WOOD BUFFALO
ENVIRONMENTAL ASSOCIATION

Unit 3 - 805 Memorial Drive
Fort McMurray, AB T9K 0K4
P: 780.799.4420 E: info@wbea.org
wbea.org

Wood Buffalo Environmental Association

JULY 2023

MONTHLY CALIBRATION REPORT

CONTINUOUS MONITORING

August 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
JULY 2023

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

August 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:	July 14, 2023	Last Cal Date:	June 1, 2023
Start time (MST):	9:56	End time (MST):	14:53
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.21	ppm	Cal Gas Exp Date:	March 10, 2031
Cal Gas Cylinder #:	CC418809			
Removed Cal Gas Conc:	49.19	ppm	Rem Gas Exp Date:	February 23, 2025
Removed Gas Cyl #:	CC486642		Diff between cyl:	-1.8%
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3565
ZAG Make/Model:	Teledyne API T701		Serial Number:	5609

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999958	1.000680	Backgd or Offset:	19.1	19.2
Calibration intercept:	0.086959	-0.433310	Coeff or Slope:	0.883	0.892

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.2	----
as found span	4918	81.3	799.9	802.4	0.997
as found 2nd point					
as found 3rd point					
new cylinder response	4918	81.3	800.3	788.4	1.015
calibrator zero	5000	0.0	0.0	0.5	----
high point	4918	81.3	800.3	801.0	0.999
second point	4959	40.7	400.6	399.5	1.003
third point	4979	20.3	199.8	198.9	1.005
as left zero	5000	0.0	0.0	0.4	----
as left span	4918	81.3	800.3	801.0	0.999
				Average Correction Factor	1.002

Baseline Corr As found:	802.20	Previous response	799.99	*% 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: Changed the inlet filter and SO2/HC cylinder after as founds. Adjusted span only.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

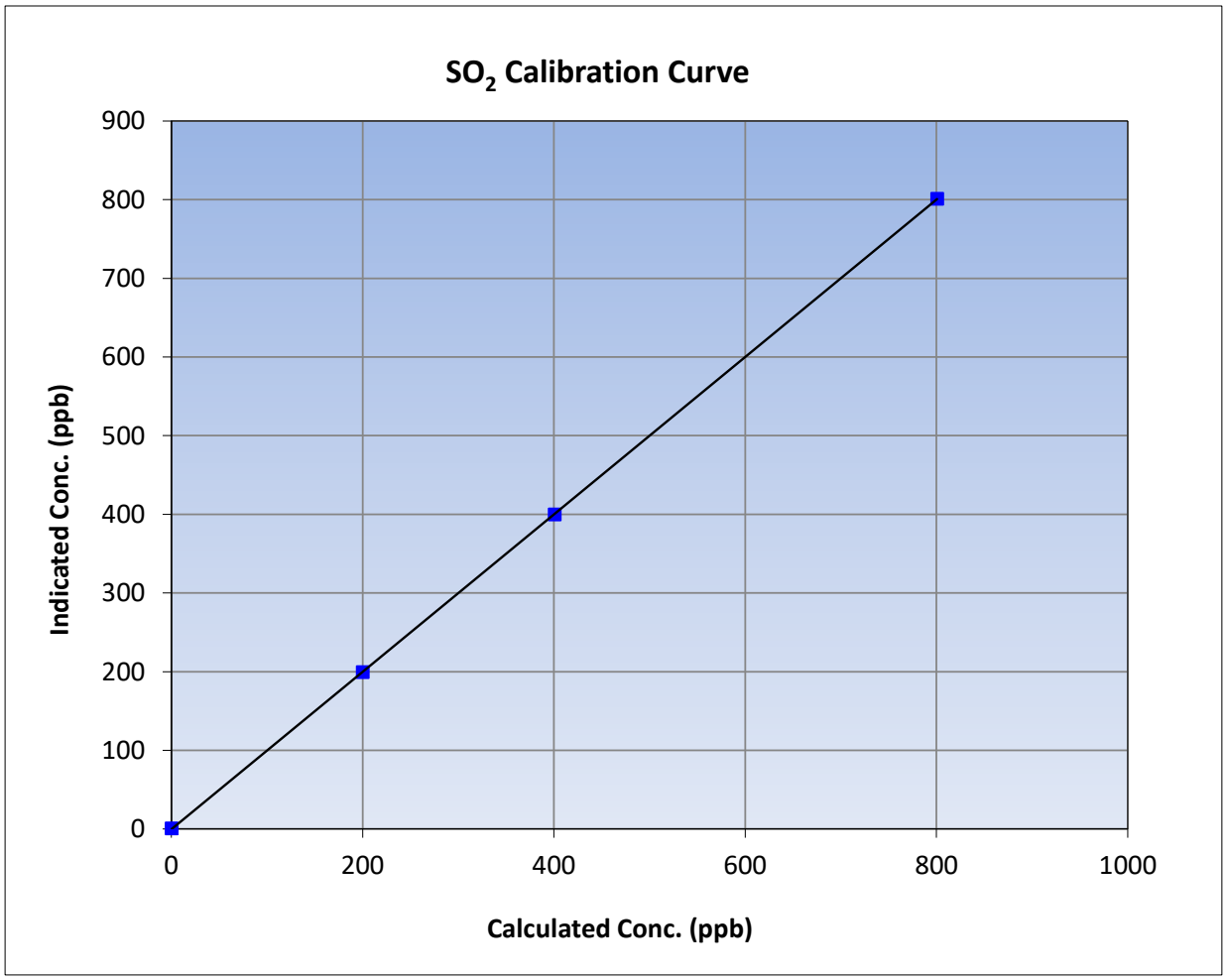
Station Information

Calibration Date:	July 14, 2023	Previous Calibration:	June 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:56	End Time (MST):	14:53
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301448

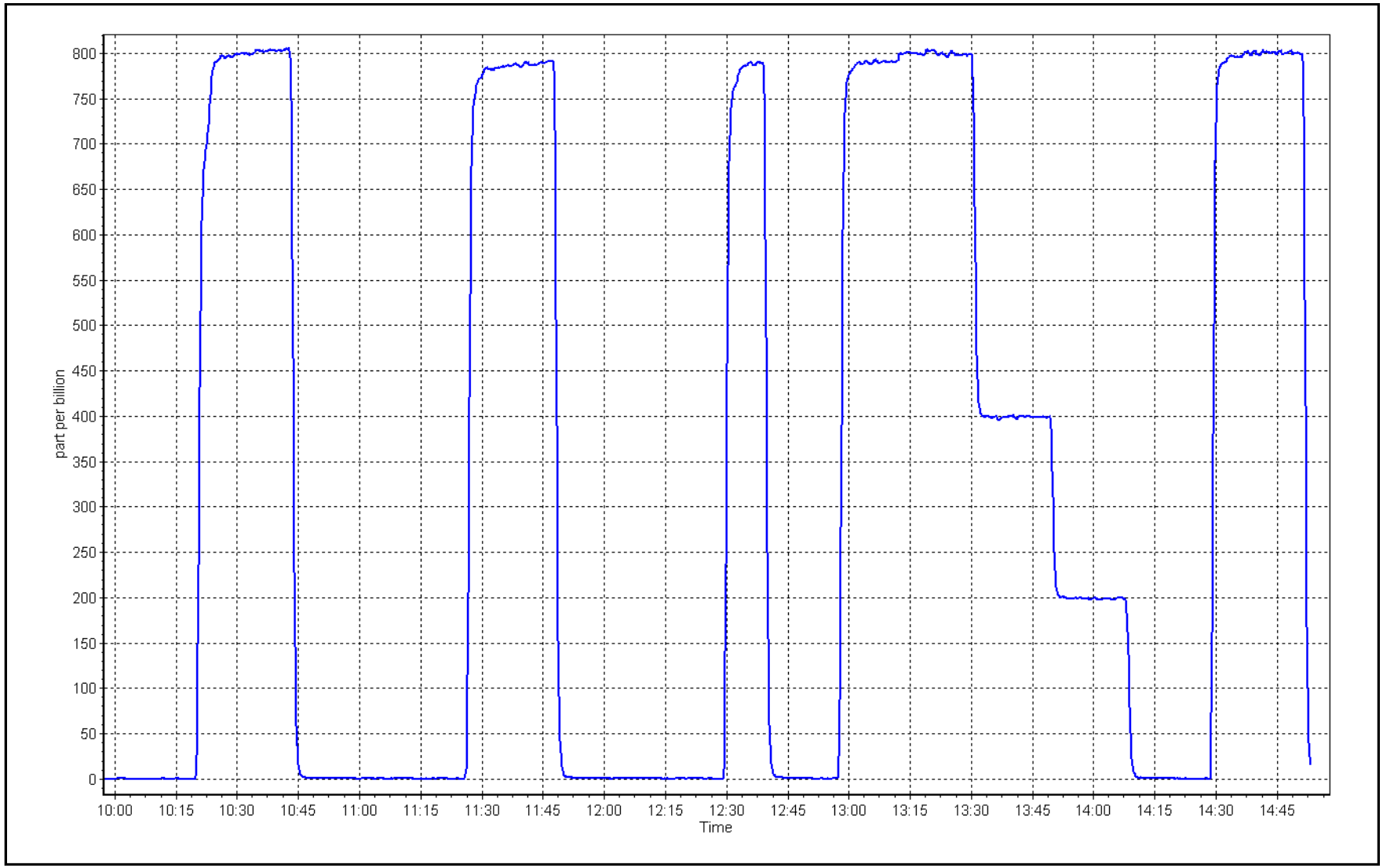
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
800.3	801.0	0.9991
400.6	399.5	1.0027
199.8	198.9	1.0046

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999993	*≥0.995*
Slope	1.000680	*0.90 - 1.10*
Intercept	-0.433310	*+/-30*



SO2 Calibration Plot Date: July 14, 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:	July 18, 2023	Last Cal Date:	June 27, 2023
Start time (MST):	9:41	End time (MST):	15:29
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1218153461	
Converter make:	CD Nova		Converter serial #:	470	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.002650	1.000507	Backgd or Offset:	2.30	2.28
Calibration intercept:	0.159995	0.159999	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	0.2	----
as found span	4921	78.4	80.0	78.7	1.019
as found 2nd point	4960	39.2	40.0	39.4	1.020
as found 3rd point	4980	19.6	20.0	19.8	1.020
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	80.2	0.997
second point	4960	39.2	40.0	40.2	0.995
third point	4980	19.6	20.0	20.1	0.995
as left zero	5000	0.0	0.0	0.3	----
as left span	4921	78.4	80.0	79.2	1.010
SO2 Scrubber Check	4919	81.3	813.0	0.0	----
Date of last scrubber change:		December 17, 2021		Ave Corr Factor	0.996
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.5	Prev response:	80.37	*% change:	-2.4%
Baseline Corr 2nd AF pt:	39.2	AF Slope:	0.981363	AF Intercept:	0.180000
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999999		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

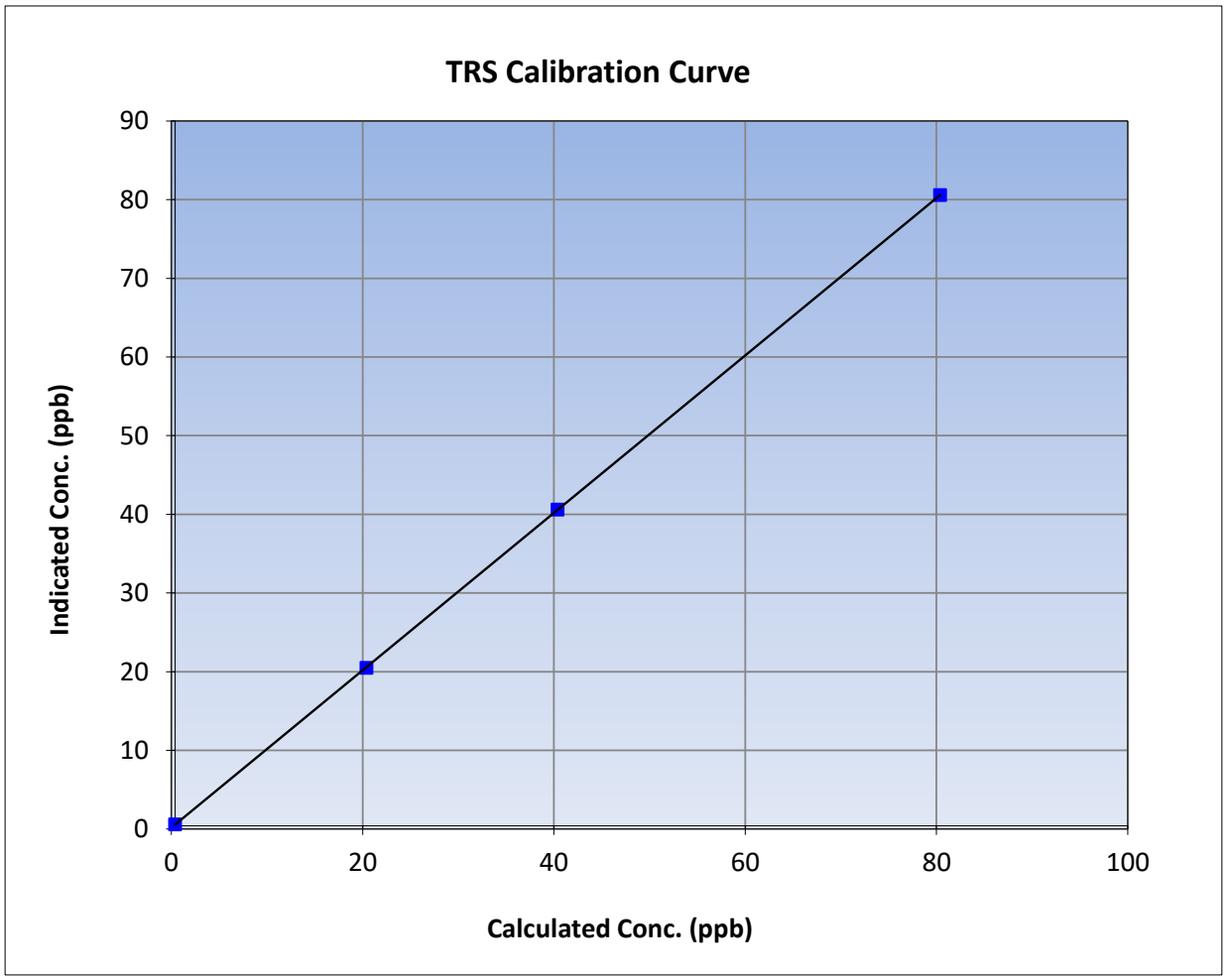
Station Information

Calibration Date:	July 18, 2023	Previous Calibration:	June 27, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:41	End Time (MST):	15:29
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153461

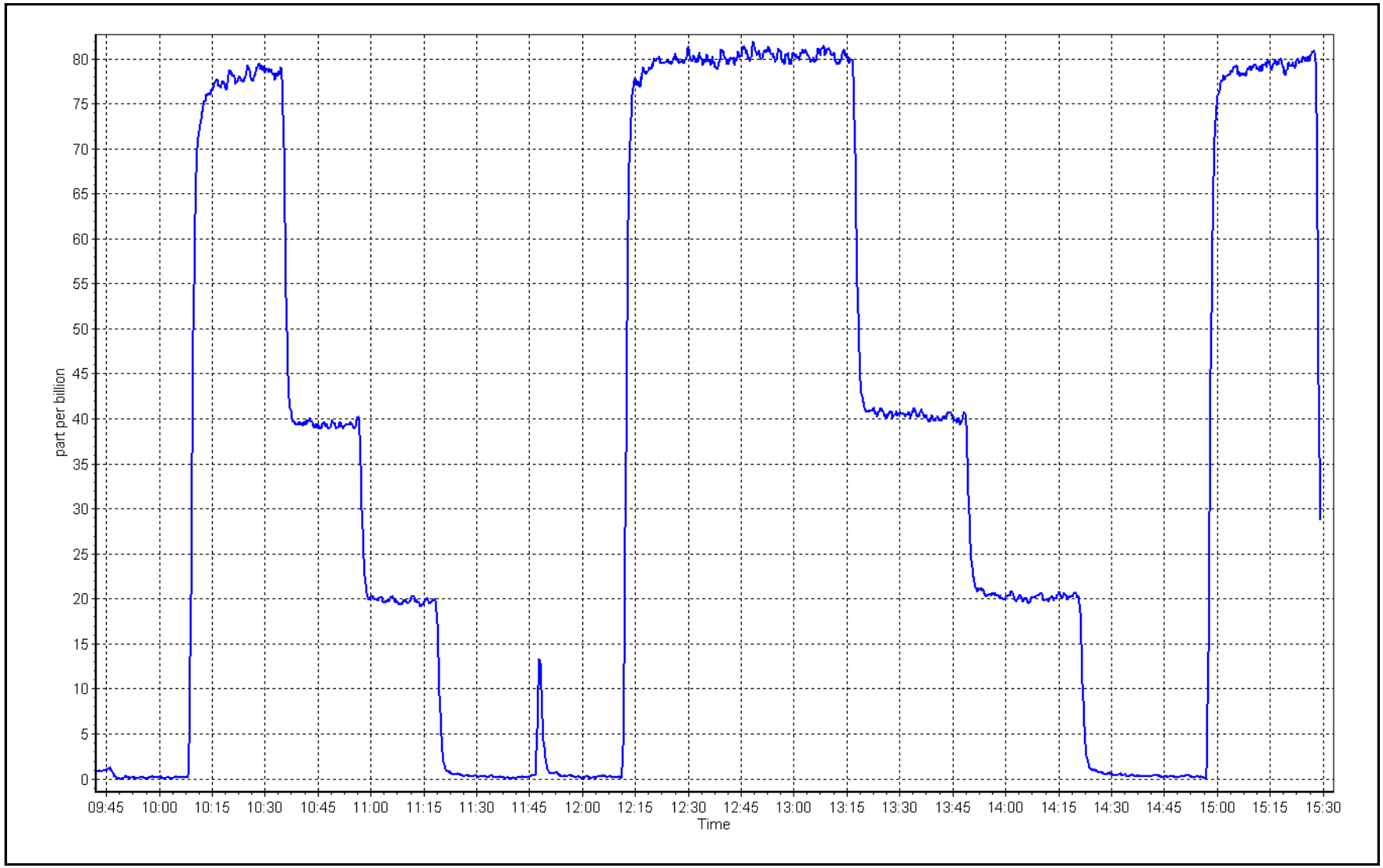
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	80.2	0.9974
40.0	40.2	0.9950
20.0	20.1	0.9949

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.000507	*0.90 - 1.10*
Intercept	0.159999	*+/-3*



TRS Calibration Plot Date: July 18, 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:	July 18, 2023	Last Cal Date:	June 28, 2023
Start time (MST):	9:41	End time (MST):	15:29
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:	0.997140	1.002857	Backgd or Offset:	1.91	1.95
Calibration intercept:	0.156826	0.056779	Coeff or Slope:	0.992	1.014

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.2	----
as found span	4922	78.4	80.0	80.0	0.997
as found 2nd point	4960	39.2	40.0	39.6	1.005
as found 3rd point	4980	19.6	20.0	19.7	1.005
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4922	78.4	80.0	80.2	0.997
second point	4960	39.2	40.0	40.3	0.993
third point	4980	19.6	20.0	20.1	0.995
as left zero	5000	0.0	0.0	0.4	----
as left span	4922	78.4	80.0	77.2	1.036
SO2 Scrubber Check	4919	81.3	813.0	-0.1	----
Date of last scrubber change:		March 21, 2022		Ave Corr Factor	0.995
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.2	Prev response:	79.89	*% change:	0.4%
Baseline Corr 2nd AF pt:	39.8	AF Slope:	1.003195	AF Intercept:	-0.323189
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999981		

* = > +/-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

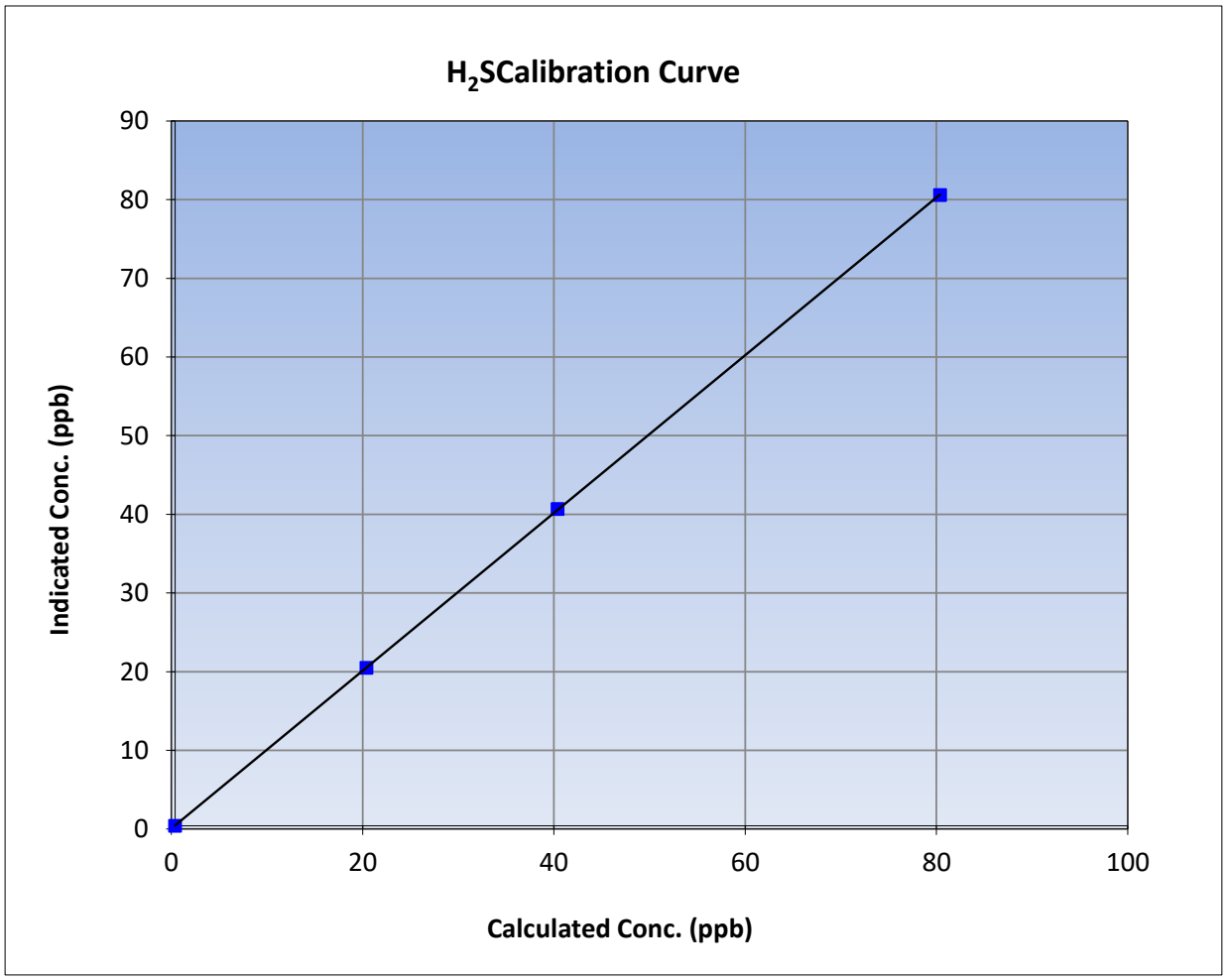
Station Information

Calibration Date:	July 18, 2023	Previous Calibration:	June 28, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:41	End Time (MST):	15:29
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1200326167

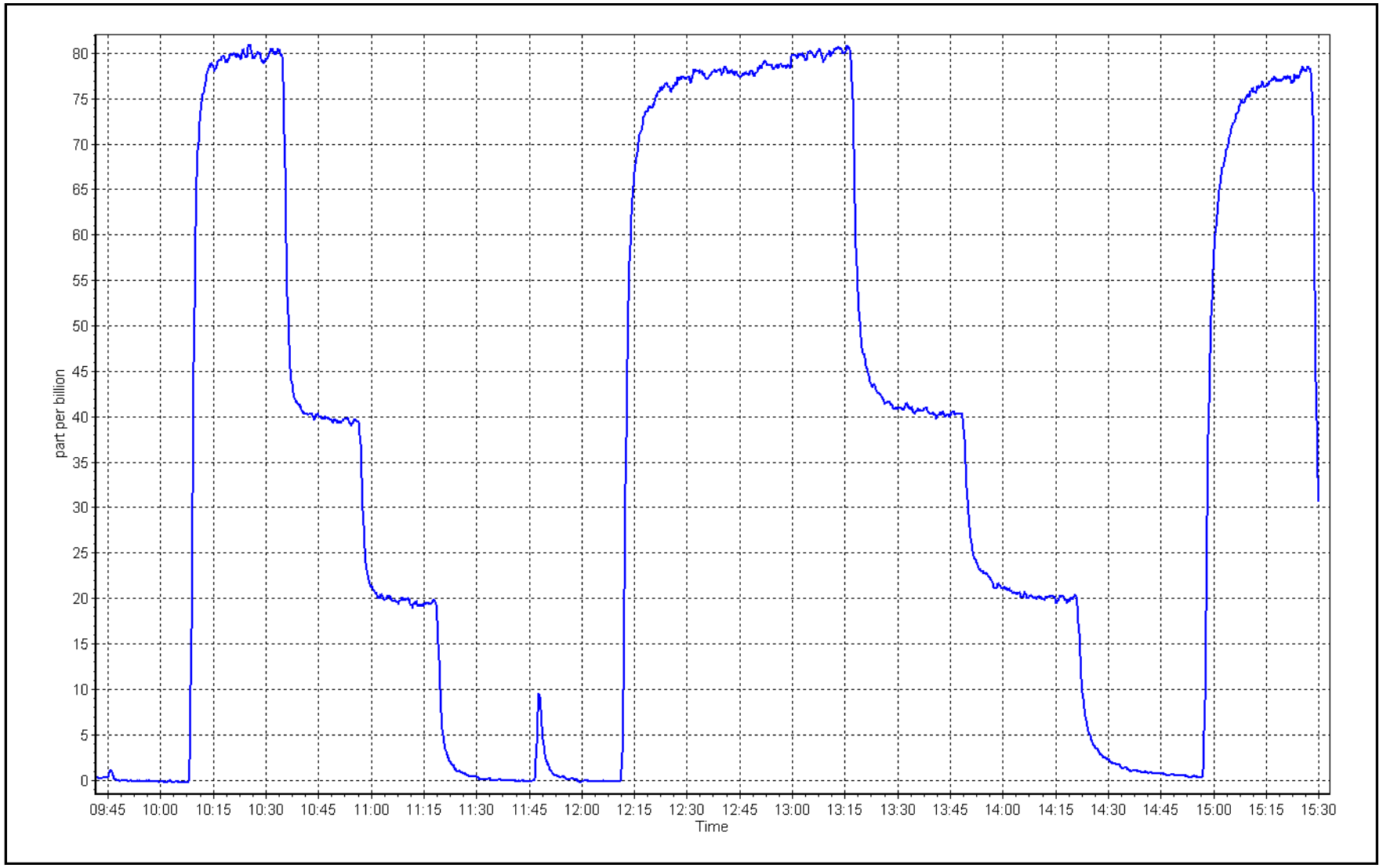
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.2	0.9972
40.0	40.3	0.9925
20.0	20.1	0.9949

Statistical Evaluation		Limits
Correlation Coefficient	0.999993	≥0.995
Slope	1.002857	0.90 - 1.10
Intercept	0.056779	+/-3



H_2S Calibration Plot Date: July 18, 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:	July 14, 2023	Last Cal Date:	June 1, 2023
Start time (MST):	9:56	End time (MST):	14:53
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC418809	Cal Gas Expiry Date:	March 10, 2031	
CH4 Cal Gas Conc.	497.2	ppm	CH4 Equiv Conc.	1061.8	ppm
C3H8 Cal Gas Conc.	205.3	ppm			
Removed Gas Cert:		CC486642	Removed Gas Expiry:	February 23, 2025	
Removed CH4 Conc.	497.7	ppm	CH4 Equiv Conc.	1063.1	ppm
Removed C3H8 Conc.	205.6	ppm	Diff between cyl (THC):	2.3%	
Diff between cyl (CH_4):	0.7%		Diff between cyl (NM):	3.8%	
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:	2.89E-04	2.90E-04	NMHC SP Ratio:	6.23E-05	6.14E-05
CH4 Retention time:	14.6	14.6	NMHC Peak Area:	147590	149639

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4918	81.3	17.29	17.09	1.012
as found 2nd point					
as found 3rd point					
new cylinder response	4918	81.3	17.27	17.47	0.988
calibrator zero	5000	0.0	0.00	0.00	----
high point	4918	81.3	17.27	17.29	0.999
second point	4959	40.7	8.64	8.51	1.016
third point	4980	20.3	4.31	4.24	1.017
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	17.27	17.28	0.999
				Average Correction Factor	1.010

Baseline Corr AF:	17.09	Prev response	17.23	*% change	-0.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4918	81.3	9.19	9.05	1.016
as found 2nd point					
as found 3rd point					
new cylinder response	4918	81.3	9.18	9.39	0.978
calibrator zero	5000	0	0.00	0.00	----
high point	4918	81.3	9.18	9.19	0.999
second point	4959	40.7	4.60	4.55	1.010
third point	4980	20.3	2.29	2.28	1.004
as left zero	5000	0	0.00	0.00	----
as left span	4918	81.3	9.18	9.20	0.998
				Average Correction Factor	1.005
Baseline Corr AF:	9.05	Prev response	9.17	*% change	-1.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4918	81.3	8.09	8.04	1.007
as found 2nd point					
as found 3rd point					
new cylinder response	4918	81.3	8.09	8.08	1.000
calibrator zero	5000	0.0	0.00	0.00	----
high point	4918	81.3	8.09	8.09	0.999
second point	4959	40.7	4.05	3.96	1.022
third point	4980	20.3	2.02	1.96	1.031
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	8.09	8.08	1.000
				Average Correction Factor	1.017
Baseline Corr AF:	8.04	Prev response	8.05	*% change	-0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.998392	1.001595
THC Cal Offset:	-0.033901	-0.058682
CH4 Cal Slope:	0.999433	1.002288
CH4 Cal Offset:	-0.034161	-0.042956
NMHC Cal Slope:	0.997502	1.000424
NMHC Cal Offset:	0.000659	-0.014727

Notes: Changed the inlet filter, SO2/HC cylinder, and H2 cylinder after as founds. Adjusted span only.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

THC Calibration Summary

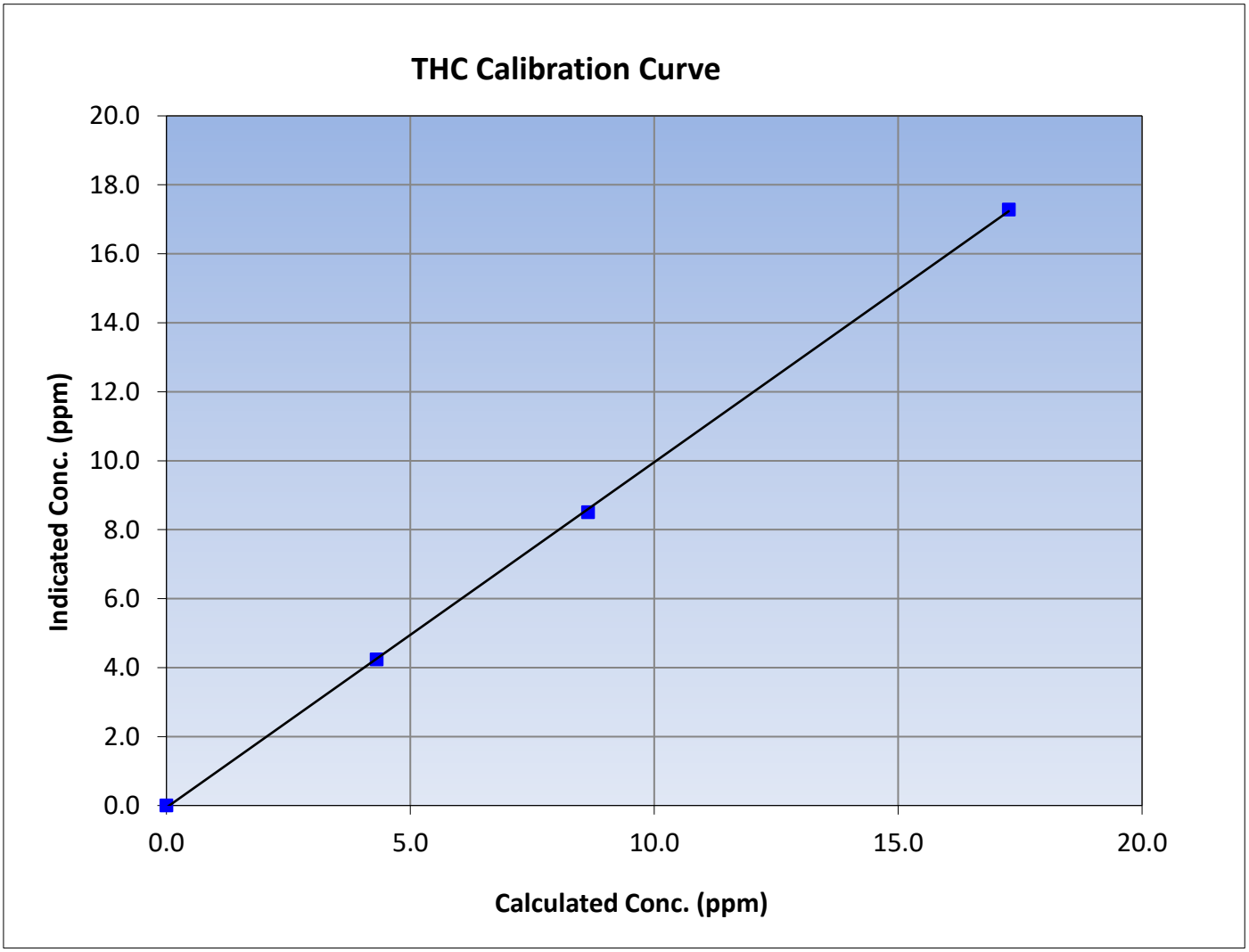
Version-01-2020

Station Information

Calibration Date:	July 14, 2023	Previous Calibration:	June 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:56	End Time (MST):	14:53
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
17.27	17.29	0.9990			
8.64	8.51	1.0157	Slope	1.001595	0.90 - 1.10
4.31	4.24	1.0167			
			Intercept	-0.058682	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

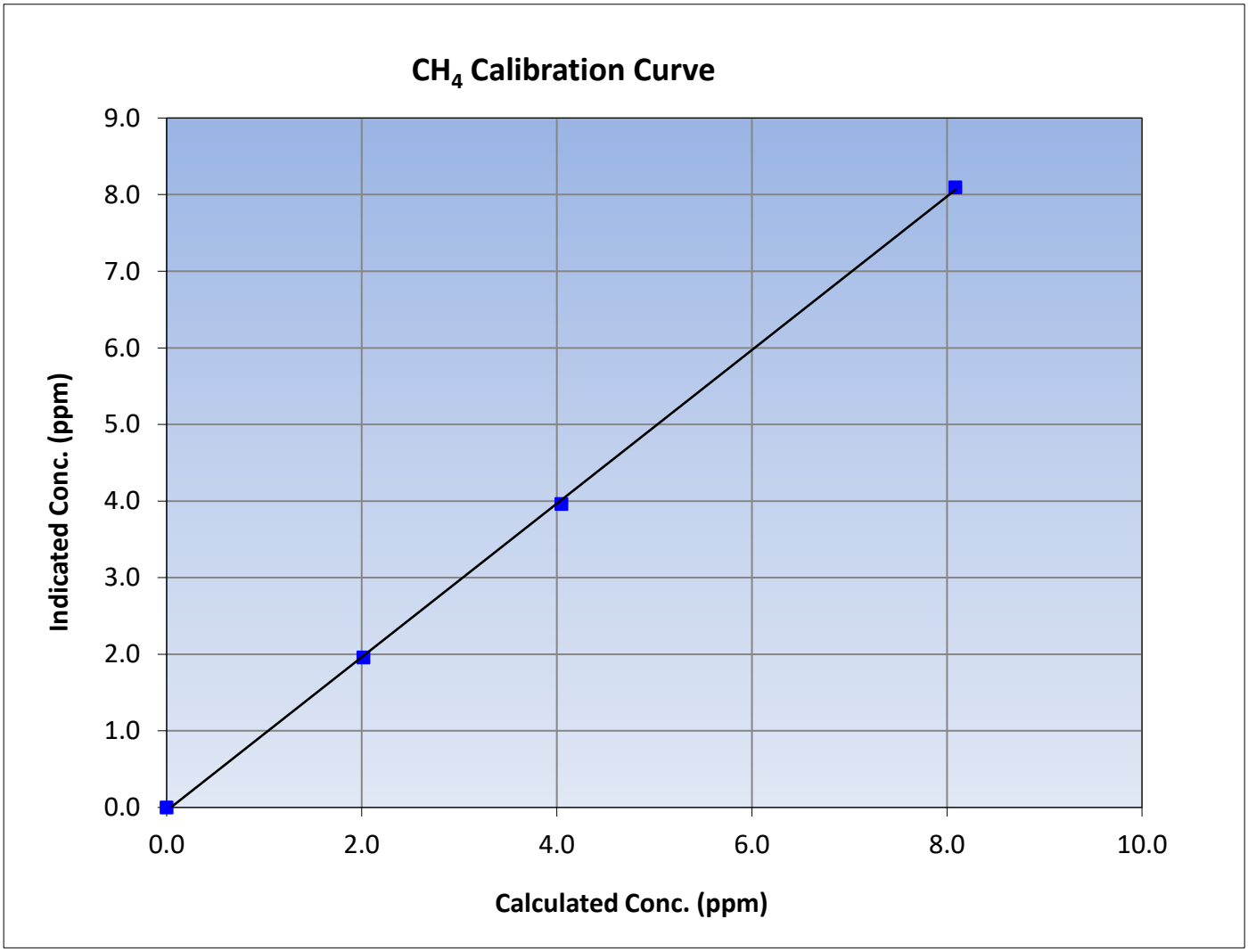
Version-01-2020

Station Information

Calibration Date:	July 14, 2023	Previous Calibration:	June 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:56	End Time (MST):	14:53
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	0.999830	*≥0.995*
8.09	8.09	0.9991			
4.05	3.96	1.0218	Slope	1.002288	*0.90 - 1.10*
2.02	1.96	1.0310			
			Intercept	-0.042956	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

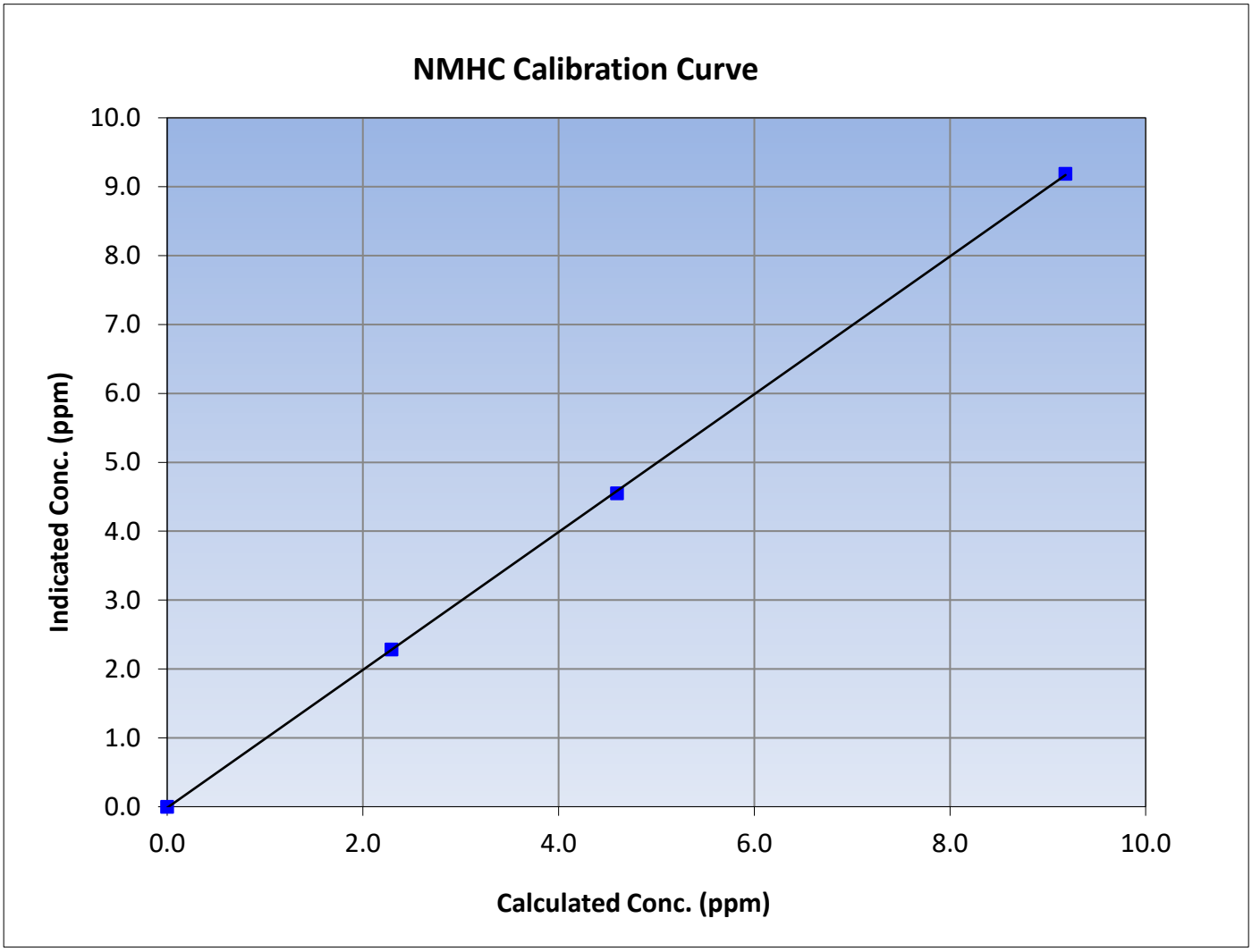
Version-01-2020

Station Information

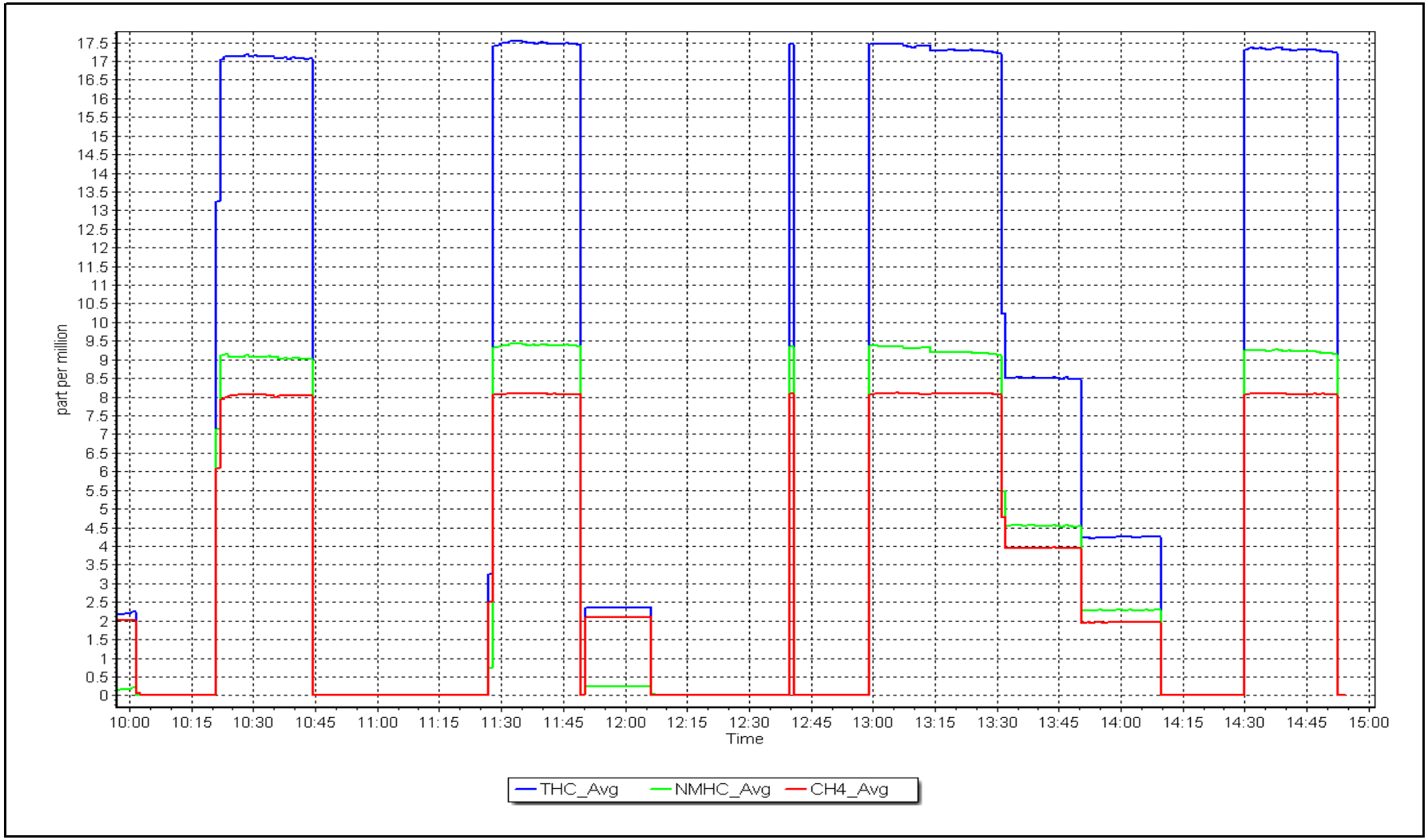
Calibration Date:	July 14, 2023	Previous Calibration:	June 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:56	End Time (MST):	14:53
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320040

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999963	≥0.995
9.18	9.19	0.9994			
4.60	4.55	1.0105	Slope	1.000424	0.90 - 1.10
2.29	2.28	1.0045			
			Intercept	-0.014727	+/-0.5



NMHC Calibration Plot Date: July 14, 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:	July 11, 2023	Last Cal Date:	June 20, 2023
Start time (MST):	9:20	End time (MST):	14:08
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:	1.334	1.324	NO bkgnd or offset:	6.6	6.9
NOX coeff or slope:	0.988	0.991	NOX bkgnd or offset:	6.8	7.0
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	186.2	186.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000702	0.998356
NO_X Cal Offset:	-0.180000	-0.420000
NO Cal Slope:	1.001256	0.998644
NO Cal Offset:	-0.920000	-1.180000
NO_2 Cal Slope:	0.998452	1.002441
NO_2 Cal Offset:	0.436719	0.783625

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.4	0.3	0.1	----	----
as found span	4920	80.0	813.4	800.6	12.8	817.3	803.2	14.0	0.9953	0.9968
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	4920	80.0	813.4	800.6	12.8	811.9	798.9	13.0	1.0019	1.0022
second point	4960	40.0	406.7	400.3	6.4	405.5	398.1	7.4	1.0030	1.0056
third point	4980	20.0	203.4	200.2	3.2	202.0	197.6	4.4	1.0067	1.0130
as left zero	5000	0.0	0.0	0.0	0.0	0.2	-0.1	0.3	----	----
as left span	4920	80.0	813.4	404.8	408.6	812.0	402.5	409.5	1.0018	1.0058
								Average Correction Factor	1.0039	1.0069

Corrected As found	NO_X = 816.9 ppb	NO = 802.9 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	0.4%
Previous Response	NO_X = 813.8 ppb	NO = 800.7 ppb			*Percent Change	NO =	0.3%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	796.2	400.4	408.6	410.1	0.9963	100.4%
2nd GPT point (200 ppb O3)	796.2	602.9	206.1	207.6	0.9928	100.7%
3rd GPT point (100 ppb O3)	796.2	700.3	108.7	110.4	0.9846	101.6%
				Average Correction Factor	0.9912	100.9%

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

NO_X Calibration Summary

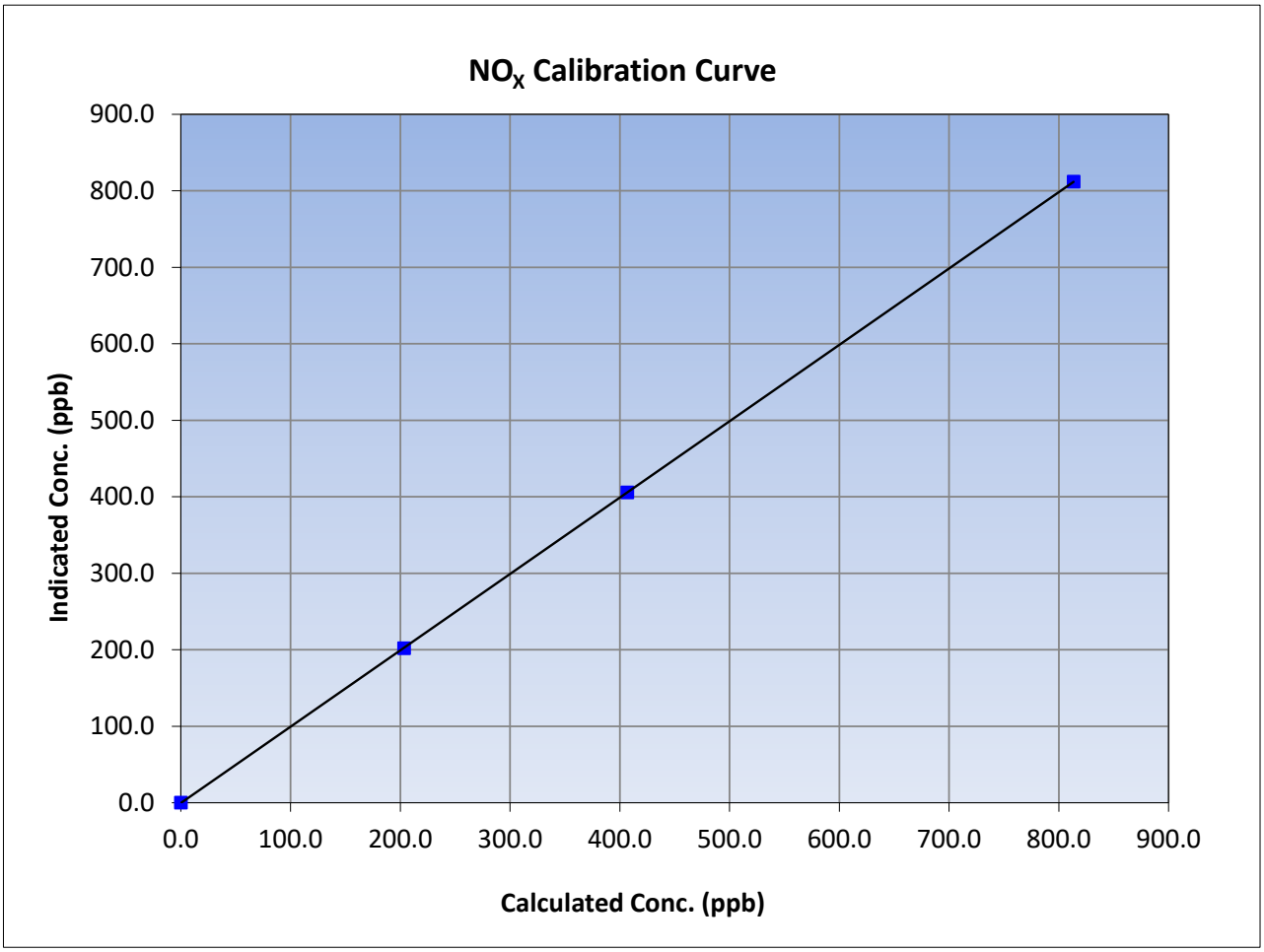
Version-04-2020

Station Information

Calibration Date:	July 11, 2023	Previous Calibration:	June 20, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:20	End Time (MST):	14:08
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999998	≥0.995
813.4	811.9	1.0019			
406.7	405.5	1.0030	Slope	0.998356	0.90 - 1.10
203.4	202.0	1.0067			
			Intercept	-0.420000	+/-20



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NO Calibration Summary

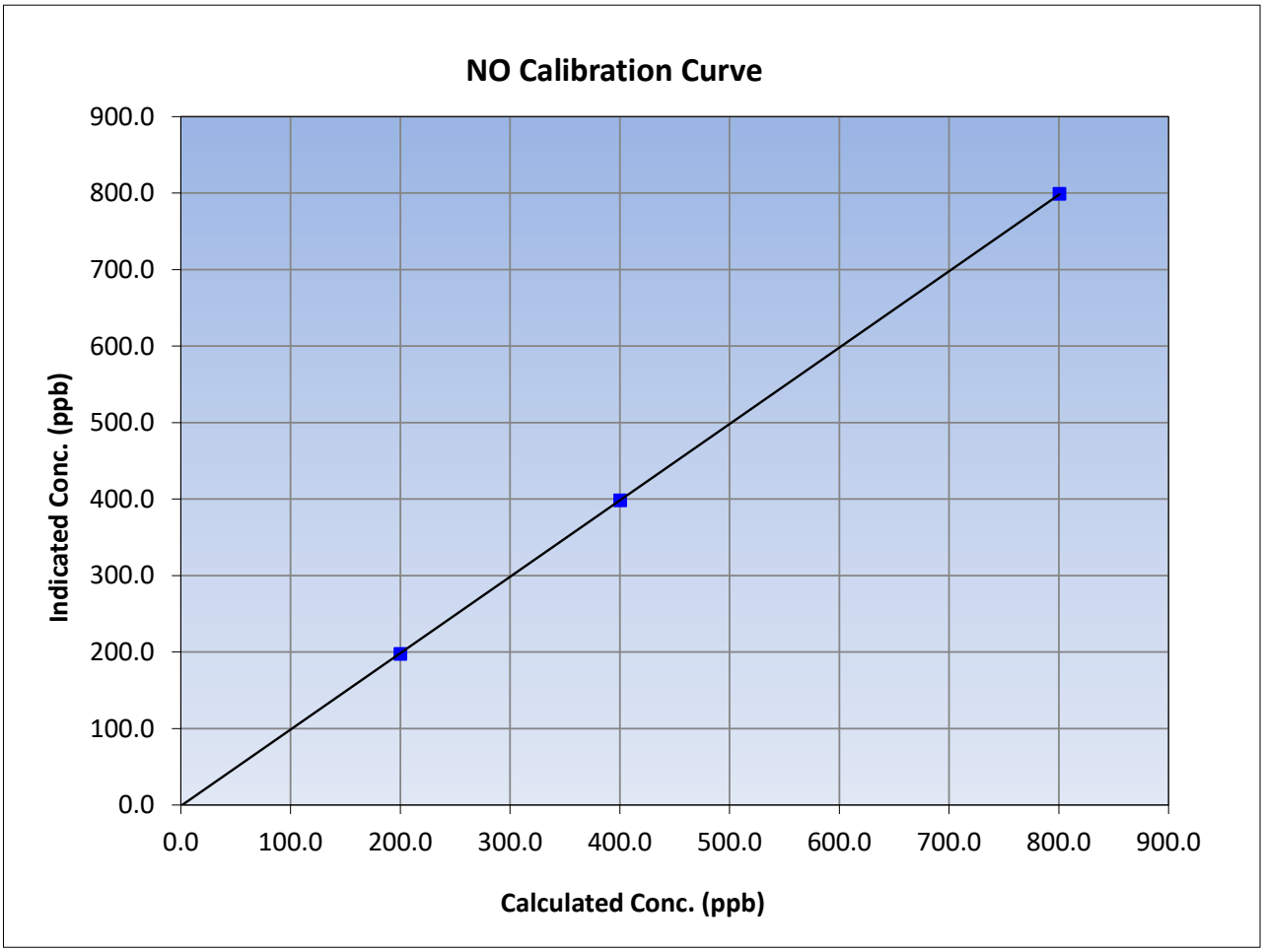
Version-04-2020

Station Information

Calibration Date:	July 11, 2023	Previous Calibration:	June 20, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:20	End Time (MST):	14:08
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999992	≥0.995
800.6	798.9	1.0022			
400.3	398.1	1.0056	Slope	0.998644	0.90 - 1.10
200.2	197.6	1.0130			
			Intercept	-1.180000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

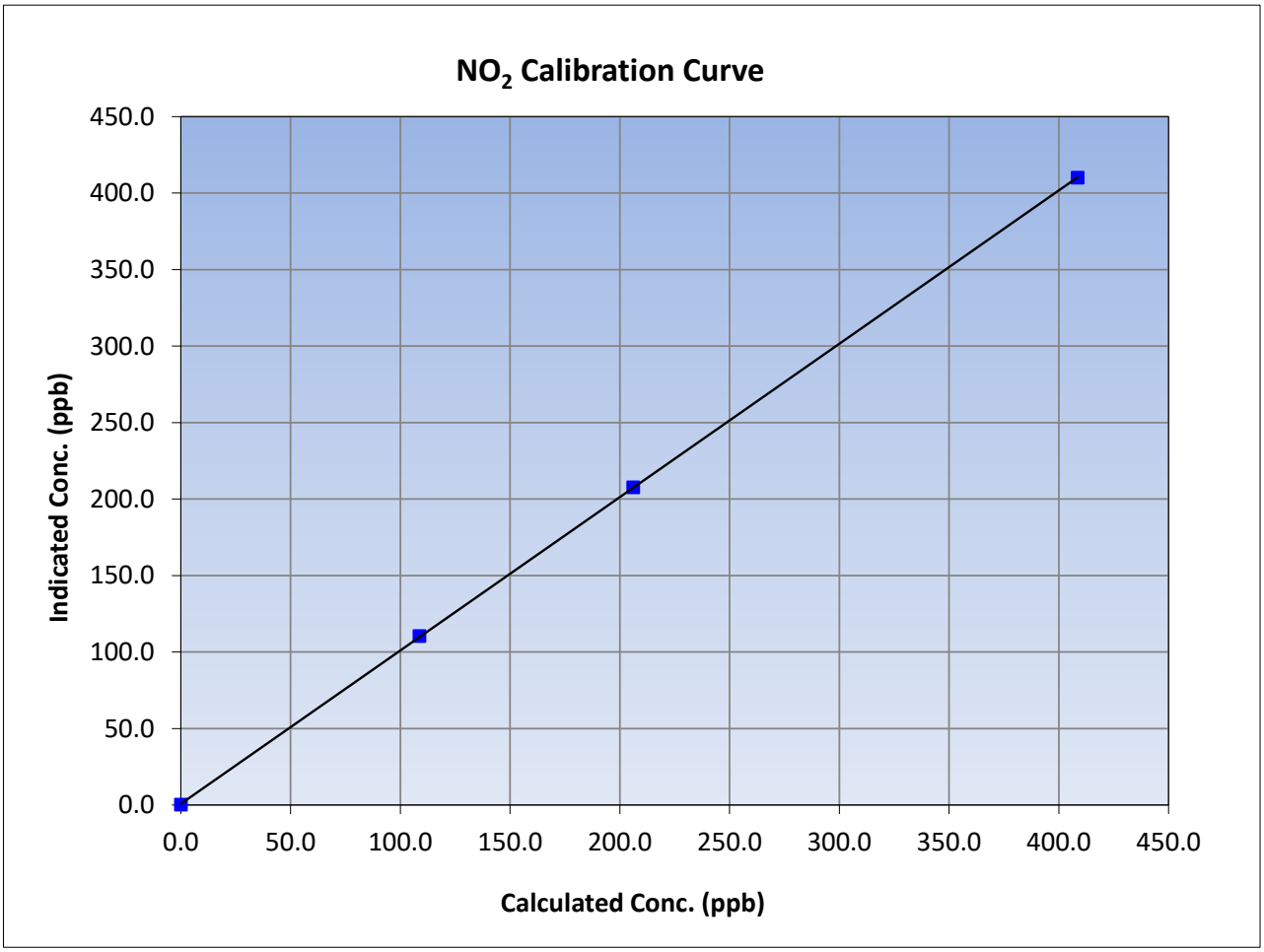
Version-04-2020

Station Information

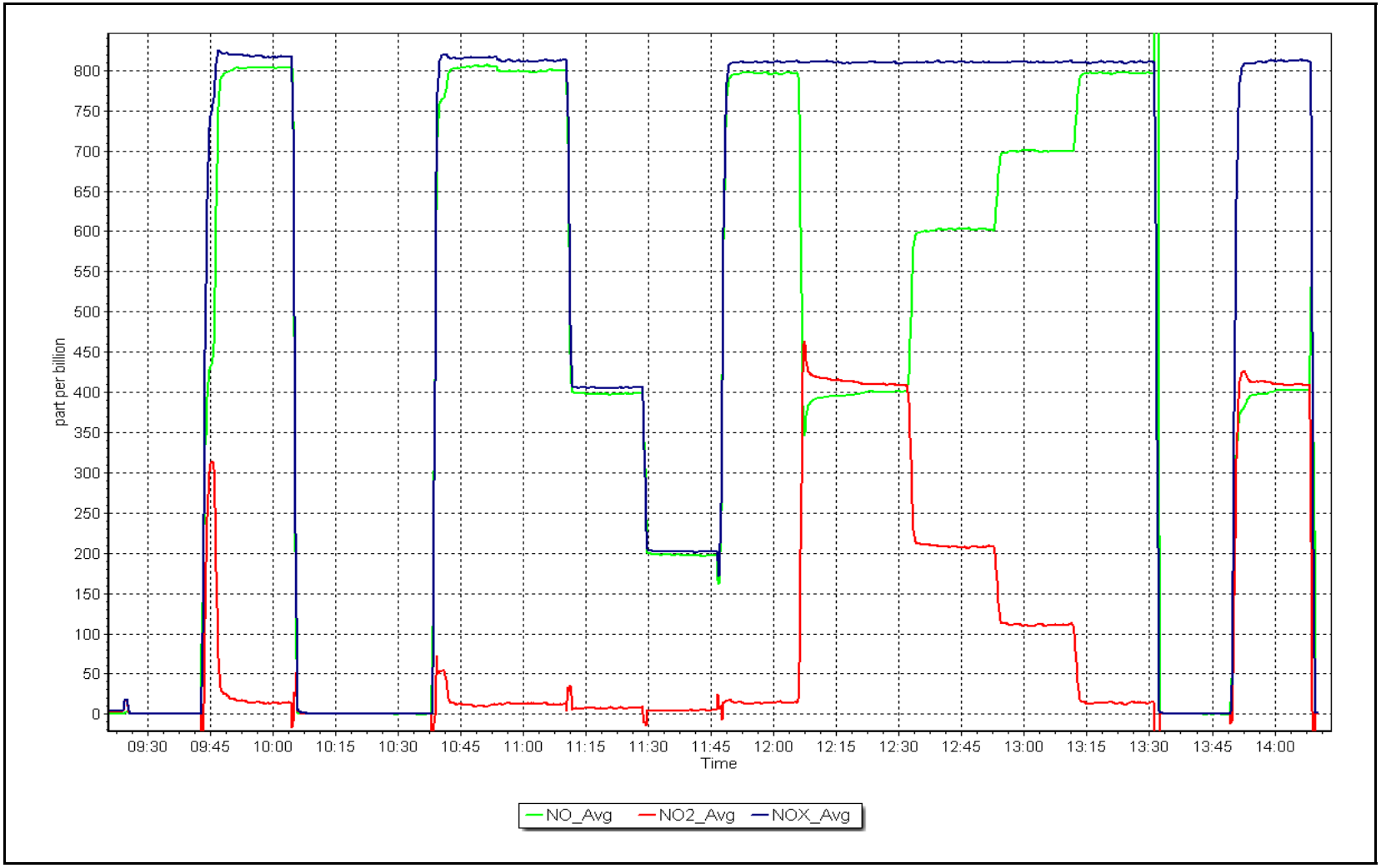
Calibration Date:	July 11, 2023	Previous Calibration:	June 20, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:20	End Time (MST):	14:08
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999990	≥0.995
408.6	410.1	0.9963			
206.1	207.6	0.9928	Slope	1.002441	0.90 - 1.10
108.7	110.4	0.9846			
			Intercept	0.783625	+/-20



NO_X Calibration Plot Date: July 11, 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:	July 4, 2023	Last Cal Date:	June 2, 2023
Start time (MST):	9:40	End time (MST):	12:21
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001229	1.001486	Backgd or Offset:	3.2	3.2
Calibration intercept:	0.260000	0.240000	Coeff or Slope:	1.010	1.010

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.2	----
as found span	5000	855.5	400.0	400.9	0.998
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	858.8	400.0	400.6	0.999
second point	5000	743.1	200.0	201.1	0.995
third point	5000	653.5	100.0	100.2	0.998
as left zero	5000	0.0	0.0	-0.3	----
as left span	5000	858.8	400.0	405.0	0.988
				Average Correction Factor	0.997

Baseline Corr As found:	401.1	Previous response	400.8	*% 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 inlet filter after as founds. No adjustments made.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

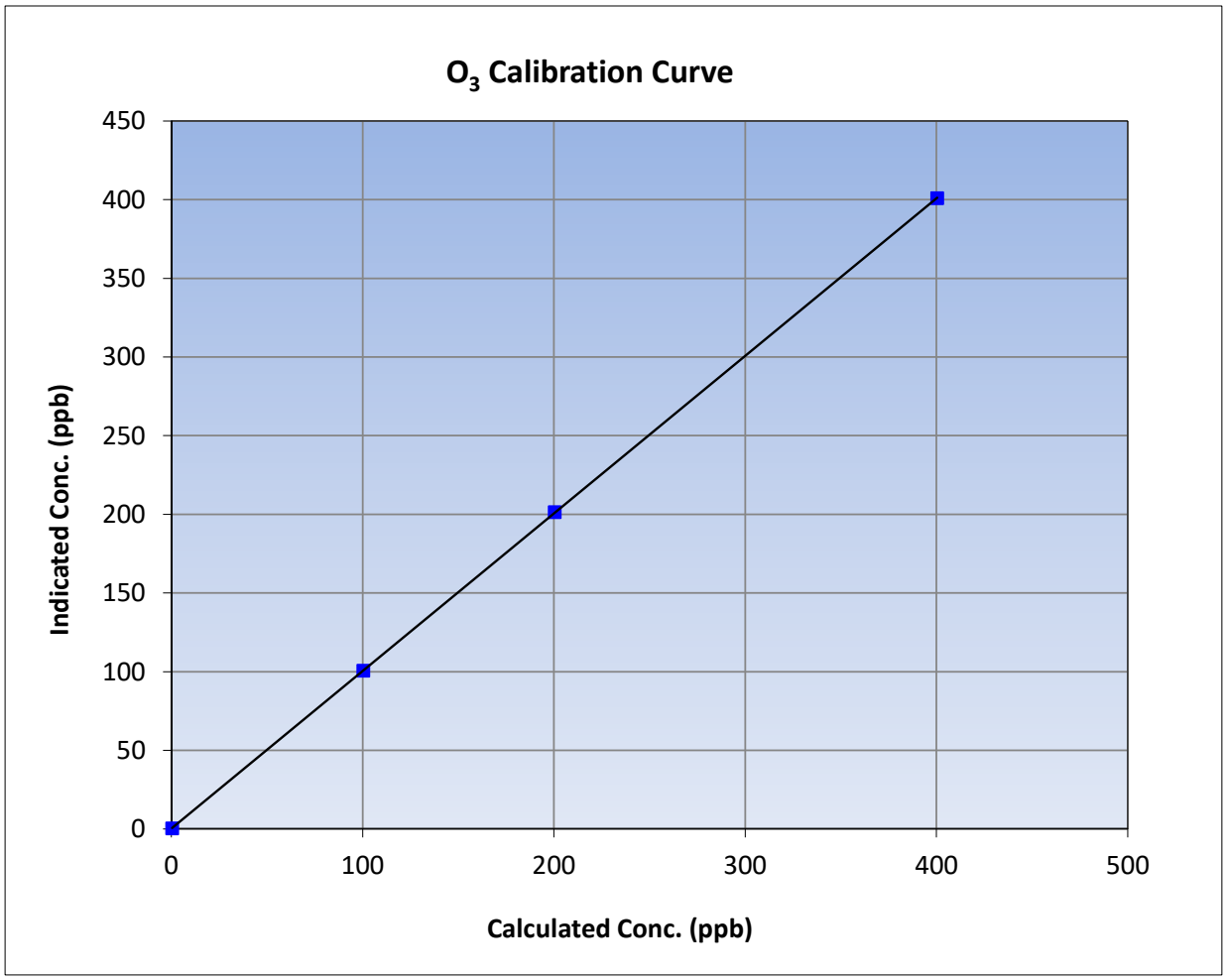
Station Information

Calibration Date:	July 4, 2023	Previous Calibration:	June 2, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:40	End Time (MST):	12:21
Analyzer make:	Teledyne API T400	Analyzer serial #:	1107

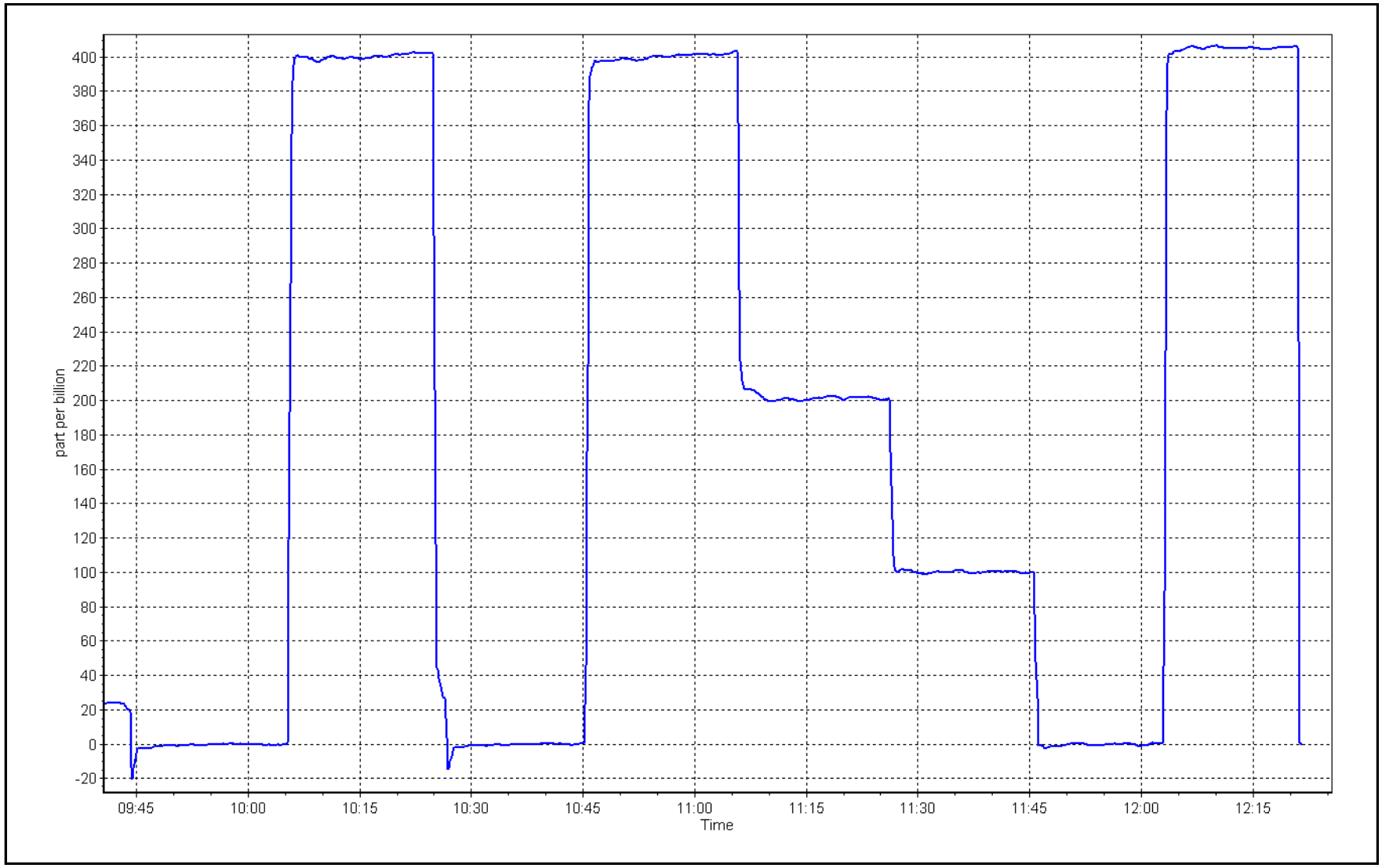
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
400.0	400.6	0.9985
200.0	201.1	0.9945
100.0	100.2	0.9980

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.001486	*0.90 - 1.10*
Intercept	0.240000	*+/- 5*



O_3 Calibration Plot Date: July 4, 2023 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Fort McKay - Bertha Ganter	Station number:	AMS 01
Calibration Date:	July 18, 2023	Last Cal Date:	June 2, 2023
Start time (MST):	12:25	End time (MST):	14:07
Analyzer Make:	Teledyne API T640	S/N:	324
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	1450
Temp/RH standard:	Delta Cal	S/N:	1450

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	27.7	26.6	27.7	☐	+/- 2 °C
P (mmHg)	734.1	734	734.1	☐	+/- 10 mmHg
flow (LPM)	4.99	5.08	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: July 18, 2023 Last Cal Date: June 2, 2023

PM w/o HEPA: 71.1 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	10.1	10.5	11.1	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 63.6 w/ HEPA: 0 <0.2 ug/m3

Date Optical Chamber Cleaned: July 18, 2023

Disposable Filter Changed: July 18, 2023

Annual Maintenance

Date Sample Tube Cleaned:

Date RH/T Sensor Cleaned: July 18, 2023

Notes: Flow, temperature, and pressure all within limits. Leak checks passed. PMT peak voltage adjusted from 1358 to 1362. Inlet head cleaned. Displosable filter changed. Optical chamber and RH/T sensor cleaned.

Calibration by: Rene Chamberland

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	July 17, 2023	Last Cal Date:	June 26, 2023
Start time (MST):	10:03	End time (MST):	13:07
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Teledyne API T300		Analyzer serial #:	3520	
Analyzer Range:	0 - 50 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001481	1.002385	Backgd or Offset:	-0.012	-0.012
Calibration intercept:	0.163854	0.147828	Coeff or Slope:	0.992	0.992

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4933	66.7	40.6	40.8	0.995
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4933	66.7	40.6	40.7	0.997
second point	4966	33.3	20.2	20.7	0.978
third point	4983	16.7	10.2	10.3	0.986
as left zero	5000	0.0	0.0	0.0	----
as left span	2960	40.0	40.5	40.1	1.010
				Average Correction Factor	0.987

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

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO Calibration Summary

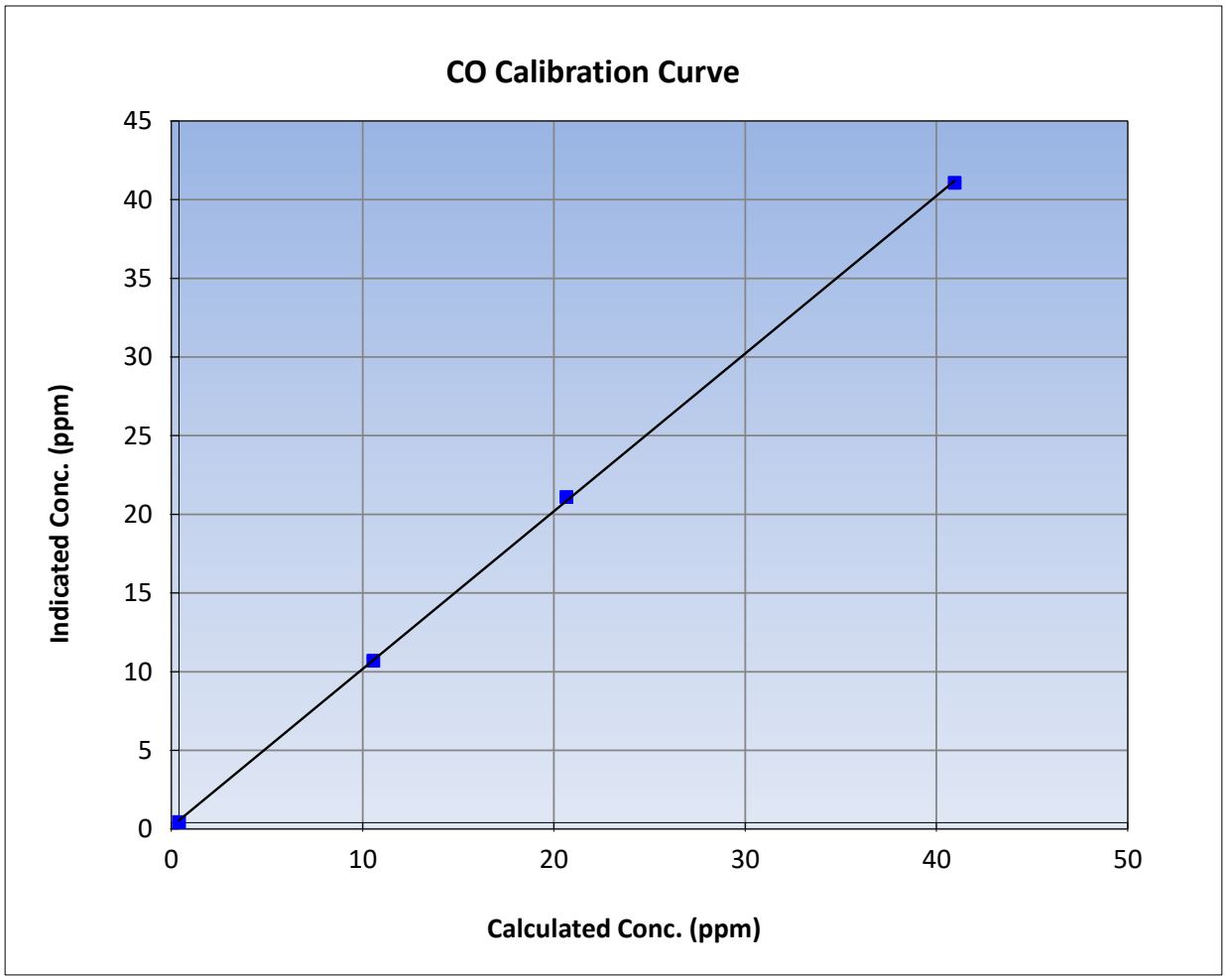
Version-01-2020

Station Information

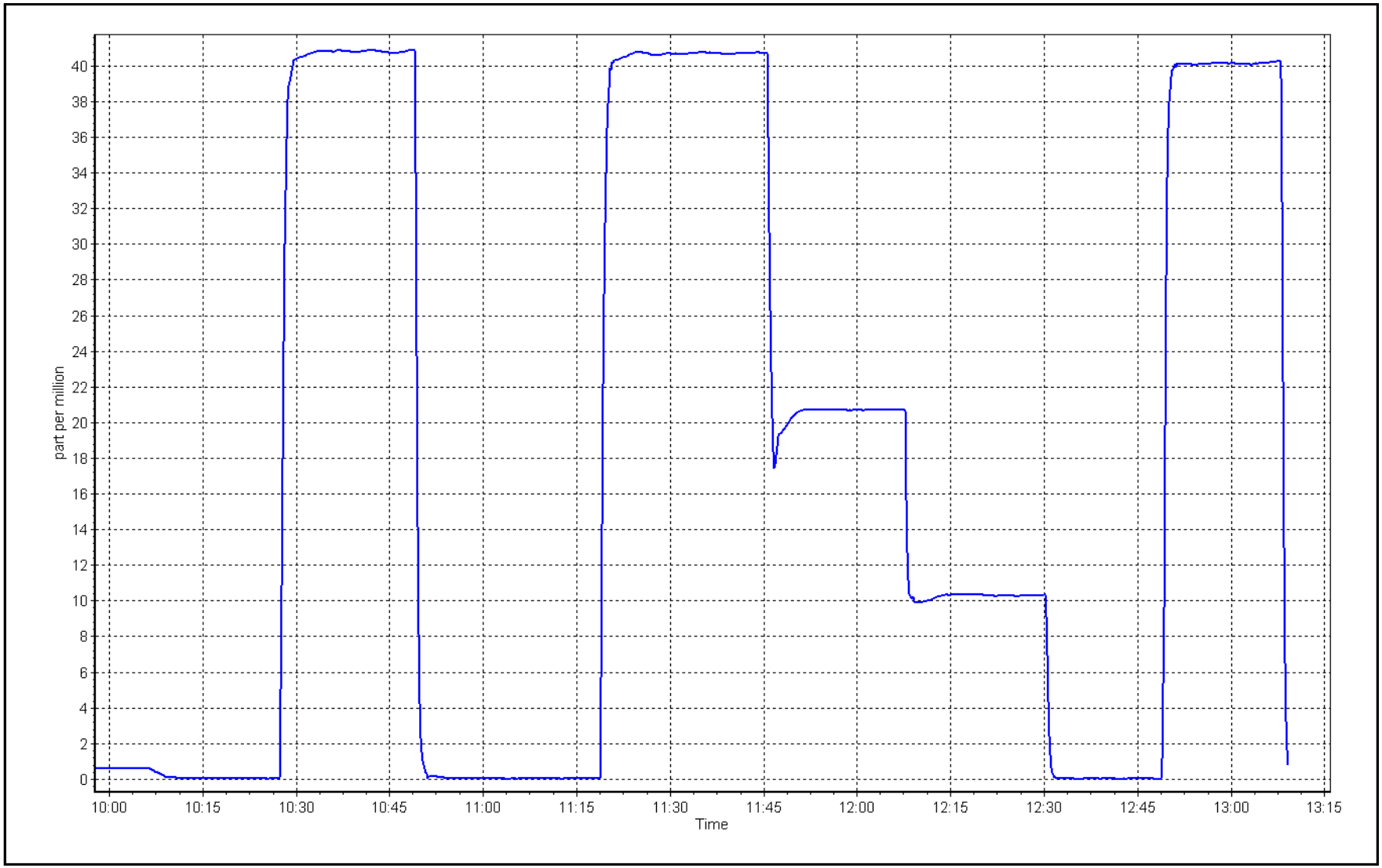
Calibration Date:	July 17, 2023	Previous Calibration:	June 26, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:03	End Time (MST):	13:07
Analyzer make:	Teledyne API T300	Analyzer serial #:	3520

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999899	*≥0.995*
40.6	40.7	0.9970			
20.2	20.7	0.9782	Slope	1.002385	*0.90 - 1.10*
10.2	10.3	0.9858			
			Intercept	0.147828	*+/-1.5*



CO Calibration Plot Date: July 17, 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:	July 10, 2023	Last Cal Date:	June 12, 2023
Start time (MST):	9:34	End time (MST):	13:03
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:	1.001960	1.000422	Backgd or Offset:	0.045	0.045
Calibration intercept:	-4.460000	-4.480000	Coeff or Slope:	0.874	0.874

CO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	3000	0.0	0.0	0.2	----
as found span	2920	80.0	1605.3	1604.9	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	-0.1	----
high point	2920	80.0	1605.3	1603.2	1.001
second point	2960	40.0	802.7	797.9	1.006
third point	2980	20.0	401.3	391.6	1.025
as left zero	3000	0.0	0.0	0.0	----
as left span	2960	40.0	802.7	786.5	1.021
				Average Correction Factor	1.011

Baseline Corr As found:	1604.70	Prev response:	1604.02	*% 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. Cycled power to the analyzer. No adjustments made.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

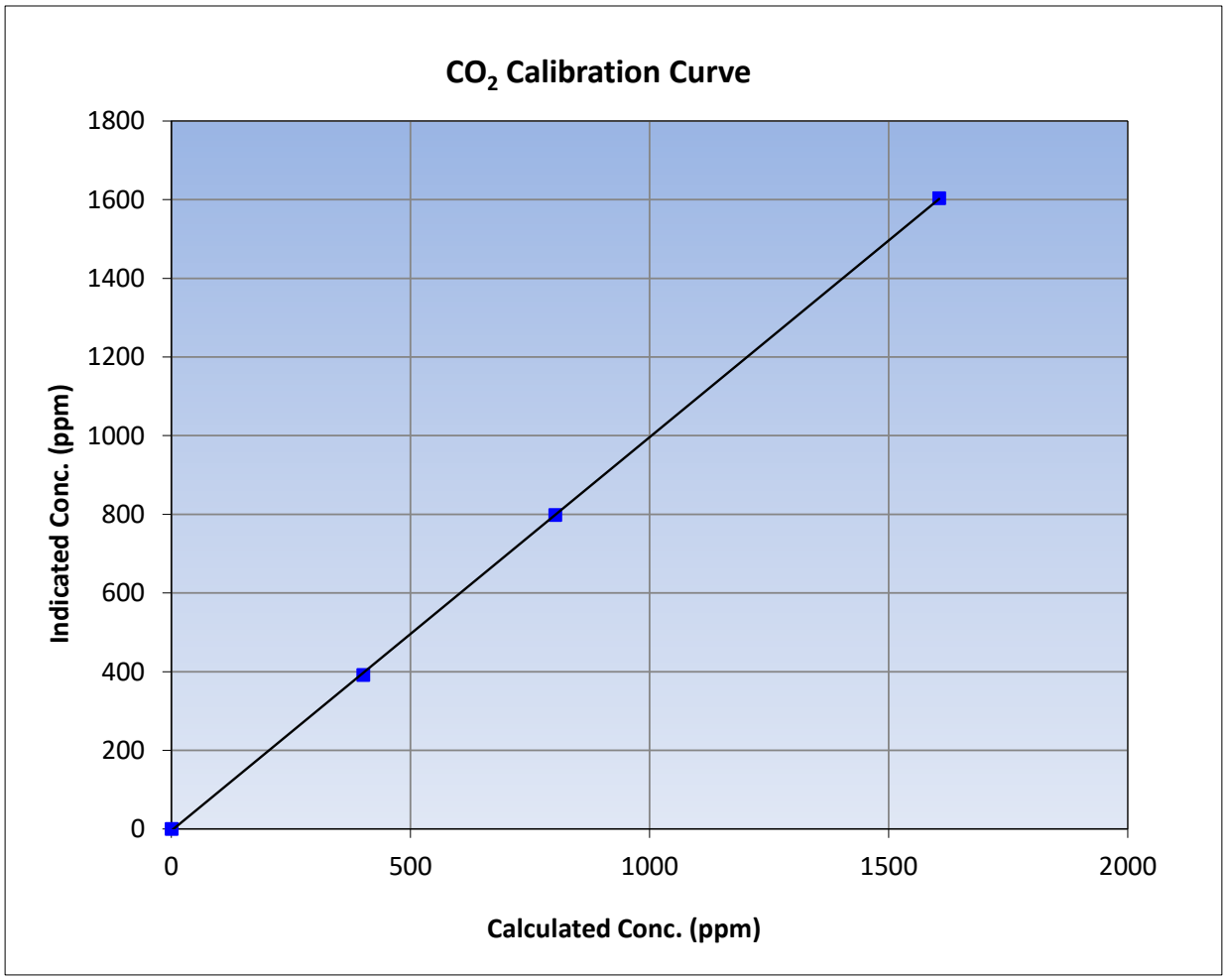
Station Information

Calibration Date	July 10, 2023	Previous Calibration	June 12, 2023
Station Name	Bertha Ganter-Fort McKay	Station Number	AMS01
Start Time (MST)	9:34	End Time (MST)	13:03
Analyzer make	Teledyne API 360	Analyzer serial #	442

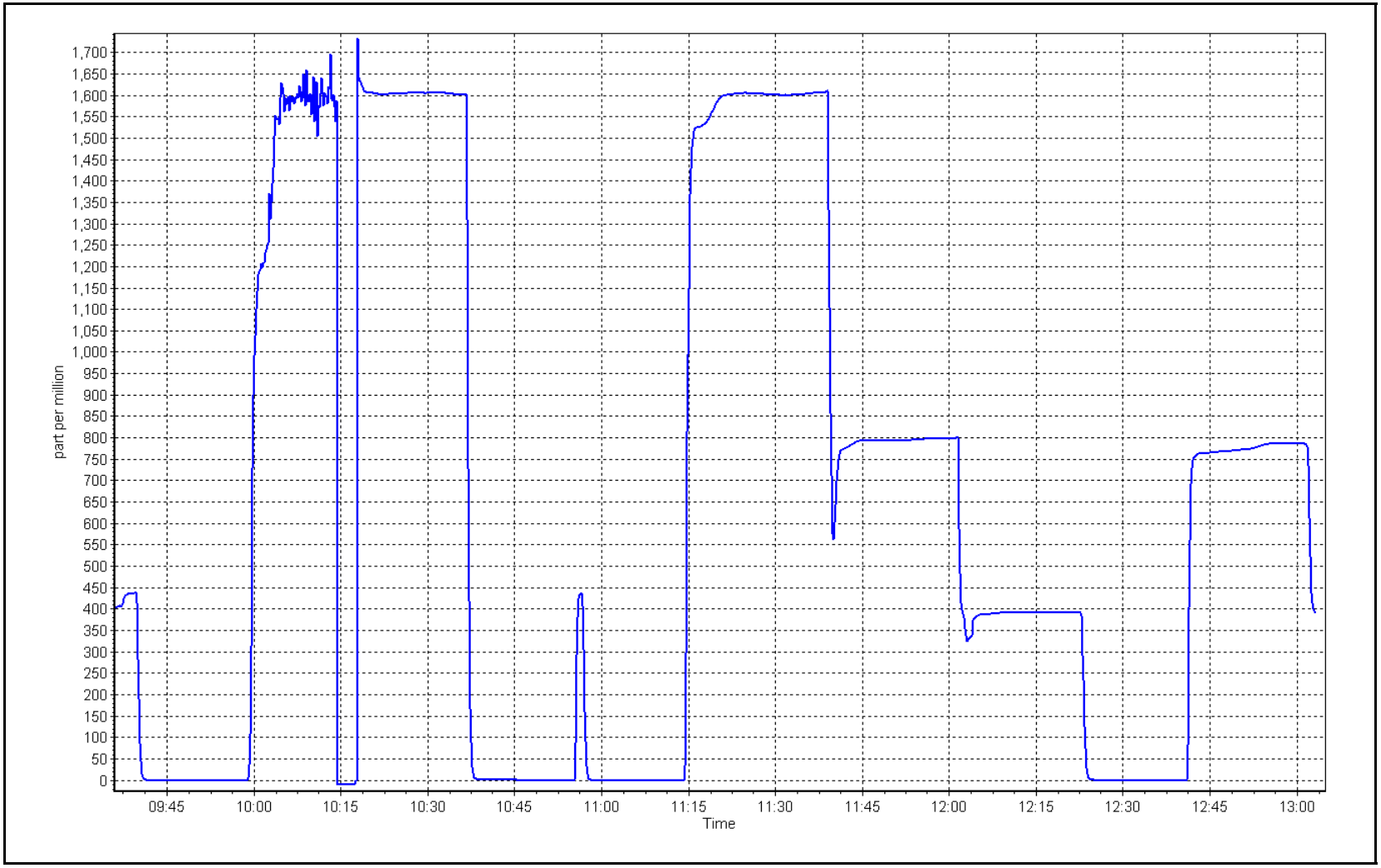
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
1605.3	1603.2	1.0013
802.7	797.9	1.0060
401.3	391.6	1.0249

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999963	*≥0.995*
Slope	1.000422	*0.90 - 1.10*
Intercept	-4.480000	*+/-10*



CO_2 Calibration Plot Date: July 10, 2023 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

TN - NO_X - NH_3 Calibration Report

Version-05-2023

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
NOX Cal Date:	July 12, 2023	Last Cal Date:	June 21, 2023
Start time (MST):	9:50	End time (MST):	14:38
NH3 Cal Date:	July 13, 2023	Last Cal Date:	June 22, 2023
Start time (MST):	9:58	End time (MST):	16:46
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:	74.90	ppm	NH3 Gas Cylinder #:	CC744566
			NH3 Cal Gas Expiry:	December 21, 2023
Removed NH3 Conc:	72.93	ppm	Removed Cylinder #:	CC281298
NH3 gas Diff:	3.7%		Removed cyl Expiry:	February 28, 2023
Calibrator Model:	Teledyne API T700		Serial Number:	3565
ZAG make/model:	Teledyne API T701		Serial Number:	5609

Analyzer Information

Analyzer model:	Teledyne API T201	Analyzer serial #:	475
Converter model:	Teledyne API T501	Converter serial #:	824
NH3 Range (ppb):	0 - 2000 ppb	Reaction cell Press:	5.00
NOX Range (ppb):	0 - 1000 ppb	Sample Flow:	512

	Start	*Finish*		*Start*	*Finish*
NO coefficient:	0.989	0.987	TN coefficient:	0.995	0.989
NOX coefficient:	0.991	0.987	NO bkgrnd:	-0.5	-0.9
NO2 coefficient:	1.000	1.000	NOX bkgrnd:	-0.3	-0.3
NH3 coefficient:	0.941	0.973	TN bkgrnd:	0.5	1.2

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	0.998174	1.000126
NO_X Cal Offset:	-1.280000	-1.500000
NO Cal Slope:	0.999572	1.000428
NO Cal Offset:	-2.180000	-2.080000
NO_2 Cal Slope:	1.004664	0.999045
NO_2 Cal Offset:	0.067495	0.023464
NH3 Cal Slope:	0.998759	1.002916
NH3 Cal Offset:	1.195770	-5.175346
TN Cal Slope:	1.001474	1.005585
TN Cal Offset:	1.255511	-5.152839

Wood Buffalo Environmental Association

TN - NOX - NH_3 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated TN concentration (ppb) (Cc)	Calculated NOX concentration (ppb) (Cc)	Calculated NH3 concentration (ppb) (Cc)	Indicated TN concentration (ppb) (Ic)	Indicated NOX concentration (ppb) (Ic)	Indicated NH3 concentration (ppb) (Ic)	TN Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NH3 Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.3	0.1	----	----
as found NO	4920	80.0	813.4	813.4	----	813.3	812.8	0.5	1.000	----
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
high NO point	4920	80.0	813.4	813.4	----	812.0	813.0	-0.8	1.002	----
NO/O3 point	4920	80.0	813.4	813.4	----	811.4	809.3	2.4	1.003	----
as found NH3	3413	86.4	1800.6	----	1800.6	1796.1	----	1791.3	1.003	1.005
new NH3 cyl rp	3416	84.1	1799.7	----	1799.7	1862.2	----	1858.0	0.966	0.969
first NH3	3416	84.1	1799.7	----	1799.7	1805.9	----	1801.2	0.997	0.999
second NH3	3453	46.7	999.4	----	999.4	1001.6	----	998.6	0.998	1.001
third NH3	3477	23.4	500.8	----	500.8	490.3	----	489.1	1.021	1.024
								Average Correction Factor	1.0021	1.0079

Corrected As found TN = 813.5 ppb NO_X = 813.1 ppb NH3 = 1791.2 ppb

Previous Response TN = 815.9 ppb NO_X = 810.7 ppb NH3 = 1799.6 ppb

*Percent Change TN = -0.3%

*Percent Change NO_X = 0.3%

*Percent Change NH3 = -0.5%

* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 94.1%

NH3 Current Converter Efficiency = 97.3%

Wood Buffalo Environmental Association

NO_X - NO - NO_2 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.5	-1.3	-0.6	----	----
as found span	4920	80.0	813.4	800.6	813.4	814.3	801.3	818.1	0.9989	0.9992
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	----	----
high point	4920	80.0	813.4	800.6	813.4	813.0	800.0	812.0	1.0005	1.0008
second point	4960	40.0	406.7	400.3	406.7	403.9	397.2	404.6	1.0070	1.0079
third point	4980	20.0	203.4	200.2	203.4	200.8	196.2	200.9	1.0127	1.0202
								Average Correction Factor	1.0068	1.0096

Baseline Corr As fnd	TN =	818.7 ppb	NO_X =	814.8 ppb	NO =	802.6 ppb	*Percent Change	TN = 0.3%
Previous Response	TN =	815.9 ppb	NO_X =	810.7 ppb	NO =	798.1 ppb	*Percent Change	NO_X = 0.5%
							*Percent Change	NO = 0.6%

* = > +/-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	0.8	----	----
calibration zero	----	----	0.0	0.0	----	----
1st GPT point (400 ppb O3)	795.4	398.1	410.1	409.7	1.0010	99.9%
2nd GPT point (200 ppb O3)	795.4	602.8	205.4	205.3	1.0005	100.0%
3rd GPT point (100 ppb O3)	795.4	697.4	110.8	110.7	1.0009	99.9%
				Average Correction Factor	1.0008	99.9%

Notes: Changed the inlet filter after as founds. Adjusted the NOx/TN zero and span. Used the 2nd GPT reference point due to drift. Changed out the NH3 cylinder. Adjusted the NH3 span.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TN Calibration Summary

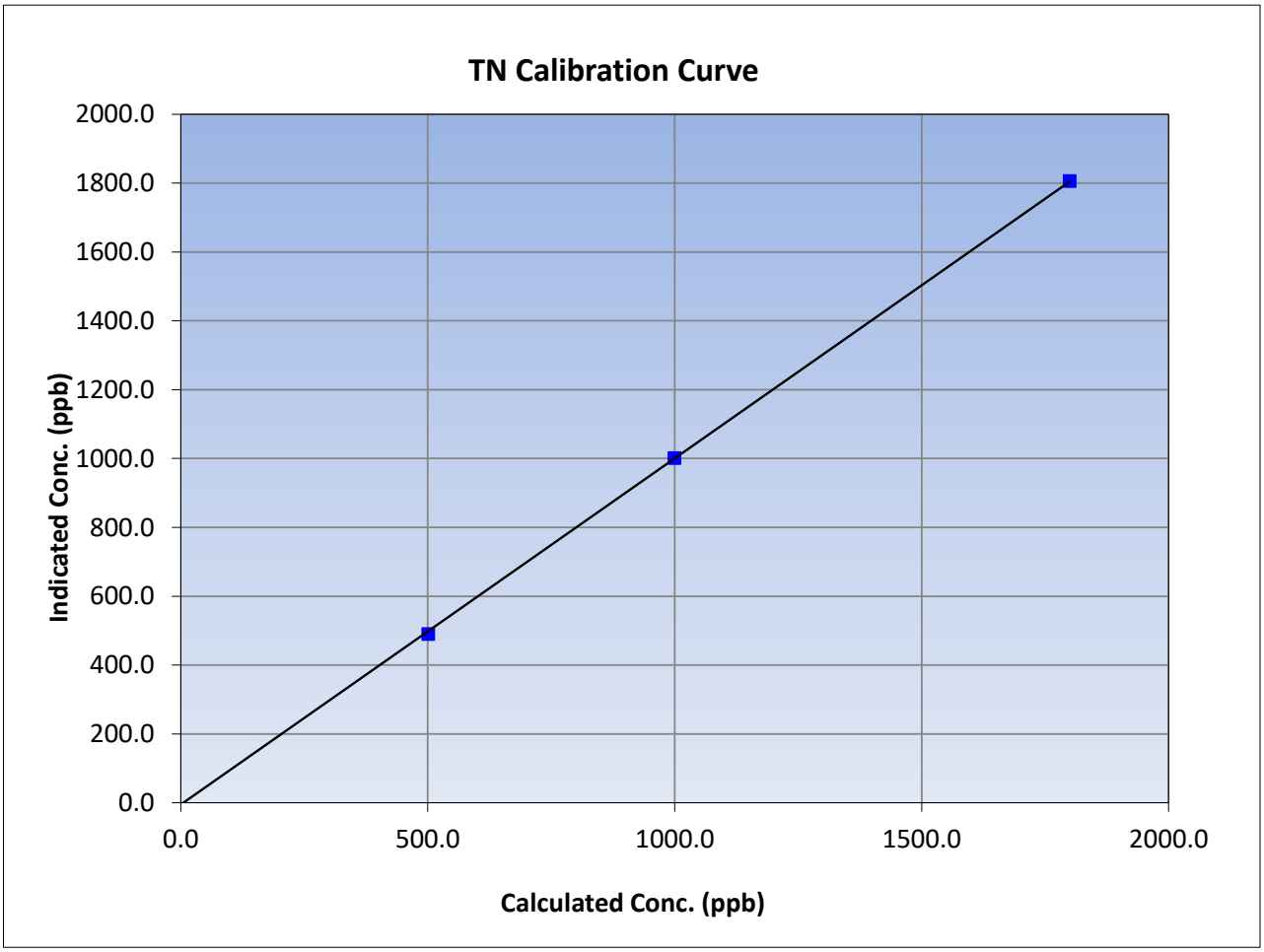
Version-05-2023

Station Information

Calibration Date:	July 13, 2023	Previous Calibration:	June 21, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:50	End Time (MST):	14:38
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999946	≥0.995
1799.7	1805.9	0.9966			
999.4	1001.6	0.9978	Slope	1.005585	0.90 - 1.10
500.8	490.3	1.0213			
			Intercept	-5.152839	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

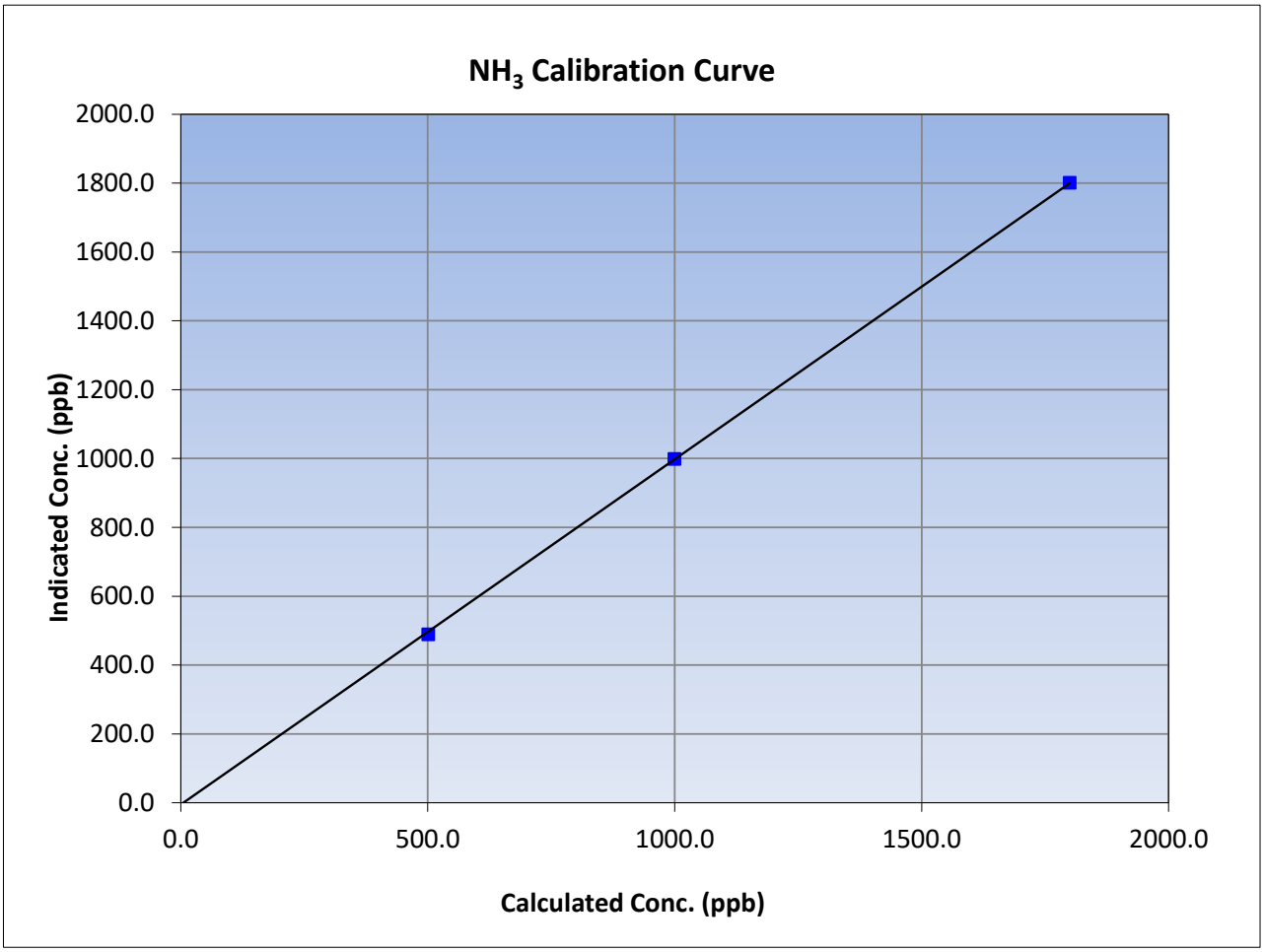
Version-05-2023

Station Information

Calibration Date:	July 13, 2023	Previous Calibration:	June 21, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:50	End Time (MST):	14:38
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999948	≥0.995
1799.7	1801.2	0.9992			
999.4	998.6	1.0008	Slope	1.002916	0.90 - 1.10
500.8	489.1	1.0238			
			Intercept	-5.175346	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

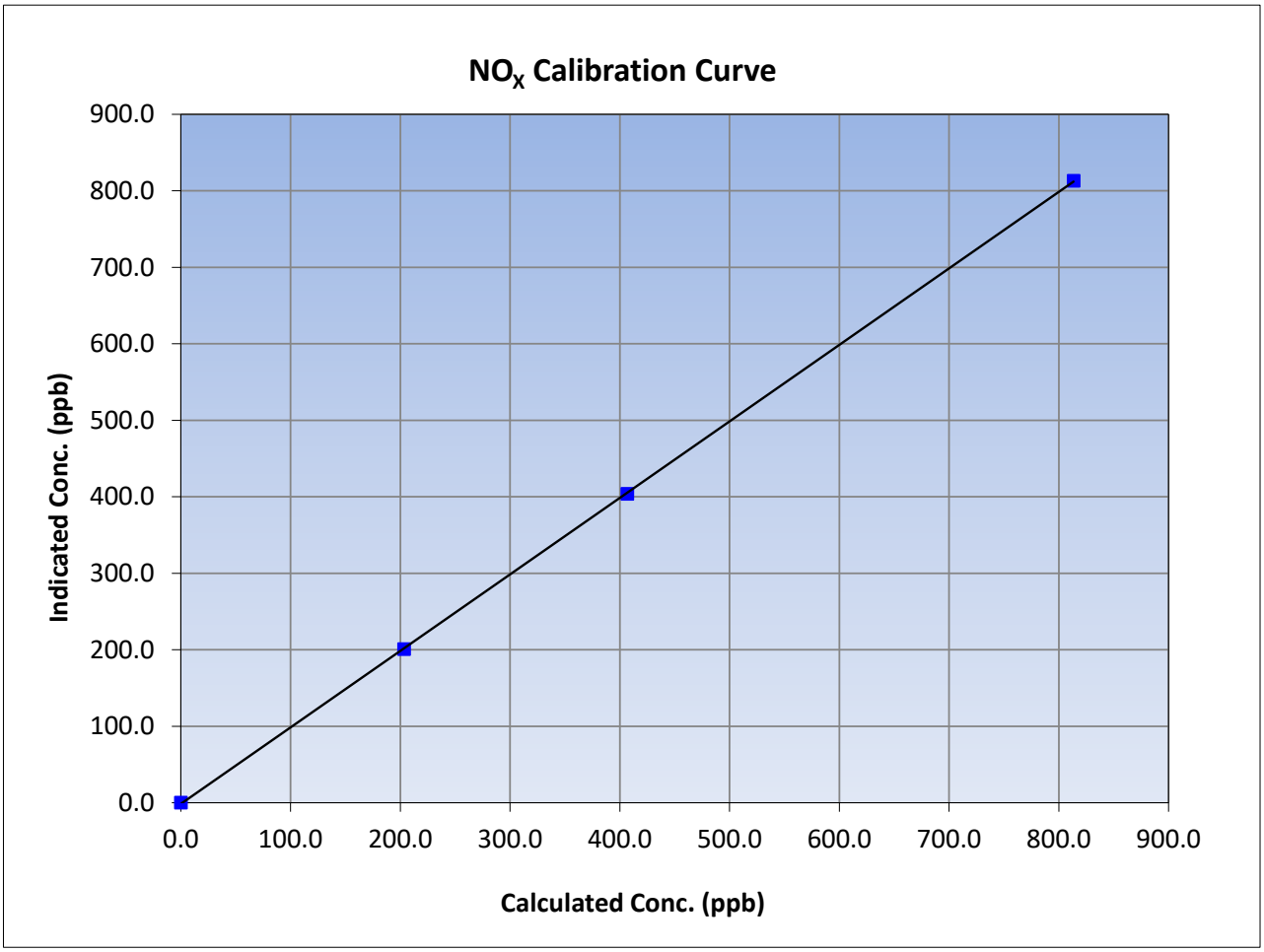
Version-05-2023

Station Information

Calibration Date:	July 12, 2023	Previous Calibration:	June 21, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:50	End Time (MST):	14:38
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999983	≥0.995
813.4	813.0	1.0005			
406.7	403.9	1.0070	Slope	1.000126	0.90 - 1.10
203.4	200.8	1.0127			
			Intercept	-1.500000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

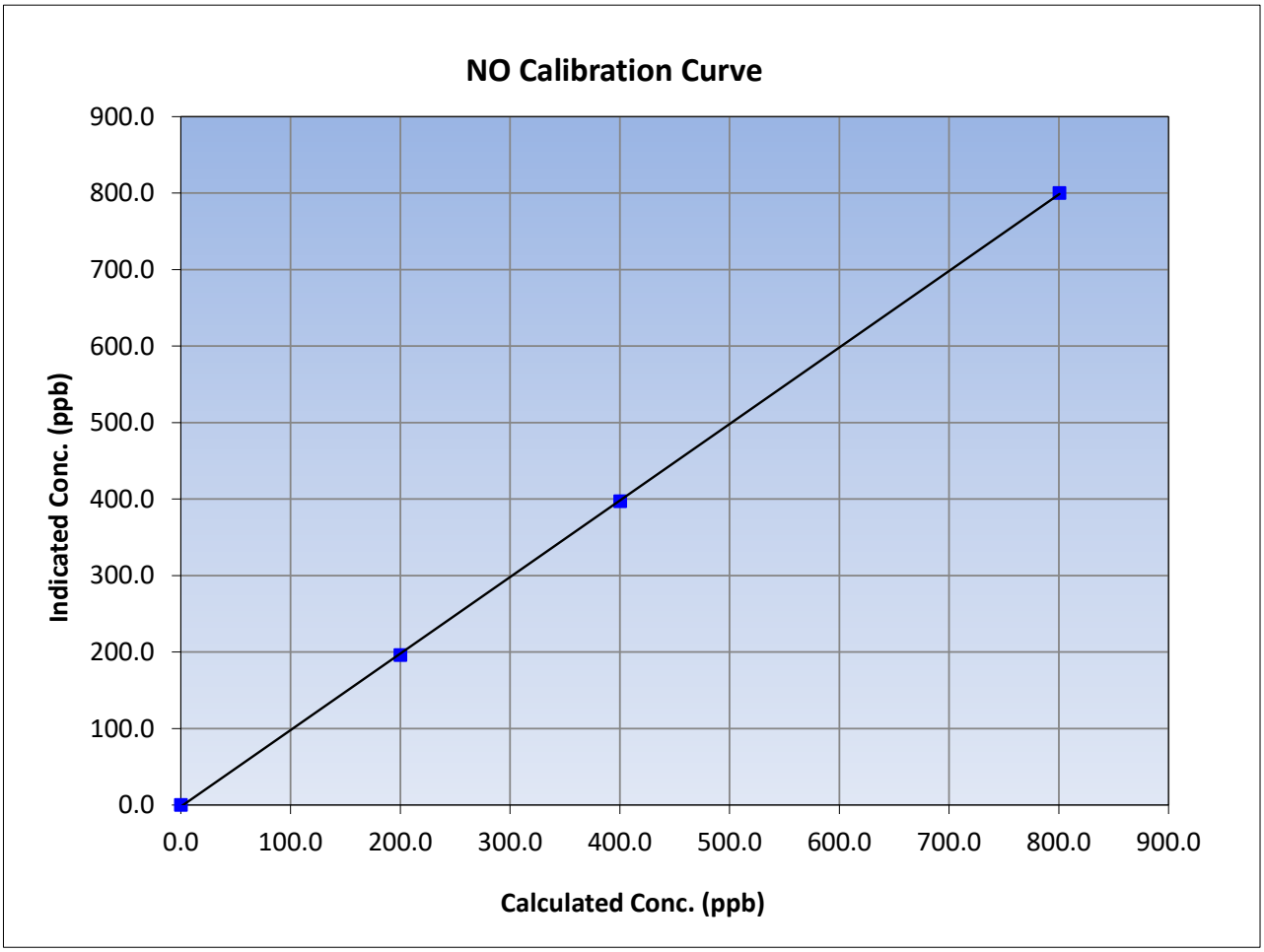
Version-05-2023

Station Information

Calibration Date:	July 12, 2023	Previous Calibration:	June 21, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:50	End Time (MST):	14:38
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999969	≥0.995
800.6	800.0	1.0008			
400.3	397.2	1.0079	Slope	1.000428	0.90 - 1.10
200.2	196.2	1.0202			
			Intercept	-2.080000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

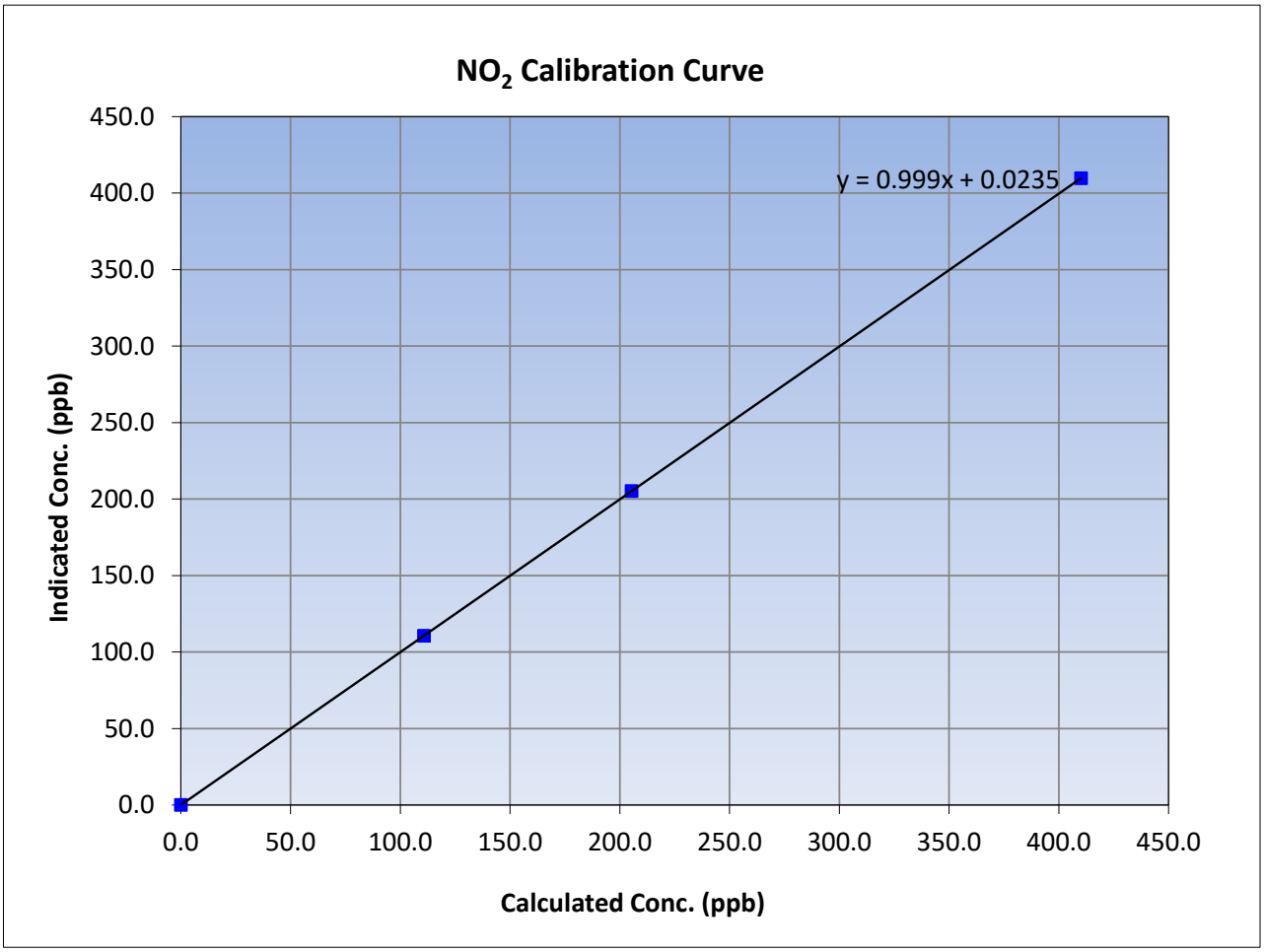
Version-05-2023

Station Information

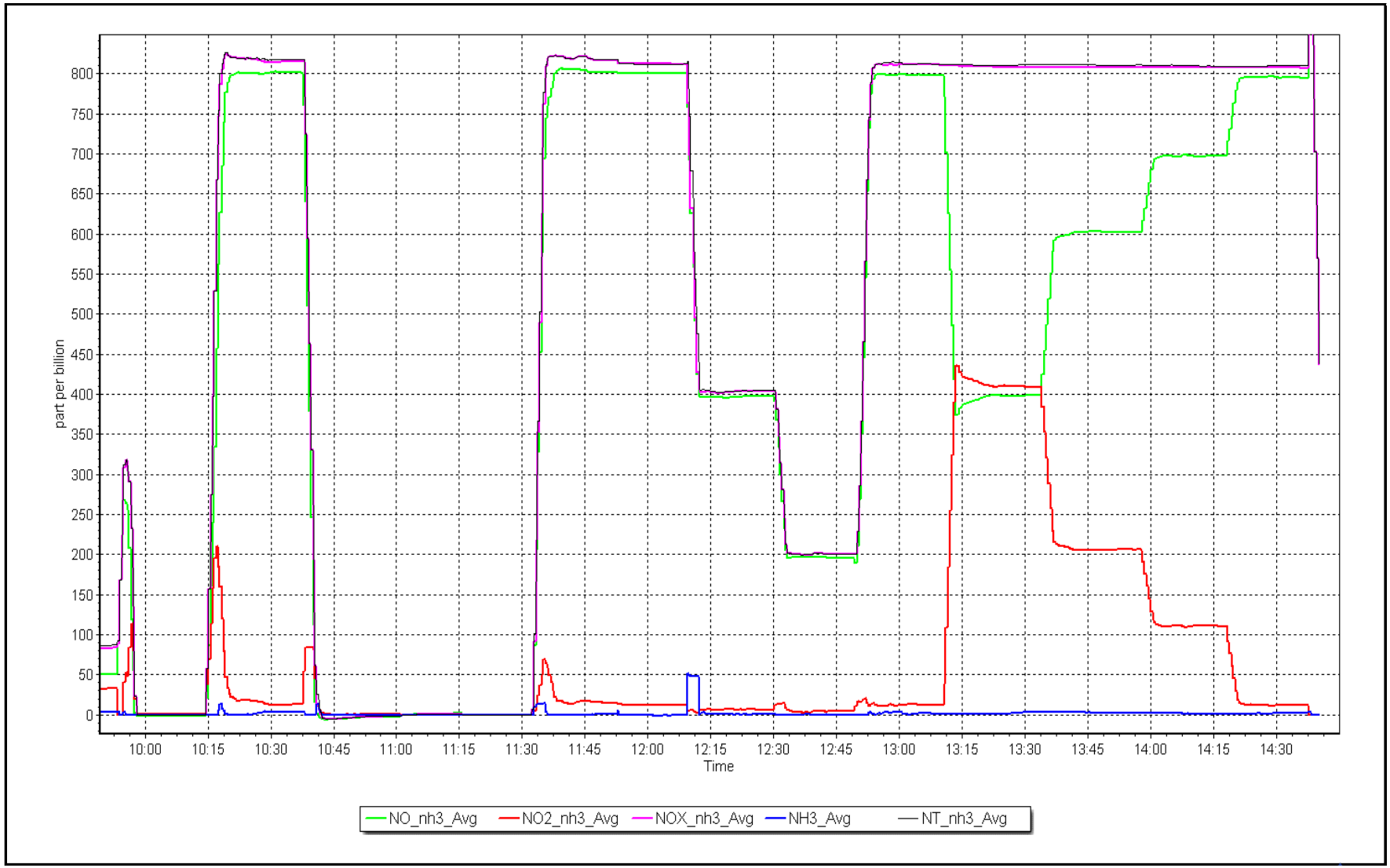
Calibration Date:	July 12, 2023	Previous Calibration:	June 21, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:50	End Time (MST):	14:38
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

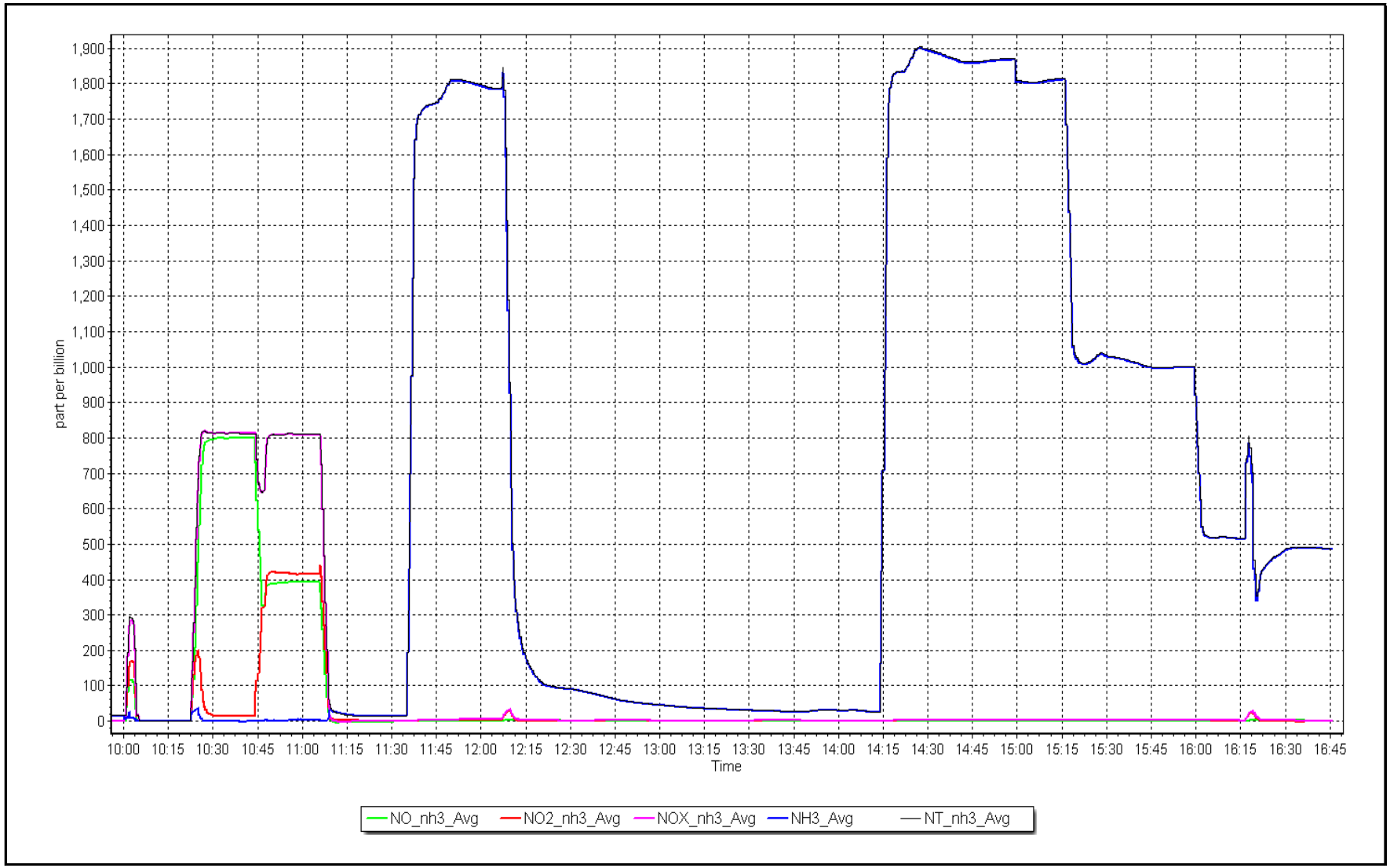
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	1.000000	≥0.995
410.1	409.7	1.0010			
205.4	205.3	1.0005	Slope	0.999045	0.90 - 1.10
110.8	110.7	1.0009			
			Intercept	0.023464	+/-20



NO_X Calibration Plot Date: July 12, 2023 Location: Bertha Ganter-Fort McKay



NH_3 Calibration Plot Date: July 13, 2023 Location: Bertha Ganter-Fort McKay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS02
MILDRED LAKE
JULY 2023

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

August 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Mildred Lake	Station number:	AMS02
Calibration Date:	July 12, 2023	Last Cal Date:	June 29, 2023
Start time (MST):	9:25	End time (MST):	12:37
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 T750		Serial Number:	4891

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999231	1.000728	Backgd or Offset:	17.8	17.8
Calibration intercept:	-0.605160	-1.304958	Coeff or Slope:	0.783	0.783

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	800.0	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4920	80.2	801.6	802.0	1.000
second point	4960	40.1	400.8	397.9	1.007
third point	4980	20.0	199.9	198.3	1.008
as left zero	5000	0.0	0.0	-0.1	----
as left span	4920	80.2	801.6	795.0	1.008
				Average Correction Factor	1.005

Baseline Corr As found:	800.20	Previous response	800.43	*% change	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

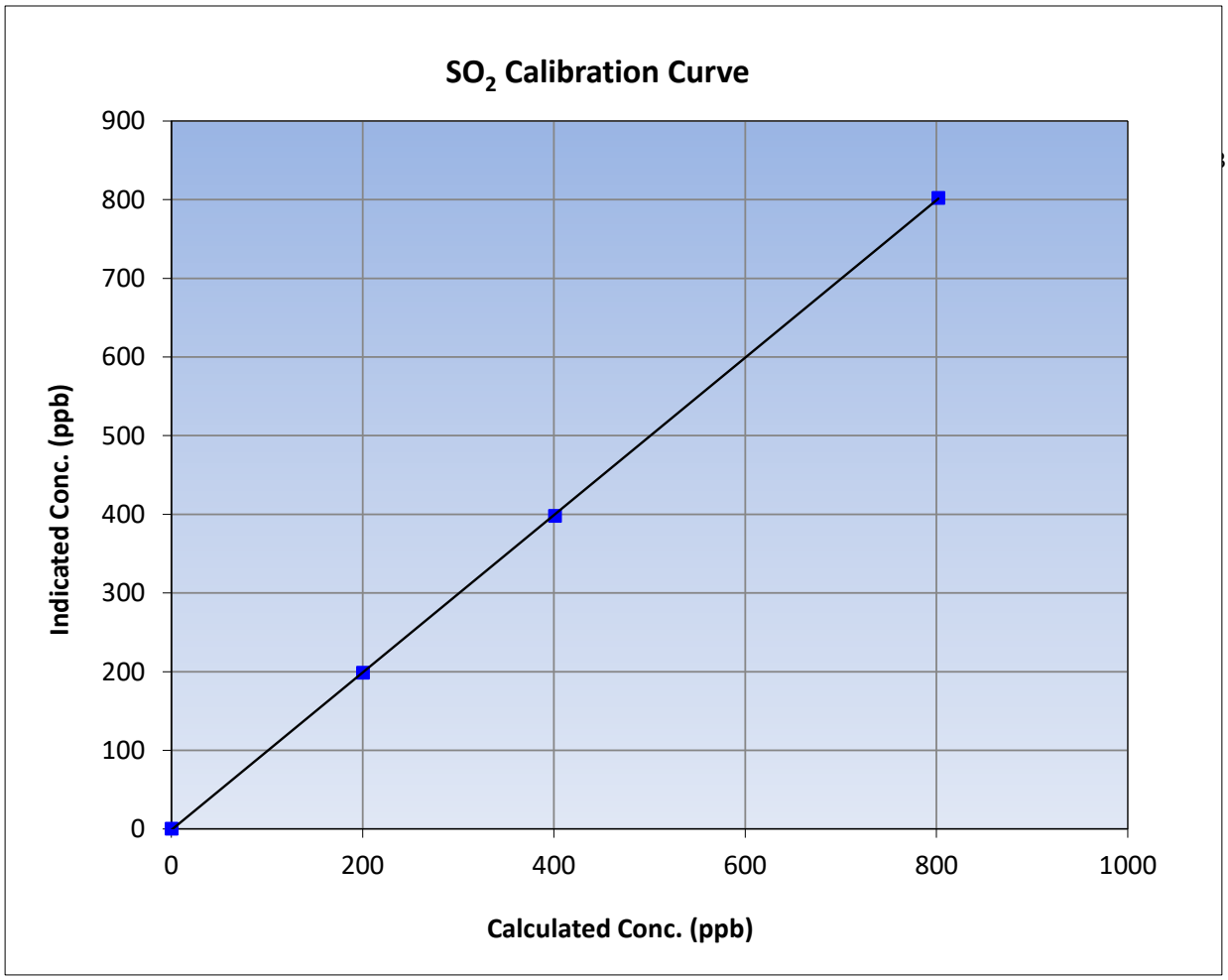
Station Information

Calibration Date:	July 12, 2023	Previous Calibration:	June 29, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:25	End Time (MST):	12:37
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1404901075

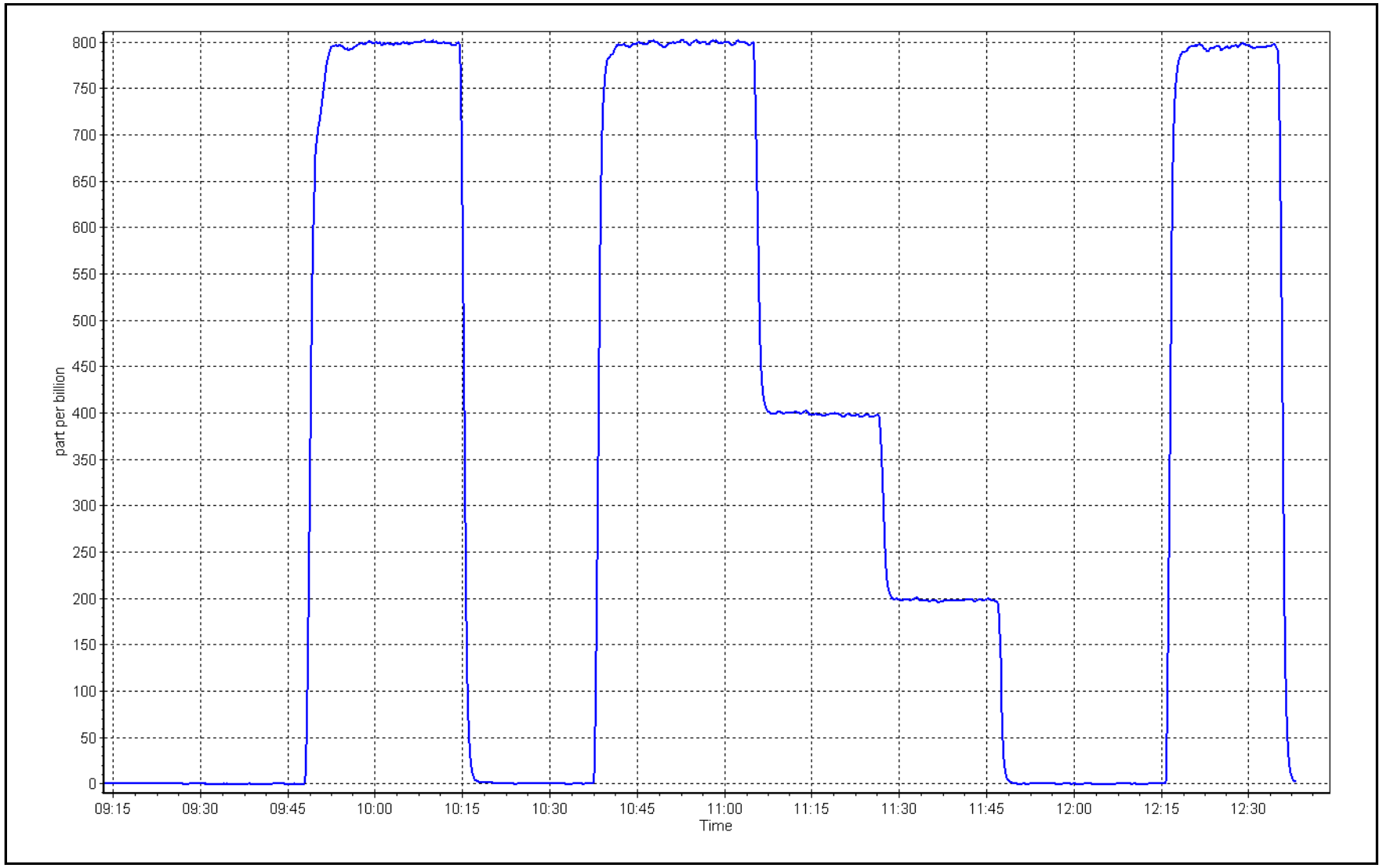
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
801.6	802.0	0.9996
400.8	397.9	1.0074
199.9	198.3	1.0082

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999981	*≥0.995*
Slope	1.000728	*0.90 - 1.10*
Intercept	-1.304958	*+/-30*



SO2 Calibration Plot Date: July 12, 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:	July 20, 2023	Last Cal Date:	June 29, 2023
Start time (MST):	9:17	End time (MST):	15:25
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43iQTL		Analyzer serial #:	12113311966	
Converter make:	Global G150		Converter serial #:	2022-198	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.006394	0.994964	Backgd or Offset:	1.72	1.77
Calibration intercept:	-0.119196	-0.019203	Coeff or Slope:	0.797	0.821

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	4924	75.6	80.0	79.0	1.013
as found 2nd point	4962	37.8	40.0	39.1	1.023
as found 3rd point	4981	18.9	20.0	19.4	1.031
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4924	75.6	80.0	79.5	1.006
second point	4962	37.8	40.0	40.0	1.000
third point	4981	18.9	20.0	19.7	1.015
as left zero	5000	0.0	0.0	0.2	----
as left span	4924	75.6	80.0	78.1	1.024
SO2 Scrubber Check	4920	80.2	802.0	0.1	----
Date of last scrubber change:		12-Sep-22		Ave Corr Factor	1.007
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.0	Prev response:	80.38	*% change:	-1.8%
Baseline Corr 2nd AF pt:	39.1	AF Slope:	0.988535	AF Intercept:	-0.219214
Baseline Corr 3rd AF pt:	19.4	AF Correlation:	0.999960		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after MPAF's. Scrubber check passed after MPAF's. Adjusted span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

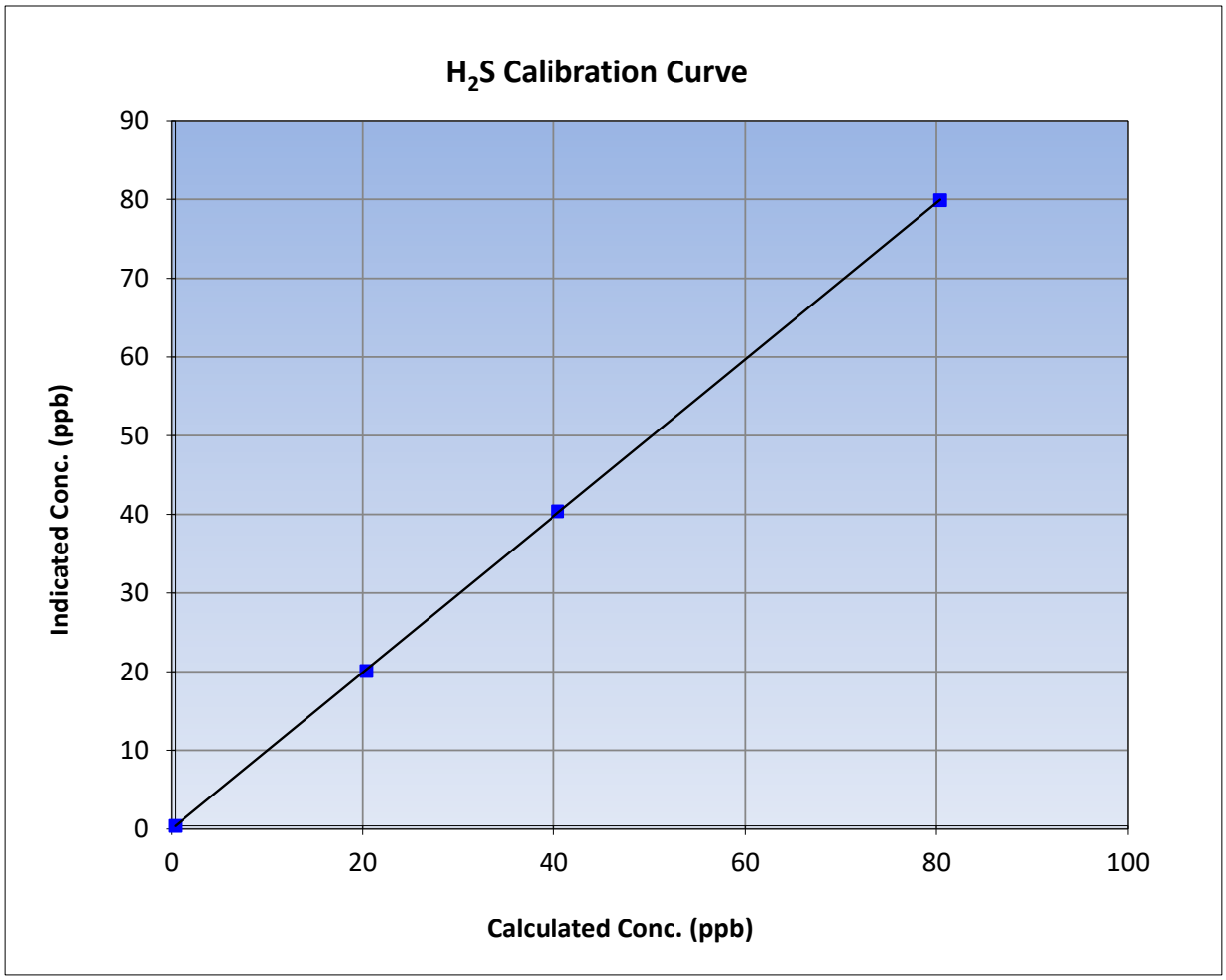
Station Information

Calibration Date:	July 20, 2023	Previous Calibration:	June 29, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:17	End Time (MST):	15:25
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	12113311966

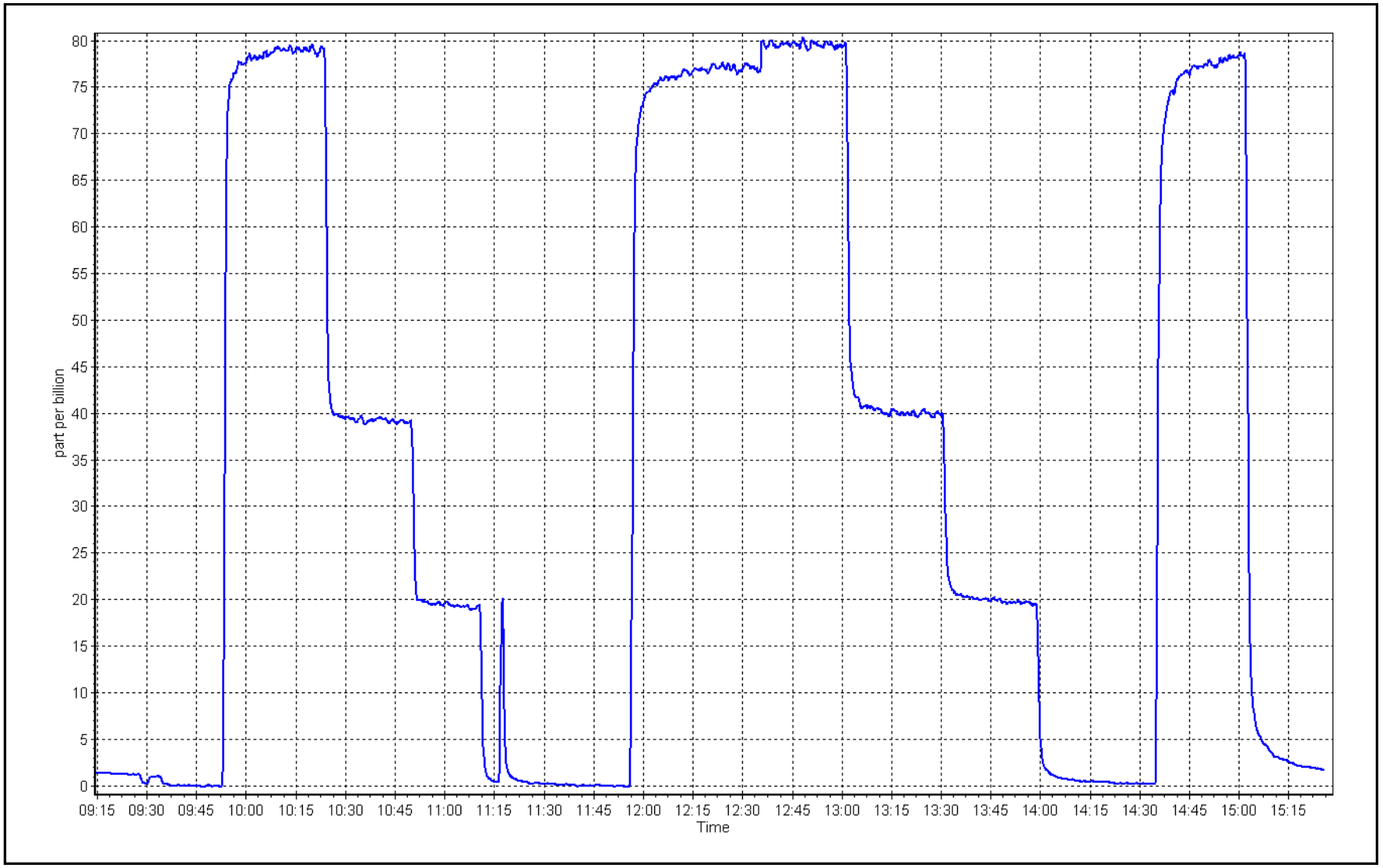
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	79.5	1.0062
40.0	40.0	0.9998
20.0	19.7	1.0151

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999975	*≥0.995*
Slope	0.994964	*0.90 - 1.10*
Intercept	-0.019203	*+/-3*



H_2S Calibration Plot Date: July 20, 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:	July 12, 2023	Last Cal Date:	June 29, 2023
Start time (MST):	9:25	End time (MST):	12:37
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC501209	Cal Gas Expiry Date:	August 12, 2024	
CH4 Cal Gas Conc.	500.2	ppm	CH4 Equiv Conc.	1048.6	ppm
C3H8 Cal Gas Conc.	199.4	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:		
Removed CH4 Conc.	500.2	ppm	CH4 Equiv Conc.	1048.6	ppm
Removed C3H8 Conc.	199.4	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	1185	
ZAG make/model:	Teledyne API T701		Serial Number:	4891	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320038	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.88E-04	2.97E-04	NMHC SP Ratio:	4.52E-05	4.58E-05
CH4 Retention time:	14.6	14.8	NMHC Peak Area:	194709	192143
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	16.48	1.021
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	16.82	16.82	1.000
second point	4960	40.1	8.41	8.38	1.003
third point	4980	20.0	4.19	4.17	1.005
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	16.82	16.84	0.999
				Average Correction Factor	1.003

Baseline Corr AF:	16.48	Prev response	16.84	*% 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-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	8.69	1.012
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	8.80	8.80	0.999
second point	4960	40.1	4.40	4.40	1.000
third point	4980	20.0	2.19	2.21	0.995
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.80	8.81	0.998
				Average Correction Factor	0.998
Baseline Corr AF:	8.69	Prev response	8.84	*% change	-1.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	8.02	7.79	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	80.2	8.02	8.02	1.000
second point	4960	40.1	4.01	3.98	1.008
third point	4980	20.0	2.00	1.97	1.016
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.02	8.04	0.998
				Average Correction Factor	1.008
Baseline Corr AF:	7.79	Prev response	8.01	*% 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:	1.001404	1.000332
THC Cal Offset:	0.001307	-0.014309
CH4 Cal Slope:	0.999914	1.000556
CH4 Cal Offset:	-0.014249	-0.018253
NMHC Cal Slope:	1.002789	1.000114
NMHC Cal Offset:	0.015957	0.003745

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

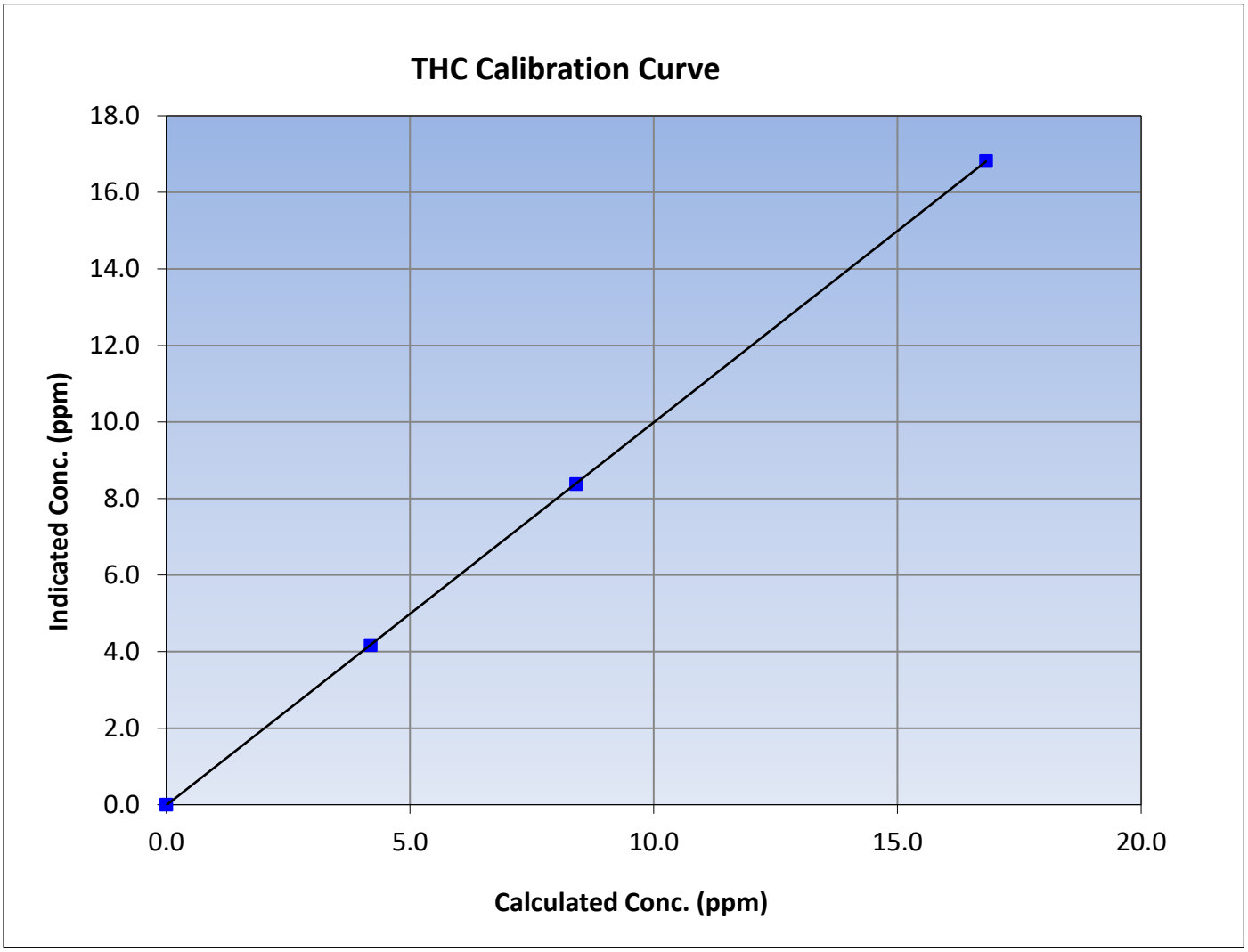
Version-06-2022

Station Information

Calibration Date:	July 12, 2023	Previous Calibration:	June 29, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:25	End Time (MST):	12:37
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	8.38	1.0035	Slope	1.000332	0.90 - 1.10
4.19	4.17	1.0048			
			Intercept	-0.014309	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

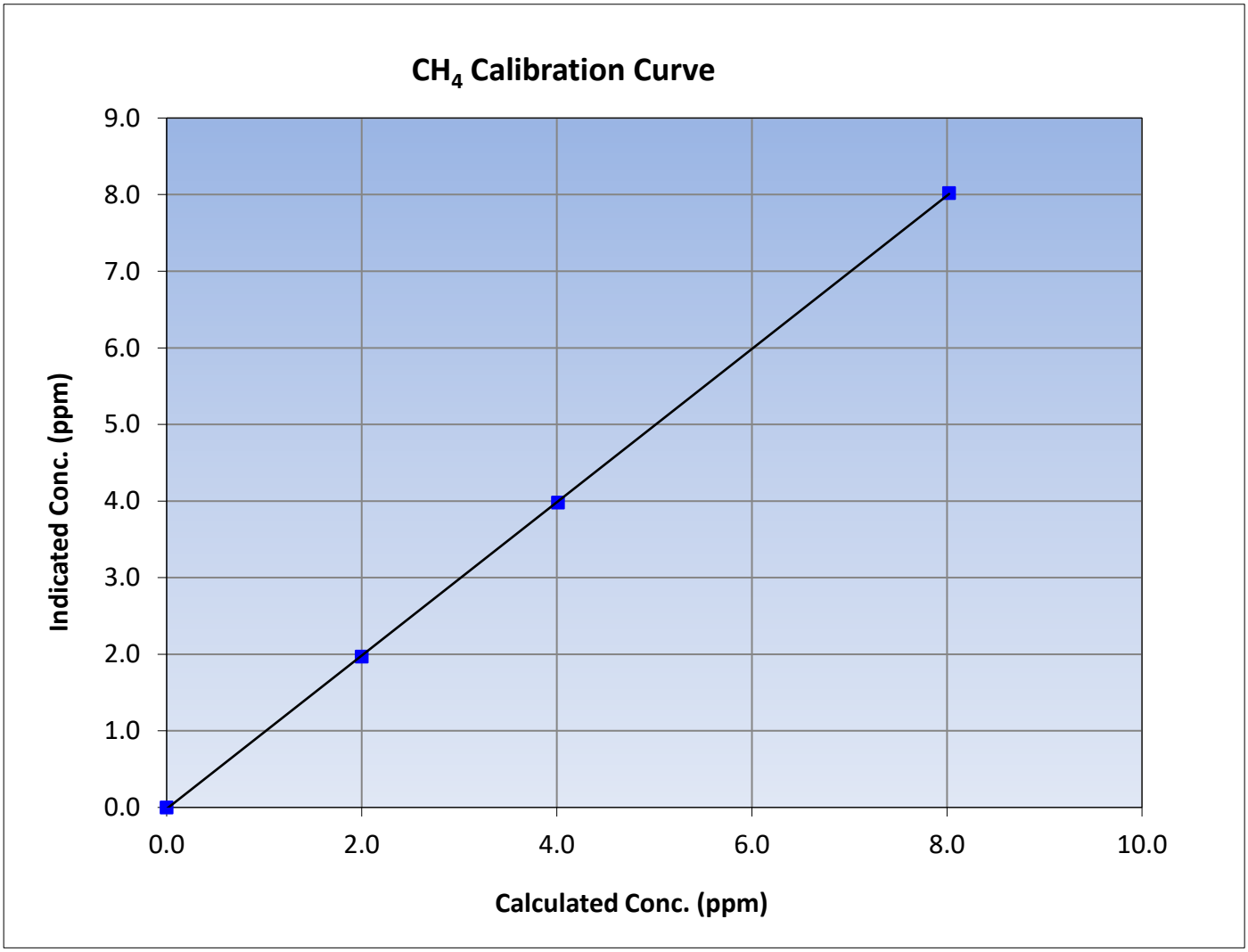
Version-06-2022

Station Information

Calibration Date:	July 12, 2023	Previous Calibration:	June 29, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:25	End Time (MST):	12:37
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	0.999975	*≥0.995*
8.02	8.02	1.0004			
4.01	3.98	1.0077	Slope	1.000556	*0.90 - 1.10*
2.00	1.97	1.0162			
			Intercept	-0.018253	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

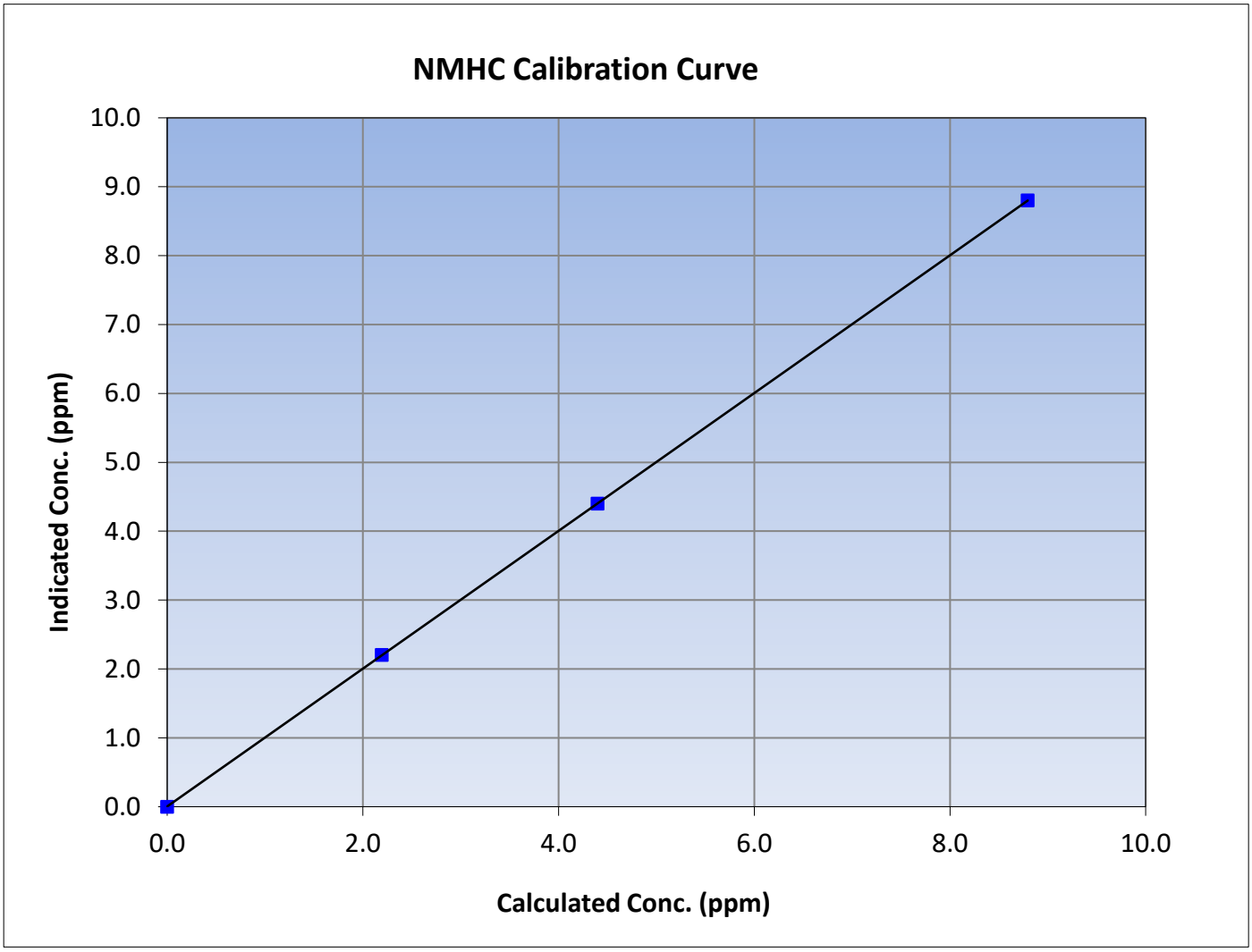
Version-06-2022

Station Information

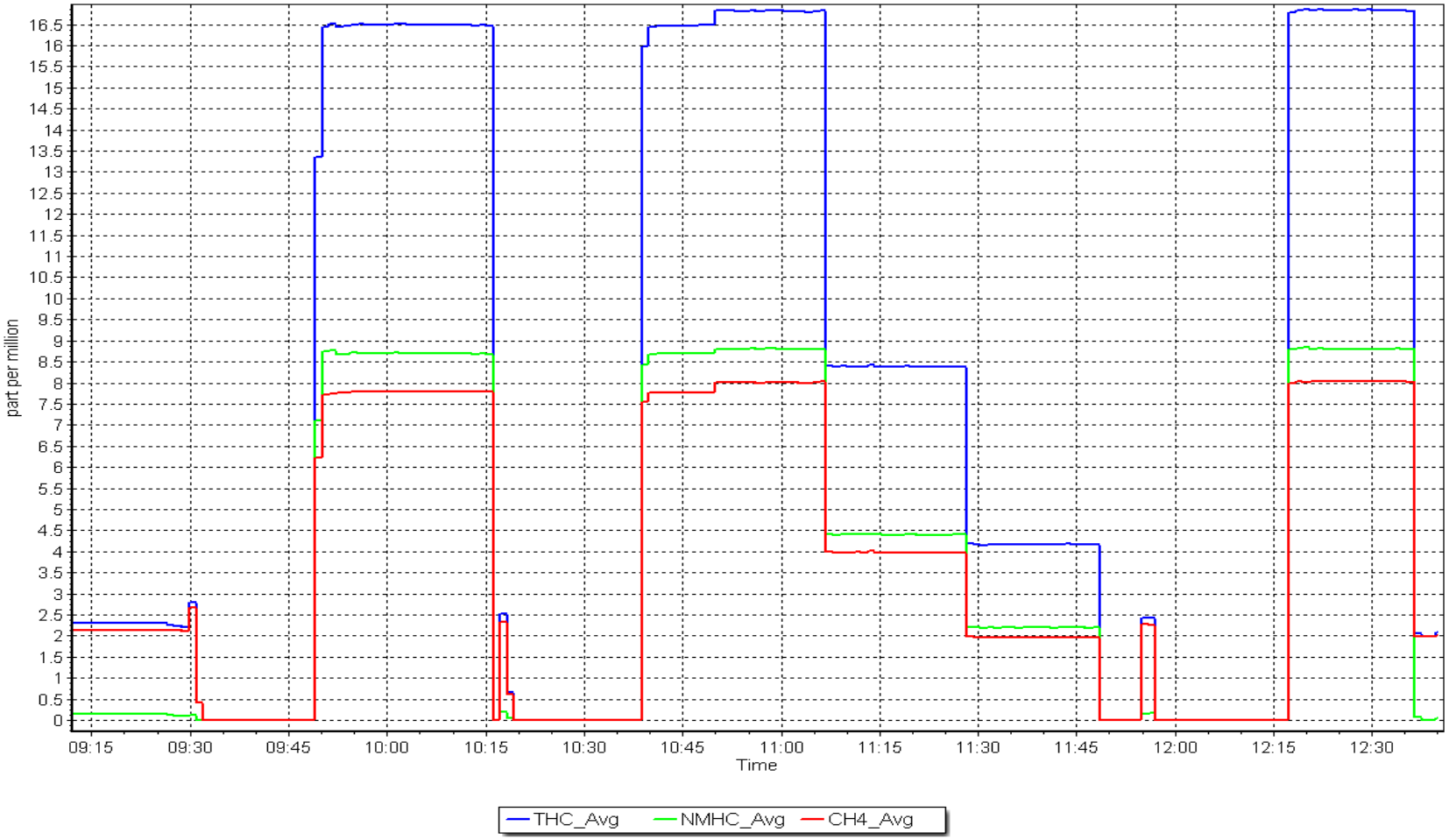
Calibration Date:	July 12, 2023	Previous Calibration:	June 29, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:25	End Time (MST):	12:37
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320038

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999998	≥0.995
8.80	8.80	0.9995			
4.40	4.40	0.9999	Slope	1.000114	0.90 - 1.10
2.19	2.21	0.9947			
			Intercept	0.003745	+/-0.5



NMHC Calibration Plot Date: July 12, 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:	July 20, 2023	Last Cal Date:	July 12, 2023
Start time (MST):	15:00	End time (MST):	16:34
Reason:	Cylinder Change		

Calibration Standards

Gas Cert Reference:		CC501209	Cal Gas Expiry Date:	August 12, 2024	
CH4 Cal Gas Conc.	500.2	ppm	CH4 Equiv Conc.	1048.6	ppm
C3H8 Cal Gas Conc.	199.4	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:		
Removed CH4 Conc.	500.2	ppm	CH4 Equiv Conc.	1048.6	ppm
Removed C3H8 Conc.	199.4	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	1185	
ZAG make/model:	Teledyne API T701		Serial Number:	4891	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320038	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.97E-04	2.97E-04	NMHC SP Ratio:	4.58E-05	4.58E-05
CH4 Retention time:	14.8	14.8	NMHC Peak Area:	192143	192143
Zero Chromatogram:	ON	ON	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	16.82	17.00	0.989
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	16.82	17.28	0.973
				Average Correction Factor	
Baseline Corr AF:	17.00	Prev response	16.81	*% 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-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	8.93	0.985
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.80	9.07	0.970
				Average Correction Factor	
Baseline Corr AF:	8.93	Prev response	8.80	*% change	1.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	8.02	8.07	0.994
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.02	8.21	0.977
				Average Correction Factor	
Baseline Corr AF:	8.07	Prev response	8.01	*% 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:	1.000332	
THC Cal Offset:	-0.014309	
CH4 Cal Slope:	1.000556	
CH4 Cal Offset:	-0.018253	
NMHC Cal Slope:	1.000114	
NMHC Cal Offset:	0.003745	

Notes: Changed Hydrogen cylinder.

Calibration Performed By: Braiden Boutilier

NMHC Calibration Plot Date: July 20, 2023 Location: Mildred Lake

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS04
BUFFALO VIEWPOINT
JULY 2023

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

August 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	July 19, 2023	Last Cal Date:	June 9, 2023
Start time (MST):	6:42	End time (MST):	10:02
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.87	ppm	Cal Gas Exp Date:	March 10, 2031
Cal Gas Cylinder #:	CC446753			
Removed Cal Gas Conc:	50.02	ppm	Rem Gas Exp Date:	September 9, 2028
Removed Gas Cyl #:	CC470284		Diff between cyl:	-0.8%
Calibrator Make/Model:	API T700		Serial Number:	3808
ZAG Make/Model:	API T701		Serial Number:	362

Analyzer Information

Analyzer make: Thermo 43i Analyzer serial #: JC1327300932

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001756	1.000328	Backgd or Offset:	22.1	22.1
Calibration intercept:	0.520000	0.714976	Coeff or Slope:	0.860	0.860

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	806.0	0.993
as found 2nd point					
as found 3rd point					
new cylinder response	4921	78.6	799.7	798.6	1.001
calibrator zero	5000	0.0	0.0	0.3	----
high point	4921	78.6	799.7	800.5	0.999
second point	4961	39.3	399.8	400.9	0.997
third point	4980	19.6	199.4	200.6	0.994
as left zero	5000	0.0	0.0	0.4	----
as left span	4921	78.6	799.7	796.8	1.004
				Average Correction Factor	0.997

Baseline Corr As found:	805.80	Previous response	802.25	*% 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: Calibration gas changed. No adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

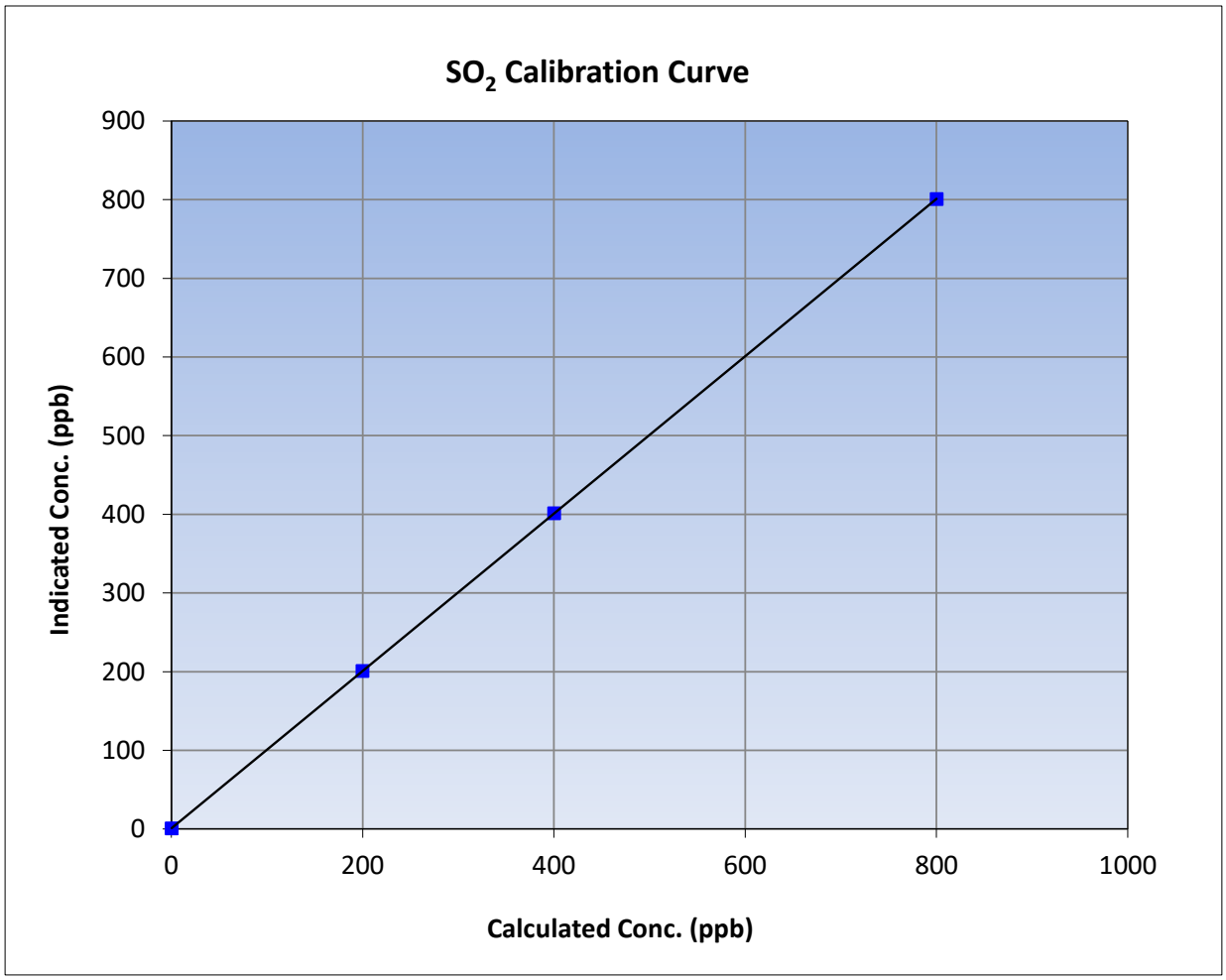
Station Information

Calibration Date:	July 19, 2023	Previous Calibration:	June 9, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:42	End Time (MST):	10:02
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1327300932

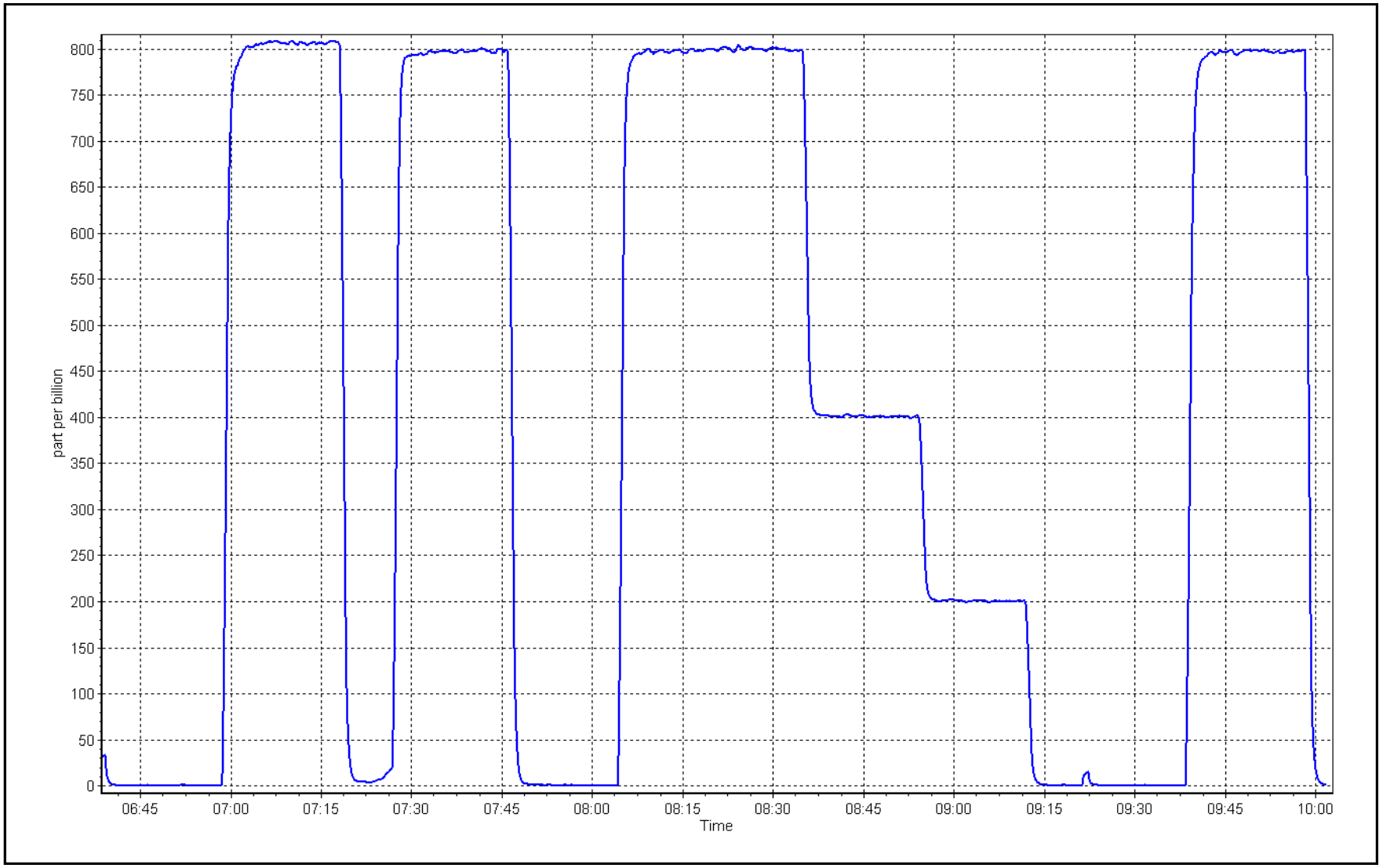
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
799.7	800.5	0.9991
399.8	400.9	0.9973
199.4	200.6	0.9941

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	1.000328	*0.90 - 1.10*
Intercept	0.714976	*+/-30*



SO2 Calibration Plot Date: July 19, 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:	July 11, 2023	Last Cal Date:	June 22, 2023
Start time (MST):	5:45	End time (MST):	9:43
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i-LTE		Analyzer serial #:	1008841400	
Converter make:	Global		Converter serial #:	2022-200	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001341	0.994226	Backgd or Offset:	1.8	1.8
Calibration intercept:	-0.017797	-0.017926	Coeff or Slope:	1.095	1.095

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4926	74.1	80.3	80.0	1.004
as found 2nd point	4963	37.0	40.1	40.1	1.000
as found 3rd point	4982	18.5	20.1	19.8	1.013
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	80.3	79.8	1.007
second point	4963	37.0	40.1	40.0	1.003
third point	4982	18.5	20.1	19.8	1.013
as left zero	5000	0.0	0.0	0.0	----
as left span	4926	74.1	80.3	79.4	1.012
SO2 Scrubber Check	4920	80.0	800.0	0.0	----
Date of last scrubber change:		16-May-23		Ave Corr Factor	1.007
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.0	Prev response:	80.41	*% change:	-0.5%
Baseline Corr 2nd AF pt:	40.1	AF Slope:	0.996930	AF Intercept:	-0.037869
Baseline Corr 3rd AF pt:	19.8	AF Correlation:	0.999986		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

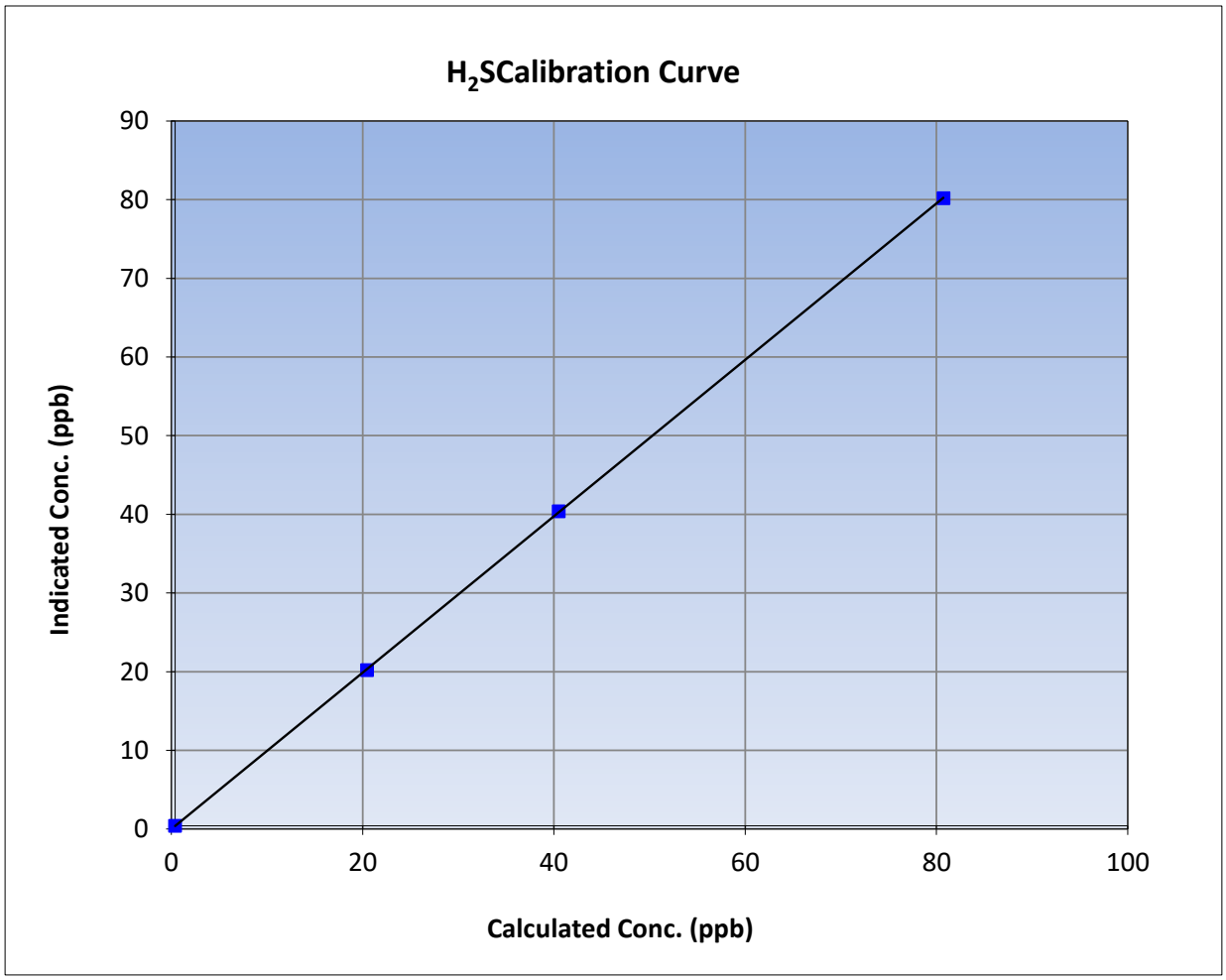
Station Information

Calibration Date:	July 11, 2023	Previous Calibration:	June 22, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	5:45	End Time (MST):	9:43
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1008841400

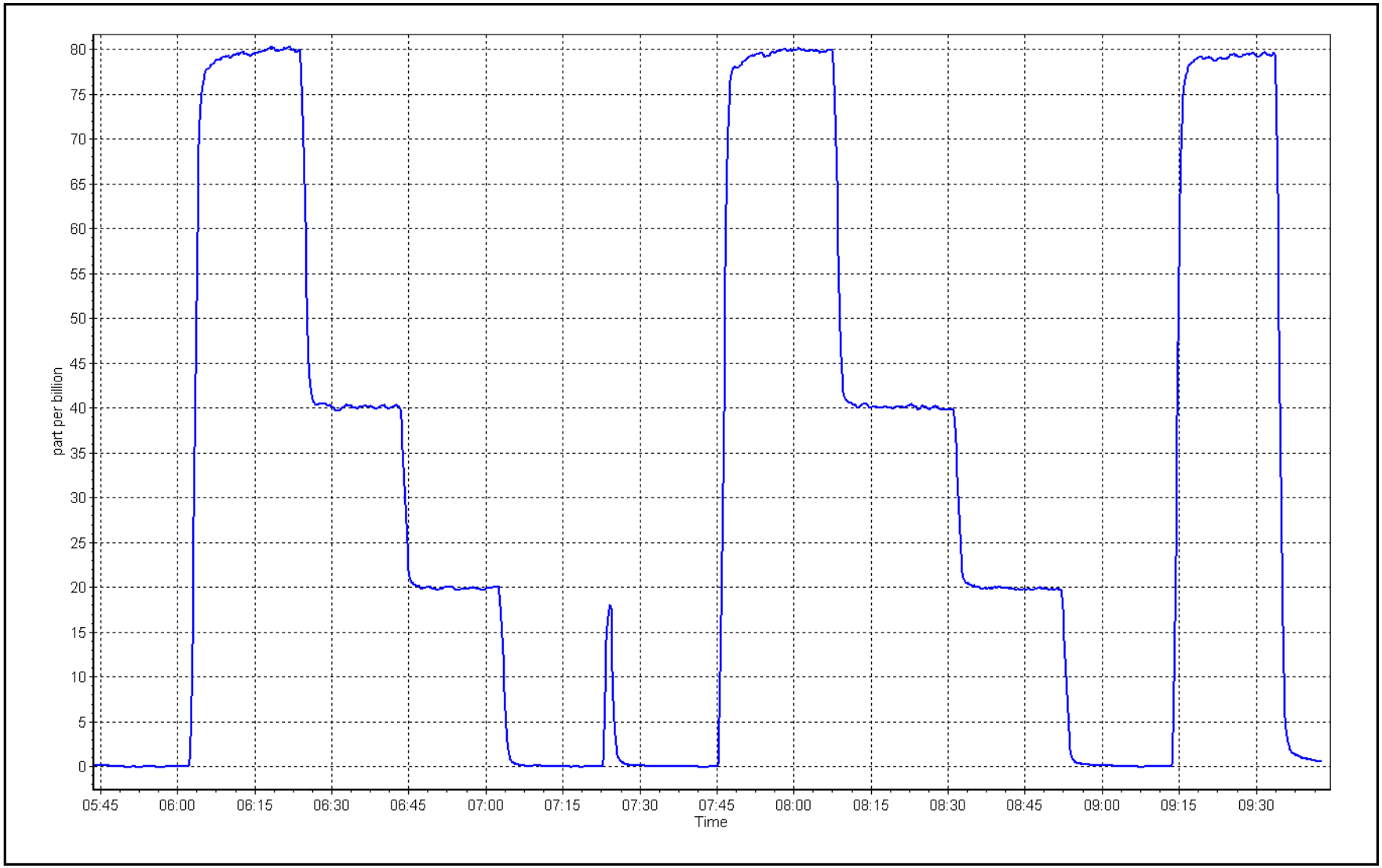
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.3	79.8	1.0066
40.1	40.0	1.0027
20.1	19.8	1.0127

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999990	*≥0.995*
Slope	0.994226	*0.90 - 1.10*
Intercept	-0.017926	*+/-3*



H_2S Calibration Plot Date: July 11, 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:	July 19, 2023	Last Cal Date:	June 9, 2023
Start time (MST):	6:42	End time (MST):	10:01
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC446753	Cal Gas Expiry Date:	March 10, 2031	
CH4 Cal Gas Conc.	497.2	ppm	CH4 Equiv Conc.	1058.2	ppm
C3H8 Cal Gas Conc.	204.0	ppm			
Removed Gas Cert:		CC470284	Removed Gas Expiry:	September 9, 2028	
Removed CH4 Conc.	497.8	ppm	CH4 Equiv Conc.	1062.9	ppm
Removed C3H8 Conc.	205.5	ppm	Diff between cyl (THC):	0.0%	
Diff between cyl (CH_4):	0.0%		Diff between cyl (NM):	0.0%	
Calibrator Model:	API T700		Serial Number:	3808	
ZAG make/model:	API T701		Serial Number:	362	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1222762077	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	1.860E-04	1.840E-04	NMHC SP Ratio:	3.870E-05	3.910E-05
CH4 Retention time:	11.8	11.8	NMHC Peak Area:	233712	225808

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	16.97	1.002
as found 2nd point					
as found 3rd point					
new cylinder response	4921	78.6	16.64	16.60	1.002
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	78.6	16.64	16.64	1.000
second point	4961	39.3	8.32	8.32	1.000
third point	4980	19.6	4.15	4.14	1.002
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	78.6	16.64	16.62	1.001
				Average Correction Factor	1.000

Baseline Corr AF:	16.97	Prev response	17.09	*% change	-0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	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	4921	78.6	8.82	8.72	1.011
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	78.6	8.82	8.82	1.000
second point	4961	39.3	4.41	4.42	0.998
third point	4980	19.6	2.20	2.20	1.000
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	78.6	8.82	8.81	1.001
				Average Correction Factor	0.999
Baseline Corr AF:	8.94	Prev response	9.04	*% change	-1.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	7.96	8.03	0.992
as found 2nd point					
as found 3rd point					
new cylinder response	4921	78.6	7.82	7.88	0.992
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	78.6	7.82	7.83	0.998
second point	4961	39.3	3.91	3.90	1.002
third point	4980	19.6	1.95	1.94	1.005
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	78.6	7.82	7.81	1.001
				Average Correction Factor	1.002
Baseline Corr AF:	8.03	Prev response	8.05	*% change	-0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.005850	1.000429
THC Cal Offset:	-0.014000	-0.003535
CH4 Cal Slope:	1.010733	1.002052
CH4 Cal Offset:	-0.002000	-0.007900
NMHC Cal Slope:	1.001548	1.000156
NMHC Cal Offset:	-0.012000	0.002367

Notes: Span Adjusted. Calibration gas changed.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

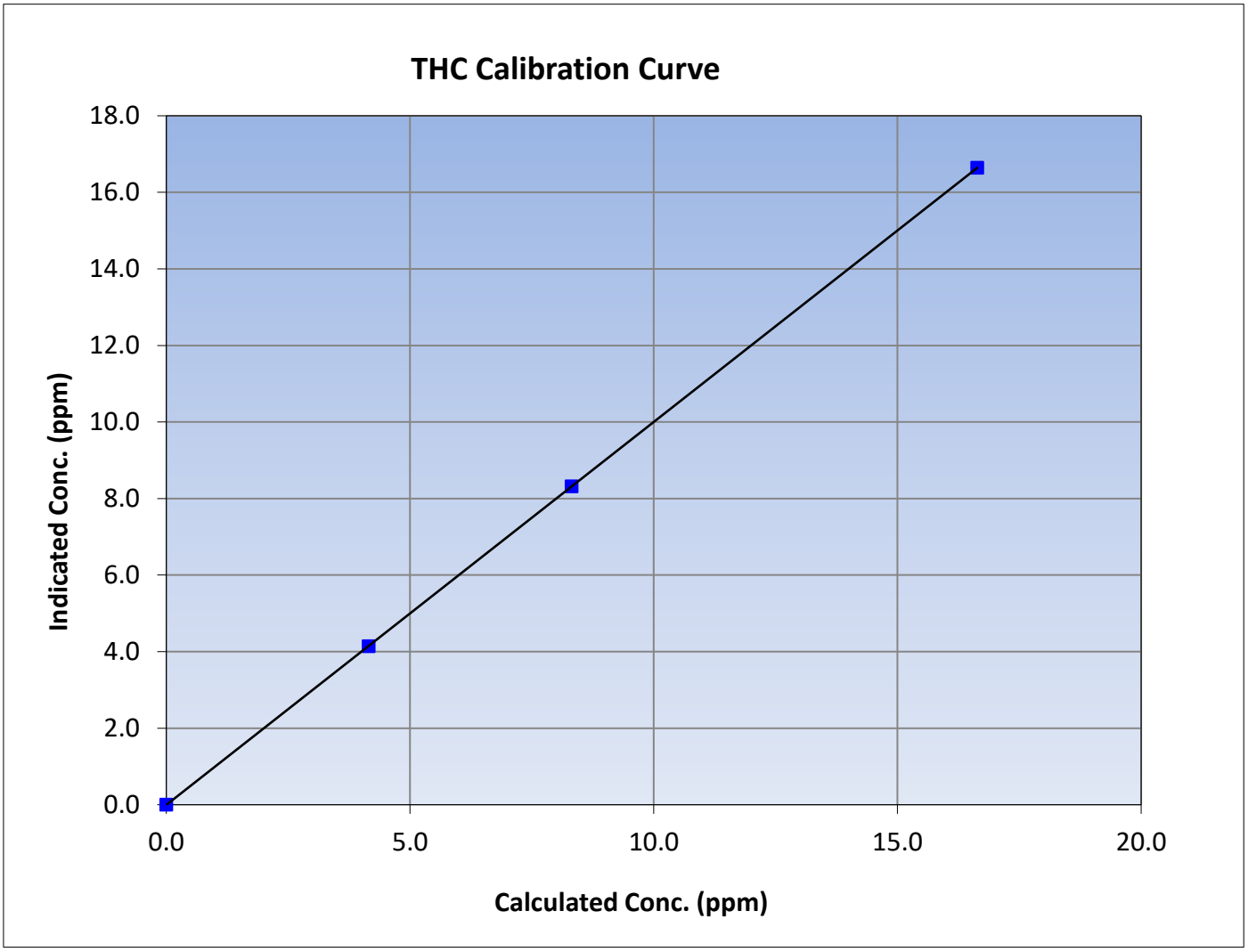
Version-01-2020

Station Information

Calibration Date:	July 19, 2023	Previous Calibration:	June 9, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:42	End Time (MST):	10:01
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
16.64	16.64	0.9998			
8.32	8.32	0.9996	Slope	1.000429	0.90 - 1.10
4.15	4.14	1.0020			
			Intercept	-0.003535	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

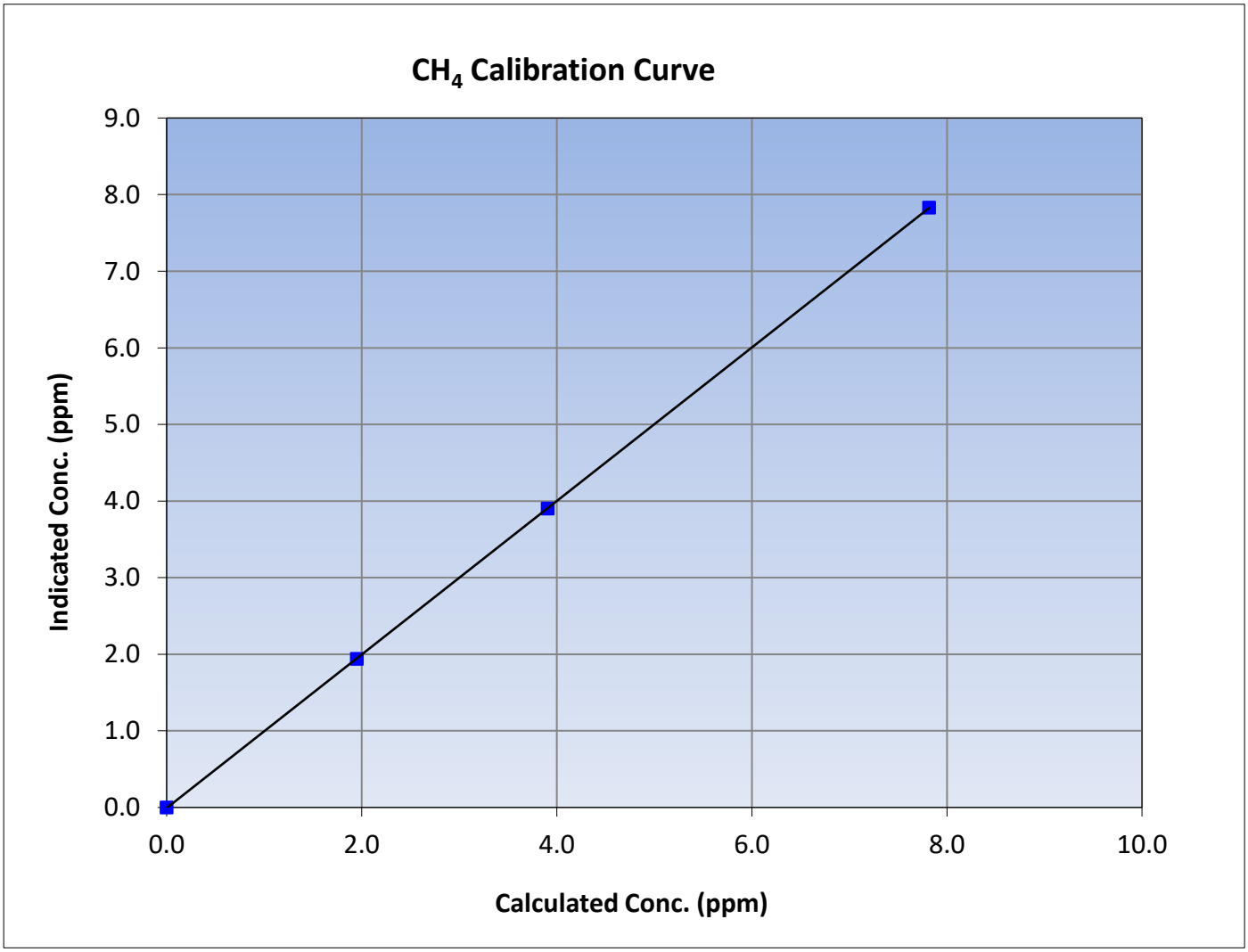
Version-01-2020

Station Information

Calibration Date:	July 19, 2023	Previous Calibration:	June 9, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:42	End Time (MST):	10:01
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
7.82	7.83	0.9983			
3.91	3.90	1.0020	Slope	1.002052	0.90 - 1.10
1.95	1.94	1.0047			
			Intercept	-0.007900	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

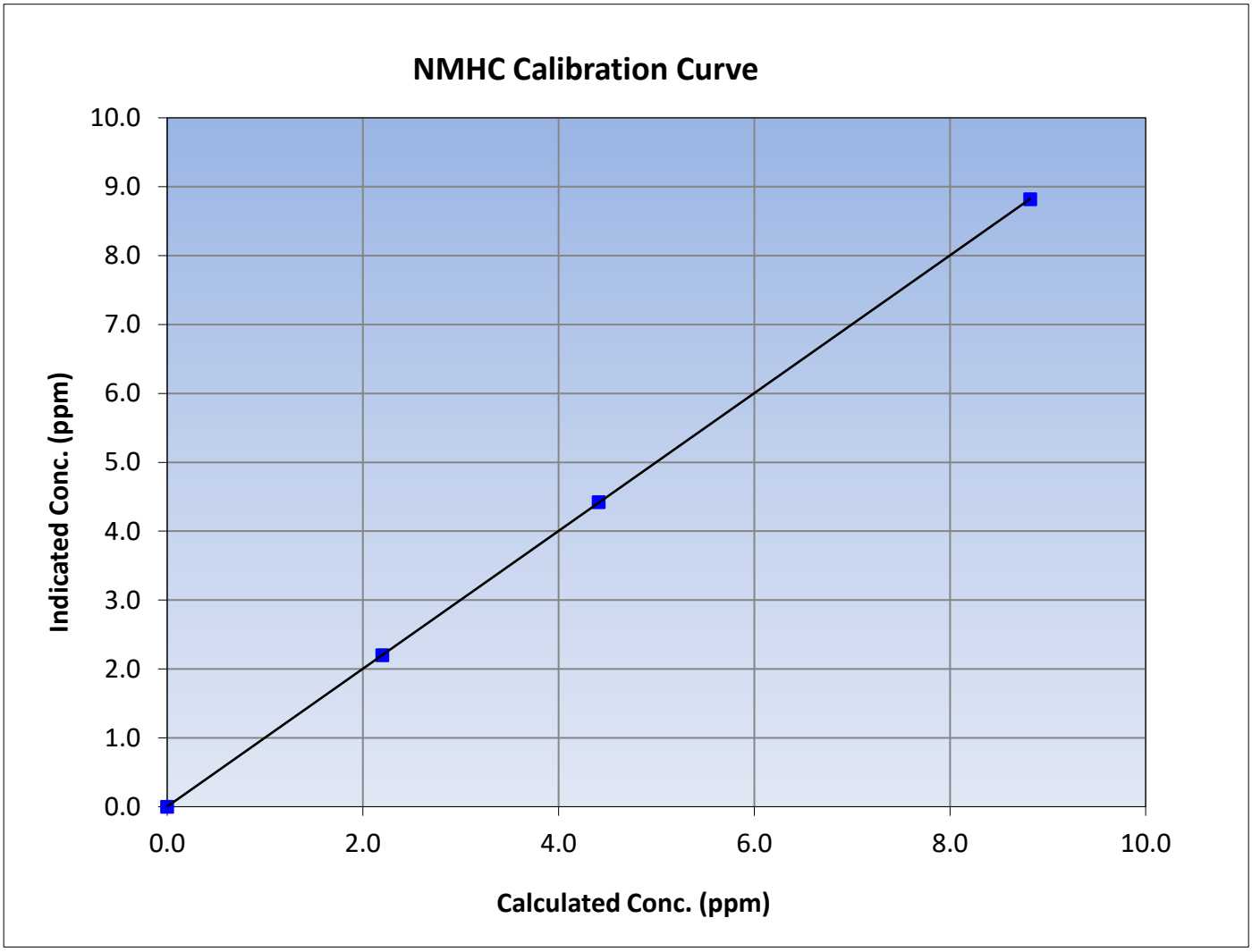
Version-01-2020

Station Information

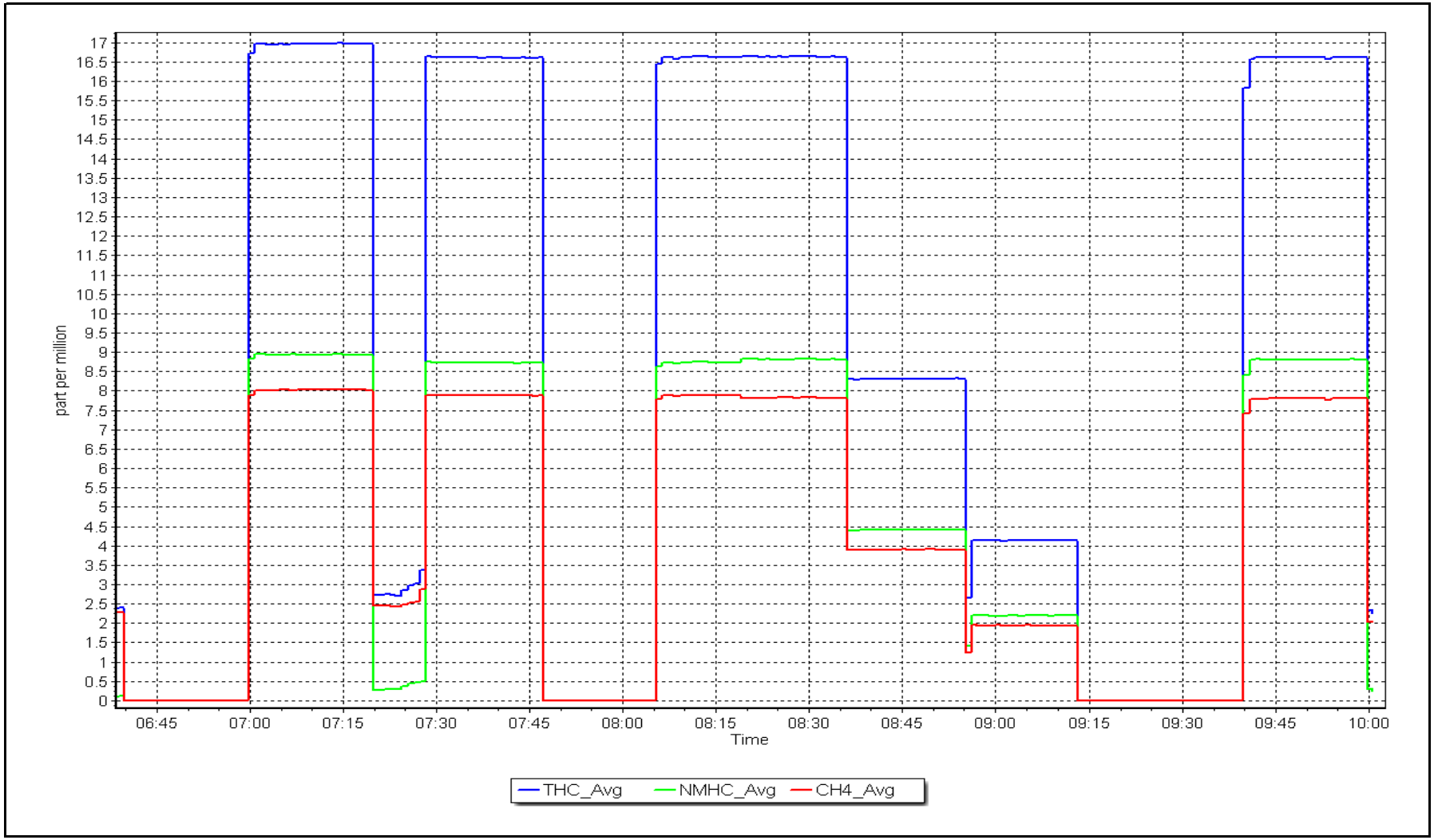
Calibration Date:	July 19, 2023	Previous Calibration:	June 9, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:42	End Time (MST):	10:01
Analyzer make:	Thermo 55i	Analyzer serial #:	1222762077

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999998	≥0.995
8.82	8.82	1.0000			
4.41	4.42	0.9976	Slope	1.000156	0.90 - 1.10
2.20	2.20	0.9997			
			Intercept	0.002367	+/-0.5



NMHC Calibration Plot Date: July 19, 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:	July 10, 2023	Last Cal Date:	June 5, 2023
Start time (MST):	6:20	End time (MST):	11:37
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T36RH1F		Cal Gas Expiry Date:	August 18, 2023	
NOX Cal Gas Conc:	51.16	ppm	NO Cal Gas Conc:	50.91	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	51.16	ppm	Removed Gas NO Conc:	50.91	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3808	
ZAG make/model:	API T701		Serial Number:	362	

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.146	1.194	NO bkgnd or offset:	-2.6	-2.7
NOX coeff or slope:	1.149	1.188	NOX bkgnd or offset:	-2.7	-1.6
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	7.5	7.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001047	0.997031
NO_X Cal Offset:	1.266147	0.445643
NO Cal Slope:	0.997960	1.000259
NO Cal Offset:	0.425945	-0.474006
NO_2 Cal Slope:	1.007354	0.987013
NO_2 Cal Offset:	1.181889	-0.851422

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
as found span	4922	78.1	799.1	795.2	3.9	772.4	761.9	10.4	1.0346	1.0437
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	0.4	-0.5	----	----
high point	4922	78.1	799.1	795.2	3.9	796.5	795.2	1.4	1.0033	1.0000
second point	4961	39.1	400.1	398.1	2.0	400.7	397.8	2.8	0.9984	1.0008
third point	4981	19.5	199.5	198.5	1.0	199.3	196.9	2.5	1.0010	1.0083
as left zero	5000	0.0	0.0	0.0	0.0	-0.5	0.2	-0.7	----	----
as left span	4922	78.1	799.1	379.9	419.2	794.8	382.7	412.1	1.0054	0.9927
								Average Correction Factor	1.0009	1.0030

Corrected As found	NO_X = 772.7 ppb	NO = 762.1 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-3.7%
Previous Response	NO_X = 801.2 ppb	NO = 794.0 ppb		*Percent Change	NO =	-4.2%
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)	794.7	379.4	419.2	413.1	1.0148	98.5%
2nd GPT point (200 ppb O3)	794.7	586.8	211.8	208.0	1.0183	98.2%
3rd GPT point (100 ppb O3)	794.7	689.7	108.9	106.3	1.0245	97.6%
				Average Correction Factor	1.0192	98.1%

Notes: Zero and Span adjusted. No Maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

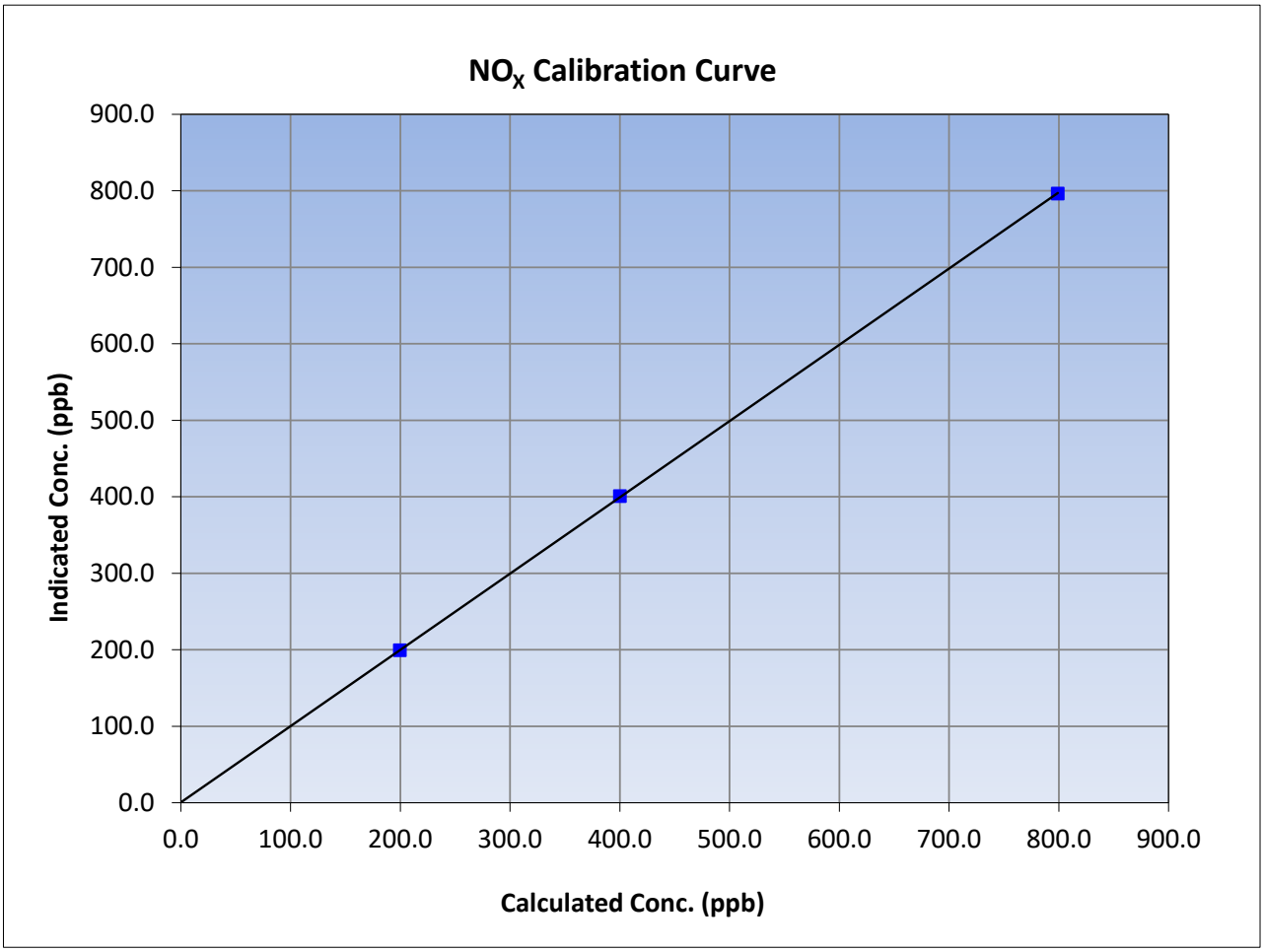
Version-04-2020

Station Information

Calibration Date:	July 10, 2023	Previous Calibration:	June 5, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:20	End Time (MST):	11:37
Analyzer make:	API T200	Analyzer serial #:	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999992	≥0.995
799.1	796.5	1.0033			
400.1	400.7	0.9984	Slope	0.997031	0.90 - 1.10
199.5	199.3	1.0010			
			Intercept	0.445643	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

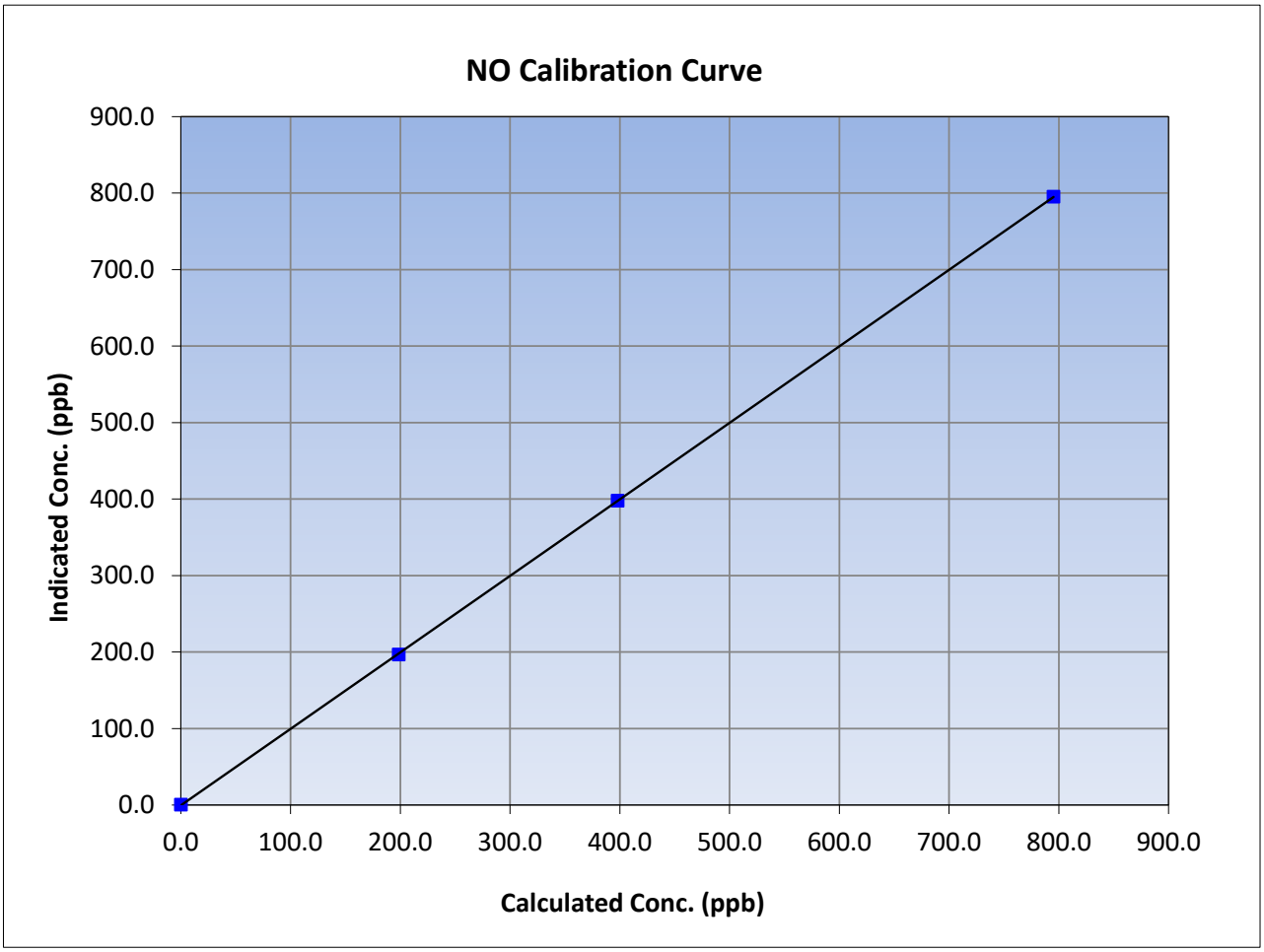
Version-04-2020

Station Information

Calibration Date:	July 10, 2023	Previous Calibration:	June 5, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:20	End Time (MST):	11:37
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	0.999993	≥0.995
795.2	795.2	1.0000			
398.1	397.8	1.0008	Slope	1.000259	0.90 - 1.10
198.5	196.9	1.0083			
			Intercept	-0.474006	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

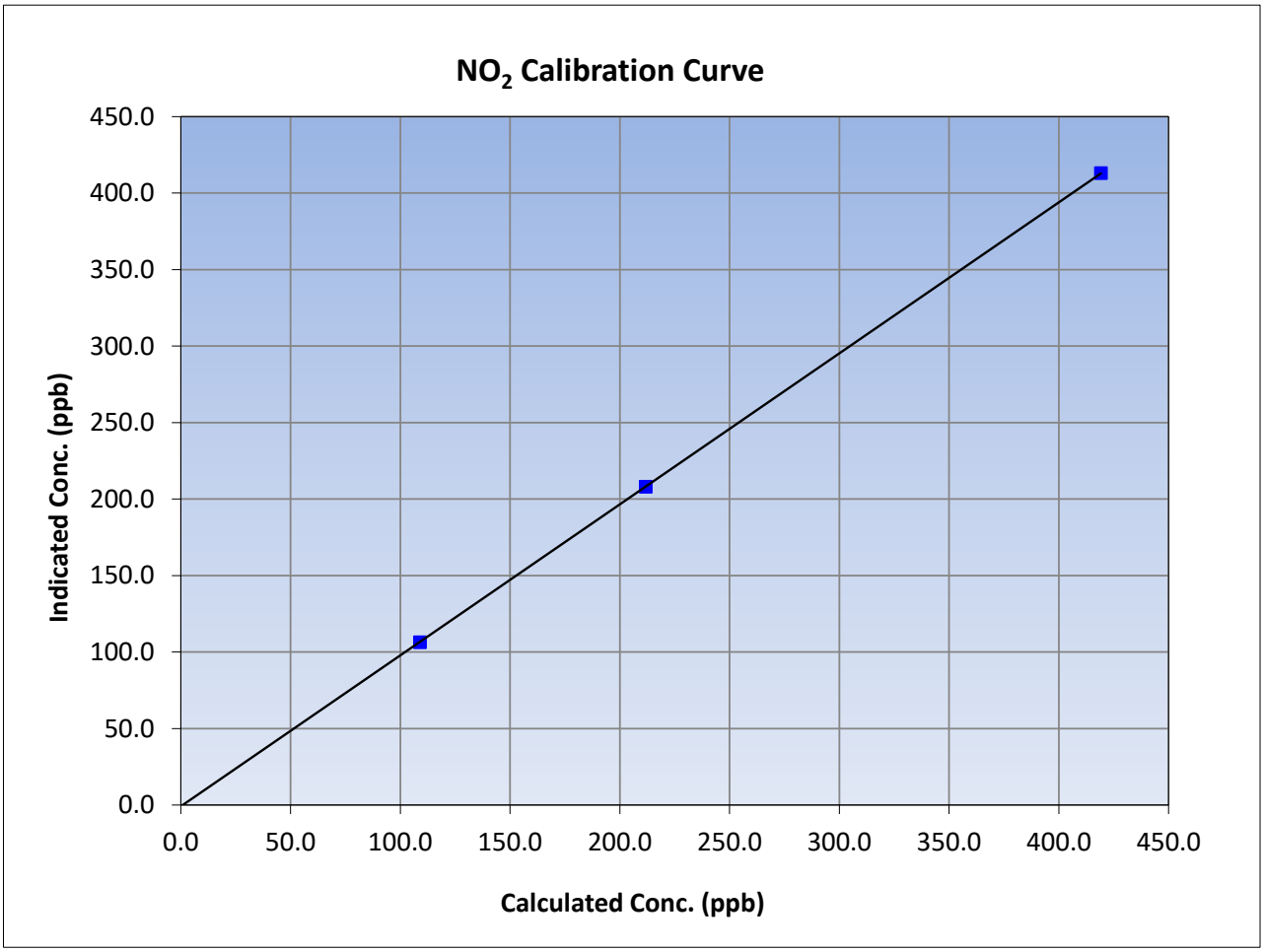
Version-04-2020

Station Information

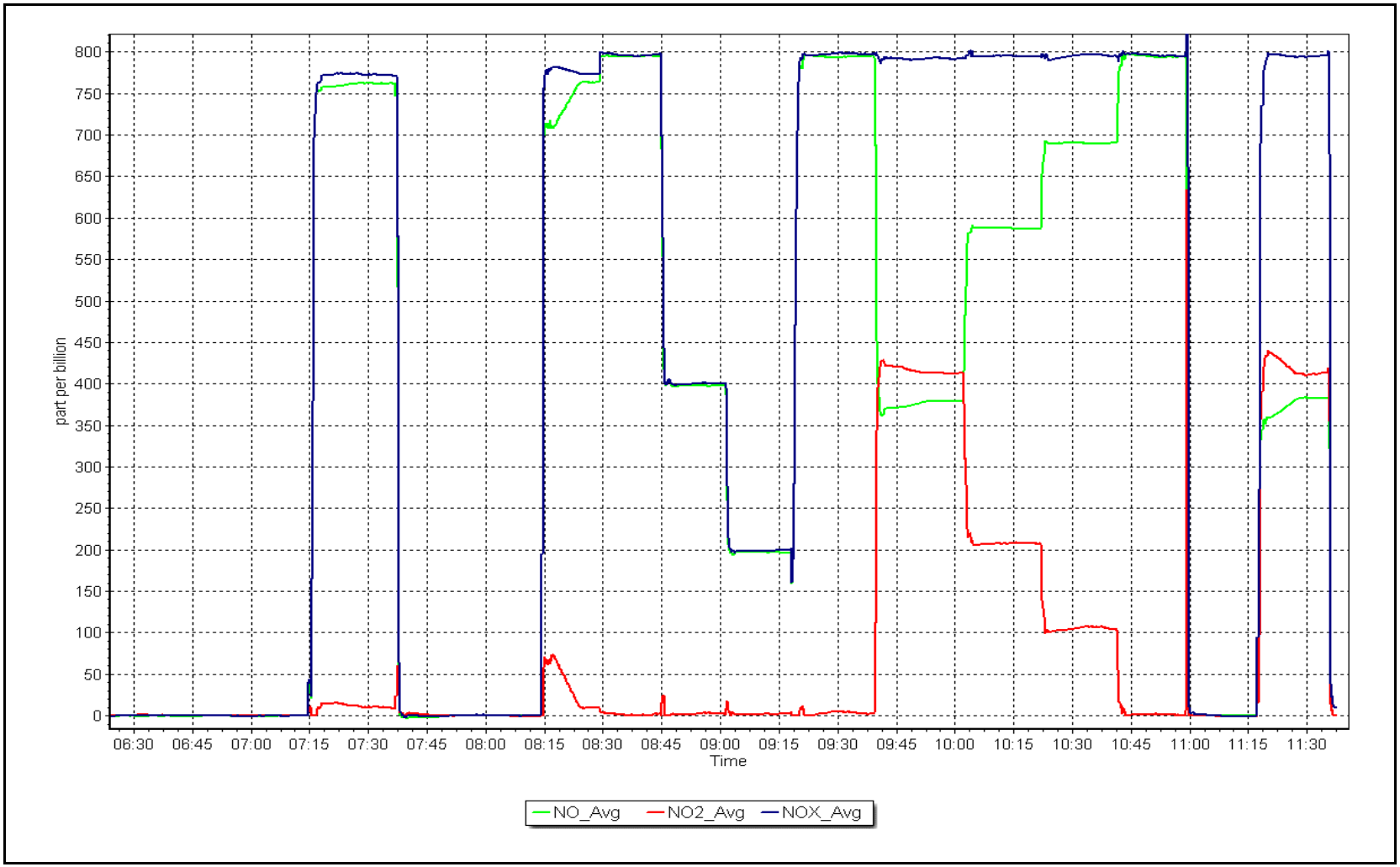
Calibration Date:	July 10, 2023	Previous Calibration:	June 5, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:20	End Time (MST):	11:37
Analyzer make:	API T200	Analyzer serial #:	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.5	----	Correlation Coefficient	0.999997	≥0.995
419.2	413.1	1.0148			
211.8	208.0	1.0183	Slope	0.987013	0.90 - 1.10
108.9	106.3	1.0245			
			Intercept	-0.851422	+/-20



NO_X Calibration Plot Date: July 10, 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:	July 26, 2023	Last Cal Date:	July 10, 2023
Start time (MST):	6:50	End time (MST):	10:35
Reason:	Removal	unstable Zero	

Calibration Standards

NO Gas Cylinder #:	T36RH1F		Cal Gas Expiry Date:	August 18, 2023	
NOX Cal Gas Conc:	51.16	ppm	NO Cal Gas Conc:	50.91	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	51.16	ppm	Removed Gas NO Conc:	50.91	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3808	
ZAG make/model:	API T701		Serial Number:	362	

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.194	1.194	NO bkgnd or offset:	-2.7	-2.7
NOX coeff or slope:	1.188	1.188	NOX bkgnd or offset:	-1.6	-1.6
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	7.4	7.4

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.997031	
NO_X Cal Offset:	0.445643	
NO Cal Slope:	1.000259	
NO Cal Offset:	-0.474006	
NO_2 Cal Slope:	0.987013	
NO_2 Cal Offset:	-0.851422	

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	-0.6	0.1	----	----
as found span	4922	78.1	799.1	795.2	3.9	757.2	754.0	3.2	1.0553	1.0546
as found 2nd	4961	39.1	400.1	398.1	2.0	381.2	375.9	5.3	1.0495	1.0591
as found 3rd	4981	19.5	199.5	198.5	1.0	190.6	186.8	3.8	1.0467	1.0628
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 = 757.7 ppb	NO = 754.6 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-5.2%
Previous Response	NO_X = 797.2 ppb	NO = 794.9 ppb			*Percent Change	NO =	-5.3%
Baseline Corr 2nd pt	NO_X = 381.7 ppb	NO = 376.5 ppb	As found	NO_X r^2: 0.999985	Nx Sl: 0.947698	Nx Int:	0.746
Baseline Corr 3rd pt	NO_X = 191.1 ppb	NO = 187.4 ppb	As found	NO r^2: 0.999996	NO Sl: 0.949189	NO Int:	-1.254
			As found	NO_2 r^2: 0.999997	NO2 Sl: 0.987921	NO_2 Int:	0.328

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	0.1	----	----
as found GPT point (400 ppb NO2)	753.8	360.8	396.9	392.4	1.0115	98.9%
as found GPT point (200 ppb NO2)	753.8	557.6	200.1	197.9	1.0111	98.9%
as found GPT point (100 ppb NO2)	753.8	657.1	100.6	100.1	1.0050	99.5%
1st GPT point (400 ppb O3)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
				Average Correction Factor		

Notes: Removed due to unstable zero

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

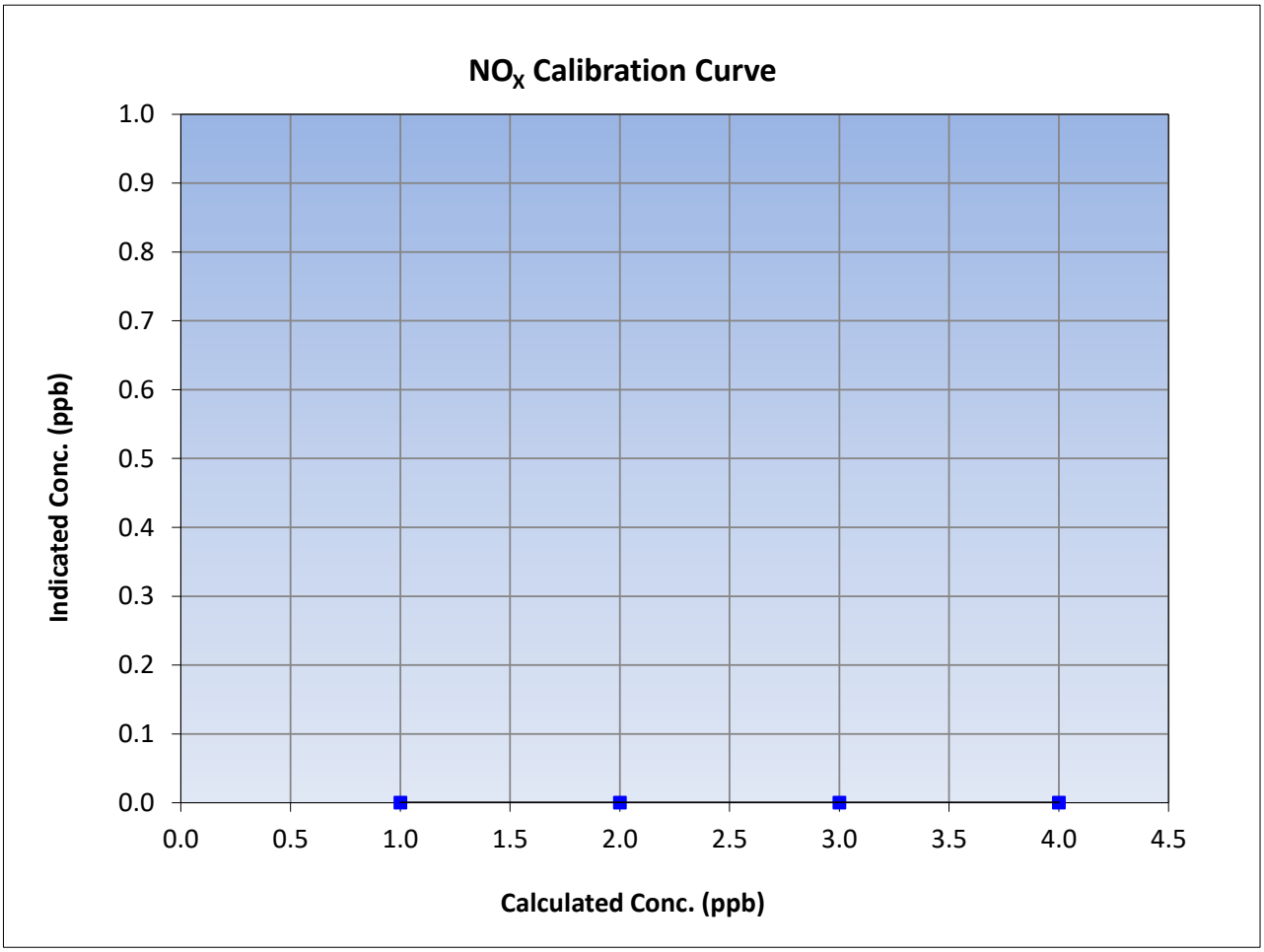
Version-04-2020

Station Information

Calibration Date:	July 26, 2023	Previous Calibration:	July 10, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:50	End Time (MST):	10:35
Analyzer make:	API T200	Analyzer serial #:	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
			Correlation Coefficient		≥0.995
			Slope		0.90 - 1.10
			Intercept		+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

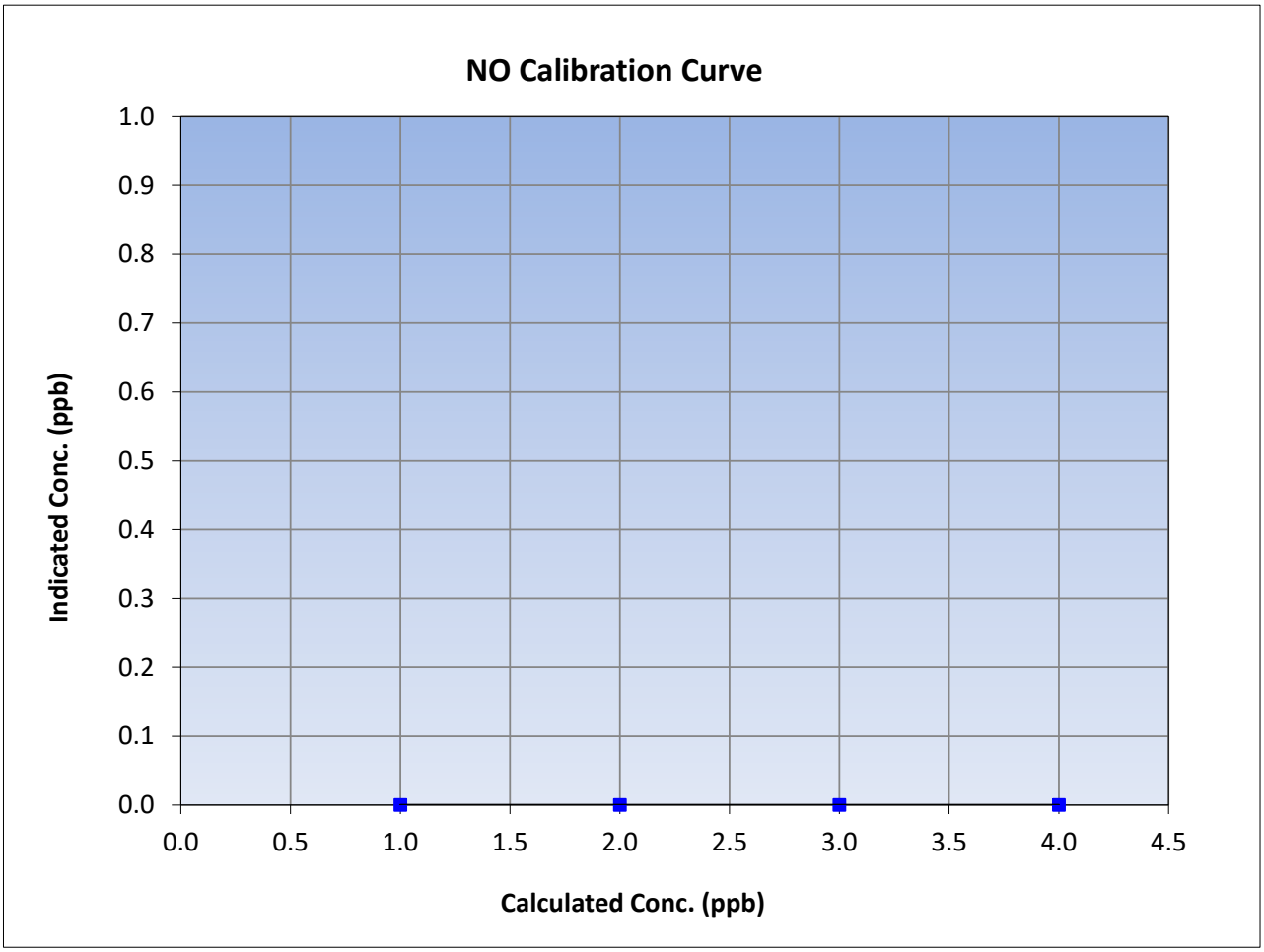
Version-04-2020

Station Information

Calibration Date:	July 26, 2023	Previous Calibration:	July 10, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:50	End Time (MST):	10:35
Analyzer make:	API T200	Analyzer serial #:	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
			Correlation Coefficient		≥0.995
			Slope		0.90 - 1.10
			Intercept		+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

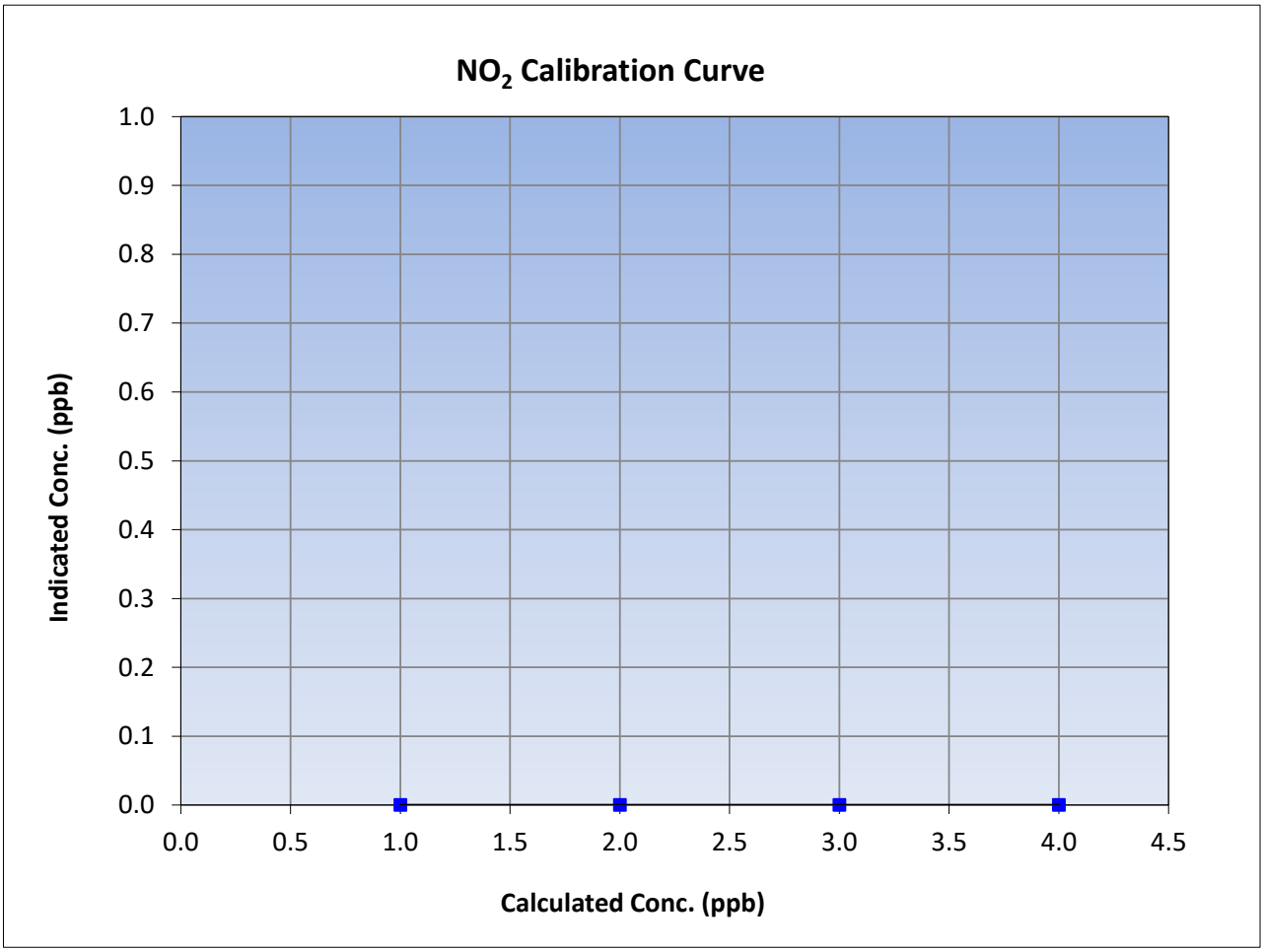
Version-04-2020

Station Information

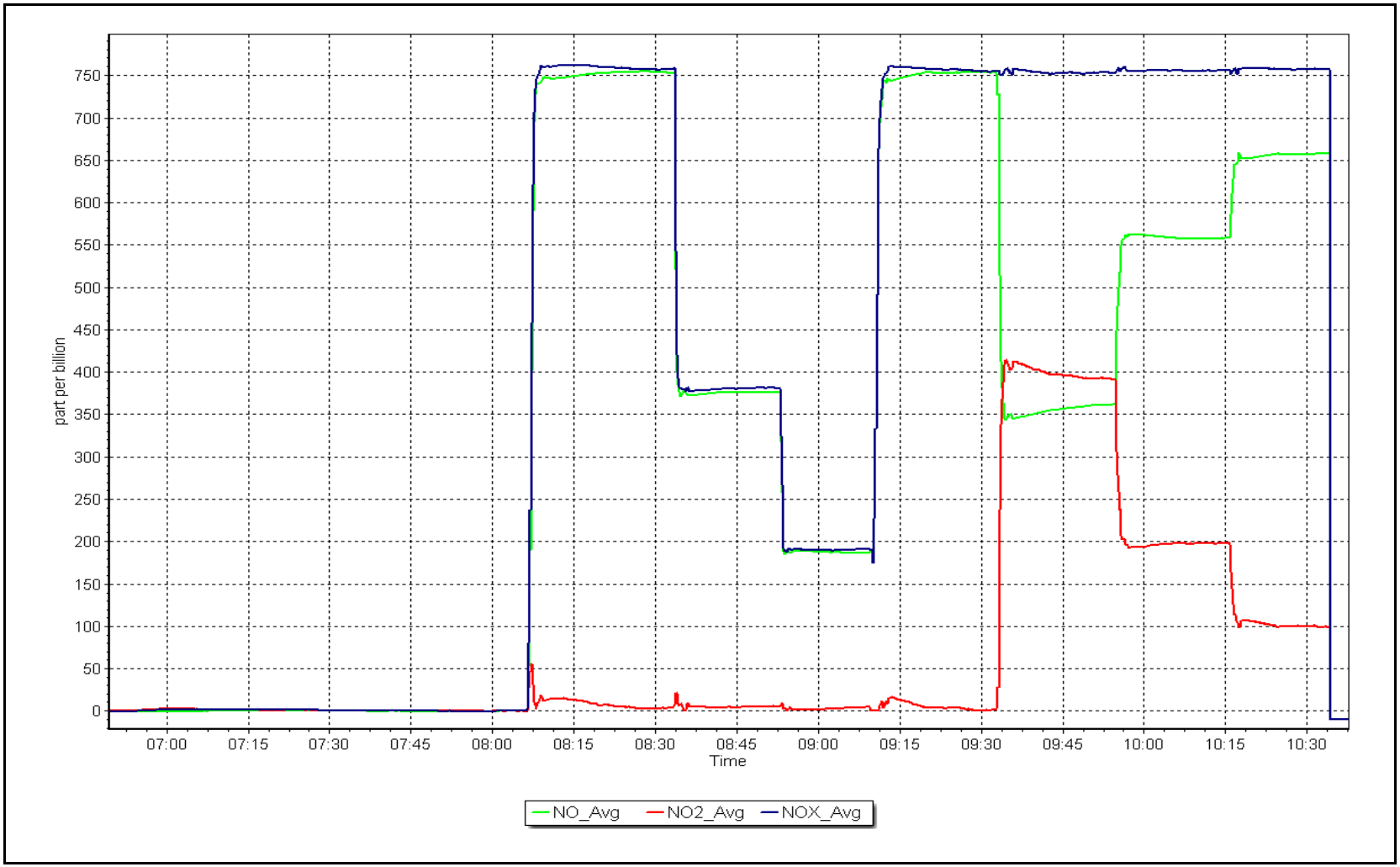
Calibration Date:	July 26, 2023	Previous Calibration:	July 10, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:50	End Time (MST):	10:35
Analyzer make:	API T200	Analyzer serial #:	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
			Correlation Coefficient		≥0.995
			Slope		0.90 - 1.10
			Intercept		+/-20



NO_X Calibration Plot Date: July 26, 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:	July 27, 2023	Last Cal Date:	
Start time (MST):	6:00	End time (MST):	10:51
Reason:	Install		

Calibration Standards

NO Gas Cylinder #:	T36RH1F		Cal Gas Expiry Date:	August 18, 2023	
NOX Cal Gas Conc:	51.16	ppm	NO Cal Gas Conc:	50.91	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	51.16	ppm	Removed Gas NO Conc:	50.91	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3808	
ZAG make/model:	API T701		Serial Number:	362	

Analyzer Information

Analyzer make:	API T200	Analyzer serial #:	721
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:		1.071	NO bkgnd or offset:		-0.6
NOX coeff or slope:		1.066	NOX bkgnd or offset:		-0.3
NO2 coeff or slope:		1.000	Reaction cell Press:		4.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.997031	1.002547
NO_X Cal Offset:	0.445643	-0.233343
NO Cal Slope:	1.000259	1.001796
NO Cal Offset:	-0.474006	-1.333988
NO_2 Cal Slope:	0.987013	0.990498
NO_2 Cal Offset:	-0.851422	0.120026

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	0.3	0.0	0.4	----	----
high point	4922	78.1	799.1	795.2	3.9	801.3	795.8	5.5	0.9973	0.9992
second point	4961	39.1	400.1	398.1	2.0	400.2	397.3	2.9	0.9997	1.0020
third point	4981	19.5	199.5	198.5	1.0	199.5	195.9	3.6	1.0000	1.0134
as left zero	5000	0.0	0.0	0.0	0.0	0.5	0.6	0.0	----	----
as left span	4922	78.1	799.1	381.9	417.2	791.7	381.6	410.1	1.0094	1.0008
								Average Correction Factor	0.9990	1.0049

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

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	794.1	380.8	417.2	413.6	1.0087	99.1%
2nd GPT point (200 ppb O3)	794.1	587.9	210.1	207.8	1.0111	98.9%
3rd GPT point (100 ppb O3)	794.1	689.2	108.8	107.8	1.0093	99.1%
				Average Correction Factor	1.0097	99.0%

Notes: Installed due to old analyzer having an unstable zero. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

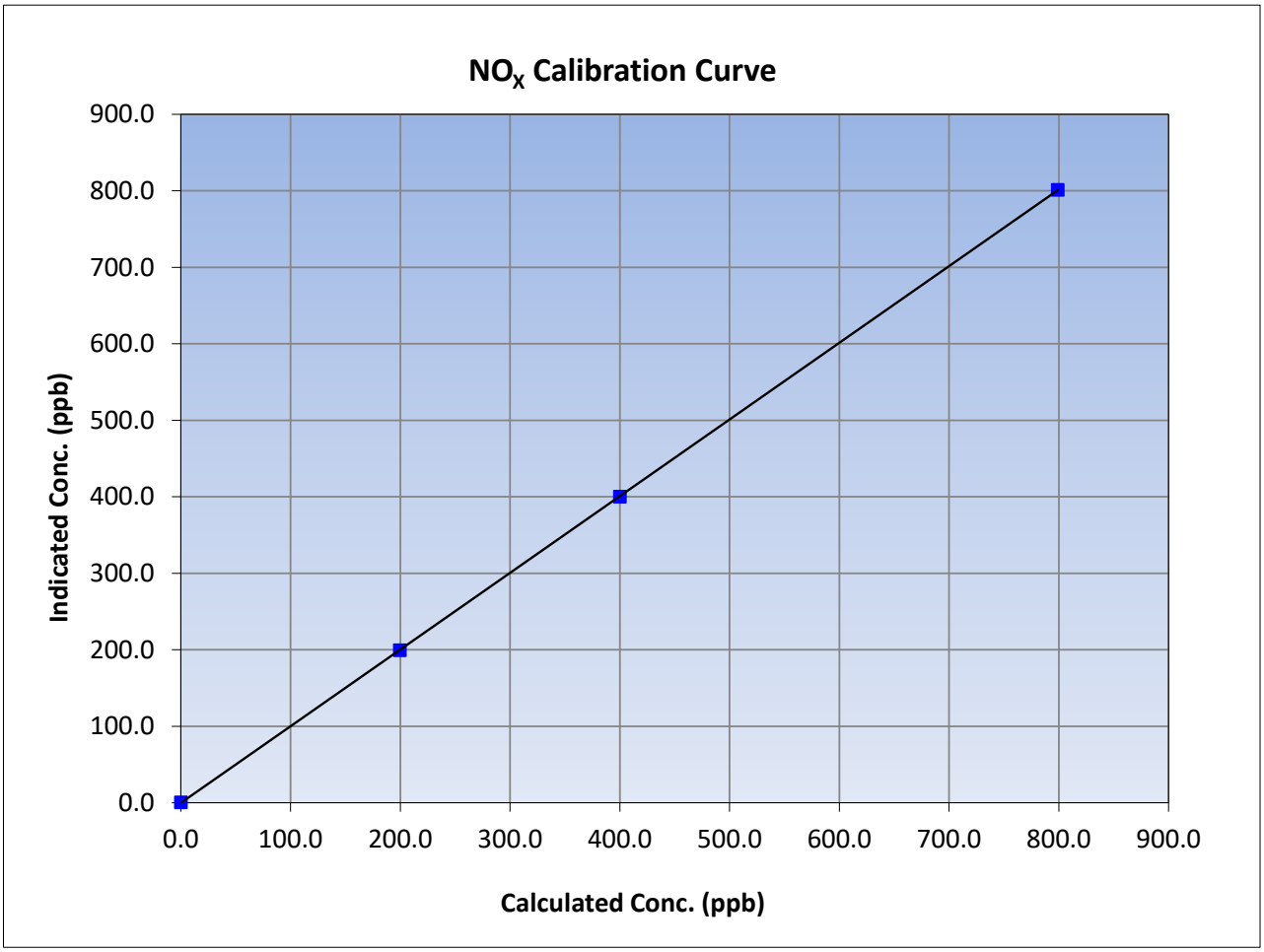
Version-04-2020

Station Information

Calibration Date:	July 27, 2023	Previous Calibration:	
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:00	End Time (MST):	10:51
Analyzer make:	API T200	Analyzer serial #:	721

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.3	----	Correlation Coefficient	0.999997	≥0.995
799.1	801.3	0.9973			
400.1	400.2	0.9997	Slope	1.002547	0.90 - 1.10
199.5	199.5	1.0000			
			Intercept	-0.233343	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

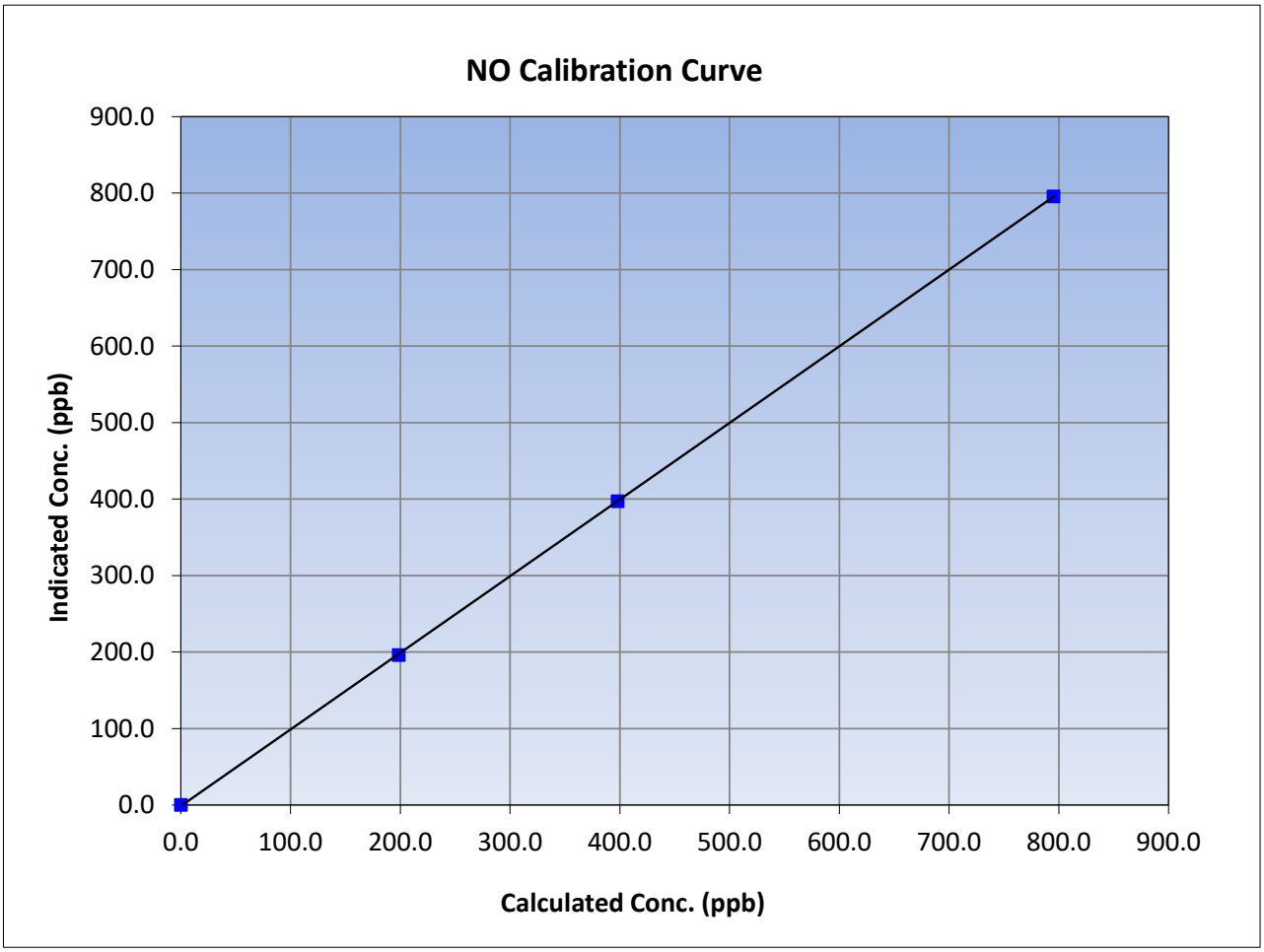
Version-04-2020

Station Information

Calibration Date:	July 27, 2023	Previous Calibration:	
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:00	End Time (MST):	10:51
Analyzer make:	API T200	Analyzer serial #:	721

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999986	≥0.995
795.2	795.8	0.9992			
398.1	397.3	1.0020	Slope	1.001796	0.90 - 1.10
198.5	195.9	1.0134			
			Intercept	-1.333988	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

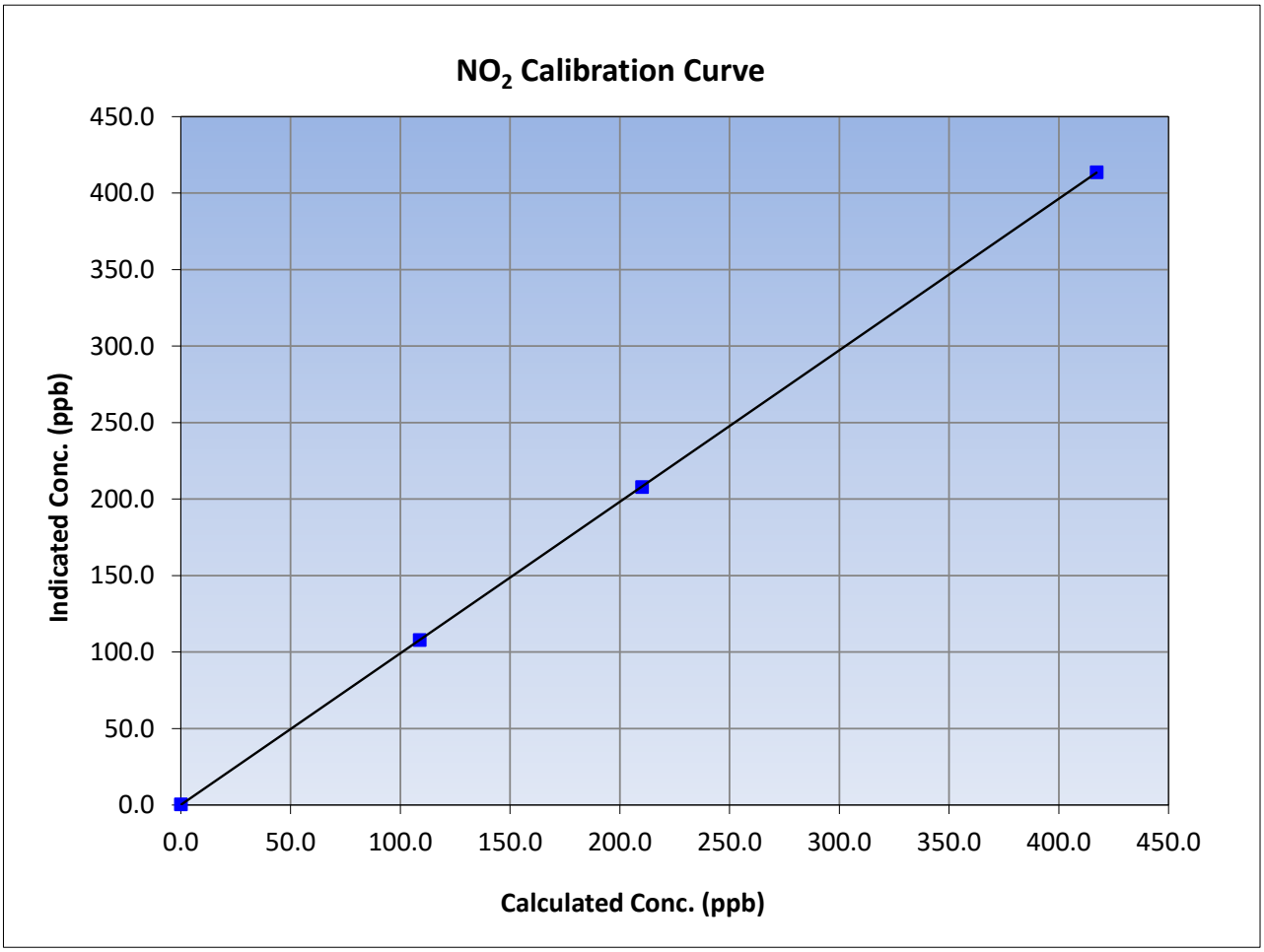
Version-04-2020

Station Information

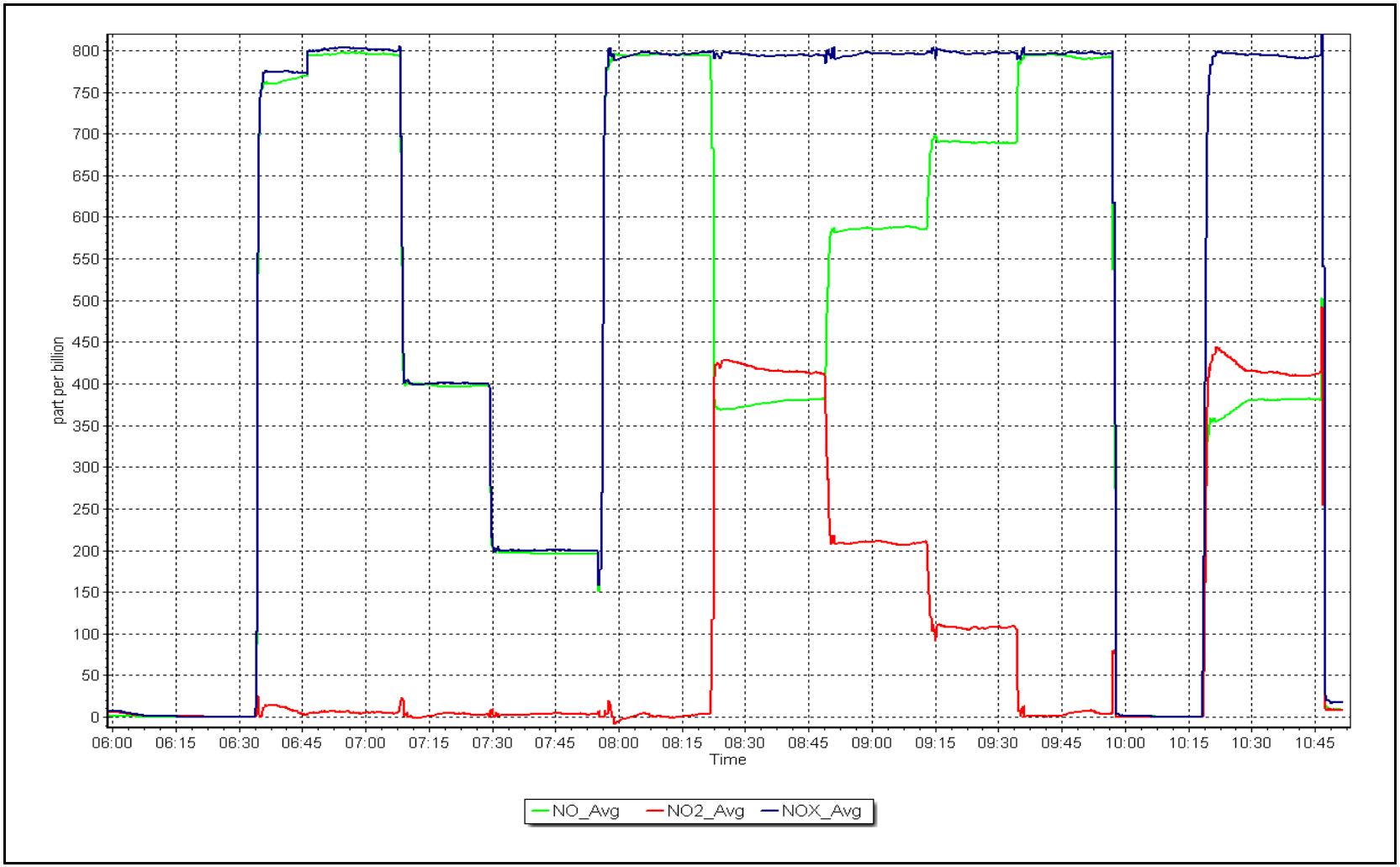
Calibration Date:	July 27, 2023	Previous Calibration:	
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:00	End Time (MST):	10:51
Analyzer make:	API T200	Analyzer serial #:	721

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.4	----	Correlation Coefficient	0.999996	≥0.995
417.2	413.6	1.0087			
210.1	207.8	1.0111	Slope	0.990498	0.90 - 1.10
108.8	107.8	1.0093			
			Intercept	0.120026	+/-20



NO_X Calibration Plot Date: July 27, 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:	July 20, 2023	Last Cal Date:	June 23, 2023
Start time (MST):	6:25	End time (MST):	8:52
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000343	0.996714	Backgd or Offset:	-2.6	-2.6
Calibration intercept:	-0.060000	0.200000	Coeff or Slope:	1.008	1.008

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.4	----
as found span	5000	985.2	400.0	397.4	1.007
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	984.3	400.0	398.7	1.003
second point	5000	816.3	200.0	199.9	1.001
third point	5000	708.4	100.0	99.9	1.001
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	985.9	400.0	399.6	1.001
				Average Correction Factor	1.002

Baseline Corr As found:	397.8	Previous response	400.1	*% change	-0.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No Maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

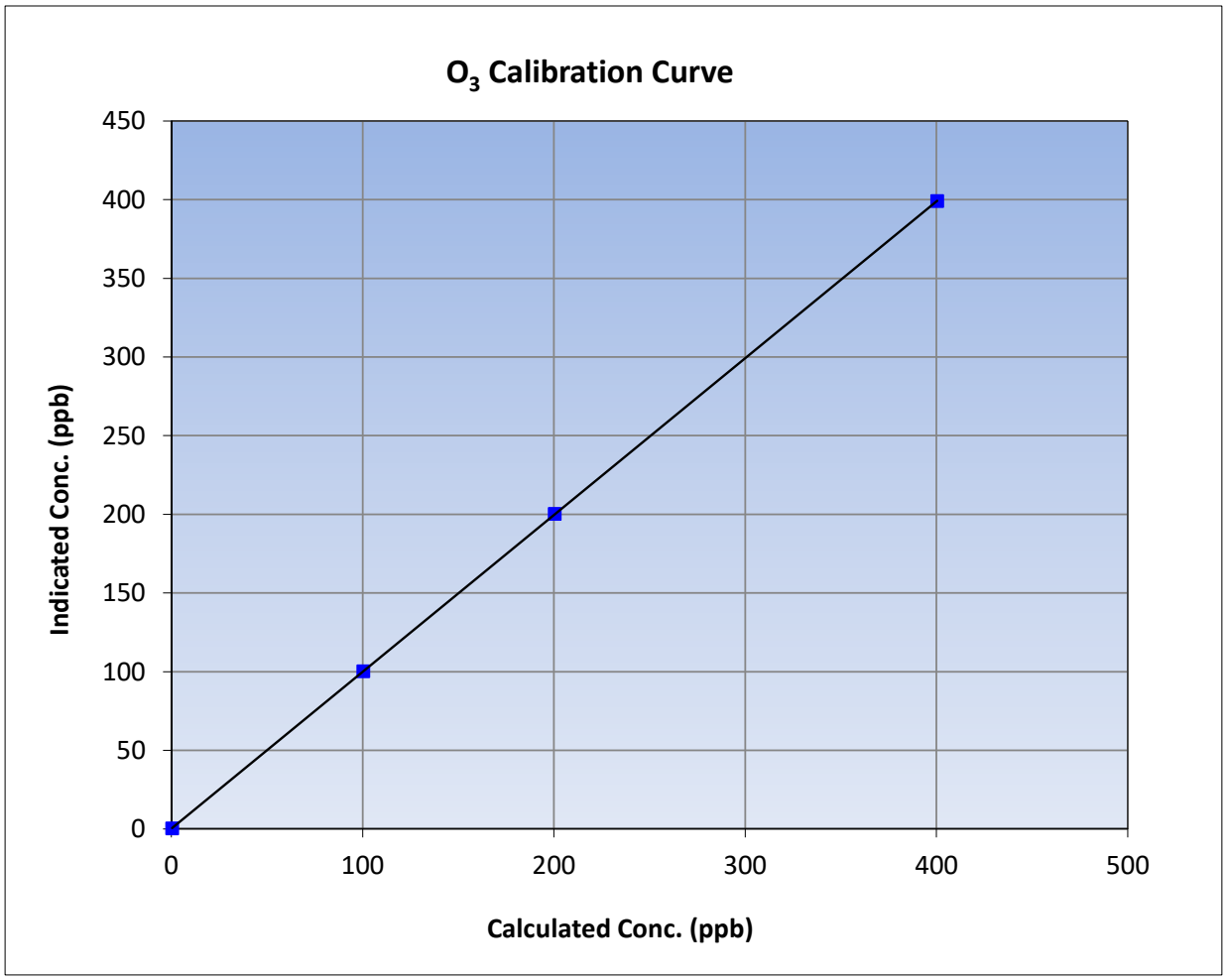
Station Information

Calibration Date:	July 20, 2023	Previous Calibration:	June 23, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:25	End Time (MST):	8:52
Analyzer make:	API T400	Analyzer serial #:	2961

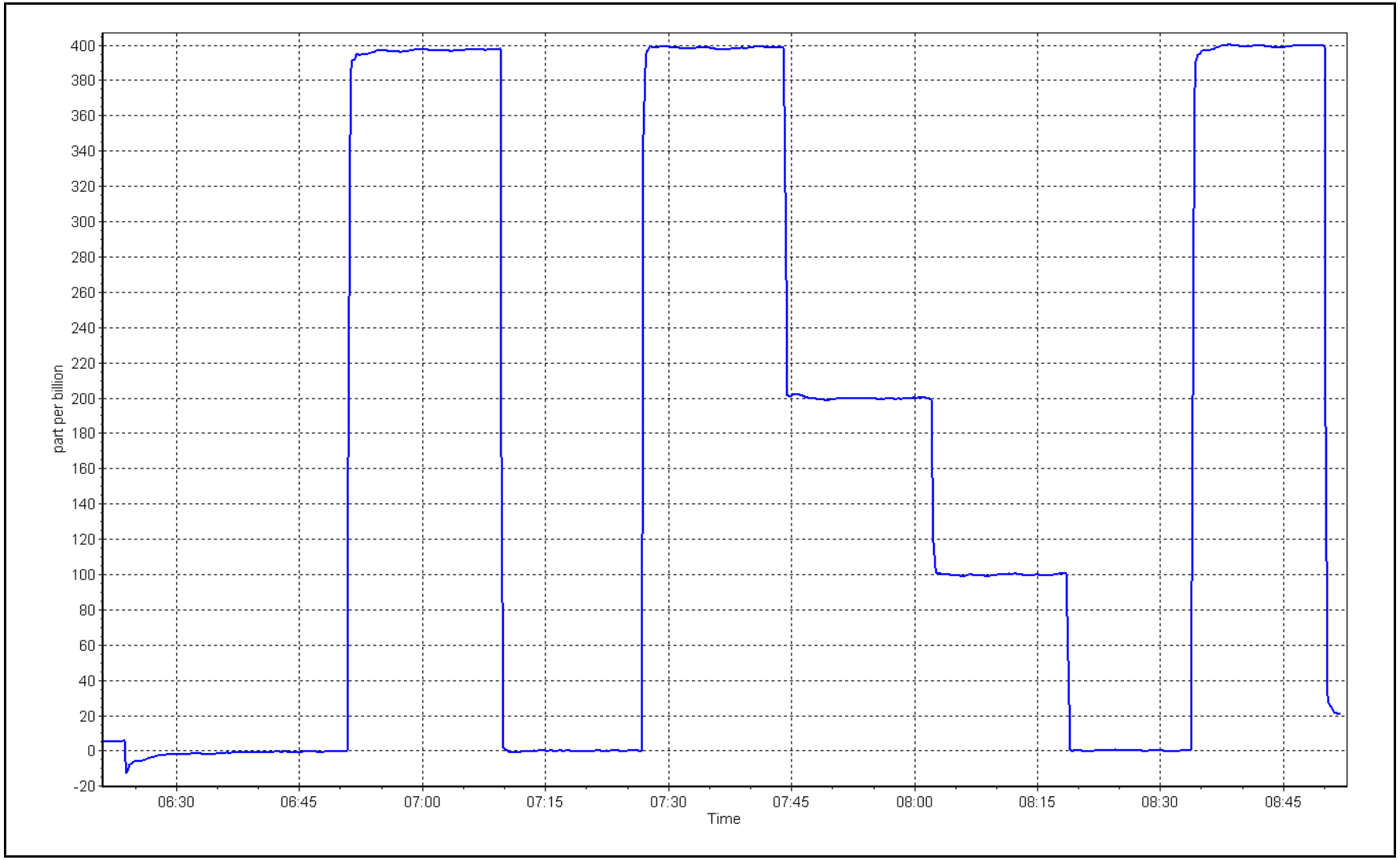
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
400.0	398.7	1.0033
200.0	199.9	1.0005
100.0	99.9	1.0010

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	0.996714	*0.90 - 1.10*
Intercept	0.200000	*+/- 5*



O_3 Calibration Plot Date: July 20, 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:	July 11, 2023	Last Cal Date:	June 23, 2023
Start time (MST):	9:43	End time (MST):	10:10
Analyzer Make:	API T640	S/N:	322
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Deltacal	S/N:	1451
Temp/RH standard:	Deltacal	S/N:	1451

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	20.5	20.6	20.5	☐	+/- 2 °C
P (mmHg)	728	726.6	728	☐	+/- 10 mmHg
flow (LPM)	5.02	4.90	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: July 11, 2023 Last Cal Date: June 23, 2023

PM w/o HEPA: 3.9 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

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

Disposable Filter Changed: May 23, 2023

Annual Maintenance

Date Sample Tube Cleaned: May 23, 2023

Date RH/T Sensor Cleaned: May 23, 2023

Notes: No adjustments done. Head cleaned.

Calibration by: Melissa Lemay

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS05
MANNIX
JULY 2023

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

August 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	July 11, 2023	Last Cal Date:	June 15, 2023
Start time (MST):	9:32	End time (MST):	13:10
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000214	1.000771	Backgd or Offset:	8.9	9.0
Calibration intercept:	-0.540000	0.040000	Coeff or Slope:	0.908	0.941

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.5	----
as found span	4920	80.0	800.3	775.6	1.032
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	----
high point	4920	80.0	800.3	801.1	0.999
second point	4960	40.0	400.2	400.5	0.999
third point	4980	20.0	200.1	199.8	1.001
as left zero	5000	0.0	0.0	0.6	----
as left span	4920	80.0	800.3	799.4	1.001
				Average Correction Factor	1.000

Baseline Corr As found:	775.10	Previous response	799.95	*% change	-3.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

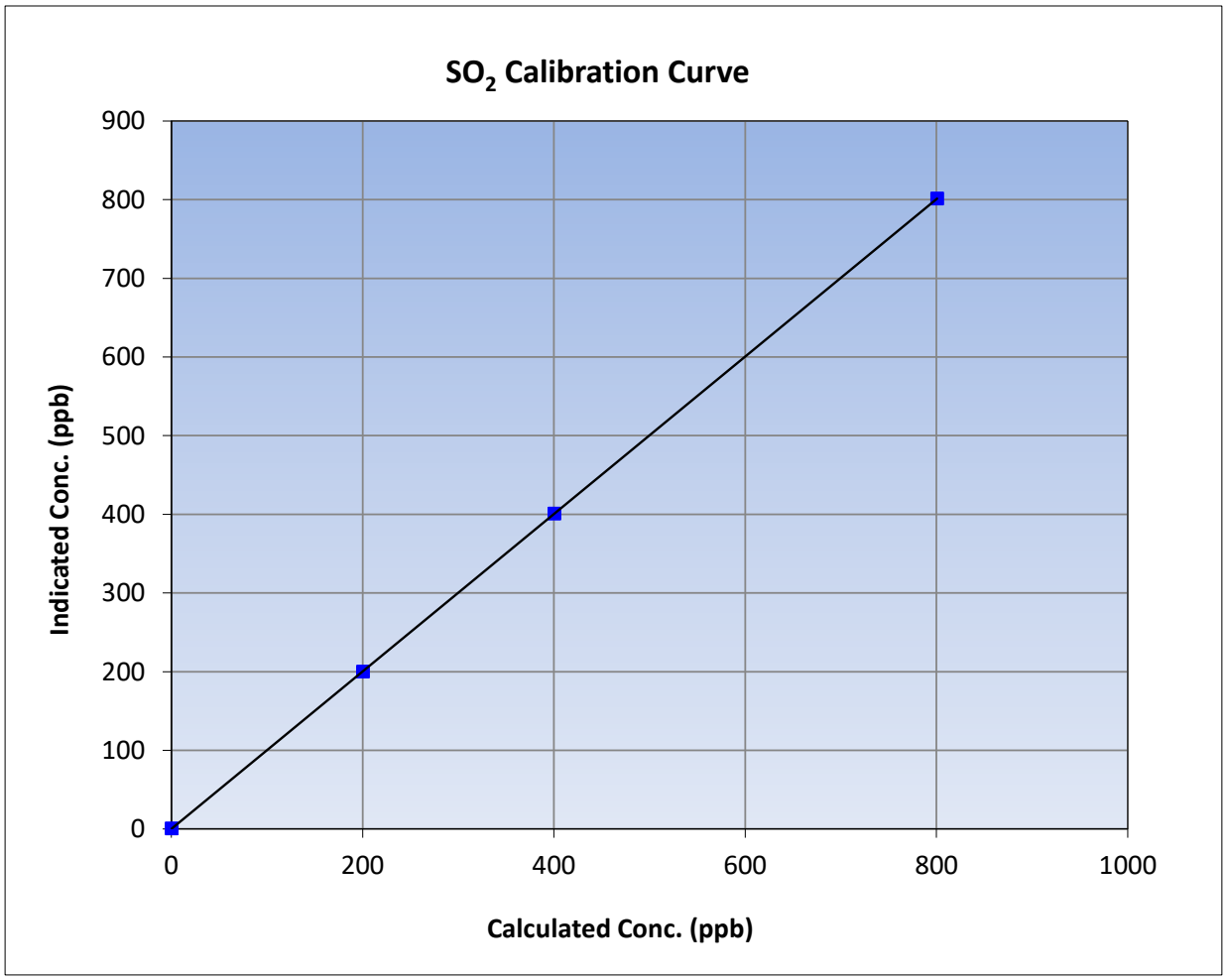
Station Information

Calibration Date:	July 11, 2023	Previous Calibration:	June 15, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	9:32	End Time (MST):	13:10
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841399

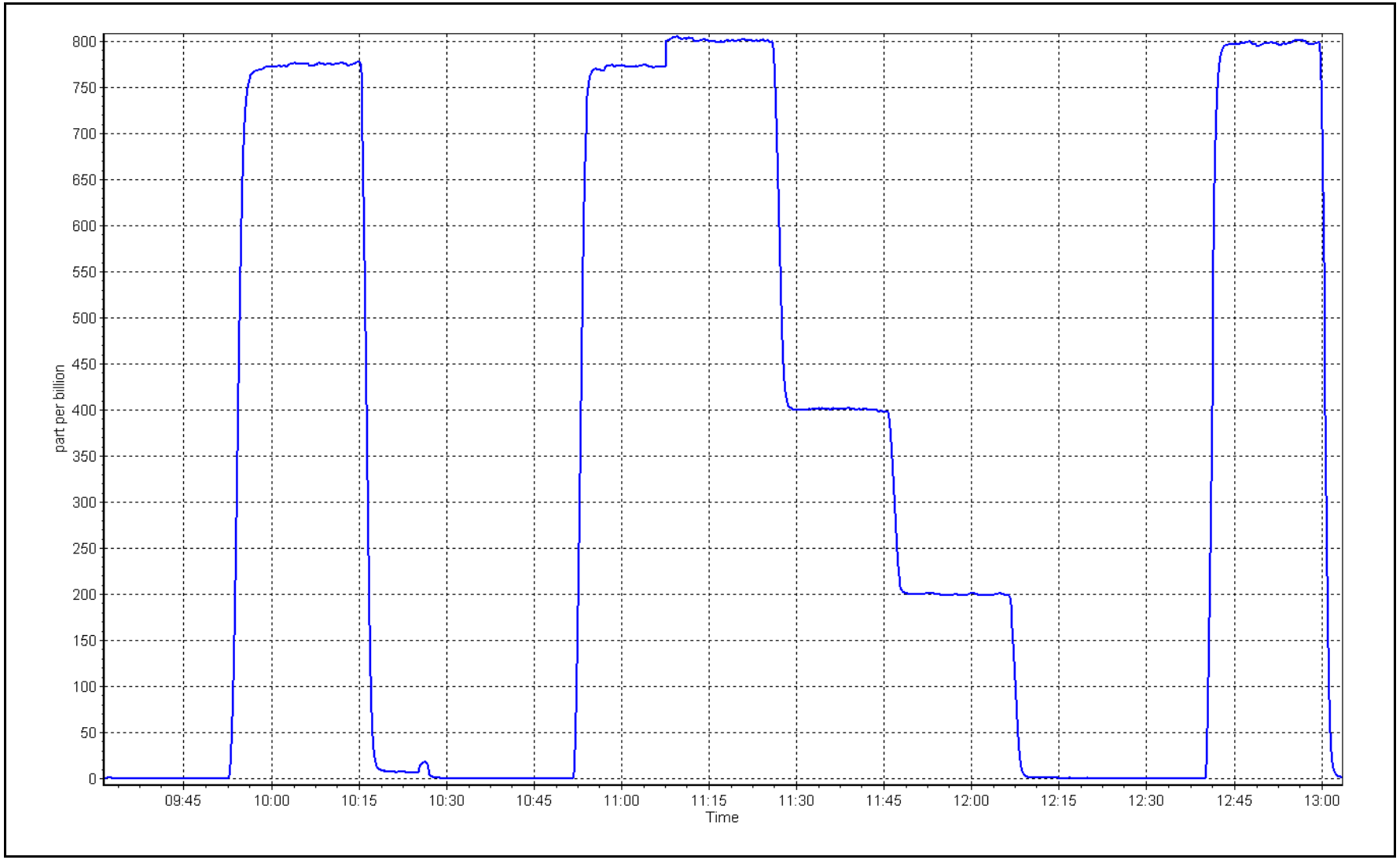
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
800.3	801.1	0.9990
400.2	400.5	0.9992
200.1	199.8	1.0014

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	1.000771	*0.90 - 1.10*
Intercept	0.040000	*+/-30*



SO2 Calibration Plot Date: July 11, 2023 Location: Mannix



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	July 13, 2023	Last Cal Date:	June 9, 2023
Start time (MST):	9:03	End time (MST):	13:38
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43iQTL		Analyzer serial #:	1203169745	
Converter make:	Global		Converter serial #:	2022-196	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003756	0.996187	Backgd or Offset:	2.07	2.13
Calibration intercept:	0.040615	0.180584	Coeff or Slope:	0.821	0.842

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	4919	81.3	80.0	79.1	1.013
as found 2nd point	4960	40.7	40.0	39.5	1.016
as found 3rd point	4980	20.3	20.0	19.7	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	79.8	1.002
second point	4960	40.7	40.0	40.2	0.996
third point	4980	20.3	20.0	20.1	0.994
as left zero	5000	0.0	0.0	0.5	----
as left span	4919	81.3	80.0	77.7	1.030
SO2 Scrubber Check	4920	80.0	800.0	-0.1	----
Date of last scrubber change:				Ave Corr Factor	0.997
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.0	Prev response:	80.34	*% change:	-1.7%
Baseline Corr 2nd AF pt:	39.4	AF Slope:	0.987899	AF Intercept:	0.020656
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999995		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

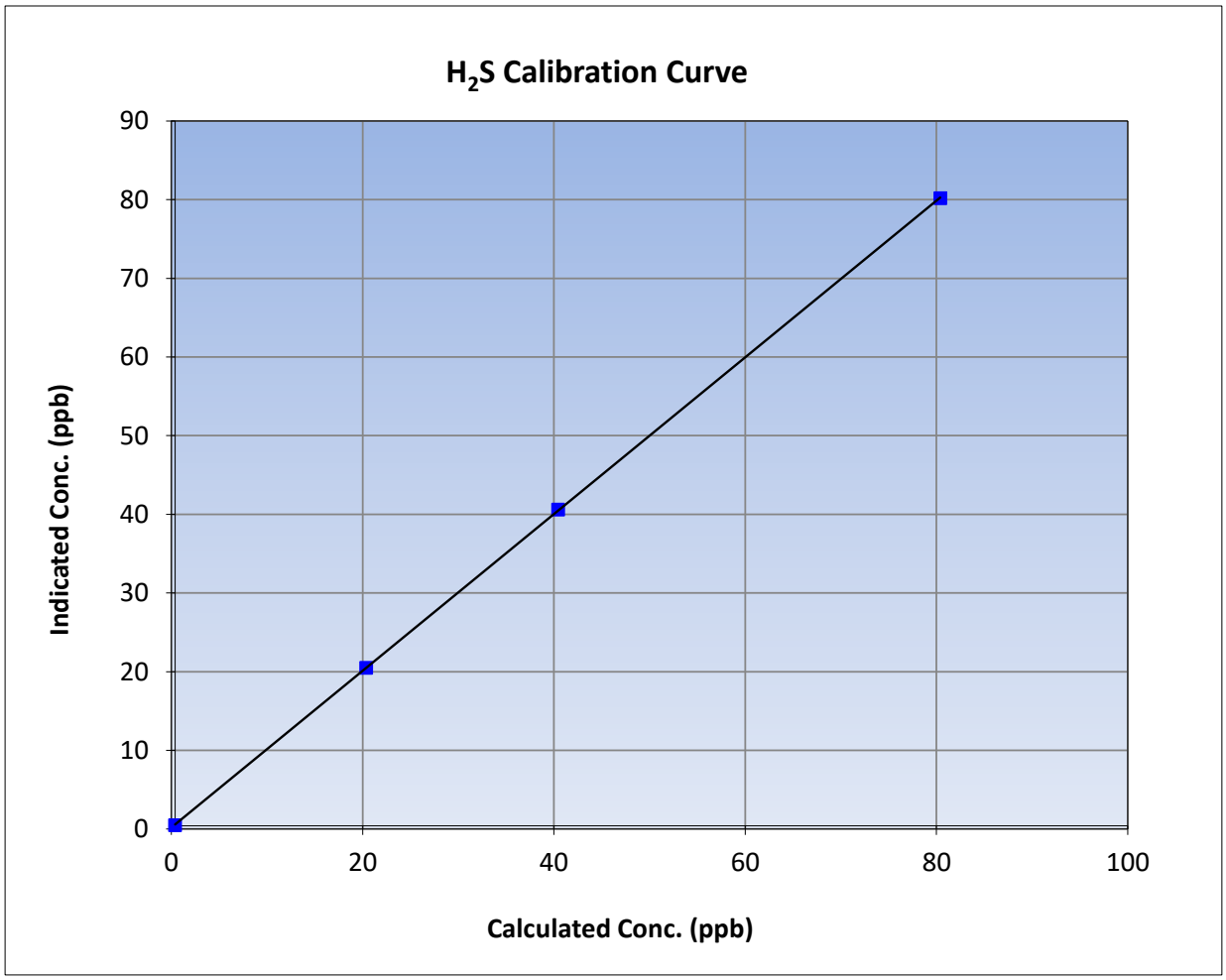
Station Information

Calibration Date:	July 13, 2023	Previous Calibration:	June 9, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	9:03	End Time (MST):	13:38
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1203169745

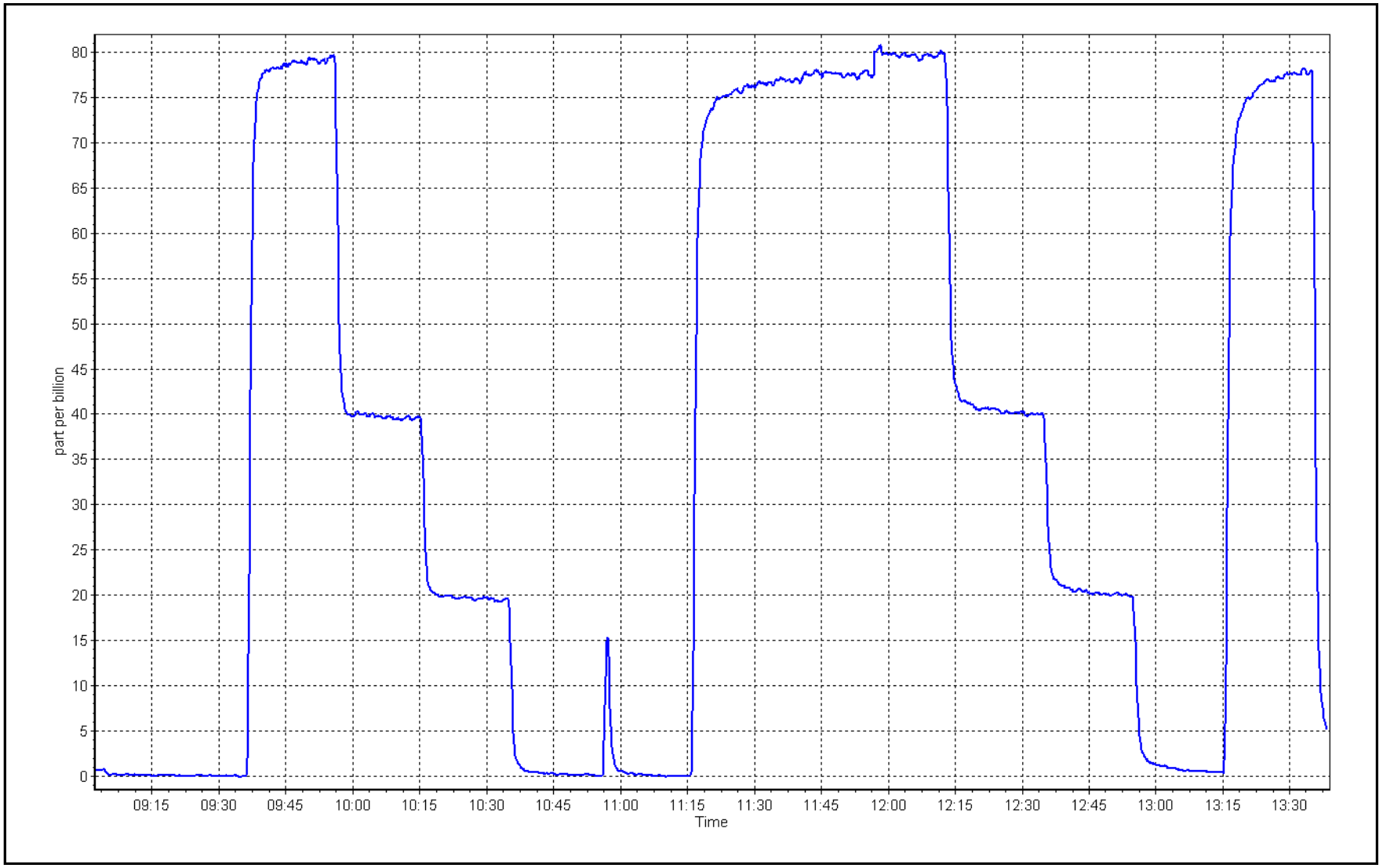
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	79.8	1.0024
40.0	40.2	0.9961
20.0	20.1	0.9937

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	0.996187	*0.90 - 1.10*
Intercept	0.180584	*+/-3*



H_2S Calibration Plot Date: July 13, 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:	July 11, 2023	Last Cal Date:	June 15, 2023
Start time (MST):	9:32	End time (MST):	13:10
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 T701		Serial Number:	5613	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1152430011	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.66E-04	2.60E-05	NMHC SP Ratio:	4.43E-05	4.34E-05
CH4 Retention time:	15.20	15.00	NMHC Peak Area:	206739	210847

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	17.55	0.981
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	17.23	17.22	1.001
second point	4960	40.0	8.61	8.63	0.998
third point	4980	20.0	4.31	4.31	1.000
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	17.23	17.30	0.996
				Average Correction Factor	1.000

Baseline Corr AF:	17.55	Prev response	17.25	*% change	1.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4920	80	9.15	9.32	0.981
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	9.13	1.002
second point	4960	40	4.57	4.59	0.997
third point	4980	20	2.29	2.30	0.995
as left zero	5000	0	0.00	0.00	----
as left span	4920	80	9.15	9.20	0.995
				Average Correction Factor	0.998
Baseline Corr AF:	9.32	Prev response	9.17	*% change	1.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	8.08	8.23	0.982
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	8.08	8.09	0.999
second point	4960	40.0	4.04	4.04	1.001
third point	4980	20.0	2.02	2.01	1.006
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	8.08	8.11	0.996
				Average Correction Factor	1.002
Baseline Corr AF:	8.23	Prev response	8.09	*% 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:	1.001244	0.999419
THC Cal Offset:	0.006000	0.005000
CH4 Cal Slope:	1.001712	1.001938
CH4 Cal Offset:	-0.006600	-0.007400
NMHC Cal Slope:	1.000793	0.997195
NMHC Cal Offset:	0.013000	0.012400

Notes: Changed the inlet filter and the H2 cylinder after as founds. Adjusted the span only.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

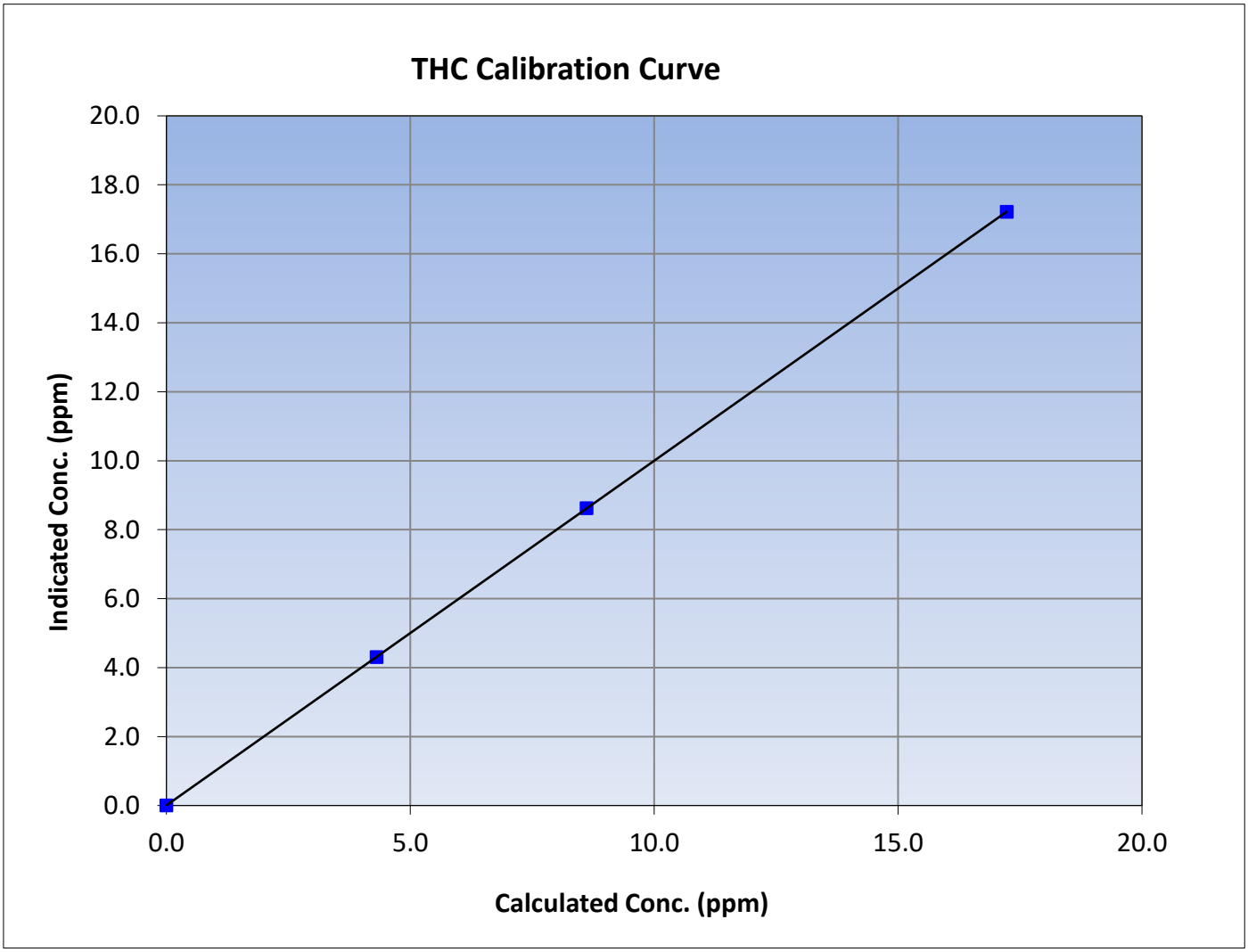
Version-01-2020

Station Information

Calibration Date:	July 11, 2023	Previous Calibration:	June 15, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	9:32	End Time (MST):	13:10
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999999	*≥0.995*
17.23	17.22	1.0006			
8.61	8.63	0.9985	Slope	0.999419	*0.90 - 1.10*
4.31	4.31	0.9999			
			Intercept	0.005000	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

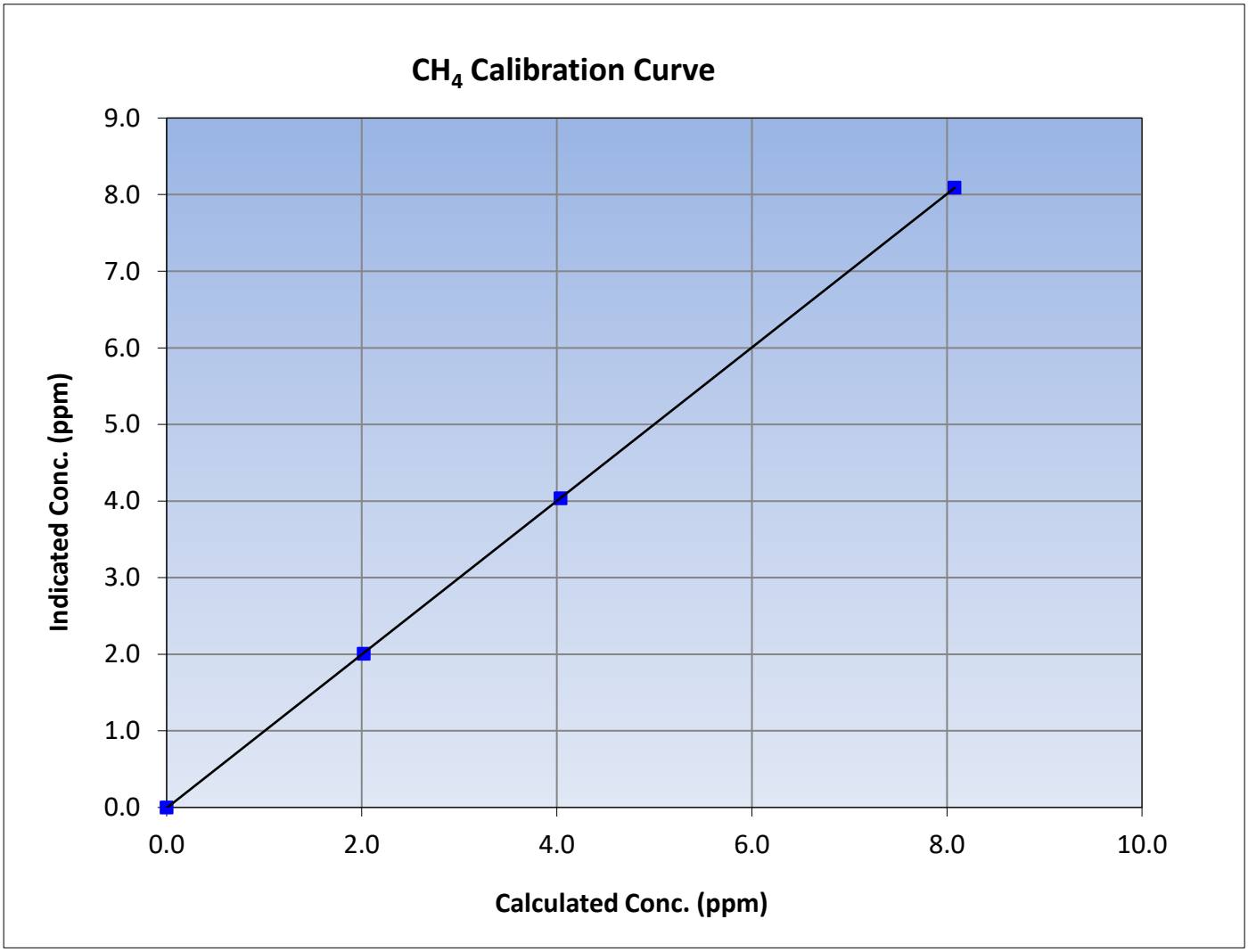
Version-01-2020

Station Information

Calibration Date:	July 11, 2023	Previous Calibration:	June 15, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	9:32	End Time (MST):	13:10
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	0.999996	*≥0.995*
8.08	8.09	0.9986			
4.04	4.04	1.0005	Slope	1.001938	*0.90 - 1.10*
2.02	2.01	1.0058			
			Intercept	-0.007400	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

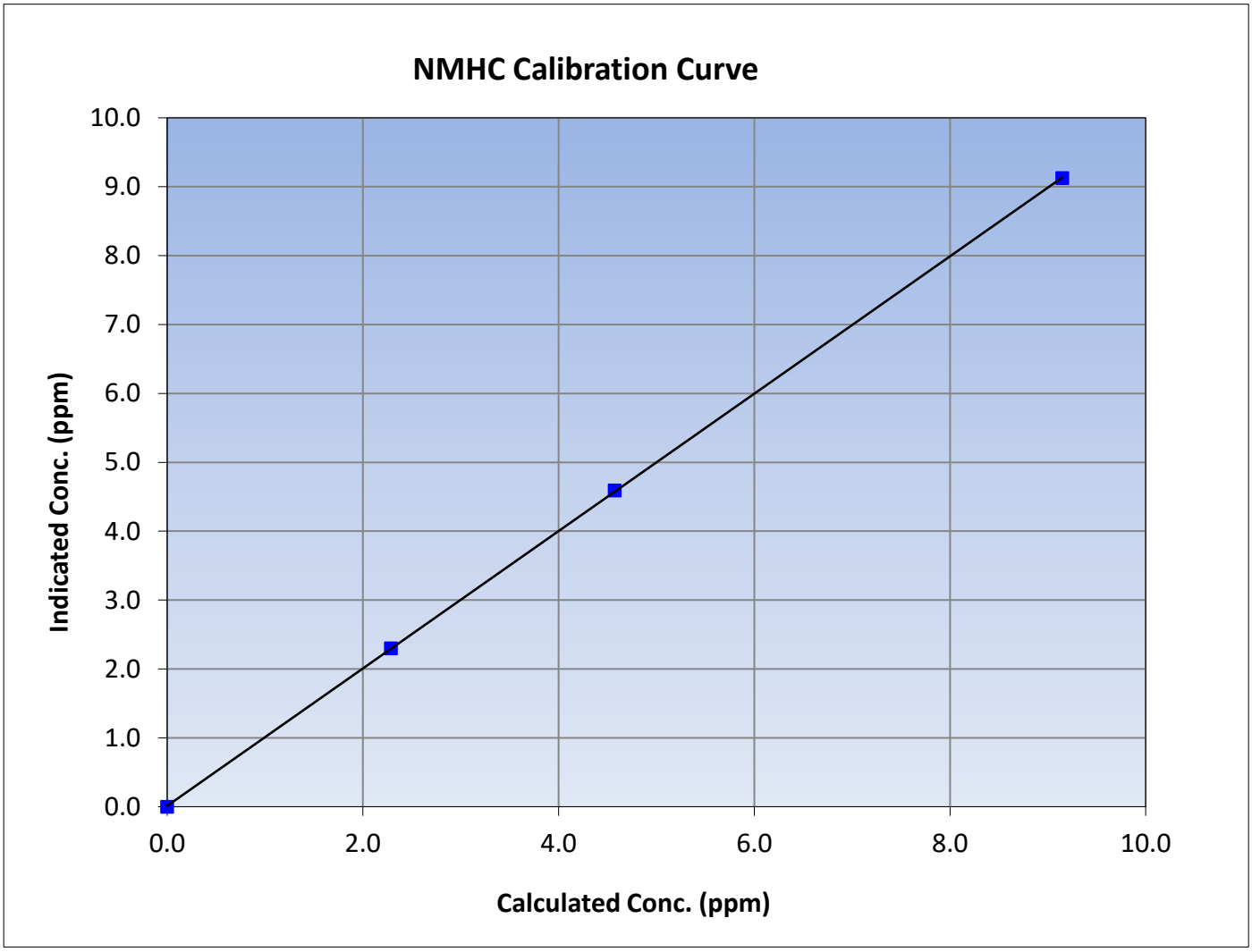
Version-01-2020

Station Information

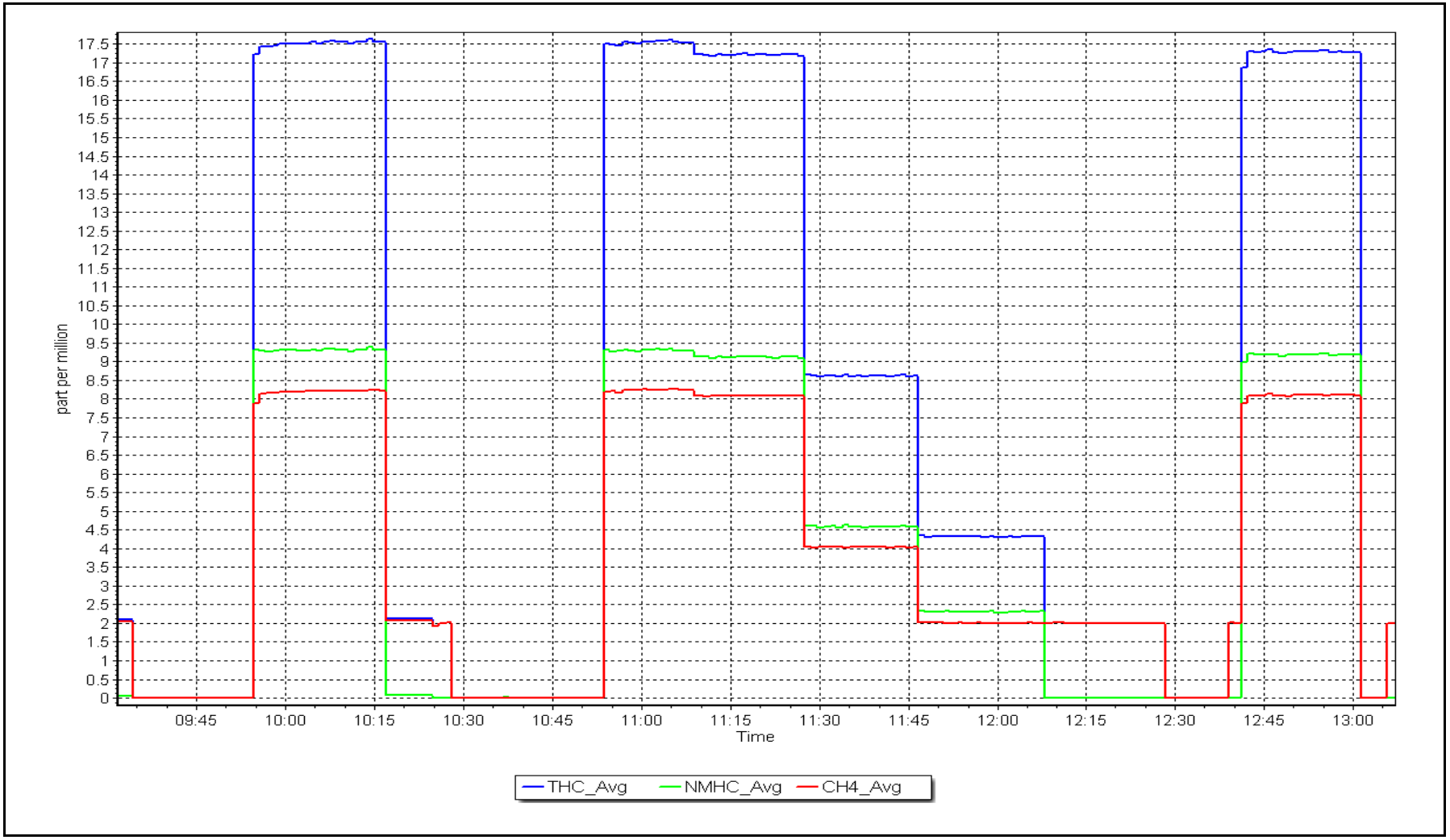
Calibration Date:	July 11, 2023	Previous Calibration:	June 15, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	9:32	End Time (MST):	13:10
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999989	≥0.995
9.15	9.13	1.0025			
4.57	4.59	0.9967	Slope	0.997195	0.90 - 1.10
2.29	2.30	0.9947			
			Intercept	0.012400	+/-0.5



NMHC Calibration Plot Date: July 11, 2023 Location: Mannix



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS06
PATRICIA MCINNES
JULY 2023

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

August 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	July 4, 2023	Last Cal Date:	June 5, 2023
Start time (MST):	9:20	End time (MST):	12:31
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.78	ppm	Cal Gas Exp Date:	September 9, 2024
Cal Gas Cylinder #:	AAL070632			
Removed Cal Gas Conc:	49.78	ppm	Rem Gas Exp Date:	N/A
Removed Gas Cyl #:	N/A		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3566
ZAG Make/Model:	API T701		Serial Number:	5608

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003750	1.006537	Backgd or Offset:	17.2	17.2
Calibration intercept:	1.159413	1.758830	Coeff or Slope:	0.901	0.901

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.2	----
as found span	4920	80.3	799.5	803.4	0.995
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	805.7	0.992
second point	4960	40.2	400.2	405.1	0.988
third point	4980	20.1	200.1	205.2	0.975
as left zero	5000	0.0	0.0	0.1	----
as left span	4920	80.3	799.5	804.0	0.994
				Average Correction Factor	0.985

Baseline Corr As found:	803.60	Previous response	803.62	*% change	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Ryan Power

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

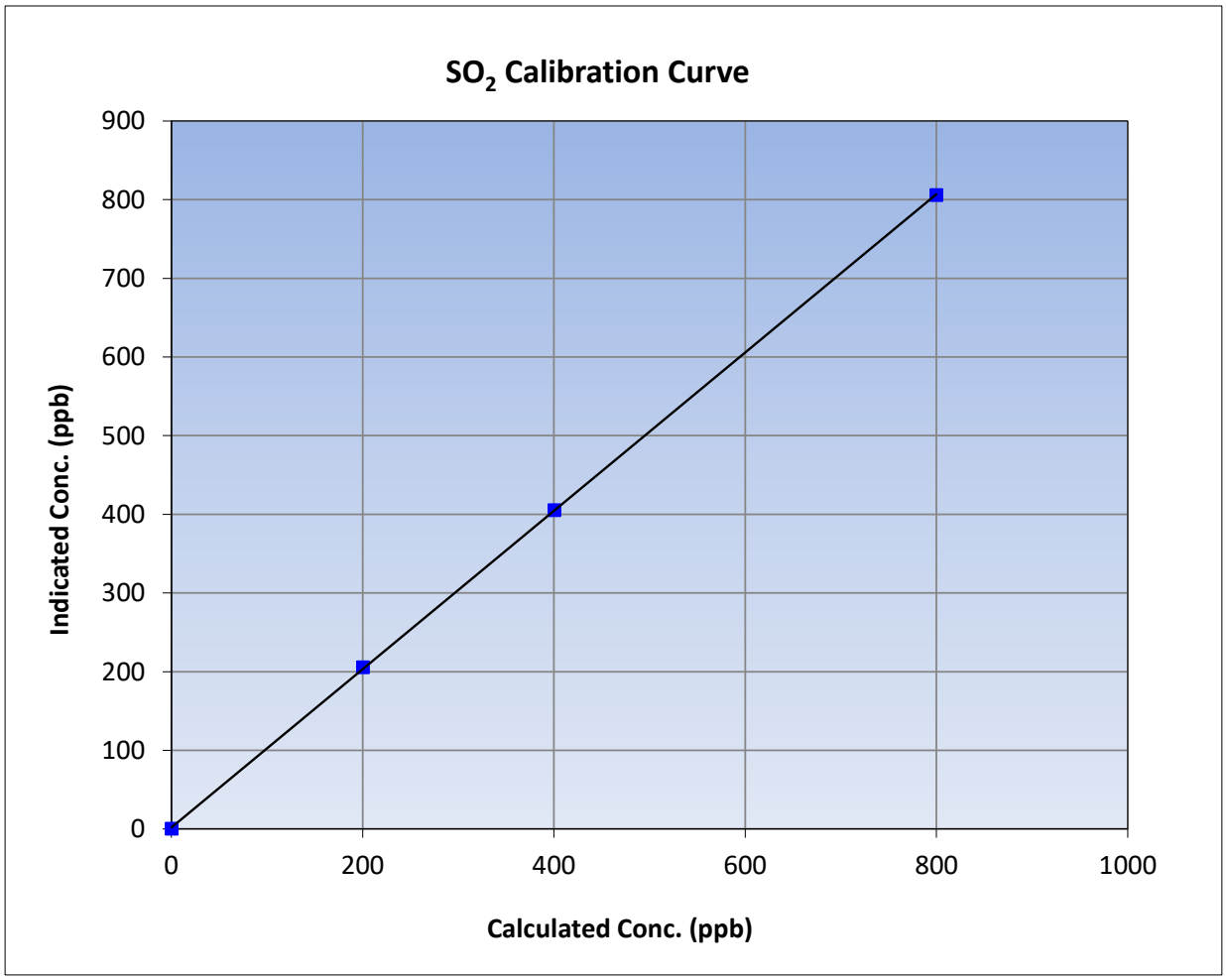
Station Information

Calibration Date:	July 4, 2023	Previous Calibration:	June 5, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:20	End Time (MST):	12:31
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290013

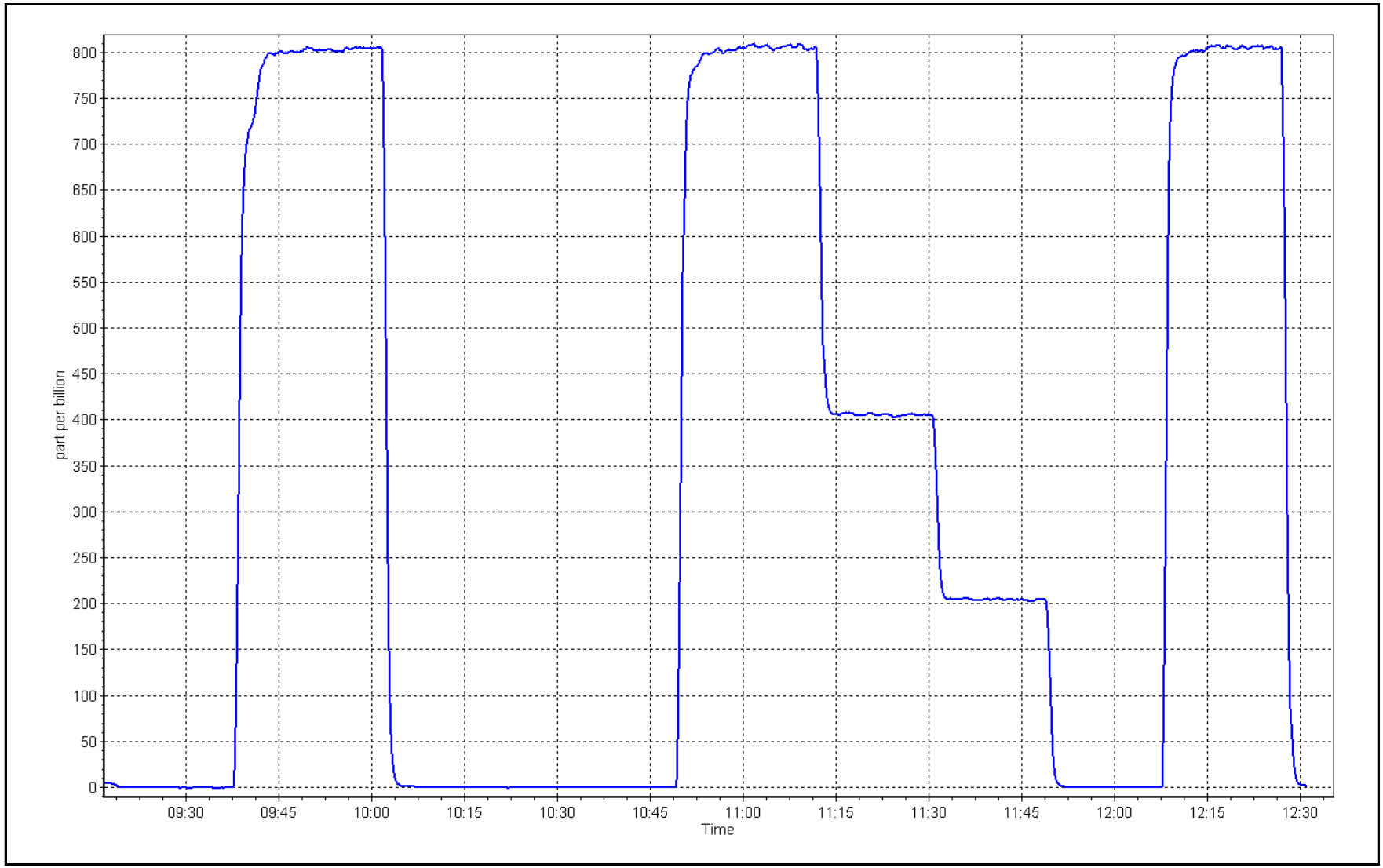
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
799.5	805.7	0.9923
400.2	405.1	0.9880
200.1	205.2	0.9752

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999977	*≥0.995*
Slope	1.006537	*0.90 - 1.10*
Intercept	1.758830	*+/-30*



SO2 Calibration Plot Date: July 4, 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:	July 12, 2023	Last Cal Date:	June 12, 2023
Start time (MST):	8:40	End time (MST):	15:05
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		Serial Number:	4602

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1218153358	
Converter make:	CDN-101		Converter serial #:	517	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.994772	1.004924	Backgd or Offset:	1.92	2.06
Calibration intercept:	0.337244	0.356984	Coeff or Slope:	1.116	1.187

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	4926	74.3	79.9	75.6	1.059
as found 2nd point	4963	37.2	40.0	38.3	1.048
as found 3rd point	4981	18.6	20.0	19.2	1.048
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4926	74.3	79.9	80.6	0.992
second point	4963	37.2	40.0	40.7	0.983
third point	4981	18.6	20.0	20.6	0.972
as left zero	5000	0.0	0.0	0.6	----
as left span	4926	74.3	79.9	79.6	1.004
SO2 Scrubber Check	4920	80.3	803.0	0.0	----
Date of last scrubber change:		December 20, 2021		Ave Corr Factor	0.982
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	75.5	Prev response:	79.86	*% change:	-5.8%
Baseline Corr 2nd AF pt:	38.2	AF Slope:	0.944164	AF Intercept:	0.258323
Baseline Corr 3rd AF pt:	19.1	AF Correlation:	0.999965		

* = > +/-5% change initiates investigation

Notes: Problem with the zero air during as founds, swapped out the zero air generator and continued the calibration. As founds are low but diagnostics are normal. Changed the inlet filter after as founds. Ran a SO2 scrubber check after calibrator zero. Adjusted the span only.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

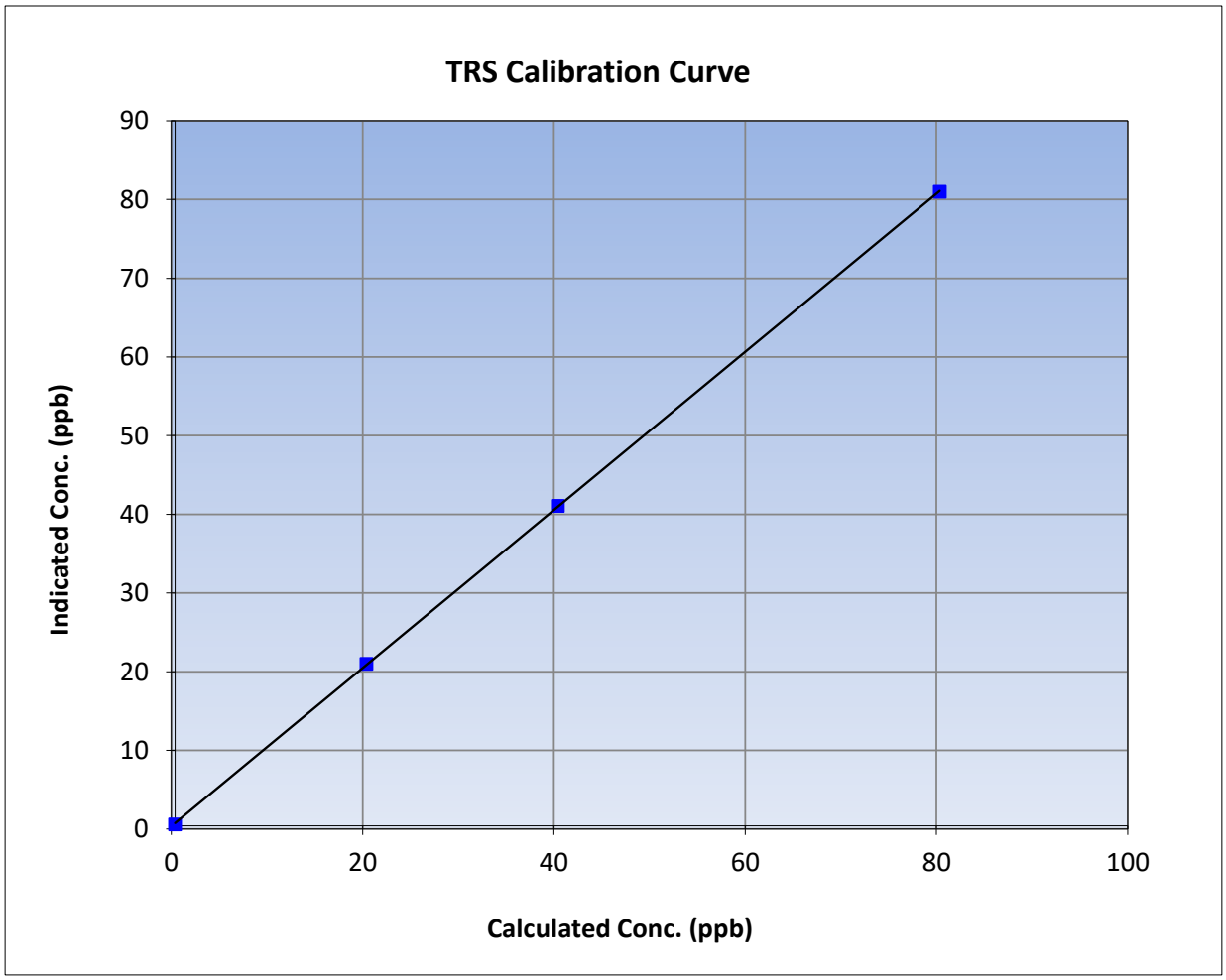
Station Information

Calibration Date:	July 12, 2023	Previous Calibration:	June 12, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:40	End Time (MST):	15:05
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1218153358

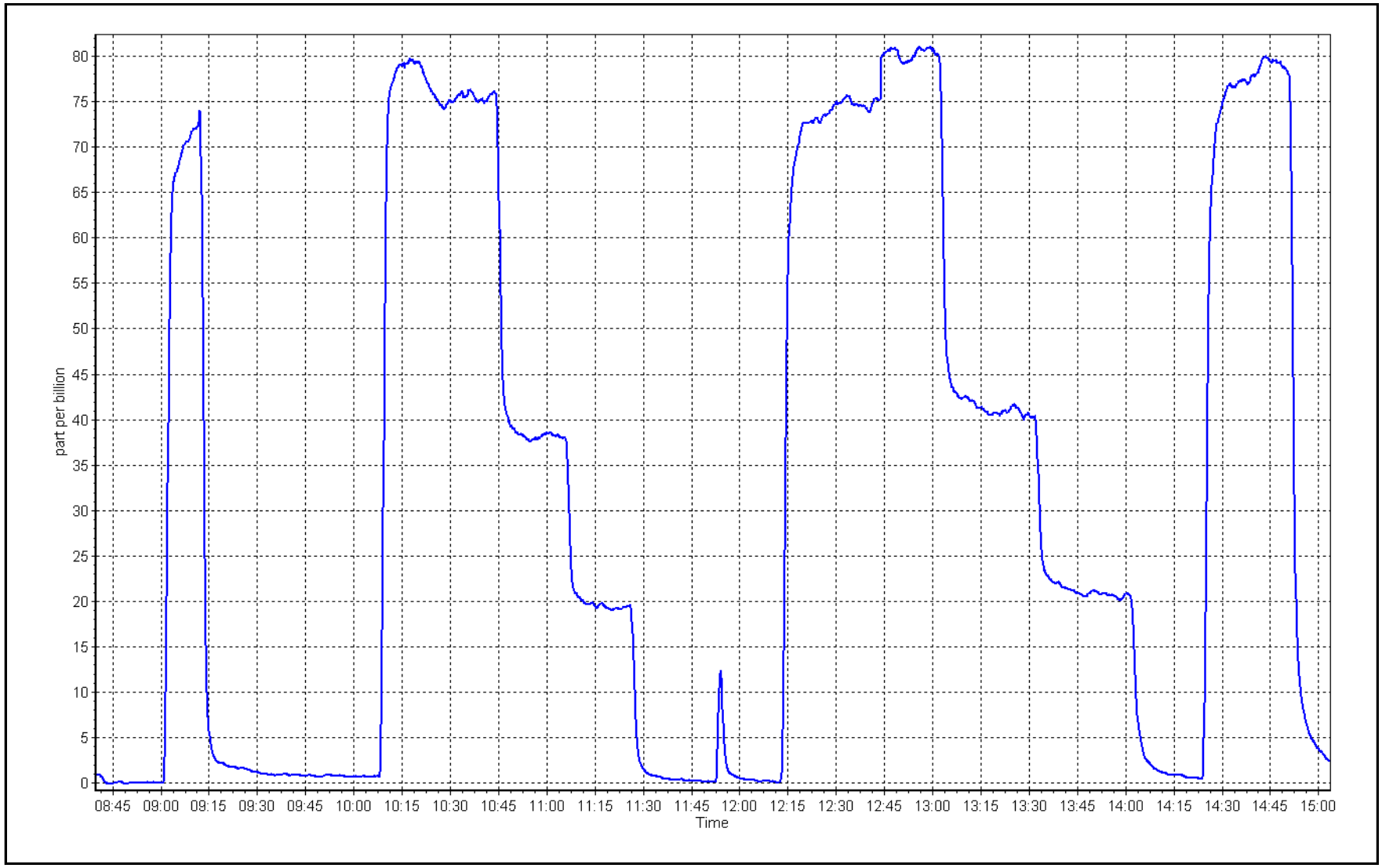
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
79.9	80.6	0.9918
40.0	40.7	0.9834
20.0	20.6	0.9716

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999982	*≥0.995*
Slope	1.004924	*0.90 - 1.10*
Intercept	0.356984	*+/-3*



TRS Calibration Plot Date: July 12, 2023 Location: Patricia McInnes



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	July 4, 2023	Last Cal Date:	June 19, 2023
Start time (MST):	9:20	End time (MST):	12:30
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:	5608	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320037	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.54E-04	2.63E-04	NMHC SP Ratio:	7.86E-05	7.22E-05
CH4 Retention time:	12.1	12.5	NMHC Peak Area:	115463	125821

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	17.90	0.957
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	17.24	0.993
second point	4960	40.2	8.57	8.50	1.009
third point	4980	20.1	4.29	4.25	1.009
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.12	17.24	0.993
				Average Correction Factor	1.004

Baseline Corr AF:	17.90	Prev response	17.17	*% change	4.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4920	80.3	9.07	10.00	0.907
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	9.15	0.991
second point	4960	40.2	4.54	4.56	0.995
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	9.07	1.000
				Average Correction Factor	0.994
Baseline Corr AF:	10.00	Prev response	9.11	*% change	8.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	8.06	7.89	1.021
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	8.06	8.09	0.996
second point	4960	40.2	4.03	3.93	1.025
third point	4980	20.1	2.02	1.97	1.024
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	8.06	8.17	0.986
				Average Correction Factor	1.015
Baseline Corr AF:	7.89	Prev response	8.05	*% 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:	1.007754	1.007103
THC Cal Offset:	-0.087832	-0.053449
CH4 Cal Slope:	1.007409	1.004333
CH4 Cal Offset:	-0.063374	-0.044776
NMHC Cal Slope:	1.007709	1.009703
NMHC Cal Offset:	-0.024058	-0.008474

Notes: NM spans slowly rising since ZAG changed out last month. Seems to have settled. Analyzer flows were also adjusted last month, putting 8.9% change down to these maintenance items. New zero chrome ran and applied. Span adjusted. Filter changed after As Founds.

Calibration Performed By: Ryan Power

Wood Buffalo Environmental Association

THC Calibration Summary

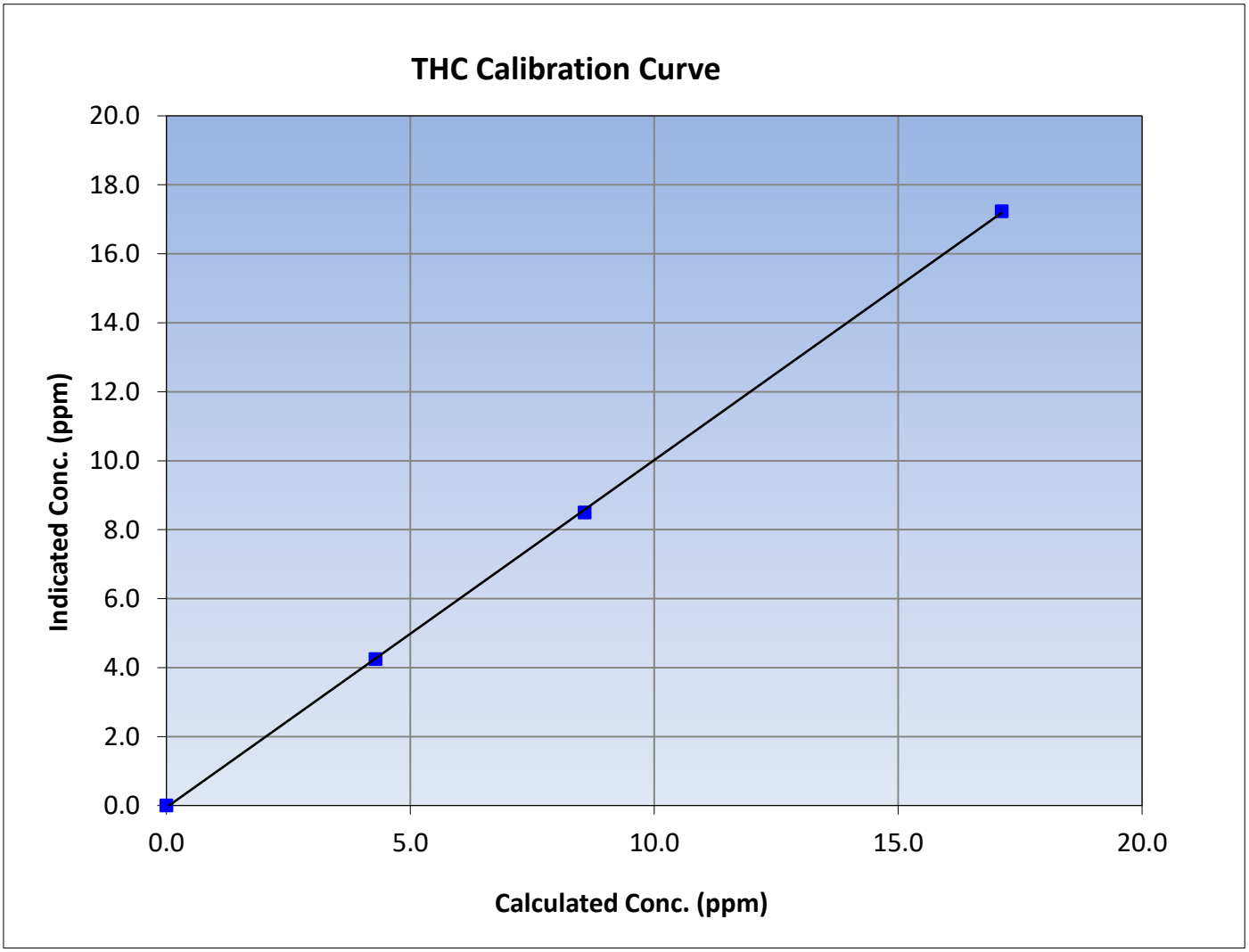
Version-01-2020

Station Information

Calibration Date:	July 4, 2023	Previous Calibration:	June 19, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:20	End Time (MST):	12:30
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	0.999924	*≥0.995*
17.12	17.24	0.9934			
8.57	8.50	1.0091	Slope	1.007103	*0.90 - 1.10*
4.29	4.25	1.0090			
			Intercept	-0.053449	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

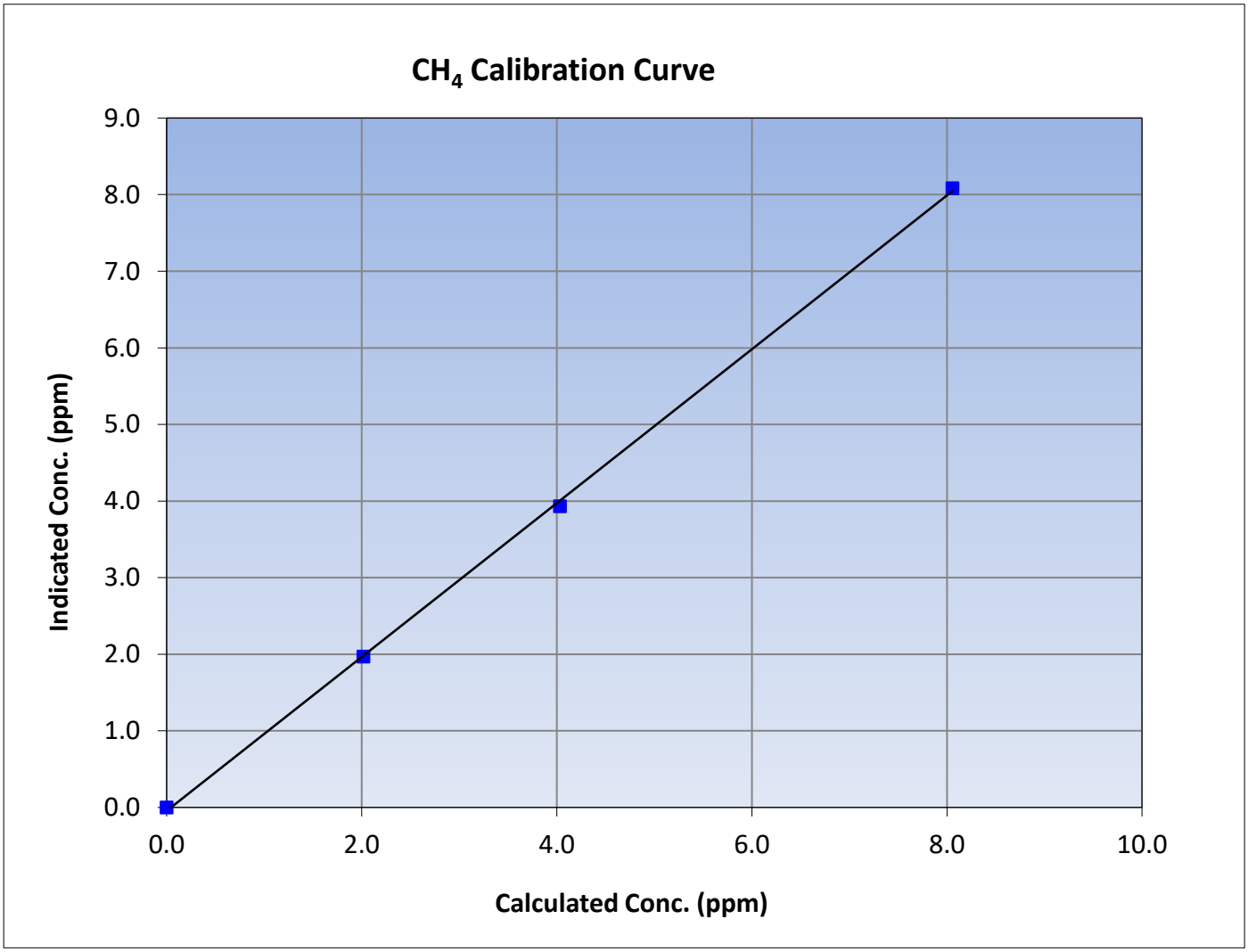
Version-01-2020

Station Information

Calibration Date:	July 4, 2023	Previous Calibration:	June 19, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:20	End Time (MST):	12:30
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	0.999750	*≥0.995*
8.06	8.09	0.9964			
4.03	3.93	1.0254	Slope	1.004333	*0.90 - 1.10*
2.02	1.97	1.0241			
			Intercept	-0.044776	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

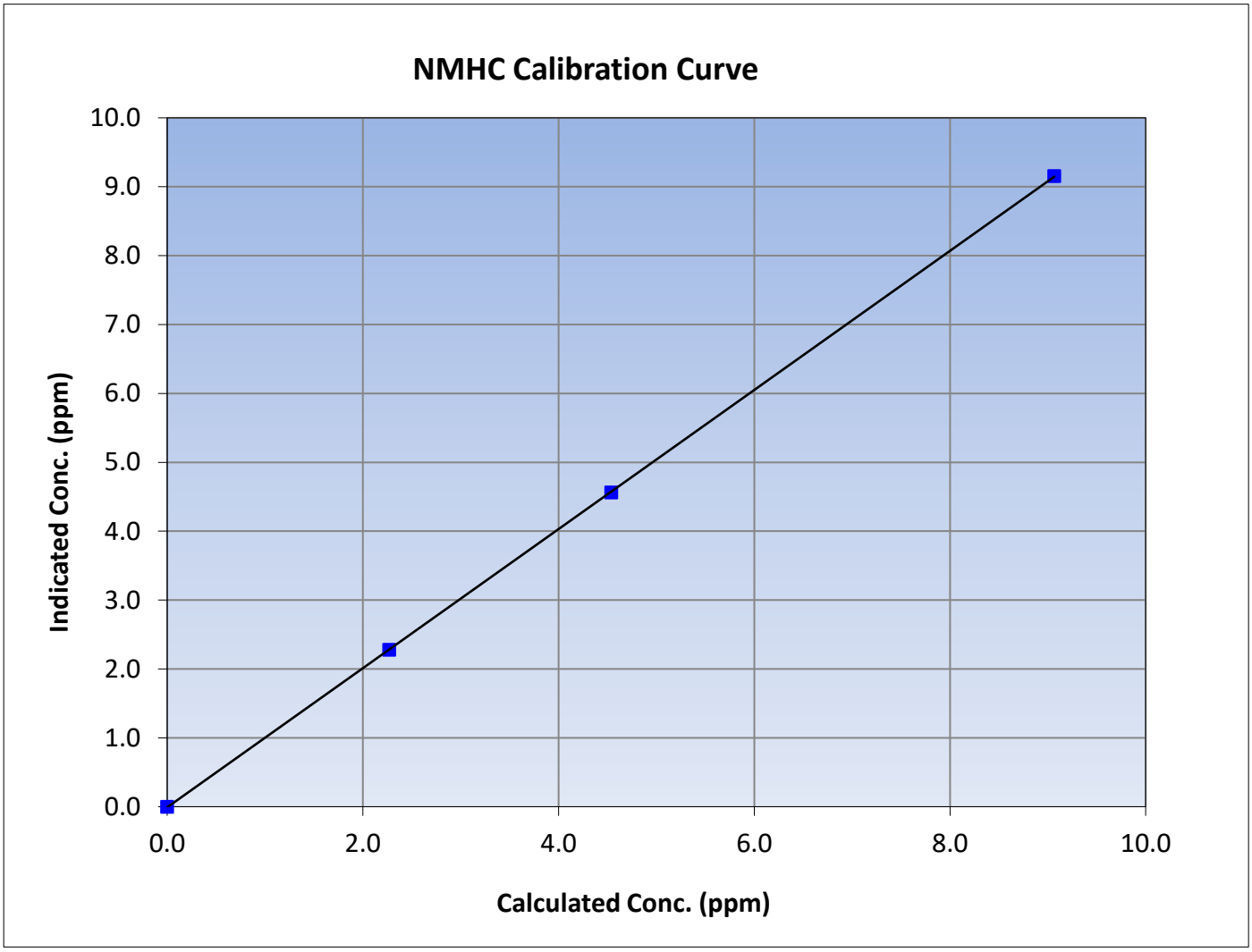
Version-01-2020

Station Information

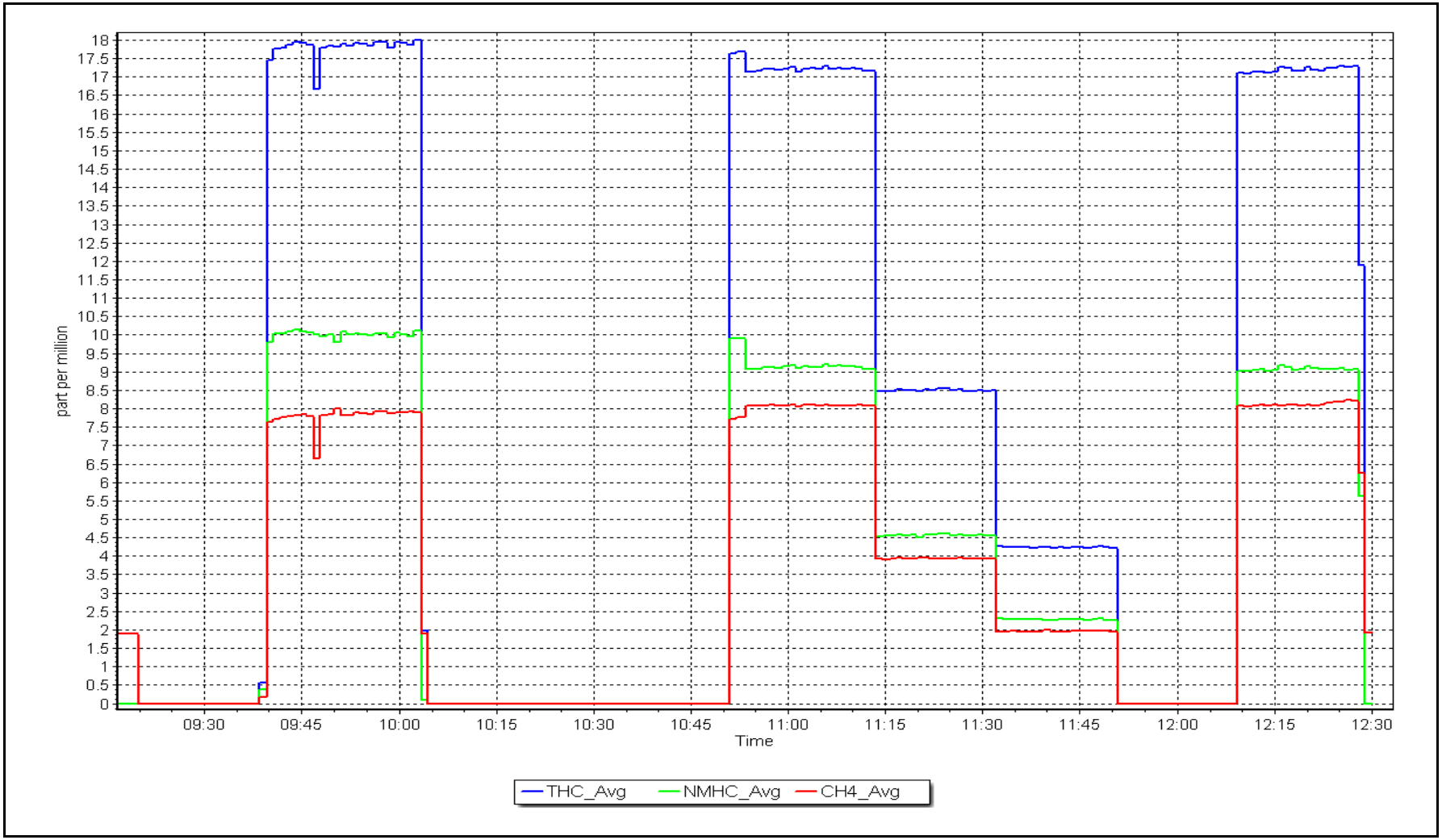
Calibration Date:	July 4, 2023	Previous Calibration:	June 19, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:20	End Time (MST):	12:30
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999995	≥0.995
9.07	9.15	0.9906			
4.54	4.56	0.9946	Slope	1.009703	0.90 - 1.10
2.27	2.28	0.9959			
			Intercept	-0.008474	+/-0.5



NMHC Calibration Plot Date: July 4, 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:	July 10, 2023	Last Cal Date:	July 4, 2023
Start time (MST):	8:40	End time (MST):	10:20
Reason:	Removal		

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:	5608	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320037	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.63E-04	NA	NMHC SP Ratio:	7.22E-05	NA
CH4 Retention time:	12.5	NA	NMHC Peak Area:	125821	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	80.3	17.12	16.55	1.035
as found 2nd point	4960	40.2	8.57	8.13	1.054
as found 3rd point	4980	20.1	4.29	4.05	1.057
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	17.12	16.55	1.035
second point	4960	40.2	8.57	8.13	1.054
third point	4980	20.1	4.29	4.05	1.057
as left zero					
as left span					
				Average Correction Factor	1.049

Baseline Corr AF:	16.55	Prev response	17.17	*% change	-3.7%
Baseline Corr 2nd AF:	8.1	AF Slope:	0.967241	AF Intercept:	-0.065575
Baseline Corr 3rd AF:	4.1	AF Correlation:	0.999891	* = > +/-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	9.21	0.985
as found 2nd point	4960	40.2	4.54	4.54	1.001
as found 3rd point	4980	20.1	2.27	2.28	0.998
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4920	80.3	9.07	9.21	0.985
second point	4960	40.2	4.54	4.54	1.001
third point	4980	20.1	2.27	2.28	0.998
as left zero					
as left span					
				Average Correction Factor	0.994
Baseline Corr AF:	9.21	Prev response	9.11	*% change	1.0%
Baseline Corr 2nd AF:	4.5	AF Slope:	1.015397	AF Intercept:	-0.026014
Baseline Corr 3rd AF:	2.3	AF Correlation:	0.999925	* = > +/-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	7.34	1.097
as found 2nd point	4960	40.2	4.03	3.60	1.121
as found 3rd point	4980	20.1	2.02	1.78	1.133
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	8.06	7.34	1.097
second point	4960	40.2	4.03	3.60	1.121
third point	4980	20.1	2.02	1.78	1.133
as left zero					
as left span					
				Average Correction Factor	1.117
Baseline Corr AF:	7.34	Prev response	8.05	*% change	-9.6%
Baseline Corr 2nd AF:	3.60	AF Slope:	0.913040	AF Intercept:	-0.039560
Baseline Corr 3rd AF:	1.78	AF Correlation:	0.999833	* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.007754	0.967241
THC Cal Offset:	-0.087832	-0.065575
CH4 Cal Slope:	1.007409	0.913040
CH4 Cal Offset:	-0.063374	-0.039560
NMHC Cal Slope:	1.007709	1.015397
NMHC Cal Offset:	-0.024058	-0.026014

Notes: Removal calibration

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

THC Calibration Summary

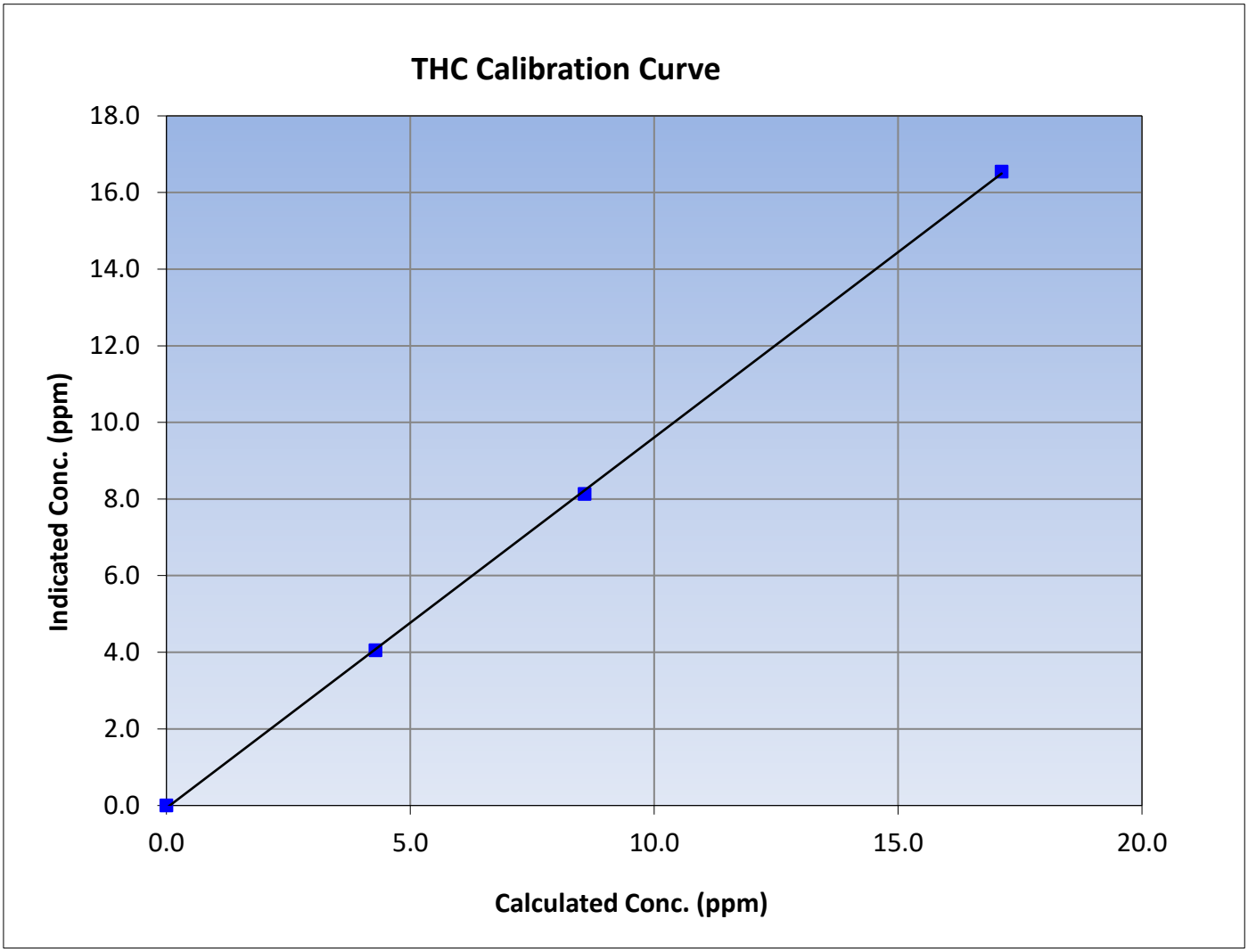
Version-01-2020

Station Information

Calibration Date:	July 10, 2023	Previous Calibration:	July 4, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:40	End Time (MST):	10:20
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	0.999891	*≥0.995*
17.12	16.55	1.0347			
8.57	8.13	1.0539	Slope	0.967241	*0.90 - 1.10*
4.29	4.05	1.0572			
			Intercept	-0.065575	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

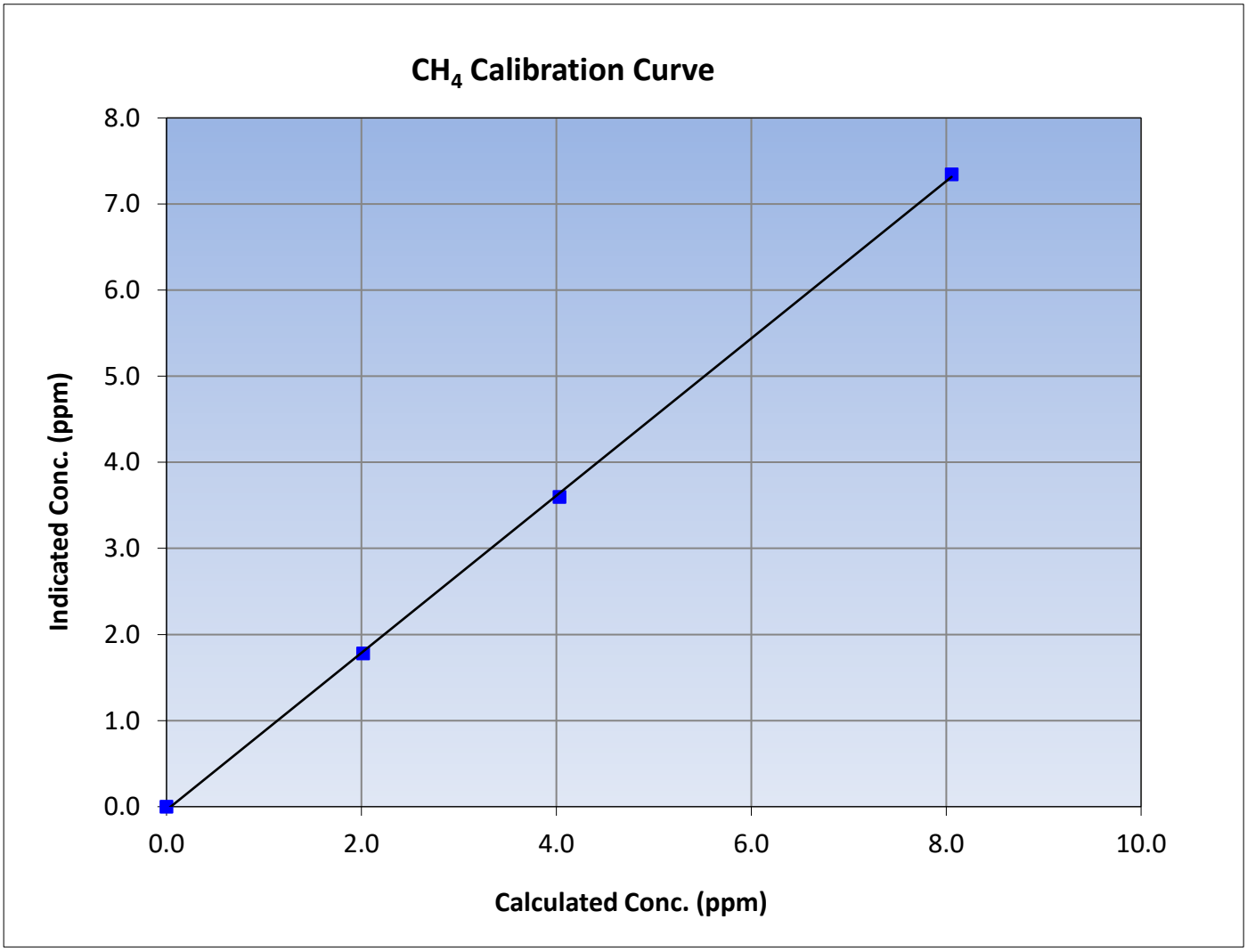
Version-01-2020

Station Information

Calibration Date:	July 10, 2023	Previous Calibration:	July 4, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:40	End Time (MST):	10:20
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	0.999833	≥0.995
8.06	7.34	1.0969			
4.03	3.60	1.1211	Slope	0.913040	0.90 - 1.10
2.02	1.78	1.1334			
			Intercept	-0.039560	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

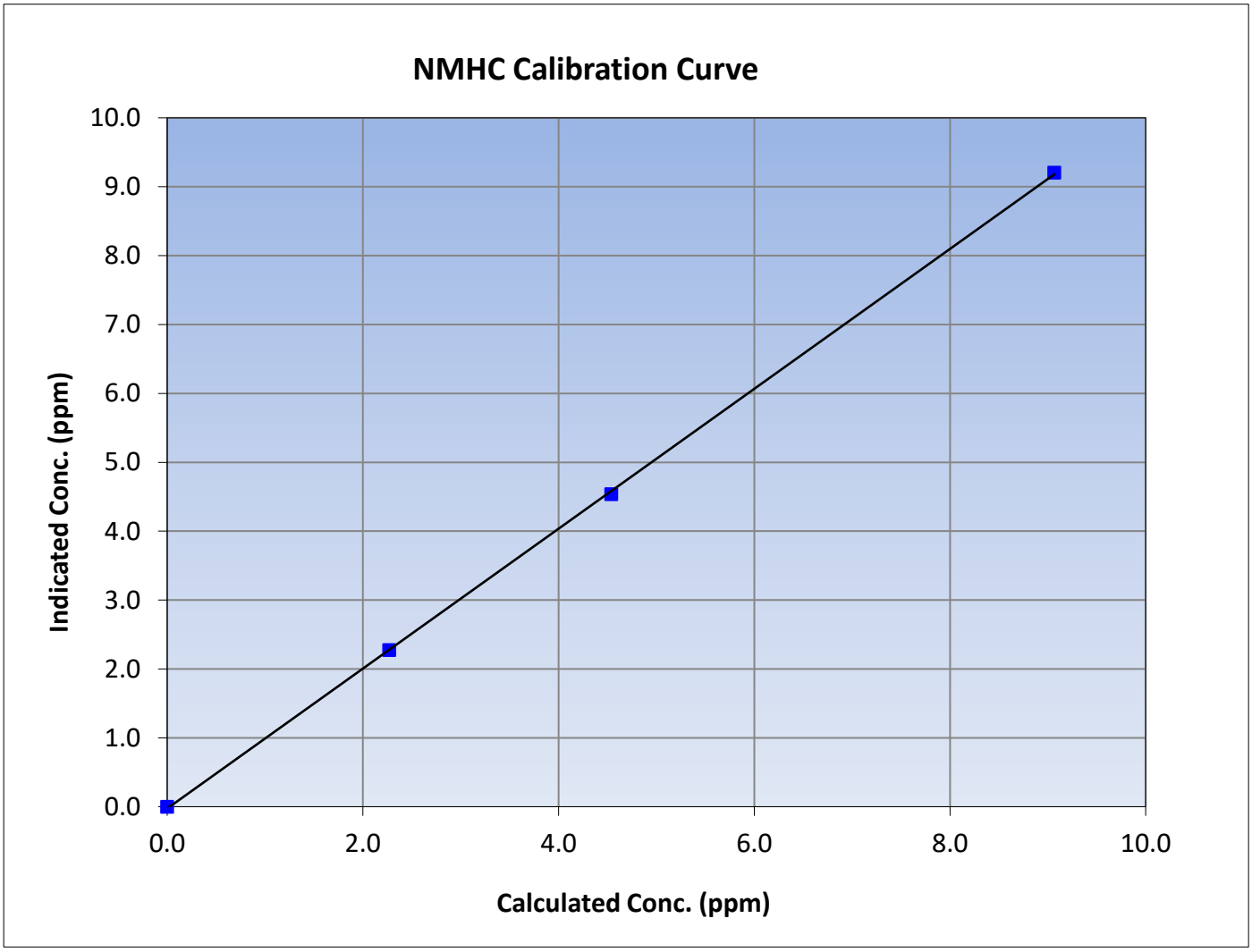
Version-01-2020

Station Information

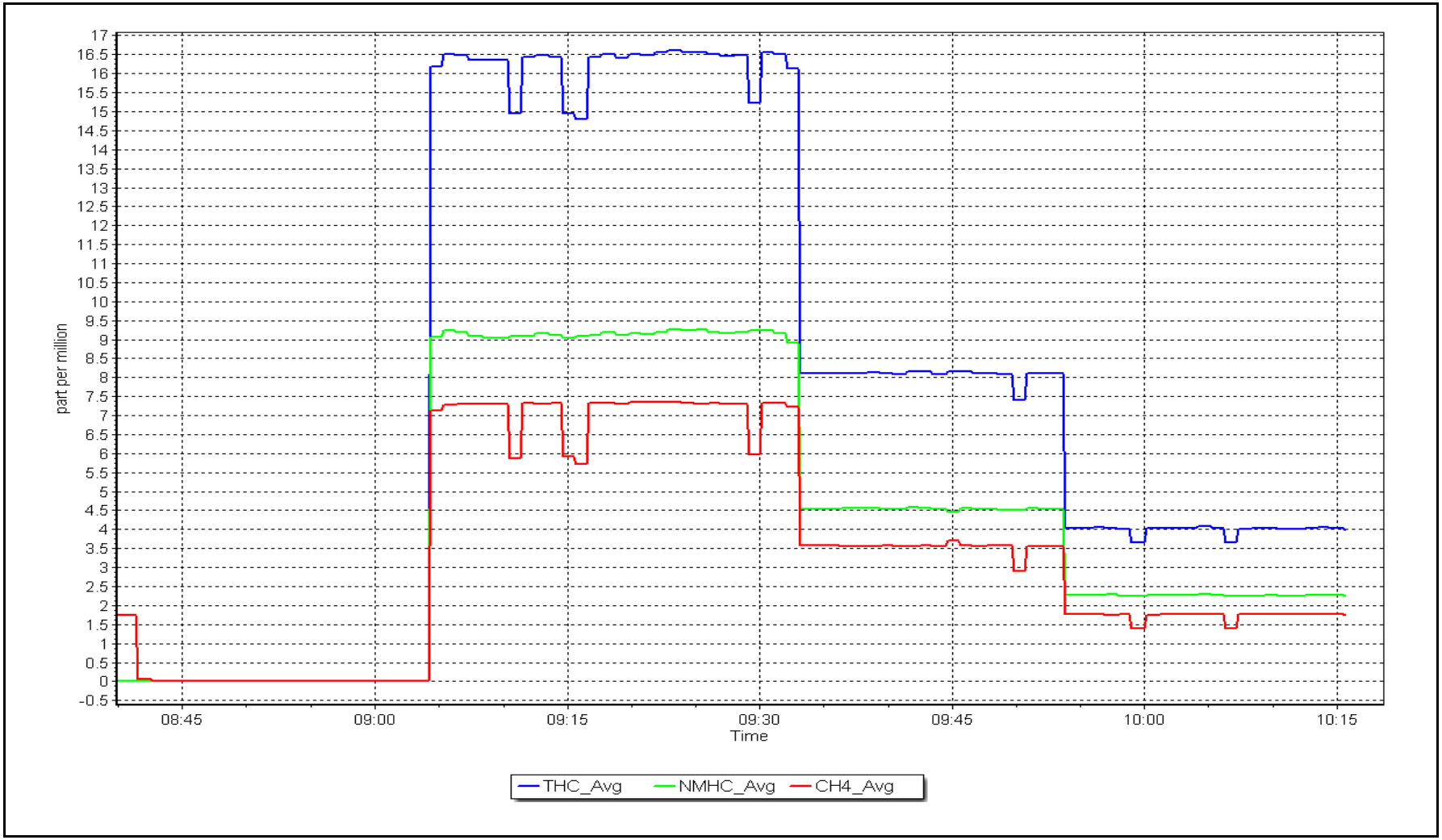
Calibration Date:	July 10, 2023	Previous Calibration:	July 4, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:40	End Time (MST):	10:20
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999925	≥0.995
9.07	9.21	0.9850			
4.54	4.54	1.0007	Slope	1.015397	0.90 - 1.10
2.27	2.28	0.9976			
			Intercept	-0.026014	+/-0.5



NMHC Calibration Plot Date: July 10, 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:	July 10, 2023	Last Cal Date:	NA
Start time (MST):	11:50	End time (MST):	14:15
Reason:	Install		

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:	5608	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1172750022	
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	2.12E-04	NMHC SP Ratio:	NA	4.63E-05
CH4 Retention time:	NA	14.0	NMHC Peak Area:	NA	195941

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	80.3	17.12	17.12	1.000
second point	4960	40.2	8.57	8.57	1.000
third point	4980	20.1	4.29	4.36	0.984
as left zero	5000	0.0	0.00	0.01	----
as left span	4920	80.3	17.12	17.09	1.002
				Average Correction Factor	0.995

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

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4920	80.3	9.07	9.09	0.997
second point	4960	40.2	4.54	4.57	0.993
third point	4980	20.1	2.27	2.34	0.970
as left zero	5000	0	0.00	0.01	----
as left span	4920	80.3	9.07	9.04	1.003
				Average Correction Factor	0.987
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	80.3	8.06	8.03	1.003
second point	4960	40.2	4.03	4.00	1.008
third point	4980	20.1	2.02	2.02	1.000
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	8.06	8.05	1.000
				Average Correction Factor	1.004
Baseline Corr AF:	NA	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	NA	0.998360
THC Cal Offset:	NA	0.029442
CH4 Cal Slope:	NA	0.996256
CH4 Cal Offset:	NA	-0.001745
NMHC Cal Slope:	NA	1.000342
NMHC Cal Offset:	NA	0.030986

Notes: Installation calibration. Span adjusted.

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

THC Calibration Summary

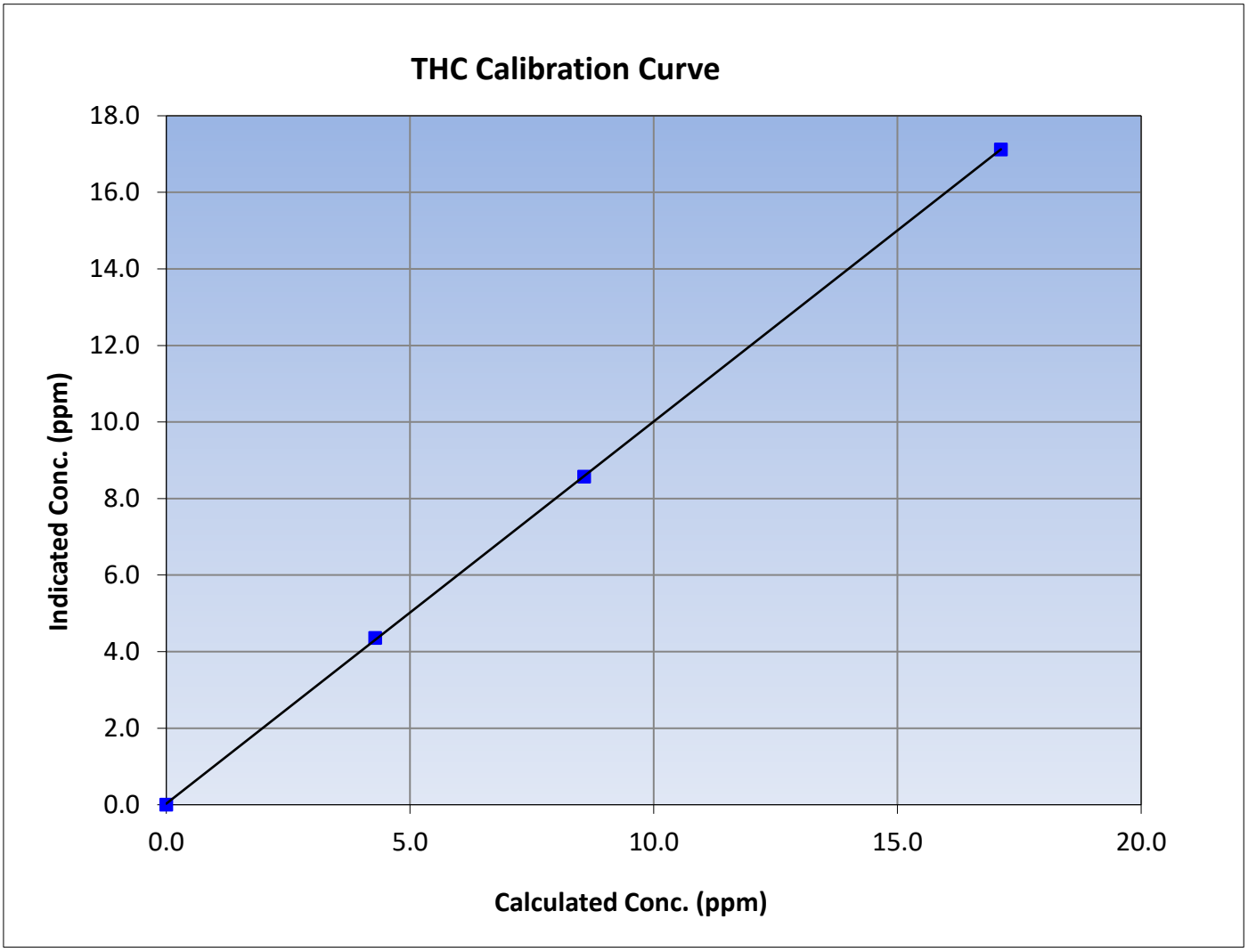
Version-01-2020

Station Information

Calibration Date:	July 10, 2023	Previous Calibration:	NA
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	11:50	End Time (MST):	14:15
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750022

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999980	≥0.995
17.12	17.12	1.0001			
8.57	8.57	1.0002	Slope	0.998360	0.90 - 1.10
4.29	4.36	0.9841			
			Intercept	0.029442	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

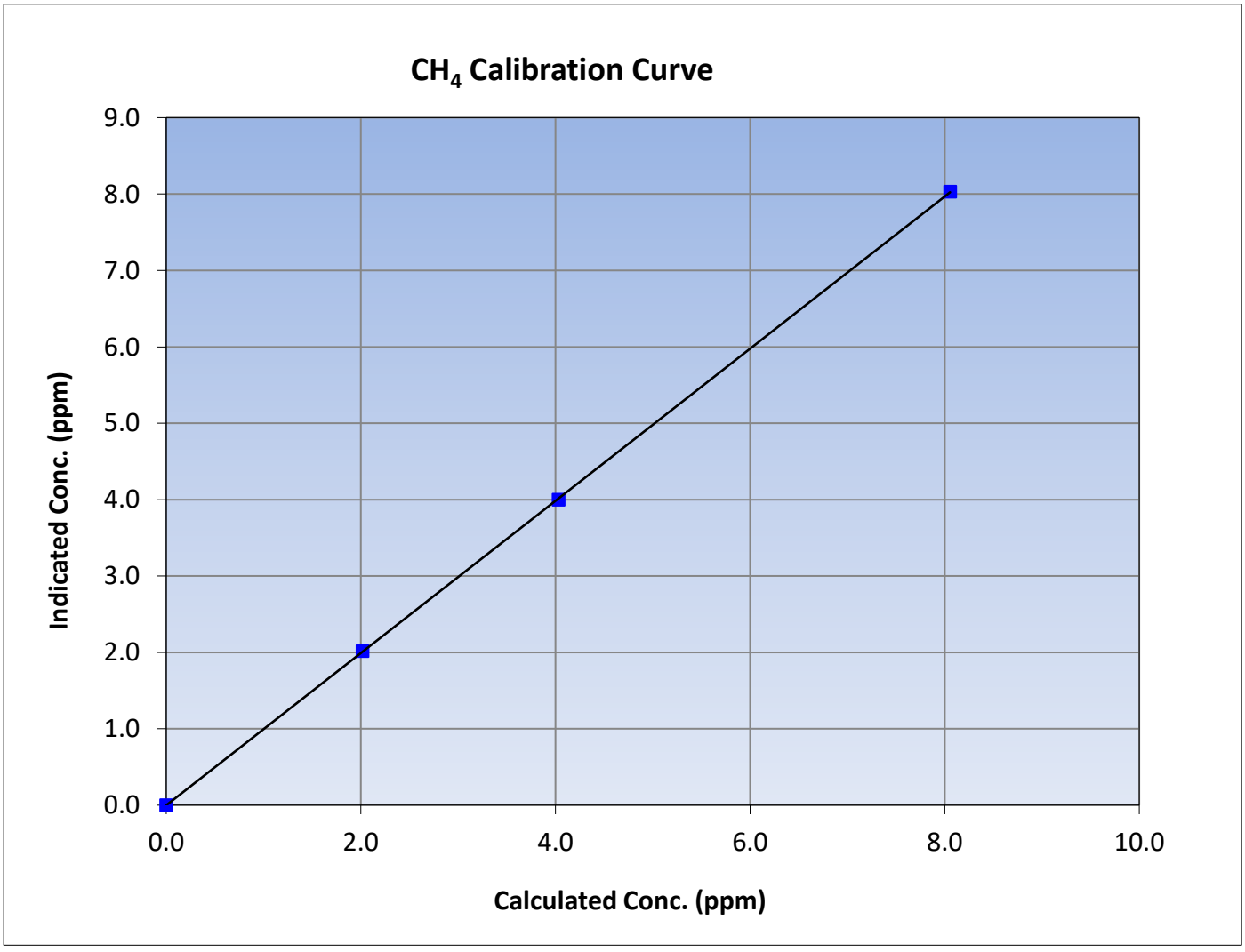
Version-01-2020

Station Information

Calibration Date:	July 10, 2023	Previous Calibration:	NA
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	11:50	End Time (MST):	14:15
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750022

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999988	≥0.995
8.06	8.03	1.0032			
4.03	4.00	1.0084	Slope	0.996256	0.90 - 1.10
2.02	2.02	1.0002			
			Intercept	-0.001745	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

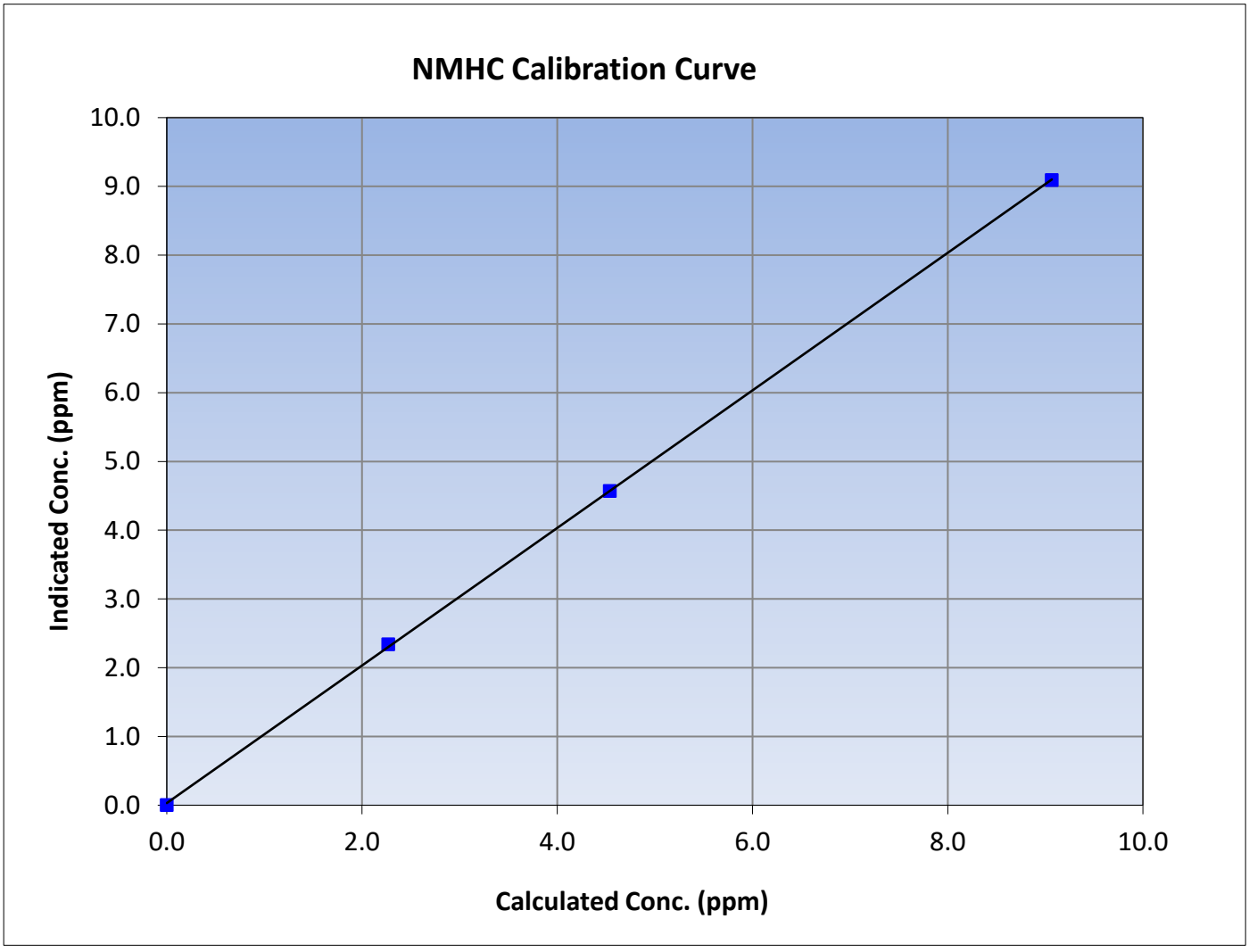
Version-01-2020

Station Information

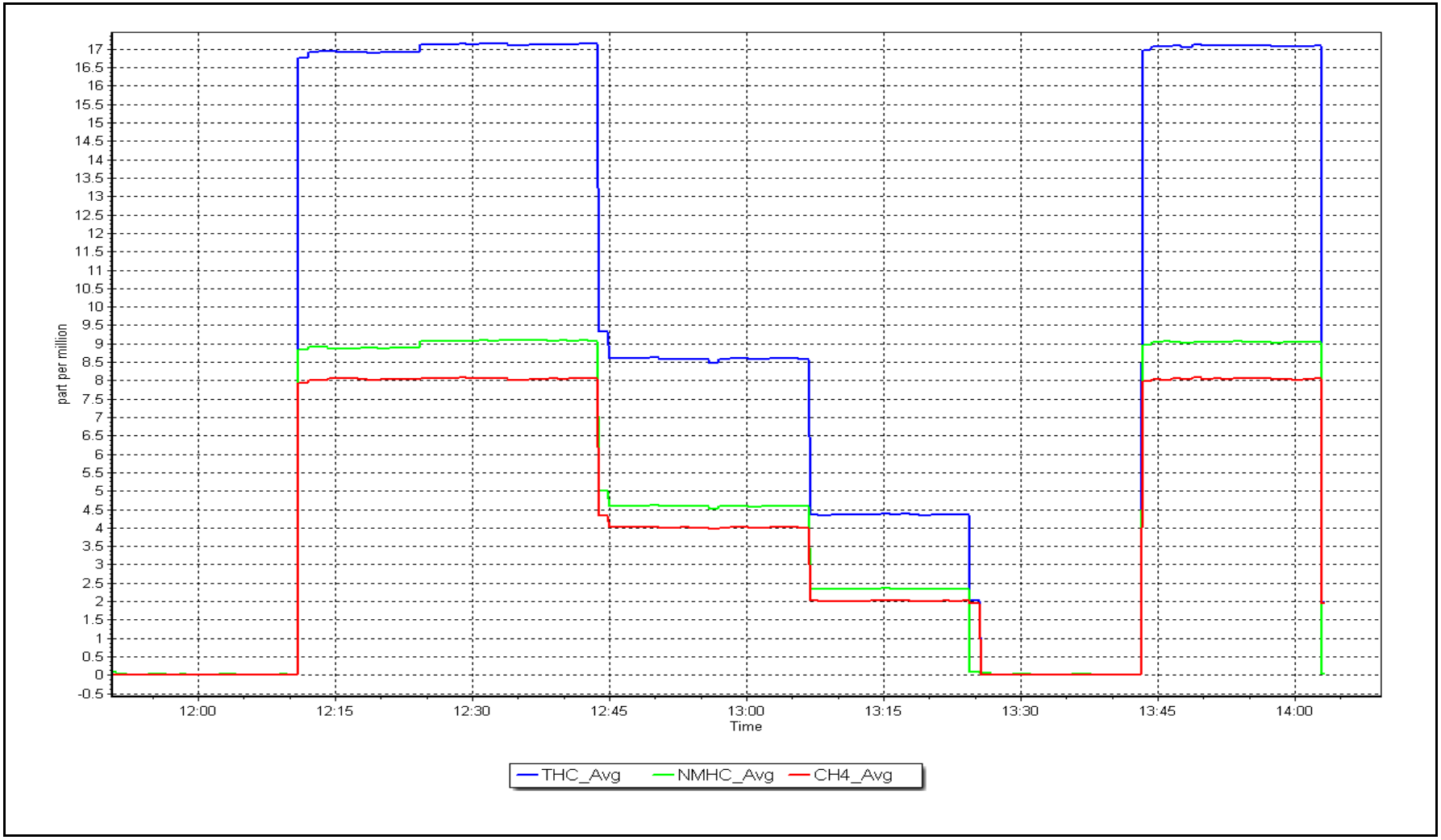
Calibration Date:	July 10, 2023	Previous Calibration:	NA
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	11:50	End Time (MST):	14:15
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750022

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999949	≥0.995
9.07	9.09	0.9973			
4.54	4.57	0.9930	Slope	1.000342	0.90 - 1.10
2.27	2.34	0.9703			
			Intercept	0.030986	+/-0.5



NMHC Calibration Plot Date: July 10, 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:	July 30, 2023	Last Cal Date:	July 10, 2023
Start time (MST):	10:15	End time (MST):	12:14
Reason:	As Found		

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:	5608	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1118148495	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.12E-04	2.12E-04	NMHC SP Ratio:	4.63E-05	4.63E-05
CH4 Retention time:	14.0	14.0	NMHC Peak Area:	195941	195941

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.02	----
as found span	4920	80.3	17.12	12.21	1.402
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.01	----
high point	4920	80.3	17.12	12.40	1.381
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.381
Baseline Corr AF:	12.20	Prev response	17.12	*% change	-40.4%
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	0.01	----
as found span	4920	80.3	9.07	5.87	1.546
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.01	----
high point	4920	80.3	9.07	6.06	1.497
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.497
Baseline Corr AF:	5.86	Prev response	9.10	*% change	-55.3%
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	0.01	----
as found span	4920	80.3	8.06	6.35	1.269
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.01	----
high point	4920	80.3	8.06	6.34	1.271
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.271
Baseline Corr AF:	6.34	Prev response	8.02	*% change	-26.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

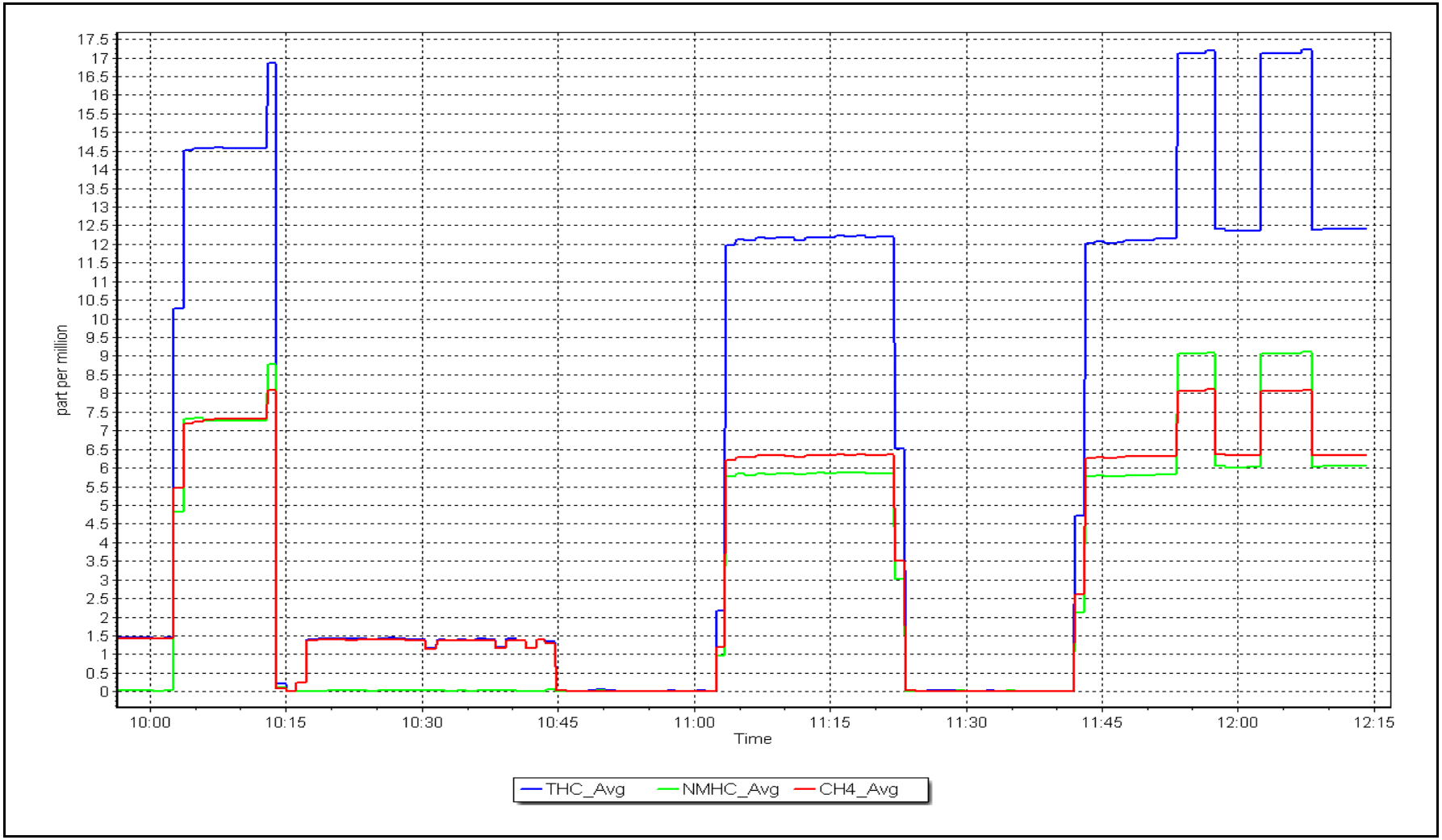
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.998360	0.723598
THC Cal Offset:	0.029442	0.010000
CH4 Cal Slope:	0.996256	0.786400
CH4 Cal Offset:	-0.001745	0.005000
NMHC Cal Slope:	1.000342	0.667580
NMHC Cal Offset:	0.030986	0.005000

Notes: Analyzer baseline shifted down and was dipping. Performed as founds. Span adjustments were attempted but the analyzer kept reverting back to the previous span targets.

Calibration Performed By: Rene Chamberland

NMHC Calibration Plot Date: July 30, 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:	July 31, 2023	Last Cal Date:	July 10, 2023
Start time (MST):	9:00	End time (MST):	12:20
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:	4602	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1118148495	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.12E-04	2.11E-04	NMHC SP Ratio:	4.63E-05	4.72E-05
CH4 Retention time:	14.0	14.0	NMHC Peak Area:	195941	192120

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	0.01	----
high point	4920	80.3	17.12	17.18	0.997
second point	4960	40.2	8.57	8.61	0.996
third point	4980	20.1	4.29	4.36	0.984
as left zero	5000	0.0	0.00	0.02	----
as left span	4920	80.3	17.12	17.08	1.003
				Average Correction Factor	0.992

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

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.01	----
high point	4920	80.3	9.07	9.12	0.994
second point	4960	40.2	4.54	4.60	0.987
third point	4980	20.1	2.27	2.34	0.970
as left zero	5000	0	0.00	0.02	----
as left span	4920	80.3	9.07	9.08	0.999
				Average Correction Factor	0.984
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	80.3	8.06	8.06	0.999
second point	4960	40.2	4.03	4.01	1.006
third point	4980	20.1	2.02	2.02	0.999
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	8.06	8.00	1.007
				Average Correction Factor	1.001
Baseline Corr AF:	NA	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.998360	1.001550
THC Cal Offset:	0.029442	0.032027
CH4 Cal Slope:	0.996256	1.000285
CH4 Cal Offset:	-0.001745	-0.004951
NMHC Cal Slope:	1.000342	1.002851
NMHC Cal Offset:	0.030986	0.036779

Notes: Analyzer baseline shifted down and was dipping. As founds were completed yesterday. Changed the pump and adjusted the span.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

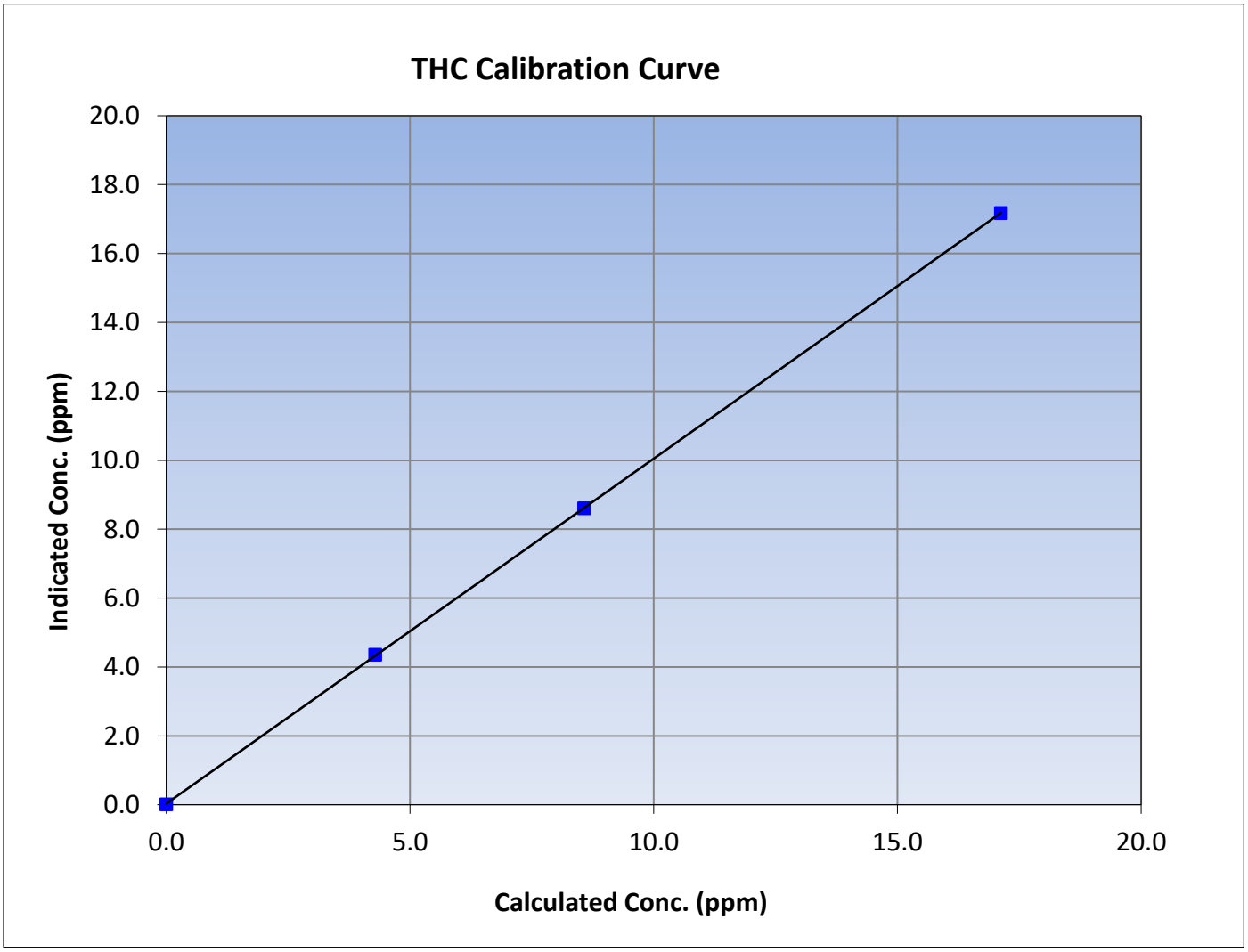
Version-01-2020

Station Information

Calibration Date:	July 31, 2023	Previous Calibration:	July 10, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:00	End Time (MST):	12:20
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.01	----	Correlation Coefficient	0.999991	≥0.995
17.12	17.18	0.9968			
8.57	8.61	0.9956	Slope	1.001550	0.90 - 1.10
4.29	4.36	0.9839			
			Intercept	0.032027	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

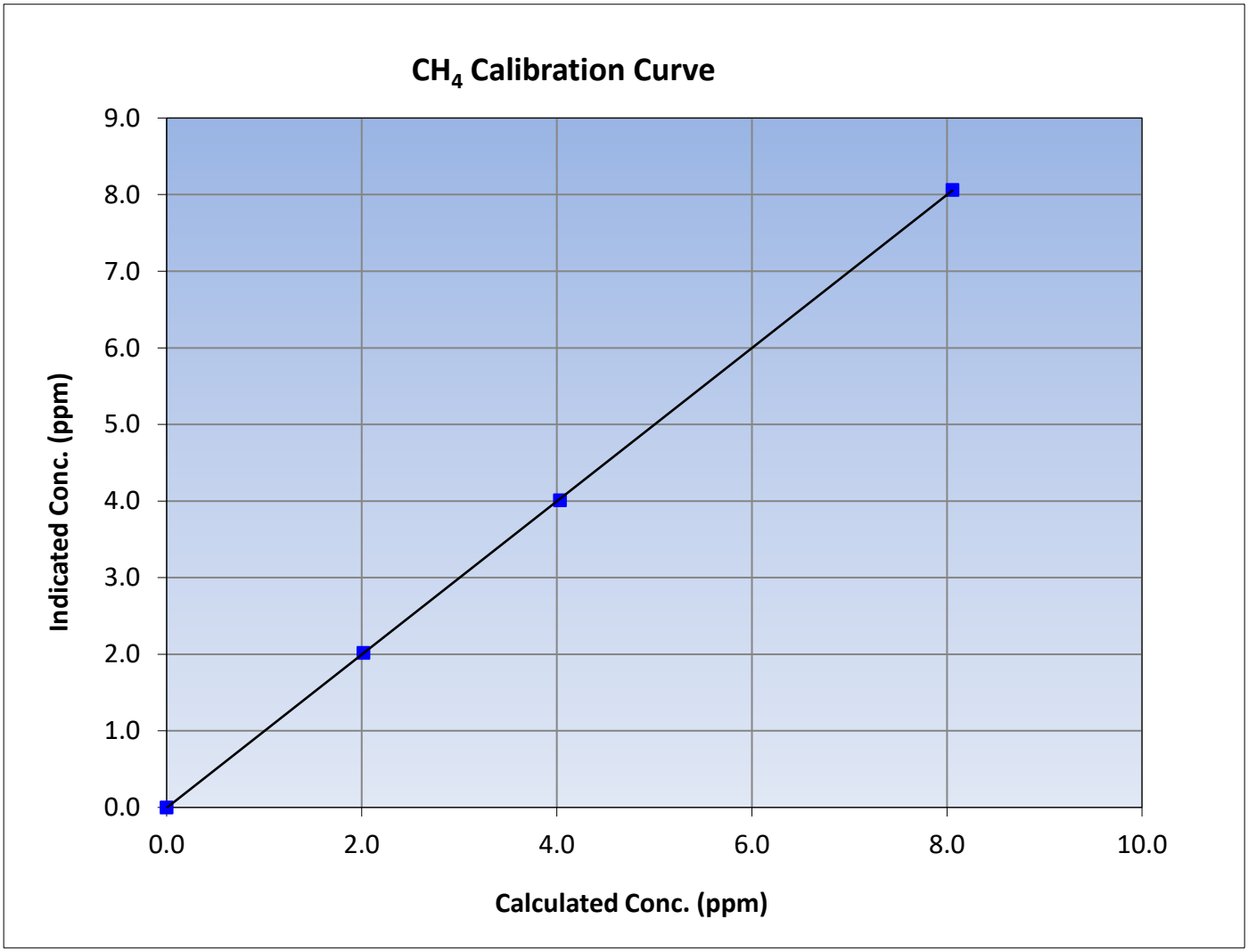
Version-01-2020

Station Information

Calibration Date:	July 31, 2023	Previous Calibration:	July 10, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:00	End Time (MST):	12:20
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999986	≥0.995
8.06	8.06	0.9993			
4.03	4.01	1.0057	Slope	1.000285	0.90 - 1.10
2.02	2.02	0.9992			
			Intercept	-0.004951	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

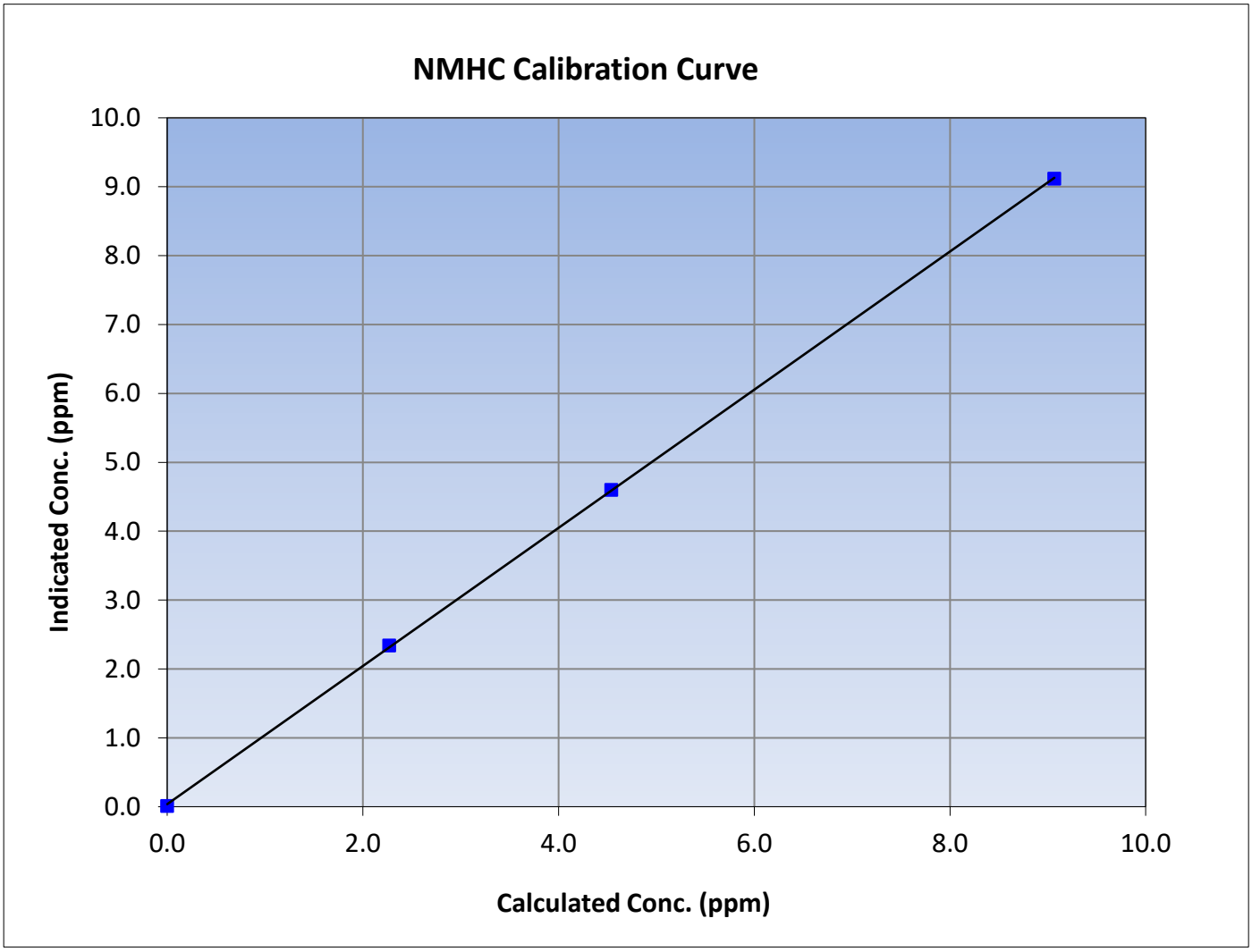
Version-01-2020

Station Information

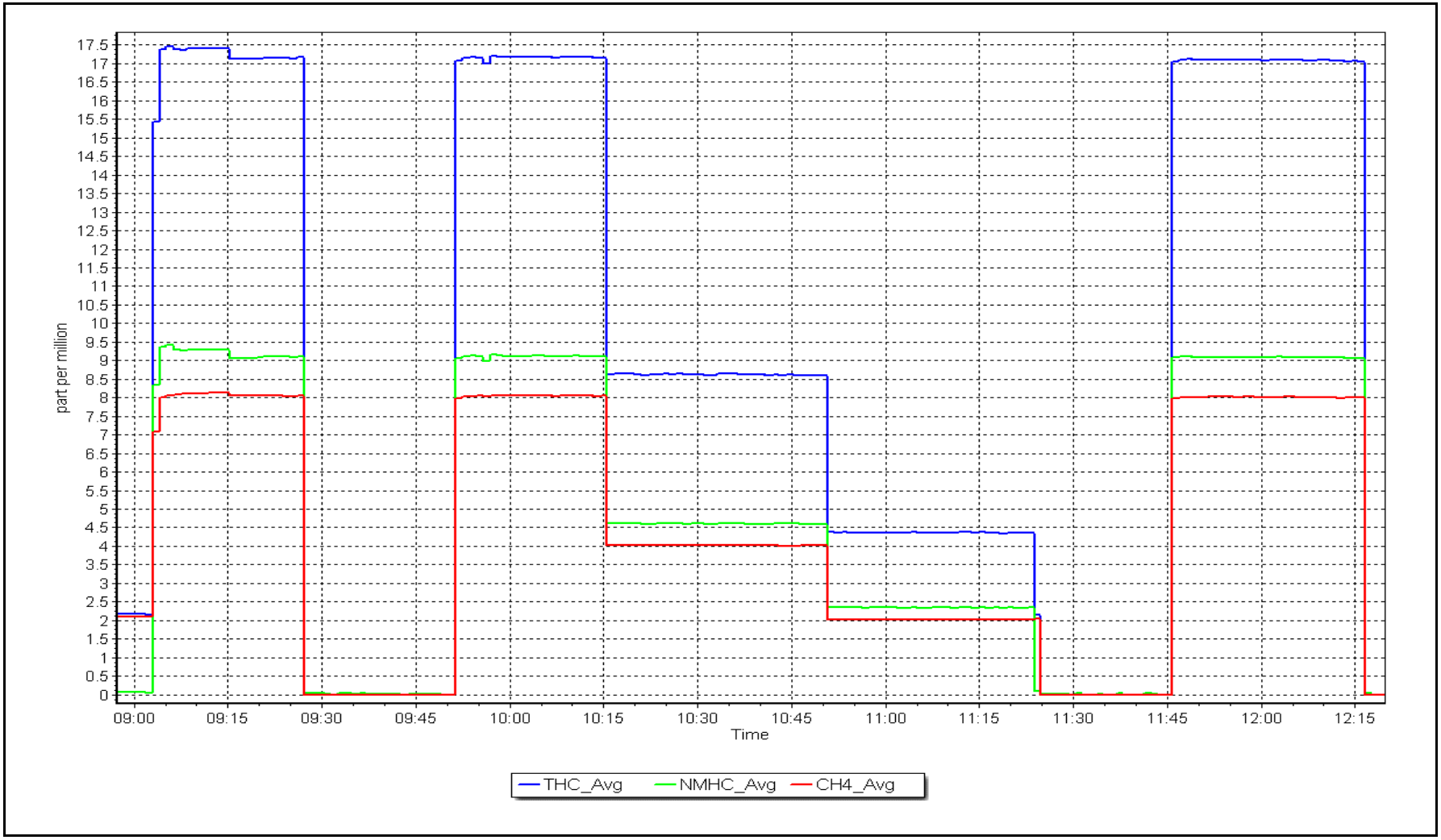
Calibration Date:	July 31, 2023	Previous Calibration:	July 10, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:00	End Time (MST):	12:20
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.01	----	Correlation Coefficient	0.999966	≥0.995
9.07	9.12	0.9944			
4.54	4.60	0.9870	Slope	1.002851	0.90 - 1.10
2.27	2.34	0.9703			
			Intercept	0.036779	+/-0.5



NMHC Calibration Plot Date: July 31, 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:	July 27, 2023	Last Cal Date:	June 26, 2023
Start time (MST):	8:08	End time (MST):	12:36
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T30YCWN		Cal Gas Expiry Date:	April 11, 2025	
NOX Cal Gas Conc:	47.94	ppm	NO Cal Gas Conc:	46.39	ppm
Removed Cylinder #:	N/A		Removed Gas Exp Date:	N/A	
Removed Gas NOX Conc:	47.94	ppm	Removed Gas NO Conc:	46.39	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	3566	
ZAG make/model:	Teledyne API T701		Serial Number:	4602	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1172750022	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	0.815	0.815	NO bkgnd or offset:	3.2	3.2
NOX coeff or slope:	0.986	0.986	NOX bkgnd or offset:	3.8	3.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	156.0	157.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.996744	0.993425
NO_X Cal Offset:	2.176487	2.677022
NO Cal Slope:	1.000845	0.996185
NO Cal Offset:	1.122676	1.203660
NO_2 Cal Slope:	1.000605	0.998218
NO_2 Cal Offset:	-0.357261	-0.045063

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.6	0.2	0.4	----	----
as found span	4914	86.2	826.5	799.7	26.7	824.1	795.2	28.9	1.0029	1.0057
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.7	0.3	0.4	----	----
high point	4914	86.2	826.5	799.7	26.7	822.7	797.3	25.6	1.0046	1.0030
second point	4957	43.1	413.2	399.9	13.4	414.2	400.4	13.8	0.9977	0.9987
third point	4978	21.6	207.1	200.4	6.7	210.4	201.5	8.9	0.9844	0.9946
as left zero	5000	0.0	0.0	0.0	0.0	0.4	0.2	0.1	----	----
as left span	4914	86.2	826.5	402.5	423.9	823.7	399.1	424.7	1.0033	1.0086
								Average Correction Factor	0.9955	0.9988

Corrected As found	NO_X = 823.5 ppb	NO = 795.0 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-0.3%
Previous Response	NO_X = 825.9 ppb	NO = 801.5 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)	796.0	398.8	423.9	423.5	1.0010	99.9%
2nd GPT point (200 ppb O3)	796.0	598.0	224.7	223.7	1.0046	99.5%
3rd GPT point (100 ppb O3)	796.0	695.7	127.0	126.5	1.0041	99.6%
				Average Correction Factor	1.0032	99.7%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

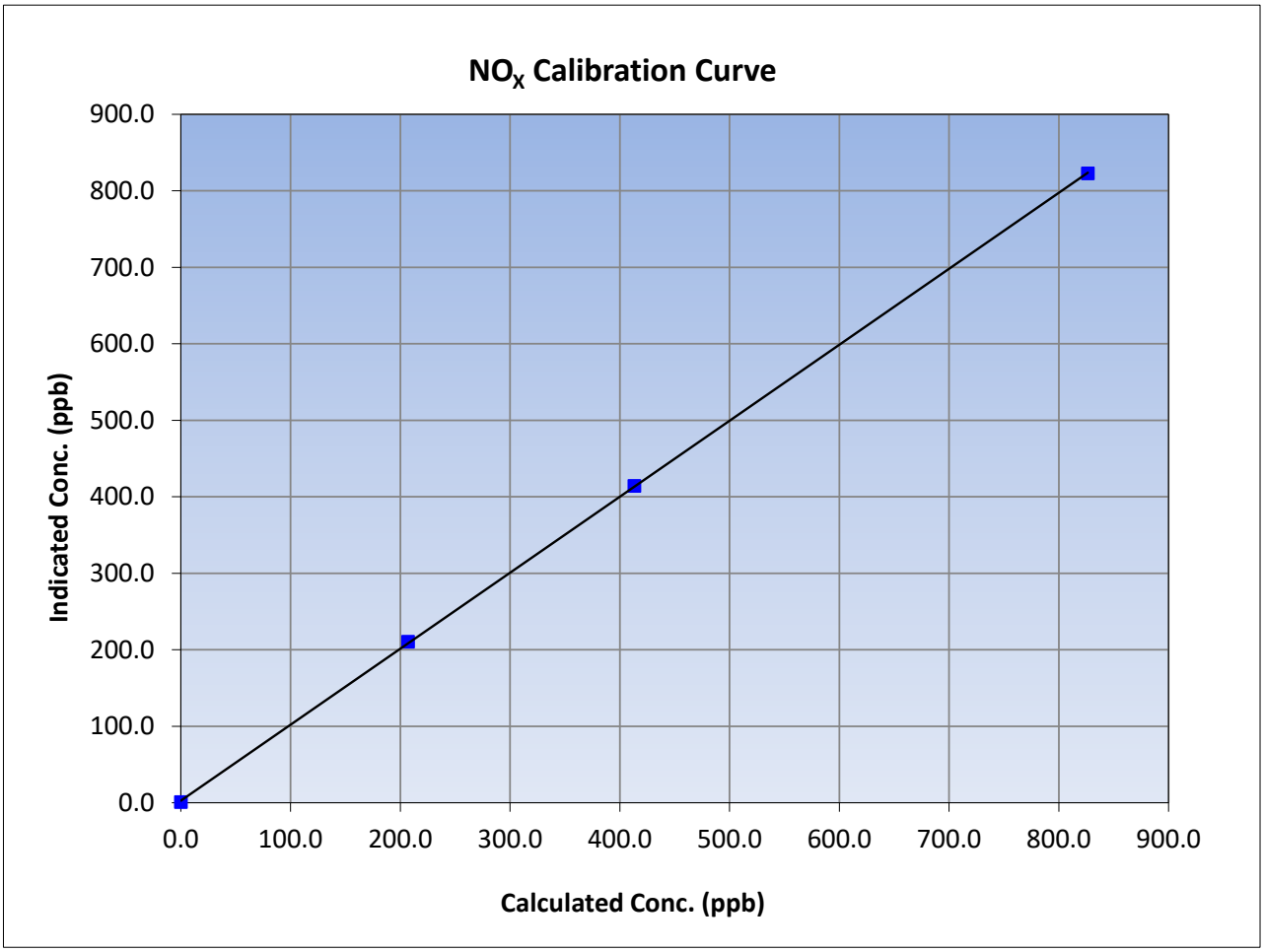
Version-04-2020

Station Information

Calibration Date:	July 27, 2023	Previous Calibration:	June 26, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:08	End Time (MST):	12:36
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	0.7	----	Correlation Coefficient	0.999973	≥0.995
826.5	822.7	1.0046			
413.2	414.2	0.9977	Slope	0.993425	0.90 - 1.10
207.1	210.4	0.9844			
			Intercept	2.677022	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

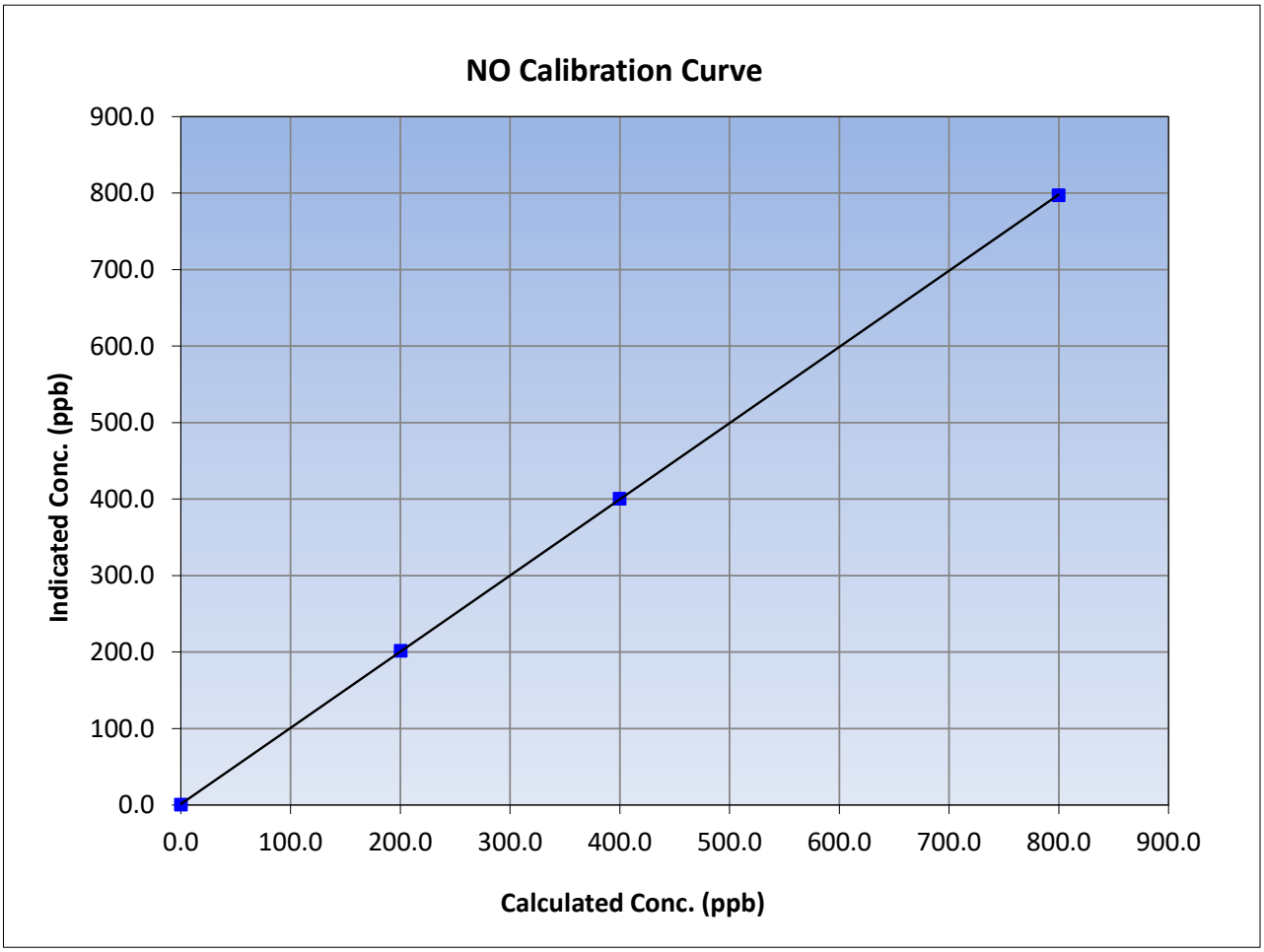
Version-04-2020

Station Information

Calibration Date:	July 27, 2023	Previous Calibration:	June 26, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:08	End Time (MST):	12:36
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	0.3	----	Correlation Coefficient	0.999993	*≥0.995*
799.7	797.3	1.0030			
399.9	400.4	0.9987	Slope	0.996185	*0.90 - 1.10*
200.4	201.5	0.9946			
			Intercept	1.203660	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

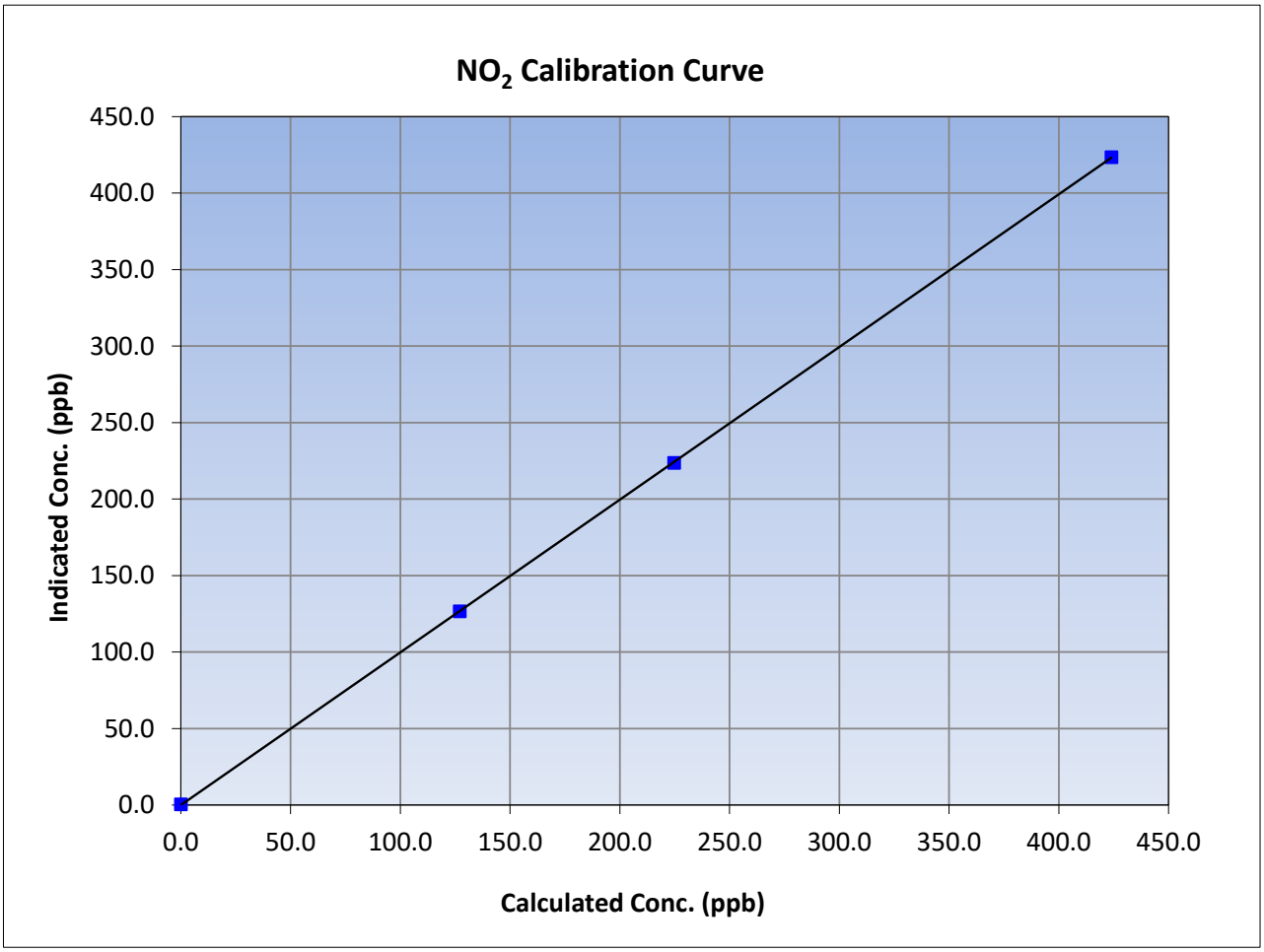
Version-04-2020

Station Information

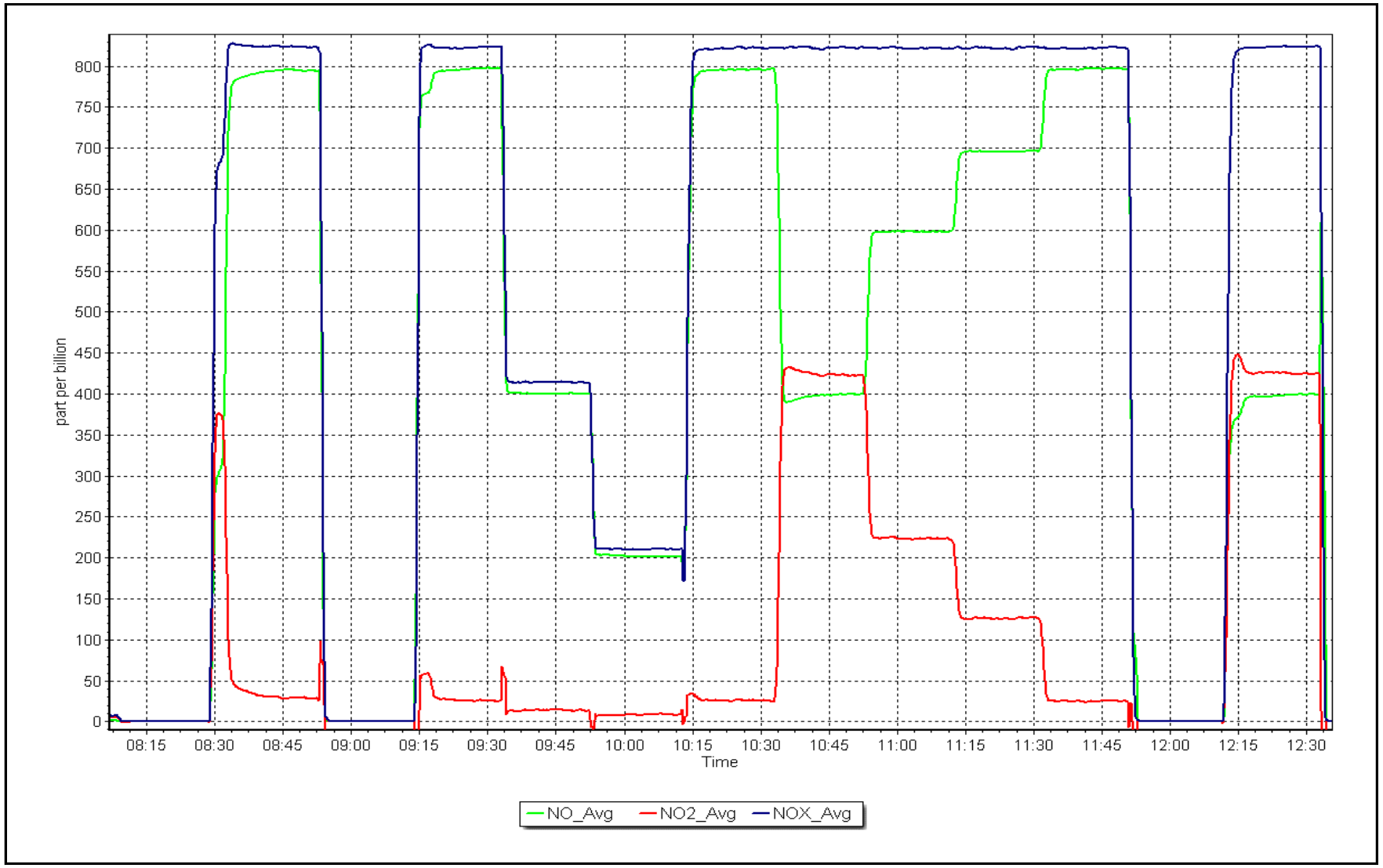
Calibration Date:	July 27, 2023	Previous Calibration:	June 26, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:08	End Time (MST):	12:36
Analyzer make:	Thermo 42i	Analyzer serial #:	1172750022

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.4	----	Correlation Coefficient	0.999992	*≥0.995*
423.9	423.5	1.0010			
224.7	223.7	1.0046	Slope	0.998218	*0.90 - 1.10*
127.0	126.5	1.0041			
			Intercept	-0.045063	*+/-20*



NO_X Calibration Plot Date: July 27, 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:	July 14, 2023	Last Cal Date:	June 13, 2023
Start time (MST):	9:15	End time (MST):	12:12
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.002286	1.001286	Backgd or Offset:	-0.2	-0.2
Calibration intercept:	0.600000	0.500000	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	0.1	----
as found span	5000	1303.0	400.0	400.1	1.000
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	-0.1	----
high point	5000	1303.0	400.0	400.6	0.999
second point	5000	966.5	200.0	201.4	0.993
third point	5000	794.3	100.0	101.0	0.990
as left zero	5000	800.0	0.0	0.6	----
as left span	5000	1303.0	400.0	402.8	0.993
				Average Correction Factor	0.994

Baseline Corr As found:	400.0	Previous response	401.5	*% change	-0.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

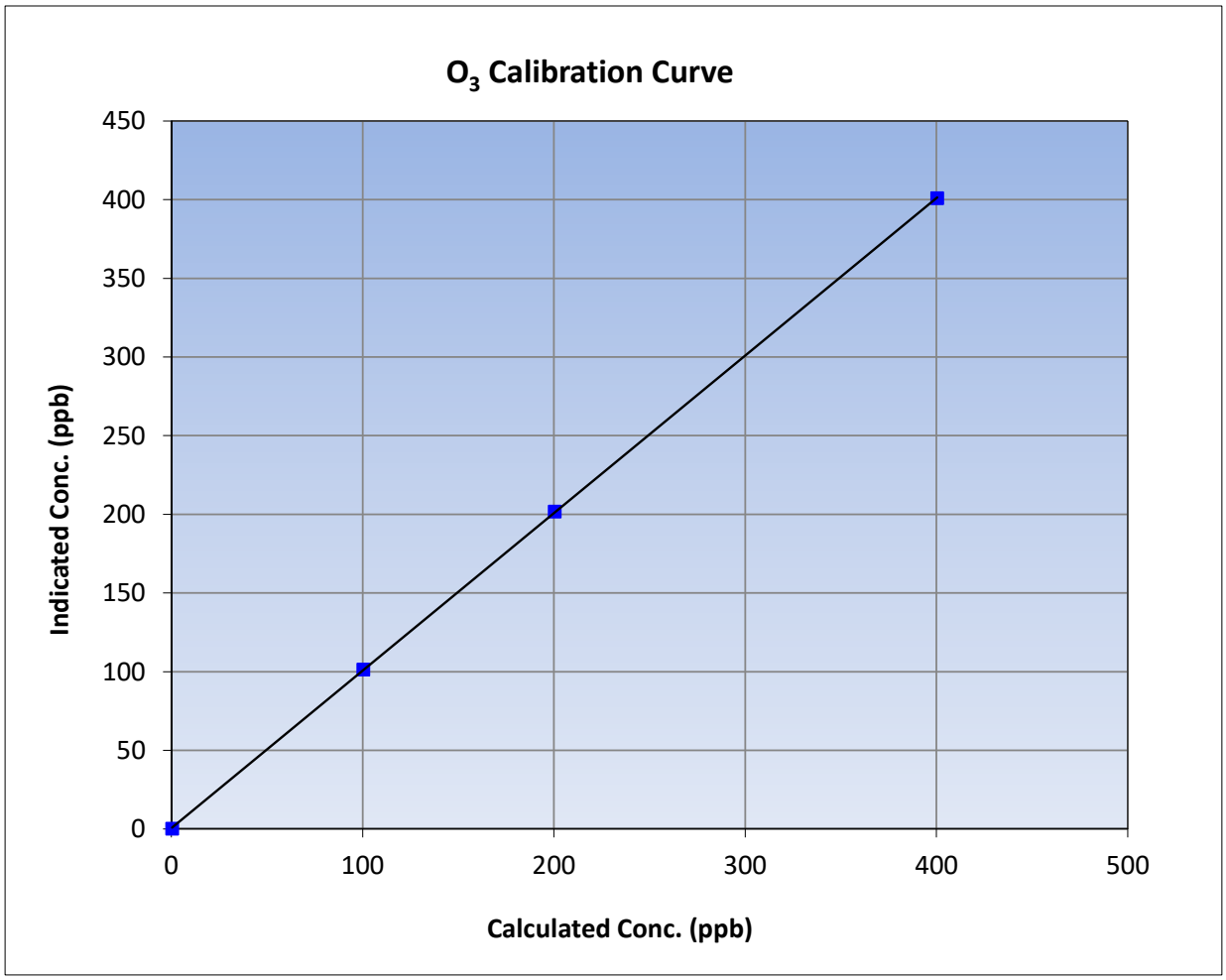
Station Information

Calibration Date:	July 14, 2023	Previous Calibration:	June 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:15	End Time (MST):	12:12
Analyzer make:	Thermo 49i	Analyzer serial #:	1300156234

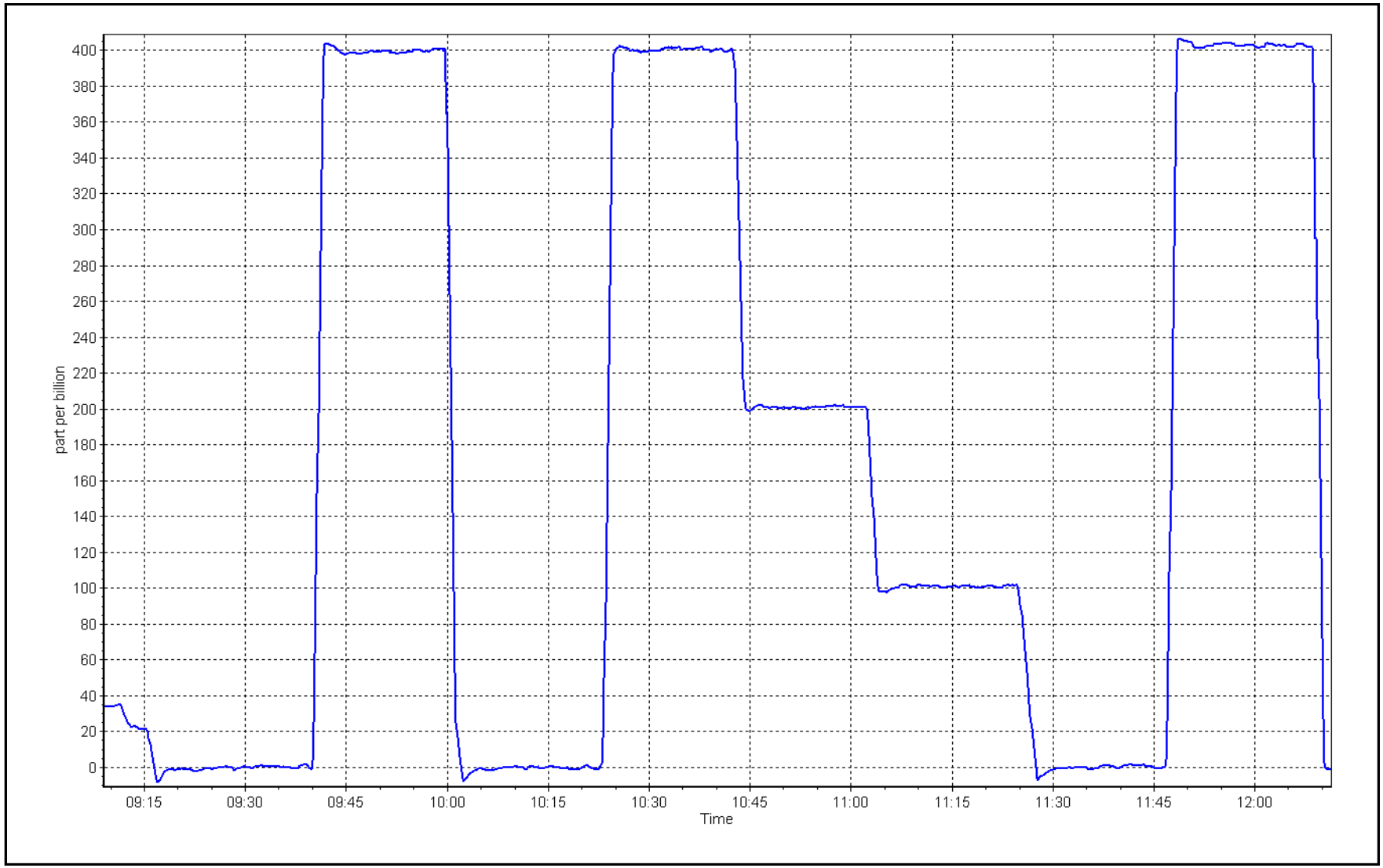
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
400.0	400.6	0.9985
200.0	201.4	0.9930
100.0	101.0	0.9901

Statistical Evaluation		Limits
Correlation Coefficient	0.999988	≥0.995
Slope	1.001286	0.90 - 1.10
Intercept	0.500000	+/- 5



O_3 Calibration Plot Date: July 14, 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:	July 14, 2023	Last Cal Date:	June 5, 2023
Start time (MST):	13:19	End time (MST):	14:20
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)	19.4	19.4	19.4	☐	+/- 2 °C
P (mmHg)	727.5	728.1	727.5	☐	+/- 10 mmHg
flow (LPM)	5.00	5.06	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: July 14, 2023 Last Cal Date: June 5, 2023

PM w/o HEPA: 105.3 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	9	10.9	10.9	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 79.4 w/ HEPA: 0

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

Disposable Filter Changed: July 14, 2023

Annual Maintenance

Date Sample Tube Cleaned: April 13, 2023

Date RH/T Sensor Cleaned: April 13, 2023

Notes: "Perform span dust check" alarm was on upon arrival. Cleaned the chamber and changed the filter. PMT peak was on target after the post maintenance. Leak check passed, no adjustments made.

Calibration by: Max Farrell

Wood Buffalo Environmental Association

TN - NO_X - NH_3 Calibration Report

Version-05-2023

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
NOX Cal Date:	July 18, 2023	Last Cal Date:	June 26, 2023
Start time (MST):	9:19	End time (MST):	13:45
NH3 Cal Date:	July 18, 2023	Last Cal Date:	June 27, 2023
Start time (MST):	13:45	End time (MST):	17:20
Reason:	Routine		

Calibration Standards

NOX Cal Gas Conc:	47.94	ppm	NO Gas Cylinder #:	T30YCWN
NO Cal Gas Conc:	46.39	ppm	NO Cal Gas Expiry:	April 11, 2025
Removed NOX Conc:	47.94	ppm	Removed Cylinder #:	NA
Removed NO Conc:	46.39	ppm	Removed cyl Expiry:	NA
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 #:	NA
NH3 gas Diff:			Removed cyl Expiry:	NA
Calibrator Model:	API T700		Serial Number:	3566
ZAG make/model:	API T701		Serial Number:	4602

Analyzer Information

Analyzer model:	Teledyne API T201	Analyzer serial #:	152
Converter model:	Teledyne API T501	Converter serial #:	147
NH3 Range (ppb):	0 - 2000 ppb	Reaction cell Press:	6.50
NOX Range (ppb):	0 - 1000 ppb	Sample Flow:	542

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

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	1.005776	1.012637
NO_X Cal Offset:	1.234716	1.353007
NO Cal Slope:	0.998846	1.012223
NO Cal Offset:	1.222396	1.240145
NO_2 Cal Slope:	1.005535	1.001251
NO_2 Cal Offset:	0.912555	0.861558
NH3 Cal Slope:	1.017396	1.026272
NH3 Cal Offset:	0.876681	3.727263
TN Cal Slope:	1.023007	1.031709
TN Cal Offset:	0.746567	4.015689

Wood Buffalo Environmental Association

TN - NOX - NH_3 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated TN concentration (ppb) (Cc)	Calculated NOX concentration (ppb) (Cc)	Calculated NH3 concentration (ppb) (Cc)	Indicated TN concentration (ppb) (Ic)	Indicated NOX concentration (ppb) (Ic)	Indicated NH3 concentration (ppb) (Ic)	TN Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NH3 Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	1.2	0.0	1.2	----	----
as found NO	4914	86.2	826.5	826.5	----	839.1	839.0	0.0	0.985	----
calibrator zero	5000	0.0	0.0	0.0	0.0	1.2	0.0	1.2	----	----
high NO point	4914	86.2	826.5	826.5	----	839.1	839.0	0.0	0.985	----
GPT point	4914	86.2	826.5	826.5	----	846.4	834.5	11.8	0.976	----
as found NH3	3419	81.0	1800.5	----	1800.5	1859.7	----	1849.8	0.968	0.973
new NH3 cyl rp							----			
first NH3	3419	81.0	1800.5	----	1800.5	1859.7	----	1849.8	0.968	0.973
second NH3	3455	45.0	1000.3	----	1000.3	1038.2	----	1032.3	0.963	0.969
third NH3	3478	22.5	500.1	----	500.1	522.5	----	519.2	0.957	0.963
								Average Correction Factor	0.9807	0.9685

Corrected As found TN = 837.9 ppb NO_X = 839.0 ppb NH3 = 1848.6 ppb

Previous Response TN = 846.2 ppb NO_X = 832.5 ppb NH3 = 1832.7 ppb

*Percent Change TN = -1.0%

*Percent Change NO_X = 0.8%

*Percent Change NH3 = 0.9%

* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 90.8%

NH3 Current Converter Efficiency = 90.8%

Wood Buffalo Environmental Association

NO_X - NO - NO_2 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.0	0.2	1.2	----	----
as found span	4914	86.2	826.5	799.7	826.5	839.0	807.7	839.1	0.9850	0.9901
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.2	2.9	----	----
high point	4914	86.2	826.5	799.7	826.5	837.9	810.4	839.3	0.9863	0.9868
second point	4957	43.1	413.2	399.9	413.2	419.4	406.0	424.5	0.9853	0.9849
third point	4978	21.6	207.1	200.4	207.1	213.3	205.5	215.4	0.9710	0.9753
								Average Correction Factor	0.9809	0.9823

Baseline Corr As fnd	TN =	837.9 ppb	NO_X =	839.0 ppb	NO =	807.5 ppb	*Percent Change	TN = -1.0%
Previous Response	TN =	846.2 ppb	NO_X =	832.5 ppb	NO =	800.0 ppb	*Percent Change	NO_X = 0.8%
							*Percent Change	NO = 0.9%

* = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found zero	----	----	0.0	-0.3	----	----
calibration zero	----	----	0.0	-0.3	----	----
1st GPT point (400 ppb O3)	807.0	401.5	432.2	433.0	0.9982	100.2%
2nd GPT point (200 ppb O3)	807.0	607.3	226.4	227.9	0.9935	100.7%
3rd GPT point (100 ppb O3)	807.0	700.2	133.5	136.0	0.9818	101.9%
				Average Correction Factor	0.9912	100.9%

Notes: No adjustments or maintenance performed.

Calibration Performed By: Maddison Baragar

Wood Buffalo Environmental Association

TN Calibration Summary

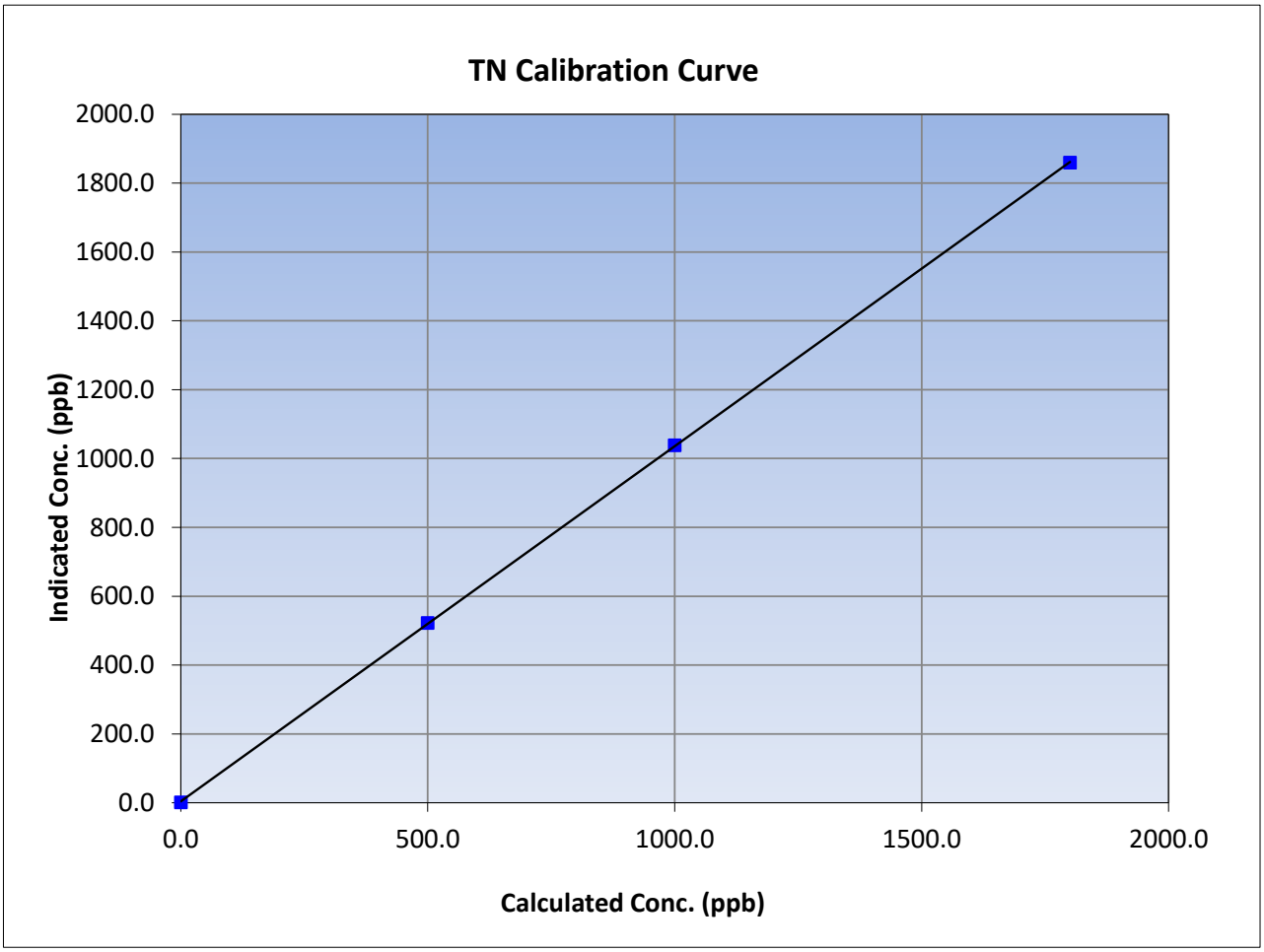
Version-05-2023

Station Information

Calibration Date:	July 18, 2023	Previous Calibration:	June 26, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	13:45	End Time (MST):	17:20
Analyzer make:	Teledyne API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	1.2	----	Correlation Coefficient	0.999988	≥0.995
1800.5	1859.7	0.9682			
1000.3	1038.2	0.9635	Slope	1.031709	0.90 - 1.10
500.1	522.5	0.9571			
			Intercept	4.015689	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

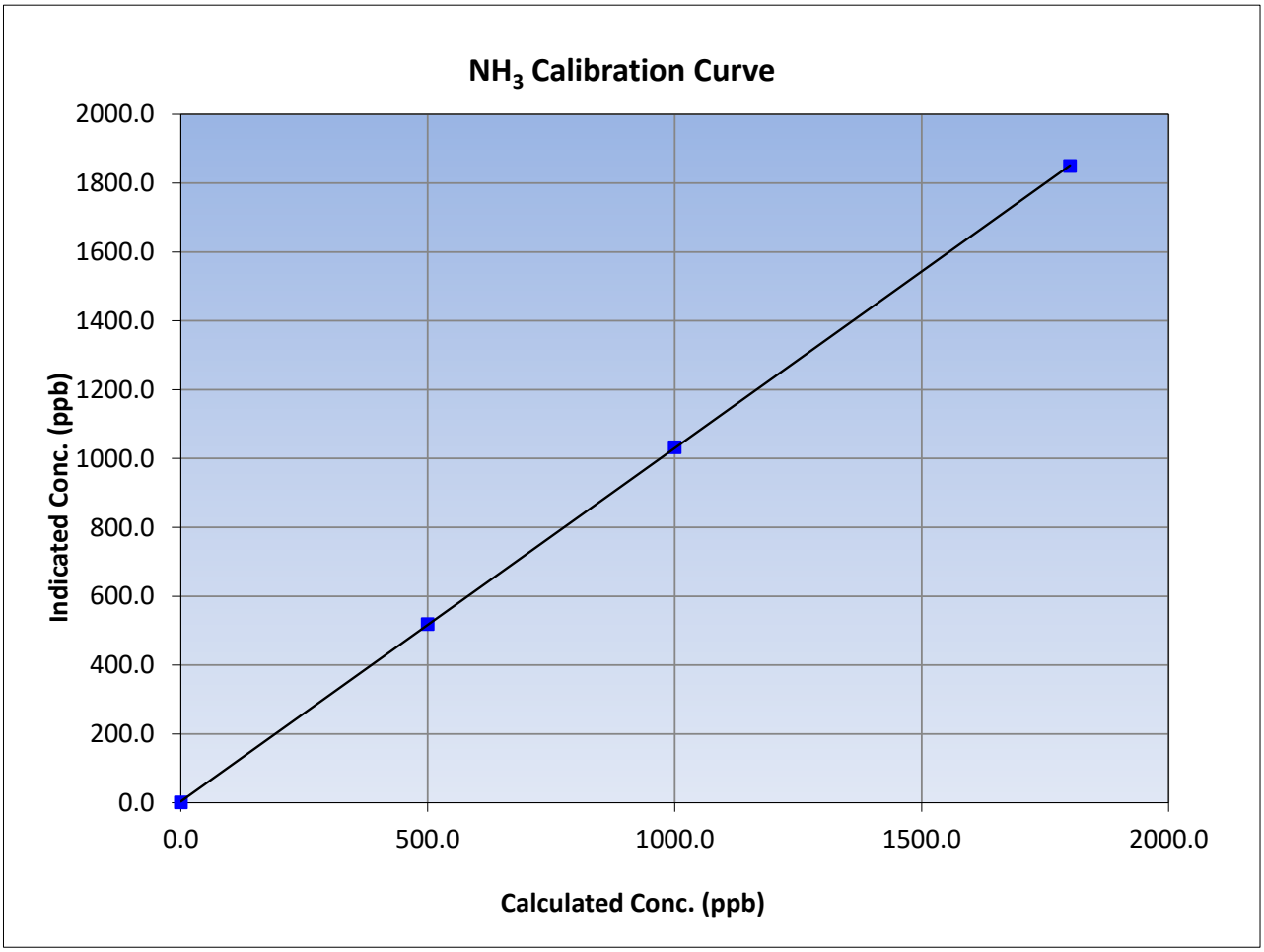
Version-05-2023

Station Information

Calibration Date:	July 18, 2023	Previous Calibration:	June 26, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	13:45	End Time (MST):	17:20
Analyzer make:	Teledyne API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	1.2	----	Correlation Coefficient	0.999990	≥0.995
1800.5	1849.8	0.9734			
1000.3	1032.3	0.9690	Slope	1.026272	0.90 - 1.10
500.1	519.2	0.9632			
			Intercept	3.727263	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

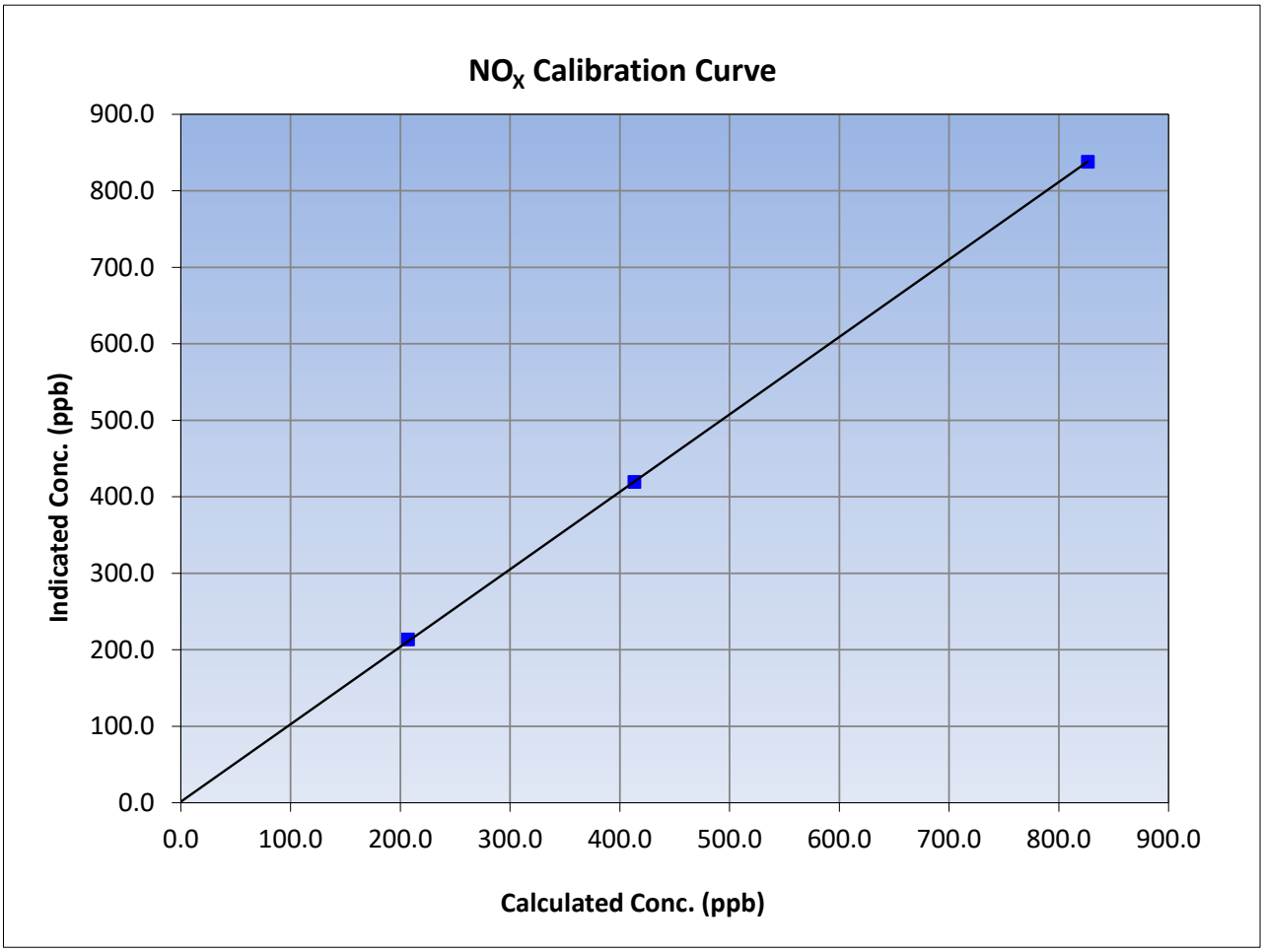
Version-05-2023

Station Information

Calibration Date:	July 18, 2023	Previous Calibration:	June 26, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:19	End Time (MST):	13:45
Analyzer make:	Teledyne 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	0.999981	≥0.995
826.5	837.9	0.9863			
413.2	419.4	0.9853	Slope	1.012637	0.90 - 1.10
207.1	213.3	0.9710			
			Intercept	1.353007	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

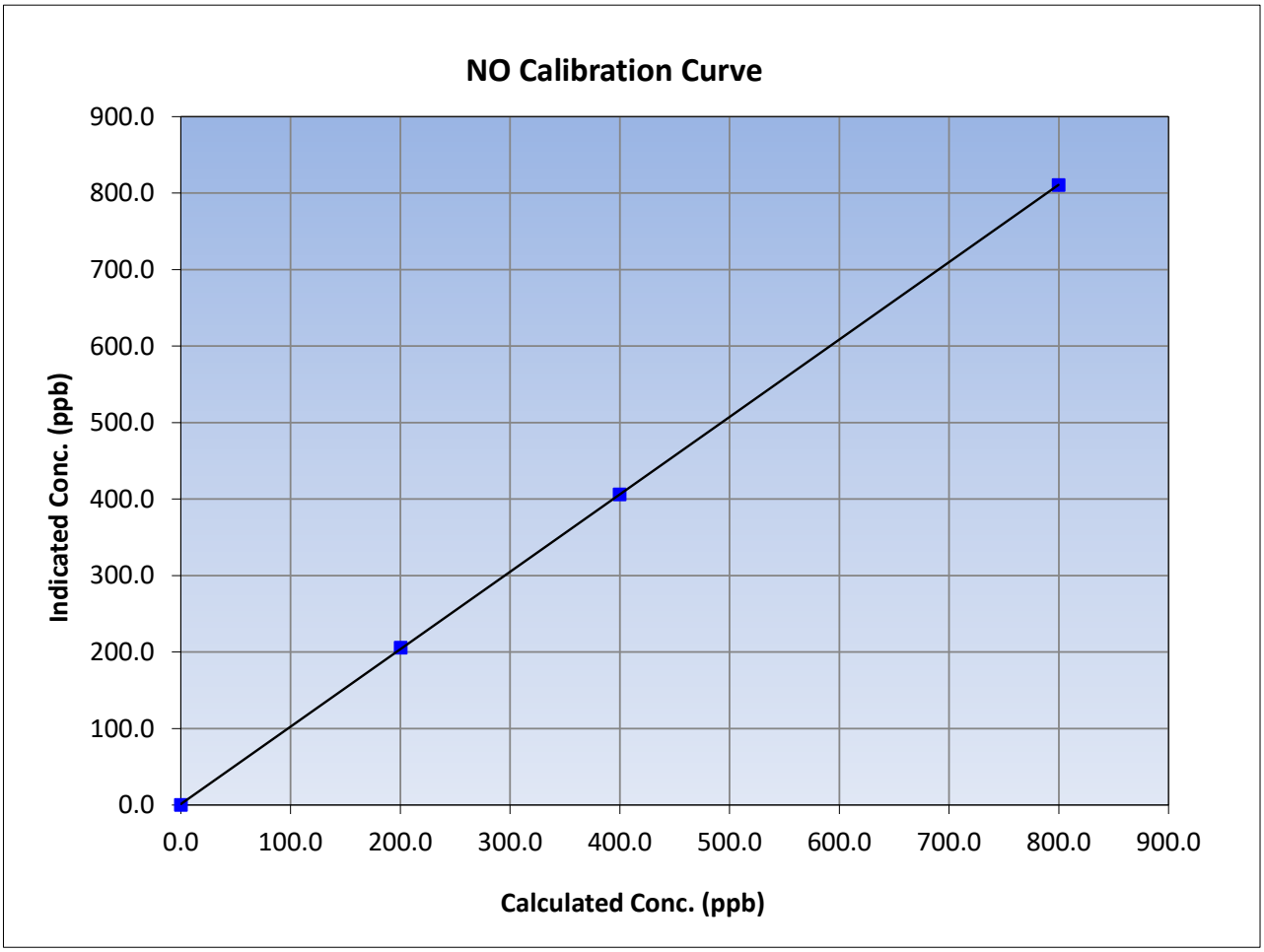
Version-05-2023

Station Information

Calibration Date:	July 18, 2023	Previous Calibration:	June 26, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:19	End Time (MST):	13:45
Analyzer make:	Teledyne API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999991	≥0.995
799.7	810.4	0.9868			
399.9	406.0	0.9849	Slope	1.012223	0.90 - 1.10
200.4	205.5	0.9753			
			Intercept	1.240145	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

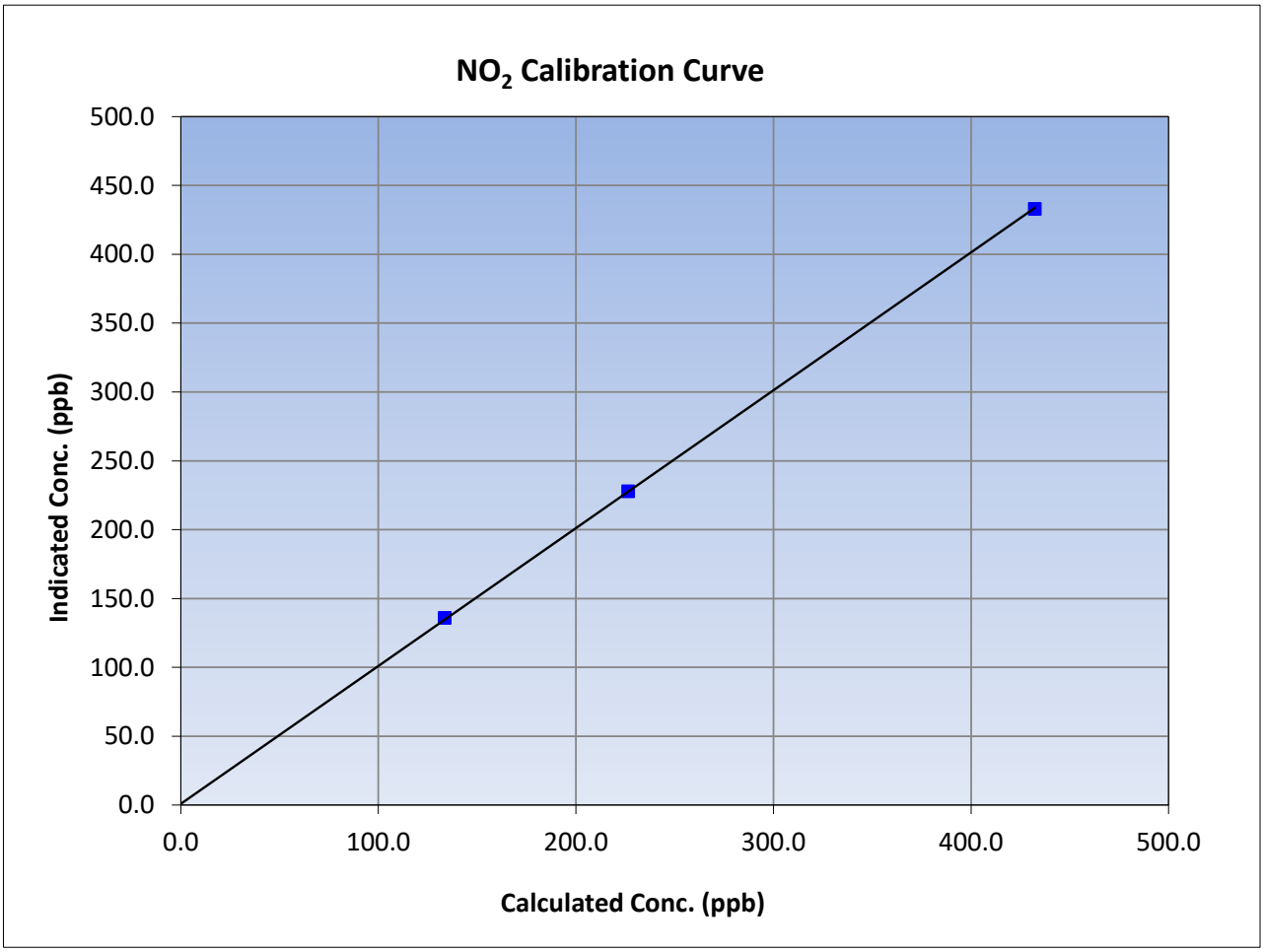
Version-05-2023

Station Information

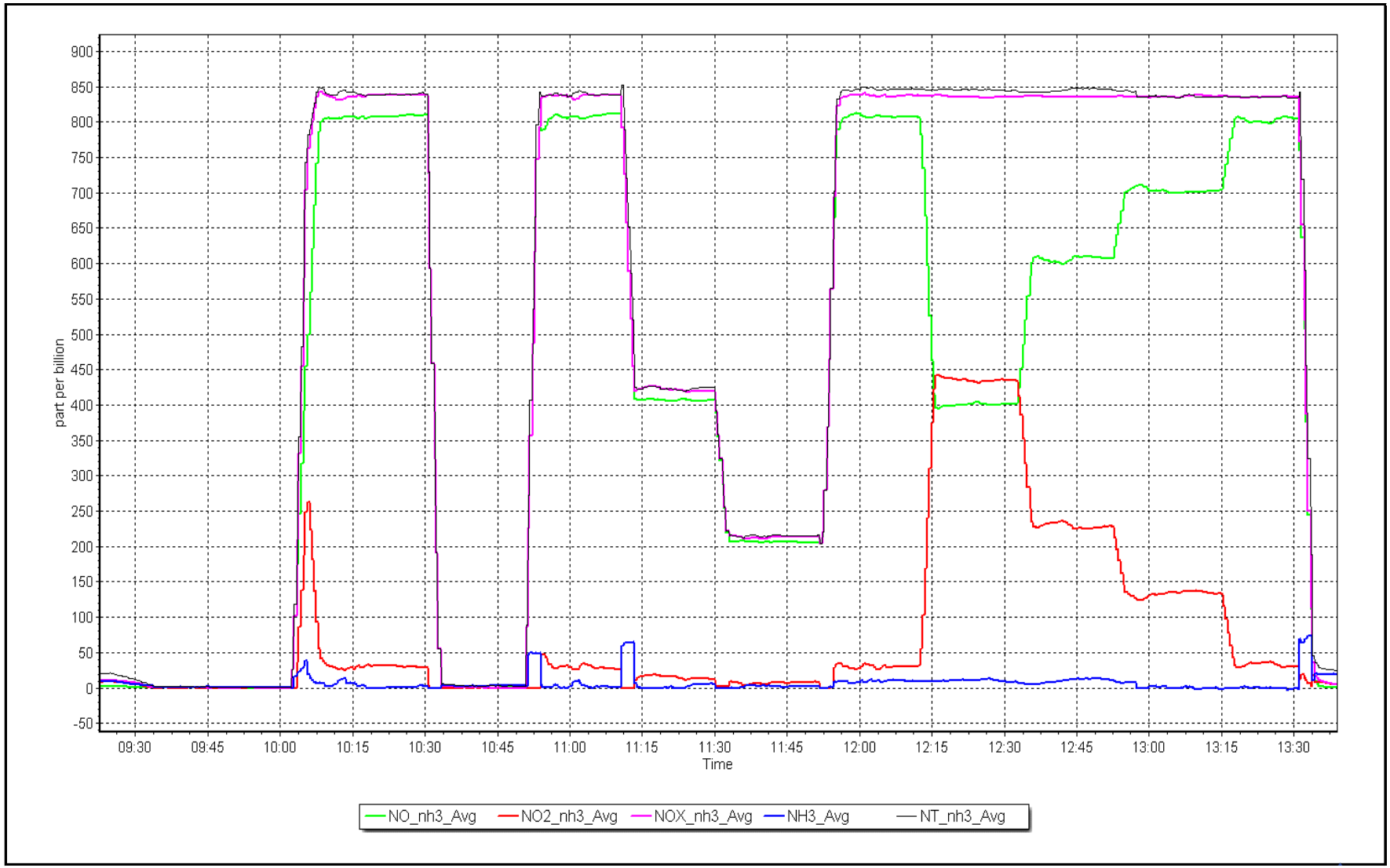
Calibration Date:	July 18, 2023	Previous Calibration:	June 26, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:19	End Time (MST):	13:45
Analyzer make:	Teledyne API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.3	----	Correlation Coefficient	0.999960	≥0.995
432.2	433.0	0.9982			
226.4	227.9	0.9935	Slope	1.001251	0.90 - 1.10
133.5	136.0	0.9818			
			Intercept	0.861558	+/-20



NO_X Calibration Plot Date: July 18, 2023 Location: Patricia McInnes



NH_3 Calibration Plot Date: July 18, 2023 Location: Patricia McInnes

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS07
ATHABASCA VALLEY
JULY 2023

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

August 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	July 6, 2023	Last Cal Date:	June 16, 2023
Start time (MST):	9:17	End time (MST):	16:58
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:	1.003815	0.995398	Backgd or Offset:	2.70	2.61
Calibration intercept:	1.384231	2.183198	Coeff or Slope:	0.840	0.834

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4921	79.3	801.2	805.9	0.994
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4921	79.3	801.2	798.4	1.004
second point	4960	39.6	400.2	402.2	0.995
third point	4980	19.8	200.1	203.1	0.985
as left zero	5000	0.0	0.0	0.0	----
as left span	4921	79.2	800.2	804.1	0.995
				Average Correction Factor	0.994

Baseline Corr As found:	806.00	Previous response	805.64	*% 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: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

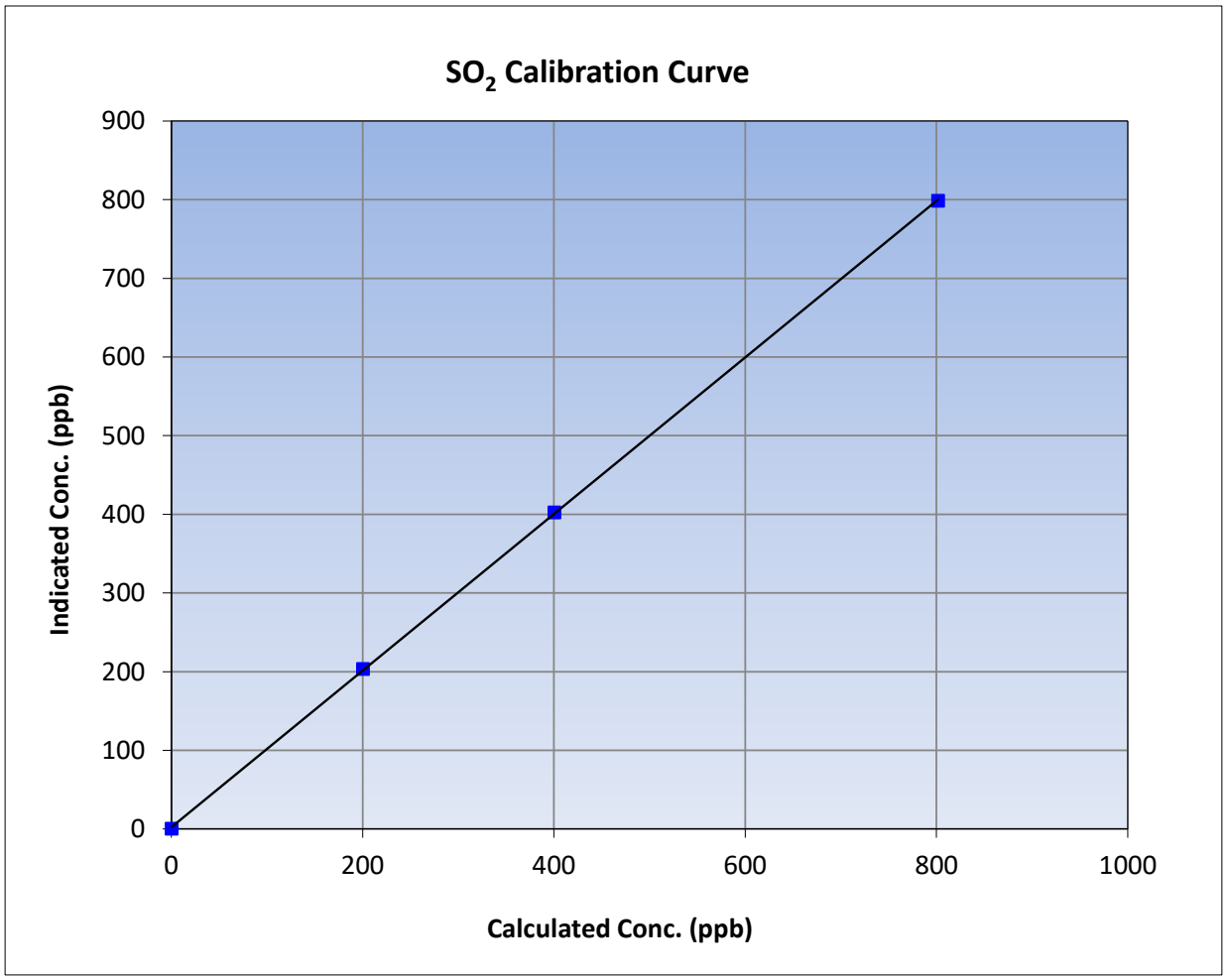
Station Information

Calibration Date:	July 6, 2023	Previous Calibration:	June 16, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:17	End Time (MST):	16:58
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1507864683

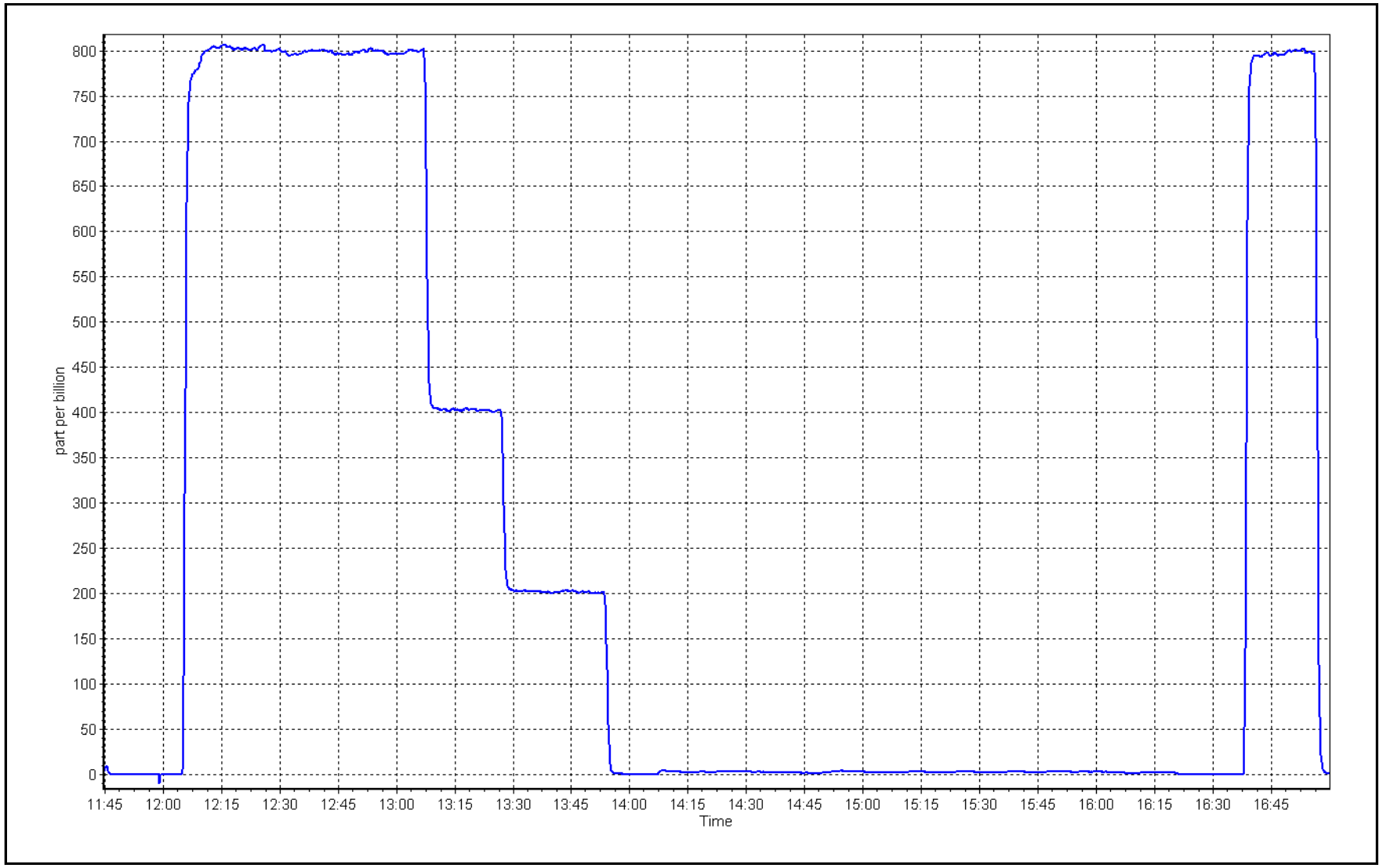
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
801.2	798.4	1.0035
400.2	402.2	0.9949
200.1	203.1	0.9851

Statistical Evaluation		Limits
Correlation Coefficient	0.999964	≥0.995
Slope	0.995398	0.90 - 1.10
Intercept	2.183198	+/-30



SO2 Calibration Plot Date: July 6, 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:	July 11, 2023	Last Cal Date:	June 26, 2023
Start time (MST):	9:05	End time (MST):	13:45
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.25	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC504080			
Removed Cal Gas Conc:	5.25	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3805
ZAG Make/Model:	API T701H		Serial Number:	198

Analyzer Information

Analyzer make:	Thermo 43i LTE		Analyzer serial #:	1180540018	
Converter make:	CDN-101		Converter serial #:	551	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003525	1.008281	Backgd or Offset:	2.33	2.33
Calibration intercept:	-0.042085	-0.182074	Coeff or Slope:	0.885	0.885

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	79.3	80.0	0.990
as found 2nd point	4962	37.7	39.6	39.8	0.992
as found 3rd point	4981	18.9	19.8	19.7	1.002
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4925	75.5	79.3	79.8	0.994
second point	4962	37.7	39.6	39.9	0.993
third point	4981	18.9	19.9	19.5	1.018
as left zero	5000	0.0	0.0	0.0	----
as left span	4925	75.5	79.3	79.5	0.998
SO2 Scrubber Check	4921	79.2	800.2	0.1	----
Date of last scrubber change:		25-Feb-22		Ave Corr Factor	1.002
Date of last converter efficiency test:		April 22, 2022		92.6%	efficiency

Baseline Corr As found:	80.1	Prev response:	79.50	*% change:	0.7%
Baseline Corr 2nd AF pt:	39.9	AF Slope:	1.011456	AF Intercept:	-0.222210
Baseline Corr 3rd AF pt:	19.8	AF Correlation:	0.999989		

* = > +/-5% change initiates investigation

Notes: Scrubber check passed. No adjustment needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

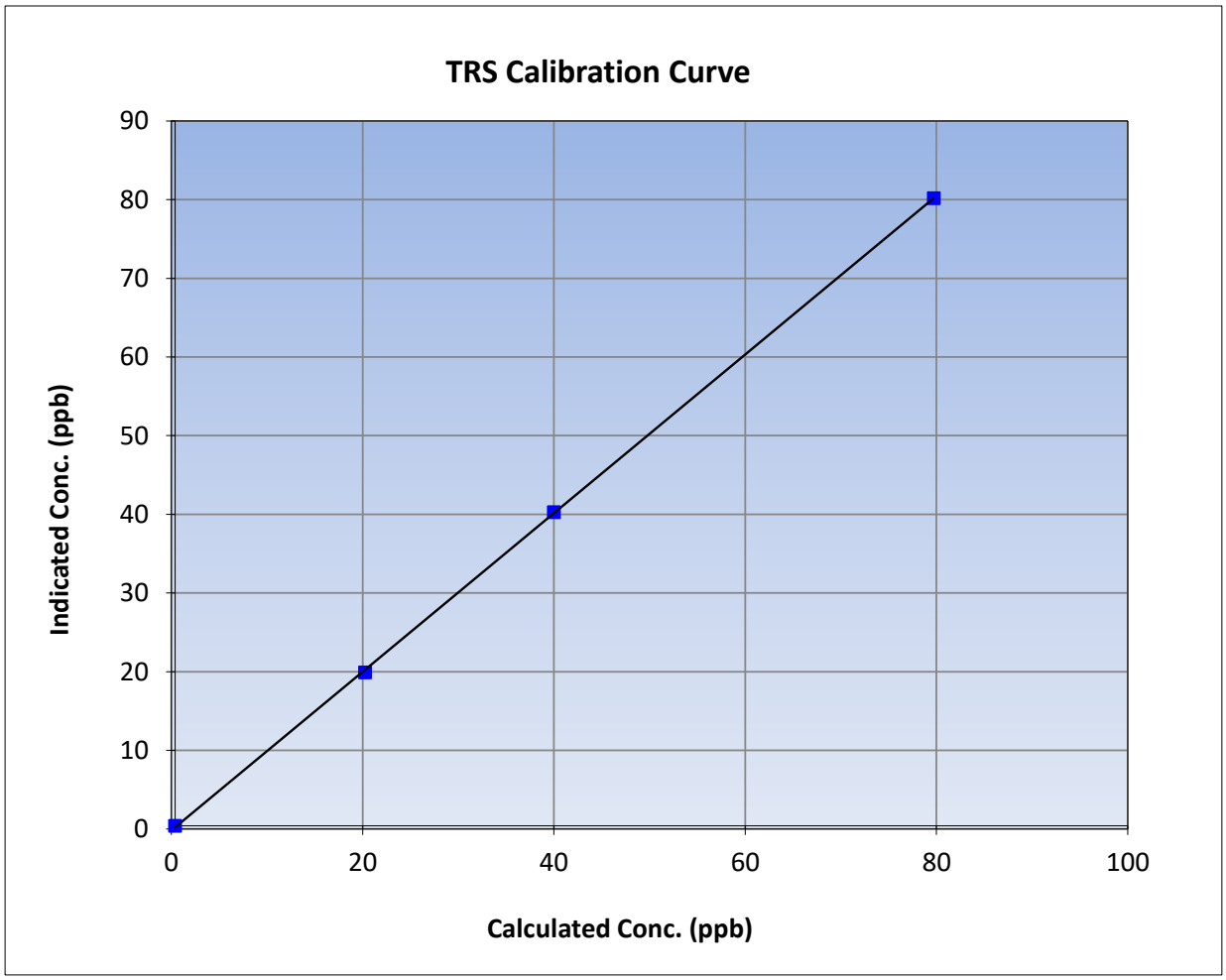
Station Information

Calibration Date:	July 11, 2023	Previous Calibration:	June 26, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:05	End Time (MST):	13:45
Analyzer make:	CDN-101	Analyzer serial #:	551

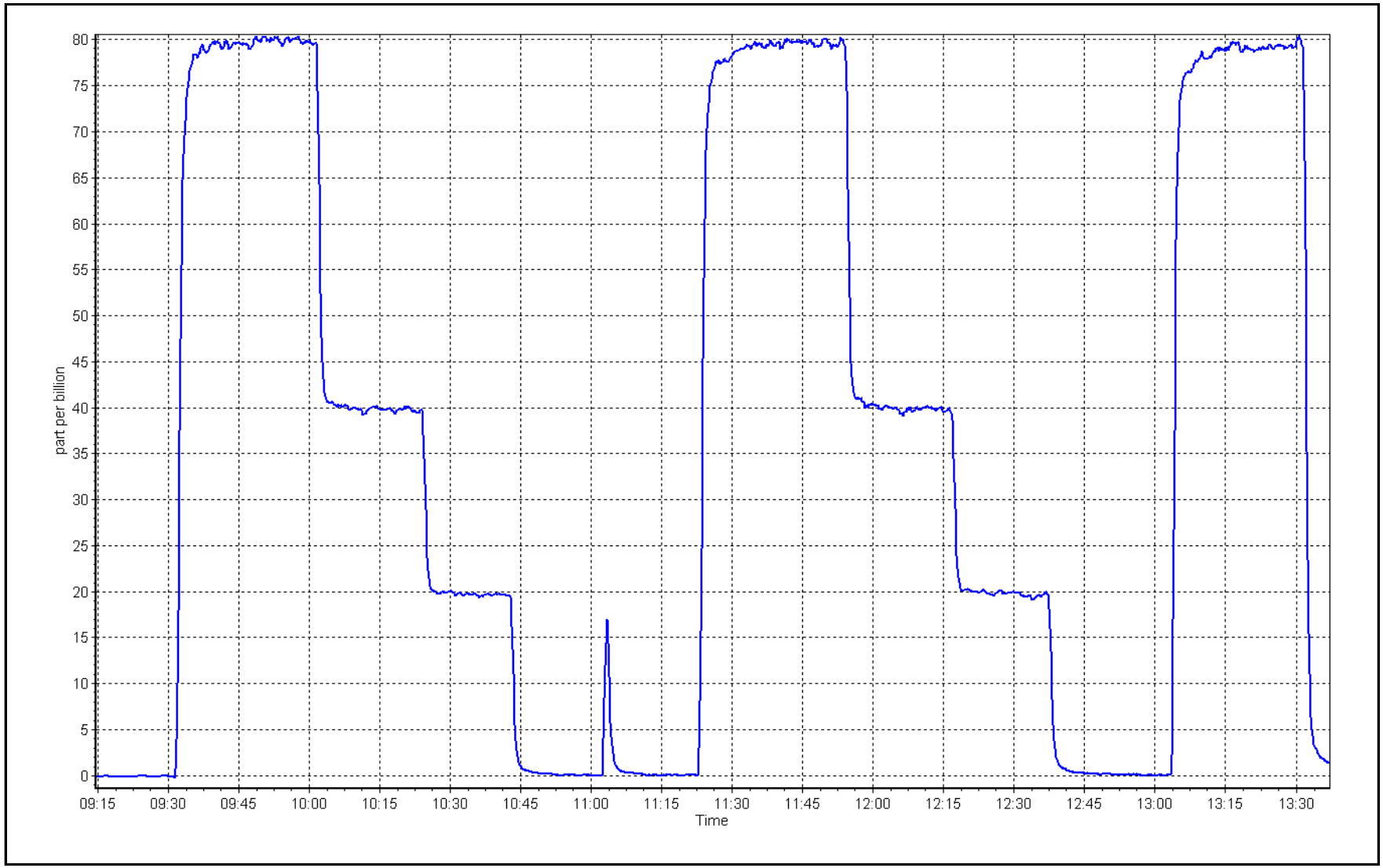
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
79.3	79.8	0.9939
39.6	39.9	0.9927
19.9	19.5	1.0183

Statistical Evaluation		Limits
Correlation Coefficient	0.999952	≥0.995
Slope	1.008281	0.90 - 1.10
Intercept	-0.182074	+/-3



TRS Calibration Plot Date: July 11, 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:	July 6, 2023	Last Cal Date:	June 28, 2023
Start time (MST):	9:00	End time (MST):	10:55
Reason:	Removal		

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:	0.000288	NA	NMHC SP Ratio:	5.28E-05	NA
CH4 Retention time:	14.0	NA	NMHC Peak Area:	172128	NA

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	17.03	16.31	1.044
as found 2nd point	4960	39.6	8.52	8.15	1.044
as found 3rd point	4980	19.8	4.26	4.11	1.035
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	

Baseline Corr AF:	16.31	Prev response	16.92	*% change	-3.7%
Baseline Corr 2nd AF:	8.2	AF Slope:	0.957020	AF Intercept:	0.014074
Baseline Corr 3rd AF:	4.1	AF Correlation:	0.999994	* = > +/-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	9.09	8.16	1.114
as found 2nd point	4960	39.6	4.55	4.09	1.112
as found 3rd point	4980	19.8	2.27	2.08	1.094
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	8.16	Prev response	8.98	*% change	-10.0%
Baseline Corr 2nd AF:	4.1	AF Slope:	0.896083	AF Intercept:	0.017237
Baseline Corr 3rd AF:	2.1	AF Correlation:	0.999975	* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	7.94	8.15	0.974
as found 2nd point	4960	39.6	3.97	4.07	0.977
as found 3rd point	4980	19.8	1.98	2.04	0.975
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	8.15	Prev response	7.94	*% change	2.6%
Baseline Corr 2nd AF:	4.07	AF Slope:	1.027057	AF Intercept:	-0.003563
Baseline Corr 3rd AF:	2.04	AF Correlation:	0.999997	* = > +/-5% change initiates investigation	

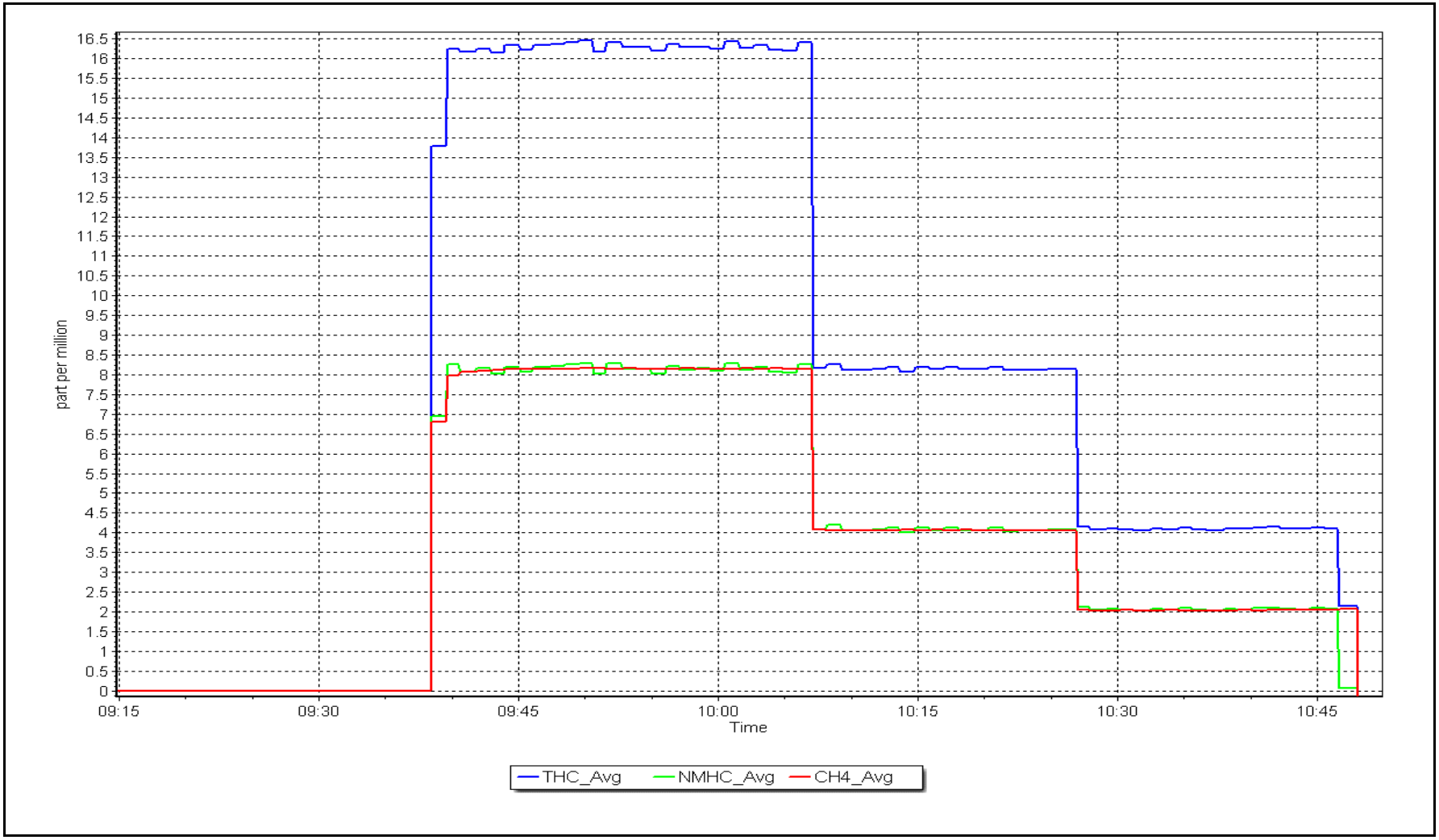
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.993911	
THC Cal Offset:	-0.005538	
CH4 Cal Slope:	1.000237	
CH4 Cal Offset:	0.002841	
NMHC Cal Slope:	0.988285	
NMHC Cal Offset:	-0.007979	

Notes: Removal calibration performed due to dips, more maintenance needed at the WBEAC.

Calibration Performed By: Aswin Sasi Kumar

NMHC Calibration Plot Date: July 6, 2023 Location: Athabasca Valley



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	July 6, 2023	Last Cal Date:	NA
Start time (MST):	11:45	End time (MST):	16:58
Reason:	Install		

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 #:	1152430012	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	NA	0.000259	NMHC SP Ratio:	NA	5.19E-05
CH4 Retention time:	NA	14.2	NMHC Peak Area:	NA	175309

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	0.01	----
high point	4921	79.2	17.03	17.03	1.000
second point	4960	39.6	8.52	8.51	1.000
third point	4980	19.8	4.26	4.31	0.989
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	16.85	1.010
				Average Correction Factor	0.996

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

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	9.09	9.09	1.000
second point	4960	39.6	4.55	4.54	1.002
third point	4980	19.8	2.27	2.32	0.981
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	9.09	8.95	1.016
				Average Correction Factor	0.994
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	5000	0.0	0.00		----
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.01	----
high point	4921	79.2	7.94	7.94	1.000
second point	4960	39.6	3.97	3.97	0.999
third point	4980	19.8	1.98	1.99	0.998
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.94	7.91	1.004
				Average Correction Factor	0.999
Baseline Corr AF:	NA	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:		0.998642
THC Cal Offset:		0.023460
CH4 Cal Slope:		0.999172
CH4 Cal Offset:		0.007041
NMHC Cal Slope:		0.998192
NMHC Cal Offset:		0.015619

Notes: Install calibration, "zero chromatogram" and "use flat baseline" turned on. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

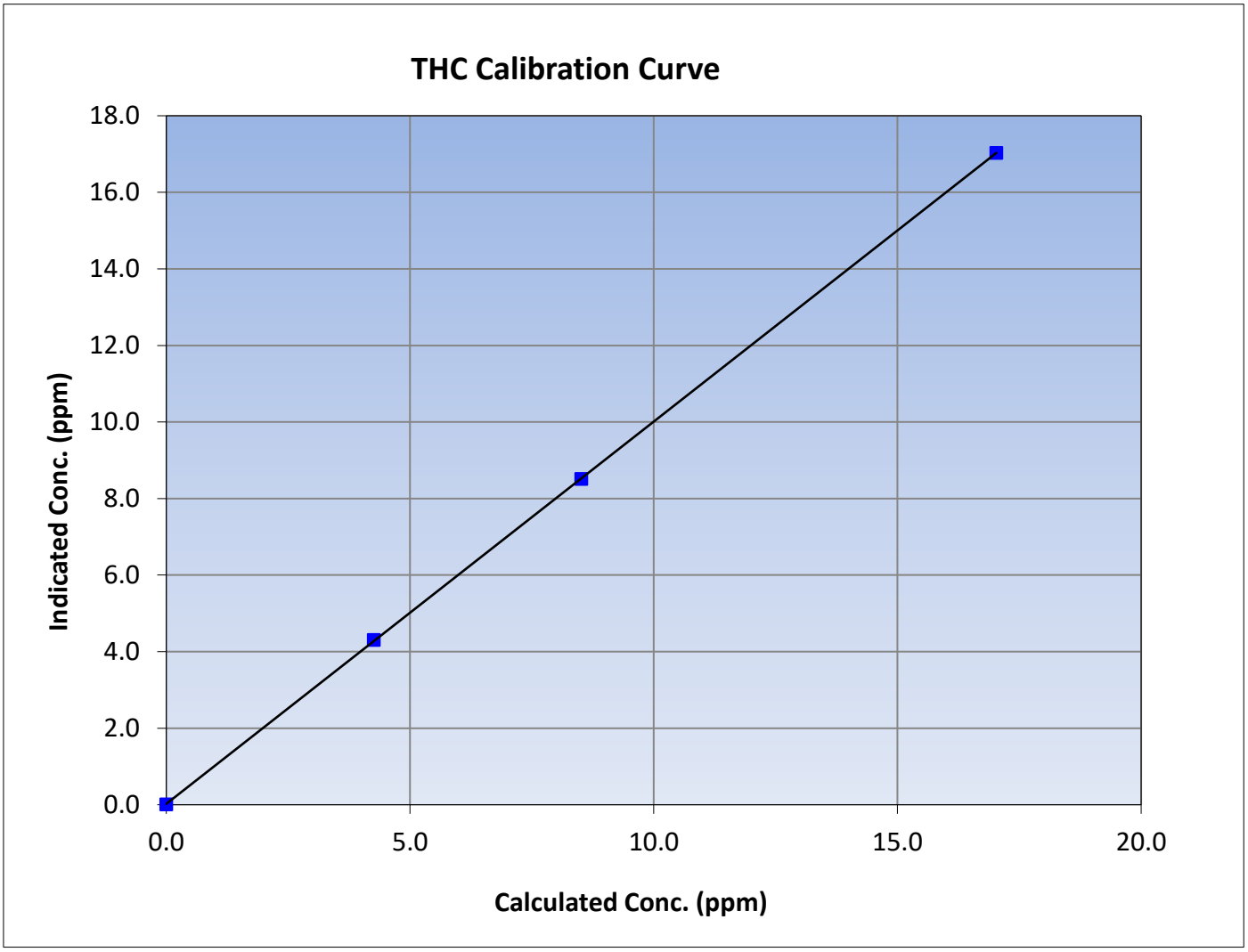
Version-01-2020

Station Information

Calibration Date:	July 6, 2023	Previous Calibration:	NA
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	11:45	End Time (MST):	16:58
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.01	----	Correlation Coefficient	0.999992	≥0.995
17.03	17.03	1.0000			
8.52	8.51	1.0004	Slope	0.998642	0.90 - 1.10
4.26	4.31	0.9890			
			Intercept	0.023460	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

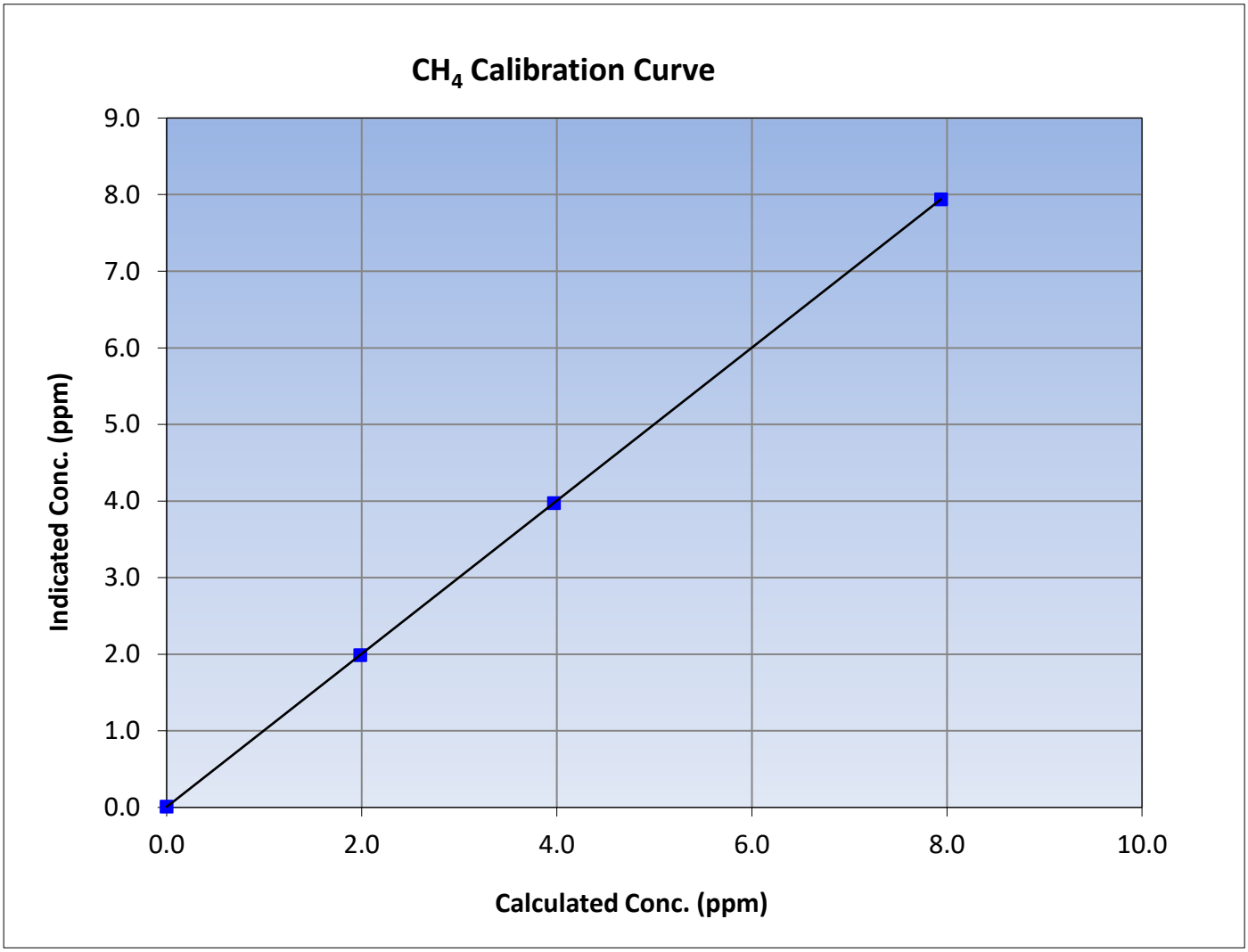
Version-01-2020

Station Information

Calibration Date:	July 6, 2023	Previous Calibration:	NA
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	11:45	End Time (MST):	16:58
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.01	----	Correlation Coefficient	1.000000	≥0.995
7.94	7.94	0.9998			
3.97	3.97	0.9992	Slope	0.999172	0.90 - 1.10
1.98	1.99	0.9984			
			Intercept	0.007041	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

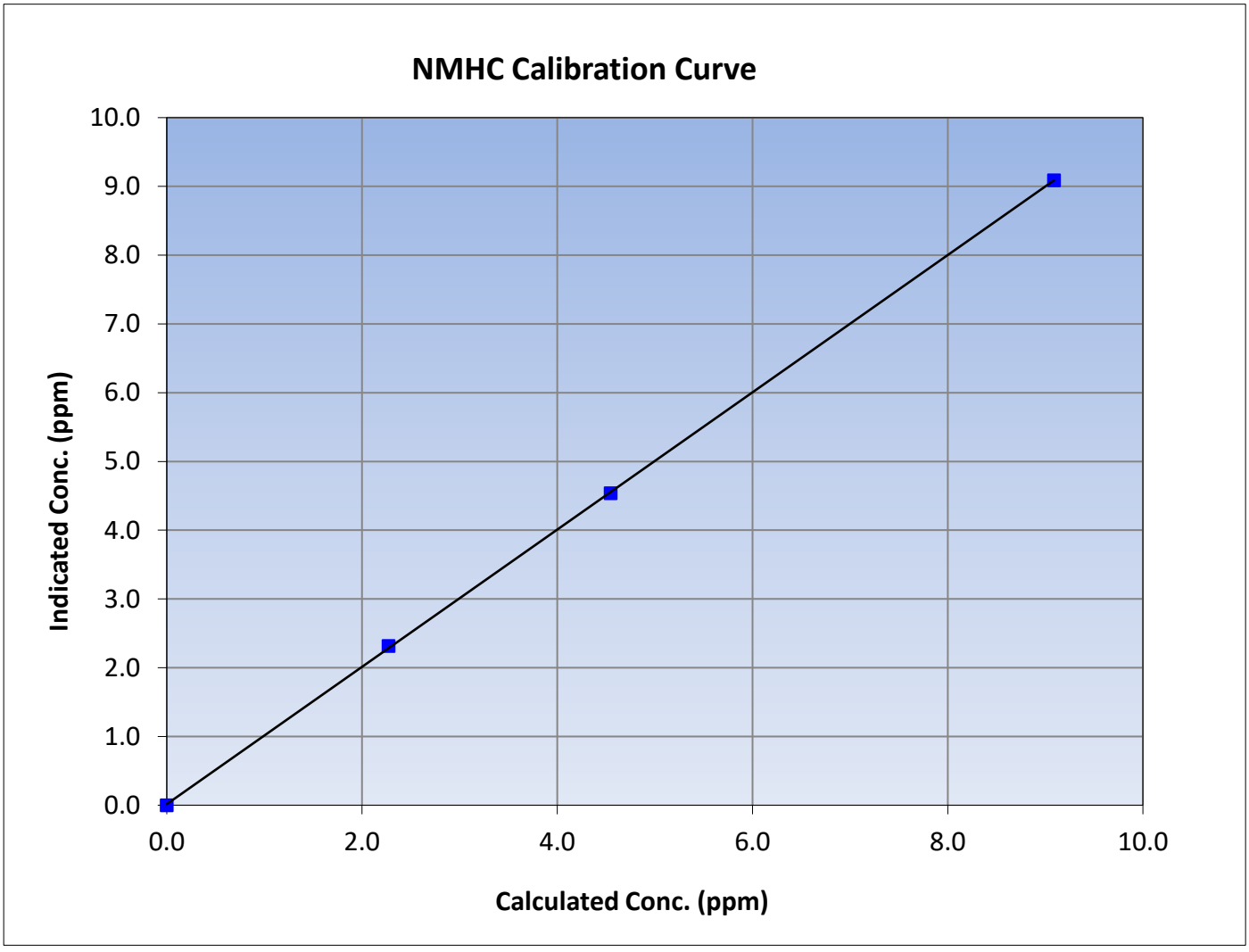
Version-01-2020

Station Information

Calibration Date:	July 6, 2023	Previous Calibration:	NA
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	11:45	End Time (MST):	16:58
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999966	≥0.995
9.09	9.09	1.0001			
4.55	4.54	1.0020	Slope	0.998192	0.90 - 1.10
2.27	2.32	0.9814			
			Intercept	0.015619	+/-0.5



NMHC Calibration Plot Date: July 6, 2023 Location: Athabasca Valley

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	July 10, 2023	Last Cal Date:	July 6, 2023
Start time (MST):	9:08	End time (MST):	14:18
Reason:	Maintenance		

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 #:	1152430012	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	0.000259	0.000268	NMHC SP Ratio:	5.19E-05	6.03E-05
CH4 Retention time:	14.2	14.4	NMHC Peak Area:	175309	150713

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	15.87	1.073
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.01	----
high point	4921	79.2	17.03	17.11	0.995
second point	4960	39.6	8.52	8.55	0.996
third point	4980	19.8	4.26	4.26	1.000
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	17.07	0.997
				Average Correction Factor	0.997

Baseline Corr AF:	15.87	Prev response	17.03	*% change	-7.3%
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	4921	79.2	9.09	8.16	1.114
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	9.09	9.14	0.995
second point	4960	39.6	4.55	4.55	0.998
third point	4980	19.8	2.27	2.26	1.007
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	9.09	9.11	0.998
				Average Correction Factor	1.000
Baseline Corr AF:	8.16	Prev response	9.09	*% change	-11.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	7.94	7.71	1.030
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.01	----
high point	4921	79.2	7.94	7.97	0.996
second point	4960	39.6	3.97	4.00	0.993
third point	4980	19.8	1.98	2.00	0.992
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.94	7.96	0.997
				Average Correction Factor	0.994
Baseline Corr AF:	7.71	Prev response	7.94	*% change	-3.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.998642	1.004709
THC Cal Offset:	0.023460	-0.003742
CH4 Cal Slope:	0.999172	1.003246
CH4 Cal Offset:	0.007041	0.010640
NMHC Cal Slope:	0.998192	1.006250
NMHC Cal Offset:	0.015619	-0.014182

Notes: Follow-up calibration on the recently installed instrument since span was 11% low during nightly z/s. Zero chromatogram setting turned off. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

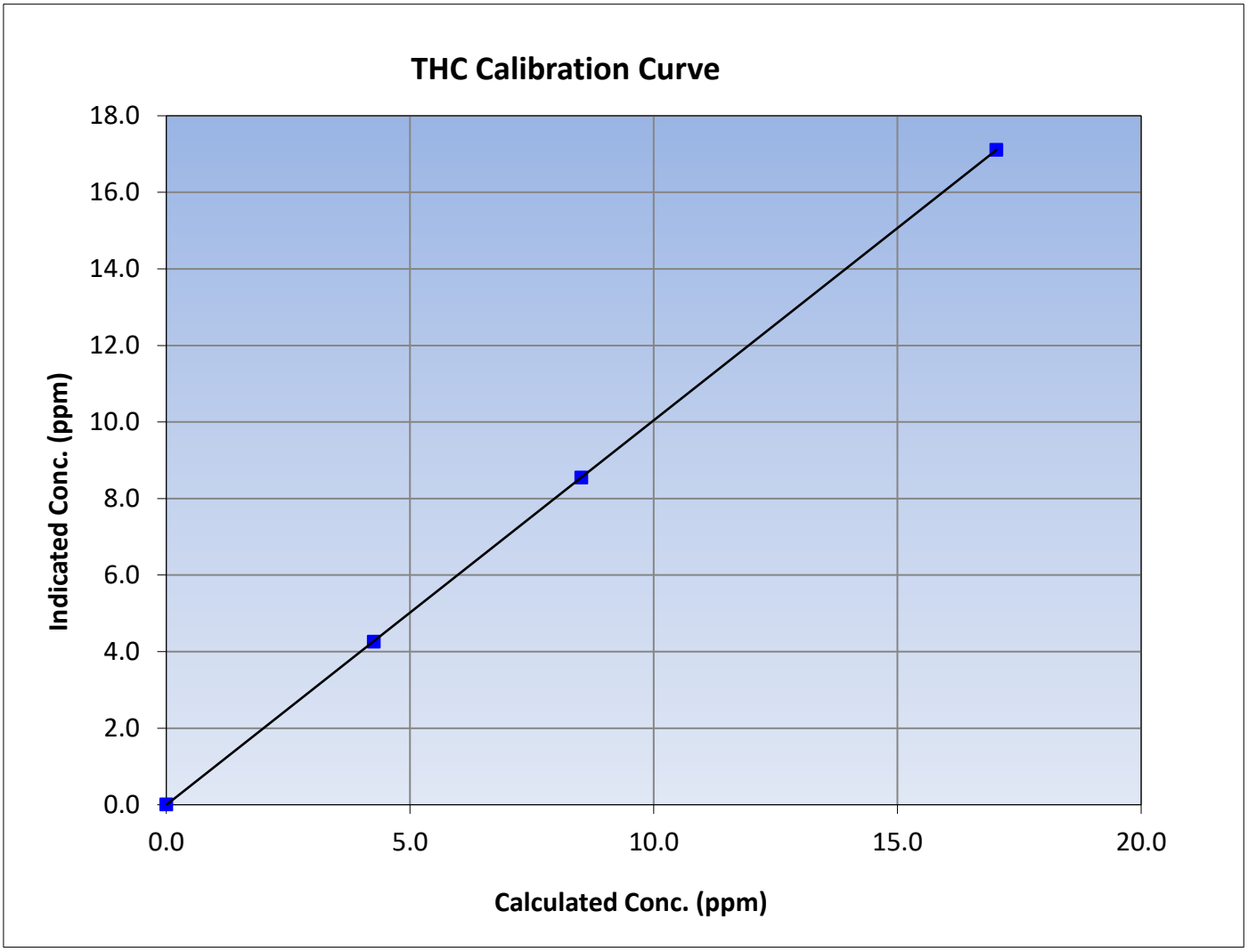
Version-01-2020

Station Information

Calibration Date:	July 10, 2023	Previous Calibration:	July 6, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:08	End Time (MST):	14:18
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.01	----	Correlation Coefficient	0.999997	≥0.995
17.03	17.11	0.9952			
8.52	8.55	0.9961	Slope	1.004709	0.90 - 1.10
4.26	4.26	0.9997			
			Intercept	-0.003742	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

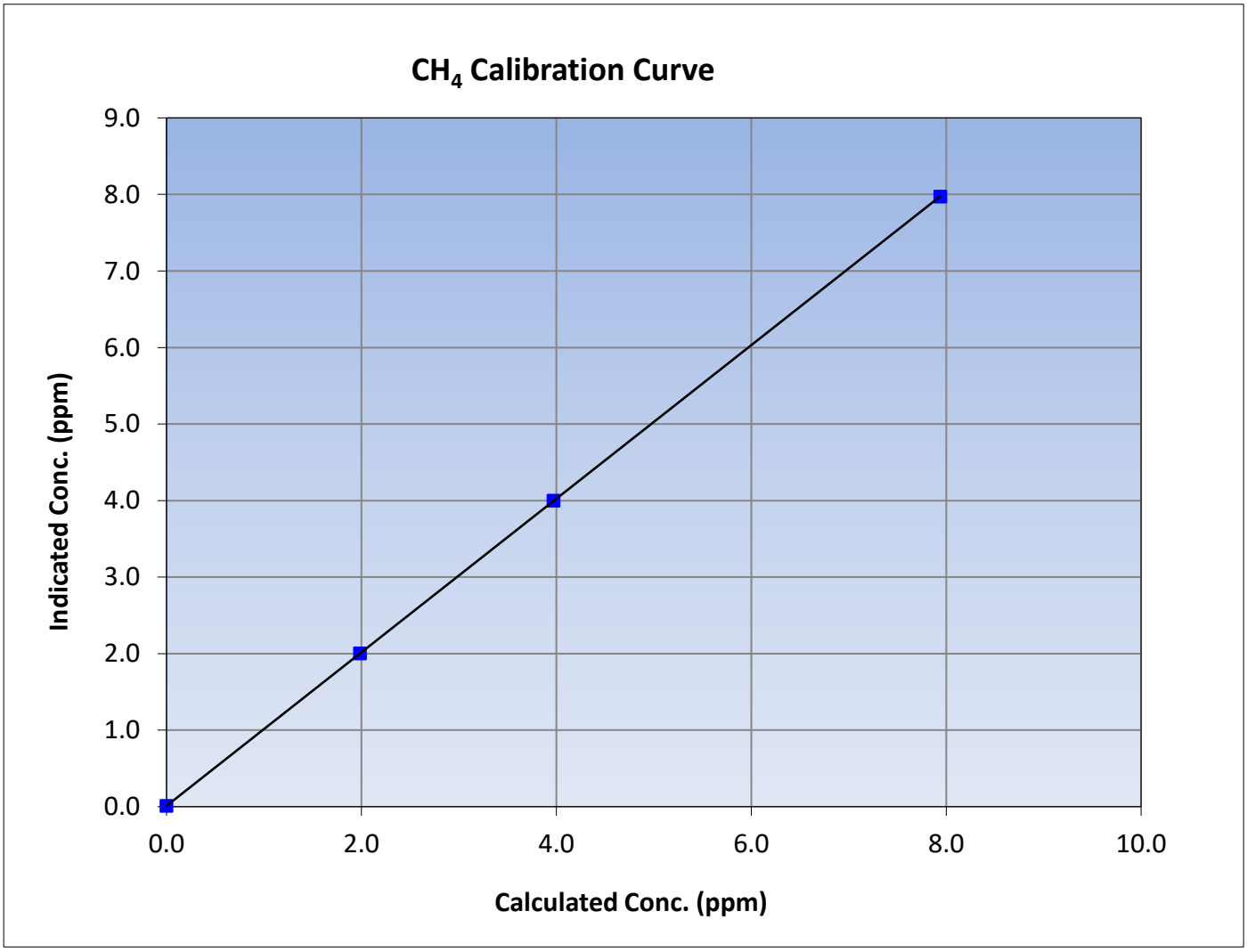
Version-01-2020

Station Information

Calibration Date:	July 10, 2023	Previous Calibration:	July 6, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:08	End Time (MST):	14:18
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.01	----	Correlation Coefficient	0.999999	≥0.995
7.94	7.97	0.9957			
3.97	4.00	0.9930	Slope	1.003246	0.90 - 1.10
1.98	2.00	0.9919			
			Intercept	0.010640	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

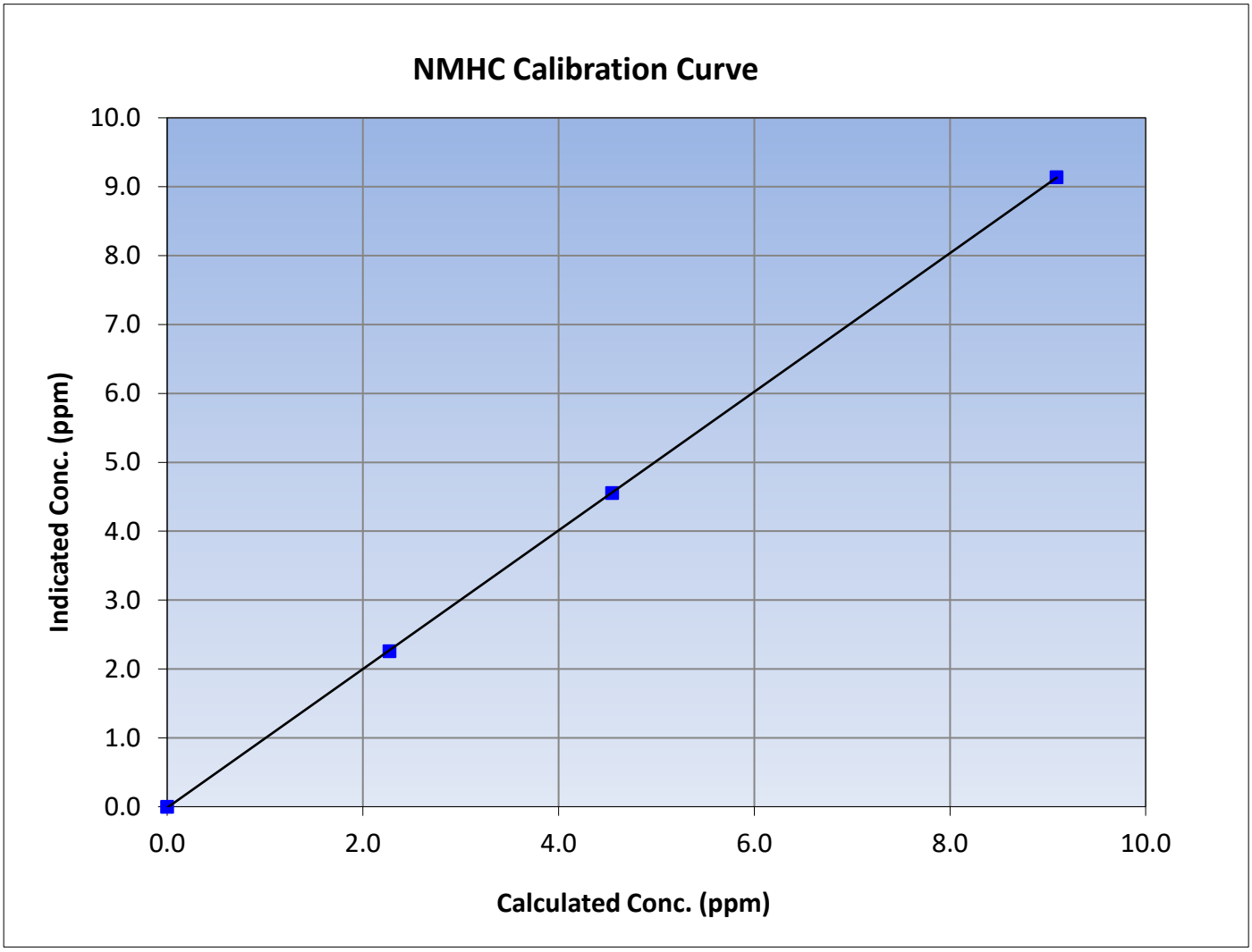
Version-01-2020

Station Information

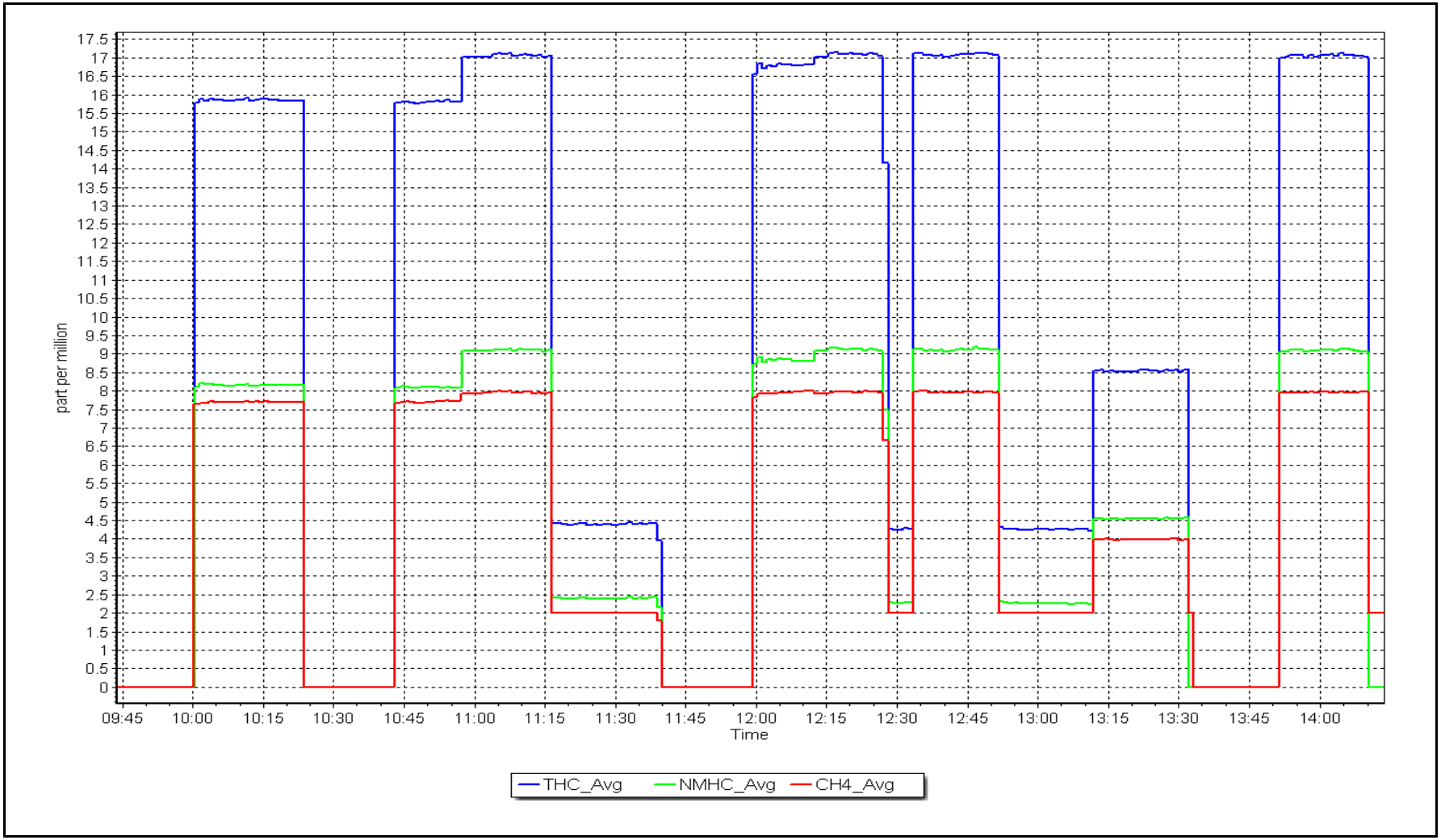
Calibration Date:	July 10, 2023	Previous Calibration:	July 6, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:08	End Time (MST):	14:18
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999989	≥0.995
9.09	9.14	0.9946			
4.55	4.55	0.9982	Slope	1.006250	0.90 - 1.10
2.27	2.26	1.0066			
			Intercept	-0.014182	+/-0.5



NMHC Calibration Plot Date: July 10, 2023 Location: Athabasca Valley



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	July 21, 2023	Last Cal Date:	July 10, 2023
Start time (MST):	9:33	End time (MST):	16:03
Reason:	Maintenance		

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 #:	1152430012	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	0.000268	0.000263	NMHC SP Ratio:	6.03E-05	4.97E-05
CH4 Retention time:	14.4	14.4	NMHC Peak Area:	150713	182990

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	17.03	17.51	0.973
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.01	----
high point	4921	79.2	17.03	16.93	1.006
second point	4960	39.6	8.52	8.35	1.019
third point	4980	19.8	4.26	4.21	1.011
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	16.50	1.032
				Average Correction Factor	1.012

Baseline Corr AF:	17.51	Prev response	17.11	*% change	2.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4921	79.2	9.09	9.47	0.960
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	9.09	8.99	1.011
second point	4960	39.6	4.55	4.41	1.032
third point	4980	19.8	2.27	2.23	1.020
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	9.09	8.62	1.055
				Average Correction Factor	1.021
Baseline Corr AF:	9.47	Prev response	9.13	*% change	3.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	7.94	8.04	0.988
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.01	----
high point	4921	79.2	7.94	7.94	1.000
second point	4960	39.6	3.97	3.95	1.006
third point	4980	19.8	1.98	1.98	1.001
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.94	7.88	1.008
				Average Correction Factor	1.002
Baseline Corr AF:	8.04	Prev response	7.98	*% 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:	1.004709	0.993293
THC Cal Offset:	-0.003742	-0.024935
CH4 Cal Slope:	1.003246	0.998509
CH4 Cal Offset:	0.010640	0.000842
NMHC Cal Slope:	1.006250	0.988725
NMHC Cal Offset:	-0.014182	-0.025977

Notes: NM was 11% high during nightly z/s cycle. Zero chromatogram feature turned on for baseline. Span adjusted. As left NM span is 5.5% low.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

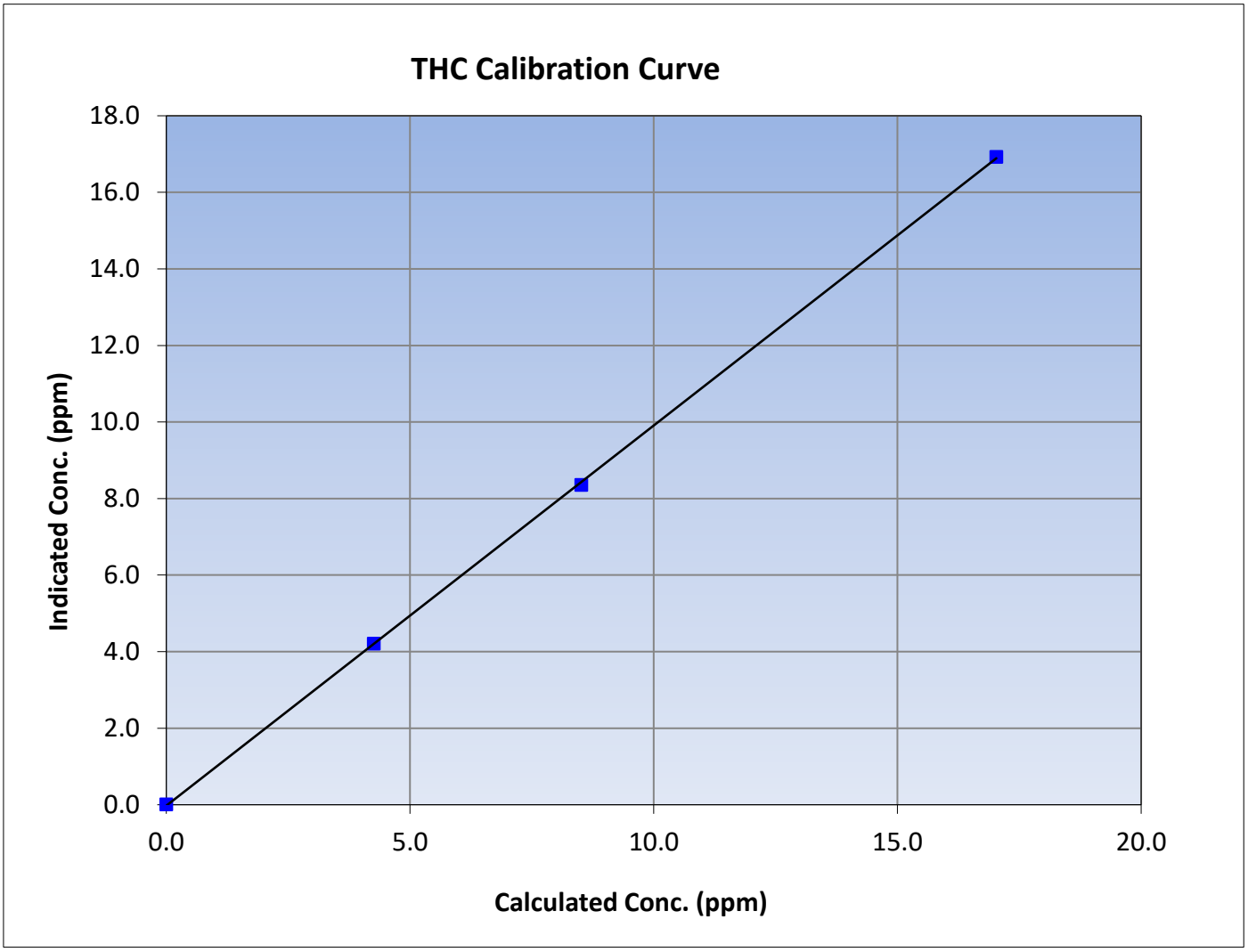
Version-01-2020

Station Information

Calibration Date:	July 21, 2023	Previous Calibration:	July 10, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:33	End Time (MST):	16:03
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.01	----	Correlation Coefficient	0.999943	≥0.995
17.03	16.93	1.0060			
8.52	8.35	1.0194	Slope	0.993293	0.90 - 1.10
4.26	4.21	1.0108			
			Intercept	-0.024935	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

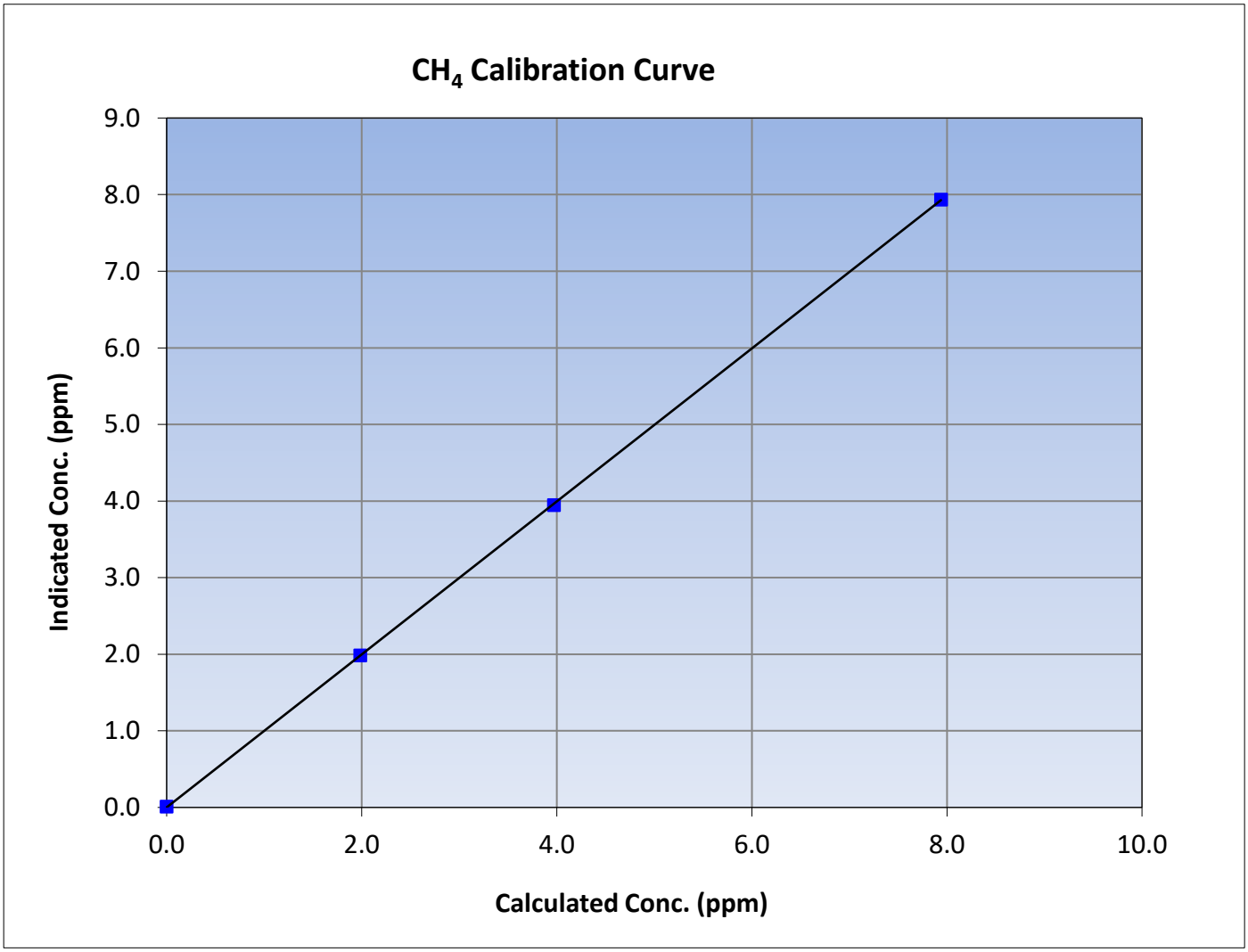
Version-01-2020

Station Information

Calibration Date:	July 21, 2023	Previous Calibration:	July 10, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:33	End Time (MST):	16:03
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.01	----	Correlation Coefficient	0.999988	*≥0.995*
7.94	7.94	1.0003			
3.97	3.95	1.0055	Slope	0.998509	*0.90 - 1.10*
1.98	1.98	1.0009			
			Intercept	0.000842	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

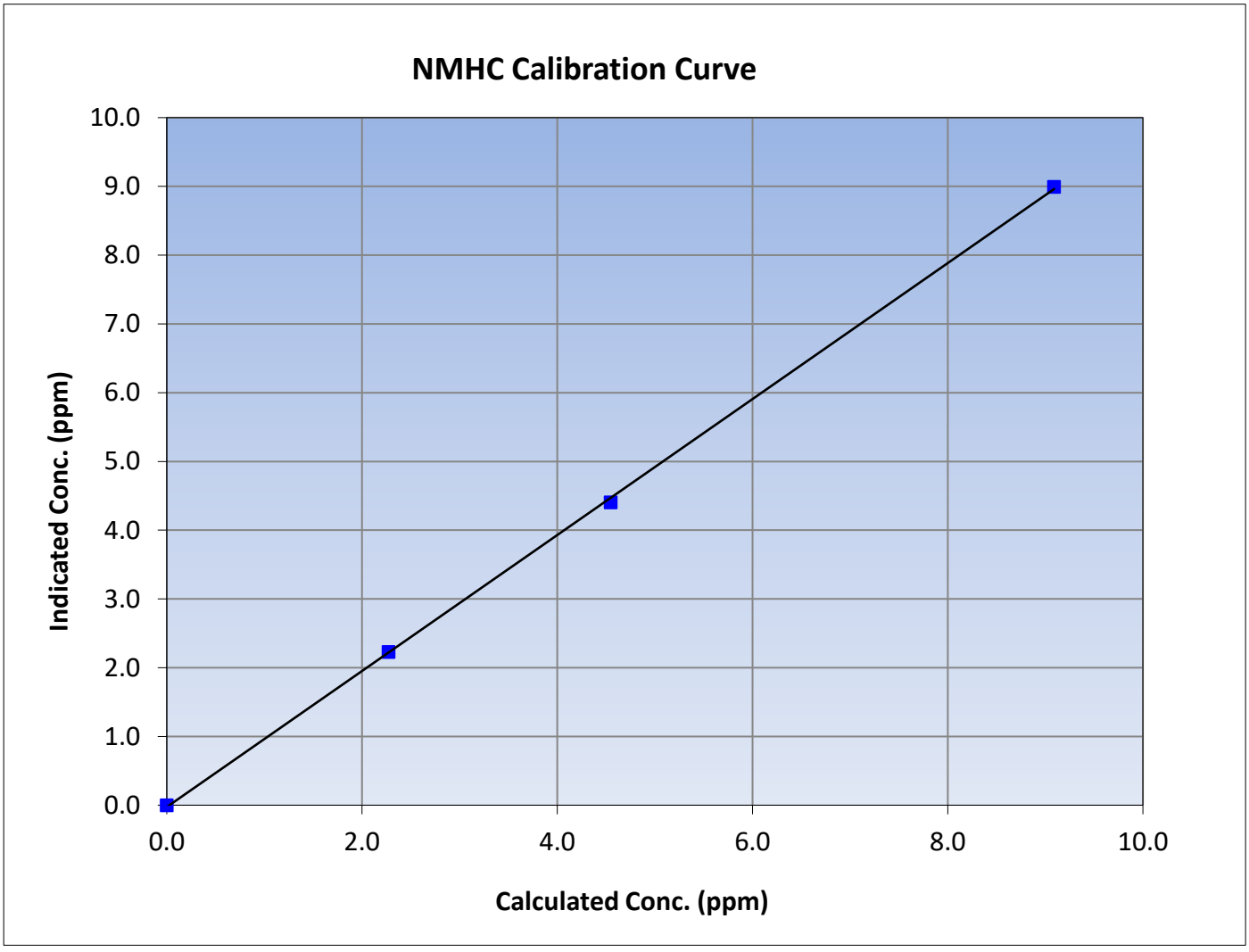
Version-01-2020

Station Information

Calibration Date:	July 21, 2023	Previous Calibration:	July 10, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:33	End Time (MST):	16:03
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999872	≥0.995
9.09	8.99	1.0110			
4.55	4.41	1.0320	Slope	0.988725	0.90 - 1.10
2.27	2.23	1.0197			
			Intercept	-0.025977	+/-0.5



NMHC Calibration Plot Date: July 21, 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:	July 13, 2023	Last Cal Date:	June 12, 2023
Start time (MST):	9:02	End time (MST):	14:03
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	1.065	NO bkgnd or offset:	7.3	7.5
NOX coeff or slope:	0.995	0.995	NOX bkgnd or offset:	7.5	7.7
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	201.6	207.8

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.997768	1.001112
NO_X Cal Offset:	1.378516	1.259152
NO Cal Slope:	0.998277	1.001431
NO Cal Offset:	0.974621	0.895212
NO_2 Cal Slope:	1.001546	1.003989
NO_2 Cal Offset:	0.752238	0.417819

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.4	0.1	0.3	----	----
as found span	4920	80.2	816.7	800.7	16.0	804.9	786.7	18.3	1.0147	1.0178
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.1	----	----
high point	4920	80.2	816.7	800.7	16.0	818.0	802.0	16.0	0.9984	0.9984
second point	4960	40.1	408.4	400.4	8.0	411.7	403.2	8.5	0.9919	0.9929
third point	4980	20.0	203.7	199.7	4.0	205.5	201.0	4.5	0.9911	0.9934
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.1	----	----
as left span	4920	80.2	816.7	394.6	422.1	824.0	395.7	428.4	0.9912	0.9972
								Average Correction Factor	0.9938	0.9949

Corrected As found	NO_X = 804.5 ppb	NO = 786.6 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -1.5%
Previous Response	NO_X = 816.3 ppb	NO = 800.3 ppb		*Percent Change	NO = -1.7%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	800.1	394.0	422.1	423.8	0.9961	100.4%
2nd GPT point (200 ppb O3)	800.1	599.9	216.2	218.5	0.9897	101.0%
3rd GPT point (100 ppb O3)	800.1	699.8	116.3	117.0	0.9944	100.6%
				Average Correction Factor	0.9934	100.7%

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

NO_X Calibration Summary

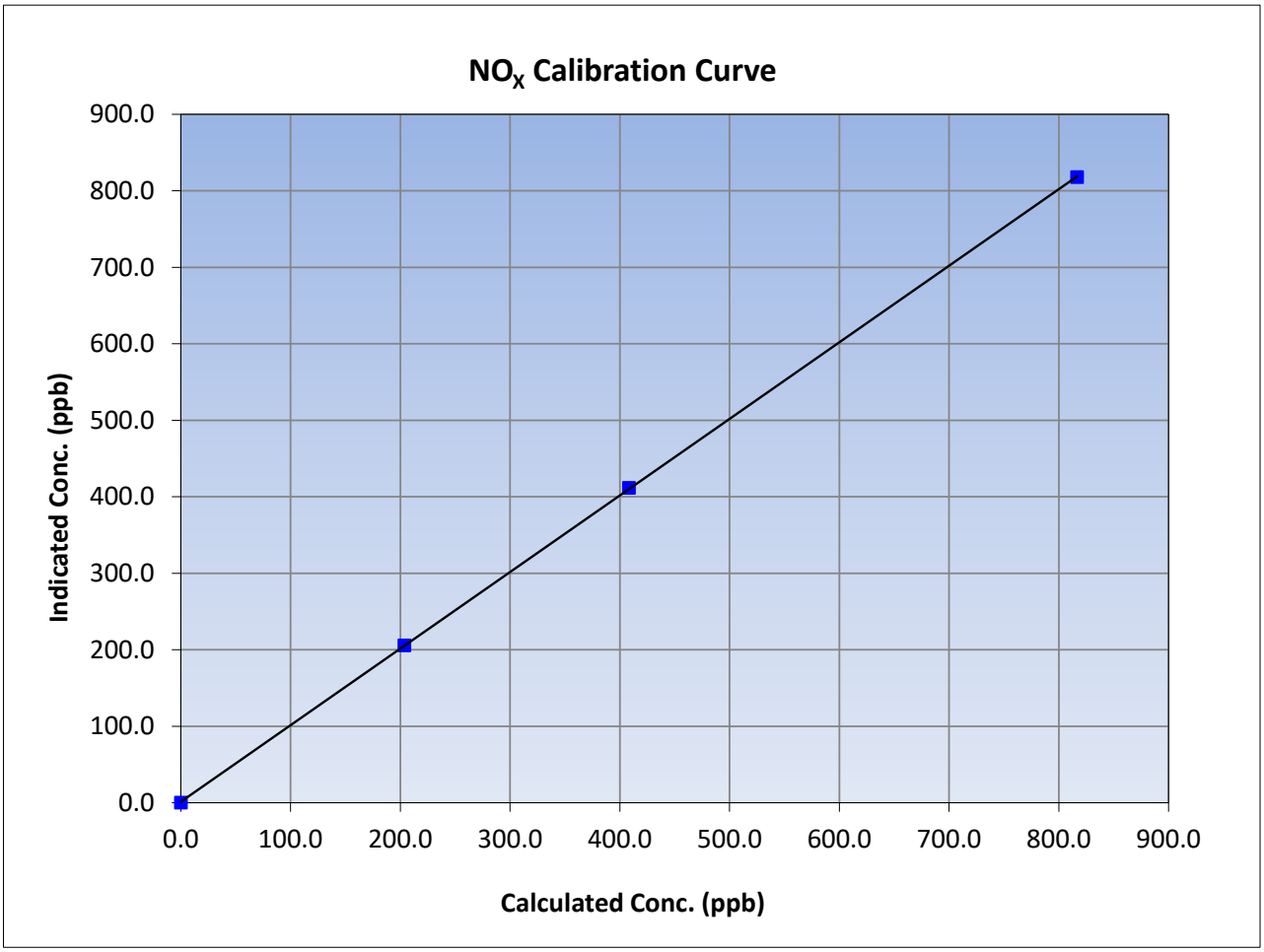
Version-04-2020

Station Information

Calibration Date:	July 13, 2023	Previous Calibration:	June 12, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:02	End Time (MST):	14:03
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	0.999987	*≥0.995*
816.7	818.0	0.9984			
408.4	411.7	0.9919	Slope	1.001112	*0.90 - 1.10*
203.7	205.5	0.9911			
			Intercept	1.259152	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

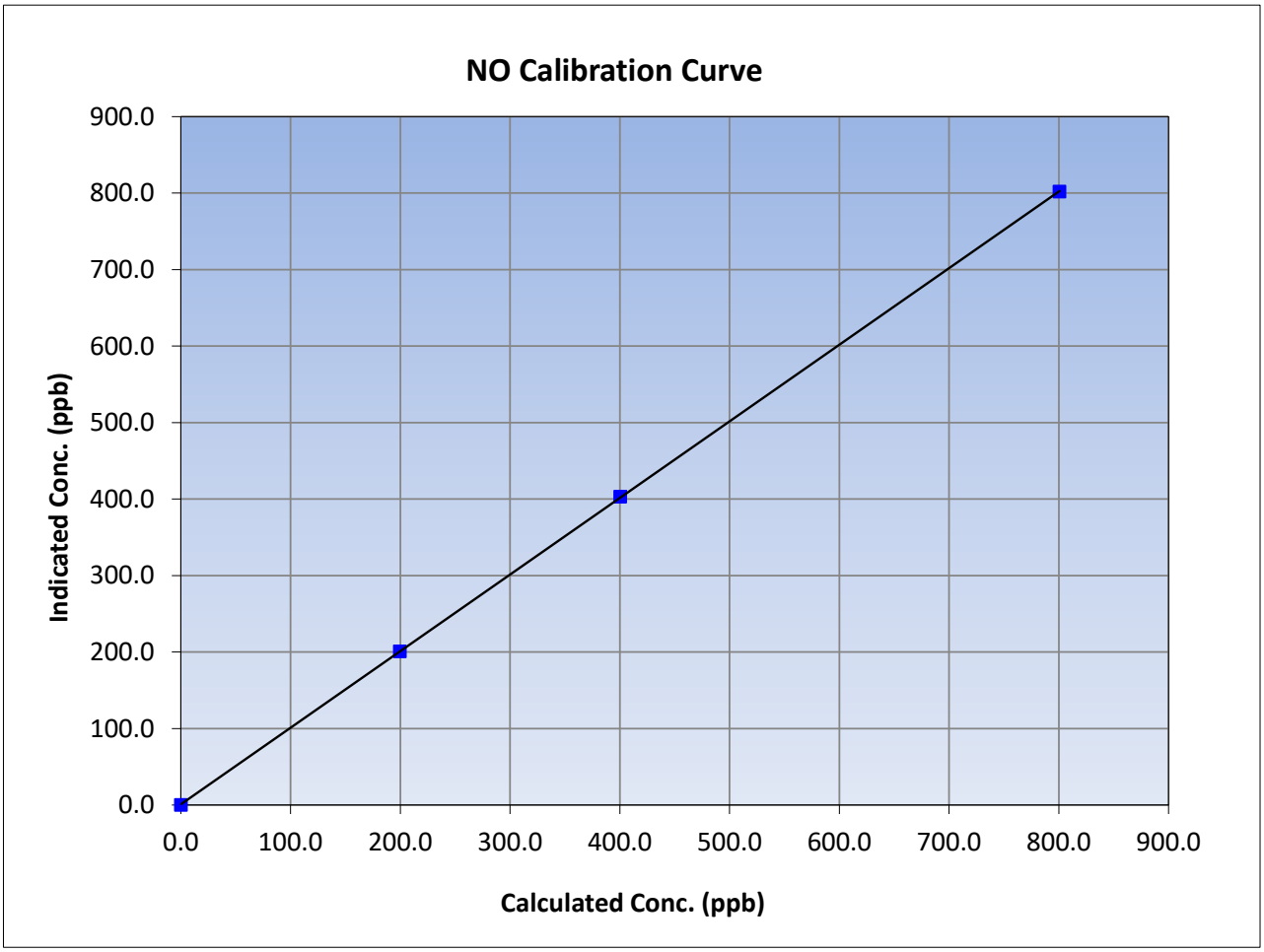
Version-04-2020

Station Information

Calibration Date:	July 13, 2023	Previous Calibration:	June 12, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:02	End Time (MST):	14:03
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999991	≥0.995
800.7	802.0	0.9984			
400.4	403.2	0.9929	Slope	1.001431	0.90 - 1.10
199.7	201.0	0.9934			
			Intercept	0.895212	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

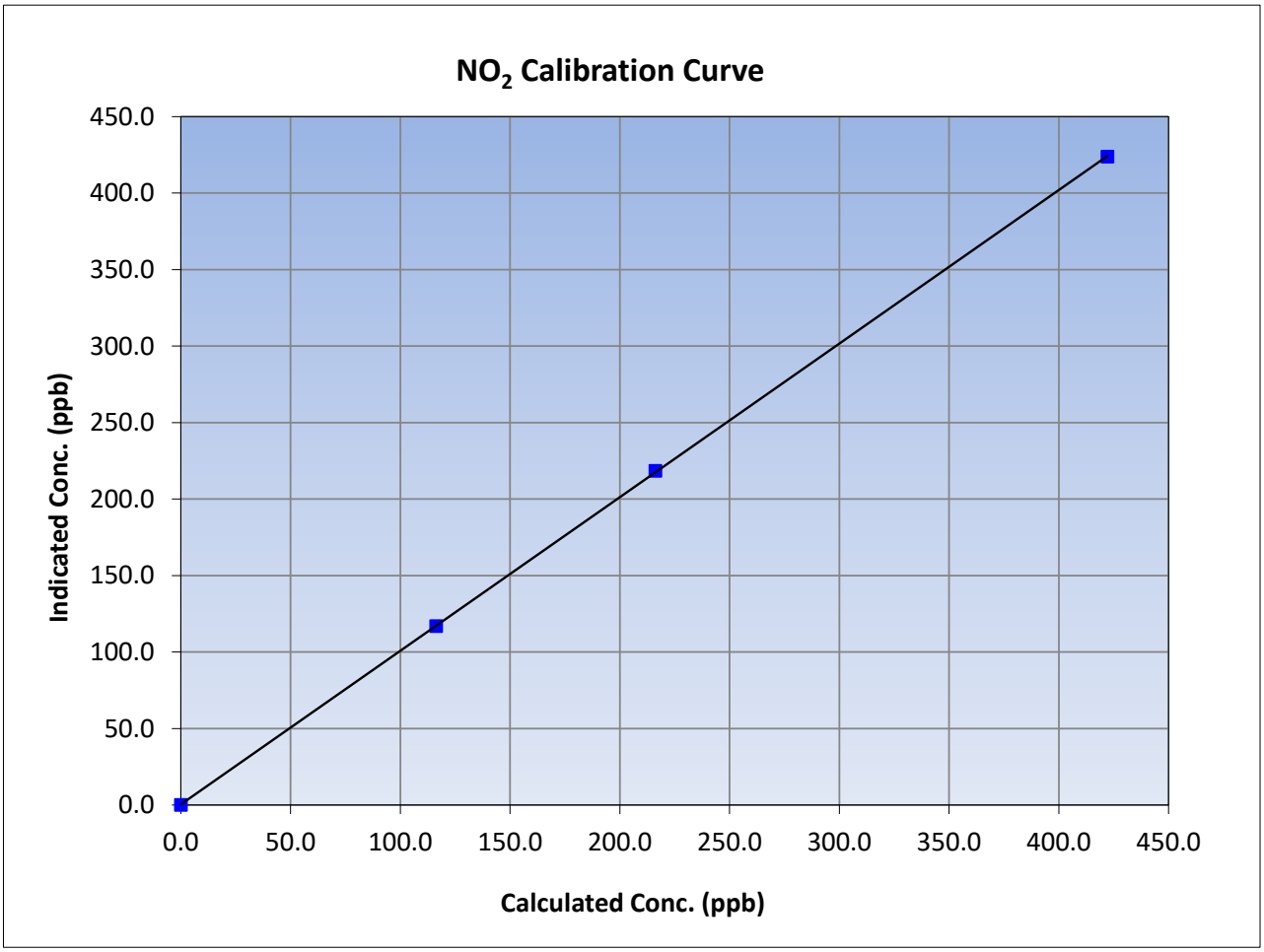
Version-04-2020

Station Information

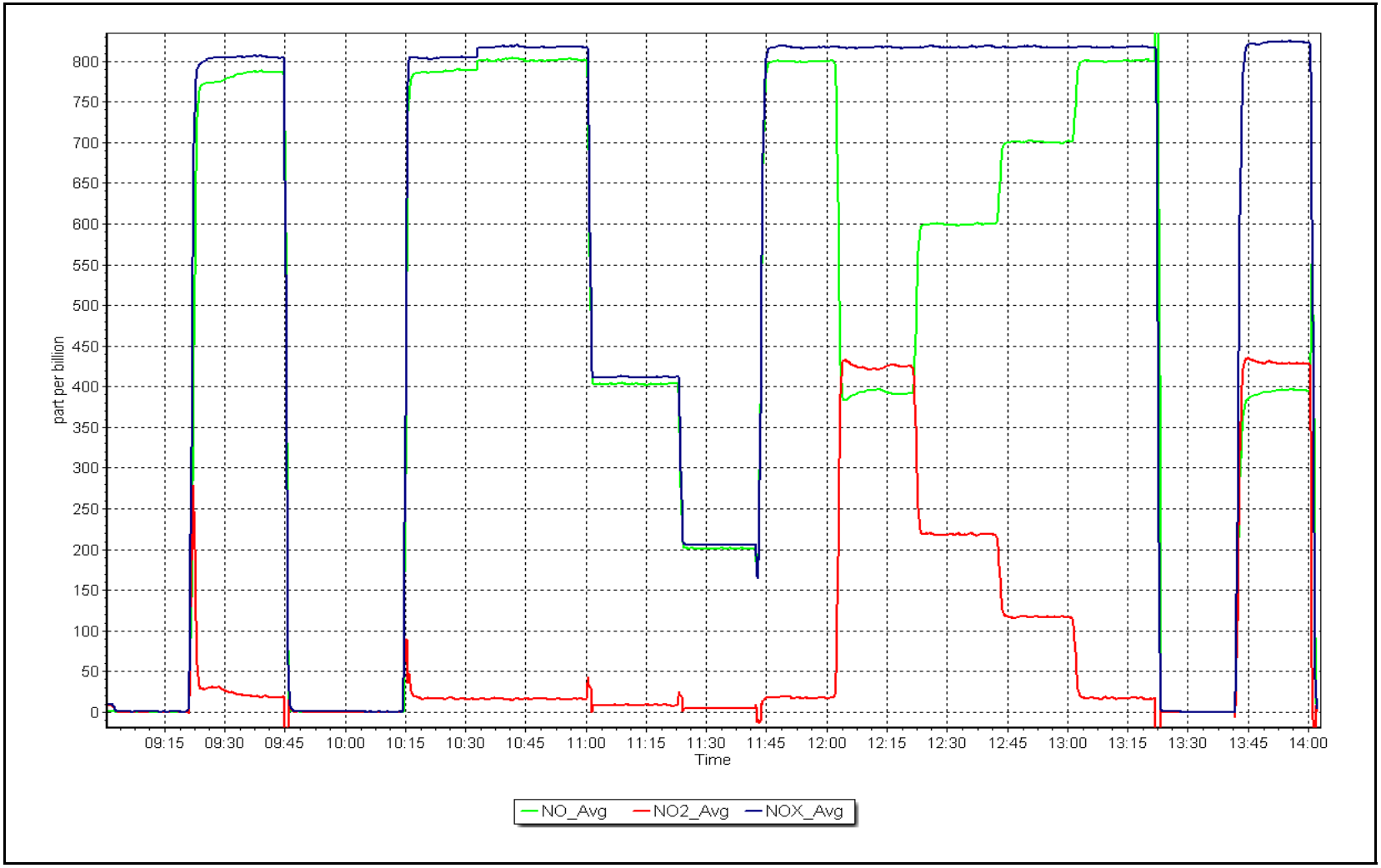
Calibration Date:	July 13, 2023	Previous Calibration:	June 12, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:02	End Time (MST):	14:03
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999987	≥0.995
422.1	423.8	0.9961			
216.2	218.5	0.9897	Slope	1.003989	0.90 - 1.10
116.3	117.0	0.9944			
			Intercept	0.417819	+/-20



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



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	July 7, 2023	Last Cal Date:	June 6, 2023
Start time (MST):	10:00	End time (MST):	14:45
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999971	1.002371	Backgd or Offset:	-3.5	-2.6
Calibration intercept:	0.480000	0.860000	Coeff or Slope:	1.504	1.522

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	1414.8	400.0	394.1	1.015
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.5	----
high point	5000	1415.7	400.0	401.7	0.996
second point	5000	1039.9	200.0	201.3	0.994
third point	5000	856.2	100.0	101.6	0.984
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	1416.0	400.0	400.2	1.000
				Average Correction Factor	0.991

Baseline Corr As found:	394.1	Previous response	400.5	*% 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: Zero and span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

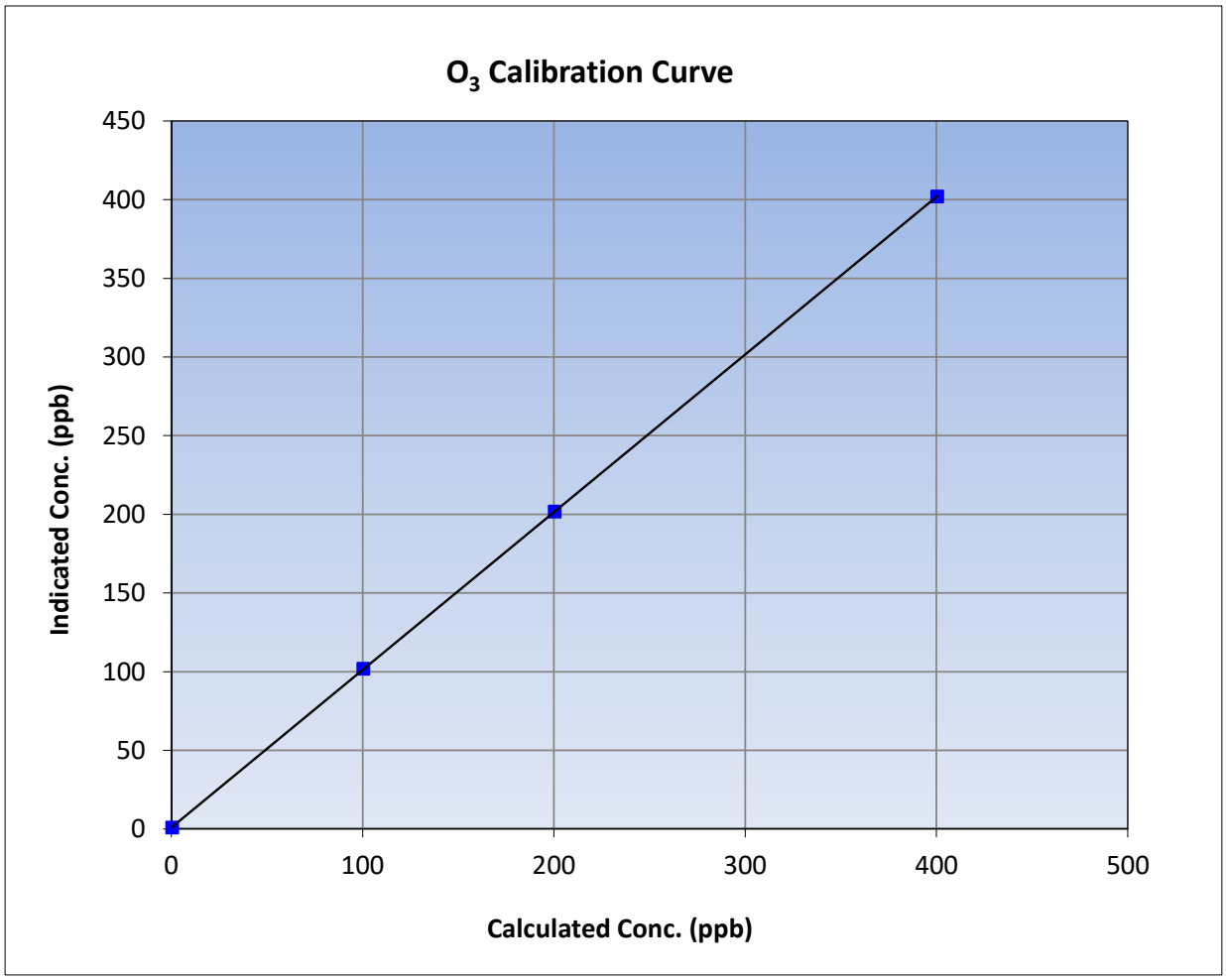
Station Information

Calibration Date:	July 7, 2023	Previous Calibration:	June 6, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:00	End Time (MST):	14:45
Analyzer make:	Thermo 49i	Analyzer serial #:	1152220023

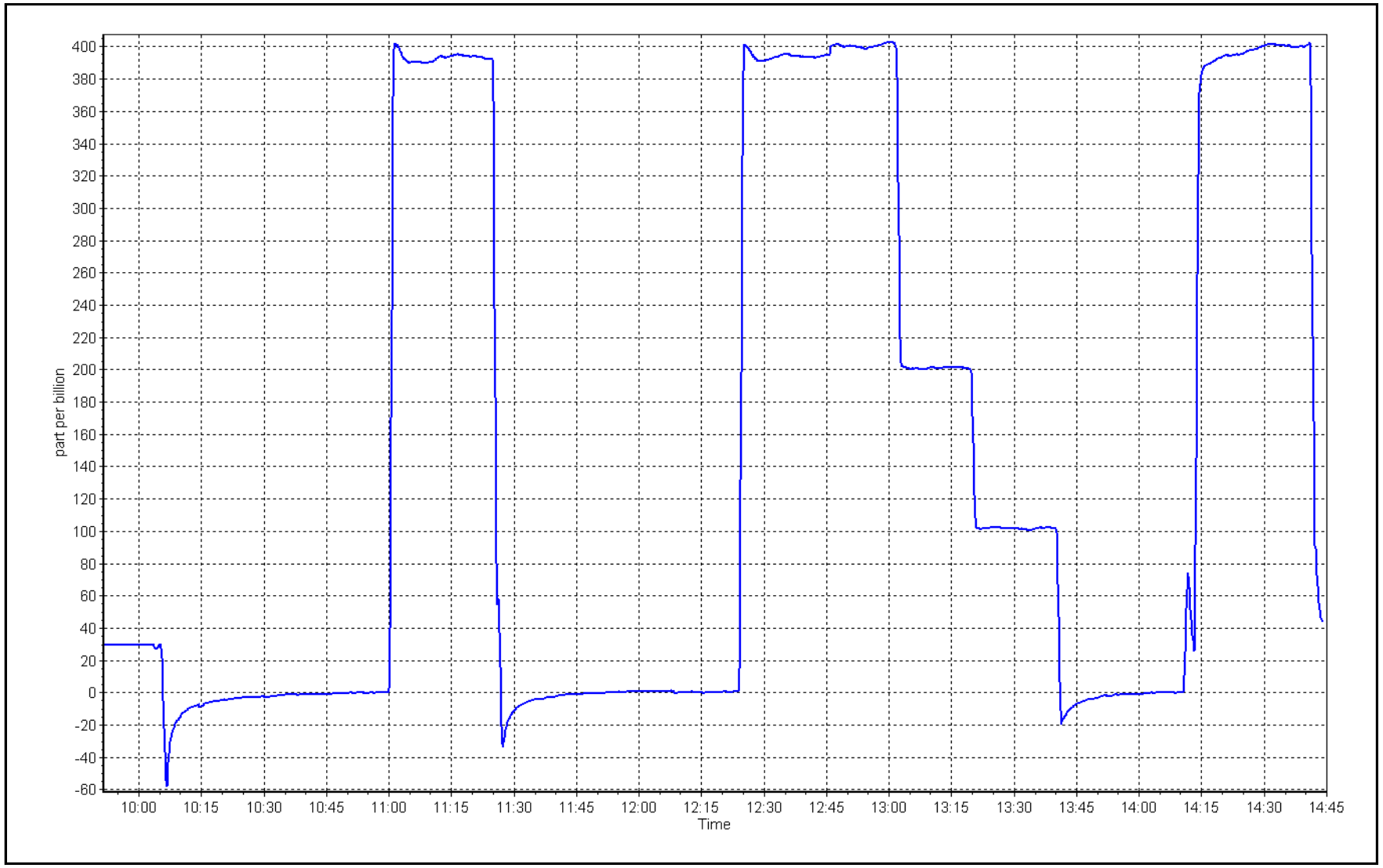
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
400.0	401.7	0.9958
200.0	201.3	0.9935
100.0	101.6	0.9843

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	1.002371	*0.90 - 1.10*
Intercept	0.860000	*+/- 5*



O_3 Calibration Plot Date: July 7, 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:	July 24, 2023	Last Cal Date:	June 29, 2023
Start time (MST):	11:30	End time (MST):	14:33
Analyzer Make:	API T640	S/N:	871
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388748
Temp/RH standard:	Alicat FP-25BT	S/N:	388748

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	29.8	29.09	31.6	☐	+/- 2 °C
P (mmHg)	732	735.03	729.5	☐	+/- 10 mmHg
flow (LPM)	5.10	5.10	4.93	☐	+/- 0.25 LPM

Leak Test: Date of check: July 24, 2023 Last Cal Date: June 29, 2023

PM w/o HEPA: 14.8 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	9.2	10.1	10.1	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 20.1 w/ HEPA: 0.0

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

Disposable Filter Changed: July 24, 2023

Annual Maintenance

Date Sample Tube Cleaned: December 5, 2022

Date RH/T Sensor Cleaned: December 5, 2022

Notes: Temp, flow and pressure checked. Leak check passed. Chamber cleaned, filter swapped. No issues.

Calibration by: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	July 24, 2023	Last Cal Date:	June 29, 2023
Start time (MST):	9:44	End time (MST):	13:07
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:	0.999915	1.000886	Backgd or Offset:	4.147	4.137
Calibration intercept:	0.018540	0.076548	Coeff or Slope:	1.086	1.086

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4933	66.7	40.0	40.1	0.999
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	40.1	0.998
second point	4967	33.3	20.0	20.2	0.991
third point	4983	16.7	10.0	10.1	0.993
as left zero	5000	0.0	0.0	0.0	----
as left span	4933	66.7	40.0	40.0	1.001
				Average Correction Factor	0.994

Baseline Corr As found:	40.03	Prev response:	40.04	*% change:	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No Maintenance done. No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

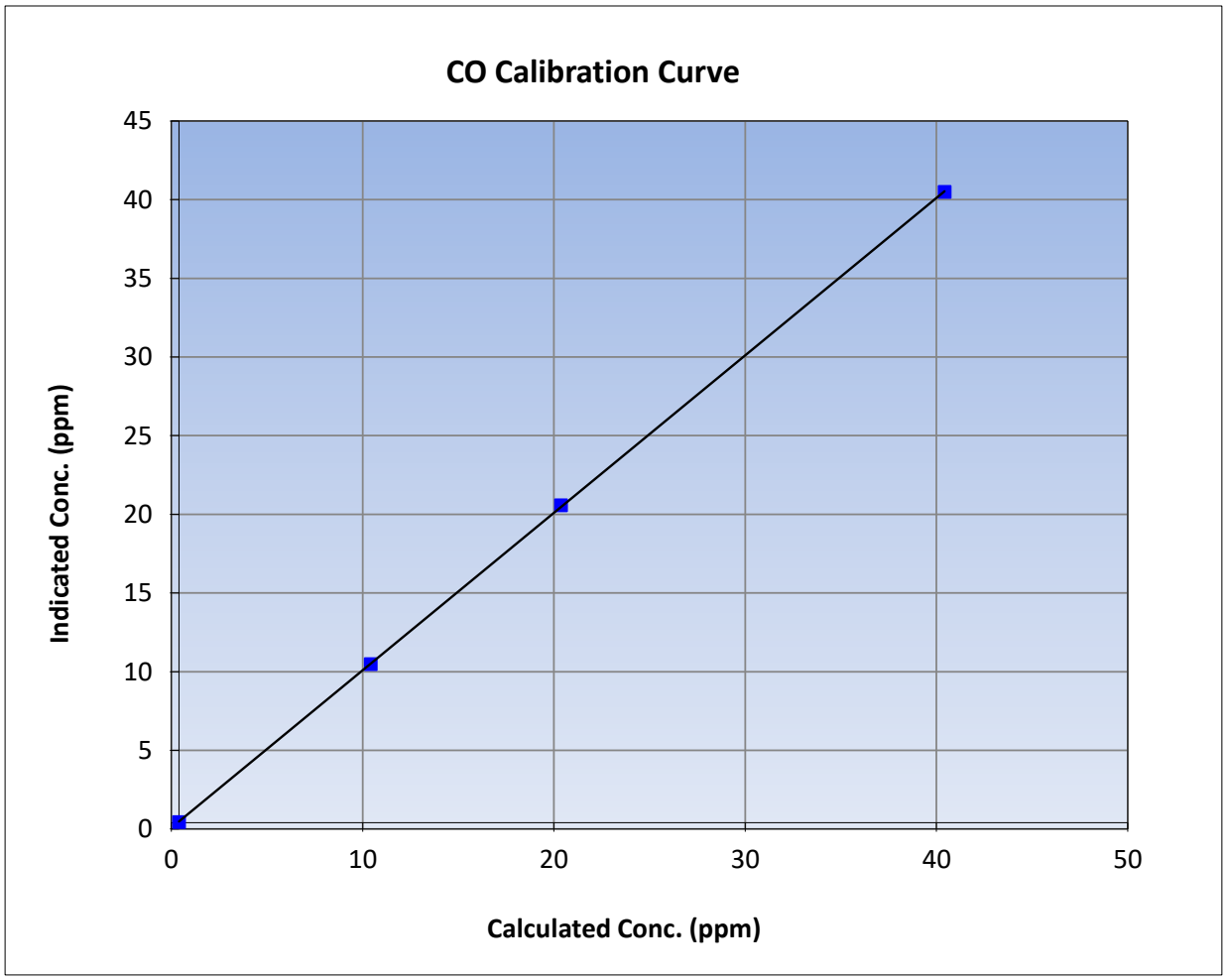
Station Information

Calibration Date:	July 24, 2023	Previous Calibration:	June 29, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:44	End Time (MST):	13:07
Analyzer make:	Thermo 48i-LTE	Analyzer serial #:	1408761381

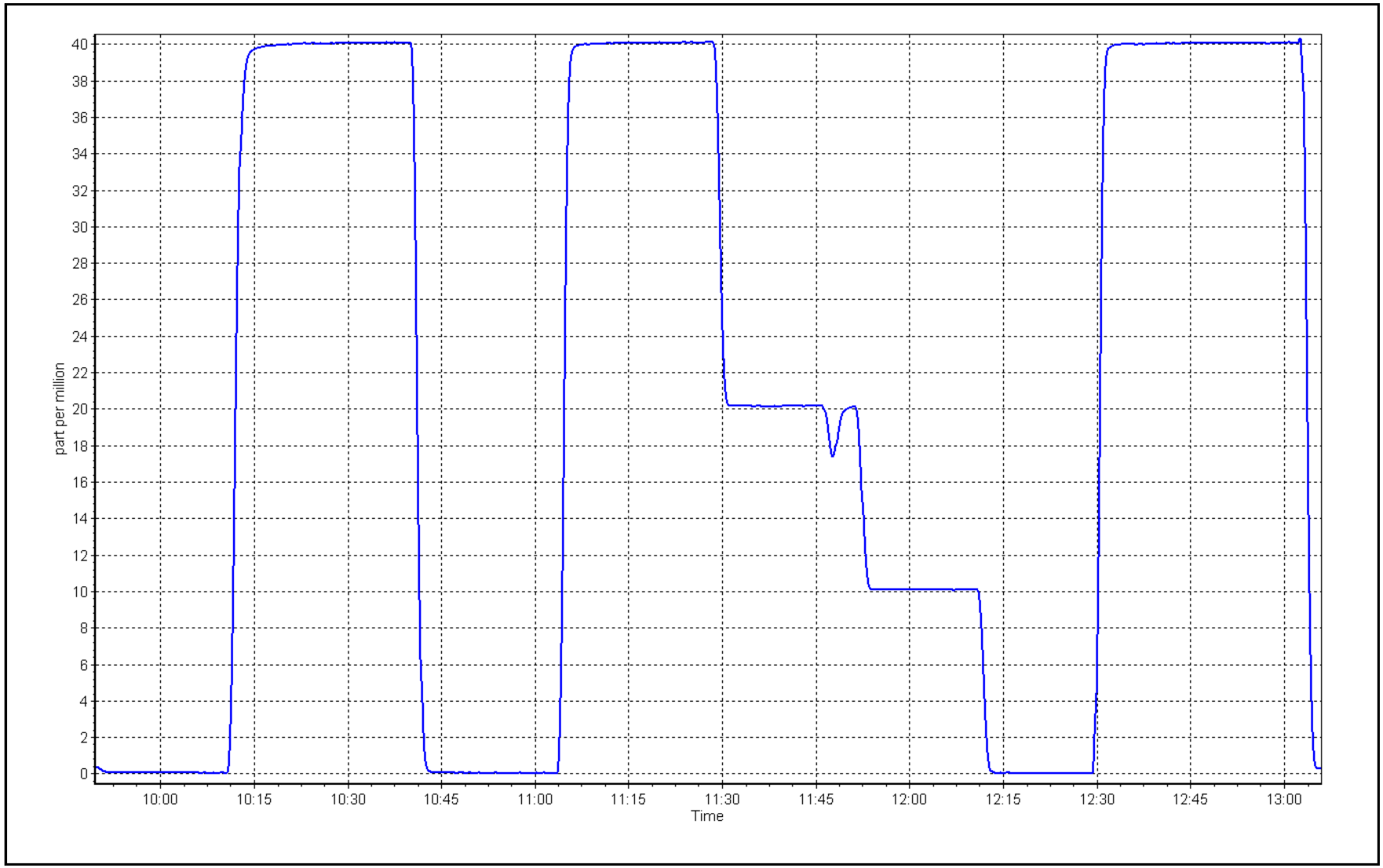
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.0	40.1	0.9983
20.0	20.2	0.9905
10.0	10.1	0.9931

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999985	*≥0.995*
Slope	1.000886	*0.90 - 1.10*
Intercept	0.076548	*+/-1.5*



CO Calibration Plot Date: July 24, 2023 Location: Athabasca Valley



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS08
FORT CHIPEWYAN
JULY 2023

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

August 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	July 14, 2023	Last Cal Date:	June 28, 2023
Start time (MST):	11:34	End time (MST):	14:16
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.84	ppm	Cal Gas Exp Date:	January 6, 2030
Cal Gas Cylinder #:	CC196697			
Removed Cal Gas Conc:	49.84	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3060
ZAG Make/Model:	Teledyne API T701		Serial Number:	260

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.996931	1.003156	Backgd or Offset:	1.60	1.53
Calibration intercept:	-0.082970	-0.363935	Coeff or Slope:	0.915	0.915

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.3	----
as found span	4920	80.3	800.4	800.9	0.999
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.6	----
high point	4920	80.3	800.4	803.4	0.996
second point	4960	40.2	400.7	400.0	1.002
third point	4980	20.1	200.4	200.4	1.000
as left zero	5000	0.0	0.0	0.6	----
as left span	4920	80.3	800.4	805.2	0.994
				Average Correction Factor	0.999

Baseline Corr As found:	800.60	Previous response	797.84	*% change	0.3%

* = > +/-5% change initiates investigation

Notes: Sampled inlet filters after as founds. No adjustments made.

Calibration Performed By: Matthew C

Wood Buffalo Environmental Association

SO_2 Calibration Summary

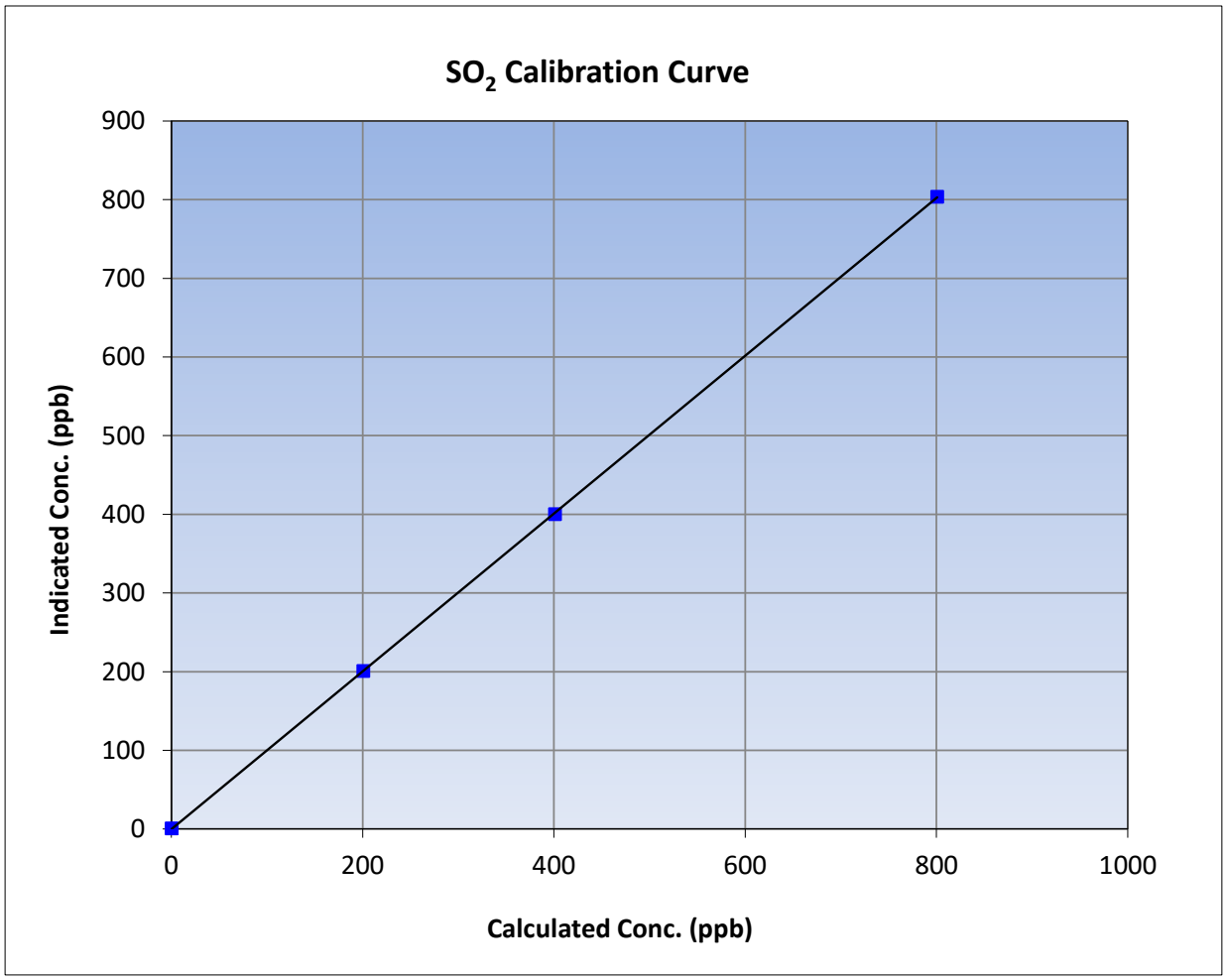
Version-01-2020

Station Information

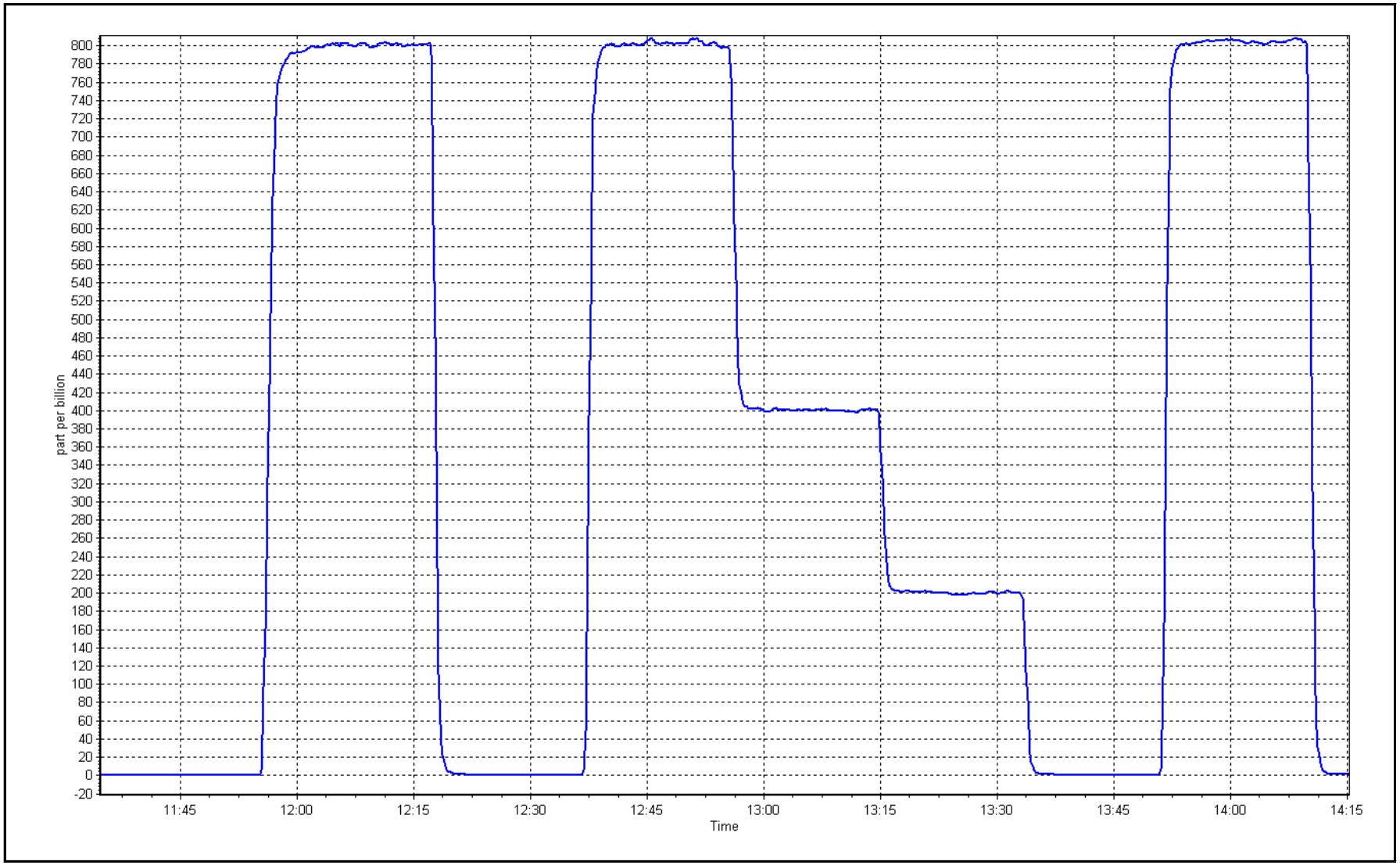
Calibration Date:	July 14, 2023	Previous Calibration:	June 28, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	11:34	End Time (MST):	14:16
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1136451241

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.6	----	Correlation Coefficient	0.999988	*≥0.995*
800.4	803.4	0.9962			
400.7	400.0	1.0017	Slope	1.003156	*0.90 - 1.10*
200.4	200.4	0.9998			
			Intercept	-0.363935	*+/-30*



SO2 Calibration Plot Date: July 14, 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:	July 14, 2023	Last Cal Date:	June 29, 2023
Start time (MST):	15:00	End time (MST):	18:22
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43iQ-TL		Analyzer serial #:	1203169744
Converter make:	CDN-101		Converter serial #:	14639
Analyzer Range	0 - 100 ppb			

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005570	1.011142	Backgd or Offset:	0.94	0.94
Calibration intercept:	0.218839	0.198873	Coeff or Slope:	0.707	0.707

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	4920	80.5	80.0	80.2	1.003
as found 2nd point	4960	40.2	40.0	40.4	0.999
as found 3rd point	4980	20.1	20.0	20.1	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	0.3	----
high point	4920	80.5	80.0	81.2	0.985
second point	4960	40.2	40.0	40.4	0.989
third point	4980	20.1	20.0	20.4	0.979
as left zero	5000	0.0	0.0	0.5	----
as left span	4920	80.5	80.0	80.0	1.000
SO2 Scrubber Check	4919.7	80.3	803.0	0.2	----
Date of last scrubber change:		March 7, 2022		Ave Corr Factor	0.985
Date of last converter efficiency test:		March 15, 2022		100.7%	efficiency

Baseline Corr As found:	79.8	Prev response:	80.67	*% change:	-1.1%
Baseline Corr 2nd AF pt:	40.0	AF Slope:	0.998569	AF Intercept:	0.338765
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999981		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Matthew C

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

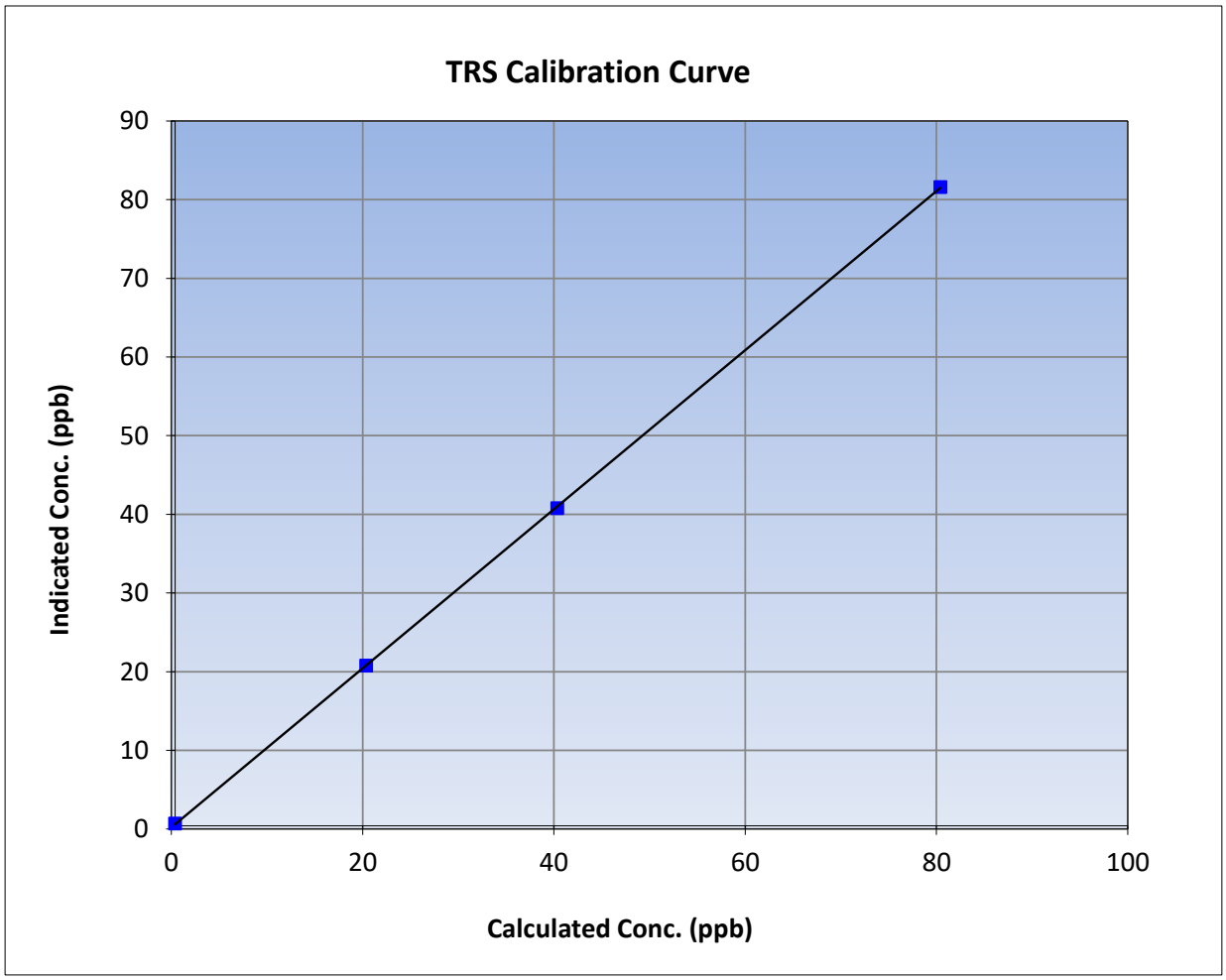
Station Information

Calibration Date:	July 14, 2023	Previous Calibration:	June 29, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	15:00	End Time (MST):	18:22
Analyzer make:	Thermo 43iQ-TL	Analyzer serial #:	1203169744

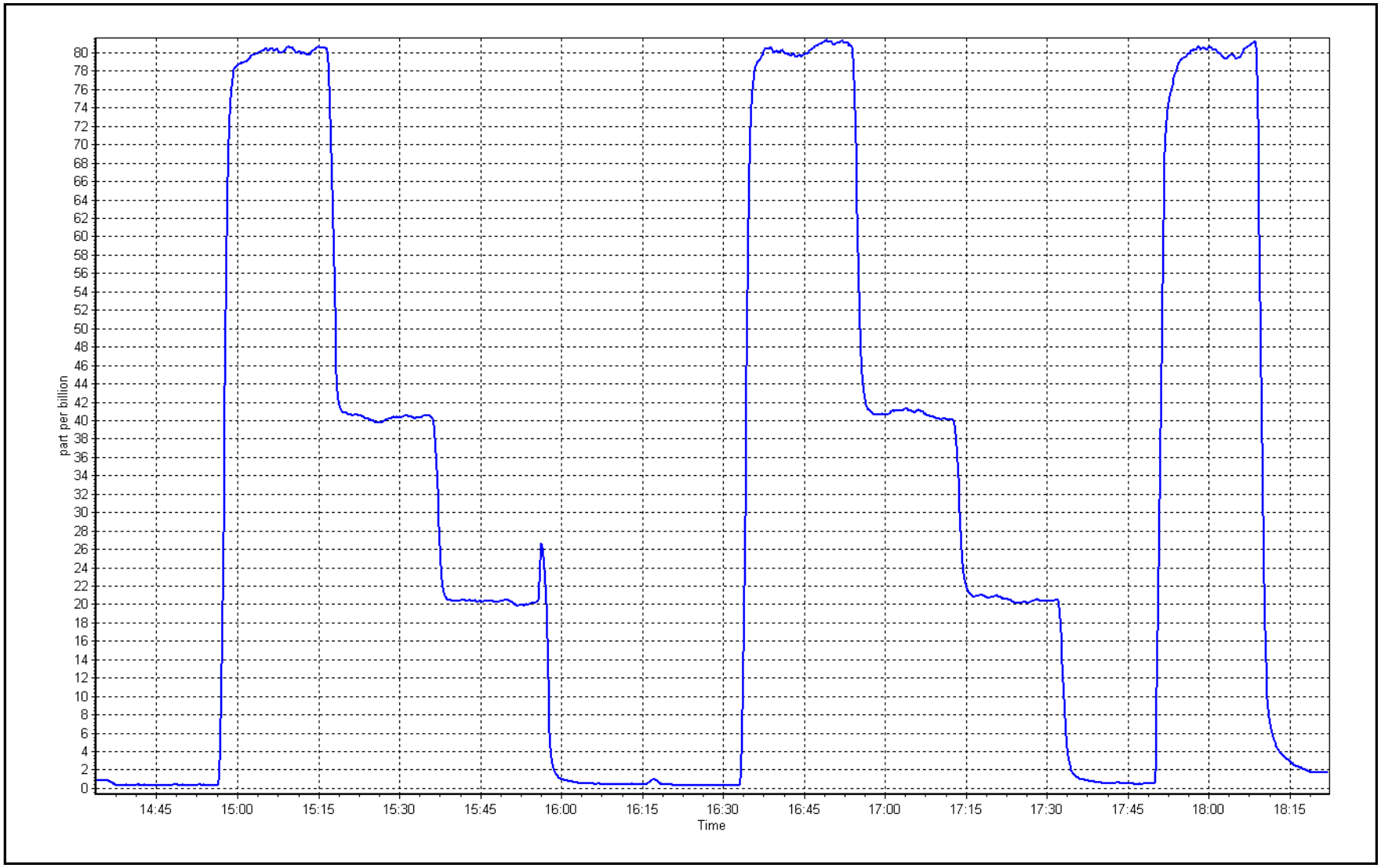
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
80.0	81.2	0.9853
40.0	40.4	0.9890
20.0	20.4	0.9794

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999983	*≥0.995*
Slope	1.011142	*0.90 - 1.10*
Intercept	0.198873	*+/-3*



TRS Calibration Plot Date: July 14, 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:	July 13, 2023	Last Cal Date:	June 27, 2023
Start time (MST):	7:41	End time (MST):	12:16
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1426262592	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.933	1.933	NO bkgnd or offset:	8.1	8.1
NOX coeff or slope:	0.993	0.993	NOX bkgnd or offset:	8.2	8.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	268.1	268.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999486	0.991475
NO_X Cal Offset:	-0.060000	0.520000
NO Cal Slope:	1.002670	0.992674
NO Cal Offset:	-1.000000	-0.500000
NO_2 Cal Slope:	0.991397	0.995889
NO_2 Cal Offset:	0.179814	0.340396

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.6	0.2	0.4	----	----
as found span	4918	82.0	800.3	800.3	0.0	796.3	793.8	2.3	1.0050	1.0082
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.7	0.2	0.4	----	----
high point	4918	82.0	800.3	800.3	0.0	794.0	794.2	-0.2	1.0080	1.0077
second point	4959	41.0	400.2	400.2	0.0	397.5	396.7	0.8	1.0067	1.0087
third point	4980	20.5	200.1	200.1	0.0	198.5	197.2	1.3	1.0080	1.0146
as left zero	5000	0.0	0.0	0.0	0.0	0.4	0.2	0.3	----	----
as left span	4918	82.0	800.3	423.0	377.3	794.7	418.4	376.2	1.0071	1.0110
								Average Correction Factor	1.0075	1.0103

Corrected As found	NO_X = 795.7 ppb	NO = 793.6 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-0.5%
Previous Response	NO_X = 799.8 ppb	NO = 801.5 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)	792.6	415.3	377.3	376.4	1.0024	99.8%
2nd GPT point (200 ppb O3)	792.6	609.8	182.8	181.5	1.0072	99.3%
3rd GPT point (100 ppb O3)	792.6	705.2	87.4	87.9	0.9943	100.6%
				Average Correction Factor	1.0013	99.9%

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

Calibration Performed By: Matthew C

Wood Buffalo Environmental Association

NO_X Calibration Summary

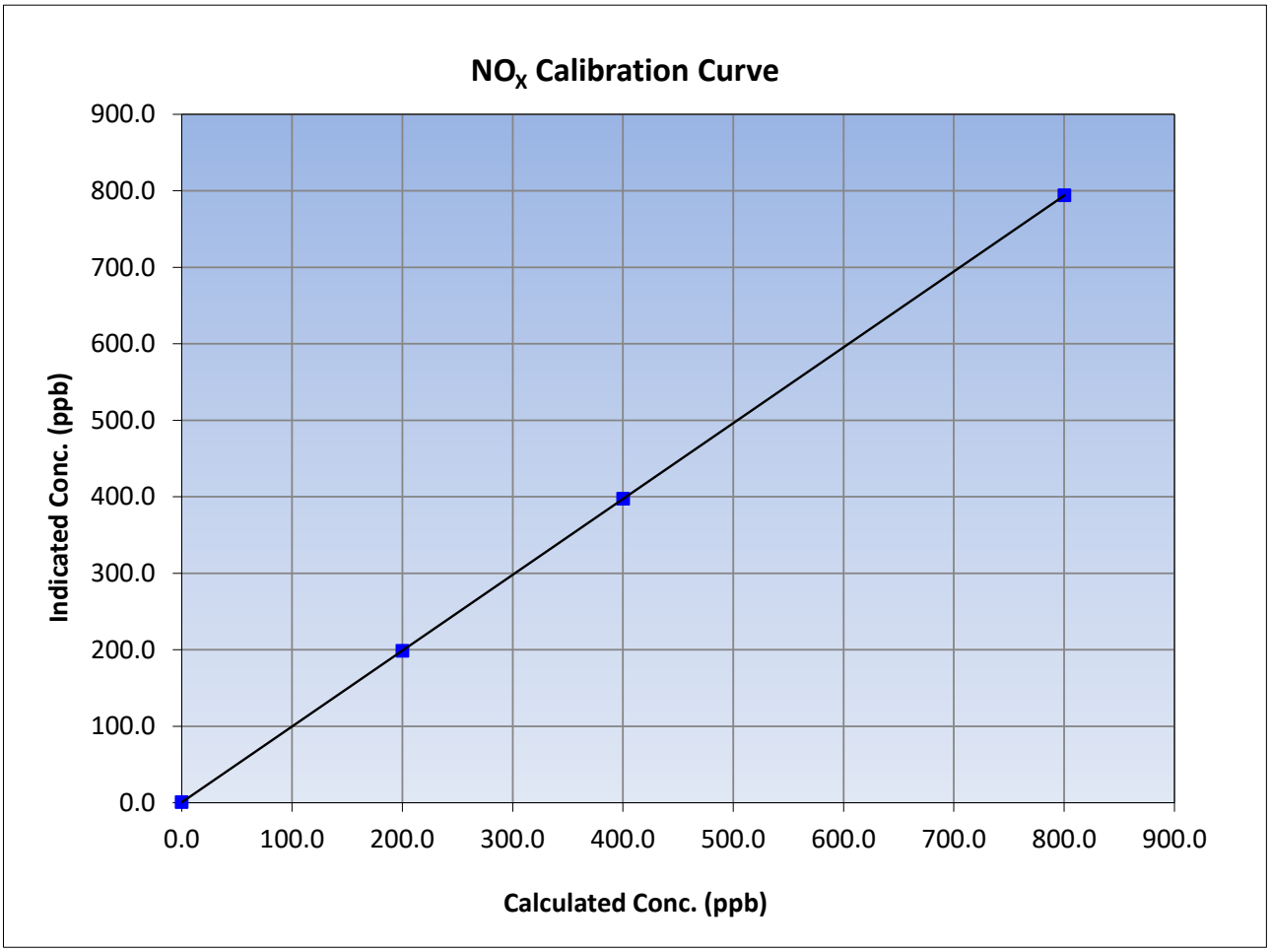
Version-04-2020

Station Information

Calibration Date:	July 13, 2023	Previous Calibration:	June 27, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	7:41	End Time (MST):	12:16
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.7	----	Correlation Coefficient	0.999999	≥0.995
800.3	794.0	1.0080			
400.2	397.5	1.0067	Slope	0.991475	0.90 - 1.10
200.1	198.5	1.0080			
			Intercept	0.520000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

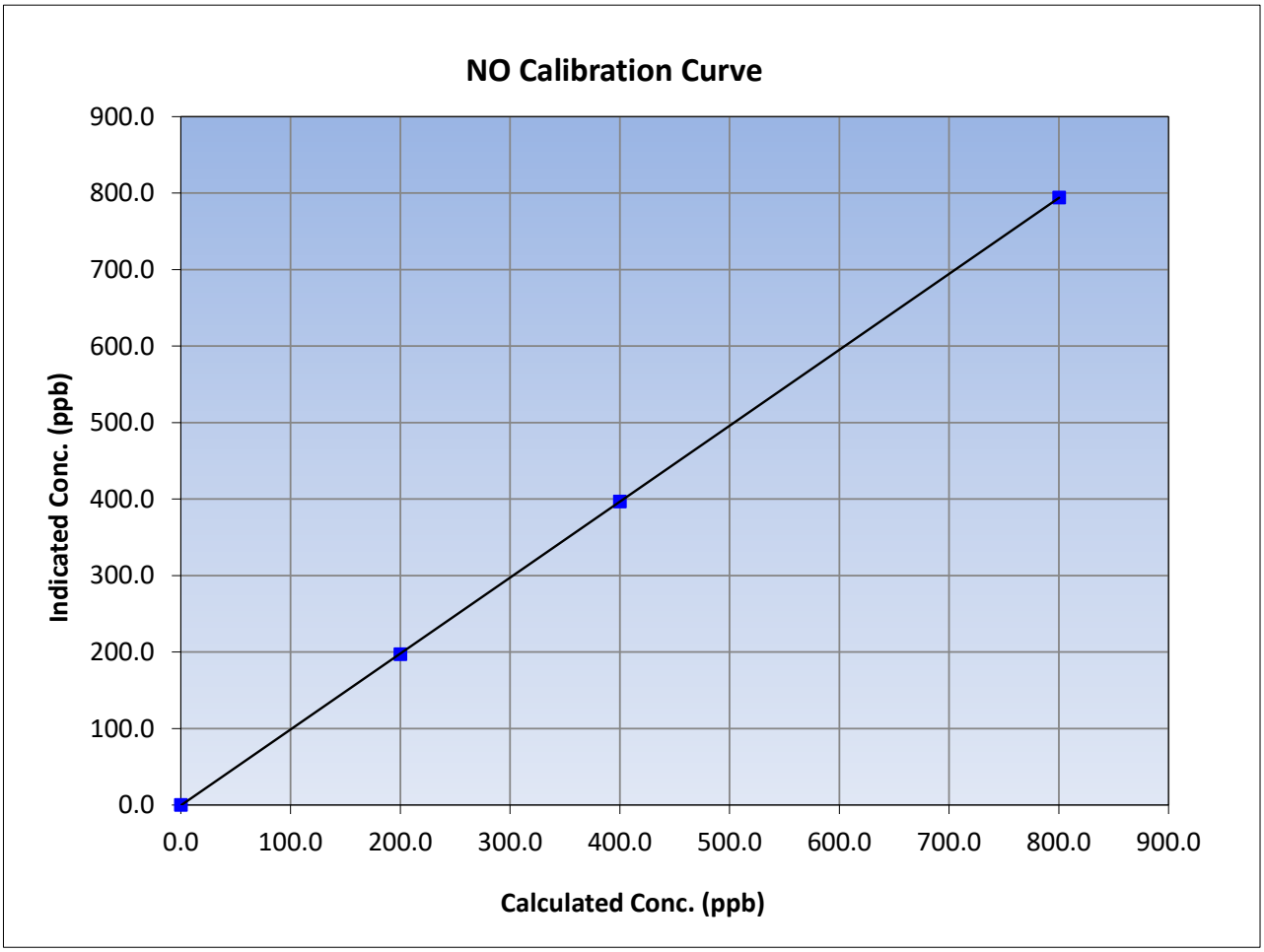
Version-04-2020

Station Information

Calibration Date:	July 13, 2023	Previous Calibration:	June 27, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	7:41	End Time (MST):	12:16
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999996	≥0.995
800.3	794.2	1.0077			
400.2	396.7	1.0087	Slope	0.992674	0.90 - 1.10
200.1	197.2	1.0146			
			Intercept	-0.500000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

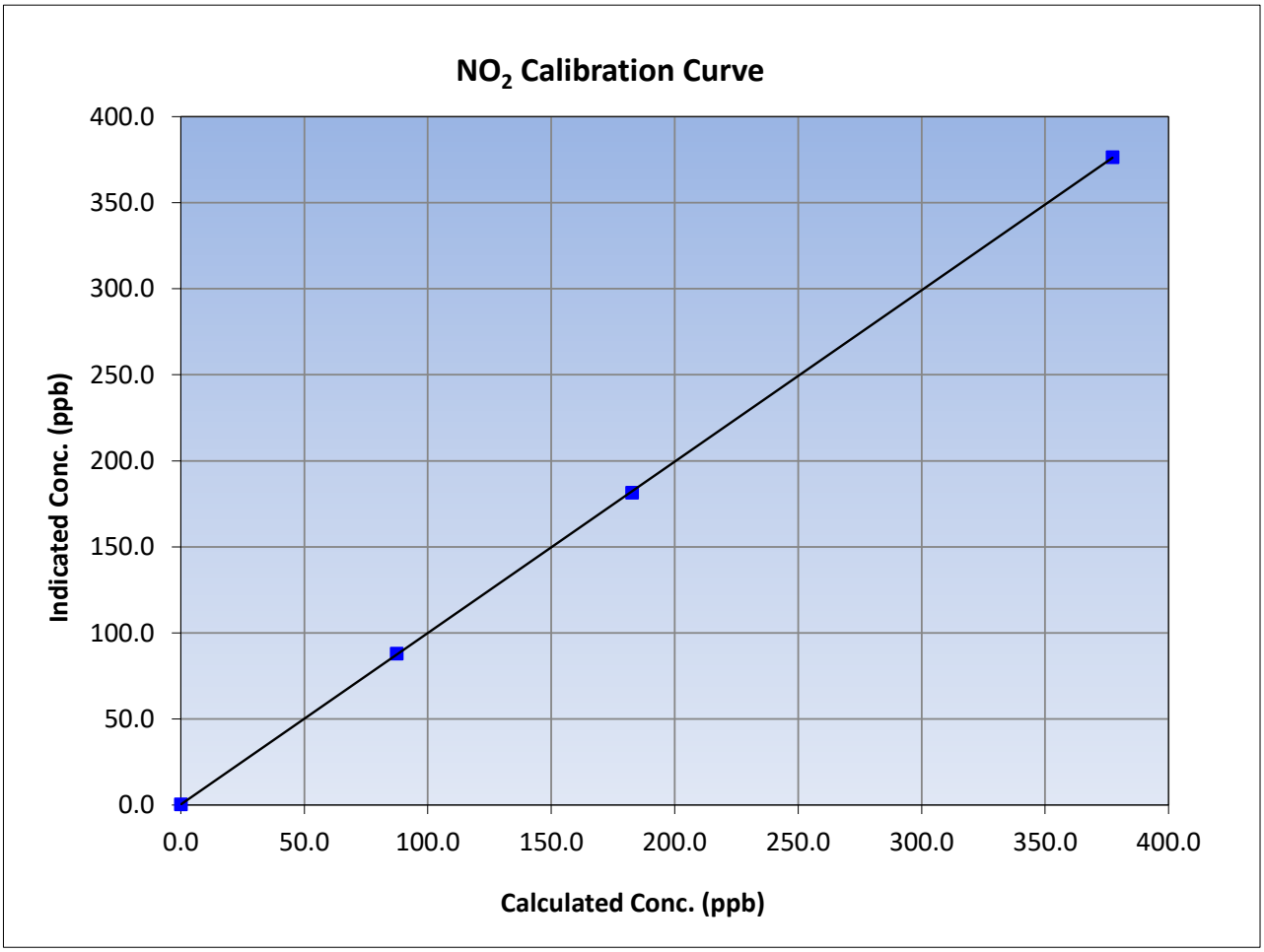
Version-04-2020

Station Information

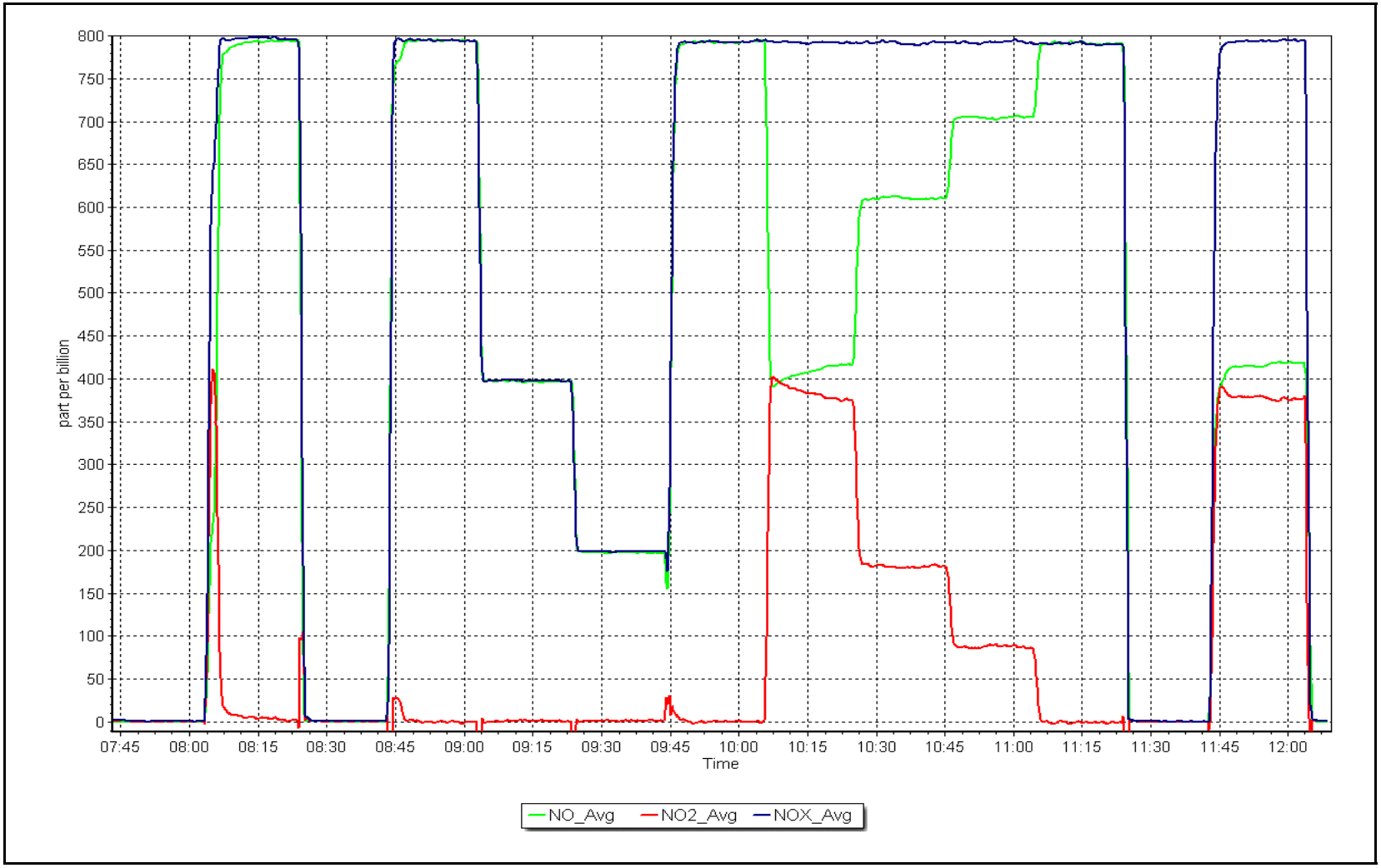
Calibration Date:	July 13, 2023	Previous Calibration:	June 27, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	7:41	End Time (MST):	12:16
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.4	----	Correlation Coefficient	0.999985	≥0.995
377.3	376.4	1.0024			
182.8	181.5	1.0072	Slope	0.995889	0.90 - 1.10
87.4	87.9	0.9943			
			Intercept	0.340396	+/-20



NO_X Calibration Plot Date: July 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:	July 10, 2023	Last Cal Date:	June 28, 2023
Start time (MST):	8:51	End time (MST):	11:57
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:	1.012486	1.010943	Backgd or Offset:	-2.0	-2.0
Calibration intercept:	-1.460000	-1.940000	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	913.0	400.0	403.3	0.992
as found 2nd point					
as found 3rd point					
calibrator zero	5000	NA	0.0	0.5	----
high point	5000	914.7	400.0	403.7	0.991
second point	5000	786.4	200.0	198.9	1.006
third point	5000	701.3	100.0	96.8	1.033
as left zero	5000	NA	0.0	0.0	----
as left span	5000	963.3	400.0	404.5	0.989
				Average Correction Factor	1.010

Baseline Corr As found:	403.5	Previous response	403.5	*% change	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: remote calibration done. No adjustments

Calibration Performed By: Morgan Voyageur

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

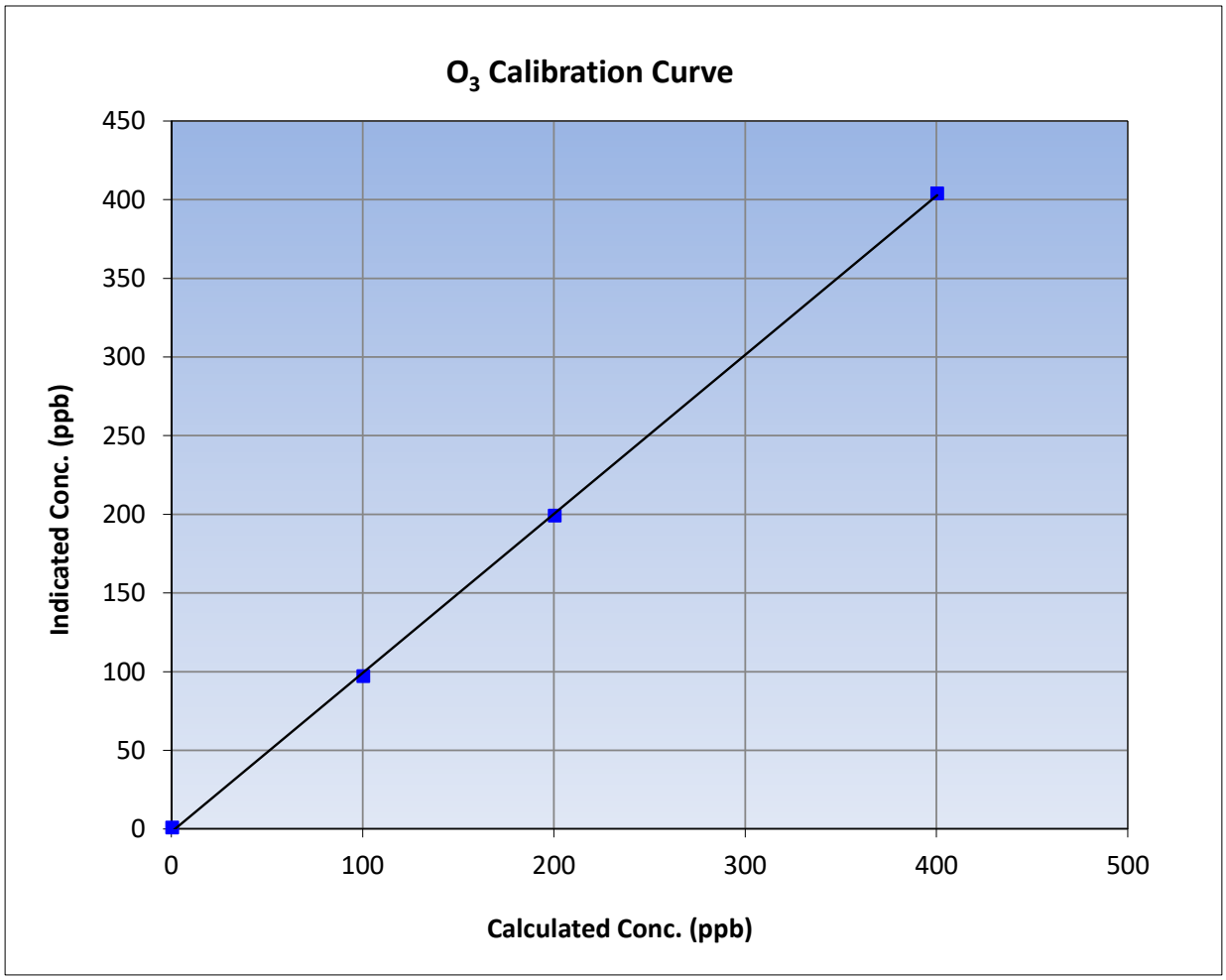
Station Information

Calibration Date:	July 10, 2023	Previous Calibration:	June 28, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:51	End Time (MST):	11:57
Analyzer make:	Teledyne API T400	Analyzer serial #:	3872

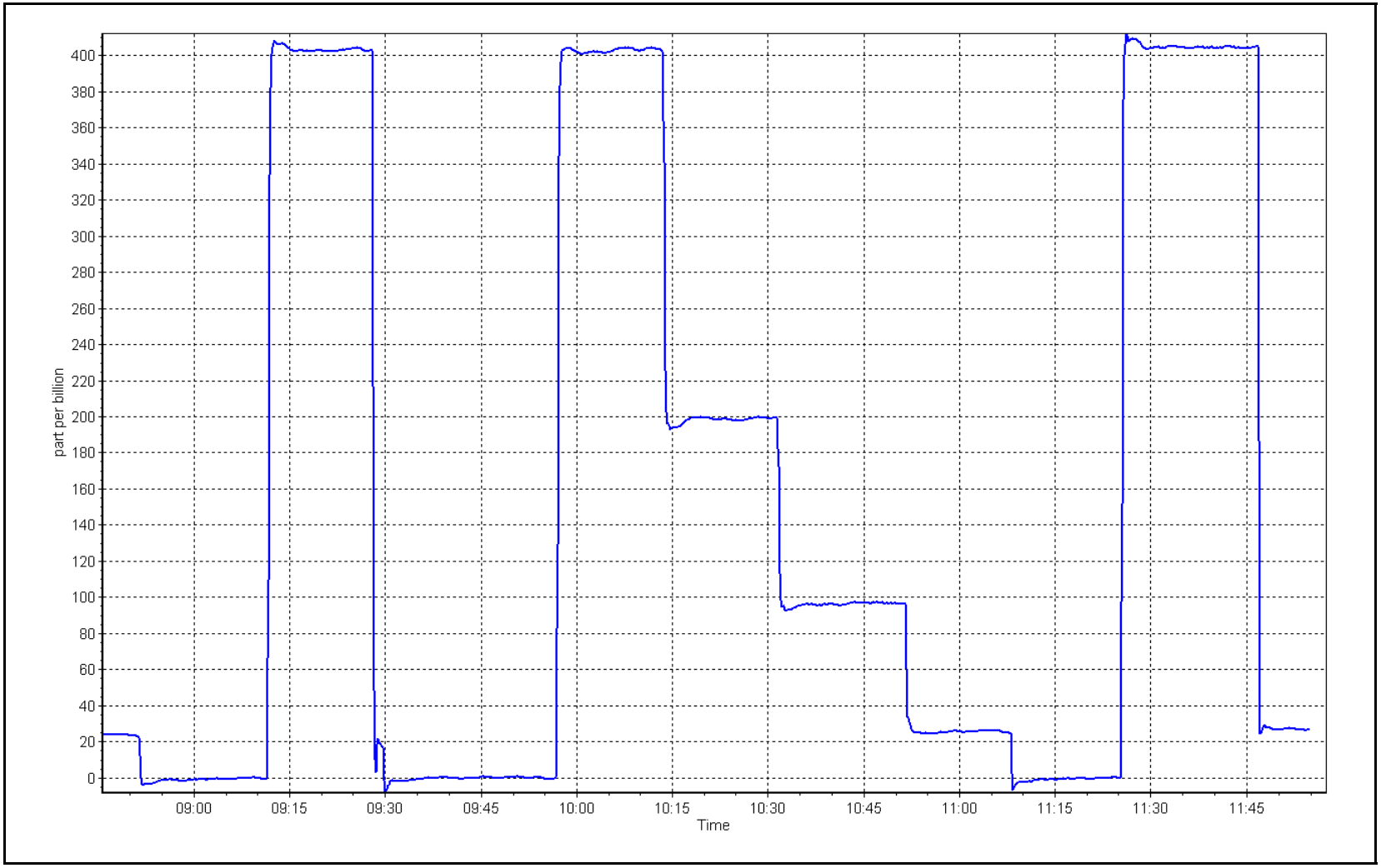
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
400.0	403.7	0.9908
200.0	198.9	1.0055
100.0	96.8	1.0331

Statistical Evaluation		Limits
Correlation Coefficient	0.999833	≥0.995
Slope	1.010943	0.90 - 1.10
Intercept	-1.940000	+/- 5



O_3 Calibration Plot Date: July 10, 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:	July 25, 2023	Last Cal Date:	June 29, 2023
Start time (MST):	11:37	End time (MST):	13:39
Analyzer Make:	Teledyne API T640	S/N:	216
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	FP-25	S/N:	388747
Temp/RH standard:	FP-25	S/N:	388747

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	21.3	21.14	21.3	☐	+/- 2 °C
P (mmHg)	730.9	734.27	730.9	☐	+/- 10 mmHg
flow (LPM)	5.05	4.96	5.05	☐	+/- 0.25 LPM

Leak Test: Date of check: July 25, 2023 Last Cal Date: June 29,2023

PM w/o HEPA: 18.8 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	10.2	10.3	11.2	☑	11.3 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 24.5 w/ HEPA: 0.0

Date Optical Chamber Cleaned: July 25, 2023 <0.2 ug/m3

Disposable Filter Changed: July 25, 2023

Annual Maintenance

Date Sample Tube Cleaned: July 25, 2023

Date RH/T Sensor Cleaned: July 25, 2023

Notes: Verified flow, temperature, and pressure. Leak test passed. PMT peak voltage adjusted. Optical chamber, RH/T sensor, and sample tube cleaned. Disposable filter changed. Inlet head cleaned

Calibration by: Mohammed Kashif

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	July 25, 2023	Last Cal Date:	June 30, 2023
Start time (MST):	8:03	End time (MST):	11:00
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make: API T300 — Analyzer serial #: 3505

Analyzer Range: 0 - 50 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.988086	0.996203	Backgd or Offset:	-0.014	-0.014
Calibration intercept:	0.136987	0.030984	Coeff or Slope:	0.968	0.968

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.11	----
as found span	4933	66.7	40.4	40.2	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4934	66.7	40.4	40.2	1.006
second point	4967	33.3	20.2	20.4	0.992
third point	4983	16.7	10.1	10.1	0.999
as left zero	5000	0.0	0.0	-0.1	----
as left span	2960	40.0	40.4	40.1	1.009
				Average Correction Factor	0.999

Baseline Corr As found:	40.33	Prev response:	40.08	*% change:	0.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Matthew C

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

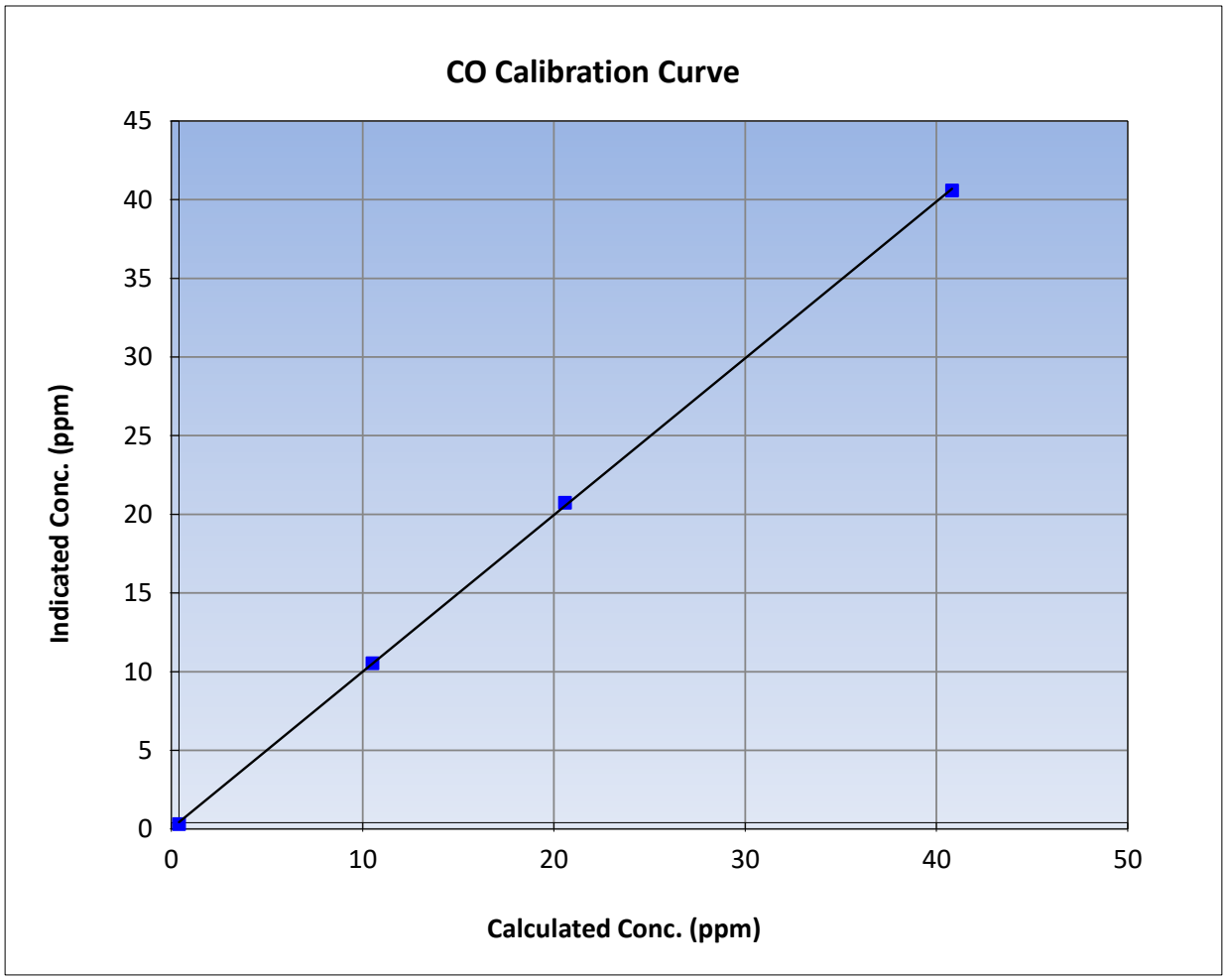
Station Information

Calibration Date:	July 25, 2023	Previous Calibration:	June 30, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:03	End Time (MST):	11:00
Analyzer make:	API T300	Analyzer serial #:	3505

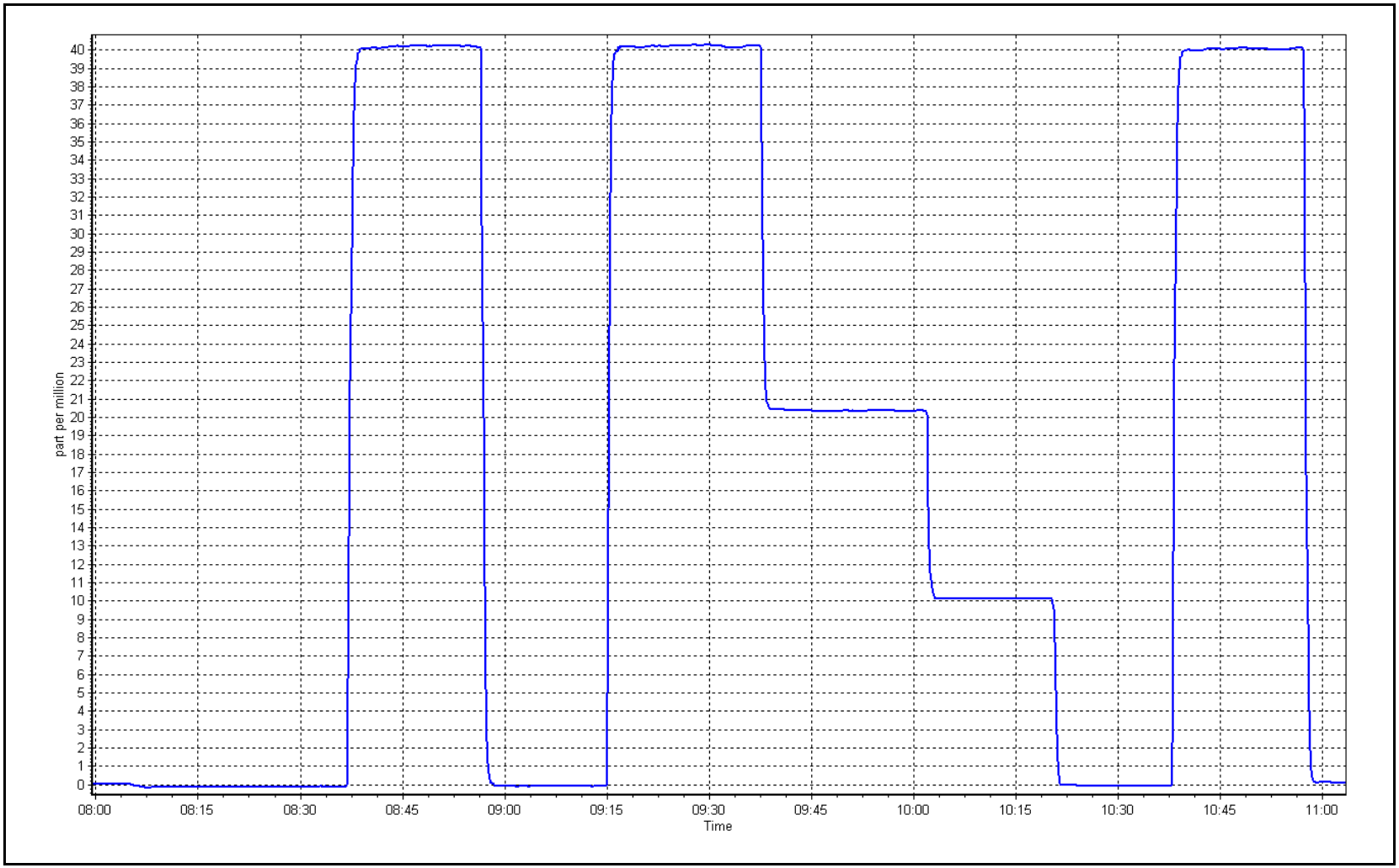
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
40.4	40.2	1.0058
20.2	20.4	0.9916
10.1	10.1	0.9990

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999916	*≥0.995*
Slope	0.996203	*0.90 - 1.10*
Intercept	0.030984	*+/-1.5*



CO Calibration Plot Date: July 25, 2023 Location: Fort Chipewyan



Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	July 26, 2023	Last Cal Date:	July 25, 2023
Start time (MST):	13:50	End time (MST):	16:48
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	3,030	ppm	Cal Gas Exp Date:	December 1, 2028
Cal Gas Cylinder #:	ALM014846			
Removed Cal Gas Conc:	3,030	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3252
ZAG Make/Model:	API T701H		Serial Number:	260

Analyzer Information

Analyzer make:	API T300		Analyzer serial #:	3505
Analyzer Range:	0 - 50 ppm			

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.996203	1.002649	Backgd or Offset:	-0.014	-0.013
Calibration intercept:	0.030984	-0.072958	Coeff or Slope:	0.968	0.999

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	-0.27	----
as found span	4933	66.7	40.4	37.8	1.070
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4934	66.7	40.4	40.4	1.000
second point	4967	33.3	20.2	20.4	0.992
third point	4983	16.7	10.1	9.9	1.027
as left zero	5000	0.0	0.0	0.0	----
as left span	2960	40.0	40.4	40.2	1.005
				Average Correction Factor	1.006

Baseline Corr As found:	38.05	Prev response:	40.30	*% change:	-5.9%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Inlet filter was changed out yesterday. Adjusted both zero and span.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO Calibration Summary

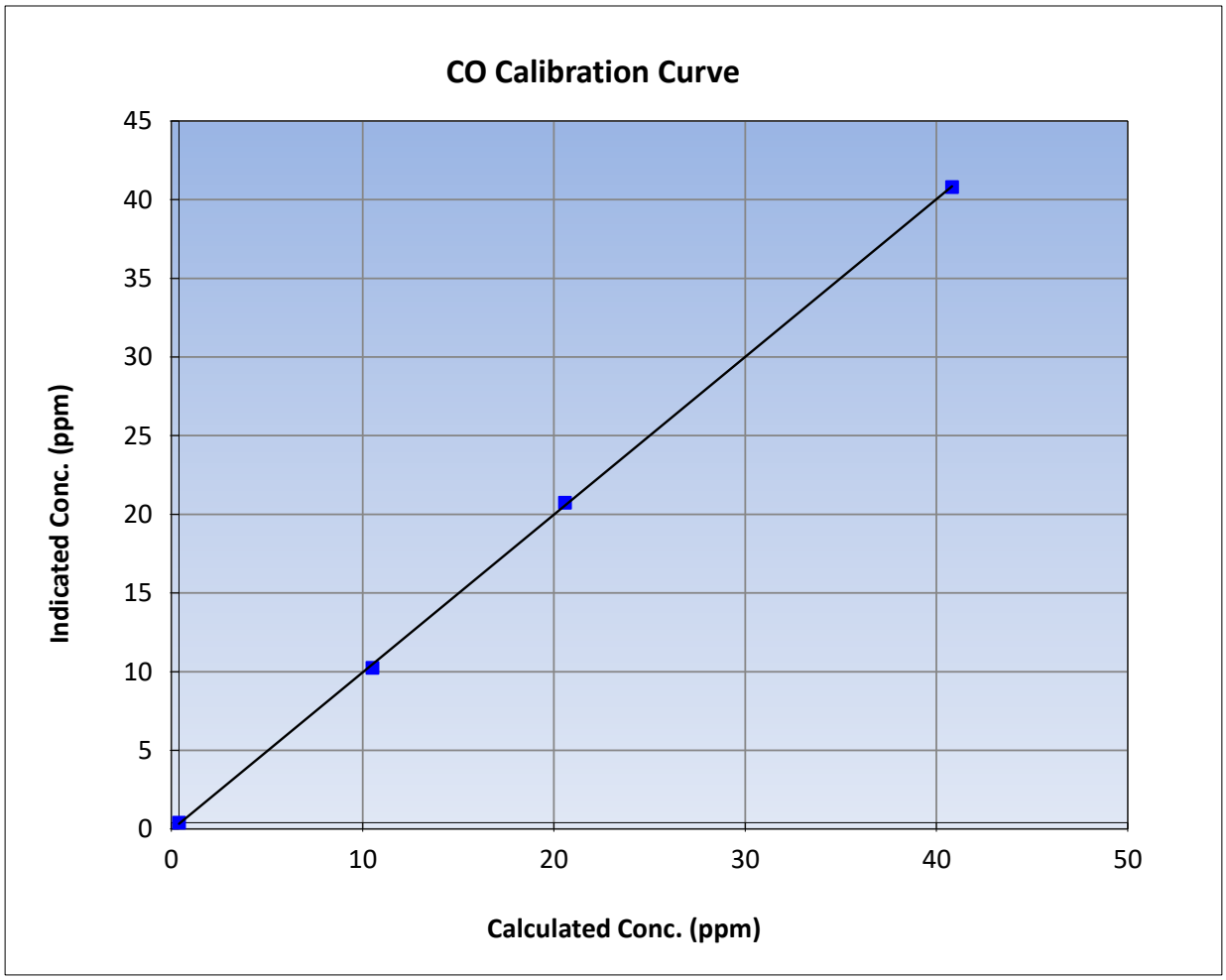
Version-01-2020

Station Information

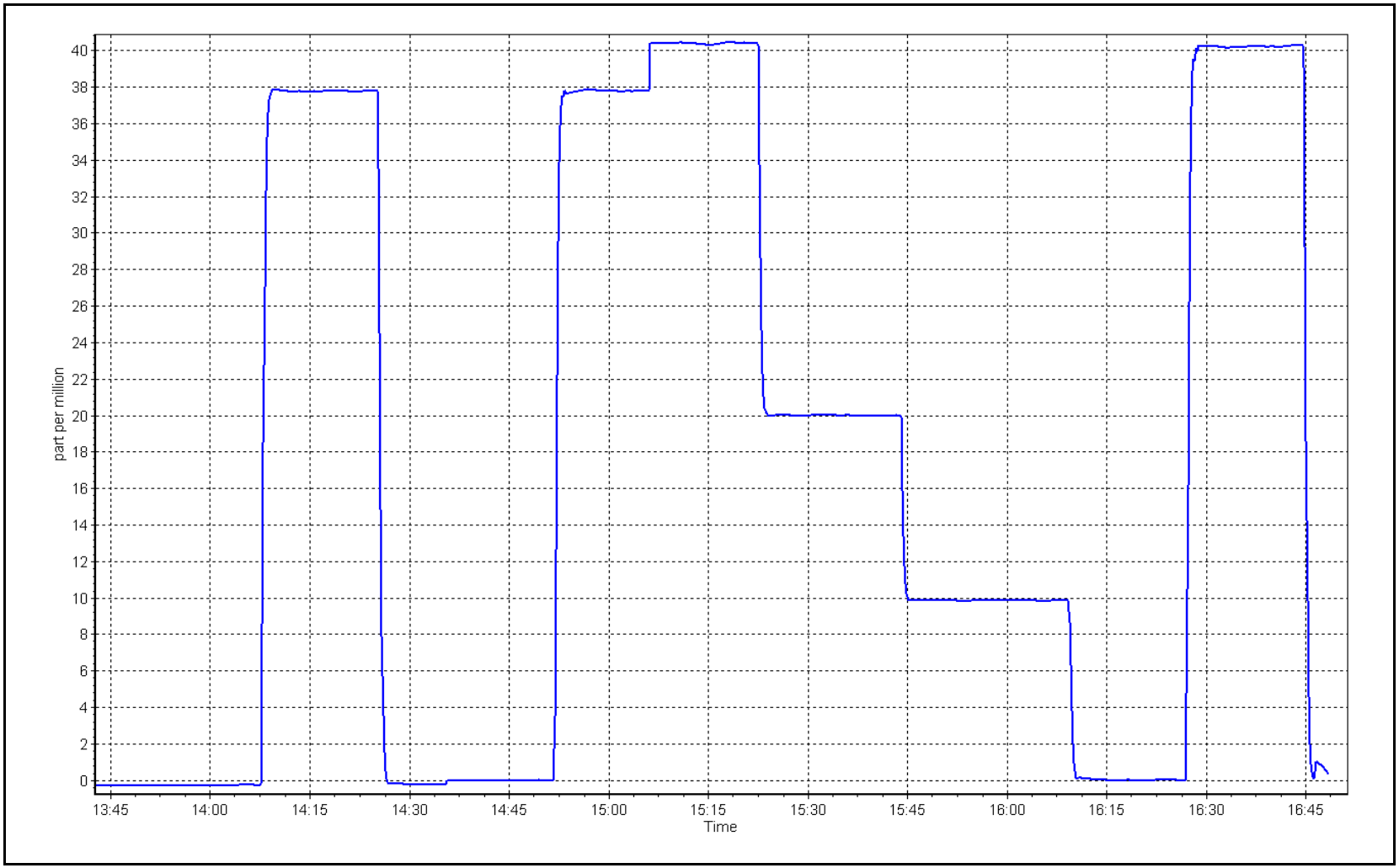
Calibration Date:	July 26, 2023	Previous Calibration:	July 25, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	13:50	End Time (MST):	16:48
Analyzer make:	API T300	Analyzer serial #:	3505

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999896	*≥0.995*
40.4	40.4	1.0001			
20.2	20.4	0.9916	Slope	1.002649	*0.90 - 1.10*
10.1	9.9	1.0274			
			Intercept	-0.072958	*+/-1.5*



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



Wood Buffalo Environmental Association

CO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	July 25, 2023	Last Cal Date:	June 28, 2023
Start time (MST):	11:15	End time (MST):	12:45
Reason:	As Found		

Calibration Standards

Cal Gas Concentration:	60,220	ppm	Cal Gas Exp Date:	December 1, 2028
Cal Gas Cylinder #:	ALM014846			
Removed Cal Gas Conc:	60,220	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3060
N2 Gen Make/Model:	NG 5000		Serial Number:	771048318

Analyzer Information

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

Analyzer Range 0 - 2,000 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.986205		Backgd or Offset:	0.008	0.008
Calibration intercept:	-4.300000		Coeff or Slope:	1.002	1.002

CO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	3000	0.0	0.0	0.4	----
as found span	2920	80.0	1605.9	1587.0	1.012
as found 2nd point	2960	40.0	802.9	779.7	1.030
as found 3rd point	2980	20.0	401.5	397.4	1.010
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	

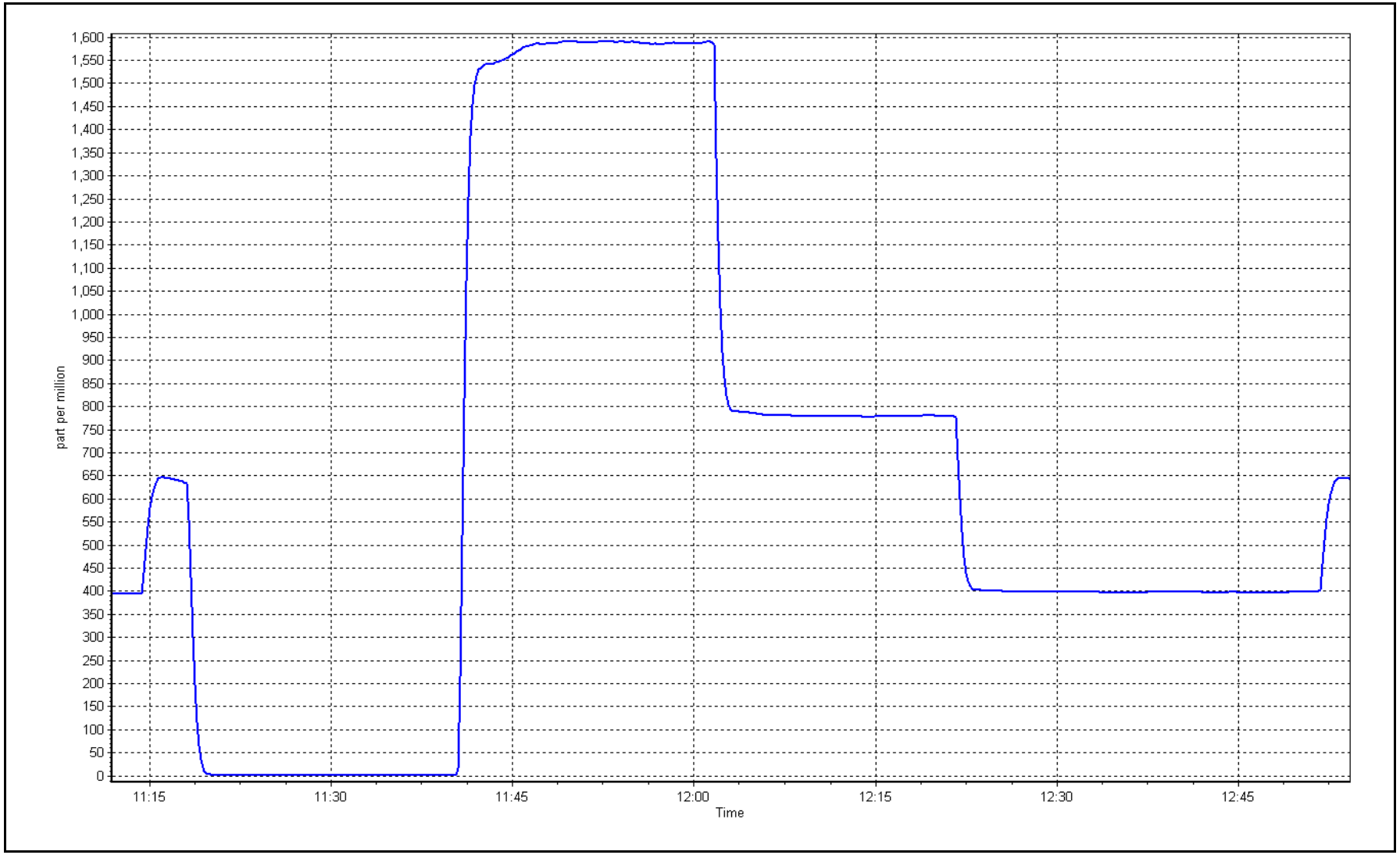
Baseline Corr As found:	1586.60	Prev response:	1579.41	*% change:	0.5%
Baseline Corr 2nd AF pt:	779.3	AF Slope:	0.986931	AF Intercept:	-2.260000
Baseline Corr 3rd AF pt:	397.0	AF Correlation:	0.999892		

* = > +/-5% change initiates investigation

Notes: Performed multi-point as founds. Changed out the sample pump.

Calibration Performed By: Rene Chamberland

CO_2 Calibration Plot Date: July 25, 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:	July 26, 2023	Last Cal Date:	June 28, 2023
Start time (MST):	10:10	End time (MST):	13:45
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	60,220	ppm	Cal Gas Exp Date:	December 1, 2028
Cal Gas Cylinder #:	ALM014846			
Removed Cal Gas Conc:	60,220	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3252
N2 Gen Make/Model:	NG 5000		Serial Number:	771048318

Analyzer Information

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

Analyzer Range 0 - 2,000 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.986205	0.997030	Backgd or Offset:	0.008	0.008
Calibration intercept:	-4.300000	-4.080000	Coeff or Slope:	1.002	1.016

CO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	0.7	----
high point	2920	80.0	1605.9	1604.1	1.001
second point	2960	40.0	802.9	780.0	1.029
third point	2980	20.0	401.5	400.8	1.002
as left zero	3000	0.0	0.0	1.4	----
as left span	2960	40.0	802.9	776.0	1.035
				Average Correction Factor	1.011

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

* = > +/-5% change initiates investigation

Notes: As founds and pump change were done yesterday. Changed the inlet filter. Adjusted the span. Performed a linearity adjustment on the 3rd point.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

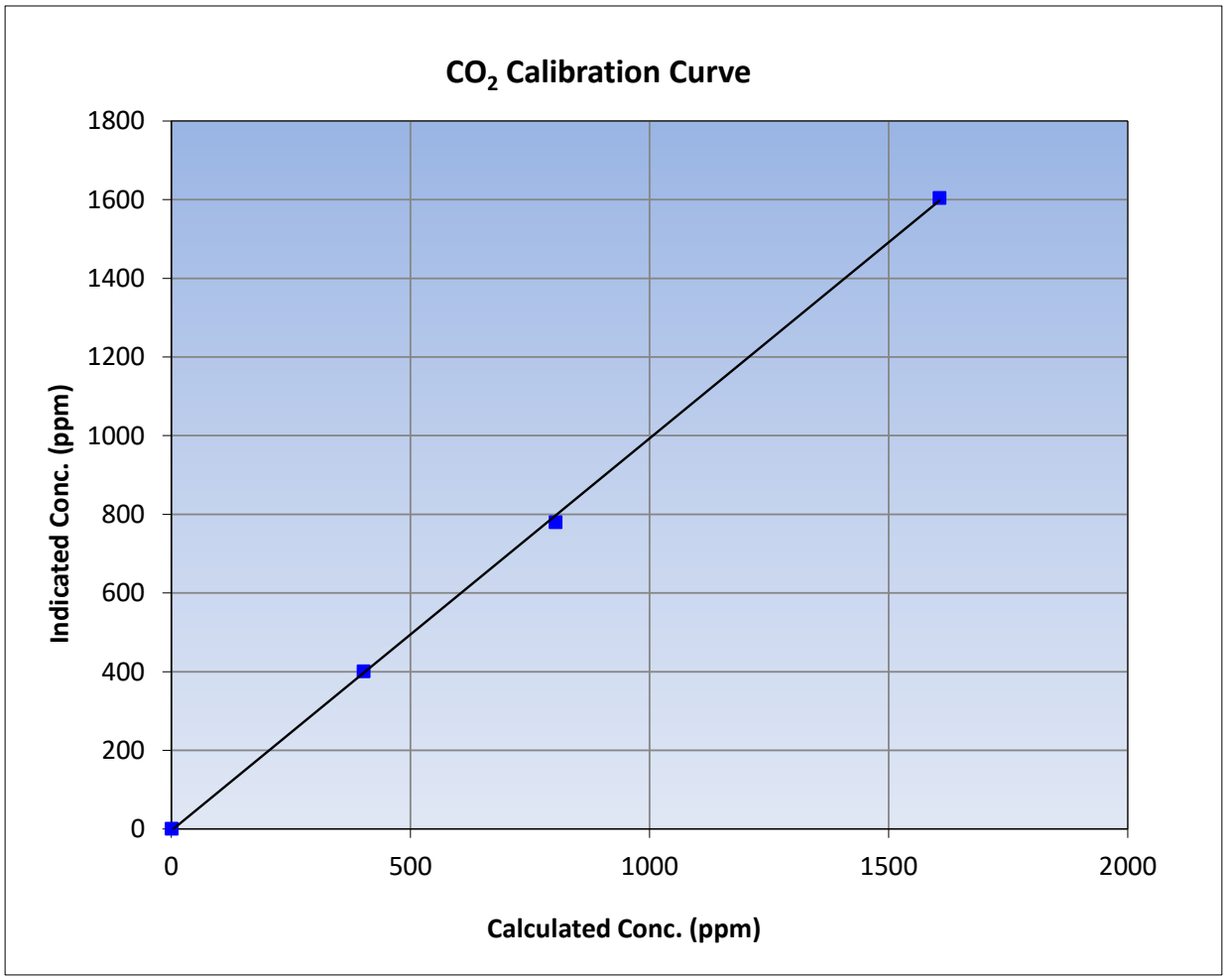
Station Information

Calibration Date	July 26, 2023	Previous Calibration	June 28, 2023
Station Name	Fort Chipewyan	Station Number	AMS08
Start Time (MST)	10:10	End Time (MST)	13:45
Analyzer make	Teledyne API T360	Analyzer serial #	289

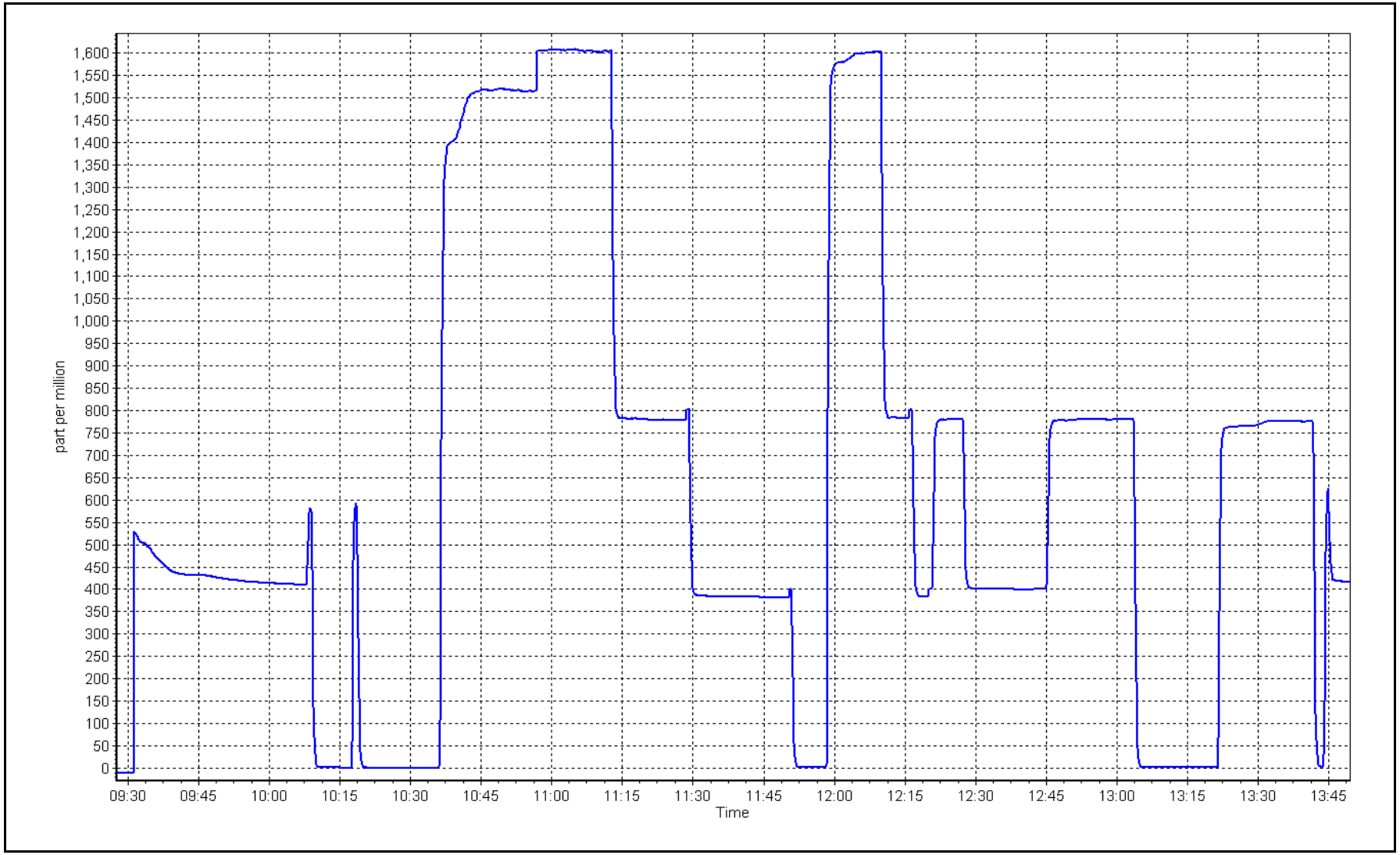
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.7	----
1605.9	1604.1	1.0011
802.9	780.0	1.0294
401.5	400.8	1.0017

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999739	*≥0.995*
Slope	0.997030	*0.90 - 1.10*
Intercept	-4.080000	*+/-20*



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



Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Fort Chipewyan	Station Number:	AMS 08
Calibration Date:	July 25, 2023	Prev Cal Date:	June 29, 2022
Start Time (MST):	12:23	End Time (MST):	14:00
Tower Height (m):	9.6	Reason:	Routine

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	P22394
WS Calibrator:	MetOne 053	Serial Number:	CA 05231

Shaft RPM	Calculated Speed (K/hr) (Cv)	Indicated Speed (K/hr) (Iv)	% Error *Limit = +/- 1.5%*
0	0.0	0.0	---
200	20.2	20.1	-0.2%
400	39.4	39.3	-0.3%
600	58.6	58.4	-0.3%
800	77.8	77.6	-0.3%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)	0.999999	1.000000	*≥0.9995*
Calculated slope	0.998873	1.002580	*0.90 - 1.10*
Calculated intercept	-0.027395	-0.001028	*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	E4853
As Found Declination (deg east of True North):	14	As Left Declination (deg east of True North):	14
Solar noon time (MST):	14:27	Calc Declination*:	13.75 Degrees
Deadband calc:	-0.7 degrees (*Limit 4 deg*)		* - calculated declination as per NOAA website

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	% Error (based on 357° FS) *Limit = +/- 1.0%*
0	0.0	---
90	89.2	-0.2%
180	181.4	0.4%
270	273.2	0.9%
357	357.7	0.2%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)	0.999915	0.999961	*≥0.9995*
Calculated slope	0.990857	0.993820	*0.90 - 1.10*
Calculated intercept	-0.704563	0.199340	*+/- 4*

Notes: Annual met calibration.

Calibration Performed By: Rene Chamberland

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS09
BARGE LANDING
JULY 2023

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

August 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	July 11, 2023	Last Cal Date:	June 8, 2023
Start time (MST):	8:56	End time (MST):	12:12
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make: Thermo 43i Analyzer serial #: 1118148498

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.995921	1.000739	Backgd or Offset:	9.6	9.6
Calibration intercept:	0.510287	0.671341	Coeff or Slope:	0.972	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	0.2	----
as found span	4919	80.2	801.5	787.6	1.018
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	802.5	0.999
second point	4959	40.1	400.8	402.1	0.997
third point	4980	20.0	199.8	200.9	0.995
as left zero	5000	0.0	0.0	0.2	----
as left span	4919	80.2	801.5	803.4	0.998
				Average Correction Factor	0.997

Baseline Corr As found:	787.40	Previous response	798.73	*% 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: Changed sample inlet filter after as founds. Adjusted span only.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

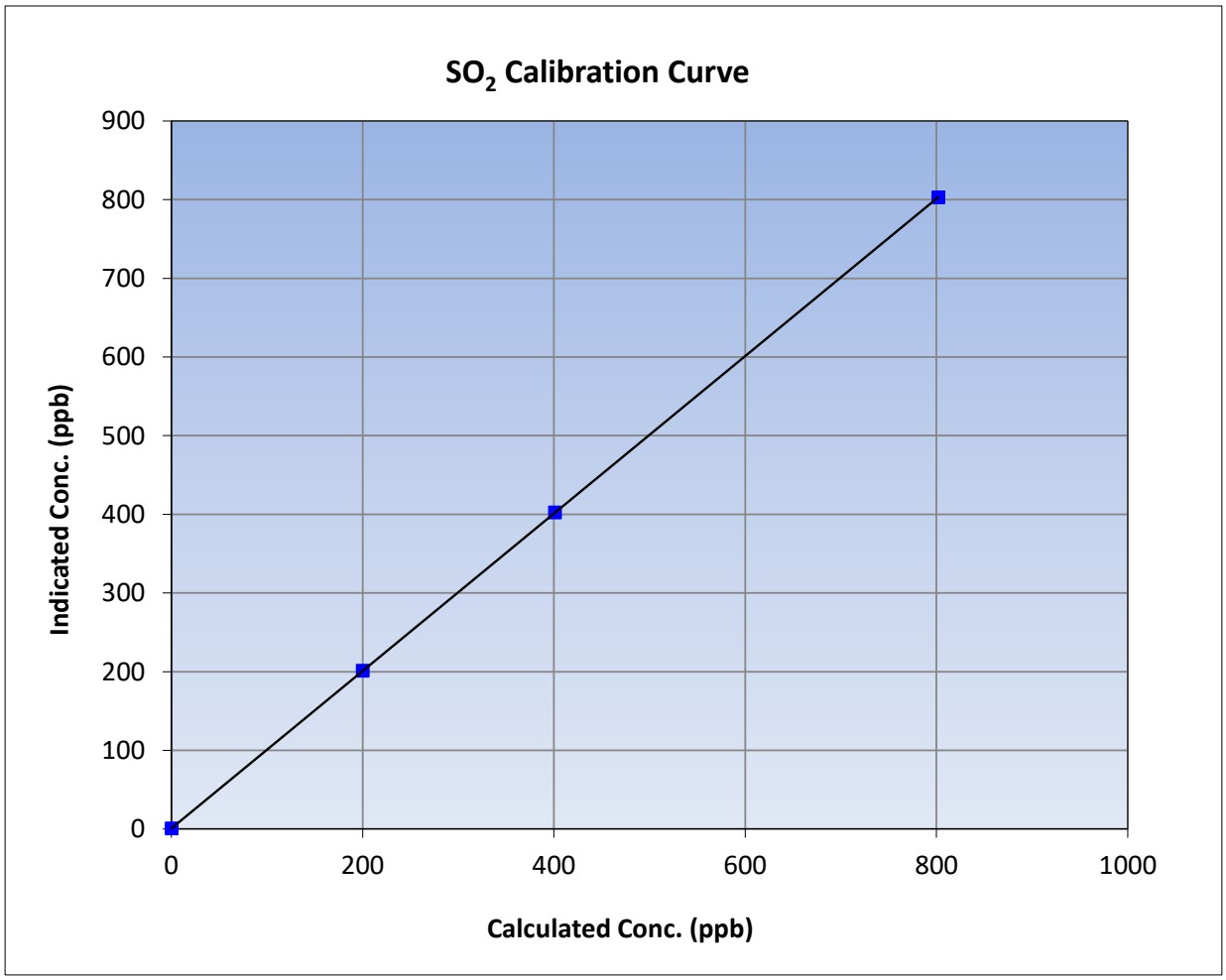
Station Information

Calibration Date:	July 11, 2023	Previous Calibration:	June 8, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	8:56	End Time (MST):	12:12
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148498

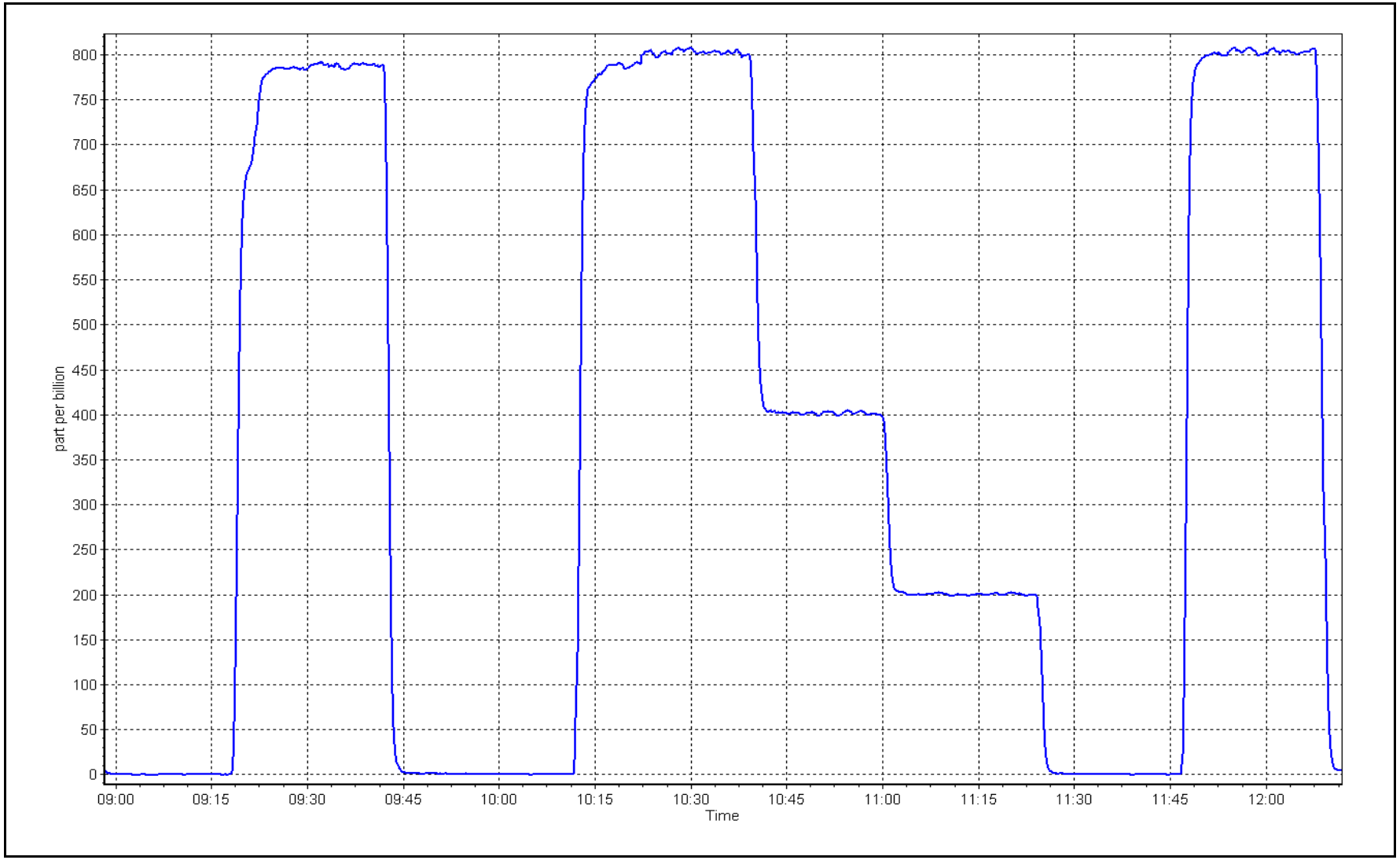
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
801.5	802.5	0.9987
400.8	402.1	0.9966
199.8	200.9	0.9947

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	1.000739	*0.90 - 1.10*
Intercept	0.671341	*+/-30*



SO2 Calibration Plot Date: July 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:	July 4, 2023	Last Cal Date:	June 7, 2023
Start time (MST):	9:21	End time (MST):	13:14
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:	1.007720	1.000859	Backgd or Offset:	2.77	2.77
Calibration intercept:	-0.060968	-0.220903	Coeff or Slope:	1.134	1.134

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4918	82.1	80.0	78.9	1.012
as found 2nd point	4959	41.1	40.0	39.3	1.016
as found 3rd point	4979	20.5	20.0	19.4	1.024
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	82.1	80.0	79.9	1.001
second point	4959	41.1	40.0	39.7	1.008
third point	4979	20.5	20.0	19.7	1.014
as left zero	5000	0.0	0.0	-0.1	----
as left span	4918	82.1	80.0	80.3	0.996
SO2 Scrubber Check	4920	80.2	802.0	0.0	----
Date of last scrubber change:		28-Feb-23		Ave Corr Factor	1.008
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.0	Prev response:	80.52	*% change:	-1.9%
Baseline Corr 2nd AF pt:	39.4	AF Slope:	0.988714	AF Intercept:	-0.220946
Baseline Corr 3rd AF pt:	19.5	AF Correlation:	0.999989		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. SOx scrubber check done after calibrator zero. No adjustment made.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

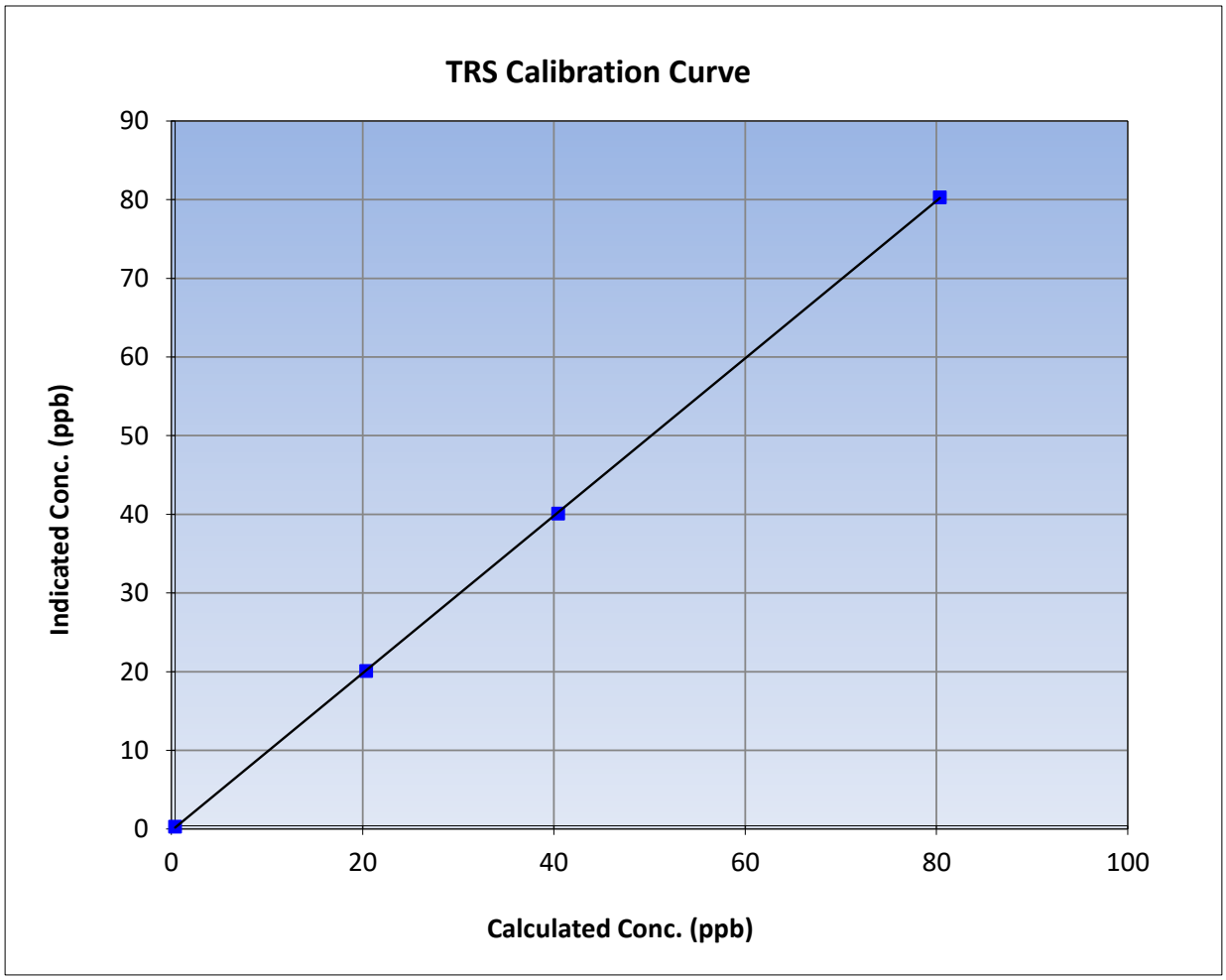
Station Information

Calibration Date:	July 4, 2023	Previous Calibration:	June 7, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:21	End Time (MST):	13:14
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1331259320

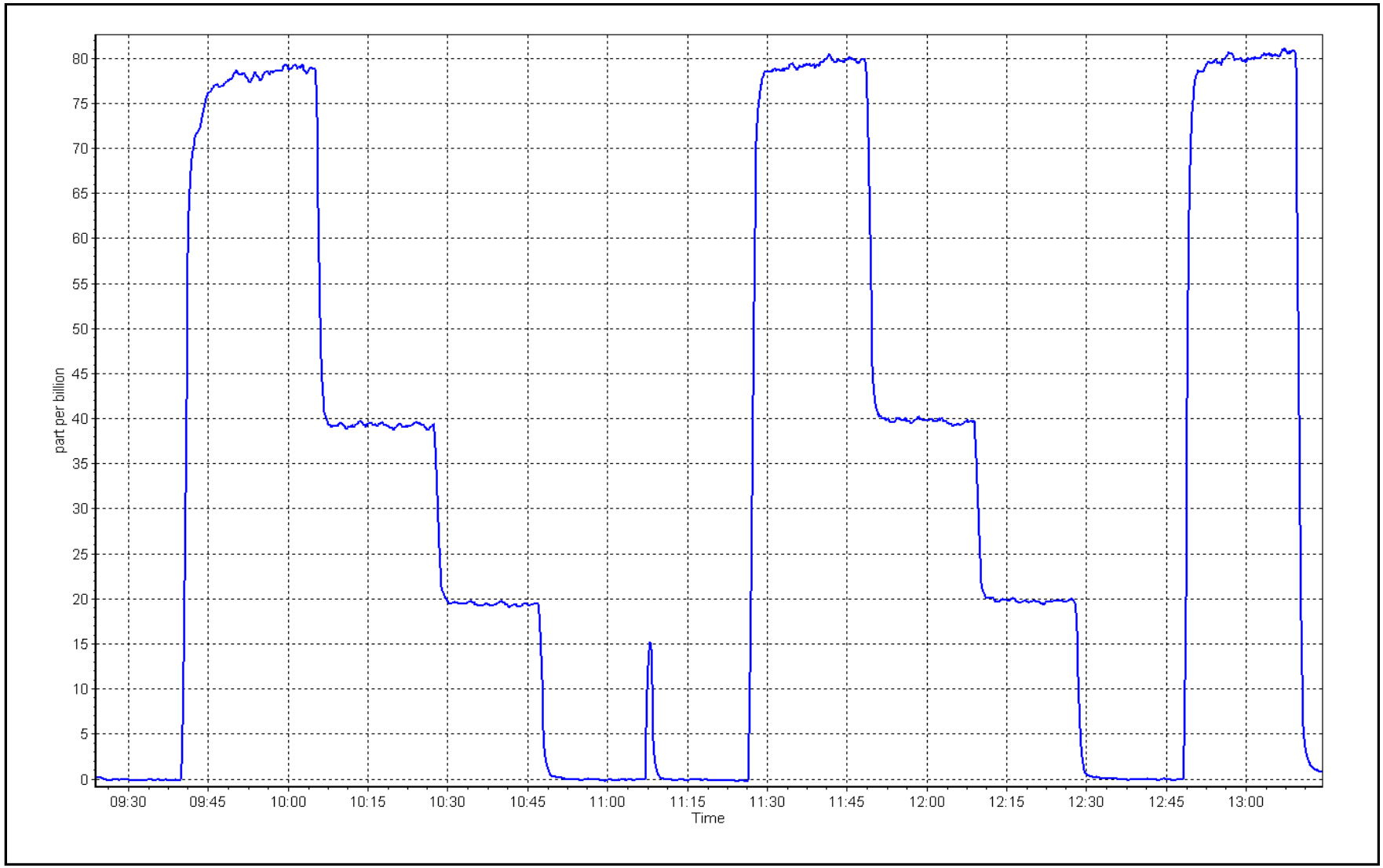
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	79.9	1.0008
40.0	39.7	1.0083
20.0	19.7	1.0137

Statistical Evaluation		Limits
Correlation Coefficient	0.999986	≥0.995
Slope	1.000859	0.90 - 1.10
Intercept	-0.220903	+/-3



TRS Calibration Plot Date: July 4, 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:	July 11, 2023	Last Cal Date:	June 8, 2023
Start time (MST):	8:46	End time (MST):	12:12
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	2.52E-04	NMHC SP Ratio:	4.85E-05	4.85E-05
CH4 Retention time:	15.2	15.4	NMHC Peak Area:	188395	188466

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	80.2	17.12	17.11	1.001
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	17.17	0.997
second point	4960	40.1	8.56	8.56	1.000
third point	4980	20.0	4.27	4.28	0.997
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	17.12	17.15	0.998
				Average Correction Factor	0.998

Baseline Corr AF:	17.11	Prev response	17.16	*% 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	0.0	----
as found span	4919	80.2	9.14	9.18	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	9.14	9.17	0.997
second point	4960	40.1	4.57	4.57	1.000
third point	4980	20	2.28	2.28	0.997
as left zero	5000	0	0.00	0.00	----
as left span	4919	80.2	9.14	9.14	1.000
				Average Correction Factor	0.998
Baseline Corr AF:	9.18	Prev response	9.16	*% change	0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	80.2	7.98	7.93	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	7.98	8.00	0.998
second point	4960	40.1	3.99	4.00	0.999
third point	4980	20.0	1.99	2.00	0.997
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	7.98	8.02	0.996
				Average Correction Factor	0.998
Baseline Corr AF:	7.93	Prev response	8.00	*% change	-0.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.002132	1.002740
THC Cal Offset:	0.007266	-0.004535
CH4 Cal Slope:	1.002397	1.002125
CH4 Cal Offset:	-0.001332	-0.000132
NMHC Cal Slope:	1.001775	1.003064
NMHC Cal Offset:	0.008598	-0.003803

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

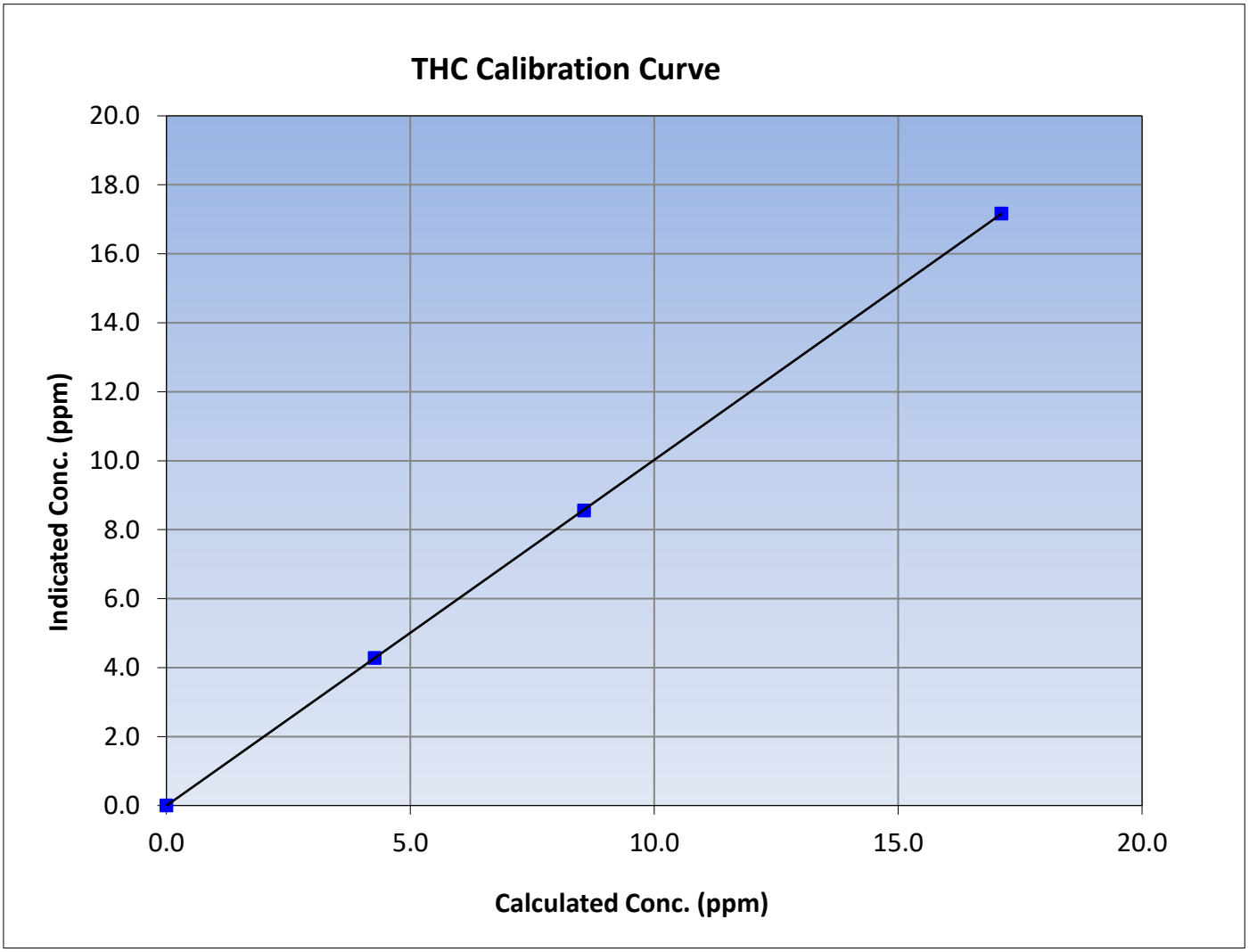
Version-01-2020

Station Information

Calibration Date:	July 11, 2023	Previous Calibration:	June 8, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	8:46	End Time (MST):	12:12
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	0.999998	≥0.995
17.12	17.17	0.9971			
8.56	8.56	0.9998	Slope	1.002740	0.90 - 1.10
4.27	4.28	0.9971			
			Intercept	-0.004535	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

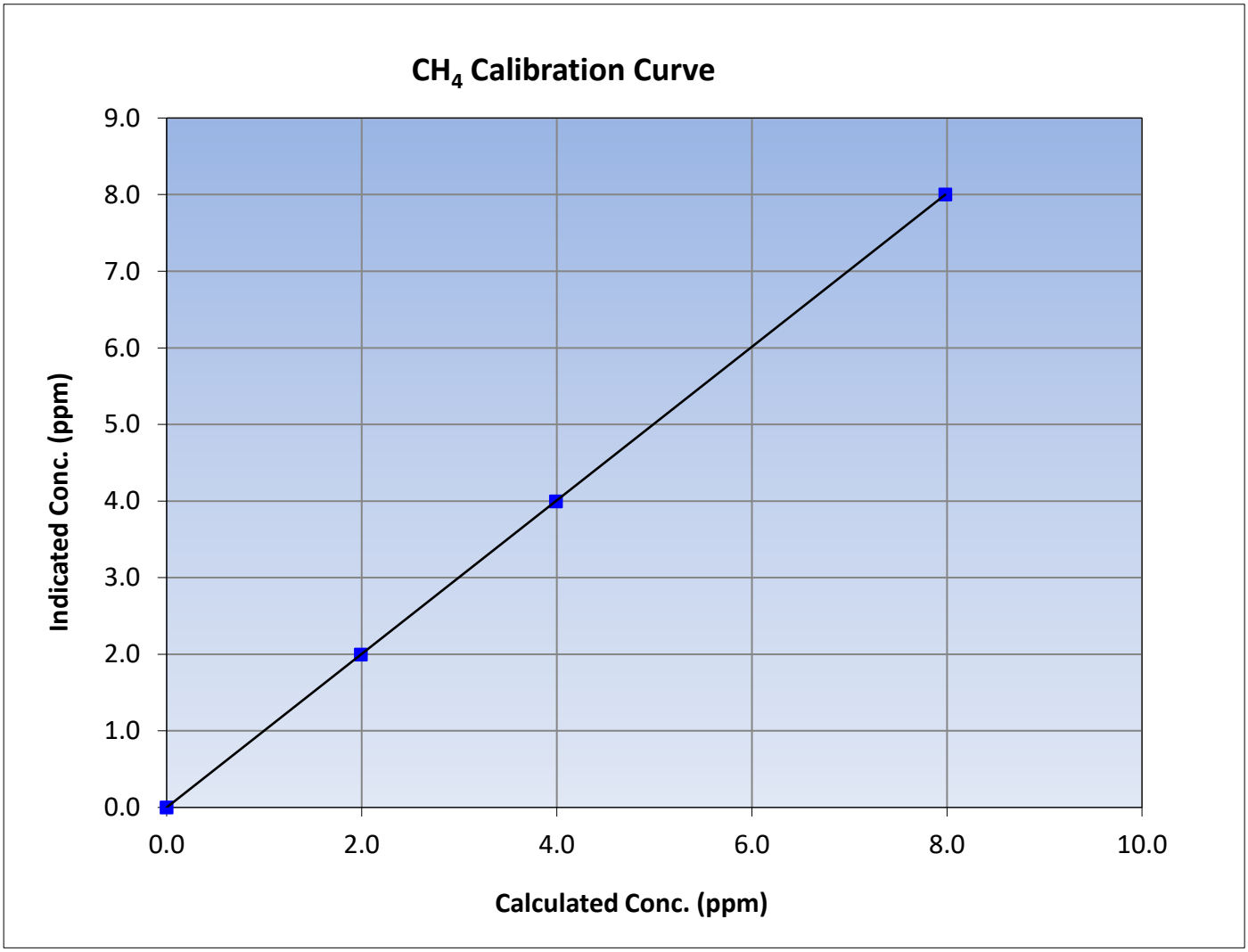
Version-01-2020

Station Information

Calibration Date:	July 11, 2023	Previous Calibration:	June 8, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	8:46	End Time (MST):	12:12
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	0.999999	*≥0.995*
7.98	8.00	0.9977			
3.99	4.00	0.9989	Slope	1.002125	*0.90 - 1.10*
1.99	2.00	0.9967			
			Intercept	-0.000132	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

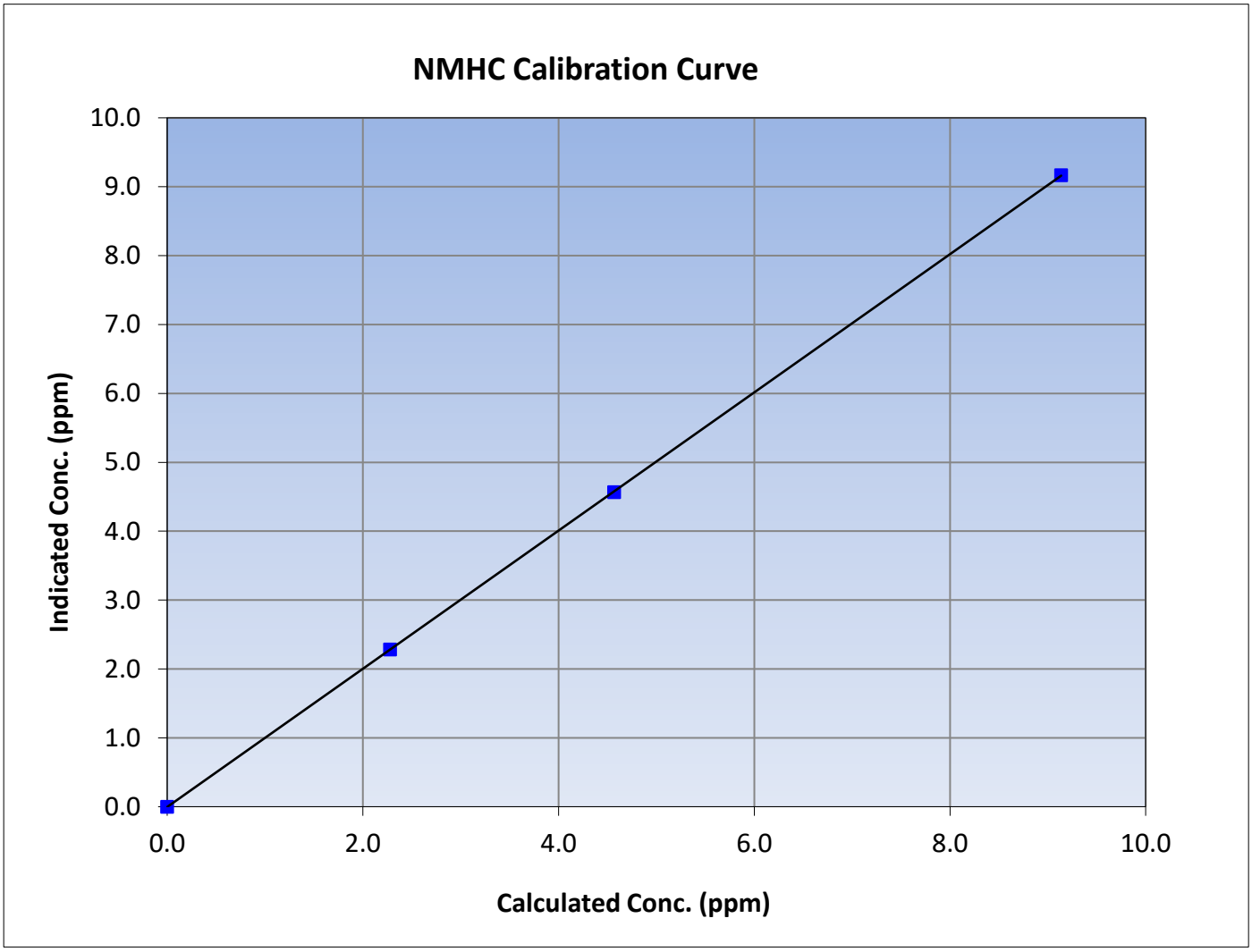
Version-01-2020

Station Information

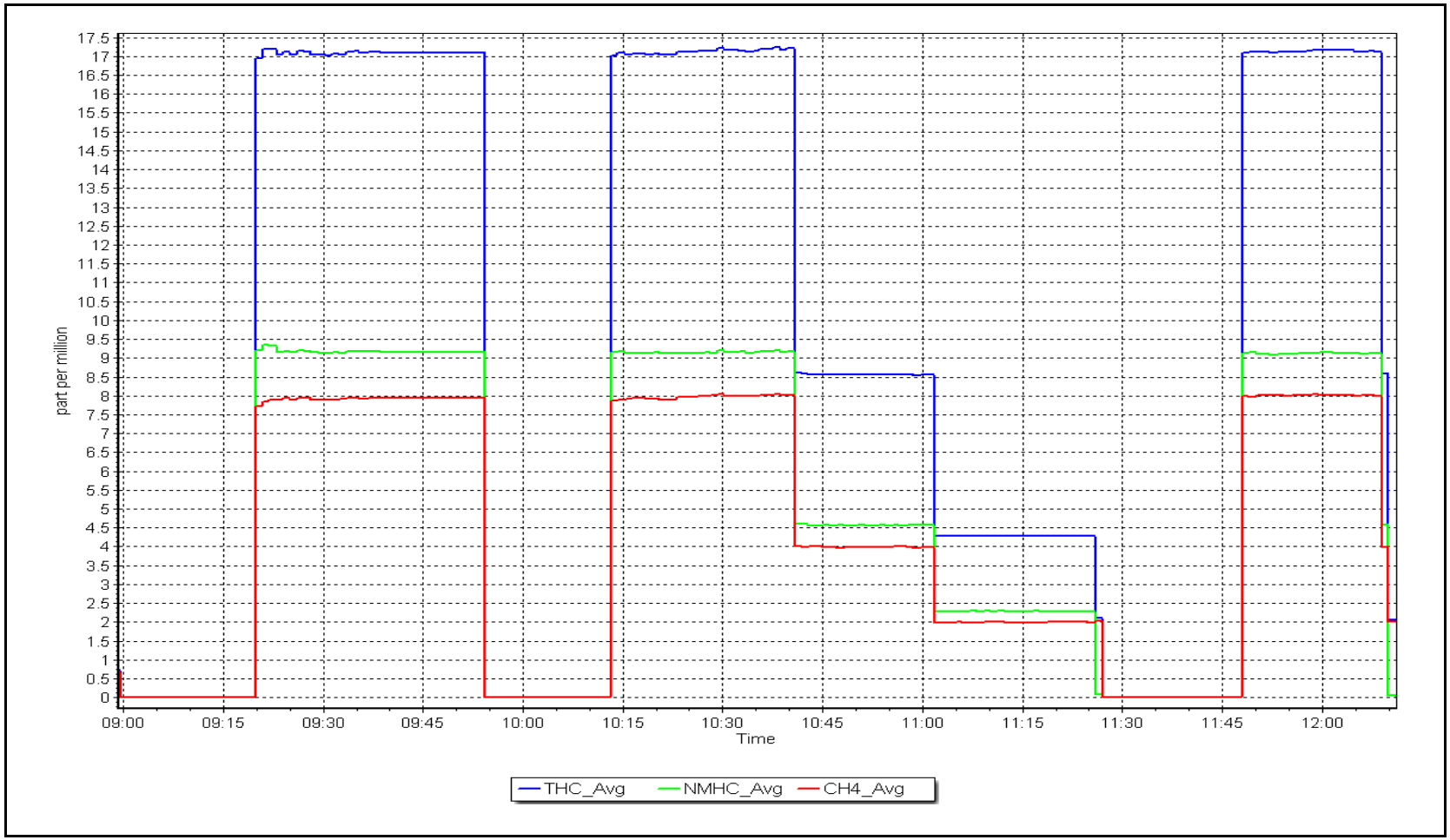
Calibration Date:	July 11, 2023	Previous Calibration:	June 8, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	8:46	End Time (MST):	12:12
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999996	≥0.995
9.14	9.17	0.9968			
4.57	4.57	1.0003	Slope	1.003064	0.90 - 1.10
2.28	2.28	0.9974			
			Intercept	-0.003803	+/-0.5



NMHC Calibration Plot Date: July 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:	July 5, 2023	Last Cal Date:	June 6, 2023
Start time (MST):	9:19	End time (MST):	13:45
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:	1.181	1.169	NO bkgnd or offset:	10.8	10.7
NOX coeff or slope:	0.994	0.994	NOX bkgnd or offset:	11.0	10.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	172.2	175.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.998838	0.997858
NO_X Cal Offset:	0.888950	0.708793
NO Cal Slope:	1.001441	0.999541
NO Cal Offset:	-0.512202	-0.472540
NO_2 Cal Slope:	0.999242	1.000792
NO_2 Cal Offset:	0.437176	-0.264400

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.3	-0.1	----	----
as found span	4919	80.5	805.1	800.3	4.8	815.4	807.4	8.0	0.987	0.991
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.2	----	----
high point	4919	80.5	805.1	800.3	4.8	803.6	799.5	4.2	1.002	1.001
second point	4959	40.2	402.1	399.7	2.4	402.4	399.1	3.3	0.999	1.001
third point	4979	20.1	201.0	199.8	1.2	202.2	198.7	3.5	0.994	1.006
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1	----	----
as left span	4919	80.5	805.1	436.0	369.1	802.5	432.0	370.5	1.003	1.009
								Average Correction Factor	0.998	1.003

Corrected As found	NO_X = 815.8 ppb	NO = 807.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	1.3%
Previous Response	NO_X = 805.0 ppb	NO = 800.9 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)	796.1	431.8	369.1	369.1	1.000	100.0%
2nd GPT point (200 ppb O3)	796.1	656.8	144.1	144.3	0.999	100.1%
3rd GPT point (100 ppb O3)	796.1	725.7	75.2	74.7	1.007	99.3%
				Average Correction Factor	1.002	99.8%

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

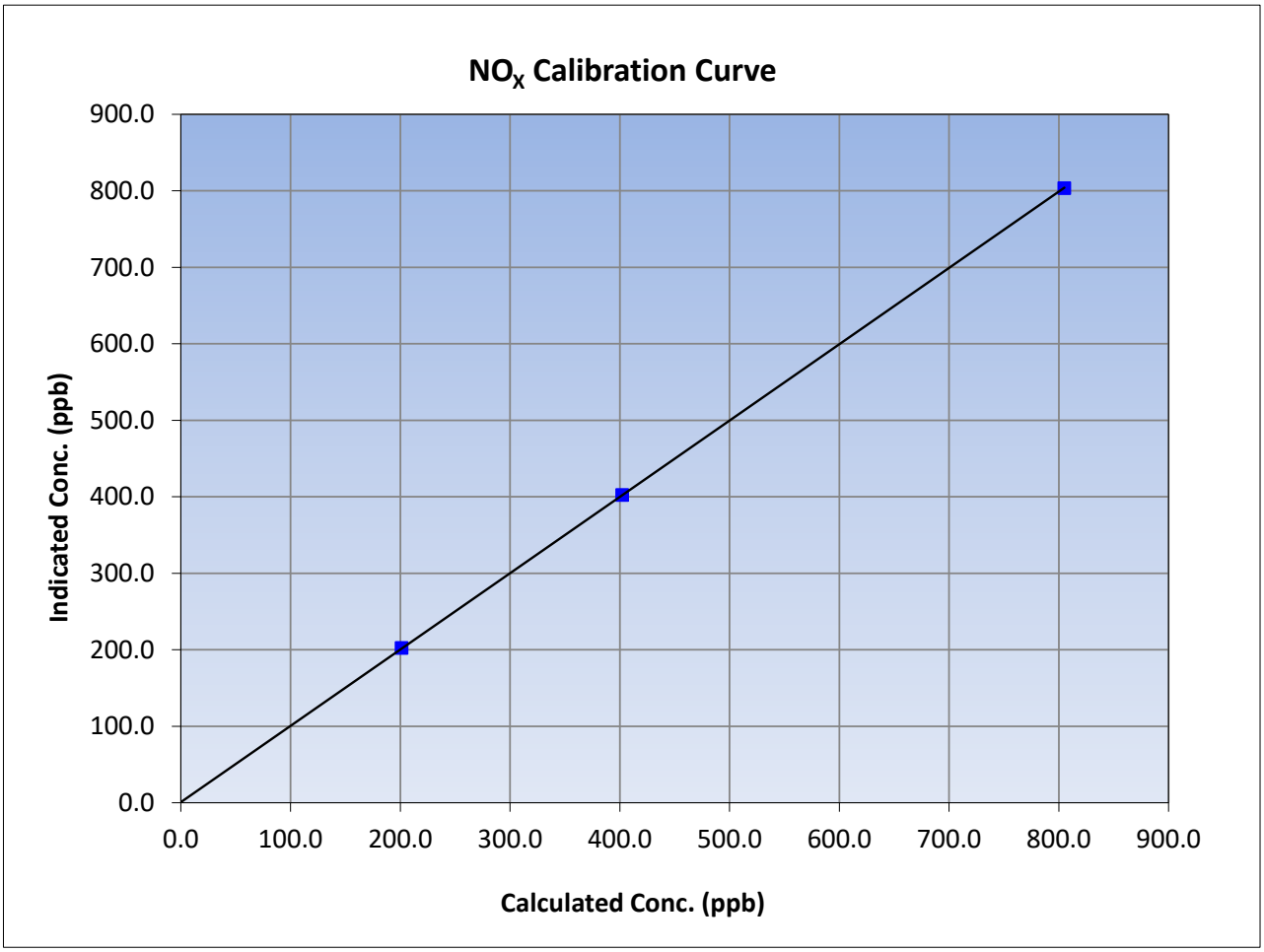
Version-04-2020

Station Information

Calibration Date:	July 5, 2023	Previous Calibration:	June 6, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:19	End Time (MST):	13:45
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999994	≥0.995
805.1	803.6	1.0018			
402.1	402.4	0.9992	Slope	0.997858	0.90 - 1.10
201.0	202.2	0.9942			
			Intercept	0.708793	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

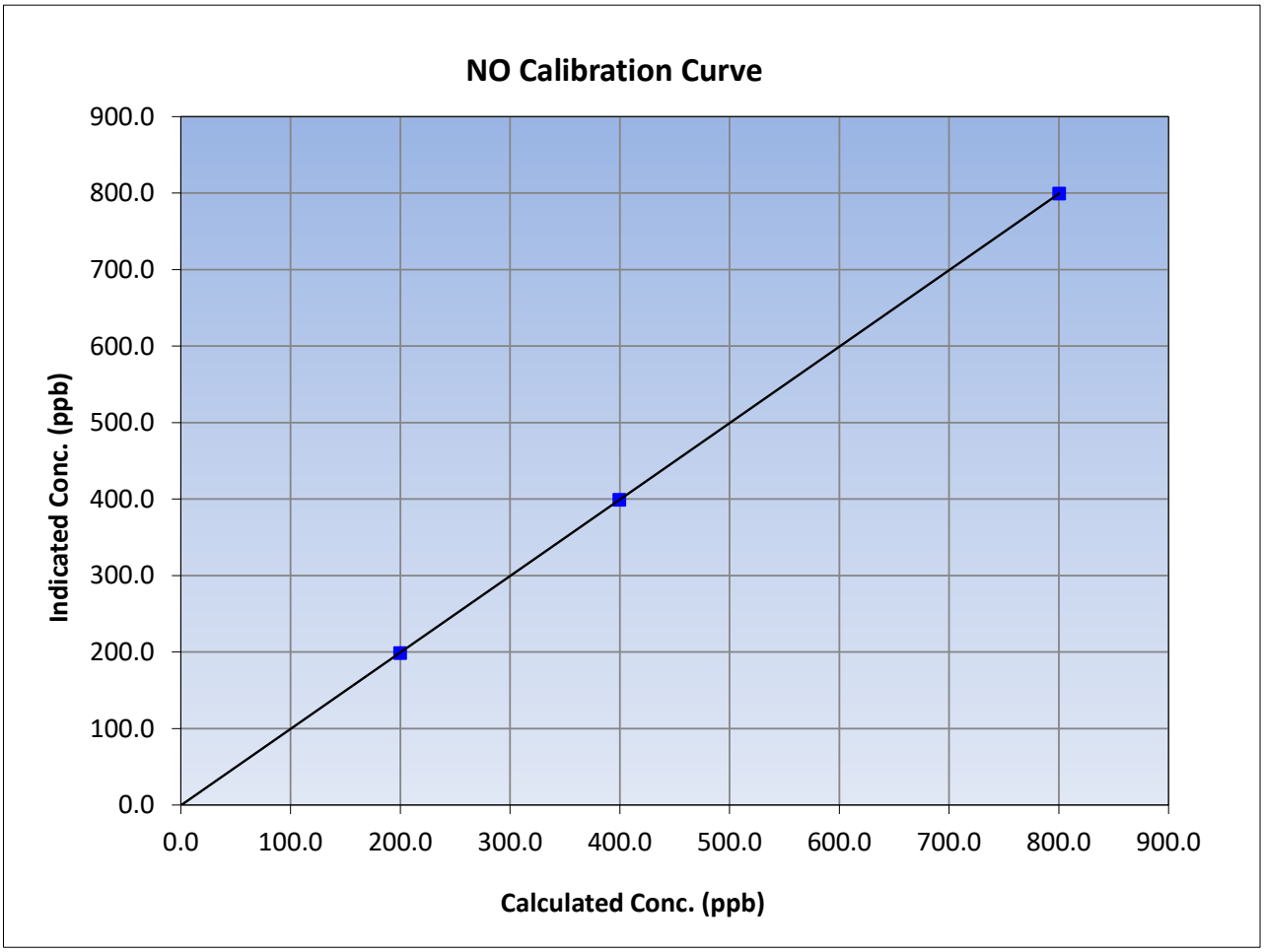
Version-04-2020

Station Information

Calibration Date:	July 5, 2023	Previous Calibration:	June 6, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:19	End Time (MST):	13:45
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	0.999999	≥0.995
800.3	799.5	1.0009			
399.7	399.1	1.0014	Slope	0.999541	0.90 - 1.10
199.8	198.7	1.0057			
			Intercept	-0.472540	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

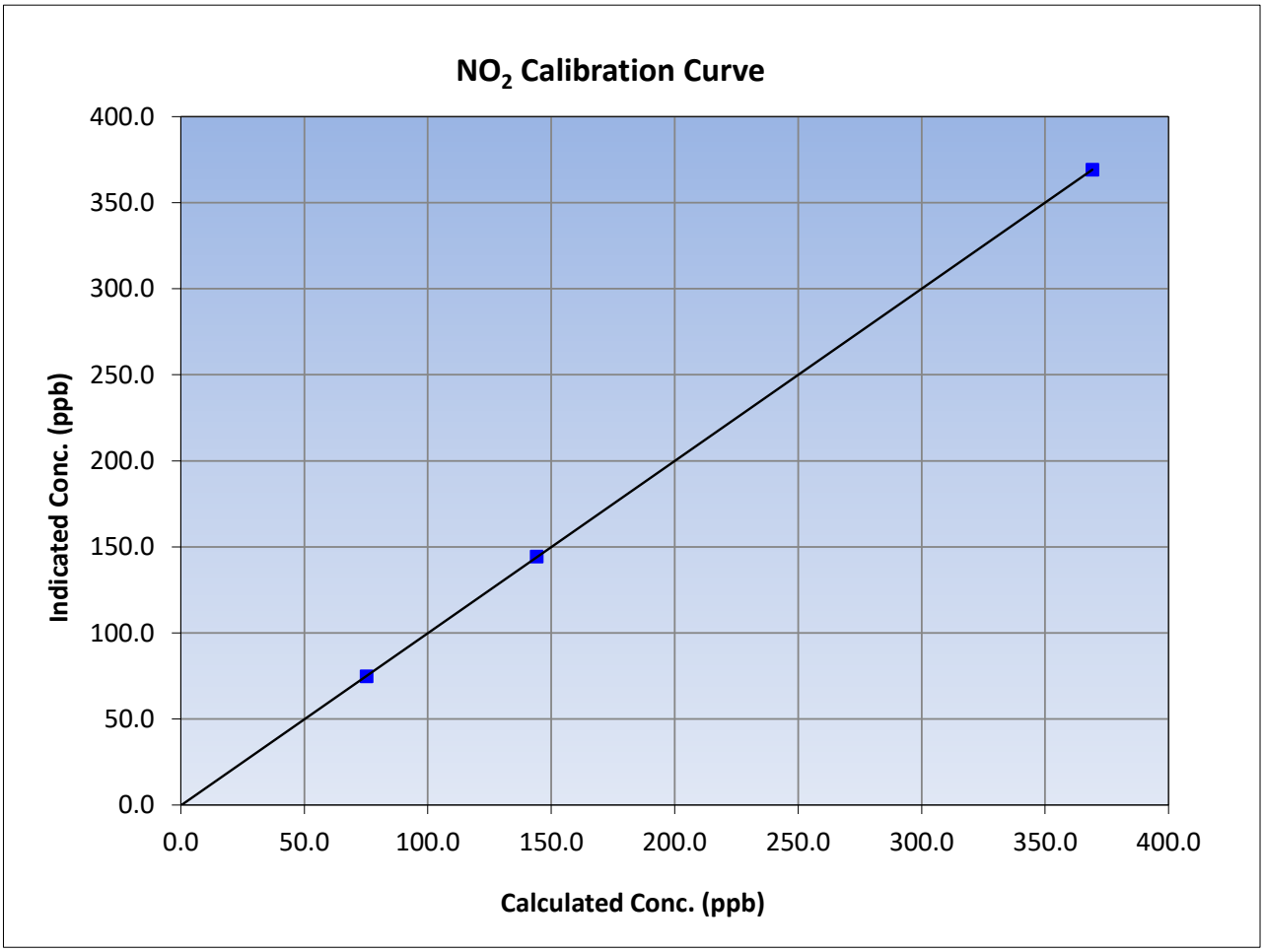
Version-04-2020

Station Information

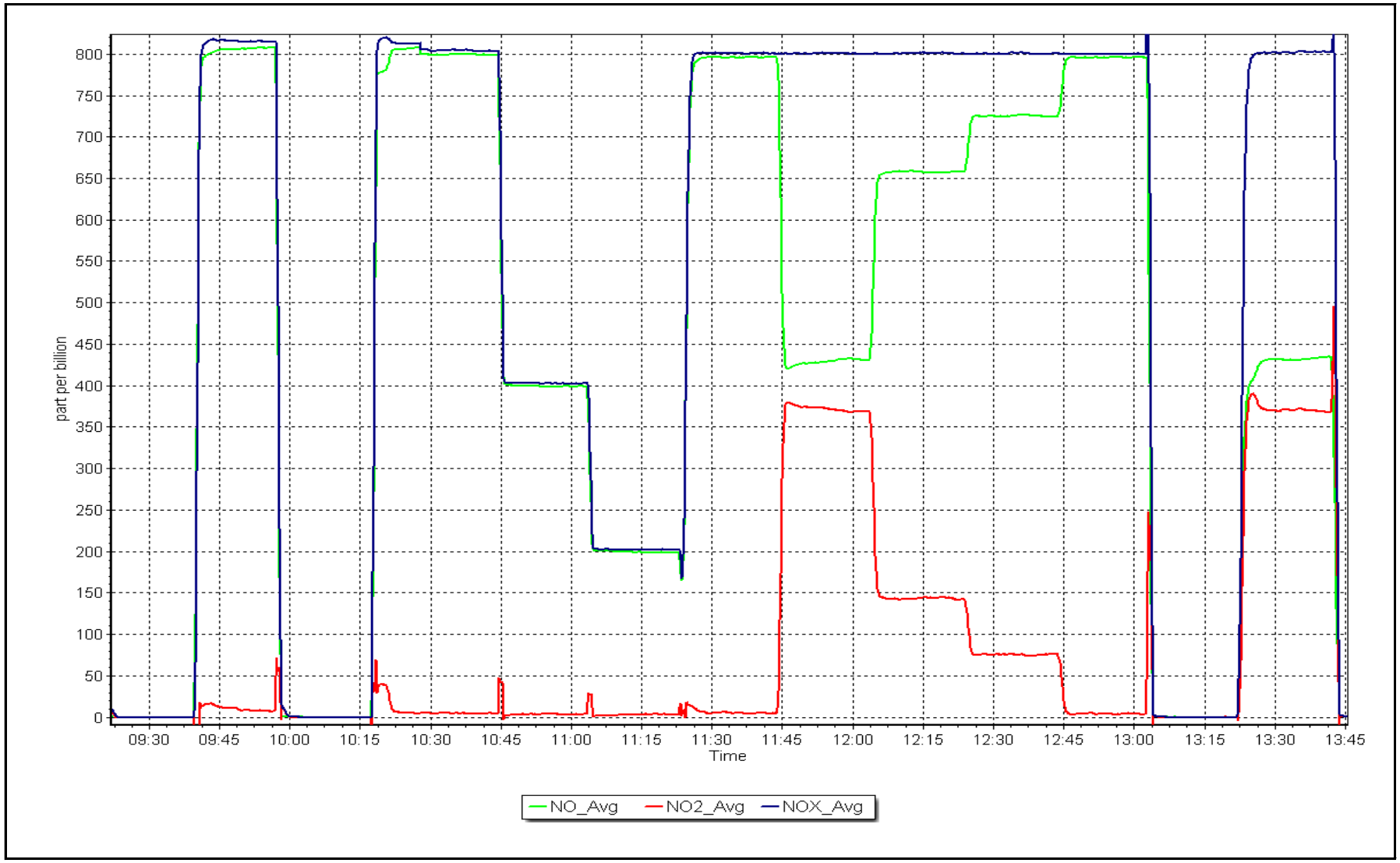
Calibration Date:	July 5, 2023	Previous Calibration:	June 6, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:19	End Time (MST):	13:45
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999997	≥0.995
369.1	369.1	1.0001			
144.1	144.3	0.9988	Slope	1.000792	0.90 - 1.10
75.2	74.7	1.0071			
			Intercept	-0.264400	+/-20



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



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Barge Landing	Station number:	AMS 09
Calibration Date:	July 5, 2023	Last Cal Date:	June 7, 2023
Start time (MST):	11:51	End time (MST):	12:08
Analyzer Make:	API T640	S/N:	321
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	DeltaCal	S/N:	1451
Temp/RH standard:	DeltaCal	S/N:	1451

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (^{o}C)	25.4	24.1	25.4	☐	+/- 2 ^{o}C
P (mmHg)	730.3	731.5	730.3	☐	+/- 10 mmHg
flow (LPM)	5.02	5.08	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: July 5, 2023 Last Cal Date: June 7, 2023

PM w/o HEPA: 13.5 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

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

Disposable Filter Changed: May 23, 2023

Annual Maintenance

Date Sample Tube Cleaned: November 15, 2022

Date RH/T Sensor Cleaned: November 15, 2022

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

Calibration by: Sean Bala

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS11
LOWER CAMP
JULY 2023

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

August 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Lower Camp	Station number:	AMS11
Calibration Date:	July 17, 2023	Last Cal Date:	June 27, 2023
Start time (MST):	10:05	End time (MST):	13:01
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:	1.004834	1.004778	Backgd or Offset:	14.7	14.7
Calibration intercept:	-0.648706	0.370932	Coeff or Slope:	1.034	1.034

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.3	----
as found span	4919	81.3	800.8	802.8	0.997
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.7	----
high point	4919	81.3	800.8	805.4	0.994
second point	4959	40.7	400.9	402.2	0.997
third point	4980	20.3	199.9	201.5	0.992
as left zero	5000	0.0	0.0	0.5	----
as left span	4919	81.3	800.8	807.7	0.991
				Average Correction Factor	0.994

Baseline Corr As found:	802.50	Previous response	803.98	*% change	-0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

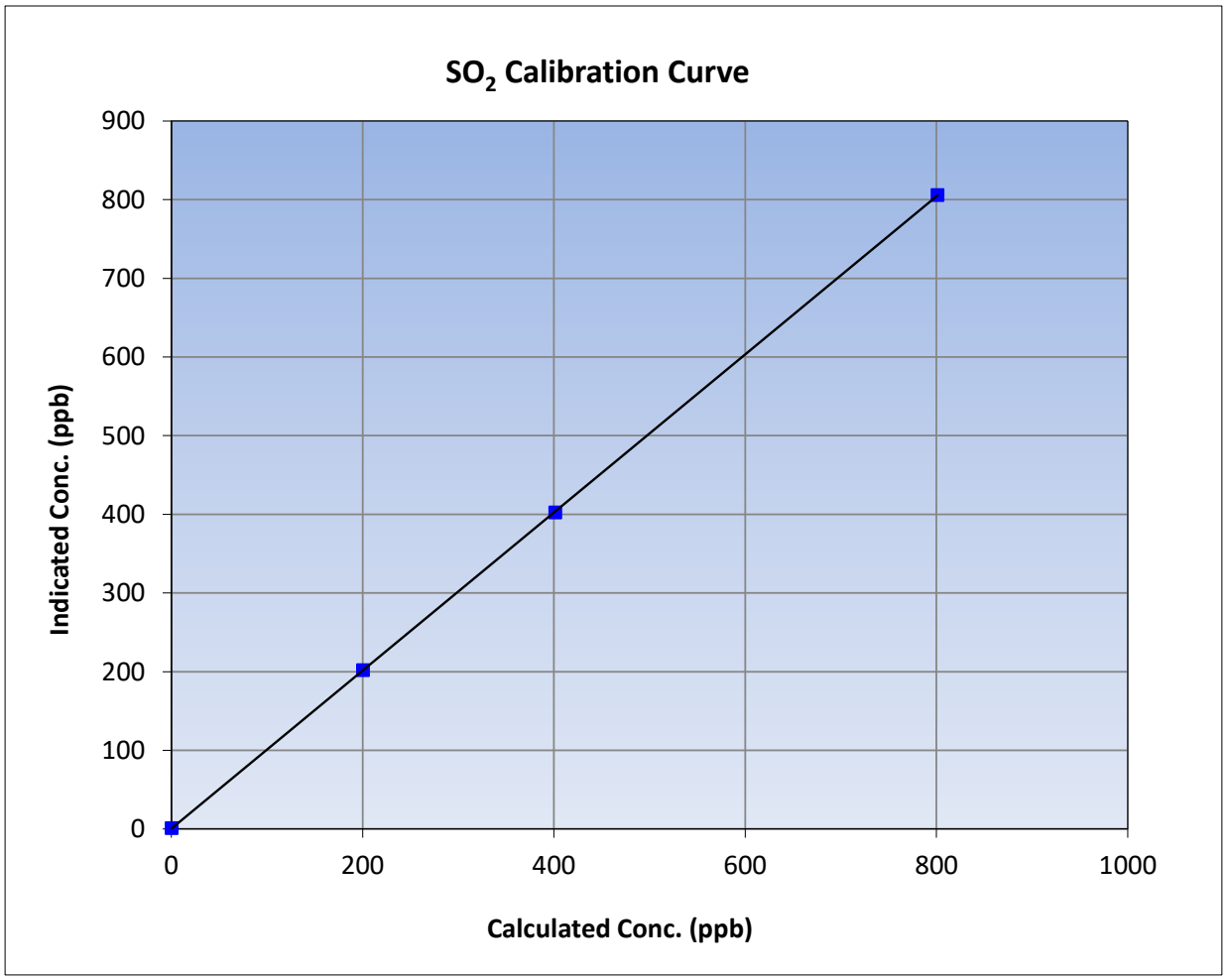
Station Information

Calibration Date:	July 17, 2023	Previous Calibration:	June 27, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:05	End Time (MST):	13:01
Analyzer make:	Thermo 43i	Analyzer serial #:	100841398

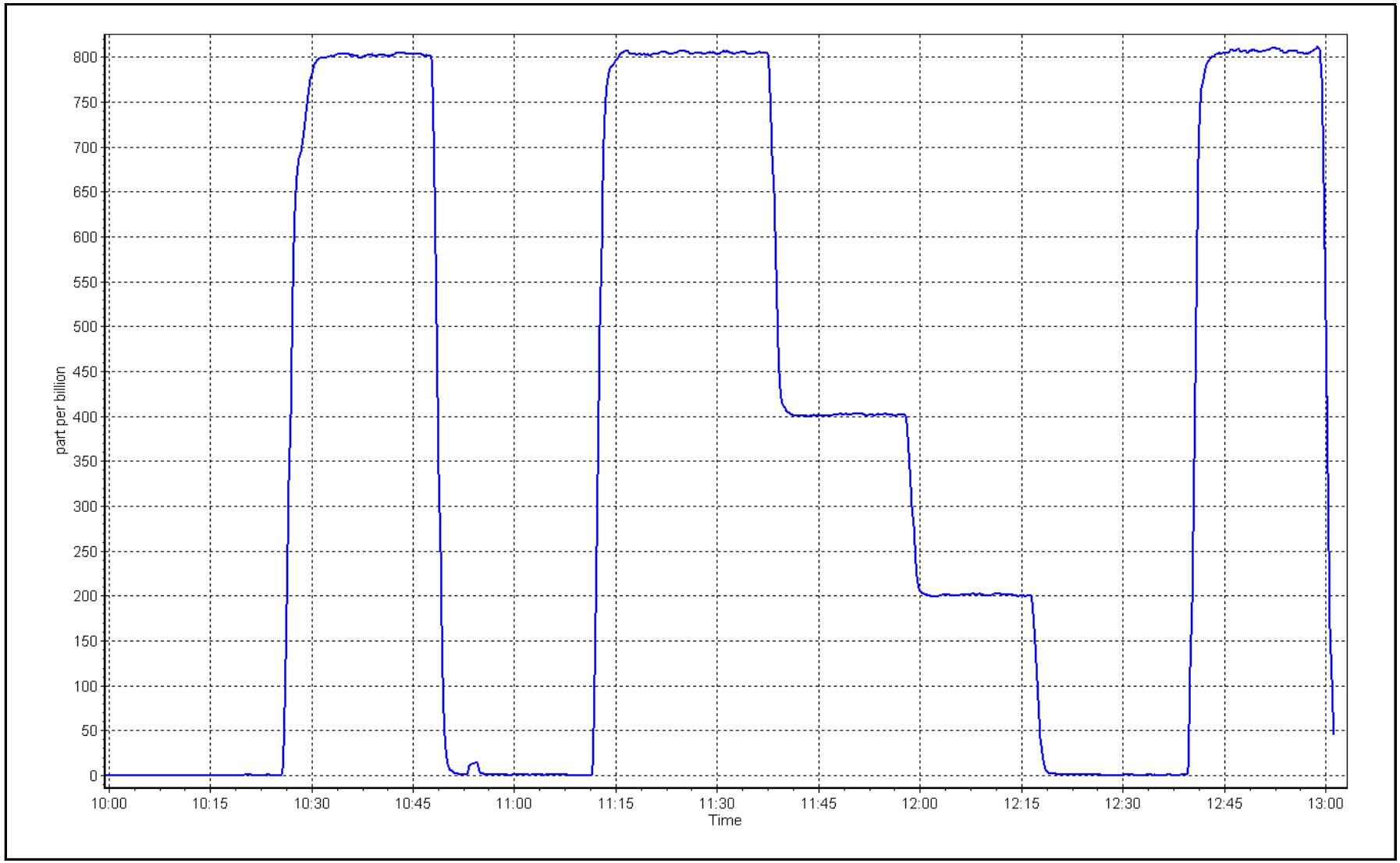
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.7	----
800.8	805.4	0.9942
400.9	402.2	0.9968
199.9	201.5	0.9923

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	1.004778	*0.90 - 1.10*
Intercept	0.370932	*+/-30*



SO2 Calibration Plot Date: July 17, 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:	July 18, 2023	Last Cal Date:	June 28, 2023
Start time (MST):	9:20	End time (MST):	13:20
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:	1.012197	1.017077	Backgd or Offset:	13.6	13.5
Calibration intercept:	0.054446	0.133554	Coeff or Slope:	1.001	1.001

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4926	73.6	79.9	81.8	0.977
as found 2nd point	4963	36.8	40.0	40.6	0.984
as found 3rd point	4982	18.6	20.2	20.3	0.995
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4926	73.6	79.9	81.4	0.982
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	0.1	----
as left span	4926	73.6	79.9	81.5	0.981
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:	81.8	Prev response:	80.95	*% change:	1.0%
Baseline Corr 2nd AF pt:	40.6	AF Slope:	1.024650	AF Intercept:	-0.206638
Baseline Corr 3rd AF pt:	20.3	AF Correlation:	0.999970		

* = > +/-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

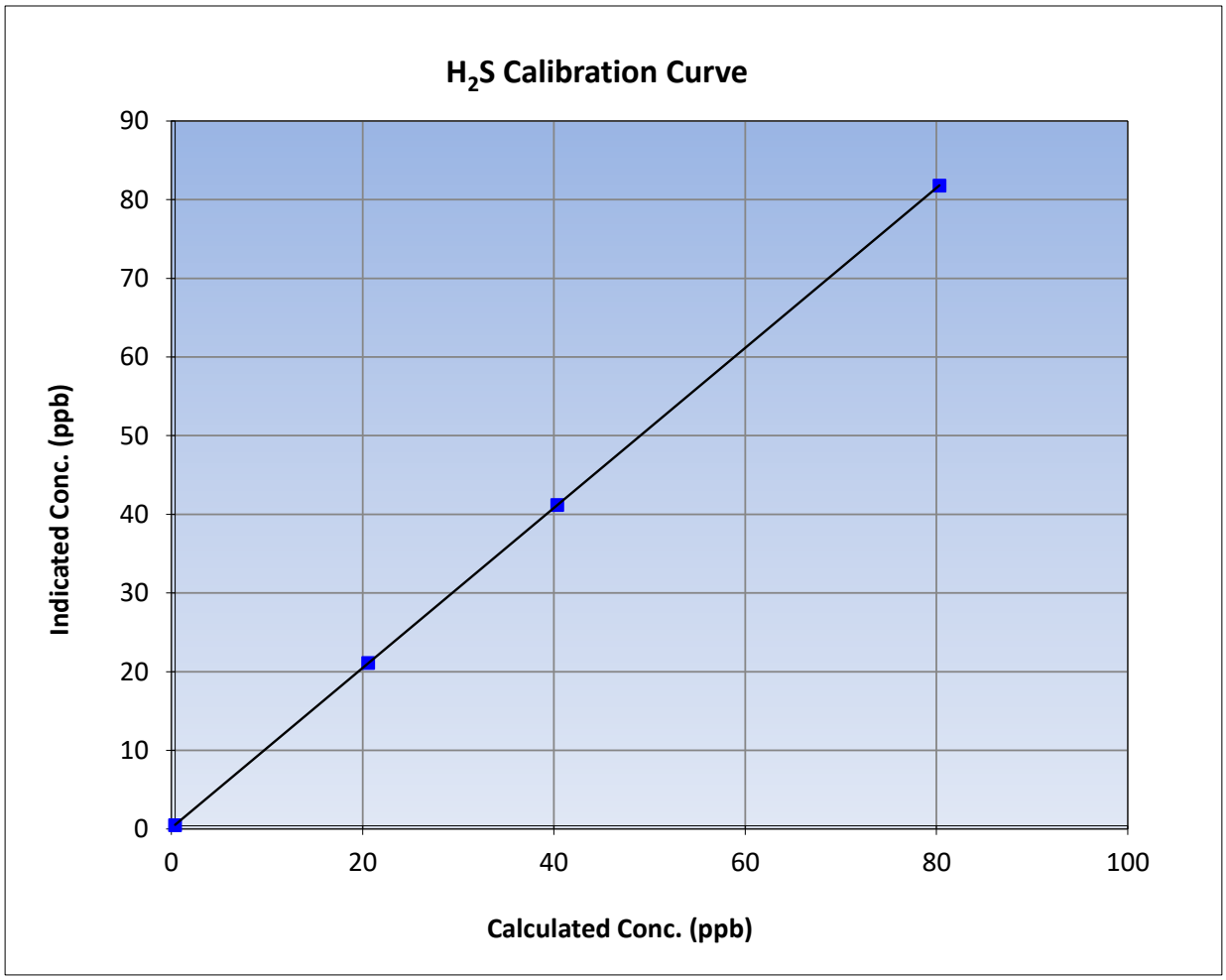
Station Information

Calibration Date:	July 18, 2023	Previous Calibration:	June 28, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:20	End Time (MST):	13:20
Analyzer make:	Thermo 450iQ	Analyzer serial #:	CM20080003

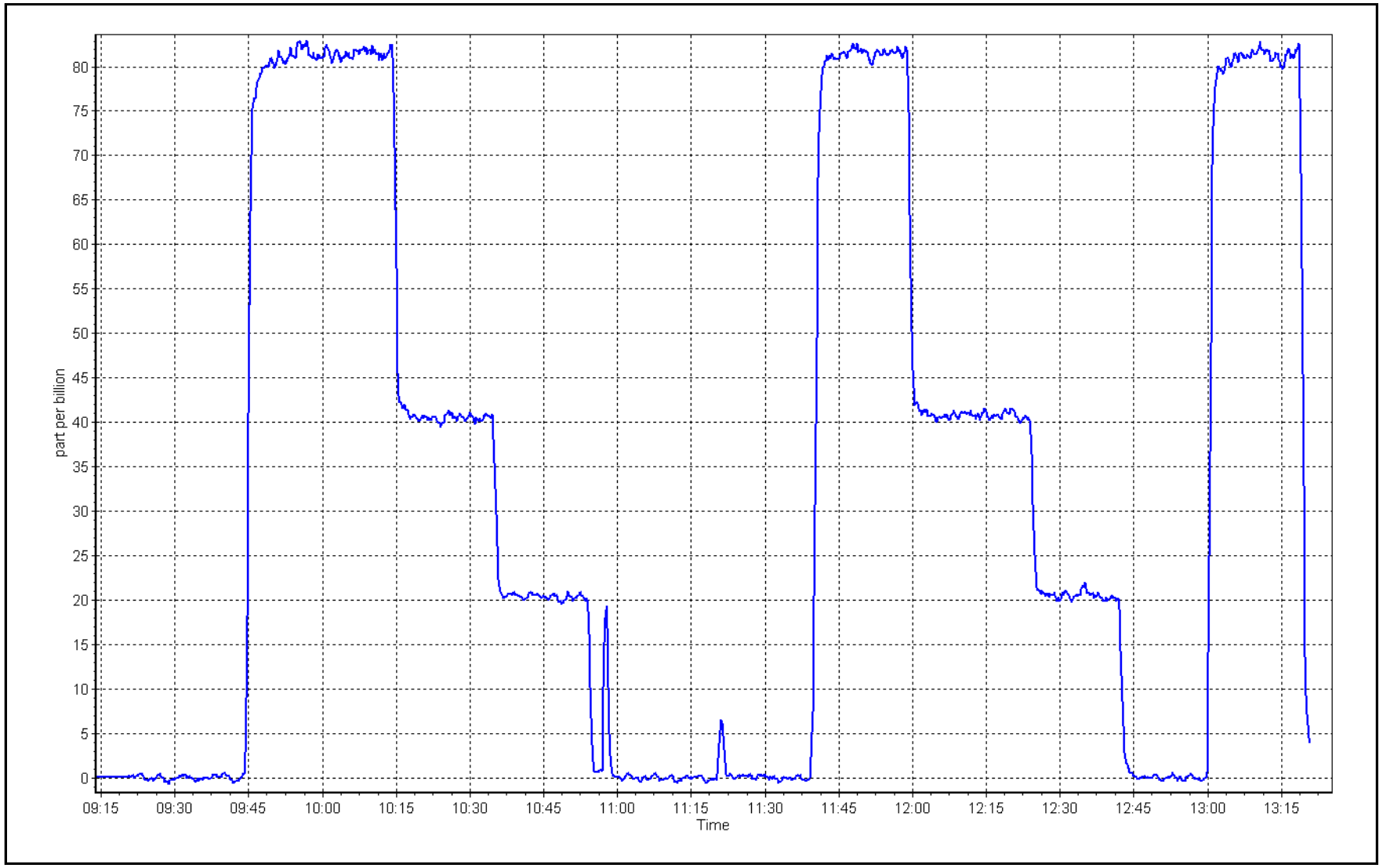
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
79.9	81.4	0.9818
40.0	40.8	0.9794
20.2	20.7	0.9755

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	1.017077	*0.90 - 1.10*
Intercept	0.133554	*+/-3*



H_2S Calibration Plot Date: July 18, 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:	July 17, 2023	Last Cal Date:	June 27, 2023
Start time (MST):	10:05	End time (MST):	13:01
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1505164381	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.99E-04	2.99E-04	NMHC SP Ratio:	5.79E-05	5.79E-05
CH4 Retention time:	14.0	14.0	NMHC Peak Area:	158468	158468

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	17.35	17.24	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	17.35	17.22	1.007
second point	4959	40.7	8.69	8.58	1.013
third point	4980	20.3	4.33	4.28	1.012
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	17.35	17.34	1.001
				Average Correction Factor	1.011

Baseline Corr AF:	17.24	Prev response	17.28	*% 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	9.15	1.005
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	9.12	1.007
second point	4959	40.7	4.60	4.56	1.010
third point	4980	20.3	2.29	2.28	1.007
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	9.19	9.20	0.998
				Average Correction Factor	1.008
Baseline Corr AF:	9.15	Prev response	9.16	*% change	-0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	8.16	8.09	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	81.3	8.16	8.10	1.007
second point	4959	40.7	4.09	4.02	1.016
third point	4980	20.3	2.04	2.00	1.018
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	8.16	8.14	1.003
				Average Correction Factor	1.014
Baseline Corr AF:	8.09	Prev response	8.12	*% 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:	0.997114	0.992518
THC Cal Offset:	-0.018987	-0.014592
CH4 Cal Slope:	0.996346	0.993056
CH4 Cal Offset:	-0.012088	-0.015088
NMHC Cal Slope:	0.997920	0.992065
NMHC Cal Offset:	-0.006899	0.000895

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

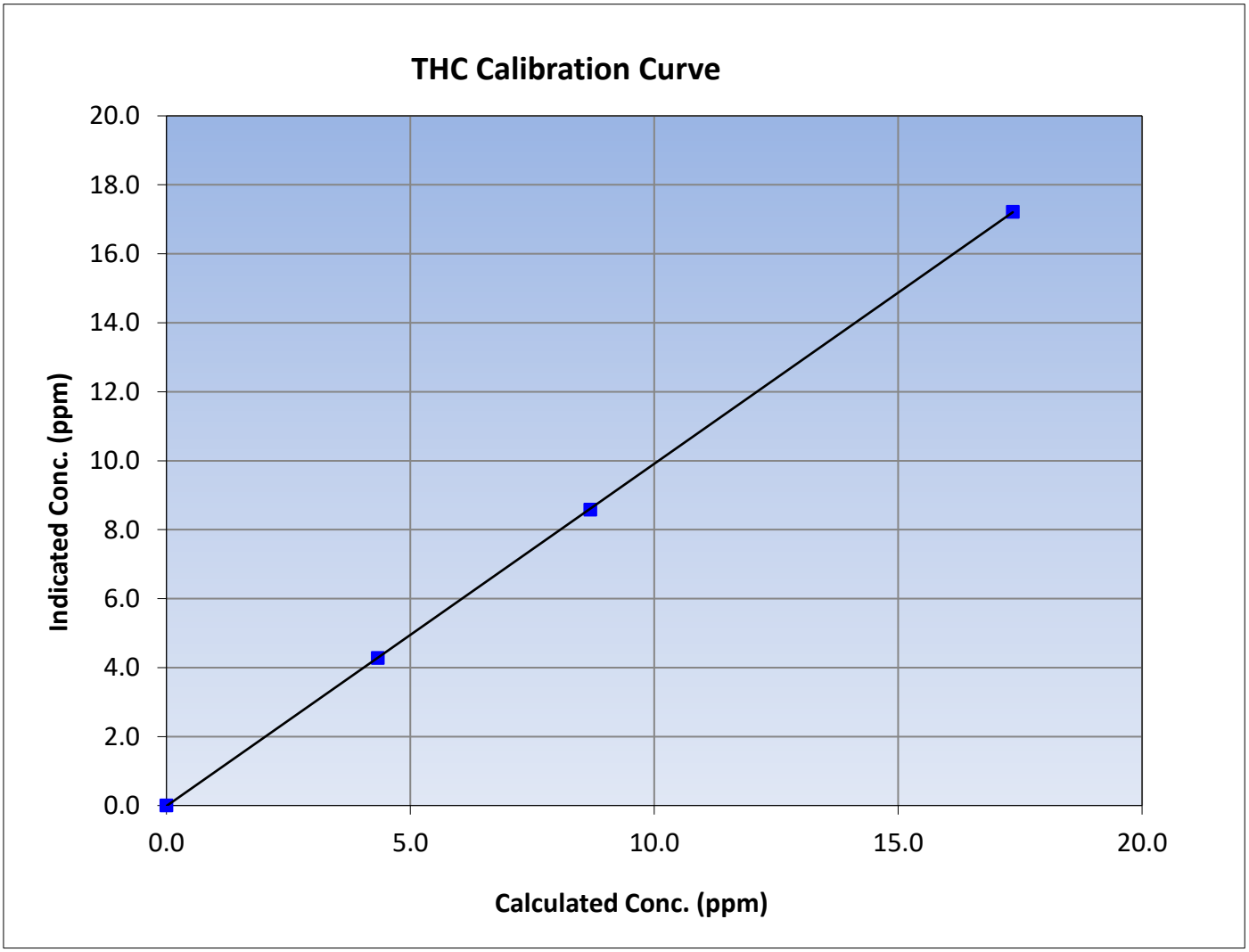
Version-01-2020

Station Information

Calibration Date:	July 17, 2023	Previous Calibration:	June 27, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:05	End Time (MST):	13:01
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	0.999991	*≥0.995*
17.35	17.22	1.0075			
8.69	8.58	1.0127	Slope	0.992518	*0.90 - 1.10*
4.33	4.28	1.0122			
			Intercept	-0.014592	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

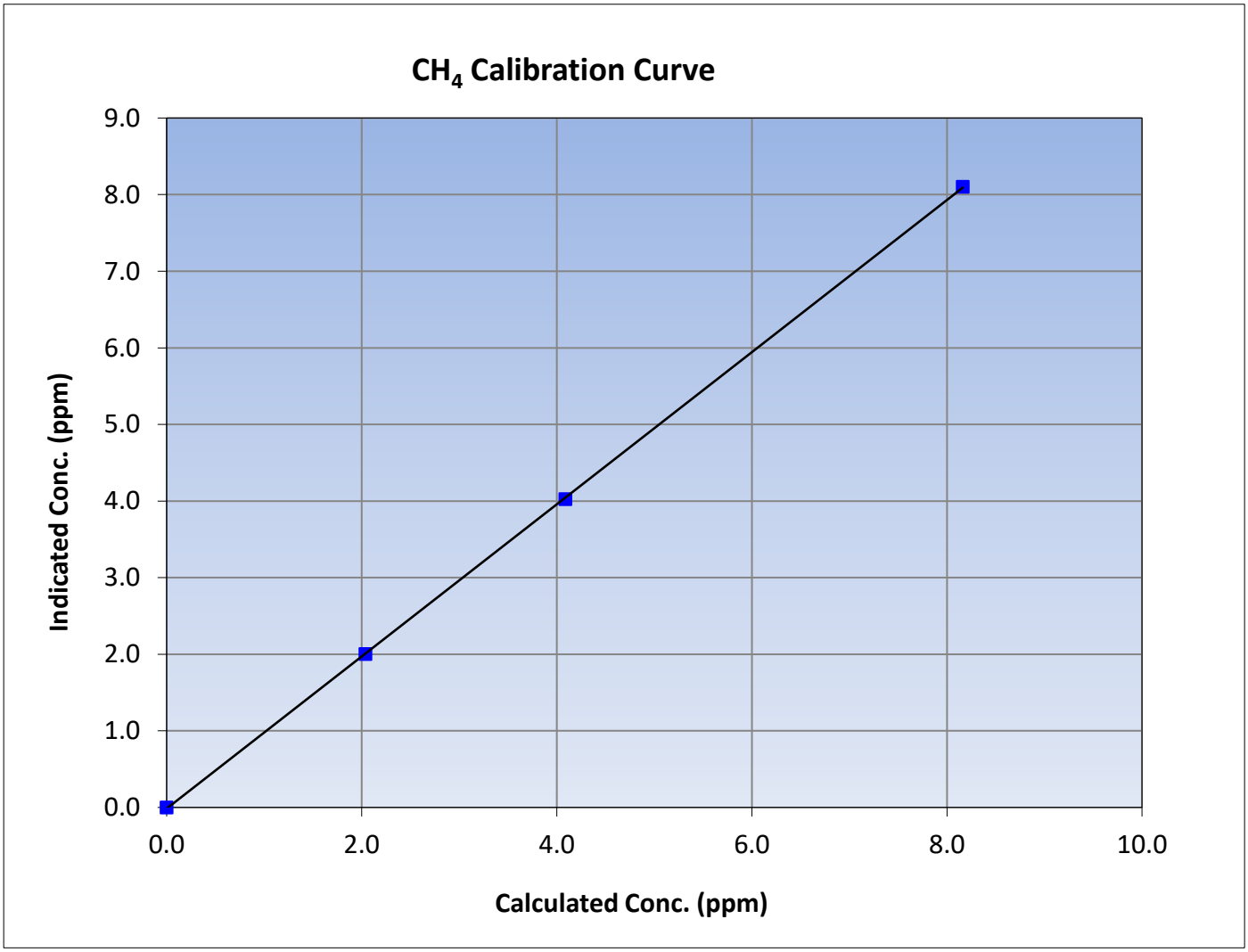
Version-01-2020

Station Information

Calibration Date:	July 17, 2023	Previous Calibration:	June 27, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:05	End Time (MST):	13:01
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	0.999977	*≥0.995*
8.16	8.10	1.0074			
4.09	4.02	1.0158	Slope	0.993056	*0.90 - 1.10*
2.04	2.00	1.0180			
			Intercept	-0.015088	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

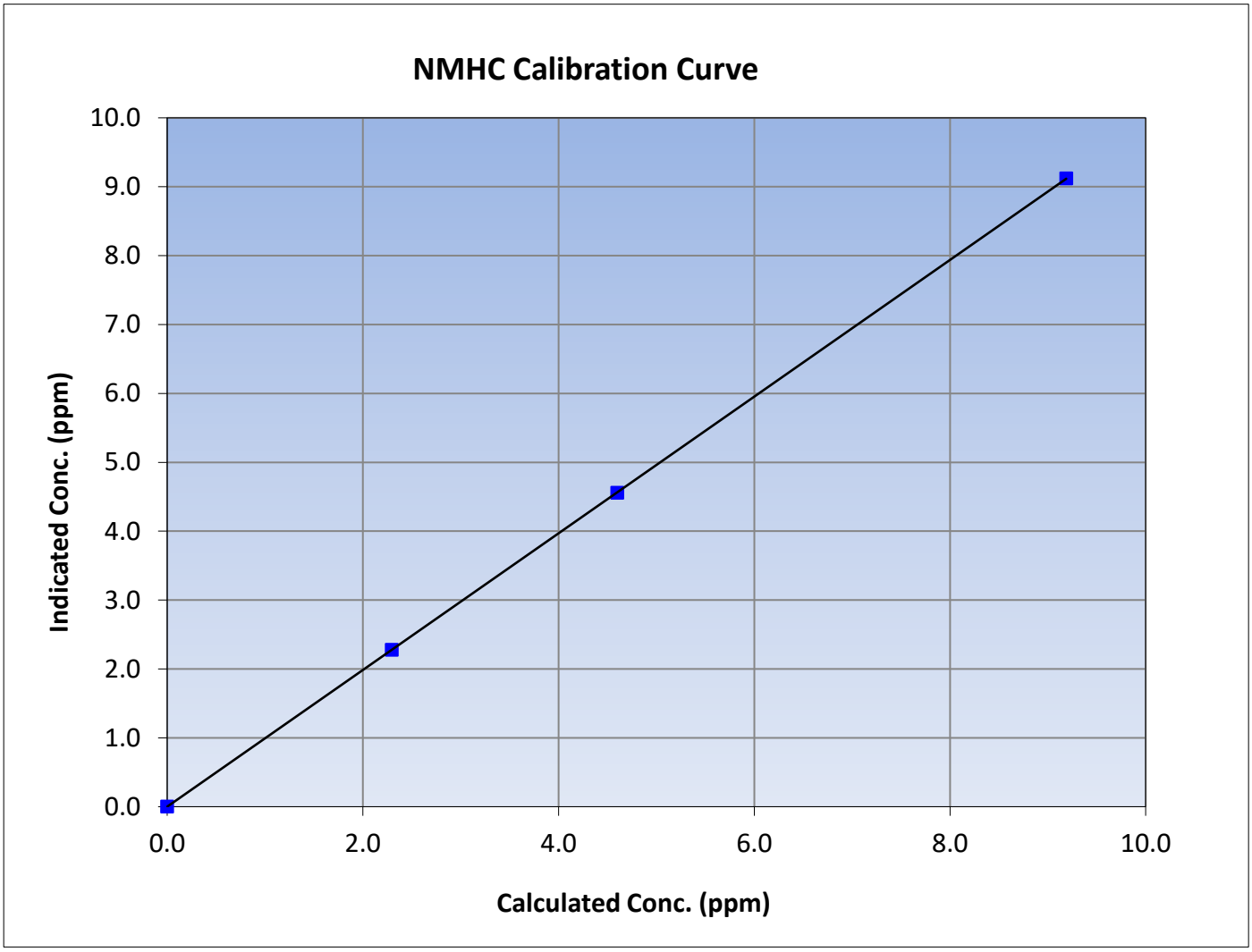
Version-01-2020

Station Information

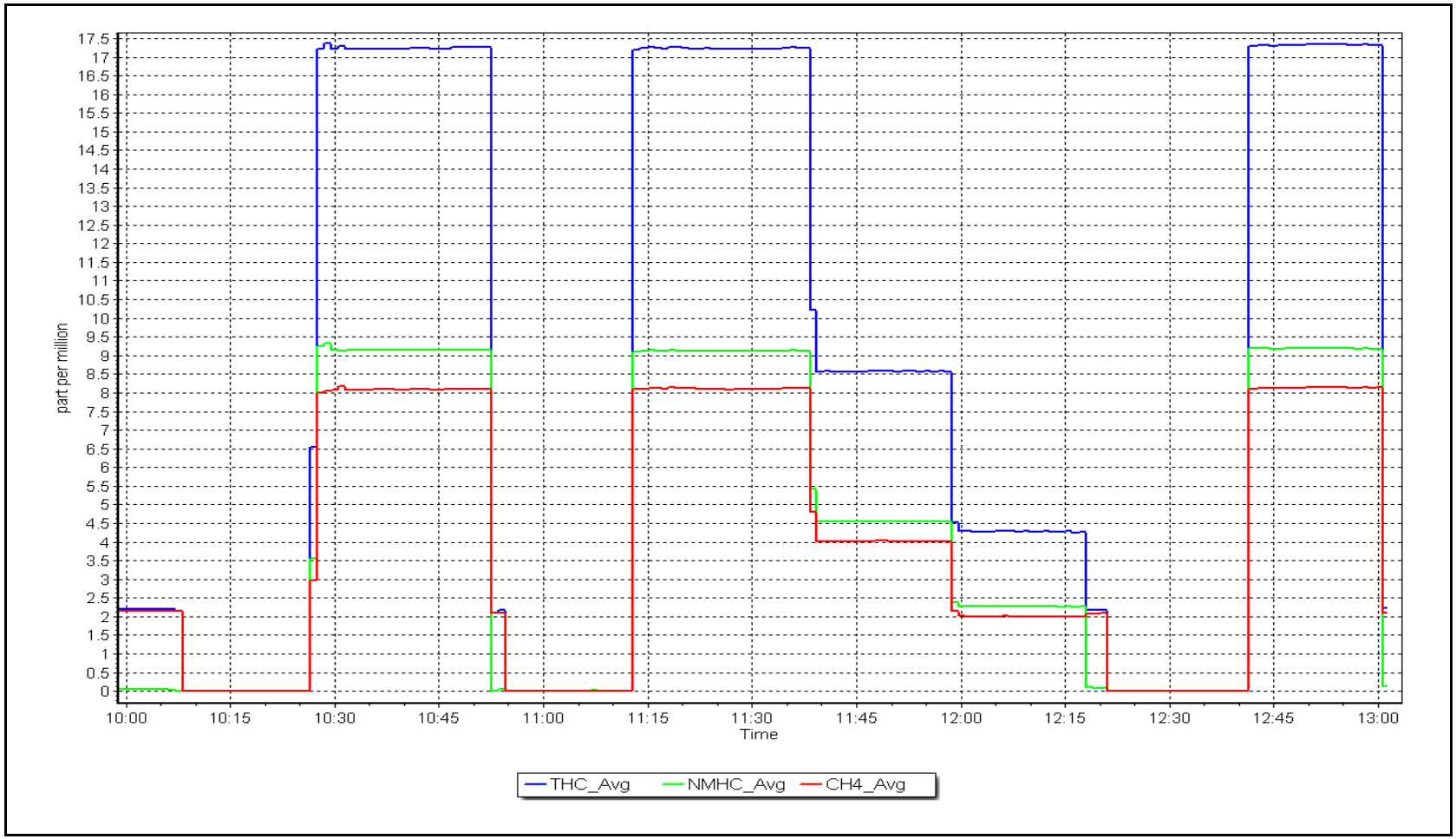
Calibration Date:	July 17, 2023	Previous Calibration:	June 27, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:05	End Time (MST):	13:01
Analyzer make:	Thermo 55i	Analyzer serial #:	1505164381

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999998	*≥0.995*
9.19	9.12	1.0075			
4.60	4.56	1.0095	Slope	0.992065	*0.90 - 1.10*
2.29	2.28	1.0071			
			Intercept	0.000895	*+/-0.5*



NMHC Calibration Plot Date: July 17, 2023 Location: Lower Camp



Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Lower Camp	Station Number:	AMS 11
Calibration Date:	July 21, 2023	Prev Cal Date:	July 15, 2022
Start Time (MST):	14:41	End Time (MST):	16:31
Tower Height (m):	10.0	Reason:	Routine

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	N11710
WS Calibrator:	MetOne 053	Serial Number:	CA05231

Shaft RPM	Calculated Speed (K/hr) (Cv)	Indicated Speed (K/hr) (Iv)	% Error *Limit = +/- 1.5%*
0	0.0	0.0	---
200	20.2	20.1	-0.3%
400	39.4	39.3	-0.3%
600	58.6	58.5	0.0%
800	77.8	77.7	-0.1%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)	0.999998	0.999999	*≥0.9995*
Calculated slope	0.998863	1.000455	*0.90 - 1.10*
Calculated intercept	0.064097	0.029806	*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	N12035
As Found Declination (deg east of True North):	14	As Left Declination (deg east of True North):	14
Solar noon time (MST):	13:32	Calc Declination*:	13.64 Degrees
Deadband calc:	3.8 degrees (*Limit 4 deg*)		* - calculated declination as per NOAA website

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	% Error (based on 357° FS) *Limit = +/- 1.0%*
0	2.4	---
90	89.8	-0.1%
180	178.8	-0.3%
270	271.1	0.3%
354.5	355.7	0.3%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)	0.999918	0.999950	*≥0.9995*
Calculated slope	0.998903	1.001241	*0.90 - 1.10*
Calculated intercept	-0.302646	-0.872405	*+/- 4*

Notes: WS/WD calibration. All points are within limit. Cross arm was aligned using compass after calibration.

Calibration Performed By: Mohammed Kashif

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS13
FORT MCKAY SOUTH
JULY 2023

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

August 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:	July 25, 2023	Last Cal Date:	June 26, 2023
Start time (MST):	8:31	End time (MST):	11:33
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:	1.001127	1.002083	Backgd or Offset:	86.3	86.3
Calibration intercept:	-2.638171	-1.997771	Coeff or Slope:	0.714	0.715

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.2	----
as found span	4921	79.1	799.7	798.3	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4921	79.1	799.7	800.2	0.999
second point	4961	39.5	399.3	397.9	1.004
third point	4980	19.8	200.2	195.7	1.023
as left zero	5000	0.0	0.0	0.2	----
as left span	4921	79.1	799.7	799.3	1.000
				Average Correction Factor	1.009

Baseline Corr As found:	798.10	Previous response	797.95	*% 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 span only.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

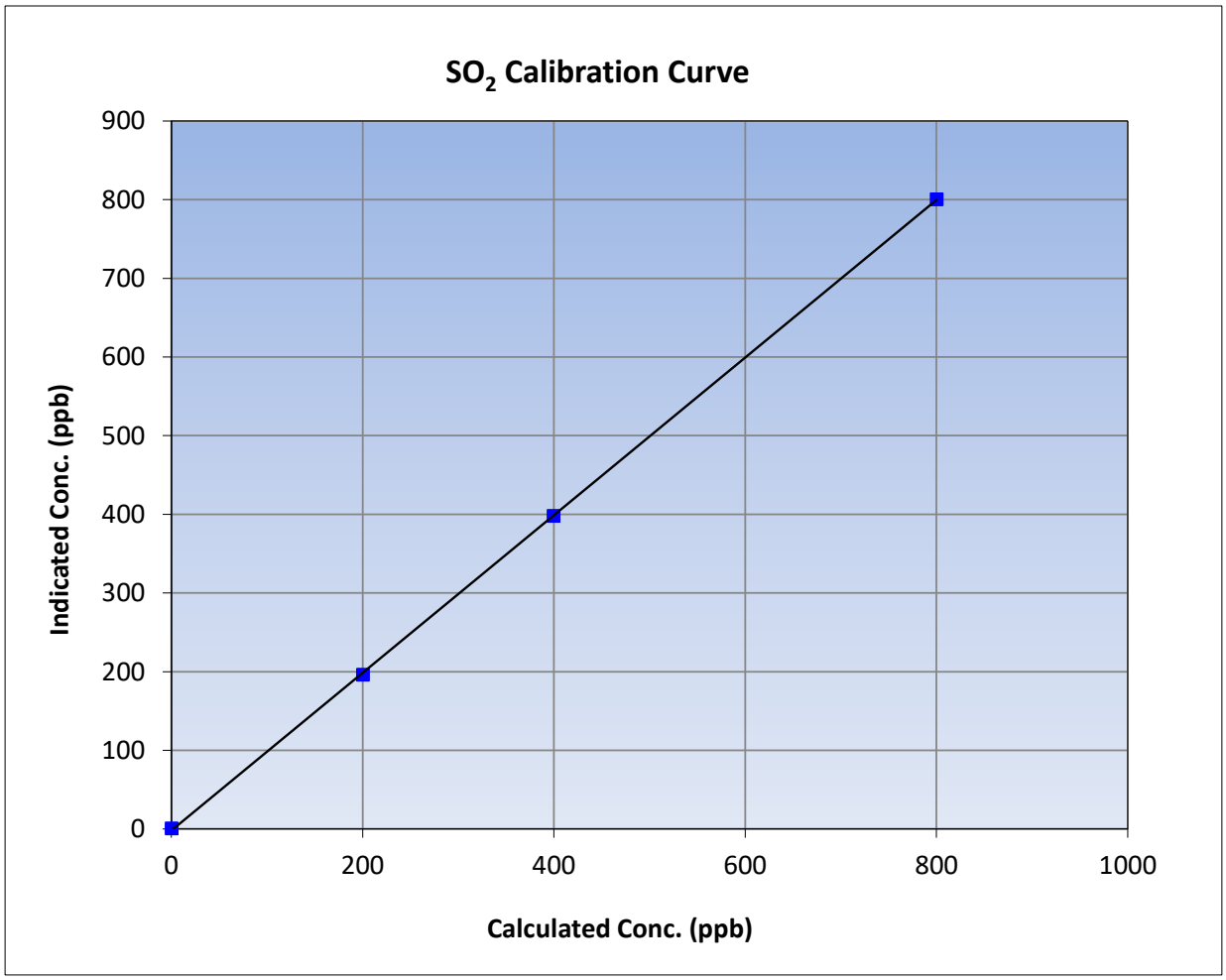
Station Information

Calibration Date:	July 25, 2023	Previous Calibration:	June 26, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:31	End Time (MST):	11:33
Analyzer make:	API T100	Analyzer serial #:	599

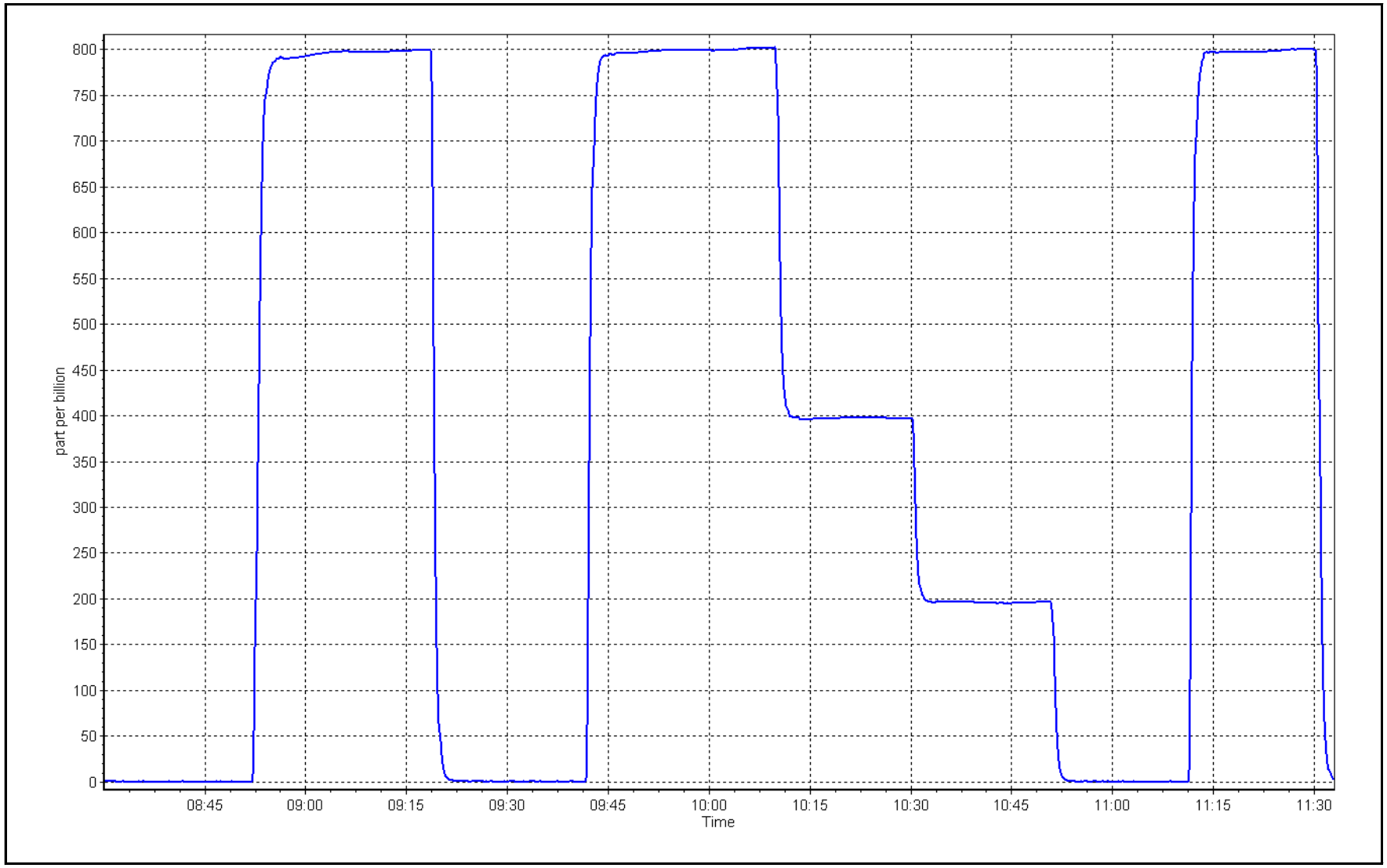
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
799.7	800.2	0.9994
399.3	397.9	1.0035
200.2	195.7	1.0229

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999959	*≥0.995*
Slope	1.002083	*0.90 - 1.10*
Intercept	-1.997771	*+/-30*



SO2 Calibration Plot Date: July 25, 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:	July 6, 2023	Last Cal Date:	June 29, 2023
Start time (MST):	8:48	End time (MST):	12:50
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1180540017	
Converter make:	CDN-101		Converter serial #:	521	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.004617	0.995542	Backgd or Offset:	3.54	3.54
Calibration intercept:	-0.182243	-0.262162	Coeff or Slope:	1.066	1.066

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	78.6	1.024
as found 2nd point	4962	37.7	40.3	39.1	1.027
as found 3rd point	4981	18.9	20.2	19.3	1.040
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4925	75.5	80.6	80.1	1.007
second point	4962	37.7	40.3	39.8	1.012
third point	4981	18.9	20.2	19.5	1.035
as left zero	5000	0.0	0.0	0.1	----
as left span	4925	75.5	80.6	79.4	1.015
SO2 Scrubber Check	4921	79.1	791.0	0.0	----
Date of last scrubber change:		20-Mar-20		Ave Corr Factor	1.018
Date of last converter efficiency test:		NA			efficiency

Baseline Corr As found:	78.7	Prev response:	80.82	*% change:	-2.7%
Baseline Corr 2nd AF pt:	39.2	AF Slope:	0.977254	AF Intercept:	-0.242156
Baseline Corr 3rd AF pt:	19.4	AF Correlation:	0.999983		

* = > +/-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

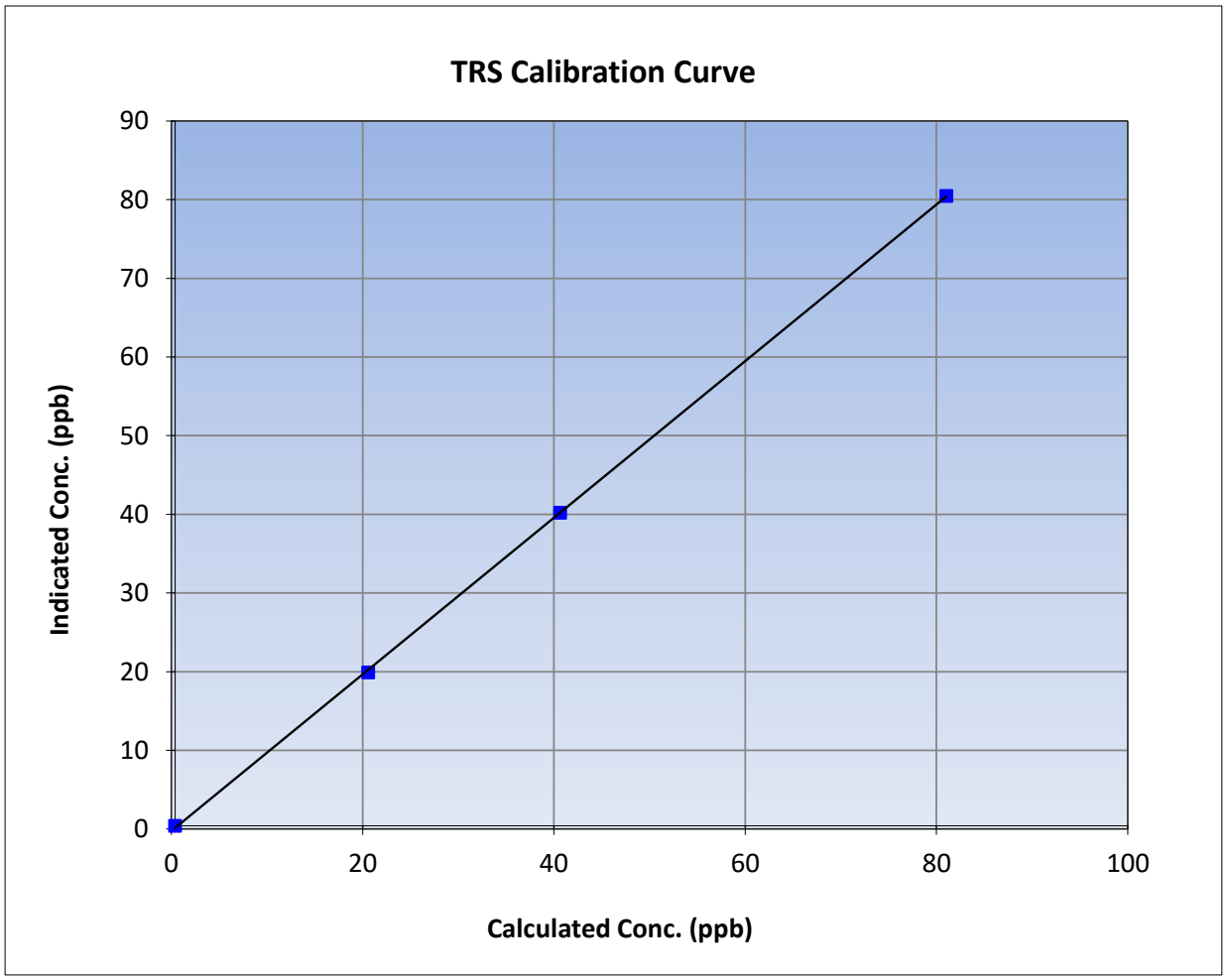
Station Information

Calibration Date:	July 6, 2023	Previous Calibration:	June 29, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:48	End Time (MST):	12:50
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1180540017

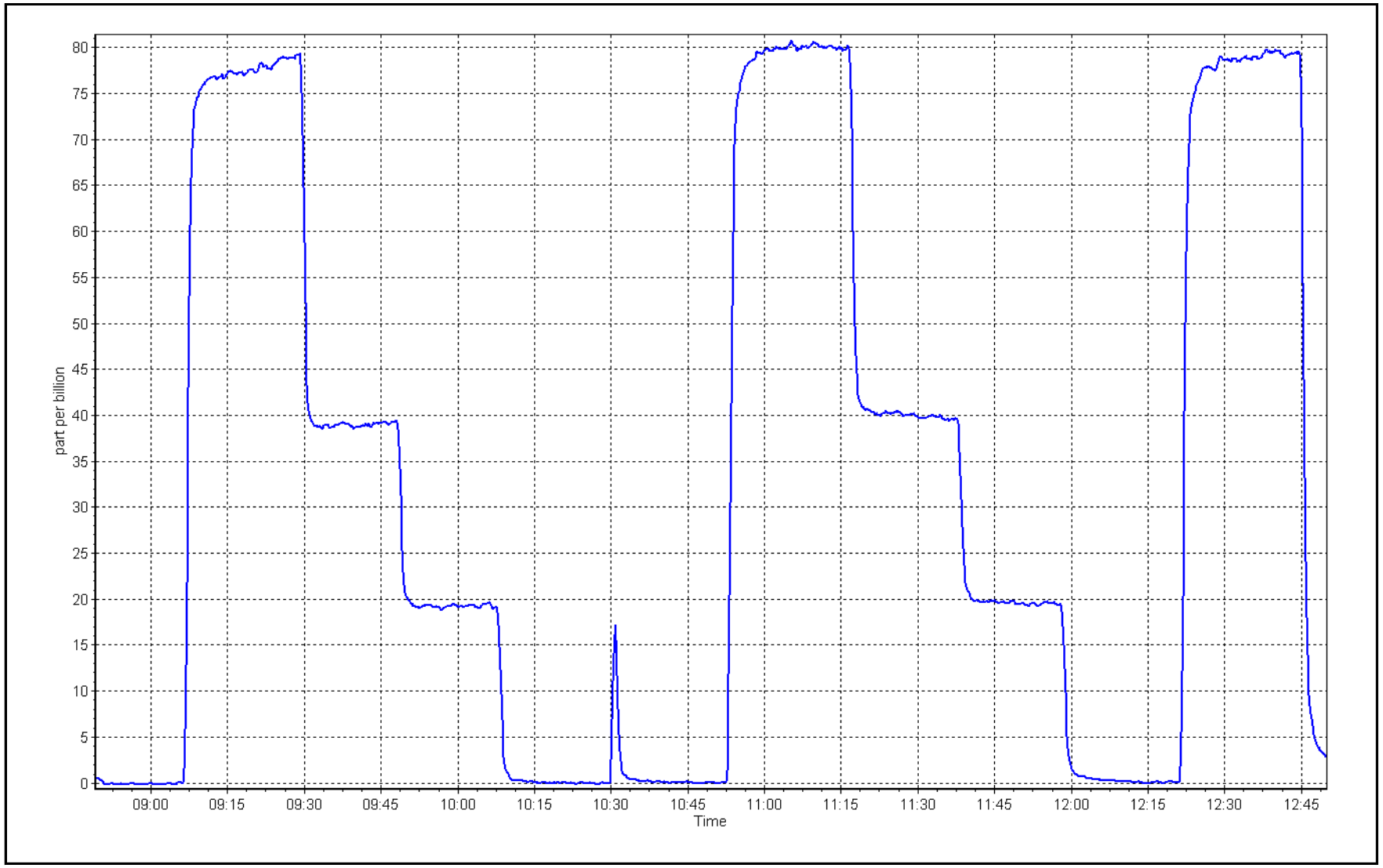
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.6	80.1	1.0066
40.3	39.8	1.0117
20.2	19.5	1.0352

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999946	*≥0.995*
Slope	0.995542	*0.90 - 1.10*
Intercept	-0.262162	*+/-3*



TRS Calibration Plot Date: July 6, 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:	July 25, 2023	Last Cal Date:	June 26, 2023
Start time (MST):	8:31	End time (MST):	11:33
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1170050130	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.22E-04	2.21E-04	NMHC SP Ratio:	5.10E-04	5.17E-04
CH4 Retention time:	13.0	12.8	NMHC Peak Area:	177982	175502

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	17.00	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.1	17.05	17.06	0.999
second point	4961	39.5	8.51	8.41	1.013
third point	4980	19.8	4.27	4.12	1.035
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	17.05	17.04	1.000
				Average Correction Factor	1.016

Baseline Corr AF:	17.00	Prev response	16.98	*% 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	8.98	1.012
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	9.09	0.999
second point	4960	39.5	4.53	4.49	1.010
third point	4980	19.8	2.27	2.20	1.032
as left zero	5000	0	0.00	0.00	----
as left span	4921	79.1	9.08	9.06	1.002
				Average Correction Factor	1.014
Baseline Corr AF:	8.98	Prev response	9.05	*% 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	4921	79.1	7.97	8.03	0.992
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.1	7.97	7.98	0.998
second point	4960	39.5	3.98	3.92	1.016
third point	4980	19.8	1.99	1.92	1.040
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	7.97	7.98	0.998
				Average Correction Factor	1.018
Baseline Corr AF:	8.03	Prev response	7.93	*% change	1.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000853	1.003313
THC Cal Offset:	-0.082577	-0.083173
CH4 Cal Slope:	1.001309	1.003948
CH4 Cal Offset:	-0.048553	-0.045749
NMHC Cal Slope:	1.000342	1.002735
NMHC Cal Offset:	-0.034760	-0.038763

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

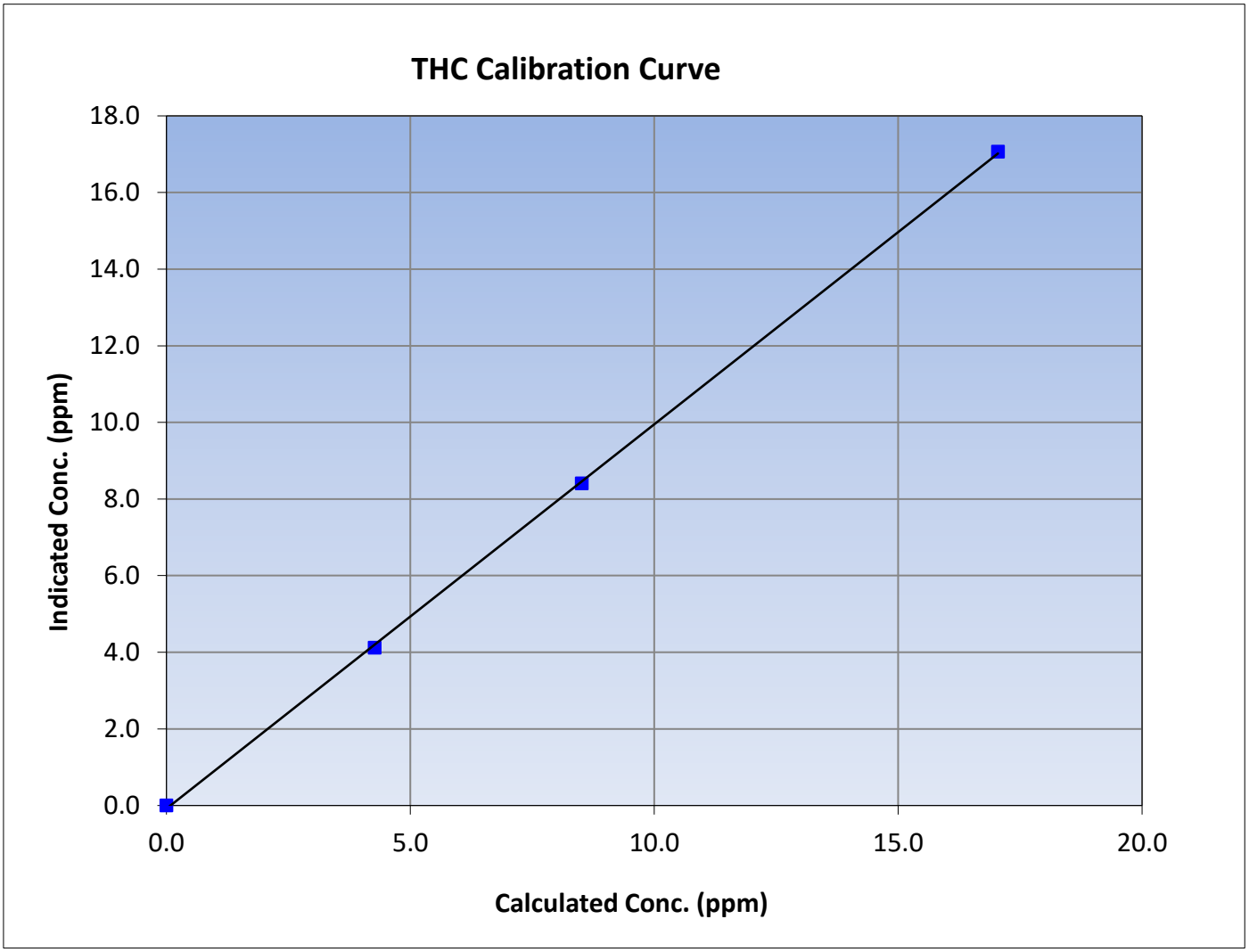
Version-01-2020

Station Information

Calibration Date:	July 25, 2023	Previous Calibration:	June 26, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:31	End Time (MST):	11:33
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	0.999891	≥0.995
17.05	17.06	0.9990			
8.51	8.41	1.0126	Slope	1.003313	0.90 - 1.10
4.27	4.12	1.0355			
			Intercept	-0.083173	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

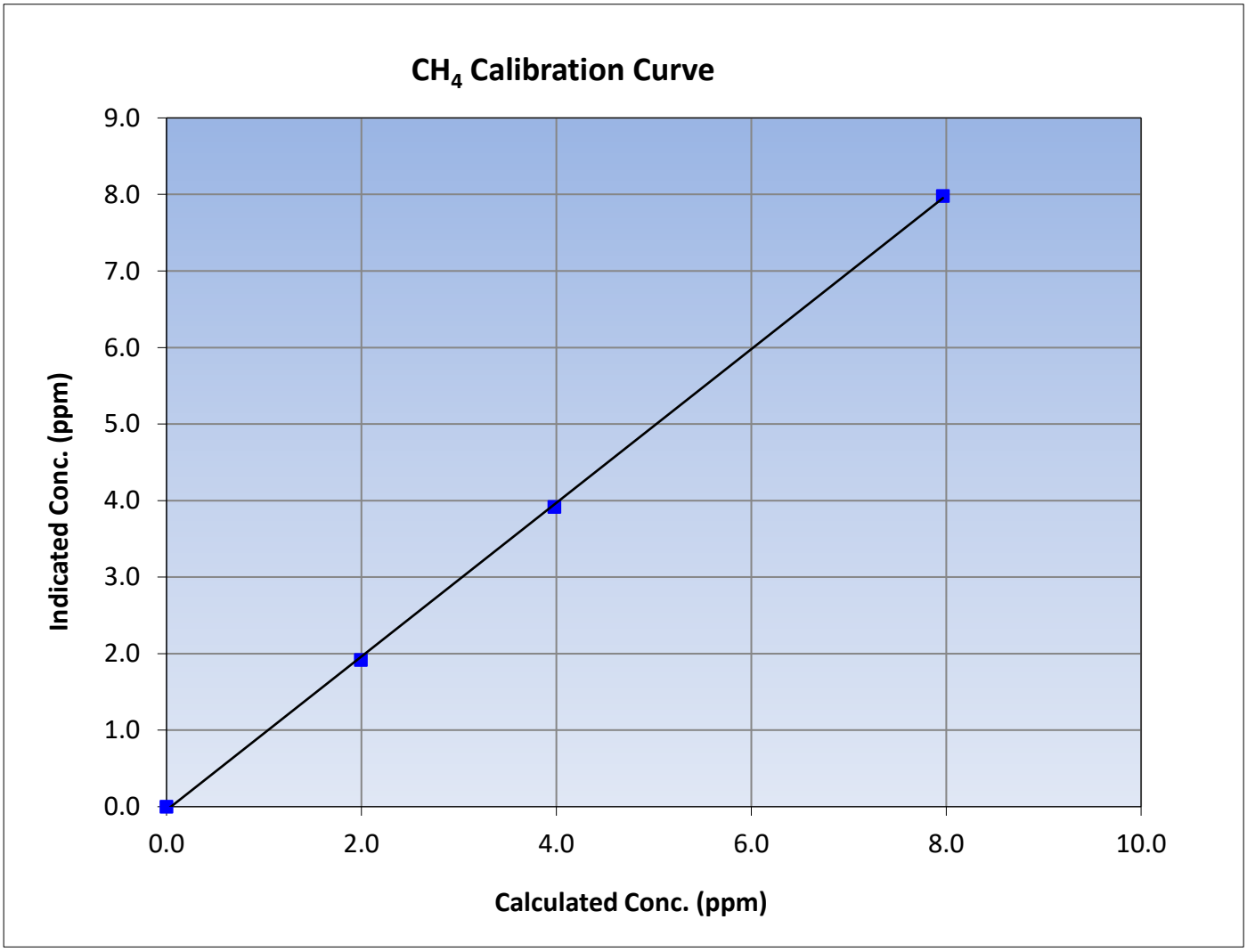
Version-01-2020

Station Information

Calibration Date:	July 25, 2023	Previous Calibration:	June 26, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:31	End Time (MST):	11:33
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	0.999845	*≥0.995*
7.97	7.98	0.9985			
3.98	3.92	1.0163	Slope	1.003948	*0.90 - 1.10*
1.99	1.92	1.0398			
			Intercept	-0.045749	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

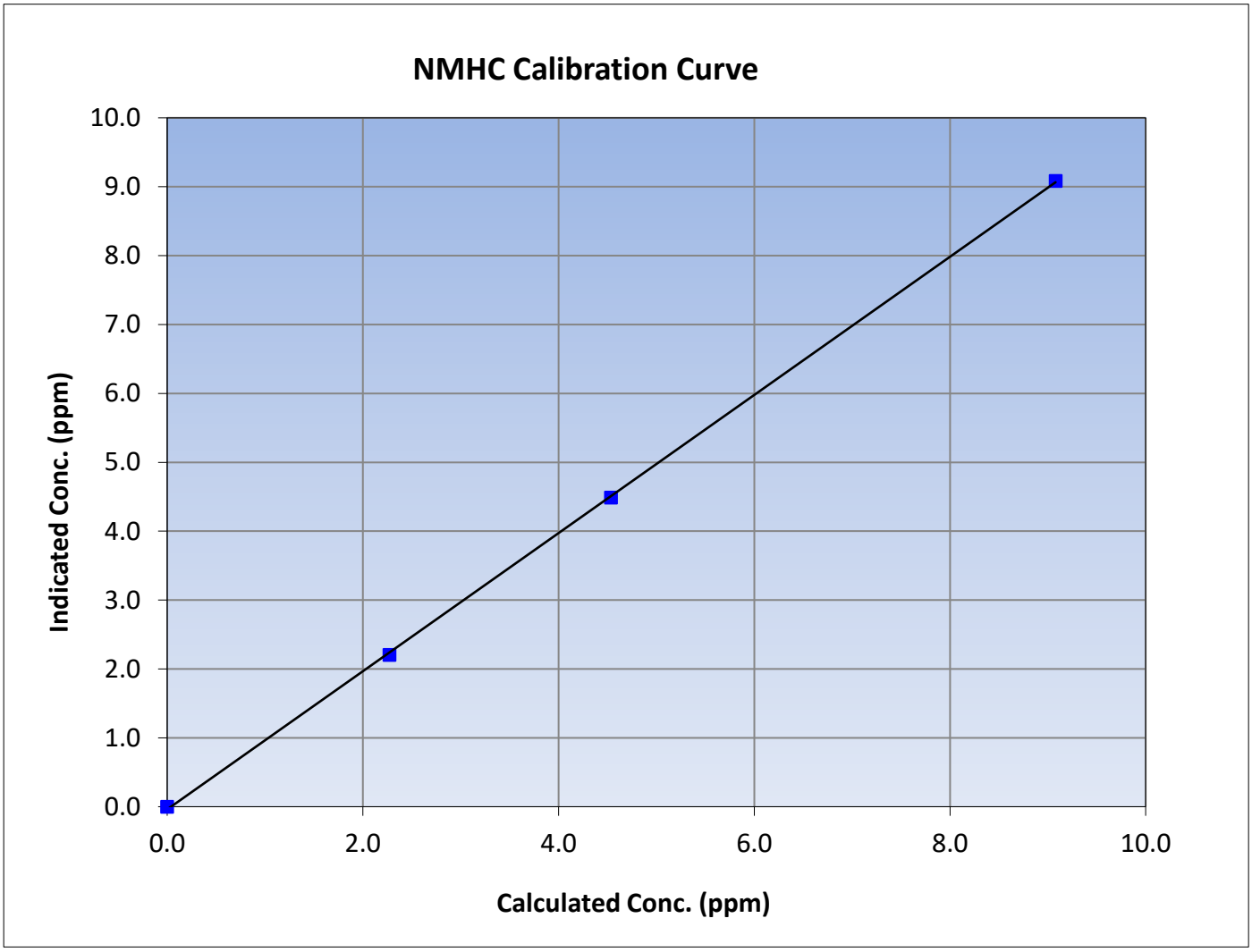
Version-01-2020

Station Information

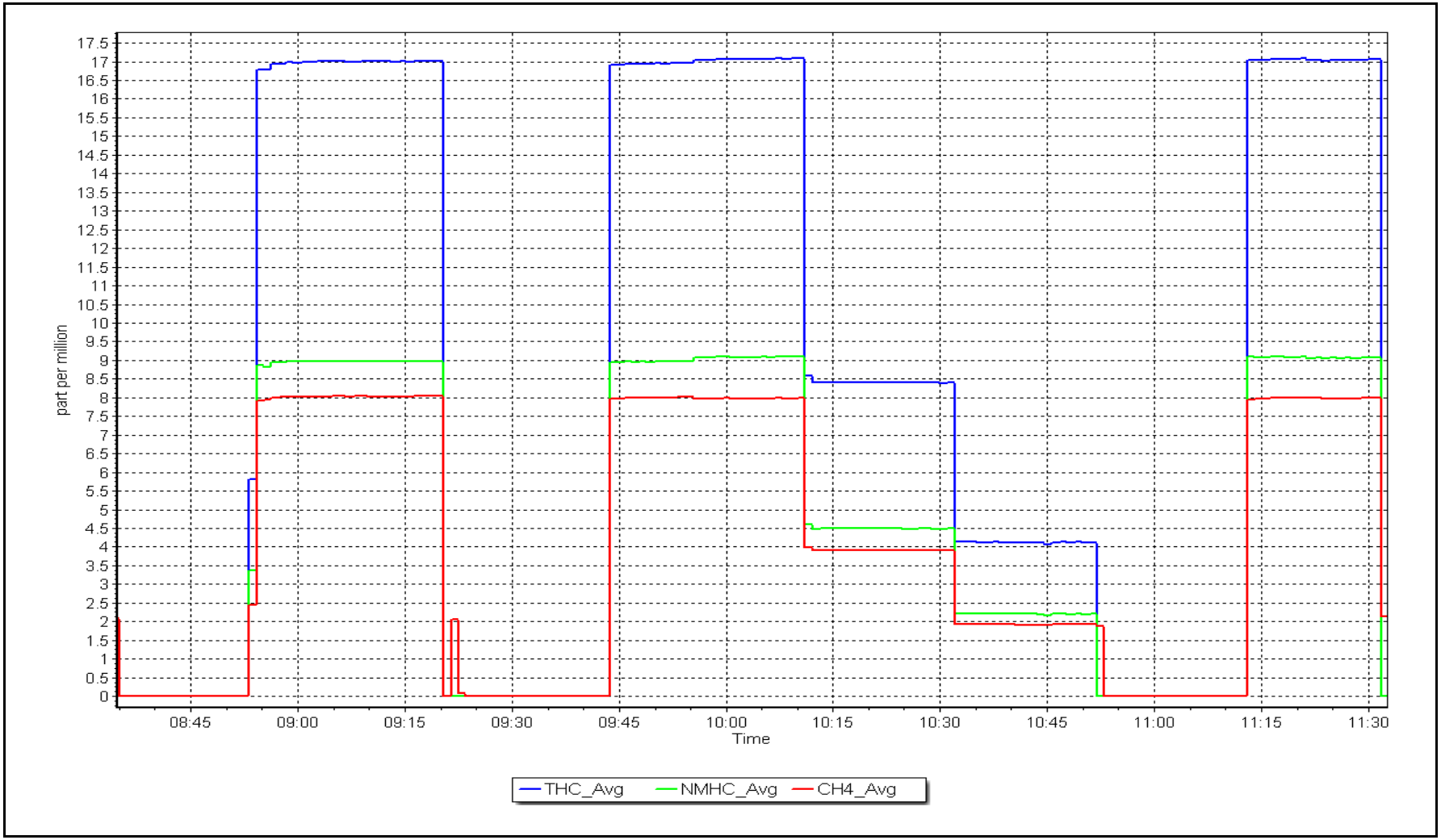
Calibration Date:	July 25, 2023	Previous Calibration:	June 26, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:31	End Time (MST):	11:33
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050130

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999917	≥0.995
9.08	9.09	0.9994			
4.53	4.49	1.0104	Slope	1.002735	0.90 - 1.10
2.27	2.20	1.0322			
			Intercept	-0.038763	+/-0.5



NMHC Calibration Plot Date: July 25, 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:	July 17, 2023	Last Cal Date:	June 5, 2023
Start time (MST):	9:24	End time (MST):	13:36
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:	1.095	1.113	NO bkgnd or offset:	8.9	9.1
NOX coeff or slope:	0.991	0.991	NOX bkgnd or offset:	10.3	10.5
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	158.1	159.0

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.997811	1.000258
NO_X Cal Offset:	-1.870975	-1.931590
NO Cal Slope:	1.002005	1.002649
NO Cal Offset:	-2.905185	-2.105499
NO_2 Cal Slope:	0.997514	1.001659
NO_2 Cal Offset:	0.257066	-0.999973

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	0.2	-0.5	----	----
as found span	4919	81.1	826.9	800.0	26.9	814.8	788.3	26.4	1.0148	1.0148
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.4	-0.4	----	----
high point	4919	81.1	826.9	800.0	26.9	826.0	801.1	24.8	1.0011	0.9986
second point	4960	40.6	413.9	400.4	13.5	411.5	398.5	13.0	1.0059	1.0048
third point	4980	20.3	207.0	200.2	6.7	202.9	195.9	7.1	1.0200	1.0221
as left zero	5000	0.0	0.0	0.0	0.0	-0.6	0.3	-0.9	----	----
as left span	4919	80.1	816.8	374.2	442.6	830.6	384.3	446.3	0.9834	0.9738
								Average Correction Factor	1.0090	1.0085

Corrected As found	NO_X = 815.1 ppb	NO = 788.1 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-1.0%
Previous Response	NO_X = 823.2 ppb	NO = 798.7 ppb		*Percent Change	NO =	-1.3%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.6	381.9	442.6	442.7	0.9998	100.0%
2nd GPT point (200 ppb O3)	797.6	595.5	229.0	228.1	1.0041	99.6%
3rd GPT point (100 ppb O3)	797.6	697.0	127.5	126.1	1.0113	98.9%
				Average Correction Factor	1.0051	99.5%

Notes: Adjusted span only. Used 2nd NO reference point due to drift.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

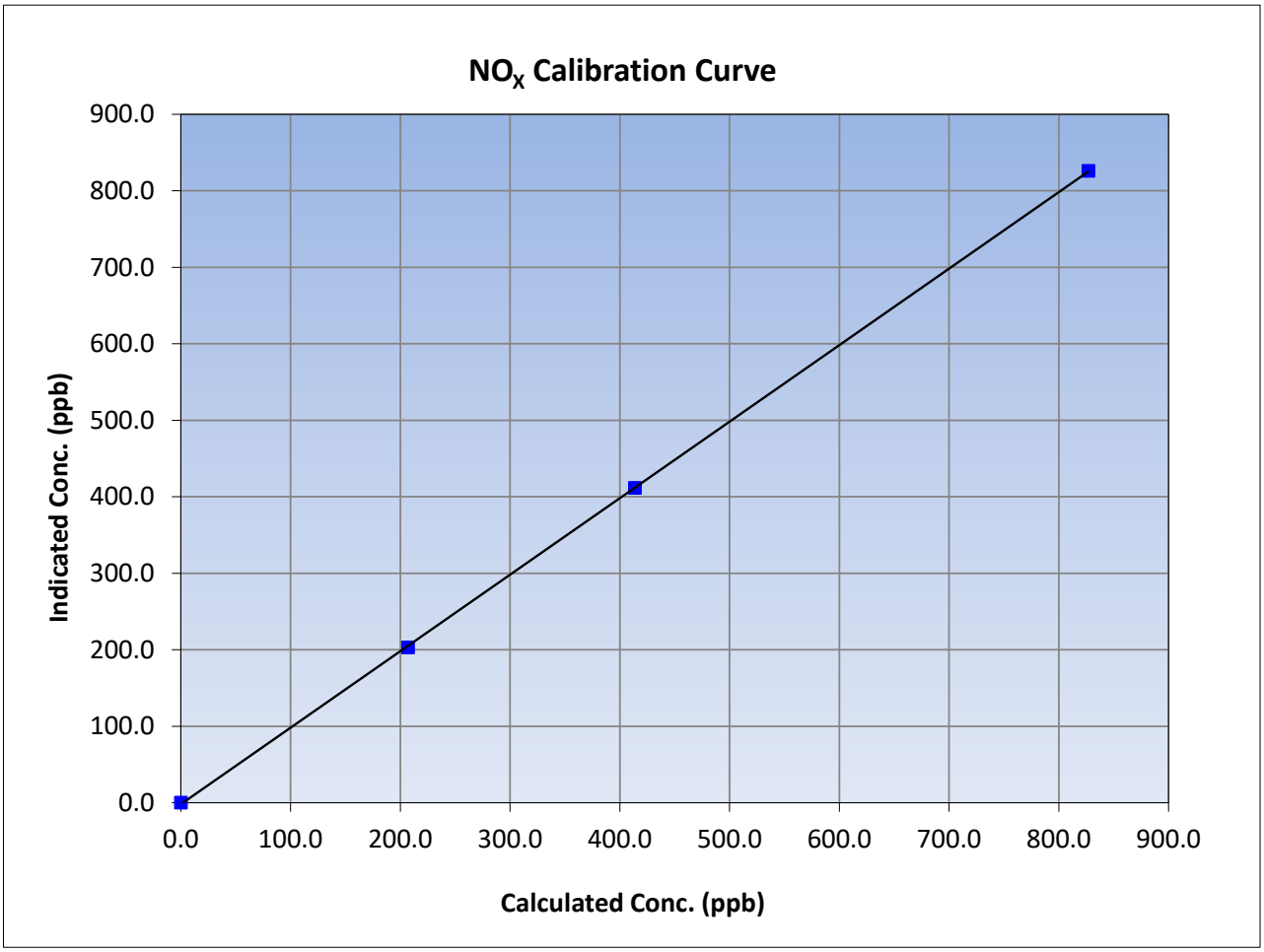
Version-04-2020

Station Information

Calibration Date:	July 17, 2023	Previous Calibration:	June 5, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	9:24	End Time (MST):	13:36
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	0.999974	≥0.995
826.9	826.0	1.0011			
413.9	411.5	1.0059	Slope	1.000258	0.90 - 1.10
207.0	202.9	1.0200			
			Intercept	-1.931590	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

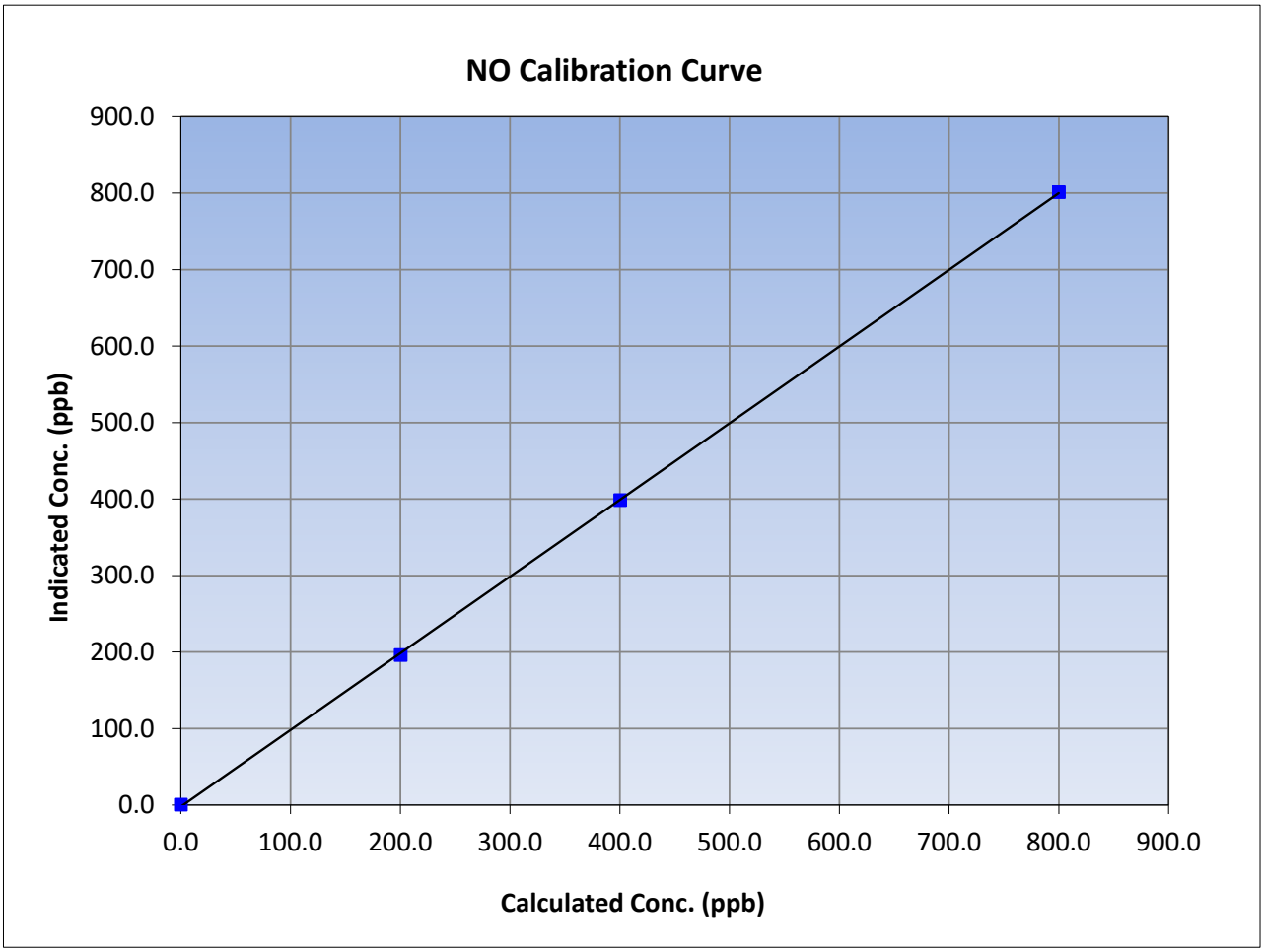
Version-04-2020

Station Information

Calibration Date:	July 17, 2023	Previous Calibration:	June 5, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	9:24	End Time (MST):	13:36
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	0.4	----	Correlation Coefficient	0.999955	≥0.995
800.0	801.1	0.9986			
400.4	398.5	1.0048	Slope	1.002649	0.90 - 1.10
200.2	195.9	1.0221			
			Intercept	-2.105499	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

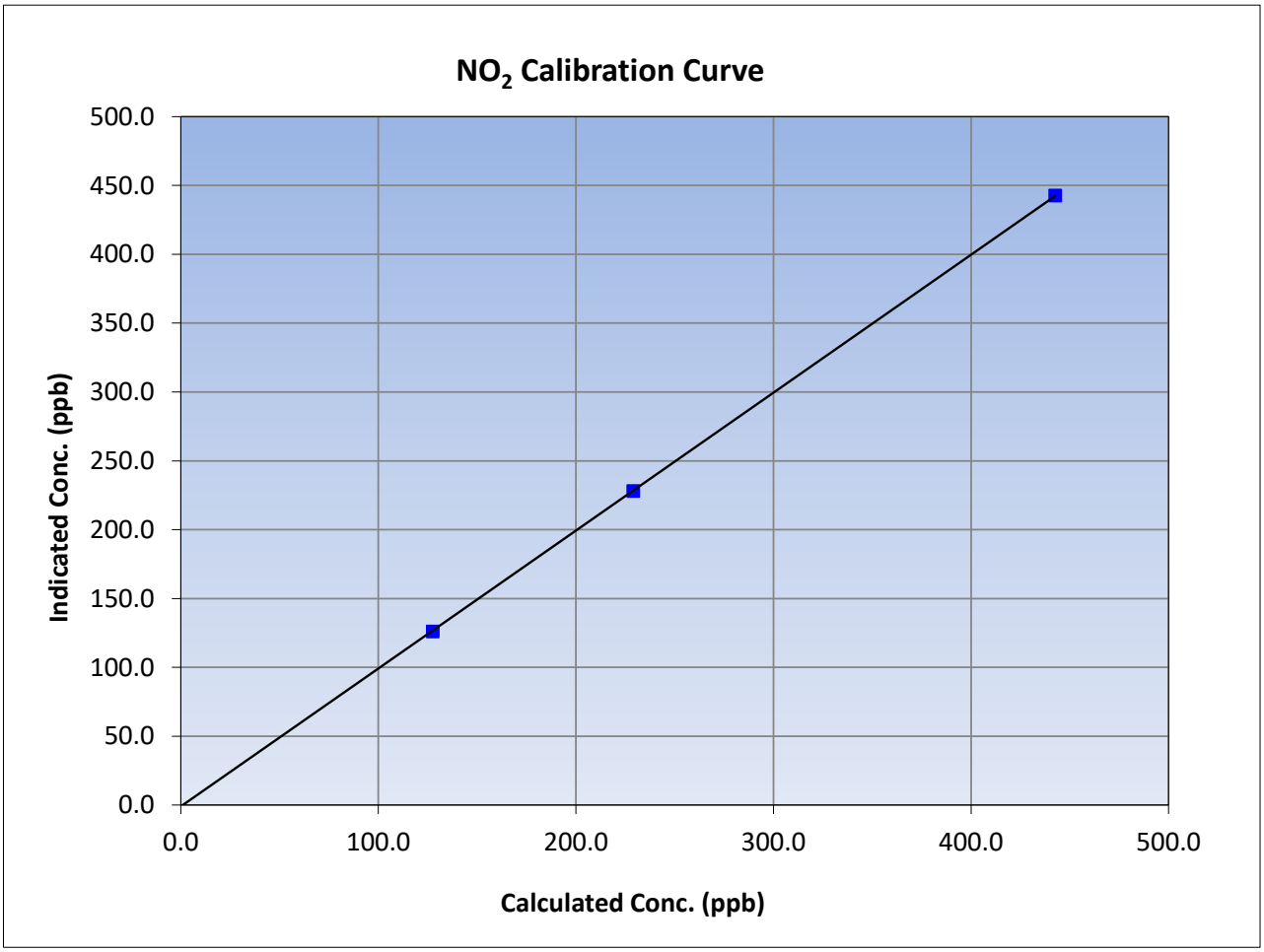
Version-04-2020

Station Information

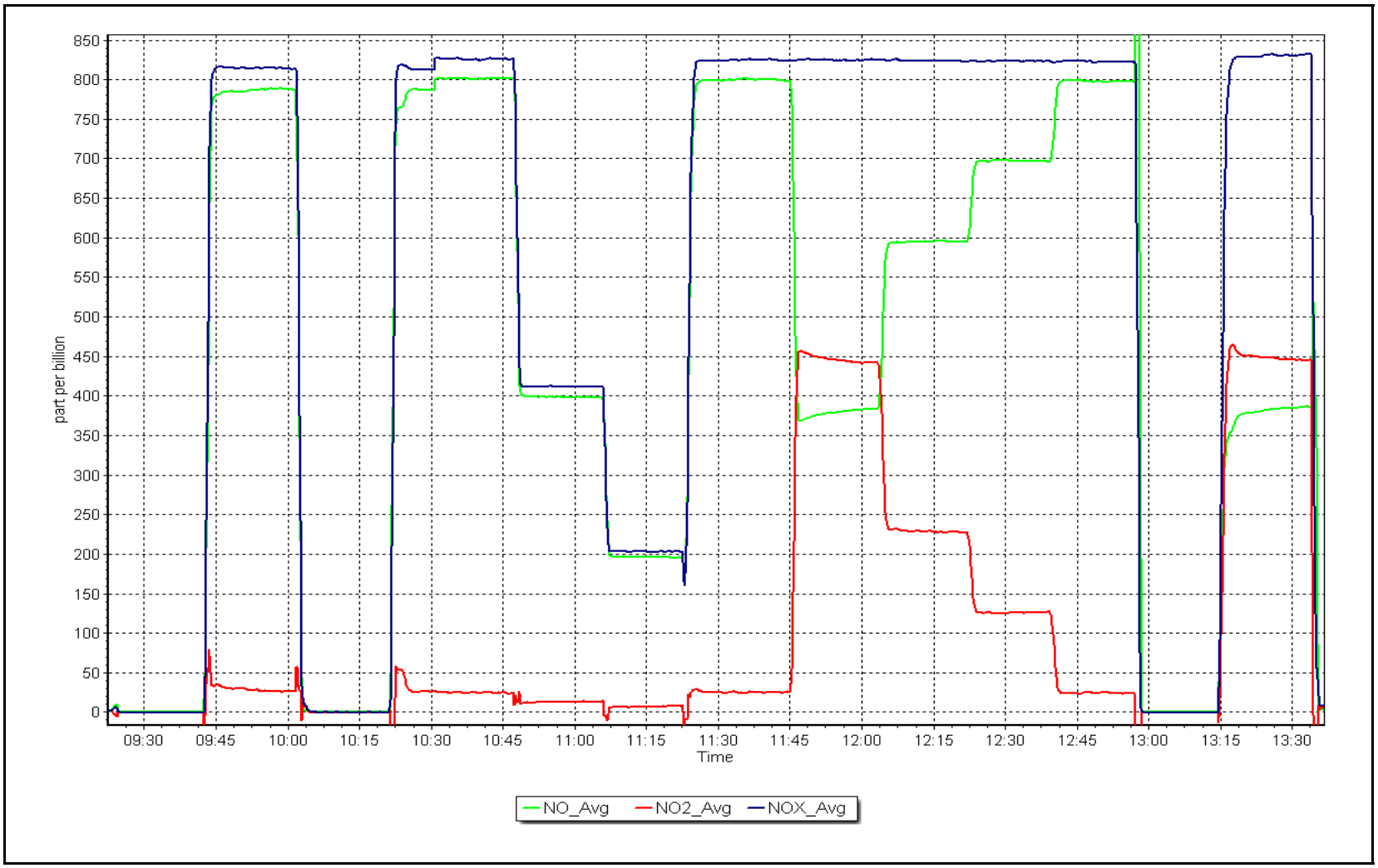
Calibration Date:	July 17, 2023	Previous Calibration:	June 5, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	9:24	End Time (MST):	13:36
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.4	----	Correlation Coefficient	0.999991	≥0.995
442.6	442.7	0.9998			
229.0	228.1	1.0041	Slope	1.001659	0.90 - 1.10
127.5	126.1	1.0113			
			Intercept	-0.999973	+/-20



NO_X Calibration Plot Date: July 17, 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:	July 11, 2023	Last Cal Date:	June 2, 2023
Start time (MST):	9:40	End time (MST):	13:05
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997857	0.996829	Backgd or Offset:	2.4	2.4
Calibration intercept:	1.000000	0.980000	Coeff or Slope:	0.963	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	0.2	----
as found span	5000	977.0	400.0	397.9	1.005
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	977.0	400.0	399.3	1.002
second point	5000	838.0	200.0	200.8	0.996
third point	5000	735.9	100.0	101.4	0.986
as left zero	5000	0.0	0.0	-0.5	----
as left span	5000	977.0	400.0	400.7	0.998
				Average Correction Factor	0.995

Baseline Corr As found:	397.7	Previous response	400.1	*% change	-0.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

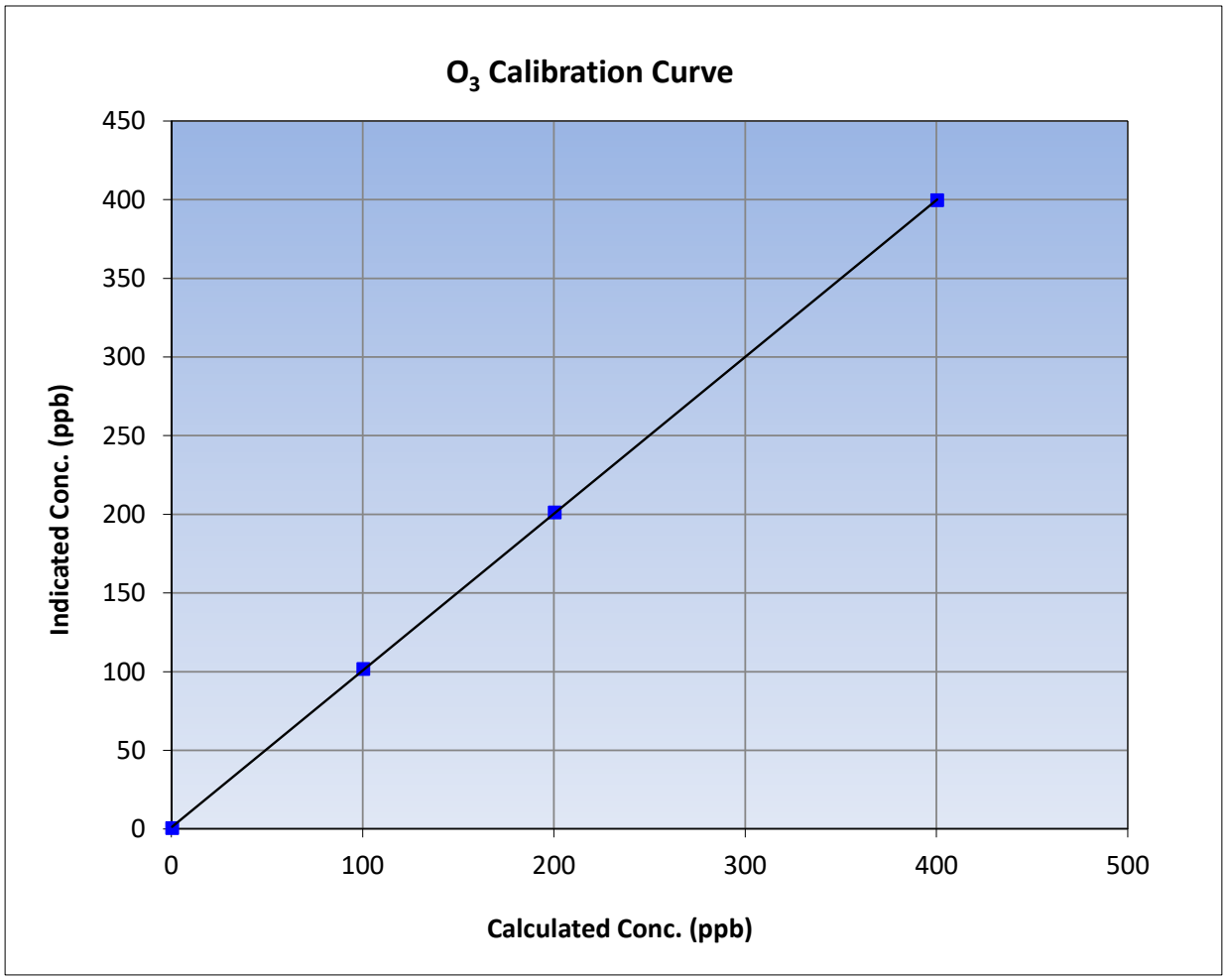
Station Information

Calibration Date:	July 11, 2023	Previous Calibration:	June 2, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	9:40	End Time (MST):	13:05
Analyzer make:	Teledyne API T400	Analyzer serial #:	3871

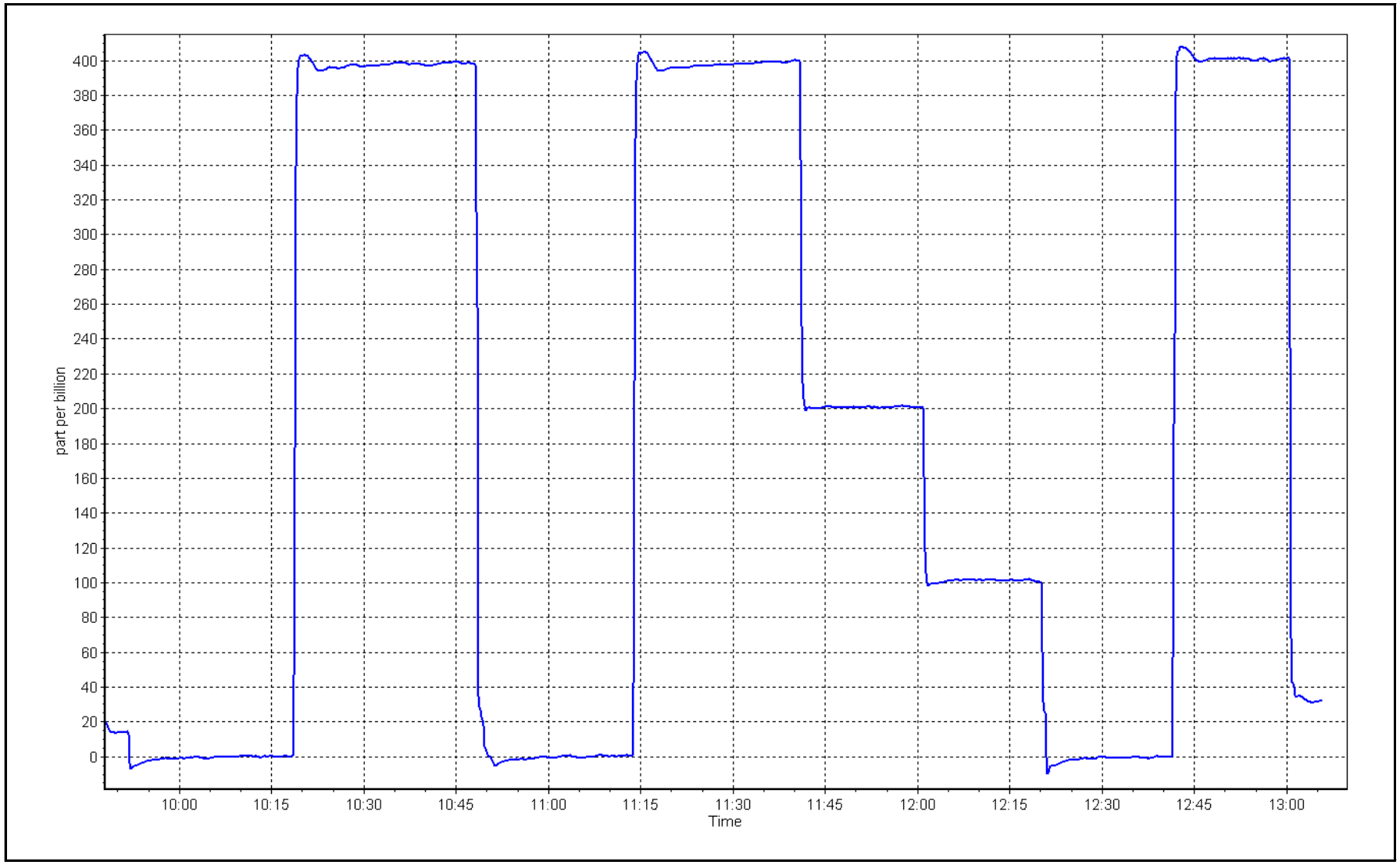
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
400.0	399.3	1.0018
200.0	200.8	0.9960
100.0	101.4	0.9862

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999982	*≥0.995*
Slope	0.996829	*0.90 - 1.10*
Intercept	0.980000	*+/- 5*



O_3 Calibration Plot Date: July 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:	July 26, 2023	Last Cal Date:	June 29, 2023
Start time (MST):	8:53	End time (MST):	9:14
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)	15.1	14.5	15.1	☐	+/- 2 °C
P (mmHg)	729.7	730.5	730.5	☐	+/- 10 mmHg
flow (LPM)	5.01	4.86	4.86	☑	+/- 0.25 LPM

Leak Test: Date of check: July 26, 2023 Last Cal Date: June 29, 2023

PM w/o HEPA: 3.0 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: June 29, 2023 <0.2 ug/m3

Disposable Filter Changed: July 26, 2023

Annual Maintenance

Date Sample Tube Cleaned: June 29, 2023

Date RH/T Sensor Cleaned: June 29, 2023

Notes: Inlet head clean and inspected. Changed the filter due to recent smoke in the area.

Calibration by: Sean Bala

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS14
ANZAC
JULY 2023

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

August 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	July 6, 2023	Last Cal Date:	June 5, 2023
Start time (MST):	9:48	End time (MST):	12:43
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:	1.016533	1.020118	Backgd or Offset:	25.0	25.1
Calibration intercept:	-0.680611	-0.460015	Coeff or Slope:	0.798	0.798

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.7	----
as found span	4920	80.1	800.2	817.7	0.979
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.7	----
high point	4920	80.1	800.2	816.4	0.980
second point	4960	40.0	399.6	406.6	0.983
third point	4980	20.0	199.8	202.2	0.988
as left zero	5000	0.0	0.0	0.8	----
as left span	4920	80.1	800.2	818.5	0.978
				Average Correction Factor	0.984

Baseline Corr As found:	817.00	Previous response	812.73	*% change	0.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

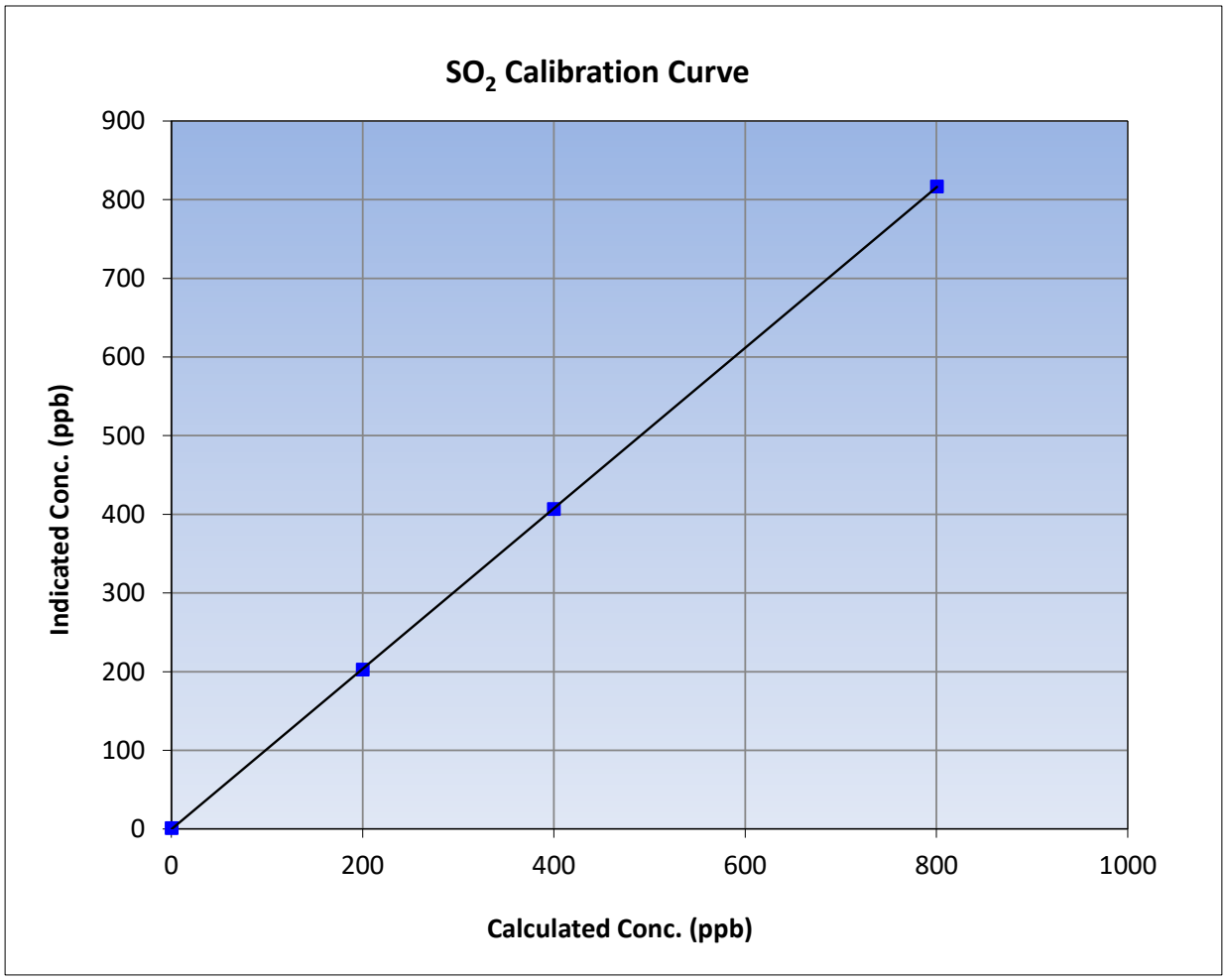
Station Information

Calibration Date:	July 6, 2023	Previous Calibration:	June 5, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:48	End Time (MST):	12:43
Analyzer make:	Thermo 43i	Analyzer serial #:	0710321322

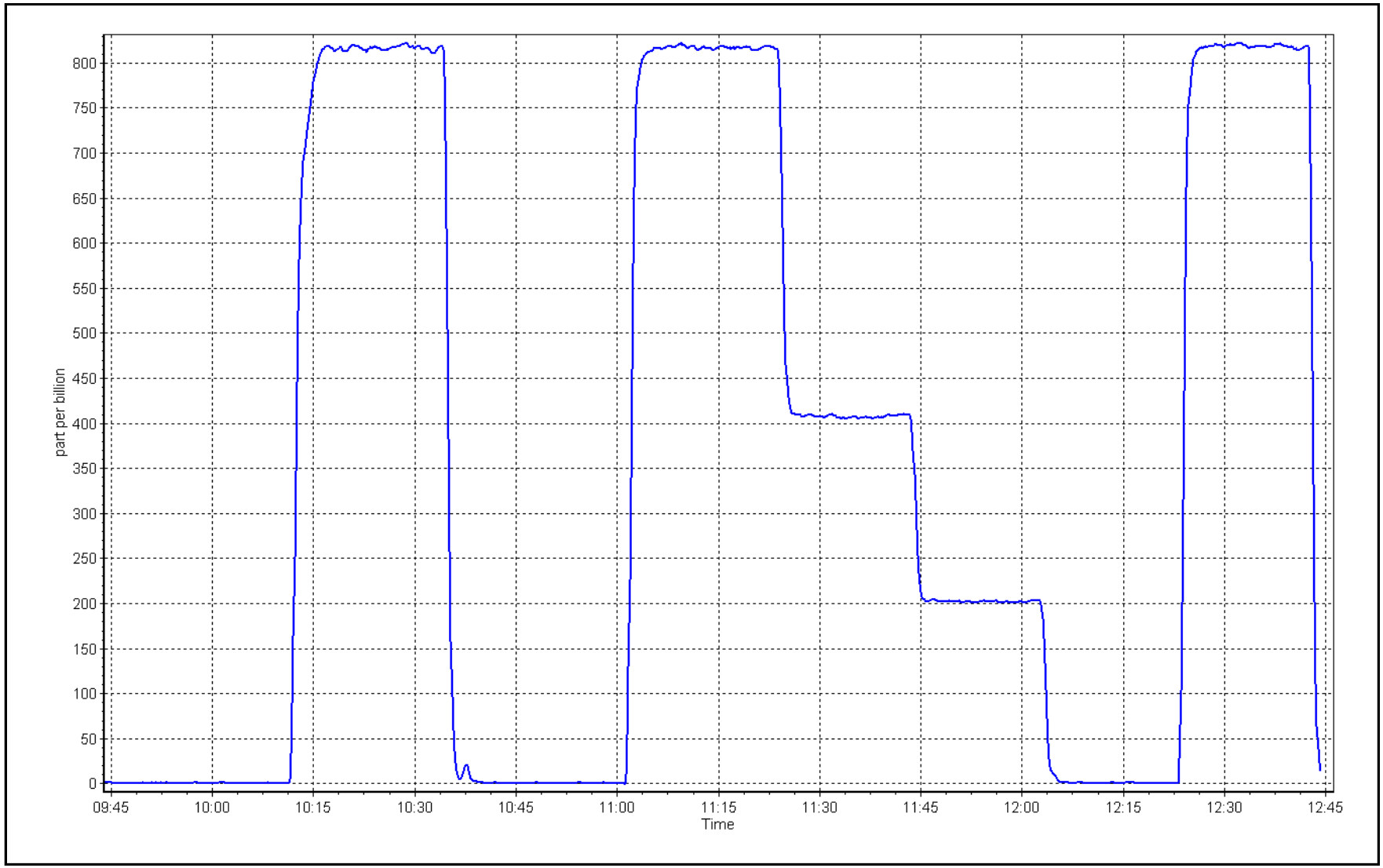
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.7	----
800.2	816.4	0.9801
399.6	406.6	0.9828
199.8	202.2	0.9881

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999991	*≥0.995*
Slope	1.020118	*0.90 - 1.10*
Intercept	-0.460015	*+/-30*



SO2 Calibration Plot Date: July 6, 2023 Location: Anzac



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	July 2, 2023	Last Cal Date:	NA
Start time (MST):	11:26	End time (MST):	16:10
Reason:	Install		

Calibration Standards

Cal Gas Concentration:	5.38	ppm	Cal Gas Exp Date:	February 3, 2023
Cal Gas Cylinder #:	EY0000859			
Removed Cal Gas Conc:	5.38	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	5239
ZAG Make/Model:	API 701H		Serial Number:	357

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1218153582	
Converter make:	CD Nova CDN-101		Converter serial #:	503	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	NA	0.998548	Backgd or Offset:	NA	2.20
Calibration intercept:	NA	-0.100891	Coeff or Slope:	NA	0.960

TRS As Found Data

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

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4925	74.3	80.0	80.0	0.999
second point	4962	37.2	40.0	39.4	1.016
third point	4981	18.6	20.0	19.8	1.011
as left zero	5000	0.0	0.0	0.3	----
as left span	4925	74.3	80.0	78.8	1.015
SO2 Scrubber Check	4920	80.0	800.0	-0.4	----
Date of last scrubber change:				Ave Corr Factor	1.009
Date of last converter efficiency test:					efficiency

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

* = > +/-5% change initiates investigation

Notes: Install calibration. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

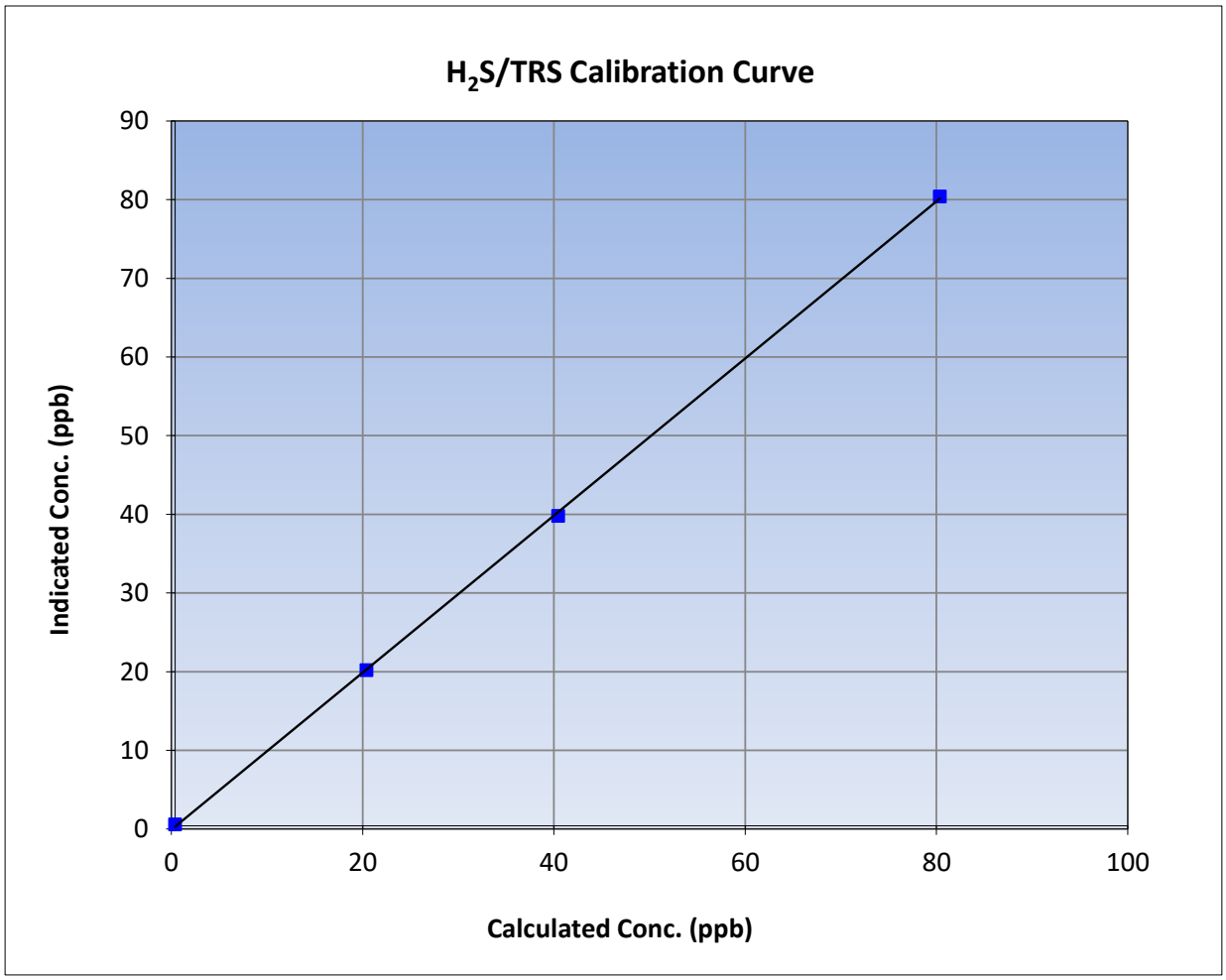
Station Information

Calibration Date:	July 2, 2023	Previous Calibration:	NA
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	11:26	End Time (MST):	16:10
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153582

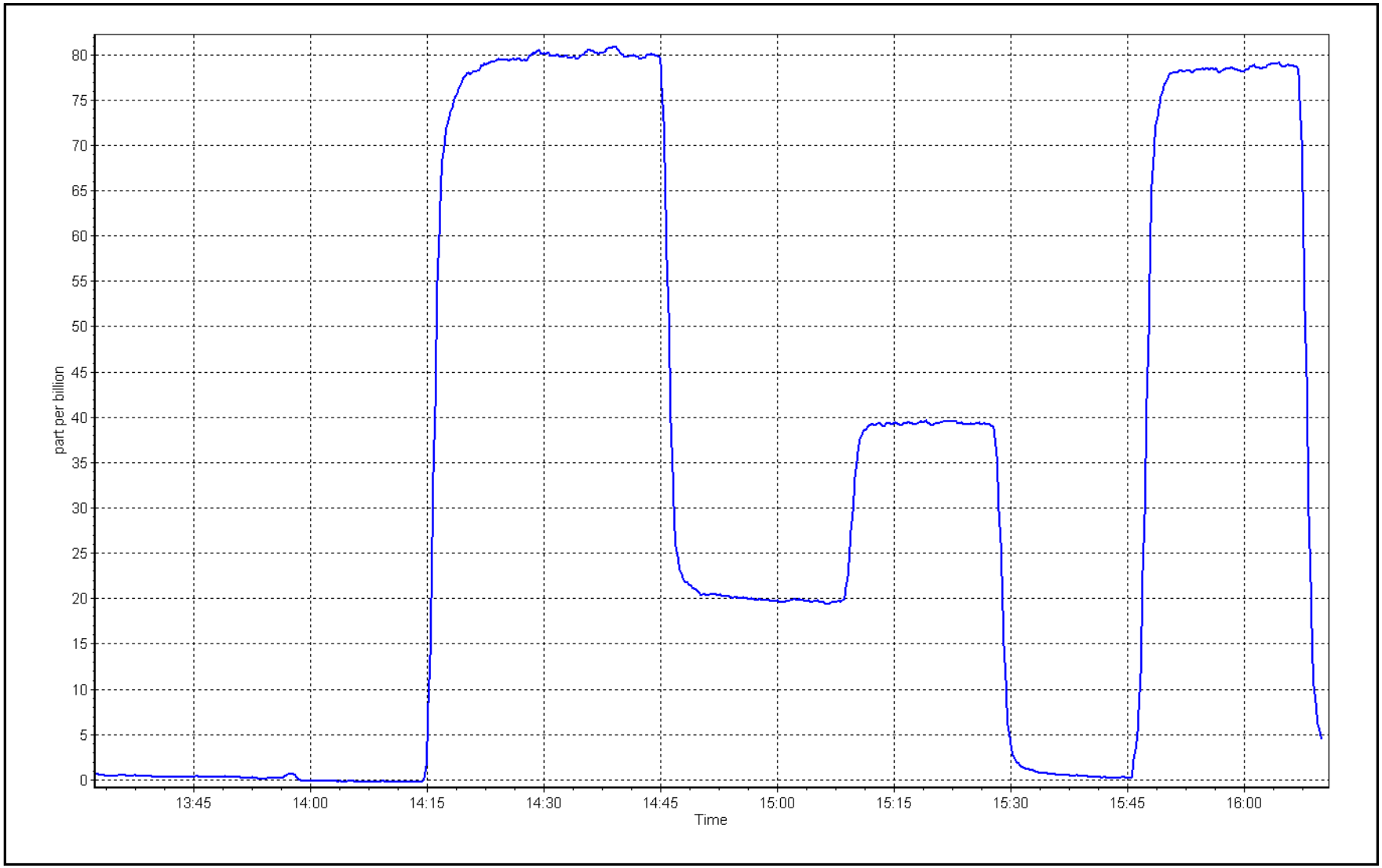
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	80.0	0.9995
40.0	39.4	1.0161
20.0	19.8	1.0109

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999888	*≥0.995*
Slope	0.998548	*0.90 - 1.10*
Intercept	-0.100891	*+/-3*



TRS Calibration Plot Date: July 2, 2023 Location: Anzac



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	July 6, 2023	Last Cal Date:	June 5, 2023
Start time (MST):	9:48	End time (MST):	12:43
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:	5239	
ZAG make/model:	API 701H		Serial Number:	357	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1118148494	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.90E-04	3.90E-04	NMHC SP Ratio:	4.53E-05	4.53E-05
CH4 Retention time:	12.20	12.20	NMHC Peak Area:	201206	201206

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	17.12	17.15	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	17.12	17.16	0.998
second point	4960	40.0	8.55	8.59	0.995
third point	4980	20.0	4.28	4.27	1.002
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.1	17.12	17.18	0.997
				Average Correction Factor	0.998

Baseline Corr AF:	17.15	Prev response	17.07	*% change	0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-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	9.10	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	80.1	9.12	9.10	1.003
second point	4960	40.0	4.56	4.56	0.999
third point	4980	20.0	2.28	2.26	1.008
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.1	9.12	9.11	1.001
				Average Correction Factor	1.003
Baseline Corr AF:	9.10	Prev response	9.09	*% change	0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	8.00	8.05	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	80.1	8.00	8.06	0.992
second point	4960	40.0	3.99	4.03	0.990
third point	4980	20.0	2.00	2.01	0.995
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.1	8.00	8.07	0.992
				Average Correction Factor	0.992
Baseline Corr AF:	8.05	Prev response	7.98	*% change	0.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.996014	1.002824
THC Cal Offset:	0.012807	-0.002175
CH4 Cal Slope:	0.996447	1.007994
CH4 Cal Offset:	0.010369	-0.000017
NMHC Cal Slope:	0.995647	0.998090
NMHC Cal Offset:	0.002638	-0.001358

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

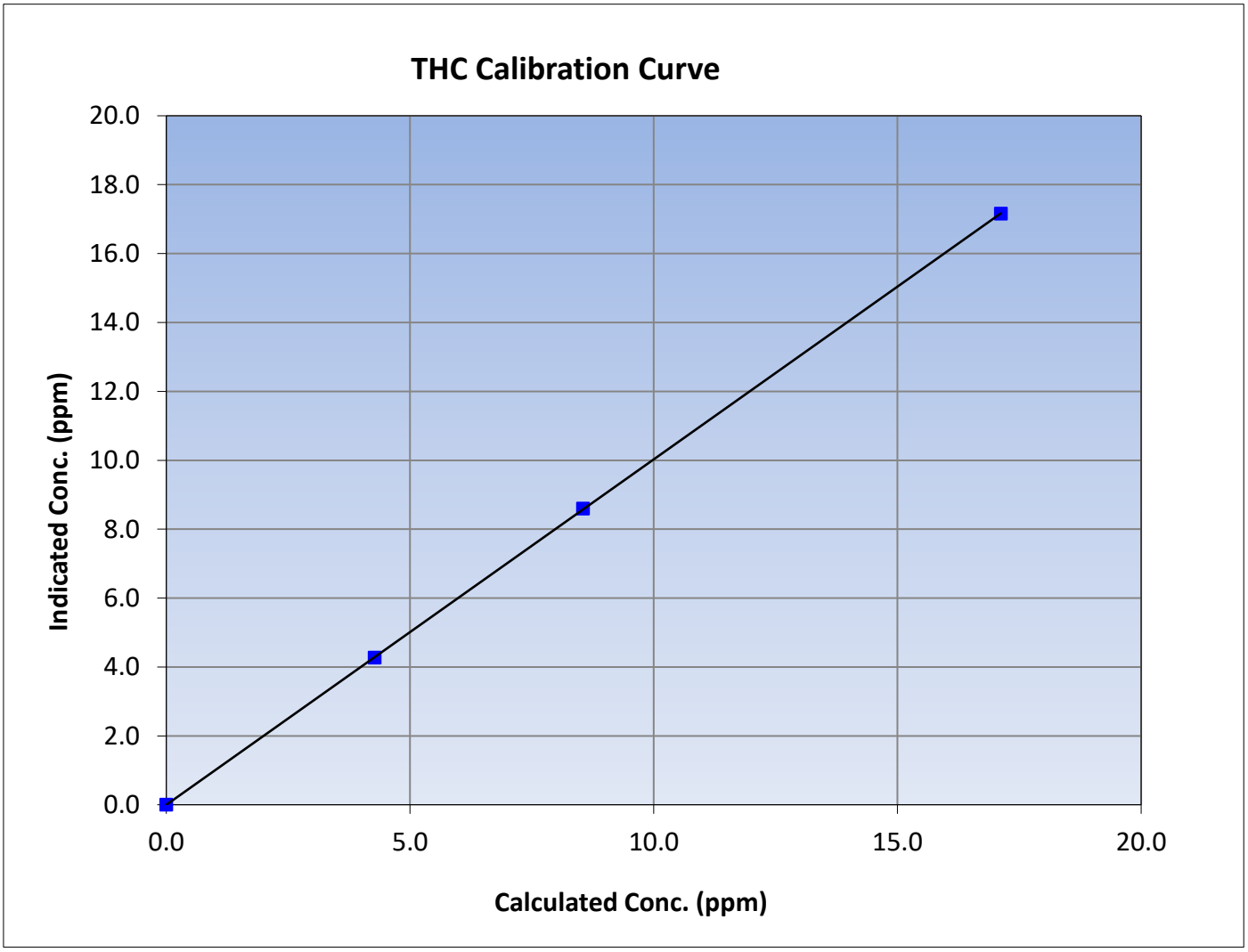
Version-01-2020

Station Information

Calibration Date:	July 6, 2023	Previous Calibration:	June 5, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:48	End Time (MST):	12:43
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999995	≥0.995
17.12	17.16	0.9977			
8.55	8.59	0.9949	Slope	1.002824	0.90 - 1.10
4.28	4.27	1.0017			
			Intercept	-0.002175	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

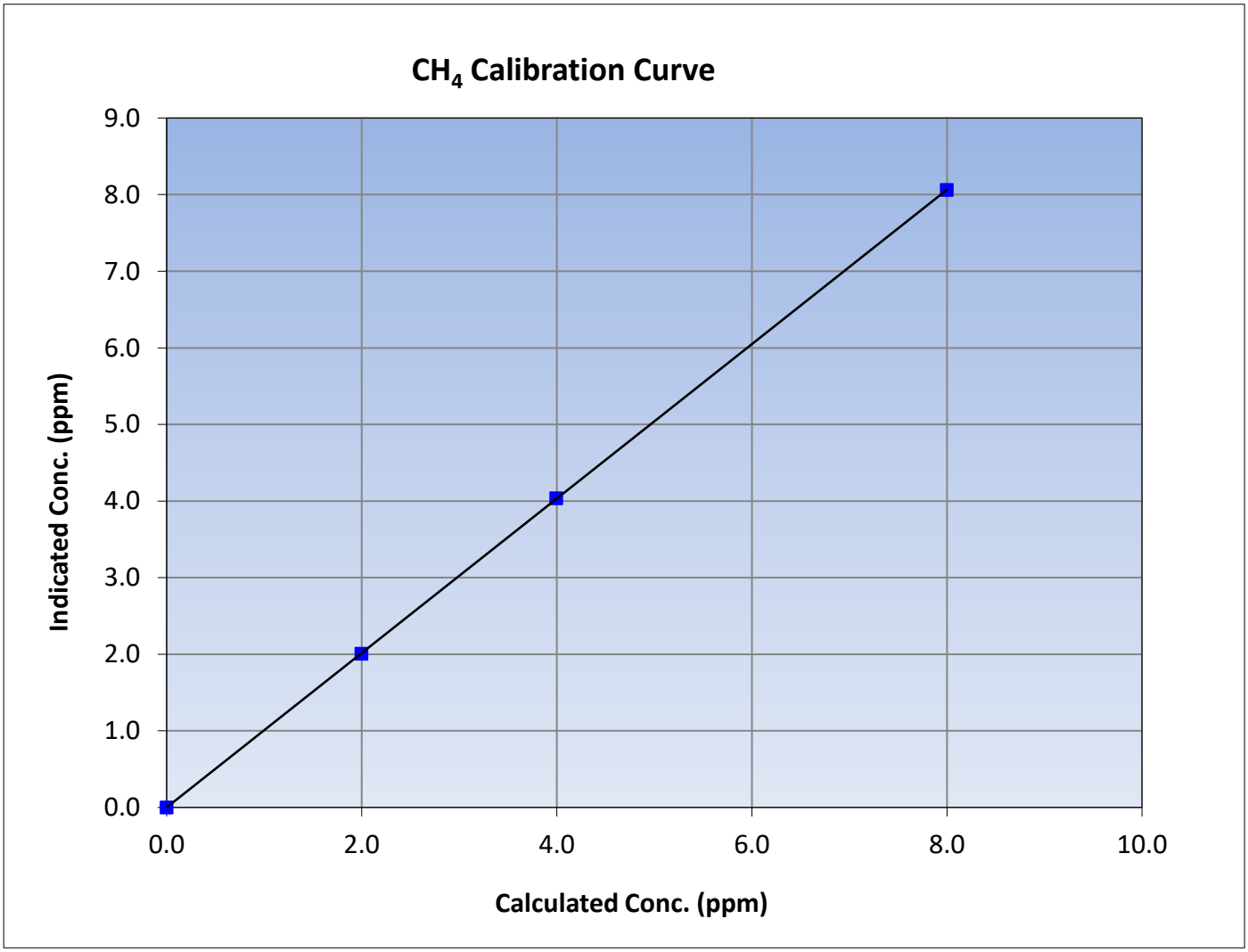
Version-01-2020

Station Information

Calibration Date:	July 6, 2023	Previous Calibration:	June 5, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:48	End Time (MST):	12:43
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	0.999997	≥0.995
8.00	8.06	0.9924			
3.99	4.03	0.9902	Slope	1.007994	0.90 - 1.10
2.00	2.01	0.9946			
			Intercept	-0.000017	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

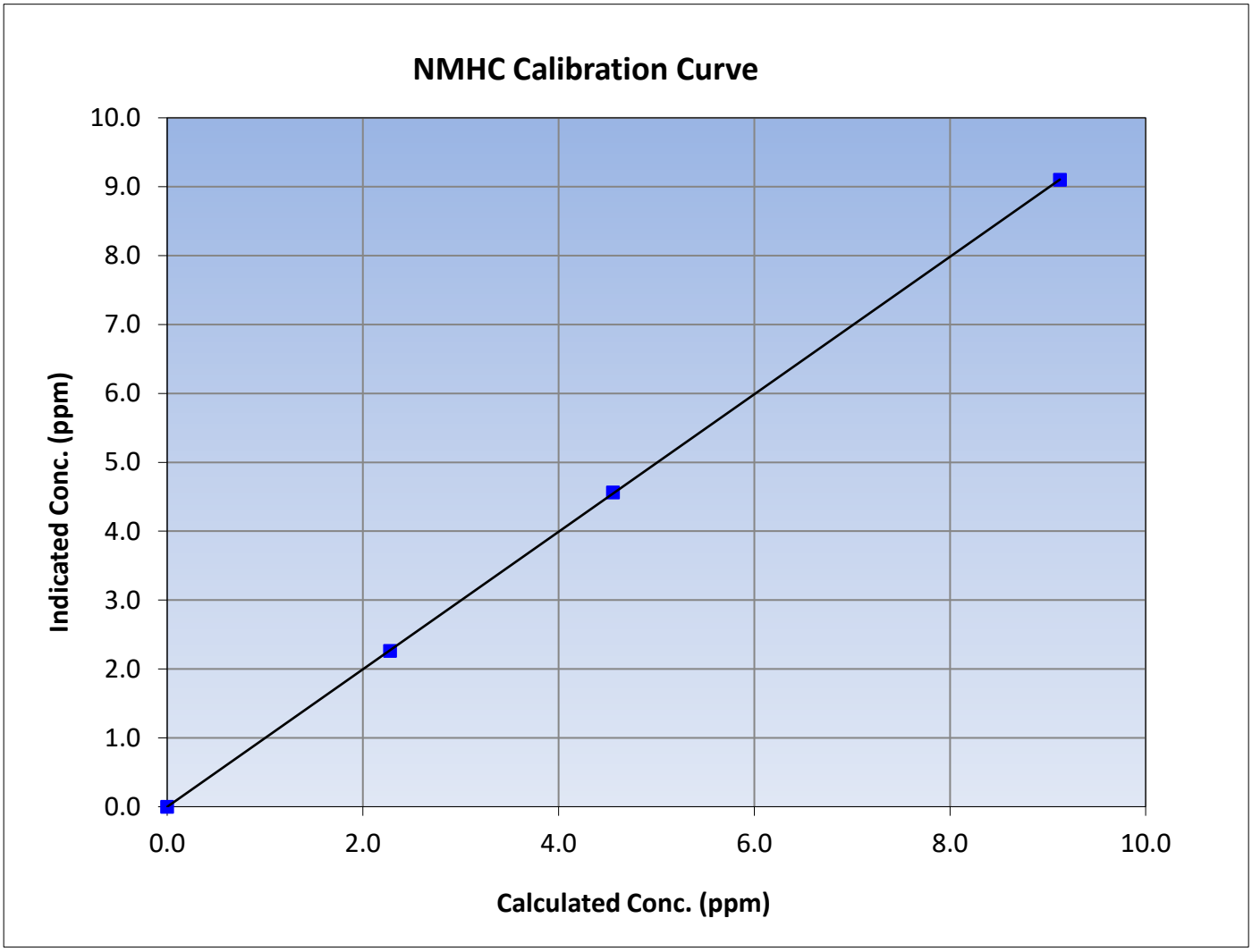
Version-01-2020

Station Information

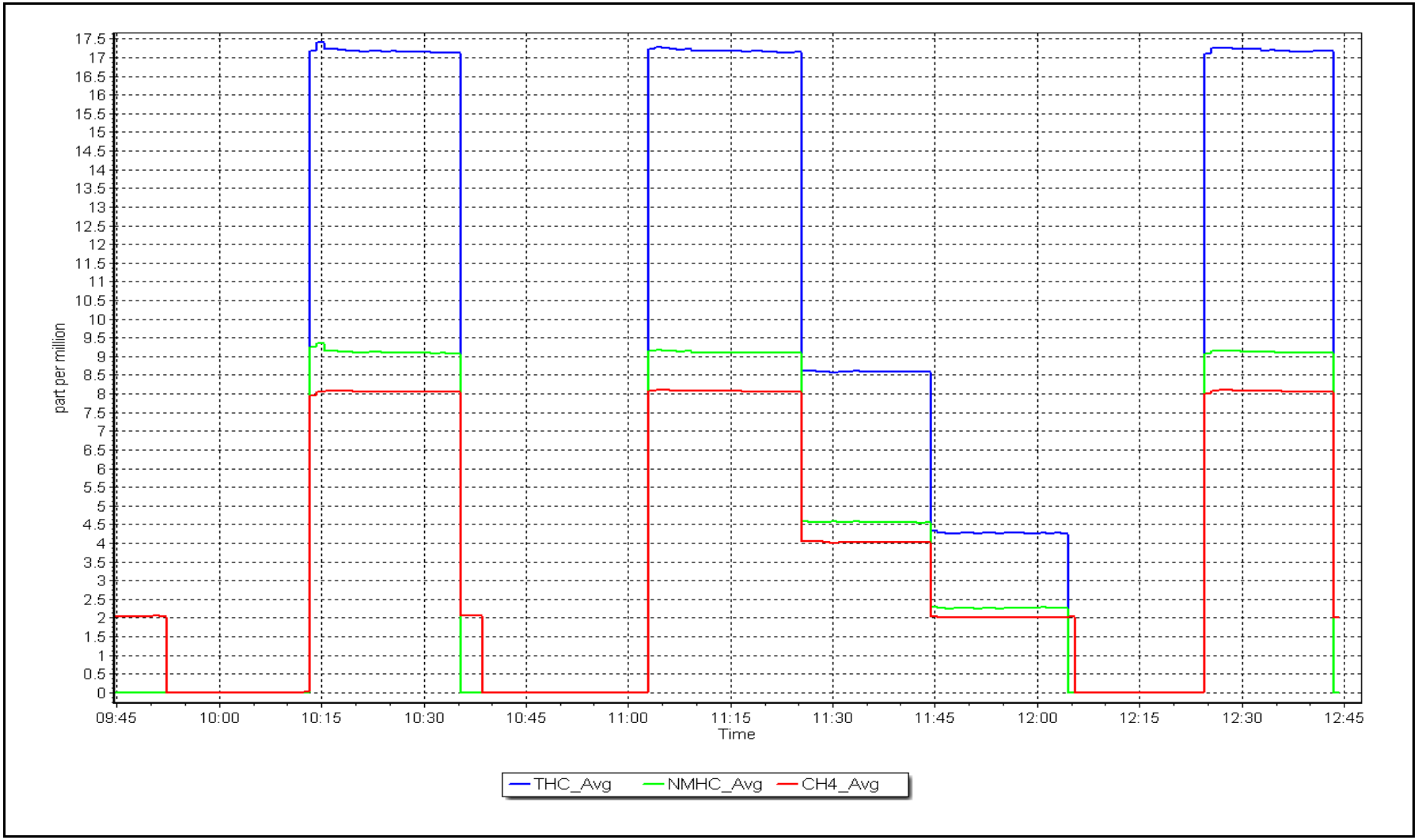
Calibration Date:	July 6, 2023	Previous Calibration:	June 5, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:48	End Time (MST):	12:43
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999991	*≥0.995*
9.12	9.10	1.0026			
4.56	4.56	0.9987	Slope	0.998090	*0.90 - 1.10*
2.28	2.26	1.0080			
			Intercept	-0.001358	*+/-0.5*



NMHC Calibration Plot Date: July 6, 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:	July 28, 2023	Last Cal Date:	July 6, 2023
Start time (MST):	9:47	End time (MST):	11:45
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:	5239	
ZAG make/model:	API 701H		Serial Number:	357	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1118148494	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.90E-04	NA	NMHC SP Ratio:	4.53E-05	NA
CH4 Retention time:	12.20	NA	NMHC Peak Area:	201206	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	80.1	17.12	17.23	0.994
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	17.12	17.20	0.995
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.995

Baseline Corr AF:	17.23	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-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	9.17	0.995
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	9.12	9.15	0.997
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.997
Baseline Corr AF:	9.17	Prev response	9.10	*% change	0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	8.00	8.06	0.992
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	8.00	8.05	0.994
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.994
Baseline Corr AF:	8.06	Prev response	8.06	*% change	0.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

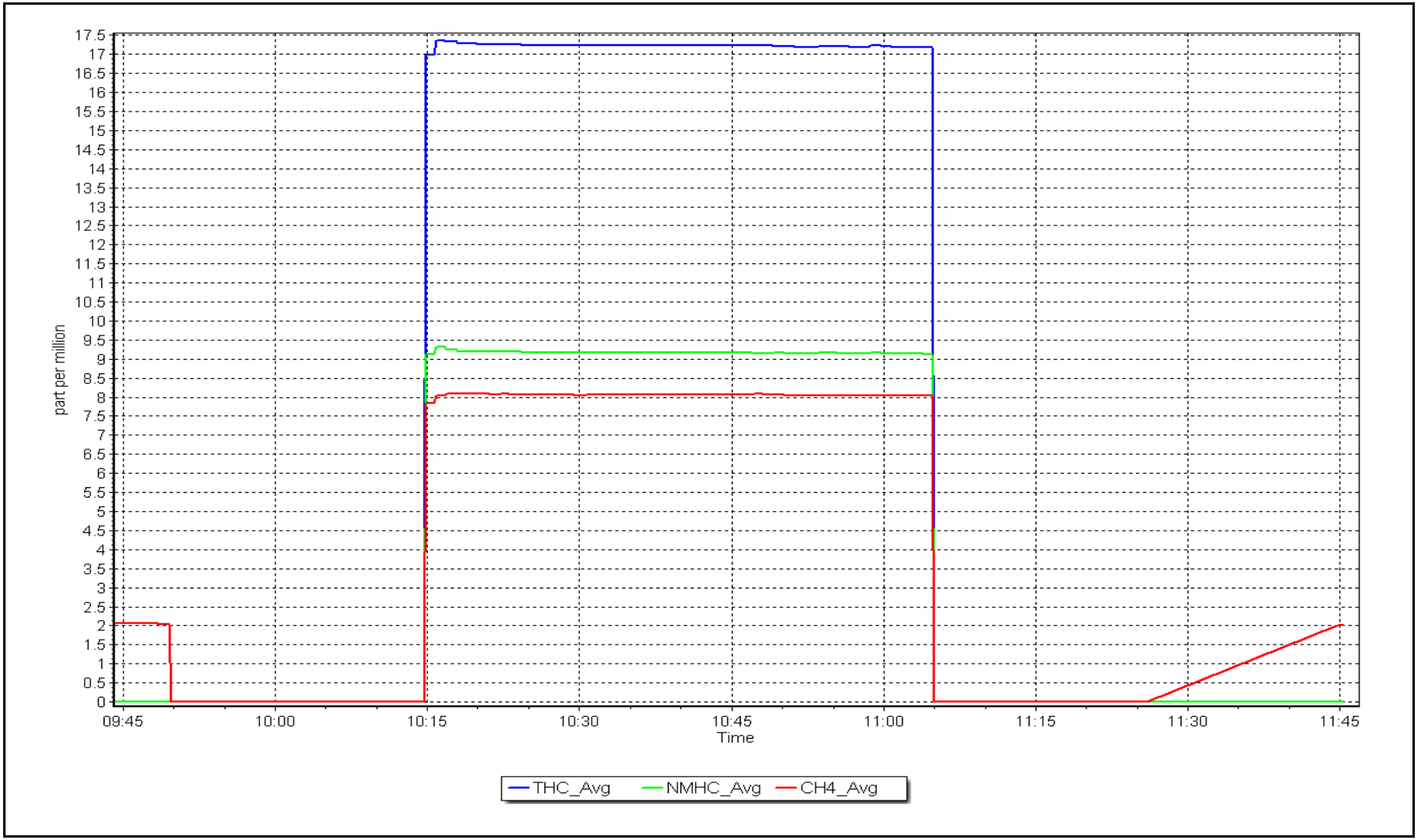
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.002824	1.004659
THC Cal Offset:	-0.002175	0.000000
CH4 Cal Slope:	1.007994	1.006423
CH4 Cal Offset:	-0.000017	0.000000
NMHC Cal Slope:	0.998090	1.003112
NMHC Cal Offset:	-0.001358	0.000000

Notes: Nitrogen cylinder change.

Calibration Performed By: Mohammed Kashif

NMHC Calibration Plot Date: July 28, 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:	July 7, 2023	Last Cal Date:	June 8, 2023
Start time (MST):	9:58	End time (MST):	14:46
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:	1.375	1.375	NO bkgnd or offset:	3.7	3.7
NOX coeff or slope:	0.996	0.996	NOX bkgnd or offset:	3.7	3.7
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	162.1	163.9

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000547	0.995865
NO_X Cal Offset:	-0.105430	0.033705
NO Cal Slope:	1.001604	0.996593
NO Cal Offset:	-1.609467	-1.310286
NO_2 Cal Slope:	1.002084	1.000260
NO_2 Cal Offset:	1.232321	1.094049

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	797.4	781.6	15.8	1.0039	1.0067
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.4	0.0	0.3	----	----
high point	4921	78.6	800.5	786.8	13.7	797.3	783.4	13.9	1.0040	1.0044
second point	4961	39.3	400.2	393.4	6.8	398.8	390.4	8.4	1.0035	1.0076
third point	4980	19.6	199.6	196.2	3.4	198.2	192.7	5.5	1.0072	1.0182
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.3	----	----
as left span	4921	78.6	800.5	393.8	406.7	794.7	387.6	407.2	1.0073	1.0161
								Average Correction Factor	1.0049	1.0101

Corrected As found	NO_X = 797.3 ppb	NO = 781.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.4%
Previous Response	NO_X = 800.9 ppb	NO = 786.5 ppb		*Percent Change	NO =	-0.6%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	778.0	385.0	406.7	407.3	0.9985	100.2%
2nd GPT point (200 ppb O3)	778.0	576.3	215.4	217.3	0.9912	100.9%
3rd GPT point (100 ppb O3)	778.0	677.5	114.2	115.9	0.9851	101.5%
				Average Correction Factor	0.9916	100.9%

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

Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

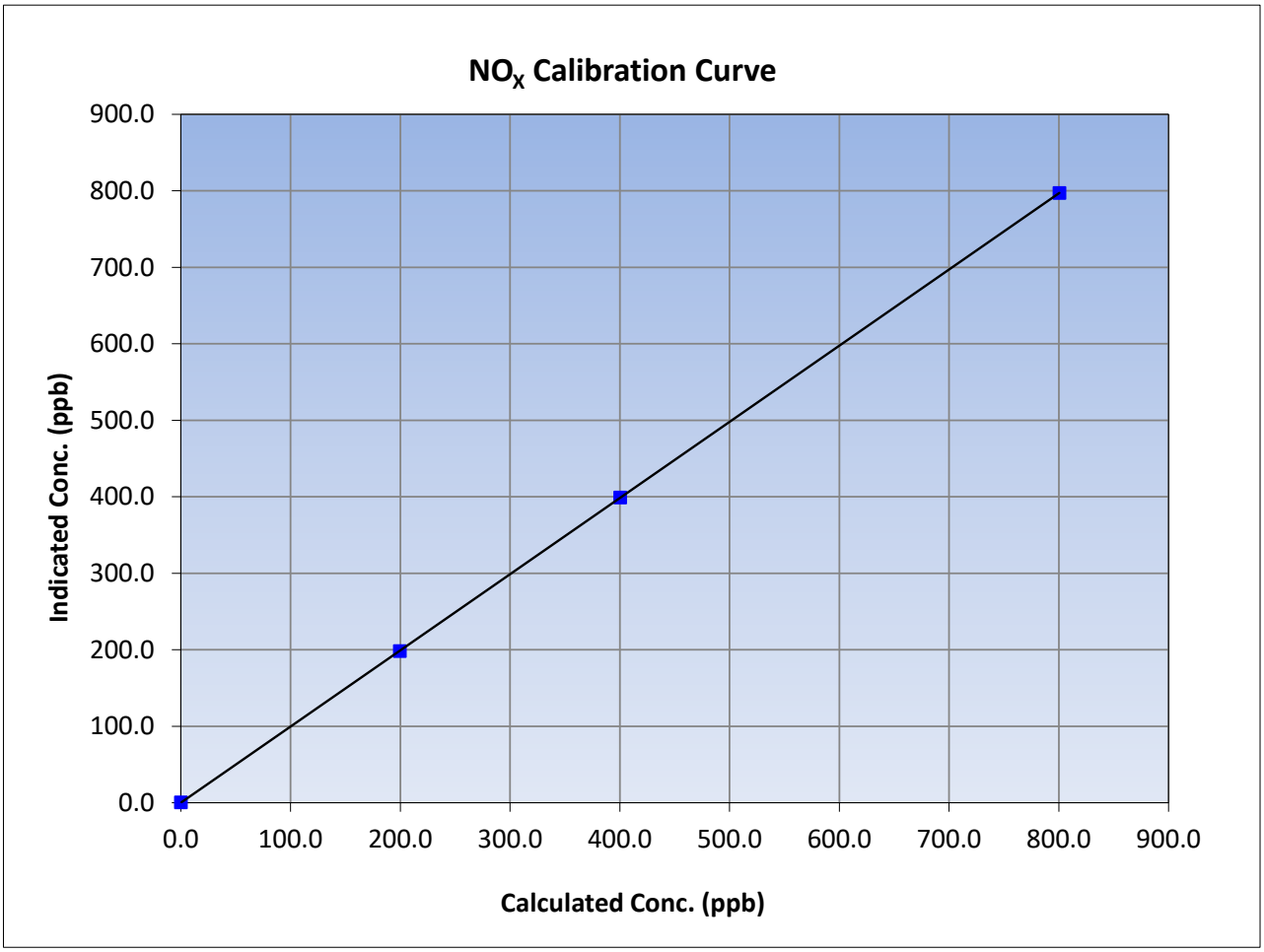
Version-04-2020

Station Information

Calibration Date:	July 7, 2023	Previous Calibration:	June 8, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:58	End Time (MST):	14:46
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	0.4	----	Correlation Coefficient	0.999998	≥0.995
800.5	797.3	1.0040			
400.2	398.8	1.0035	Slope	0.995865	0.90 - 1.10
199.6	198.2	1.0072			
			Intercept	0.033705	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

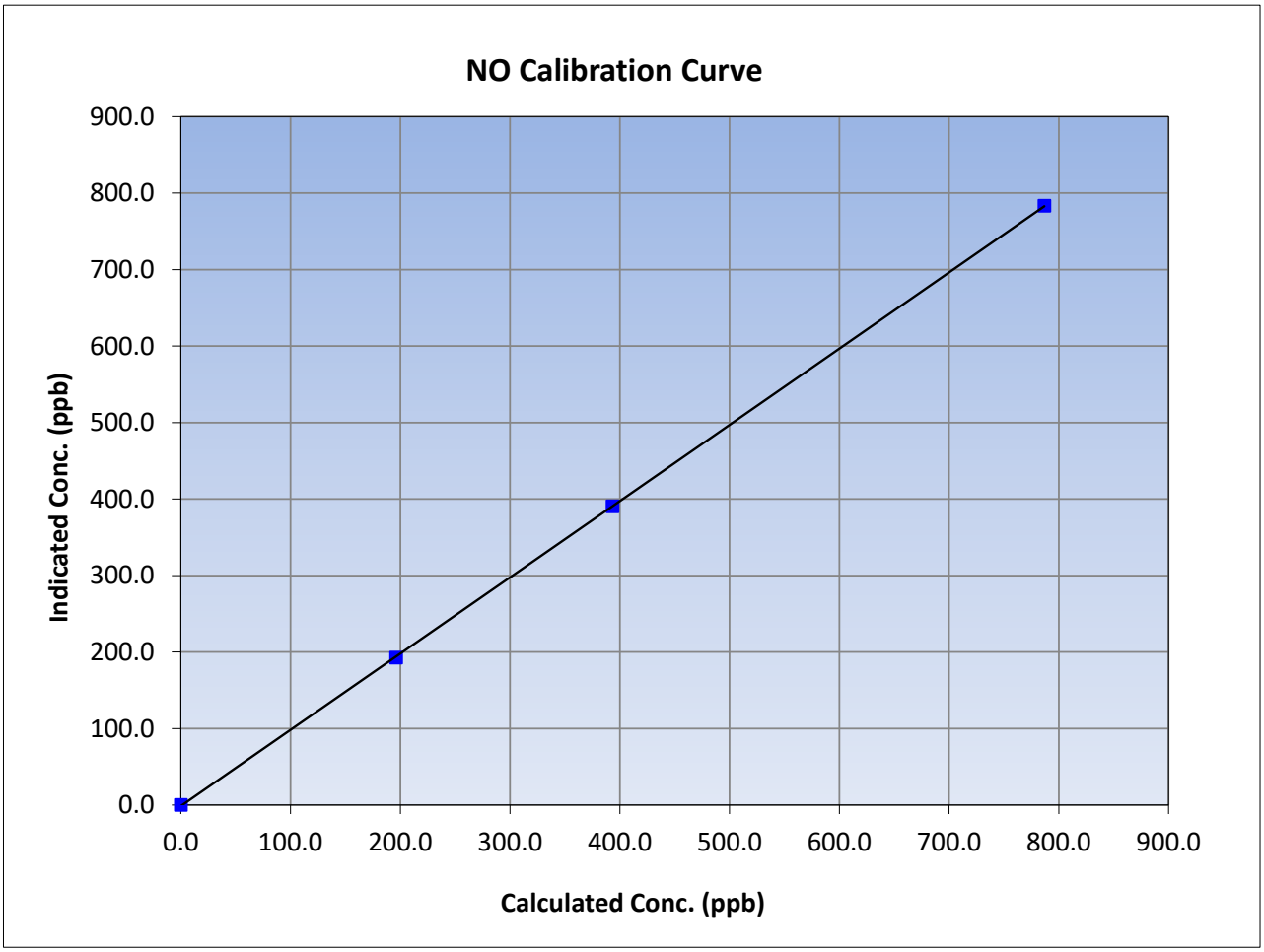
Version-04-2020

Station Information

Calibration Date:	July 7, 2023	Previous Calibration:	June 8, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:58	End Time (MST):	14:46
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	0.999987	≥0.995
786.8	783.4	1.0044			
393.4	390.4	1.0076	Slope	0.996593	0.90 - 1.10
196.2	192.7	1.0182			
			Intercept	-1.310286	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

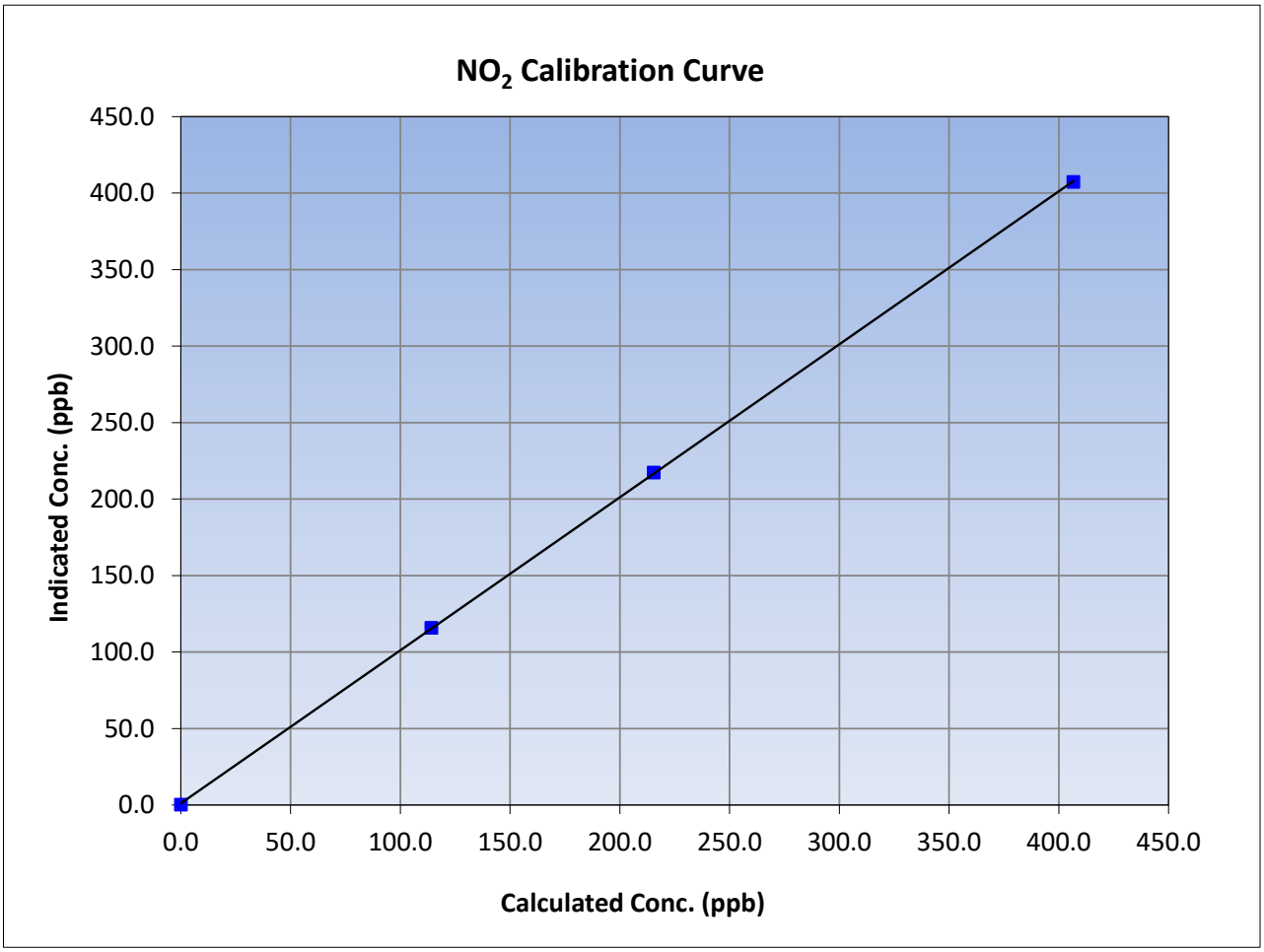
Version-04-2020

Station Information

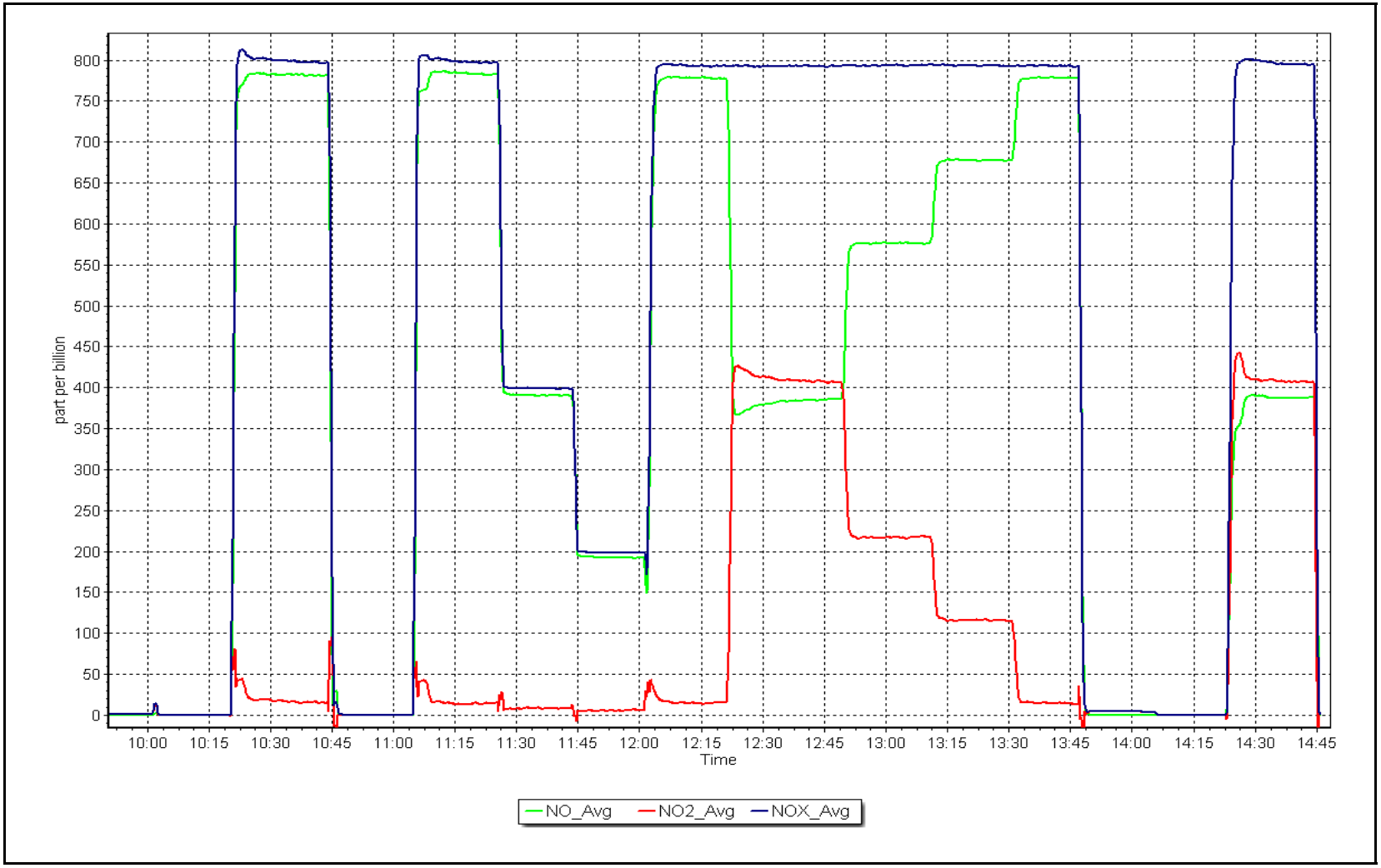
Calibration Date:	July 7, 2023	Previous Calibration:	June 8, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:58	End Time (MST):	14:46
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.3	----	Correlation Coefficient	0.999979	≥0.995
406.7	407.3	0.9985			
215.4	217.3	0.9912	Slope	1.000260	0.90 - 1.10
114.2	115.9	0.9851			
			Intercept	1.094049	+/-20



NO_X Calibration Plot Date: July 7, 2023 Location: Anzac



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	July 11, 2023	Last Cal Date:	June 7, 2023
Start time (MST):	9:46	End time (MST):	12:31
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.993171	0.989000	Backgd or Offset:	1.3	1.3
Calibration intercept:	1.020000	0.500000	Coeff or Slope:	1.516	1.516

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.5	----
as found span	5000	884.2	400.0	395.7	1.011
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.4	----
high point	5000	884.9	400.0	396.1	1.010
second point	5000	769.3	200.0	198.2	1.009
third point	5000	669.8	100.0	99.6	1.004
as left zero	5000	0.0	0.0	0.4	----
as left span	5000	883.1	400.0	398.4	1.004
				Average Correction Factor	1.008

Baseline Corr As found:	395.2	Previous response	398.3	*% 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. No adjustments made.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

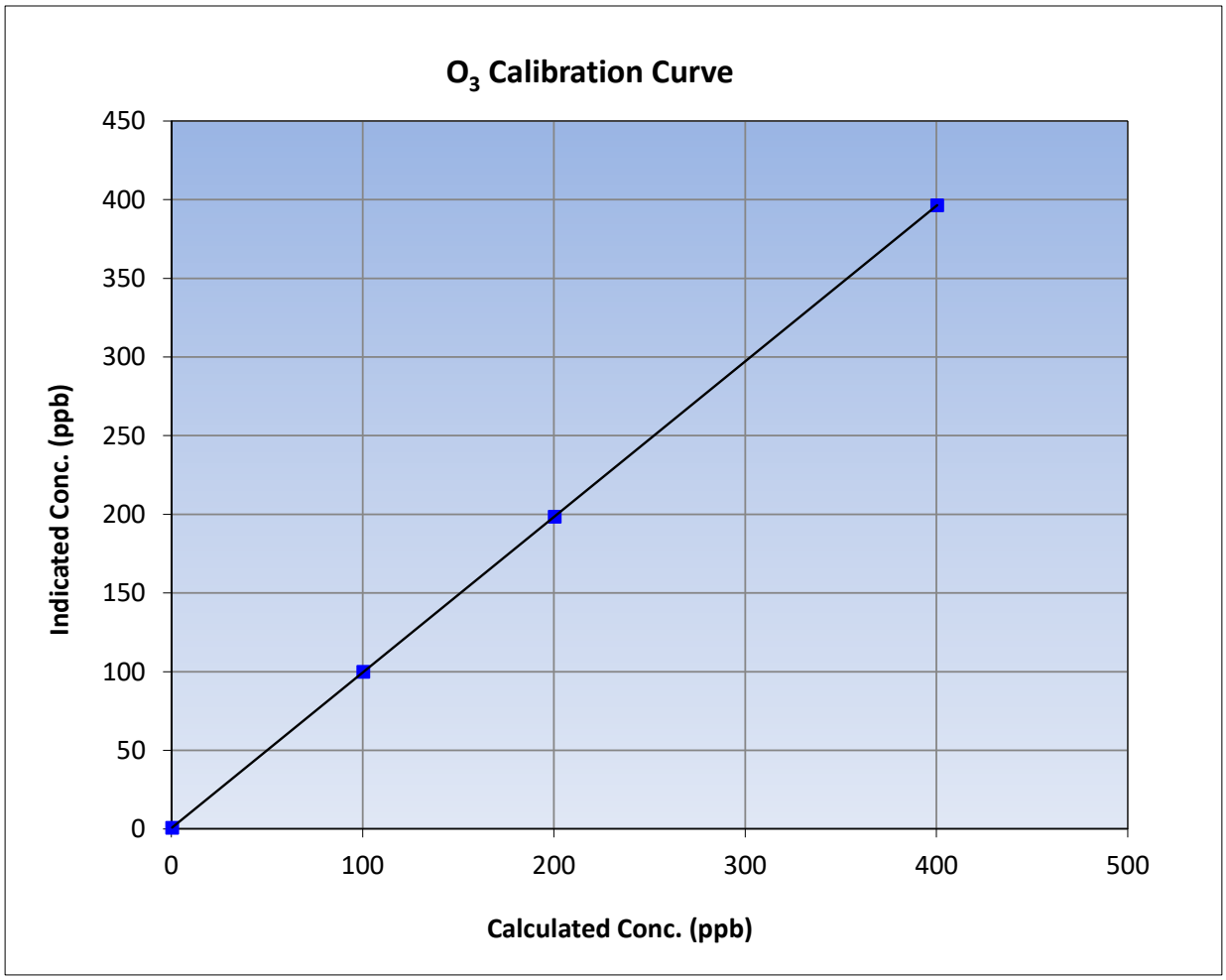
Station Information

Calibration Date:	July 11, 2023	Previous Calibration:	June 7, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	9:46	End Time (MST):	12:31
Analyzer make:	Thermo 49i	Analyzer serial #:	1426262595

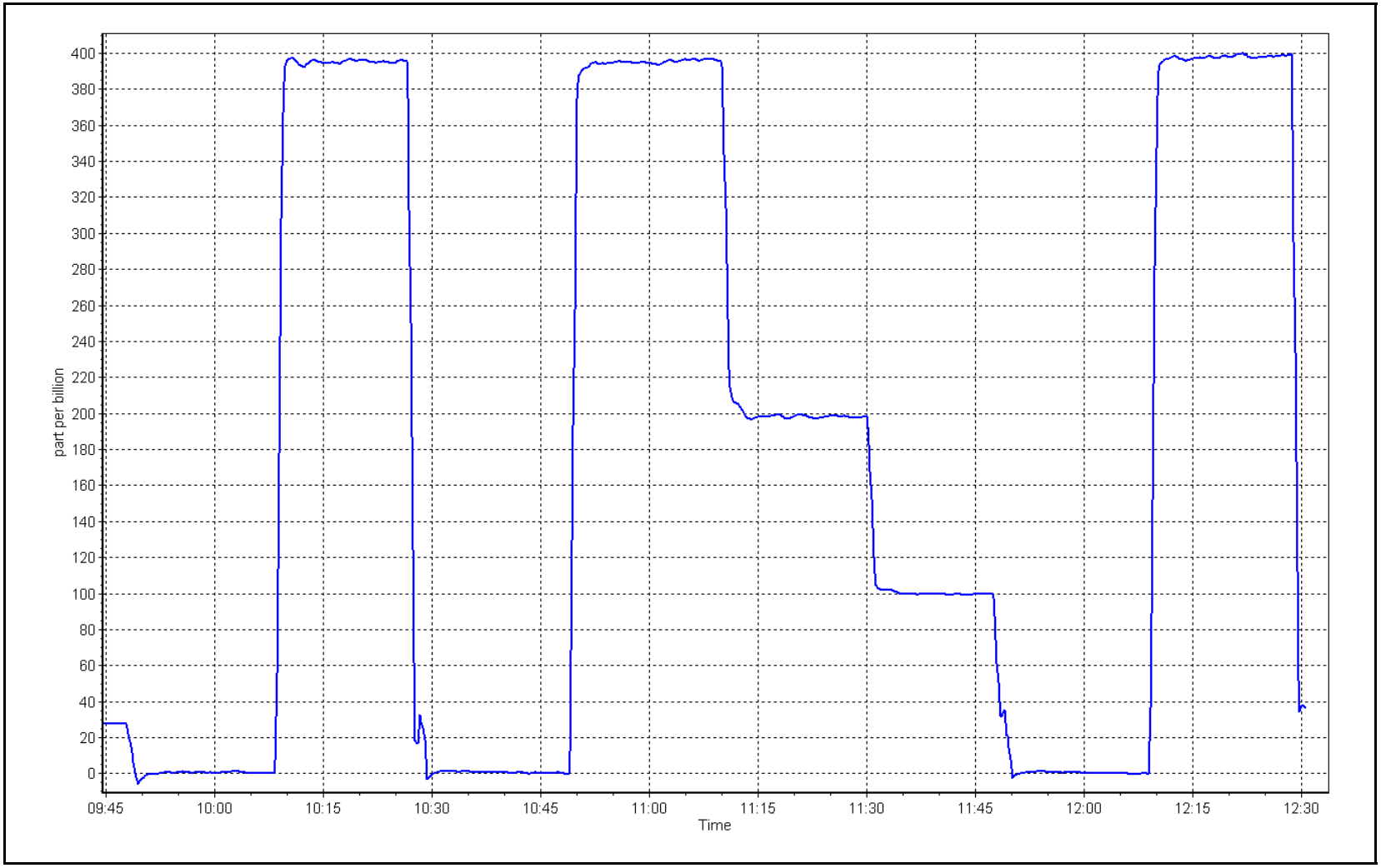
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
400.0	396.1	1.0098
200.0	198.2	1.0091
100.0	99.6	1.0040

Statistical Evaluation		Limits
Correlation Coefficient	0.999999	≥0.995
Slope	0.989000	0.90 - 1.10
Intercept	0.500000	+/- 5



O_3 Calibration Plot Date: July 11, 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:	July 6, 2023	Last Cal Date:	June 14, 2023
Start time (MST):	12:55	End time (MST):	13:39
Analyzer Make:	API T640	S/N:	825
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25	S/N:	388749
Temp/RH standard:	Alicat FP-25	S/N:	388749

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	(Limits)
T (°C)	21.6	23.1	21.6	☐	+/- 2 °C
P (mmHg)	716.4	717.5	716.4	☐	+/- 10 mmHg
flow (LPM)	5.01	4.98	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: July 6, 2023 Last Cal Date: June 14, 2023

PM w/o HEPA: 27.7 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	9.7	10	10.9	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 23.1 w/ HEPA: 0

Date Optical Chamber Cleaned: July 6, 2023 <0.2 ug/m3

Disposable Filter Changed: July 6, 2023

Annual Maintenance

Date Sample Tube Cleaned: July 6, 2023

Date RH/T Sensor Cleaned: July 6, 2023

Notes: PMT adjusted after cleaning. Leak check passed. Completed quarterly and annual mainenance. Head Cleaned.

Calibration by: Mohammed Kashif

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS17
WAPASU
JULY 2023

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

August 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	July 5, 2023	Last Cal Date:	June 5, 2023
Start time (MST):	9:50	End time (MST):	14:30
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:	0.998368	1.008014	Backgd or Offset:	12.4	12.6
Calibration intercept:	-2.660243	-1.662517	Coeff or Slope:	1.099	1.111

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.3	----
as found span	4921	79.4	800.0	791.9	1.010
as found 2nd point	4960	39.7	400.0	392.4	1.019
as found 3rd point	4980	19.8	199.5	194.5	1.026
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4921	79.4	800.0	805.6	0.993
second point	4960	39.7	400.0	400.6	0.999
third point	4980	19.8	199.5	197.9	1.008
as left zero	5000	0.0	0.0	0.0	----
as left span	4920	79.4	800.1	805.7	0.993
				Average Correction Factor	1.000

Baseline Corr As found:	792.20	Previous response	796.00	*% change	-0.5%
Baseline Corr 2nd AF pt:	392.70	AF Slope:	0.990983	AF Intercept:	-2.101327
Baseline Corr 3rd AF pt:	194.80	AF Correlation:	0.999972		

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. Span adjusted.

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

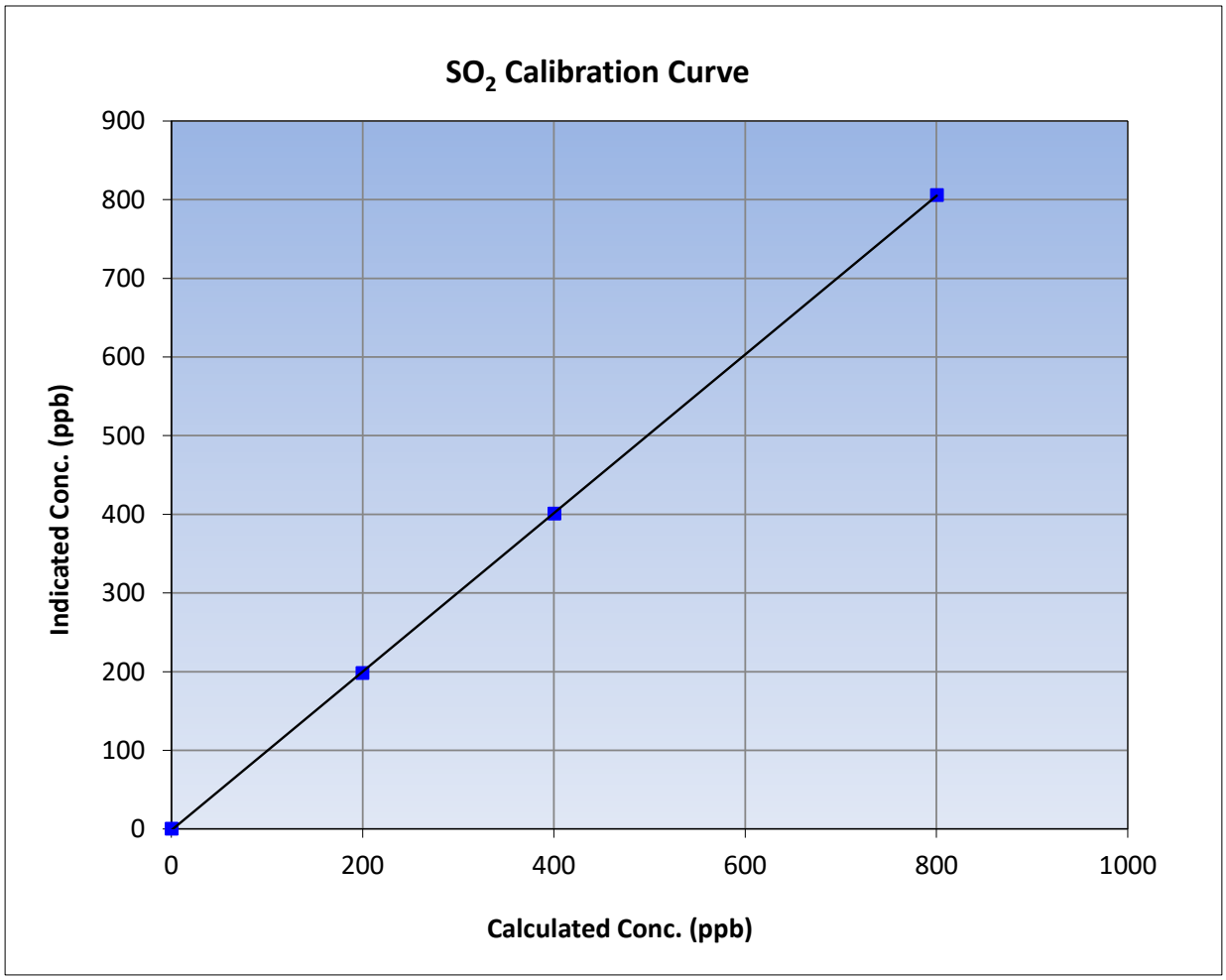
Station Information

Calibration Date:	July 5, 2023	Previous Calibration:	June 5, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:50	End Time (MST):	14:30
Analyzer make:	Thermo 43i	Analyzer serial #:	1218153459

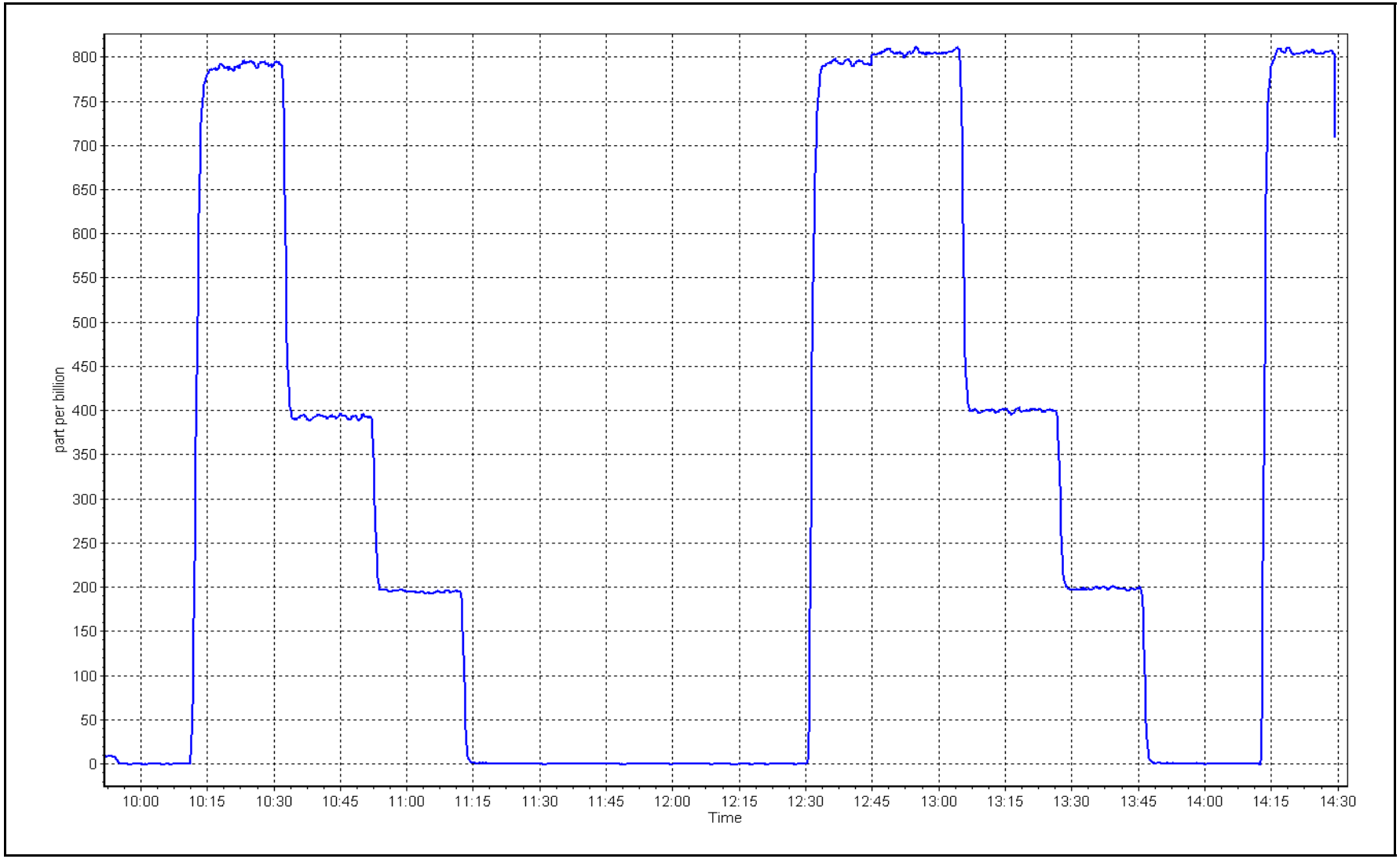
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
800.0	805.6	0.9930
400.0	400.6	0.9986
199.5	197.9	1.0082

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999980	*≥0.995*
Slope	1.008014	*0.90 - 1.10*
Intercept	-1.662517	*+/-30*



SO2 Calibration Plot Date: July 5, 2023 Location: Wapasu



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	July 17, 2023	Last Cal Date:	June 21, 2023
Start time (MST):	10:42	End time (MST):	16:06
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:	0.997854	0.996997	Backgd or Offset:	13.2	13.0
Calibration intercept:	-0.199211	-0.319220	Coeff or Slope:	1.115	1.134

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.3	----
as found span	4921	78.8	80.0	79.5	1.010
as found 2nd point	4961	39.4	40.0	41.1	0.980
as found 3rd point	4980	19.7	20.0	20.7	0.980
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4921	78.8	80.0	79.6	1.005
second point	4961	39.4	40.0	39.2	1.020
third point	4980	19.7	20.0	19.7	1.015
as left zero	5000	0.0	0.0	0.4	----
as left span	4921	78.8	80.0	77.1	1.038
SO2 Scrubber Check	4921	79.4	800.0	0.1	----
Date of last scrubber change:		n/a		Ave Corr Factor	1.014
Date of last converter efficiency test:		n/a			efficiency

Baseline Corr As found:	79.2	Prev response:	79.63	*% change:	-0.5%
Baseline Corr 2nd AF pt:	40.8	AF Slope:	0.989138	AF Intercept:	0.780827
Baseline Corr 3rd AF pt:	20.4	AF Correlation:	0.999710		

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. Zero and span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

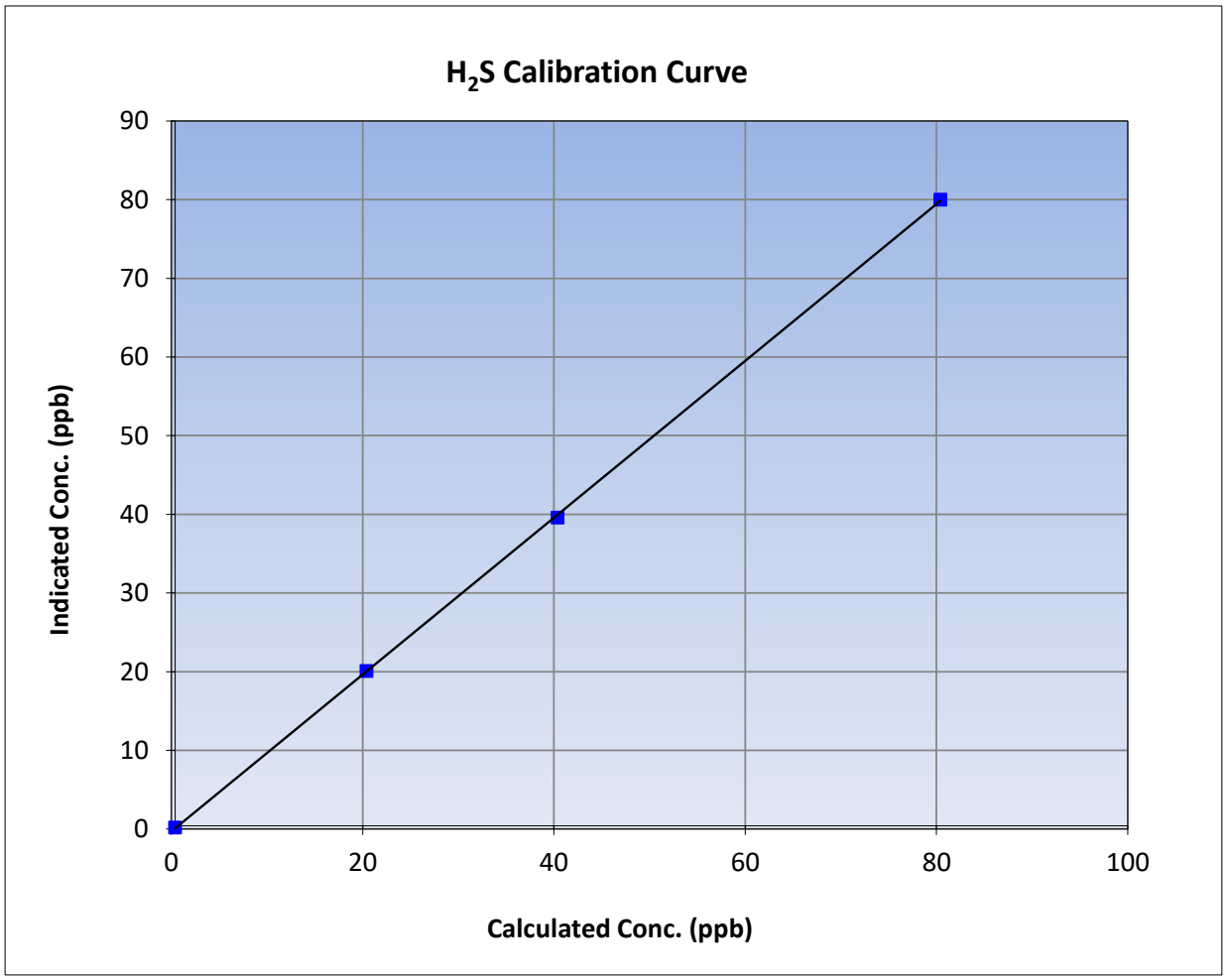
Station Information

Calibration Date:	July 17, 2023	Previous Calibration:	June 21, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:42	End Time (MST):	16:06
Analyzer make:	Thermo 450i	Analyzer serial #:	1218153583

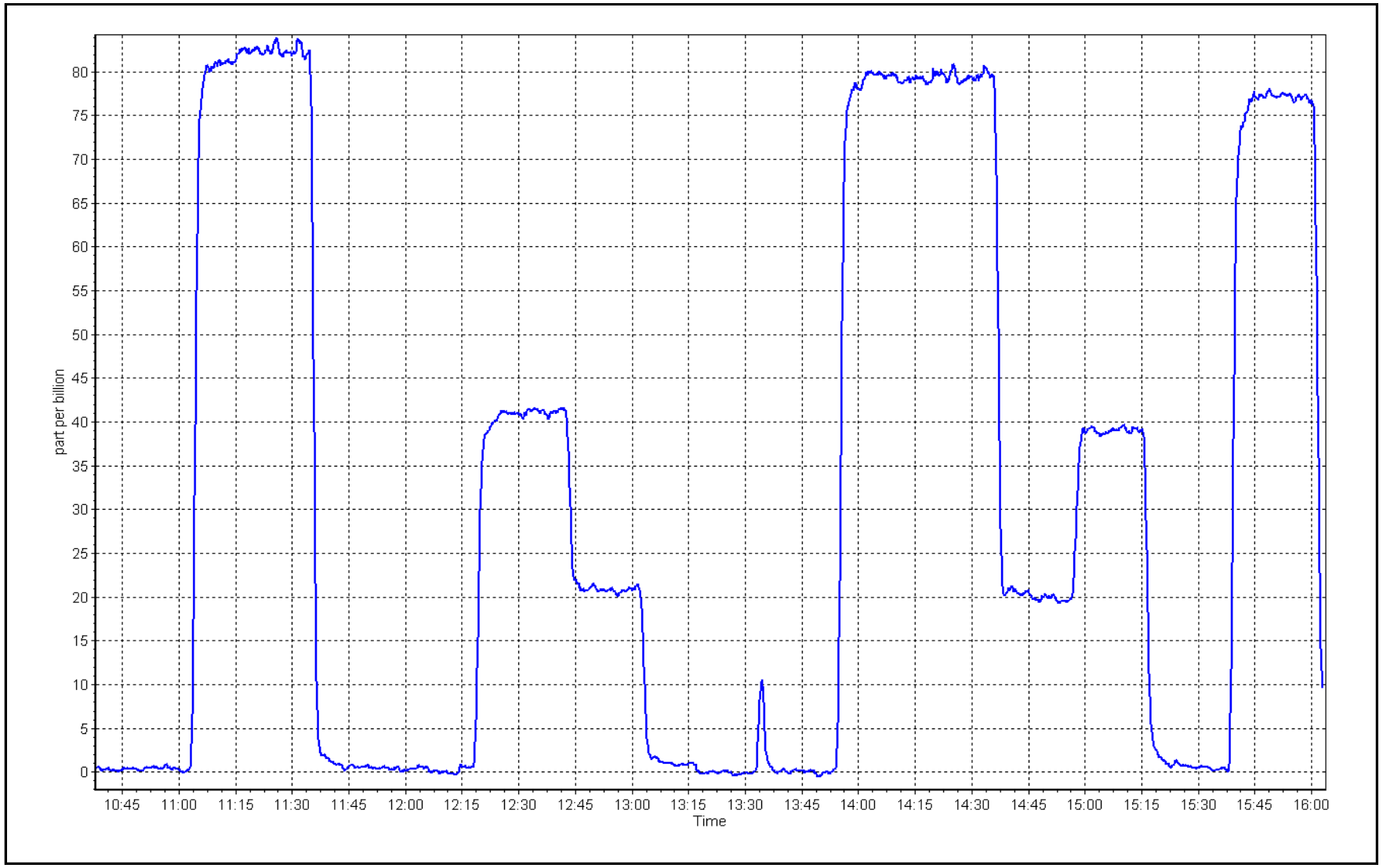
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
80.0	79.6	1.0050
40.0	39.2	1.0203
20.0	19.7	1.0153

Statistical Evaluation		Limits
Correlation Coefficient	0.999950	≥0.995
Slope	0.996997	0.90 - 1.10
Intercept	-0.319220	+/-3



H_2S Calibration Plot Date: July 17, 2023 Location: Wapasu



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	July 5, 2023	Last Cal Date:	June 5, 2023
Start time (MST):	9:50	End time (MST):	14:30
Reason:	Maintenance		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 51i-LT		Analyzer serial #:	1218153352	
Analyzer Range:	0 - 20 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998402	0.994932	Background:	3.210	3.300
Calibration intercept:	-0.031959	-0.001771	Coefficient:	4.483	4.460

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	-0.15	----
as found span	4921	79.4	17.09	15.54	1.100
as found 2nd point	4960	39.7	8.55	7.65	1.118
as found 3rd point	4980	19.8	4.26	3.74	1.140
new cylinder response					
calibrator zero	5000	0.0	0.00	0.03	----
high point	4921	79.4	17.09	17.02	1.004
second point	4960	39.7	8.55	8.49	1.007
third point	4980	19.8	4.26	4.21	1.012
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.4	17.09	17.06	1.002
				Average Correction Factor	1.008

Baseline Corr As found:	15.69	Previous response	17.03	*% change	-8.5%
Baseline Corr 2nd AF pt:	7.79	AF Slope:	0.918313	AF Intercept:	-0.169055
Baseline Corr 3rd AF pt:	3.89	AF Correlation:	0.999985		

* = > +/-5% change initiates investigation

Notes: Inlet filter, H2 cylinder, and pump replaced after as founds. Zero and span adjusted.

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

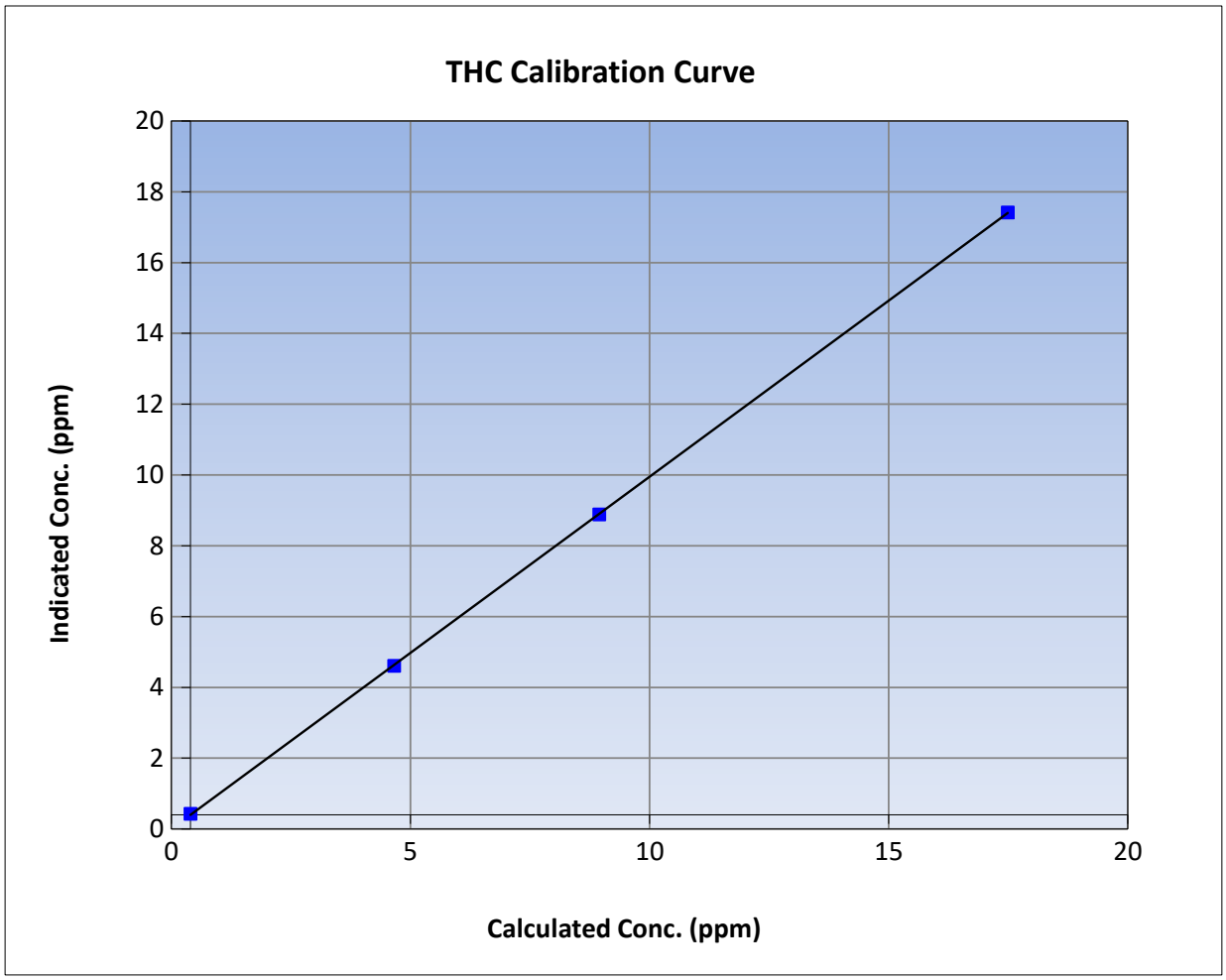
Station Information

Calibration Date:	July 5, 2023	Previous Calibration:	June 5, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:50	End Time (MST):	14:30
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1218153352

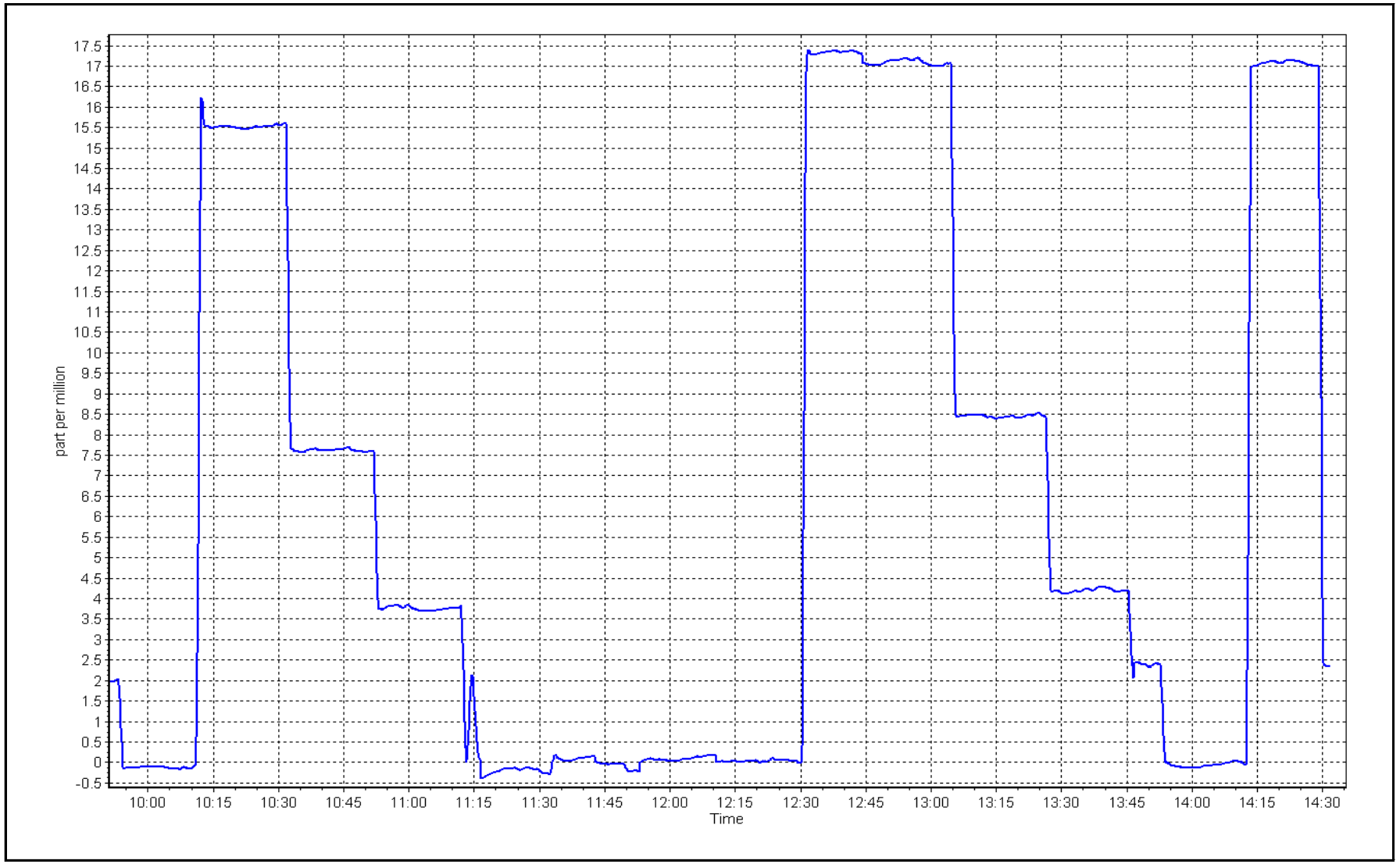
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.03	----
17.09	17.02	1.0043
8.55	8.49	1.0071
4.26	4.21	1.0122

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999987	*≥0.995*
Slope	0.994932	*0.90 - 1.10*
Intercept	-0.001771	*+/-1.5*



THC Calibration Plot Date: July 5, 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:	July 25, 2023	Last Cal Date:	June 7, 2023
Start time (MST):	10:07	End time (MST):	17:56
Reason:	Install		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo Scientific 42iQ	Analyzer serial #:	12300522720
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	0.932	1.205	NO bkgnd or offset:	2.4	10.1
NOX coeff or slope:	0.984	0.996	NOX bkgnd or offset:	2.4	10.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	141.3	430.0

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.003075	0.988306
NO_X Cal Offset:	-4.520000	-0.640000
NO Cal Slope:	1.003530	0.986171
NO Cal Offset:	-5.460000	-1.460000
NO_2 Cal Slope:	1.006000	1.024572
NO_2 Cal Offset:	-0.618680	-0.186089

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.4	0.3	0.1	----	----
as found span	4917	83.2	817.2	799.9	17.3	793.6	776.7	16.9	1.0297	1.0299
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.3	0.3	0.1	----	----
high point	4917	83.2	817.2	799.9	17.3	806.7	787.5	19.2	1.0130	1.0157
second point	4958	41.6	408.6	399.9	8.7	405.0	394.3	10.7	1.0089	1.0143
third point	4979	20.8	204.3	200.0	4.3	198.8	192.5	6.3	1.0277	1.0388
as left zero	5000	0.0	0.0	0.0	0.0	0.4	0.3	0.1	----	----
as left span	4917	83.2	817.2	393.9	423.3	813.0	388.7	424.3	1.0051	1.0133
								Average Correction Factor	1.0165	1.0229

Corrected As found	NO_X = 793.2 ppb	NO = 776.4 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-2.8%
Previous Response	NO_X = 815.2 ppb	NO = 797.2 ppb		*Percent Change	NO =	-2.7%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found NO r^2:	NO Sl:	NO Int:	
			As found NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	798.3	392.3	423.3	433.9	0.9756	102.5%
2nd GPT point (200 ppb O3)	798.3	593.1	222.5	227.0	0.9802	102.0%
3rd GPT point (100 ppb O3)	798.3	695.2	120.4	123.3	0.9765	102.4%
				Average Correction Factor	0.9774	102.3%

Notes: Zero and span adjusted after pump changout.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

NO_X Calibration Summary

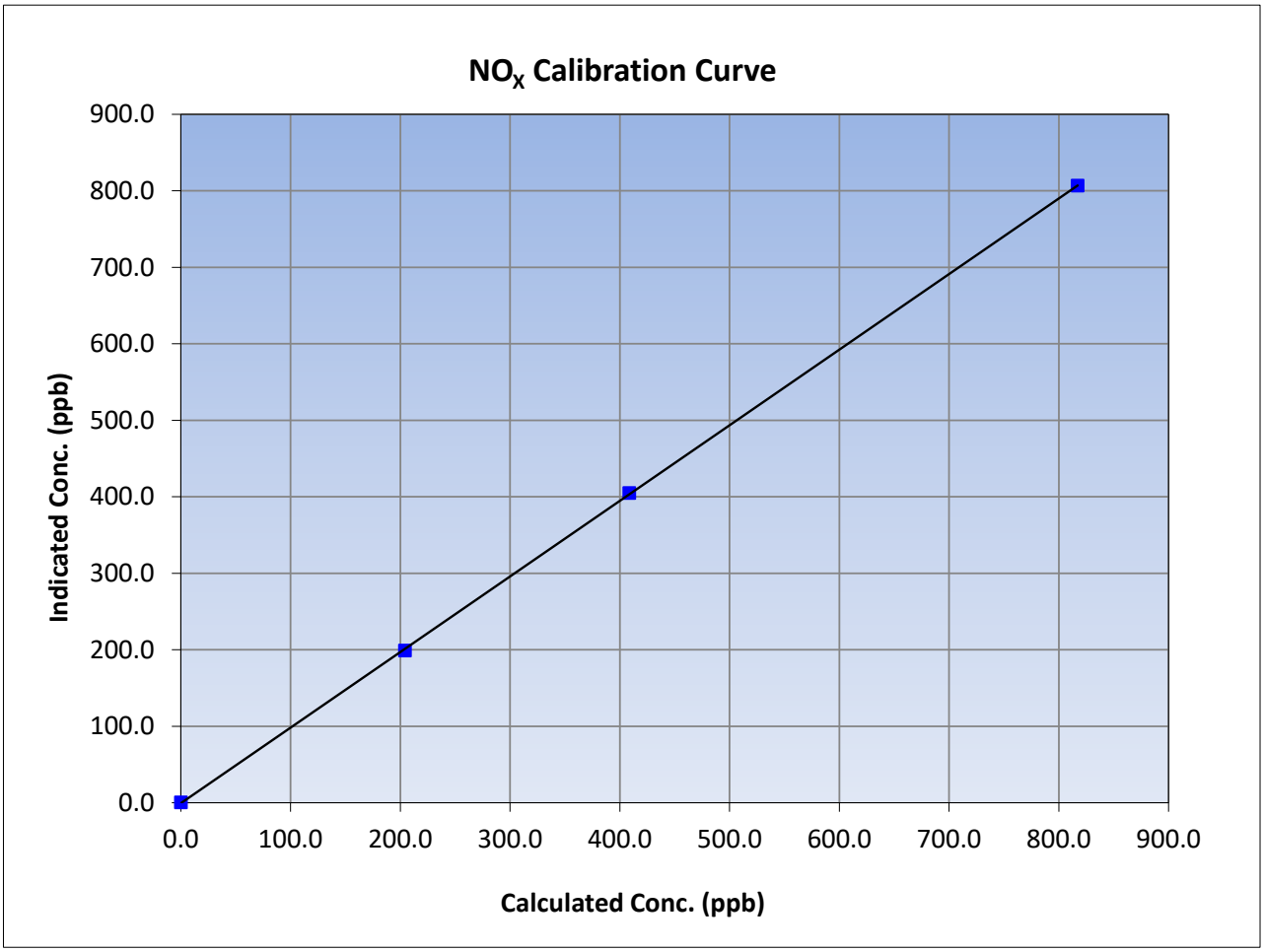
Version-04-2020

Station Information

Calibration Date:	July 25, 2023	Previous Calibration:	June 7, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:07	End Time (MST):	17:56
Analyzer make:	Thermo Scientific 42iQ	Analyzer serial #:	12300522720

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.3	----	Correlation Coefficient	0.999971	≥0.995
817.2	806.7	1.0130			
408.6	405.0	1.0089	Slope	0.988306	0.90 - 1.10
204.3	198.8	1.0277			
			Intercept	-0.640000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

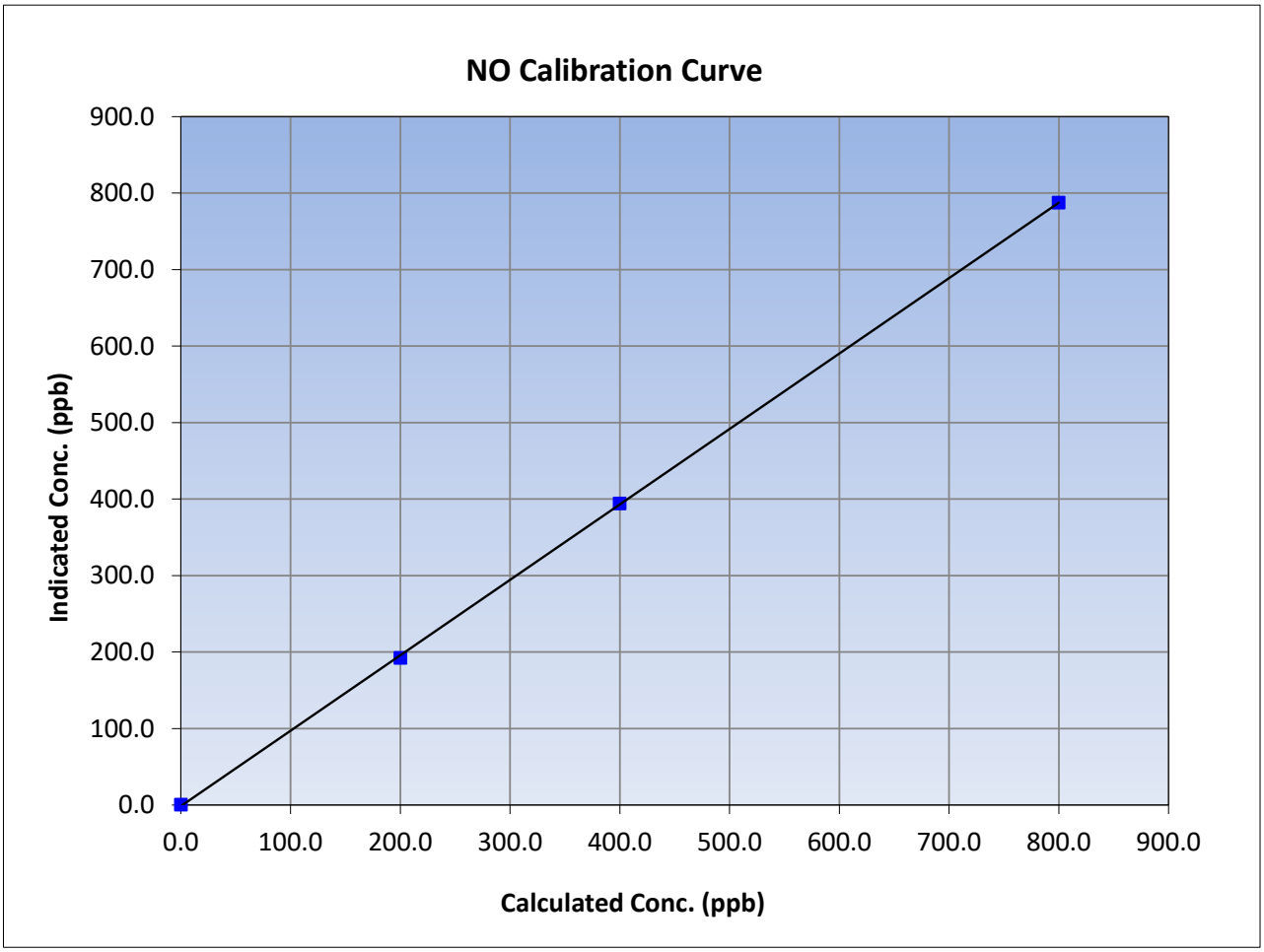
Version-04-2020

Station Information

Calibration Date:	July 25, 2023	Previous Calibration:	June 7, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:07	End Time (MST):	17:56
Analyzer make:	Thermo Scientific 42iQ	Analyzer serial #:	12300522720

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.3	----	Correlation Coefficient	0.999955	*≥0.995*
799.9	787.5	1.0157			
399.9	394.3	1.0143	Slope	0.986171	*0.90 - 1.10*
200.0	192.5	1.0388			
			Intercept	-1.460000	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

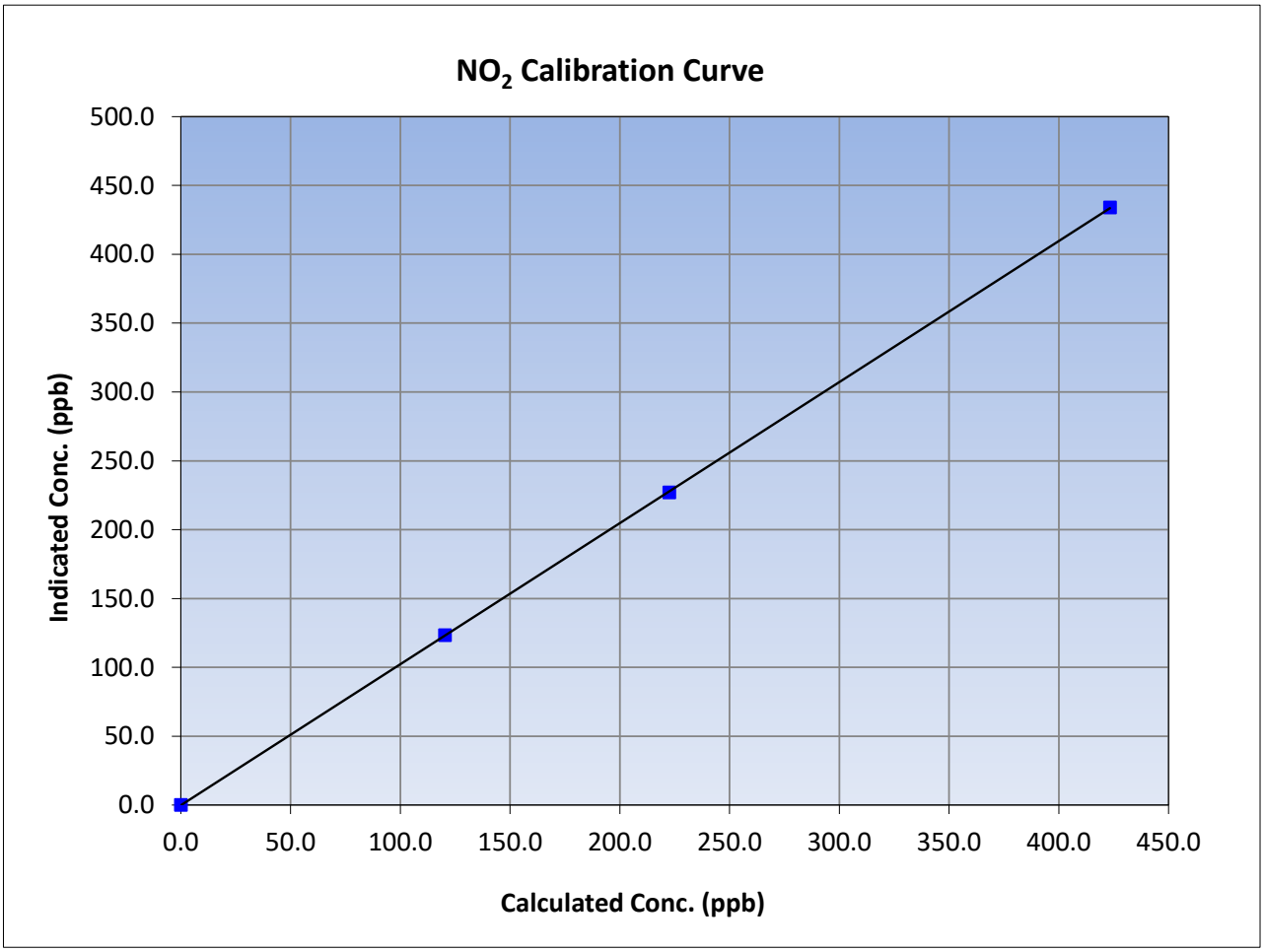
Version-04-2020

Station Information

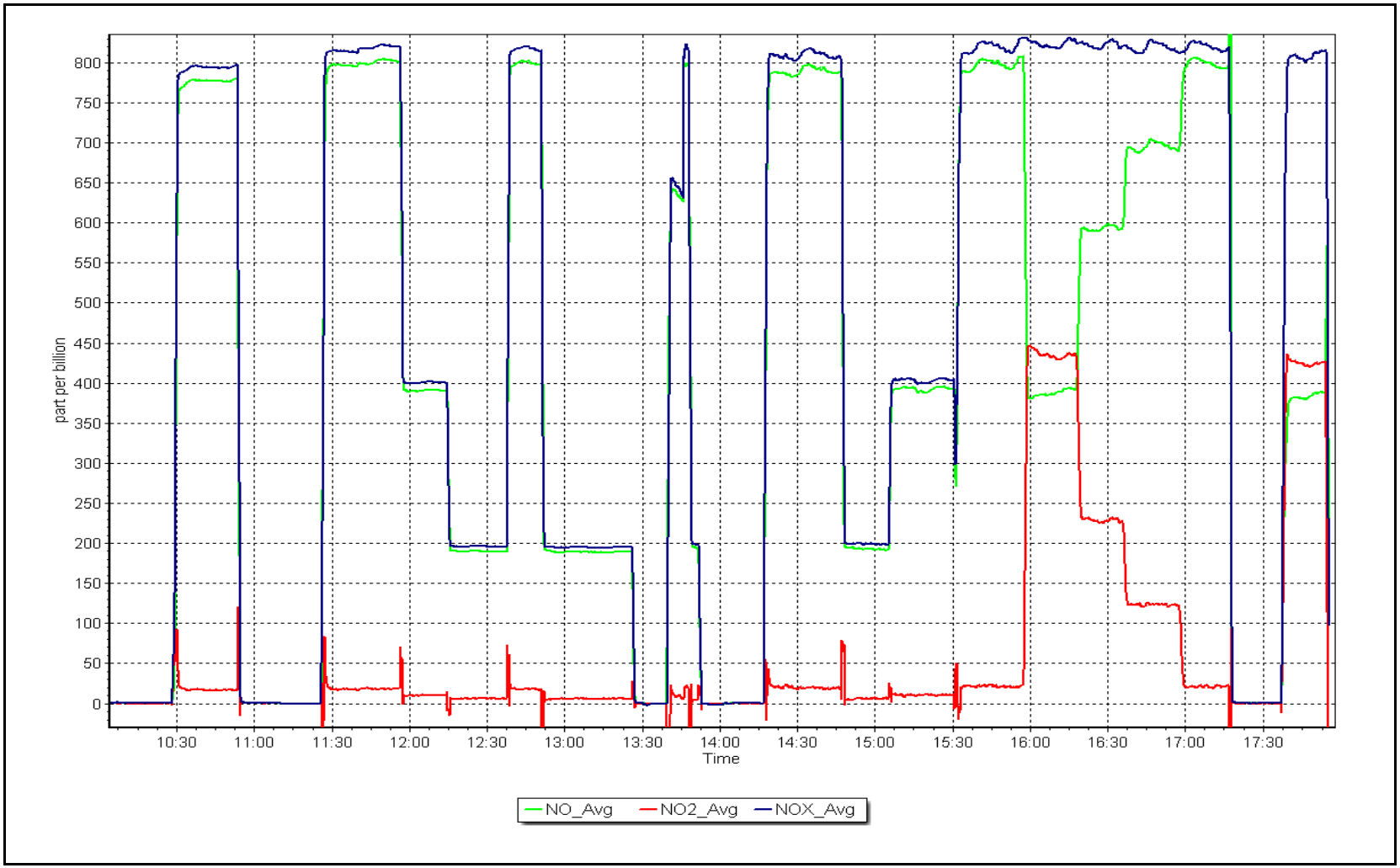
Calibration Date:	July 25, 2023	Previous Calibration:	June 7, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:07	End Time (MST):	17:56
Analyzer make:	Thermo Scientific 42iQ	Analyzer serial #:	12300522720

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999992	≥0.995
423.3	433.9	0.9756			
222.5	227.0	0.9802	Slope	1.024572	0.90 - 1.10
120.4	123.3	0.9765			
			Intercept	-0.186089	+/-20



NO_x Calibration Plot Date: July 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:	July 12, 2023	Last Cal Date:	June 1, 2023
Start time (MST):	9:41	End time (MST):	13:20
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:	1.004914	1.000171	Backgd or Offset:	-1.8	-1.8
Calibration intercept:	-0.460000	-0.580000	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	-0.5	----
as found span	5000	1077.3	400.0	397.5	1.006
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	1077.3	400.0	399.6	1.001
second point	5000	900.3	200.0	199.5	1.003
third point	5000	789.5	100.0	98.9	1.011
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	1077.3	400.0	404.3	0.989
				Average Correction Factor	1.005

Baseline Corr As found:	398.0	Previous response	401.5	*% 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. No adjustments made.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

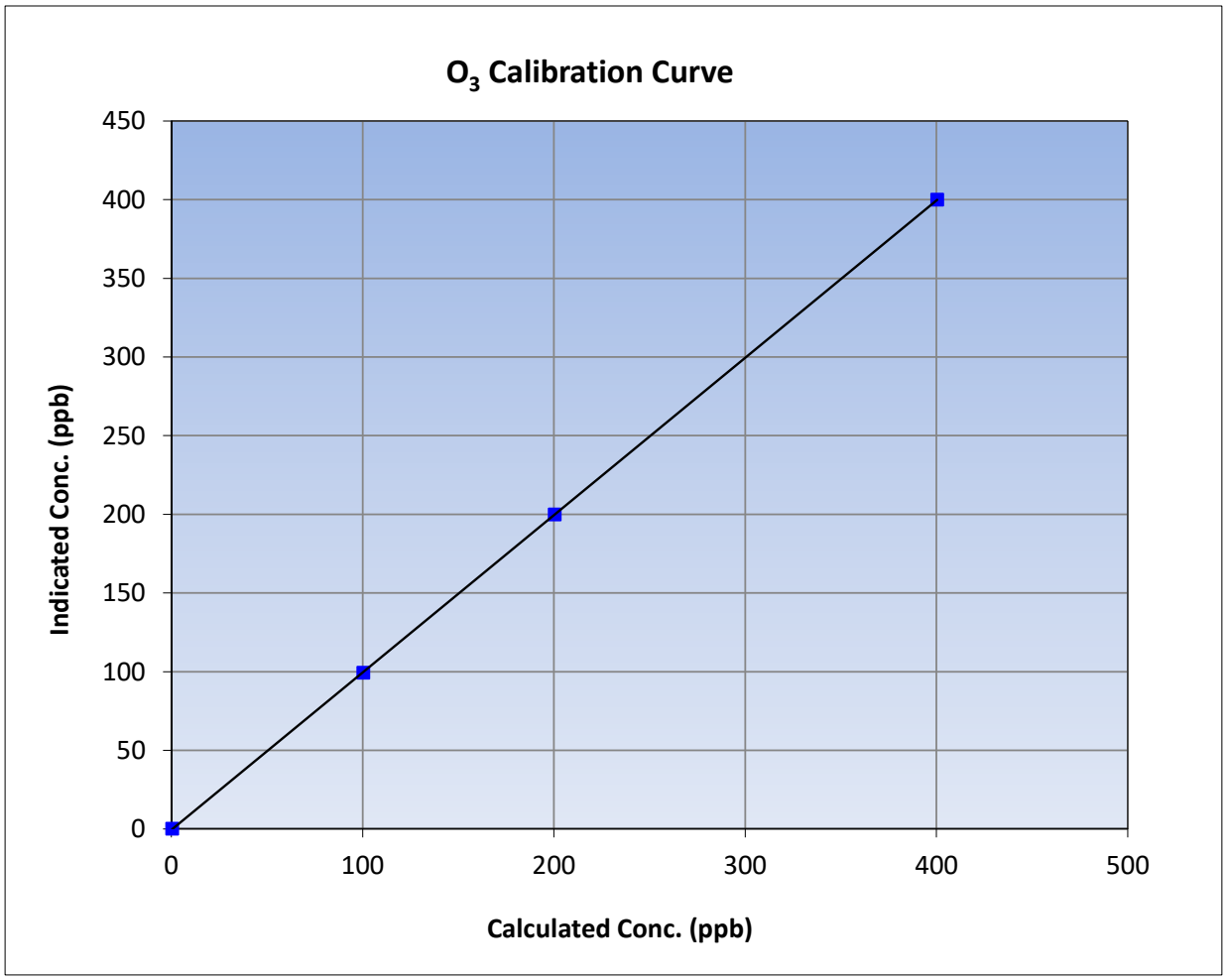
Station Information

Calibration Date:	July 12, 2023	Previous Calibration:	June 1, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:41	End Time (MST):	13:20
Analyzer make:	API T400	Analyzer serial #:	3870

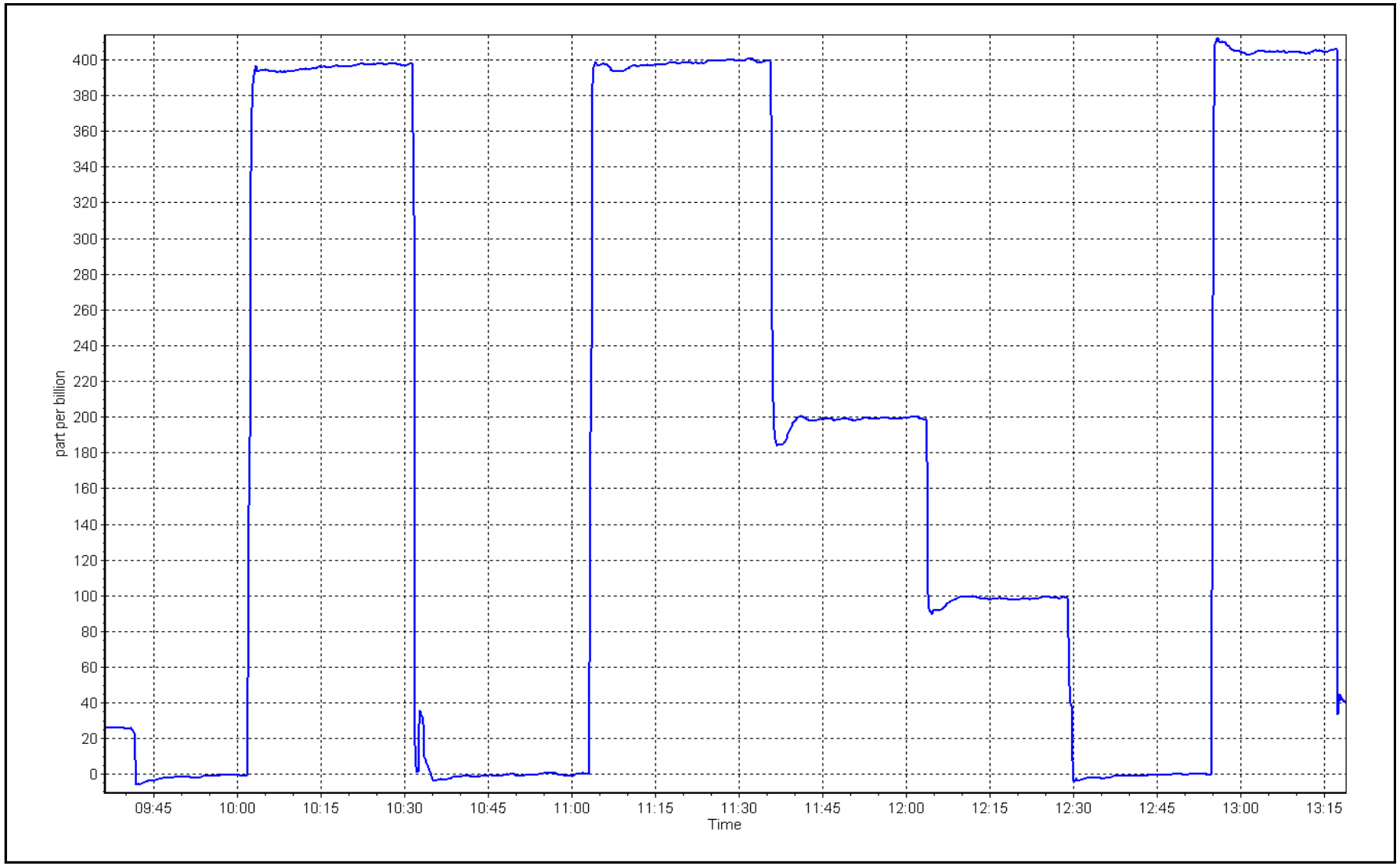
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
400.0	399.6	1.0010
200.0	199.5	1.0025
100.0	98.9	1.0111

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.000171	*0.90 - 1.10*
Intercept	-0.580000	*+/- 5*



O_3 Calibration Plot Date: July 12, 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:	July 27, 2023	Last Cal Date:	June 21, 2023
Start time (MST):	12:23	End time (MST):	13:33
Analyzer Make:	API T640	S/N:	1183
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388748
Temp/RH standard:	Alicat FP-25BT	S/N:	388748

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (^{o}C)	16.9	16.6	16.9	☐	+/- 2 ^{o}C
P (mmHg)	719.4	722.4	719.4	☐	+/- 10 mmHg
flow (LPM)	4.46	4.51	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: July 27, 2023 Last Cal Date: June 21, 2023

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

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

Post-maintenance leak check: PM w/o HEPA: 7 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: July 27, 2023

Disposable Filter Changed: July 27, 2023

Annual Maintenance

Date Sample Tube Cleaned:

Date RH/T Sensor Cleaned:

Notes: Temp, pressure and flow checked. Flow was low, changing out filter increased pump output to expected levels. Leak check passed.

Calibration by: Aswin Sasi Kumar

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS18
STONY MOUNTAIN
JULY 2023

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

August 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:	July 18, 2023	Last Cal Date:	June 15, 2023
Start time (MST):	9:51	End time (MST):	13:08
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:	1.002775	1.003290	Backgd or Offset:	22.6	22.6
Calibration intercept:	-1.563172	-0.043536	Coeff or Slope:	0.808	0.808

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5009	0.0	0.0	-0.1	----
as found span	4919	81.0	800.3	803.2	0.996
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	802.1	0.998
second point	4959	40.5	400.2	403.9	0.991
third point	4979	20.2	199.6	198.4	1.006
as left zero	5000	0.0	0.0	0.0	----
as left span	4919	81.0	800.3	803.4	0.996
				Average Correction Factor	0.998

Baseline Corr As found:	803.30	Previous response	800.94	*% 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 needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

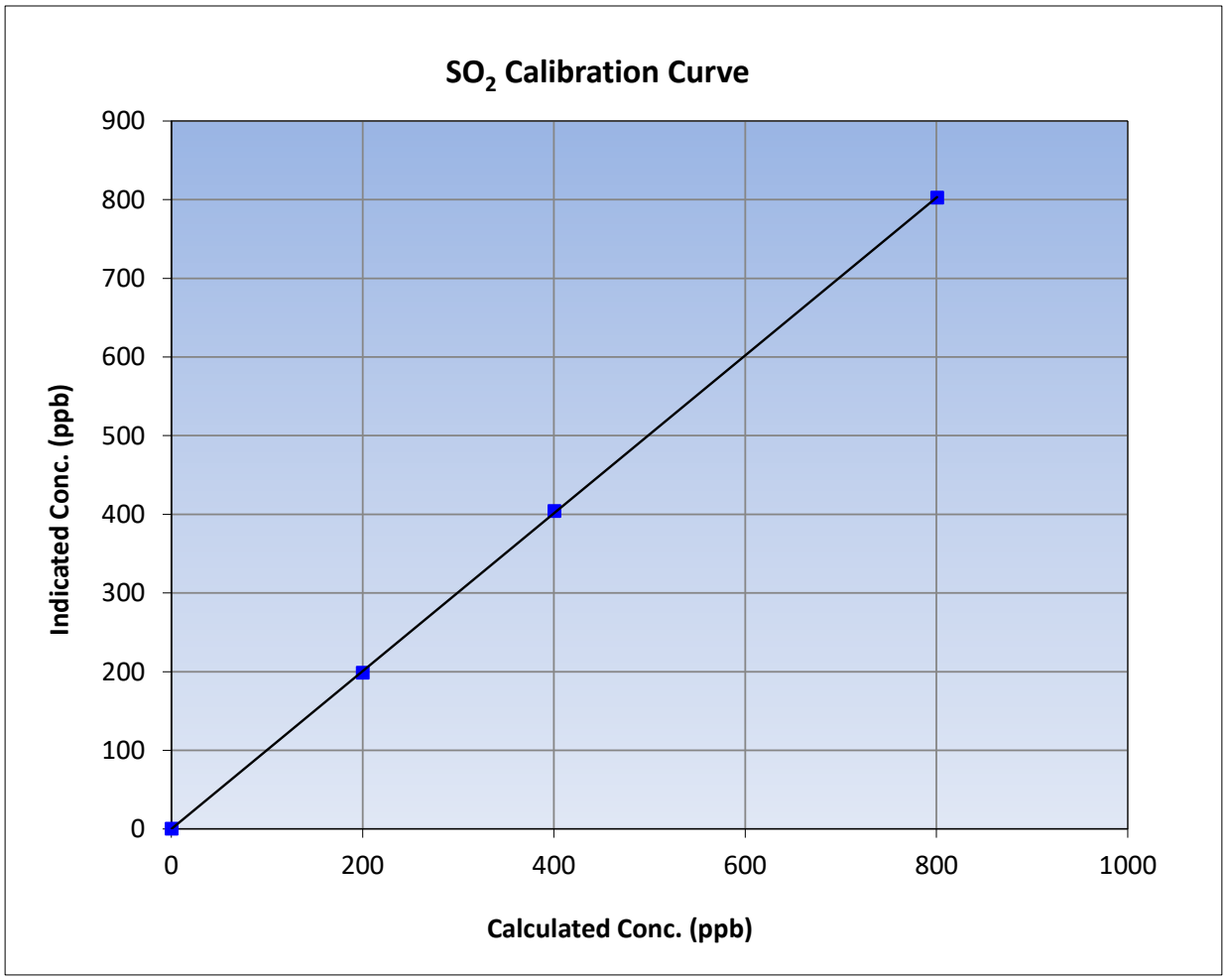
Station Information

Calibration Date:	July 18, 2023	Previous Calibration:	June 15, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:51	End Time (MST):	13:08
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301453

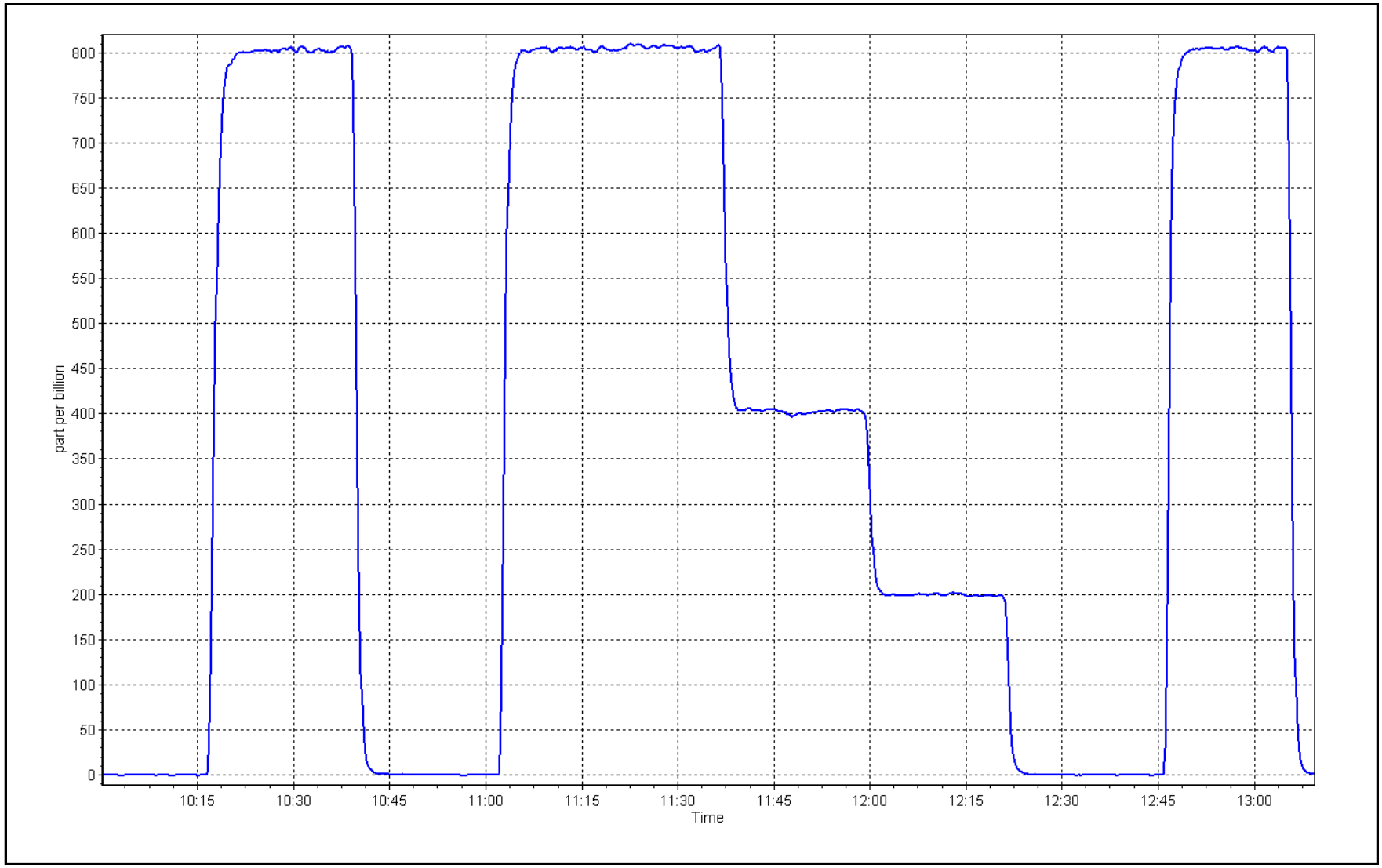
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
800.3	802.1	0.9977
400.2	403.9	0.9908
199.6	198.4	1.0061

Statistical Evaluation		Limits
Correlation Coefficient	0.999972	≥0.995
Slope	1.003290	0.90 - 1.10
Intercept	-0.043536	+/-30



SO2 Calibration Plot Date: July 18, 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:	July 19, 2023	Last Cal Date:	June 27, 2023
Start time (MST):	9:47	End time (MST):	15:30
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1218153359	
Converter make:	CD Nova CDN-101		Converter serial #:	555	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003297	1.003873	Backgd or Offset:	2.70	2.66
Calibration intercept:	0.101073	0.080889	Coeff or Slope:	1.189	1.189

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.2	----
as found span	4927	73.0	80.0	79.7	1.006
as found 2nd point	4964	36.5	40.0	39.4	1.020
as found 3rd point	4983	18.3	20.0	19.2	1.055
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4927	73.0	80.0	80.5	0.994
second point	4964	36.5	40.0	40.0	1.000
third point	4983	18.3	20.0	20.2	0.992
as left zero	5000	0.0	0.0	0.4	----
as left span	4927	73.0	80.0	80.3	0.996
SO2 Scrubber Check	4923	77.1	771.0	0.0	----
Date of last scrubber change:		17-Dec-21		Ave Corr Factor	0.995
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.5	Prev response:	80.36	*% change:	-1.1%
Baseline Corr 2nd AF pt:	39.2	AF Slope:	0.997007	AF Intercept:	-0.278730
Baseline Corr 3rd AF pt:	19.0	AF Correlation:	0.999834		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

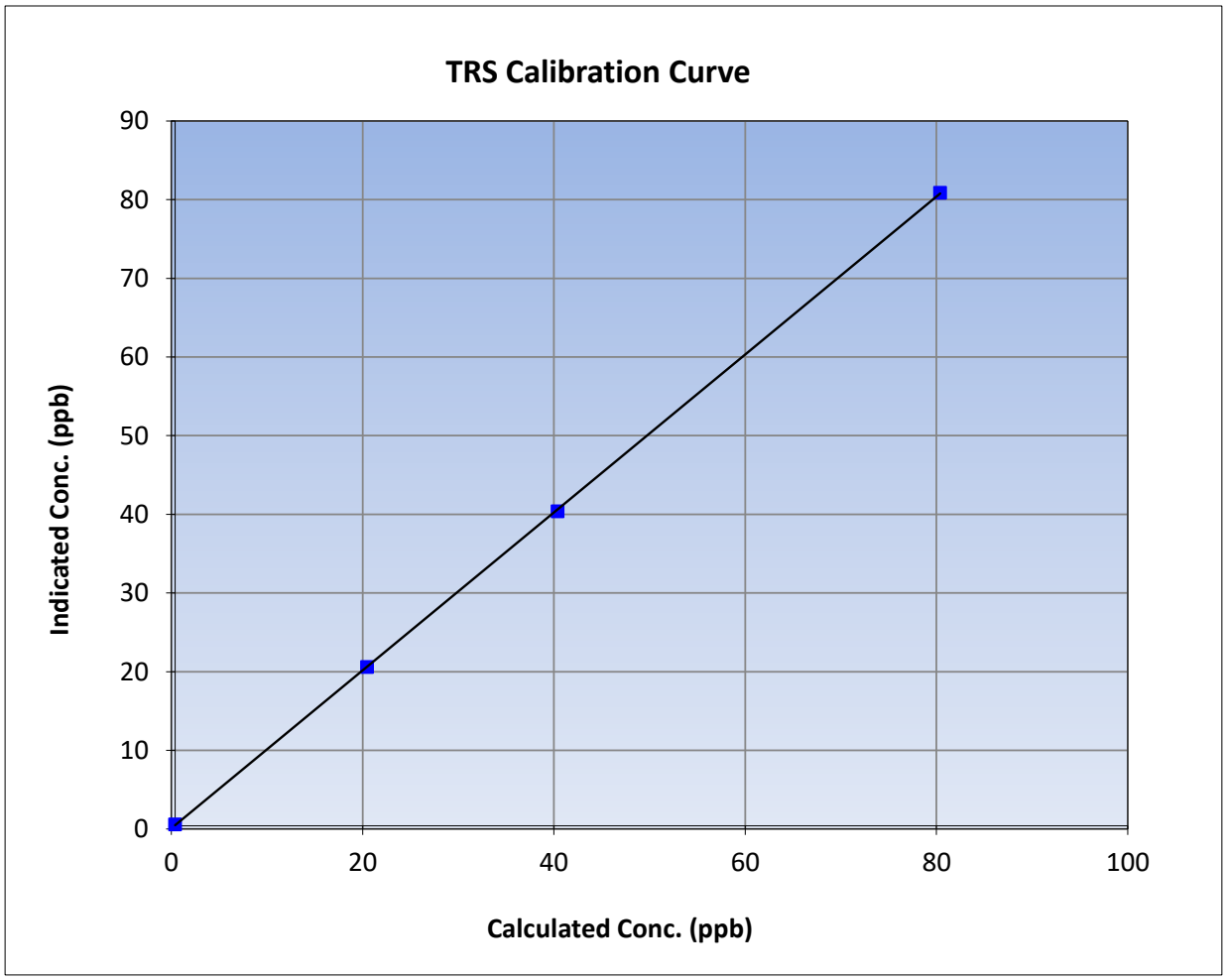
Station Information

Calibration Date:	July 19, 2023	Previous Calibration:	June 27, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	9:47	End Time (MST):	15:30
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153359

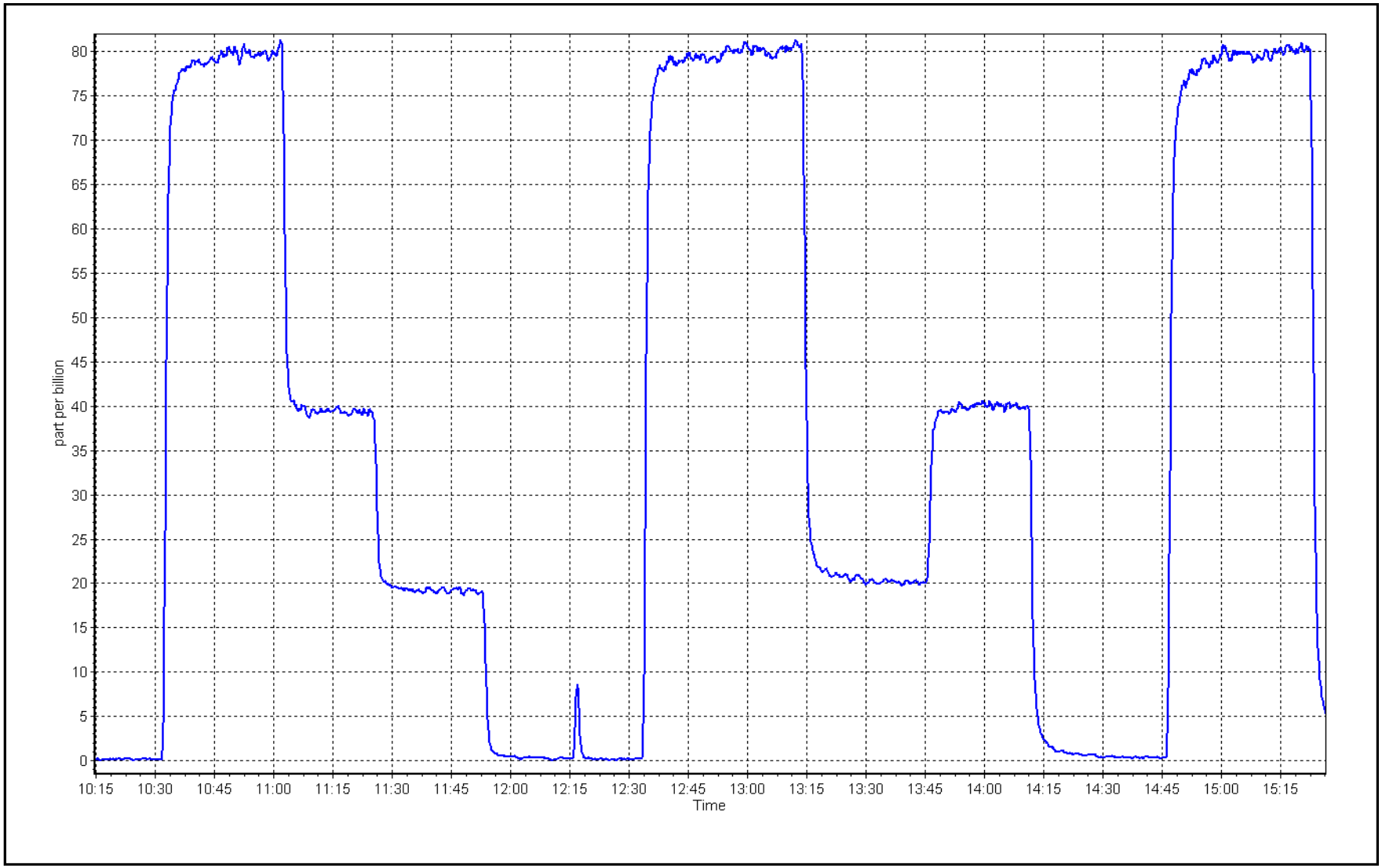
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	80.5	0.9937
40.0	40.0	0.9998
20.0	20.2	0.9925

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999977	*≥0.995*
Slope	1.003873	*0.90 - 1.10*
Intercept	0.080889	*+/-3*



TRS Calibration Plot Date: July 19, 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:	July 18, 2023	Last Cal Date:	June 15, 2023
Start time (MST):	9:51	End time (MST):	13:08
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:	3.17E-04	3.21E-04	NMHC SP Ratio:	5.97E-05	6.21E-05
CH4 Retention time:	15.20	15.20	NMHC Peak Area:	153659	147573

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.02	----
as found span	4919	81.0	17.28	16.82	1.028
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.01	----
high point	4919	81.0	17.28	17.26	1.001
second point	4959	40.5	8.64	8.62	1.003
third point	4979	20.2	4.31	4.30	1.002
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	17.28	17.27	1.001
				Average Correction Factor	1.002
Baseline Corr AF:	16.80	Prev response	17.29	*% change	-2.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	9.17	8.82	1.040
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	9.15	1.002
second point	4959	40.5	4.58	4.57	1.003
third point	4979	20.2	2.29	2.29	0.997
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81	9.17	9.12	1.006
				Average Correction Factor	1.001
Baseline Corr AF:	8.82	Prev response	9.18	*% change	-4.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.02	----
as found span	4919	81.0	8.11	8.00	1.014
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.01	----
high point	4919	81.0	8.11	8.11	1.000
second point	4959	40.5	4.06	4.05	1.003
third point	4979	20.2	2.02	2.01	1.008
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	8.11	8.15	0.995
				Average Correction Factor	1.004
Baseline Corr AF:	7.98	Prev response	8.11	*% change	-1.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000273	0.998376
THC Cal Offset:	0.004621	0.001211
CH4 Cal Slope:	0.999876	0.999482
CH4 Cal Offset:	-0.002412	-0.003013
NMHC Cal Slope:	1.000625	0.997360
NMHC Cal Offset:	0.007033	0.003625

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

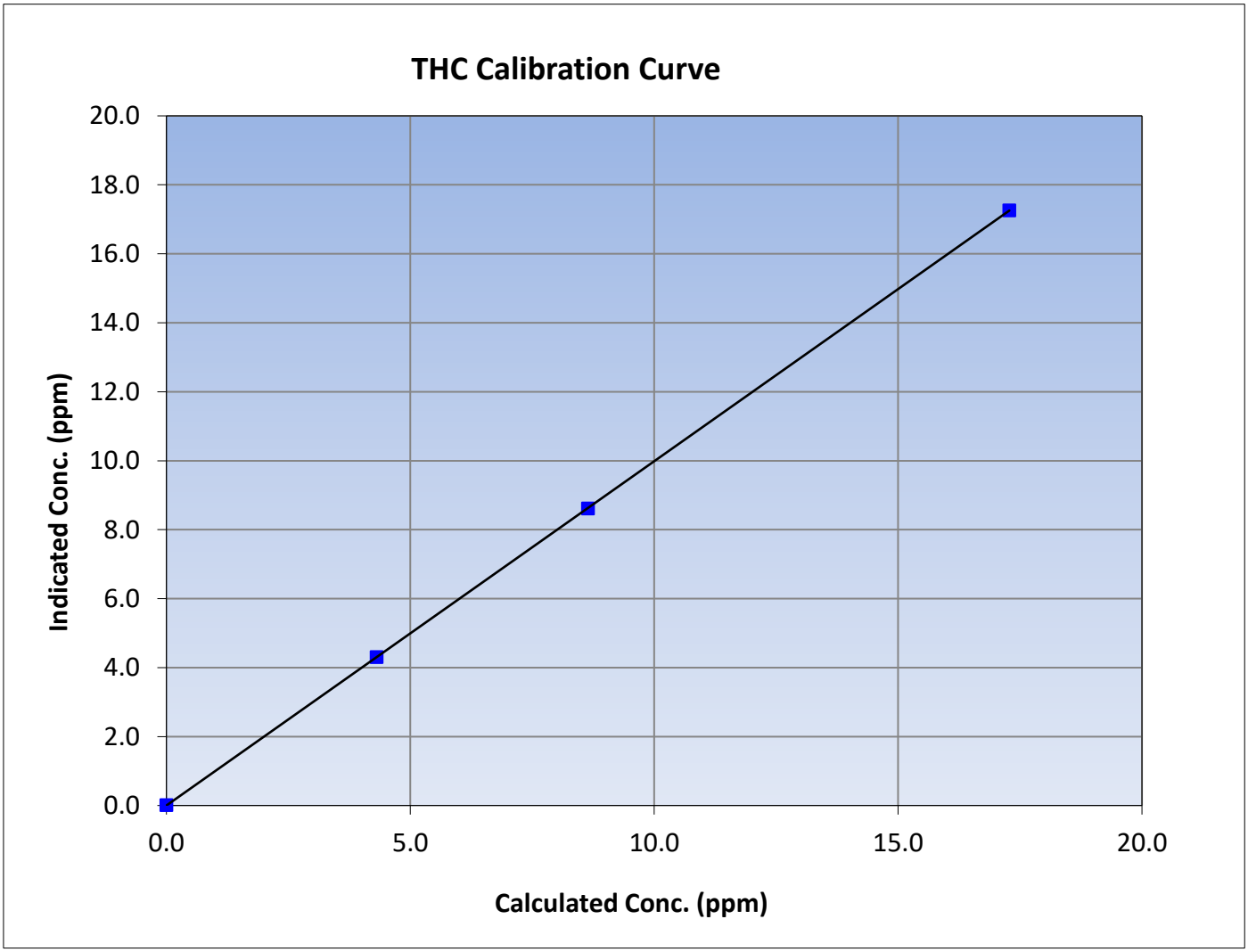
Version-01-2020

Station Information

Calibration Date:	July 18, 2023	Previous Calibration:	June 15, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:51	End Time (MST):	13:08
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	0.01	----	Correlation Coefficient	0.999998	*≥0.995*
17.28	17.26	1.0012			
8.64	8.62	1.0028	Slope	0.998376	*0.90 - 1.10*
4.31	4.30	1.0019			
			Intercept	0.001211	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

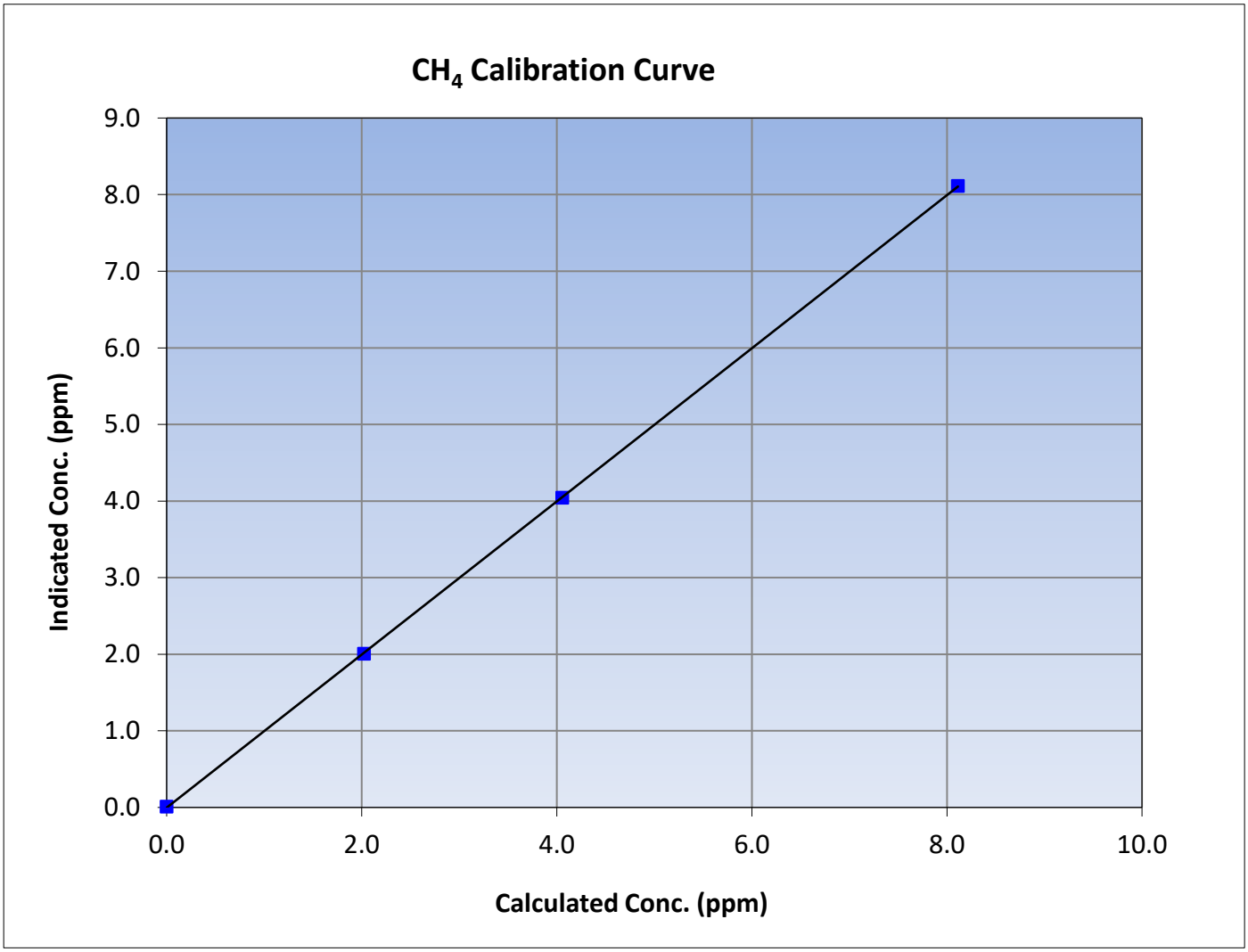
Version-01-2020

Station Information

Calibration Date:	July 18, 2023	Previous Calibration:	June 15, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:51	End Time (MST):	13:08
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	0.01	----	Correlation Coefficient	0.999990	*≥0.995*
8.11	8.11	1.0001			
4.06	4.05	1.0029	Slope	0.999482	*0.90 - 1.10*
2.02	2.01	1.0077			
			Intercept	-0.003013	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

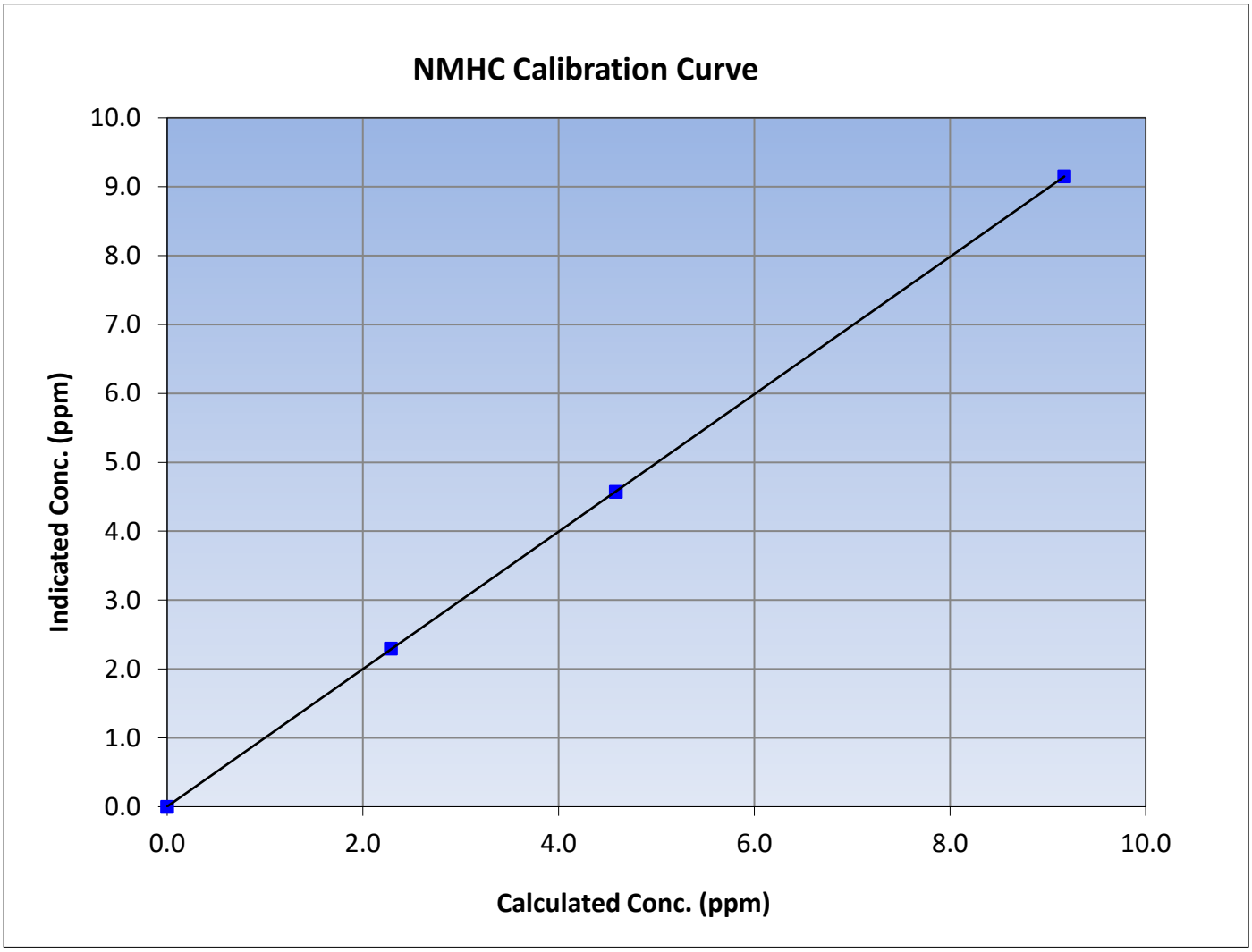
Version-01-2020

Station Information

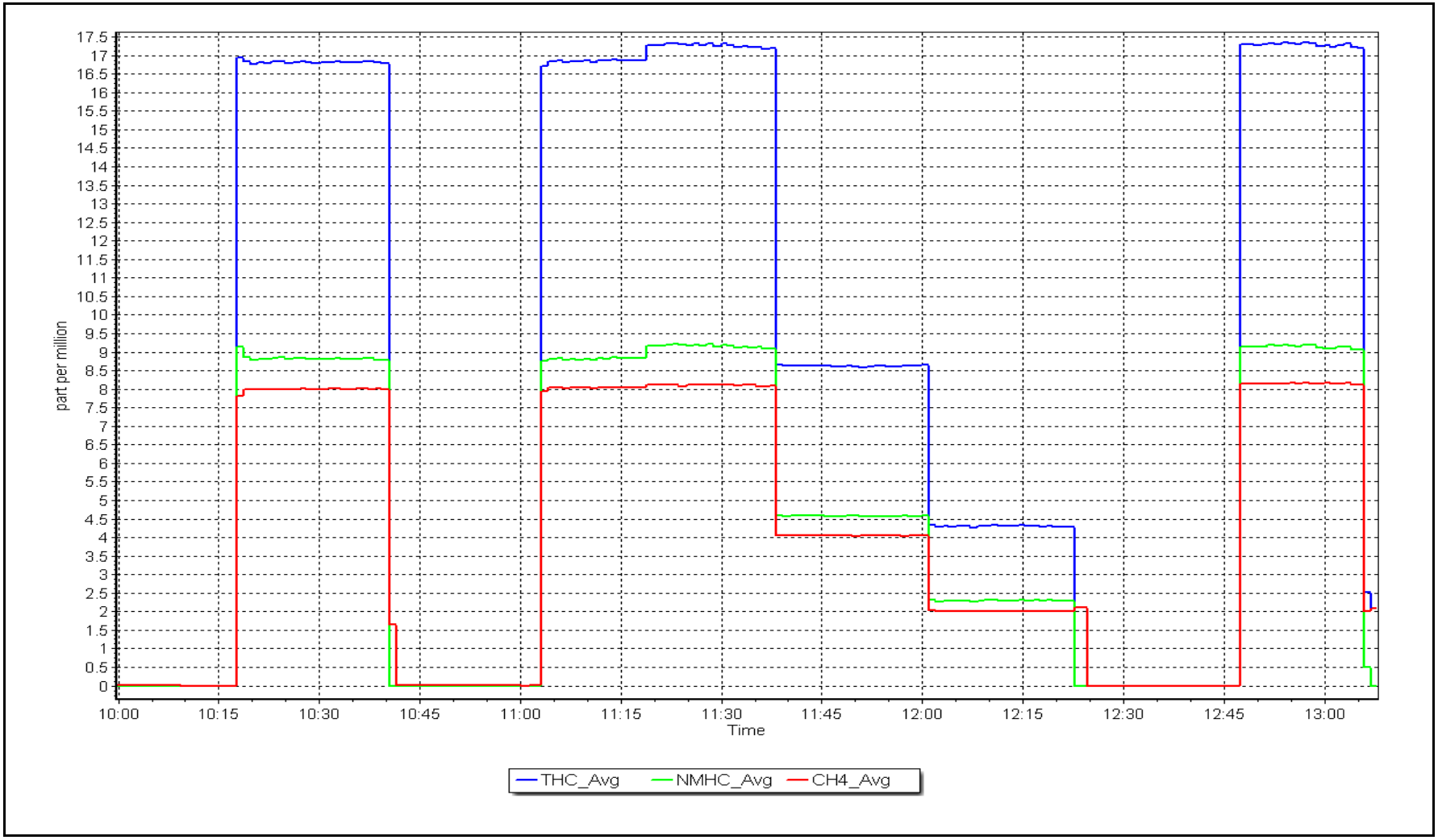
Calibration Date:	July 18, 2023	Previous Calibration:	June 15, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:51	End Time (MST):	13:08
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999997	≥0.995
9.17	9.15	1.0021			
4.58	4.57	1.0034	Slope	0.997360	0.90 - 1.10
2.29	2.29	0.9969			
			Intercept	0.003625	+/-0.5



NMHC Calibration Plot Date: July 18, 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:	July 26, 2023	Last Cal Date:	June 28, 2023
Start time (MST):	10:38	End time (MST):	16:01
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:	0.964	0.993	NO bkgnd or offset:	2.7	2.8
NOX coeff or slope:	0.987	0.984	NOX bkgnd or offset:	2.7	2.8
NO2 coeff or slope:	0.999	0.999	Reaction cell Press:	225.1	230.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001389	0.998716
NO_X Cal Offset:	0.070063	-0.069984
NO Cal Slope:	1.001010	1.001009
NO Cal Offset:	-1.269997	-1.469781
NO_2 Cal Slope:	1.004754	1.000734
NO_2 Cal Offset:	0.176637	-0.286696

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.2	----	----
as found span	4919	81.3	820.8	800.3	20.5	800.0	774.7	25.5	1.0259	1.0330
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.1	----	----
high point	4919	81.3	820.8	800.3	20.5	819.7	800.3	19.5	1.0013	1.0000
second point	4959	40.7	410.9	400.7	10.3	410.4	399.1	11.2	1.0013	1.0039
third point	4980	20.3	204.9	199.8	5.1	204.2	196.8	7.5	1.0036	1.0154
as left zero	5000	0.0	0.0	0.0	0.0	0.3	0.0	0.3	----	----
as left span	4919	81.3	820.8	362.9	457.9	822.3	361.2	461.1	0.9981	1.0046
								Average Correction Factor	1.0021	1.0064

Corrected As found	NO_X = 799.8 ppb	NO = 774.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-2.8%
Previous Response	NO_X = 822.0 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)	797.4	360.0	457.9	458.0	0.9998	100.0%
2nd GPT point (200 ppb O3)	797.4	595.0	222.9	223.0	0.9995	100.1%
3rd GPT point (100 ppb O3)	797.4	698.5	119.4	118.5	1.0075	99.3%
				Average Correction Factor	1.0022	99.8%

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

NO_X Calibration Summary

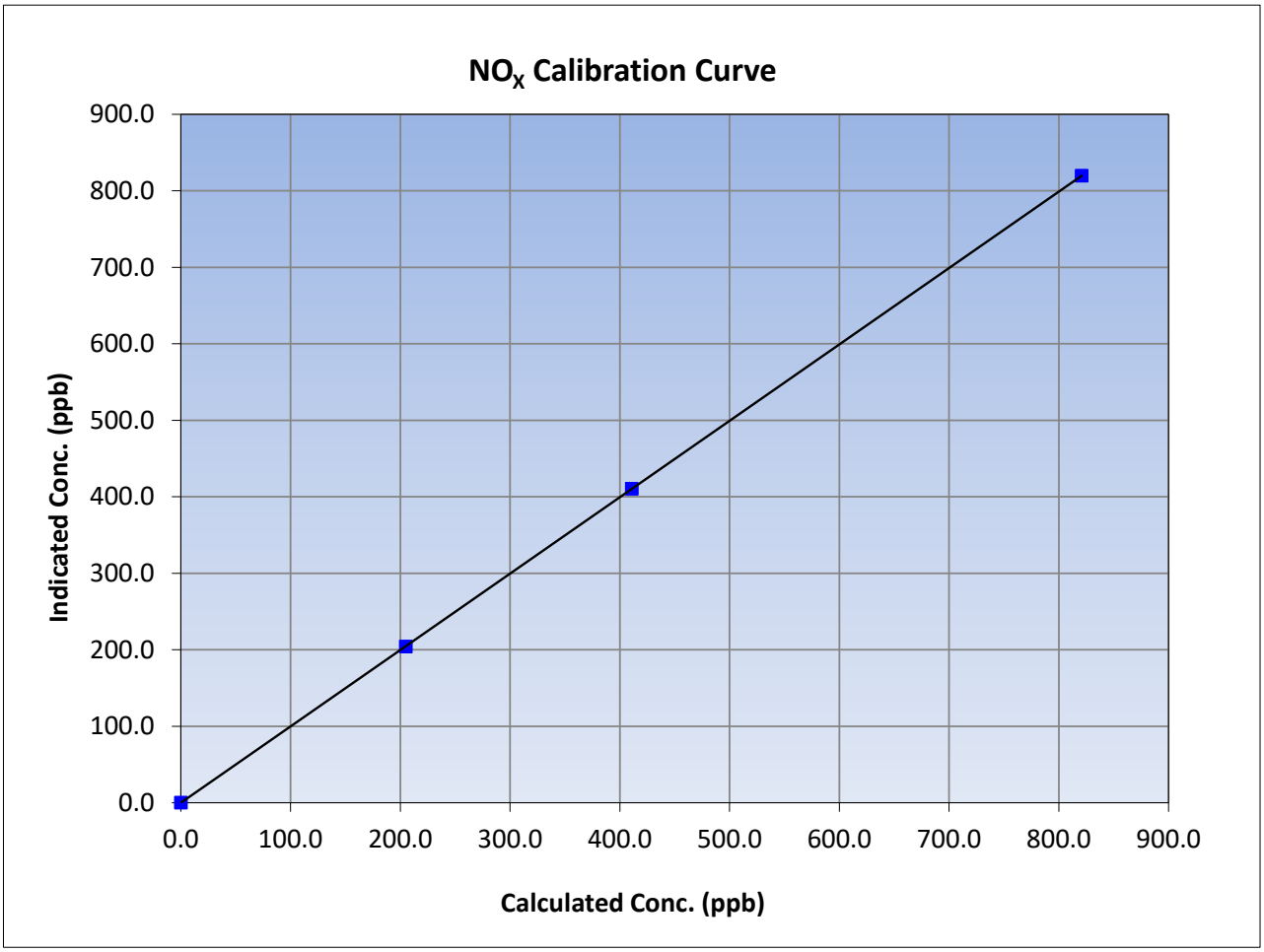
Version-04-2020

Station Information

Calibration Date:	July 26, 2023	Previous Calibration:	June 28, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:38	End Time (MST):	16:01
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999999	≥0.995
820.8	819.7	1.0013			
410.9	410.4	1.0013	Slope	0.998716	0.90 - 1.10
204.9	204.2	1.0036			
			Intercept	-0.069984	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

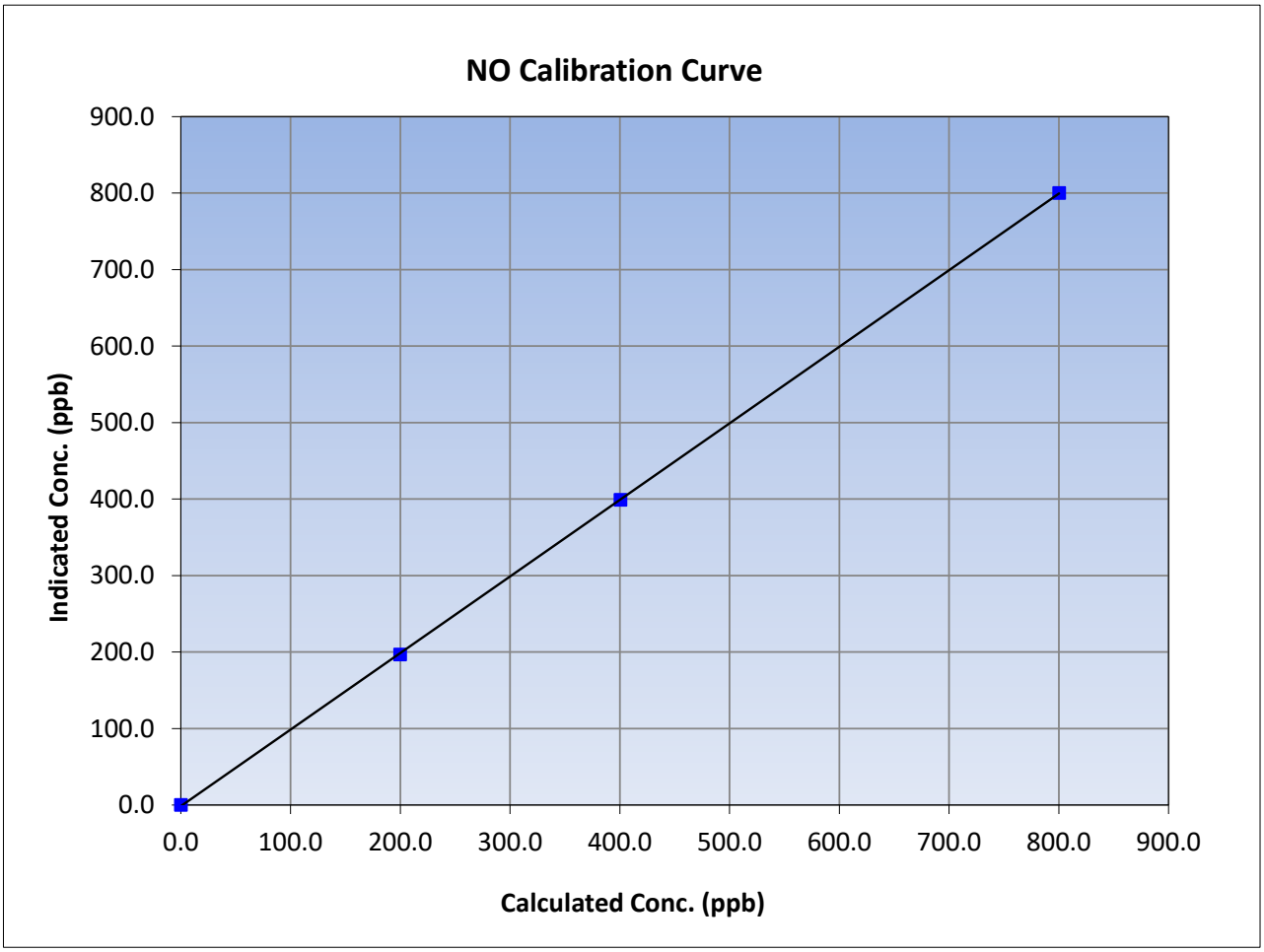
Version-04-2020

Station Information

Calibration Date:	July 26, 2023	Previous Calibration:	June 28, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:38	End Time (MST):	16:01
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	0.999982	*≥0.995*
800.3	800.3	1.0000			
400.7	399.1	1.0039	Slope	1.001009	*0.90 - 1.10*
199.8	196.8	1.0154			
			Intercept	-1.469781	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

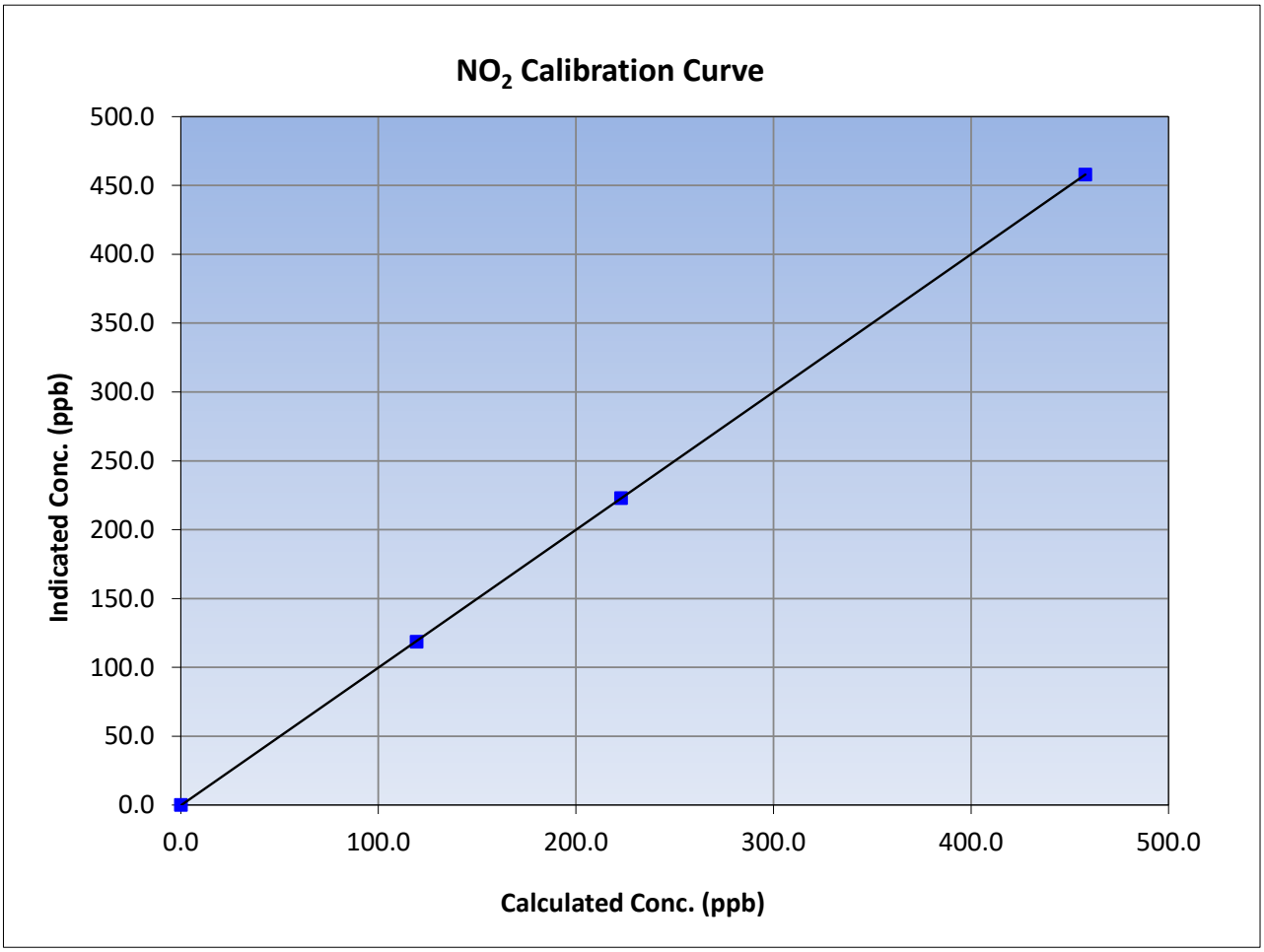
Version-04-2020

Station Information

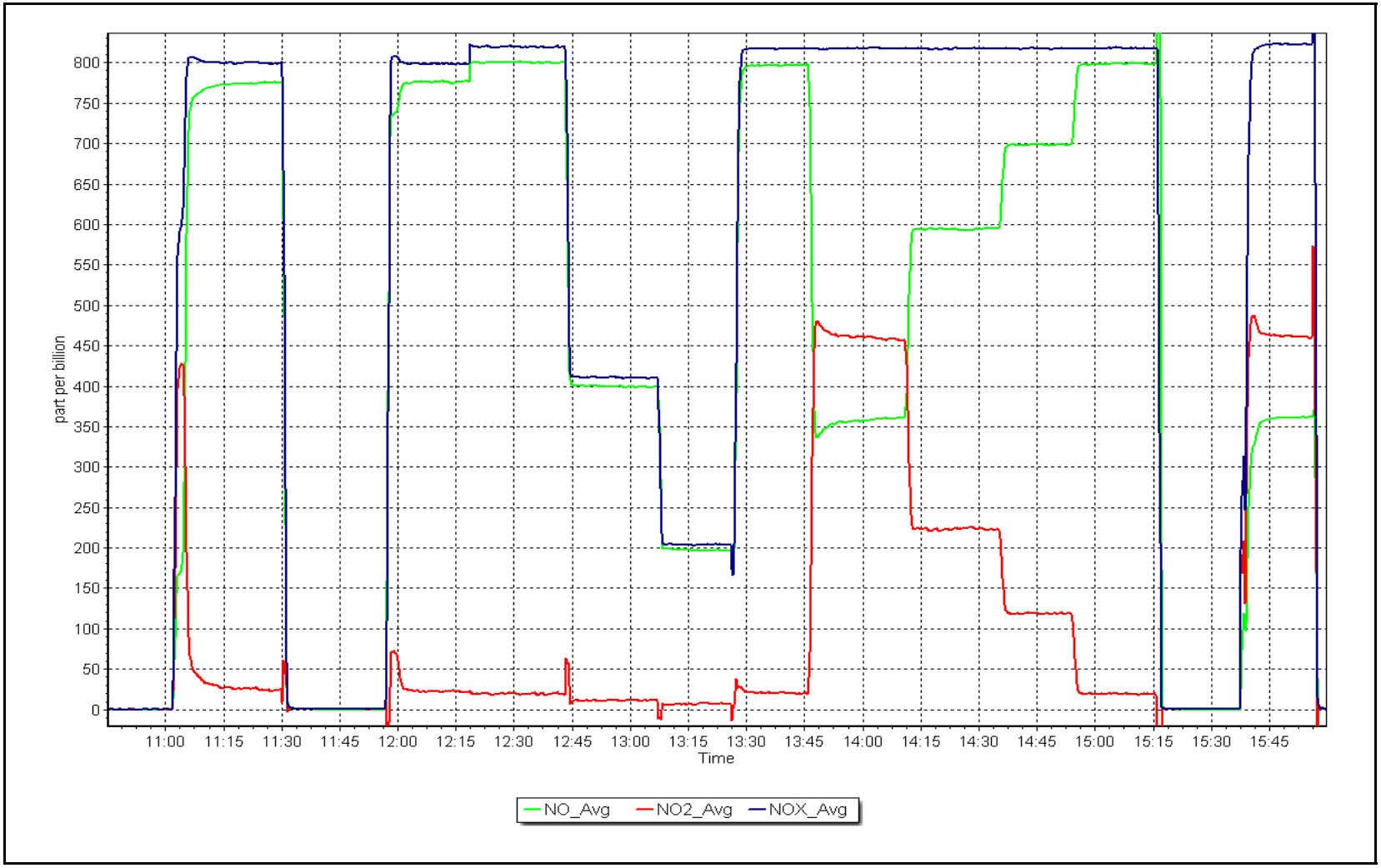
Calibration Date:	July 26, 2023	Previous Calibration:	June 28, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:38	End Time (MST):	16:01
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999994	≥0.995
457.9	458.0	0.9998			
222.9	223.0	0.9995	Slope	1.000734	0.90 - 1.10
119.4	118.5	1.0075			
			Intercept	-0.286696	+/-20



NO_X Calibration Plot Date: July 26, 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:	July 26, 2023	Last Cal Date:	June 28, 2023
Start time (MST):	10:58	End time (MST):	16:15
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	Teledyne API T750	Serial Number:	282
ZAG Make/Model:	Teledyne API T751H	Serial Number:	321

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005457	1.007600	Backgd or Offset:	1.000	1.300
Calibration intercept:	-0.380000	-1.380000	Coeff or Slope:	0.995	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	800.0	0.0	-1.0	----
as found span	4888	1096.9	400.0	399.9	1.000
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	0.2	----
high point	4888	1101.7	400.0	402.5	0.994
second point	4888	863.9	200.0	199.2	1.004
third point	4888	741.4	100.0	97.9	1.021
as left zero	5000	800.0	0.0	0.3	----
as left span	4812	1097.9	400.0	407.9	0.981
				Average Correction Factor	1.006

Baseline Corr As found:	400.9	Previous response	401.8	*% 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. Using portable calibrator for the calibration. Zero and span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

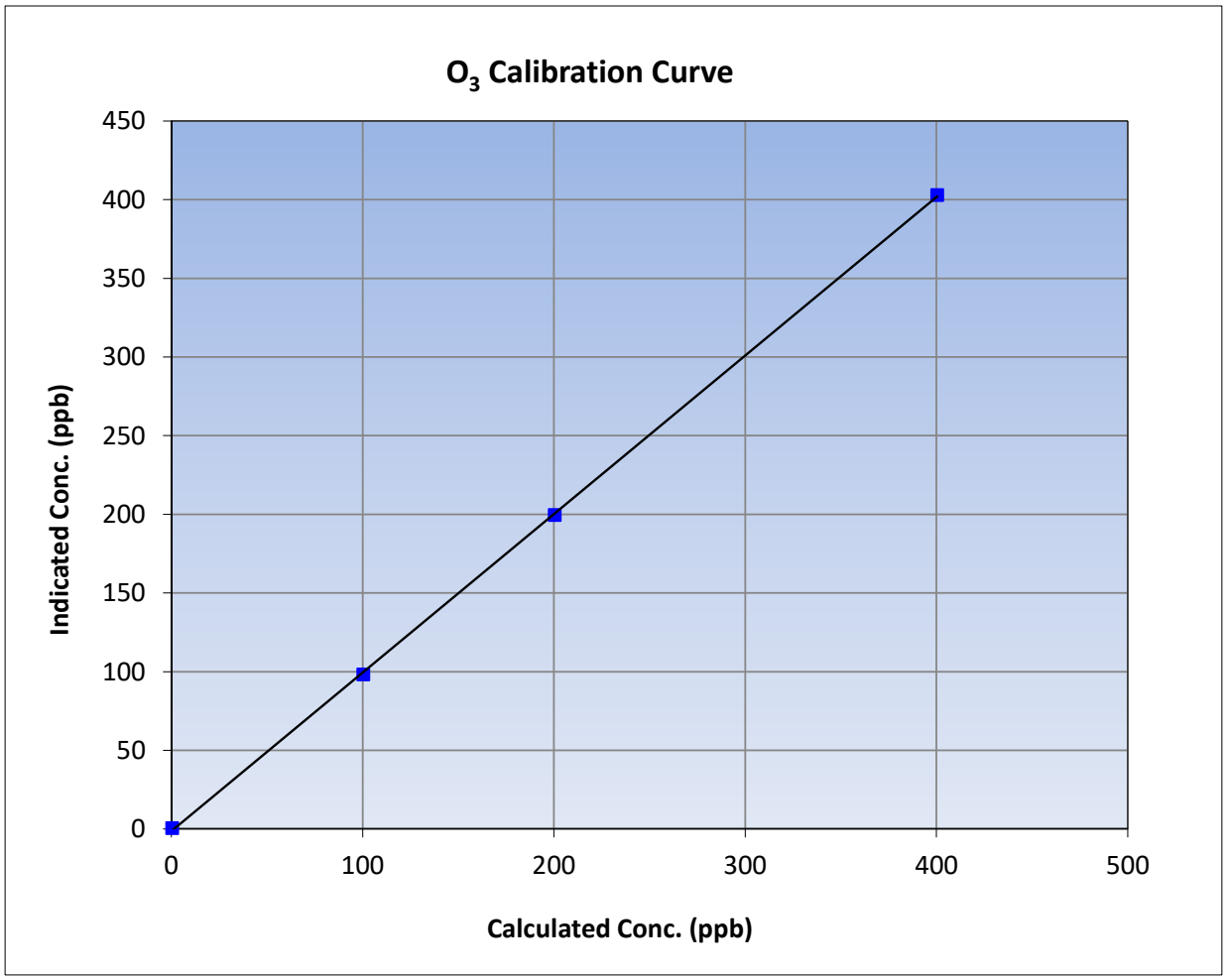
Station Information

Calibration Date:	July 26, 2023	Previous Calibration:	June 28, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	10:58	End Time (MST):	16:15
Analyzer make:	API T400	Analyzer serial #:	825

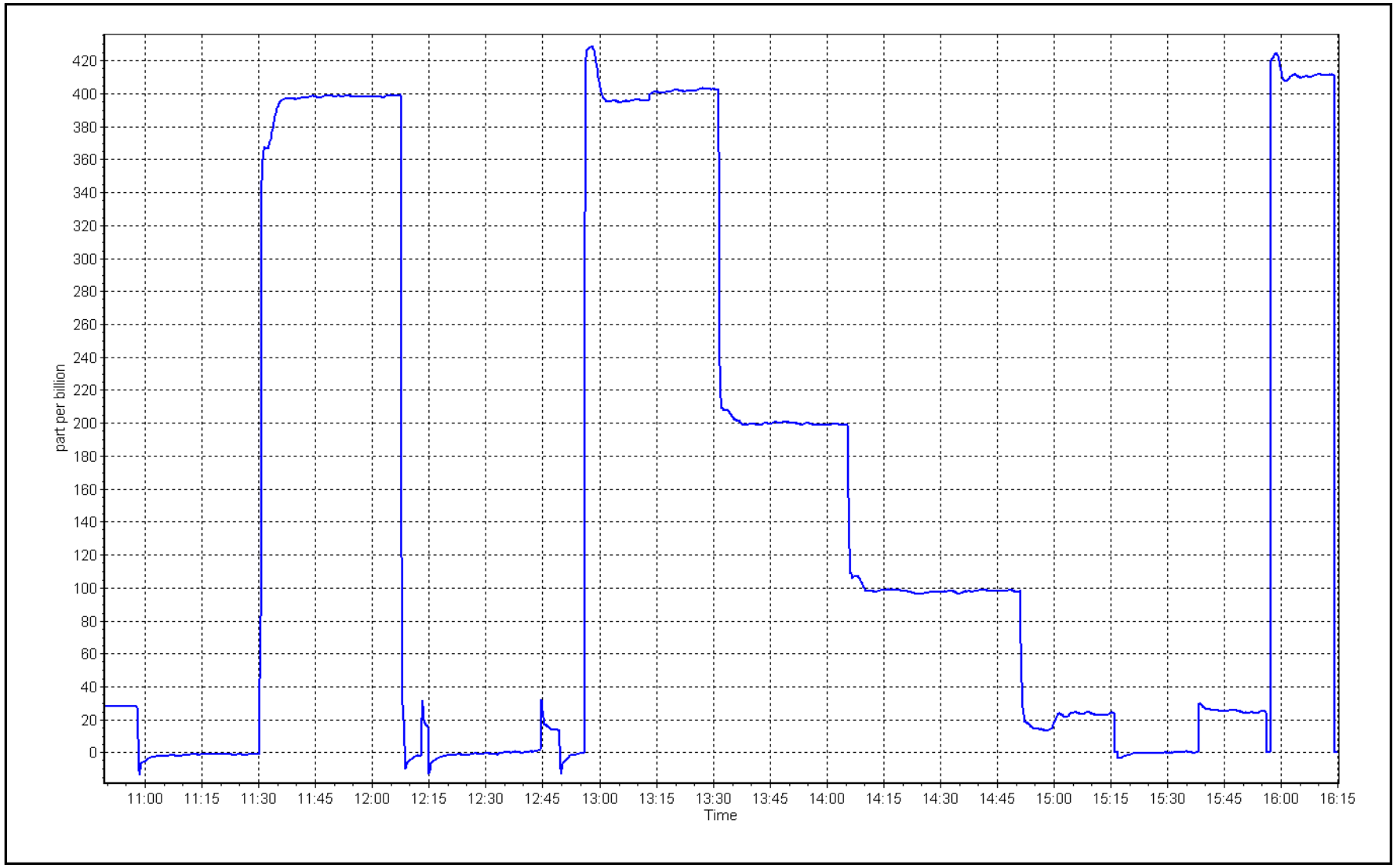
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
400.0	402.5	0.9938
200.0	199.2	1.0040
100.0	97.9	1.0215

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999929	*≥0.995*
Slope	1.007600	*0.90 - 1.10*
Intercept	-1.380000	*+/- 5*



O_3 Calibration Plot Date: July 26, 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:	July 26, 2023	Last Cal Date:	June 28, 2023
Start time (MST):	14:23	End time (MST):	16:02
Analyzer Make:	API T640	S/N:	1162
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388748
Temp/RH standard:	Alicat FP-25BT	S/N:	388748

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	16.3	16.07	16.3	☐	+/- 2 °C
P (mmHg)	697.3	697.05	697.3	☐	+/- 10 mmHg
flow (LPM)	4.99	5.00	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: July 26, 2023 Last Cal Date: May 16, 2023

PM w/o HEPA: 2.8 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	10.0	10.0	10.0	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 2.4 w/ HEPA: 0.0

Date Optical Chamber Cleaned: July 26, 2023 <0.2 ug/m3

Disposable Filter Changed: July 26, 2023

Annual Maintenance

Date Sample Tube Cleaned: August 30, 2022

Date RH/T Sensor Cleaned: August 30, 2022

Notes: No adjustments needed.

Calibration by: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	July 4, 2023	Last Cal Date:	June 8, 2023
Start time (MST):	10:37	End time (MST):	13:49
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	3,050	ppm	Cal Gas Exp Date:	December 1, 2028
Cal Gas Cylinder #:	ALM063503			
Removed Cal Gas Conc:	3,050	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	2658
ZAG Make/Model:	Teledyne API T701		Serial Number:	360

Analyzer Information

Analyzer make: API T300 — Analyzer serial #: 3504

Analyzer Range: 0 - 50 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999102	0.999550	Backgd or Offset:	-0.010	-0.010
Calibration intercept:	0.057760	0.039792	Coeff or Slope:	0.906	0.906

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	----
as found span	4933	66.7	40.7	40.6	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4933	66.7	40.7	40.6	1.001
second point	4966	33.3	20.3	20.5	0.990
third point	4983	16.7	10.2	10.2	1.003
as left zero	3000	0.0	0.0	0.0	----
as left span	2960	40.0	40.7	40.7	0.999
				Average Correction Factor	0.998

Baseline Corr As found:	40.57	Prev response:	40.71	*% 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 needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

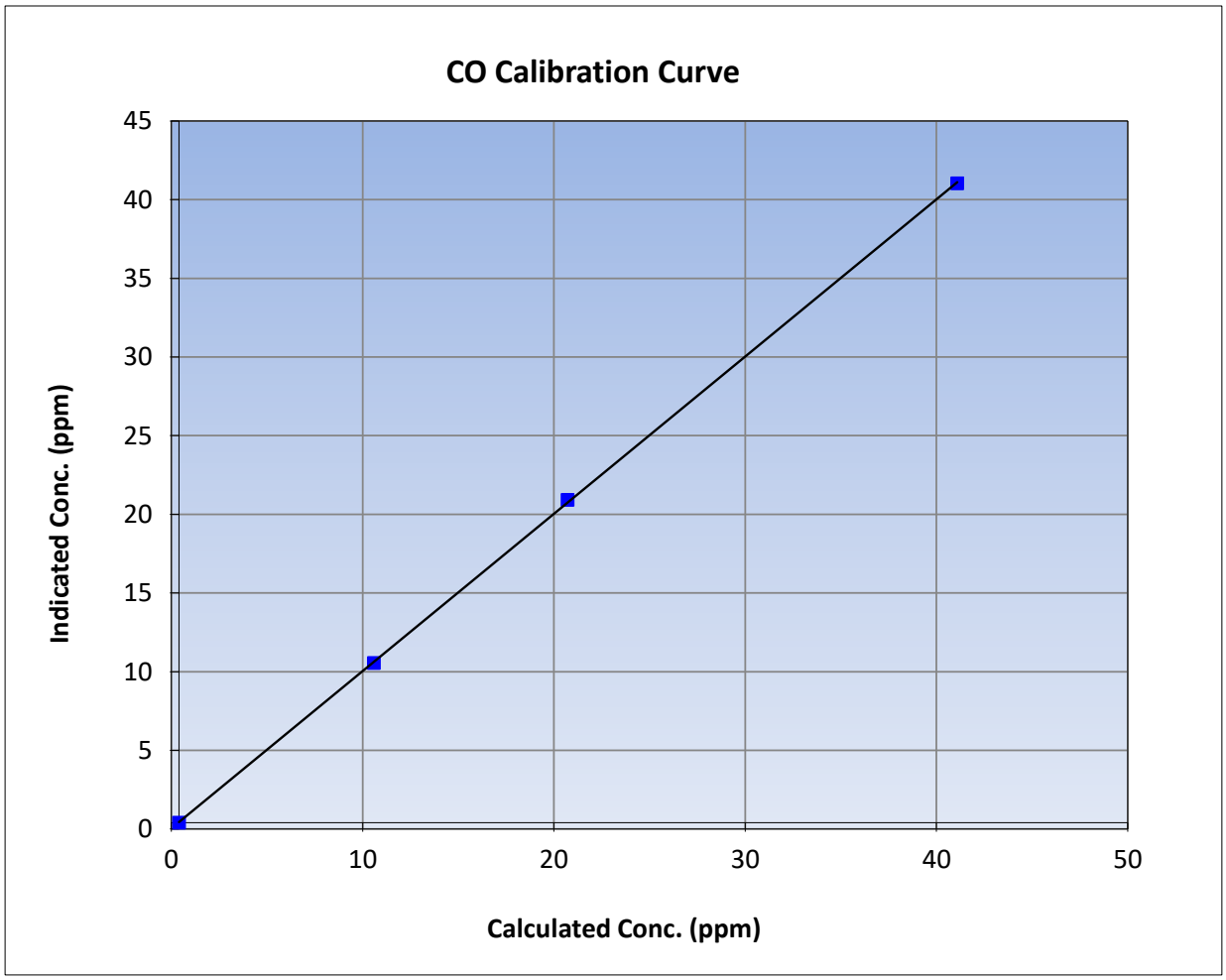
Station Information

Calibration Date:	July 4, 2023	Previous Calibration:	June 8, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:37	End Time (MST):	13:49
Analyzer make:	API T300	Analyzer serial #:	3504

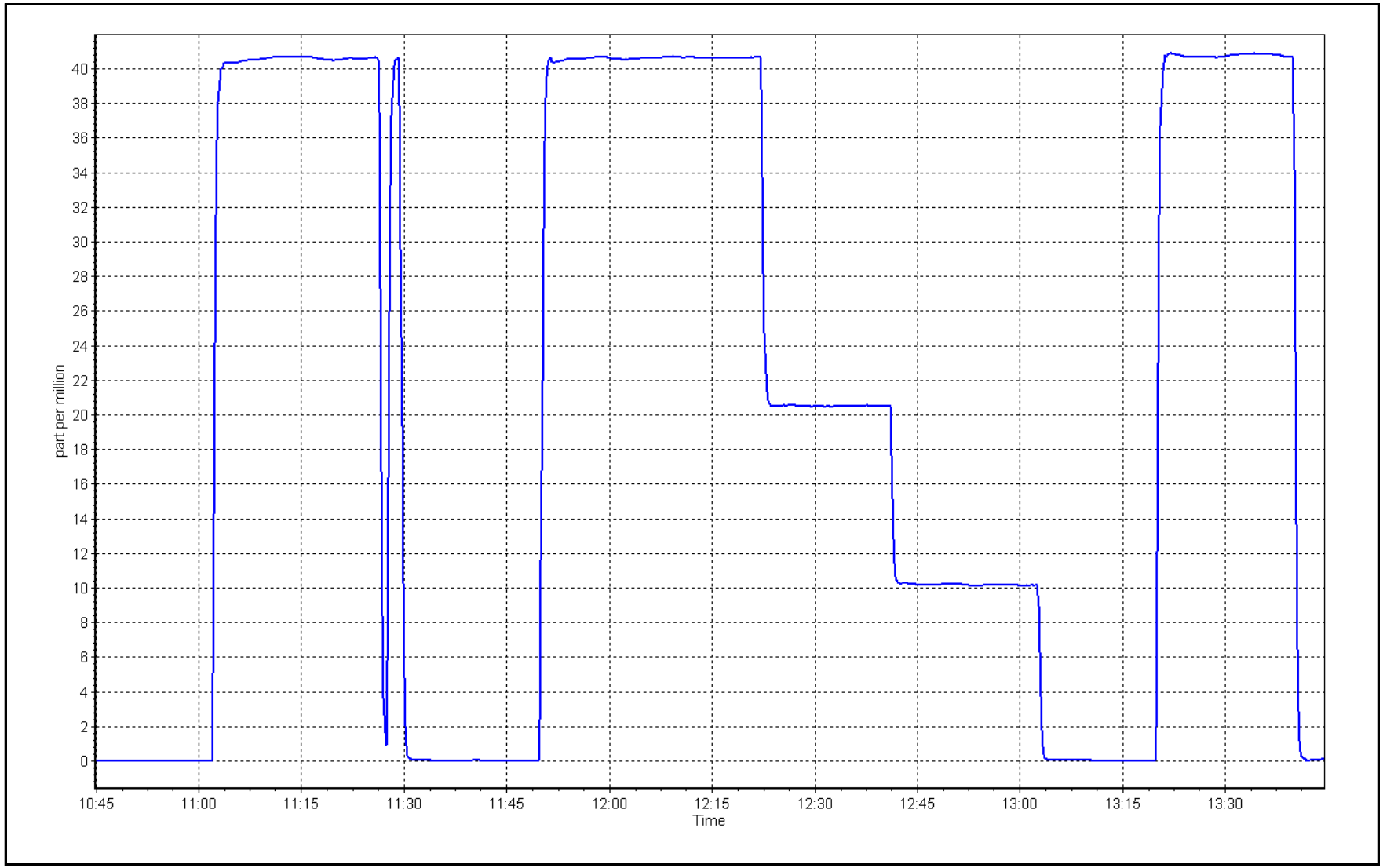
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.7	40.6	1.0012
20.3	20.5	0.9901
10.2	10.2	1.0027

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999955	*≥0.995*
Slope	0.999550	*0.90 - 1.10*
Intercept	0.039792	*+/-1.5*



CO Calibration Plot Date: July 4, 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:	July 5, 2023	Last Cal Date:	June 14, 2023
Start time (MST):	10:36	End time (MST):	14:14
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make: API T360 — Analyzer serial #: 283

Analyzer Range 0 - 2,000 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997863	0.999115	Backgd or Offset:	-0.081	-0.103
Calibration intercept:	-0.740000	-4.820000	Coeff or Slope:	1.091	1.109

CO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	3000	0.0	0.0	1.4	----
as found span	2920	80.0	1605.9	1644.2	0.977
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	1601.0	1.003
second point	2960	40.0	802.9	798.0	1.006
third point	2980	20.0	401.5	389.6	1.030
as left zero	3000	0.0	0.0	0.8	----
as left span	2930	80.0	1600.5	1602.0	0.999
				Average Correction Factor	1.013

Baseline Corr As found:	1642.80	Prev response:	1601.69	*% change:	2.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

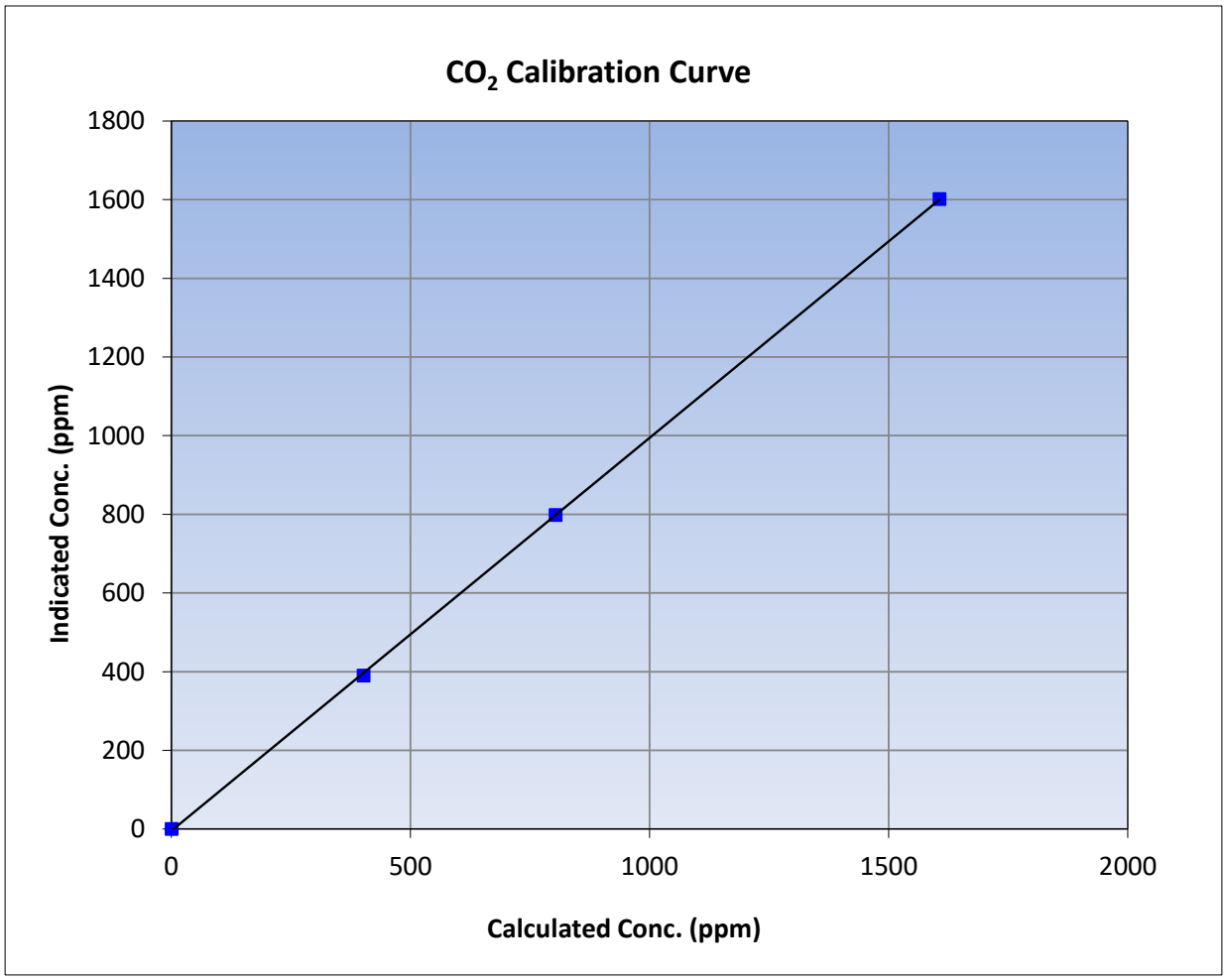
Station Information

Calibration Date	July 5, 2023	Previous Calibration	June 14, 2023
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:36	End Time (MST)	14:14
Analyzer make	API T360	Analyzer serial #	283

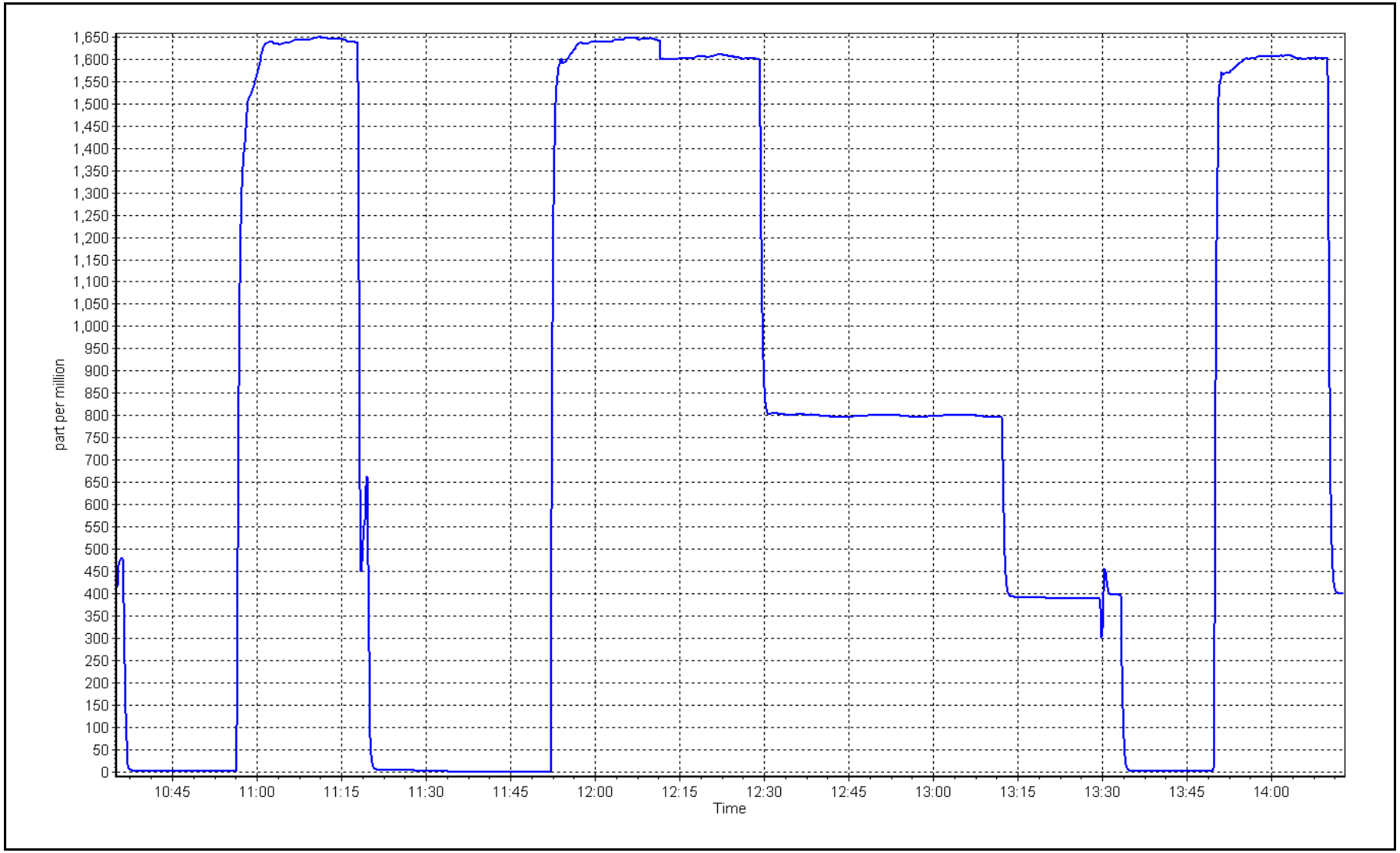
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
1605.9	1601.0	1.0030
802.9	798.0	1.0062
401.5	389.6	1.0305

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999951	*≥0.995*
Slope	0.999115	*0.90 - 1.10*
Intercept	-4.820000	*+/-10*



CO_2 Calibration Plot Date: July 5, 2023 Location: Stony Mountain



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS19
FIREBAG
JULY 2023

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

August 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	July 19, 2023	Last Cal Date:	June 20, 2023
Start time (MST):	9:58	End time (MST):	15:13
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.29	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC716618			
Removed Cal Gas Conc:	49.29	ppm	Rem Gas Exp Date:	
Removed Gas Cyl #:			Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	1607
ZAG Make/Model:	API T701		Serial Number:	1118

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1410661308

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998790	0.995832	Backgd or Offset:	10.3	10.2
Calibration intercept:	-0.461656	-0.101381	Coeff or Slope:	0.992	0.992

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	4999	0.0	0.0	-0.2	----
as found span	4919	81.1	799.5	796.6	1.004
as found 2nd point	4959	40.6	400.3	399.6	1.002
as found 3rd point	4980	20.3	200.1	199.6	1.003
new cylinder response					
calibrator zero	4999	0.0	0.0	-0.1	----
high point	4919	81.1	799.5	795.8	1.005
second point	4959	40.6	400.3	399.2	1.003
third point	4980	20.3	200.1	198.7	1.007
as left zero	4999	0.0	0.0	-0.1	----
as left span	4919	81.1	799.5	797.0	1.003
				Average Correction Factor	1.005

Baseline Corr As found:	796.80	Previous response	798.04	*% change	-0.2%
Baseline Corr 2nd AF pt:	399.80	AF Slope:	0.996633	AF Intercept:	0.118409
Baseline Corr 3rd AF pt:	199.80	AF Correlation:	0.999999		

* = > +/-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

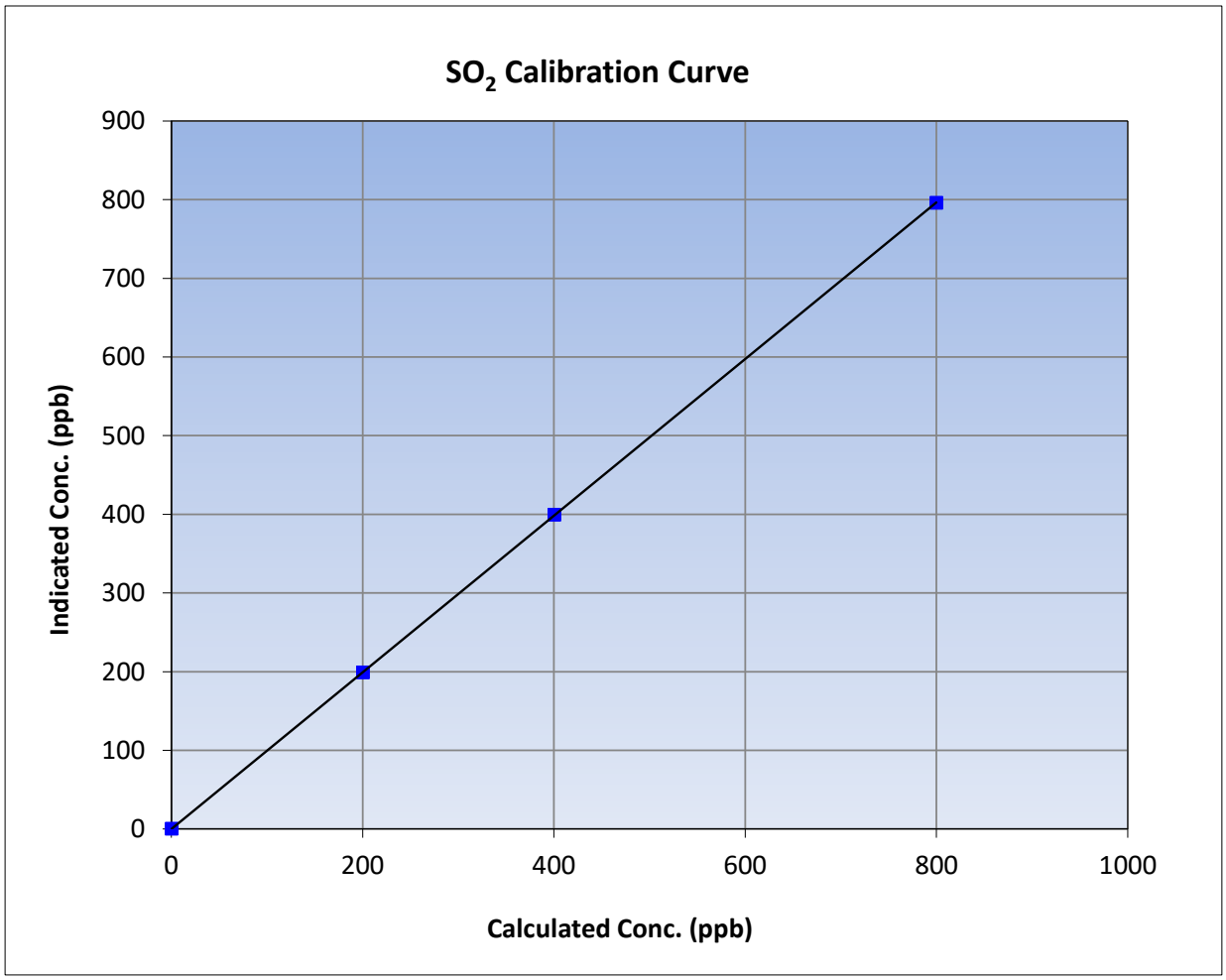
Station Information

Calibration Date:	July 19, 2023	Previous Calibration:	June 20, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	9:58	End Time (MST):	15:13
Analyzer make:	Thermo 43i	Analyzer serial #:	1410661308

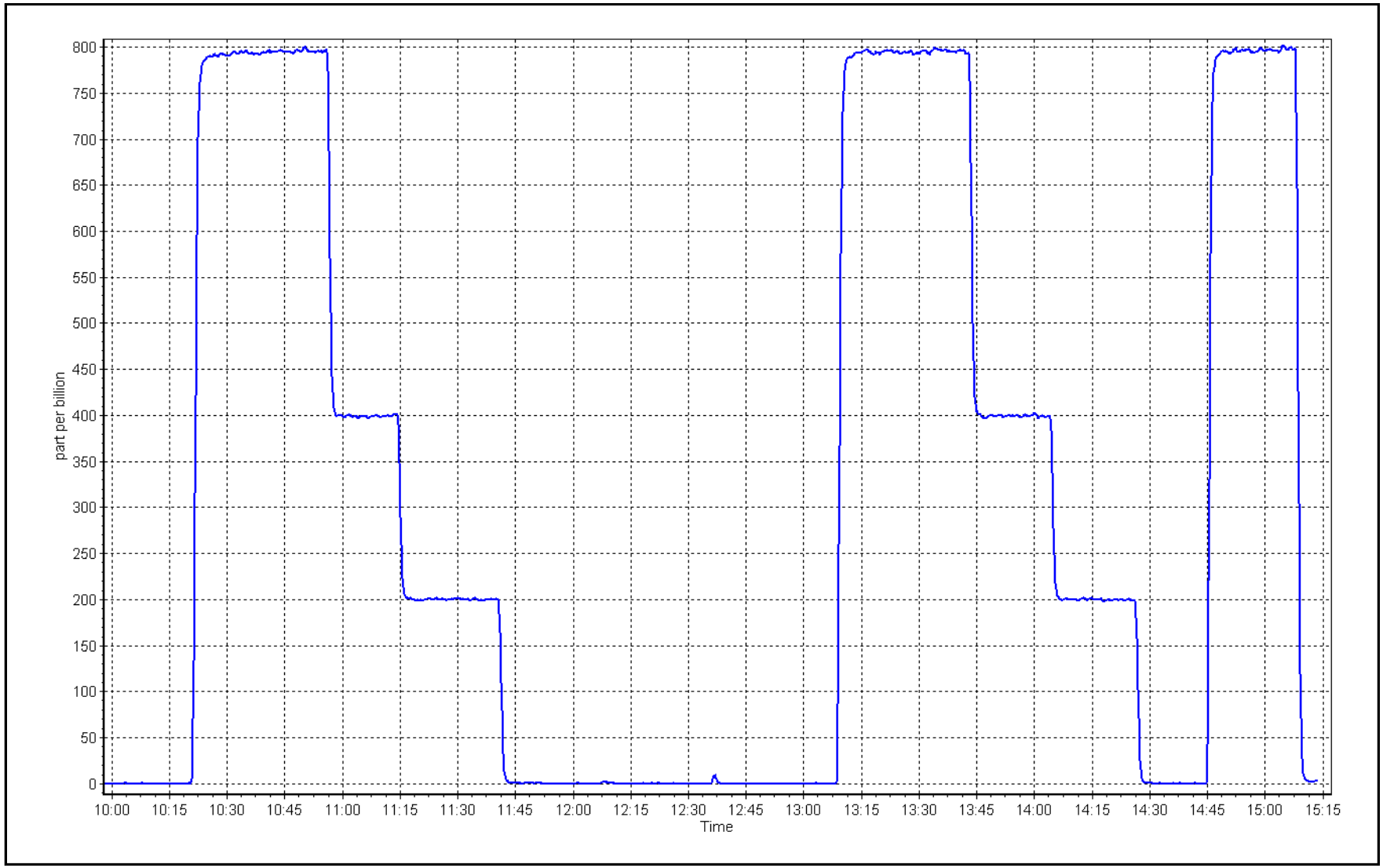
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
799.5	795.8	1.0046
400.3	399.2	1.0027
200.1	198.7	1.0071

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	0.995832	*0.90 - 1.10*
Intercept	-0.101381	*+/-30*



SO2 Calibration Plot Date: July 19, 2023 Location: Firebag



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Firebag	Station number:	AMS19
Calibration Date:	July 18, 2023	Last Cal Date:	June 30, 2023
Start time (MST):	10:02	End time (MST):	14:08
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1151680032	
Converter make:	Global		Converter serial #:	2022-222	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.002911	1.004340	Backgd or Offset:	2.54	2.54
Calibration intercept:	-0.281624	-0.181643	Coeff or Slope:	1.122	1.122

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.2	----
as found span	4922	78.2	80.0	81.2	0.983
as found 2nd point	4961	39.1	40.0	40.4	0.985
as found 3rd point	4980	19.6	20.0	20.1	0.988
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4922	78.2	80.0	80.1	0.998
second point	4961	39.1	40.0	40.1	0.997
third point	4980	19.6	20.0	19.9	1.007
as left zero	5000	0.0	0.0	0.0	----
as left span	4922	78.2	80.0	79.8	1.002
SO2 Scrubber Check	4922	78.3	800.2	0.0	----
Date of last scrubber change:		January 18, 2023		Ave Corr Factor	1.001
Date of last converter efficiency test:		n/a			efficiency

Baseline Corr As found:	81.4	Prev response:	79.93	*% change:	1.8%
Baseline Corr 2nd AF pt:	40.6	AF Slope:	1.018061	AF Intercept:	-0.261941
Baseline Corr 3rd AF pt:	20.3	AF Correlation:	0.999997		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter and the external pump after MPAF's. Ran SOx scrubber check after MPAF's. No adjustments needed.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

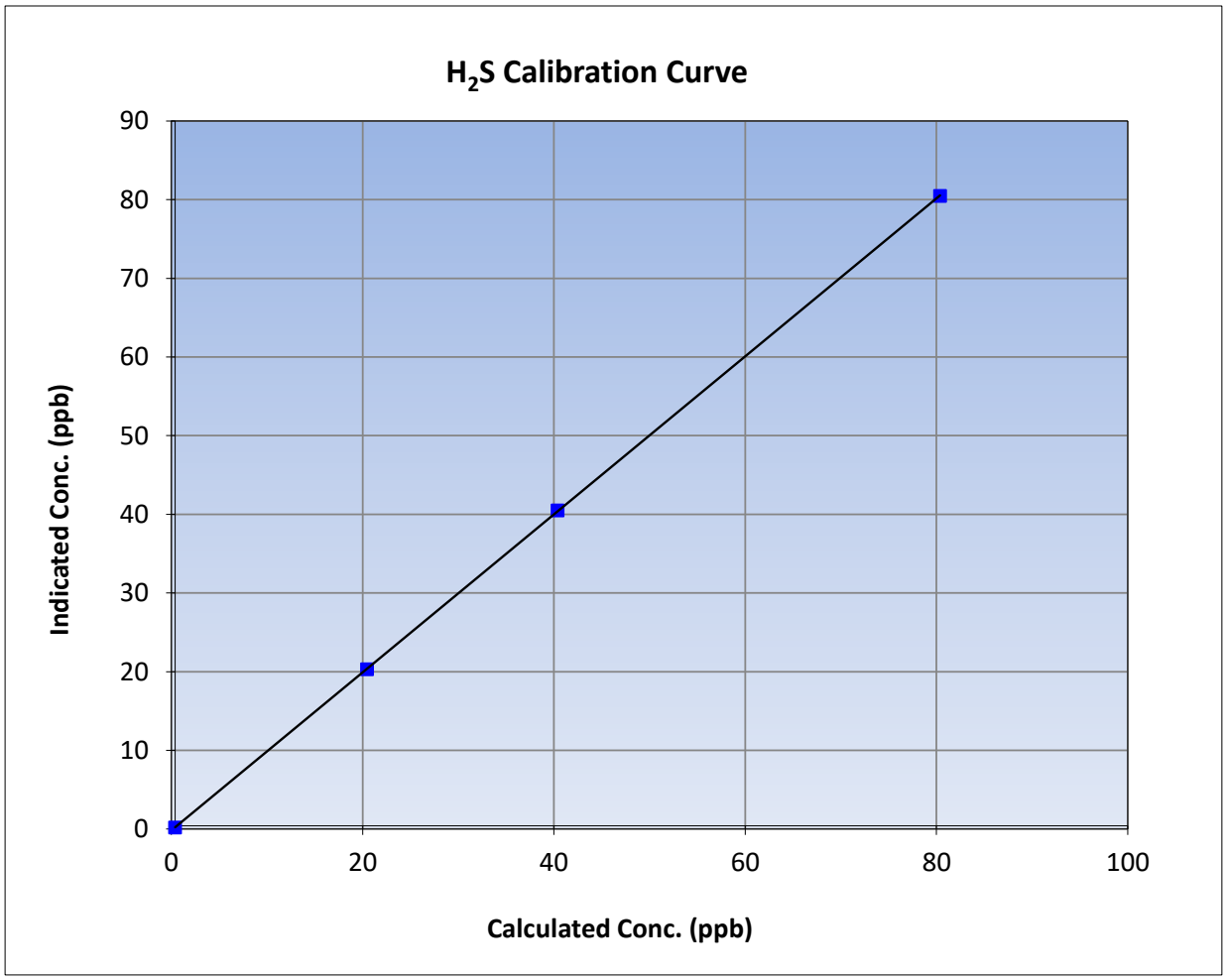
Station Information

Calibration Date:	July 18, 2023	Previous Calibration:	June 30, 2023
Station Name:	Firebag	Station Number:	AMS19
Start Time (MST):	10:02	End Time (MST):	14:08
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1151680032

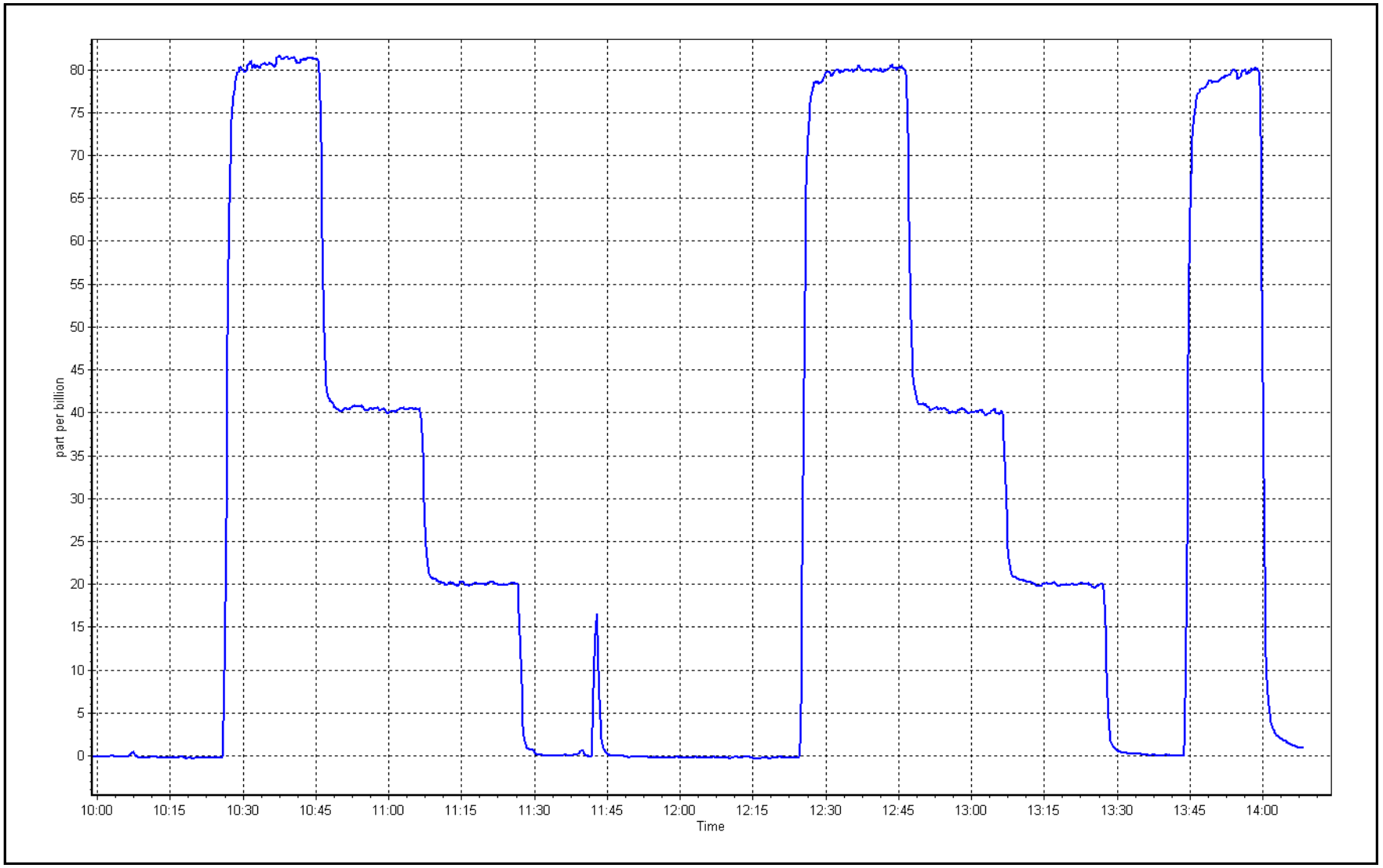
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
80.0	80.1	0.9985
40.0	40.1	0.9973
20.0	19.9	1.0075

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.004340	*0.90 - 1.10*
Intercept	-0.181643	*+/-3*



H_2S Calibration Plot Date: July 18, 2023 Location: Firebag



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	July 19, 2023	Last Cal Date:	June 20, 2023
Start time (MST):	9:58	End time (MST):	15:13
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 51i-LT		Analyzer serial #:	1336160089	
Analyzer Range:	0 - 20 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003320	0.999589	Background:	2.69	3.75
Calibration intercept:	-0.013586	-0.108328	Coefficient:	3.908	3.716

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	0.32	----
as found span	4919	81.1	17.31	17.54	0.987
as found 2nd point	4959	40.6	8.66	8.77	0.988
as found 3rd point	4980	20.3	4.33	4.64	0.933
new cylinder response					
calibrator zero	4999	0.0	0.00	-0.04	----
high point	4919	81.1	17.31	17.23	1.004
second point	4959	40.6	8.66	8.50	1.019
third point	4980	20.3	4.33	4.17	1.040
as left zero	5000	0.0	0.00	-0.20	----
as left span	4919	81.1	17.31	17.15	1.009
				Average Correction Factor	1.021

Baseline Corr As found:	17.22	Previous response	17.35	*% change	-0.8%
Baseline Corr 2nd AF pt:	8.45	AF Slope:	0.993498	AF Intercept:	0.293316
Baseline Corr 3rd AF pt:	4.32	AF Correlation:	0.999856		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. Changed internal pump, adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

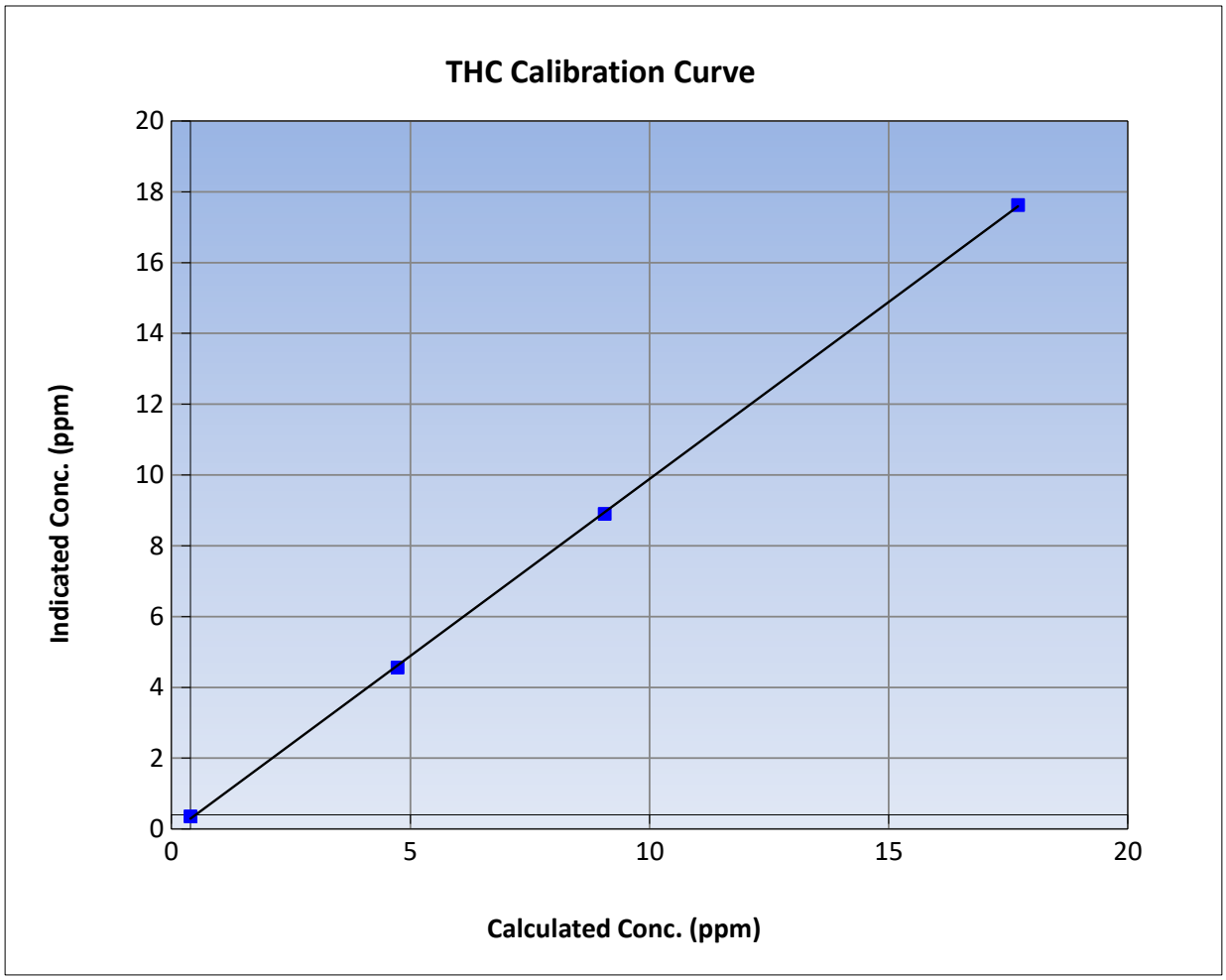
Station Information

Calibration Date:	July 19, 2023	Previous Calibration:	June 20, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	9:58	End Time (MST):	15:13
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1336160089

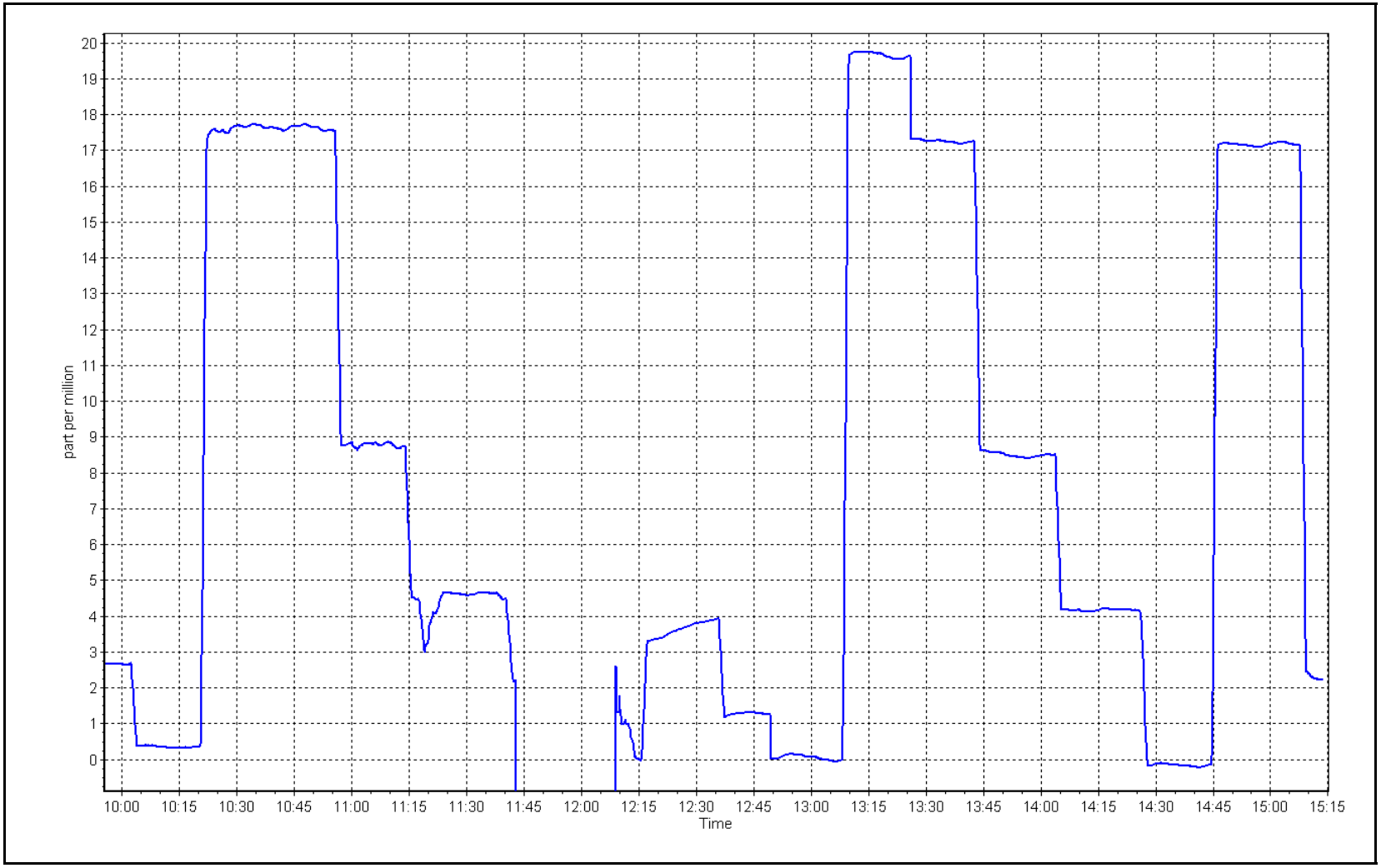
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.04	----
17.31	17.23	1.0044
8.66	8.50	1.0193
4.33	4.17	1.0400

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999925	*≥0.995*
Slope	0.999589	*0.90 - 1.10*
Intercept	-0.108328	*+/-1.5*



THC Calibration Plot Date: July 19, 2023 Location: Firebag



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	July 24, 2023	Last Cal Date:	July 19, 2023
Start time (MST):	10:28	End time (MST):	13:24
Reason:	Maintenance		

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:	0.999589	1.005161	Background:	3.75	3.00
Calibration intercept:	-0.108328	-0.081786	Coefficient:	3.716	3.775

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	-0.81	----
as found span	4919	81.1	17.31	16.25	1.065
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	4999	0.0	0.00	-0.08	----
high point	4919	81.1	17.31	17.32	0.999
second point	4959	40.6	8.66	8.61	1.006
third point	4980	20.3	4.33	4.28	1.013
as left zero	5000	0.0	0.00	-0.02	----
as left span	4919	81.1	17.31	17.39	0.995
				Average Correction Factor	1.006

Baseline Corr As found:	17.06	Previous response	17.19	*% 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: Adjusted zero and span after baseline drift.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

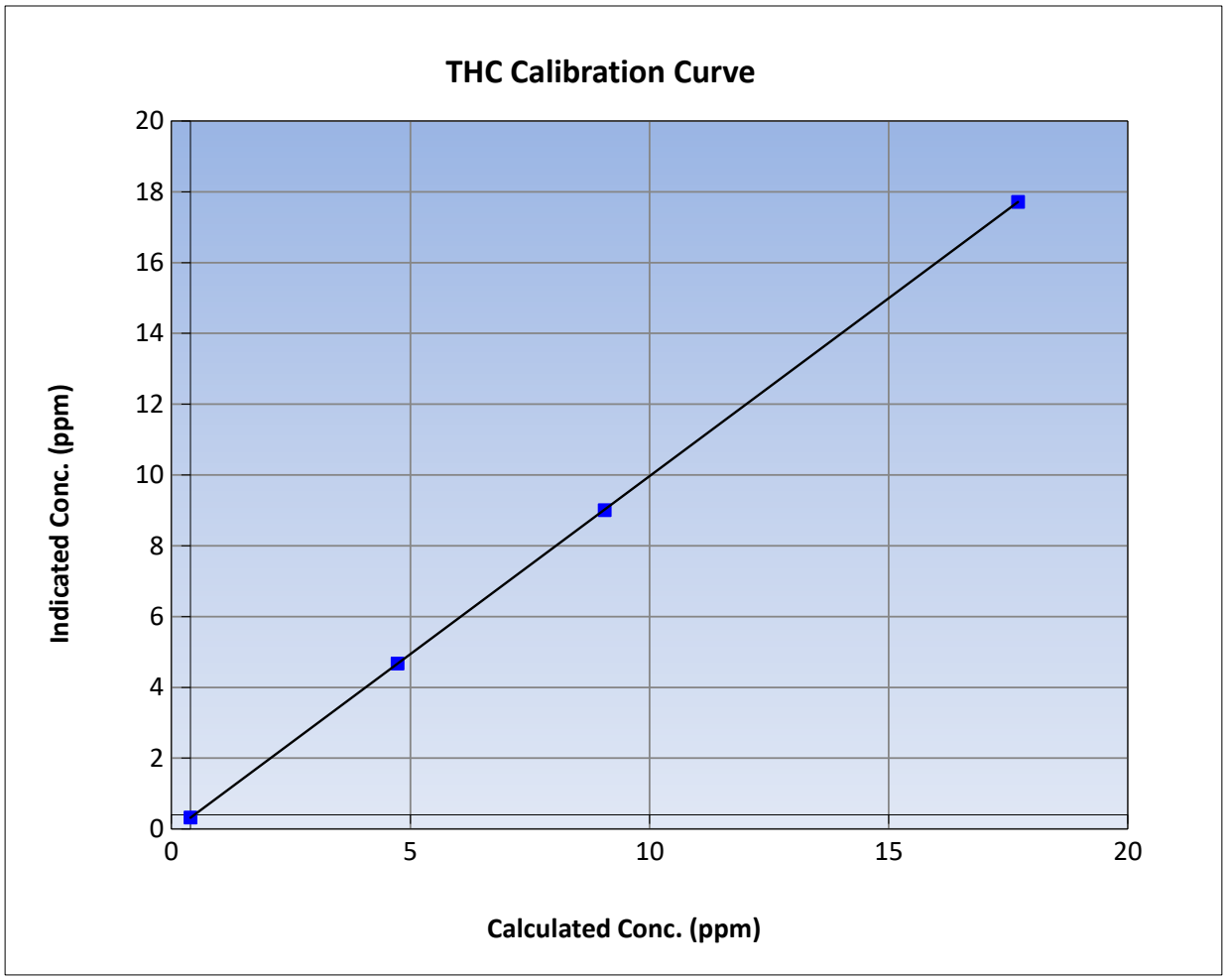
Station Information

Calibration Date:	July 24, 2023	Previous Calibration:	July 19, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:28	End Time (MST):	13:24
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1336160089

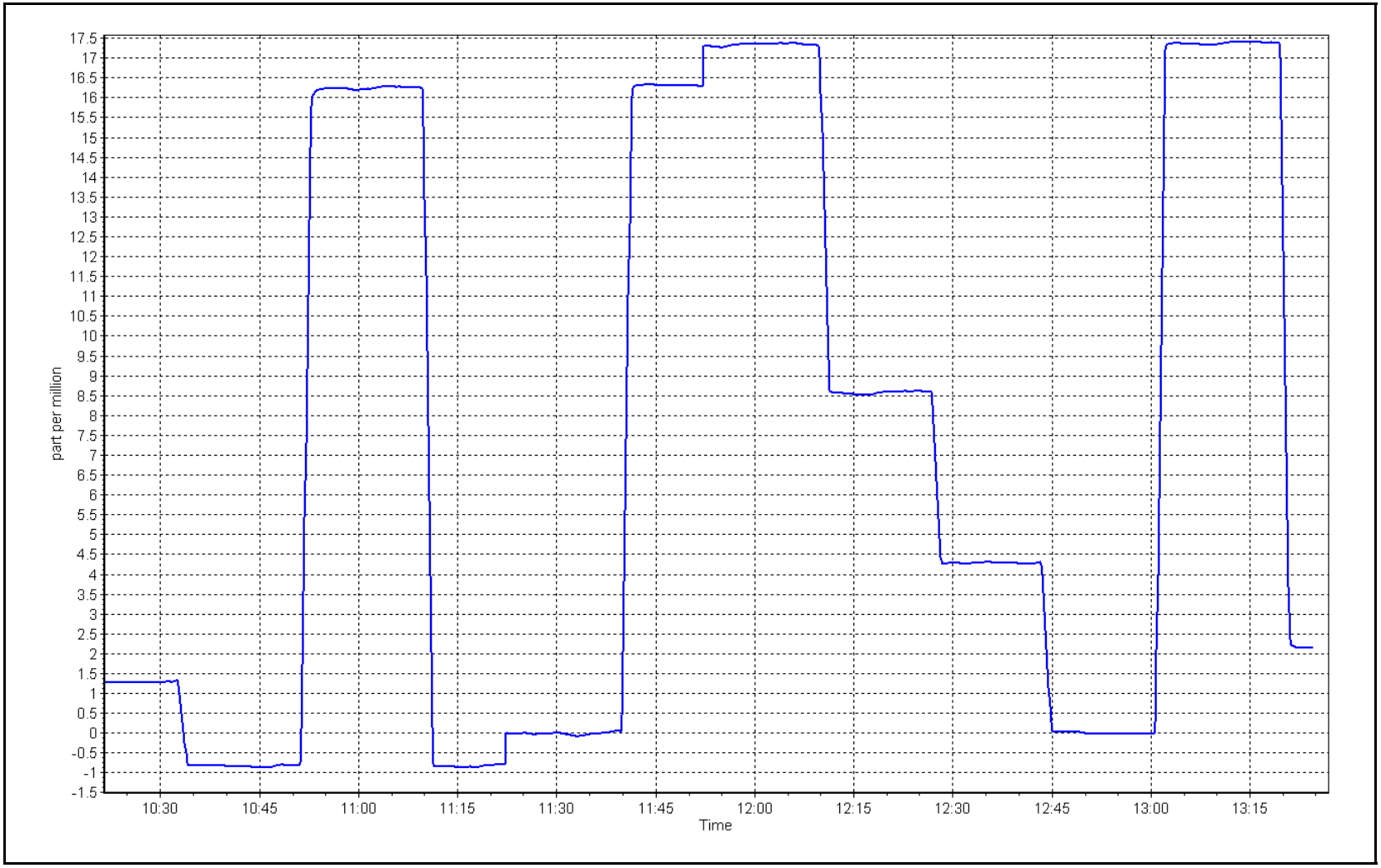
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.08	----
17.31	17.32	0.9991
8.66	8.61	1.0063
4.33	4.28	1.0127

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.005161	*0.90 - 1.10*
Intercept	-0.081786	*+/-1.5*



THC Calibration Plot Date: July 24, 2023 Location: Firebag



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	July 27, 2023	Last Cal Date:	June 22, 2023
Start time (MST):	9:40	End time (MST):	14:01
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:	1.094	1.106	NO bkgnd or offset:	7.6	7.7
NOX coeff or slope:	0.994	0.993	NOX bkgnd or offset:	7.6	7.7
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	211.5	214.0

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.998084	0.996456
NO_X Cal Offset:	1.096129	1.235903
NO Cal Slope:	0.999369	0.999440
NO Cal Offset:	0.508726	0.208843
NO_2 Cal Slope:	1.001853	0.999338
NO_2 Cal Offset:	-0.516592	0.066857

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	4999	0.0	0.0	0.0	0.0	-0.1	-0.2	0.1	----	----
as found span	4919	81.0	828.1	800.3	27.9	821.0	790.3	30.6	1.0087	1.0126
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	4999	0.0	0.0	0.0	0.0	0.2	0.0	0.2	----	----
high point	4919	81.0	828.1	800.3	27.9	826.0	800.0	26.0	1.0026	1.0004
second point	4960	40.5	414.0	400.1	13.9	414.1	400.0	14.2	0.9998	1.0002
third point	4980	20.2	206.5	199.6	6.9	208.2	200.0	8.2	0.9919	0.9978
as left zero	4999	0.0	0.0	0.0	0.0	0.1	-0.1	0.2	----	----
as left span	4919	81.0	828.1	363.5	464.7	828.0	362.2	465.7	1.0002	1.0035
								Average Correction Factor	0.9981	0.9995

Corrected As found	NO_X = 821.1 ppb	NO = 790.5 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -0.8%		
Previous Response	NO_X = 827.7 ppb	NO = 800.3 ppb		*Percent Change	NO = -1.2%		
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.9	361.1	464.7	464.3	1.0008	99.9%
2nd GPT point (200 ppb O3)	797.9	580.3	245.5	245.9	0.9982	100.2%
3rd GPT point (100 ppb O3)	797.9	690.6	135.2	134.6	1.0042	99.6%
				Average Correction Factor	1.0011	99.9%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

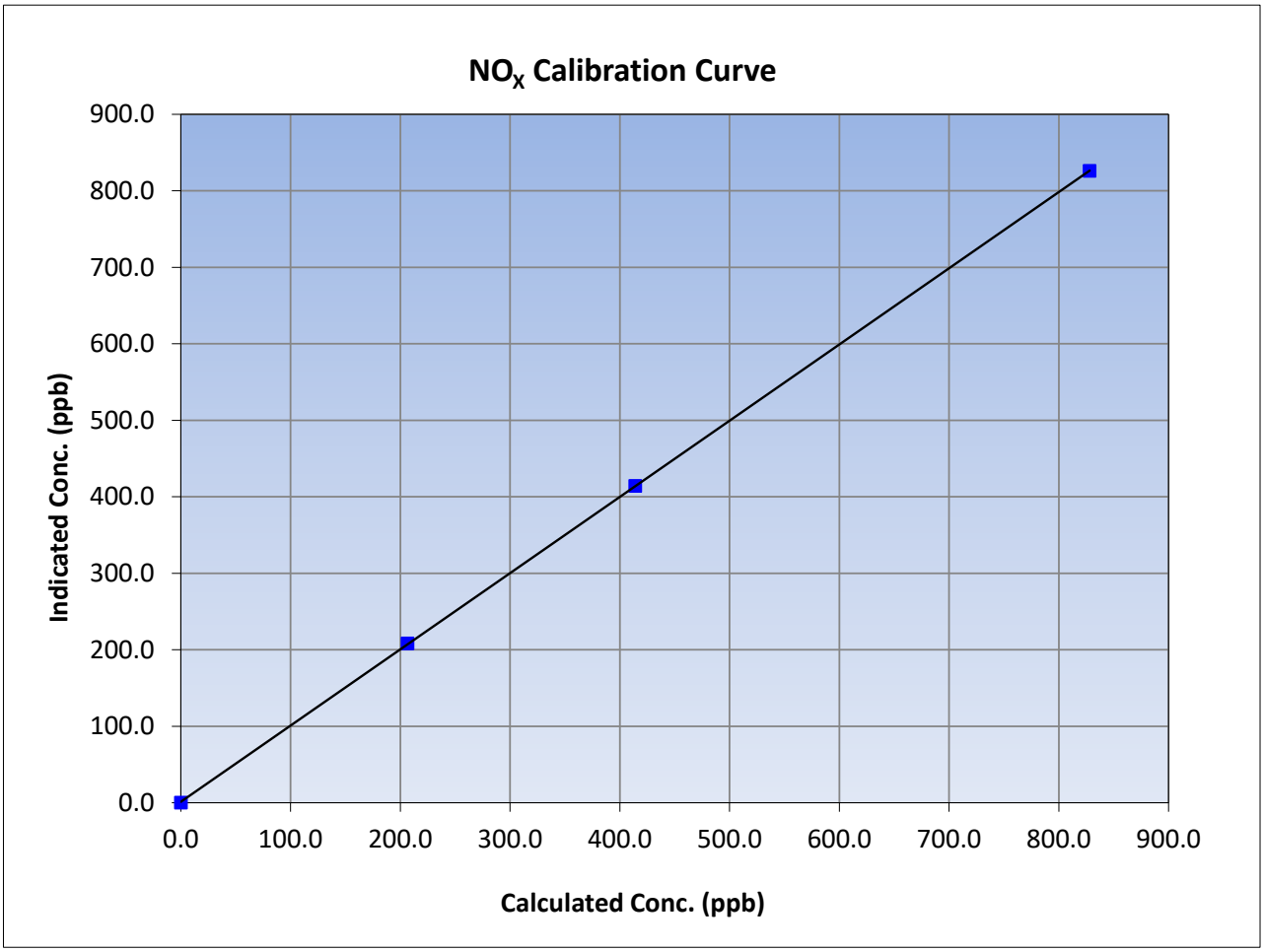
Version-04-2020

Station Information

Calibration Date:	July 27, 2023	Previous Calibration:	June 22, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	9:40	End Time (MST):	14:01
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999993	≥0.995
828.1	826.0	1.0026			
414.0	414.1	0.9998	Slope	0.996456	0.90 - 1.10
206.5	208.2	0.9919			
			Intercept	1.235903	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

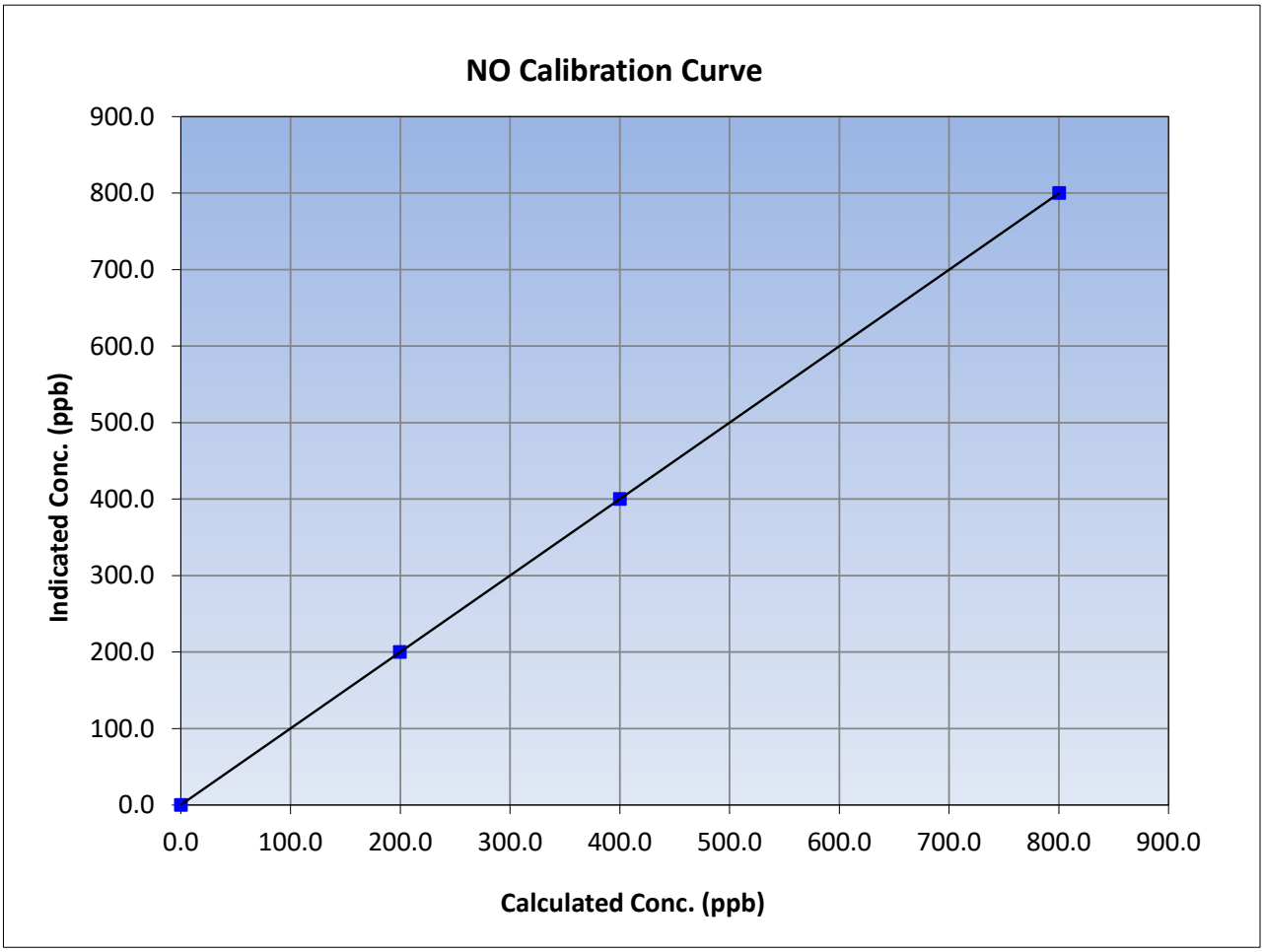
Version-04-2020

Station Information

Calibration Date:	July 27, 2023	Previous Calibration:	June 22, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	9:40	End Time (MST):	14:01
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	1.000000	*≥0.995*
800.3	800.0	1.0004			
400.1	400.0	1.0002	Slope	0.999440	*0.90 - 1.10*
199.6	200.0	0.9978			
			Intercept	0.208843	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

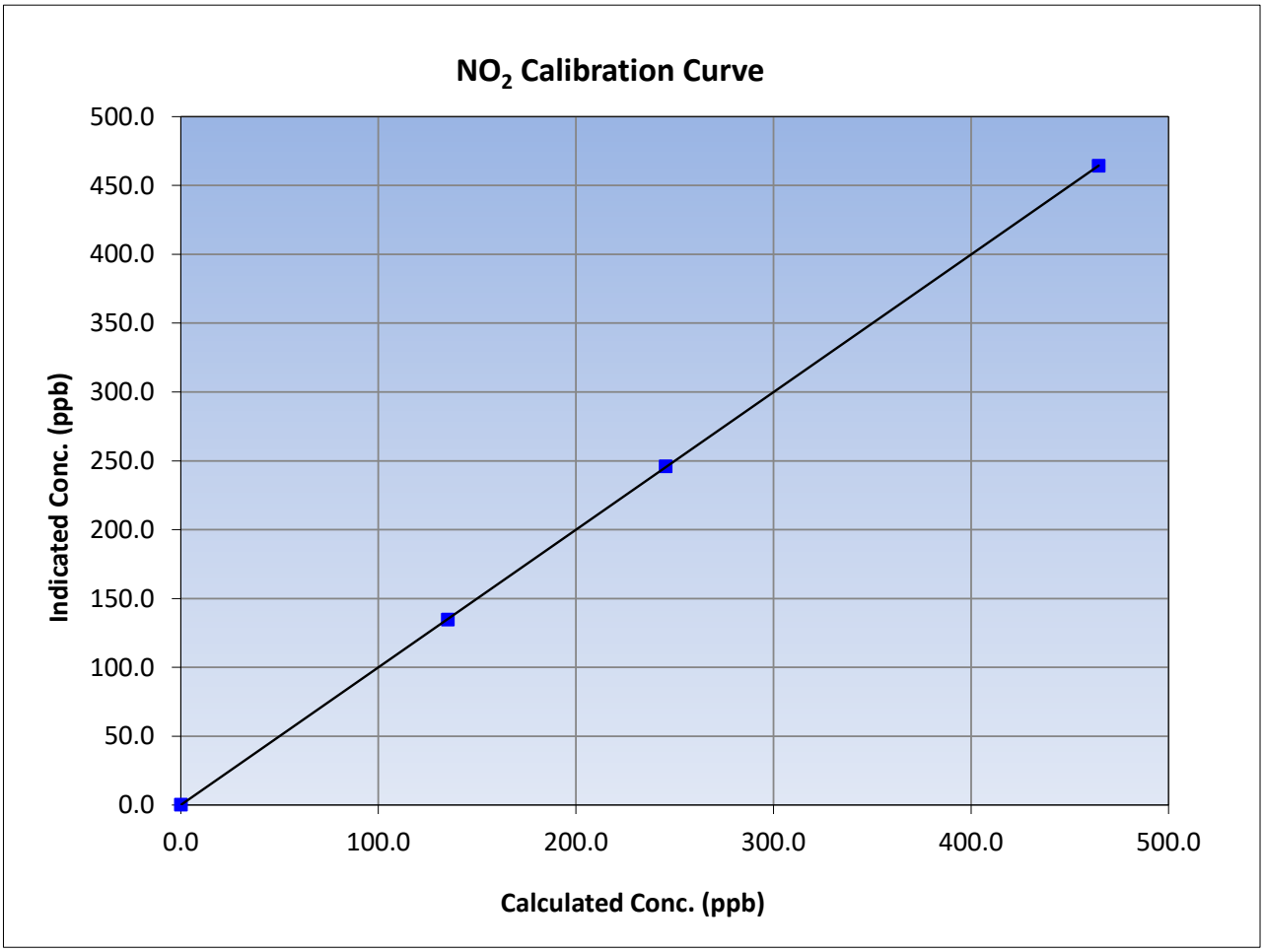
Version-04-2020

Station Information

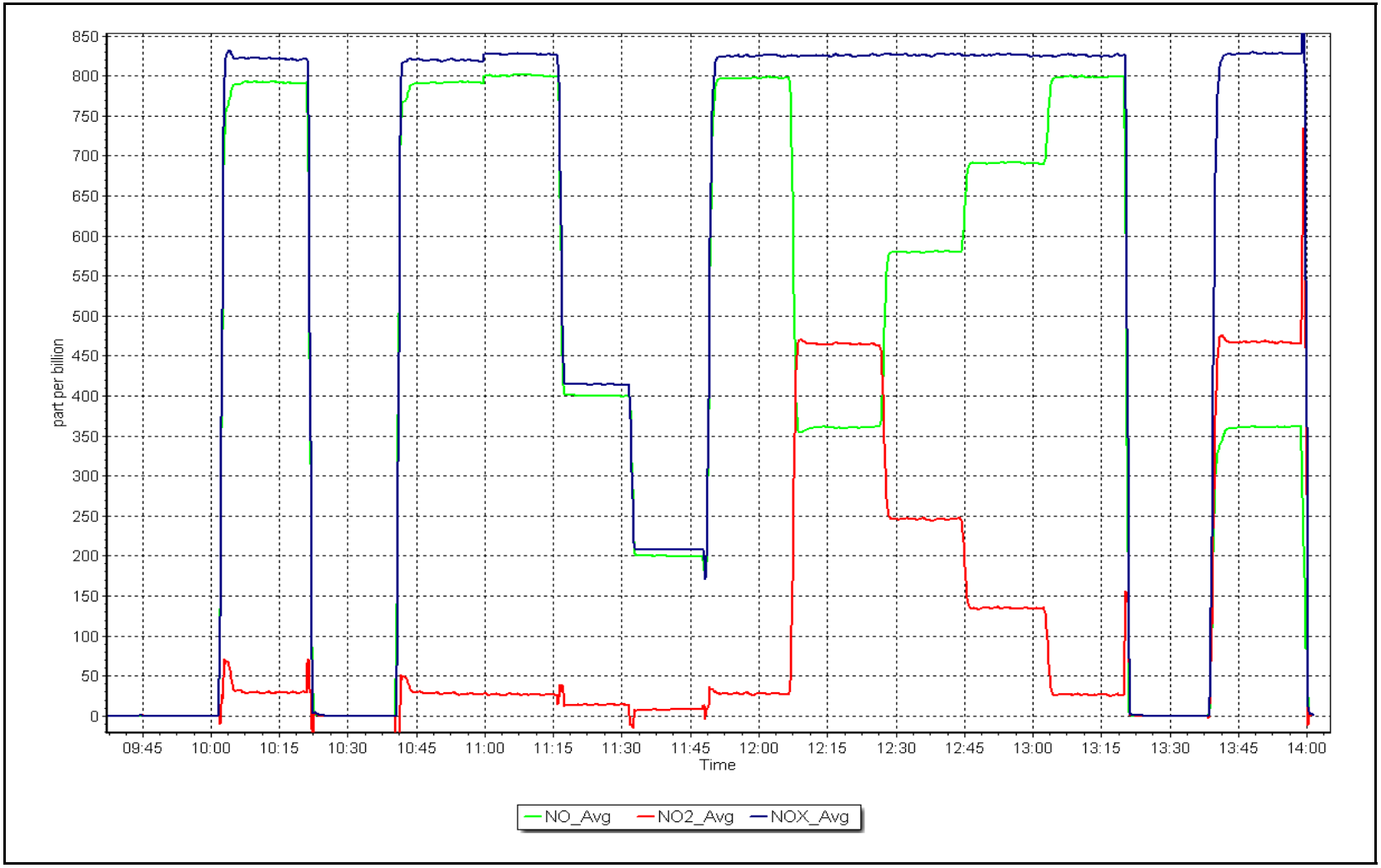
Calibration Date:	July 27, 2023	Previous Calibration:	June 22, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	9:40	End Time (MST):	14:01
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999995	≥0.995
464.7	464.3	1.0008			
245.5	245.9	0.9982	Slope	0.999338	0.90 - 1.10
135.2	134.6	1.0042			
			Intercept	0.066857	+/-20



NO_X Calibration Plot Date: July 27, 2023 Location: Firebag



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS20
MACKAY RIVER
JULY 2023

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

August 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	July 6, 2023	Last Cal Date:	June 8, 2023
Start time (MST):	7:30	End time (MST):	10:03
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:	0.995624	0.996723	Backgd or Offset:	18.2	18.2
Calibration intercept:	0.891225	2.331293	Coeff or Slope:	0.945	0.945

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.8	----
as found span	4919	81.3	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	4919	81.3	800.3	799.5	1.001
second point	4959	40.7	400.7	401.3	0.998
third point	4980	20.3	199.8	204.2	0.979
as left zero	5000	0.0	0.0	0.4	----
as left span	4919	81.3	800.3	799.9	1.000
				Average Correction Factor	0.993

Baseline Corr As found:	799.80	Previous response	797.66	*% change	0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

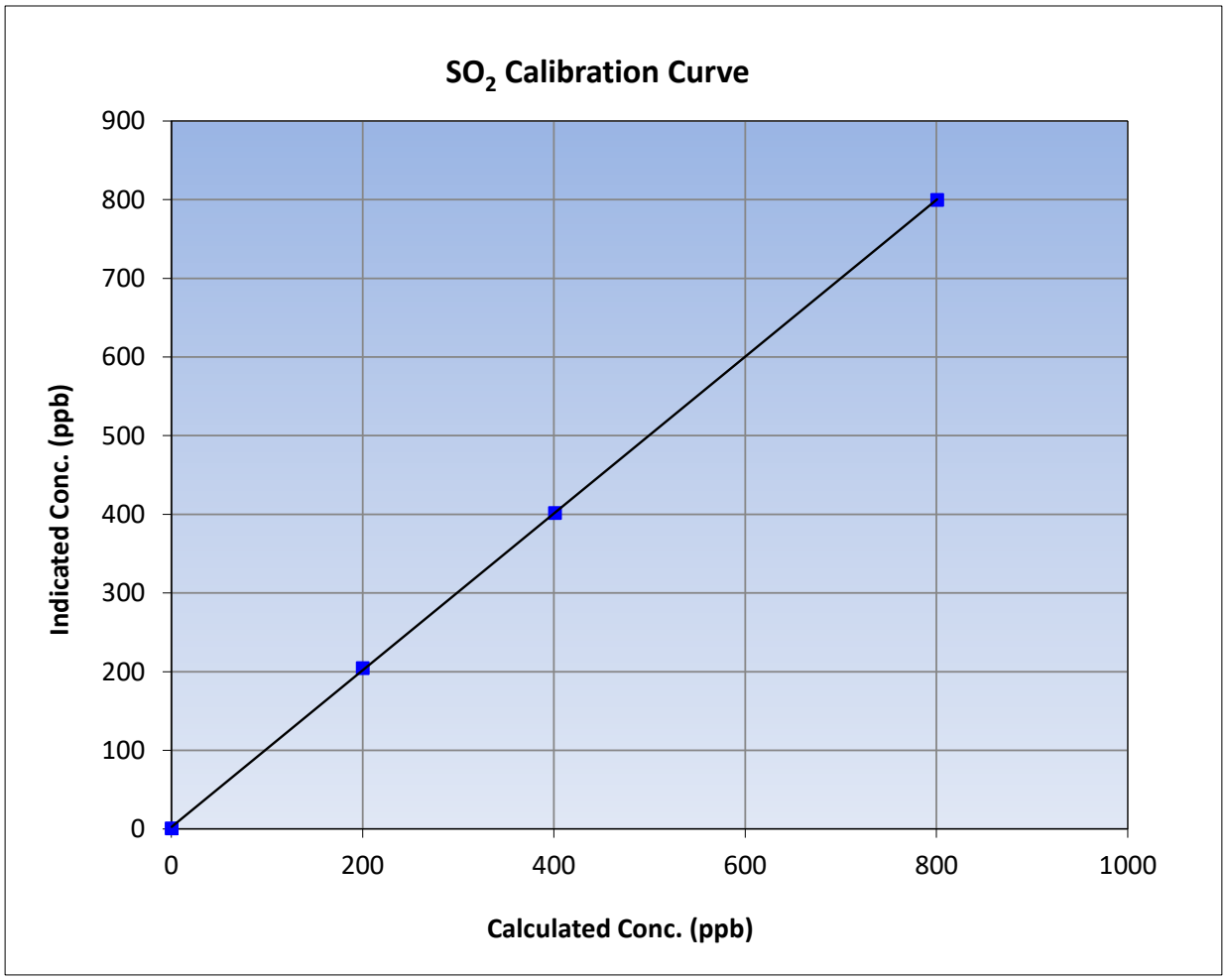
Station Information

Calibration Date:	July 6, 2023	Previous Calibration:	June 8, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	7:30	End Time (MST):	10:03
Analyzer make:	Thermo 43i	Analyzer serial #:	1501301450

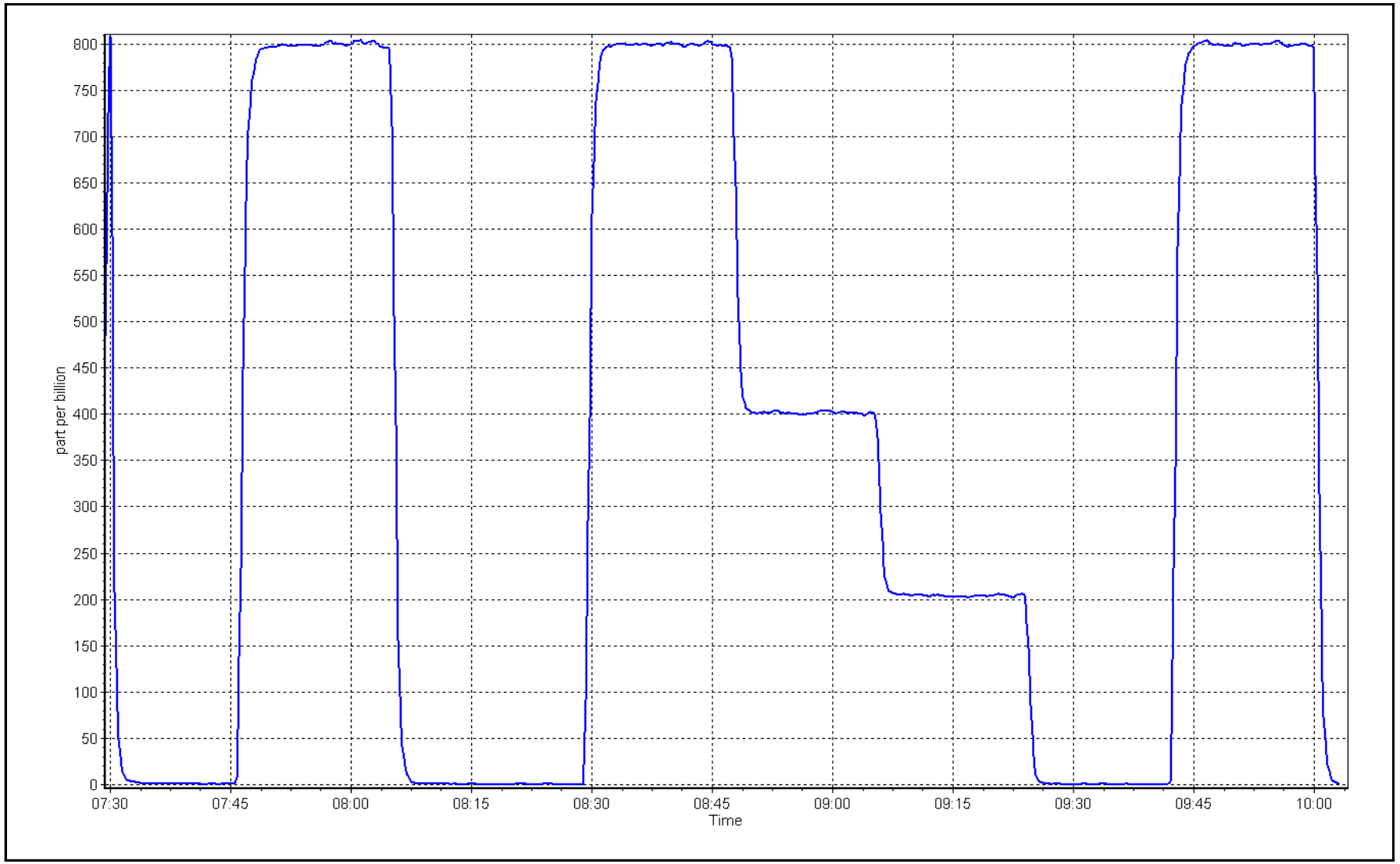
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
800.3	799.5	1.0010
400.7	401.3	0.9984
199.8	204.2	0.9786

Statistical Evaluation		Limits
Correlation Coefficient	0.999968	≥0.995
Slope	0.996723	0.90 - 1.10
Intercept	2.331293	+/-30



SO2 Calibration Plot Date: July 6, 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:	July 5, 2023	Last Cal Date:	June 7, 2023
Start time (MST):	7:10	End time (MST):	11:09
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.12	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC515997			
Removed Cal Gas Conc:	5.12	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	1220
ZAG Make/Model:	Teledyne API 701		Serial Number:	4522

Analyzer Information

Analyzer make:	Thermo 43iQ TLE		Analyzer serial #:	12124313139	
Converter make:	Global		Converter serial #:	2022-226	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.002952	0.996518	Backgd or Offset:	1.1	1.03
Calibration intercept:	-0.033000	0.267198	Coeff or Slope:	0.605	0.571

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4922	78.1	80.0	85.4	0.936
as found 2nd point	4961	39.0	39.9	42.7	0.935
as found 3rd point	4980	19.5	20.0	21.6	0.925
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4922	78.1	80.0	79.9	1.002
second point	4961	39.0	40.0	40.3	0.992
third point	4980	19.5	20.0	20.3	0.986
as left zero	5000	0.0	0.0	0.1	----
as left span	4922	78.1	80.0	79.7	1.004
SO2 Scrubber Check	4919	80.0	800.2	-0.1	----
Date of last scrubber change:		May 25, 2023		Ave Corr Factor	0.993
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	85.4	Prev response:	80.18	*% change:	6.1%
Baseline Corr 2nd AF pt:	42.7	AF Slope:	1.066761	AF Intercept:	0.120683
Baseline Corr 3rd AF pt:	21.6	AF Correlation:	0.999988		

* = > +/-5% change initiates investigation

Notes: Diagonstics similar to last month. Sox Scrubber check completed after calibrator zero. Span Adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

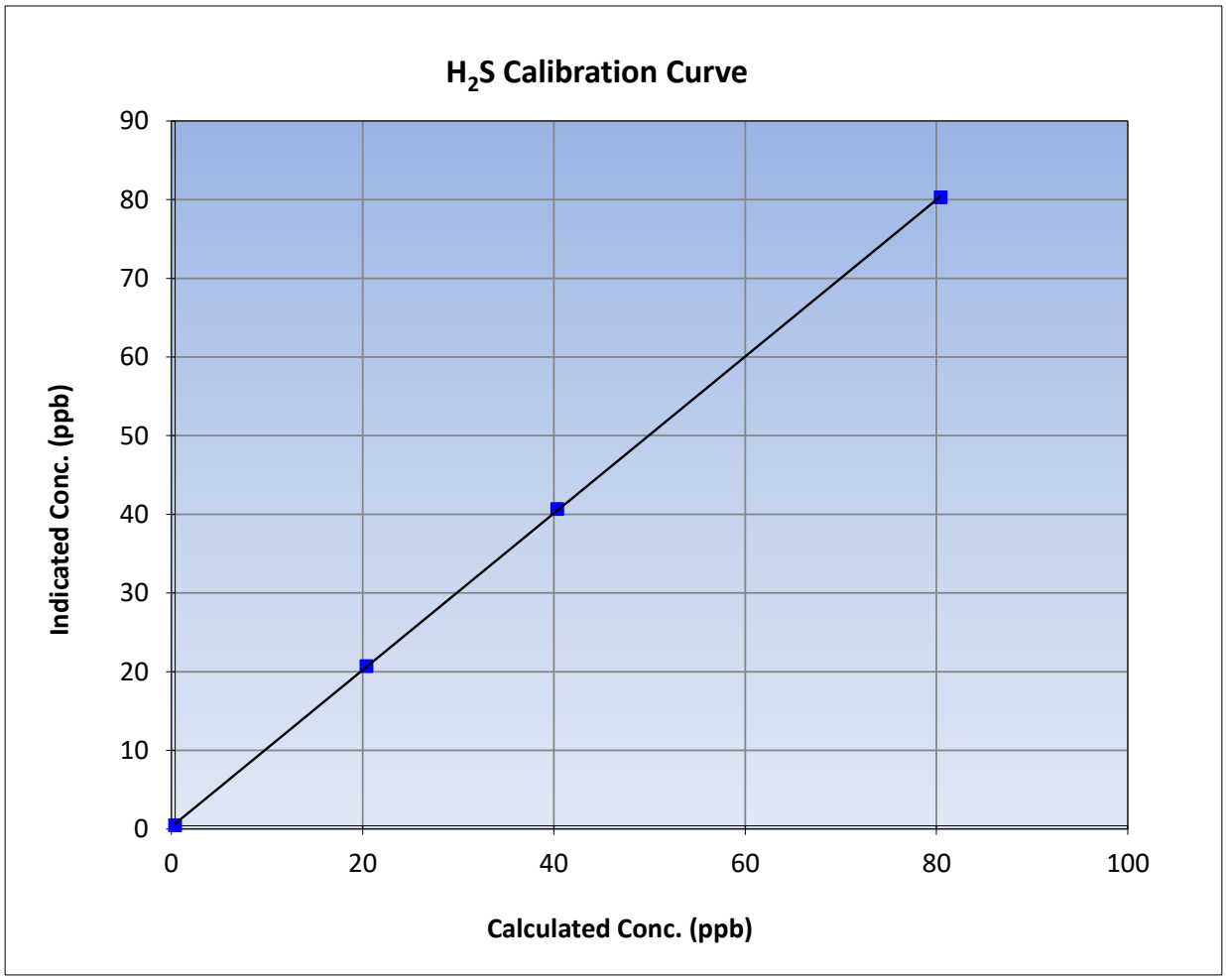
Station Information

Calibration Date:	July 5, 2023	Previous Calibration:	June 7, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	7:10	End Time (MST):	11:09
Analyzer make:	Thermo 43iQ TLE	Analyzer serial #:	12124313139

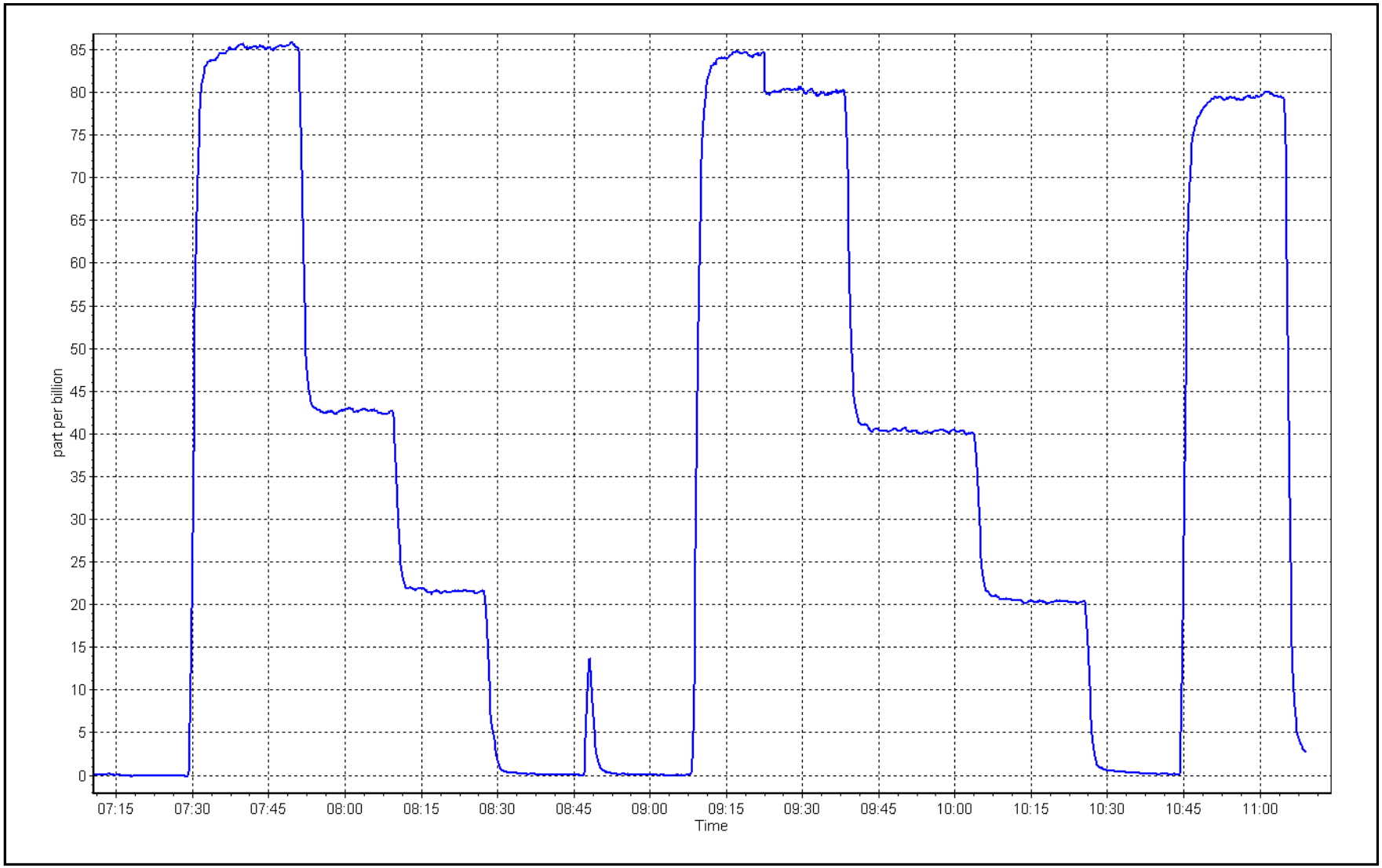
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	79.9	1.0017
40.0	40.3	0.9917
20.0	20.3	0.9860

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999973	*≥0.995*
Slope	0.996518	*0.90 - 1.10*
Intercept	0.267198	*+/-3*



H_2S Calibration Plot Date: July 5, 2023 Location: MacKay River



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	July 6, 2023	Last Cal Date:	June 8, 2023
Start time (MST):	7:30	End time (MST):	10:02
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:	1.002852	0.989494	Background:	3.220	3.040
Calibration intercept:	-0.024234	0.030619	Coefficient:	5.430	5.384

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	-0.14	----
as found span	4919	81.3	17.34	17.22	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.01	----
high point	4919	81.3	17.34	17.18	1.009
second point	4959	40.7	8.68	8.60	1.009
third point	4980	20.3	4.33	4.38	0.988
as left zero	5000	0.0	0.00	-0.03	----
as left span	4919	81.3	17.34	17.17	1.010
				Average Correction Factor	1.002

Baseline Corr As found:	17.36	Previous response	17.36	*% change	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No maintenance done. Zero adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

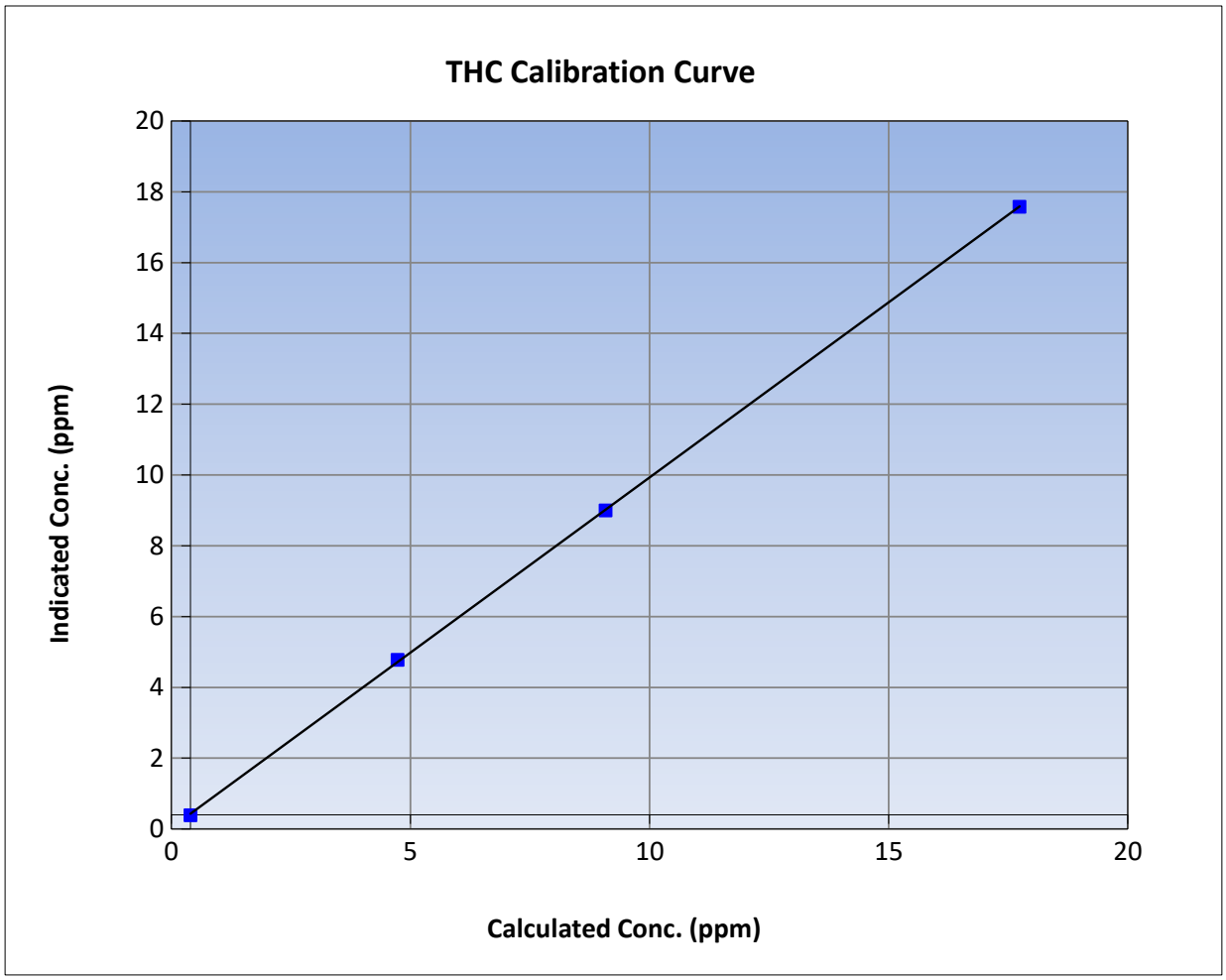
Station Information

Calibration Date:	July 6, 2023	Previous Calibration:	June 8, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	7:30	End Time (MST):	10:02
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1501663727

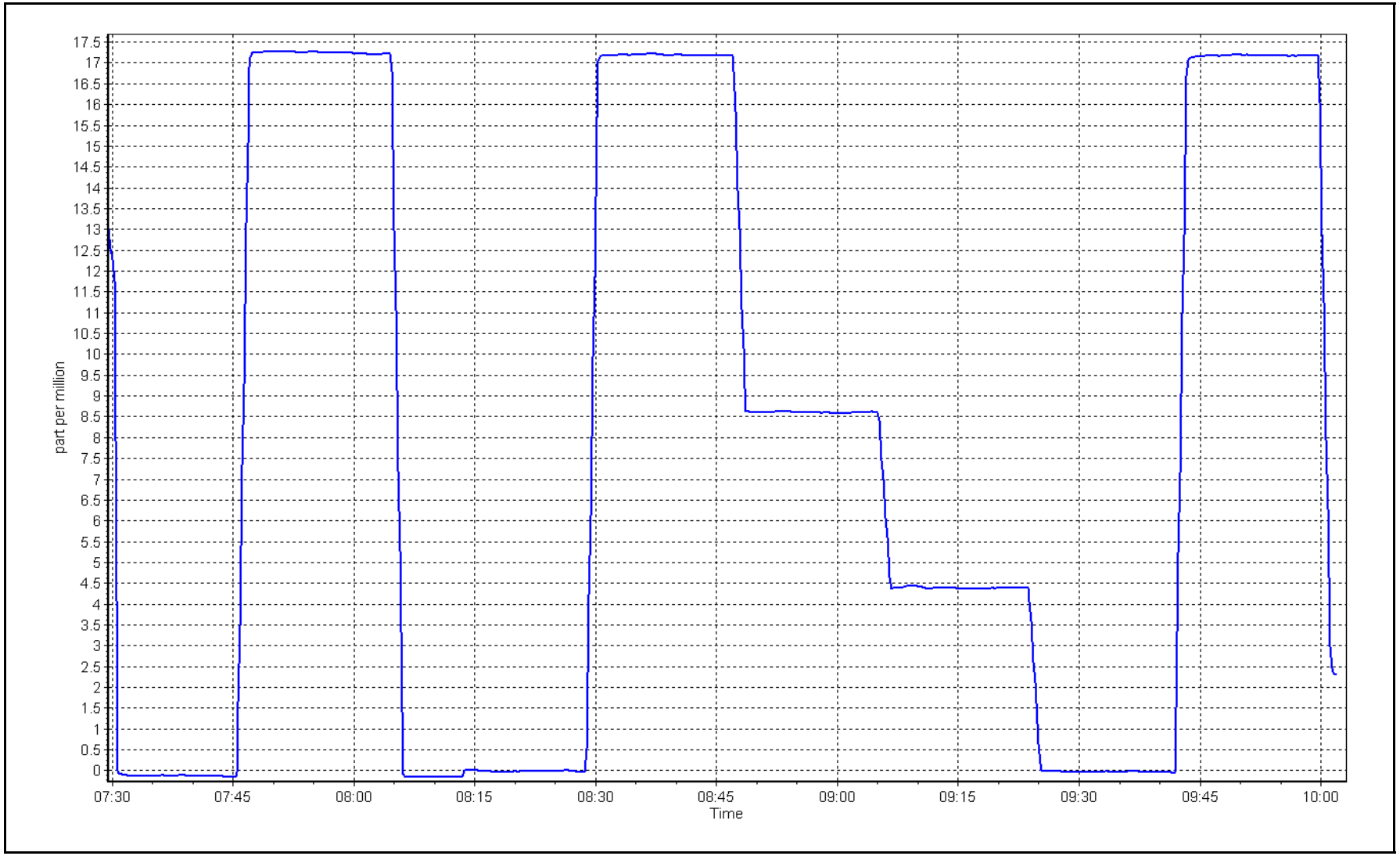
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.01	----
17.34	17.18	1.0093
8.68	8.60	1.0090
4.33	4.38	0.9885

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999961	*≥0.995*
Slope	0.989494	*0.90 - 1.10*
Intercept	0.030619	*+/-1.5*



THC Calibration Plot Date: July 6, 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:	July 4, 2023	Last Cal Date:	June 19, 2023
Start time (MST):	7:14	End time (MST):	11:07
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:	1.503	1.503	NO bkgnd or offset:	4.2	4.2
NOX coeff or slope:	0.992	0.992	NOX bkgnd or offset:	4.2	4.2
NO2 coeff or slope:	0.995	0.995	Reaction cell Press:	182.5	182.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.997289	0.990458
NO_X Cal Offset:	2.290060	2.589991
NO Cal Slope:	0.998247	0.991438
NO Cal Offset:	1.091419	1.451137
NO_2 Cal Slope:	1.002522	0.998430
NO_2 Cal Offset:	-0.129742	-0.419338

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	4917	83.3	819.5	800.3	19.2	817.3	797.4	19.9	1.0026	1.0036
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.2	----	----
high point	4917	83.3	819.5	800.3	19.2	813.3	794.4	19.0	1.0076	1.0074
second point	4956	41.7	410.4	400.8	9.6	409.5	398.9	10.7	1.0023	1.0049
third point	4979	20.8	204.6	199.9	4.8	208.2	201.5	6.7	0.9829	0.9918
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.1	----	----
as left span	4917	83.3	819.5	442.0	377.5	818.3	437.3	381.1	1.0014	1.0107
								Average Correction Factor	0.9976	1.0014

Corrected As found	NO_X = 817.3 ppb	NO = 797.5 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.3%
Previous Response	NO_X = 819.5 ppb	NO = 800.0 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)	793.1	434.8	377.5	377.0	1.0012	99.9%
2nd GPT point (200 ppb O3)	793.1	606.2	206.1	204.5	1.0076	99.2%
3rd GPT point (100 ppb O3)	793.1	697.4	114.9	113.9	1.0084	99.2%
				Average Correction Factor	1.0057	99.4%

Notes: No adjustments and maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

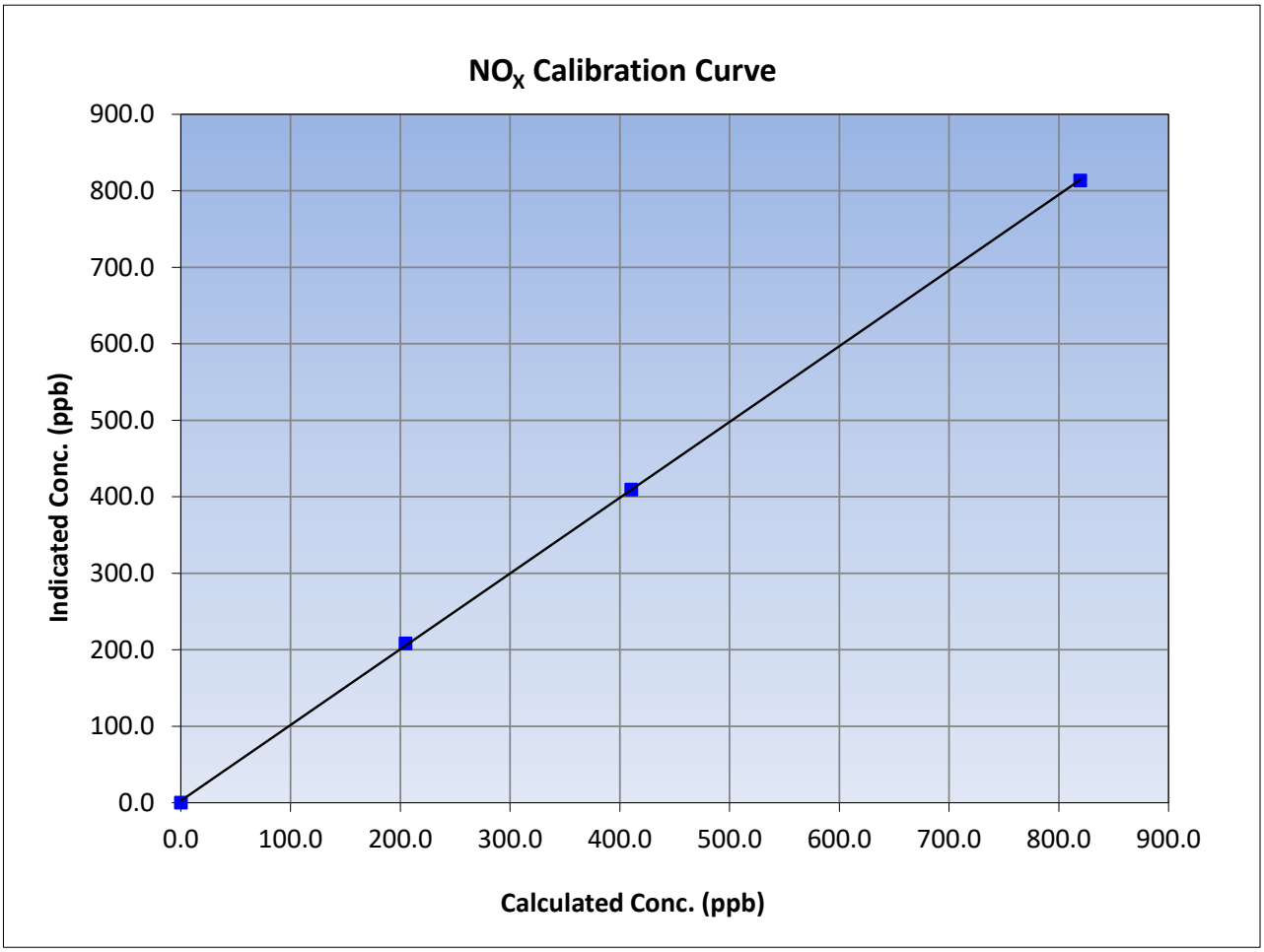
Version-04-2020

Station Information

Calibration Date:	July 4, 2023	Previous Calibration:	June 19, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	7:14	End Time (MST):	11:07
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	0.2	----	Correlation Coefficient	0.999958	*≥0.995*
819.5	813.3	1.0076			
410.4	409.5	1.0023	Slope	0.990458	*0.90 - 1.10*
204.6	208.2	0.9829			
			Intercept	2.589991	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

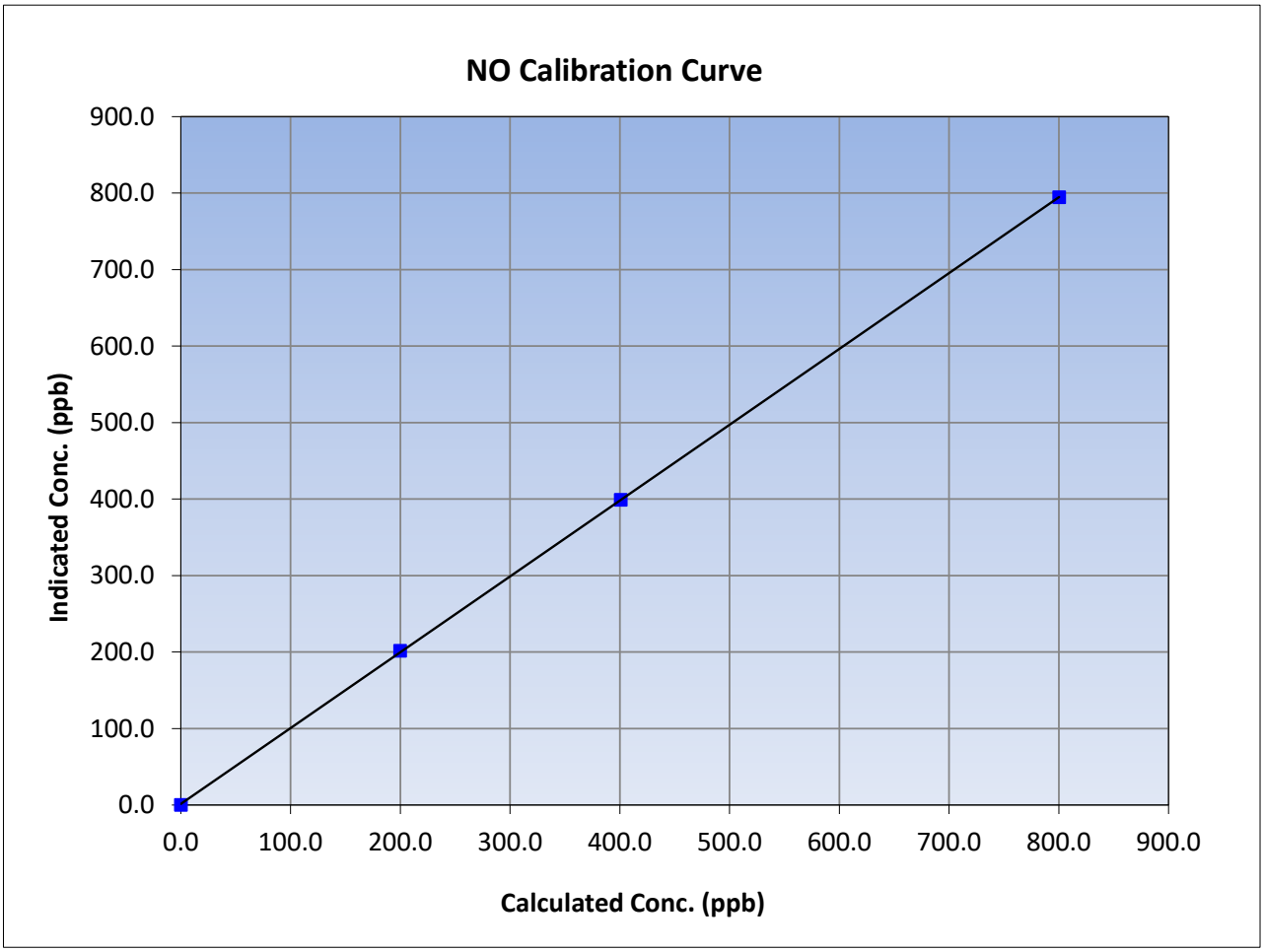
Version-04-2020

Station Information

Calibration Date:	July 4, 2023	Previous Calibration:	June 19, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	7:14	End Time (MST):	11:07
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	0.999983	≥0.995
800.3	794.4	1.0074			
400.8	398.9	1.0049	Slope	0.991438	0.90 - 1.10
199.9	201.5	0.9918			
			Intercept	1.451137	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

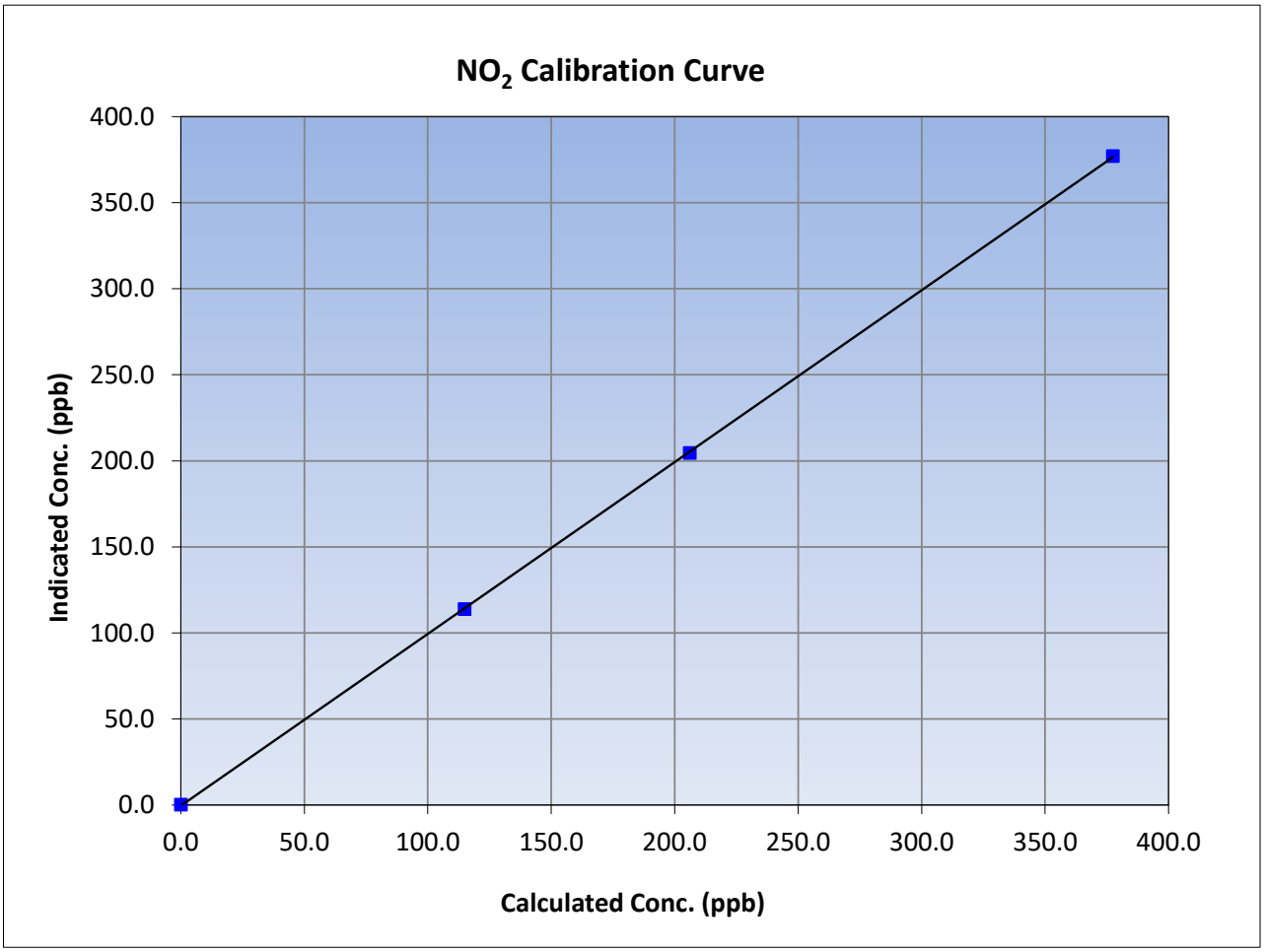
Version-04-2020

Station Information

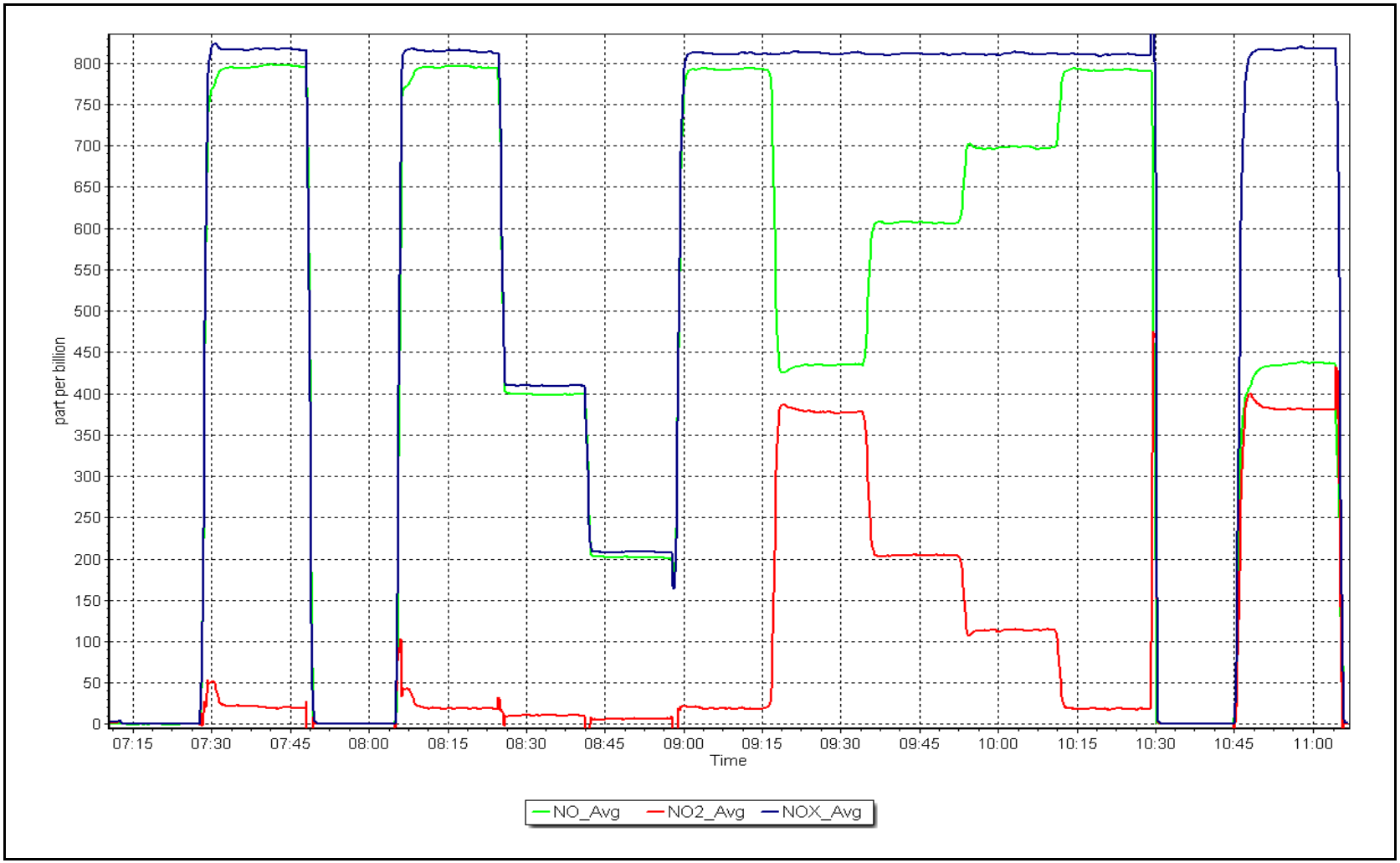
Calibration Date:	July 4, 2023	Previous Calibration:	June 19, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	7:14	End Time (MST):	11:07
Analyzer make:	Thermo 42i	Analyzer serial #:	1505164379

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999980	≥0.995
377.5	377.0	1.0012			
206.1	204.5	1.0076	Slope	0.998430	0.90 - 1.10
114.9	113.9	1.0084			
			Intercept	-0.419338	+/-20



NO_X Calibration Plot Date: July 4, 2023 Location: MacKay River



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS21
CONKLIN
JULY 2023

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

August 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	July 13, 2023	Last Cal Date:	June 5, 2023
Start time (MST):	9:55	End time (MST):	12:50
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.93	ppm	Cal Gas Exp Date:	January 5, 2025
Cal Gas Cylinder #:	CC259455			
Removed Cal Gas Conc:	49.93	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:			Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3810
ZAG Make/Model:	Teledyne API 701		Serial Number:	691

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1428701363

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	0.999546	0.997605	Backgd or Offset:	27.3	27.2
Calibration intercept:	0.235763	0.415762	Coeff or Slope:	0.883	0.883

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	-0.2	----
as found span	4920	80.2	800.8	796.5	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5005	0.0	0.0	-0.2	----
high point	4920	80.2	800.8	799.1	1.002
second point	4960	40.1	400.4	400.0	1.001
third point	4980	20.0	200.1	200.8	0.997
as left zero	5005	0.0	0.0	-0.1	----
as left span	4920	80.2	800.8	798.0	1.004
				Average Correction Factor	1.000

Baseline Corr As found:	796.70	Previous response	800.72	*% change	-0.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

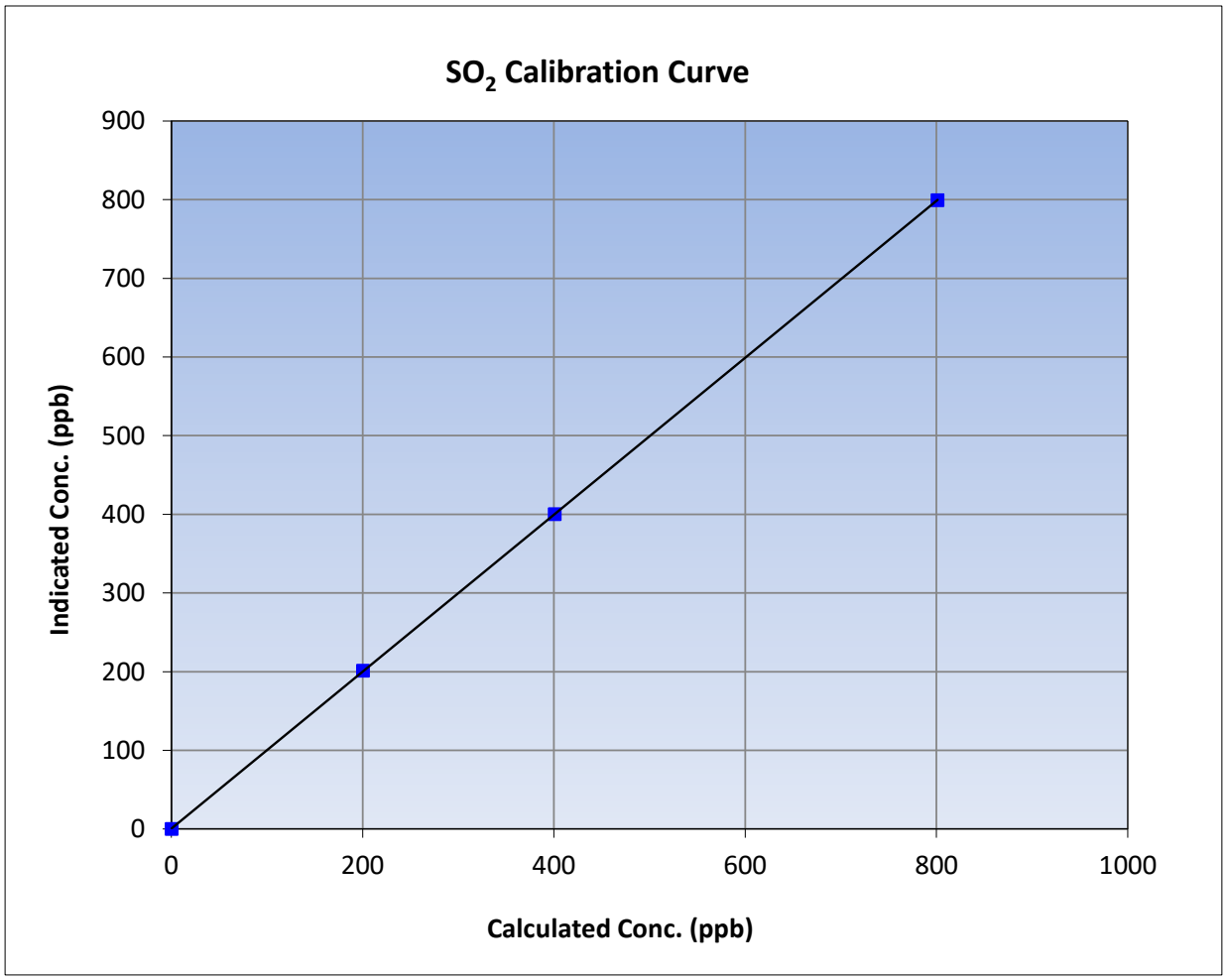
Station Information

Calibration Date:	July 13, 2023	Previous Calibration:	June 5, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:55	End Time (MST):	12:50
Analyzer make:	Thermo 43i	Analyzer serial #:	1428701363

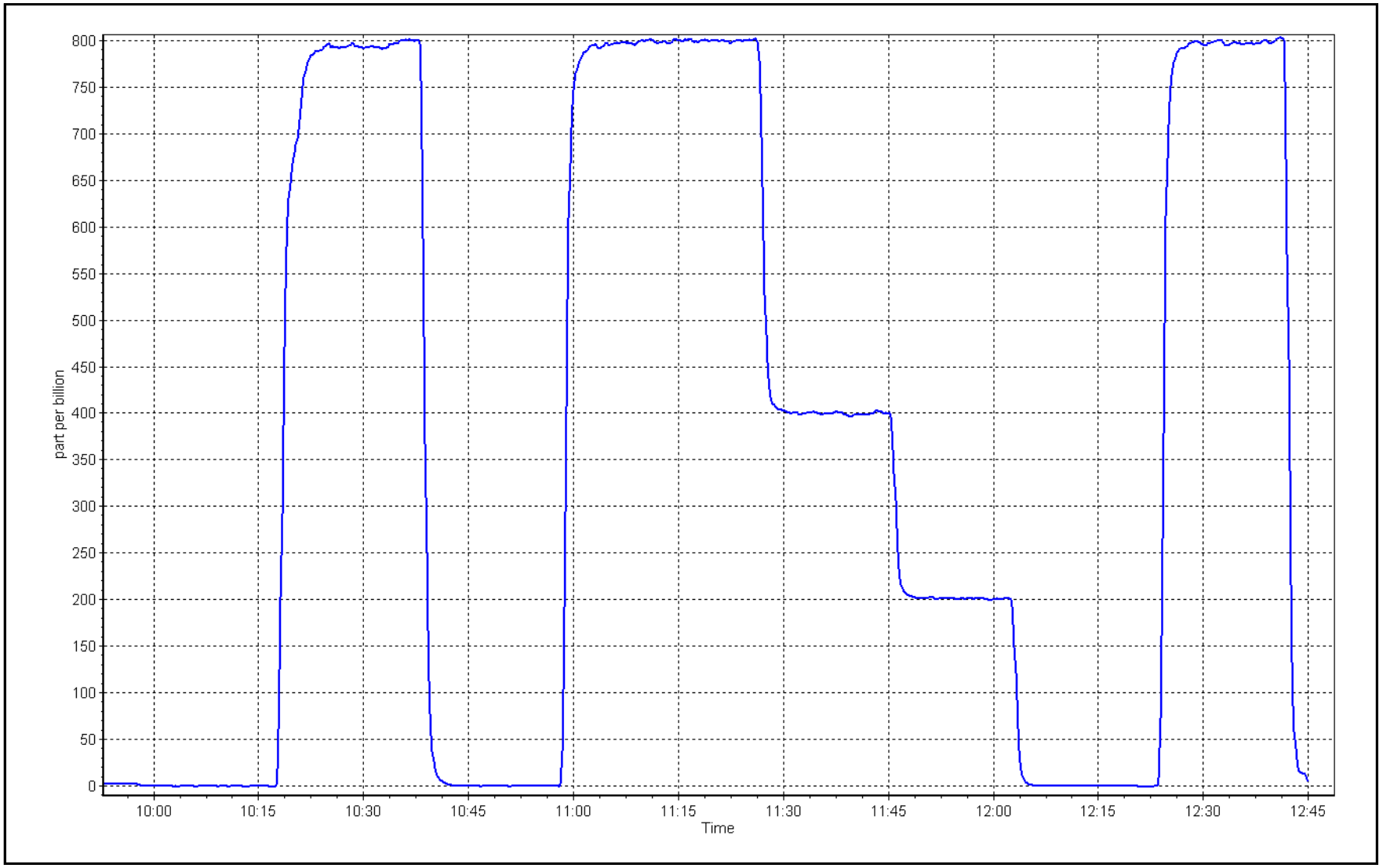
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
800.8	799.1	1.0022
400.4	400.0	1.0011
200.1	200.8	0.9966

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999997	*≥0.995*
Slope	0.997605	*0.90 - 1.10*
Intercept	0.415762	*+/-30*



SO2 Calibration Plot Date: July 13, 2023 Location: Conklin



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	July 27, 2023	Last Cal Date:	June 28, 2023
Start time (MST):	8:14	End time (MST):	11:50
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.00	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC501204			
Removed Cal Gas Conc:	5.03	ppm	Rem Gas Exp Date:	April 16, 2022
Removed Gas Cyl #:	CC505493		Diff between cyl:	
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:	1.001571	1.007143	Backgd or Offset:	2.4	2.4
Calibration intercept:	0.320000	0.200000	Coeff or Slope:	0.974	0.958

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic·AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4920	80.0	80.5	81.0	0.994
as found 2nd point	4960	40.0	40.2	40.7	0.989
as found 3rd point	4980	20.0	20.1	20.3	0.991
new cylinder response	4920	80.0	80.0		

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4920	80.0	80.0	80.7	0.991
second point	4960	40.0	40.0	40.6	0.985
third point	4980	20.0	20.0	20.4	0.980
as left zero	5000	0.0	0.0	0.2	----
as left span	4920	80.0	80.0	80.2	0.998
SO2 Scrubber Check	4920	80.2	802.0		----
Date of last scrubber change:				Ave Corr Factor	0.986
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.0	Prev response:	80.93	*% change:	0.1%
Baseline Corr 2nd AF pt:	40.7	AF Slope:	1.006532	AF Intercept:	0.060000
Baseline Corr 3rd AF pt:	20.3	AF Correlation:	0.999993		

* = > +/-5% change initiates investigation

Notes: Adjusted the span only.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

TRS Calibration Summary

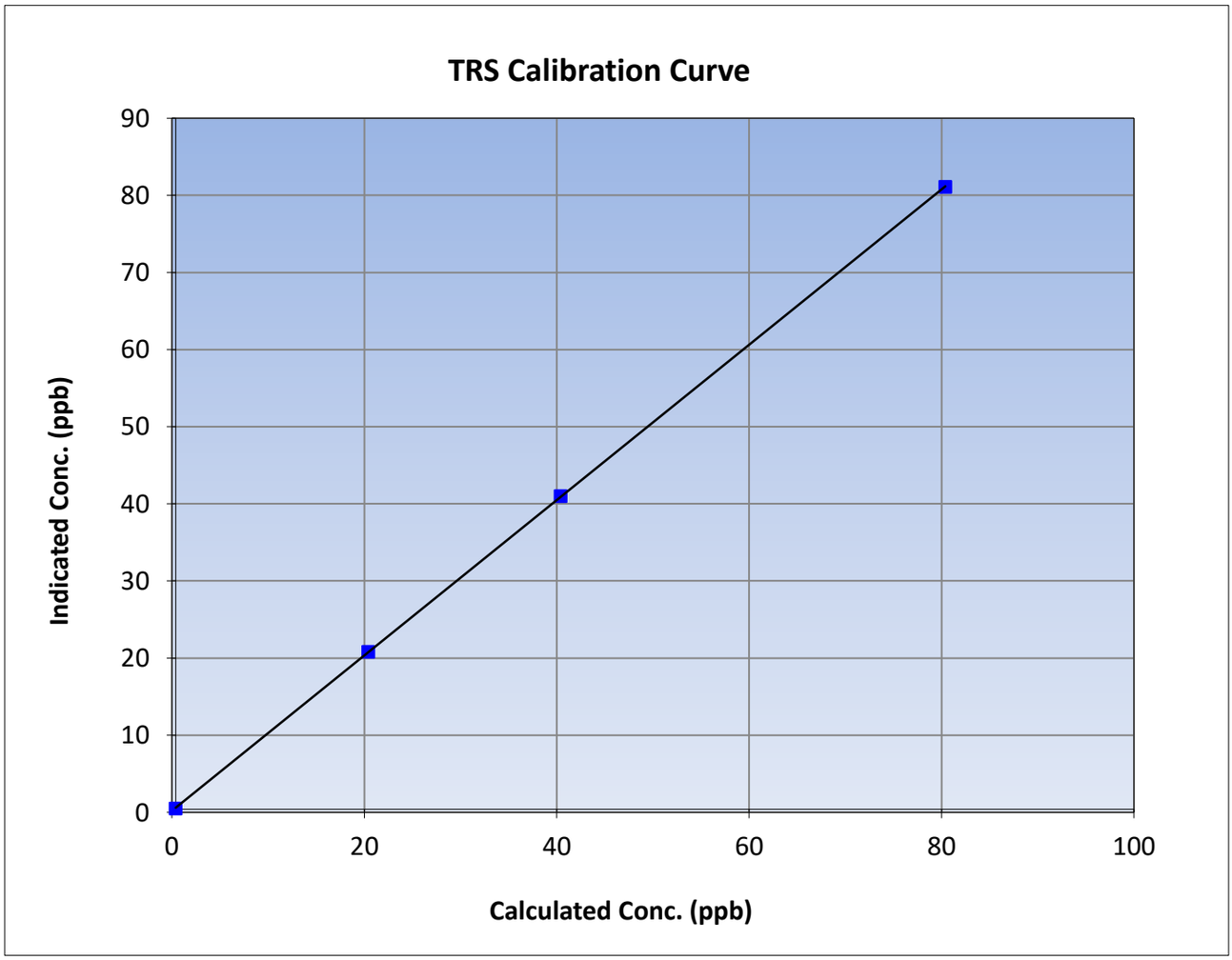
Version-11-2021

Station Information

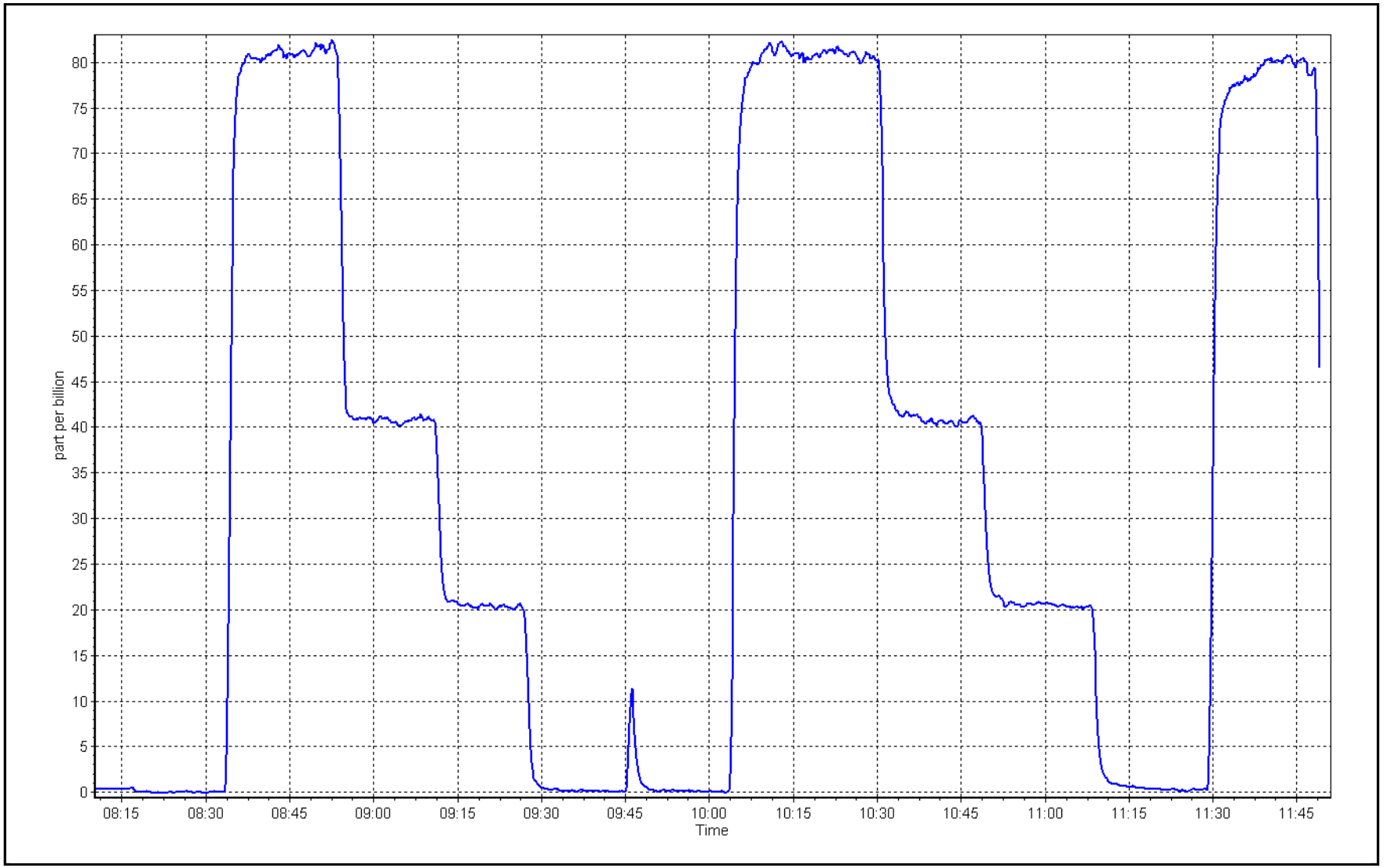
Calibration Date:	July 27, 2023	Previous Calibration:	June 28, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	8:14	End Time (MST):	11:50
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1236656116

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.1	----	Correlation Coefficient	0.999991	*≥0.995*
80.0	80.7	0.9913			
40.0	40.6	0.9852	Slope	1.007143	*0.90 - 1.10*
20.0	20.4	0.9804			
			Intercept	0.200000	*+/-3*



TRS Calibration Plot Date: July 27, 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:	July 13, 2023	Last Cal Date:	June 21, 2023
Start time (MST):	9:55	End time (MST):	12:50
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC259455	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
C3H8 Cal Gas Conc.	207.2	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
Removed C3H8 Conc.	207.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	3810	
ZAG make/model:	Teledyne API 701H		Serial Number:	691	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1331259521	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.26E-04	2.27E-04	NMHC SP Ratio:	4.99E-05	5.05E-05
CH4 Retention time:	12.00	12.00	NMHC Peak Area:	183139	180824

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	17.13	16.98	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	17.13	17.12	1.000
second point	4960	40.1	8.56	8.54	1.002
third point	4980	20.0	4.27	4.29	0.996
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	17.13	17.16	0.998
				Average Correction Factor	0.999
Baseline Corr AF:	16.98	Prev response	17.11	*% change	-0.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	9.14	9.04	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	80.2	9.14	9.13	1.001
second point	4960	40.1	4.57	4.57	0.999
third point	4980	20.0	2.28	2.30	0.991
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	9.14	9.16	0.998
				Average Correction Factor	0.997
Baseline Corr AF:	9.04	Prev response	9.14	*% 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	4920	80.2	7.99	7.94	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	80.2	7.99	7.99	1.000
second point	4960	40.1	3.99	3.97	1.006
third point	4980	20.0	1.99	1.99	1.000
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	1.002
Baseline Corr AF:	7.94	Prev response	7.98	*% change	-0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999095	0.999162
THC Cal Offset:	0.002575	0.004574
CH4 Cal Slope:	0.999624	0.999695
CH4 Cal Offset:	-0.006854	-0.004854
NMHC Cal Slope:	0.998558	0.998696
NMHC Cal Offset:	0.009229	0.009428

Notes: Adjusted the span only.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

THC Calibration Summary

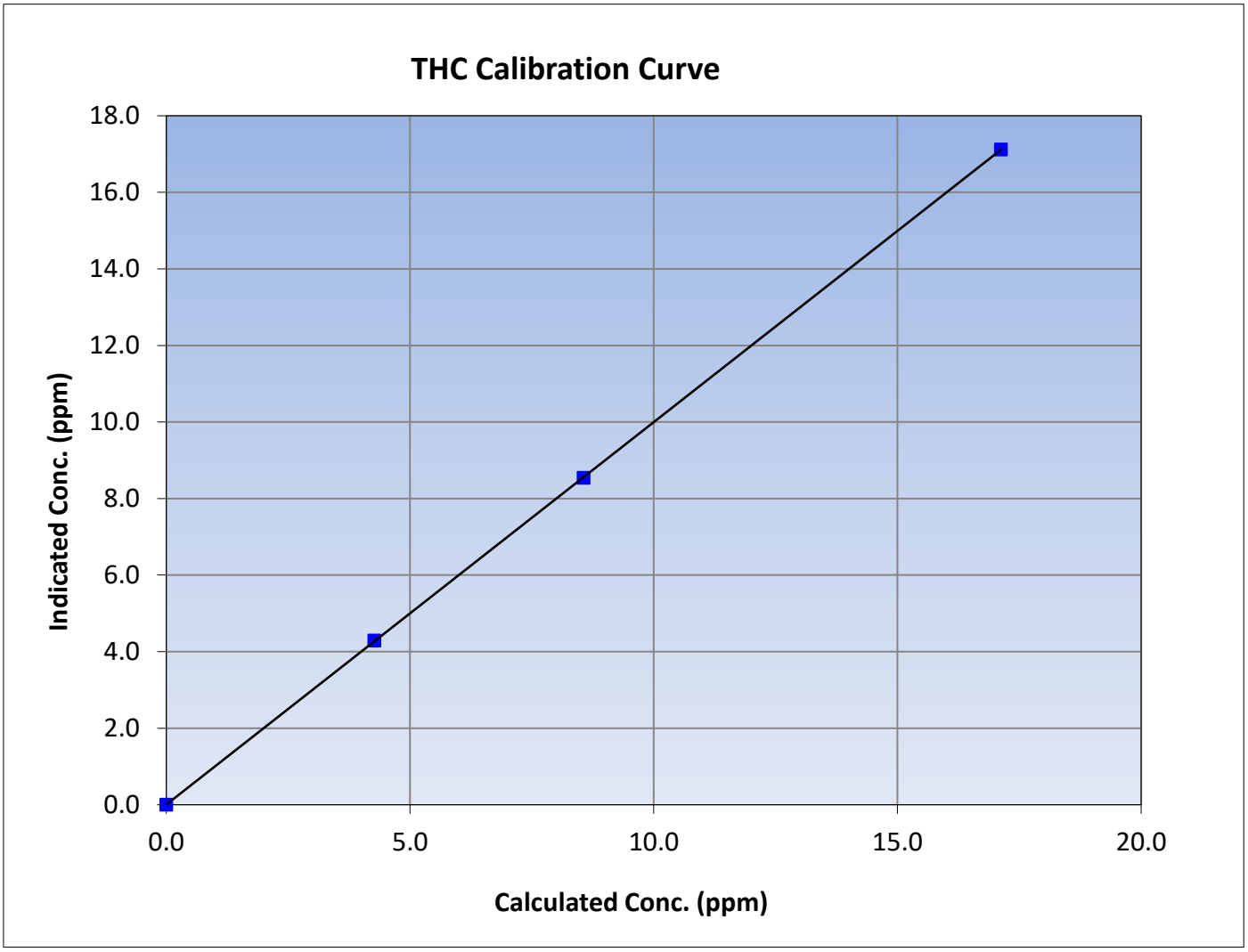
Version-06-2022

Station Information

Calibration Date:	July 13, 2023	Previous Calibration:	June 21, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:55	End Time (MST):	12:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999996	≥0.995
17.13	17.12	1.0003			
8.56	8.54	1.0024	Slope	0.999162	0.90 - 1.10
4.27	4.29	0.9955			
			Intercept	0.004574	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

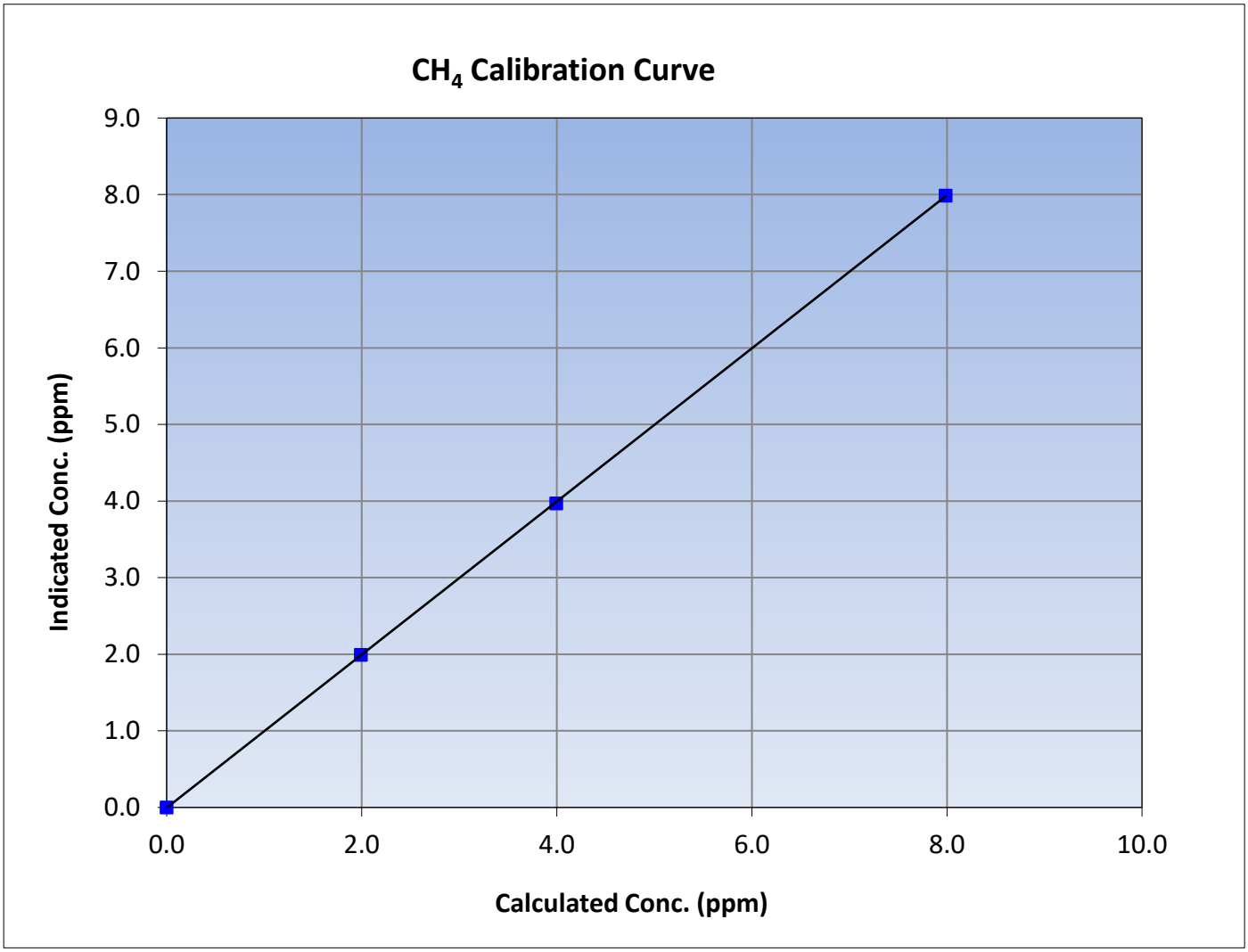
Version-06-2022

Station Information

Calibration Date:	July 13, 2023	Previous Calibration:	June 21, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:55	End Time (MST):	12:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999989	*≥0.995*
7.99	7.99	1.0000			
3.99	3.97	1.0058	Slope	0.999695	*0.90 - 1.10*
1.99	1.99	1.0003			
			Intercept	-0.004854	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

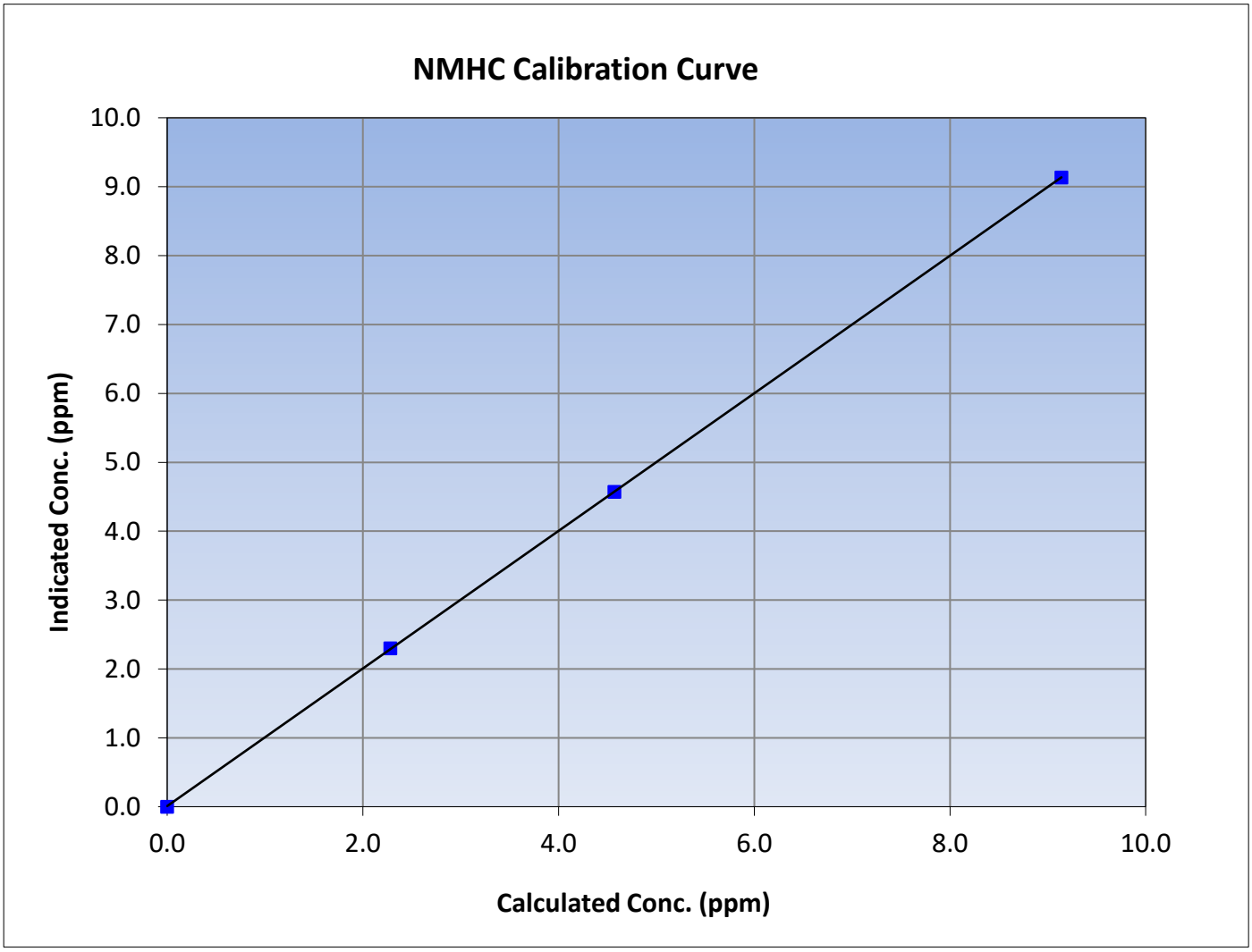
Version-06-2022

Station Information

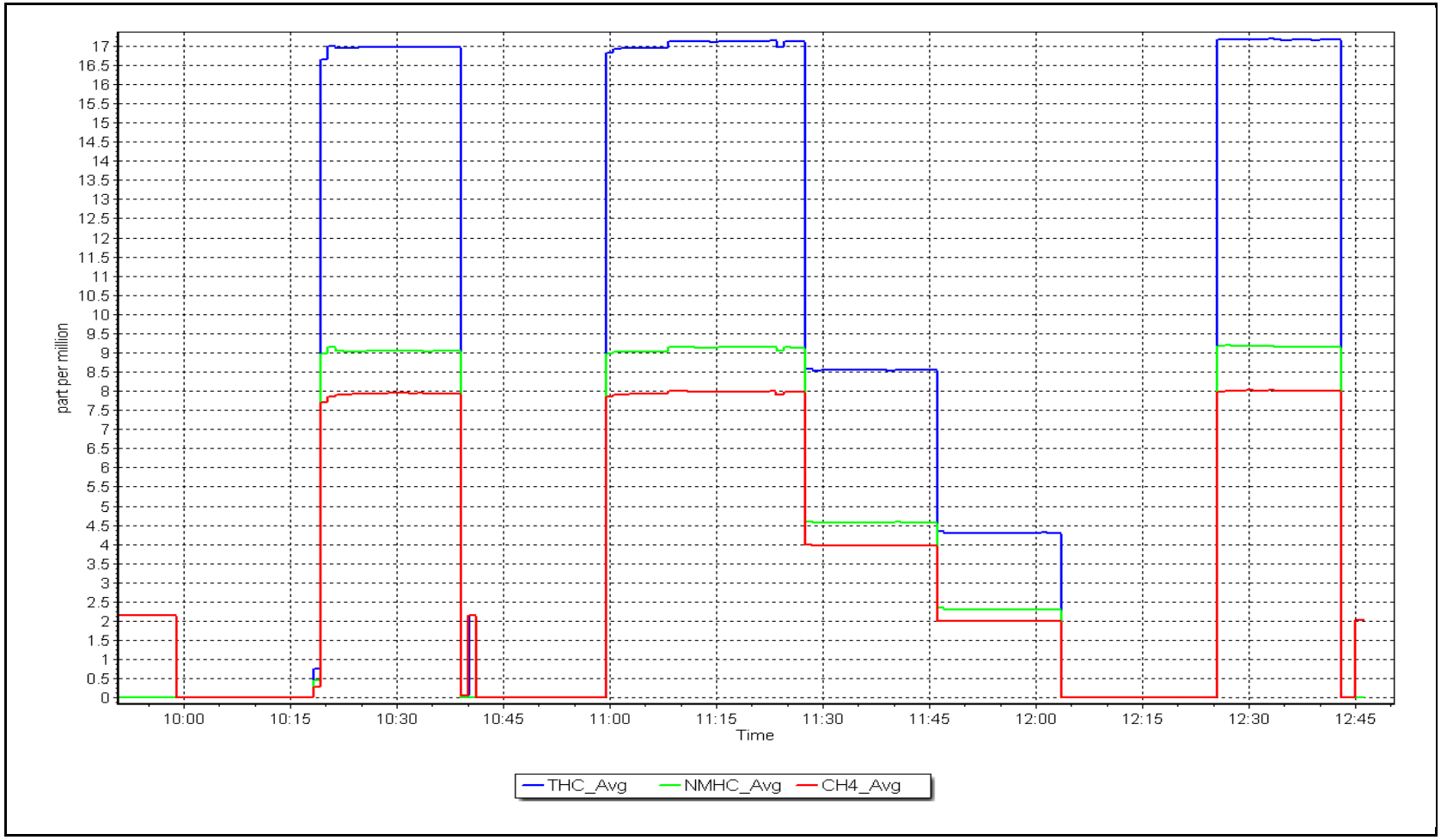
Calibration Date:	July 13, 2023	Previous Calibration:	June 21, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:55	End Time (MST):	12:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999994	≥0.995
9.14	9.13	1.0006			
4.57	4.57	0.9995	Slope	0.998696	0.90 - 1.10
2.28	2.30	0.9914			
			Intercept	0.009428	+/-0.5



NMHC Calibration Plot Date: July 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:	July 18, 2023	Last Cal Date:	July 13, 2023
Start time (MST):	9:26	End time (MST):	11:05
Reason:	Cylinder Change		

Calibration Standards

Gas Cert Reference:		CC259455	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
C3H8 Cal Gas Conc.	207.2	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
Removed C3H8 Conc.	207.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	3810	
ZAG make/model:	Teledyne API 701H		Serial Number:	691	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1331259521	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.27E-04	2.27E-04	NMHC SP Ratio:	5.05E-05	5.05E-05
CH4 Retention time:	12.00	12.00	NMHC Peak Area:	180824	180824

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	17.12	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	17.13	17.53	0.977
				Average Correction Factor	
Baseline Corr AF:	17.12	Prev response	17.12	*% change	0.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	9.14	9.16	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	9.14	9.43	0.969
				Average Correction Factor	
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	4920	80.2	7.99	7.97	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	7.99	8.10	0.986
				Average Correction Factor	
Baseline Corr AF:	7.97	Prev response	7.98	*% change	-0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

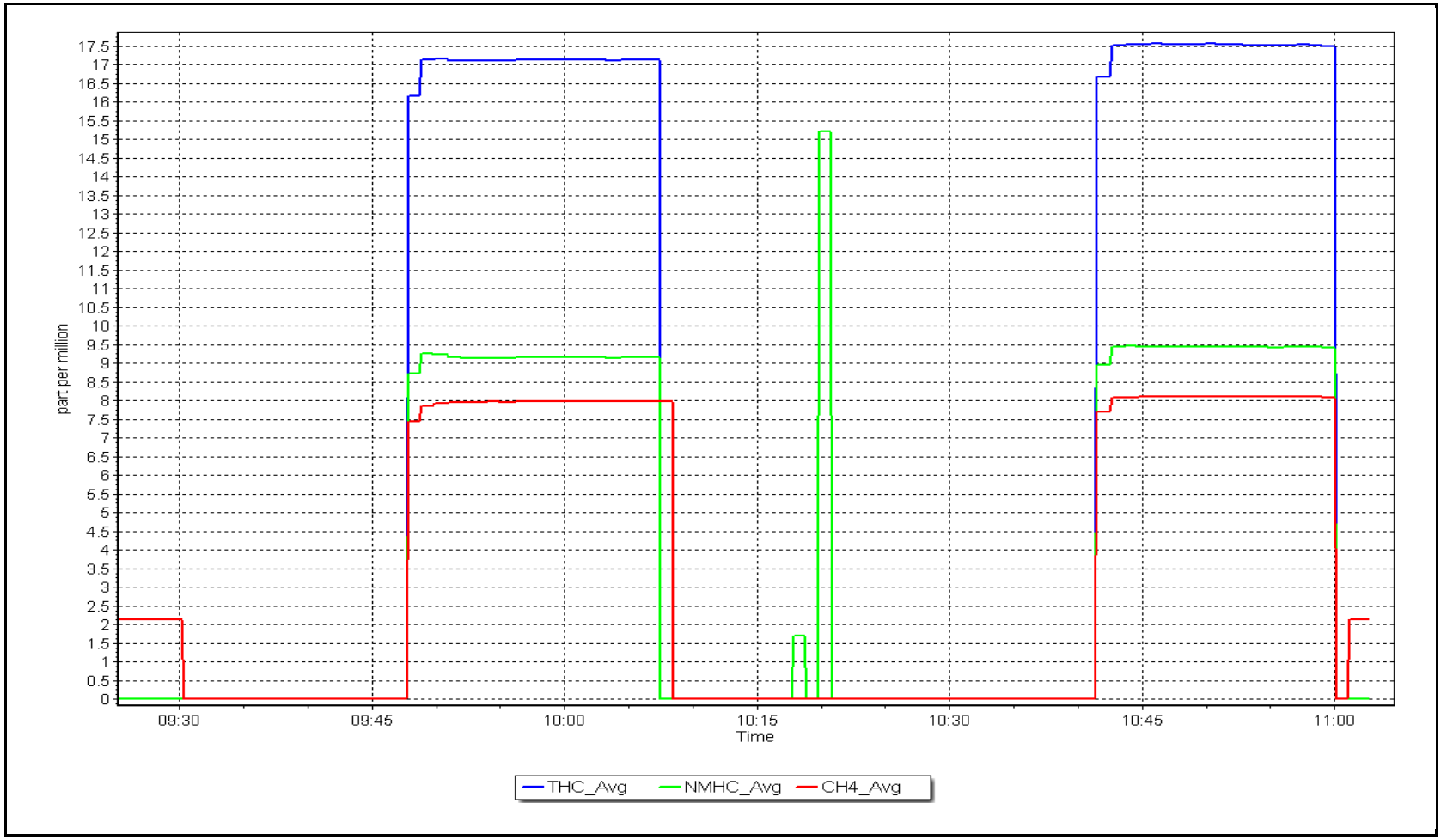
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999162	
THC Cal Offset:	0.004574	
CH4 Cal Slope:	0.999695	
CH4 Cal Offset:	-0.004854	
NMHC Cal Slope:	0.998696	
NMHC Cal Offset:	0.009428	

Notes: Replaced N2 cylinder.

Calibration Performed By: Denny Ray Estador

NMHC Calibration Plot Date: July 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:	July 28, 2023	Last Cal Date:	June 27, 2023
Start time (MST):	8:18	End time (MST):	12:10
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:	1.112	1.115	NO bkgnd or offset:	11.1	11.2
NOX coeff or slope:	0.999	1.000	NOX bkgnd or offset:	11.3	11.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	201.3	203.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.998659	0.998617
NO_X Cal Offset:	1.463814	2.003897
NO Cal Slope:	1.000266	0.999267
NO Cal Offset:	0.781352	0.881047
NO_2 Cal Slope:	0.995256	0.998137
NO_2 Cal Offset:	0.164082	-0.798489

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	4921	79.4	811.2	800.1	11.1	811.0	799.5	11.6	1.0003	1.0008
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	4921	79.4	811.2	800.1	11.1	811.1	800.0	10.9	1.0002	1.0002
second point	4960	39.7	405.7	400.1	5.6	408.2	401.1	7.2	0.9938	0.9976
third point	4980	19.8	202.3	199.6	2.8	206.0	201.2	4.8	0.9822	0.9918
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	374.7	436.5	810.0	377.0	433.0	1.0015	0.9940
								Average Correction Factor	0.9921	0.9965

Corrected As found	NO_X = 811.1 ppb	NO = 799.6 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.1%
Previous Response	NO_X = 811.6 ppb	NO = 801.1 ppb		*Percent Change	NO =	-0.2%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found NO r^2:	NO Sl:	NO Int:	
			As found NO_2 r^2:	NO2 Sl: ;	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	798.4	373.0	436.5	435.4	1.0026	99.7%
2nd GPT point (200 ppb O3)	798.4	586.1	223.4	221.6	1.0082	99.2%
3rd GPT point (100 ppb O3)	798.4	690.5	119.0	117.3	1.0146	98.6%
				Average Correction Factor	1.0085	99.2%

Notes: Adjusted the span only.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

NO_X Calibration Summary

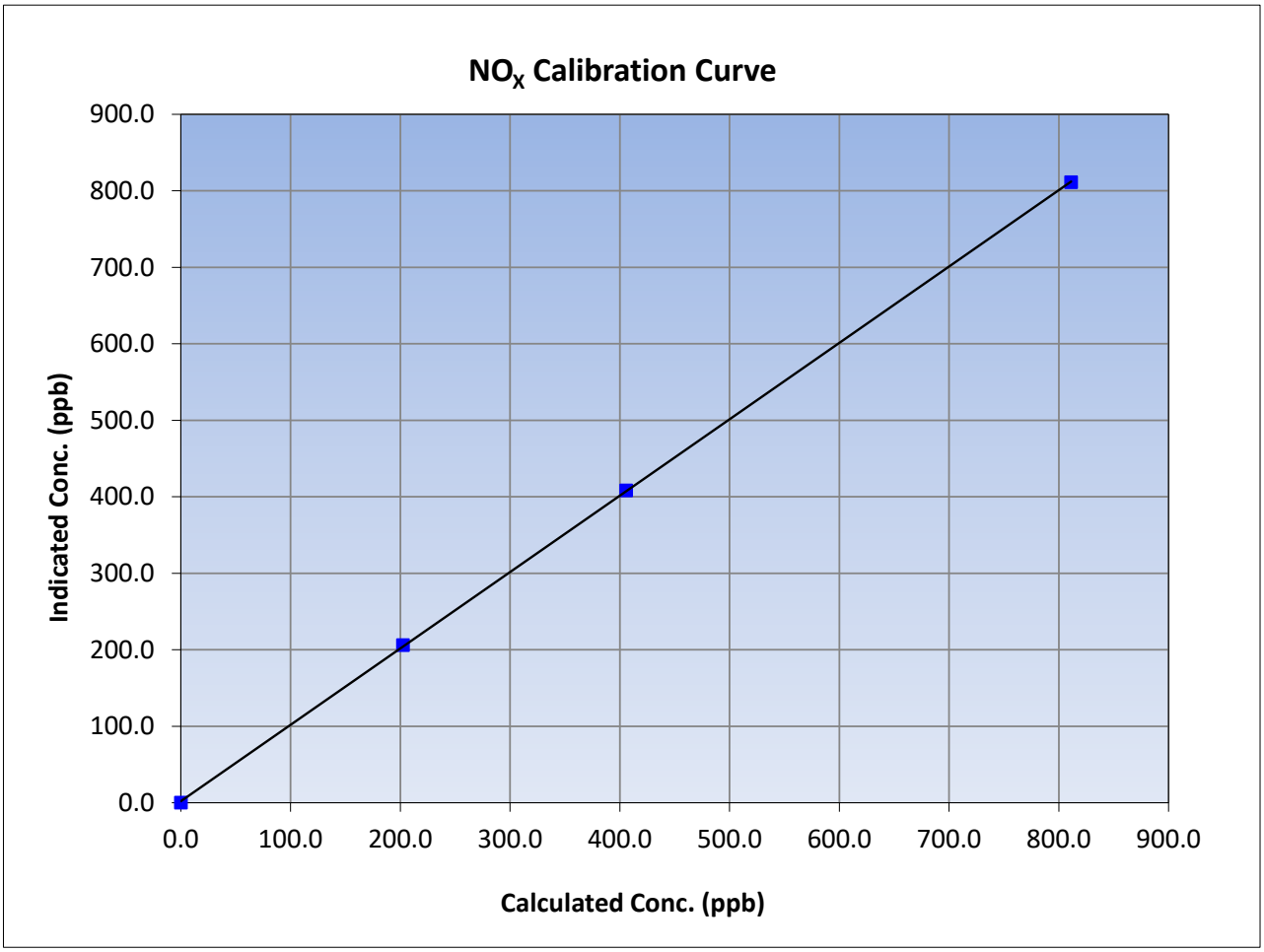
Version-04-2020

Station Information

Calibration Date:	July 28, 2023	Previous Calibration:	June 27, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	8:18	End Time (MST):	12:10
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	0.999972	*≥0.995*
811.2	811.1	1.0002			
405.7	408.2	0.9938	Slope	0.998617	*0.90 - 1.10*
202.3	206.0	0.9822			
			Intercept	2.003897	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

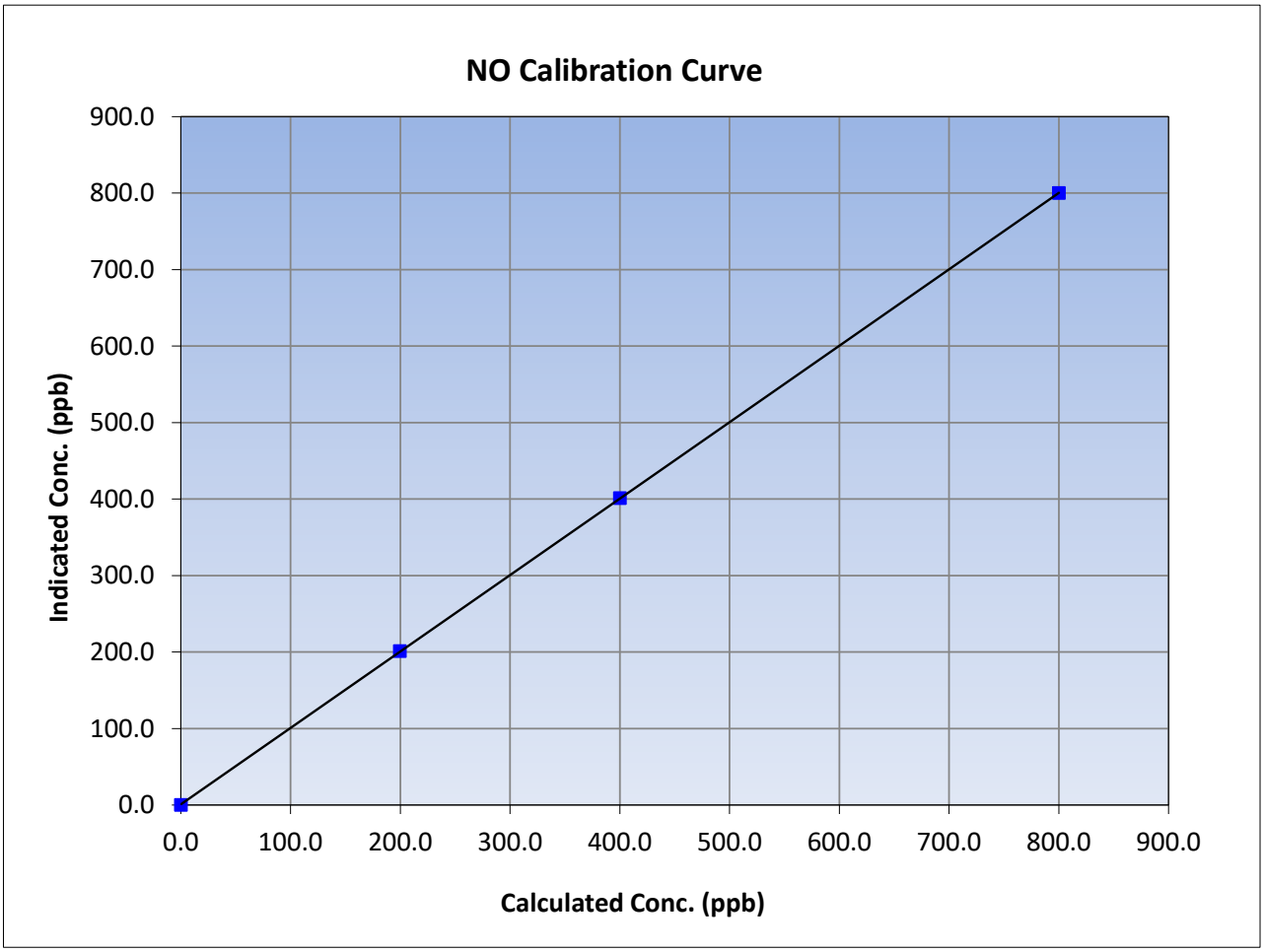
Version-04-2020

Station Information

Calibration Date:	July 28, 2023	Previous Calibration:	June 27, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	8:18	End Time (MST):	12:10
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	0.999994	≥0.995
800.1	800.0	1.0002			
400.1	401.1	0.9976	Slope	0.999267	0.90 - 1.10
199.6	201.2	0.9918			
			Intercept	0.881047	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

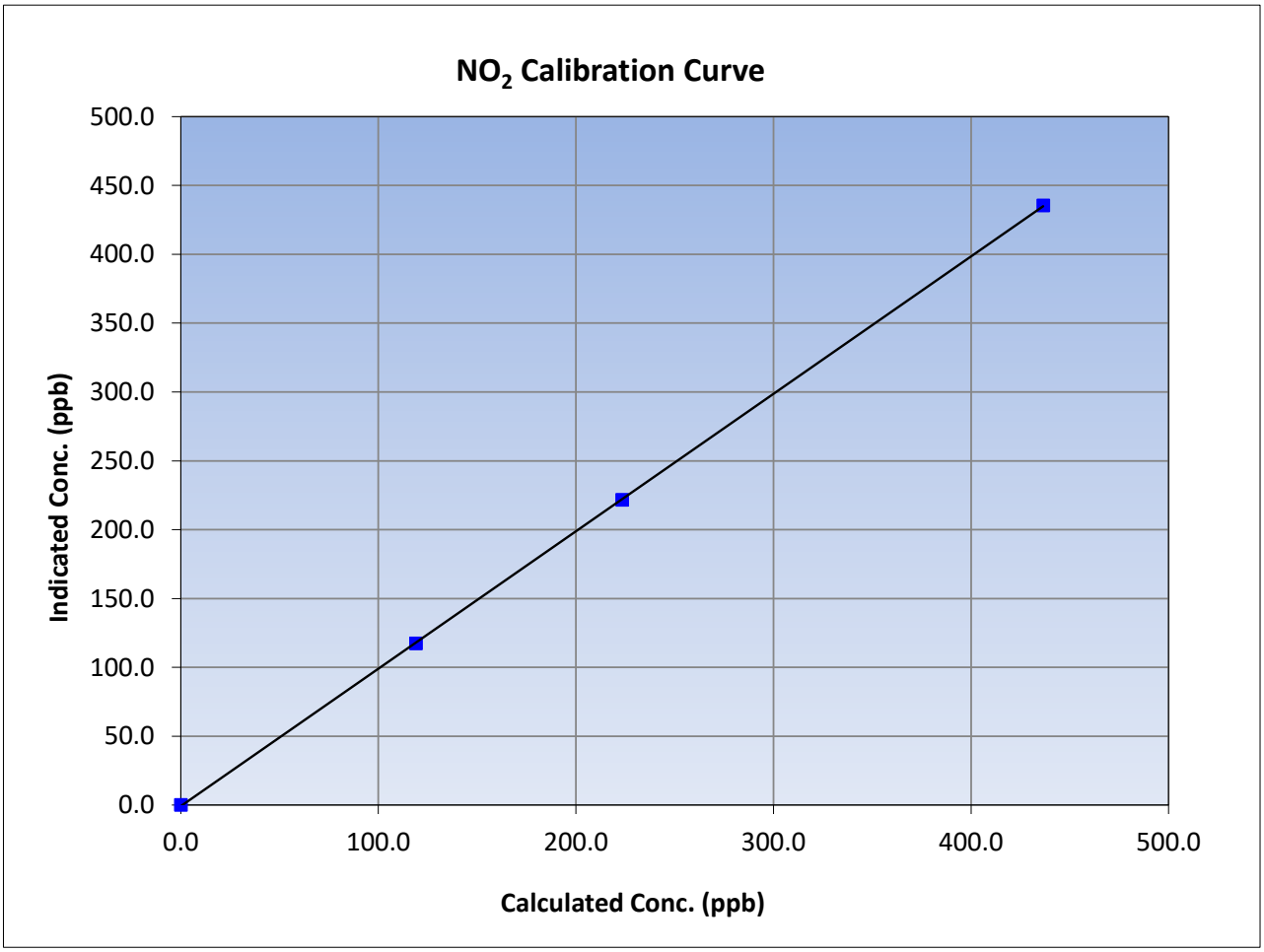
Version-04-2020

Station Information

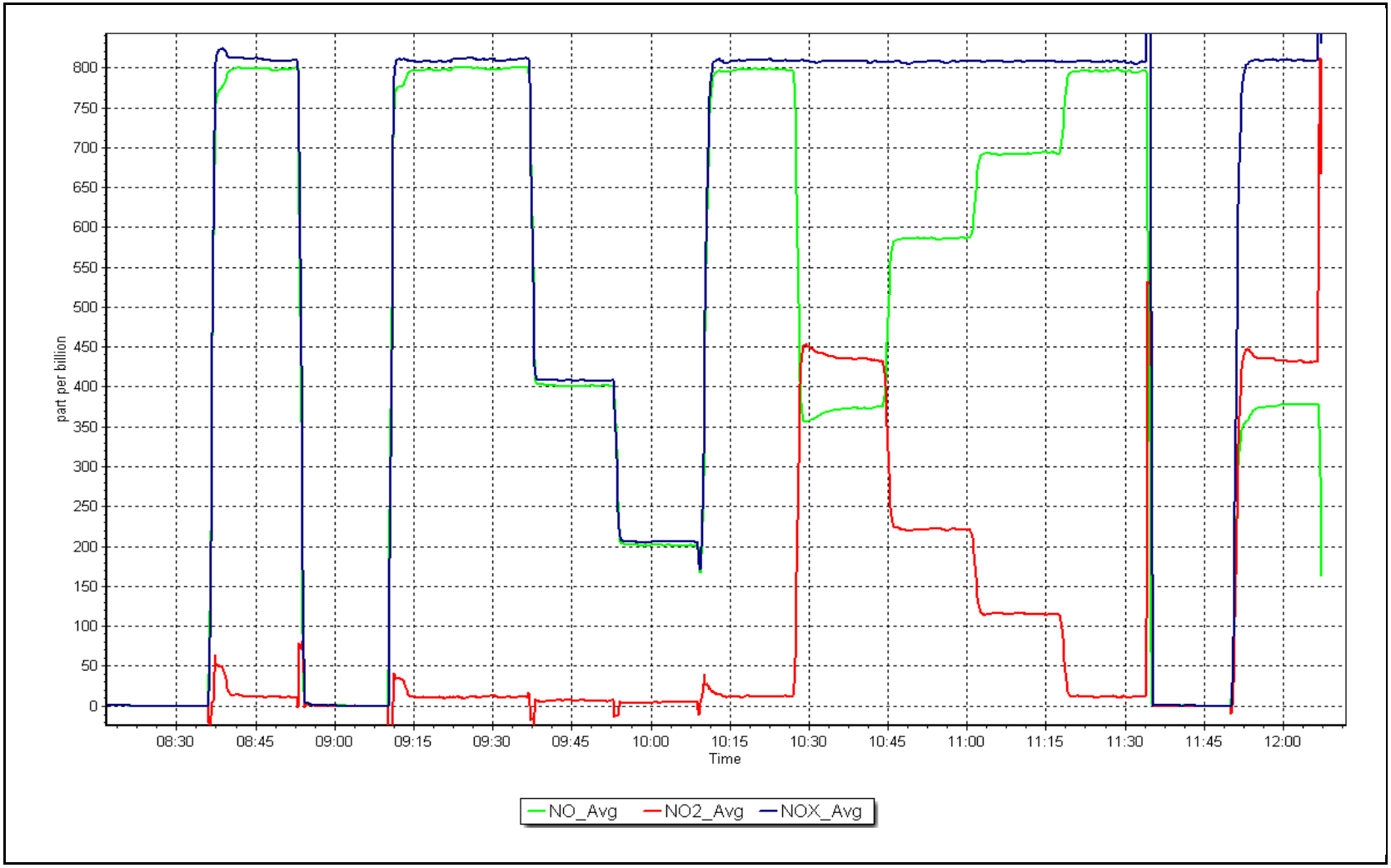
Calibration Date:	July 28, 2023	Previous Calibration:	June 27, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	8:18	End Time (MST):	12:10
Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999983	≥0.995
436.5	435.4	1.0026			
223.4	221.6	1.0082	Slope	0.998137	0.90 - 1.10
119.0	117.3	1.0146			
			Intercept	-0.798489	+/-20



NO_X Calibration Plot Date: July 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:	July 24, 2023	Last Cal Date:	June 7, 2023
Start time (MST):	10:22	End time (MST):	13:05
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	Teledyne API T700	Serial Number:	3810
ZAG Make/Model:	Teledyne API 701H	Serial Number:	691

Analyzer Information

Analyzer make:	Thermo 49i	Analyzer serial #:	1501663734
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997914	1.012514	Backgd or Offset:	-2.0	-2.0
Calibration intercept:	1.340000	1.160000	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	-1.3	----
as found span	5000	951.2	400.0	405.0	0.988
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	950.9	400.0	405.2	0.987
second point	5000	804.0	200.0	205.3	0.974
third point	5000	703.6	100.0	103.0	0.971
as left zero	5000	0.0	0.0	-0.3	----
as left span	5000	936.0	400.0	410.1	0.975
				Average Correction Factor	0.977

Baseline Corr As found:	406.3	Previous response	400.5	*% 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: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

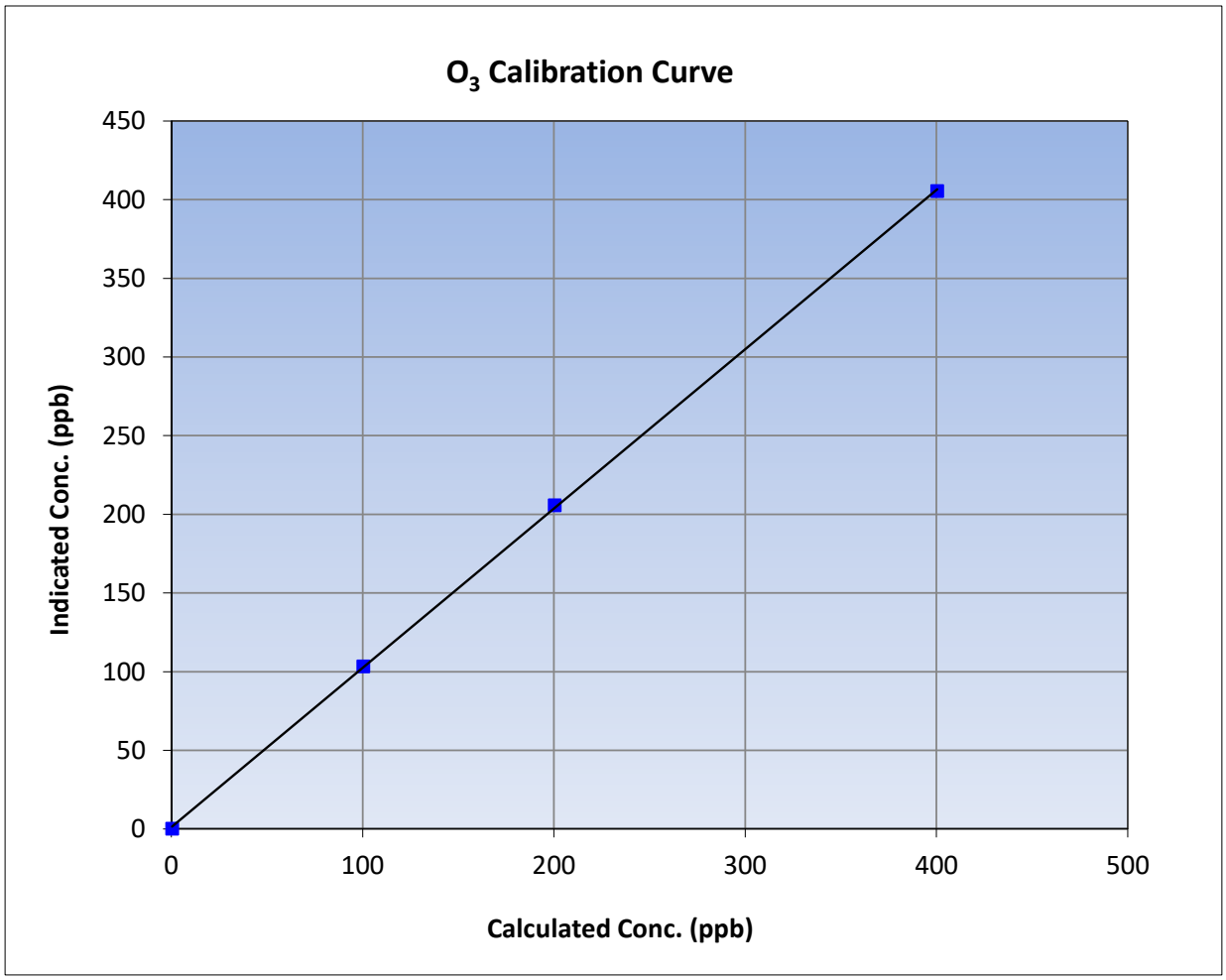
Station Information

Calibration Date:	July 24, 2023	Previous Calibration:	June 7, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:22	End Time (MST):	13:05
Analyzer make:	Thermo 49i	Analyzer serial #:	1501663734

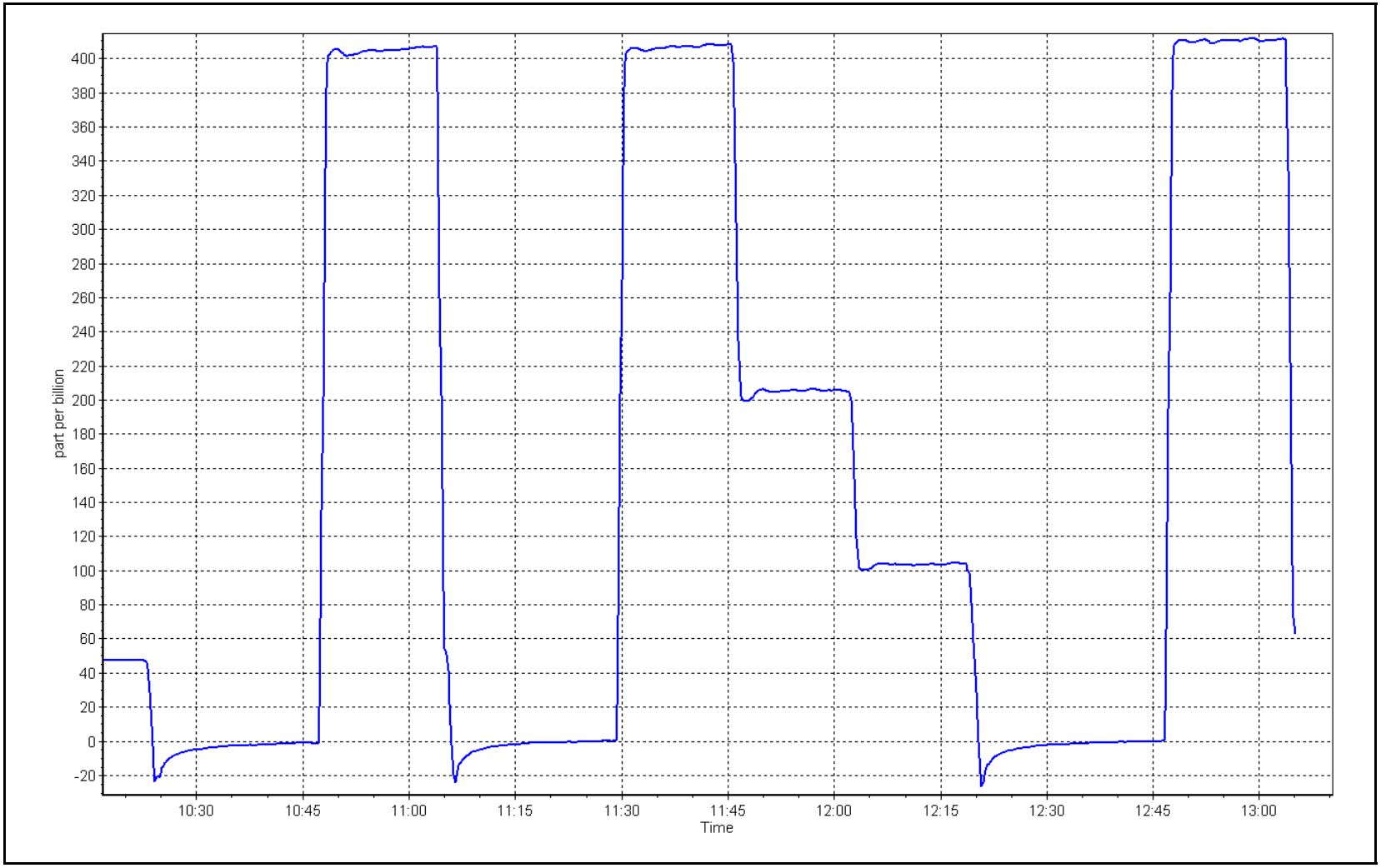
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
400.0	405.2	0.9872
200.0	205.3	0.9742
100.0	103.0	0.9709

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999938	*≥0.995*
Slope	1.012514	*0.90 - 1.10*
Intercept	1.160000	*+/- 5*



O_3 Calibration Plot Date: July 24, 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:	July 27, 2023	Last Cal Date:	June 27, 2023
Start time (MST):	8:33	End time (MST):	9:29
Analyzer Make:	API T640X	S/N:	1597
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat	S/N:	388751
Temp/RH standard:	Alicat	S/N:	388751

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	12.2	12.03	12.2	☐	+/- 2 °C
P (mmHg)	713.2	715.28	713.2	☐	+/- 10 mmHg
flow (LPM)	5.05	5.01	5.05	☐	+/- 0.25 LPM

Leak Test: Date of check: July 27, 2023 Last Cal Date: June 27, 2023

PM w/o HEPA: 5.4 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	11	11.1	11.1	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 3.3 w/ HEPA: 0 <0.2 ug/m3

Date Optical Chamber Cleaned: July 27, 2023

Disposable Filter Changed: July 27, 2023

Annual Maintenance

Date Sample Tube Cleaned:

Date RH/T Sensor Cleaned:

Notes: No adjustments made for both monthly and quarterly maintenance.

Calibration by: Denny Ray Estador

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS22
JANVIER
JULY 2023

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

August 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	July 17, 2023	Last Cal Date:	June 14, 2023
Start time (MST):	10:07	End time (MST):	13:02
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.11	ppm	Cal Gas Exp Date:	January 18, 2029
Cal Gas Cylinder #:	CC281519			
Removed Cal Gas Conc:	50.11	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3806
ZAG Make/Model:	Teledyne API T701		Serial Number:	4890

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1152430006

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.007567	1.001279	Backgd or Offset:	21.3	21.4
Calibration intercept:	1.922834	2.123935	Coeff or Slope:	0.998	0.989

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.9	----
as found span	4920	79.8	799.8	809.7	0.988
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	1.0	----
high point	4920	79.8	799.8	802.0	0.997
second point	4960	39.9	399.9	404.2	0.989
third point	4980	20.0	200.4	203.2	0.986
as left zero	5000	0.0	0.0	0.9	----
as left span	4920	79.8	799.8	804.6	0.994
				Average Correction Factor	0.991

Baseline Corr As found:	808.80	Previous response	807.76	*% change	0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

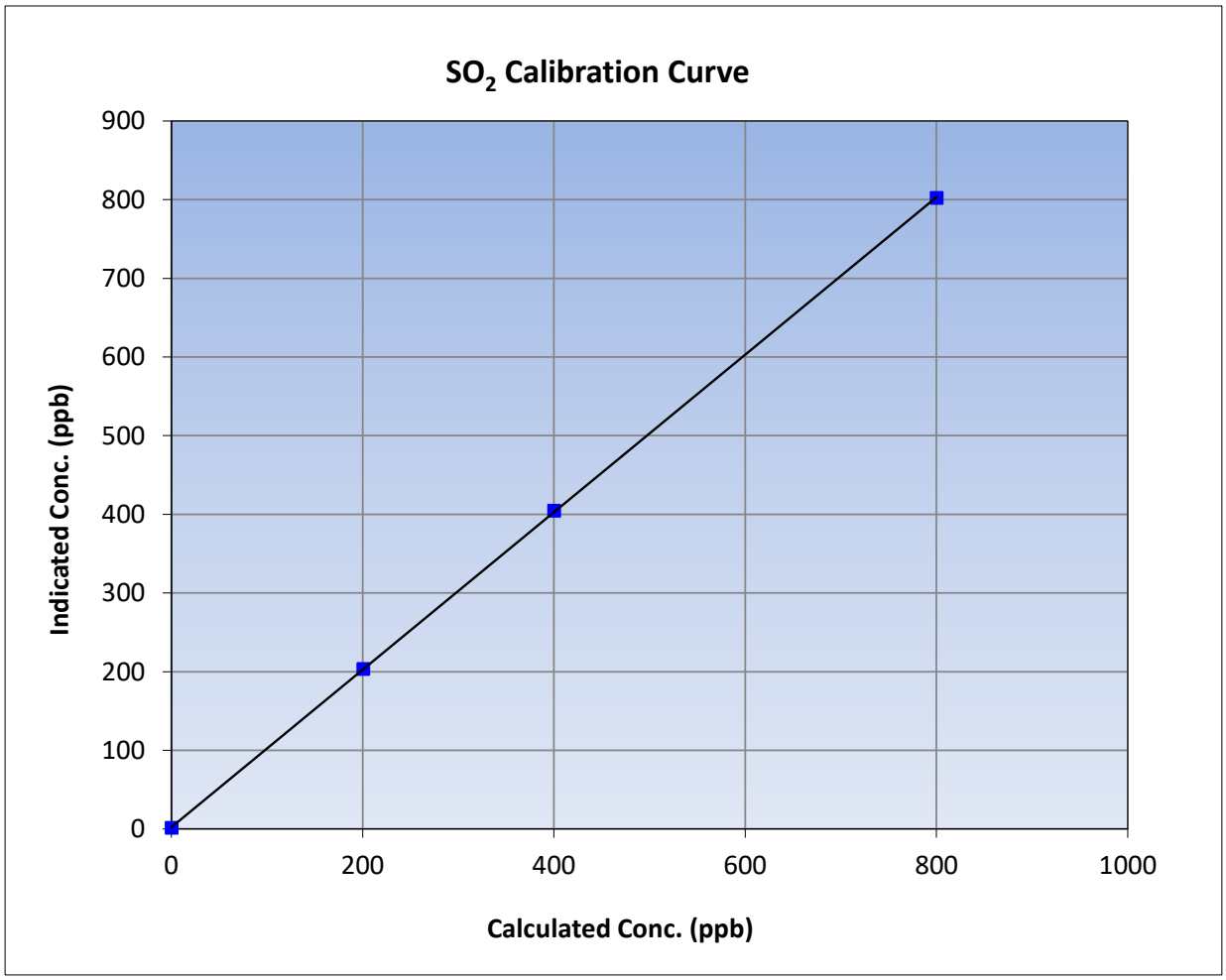
Station Information

Calibration Date:	July 17, 2023	Previous Calibration:	June 14, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:07	End Time (MST):	13:02
Analyzer make:	Thermo 43i	Analyzer serial #:	1152430006

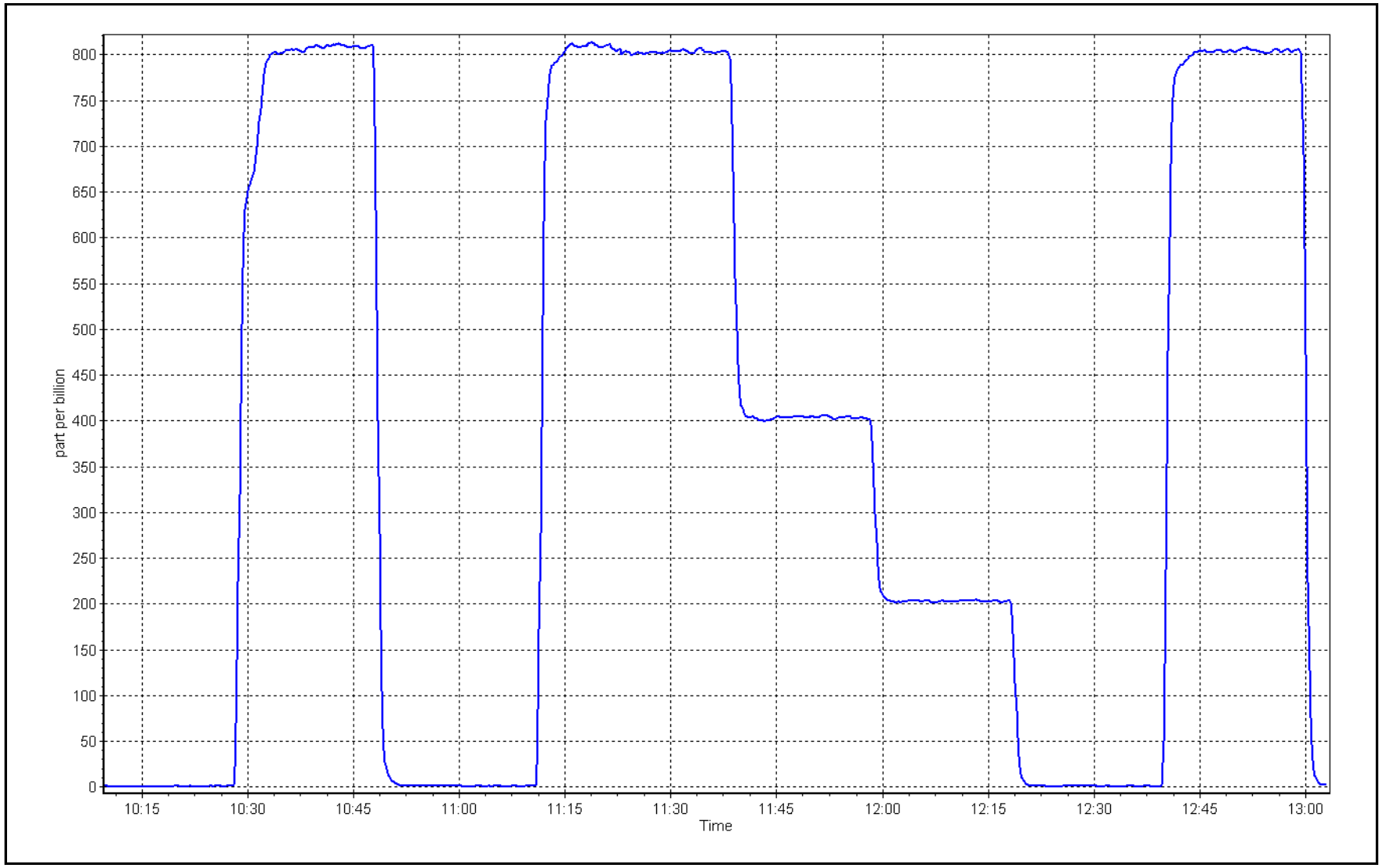
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	1.0	----
799.8	802.0	0.9972
399.9	404.2	0.9893
200.4	203.2	0.9864

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999985	*≥0.995*
Slope	1.001279	*0.90 - 1.10*
Intercept	2.123935	*+/-30*



SO2 Calibration Plot Date: July 17, 2023 Location: Janvier



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Janvier	Station number:	AMS22
Calibration Date:	July 25, 2023	Last Cal Date:	June 20, 2023
Start time (MST):	9:04	End time (MST):	13:28
Reason:	Maintenance		

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 43iQ-TLE		Analyzer serial #:	1200326169	
Converter make:	CDN-101		Converter serial #:	587	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.004939	1.003363	Backgd or Offset:	1.05	0.96
Calibration intercept:	0.140790	0.020959	Coeff or Slope:	0.954	0.880

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.2	----
as found span	4920	79.5	80.0	78.3	1.024
as found 2nd point	4960	39.8	40.0	40.0	1.006
as found 3rd point	4980	19.9	20.0	20.3	0.996
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4920	79.5	80.0	80.3	0.996
second point	4960	39.8	40.0	40.2	0.996
third point	4980	19.9	20.0	20.0	1.001
as left zero	5000	0.0	0.0	0.1	----
as left span	4920	79.5	80.0	79.9	1.001
SO2 Scrubber Check	4920	79.8	798.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.998
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.1	Prev response:	80.52	*% change:	-3.1%
Baseline Corr 2nd AF pt:	39.8	AF Slope:	0.975079	AF Intercept:	0.561232
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999880		

* = > +/-5% change initiates investigation

Notes: Changed the SO2 scrubbers after multipoint as founds. Adjusted the span only. Ran a SO2 scrubber check after the third point.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

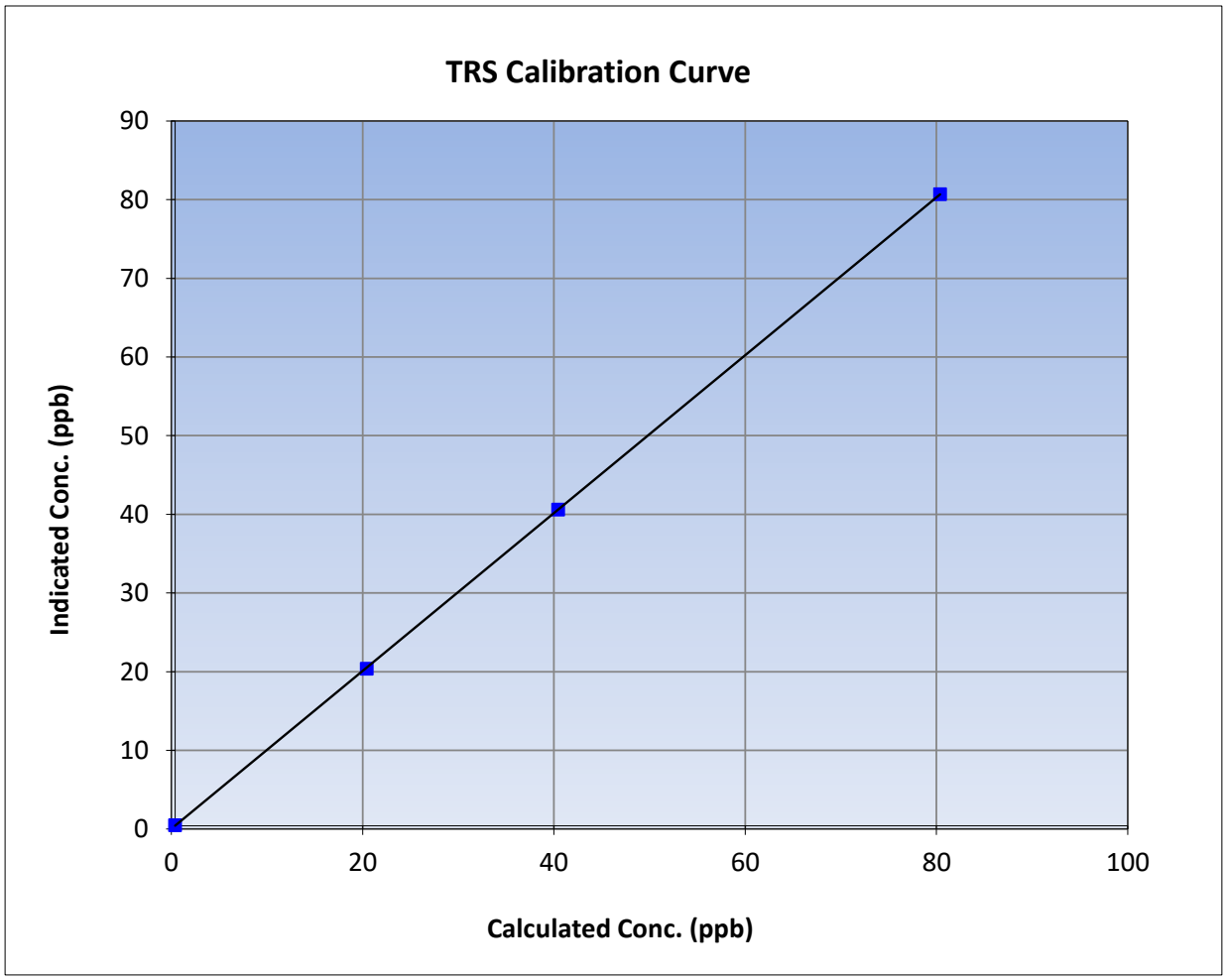
Station Information

Calibration Date:	July 25, 2023	Previous Calibration:	June 20, 2023
Station Name:	Janvier	Station Number:	AMS22
Start Time (MST):	9:04	End Time (MST):	13:28
Analyzer make:	Thermo 43iQ-TLE	Analyzer serial #:	1200326169

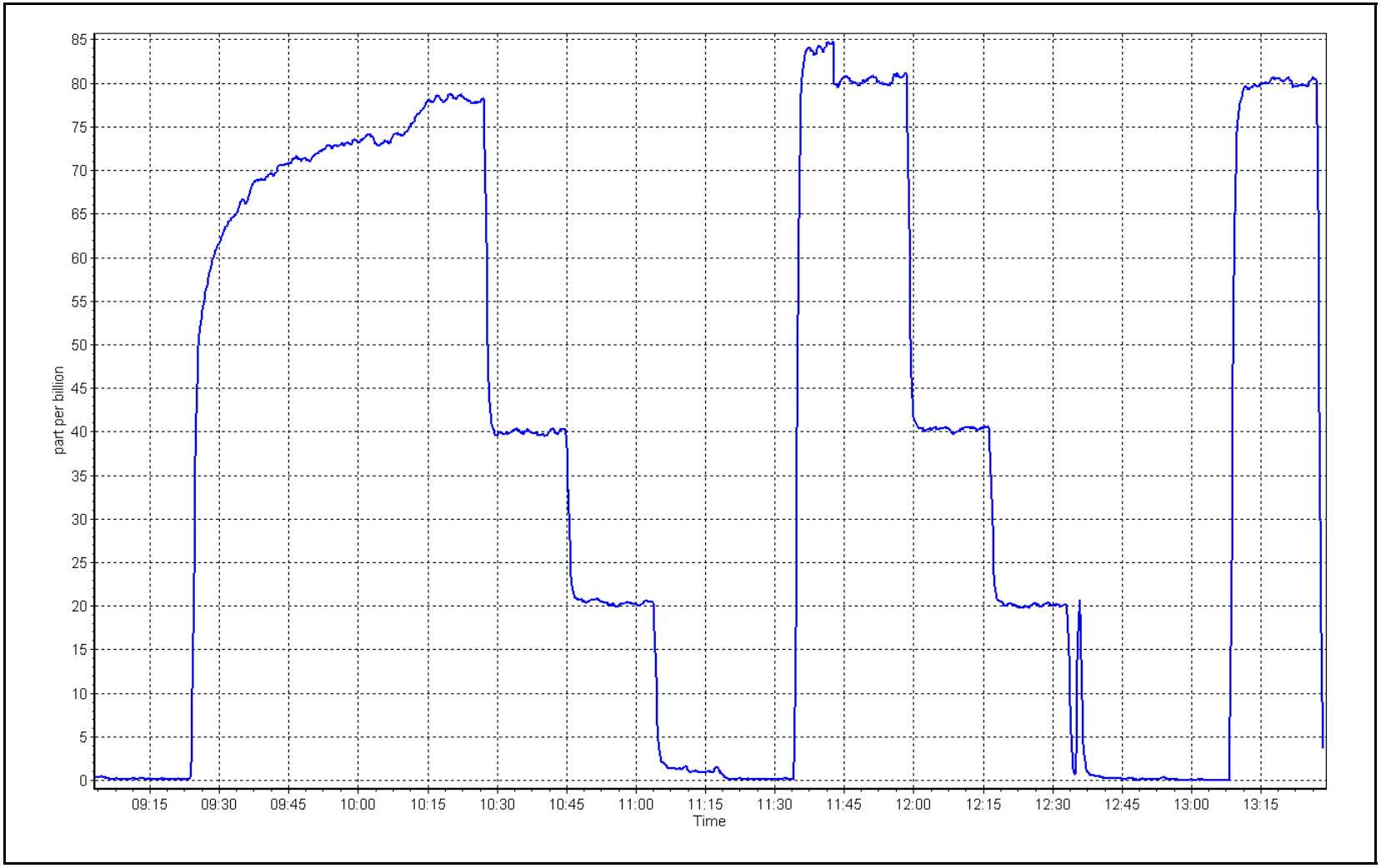
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.3	0.9961
40.0	40.2	0.9960
20.0	20.0	1.0010

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.003363	*0.90 - 1.10*
Intercept	0.020959	*+/-3*



TRS Calibration Plot Date: July 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:	July 17, 2023	Last Cal Date:	June 14, 2023
Start time (MST):	10:07	End time (MST):	13:02
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	2.180E-04	NMHC SP Ratio:	4.55E-05	4.35E-05
CH4 Retention time:	13.4	13.4	NMHC Peak Area:	201202	210352

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	17.64	0.973
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	17.27	0.994
second point	4960	39.9	8.59	8.63	0.995
third point	4980	20.0	4.30	4.31	0.999
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	17.17	17.23	0.997
				Average Correction Factor	0.996

Baseline Corr AF:	17.64	Prev response	17.20	*% change	2.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4920	79.8	9.15	9.58	0.955
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	9.13	1.002
second point	4960	39.9	4.57	4.56	1.003
third point	4980	20.0	2.29	2.27	1.011
as left zero	5000	0	0.00	0.00	----
as left span	4920	79.8	9.15	9.11	1.004
				Average Correction Factor	1.005
Baseline Corr AF:	9.58	Prev response	9.13	*% change	4.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	79.8	8.03	8.06	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	79.8	8.03	8.14	0.986
second point	4960	39.9	4.01	4.07	0.986
third point	4980	20.0	2.01	2.04	0.985
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	8.03	8.11	0.989
				Average Correction Factor	0.986
Baseline Corr AF:	8.06	Prev response	8.08	*% change	-0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.001387	1.006073
THC Cal Offset:	0.007200	-0.009020
CH4 Cal Slope:	1.004460	1.014274
CH4 Cal Offset:	0.011429	0.000208
NMHC Cal Slope:	0.998704	0.998891
NMHC Cal Offset:	-0.004029	-0.009028

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

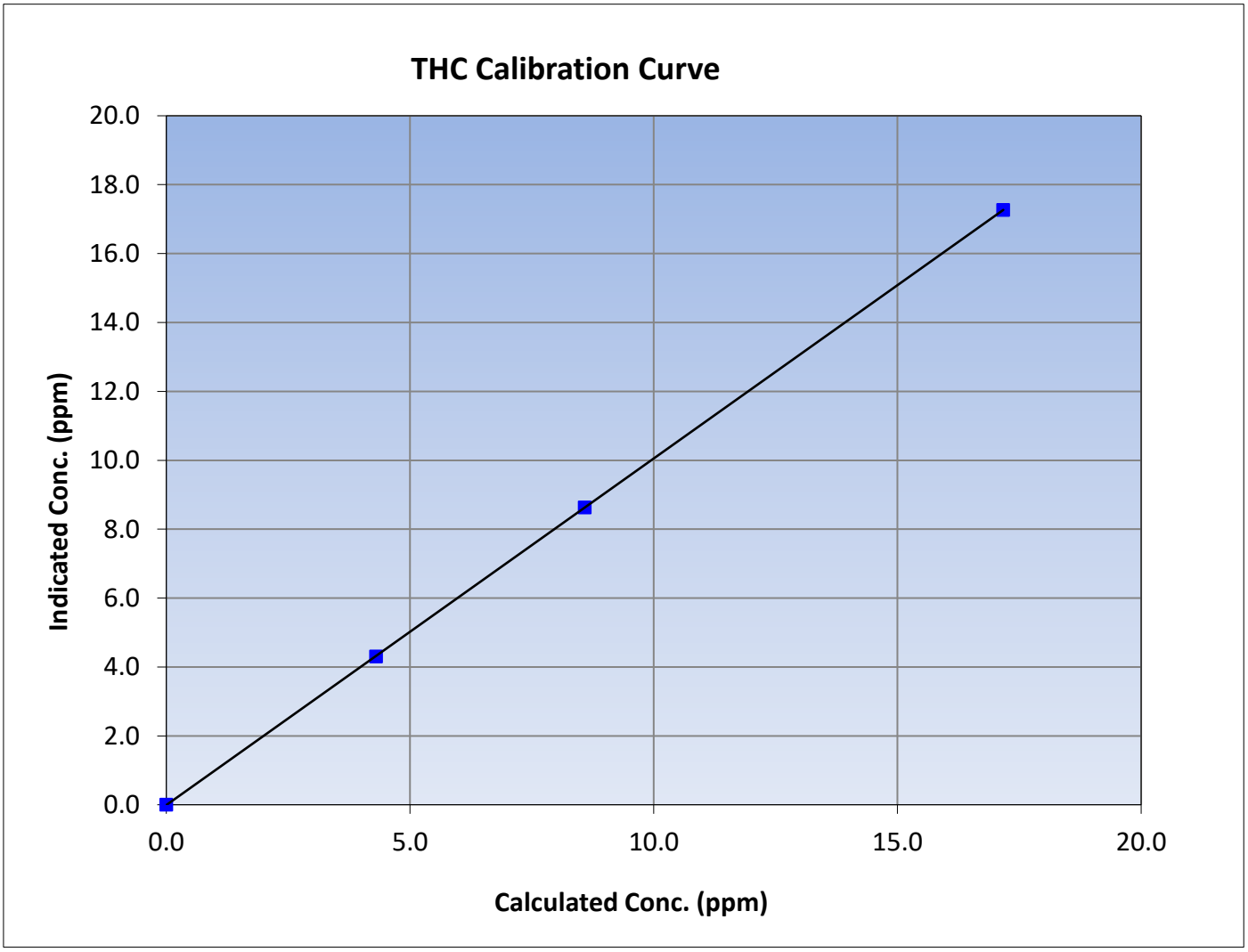
Version-01-2020

Station Information

Calibration Date:	July 17, 2023	Previous Calibration:	June 14, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:07	End Time (MST):	13:02
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750023

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999998	≥0.995
17.17	17.27	0.9943			
8.59	8.63	0.9949	Slope	1.006073	0.90 - 1.10
4.30	4.31	0.9990			
			Intercept	-0.009020	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

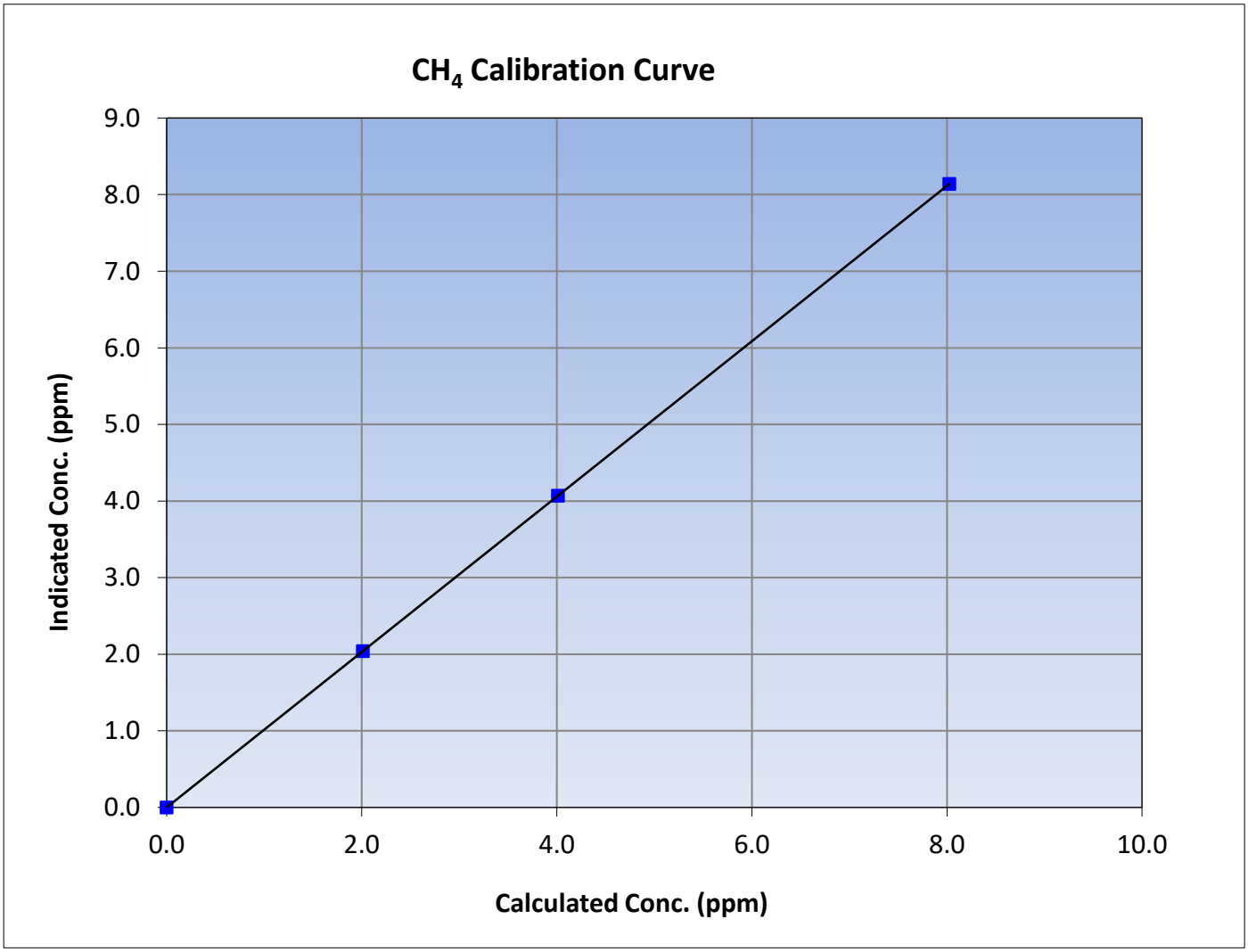
Version-01-2020

Station Information

Calibration Date:	July 17, 2023	Previous Calibration:	June 14, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:07	End Time (MST):	13:02
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	1.000000	≥0.995
8.03	8.14	0.9859			
4.01	4.07	0.9861	Slope	1.014274	0.90 - 1.10
2.01	2.04	0.9854			
			Intercept	0.000208	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

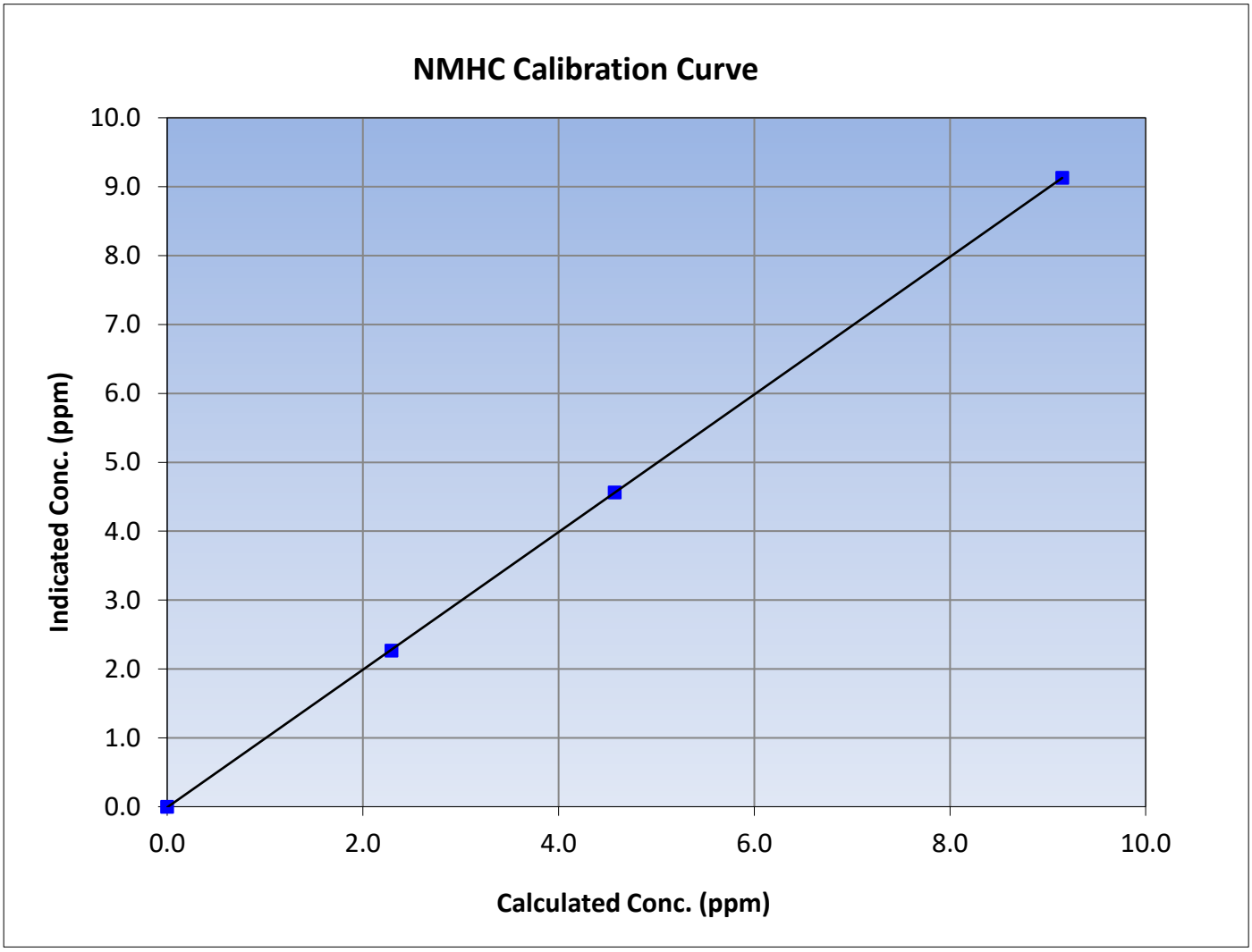
Version-01-2020

Station Information

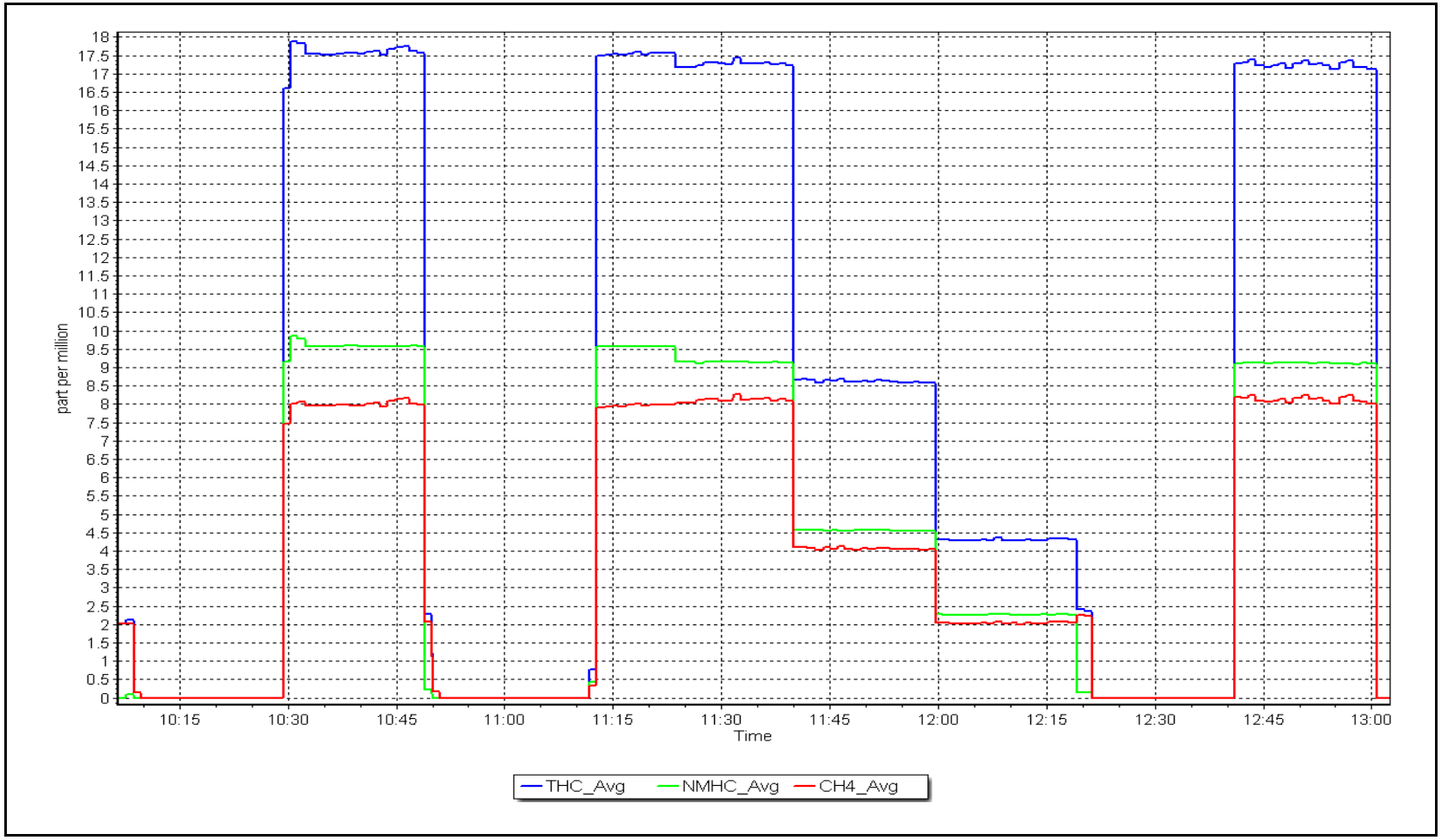
Calibration Date:	July 17, 2023	Previous Calibration:	June 14, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:07	End Time (MST):	13:02
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750023

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999994	≥0.995
9.15	9.13	1.0019			
4.57	4.56	1.0025	Slope	0.998891	0.90 - 1.10
2.29	2.27	1.0112			
			Intercept	-0.009028	+/-0.5



NMHC Calibration Plot Date: July 17, 2023 Location: Janvier



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	July 19, 2023	Last Cal Date:	N/A
Start time (MST):	9:57	End time (MST):	14:05
Reason:	Install		

Calibration Standards

NO Gas Cylinder #:	CC424183		Cal Gas Expiry Date:	April 16, 2023	
NOX Cal Gas Conc:	48.60	ppm	NO Cal Gas Conc:	48.60	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	48.60	ppm	Removed Gas NO Conc:	48.60	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	3806	
ZAG make/model:	Teledyne API T701		Serial Number:	4890	

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	N/A	0.808	NO bkgnd or offset:	N/A	-5.6
NOX coeff or slope:	N/A	0.799	NOX bkgnd or offset:	N/A	-3.9
NO2 coeff or slope:	N/A	1.000	Reaction cell Press:	N/A	5.0

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	N/A	0.997788
NO_X Cal Offset:	N/A	2.208515
NO Cal Slope:	N/A	0.999902
NO Cal Offset:	N/A	1.168443
NO_2 Cal Slope:	N/A	0.994081
NO_2 Cal Offset:	N/A	-0.360935

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	1.0	0.7	0.3	----	----
high point	4918	82.3	799.9	799.9	0.0	799.6	800.6	-0.9	1.0004	0.9991
second point	4959	41.2	400.4	400.4	0.0	402.8	402.3	0.5	0.9942	0.9954
third point	4980	20.6	200.2	200.2	0.0	202.9	201.5	1.4	0.9867	0.9936
as left zero	5000	0.0	0.0	0.0	0.0	2.1	2.1	0.1	----	----
as left span	4918	82.3	799.9	372.0	427.9	793.5	369.6	423.9	1.0081	1.0065
								Average Correction Factor	0.9938	0.9960

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)	798.6	370.7	427.9	425.6	1.0054	99.5%
2nd GPT point (200 ppb O3)	798.6	594.0	204.6	201.8	1.0139	98.6%
3rd GPT point (100 ppb O3)	798.6	695.1	103.5	102.5	1.0098	99.0%
				Average Correction Factor	1.0097	99.0%

Notes: Replaced the previous instrument with this one due to stability issues. Adjusted zero and span.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

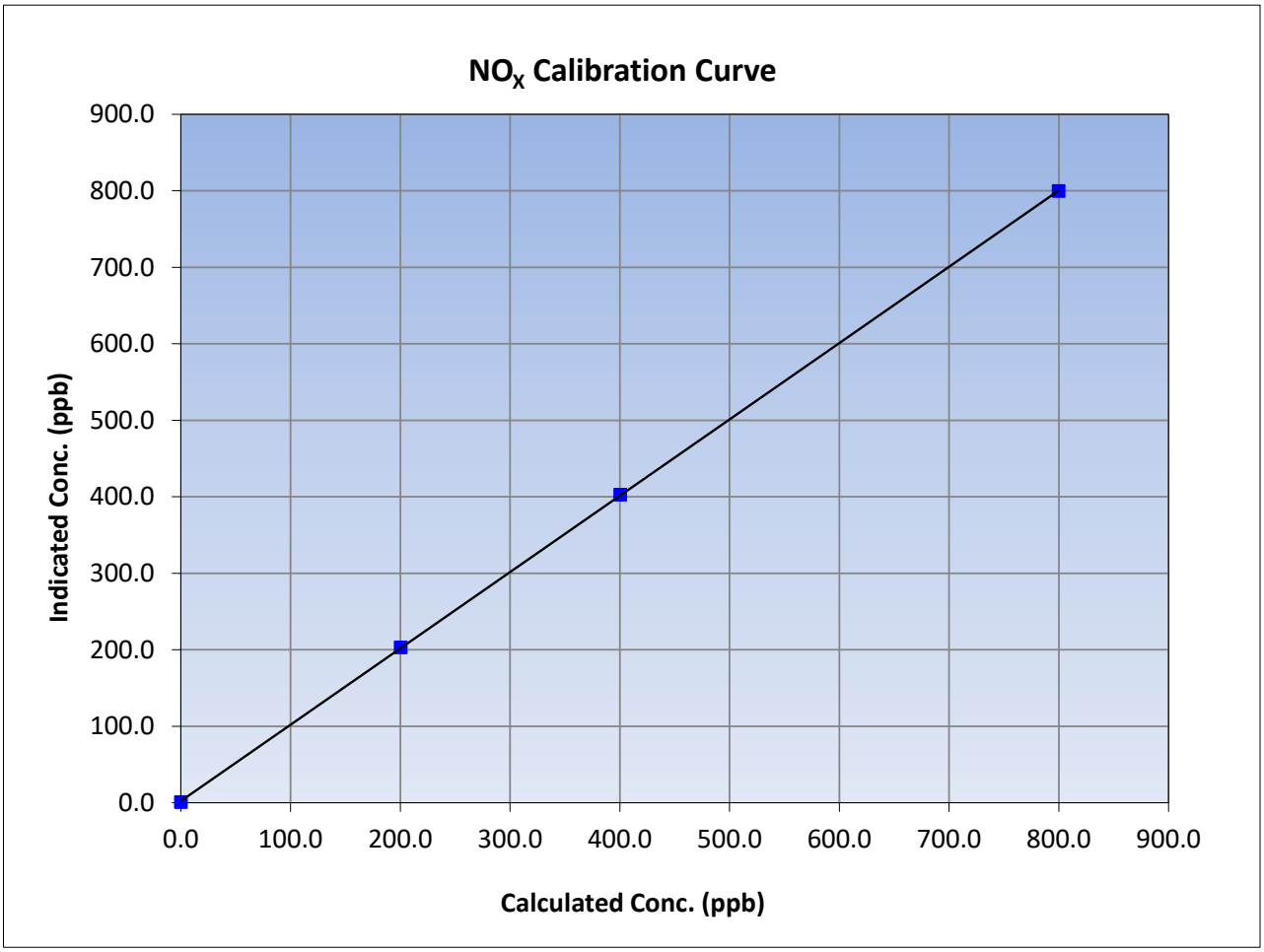
Version-04-2020

Station Information

Calibration Date:	July 19, 2023	Previous Calibration:	N/A
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:57	End Time (MST):	14:05
Analyzer make:	API T200	Analyzer serial #:	833

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	1.0	----	Correlation Coefficient	0.999989	≥0.995
799.9	799.6	1.0004			
400.4	402.8	0.9942	Slope	0.997788	0.90 - 1.10
200.2	202.9	0.9867			
			Intercept	2.208515	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

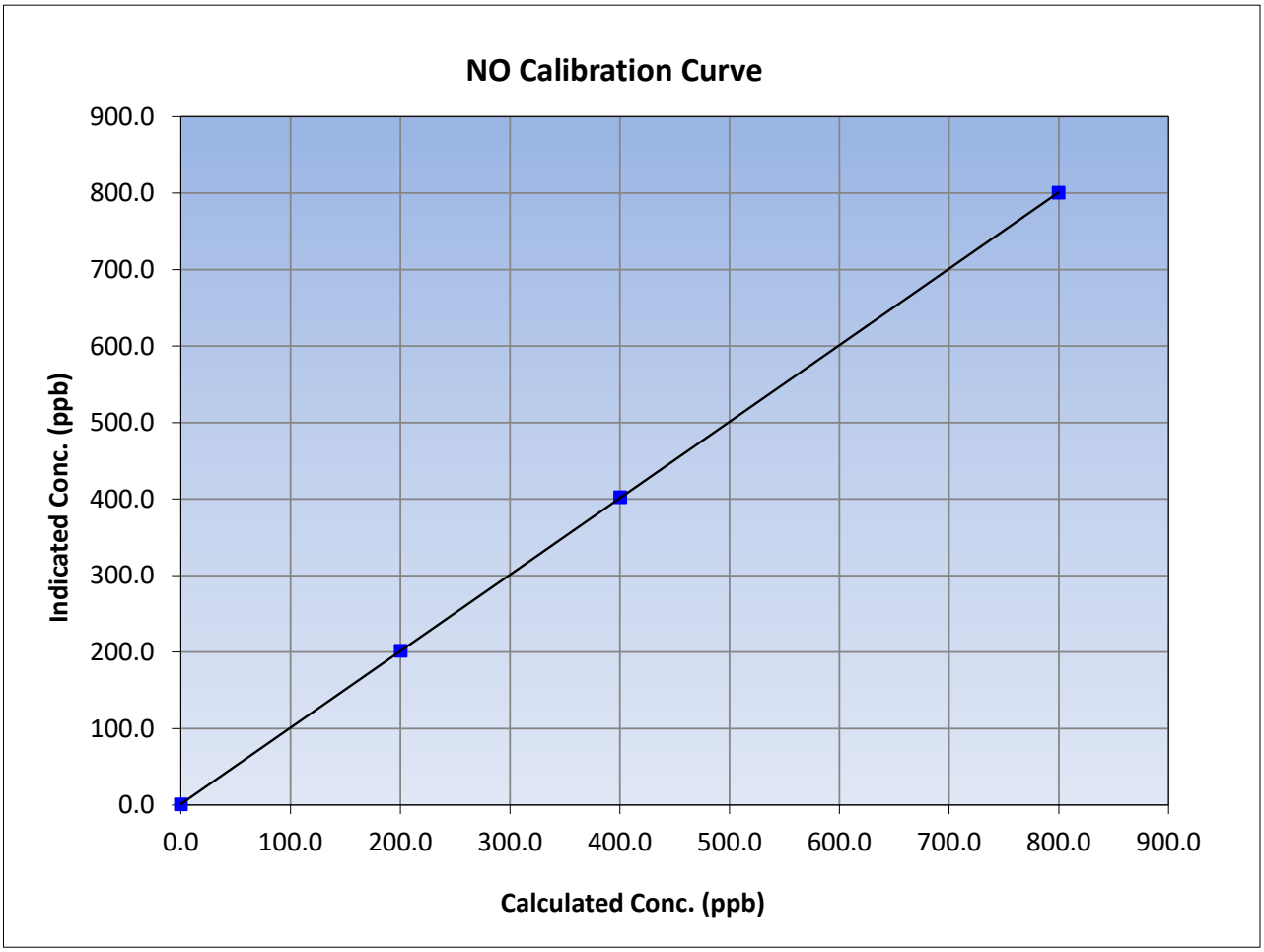
Version-04-2020

Station Information

Calibration Date:	July 19, 2023	Previous Calibration:	N/A
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:57	End Time (MST):	14:05
Analyzer make:	API T200	Analyzer serial #:	833

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.7	----	Correlation Coefficient	0.999997	≥0.995
799.9	800.6	0.9991			
400.4	402.3	0.9954	Slope	0.999902	0.90 - 1.10
200.2	201.5	0.9936			
			Intercept	1.168443	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

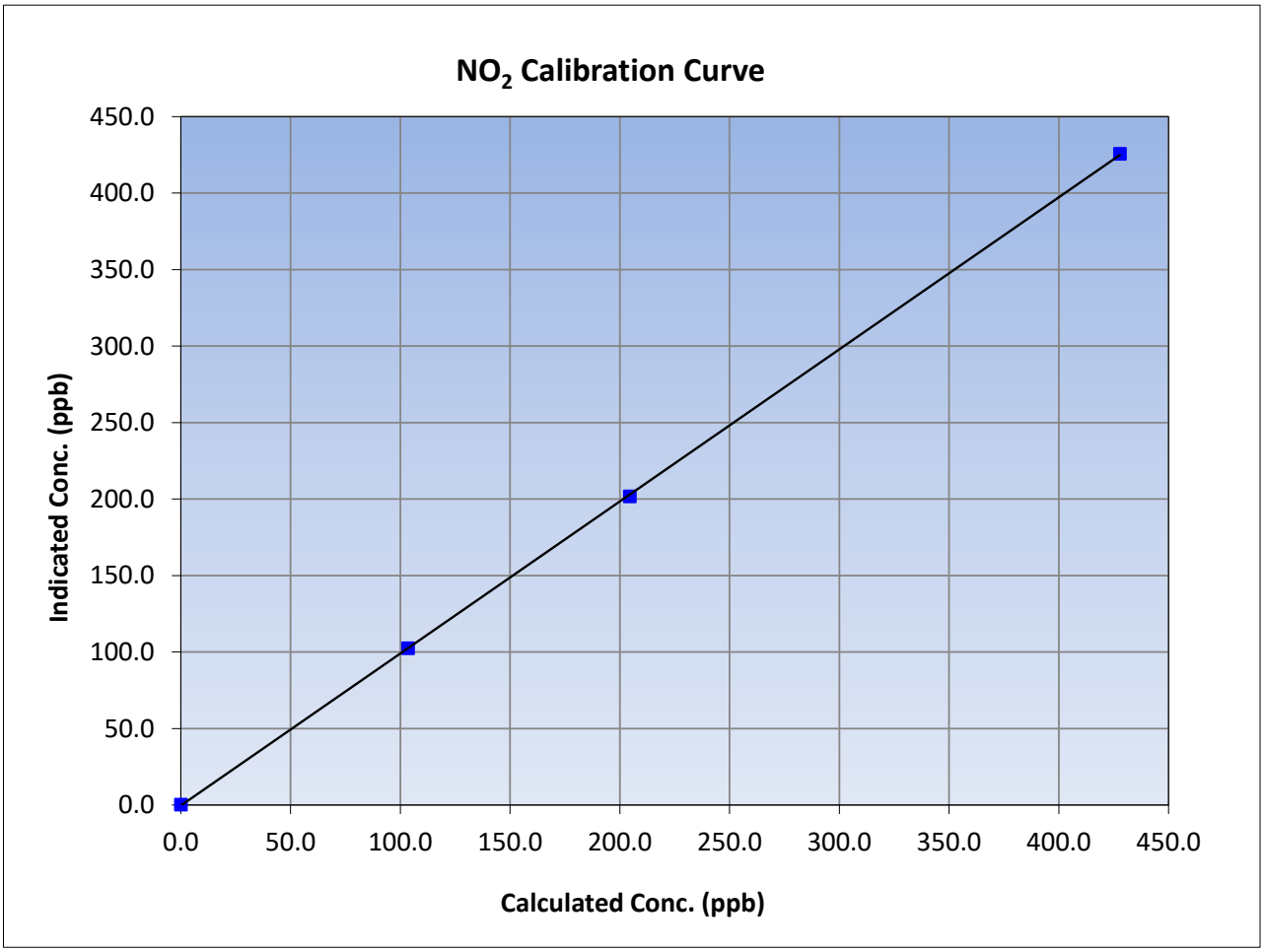
Version-04-2020

Station Information

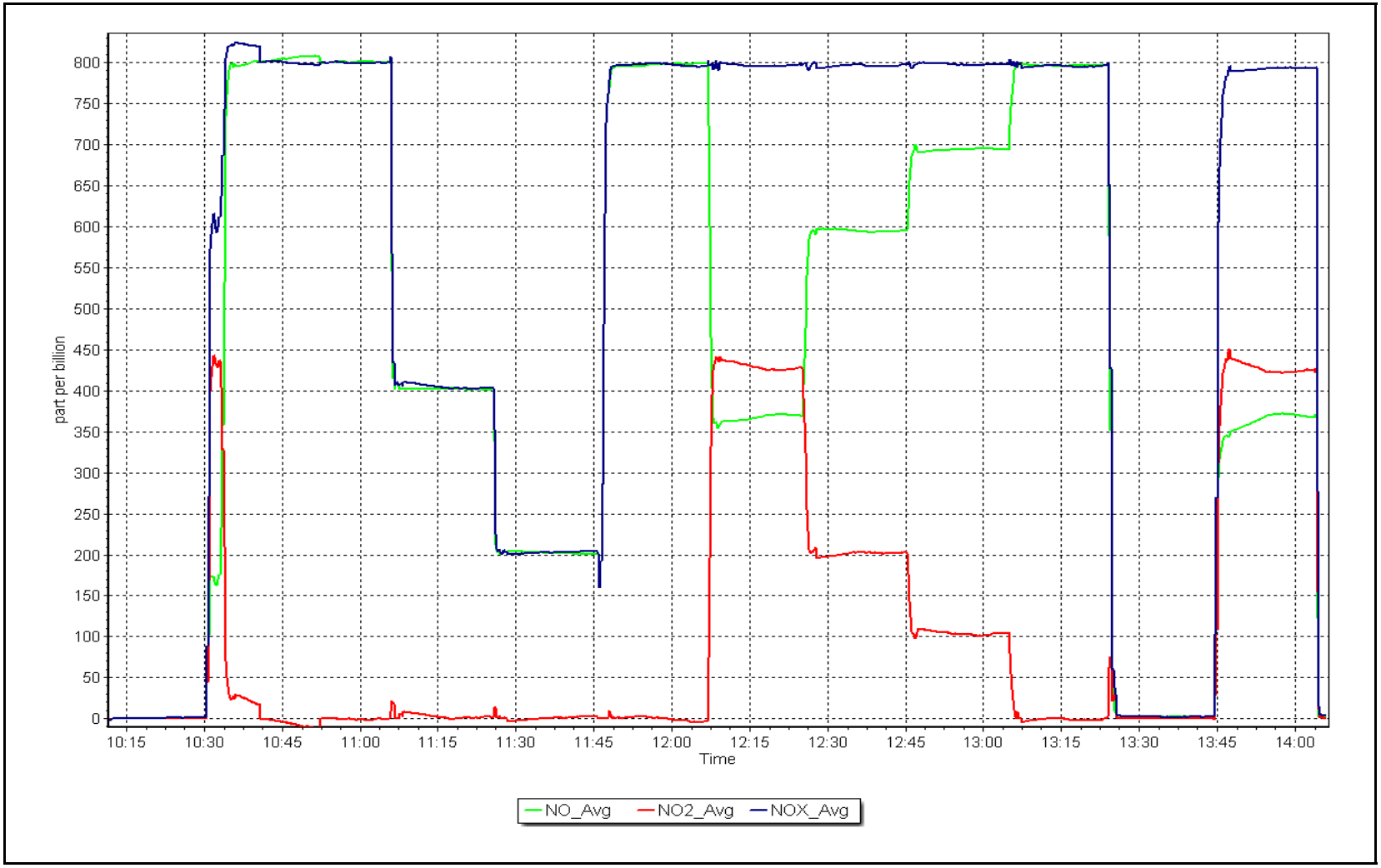
Calibration Date:	July 19, 2023	Previous Calibration:	N/A
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:57	End Time (MST):	14:05
Analyzer make:	API T200	Analyzer serial #:	833

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.3	----	Correlation Coefficient	0.999977	≥0.995
427.9	425.6	1.0054			
204.6	201.8	1.0139	Slope	0.994081	0.90 - 1.10
103.5	102.5	1.0098			
			Intercept	-0.360935	+/-20



NO_X Calibration Plot Date: July 19, 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:	July 26, 2023	Last Cal Date:	June 22, 2023
Start time (MST):	10:58	End time (MST):	14:30
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	Teledyne API T700	Serial Number:	3806
ZAG Make/Model:	Teledyne API T701H	Serial Number:	201

Analyzer Information

Analyzer make:	Teledyne API T400	Analyzer serial #:	7046
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000371	0.999714	Backgd or Offset:	-0.2	-0.1
Calibration intercept:	1.760000	2.000000	Coeff or Slope:	1.018	0.953

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	0.6	----
as found span	4895	904.3	400.0	429.1	0.932
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	-0.1	----
high point	4895	904.3	400.0	400.6	0.999
second point	4895	756.7	200.0	203.7	0.982
third point	4895	656.1	100.0	103.6	0.965
as left zero	5000	800.0	0.0	0.5	----
as left span	4895	904.3	400.0	406.5	0.984
				Average Correction Factor	0.982

Baseline Corr As found:	428.5	Previous response	401.9	*% change	6.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. There was a power outage during as founds and the as found span is 7% high, diagnostics are all good and the instrument was installed last month. See docit note for more info. Adjusted the span only.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

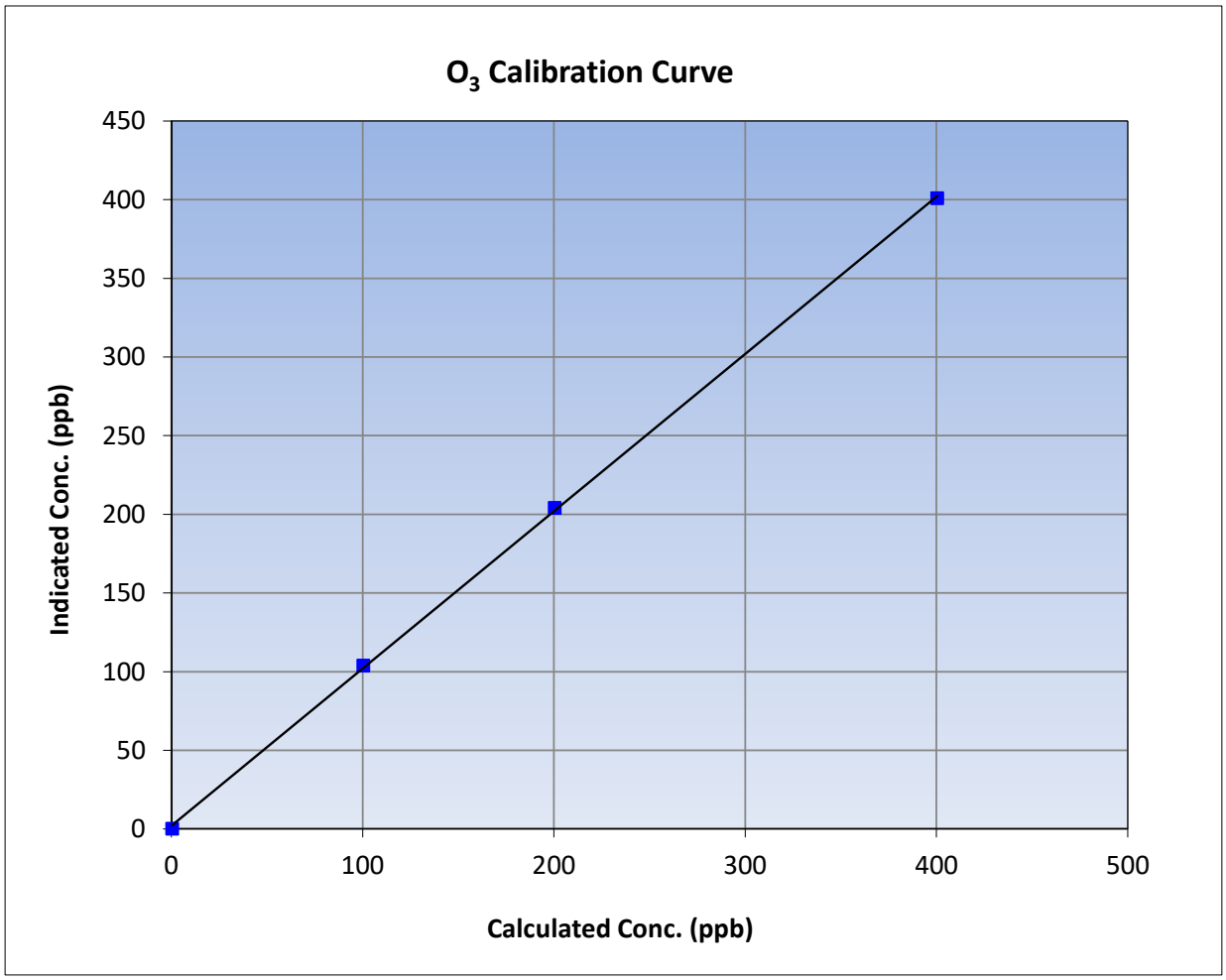
Station Information

Calibration Date:	July 26, 2023	Previous Calibration:	June 22, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:58	End Time (MST):	14:30
Analyzer make:	Teledyne API T400	Analyzer serial #:	7046

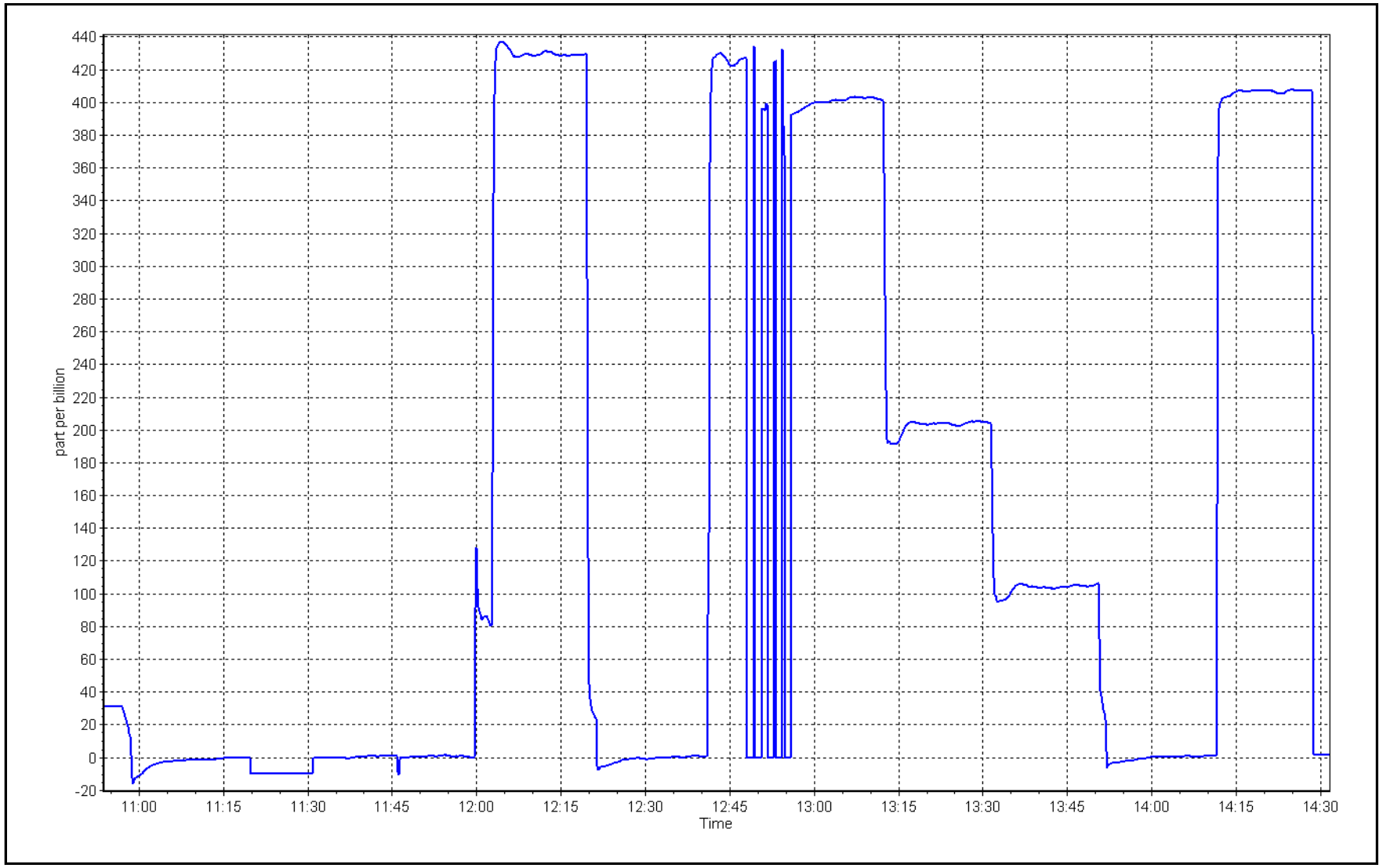
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
400.0	400.6	0.9985
200.0	203.7	0.9818
100.0	103.6	0.9653

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999865	*≥0.995*
Slope	0.999714	*0.90 - 1.10*
Intercept	2.000000	*+/- 5*



O_3 Calibration Plot Date: July 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:	July 26, 2023	Last Cal Date:	June 13, 2023
Start time (MST):	9:48	End time (MST):	10:20
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)	17.8	18.01	17.8	☐	+/- 2 °C
P (mmHg)	712.8	712.6	712.8	☐	+/- 10 mmHg
flow (LPM)	5.03	4.94	5.03	☐	+/- 0.25 LPM

Leak Test: Date of check: July 26, 2023 Last Cal Date: June 13, 2023

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

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

Post-maintenance leak check: PM w/o HEPA: 4.9 w/ HEPA: 0 <0.2 ug/m3

Date Optical Chamber Cleaned: July 26, 2023

Disposable Filter Changed: July 26, 2023

Annual Maintenance

Date Sample Tube Cleaned: July 26, 2023

Date RH/T Sensor Cleaned: July 26, 2023

Notes: Completed annual, monthly and quarterly calibrations. No adjustments needed. Leak check passed.

Calibration by: Max Farrell

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS23
FORT HILLS
JULY 2023

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

August 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	July 10, 2023	Last Cal Date:	June 6, 2023
Start time (MST):	10:03	End time (MST):	13:00
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.76	ppm	Cal Gas Exp Date:	January 5, 2025
Cal Gas Cylinder #:	CC281425			
Removed Cal Gas Conc:	49.76	ppm	Rem Gas Exp Date:	N/A
Removed Gas Cyl #:	N/A		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	451
ZAG Make/Model:	API T701		Serial Number:	5611

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1160290012

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.004713	1.002525	Backgd or Offset:	17.8	17.8
Calibration intercept:	-0.844401	-0.604149	Coeff or Slope:	1.040	1.040

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.2	----
as found span	4920	80.3	799.1	798.2	1.001
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	799.1	800.7	0.998
second point	4960	40.2	400.1	400.5	0.999
third point	4980	20.1	200.0	199.1	1.005
as left zero	5000	0.0	0.0	0.0	----
as left span	4920	80.3	799.1	799.8	0.999
				Average Correction Factor	1.001

Baseline Corr As found:	798.40	Previous response	802.02	*% change	-0.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

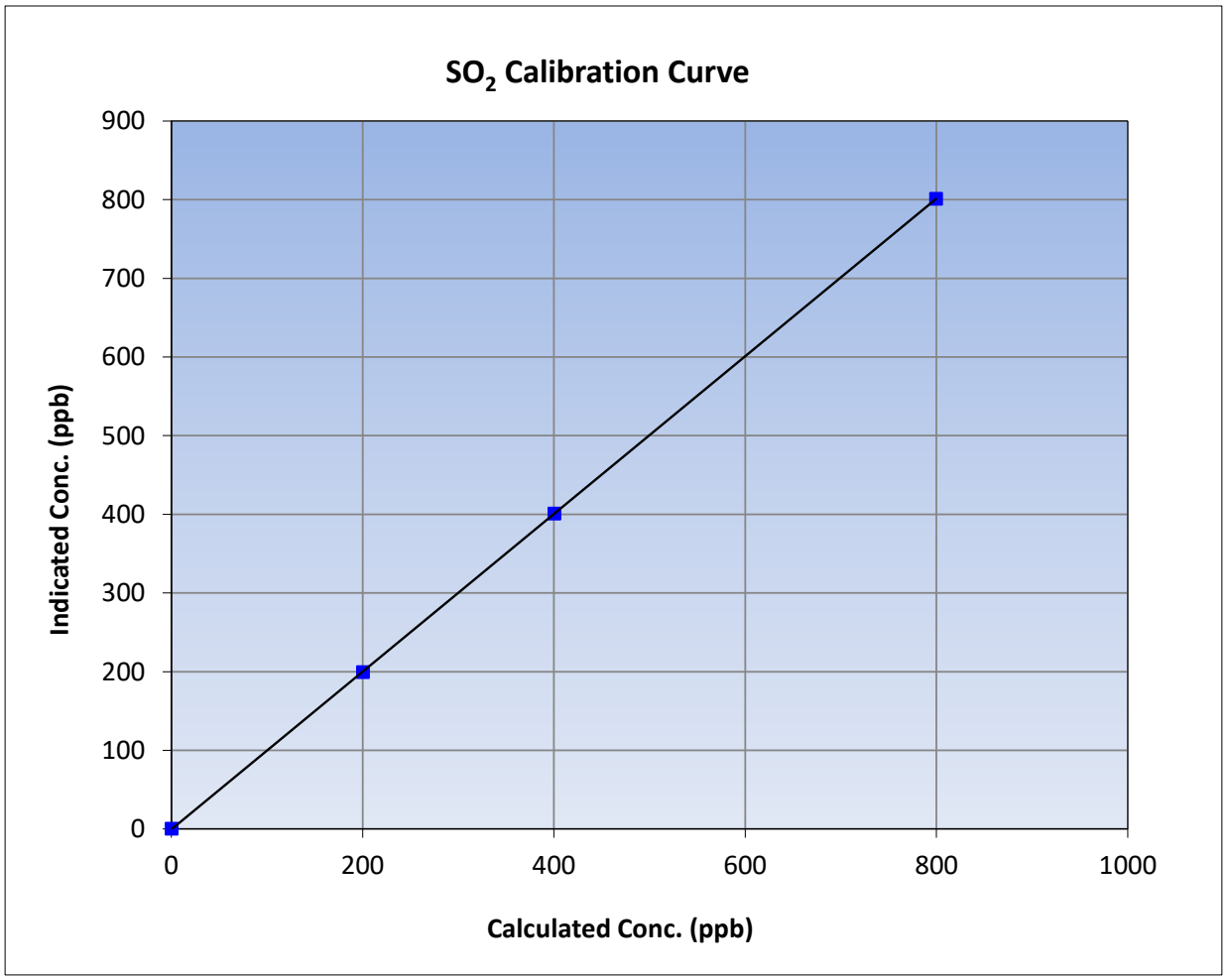
Station Information

Calibration Date:	July 10, 2023	Previous Calibration:	June 6, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:03	End Time (MST):	13:00
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290012

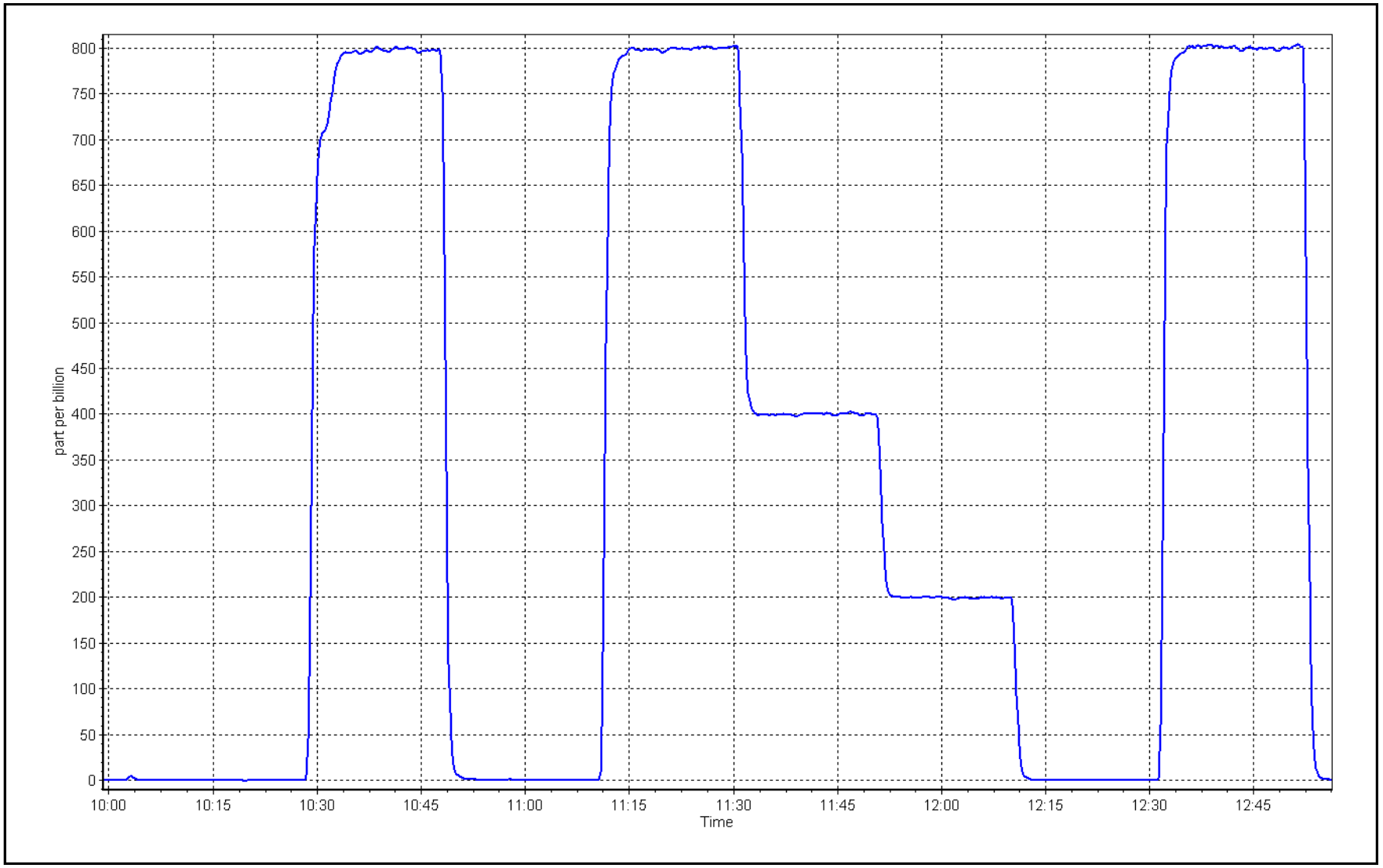
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
799.1	800.7	0.9980
400.1	400.5	0.9989
200.0	199.1	1.0047

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999997	*≥0.995*
Slope	1.002525	*0.90 - 1.10*
Intercept	-0.604149	*+/-30*



SO2 Calibration Plot Date: July 10, 2023 Location: Fort Hills



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	July 24, 2023	Last Cal Date:	June 29, 2023
Start time (MST):	10:13	End time (MST):	14:20
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.20	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517372			
Removed Cal Gas Conc:	5.20	ppm	Rem Gas Exp Date:	N/A
Removed Gas Cyl #:	N/A		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	451
ZAG Make/Model:	API T701		Serial Number:	5611

Analyzer Information

Analyzer make:	Thermo 43iQ TLE		Analyzer serial #:	1300156232	
Converter make:	CDN-101		Converter serial #:	594	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.006026	1.006312	Backgd or Offset:	1.93	1.19
Calibration intercept:	0.002053	0.042041	Coeff or Slope:	1.132	1.124

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4923	77.0	80.0	78.0	1.024
as found 2nd point	4962	38.5	40.0	39.2	1.018
as found 3rd point	4981	19.2	19.9	19.5	1.018
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4923	77.0	80.0	80.4	0.995
second point	4962	38.5	40.0	40.6	0.985
third point	4981	19.2	19.9	20.1	0.992
as left zero	5000	0.0	0.0	0.0	----
as left span	4923	77.0	80.0	81.8	0.978
SO2 Scrubber Check	4920	80.3	803.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.991
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.1	Prev response:	80.49	*% change:	-3.1%
Baseline Corr 2nd AF pt:	39.3	AF Slope:	0.976033	AF Intercept:	0.001396
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999987		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

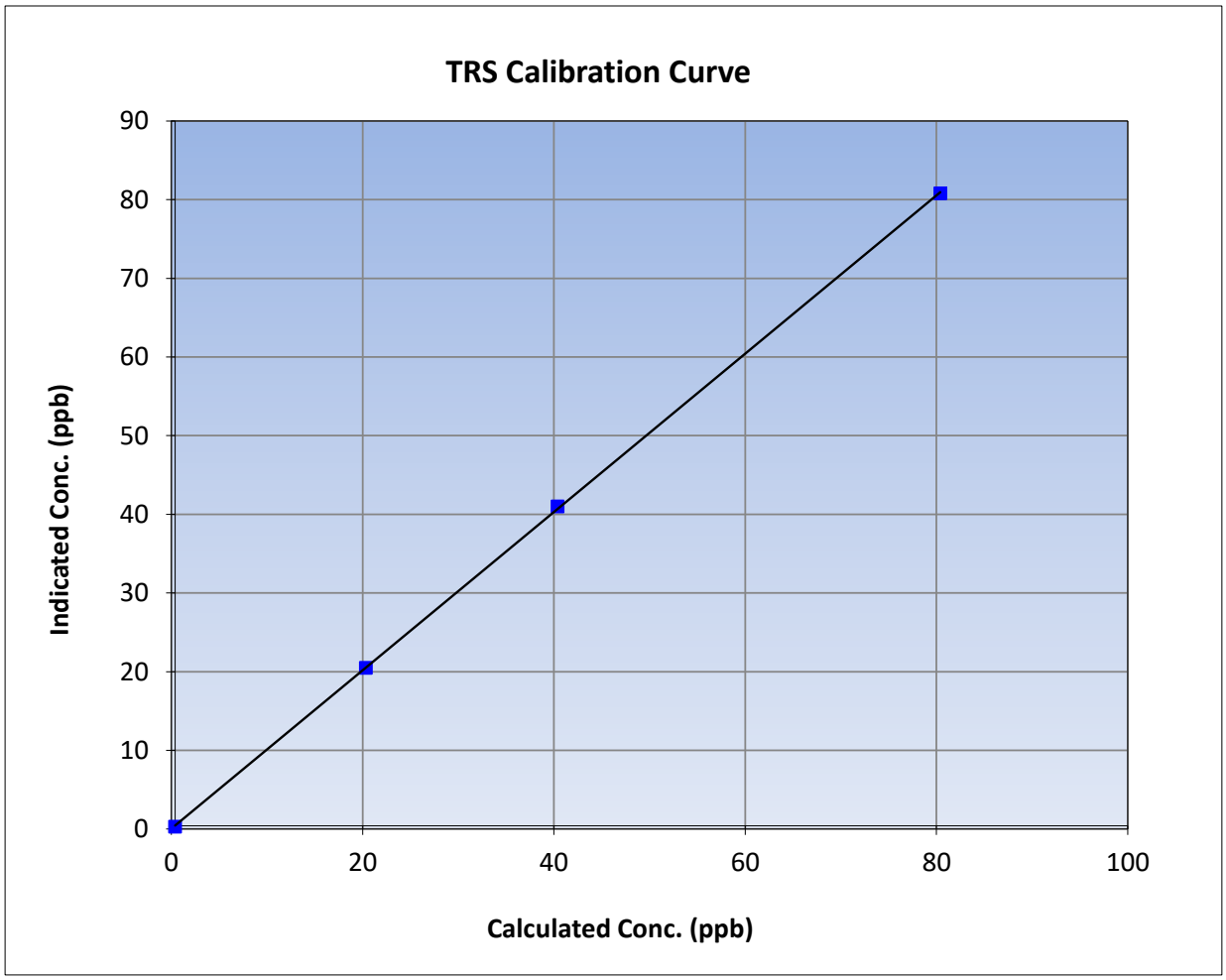
Station Information

Calibration Date:	July 24, 2023	Previous Calibration:	June 29, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:13	End Time (MST):	14:20
Analyzer make:	Thermo 43iQ TLE	Analyzer serial #:	1300156232

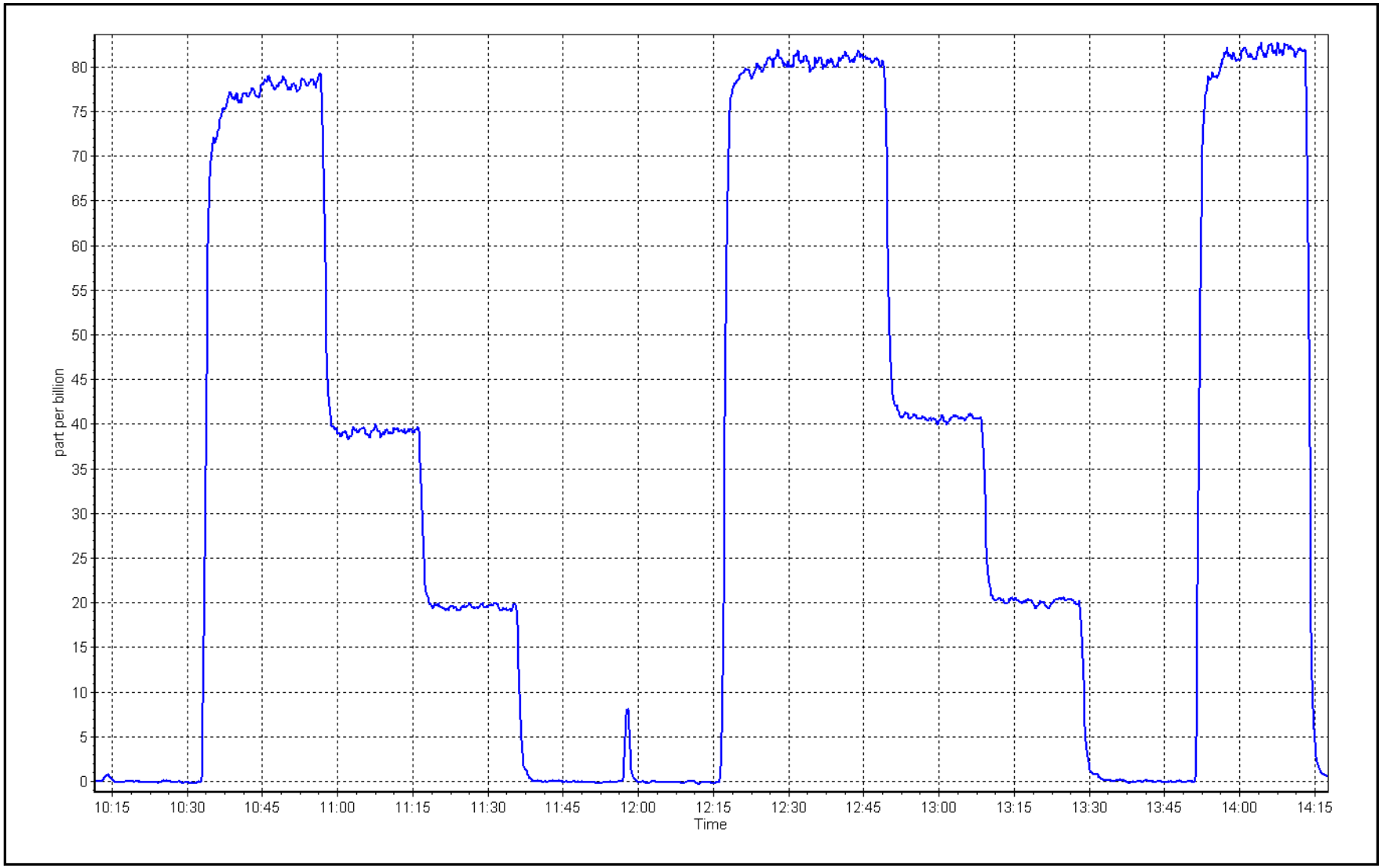
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.4	0.9951
40.0	40.6	0.9852
19.9	20.1	0.9924

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999961	*≥0.995*
Slope	1.006312	*0.90 - 1.10*
Intercept	0.042041	*+/-3*



TRS Calibration Plot Date: July 24, 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:	July 10, 2023	Last Cal Date:	June 6, 2023
Start time (MST):	10:02	End time (MST):	13:00
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	17.05	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	17.19	17.08	1.006
second point	4960	40.2	8.61	8.50	1.012
third point	4980	20.1	4.30	4.25	1.012
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.19	17.08	1.007
				Average Correction Factor	1.010

Baseline Corr AF:	17.05	Prev response	17.10	*% 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	9.07	1.010
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	9.16	9.08	1.009
second point	4960	40.2	4.59	4.56	1.006
third point	4980	20.1	2.29	2.30	0.997
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	9.16	9.07	1.009
				Average Correction Factor	1.004
Baseline Corr AF:	9.07	Prev response	9.11	*% change	-0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	8.03	7.98	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	8.03	8.00	1.004
second point	4960	40.2	4.02	3.94	1.020
third point	4980	20.1	2.01	1.95	1.031
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	8.03	8.00	1.004
				Average Correction Factor	1.018
Baseline Corr AF:	7.98	Prev response	7.99	*% change	0.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.995947	0.993826
THC Cal Offset:	-0.024349	-0.020141
CH4 Cal Slope:	0.998403	0.997507
CH4 Cal Offset:	-0.034620	-0.033221
NMHC Cal Slope:	0.993893	0.990511
NMHC Cal Offset:	0.009871	0.013680

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

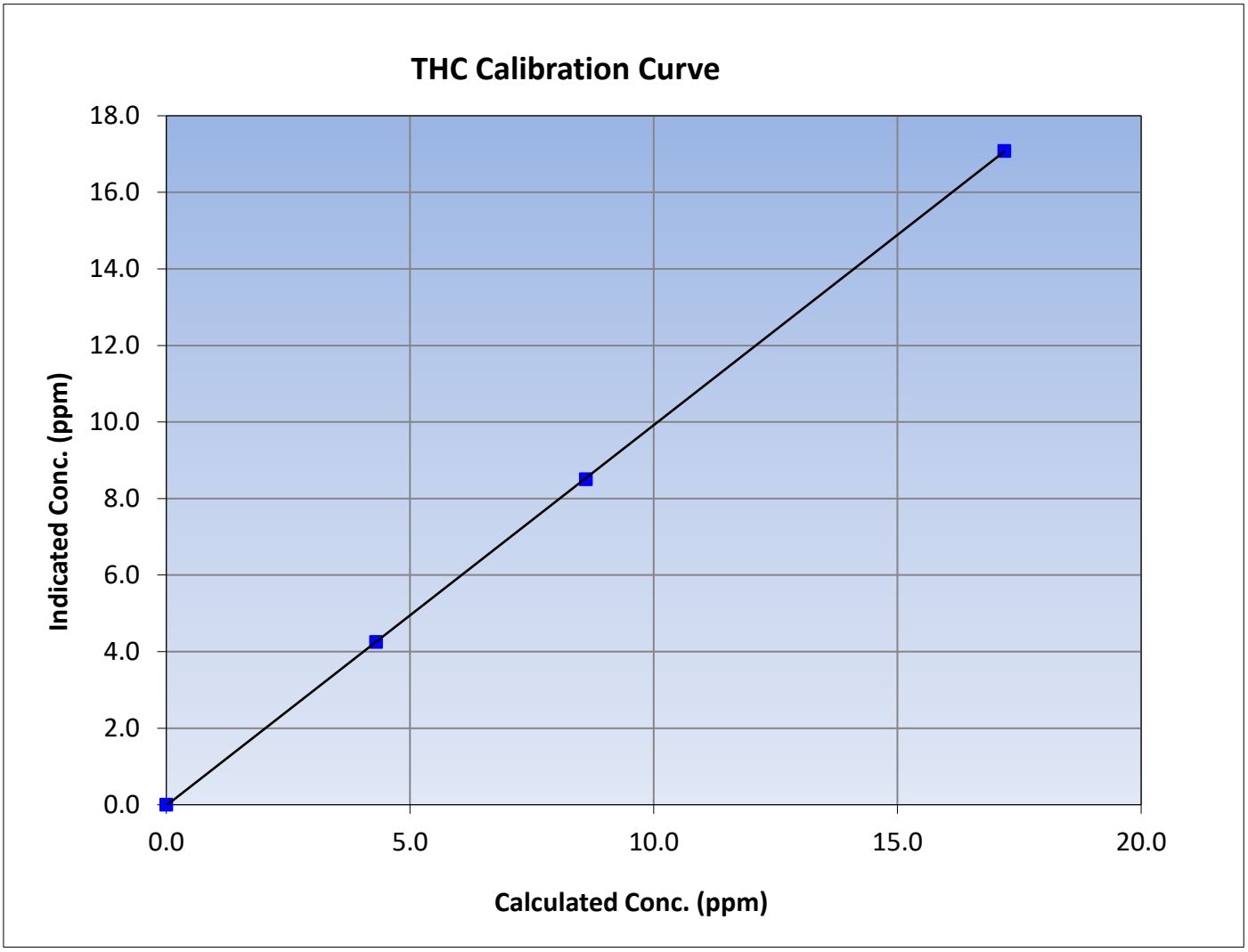
Version-01-2020

Station Information

Calibration Date:	July 10, 2023	Previous Calibration:	June 6, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:02	End Time (MST):	13:00
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585648

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999989	≥0.995
17.19	17.08	1.0064			
8.61	8.50	1.0123	Slope	0.993826	0.90 - 1.10
4.30	4.25	1.0124			
			Intercept	-0.020141	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

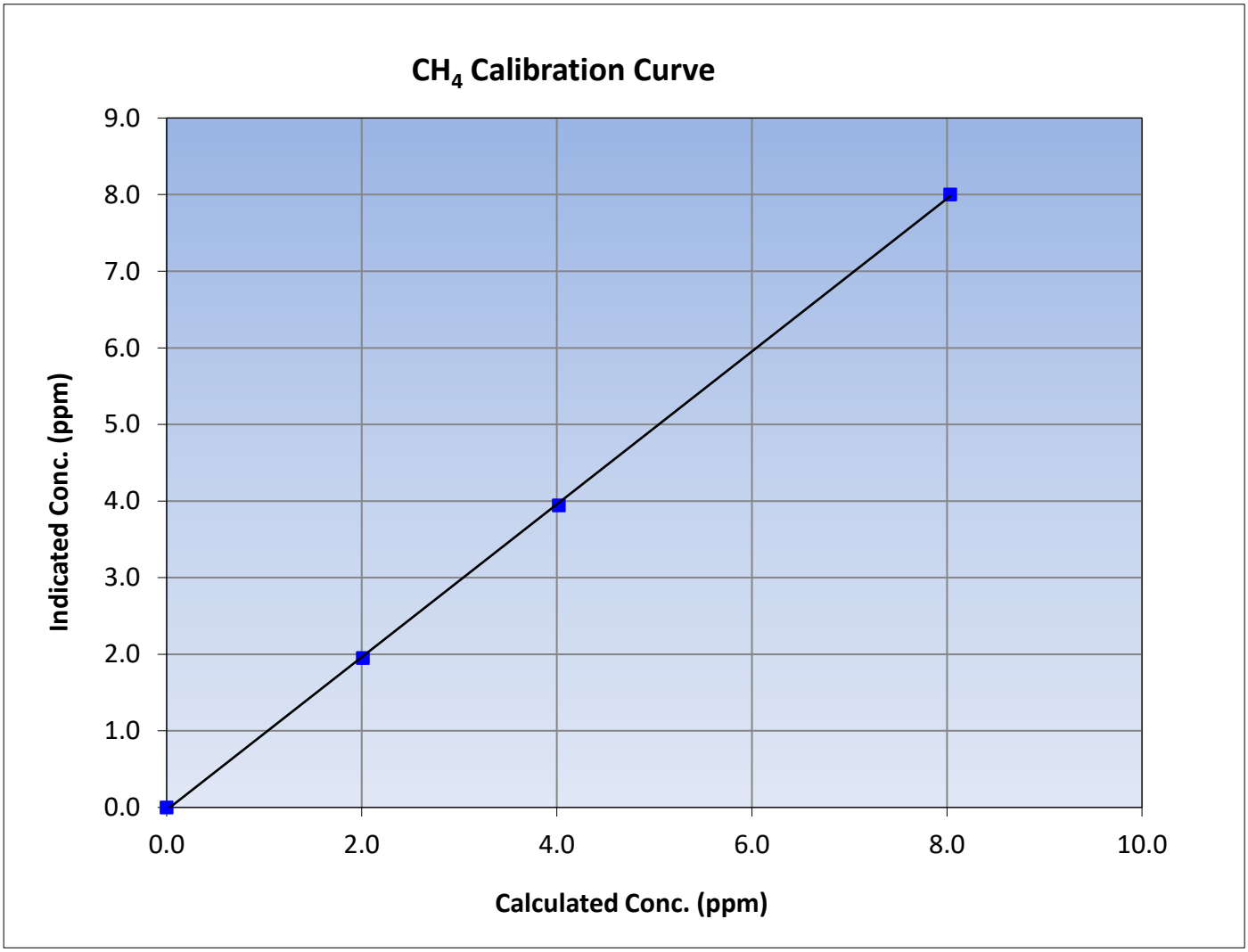
Version-01-2020

Station Information

Calibration Date:	July 10, 2023	Previous Calibration:	June 6, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:02	End Time (MST):	13:00
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	0.999908	*≥0.995*
8.03	8.00	1.0038			
4.02	3.94	1.0196	Slope	0.997507	*0.90 - 1.10*
2.01	1.95	1.0306			
			Intercept	-0.033221	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

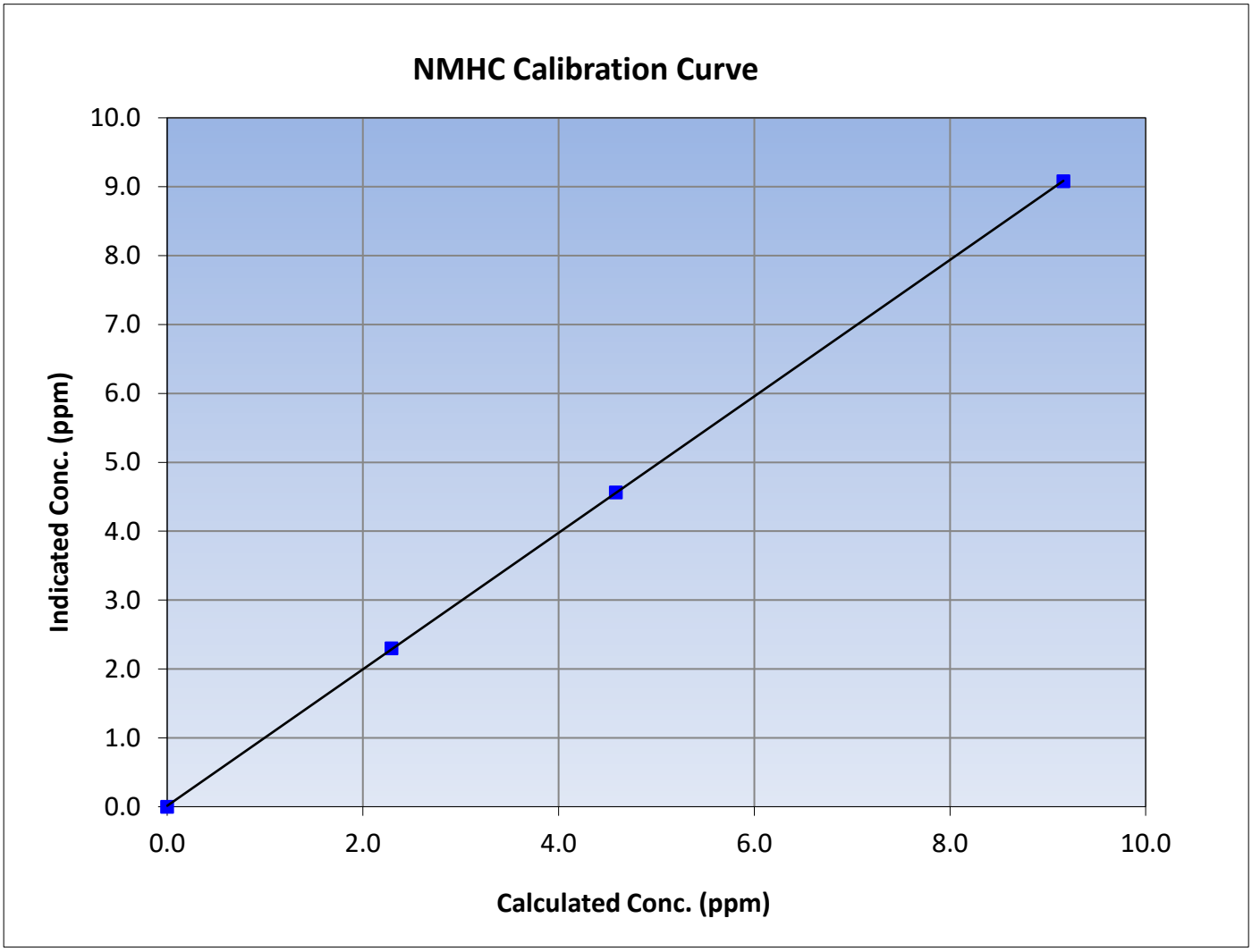
Version-01-2020

Station Information

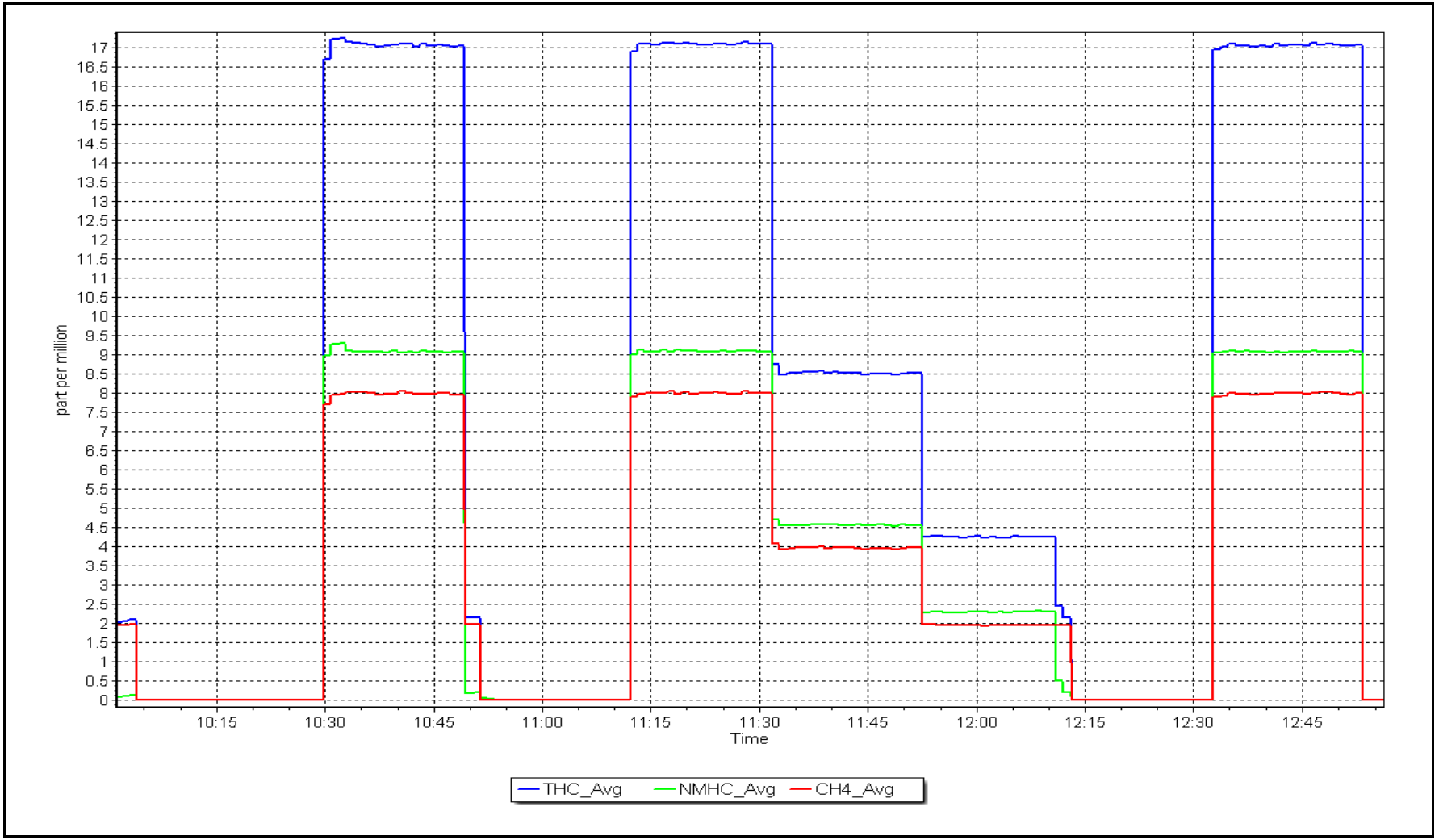
Calibration Date:	July 10, 2023	Previous Calibration:	June 6, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:02	End Time (MST):	13:00
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585648

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999989	≥0.995
9.16	9.08	1.0087			
4.59	4.56	1.0056	Slope	0.990511	0.90 - 1.10
2.29	2.30	0.9969			
			Intercept	0.013680	+/-0.5



NMHC Calibration Plot Date: July 10, 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:	July 21, 2023	Last Cal Date:	July 10, 2023
Start time (MST):	10:30	End time (MST):	12:30
Reason:	Cylinder Change		

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 T750		Serial Number:	282	
ZAG make/model:	API T751H		Serial Number:	321	

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	17.33	0.992
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.19	17.27	0.995
				Average Correction Factor	
Baseline Corr AF:	17.33	Prev response	17.07	*% change	1.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	9.16	9.25	0.990
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	9.16	9.23	0.993
				Average Correction Factor	
Baseline Corr AF:	9.25	Prev response	9.09	*% change	1.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	8.03	8.08	0.994
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	8.03	8.05	0.998
				Average Correction Factor	
Baseline Corr AF:	8.08	Prev response	7.98	*% change	1.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

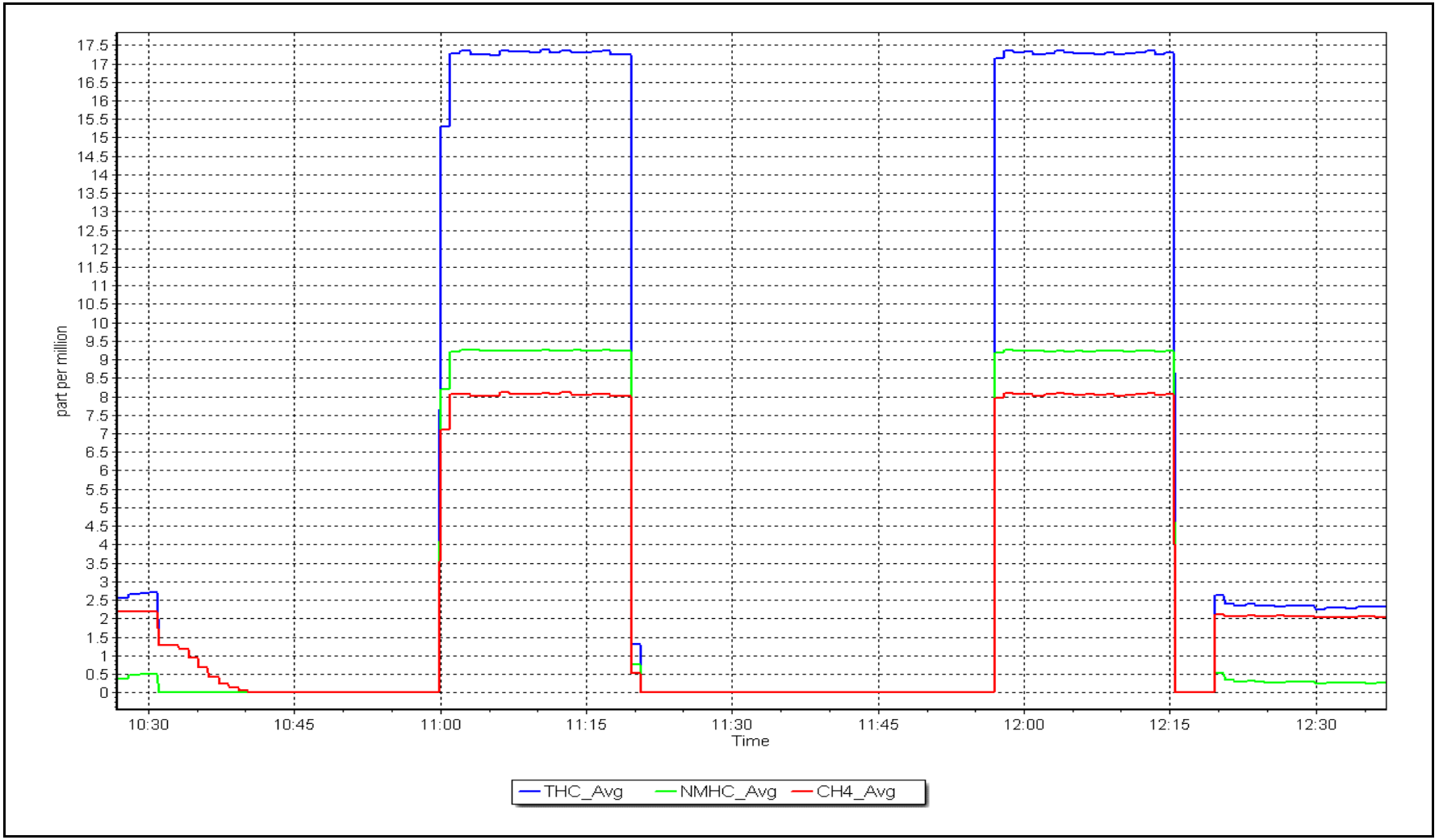
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.993826	
THC Cal Offset:	-0.020141	
CH4 Cal Slope:	0.997507	
CH4 Cal Offset:	-0.033221	
NMHC Cal Slope:	0.990511	
NMHC Cal Offset:	0.013680	

Notes: Changed the N2 cylinder after as founds.

Calibration Performed By: Rene Chamberland

NMHC Calibration Plot Date: July 21, 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:	July 21, 2023	Last Cal Date:	June 1, 2023
Start time (MST):	10:14	End time (MST):	15:26
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	CC332703		Cal Gas Expiry Date:	January 28, 2024	
NOX Cal Gas Conc:	49.7	ppm	NO Cal Gas Conc:	49.7	ppm
Removed Cylinder #:	N/A		Removed Gas Exp Date:	N/A	
Removed Gas NOX Conc:	49.7	ppm	Removed Gas NO Conc:	49.7	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	451	
ZAG make/model:	Teledyne API T701		Serial Number:	5611	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1152430007	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.072	1.094	NO bkgnd or offset:	3	3.4
NOX coeff or slope:	0.995	0.995	NOX bkgnd or offset:	3.2	3.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	166.3	165.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.998879	0.999493
NO_X Cal Offset:	1.384352	0.844323
NO Cal Slope:	0.999937	0.999823
NO Cal Offset:	-0.035916	0.004005
NO_2 Cal Slope:	1.003749	1.006741
NO_2 Cal Offset:	0.418698	0.163045

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.9	0.4	0.5	----	----
as found span	4920	80.5	800.2	800.2	0.0	782.7	777.2	5.4	1.022	1.030
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	-0.1	0.1	----	----
high point	4920	80.5	800.2	800.2	0.0	799.8	799.6	0.2	1.000	1.001
second point	4960	40.2	399.6	399.6	0.0	401.9	400.7	1.1	0.994	0.997
third point	4980	20.1	199.8	199.8	0.0	200.4	199.1	1.3	0.997	1.003
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	-0.1	----	----
as left span	4920	80.5	800.2	447.3	352.9	797.3	442.9	354.4	1.004	1.010
								Average Correction Factor	0.997	1.000

Corrected As found	NO_X = 781.8 ppb	NO = 776.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -2.4%
Previous Response	NO_X = 800.7 ppb	NO = 800.1 ppb		*Percent Change	NO = -3.0%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	796.7	443.8	352.9	355.4	0.993	100.7%
2nd GPT point (200 ppb O3)	796.7	622.8	173.9	175.3	0.992	100.8%
3rd GPT point (100 ppb O3)	796.7	708.2	88.5	89.3	0.991	100.9%
				Average Correction Factor	0.992	100.8%

Notes: Changed the inlet filter after as founds. Adjusted both zero and span. Used the 2nd GPT reference points due to drift.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

NO_X Calibration Summary

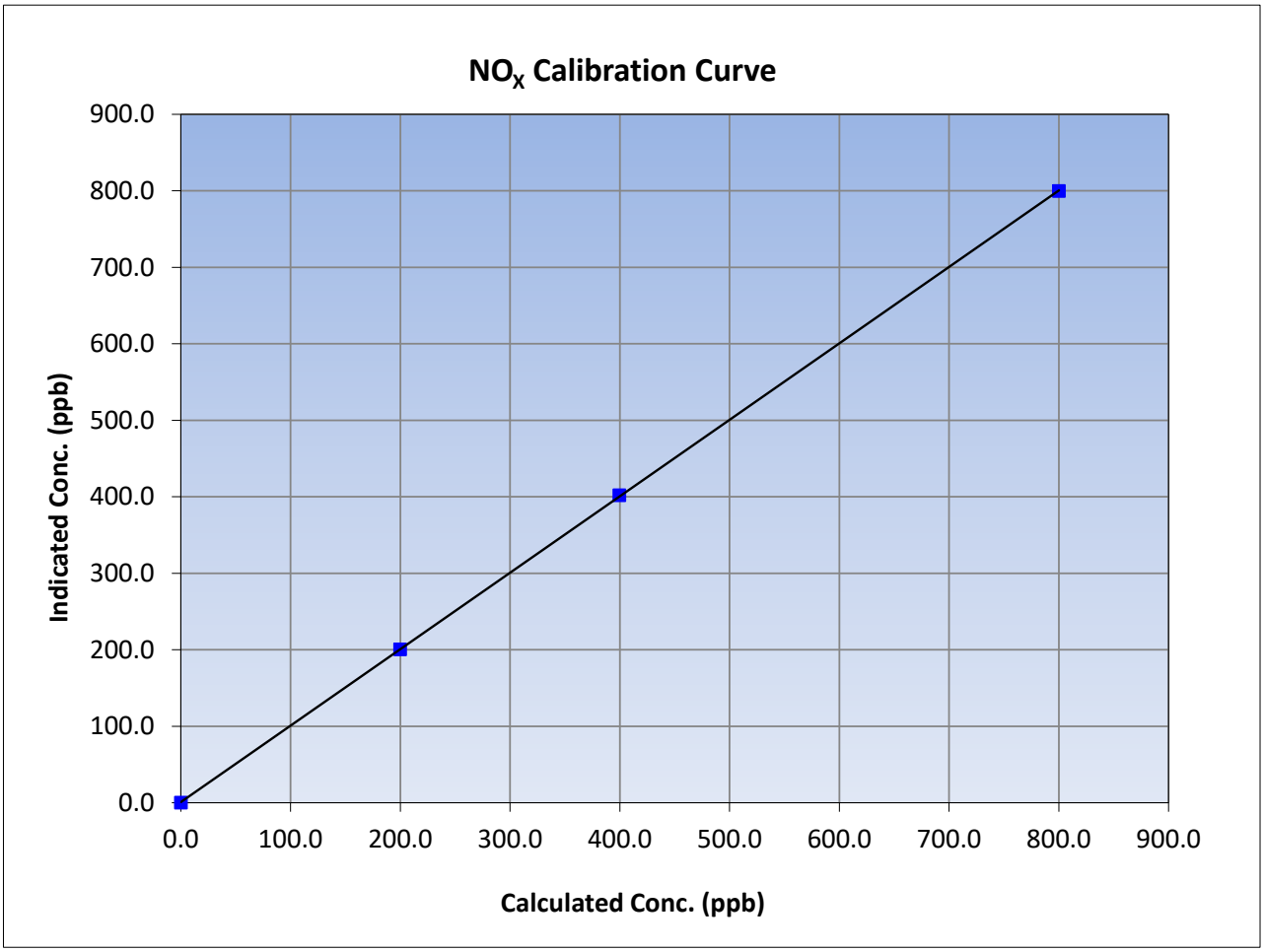
Version-04-2020

Station Information

Calibration Date:	July 21, 2023	Previous Calibration:	June 1, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:14	End Time (MST):	15:26
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	0.999988	*≥0.995*
800.2	799.8	1.0005			
399.6	401.9	0.9942	Slope	0.999493	*0.90 - 1.10*
199.8	200.4	0.9970			
			Intercept	0.844323	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

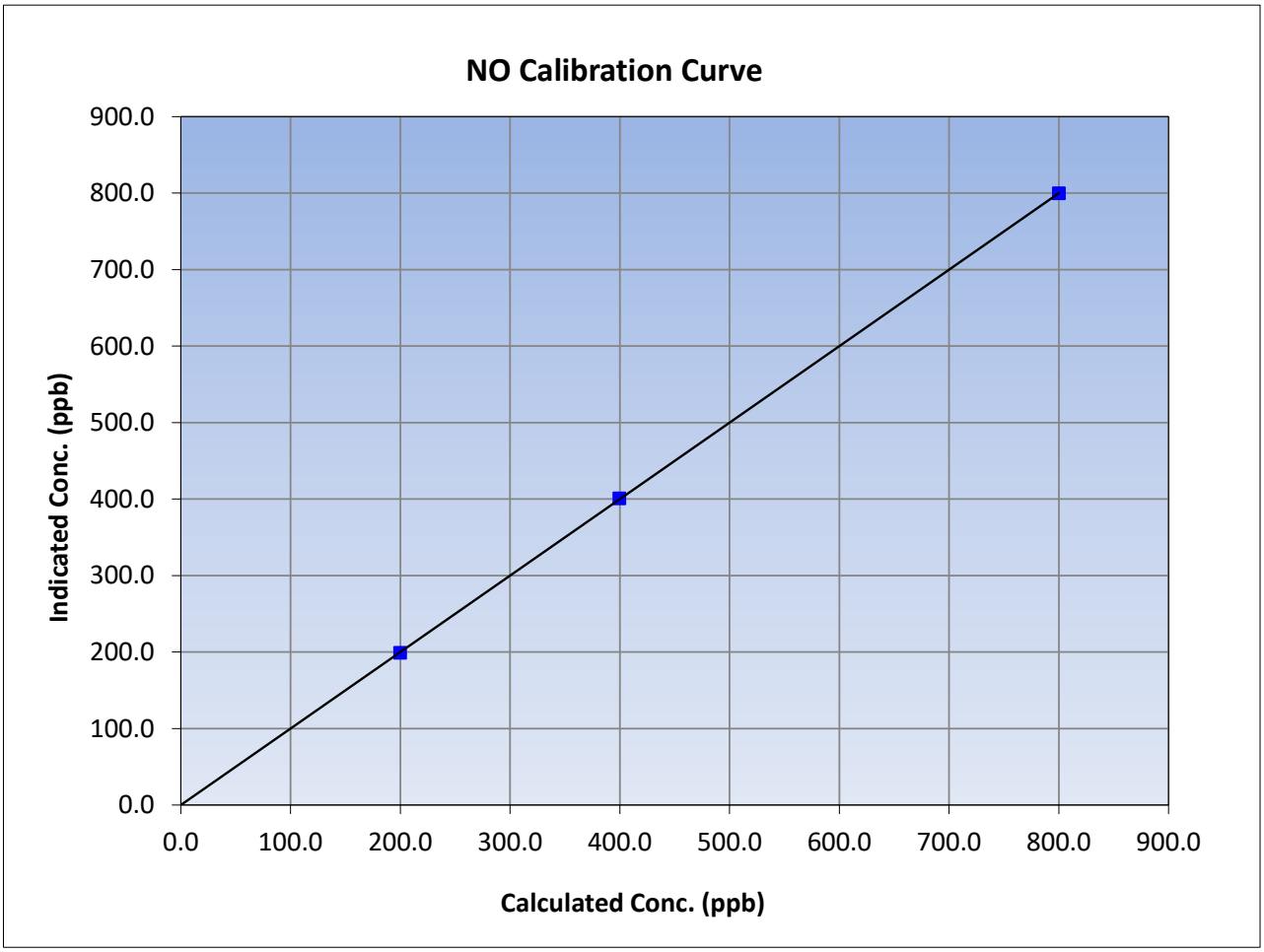
Version-04-2020

Station Information

Calibration Date:	July 21, 2023	Previous Calibration:	June 1, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:14	End Time (MST):	15:26
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999994	≥0.995
800.2	799.6	1.0007			
399.6	400.7	0.9972	Slope	0.999823	0.90 - 1.10
199.8	199.1	1.0035			
			Intercept	0.004005	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

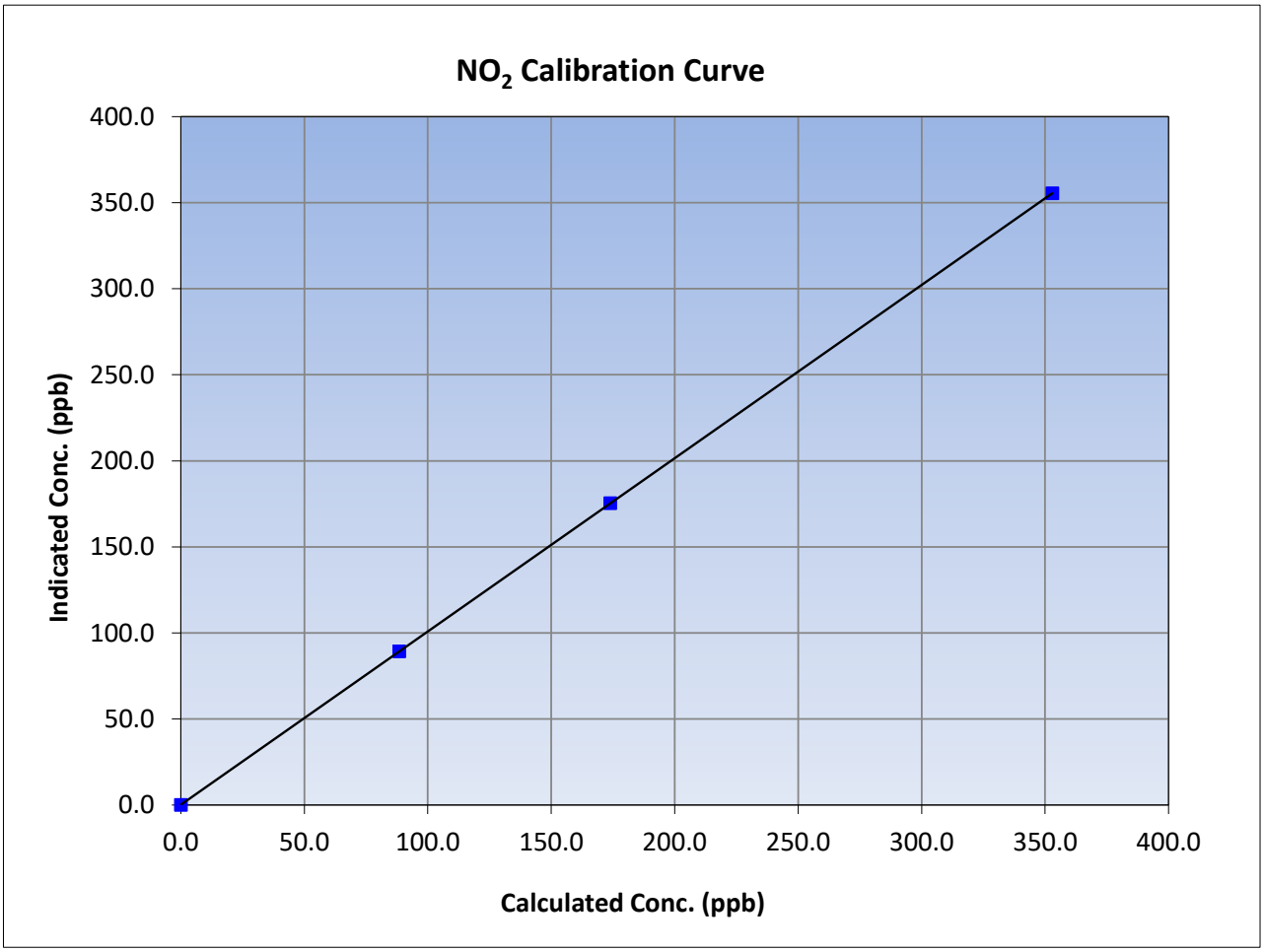
Version-04-2020

Station Information

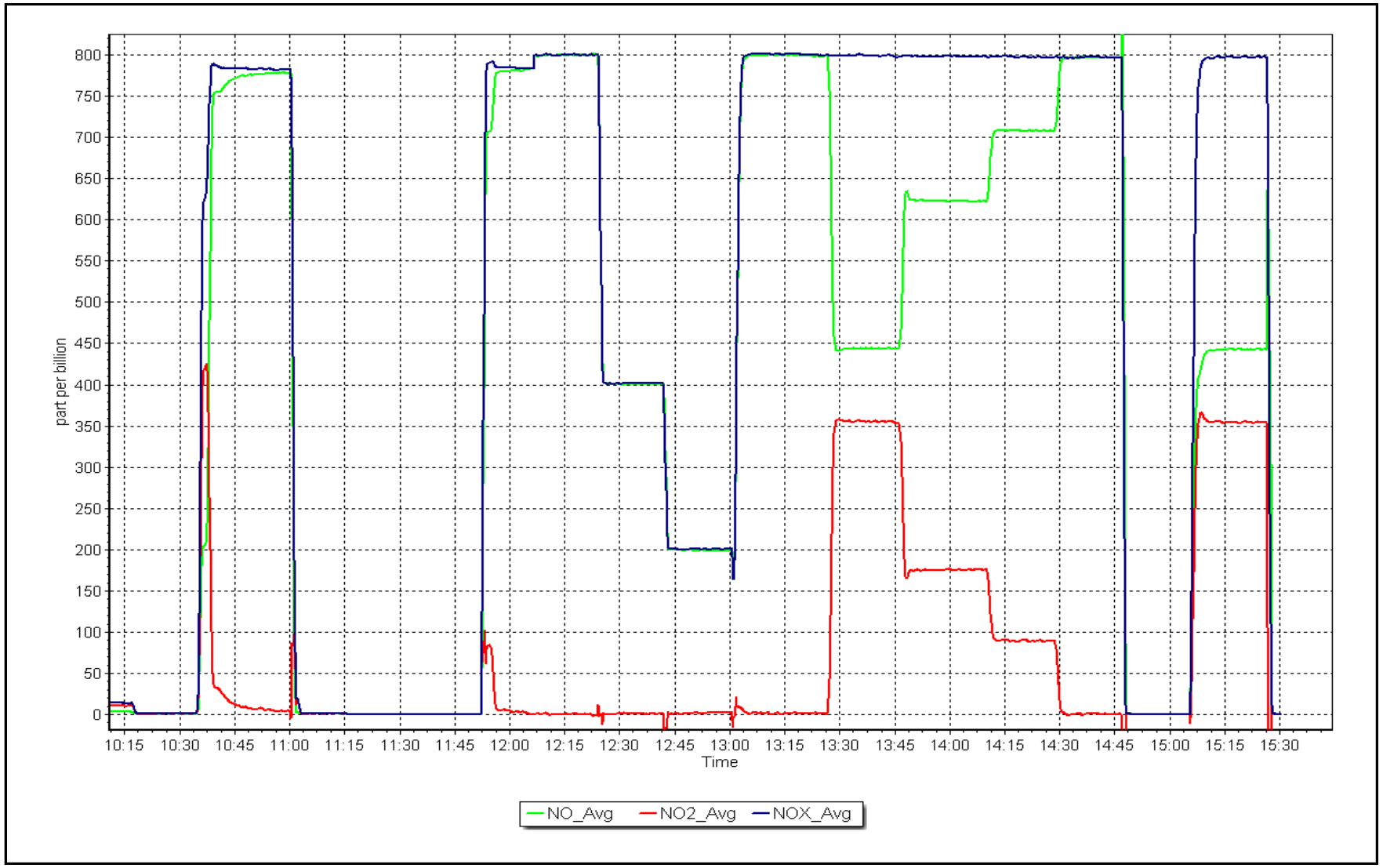
Calibration Date:	July 21, 2023	Previous Calibration:	June 1, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:14	End Time (MST):	15:26
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	1.000000	≥0.995
352.9	355.4	0.9930			
173.9	175.3	0.9920	Slope	1.006741	0.90 - 1.10
88.5	89.3	0.9910			
			Intercept	0.163045	+/-20



NO_X Calibration Plot Date: July 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:	July 24, 2023	Last Cal Date:	June 6, 2023
Start time (MST):	13:54	End time (MST):	14:38
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)	30	30.79	30	☐	+/- 2 °C
P (mmHg)	732.8	732.08	732.8	☐	+/- 10 mmHg
flow (LPM)	5.02	4.99	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: July 24, 2023 Last Cal Date: June 6, 2023

PM w/o HEPA: 29.5 PM w/ HEPA: 0.1 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	10.8	11.3	11	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 30.3 w/ HEPA: 0.1 <0.2 ug/m3

Date Optical Chamber Cleaned: July 24, 2023

Disposable Filter Changed: July 24, 2023

Annual Maintenance

Date Sample Tube Cleaned: May 10, 2023

Date RH/T Sensor Cleaned: May 10, 2023

Notes: Leak check passed, adjusted the PMT. Instrument is very dirty due to a lot of site activity and smoke in the area, completed the quarterly maintenance and the monthly checks.

Calibration by: Max Farrell

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS25
WASKŌW OHCI PIMÂTISIWIN
JULY 2023

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

August 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:	July 24, 2023	Last Cal Date:	June 15, 2023
Start time (MST):	6:48	End time (MST):	10:00
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.54	ppm	Cal Gas Exp Date:	December 29, 2028
Cal Gas Cylinder #:	CC437219			
Removed Cal Gas Conc:	50.54	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	747
ZAG Make/Model:	API T701		Serial Number:	4765

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1118148497

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999805	1.005116	Backgd or Offset:	9.7	9.7
Calibration intercept:	0.523945	-0.536058	Coeff or Slope:	0.974	0.988

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	----
as found span	4921	79.2	800.5	789.5	1.014
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4921	79.2	800.5	804.5	0.995
second point	4960	39.6	400.3	401.3	0.998
third point	4980	19.8	200.1	200.0	1.001
as left zero	5000	0.0	0.0	0.3	----
as left span	4921	79.2	800.5	802.3	0.998
				Average Correction Factor	0.998

Baseline Corr As found:	789.50	Previous response	800.89	*% 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: Span adjusted. No maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

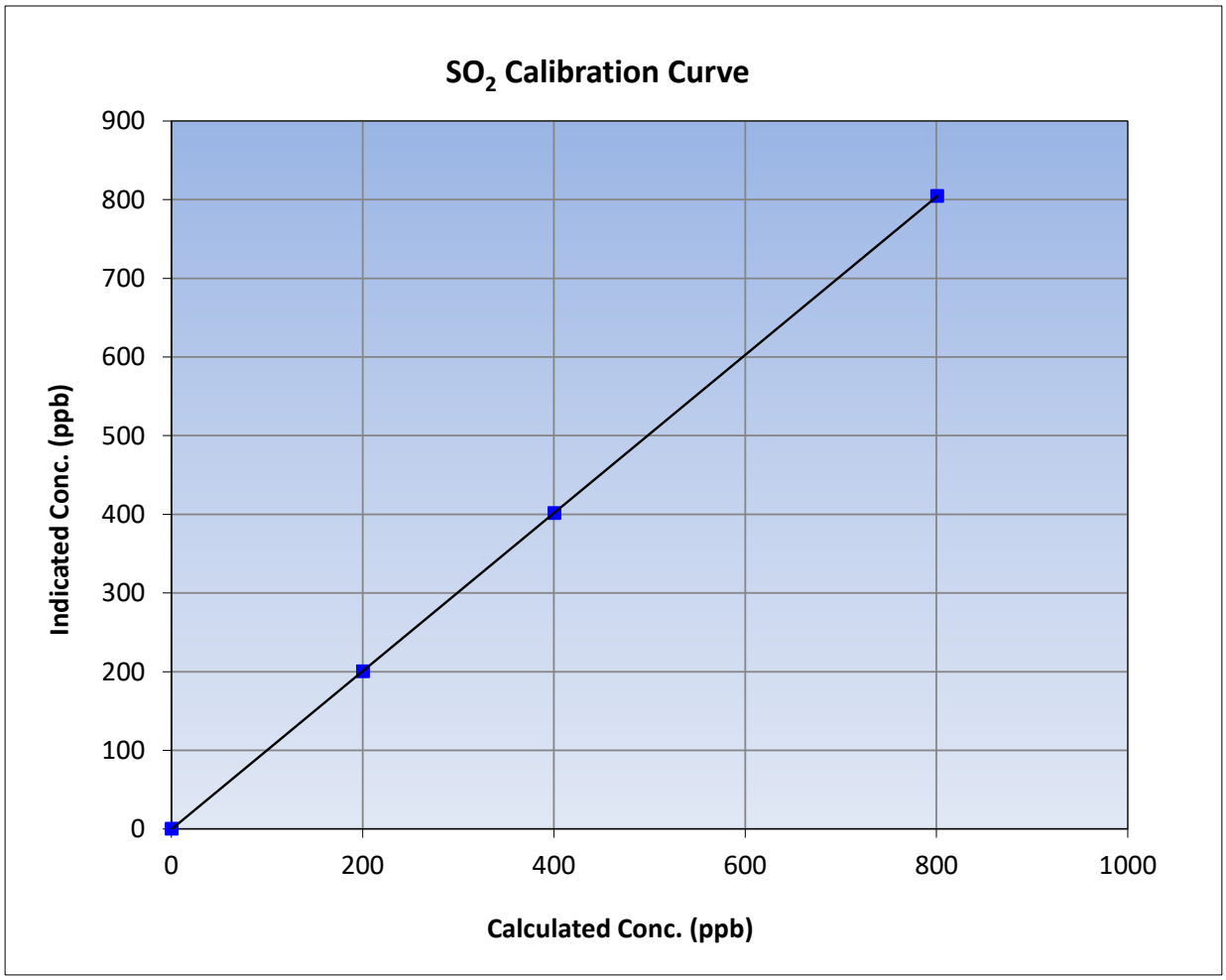
Station Information

Calibration Date:	July 24, 2023	Previous Calibration:	June 15, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	6:48	End Time (MST):	10:00
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148497

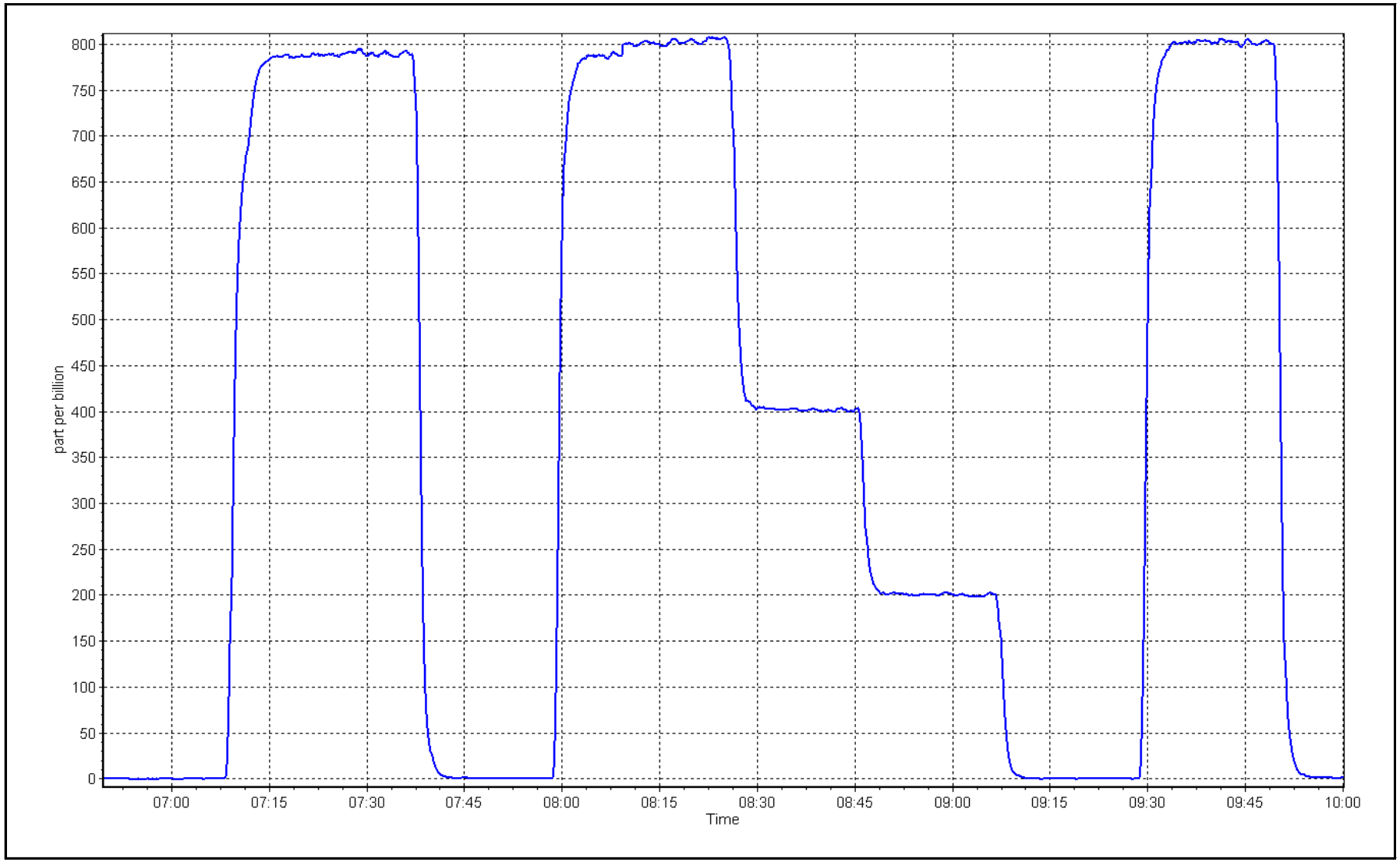
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
800.5	804.5	0.9951
400.3	401.3	0.9975
200.1	200.0	1.0007

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	1.005116	*0.90 - 1.10*
Intercept	-0.536058	*+/-30*



SO2 Calibration Plot Date: July 24, 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:	July 18, 2023	Last Cal Date:	June 30, 2023
Start time (MST):	6:42	End time (MST):	11:37
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	4.97	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC517099			
Removed Cal Gas Conc:	4.97	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	747
ZAG Make/Model:	API T701		Serial Number:	261

Analyzer Information

Analyzer make:	Thermo 43i-LTE		Analyzer serial #:	1170050146	
Converter make:	Global G-150		Converter serial #:	2022-219	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.996347	0.997066	Backgd or Offset:	3.25	3.25
Calibration intercept:	0.040000	-0.060000	Coeff or Slope:	1.079	1.079

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4920	80.0	79.5	79.1	1.003
as found 2nd point	4960	40.0	39.7	39.6	1.001
as found 3rd point	4980	20.0	19.9	19.9	0.993
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4920	80.0	79.5	79.1	1.005
second point	4960	40.0	39.7	39.7	1.001
third point	4980	20.0	19.9	19.7	1.008
as left zero	5000	0.0	0.0	0.0	----
as left span	4920	80.0	800.0	800.0	1.000
SO2 Scrubber Check	4921	79.2	800.0	0.1	----
Date of last scrubber change:		20-Jun-23		Ave Corr Factor	1.005
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.2	Prev response:	79.21	*% change:	0.0%
Baseline Corr 2nd AF pt:	39.7	AF Slope:	0.996059	AF Intercept:	0.000000
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999992		

* = > +/-5% change initiates investigation

Notes: Calibration after the Sulphur Study. SOx scrubber checked after the calibrator zero. No adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

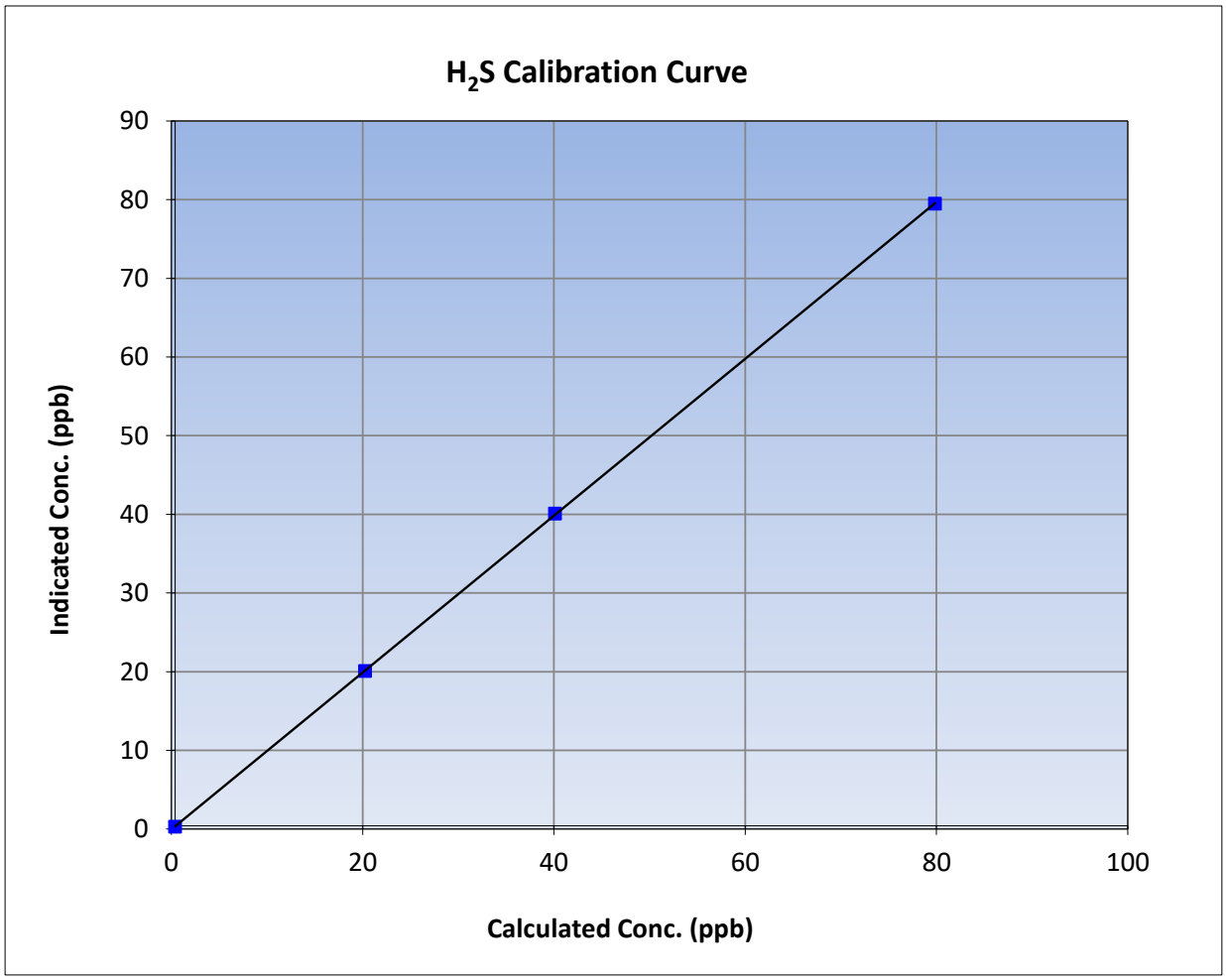
Station Information

Calibration Date:	July 18, 2023	Previous Calibration:	June 30, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	6:42	End Time (MST):	11:37
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1170050146

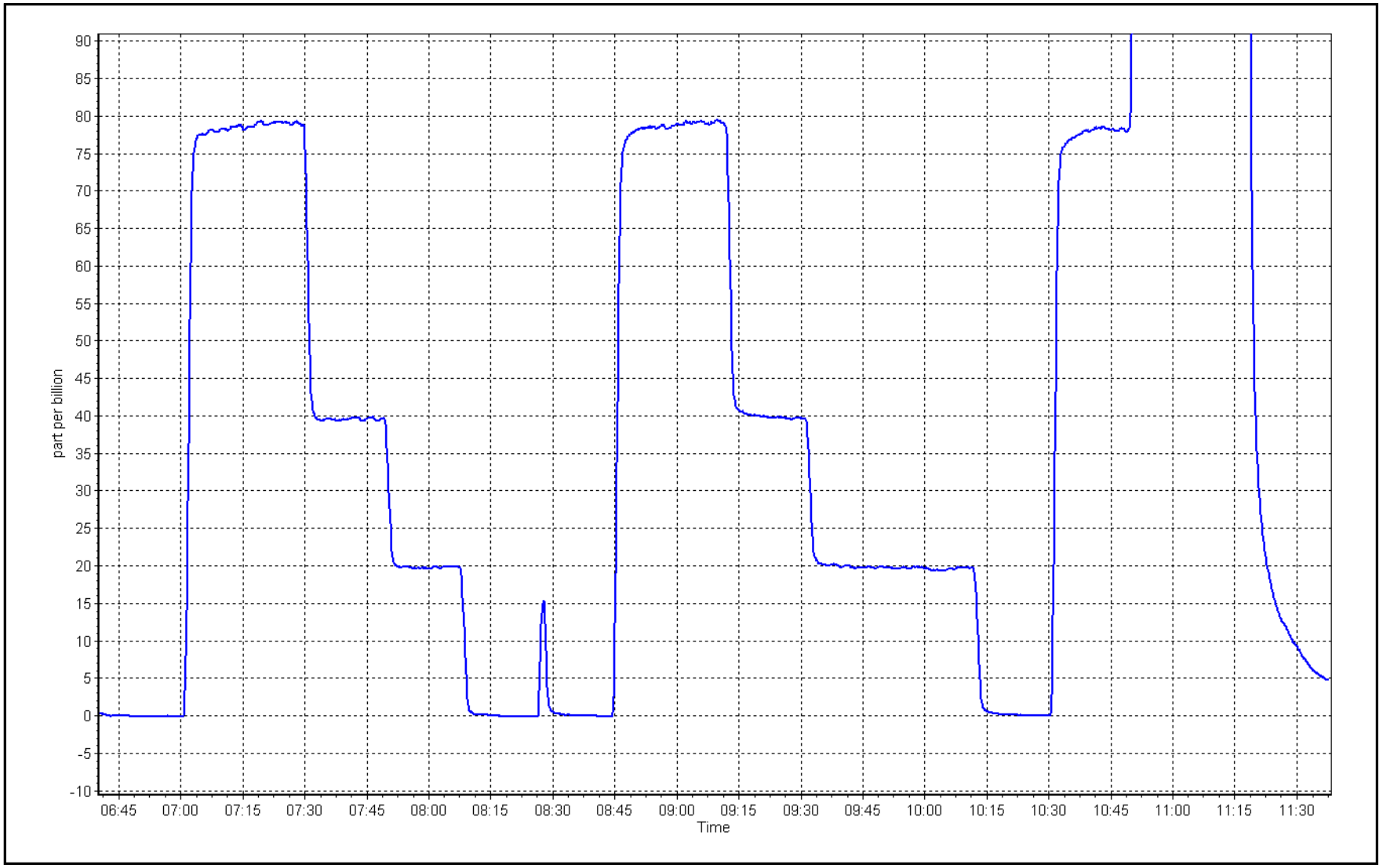
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
79.5	79.1	1.0045
39.7	39.7	1.0007
19.9	19.7	1.0083

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999991	*≥0.995*
Slope	0.997066	*0.90 - 1.10*
Intercept	-0.060000	*+/-3*



H_2S Calibration Plot Date: July 18, 2023 Location: Waskow ohci Pimatisiwin



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS26
CHRISTINA LAKE
JULY 2023

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

August 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:	July 13, 2023	Last Cal Date:	June 1, 2023
Start time (MST):	8:34	End time (MST):	11:20
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 T701H		Serial Number:	832

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1173410001

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001939	1.015687	Backgd or Offset:	16.1	16.2
Calibration intercept:	-2.456875	-2.538773	Coeff or Slope:	0.900	0.900

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	80.6	799.0	808.3	0.988
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4919	80.6	799.0	810.2	0.986
second point	4960	40.3	399.4	402.3	0.993
third point	4980	20.2	200.2	197.6	1.013
as left zero	5000	0.0	0.0	0.3	----
as left span	4919	80.6	799.0	811.4	0.985
				Average Correction Factor	0.997

Baseline Corr As found:	808.20	Previous response	798.06	*% change	1.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

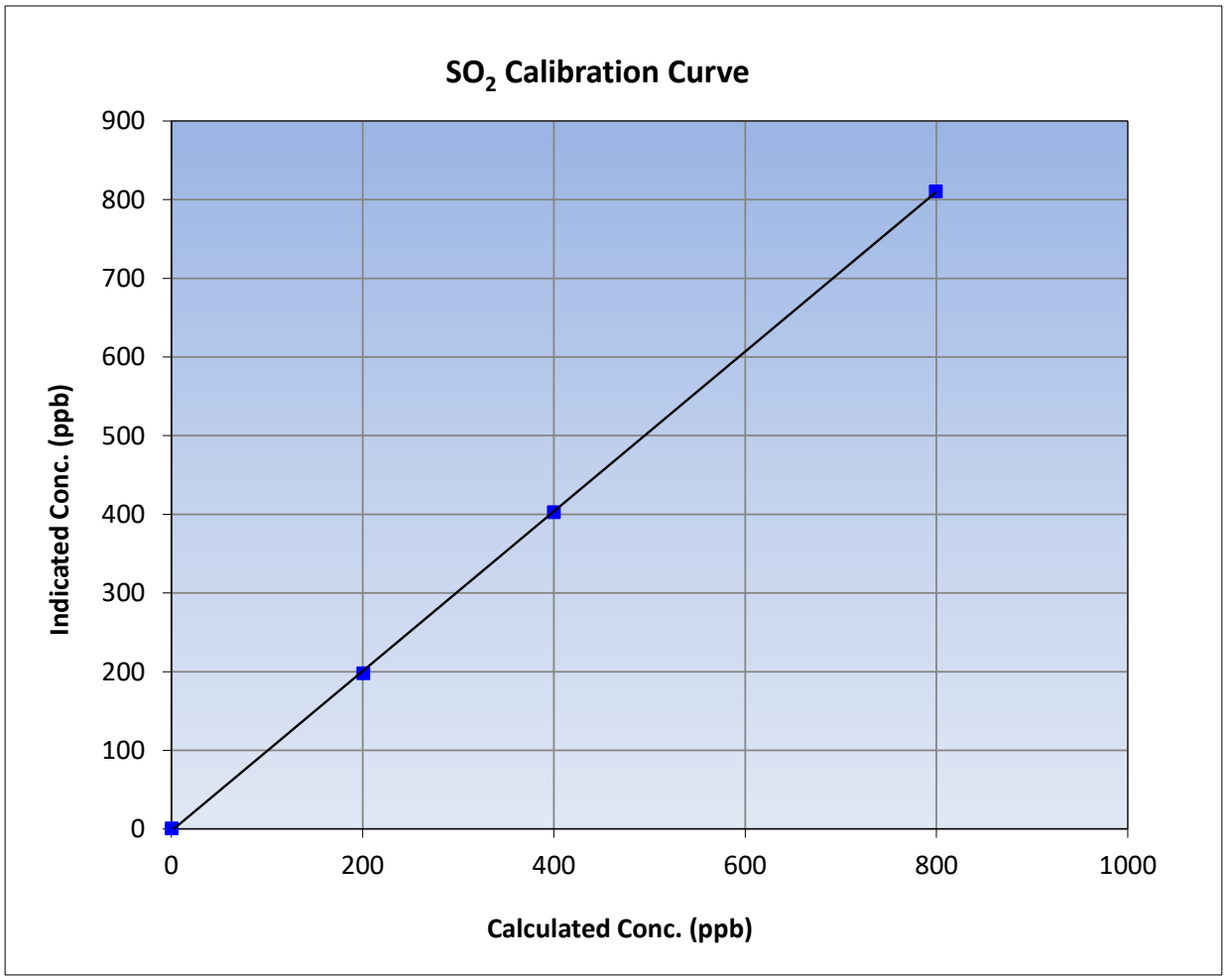
Station Information

Calibration Date:	July 13, 2023	Previous Calibration:	June 1, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	8:34	End Time (MST):	11:20
Analyzer make:	Thermo 43i	Analyzer serial #:	1173410001

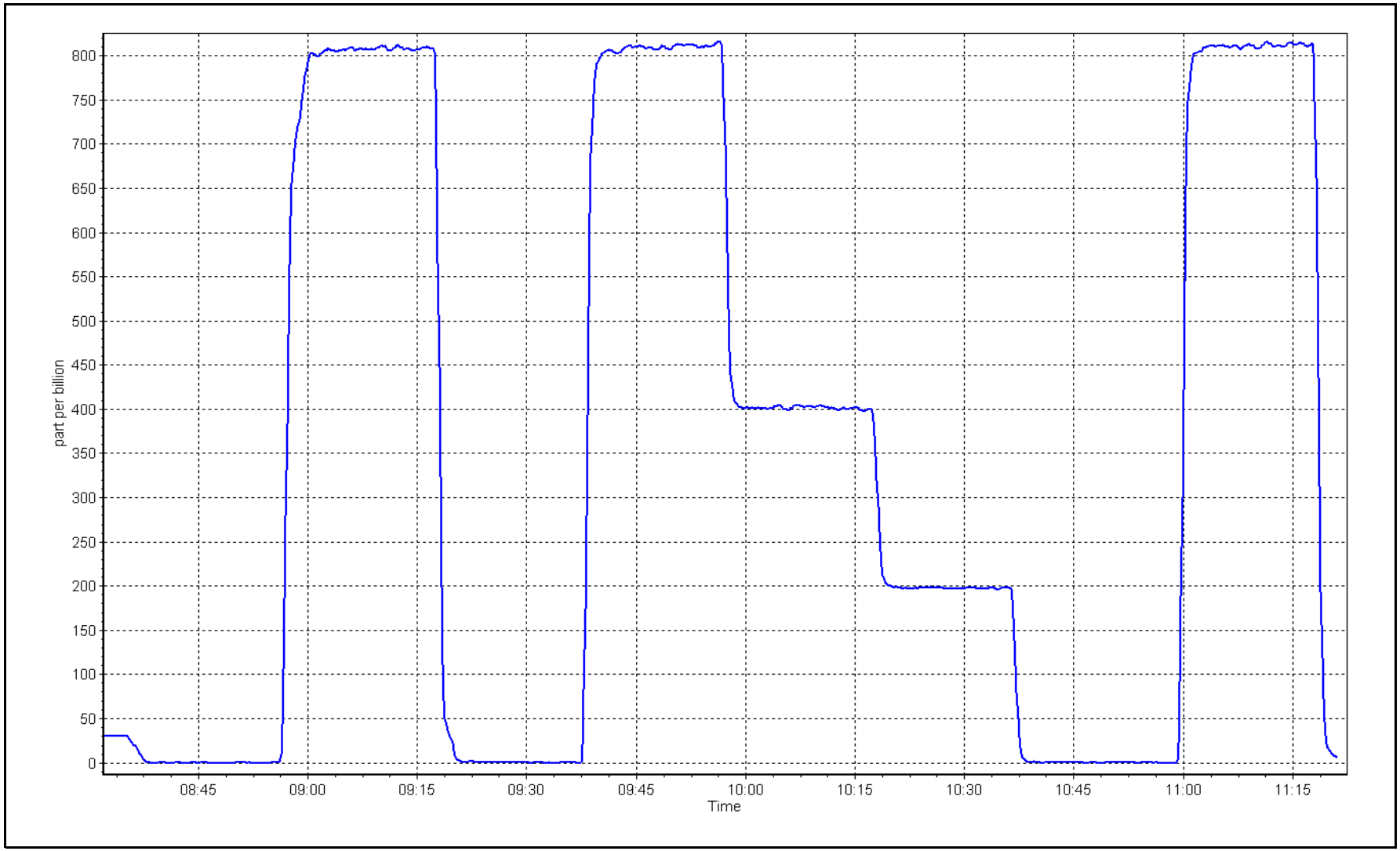
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
799.0	810.2	0.9861
399.4	402.3	0.9929
200.2	197.6	1.0132

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999943	*≥0.995*
Slope	1.015687	*0.90 - 1.10*
Intercept	-2.538773	*+/-30*



SO2 Calibration Plot Date: July 13, 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:	July 14, 2023	Last Cal Date:	June 14, 2023
Start time (MST):	6:35	End time (MST):	10:35
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	4.89	ppm	Cal Gas Exp Date:	February 9, 2024
Cal Gas Cylinder #:	EY0002466			
Removed Cal Gas Conc:	4.89	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	2447
ZAG Make/Model:	API T701H		Serial Number:	832

Analyzer Information

Analyzer make:	Thermo 450i		Analyzer serial #:	1180030032
Converter make:	NA		Converter serial #:	NA
Analyzer Range	0 - 100 ppb			

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.010753	1.001325	Backgd or Offset:	35.0	35.1
Calibration intercept:	-0.140775	-0.160901	Coeff or Slope:	1.093	1.093

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.3	----
as found span	4918	81.8	80.0	82.2	0.977
as found 2nd point	4959	40.9	40.0	41.4	0.973
as found 3rd point	4979	20.4	20.0	20.4	0.993
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4918	81.8	80.0	79.9	1.001
second point	4959	40.9	40.0	40.0	1.000
third point	4979	20.4	20.0	19.8	1.008
as left zero	5000	0.0	0.0	0.0	----
as left span	4918	81.8	80.0	80.7	0.991
SO2 Scrubber Check	4919	80.6	806.1	0.0	----
Date of last scrubber change:		27-Feb-19		Ave Corr Factor	1.003
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.9	Prev response:	80.72	*% change:	1.4%
Baseline Corr 2nd AF pt:	41.1	AF Slope:	1.025322	AF Intercept:	0.199445
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999969		

* = > +/-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

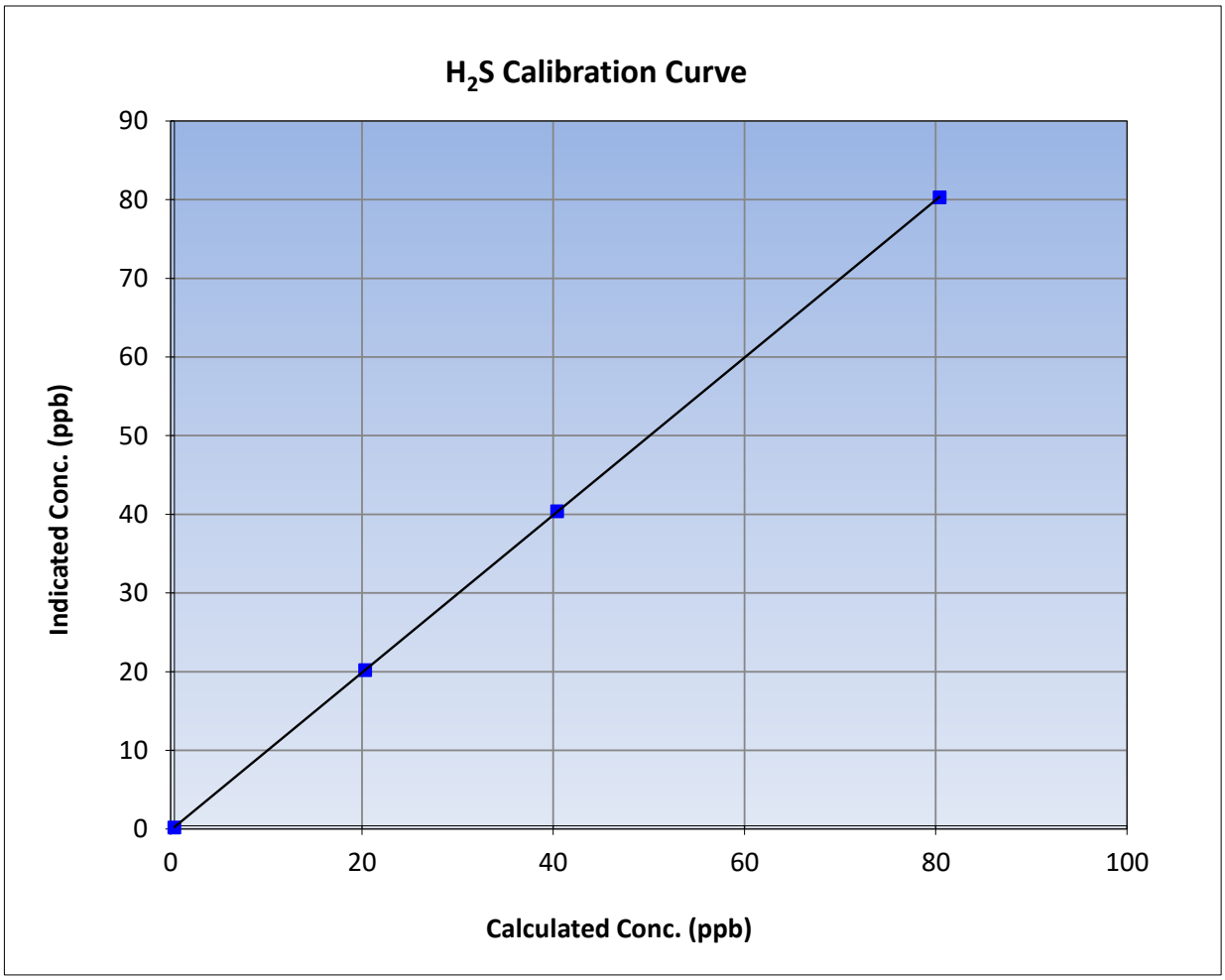
Station Information

Calibration Date:	July 14, 2023	Previous Calibration:	June 14, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	6:35	End Time (MST):	10:35
Analyzer make:	Thermo 450i	Analyzer serial #:	1180030032

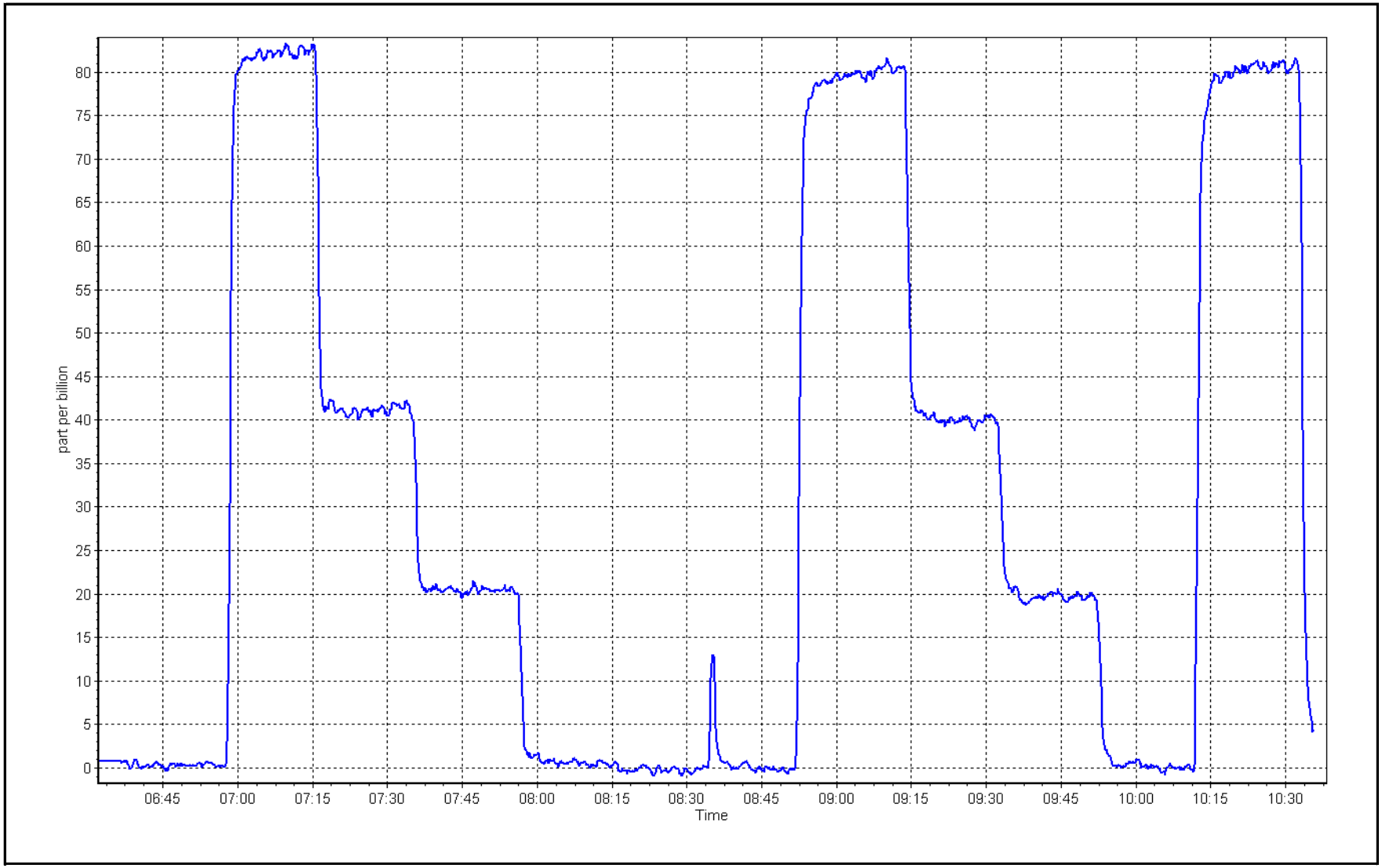
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
80.0	79.9	1.0013
40.0	40.0	1.0000
20.0	19.8	1.0078

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	1.001325	*0.90 - 1.10*
Intercept	-0.160901	*+/-3*



H_2S Calibration Plot Date: July 14, 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:	July 12, 2023	Last Cal Date:	June 15, 2023
Start time (MST):	11:37	End time (MST):	15:20
Reason:	As Found		

Calibration Standards

NO Gas Cylinder #:	T2Y1P4C		Cal Gas Expiry Date:	November 12, 2023	
NOX Cal Gas Conc:	50.82	ppm	NO Cal Gas Conc:	50.02	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	50.82	ppm	Removed Gas NO Conc:	50.02	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	2447	
ZAG make/model:	API T701H		Serial Number:	832	

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.887	1.887	NO bkgnd or offset:	3.6	3.6
NOX coeff or slope:	0.995	0.995	NOX bkgnd or offset:	4.2	4.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	212.8	225.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.003570	
NO_X Cal Offset:	-1.960000	
NO Cal Slope:	1.003127	
NO Cal Offset:	-3.060000	
NO_2 Cal Slope:	1.001715	
NO_2 Cal Offset:	-0.246575	

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.6	-0.1	-0.5	----	----
as found span	4920	80.0	813.1	800.3	12.8	762.0	748.1	13.9	1.0671	1.0698
as found 2nd	4960	40.0	406.6	400.2	6.4	381.4	373.4	8.0	1.0660	1.0717
as found 3rd	4980	20.0	203.3	200.1	3.2	188.6	183.5	5.2	1.0778	1.0904
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 = 762.6 ppb	NO = 748.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -6.7%
Previous Response	NO_X = 814.1 ppb	NO = 799.8 ppb		*Percent Change	NO = -6.9%
Baseline Corr 2nd pt	NO_X = 382.0 ppb	NO = 373.5 ppb	As found	NO_X r^2: 0.999993	Nx Sl: 0.938579	Nx Int: -1.040
Baseline Corr 3rd pt	NO_X = 189.2 ppb	NO = 183.6 ppb	As found	NO r^2: 0.999976	NO Sl: 0.936268	NO Int: -1.600
			As found	NO_2 r^2: 0.999994	NO2 Sl: 1.002544	NO_2 Int: -0.182

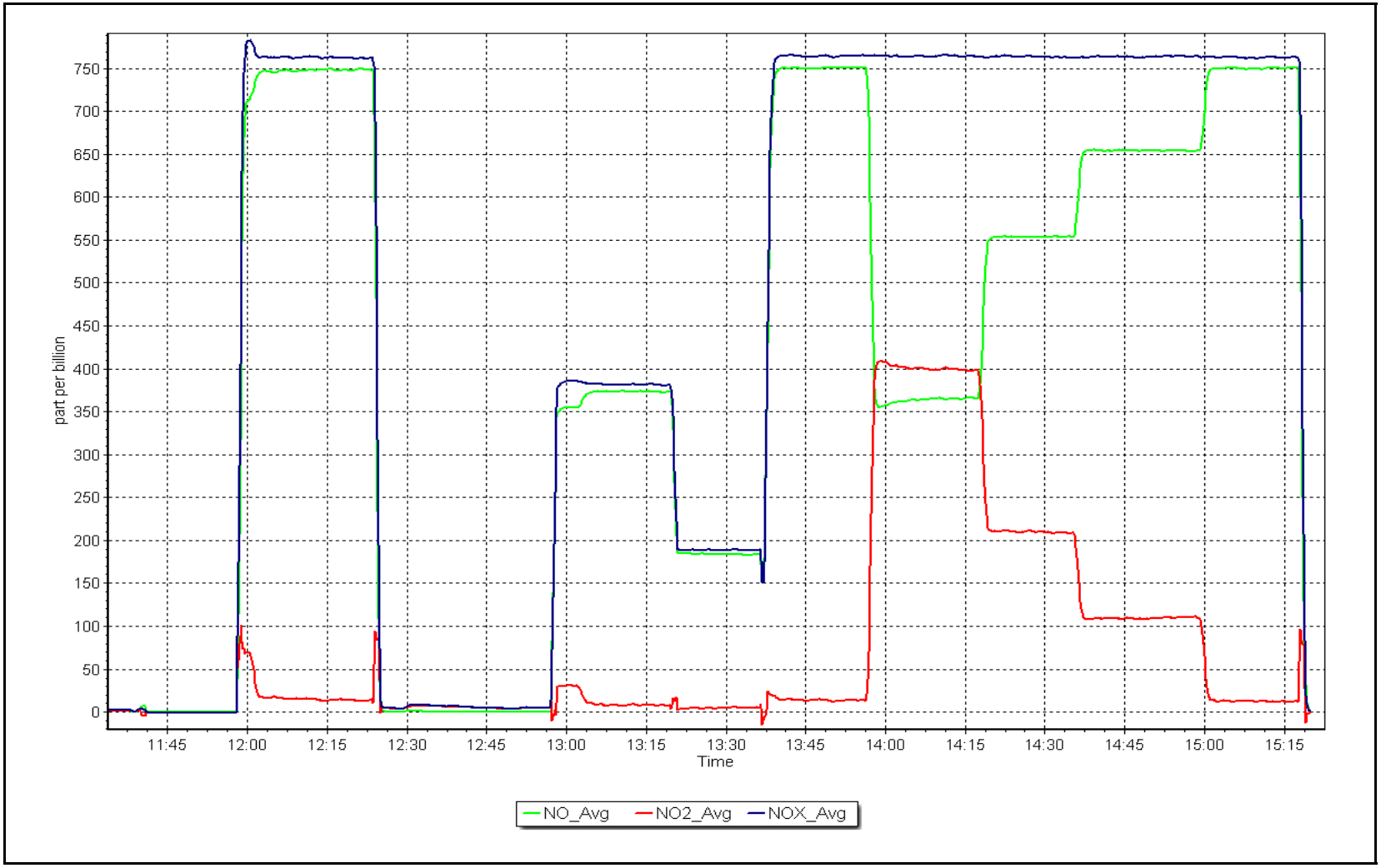
GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero	----	----	0.0	-0.5	----	----
as found GPT point (400 ppb NO2)	750.7	364.8	398.7	399.5	0.9980	100.2%
as found GPT point (200 ppb NO2)	750.7	553.4	210.1	210.2	0.9995	100.0%
as found GPT point (100 ppb NO2)	750.7	654.0	109.5	110.2	0.9936	100.6%
1st GPT point (400 ppb O3)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
				Average Correction Factor		

Notes: As found span was low, investigated issue and found pump was the issue. Perfomed MPAF's for pump change out.

Calibration Performed By: Mohammed Kashif

NO_X Calibration Plot Date: July 12, 2023 Location: Christina Lake



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Christina Lake	Station number:	AMS26
Calibration Date:	July 13, 2023	Last Cal Date:	June 15, 2023
Start time (MST):	11:20	End time (MST):	15:39
Reason:	Maintenance		

Calibration Standards

NO Gas Cylinder #:	T2Y1P4C		Cal Gas Expiry Date:	November 12, 2023	
NOX Cal Gas Conc:	50.82	ppm	NO Cal Gas Conc:	50.02	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	50.82	ppm	Removed Gas NO Conc:	50.02	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	2447	
ZAG make/model:	API T701H		Serial Number:	832	

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.887	1.396	NO bkgnd or offset:	3.6	2.6
NOX coeff or slope:	0.995	0.991	NOX bkgnd or offset:	4.2	3.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	225.5	164.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:		0.999944
NO_X Cal Offset:		-1.520000
NO Cal Slope:		1.003527
NO Cal Offset:		-2.600000
NO_2 Cal Slope:		0.993893
NO_2 Cal Offset:		-0.796010

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero										
as found span										
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
high point	4920	80.0	813.1	800.3	12.8	812.2	801.6	10.6	1.0011	0.9984
second point	4960	40.0	406.6	400.2	6.4	404.6	398.3	6.4	1.0048	1.0047
third point	4980	20.0	203.3	200.1	3.2	200.0	195.3	4.6	1.0164	1.0245
as left zero	5000	0.0	0.0	0.0	0.0	-0.3	0.0	-0.4	----	----
as left span	4920	80.0	813.1	391.8	421.3	814.6	397.0	417.5	0.9982	0.9870
								Average Correction Factor	1.0075	1.0092

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)	801.9	393.4	421.3	418.7	1.0062	99.4%
2nd GPT point (200 ppb O3)	801.9	593.6	221.1	217.7	1.0156	98.5%
3rd GPT point (100 ppb O3)	801.9	701.2	113.5	111.6	1.0170	98.3%
				Average Correction Factor	1.0130	98.7%

Notes: Installed new pump and changed sample inlet filter. Adjusted both zero and span. No other maintenance needed.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

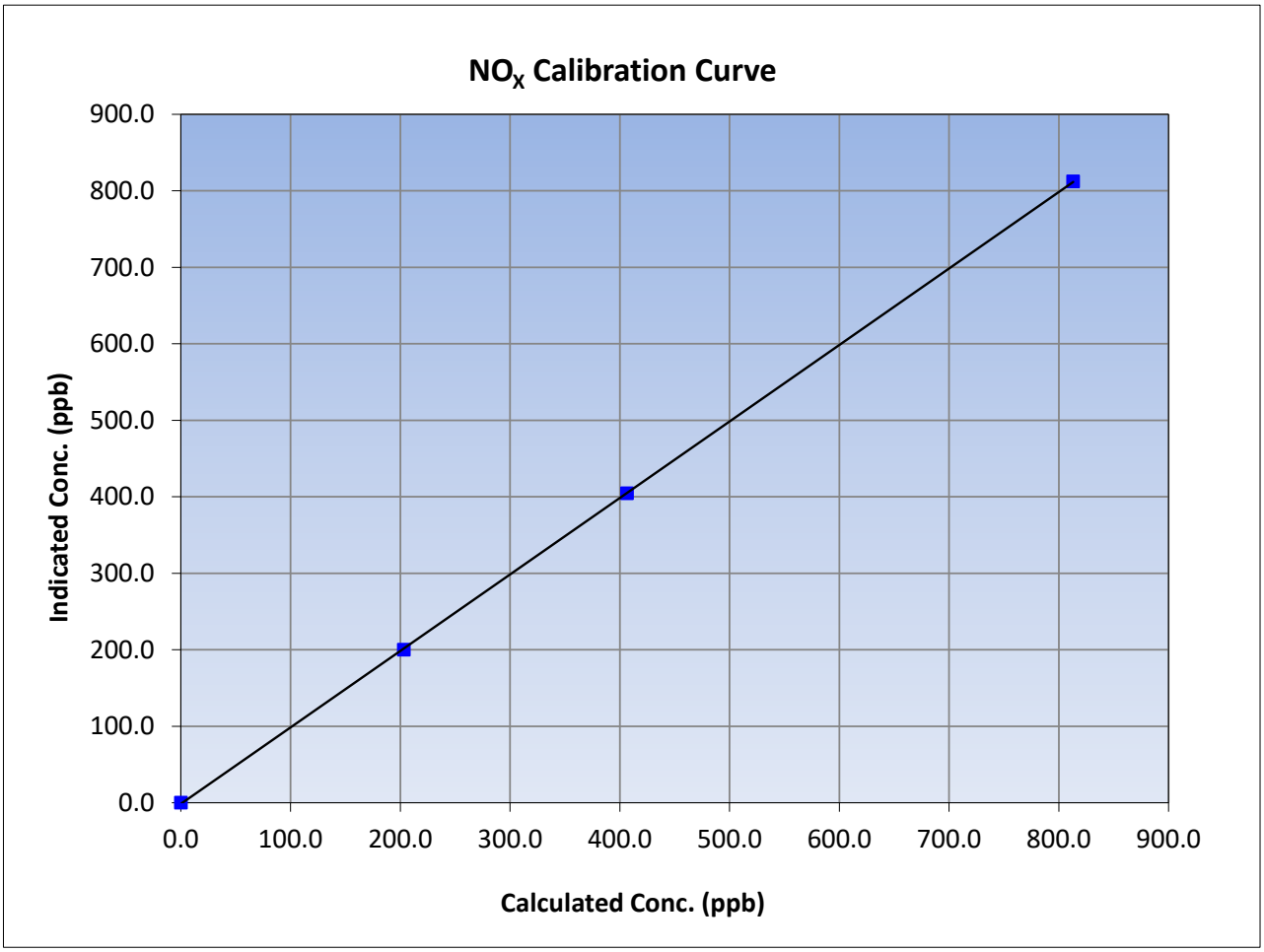
Version-04-2020

Station Information

Calibration Date:	July 13, 2023	Previous Calibration:	June 15, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	11:20	End Time (MST):	15:39
Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999984	*≥0.995*
813.1	812.2	1.0011			
406.6	404.6	1.0048	Slope	0.999944	*0.90 - 1.10*
203.3	200.0	1.0164			
			Intercept	-1.520000	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

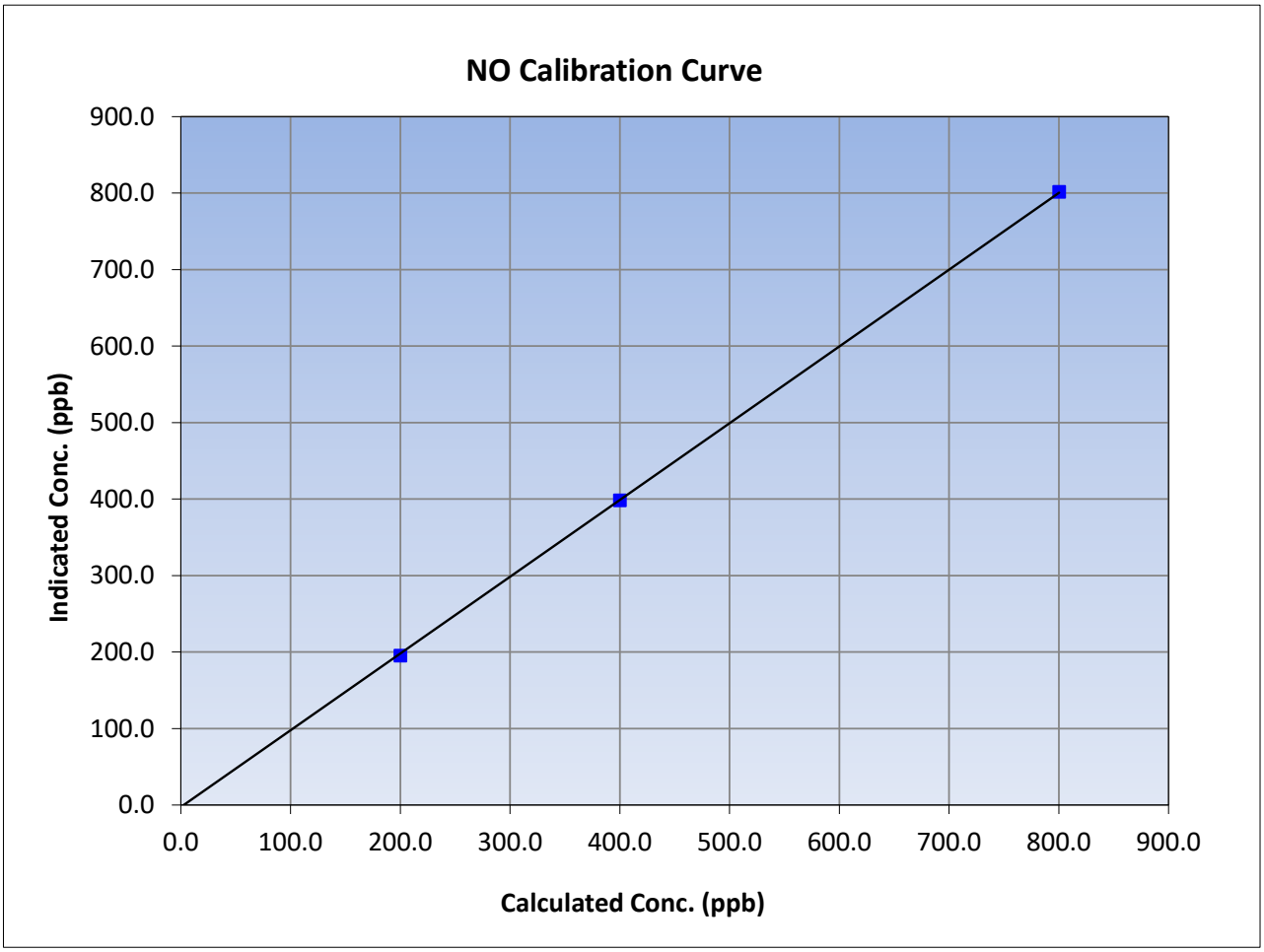
Version-04-2020

Station Information

Calibration Date:	July 13, 2023	Previous Calibration:	June 15, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	11:20	End Time (MST):	15:39
Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999954	≥0.995
800.3	801.6	0.9984			
400.2	398.3	1.0047	Slope	1.003527	0.90 - 1.10
200.1	195.3	1.0245			
			Intercept	-2.600000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

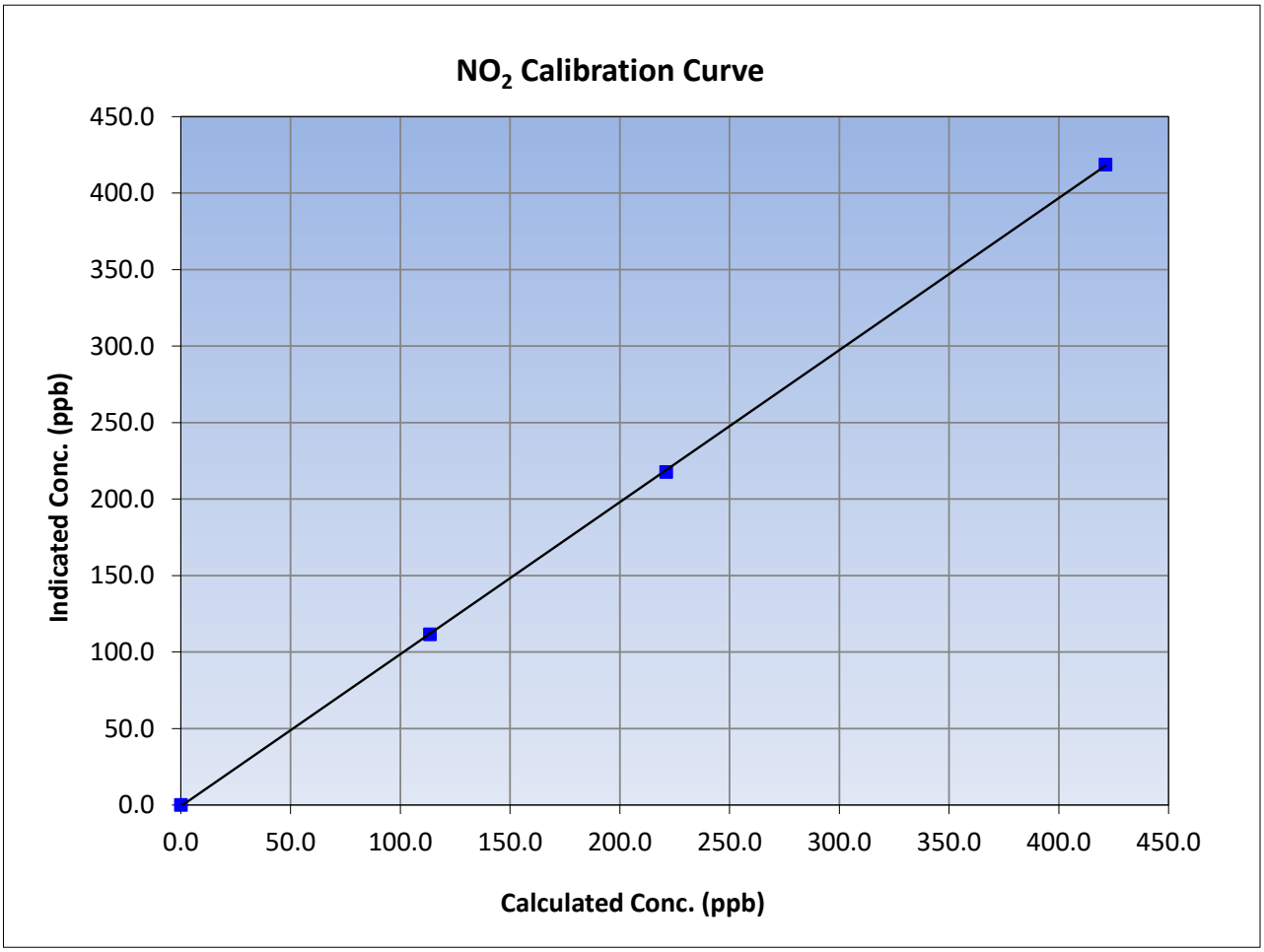
Version-04-2020

Station Information

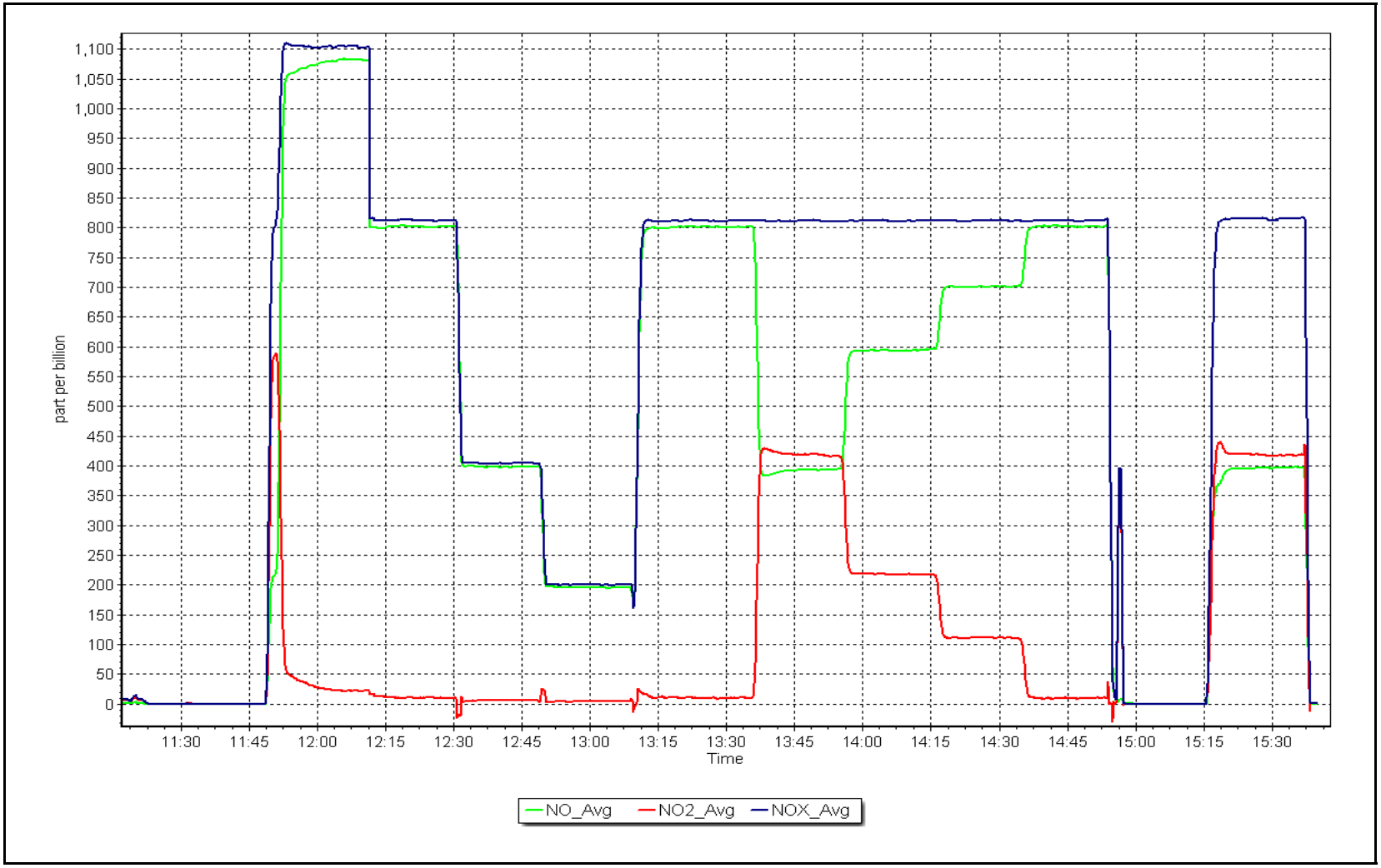
Calibration Date:	July 13, 2023	Previous Calibration:	June 15, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	11:20	End Time (MST):	15:39
Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999967	≥0.995
421.3	418.7	1.0062			
221.1	217.7	1.0156	Slope	0.993893	0.90 - 1.10
113.5	111.6	1.0170			
			Intercept	-0.796010	+/-20



NO_X Calibration Plot Date: July 13, 2023 Location: Christina Lake



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS27
JACKFISH 2/3
JULY 2023

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

August 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:	July 7, 2023	Last Cal Date:	June 1, 2023
Start time (MST):	9:26	End time (MST):	12:06
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.58	ppm	Cal Gas Exp Date:	December 29, 2028
Cal Gas Cylinder #:	SG9133974BAL			
Removed Cal Gas Conc:	50.58	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3811
ZAG Make/Model:	API 701		Serial Number:	135

Analyzer Information

Analyzer make: Thero 43iQ — Analyzer serial #: 12124313138

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.006390	1.008391	Backgd or Offset:	7.5	7.5
Calibration intercept:	-1.738080	-1.738506	Coeff or Slope:	0.942	0.942

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	79.1	800.2	802.8	0.997
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	806.0	0.993
second point	4961	39.5	399.5	400.2	0.998
third point	4980	19.8	200.3	198.7	1.008
as left zero	5000	0.0	0.0	-0.1	----
as left span	4921	79.1	800.2	807.0	0.992
				Average Correction Factor	1.000

Baseline Corr As found:	802.90	Previous response	803.53	*% change	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

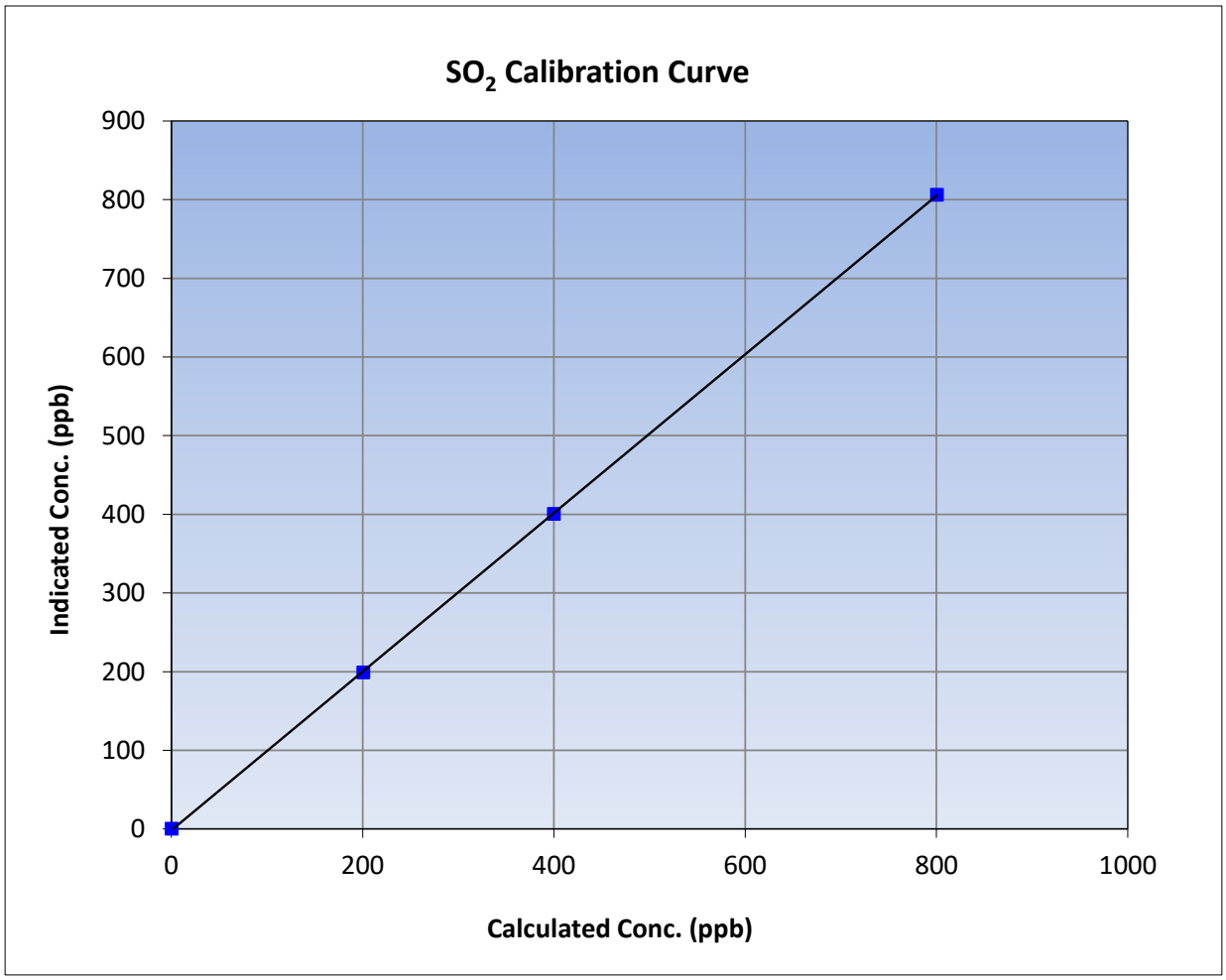
Station Information

Calibration Date:	July 7, 2023	Previous Calibration:	June 1, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS 27
Start Time (MST):	9:26	End Time (MST):	12:06
Analyzer make:	Thero 43iQ	Analyzer serial #:	12124313138

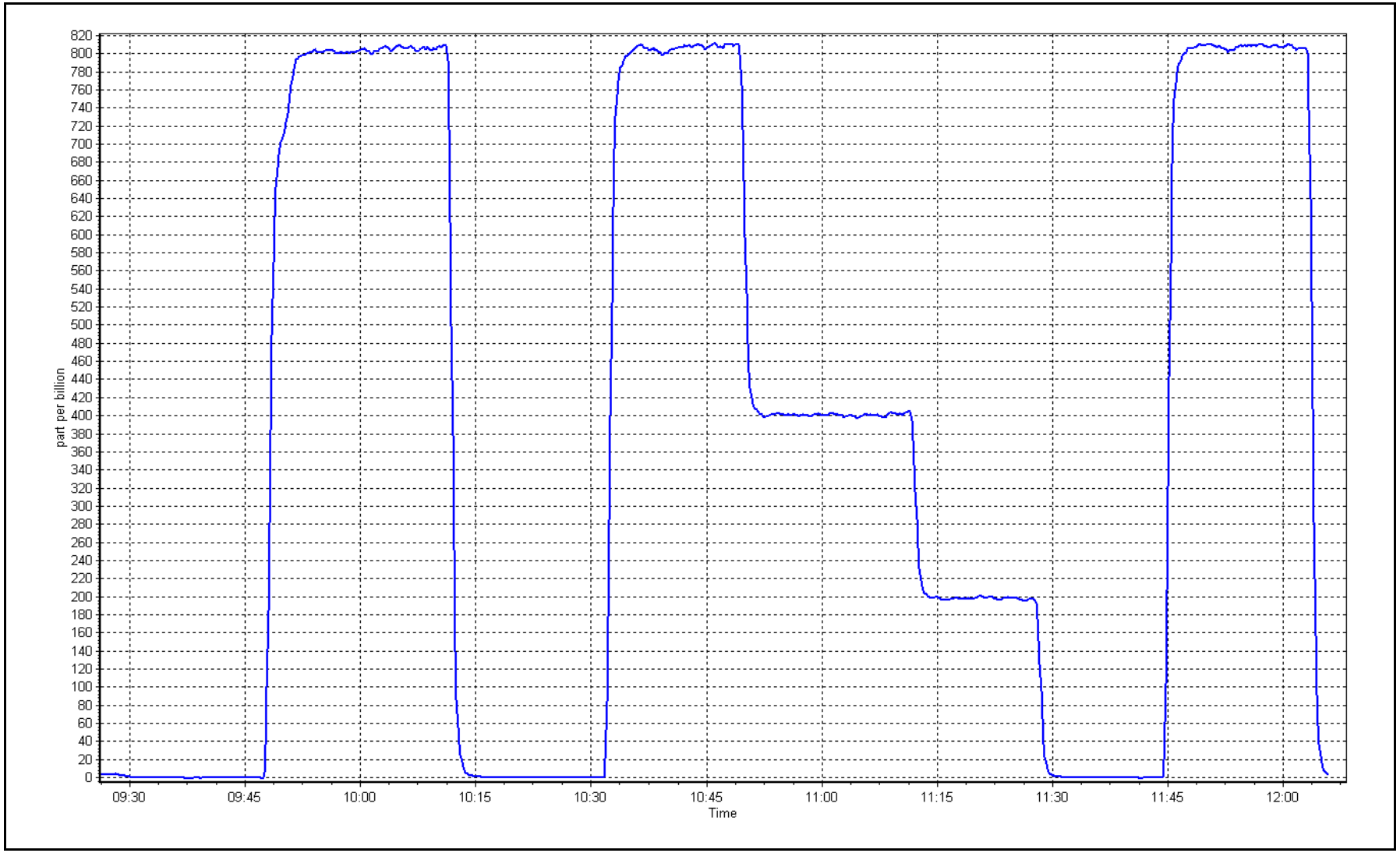
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
800.2	806.0	0.9928
399.5	400.2	0.9984
200.3	198.7	1.0081

Statistical Evaluation		Limits
Correlation Coefficient	0.999981	≥0.995
Slope	1.008391	0.90 - 1.10
Intercept	-1.738506	+/-30



SO2 Calibration Plot Date: July 7, 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:	July 19, 2023	Last Cal Date:	June 13, 2023
Start time (MST):	7:49	End time (MST):	11:20
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.41	ppm	Cal Gas Exp Date:	January 4, 2025
Cal Gas Cylinder #:	CC345023			
Removed Cal Gas Conc:	5.41	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3811
ZAG Make/Model:	API 701		Serial Number:	135

Analyzer Information

Analyzer make:	API T101		Analyzer serial #:	621	
Converter make:			Converter serial #:		
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003478	1.011028	Backgd or Offset:	27.3	27.3
Calibration intercept:	-0.077831	0.082512	Coeff or Slope:	0.961	0.961

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4926	74.1	80.2	82.0	0.978
as found 2nd point	4963	37.0	40.0	41.0	0.976
as found 3rd point	4982	18.5	20.0	20.2	0.991
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	81.0	0.990
second point	4963	37.0	40.0	40.9	0.979
third point	4982	18.5	20.0	20.2	0.991
as left zero	5000	0.0	0.0	0.4	----
as left span	4926	74.1	80.2	80.2	1.000
SO2 Scrubber Check	4921	79.1	791.0	-0.2	----
Date of last scrubber change:				Ave Corr Factor	0.986
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	82.0	Prev response:	80.38	*% change:	2.0%
Baseline Corr 2nd AF pt:	41.0	AF Slope:	1.024003	AF Intercept:	-0.097351
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999984		

* = > +/-5% change initiates investigation

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

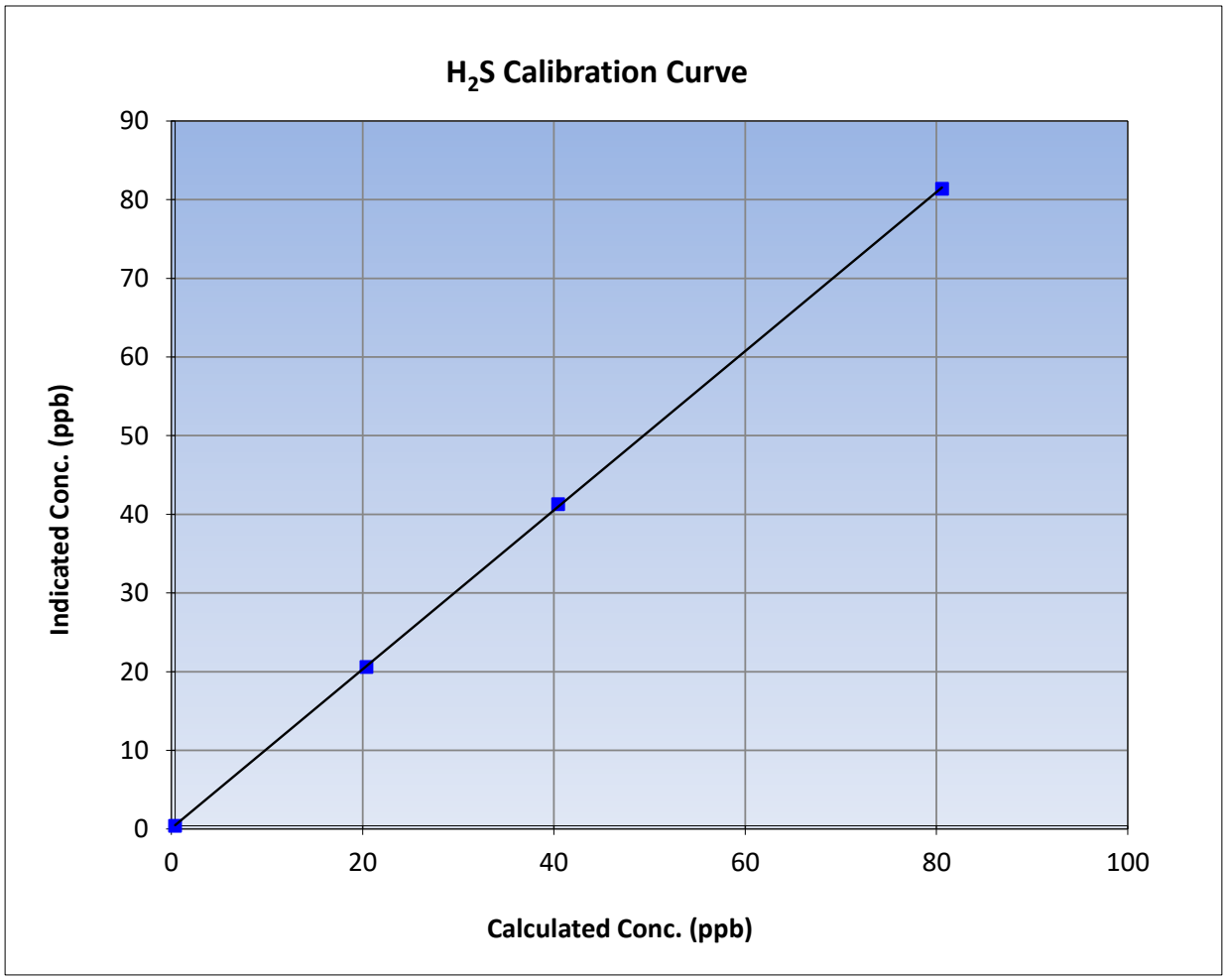
Station Information

Calibration Date:	July 19, 2023	Previous Calibration:	June 13, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	7:49	End Time (MST):	11:20
Analyzer make:	API T101	Analyzer serial #:	621

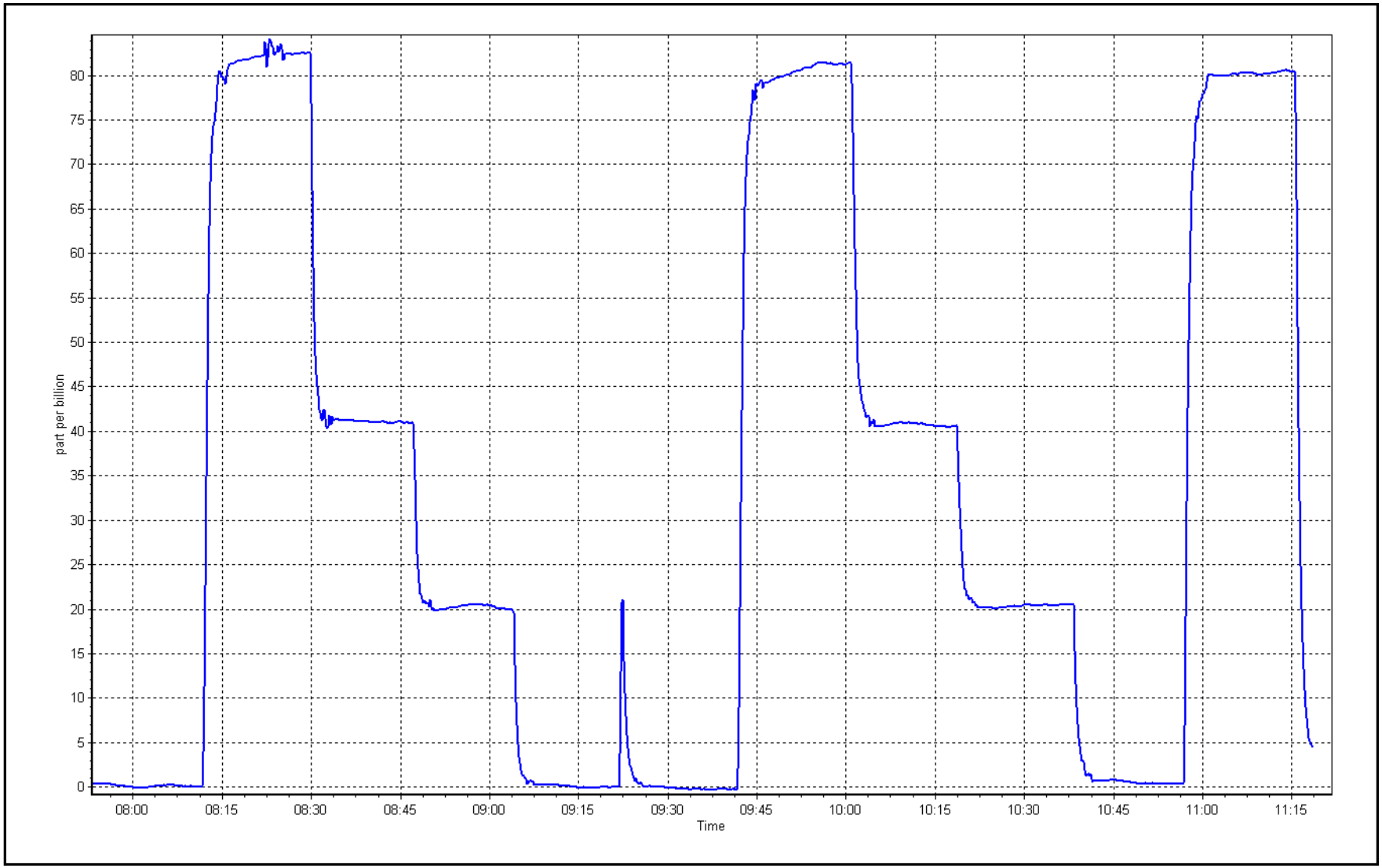
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.2	81.0	0.9898
40.0	40.9	0.9788
20.0	20.2	0.9908

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999956	*≥0.995*
Slope	1.011028	*0.90 - 1.10*
Intercept	0.082512	*+/-3*



H_2S Calibration Plot Date: July 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:	July 20, 2023	Last Cal Date:	June 15, 2023
Start time (MST):	7:52	End time (MST):	14:08
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2Y1P35		Cal Gas Expiry Date:	December 11, 2023	
NOX Cal Gas Conc:	51.44	ppm	NO Cal Gas Conc:	50.40	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	51.44	ppm	Removed Gas NO Conc:	50.40	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3811	
ZAG make/model:	API T701		Serial Number:	135	

Analyzer Information

Analyzer make:	API T200		Analyzer serial #:	722	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.099	1.082	NO bkgnd or offset:	-0.9	0.3
NOX coeff or slope:	1.082	1.081	NOX bkgnd or offset:	-0.2	1.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	4.9	5.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000905	1.000962
NO_X Cal Offset:	-1.315764	-1.136298
NO Cal Slope:	1.008010	1.001486
NO Cal Offset:	-1.998764	-2.340129
NO_2 Cal Slope:	0.996976	1.003914
NO_2 Cal Offset:	0.633893	0.816669

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	1.2	0.6	0.6	----	----
as found span	4921	79.4	816.8	800.3	16.5	815.2	804.1	11.1	1.0020	0.9953
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	4921	79.4	816.8	800.3	16.5	816.4	800.0	16.5	1.0005	1.0004
second point	4960	39.7	408.5	400.2	8.3	408.8	398.0	10.8	0.9992	1.0055
third point	4980	19.8	203.7	199.6	4.1	200.8	195.0	5.8	1.0145	1.0235
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.7	-0.7	----	----
as left span	4921	79.4	816.8	421.8	385.4	812.5	417.4	395.0	1.0053	1.0105
								Average Correction Factor	1.0047	1.0098

Corrected As found NO_X = 814.0 ppb NO = 803.5 ppb

Previous Response NO_X = 816.2 ppb NO = 804.7 ppb

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

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

* = > +/-5% change initiates investigation

*Percent Change NO_X = -0.3%

*Percent Change NO = -0.1%

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

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

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

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	796.8	427.9	385.4	387.1	0.9956	100.4%
2nd GPT point (200 ppb O3)	796.8	618.2	195.1	197.6	0.9874	101.3%
3rd GPT point (100 ppb O3)	796.8	706.2	107.1	109.0	0.9827	101.8%
				Average Correction Factor	0.9886	101.2%

Notes: Adjusted zero only at first but third point of GPT was failing hence, went back to adjust the span and performed the calibration process again at around 11:15 MST.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

NO_X Calibration Summary

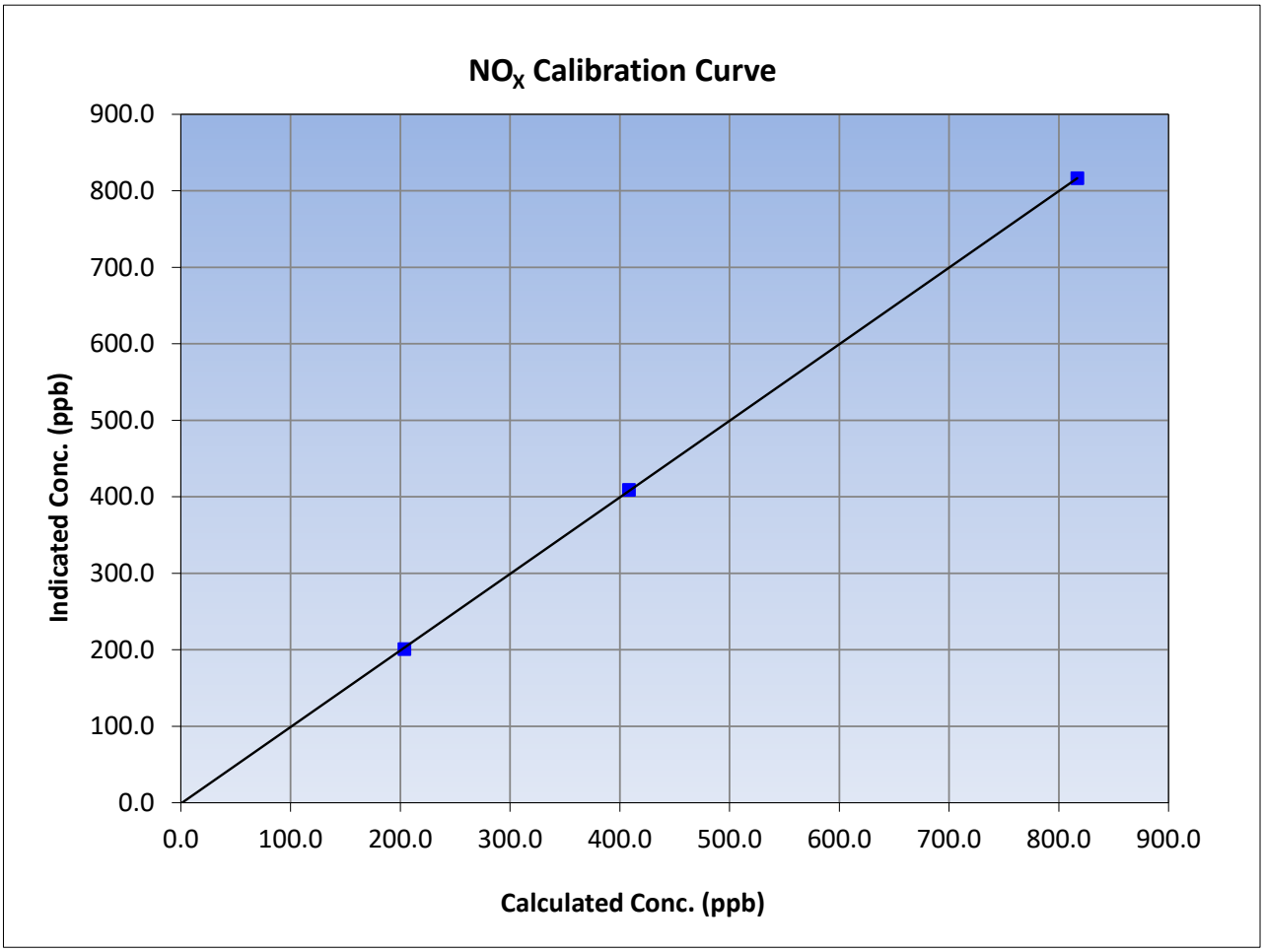
Version-04-2020

Station Information

Calibration Date:	July 20, 2023	Previous Calibration:	June 15, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	7:52	End Time (MST):	14:08
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	-0.2	----	Correlation Coefficient	0.999984	≥0.995
816.8	816.4	1.0005			
408.5	408.8	0.9992	Slope	1.000962	0.90 - 1.10
203.7	200.8	1.0145			
			Intercept	-1.136298	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

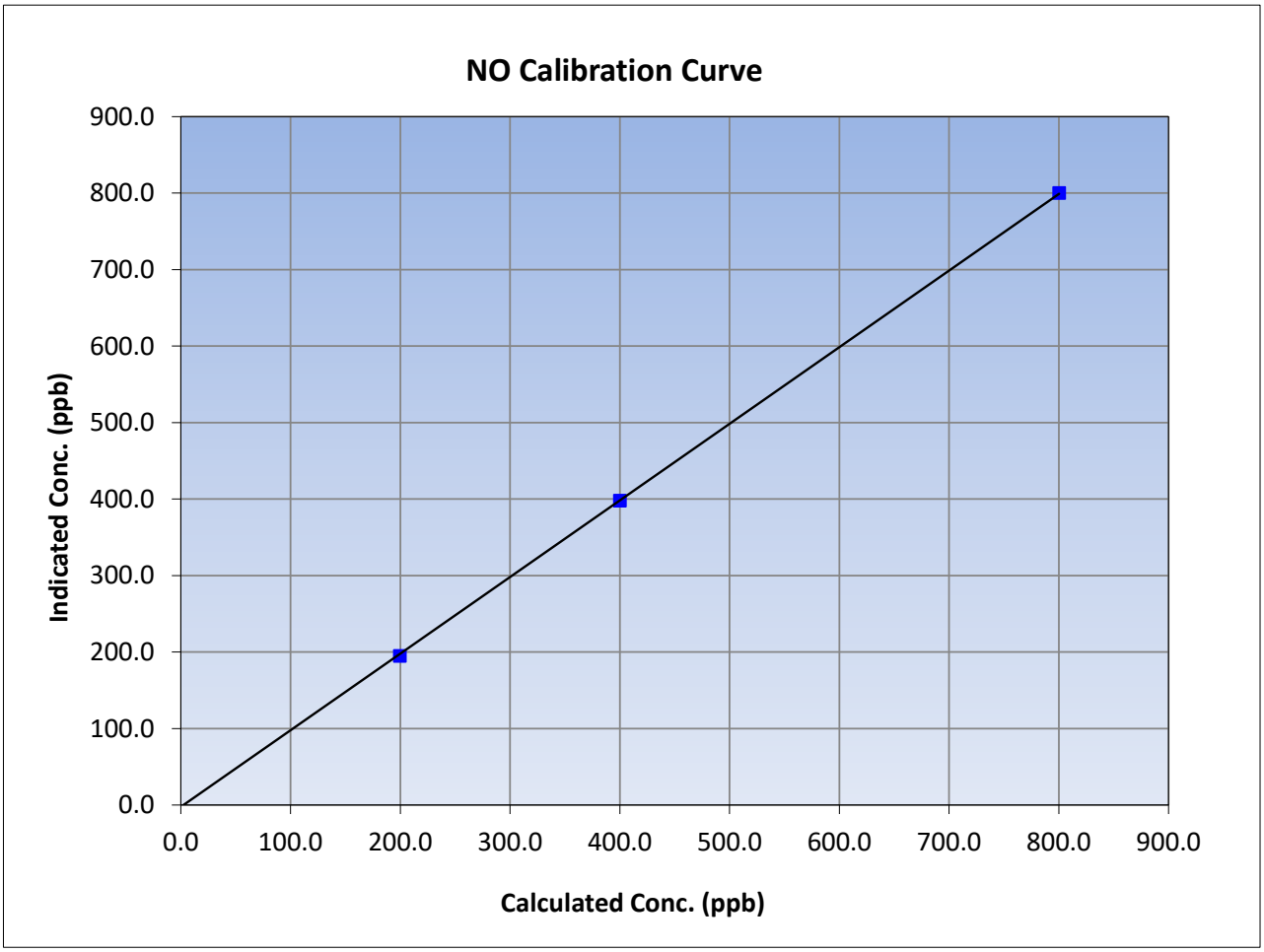
Version-04-2020

Station Information

Calibration Date:	July 20, 2023	Previous Calibration:	June 15, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	7:52	End Time (MST):	14:08
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	-0.2	----	Correlation Coefficient	0.999966	≥0.995
800.3	800.0	1.0004			
400.2	398.0	1.0055	Slope	1.001486	0.90 - 1.10
199.6	195.0	1.0235			
			Intercept	-2.340129	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

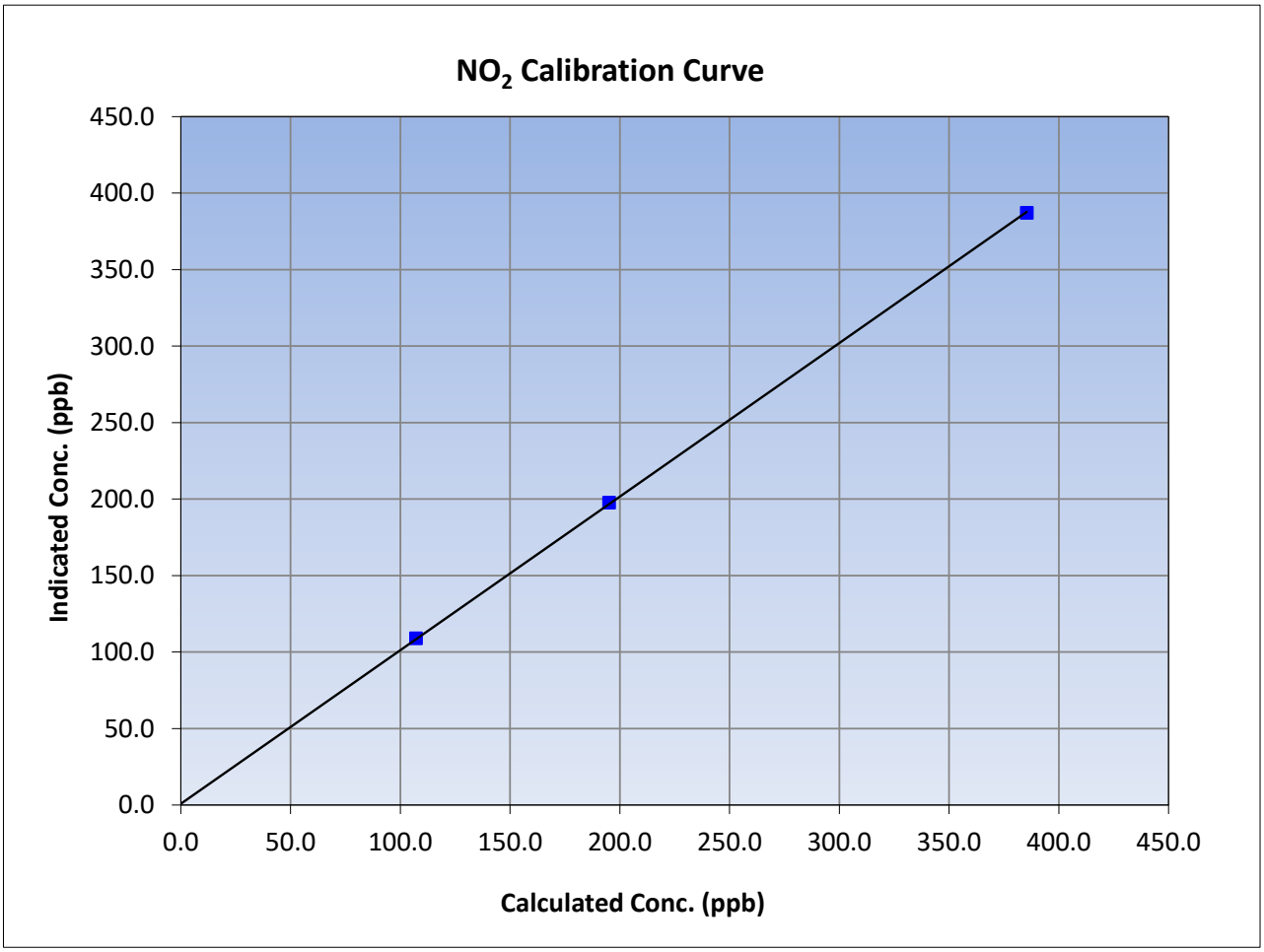
Version-04-2020

Station Information

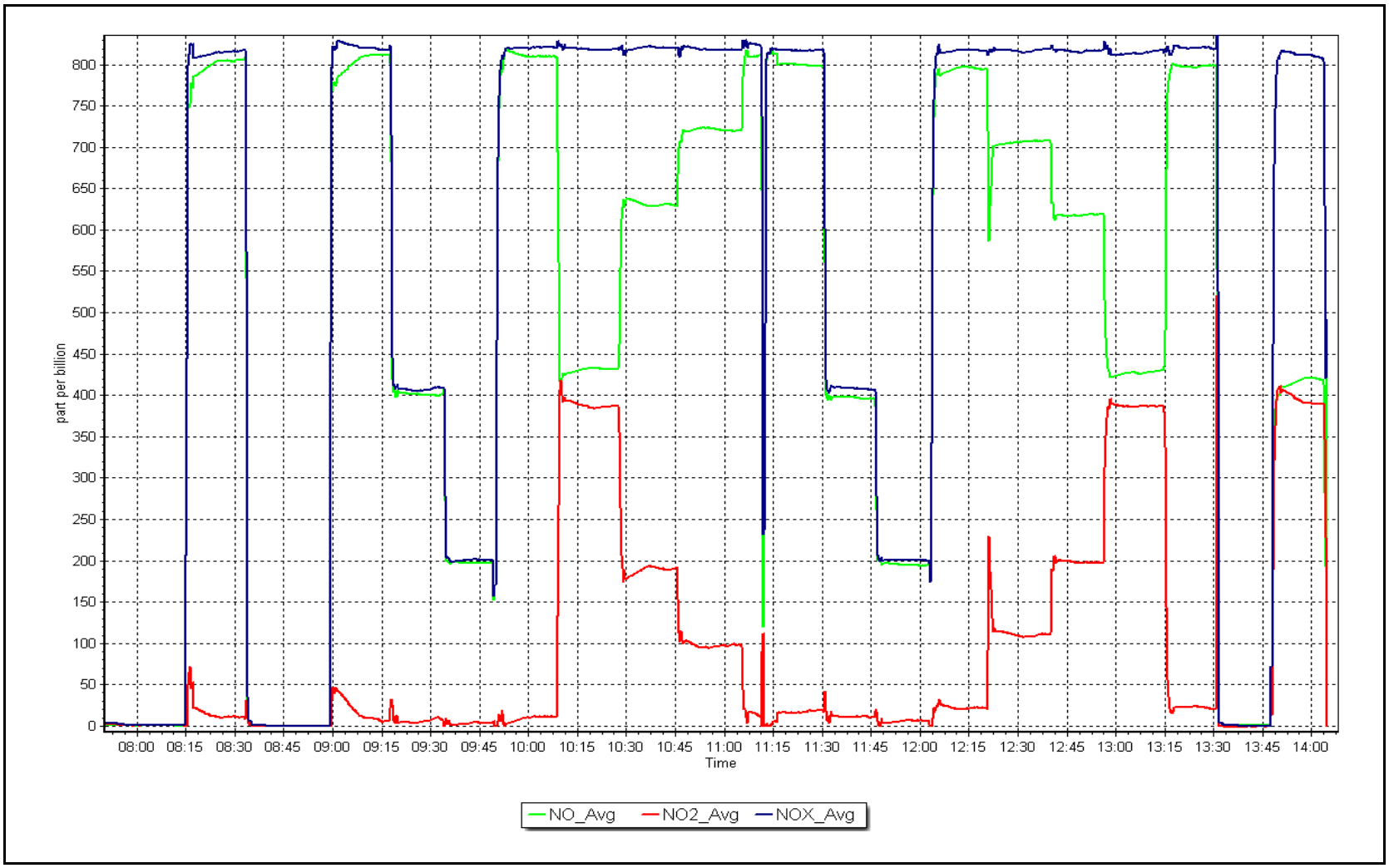
Calibration Date:	July 20, 2023	Previous Calibration:	June 15, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	7:52	End Time (MST):	14:08
Analyzer make:	API T200	Analyzer serial #:	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999969	≥0.995
385.4	387.1	0.9956			
195.1	197.6	0.9874	Slope	1.003914	0.90 - 1.10
107.1	109.0	0.9827			
			Intercept	0.816669	+/-20



NO_X Calibration Plot Date: July 20, 2023 Location: Jackfish 2/3



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS29
SURMONT 2
JULY 2023

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

August 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	July 17, 2023	Last Cal Date:	June 6, 2023
Start time (MST):	9:56	End time (MST):	13:05
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.21	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC356008			
Removed Cal Gas Conc:	49.21	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5472
ZAG Make/Model:	Teledyne API T701		Serial Number:	4297

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1170050150

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.001929	1.005842	Backgd or Offset:	12.4	12.5
Calibration intercept:	-1.605425	-1.525687	Coeff or Slope:	0.942	0.942

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.3	----
as found span	4919	81.3	800.1	803.0	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4919	81.3	800.1	804.0	0.995
second point	4959	40.7	400.6	400.7	1.000
third point	4979	20.3	199.8	197.9	1.010
as left zero	5000	0.0	0.0	0.0	----
as left span	4919	81.3	800.1	805.0	0.994
				Average Correction Factor	1.002

Baseline Corr As found:	803.30	Previous response	800.04	*% 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 other maintenance done.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

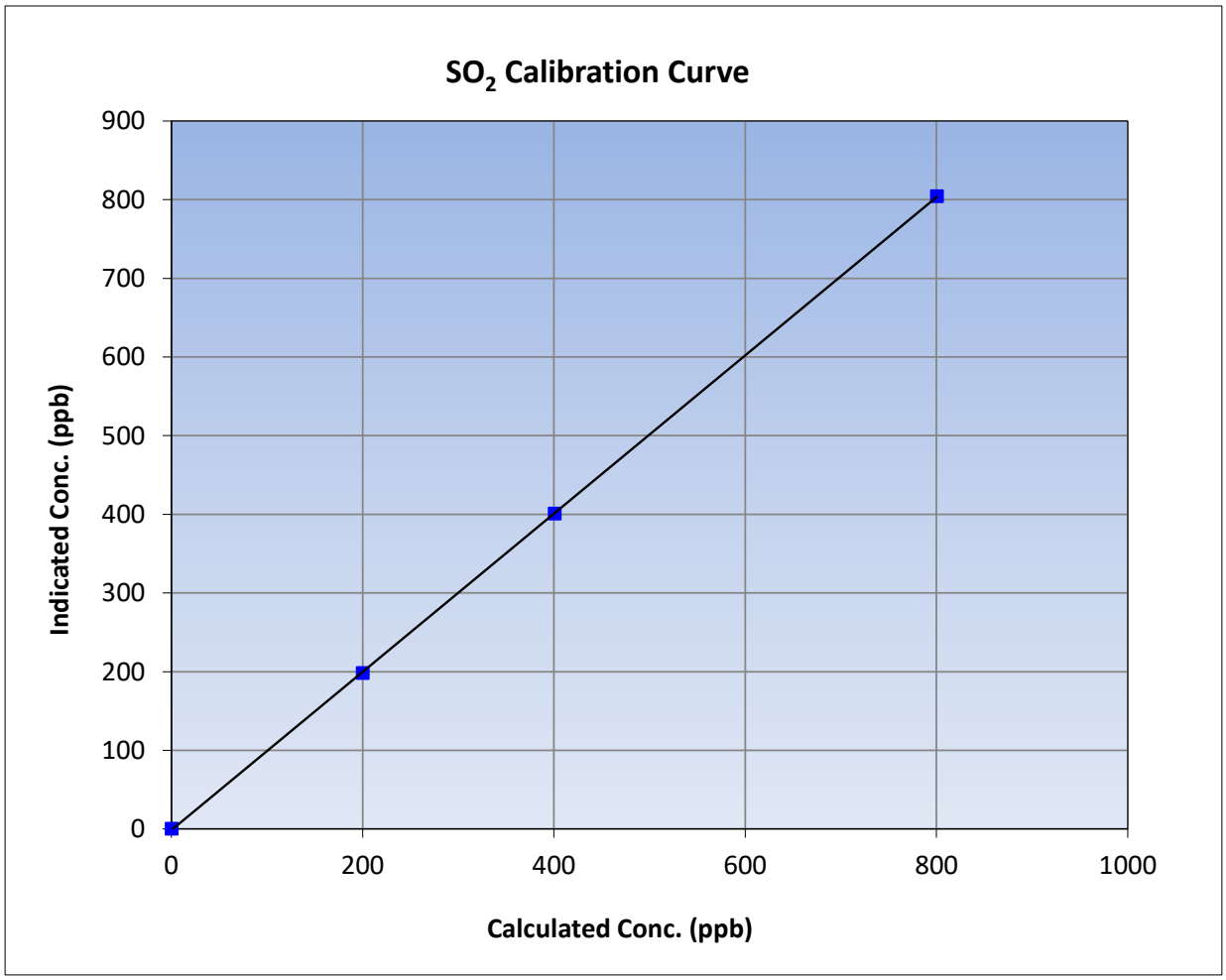
Station Information

Calibration Date:	July 17, 2023	Previous Calibration:	June 6, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:56	End Time (MST):	13:05
Analyzer make:	Thermo 43i	Analyzer serial #:	1170050150

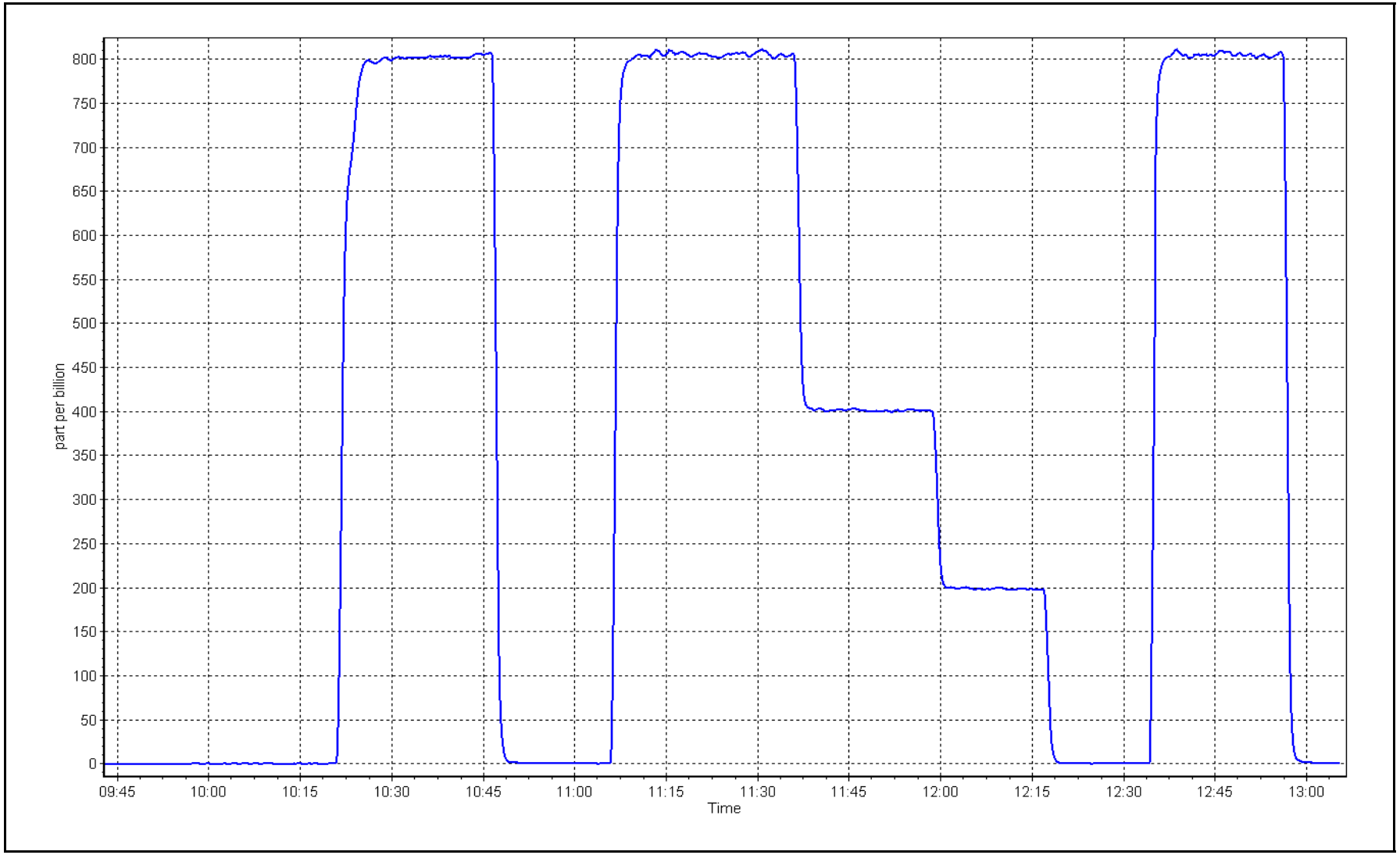
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
800.1	804.0	0.9952
400.6	400.7	0.9997
199.8	197.9	1.0097

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999984	*≥0.995*
Slope	1.005842	*0.90 - 1.10*
Intercept	-1.525687	*+/-30*



SO2 Calibration Plot Date: July 17, 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:	July 10, 2023	Last Cal Date:	June 7, 2023
Start time (MST):	9:50	End time (MST):	14:52
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.391	ppm	Cal Gas Exp Date:	January 4, 2025
Cal Gas Cylinder #:	CC508338			
Removed Cal Gas Conc:	5.391	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	CC508338		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5472
ZAG Make/Model:	Teledyne API T701		Serial Number:	4297

Analyzer Information

Analyzer make:	Thermo 43iQ-TLE		Analyzer serial #:	1200326170	
Converter make:	Global		Converter serial #:	2022-223	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999622	1.001618	Backgd or Offset:	0.82	0.82
Calibration intercept:	-0.002939	-0.122896	Coeff or Slope:	1.046	1.049

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.2	----
as found span	4926	74.2	80.0	79.9	0.999
as found 2nd point	4963	37.2	40.1	40.0	0.998
as found 3rd point	4982	18.6	20.1	19.8	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	74.2	80.0	80.0	1.000
second point	4963	37.2	40.1	40.1	1.000
third point	4982	18.6	20.1	19.9	1.008
as left zero	5000	0.0	0.0	0.0	----
as left span	4926	74.2	80.0	79.0	1.013
SO2 Scrubber Check	4919	81.3	813.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.003
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.1	Prev response:	79.97	*% change:	0.2%
Baseline Corr 2nd AF pt:	40.2	AF Slope:	1.001618	AF Intercept:	-0.222896
Baseline Corr 3rd AF pt:	20.0	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

H_2S Calibration Summary

Version-11-2021

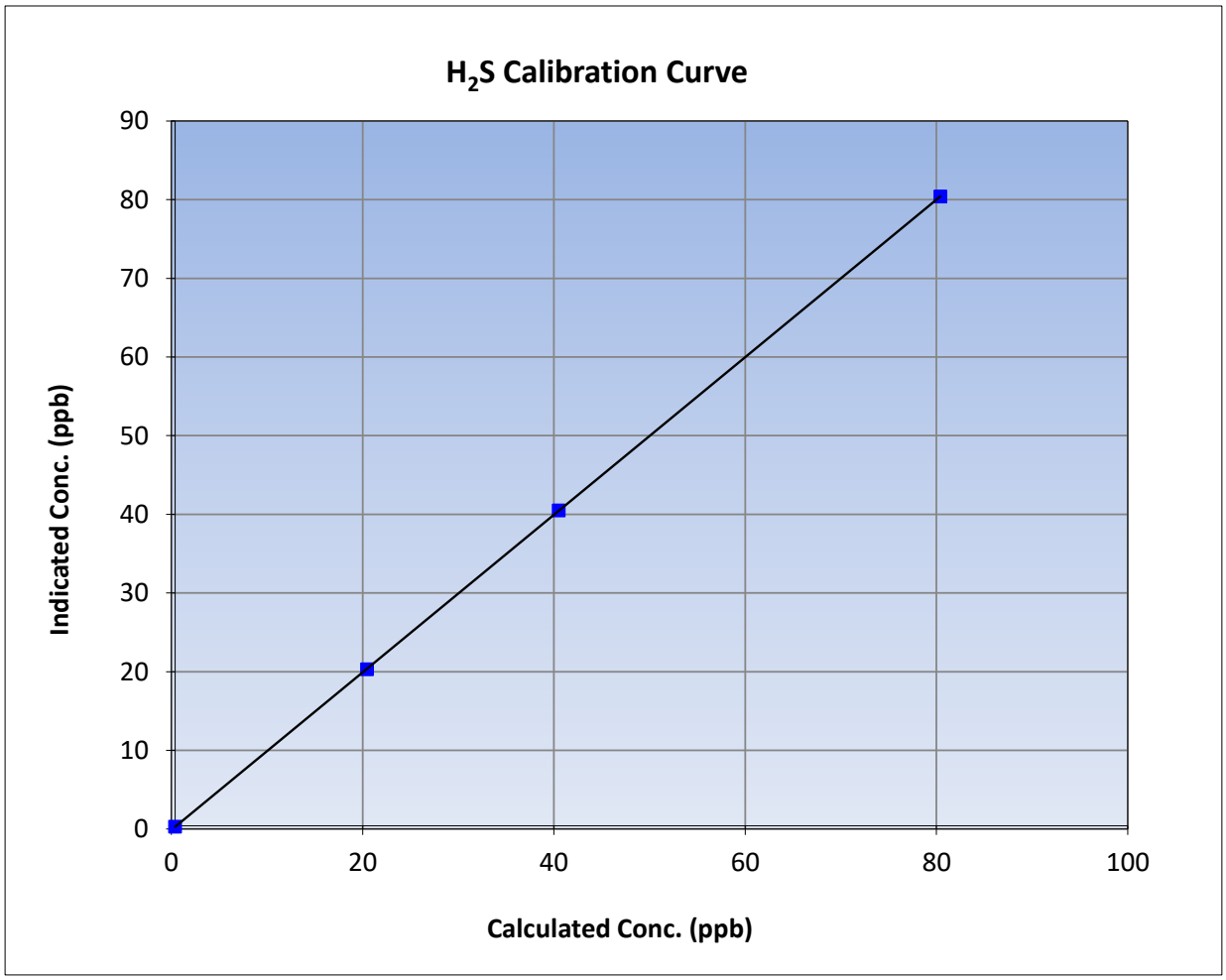
Station Information

Calibration Date:	July 10, 2023	Previous Calibration:	June 7, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:50	End Time (MST):	14:52
Analyzer make:	Thermo 43iQ-TLE	Analyzer serial #:	1200326170

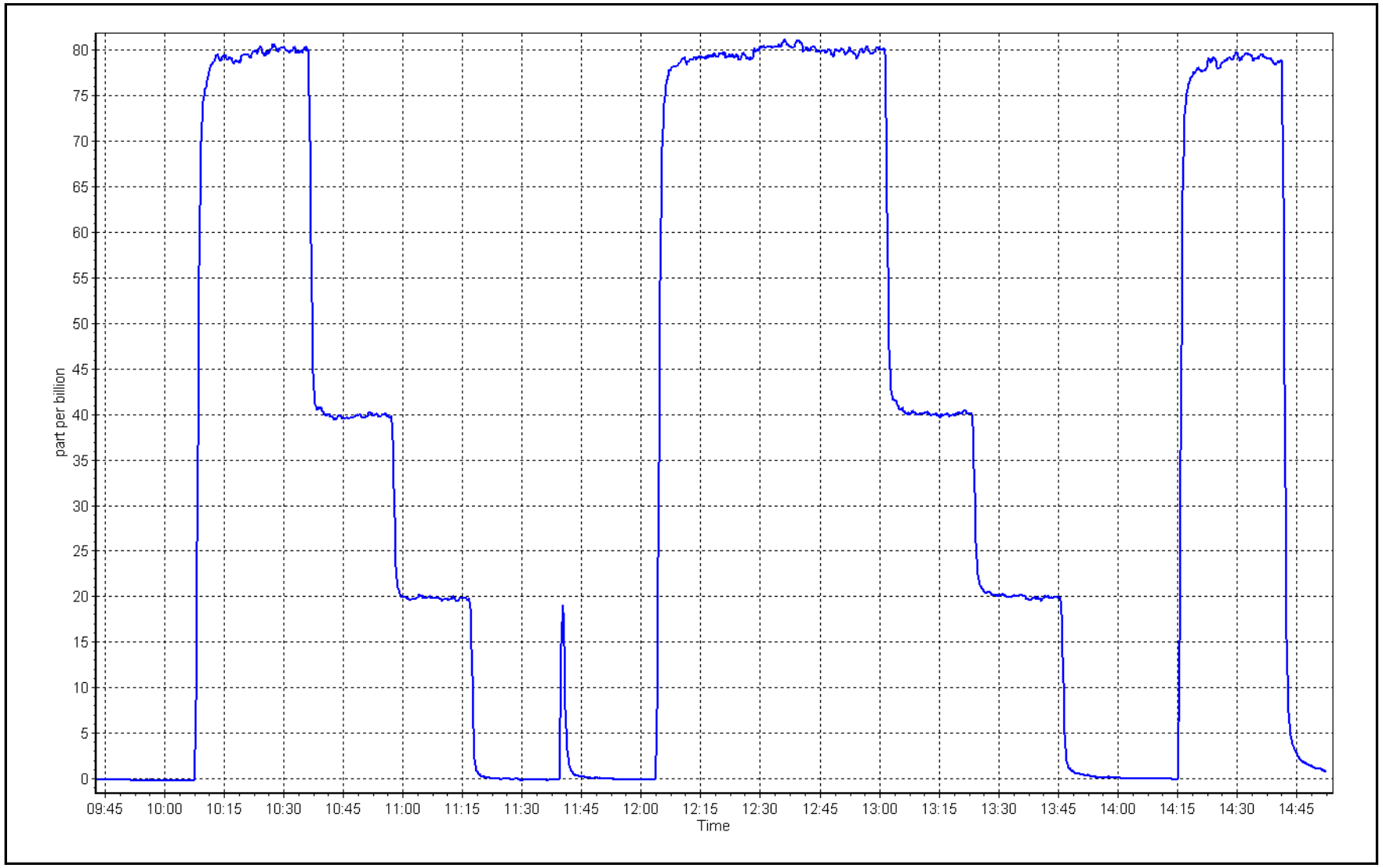
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.0	1.0000
40.1	40.1	1.0002
20.1	19.9	1.0077

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.001618	*0.90 - 1.10*
Intercept	-0.122896	*+/-3*



H_2S Calibration Plot Date: July 10, 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:	July 17, 2023	Last Cal Date:	June 2, 2023
Start time (MST):	9:56	End time (MST):	13:05
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	CC356008		Cal Gas Expiry Date:	February 23, 2025	
CH4 Cal Gas Conc.	499.0	ppm	CH4 Equiv Conc.	1064.7	ppm
C3H8 Cal Gas Conc.	205.7	ppm			
Removed Gas Cert:	NA		Removed Gas Expiry:	NA	
Removed CH4 Conc.	499.0	ppm	CH4 Equiv Conc.	1064.7	ppm
Removed C3H8 Conc.	205.7	ppm	Diff between cyl:		
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5472	
ZAG Make/Model:	Teledyne API T701		Serial Number:	4297	

Analyzer Information

Analyzer make:	Thermo 51i-LT		Analyzer serial #:	1170050149	
Analyzer Range:	0 - 20 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003409	1.000217	Background:	3.72	3.64
Calibration intercept:	-0.030830	-0.075664	Coefficient:	4.074	3.987

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	0.02	----
as found span	4918	81.3	17.31	17.71	0.978
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.02	----
high point	4918	81.3	17.31	17.27	1.003
second point	4959	40.6	8.65	8.54	1.012
third point	4979	20.3	4.32	4.20	1.029
as left zero	5000	0.0	0.00	-0.06	----
as left span	4918	81.3	17.31	17.35	0.998
				Average Correction Factor	1.015

Baseline Corr As found:	17.70	Previous response	17.34	*% change	2.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

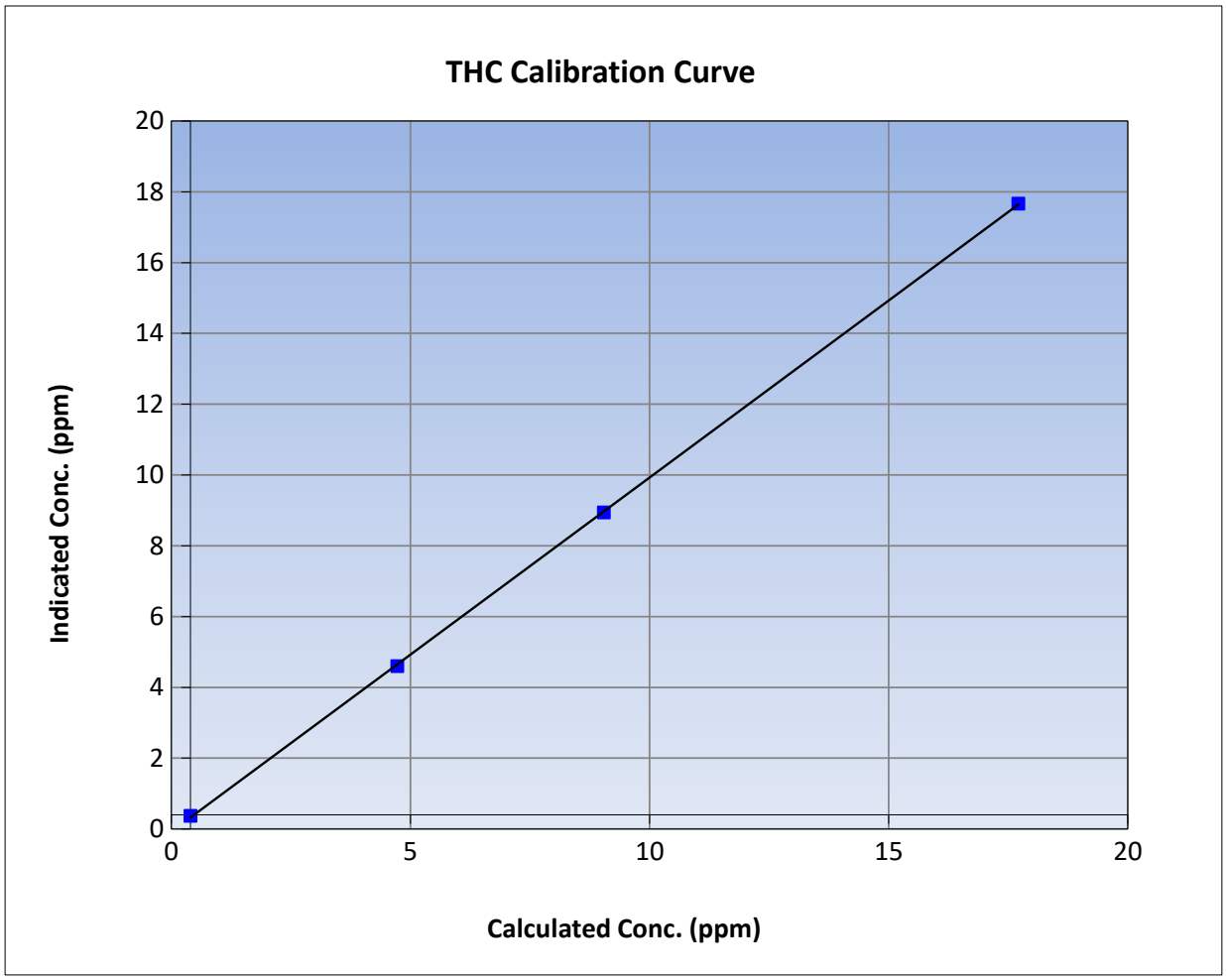
Station Information

Calibration Date:	July 17, 2023	Previous Calibration:	June 2, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:56	End Time (MST):	13:05
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1170050149

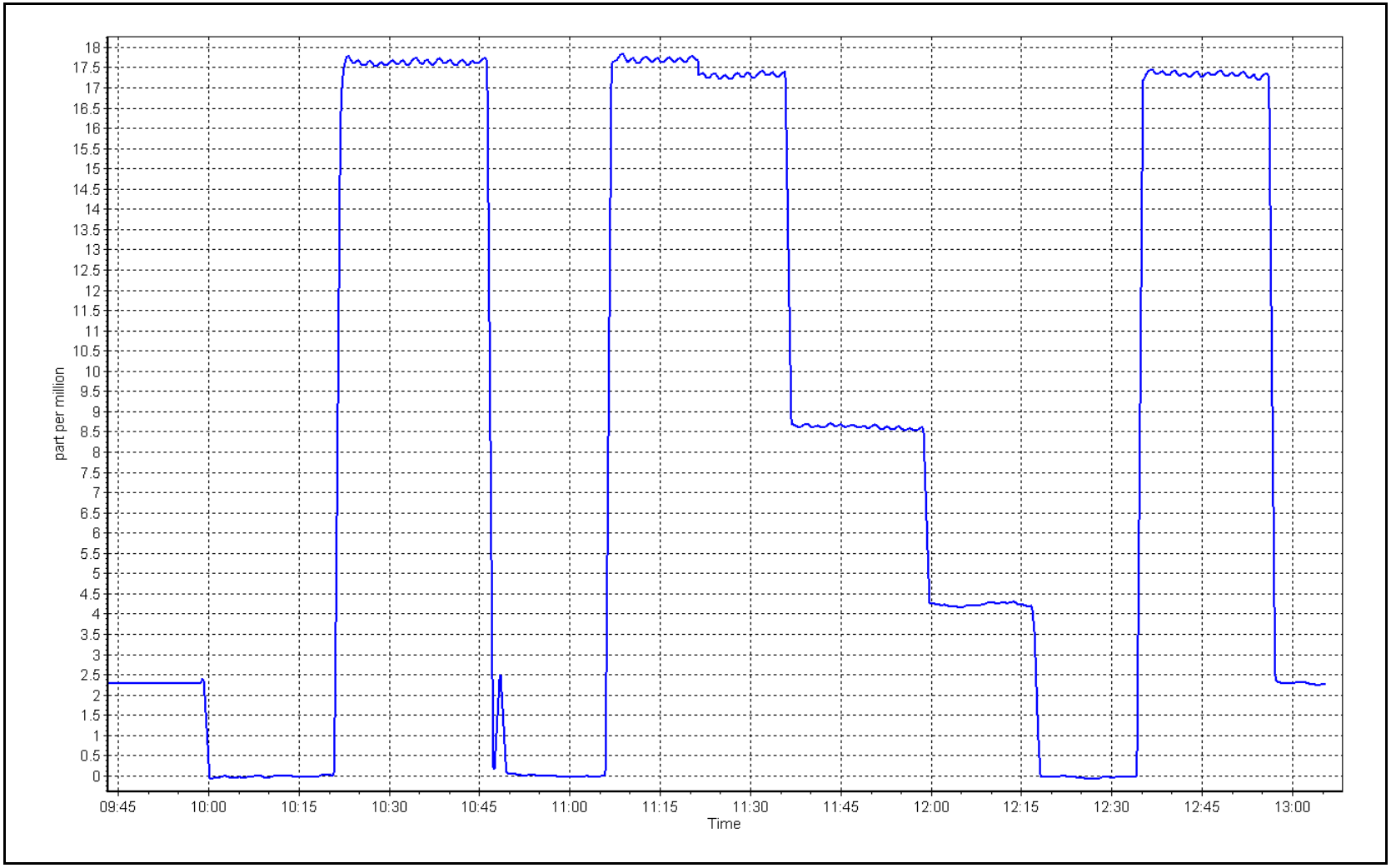
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.02	----
17.31	17.27	1.0026
8.65	8.54	1.0124
4.32	4.20	1.0291

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999959	*≥0.995*
Slope	1.000217	*0.90 - 1.10*
Intercept	-0.075664	*+/-1.5*



THC Calibration Plot Date: July 17, 2023 Location: Surmont 2



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	July 21, 2023	Last Cal Date:	June 21, 2023
Start time (MST):	9:40	End time (MST):	14:20
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:		T12YYFE	Cal Gas Expiry Date:	October 30, 2024	
NOX Cal Gas Conc:	47.46	ppm	NO Cal Gas Conc:	47.46	ppm
Removed Cylinder #:		NA	Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	47.46	ppm	Removed Gas NO Conc:	47.46	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	5472	
ZAG make/model:	Teledyne API T701		Serial Number:	4297	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1170050148	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.370	1.370	NO bkgnd or offset:	1.3	1.3
NOX coeff or slope:	0.995	0.995	NOX bkgnd or offset:	1.4	1.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	171.7	173.4

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.008735	1.002041
NO_X Cal Offset:	0.025730	0.266787
NO Cal Slope:	1.008047	1.002168
NO Cal Offset:	-0.733798	-1.052471
NO_2 Cal Slope:	0.995558	0.999330
NO_2 Cal Offset:	-0.127452	0.616986

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	0.2	----	----
as found span	4916	84.2	799.2	799.2	0.0	799.8	798.2	1.5	0.9992	1.0012
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.4	0.1	0.3	----	----
high point	4916	84.2	799.2	799.2	0.0	801.0	800.0	0.3	0.9977	0.9990
second point	4958	42.1	399.6	399.6	0.0	401.1	400.2	0.9	0.9963	0.9985
third point	4979	21.1	200.3	200.3	0.0	200.5	197.6	2.8	0.9989	1.0135
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.1	----	----
as left span	4916	84.2	799.2	394.9	404.3	802.0	396.2	405.7	0.9965	0.9967
								Average Correction Factor	0.9976	1.0037

Corrected As found	NO_X = 799.5 ppb	NO = 798.1 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.8%
Previous Response	NO_X = 806.2 ppb	NO = 804.9 ppb		*Percent Change	NO =	-0.9%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	799.6	395.3	404.3	404.7	0.9990	100.1%
2nd GPT point (200 ppb O3)	799.6	603.5	196.1	196.1	1.0000	100.0%
3rd GPT point (100 ppb O3)	799.6	701.5	98.1	99.4	0.9869	101.3%
				Average Correction Factor	0.9953	100.5%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

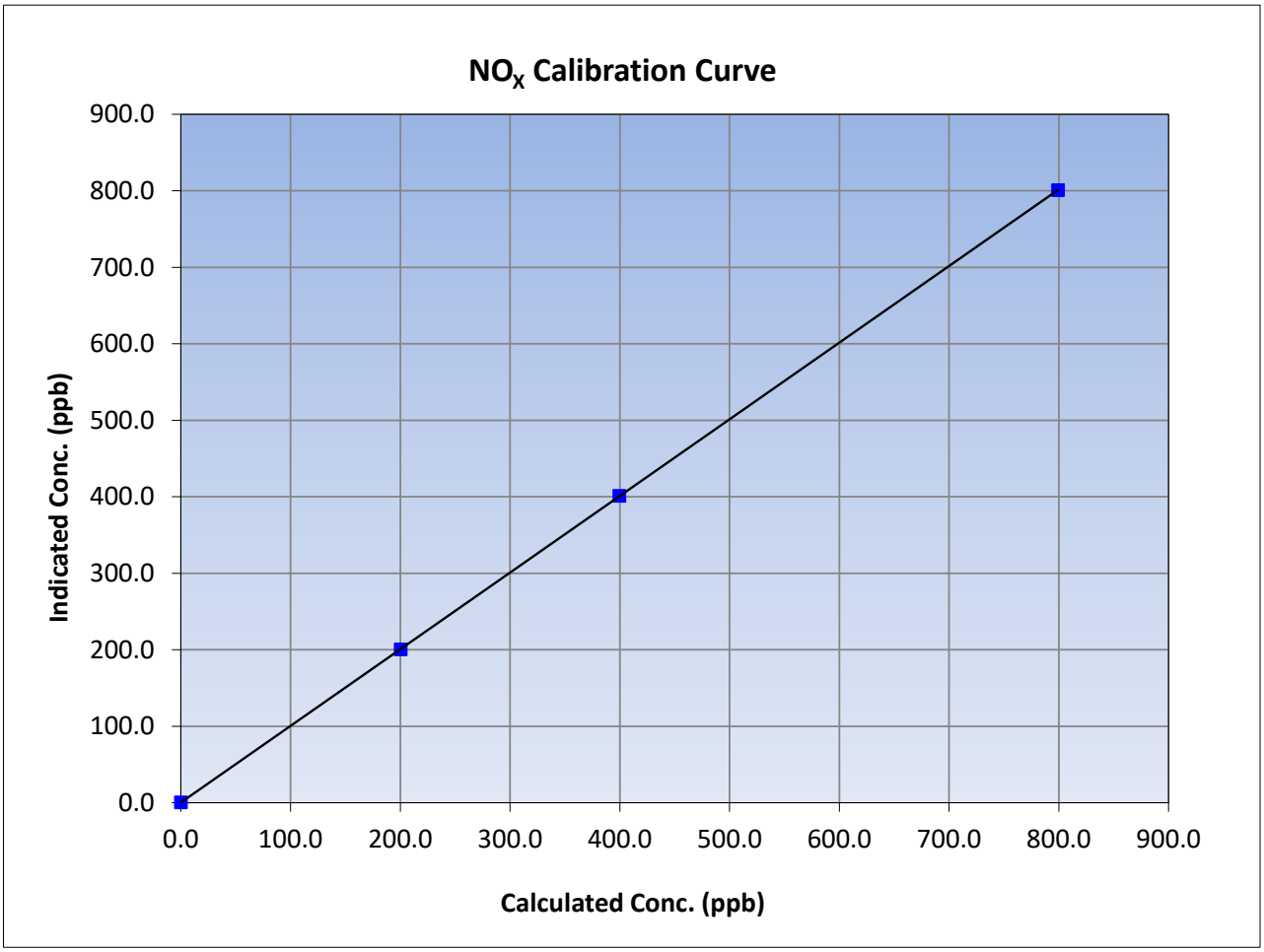
Version-04-2020

Station Information

Calibration Date:	July 21, 2023	Previous Calibration:	June 21, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:40	End Time (MST):	14:20
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	0.4	----	Correlation Coefficient	0.999999	≥0.995
799.2	801.0	0.9977			
399.6	401.1	0.9963	Slope	1.002041	0.90 - 1.10
200.3	200.5	0.9989			
			Intercept	0.266787	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

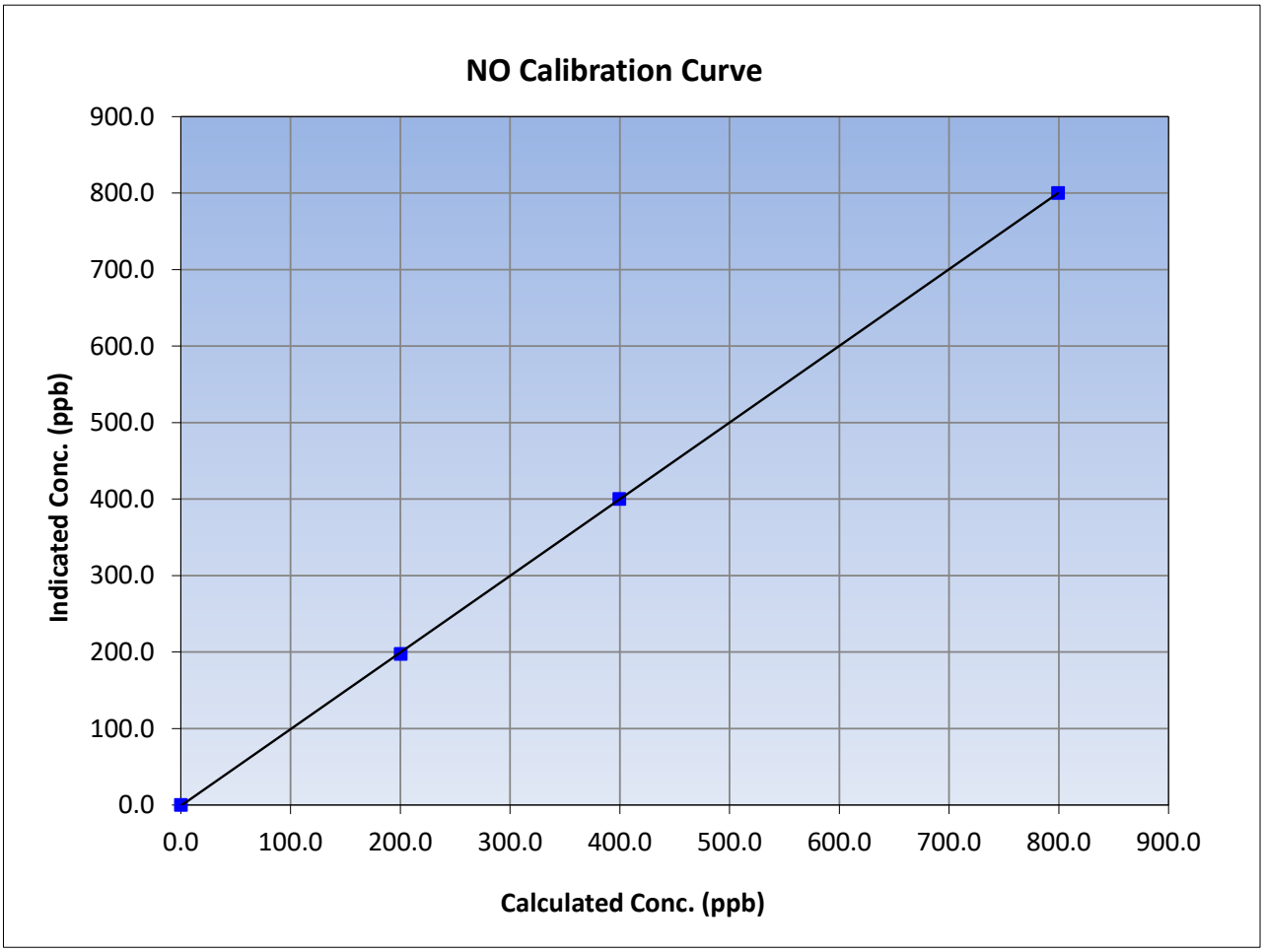
Version-04-2020

Station Information

Calibration Date:	July 21, 2023	Previous Calibration:	June 21, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:40	End Time (MST):	14:20
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	800.0	0.9990			
399.6	400.2	0.9985	Slope	1.002168	0.90 - 1.10
200.3	197.6	1.0135			
			Intercept	-1.052471	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

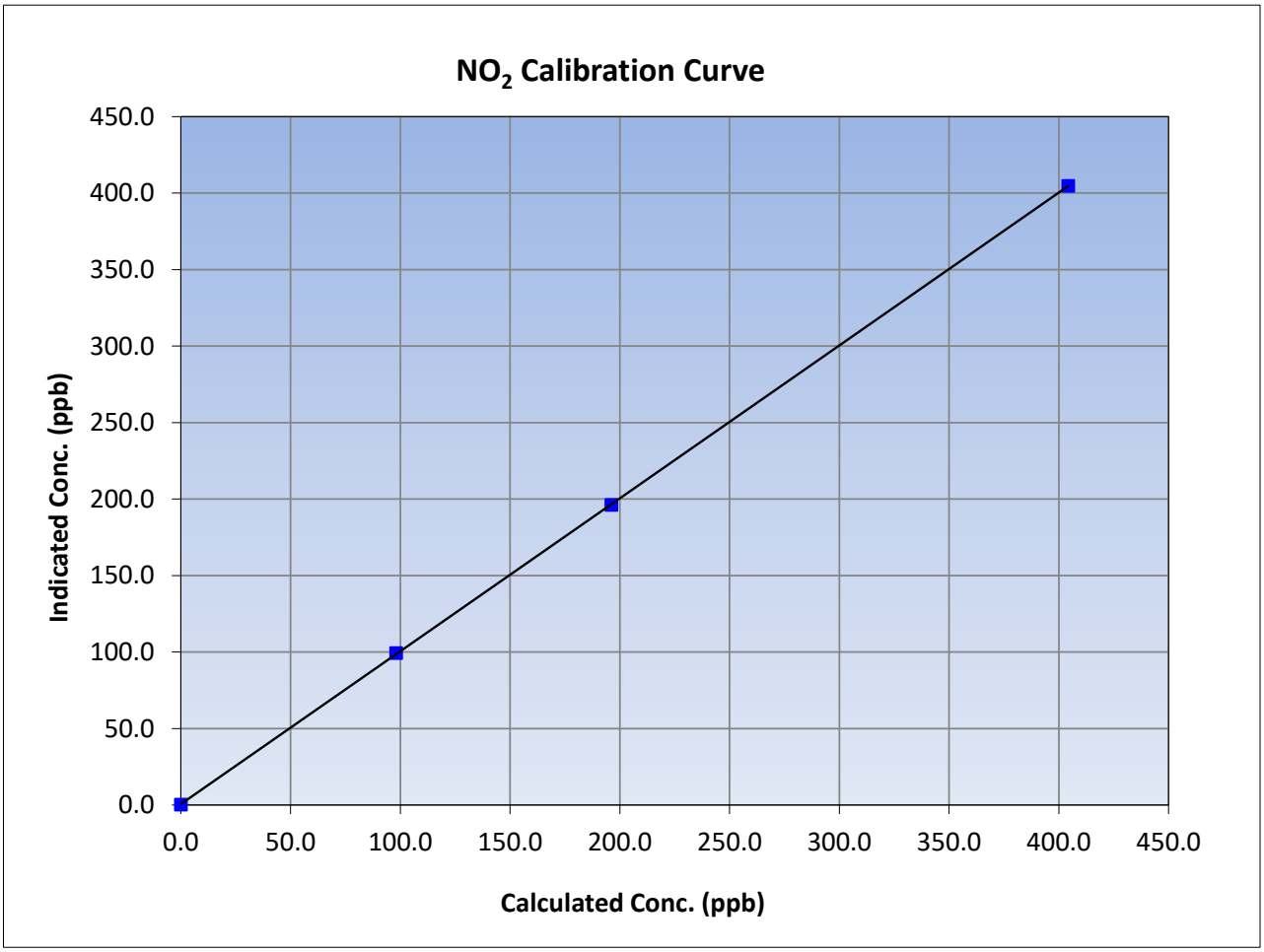
Version-04-2020

Station Information

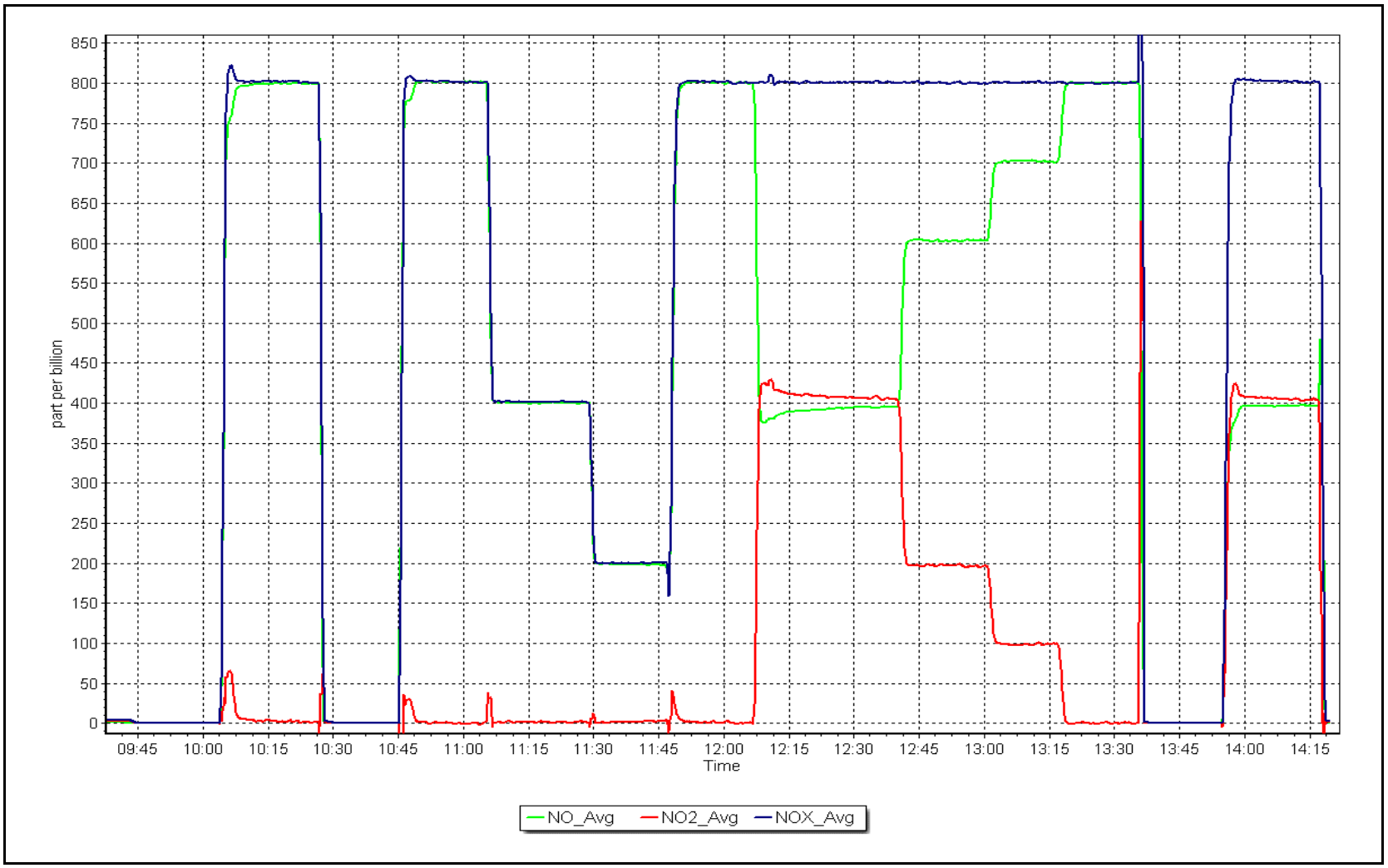
Calibration Date:	July 21, 2023	Previous Calibration:	June 21, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:40	End Time (MST):	14:20
Analyzer make:	Thermo 42i	Analyzer serial #:	1170050148

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.3	----	Correlation Coefficient	0.999990	≥0.995
404.3	404.7	0.9990			
196.1	196.1	1.0000	Slope	0.999330	0.90 - 1.10
98.1	99.4	0.9869			
			Intercept	0.616986	+/-20



NO_X Calibration Plot Date: July 21, 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:	July 21, 2023	Last Cal Date:	June 21, 2023
Start time (MST):	10:18	End time (MST):	11:36
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)	23.9	24.31	23.9	☐	+/- 2 °C
P (mmHg)	712.7	714.14	712.7	☐	+/- 10 mmHg
flow (LPM)	5.02	5.139	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: July 21, 2023 Last Cal Date: June 21, 2023

PM w/o HEPA: 31.8 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	10.8	12.1	11.1	☑	11.3 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 34.8 w/ HEPA: 0.0

Date Optical Chamber Cleaned: July 21, 2023 <0.2 ug/m3

Disposable Filter Changed: July 21, 2023

Annual Maintenance

Date Sample Tube Cleaned: September 30, 2022

Date RH/T Sensor Cleaned: October 6, 2022

Notes: Adjusted PMT peak, both leak checks passed.

Calibration by: Braiden Boutilier

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS30
ELLS RIVER
JULY 2023

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

August 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:	July 4, 2023	Last Cal Date:	June 2, 2023
Start time (MST):	9:26	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:	1.010127	1.010041	Backgd or Offset:	9.5	9.5
Calibration intercept:	-2.796062	-3.016022	Coeff or Slope:	0.988	0.988

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.4	----
as found span	4921	79.2	800.4	806.0	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4921	79.2	800.4	807.1	0.992
second point	4960	39.6	400.2	398.9	1.003
third point	4980	19.8	200.1	196.9	1.016
as left zero	5000	0.0	0.0	0.3	----
as left span	4921	79.2	800.4	807.0	0.992
				Average Correction Factor	1.004

Baseline Corr As found:	806.40	Previous response	805.67	*% change	0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

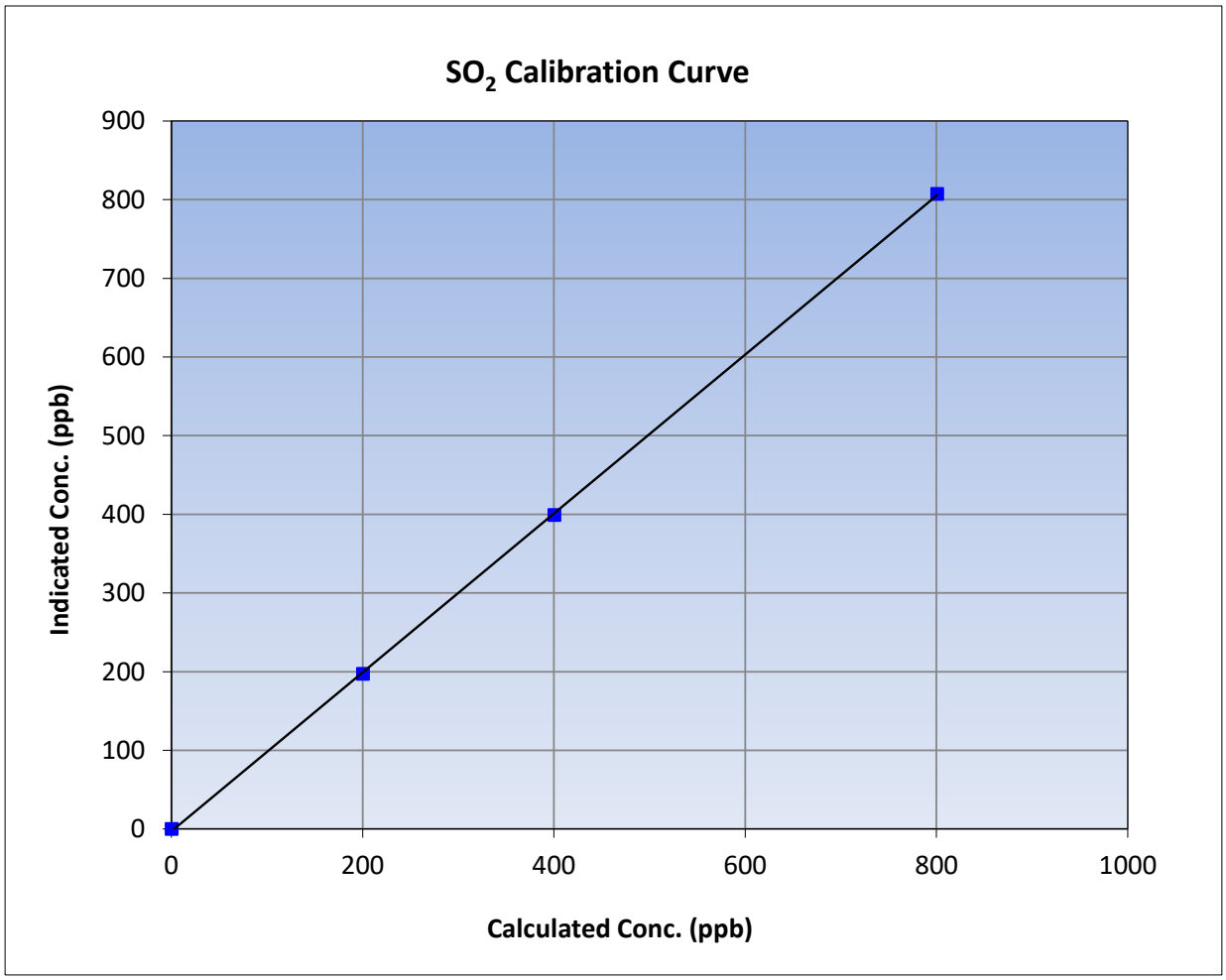
Station Information

Calibration Date:	July 4, 2023	Previous Calibration:	June 2, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:26	End Time (MST):	12:20
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841397

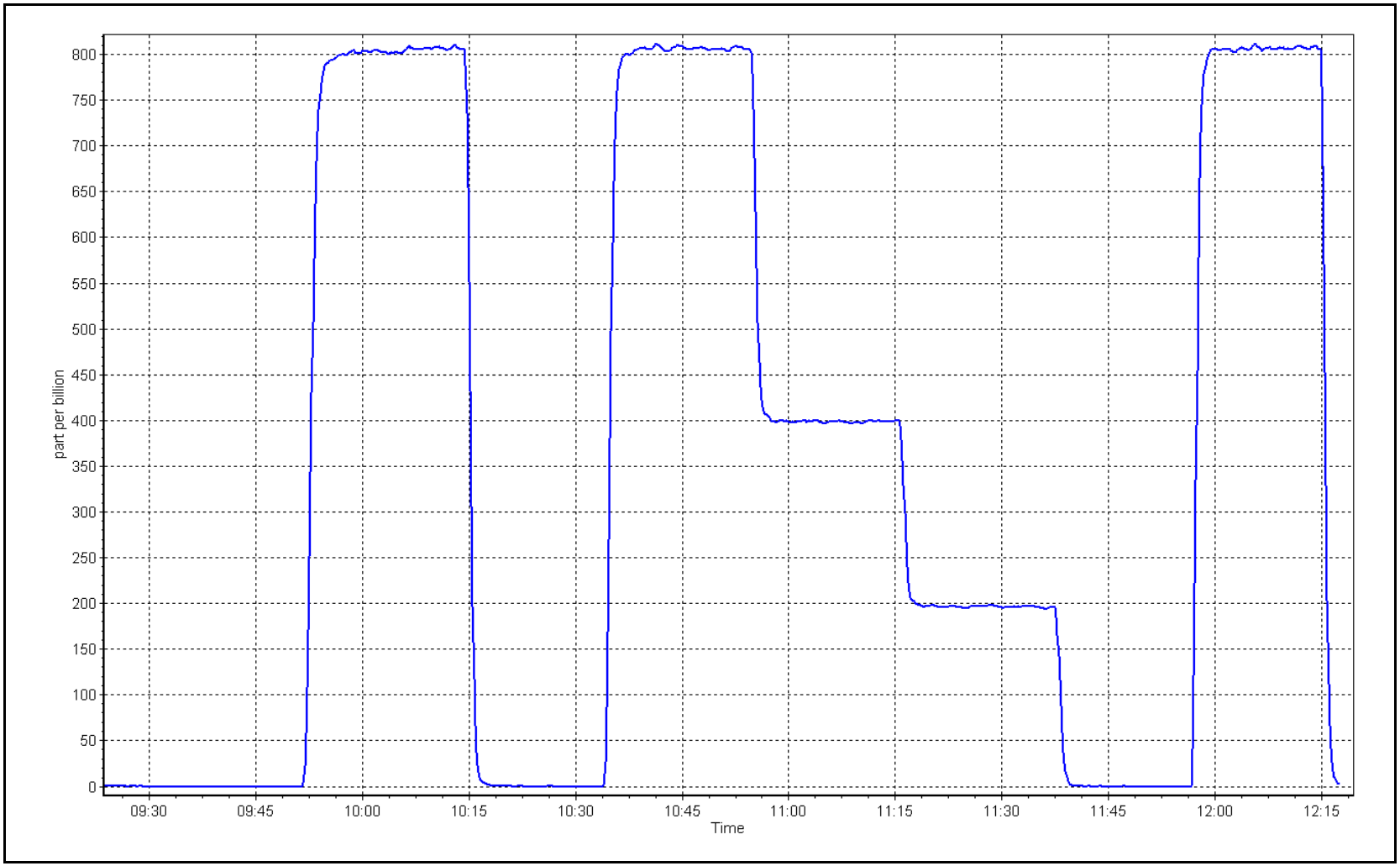
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
800.4	807.1	0.9917
400.2	398.9	1.0033
200.1	196.9	1.0163

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999941	*≥0.995*
Slope	1.010041	*0.90 - 1.10*
Intercept	-3.016022	*+/-30*



SO2 Calibration Plot Date: July 4, 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:	July 5, 2023	Last Cal Date:	June 12, 2023
Start time (MST):	9:23	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 #:	562	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003207	1.008782	Backgd or Offset:	1.59	1.61
Calibration intercept:	-0.139148	-0.159281	Coeff or Slope:	1.136	1.136

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	79.9	1.001
as found 2nd point	4961	39.4	40.0	39.9	1.003
as found 3rd point	4980	19.7	20.0	19.9	1.006
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4921	78.7	80.0	80.6	0.992
second point	4961	39.4	40.0	40.1	0.998
third point	4980	19.7	20.0	19.9	1.006
as left zero	5000	0.0	0.0	0.1	----
as left span	4921	78.7	80.0	80.2	0.997
SO2 Scrubber Check	4921	79.2	800.4	0.1	----
Date of last scrubber change:		N/A		Ave Corr Factor	0.999
Date of last converter efficiency test:		N/A			efficiency

Baseline Corr As found:	79.9	Prev response:	80.08	*% change:	-0.2%
Baseline Corr 2nd AF pt:	39.9	AF Slope:	0.999493	AF Intercept:	-0.059157
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

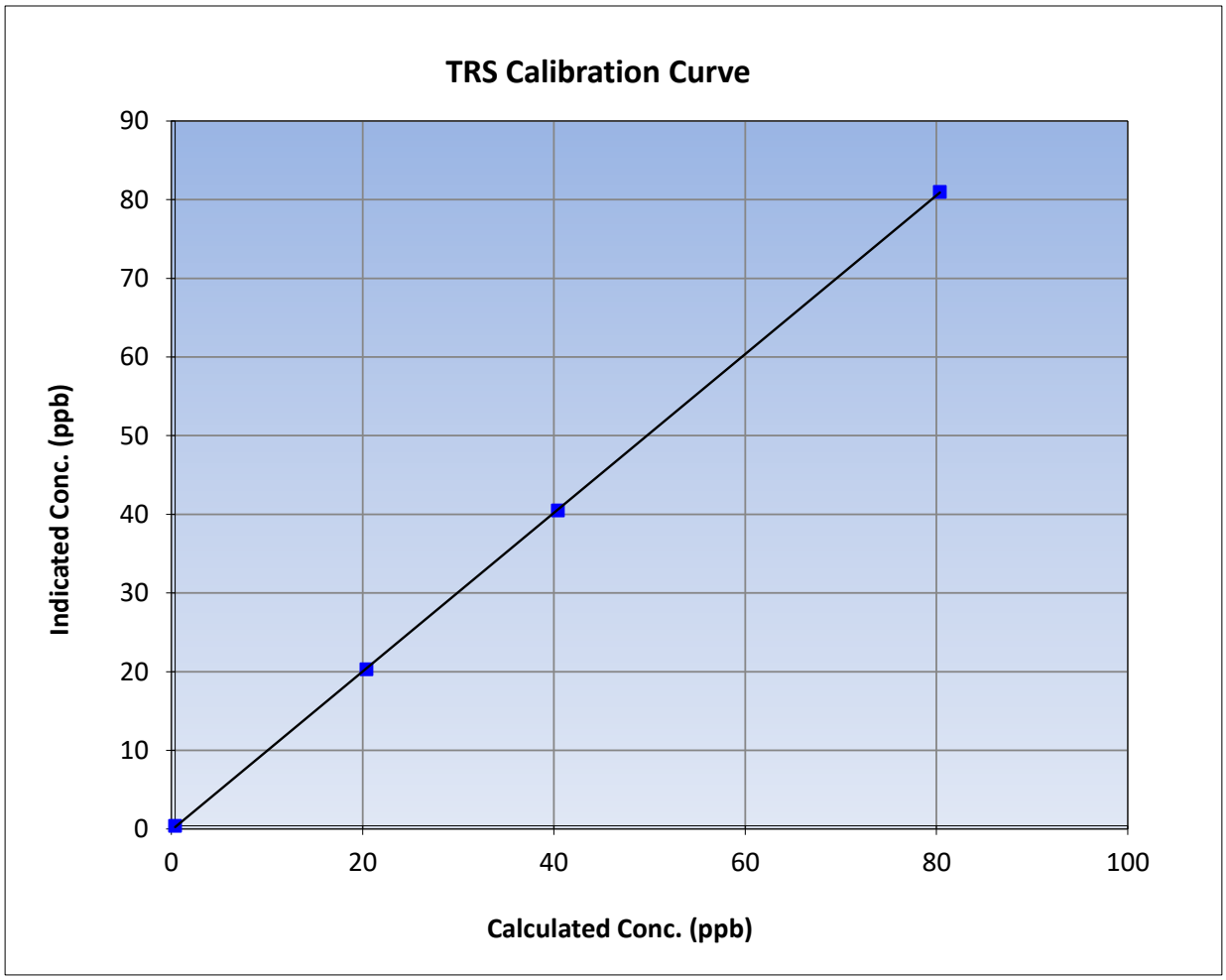
Station Information

Calibration Date:	July 5, 2023	Previous Calibration:	June 12, 2023
Station Name:	Ells River	Station Number:	AMS30
Start Time (MST):	9:23	End Time (MST):	13:15
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1410661331

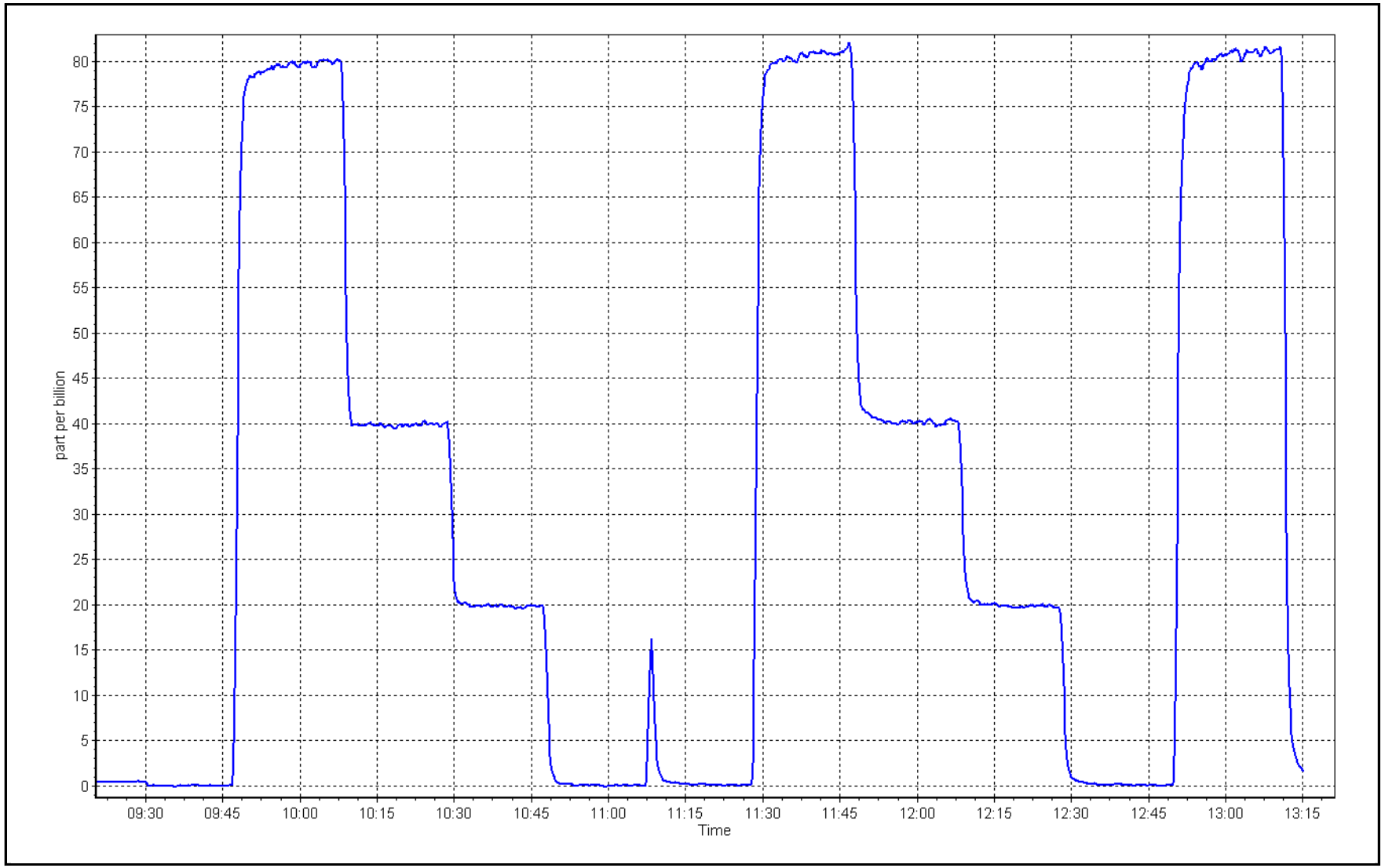
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.6	0.9921
40.0	40.1	0.9982
20.0	19.9	1.0058

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999981	*≥0.995*
Slope	1.008782	*0.90 - 1.10*
Intercept	-0.159281	*+/-3*



TRS Calibration Plot Date: July 5, 2023 Location: Ells River



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Ells River	Station number:	AMS 30
Calibration Date:	July 4, 2023	Last Cal Date:	June 2, 2023
Start time (MST):	9:26	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 #:	1181490018	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	0.000241	0.000241	NMHC SP Ratio:	4.51E-05	4.51E-05
CH4 Retention time:	14.2	14.2	NMHC Peak Area:	202169	202169

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	16.97	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	17.03	17.01	1.001
second point	4960	39.6	8.51	8.41	1.012
third point	4980	19.8	4.26	4.11	1.035
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	17.11	0.995
				Average Correction Factor	1.016

Baseline Corr AF:	16.97	Prev response	16.99	*% change	-0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4921	79.2	9.11	9.18	0.993
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	9.22	0.989
second point	4960	39.6	4.56	4.55	1.003
third point	4980	19.8	2.28	2.21	1.029
as left zero	5000	0	0.00	0.00	----
as left span	4921	79.2	9.11	9.26	0.984
				Average Correction Factor	1.007
Baseline Corr AF:	9.18	Prev response	9.09	*% 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	4921	79.2	7.91	7.80	1.015
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	7.80	1.015
second point	4960	39.6	3.96	3.87	1.023
third point	4980	19.8	1.98	1.90	1.042
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.91	7.85	1.009
				Average Correction Factor	1.027
Baseline Corr AF:	7.80	Prev response	7.91	*% change	-1.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.002469	1.001214
THC Cal Offset:	-0.074938	-0.074338
CH4 Cal Slope:	1.003253	0.986547
CH4 Cal Offset:	-0.032957	-0.025355
NMHC Cal Slope:	1.001801	1.013966
NMHC Cal Offset:	-0.041781	-0.048783

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

THC Calibration Summary

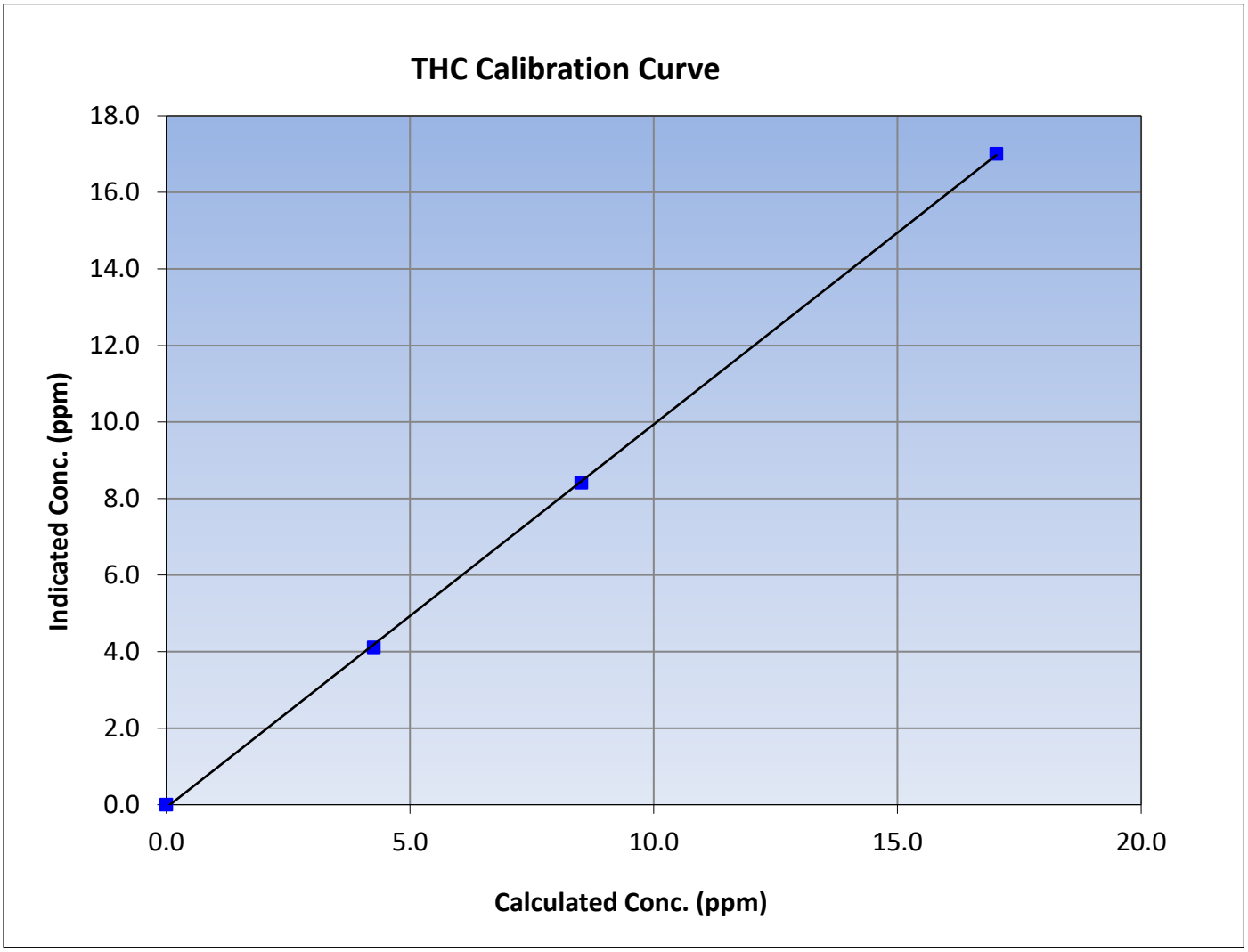
Version-01-2020

Station Information

Calibration Date:	July 4, 2023	Previous Calibration:	June 2, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:26	End Time (MST):	12:20
Analyzer make:	Thermo 55i	Analyzer serial #:	1181490018

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999913	*≥0.995*
17.03	17.01	1.0010			
8.51	8.41	1.0121	Slope	1.001214	*0.90 - 1.10*
4.26	4.11	1.0348			
			Intercept	-0.074338	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

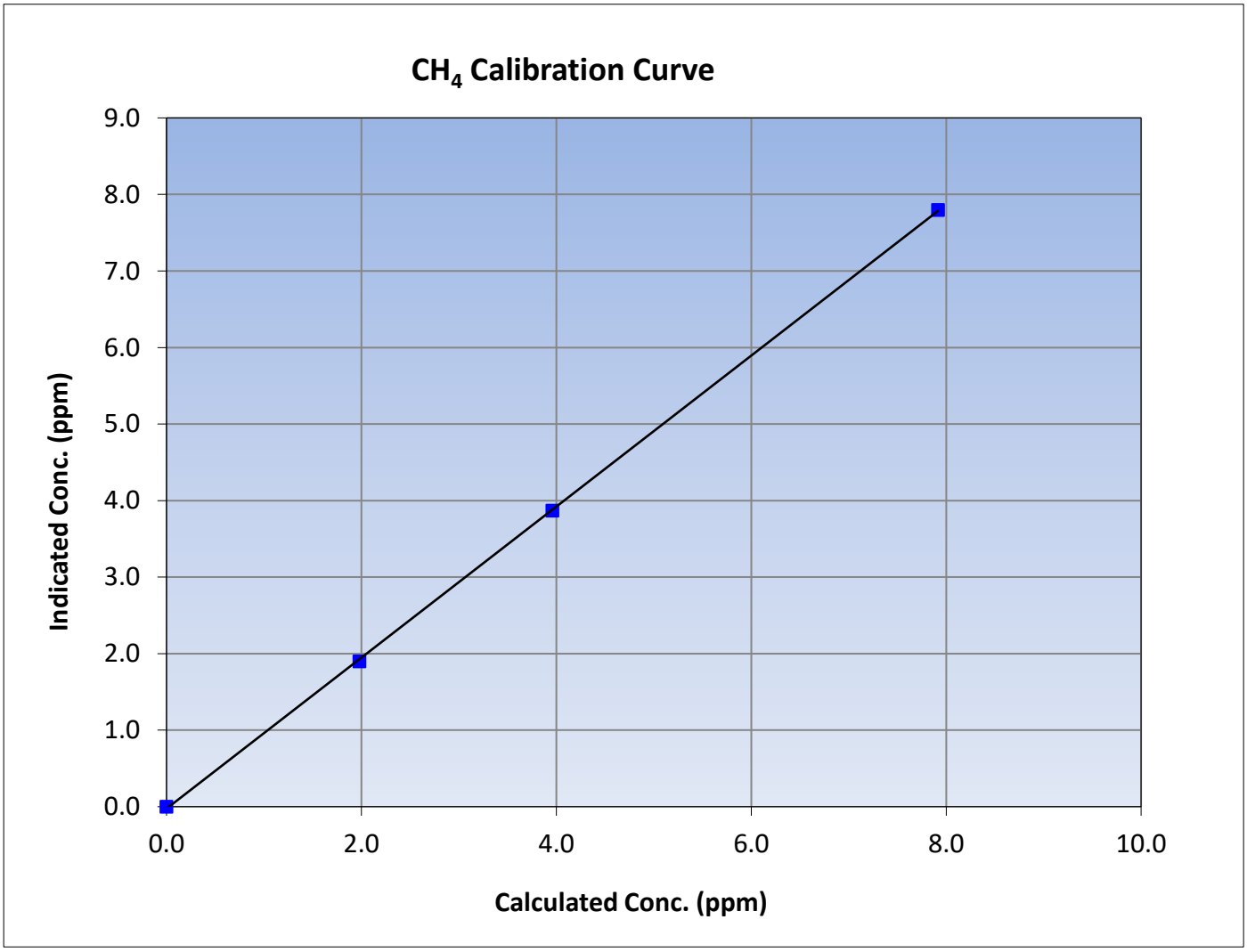
Version-01-2020

Station Information

Calibration Date:	July 4, 2023	Previous Calibration:	June 2, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:26	End Time (MST):	12:20
Analyzer make:	Thermo 55i	Analyzer serial #:	1181490018

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999952	≥0.995
7.91	7.80	1.0154			
3.96	3.87	1.0230	Slope	0.986547	0.90 - 1.10
1.98	1.90	1.0415			
			Intercept	-0.025355	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

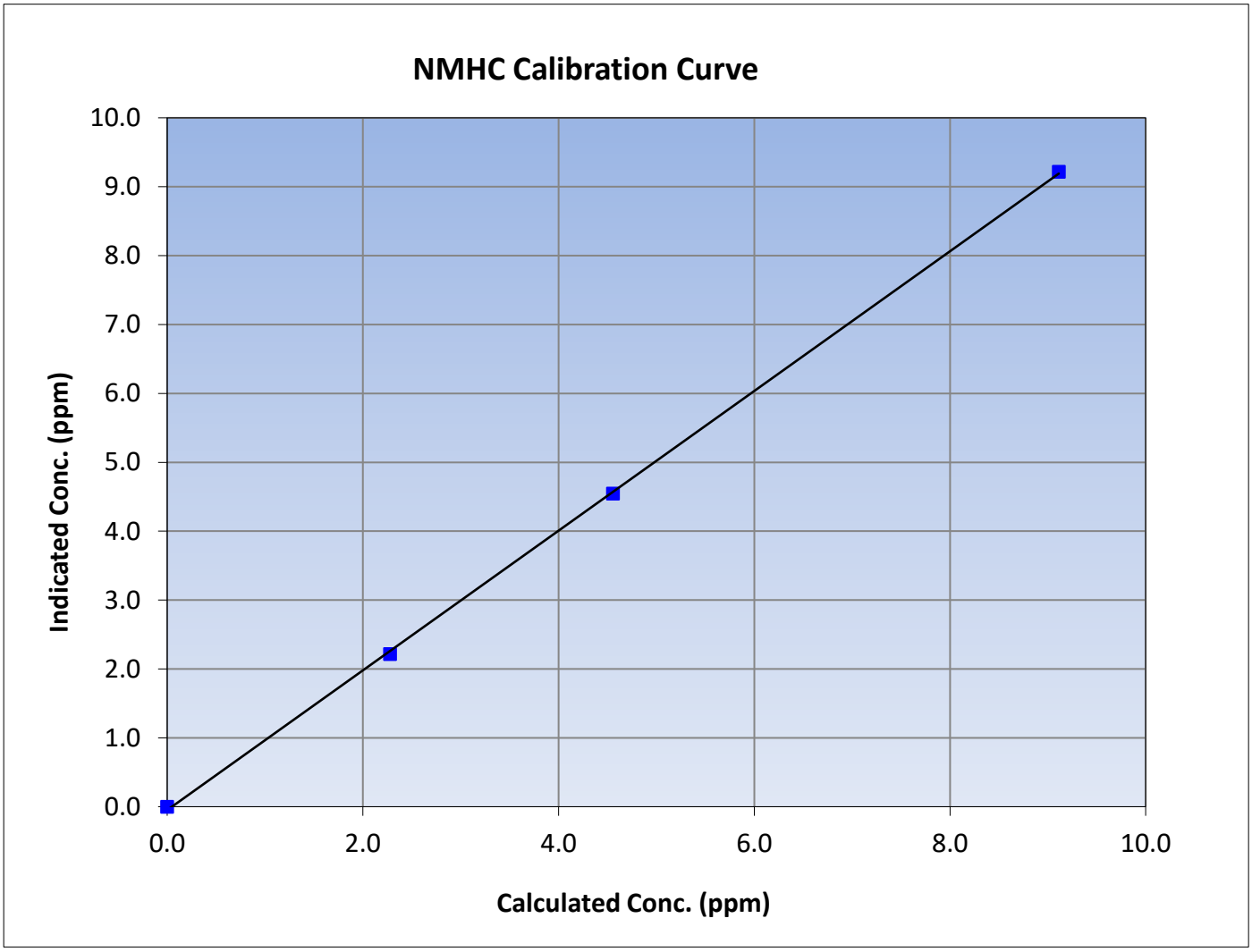
Version-01-2020

Station Information

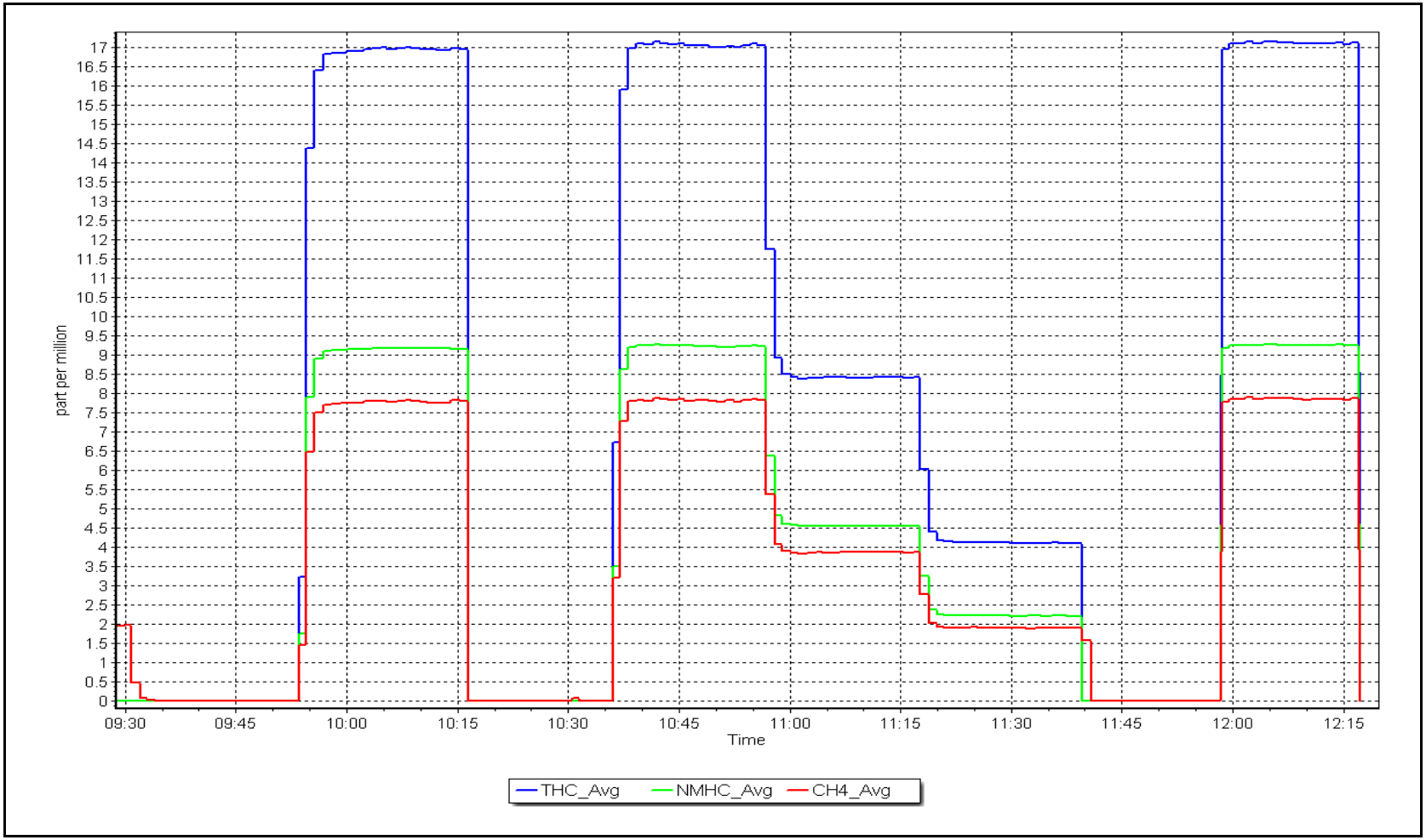
Calibration Date:	July 4, 2023	Previous Calibration:	June 2, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:26	End Time (MST):	12:20
Analyzer make:	Thermo 55i	Analyzer serial #:	1181490018

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999872	≥0.995
9.11	9.22	0.9888			
4.56	4.55	1.0026	Slope	1.013966	0.90 - 1.10
2.28	2.21	1.0290			
			Intercept	-0.048783	+/-0.5



NMHC Calibration Plot Date: July 4, 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:	July 21, 2023	Last Cal Date:	July 4, 2023
Start time (MST):	8:44	End time (MST):	14:50
Reason:	Maintenance		

Calibration Standards

Gas Cert Reference:		CC494126	Cal Gas Expiry Date:	December 29, 2028	
CH4 Cal Gas Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm
C3H8 Cal Gas Conc.	209.2	ppm			
Removed Gas Cert:			Removed Gas Expiry:		
Removed CH4 Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm
Removed C3H8 Conc.	209.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3061	
ZAG make/model:	API T701H		Serial Number:	358	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1181490018	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	0.000241	0.000252	NMHC SP Ratio:	4.51E-05	4.67E-05
CH4 Retention time:	14.2	14.4	NMHC Peak Area:	202169	195284

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	15.13	1.125
as found 2nd point	4960	39.6	8.51	7.53	1.130
as found 3rd point	4980	19.8	4.26	3.70	1.151
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	17.03	17.03	1.000
second point	4960	39.6	8.51	8.43	1.010
third point	4980	19.8	4.26	4.14	1.027
as left zero	5000	0.0	0.00	4.14	----
as left span	4921	79.2	17.03	17.05	0.999
				Average Correction Factor	1.012

Baseline Corr AF:	15.13	Prev response	16.97	*% change	-12.2%
Baseline Corr 2nd AF:	7.5	AF Slope:	0.890002	AF Intercept:	-0.040671
Baseline Corr 3rd AF:	3.7	AF Correlation:	0.999964	* = > +/-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	7.96	1.145
as found 2nd point	4960	39.6	4.56	3.96	1.153
as found 3rd point	4980	19.8	2.28	1.94	1.175
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4921	79.2	9.11	9.11	1.000
second point	4960	39.6	4.56	4.51	1.010
third point	4980	19.8	2.28	2.22	1.028
as left zero	5000	0	0.00	2.22	----
as left span	4921	79.2	9.11	9.13	0.998
				Average Correction Factor	1.013
Baseline Corr AF:	7.96	Prev response	9.19	*% change	-15.5%
Baseline Corr 2nd AF:	4.0	AF Slope:	0.874897	AF Intercept:	-0.025924
Baseline Corr 3rd AF:	1.9	AF Correlation:	0.999951	* = > +/-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	7.17	1.104
as found 2nd point	4960	39.6	3.96	3.57	1.108
as found 3rd point	4980	19.8	1.98	1.76	1.125
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	7.91	7.91	1.000
second point	4960	39.6	3.96	3.92	1.010
third point	4980	19.8	1.98	1.93	1.026
as left zero	5000	0.0	0.00	1.93	----
as left span	4921	79.2	7.91	7.92	1.000
				Average Correction Factor	1.012
Baseline Corr AF:	7.17	Prev response	7.78	*% change	-8.6%
Baseline Corr 2nd AF:	3.57	AF Slope:	0.906873	AF Intercept:	-0.015916
Baseline Corr 3rd AF:	1.76	AF Correlation:	0.999976	* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.001214	1.001691
THC Cal Offset:	-0.074338	-0.062138
CH4 Cal Slope:	0.986547	1.001405
CH4 Cal Offset:	-0.025355	-0.027557
NMHC Cal Slope:	1.013966	1.001951
NMHC Cal Offset:	-0.048783	-0.034381

Notes: Replaced pump after MPAFs. Calibration started at 13:00 MST.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

THC Calibration Summary

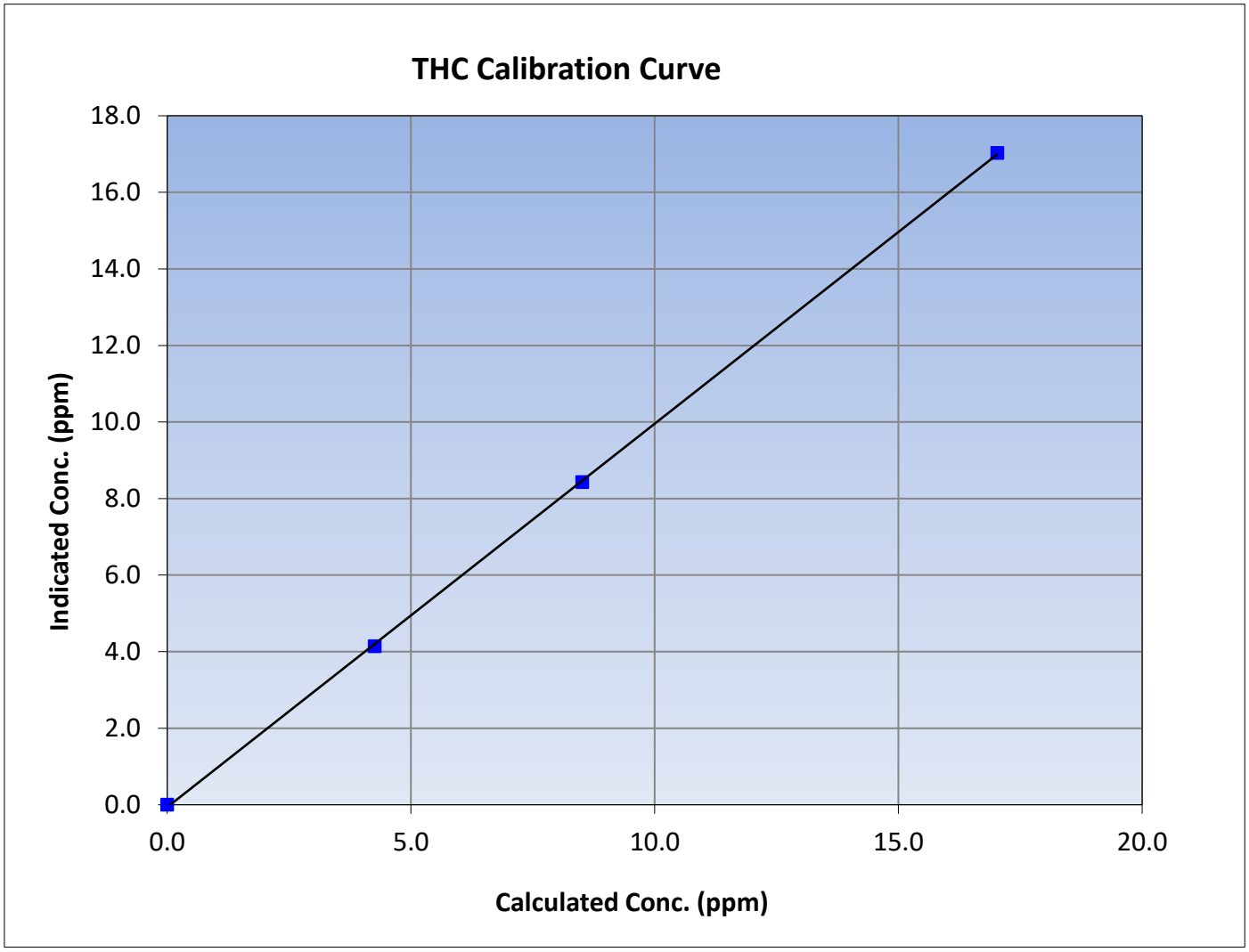
Version-01-2020

Station Information

Calibration Date:	July 21, 2023	Previous Calibration:	July 4, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	8:44	End Time (MST):	14:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1181490018

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999939	*≥0.995*
17.03	17.03	1.0000			
8.51	8.43	1.0100	Slope	1.001691	*0.90 - 1.10*
4.26	4.14	1.0273			
			Intercept	-0.062138	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

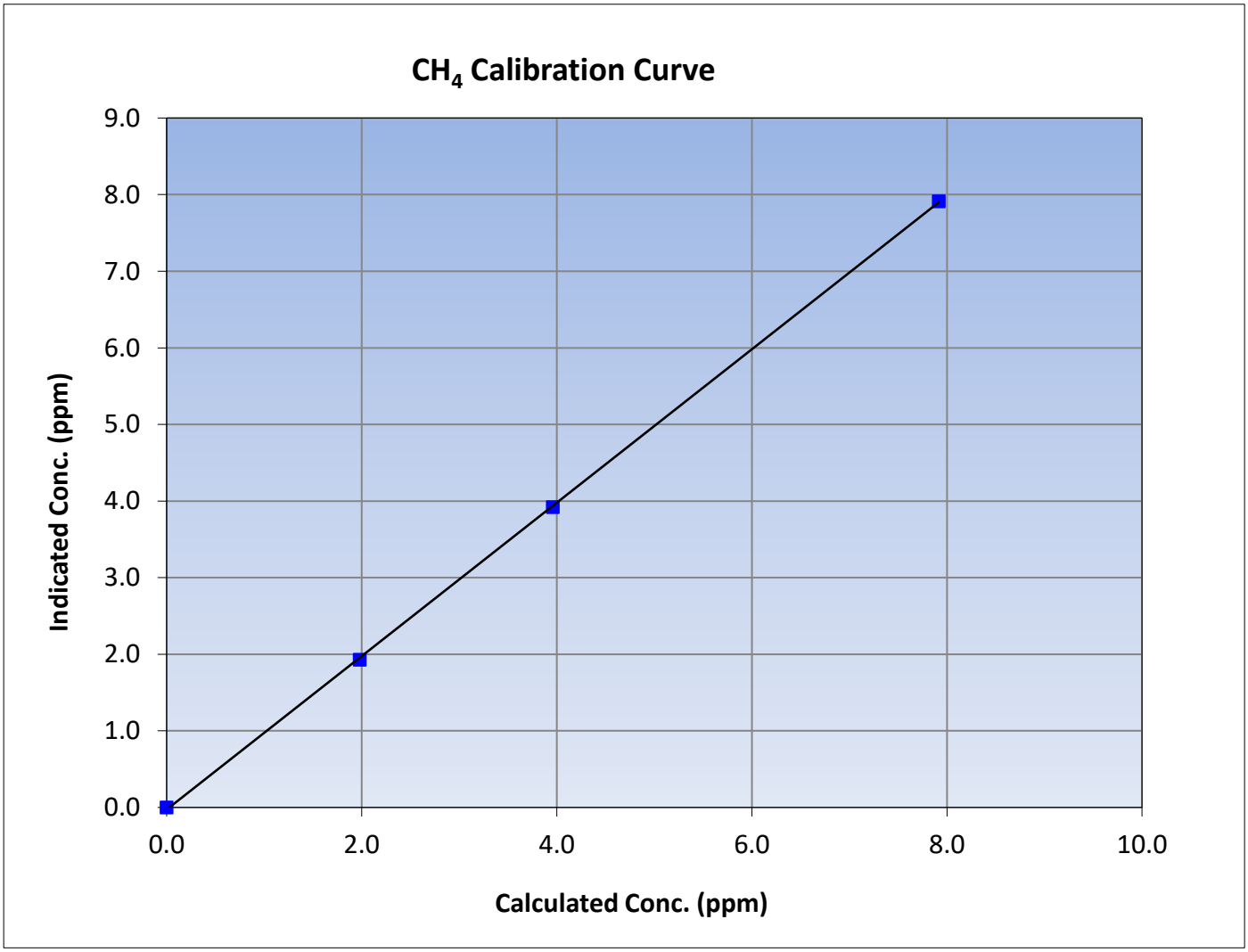
Version-01-2020

Station Information

Calibration Date:	July 21, 2023	Previous Calibration:	July 4, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	8:44	End Time (MST):	14:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1181490018

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999945	≥0.995
7.91	7.91	1.0002			
3.96	3.92	1.0097	Slope	1.001405	0.90 - 1.10
1.98	1.93	1.0264			
			Intercept	-0.027557	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

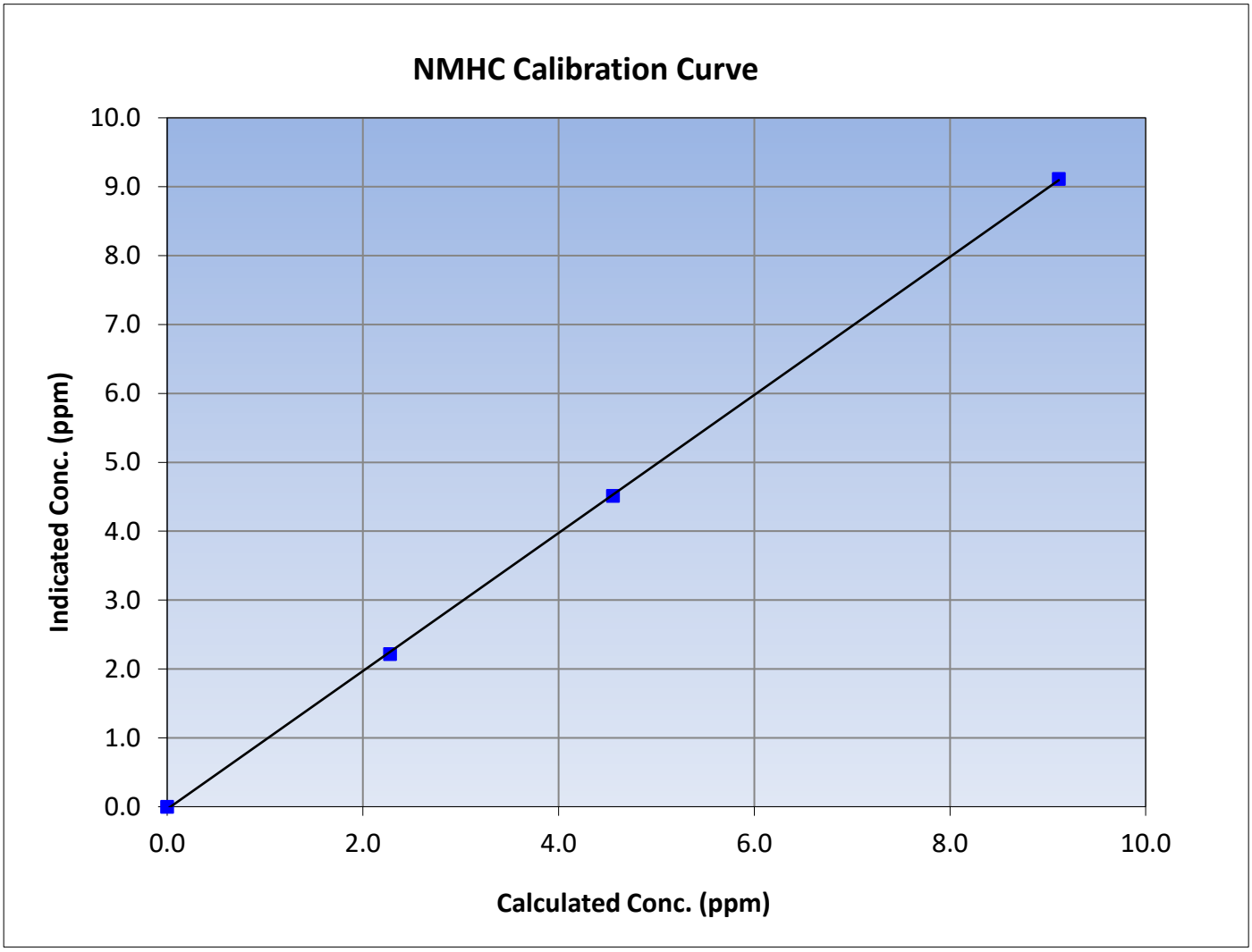
Version-01-2020

Station Information

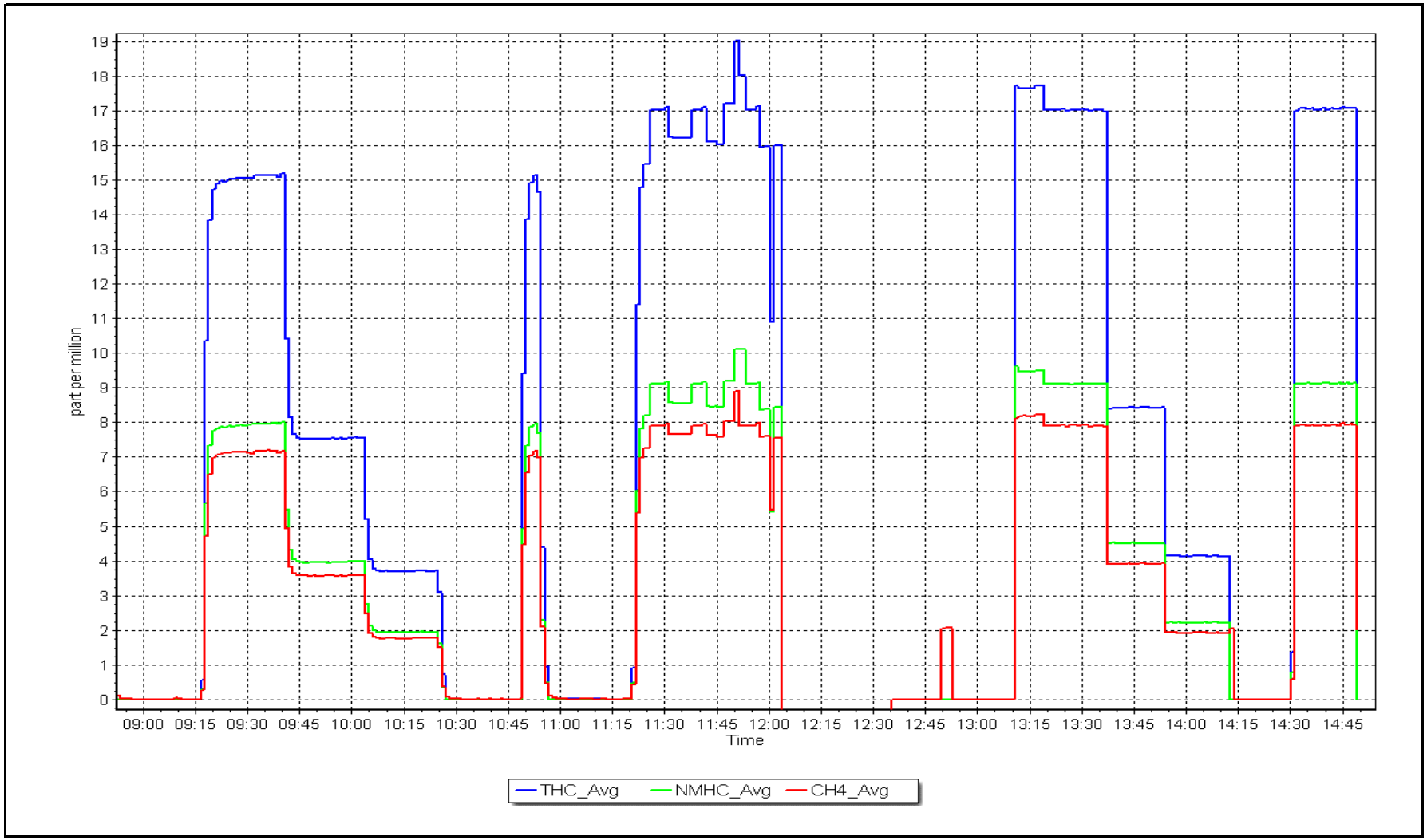
Calibration Date:	July 21, 2023	Previous Calibration:	July 4, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	8:44	End Time (MST):	14:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1181490018

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999935	*≥0.995*
9.11	9.11	0.9998			
4.56	4.51	1.0101	Slope	1.001951	*0.90 - 1.10*
2.28	2.22	1.0281			
			Intercept	-0.034381	*+/-0.5*



NMHC Calibration Plot Date: July 21, 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:	July 6, 2023	Last Cal Date:	June 6, 2023
Start time (MST):	9:16	End time (MST):	13:55
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:	1.051	1.031	NO bkgnd or offset:	12.7	12.8
NOX coeff or slope:	0.990	0.994	NOX bkgnd or offset:	12.9	12.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	180.6	184.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.996431	1.001026
NO_X Cal Offset:	-1.740000	-1.400000
NO Cal Slope:	0.993668	0.999657
NO Cal Offset:	-2.100000	-2.520000
NO_2 Cal Slope:	1.000832	1.005854
NO_2 Cal Offset:	0.789762	1.195147

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	4920	80.0	813.3	799.5	13.8	830.0	814.5	15.7	0.9799	0.9816
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
high point	4920	80.0	813.3	799.5	13.8	813.5	798.1	15.3	0.9997	1.0018
second point	4960	40.0	406.6	399.8	6.9	404.7	395.5	9.2	1.0048	1.0108
third point	4980	20.0	203.3	199.9	3.4	200.9	195.0	5.9	1.0120	1.0250
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as left span	4920	80.0	813.3	421.3	392.0	817.3	422.8	394.5	0.9951	0.9965
								Average Correction Factor	1.0055	1.0125

Corrected As found	NO_X = 829.9 ppb	NO = 814.3 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = 2.6%
Previous Response	NO_X = 808.6 ppb	NO = 792.4 ppb		*Percent Change	NO = 2.7%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	794.9	416.7	392.0	394.7	0.9931	100.7%
2nd GPT point (200 ppb O3)	794.9	616.0	192.7	196.0	0.9830	101.7%
3rd GPT point (100 ppb O3)	794.9	703.2	105.5	108.2	0.9747	102.6%
				Average Correction Factor	0.9836	101.7%

Notes: Both zero and span was adjusted.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

NO_X Calibration Summary

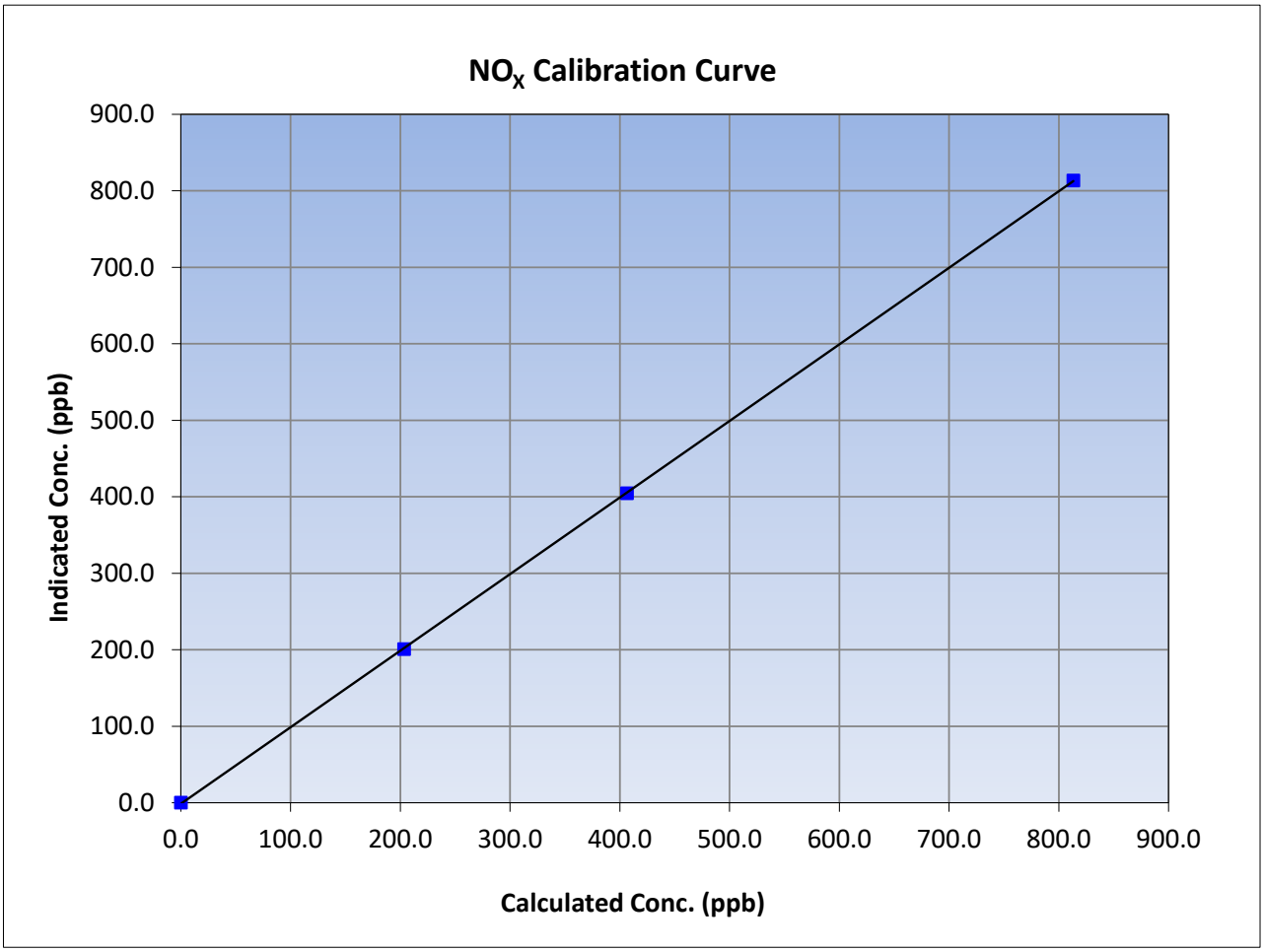
Version-04-2020

Station Information

Calibration Date:	July 6, 2023	Previous Calibration:	June 6, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:16	End Time (MST):	13:55
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	0.999986	≥0.995
813.3	813.5	0.9997			
406.6	404.7	1.0048	Slope	1.001026	0.90 - 1.10
203.3	200.9	1.0120			
			Intercept	-1.400000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

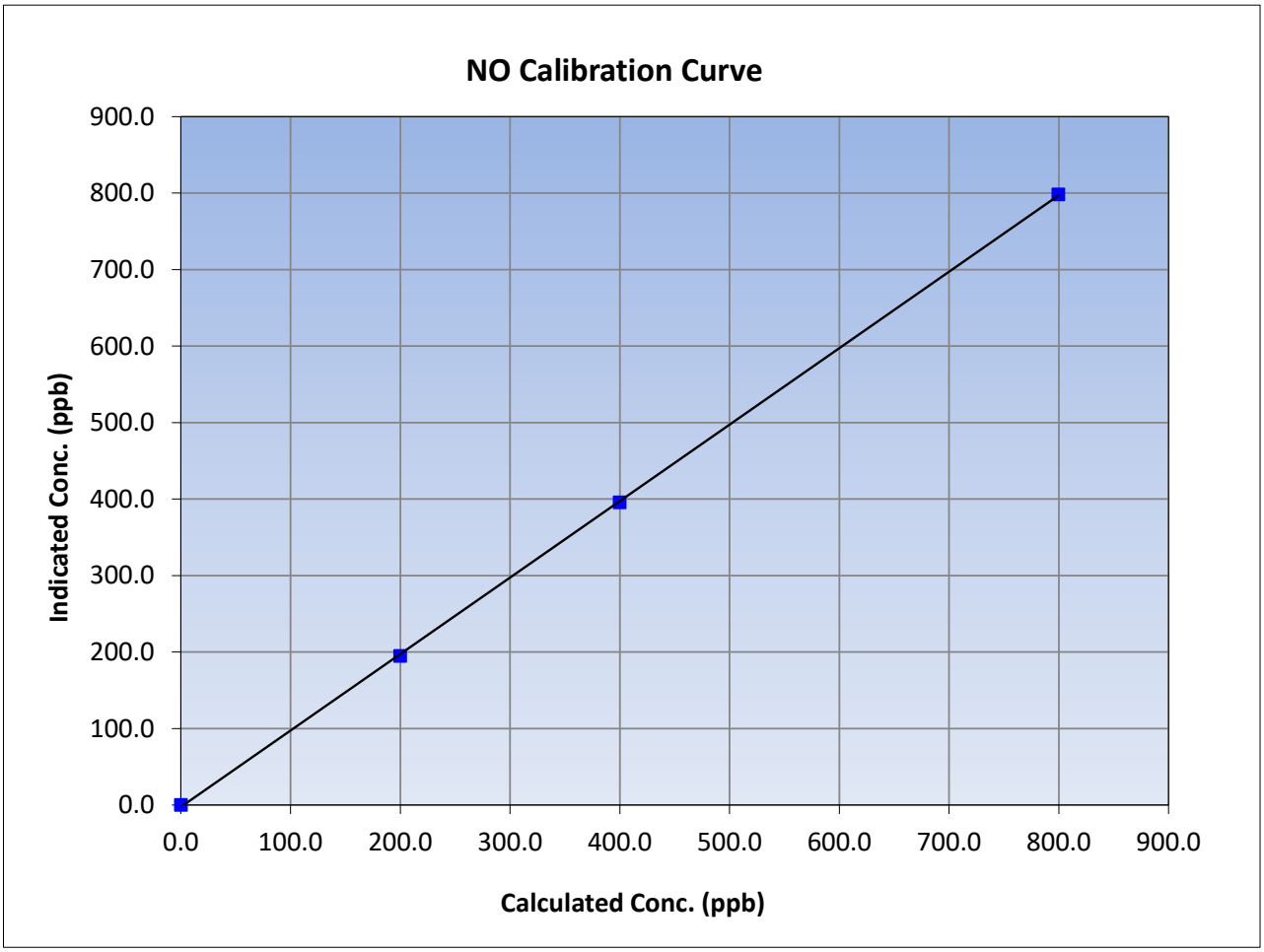
Version-04-2020

Station Information

Calibration Date:	July 6, 2023	Previous Calibration:	June 6, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:16	End Time (MST):	13:55
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	0.999954	≥0.995
799.5	798.1	1.0018			
399.8	395.5	1.0108	Slope	0.999657	0.90 - 1.10
199.9	195.0	1.0250			
			Intercept	-2.520000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

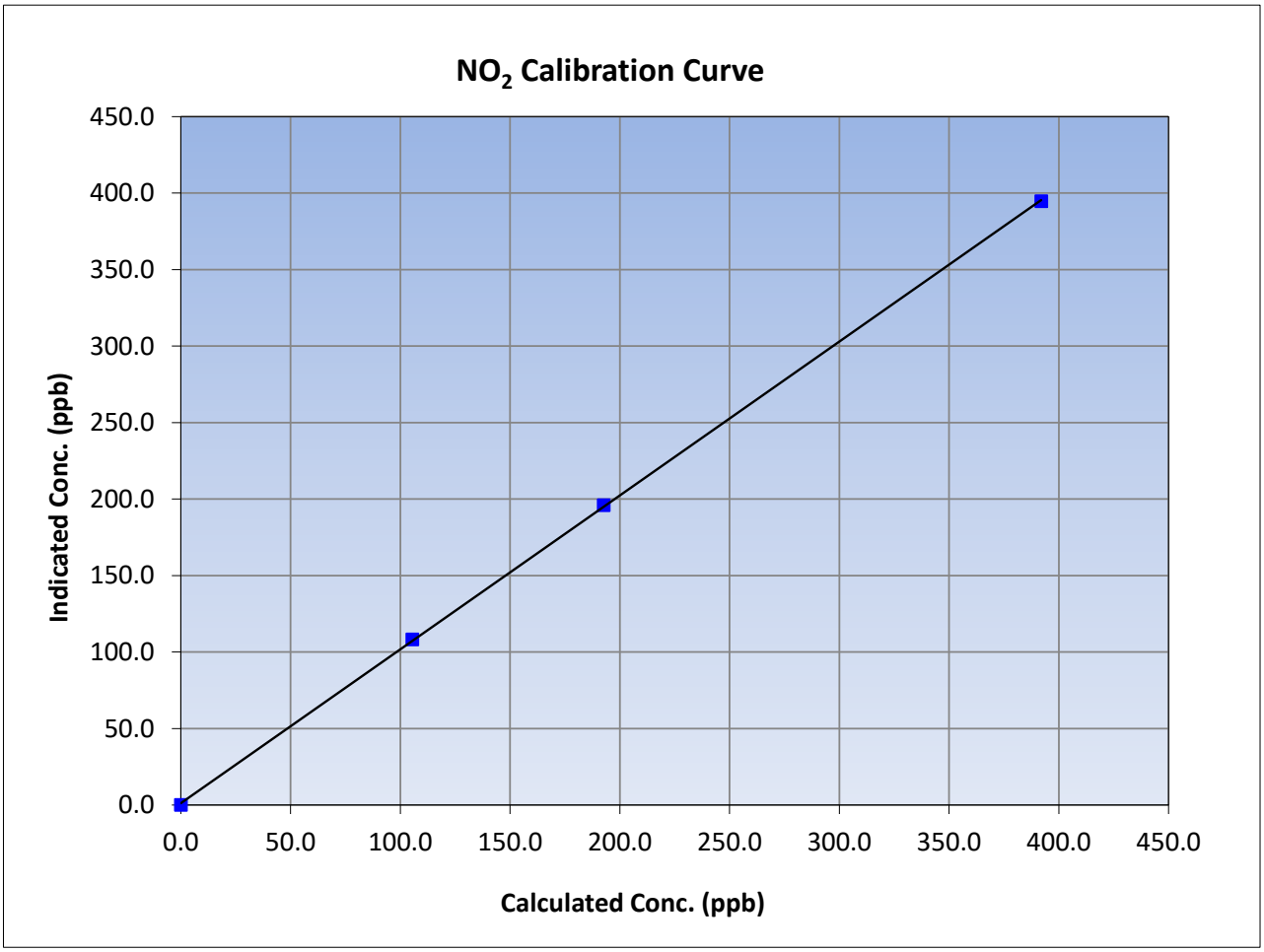
Version-04-2020

Station Information

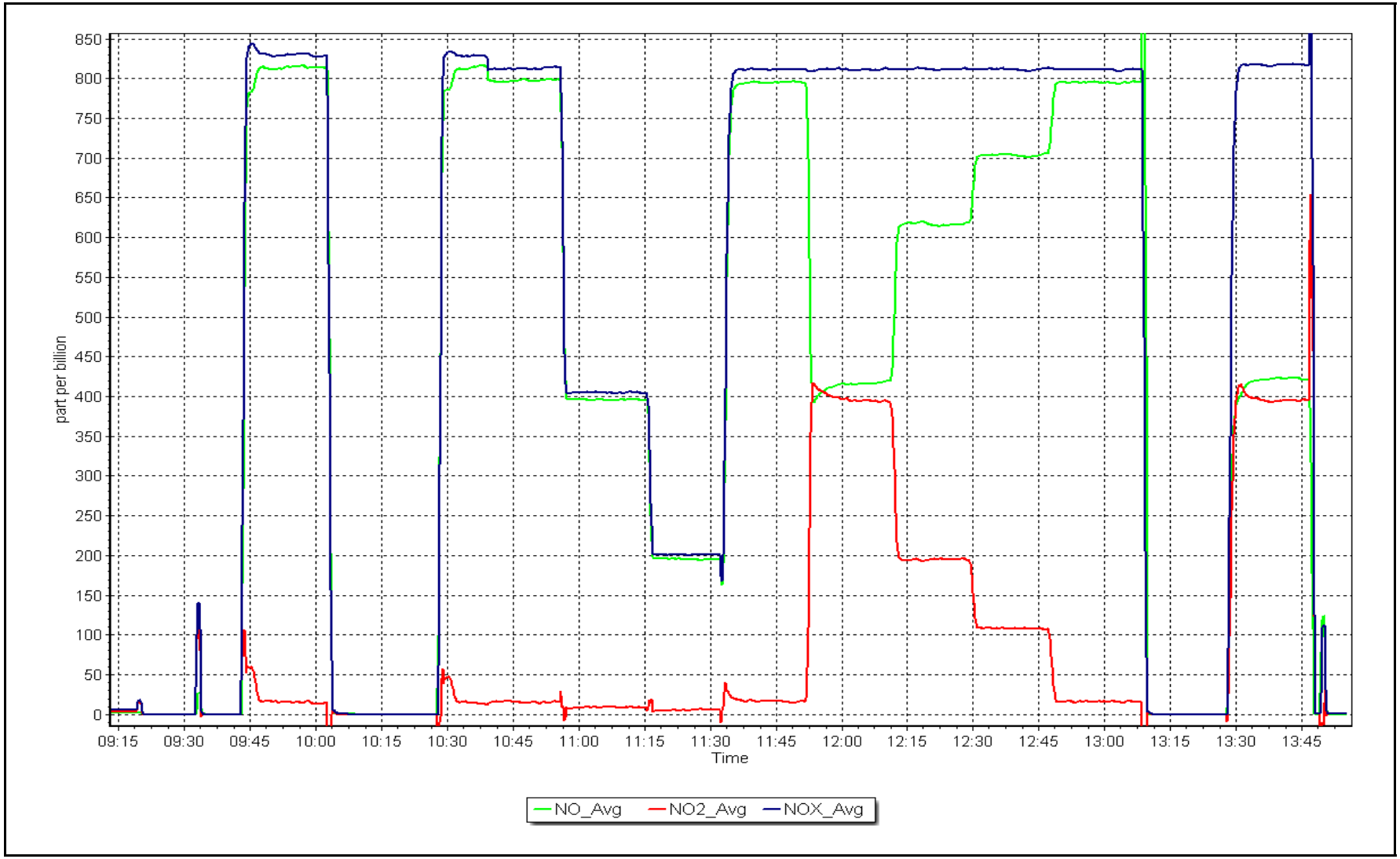
Calibration Date:	July 6, 2023	Previous Calibration:	June 6, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:16	End Time (MST):	13:55
Analyzer make:	Thermo 42i	Analyzer serial #:	710321429

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999954	≥0.995
392.0	394.7	0.9931			
192.7	196.0	0.9830	Slope	1.005854	0.90 - 1.10
105.5	108.2	0.9747			
			Intercept	1.195147	+/-20



NO_X Calibration Plot Date: July 6, 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:	July 26, 2023	Last Cal Date:	June 29, 2023
Start time (MST):	9:13	End time (MST):	9:30
Analyzer Make:	API T640	S/N:	875
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat	S/N:	388751
Temp/RH standard:	Alicat	S/N:	388751

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	15	14.46	15	☐	+/- 2 °C
P (mmHg)	726.5	728.43	726.43	☐	+/- 10 mmHg
flow (LPM)	4.99	4.98	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: July 26, 2023 Last Cal Date: July 21, 2023

PM w/o HEPA: 4.2 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test				☐	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: Clean!

Calibration by: Denny Ray Estador

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS505
SAWBONES BAY
JULY 2023

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

August 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Sawbones Bay	Station number:	AMS505
Calibration Date:	July 14, 2023	Last Cal Date:	June 21, 2023
Start time (MST):	8:21	End time (MST):	11:17
Reason:	Install		

Calibration Standards

Cal Gas Concentration:	51.4	ppm	Cal Gas Exp Date:	February 15, 2029
Cal Gas Cylinder #:	EY0000672			
Removed Cal Gas Conc:	51.40	ppm	Rem Gas Exp Date:	February 15, 2029
Removed Gas Cyl #:	EY0000672		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5112
ZAG Make/Model:	Teledyne API T701H		Serial Number:	690

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 0710321323

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001395	1.001253	Backgd or Offset:	19.2	19.2
Calibration intercept:	-0.652437	-0.552518	Coeff or Slope:	0.988	0.995

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	4922	77.8	799.8	793.2	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4922	77.8	799.8	800.4	0.999
second point	4961	38.9	399.9	400.1	1.000
third point	4981	19.5	200.4	199.1	1.007
as left zero	5000	0.0	0.0	0.2	----
as left span	4922	77.8	799.8	802.9	0.996
				Average Correction Factor	1.002

Baseline Corr As found:	793.40	Previous response	800.28	*% 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. Adjusted span only.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

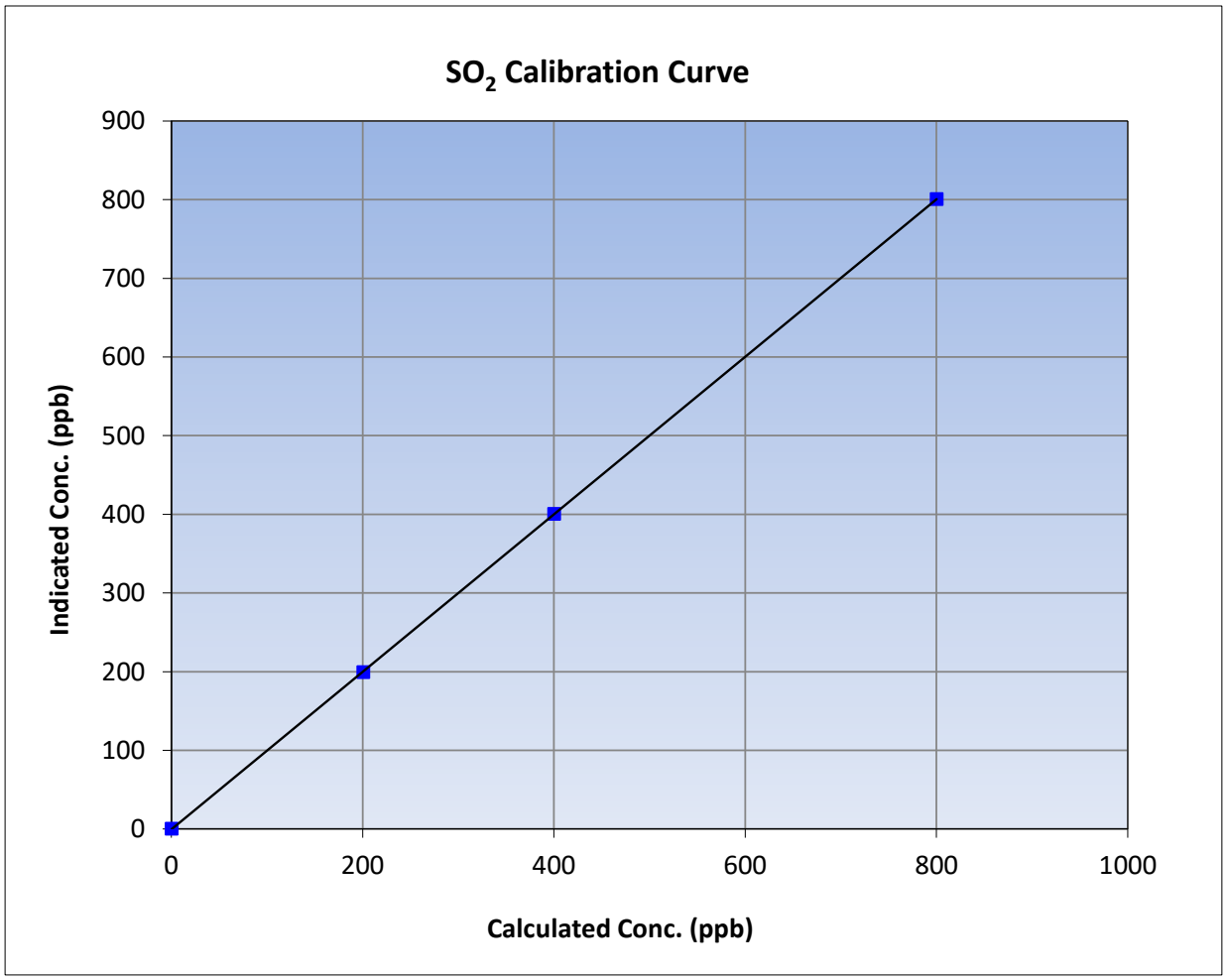
Station Information

Calibration Date:	July 14, 2023	Previous Calibration:	June 21, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:21	End Time (MST):	11:17
Analyzer make:	Thermo 43i	Analyzer serial #:	0710321323

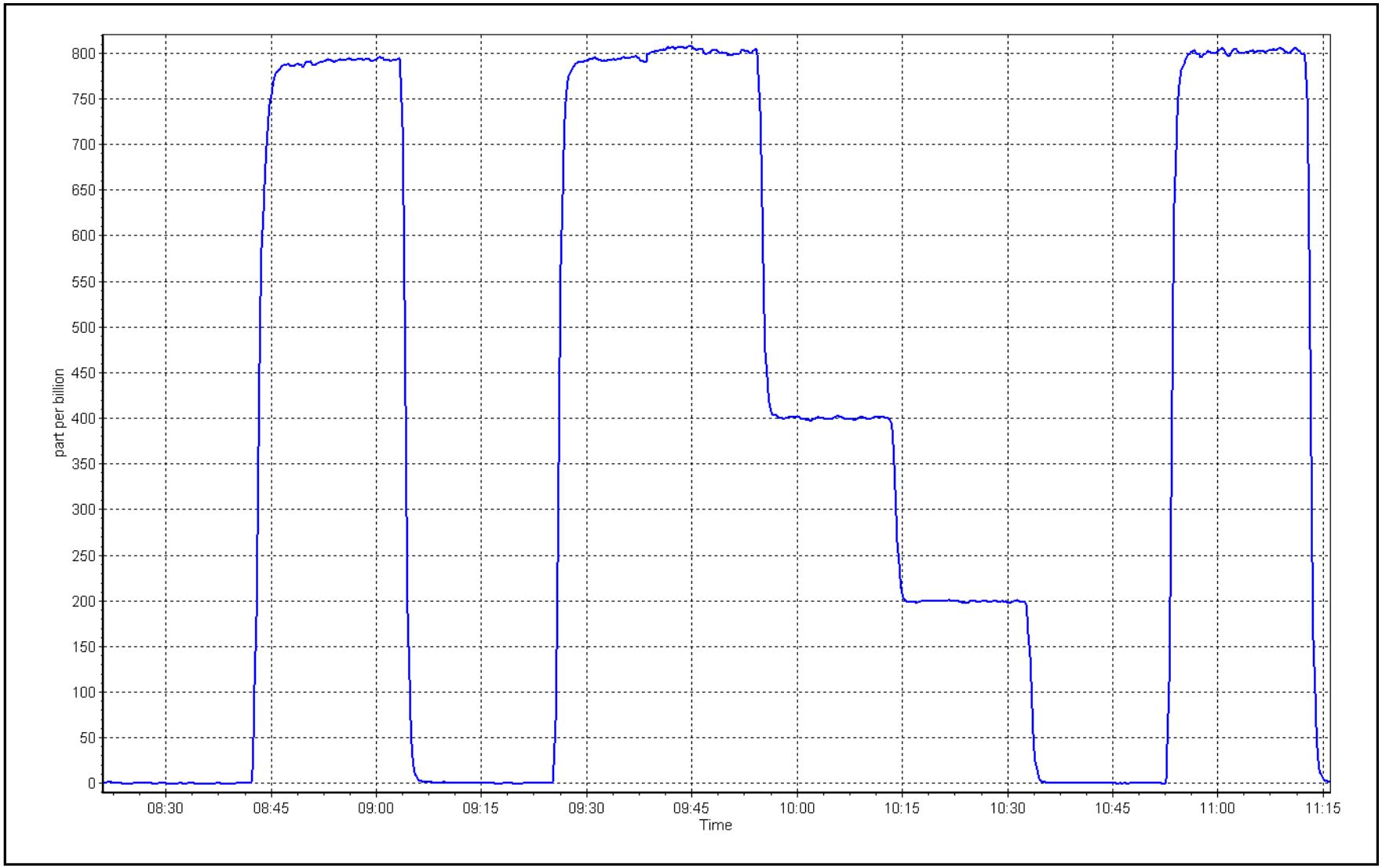
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
799.8	800.4	0.9993
399.9	400.1	0.9995
200.4	199.1	1.0067

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.001253	*0.90 - 1.10*
Intercept	-0.552518	*+/-30*



SO2 Calibration Plot Date: July 14, 2023 Location: Sawbones Bay



Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Sawbones Bay	Station number:	AMS505
Calibration Date:	June 21, 2023	Last Cal Date:	NA
Start time (MST):	8:49	End time (MST):	11:00
Reason:	Install		

Calibration Standards

Cal Gas Concentration:	51.4	ppm	Cal Gas Exp Date:	February 15, 2029
Cal Gas Cylinder #:	EY0000672			
Removed Cal Gas Conc:	51.40	ppm	Rem Gas Exp Date:	February 15, 2029
Removed Gas Cyl #:	EY0000672		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5112
ZAG Make/Model:	Teledyne API T701H		Serial Number:	690

Analyzer Information

Analyzer make: Thermo 43i Analyzer serial #: 0710321323

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	NA	1.001395	Backgd or Offset:	NA	19.2
Calibration intercept:	NA	-0.652437	Coeff or Slope:	NA	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					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4922	77.8	799.8	800.6	0.999
second point	4961	38.9	399.9	399.8	1.000
third point	4981	19.5	200.4	198.8	1.008
as left zero	5000	0.0	0.0	0.2	----
as left span	4922	77.8	799.8	801.7	0.998
				Average Correction Factor	1.003

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: Changed inlet filter. Adjusted span only.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

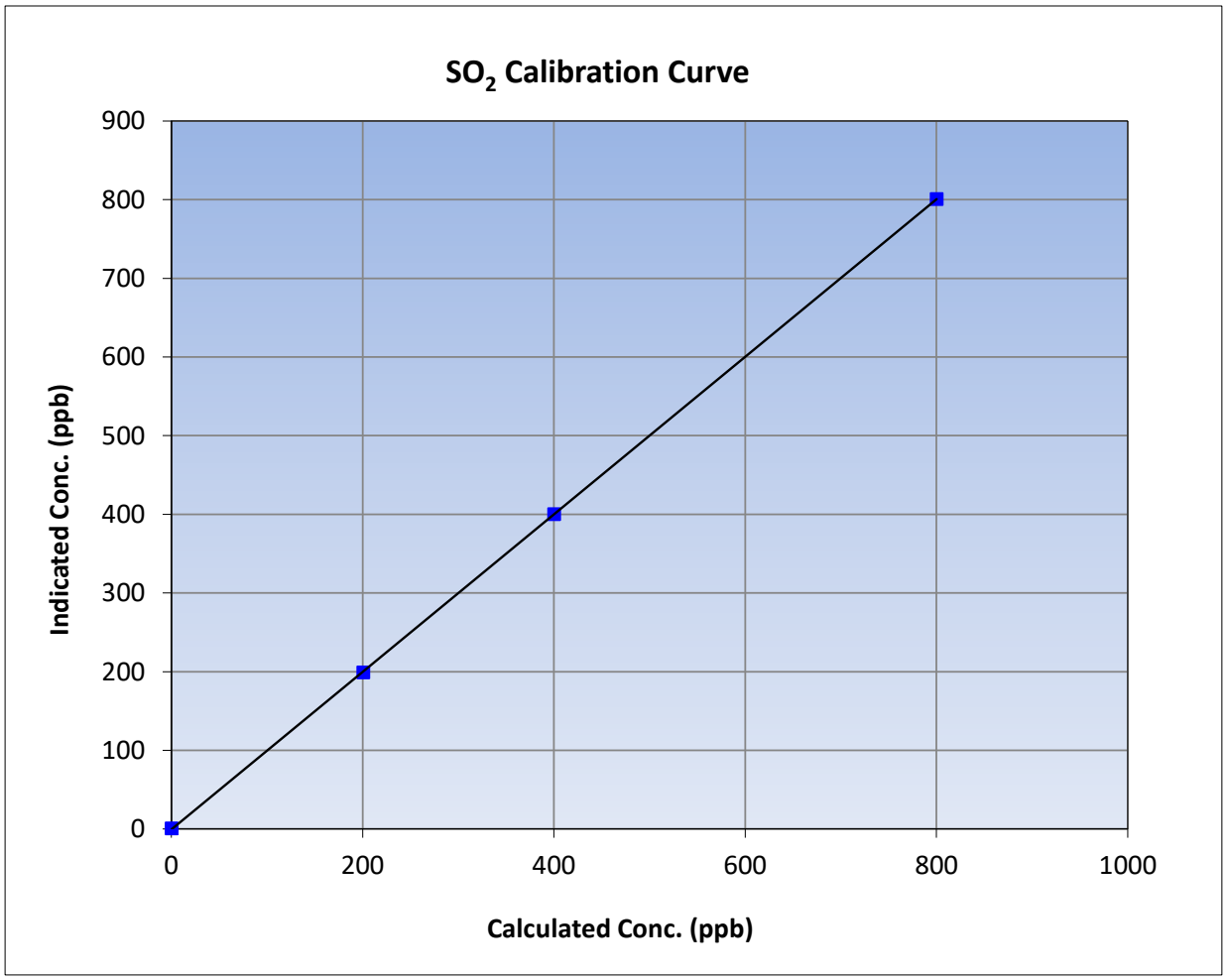
Station Information

Calibration Date:	June 21, 2023	Previous Calibration:	NA
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:49	End Time (MST):	11:00
Analyzer make:	Thermo 43i	Analyzer serial #:	0710321323

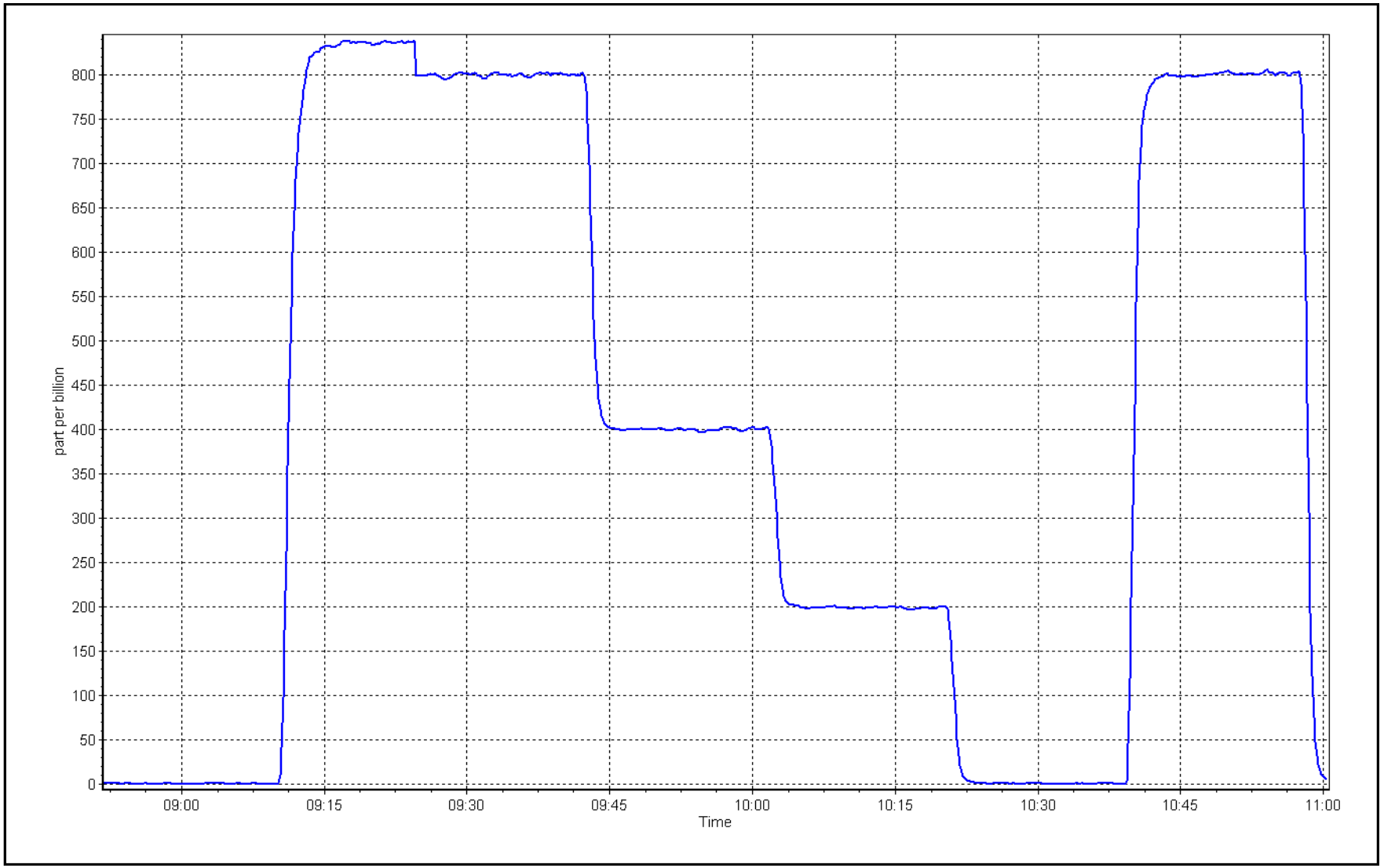
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
799.8	800.6	0.9990
399.9	399.8	1.0003
200.4	198.8	1.0082

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999993	*≥0.995*
Slope	1.001395	*0.90 - 1.10*
Intercept	-0.652437	*+/-30*



SO2 Calibration Plot Date: June 21, 2023 Location: Sawbones Bay



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Sawbones Bay	Station number:	AMS505
Calibration Date:	June 14, 2023	Last Cal Date:	NA
Start time (MST):	10:19	End time (MST):	13:42
Reason:	Install		

Calibration Standards

Cal Gas Concentration:	5.15	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517397			
Removed Cal Gas Conc:	5.15	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledybe API T700		Serial Number:	5112
ZAG Make/Model:	Teledybe API T701		Serial Number:	690

Analyzer Information

Analyzer make:	Thermo 43iQ		Analyzer serial #:	1228021057	
Converter make:	Global 150		Converter serial #:	2022-224	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	NA	1.000362	Backgd or Offset:	NA	2.26
Calibration intercept:	NA	-0.258108	Coeff or Slope:	NA	1.037

H_2S As Found Data

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

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4922	77.7	80.0	79.8	1.003
second point	4961	38.8	40.0	39.8	1.004
third point	4981	19.4	20.0	19.6	1.019
as left zero	5000	0.0	0.0	-0.1	----
as left span	4922	77.7	80.0	80.0	1.000
SO2 Scrubber Check	4922	77.8	778.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.009
Date of last converter efficiency test:					efficiency

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

* = > +/-5% change initiates investigation

Notes: Changed inlet after calibrator zero. Scrubber check and passed after calibrator zero. Adjusted span only.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

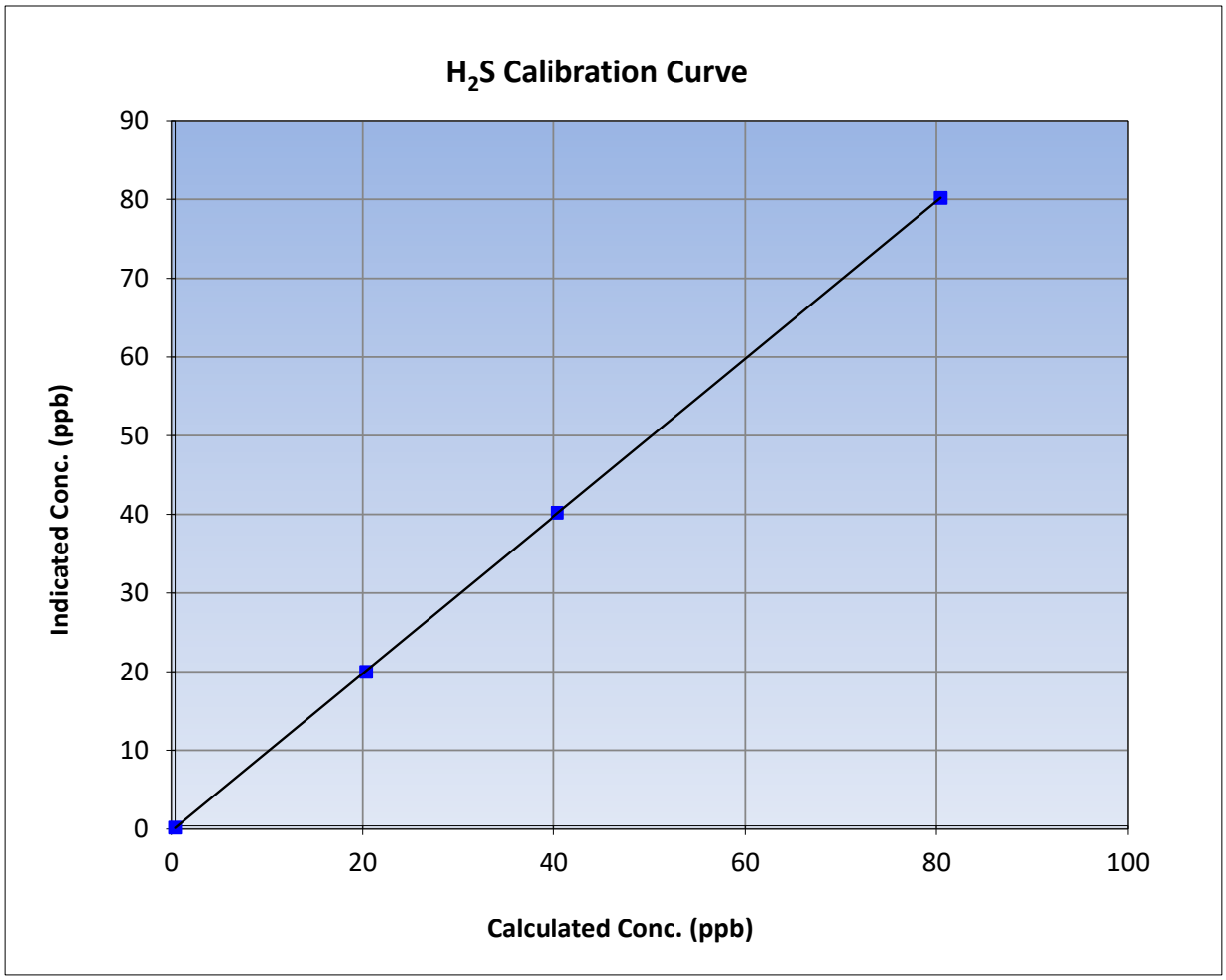
Station Information

Calibration Date:	June 14, 2023	Previous Calibration:	NA
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	10:19	End Time (MST):	13:42
Analyzer make:	Thermo 43iQ	Analyzer serial #:	1228021057

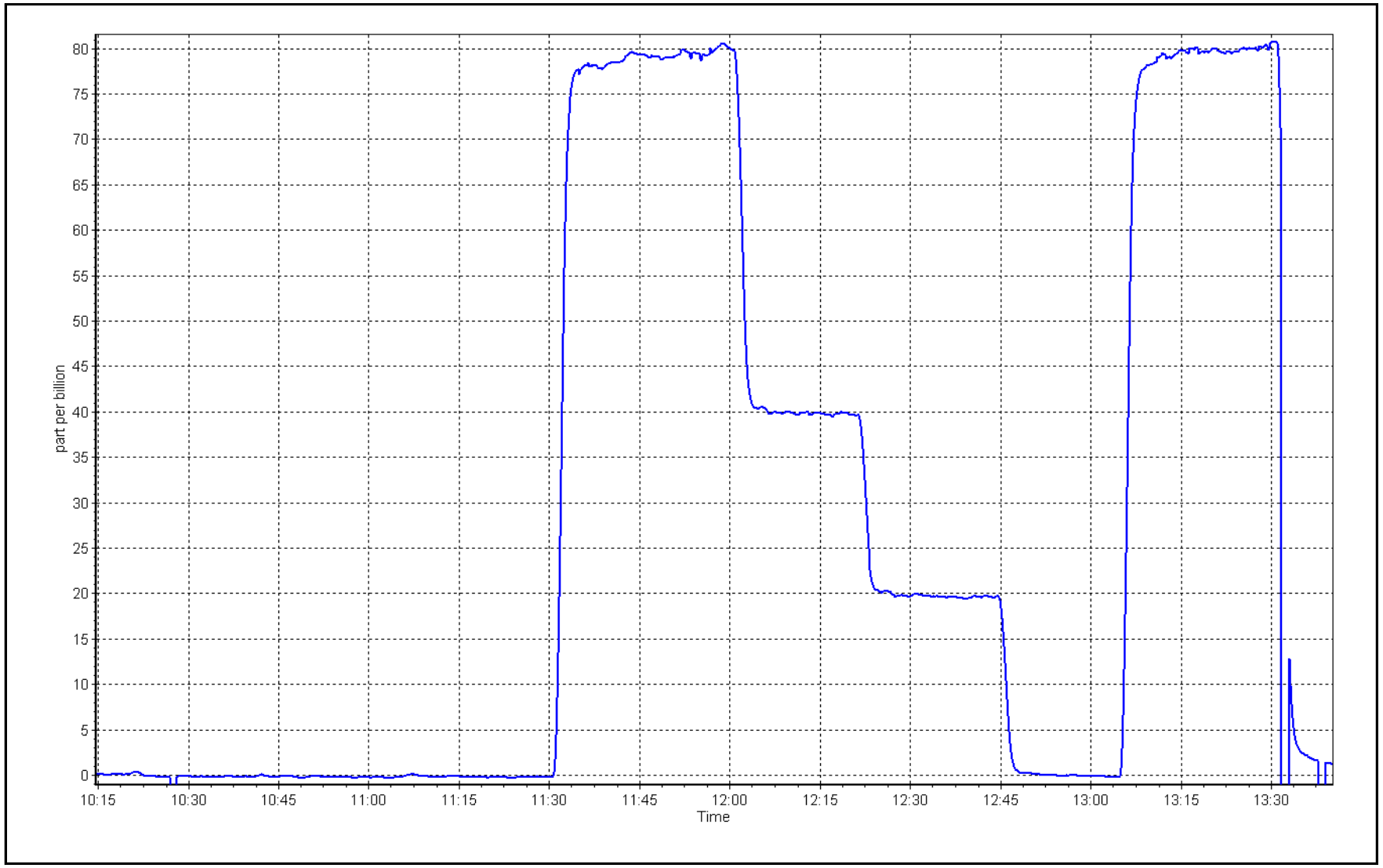
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
80.0	79.8	1.0030
40.0	39.8	1.0042
20.0	19.6	1.0194

Statistical Evaluation		Limits
Correlation Coefficient	0.999993	≥0.995
Slope	1.000362	0.90 - 1.10
Intercept	-0.258108	+/-3



H_2S Calibration Plot Date: June 14, 2023 Location: Sawbones Bay



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Sawbones Bay	Station number:	AMS505
Calibration Date:	July 12, 2023	Last Cal Date:	June 14, 2023
Start time (MST):	8:30	End time (MST):	12:34
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.15	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517397			
Removed Cal Gas Conc:	5.15	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5112
ZAG Make/Model:	Teledyne API T701		Serial Number:	690

Analyzer Information

Analyzer make:	Thermo 43iQ		Analyzer serial #:	1228021057	
Converter make:	Global 150		Converter serial #:	2022-224	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000362	0.994365	Backgd or Offset:	2.26	2.26
Calibration intercept:	-0.258108	-0.098257	Coeff or Slope:	1.037	1.037

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4922	77.7	80.0	79.1	1.011
as found 2nd point	4961	38.8	40.0	39.7	1.004
as found 3rd point	4981	19.4	20.0	19.6	1.014
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4922	77.7	80.0	79.5	1.007
second point	4961	38.8	40.0	39.6	1.009
third point	4981	19.4	20.0	19.8	1.009
as left zero	5000	0.0	0.0	0.1	----
as left span	4922	77.7	80.0	79.3	1.009
SO2 Scrubber Check	4922	77.8	778.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.008
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.2	Prev response:	79.81	*% change:	-0.8%
Baseline Corr 2nd AF pt:	39.8	AF Slope:	0.990222	AF Intercept:	-0.078258
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999983		

* = > +/-5% change initiates investigation

Notes: Changed inlet after calibrator zero. Scrubber check and passed after calibrator zero. No adjustment made.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

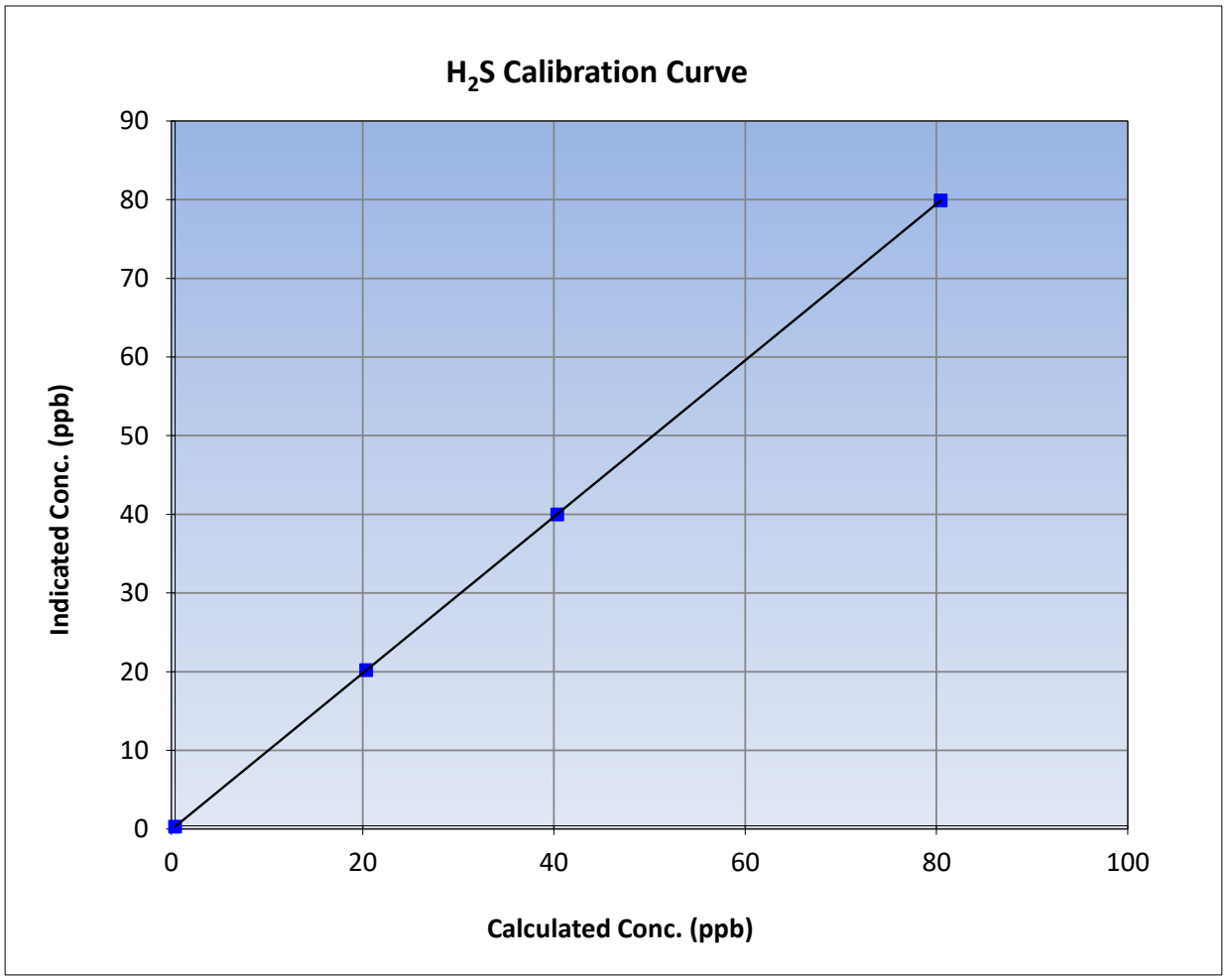
Station Information

Calibration Date:	July 12, 2023	Previous Calibration:	June 14, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:30	End Time (MST):	12:34
Analyzer make:	Thermo 43iQ	Analyzer serial #:	1228021057

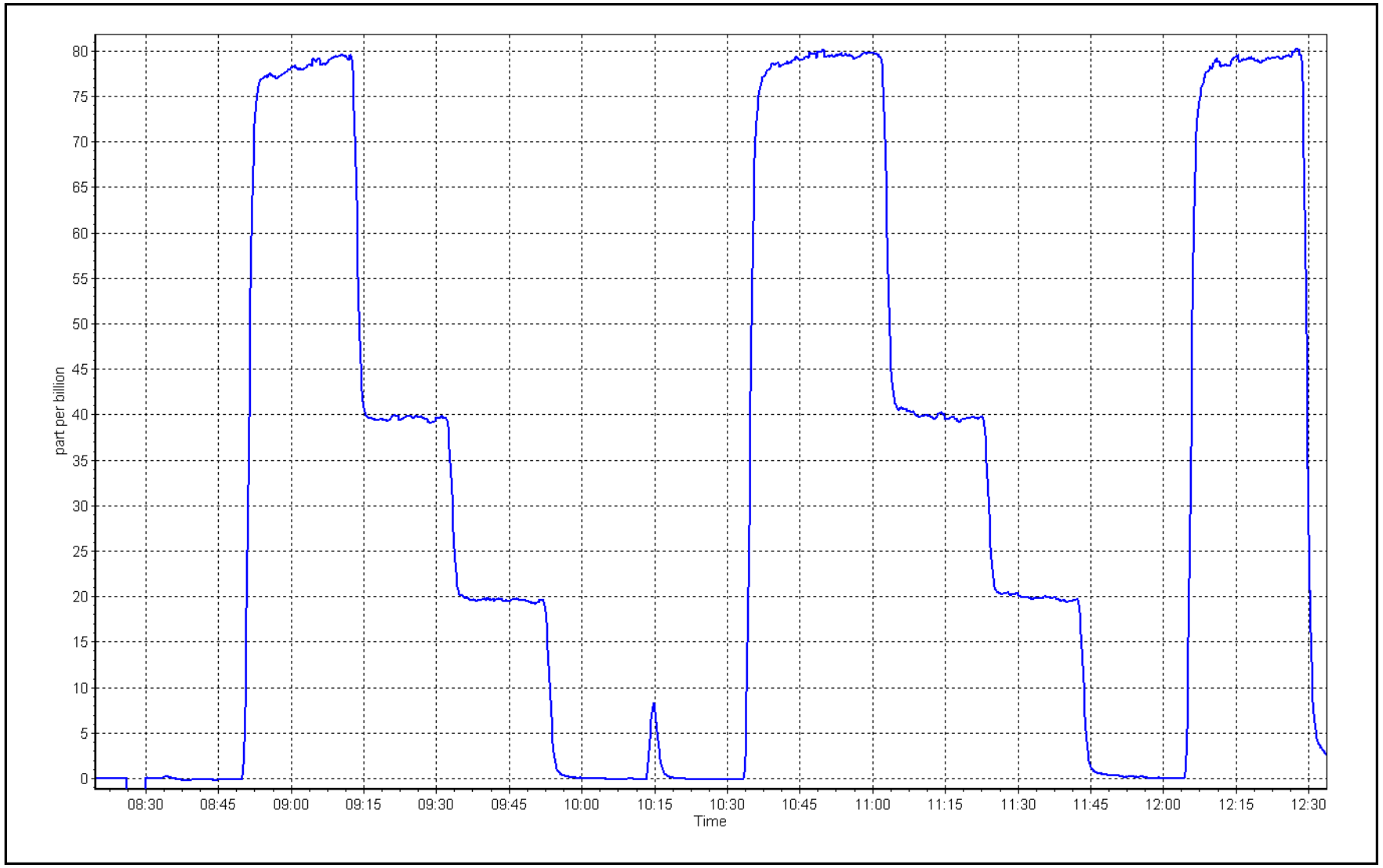
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	79.5	1.0067
40.0	39.6	1.0092
20.0	19.8	1.0091

Statistical Evaluation		Limits
Correlation Coefficient	0.999999	≥0.995
Slope	0.994365	0.90 - 1.10
Intercept	-0.098257	+/-3



H_2S Calibration Plot Date: July 12, 2023 Location: Sawbones Bay



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Sawbones Bay	Station number:	AMS505
Calibration Date:	June 15, 2023	Last Cal Date:	NA
Start time (MST):	9:19	End time (MST):	16:28
Reason:	Install		

Calibration Standards

NO Gas Cylinder #:	T1FY3PK		Cal Gas Expiry Date:	January 14, 2024	
NOX Cal Gas Conc:	47.94	ppm	NO Cal Gas Conc:	47.94	ppm
Removed Cylinder #:	T1FY3PK		Removed Gas Exp Date:	January 14, 2024	
Removed Gas NOX Conc:	47.94	ppm	Removed Gas NO Conc:	47.94	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	5112	
ZAG make/model:	API T701H		Serial Number:	690	

Analyzer Information

Analyzer make:	API T200	Analyzer serial #:	4260
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	NA	0.995	NO bkgnd or offset:	NA	0
NOX coeff or slope:	NA	0.985	NOX bkgnd or offset:	NA	1.9
NO2 coeff or slope:	NA	NA	Reaction cell Press:	NA	10.8

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	NA	1.004292
NO_X Cal Offset:	NA	-3.829947
NO Cal Slope:	NA	1.006091
NO Cal Offset:	NA	-5.309700
NO_2 Cal Slope:	NA	1.006124
NO_2 Cal Offset:	NA	2.493980

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	-0.2	-0.1	-0.1	----	----
high point	4917	83.4	799.6	799.6	0.0	801.0	802.0	-1.4	0.9982	0.9970
second point	4958	41.7	399.8	399.8	0.0	395.9	393.6	2.3	1.0100	1.0159
third point	4979	20.9	200.4	200.4	0.0	193.8	191.6	2.2	1.0340	1.0459
as left zero	5000	0.0	0.0	0.0	0.0	-0.6	0.1	-0.7	----	----
as left span	4916	83.4	799.7	315.6	484.1	795.6	309.0	486.5	1.0052	1.0215
								Average Correction Factor	1.0141	1.0196

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

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	792.3	308.2	484.1	487.4	0.9932	100.7%
2nd GPT point (200 ppb O3)	792.3	537.9	254.4	261.4	0.9732	102.8%
3rd GPT point (100 ppb O3)	792.3	628.8	163.5	168.8	0.9686	103.2%
				Average Correction Factor	0.9784	102.2%

Notes: Adjusted zero and span. The first span response was not settling properly. Decided to go back to zero and purge the calibrator. Used 2nd NO reference point due to drift.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

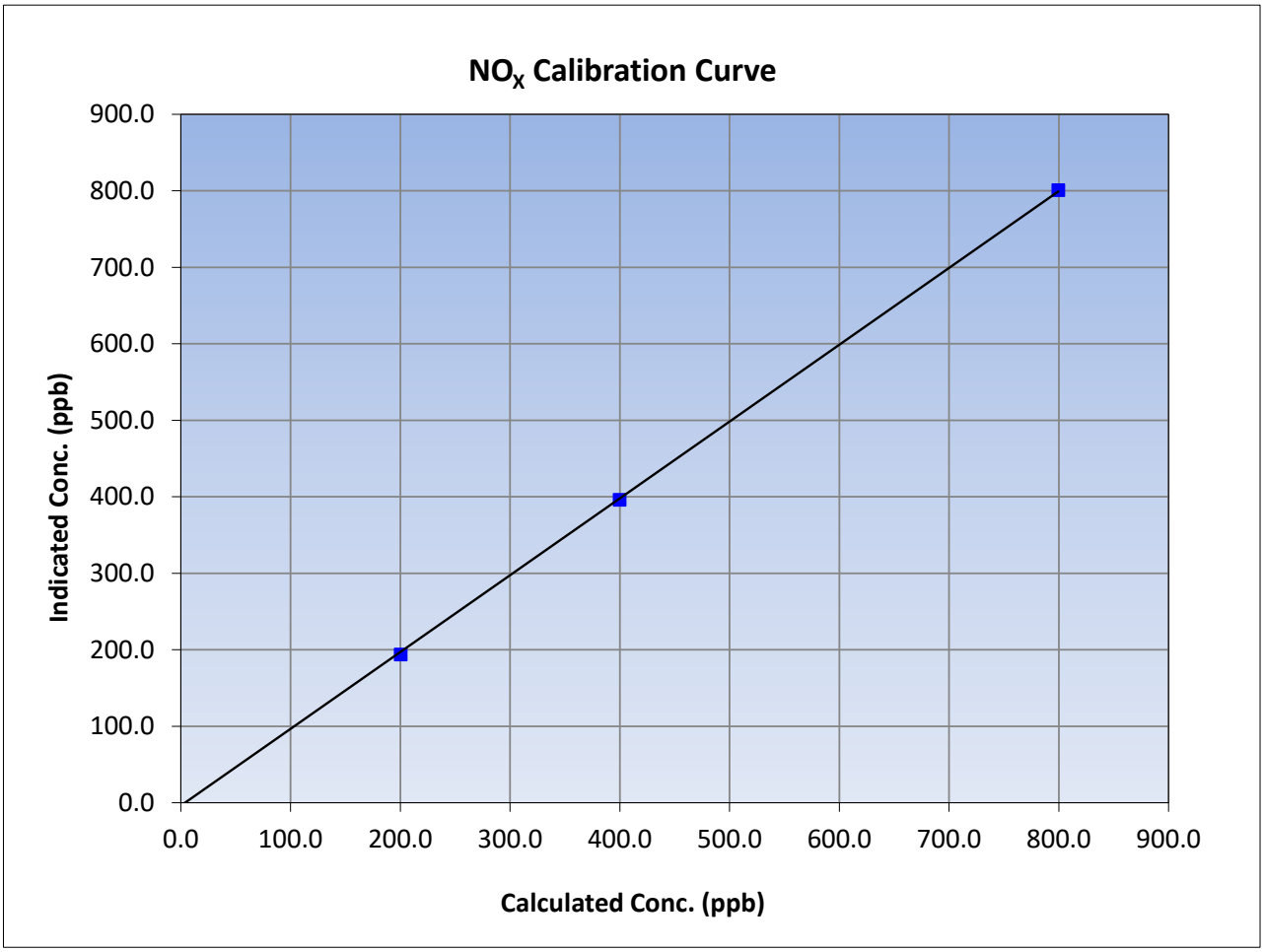
Version-04-2020

Station Information

Calibration Date:	June 15, 2023	Previous Calibration:	NA
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	9:19	End Time (MST):	16:28
Analyzer make:	API T200	Analyzer serial #:	4260

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999906	≥0.995
799.6	801.0	0.9982			
399.8	395.9	1.0100	Slope	1.004292	0.90 - 1.10
200.4	193.8	1.0340			
			Intercept	-3.829947	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

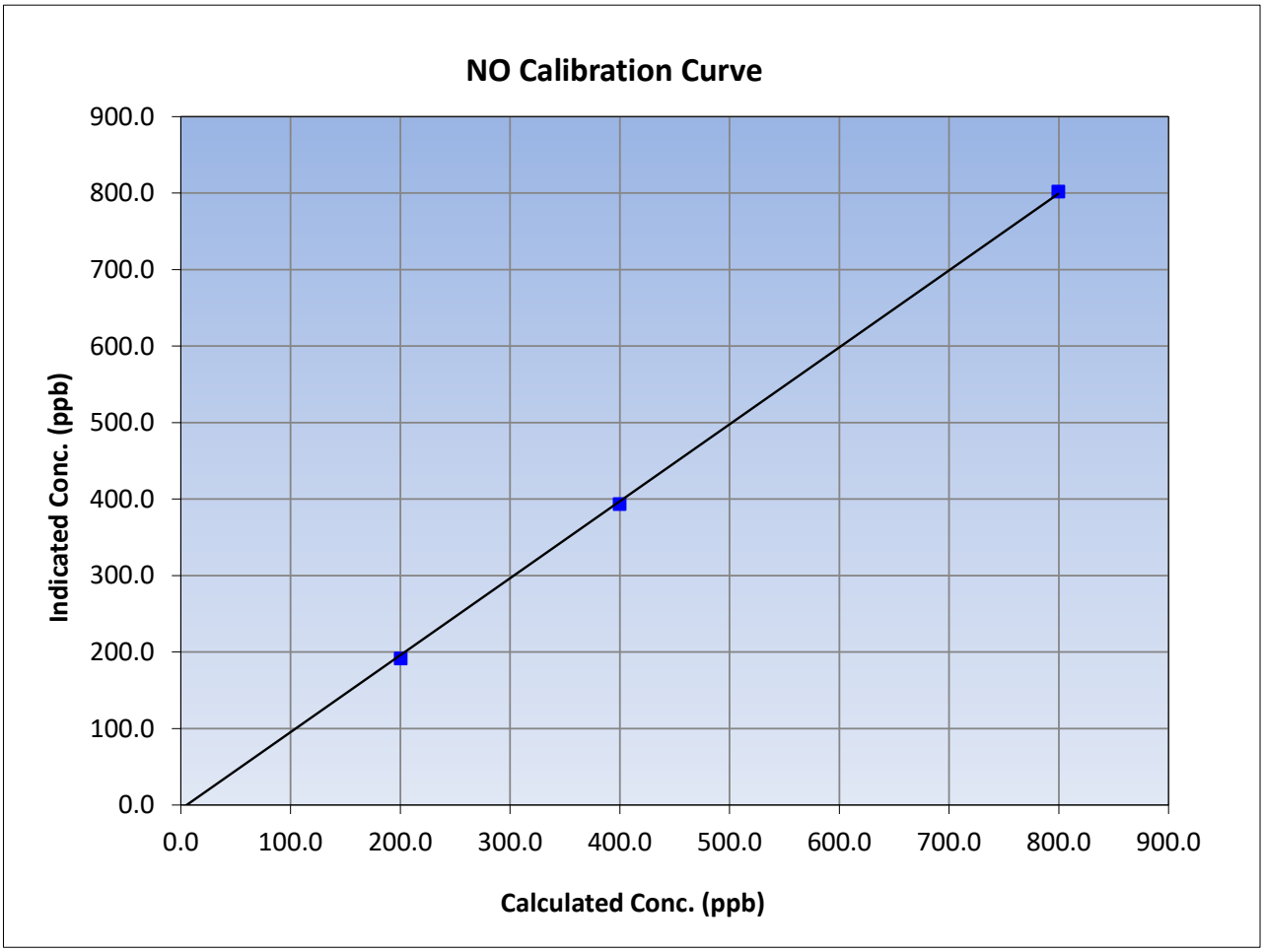
Version-04-2020

Station Information

Calibration Date:	June 15, 2023	Previous Calibration:	NA
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	9:19	End Time (MST):	16:28
Analyzer make:	API T200	Analyzer serial #:	4260

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999805	≥0.995
799.6	802.0	0.9970			
399.8	393.6	1.0159	Slope	1.006091	0.90 - 1.10
200.4	191.6	1.0459			
			Intercept	-5.309700	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

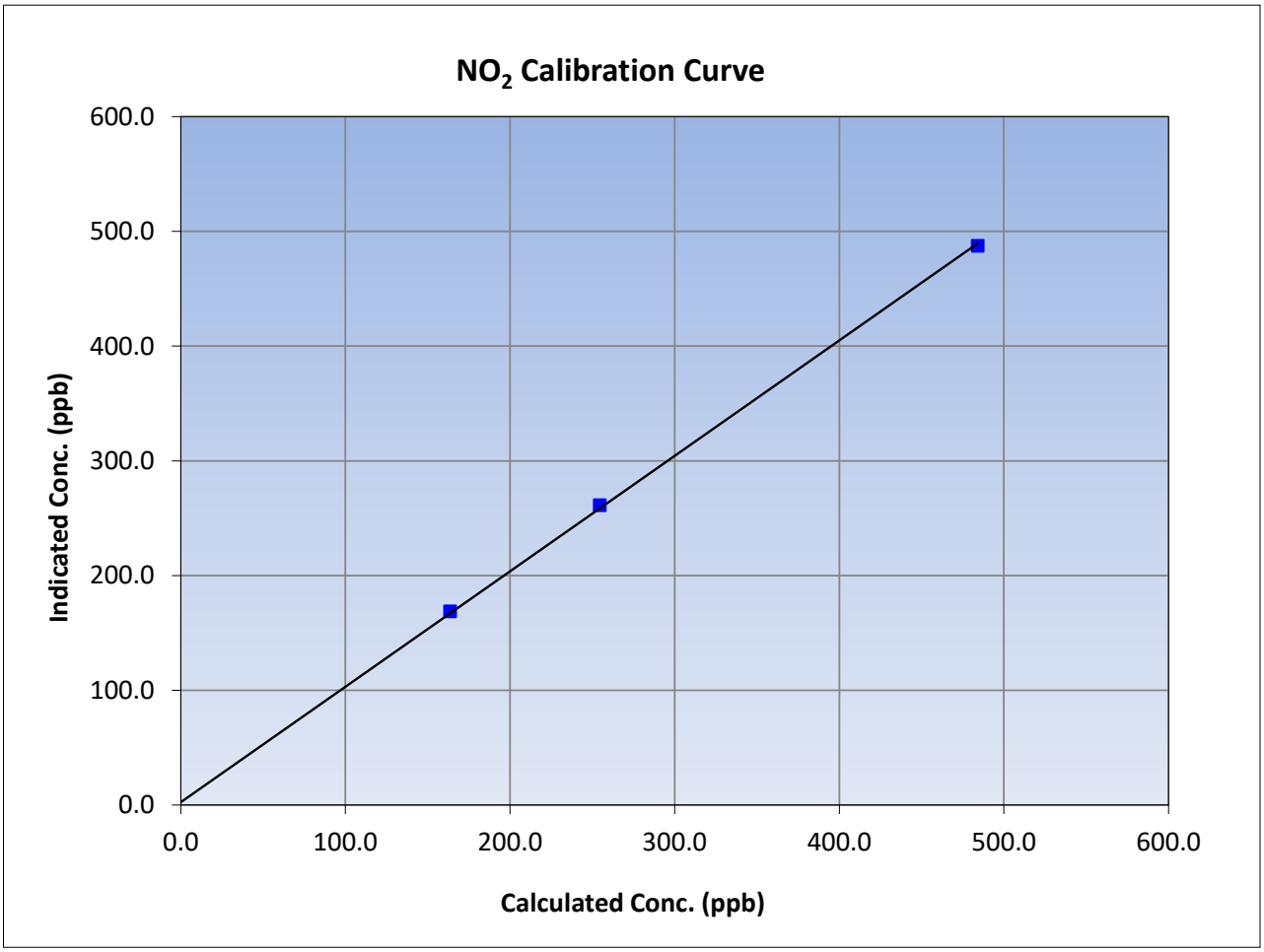
Version-04-2020

Station Information

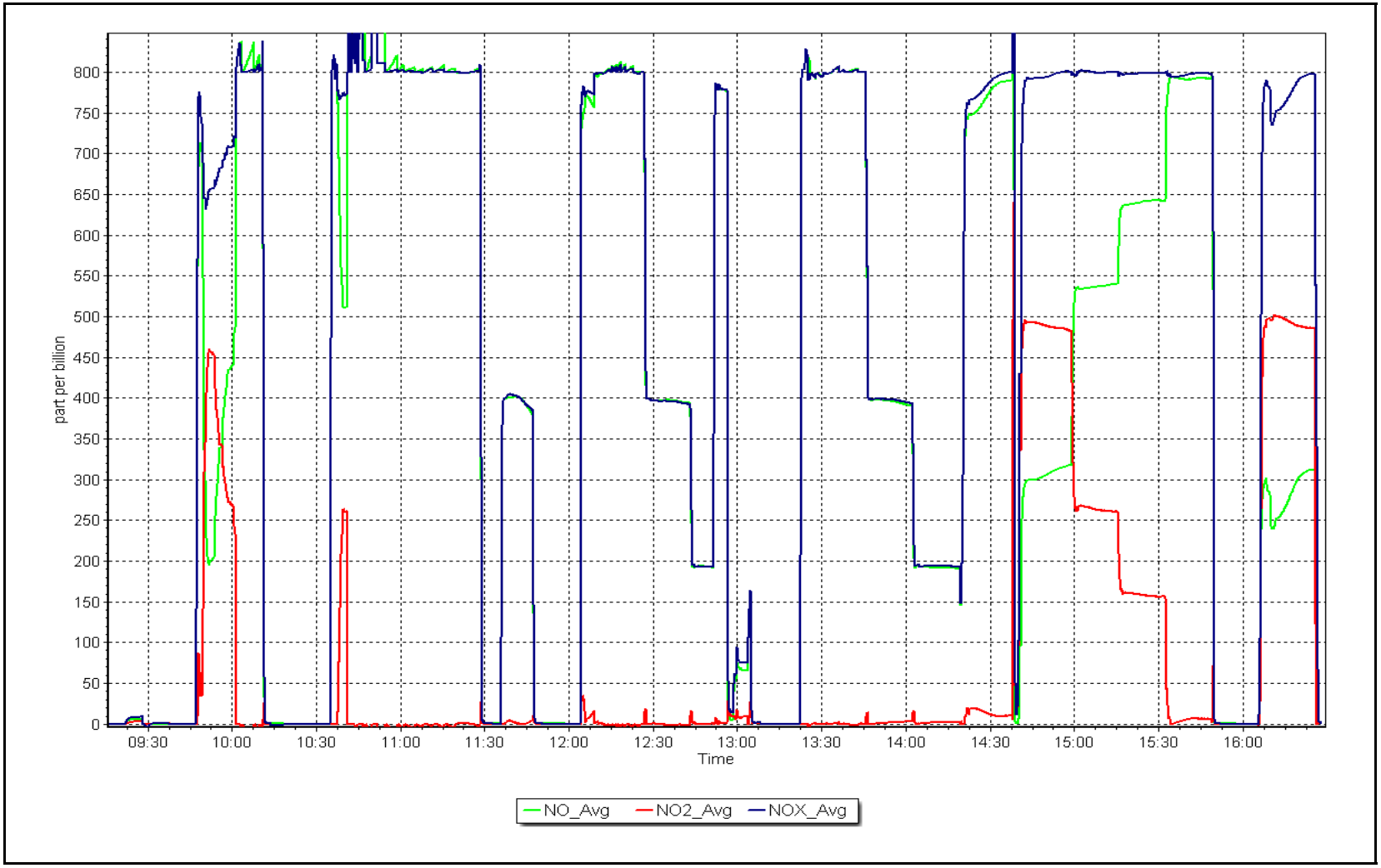
Calibration Date:	June 15, 2023	Previous Calibration:	NA
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	9:19	End Time (MST):	16:28
Analyzer make:	API T200	Analyzer serial #:	4260

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999812	≥0.995
484.1	487.4	0.9932			
254.4	261.4	0.9732	Slope	1.006124	0.90 - 1.10
163.5	168.8	0.9686			
			Intercept	2.493980	+/-20



NO_X Calibration Plot Date: June 15, 2023 Location: Sawbones Bay



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Sawbones Bay	Station number:	AMS505
Calibration Date:	July 13, 2023	Last Cal Date:	June 15, 2023
Start time (MST):	8:17	End time (MST):	12:29
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T1FY3PK		Cal Gas Expiry Date:	January 14, 2024	
NOX Cal Gas Conc:	47.94	ppm	NO Cal Gas Conc:	47.94	ppm
Removed Cylinder #:	T1FY3PK		Removed Gas Exp Date:	January 14, 2024	
Removed Gas NOX Conc:	47.94	ppm	Removed Gas NO Conc:	47.94	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	5112	
ZAG make/model:	API T701H		Serial Number:	690	

Analyzer Information

Analyzer make:	API T200	Analyzer serial #:	4260
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	0.995	0.977	NO bkgnd or offset:	0.0	0.0
NOX coeff or slope:	0.985	0.972	NOX bkgnd or offset:	1.9	1.9
NO2 coeff or slope:	NA	NA	Reaction cell Press:	10.8	11.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.004292	1.003551
NO_X Cal Offset:	-3.829947	-0.870760
NO Cal Slope:	1.006091	1.008612
NO Cal Offset:	-5.309700	-1.291670
NO_2 Cal Slope:	1.006124	0.999342
NO_2 Cal Offset:	2.493980	0.567256

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	3.4	-0.2	3.6	----	----
as found span	4917	83.4	799.6	799.6	0.0	810.0	813.8	-3.8	0.9871	0.9825
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
high point	4917	83.4	799.6	799.6	0.0	801.4	805.2	-3.9	0.9977	0.9930
second point	4958	41.7	399.8	399.8	0.0	401.7	403.1	-1.3	0.9954	0.9919
third point	4979	20.9	200.4	200.4	0.0	198.2	198.5	-0.3	1.0111	1.0095
as left zero	5000	0.0	0.0	0.0	0.0	-0.6	0.1	-0.7	----	----
as left span	4916	83.4	799.7	325.3	474.4	801.6	329.0	472.6	0.9977	0.9889
								Average Correction Factor	1.0014	0.9982

Corrected As found	NO_X = 806.6 ppb	NO = 814.0 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.9%
Previous Response	NO_X = 799.2 ppb	NO = 799.1 ppb		*Percent Change	NO =	1.8%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	801.1	326.7	474.4	473.9	1.0011	99.9%
2nd GPT point (200 ppb O3)	801.1	555.5	245.6	247.8	0.9911	100.9%
3rd GPT point (100 ppb O3)	801.1	656.8	144.3	144.2	1.0007	99.9%
				Average Correction Factor	0.9976	100.2%

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

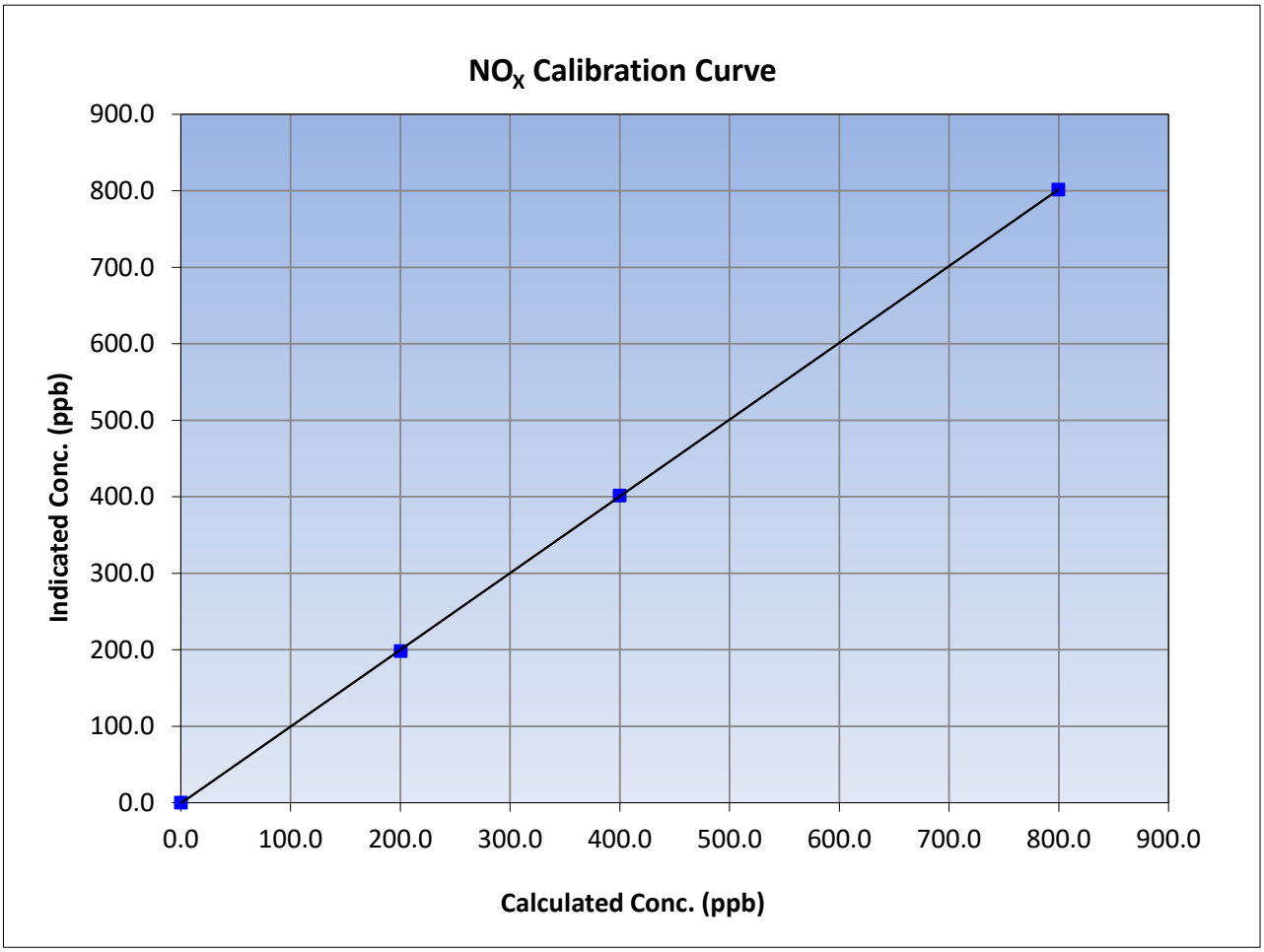
Version-04-2020

Station Information

Calibration Date:	July 13, 2023	Previous Calibration:	June 15, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:17	End Time (MST):	12:29
Analyzer make:	API T200	Analyzer serial #:	4260

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999981	*≥0.995*
799.6	801.4	0.9977			
399.8	401.7	0.9954	Slope	1.003551	*0.90 - 1.10*
200.4	198.2	1.0111			
			Intercept	-0.870760	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

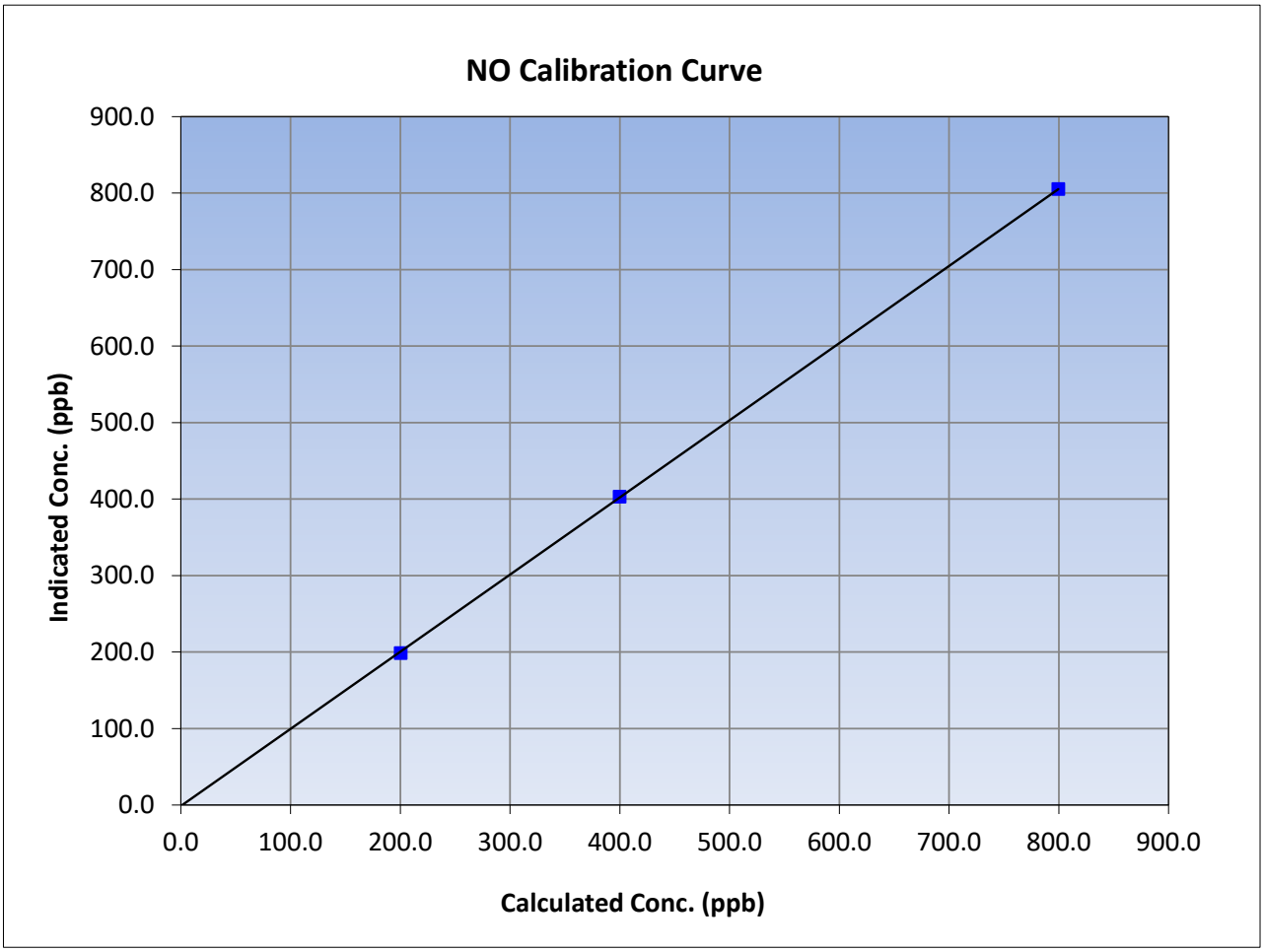
Version-04-2020

Station Information

Calibration Date:	July 13, 2023	Previous Calibration:	June 15, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:17	End Time (MST):	12:29
Analyzer make:	API T200	Analyzer serial #:	4260

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999977	≥0.995
799.6	805.2	0.9930			
399.8	403.1	0.9919	Slope	1.008612	0.90 - 1.10
200.4	198.5	1.0095			
			Intercept	-1.291670	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

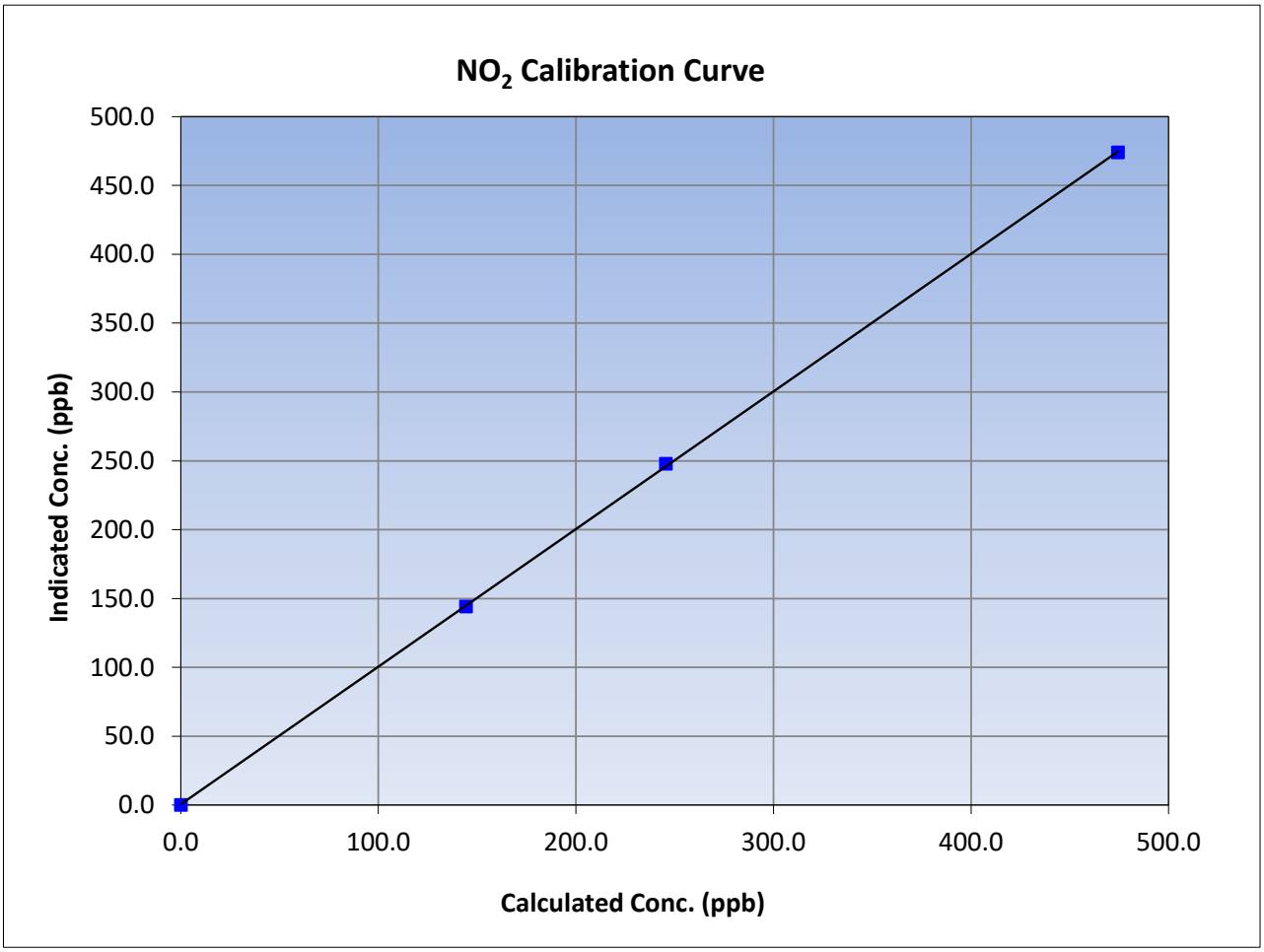
Version-04-2020

Station Information

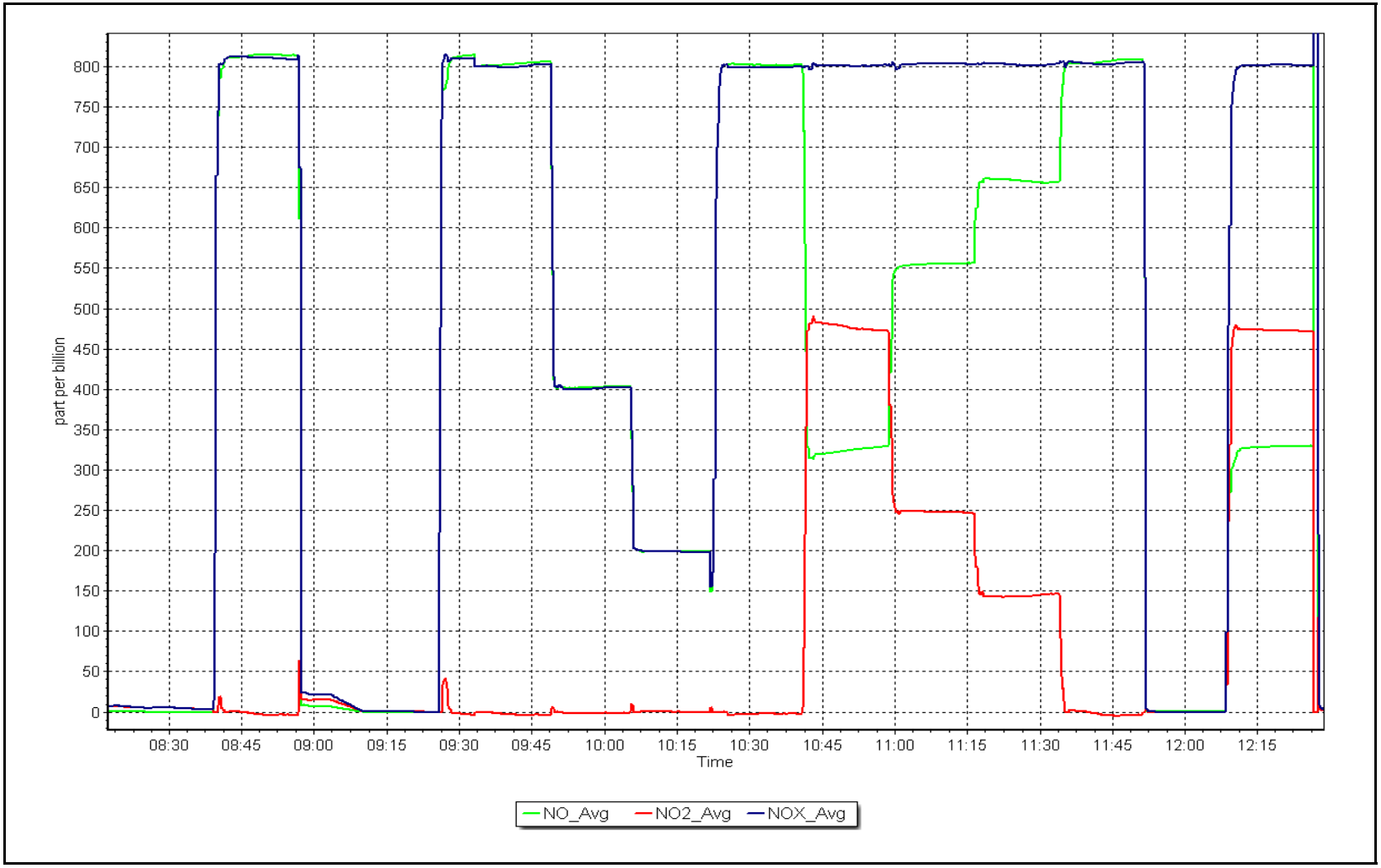
Calibration Date:	July 13, 2023	Previous Calibration:	June 15, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:17	End Time (MST):	12:29
Analyzer make:	API T200	Analyzer serial #:	4260

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999964	≥0.995
474.4	473.9	1.0011			
245.6	247.8	0.9911	Slope	0.999342	0.90 - 1.10
144.3	144.2	1.0007			
			Intercept	0.567256	+/-20



NO_X Calibration Plot Date: July 13, 2023 Location: Sawbones Bay



Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Sawbones Bay	Station Number:	AMS 505
Calibration Date:	June 16, 2023	Prev Cal Date:	NA
Start Time (MST):	12:17	End Time (MST):	13:45
Tower Height (m):		Reason:	Install

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	CA 03845
WS Calibrator:	MetOne 053	Serial Number:	P15103

Shaft RPM	Calculated Speed (K/hr) (Cv)	Indicated Speed (K/hr) (Iv)	% Error *Limit = +/- 1.5%*
0	0.0	0.0	---
200	20.2	20.3	0.5%
400	39.4	39.4	0.1%
600	58.6	58.5	0.0%
800	77.8	77.8	0.1%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)	NA	0.999999	*≥0.9995*
Calculated slope	NA	0.999594	*0.90 - 1.10*
Calculated intercept	NA	-0.028293	*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	B4693
As Found Declination (deg east of True North):	NA	As Left Declination (deg east of True North):	14
Solar noon time (MST):	13:20	Calc Declination*:	12.96 Degrees
Deadband calc:	0.6 degrees (*Limit 4 deg*)		* - calculated declination as per NOAA website

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	% Error (based on 357° FS) *Limit = +/- 1.0%*
0	0.2	---
90	89.1	-0.3%
180	179.2	-0.2%
270	270.1	0.0%
357	356.6	-0.1%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)	NA	0.999994	*≥0.9995*
Calculated slope	NA	1.000239	*0.90 - 1.10*
Calculated intercept	NA	0.330283	*+/- 4*

Notes: Install calibration. WS/WD sensor lines replaced.

Calibration Performed By: Rene Chamberland

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS506
JACKFISH 1
JULY 2023

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

August 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:	July 18, 2023	Last Cal Date:	June 28, 2023
Start time (MST):	8:44	End time (MST):	11:50
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:	1.001415	1.004172	Backgd or Offset:	18.6	18.1
Calibration intercept:	-2.176005	-1.416078	Coeff or Slope:	0.941	0.948

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.8	----
as found span	4921	79.2	800.2	793.1	1.009
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.5	----
high point	4921	79.2	800.2	802.2	0.998
second point	4960	39.6	400.2	401.1	0.998
third point	4980	19.8	200.1	197.8	1.011
as left zero	5000	0.0	0.0	-0.2	----
as left span	4921	79.2	800.2	803.8	0.996
				Average Correction Factor	1.002

Baseline Corr As found:	793.90	Previous response	799.16	*% change	-0.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

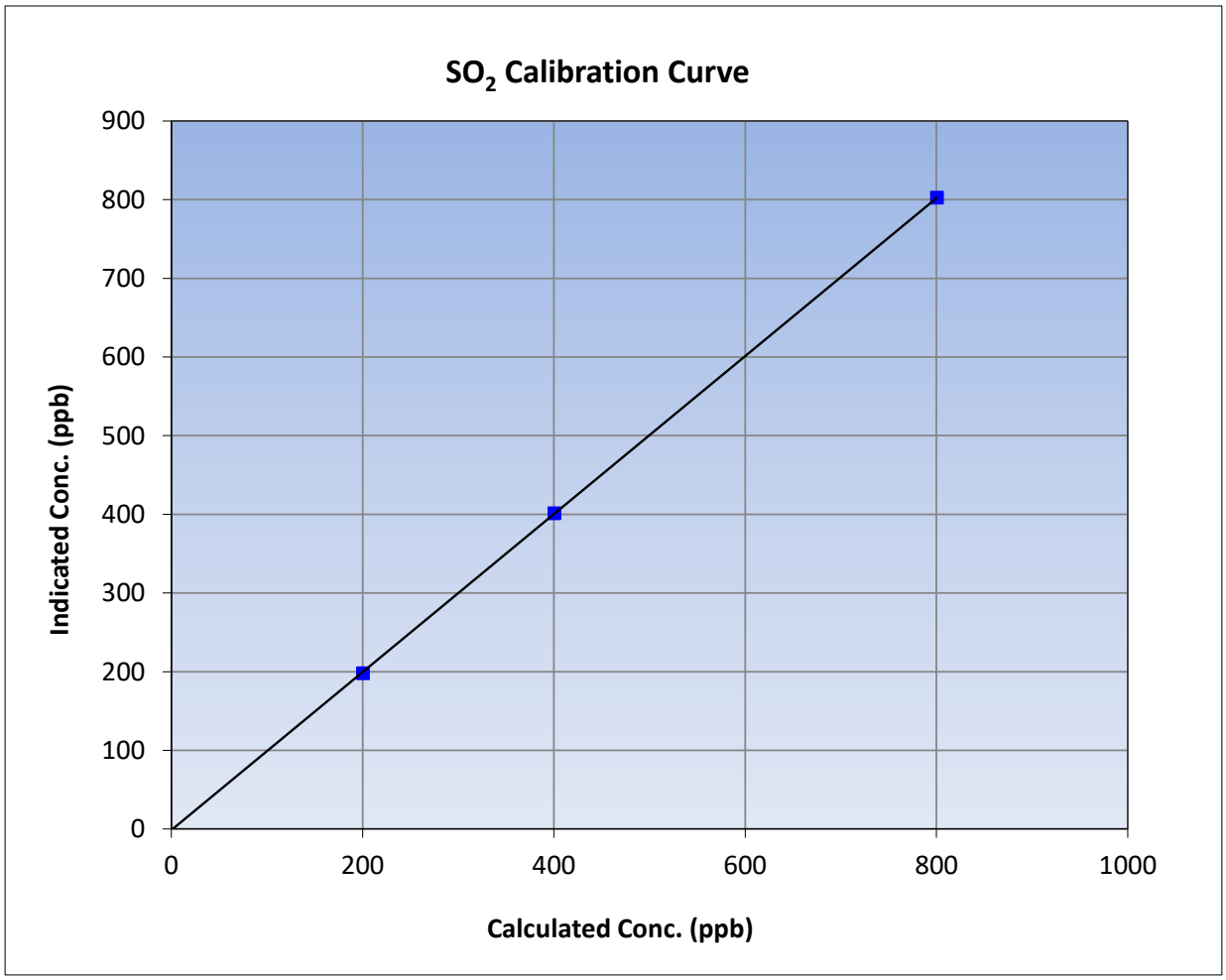
Station Information

Calibration Date:	July 18, 2023	Previous Calibration:	June 28, 2023
Station Name:	Jackfish 1	Station Number:	AMS 506
Start Time (MST):	8:44	End Time (MST):	11:50
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290011

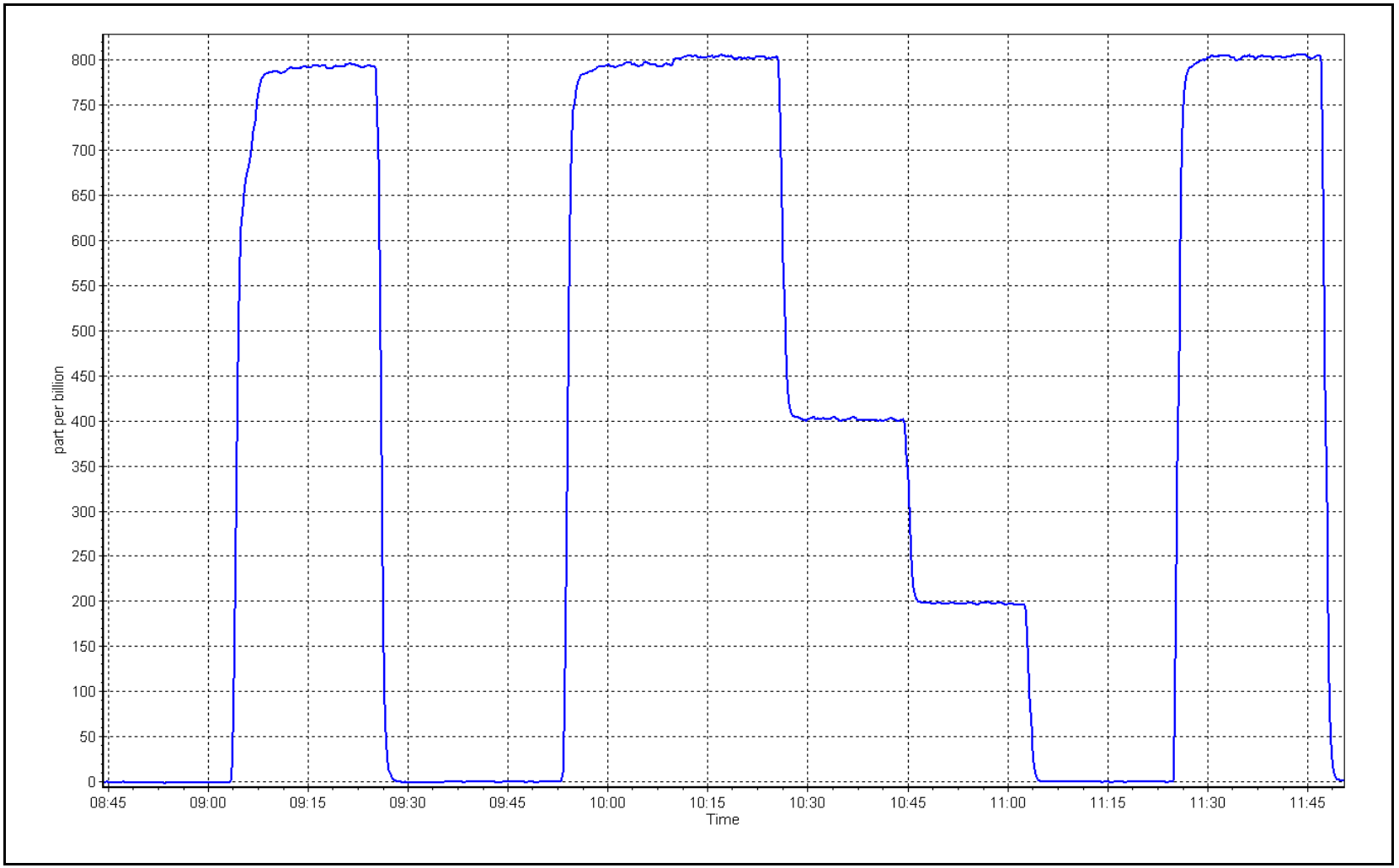
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.5	----
800.2	802.2	0.9975
400.2	401.1	0.9976
200.1	197.8	1.0115

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999988	*≥0.995*
Slope	1.004172	*0.90 - 1.10*
Intercept	-1.416078	*+/-30*



SO2 Calibration Plot Date: July 18, 2023 Location: Jackfish 1



Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Jackfish 1	Station number:	AMS 506
Calibration Date:	August 10, 2023	Last Cal Date:	July 18, 2023
Start time (MST):	9:01	End time (MST):	10:23
Reason:	Removal		

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 T750			Serial Number:	282
ZAG Make/Model:	API 751H			Serial Number:	321

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1160290011

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.004172		Backgd or Offset:	18.1	18.1
Calibration intercept:	-1.416078		Coeff or Slope:	0.948	0.948

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	79.2	800.2	814.4	0.983
as found 2nd point	4960	39.6	400.2	406.6	0.984
as found 3rd point	4980	19.8	200.1	204.0	0.981
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	

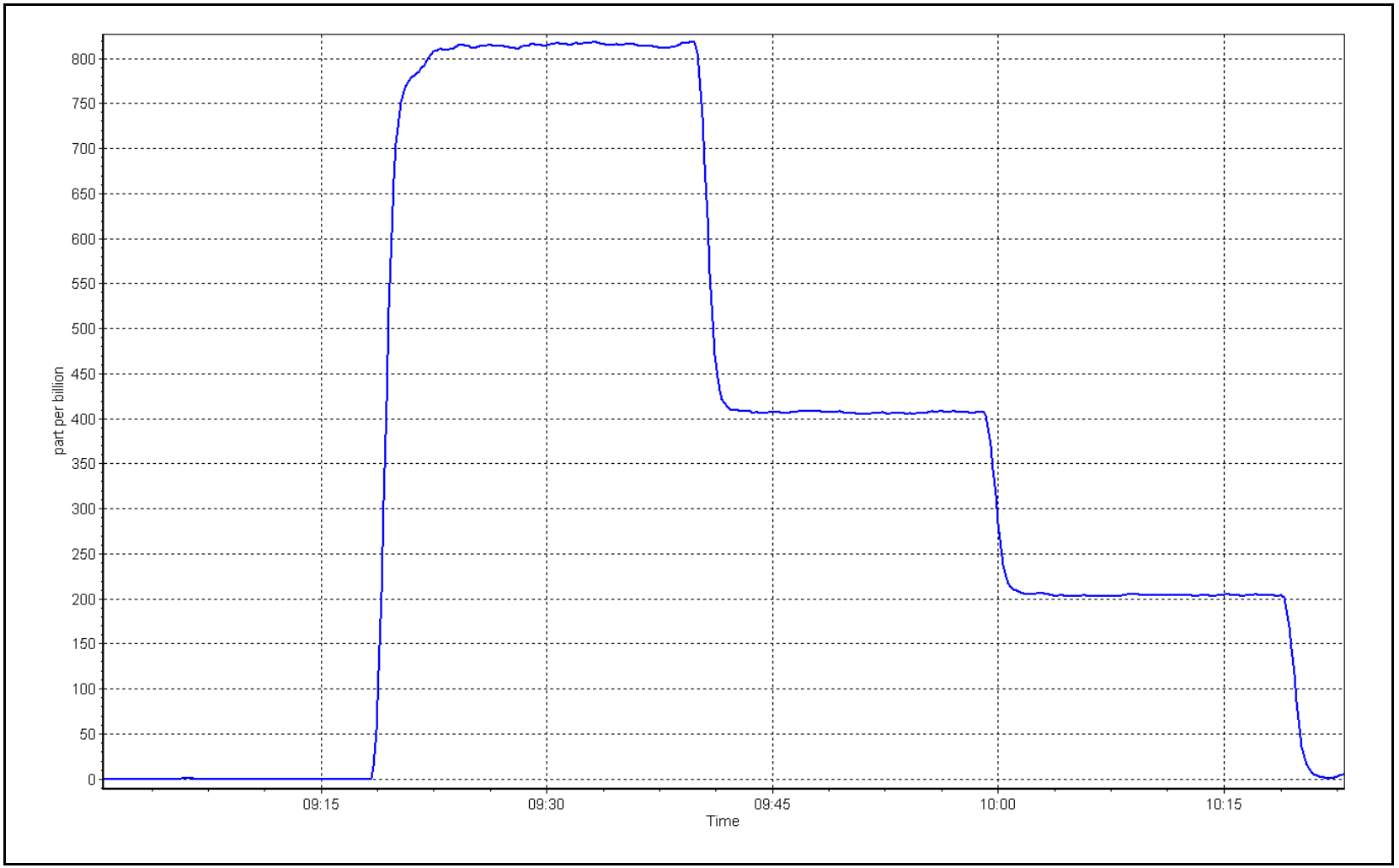
Baseline Corr As found:	814.70	Previous response	802.13	*% change	1.5%
Baseline Corr 2nd AF pt:	406.90	AF Slope:	1.017782	AF Intercept:	-0.156274
Baseline Corr 3rd AF pt:	204.30	AF Correlation:	0.999998		

* = > +/-5% change initiates investigation

Notes: Removal calibration.

Calibration Performed By: Sean Bala

SO2 Calibration Plot Date: August 10, 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:	July 20, 2023	Last Cal Date:	June 22, 2023
Start time (MST):	9:50	End time (MST):	13:40
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:	1.015290	1.014004	Backgd or Offset:	3.35	3.35
Calibration intercept:	-0.438102	-0.418127	Coeff or Slope:	1.066	1.066

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.3	----
as found span	4922	77.8	80.0	78.2	1.019
as found 2nd point	4961	38.9	40.0	39.4	1.007
as found 3rd point	4981	19.4	19.9	19.4	1.012
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.3	----
high point	4922	77.8	80.0	80.7	0.991
second point	4961	38.9	40.0	40.2	0.995
third point	4981	19.4	19.9	19.6	1.017
as left zero	5000	0.0	0.0	-0.3	----
as left span	4922	77.8	80.0	80.4	0.995
SO2 Scrubber Check	4921	79.2	792.0	0.0	----
Date of last scrubber change:		24-Feb-23		Ave Corr Factor	1.001
Date of last converter efficiency test:		December 1, 2022			efficiency

Baseline Corr As found:	78.5	Prev response:	80.77	*% change:	-2.9%
Baseline Corr 2nd AF pt:	39.7	AF Slope:	0.981572	AF Intercept:	-0.158727
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999960		

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after multi-point as founds. Scrubber test done and passed after calibrator zero. No adjustment made.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

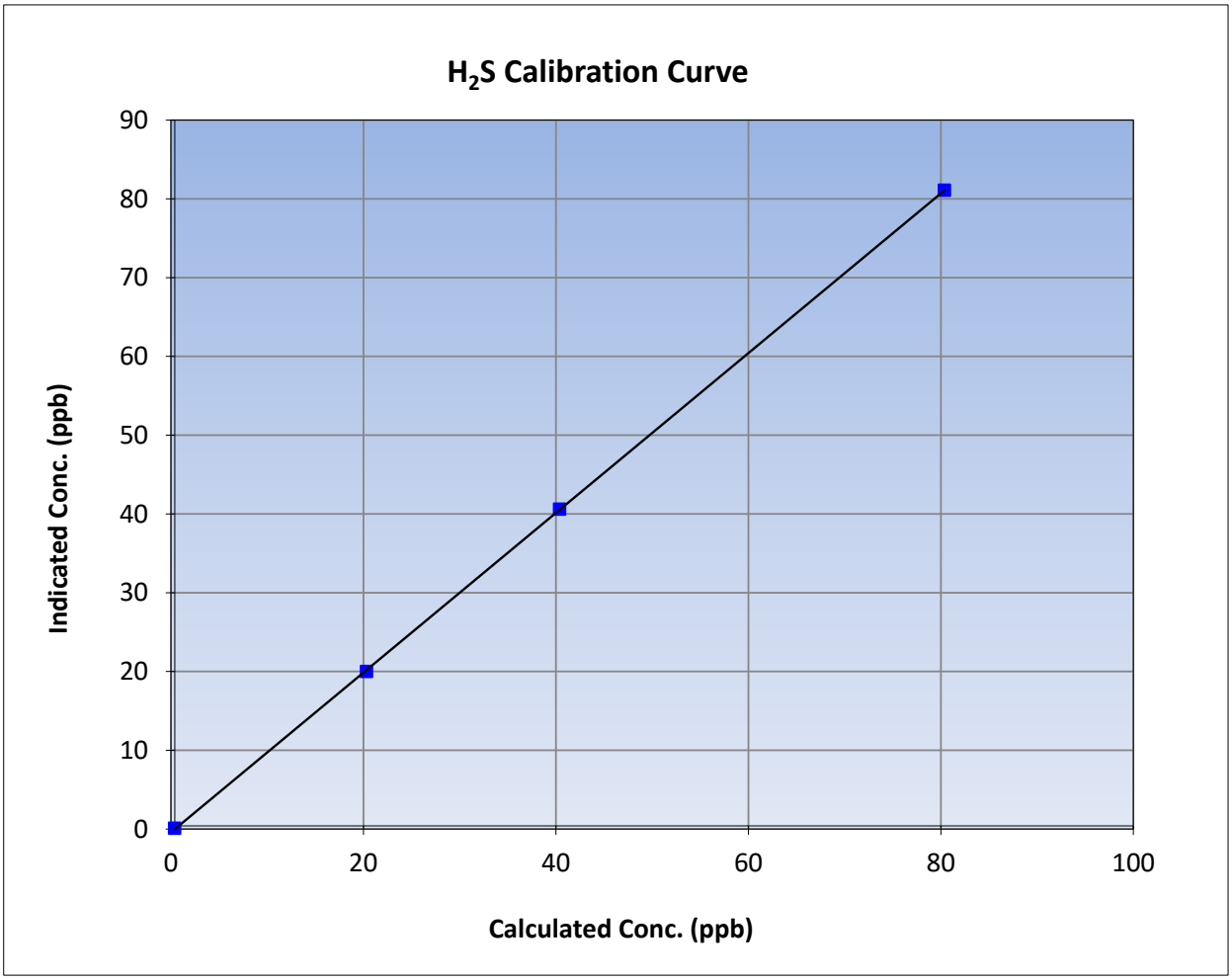
Station Information

Calibration Date:	July 20, 2023	Previous Calibration:	June 22, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	9:50	End Time (MST):	13:40
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1180540020

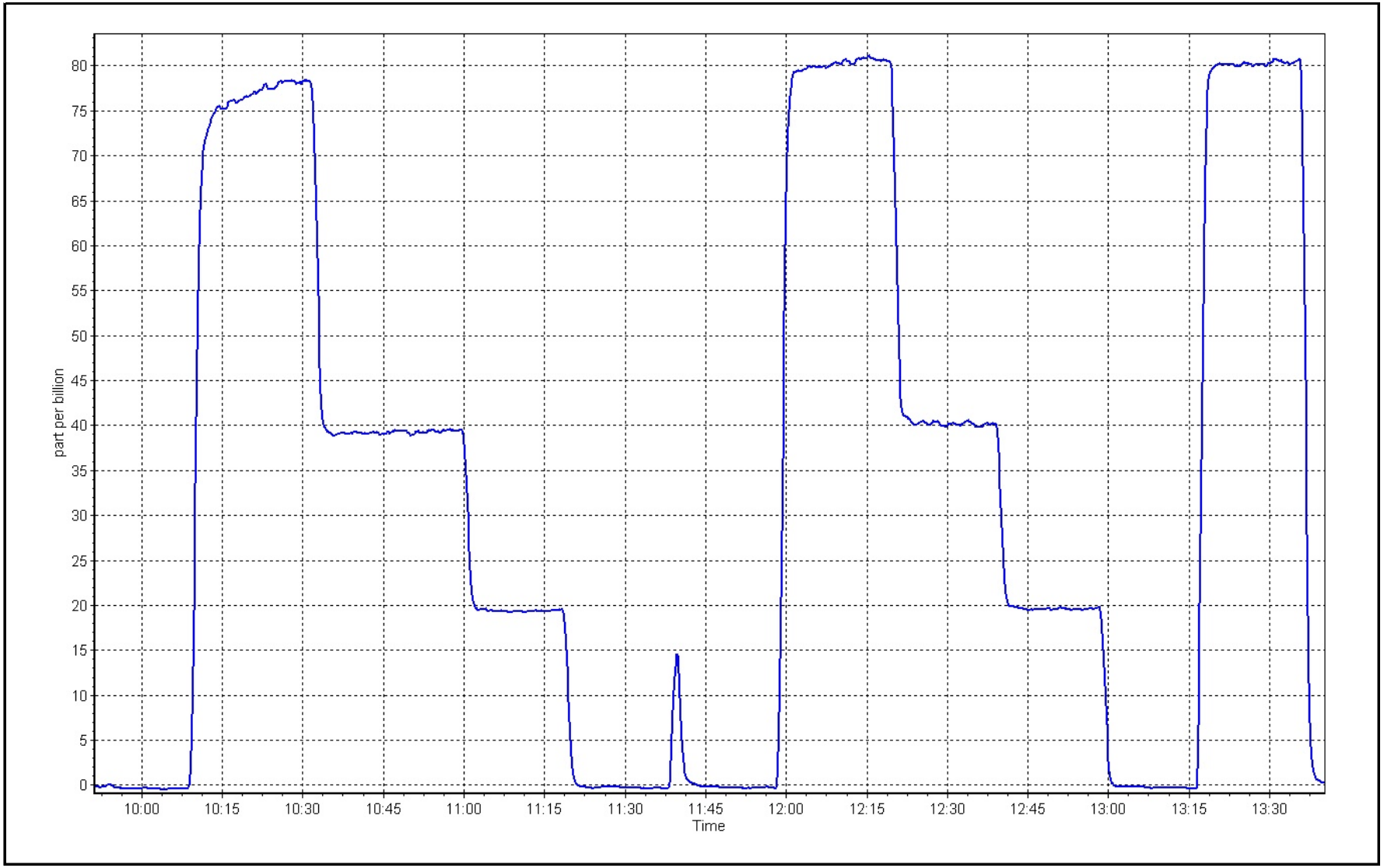
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
80.0	80.7	0.9911
40.0	40.2	0.9948
19.9	19.6	1.0174

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999983	*≥0.995*
Slope	1.014004	*0.90 - 1.10*
Intercept	-0.418127	*+/-3*



H_2S Calibration Plot Date: July 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:	August 10, 2023	Last Cal Date:	July 20, 2023
Start time (MST):	10:24	End time (MST):	11:56
Reason:	Removal		

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 T750		Serial Number:	282
ZAG Make/Model:	API 751H		Serial Number:	321

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:	1.014004		Backgd or Offset:	3.35	3.35
Calibration intercept:	-0.418127		Coeff or Slope:	1.066	1.066

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.4	----
as found span	4922	77.8	80.0	80.4	0.990
as found 2nd point	4961	38.9	40.0	40.3	0.983
as found 3rd point	4981	19.4	19.9	20.1	0.973
new cylinder response					

H_2S Calibration Data

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

Date of last scrubber change:	24-Feb-23	Ave Corr Factor	
Date of last converter efficiency test:	December 1, 2022		efficiency

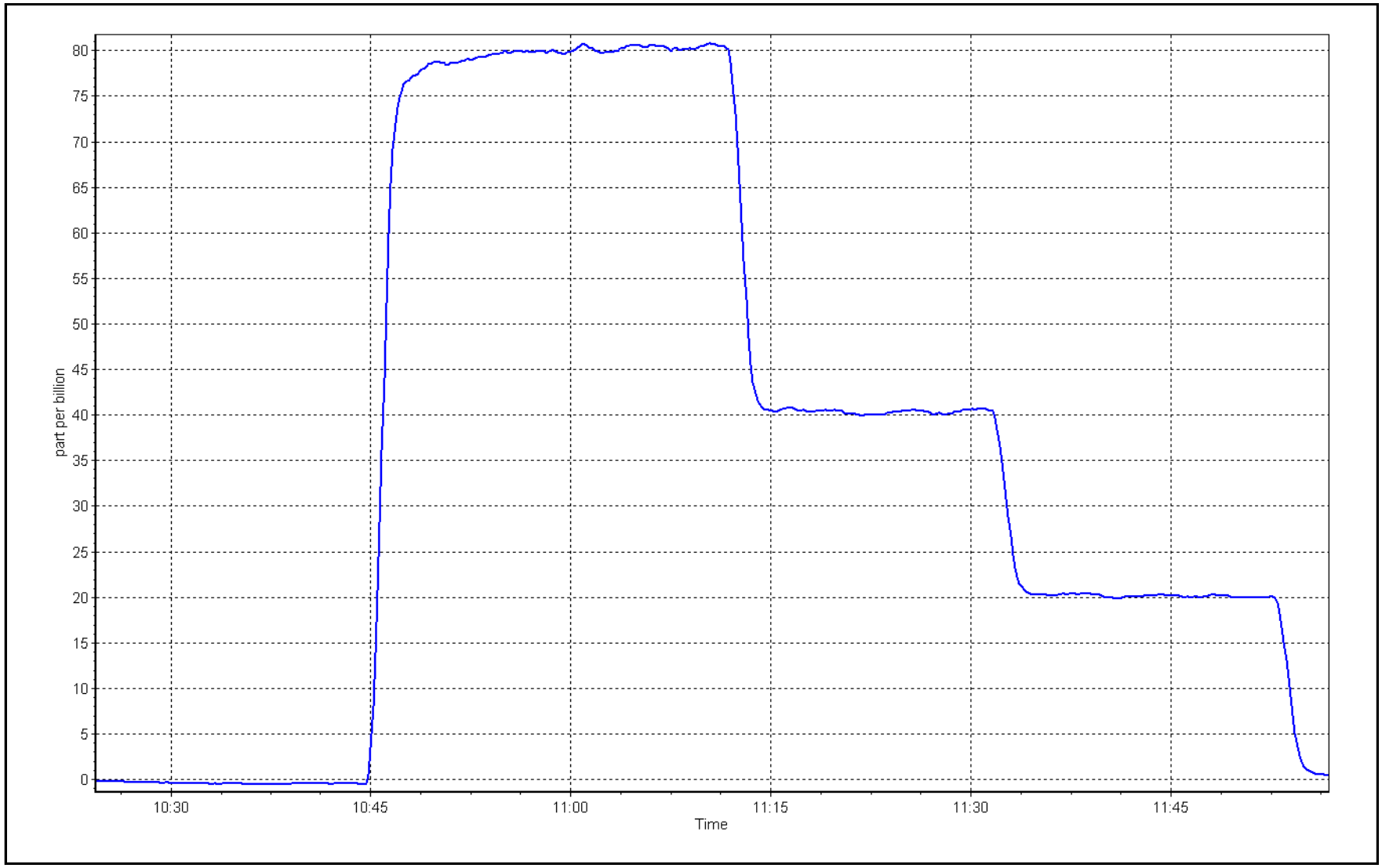
Baseline Corr As found:	80.8	Prev response:	80.68	*% change:	0.1%
Baseline Corr 2nd AF pt:	40.7	AF Slope:	1.009141	AF Intercept:	-0.198029
Baseline Corr 3rd AF pt:	20.5	AF Correlation:	0.999971		

* = > +/-5% change initiates investigation

Notes: Removal Calibration.

Calibration Performed By: Sean Bala

H_2S Calibration Plot Date: August 10, 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:	July 27, 2023	Last Cal Date:	June 27, 2023
Start time (MST):	8:30	End time (MST):	13:01
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:	1.150	1.162	NO bkgnd or offset:	3.8	3.8
NOX coeff or slope:	0.989	0.990	NOX bkgnd or offset:	4.0	4.0
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	173.1	173.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001347	0.999777
NO_X Cal Offset:	-1.568006	-1.467995
NO Cal Slope:	1.002797	1.000782
NO Cal Offset:	-2.507983	-2.727959
NO_2 Cal Slope:	1.006674	1.000178
NO_2 Cal Offset:	-0.458123	-0.291235

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.2	-0.2	----	----
as found span	4916	84.4	801.1	799.9	1.2	797.4	794.0	3.3	1.0046	1.0074
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.1	-0.2	----	----
high point	4916	84.4	801.1	799.9	1.2	799.6	798.8	0.8	1.0018	1.0014
second point	4958	42.2	400.5	400.0	0.6	399.6	397.1	2.4	1.0024	1.0072
third point	4979	21.1	200.3	200.0	0.3	196.8	194.2	2.6	1.0177	1.0298
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1	----	----
as left span	4916	84.4	801.1	422.8	378.3	795.2	416.4	379.5	1.0074	1.0153
								Average Correction Factor	1.0073	1.0128

Corrected As found	NO_X = 797.8 ppb	NO = 794.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.3%
Previous Response	NO_X = 800.6 ppb	NO = 799.6 ppb		*Percent Change	NO =	-0.7%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found NO r^2:	NO Sl:	NO Int:	
			As found NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	793.2	416.1	378.3	378.1	1.0005	100.0%
2nd GPT point (200 ppb O3)	793.2	599.5	194.9	194.6	1.0014	99.9%
3rd GPT point (100 ppb O3)	793.2	691.8	102.6	102.2	1.0037	99.6%
				Average Correction Factor	1.0019	99.8%

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

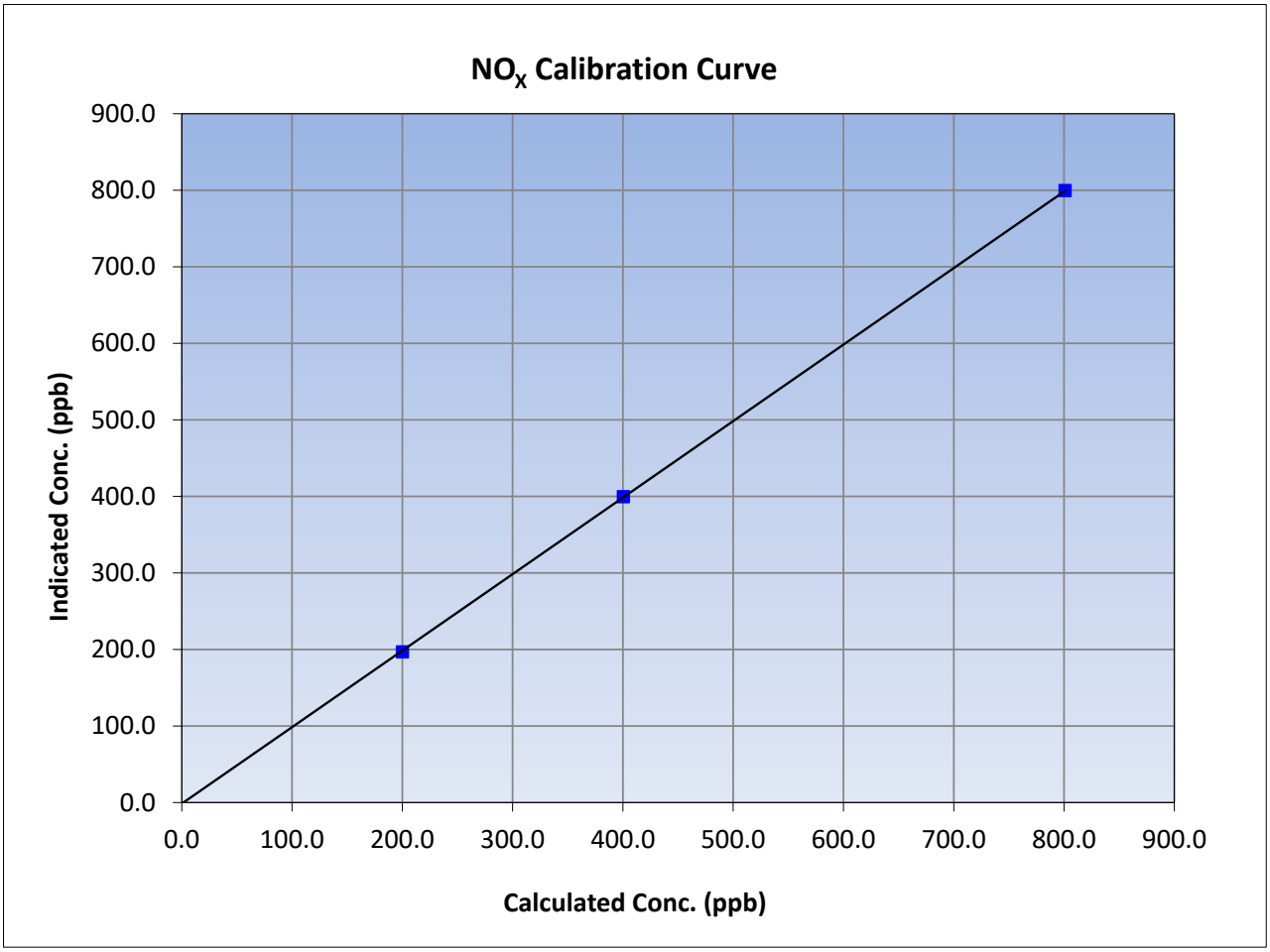
Version-04-2020

Station Information

Calibration Date:	July 27, 2023	Previous Calibration:	June 27, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	8:30	End Time (MST):	13:01
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.3	----	Correlation Coefficient	0.999984	*≥0.995*
801.1	799.6	1.0018			
400.5	399.6	1.0024	Slope	0.999777	*0.90 - 1.10*
200.3	196.8	1.0177			
			Intercept	-1.467995	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

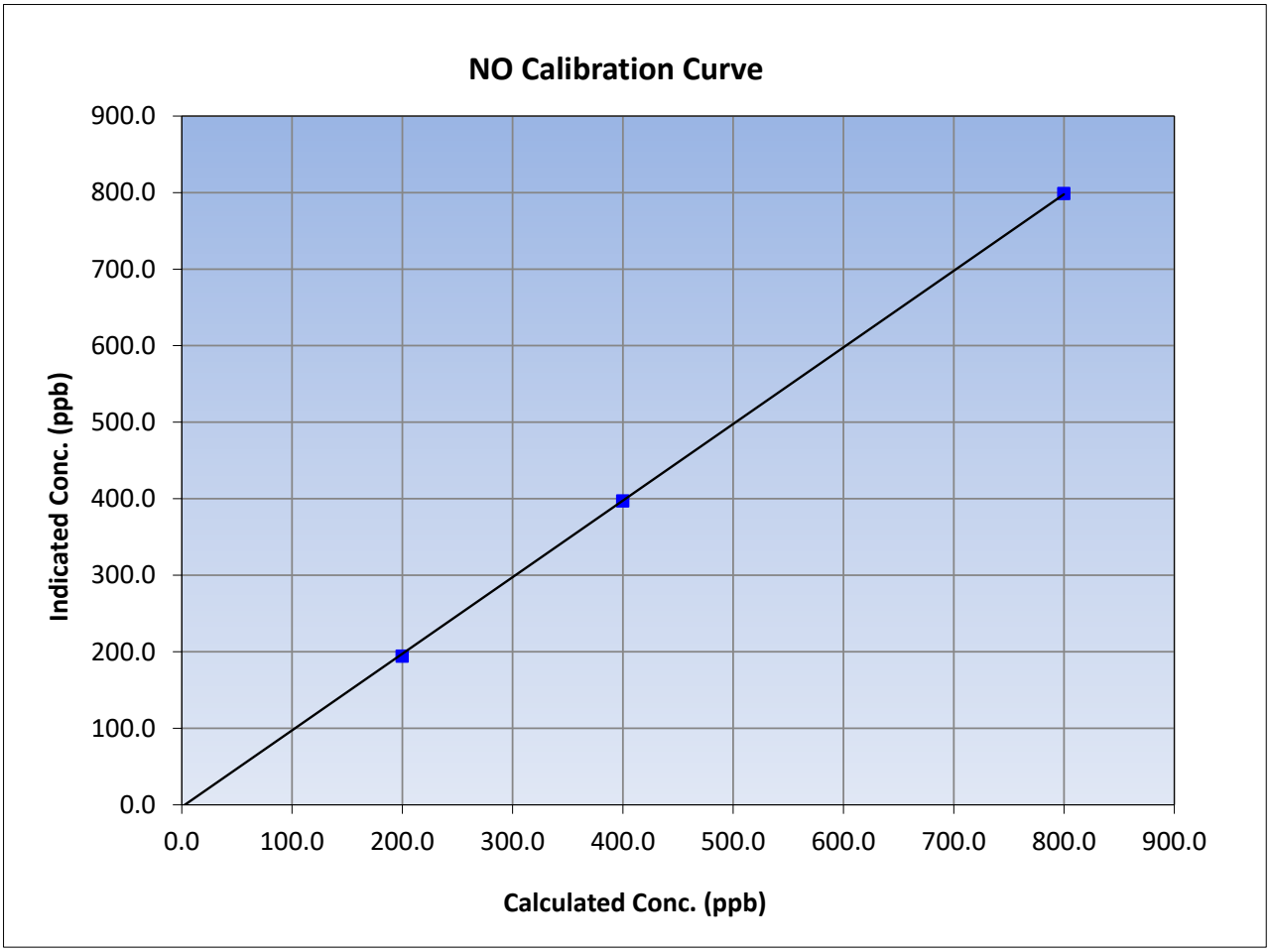
Version-04-2020

Station Information

Calibration Date:	July 27, 2023	Previous Calibration:	June 27, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	8:30	End Time (MST):	13:01
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.1	----	Correlation Coefficient	0.999947	*≥0.995*
799.9	798.8	1.0014			
400.0	397.1	1.0072	Slope	1.000782	*0.90 - 1.10*
200.0	194.2	1.0298			
			Intercept	-2.727959	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

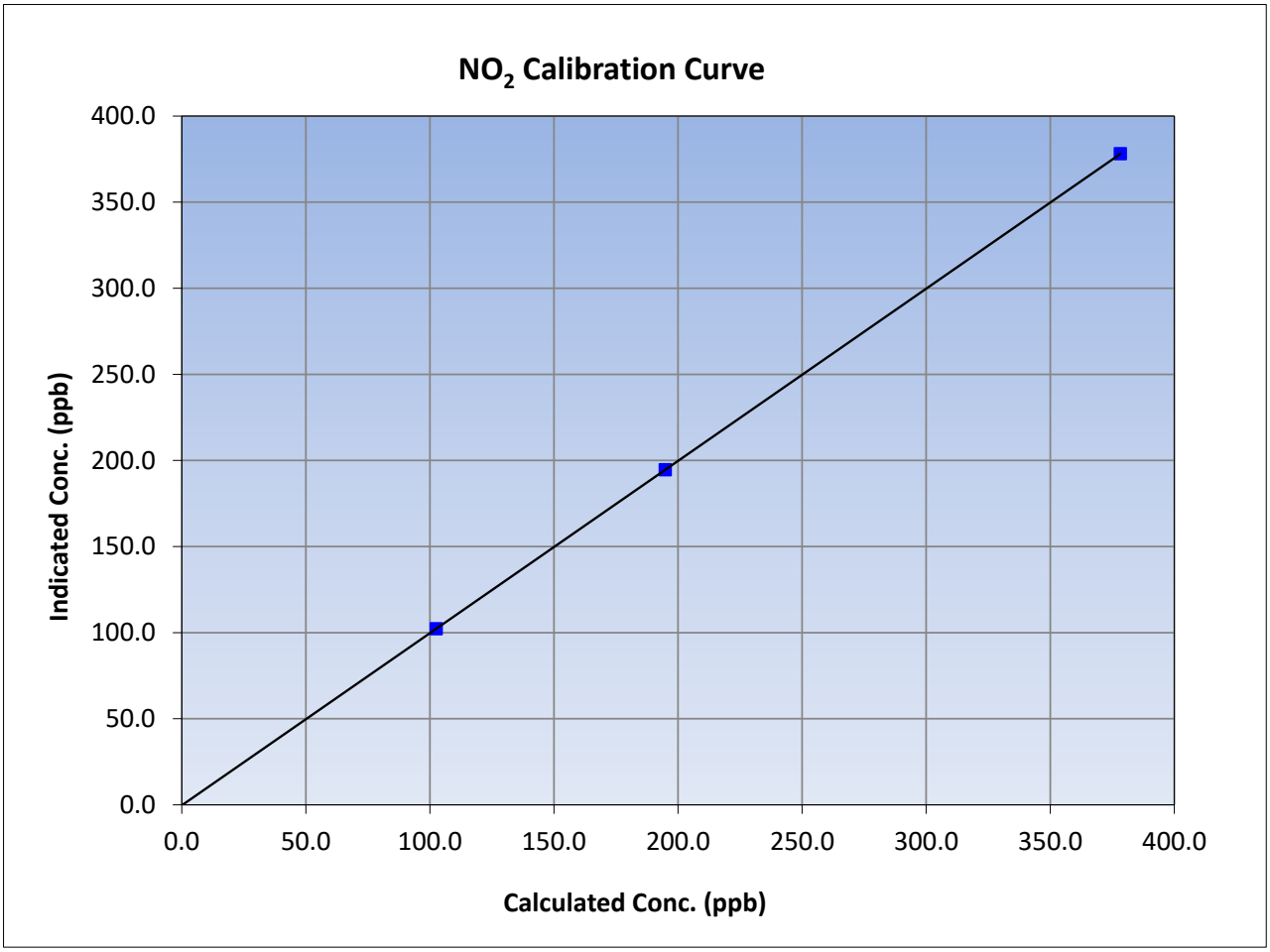
Version-04-2020

Station Information

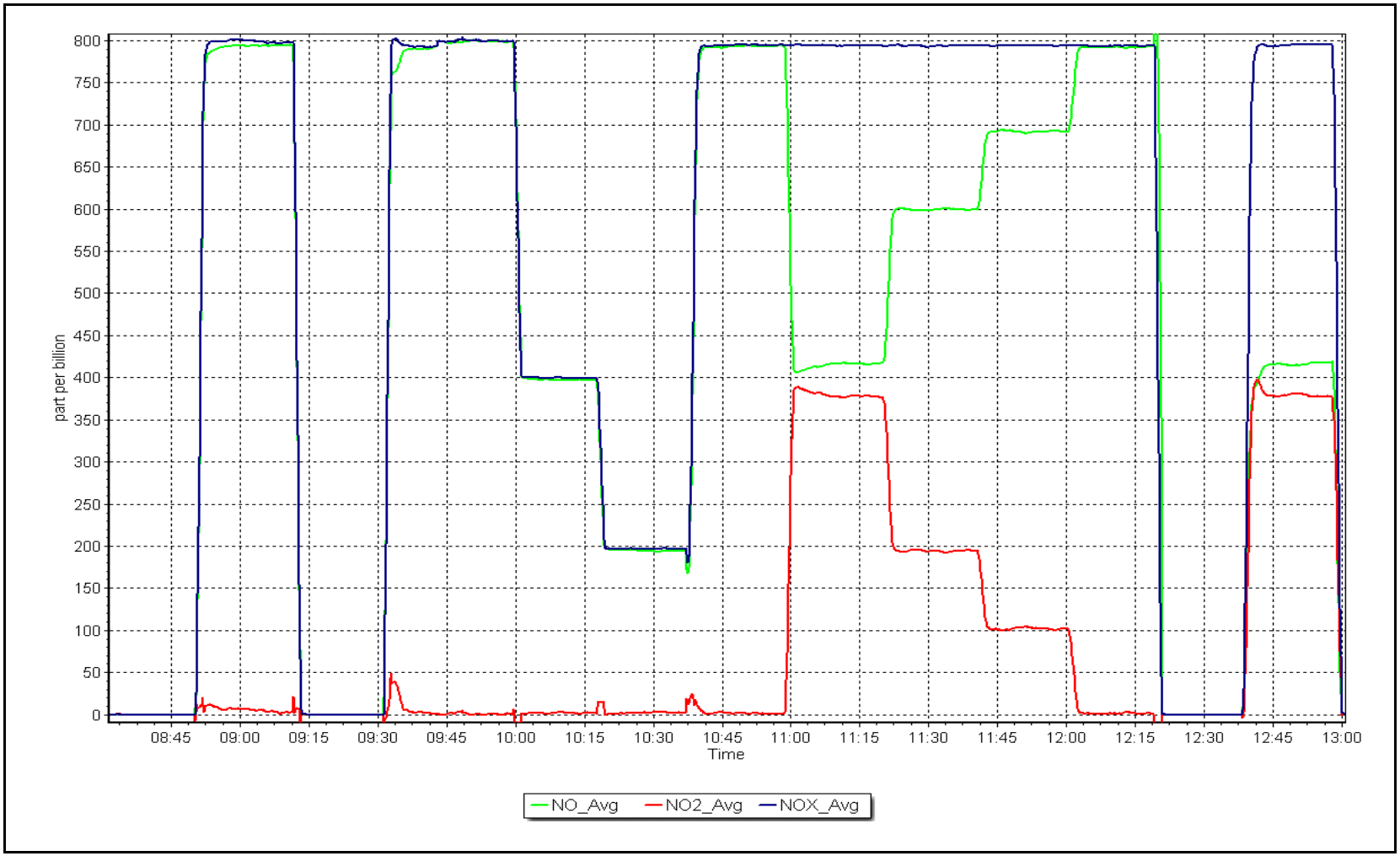
Calibration Date:	July 27, 2023	Previous Calibration:	June 27, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	8:30	End Time (MST):	13:01
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.2	----	Correlation Coefficient	1.000000	*≥0.995*
378.3	378.1	1.0005			
194.9	194.6	1.0014	Slope	1.000178	*0.90 - 1.10*
102.6	102.2	1.0037			
			Intercept	-0.291235	*+/-20*



NO_X Calibration Plot Date: July 27, 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:	August 10, 2023	Last Cal Date:	July 27, 2023
Start time (MST):	8:44	End time (MST):	11:27
Reason:	Removal		

Calibration Standards

NO Gas Cylinder #:		T26811M	Cal Gas Expiry Date:	October 30, 2024	
NOX Cal Gas Conc:	47.46	ppm	NO Cal Gas Conc:	47.39	ppm
Removed Cylinder #:		NA	Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	47.46	ppm	Removed Gas NO Conc:	47.39	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	2659	
ZAG make/model:	API 701		Serial Number:	4427	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1218153356	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.162	1.162	NO bkgnd or offset:	3.8	3.8
NOX coeff or slope:	0.990	0.990	NOX bkgnd or offset:	4.0	4.0
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	173.1	173.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999777	
NO_X Cal Offset:	-1.467995	
NO Cal Slope:	1.000782	
NO Cal Offset:	-2.727959	
NO_2 Cal Slope:	1.000178	
NO_2 Cal Offset:	-0.291235	

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
as found span	4916	84.4	801.1	799.9	1.2	796.0	791.9	4.0	1.0064	1.0101
as found 2nd	4958	42.2	400.5	400.0	0.6	397.2	394.0	3.2	1.0084	1.0151
as found 3rd	4979	21.1	200.3	200.0	0.3	195.1	192.1	3.0	1.0265	1.0410
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 = 796.3 ppb	NO = 792.1 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-0.4%
Previous Response	NO_X = 799.4 ppb	NO = 797.8 ppb			*Percent Change	NO =	-0.7%
Baseline Corr 2nd pt	NO_X = 397.5 ppb	NO = 394.2 ppb	As found	NO_X r^2: 0.999975	Nx Sl: 0.995540	Nx Int:	-1.908
Baseline Corr 3rd pt	NO_X = 195.4 ppb	NO = 192.3 ppb	As found	NO r^2: 0.999941	NO Sl: 0.992467	NO Int:	-2.868
			As found	NO_2 r^2: 0.999983	NO2 Sl: 1.001405	NO_2 Int:	-0.788

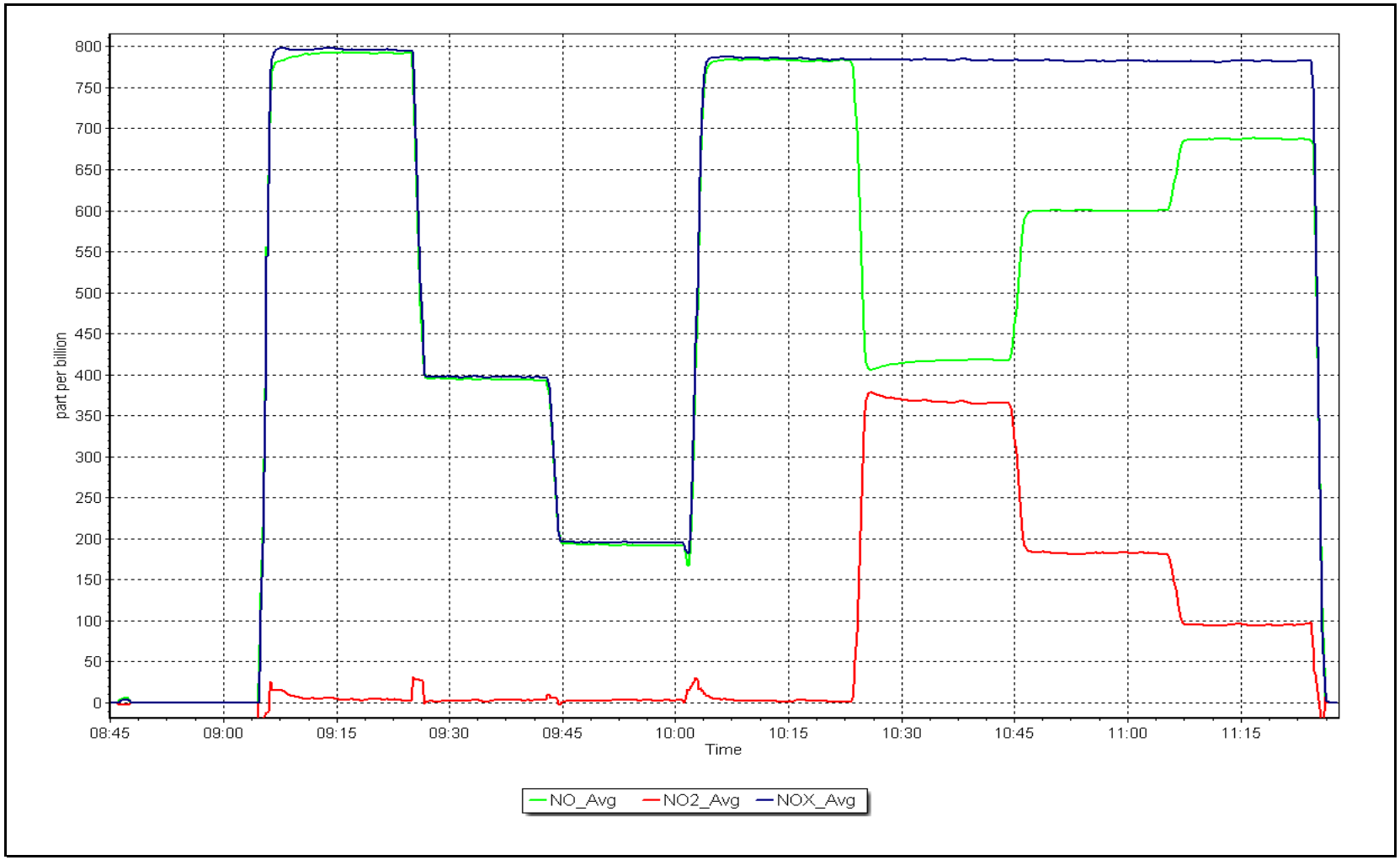
GPT Calibration Data

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	-0.1	----	----
as found GPT point (400 ppb NO2)	782.2	417.7	365.7	365.8	0.9997	100.0%
as found GPT point (200 ppb NO2)	782.2	599.6	183.8	182.8	1.0054	99.5%
as found GPT point (100 ppb NO2)	782.2	687.1	96.3	95.0	1.0135	98.7%
1st GPT point (400 ppb O3)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
				Average Correction Factor		

Notes: Removal calibration.

Calibration Performed By: Sean Bala

NO_x Calibration Plot Date: August 10, 2023 Location: Jackfish 1



Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-03-2017

Station Information

Station Name:	Jackfish 1	Station Number:	AMS 506	
Calibration Date:	August 10, 2023	Prev Cal Date:	July 7, 2022	
Start Time (MST):	10:46	End Time (MST):	11:39	
Barometric Press:	N/A	Station Temp:	21.5	Deg C
Reason:	Removal			

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	Y18362
WS Calibrator:	MetOne 053	Serial Number:	P15103

Shaft RPM	Actual Speed (K/hr) (Cv)	Indicated Speed (K/hr) (Iv)	Correction factor (Cv/Iv) *Limit = 0.95-1.05*
0	0.0	0.0	n/a
200	20.2	20.2	0.9981
400	39.4	39.4	0.9990
600	58.6	58.6	0.9992
800	77.8	77.8	0.9994
		Average Correction Factor	0.9989

	Start	***Finish***	*Limits*
Correl Coeff (r^2)	0.999999	1.000000	*≥0.995*
Calculated slope	0.998858	0.999465	*0.90 - 1.10*
Calculated intercept	0.034341	-0.013446	*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	R14654
As Found Declination (deg east of North)	14	As Left Declination (deg east of North)	NA

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	Correction factor (Cv/Iv) *Limit = 0.95-1.05*
0	0.0	n/a
90	91.2	0.9868
180	179.7	1.0017
270	270.2	0.9993
356	357.0	0.9972
	Average Correction Factor	0.9962

	Start	***Finish***	*Limits*
Correl Coeff (r^2)	0.999989	0.999990	*≥0.995*
Calculated slope	1.006027	0.998879	*0.90 - 1.10*
Calculated intercept	0.130799	-0.218717	*+/- 7*

Notes: Removal Calibration.

Calibration Performed By: Sean Bala

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS507
KIRBY SOUTH
JULY 2023

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

August 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Kirby South	Station number:	AMS 507
Calibration Date:	July 6, 2023	Last Cal Date:	NA
Start time (MST):	13:15	End time (MST):	16:00
Reason:	Install		

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:	NA	1.002607	Backgd or Offset:	NA	18.9
Calibration intercept:	NA	-0.968916	Coeff or Slope:	NA	1.135

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4919	81.3	799.6	801.5	0.998
second point	4959	40.7	400.3	399.0	1.003
third point	4980	20.3	199.7	199.0	1.003
as left zero					
as left span					
				Average Correction Factor	1.001

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

* = > +/-5% change initiates investigation

Notes: Install calibration for Kirby South site. Adjusted span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

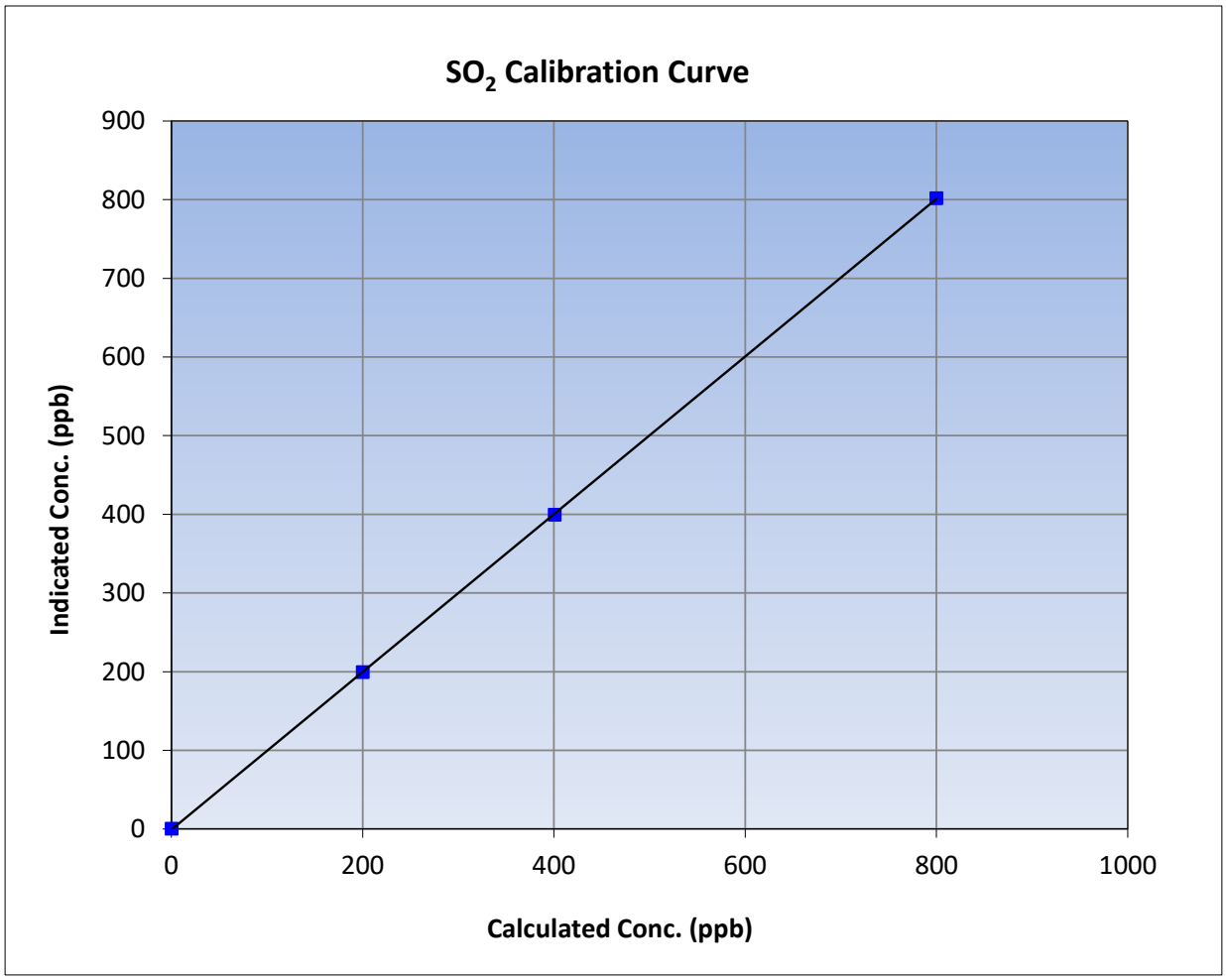
Station Information

Calibration Date:	July 6, 2023	Previous Calibration:	NA
Station Name:	Kirby South	Station Number:	AMS 507
Start Time (MST):	13:15	End Time (MST):	16:00
Analyzer make:	Thermo 43iQ	Analyzer serial #:	1182340007

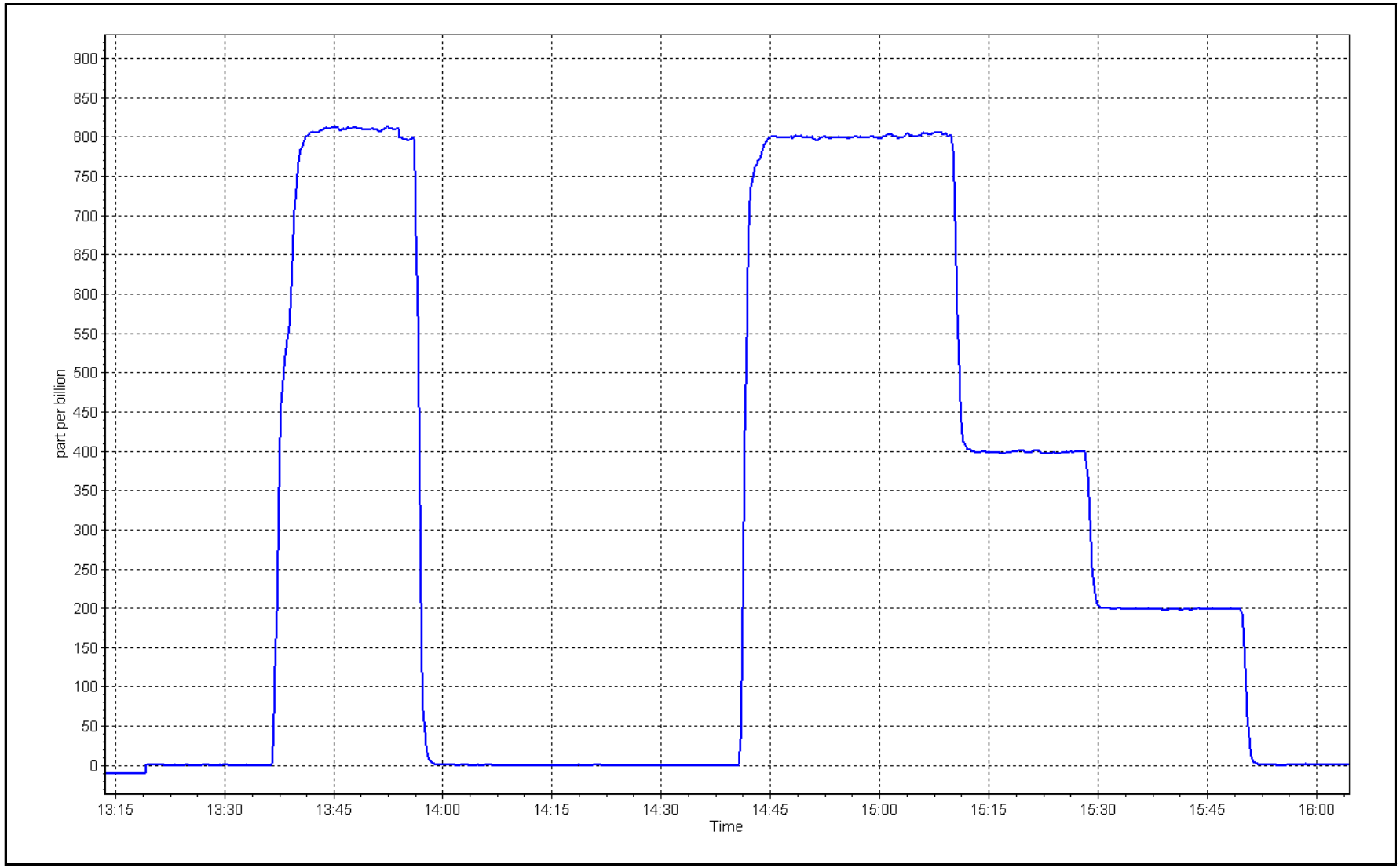
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
799.6	801.5	0.9977
400.3	399.0	1.0034
199.7	199.0	1.0033

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999990	*≥0.995*
Slope	1.002607	*0.90 - 1.10*
Intercept	-0.968916	*+/-30*



SO2 Calibration Plot Date: July 6, 2023 Location: Kirby South



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Kirby South	Station number:	AMS507
Calibration Date:	July 7, 2023	Last Cal Date:	NA
Start time (MST):	10:30	End time (MST):	14:54
Reason:	Install		

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:	NA	1.005741	Backgd or Offset:	NA	3.00
Calibration intercept:	NA	-0.280895	Coeff or Slope:	NA	1.069

H_2S As Found Data

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

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4923	77.4	80.0	80.4	0.995
second point	4961	38.8	40.1	39.7	1.010
third point	4981	19.3	19.9	19.5	1.023
as left zero	5000	0.0	0.0	-0.3	----
as left span	4923	77.4	80.0	79.8	1.002
SO2 Scrubber Check	4919	81.3	813.0	-0.1	----
Date of last scrubber change:		14-Jun-23		Ave Corr Factor	1.009
Date of last converter efficiency test:					efficiency

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

* = > +/-5% change initiates investigation

Notes: Adjusted zero and span. Scrubber check done after cal zero.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

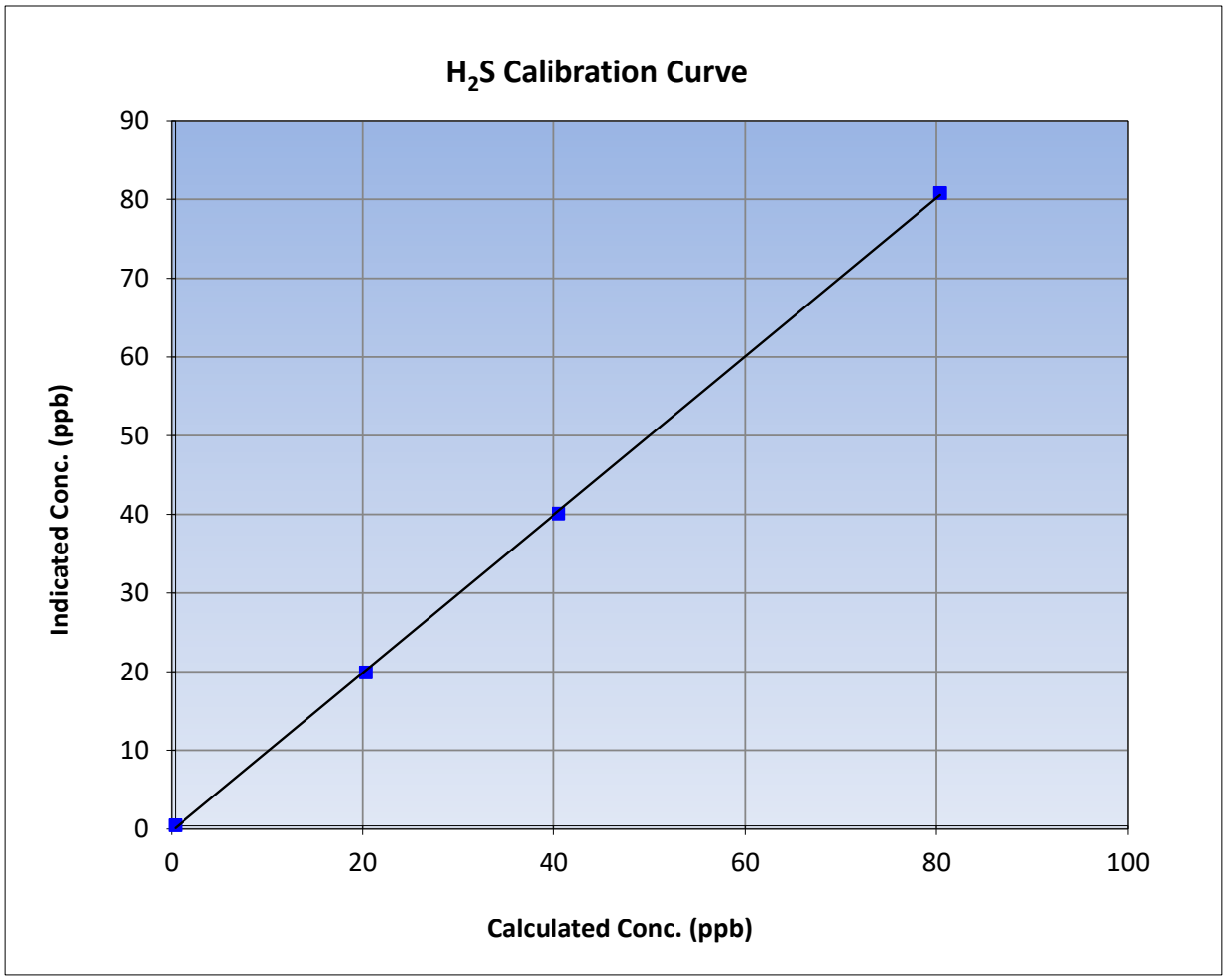
Station Information

Calibration Date:	July 7, 2023	Previous Calibration:	NA
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	10:30	End Time (MST):	14:54
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1150840012

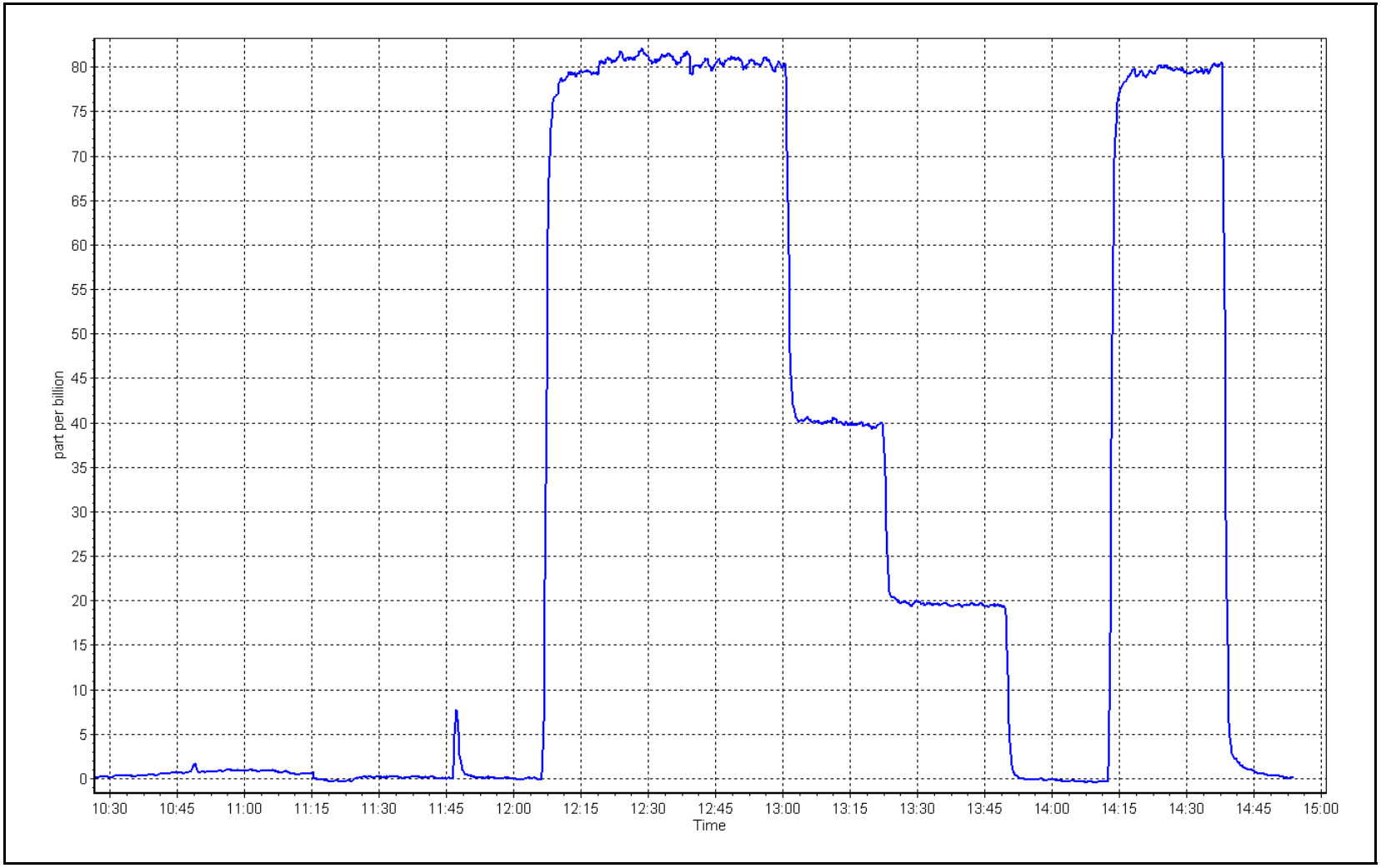
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.4	0.9948
40.1	39.7	1.0100
19.9	19.5	1.0227

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999887	*≥0.995*
Slope	1.005741	*0.90 - 1.10*
Intercept	-0.280895	*+/-3*



H_2S Calibration Plot Date: July 7, 2023 Location: Kirby South



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Kirby South	Station number:	AMS507
Calibration Date:	July 11, 2023	Last Cal Date:	July 7, 2023
Start time (MST):	10:30	End time (MST):	14:46
Reason:	Maintenance		

Calibration Standards

Cal Gas Concentration:	5.167	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517378			
Removed Cal Gas Conc:	5.167	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3804
ZAG Make/Model:	API 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:	1.005741	1.004463	Backgd or Offset:	3.00	2.00
Calibration intercept:	-0.280895	-0.061147	Coeff or Slope:	1.069	1.069

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-1.0	----
as found span	4923	77.4	80.0	79.3	0.996
as found 2nd point	4961	38.8	40.1	39.0	1.002
as found 3rd point	4981	19.3	19.9	18.8	1.007
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4923	77.4	80.0	80.3	0.996
second point	4961	38.8	40.1	40.2	0.997
third point	4981	19.3	19.9	19.9	1.002
as left zero	5000	0.0	0.0	0.0	----
as left span	4923	77.4	80.0	80.2	0.997

SO2 Scrubber Check

Date of last scrubber change:	14-Jun-23	Ave Corr Factor	0.999
Date of last converter efficiency test:			efficiency

Baseline Corr As found:	80.3	Prev response:	80.16	*% change:	0.2%
Baseline Corr 2nd AF pt:	40.0	AF Slope:	1.004602	AF Intercept:	-1.141023
Baseline Corr 3rd AF pt:	19.8	AF Correlation:	0.999984		

* = > +/-5% change initiates investigation

Notes: Adjusted zero due to baseline drift.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

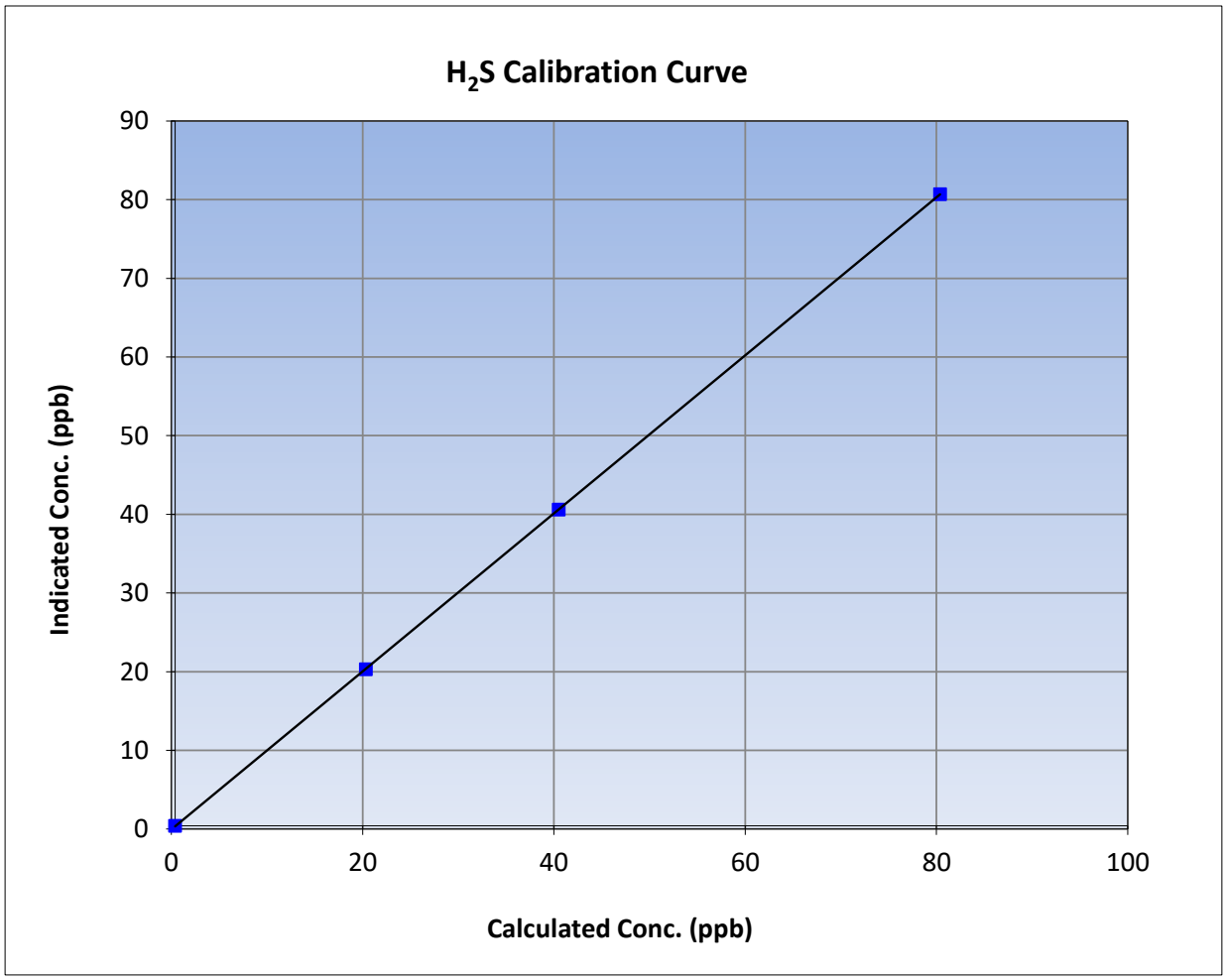
Station Information

Calibration Date:	July 11, 2023	Previous Calibration:	July 7, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	10:30	End Time (MST):	14:46
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1150840012

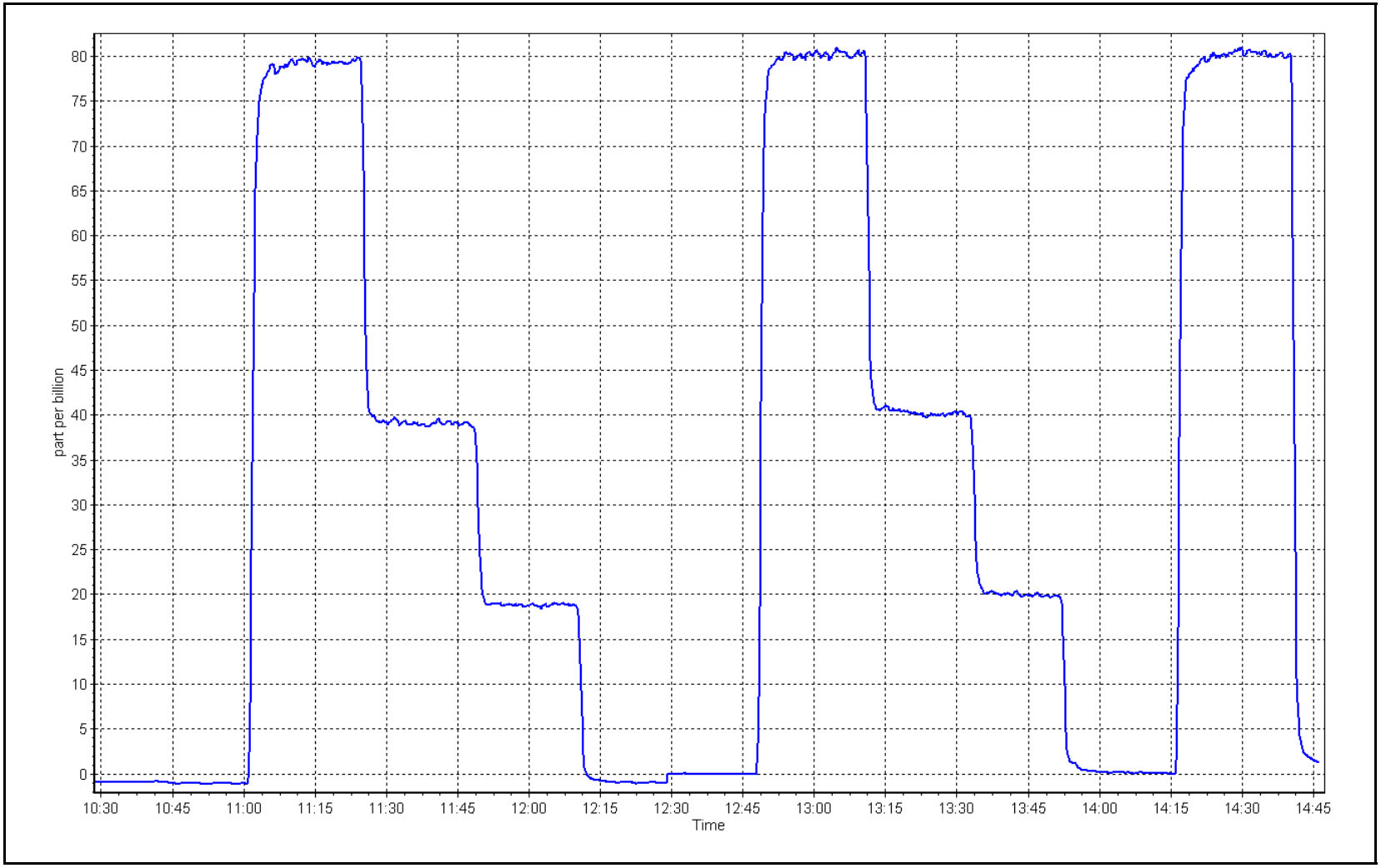
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.3	0.9960
40.1	40.2	0.9975
19.9	19.9	1.0022

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999997	*≥0.995*
Slope	1.004463	*0.90 - 1.10*
Intercept	-0.061147	*+/-3*



H_2S Calibration Plot Date: July 11, 2023 Location: Kirby South



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Kirby South	Station number:	AMS507
Calibration Date:	July 25, 2023	Last Cal Date:	July 11, 2023
Start time (MST):	11:30	End time (MST):	19:00
Reason:	Maintenance		

Calibration Standards

Cal Gas Concentration:	5.167	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517378			
Removed Cal Gas Conc:	5.167	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3804
ZAG Make/Model:	API 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:	1.004463	1.005318	Backgd or Offset:	2.00	1.64
Calibration intercept:	-0.061147	0.458932	Coeff or Slope:	1.069	1.109

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	4923	77.4	80.0	79.9	1.001
as found 2nd point	4961	38.8	40.1	39.9	1.005
as found 3rd point	4981	19.3	19.9	19.6	1.018
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4923	77.4	80.0	80.7	0.991
second point	4961	38.8	40.1	40.9	0.980
third point	4981	19.3	19.9	20.9	0.954
as left zero	5000	0.0	0.0	0.6	----
as left span	4923	77.4	80.0	81.2	0.985
SO2 Scrubber Check				0.1	
Date of last scrubber change:		25-Jul-23		Ave Corr Factor	0.975
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.9	Prev response:	80.27	*% change:	-0.5%
Baseline Corr 2nd AF pt:	39.9	AF Slope:	1.000178	AF Intercept:	-0.161170
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999981		

* = > +/-5% change initiates investigation

Notes: Replaced scrubber due to slow response during nightly spans. Adjusted zero and span. Scrubber check passed.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

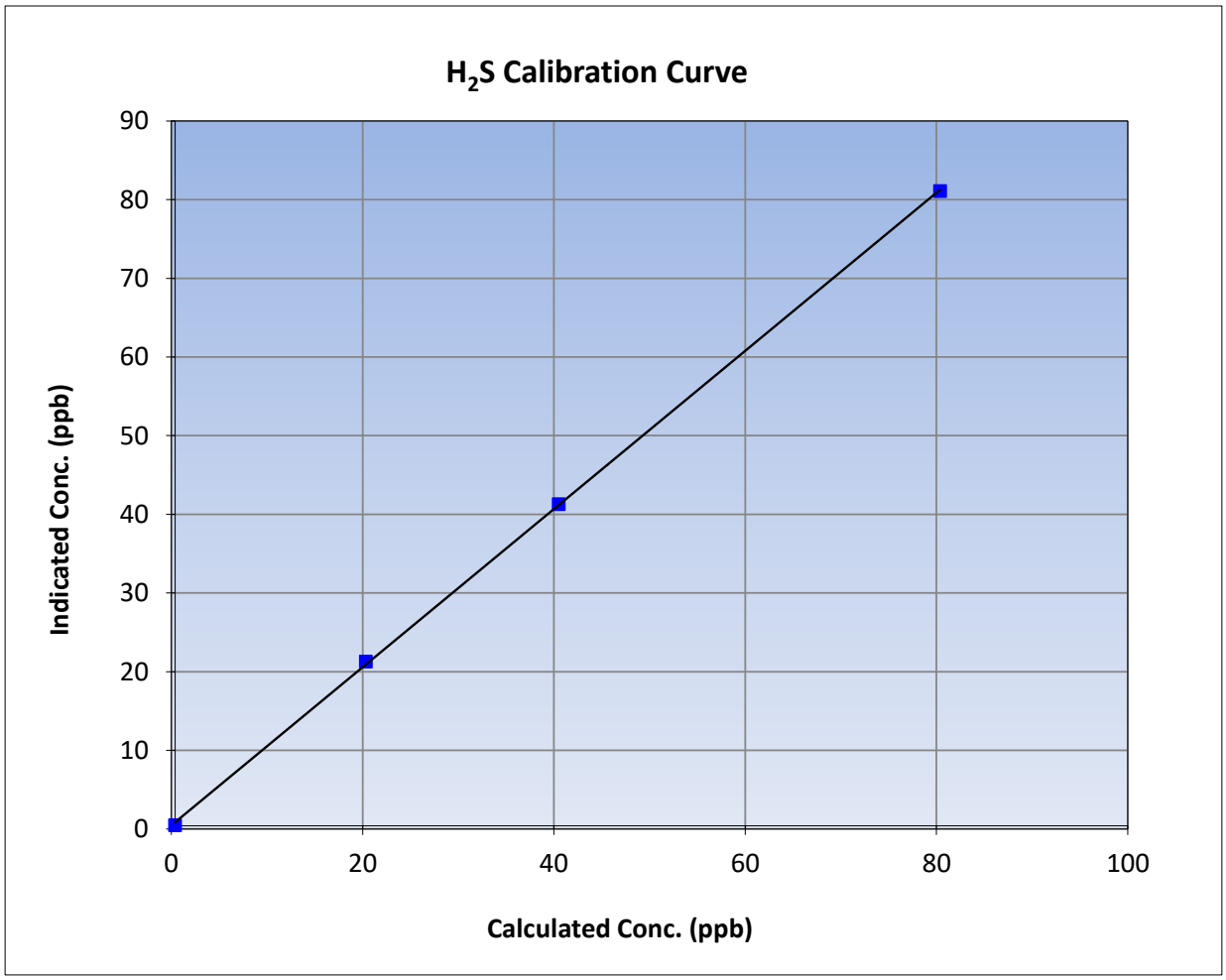
Station Information

Calibration Date:	July 25, 2023	Previous Calibration:	July 11, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	11:30	End Time (MST):	19:00
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1150840012

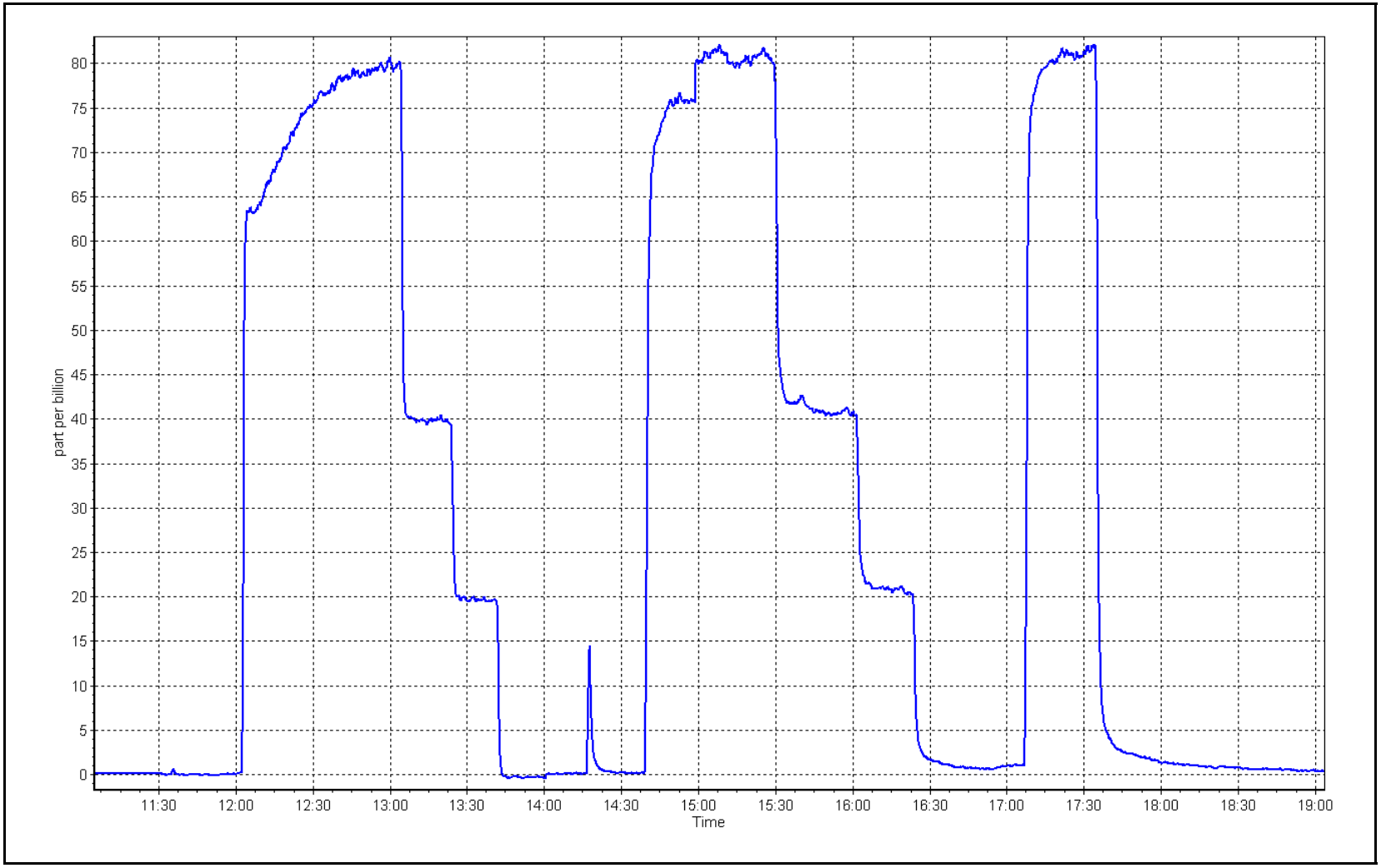
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.7	0.9911
40.1	40.9	0.9804
19.9	20.9	0.9542

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999908	*≥0.995*
Slope	1.005318	*0.90 - 1.10*
Intercept	0.458932	*+/-3*



H_2S Calibration Plot Date: July 25, 2023 Location: Kirby South



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Kirby South	Station number:	AMS507
Calibration Date:	July 6, 2023	Last Cal Date:	NA
Start time (MST):	13:58	End time (MST):	16:00
Reason:	Install		

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:	NA	0.999300	Background:	NA	2.70
Calibration intercept:	NA	-0.060190	Coefficient:	NA	3.749

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					
as found span					
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	17.21	1.003
second point	4959	40.7	8.64	8.54	1.012
third point	4980	20.3	4.31	4.24	1.017
as left zero					
as left span					
				Average Correction Factor	1.011

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

* = > +/-5% change initiates investigation

Notes: Install calibration for Kirby South site. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

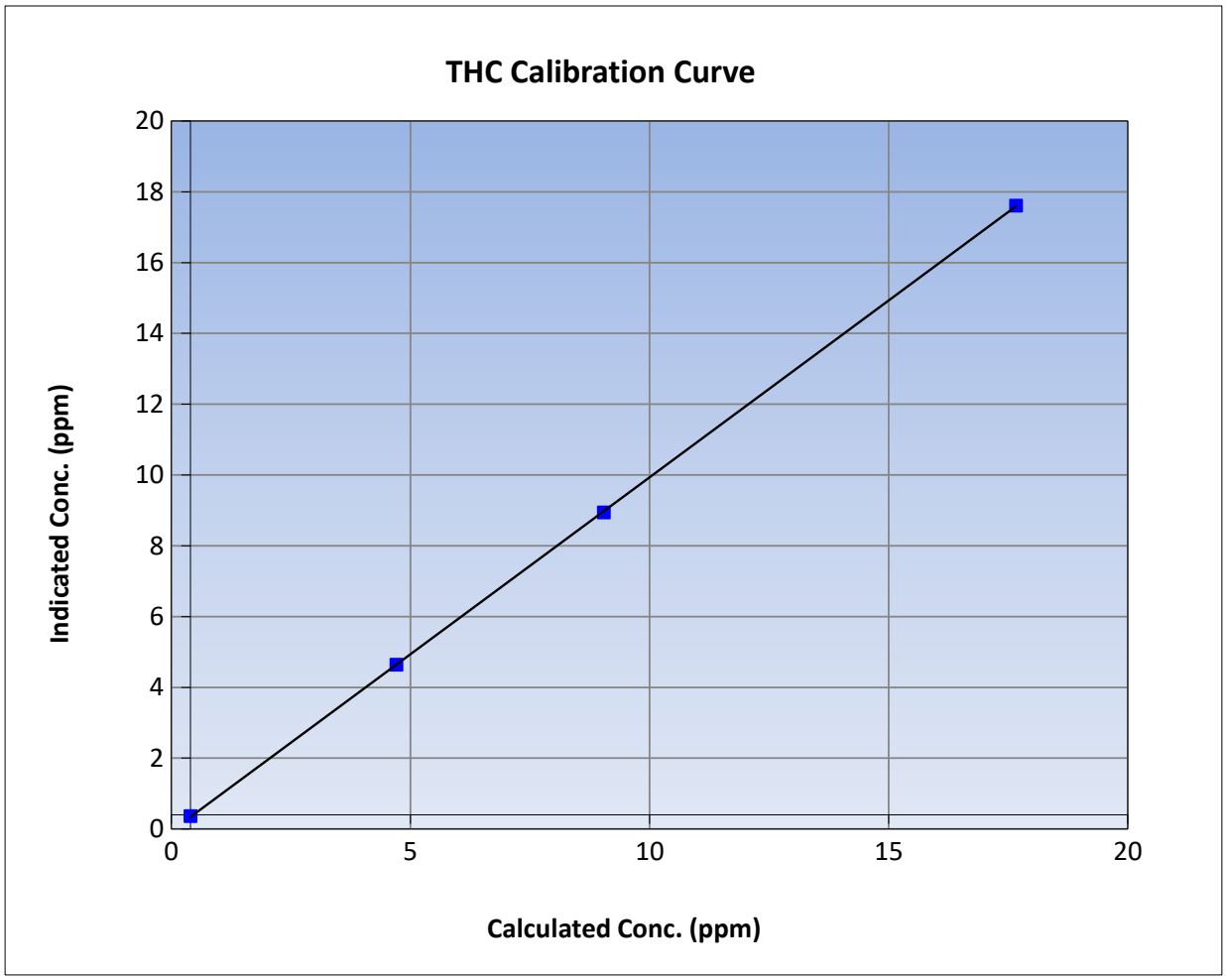
Station Information

Calibration Date:	July 6, 2023	Previous Calibration:	NA
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	13:58	End Time (MST):	16:00
Analyzer make:	Thermo 51i	Analyzer serial #:	1182340005

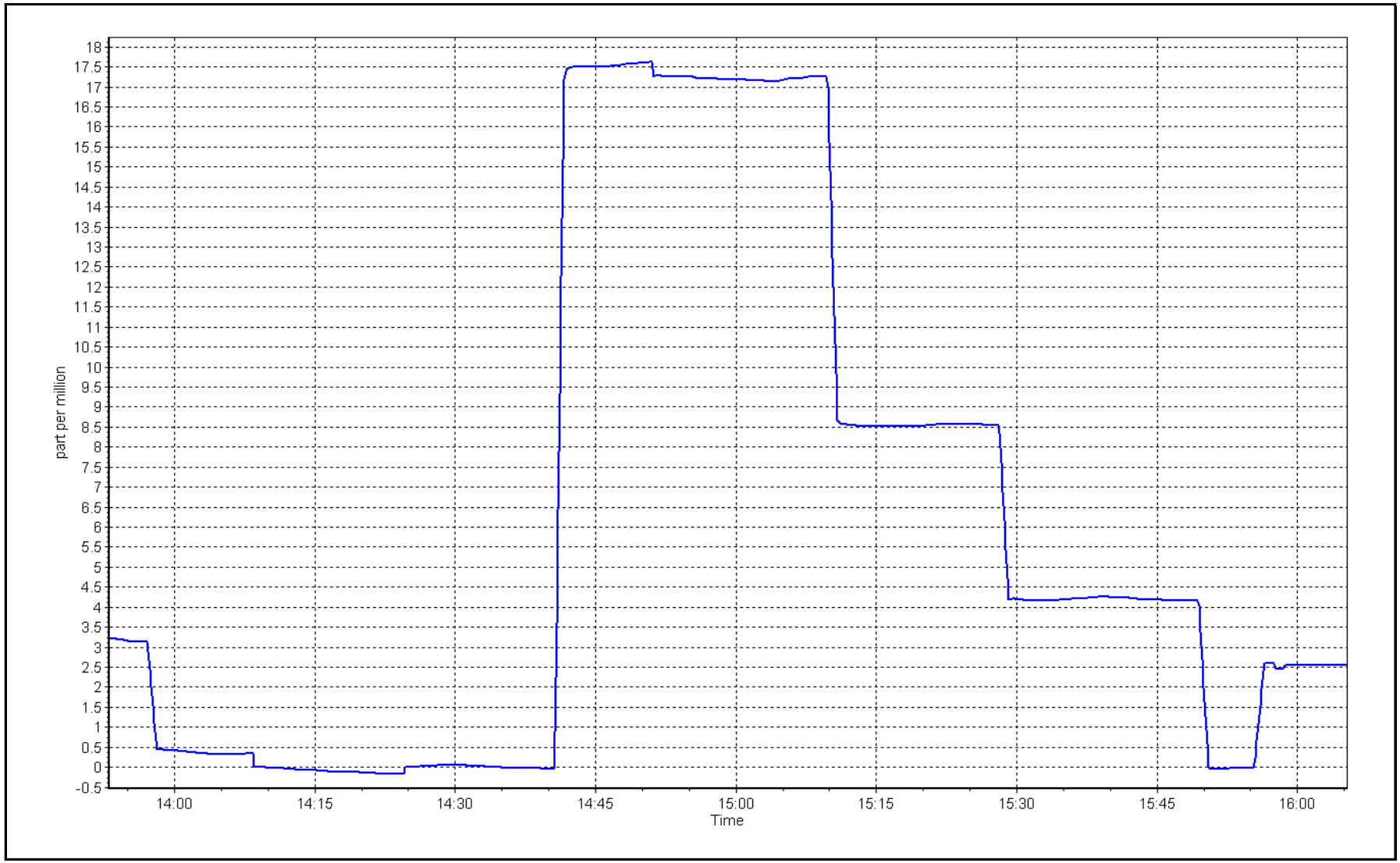
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.04	----
17.26	17.21	1.0031
8.64	8.54	1.0119
4.31	4.24	1.0166

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999986	*≥0.995*
Slope	0.999300	*0.90 - 1.10*
Intercept	-0.060190	*+/-1.5*



THC Calibration Plot Date: July 6, 2023 Location: Kirby South



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Kirby South	Station number:	AMS507
Calibration Date:	July 7, 2023	Last Cal Date:	NA
Start time (MST):	10:30	End time (MST):	15:32
Reason:	Install		

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 T750		Serial Number:	282	
ZAG make/model:	API 751H		Serial Number:	321	

Analyzer Information

Analyzer make:	Thermo 42iQ		Analyzer serial #:	1182340006	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	NA	1.429	NO bkgnd or offset:	NA	1.9
NOX coeff or slope:	NA	0.992	NOX bkgnd or offset:	NA	2.0
NO2 coeff or slope:	NA	1.000	Reaction cell Press:	NA	162.66

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	NA	1.001602
NO_X Cal Offset:	NA	-2.351758
NO Cal Slope:	NA	1.003048
NO Cal Offset:	NA	-3.253489
NO_2 Cal Slope:	NA	1.006879
NO_2 Cal Offset:	NA	1.400873

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	-0.6	-0.6	0.0	----	----
high point	4919	81.0	800.1	794.1	6.0	800.0	794.7	5.7	1.0001	0.9993
second point	4960	40.5	400.0	397.0	3.0	397.2	393.4	3.8	1.0071	1.0092
third point	4980	20.2	199.5	198.0	1.5	195.9	192.9	3.1	1.0185	1.0266
as left zero	5000	0.0	0.0	0.0	0.0	-0.6	-0.6	0.0	----	----
as left span	4919	81.0	800.1	392.0	408.1	779.8	376.2	403.6	1.0261	1.0421
								Average Correction Factor	1.0086	1.0117

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)	794.7	392.6	408.1	411.4	0.9920	100.8%
2nd GPT point (200 ppb O3)	794.7	597.3	203.4	207.5	0.9802	102.0%
3rd GPT point (100 ppb O3)	794.7	697.8	102.9	106.0	0.9707	103.0%
				Average Correction Factor	0.9810	101.9%

Notes: Install calibration for the move to Kirby South. Installed an external pump. Adjusted zero and span. Large span adjustment made due to the large change in flow.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

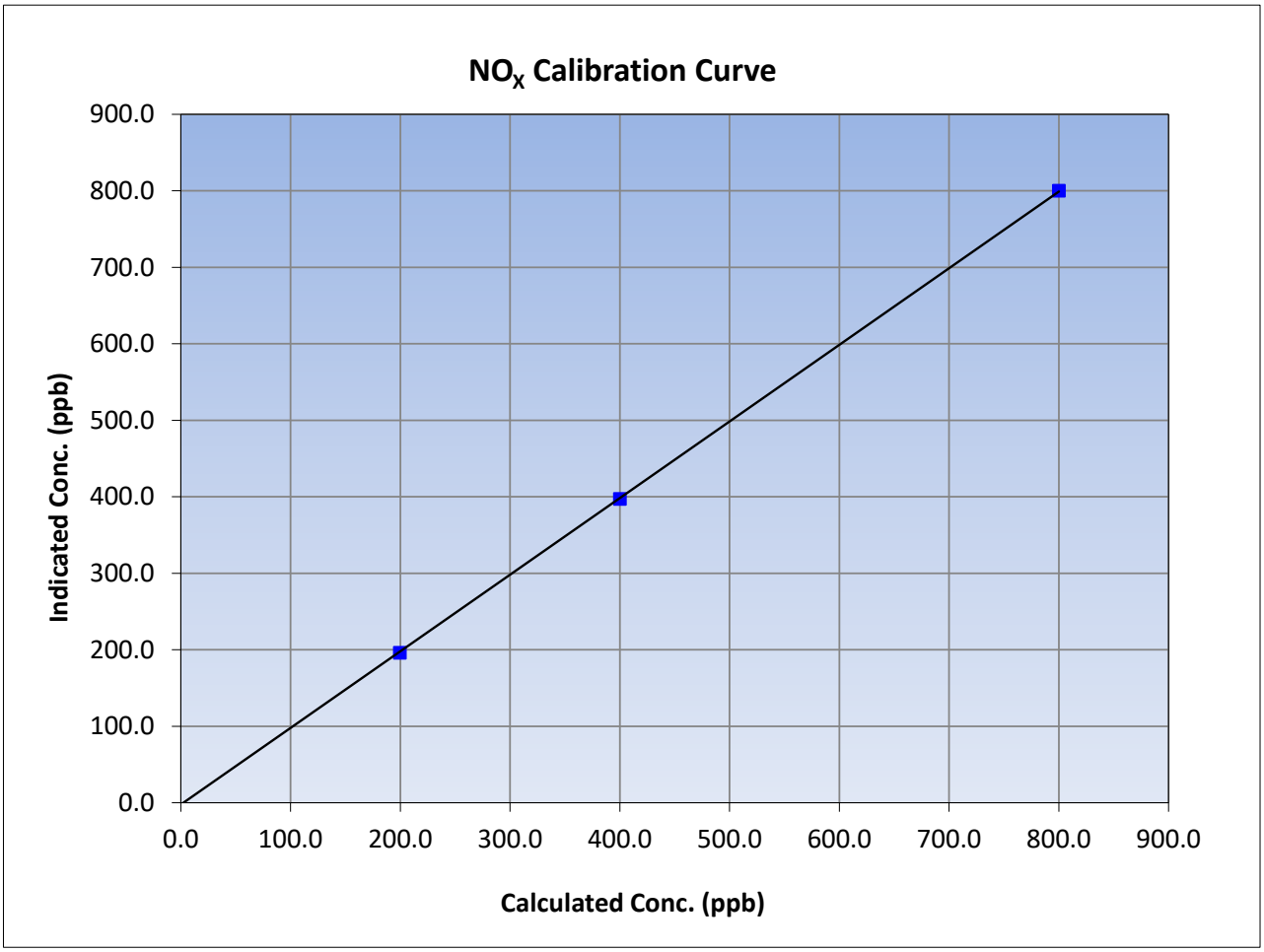
Version-04-2020

Station Information

Calibration Date:	July 7, 2023	Previous Calibration:	NA
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	10:30	End Time (MST):	15:32
Analyzer make:	Thermo 42iQ	Analyzer serial #:	1182340006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.6	----	Correlation Coefficient	0.999978	≥0.995
800.1	800.0	1.0001			
400.0	397.2	1.0071	Slope	1.001602	0.90 - 1.10
199.5	195.9	1.0185			
			Intercept	-2.351758	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

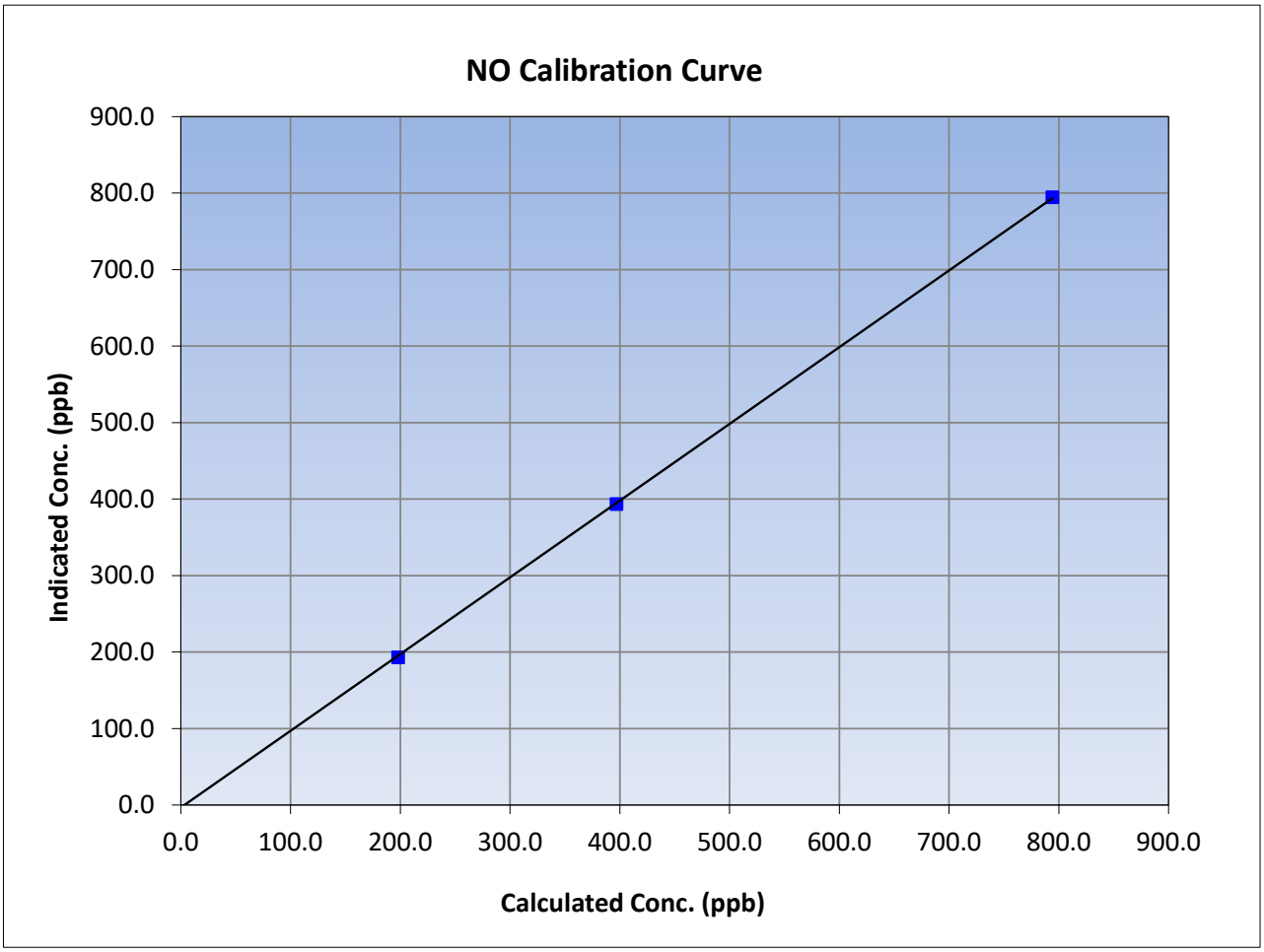
Version-04-2020

Station Information

Calibration Date:	July 7, 2023	Previous Calibration:	NA
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	10:30	End Time (MST):	15:32
Analyzer make:	Thermo 42iQ	Analyzer serial #:	1182340006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.6	----	Correlation Coefficient	0.999949	≥0.995
794.1	794.7	0.9993			
397.0	393.4	1.0092	Slope	1.003048	0.90 - 1.10
198.0	192.9	1.0266			
			Intercept	-3.253489	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

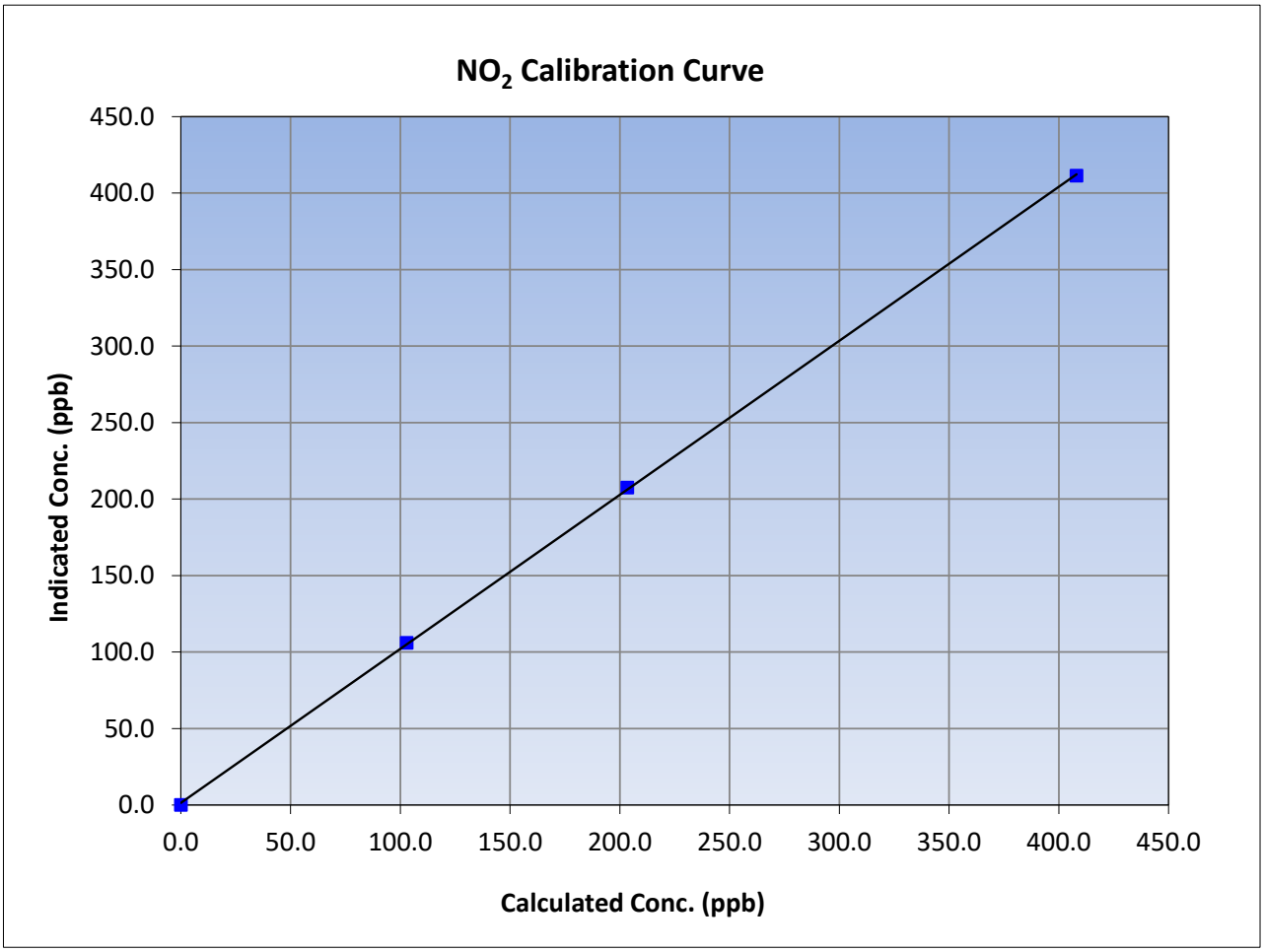
Version-04-2020

Station Information

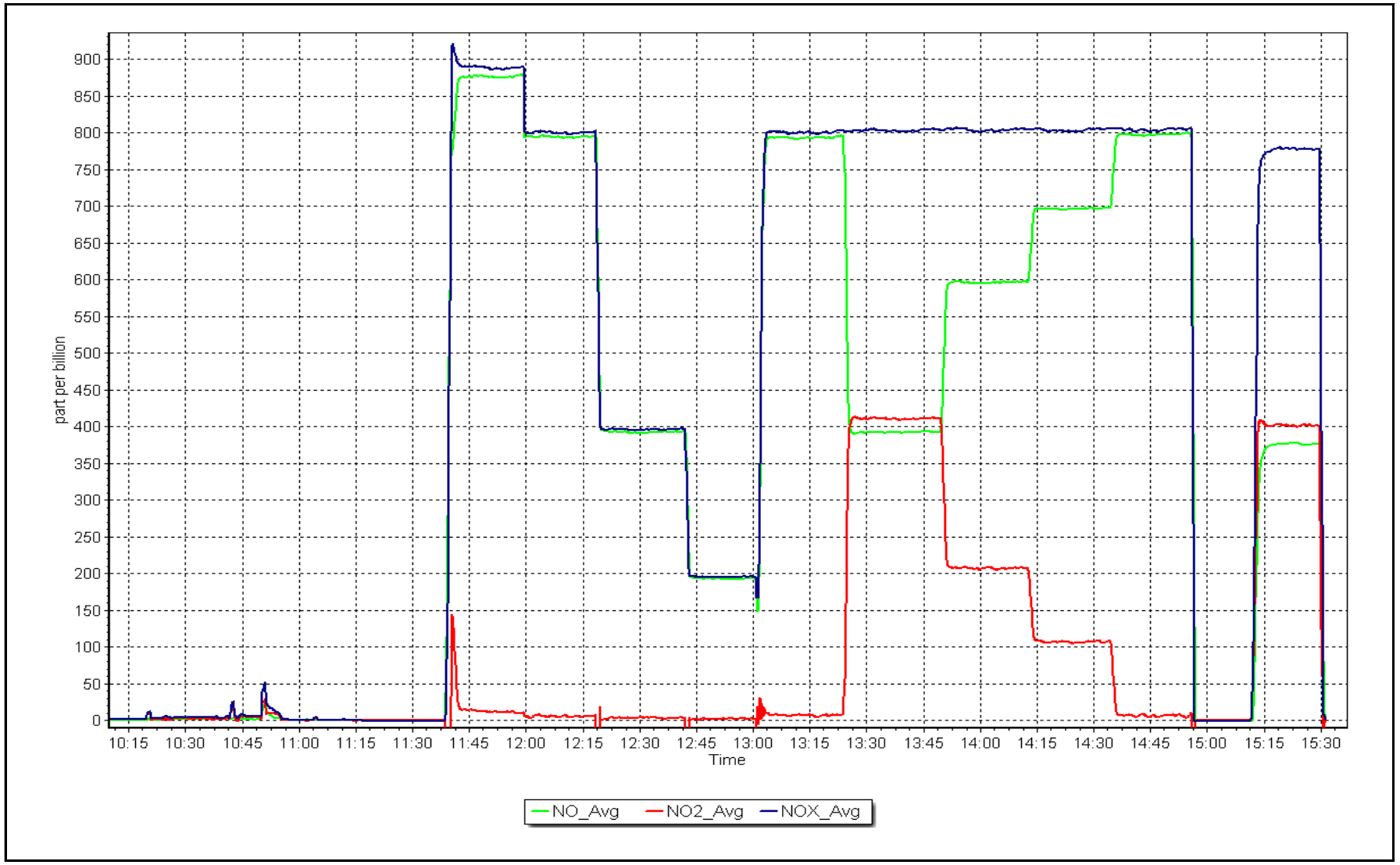
Calibration Date:	July 7, 2023	Previous Calibration:	NA
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	10:30	End Time (MST):	15:32
Analyzer make:	Thermo 42iQ	Analyzer serial #:	1182340006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999941	≥0.995
408.1	411.4	0.9920			
203.4	207.5	0.9802	Slope	1.006879	0.90 - 1.10
102.9	106.0	0.9707			
			Intercept	1.400873	+/-20



NO_X Calibration Plot Date: July 7, 2023 Location: Kirby South



Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Kirby South	Station Number:	AMS 507
Calibration Date:	July 7, 2023	Prev Cal Date:	NA
Start Time (MST):	12:15	End Time (MST):	14:15
Tower Height (m):	10.0	Reason:	Install

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	X16479
WS Calibrator:	Young 18802	Serial Number:	03845

Shaft RPM	Calculated Speed (K/hr) (Cv)	Indicated Speed (K/hr) (Iv)	% Error *Limit = +/- 1.5%*
0	0.0	0.0	---
200	20.2	20.3	0.4%
400	39.4	39.4	0.1%
600	58.6	58.5	0.0%
800	77.8	77.8	0.1%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)		0.999999	*≥0.9995*
Calculated slope		0.999615	*0.90 - 1.10*
Calculated intercept		-0.025296	*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	X16495
As Found Declination (deg east of True North):	NA	As Left Declination (deg east of True North):	14
Solar noon time (MST):	13:28	Calc Declination*:	14 Degrees
Deadband calc:	0.3 degrees (*Limit 4 deg*)		* - calculated declination as per NOAA website

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	% Error (based on 357° FS) *Limit = +/- 1.0%*
0	2.9	---
90	92.5	0.7%
180	182.0	0.6%
270	271.3	0.4%
357	359.6	0.7%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)		0.999992	*≥0.9995*
Calculated slope		1.001983	*0.90 - 1.10*
Calculated intercept		-2.611256	*+/- 4*

Notes: All points passed. Aligned tower using solar noon and verified with a compass.

Calibration Performed By: Braiden Boutilier

W B E A

End of Report