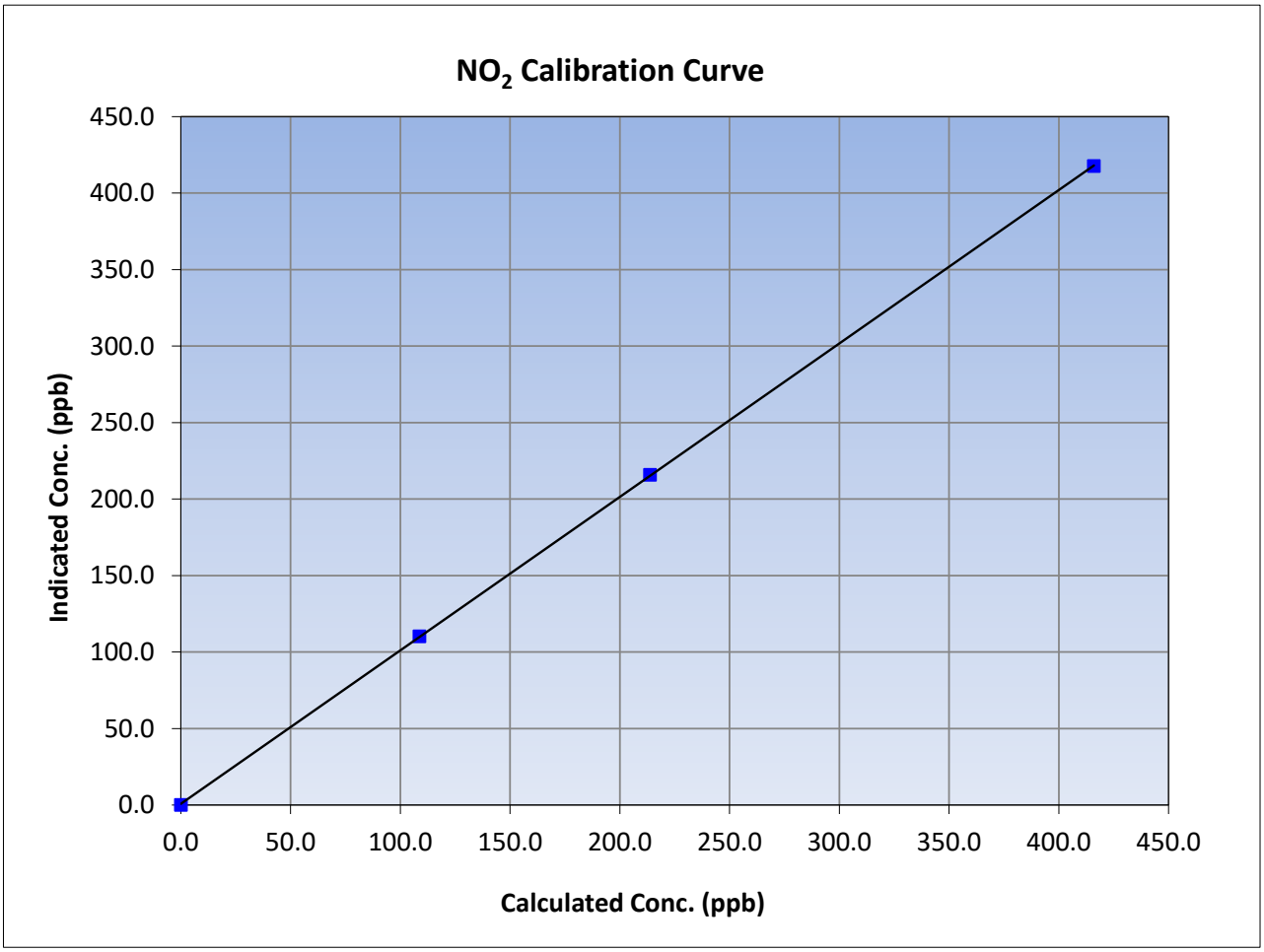
Version-04-2020

Station Information

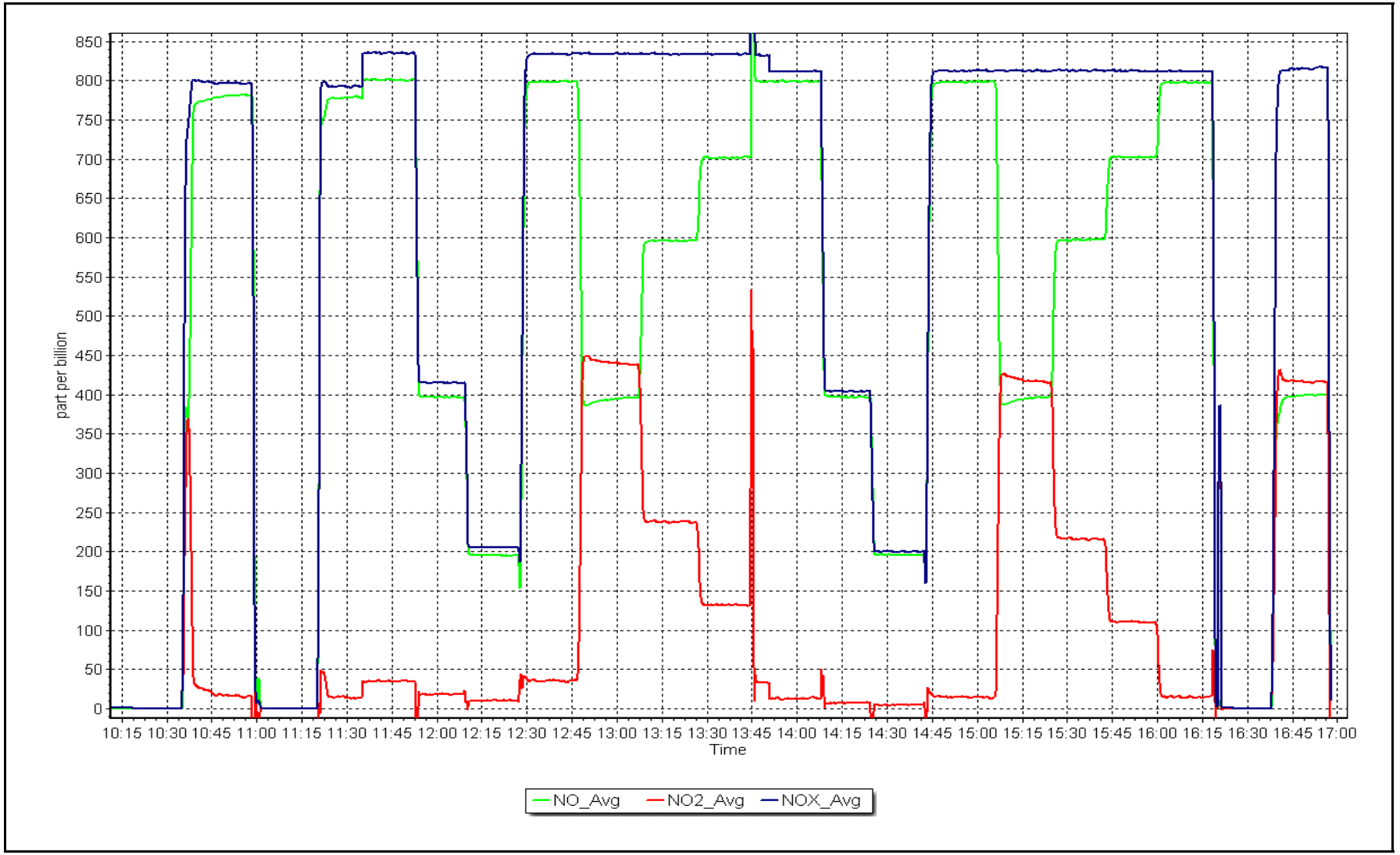
Calibration Date:	April 26, 2023	Previous Calibration:	March 29, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	10:16	End Time (MST):	16:57
Analyzer make:	Thermo 42i	Analyzer serial #:	14:00

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999986	≥0.995
416.0	417.6	0.9962			
213.8	215.9	0.9903	Slope	1.003094	0.90 - 1.10
108.7	110.3	0.9855			
			Intercept	0.778854	+/-20



NO_X Calibration Plot Date: April 26, 2023 Location: Christina Lake



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS27
JACKFISH 2/3
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Jackfish 2/3	Station number:	AMS 27
Calibration Date:	April 4, 2023	Last Cal Date:	March 8, 2023
Start time (MST):	9:39	End time (MST):	12:07
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 T701H		Serial Number:	135

Analyzer Information

Analyzer make: Thero 43iQ — Analyzer serial #: 12124313138

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.002034	1.012431	Backgd or Offset:	7.8	7.9
Calibration intercept:	-2.538384	-1.377395	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	810.0	0.988
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4921	79.1	800.2	809.0	0.989
second point	4961	39.5	399.5	403.8	0.989
third point	4980	19.8	200.3	199.0	1.007
as left zero	5000	0.0	0.0	0.2	----
as left span	4921	79.1	800.2	811.3	0.986
				Average Correction Factor	0.995

Baseline Corr As found:	810.00	Previous response	799.25	*% 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: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

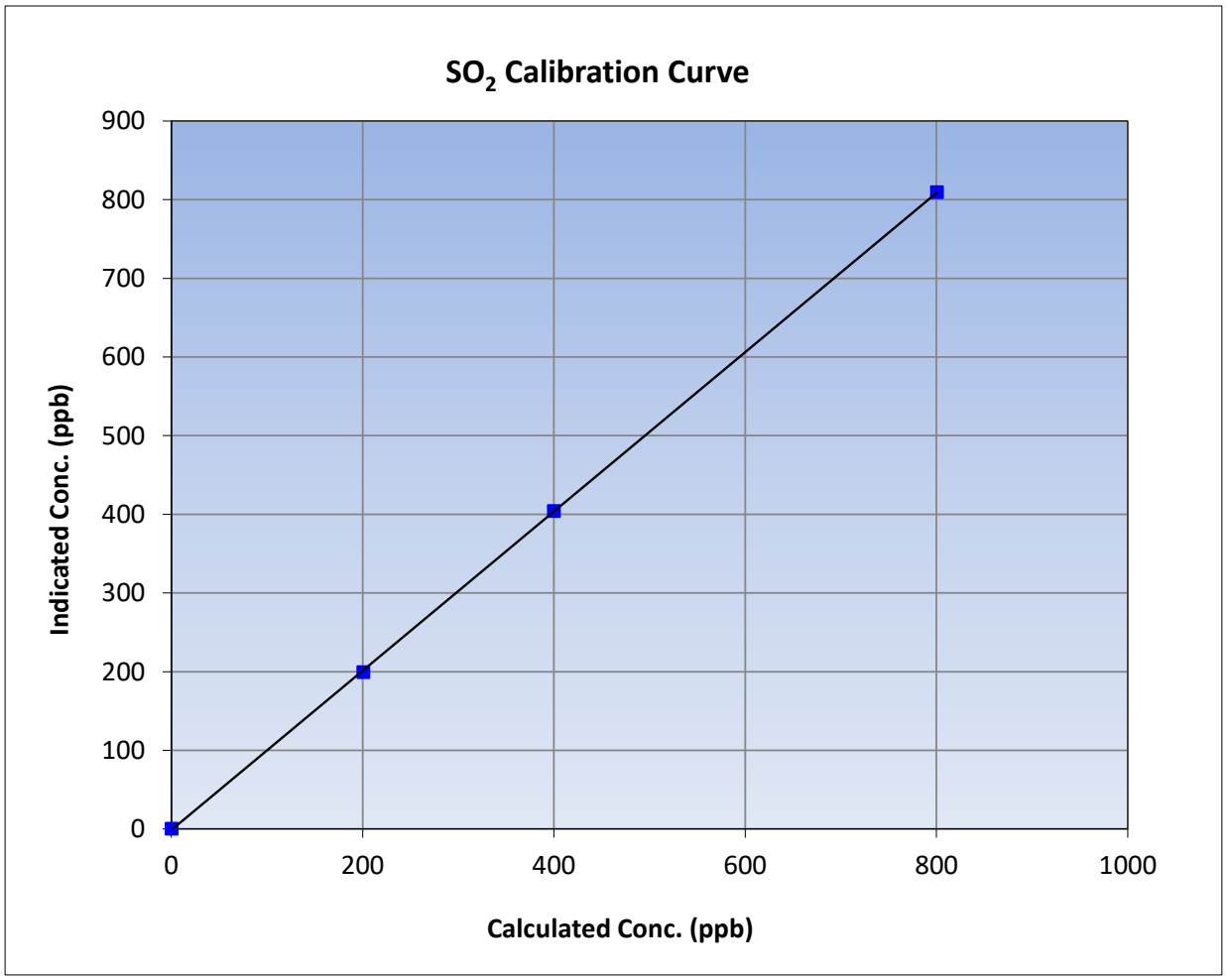
Station Information

Calibration Date:	April 4, 2023	Previous Calibration:	March 8, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS 27
Start Time (MST):	9:39	End Time (MST):	12:07
Analyzer make:	Thero 43iQ	Analyzer serial #:	12124313138

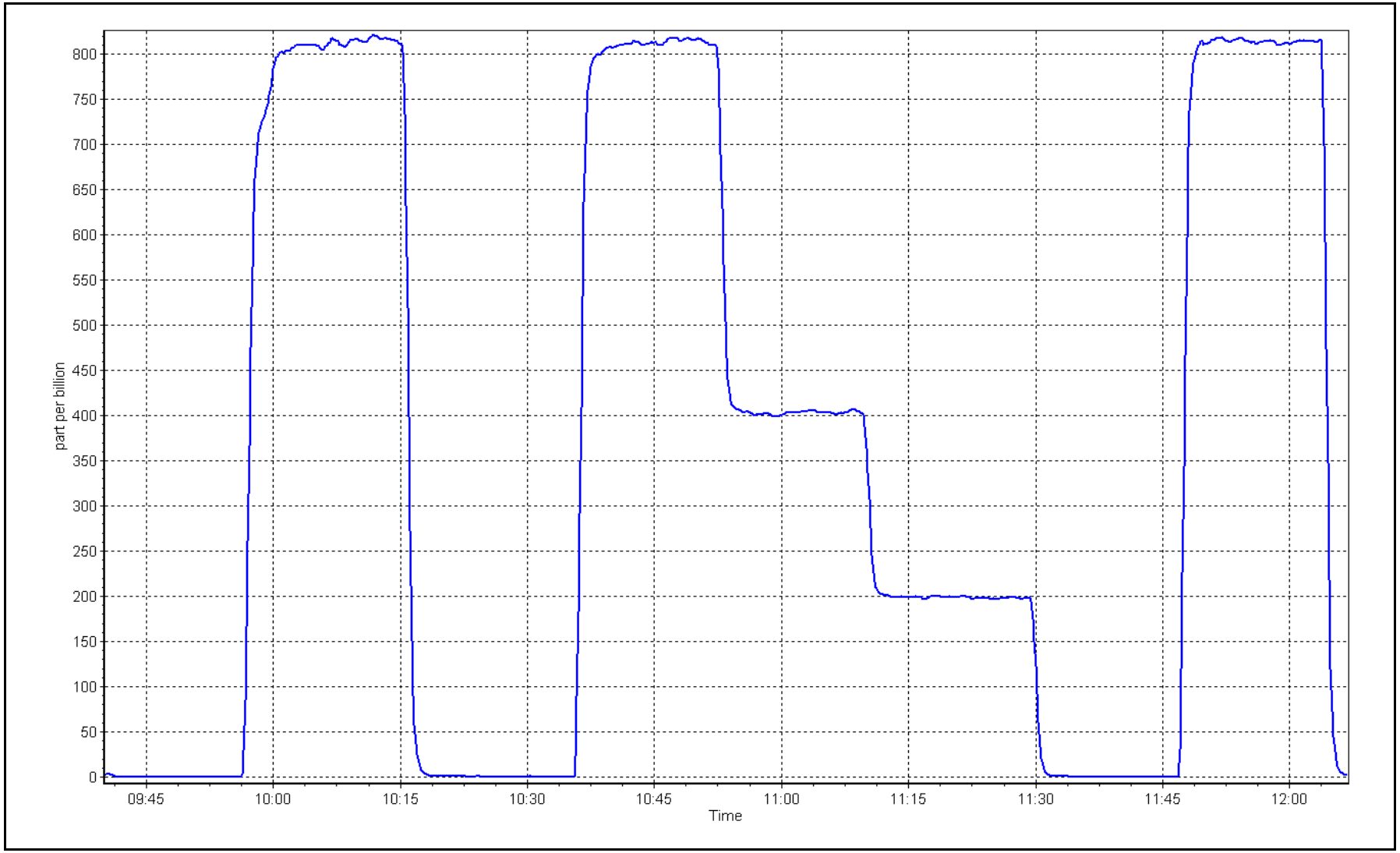
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
800.2	809.0	0.9891
399.5	403.8	0.9895
200.3	199.0	1.0066

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999976	*≥0.995*
Slope	1.012431	*0.90 - 1.10*
Intercept	-1.377395	*+/-30*



SO2 Calibration Plot Date: April 4, 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:	April 27, 2023	Last Cal Date:	March 23, 2023
Start time (MST):	9:18	End time (MST):	13:12
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.41	ppm	Cal Gas Exp Date:	January 4, 2025
Cal Gas Cylinder #:	CC345023			
Removed Cal Gas Conc:	5.41	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3811
ZAG Make/Model:	API 701		Serial Number:	135

Analyzer Information

Analyzer make:	API T101		Analyzer serial #:	621	
Converter make:			Converter serial #:		
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.983812	1.000342	Backgd or Offset:	25.4	25.7
Calibration intercept:	-0.138417	-0.217897	Coeff or Slope:	0.949	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	0.3	----
as found span	4926	74.1	80.2	79.7	1.010
as found 2nd point	4963	37.0	40.0	39.8	1.014
as found 3rd point	4982	18.5	20.0	19.5	1.042
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4926	74.1	80.2	80.0	1.002
second point	4963	37.0	40.0	40.0	1.001
third point	4982	18.5	20.0	19.4	1.032
as left zero	5000	0.0	0.0	0.0	----
as left span	4926	74.1	80.2	79.9	1.003
SO2 Scrubber Check	4921	79.1	791.0	0.1	----
Date of last scrubber change:				Ave Corr Factor	1.012
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.4	Prev response:	78.74	*% change:	0.8%
Baseline Corr 2nd AF pt:	39.5	AF Slope:	0.992790	AF Intercept:	0.021866
Baseline Corr 3rd AF pt:	19.2	AF Correlation:	0.999931		

* = > +/-5% change initiates investigation

Notes: Adjusted the zero and span.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

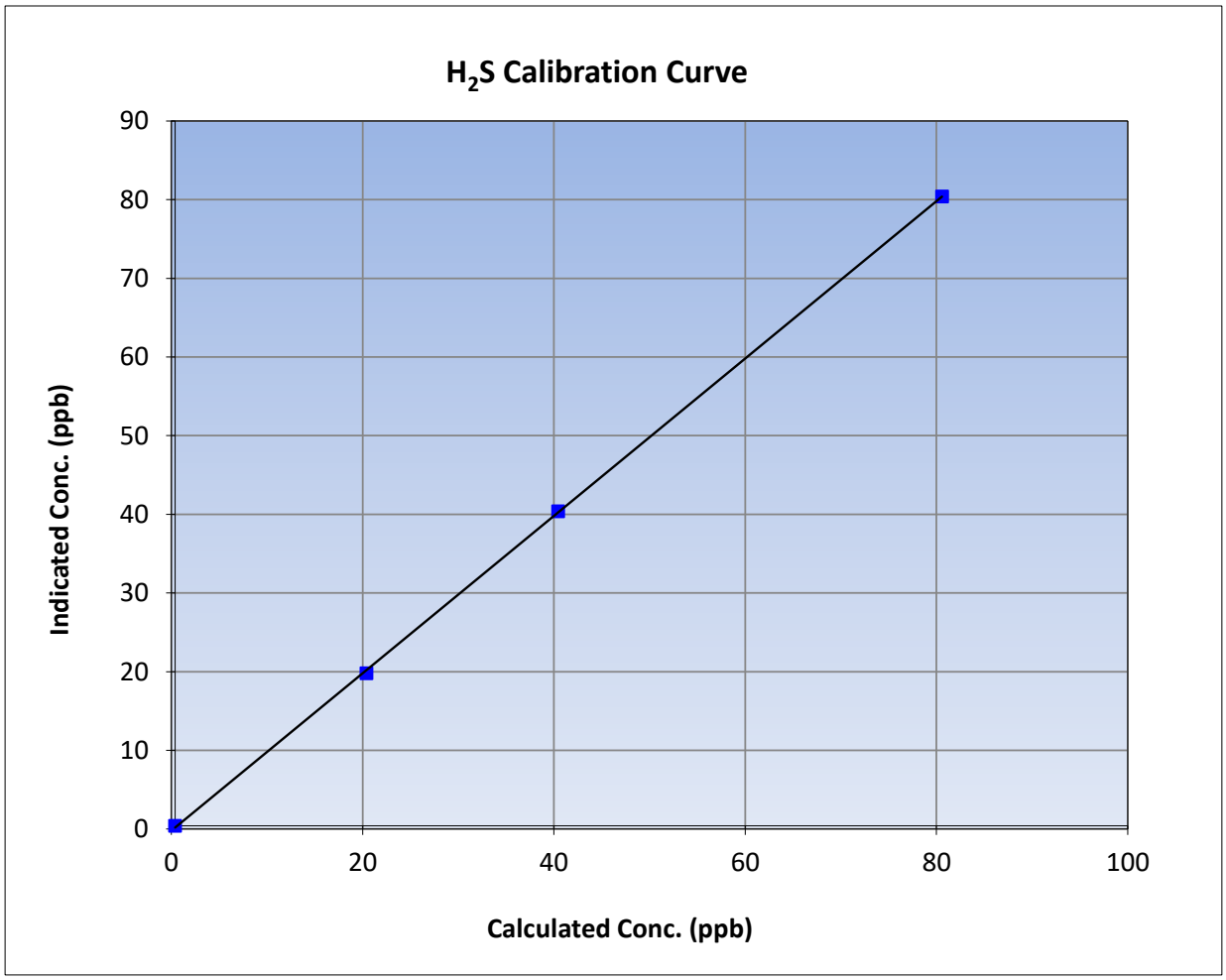
Station Information

Calibration Date:	April 27, 2023	Previous Calibration:	March 23, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:18	End Time (MST):	13:12
Analyzer make:	API T101	Analyzer serial #:	621

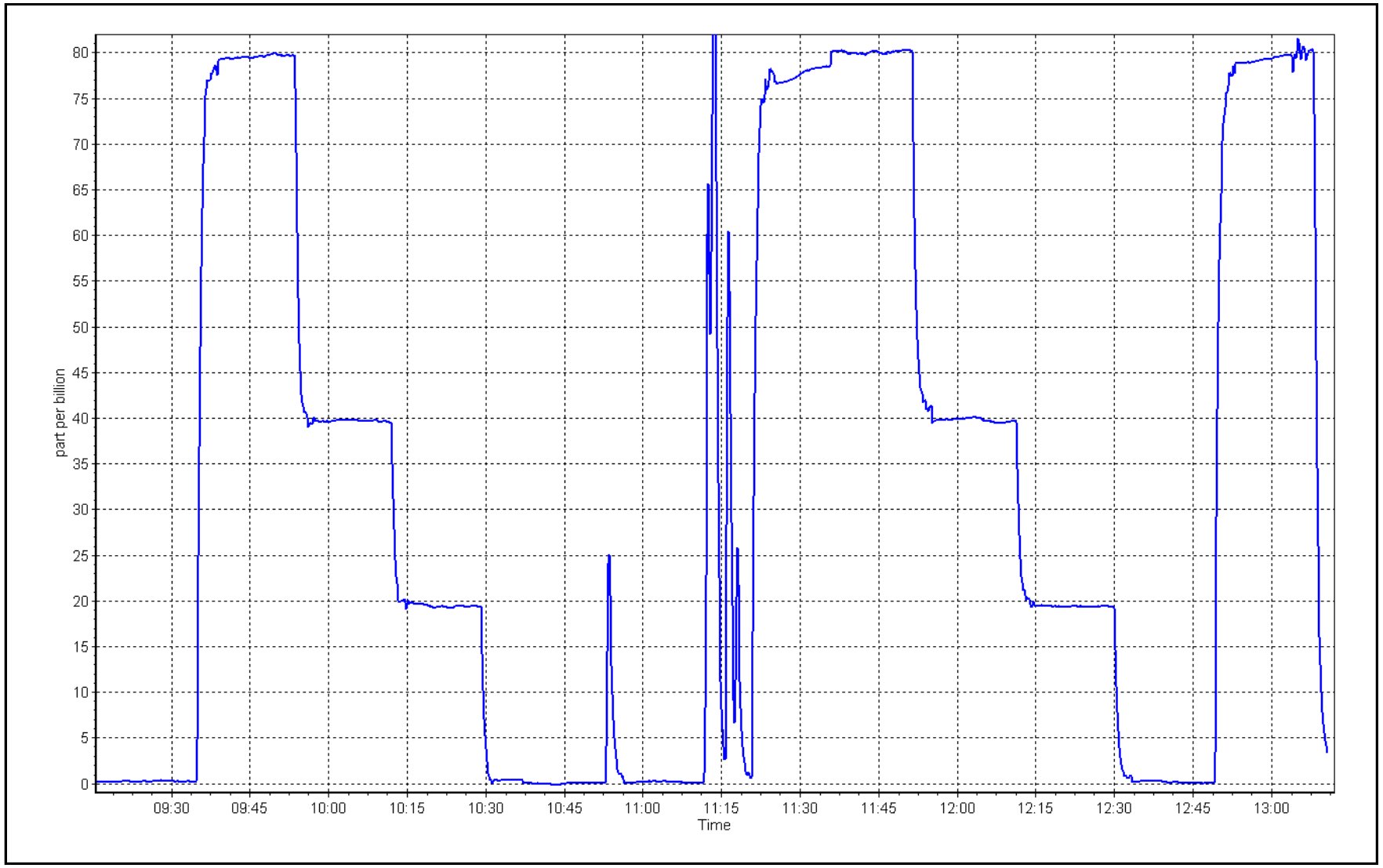
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.2	80.0	1.0022
40.0	40.0	1.0009
20.0	19.4	1.0317

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999932	*≥0.995*
Slope	1.000342	*0.90 - 1.10*
Intercept	-0.217897	*+/-3*



H_2S Calibration Plot Date: April 27, 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:	April 19, 2023	Last Cal Date:	March 28, 2023
Start time (MST):	9:42	End time (MST):	12:15
Reason:	Removal		

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 #:	4460
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.241	N/A	NO bkgnd or offset:	0.9	N/A
NOX coeff or slope:	1.228	N/A	NOX bkgnd or offset:	0.9	N/A
NO2 coeff or slope:	1.000	N/A	Reaction cell Press:	4.4	N/A

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.998179	N/A
NO_X Cal Offset:	-4.217263	N/A
NO Cal Slope:	0.998789	N/A
NO Cal Offset:	-3.720948	N/A
NO_2 Cal Slope:	0.995821	N/A
NO_2 Cal Offset:	-0.727241	N/A

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	-0.8	0.9	----	----
as found span	4921	79.4	816.8	800.3	16.5	805.0	793.4	11.6	1.0147	1.0087
as found 2nd	4960	39.7	408.5	400.2	8.3	400.2	392.1	8.2	1.0206	1.0207
as found 3rd	4980	19.8	203.7	199.6	4.1	198.9	190.9	8.0	1.0242	1.0455
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 = 804.8 ppb	NO = 794.2 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X = 83.2%
Previous Response	NO_X = 135.0 ppb	NO = 795.6 ppb			*Percent Change	NO = -0.2%
Baseline Corr 2nd pt	NO_X = 400.0 ppb	NO = 392.9 ppb	As found	NO_X r^2: 0.999986	Nx Sl: 0.985810	Nx Int: -1.098
Baseline Corr 3rd pt	NO_X = 198.7 ppb	NO = 191.7 ppb	As found	NO r^2: 0.999917	NO Sl: 0.994520	NO Int: -4.202
			As found	NO_2 r^2: 0.999899	NO2 Sl: 0.992758	NO_2 Int: -0.742

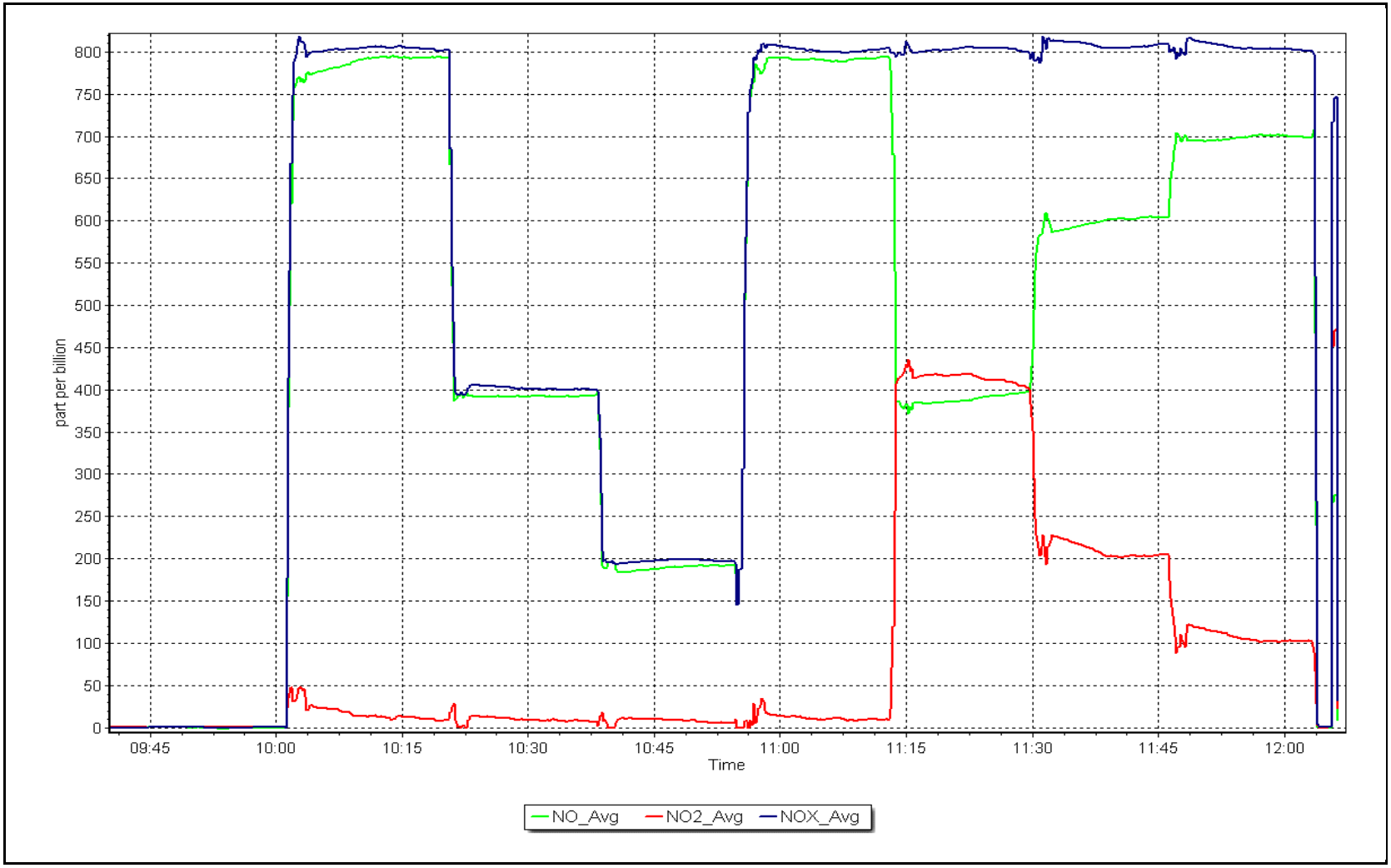
GPT Calibration Data

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	0.9	----	----
as found GPT point (400 ppb NO2)	790.9	392.7	414.7	411.4	1.0081	99.2%
as found GPT point (200 ppb NO2)	790.9	600.5	206.9	205.1	1.0088	99.1%
as found GPT point (100 ppb NO2)	790.9	700.6	106.8	102.8	1.0390	96.2%
1st GPT point (400 ppb O3)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)	N/A					
				Average Correction Factor		

Notes: Conducted MPAFs for a removal calibration; analyzer will be replaced.

Calibration Performed By: Denny Ray Estador

NO_X Calibration Plot Date: April 19, 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:	April 20, 2023	Last Cal Date:	April 19, 2023
Start time (MST):	9:18	End time (MST):	13:15
Reason:	Install		

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:	1.241	1.003	NO bkgnd or offset:	0.9	-3.0
NOX coeff or slope:	1.228	1.005	NOX bkgnd or offset:	0.9	-2.6
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	4.4	4.4

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	N/A	1.005888
NO_X Cal Offset:	N/A	-2.995962
NO Cal Slope:	N/A	1.002272
NO Cal Offset:	N/A	-2.840268
NO_2 Cal Slope:	N/A	0.996178
NO_2 Cal Offset:	N/A	1.252891

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	0.1	0.0	----	----
high point	4921	79.4	816.8	800.3	16.5	820.0	800.6	19.2	0.9961	0.9996
second point	4960	39.7	408.5	400.2	8.3	406.8	397.2	9.6	1.0041	1.0076
third point	4980	19.8	203.7	199.6	4.1	198.5	194.0	4.5	1.0262	1.0288
as left zero	5000	0.0	0.0	0.0	0.0	0.5	0.9	-0.4	----	----
as left span	4921	79.4	816.8	407.9	410.1	814.4	405.6	408.9	1.0029	1.0057
								Average Correction Factor	1.0088	1.0120

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)	800.1	406.5	410.1	409.1	1.0025	99.8%
2nd GPT point (200 ppb O3)	800.1	615.2	201.4	202.7	0.9937	100.6%
3rd GPT point (100 ppb O3)	800.1	707.8	108.8	110.8	0.9821	101.8%
				Average Correction Factor	0.9927	100.7%

Notes: Install calibration; Replaced analyzer due to poor performance. Adjusted both zero and span.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

NO_X Calibration Summary

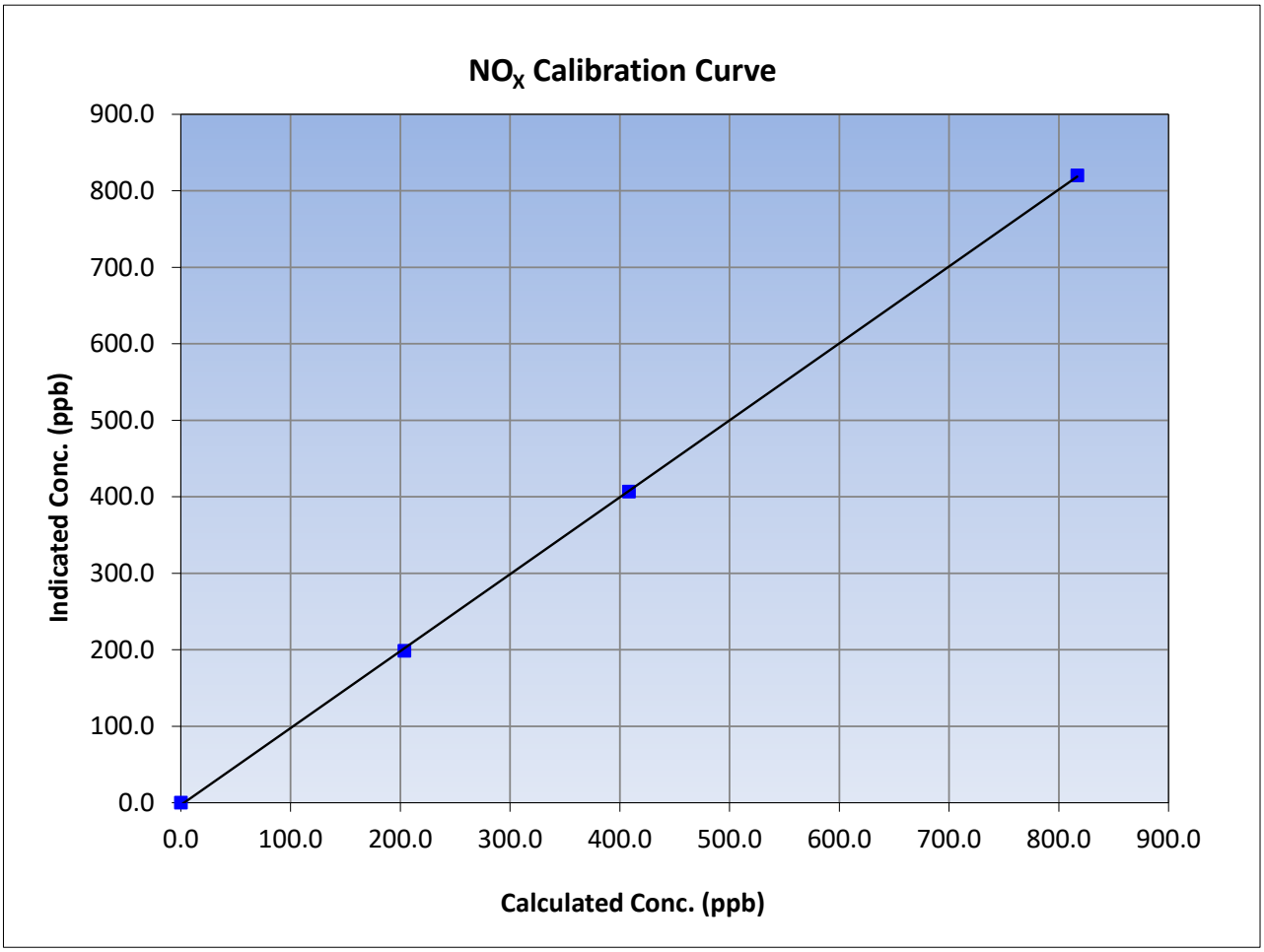
Version-04-2020

Station Information

Calibration Date:	April 20, 2023	Previous Calibration:	April 19, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:18	End Time (MST):	13:15
Analyzer make:	API T200	Analyzer serial #:	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999934	≥0.995
816.8	820.0	0.9961			
408.5	406.8	1.0041	Slope	1.005888	0.90 - 1.10
203.7	198.5	1.0262			
			Intercept	-2.995962	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

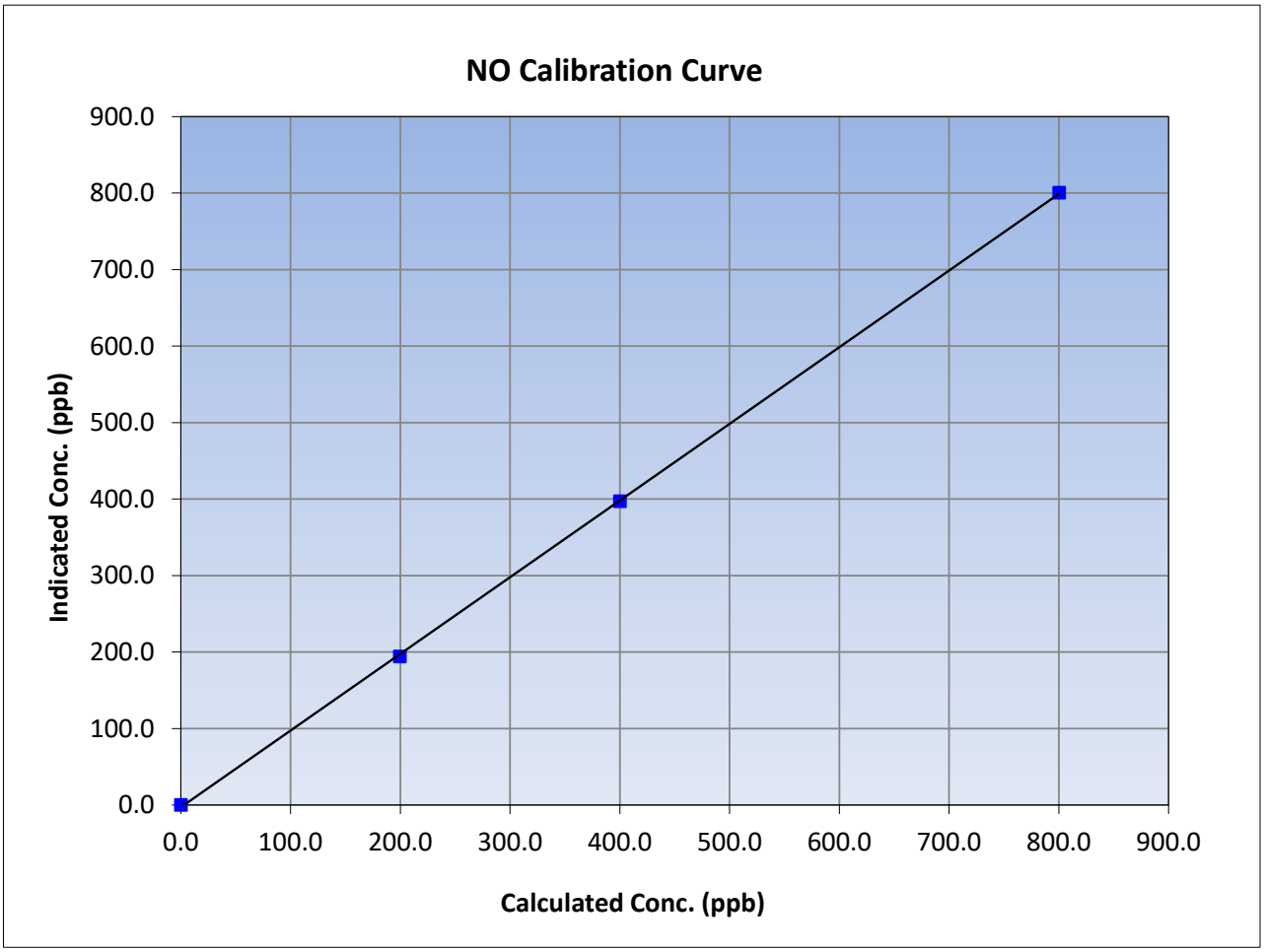
Version-04-2020

Station Information

Calibration Date:	April 20, 2023	Previous Calibration:	April 19, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:18	End Time (MST):	13:15
Analyzer make:	API T200	Analyzer serial #:	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999938	≥0.995
800.3	800.6	0.9996			
400.2	397.2	1.0076	Slope	1.002272	0.90 - 1.10
199.6	194.0	1.0288			
			Intercept	-2.840268	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

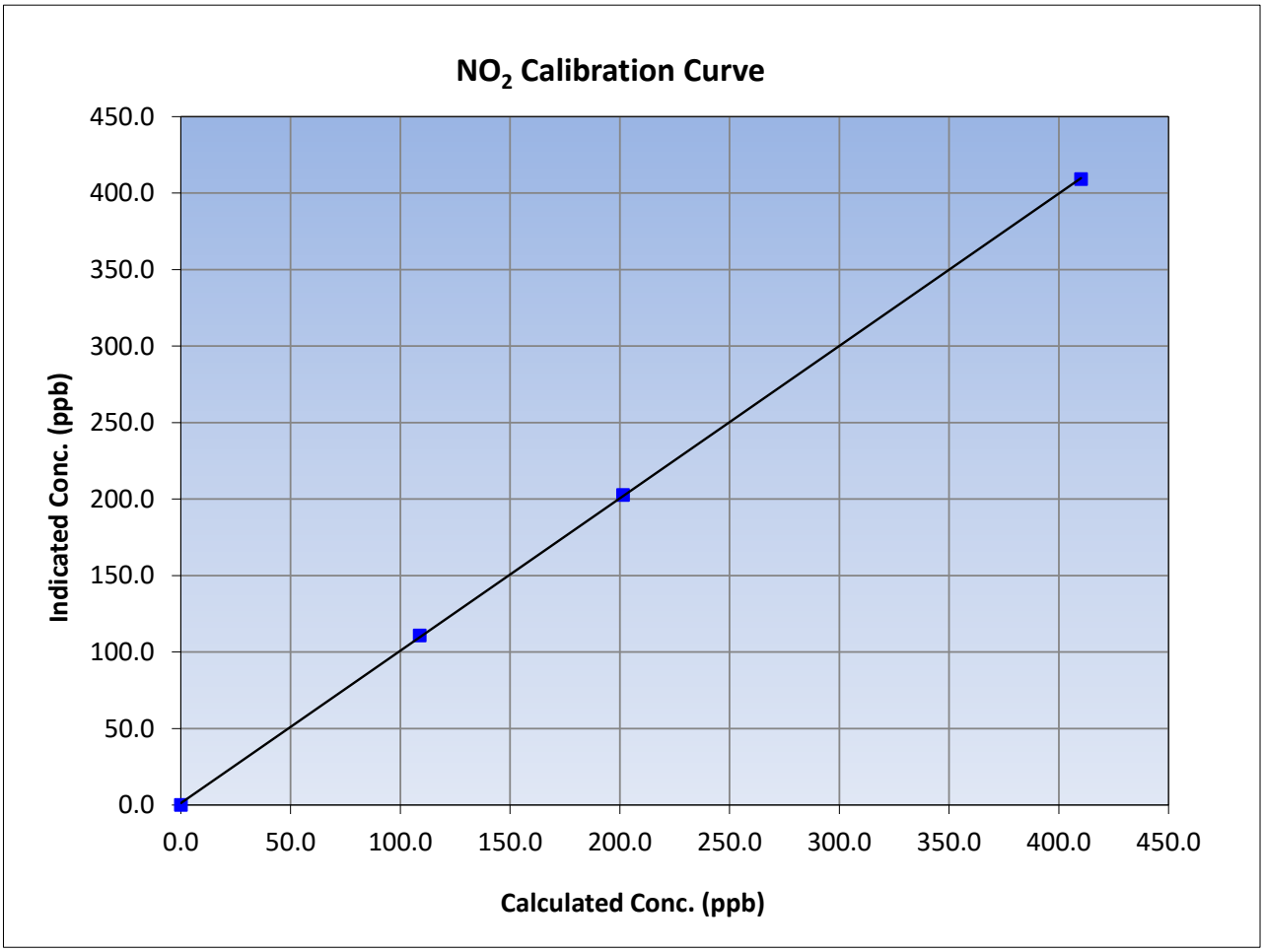
Version-04-2020

Station Information

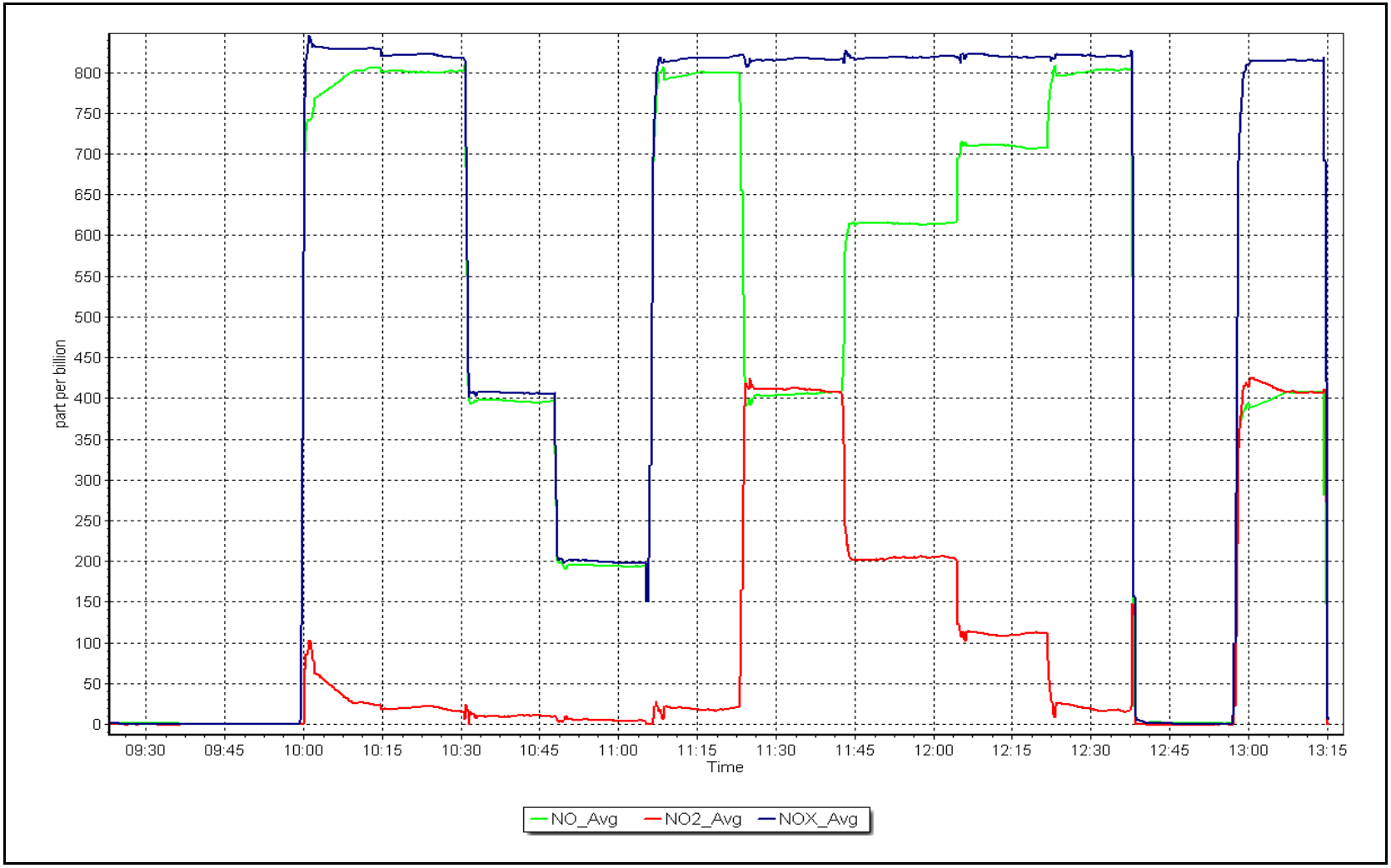
Calibration Date:	April 20, 2023	Previous Calibration:	April 19, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:18	End Time (MST):	13:15
Analyzer make:	API T200	Analyzer serial #:	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999955	≥0.995
410.1	409.1	1.0025			
201.4	202.7	0.9937	Slope	0.996178	0.90 - 1.10
108.8	110.8	0.9821			
			Intercept	1.252891	+/-20



NO_X Calibration Plot Date: April 20, 2023 Location: Jackfish 2/3



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS29
SURMONT 2
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	April 13, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	10:01	End time (MST):	13:12
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:	1.006112	0.998958	Backgd or Offset:	12.4	12.3
Calibration intercept:	-2.145180	-0.765478	Coeff or Slope:	0.934	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	-0.2	----
as found span	4919	81.3	800.1	805.0	0.994
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	800.1	799.1	1.001
second point	4959	40.7	400.6	398.8	1.004
third point	4979	20.3	199.8	197.7	1.011
as left zero	5000	0.0	0.0	0.1	----
as left span	4919	81.3	800.1	799.5	1.001
				Average Correction Factor	1.005

Baseline Corr As found:	805.20	Previous response	802.85	*% change	0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

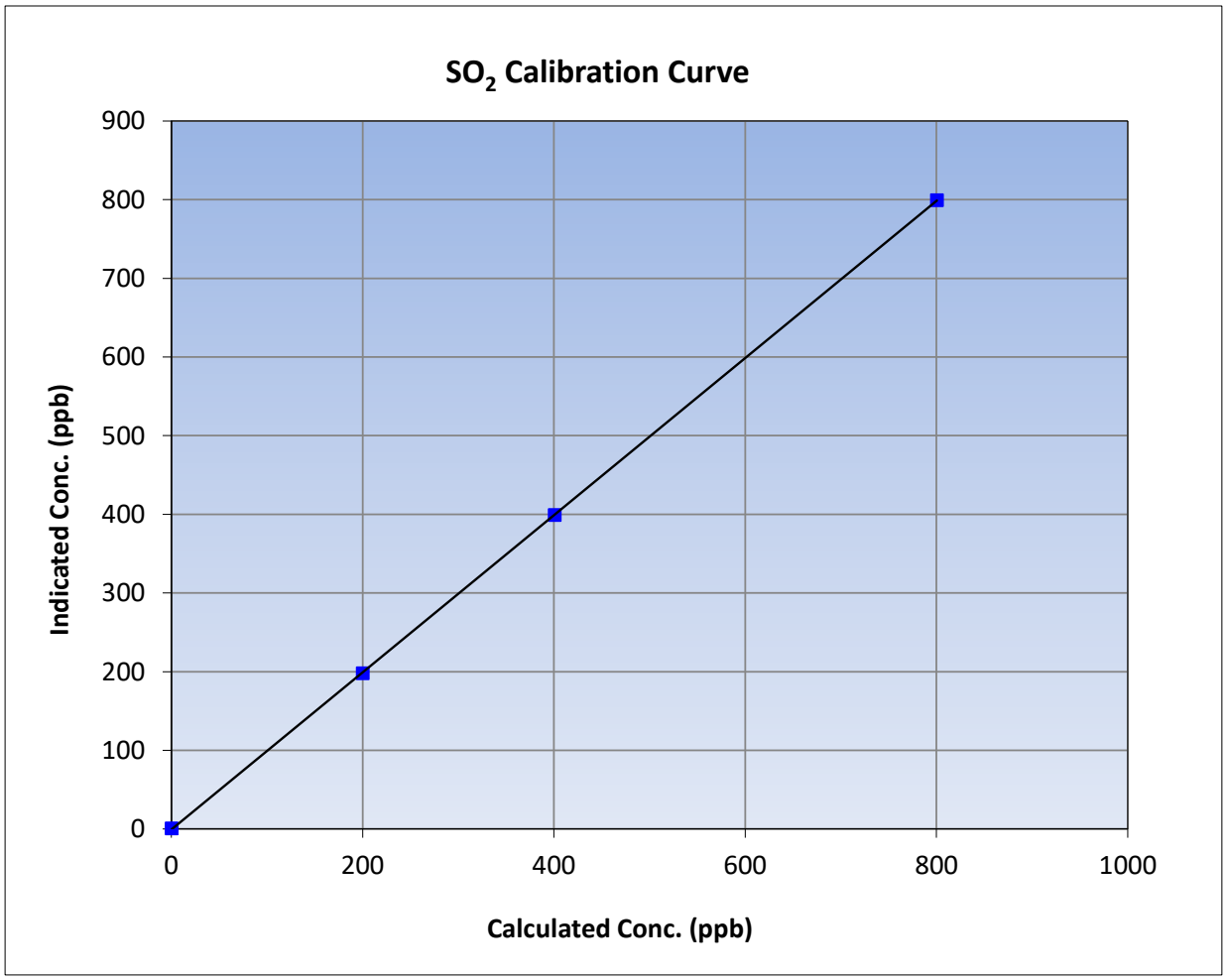
Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 13, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:01	End Time (MST):	13:12
Analyzer make:	Thermo 43i	Analyzer serial #:	1170050150

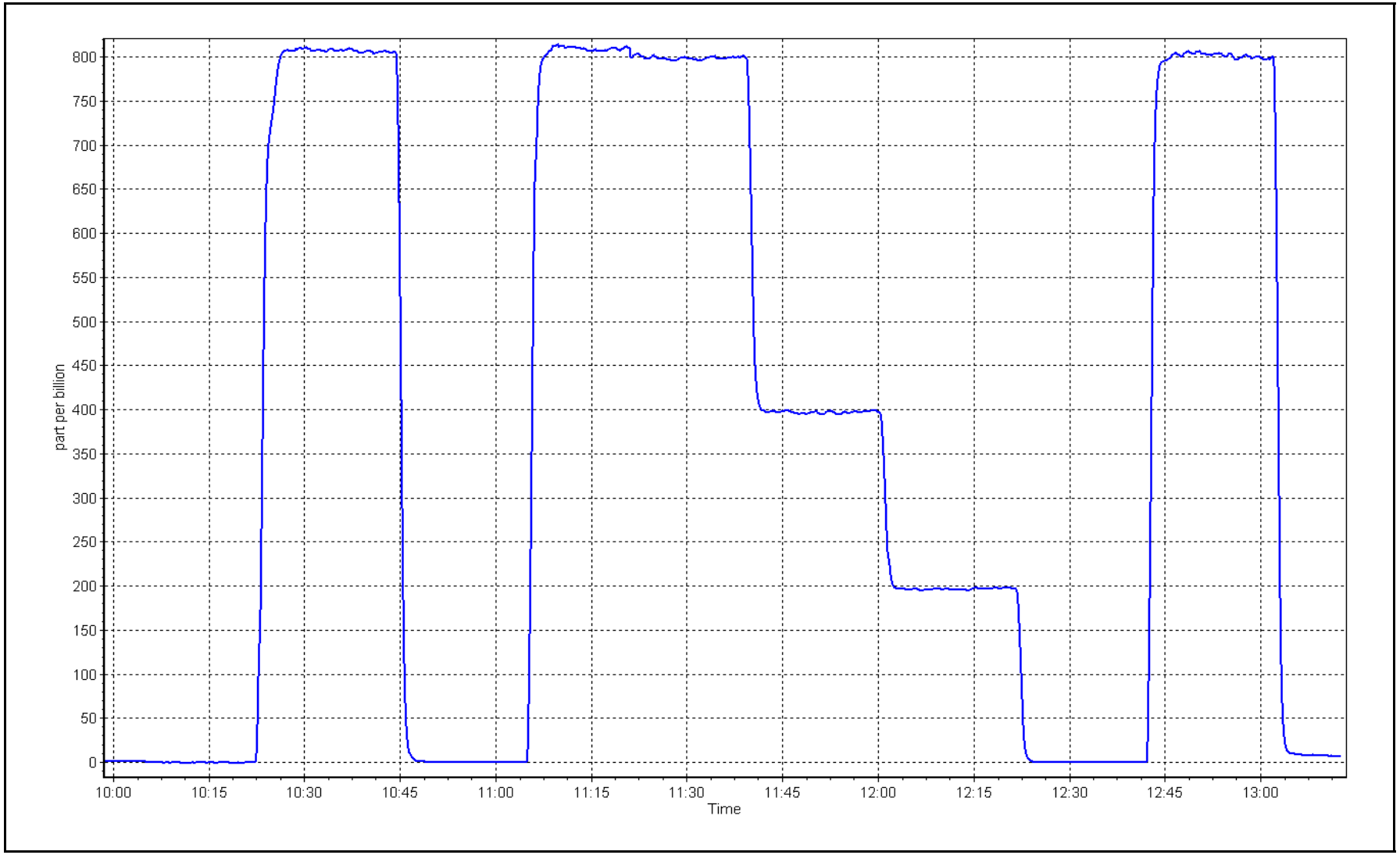
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
800.1	799.1	1.0013
400.6	398.8	1.0045
199.8	197.7	1.0107

Statistical Evaluation		Limits
Correlation Coefficient	0.999990	≥0.995
Slope	0.998958	0.90 - 1.10
Intercept	-0.765478	+/-30



SO2 Calibration Plot Date: April 13, 2023 Location: Surmont 2



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	April 12, 2023	Last Cal Date:	March 30, 2023
Start time (MST):	9:31	End time (MST):	14:54
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.391	ppm	Cal Gas Exp Date:	January 4, 2025
Cal Gas Cylinder #:	CC508338			
Removed Cal Gas Conc:	5.391	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	CC508338		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5258
ZAG Make/Model:	Teledyne API T701		Serial Number:	4297

Analyzer Information

Analyzer make:	Thermo 43iQ-TLE		Analyzer serial #:	1200326170	
Converter make:	Global		Converter serial #:	2022-223	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.002040	0.999326	Backgd or Offset:	1.22	0.82
Calibration intercept:	-0.162687	-0.142577	Coeff or Slope:	1.043	1.043

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.5	----
as found span	4926	74.2	80.0	78.9	1.008
as found 2nd point	4963	37.2	40.1	39.0	1.015
as found 3rd point	4982	18.6	20.1	19.0	1.028
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4926	74.2	80.0	79.9	1.001
second point	4963	37.2	40.1	39.8	1.008
third point	4982	18.6	20.1	19.8	1.013
as left zero	5000	0.0	0.0	0.0	----
as left span	4926	74.2	80.0	80.3	0.996
SO2 Scrubber Check	4919	81.3	813.0	0.1	----
Date of last scrubber change:				Ave Corr Factor	1.007
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.4	Prev response:	80.00	*% change:	-0.8%
Baseline Corr 2nd AF pt:	39.5	AF Slope:	0.993753	AF Intercept:	-0.722284
Baseline Corr 3rd AF pt:	19.5	AF Correlation:	0.999964		

* = > +/-5% change initiates investigation

Notes: Changed external valve. Adjusted zero only. SOx scrubber check done after calibrator zero.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

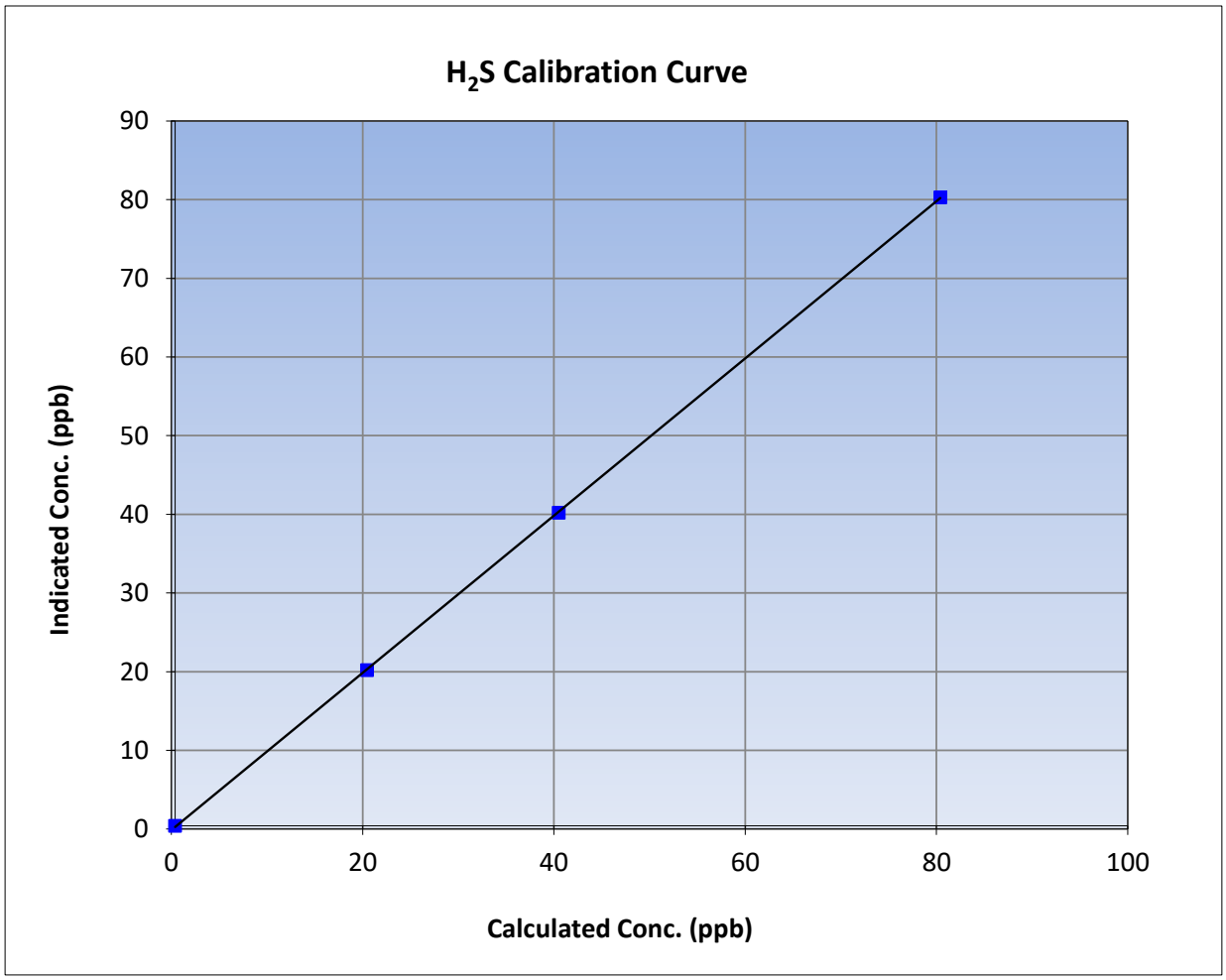
Station Information

Calibration Date:	April 12, 2023	Previous Calibration:	March 30, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:31	End Time (MST):	14:54
Analyzer make:	Thermo 43iQ-TLE	Analyzer serial #:	1200326170

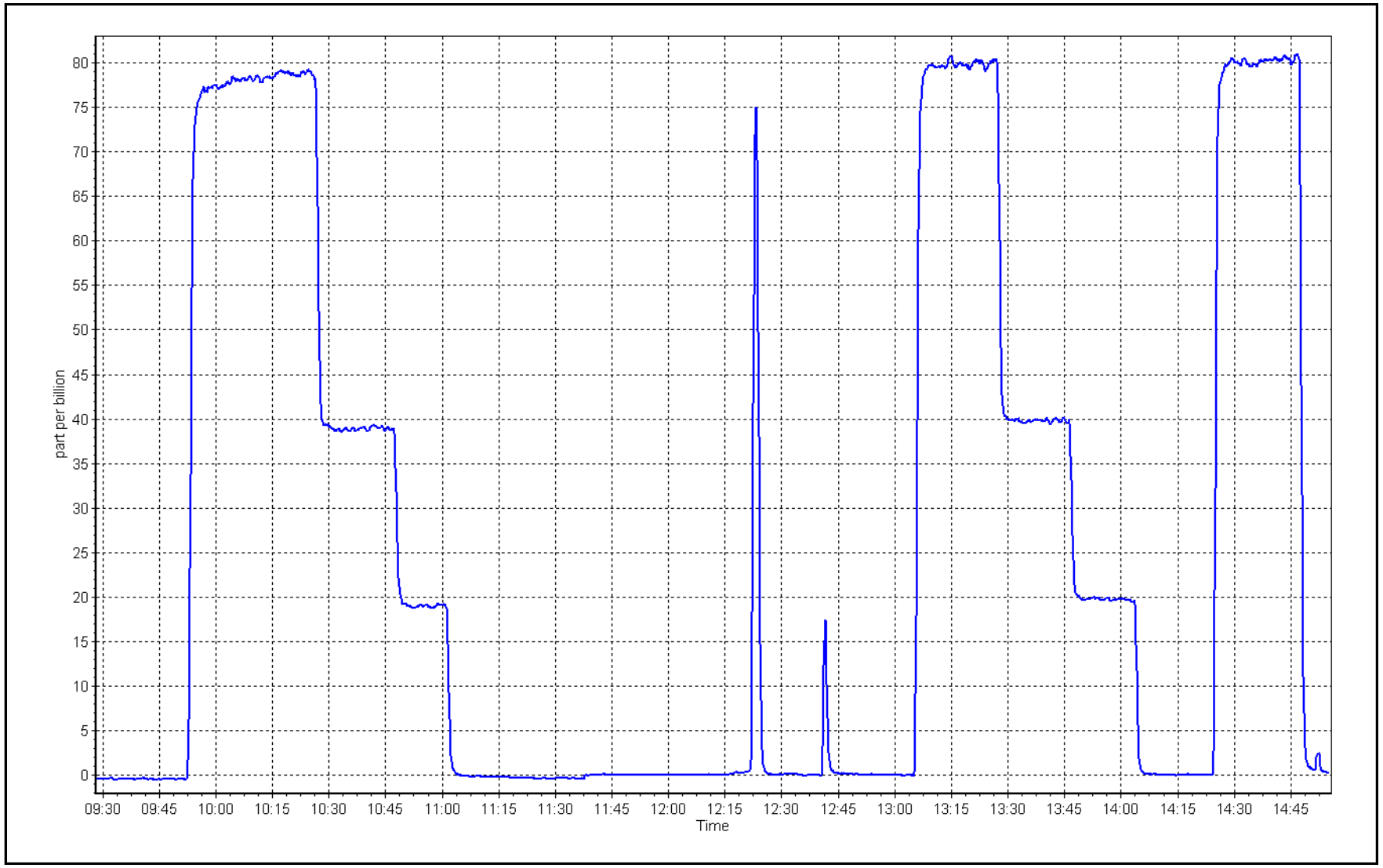
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	79.9	1.0013
40.1	39.8	1.0077
20.1	19.8	1.0128

Statistical Evaluation		Limits
Correlation Coefficient	0.999983	≥0.995
Slope	0.999326	0.90 - 1.10
Intercept	-0.142577	+/-3



H_2S Calibration Plot Date: April 12, 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:	April 13, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	10:01	End time (MST):	13:12
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:	1.008880	1.000707	Background:	4.62	4.62
Calibration intercept:	-0.118074	-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	-0.04	----
as found span	4918	81.3	17.31	17.32	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.03	----
high point	4918	81.3	17.31	17.30	1.001
second point	4959	40.7	8.67	8.62	1.005
third point	4979	20.3	4.32	4.29	1.008
as left zero	5000	0.0	0.00	-0.03	----
as left span	4918	81.3	17.31	17.40	0.995
				Average Correction Factor	1.005

Baseline Corr As found:	17.36	Previous response	17.35	*% 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. No adjustments made.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

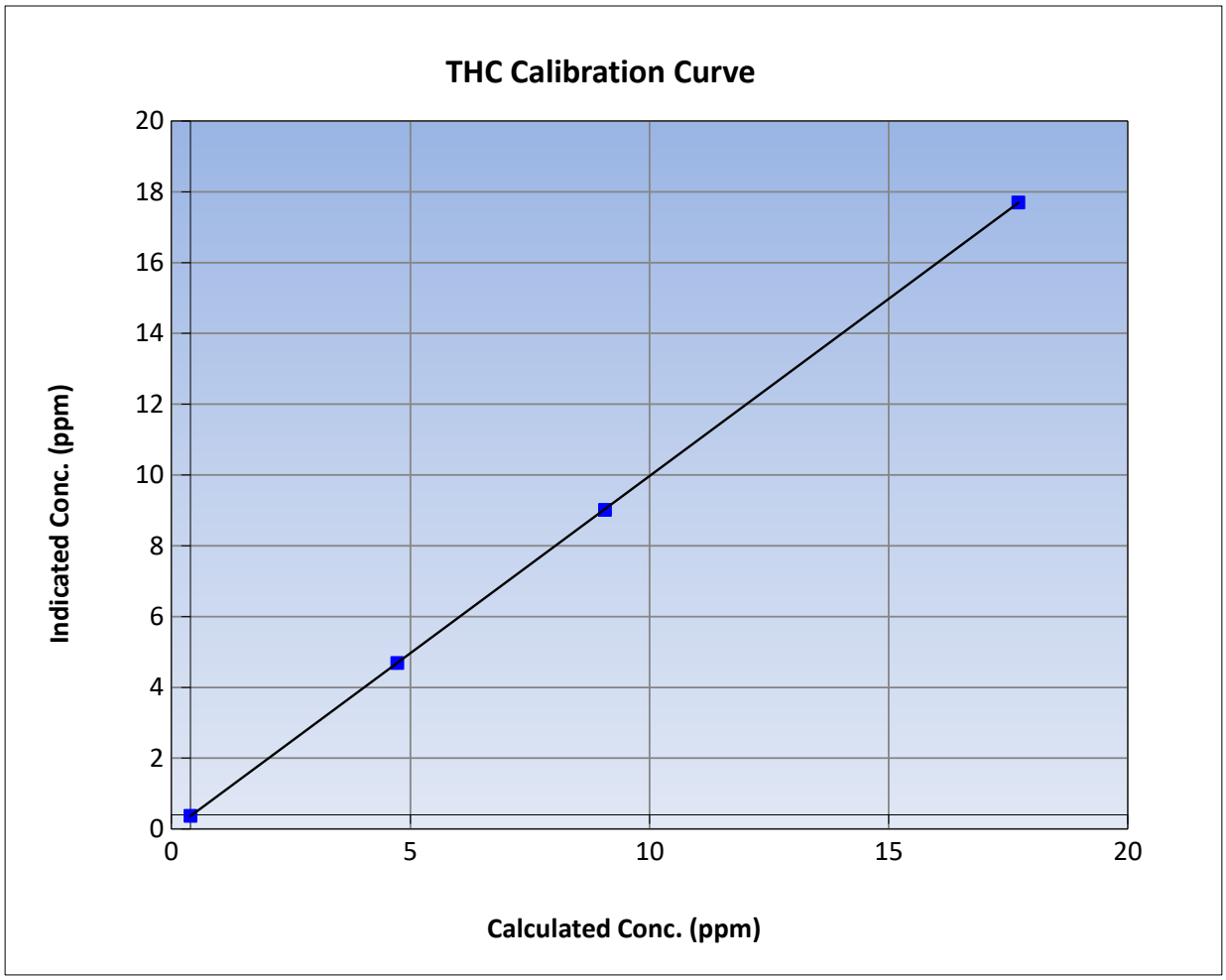
Station Information

Calibration Date:	April 13, 2023	Previous Calibration:	March 13, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:01	End Time (MST):	13:12
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1170050149

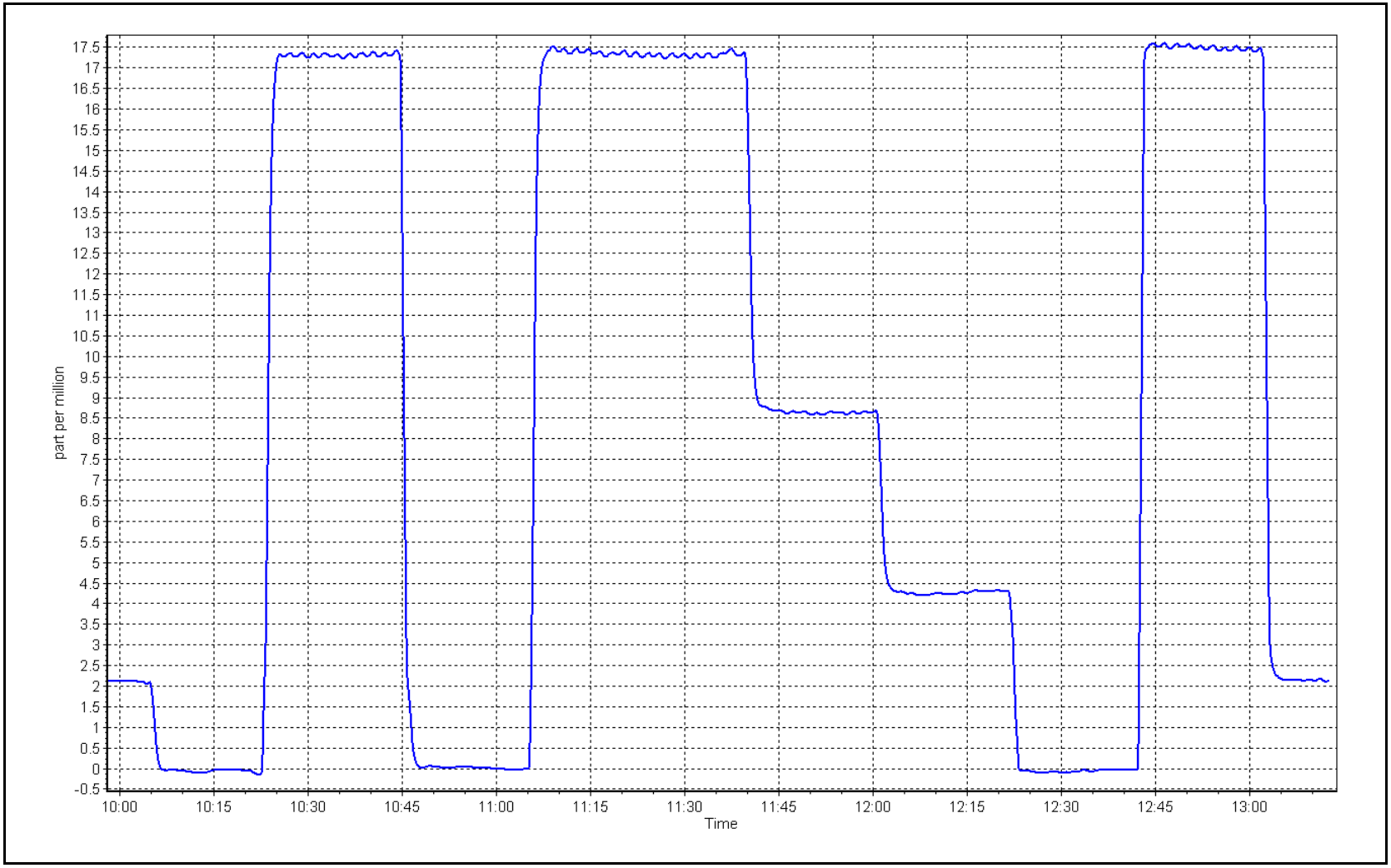
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.03	----
17.31	17.30	1.0008
8.67	8.62	1.0054
4.32	4.29	1.0082

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999997	*≥0.995*
Slope	1.000707	*0.90 - 1.10*
Intercept	-0.035654	*+/-1.5*



THC Calibration Plot Date: April 13, 2023 Location: Surmont 2



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	April 26, 2023	Last Cal Date:	March 16, 2023
Start time (MST):	10:00	End time (MST):	15:05
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:	1.357	1.370	NO bkgnd or offset:	1.3	1.3
NOX coeff or slope:	0.996	0.995	NOX bkgnd or offset:	1.4	1.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	175.2	173.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999093	1.000252
NO_X Cal Offset:	-1.251932	-0.432516
NO Cal Slope:	0.999707	0.999765
NO Cal Offset:	-1.991859	-1.012030
NO_2 Cal Slope:	0.998536	0.997717
NO_2 Cal Offset:	0.601598	0.172614

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	0.0	----	----
as found span	4916	84.2	799.2	799.2	0.0	792.0	790.3	1.7	1.0091	1.0113
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
high point	4916	84.2	799.2	799.2	0.0	798.8	797.9	1.0	1.0005	1.0016
second point	4958	42.1	399.6	399.6	0.0	400.2	399.7	0.5	0.9985	0.9998
third point	4979	21.1	200.3	200.3	0.0	198.7	197.2	1.4	1.0079	1.0156
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as left span	4916	84.2	799.2	396.7	402.5	794.4	392.4	402.0	1.0060	1.0109
								Average Correction Factor	1.0023	1.0057

Corrected As found	NO_X = 792.2 ppb	NO = 790.4 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.6%
Previous Response	NO_X = 797.2 ppb	NO = 797.0 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)	793.3	390.8	402.5	402.2	1.0007	99.9%
2nd GPT point (200 ppb O3)	793.3	595.7	197.6	195.9	1.0087	99.1%
3rd GPT point (100 ppb O3)	793.3	696.6	96.7	97.7	0.9898	101.0%
				Average Correction Factor	0.9997	100.0%

Notes: Changed sample inlet filter after as founds. Adjusted span. Second high NO reference point used for the GPT calibration formulas.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

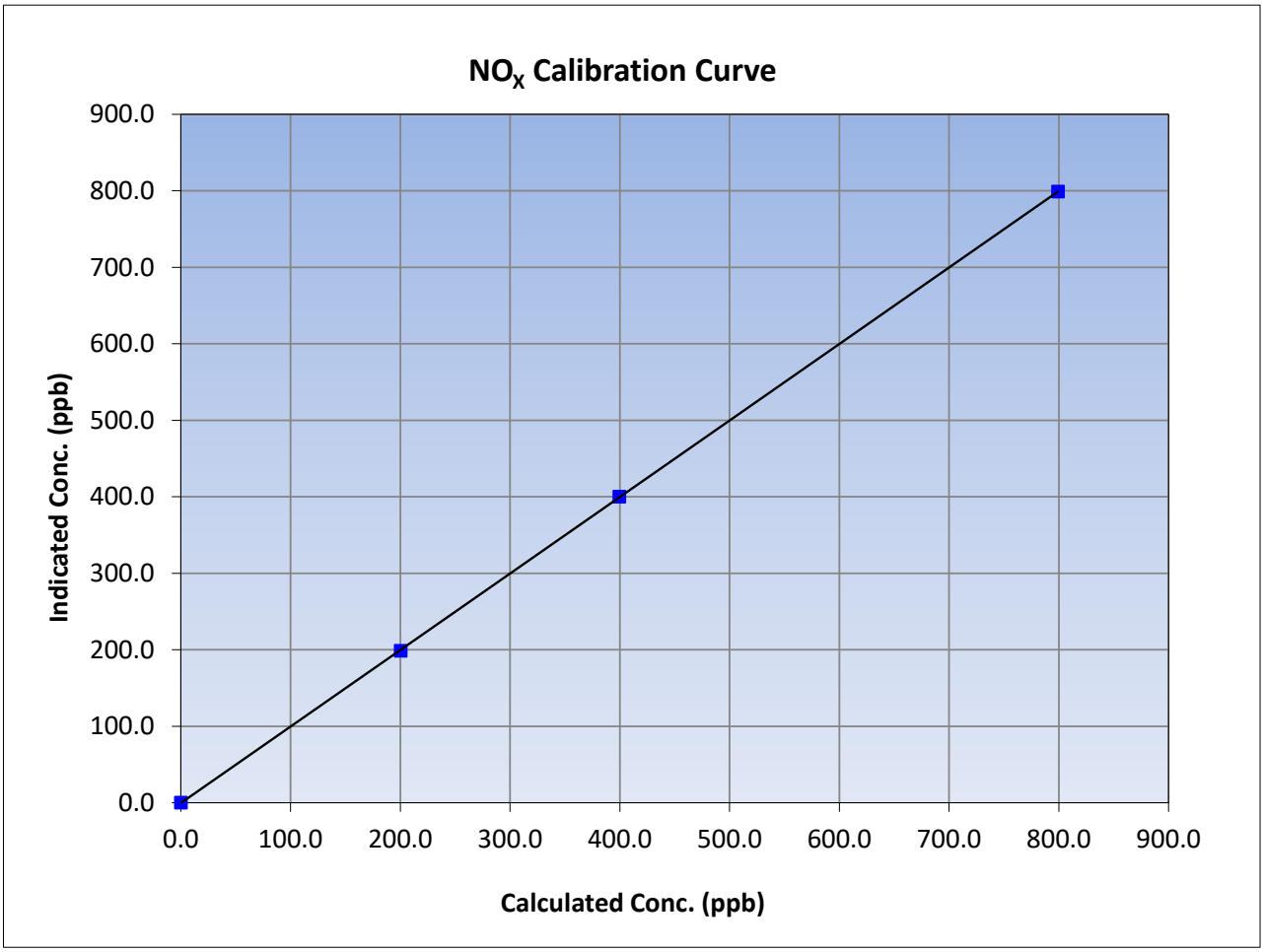
Version-04-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 16, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:00	End Time (MST):	15:05
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	0.999993	*≥0.995*
799.2	798.8	1.0005			
399.6	400.2	0.9985	Slope	1.000252	*0.90 - 1.10*
200.3	198.7	1.0079			
			Intercept	-0.432516	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

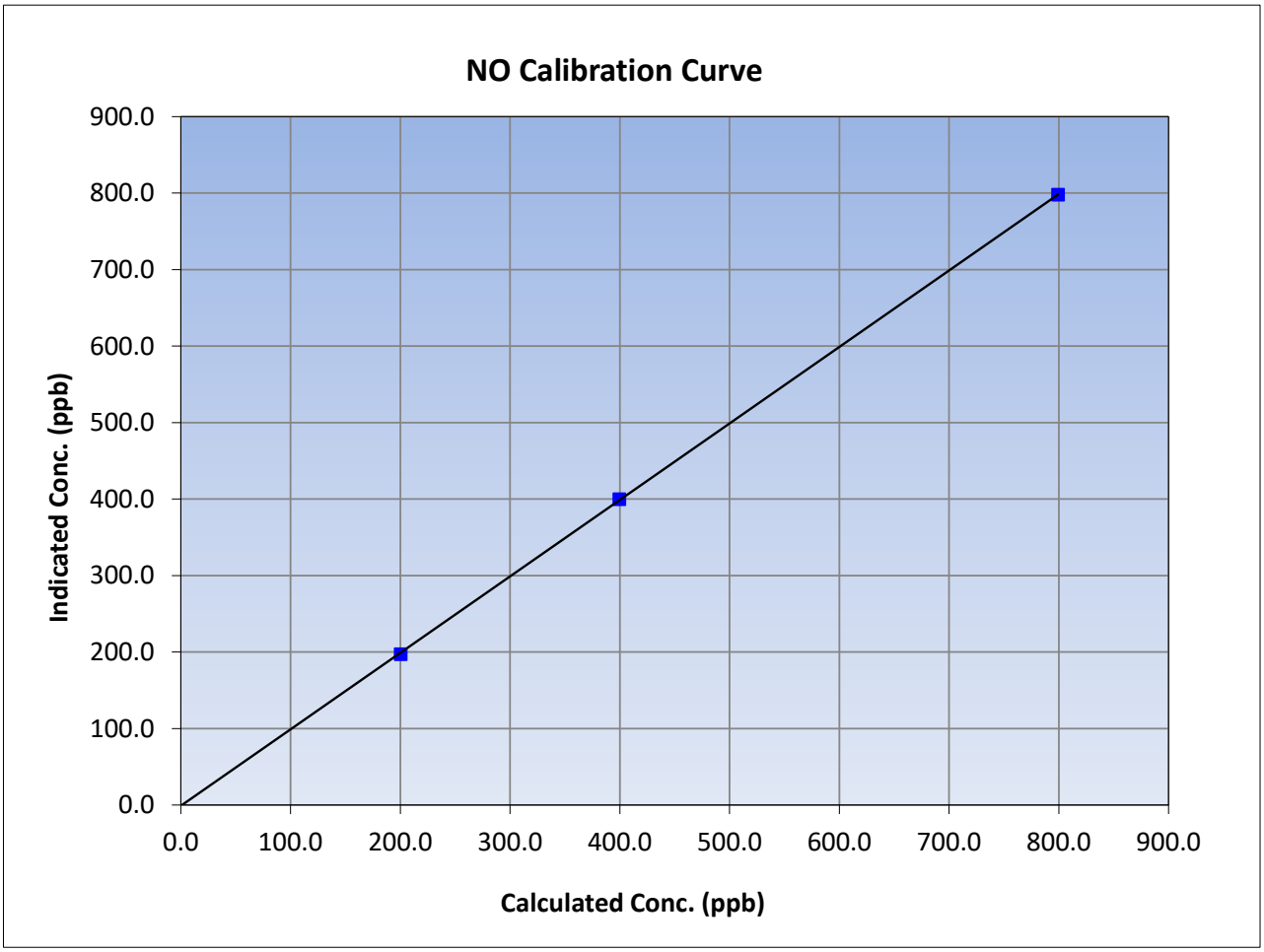
Version-04-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 16, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:00	End Time (MST):	15:05
Analyzer make:	Thermo 42i	Analyzer serial #:	1170050148

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999982	≥0.995
799.2	797.9	1.0016			
399.6	399.7	0.9998	Slope	0.999765	0.90 - 1.10
200.3	197.2	1.0156			
			Intercept	-1.012030	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

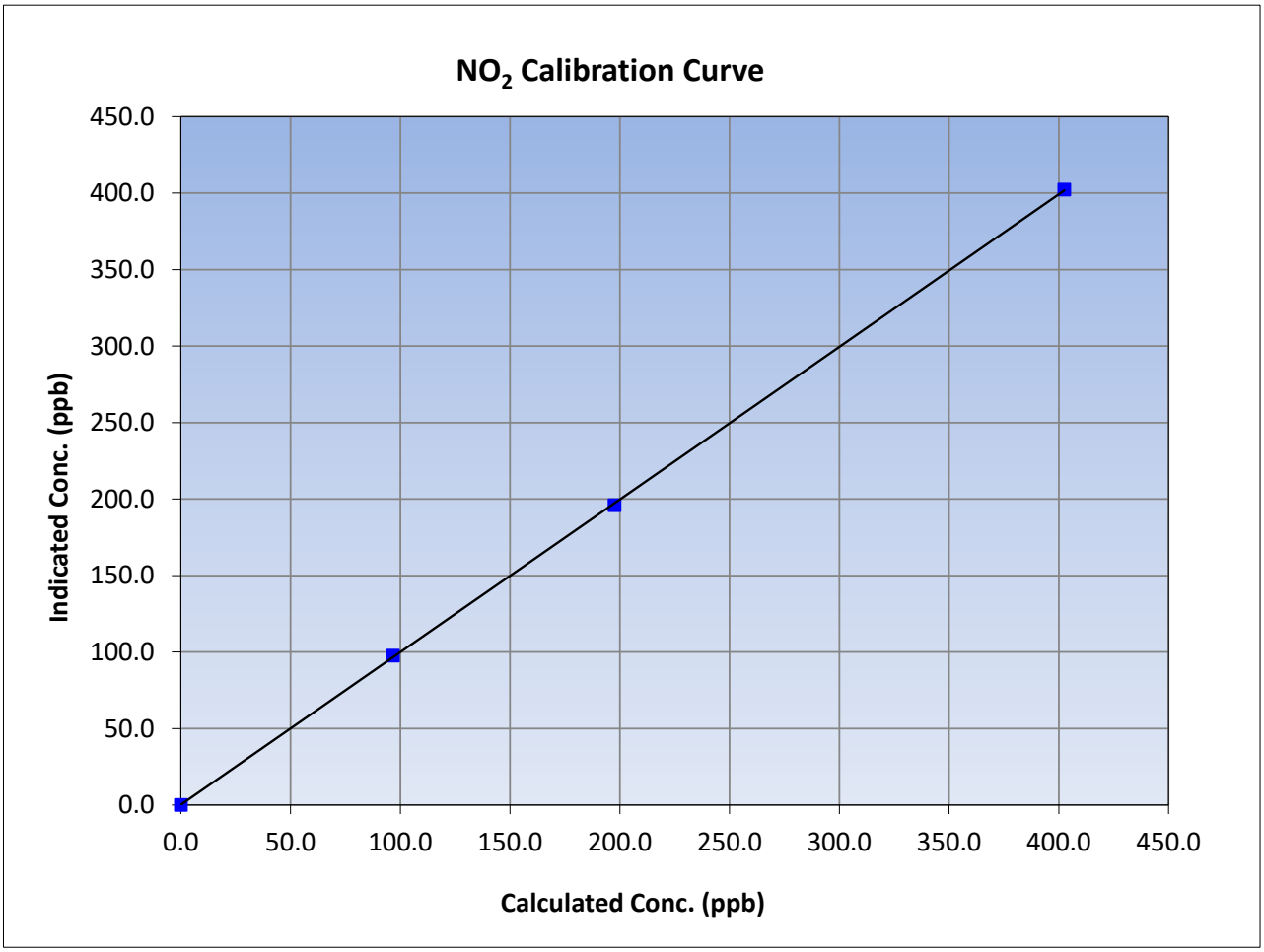
Version-04-2020

Station Information

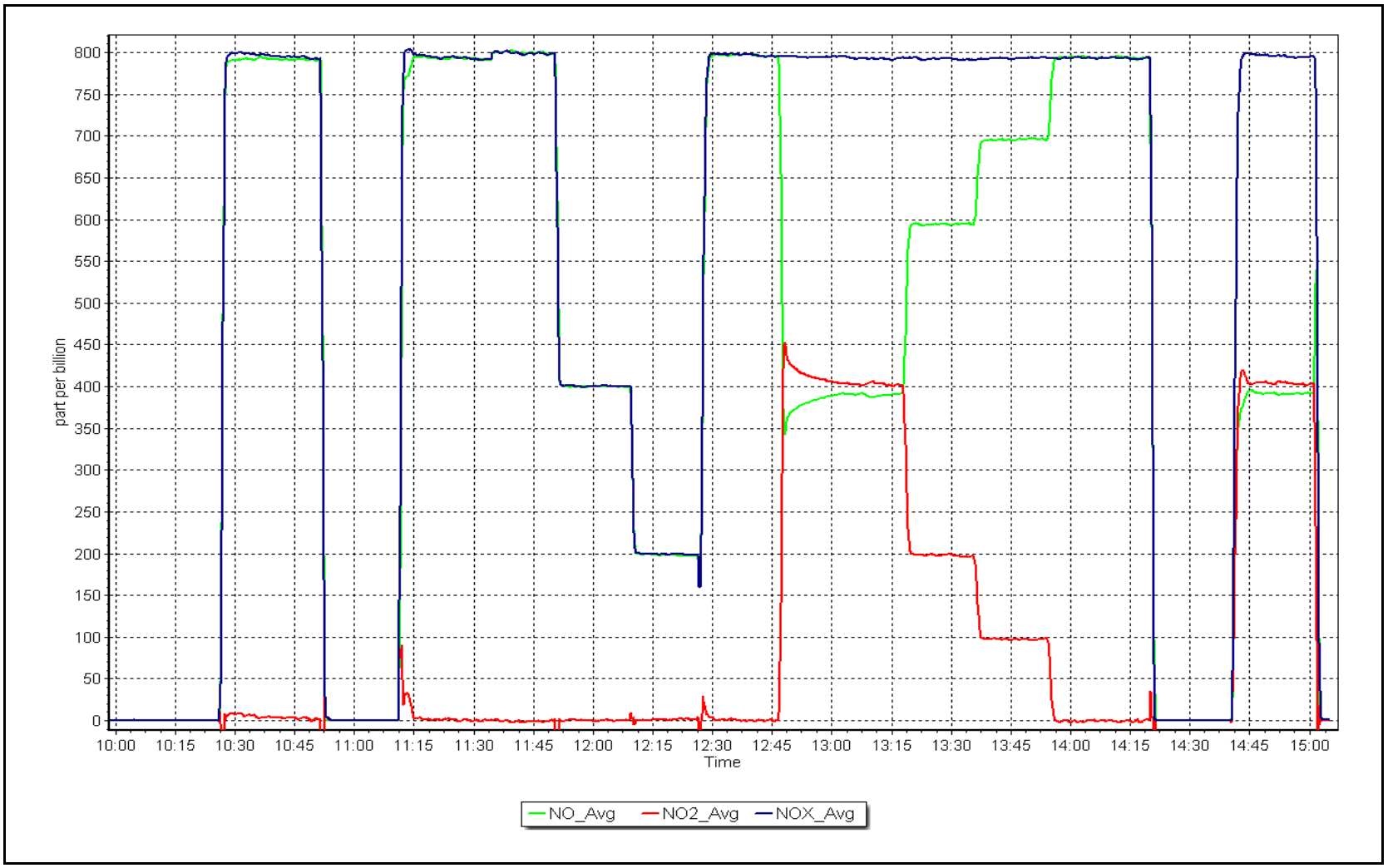
Calibration Date:	April 26, 2023	Previous Calibration:	March 16, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:00	End Time (MST):	15:05
Analyzer make:	Thermo 42i	Analyzer serial #:	1170050148

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999962	≥0.995
402.5	402.2	1.0007			
197.6	195.9	1.0087	Slope	0.997717	0.90 - 1.10
96.7	97.7	0.9898			
			Intercept	0.172614	+/-20



NO_X Calibration Plot Date: April 26, 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:	April 26, 2023	Last Cal Date:	March 13, 2023
Start time (MST):	11:38	End time (MST):	12:38
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)	6.5	5.76	6.5	☐	+/- 2 °C
P (mmHg)	706.8	707.79	706.8	☐	+/- 10 mmHg
flow (LPM)	4.99	5.068	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: April 26, 2023 Last Cal Date: March 13, 2023

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

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: February 17, 2023 <0.2 ug/m3

Disposable Filter Changed: February 17, 2023

Annual Maintenance

Date Sample Tube Cleaned: September 30, 2022

Date RH/T Sensor Cleaned: October 6, 2022

Notes: No adjustments made, Leak check passed.

Calibration by: Braiden Boutilier

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS30
ELLS RIVER
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Ells River	Station number:	AMS 30
Calibration Date:	April 11, 2023	Last Cal Date:	March 1, 2023
Start time (MST):	9:19	End time (MST):	12:20
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:	1.004115	1.003073	Backgd or Offset:	8.9	9.0
Calibration intercept:	-2.615941	-2.075962	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	-0.1	----
as found span	4921	79.2	800.4	799.4	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4921	79.2	800.4	801.9	0.998
second point	4960	39.6	400.2	398.0	1.006
third point	4980	19.8	200.1	196.8	1.017
as left zero	5000	0.0	0.0	0.0	----
as left span	4921	79.2	800.4	802.6	0.997
				Average Correction Factor	1.007

Baseline Corr As found:	799.50	Previous response	801.04	*% change	-0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

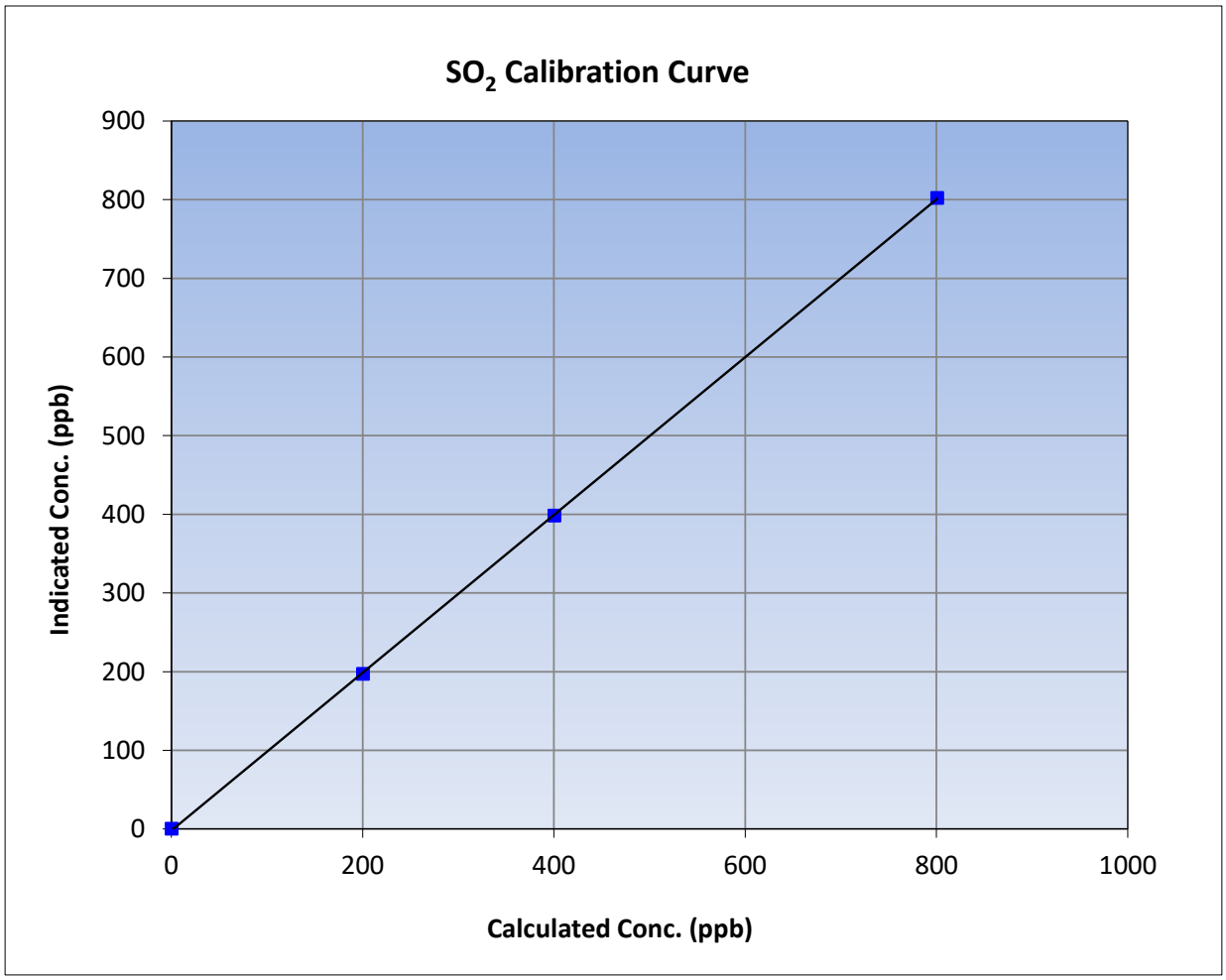
Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:19	End Time (MST):	12:20
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841397

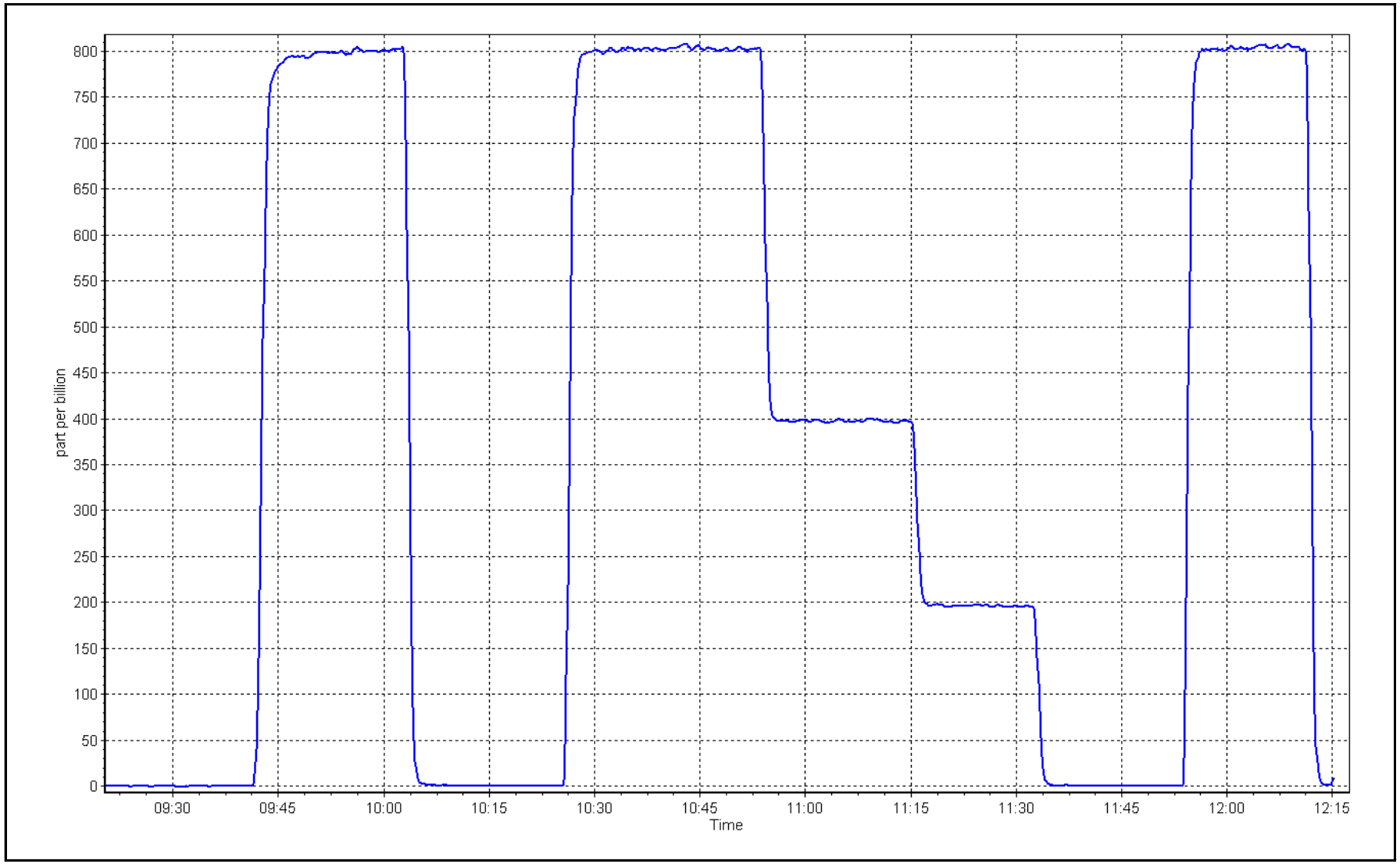
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
800.4	801.9	0.9981
400.2	398.0	1.0056
200.1	196.8	1.0168

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999969	*≥0.995*
Slope	1.003073	*0.90 - 1.10*
Intercept	-2.075962	*+/-30*



SO2 Calibration Plot Date: April 11, 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:	April 3, 2023	Last Cal Date:	March 2, 2023
Start time (MST):	9:34	End time (MST):	13:15
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.08	ppm	Cal Gas Exp Date:	February 9, 2024
Cal Gas Cylinder #:	EY0002443			
Removed Cal Gas Conc:	5.08	ppm	Rem Gas Exp Date:	
Removed Gas Cyl #:			Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3061
ZAG Make/Model:	API T701H		Serial Number:	358

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1410661331	
Converter make:	CDN - 101		Converter serial #:	555	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998207	1.000494	Backgd or Offset:	1.57	1.55
Calibration intercept:	0.060852	-0.019196	Coeff or Slope:	1.092	1.092

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4921	78.7	80.0	79.3	1.008
as found 2nd point	4961	39.4	40.0	39.6	1.011
as found 3rd point	4980	19.7	20.0	19.9	1.006
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4921	78.7	80.0	80.0	1.000
second point	4961	39.4	40.0	40.0	1.001
third point	4980	19.7	20.0	20.0	1.001
as left zero	5000	0.0	0.0	0.3	----
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:	79.3	Prev response:	79.88	*% change:	-0.7%
Baseline Corr 2nd AF pt:	39.6	AF Slope:	0.991347	AF Intercept:	0.000989
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999997		

* = > +/-5% change initiates investigation

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

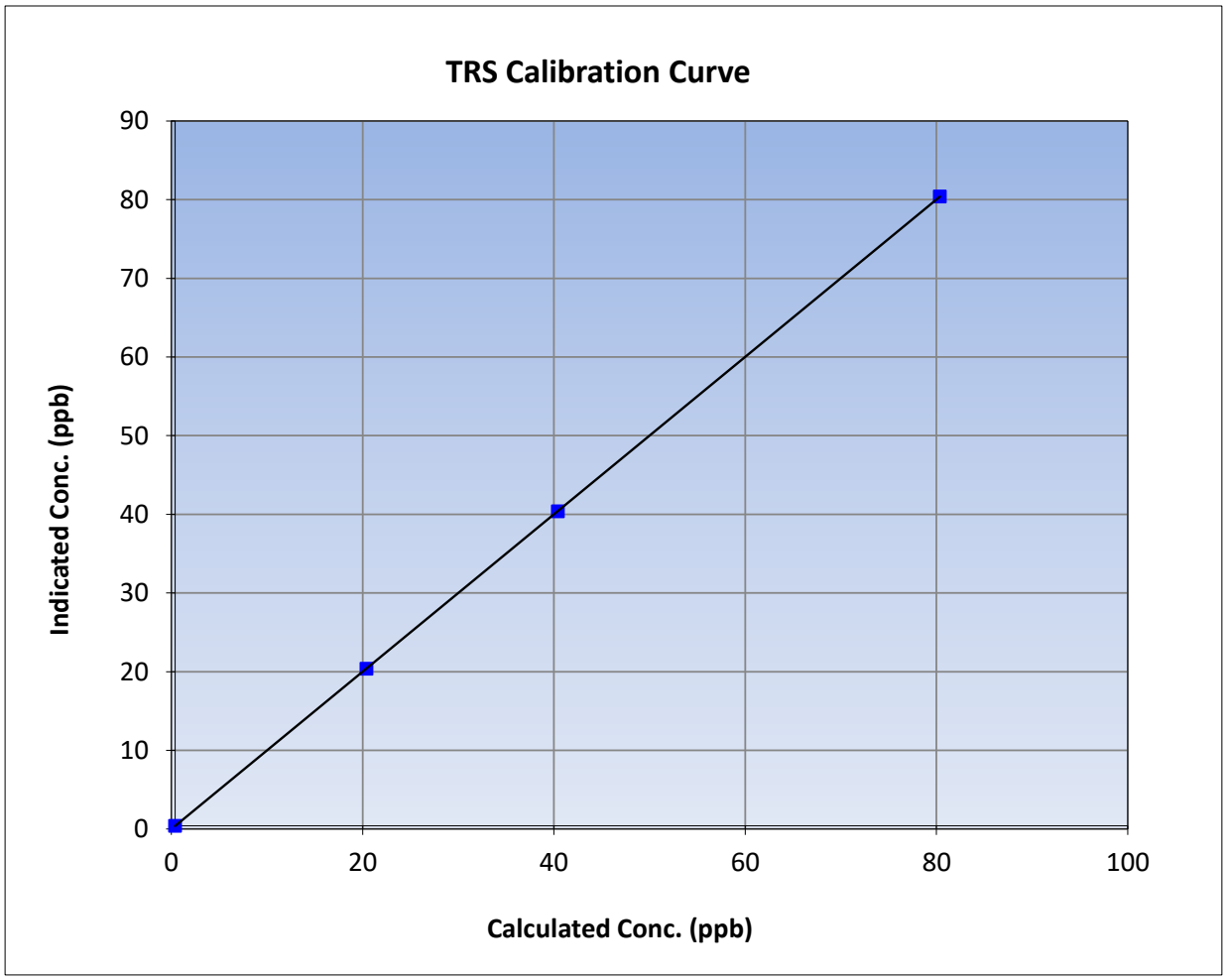
Station Information

Calibration Date:	April 3, 2023	Previous Calibration:	March 2, 2023
Station Name:	Ells River	Station Number:	AMS30
Start Time (MST):	9:34	End Time (MST):	13:15
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1410661331

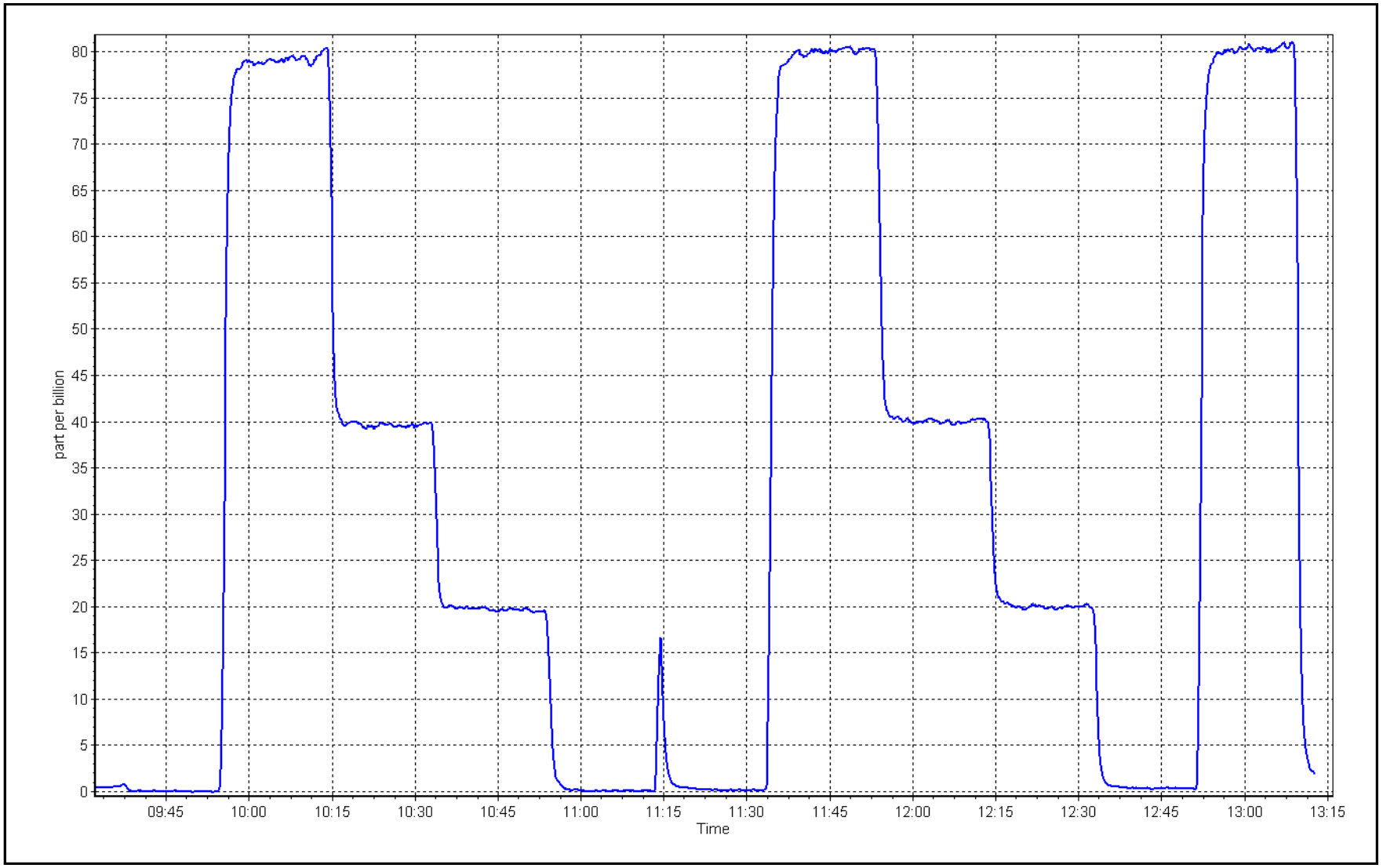
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.0	0.9995
40.0	40.0	1.0007
20.0	20.0	1.0008

Statistical Evaluation		*Limits*
Correlation Coefficient	1.000000	*≥0.995*
Slope	1.000494	*0.90 - 1.10*
Intercept	-0.019196	*+/-3*



TRS Calibration Plot Date: April 3, 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:	April 11, 2023	Last Cal Date:	March 1, 2023
Start time (MST):	9:19	End time (MST):	12:20
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC494126	Cal Gas Expiry Date:	December 29, 2028	
CH4 Cal Gas Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm
C3H8 Cal Gas Conc.	209.2	ppm			
Removed Gas Cert:			Removed Gas Expiry:		
Removed CH4 Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm
Removed C3H8 Conc.	209.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3061	
ZAG make/model:	API T701H		Serial Number:	358	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1193585650	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	0.000234	0.000238	NMHC SP Ratio:	4.19E-05	4.39E-05
CH4 Retention time:	14.2	14.2	NMHC Peak Area:	217301	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	16.46	1.035
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	17.03	16.98	1.003
second point	4960	39.6	8.51	8.42	1.012
third point	4980	19.8	4.26	4.16	1.023
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	17.06	0.998
				Average Correction Factor	1.012
Baseline Corr AF:	16.46	Prev response	16.96	*% change	-3.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4921	79.2	9.11	8.72	1.045
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4921	79.2	9.11	9.10	1.001
second point	4960	39.6	4.56	4.53	1.007
third point	4980	19.8	2.28	2.24	1.016
as left zero	5000	0	0.00	0.00	----
as left span	4921	79.2	9.11	9.13	0.998
				Average Correction Factor	1.008
Baseline Corr AF:	8.72	Prev response	9.10	*% change	-4.3%
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	79.2	7.91	7.74	1.022
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	7.88	1.005
second point	4960	39.6	3.96	3.89	1.017
third point	4980	19.8	1.98	1.92	1.031
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.91	7.92	0.999
				Average Correction Factor	1.018
Baseline Corr AF:	7.74	Prev response	7.87	*% 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:	0.998858	0.998335
THC Cal Offset:	-0.050537	-0.048138
CH4 Cal Slope:	0.997766	0.996510
CH4 Cal Offset:	-0.031956	-0.029356
NMHC Cal Slope:	1.000170	0.999568
NMHC Cal Offset:	-0.018781	-0.018381

Notes: Adjusted the span.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

THC Calibration Summary

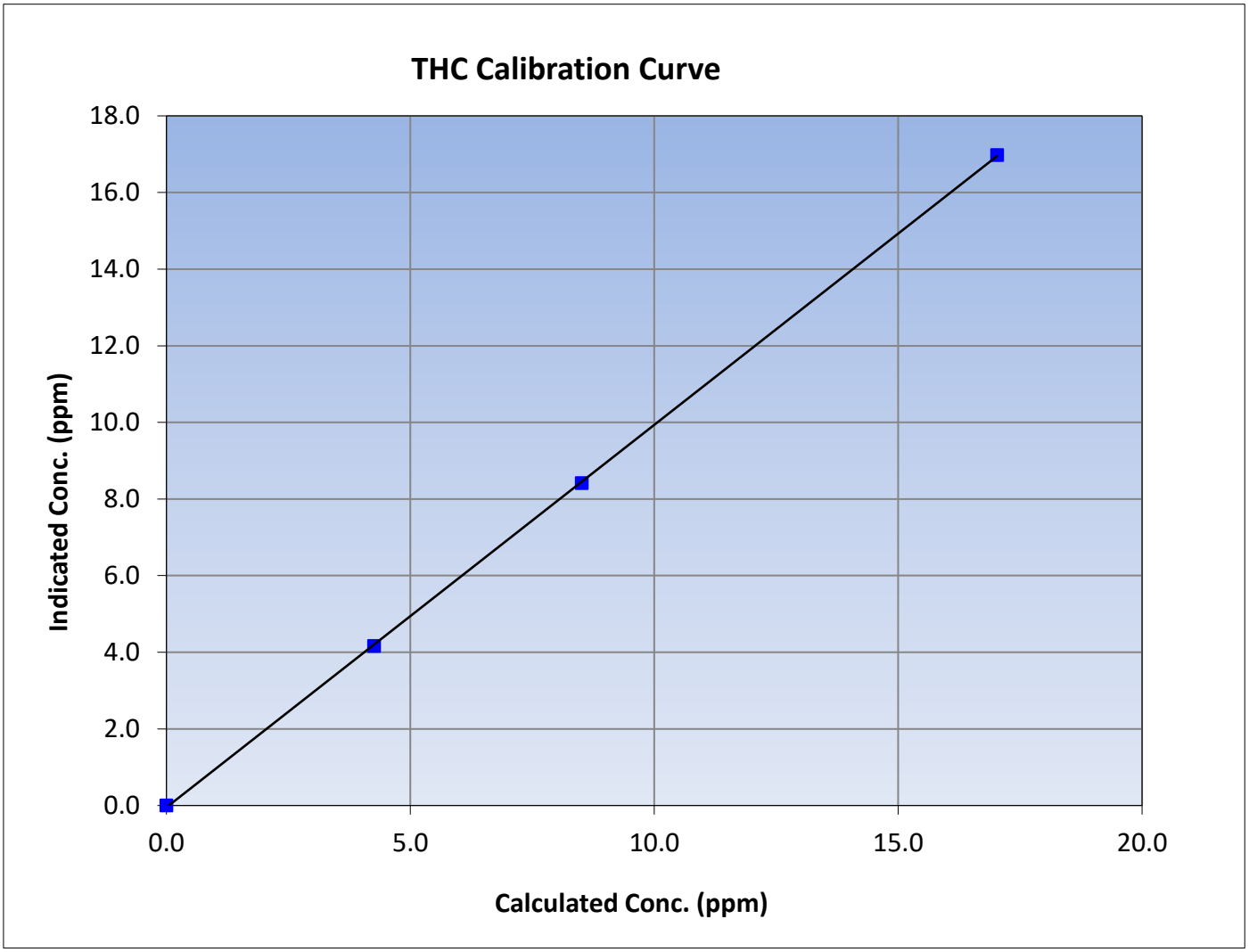
Version-01-2020

Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:19	End Time (MST):	12:20
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585650

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999962	*≥0.995*
17.03	16.98	1.0028			
8.51	8.42	1.0117	Slope	0.998335	*0.90 - 1.10*
4.26	4.16	1.0229			
			Intercept	-0.048138	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

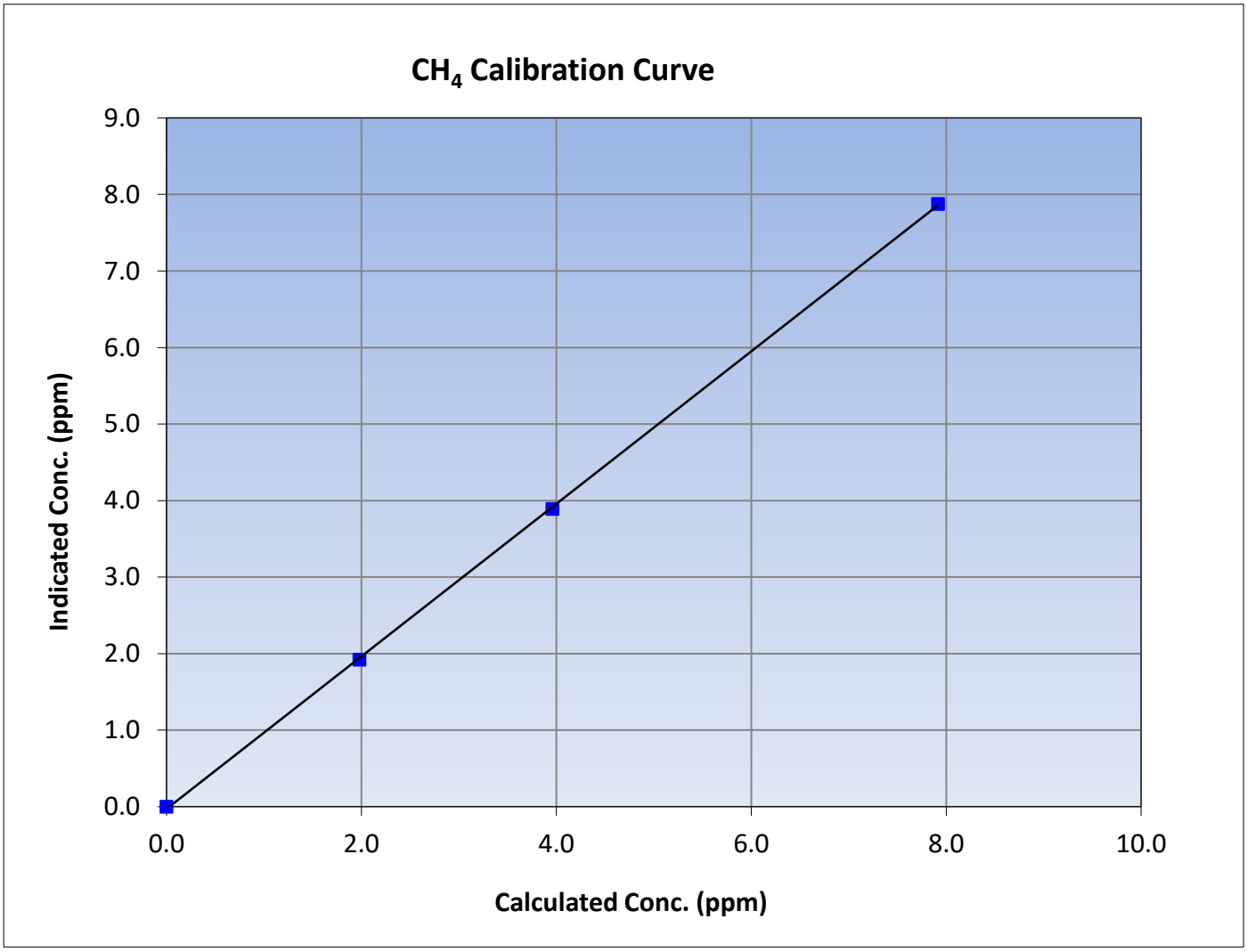
Version-01-2020

Station Information

Calibration Date:	April 11, 2023	Previous Calibration:	March 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:19	End Time (MST):	12:20
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585650

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999932	*≥0.995*
7.91	7.88	1.0049			
3.96	3.89	1.0175	Slope	0.996510	*0.90 - 1.10*
1.98	1.92	1.0307			
			Intercept	-0.029356	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

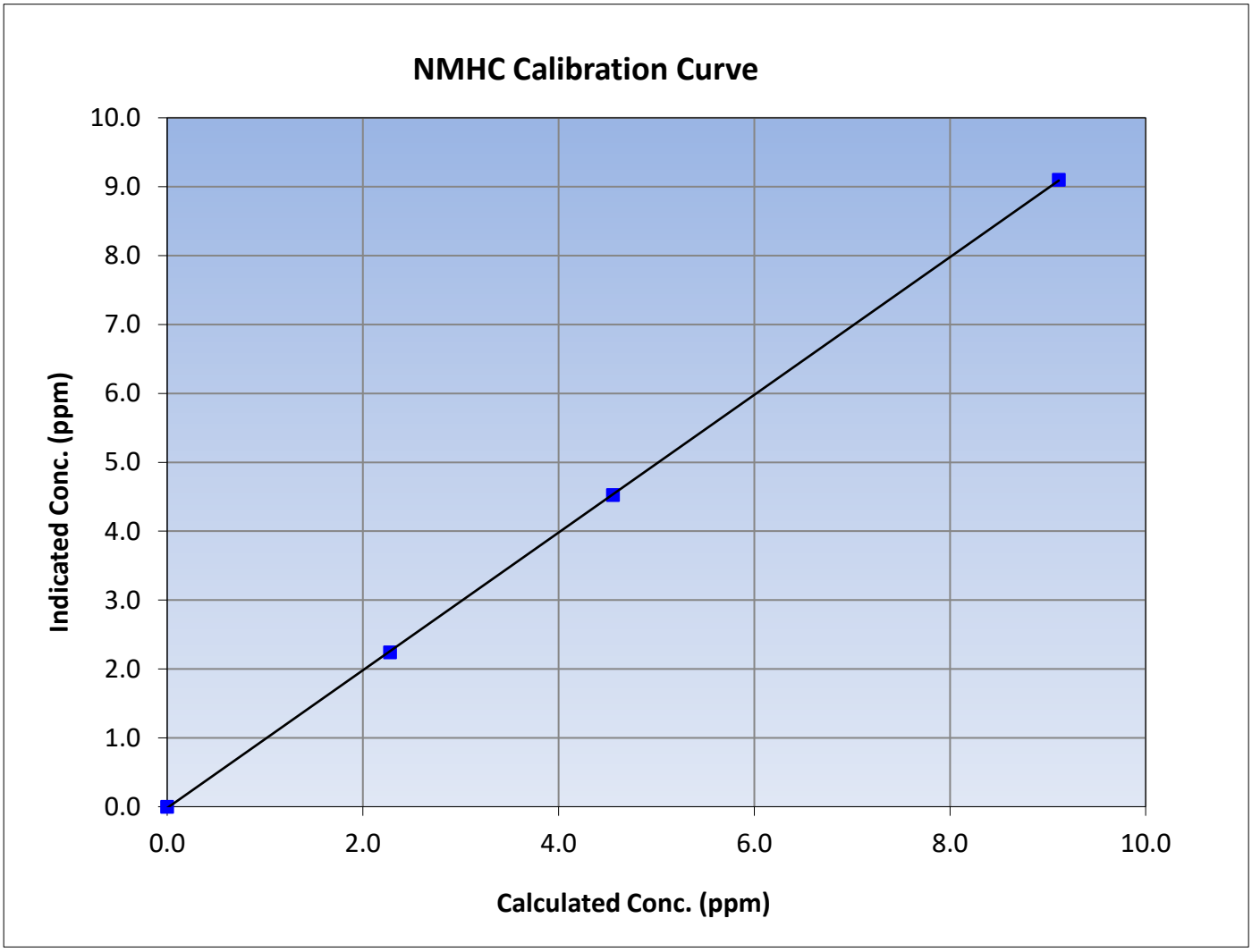
Version-01-2020

Station Information

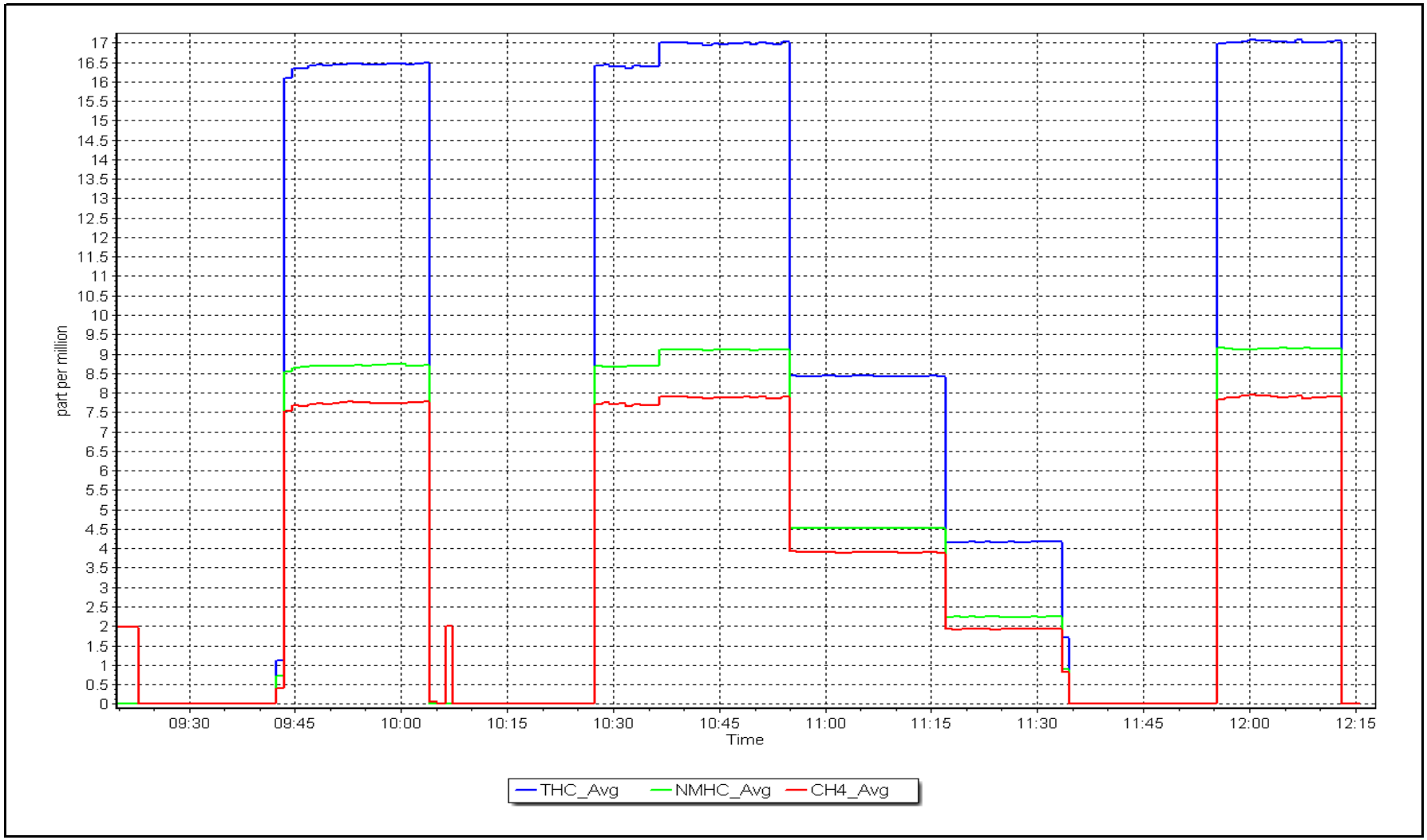
Calibration Date:	April 11, 2023	Previous Calibration:	March 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:19	End Time (MST):	12:20
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585650

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999981	≥0.995
9.11	9.10	1.0014			
4.56	4.53	1.0070	Slope	0.999568	0.90 - 1.10
2.28	2.24	1.0162			
			Intercept	-0.018381	+/-0.5



NMHC Calibration Plot Date: April 11, 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:	April 5, 2023	Last Cal Date:	March 15, 2023
Start time (MST):	8:57	End time (MST):	13:15
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:		T2Y1P2R	Cal Gas Expiry Date:	December 11, 2023	
NOX Cal Gas Conc:	50.83	ppm	NO Cal Gas Conc:	49.97	ppm
Removed Cylinder #:			Removed Gas Exp Date:		
Removed Gas NOX Conc:	50.83	ppm	Removed Gas NO Conc:	49.97	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3061	
ZAG make/model:	API T701H		Serial Number:	358	

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	710321429
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.029	1.029	NO bkgnd or offset:	12.5	12.5
NOX coeff or slope:	0.992	0.992	NOX bkgnd or offset:	12.4	12.5
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	182.7	183.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999129	1.000576
NO_X Cal Offset:	-0.900000	-1.140000
NO Cal Slope:	0.999714	0.998571
NO Cal Offset:	-1.740000	-1.840000
NO_2 Cal Slope:	1.002165	1.002663
NO_2 Cal Offset:	0.164860	0.679699

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	-0.3	0.3	----	----
as found span	4920	80.0	813.3	799.5	13.8	813.0	796.8	16.1	1.0003	1.0034
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
high point	4920	80.0	813.3	799.5	13.8	813.3	797.6	15.7	1.0000	1.0024
second point	4960	40.0	406.6	399.8	6.9	404.9	396.0	8.9	1.0043	1.0095
third point	4980	20.0	203.3	199.9	3.4	201.2	196.2	4.9	1.0105	1.0188
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as left span	4920	80.0	813.3	437.9	375.4	812.3	435.3	376.8	1.0012	1.0060
								Average Correction Factor	1.0049	1.0102

Corrected As found	NO_X = 813.0 ppb	NO = 797.1 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = 0.2%
Previous Response	NO_X = 811.7 ppb	NO = 797.6 ppb		*Percent Change	NO = -0.1%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	793.8	432.2	375.4	376.7	0.9964	100.4%
2nd GPT point (200 ppb O3)	793.8	611.9	195.7	197.2	0.9922	100.8%
3rd GPT point (100 ppb O3)	793.8	702.3	105.3	106.8	0.9856	101.5%
				Average Correction Factor	0.9914	100.9%

Notes: No adjusments have been made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

NO_X Calibration Summary

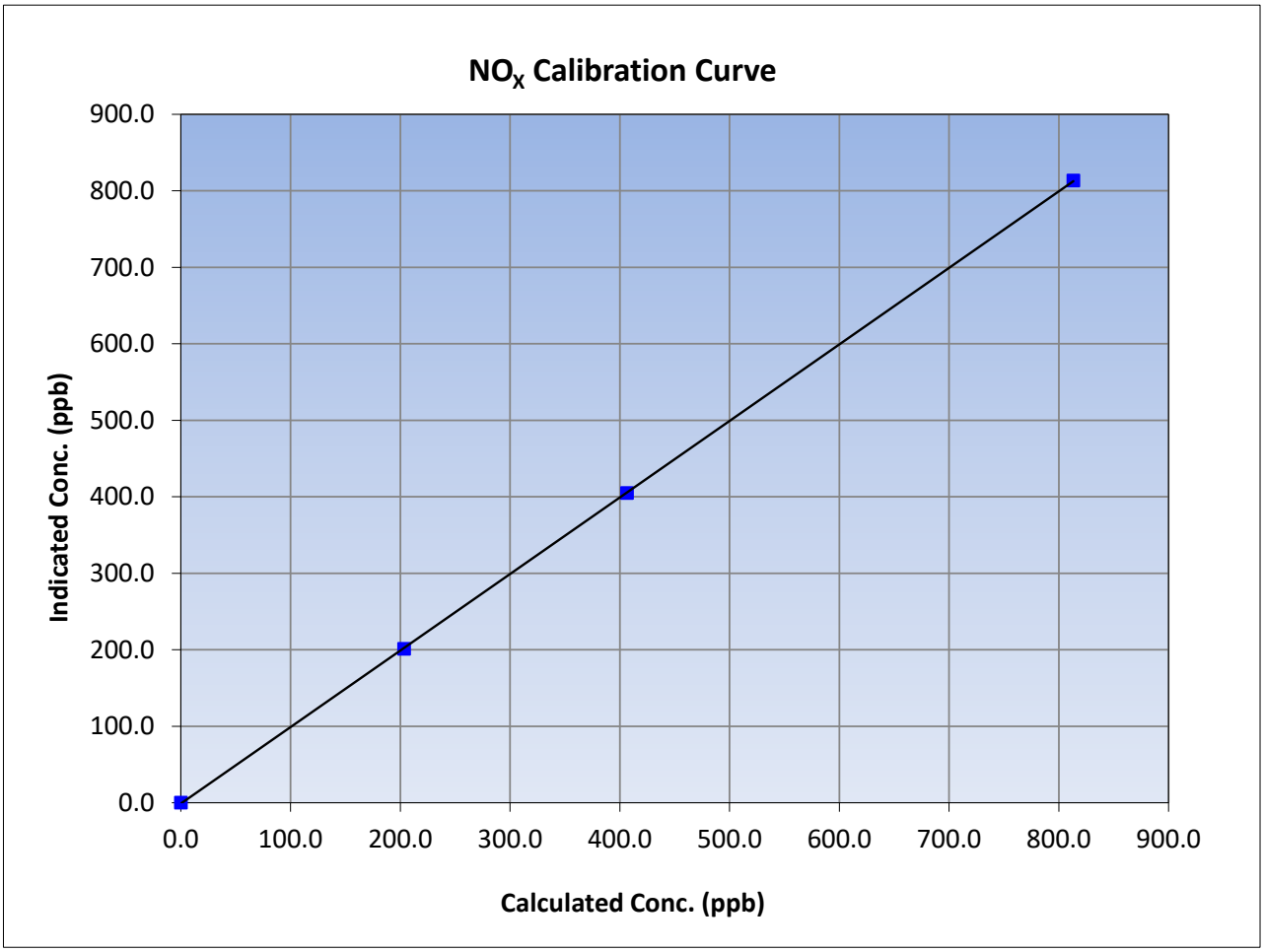
Version-04-2020

Station Information

Calibration Date:	April 5, 2023	Previous Calibration:	March 15, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	8:57	End Time (MST):	13:15
Analyzer make:	Thermo 42i	Analyzer serial #:	710321429

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999989	≥0.995
813.3	813.3	1.0000			
406.6	404.9	1.0043	Slope	1.000576	0.90 - 1.10
203.3	201.2	1.0105			
			Intercept	-1.140000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

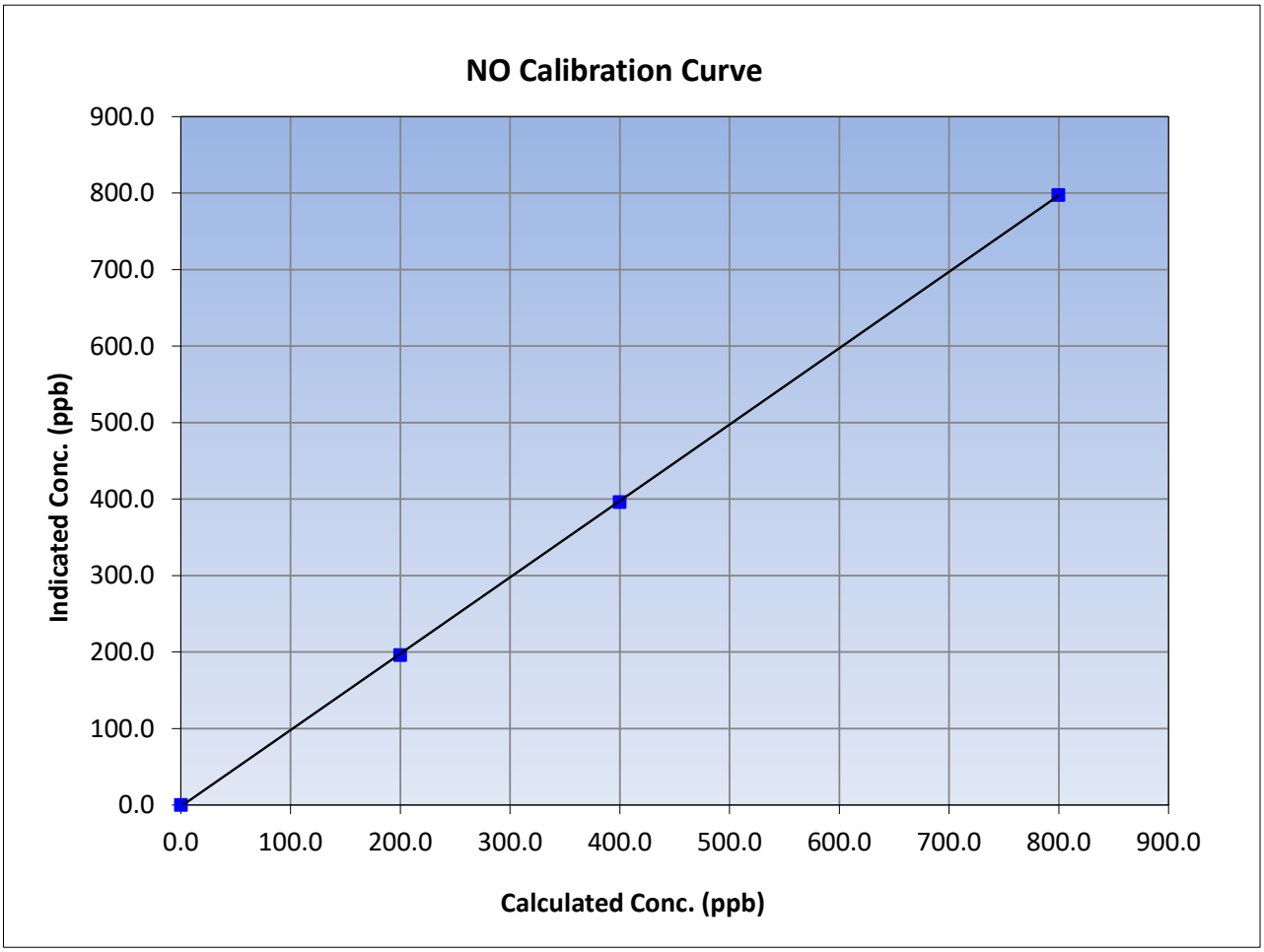
Version-04-2020

Station Information

Calibration Date:	April 5, 2023	Previous Calibration:	March 15, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	8:57	End Time (MST):	13:15
Analyzer make:	Thermo 42i	Analyzer serial #:	710321429

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999975	≥0.995
799.5	797.6	1.0024			
399.8	396.0	1.0095	Slope	0.998571	0.90 - 1.10
199.9	196.2	1.0188			
			Intercept	-1.840000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

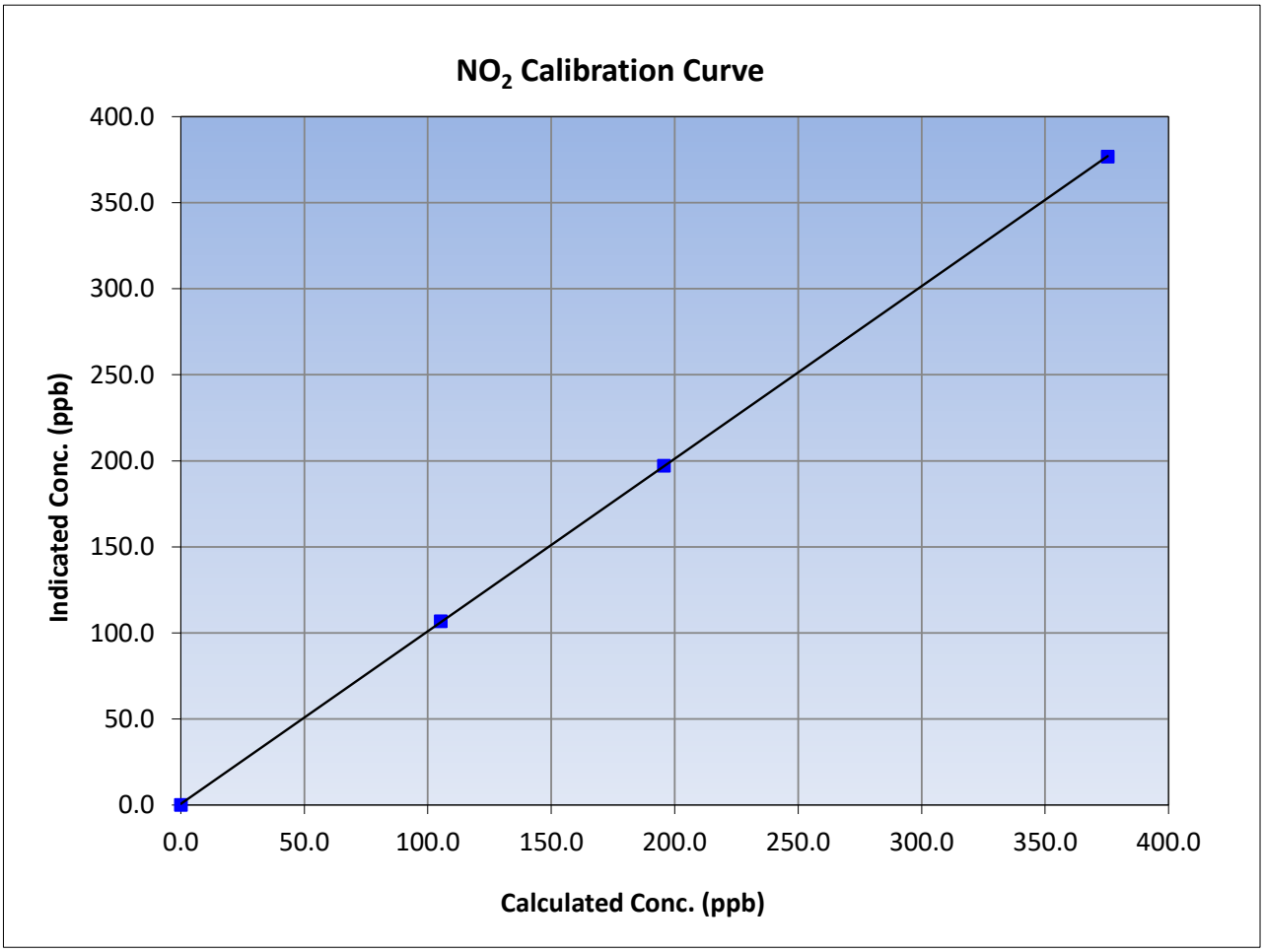
Version-04-2020

Station Information

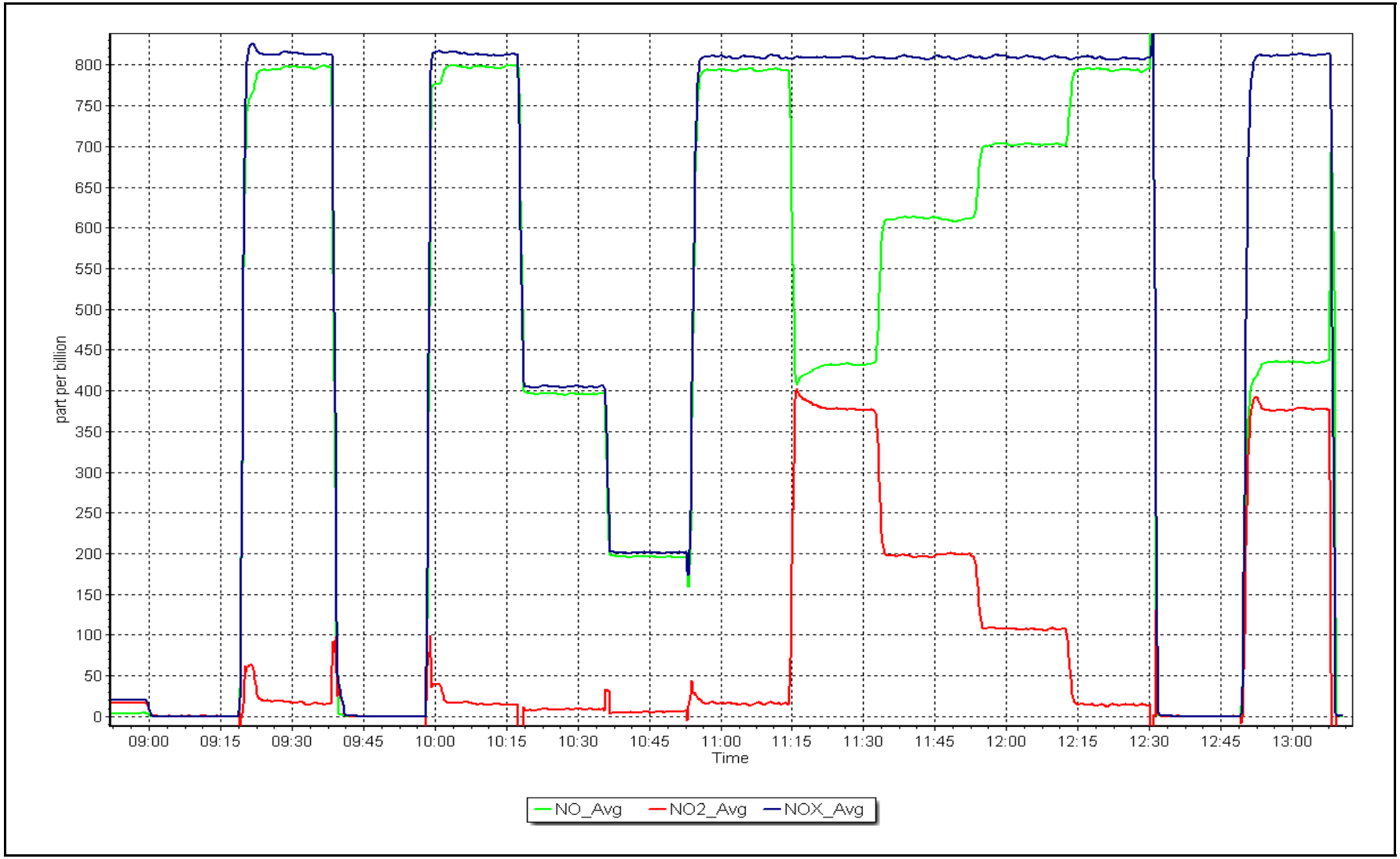
Calibration Date:	April 5, 2023	Previous Calibration:	March 15, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	8:57	End Time (MST):	13:15
Analyzer make:	Thermo 42i	Analyzer serial #:	710321429

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999988	≥0.995
375.4	376.7	0.9964			
195.7	197.2	0.9922	Slope	1.002663	0.90 - 1.10
105.3	106.8	0.9856			
			Intercept	0.679699	+/-20



NO_X Calibration Plot Date: April 5, 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:	April 11, 2023	Last Cal Date:	March 16, 2023
Start time (MST):	10:57	End time (MST):	11:20
Analyzer Make:	API T640	S/N:	875
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	954
Temp/RH standard:	Delta Cal	S/N:	954

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-11	-10.2	-11	☐	+/- 2 °C
P (mmHg)	724	724	724	☐	+/- 10 mmHg
flow (LPM)	5.02	5.05	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: April 11, 2023 Last Cal Date: March 16, 2023

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

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test				☐	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
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Jackfish 1	Station number:	AMS 506
Calibration Date:	April 20, 2023	Last Cal Date:	March 9, 2023
Start time (MST):	8:39	End time (MST):	11:20
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:	1.001172	1.003357	Backgd or Offset:	18.9	18.7
Calibration intercept:	-1.416002	-1.656062	Coeff or Slope:	0.966	0.949

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.6	----
as found span	4921	79.2	800.2	813.2	0.984
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	801.4	0.999
second point	4960	39.6	400.2	400.7	0.999
third point	4980	19.8	200.1	196.7	1.017
as left zero	5000	0.0	0.0	-0.2	----
as left span	4921	79.2	800.2	800.4	1.000
				Average Correction Factor	1.005

Baseline Corr As found:	813.80	Previous response	799.73	*% change	1.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

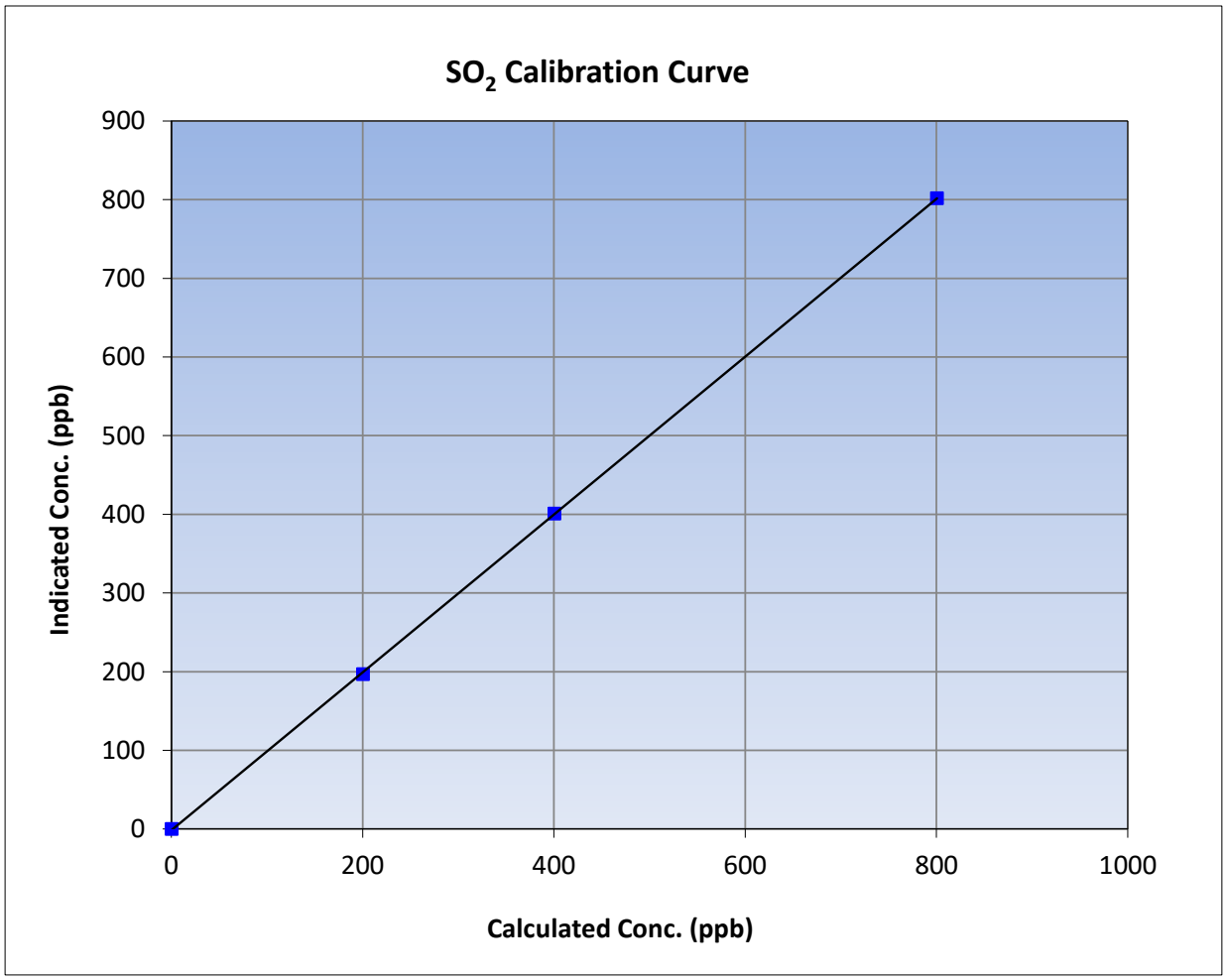
Station Information

Calibration Date:	April 20, 2023	Previous Calibration:	March 9, 2023
Station Name:	Jackfish 1	Station Number:	AMS 506
Start Time (MST):	8:39	End Time (MST):	11:20
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290011

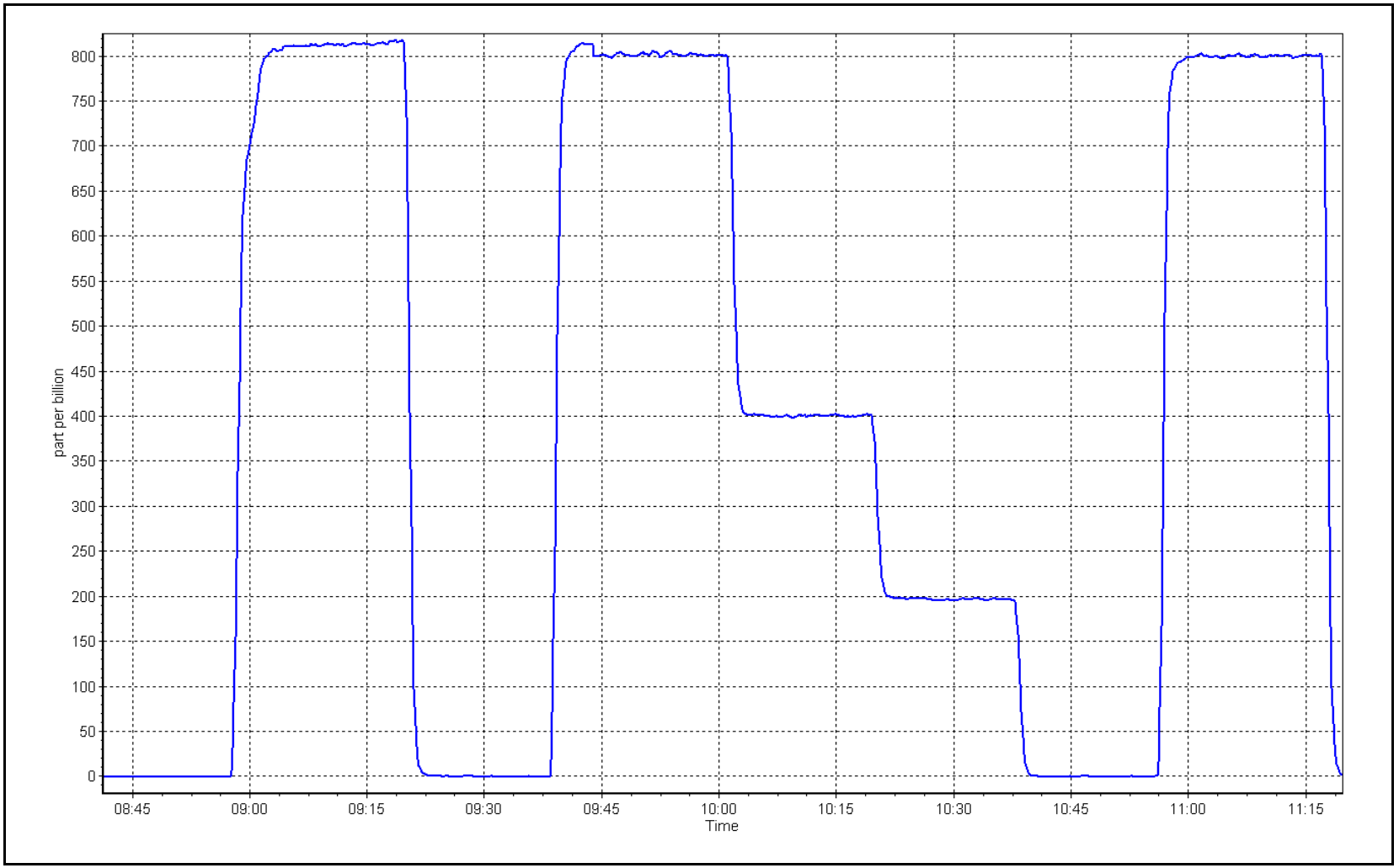
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
800.2	801.4	0.9985
400.2	400.7	0.9986
200.1	196.7	1.0171

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999976	*≥0.995*
Slope	1.003357	*0.90 - 1.10*
Intercept	-1.656062	*+/-30*



SO2 Calibration Plot Date: April 20, 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:	April 25, 2023	Last Cal Date:	March 29, 2023
Start time (MST):	9:04	End time (MST):	12:54
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.14	ppm	Cal Gas Exp Date:	September 16, 2024
Cal Gas Cylinder #:	CC511843			
Removed Cal Gas Conc:	5.14	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	2659
ZAG Make/Model:	API 701		Serial Number:	4427

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1180540020	
Converter make:	Global G150		Converter serial #:	2022-218	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005003	0.999860	Backgd or Offset:	3.42	3.37
Calibration intercept:	-0.178301	-0.298400	Coeff or Slope:	1.090	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	-0.2	----
as found span	4922	77.8	80.0	80.8	0.987
as found 2nd point	4961	38.9	40.0	40.1	0.992
as found 3rd point	4981	19.4	19.9	19.7	1.002
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4922	77.8	80.0	79.7	1.004
second point	4961	38.9	40.0	39.7	1.007
third point	4981	19.4	19.9	19.5	1.023
as left zero	5000	0.0	0.0	-0.2	----
as left span	4922	77.8	80.0	79.9	1.001
SO2 Scrubber Check	4921	79.2	792.0	0.0	----
Date of last scrubber change:		24-Feb-23		Ave Corr Factor	1.011
Date of last converter efficiency test:		December 1, 2022			efficiency

Baseline Corr As found:	81.0	Prev response:	80.20	*% change:	1.0%
Baseline Corr 2nd AF pt:	40.3	AF Slope:	1.013717	AF Intercept:	-0.358110
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999983		

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after multi-point as founds. Scrubber test done and passed after calibrator zero. Adjusted span only.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

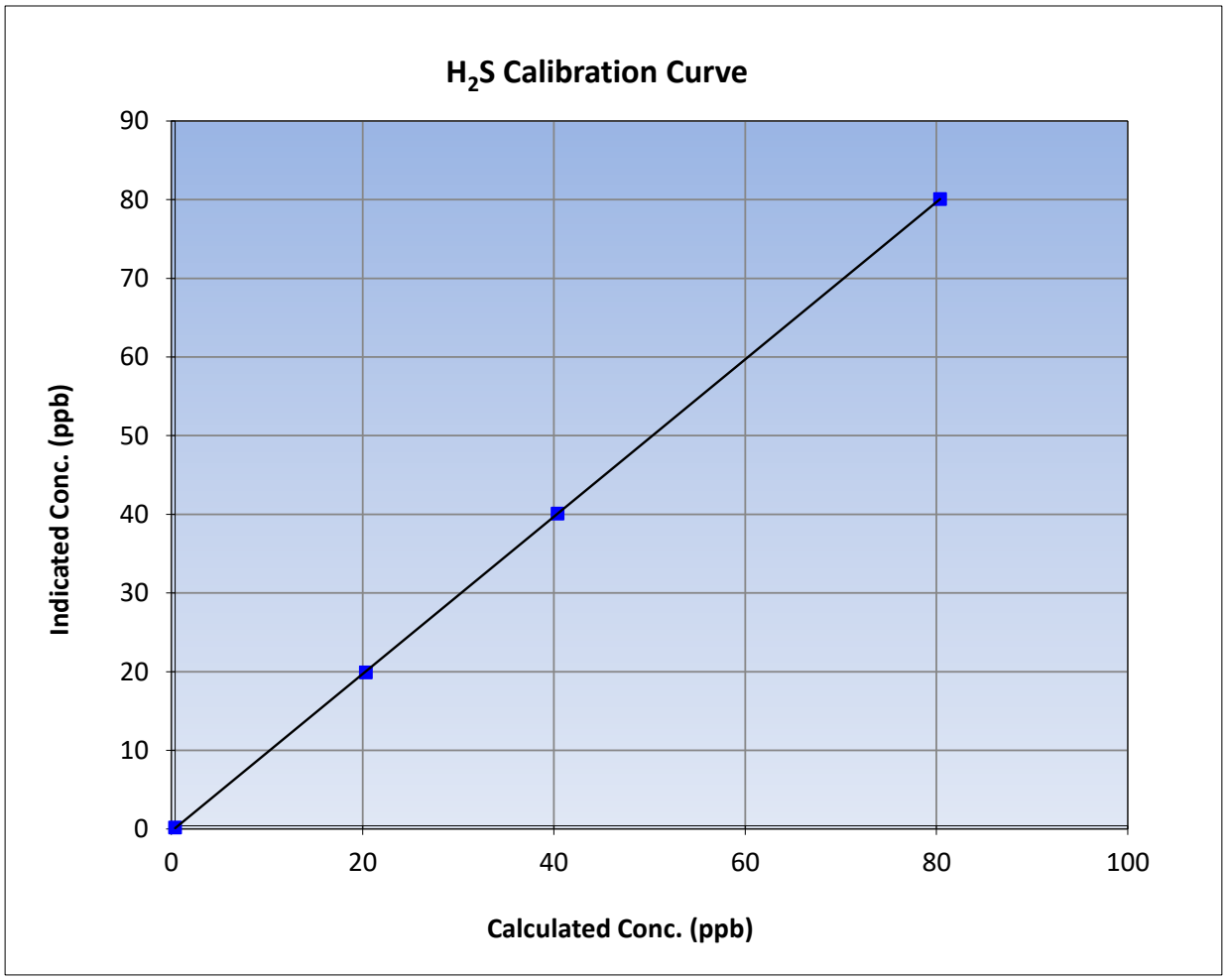
Station Information

Calibration Date:	April 25, 2023	Previous Calibration:	March 29, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	9:04	End Time (MST):	12:54
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1180540020

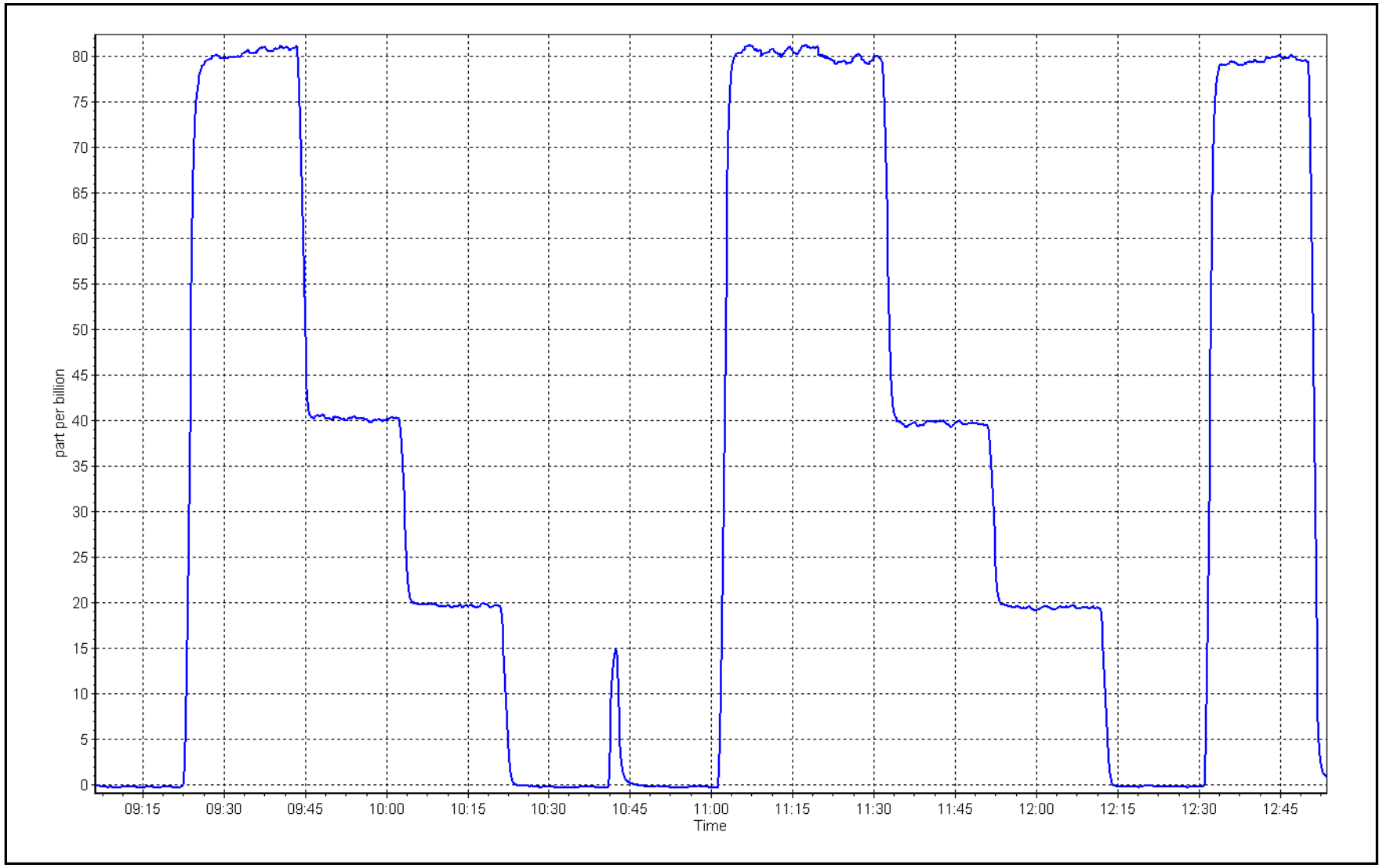
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
80.0	79.7	1.0035
40.0	39.7	1.0073
19.9	19.5	1.0226

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999991	*≥0.995*
Slope	0.999860	*0.90 - 1.10*
Intercept	-0.298400	*+/-3*



H_2S Calibration Plot Date: April 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:	April 26, 2023	Last Cal Date:	March 30, 2023
Start time (MST):	8:21	End time (MST):	12:30
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:	1.130	1.143	NO bkgnd or offset:	3.2	3.3
NOX coeff or slope:	0.993	0.993	NOX bkgnd or offset:	3.3	3.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	172.2	172.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.003601	1.001147
NO_X Cal Offset:	-0.808032	-0.448022
NO Cal Slope:	1.002854	0.999625
NO Cal Offset:	-1.627998	-1.447978
NO_2 Cal Slope:	1.003399	1.006063
NO_2 Cal Offset:	0.523900	0.960980

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	4916	84.4	801.1	799.9	1.2	792.4	786.0	6.3	1.0109	1.0177
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.2	0.0	----	----
high point	4916	84.4	801.1	799.9	1.2	801.2	798.3	3.0	0.9998	1.0020
second point	4958	42.2	400.5	400.0	0.6	402.2	399.5	2.6	0.9959	1.0011
third point	4979	21.1	200.3	200.0	0.3	198.1	195.5	2.6	1.0110	1.0229
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.2	0.0	----	----
as left span	4916	84.4	801.1	402.4	398.7	803.1	402.5	400.6	0.9975	0.9997
								Average Correction Factor	1.0022	1.0087

Corrected As found	NO_X = 792.3 ppb	NO = 785.9 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-1.4%
Previous Response	NO_X = 803.1 ppb	NO = 800.5 ppb		*Percent Change	NO =	-1.9%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	798.8	401.3	398.7	401.7	0.9925	100.8%
2nd GPT point (200 ppb O3)	798.8	595.0	205.0	207.2	0.9893	101.1%
3rd GPT point (100 ppb O3)	798.8	692.5	107.5	110.4	0.9736	102.7%
				Average Correction Factor	0.9851	101.5%

Notes: Adjusted the span only.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

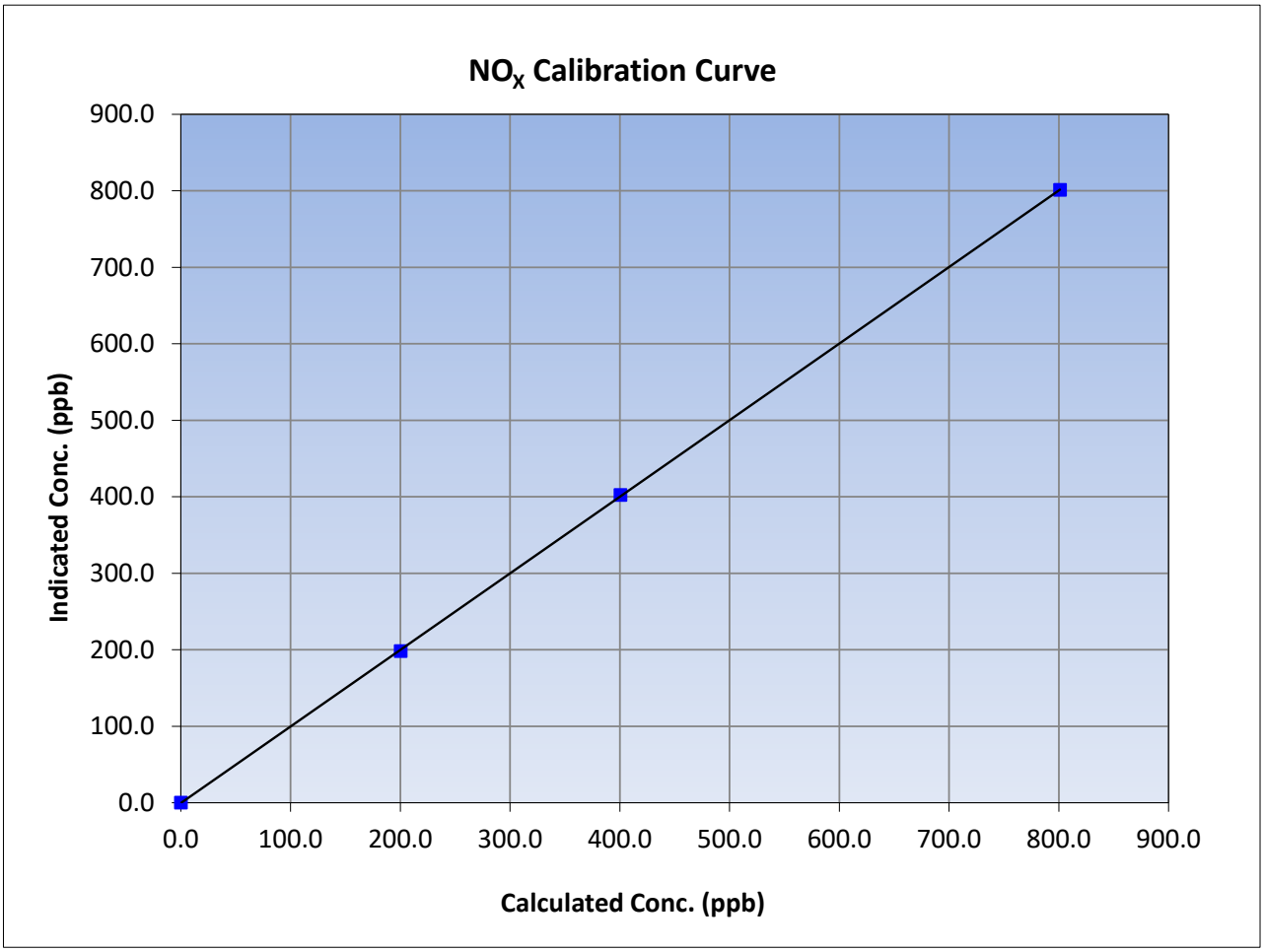
Version-04-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 30, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	8:21	End Time (MST):	12:30
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999980	≥0.995
801.1	801.2	0.9998			
400.5	402.2	0.9959	Slope	1.001147	0.90 - 1.10
200.3	198.1	1.0110			
			Intercept	-0.448022	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

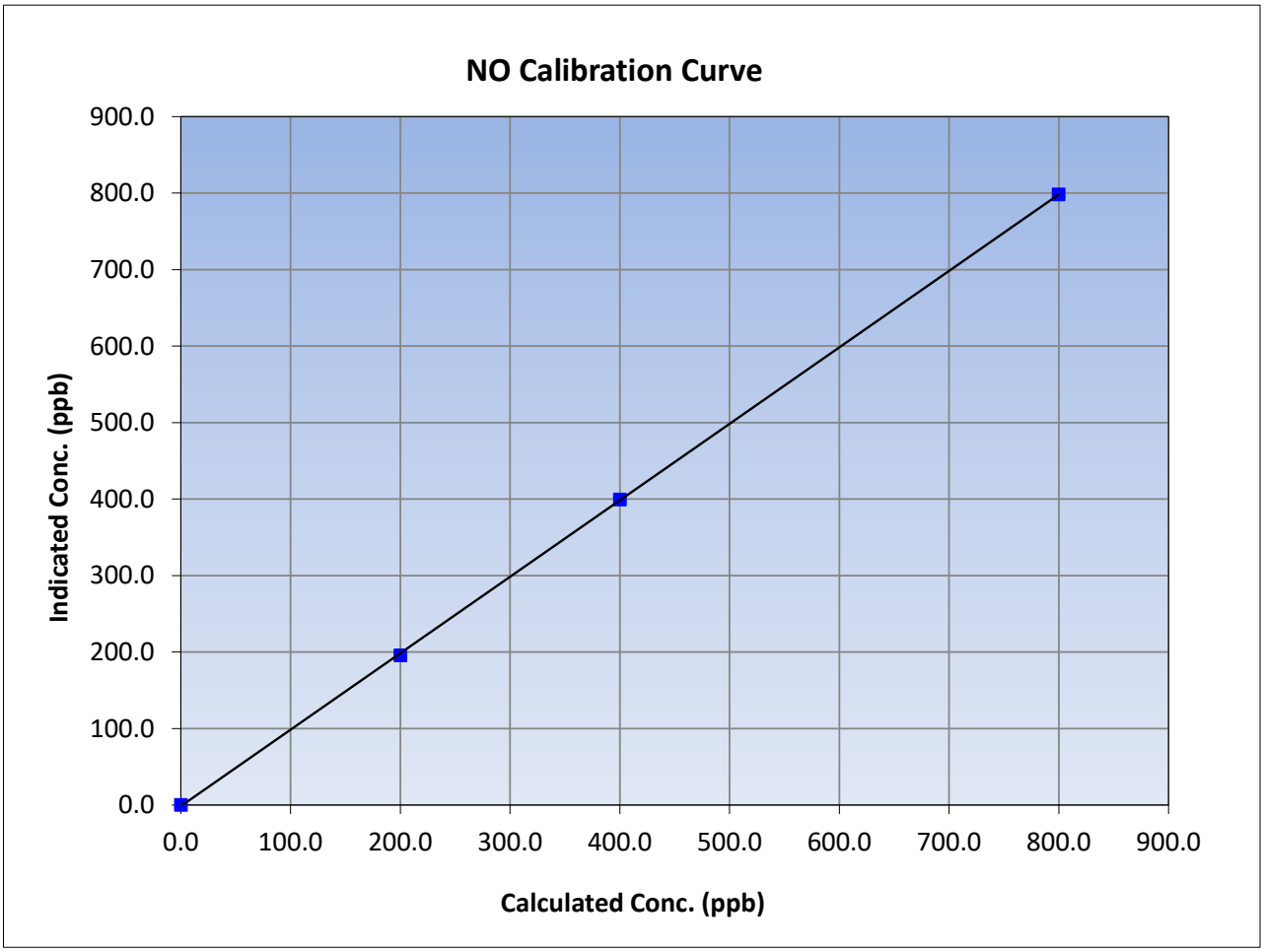
Version-04-2020

Station Information

Calibration Date:	April 26, 2023	Previous Calibration:	March 30, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	8:21	End Time (MST):	12:30
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999963	≥0.995
799.9	798.3	1.0020			
400.0	399.5	1.0011	Slope	0.999625	0.90 - 1.10
200.0	195.5	1.0229			
			Intercept	-1.447978	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

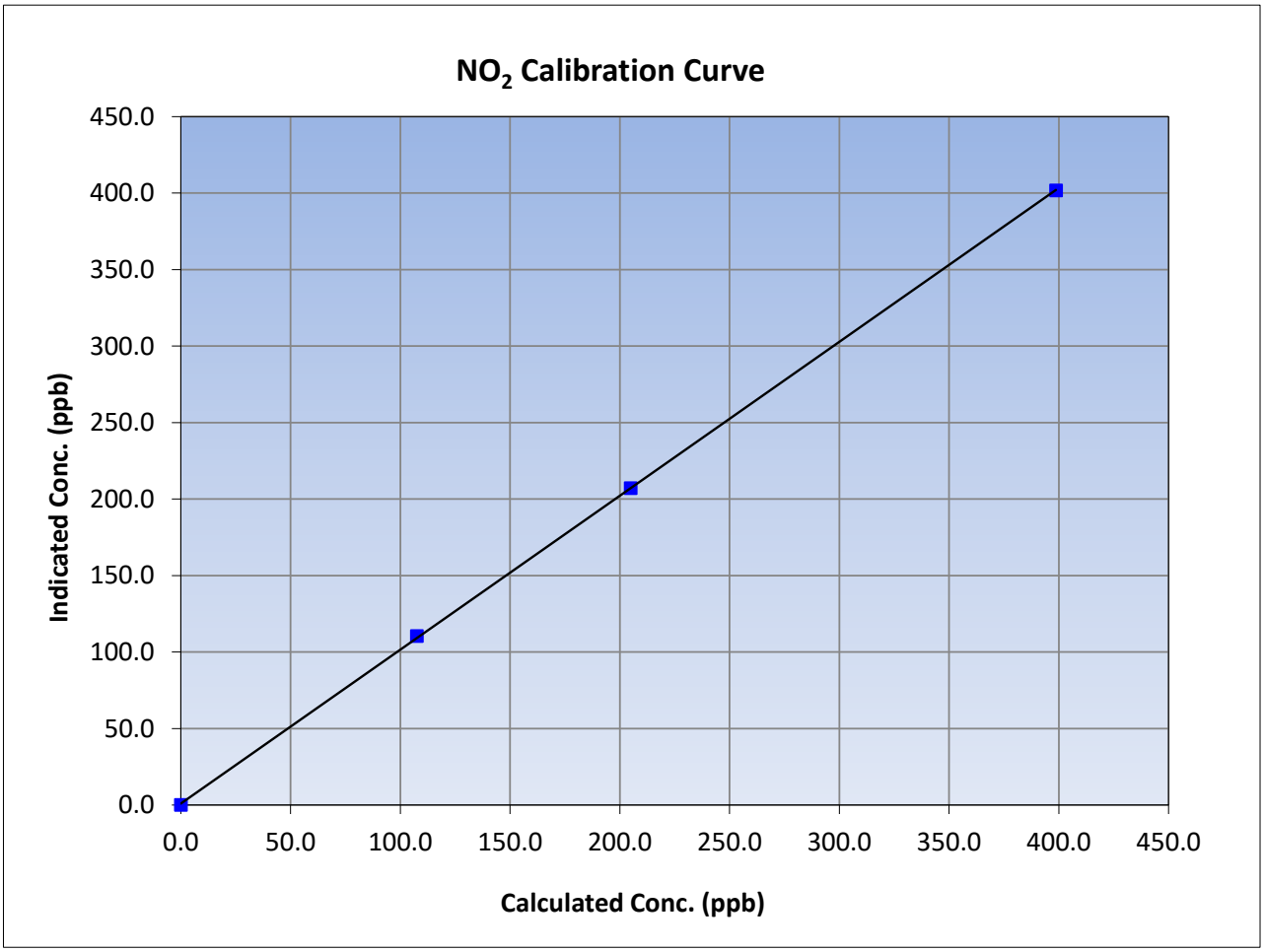
Version-04-2020

Station Information

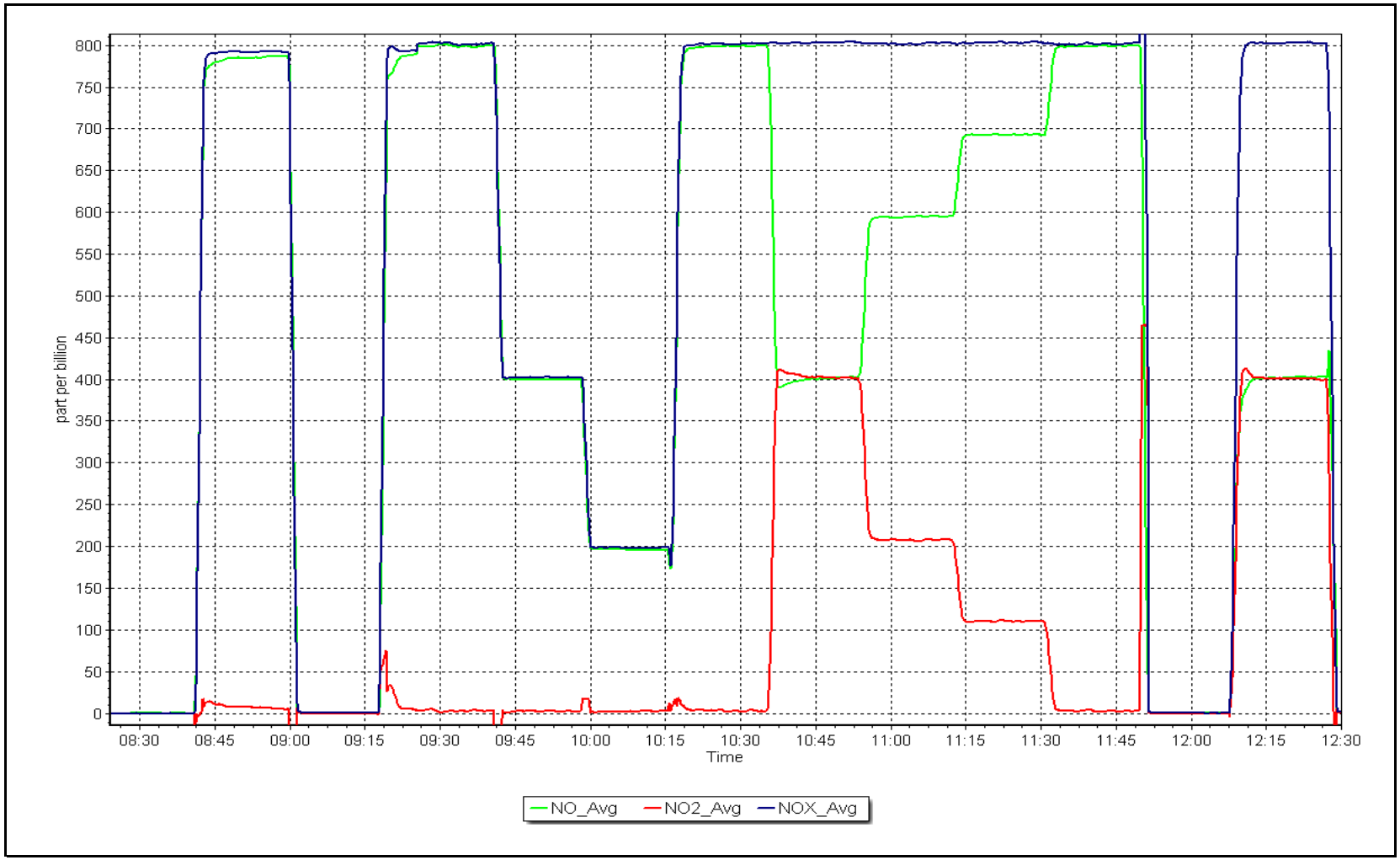
Calibration Date:	April 26, 2023	Previous Calibration:	March 30, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	8:21	End Time (MST):	12:30
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999968	≥0.995
398.7	401.7	0.9925			
205.0	207.2	0.9893	Slope	1.006063	0.90 - 1.10
107.5	110.4	0.9736			
			Intercept	0.960980	+/-20



NO_x Calibration Plot Date: April 26, 2023 Location: Jackfish 1



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS508
KIRBY NORTH
APRIL 2023

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

May 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Kirby North	Station number:	AMS508
Calibration Date:	April 21, 2023	Last Cal Date:	March 9, 2023
Start time (MST):	9:33	End time (MST):	12:46
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:	0.997350	0.997420	Backgd or Offset:	19.6	19.5
Calibration intercept:	-0.929311	-0.728926	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	-0.2	----
as found span	4919	81.3	799.6	799.2	1.001
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	799.6	797.3	1.003
second point	4959	40.7	400.3	397.5	1.007
third point	4980	20.3	199.7	198.7	1.005
as left zero	5000	0.0	0.0	-0.3	----
as left span	4919	81.3	799.6	800.0	1.000
				Average Correction Factor	1.005

Baseline Corr As found:	799.40	Previous response	796.57	*% 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

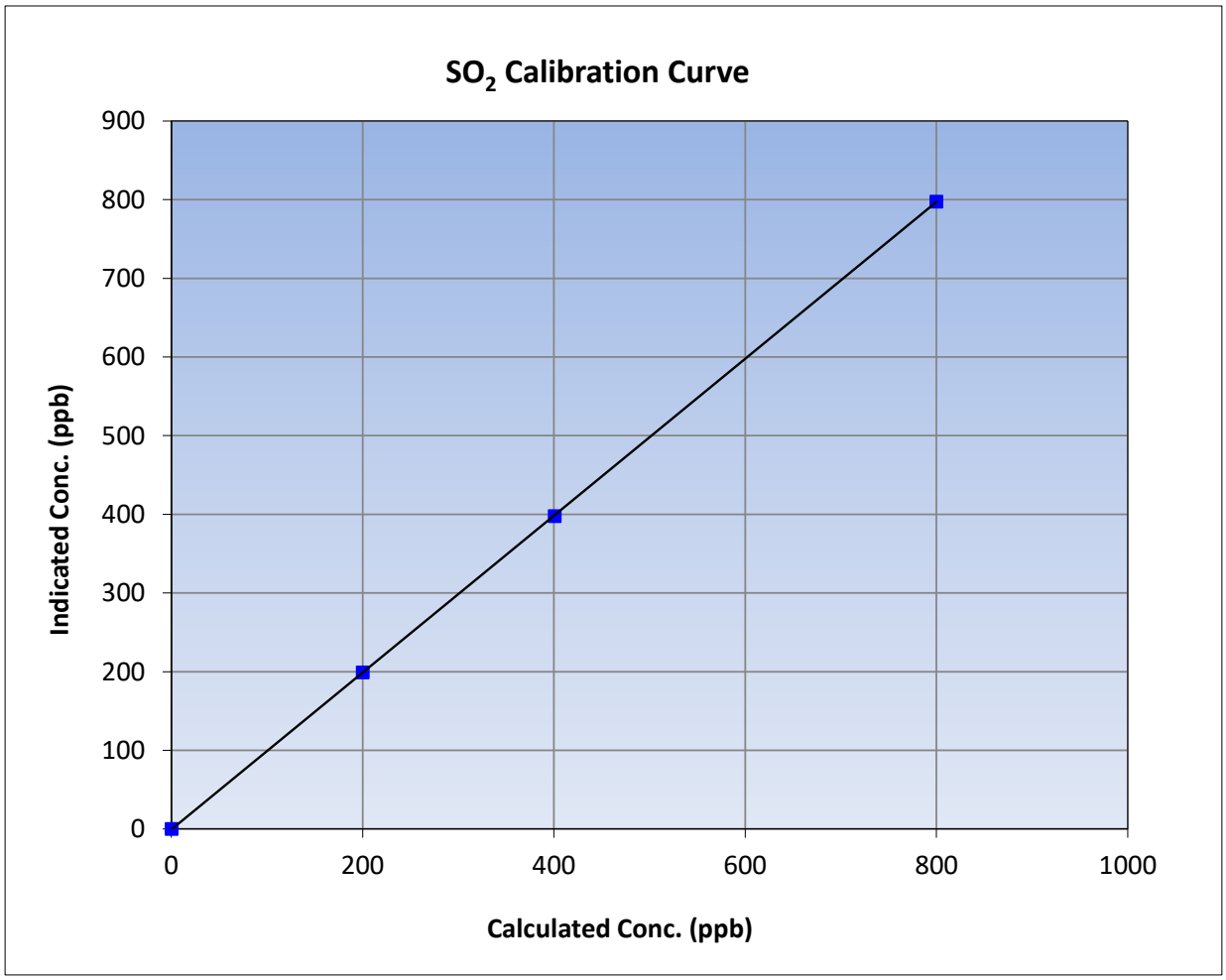
Station Information

Calibration Date:	April 21, 2023	Previous Calibration:	March 9, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	9:33	End Time (MST):	12:46
Analyzer make:	Thermo 43iQ	Analyzer serial #:	1182340007

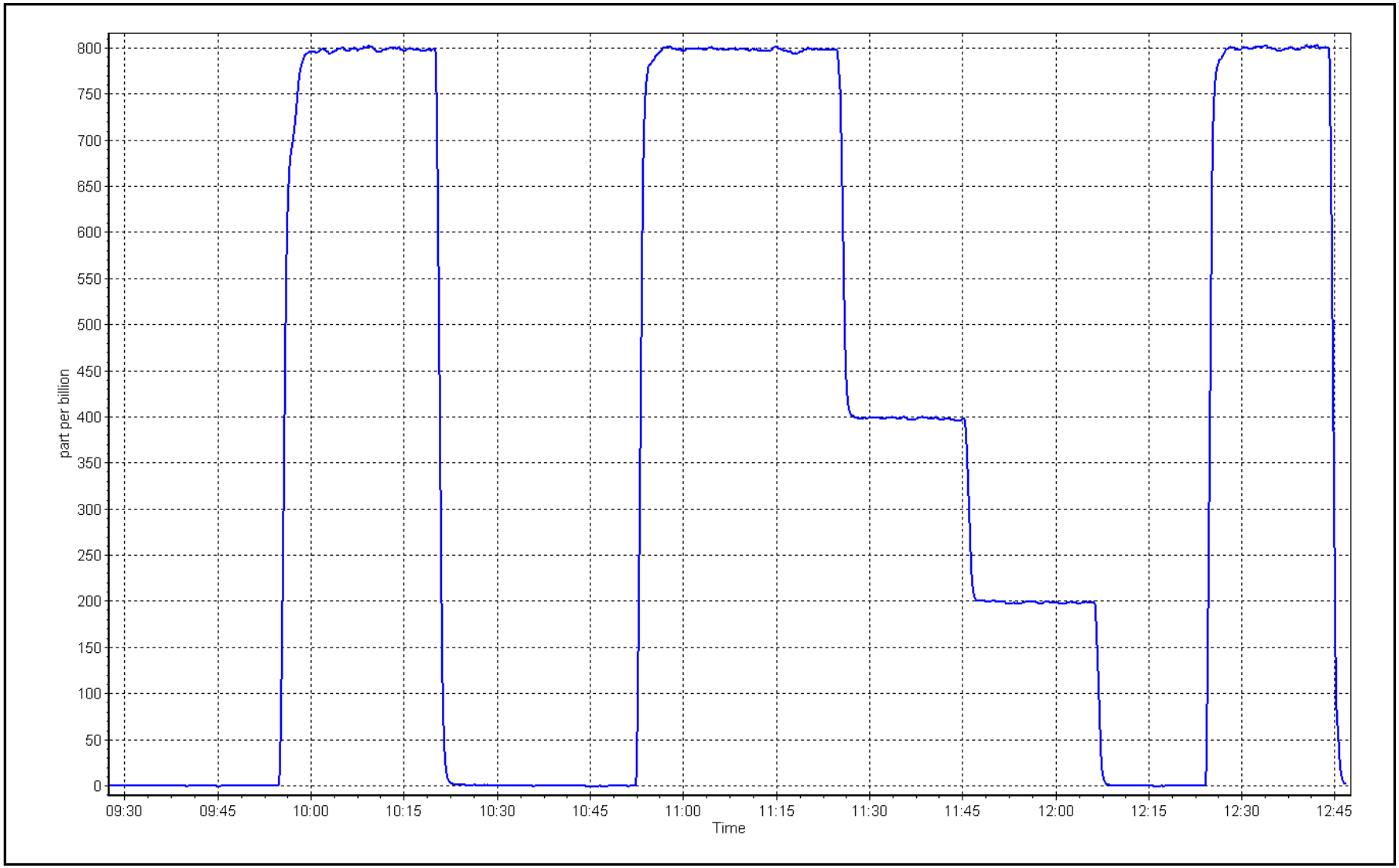
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.4	----
799.6	797.3	1.0029
400.3	397.5	1.0072
199.7	198.7	1.0048

Statistical Evaluation		Limits
Correlation Coefficient	0.999995	≥0.995
Slope	0.997420	0.90 - 1.10
Intercept	-0.728926	+/-30



SO2 Calibration Plot Date: April 21, 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:	April 19, 2023	Last Cal Date:	March 9, 2023
Start time (MST):	10:48	End time (MST):	16:14
Reason:	As Found		

Calibration Standards

Cal Gas Concentration:	5.167	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517378			
Removed Cal Gas Conc:	5.167	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3804
ZAG Make/Model:	API 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:	1.007456		Backgd or Offset:	1.67	1.71
Calibration intercept:	-0.140937		Coeff or Slope:	1.009	1.114

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.2	----
as found span	4923	77.4	80.0	78.4	1.018
as found 2nd point	4961	38.8	40.1	38.8	1.028
as found 3rd point	4981	19.3	19.9	19.2	1.028
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4923	77.4	80.0	80.3	0.996
second point					
third point					
as left zero					
as left span					
SO2 Scrubber Check	4920	79.8	798.0	0.1	----
Date of last scrubber change:		19-Apr-23		Ave Corr Factor	0.996
Date of last converter efficiency test:					efficiency

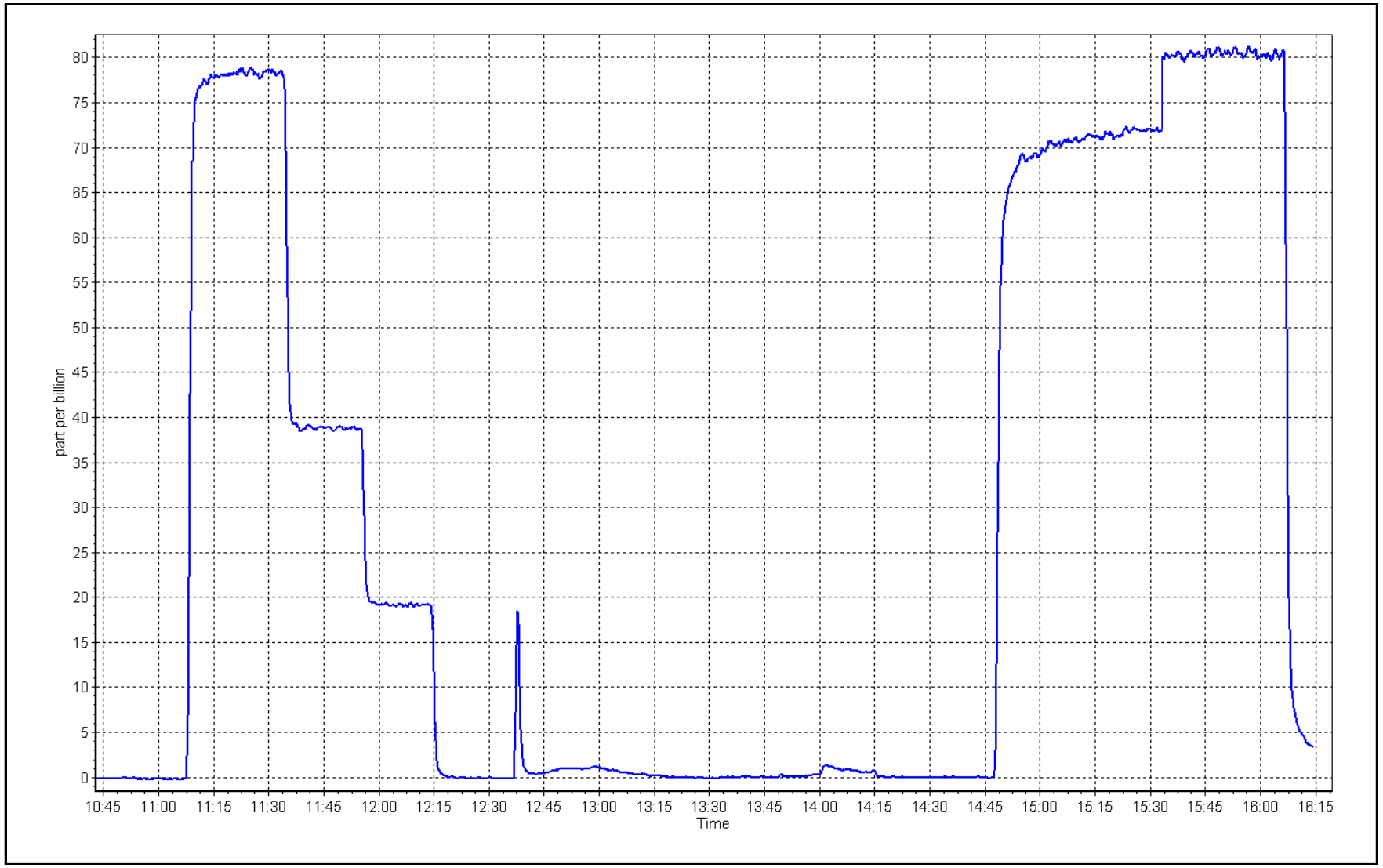
Baseline Corr As found:	78.6	Prev response:	80.43	*% change:	-2.3%
Baseline Corr 2nd AF pt:	39.0	AF Slope:	0.983029	AF Intercept:	-0.360848
Baseline Corr 3rd AF pt:	19.4	AF Correlation:	0.999967		

* = > +/-5% change initiates investigation

Notes: As founds completed. Replaced SOx scrubber, third scrubber check passed. Adjusted zero and span. The remaining portion of the calibration will be completed April 20, 2023.

Calibration Performed By: Braiden Boutilier

H_2S Calibration Plot Date: April 19, 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:	April 20, 2023	Last Cal Date:	April 19, 2023
Start time (MST):	6:30	End time (MST):	9:14
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:	1.007456	1.001312	Backgd or Offset:	1.71	1.60
Calibration intercept:	-0.140937	-0.100838	Coeff or Slope:	1.114	1.046

H_2S As Found Data

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

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4923	77.4	80.0	80.1	0.998
second point	4961	38.8	40.1	39.8	1.007
third point	4981	19.3	19.9	19.9	1.002
as left zero	5000	0.0	0.0	0.1	----
as left span	4923	77.4	80.0	80.2	0.997

SO2 Scrubber Check

Date of last scrubber change:	19-Apr-23	Ave Corr Factor	1.003
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: Completed calibration, as founds and scrubber check done April 19, 2023. Adjusted span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

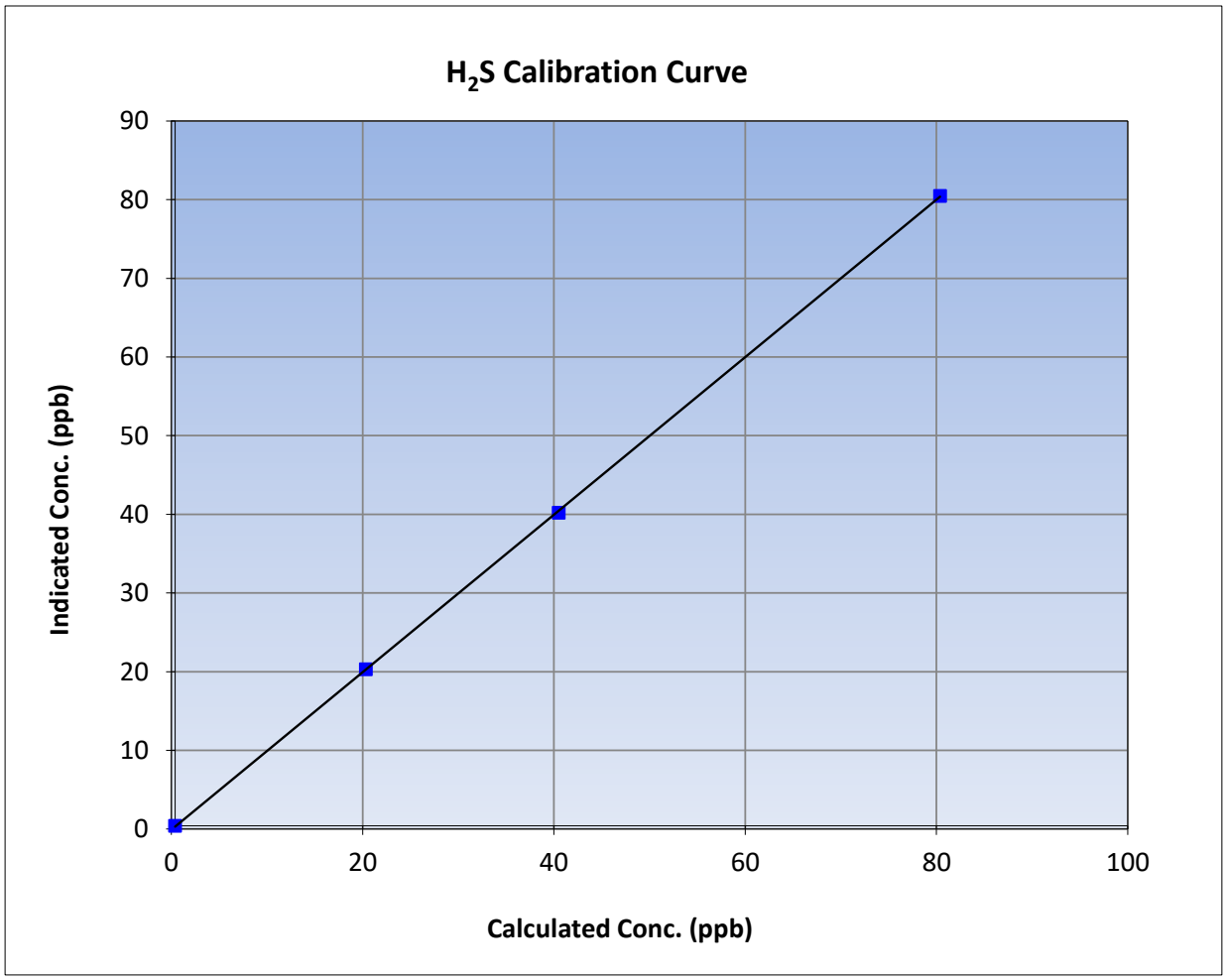
Station Information

Calibration Date:	April 20, 2023	Previous Calibration:	April 19, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	6:30	End Time (MST):	9:14
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1150840012

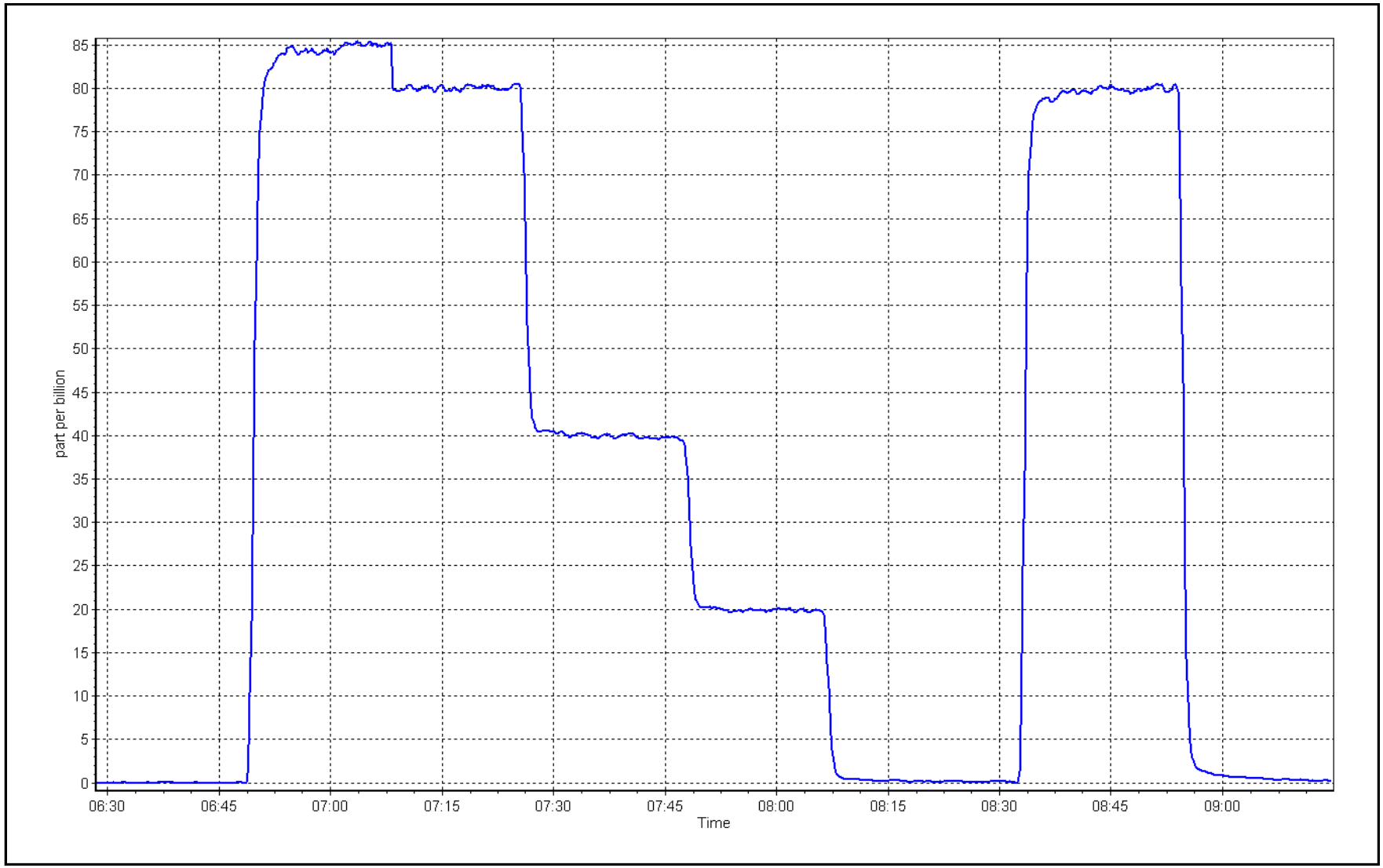
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.1	0.9985
40.1	39.8	1.0075
19.9	19.9	1.0022

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999975	*≥0.995*
Slope	1.001312	*0.90 - 1.10*
Intercept	-0.100838	*+/-3*



H_2S Calibration Plot Date: April 20, 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:	April 21, 2023	Last Cal Date:	March 9, 2023
Start time (MST):	9:33	End time (MST):	12:46
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:	0.998186	0.994800	Background:	2.86	2.62
Calibration intercept:	0.031226	0.044805	Coefficient:	3.706	3.695

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	-0.36	----
as found span	4919	81.3	17.26	16.89	1.022
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.04	----
high point	4919	81.3	17.26	17.22	1.002
second point	4959	40.7	8.64	8.63	1.002
third point	4980	20.3	4.31	4.35	0.991
as left zero	5000	0.0	0.00	0.10	----
as left span	4919	81.3	17.26	17.29	0.998
				Average Correction Factor	0.998

Baseline Corr As found:	17.25	Previous response	17.26	*% change	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

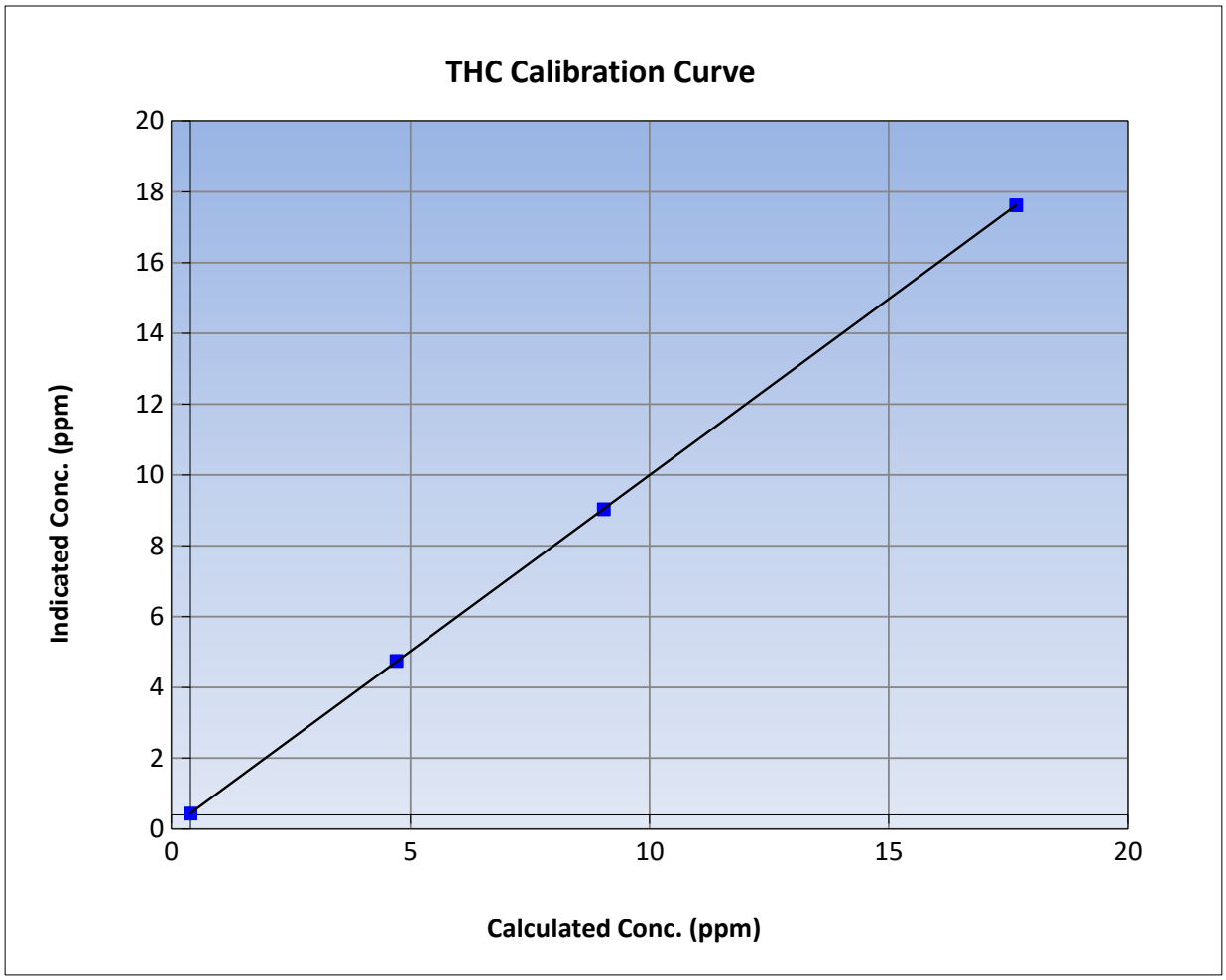
Station Information

Calibration Date:	April 21, 2023	Previous Calibration:	March 9, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	9:33	End Time (MST):	12:46
Analyzer make:	Thermo 51i	Analyzer serial #:	1182340005

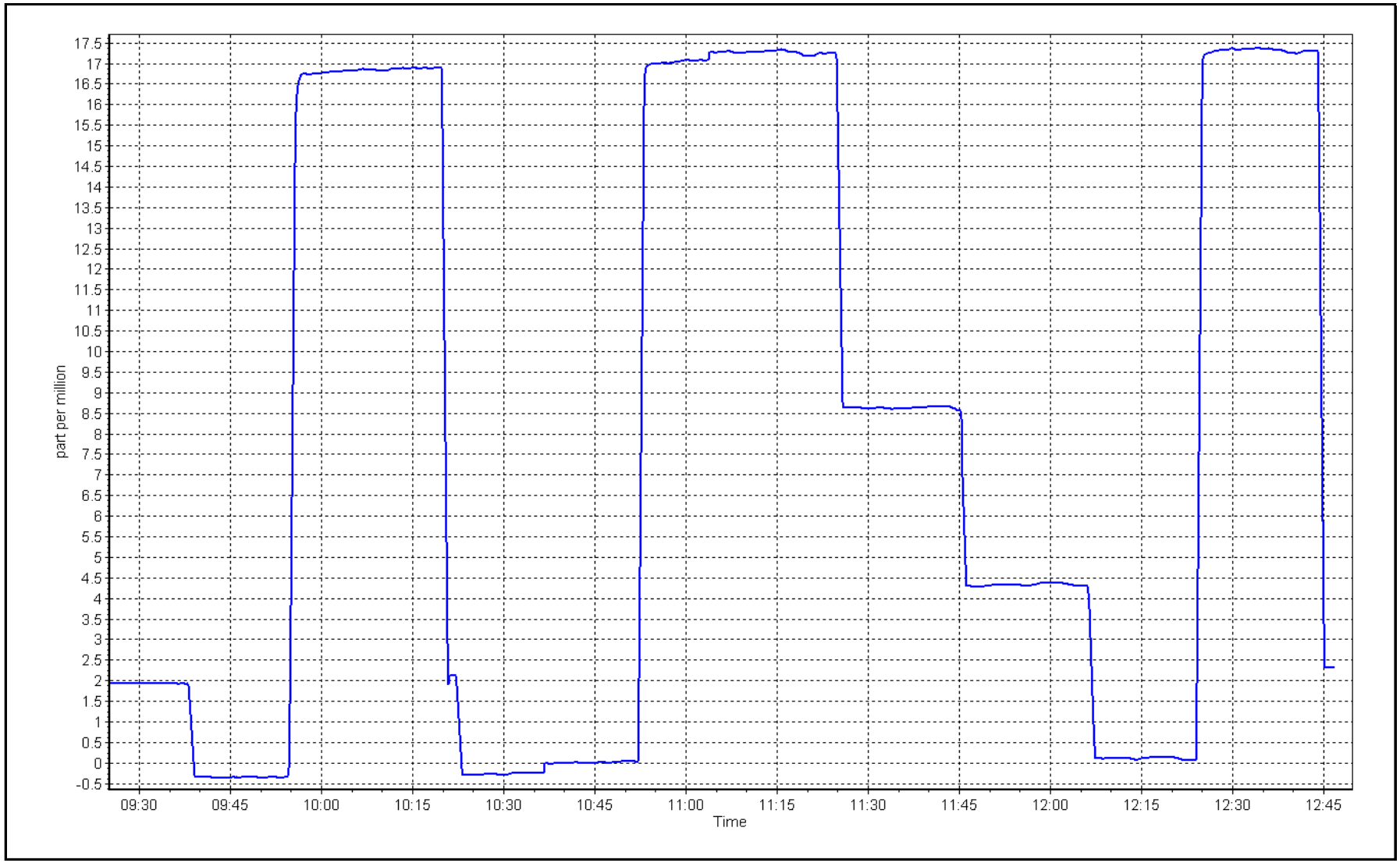
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.04	----
17.26	17.22	1.0025
8.64	8.63	1.0015
4.31	4.35	0.9911

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999997	*≥0.995*
Slope	0.994800	*0.90 - 1.10*
Intercept	0.044805	*+/-1.5*



THC Calibration Plot Date: April 21, 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:	April 20, 2023	Last Cal Date:	March 8, 2023
Start time (MST):	8:53	End time (MST):	13:44
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:		T34ULGL	Cal Gas Expiry Date:	March 8, 2025	
NOX Cal Gas Conc:	49.39	ppm	NO Cal Gas Conc:	49.02	ppm
Removed Cylinder #:		NA	Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	49.39	ppm	Removed Gas NO Conc:	49.02	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3804	
ZAG make/model:	API 701H		Serial Number:	880	

Analyzer Information

Analyzer make:	API T200	Analyzer serial #:	7029
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.026	1.026	NO bkgnd or offset:	0.1	0.1
NOX coeff or slope:	1.023	1.023	NOX bkgnd or offset:	0.3	0.3
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	5.0	5.0

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.997146	0.999458
NO_X Cal Offset:	-1.392505	-0.151623
NO Cal Slope:	0.996559	1.001479
NO Cal Offset:	-2.174660	-1.633427
NO_2 Cal Slope:	1.007853	1.001970
NO_2 Cal Offset:	0.638504	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	0.1	0.0	0.1	----	----
as found span	4919	81.0	800.1	794.1	6.0	795.6	787.6	8.0	1.0057	1.0083
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
high point	4919	81.0	800.1	794.1	6.0	799.4	794.4	5.0	1.0009	0.9997
second point	4960	40.5	400.0	397.0	3.0	400.2	395.4	4.8	0.9995	1.0041
third point	4980	20.2	199.5	198.0	1.5	198.7	194.9	3.8	1.0042	1.0161
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
as left span	4919	81.0	800.1	415.2	384.9	799.0	414.3	384.7	1.0014	1.0022
								Average Correction Factor	1.0015	1.0066

Corrected As found	NO_X = 795.5 ppb	NO = 787.6 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-0.1%
Previous Response	NO_X = 796.4 ppb	NO = 789.2 ppb			*Percent Change	NO =	-0.2%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	791.5	412.6	384.9	386.0	0.9971	100.3%
2nd GPT point (200 ppb O3)	791.5	608.3	189.2	191.6	0.9874	101.3%
3rd GPT point (100 ppb O3)	791.5	706.7	90.8	92.6	0.9805	102.0%
				Average Correction Factor	0.9884	101.2%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

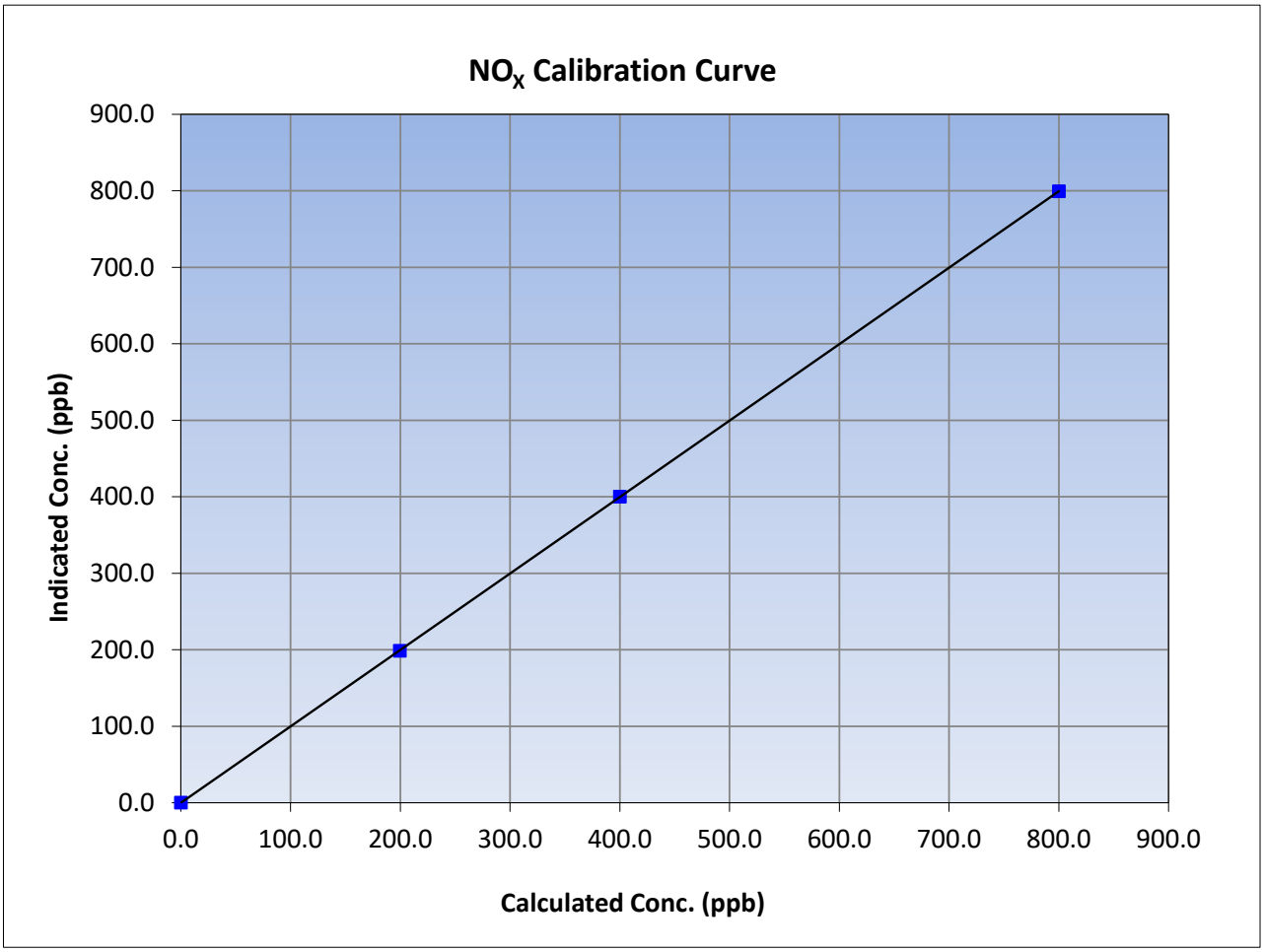
Version-04-2020

Station Information

Calibration Date:	April 20, 2023	Previous Calibration:	March 8, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	8:53	End Time (MST):	13:44
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	0.999998	≥0.995
800.1	799.4	1.0009			
400.0	400.2	0.9995	Slope	0.999458	0.90 - 1.10
199.5	198.7	1.0042			
			Intercept	-0.151623	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

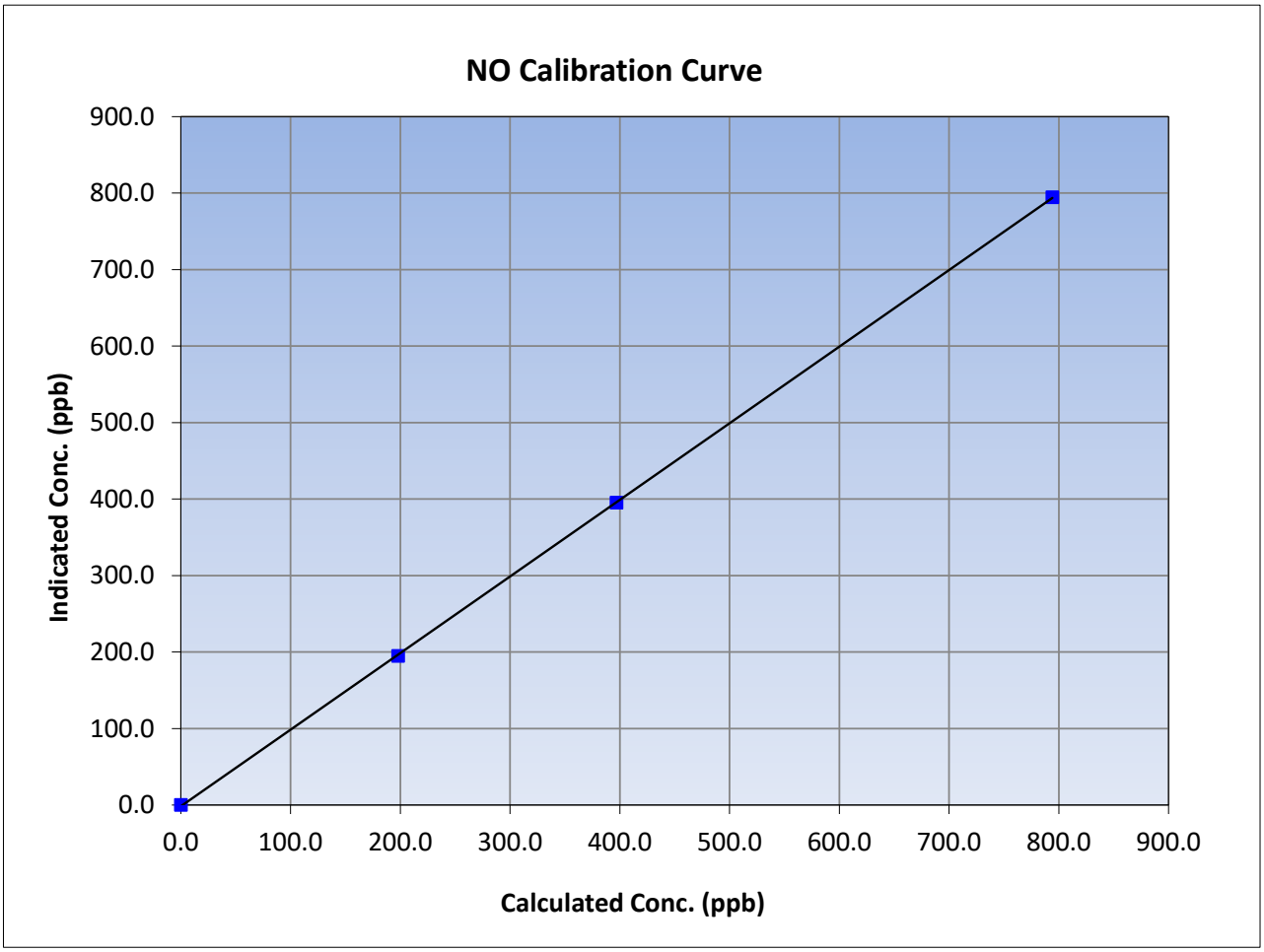
Version-04-2020

Station Information

Calibration Date:	April 20, 2023	Previous Calibration:	March 8, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	8:53	End Time (MST):	13:44
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	0.999980	≥0.995
794.1	794.4	0.9997			
397.0	395.4	1.0041	Slope	1.001479	0.90 - 1.10
198.0	194.9	1.0161			
			Intercept	-1.633427	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

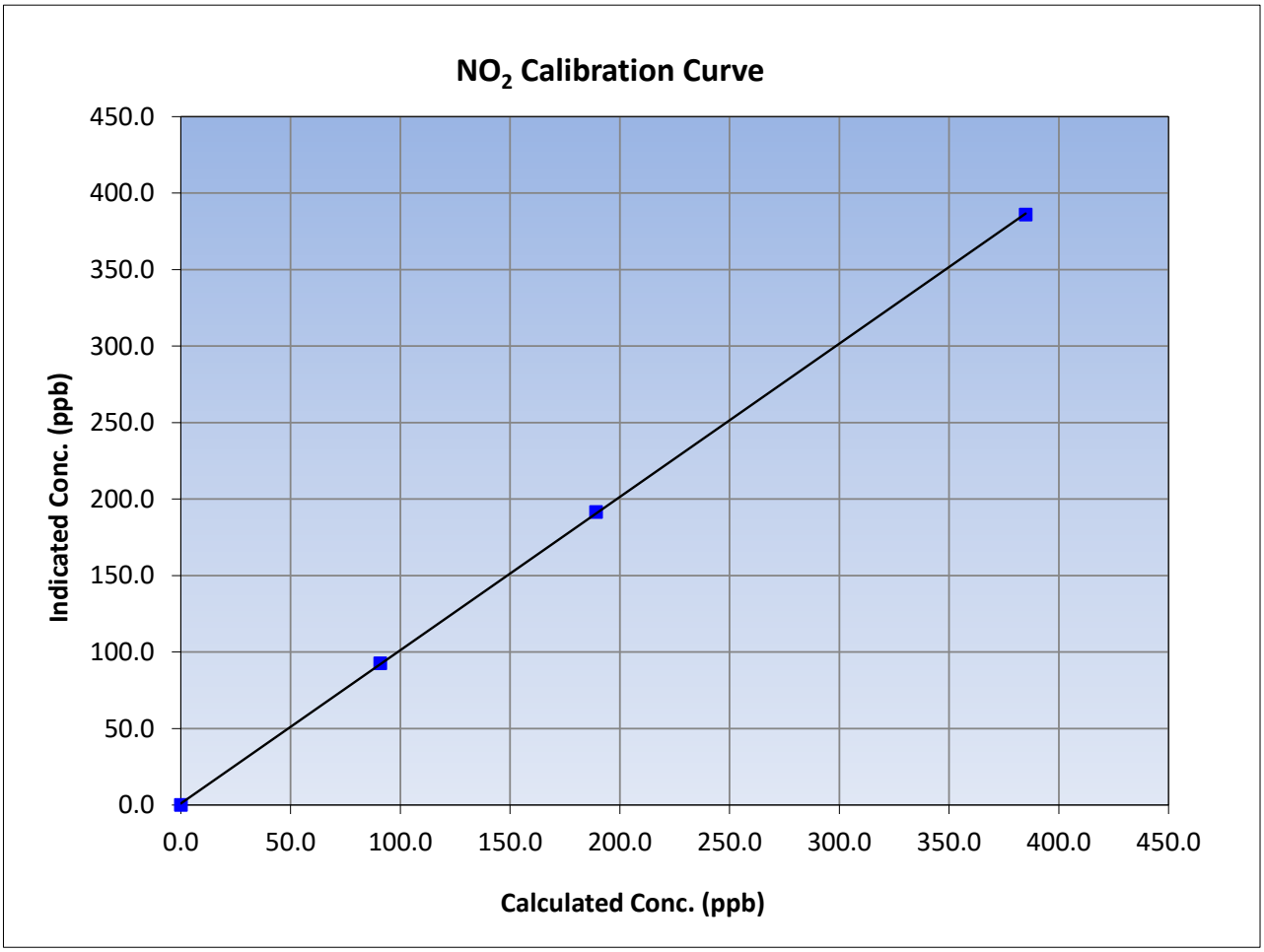
Version-04-2020

Station Information

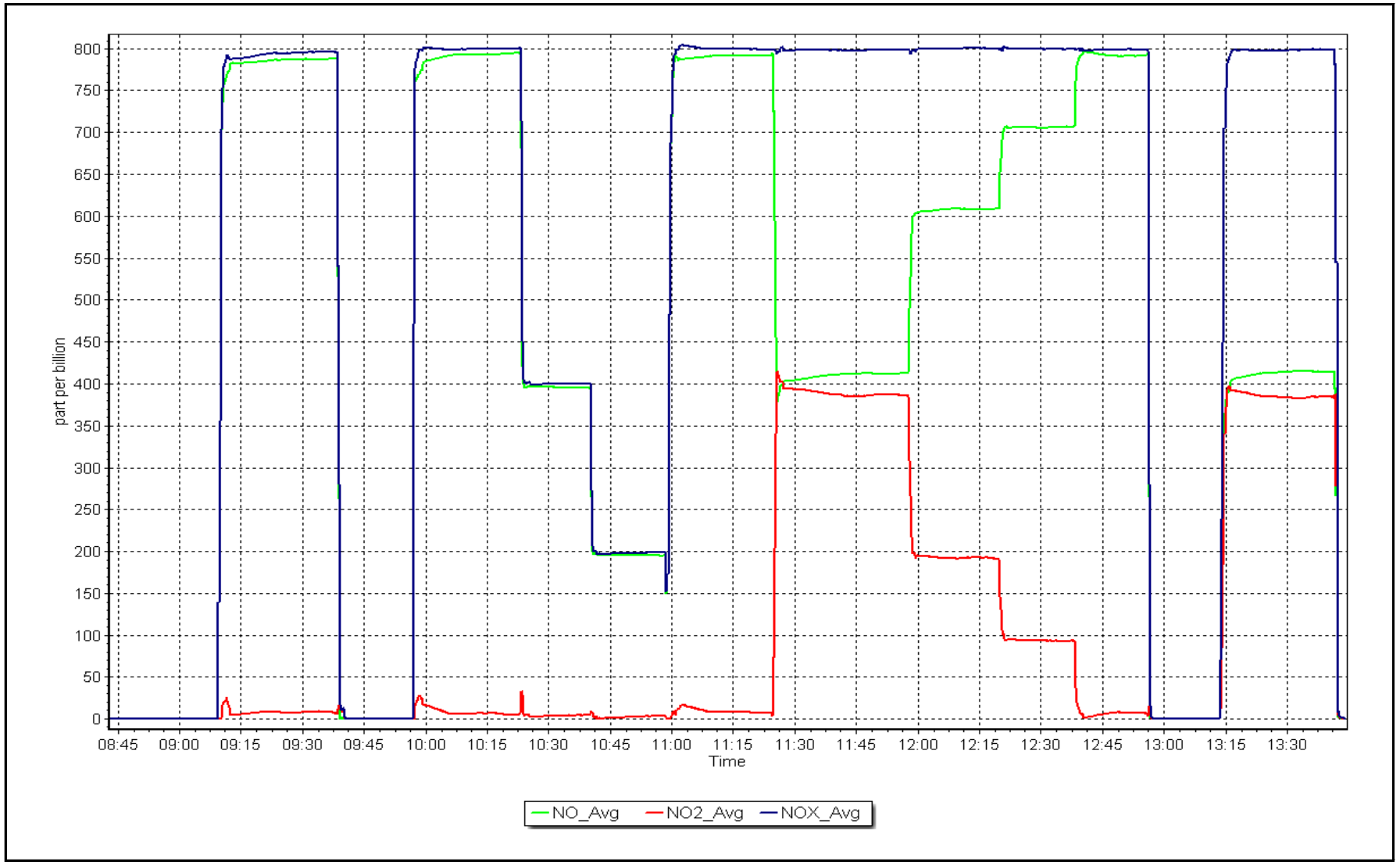
Calibration Date:	April 20, 2023	Previous Calibration:	March 8, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	8:53	End Time (MST):	13:44
Analyzer make:	API T200	Analyzer serial #:	7029

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999965	≥0.995
384.9	386.0	0.9971			
189.2	191.6	0.9874	Slope	1.001970	0.90 - 1.10
90.8	92.6	0.9805			
			Intercept	1.001988	+/-20



NO_X Calibration Plot Date: April 20, 2023 Location: Kirby North



End of Report