WOOD BUFFALO
ENVIRONMENTAL ASSOCIATION

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Wood Buffalo Environmental Association

SEPTEMBER 2023

MONTHLY CALIBRATION REPORT

CONTINUOUS MONITORING

October 30, 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
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	September 12, 2023	Last Cal Date:	August 1, 2023
Start time (MST):	9:52	End time (MST):	13:11
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:	49.21	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3565
ZAG Make/Model:	Teledyne API T701		Serial Number:	5609

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999194	0.999839	Backgd or Offset:	19.2	19.3
Calibration intercept:	0.086933	-0.113750	Coeff or Slope:	0.886	0.890

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	800.3	796.0	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	----
high point	4918	81.3	800.3	800.2	1.000
second point	4959	40.7	400.6	400.4	1.000
third point	4979	20.3	199.8	199.0	1.004
as left zero	5000	0.0	0.0	0.7	----
as left span	4918	81.3	800.3	800.2	1.000
				Average Correction Factor	1.002

Baseline Corr As found:	795.80	Previous response	799.71	*% change	-0.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

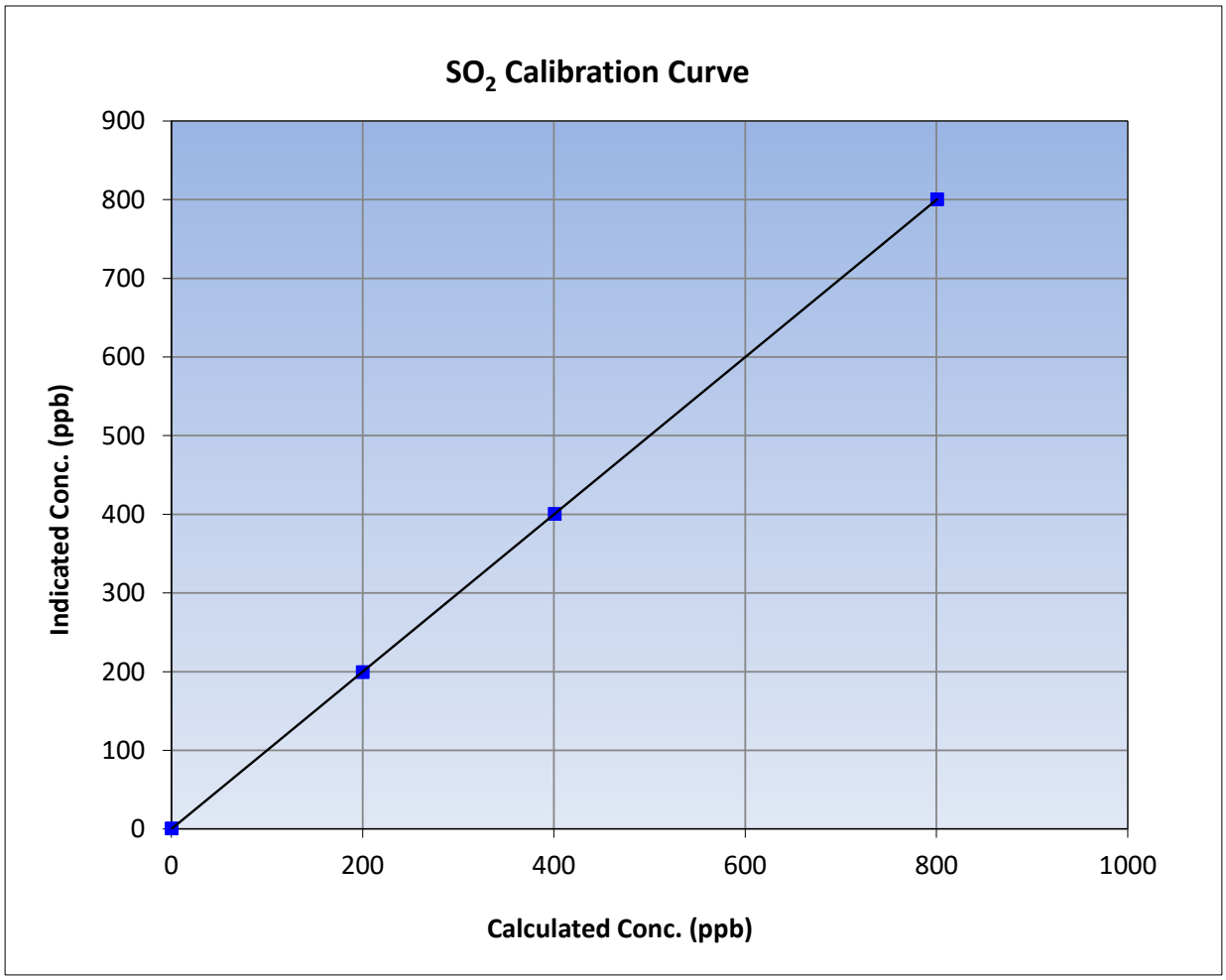
Station Information

Calibration Date:	September 12, 2023	Previous Calibration:	August 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:52	End Time (MST):	13:11
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301448

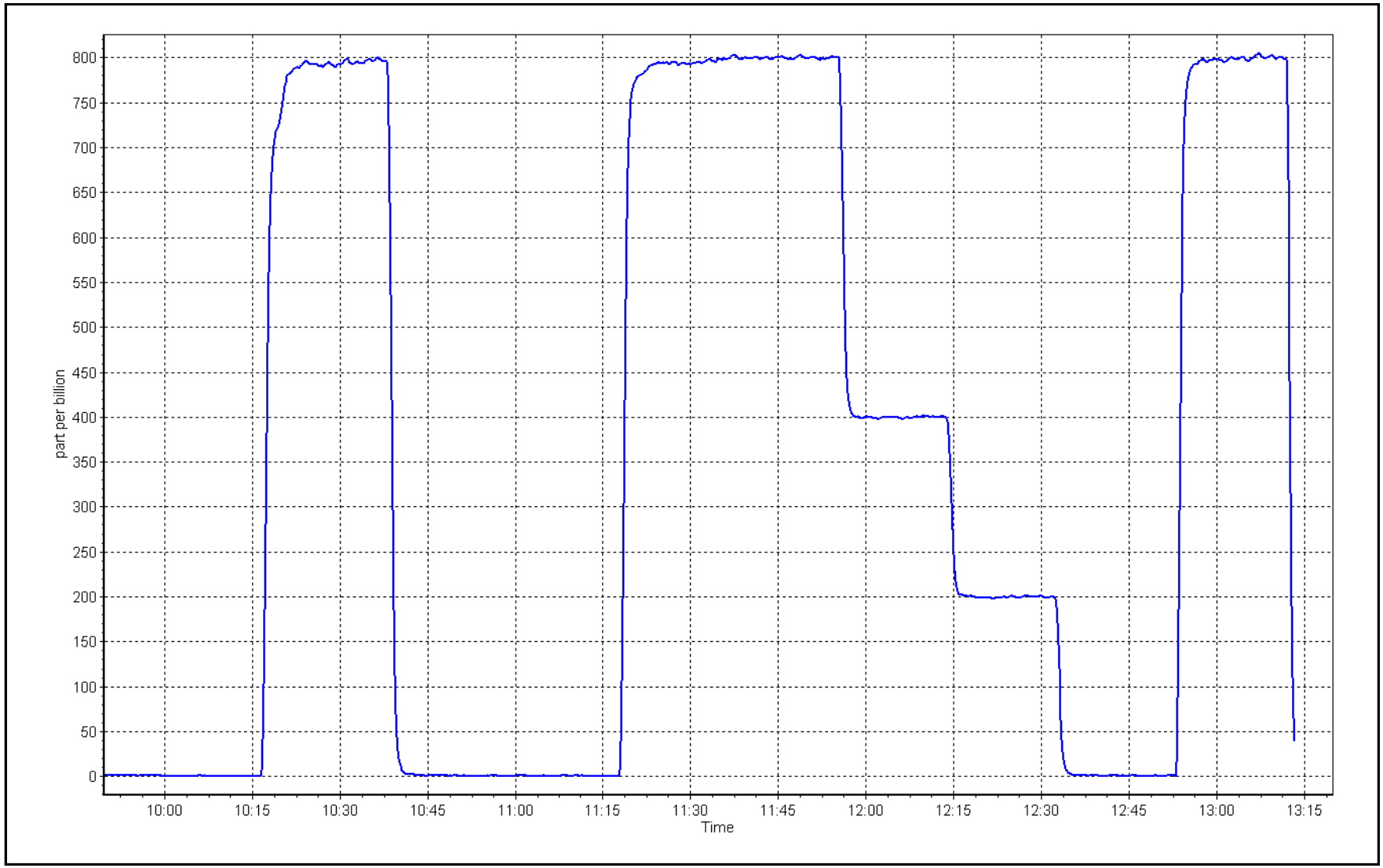
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
800.3	800.2	1.0001
400.6	400.4	1.0005
199.8	199.0	1.0041

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	0.999839	*0.90 - 1.10*
Intercept	-0.113750	*+/-30*



SO2 Calibration Plot Date: September 12, 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:	September 11, 2023	Last Cal Date:	August 28, 2023
Start time (MST):	9:15	End time (MST):	14:50
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:	1.000364	0.995649	Backgd or Offset:	2.29	2.26
Calibration intercept:	0.140000	0.279998	Coeff or Slope:	0.919	0.906

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	40.0	1.005
as found 3rd point	4980	19.6	20.0	20.1	1.005
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.3	----
high point	4921	78.4	80.0	79.9	1.001
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	81.0	0.988
SO2 Scrubber Check	4919	81.3	813.0	0.0	----
Date of last scrubber change:		December 17, 2021		Ave Corr Factor	0.997
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.5	Prev response:	80.16	*% change:	-2.1%
Baseline Corr 2nd AF pt:	39.8	AF Slope:	0.980934	AF Intercept:	0.419995
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999939		

* = > +/-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

TRS Calibration Summary

Version-11-2021

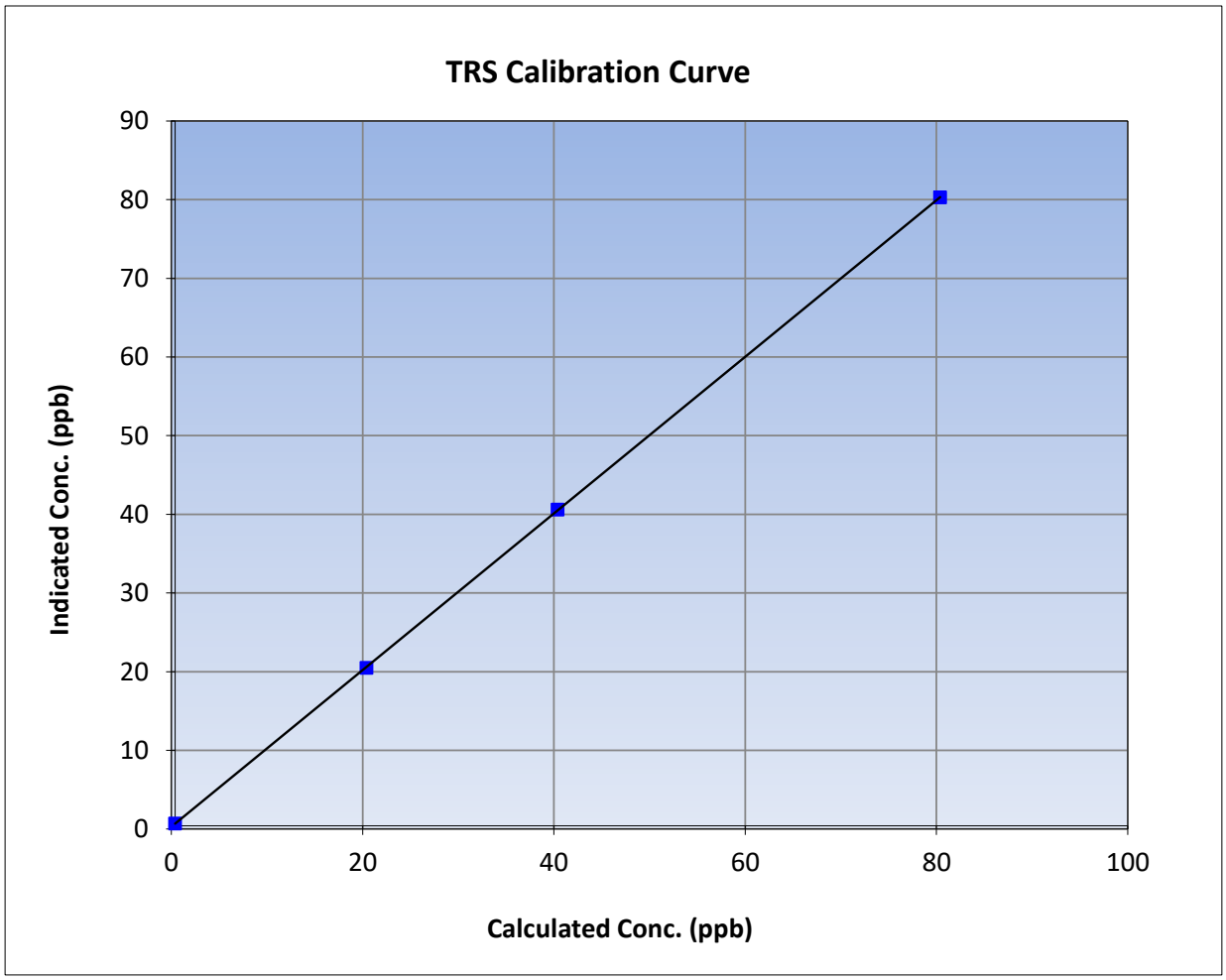
Station Information

Calibration Date:	September 11, 2023	Previous Calibration:	August 28, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:15	End Time (MST):	14:50
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153461

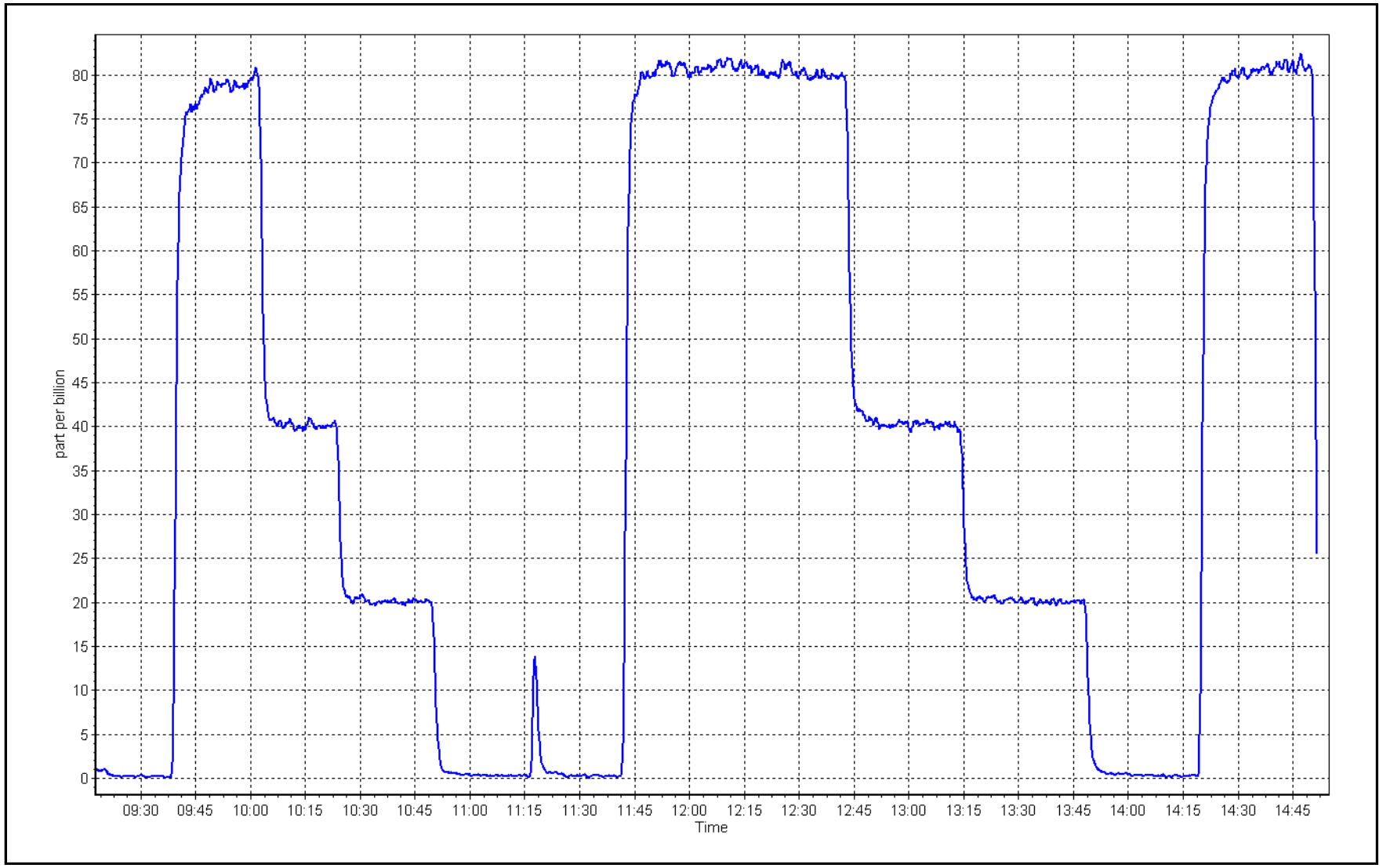
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
80.0	79.9	1.0012
40.0	40.2	0.9950
20.0	20.1	0.9949

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	0.995649	*0.90 - 1.10*
Intercept	0.279998	*+/-3*



TRS Calibration Plot Date: September 11, 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:	September 11, 2023	Last Cal Date:	August 28, 2023
Start time (MST):	9:15	End time (MST):	14:50
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:	1.003143	0.997856	Backgd or Offset:	1.74	1.70
Calibration intercept:	0.096765	0.156776	Coeff or Slope:	1.014	0.997

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4922	78.4	80.0	82.9	0.963
as found 2nd point	4960	39.2	40.0	41.5	0.961
as found 3rd point	4980	19.6	20.0	20.4	0.975
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	79.8	1.002
second point	4960	39.2	40.0	40.4	0.990
third point	4980	19.6	20.0	20.1	0.995
as left zero	5000	0.0	0.0	0.7	----
as left span	4922	78.4	80.0	77.7	1.029
SO2 Scrubber Check	4919	81.3	813.0	0.1	----
Date of last scrubber change:		March 21, 2022		Ave Corr Factor	0.996
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	83.0	Prev response:	80.31	*% change:	3.2%
Baseline Corr 2nd AF pt:	41.6	AF Slope:	1.039213	AF Intercept:	-0.183330
Baseline Corr 3rd AF pt:	20.5	AF Correlation:	0.999984		

* = > +/-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

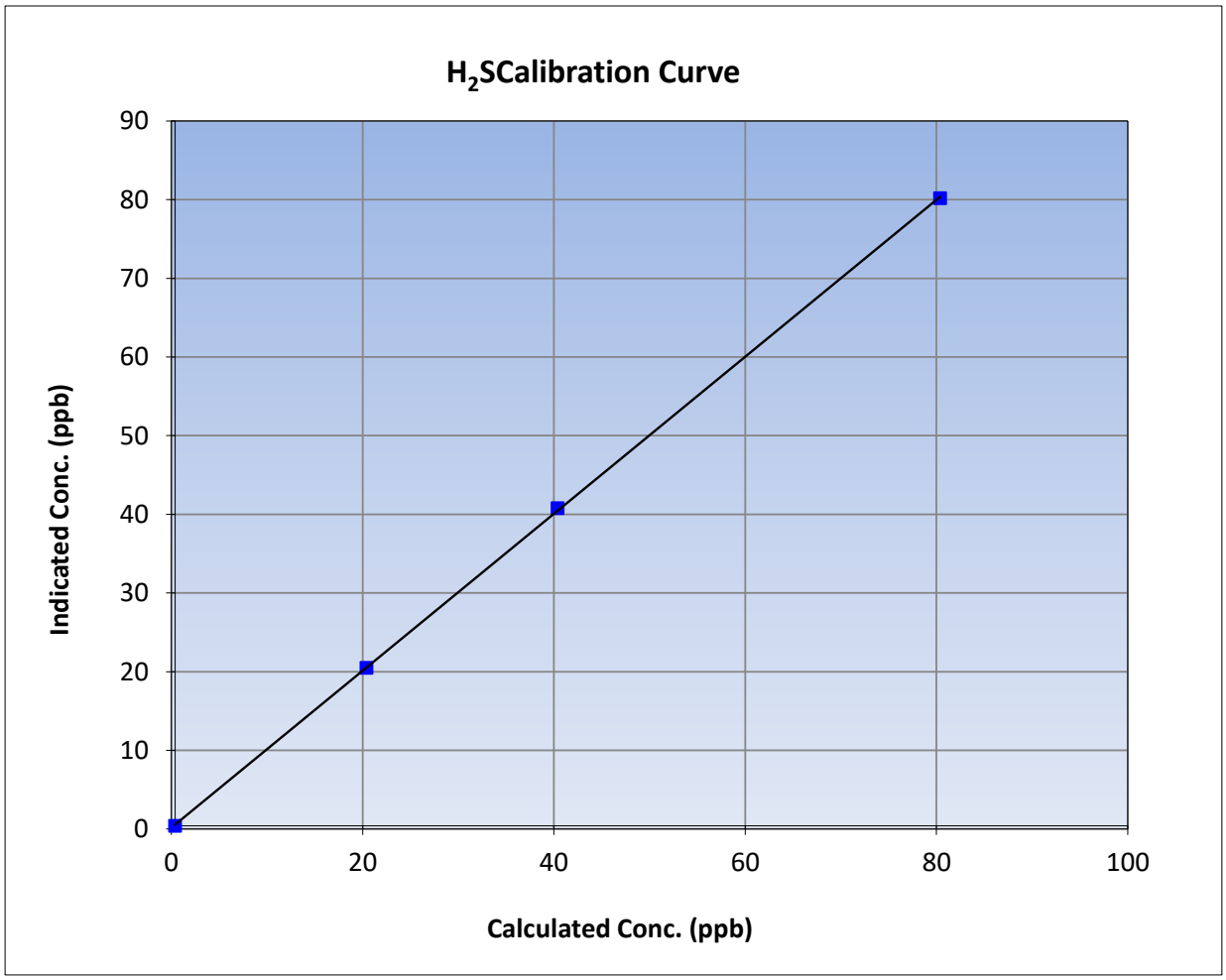
Station Information

Calibration Date:	September 11, 2023	Previous Calibration:	August 28, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:15	End Time (MST):	14:50
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1200326167

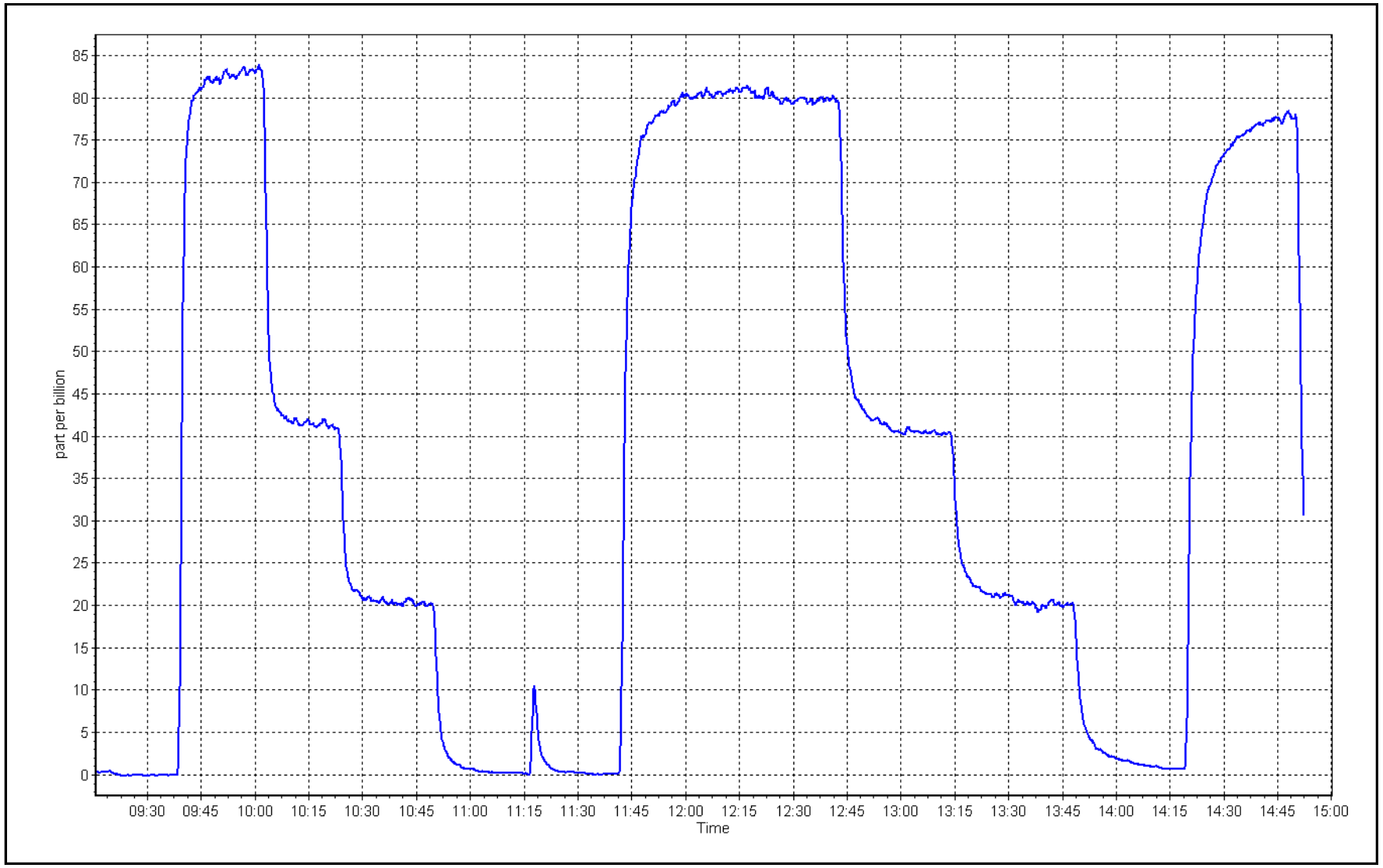
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	79.8	1.0022
40.0	40.4	0.9901
20.0	20.1	0.9949

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999954	*≥0.995*
Slope	0.997856	*0.90 - 1.10*
Intercept	0.156776	*+/-3*



H_2S Calibration Plot Date: September 11, 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:	September 12, 2023	Last Cal Date:	August 1, 2023
Start time (MST):	9:52	End time (MST):	13:11
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:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.2	ppm	CH4 Equiv Conc.	1061.8	ppm
Removed C3H8 Conc.	205.3	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	3565	
ZAG make/model:	Teledyne API T701		Serial Number:	5609	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320040	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.91E-04	2.97E-04	NMHC SP Ratio:	6.33E-05	6.42E-05
CH4 Retention time:	14.6	14.6	NMHC Peak Area:	145218	143189

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	17.27	17.04	1.013
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4918	81.3	17.27	17.23	1.002
second point	4959	40.7	8.64	8.50	1.017
third point	4980	20.3	4.31	4.23	1.020
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	1.013

Baseline Corr AF:	17.04	Prev response	17.18	*% 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	9.18	9.09	1.010
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4918	81.3	9.18	9.15	1.003
second point	4959	40.7	4.60	4.56	1.008
third point	4980	20.3	2.29	2.29	1.003
as left zero	5000	0	0.00	0.00	----
as left span	4918	81.3	9.18	9.19	0.999
				Average Correction Factor	1.005
Baseline Corr AF:	9.09	Prev response	9.15	*% 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	4918	81.3	8.09	7.95	1.017
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4918	81.3	8.09	8.08	1.001
second point	4959	40.7	4.05	3.94	1.028
third point	4980	20.3	2.02	1.94	1.039
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	8.09	8.09	1.000
				Average Correction Factor	1.023
Baseline Corr AF:	7.95	Prev response	8.03	*% change	-1.0%
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:	0.997017	0.998565
THC Cal Offset:	-0.038093	-0.056289
CH4 Cal Slope:	0.999108	1.000577
CH4 Cal Offset:	-0.047957	-0.051154
NMHC Cal Slope:	0.995361	0.996780
NMHC Cal Offset:	0.009863	-0.004336

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

THC Calibration Summary

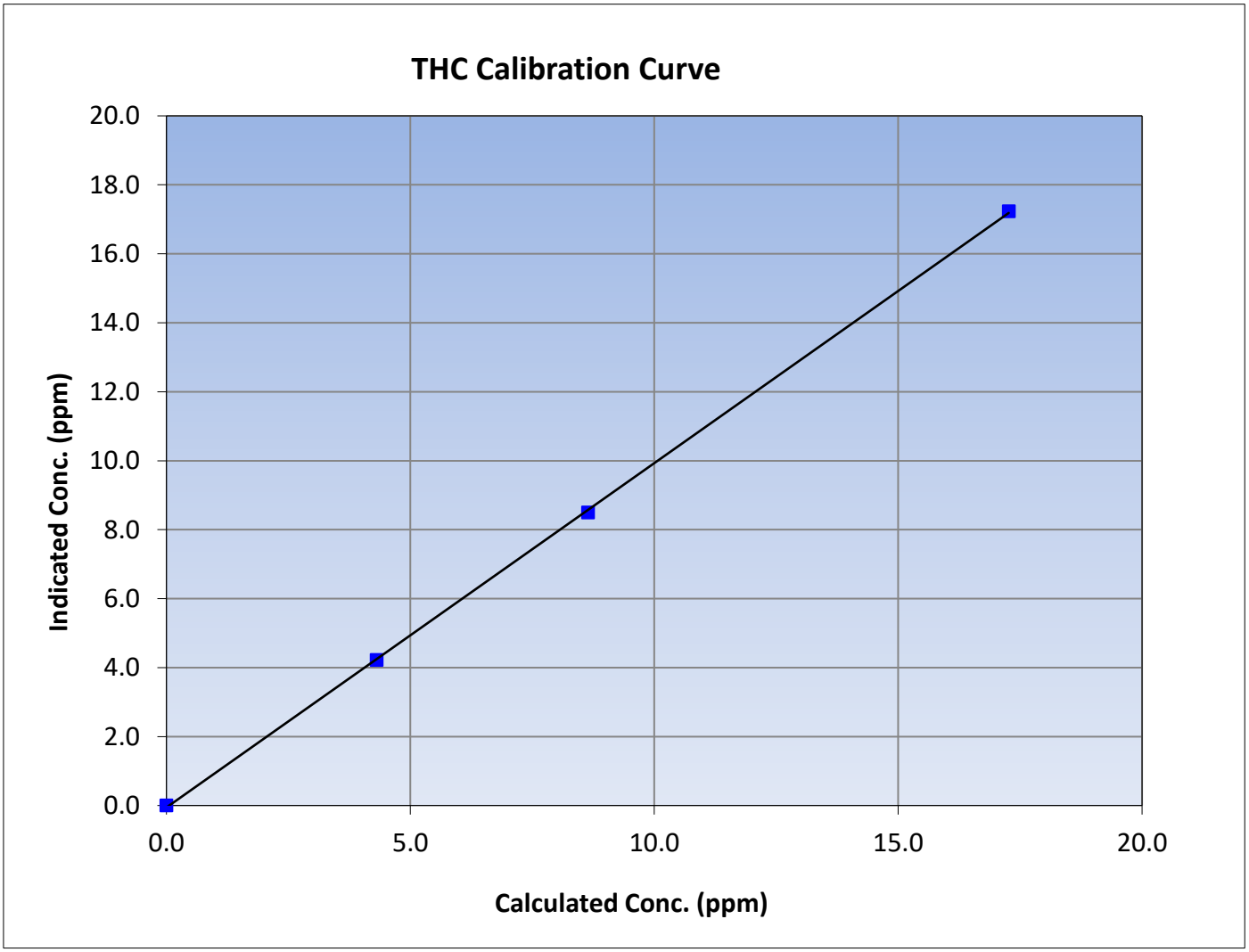
Version-01-2020

Station Information

Calibration Date:	September 12, 2023	Previous Calibration:	August 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:52	End Time (MST):	13:11
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	0.999926	≥0.995
17.27	17.23	1.0021			
8.64	8.50	1.0174	Slope	0.998565	0.90 - 1.10
4.31	4.23	1.0201			
			Intercept	-0.056289	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

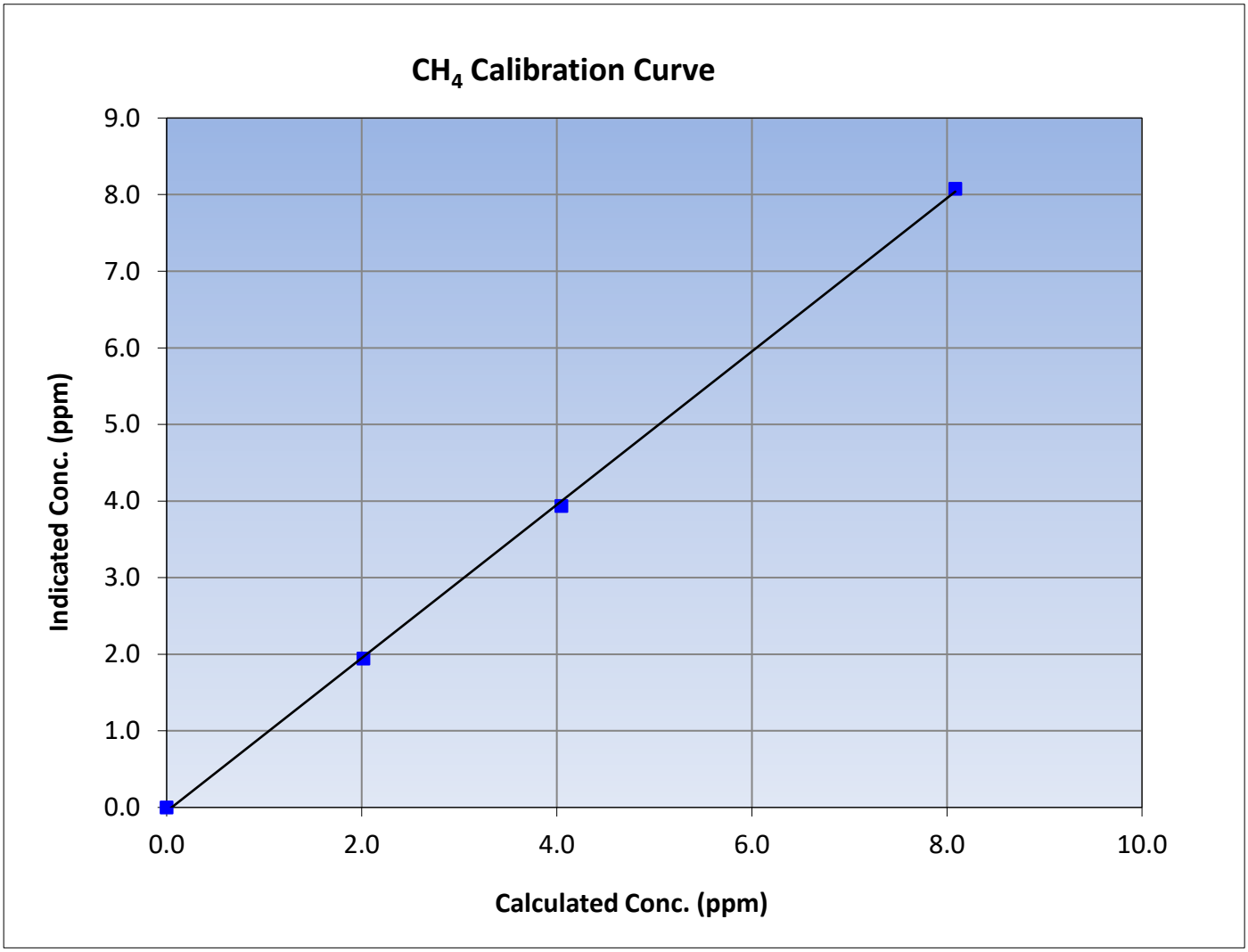
Version-01-2020

Station Information

Calibration Date:	September 12, 2023	Previous Calibration:	August 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:52	End Time (MST):	13:11
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	0.999758	*≥0.995*
8.09	8.08	1.0011			
4.05	3.94	1.0283	Slope	1.000577	*0.90 - 1.10*
2.02	1.94	1.0395			
			Intercept	-0.051154	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

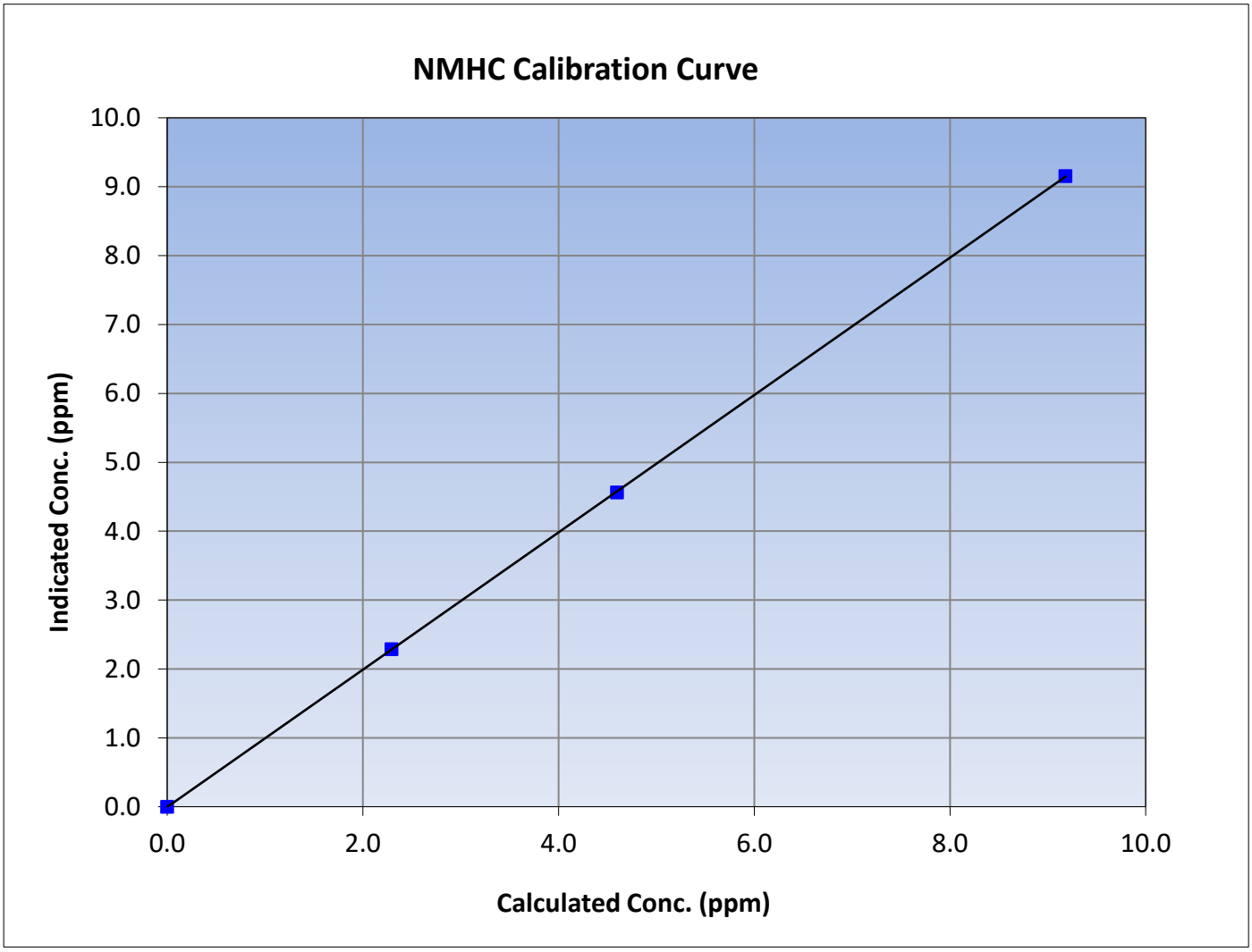
Version-01-2020

Station Information

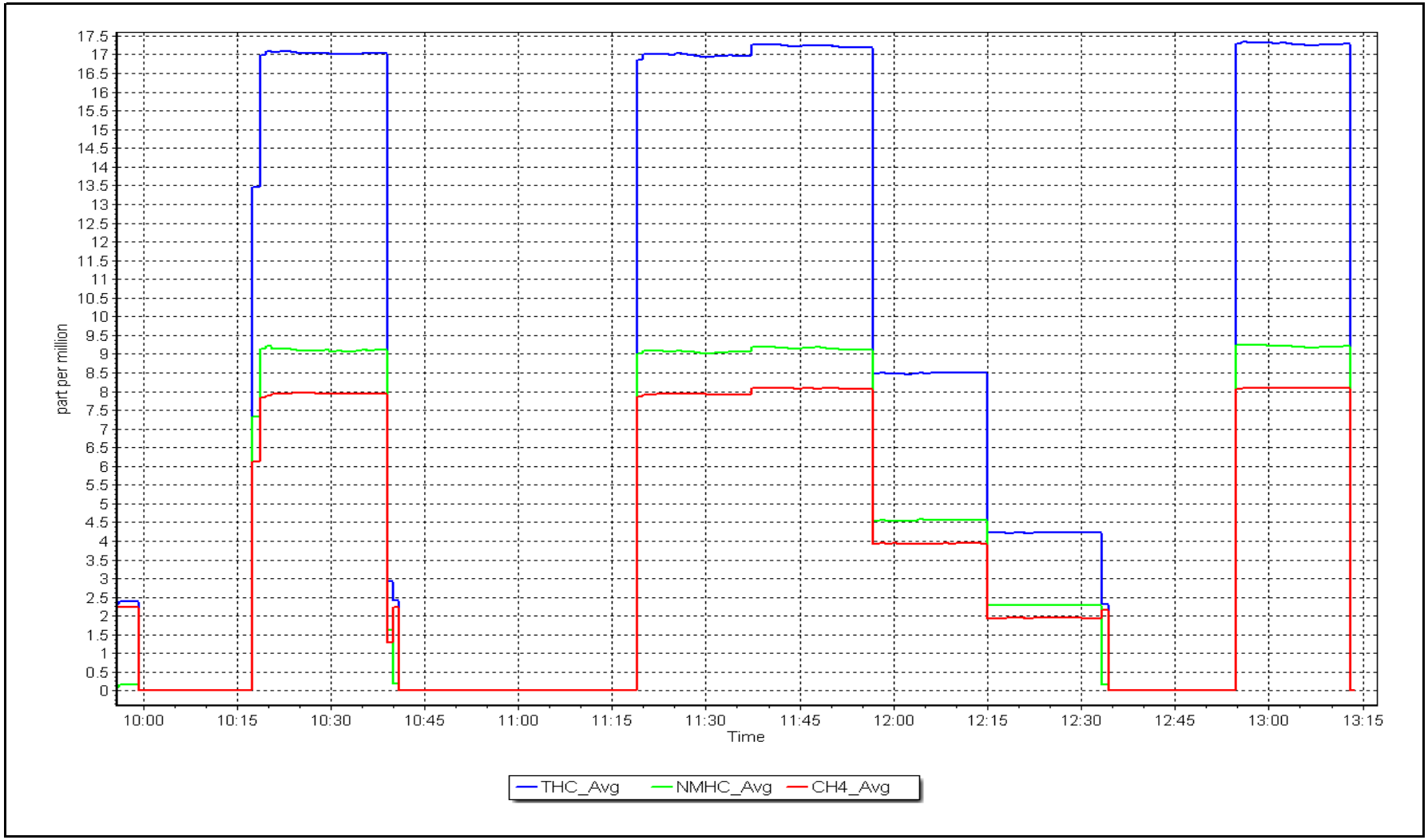
Calibration Date:	September 12, 2023	Previous Calibration:	August 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:52	End Time (MST):	13:11
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320040

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999993	*≥0.995*
9.18	9.15	1.0030			
4.60	4.56	1.0076	Slope	0.996780	*0.90 - 1.10*
2.29	2.29	1.0031			
			Intercept	-0.004336	*+/-0.5*



NMHC Calibration Plot Date: September 12, 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:	September 6, 2023	Last Cal Date:	August 25, 2023
Start time (MST):	9:57	End time (MST):	14:43
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:	1.348	1.357	NO bkgnd or offset:	6.9	7.0
NOX coeff or slope:	0.992	0.991	NOX bkgnd or offset:	7.1	7.7
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	189.5	188.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000155	0.999396
NO_X Cal Offset:	-0.260000	-0.540000
NO Cal Slope:	0.998858	0.999215
NO Cal Offset:	-1.280000	-1.080000
NO_2 Cal Slope:	1.001610	1.001909
NO_2 Cal Offset:	0.629963	-0.228647

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.4	0.0	0.4	----	----
as found span	4920	80.0	813.4	800.6	12.8	809.0	789.2	19.8	1.0055	1.0145
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	80.0	813.4	800.6	12.8	812.7	799.6	13.0	1.0009	1.0013
second point	4960	40.0	406.7	400.3	6.4	405.5	398.1	7.5	1.0030	1.0056
third point	4980	20.0	203.4	200.2	3.2	202.4	197.9	4.5	1.0047	1.0114
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.2	0.0	----	----
as left span	4920	80.0	813.4	402.2	411.2	813.3	403.7	409.5	1.0002	0.9964
								Average Correction Factor	1.0029	1.0061

Corrected As found	NO_X = 808.6 ppb	NO = 789.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.6%
Previous Response	NO_X = 813.3 ppb	NO = 798.4 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)	797.7	399.3	411.2	411.8	0.9985	100.1%
2nd GPT point (200 ppb O3)	797.7	595.2	215.3	215.5	0.9991	100.1%
3rd GPT point (100 ppb O3)	797.7	696.0	114.5	114.3	1.0017	99.8%
				Average Correction Factor	0.9998	100.0%

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

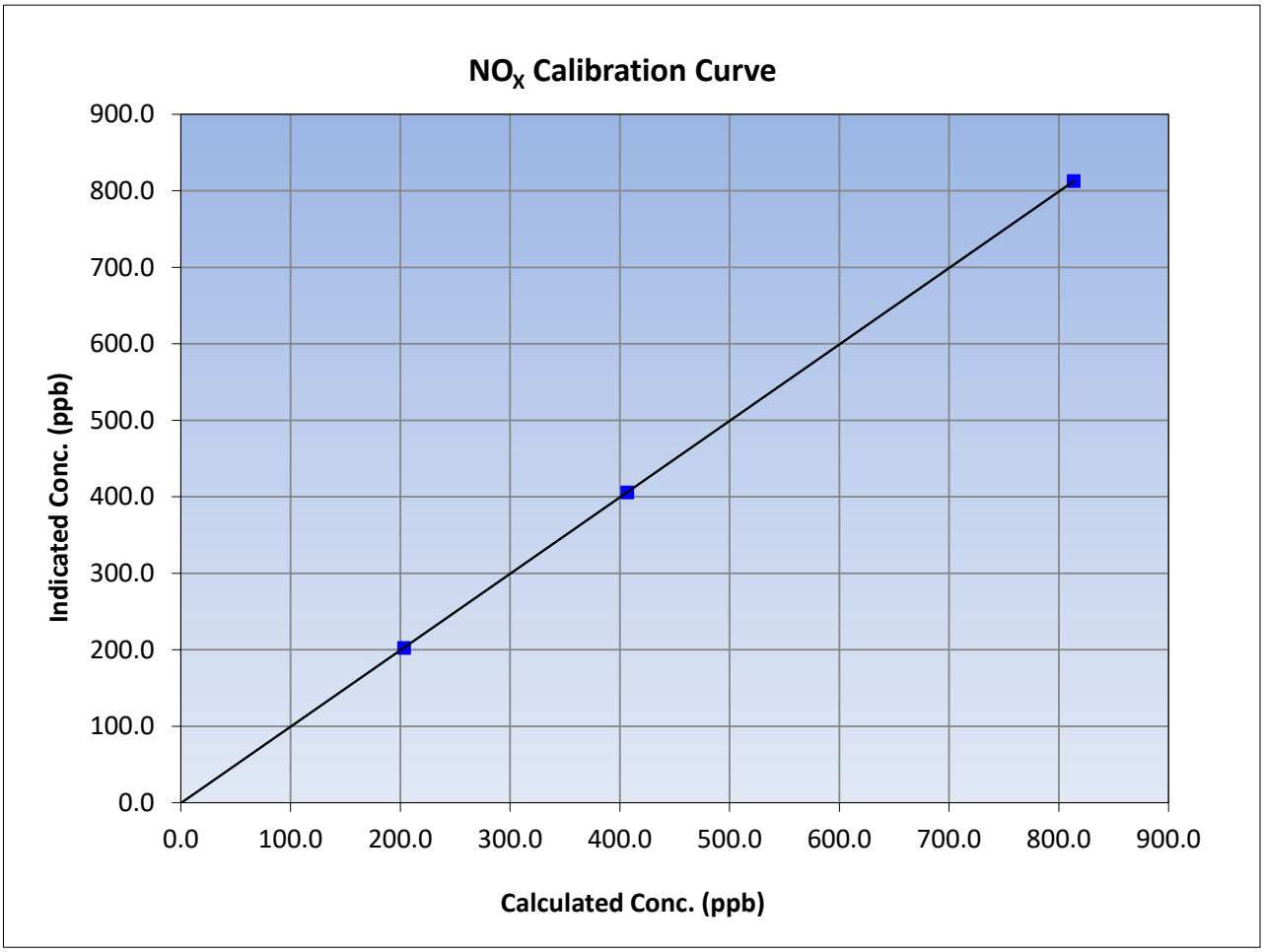
Version-04-2020

Station Information

Calibration Date:	September 6, 2023	Previous Calibration:	August 25, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:57	End Time (MST):	14:43
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	812.7	1.0009			
406.7	405.5	1.0030	Slope	0.999396	0.90 - 1.10
203.4	202.4	1.0047			
			Intercept	-0.540000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

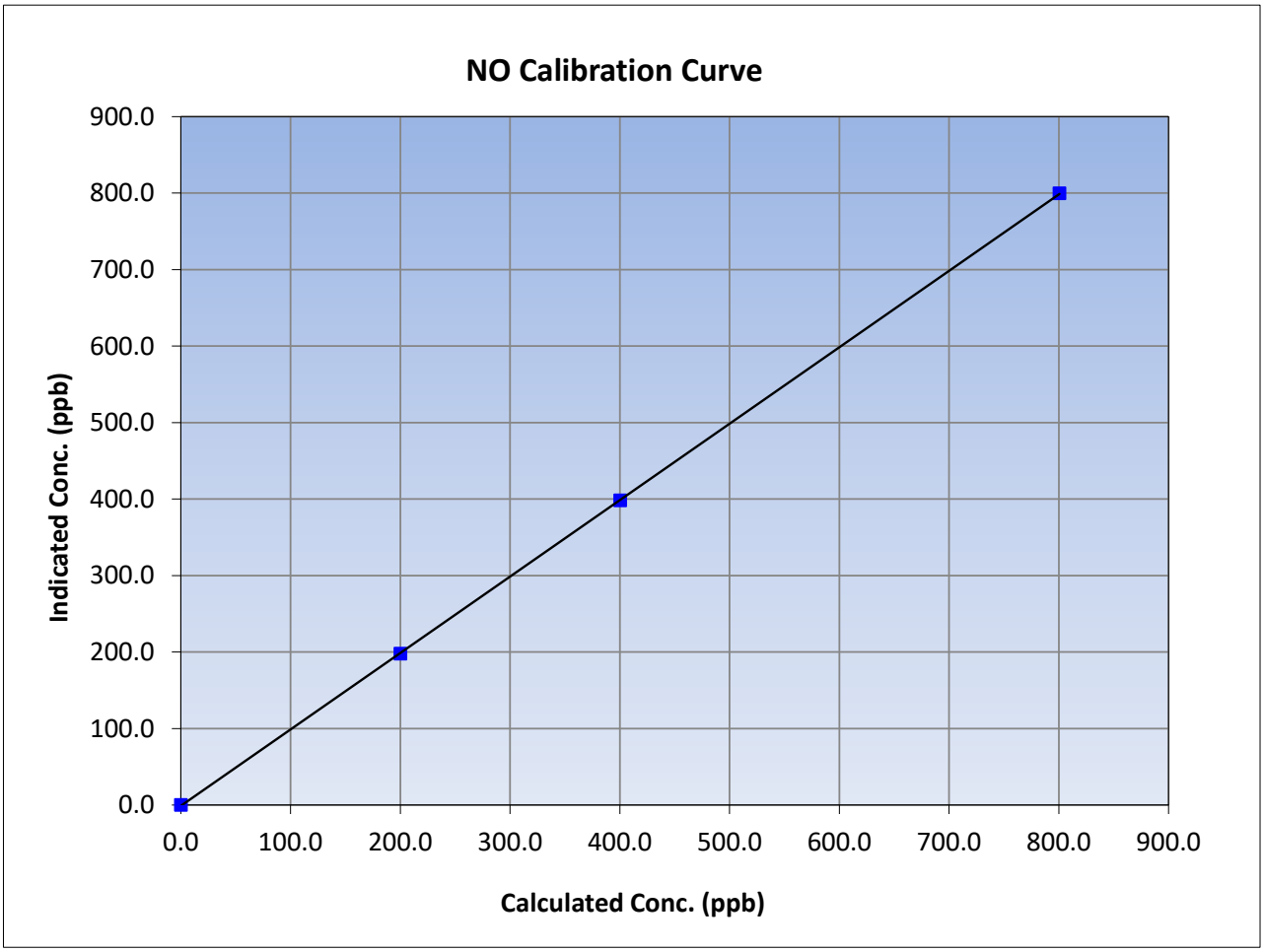
Version-04-2020

Station Information

Calibration Date:	September 6, 2023	Previous Calibration:	August 25, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:57	End Time (MST):	14:43
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	0.999990	≥0.995
800.6	799.6	1.0013			
400.3	398.1	1.0056	Slope	0.999215	0.90 - 1.10
200.2	197.9	1.0114			
			Intercept	-1.080000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

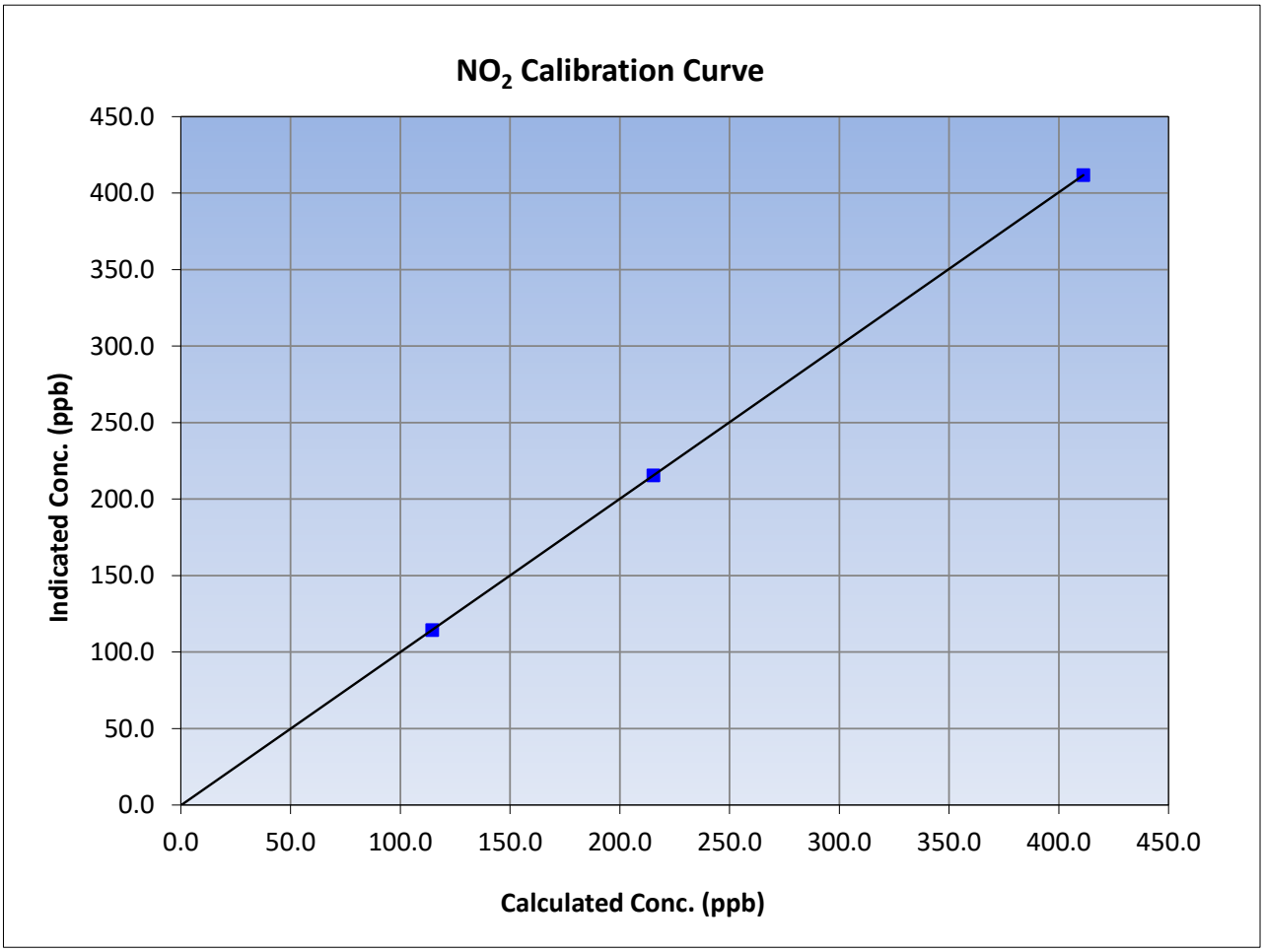
Version-04-2020

Station Information

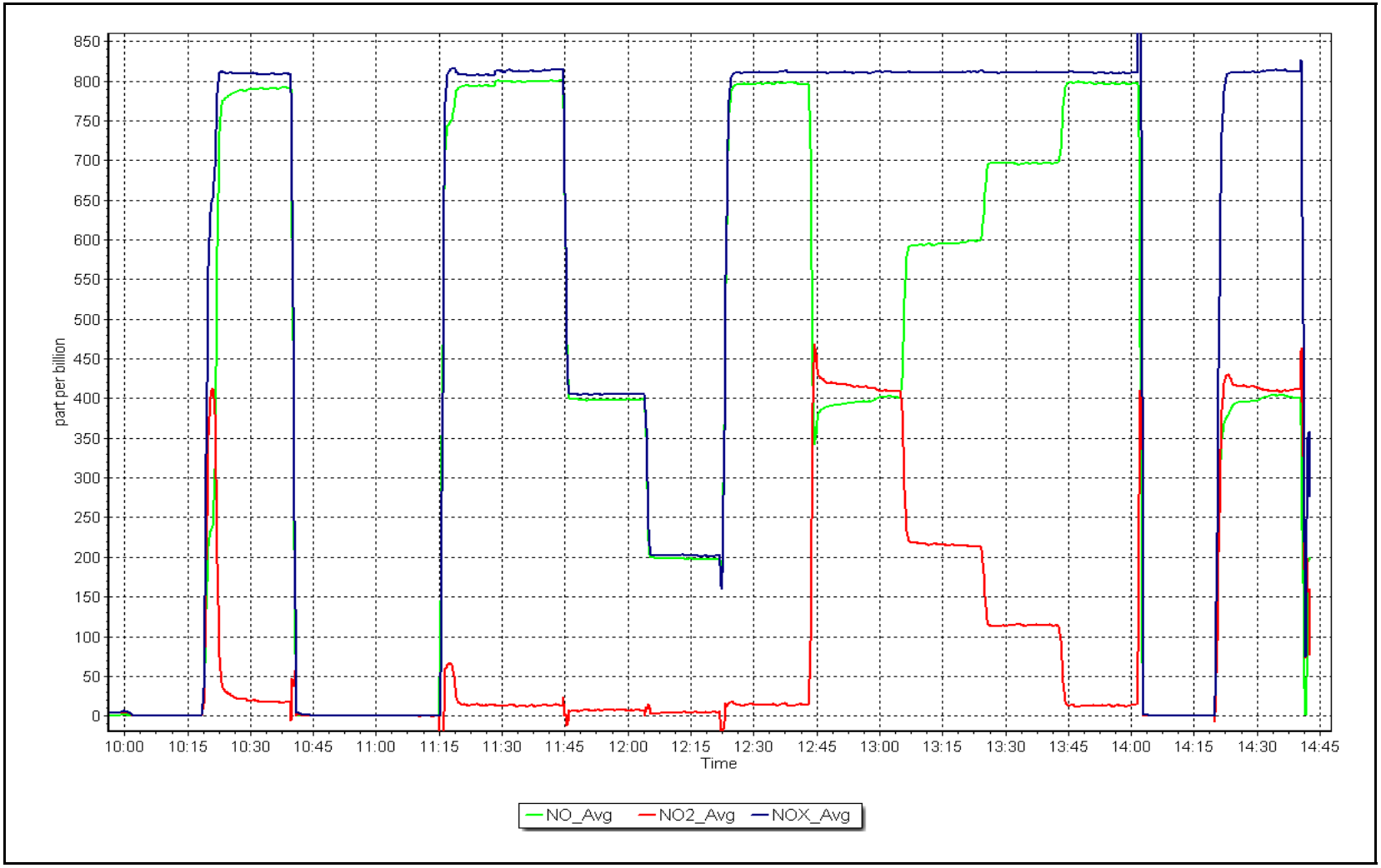
Calibration Date:	September 6, 2023	Previous Calibration:	August 25, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:57	End Time (MST):	14:43
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999999	≥0.995
411.2	411.8	0.9985			
215.3	215.5	0.9991	Slope	1.001909	0.90 - 1.10
114.5	114.3	1.0017			
			Intercept	-0.228647	+/-20



NO_X Calibration Plot Date: September 6, 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:	September 1, 2023	Last Cal Date:	August 10, 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:	1.001743	0.999943	Backgd or Offset:	3.2	3.2
Calibration intercept:	-0.080000	0.060000	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	-0.1	----
as found span	5000	863.1	400.0	400.3	0.999
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	863.1	400.0	400.0	1.000
second point	5000	742.5	200.0	200.1	1.000
third point	5000	651.7	100.0	100.1	0.999
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	863.1	400.0	404.4	0.989
				Average Correction Factor	1.000

Baseline Corr As found:	400.4	Previous response	400.6	*% change	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: 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

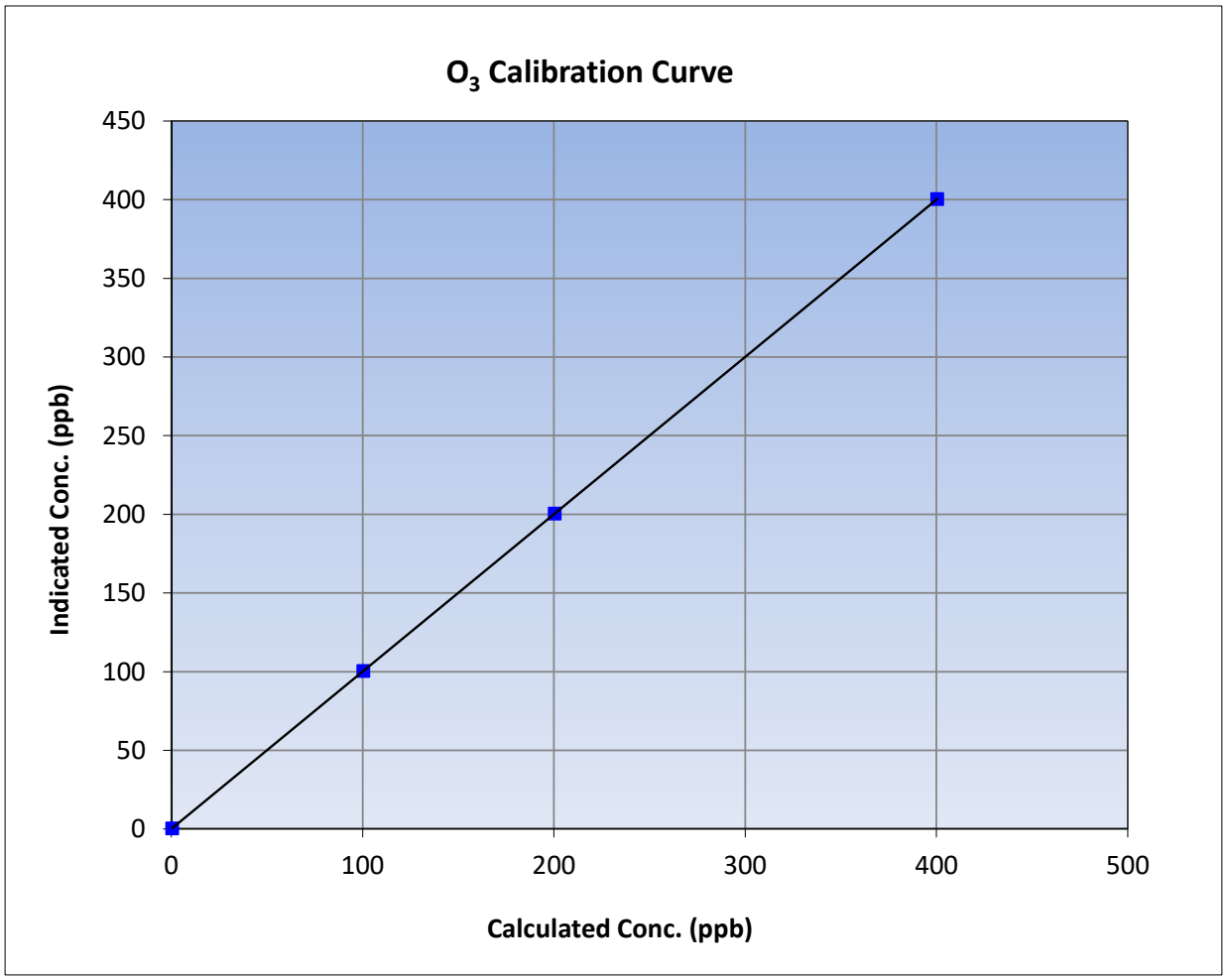
Station Information

Calibration Date:	September 1, 2023	Previous Calibration:	August 10, 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

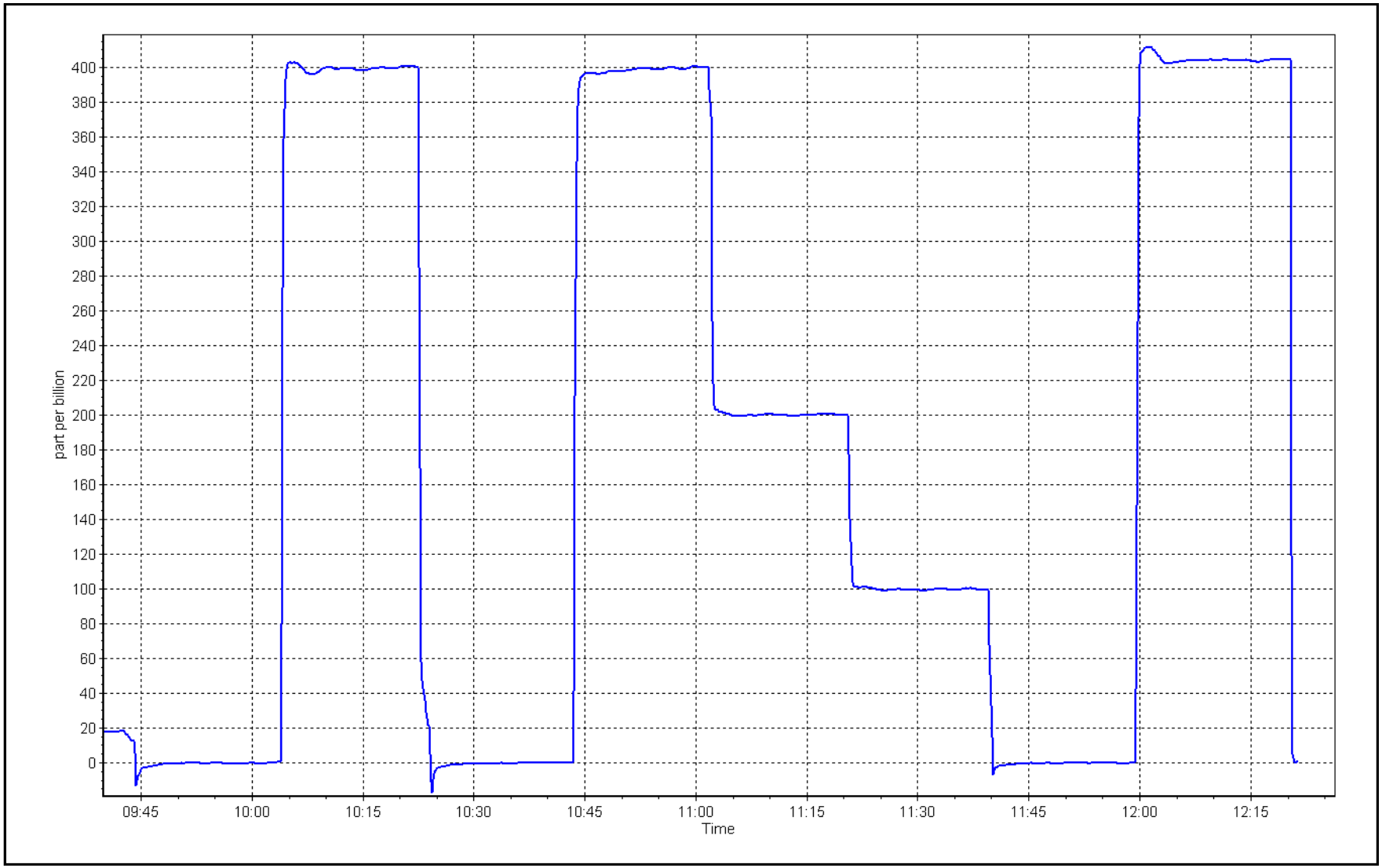
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
400.0	400.0	1.0000
200.0	200.1	0.9995
100.0	100.1	0.9990

Statistical Evaluation		*Limits*
Correlation Coefficient	1.000000	*≥0.995*
Slope	0.999943	*0.90 - 1.10*
Intercept	0.060000	*+/- 5*



O_3 Calibration Plot Date: September 1, 2023 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Fort McKay - Bertha Ganter	Station number:	AMS 01
Calibration Date:	September 14, 2023	Last Cal Date:	August 23, 2023
Start time (MST):	9:51	End time (MST):	11:18
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)	17.1	16.1	17.1	☐	+/- 2 °C
P (mmHg)	736.3	735	736.3	☐	+/- 10 mmHg
flow (LPM)	5.01	5.12	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: September 14, 2023 Last Cal Date: August 23, 2023

PM w/o HEPA: 70.1 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	10.5	11.1	11.1	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 75.3 w/ HEPA: 0

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

Disposable Filter Changed: September 14, 2023

Annual Maintenance

Date Sample Tube Cleaned: September 14, 2023

Date RH/T Sensor Cleaned: September 14, 2023

Notes: Flow, temperature, and pressure all within limits. Leak checks passed. Displosable filter changed. PMT peak test verified. Optical chamber and RH/T sensor cleaned. Sample tube 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:	September 14, 2023	Last Cal Date:	August 21, 2023
Start time (MST):	9:28	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:	1.001990	1.000977	Backgd or Offset:	-0.012	-0.012
Calibration intercept:	0.159827	0.127800	Coeff or Slope:	0.992	0.990

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4933	66.7	40.6	40.9	0.992
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4933	66.7	40.6	40.6	0.999
second point	4966	33.3	20.2	20.6	0.982
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	1.011
				Average Correction Factor	0.989

Baseline Corr As found:	40.81	Prev response:	40.80	*% 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 both zero and span.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

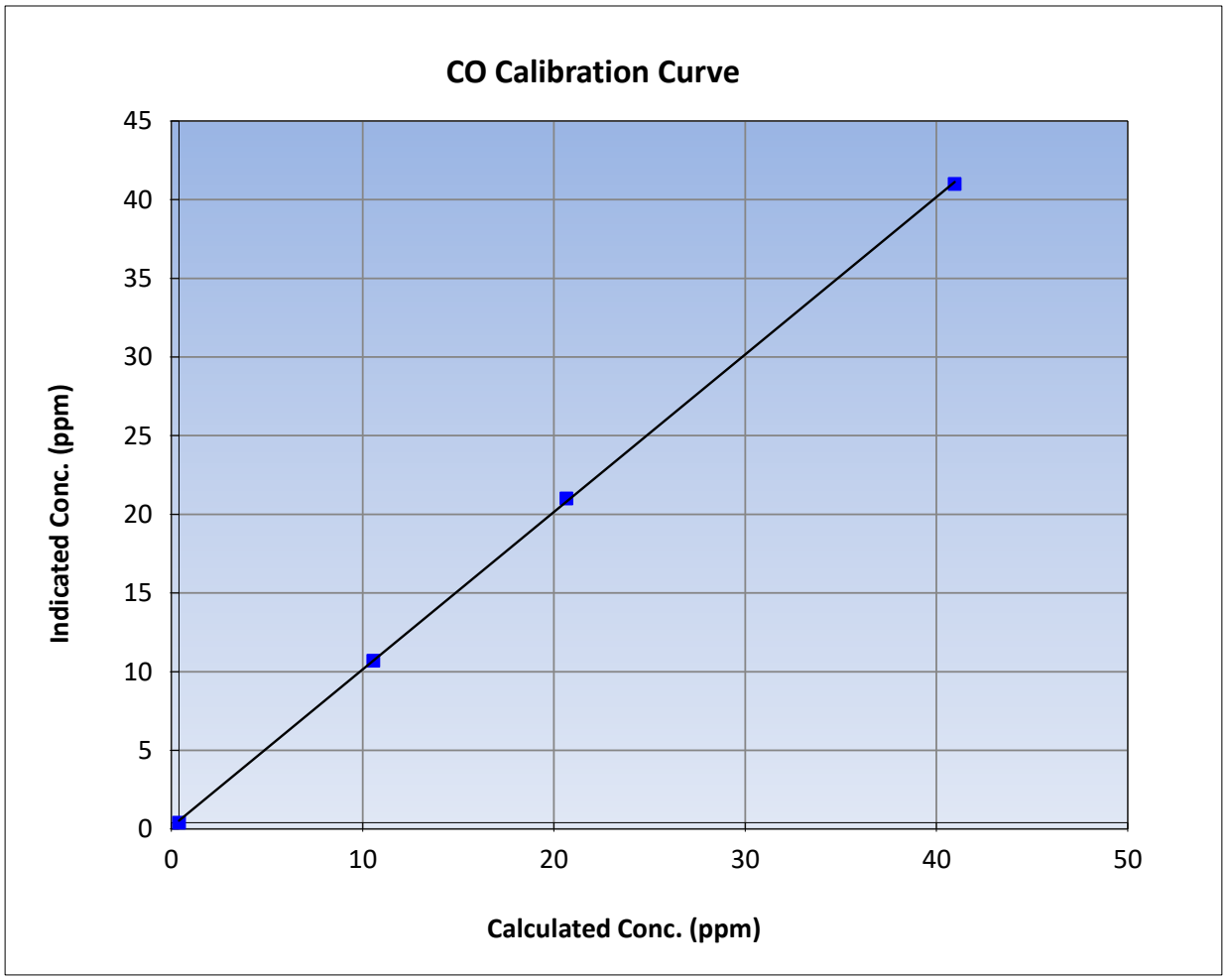
Station Information

Calibration Date:	September 14, 2023	Previous Calibration:	August 21, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:28	End Time (MST):	13:07
Analyzer make:	Teledyne API T300	Analyzer serial #:	3520

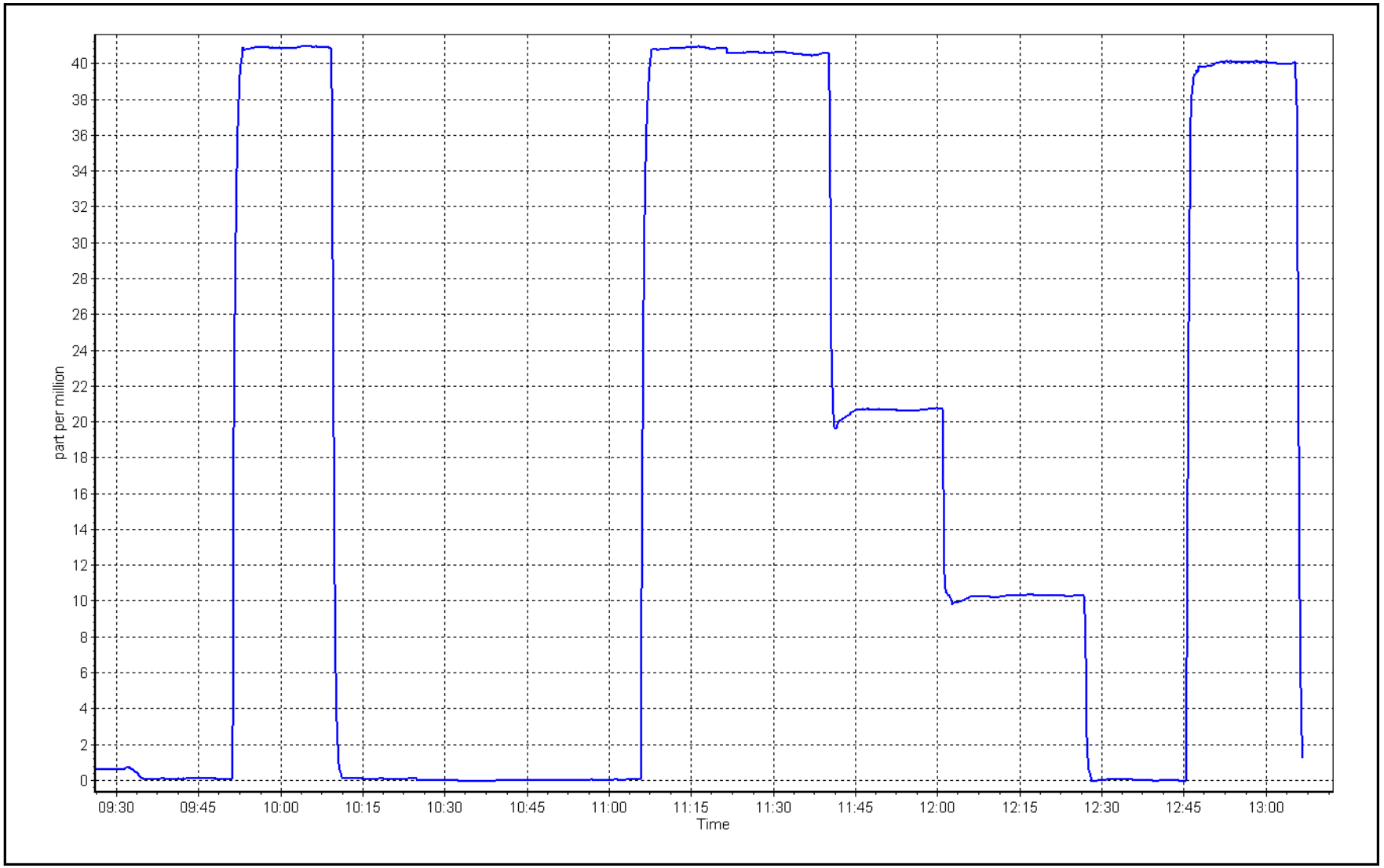
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.6	40.6	0.9987
20.2	20.6	0.9820
10.2	10.3	0.9858

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999915	*≥0.995*
Slope	1.000977	*0.90 - 1.10*
Intercept	0.127800	*+/-1.5*



CO Calibration Plot Date: September 14, 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:	September 5, 2023	Last Cal Date:	August 11, 2023
Start time (MST):	9:56	End time (MST):	13:23
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:	1.000529	1.001868	Backgd or Offset:	0.045	0.045
Calibration intercept:	-5.380000	-5.320000	Coeff or Slope:	0.874	0.875

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	1596.2	1.006
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	1605.8	1.000
second point	2960	40.0	802.7	795.9	1.009
third point	2980	20.0	401.3	391.5	1.025
as left zero	3000	0.0	0.0	0.0	----
as left span	2960	40.0	802.7	784.7	1.023
				Average Correction Factor	1.011

Baseline Corr As found:	1596.40	Prev response:	1600.80	*% change:	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

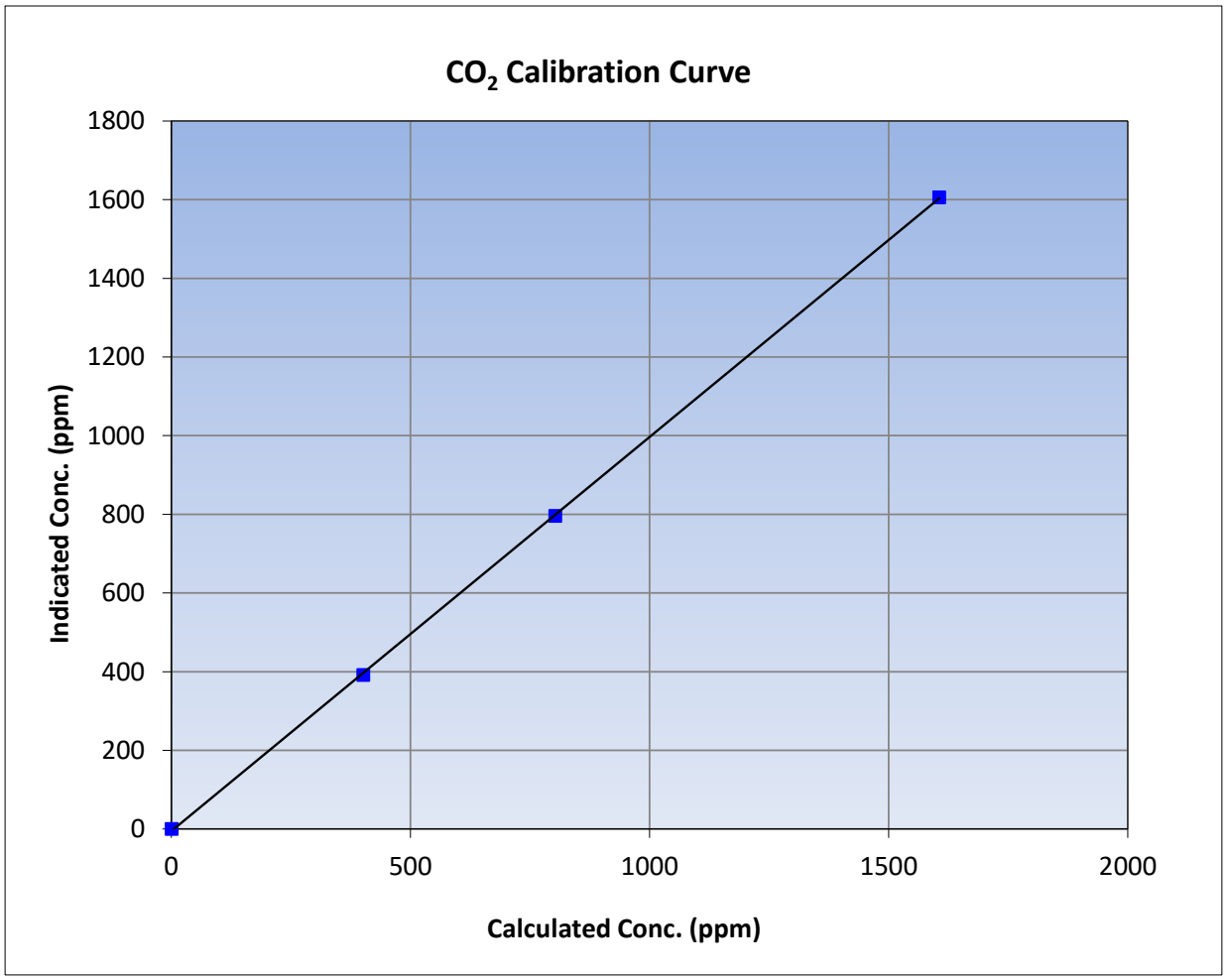
Station Information

Calibration Date	September 5, 2023	Previous Calibration	August 11, 2023
Station Name	Bertha Ganter-Fort McKay	Station Number	AMS01
Start Time (MST)	9:56	End Time (MST)	13:23
Analyzer make	Teledyne API 360	Analyzer serial #	442

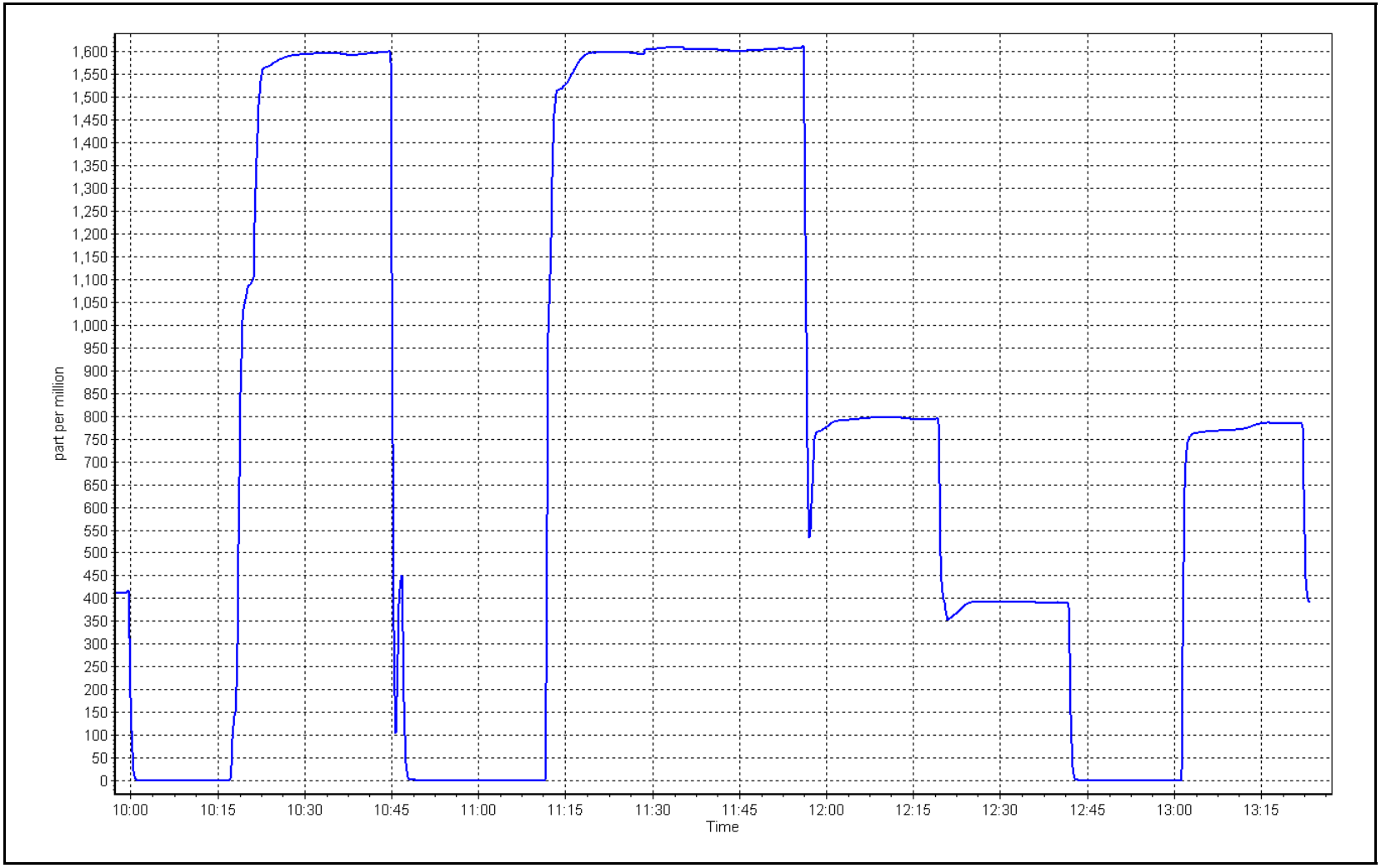
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
1605.3	1605.8	0.9997
802.7	795.9	1.0085
401.3	391.5	1.0251

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999948	*≥0.995*
Slope	1.001868	*0.90 - 1.10*
Intercept	-5.320000	*+/-10*



CO_2 Calibration Plot Date: September 5, 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:	September 7, 2023	Last Cal Date:	August 23, 2023
Start time (MST):	9:23	End time (MST):	14:39
NH3 Cal Date:	September 8, 2023	Last Cal Date:	August 23, 2023
Start time (MST):	9:21	End time (MST):	13:30
Reason:	Routine		

Calibration Standards

NOX Cal Gas Conc:	50.84	ppm	NO Gas Cylinder #:	T2Y1P9L
NO Cal Gas Conc:	50.04	ppm	NO Cal Gas Expiry:	March 3, 2028
Removed NOX Conc:	50.84	ppm	Removed Cylinder #:	NA
Removed NO Conc:	50.04	ppm	Removed cyl Expiry:	NA
NOX gas Diff:			NO gas Diff:	
NH3 Cal Gas Conc:	74.90	ppm	NH3 Gas Cylinder #:	CC744566
			NH3 Cal Gas Expiry:	December 21, 2023
Removed NH3 Conc:	74.90	ppm	Removed Cylinder #:	NA
NH3 gas Diff:			Removed cyl Expiry:	NA
Calibrator Model:	Teledyne API T700		Serial Number:	3565
ZAG make/model:	Teledyne API T701		Serial Number:	5609

Analyzer Information

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

	Start	*Finish*		*Start*	*Finish*
NO coefficient:	0.987	0.996	TN coefficient:	0.989	1.001
NOX coefficient:	0.987	0.999	NO bkgrnd:	-0.9	-0.9
NO2 coefficient:	1.000	1.000	NOX bkgrnd:	-0.3	-0.3
NH3 coefficient:	0.973	0.995	TN bkgrnd:	1.2	1.2

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	0.998131	0.999916
NO_X Cal Offset:	-2.040000	-2.000000
NO Cal Slope:	0.998944	0.999929
NO Cal Offset:	-2.460000	-2.380000
NO_2 Cal Slope:	0.999734	0.997369
NO_2 Cal Offset:	0.074243	0.086604
NH3 Cal Slope:	1.003610	1.003196
NH3 Cal Offset:	0.576979	-1.081485
TN Cal Slope:	1.006104	1.005635
TN Cal Offset:	0.744017	-0.793819

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	-0.3	-0.3	0.0	----	----
as found NO	4920	80.0	813.4	813.4	----	816.0	815.0	0.9	0.997	----
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
high NO point	4920	80.0	813.4	813.4	----	812.9	813.0	-0.2	1.001	----
NO/O3 point	4920	80.0	813.4	813.4	----	814.1	811.0	3.6	0.999	----
as found NH3	3416	84.1	1799.7	----	1799.7	1844.9	----	1839.9	0.976	0.978
new NH3 cyl rp							----			
first NH3	3416	84.1	1799.7	----	1799.7	1809.9	----	1805.4	0.994	0.997
second NH3	3453	46.7	999.4	----	999.4	1003.0	----	1000.0	0.996	0.999
third NH3	3477	23.4	500.8	----	500.8	502.3	----	500.7	0.997	1.000
								Average Correction Factor	0.9999	0.9988

Corrected As found TN = 816.3 ppb NO_X = 815.3 ppb NH3 = 1839.9 ppb *Percent Change TN = -0.3%

Previous Response TN = 819.1 ppb NO_X = 809.9 ppb NH3 = 1806.8 ppb *Percent Change NO_X = 0.7%

*Percent Change NH3 = 1.8%

* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 97.3%

NH3 Current Converter Efficiency = 99.5%

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	-0.4	-0.2	-0.6	----	----
as found span	4920	80.0	813.4	800.6	813.4	805.0	793.3	807.5	1.0105	1.0093
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.3	0.1	----	----
high point	4920	80.0	813.4	800.6	813.4	813.0	799.8	812.9	1.0005	1.0011
second point	4960	40.0	406.7	400.3	406.7	401.9	395.8	402.2	1.0120	1.0114
third point	4980	20.0	203.4	200.2	203.4	200.4	195.6	200.2	1.0148	1.0233
								Average Correction Factor	1.0091	1.0119

Baseline Corr As fnd	TN =	808.1 ppb	NO_X =	805.4 ppb	NO =	793.5 ppb	*Percent Change	TN = -1.4%
Previous Response	TN =	819.1 ppb	NO_X =	809.9 ppb	NO =	797.3 ppb	*Percent Change	NO_X = -0.6%
							*Percent Change	NO = -0.5%

* = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found zero	----	----	0.0	-0.2	----	----
calibration zero	----	----	0.0	-0.2	----	----
1st GPT point (400 ppb O3)	795.8	395.2	413.4	411.9	1.0036	99.6%
2nd GPT point (200 ppb O3)	795.8	595.5	213.1	213.8	0.9967	100.3%
3rd GPT point (100 ppb O3)	795.8	695.4	113.2	112.6	1.0053	99.5%
				Average Correction Factor	1.0019	99.8%

Notes: Changed the inlet filter after as founds. Adjusted NOx/NO/TN span. Adjusted NH3 span.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TN Calibration Summary

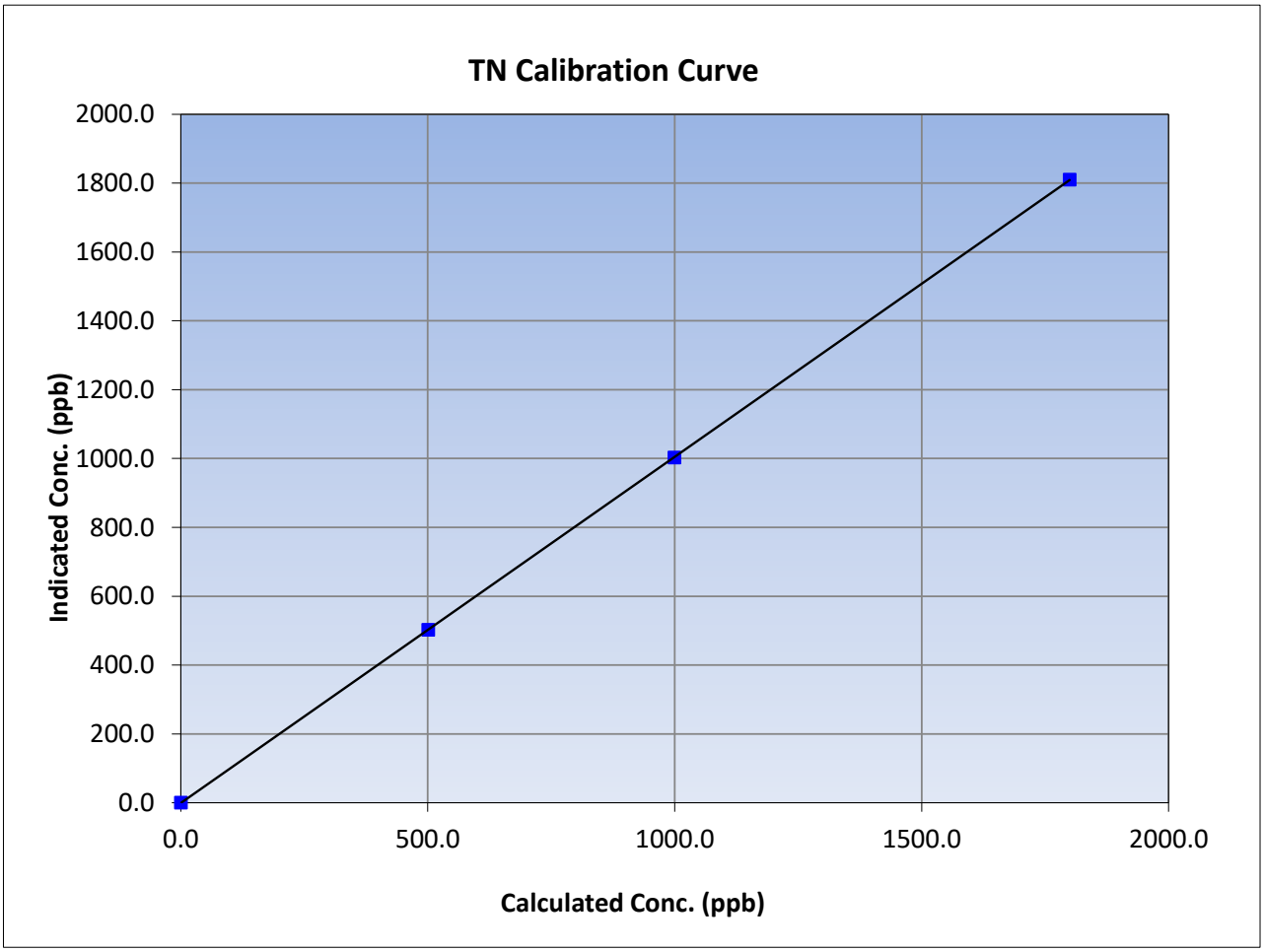
Version-05-2023

Station Information

Calibration Date:	September 8, 2023	Previous Calibration:	August 23, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:23	End Time (MST):	14:39
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	0.999998	≥0.995
1799.7	1809.9	0.9944			
999.4	1003.0	0.9964	Slope	1.005635	0.90 - 1.10
500.8	502.3	0.9969			
			Intercept	-0.793819	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

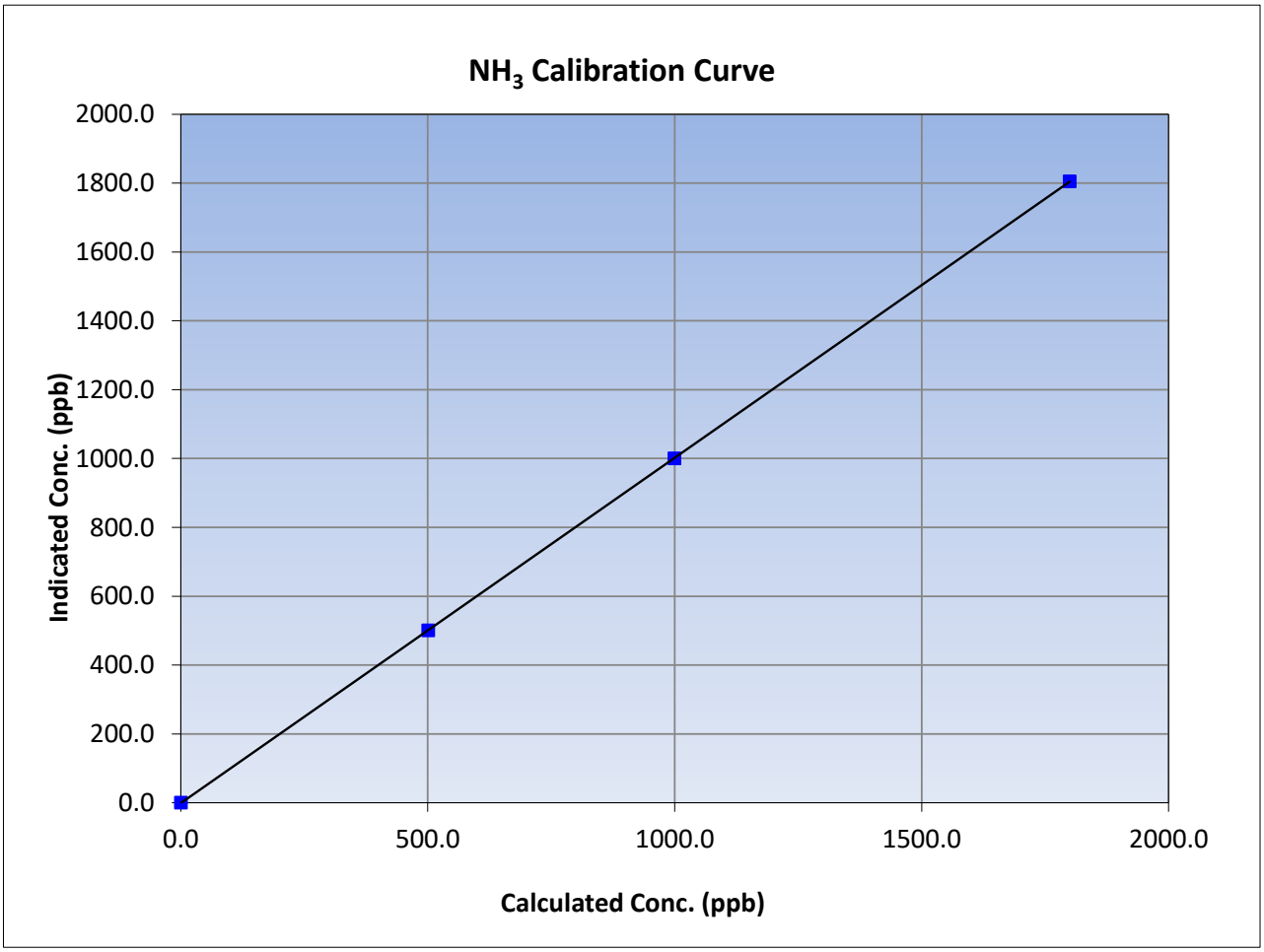
Version-05-2023

Station Information

Calibration Date:	September 8, 2023	Previous Calibration:	August 23, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:23	End Time (MST):	14:39
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	0.999997	≥0.995
1799.7	1805.4	0.9969			
999.4	1000.0	0.9994	Slope	1.003196	0.90 - 1.10
500.8	500.7	1.0001			
			Intercept	-1.081485	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

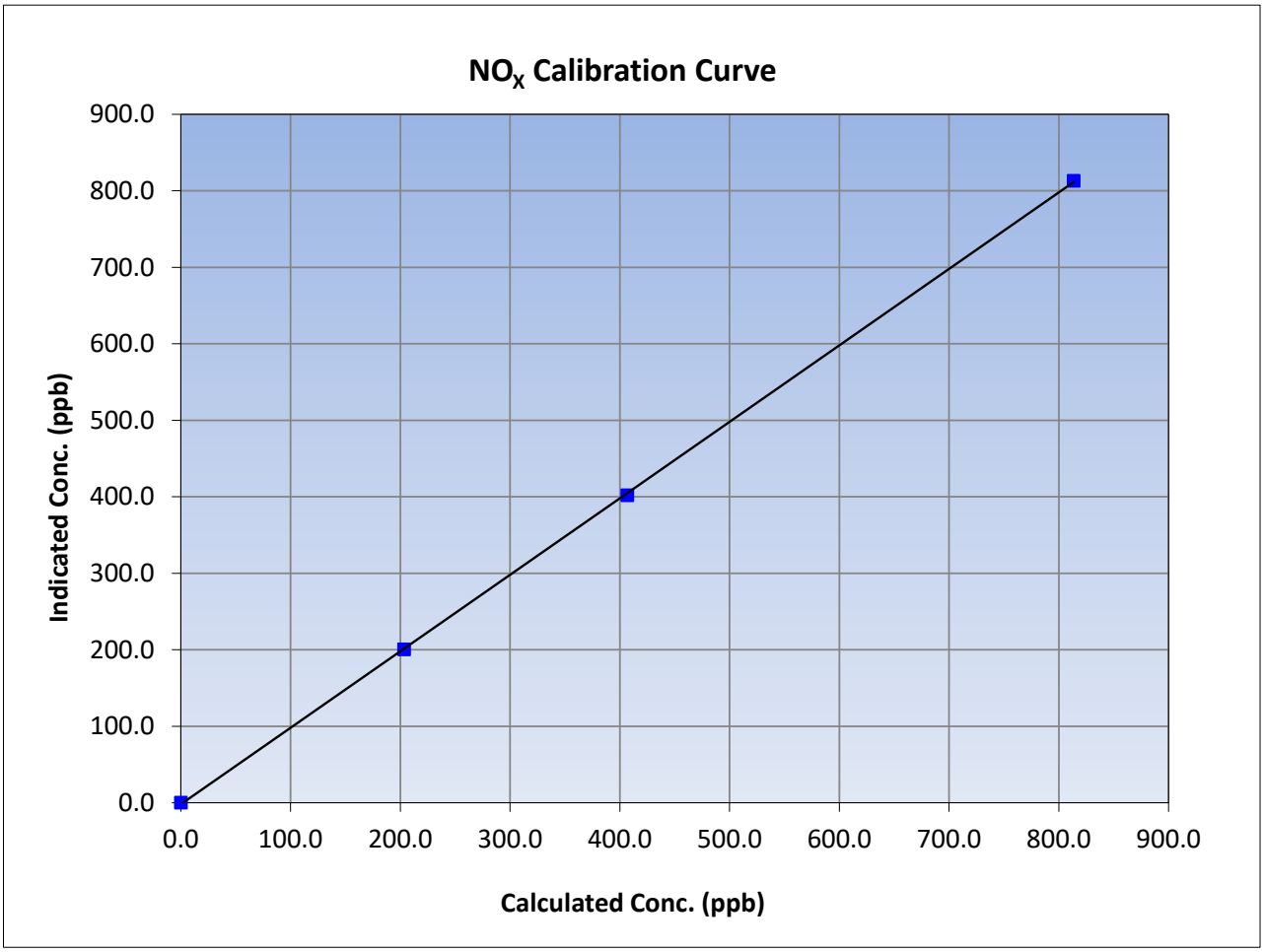
Version-05-2023

Station Information

Calibration Date:	September 7, 2023	Previous Calibration:	August 23, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:23	End Time (MST):	14:39
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	0.999957	≥0.995
813.4	813.0	1.0005			
406.7	401.9	1.0120	Slope	0.999916	0.90 - 1.10
203.4	200.4	1.0148			
			Intercept	-2.000000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

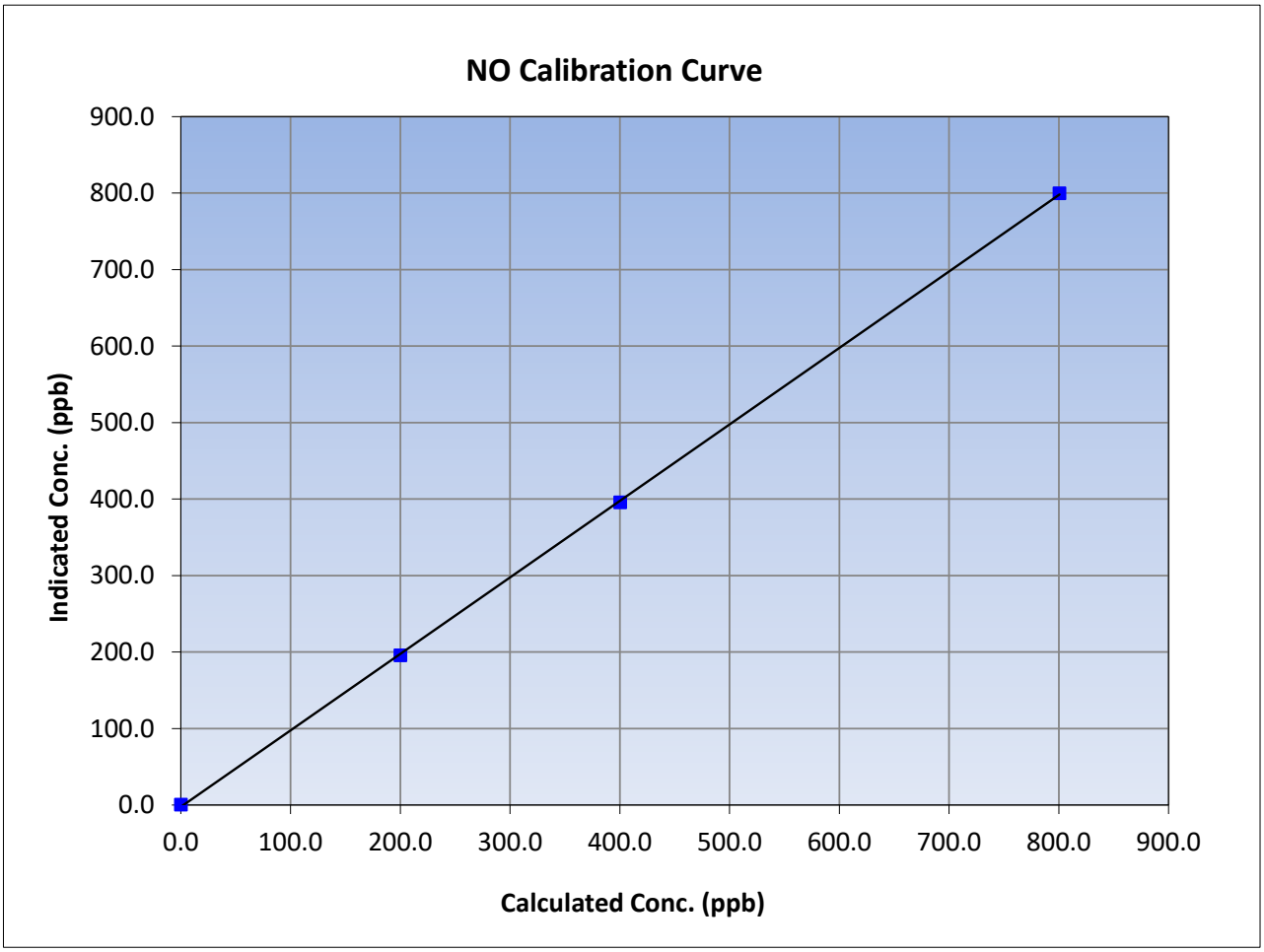
Version-05-2023

Station Information

Calibration Date:	September 7, 2023	Previous Calibration:	August 23, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:23	End Time (MST):	14:39
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.3	----	Correlation Coefficient	0.999946	≥0.995
800.6	799.8	1.0011			
400.3	395.8	1.0114	Slope	0.999929	0.90 - 1.10
200.2	195.6	1.0233			
			Intercept	-2.380000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

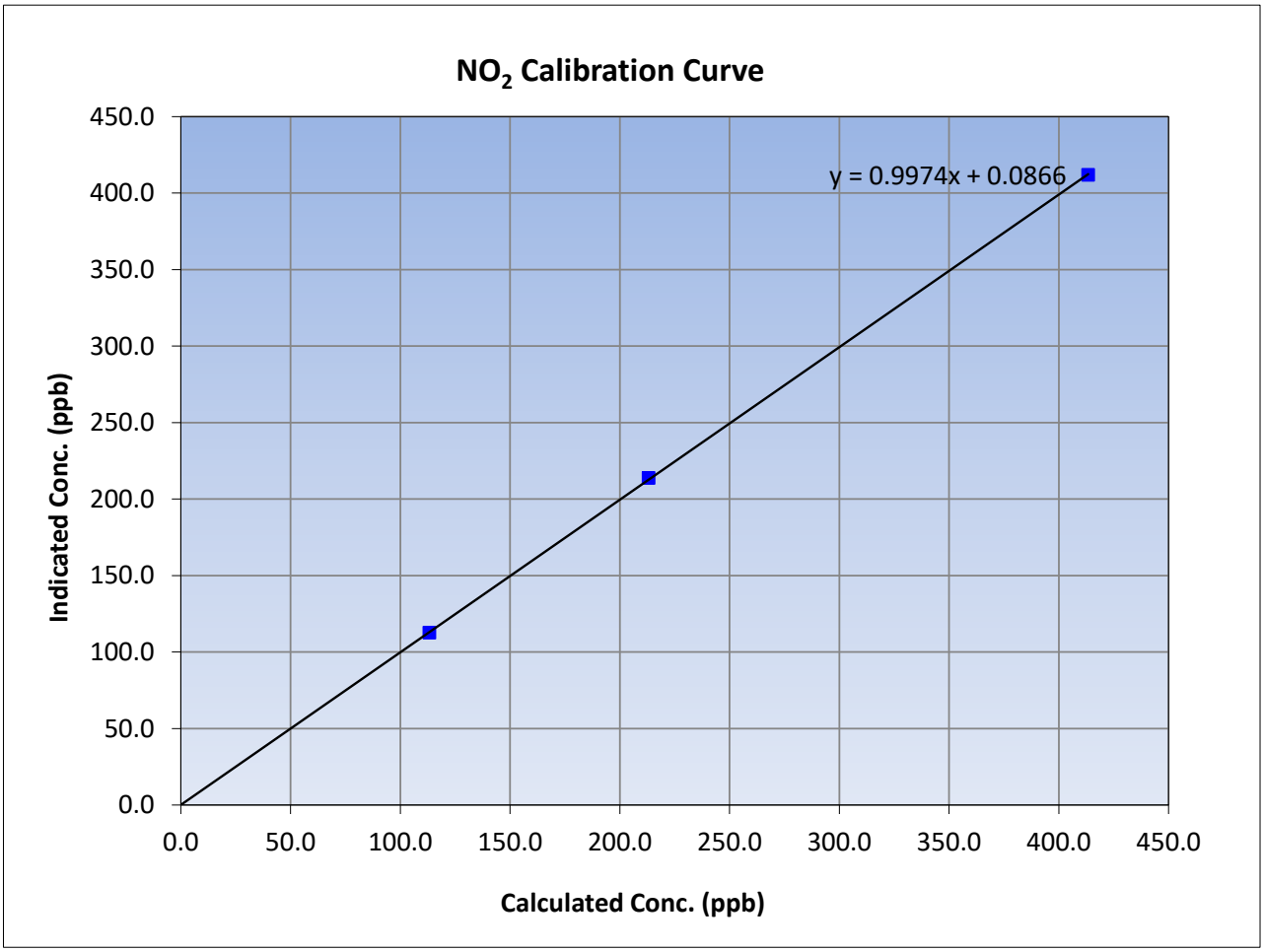
Version-05-2023

Station Information

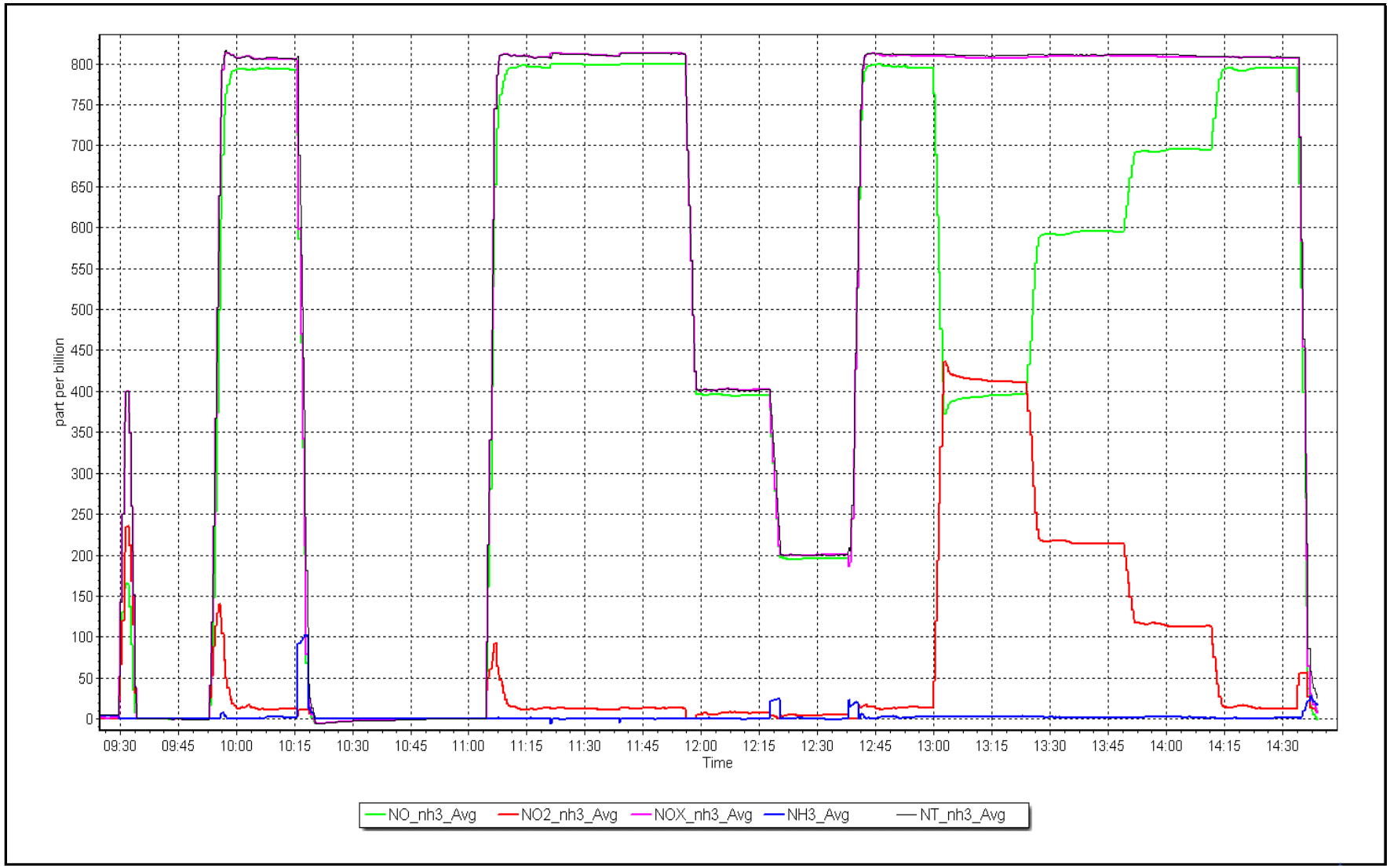
Calibration Date:	September 7, 2023	Previous Calibration:	August 23, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:23	End Time (MST):	14:39
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

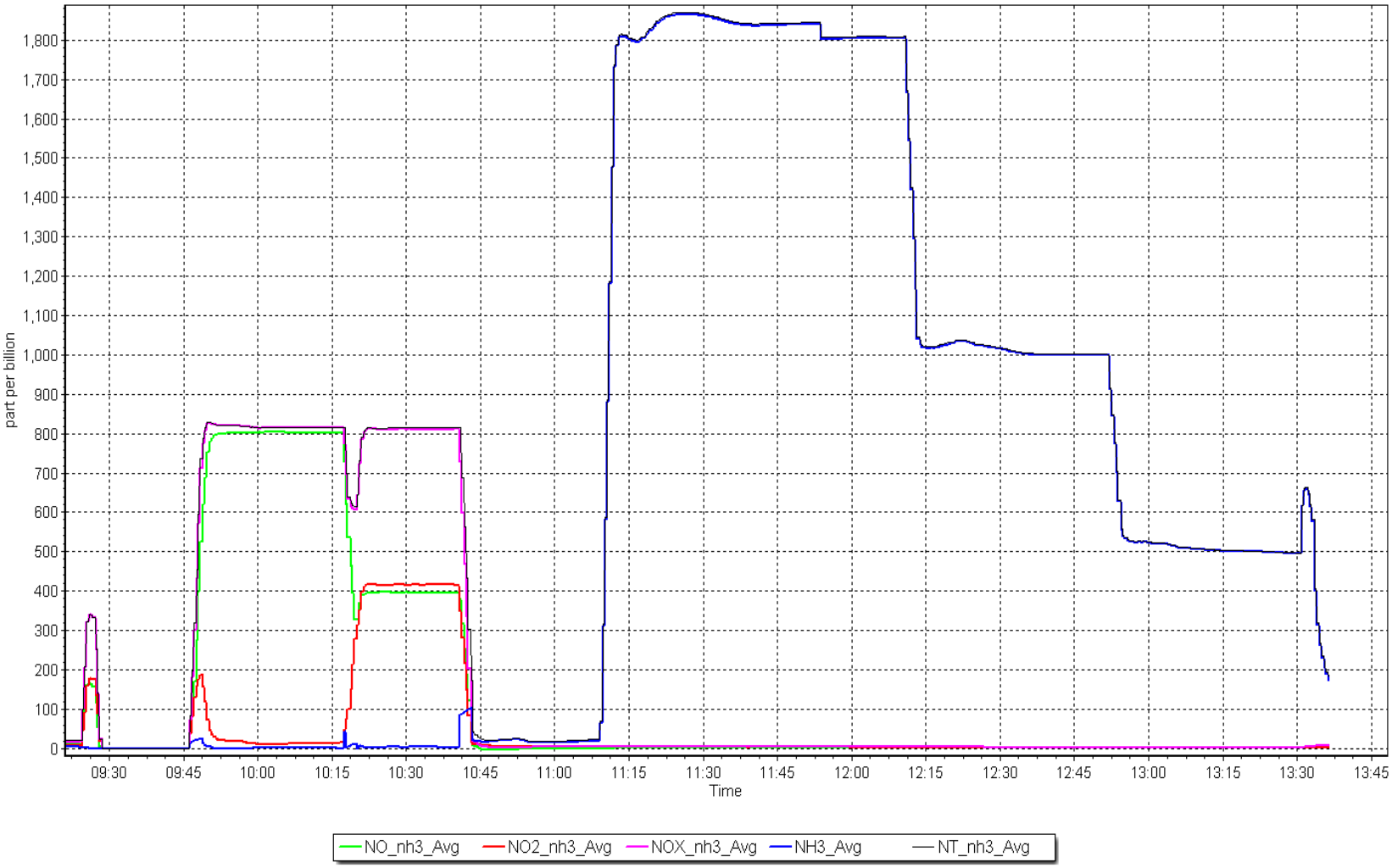
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999980	≥0.995
413.4	411.9	1.0036			
213.1	213.8	0.9967	Slope	0.997369	0.90 - 1.10
113.2	112.6	1.0053			
			Intercept	0.086604	+/-20



NO_X Calibration Plot Date: September 7, 2023 Location: Bertha Ganter-Fort McKay



NH_3 Calibration Plot Date: September 8, 2023 Location: Bertha Ganter-Fort McKay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS02
MILDRED LAKE
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Mildred Lake	Station number:	AMS02
Calibration Date:	October 20, 2023	Last Cal Date:	September 25, 2023
Start time (MST):	9:27	End time (MST):	12:30
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.98	ppm	Cal Gas Exp Date:	August 12, 2024
Cal Gas Cylinder #:	CC501209			
Removed Cal Gas Conc:	49.98	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	1185
ZAG Make/Model:	API T701		Serial Number:	4891

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.995496	0.999174	Backgd or Offset:	18.1	17.5
Calibration intercept:	0.154391	0.714964	Coeff or Slope:	0.797	0.774

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.4	----
as found span	4920	80.2	801.6	813.0	0.986
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.7	----
high point	4920	80.2	801.6	801.7	1.000
second point	4960	40.1	400.8	401.2	0.999
third point	4980	20.0	199.9	200.5	0.997
as left zero	5000	0.0	0.0	0.5	----
as left span	4920	80.2	801.6	805.2	0.996
				Average Correction Factor	0.999

Baseline Corr As found:	812.60	Previous response	798.19	*% change	1.8%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

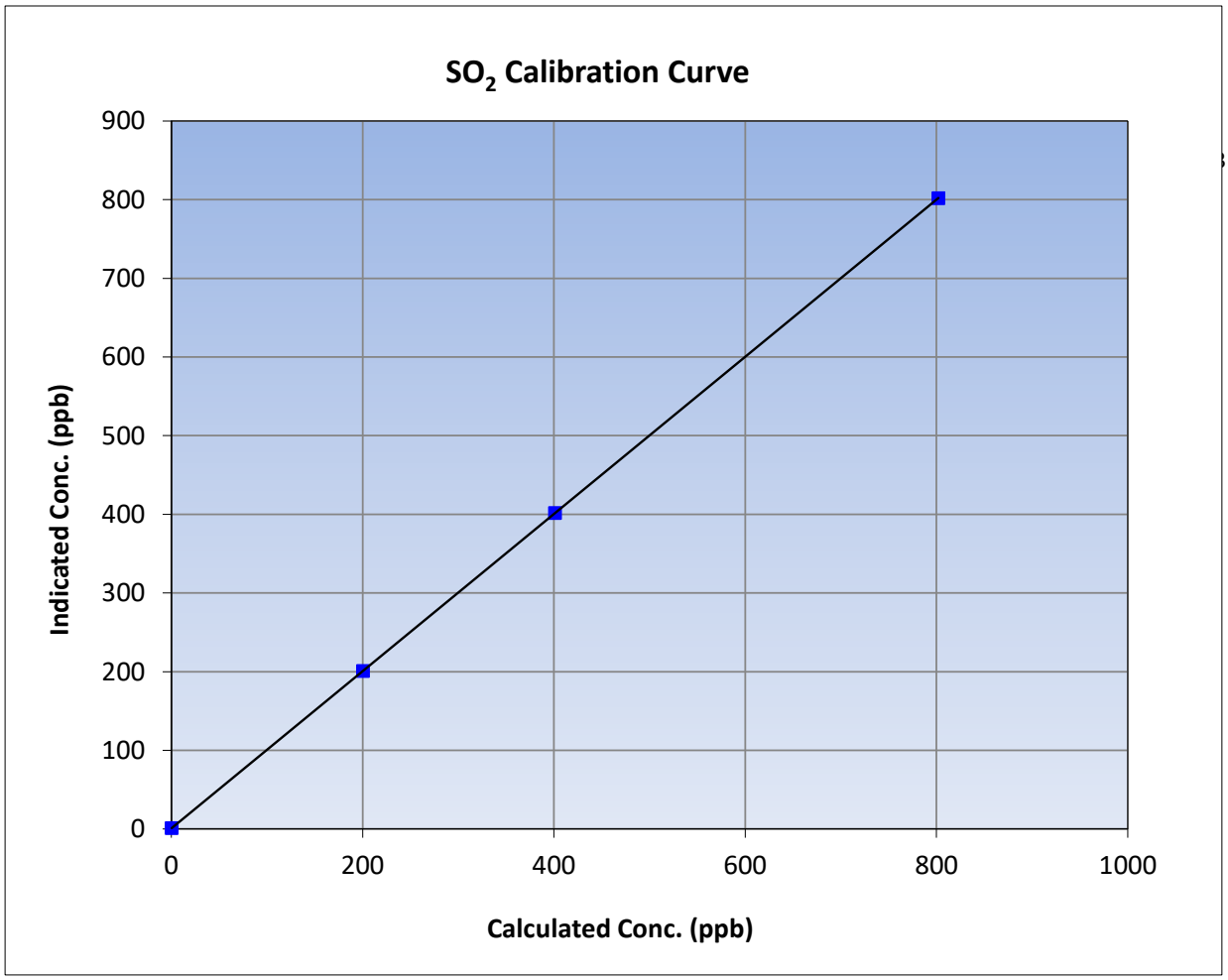
Station Information

Calibration Date:	October 20, 2023	Previous Calibration:	September 25, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:27	End Time (MST):	12:30
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1404901075

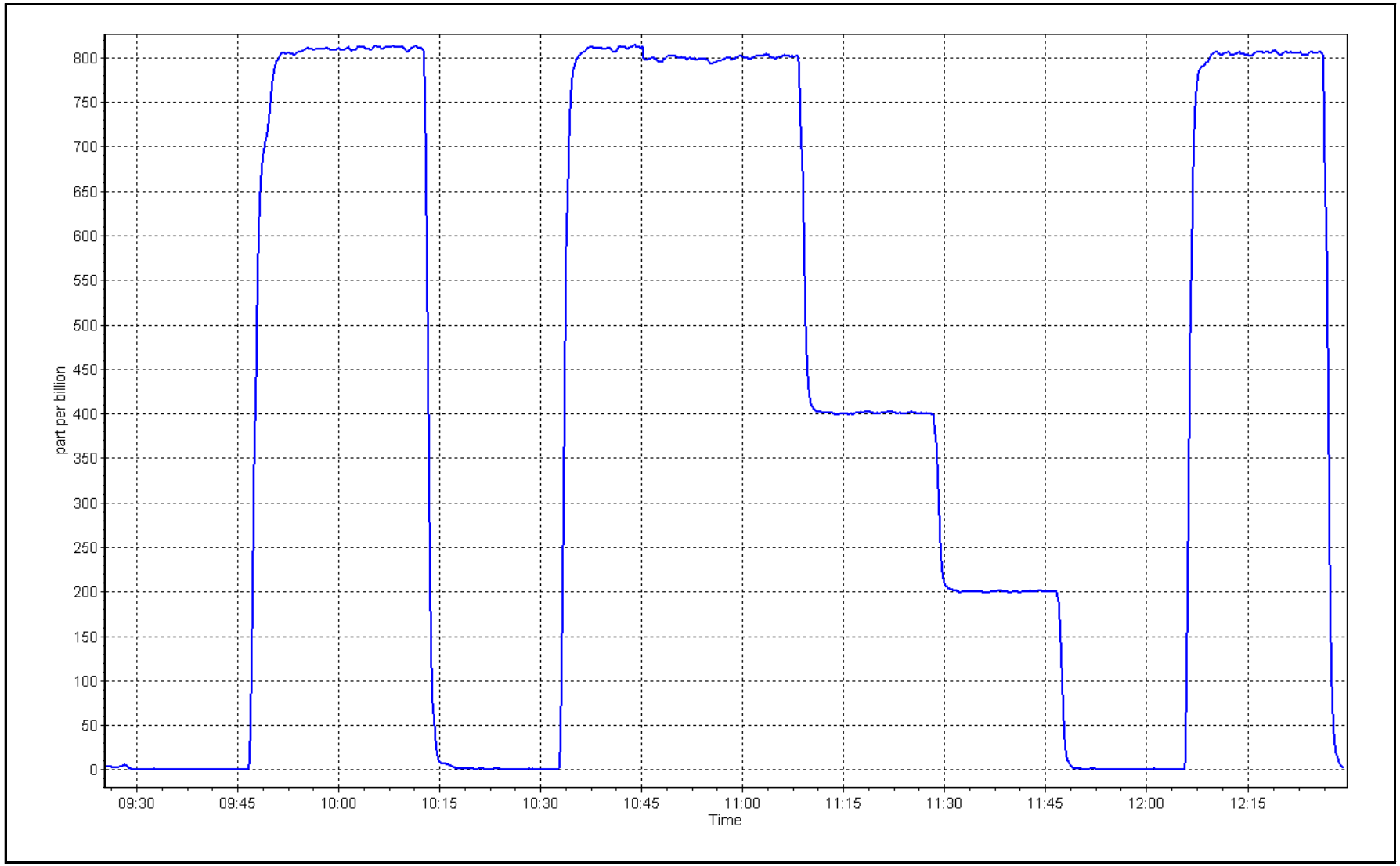
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.7	----
801.6	801.7	0.9999
400.8	401.2	0.9991
199.9	200.5	0.9971

Statistical Evaluation		Limits
Correlation Coefficient	1.000000	≥0.995
Slope	0.999174	0.90 - 1.10
Intercept	0.714964	+/-30



SO2 Calibration Plot Date: October 20, 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:	October 25, 2023	Last Cal Date:	September 20, 2023
Start time (MST):	6:45	End time (MST):	10:54
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:	1.004536	1.002536	Backgd or Offset:	1.78	1.71
Calibration intercept:	0.220806	-0.059198	Coeff or Slope:	0.781	0.754

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	83.2	0.961
as found 2nd point	4962	37.8	40.0	41.6	0.961
as found 3rd point	4981	18.9	20.0	20.6	0.971
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4924	75.6	80.0	80.1	0.999
second point	4962	37.8	40.0	40.2	0.995
third point	4981	18.9	20.0	19.8	1.010
as left zero	5000	0.0	0.0	0.1	----
as left span	4924	75.6	80.0	80.7	0.991
SO2 Scrubber Check	4920	80.2	802.0	0.1	----
Date of last scrubber change:		20-Sep-23		Ave Corr Factor	1.001
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	83.2	Prev response:	80.57	*% change:	3.2%
Baseline Corr 2nd AF pt:	41.6	AF Slope:	1.040969	AF Intercept:	-0.079168
Baseline Corr 3rd AF pt:	20.6	AF Correlation:	0.999993		

* = > +/-5% change initiates investigation

Notes: Sox scrubber checked after the calibrated zero. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

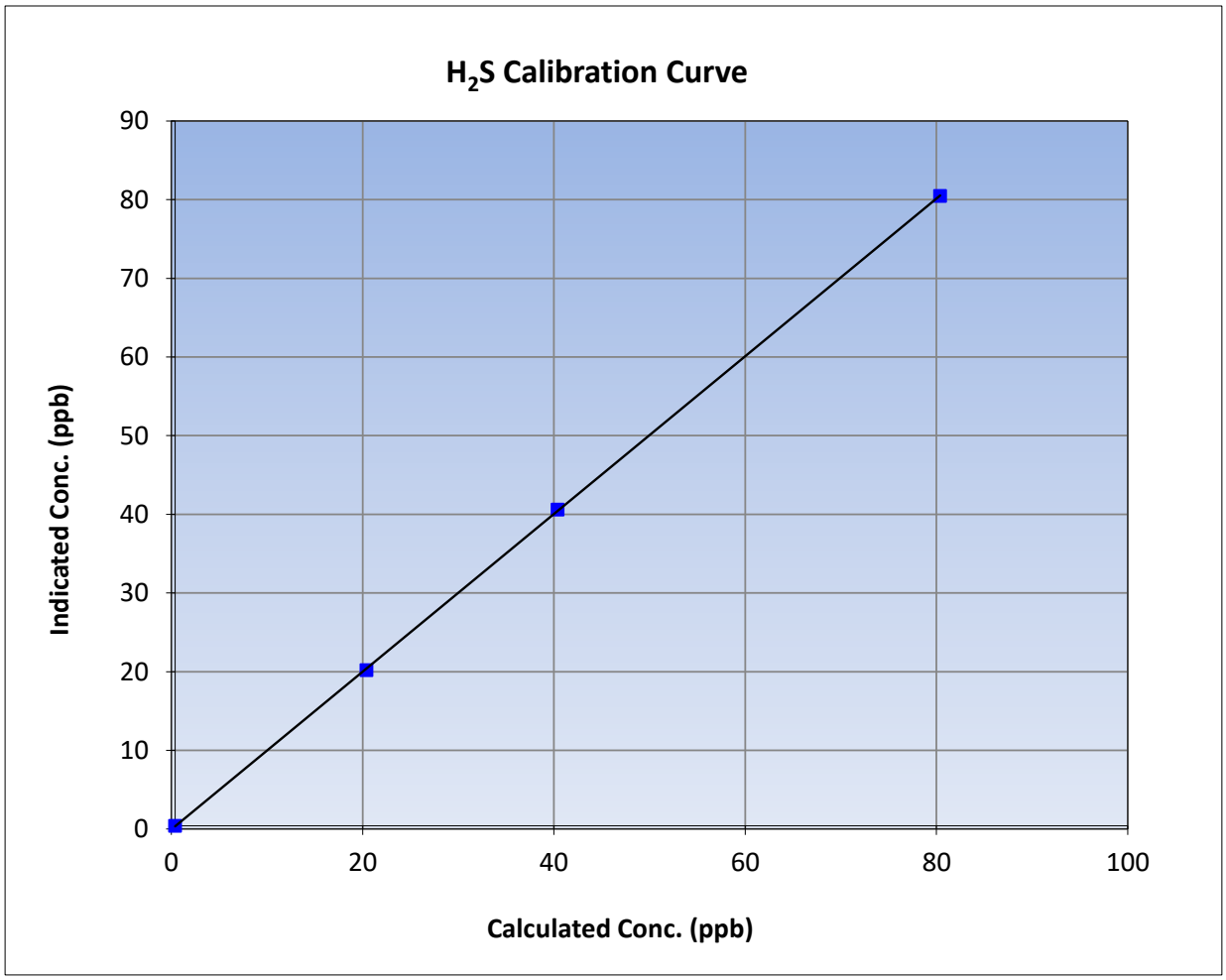
Station Information

Calibration Date:	October 25, 2023	Previous Calibration:	September 20, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	6:45	End Time (MST):	10:54
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	12113311966

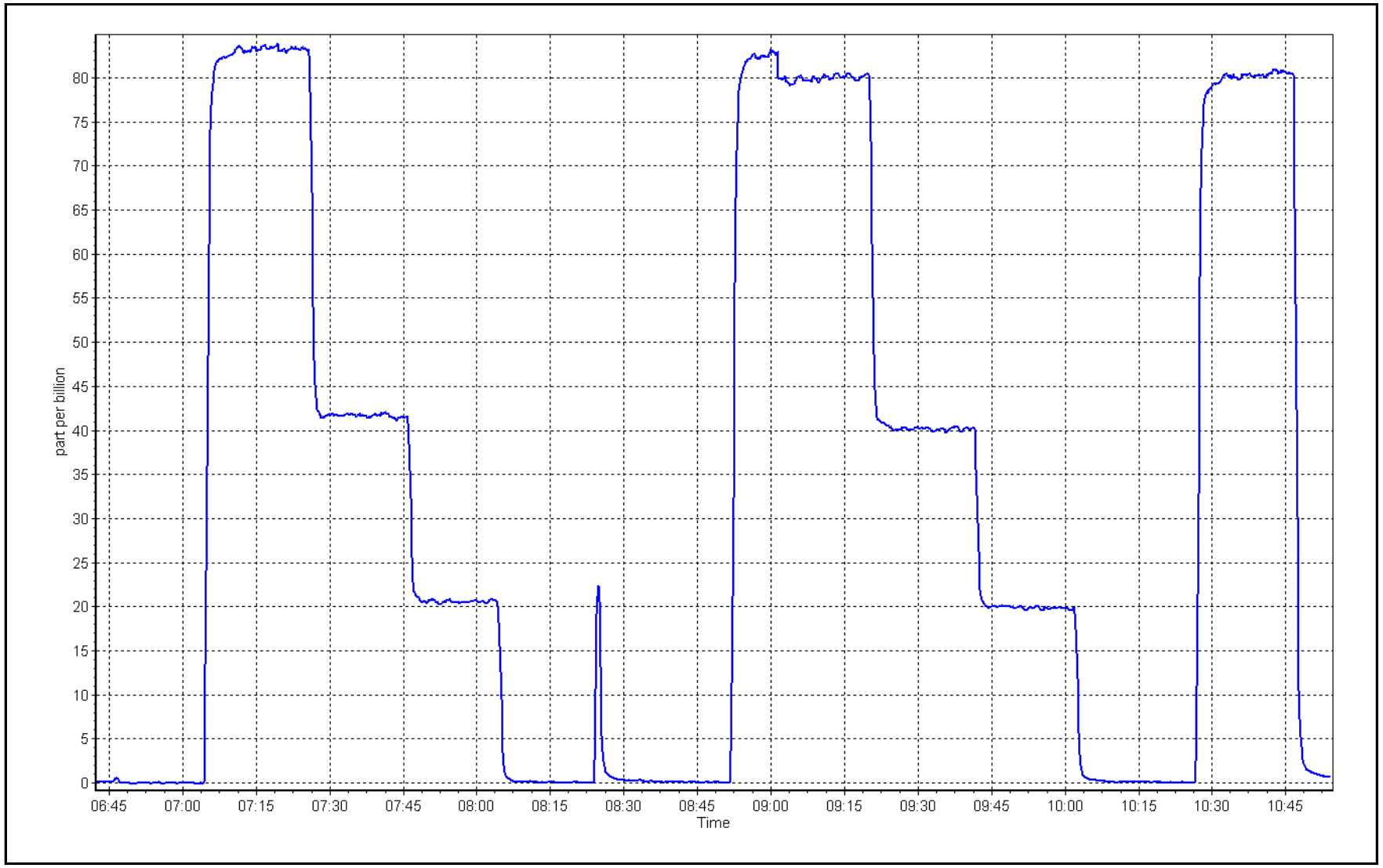
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.1	0.9986
40.0	40.2	0.9949
20.0	19.8	1.0099

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999981	*≥0.995*
Slope	1.002536	*0.90 - 1.10*
Intercept	-0.059198	*+/-3*



H_2S Calibration Plot Date: October 25, 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:	October 20, 2023	Last Cal Date:	September 25, 2023
Start time (MST):	9:27	End time (MST):	12:30
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:	2.99E-04	3.04E-04	NMHC SP Ratio:	4.58E-05	4.59E-05
CH4 Retention time:	14.6	14.8	NMHC Peak Area:	192179	191592
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	16.67	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	16.82	16.76	1.003
second point	4960	40.1	8.41	8.36	1.006
third point	4980	20.0	4.19	4.16	1.007
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	16.82	16.78	1.002
				Average Correction Factor	1.006
Baseline Corr AF:	16.67	Prev response	16.78	*% 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-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	8.78	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	8.80	8.79	1.001
second point	4960	40.1	4.40	4.41	0.997
third point	4980	20.0	2.19	2.21	0.991
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.80	8.83	0.997
				Average Correction Factor	0.996
Baseline Corr AF:	8.78	Prev response	8.79	*% 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	80.2	8.02	7.88	1.018
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	8.02	7.97	1.007
second point	4960	40.1	4.01	3.94	1.018
third point	4980	20.0	2.00	1.95	1.025
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.02	7.96	1.008
				Average Correction Factor	1.017
Baseline Corr AF:	7.88	Prev response	7.99	*% 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:	0.998613	0.996697
THC Cal Offset:	-0.013917	-0.011323
CH4 Cal Slope:	0.999502	0.994304
CH4 Cal Offset:	-0.025057	-0.023065
NMHC Cal Slope:	0.998932	0.998828
NMHC Cal Offset:	0.008542	0.011943

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

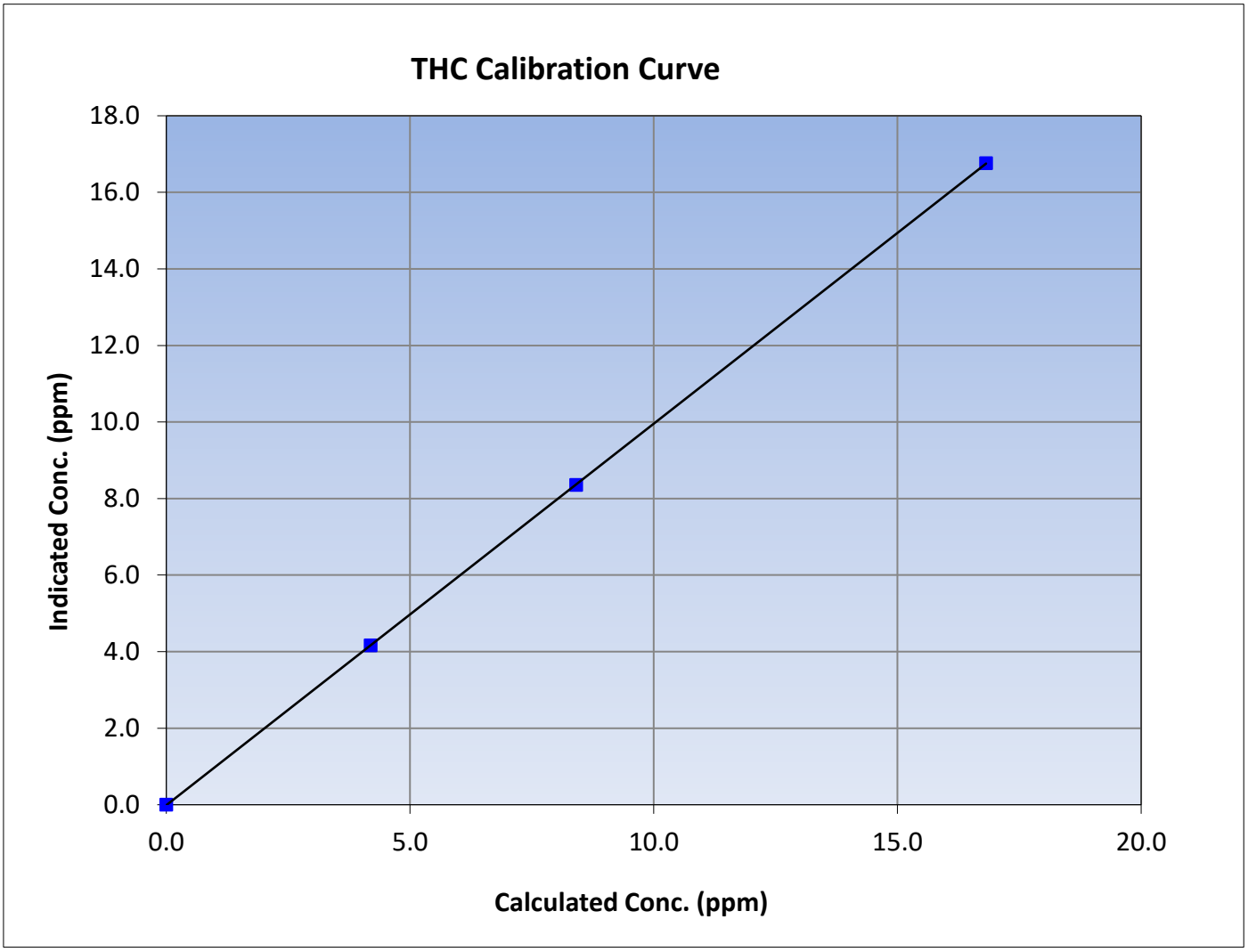
Version-06-2022

Station Information

Calibration Date:	October 20, 2023	Previous Calibration:	September 25, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:27	End Time (MST):	12:30
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320038

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999997	≥0.995
16.82	16.76	1.0035			
8.41	8.36	1.0065	Slope	0.996697	0.90 - 1.10
4.19	4.16	1.0073			
			Intercept	-0.011323	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

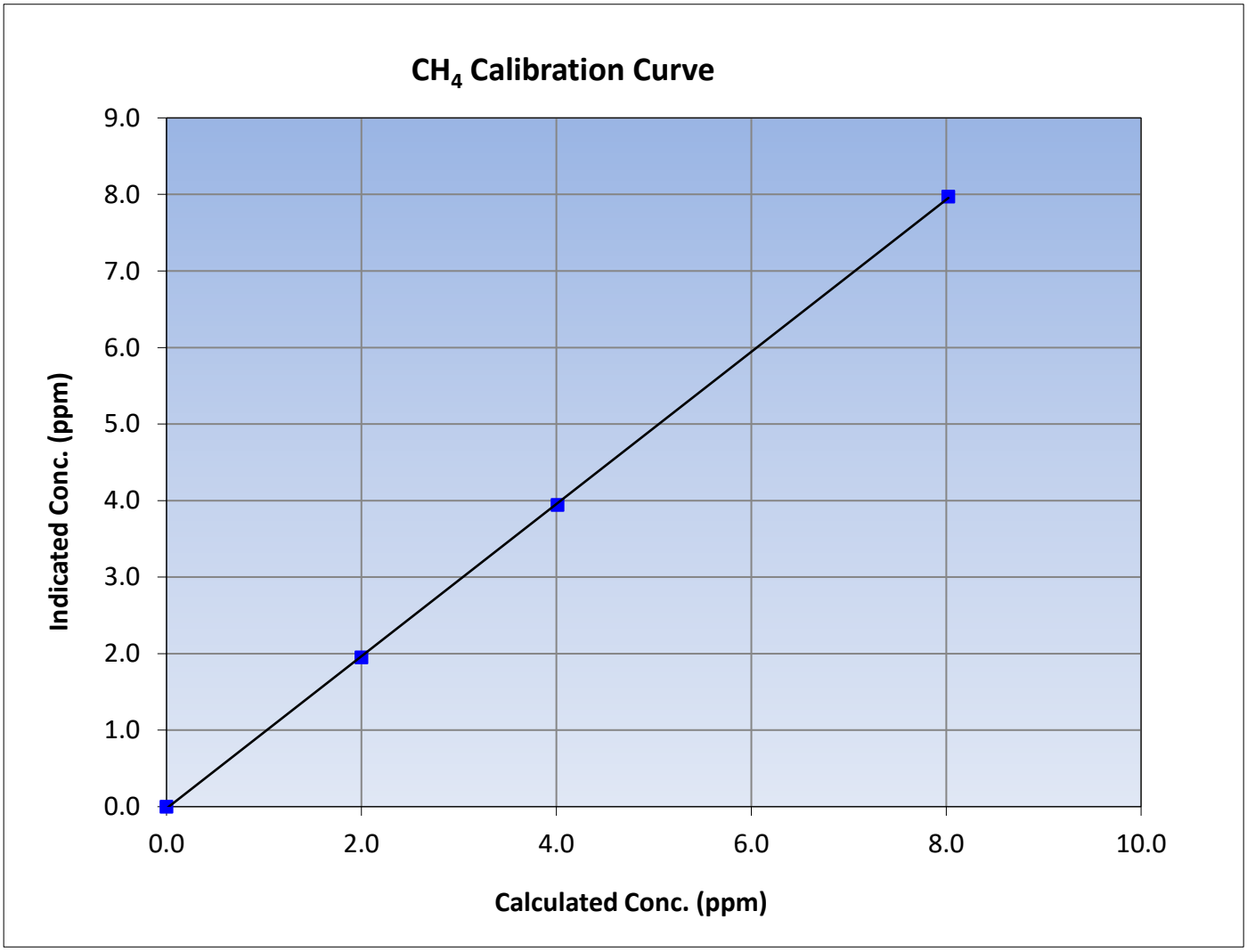
Version-06-2022

Station Information

Calibration Date:	October 20, 2023	Previous Calibration:	September 25, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:27	End Time (MST):	12:30
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	0.999954	≥0.995
8.02	7.97	1.0066			
4.01	3.94	1.0179	Slope	0.994304	0.90 - 1.10
2.00	1.95	1.0250			
			Intercept	-0.023065	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

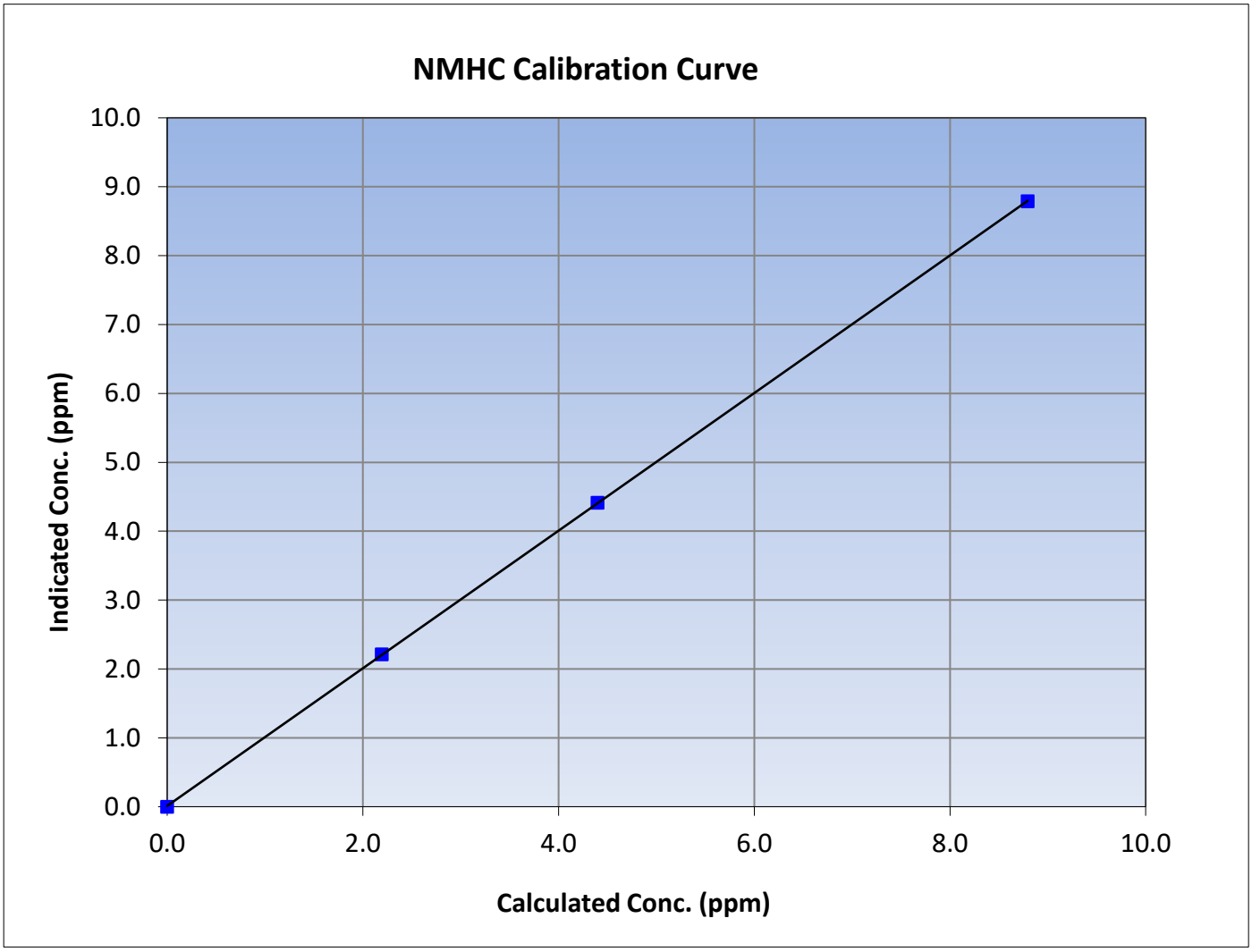
Version-06-2022

Station Information

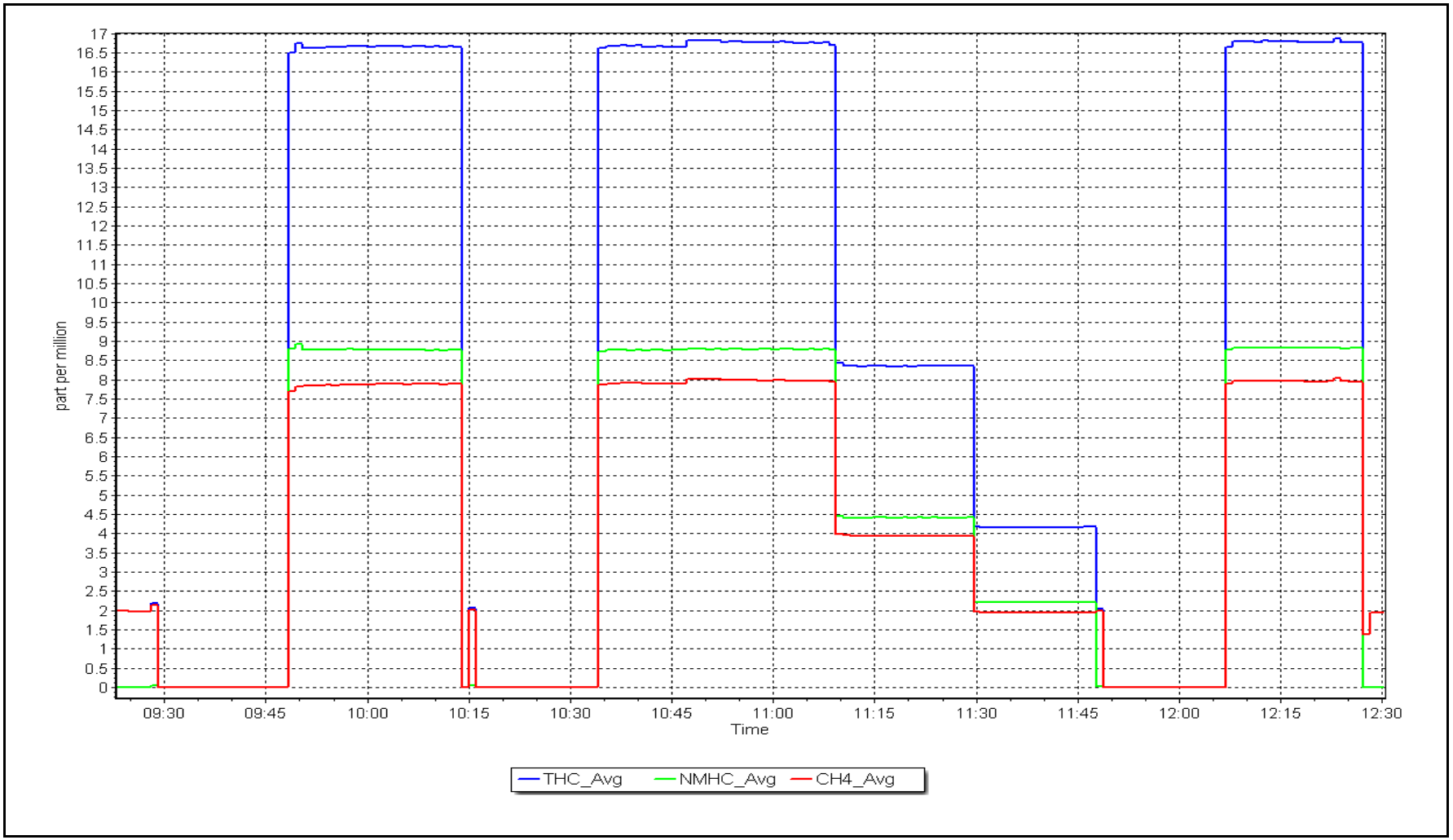
Calibration Date:	October 20, 2023	Previous Calibration:	September 25, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:27	End Time (MST):	12:30
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320038

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999991	*≥0.995*
8.80	8.79	1.0006			
4.40	4.41	0.9965	Slope	0.998828	*0.90 - 1.10*
2.19	2.21	0.9911			
			Intercept	0.011943	*+/-0.5*



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



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS04
BUFFALO VIEWPOINT
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	September 13, 2023	Last Cal Date:	August 9, 2023
Start time (MST):	8:35	End time (MST):	11:20
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:	50.87	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3808
ZAG Make/Model:	API T701		Serial Number:	362

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999657	0.994771	Backgd or Offset:	22.1	22.1
Calibration intercept:	0.974700	2.033465	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	0.4	----
as found span	4921	78.6	799.7	800.5	0.999
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	1.0	----
high point	4921	78.6	799.7	796.3	1.004
second point	4961	39.3	399.8	402.6	0.993
third point	4980	19.6	199.4	199.9	0.998
as left zero	5000	0.0	0.0	0.8	----
as left span	4921	78.6	799.7	798.4	1.002
				Average Correction Factor	0.998

Baseline Corr As found:	800.10	Previous response	800.44	*% 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 or adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

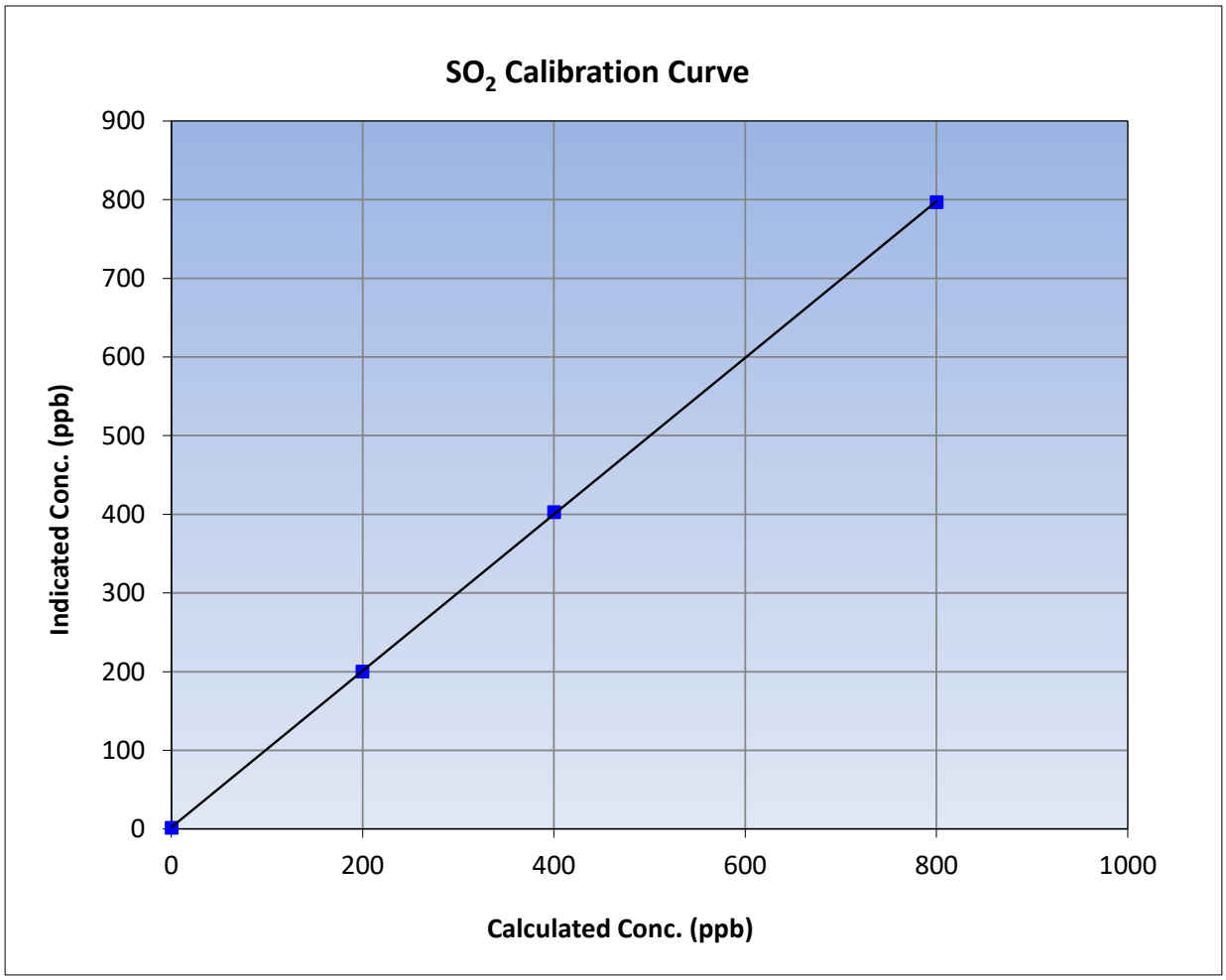
Station Information

Calibration Date:	September 13, 2023	Previous Calibration:	August 9, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:35	End Time (MST):	11:20
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1327300932

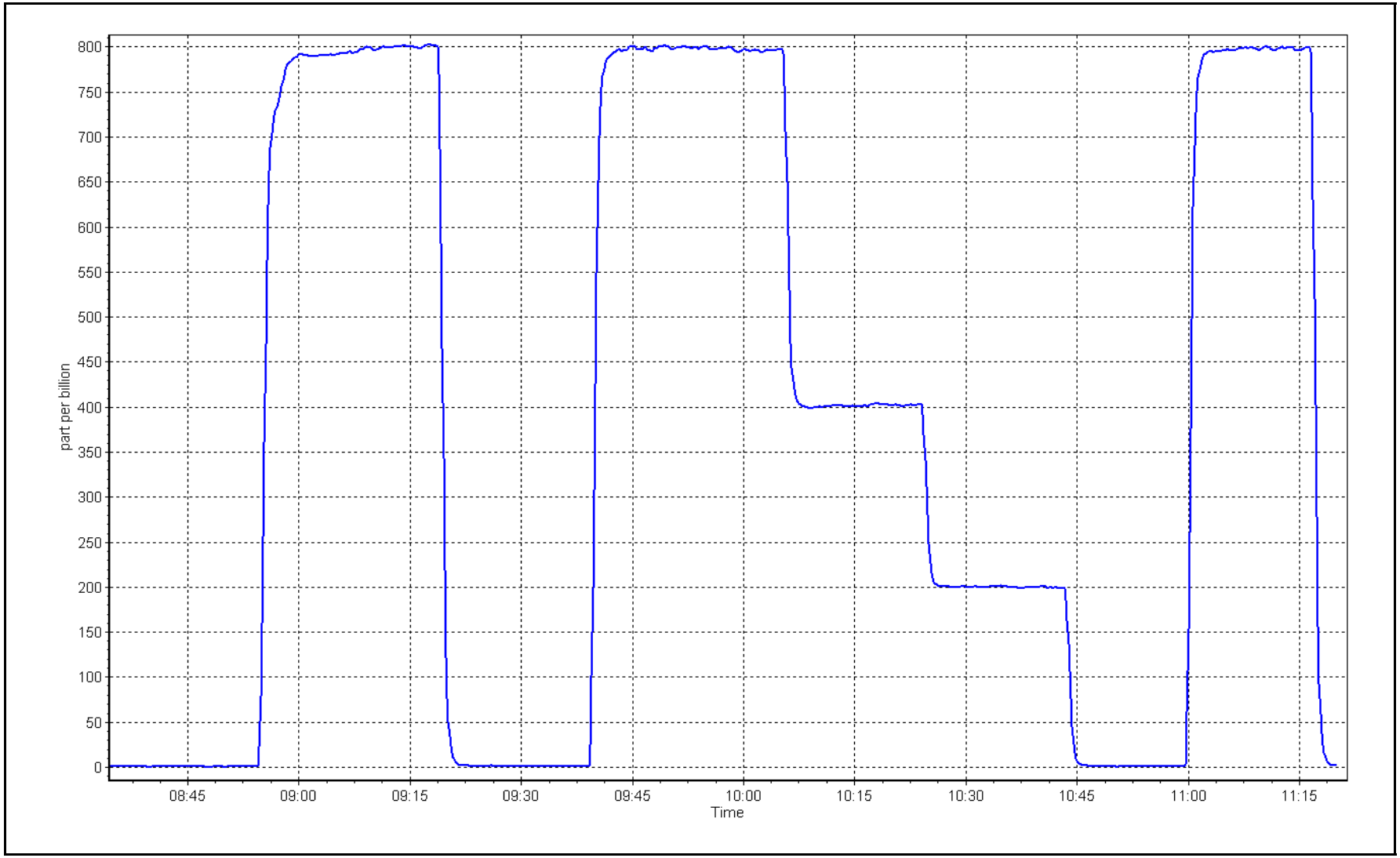
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	1.0	----
799.7	796.3	1.0043
399.8	402.6	0.9931
199.4	199.9	0.9976

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999968	*≥0.995*
Slope	0.994771	*0.90 - 1.10*
Intercept	2.033465	*+/-30*



SO2 Calibration Plot Date: September 13, 2023 Location: Buffalo Viewpoint



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	September 1, 2023	Last Cal Date:	August 2, 2023
Start time (MST):	6:15	End time (MST):	10:13
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:	1.000770	1.004754	Backgd or Offset:	1.8	1.8
Calibration intercept:	-0.097733	-0.037663	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	-0.1	----
as found span	4926	74.1	80.3	80.9	0.992
as found 2nd point	4963	37.0	40.1	40.5	0.988
as found 3rd point	4982	18.5	20.1	20.1	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	4926	74.1	80.3	80.6	0.997
second point	4963	37.0	40.1	40.4	0.993
third point	4982	18.5	20.1	20.1	0.998
as left zero	5000	0.0	0.0	0.0	----
as left span	4926	74.1	80.3	80.1	1.003
SO2 Scrubber Check	4920	80.0	800.0	0.0	----
Date of last scrubber change:		16-May-23		Ave Corr Factor	0.996
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.0	Prev response:	80.29	*% change:	0.9%
Baseline Corr 2nd AF pt:	40.6	AF Slope:	1.008738	AF Intercept:	-0.077596
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999995		

* = > +/-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

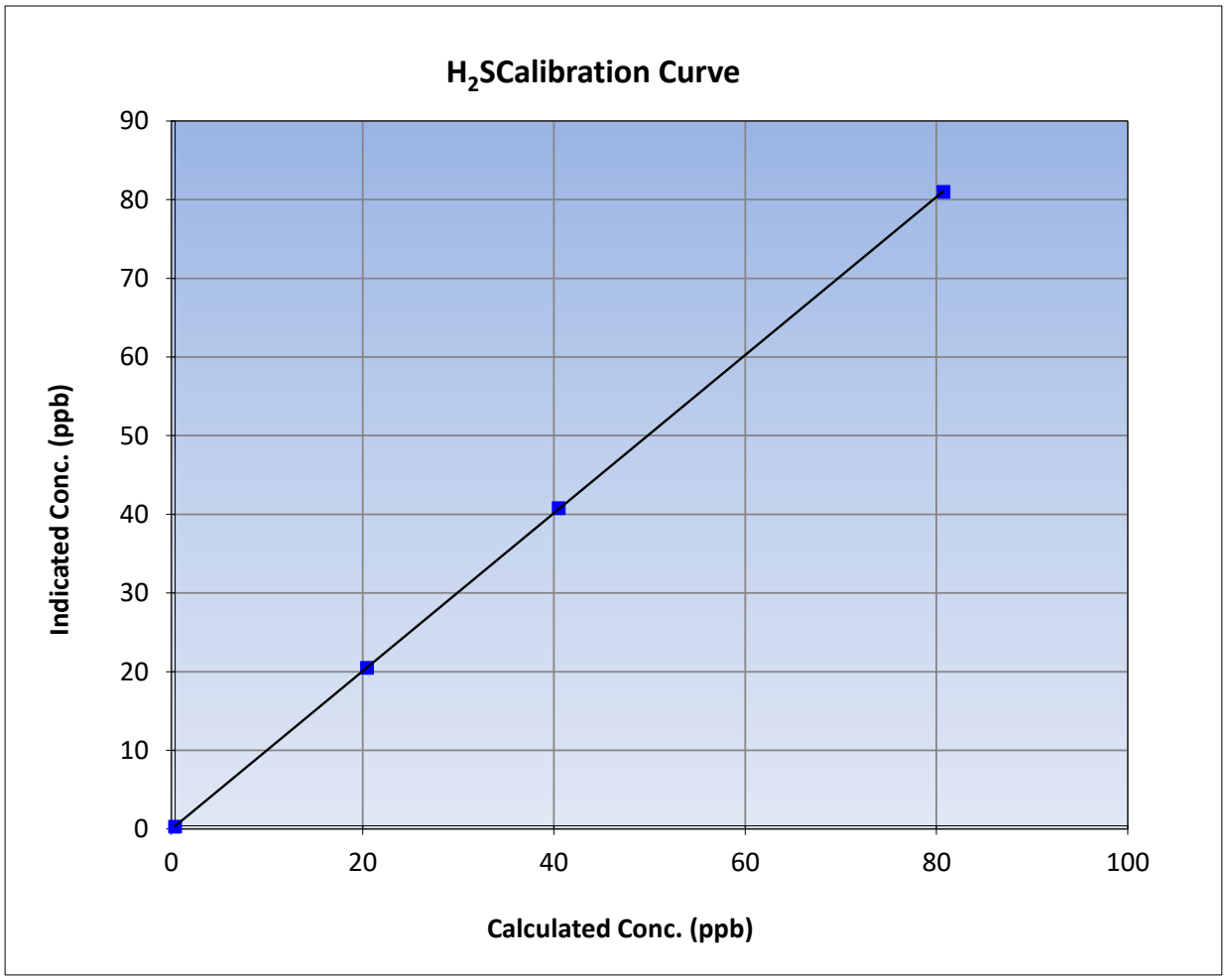
Version-11-2021

Station Information

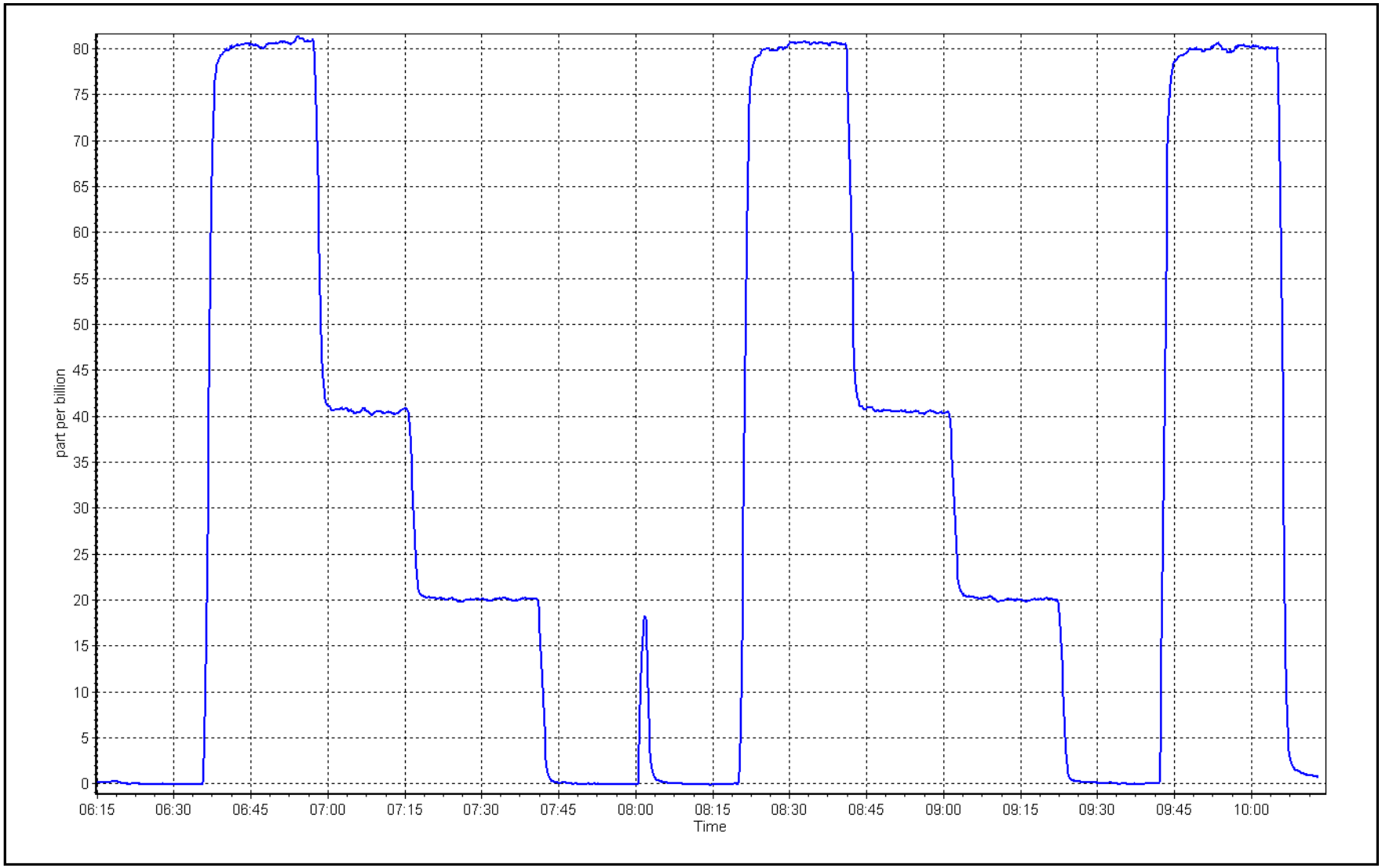
Calibration Date:	September 1, 2023	Previous Calibration:	August 2, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:15	End Time (MST):	10:13
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1008841400

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.1	----	Correlation Coefficient	0.999992	*≥0.995*
80.3	80.6	0.9966			
40.1	40.4	0.9928	Slope	1.004754	*0.90 - 1.10*
20.1	20.1	0.9976			
			Intercept	-0.037663	*+/-3*



H_2S Calibration Plot Date: September 1, 2023 Location: Buffalo Viewpoint



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	September 13, 2023	Last Cal Date:	August 9, 2023
Start time (MST):	8:35	End time (MST):	11:19
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		NA	Cal Gas Expiry Date:	March 10, 1931	
CH4 Cal Gas Conc.	497.2	ppm	CH4 Equiv Conc.	1058.2	ppm
C3H8 Cal Gas Conc.	204.0	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:		
Removed CH4 Conc.	497.2	ppm	CH4 Equiv Conc.	1058.2	ppm
Removed C3H8 Conc.	204.0	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3808	
ZAG make/model:	API T701		Serial Number:	362	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1222762077	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	1.86E-04	1.91E-04	NMHC SP Ratio:	3.96E-05	4.09E-05
CH4 Retention time:	11.8	11.8	NMHC Peak Area:	222570	215814
Zero Chromatogram:	OFF	OFF	Flat Baseline:	ON	ON

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	78.6	16.64	16.16	1.029
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	78.6	16.64	16.62	1.001
second point	4961	39.3	8.32	8.28	1.004
third point	4980	19.6	4.15	4.12	1.007
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	78.6	16.64	16.63	1.000
				Average Correction Factor	1.004
Baseline Corr AF:	16.16	Prev response	16.64	*% 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-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	4921	78.6	8.82	8.55	1.032
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	78.6	8.82	8.81	1.001
second point	4961	39.3	4.41	4.40	1.002
third point	4980	19.6	2.20	2.19	1.004
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	78.6	8.82	8.80	1.002
				Average Correction Factor	1.002
Baseline Corr AF:	8.55	Prev response	8.82	*% change	-3.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	78.6	7.82	7.61	1.027
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	78.6	7.82	7.82	1.000
second point	4961	39.3	3.91	3.88	1.007
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	7.83	0.998
				Average Correction Factor	1.004
Baseline Corr AF:	7.61	Prev response	7.82	*% change	-2.7%
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:	1.000360	0.999330
THC Cal Offset:	-0.005535	-0.015543
CH4 Cal Slope:	1.000736	1.000443
CH4 Cal Offset:	-0.005903	-0.009902
NMHC Cal Slope:	1.000144	0.999120
NMHC Cal Offset:	-0.000833	-0.003636

Notes: Span adjusted. No maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

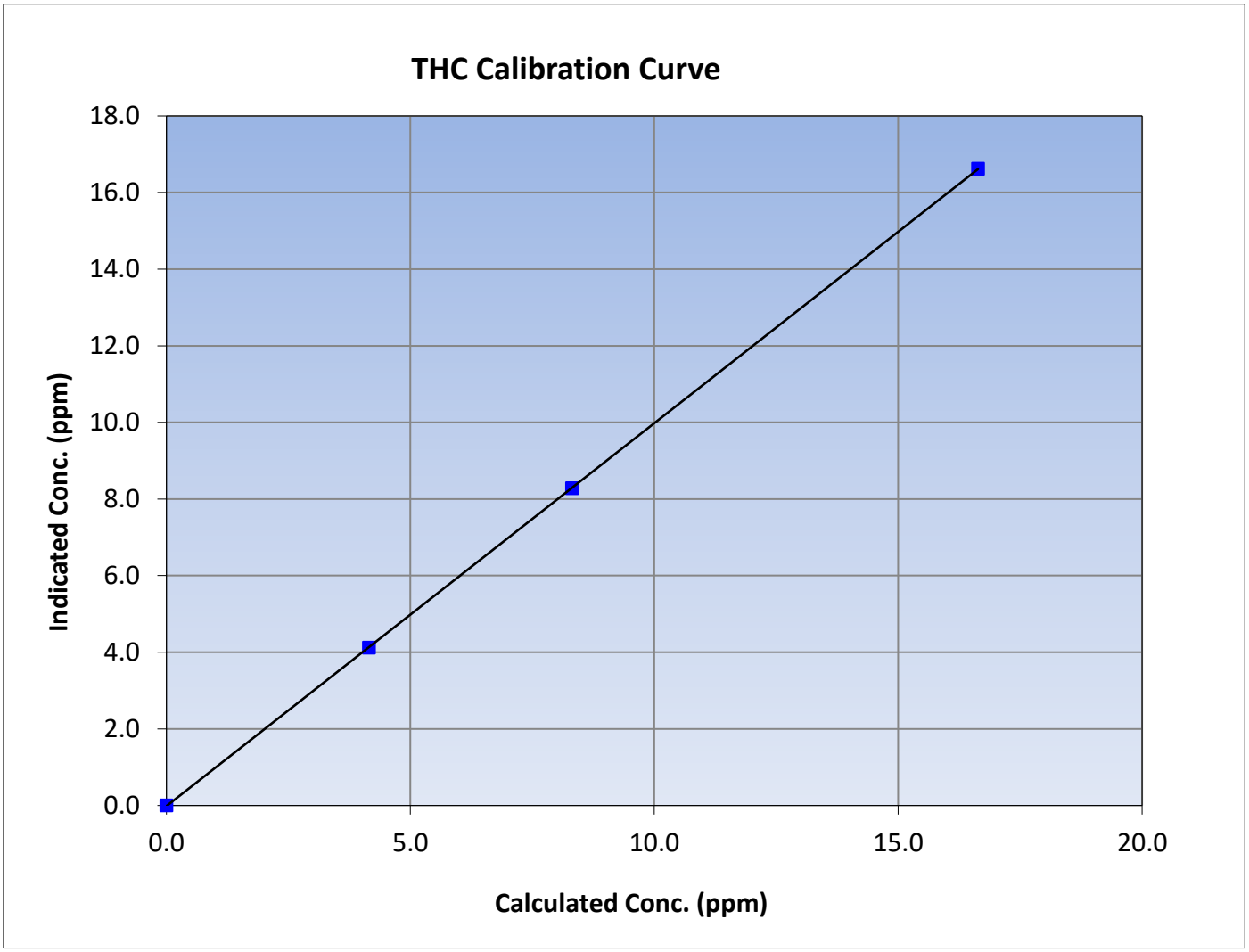
Version-06-2022

Station Information

Calibration Date:	September 13, 2023	Previous Calibration:	August 9, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:35	End Time (MST):	11:19
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*
16.64	16.62	1.0010			
8.32	8.28	1.0045	Slope	0.999330	*0.90 - 1.10*
4.15	4.12	1.0069			
			Intercept	-0.015543	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

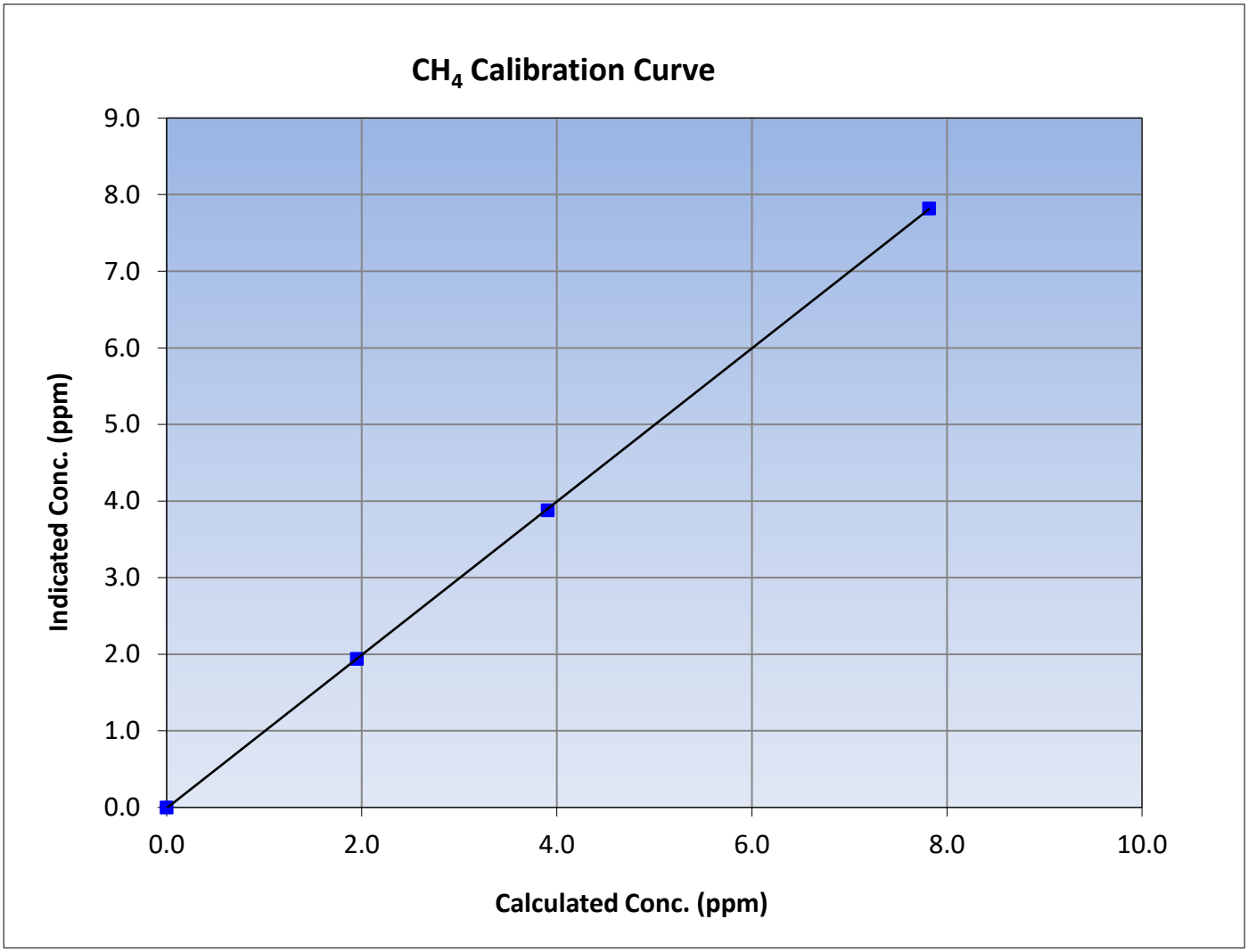
Version-06-2022

Station Information

Calibration Date:	September 13, 2023	Previous Calibration:	August 9, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:35	End Time (MST):	11:19
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	0.999983	*≥0.995*
7.82	7.82	0.9996			
3.91	3.88	1.0072	Slope	1.000443	*0.90 - 1.10*
1.95	1.94	1.0047			
			Intercept	-0.009902	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

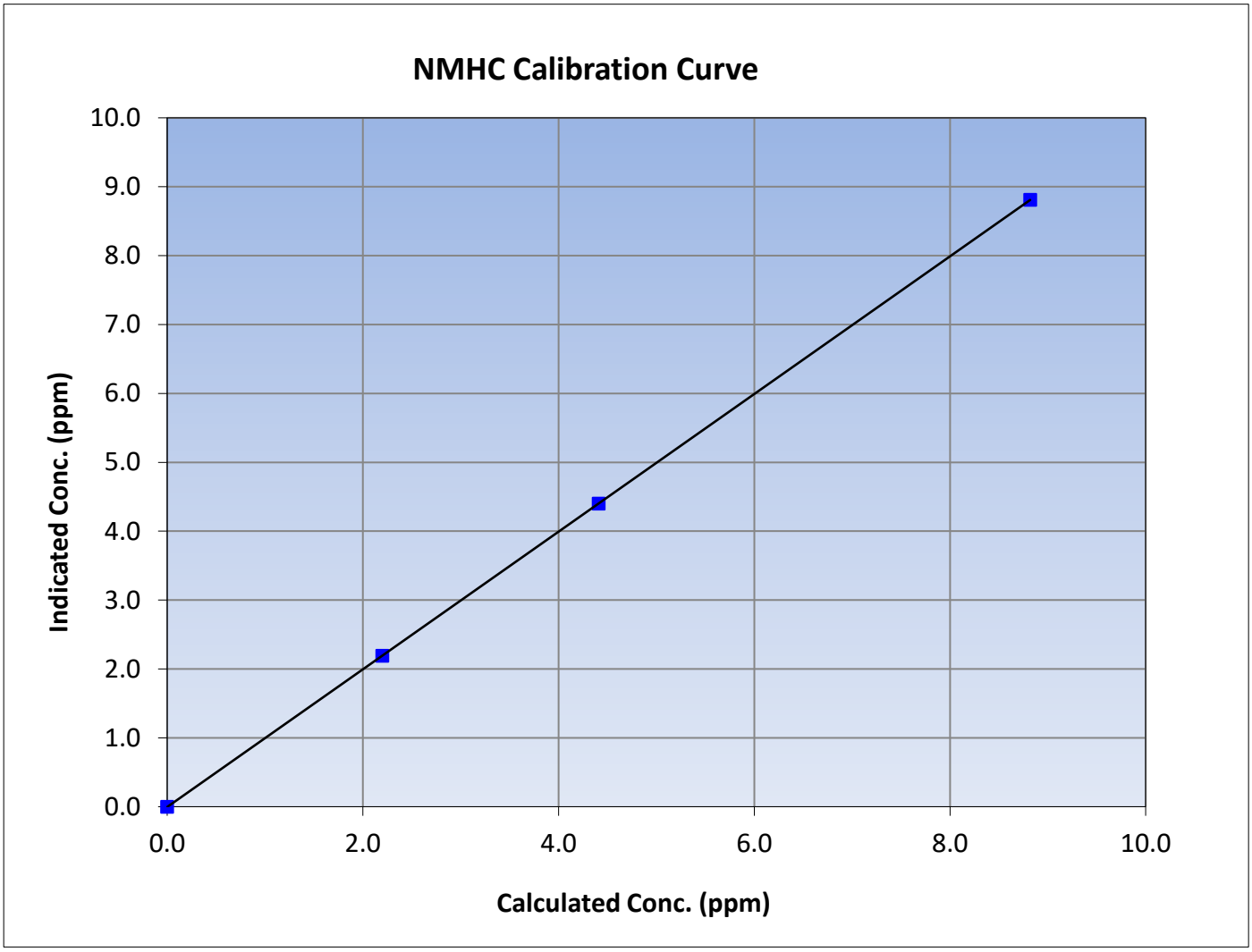
Version-06-2022

Station Information

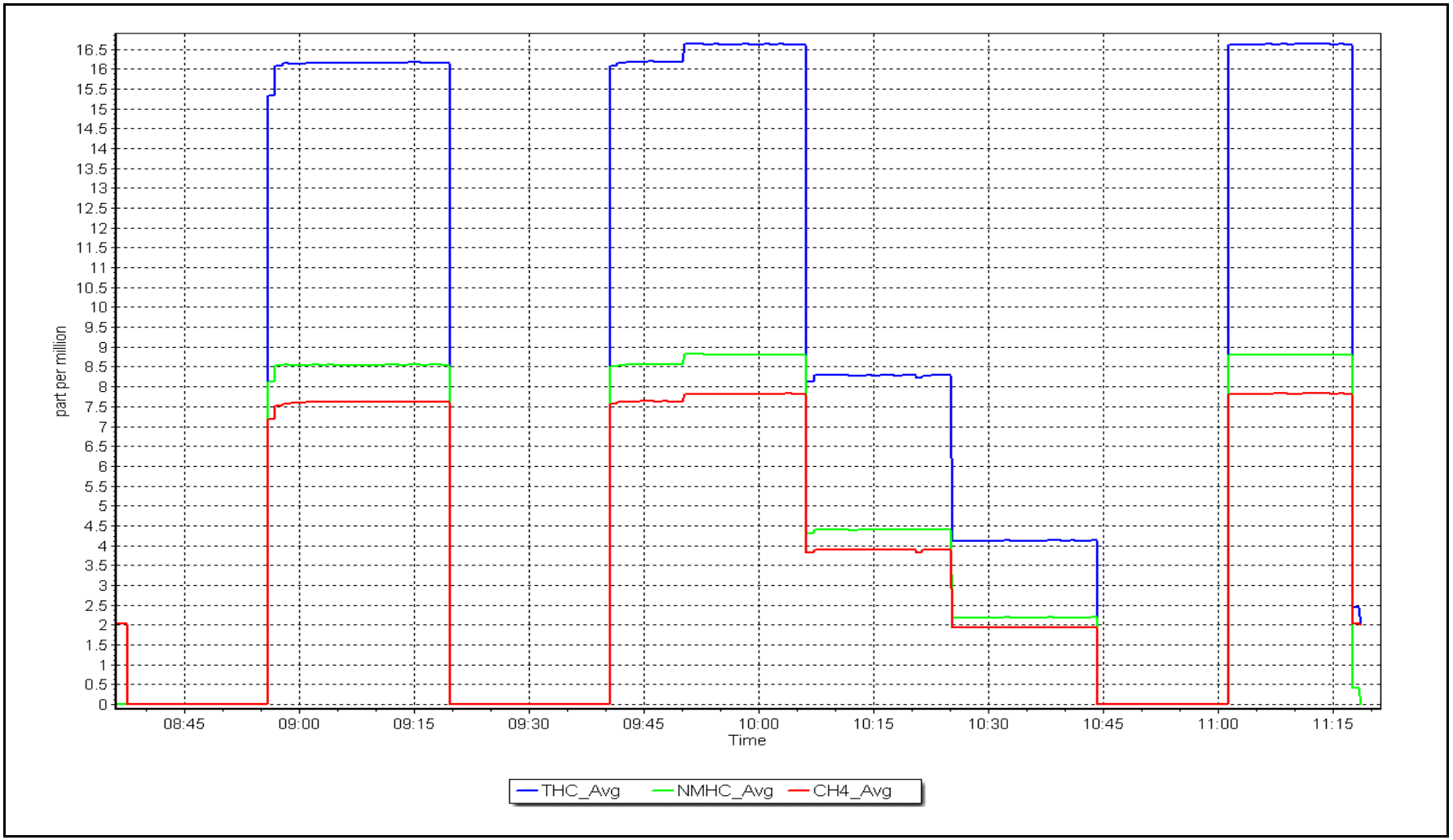
Calibration Date:	September 13, 2023	Previous Calibration:	August 9, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:35	End Time (MST):	11:19
Analyzer make:	Thermo 55i	Analyzer serial #:	1222762077

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999999	≥0.995
8.82	8.81	1.0011			
4.41	4.40	1.0021	Slope	0.999120	0.90 - 1.10
2.20	2.19	1.0042			
			Intercept	-0.003636	+/-0.5



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



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	September 8, 2023	Last Cal Date:	August 25, 2023
Start time (MST):	5:45	End time (MST):	10:53
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 #:	721
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.121	1.164	NO bkgnd or offset:	-0.6	-0.6
NOX coeff or slope:	1.119	1.159	NOX bkgnd or offset:	-0.3	-0.3
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	4.4	4.4

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000803	1.001176
NO_X Cal Offset:	0.426473	0.046144
NO Cal Slope:	1.000459	1.001222
NO Cal Offset:	-0.993702	-0.434177
NO_2 Cal Slope:	0.991739	0.996415
NO_2 Cal Offset:	2.285236	-1.016897

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.8	0.2	0.6	----	----
as found span	4922	78.1	799.1	795.2	3.9	767.9	762.5	5.4	1.0406	1.0429
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.5	0.4	0.1	----	----
high point	4922	78.1	799.1	795.2	3.9	800.2	795.9	4.3	0.9986	0.9991
second point	4961	39.1	400.1	398.1	2.0	400.7	398.5	2.2	0.9984	0.9990
third point	4981	19.5	199.5	198.5	1.0	199.1	197.0	2.1	1.0020	1.0078
as left zero	5000	0.0	0.0	0.0	0.0	0.7	1.1	-0.4	----	----
as left span	4922	78.1	799.1	384.1	415.0	794.9	385.1	409.9	1.0053	0.9974
								Average Correction Factor	0.9997	1.0020

Corrected As found	NO_X = 767.1 ppb	NO = 762.3 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-4.3%
Previous Response	NO_X = 800.2 ppb	NO = 794.6 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)	796.8	385.7	415.0	412.7	1.0056	99.4%
2nd GPT point (200 ppb O3)	796.8	586.5	214.2	213.0	1.0057	99.4%
3rd GPT point (100 ppb O3)	796.8	691.5	109.2	105.9	1.0312	97.0%
				Average Correction Factor	1.0141	98.6%

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

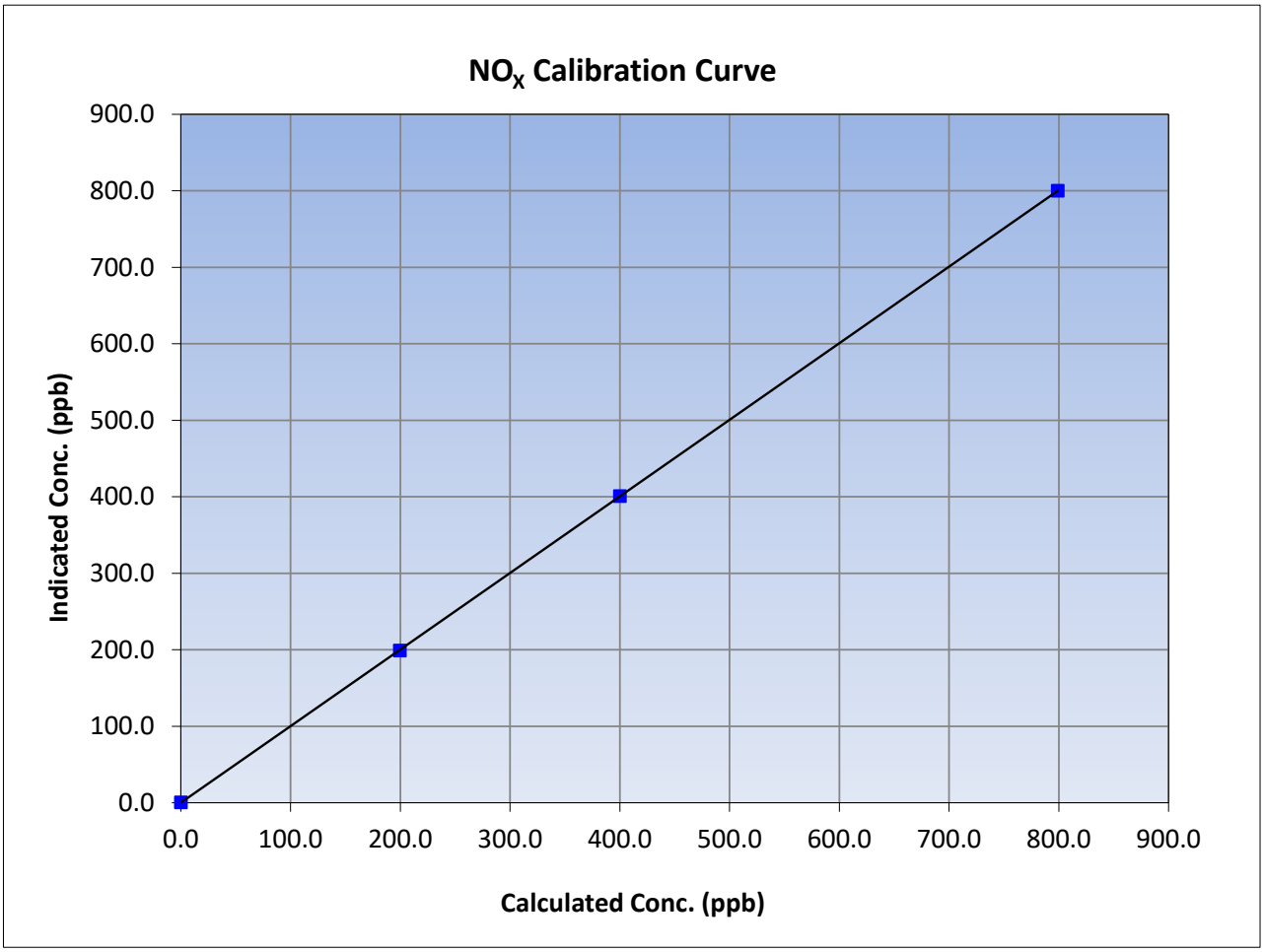
Version-04-2020

Station Information

Calibration Date:	September 8, 2023	Previous Calibration:	August 25, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	5:45	End Time (MST):	10:53
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	0.5	----	Correlation Coefficient	0.999998	≥0.995
799.1	800.2	0.9986			
400.1	400.7	0.9984	Slope	1.001176	0.90 - 1.10
199.5	199.1	1.0020			
			Intercept	0.046144	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

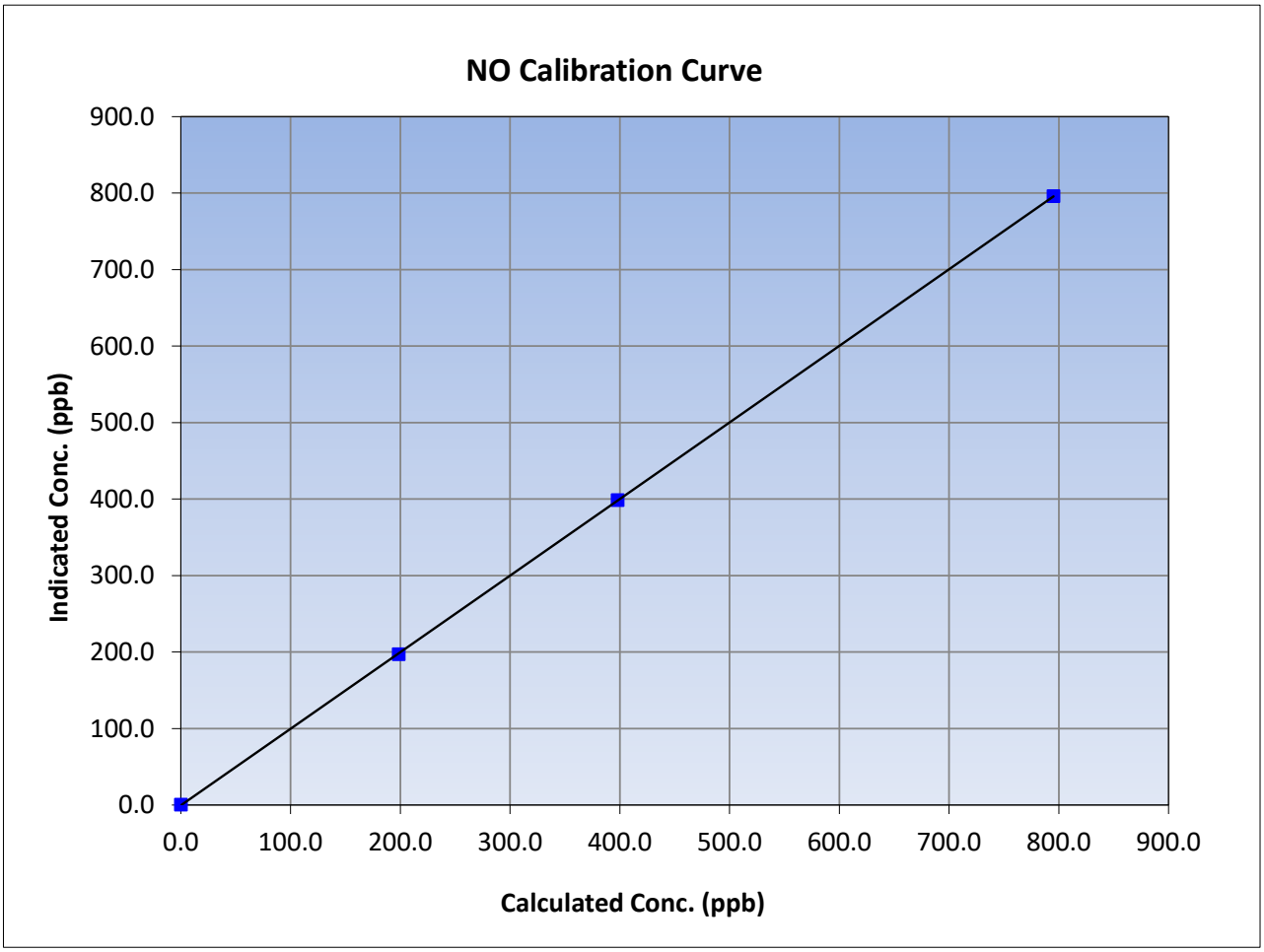
Version-04-2020

Station Information

Calibration Date:	September 8, 2023	Previous Calibration:	August 25, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	5:45	End Time (MST):	10:53
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	0.999992	≥0.995
795.2	795.9	0.9991			
398.1	398.5	0.9990	Slope	1.001222	0.90 - 1.10
198.5	197.0	1.0078			
			Intercept	-0.434177	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

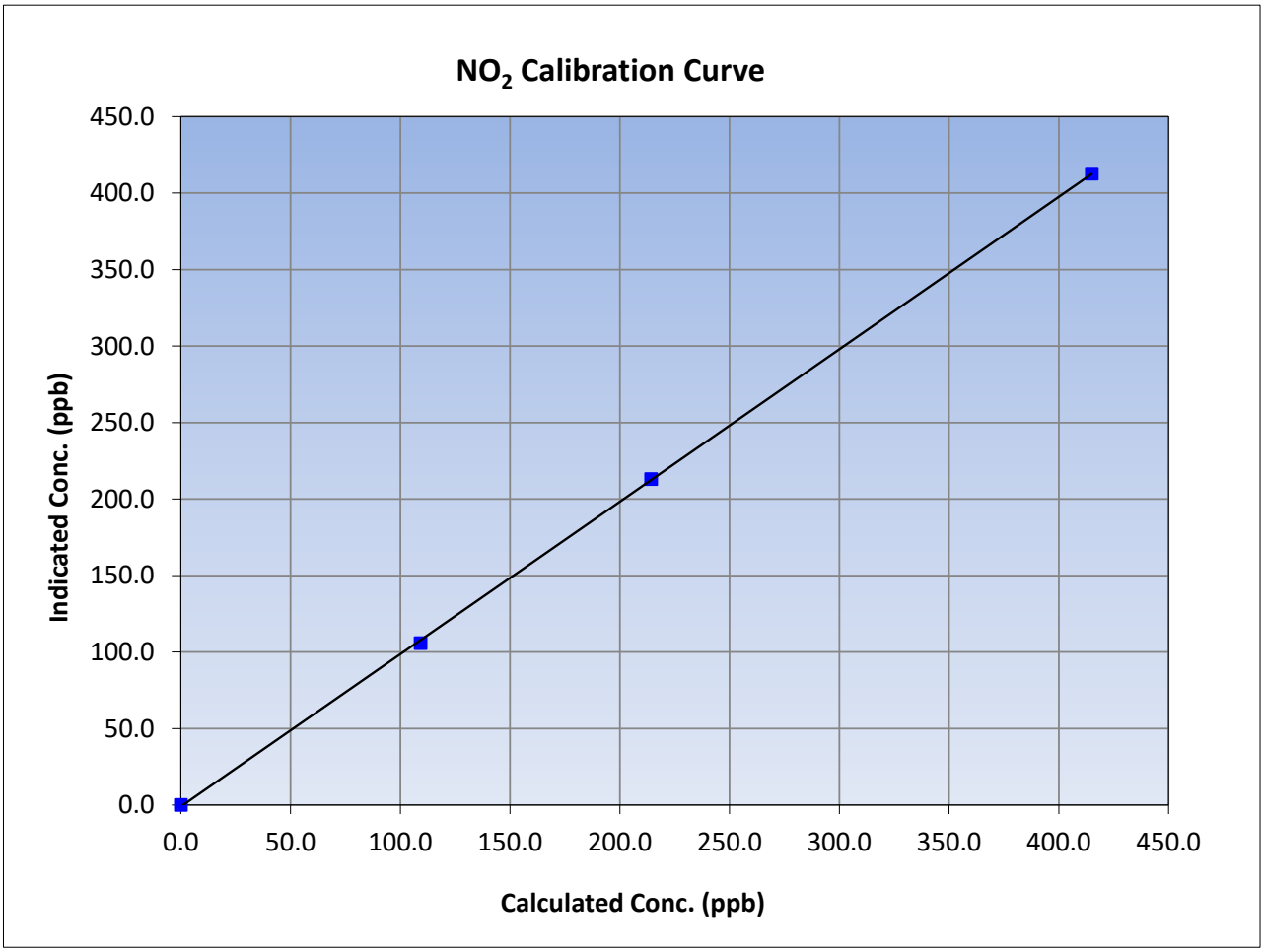
Version-04-2020

Station Information

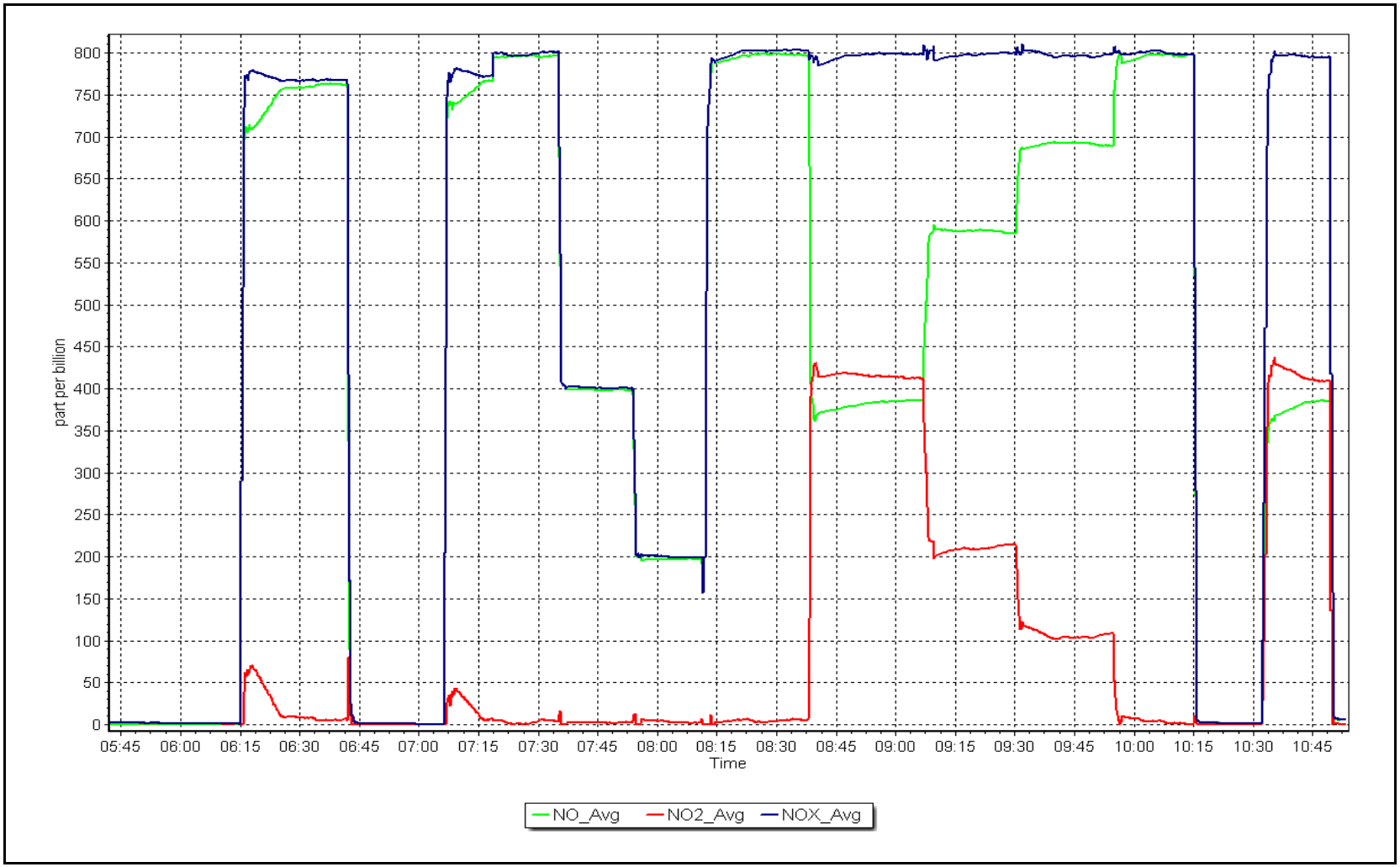
Calibration Date:	September 8, 2023	Previous Calibration:	August 25, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	5:45	End Time (MST):	10:53
Analyzer make:	API T200	Analyzer serial #:	721

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999944	≥0.995
415.0	412.7	1.0056			
214.2	213.0	1.0057	Slope	0.996415	0.90 - 1.10
109.2	105.9	1.0312			
			Intercept	-1.016897	+/-20



NO_X Calibration Plot Date: September 8, 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:	September 13, 2023	Last Cal Date:	August 9, 2023
Start time (MST):	6:30	End time (MST):	8:38
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.996114	0.997486	Backgd or Offset:	-2.6	-2.6
Calibration intercept:	0.480000	-0.460000	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					
as found span					
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.9	----
high point	5000	984.5	400.0	398.2	1.005
second point	5000	816.9	200.0	199.6	1.002
third point	5000	707.7	100.0	99.5	1.005
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	989.6	400.0	399.2	1.002
				Average Correction Factor	1.004

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: No as founds as pump had died and flow is at 0.0cc/min. Pump replaced. No adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

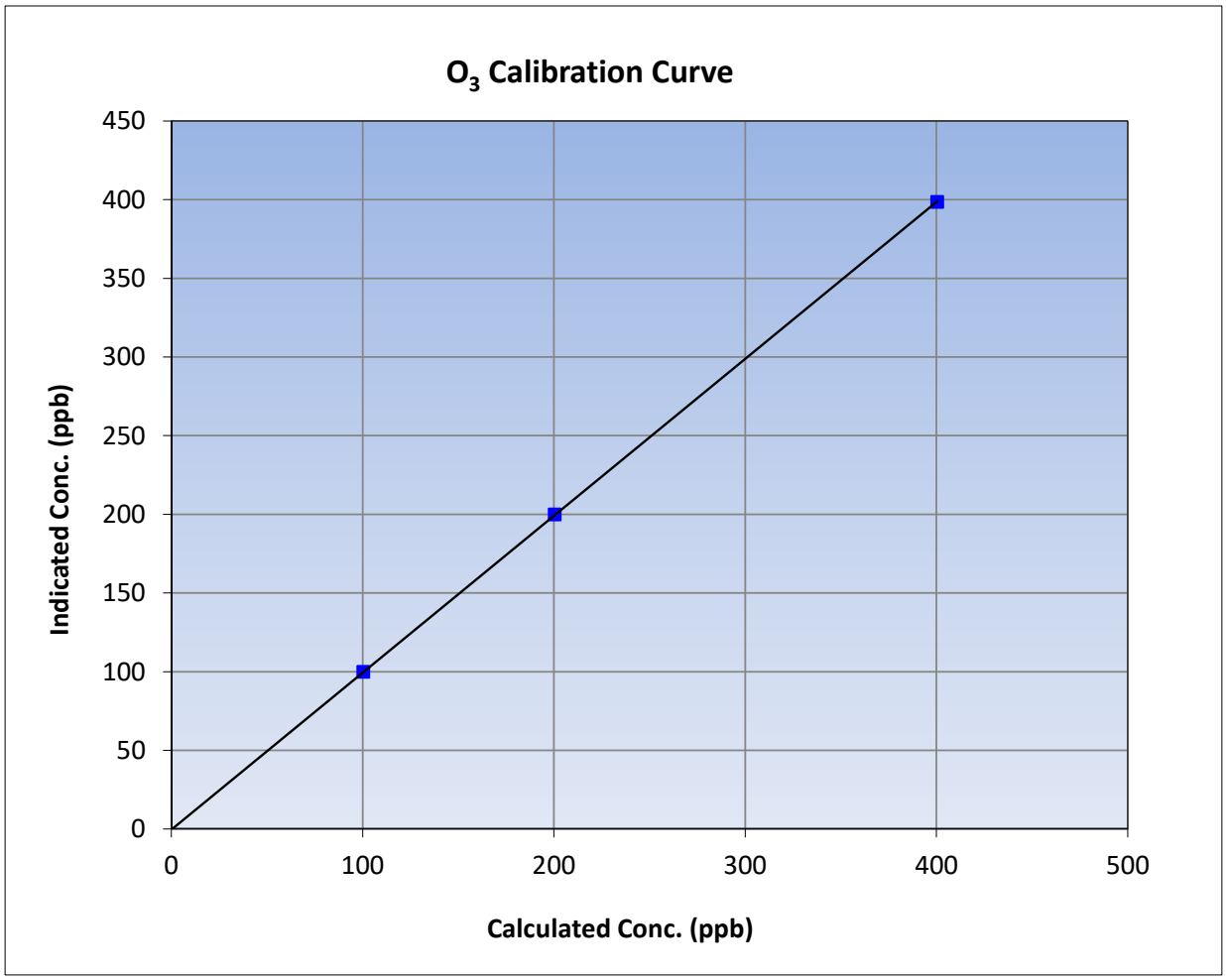
Station Information

Calibration Date:	September 13, 2023	Previous Calibration:	August 9, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:30	End Time (MST):	8:38
Analyzer make:	API T400	Analyzer serial #:	2961

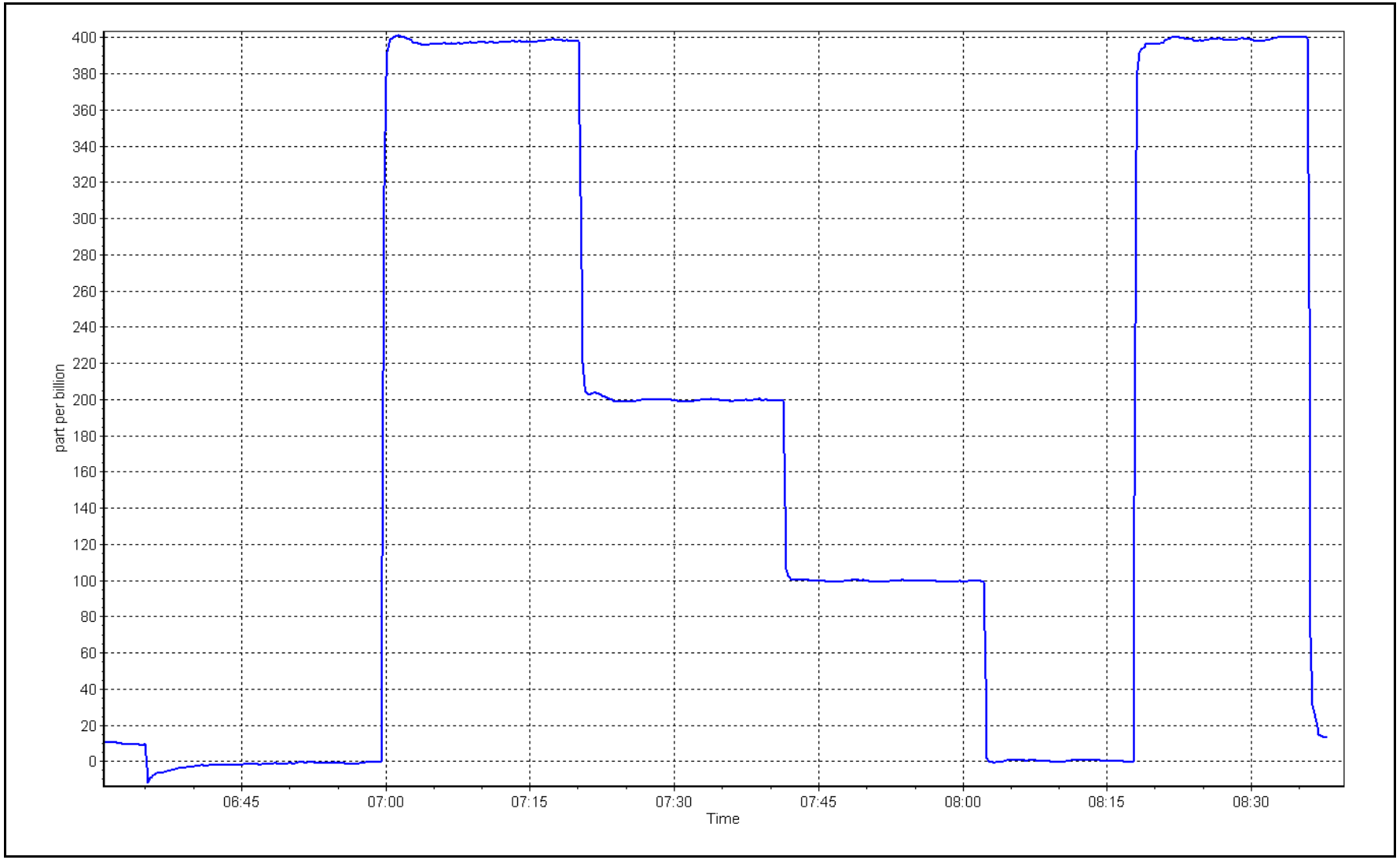
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.9	----
400.0	398.2	1.0045
200.0	199.6	1.0020
100.0	99.5	1.0050

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	0.997486	*0.90 - 1.10*
Intercept	-0.460000	*+/- 5*



O_3 Calibration Plot Date: September 13, 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:	September 13, 2023	Last Cal Date:	August 31, 2023
Start time (MST):	7:09	End time (MST):	8:13
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)	11.1	11.3	11.1	☐	+/- 2 °C
P (mmHg)	723	724.5	723	☐	+/- 10 mmHg
flow (LPM)	5.03	4.93	5.03	☐	+/- 0.25 LPM

Leak Test: Date of check: September 13, 2023 Last Cal Date: August 31, 2023

PM w/o HEPA: 200 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	(Limits)
PMT Peak Test	10.5	10.5	10.5	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 21.8 w/ HEPA: 0 <0.2 ug/m3

Date Optical Chamber Cleaned: September 13, 2023

Disposable Filter Changed: September 13, 2023

Annual Maintenance

Date Sample Tube Cleaned: May 23, 2023

Date RH/T Sensor Cleaned: May 23, 2023

Notes: No adjustments done. Leak check done before and after cleaning.

Calibration by: Melissa Lemay

Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Buffalo Viewpoint	Station Number:	AMS 04
Calibration Date:	September 29, 2023	Prev Cal Date:	October 6, 2022
Start Time (MST):	6:48	End Time (MST):	8:13
Tower Height (m):	10m	Reason:	Removal

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	Y4520
WS Calibrator:	MetOne 053	Serial Number:	R10866

Shaft RPM	Calculated Speed (K/hr) (Cv)	Indicated Speed (K/hr) (Iv)	% Error *Limit = +/- 1.5%*
0	0.0	0.0	---
200	20.2	20.1	-0.3%
400	39.4	39.4	0.1%
600	58.6	58.7	0.2%
800	77.8	77.8	0.1%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)	0.999999	0.999998	*≥0.9995*
Calculated slope	0.999979	0.998443	*0.90 - 1.10*
Calculated intercept	-0.013577	0.026636	*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	V11346
As Found Declination (deg east of True North):	14	As Left Declination (deg east of True North):	14
Solar noon time (MST):	12:12:43	Calc Declination*:	13.67 Degrees
Deadband calc:	-1.4 degrees (*Limit 4 deg*)		* - calculated declination as per NOAA website

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	% Error (based on 357° FS) *Limit = +/- 1.0%*
0	0.0	---
90	90.5	0.1%
180	179.4	-0.2%
270	269.7	-0.1%
357	358.4	0.4%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)	0.999994	0.999987	*≥0.9995*
Calculated slope	1.000909	0.997772	*0.90 - 1.10*
Calculated intercept	-0.427281	0.200128	*+/- 4*

Notes: WS was removed, WD was just calibrated.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Buffalo Viewpoint	Station Number:	AMS 04
Calibration Date:	September 29, 2023	Prev Cal Date:	October 6, 2022
Start Time (MST):	6:48	End Time (MST):	8:13
Tower Height (m):	10m	Reason:	Install

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	Y3176
WS Calibrator:	MetOne 053	Serial Number:	R10866

Shaft RPM	Calculated Speed (K/hr) (Cv)	Indicated Speed (K/hr) (Iv)	% Error *Limit = +/- 1.5%*
0	0.0	0.0	---
200	20.2	20.2	0.2%
400	39.4	39.4	0.1%
600	58.6	58.8	0.4%
800	77.8	77.8	0.1%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)		0.999996	*≥0.9995*
Calculated slope		0.998429	*0.90 - 1.10*
Calculated intercept		-0.012747	*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	V11346
As Found Declination (deg east of True North):	14	As Left Declination (deg east of True North):	14
Solar noon time (MST):	12:12;43	Calc Declination*:	13.67 Degrees
Deadband calc:	-1.4 degrees (*Limit 4 deg*)		* - calculated declination as per NOAA website

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	% Error (based on 357° FS) *Limit = +/- 1.0%*
0	0.0	---
90	90.5	0.1%
180	179.4	-0.2%
270	269.7	-0.1%
357	358.4	0.4%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)	0.999994	0.999987	*≥0.9995*
Calculated slope	1.000909	0.997772	*0.90 - 1.10*
Calculated intercept	-0.427281	0.200128	*+/- 4*

Notes: Old WS removed, New WS installed.

Calibration Performed By: Melissa Lemay

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS05
MANNIX
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	September 15, 2023	Last Cal Date:	August 15, 2023
Start time (MST):	9:07	End time (MST):	12:30
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999257	0.998615	Backgd or Offset:	8.9	8.9
Calibration intercept:	0.220000	0.320000	Coeff or Slope:	0.930	0.930

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.4	----
as found span	4920	80.0	800.3	797.9	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.7	----
high point	4920	80.0	800.3	799.2	1.001
second point	4960	40.0	400.2	401.3	0.997
third point	4980	20.0	200.1	198.7	1.007
as left zero	5000	0.0	0.0	0.8	----
as left span	4920	80.0	800.3	802.8	0.997
				Average Correction Factor	1.002

Baseline Corr As found:	797.50	Previous response	799.95	*% change	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

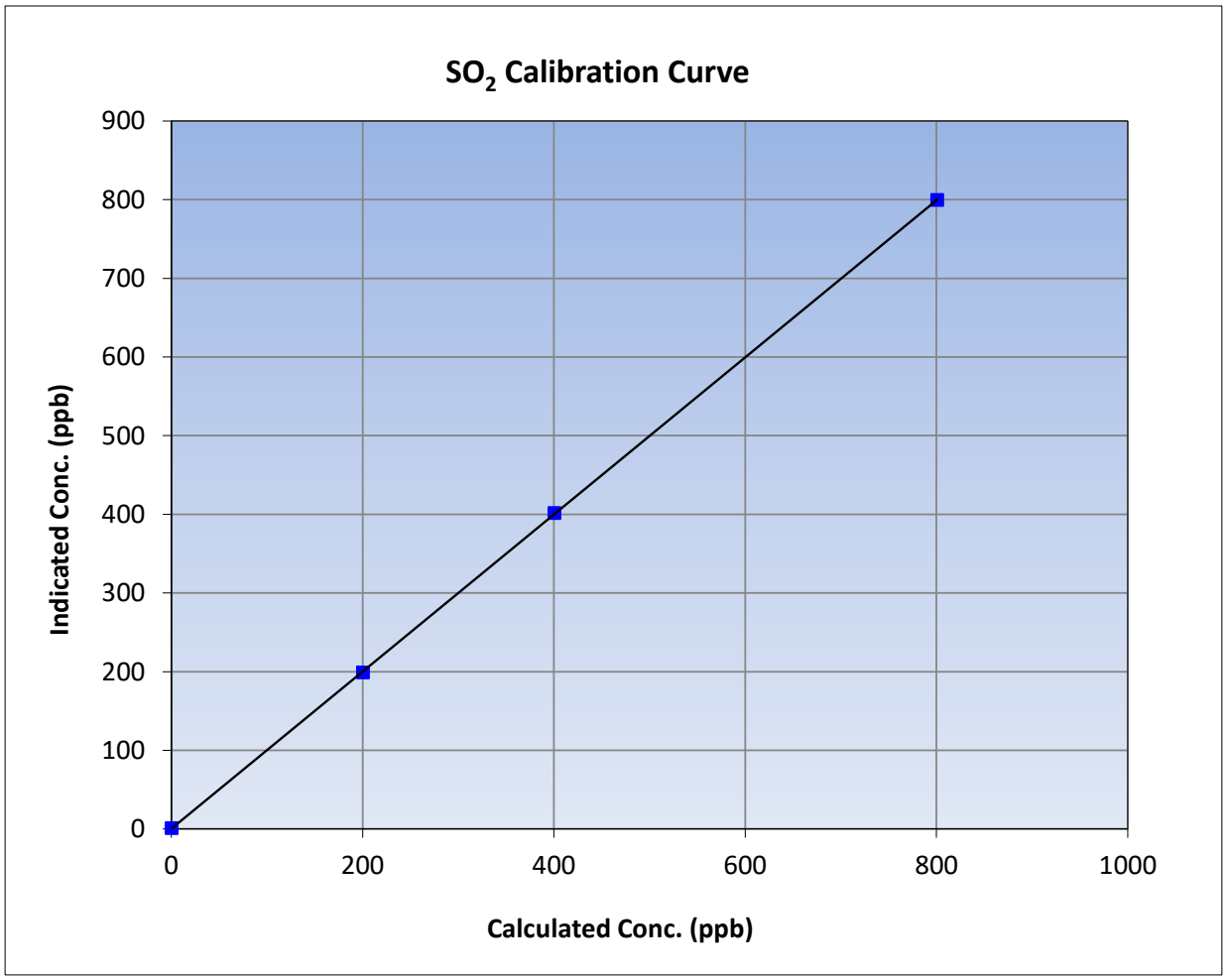
Station Information

Calibration Date:	September 15, 2023	Previous Calibration:	August 15, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	9:07	End Time (MST):	12:30
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841399

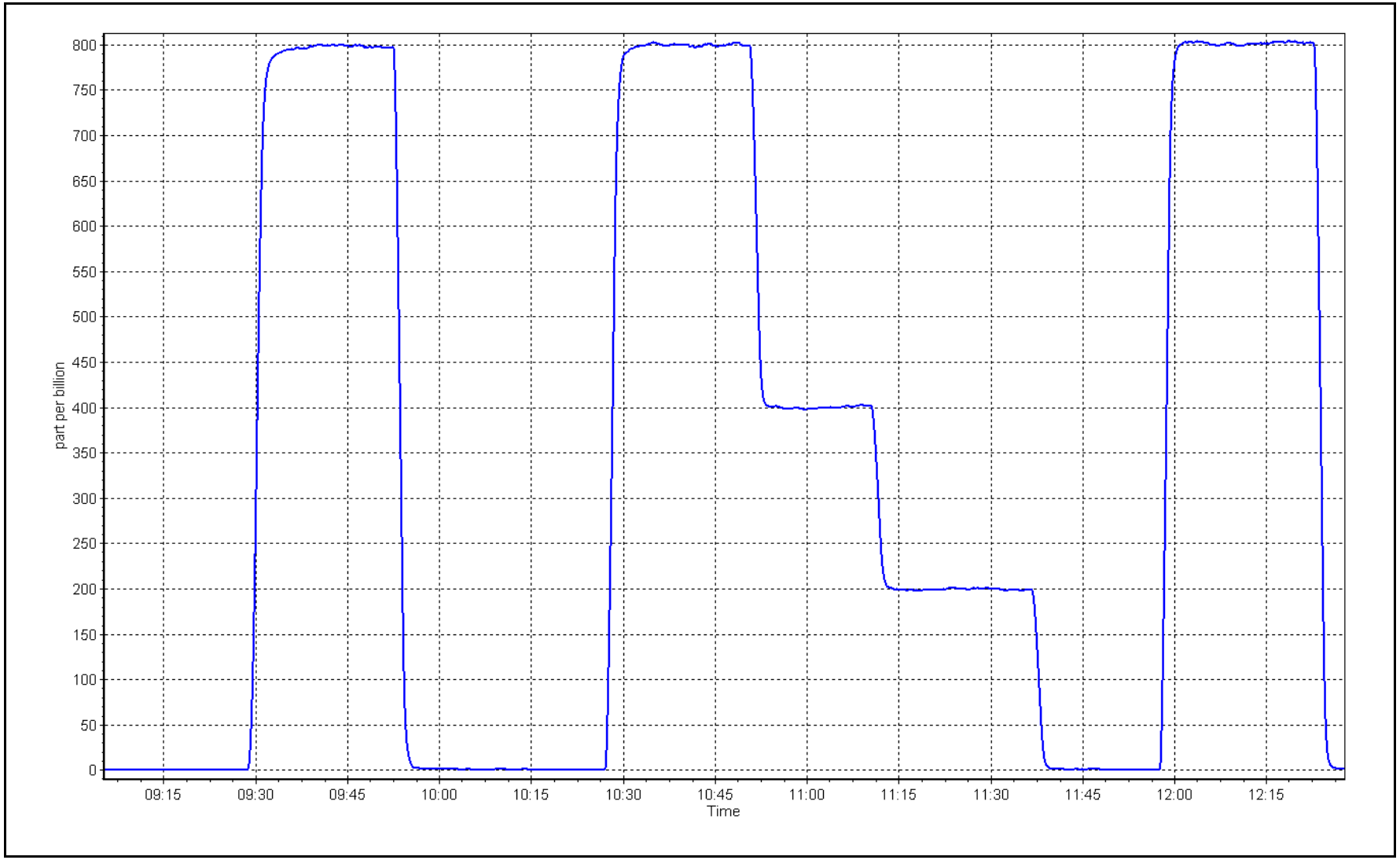
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.7	----
800.3	799.2	1.0014
400.2	401.3	0.9972
200.1	198.7	1.0069

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999988	*≥0.995*
Slope	0.998615	*0.90 - 1.10*
Intercept	0.320000	*+/-30*



SO2 Calibration Plot Date: September 15, 2023 Location: Mannix



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	September 18, 2023	Last Cal Date:	August 22, 2023
Start time (MST):	9:12	End time (MST):	13:50
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:	1.000615	0.994760	Backgd or Offset:	2.18	2.18
Calibration intercept:	0.200559	0.380518	Coeff or Slope:	0.866	0.866

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	84.4	0.949
as found 2nd point	4960	40.7	40.0	40.5	0.991
as found 3rd point	4980	20.3	20.0	20.7	0.970
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4919	81.3	80.0	79.8	1.002
second point	4960	40.7	40.0	40.5	0.989
third point	4980	20.3	20.0	20.3	0.984
as left zero	5000	0.0	0.0	0.5	----
as left span	4919	81.3	80.0	77.3	1.035
SO2 Scrubber Check	4920	80.0	800.0	-0.1	----
Date of last scrubber change:				Ave Corr Factor	0.992
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	84.3	Prev response:	80.24	*% change:	4.8%
Baseline Corr 2nd AF pt:	40.4	AF Slope:	1.053162	AF Intercept:	-0.438733
Baseline Corr 3rd AF pt:	20.6	AF Correlation:	0.999441		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

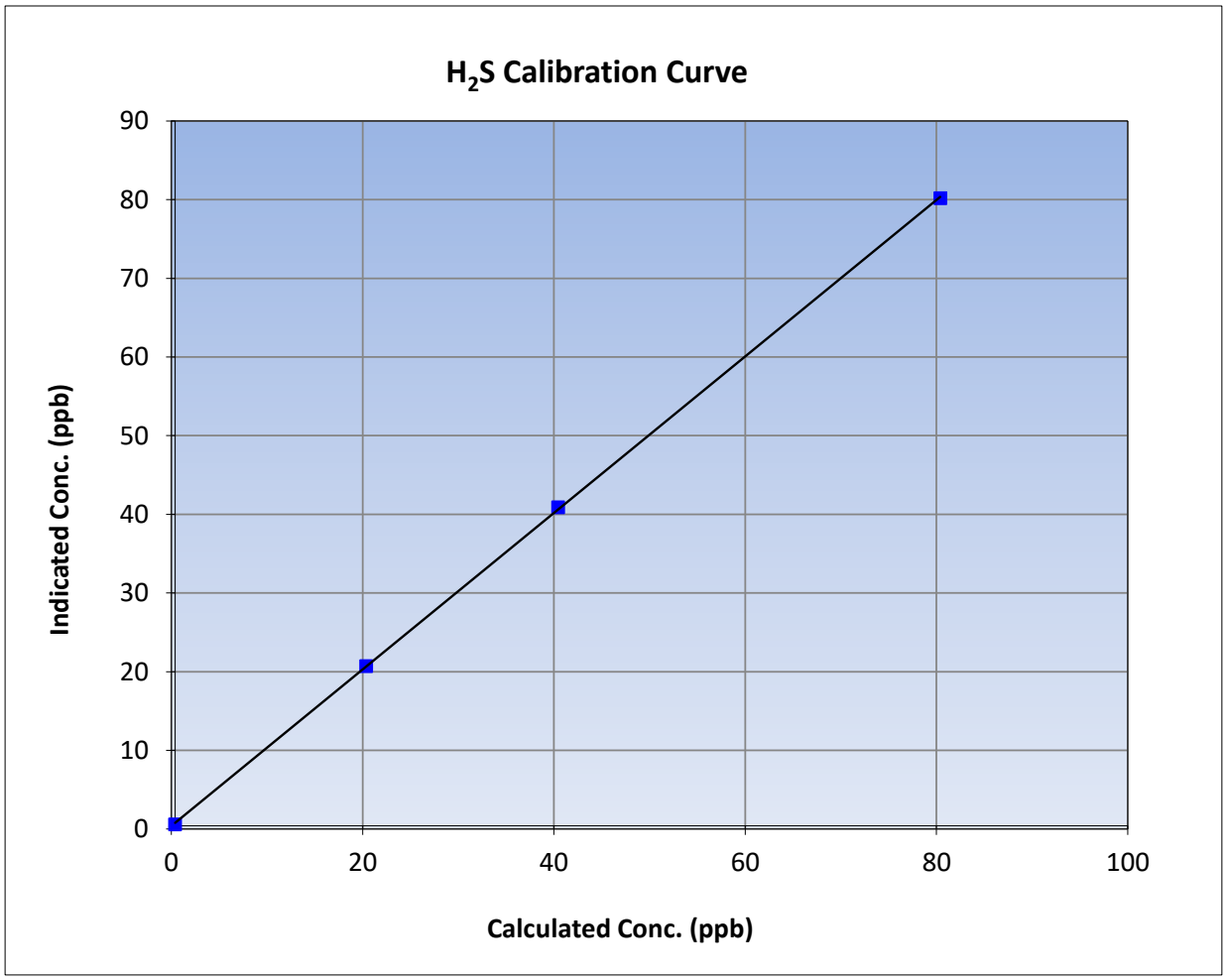
Station Information

Calibration Date:	September 18, 2023	Previous Calibration:	August 22, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	9:12	End Time (MST):	13:50
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1203169745

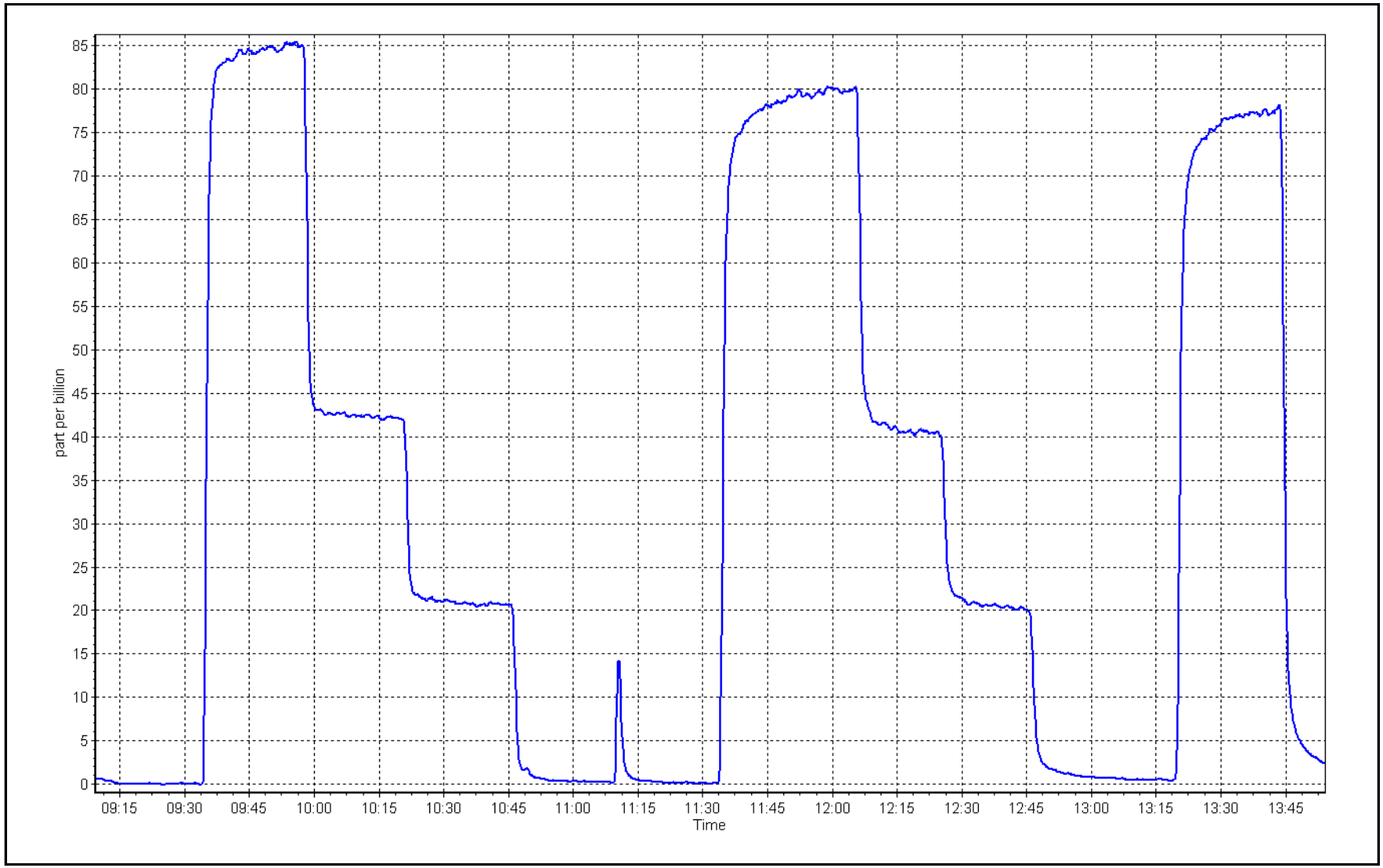
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	79.8	1.0024
40.0	40.5	0.9887
20.0	20.3	0.9839

Statistical Evaluation		Limits
Correlation Coefficient	0.999959	≥0.995
Slope	0.994760	0.90 - 1.10
Intercept	0.380518	+/-3



H_2S Calibration Plot Date: September 18, 2023 Location: Mannix



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Mannix	Station number:	AMS 05
Calibration Date:	September 8, 2023	Last Cal Date:	August 15, 2023
Start time (MST):	12:43	End time (MST):	14:16
Reason:	Cylinder Change	N2 Cylinder change	

Calibration Standards

Gas Cert Reference:	XCO268098		Cal Gas Expiry Date:	January 12, 2029	
CH4 Cal Gas Conc.	504.9	ppm	CH4 Equiv Conc.	1076.6	ppm
C3H8 Cal Gas Conc.	207.9	ppm			
Removed Gas Cert:			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:	2.62E-05	2.62E-05	NMHC SP Ratio:	4.44E-05	4.44E-05
CH4 Retention time:	15.00	15.00	NMHC Peak Area:	206221	206221
Zero Chromatogram:	ON	OFF	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	80.0	17.23	17.35	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	80.0	17.23	17.47	0.986
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.986
Baseline Corr AF:	17.35	Prev response	17.22	*% 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-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	80.0	9.15	9.25	0.989
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	9.15	9.25	0.989
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.989
Baseline Corr AF:	9.25	Prev response	9.16	*% change	1.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	8.08	8.10	0.997
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	8.08	8.22	0.983
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.983
Baseline Corr AF:	8.10	Prev response	8.07	*% change	0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

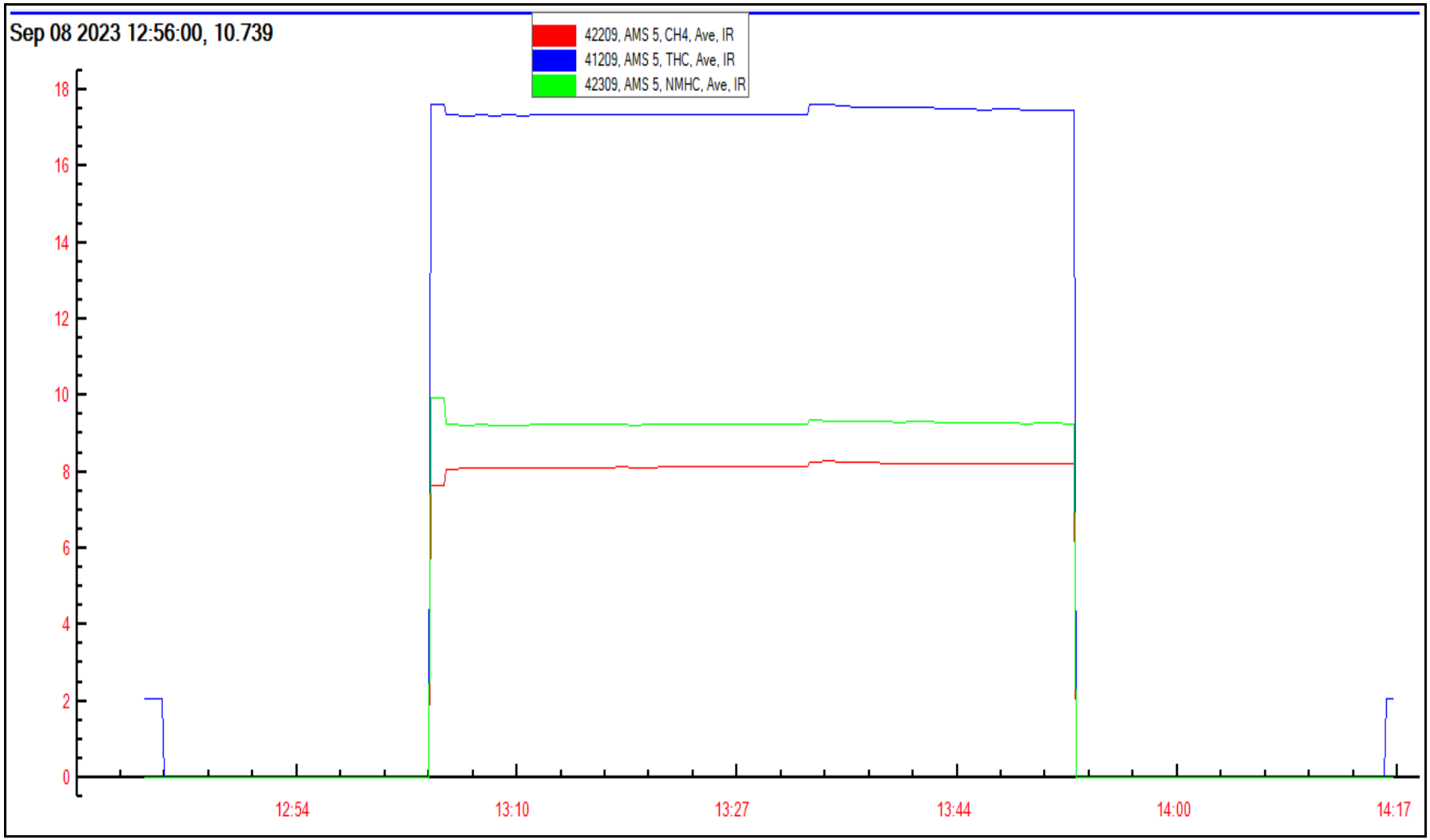
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.998929	1.014049
THC Cal Offset:	0.017200	0.000000
CH4 Cal Slope:	0.999731	1.017033
CH4 Cal Offset:	-0.006600	0.000000
NMHC Cal Slope:	0.998220	1.010976
NMHC Cal Offset:	0.023800	0.000000

Notes: Changed the N2 cylinder.

Calibration Performed By: Max Farrell

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



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Mannix	Station number:	AMS 05
Calibration Date:	September 15, 2023	Last Cal Date:	August 15, 2023
Start time (MST):	9:07	End time (MST):	12:30
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:			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:	2.62E-05	2.62E-05	NMHC SP Ratio:	4.44E-05	4.44E-05
CH4 Retention time:	15.00	15.00	NMHC Peak Area:	206221	206221
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	80.0	17.23	17.23	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	17.23	17.08	1.009
second point	4960	40.0	8.61	8.53	1.009
third point	4980	20.0	4.31	4.27	1.008
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	17.23	17.23	1.000
				Average Correction Factor	1.009
Baseline Corr AF:	17.23	Prev response	17.22	*% change	0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	9.15	9.16	0.999
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	9.15	9.07	1.009
second point	4960	40.0	4.57	4.55	1.005
third point	4980	20.0	2.29	2.29	1.000
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	9.15	9.17	0.997
				Average Correction Factor	1.005
Baseline Corr AF:	9.16	Prev response	9.16	*% change	0.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	8.08	8.07	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	8.08	8.01	1.008
second point	4960	40.0	4.04	3.99	1.014
third point	4980	20.0	2.02	1.99	1.017
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	8.08	8.06	1.003
				Average Correction Factor	1.013
Baseline Corr AF:	8.07	Prev response	8.07	*% 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:	0.998929	0.991126
THC Cal Offset:	0.017200	0.001000
CH4 Cal Slope:	0.999731	0.992078
CH4 Cal Offset:	-0.006600	-0.010800
NMHC Cal Slope:	0.998220	0.990661
NMHC Cal Offset:	0.023800	0.011800

Notes: Changed the inlet filter and the H2 cylinder after as founds. No adjustments made.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

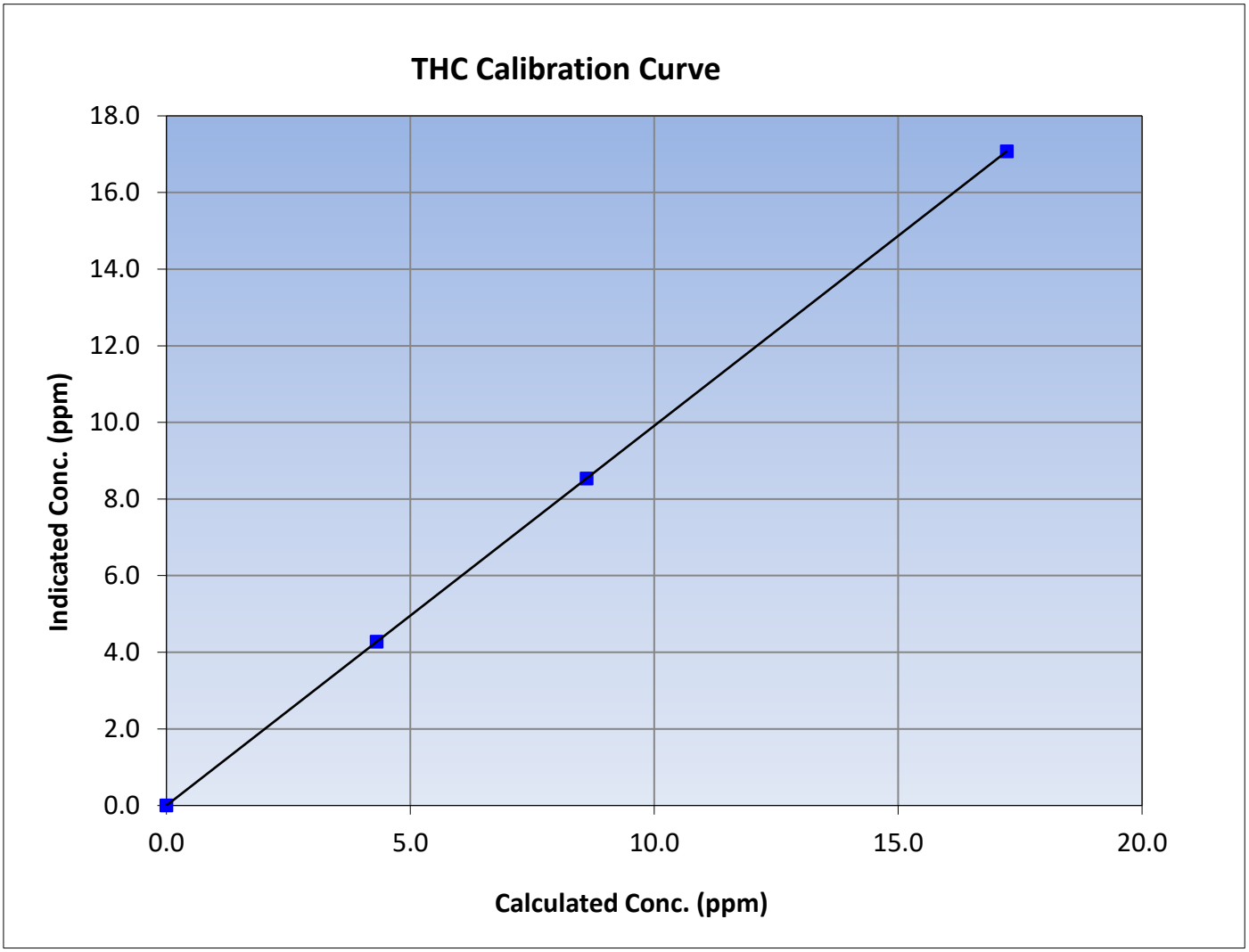
Version-06-2022

Station Information

Calibration Date:	September 15, 2023	Previous Calibration:	August 15, 2023
Station Name:	Mannix	Station Number:	AMS 05
Start Time (MST):	9:07	End Time (MST):	12:30
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	1.000000	*≥0.995*
17.23	17.08	1.0088			
8.61	8.53	1.0093	Slope	0.991126	*0.90 - 1.10*
4.31	4.27	1.0078			
			Intercept	0.001000	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

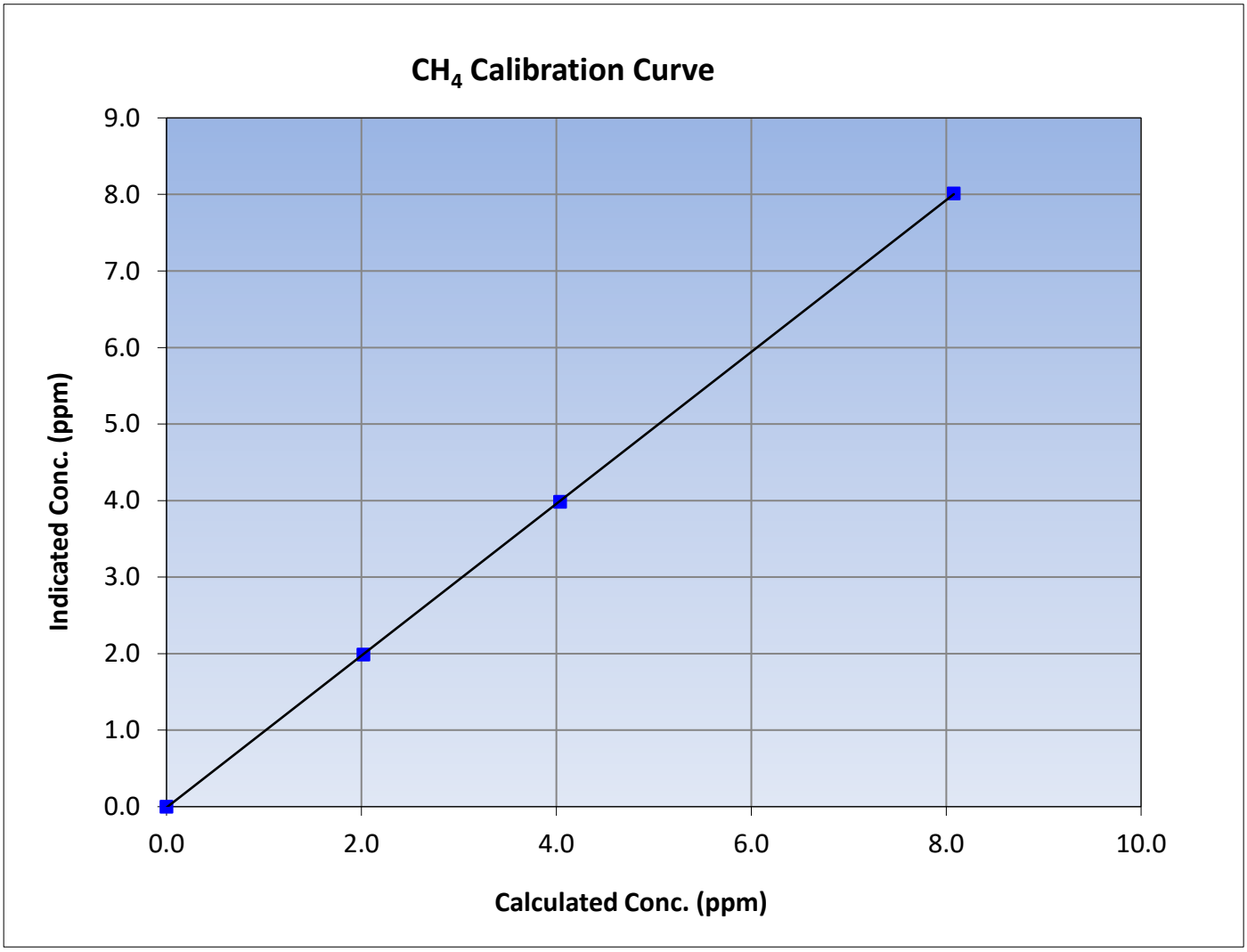
Version-06-2022

Station Information

Calibration Date:	September 15, 2023	Previous Calibration:	August 15, 2023
Station Name:	Mannix	Station Number:	AMS 05
Start Time (MST):	9:07	End Time (MST):	12:30
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999990	*≥0.995*
8.08	8.01	1.0084			
4.04	3.99	1.0136	Slope	0.992078	*0.90 - 1.10*
2.02	1.99	1.0169			
			Intercept	-0.010800	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

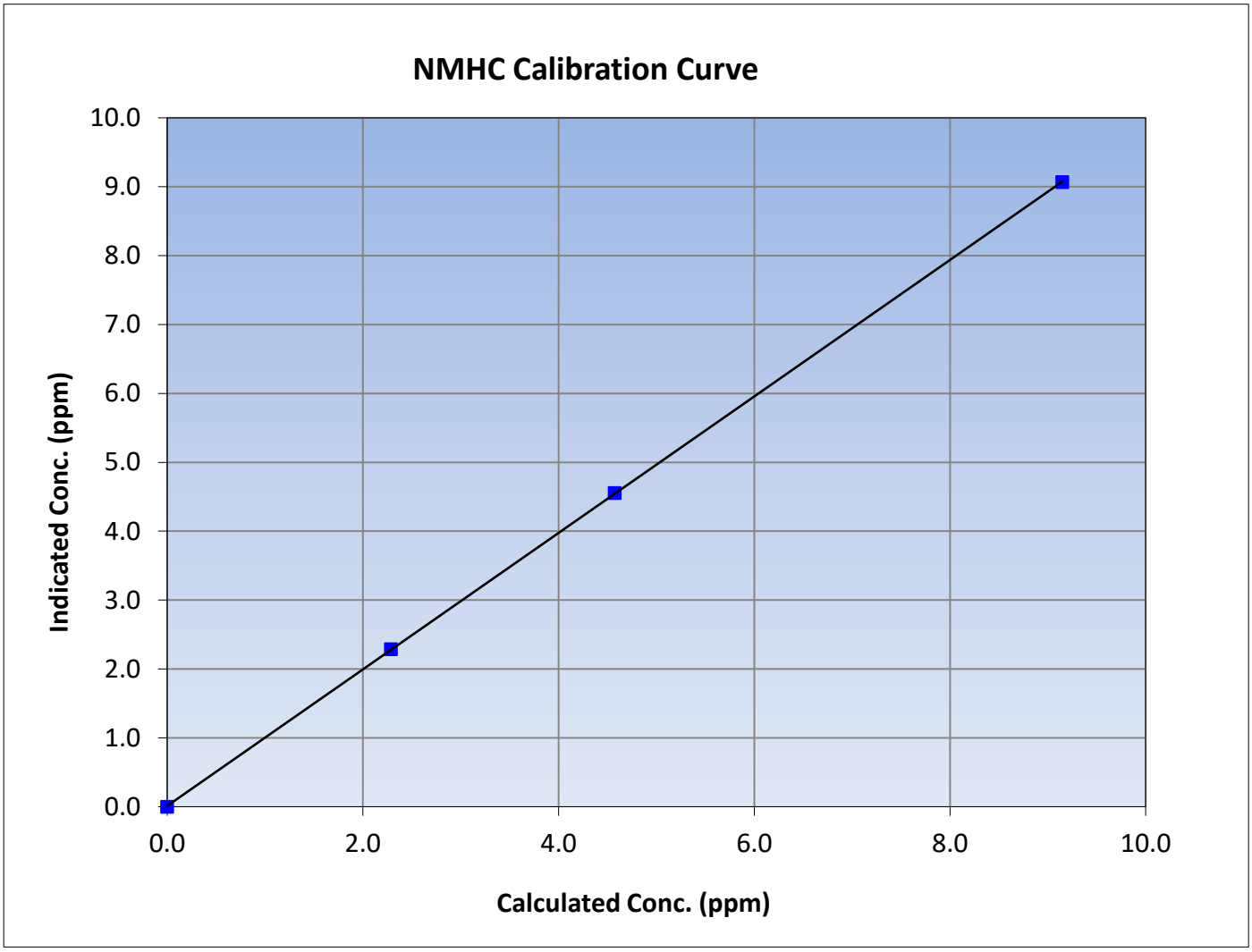
Version-06-2022

Station Information

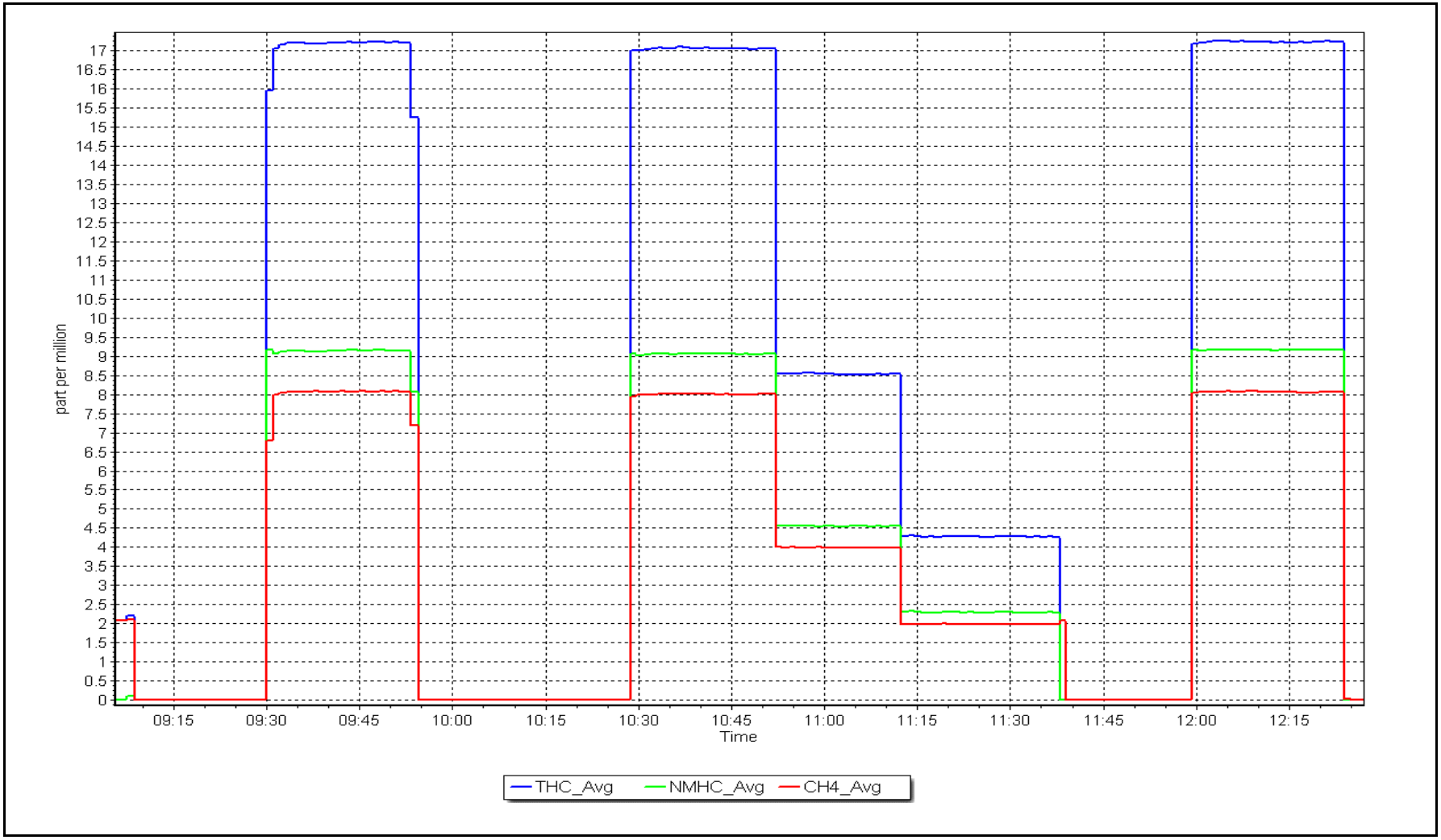
Calibration Date:	September 15, 2023	Previous Calibration:	August 15, 2023
Station Name:	Mannix	Station Number:	AMS 05
Start Time (MST):	9:07	End Time (MST):	12:30
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999992	≥0.995
9.15	9.07	1.0089			
4.57	4.55	1.0048	Slope	0.990661	0.90 - 1.10
2.29	2.29	1.0000			
			Intercept	0.011800	+/-0.5



NMHC Calibration Plot Date: September 15, 2023 Location: Mannix



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS06
PATRICIA MCINNES
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	September 14, 2023	Last Cal Date:	August 17, 2023
Start time (MST):	9:23	End time (MST):	12:30
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:	1.007062	1.000605	Backgd or Offset:	17.2	17.4
Calibration intercept:	-0.099843	1.660053	Coeff or Slope:	0.901	0.911

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.3	----
as found span	4920	80.3	799.5	791.3	1.010
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4920	80.3	799.5	800.9	0.998
second point	4960	40.2	400.2	402.7	0.994
third point	4980	20.1	200.1	203.6	0.983
as left zero	5000	0.0	0.0	0.0	----
as left span	4920	80.3	799.5	802.6	0.996
				Average Correction Factor	0.992

Baseline Corr As found:	791.60	Previous response	805.01	*% change	-1.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed 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

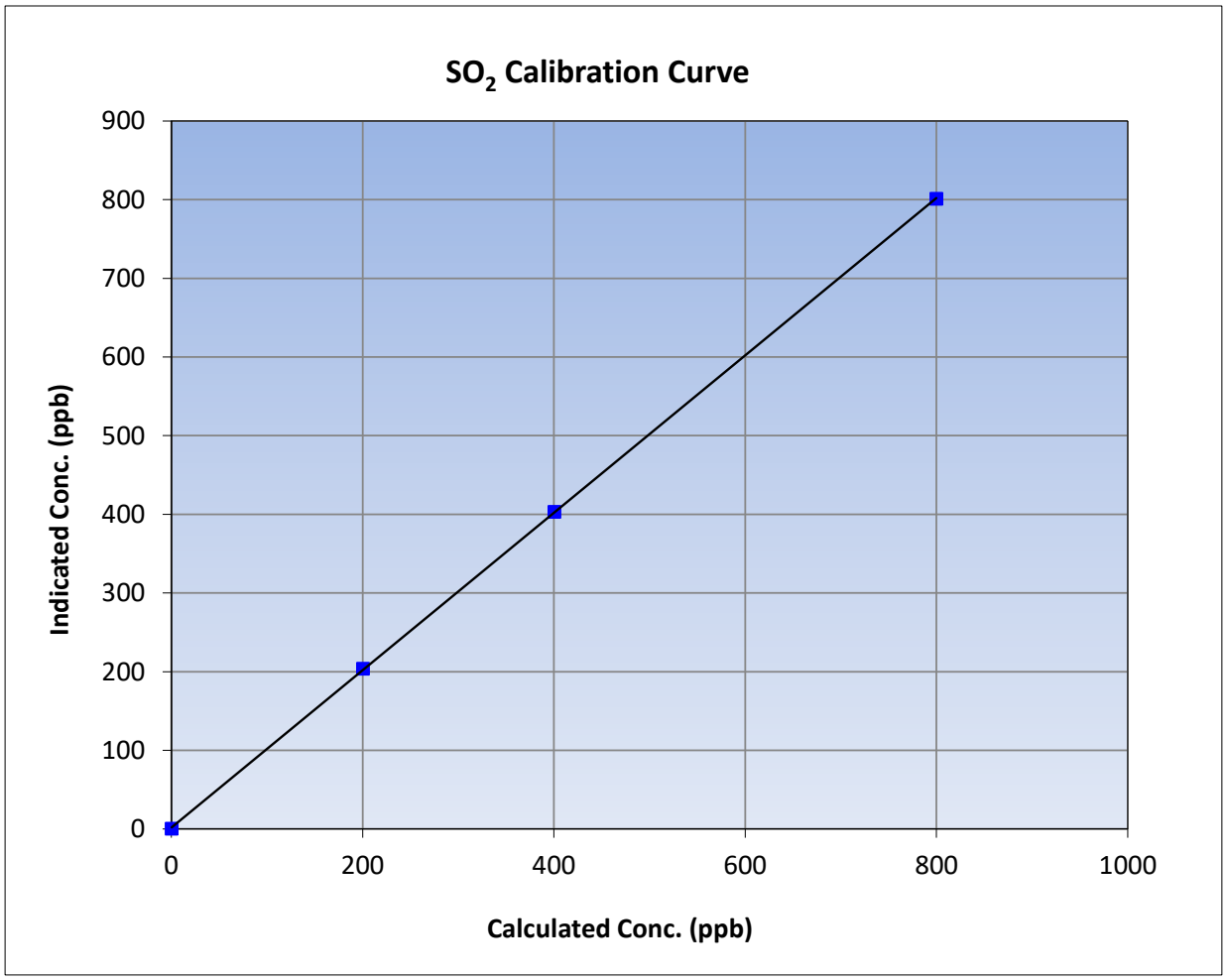
Station Information

Calibration Date:	September 14, 2023	Previous Calibration:	August 17, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:23	End Time (MST):	12:30
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290013

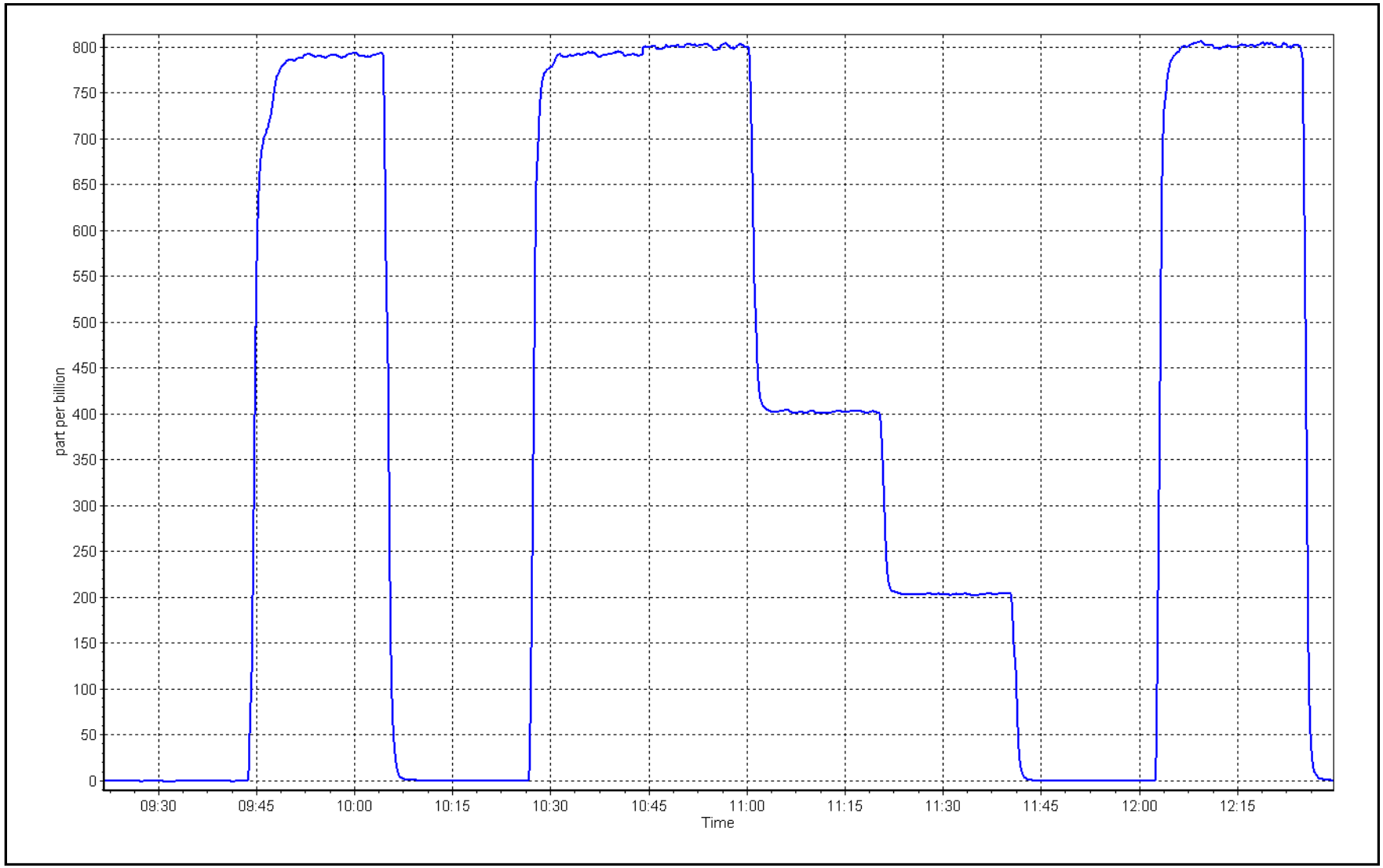
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
799.5	800.9	0.9982
400.2	402.7	0.9939
200.1	203.6	0.9829

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999982	*≥0.995*
Slope	1.000605	*0.90 - 1.10*
Intercept	1.660053	*+/-30*



SO2 Calibration Plot Date: September 14, 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:	September 22, 2023	Last Cal Date:	August 28, 2023
Start time (MST):	9:15	End time (MST):	13:48
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:	0.988760	1.004636	Backgd or Offset:	2.06	2.05
Calibration intercept:	-0.002363	0.217058	Coeff or Slope:	1.187	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	0.0	----
as found span	4926	74.3	79.9	76.4	1.046
as found 2nd point	4963	37.2	40.0	38.2	1.048
as found 3rd point	4981	18.6	20.0	19.4	1.032
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4926	74.3	79.9	80.5	0.993
second point	4963	37.2	40.0	40.4	0.991
third point	4981	18.6	20.0	20.5	0.976
as left zero	5000	0.0	0.0	0.2	----
as left span	4926	74.3	79.9	81.1	0.986
SO2 Scrubber Check	4920	80.3	803.0	0.0	----
Date of last scrubber change:		December 20, 2021		Ave Corr Factor	0.987
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	76.4	Prev response:	79.04	*% change:	-3.5%
Baseline Corr 2nd AF pt:	38.2	AF Slope:	0.954453	AF Intercept:	0.098235
Baseline Corr 3rd AF pt:	19.4	AF Correlation:	0.999981		

* = > +/-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

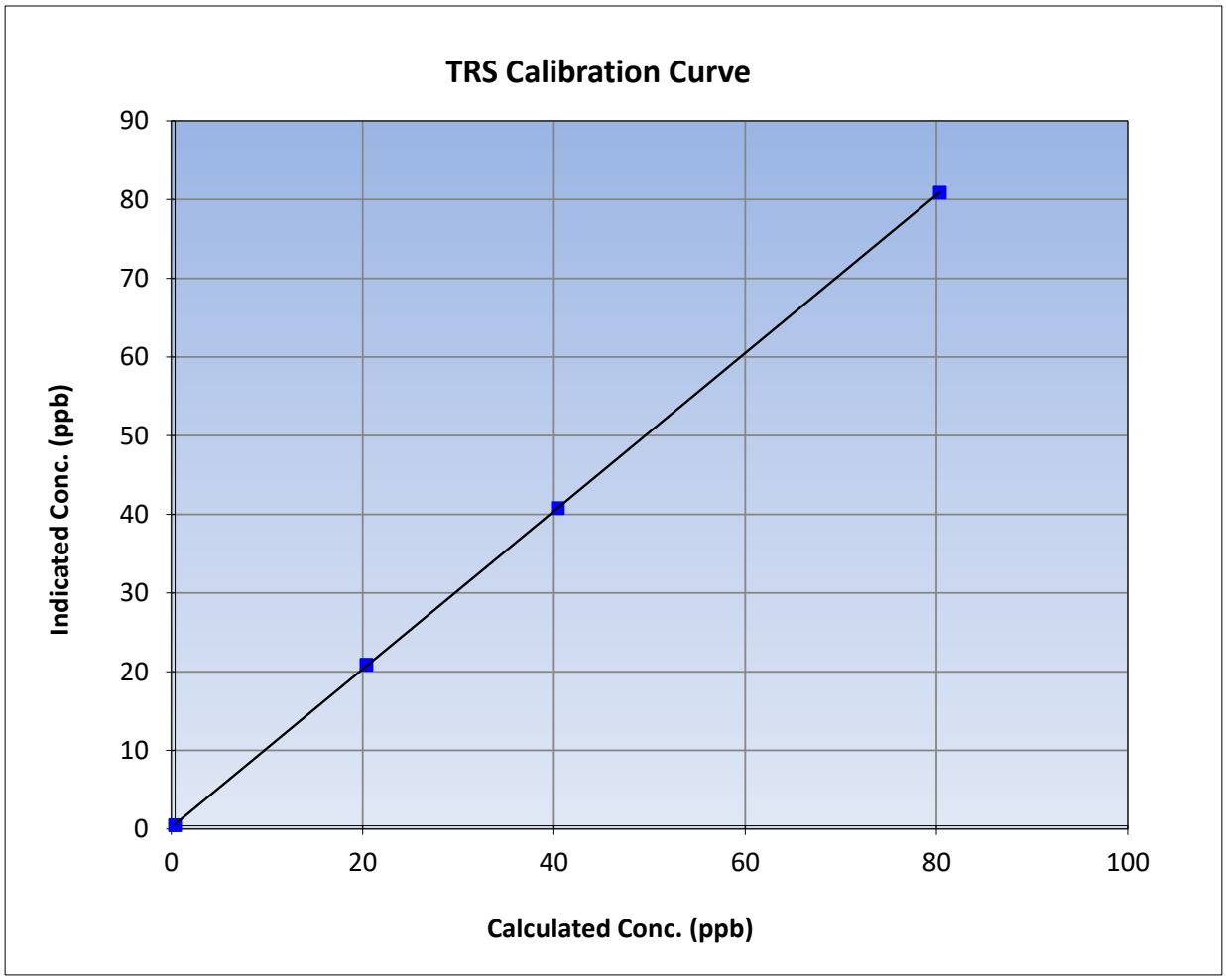
Station Information

Calibration Date:	September 22, 2023	Previous Calibration:	August 28, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:15	End Time (MST):	13:48
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1218153358

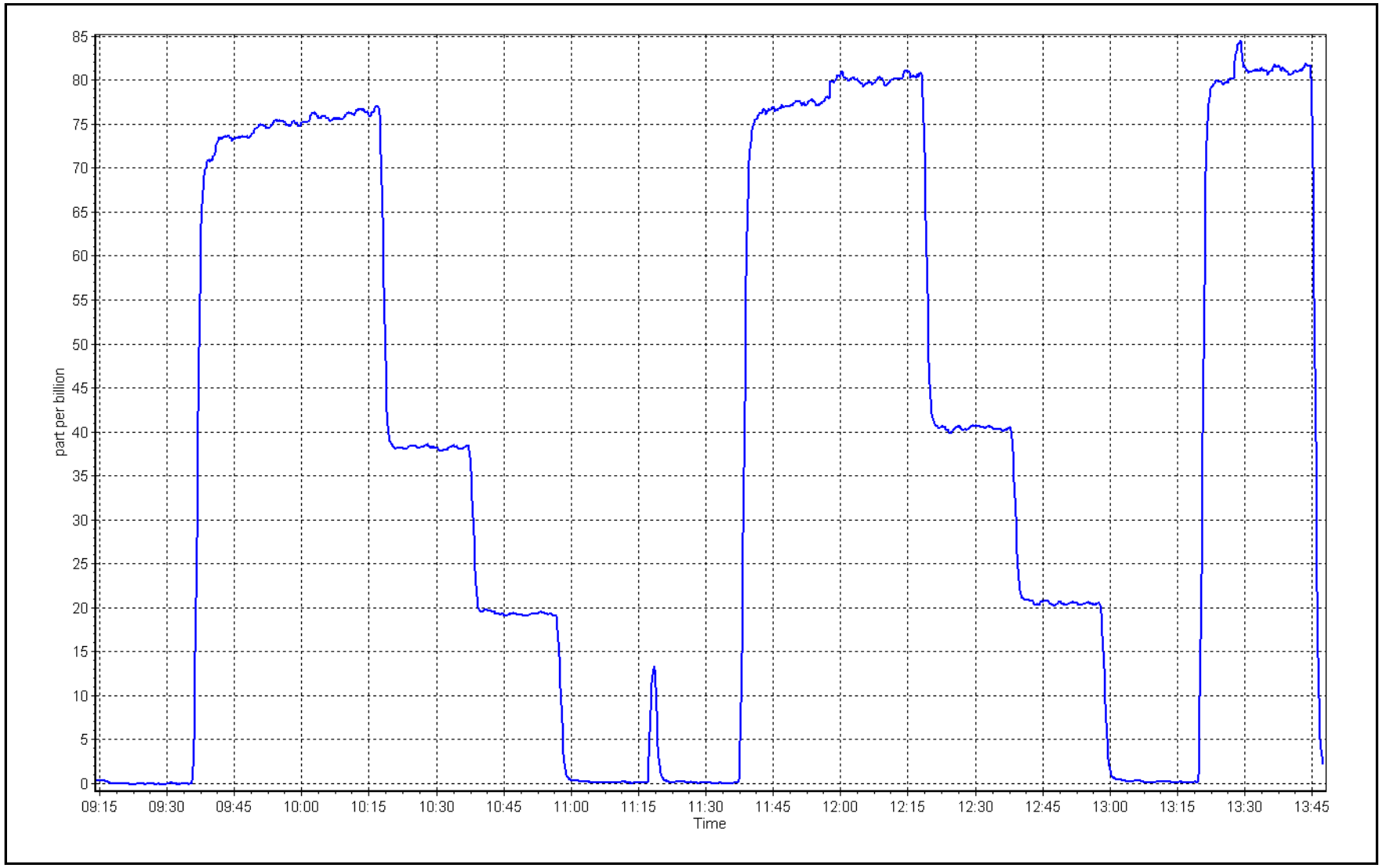
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
79.9	80.5	0.9931
40.0	40.4	0.9907
20.0	20.5	0.9764

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999987	*≥0.995*
Slope	1.004636	*0.90 - 1.10*
Intercept	0.217058	*+/-3*



TRS Calibration Plot Date: September 22, 2023 Location: Patricia McInnes



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	September 14, 2023	Last Cal Date:	August 17, 2023
Start time (MST):	9:23	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 Cert:			Removed Gas Expiry:		
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:	2.11E-04	2.12E-04	NMHC SP Ratio:	4.72E-05	4.80E-05
CH4 Retention time:	14.0	14.0	NMHC Peak Area:	192120	189064
Zero Chromatogram:	OFF		Flat Baseline:	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	0.01	----
as found span	4920	80.3	17.12	17.01	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	17.12	17.15	0.998
second point	4960	40.2	8.57	8.62	0.994
third point	4980	20.1	4.29	4.37	0.980
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.12	17.14	0.999
				Average Correction Factor	0.991
Baseline Corr AF:	17.00	Prev response	17.06	*% change	-0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.01	----
as found span	4919.7	80.3	9.07	8.98	1.009
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919.7	80.3	9.07	9.09	0.997
second point	4960	40.2	4.54	4.59	0.988
third point	4980	20.1	2.27	2.35	0.967
as left zero	5000	0.0	0.00	0.00	----
as left span	4919.7	80.3	9.07	9.09	0.997
				Average Correction Factor	0.984
Baseline Corr AF:	8.97	Prev response	9.02	*% change	-0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919.7	80.3	8.06	8.03	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919.7	80.3	8.06	8.06	0.999
second point	4960	40.2	4.03	4.03	1.001
third point	4980	20.1	2.02	2.03	0.995
as left zero	5000	0.0	0.00	0.00	----
as left span	4919.7	80.3	8.06	8.05	1.001
				Average Correction Factor	0.999
Baseline Corr AF:	8.03	Prev response	8.03	*% 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:	0.993295	1.000464
THC Cal Offset:	0.049653	0.038421
CH4 Cal Slope:	0.996285	1.000059
CH4 Cal Offset:	0.004651	0.001844
NMHC Cal Slope:	0.990348	1.000823
NMHC Cal Offset:	0.045403	0.036578

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

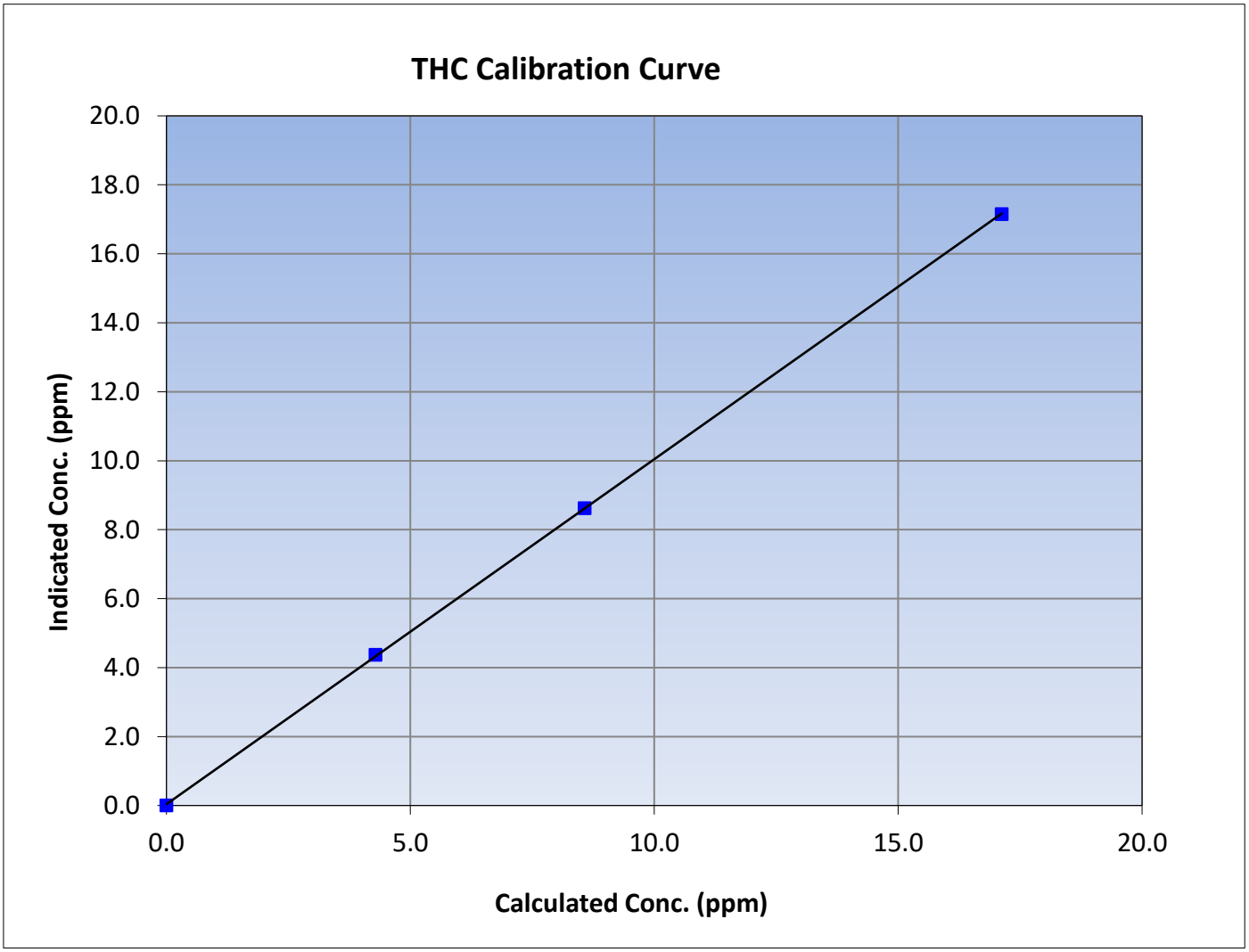
Version-06-2022

Station Information

Calibration Date:	September 14, 2023	Previous Calibration:	August 17, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:23	End Time (MST):	12:30
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	0.999976	≥0.995
17.12	17.15	0.9982			
8.57	8.62	0.9943	Slope	1.000464	0.90 - 1.10
4.29	4.37	0.9801			
			Intercept	0.038421	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

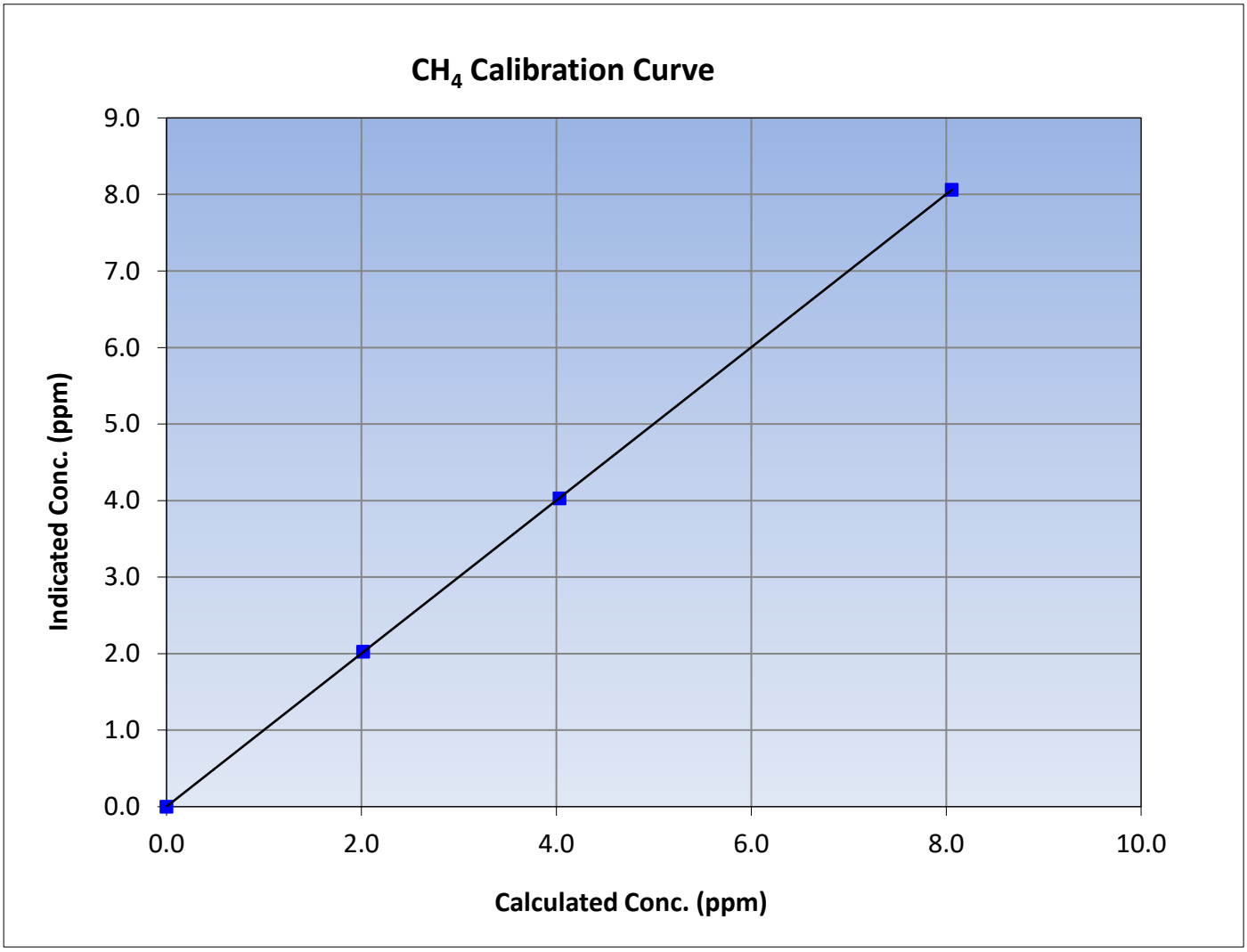
Version-06-2022

Station Information

Calibration Date:	September 14, 2023	Previous Calibration:	August 17, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:23	End Time (MST):	12:30
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	0.999996	≥0.995
8.06	8.06	0.9995			
4.03	4.03	1.0014	Slope	1.000059	0.90 - 1.10
2.02	2.03	0.9953			
			Intercept	0.001844	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

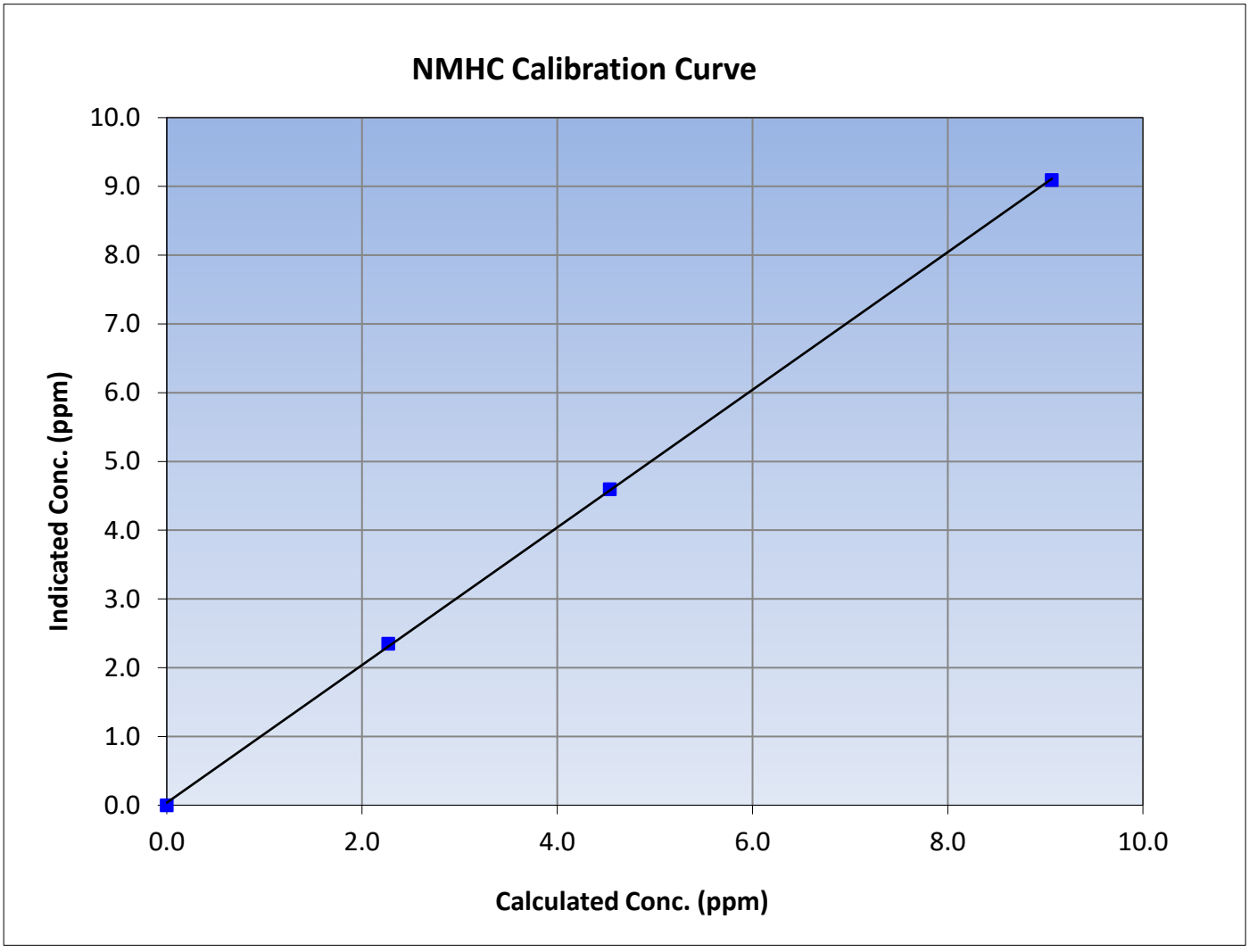
Version-06-2022

Station Information

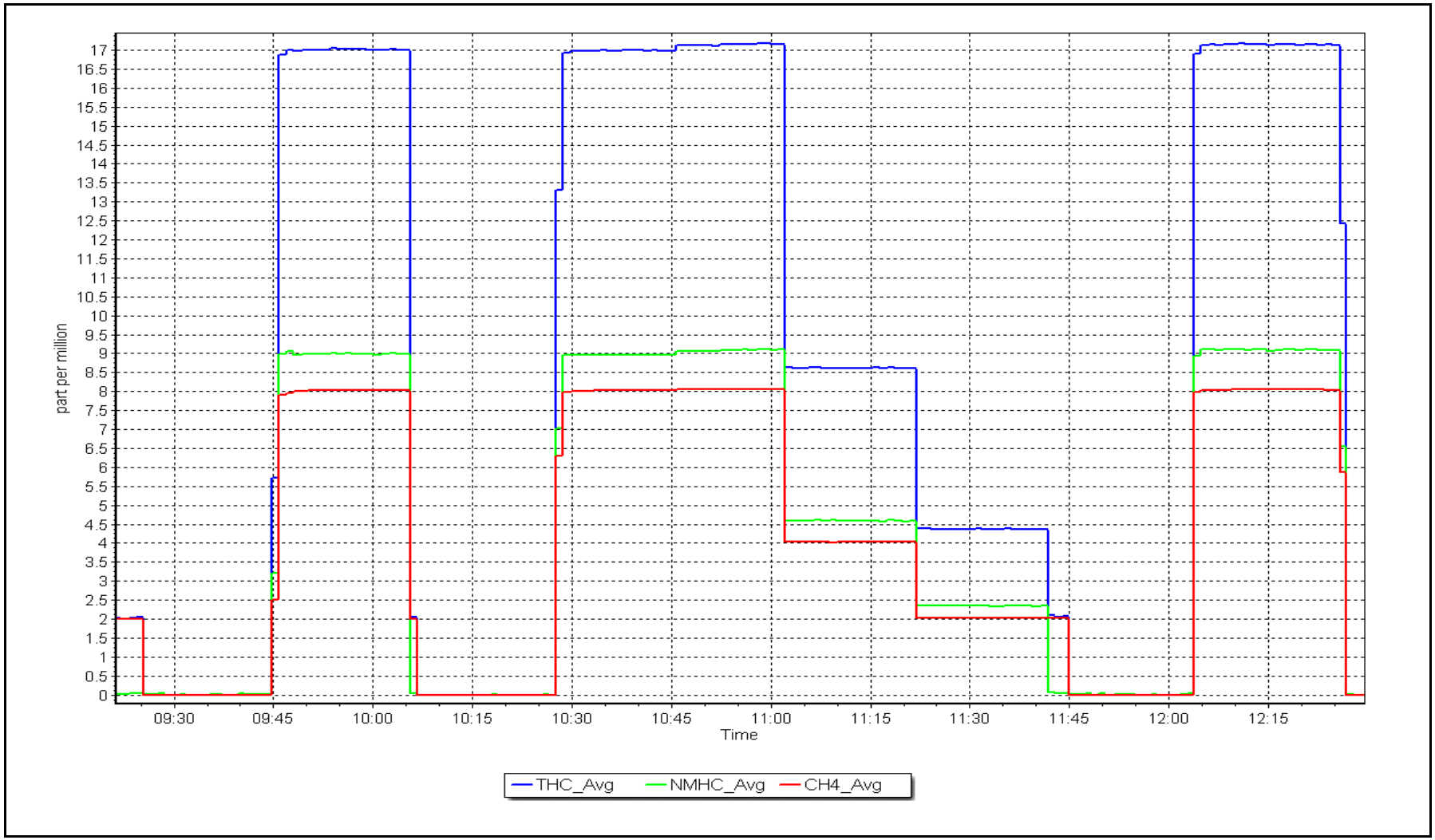
Calibration Date:	September 14, 2023	Previous Calibration:	August 17, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:23	End Time (MST):	12:30
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999925	*≥0.995*
9.07	9.09	0.9970			
4.54	4.59	0.9880	Slope	1.000823	*0.90 - 1.10*
2.27	2.35	0.9670			
			Intercept	0.036578	*+/-0.5*



NMHC Calibration Plot Date: September 14, 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:	September 20, 2023	Last Cal Date:	August 9, 2023
Start time (MST):	7:57	End time (MST):	12:41
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	0.825	NO bkgnd or offset:	3.2	3.2
NOX coeff or slope:	0.986	0.987	NOX bkgnd or offset:	3.8	3.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	157.2	157.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.992318	0.997367
NO_X Cal Offset:	2.277330	2.676082
NO Cal Slope:	0.995327	0.999173
NO Cal Offset:	1.003845	1.382870
NO_2 Cal Slope:	0.998809	1.001949
NO_2 Cal Offset:	-0.587092	0.485373

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	0.6	0.0	----	----
as found span	4914	86.2	826.5	799.7	26.7	815.7	788.9	26.8	1.0132	1.0137
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.5	0.4	0.1	----	----
high point	4914	86.2	826.5	799.7	26.7	825.9	800.0	25.9	1.0007	0.9997
second point	4957	43.1	413.2	399.9	13.4	415.8	401.3	14.4	0.9938	0.9964
third point	4978	21.6	207.1	200.4	6.7	211.5	202.7	8.7	0.9793	0.9888
as left zero	5000	0.0	0.0	0.0	0.0	0.4	0.3	0.0	----	----
as left span	4914	86.2	826.5	400.4	426.0	825.8	403.4	422.4	1.0008	0.9926
								Average Correction Factor	0.9913	0.9950

Corrected As found	NO_X = 815.1 ppb	NO = 788.3 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.9%
Previous Response	NO_X = 822.4 ppb	NO = 797.0 ppb		*Percent Change	NO =	-1.1%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	800.1	400.8	426.0	427.0	0.9977	100.2%
2nd GPT point (200 ppb O3)	800.1	606.4	220.4	221.9	0.9933	100.7%
3rd GPT point (100 ppb O3)	800.1	705.9	120.9	121.8	0.9928	100.7%
				Average Correction Factor	0.9946	100.5%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

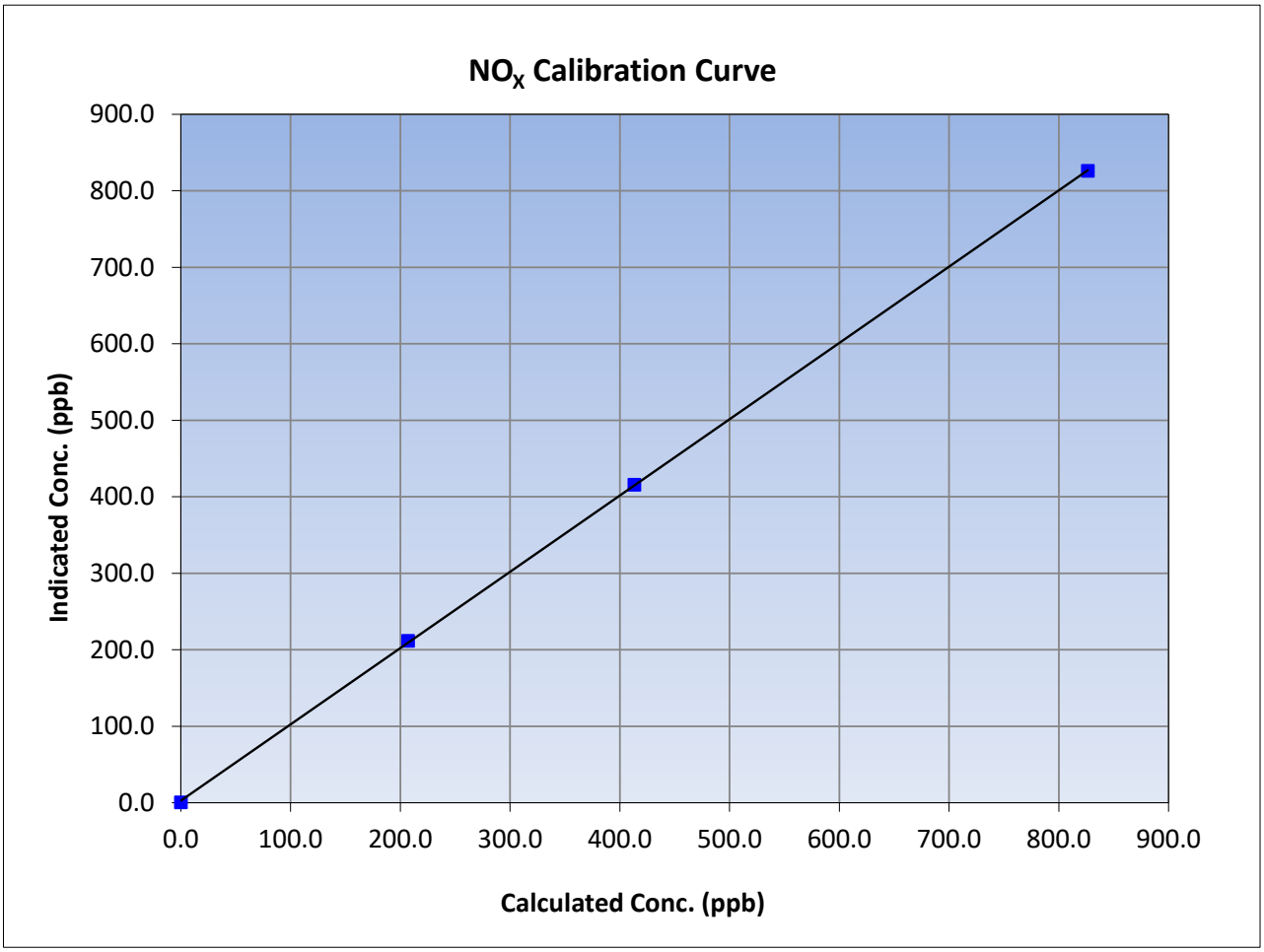
Version-04-2020

Station Information

Calibration Date:	September 20, 2023	Previous Calibration:	August 9, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	7:57	End Time (MST):	12:41
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	0.5	----	Correlation Coefficient	0.999968	*≥0.995*
826.5	825.9	1.0007			
413.2	415.8	0.9938	Slope	0.997367	*0.90 - 1.10*
207.1	211.5	0.9793			
			Intercept	2.676082	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

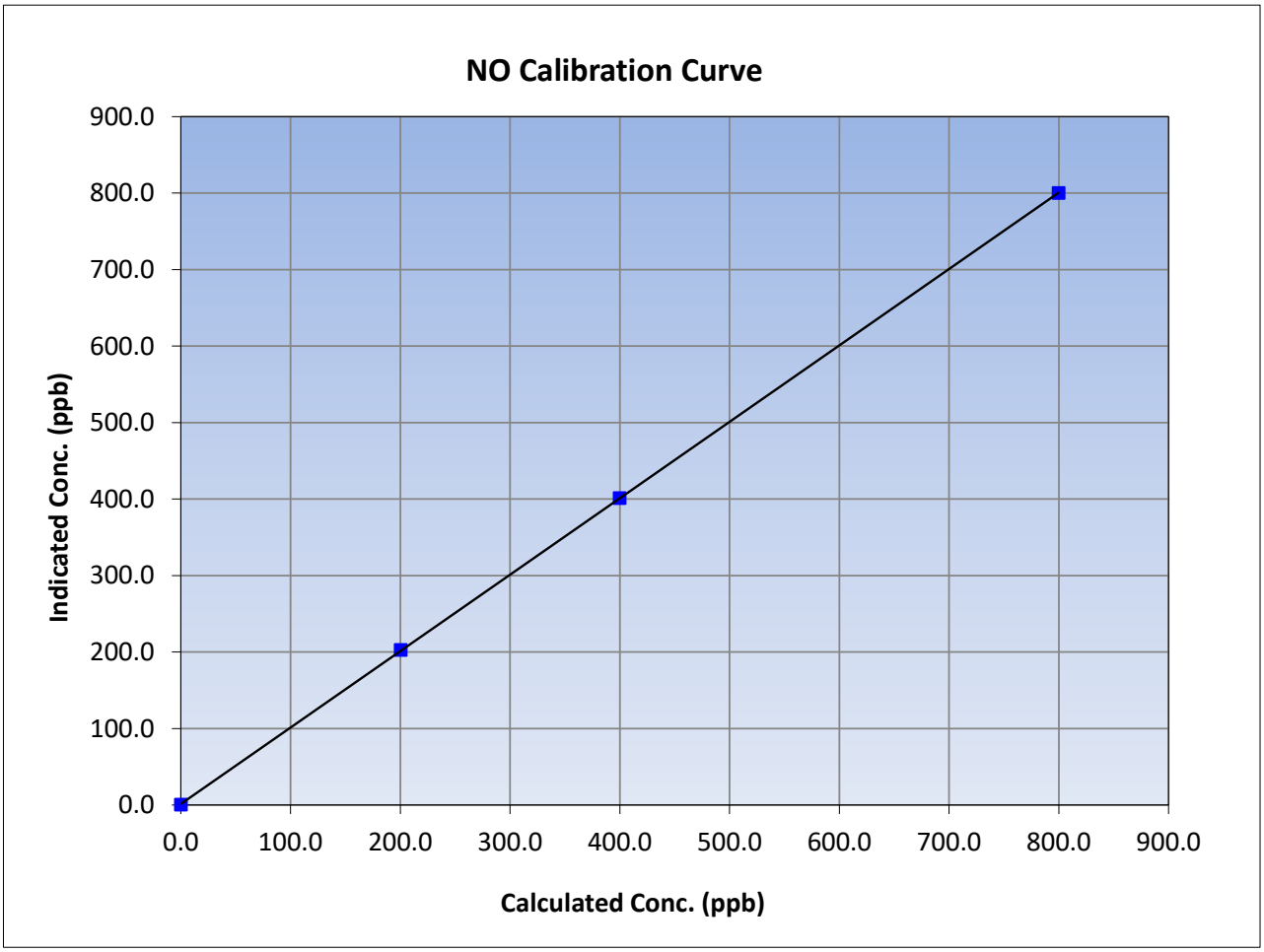
Version-04-2020

Station Information

Calibration Date:	September 20, 2023	Previous Calibration:	August 9, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	7:57	End Time (MST):	12:41
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	0.999993	≥0.995
799.7	800.0	0.9997			
399.9	401.3	0.9964	Slope	0.999173	0.90 - 1.10
200.4	202.7	0.9888			
			Intercept	1.382870	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

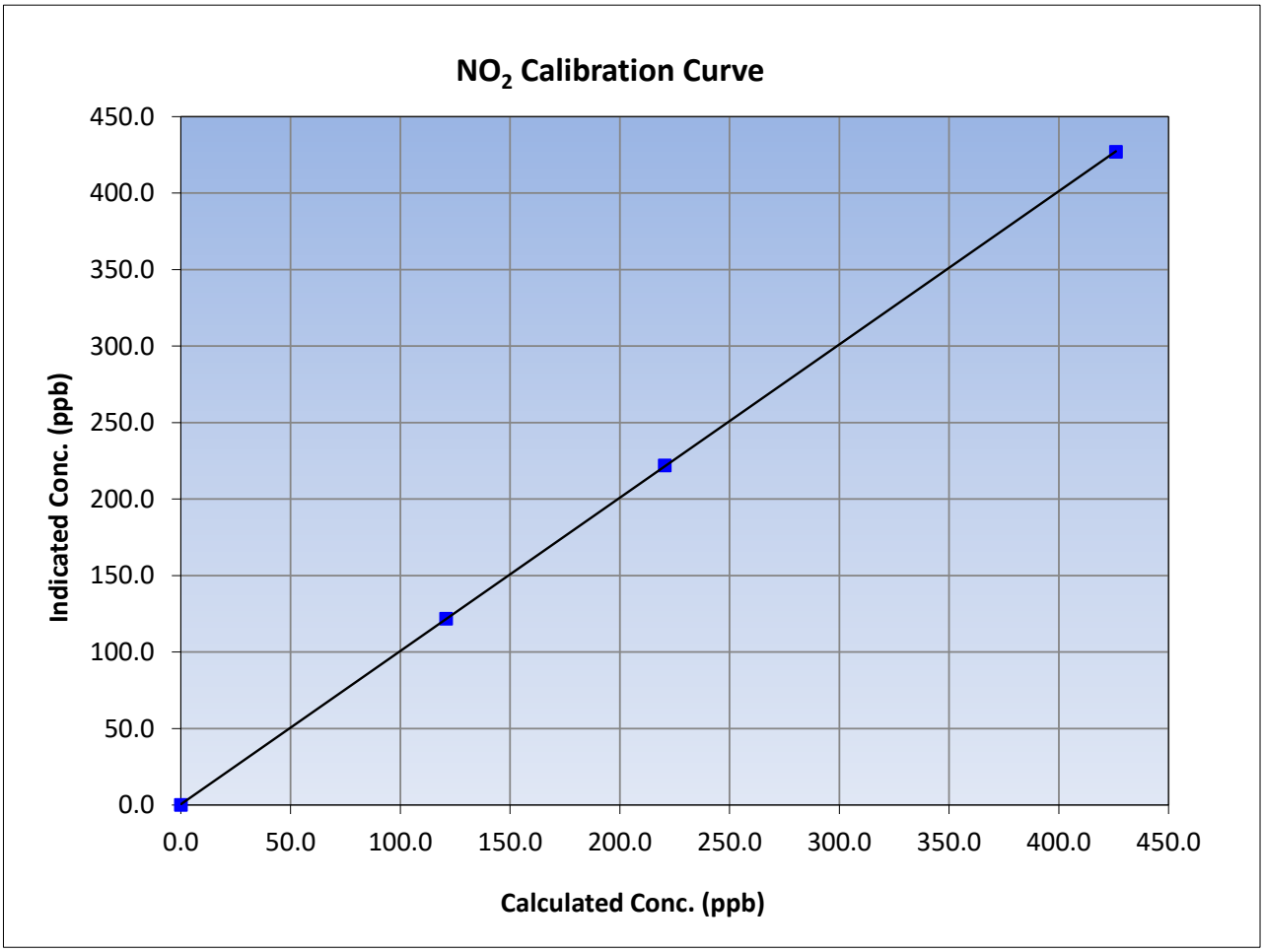
Version-04-2020

Station Information

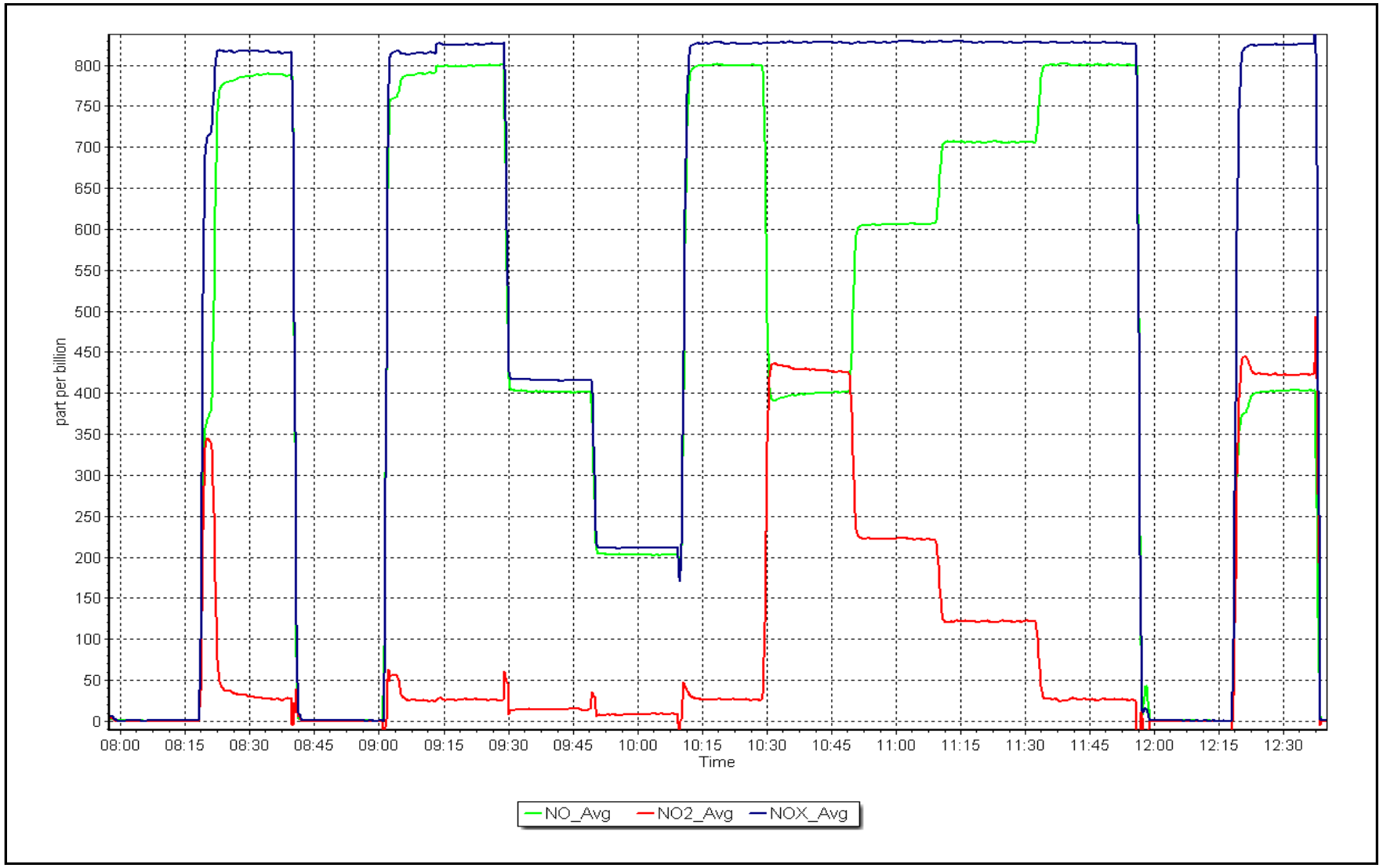
Calibration Date:	September 20, 2023	Previous Calibration:	August 9, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	7:57	End Time (MST):	12:41
Analyzer make:	Thermo 42i	Analyzer serial #:	1172750022

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.1	----	Correlation Coefficient	0.999994	*≥0.995*
426.0	427.0	0.9977			
220.4	221.9	0.9933	Slope	1.001949	*0.90 - 1.10*
120.9	121.8	0.9928			
			Intercept	0.485373	*+/-20*



NO_X Calibration Plot Date: September 20, 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:	September 5, 2023	Last Cal Date:	August 11, 2023
Start time (MST):	9:53	End time (MST):	13:03
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:	1.002629	1.005743	Backgd or Offset:	-0.2	-0.2
Calibration intercept:	0.540000	-0.480000	Coeff or Slope:	1.019	1.019

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	800.0	0.0	-0.3	----
as found span	5000	1303.0	400.0	400.5	0.999
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	-0.2	----
high point	5000	1303.0	400.0	401.9	0.995
second point	5000	966.5	200.0	200.7	0.997
third point	5000	794.3	100.0	99.7	1.003
as left zero	5000	800.0	0.0	-0.5	----
as left span	5000	1303.0	400.0	403.4	0.992
				Average Correction Factor	0.998

Baseline Corr As found:	400.8	Previous response	401.6	*% change	-0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

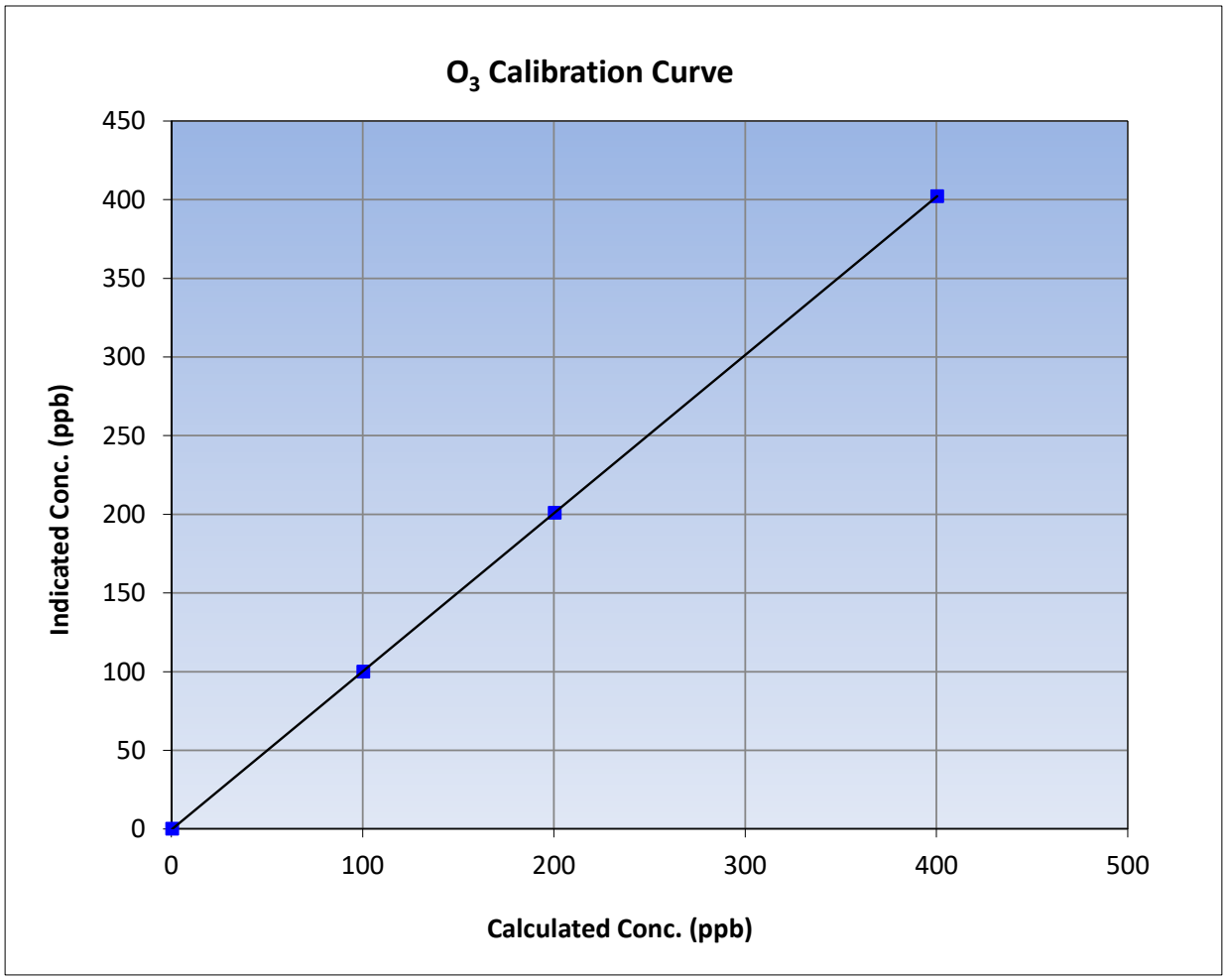
Station Information

Calibration Date:	September 5, 2023	Previous Calibration:	August 11, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:53	End Time (MST):	13:03
Analyzer make:	Thermo 49i	Analyzer serial #:	1300156234

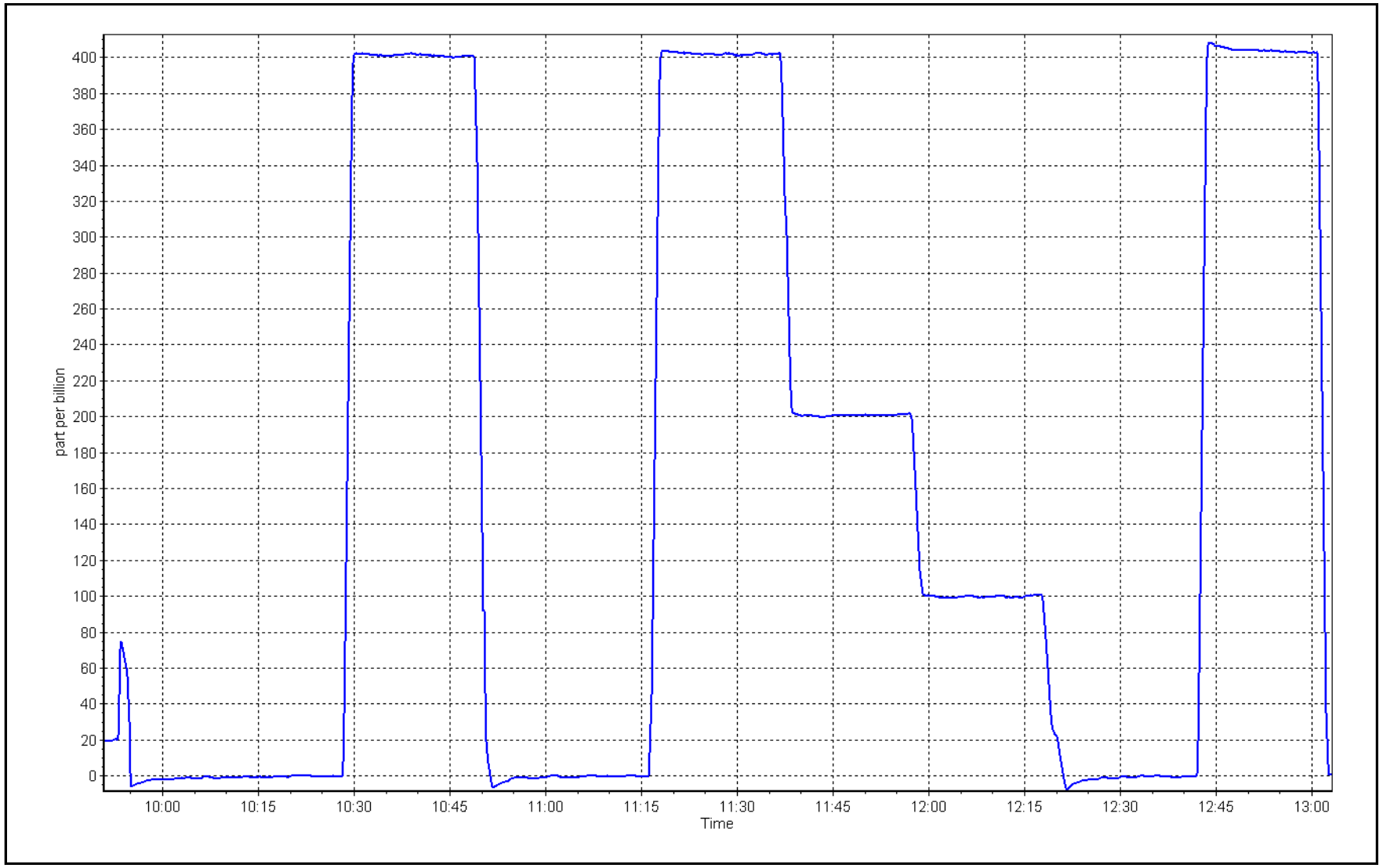
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
400.0	401.9	0.9953
200.0	200.7	0.9965
100.0	99.7	1.0030

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999997	*≥0.995*
Slope	1.005743	*0.90 - 1.10*
Intercept	-0.480000	*+/- 5*



O_3 Calibration Plot Date: September 5, 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:	September 22, 2023	Last Cal Date:	August 24, 2023
Start time (MST):	12:54	End time (MST):	13:53
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)	23.1	23.1	23.1	☐	+/- 2 °C
P (mmHg)	726.5	727.8	726.5	☐	+/- 10 mmHg
flow (LPM)	5.02	4.97	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: September 22, 2023 Last Cal Date: August 24, 2023

PM w/o HEPA: 8.5 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	11.0	11.0	11.0	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 4.7 w/ HEPA: 0 <0.2 ug/m3

Date Optical Chamber Cleaned: September 22, 2023

Disposable Filter Changed: September 22, 2023

Annual Maintenance

Date Sample Tube Cleaned: April 13, 2023

Date RH/T Sensor Cleaned: April 13, 2023

Notes: Cleaned the chamber and changed the filter. PMT peak was on target. 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:	September 12, 2023	Last Cal Date:	August 3, 2023
Start time (MST):	8:00	End time (MST):	13:45
NH3 Cal Date:	September 12, 2023	Last Cal Date:	August 3, 2023
Start time (MST):	13:45	End time (MST):	15:48
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	0.788	TN coefficient:	0.794	0.789
NOX coefficient:	0.796	0.787	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:	1.003439	1.000369
NO_X Cal Offset:	1.455068	1.915538
NO Cal Slope:	0.997870	1.000758
NO Cal Offset:	0.164066	0.303018
NO_2 Cal Slope:	1.000820	1.006122
NO_2 Cal Offset:	-0.026033	-2.141943
NH3 Cal Slope:	1.002680	0.985048
NH3 Cal Offset:	5.795340	7.896031
TN Cal Slope:	1.008130	0.991160
TN Cal Offset:	5.548239	7.076683

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	0.5	0.1	0.4	----	----
as found NO	4914	86.2	826.5	826.5	----	827.2	831.3	-4.2	0.999	----
calibrator zero	5000	0.0	0.0	0.0	0.0	0.3	-0.9	1.2	----	----
high NO point	4914	86.2	826.5	826.5	----	828.3	826.9	1.6	0.998	----
NO/O3 point	4914	86.2	826.5	826.5	----	829.6	826.1	3.5	0.996	----
as found NH3	3419	81.0	1800.5	----	1800.5	1786.0	----	1776.0	1.008	1.014
new NH3 cyl rp							----			
first NH3	3419	81.0	1800.5	----	1800.5	1786.0	----	1776.0	1.008	1.014
second NH3	3455	45.0	1000.3	----	1000.3	1006.5	----	1000.8	0.994	0.999
third NH3	3478	22.5	500.1	----	500.1	507.2	----	505.1	0.986	0.990
								Average Correction Factor	0.9970	1.0011

Corrected As found TN = 826.7 ppb NO_X = 831.2 ppb NH3 = 1775.6 ppb

Previous Response TN = 838.7 ppb NO_X = 830.7 ppb NH3 = 1811.1 ppb

*Percent Change TN = -1.5%

*Percent Change NO_X = 0.1%

*Percent Change NH3 = -2.0%

* = > +/-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	0.1	0.5	0.5	----	----
as found span	4914	86.2	826.5	799.7	826.5	831.3	801.3	827.2	0.9942	0.9980
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.9	0.2	0.3	----	----
high point	4914	86.2	826.5	799.7	826.5	826.9	800.6	828.3	0.9995	0.9989
second point	4957	43.1	413.2	399.9	413.2	417.8	400.5	414.9	0.9891	0.9984
third point	4978	21.6	207.1	200.4	207.1	211.2	201.0	211.3	0.9807	0.9971
								Average Correction Factor	0.9897	0.9982

Baseline Corr As fnd	TN =	826.7 ppb	NO_X =	831.2 ppb	NO =	800.8 ppb	*Percent Change TN = -1.5%
Previous Response	TN =	838.7 ppb	NO_X =	830.7 ppb	NO =	798.2 ppb	*Percent Change NO_X = 0.1%
							*Percent Change NO = 0.3%

* = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found zero	----	----	0.0	-0.5	----	----
calibration zero	----	----	0.0	-1.2	----	----
1st GPT point (400 ppb O3)	798.4	402.0	423.1	424.2	0.9975	100.3%
2nd GPT point (200 ppb O3)	798.4	603.1	222.0	220.5	1.0069	99.3%
3rd GPT point (100 ppb O3)	798.4	701.7	123.4	121.2	1.0183	98.2%
				Average Correction Factor	1.0076	99.3%

Notes: Changed the inlet filter after as founds. Adjusted the NOX span. Had to run GPTPS points for the calibrator photometer to set the lamp voltage accurately midway through the GPT calibration.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TN Calibration Summary

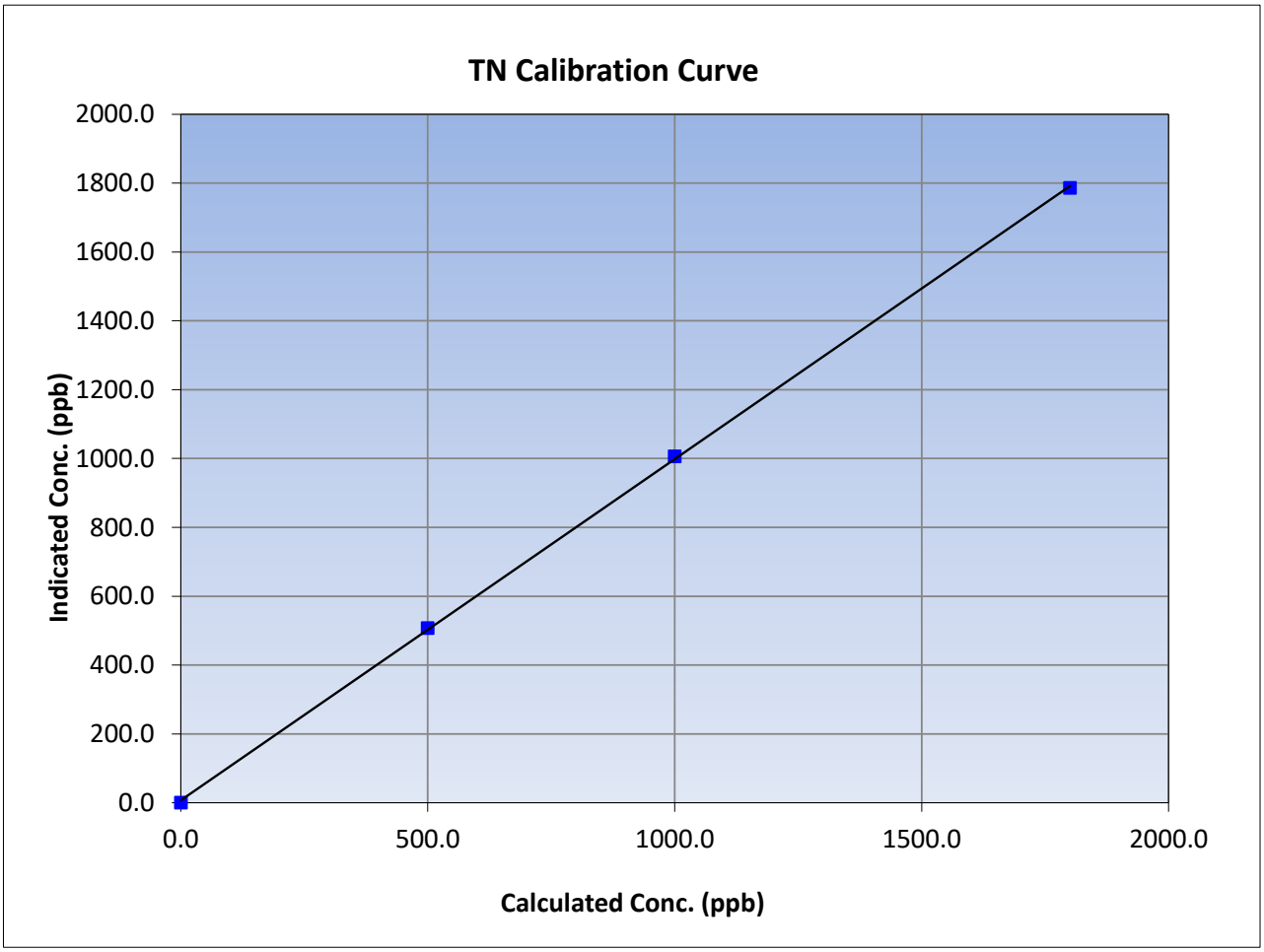
Version-05-2023

Station Information

Calibration Date:	September 12, 2023	Previous Calibration:	August 3, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:00	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	0.999907	≥0.995
1800.5	1786.0	1.0081			
1000.3	1006.5	0.9938	Slope	0.991160	0.90 - 1.10
500.1	507.2	0.9859			
			Intercept	7.076683	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

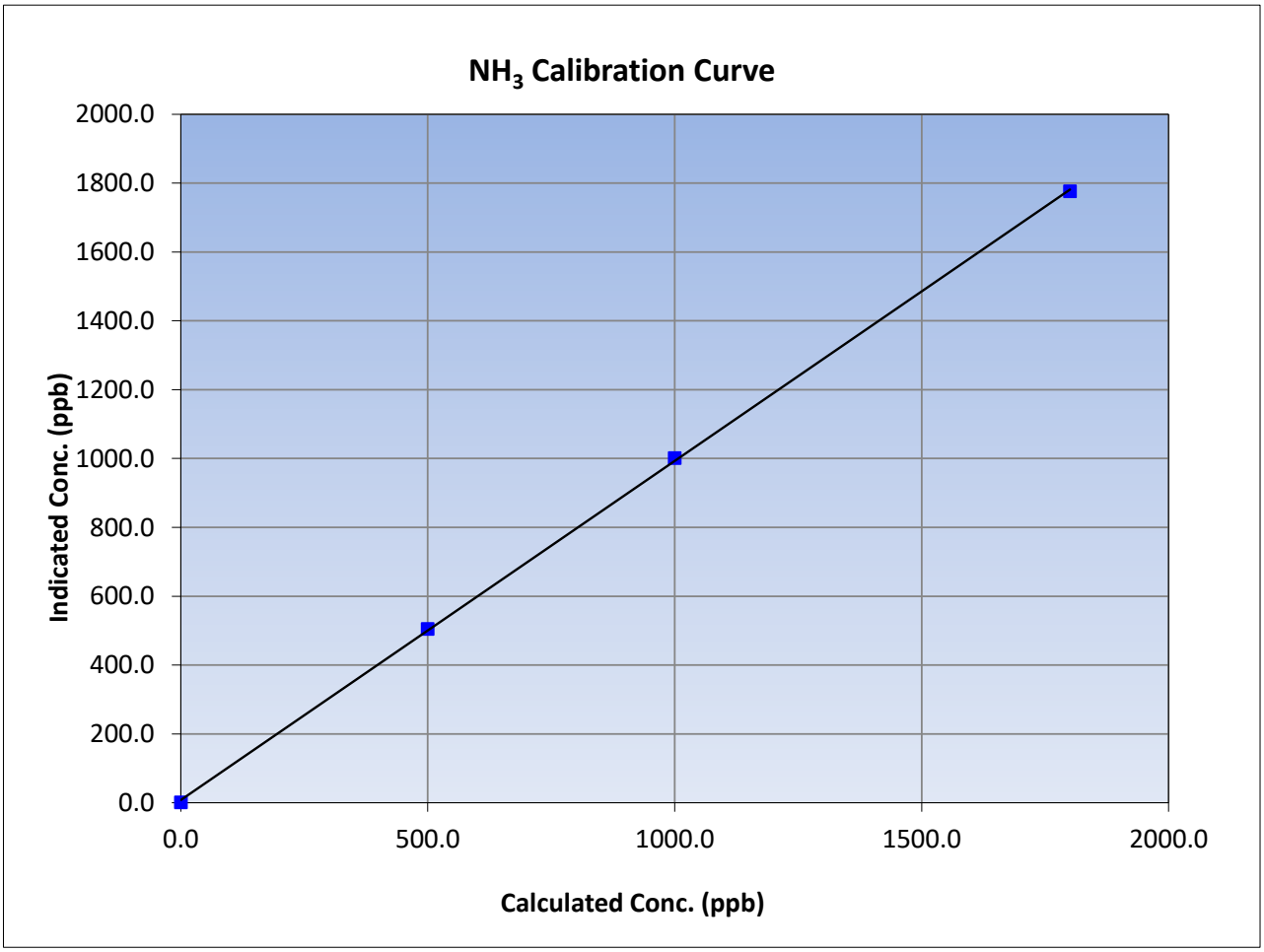
Version-05-2023

Station Information

Calibration Date:	September 12, 2023	Previous Calibration:	August 3, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:00	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	1.2	----	Correlation Coefficient	0.999911	≥0.995
1800.5	1776.0	1.0138			
1000.3	1000.8	0.9995	Slope	0.985048	0.90 - 1.10
500.1	505.1	0.9900			
			Intercept	7.896031	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

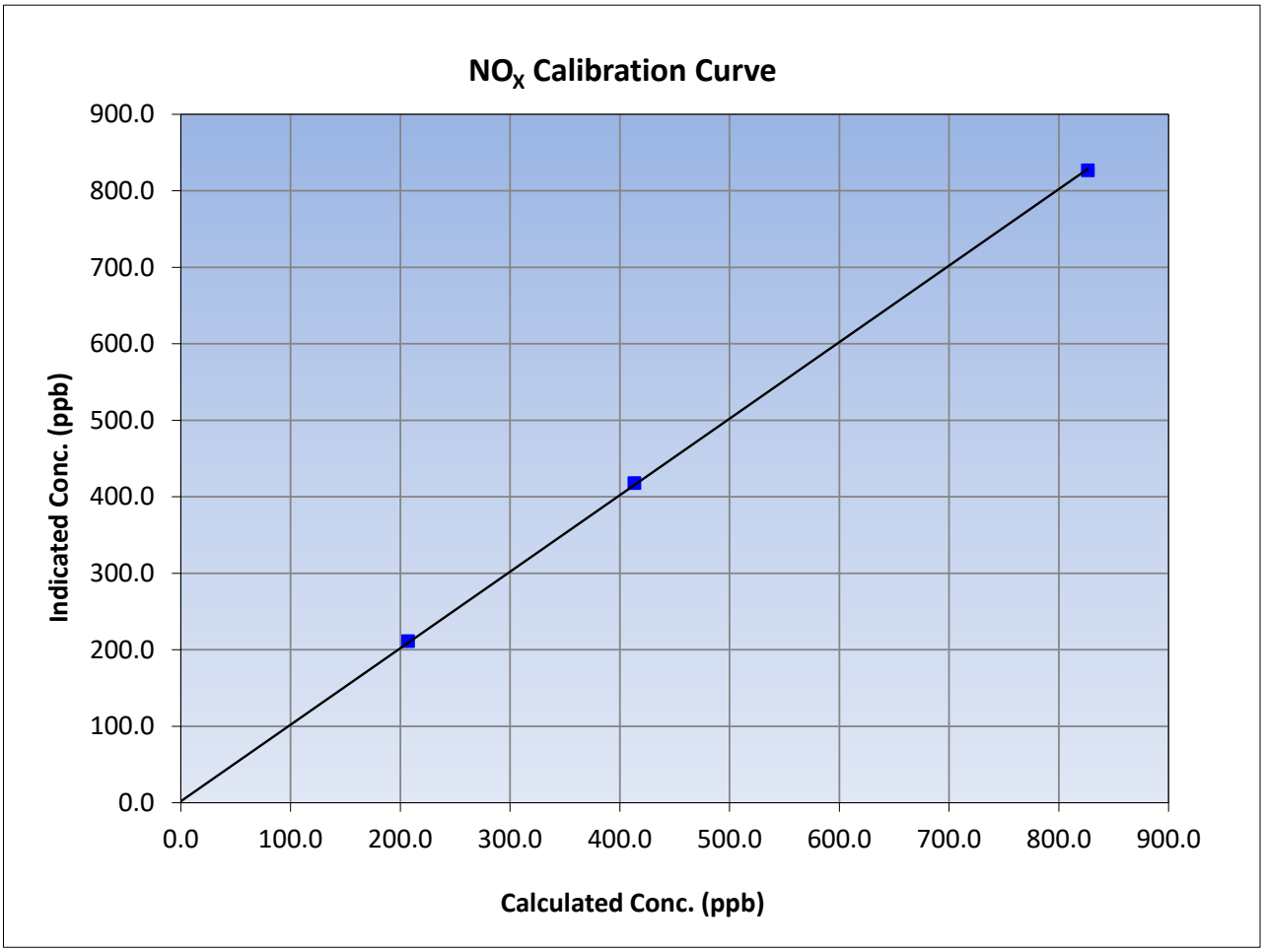
Version-05-2023

Station Information

Calibration Date:	September 12, 2023	Previous Calibration:	August 3, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:00	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	-0.9	----	Correlation Coefficient	0.999942	≥0.995
826.5	826.9	0.9995			
413.2	417.8	0.9891	Slope	1.000369	0.90 - 1.10
207.1	211.2	0.9807			
			Intercept	1.915538	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

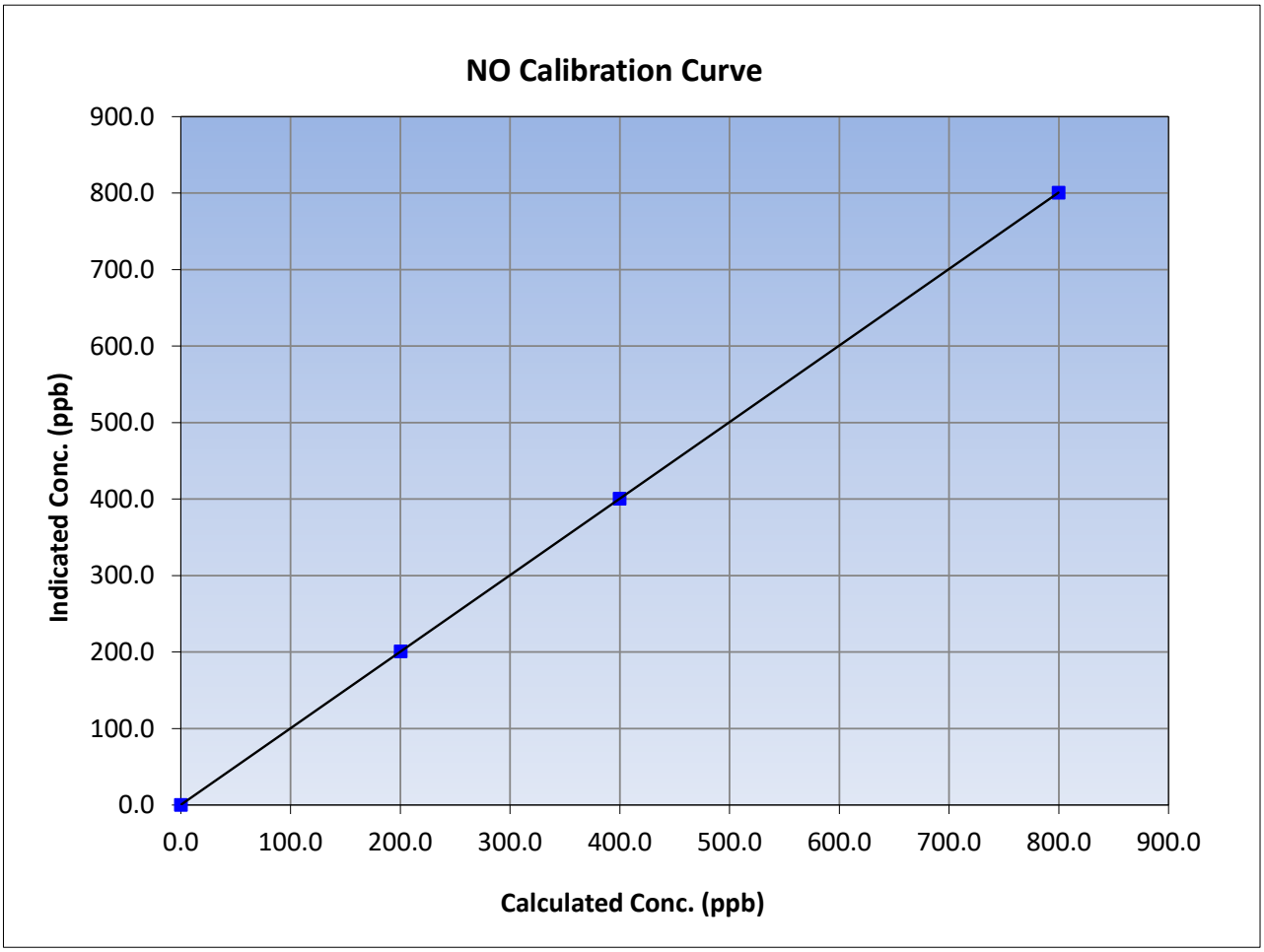
Version-05-2023

Station Information

Calibration Date:	September 12, 2023	Previous Calibration:	August 3, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:00	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	1.000000	≥0.995
799.7	800.6	0.9989			
399.9	400.5	0.9984	Slope	1.000758	0.90 - 1.10
200.4	201.0	0.9971			
			Intercept	0.303018	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

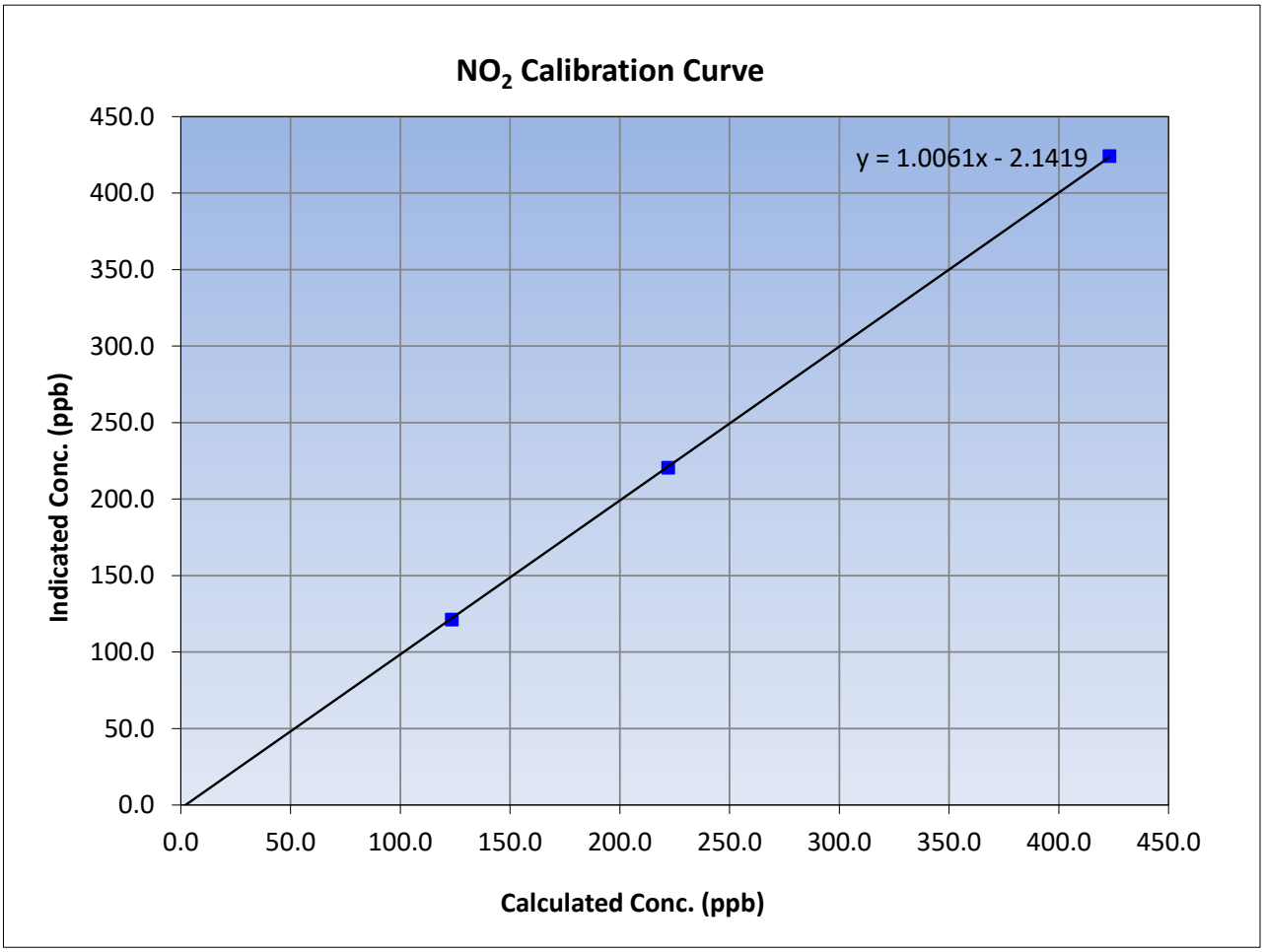
Version-05-2023

Station Information

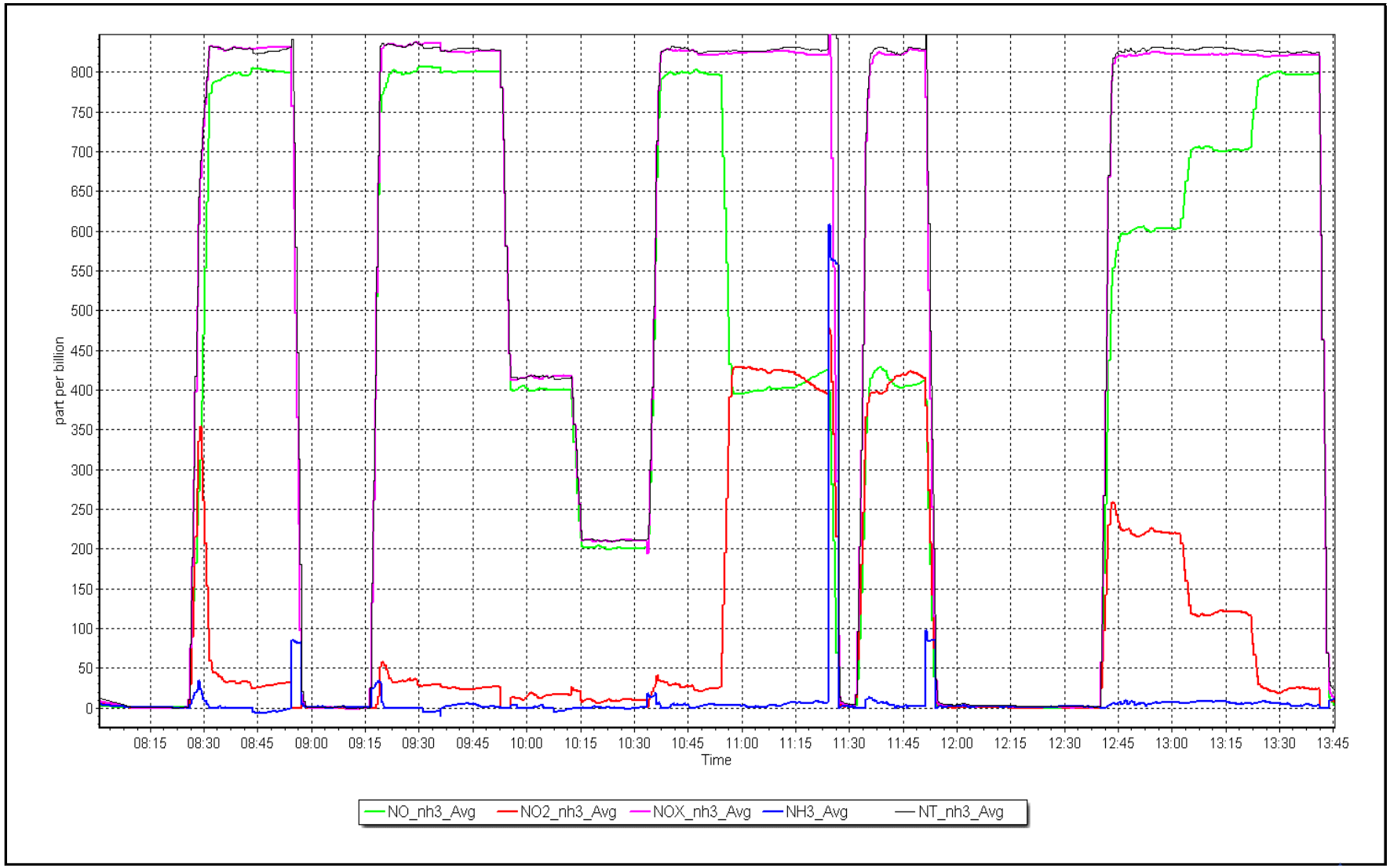
Calibration Date:	September 12, 2023	Previous Calibration:	August 3, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:00	End Time (MST):	13:45
Analyzer make:	Teledyne API T201	Analyzer serial #:	152

Calibration Data

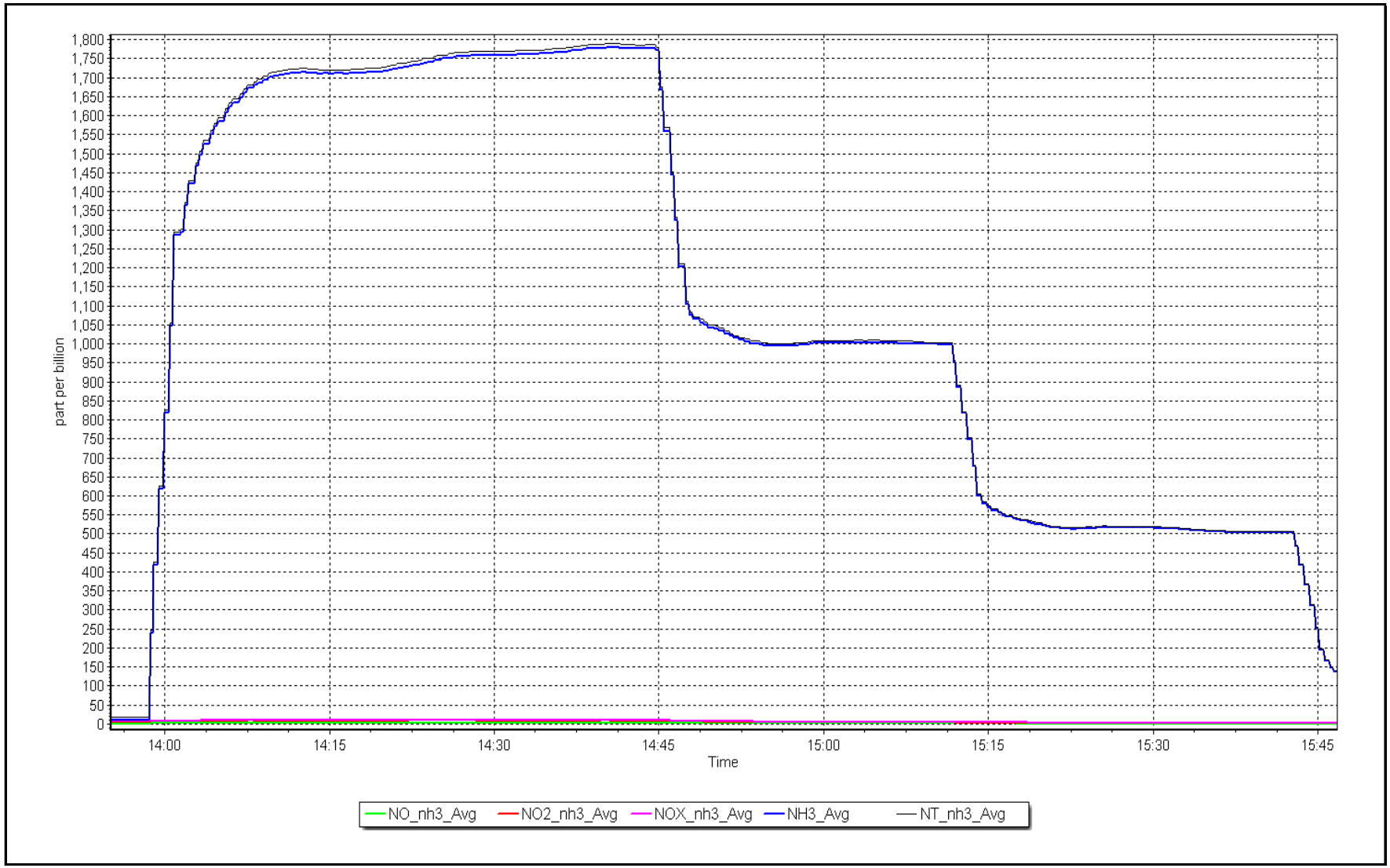
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-1.2	----	Correlation Coefficient	0.999974	≥0.995
423.1	424.2	0.9975			
222.0	220.5	1.0069	Slope	1.006122	0.90 - 1.10
123.4	121.2	1.0183			
			Intercept	-2.141943	+/-20



NO_X Calibration Plot Date: September 12, 2023 Location: Patricia McInnes



NH_3 Calibration Plot Date: September 12, 2023 Location: Patricia McInnes



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS07
ATHABASCA VALLEY
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	September 6, 2023	Last Cal Date:	August 9, 2023
Start time (MST):	8:50	End time (MST):	12:35
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997338	0.992516	Backgd or Offset:	2.61	2.61
Calibration intercept:	1.503428	1.942886	Coeff or Slope:	0.834	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	794.4	1.009
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4921	79.3	801.2	795.6	1.007
second point	4960	39.6	400.2	401.9	0.996
third point	4980	19.8	200.1	201.1	0.995
as left zero	5000	0.0	0.0	0.1	----
as left span	4921	79.2	800.2	798.7	1.002
				Average Correction Factor	0.999

Baseline Corr As found:	794.50	Previous response	800.57	*% change	-0.8%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

SO_2 Calibration Summary

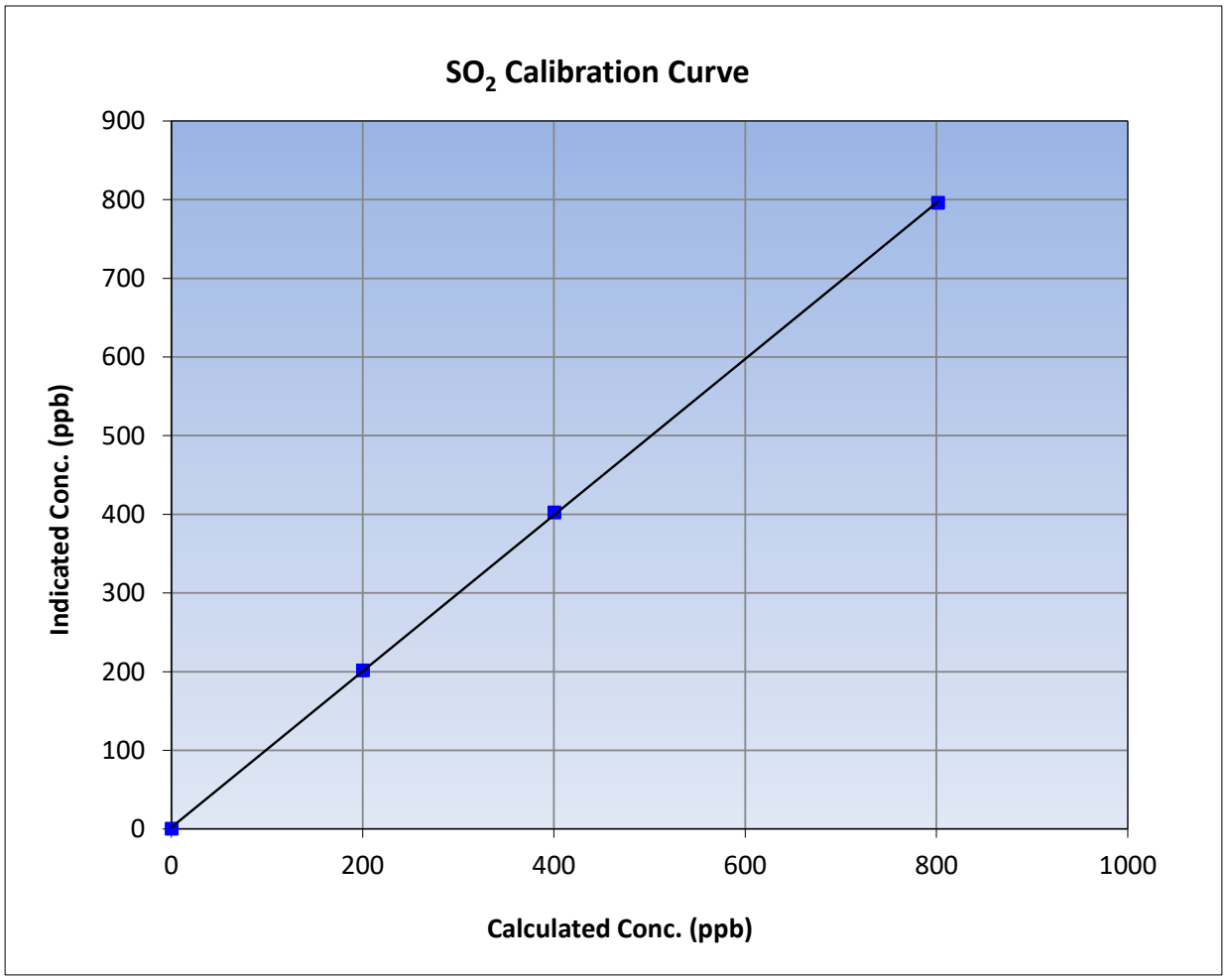
Version-01-2020

Station Information

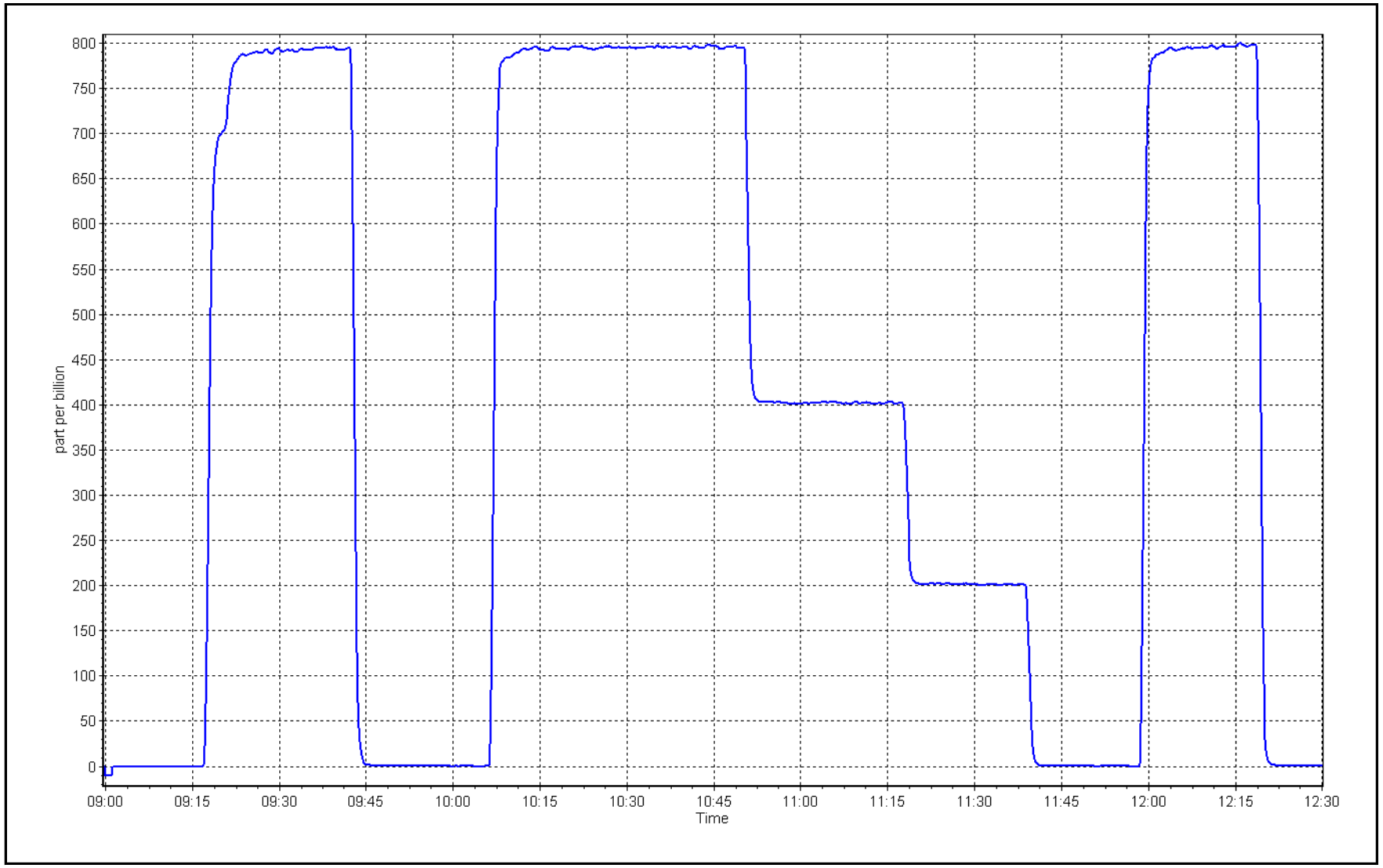
Calibration Date:	September 6, 2023	Previous Calibration:	August 9, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	8:50	End Time (MST):	12:35
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1507864683

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999960	≥0.995
801.2	795.6	1.0070			
400.2	401.9	0.9956	Slope	0.992516	0.90 - 1.10
200.1	201.1	0.9949			
			Intercept	1.942886	+/-30



SO2 Calibration Plot Date: September 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:	September 18, 2023	Last Cal Date:	August 2, 2023
Start time (MST):	9:07	End time (MST):	14:06
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:	1.005977	1.012468	Backgd or Offset:	2.33	2.33
Calibration intercept:	-0.002158	-0.002341	Coeff or Slope:	0.899	0.899

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	80.9	0.979
as found 2nd point	4962	37.7	39.6	40.4	0.977
as found 3rd point	4981	18.9	19.8	20.0	0.987
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4925	75.5	79.3	80.4	0.986
second point	4962	37.7	39.6	39.9	0.993
third point	4981	18.9	19.9	20.1	0.988
as left zero	5000	0.0	0.0	0.2	----
as left span	4925	75.5	79.3	80.2	0.989
SO2 Scrubber Check	4921	79.2	800.2	0.0	----

Date of last scrubber change:	25-Feb-22	Ave Corr Factor	0.989
Date of last converter efficiency test:	April 22, 2022	92.6%	efficiency

Baseline Corr As found:	81.0	Prev response:	79.74	*% change:	1.6%
Baseline Corr 2nd AF pt:	40.5	AF Slope:	1.022703	AF Intercept:	-0.162195
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999992		

* = > +/-5% change initiates investigation

Notes: No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

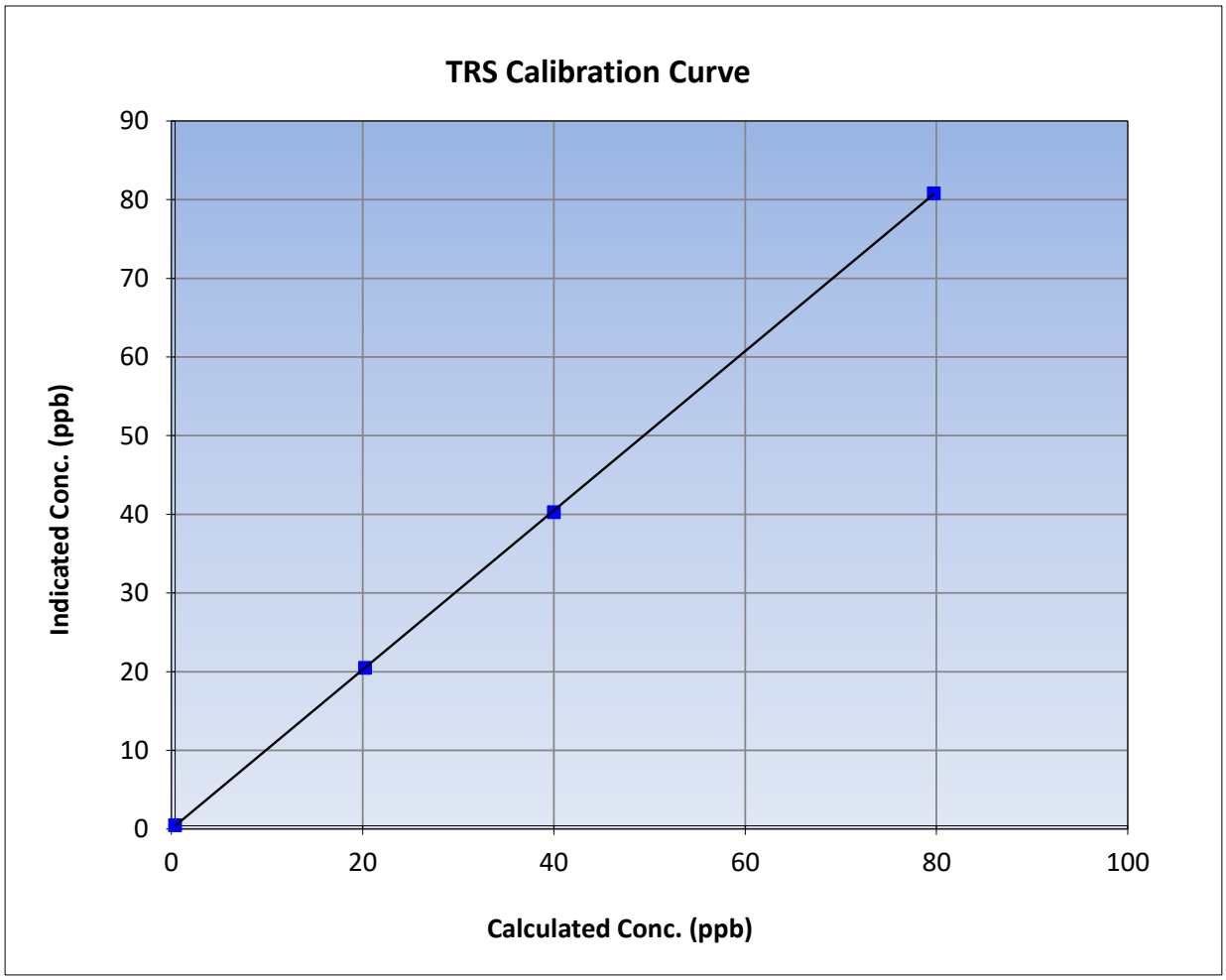
Station Information

Calibration Date:	September 18, 2023	Previous Calibration:	August 2, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:07	End Time (MST):	14:06
Analyzer make:	CDN-101	Analyzer serial #:	551

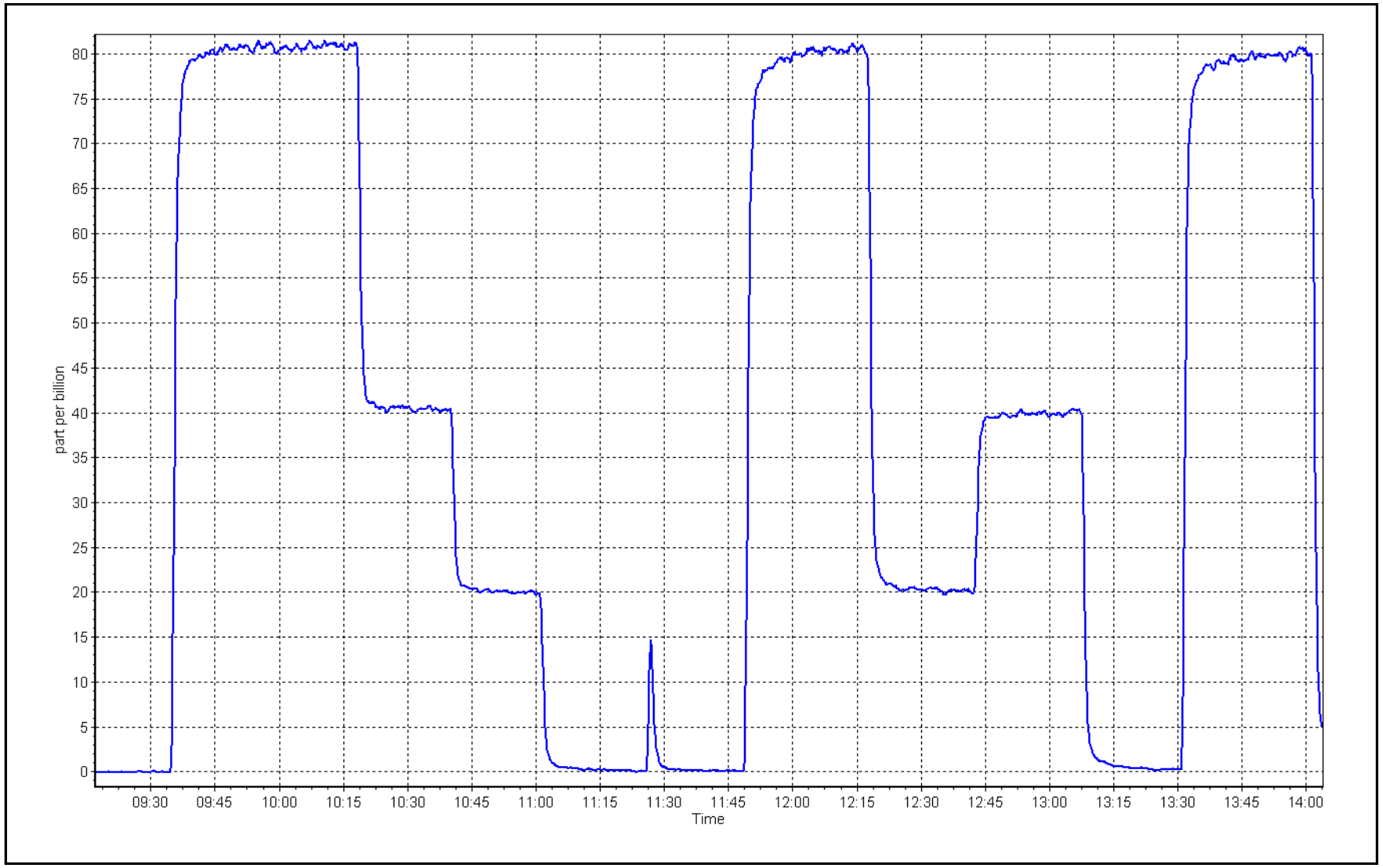
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
79.3	80.4	0.9865
39.6	39.9	0.9927
19.9	20.1	0.9879

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999983	*≥0.995*
Slope	1.012468	*0.90 - 1.10*
Intercept	-0.002341	*+/-3*



TRS Calibration Plot Date: September 18, 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:	September 6, 2023	Last Cal Date:	August 9, 2023
Start time (MST):	8:50	End time (MST):	12:35
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	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:	0.000256	0.000249	NMHC SP Ratio:	4.57E-05	4.17E-05
CH4 Retention time:	14.2	14.0	NMHC Peak Area:	198820	218242

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	18.03	0.944
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	17.03	1.000
second point	4960	39.6	8.52	8.51	1.001
third point	4980	19.8	4.26	4.29	0.993
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	16.97	1.004
				Average Correction Factor	0.998

Baseline Corr AF:	18.03	Prev response	16.99	*% change	5.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4921	79.2	9.09	9.91	0.917
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	4.56	0.996
third point	4980	19.8	2.27	2.33	0.977
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	9.09	9.06	1.004
				Average Correction Factor	0.991
Baseline Corr AF:	9.91	Prev response	9.08	*% change	8.4%
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	8.13	0.977
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	7.94	7.94	1.000
second point	4960	39.6	3.97	3.95	1.006
third point	4980	19.8	1.98	1.96	1.013
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	1.006
Baseline Corr AF:	8.13	Prev response	7.91	*% change	2.7%
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:	0.996468	0.999300
THC Cal Offset:	0.018660	0.010060
CH4 Cal Slope:	0.996465	1.001057
CH4 Cal Offset:	-0.000558	-0.015758
NMHC Cal Slope:	0.996357	0.997865
NMHC Cal Offset:	0.019418	0.025418

Notes: As found NM 9% high. Chromatograms look normal. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

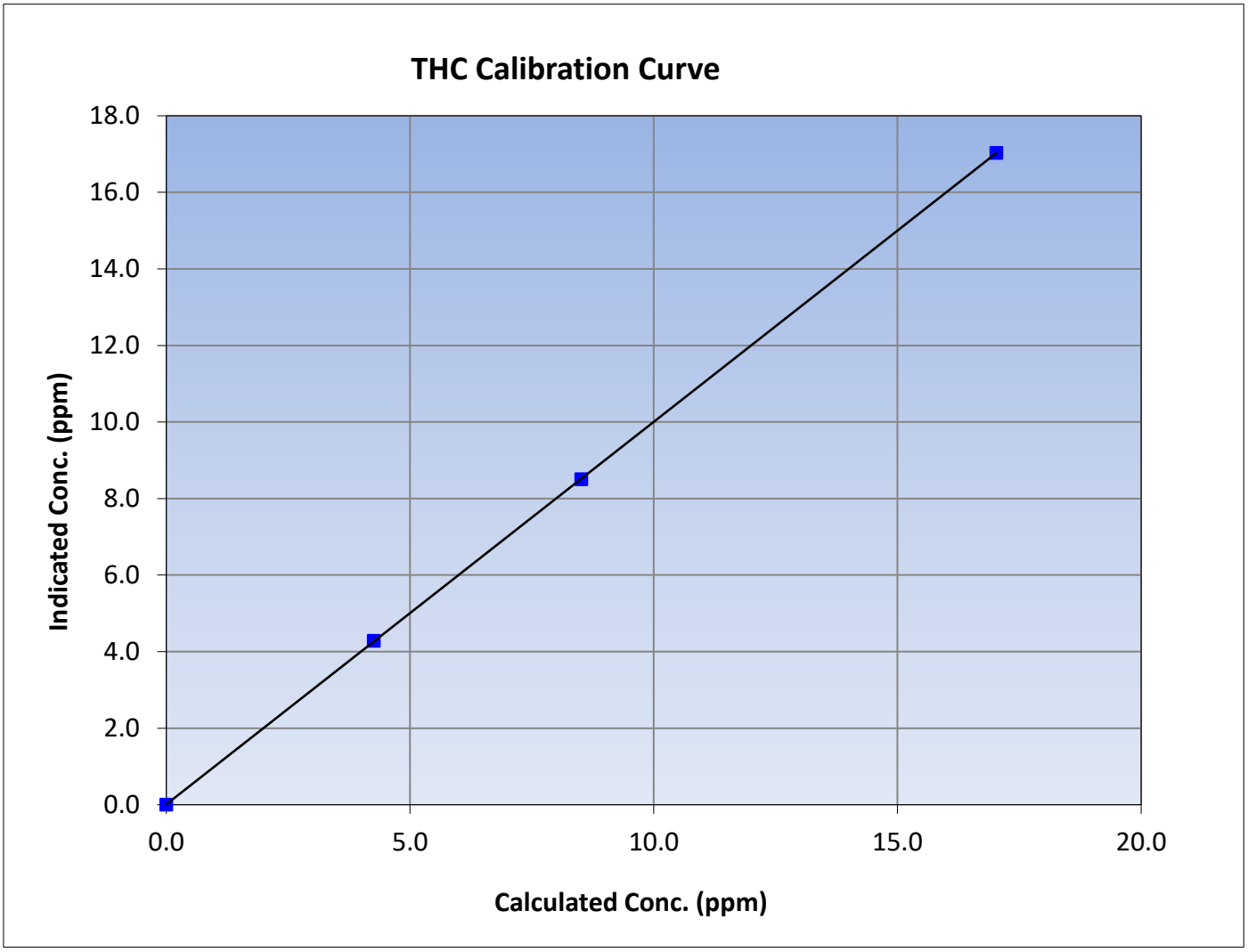
Version-01-2020

Station Information

Calibration Date:	September 6, 2023	Previous Calibration:	August 9, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	8:50	End Time (MST):	12:35
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	0.999996	≥0.995
17.03	17.03	1.0001			
8.52	8.51	1.0009	Slope	0.999300	0.90 - 1.10
4.26	4.29	0.9934			
			Intercept	0.010060	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

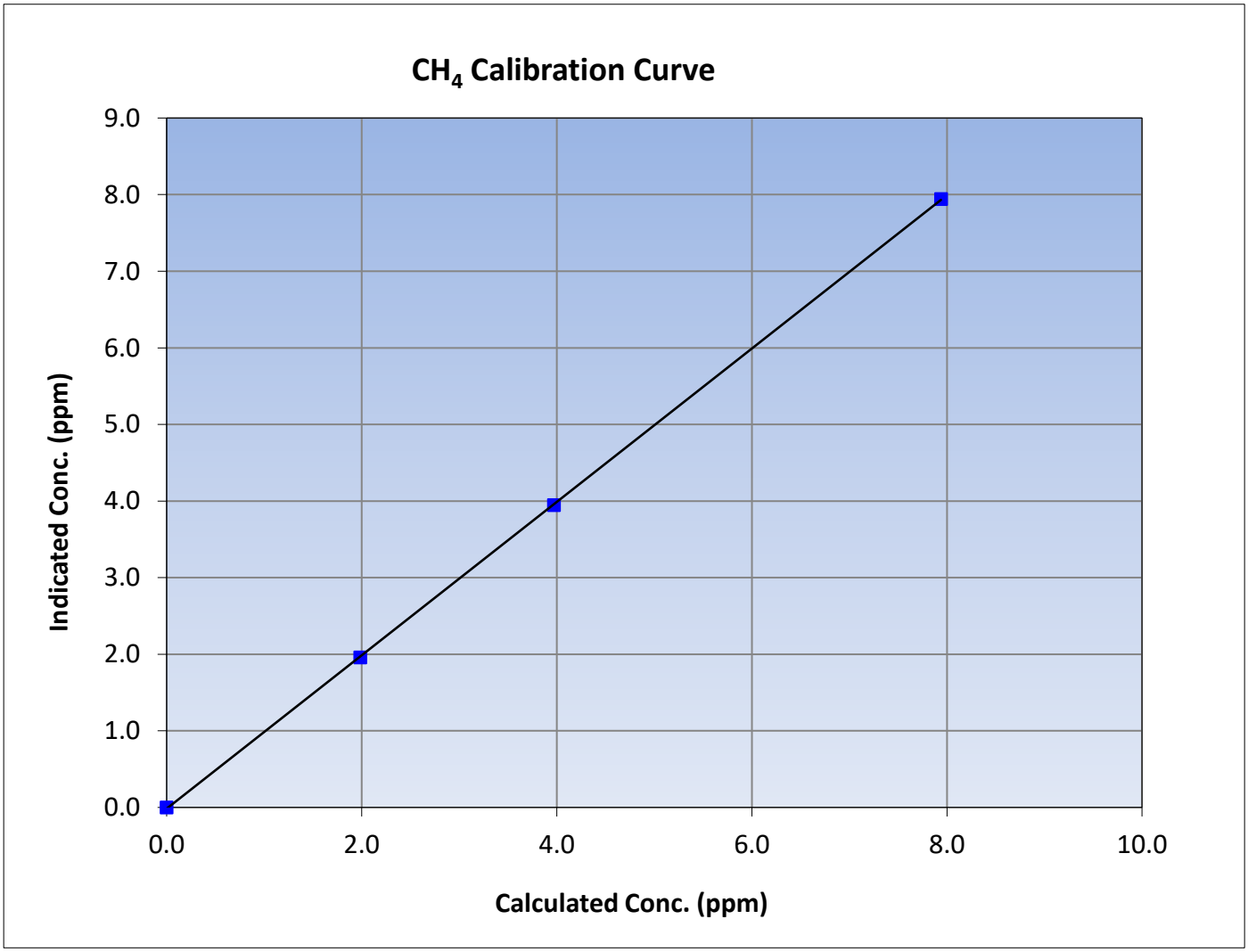
Version-01-2020

Station Information

Calibration Date:	September 6, 2023	Previous Calibration:	August 9, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	8:50	End Time (MST):	12:35
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	0.999981	*≥0.995*
7.94	7.94	0.9997			
3.97	3.95	1.0063	Slope	1.001057	*0.90 - 1.10*
1.98	1.96	1.0132			
			Intercept	-0.015758	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

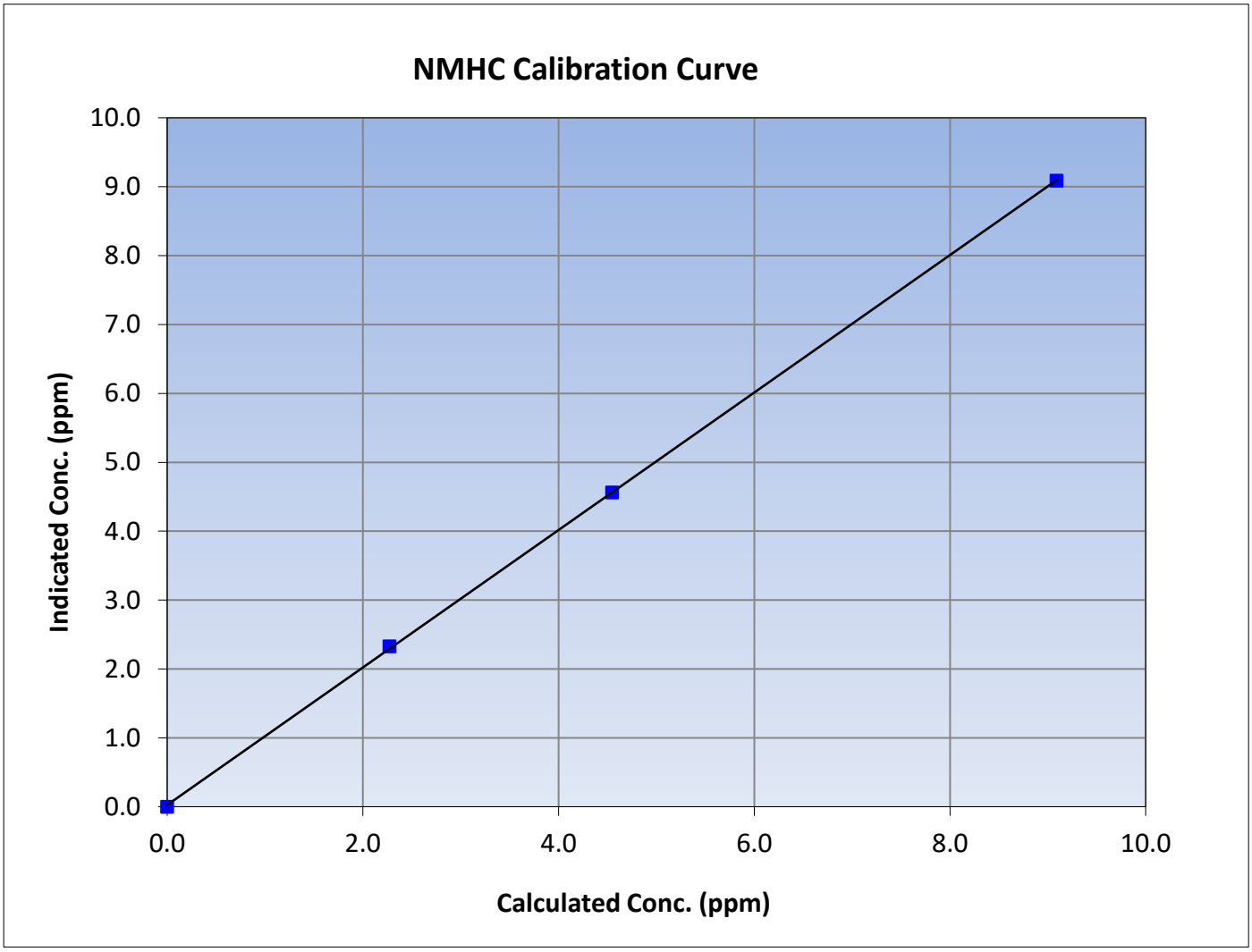
Version-01-2020

Station Information

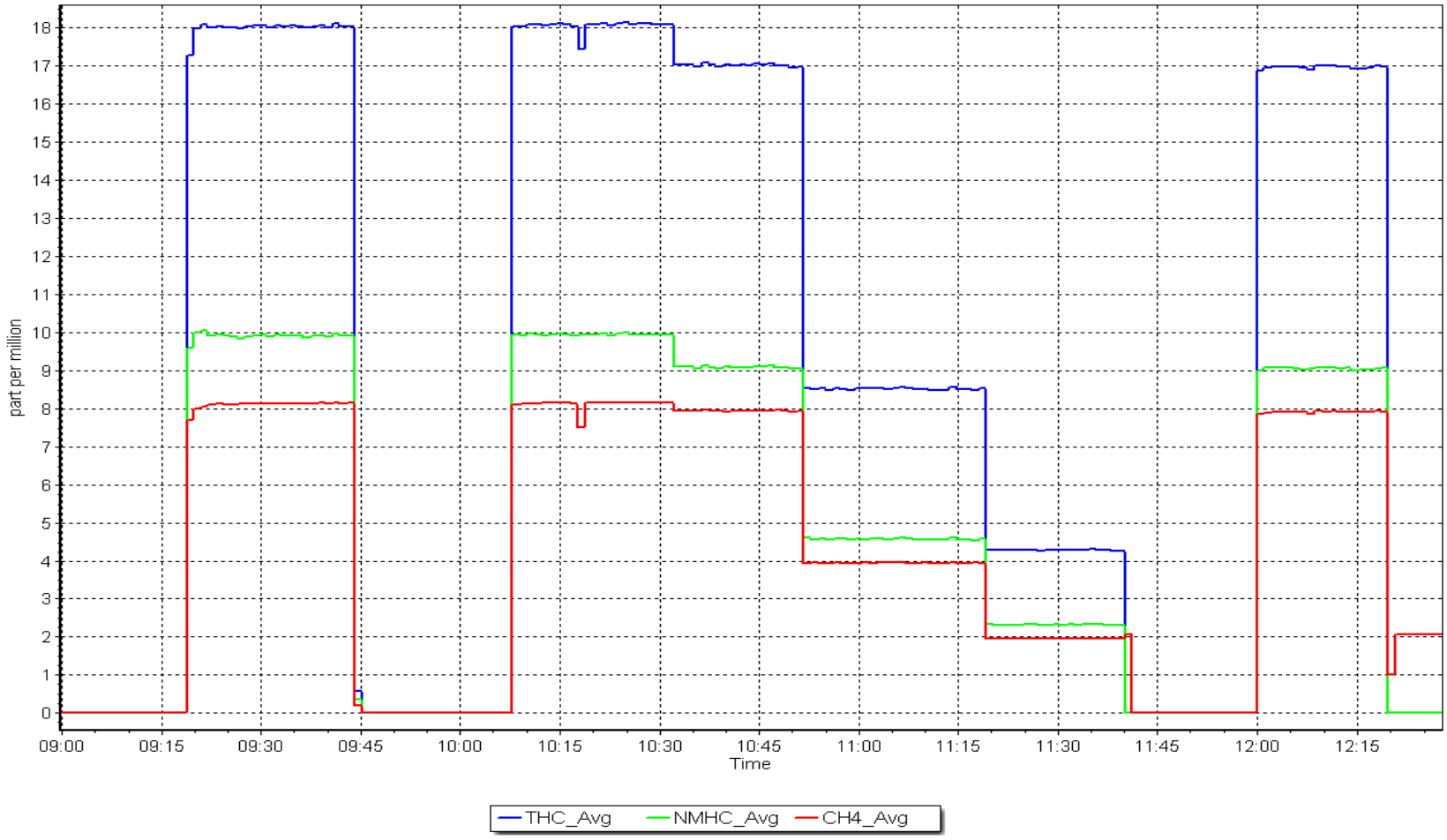
Calibration Date:	September 6, 2023	Previous Calibration:	August 9, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	8:50	End Time (MST):	12:35
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999959	≥0.995
9.09	9.09	1.0003			
4.55	4.56	0.9965	Slope	0.997865	0.90 - 1.10
2.27	2.33	0.9767			
			Intercept	0.025418	+/-0.5



NMHC Calibration Plot Date: September 6, 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:	September 15, 2023	Last Cal Date:	August 14, 2023
Start time (MST):	8:45	End time (MST):	14:00
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:	1.080	1.075	NO bkgnd or offset:	7.6	7.6
NOX coeff or slope:	0.994	0.995	NOX bkgnd or offset:	7.8	7.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	211.7	210.8

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.002539	1.000426
NO_X Cal Offset:	0.999372	1.179077
NO Cal Slope:	1.002515	1.000774
NO Cal Offset:	1.115453	0.875112
NO_2 Cal Slope:	0.998415	0.997679
NO_2 Cal Offset:	0.146993	1.130689

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
as found span	4920	80.2	816.7	800.7	16.0	822.0	806.0	16.5	0.9936	0.9934
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.2	0.0	----	----
high point	4920	80.2	816.7	800.7	16.0	817.5	801.6	15.8	0.9991	0.9989
second point	4960	40.1	408.4	400.4	8.0	411.0	402.6	8.5	0.9936	0.9944
third point	4980	20.0	203.7	199.7	4.0	205.4	200.9	4.6	0.9916	0.9939
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as left span	4920	80.2	816.7	394.7	422.0	825.0	400.0	425.3	0.9900	0.9867
								Average Correction Factor	0.9948	0.9957

Corrected As found	NO_X = 821.9 ppb	NO = 805.9 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.3%
Previous Response	NO_X = 819.8 ppb	NO = 803.8 ppb		*Percent Change	NO =	0.3%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	801.2	395.2	422.0	421.6	1.0010	99.9%
2nd GPT point (200 ppb O3)	801.2	604.2	213.0	214.2	0.9946	100.5%
3rd GPT point (100 ppb O3)	801.2	702.4	114.8	116.9	0.9824	101.8%
				Average Correction Factor	0.9927	100.7%

Notes: Span adjusted. Used second GPT reference.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

NO_X Calibration Summary

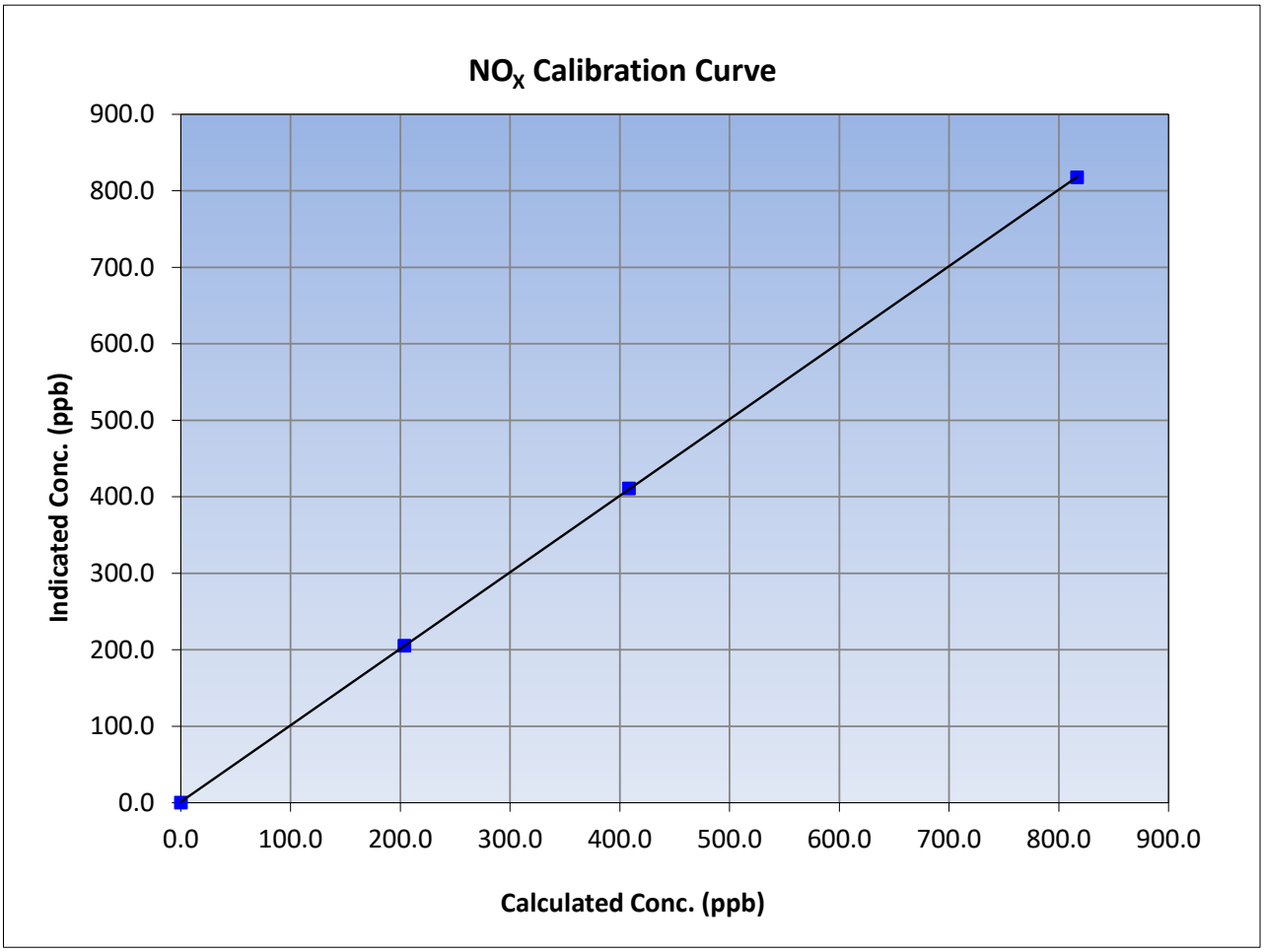
Version-04-2020

Station Information

Calibration Date:	September 15, 2023	Previous Calibration:	August 14, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	8:45	End Time (MST):	14:00
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	0.999991	≥0.995
816.7	817.5	0.9991			
408.4	411.0	0.9936	Slope	1.000426	0.90 - 1.10
203.7	205.4	0.9916			
			Intercept	1.179077	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

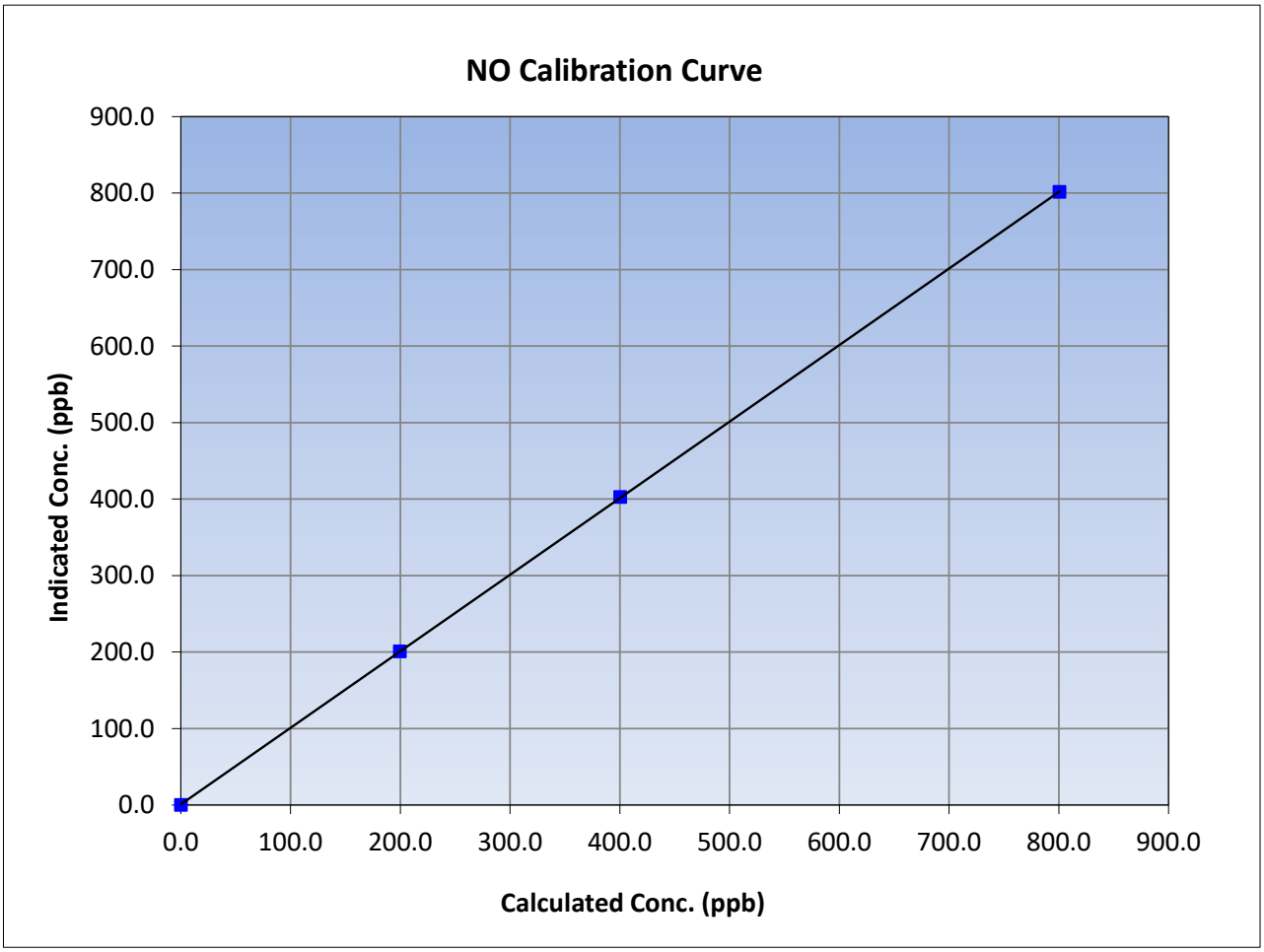
Version-04-2020

Station Information

Calibration Date:	September 15, 2023	Previous Calibration:	August 14, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	8:45	End Time (MST):	14:00
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.2	----	Correlation Coefficient	0.999994	*≥0.995*
800.7	801.6	0.9989			
400.4	402.6	0.9944	Slope	1.000774	*0.90 - 1.10*
199.7	200.9	0.9939			
			Intercept	0.875112	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

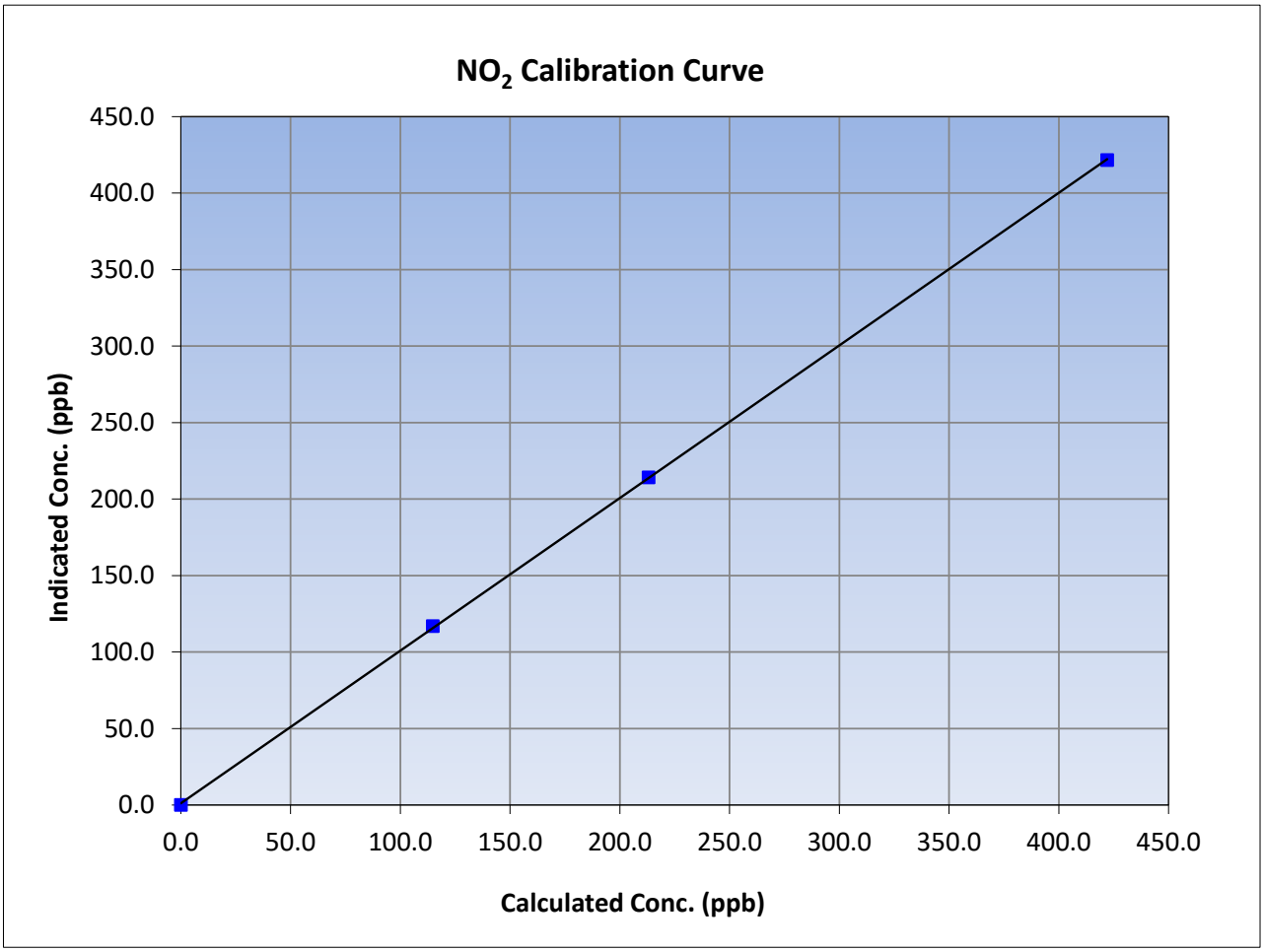
Version-04-2020

Station Information

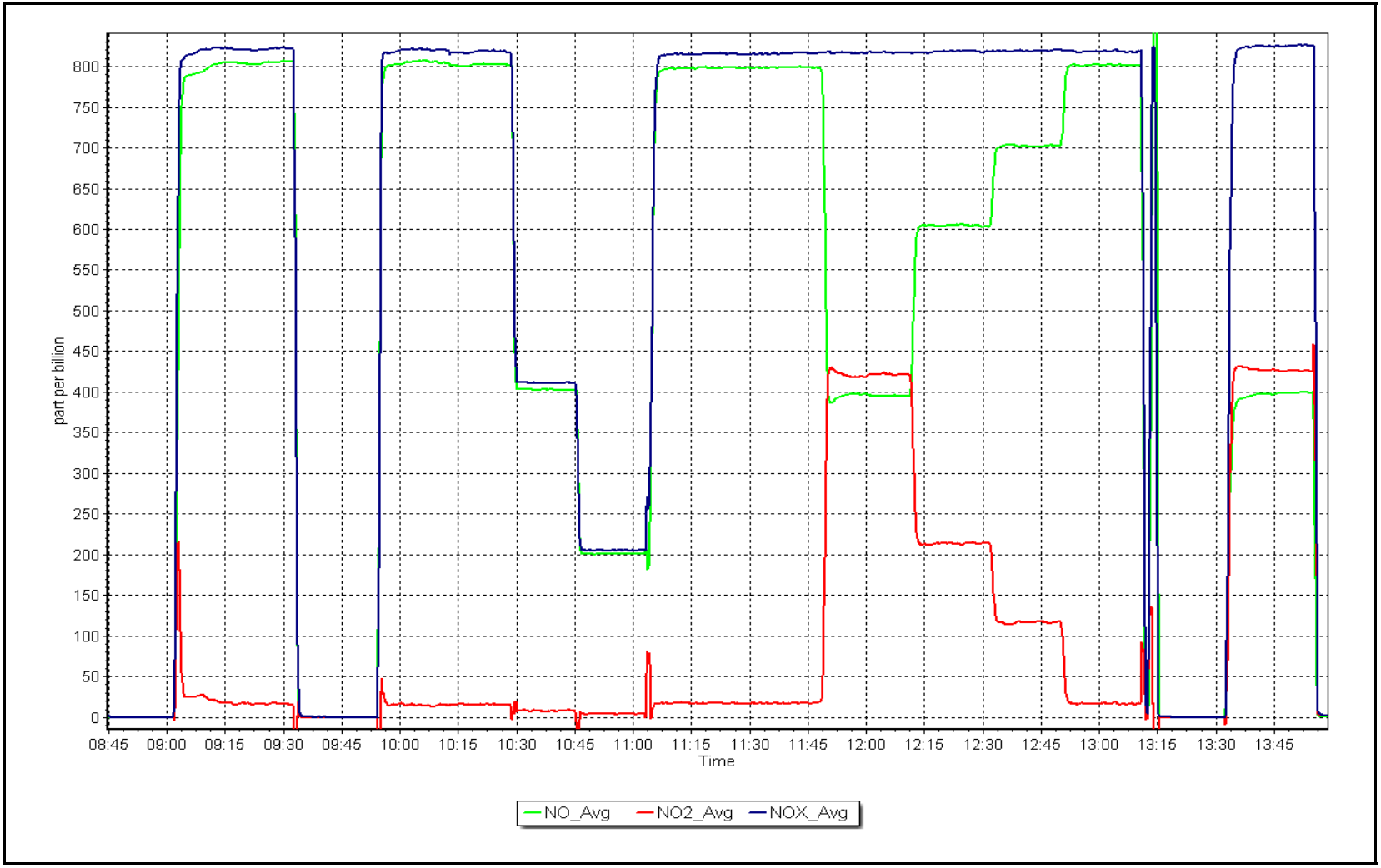
Calibration Date:	September 15, 2023	Previous Calibration:	August 14, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	8:45	End Time (MST):	14:00
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999965	≥0.995
422.0	421.6	1.0010			
213.0	214.2	0.9946	Slope	0.997679	0.90 - 1.10
114.8	116.9	0.9824			
			Intercept	1.130689	+/-20



NO_X Calibration Plot Date: September 15, 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:	September 20, 2023	Last Cal Date:	August 11, 2023
Start time (MST):	9:53	End time (MST):	15:20
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:	0.999171	0.997143	Backgd or Offset:	-2.6	-2.6
Calibration intercept:	0.320000	0.600000	Coeff or Slope:	1.522	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	-0.6	----
as found span	5000	1414.8	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	1415.7	400.0	399.3	1.002
second point	5000	1039.9	200.0	200.1	1.000
third point	5000	856.2	100.0	100.8	0.992
as left zero	5000	0.0	0.0	-0.9	----
as left span	5000	1416.0	400.0	400.5	0.999
				Average Correction Factor	0.998

Baseline Corr As found:	398.1	Previous response	400.0	*% 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 needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

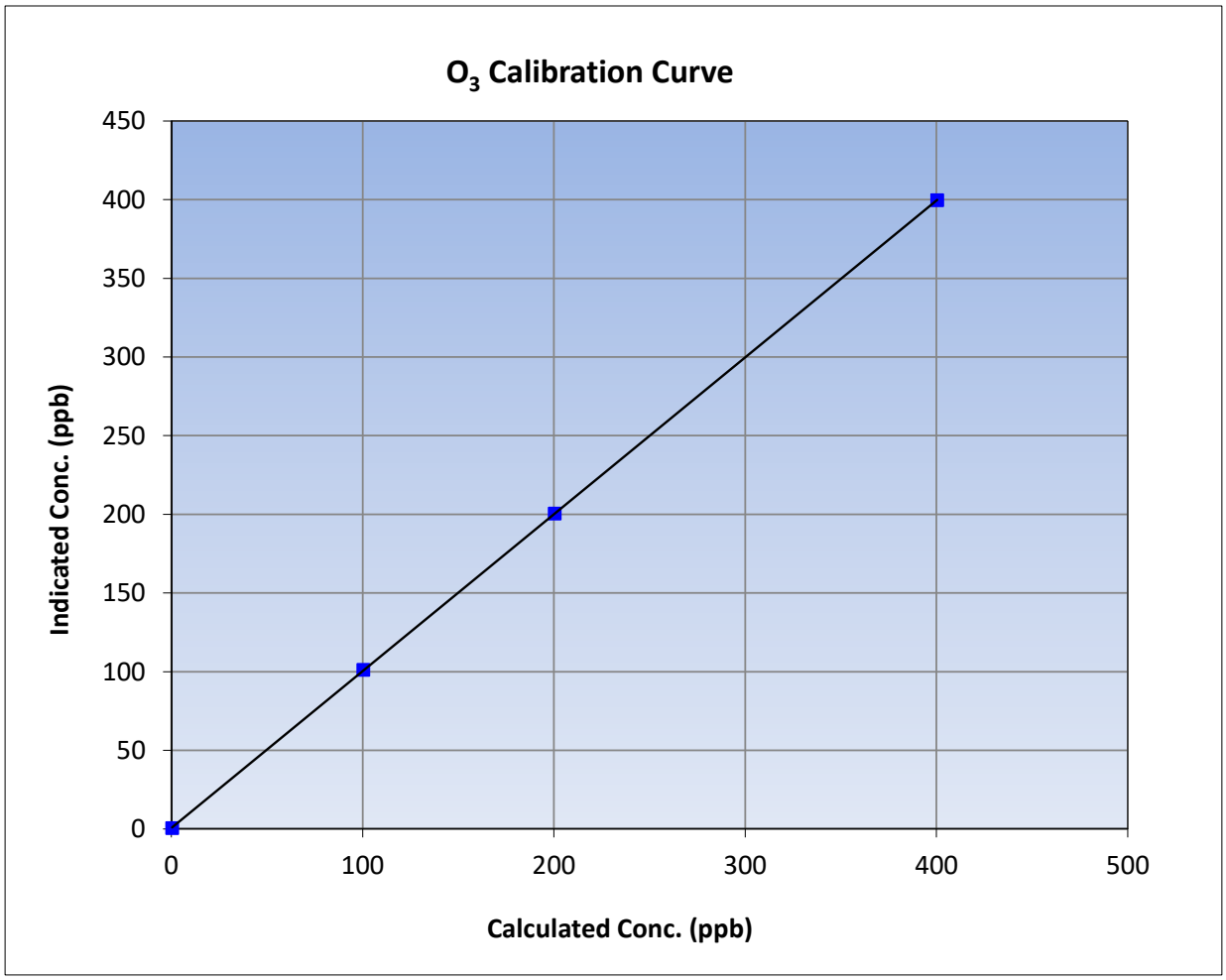
Station Information

Calibration Date:	September 20, 2023	Previous Calibration:	August 11, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:53	End Time (MST):	15:20
Analyzer make:	Thermo 49i	Analyzer serial #:	1152220023

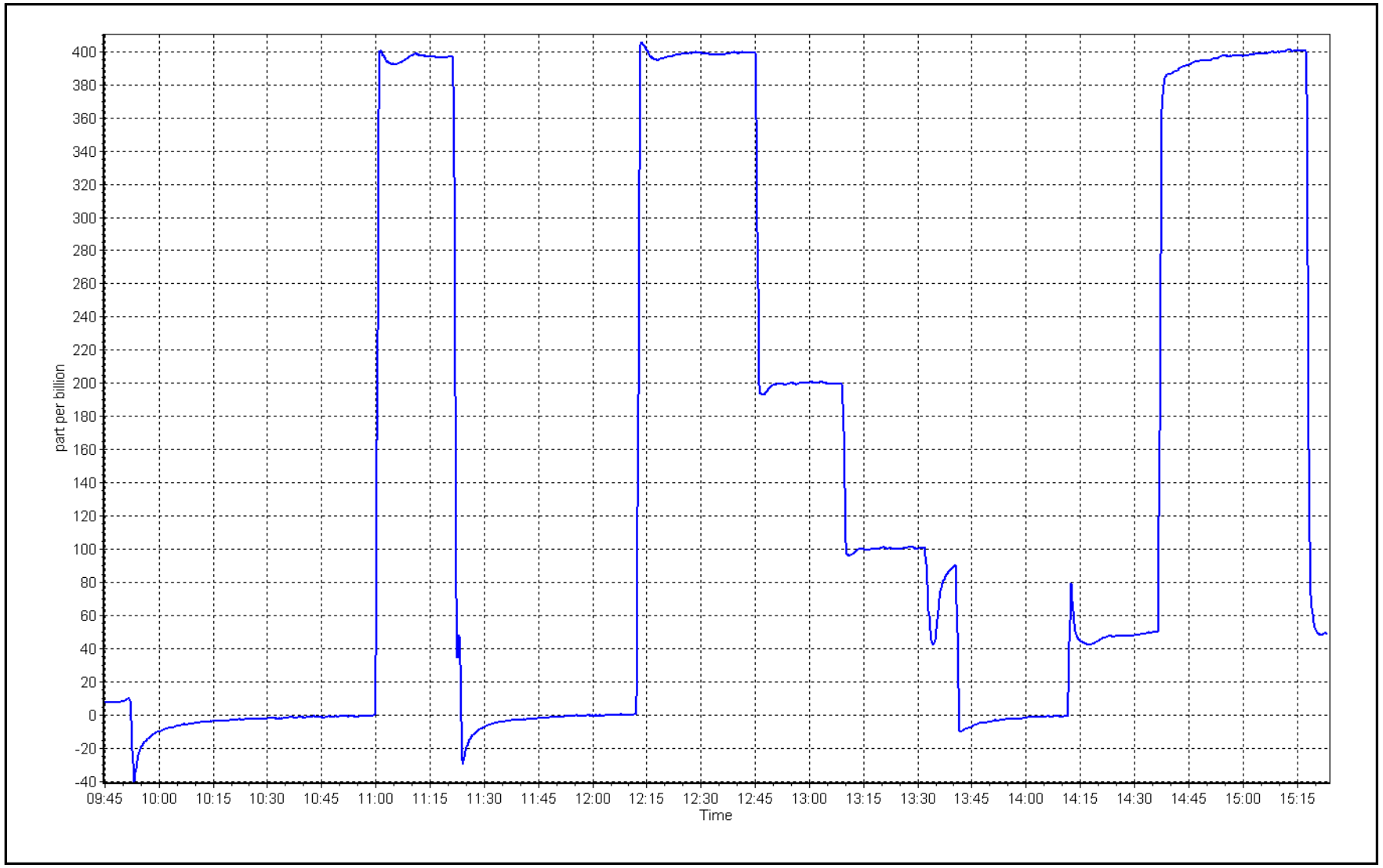
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
400.0	399.3	1.0018
200.0	200.1	0.9995
100.0	100.8	0.9921

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	0.997143	*0.90 - 1.10*
Intercept	0.600000	*+/- 5*



O_3 Calibration Plot Date: September 20, 2023 Location: Athabasca Valley



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Athabasca Valley	Station number:	AMS 07
Calibration Date:	September 27, 2023	Last Cal Date:	August 28, 2023
Start time (MST):	12:16	End time (MST):	13:48
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)	21.0	20.3	21	☐	+/- 2 °C
P (mmHg)	728.3	737.74	728.3	☐	+/- 10 mmHg
flow (LPM)	5.01	5.07	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: September 27, 2023 Last Cal Date: August 28, 2023

PM w/o HEPA: 5.3 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	10	11.2	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 5.3 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: September 27, 2023

Disposable Filter Changed: August 28, 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. 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:	September 27, 2023	Last Cal Date:	August 16, 2023
Start time (MST):	10:36	End time (MST):	13:40
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999458	1.003398	Backgd or Offset:	4.225	4.225
Calibration intercept:	0.036542	0.092559	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	40.2	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4933	66.7	40.0	40.2	0.996
second point	4967	33.3	20.0	20.3	0.985
third point	4983	16.7	10.0	10.2	0.983
as left zero	5000	0.0	0.0	0.1	----
as left span	4933	66.7	40.0	40.2	0.996
				Average Correction Factor	0.988

Baseline Corr As found:	40.06	Prev response:	40.04	*% 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 adjustment needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

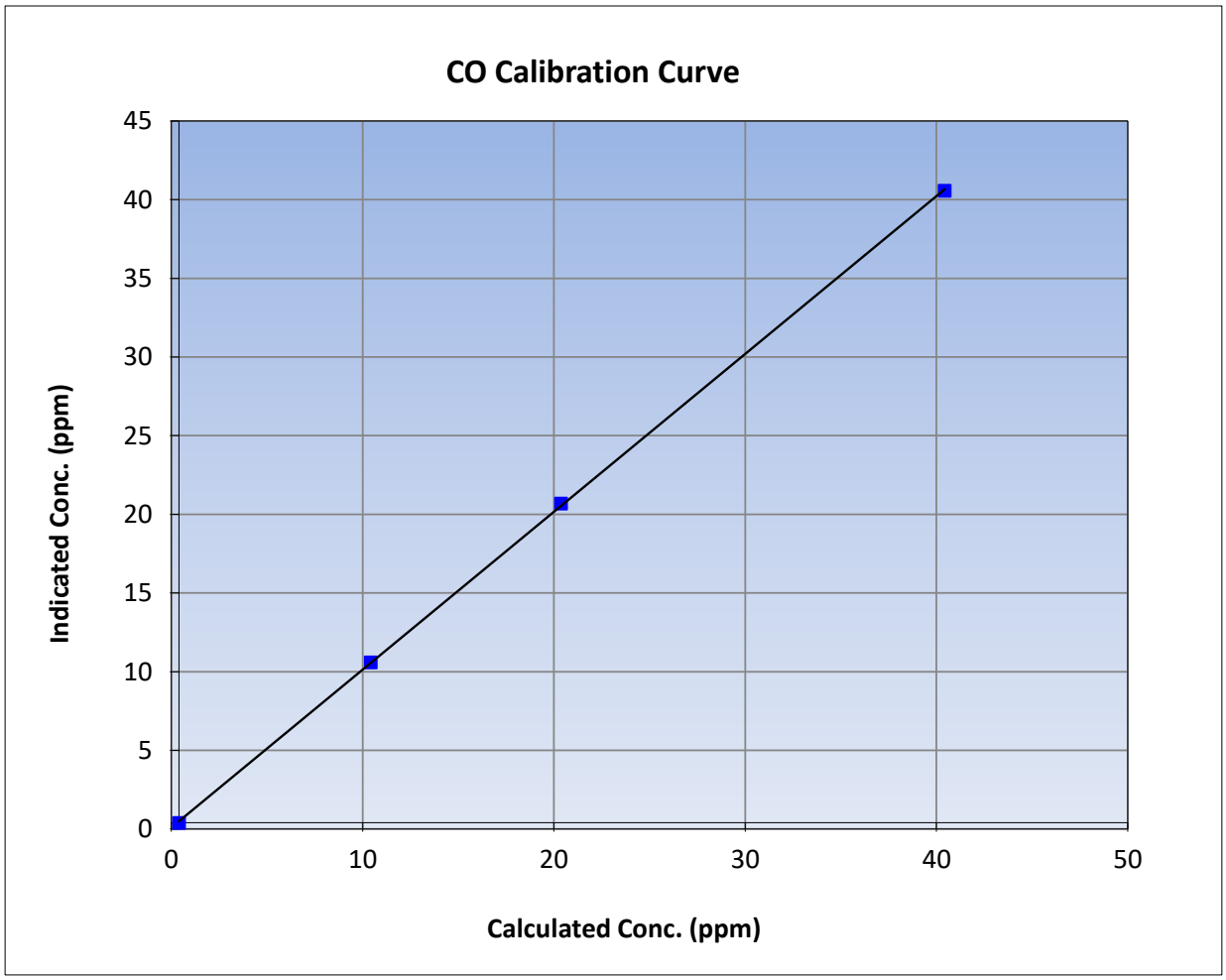
Station Information

Calibration Date:	September 27, 2023	Previous Calibration:	August 16, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:36	End Time (MST):	13:40
Analyzer make:	Thermo 48i-LTE	Analyzer serial #:	1408761381

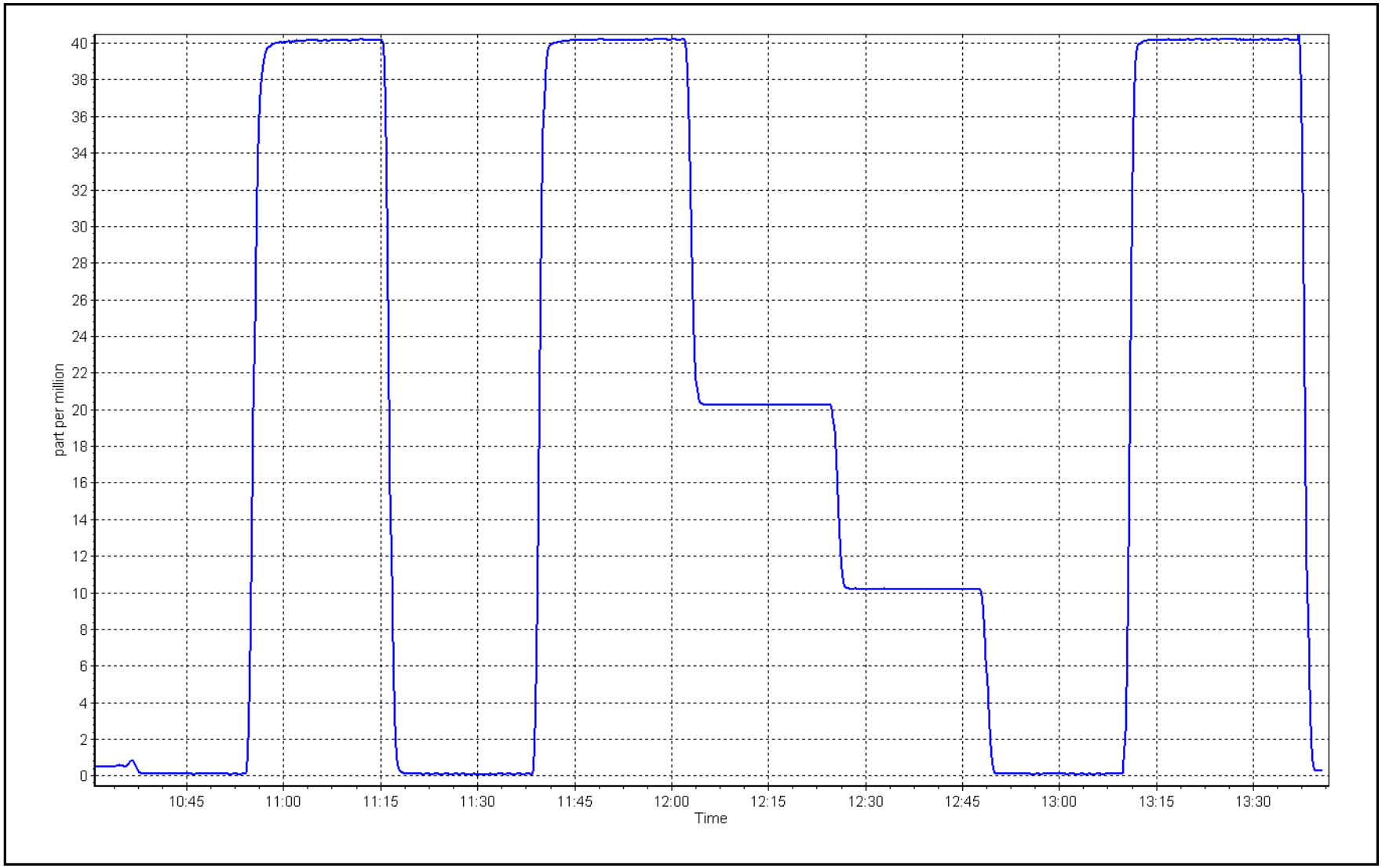
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.0	40.2	0.9963
20.0	20.3	0.9851
10.0	10.2	0.9834

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999956	*≥0.995*
Slope	1.003398	*0.90 - 1.10*
Intercept	0.092559	*+/-1.5*



CO Calibration Plot Date: September 27, 2023 Location: Athabasca Valley



Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Athabasca Valley	Station Number:	AMS 07
Calibration Date:	September 20, 2023	Prev Cal Date:	October 4, 2022
Start Time (MST):	11:56	End Time (MST):	14:57
Tower Height (m):	10.0	Reason:	Routine

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	G3212
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	20.1	-0.3%
400	39.4	39.4	0.1%
600	58.6	58.5	-0.1%
800	77.8	77.8	0.1%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)		0.999999	*≥0.9995*
Calculated slope		0.999473	*0.90 - 1.10*
Calculated intercept		0.026227	*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	R14656
As Found Declination (deg east of True North):		As Left Declination (deg east of True North):	
Solar noon time (MST):	12:17	Calc Declination*:	13.17 Degrees
Deadband calc:	6.0 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	0.7	---
90	86.9	-0.9%
180	177.3	-0.8%
270	265.9	-1.1%
357	351.7	-1.5%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)		0.999979	*≥0.9995*
Calculated slope		1.014605	*0.90 - 1.10*
Calculated intercept		0.332308	*+/- 4*

Notes: Wind speed sensor in good condition, wind direction sensor failed, replaced with sensor s/n:D13602. Install calibration paperwork for new wind direction sensor completed seperately.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Athabasca Valley	Station Number:	AMS 07
Calibration Date:	September 20, 2023	Prev Cal Date:	October 4, 2022
Start Time (MST):	11:56	End Time (MST):	14:57
Tower Height (m):	10.0	Reason:	Install

Wind Speed Information

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

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

	Start	***Finish***	*Limits*
Correl Coeff (r^2)			*≥0.9995*
Calculated slope			*0.90 - 1.10*
Calculated intercept			*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	D13602
As Found Declination (deg east of True North):		As Left Declination (deg east of True North):	
Solar noon time (MST):	12:17	Calc Declination*:	13.17 Degrees
Deadband calc:	-2.6 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	0.8	---
90	86.9	-0.9%
180	180.9	0.3%
270	271.2	0.3%
357	360.4	1.0%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)		0.999921	*≥0.9995*
Calculated slope		0.989273	*0.90 - 1.10*
Calculated intercept		1.299119	*+/- 4*

Notes: Install calibration for new Wind Direction sensor, swapped sensor S/N: R14656 with sensor S/N: D13602 during annual routine calibration.

Calibration Performed By: Aswin Sasi Kumar

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS08
FORT CHIPEWYAN
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	September 6, 2023	Last Cal Date:	August 14, 2023
Start time (MST):	10:53	End time (MST):	13:31
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:	1.000314	1.004228	Backgd or Offset:	4.65	4.64
Calibration intercept:	-0.543305	-1.764623	Coeff or Slope:	0.963	0.963

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-2.4	----
as found span	4920	80.3	800.4	799.8	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-2.1	----
high point	4920	80.3	800.4	802.4	0.997
second point	4960	40.2	400.7	399.1	1.004
third point	4980	20.1	200.4	200.9	0.997
as left zero	5000	0.0	0.0	-2.2	----
as left span	4920	80.3	800.4	802.6	0.997
				Average Correction Factor	1.000

Baseline Corr As found: 802.20 Previous response 800.09 *% change 0.3%

* = > +/-5% change initiates investigation

Notes: changed inlet filters after as founds. no adjustments

Calibration Performed By: Morgan Voyageur

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

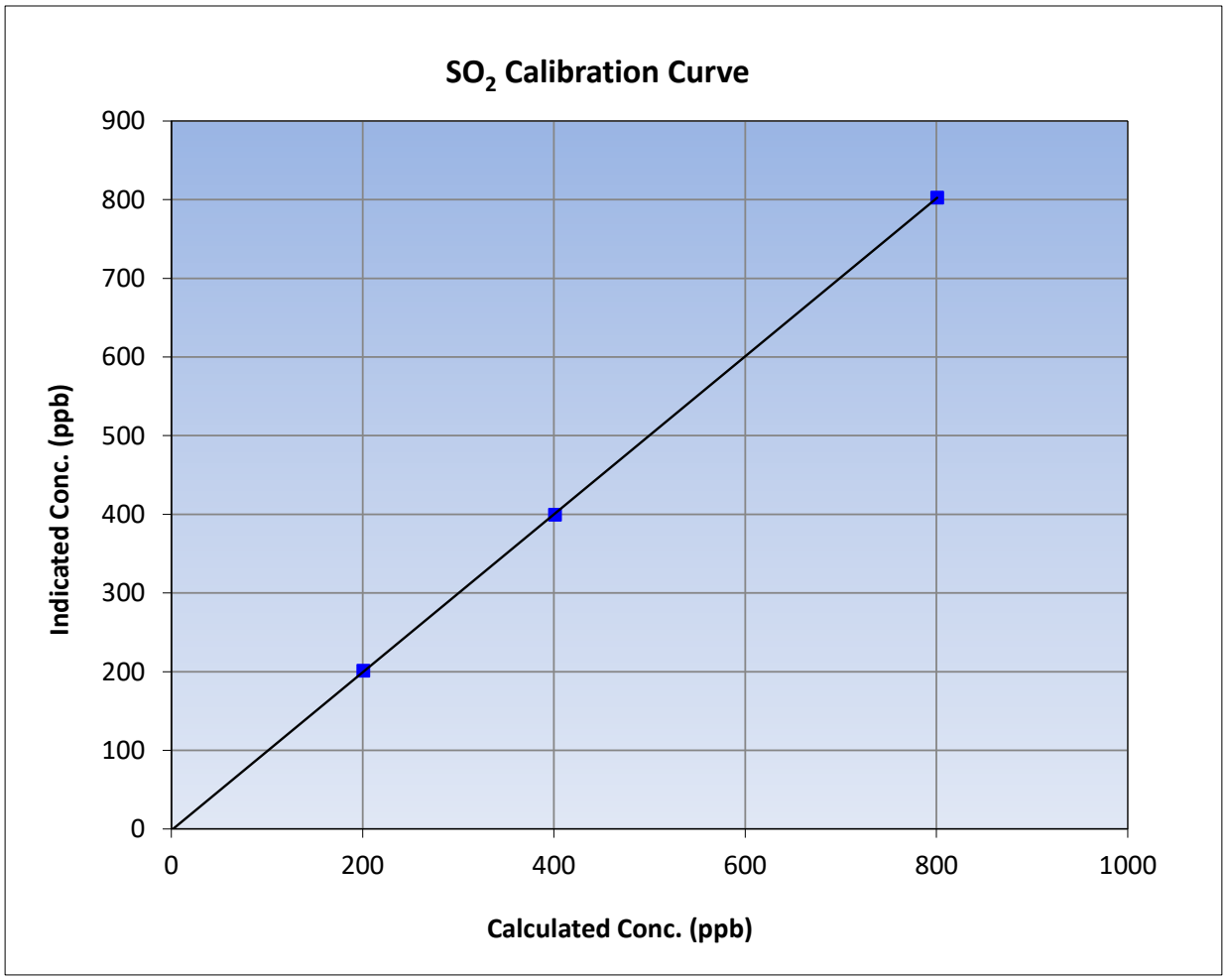
Station Information

Calibration Date:	September 6, 2023	Previous Calibration:	August 14, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	10:53	End Time (MST):	13:31
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1136451241

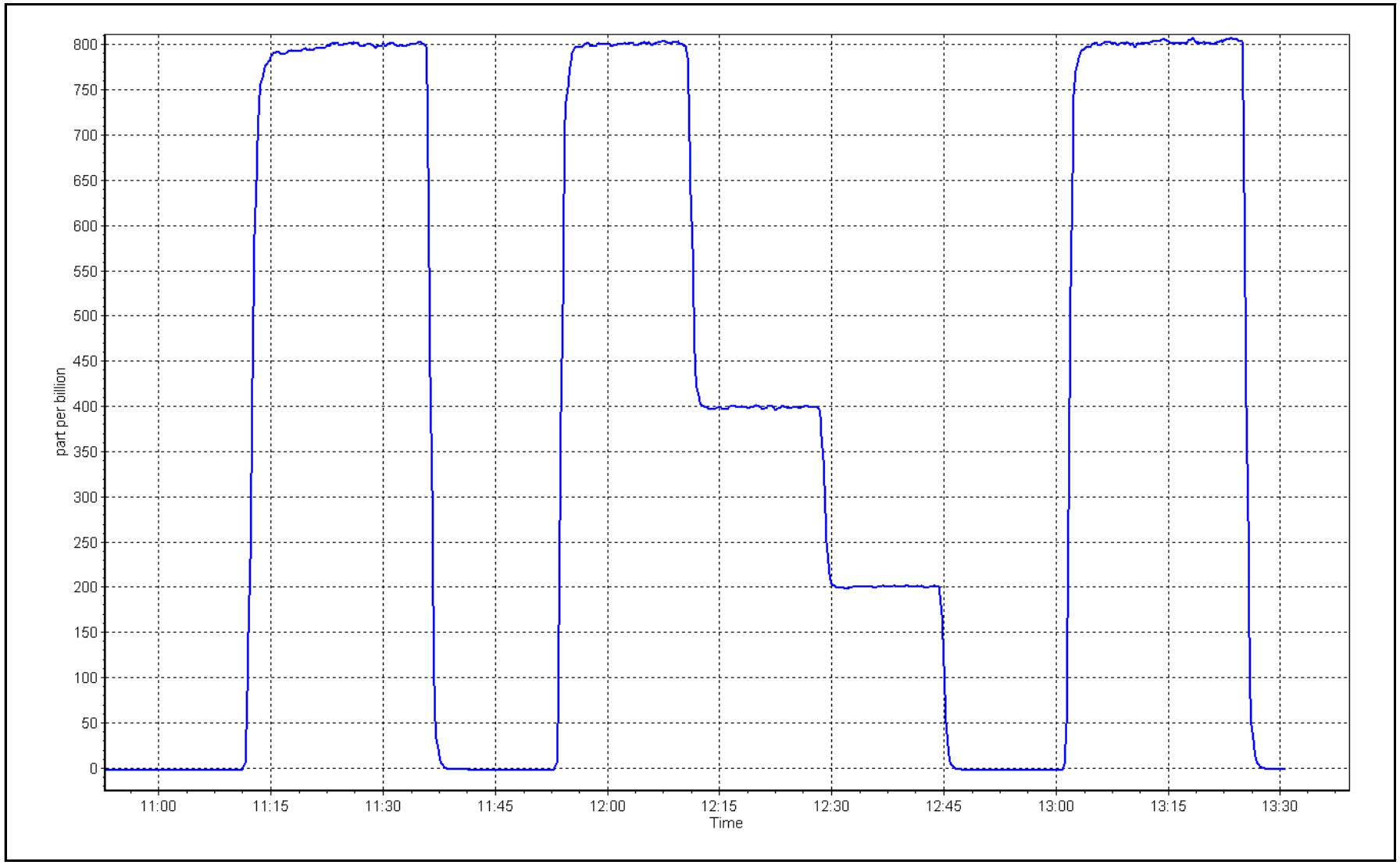
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-2.1	----
800.4	802.4	0.9975
400.7	399.1	1.0040
200.4	200.9	0.9973

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999987	*≥0.995*
Slope	1.004228	*0.90 - 1.10*
Intercept	-1.764623	*+/-30*



SO2 Calibration Plot Date: September 6, 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:	September 21, 2023	Last Cal Date:	August 24, 2023
Start time (MST):	12:29	End time (MST):	16:20
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999424	1.011429	Backgd or Offset:	0.99	1.00
Calibration intercept:	0.458863	0.338843	Coeff or Slope:	0.752	0.752

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	40.1	1.006
as found 3rd point	4980	20.1	20.0	20.5	0.994
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.4	----
high point	4920	80.5	80.0	81.4	0.983
second point	4960	40.2	40.0	40.4	0.989
third point	4980	20.1	20.0	20.7	0.965
as left zero	5000	0.0	0.0	0.6	----
as left span	4920	80.5	80.0	81.6	0.981
SO2 Scrubber Check	4919.7	80.3	803.0	0.1	----
Date of last scrubber change:		March 7, 2022		Ave Corr Factor	0.979
Date of last converter efficiency test:		March 15, 2022		100.7%	efficiency

Baseline Corr As found:	79.8	Prev response:	80.42	*% change:	-0.8%
Baseline Corr 2nd AF pt:	39.7	AF Slope:	0.996428	AF Intercept:	0.438656
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999986		

* = > +/-5% change initiates investigation

Notes: Sampled inlet filter changed after as founds. Scrubber check passed.

Calibration Performed By: Matthew Courtoreille

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

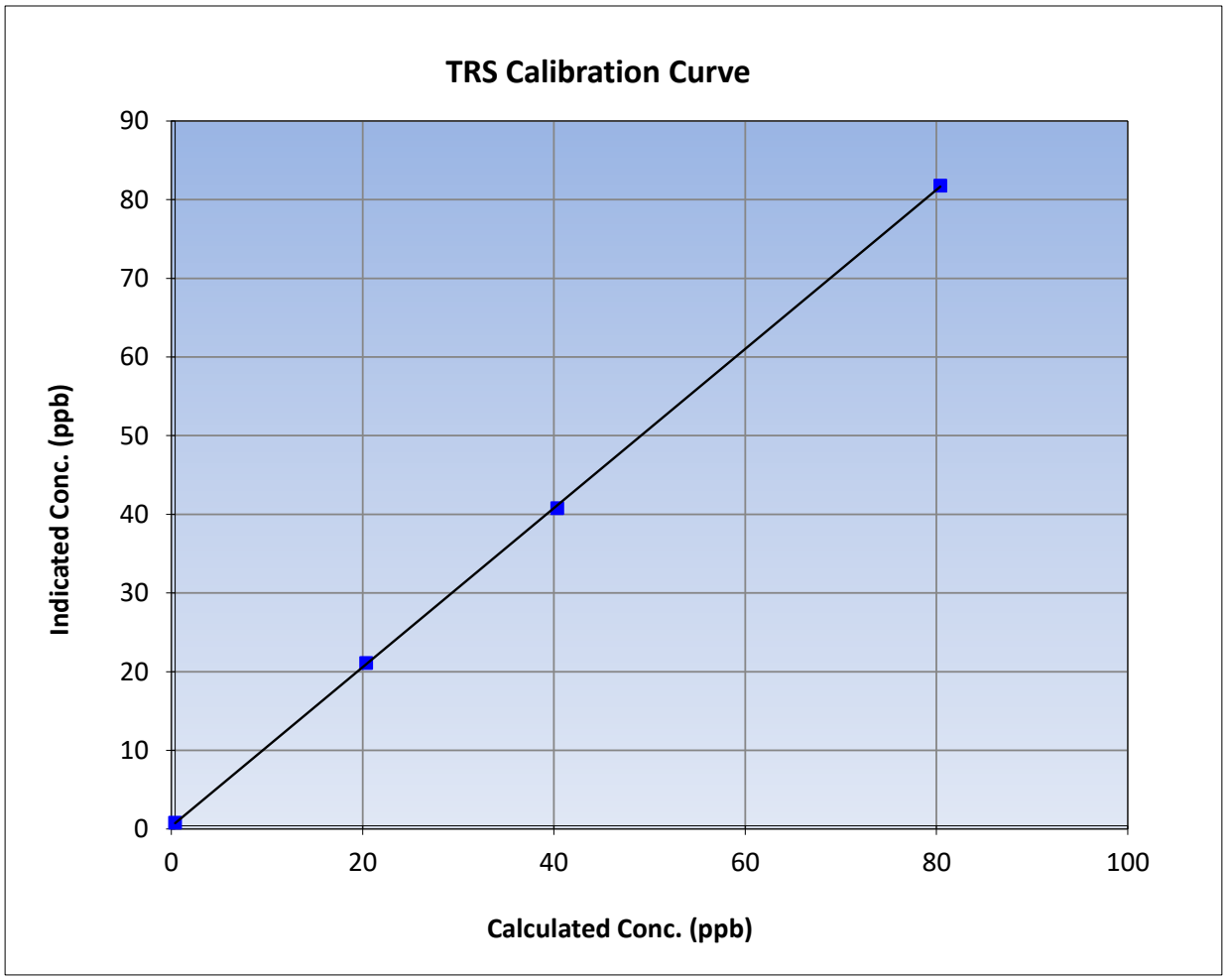
Station Information

Calibration Date:	September 21, 2023	Previous Calibration:	August 24, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	12:29	End Time (MST):	16:20
Analyzer make:	Thermo 43iQ-TL	Analyzer serial #:	1203169744

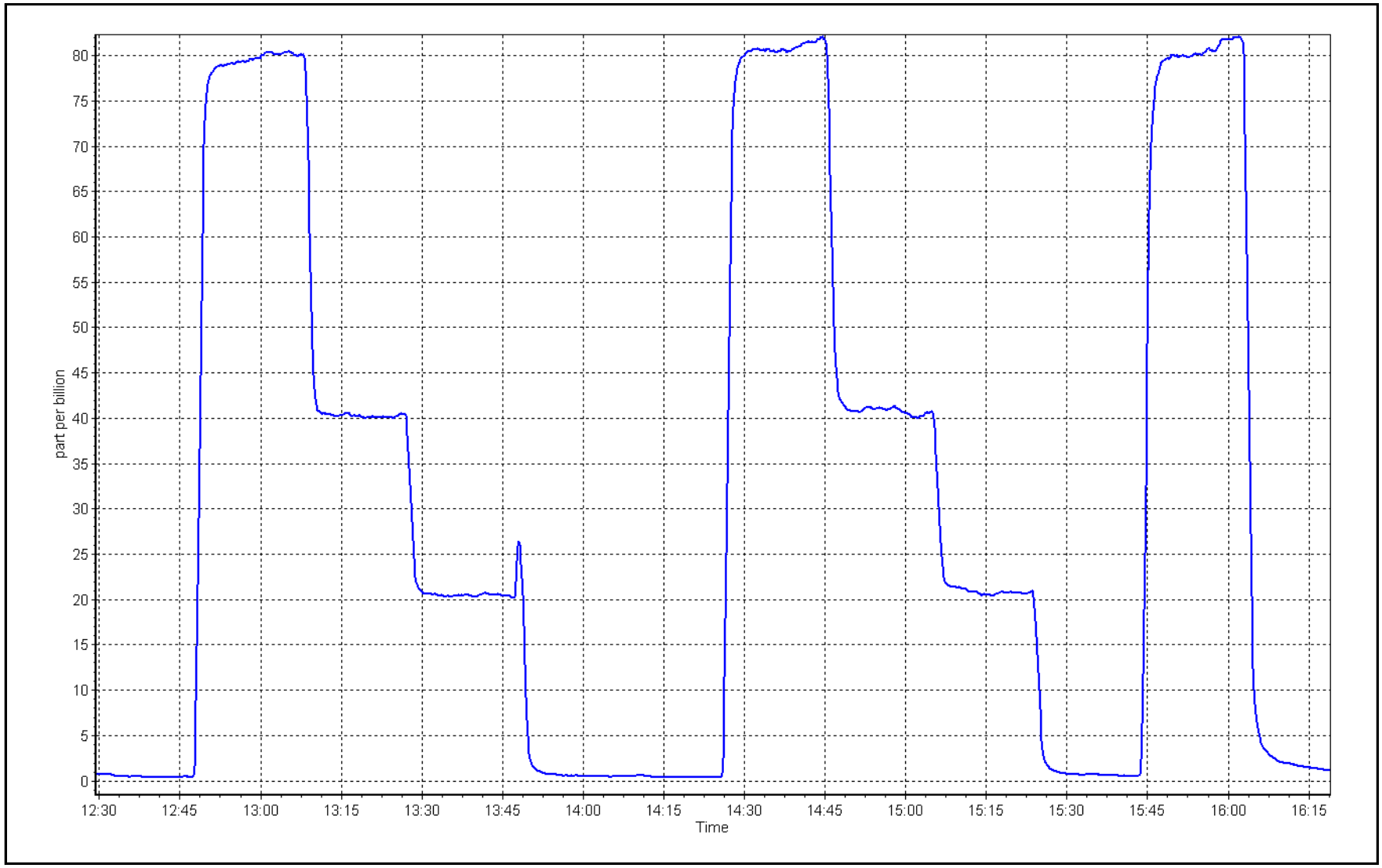
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
80.0	81.4	0.9829
40.0	40.4	0.9890
20.0	20.7	0.9652

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999952	*≥0.995*
Slope	1.011429	*0.90 - 1.10*
Intercept	0.338843	*+/-3*



TRS Calibration Plot Date: September 21, 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:	September 21, 2023	Last Cal Date:	August 29, 2023
Start time (MST):	7:30	End time (MST):	11:41
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:	1.020	1.078	NO bkgnd or offset:	9.2	9.8
NOX coeff or slope:	0.992	0.992	NOX bkgnd or offset:	10.1	10.7
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	147.0	145.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.996773	0.993131
NO_X Cal Offset:	0.340000	1.940000
NO Cal Slope:	0.997515	0.994931
NO Cal Offset:	-0.520000	1.260000
NO_2 Cal Slope:	1.009480	0.991090
NO_2 Cal Offset:	1.358955	-1.074507

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.7	0.5	0.2	----	----
as found span	4918	82.0	800.3	800.3	0.0	755.5	754.6	1.2	1.0593	1.0606
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.3	0.4	0.0	----	----
high point	4918	82.0	800.3	800.3	0.0	795.8	796.9	-0.1	1.0057	1.0043
second point	4959	41.0	400.2	400.2	0.0	400.6	400.4	0.3	0.9989	0.9994
third point	4980	20.5	200.1	200.1	0.0	202.0	200.8	1.1	0.9905	0.9964
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	0.1	-0.3	----	----
as left span	4918	82.0	800.3	404.3	396.0	793.1	403.1	389.8	1.0091	1.0030
								Average Correction Factor	0.9984	1.0000

Corrected As found	NO_X = 754.8 ppb	NO = 754.1 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-5.7%
Previous Response	NO_X = 798.1 ppb	NO = 797.8 ppb			*Percent Change	NO =	-5.8%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.8	401.8	396.0	392.5	1.0089	99.1%
2nd GPT point (200 ppb O3)	797.8	597.4	200.4	196.6	1.0193	98.1%
3rd GPT point (100 ppb O3)	797.8	597.1	200.7	196.6	1.0209	98.0%
				Average Correction Factor	1.0164	98.4%

Notes: sampled inlet filter changed after as founds. Made adjustment to high point span.

Calibration Performed By: Matthew C

Wood Buffalo Environmental Association

NO_X Calibration Summary

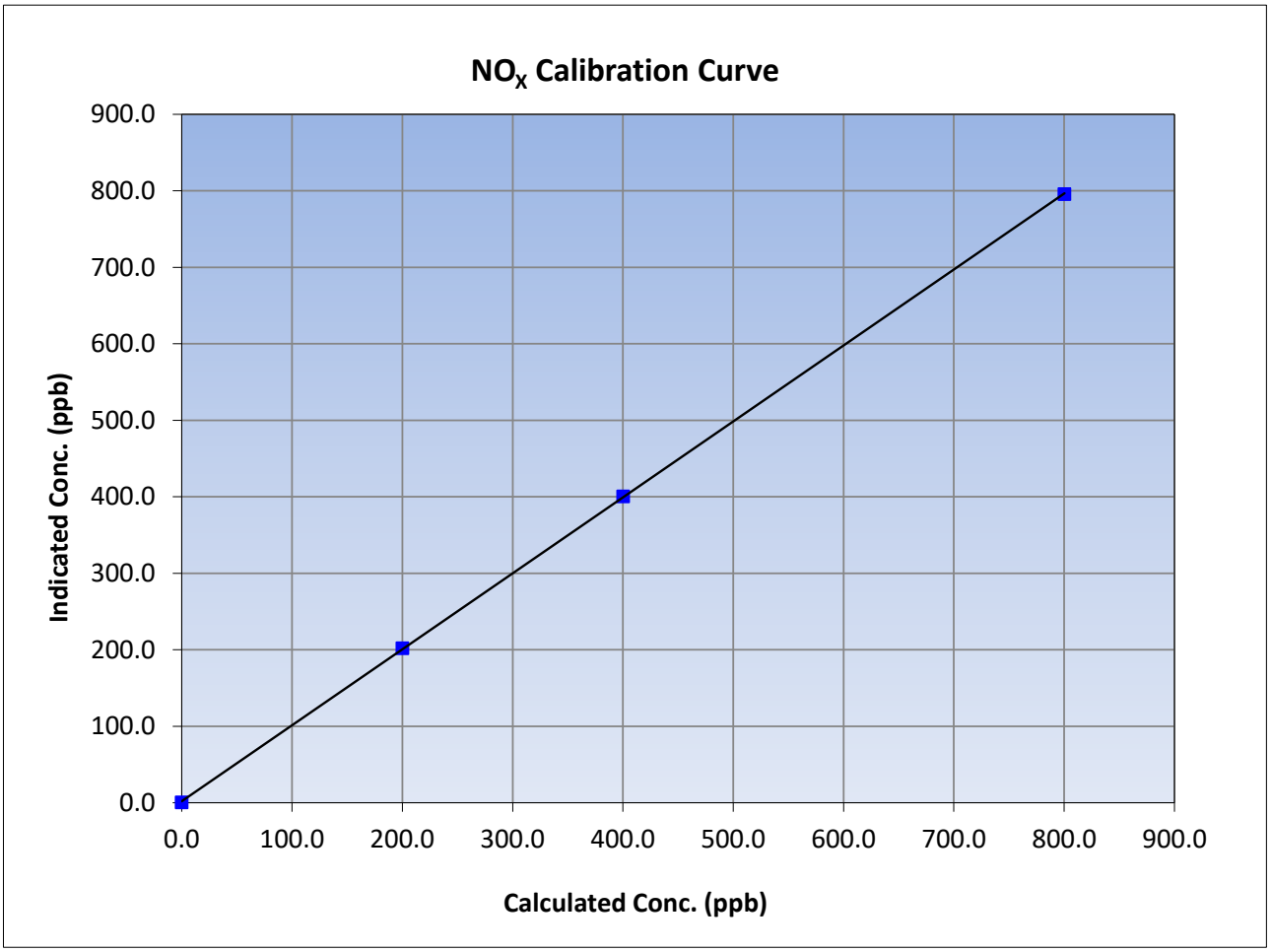
Version-04-2020

Station Information

Calibration Date:	September 21, 2023	Previous Calibration:	August 29, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:30	End Time (MST):	11:41
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	0.999980	≥0.995
800.3	795.8	1.0057			
400.2	400.6	0.9989	Slope	0.993131	0.90 - 1.10
200.1	202.0	0.9905			
			Intercept	1.940000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

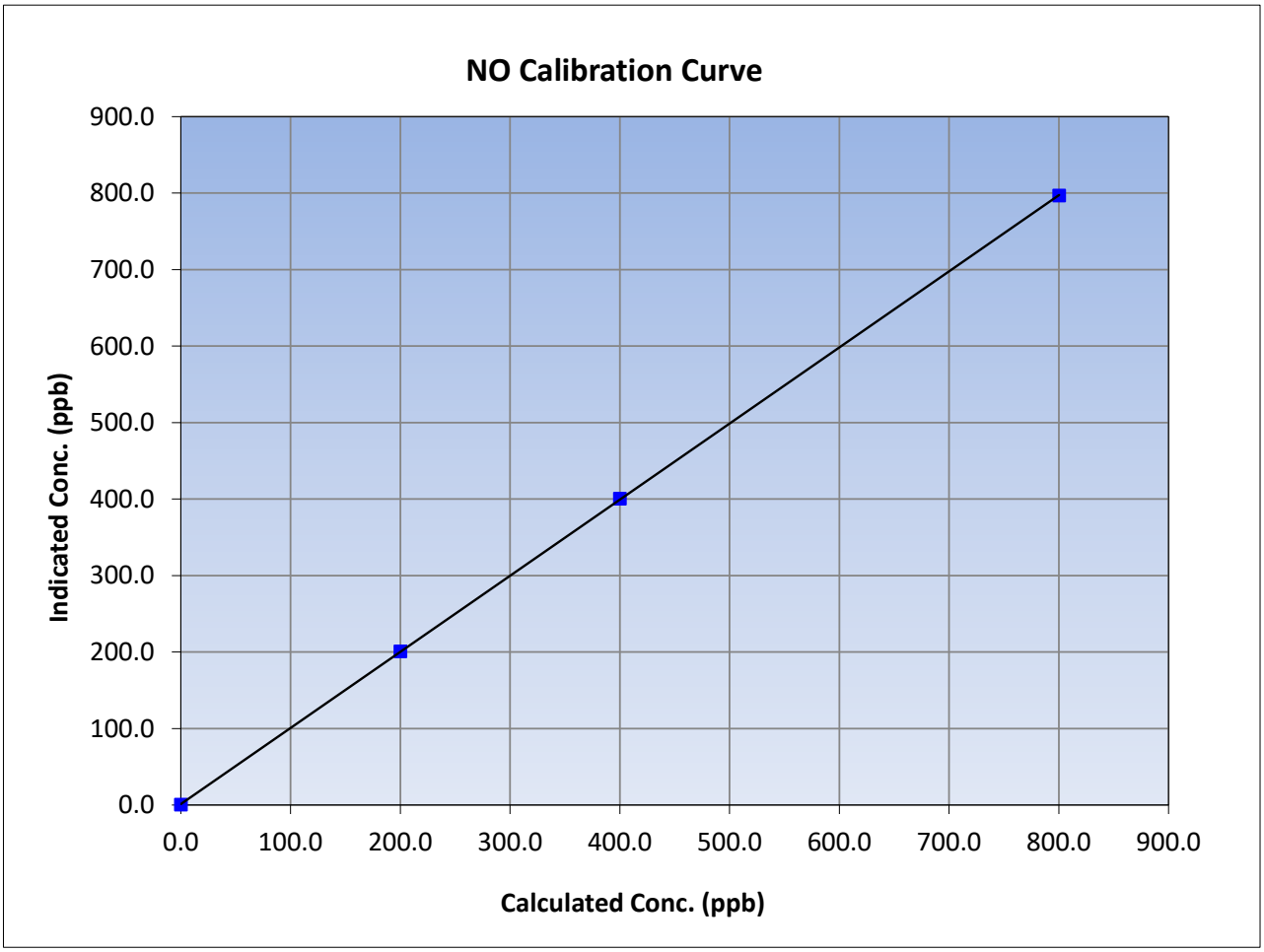
Version-04-2020

Station Information

Calibration Date:	September 21, 2023	Previous Calibration:	August 29, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:30	End Time (MST):	11:41
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	0.999993	≥0.995
800.3	796.9	1.0043			
400.2	400.4	0.9994	Slope	0.994931	0.90 - 1.10
200.1	200.8	0.9964			
			Intercept	1.260000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

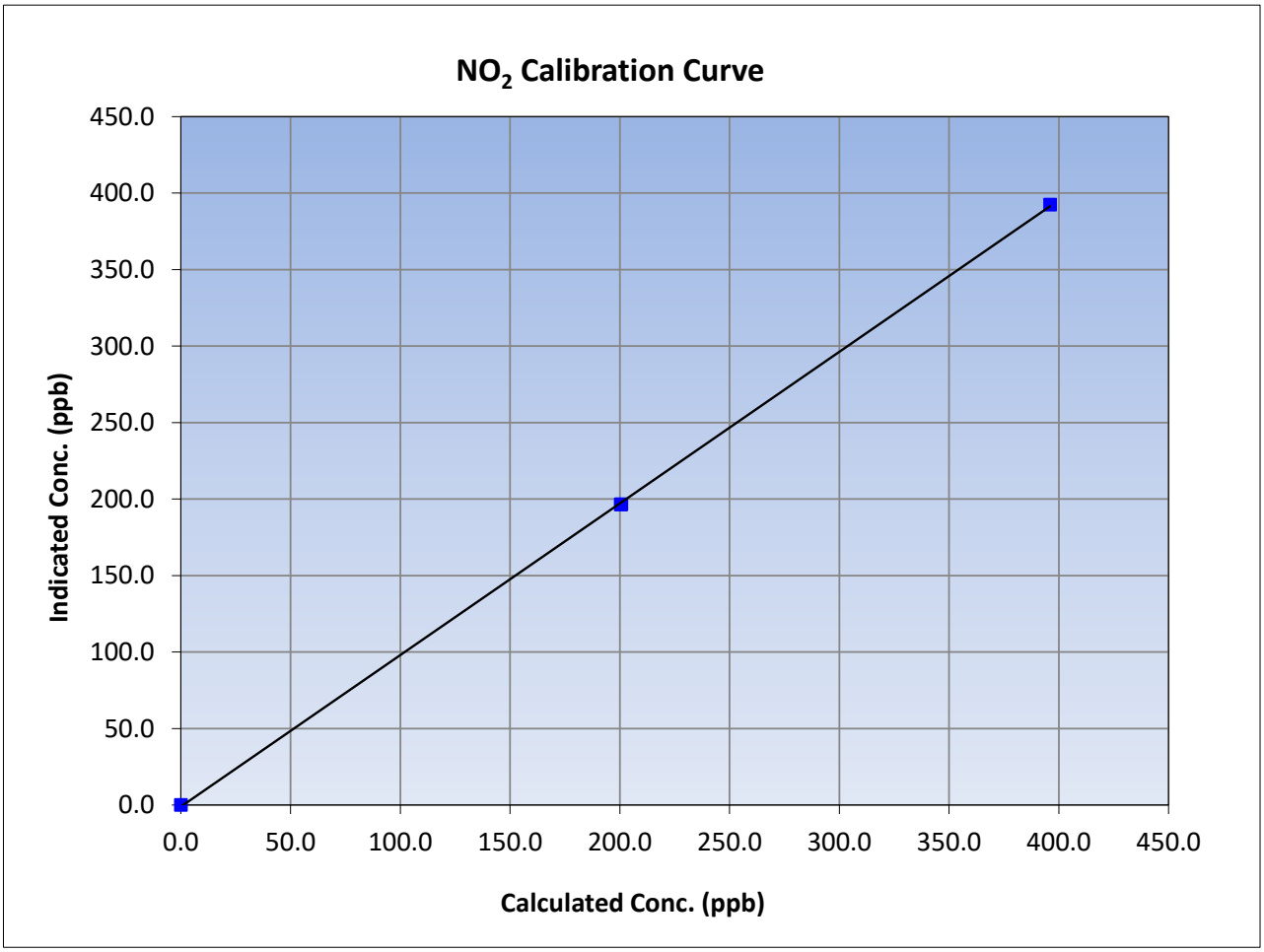
Version-04-2020

Station Information

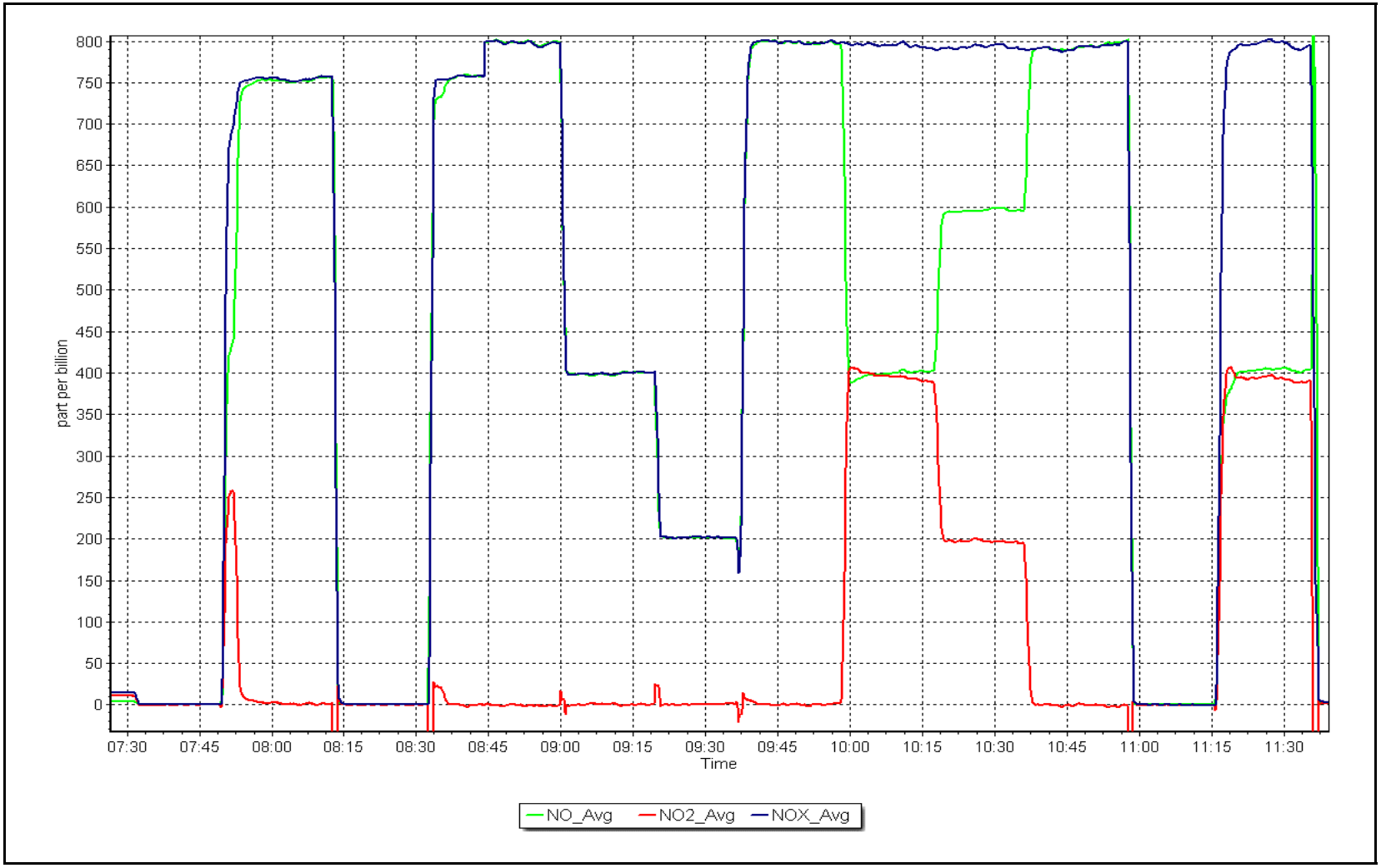
Calibration Date:	September 21, 2023	Previous Calibration:	August 29, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:30	End Time (MST):	11:41
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999938	≥0.995
396.0	392.5	1.0089			
200.4	196.6	1.0193	Slope	0.991090	0.90 - 1.10
200.7	196.6	1.0209			
			Intercept	-1.074507	+/-20



NO_X Calibration Plot Date: September 21, 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:	September 6, 2023	Last Cal Date:	August 14, 2023
Start time (MST):	8:19	End time (MST):	10:49
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:	1.018771	1.018086	Backgd or Offset:	-2.0	-2.0
Calibration intercept:	-0.760000	-0.940000	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	0.0	0.0	-0.1	----
as found span	5000	913.0	400.0	406.8	0.983
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	914.7	400.0	406.8	0.983
second point	5000	786.4	200.0	202.1	0.990
third point	5000	701.3	100.0	100.0	1.000
as left zero	5000	0.0	0.0	0.5	----
as left span	5000	963.3	400.0	408.7	0.979
				Average Correction Factor	0.991

Baseline Corr As found:	406.9	Previous response	406.7	*% 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 out inlet filter after as found. No adjustments

Calibration Performed By: Morgan Voyageur

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

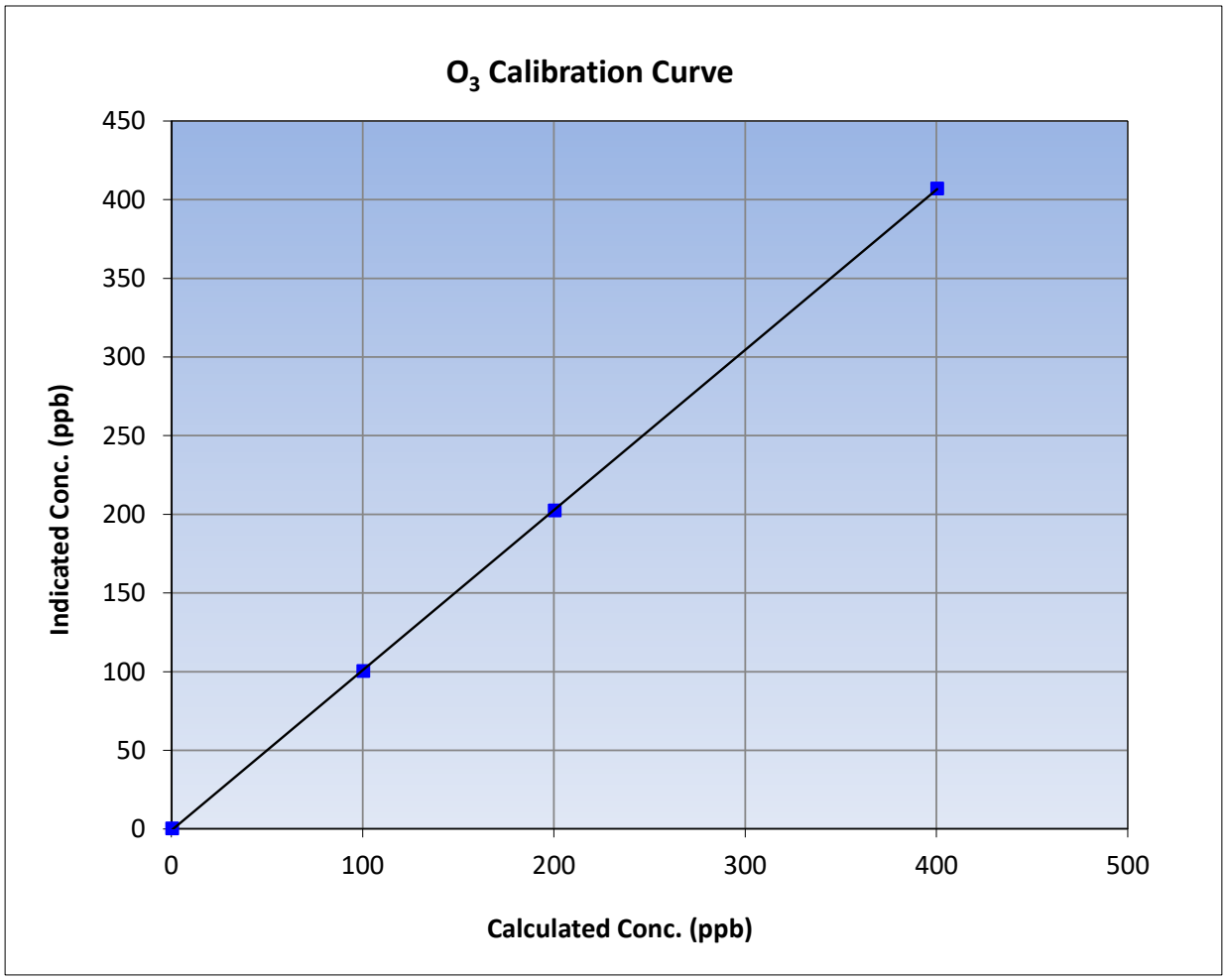
Station Information

Calibration Date:	September 6, 2023	Previous Calibration:	August 14, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:19	End Time (MST):	10:49
Analyzer make:	Teledyne API T400	Analyzer serial #:	3872

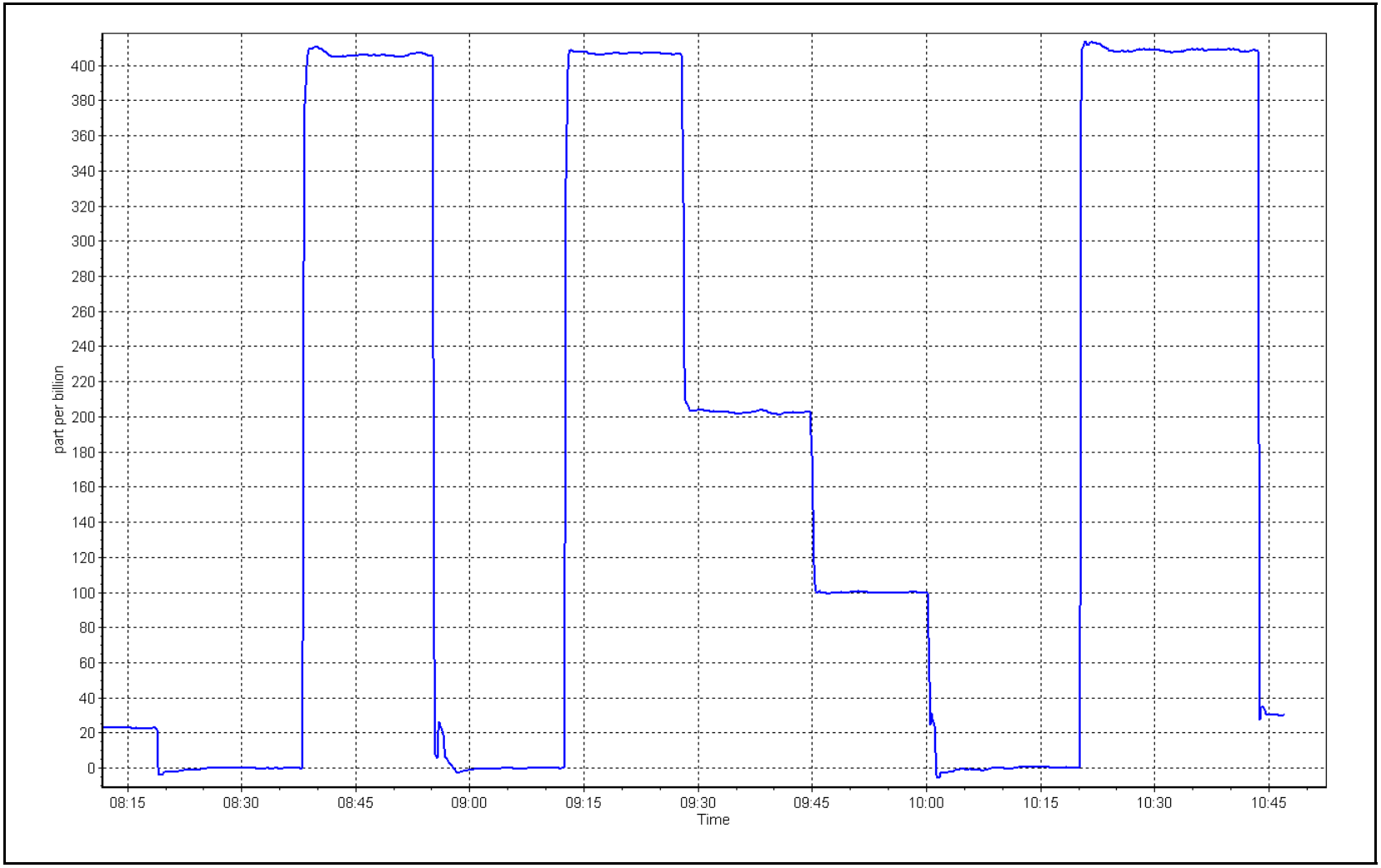
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
400.0	406.8	0.9833
200.0	202.1	0.9896
100.0	100.0	1.0000

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999975	*≥0.995*
Slope	1.018086	*0.90 - 1.10*
Intercept	-0.940000	*+/- 5*



O_3 Calibration Plot Date: September 6, 2023 Location: Fort Chipewyan



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS 08
Calibration Date:	September 21, 2023	Last Cal Date:	August 24,2023
Start time (MST):	14:37	End time (MST):	12:27
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)	17.0	17.7	17.0	☐	+/- 2 °C
P (mmHg)	735.9	739.4	735.9	☐	+/- 10 mmHg
flow (LPM)	5.01	5.10	5.01	☑	+/- 0.25 LPM

Leak Test: Date of check: September 20, 2023 Last Cal Date: July25,2023

PM w/o HEPA: 71.2 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	(Limits)
PMT Peak Test	11.1	11.0	11.2	☐	11.3 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 24.5 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: July 25, 2023

Disposable Filter Changed: July 25, 2023

Annual Maintenance

Date Sample Tube Cleaned: July 25, 2023

Date RH/T Sensor Cleaned: July 25, 2023

Notes: flow was adjusted to5.01 was 5.03.

Calibration by: Matthew Courtoreille

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	September 22, 2023	Last Cal Date:	August 30, 2023
Start time (MST):	8:48	End time (MST):	11:58
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:	0.995357	1.000563	Backgd or Offset:	-0.013	-0.014
Calibration intercept:	0.050947	0.028916	Coeff or Slope:	0.999	1.006

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	0.24	----
as found span	4933	66.7	40.4	40.6	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4934	66.7	40.4	40.4	1.000
second point	4967	33.3	20.2	20.3	0.994
third point	4983	16.7	10.1	10.1	0.998
as left zero	5000	0.0	0.0	0.0	----
as left span	2960	40.0	40.4	40.3	1.003
				Average Correction Factor	0.997

Baseline Corr As found:	40.36	Prev response:	40.29	*% change:	0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after as founds. Adjustments made to Zero point and high point.

Calibration Performed By: Matthew C

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

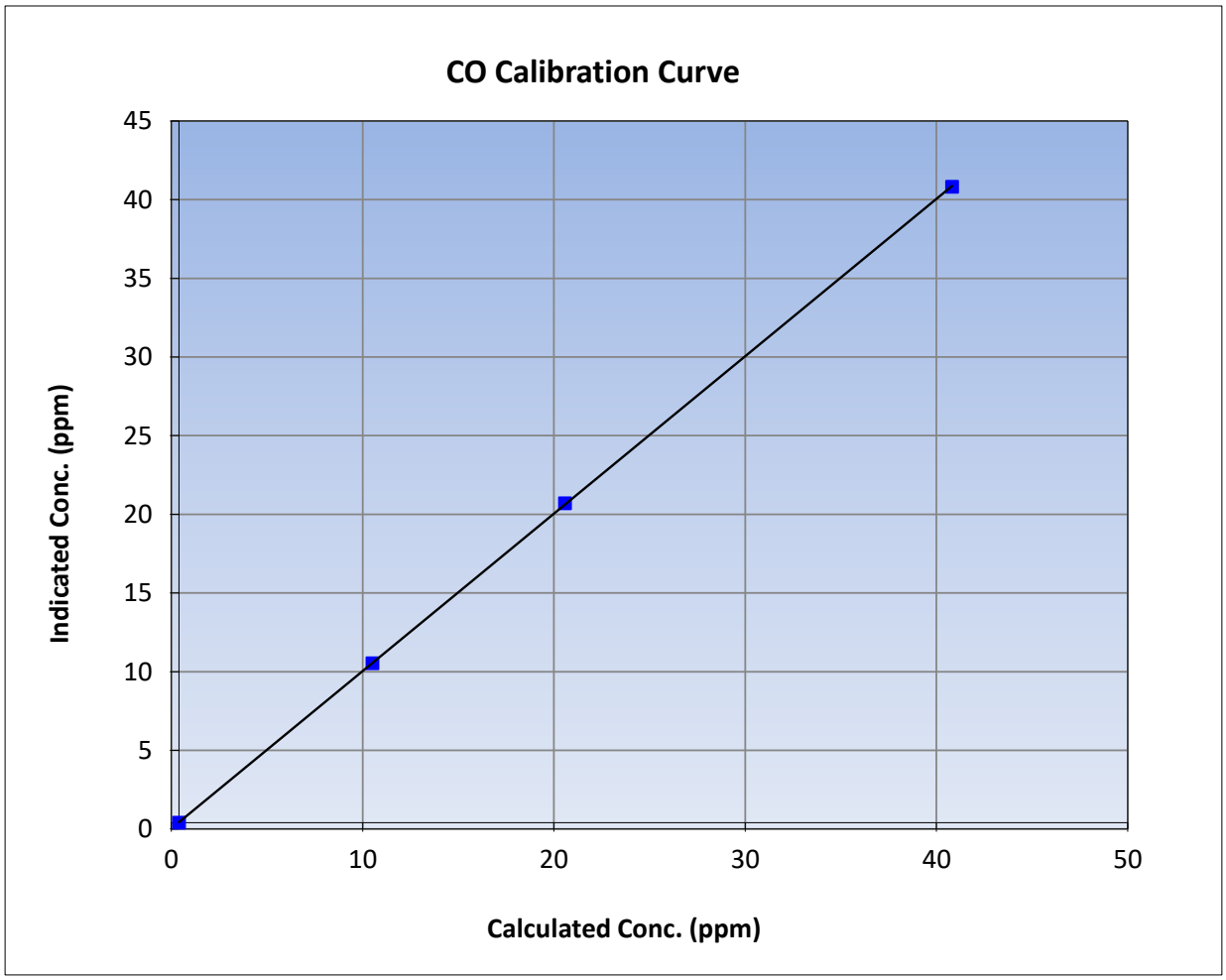
Station Information

Calibration Date:	September 22, 2023	Previous Calibration:	August 30, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:48	End Time (MST):	11:58
Analyzer make:	API T300	Analyzer serial #:	3505

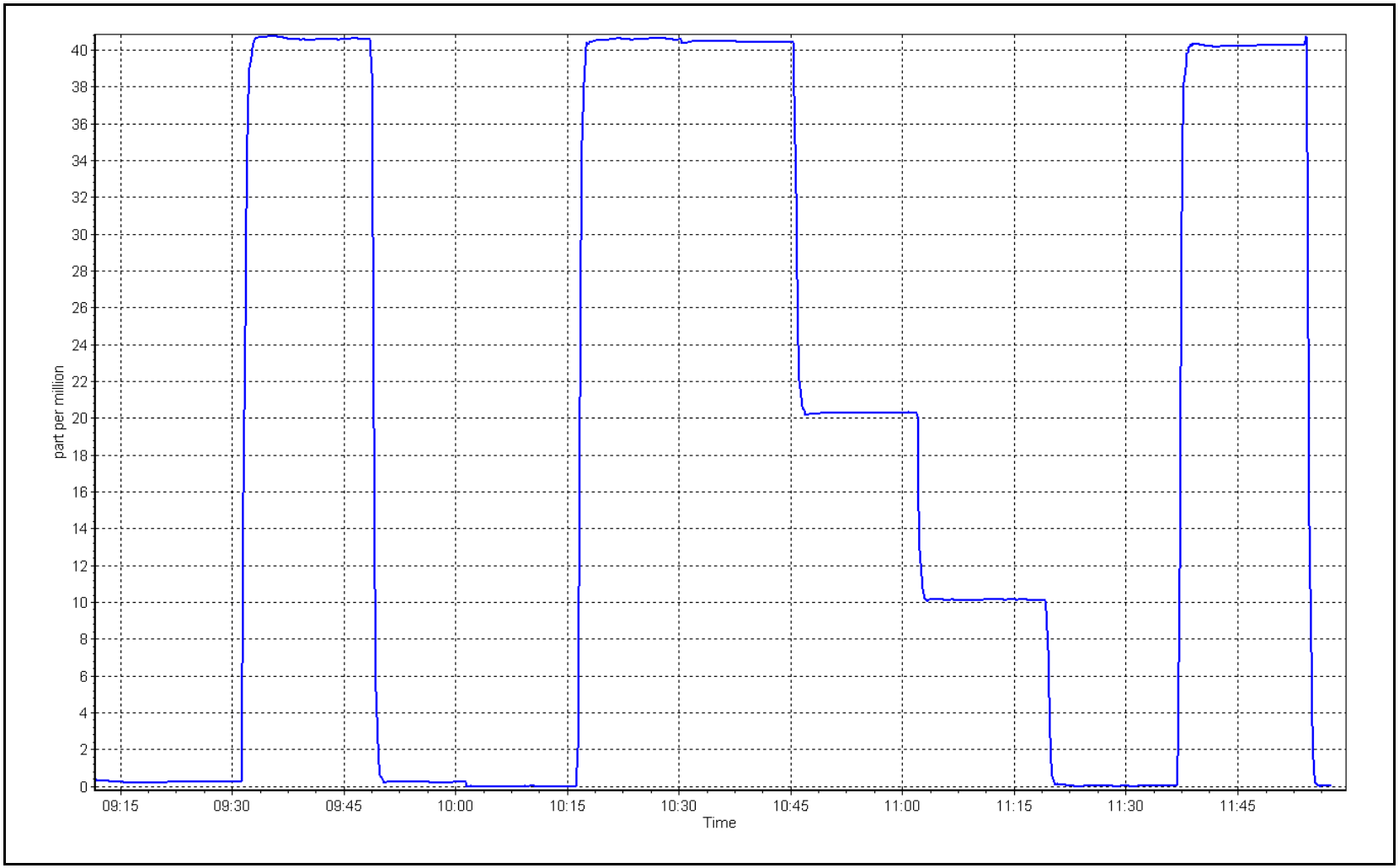
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.4	40.4	0.9996
20.2	20.3	0.9941
10.1	10.1	0.9980

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999990	*≥0.995*
Slope	1.000563	*0.90 - 1.10*
Intercept	0.028916	*+/-1.5*



CO Calibration Plot Date: September 22, 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:	September 22, 2023	Last Cal Date:	August 28, 2023
Start time (MST):	12:00	End time (MST):	14:59
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:	0.997557	0.989394	Backgd or Offset:	0.008	0.008
Calibration intercept:	-1.000000	-0.140000	Coeff or Slope:	1.019	1.019

CO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	3000	0.0	0.0	0.7	----
as found span	2920	80.0	1605.9	1592.6	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	1.0	----
high point	2920	80.0	1605.9	1593.3	1.008
second point	2960	40.0	802.9	781.6	1.027
third point	2980	20.0	401.5	404.0	0.994
as left zero	3000	0.0	0.0	1.4	----
as left span	2960	40.0	802.9	778.7	1.031
				Average Correction Factor	1.010

Baseline Corr As found:	1591.90	Prev response:	1600.94	*% 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 found.

Calibration Performed By: Matthew C

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

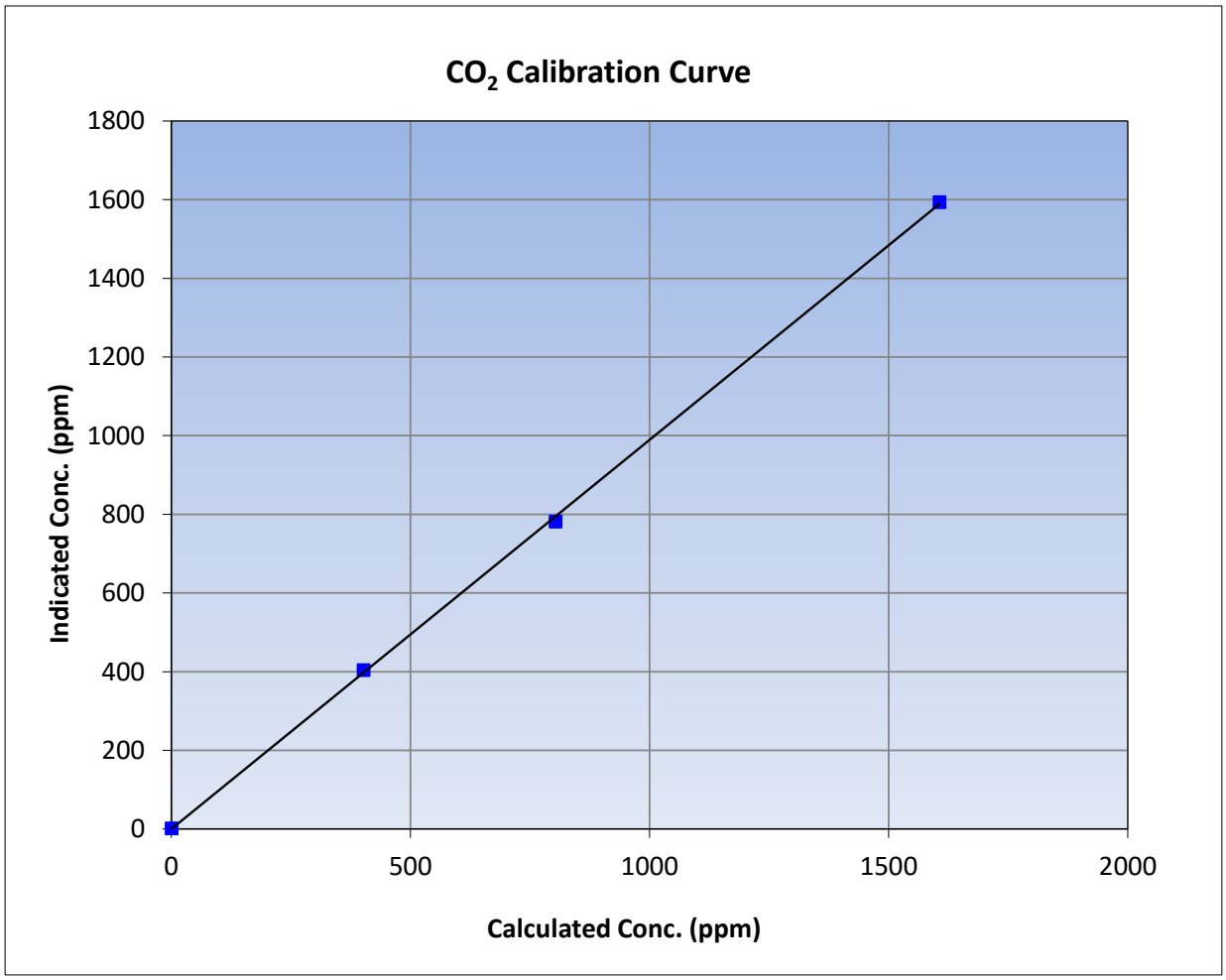
Station Information

Calibration Date	September 22, 2023	Previous Calibration	August 28, 2023
Station Name	Fort Chipewyan	Station Number	AMS08
Start Time (MST)	12:00	End Time (MST)	19:06
Analyzer make	Teledyne API T360	Analyzer serial #	289

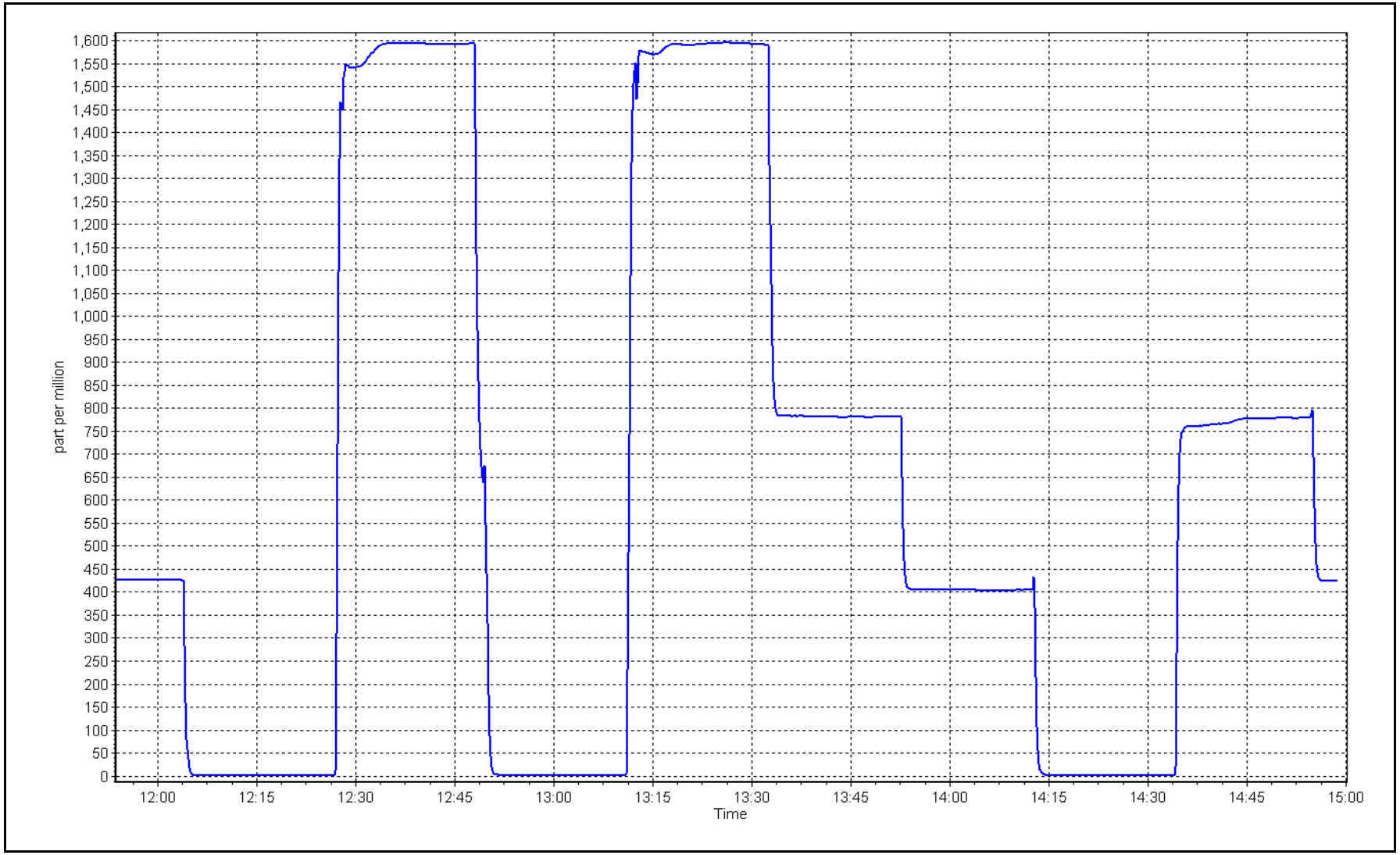
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	1.0	----
1605.9	1593.3	1.0079
802.9	781.6	1.0273
401.5	404.0	0.9937

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999833	*≥0.995*
Slope	0.989394	*0.90 - 1.10*
Intercept	-0.140000	*+/-20*



CO_2 Calibration Plot Date: September 22, 2023 Location: Fort Chipewyan



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS09
BARGE LANDING
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	September 5, 2023	Last Cal Date:	August 15, 2023
Start time (MST):	9:50	End time (MST):	13:09
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:	0.998231	1.000440	Backgd or Offset:	9.7	10.3
Calibration intercept:	0.050728	-0.648667	Coeff or Slope:	0.975	0.979

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.2	----
as found span	4919	80.2	801.5	798.0	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.3	----
high point	4919	80.2	801.5	801.7	1.000
second point	4959	40.1	400.8	399.1	1.004
third point	4980	20.0	199.8	199.6	1.001
as left zero	5000	0.0	0.0	-0.3	----
as left span	4919	80.2	801.5	801.0	1.001
				Average Correction Factor	1.002

Baseline Corr As found:	797.80	Previous response	800.12	*% change	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

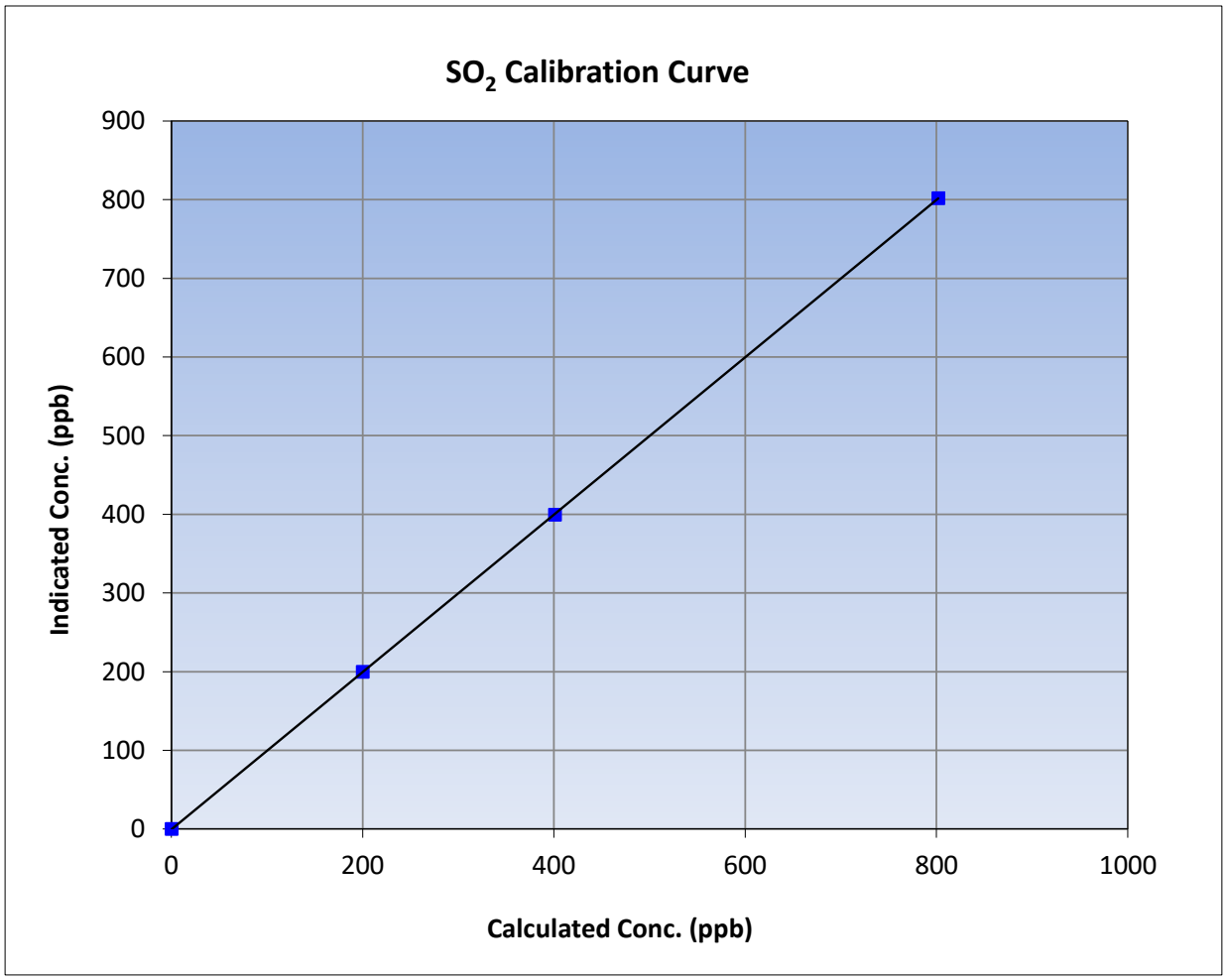
Station Information

Calibration Date:	September 5, 2023	Previous Calibration:	August 15, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:50	End Time (MST):	13:09
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148498

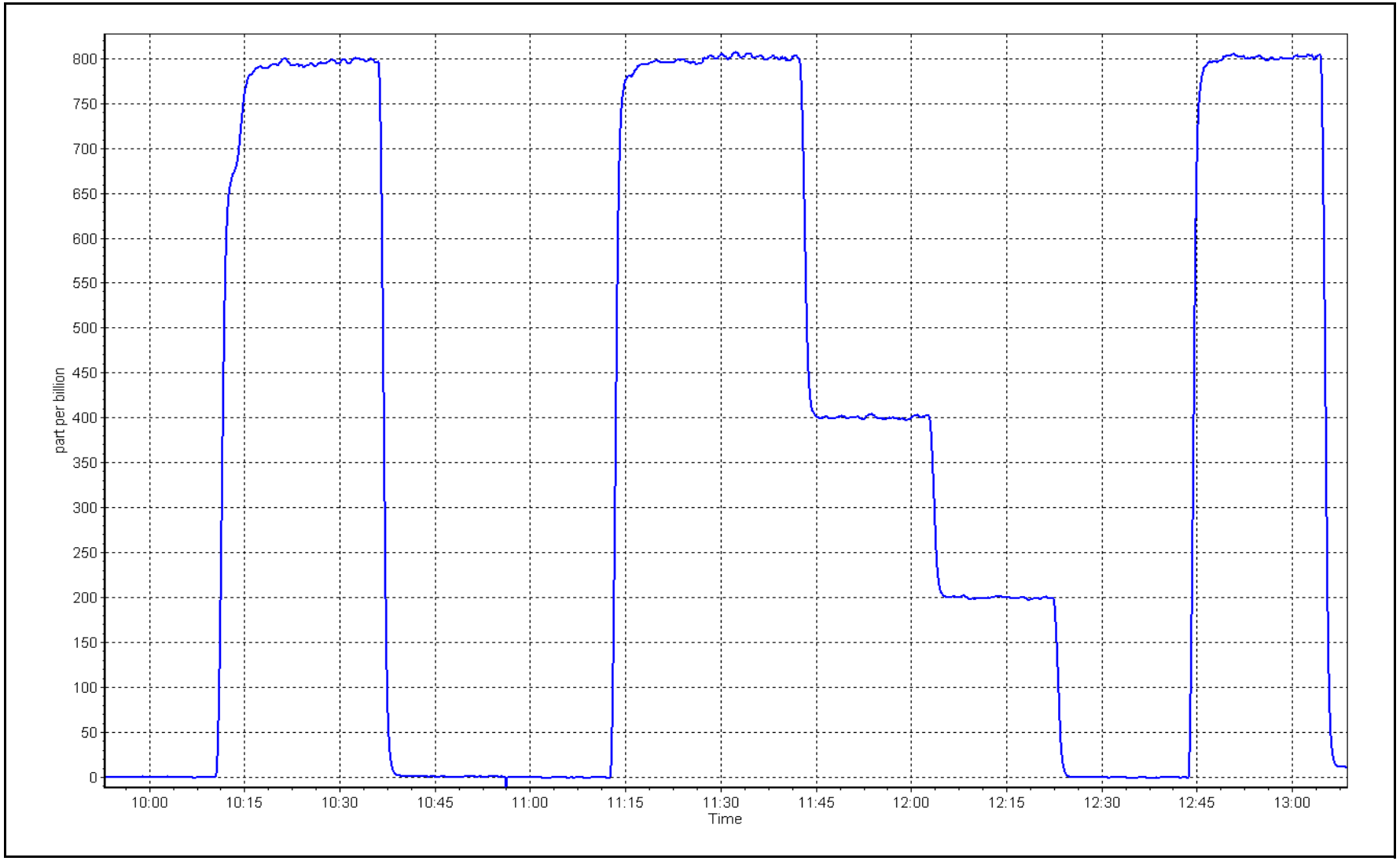
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
801.5	801.7	0.9997
400.8	399.1	1.0041
199.8	199.6	1.0012

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.000440	*0.90 - 1.10*
Intercept	-0.648667	*+/-30*



SO2 Calibration Plot Date: September 5, 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:	September 7, 2023	Last Cal Date:	August 8, 2023
Start time (MST):	9:21	End time (MST):	13:23
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	1.001003	Backgd or Offset:	2.77	2.77
Calibration intercept:	-0.060968	-0.000950	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	-0.2	----
as found span	4918	82.1	80.0	79.2	1.007
as found 2nd point	4959	41.1	40.0	39.3	1.013
as found 3rd point	4979	20.5	20.0	19.7	1.003
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4918	82.1	80.0	80.0	1.000
second point	4959	41.1	40.0	40.1	0.998
third point	4979	20.5	20.0	20.1	0.993
as left zero	5000	0.0	0.0	0.0	----
as left span	4918	82.1	80.0	80.7	0.991
SO2 Scrubber Check	4920	80.2	802.0	-0.1	----
Date of last scrubber change:		28-Feb-23		Ave Corr Factor	0.997
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.4	Prev response:	80.52	*% change:	-1.4%
Baseline Corr 2nd AF pt:	39.5	AF Slope:	0.992283	AF Intercept:	-0.220830
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999983		

* = > +/-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

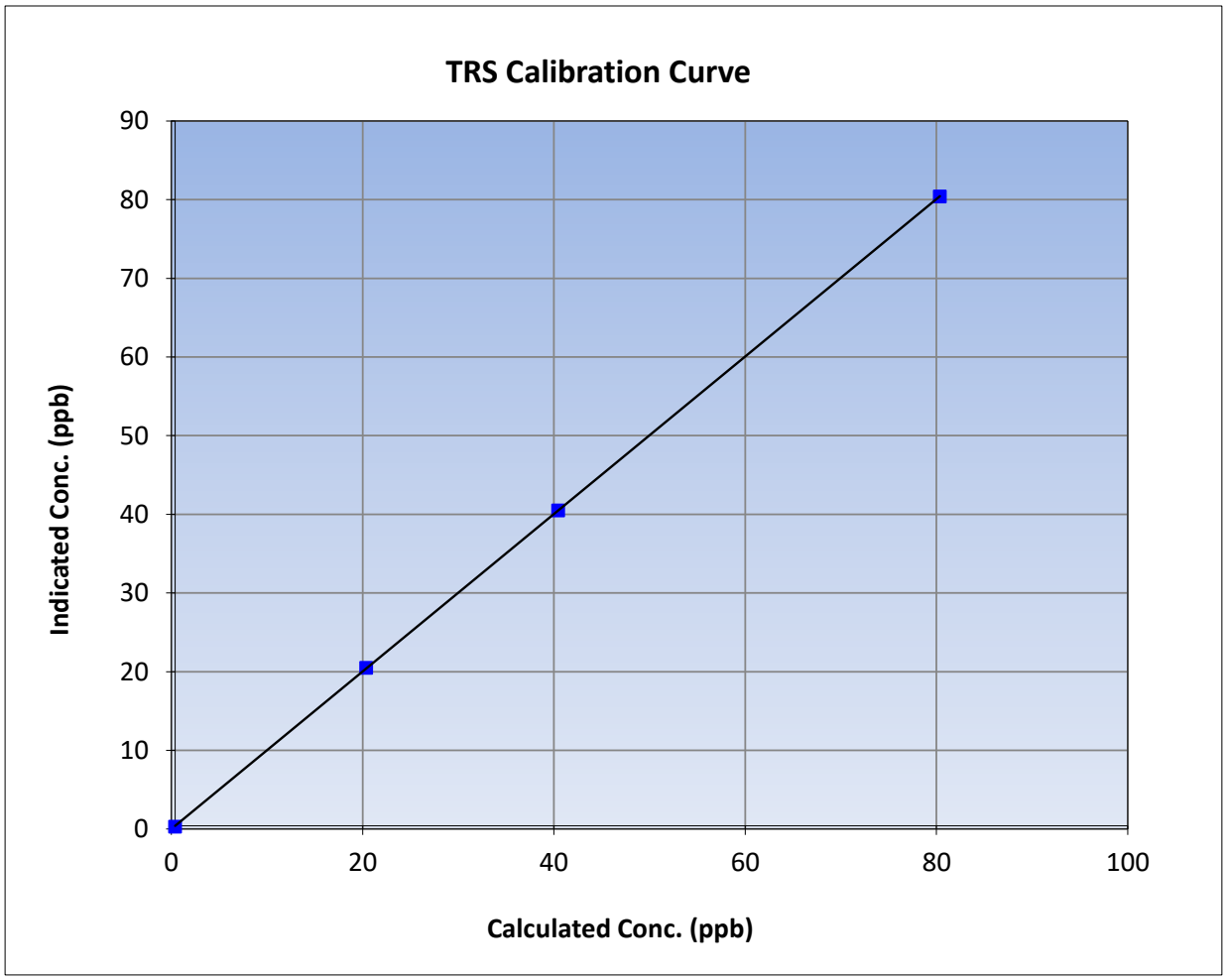
Station Information

Calibration Date:	September 7, 2023	Previous Calibration:	August 8, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:21	End Time (MST):	13:23
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1331259320

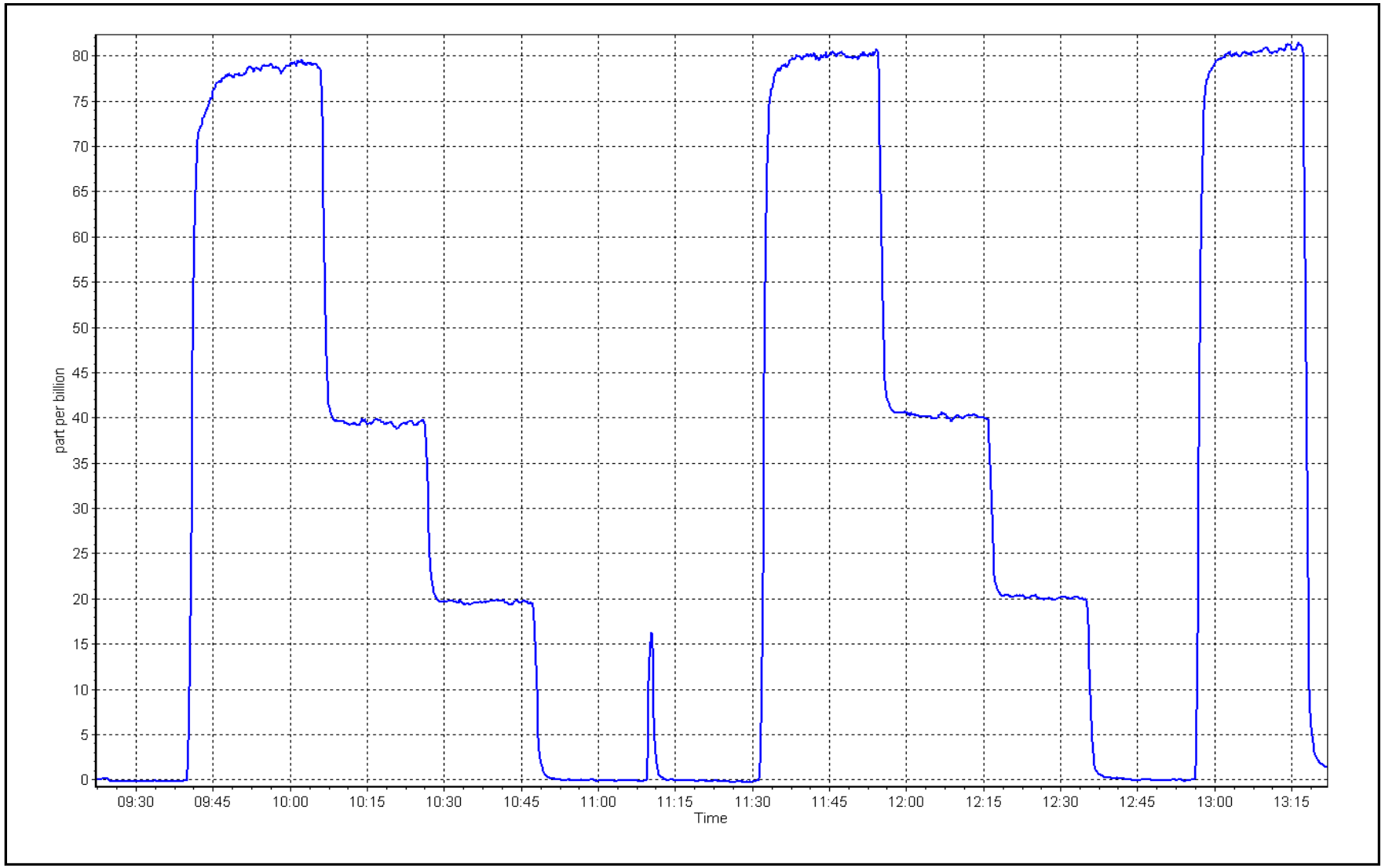
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.0	0.9995
40.0	40.1	0.9983
20.0	20.1	0.9935

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999993	*≥0.995*
Slope	1.001003	*0.90 - 1.10*
Intercept	-0.000950	*+/-3*



TRS Calibration Plot Date: September 7, 2023 Location: Barge Landing



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	September 5, 2023	Last Cal Date:	August 15, 2023
Start time (MST):	9:50	End time (MST):	13:09
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:		
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 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.51E-04	2.52E-04	NMHC SP Ratio:	4.87E-05	4.87E-05
CH4 Retention time:	15.20	15.40	NMHC Peak Area:	187816	187823
Zero Chromatogram:	OFF	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	4919	80.2	17.12	17.10	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	17.15	0.999
second point	4960	40.1	8.56	8.54	1.002
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	17.19	0.996
				ge Correction Factor	0.999
Baseline Corr AF:	17.10	Prev response	17.13	*% 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-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	4919	80.2	9.14	9.15	0.999
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	9.14	9.15	0.998
second point	4960	40.1	4.57	4.57	1.000
third point	4980	20.0	2.28	2.29	0.993
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	9.14	9.21	0.992
				Average Correction Factor	0.997
Baseline Corr AF:	9.15	Prev response	9.14	*% change	0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	80.2	7.98	7.95	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	7.98	7.99	0.999
second point	4960	40.1	3.99	3.98	1.004
third point	4980	20.0	1.99	1.99	1.001
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	7.98	7.98	1.000
				Average Correction Factor	1.001
Baseline Corr AF:	7.95	Prev response	7.99	*% change	-0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000663	1.001164
THC Cal Offset:	0.001260	-0.002739
CH4 Cal Slope:	1.002197	1.000766
CH4 Cal Offset:	-0.007135	-0.005136
NMHC Cal Slope:	0.999486	1.001350
NMHC Cal Offset:	0.007995	0.002797

Notes: Changed sample inlet filter after as founds. Do a zero chromatogram and use zero chromatogram. Adjusted span.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

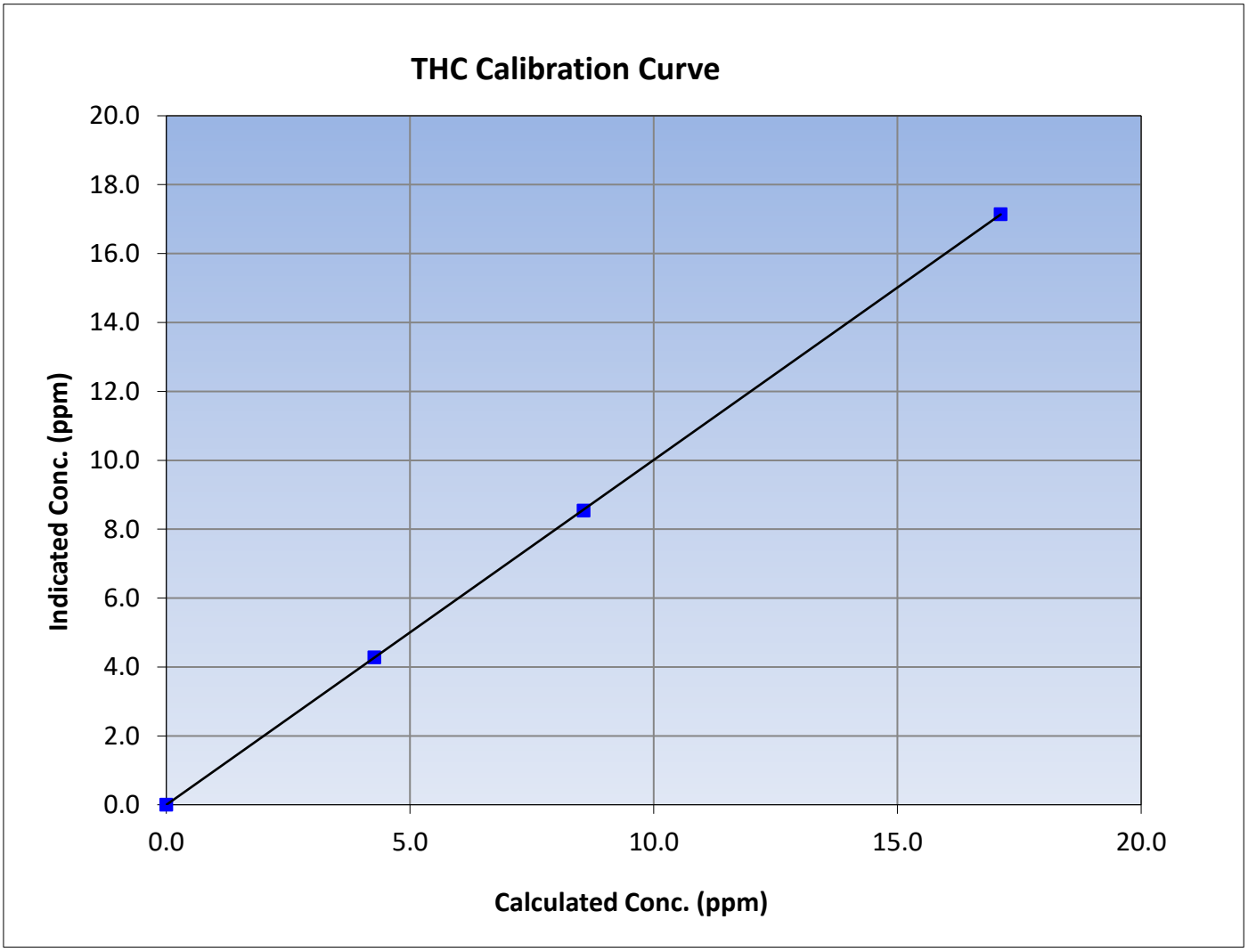
Version-06-2022

Station Information

Calibration Date:	September 5, 2023	Previous Calibration:	August 15, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:50	End Time (MST):	13:09
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
17.12	17.15	0.9985			
8.56	8.54	1.0018	Slope	1.001164	0.90 - 1.10
4.27	4.28	0.9968			
			Intercept	-0.002739	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

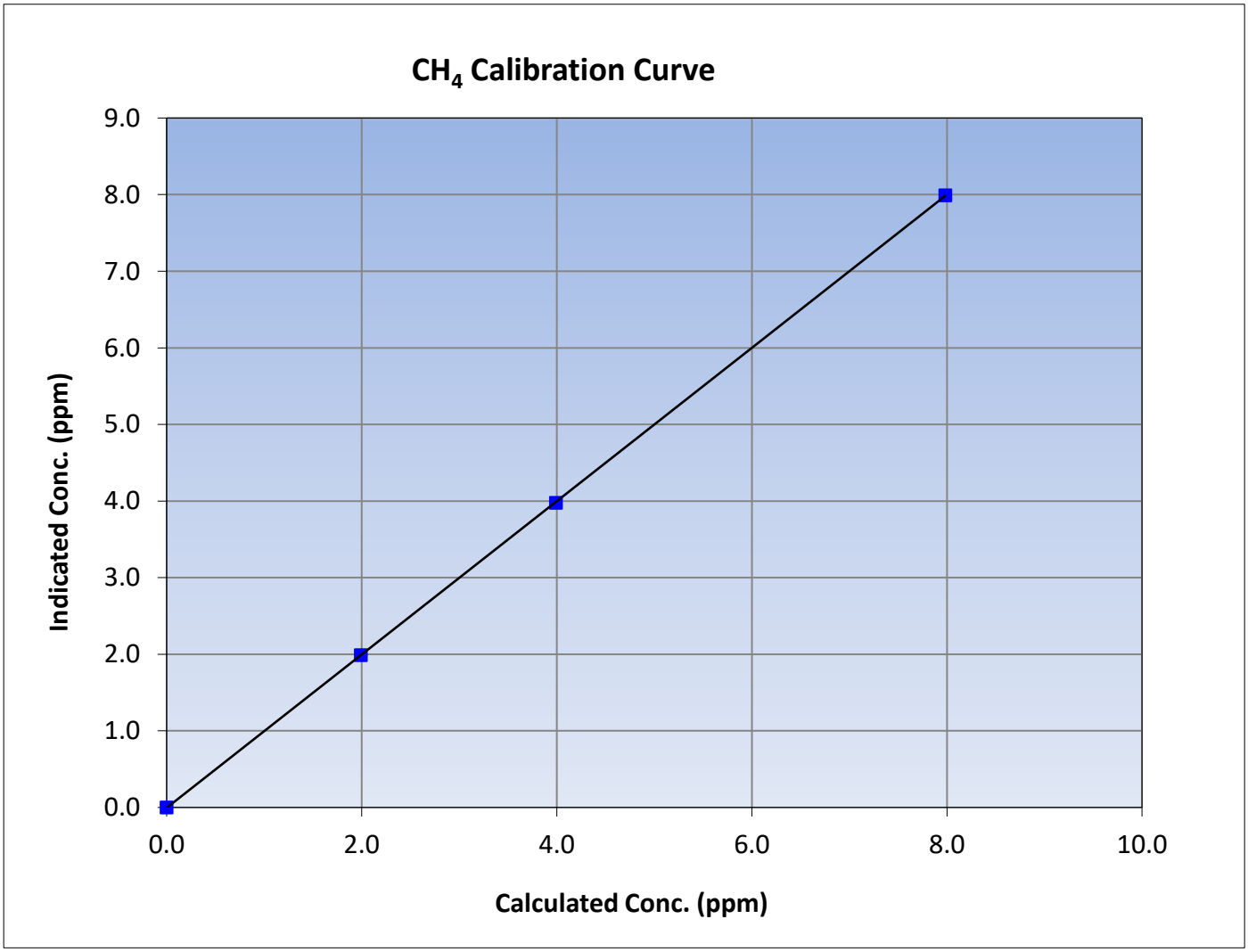
Version-06-2022

Station Information

Calibration Date:	September 5, 2023	Previous Calibration:	August 15, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:50	End Time (MST):	13:09
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	0.999993	*≥0.995*
7.98	7.99	0.9991			
3.99	3.98	1.0039	Slope	1.000766	*0.90 - 1.10*
1.99	1.99	1.0007			
			Intercept	-0.005136	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

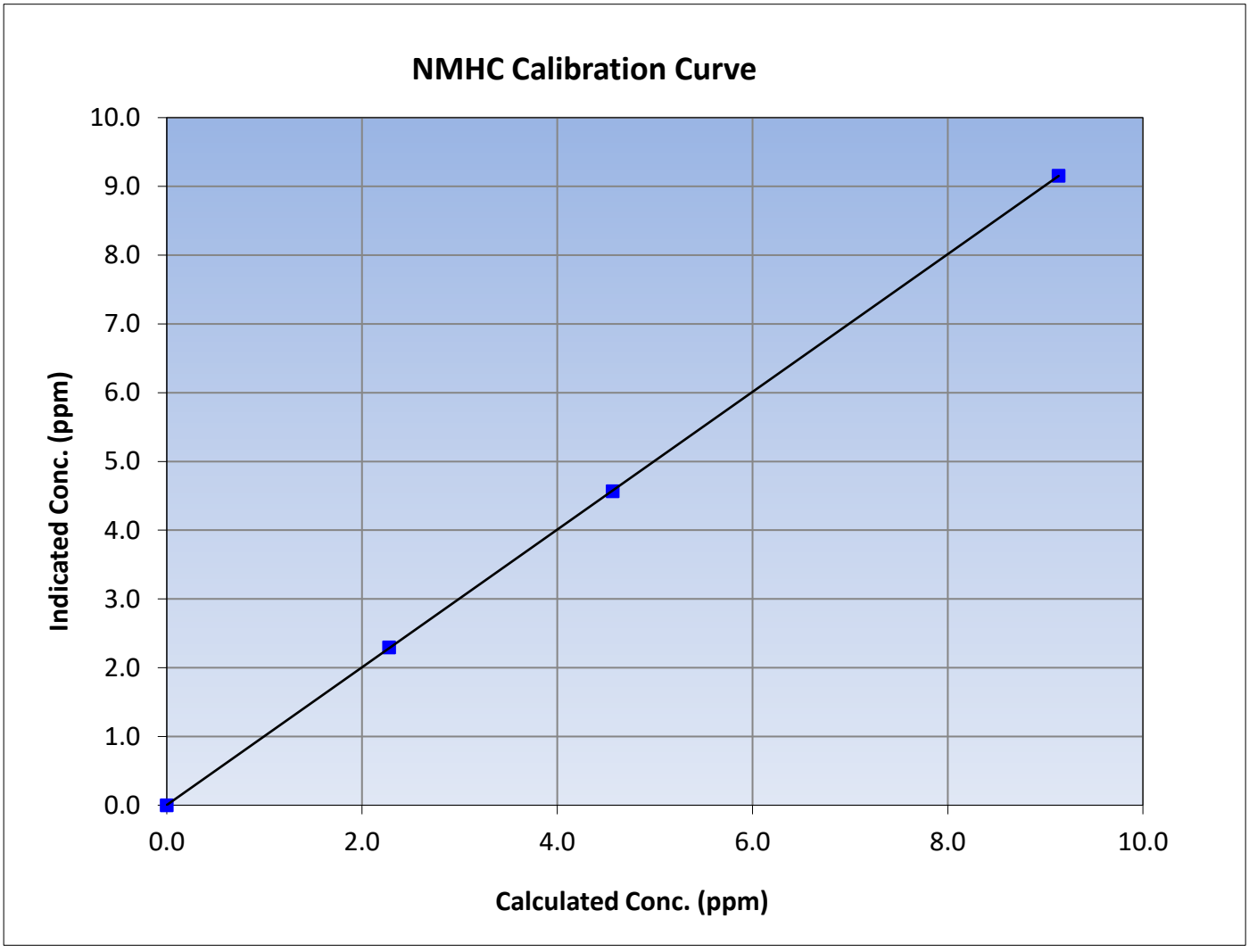
Version-06-2022

Station Information

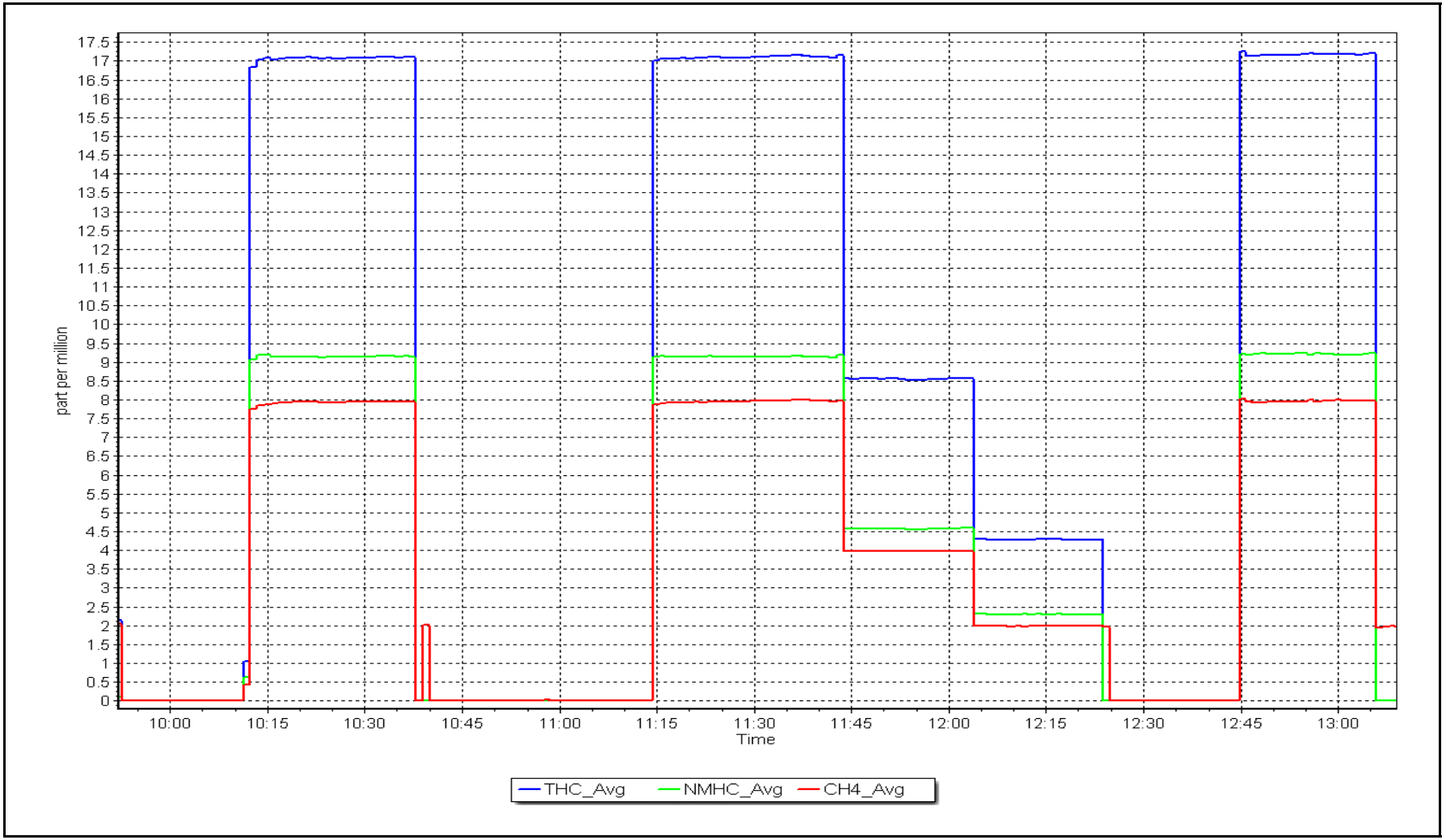
Calibration Date:	September 5, 2023	Previous Calibration:	August 15, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:50	End Time (MST):	13:09
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

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	9.15	0.9981			
4.57	4.57	1.0001	Slope	1.001350	0.90 - 1.10
2.28	2.29	0.9931			
			Intercept	0.002797	+/-0.5



NMHC Calibration Plot Date: September 5, 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:	September 6, 2023	Last Cal Date:	August 23, 2023
Start time (MST):	9:23	End time (MST):	13:53
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:	1.157	1.162	NO bkgnd or offset:	10.6	10.6
NOX coeff or slope:	0.994	0.994	NOX bkgnd or offset:	10.8	10.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	174.9	175.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999930	1.000087
NO_X Cal Offset:	0.929269	1.049154
NO Cal Slope:	1.001426	1.000827
NO Cal Offset:	-0.332141	-0.572366
NO_2 Cal Slope:	1.000531	1.000344
NO_2 Cal Offset:	0.173936	0.677077

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	0.6	----	----
as found span	4919	80.5	805.1	800.3	4.8	804.5	794.9	9.5	1.001	1.007
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.4	-0.1	0.5	----	----
high point	4919	80.5	805.1	800.3	4.8	805.8	800.5	5.4	0.999	1.000
second point	4959	40.2	402.1	399.7	2.4	403.7	399.4	4.3	0.996	1.001
third point	4979	20.1	201.0	199.8	1.2	202.6	198.8	3.8	0.992	1.005
as left zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.2	----	----
as left span	4919	80.5	805.1	439.6	365.5	804.2	437.0	367.2	1.001	1.006
								Average Correction Factor	0.996	1.002

Corrected As found	NO_X = 804.1 ppb	NO = 795.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -0.2%
Previous Response	NO_X = 806.0 ppb	NO = 801.1 ppb		*Percent Change	NO = -0.7%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.4	436.7	365.5	366.3	0.998	100.2%
2nd GPT point (200 ppb O3)	797.4	660.3	141.9	142.6	0.995	100.5%
3rd GPT point (100 ppb O3)	797.4	726.8	75.4	76.4	0.987	101.3%
				Average Correction Factor	0.994	100.7%

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

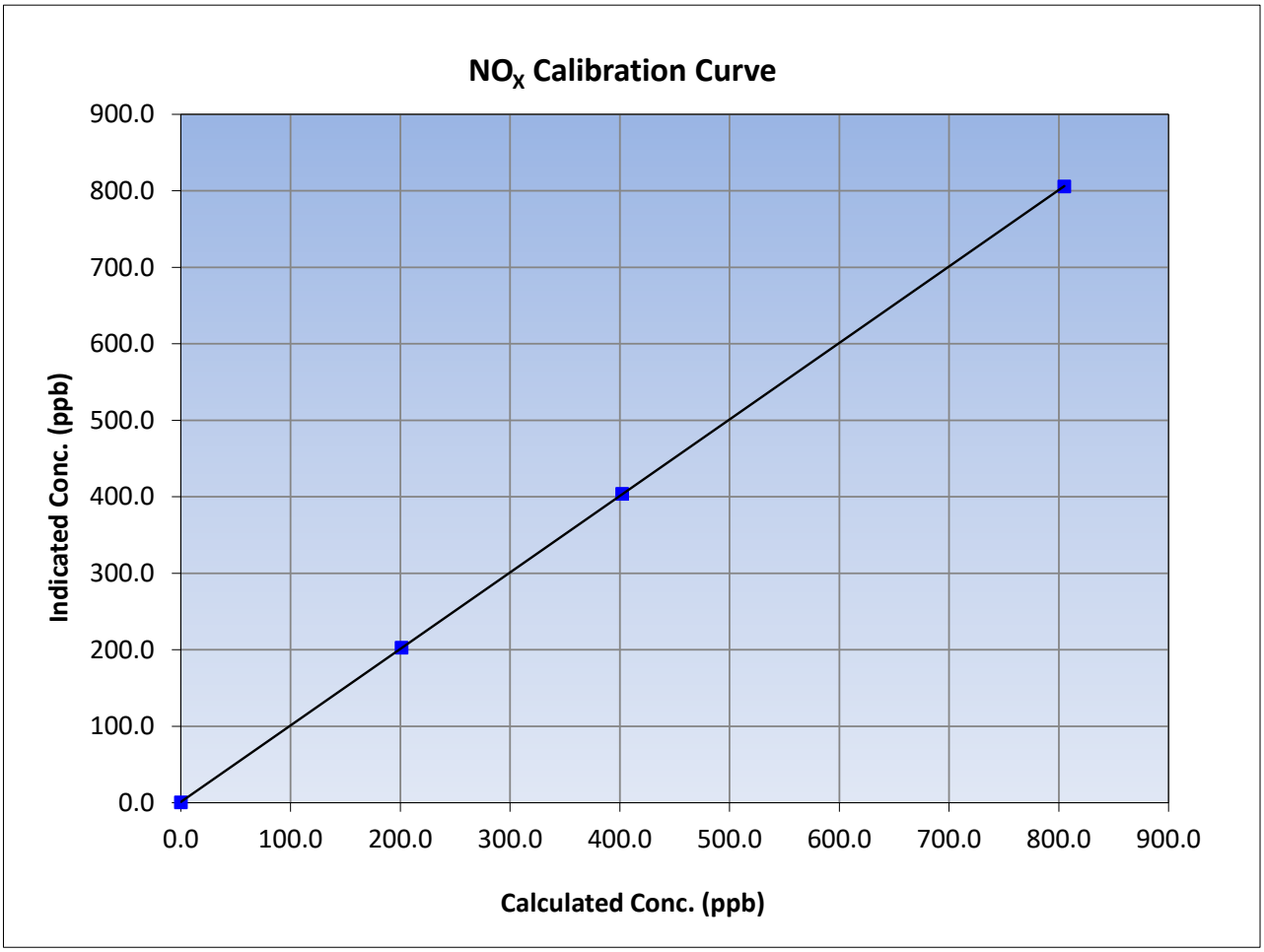
Version-04-2020

Station Information

Calibration Date:	September 6, 2023	Previous Calibration:	August 23, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:23	End Time (MST):	13:53
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	0.4	----	Correlation Coefficient	0.999997	≥0.995
805.1	805.8	0.9991			
402.1	403.7	0.9959	Slope	1.000087	0.90 - 1.10
201.0	202.6	0.9923			
			Intercept	1.049154	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

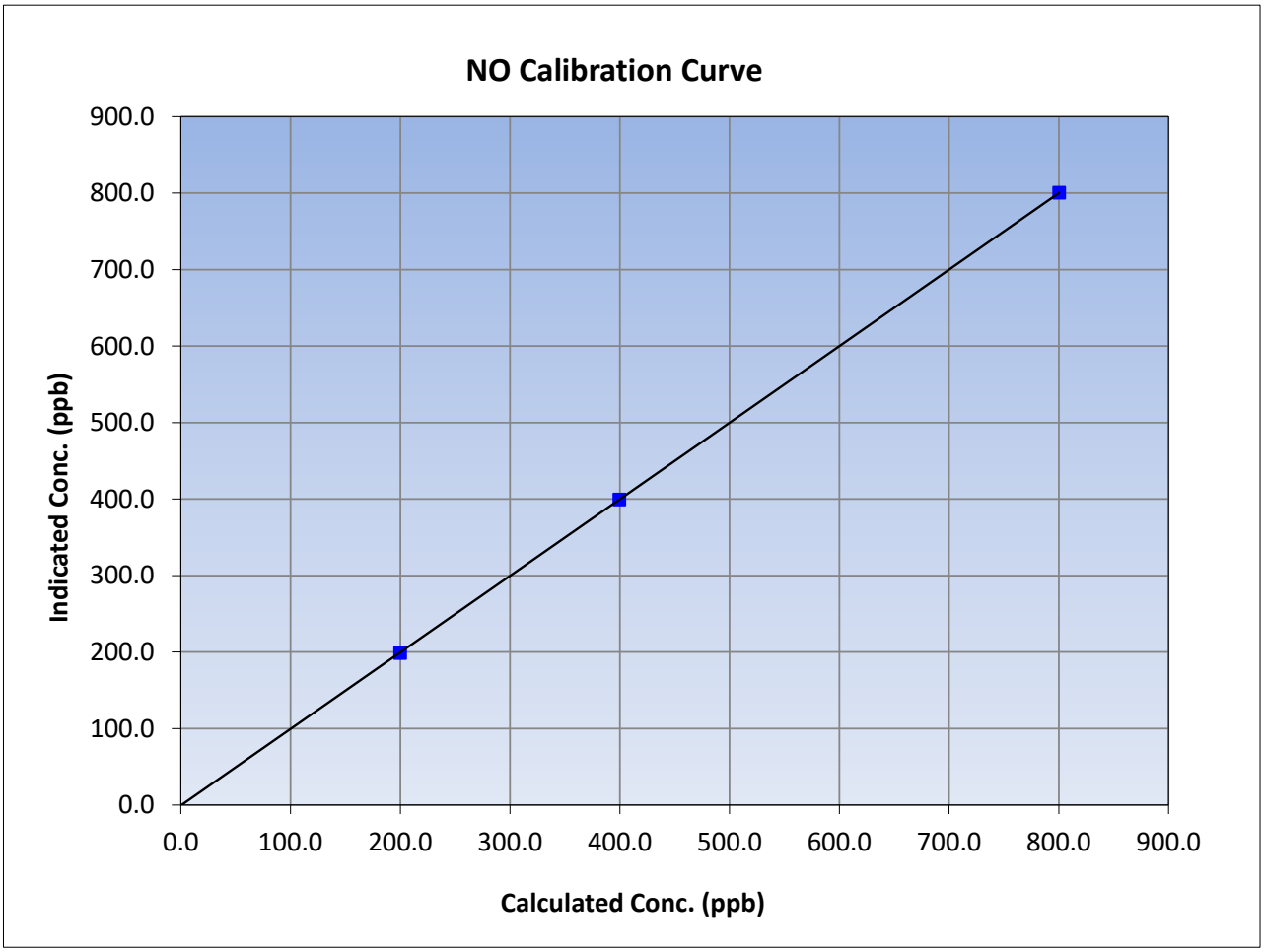
Version-04-2020

Station Information

Calibration Date:	September 6, 2023	Previous Calibration:	August 23, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:23	End Time (MST):	13:53
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999998	≥0.995
800.3	800.5	0.9997			
399.7	399.4	1.0006	Slope	1.000827	0.90 - 1.10
199.8	198.8	1.0052			
			Intercept	-0.572366	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

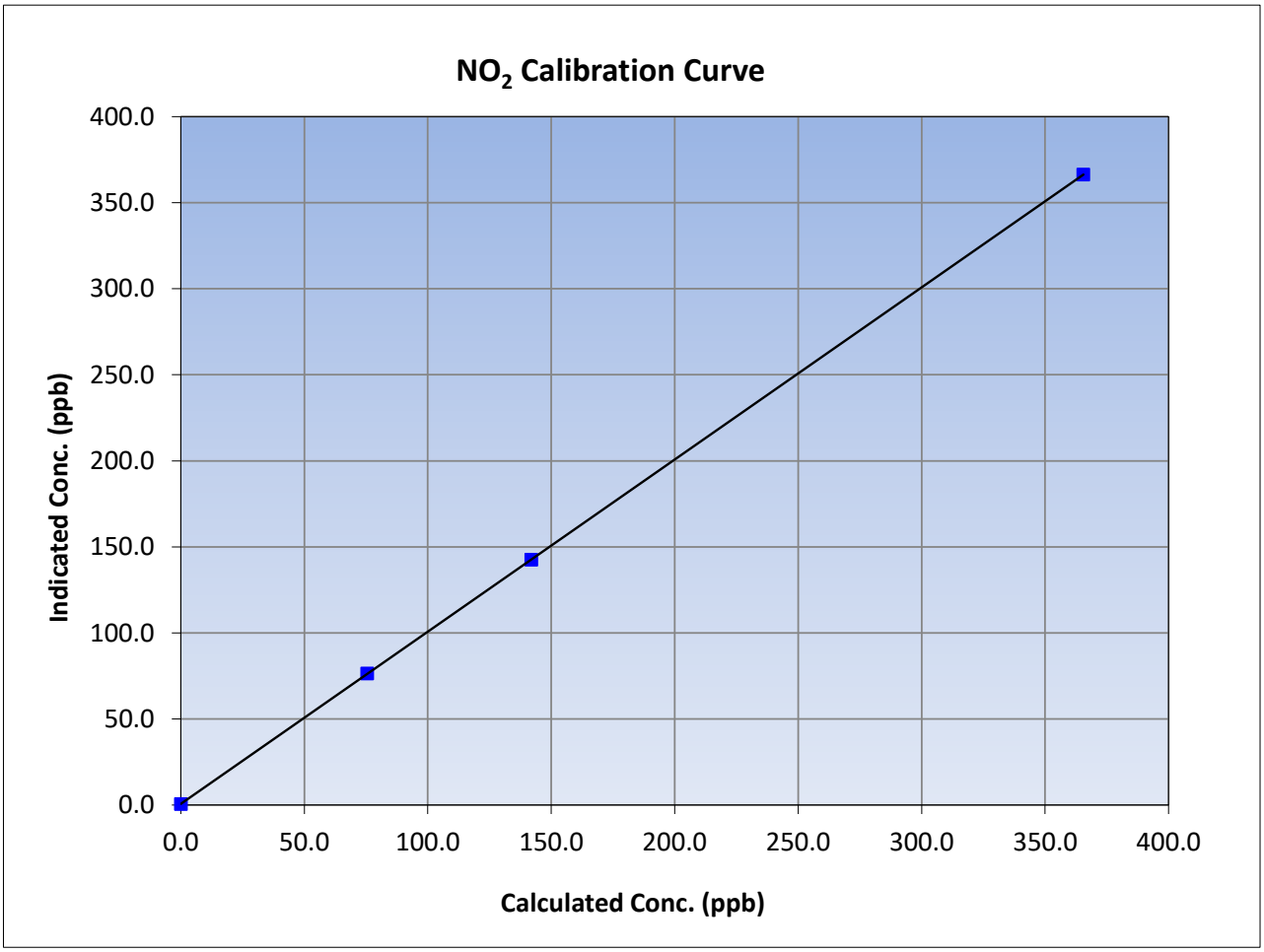
Version-04-2020

Station Information

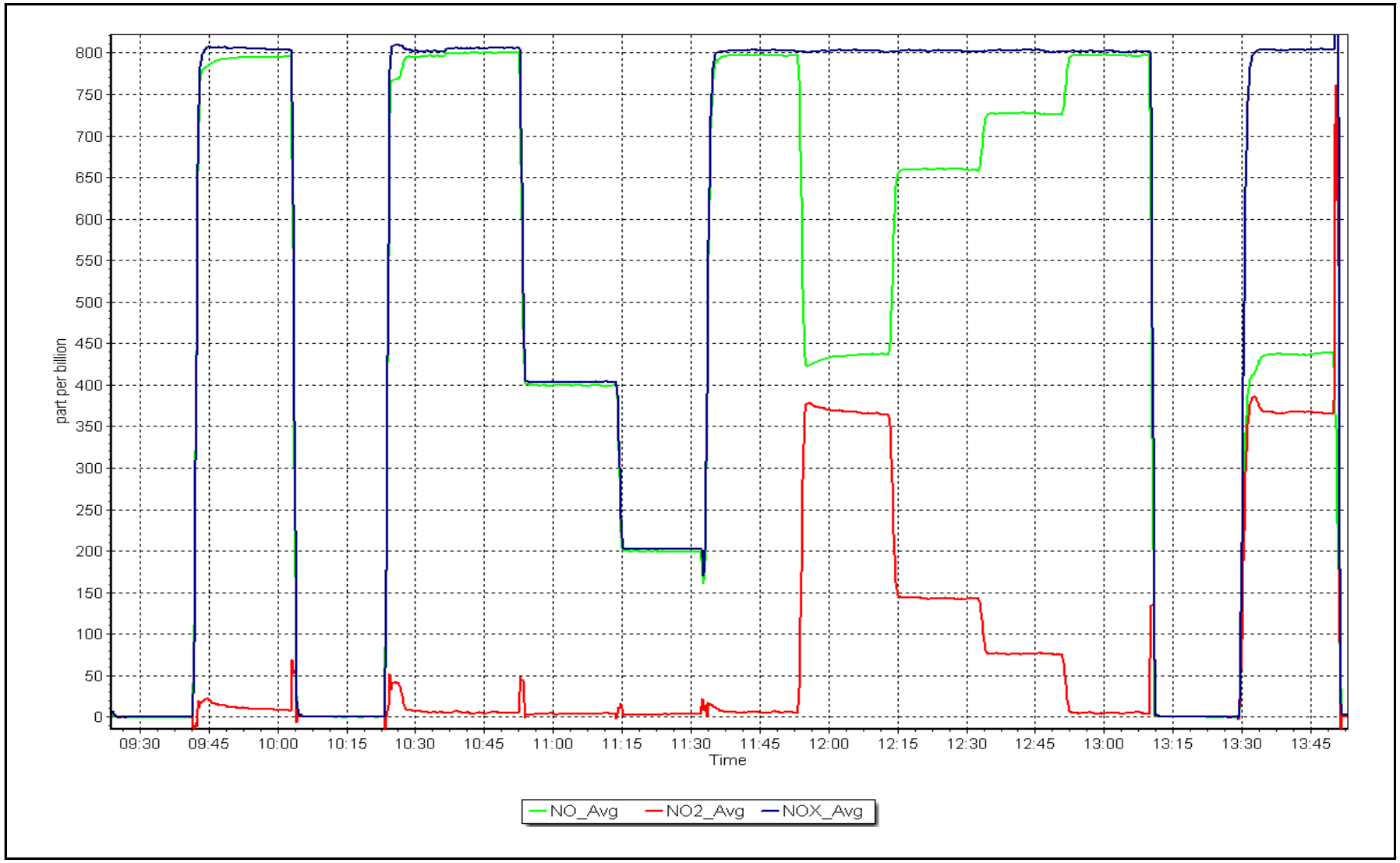
Calibration Date:	September 6, 2023	Previous Calibration:	August 23, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:23	End Time (MST):	13:53
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.5	----	Correlation Coefficient	0.999999	≥0.995
365.5	366.3	0.9979			
141.9	142.6	0.9953	Slope	1.000344	0.90 - 1.10
75.4	76.4	0.9873			
			Intercept	0.677077	+/-20



NO_X Calibration Plot Date: September 6, 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:	September 7, 2023	Last Cal Date:	August 23, 2023
Start time (MST):	11:38	End time (MST):	11:54
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 (°C)	15.3	14.3	15.3	☐	+/- 2 °C
P (mmHg)	730.7	731.5	730.7	☐	+/- 10 mmHg
flow (LPM)	5.05	5.03	5.05	☐	+/- 0.25 LPM

Leak Test: Date of check: September 7, 2023 Last Cal Date: August 23, 2023

PM w/o HEPA: 64.4 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

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

Disposable Filter Changed: September 7, 2023

Annual Maintenance

Date Sample Tube Cleaned: August 23, 2023

Date RH/T Sensor Cleaned: August 23, 2023

Notes: Inlet head looks good. No adjustments made. Leak check passed. Filter was changed due to recent smoke in the area.

Calibration by: Sean Bala

Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Barge Landing	Station number:	AMS 09
Calibration Date:	September 29, 2023	Last Cal Date:	September 7, 2023
Start time (MST):	9:23	End time (MST):	9:33
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 (°C)	8.3	8.6	8.3	☐	+/- 2 °C
P (mmHg)	732.3	733.5	732.3	☐	+/- 10 mmHg
flow (LPM)	4.99	4.98	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: September 29, 2023 Last Cal Date: September 7, 2023

PM w/o HEPA: 43.6 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

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

Disposable Filter Changed: September 7, 2023

Annual Maintenance

Date Sample Tube Cleaned: August 23, 2023

Date RH/T Sensor Cleaned: August 23, 2023

Notes: Removal calibration.

Calibration by: Sean Bala

Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Barge Landing	Station number:	AMS 09
Calibration Date:	September 29, 2023	Last Cal Date:	NA
Start time (MST):	9:52	End time (MST):	10:27
Analyzer Make:	API T640	S/N:	844
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)	8.6	8.4	8.6	☐	+/- 2 °C
P (mmHg)	727.3	733.5	727.3	☐	+/- 10 mmHg
flow (LPM)	4.99	4.89	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: September 29, 2023 Last Cal Date: NA

PM w/o HEPA: 36.3 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: _____ <0.2 ug/m3

Date Optical Chamber Cleaned: _____

Disposable Filter Changed: _____

Annual Maintenance

Date Sample Tube Cleaned: August 23, 2023

Date RH/T Sensor Cleaned: August 23, 2023

Notes: Install calibration.

Calibration by: Sean Bala

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS11
LOWER CAMP
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Lower Camp	Station number:	AMS11
Calibration Date:	September 22, 2023	Last Cal Date:	August 10, 2023
Start time (MST):	9:53	End time (MST):	12:49
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:	1.001812	1.005149	Backgd or Offset:	14.8	14.7
Calibration intercept:	0.110451	-0.308964	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	0.5	----
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	401.2	0.999
third point	4980	20.3	199.9	200.3	0.998
as left zero	5000	0.0	0.0	0.8	----
as left span	4919	81.3	800.8	806.8	0.993
				Average Correction Factor	0.997

Baseline Corr As found:	802.30	Previous response	802.32	*% 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: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

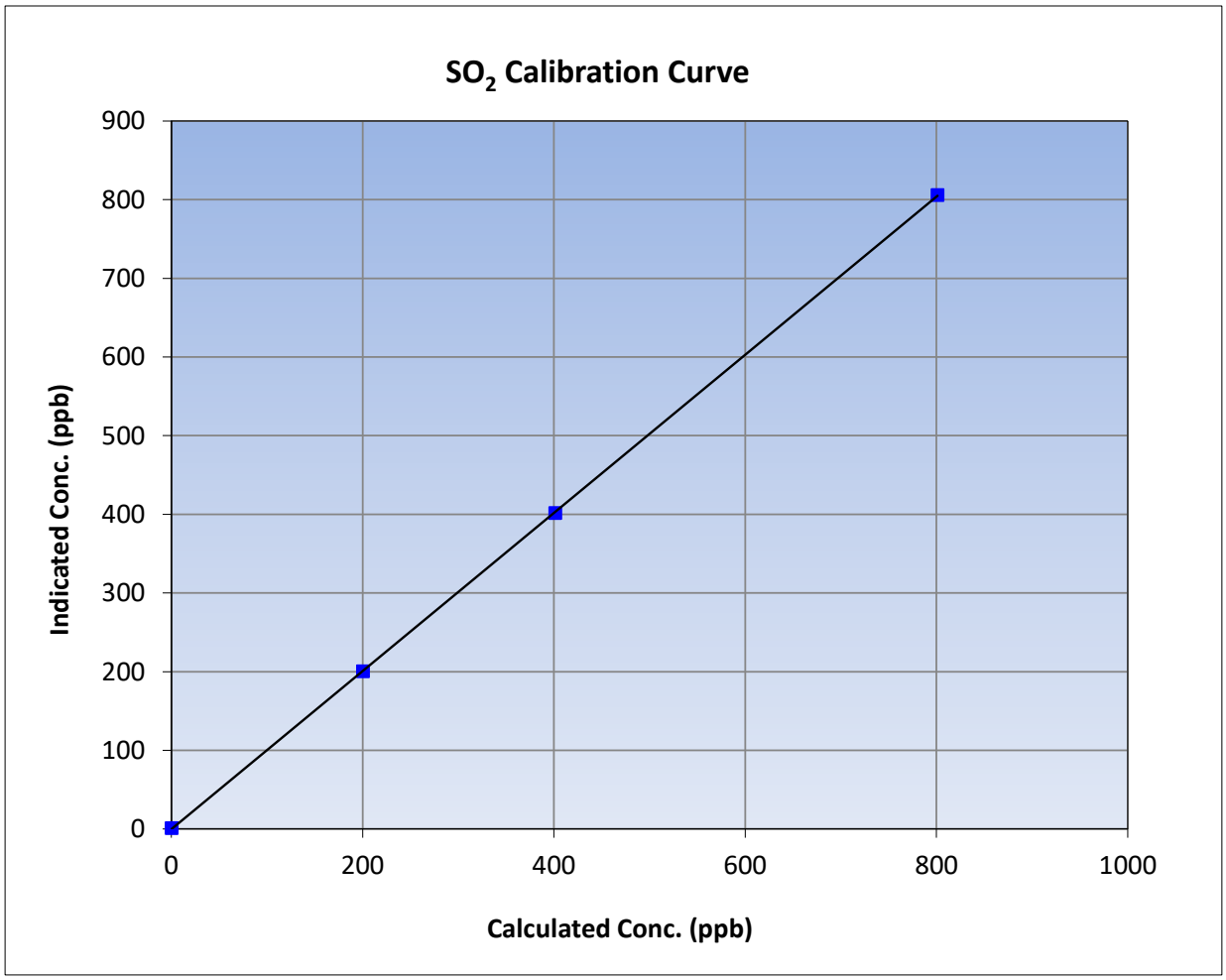
Station Information

Calibration Date:	September 22, 2023	Previous Calibration:	August 10, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:53	End Time (MST):	12:49
Analyzer make:	Thermo 43i	Analyzer serial #:	100841398

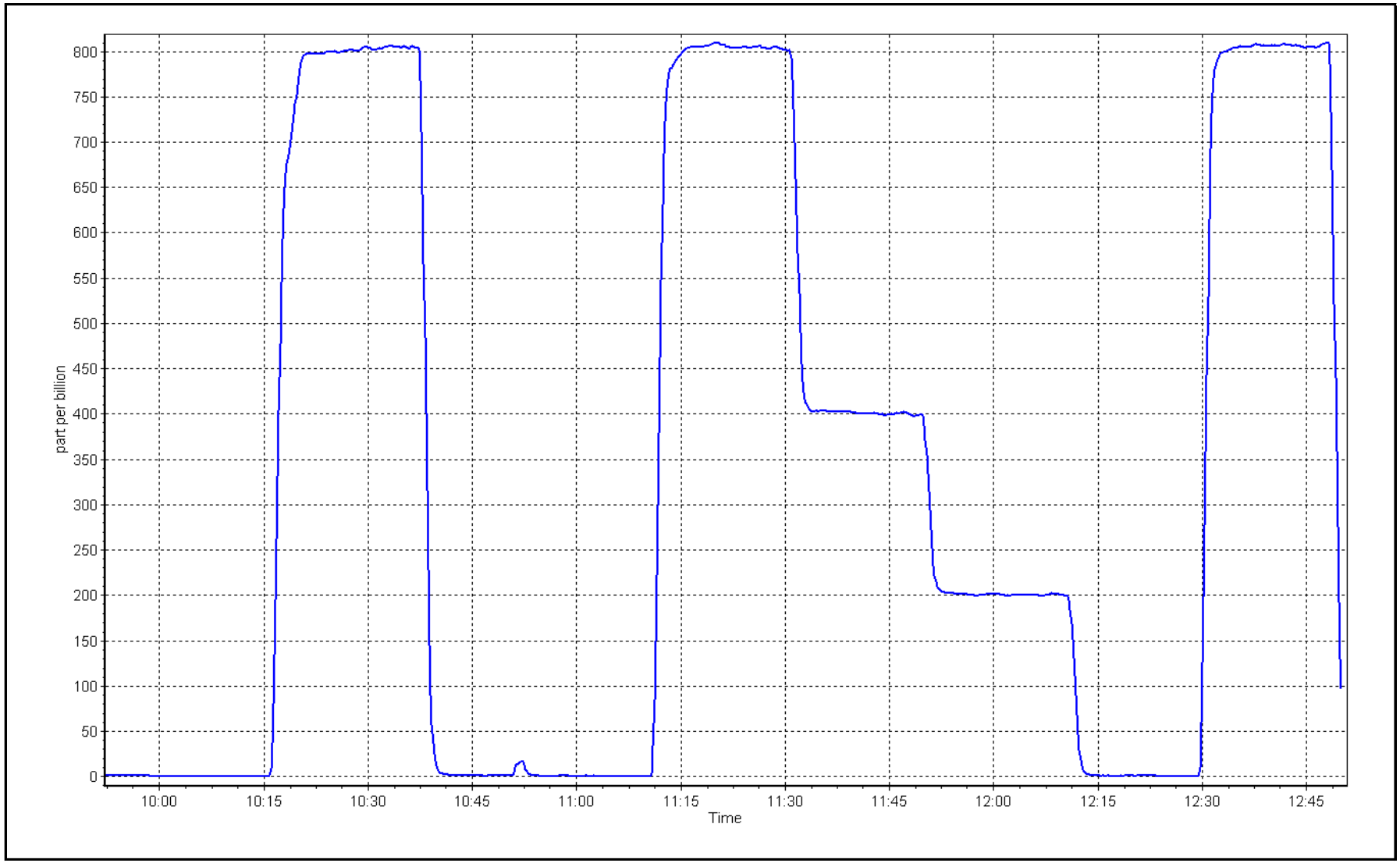
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.7	----
800.8	805.4	0.9942
400.9	401.2	0.9993
199.9	200.3	0.9982

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999989	*≥0.995*
Slope	1.005149	*0.90 - 1.10*
Intercept	-0.308964	*+/-30*



SO2 Calibration Plot Date: September 22, 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:	September 12, 2023	Last Cal Date:	August 29, 2023
Start time (MST):	9:08	End time (MST):	13:01
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:	1.017077	1.024520	Backgd or Offset:	14.1	14.2
Calibration intercept:	-0.466446	-0.427099	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	-0.3	----
as found span	4926	73.6	79.9	80.9	0.984
as found 2nd point	4963	36.8	40.0	40.6	0.977
as found 3rd point	4982	18.6	20.2	20.0	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	-0.5	----
high point	4926	73.6	79.9	81.4	0.982
second point	4963	36.8	40.0	40.6	0.984
third point	4982	18.6	20.2	20.3	0.995
as left zero	5000	0.0	0.0	-0.3	----
as left span	4926	73.6	79.9	81.9	0.976
SO2 Scrubber Check	4919	81.1	811.0	0.2	----
Date of last scrubber change:				Ave Corr Factor	0.987
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.2	Prev response:	80.82	*% change:	0.5%
Baseline Corr 2nd AF pt:	40.9	AF Slope:	1.017348	AF Intercept:	-0.325940
Baseline Corr 3rd AF pt:	20.3	AF Correlation:	0.999964		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. Completed SO2 scrubber check after calibrator zero. No adjustments required.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

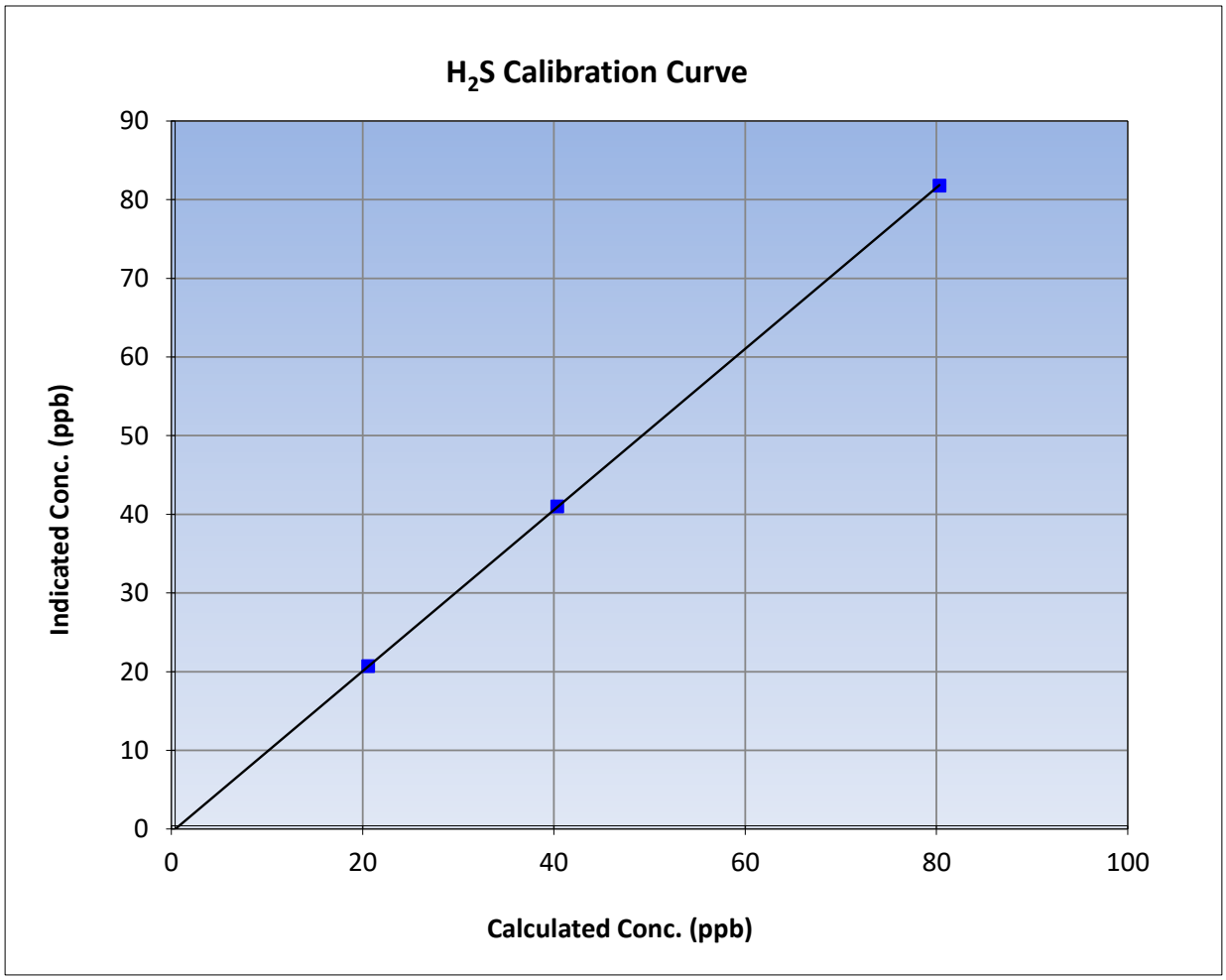
Station Information

Calibration Date:	September 12, 2023	Previous Calibration:	August 29, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:08	End Time (MST):	13:01
Analyzer make:	Thermo 450iQ	Analyzer serial #:	CM20080003

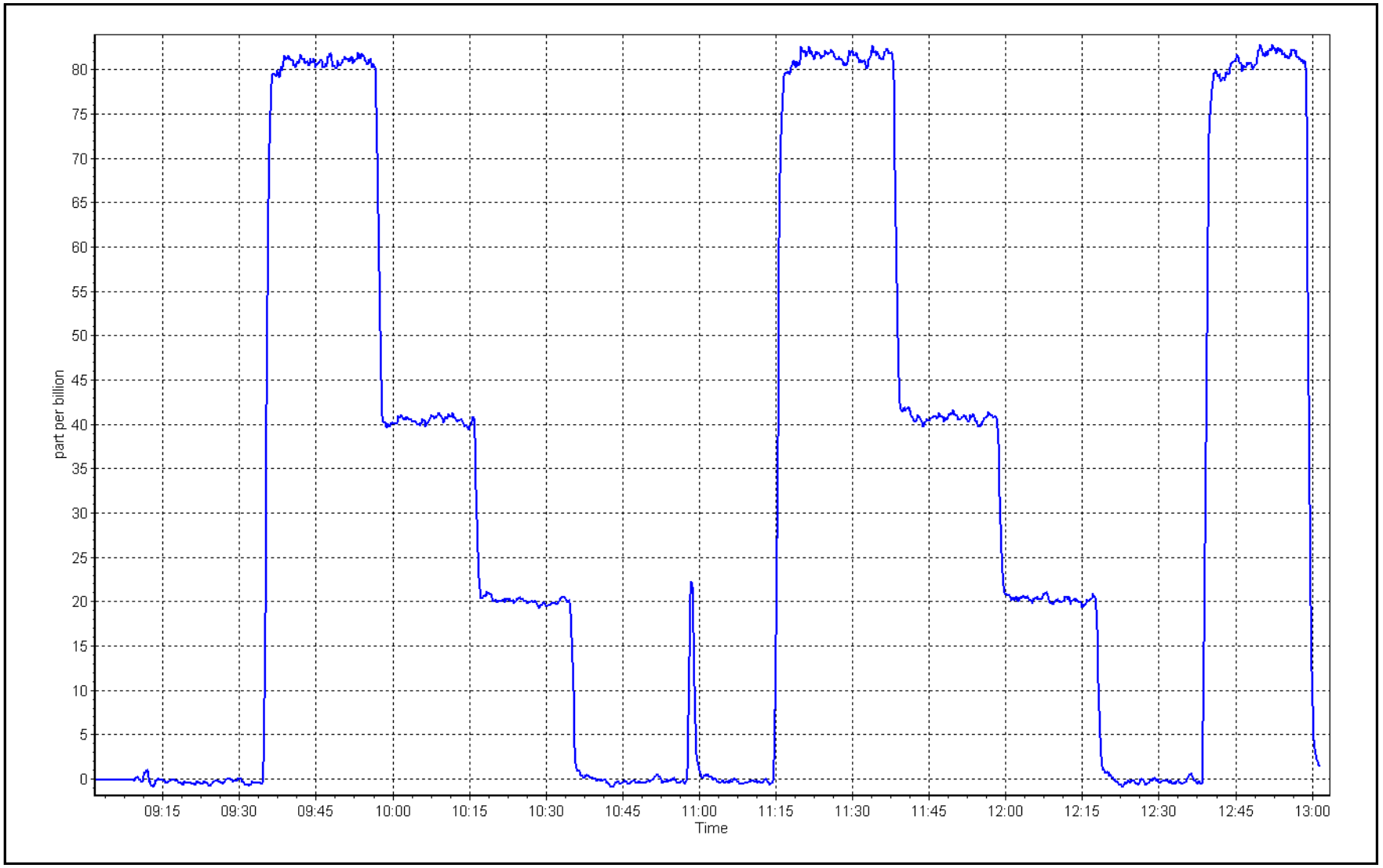
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.5	----
79.9	81.4	0.9818
40.0	40.6	0.9842
20.2	20.3	0.9948

Statistical Evaluation		Limits
Correlation Coefficient	0.999995	≥0.995
Slope	1.024520	0.90 - 1.10
Intercept	-0.427099	+/-3



H_2S Calibration Plot Date: September 12, 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:	September 22, 2023	Last Cal Date:	August 10, 2023
Start time (MST):	9:53	End time (MST):	12:49
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	17.18	1.010
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	17.26	1.005
second point	4959	40.7	8.69	8.58	1.012
third point	4980	20.3	4.33	4.28	1.011
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	17.35	17.36	0.999
				Average Correction Factor	1.009

Baseline Corr AF:	17.18	Prev response	17.26	*% 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	4919	81.3	9.19	9.09	1.010
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	9.14	1.005
second point	4959	40.7	4.60	4.55	1.012
third point	4980	20.3	2.29	2.27	1.012
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	9.19	9.18	1.001
				Average Correction Factor	1.010
Baseline Corr AF:	9.09	Prev response	9.14	*% change	-0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	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	8.13	1.004
second point	4959	40.7	4.09	4.04	1.013
third point	4980	20.3	2.04	2.02	1.010
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	8.16	8.18	0.998
				Average Correction Factor	1.009
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:	0.996495	0.995046
THC Cal Offset:	-0.024788	-0.021788
CH4 Cal Slope:	0.996527	0.995660
CH4 Cal Offset:	-0.015486	-0.010886
NMHC Cal Slope:	0.996217	0.994824
NMHC Cal Offset:	-0.009301	-0.011701

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

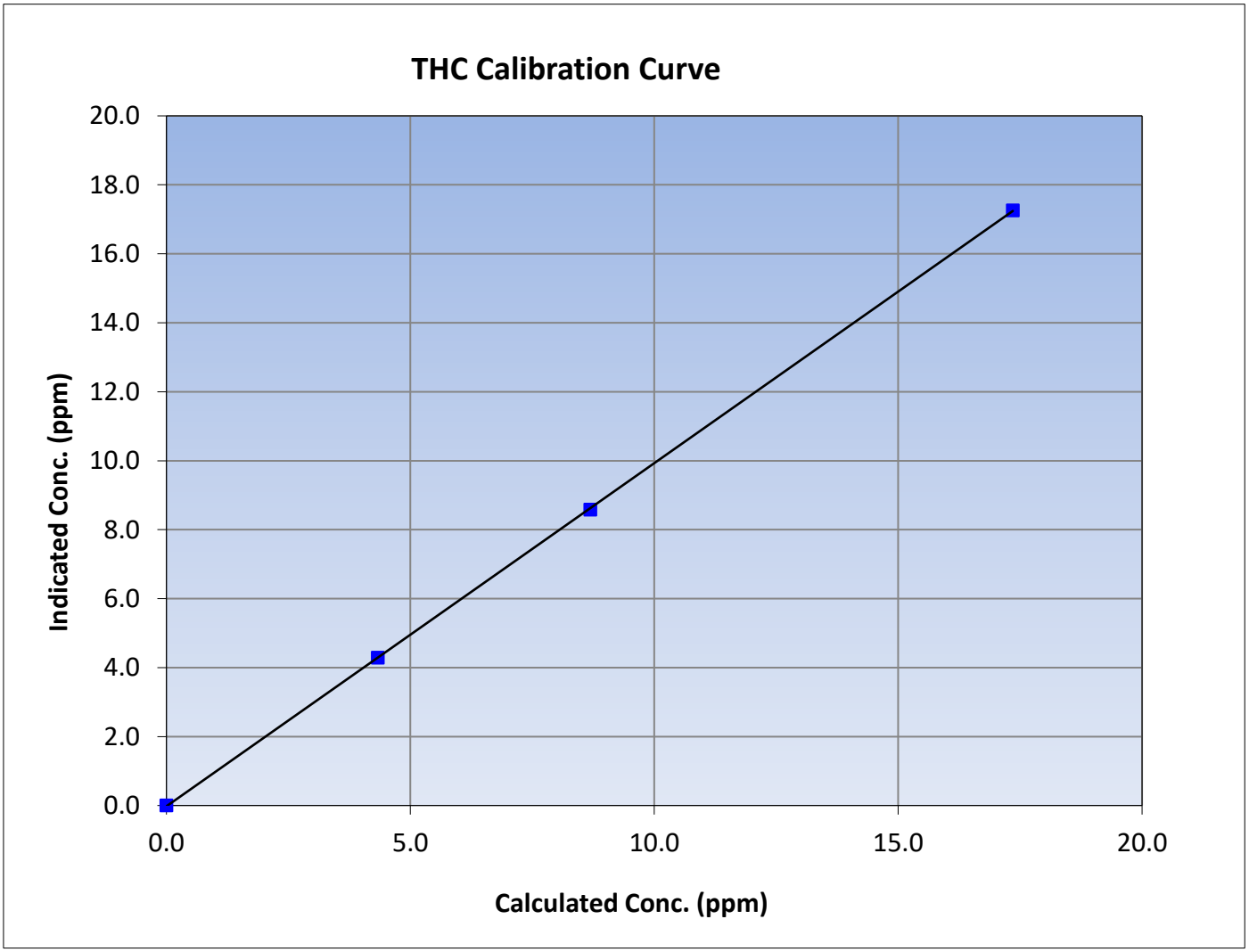
Version-01-2020

Station Information

Calibration Date:	September 22, 2023	Previous Calibration:	August 10, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:53	End Time (MST):	12:49
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	0.999985	*≥0.995*
17.35	17.26	1.0051			
8.69	8.58	1.0120	Slope	0.995046	*0.90 - 1.10*
4.33	4.28	1.0113			
			Intercept	-0.021788	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

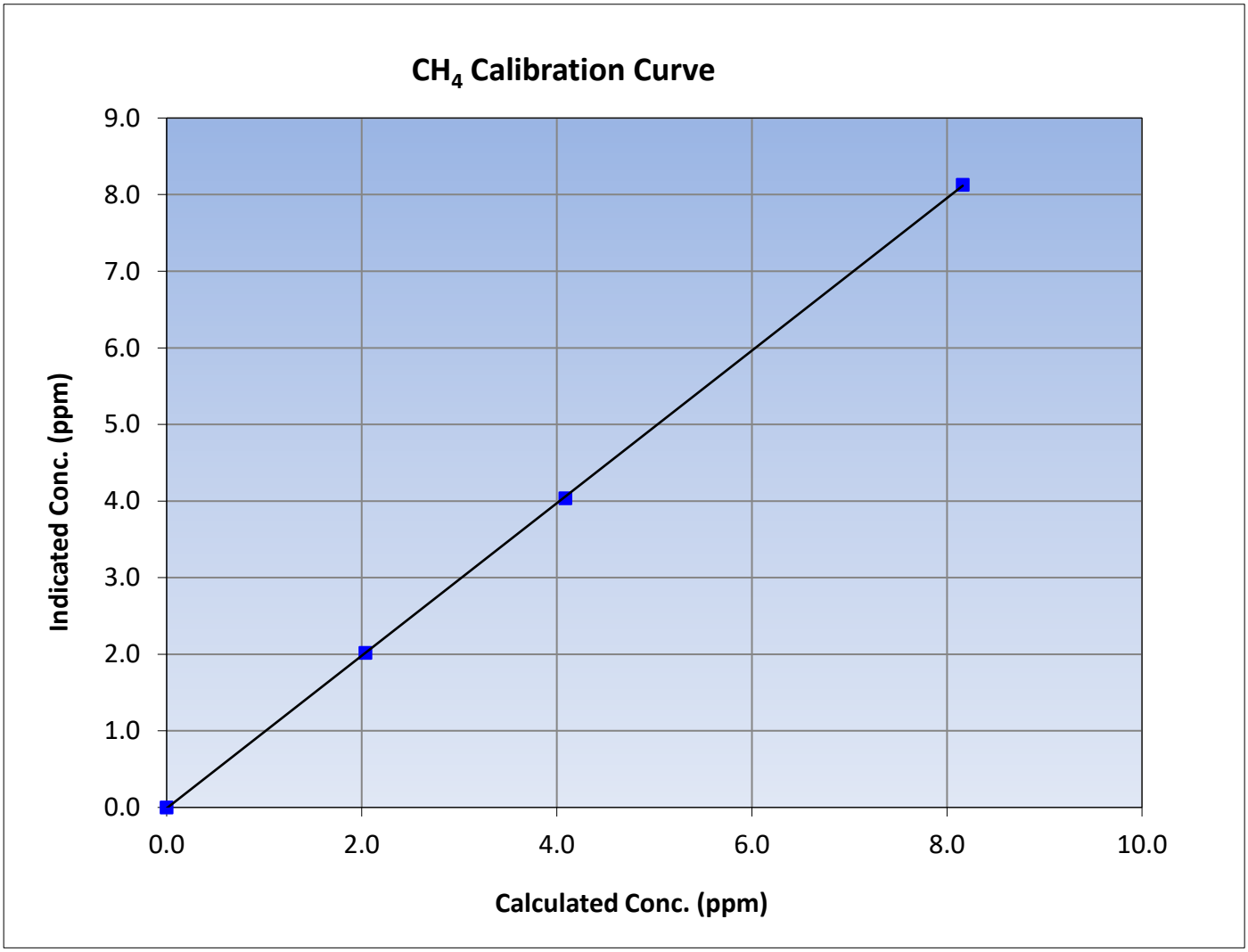
Version-01-2020

Station Information

Calibration Date:	September 22, 2023	Previous Calibration:	August 10, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:53	End Time (MST):	12:49
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	0.999979	*≥0.995*
8.16	8.13	1.0043			
4.09	4.04	1.0125	Slope	0.995660	*0.90 - 1.10*
2.04	2.02	1.0104			
			Intercept	-0.010886	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

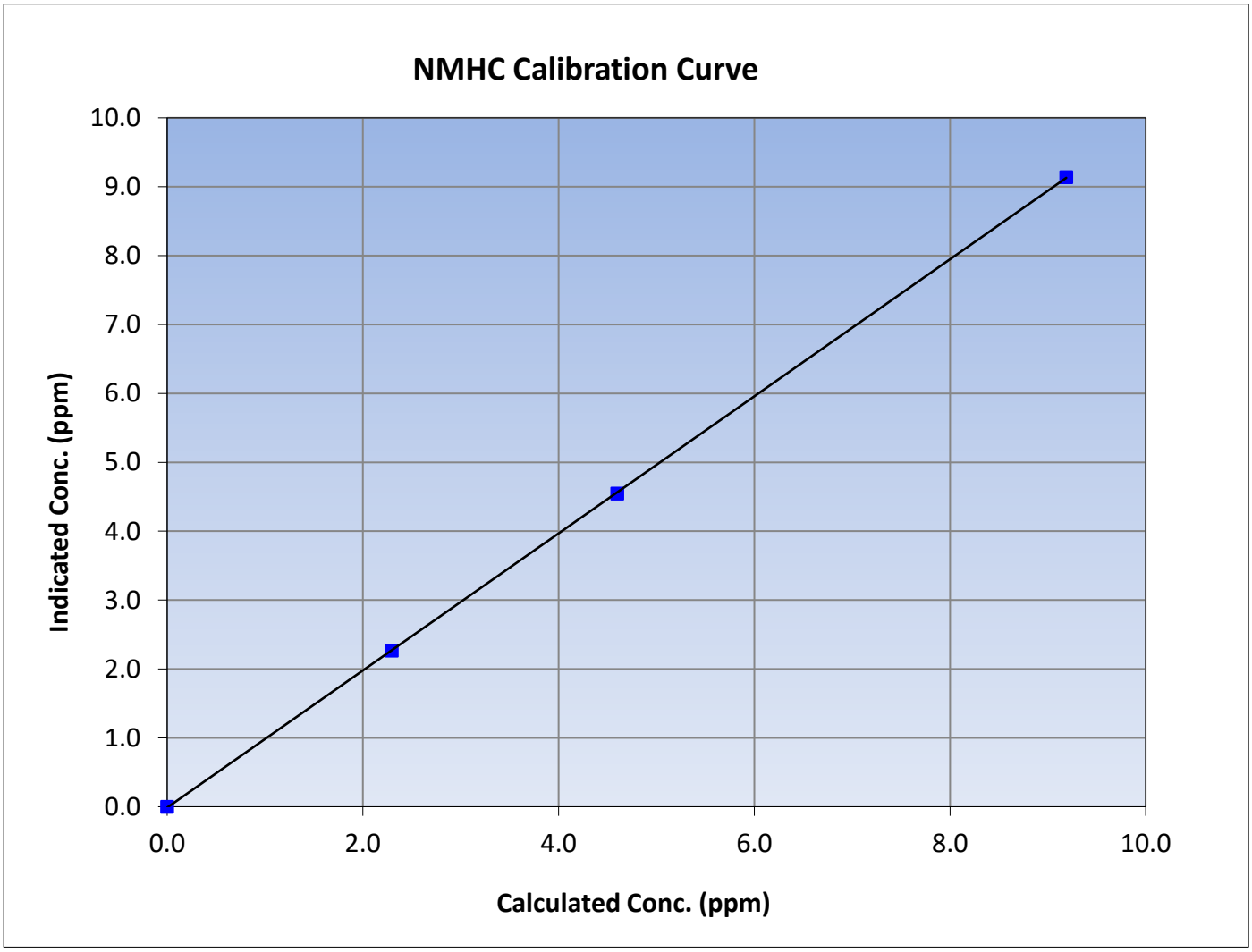
Version-01-2020

Station Information

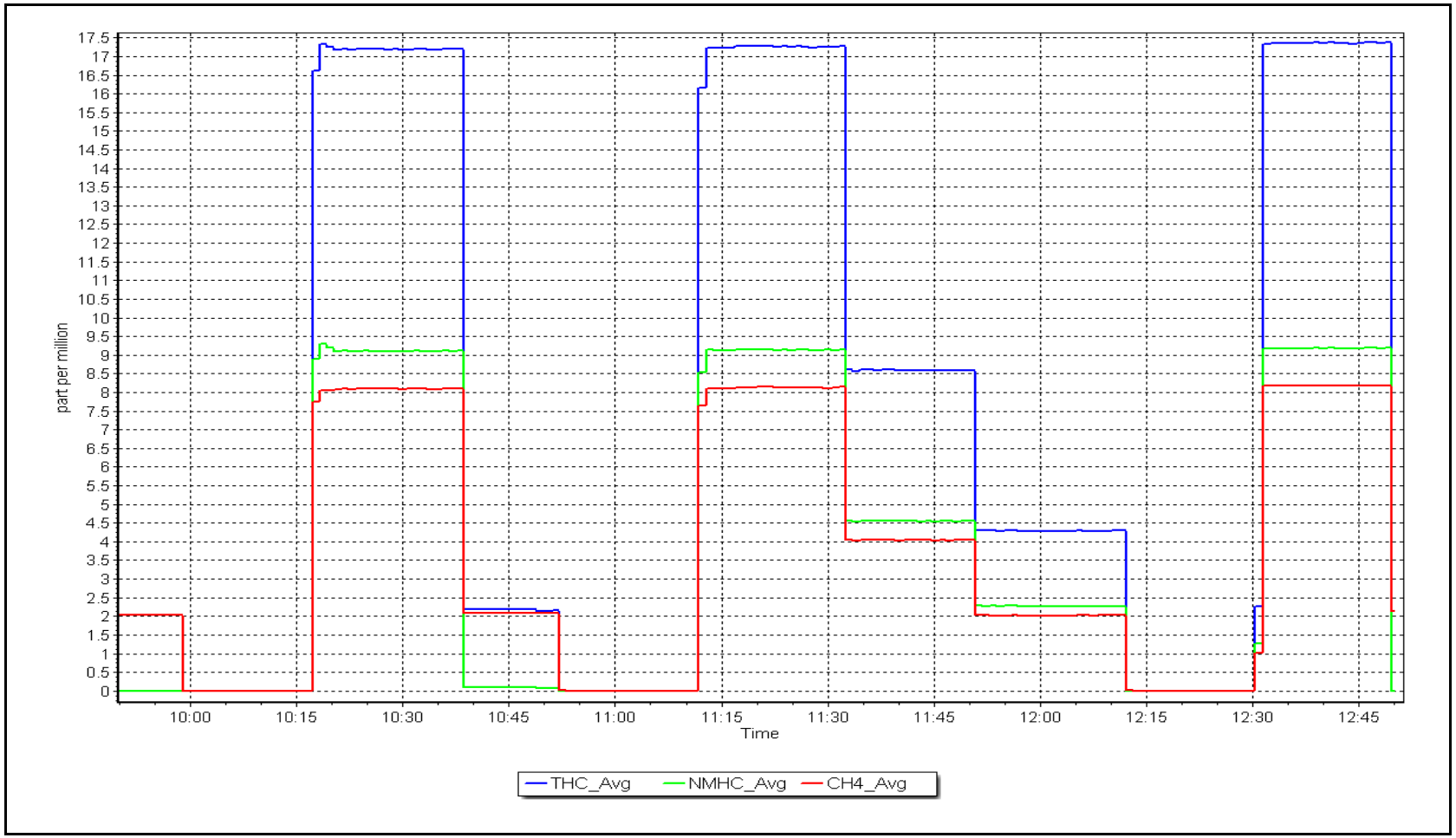
Calibration Date:	September 22, 2023	Previous Calibration:	August 10, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:53	End Time (MST):	12:49
Analyzer make:	Thermo 55i	Analyzer serial #:	1505164381

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999988	≥0.995
9.19	9.14	1.0054			
4.60	4.55	1.0117	Slope	0.994824	0.90 - 1.10
2.29	2.27	1.0120			
			Intercept	-0.011701	+/-0.5



NMHC Calibration Plot Date: September 22, 2023 Location: Lower Camp



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS13
FORT MCKAY SOUTH
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	September 15, 2023	Last Cal Date:	August 16, 2023
Start time (MST):	8:52	End time (MST):	13:30
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:	1.002886	1.002912	Backgd or Offset:	86.3	86.3
Calibration intercept:	-2.078412	-1.537784	Coeff or Slope:	0.715	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	0.3	----
as found span	4921	79.1	799.7	800.7	0.999
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.5	----
high point	4921	79.1	799.7	801.2	0.998
second point	4961	39.5	399.3	398.8	1.001
third point	4980	19.8	200.2	196.6	1.018
as left zero	5000	0.0	0.0	0.6	----
as left span	4921	79.1	799.7	800.6	0.999
				Average Correction Factor	1.006

Baseline Corr As found:	800.40	Previous response	799.91	*% 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: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

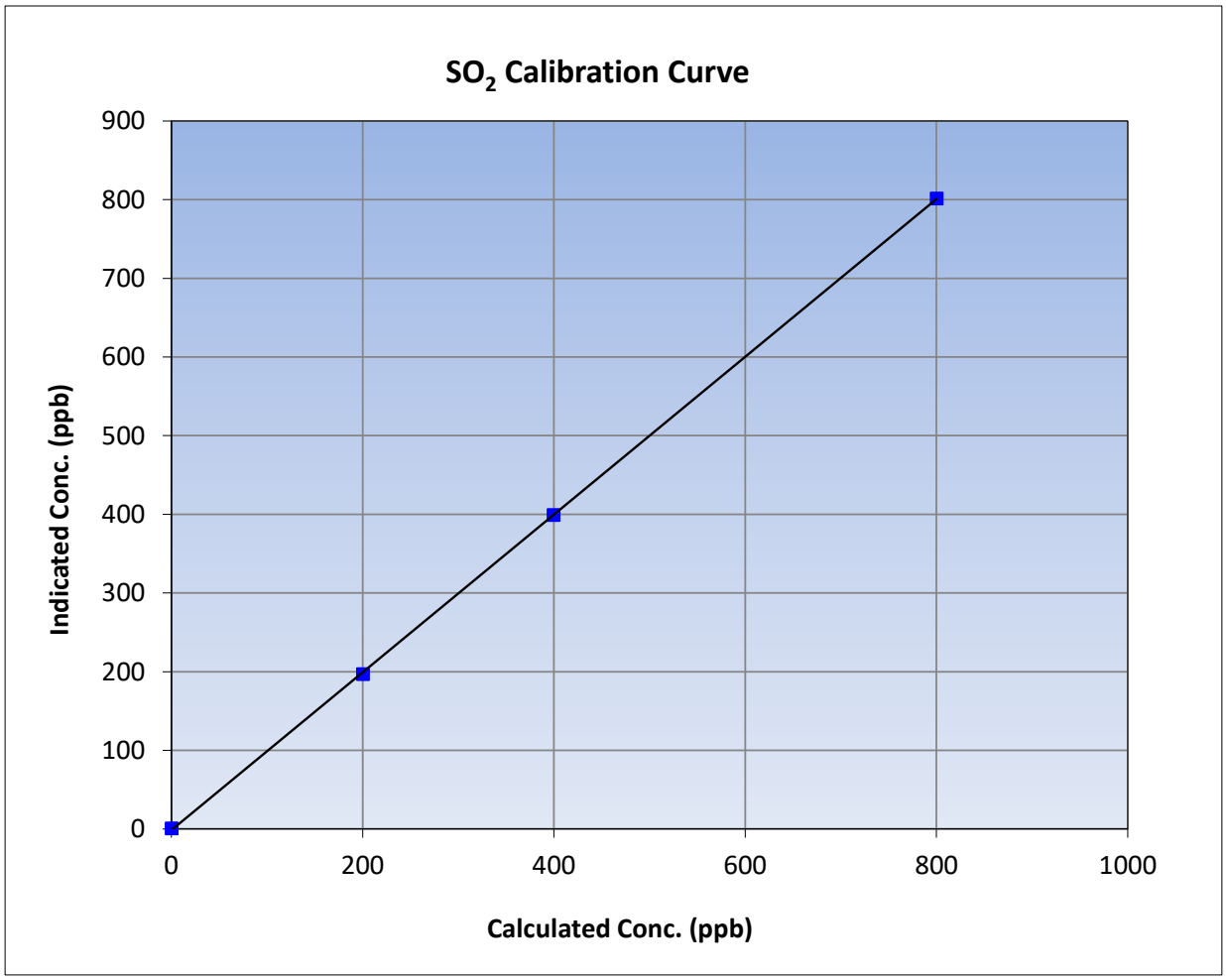
Station Information

Calibration Date:	September 15, 2023	Previous Calibration:	August 16, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:52	End Time (MST):	13:30
Analyzer make:	API T100	Analyzer serial #:	599

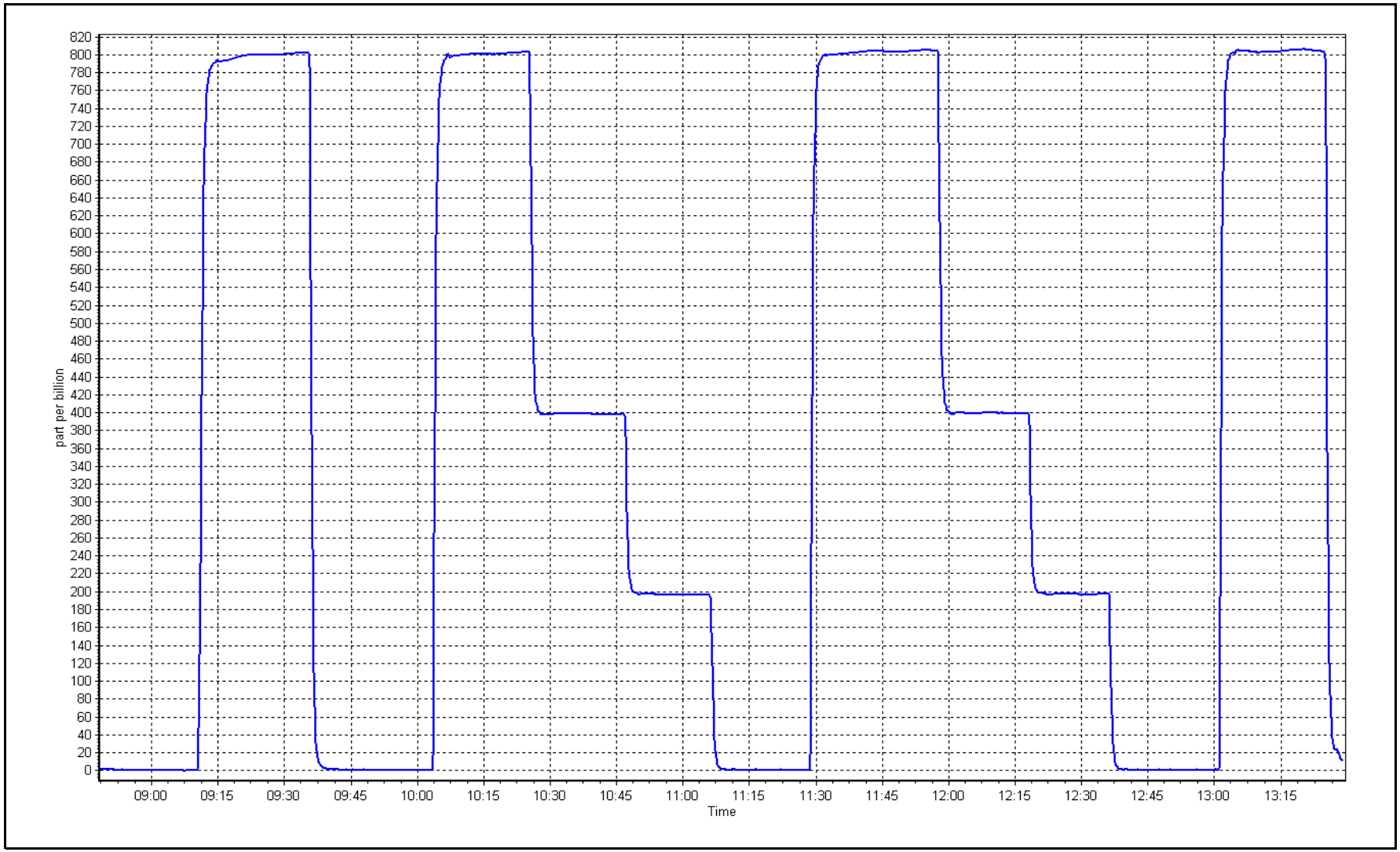
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
799.7	801.2	0.9981
399.3	398.8	1.0013
200.2	196.6	1.0182

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999967	*≥0.995*
Slope	1.002912	*0.90 - 1.10*
Intercept	-1.537784	*+/-30*



SO2 Calibration Plot Date: September 15, 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:	September 19, 2023	Last Cal Date:	August 15, 2023
Start time (MST):	8:50	End time (MST):	12:44
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:	NA
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:	1.004479	1.004193	Backgd or Offset:	3.77	3.77
Calibration intercept:	-0.502377	-0.442262	Coeff or Slope:	1.130	1.130

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.2	----
as found span	4925	75.5	80.6	81.6	0.986
as found 2nd point	4962	37.7	40.3	40.3	0.994
as found 3rd point	4981	18.9	20.2	19.7	1.014
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4925	75.5	80.6	80.7	0.999
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	0.0	----
as left span	4925	75.5	80.6	79.2	1.018
SO2 Scrubber Check	4921	79.1	791.0	0.0	----
Date of last scrubber change:		20-Mar-20		Ave Corr Factor	1.015
Date of last converter efficiency test:		NA			efficiency

Baseline Corr As found:	81.8	Prev response:	80.48	*% change:	1.6%
Baseline Corr 2nd AF pt:	40.5	AF Slope:	1.016526	AF Intercept:	-0.502263
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999938		

* = > +/-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

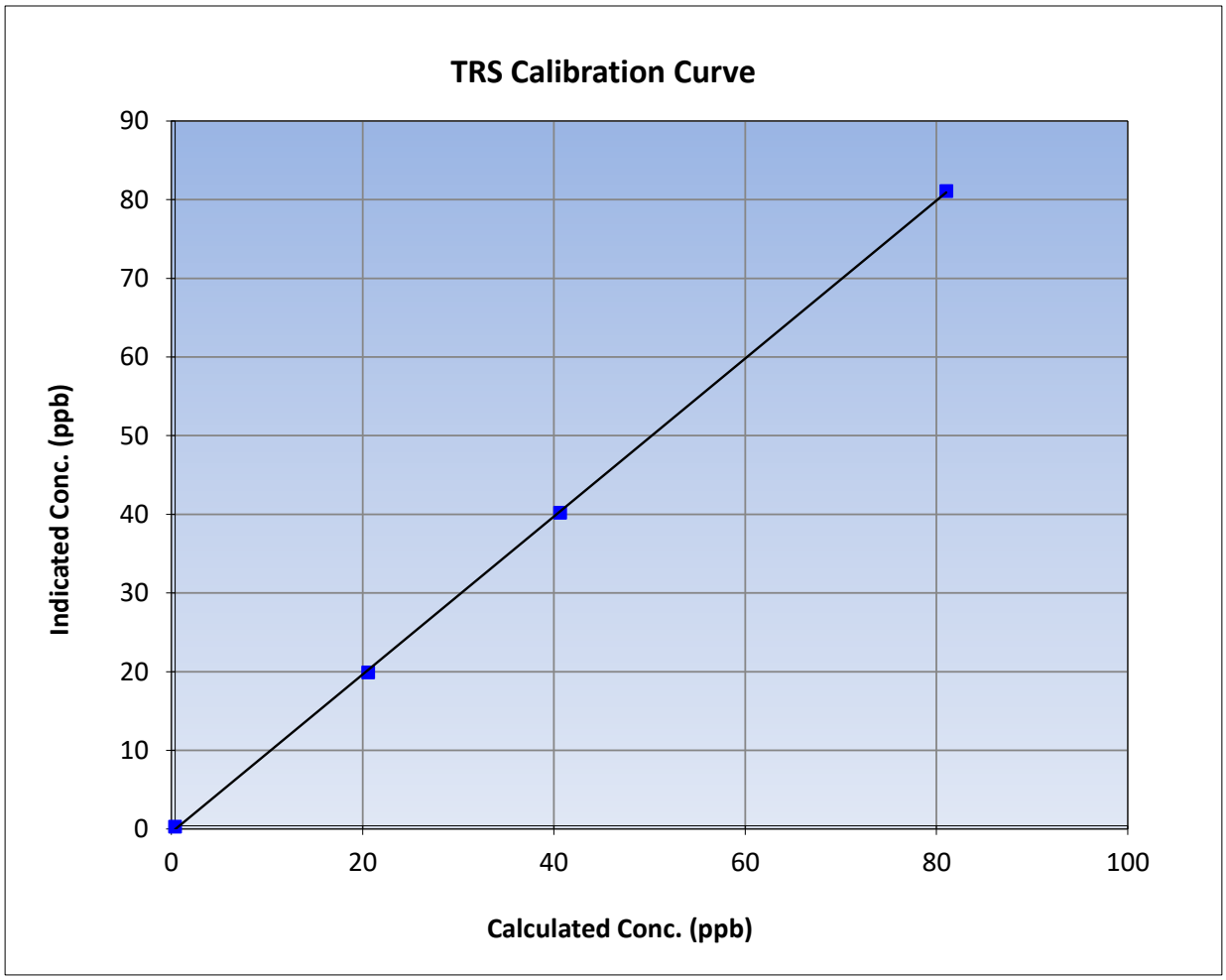
Station Information

Calibration Date:	September 19, 2023	Previous Calibration:	August 15, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:50	End Time (MST):	12:44
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1180540017

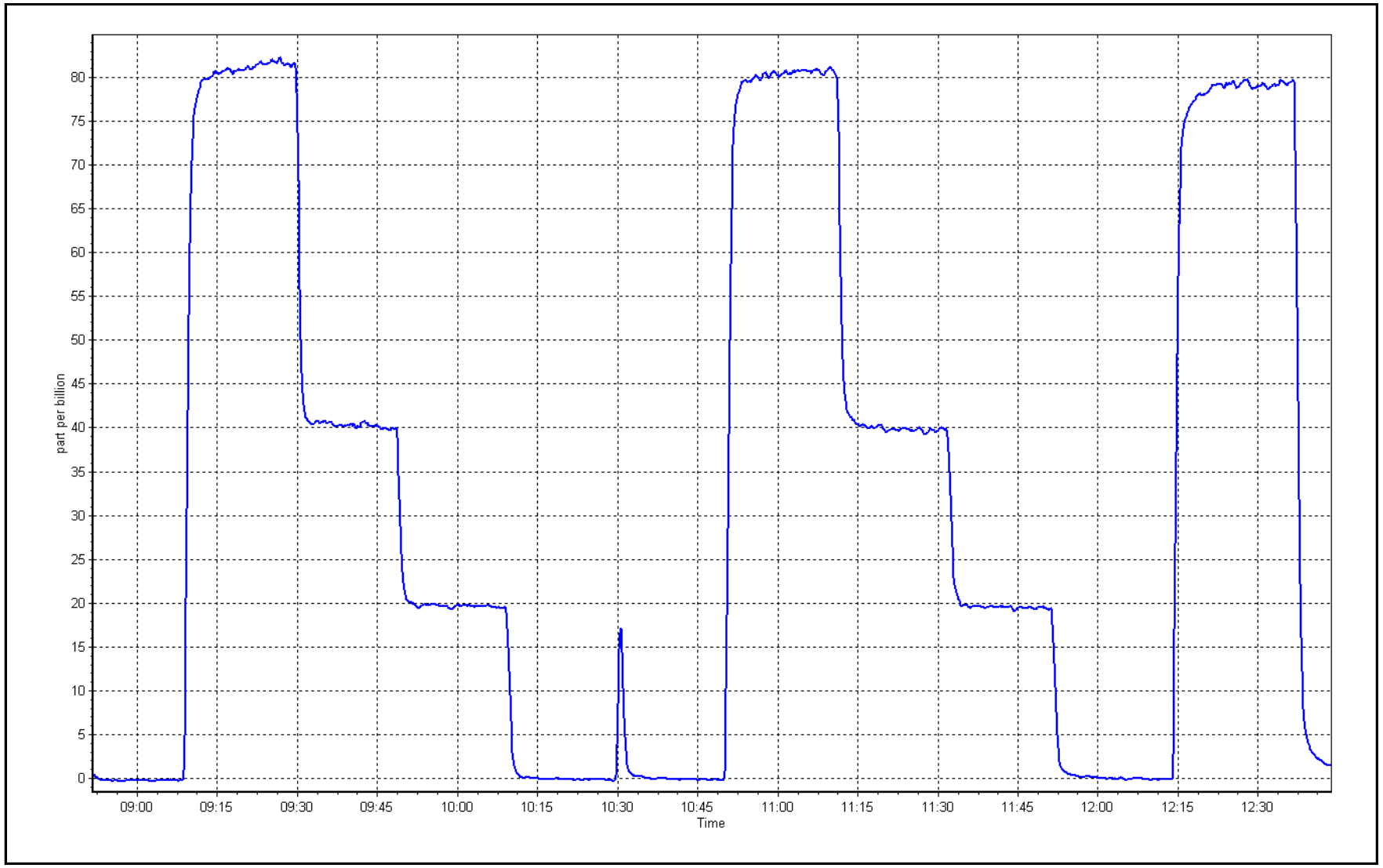
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.6	80.7	0.9991
40.3	39.8	1.0117
20.2	19.5	1.0352

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999918	*≥0.995*
Slope	1.004193	*0.90 - 1.10*
Intercept	-0.442262	*+/-3*



TRS Calibration Plot Date: September 19, 2023 Location: Fort McKay South



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	September 15, 2023	Last Cal Date:	August 16, 2023
Start time (MST):	8:52	End time (MST):	13:30
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:		
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:	API701		Serial Number:	1117	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	11700501330	
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	2.24E-04	NMHC SP Ratio:	4.70E-04	5.16E-05
CH4 Retention time:	12.80	13.00	NMHC Peak Area:	193345	176051
Zero Chromatogram:	ON	ON	Flat Baseline:	ON	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	4921	79.1	17.05	17.05	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.1	17.05	17.07	0.998
second point	4961	39.5	8.51	8.41	1.012
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	17.05	1.000
				Average Correction Factor	1.015

Baseline Corr AF:	17.05	Prev response	17.02	*% 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-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	4921	79.1	9.08	9.16	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	9.08	9.10	0.998
second point	4961	39.5	4.53	4.51	1.004
third point	4980	19.8	2.27	2.22	1.024
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	9.08	9.07	1.001
				Average Correction Factor	1.009
Baseline Corr AF:	9.16	Prev response	9.07	*% change	0.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.1	7.97	7.90	1.009
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.1	7.97	7.97	0.999
second point	4961	39.5	3.98	3.90	1.021
third point	4980	19.8	1.99	1.91	1.047
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	1.022
Baseline Corr AF:	7.90	Prev response	7.96	*% 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:	1.003320	1.003320
THC Cal Offset:	-0.078975	-0.078975
CH4 Cal Slope:	1.004551	1.004551
CH4 Cal Offset:	-0.047351	-0.047351
NMHC Cal Slope:	1.002546	1.002546
NMHC Cal Offset:	-0.032763	-0.032763

Notes: Changed inlet filter after as founds. 3rd point was failing need to goback and used zero chromatogram and flat baseline was turned off. Adjusted span.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

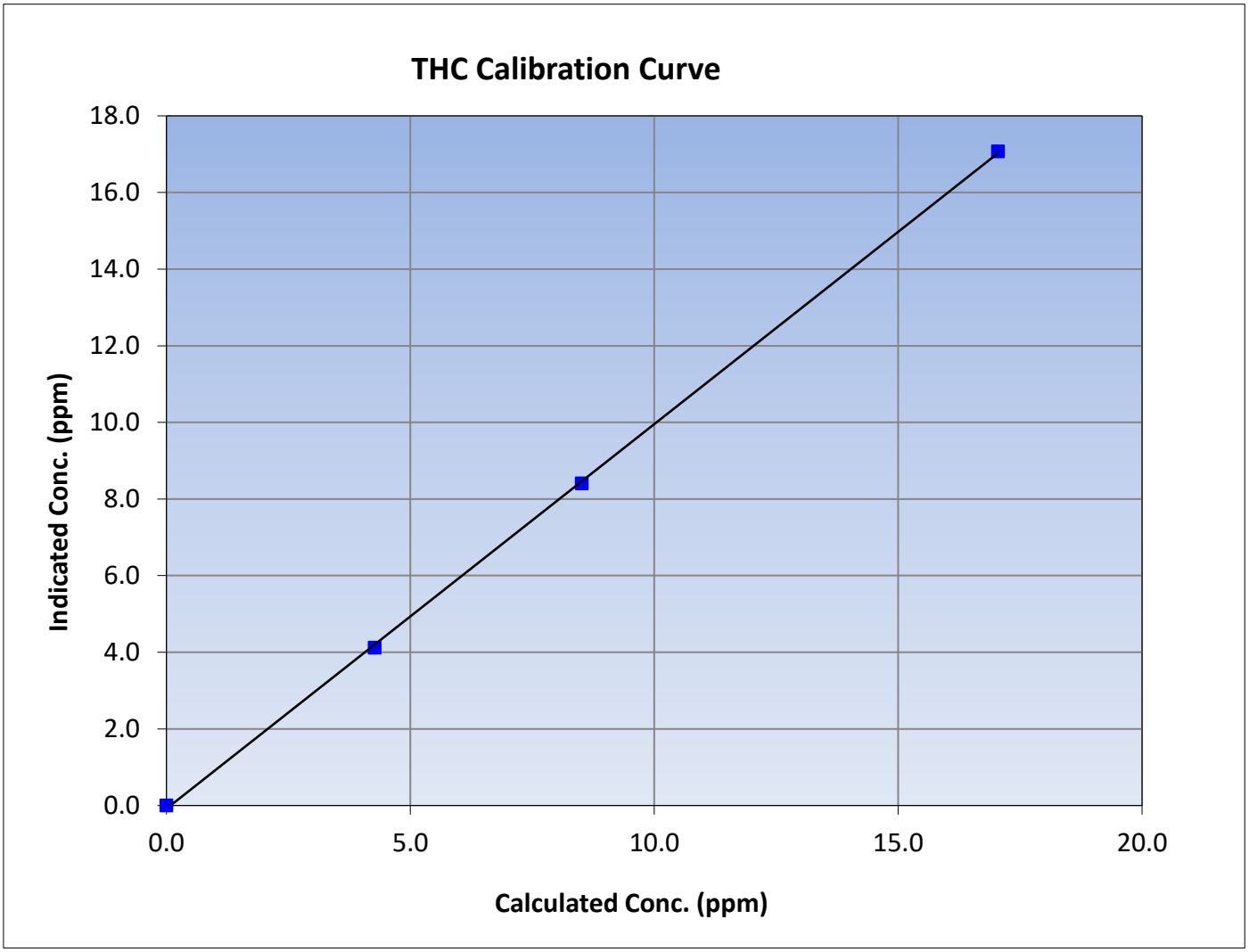
Version-06-2022

Station Information

Calibration Date:	September 15, 2023	Previous Calibration:	August 16, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:52	End Time (MST):	13:30
Analyzer make:	Thermo 55i	Analyzer serial #:	11700501330

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999889	≥0.995
17.05	17.07	0.9984			
8.51	8.41	1.0123	Slope	1.003830	0.90 - 1.10
4.27	4.12	1.0350			
			Intercept	-0.083774	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

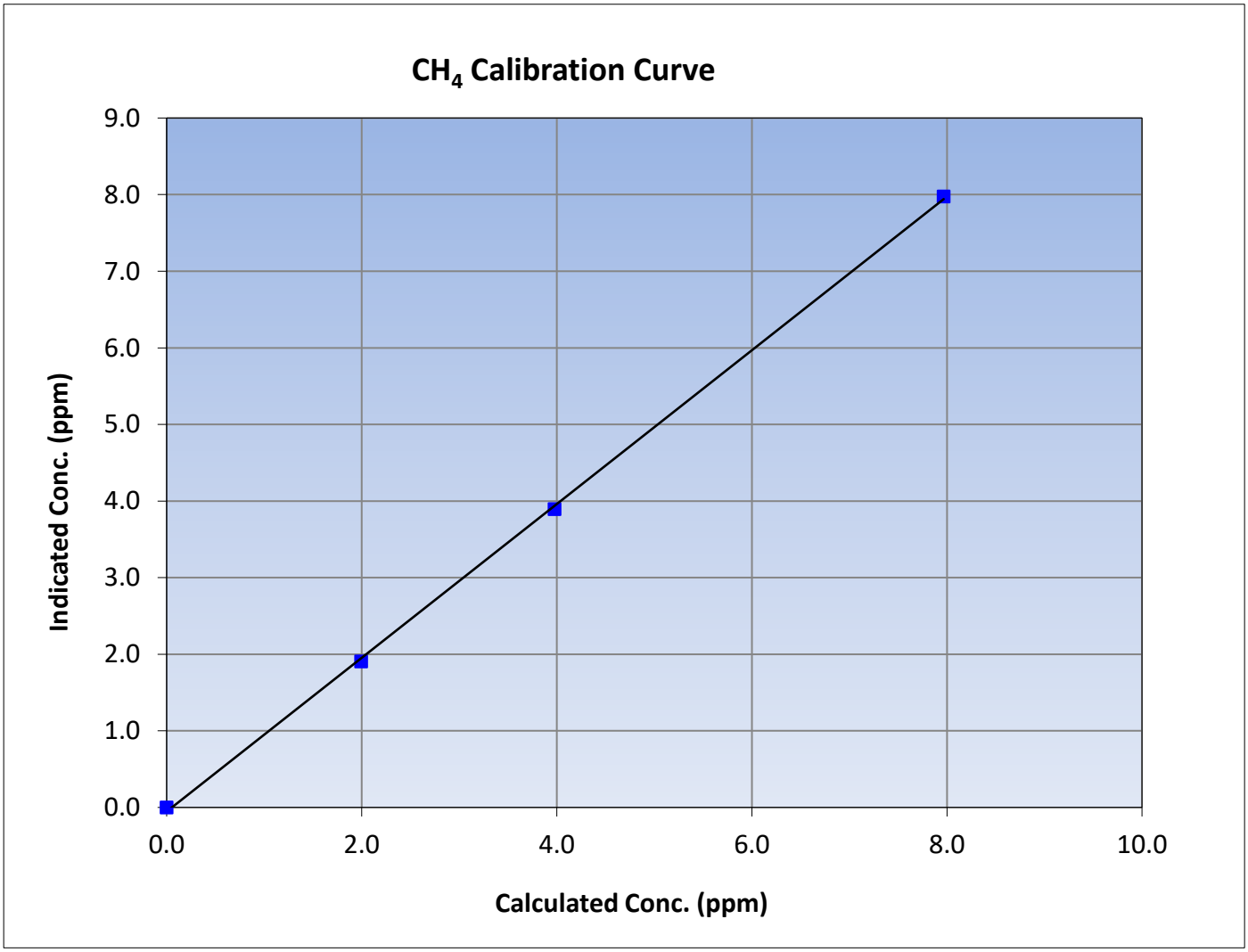
Version-06-2022

Station Information

Calibration Date:	September 15, 2023	Previous Calibration:	August 16, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:52	End Time (MST):	13:30
Analyzer make:	Thermo 55i	Analyzer serial #:	11700501330

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999781	*≥0.995*
7.97	7.97	0.9991			
3.98	3.90	1.0213	Slope	1.003588	*0.90 - 1.10*
1.99	1.91	1.0469			
			Intercept	-0.053796	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

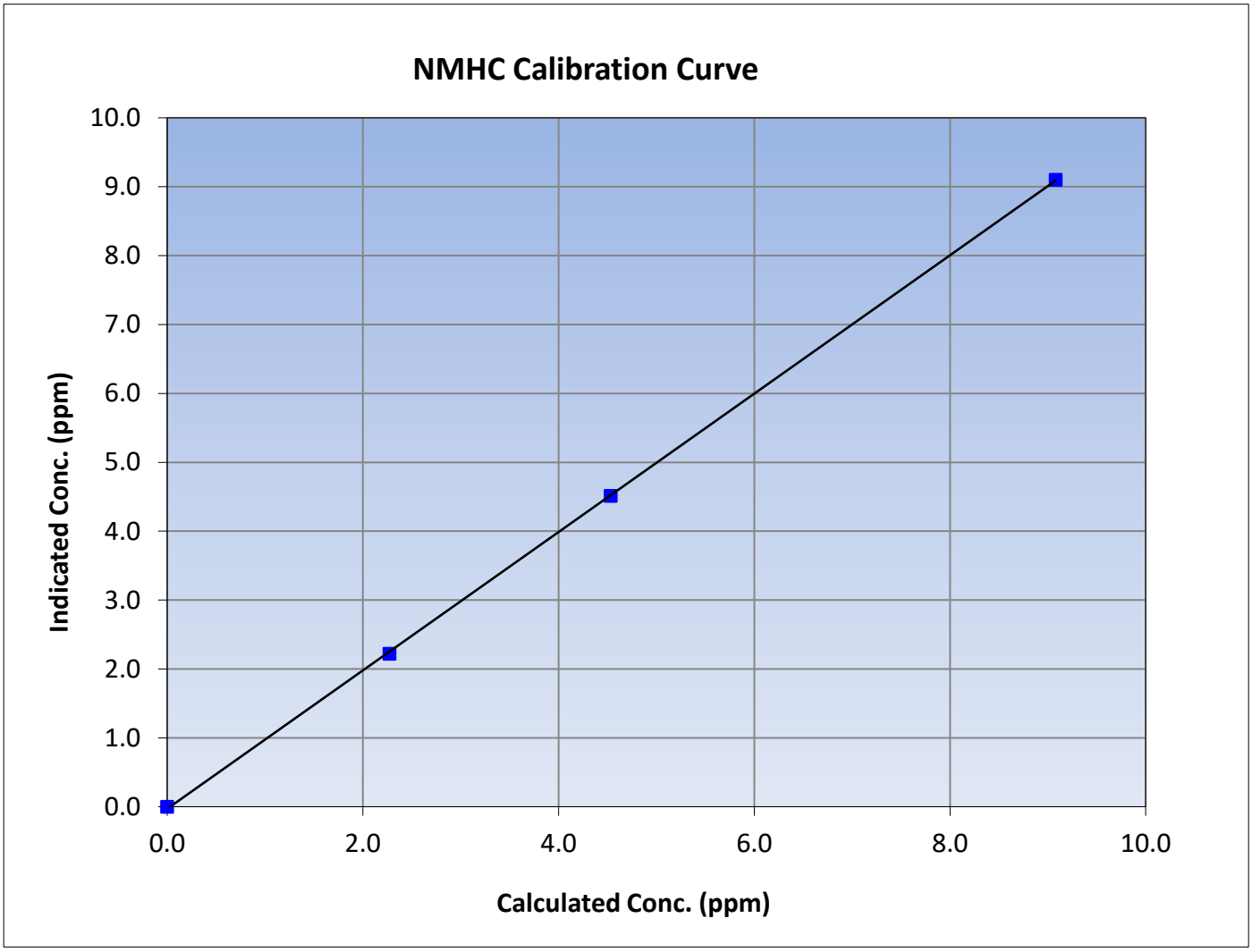
Version-06-2022

Station Information

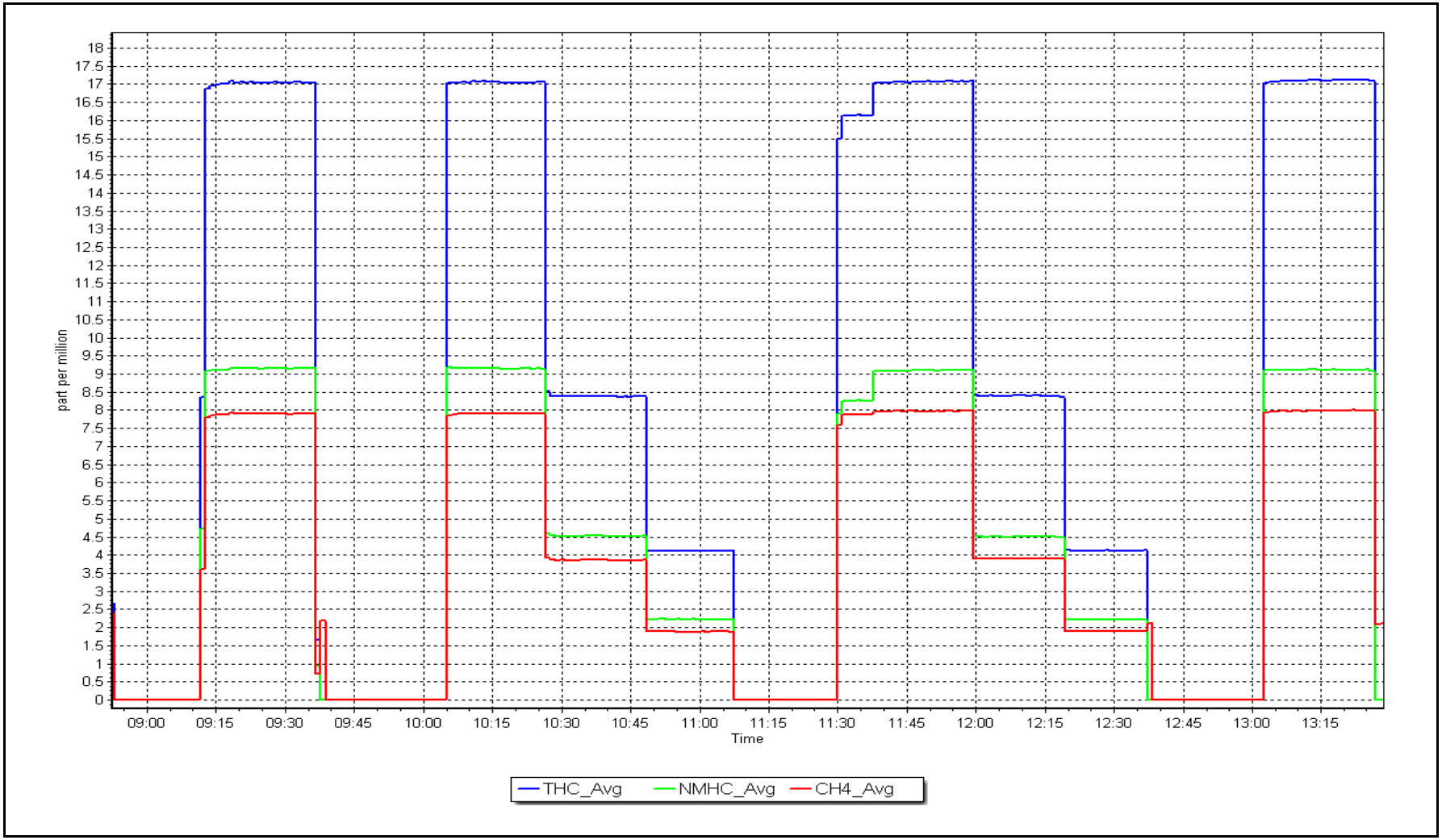
Calibration Date:	September 15, 2023	Previous Calibration:	August 16, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:52	End Time (MST):	13:30
Analyzer make:	Thermo 55i	Analyzer serial #:	11700501330

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
9.08	9.10	0.9975			
4.53	4.51	1.0043	Slope	1.004357	0.90 - 1.10
2.27	2.22	1.0243			
			Intercept	-0.029978	+/-0.5



NMHC Calibration Plot Date: September 15, 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:	September 26, 2023	Last Cal Date:	August 24, 2023
Start time (MST):	9:11	End time (MST):	13:48
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:	1.113	1.120	NO bkgnd or offset:	9.5	10.1
NOX coeff or slope:	0.991	0.991	NOX bkgnd or offset:	9.7	10.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	160.8	158.4

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.996609	0.999304
NO_X Cal Offset:	-1.710896	-1.811346
NO Cal Slope:	0.999177	1.002205
NO Cal Offset:	-2.764638	-2.825167
NO_2 Cal Slope:	0.995830	0.995992
NO_2 Cal Offset:	-0.645143	-1.479105

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.7	0.2	0.5	----	----
as found span	4919	81.1	826.9	800.0	26.9	823.8	794.0	29.9	1.0037	1.0075
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
high point	4919	81.1	826.9	800.0	26.9	825.4	800.3	25.1	1.0018	0.9996
second point	4960	40.6	413.9	400.4	13.5	411.0	397.1	13.9	1.0071	1.0084
third point	4980	20.3	207.0	200.2	6.7	203.0	195.0	8.0	1.0195	1.0268
as left zero	5000	0.0	0.0	0.0	0.0	-0.7	-0.4	-0.3	----	----
as left span	4919	80.1	816.8	372.3	444.5	830.2	382.6	447.5	0.9839	0.9731
								Average Correction Factor	1.0095	1.0116

Corrected As found	NO_X = 823.1 ppb	NO = 793.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.1%
Previous Response	NO_X = 822.4 ppb	NO = 796.5 ppb		*Percent Change	NO =	-0.3%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	798.5	380.9	444.5	442.2	1.0053	99.5%
2nd GPT point (200 ppb O3)	798.5	590.0	235.4	232.2	1.0139	98.6%
3rd GPT point (100 ppb O3)	798.5	692.7	132.7	129.0	1.0289	97.2%
				Average Correction Factor	1.0160	98.4%

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

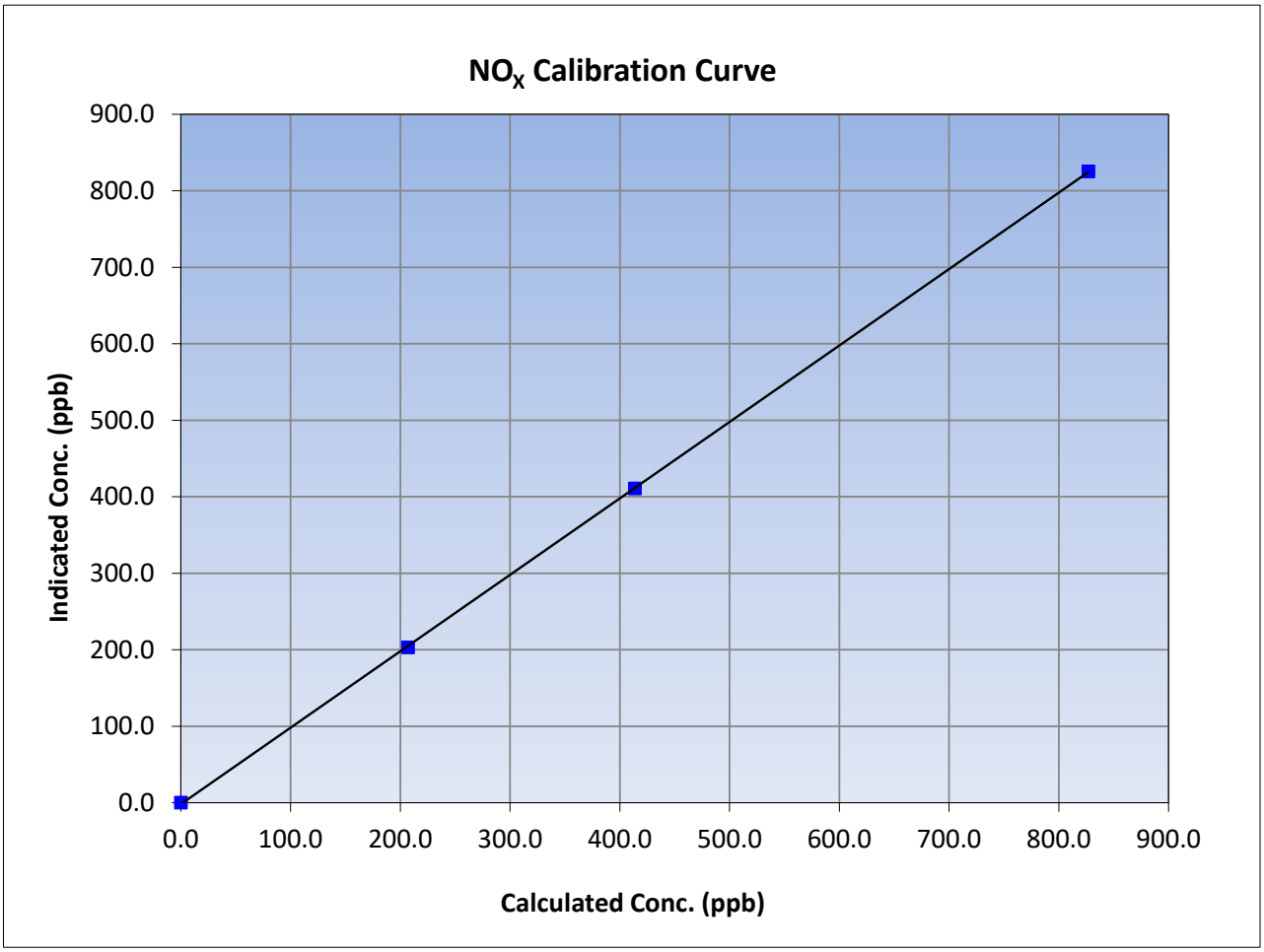
Version-04-2020

Station Information

Calibration Date:	September 26, 2023	Previous Calibration:	August 24, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	9:11	End Time (MST):	13:48
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999975	≥0.995
826.9	825.4	1.0018			
413.9	411.0	1.0071	Slope	0.999304	0.90 - 1.10
207.0	203.0	1.0195			
			Intercept	-1.811346	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

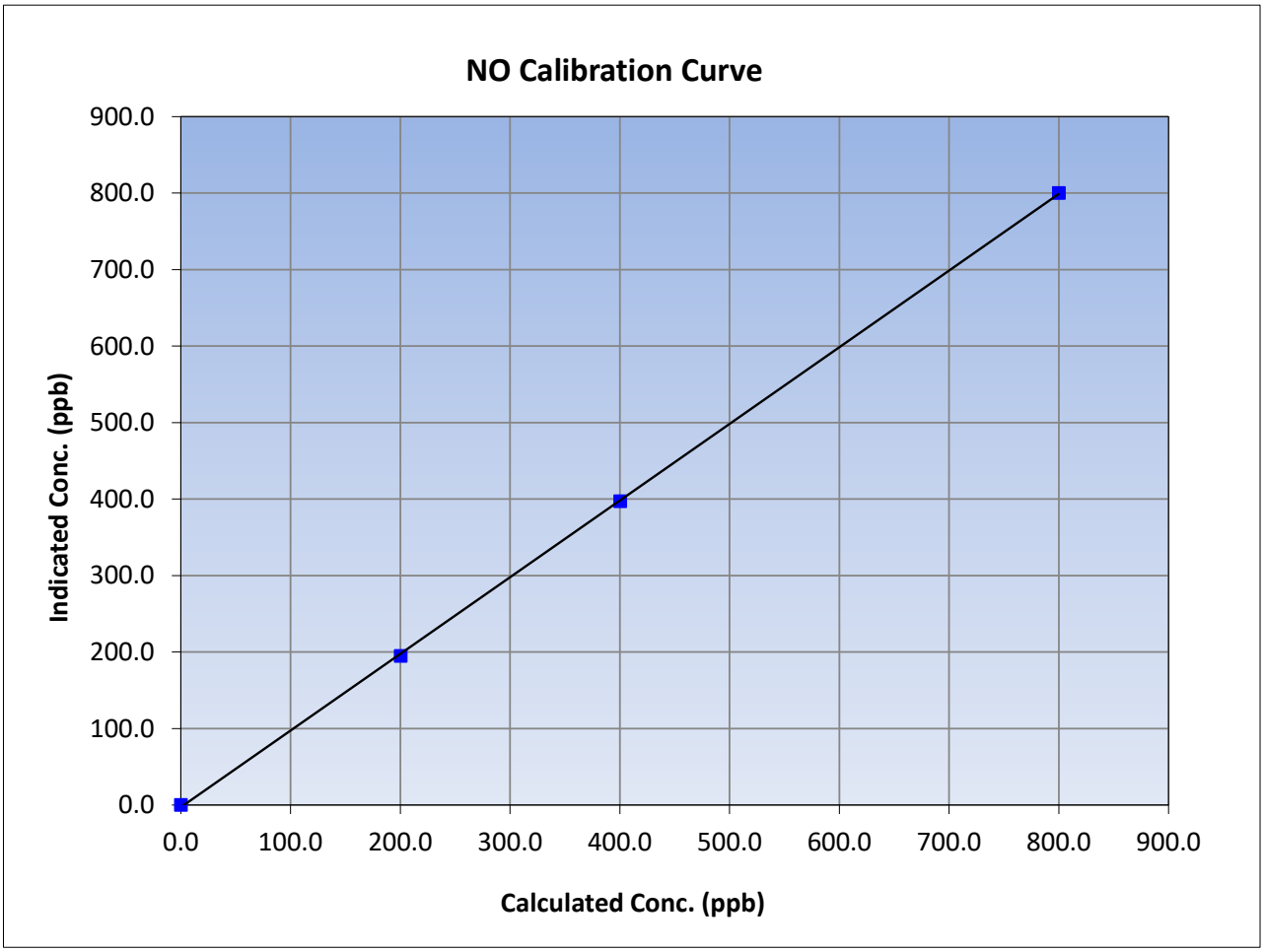
Version-04-2020

Station Information

Calibration Date:	September 26, 2023	Previous Calibration:	August 24, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	9:11	End Time (MST):	13:48
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	0.999943	≥0.995
800.0	800.3	0.9996			
400.4	397.1	1.0084	Slope	1.002205	0.90 - 1.10
200.2	195.0	1.0268			
			Intercept	-2.825167	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

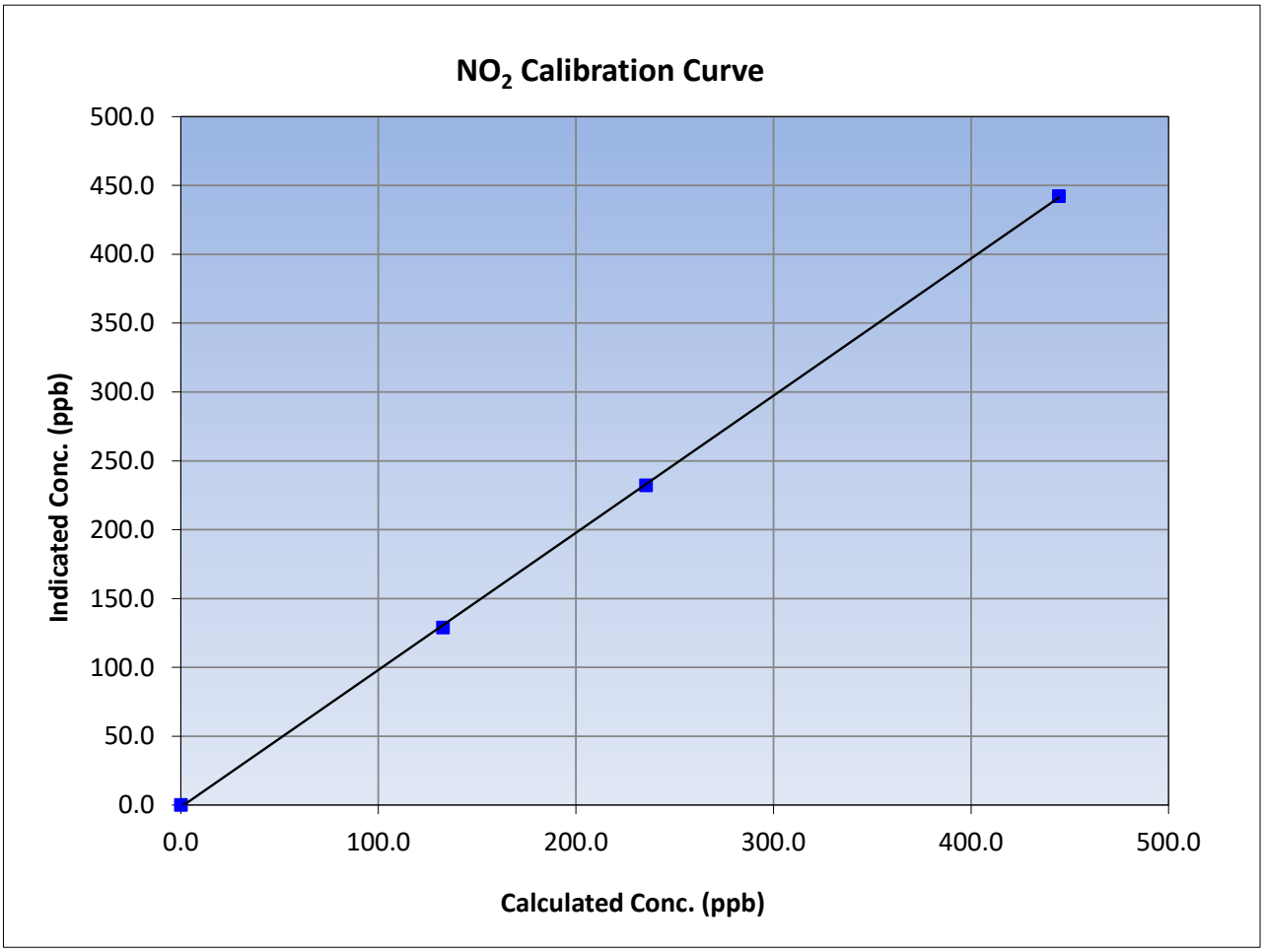
Version-04-2020

Station Information

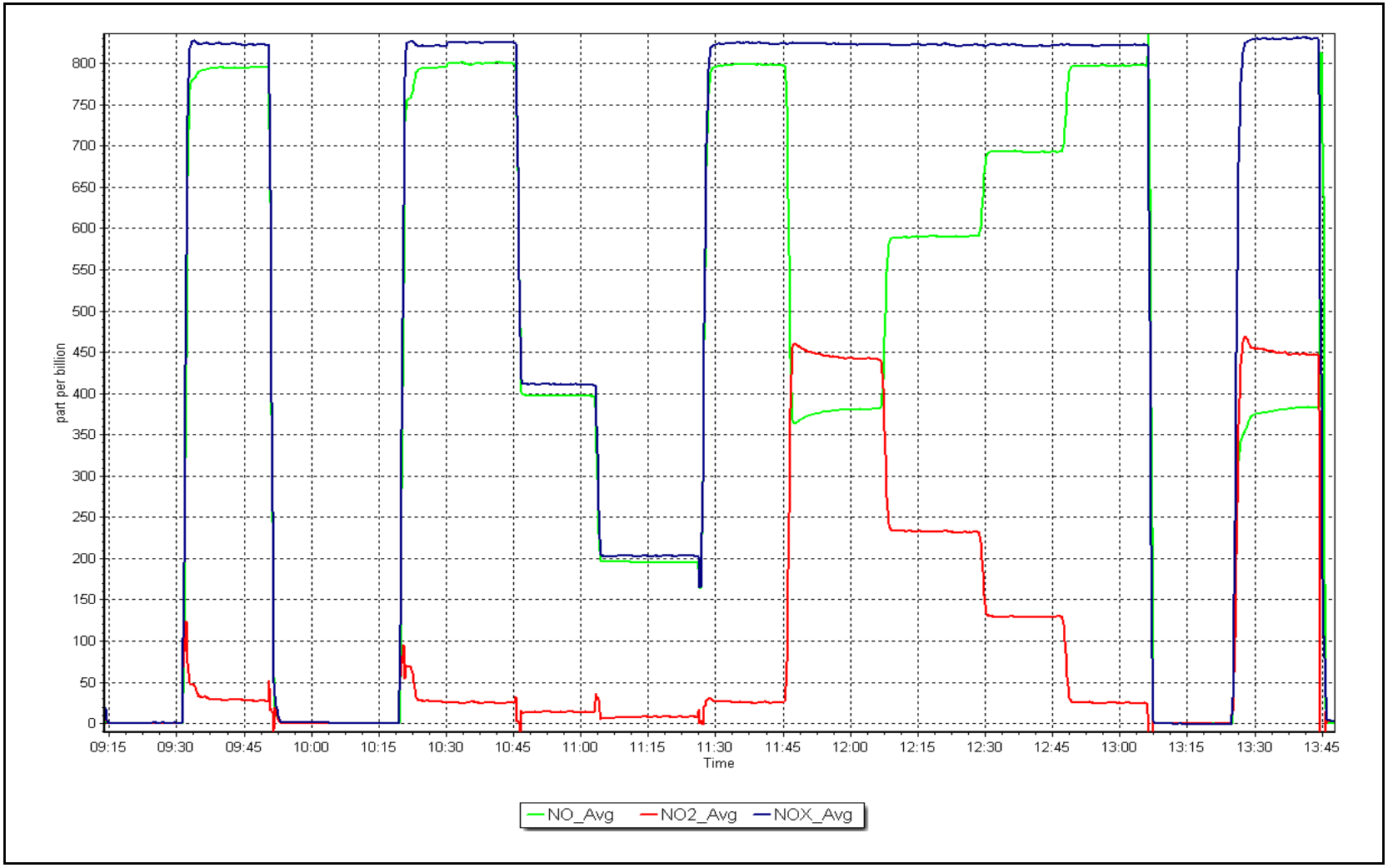
Calibration Date:	September 26, 2023	Previous Calibration:	August 24, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	9:11	End Time (MST):	13:48
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999934	≥0.995
444.5	442.2	1.0053			
235.4	232.2	1.0139	Slope	0.995992	0.90 - 1.10
132.7	129.0	1.0289			
			Intercept	-1.479105	+/-20



NO_X Calibration Plot Date: September 26, 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:	September 8, 2023	Last Cal Date:	August 11, 2023
Start time (MST):	9:00	End time (MST):	12:32
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:	0.997543	0.999886	Backgd or Offset:	2.4	2.4
Calibration intercept:	1.180000	1.020000	Coeff or Slope:	0.963	0.967

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.3	----
as found span	5000	977.0	400.0	397.2	1.007
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.3	----
high point	5000	977.0	400.0	400.5	0.999
second point	5000	838.0	200.0	201.7	0.992
third point	5000	735.9	100.0	101.5	0.985
as left zero	5000	0.0	0.0	-0.2	----
as left span	5000	977.0	400.0	401.6	0.996
				Average Correction Factor	0.992

Baseline Corr As found:	397.5	Previous response	400.2	*% change	-0.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

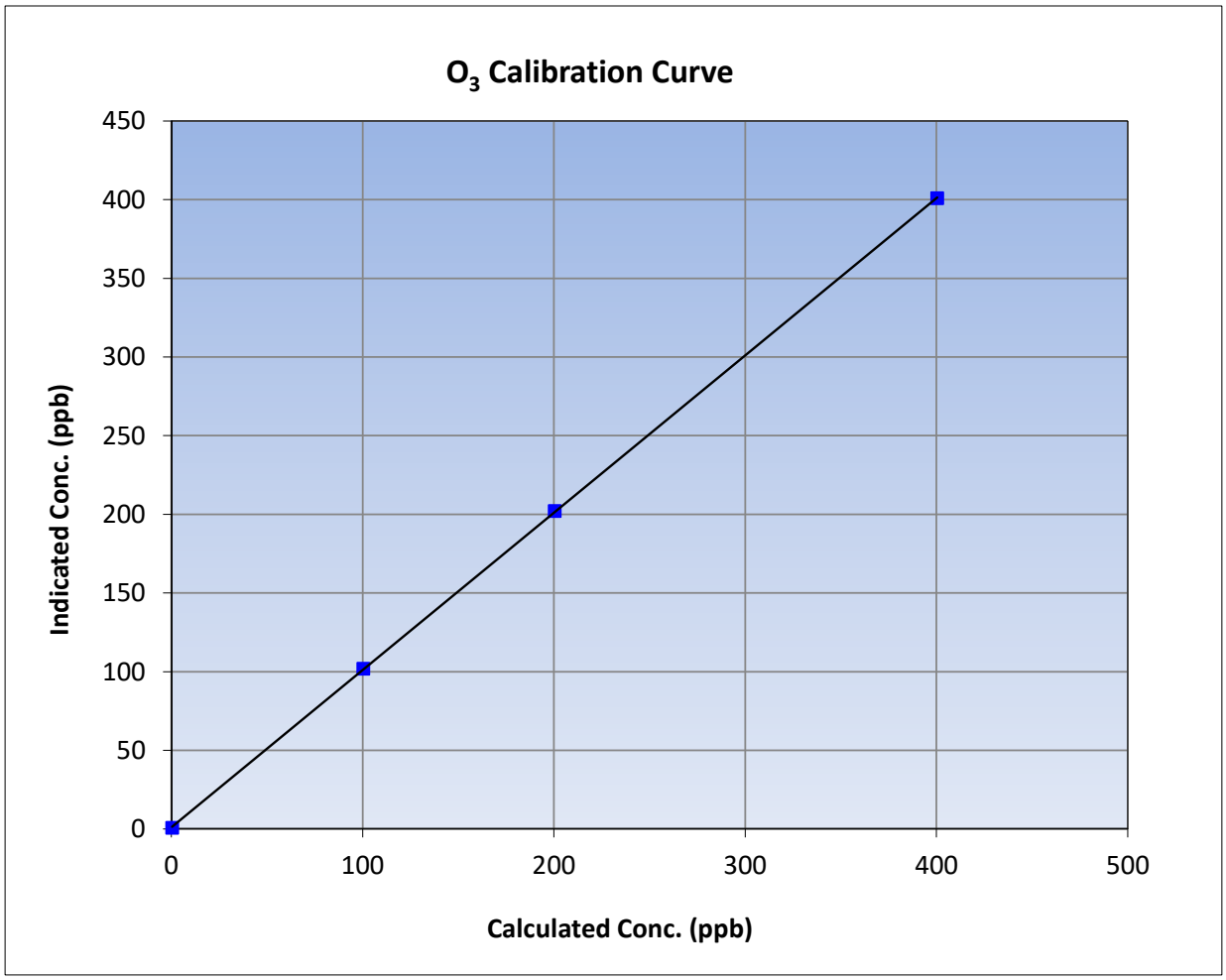
Station Information

Calibration Date:	September 8, 2023	Previous Calibration:	August 11, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	9:00	End Time (MST):	12:32
Analyzer make:	Teledyne API T400	Analyzer serial #:	3871

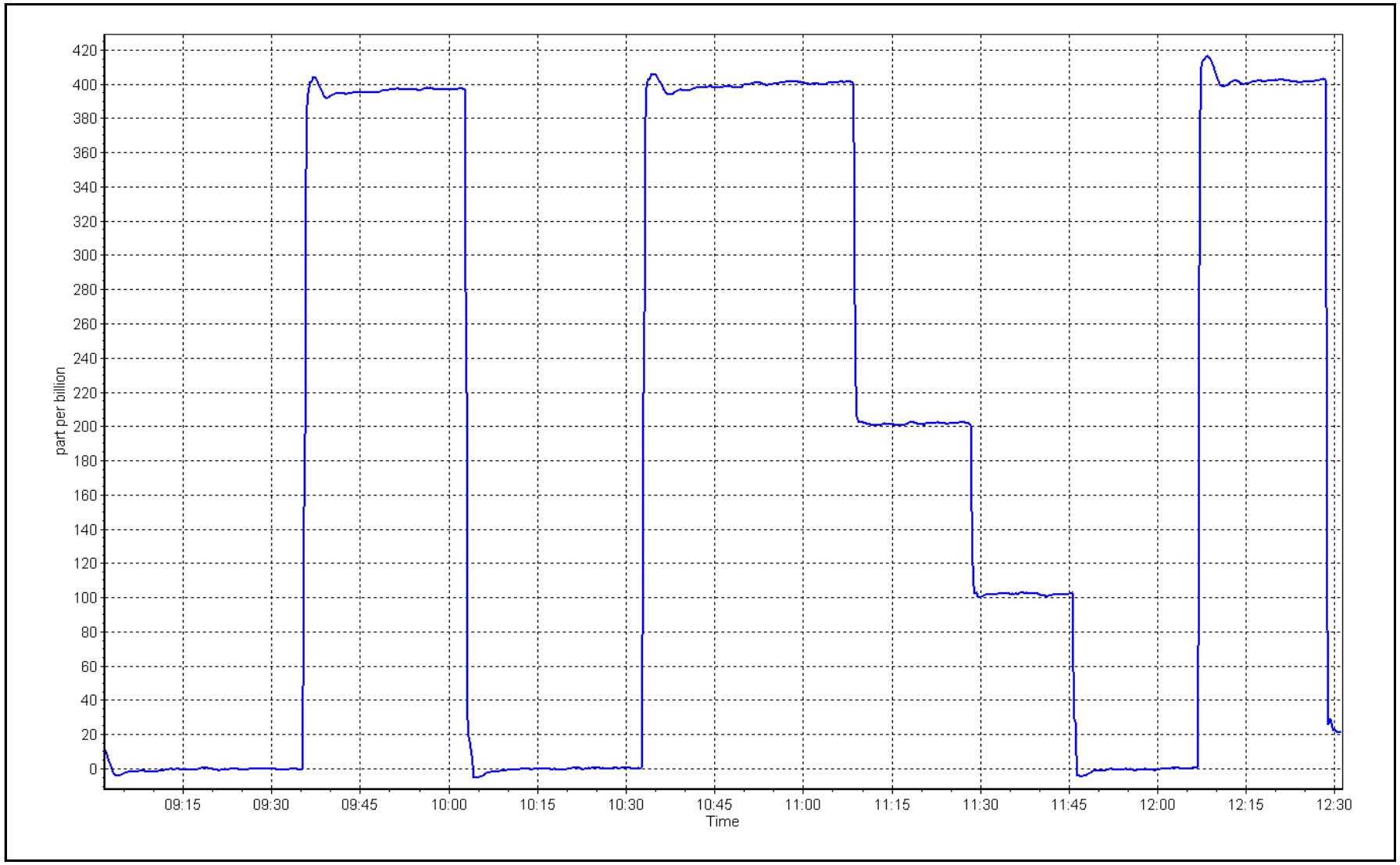
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
400.0	400.5	0.9988
200.0	201.7	0.9916
100.0	101.5	0.9852

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999983	*≥0.995*
Slope	0.999886	*0.90 - 1.10*
Intercept	1.020000	*+/- 5*



O_3 Calibration Plot Date: September 8, 2023 Location: Fort McKay South



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Fort McKay South	Station number:	AMS 13
Calibration Date:	September 26, 2023	Last Cal Date:	August 24, 2023
Start time (MST):	11:03	End time (MST):	11:16
Analyzer Make:	API T640	S/N:	319
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	1451
Temp/RH standard:	Delta Cal	S/N:	1451

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (^{o}C)	19.0	19	19.0	☐	+/- 2 ^{o}C
P (mmHg)	727.2	727.5	727.2	☐	+/- 10 mmHg
flow (LPM)	5.01	5.03	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: September 26, 2023 Last Cal Date: August 24, 2023

PM w/o HEPA: 21.4 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test				☐	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. Leak check passed. No adjustment made. Quarterly calibration will be done once filter is available.

Calibration by: Sean Bala

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:	September 29, 2023	Last Cal Date:	September 26, 2023
Start time (MST):	10:52	End time (MST):	11:02
Analyzer Make:	API T640	S/N:	319
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	1451
Temp/RH standard:	Delta Cal	S/N:	1451

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (^{o}C)	8.8	8.9	8.8	☐	+/- 2 ^{o}C
P (mmHg)	734.1	734.0	734.1	☐	+/- 10 mmHg
flow (LPM)	4.99	4.97	4.99	☐	+/- 0.25 LPM

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

PM w/o HEPA: 36.8 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				☐	10.9 +/- 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

Removal calibration.

Notes:

Calibration by: Sean Bala

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:	September 29, 2023	Last Cal Date:	NA
Start time (MST):	11:08	End time (MST):	11:41
Analyzer Make:	API T640	S/N:	1335
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	1451
Temp/RH standard:	Delta Cal	S/N:	1451

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (^{o}C)	9.40	8.90	9.40	☐	+/- 2 ^{o}C
P (mmHg)	734.00	735.00	734.00	☐	+/- 10 mmHg
flow (LPM)	5.00	4.90	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: September 29, 2023 Last Cal Date: NA

PM w/o HEPA: 24.4 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test				☐	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: June 29, 2023

Date RH/T Sensor Cleaned: June 29, 2023

Install calibration.

Notes:

Calibration by: Sean Bala

Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Fort McKay South	Station Number:	AMS 13
Calibration Date:	September 15, 2023	Prev Cal Date:	October 5, 2022
Start Time (MST):	11:17	End Time (MST):	13:09
Tower Height (m):	9.5	Reason:	Routine

Wind Speed Information

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

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	0.7%
400	39.4	39.4	0.1%
600	58.6	58.7	0.2%
800	77.8	77.8	0.1%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)	0.999998	0.999998	*≥0.9995*
Calculated slope	1.001527	0.999451	*0.90 - 1.10*
Calculated intercept	-0.014138	-0.052868	*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	
As Found Declination (deg east of True North):	14	As Left Declination (deg east of True North):	14
Solar noon time (MST):	13:21	Calc Declination*:	13.73 Degrees
Deadband calc:	0.0 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	0.5	---
90	88.1	-0.5%
180	178.5	-0.4%
270	268.3	-0.5%
357	357.5	0.1%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)	0.999936	0.999963	*≥0.9995*
Calculated slope	1.015820	0.999751	*0.90 - 1.10*
Calculated intercept	-0.298621	0.864506	*+/- 4*

Notes: Veified true north using solar noon.

Calibration Performed By: Sean Bala

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS14
ANZAC
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	September 6, 2023	Last Cal Date:	August 9, 2023
Start time (MST):	9:23	End time (MST):	12:34
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:	3060
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:	1.015152	1.017069	Backgd or Offset:	25.2	25.2
Calibration intercept:	-1.929538	-1.850638	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	0.5	----
as found span	4938	80.3	799.3	809.4	0.987
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	1.0	----
high point	4938	80.3	799.3	812.8	0.983
second point	4979	40.2	400.1	402.7	0.993
third point	4998	20.2	201.1	200.4	1.003
as left zero	5000	0.0	0.0	0.9	----
as left span	4938	80.3	799.3	814.6	0.981
				Average Correction Factor	0.993

Baseline Corr As found:	808.90	Previous response	809.45	*% change	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

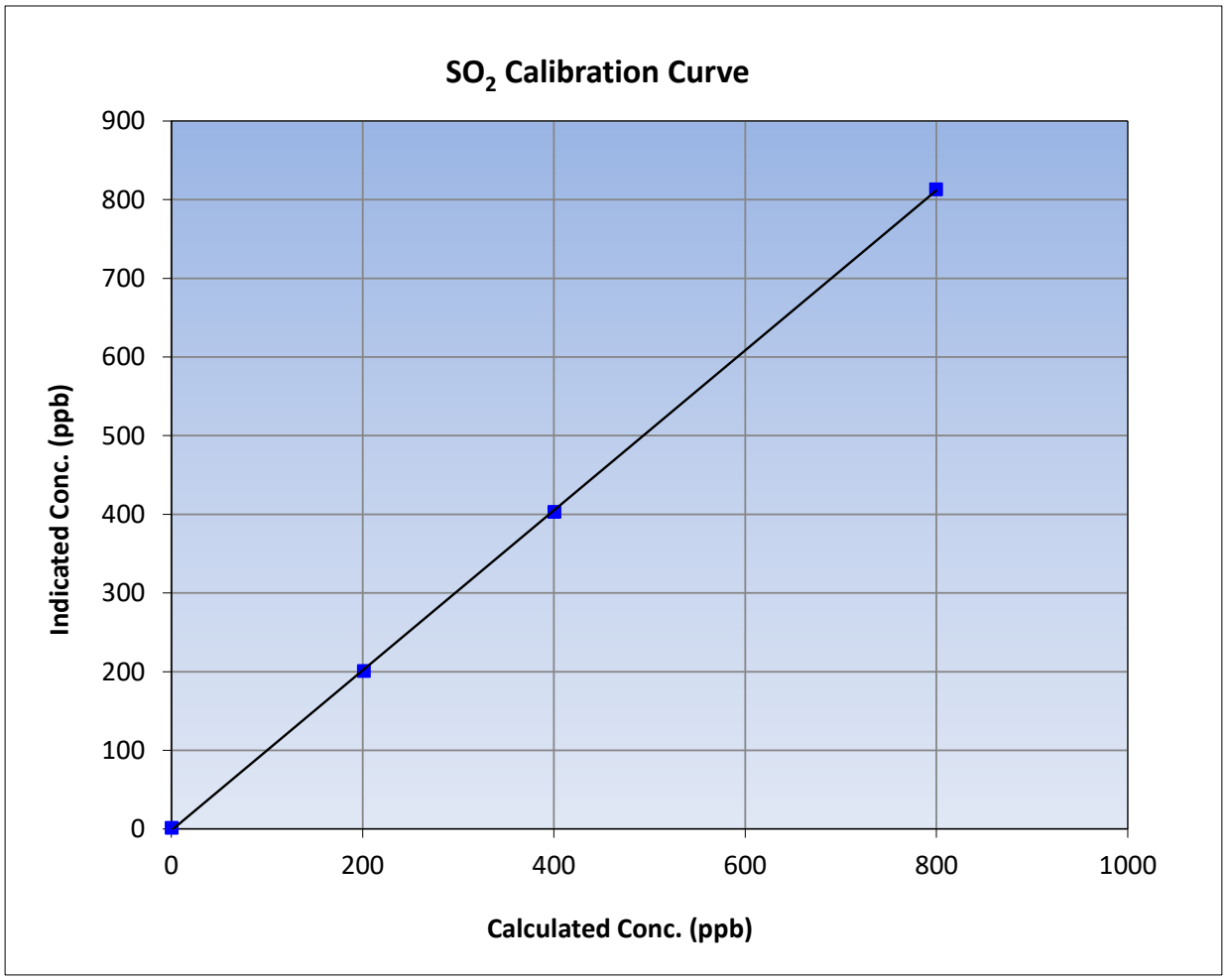
Station Information

Calibration Date:	September 6, 2023	Previous Calibration:	August 9, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:23	End Time (MST):	12:34
Analyzer make:	Thermo 43i	Analyzer serial #:	0710321322

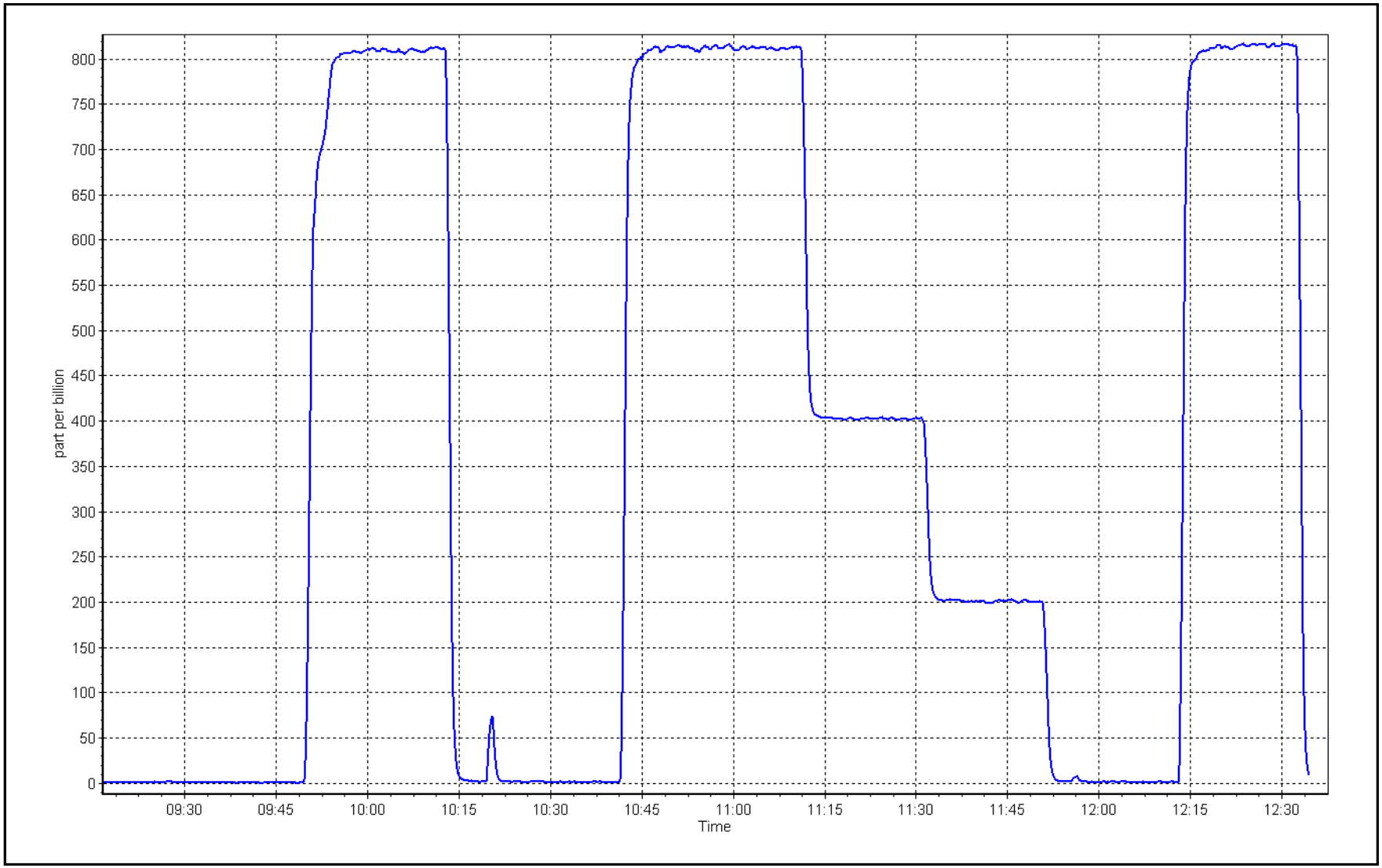
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	1.0	----
799.3	812.8	0.9834
400.1	402.7	0.9934
201.1	200.4	1.0033

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999940	*≥0.995*
Slope	1.017069	*0.90 - 1.10*
Intercept	-1.850638	*+/-30*



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



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	September 7, 2023	Last Cal Date:	August 4, 2023
Start time (MST):	9:47	End time (MST):	14:09
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.15	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC510379			
Removed Cal Gas Conc:	5.15	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 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:	0.991300	0.992584	Backgd or Offset:	2.30	2.31
Calibration intercept:	-0.125436	-0.245370	Coeff or Slope:	0.992	0.992

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	4938	77.9	80.0	79.6	1.002
as found 2nd point	4973	38.9	40.0	39.8	0.999
as found 3rd point	4997	19.5	20.0	19.6	1.011
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	4938	77.9	80.0	79.2	1.009
second point	4973	38.9	40.0	39.3	1.017
third point	4997	19.5	20.0	19.5	1.026
as left zero	5000	0.0	0.0	-0.1	----
as left span	4938	77.9	80.0	78.1	1.024
SO2 Scrubber Check	4936	80.3	800.4	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.017
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.8	Prev response:	79.16	*% change:	0.8%
Baseline Corr 2nd AF pt:	40.0	AF Slope:	0.998628	AF Intercept:	-0.245351
Baseline Corr 3rd AF pt:	19.8	AF Correlation:	0.999988		

* = > +/-5% change initiates investigation

Notes: Changed the sample 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

TRS Calibration Summary

Version-11-2021

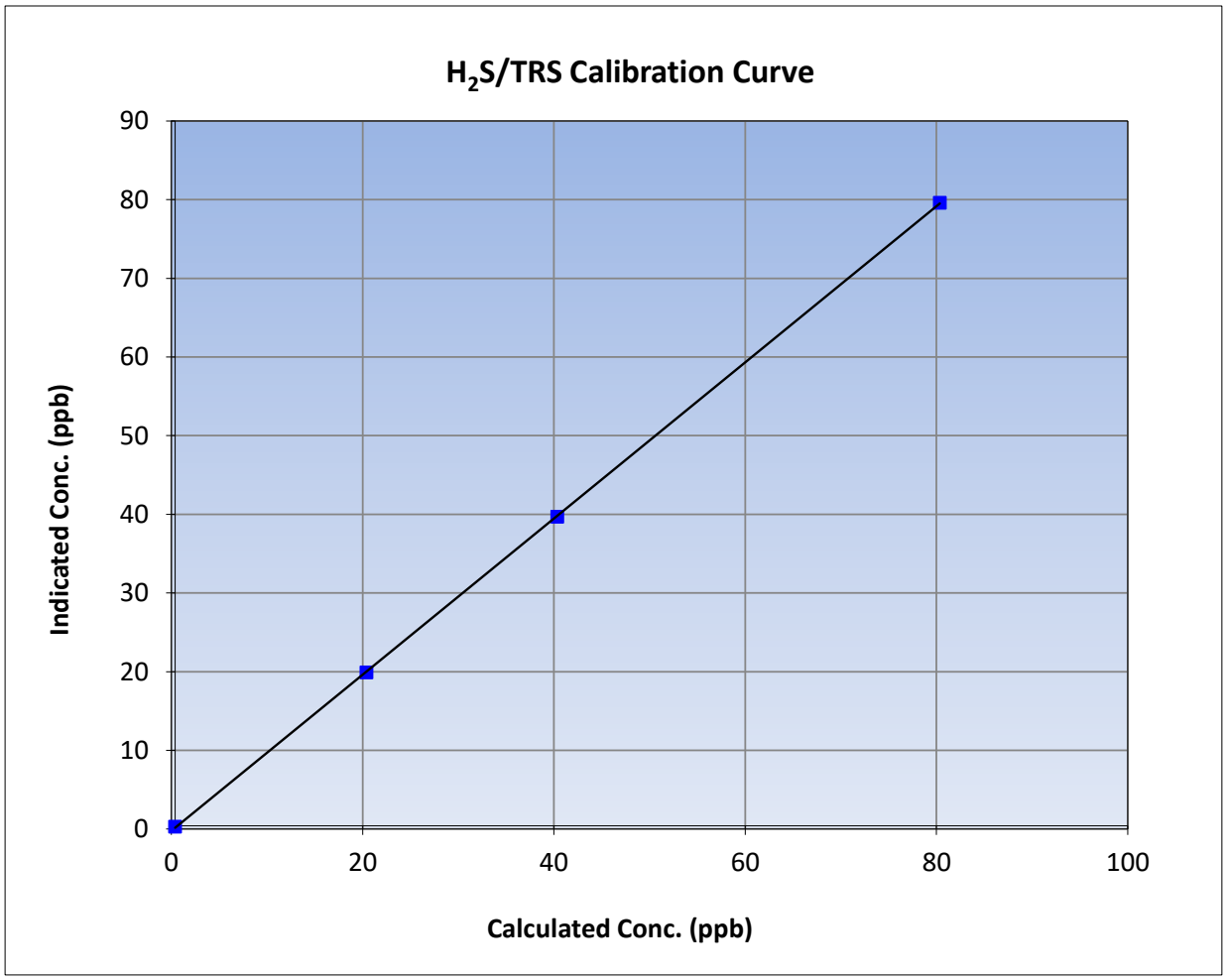
Station Information

Calibration Date:	September 7, 2023	Previous Calibration:	August 4, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	9:47	End Time (MST):	14:09
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153582

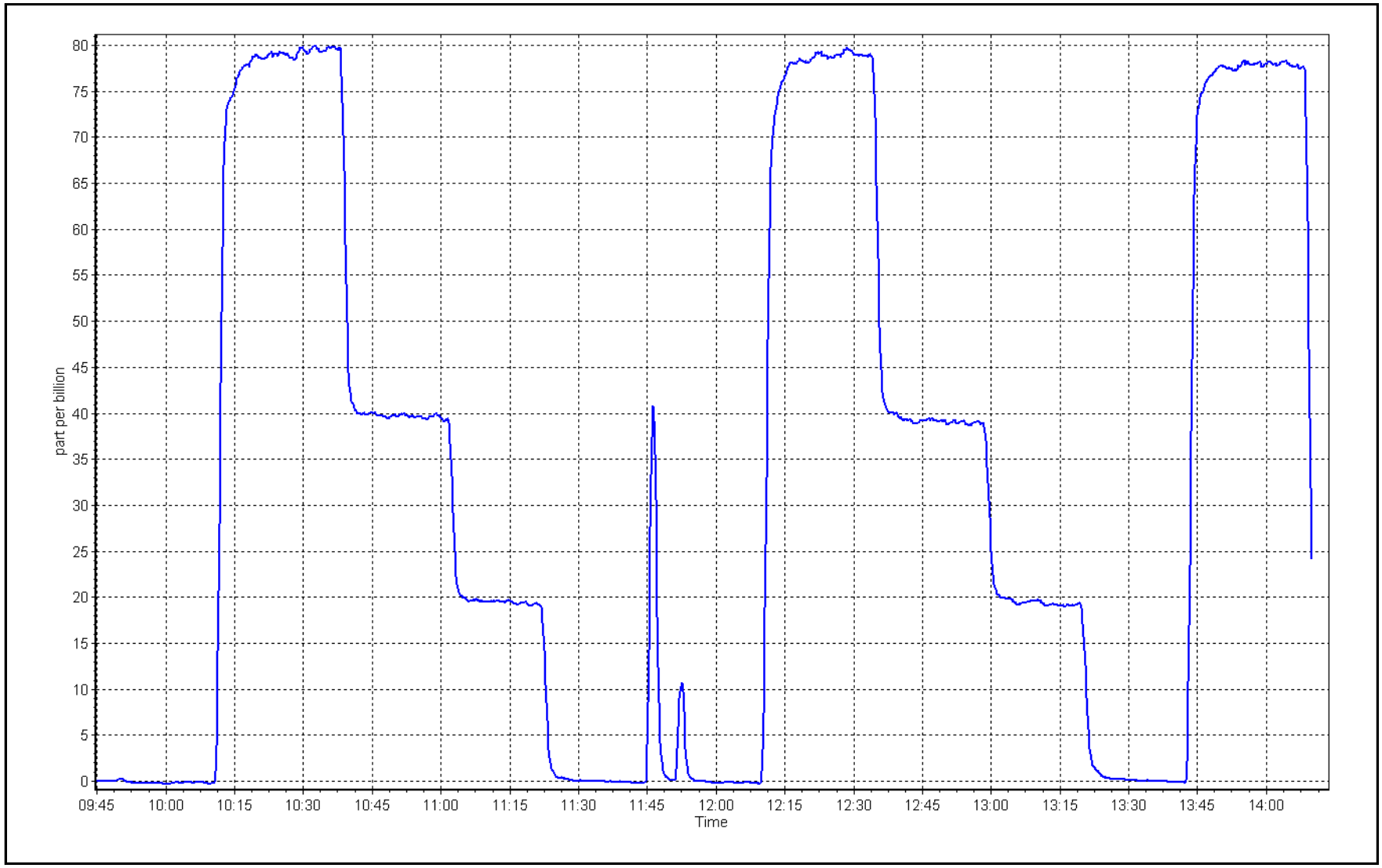
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	79.2	1.0095
40.0	39.3	1.0167
20.0	19.5	1.0262

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999984	*≥0.995*
Slope	0.992584	*0.90 - 1.10*
Intercept	-0.245370	*+/-3*



TRS Calibration Plot Date: September 7, 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:	September 6, 2023	Last Cal Date:	August 9, 2023
Start time (MST):	9:23	End time (MST):	12:34
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:	3060	
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	3.75E-04	NMHC SP Ratio:	4.53E-05	4.49E-05
CH4 Retention time:	12.20	12.20	NMHC Peak Area:	201206	203038

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	4938	80.3	17.10	17.55	0.975
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4938	80.3	17.10	17.13	0.999
second point	4979	40.2	8.56	8.52	1.005
third point	4998	20.2	4.30	4.24	1.014
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	17.10	17.13	0.998
				Average Correction Factor	1.006

Baseline Corr AF:	17.55	Prev response	17.21	*% change	2.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	9.11	9.21	0.990
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4938	80.3	9.11	9.12	0.999
second point	4979	40.2	4.56	4.54	1.006
third point	4998	20.2	2.29	2.25	1.018
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	9.11	9.12	0.999
				Average Correction Factor	1.008
Baseline Corr AF:	9.21	Prev response	9.07	*% 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	4938	80.3	7.99	8.34	0.958
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4938	80.3	7.99	8.01	0.998
second point	4979	40.2	4.00	3.98	1.004
third point	4998	20.2	2.01	1.99	1.011
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	7.99	8.01	0.997
				Average Correction Factor	1.004
Baseline Corr AF:	8.34	Prev response	8.13	*% change	2.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.007749	1.002474
THC Cal Offset:	-0.029955	-0.037684
CH4 Cal Slope:	1.019842	1.003084
CH4 Cal Offset:	-0.015535	-0.015639
NMHC Cal Slope:	0.997110	1.001701
NMHC Cal Offset:	-0.015020	-0.021844

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

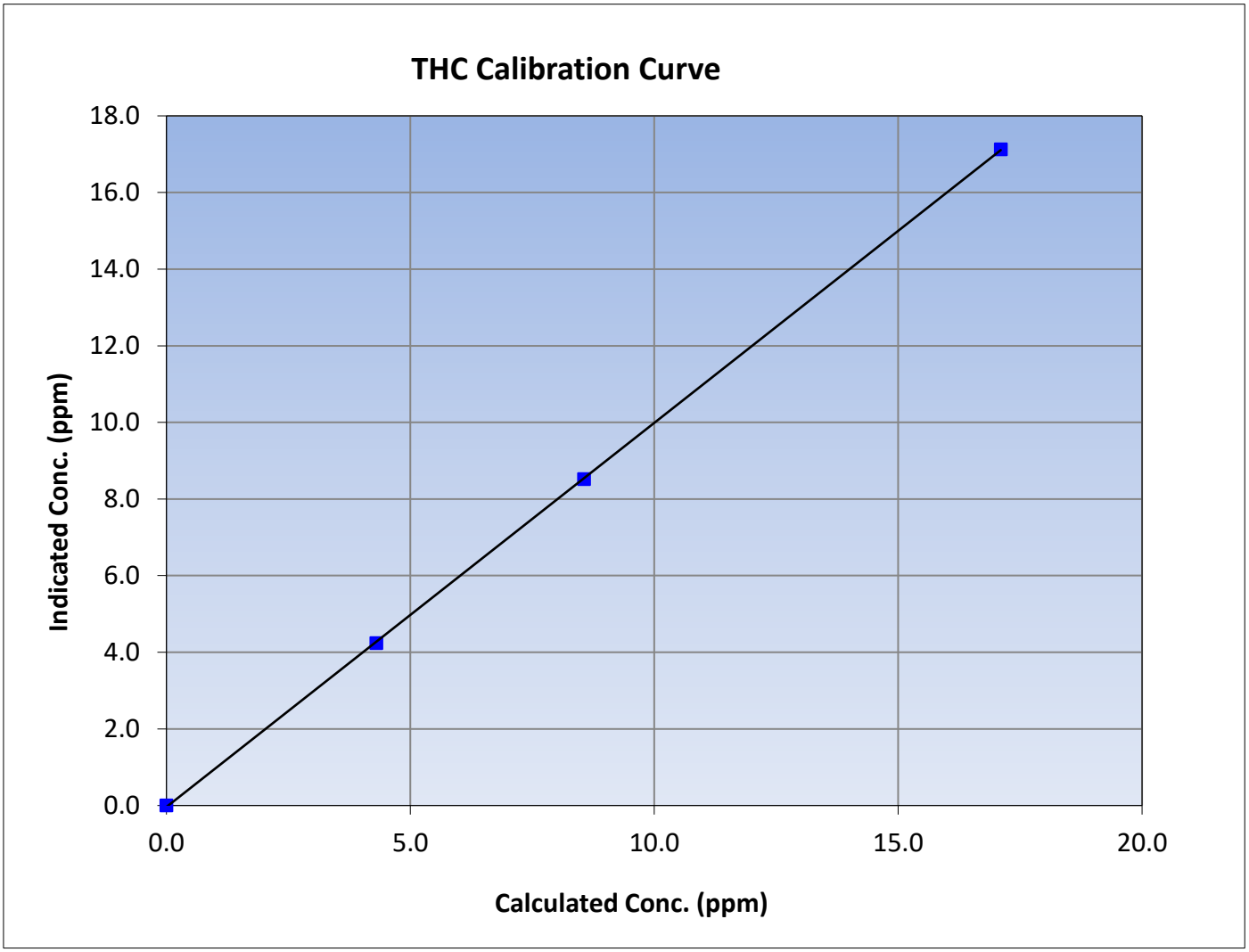
Version-01-2020

Station Information

Calibration Date:	September 6, 2023	Previous Calibration:	August 9, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:23	End Time (MST):	12:34
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999978	≥0.995
17.10	17.13	0.9985			
8.56	8.52	1.0048	Slope	1.002474	0.90 - 1.10
4.30	4.24	1.0145			
			Intercept	-0.037684	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

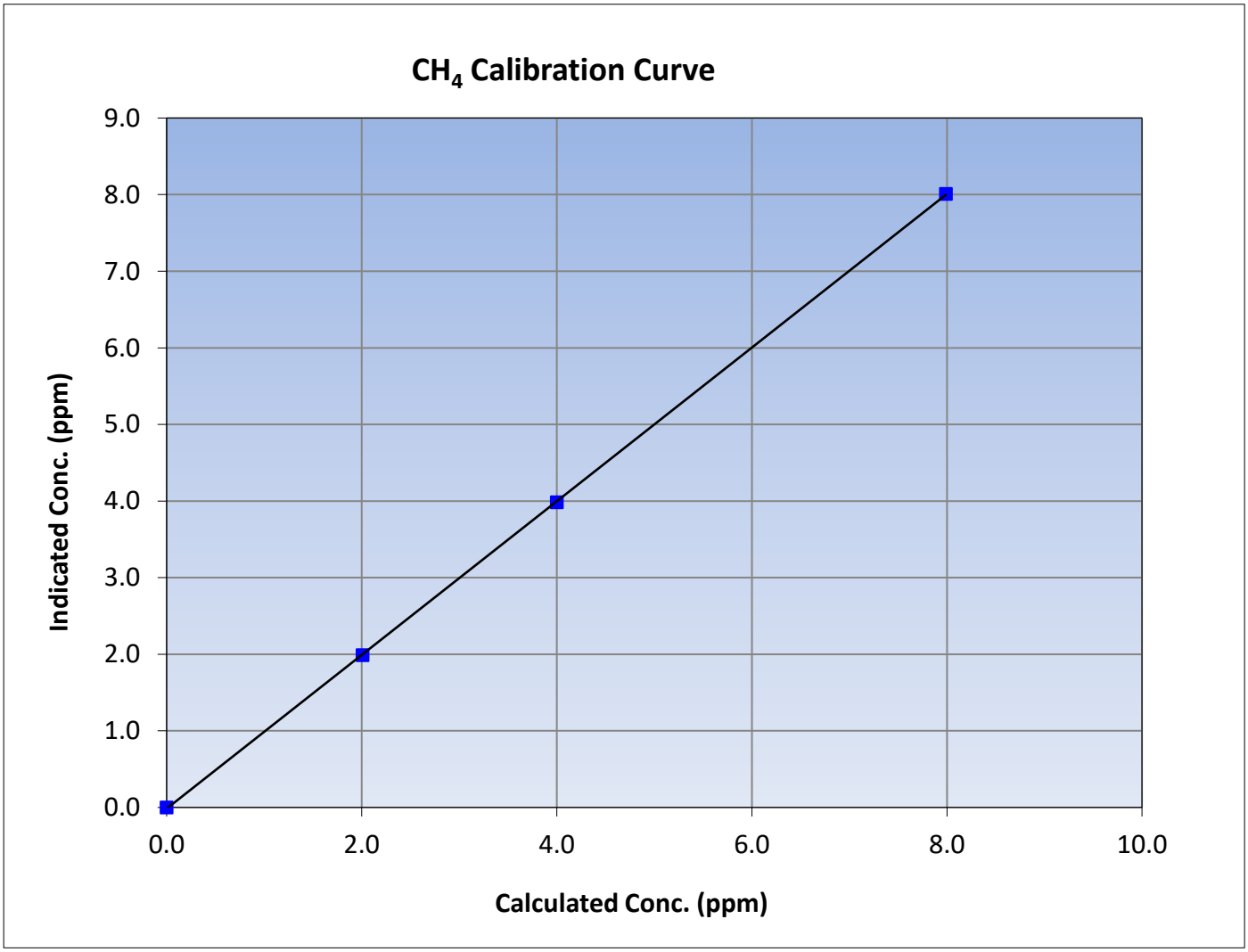
Version-01-2020

Station Information

Calibration Date:	September 6, 2023	Previous Calibration:	August 9, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:23	End Time (MST):	12:34
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	0.999981	*≥0.995*
7.99	8.01	0.9977			
4.00	3.98	1.0040	Slope	1.003084	*0.90 - 1.10*
2.01	1.99	1.0110			
			Intercept	-0.015639	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

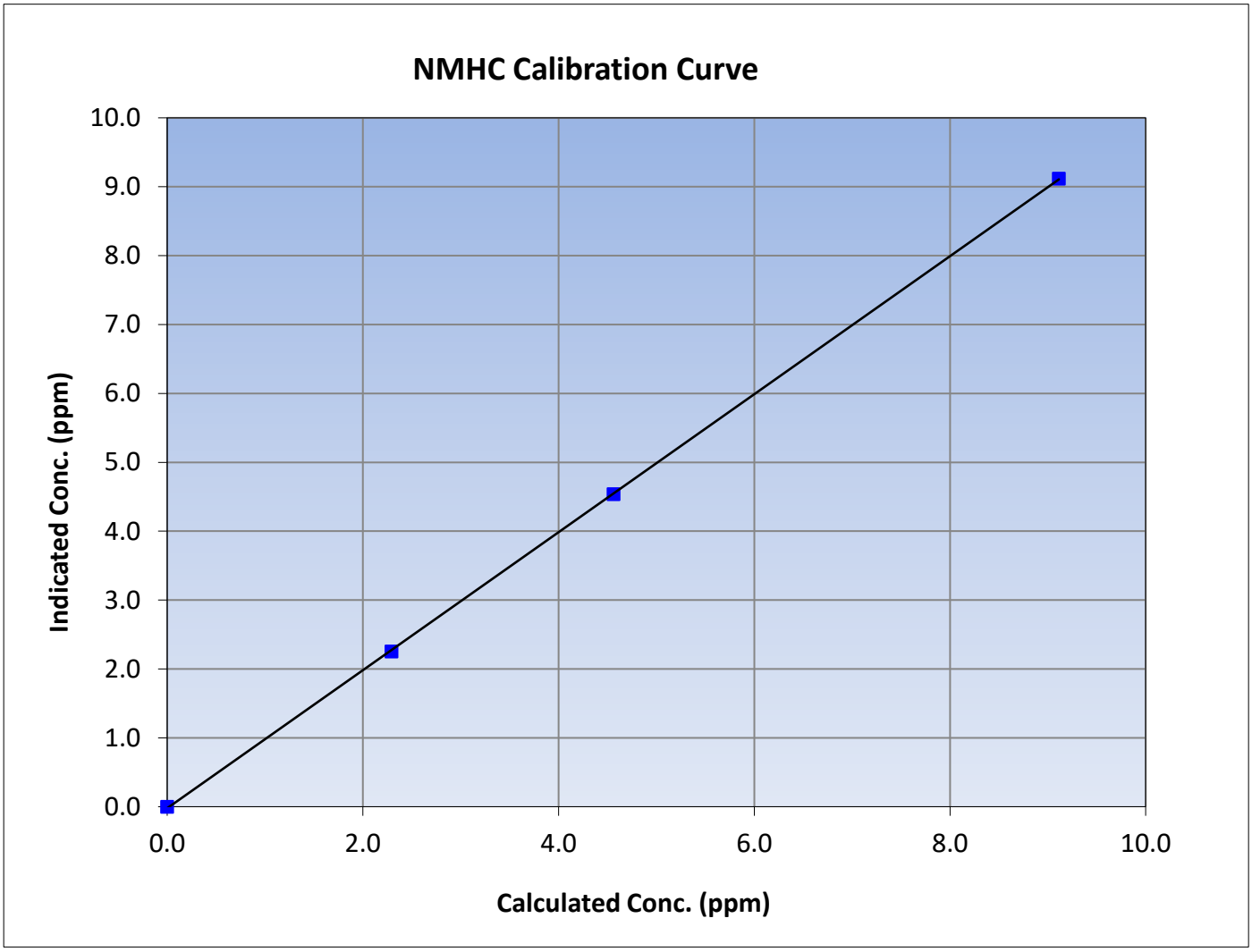
Version-01-2020

Station Information

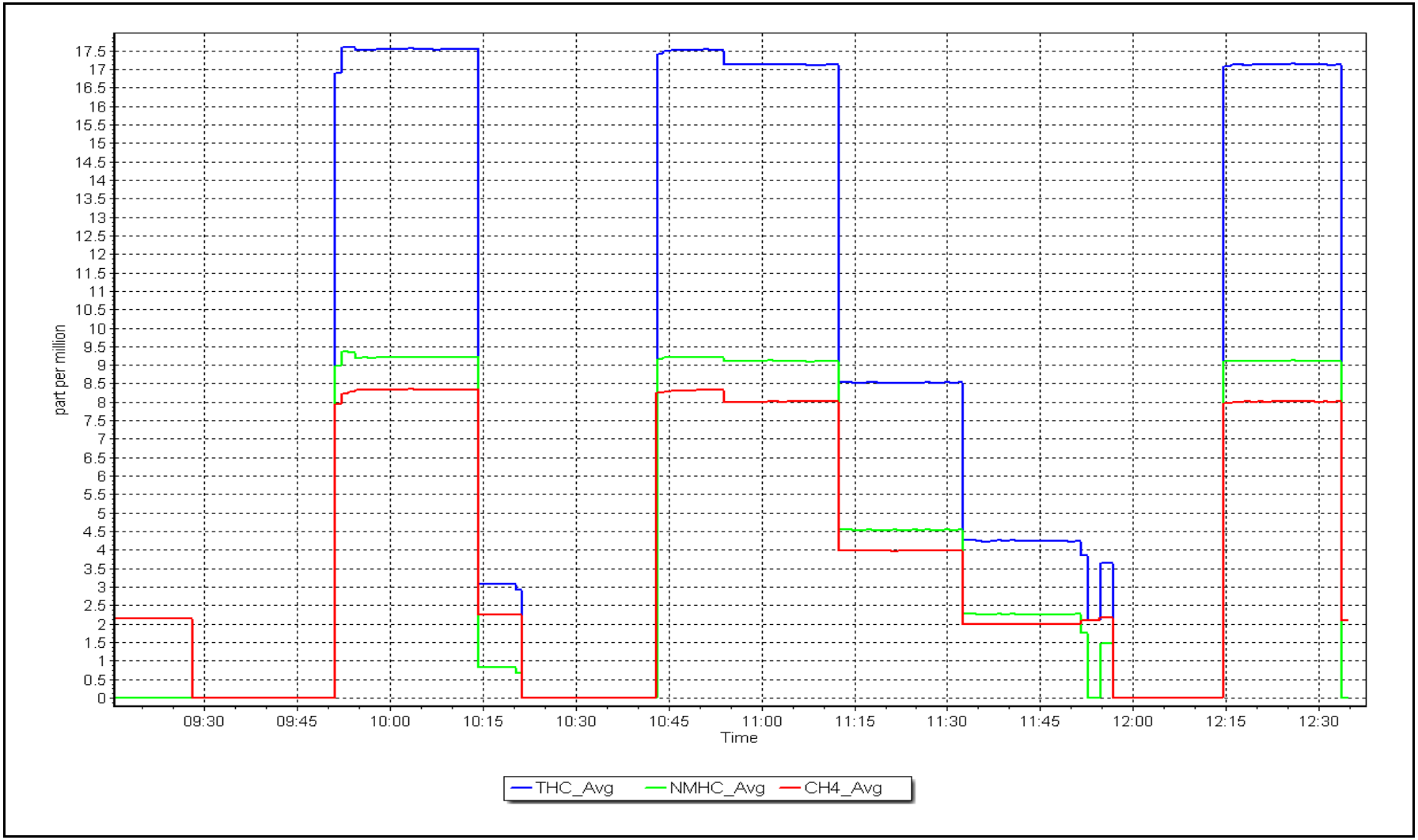
Calibration Date:	September 6, 2023	Previous Calibration:	August 9, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:23	End Time (MST):	12:34
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999974	≥0.995
9.11	9.12	0.9995			
4.56	4.54	1.0056	Slope	1.001701	0.90 - 1.10
2.29	2.25	1.0175			
			Intercept	-0.021844	+/-0.5



NMHC Calibration Plot Date: September 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:	September 25, 2023	Last Cal Date:	September 6, 2023
Start time (MST):	10:47	End time (MST):	12:24
Reason:	Cylinder Change		

Calibration Standards

Gas Cert Reference:		CC279389	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
C3H8 Cal Gas Conc.	207.1	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:		NA
Removed CH4 Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
Removed C3H8 Conc.	207.1	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3060	
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:	3.75E-04	NA	NMHC SP Ratio:	4.49E-05	NA
CH4 Retention time:	12.20	NA	NMHC Peak Area:	203038	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	4938	80.3	17.10	17.17	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4938	80.3	17.10	17.17	0.996
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.996
Baseline Corr AF:	17.17	Prev response	17.11	*% 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	4938	80.3	9.11	9.14	0.997
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4938	80.3	9.11	9.14	0.997
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.997
Baseline Corr AF:	9.14	Prev response	9.11	*% change	0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	7.99	8.03	0.995
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4938	80.3	7.99	8.03	0.995
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.995
Baseline Corr AF:	8.03	Prev response	8.00	*% change	0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

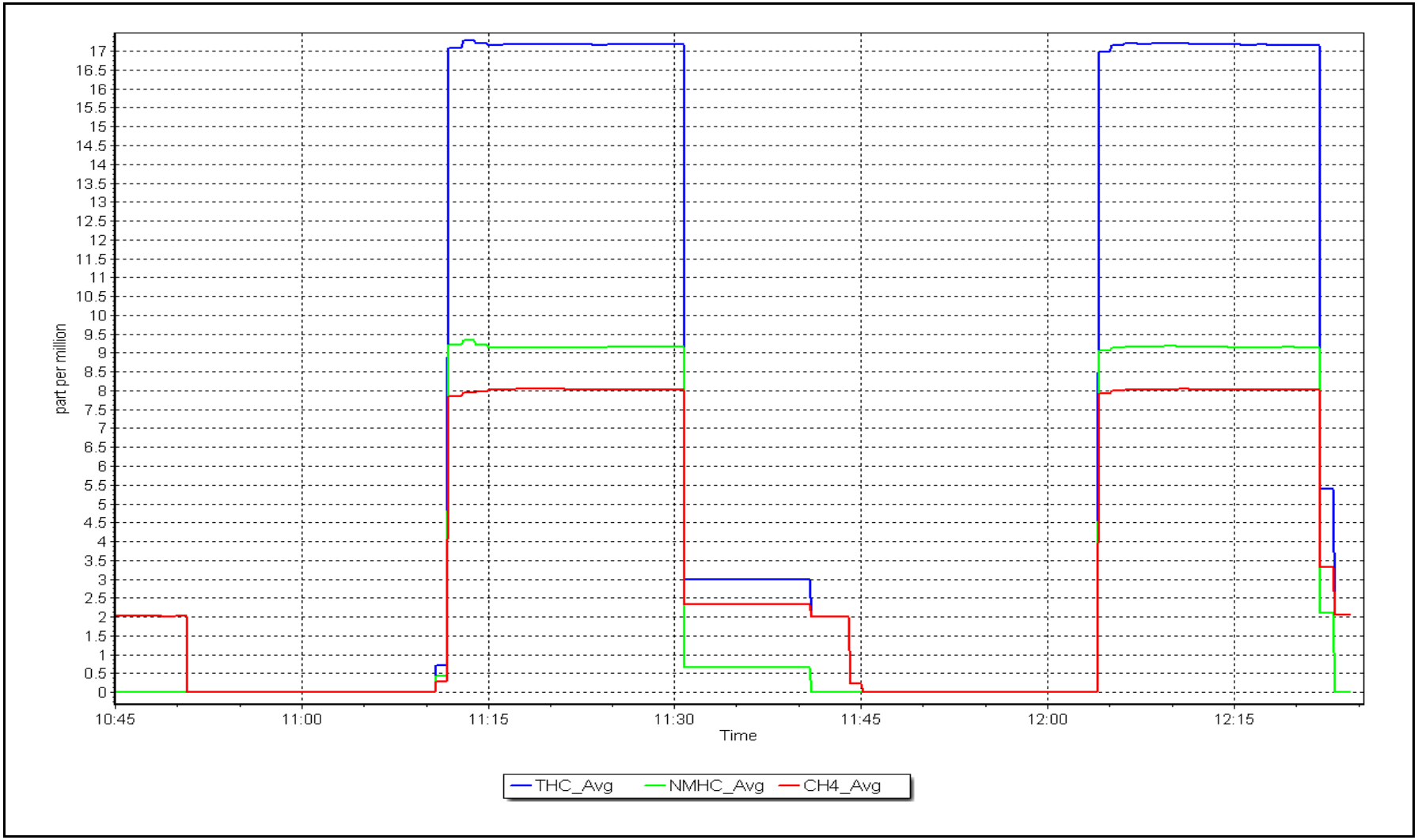
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.002474	1.004050
THC Cal Offset:	-0.037684	0.000000
CH4 Cal Slope:	1.003084	1.004817
CH4 Cal Offset:	-0.015639	0.000000
NMHC Cal Slope:	1.001701	1.003378
NMHC Cal Offset:	-0.021844	0.000000

Notes: Hydrogen cylinder change.

Calibration Performed By: Mohammed Kashif

NMHC Calibration Plot Date: September 25, 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:	September 5, 2023	Last Cal Date:	August 15, 2023
Start time (MST):	10:22	End time (MST):	15:14
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:	3060	
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	1.411	NO bkgnd or offset:	3.7	3.8
NOX coeff or slope:	0.996	0.996	NOX bkgnd or offset:	3.7	3.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	161.2	160.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.986023	1.000191
NO_X Cal Offset:	-0.615739	-0.708567
NO Cal Slope:	0.987256	1.000876
NO Cal Offset:	-2.172778	-2.586342
NO_2 Cal Slope:	1.000092	1.002633
NO_2 Cal Offset:	0.381307	0.926052

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.2	-0.2	0.4	----	----
as found span	4936	80.2	814.1	800.2	13.9	794.6	777.5	17.0	1.0246	1.0292
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.5	0.0	0.6	----	----
high point	4936	80.2	814.1	800.2	13.9	814.2	799.6	14.6	0.9999	1.0008
second point	4979	40.1	406.8	399.9	7.0	405.5	396.4	9.0	1.0033	1.0088
third point	4999	20.1	203.9	200.4	3.5	202.1	195.4	6.6	1.0090	1.0258
as left zero	5000	0.0	0.0	0.0	0.0	0.5	0.0	0.5	----	----
as left span	4936	80.2	814.1	413.5	400.6	813.5	410.1	403.4	1.0008	1.0083
								Average Correction Factor	1.0041	1.0118

Corrected As found	NO_X = 794.4 ppb	NO = 777.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-1.0%
Previous Response	NO_X = 802.1 ppb	NO = 787.8 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)	797.5	410.8	400.6	402.5	0.9953	100.5%
2nd GPT point (200 ppb O3)	797.5	607.4	204.0	205.4	0.9932	100.7%
3rd GPT point (100 ppb O3)	797.5	707.0	104.4	106.1	0.9841	101.6%
				Average Correction Factor	0.9909	100.9%

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

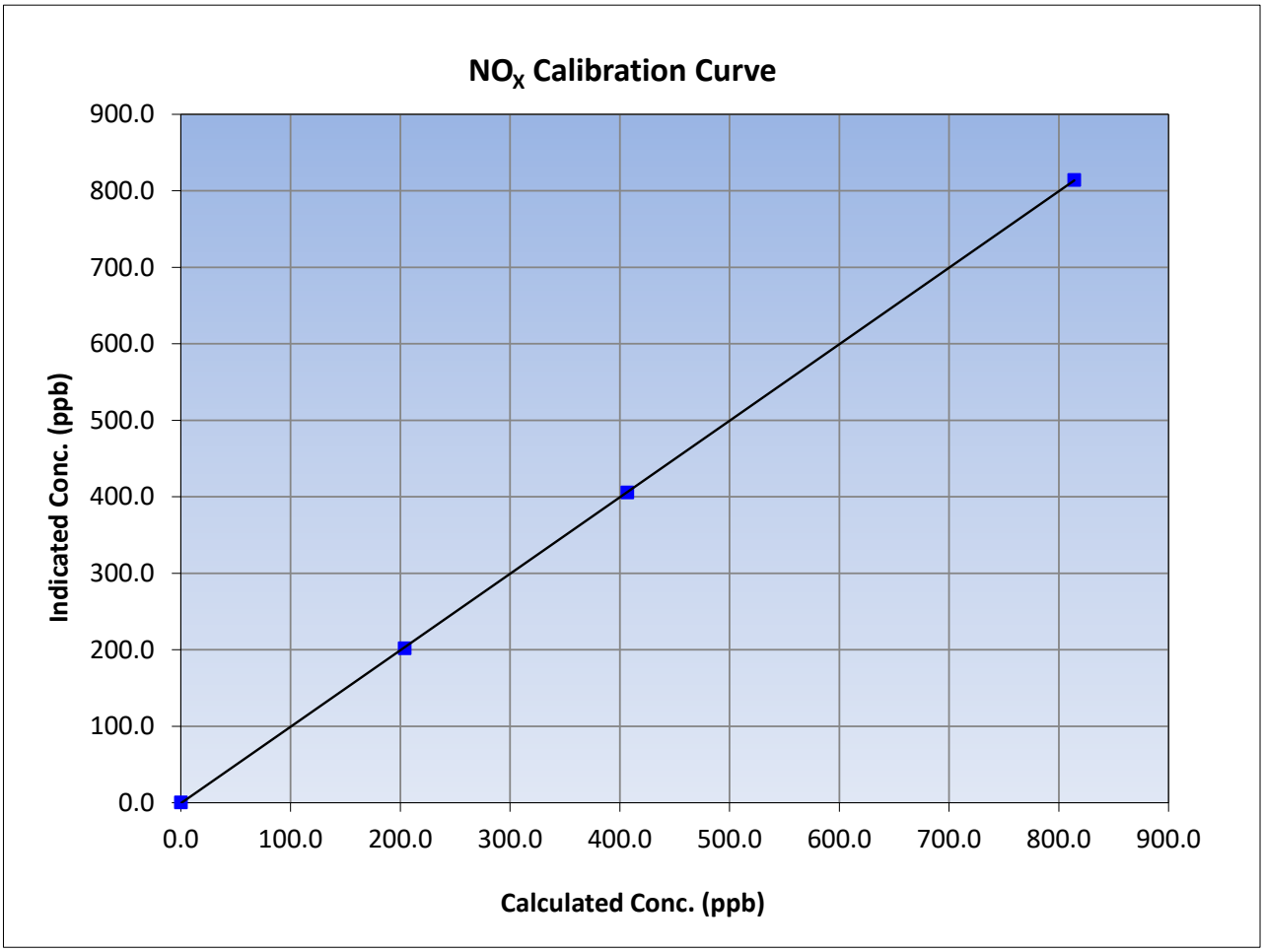
Version-04-2020

Station Information

Calibration Date:	September 5, 2023	Previous Calibration:	August 15, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	10:22	End Time (MST):	15:14
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	0.5	----	Correlation Coefficient	0.999990	≥0.995
814.1	814.2	0.9999			
406.8	405.5	1.0033	Slope	1.000191	0.90 - 1.10
203.9	202.1	1.0090			
			Intercept	-0.708567	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

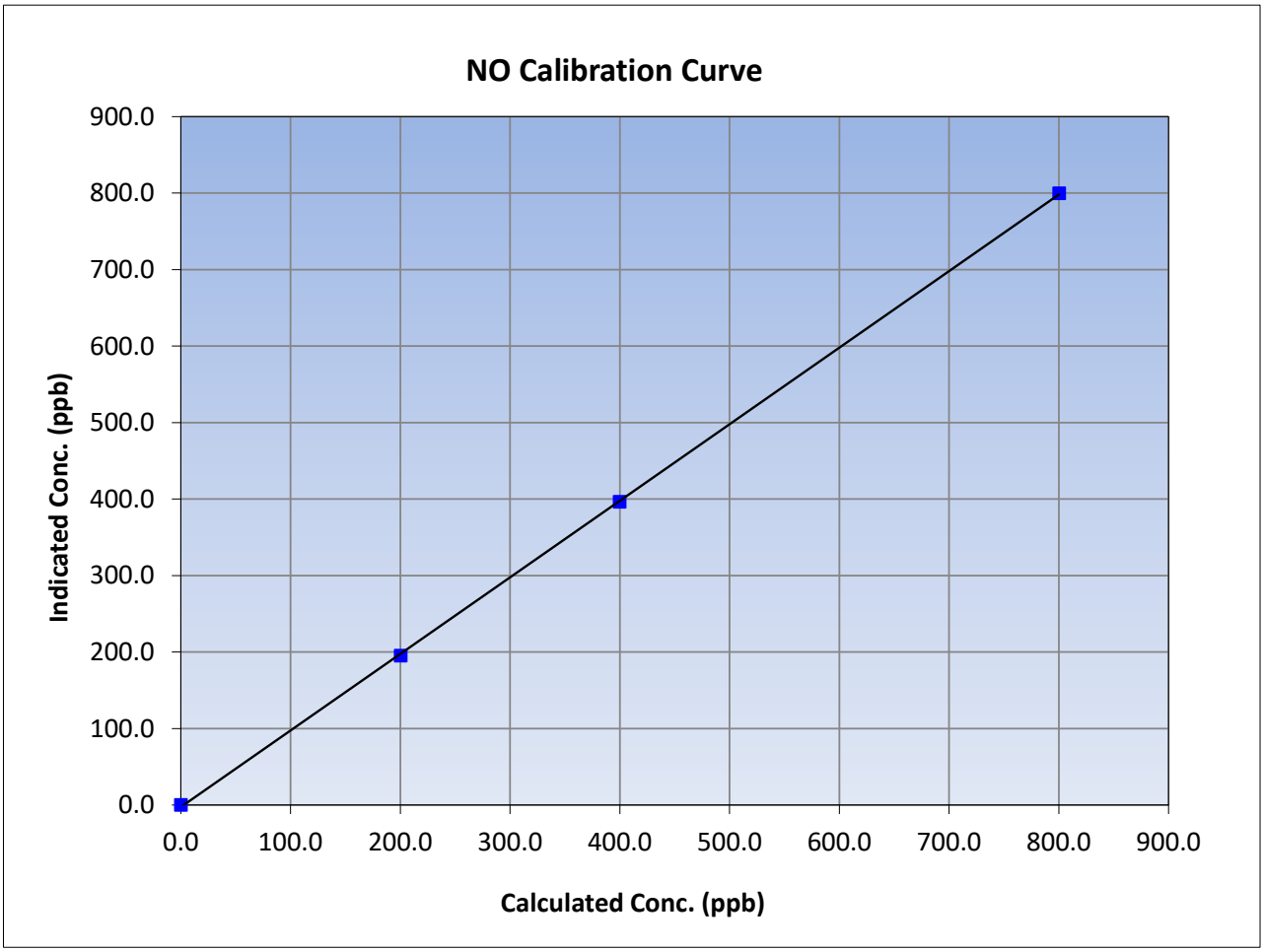
Version-04-2020

Station Information

Calibration Date:	September 5, 2023	Previous Calibration:	August 15, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	10:22	End Time (MST):	15:14
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	0.999952	≥0.995
800.2	799.6	1.0008			
399.9	396.4	1.0088	Slope	1.000876	0.90 - 1.10
200.4	195.4	1.0258			
			Intercept	-2.586342	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

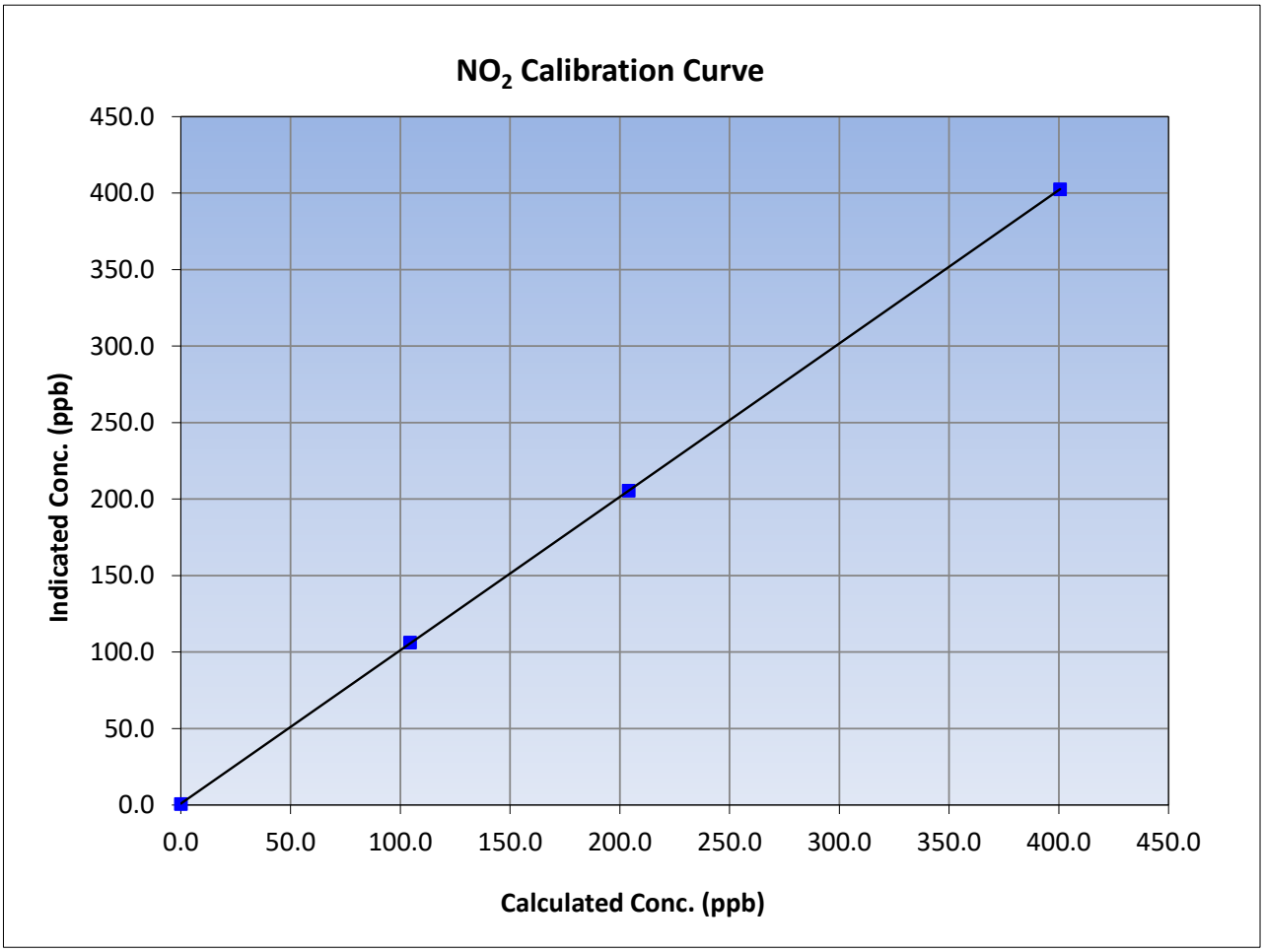
Version-04-2020

Station Information

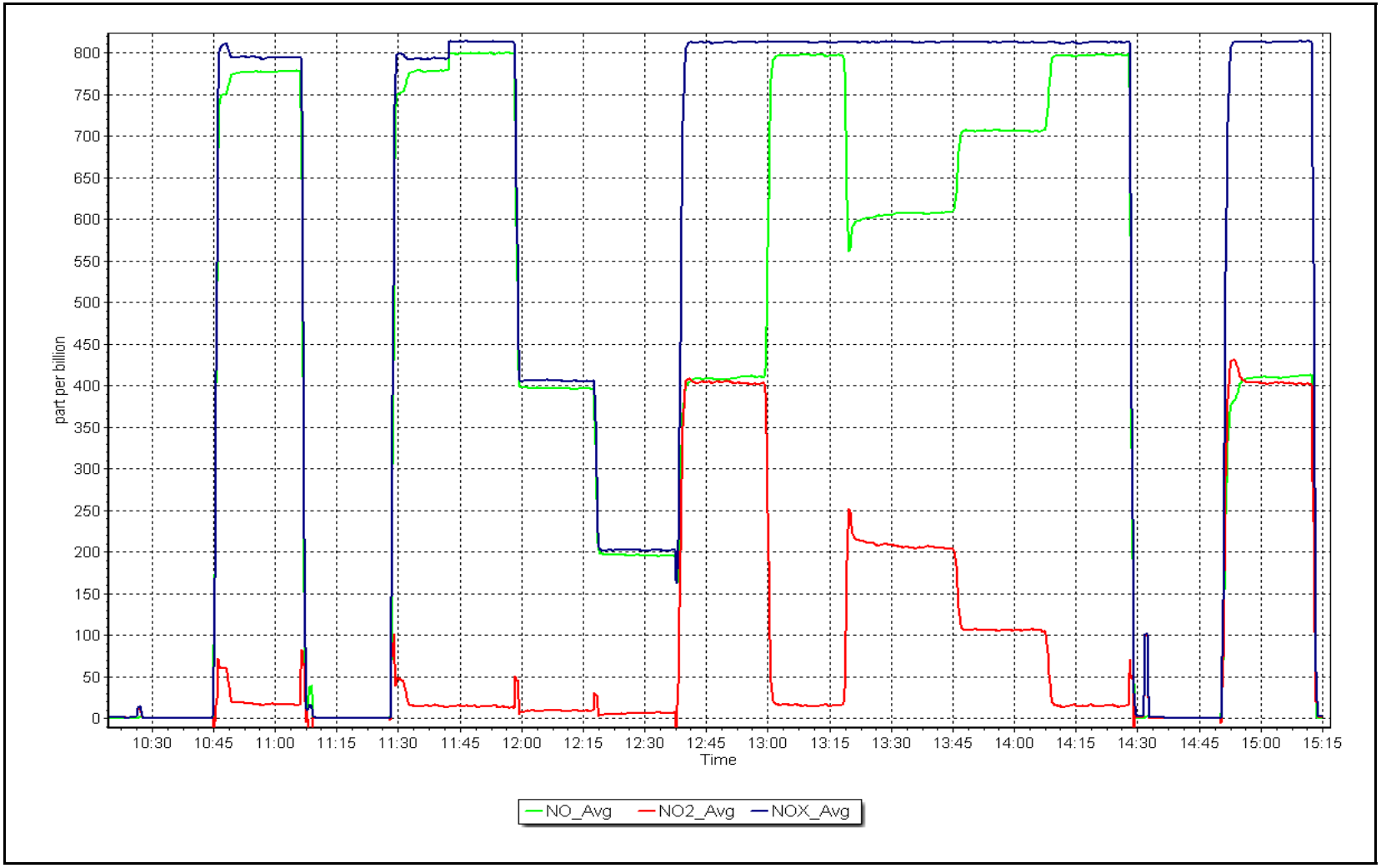
Calibration Date:	September 5, 2023	Previous Calibration:	August 15, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	10:22	End Time (MST):	15:14
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.6	----	Correlation Coefficient	0.999996	≥0.995
400.6	402.5	0.9953			
204.0	205.4	0.9932	Slope	1.002633	0.90 - 1.10
104.4	106.1	0.9841			
			Intercept	0.926052	+/-20



NO_X Calibration Plot Date: September 5, 2023 Location: Anzac



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	September 1, 2023	Last Cal Date:	August 1, 2023
Start time (MST):	8:47	End time (MST):	11:53
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	API T700	Serial Number:	3060
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:	0.999171	1.004857	Backgd or Offset:	1.3	1.4
Calibration intercept:	0.520000	-2.500000	Coeff or Slope:	1.550	1.604

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	920.5	400.0	386.6	1.035
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	920.5	400.0	400.7	0.998
second point	5000	793.4	200.0	197.3	1.014
third point	5000	686.0	100.0	95.3	1.049
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	920.5	400.0	405.1	0.987
				Average Correction Factor	1.020

Baseline Corr As found:	386.4	Previous response	400.2	*% change	-3.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

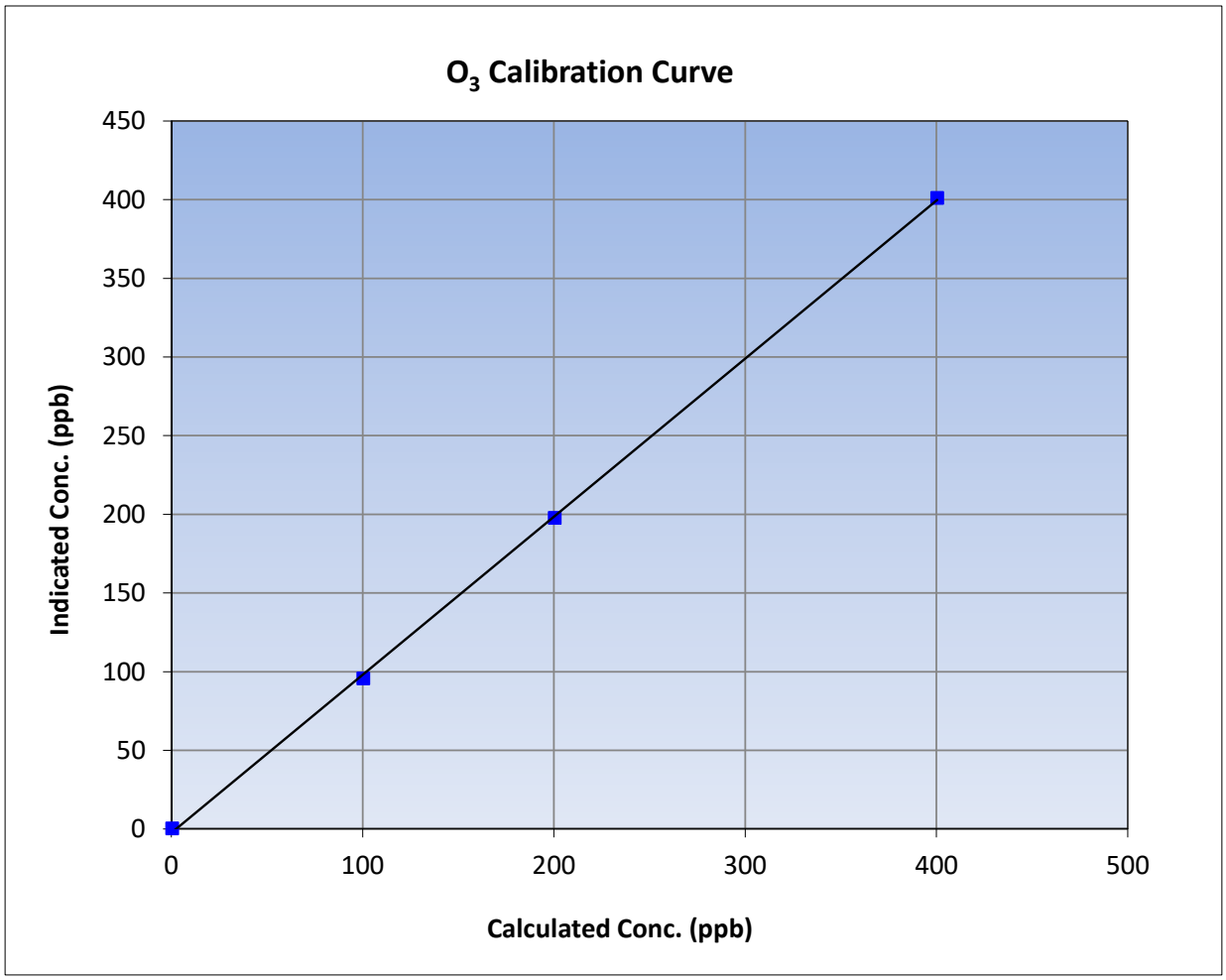
Station Information

Calibration Date:	September 1, 2023	Previous Calibration:	August 1, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	8:47	End Time (MST):	11:53
Analyzer make:	Thermo 49i	Analyzer serial #:	1426262595

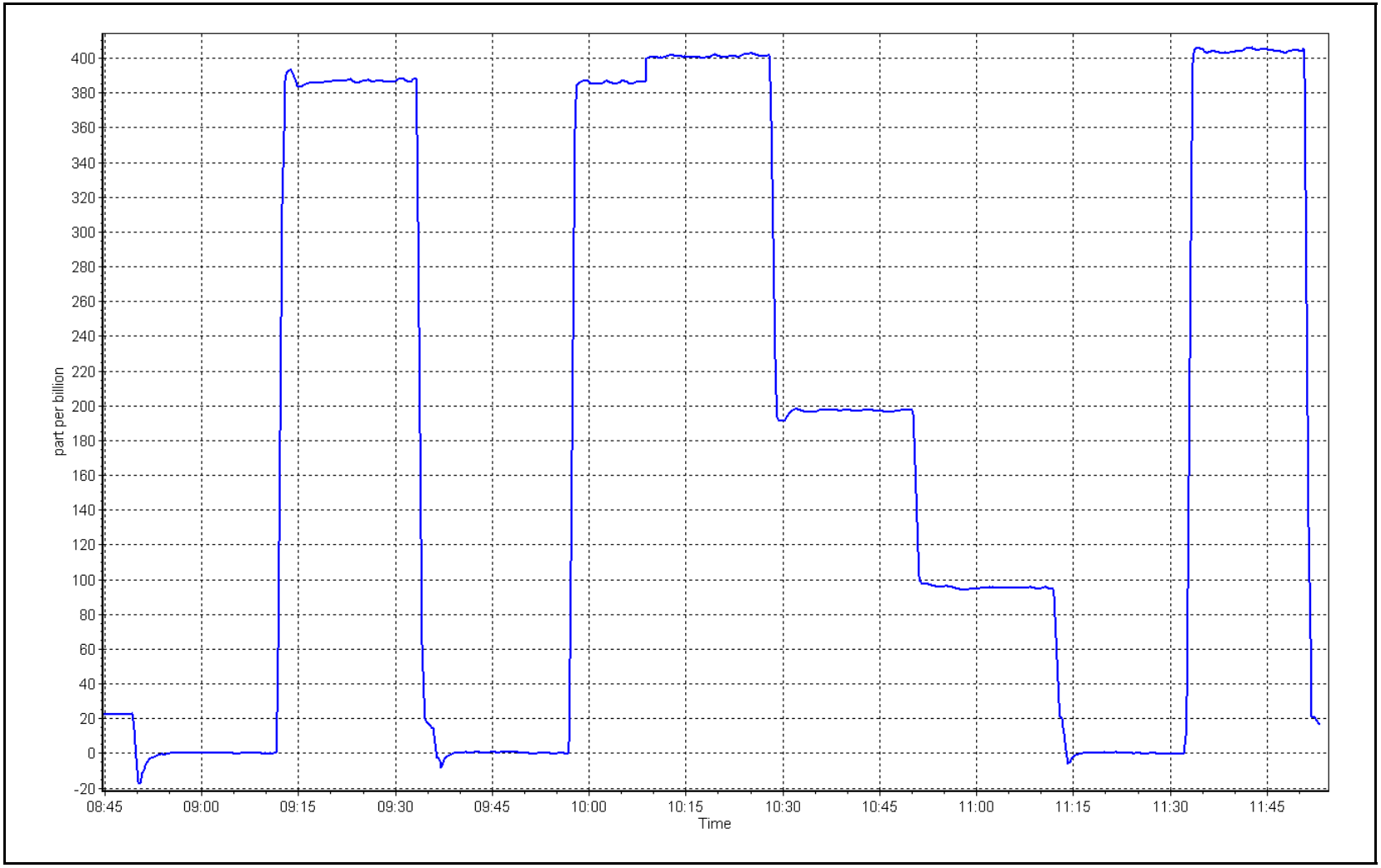
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
400.0	400.7	0.9983
200.0	197.3	1.0137
100.0	95.3	1.0493

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999808	*≥0.995*
Slope	1.004857	*0.90 - 1.10*
Intercept	-2.500000	*+/- 5*



O_3 Calibration Plot Date: September 1, 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:	September 8, 2023	Last Cal Date:	August 1, 2023
Start time (MST):	11:00	End time (MST):	12:21
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)	20.5	22.4	20.5	☐	+/- 2 °C
P (mmHg)	719.9	719.6	719.9	☐	+/- 10 mmHg
flow (LPM)	4.99	4.81	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: September 8, 2023 Last Cal Date: August 1, 2023

PM w/o HEPA: 9.9 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	11.9	11.6	10.9	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 9.4 w/ HEPA: 0 <0.2 ug/m3

Date Optical Chamber Cleaned: September 8, 2023

Disposable Filter Changed: September 8, 2023

Annual Maintenance

Date Sample Tube Cleaned: July 6, 2023

Date RH/T Sensor Cleaned: July 6, 2023

Notes: Performed quarterly maintenance and leak check passed. Adjusted PMT peak test. Head cleaned.

Calibration by: Mohammed Kashif

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS17
WAPASU
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	September 5, 2023	Last Cal Date:	August 3, 2023
Start time (MST):	10:51	End time (MST):	13:41
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.003838	1.001653	Backgd or Offset:	12.6	12.6
Calibration intercept:	-2.099065	-1.759511	Coeff or Slope:	1.111	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	0.1	----
as found span	4921	79.4	800.0	800.2	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	----
high point	4921	79.4	800.0	801.0	0.999
second point	4960	39.7	400.0	396.7	1.008
third point	4980	19.8	199.5	196.7	1.014
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	79.4	800.1	802.8	0.997
				Average Correction Factor	1.007

Baseline Corr As found:	800.10	Previous response	800.94	*% 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 needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

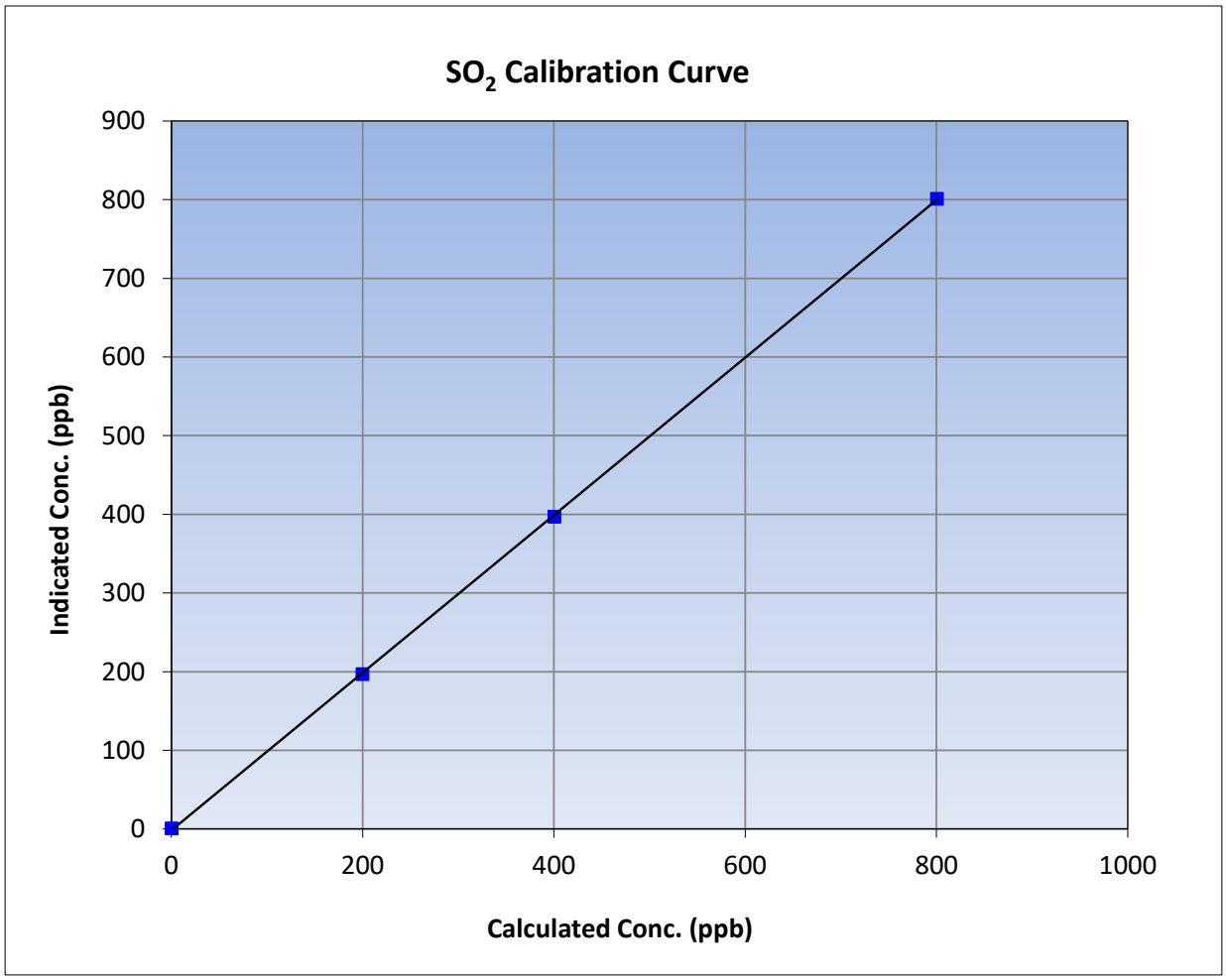
Station Information

Calibration Date:	September 5, 2023	Previous Calibration:	August 3, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:51	End Time (MST):	13:41
Analyzer make:	Thermo 43i	Analyzer serial #:	1218153459

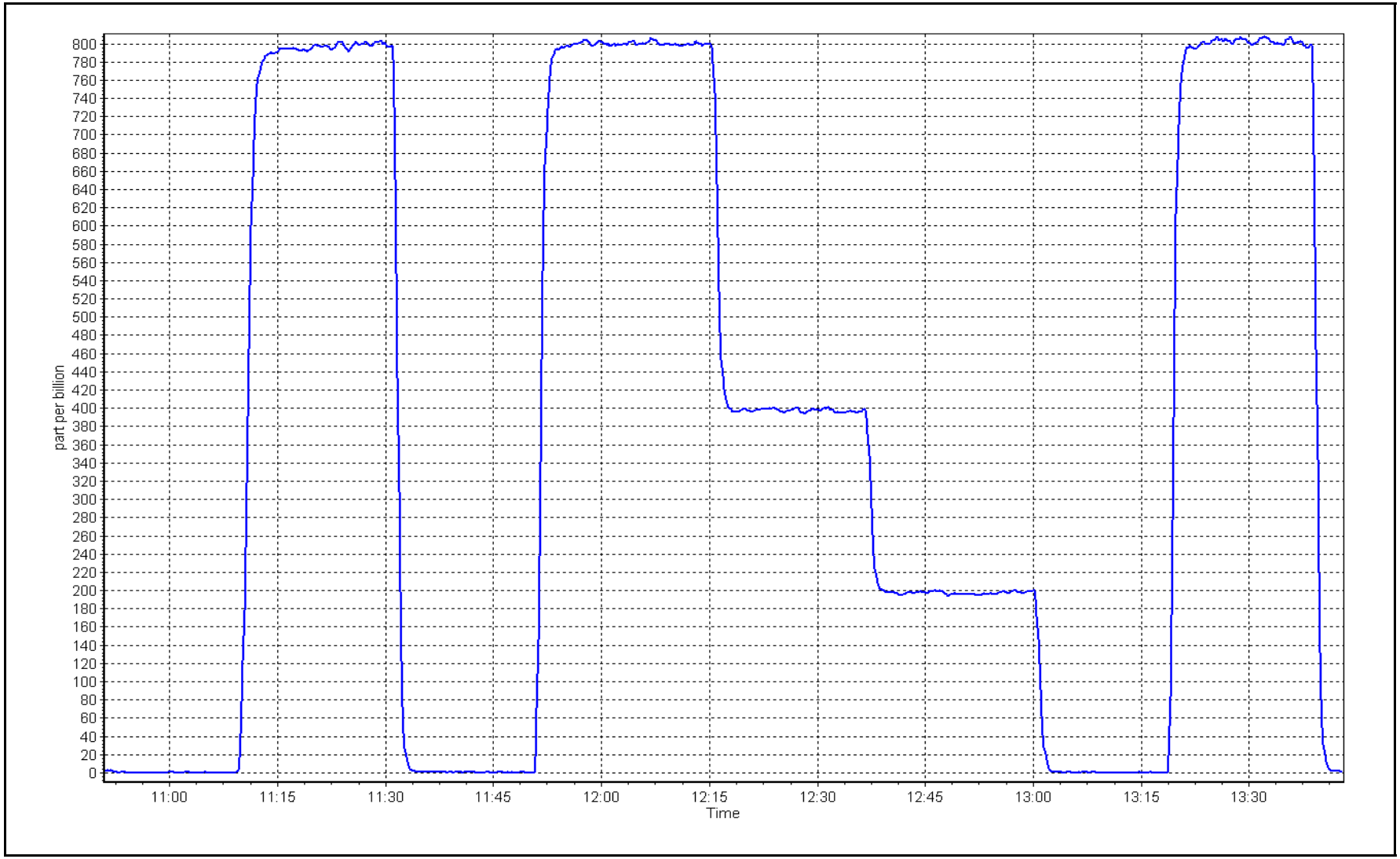
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
800.0	801.0	0.9987
400.0	396.7	1.0084
199.5	196.7	1.0143

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999961	*≥0.995*
Slope	1.001653	*0.90 - 1.10*
Intercept	-1.759511	*+/-30*



SO2 Calibration Plot Date: September 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:	September 7, 2023	Last Cal Date:	August 8, 2023
Start time (MST):	10:41	End time (MST):	15:30
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:	0.996998	0.990569	Backgd or Offset:	13.1	12.2
Calibration intercept:	-0.219239	-0.219241	Coeff or Slope:	1.116	1.114

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4921	78.8	80.0	82.2	0.972
as found 2nd point	4961	39.4	40.0	41.5	0.961
as found 3rd point	4980	19.7	20.0	20.4	0.976
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	79.4	1.008
second point	4961	39.4	40.0	38.7	1.033
third point	4980	19.7	20.0	19.5	1.026
as left zero	5000	0.0	0.0	0.5	----
as left span	4921	78.8	80.0	76.5	1.046
SO2 Scrubber Check	4921	79.4	800.0	-0.1	----
Date of last scrubber change:		n/a		Ave Corr Factor	1.022
Date of last converter efficiency test:		n/a			efficiency

Baseline Corr As found:	82.3	Prev response:	79.54	*% change:	3.4%
Baseline Corr 2nd AF pt:	41.6	AF Slope:	1.029710	AF Intercept:	-0.039159
Baseline Corr 3rd AF pt:	20.5	AF Correlation:	0.999953		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

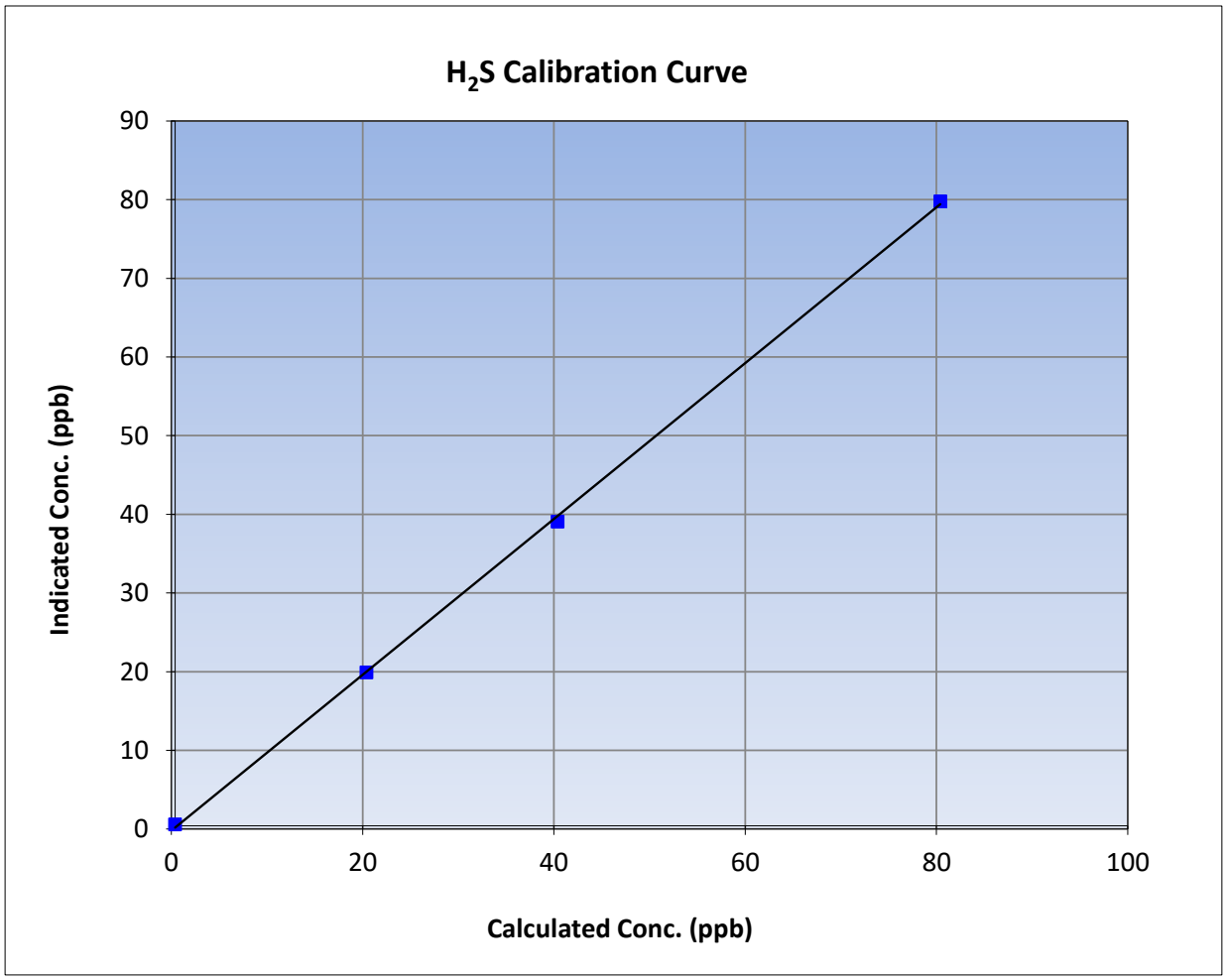
Station Information

Calibration Date:	September 7, 2023	Previous Calibration:	August 8, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:41	End Time (MST):	15:30
Analyzer make:	Thermo 450i	Analyzer serial #:	1218153583

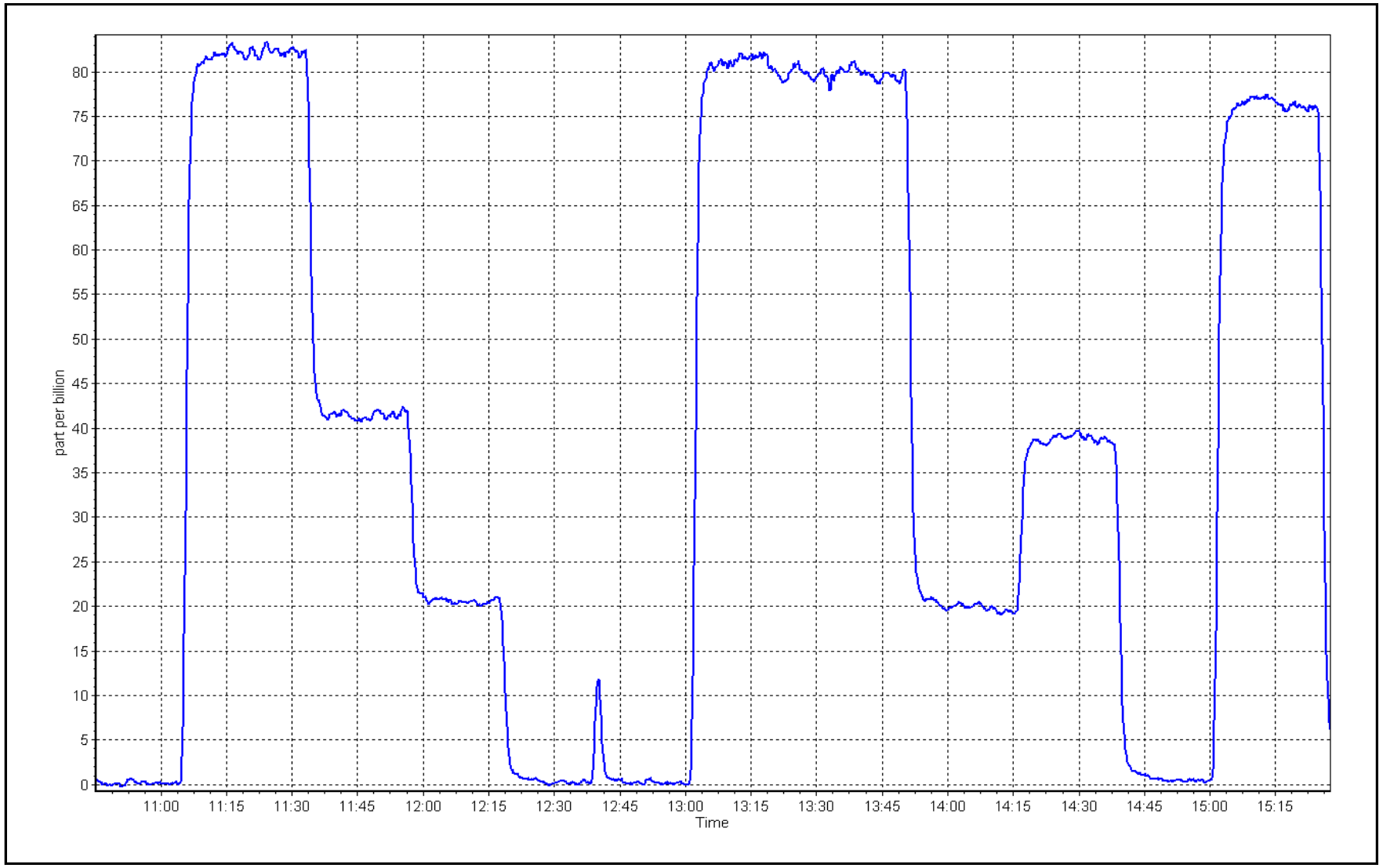
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	79.4	1.0076
40.0	38.7	1.0335
20.0	19.5	1.0257

Statistical Evaluation		Limits
Correlation Coefficient	0.999764	≥0.995
Slope	0.990569	0.90 - 1.10
Intercept	-0.219241	+/-3



H_2S Calibration Plot Date: September 7, 2023 Location: Wapasu



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	September 5, 2023	Last Cal Date:	August 3, 2023
Start time (MST):	10:51	End time (MST):	13:41
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 51i-LT		Analyzer serial #:	1218153352	
Analyzer Range:	0 - 20 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999409	1.001763	Background:	3.300	3.300
Calibration intercept:	-0.080737	-0.062338	Coefficient:	4.460	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	-0.05	----
as found span	4921	79.4	17.09	17.07	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.01	----
high point	4921	79.4	17.09	17.12	0.999
second point	4960	39.7	8.55	8.40	1.018
third point	4980	19.8	4.26	4.18	1.019
as left zero	5000	0.0	0.00	-0.02	----
as left span	4920	79.4	17.09	17.15	0.997
				Average Correction Factor	1.012

Baseline Corr As found:	17.12	Previous response	17.00	*% change	0.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

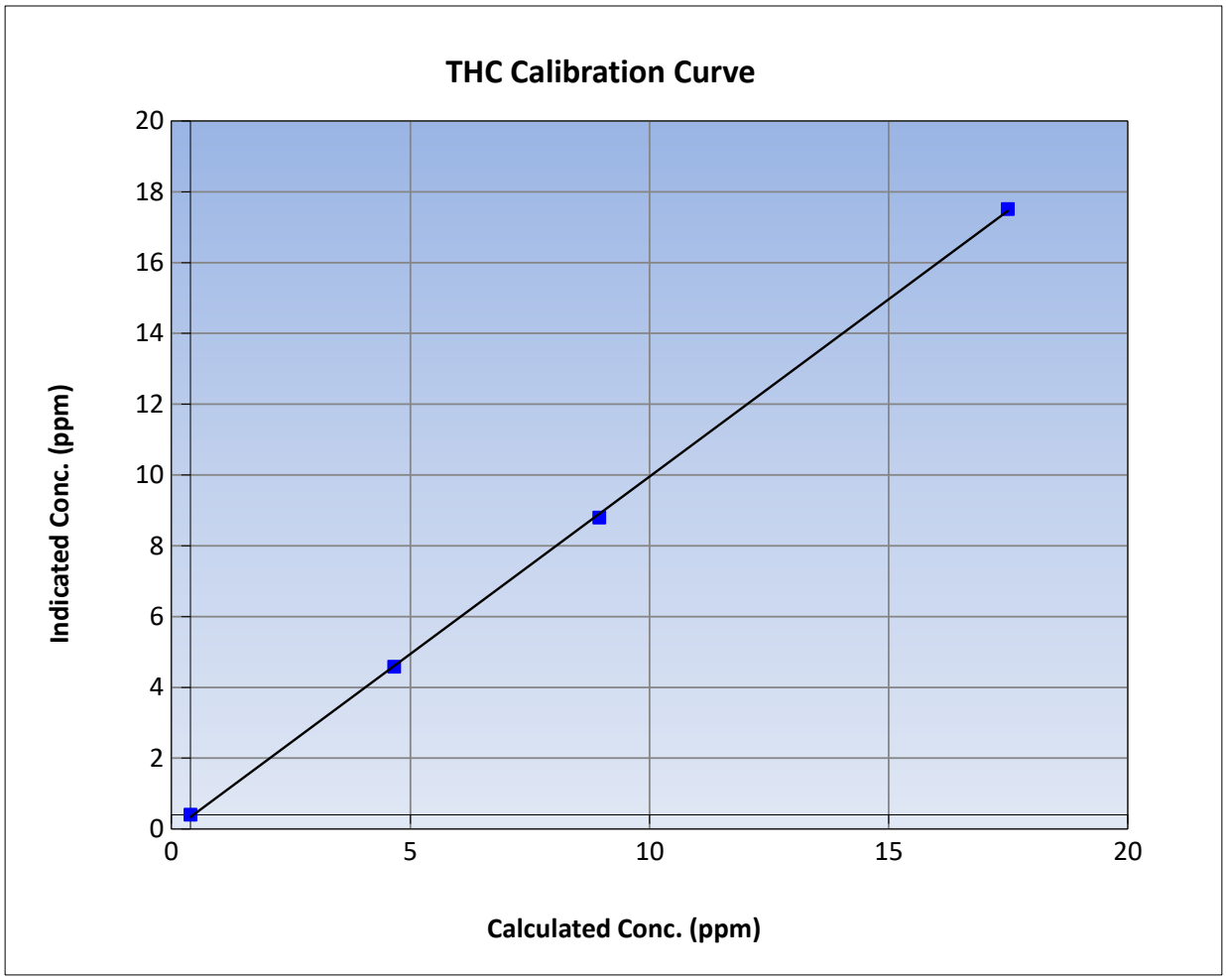
Station Information

Calibration Date:	September 5, 2023	Previous Calibration:	August 3, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:51	End Time (MST):	13:41
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1218153352

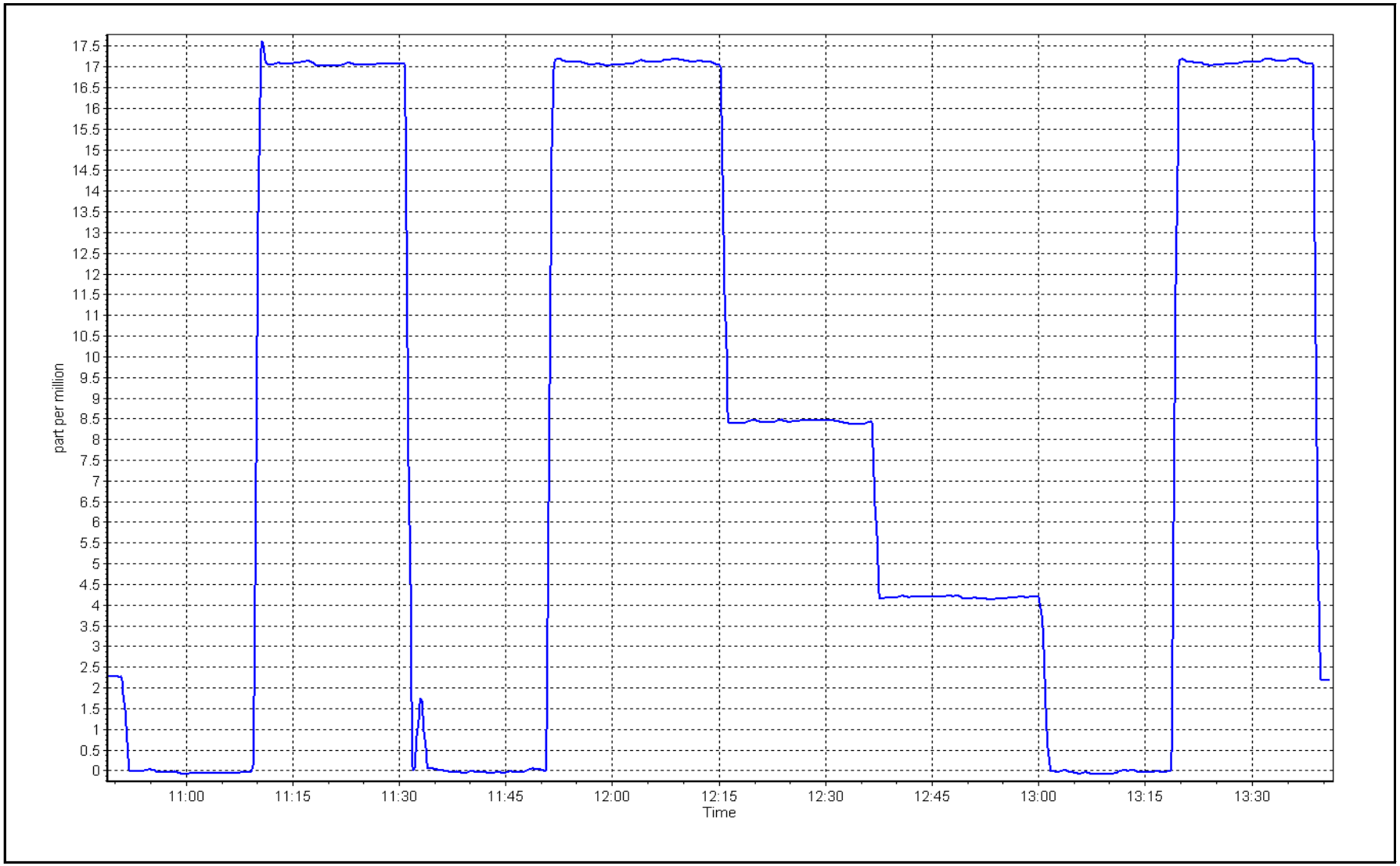
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.01	----
17.09	17.12	0.9986
8.55	8.40	1.0177
4.26	4.18	1.0187

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999884	*≥0.995*
Slope	1.001763	*0.90 - 1.10*
Intercept	-0.062338	*+/-1.5*



THC Calibration Plot Date: September 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:	September 22, 2023	Last Cal Date:	August 15, 2023
Start time (MST):	10:27	End time (MST):	15:37
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.212	1.269	NO bkgnd or offset:	9	9.0
NOX coeff or slope:	0.992	0.989	NOX bkgnd or offset:	9.1	9.1
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	383.1	363.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001480	1.000361
NO_X Cal Offset:	-3.500000	-3.500000
NO Cal Slope:	0.999458	1.002373
NO Cal Offset:	-3.960000	-4.480000
NO_2 Cal Slope:	0.998776	0.998879
NO_2 Cal Offset:	-0.422855	-1.541001

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	-0.2	----	----
as found span	4917	83.2	817.2	799.9	17.3	762.5	746.2	16.3	1.0717	1.0719
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.3	0.2	0.1	----	----
high point	4917	83.2	817.2	799.9	17.3	816.4	800.1	16.4	1.0010	0.9997
second point	4958	41.6	408.6	399.9	8.7	401.8	392.7	9.1	1.0169	1.0184
third point	4979	20.8	204.3	200.0	4.3	198.1	192.2	5.9	1.0313	1.0404
as left zero	5000	0.0	0.0	0.0	0.0	0.6	0.4	0.2	----	----
as left span	4917	83.2	817.2	398.3	418.9	805.1	389.9	415.2	1.0150	1.0214
								Average Correction Factor	1.0164	1.0195

Corrected As found	NO_X = 762.5 ppb	NO = 746.1 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-6.9%
Previous Response	NO_X = 814.9 ppb	NO = 795.5 ppb		*Percent Change	NO =	-6.6%
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)	797.8	396.2	418.9	417.8	1.0026	99.7%
2nd GPT point (200 ppb O3)	797.8	593.7	221.4	218.9	1.0114	98.9%
3rd GPT point (100 ppb O3)	797.8	694.6	120.5	117.0	1.0300	97.1%
				Average Correction Factor	1.0147	98.6%

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

NO_X Calibration Summary

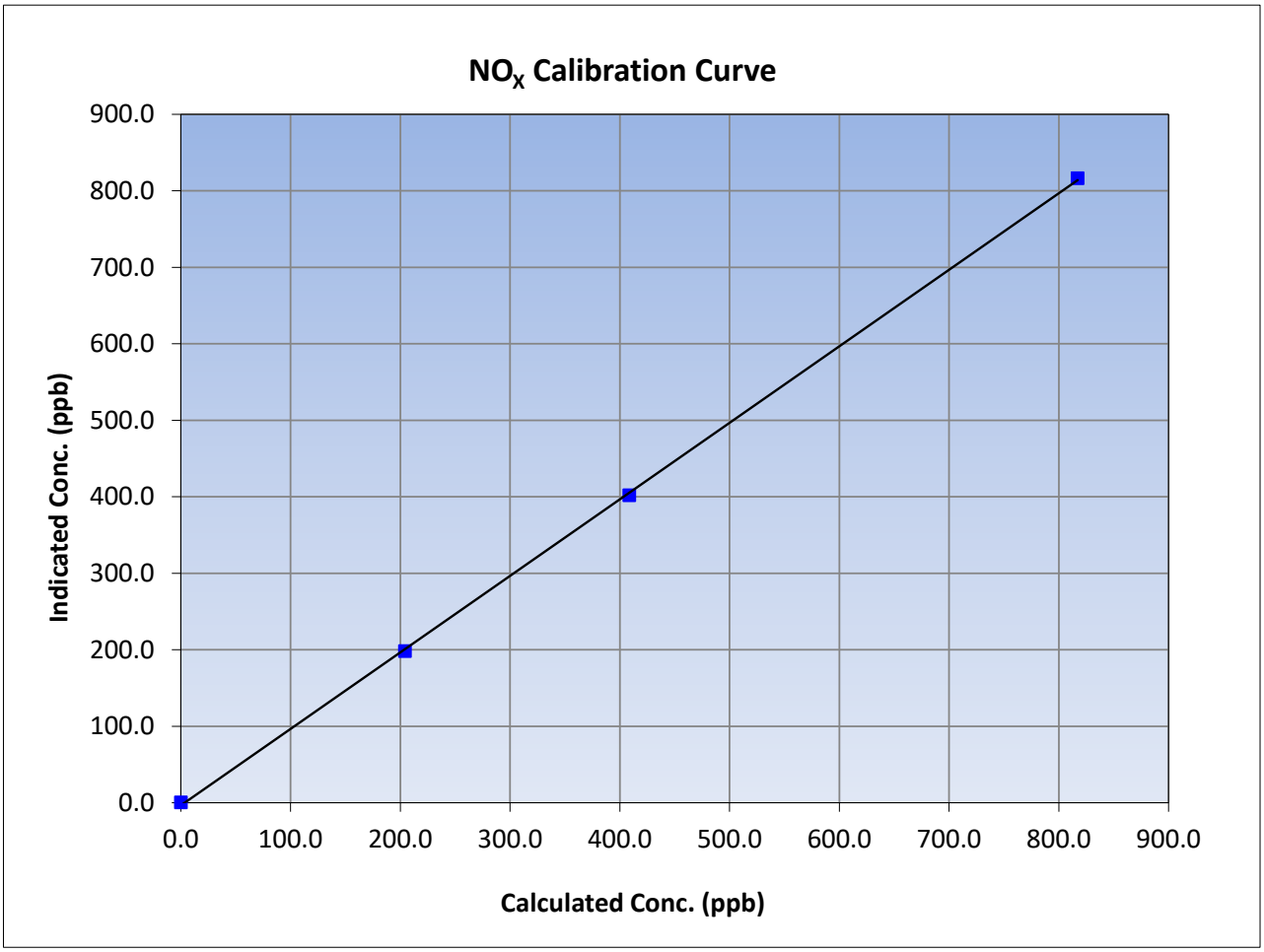
Version-04-2020

Station Information

Calibration Date:	September 22, 2023	Previous Calibration:	August 15, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:27	End Time (MST):	15:37
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	0.999891	≥0.995
817.2	816.4	1.0010			
408.6	401.8	1.0169	Slope	1.000361	0.90 - 1.10
204.3	198.1	1.0313			
			Intercept	-3.500000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

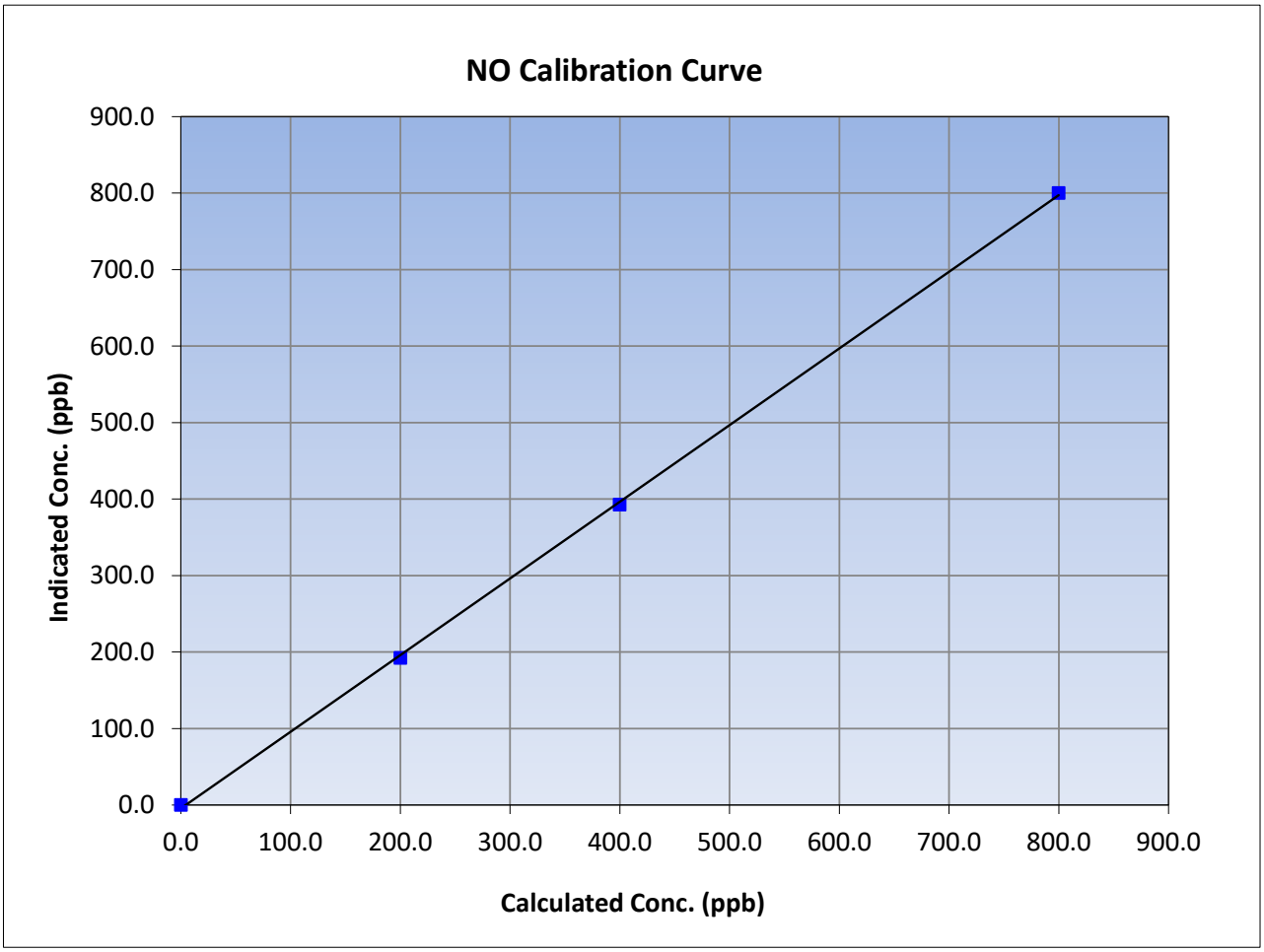
Version-04-2020

Station Information

Calibration Date:	September 22, 2023	Previous Calibration:	August 15, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:27	End Time (MST):	15:37
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	0.2	----	Correlation Coefficient	0.999836	≥0.995
799.9	800.1	0.9997			
399.9	392.7	1.0184	Slope	1.002373	0.90 - 1.10
200.0	192.2	1.0404			
			Intercept	-4.480000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

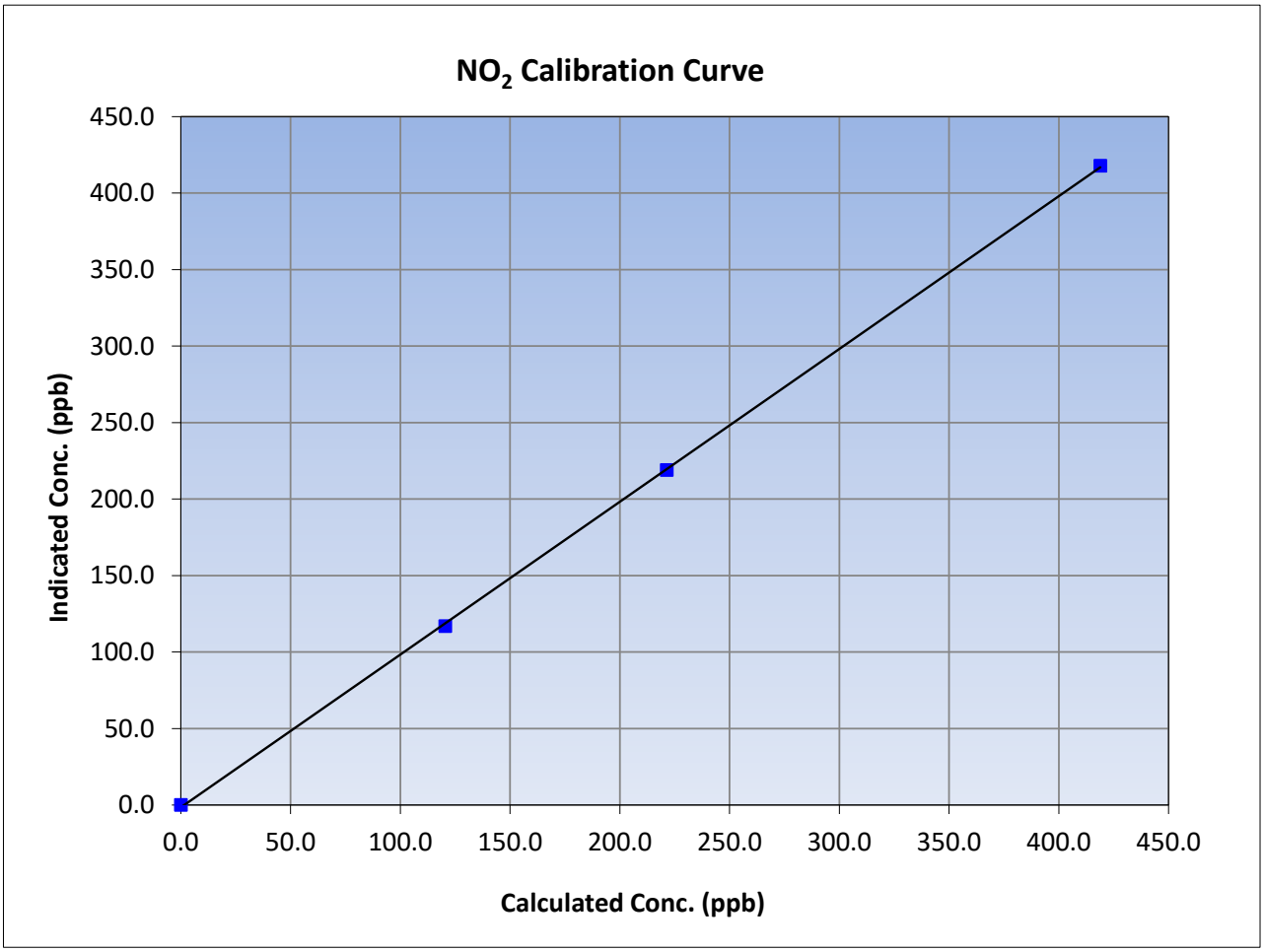
Version-04-2020

Station Information

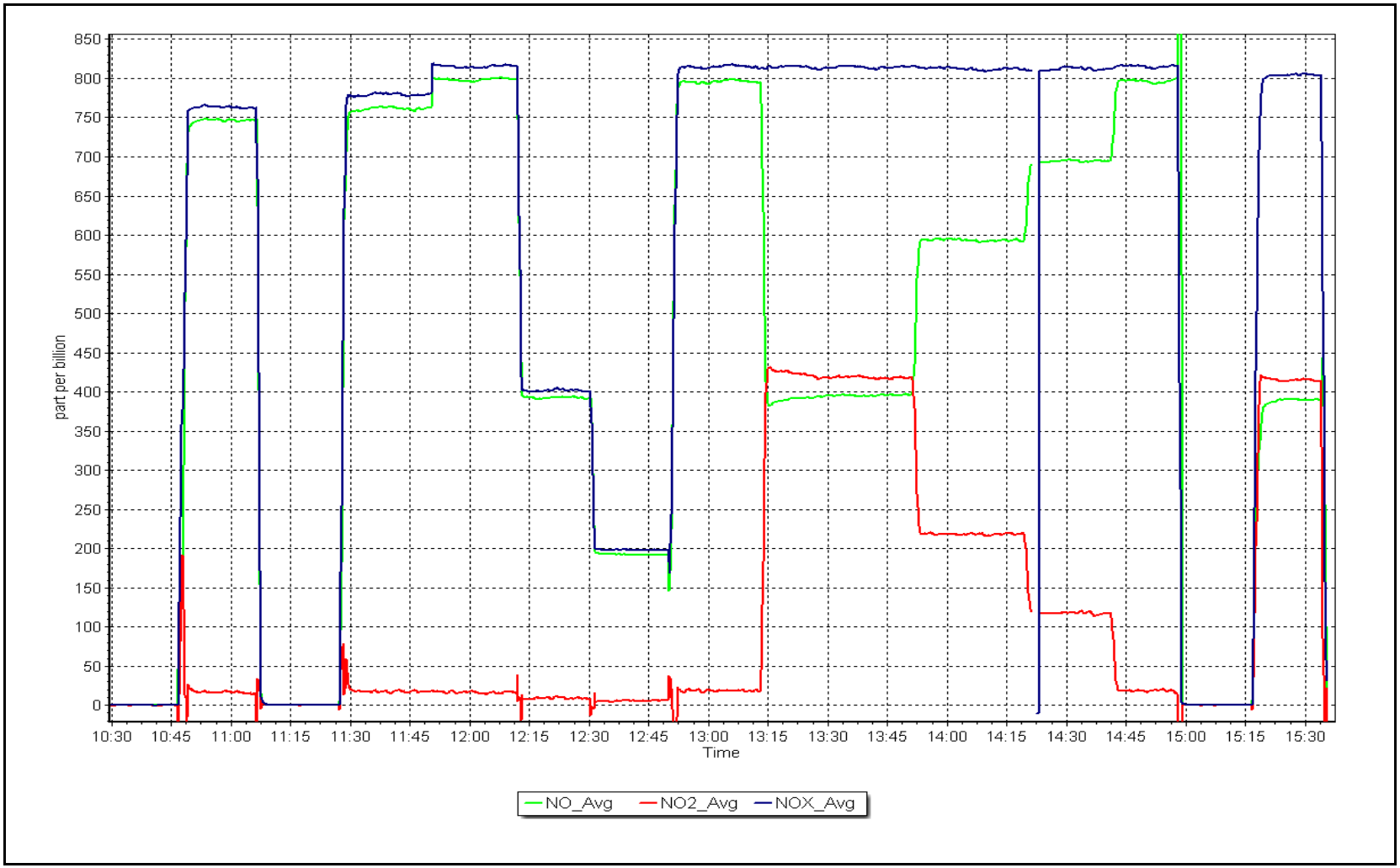
Calibration Date:	September 22, 2023	Previous Calibration:	August 15, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:27	End Time (MST):	15:37
Analyzer make:	Thermo Scientific 42iQ	Analyzer serial #:	12300522720

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999922	≥0.995
418.9	417.8	1.0026			
221.4	218.9	1.0114	Slope	0.998879	0.90 - 1.10
120.5	117.0	1.0300			
			Intercept	-1.541001	+/-20



NO_X Calibration Plot Date: September 22, 2023 Location: Wapasu



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	September 14, 2023	Last Cal Date:	August 31, 2023
Start time (MST):	10:20	End time (MST):	14:08
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:	1.009629	1.004971	Backgd or Offset:	-1.8	-1.8
Calibration intercept:	-0.060000	-1.120000	Coeff or Slope:	1.026	1.014

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.8	----
as found span	5000	1077.3	400.0	397.8	1.006
as found 2nd point	5000	900.3	200.0	197.4	1.013
as found 3rd point	5000	789.5	100.0	97.7	1.024
calibrator zero	5000	0.0	0.0	-0.3	----
high point	5000	1077.3	400.0	401.1	0.997
second point	5000	900.3	200.0	200.0	1.000
third point	5000	789.5	100.0	98.2	1.018
as left zero	5000	0.0	0.0	0.4	----
as left span	5000	1077.3	400.0	406.0	0.985
				Average Correction Factor	1.005

Baseline Corr As found:	398.6	Previous response	403.8	*% change	-1.3%
Baseline Corr 2nd AF pt:	198.2	AF Slope:	0.997171	AF Intercept:	-1.480000
Baseline Corr 3rd AF pt:	98.5	AF Correlation:	0.999986		

* = > +/-5% change initiates investigation

Notes: Sample pump changed out. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

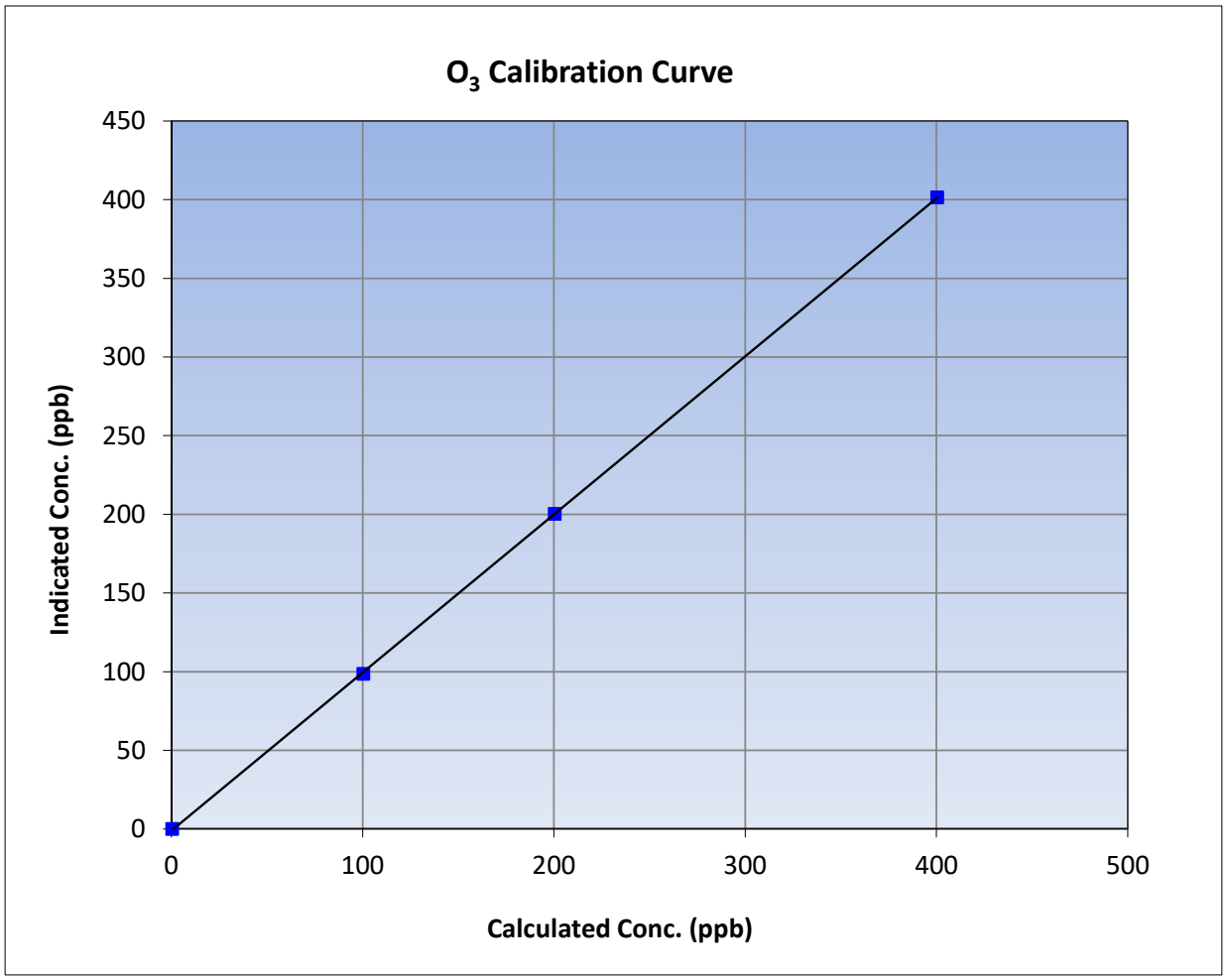
Station Information

Calibration Date:	September 14, 2023	Previous Calibration:	August 31, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:20	End Time (MST):	14:08
Analyzer make:	API T400	Analyzer serial #:	3870

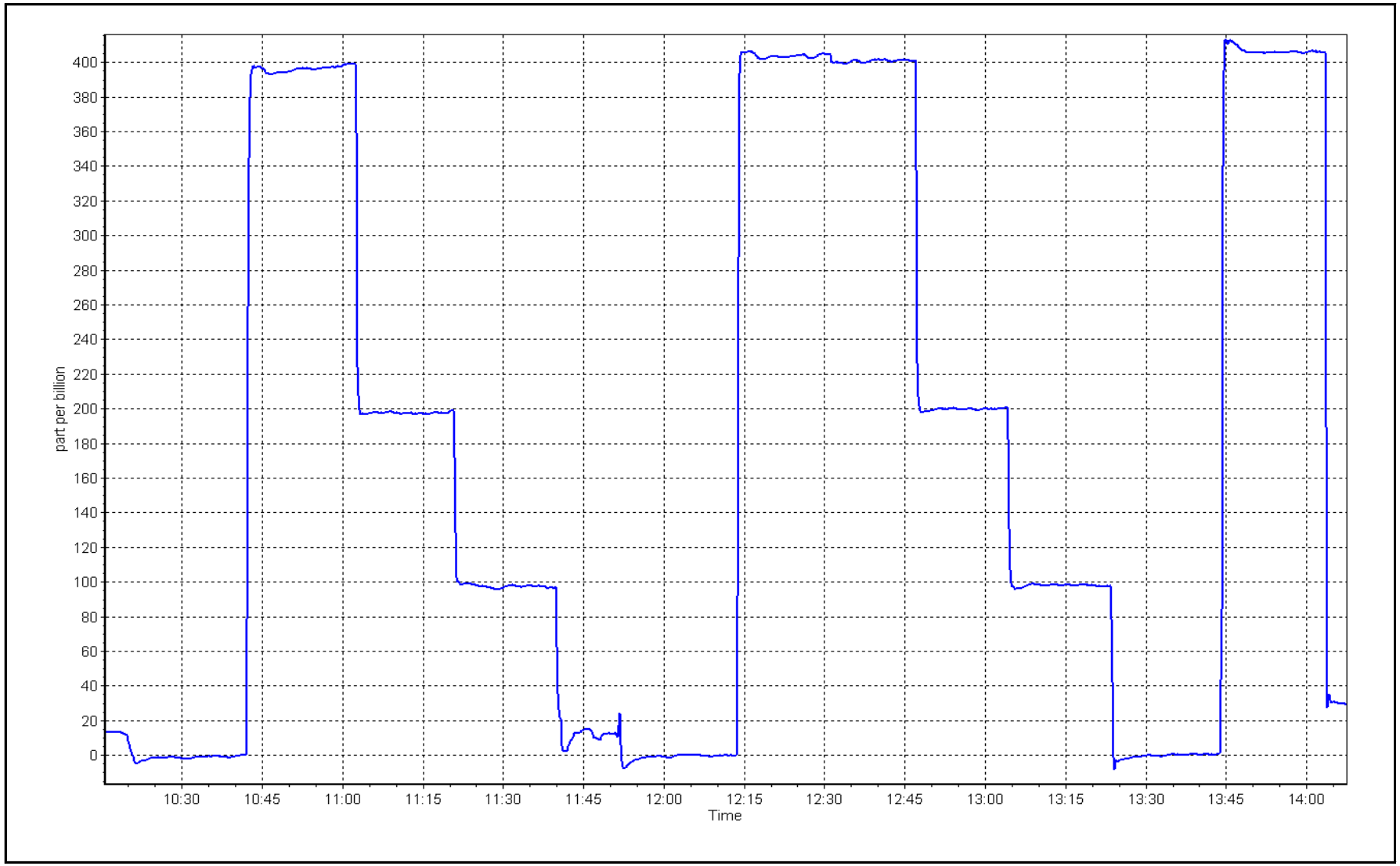
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
400.0	401.1	0.9973
200.0	200.0	1.0000
100.0	98.2	1.0183

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999976	*≥0.995*
Slope	1.004971	*0.90 - 1.10*
Intercept	-1.120000	*+/- 5*



O_3 Calibration Plot Date: September 14, 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:	September 22, 2023	Last Cal Date:	August 15, 2023
Start time (MST):	13:18	End time (MST):	15:02
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 (°C)	22.2	23.0	22.2	☐	+/- 2 °C
P (mmHg)	713.7	715.2	713.7	☐	+/- 10 mmHg
flow (LPM)	5.02	4.98	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: September 22, 2023 Last Cal Date: August 15, 2023

PM w/o HEPA: 9.3 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	11.2		11.2	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 10.9 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: September 22, 2023

Disposable Filter Changed: September 22, 2023

Annual Maintenance

Date Sample Tube Cleaned:

Date RH/T Sensor Cleaned:

Notes: Temp, pressure and flow checked. Leak check passed. Chamber cleaned, filter swapped.

Calibration by: Aswin Sasi Kumar

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS18
STONY MOUNTAIN
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	September 8, 2023	Last Cal Date:	August 10, 2023
Start time (MST):	11:06	End time (MST):	15:33
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:	1.004073	0.999906	Backgd or Offset:	22.6	22.2
Calibration intercept:	-0.542544	-1.183922	Coeff or Slope:	0.808	0.795

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5009	0.0	0.0	0.2	----
as found span	4919	81.0	800.3	808.3	0.990
as found 2nd point	4959	40.5	400.2	403.4	0.992
as found 3rd point	4979	20.2	199.6	201.1	0.993
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4919	81.0	800.3	799.6	1.001
second point	4959	40.5	400.2	398.6	1.004
third point	4979	20.2	199.6	196.8	1.014
as left zero	5000	0.0	0.0	0.4	----
as left span	4919	81.0	800.3	799.7	1.001
				Average Correction Factor	1.006

Baseline Corr As found:	808.10	Previous response	803.00	*% change	0.6%
Baseline Corr 2nd AF pt:	403.20	AF Slope:	1.009927	AF Intercept:	-0.241517
Baseline Corr 3rd AF pt:	200.90	AF Correlation:	0.999998		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

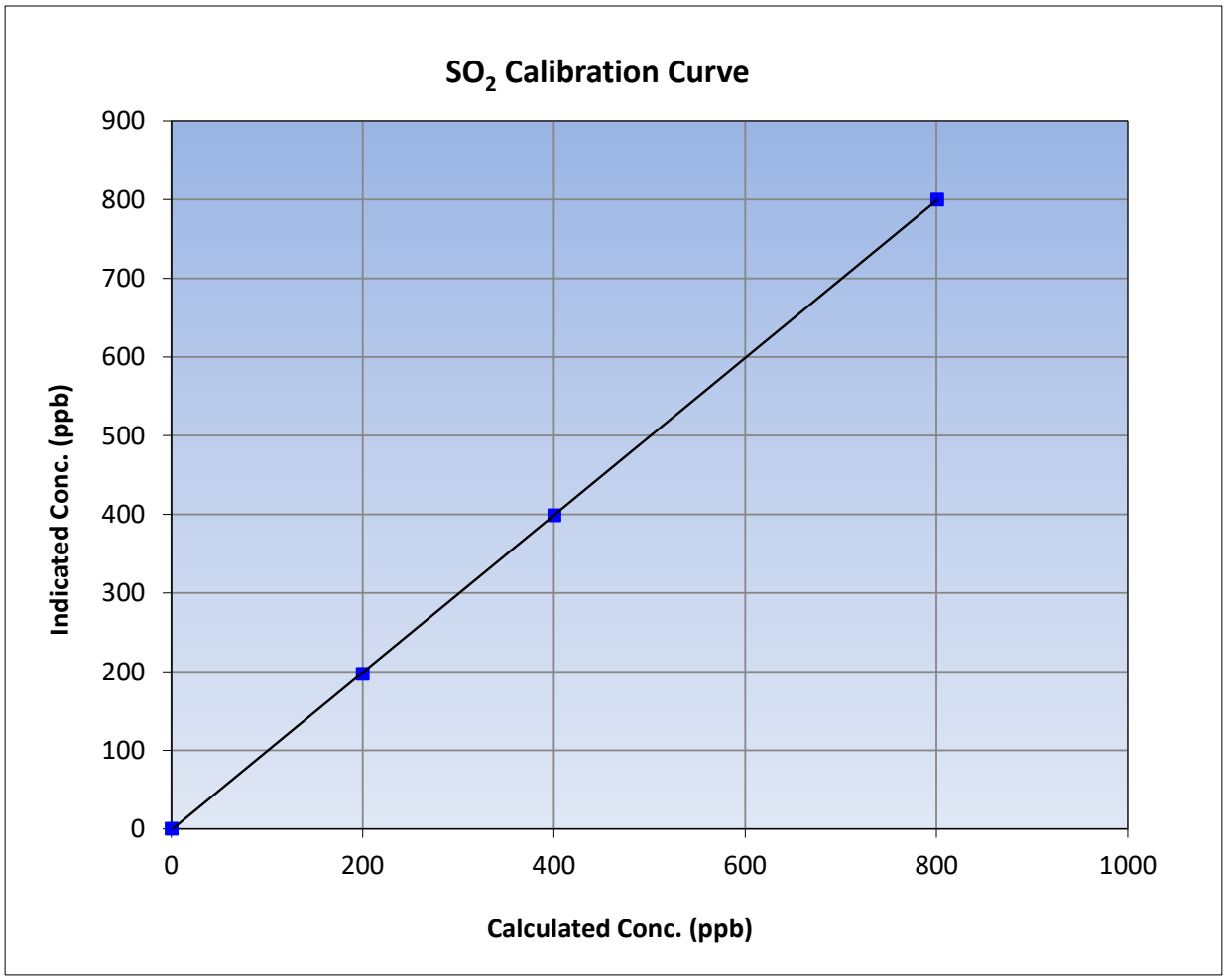
Station Information

Calibration Date:	September 8, 2023	Previous Calibration:	August 10, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:06	End Time (MST):	15:33
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301453

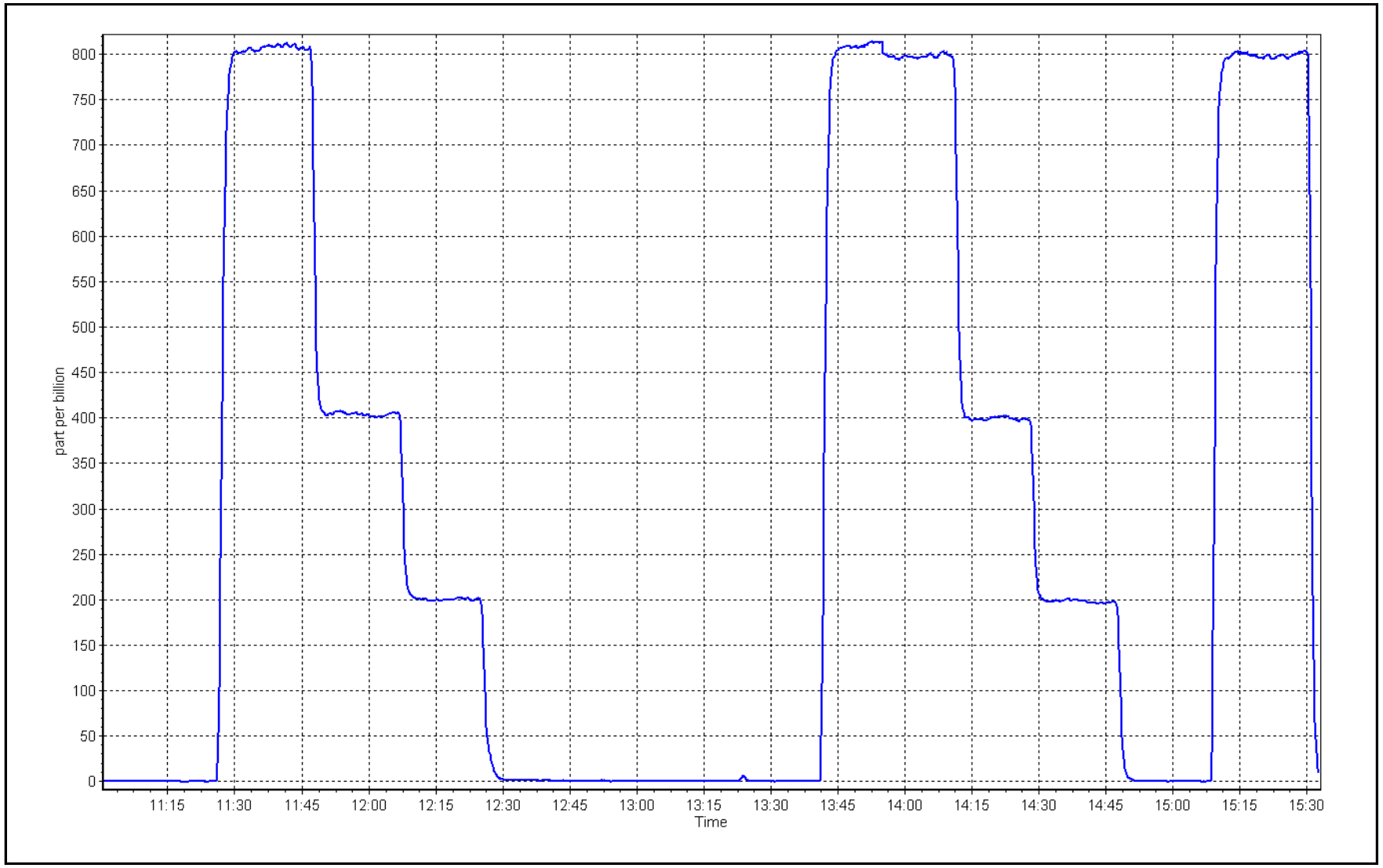
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
800.3	799.6	1.0009
400.2	398.6	1.0040
199.6	196.8	1.0143

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999986	*≥0.995*
Slope	0.999906	*0.90 - 1.10*
Intercept	-1.183922	*+/-30*



SO2 Calibration Plot Date: September 8, 2023 Location: Stony Mountain



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Stony Mountain	Station number:	AMS18
Calibration Date:	September 25, 2023	Last Cal Date:	August 24, 2023
Start time (MST):	9:30	End time (MST):	14:38
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1218153359	
Converter make:	CD Nova CDN-101		Converter serial #:	555	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.993582	1.005299	Backgd or Offset:	2.66	2.66
Calibration intercept:	0.341175	-0.019011	Coeff or Slope:	1.189	1.173

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4927	73.0	80.0	82.0	0.977
as found 2nd point	4964	36.5	40.0	41.1	0.975
as found 3rd point	4983	18.3	20.0	20.4	0.988
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	4927	73.0	80.0	80.4	0.995
second point	4964	36.5	40.0	40.3	0.992
third point	4983	18.3	20.0	19.9	1.007
as left zero	5000	0.0	0.0	0.3	----
as left span	4927	73.0	80.0	77.6	1.031
SO2 Scrubber Check	4923	77.1	771.0	0.1	----
Date of last scrubber change:		17-Dec-21		Ave Corr Factor	0.998
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.9	Prev response:	79.82	*% change:	2.5%
Baseline Corr 2nd AF pt:	41.0	AF Slope:	1.024877	AF Intercept:	0.020582
Baseline Corr 3rd AF pt:	20.3	AF Correlation:	0.999988		

* = > +/-5% change initiates investigation

Notes: Sample inlet filter changed after as founds. Scrubber check completed after calibrator zero. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

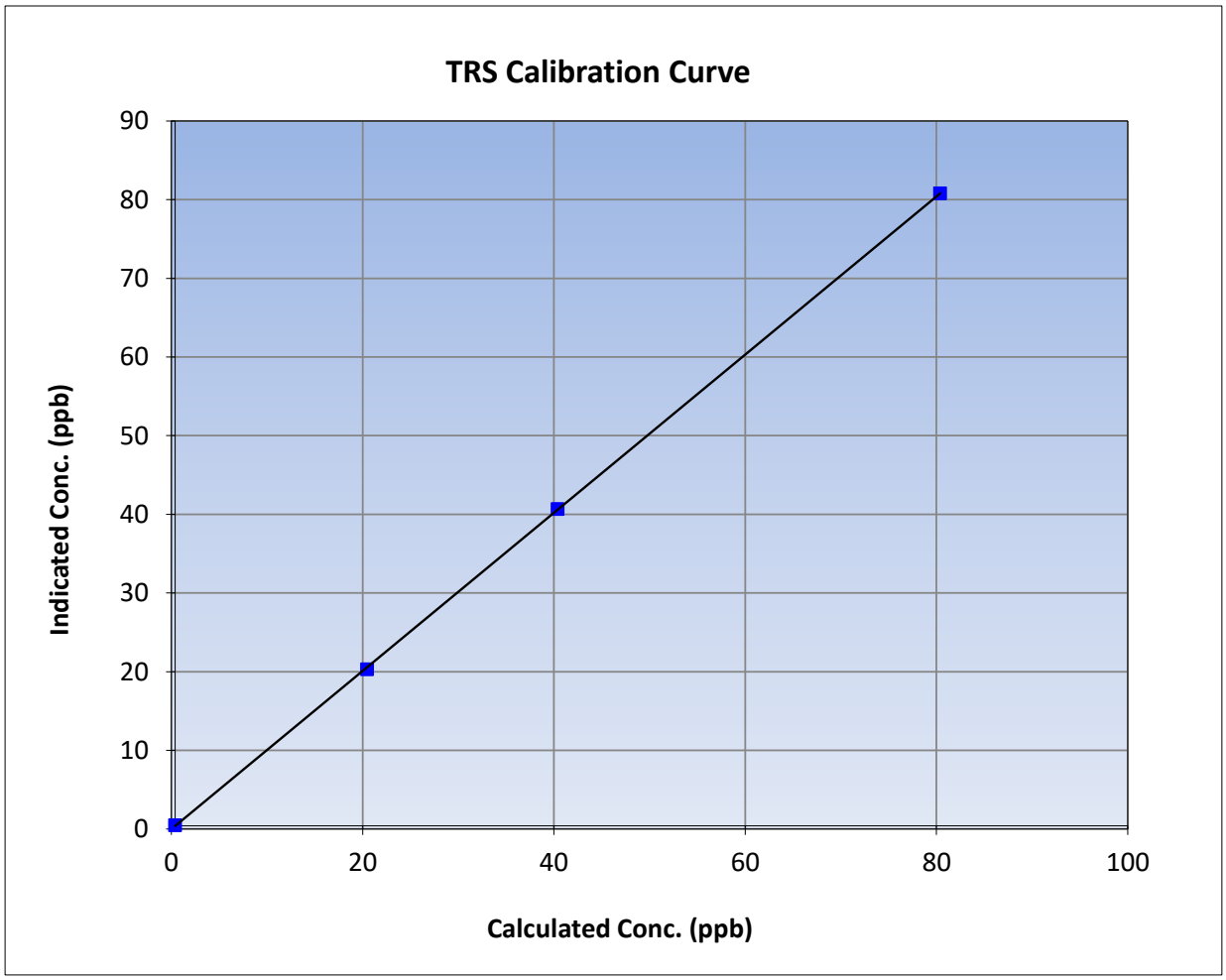
Station Information

Calibration Date:	September 25, 2023	Previous Calibration:	August 24, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	9:30	End Time (MST):	14:38
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153359

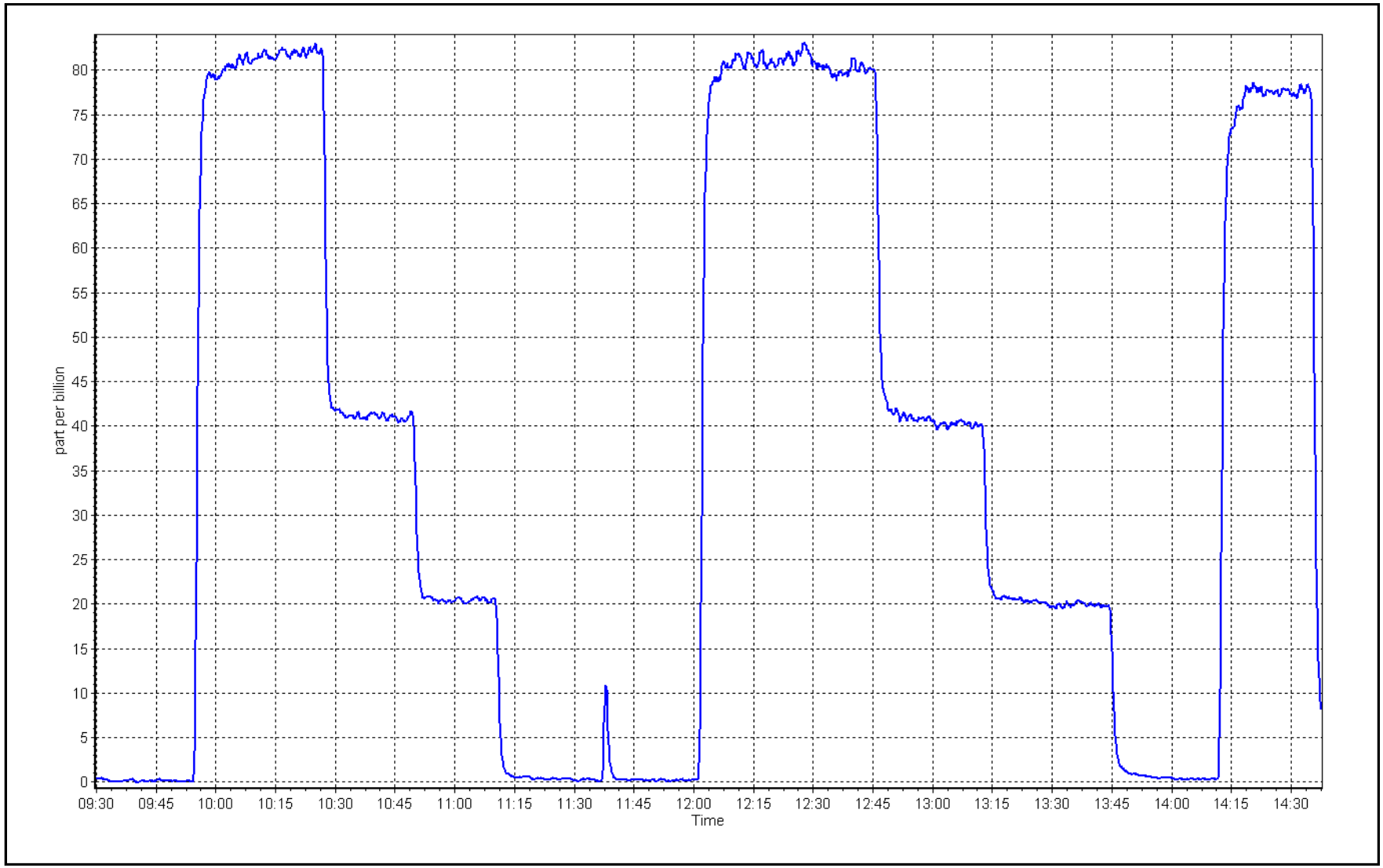
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.4	0.9949
40.0	40.3	0.9924
20.0	19.9	1.0074

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999977	*≥0.995*
Slope	1.005299	*0.90 - 1.10*
Intercept	-0.019011	*+/-3*



TRS Calibration Plot Date: September 25, 2023 Location: Stony Mountain



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	September 8, 2023	Last Cal Date:	N/A
Start time (MST):	13:00	End time (MST):	15:33
Reason:	Install		

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 #:	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:	N/A	2.23E-04	NMHC SP Ratio:	N/A	4.19E-05
CH4 Retention time:	N/A	12.9	NMHC Peak Area:	N/A	186711
Zero Chromatogram:		OFF	Flat Baseline:		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					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.0	17.28	17.34	0.997
second point	4959	40.5	8.64	8.62	1.003
third point	4979	20.2	4.31	4.26	1.012
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	17.28	17.31	0.998
				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	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.0	9.17	9.24	0.992
second point	4959	40.5	4.58	4.61	0.995
third point	4979	20.2	2.29	2.30	0.996
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	9.17	9.17	1.000
				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					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.0	8.11	8.11	1.000
second point	4959	40.5	4.06	4.01	1.012
third point	4979	20.2	2.02	1.96	1.030
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	8.11	8.14	0.997
				Average Correction Factor	1.014
Baseline Corr AF:	NA	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:		1.004309
THC Cal Offset:		-0.036379
CH4 Cal Slope:		1.001484
CH4 Cal Offset:		-0.032618
NMHC Cal Slope:		1.007917
NMHC Cal Offset:		-0.005959

Notes: Install calibration . Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

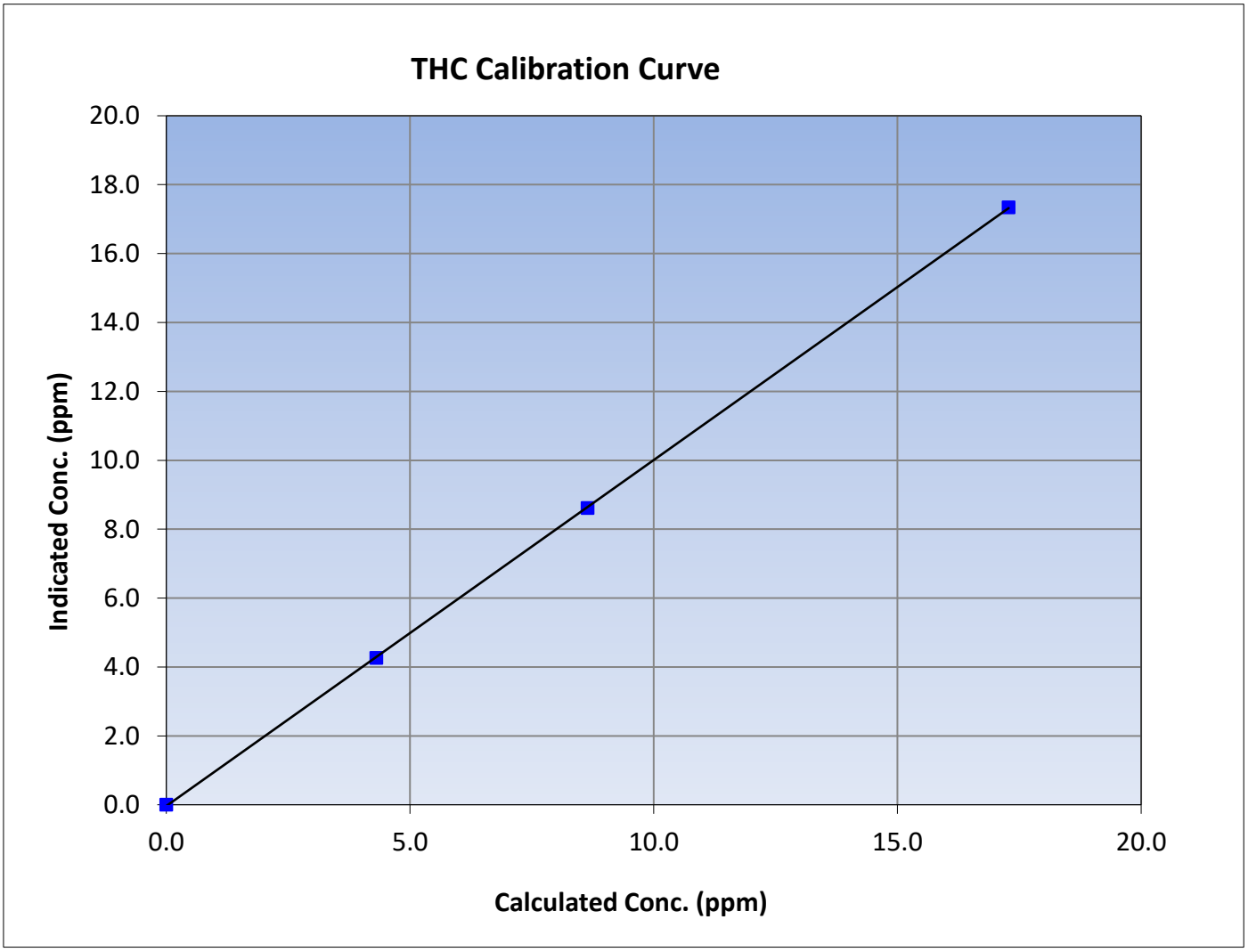
Version-06-2022

Station Information

Calibration Date:	September 8, 2023	Previous Calibration:	N/A
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	13:00	End Time (MST):	15:33
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999979	≥0.995
17.28	17.34	0.9966			
8.64	8.62	1.0028	Slope	1.004309	0.90 - 1.10
4.31	4.26	1.0116			
			Intercept	-0.036379	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

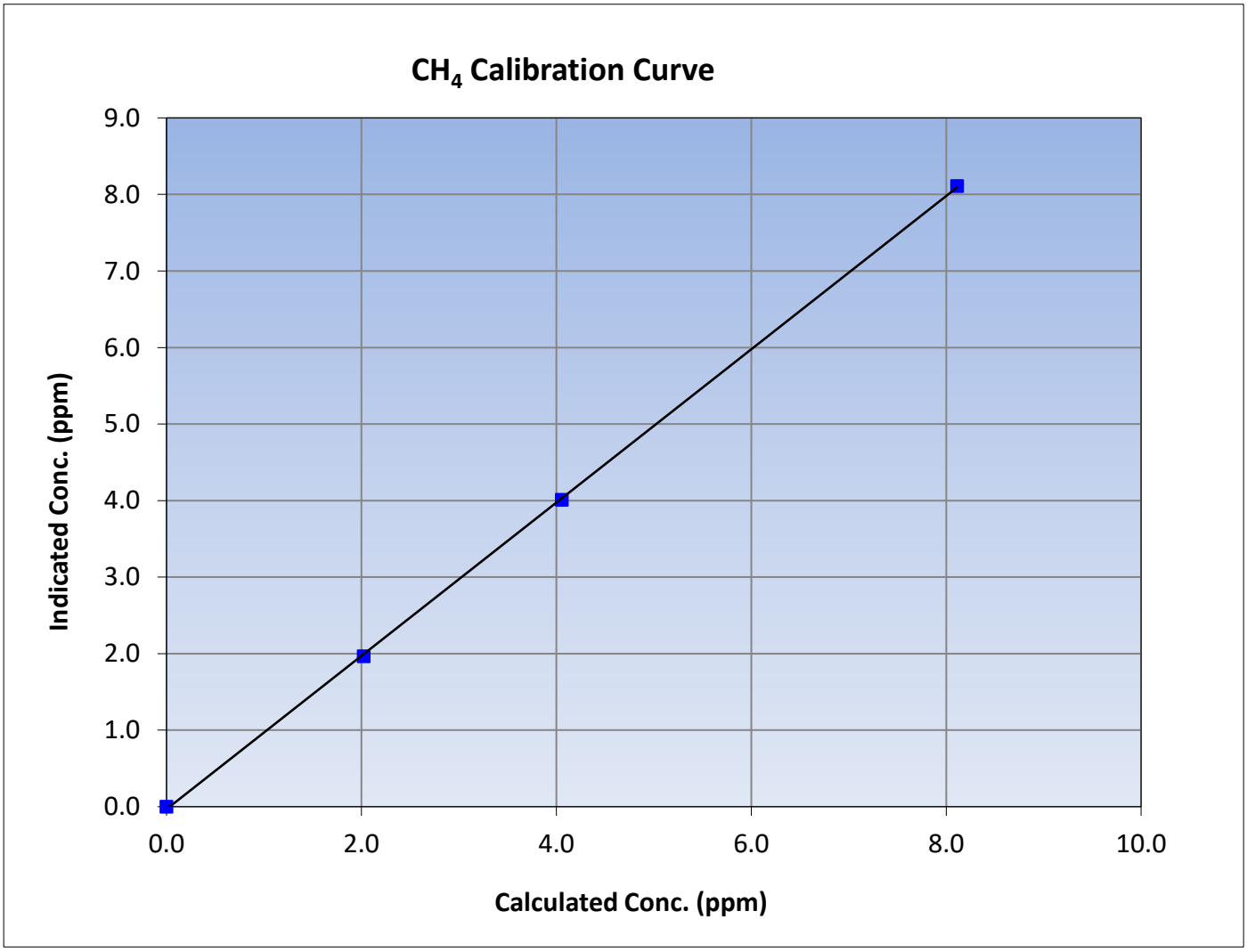
Version-06-2022

Station Information

Calibration Date:	September 8, 2023	Previous Calibration:	N/A
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	13:00	End Time (MST):	15:33
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	0.999926	*≥0.995*
8.11	8.11	1.0004			
4.06	4.01	1.0117	Slope	1.001484	*0.90 - 1.10*
2.02	1.96	1.0303			
			Intercept	-0.032618	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

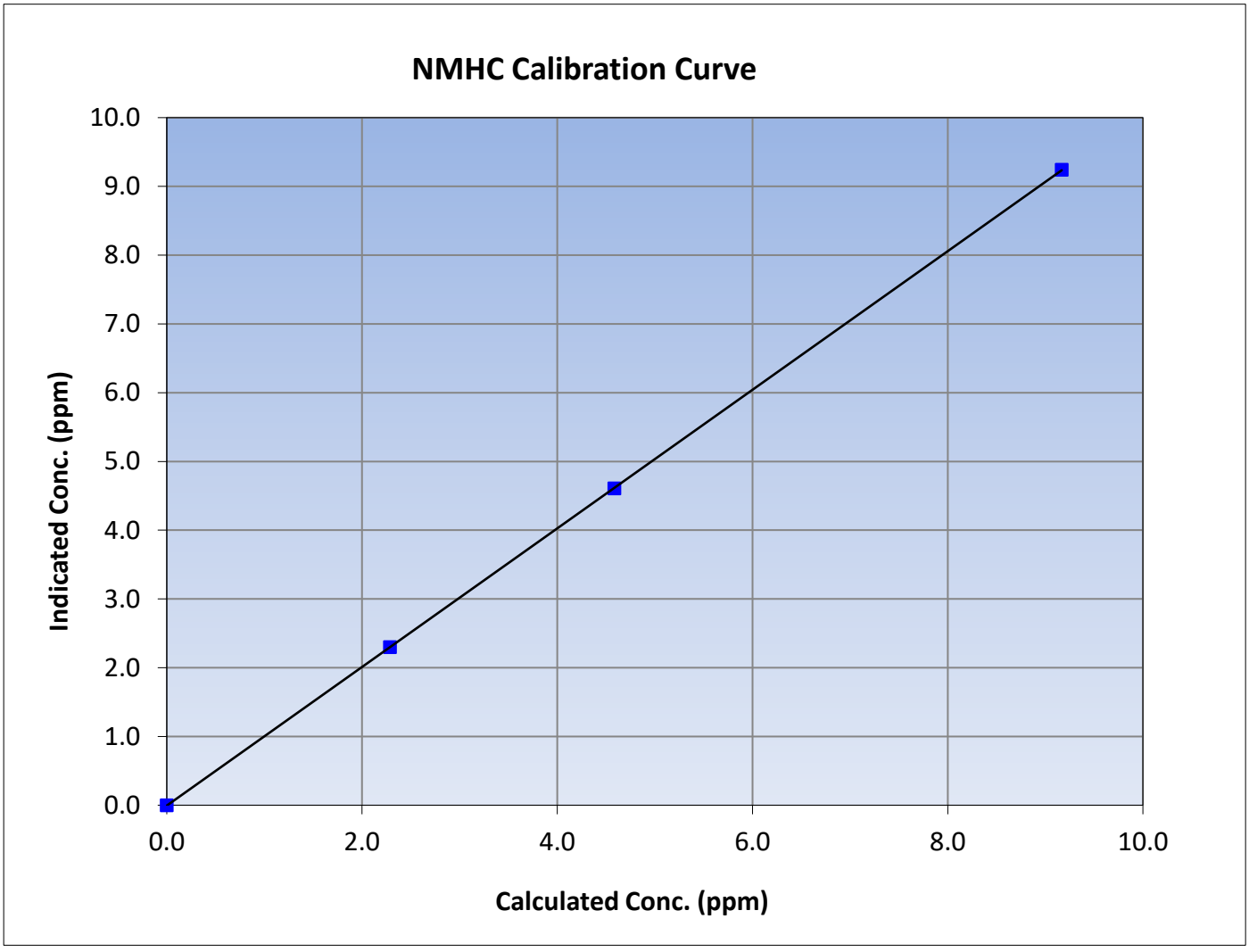
Version-06-2022

Station Information

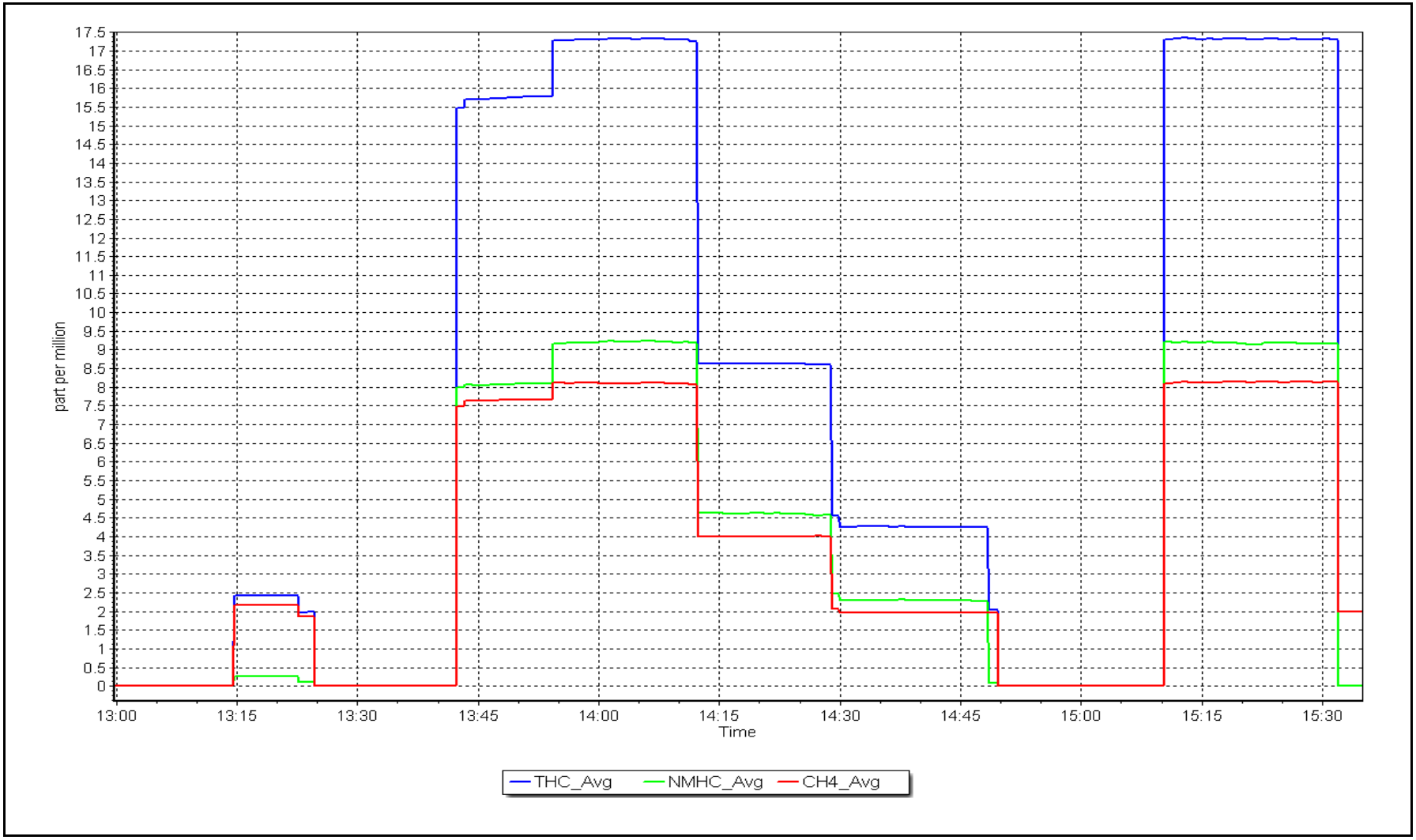
Calibration Date:	September 8, 2023	Previous Calibration:	N/A
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	13:00	End Time (MST):	15:33
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999997	≥0.995
9.17	9.24	0.9923			
4.58	4.61	0.9954	Slope	1.007917	0.90 - 1.10
2.29	2.30	0.9956			
			Intercept	-0.005959	+/-0.5



NMHC Calibration Plot Date: September 8, 2023 Location: Stony Mountain



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	September 8, 2023	Last Cal Date:	August 26, 2023
Start time (MST):	11:05	End time (MST):	N/A
Reason:	Removal		

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:	3.37E-04	N/A	NMHC SP Ratio:	6.89E-05	N/A
CH4 Retention time:	15.6	N/A	NMHC Peak Area:	133711	N/A
Zero Chromatogram:	ON		Flat Baseline:	ON	

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	16.26	1.063
as found 2nd point	4959	40.5	8.64	7.98	1.083
as found 3rd point	4979	20.2	4.31	4.08	1.057
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	16.24	Prev response	17.28	*% change	-6.4%
Baseline Corr 2nd AF:	8.0	AF Slope:	0.938700	AF Intercept:	-0.010991
Baseline Corr 3rd AF:	4.1	AF Correlation:	0.999854	* = > +/-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	4919	81.0	9.17	8.94	1.026
as found 2nd point	4959	40.5	4.58	4.49	1.022
as found 3rd point	4979	20.2	2.29	2.25	1.015
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	8.94	Prev response	9.17	*% change	-2.6%
Baseline Corr 2nd AF:	4.5	AF Slope:	0.974079	AF Intercept:	0.012979
Baseline Corr 3rd AF:	2.3	AF Correlation:	0.999990	* = > +/-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	7.33	1.107
as found 2nd point	4959	40.5	4.06	3.49	1.162
as found 3rd point	4979	20.2	2.02	1.82	1.109
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	7.31	Prev response	8.11	*% change	-11.0%
Baseline Corr 2nd AF:	3.47	AF Slope:	0.898987	AF Intercept:	-0.024170
Baseline Corr 3rd AF:	1.80	AF Correlation:	0.999188	* = > +/-5% change initiates investigation	

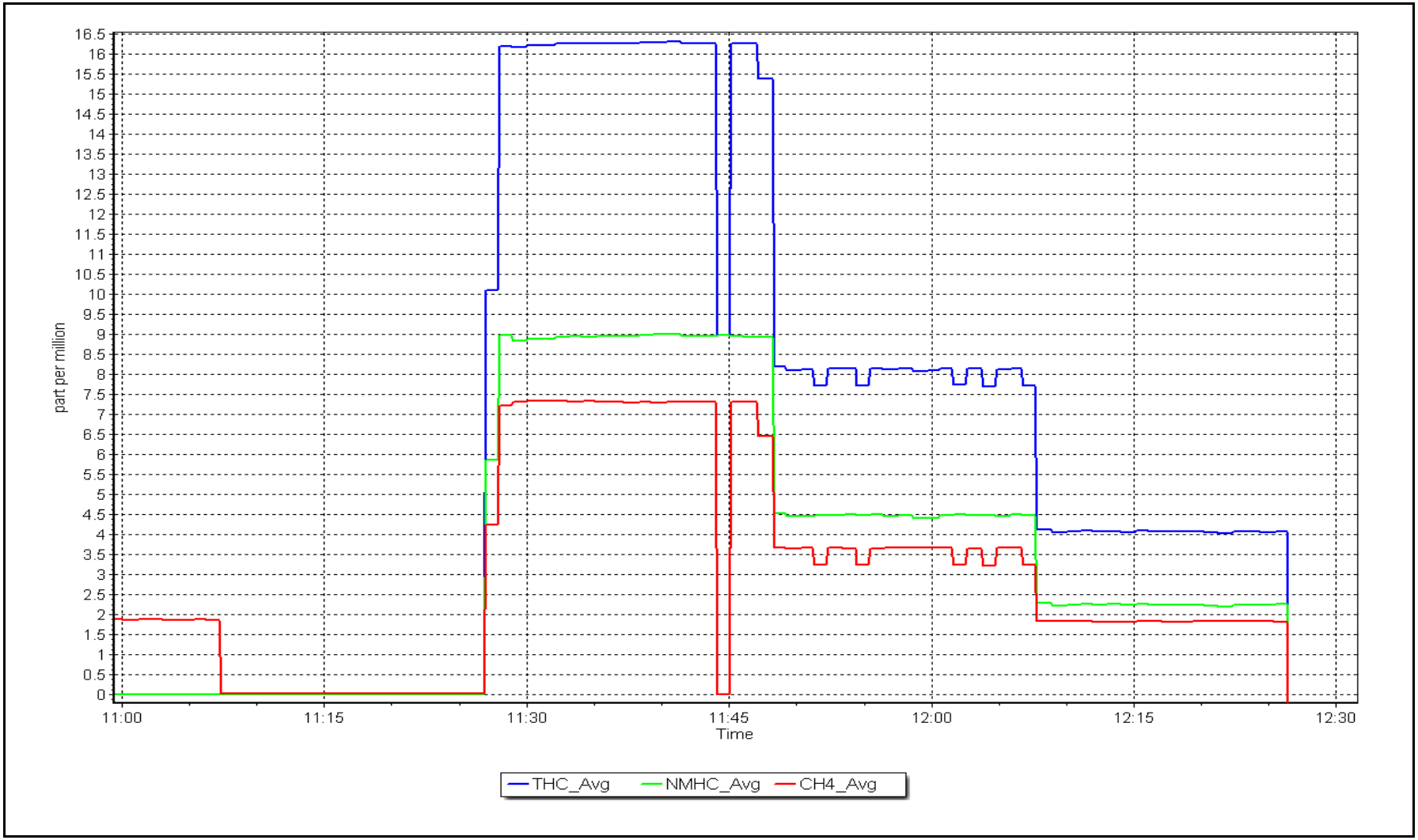
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999923	N/A
THC Cal Offset:	-0.001977	N/A
CH4 Cal Slope:	0.999791	N/A
CH4 Cal Offset:	-0.001608	N/A
NMHC Cal Slope:	1.000027	N/A
NMHC Cal Offset:	-0.000569	N/A

Notes: Removing instrument due to dips. Further maintenance to be conducted at the WBEA Centre.

Calibration Performed By: Aswin Sasi Kumar

NMHC Calibration Plot Date: September 8, 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:	September 19, 2023	Last Cal Date:	August 30, 2023
Start time (MST):	10:20	End time (MST):	15:04
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:	0.993	1.029	NO bkgnd or offset:	2.8	2.9
NOX coeff or slope:	0.984	0.984	NOX bkgnd or offset:	2.8	2.9
NO2 coeff or slope:	0.999	0.999	Reaction cell Press:	230.6	235.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000289	1.000359
NO_X Cal Offset:	-0.209933	-0.310049
NO Cal Slope:	0.999824	1.001795
NO Cal Offset:	-1.429814	-1.669844
NO_2 Cal Slope:	1.011795	0.998696
NO_2 Cal Offset:	-0.075280	-0.059273

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	810.0	786.2	24.2	1.0133	1.0179
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.4	0.1	0.2	----	----
high point	4919	81.3	820.8	800.3	20.5	821.0	800.8	20.3	0.9997	0.9993
second point	4959	40.7	410.9	400.7	10.3	410.7	399.2	11.5	1.0006	1.0037
third point	4980	20.3	204.9	199.8	5.1	203.8	196.5	7.3	1.0056	1.0169
as left zero	5000	0.0	0.0	0.0	0.0	0.4	0.1	0.3	----	----
as left span	4919	81.3	820.8	383.2	437.6	824.0	384.7	439.5	0.9961	0.9960
								Average Correction Factor	1.0019	1.0066

Corrected As found	NO_X = 809.8 ppb	NO = 786.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-1.4%
Previous Response	NO_X = 820.8 ppb	NO = 798.7 ppb		*Percent Change	NO =	-1.6%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.7	380.6	437.6	437.1	1.0011	99.9%
2nd GPT point (200 ppb O3)	797.7	594.0	224.2	223.7	1.0022	99.8%
3rd GPT point (100 ppb O3)	797.7	696.4	121.8	121.3	1.0040	99.6%
				Average Correction Factor	1.0024	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

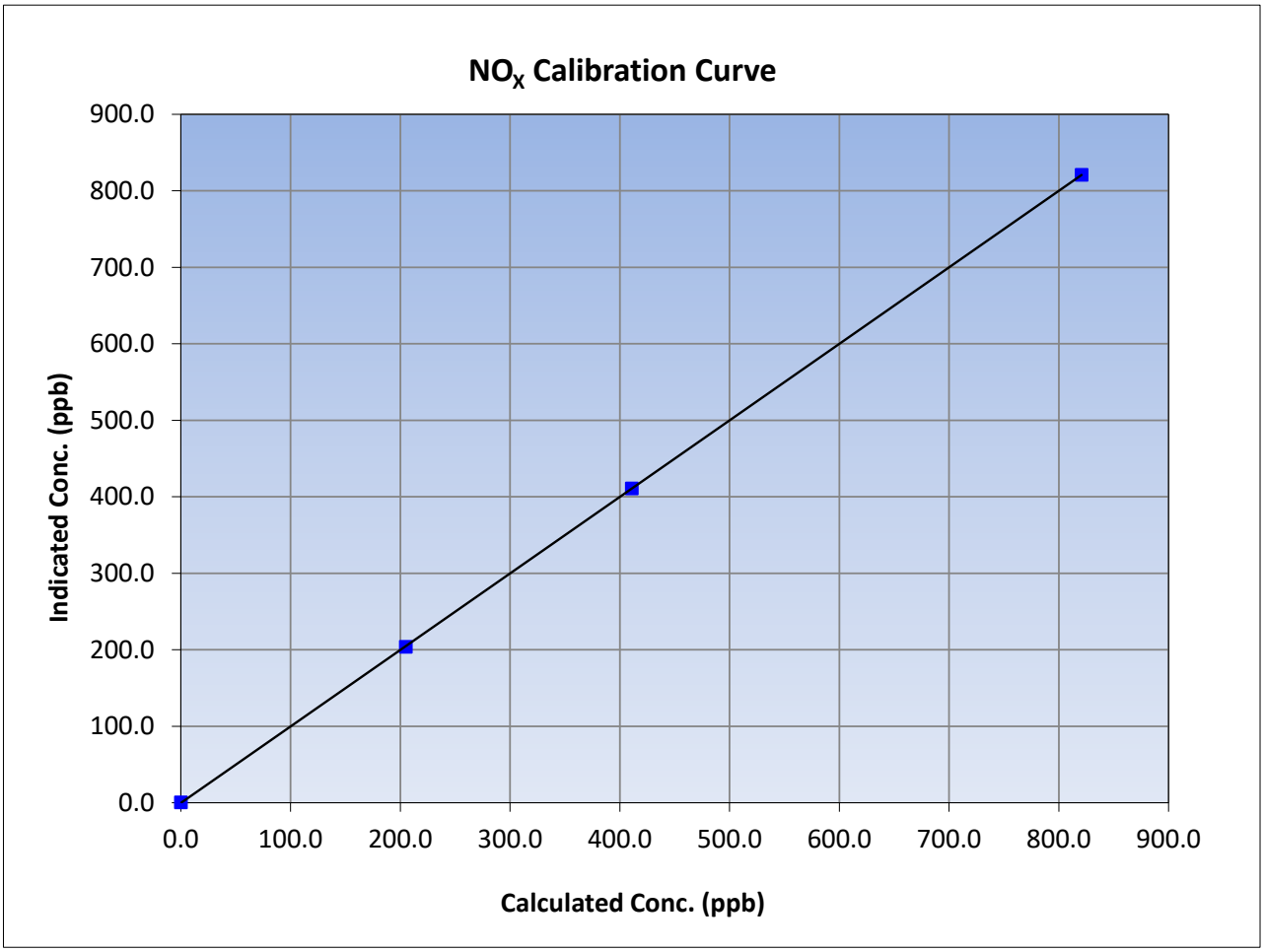
Version-04-2020

Station Information

Calibration Date:	September 19, 2023	Previous Calibration:	August 30, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:20	End Time (MST):	15:04
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	0.4	----	Correlation Coefficient	0.999996	≥0.995
820.8	821.0	0.9997			
410.9	410.7	1.0006	Slope	1.000359	0.90 - 1.10
204.9	203.8	1.0056			
			Intercept	-0.310049	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

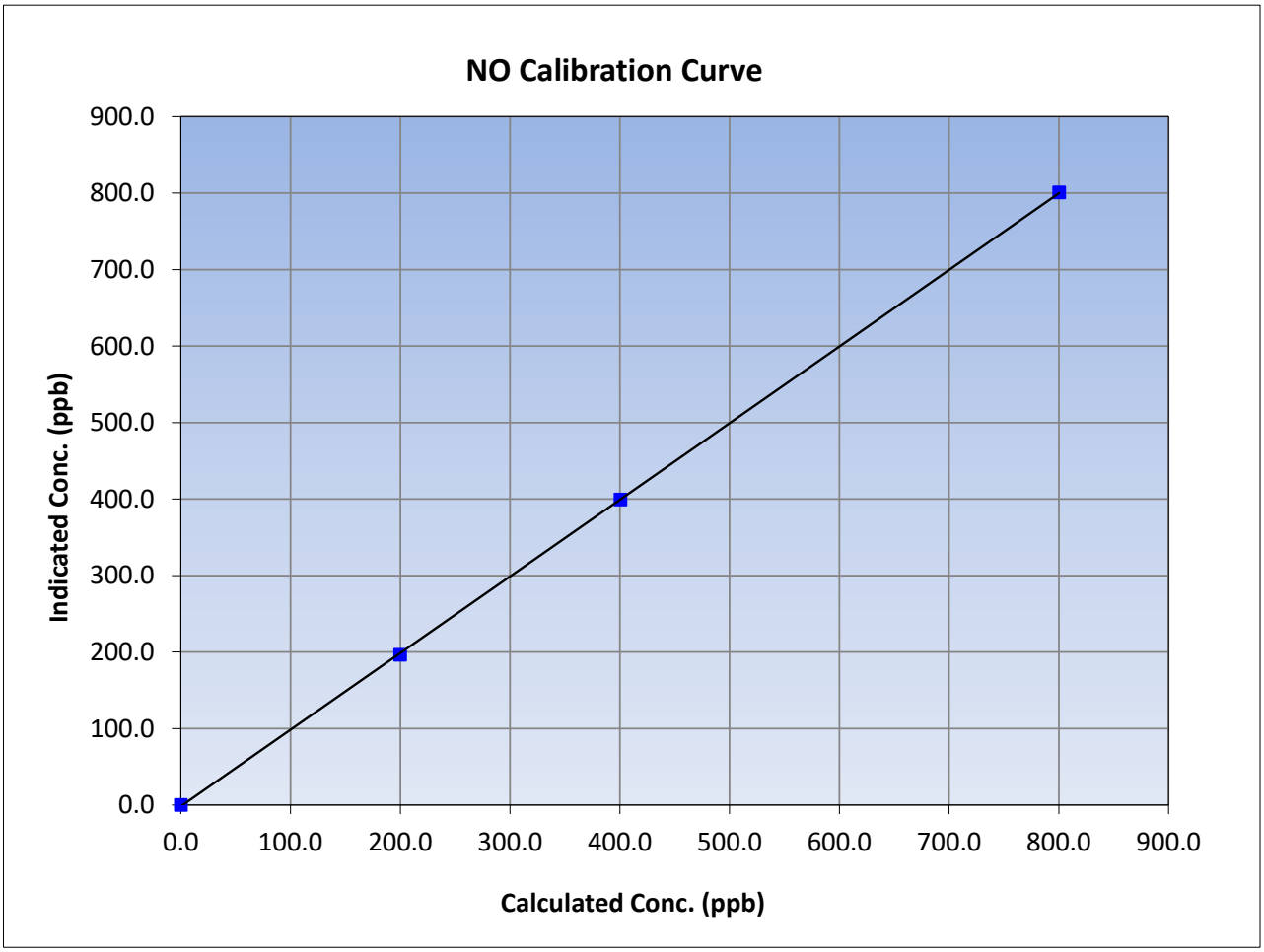
Version-04-2020

Station Information

Calibration Date:	September 19, 2023	Previous Calibration:	August 30, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:20	End Time (MST):	15:04
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	0.999977	≥0.995
800.3	800.8	0.9993			
400.7	399.2	1.0037	Slope	1.001795	0.90 - 1.10
199.8	196.5	1.0169			
			Intercept	-1.669844	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

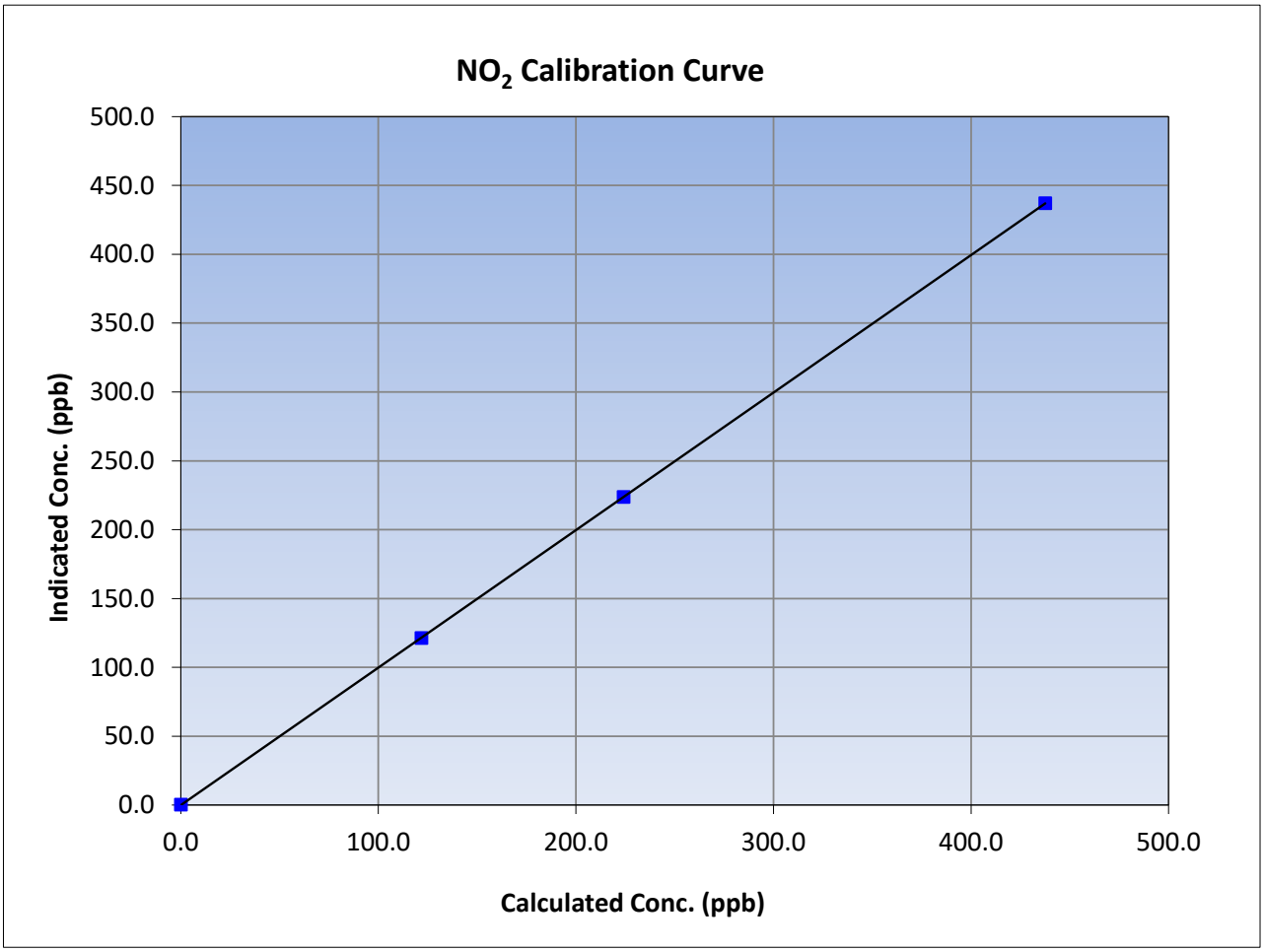
Version-04-2020

Station Information

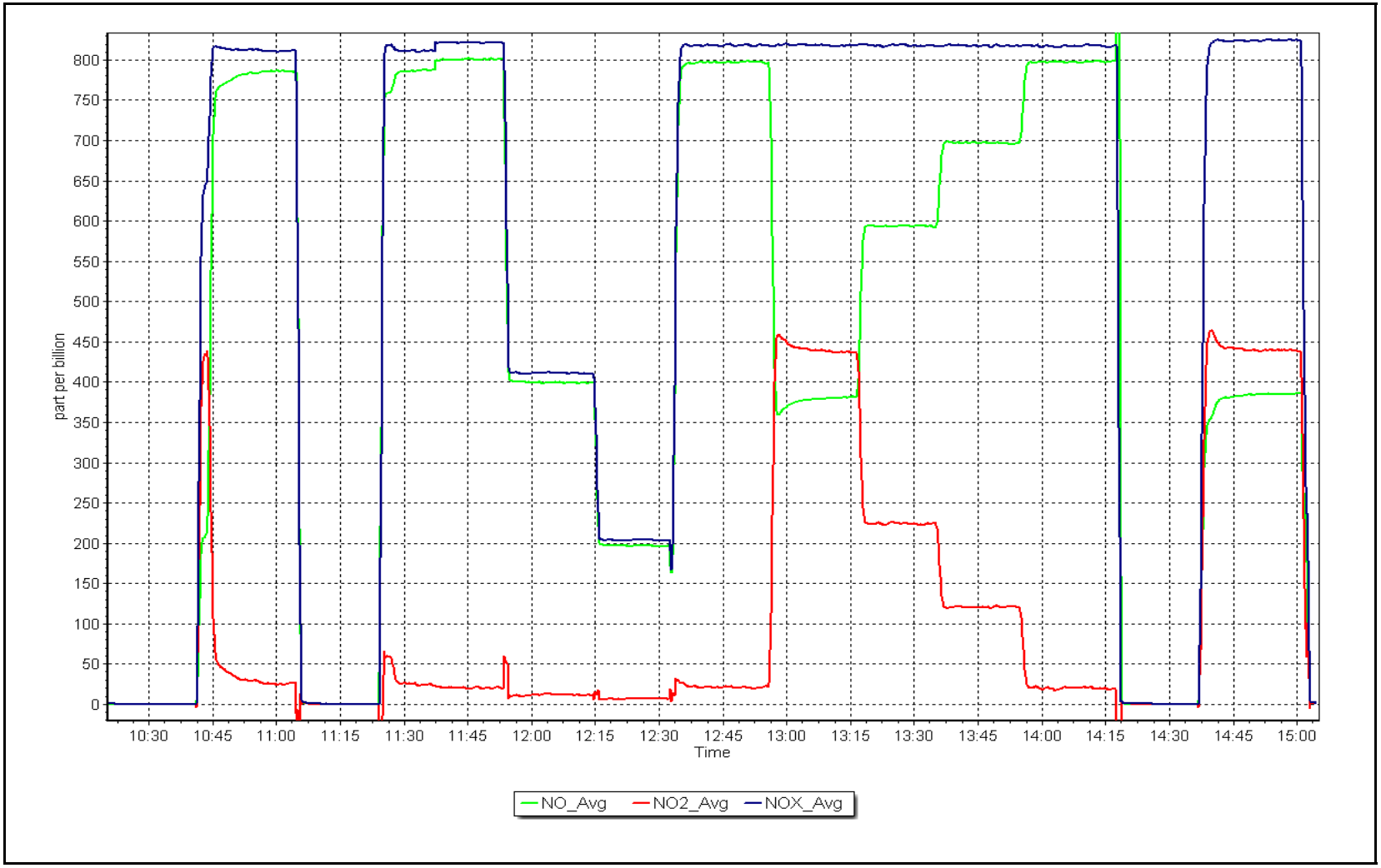
Calibration Date:	September 19, 2023	Previous Calibration:	August 30, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:20	End Time (MST):	15:04
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999998	≥0.995
437.6	437.1	1.0011			
224.2	223.7	1.0022	Slope	0.998696	0.90 - 1.10
121.8	121.3	1.0040			
			Intercept	-0.059273	+/-20



NO_X Calibration Plot Date: September 19, 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:	September 21, 2023	Last Cal Date:	August 23, 2023
Start time (MST):	11:21	End time (MST):	14:13
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:	1.003086	1.003943	Backgd or Offset:	1.300	1.300
Calibration intercept:	0.360000	-0.340000	Coeff or Slope:	1.002	0.996

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	4888	1096.9	400.0	404.5	0.989
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	0.4	----
high point	4888	1101.7	400.0	401.4	0.997
second point	4888	863.9	200.0	200.7	0.997
third point	4888	741.4	100.0	98.9	1.011
as left zero	5000	800.0	0.0	0.2	----
as left span	4812	1097.9	400.0	413.6	0.967
				Average Correction Factor	1.001

Baseline Corr As found:	404.4	Previous response	401.6	*% change	0.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Sample inlet filter changed after as founds. Using portable calibrator for the calibration. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

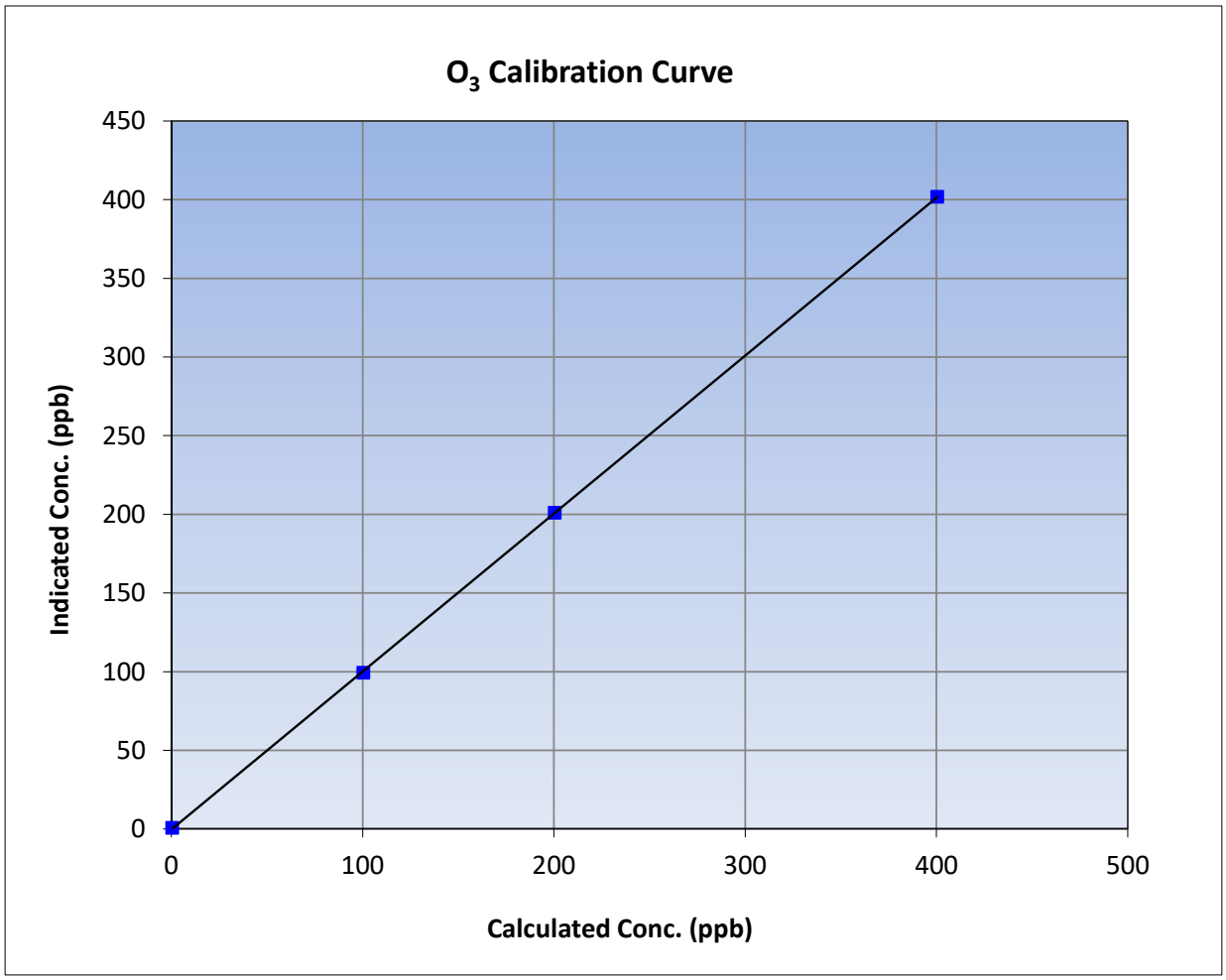
Station Information

Calibration Date:	September 21, 2023	Previous Calibration:	August 23, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	11:21	End Time (MST):	14:13
Analyzer make:	API T400	Analyzer serial #:	825

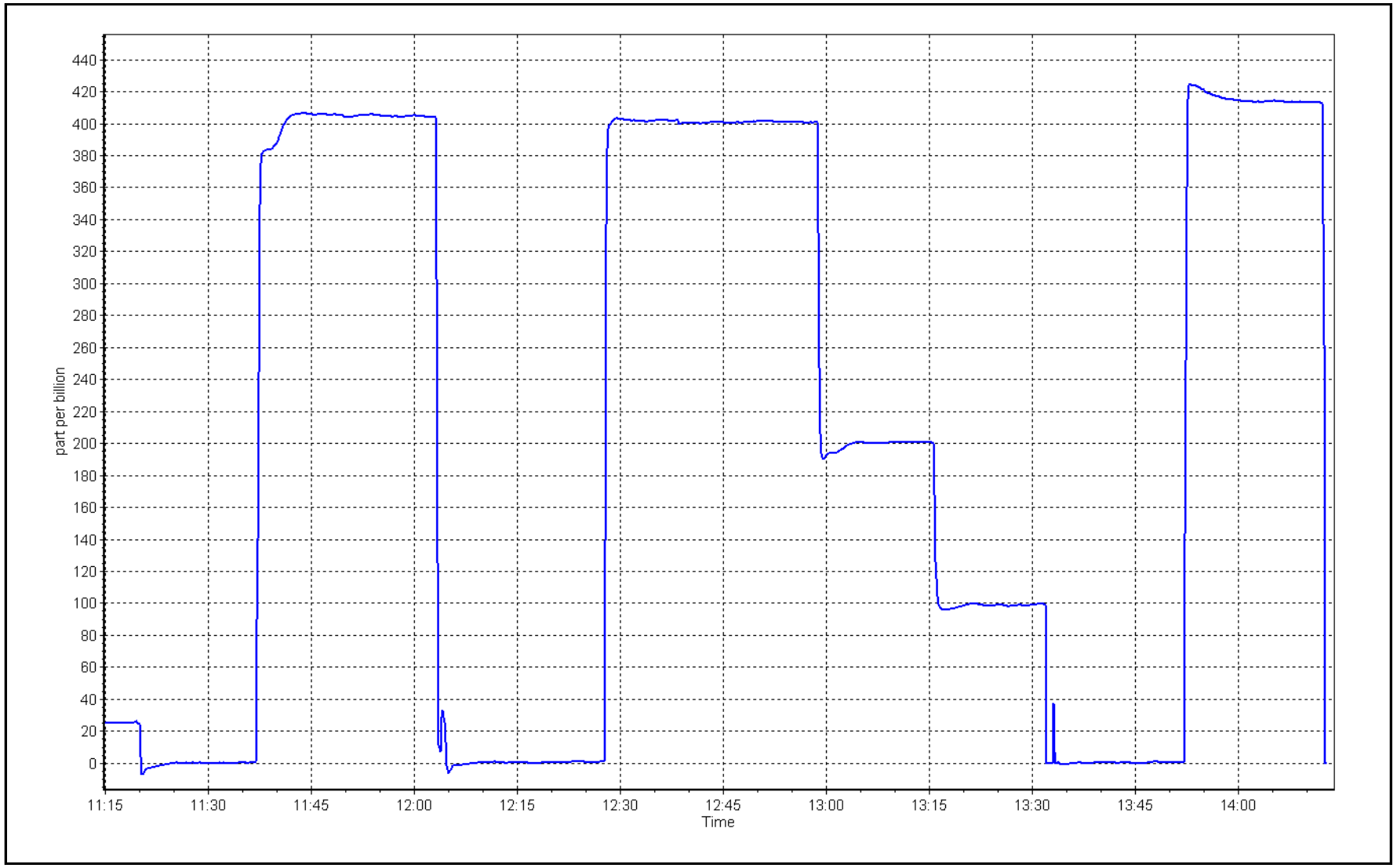
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
400.0	401.4	0.9965
200.0	200.7	0.9965
100.0	98.9	1.0111

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999978	*≥0.995*
Slope	1.003943	*0.90 - 1.10*
Intercept	-0.340000	*+/- 5*



O_3 Calibration Plot Date: September 21, 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:	September 25, 2023	Last Cal Date:	August 30, 2023
Start time (MST):	13:16	End time (MST):	14:37
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)	21.3	21.5	21.3	☐	+/- 2 °C
P (mmHg)	702.4	704.3	702.4	☐	+/- 10 mmHg
flow (LPM)	4.94	5.05	4.94	☐	+/- 0.25 LPM

Leak Test: Date of check: September 25, 2023 Last Cal Date: August 30, 2023

PM w/o HEPA: 3.9 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

Post-maintenance leak check: PM w/o HEPA: 3.9 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: September 25, 2023

Disposable Filter Changed: September 25, 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:	September 11, 2023	Last Cal Date:	August 21, 2023
Start time (MST):	10:43	End time (MST):	13:00
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:	0.999692	0.995840	Backgd or Offset:	-0.010	-0.010
Calibration intercept:	0.079759	0.085810	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	1.002
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	40.5	1.004
second point	4966	33.3	20.3	20.5	0.990
third point	4983	16.7	10.2	10.2	1.002
as left zero					
as left span					
				Average Correction Factor	0.999

Baseline Corr As found:	40.61	Prev response:	40.76	*% change:	-0.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Sample inlet filter changed after as founds. No adjustments needed. Power to the station went out during third point. No as lefts done.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

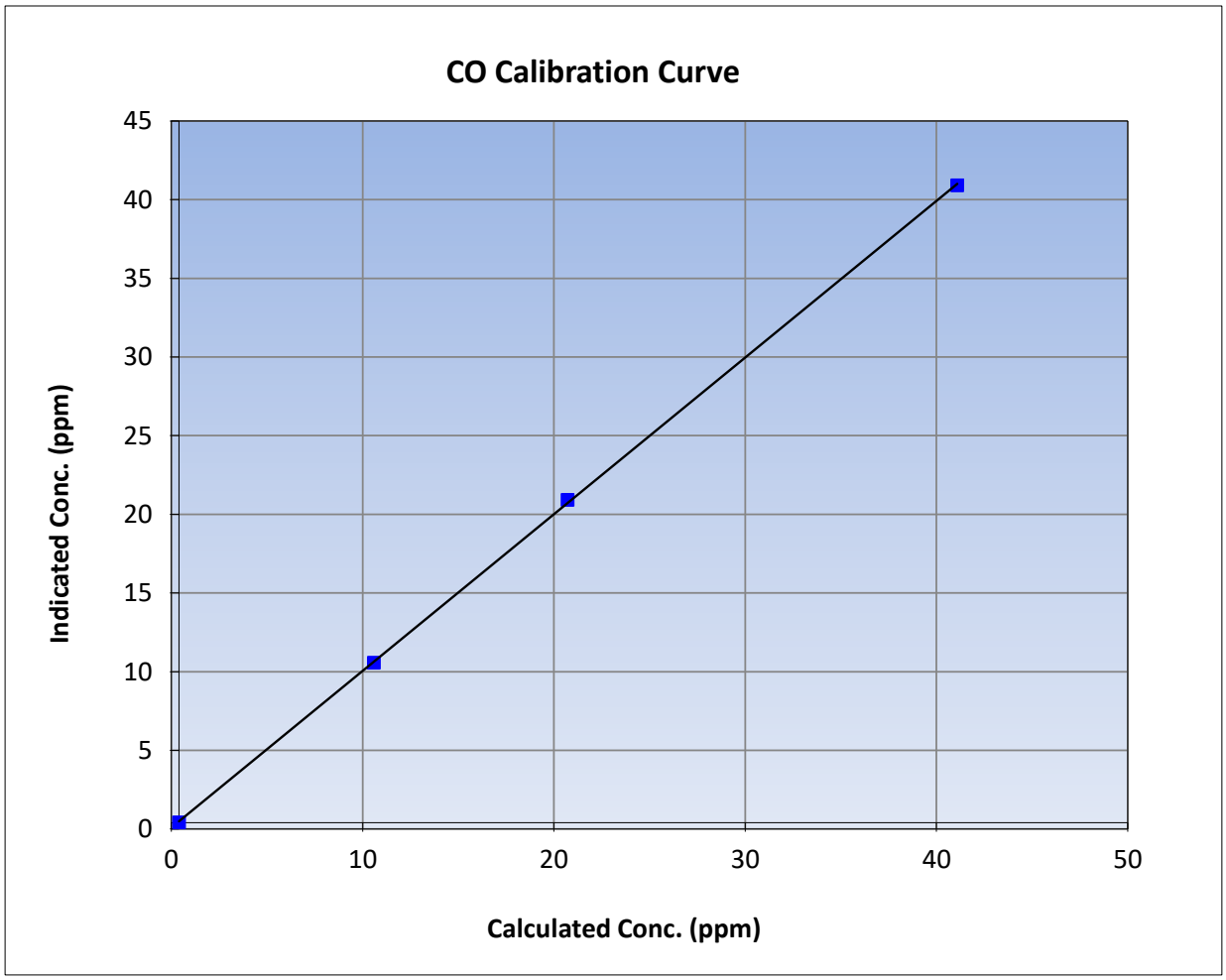
Station Information

Calibration Date:	September 11, 2023	Previous Calibration:	August 21, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:43	End Time (MST):	13:00
Analyzer make:	API T300	Analyzer serial #:	3504

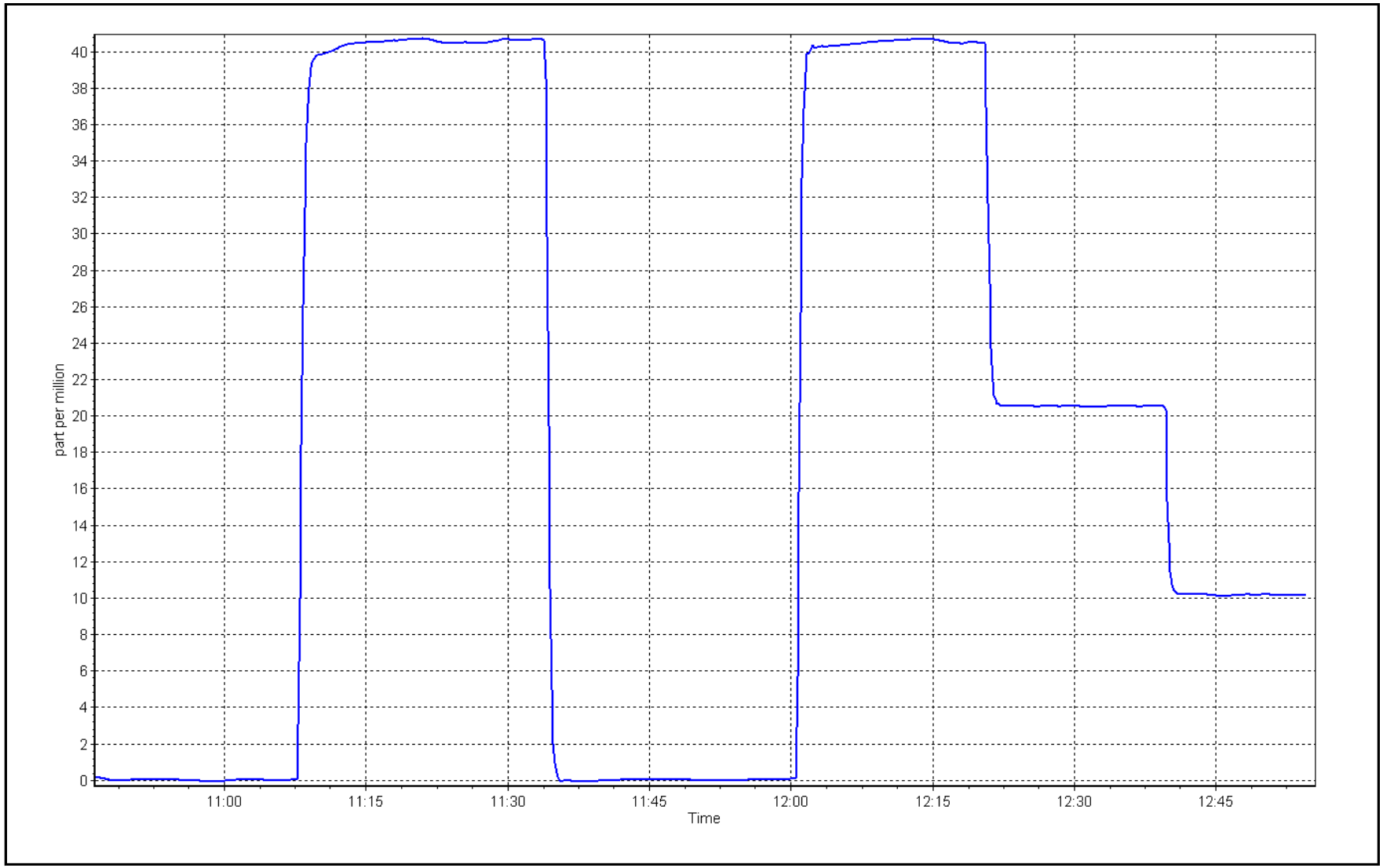
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.7	40.5	1.0042
20.3	20.5	0.9901
10.2	10.2	1.0017

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999938	*≥0.995*
Slope	0.995840	*0.90 - 1.10*
Intercept	0.085810	*+/-1.5*



CO Calibration Plot Date: September 11, 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:	September 12, 2023	Last Cal Date:	August 31, 2023
Start time (MST):	10:20	End time (MST):	14:20
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 #: 288

Analyzer Range 0 - 2,000 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000937	0.999777	Backgd or Offset:	0.041	-0.002
Calibration intercept:	-4.800000	-1.960000	Coeff or Slope:	1.009	1.051

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	3.0	----
as found span	2920	80.0	1605.9	1602.0	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	3.3	----
high point	2920	80.0	1605.9	1608.2	0.999
second point	2960	40.0	802.9	792.1	1.014
third point	2980	20.0	401.5	398.2	1.008
as left zero	3000	0.0	0.0	3.5	----
as left span	2930	80.0	1600.5	1609.9	0.994
				Average Correction Factor	1.007

Baseline Corr As found:	1599.00	Prev response:	1602.57	*% 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: Zero and span adjusted. Third point failed, performed linearity adjustment. Span and mid point checked. Zero point re-checked after mid point.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

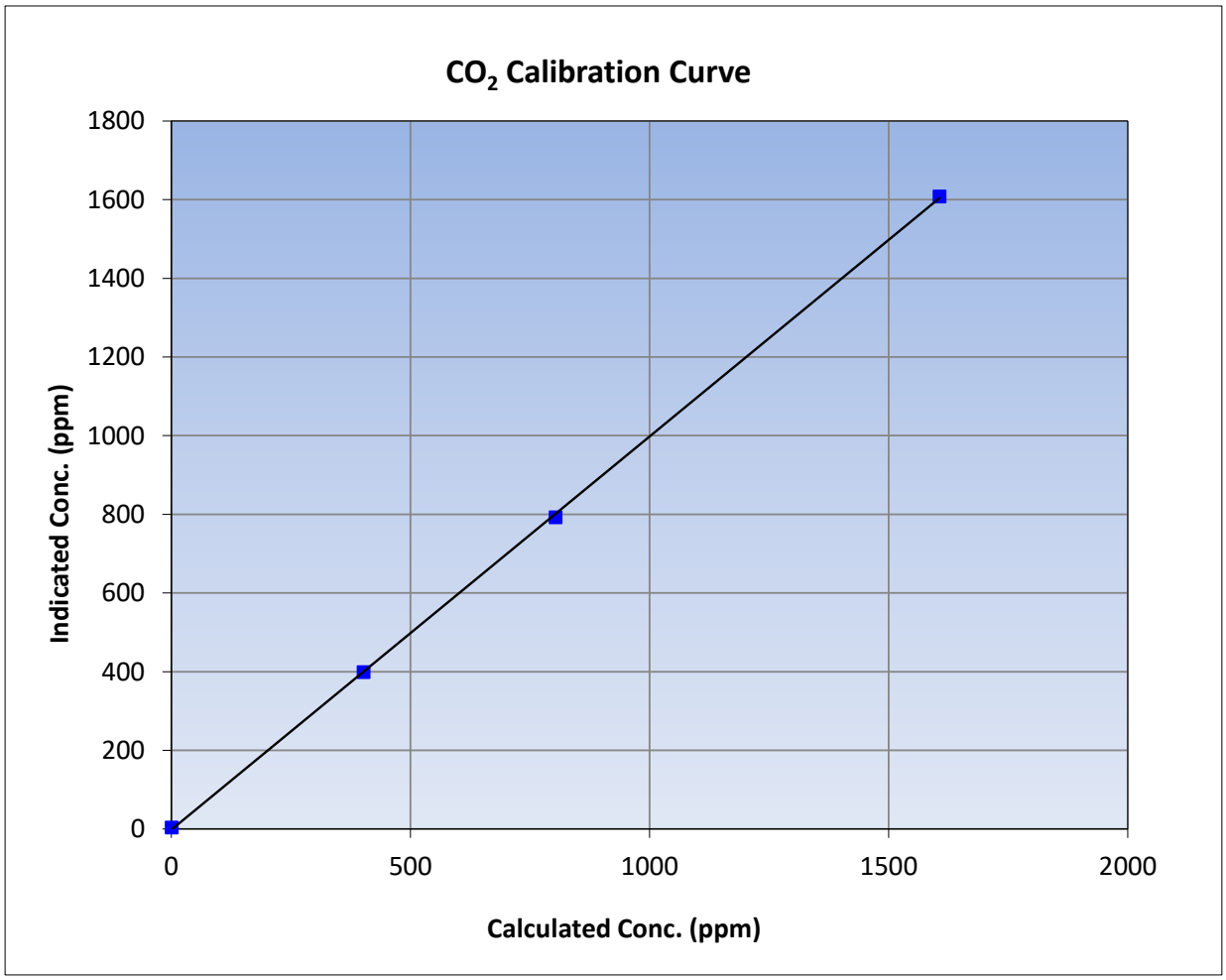
Station Information

Calibration Date	September 12, 2023	Previous Calibration	August 31, 2023
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:20	End Time (MST)	14:20
Analyzer make	API T360	Analyzer serial #	288

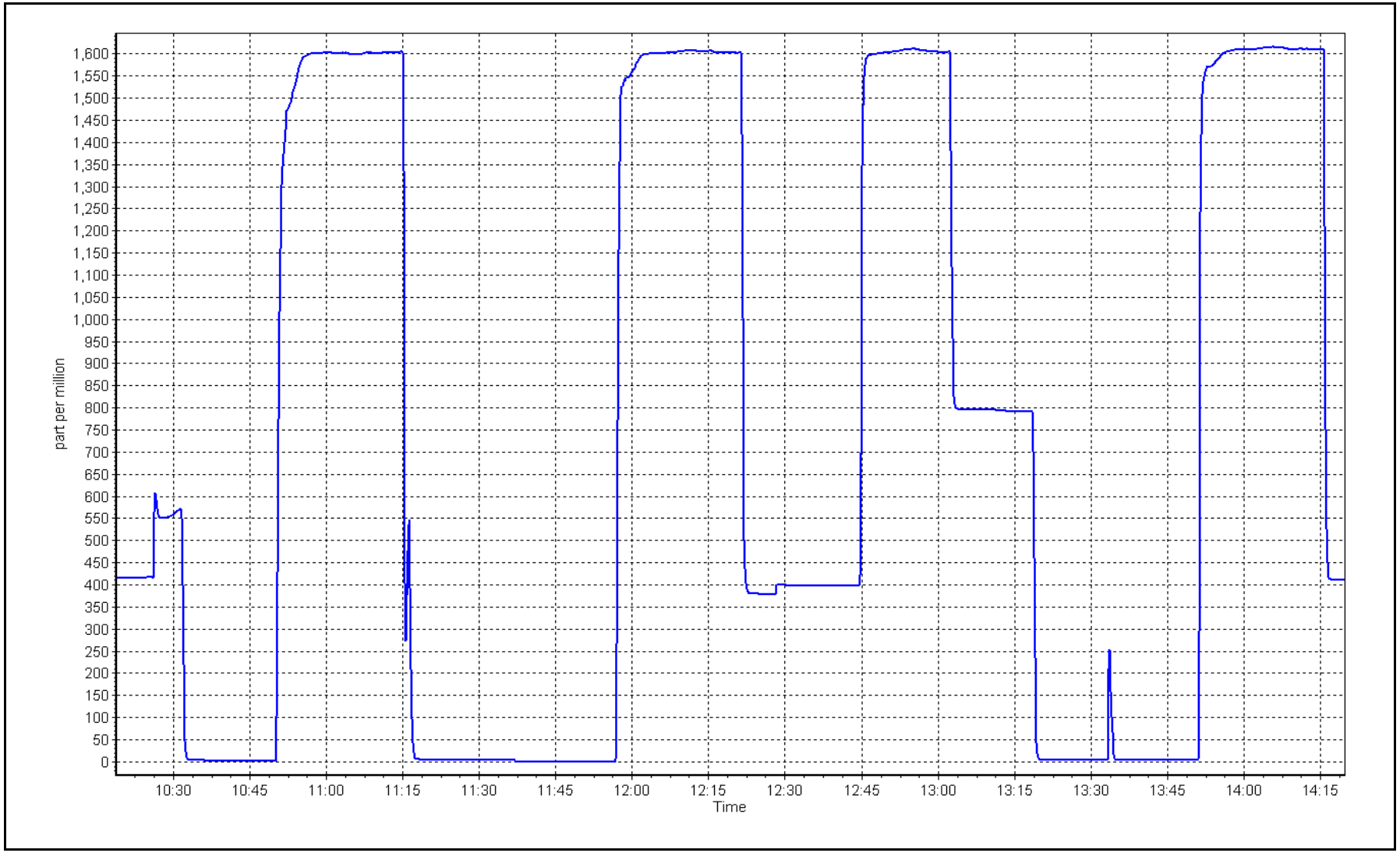
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	3.3	----
1605.9	1608.2	0.9985
802.9	792.1	1.0137
401.5	398.2	1.0082

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999910	*≥0.995*
Slope	0.999777	*0.90 - 1.10*
Intercept	-1.960000	*+/-10*



CO_2 Calibration Plot Date: September 12, 2023 Location: Stony Mountain



Wood Buffalo Environmental Association

CO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	September 29, 2023	Last Cal Date:	NA
Start time (MST):	11:20	End time (MST):	16:00
Reason:	Install		

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 #: 489

Analyzer Range 0 - 2,000 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	NA	0.998830	Backgd or Offset:	NA	-0.002
Calibration intercept:	NA	-5.420000	Coeff or Slope:	NA	1.051

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	1.4	----
high point	2920	80.0	1605.9	1606.7	0.999
second point	2960	40.0	802.9	779.0	1.031
third point	2980	20.0	401.5	398.2	1.008
as left zero	3000	0.0	0.0	5.5	----
as left span	2930	80.0	1600.5	1613.7	0.992
				Average Correction Factor	1.013

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: Instrument installation calibration, linearity adjustment performed.

Calibration Performed By: Kelly Baragar

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

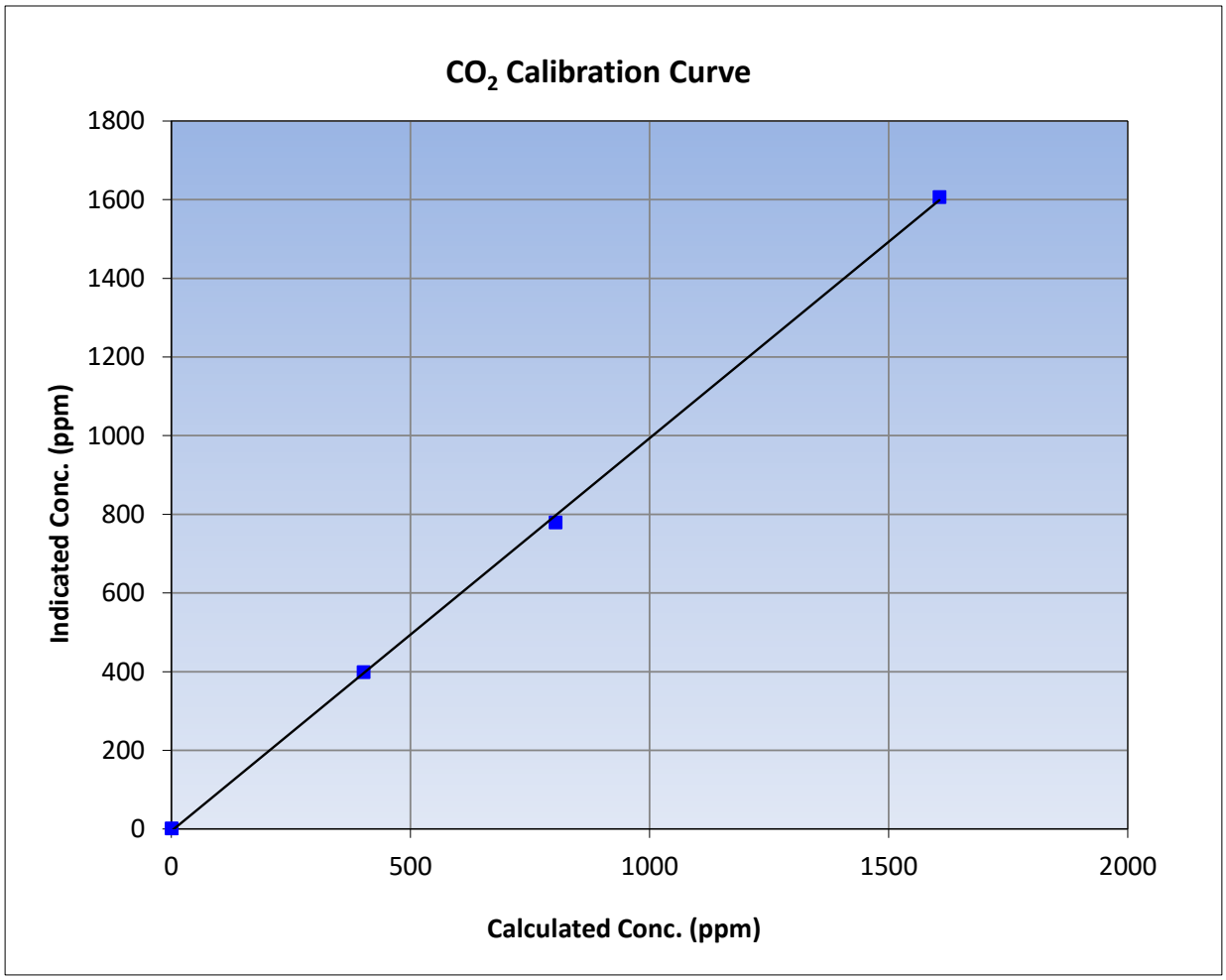
Station Information

Calibration Date	September 29, 2023	Previous Calibration	NA
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	11:20	End Time (MST)	16:00
Analyzer make	API T360	Analyzer serial #	489

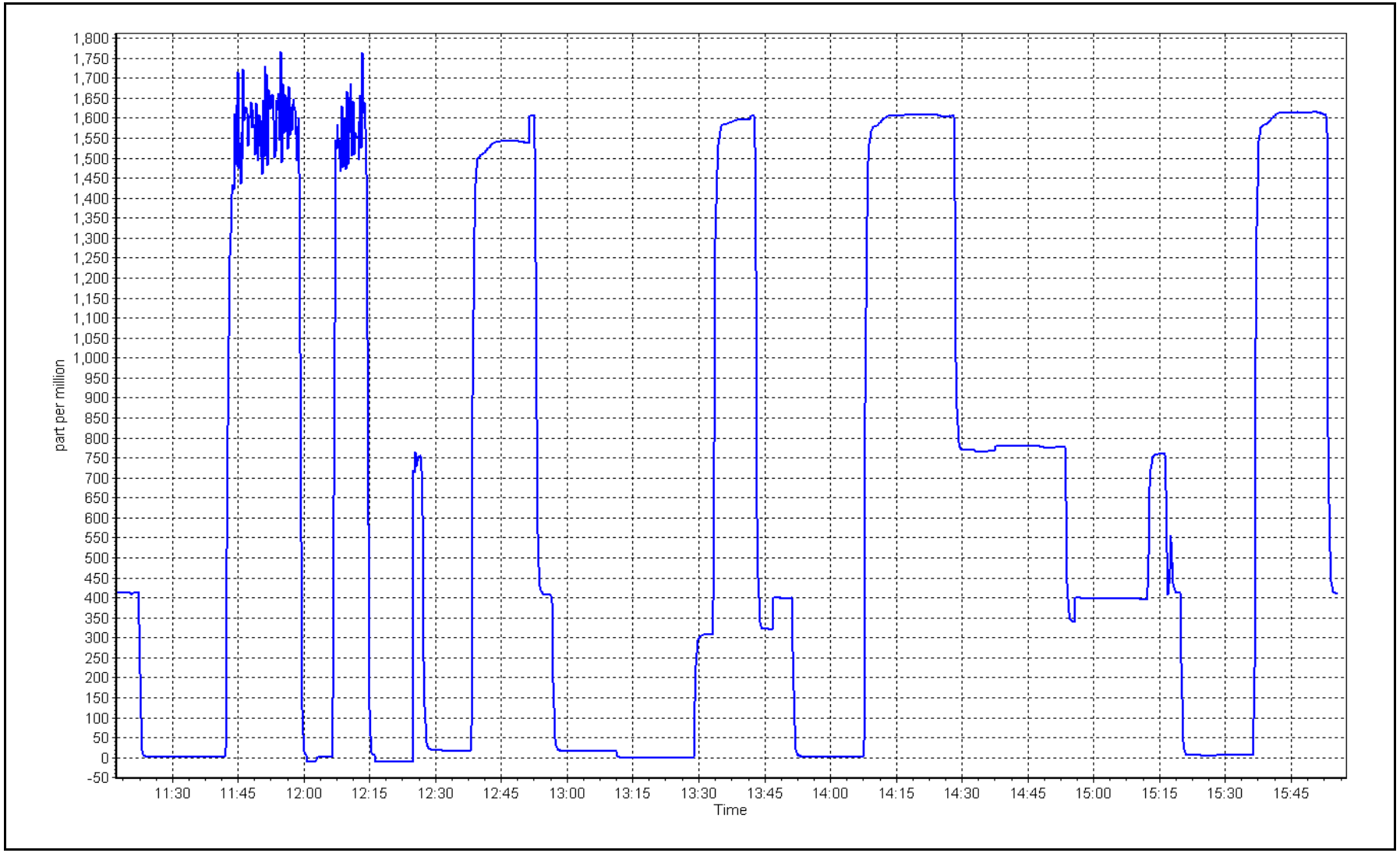
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	1.4	----
1605.9	1606.7	0.9995
802.9	779.0	1.0307
401.5	398.2	1.0082

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999696	*≥0.995*
Slope	0.998830	*0.90 - 1.10*
Intercept	-5.420000	*+/-10*



CO_2 Calibration Plot Date: September 29, 2023 Location: Stony Mountain



Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Stony Mountain	Station Number:	AMS 18
Calibration Date:	September 28, 2023	Prev Cal Date:	August 24, 2023
Start Time (MST):	11:40	End Time (MST):	12:18
Tower Height (m):	20.0	Reason:	Removal

Wind Speed Information

Sensor make/model:	NA	Serial Number:	NA
WS Calibrator:	NA	Serial Number:	NA

Shaft RPM	Calculated Speed (K/hr) (Cv)	Indicated Speed (K/hr) (Iv)	% Error *Limit = +/- 1.5%*
0			---
200			
400			
600			
800			

	Start	***Finish***	*Limits*
Correl Coeff (r^2)			*≥0.9995*
Calculated slope			*0.90 - 1.10*
Calculated intercept			*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	D14057
As Found Declination (deg east of True North):	14	As Left Declination (deg east of True North):	14
Solar noon time (MST):	13:27	Calc Declination*:	13.2 Degrees
Deadband calc:	-1.8 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	0.4	---
90	86.9	-0.9%
180	178.5	-0.4%
270	269.1	-0.2%
357	359.2	0.6%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)		0.999920	*≥0.9995*
Calculated slope		0.993367	*0.90 - 1.10*
Calculated intercept		1.758093	*+/- 4*

Notes: Removing WD sensor on the 20m tower due to suspect data. Crossarm aligned with true north.

Calibration Performed By: Rene, Ryan, & Devin

Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Stony Mountain	Station Number:	AMS 18
Calibration Date:	September 28, 2023	Prev Cal Date:	NA
Start Time (MST):	12:00	End Time (MST):	12:20
Tower Height (m):	20.0	Reason:	Install

Wind Speed Information

Sensor make/model:	NA	Serial Number:	NA
WS Calibrator:	NA	Serial Number:	NA

Shaft RPM	Calculated Speed (K/hr) (Cv)	Indicated Speed (K/hr) (Iv)	% Error *Limit = +/- 1.5%*
0			---
200			
400			
600			
800			

	Start	***Finish***	*Limits*
Correl Coeff (r^2)			*≥0.9995*
Calculated slope			*0.90 - 1.10*
Calculated intercept			*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	C21021
As Found Declination (deg east of True North):	14	As Left Declination (deg east of True North):	14
Solar noon time (MST):	13:27	Calc Declination*:	13.2 Degrees
Deadband calc:	-2.2 degrees (*Limit 4 deg*)		* - calculated declination as per NOAA website

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	% Error (based on 357° FS) *Limit = +/- 1.0%*
0	0.4	---
90	89.9	0.0%
180	179.4	-0.2%
270	270.3	0.1%
357	359.6	0.7%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)		0.999977	*≥0.9995*
Calculated slope		0.994666	*0.90 - 1.10*
Calculated intercept		0.477464	*+/- 4*

Notes: Installing new WD sensors on the 20m tower. Crossarm aligned with true north. No issues to note.

Calibration Performed By: Rene, Ryan & Devin

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS19
FIREBAG
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	September 28, 2023	Last Cal Date:	August 14, 2023
Start time (MST):	9:43	End time (MST):	14:03
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.29	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC716618			
Removed Cal Gas Conc:	49.29	ppm	Rem Gas Exp Date:	
Removed Gas Cyl #:			Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	1607
ZAG Make/Model:	API T701		Serial Number:	1118

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1410661308

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001265	0.999292	Backgd or Offset:	10.3	10.8
Calibration intercept:	0.897402	0.237822	Coeff or Slope:	1.002	0.975

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	4999	0.0	0.0	0.5	----
as found span	4919	81.1	799.5	823.0	0.971
as found 2nd point	4959	40.6	400.3	412.2	0.971
as found 3rd point	4980	20.3	200.1	206.6	0.969
new cylinder response					
calibrator zero	4999	0.0	0.0	-0.1	----
high point	4919	81.1	799.5	798.8	1.001
second point	4959	40.6	400.3	400.9	0.998
third point	4980	20.3	200.1	200.2	1.000
as left zero	4999	0.0	0.0	0.0	----
as left span	4919	81.1	799.5	796.0	1.004
				Average Correction Factor	1.000

Baseline Corr As found:	822.50	Previous response	801.38	*% change	2.6%
Baseline Corr 2nd AF pt:	411.70	AF Slope:	1.028697	AF Intercept:	0.572269
Baseline Corr 3rd AF pt:	206.10	AF Correlation:	1.000000		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

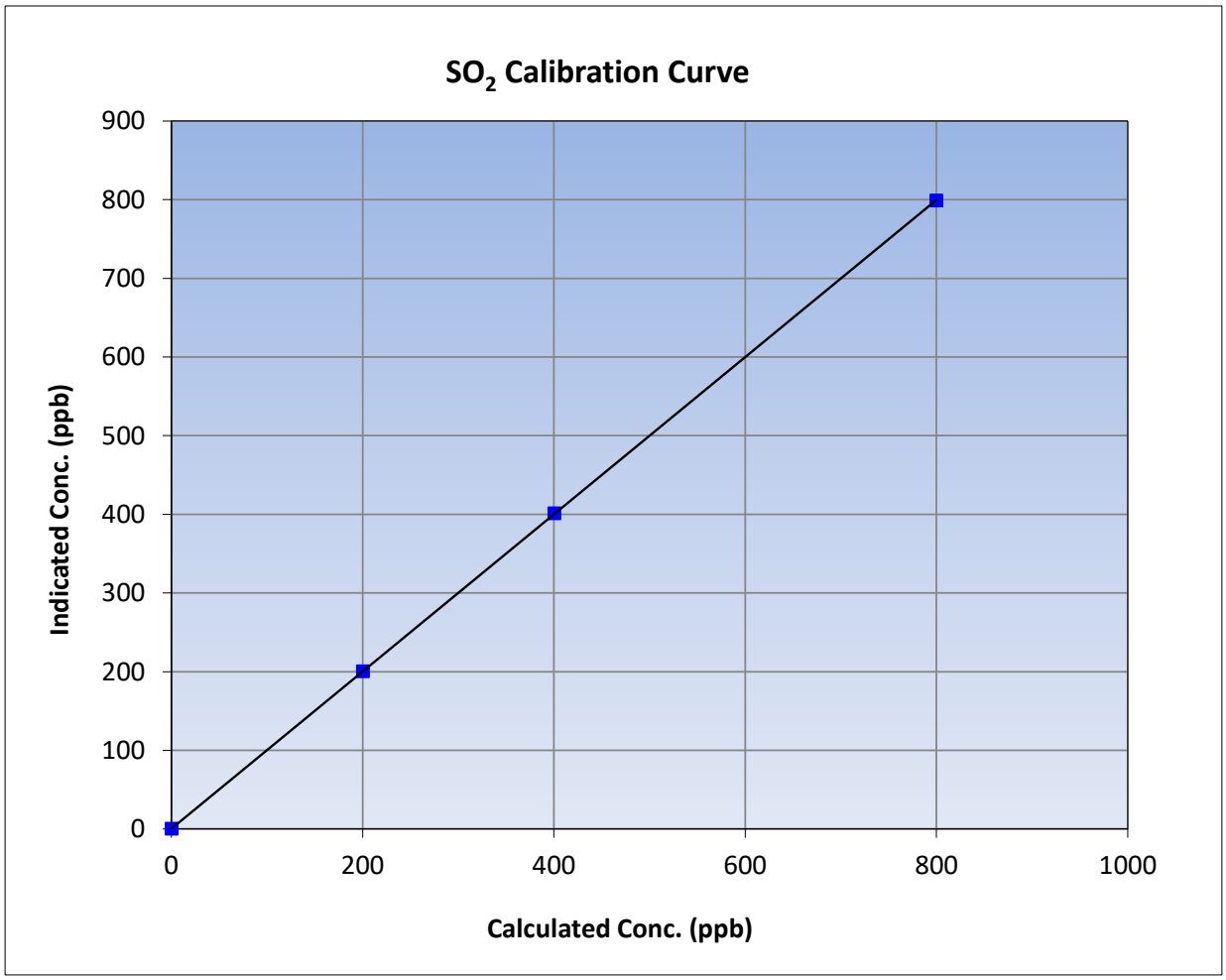
Station Information

Calibration Date:	September 28, 2023	Previous Calibration:	August 14, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	9:43	End Time (MST):	14:03
Analyzer make:	Thermo 43i	Analyzer serial #:	1410661308

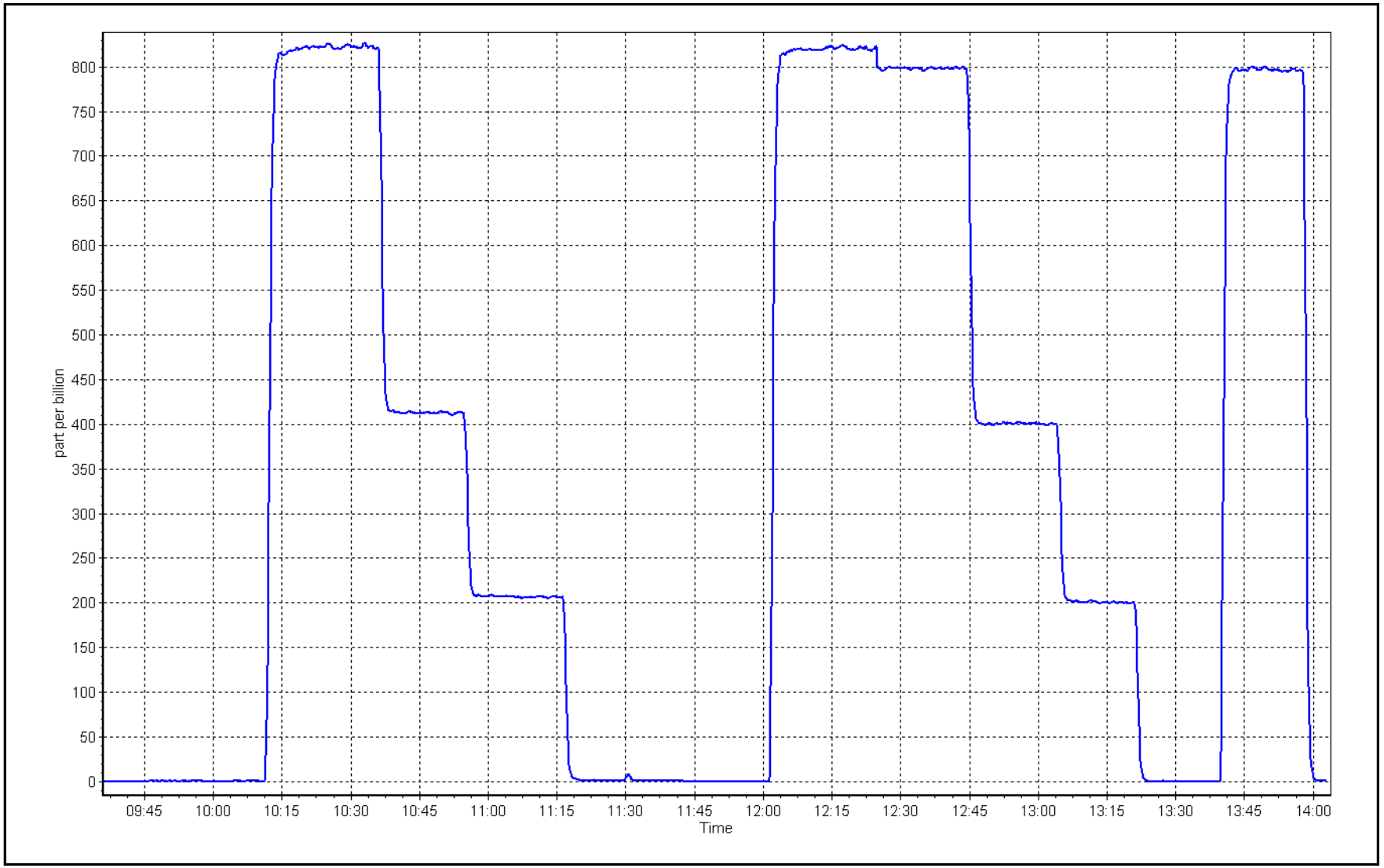
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
799.5	798.8	1.0008
400.3	400.9	0.9984
200.1	200.2	0.9995

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	0.999292	*0.90 - 1.10*
Intercept	0.237822	*+/-30*



SO2 Calibration Plot Date: September 28, 2023 Location: Firebag



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Firebag	Station number:	AMS19
Calibration Date:	September 11, 2023	Last Cal Date:	August 10, 2023
Start time (MST):	10:05	End time (MST):	14:43
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:	1.000053	0.993765	Backgd or Offset:	2.55	2.53
Calibration intercept:	-0.081596	-0.161463	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	80.2	0.995
as found 2nd point	4961	39.1	40.0	40.0	0.995
as found 3rd point	4980	19.6	20.0	19.7	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	-0.2	----
high point	4922	78.2	80.0	79.3	1.009
second point	4961	39.1	40.0	39.6	1.010
third point	4980	19.6	20.0	19.8	1.013
as left zero	5000	0.0	0.0	0.0	----
as left span	4922	78.2	80.0	78.5	1.019
SO2 Scrubber Check	4922	78.3	800.2	0.1	----
Date of last scrubber change:		January 18, 2023		Ave Corr Factor	1.010
Date of last converter efficiency test:		n/a			efficiency

Baseline Corr As found:	80.4	Prev response:	79.90	*% change:	0.6%
Baseline Corr 2nd AF pt:	40.2	AF Slope:	1.006339	AF Intercept:	-0.301622
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999988		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after MPAF's. Ran SOx scrubber check after cal zero. No adjustments needed.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

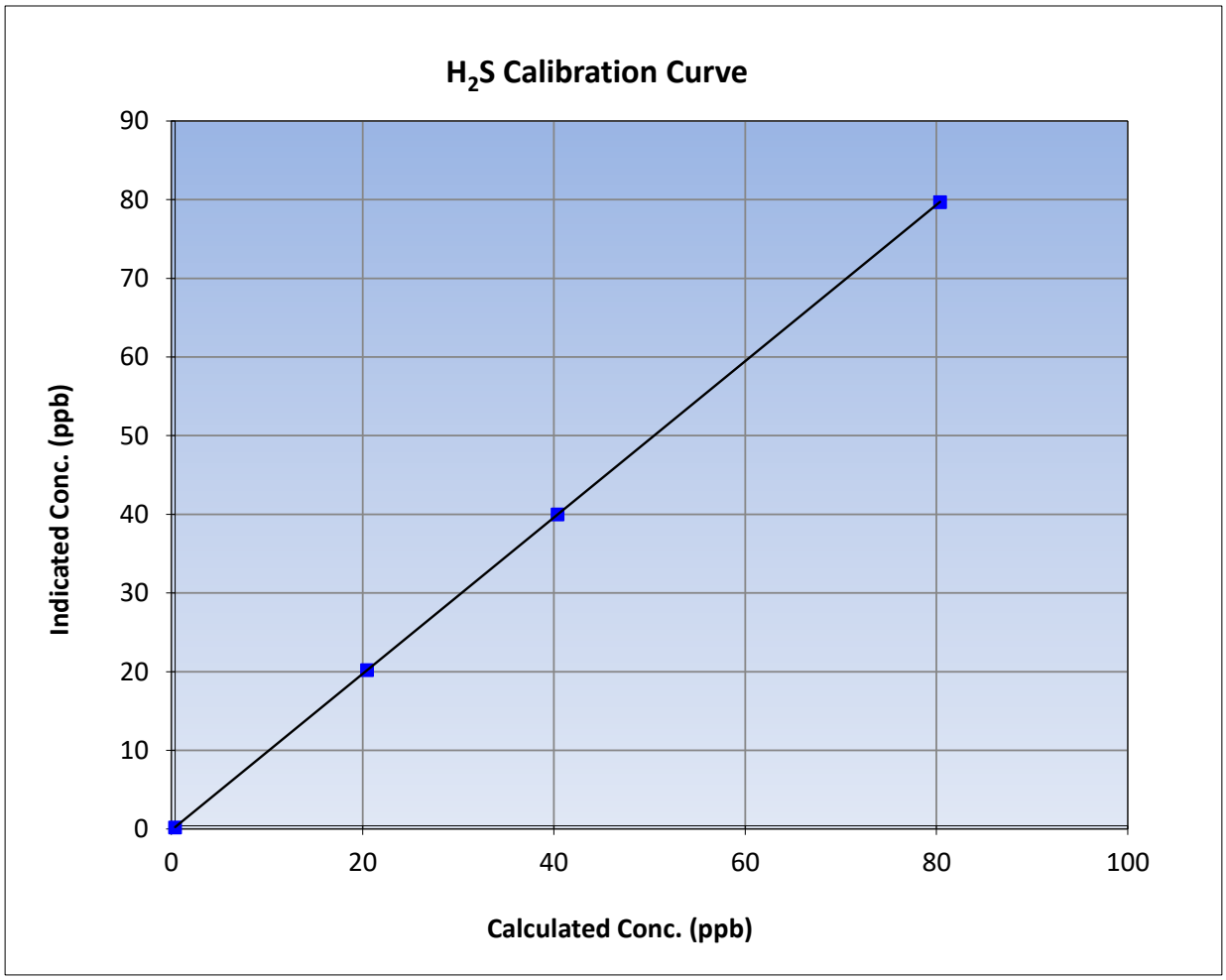
Station Information

Calibration Date:	September 11, 2023	Previous Calibration:	August 10, 2023
Station Name:	Firebag	Station Number:	AMS19
Start Time (MST):	10:05	End Time (MST):	14:43
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1151680032

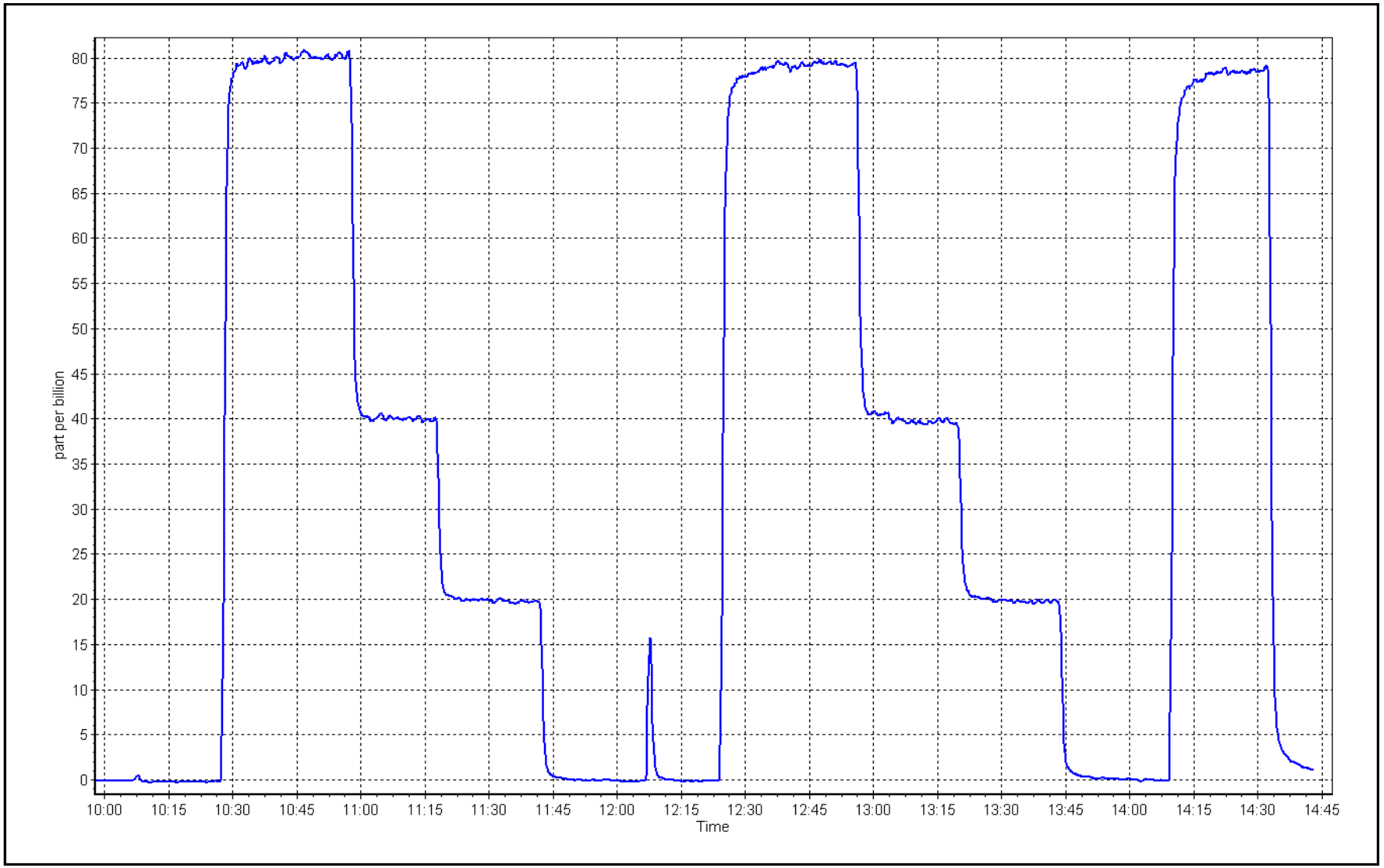
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
80.0	79.3	1.0086
40.0	39.6	1.0099
20.0	19.8	1.0125

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	0.993765	*0.90 - 1.10*
Intercept	-0.161463	*+/-3*



H_2S Calibration Plot Date: September 11, 2023 Location: Firebag



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	September 28, 2023	Last Cal Date:	August 29, 2023
Start time (MST):	9:43	End time (MST):	14:03
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 51i-LT		Analyzer serial #:	1336160089	
Analyzer Range:	0 - 20 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.994308	0.998771	Background:	3.27	3.48
Calibration intercept:	-0.010322	-0.052126	Coefficient:	3.762	3.796

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	4999	0.0	0.00	0.05	----
as found span	4919	81.1	17.31	17.21	1.006
as found 2nd point	4959	40.6	8.66	8.60	1.007
as found 3rd point	4980	20.3	4.33	4.44	0.976
new cylinder response					
calibrator zero	4999	0.0	0.00	-0.01	----
high point	4919	81.1	17.31	17.27	1.002
second point	4959	40.6	8.66	8.53	1.016
third point	4980	20.3	4.33	4.26	1.016
as left zero	5000	0.0	0.00	-0.03	----
as left span	4919	81.1	17.31	17.41	0.994
				Average Correction Factor	1.011

Baseline Corr As found:	17.16	Previous response	17.20	*% change	-0.2%
Baseline Corr 2nd AF pt:	8.55	AF Slope:	0.989495	AF Intercept:	0.078885
Baseline Corr 3rd AF pt:	4.39	AF Correlation:	0.999944		

* = > +/-5% change initiates investigation

Notes: Multipoint as founds done prior to installing firmware update. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

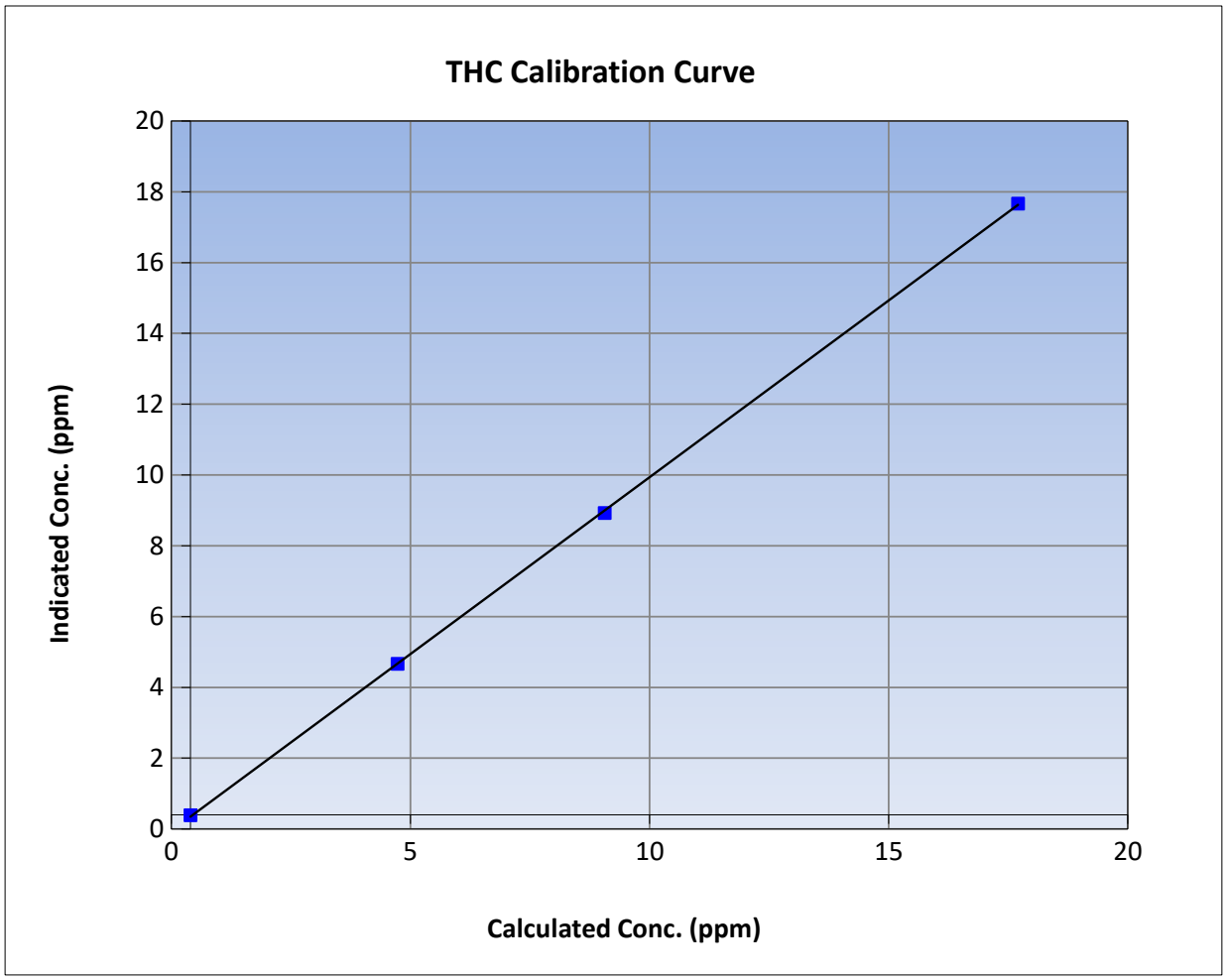
Station Information

Calibration Date:	September 28, 2023	Previous Calibration:	August 29, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	9:43	End Time (MST):	14:03
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1336160089

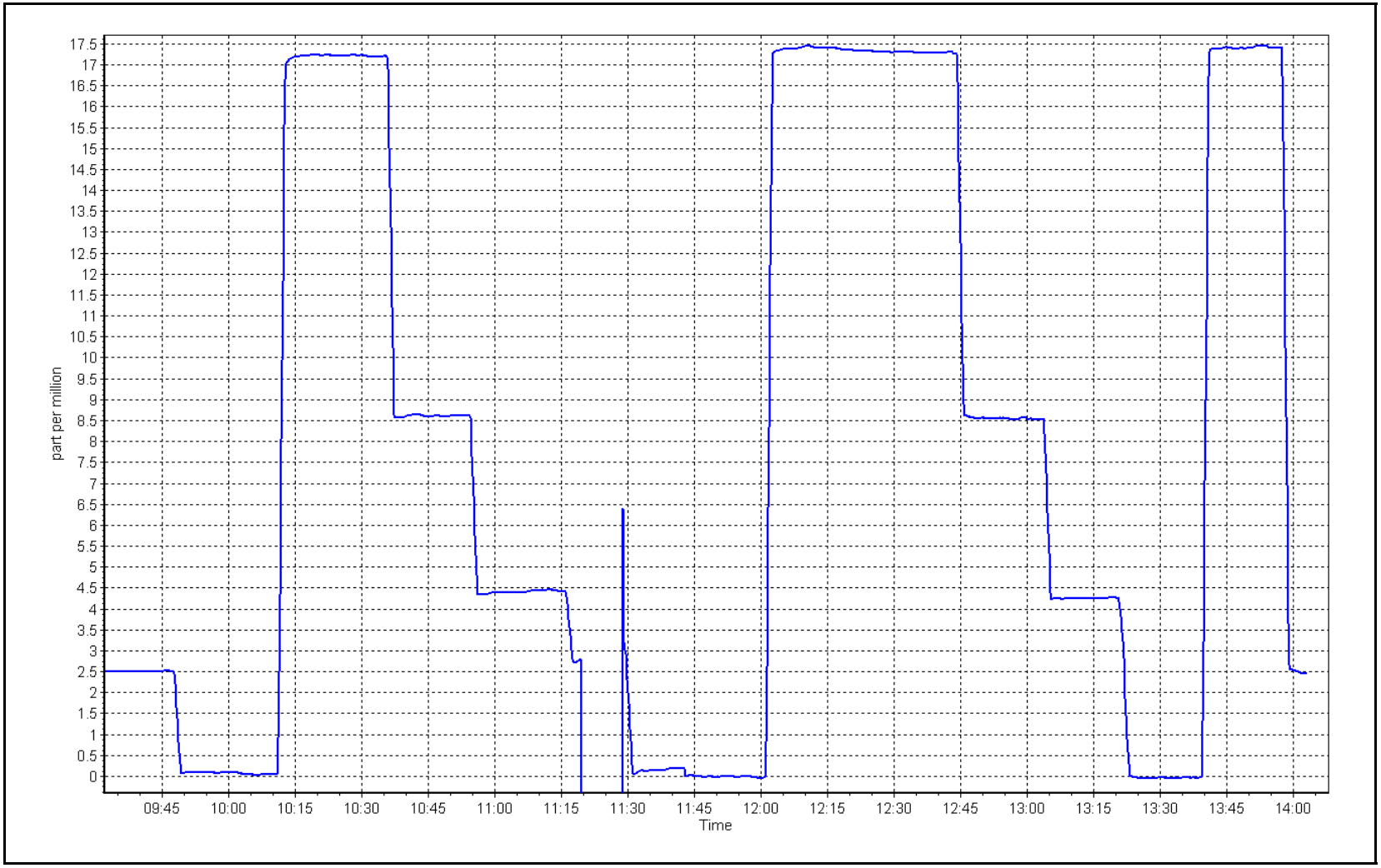
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.01	----
17.31	17.27	1.0020
8.66	8.53	1.0157
4.33	4.26	1.0158

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999948	*≥0.995*
Slope	0.998771	*0.90 - 1.10*
Intercept	-0.052126	*+/-1.5*



THC Calibration Plot Date: September 28, 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:	September 29, 2023	Last Cal Date:	August 16, 2023
Start time (MST):	9:49	End time (MST):	14:53
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:	1.112	1.098	NO bkgnd or offset:	7.8	7.6
NOX coeff or slope:	0.993	0.993	NOX bkgnd or offset:	7.8	8.6
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	213.1	213.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.998001	0.998622
NO_X Cal Offset:	1.176081	0.176163
NO Cal Slope:	0.999755	1.000897
NO Cal Offset:	0.048770	0.249004
NO_2 Cal Slope:	1.004673	0.998565
NO_2 Cal Offset:	0.372474	-1.744715

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	0.8	-0.2	1.0	----	----
as found span	4919	81.0	828.1	800.3	27.9	847.0	816.0	31.3	0.9777	0.9807
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	4999	0.0	0.0	0.0	0.0	-0.4	0.0	-0.4	----	----
high point	4919	81.0	828.1	800.3	27.9	827.0	801.0	25.8	1.0014	0.9991
second point	4960	40.5	414.0	400.1	13.9	413.6	401.2	12.4	1.0010	0.9973
third point	4980	20.2	206.5	199.6	6.9	207.2	200.0	7.2	0.9967	0.9978
as left zero	4999	0.0	0.0	0.0	0.0	-0.7	0.0	-0.7	----	----
as left span	4919	81.0	828.1	364.1	464.1	827.0	365.1	461.9	1.0014	0.9972
								Average Correction Factor	0.9997	0.9981

Corrected As found NO_X = 846.2 ppb NO = 816.2 ppb

Previous Response NO_X = 827.7 ppb NO = 800.1 ppb

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

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

* = > +/-5% change initiates investigation

*Percent Change NO_X = 2.2%

*Percent Change NO = 2.0%

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

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

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

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	800.0	363.8	464.1	462.5	1.0034	99.7%
2nd GPT point (200 ppb O3)	800.0	582.9	245.0	242.0	1.0122	98.8%
3rd GPT point (100 ppb O3)	800.0	691.6	136.3	133.0	1.0245	97.6%
				Average Correction Factor	1.0134	98.7%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

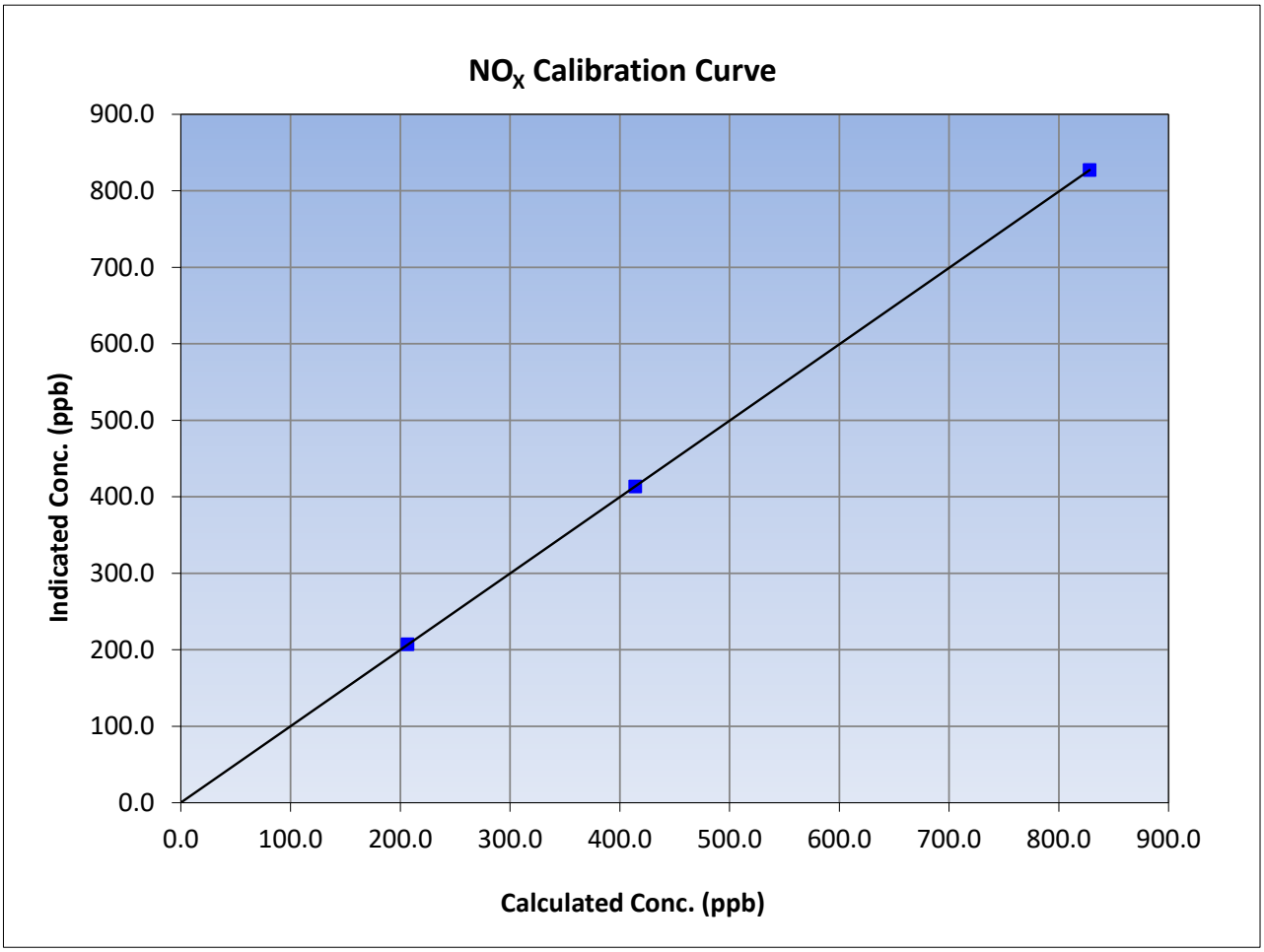
Version-04-2020

Station Information

Calibration Date:	September 29, 2023	Previous Calibration:	August 16, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	9:49	End Time (MST):	14:53
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	-0.4	----	Correlation Coefficient	0.999997	≥0.995
828.1	827.0	1.0014			
414.0	413.6	1.0010	Slope	0.998622	0.90 - 1.10
206.5	207.2	0.9967			
			Intercept	0.176163	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

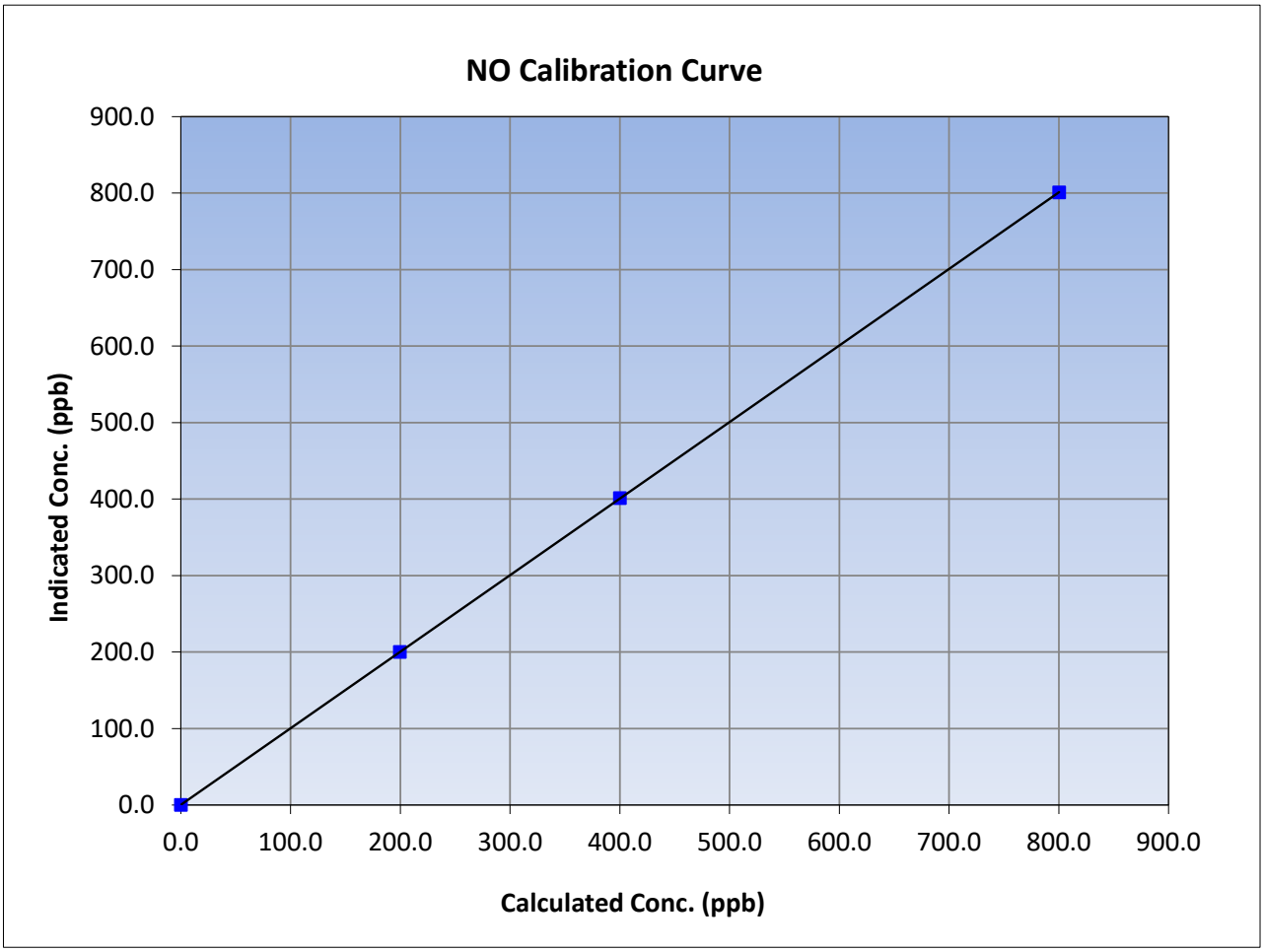
Version-04-2020

Station Information

Calibration Date:	September 29, 2023	Previous Calibration:	August 16, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	9:49	End Time (MST):	14:53
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999999	≥0.995
800.3	801.0	0.9991			
400.1	401.2	0.9973	Slope	1.000897	0.90 - 1.10
199.6	200.0	0.9978			
			Intercept	0.249004	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

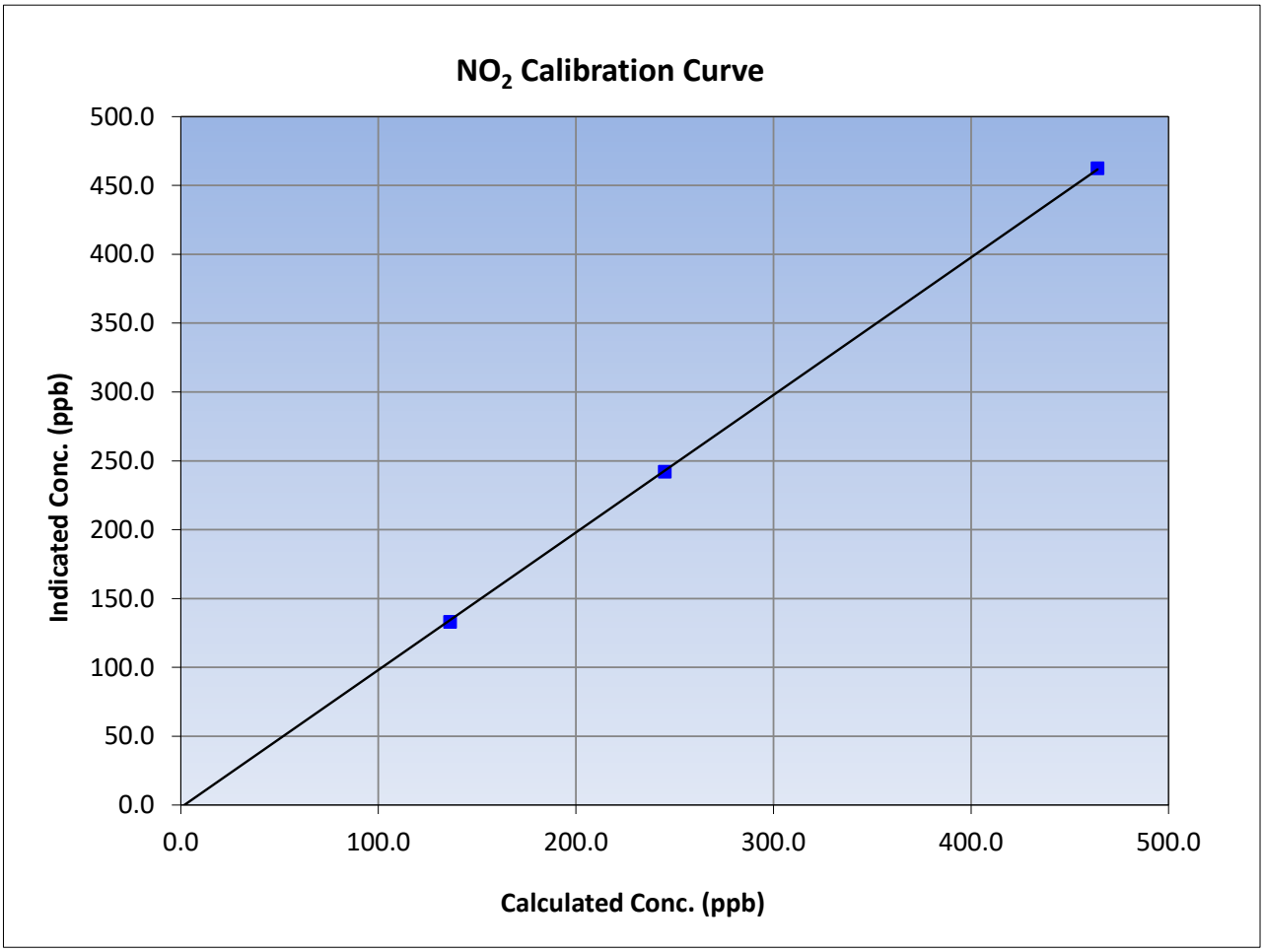
Version-04-2020

Station Information

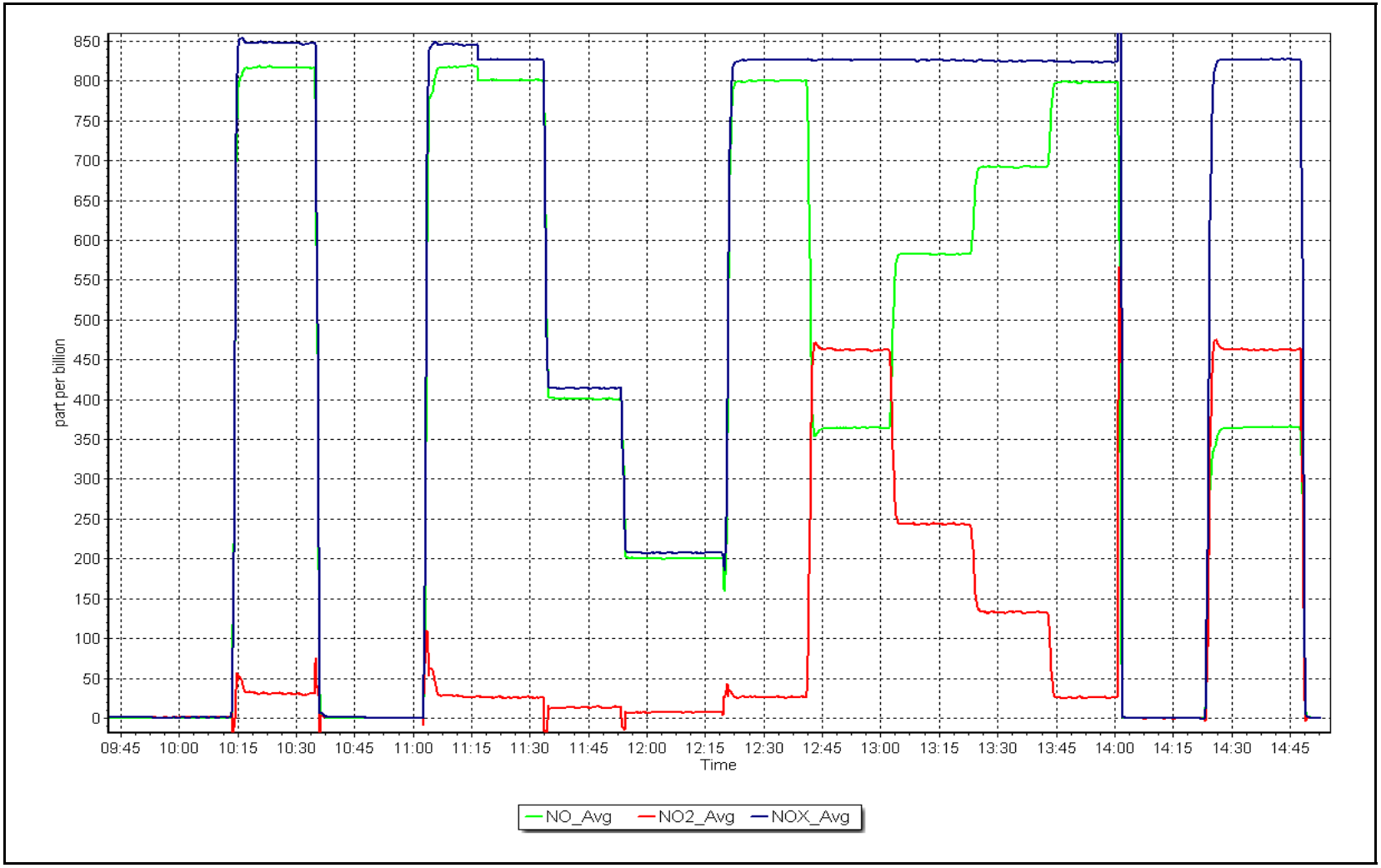
Calibration Date:	September 29, 2023	Previous Calibration:	August 16, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	9:49	End Time (MST):	14:53
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.4	----	Correlation Coefficient	0.999956	≥0.995
464.1	462.5	1.0034			
245.0	242.0	1.0122	Slope	0.998565	0.90 - 1.10
136.3	133.0	1.0245			
			Intercept	-1.744715	+/-20



NO_X Calibration Plot Date: September 29, 2023 Location: Firebag



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS20
MACKAY RIVER
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	September 12, 2023	Last Cal Date:	August 8, 2023
Start time (MST):	7:46	End time (MST):	10:25
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:	0.997865	0.998878	Backgd or Offset:	18.2	18.2
Calibration intercept:	2.431247	3.251492	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	0.4	----
as found span	4919	81.3	800.3	802.0	0.998
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	801.8	0.998
second point	4959	40.7	400.7	403.2	0.994
third point	4980	20.3	199.8	206.7	0.967
as left zero	5000	0.0	0.0	0.6	----
as left span	4919	81.3	800.3	802.5	0.997
				Average Correction Factor	0.986

Baseline Corr As found:	801.60	Previous response	800.99	*% 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 maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

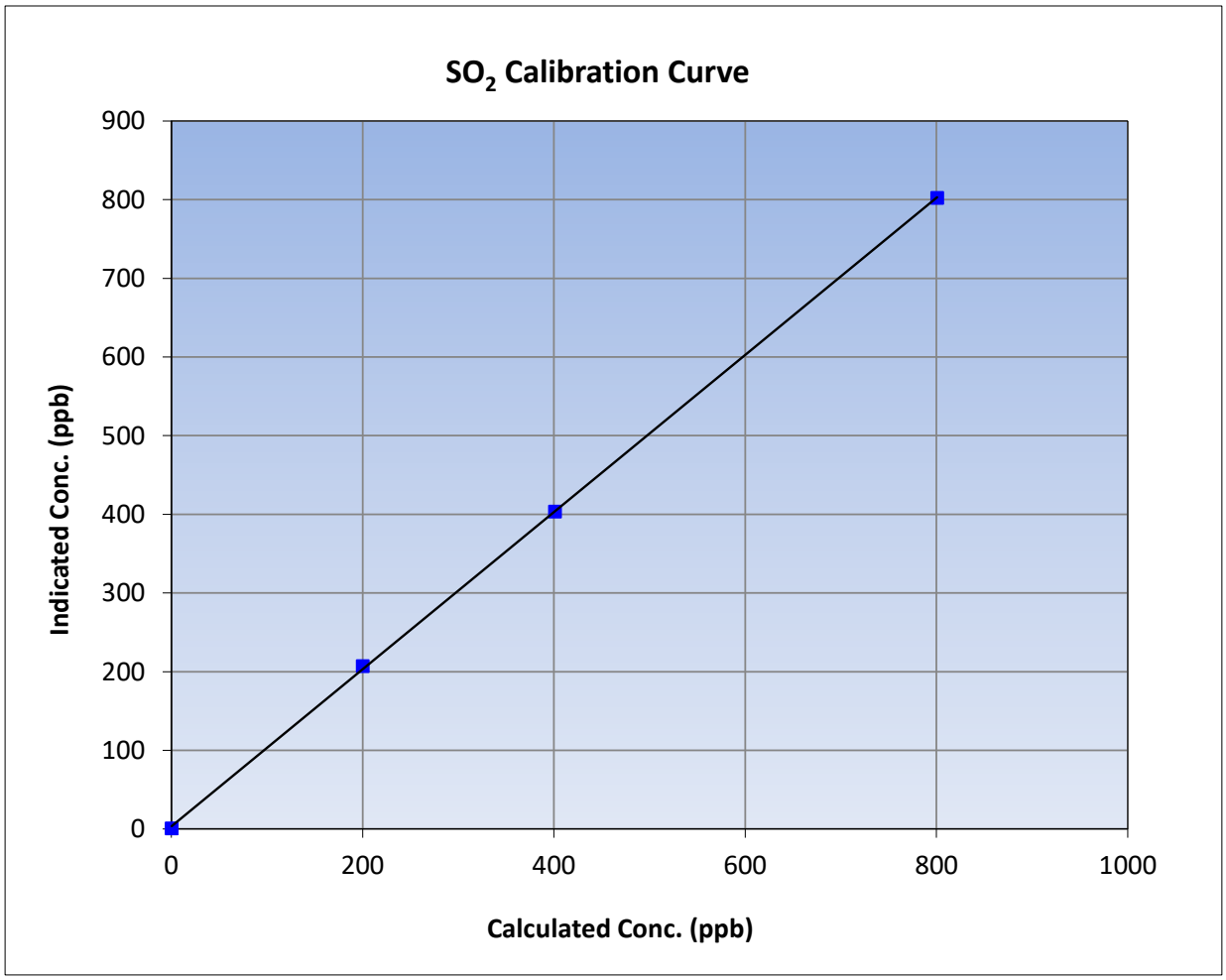
Station Information

Calibration Date:	September 12, 2023	Previous Calibration:	August 8, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	7:46	End Time (MST):	10:25
Analyzer make:	Thermo 43i	Analyzer serial #:	1501301450

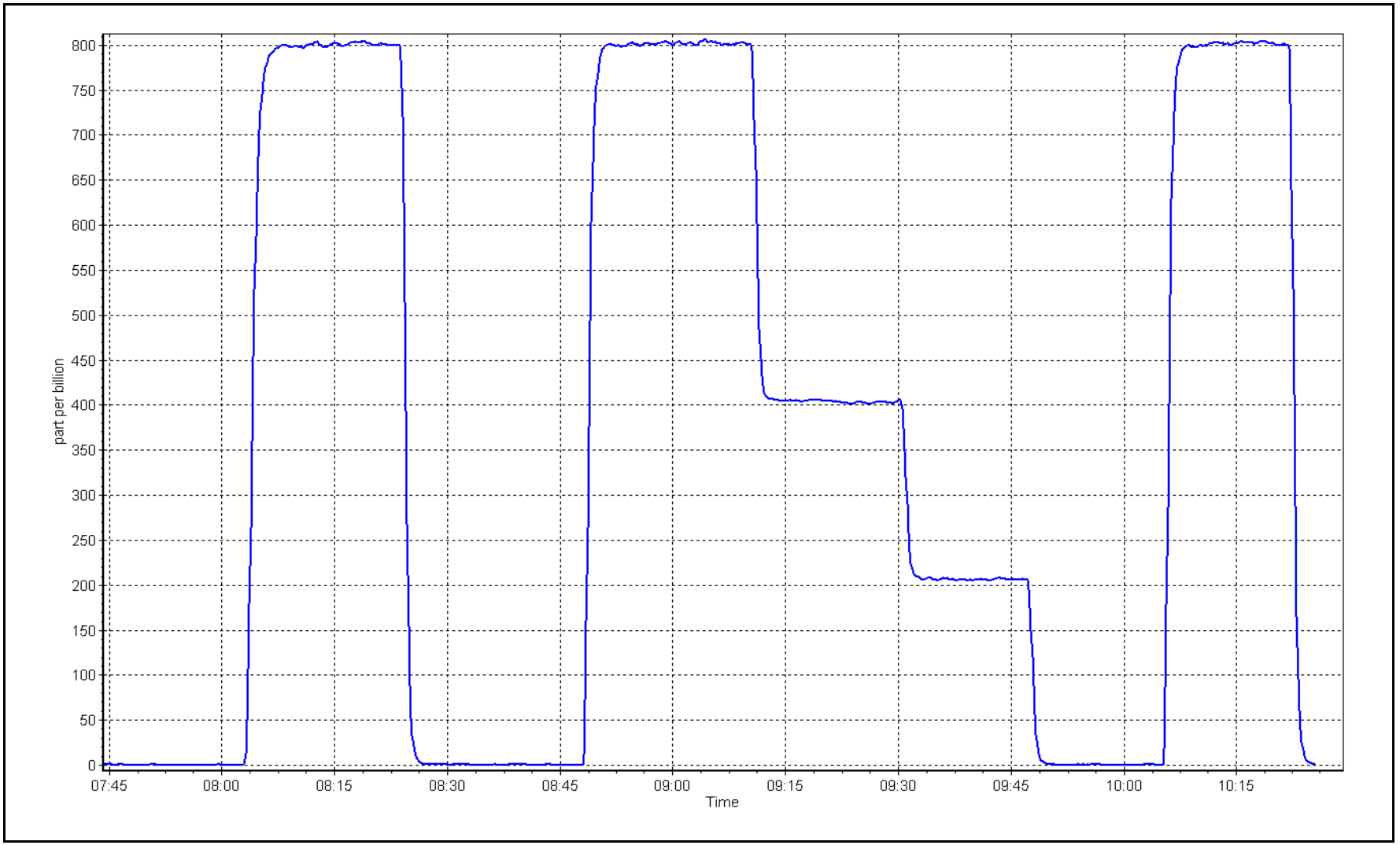
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
800.3	801.8	0.9981
400.7	403.2	0.9937
199.8	206.7	0.9667

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999934	*≥0.995*
Slope	0.998878	*0.90 - 1.10*
Intercept	3.251492	*+/-30*



SO2 Calibration Plot Date: September 12, 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:	September 11, 2023	Last Cal Date:	August 4, 2023
Start time (MST):	6:58	End time (MST):	11:07
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:	0.994521	0.995379	Backgd or Offset:	1.0	0.91
Calibration intercept:	0.287104	0.407078	Coeff or Slope:	0.535	0.501

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4922	78.1	80.0	86.7	0.923
as found 2nd point	4961	39.0	39.9	43.6	0.918
as found 3rd point	4980	19.5	20.0	22.1	0.908
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4922	78.1	80.0	80.0	1.000
second point	4961	39.0	40.0	40.2	0.994
third point	4980	19.5	20.0	20.6	0.972
as left zero	5000	0.0	0.0	0.2	----
as left span	4922	78.1	80.0	79.0	1.013
SO2 Scrubber Check	4919	80.0	800.2	0.0	----
Date of last scrubber change:		May 25, 2023		Ave Corr Factor	0.989
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	86.6	Prev response:	79.82	*% change:	7.8%
Baseline Corr 2nd AF pt:	43.5	AF Slope:	1.081621	AF Intercept:	0.301040
Baseline Corr 3rd AF pt:	22.0	AF Correlation:	0.999975		

* = > +/-5% change initiates investigation

Notes: Lamp voltage slowly going up causing the spans to go up. Changing Lamp didn't work, continued calibration. Sox scrubber checked after calibrator zero. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

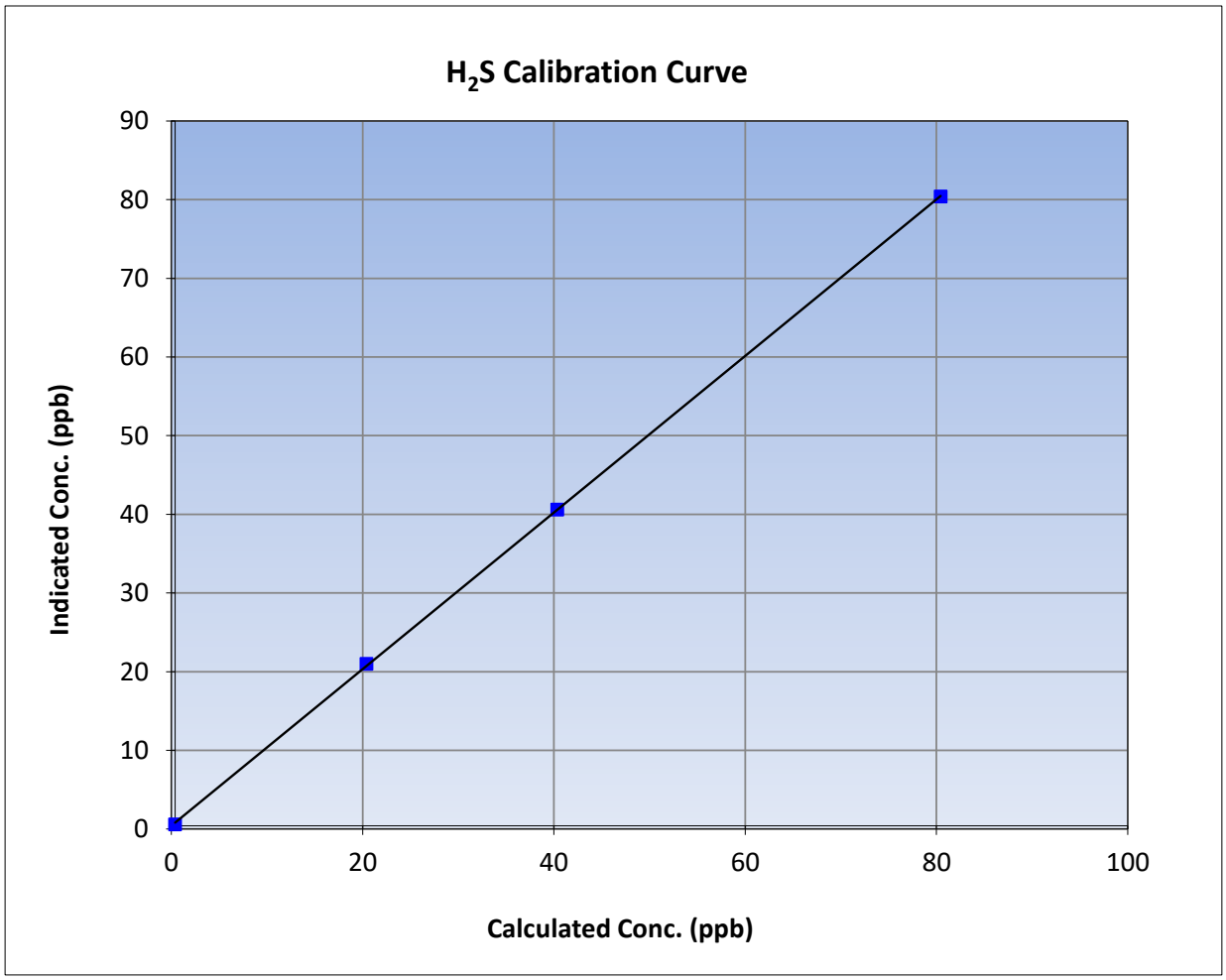
Station Information

Calibration Date:	September 11, 2023	Previous Calibration:	August 4, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	6:58	End Time (MST):	11:07
Analyzer make:	Thermo 43iQ TLE	Analyzer serial #:	12124313139

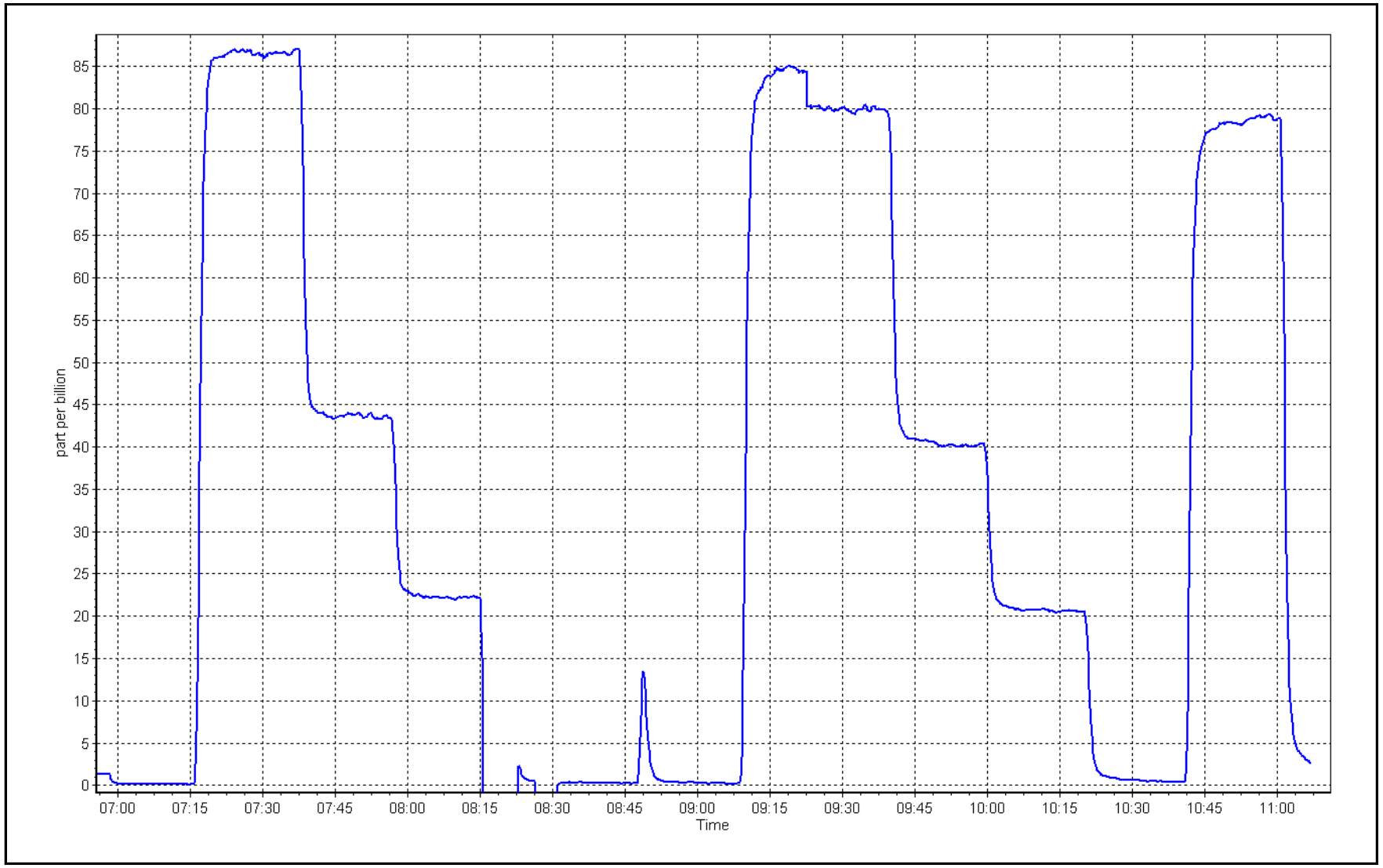
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	80.0	1.0004
40.0	40.2	0.9942
20.0	20.6	0.9717

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999965	*≥0.995*
Slope	0.995379	*0.90 - 1.10*
Intercept	0.407078	*+/-3*



H_2S Calibration Plot Date: September 11, 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:	September 12, 2023	Last Cal Date:	August 8, 2023
Start time (MST):	7:46	End time (MST):	10:24
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	CC306868		Cal Gas Expiry Date:	February 23, 2025	
CH4 Cal Gas Conc.	499.40	ppm	CH4 Equiv Conc.	1066.45	ppm
C3H8 Cal Gas Conc.	206.20	ppm			
Removed Gas Cert:	NA		Removed Gas Expiry:	NA	
Removed CH4 Conc.	499.40	ppm	CH4 Equiv Conc.	1066.45	ppm
Removed C3H8 Conc.	206.20	ppm	Diff between cyl:		
Calibrator Make/Model:	Teledyne API T700		Serial Number:	1220	
ZAG Make/Model:	Teledyne API 701		Serial Number:	4522	

Analyzer Information

Analyzer make:	Thermo 51i-LT		Analyzer serial #:	1501663727	
Analyzer Range:	0 - 20 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.992565	0.991950	Background:	3.090	3.330
Calibration intercept:	0.123818	0.123233	Coefficient:	5.465	5.583

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	0.19	----
as found span	4919	81.3	17.34	17.23	1.006
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.10	----
high point	4919	81.3	17.34	17.33	1.001
second point	4959	40.7	8.68	8.69	0.999
third point	4980	20.3	4.33	4.48	0.966
as left zero	5000	0.0	0.00	-0.07	----
as left span	4919	81.3	17.34	17.26	1.005
				Average Correction Factor	0.989

Baseline Corr As found:	17.04	Previous response	17.33	*% change	-1.8%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No maintenance done. Zero and Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

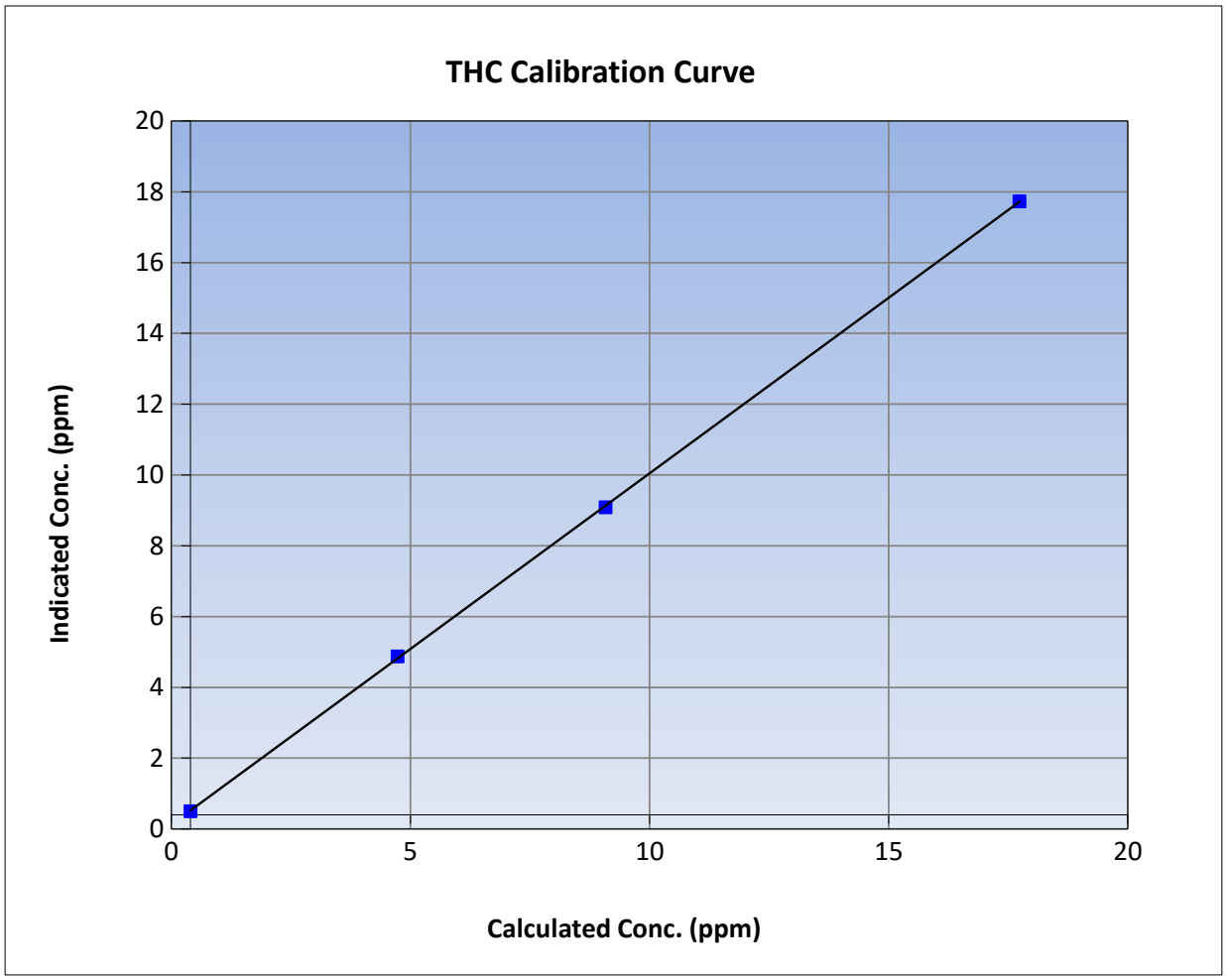
Station Information

Calibration Date:	September 12, 2023	Previous Calibration:	August 8, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	7:46	End Time (MST):	10:24
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1501663727

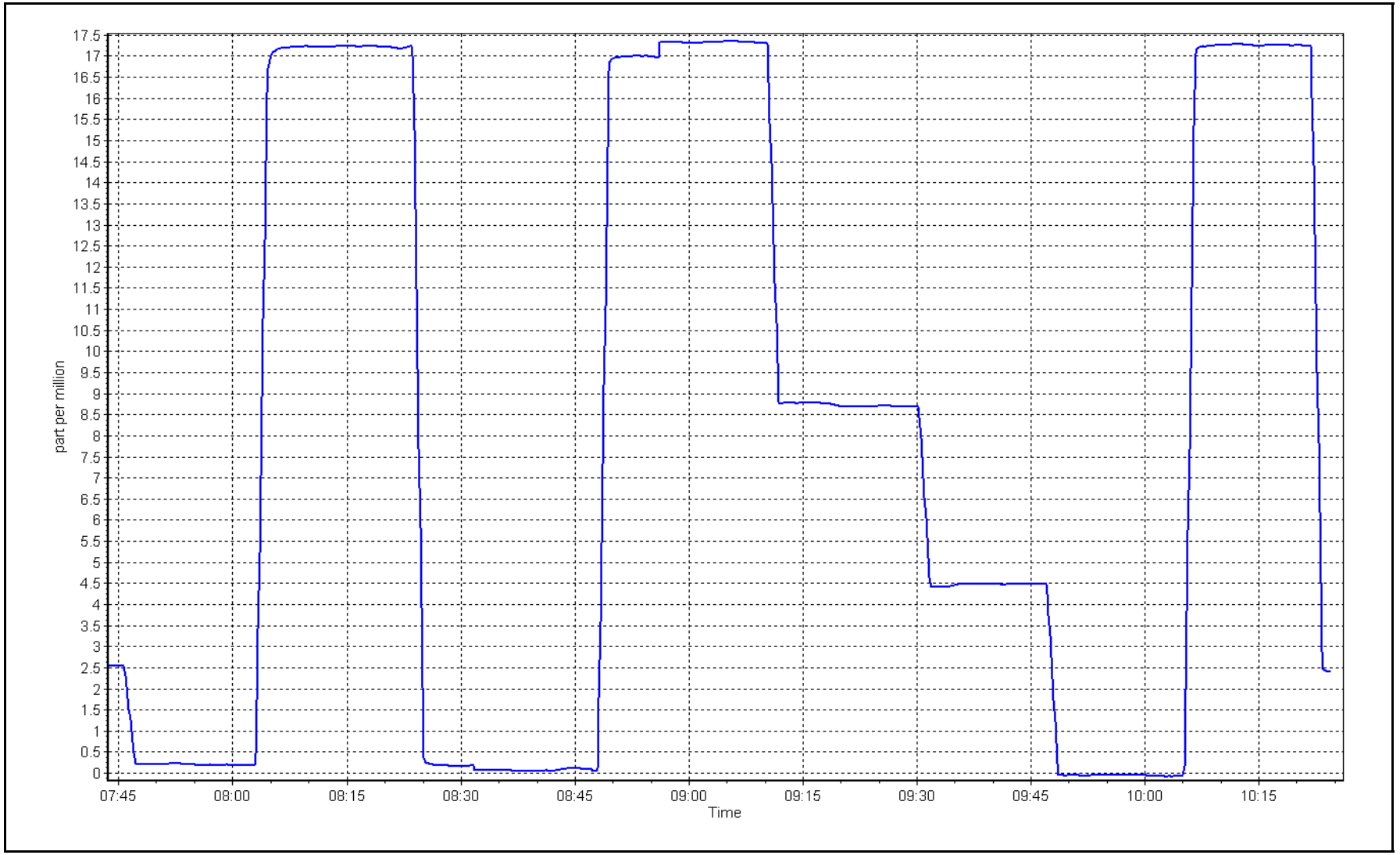
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.10	----
17.34	17.33	1.0005
8.68	8.69	0.9990
4.33	4.48	0.9664

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999960	*≥0.995*
Slope	0.991950	*0.90 - 1.10*
Intercept	0.123233	*+/-1.5*



THC Calibration Plot Date: September 12, 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:	September 14, 2023	Last Cal Date:	August 3, 2023
Start time (MST):	6:40	End time (MST):	10:50
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	1.536	NO bkgnd or offset:	4.2	4.3
NOX coeff or slope:	0.992	0.992	NOX bkgnd or offset:	4.2	4.3
NO2 coeff or slope:	0.995	0.995	Reaction cell Press:	182.5	182.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.986386	0.996495
NO_X Cal Offset:	3.150520	3.649884
NO Cal Slope:	0.988909	0.997991
NO Cal Offset:	1.711850	2.330879
NO_2 Cal Slope:	1.003108	1.001543
NO_2 Cal Offset:	1.350779	-0.862665

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.1	-0.1	0.2	----	----
as found span	4917	83.3	819.5	800.3	19.2	800.3	780.6	19.7	1.0239	1.0252
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	4917	83.3	819.5	800.3	19.2	819.0	800.2	18.7	1.0006	1.0001
second point	4956	41.7	410.4	400.8	9.6	413.1	402.6	10.4	0.9935	0.9956
third point	4979	20.8	204.6	199.9	4.8	211.6	204.6	7.0	0.9671	0.9768
as left zero	5000	0.0	0.0	0.0	0.0	0.4	0.1	0.3	----	----
as left span	4917	83.3	819.5	442.1	377.4	818.7	438.7	380.0	1.0009	1.0077
								Average Correction Factor	0.9871	0.9909

Corrected As found	NO_X = 800.2 ppb	NO = 780.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-1.4%
Previous Response	NO_X = 811.5 ppb	NO = 793.1 ppb		*Percent Change	NO =	-1.6%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	796.0	437.8	377.4	377.8	0.9988	100.1%
2nd GPT point (200 ppb O3)	796.0	610.0	205.2	204.0	1.0057	99.4%
3rd GPT point (100 ppb O3)	796.0	699.6	115.6	113.6	1.0172	98.3%
				Average Correction Factor	1.0072	99.3%

Notes: No maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

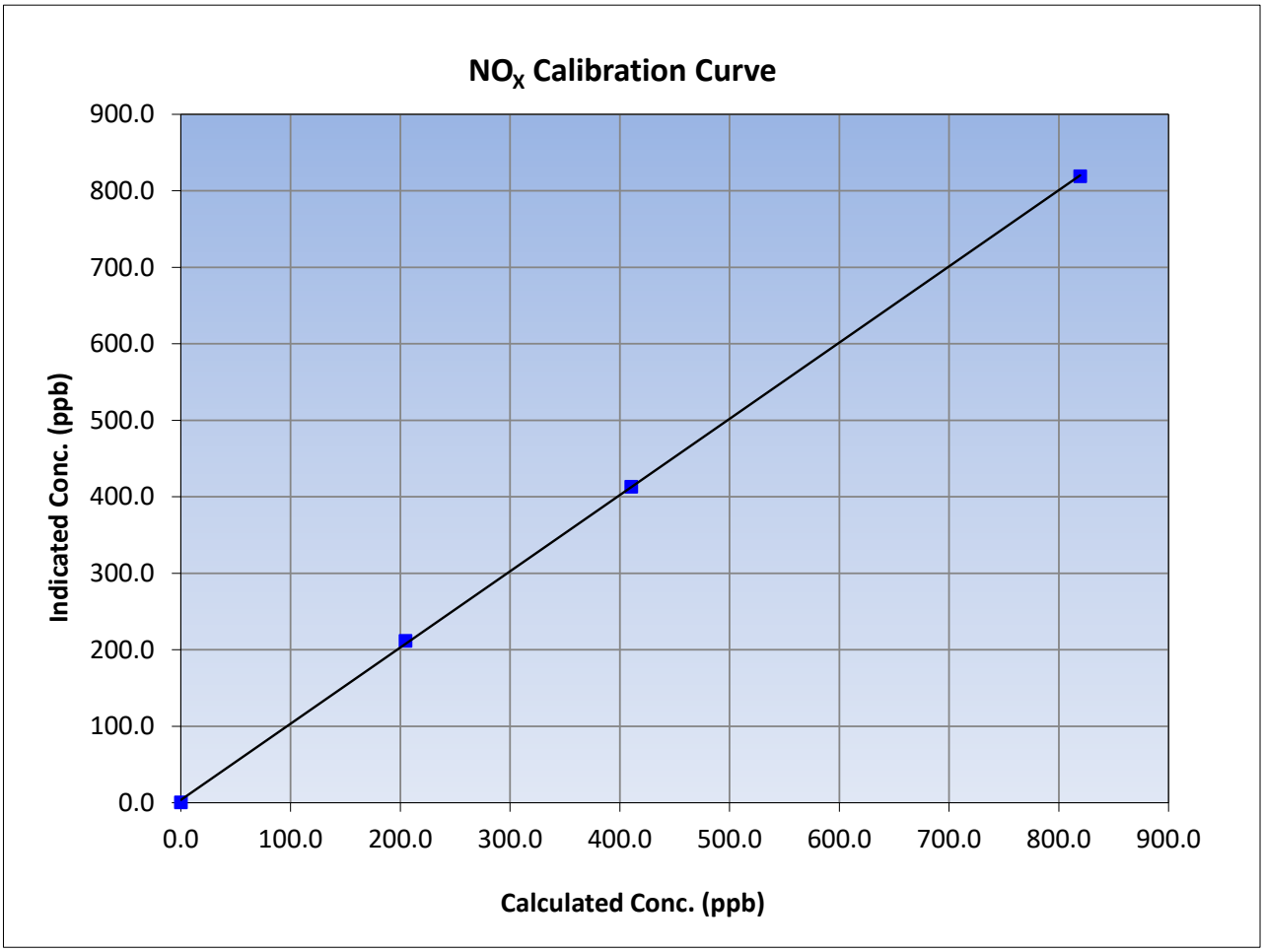
Version-04-2020

Station Information

Calibration Date:	September 14, 2023	Previous Calibration:	August 3, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	6:40	End Time (MST):	10:50
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	0.4	----	Correlation Coefficient	0.999922	≥0.995
819.5	819.0	1.0006			
410.4	413.1	0.9935	Slope	0.996495	0.90 - 1.10
204.6	211.6	0.9671			
			Intercept	3.649884	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

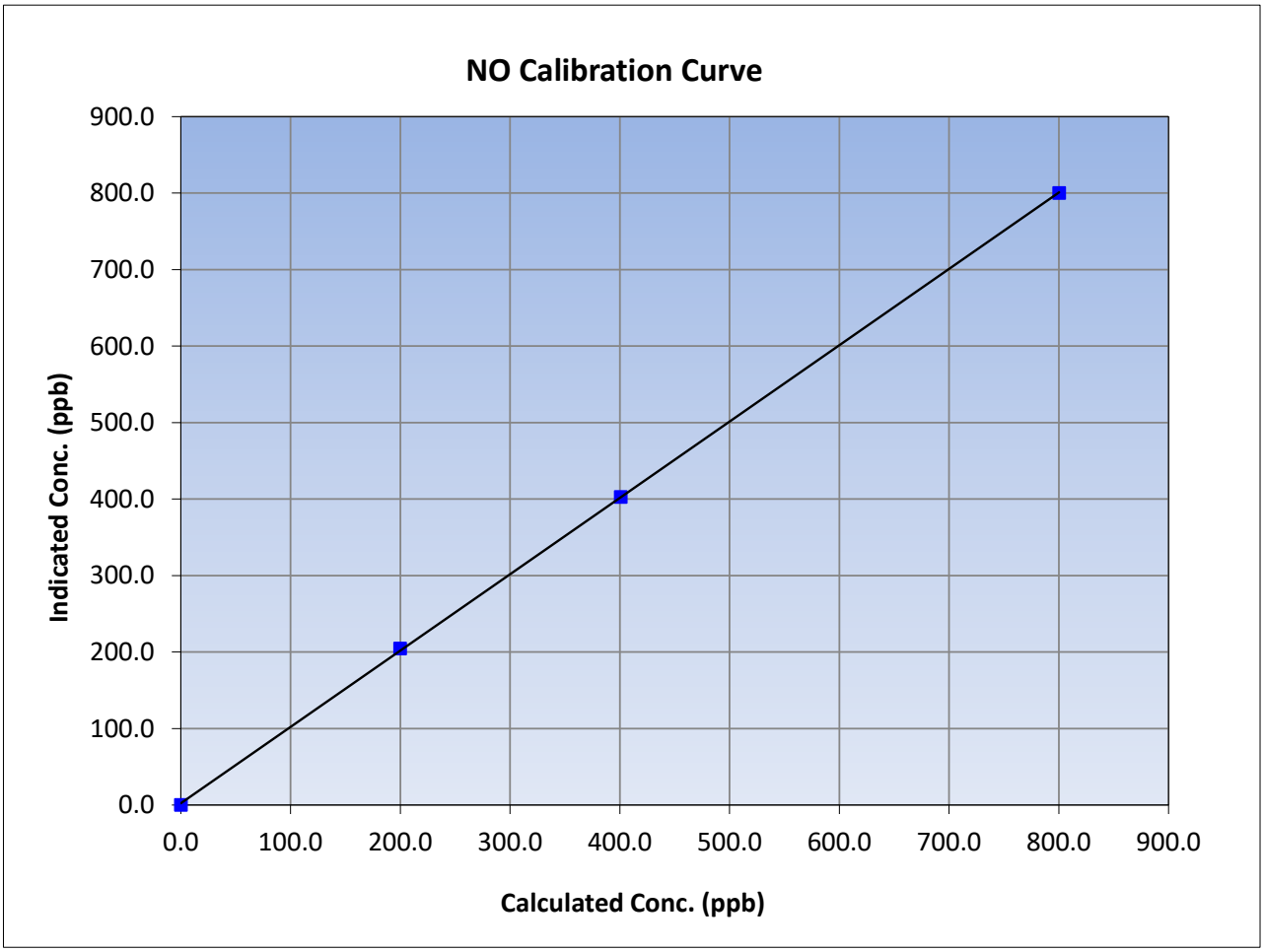
Version-04-2020

Station Information

Calibration Date:	September 14, 2023	Previous Calibration:	August 3, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	6:40	End Time (MST):	10:50
Analyzer make:	Thermo 42i	Analyzer serial #:	1505164379

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999961	≥0.995
800.3	800.2	1.0001			
400.8	402.6	0.9956	Slope	0.997991	0.90 - 1.10
199.9	204.6	0.9768			
			Intercept	2.330879	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

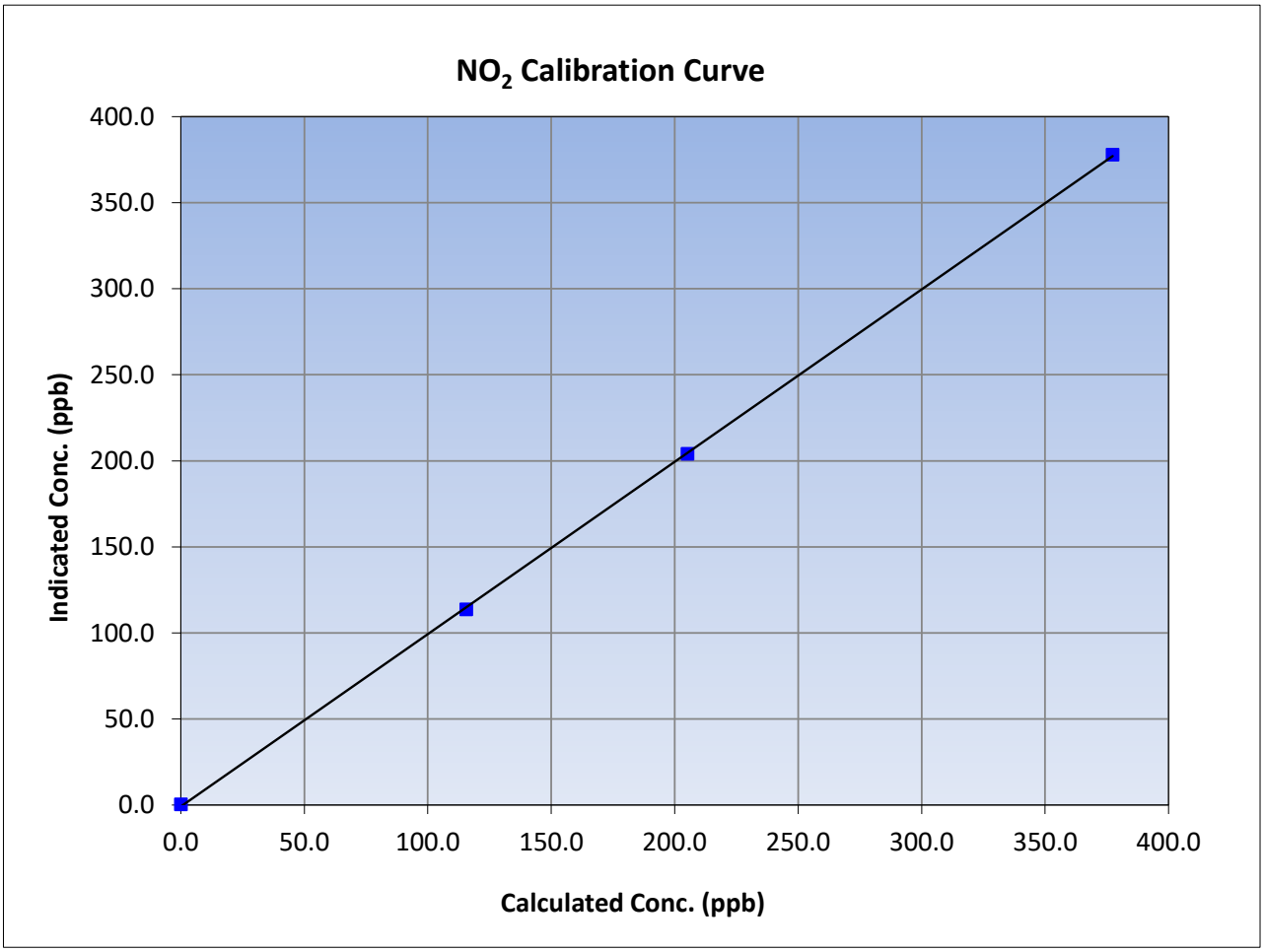
Version-04-2020

Station Information

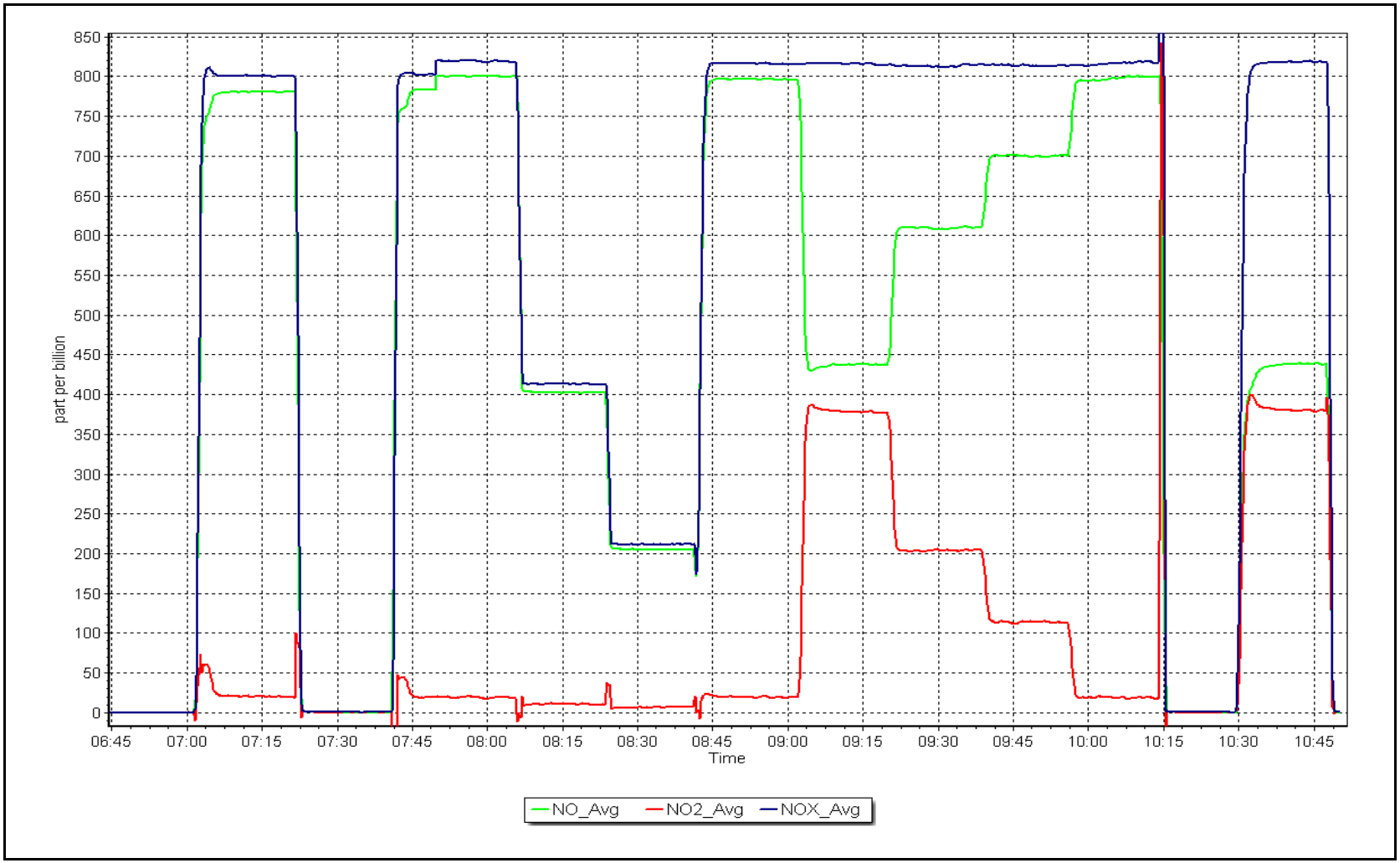
Calibration Date:	September 14, 2023	Previous Calibration:	August 3, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	6:40	End Time (MST):	10:50
Analyzer make:	Thermo 42i	Analyzer serial #:	1505164379

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.3	----	Correlation Coefficient	0.999949	≥0.995
377.4	377.8	0.9988			
205.2	204.0	1.0057	Slope	1.001543	0.90 - 1.10
115.6	113.6	1.0172			
			Intercept	-0.862665	+/-20



NO_x Calibration Plot Date: September 14, 2023 Location: MacKay River



Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	MacKay River	Station Number:	AMS 20
Calibration Date:	September 12, 2023	Prev Cal Date:	August 23, 2022
Start Time (MST):	9:13	End Time (MST):	9:43
Tower Height (m):	10m	Reason:	Routine

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	Y18363
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	20.2	0.2%
400	39.4	39.4	0.1%
600	58.6	58.7	0.2%
800	77.8	77.8	0.1%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)	0.999999	0.999999	*≥0.9995*
Calculated slope	0.998857	0.998949	*0.90 - 1.10*
Calculated intercept	0.030366	-0.013169	*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	N9937
As Found Declination (deg east of True North):	14	As Left Declination (deg east of True North):	14
Solar noon time (MST):	NA	Calc Declination*:	NA Degrees
Deadband calc:	2.9 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	89.0	-0.3%
180	179.2	-0.2%
270	270.5	0.1%
357	354.1	-0.8%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)	0.999946	0.999969	*≥0.9995*
Calculated slope	1.009899	1.004747	*0.90 - 1.10*
Calculated intercept	0.928586	-0.011707	*+/- 4*

Notes: WS/WD passed the Torque test. WD head replaced, due to crack.

Calibration Performed By: Melissa Lemay

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS21
CONKLIN
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	September 26, 2023	Last Cal Date:	August 3, 2023
Start time (MST):	11:10	End time (MST):	14:32
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.93	ppm	Cal Gas Exp Date:	January 5, 2025
Cal Gas Cylinder #:	CC259455			
Removed Cal Gas Conc:	49.93	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:			Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3810
ZAG Make/Model:	Teledyne API 701		Serial Number:	691

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1428701363

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.006909	1.000644	Backgd or Offset:	26.8	26.8
Calibration intercept:	0.556149	0.775866	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	799.5	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5005	0.0	0.0	0.3	----
high point	4920	80.2	800.8	802.0	0.999
second point	4960	40.1	400.4	401.4	0.998
third point	4980	20.0	200.1	201.7	0.992
as left zero	5005	0.0	0.0	0.3	----
as left span	4920	80.2	800.8	803.0	0.997
				Average Correction Factor	0.996

Baseline Corr As found:	799.30	Previous response	806.93	*% change	-1.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

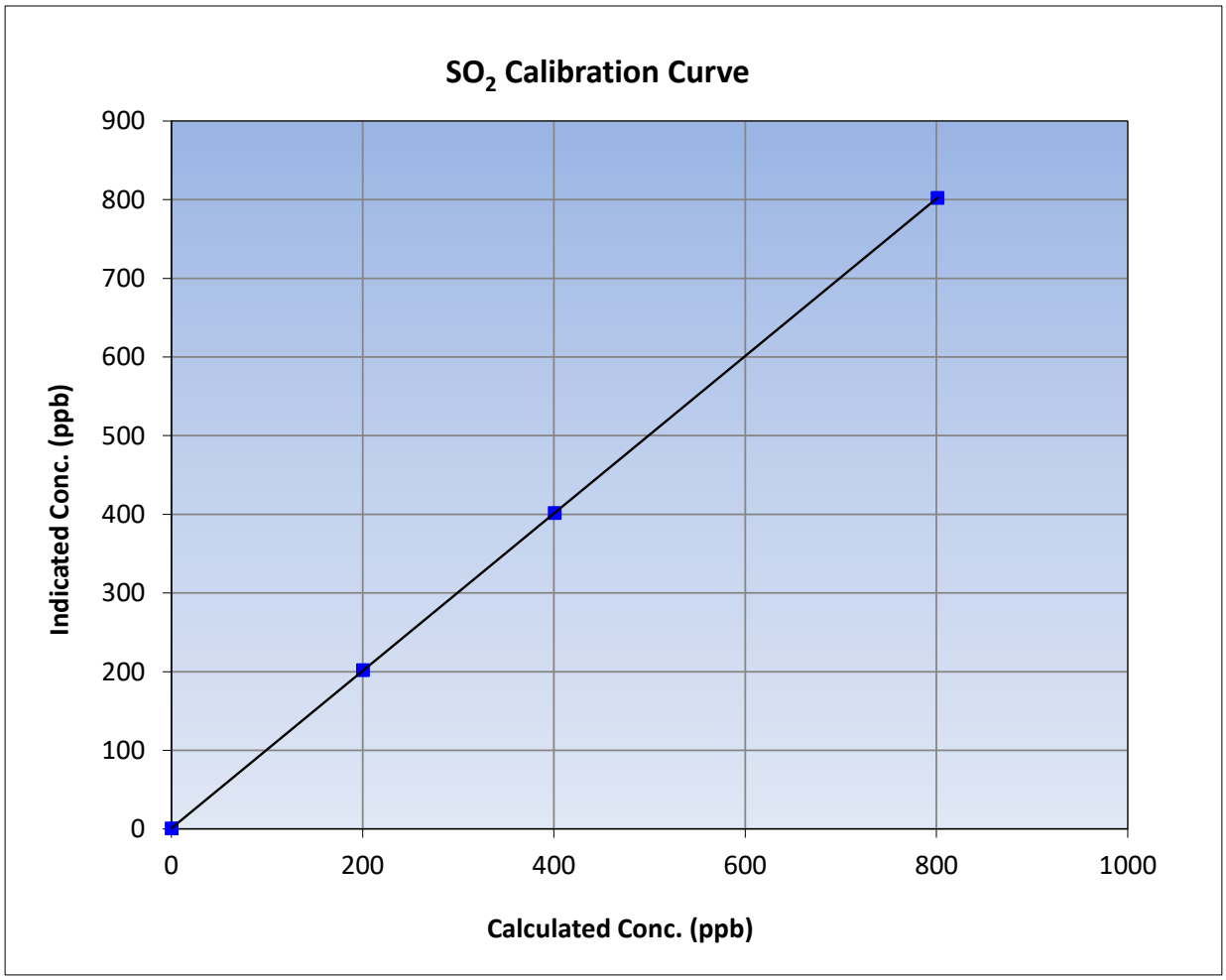
Station Information

Calibration Date:	September 26, 2023	Previous Calibration:	August 3, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:10	End Time (MST):	14:32
Analyzer make:	Thermo 43i	Analyzer serial #:	1428701363

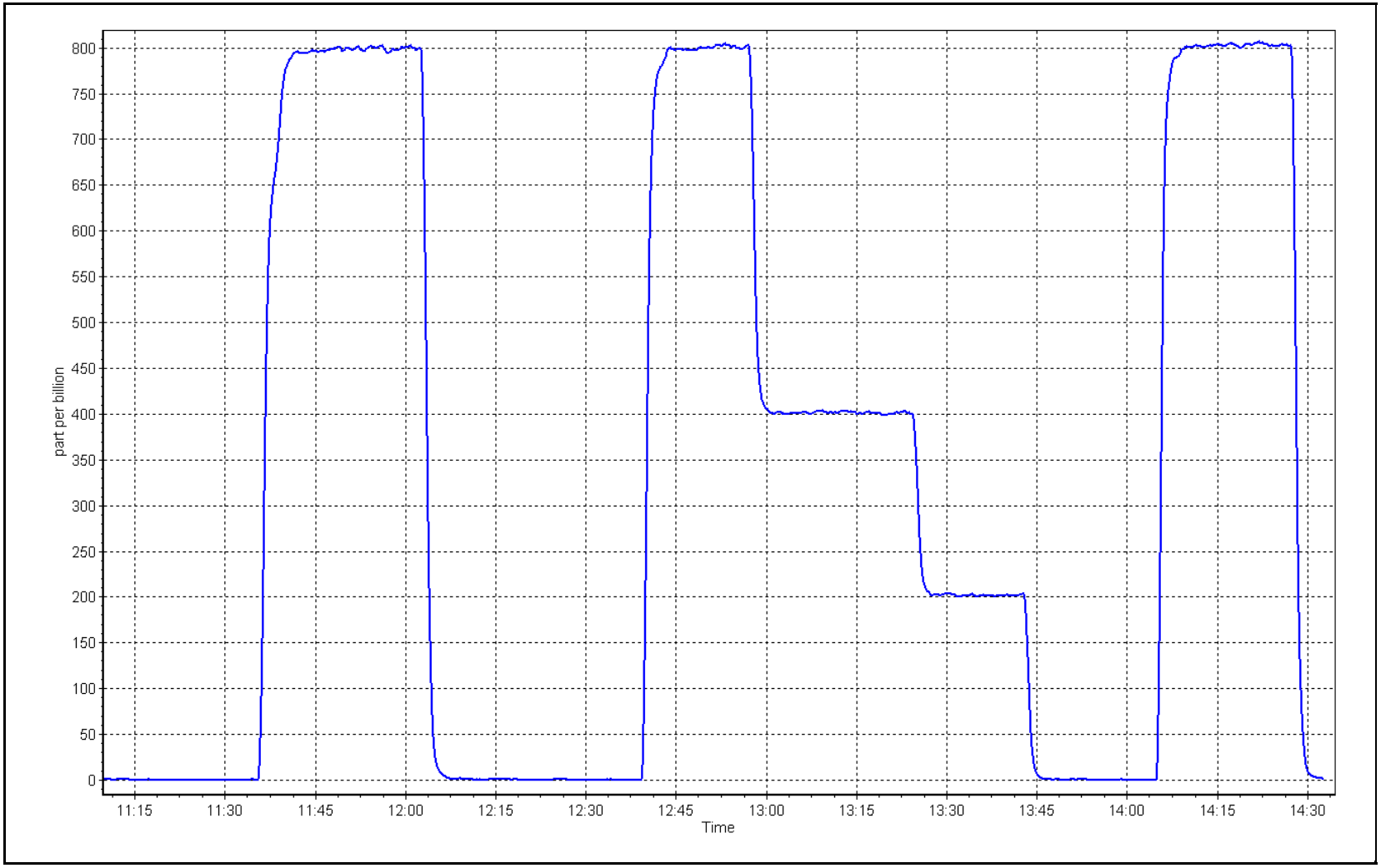
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
800.8	802.0	0.9986
400.4	401.4	0.9976
200.1	201.7	0.9922

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.000644	*0.90 - 1.10*
Intercept	0.775866	*+/-30*



SO2 Calibration Plot Date: September 26, 2023 Location: Conklin



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	September 14, 2023	Last Cal Date:	August 24, 2023
Start time (MST):	9:30	End time (MST):	13:34
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:	5.00	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3810
ZAG Make/Model:	API 701H		Serial Number:	691

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1236656116	
Converter make:	CD-Nova 101		Converter serial #:	NA	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.004857	1.007429	Backgd or Offset:	2.4	2.4
Calibration intercept:	0.280000	0.140000	Coeff or Slope:	0.958	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	80.0	80.5	0.994
as found 2nd point	4960	40.0	40.0	40.4	0.990
as found 3rd point	4980	20.0	20.0	20.3	0.985
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4920	80.0	80.0	80.7	0.991
second point	4960	40.0	40.0	40.5	0.988
third point	4980	20.0	20.0	20.3	0.985
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	80.0	80.0	79.7	1.004
SO2 Scrubber Check	4920	80.2	802.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.988
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.5	Prev response:	80.67	*% change:	-0.2%
Baseline Corr 2nd AF pt:	40.4	AF Slope:	1.005714	AF Intercept:	0.100000
Baseline Corr 3rd AF pt:	20.3	AF Correlation:	0.999993		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

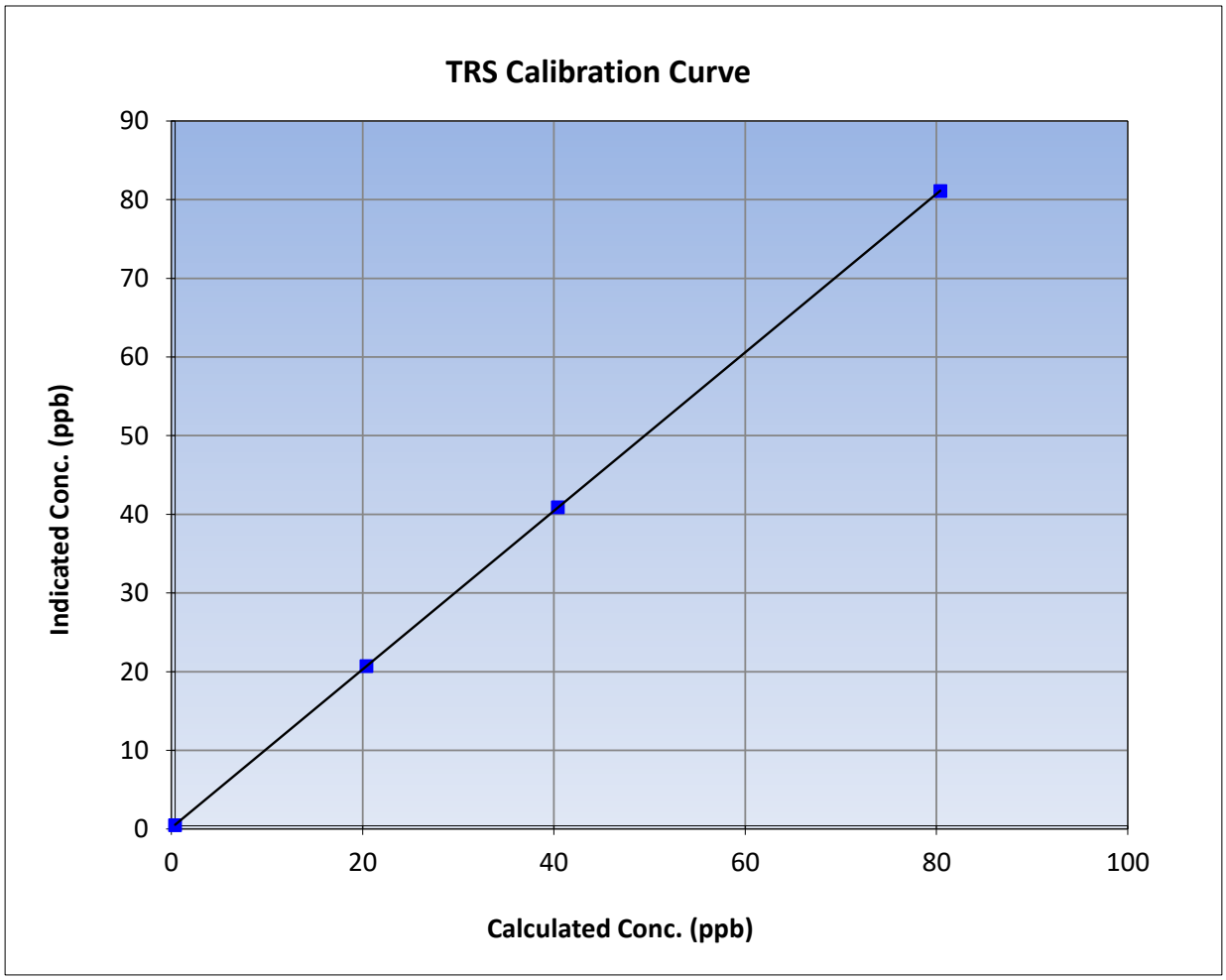
Station Information

Calibration Date:	September 14, 2023	Previous Calibration:	August 24, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:30	End Time (MST):	13:34
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1236656116

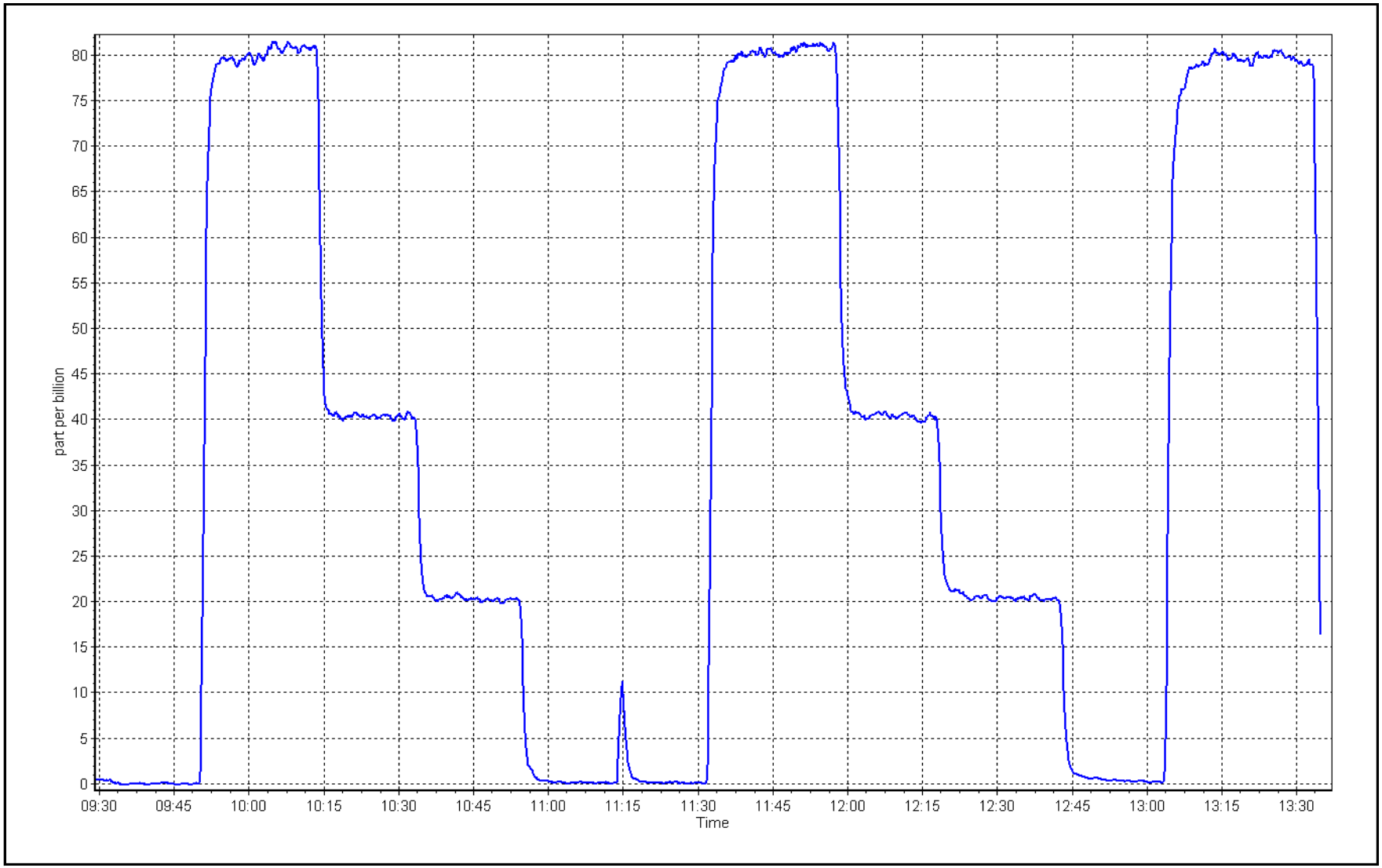
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.7	0.9913
40.0	40.5	0.9877
20.0	20.3	0.9852

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.007429	*0.90 - 1.10*
Intercept	0.140000	*+/-3*



TRS Calibration Plot Date: September 14, 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:	September 26, 2023	Last Cal Date:	August 3, 2023
Start time (MST):	11:10	End time (MST):	14:32
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:	2.29E-04	2.29E-04	NMHC SP Ratio:	5.09E-05	5.09E-05
CH4 Retention time:	12.00	12.00	NMHC Peak Area:	179681	179681

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	16.95	1.010
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	17.13	17.10	1.001
second point	4960	40.1	8.56	8.54	1.003
third point	4980	20.0	4.27	4.28	0.997
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	17.13	17.02	1.006
				Average Correction Factor	1.001
Baseline Corr AF:	16.95	Prev response	17.09	*% change	-0.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-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	
as found span	4920	80.2	9.14	8.98	1.018
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	9.14	9.08	1.007
second point	4960	40.1	4.57	4.56	1.003
third point	4980	20.0	2.28	2.29	0.995
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	9.14	9.02	1.013
				Average Correction Factor	1.002
Baseline Corr AF:	8.98	Prev response	9.13	*% 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	7.99	7.97	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	7.99	8.02	0.996
second point	4960	40.1	3.99	3.98	1.003
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	7.99	0.999
				Average Correction Factor	1.000
Baseline Corr AF:	7.97	Prev response	7.96	*% 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:	0.997914	0.998108
THC Cal Offset:	0.005170	0.004967
CH4 Cal Slope:	0.998322	1.004174
CH4 Cal Offset:	-0.008057	-0.009247
NMHC Cal Slope:	0.997658	0.992770
NMHC Cal Offset:	0.012827	0.013615

Notes: Replaced Nitrogen cylinder. No adjustments made.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

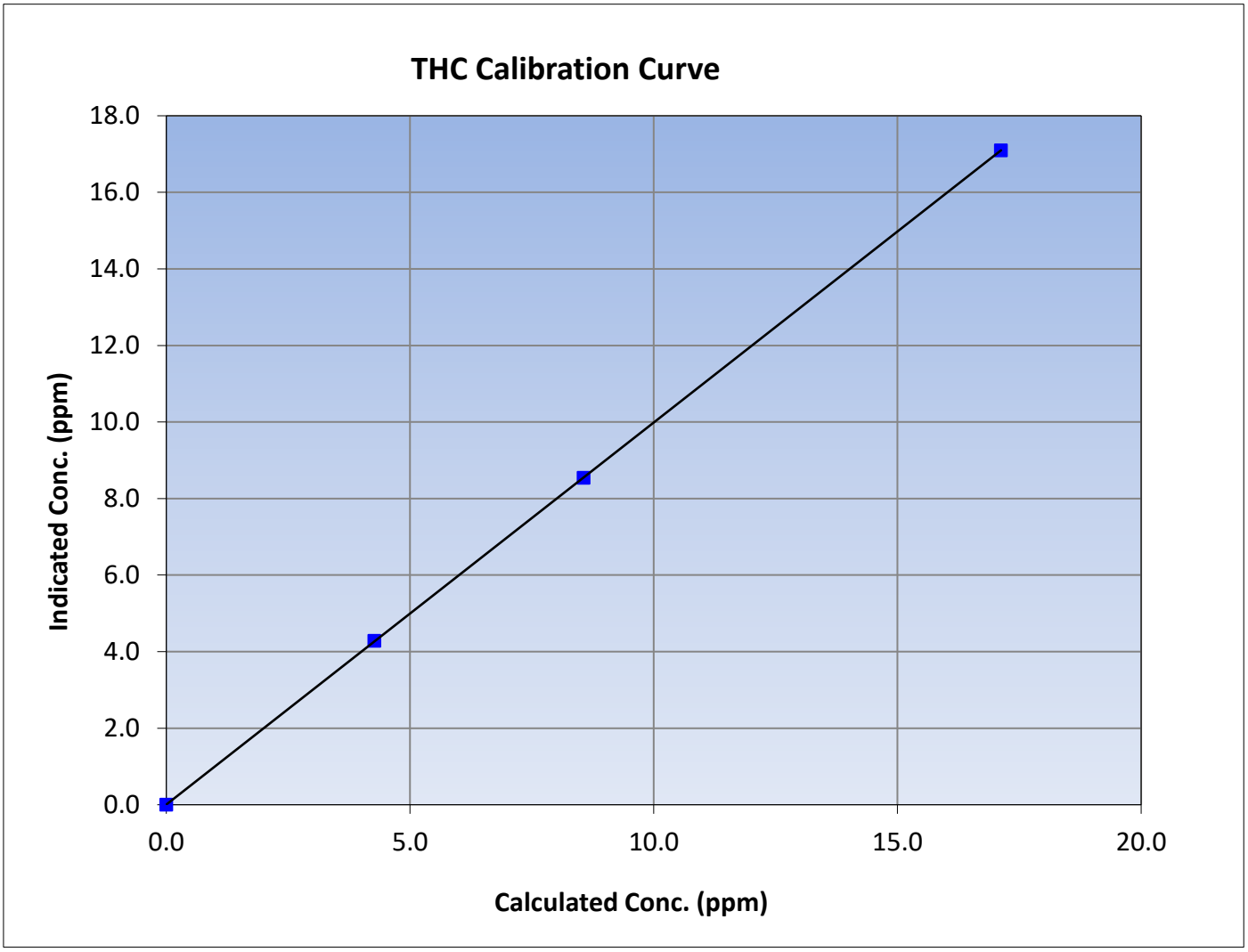
Version-06-2022

Station Information

Calibration Date:	September 26, 2023	Previous Calibration:	August 3, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:10	End Time (MST):	14:32
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	0.999998	*≥0.995*
17.13	17.10	1.0015			
8.56	8.54	1.0027	Slope	0.998108	*0.90 - 1.10*
4.27	4.28	0.9974			
			Intercept	0.004967	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

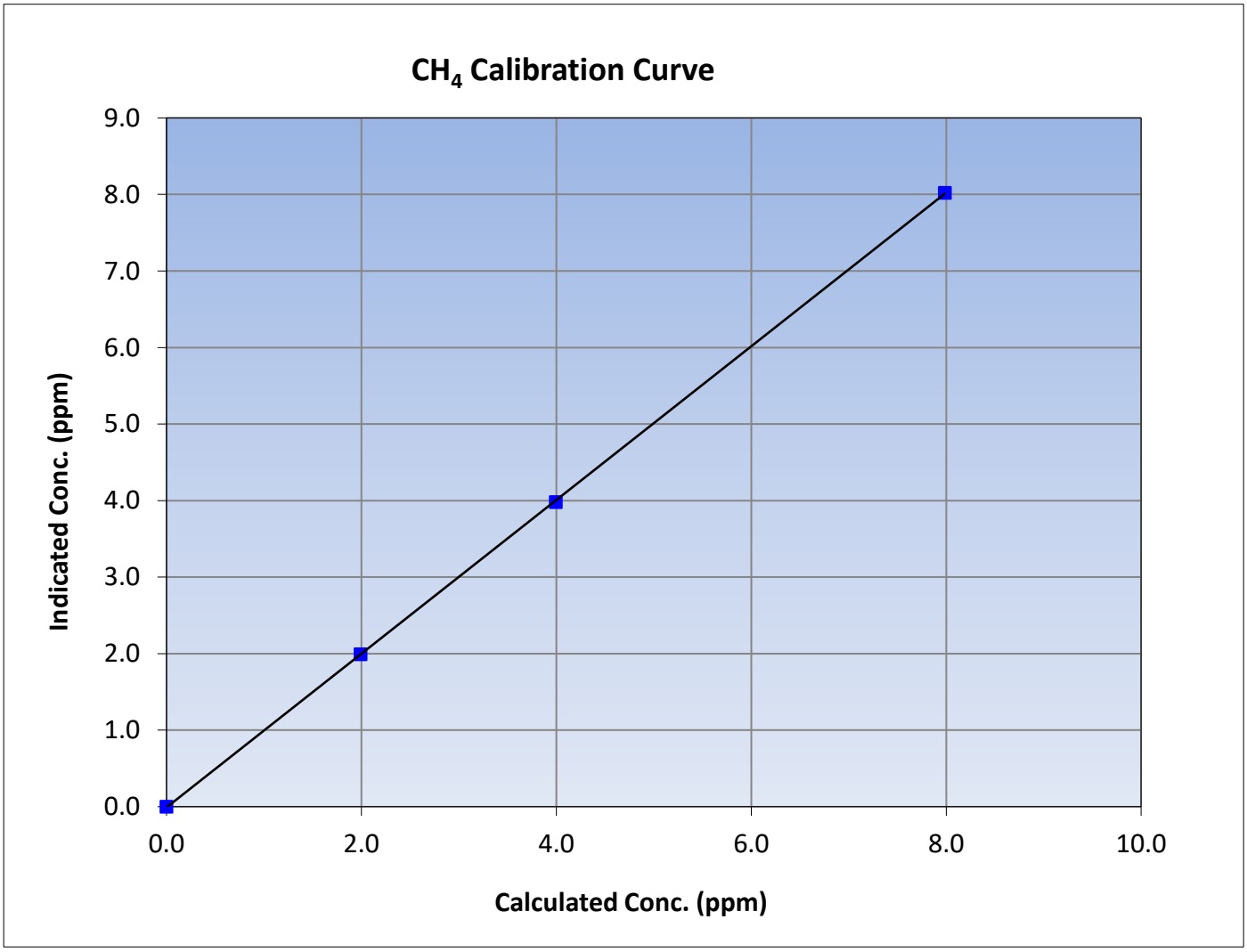
Version-06-2022

Station Information

Calibration Date:	September 26, 2023	Previous Calibration:	August 3, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:10	End Time (MST):	14:32
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	0.999983	≥0.995
7.99	8.02	0.9958			
3.99	3.98	1.0033	Slope	1.004174	0.90 - 1.10
1.99	1.99	0.9998			
			Intercept	-0.009247	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

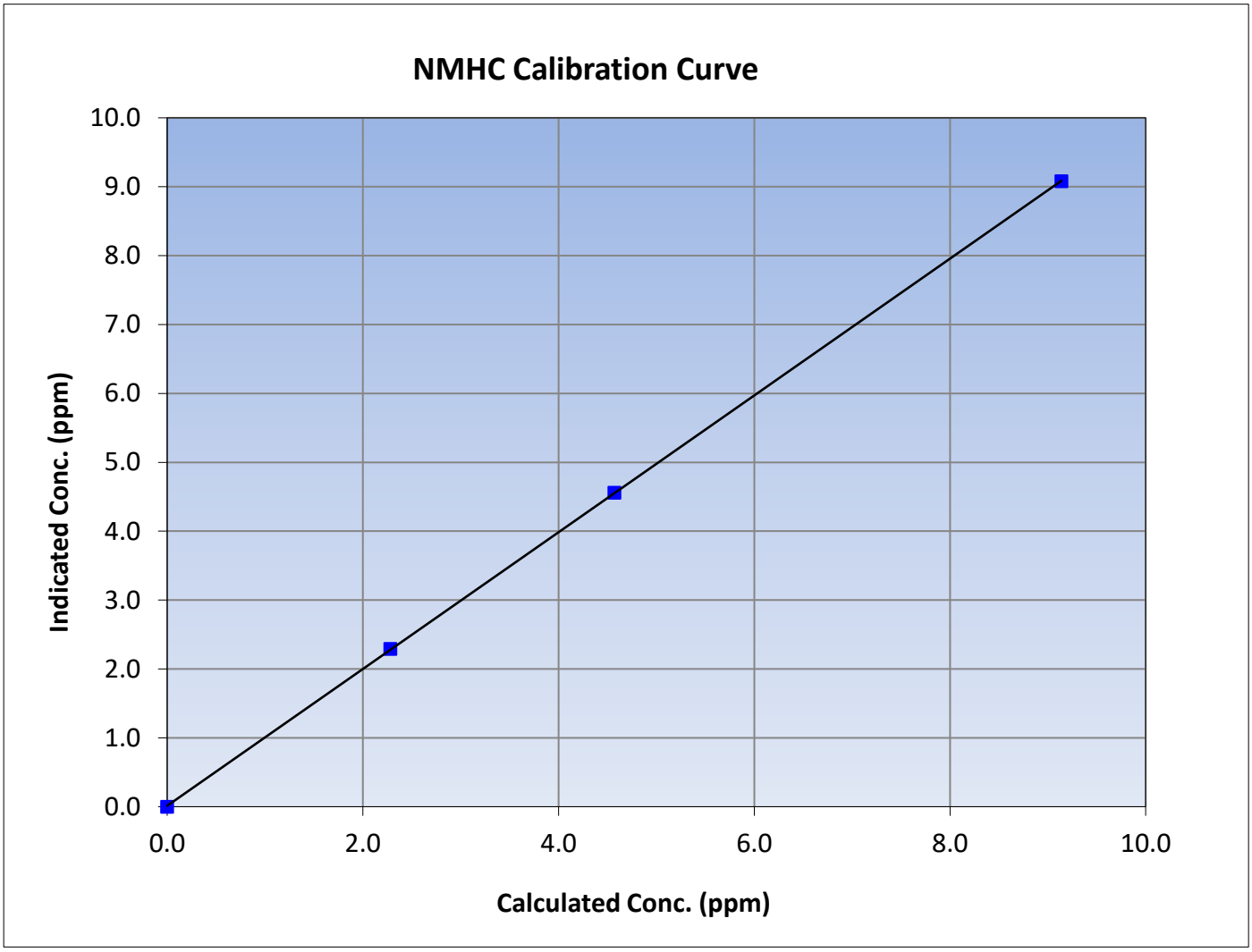
Version-06-2022

Station Information

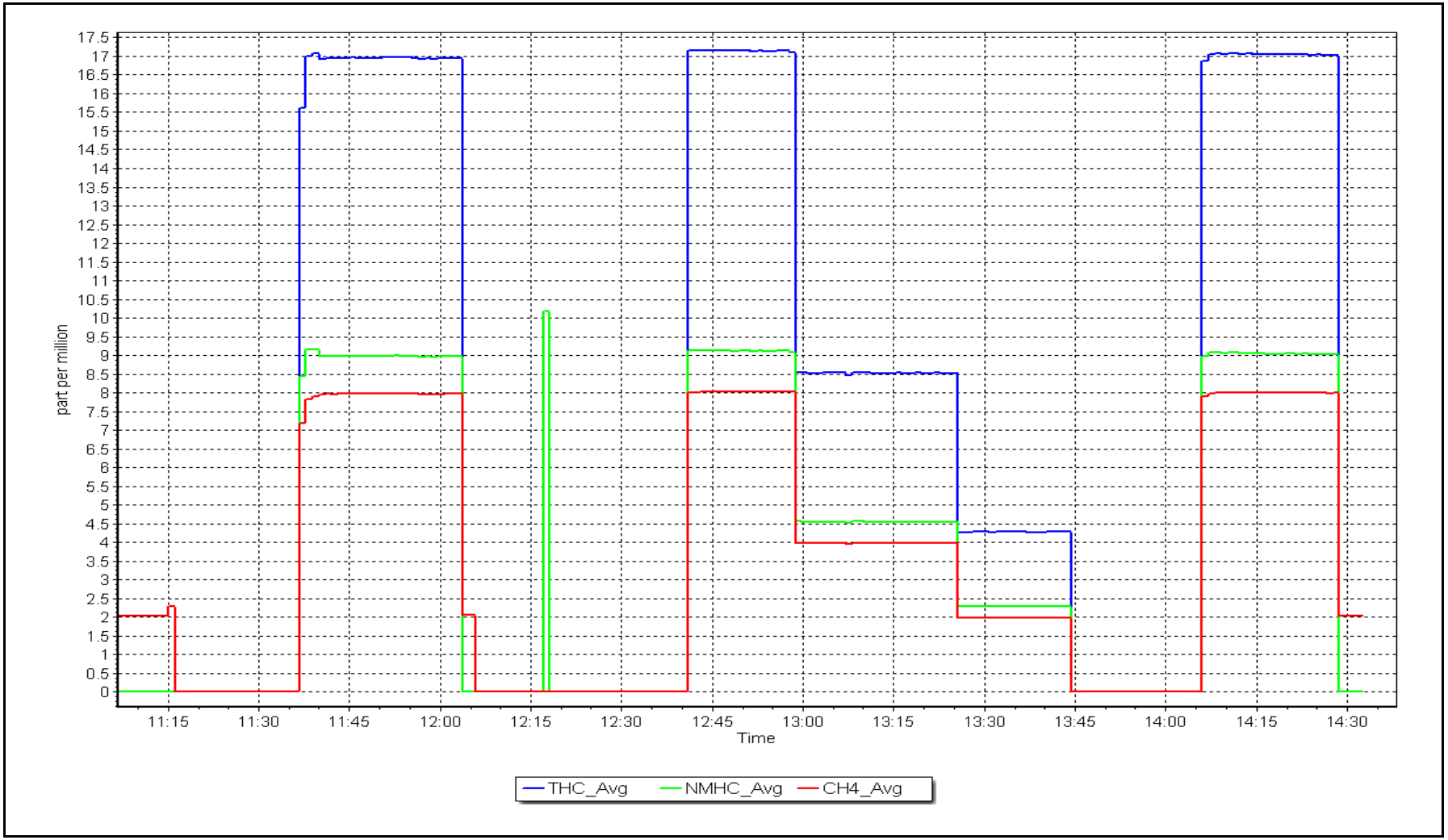
Calibration Date:	September 26, 2023	Previous Calibration:	August 3, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:10	End Time (MST):	14:32
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999990	≥0.995
9.14	9.08	1.0065			
4.57	4.56	1.0028	Slope	0.992770	0.90 - 1.10
2.28	2.29	0.9953			
			Intercept	0.013615	+/-0.5



NMHC Calibration Plot Date: September 26, 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:	September 21, 2023	Last Cal Date:	August 10, 2023
Start time (MST):	10:27	End time (MST):	14:53
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:	1.120	1.104	NO bkgnd or offset:	11.2	11
NOX coeff or slope:	1.000	1.000	NOX bkgnd or offset:	11.4	11.1
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	167.6	167.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.998758	0.993898
NO_X Cal Offset:	1.603828	2.303154
NO Cal Slope:	0.999738	0.994967
NO Cal Offset:	0.741061	1.360599
NO_2 Cal Slope:	1.000498	0.989964
NO_2 Cal Offset:	0.217772	-0.688924

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	829.1	815.4	13.7	0.9785	0.9812
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
high point	4921	79.4	811.2	800.1	11.1	807.5	796.9	10.7	1.0046	1.0041
second point	4960	39.7	405.7	400.1	5.6	406.6	399.8	6.8	0.9977	1.0008
third point	4980	19.8	202.3	199.6	2.8	205.6	201.5	4.1	0.9841	0.9903
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
as left span	4921	79.4	811.2	389.2	422.0	811.1	393.9	417.2	1.0002	0.9881
								Average Correction Factor	0.9955	0.9984

Corrected As found NO_X = 829.2 ppb NO = 815.5 ppb

Previous Response NO_X = 811.8 ppb NO = 800.6 ppb

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

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

* = > +/-5% change initiates investigation

*Percent Change NO_X = 2.1%

*Percent Change NO = 1.8%

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

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

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

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	800.6	389.7	422.0	417.7	1.0103	99.0%
2nd GPT point (200 ppb O3)	800.6	592.1	219.6	215.8	1.0177	98.3%
3rd GPT point (100 ppb O3)	800.6	697.1	114.6	112.3	1.0206	98.0%
				Average Correction Factor	1.0162	98.4%

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

NO_X Calibration Summary

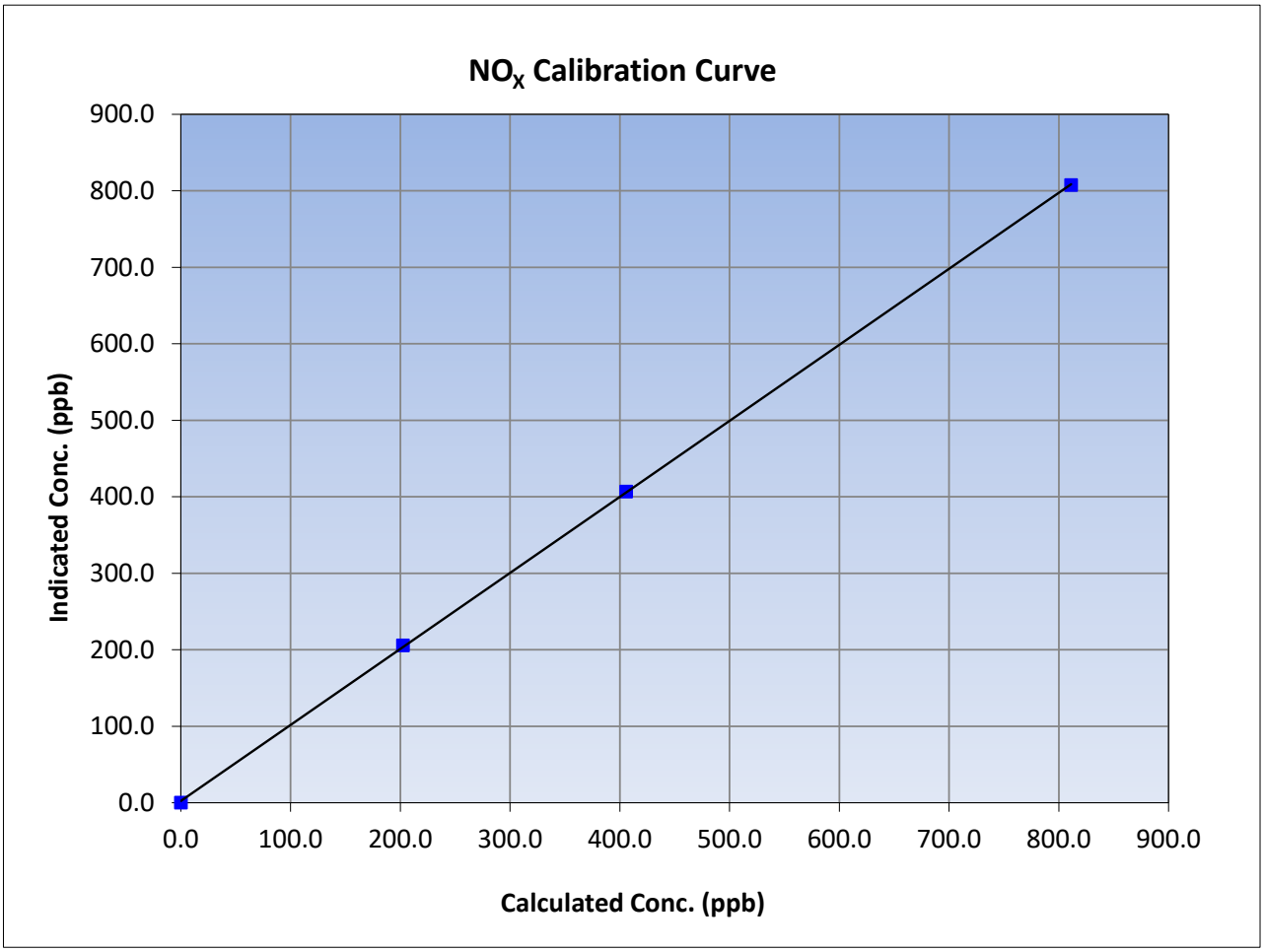
Version-04-2020

Station Information

Calibration Date:	September 21, 2023	Previous Calibration:	August 10, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:27	End Time (MST):	14:53
Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999966	≥0.995
811.2	807.5	1.0046			
405.7	406.6	0.9977	Slope	0.993898	0.90 - 1.10
202.3	205.6	0.9841			
			Intercept	2.303154	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

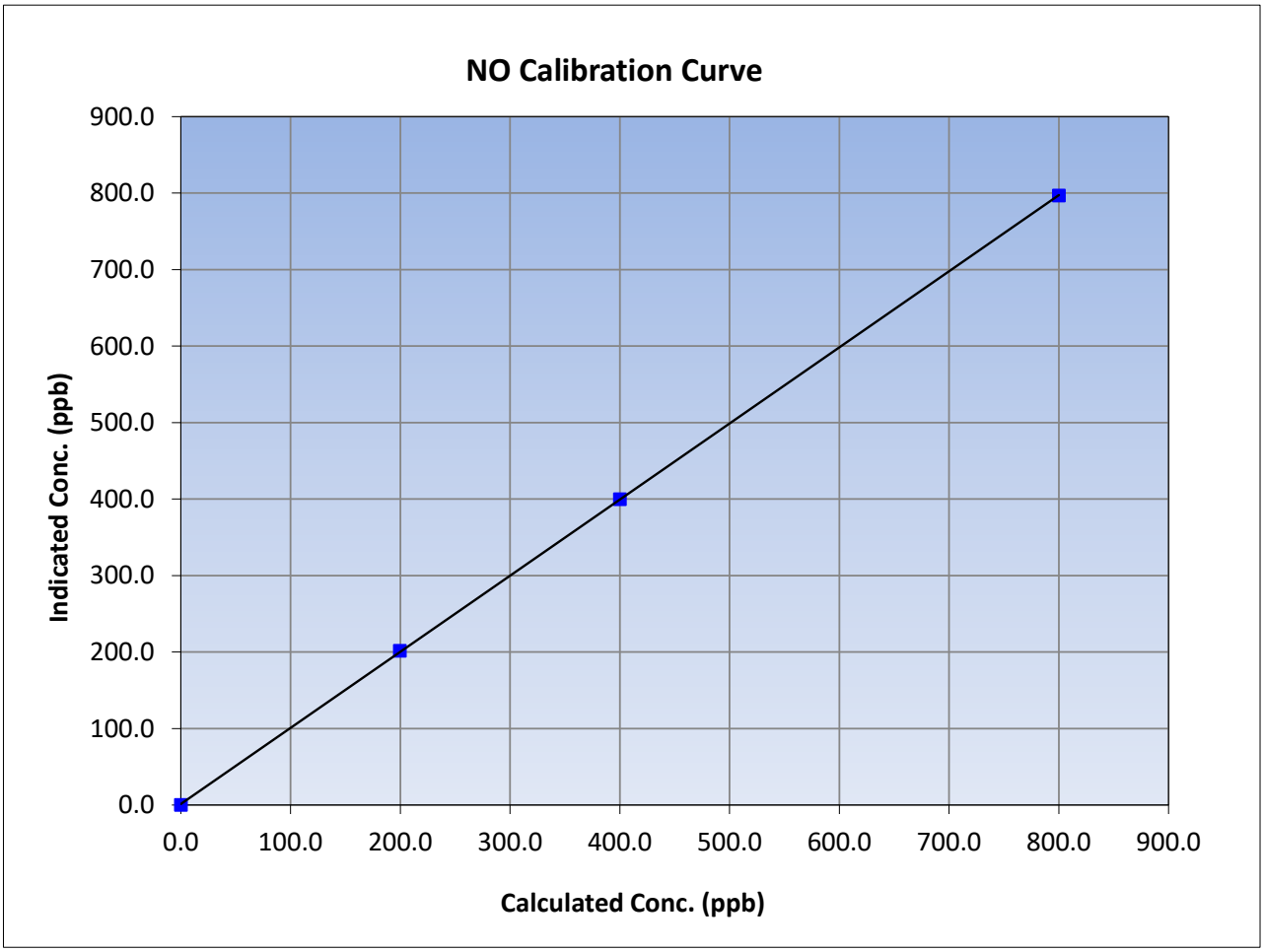
Version-04-2020

Station Information

Calibration Date:	September 21, 2023	Previous Calibration:	August 10, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:27	End Time (MST):	14:53
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	0.999986	≥0.995
800.1	796.9	1.0041			
400.1	399.8	1.0008	Slope	0.994967	0.90 - 1.10
199.6	201.5	0.9903			
			Intercept	1.360599	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

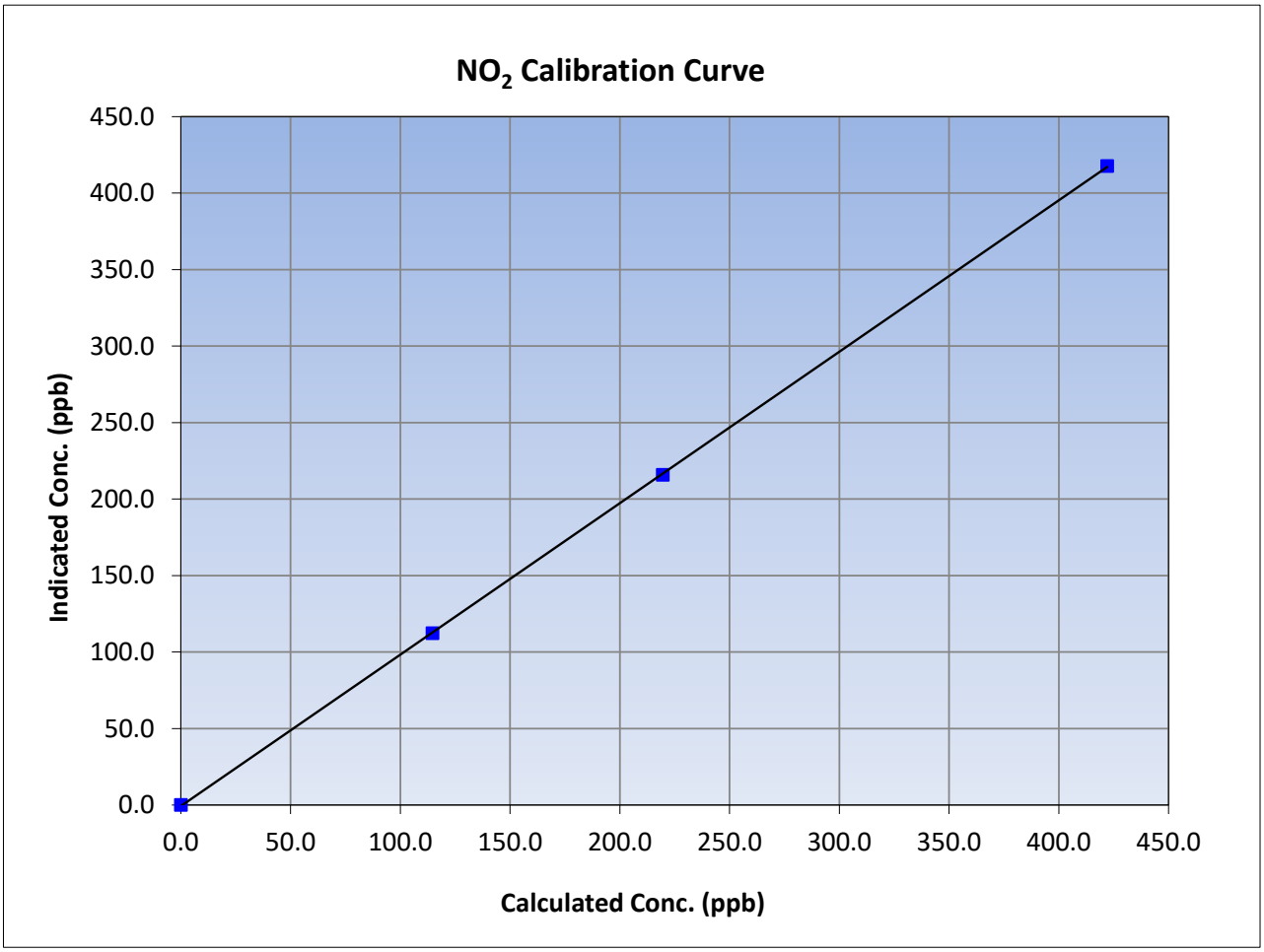
Version-04-2020

Station Information

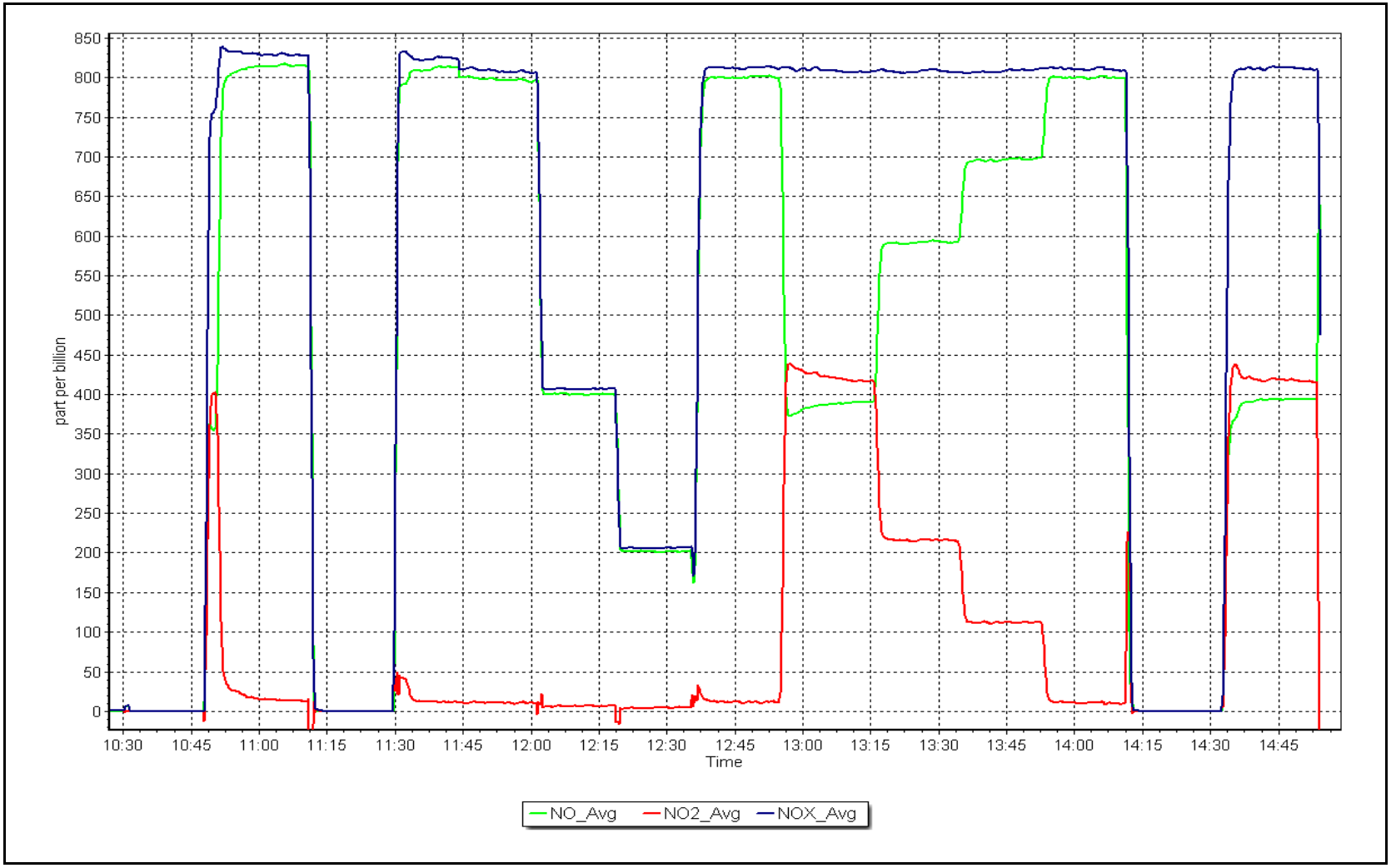
Calibration Date:	September 21, 2023	Previous Calibration:	August 10, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:27	End Time (MST):	14:53
Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999978	≥0.995
422.0	417.7	1.0103			
219.6	215.8	1.0177	Slope	0.989964	0.90 - 1.10
114.6	112.3	1.0206			
			Intercept	-0.688924	+/-20



NO_X Calibration Plot Date: September 21, 2023 Location: Conklin



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	September 11, 2023	Last Cal Date:	August 15, 2023
Start time (MST):	10:32	End time (MST):	13:51
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:	1.000257	1.001714	Backgd or Offset:	-2.0	-2.0
Calibration intercept:	1.580000	0.400000	Coeff or Slope:	0.981	1.005

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-1.0	----
as found span	5000	951.2	400.0	388.9	1.029
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.5	----
high point	5000	950.9	400.0	400.6	0.999
second point	5000	804.0	200.0	201.3	0.994
third point	5000	703.6	100.0	101.4	0.986
as left zero	5000	0.0	0.0	-0.5	----
as left span	5000	936.0	400.0	403.0	0.993
				Average Correction Factor	0.993

Baseline Corr As found:	389.9	Previous response	401.7	*% change	-3.0%
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 only.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

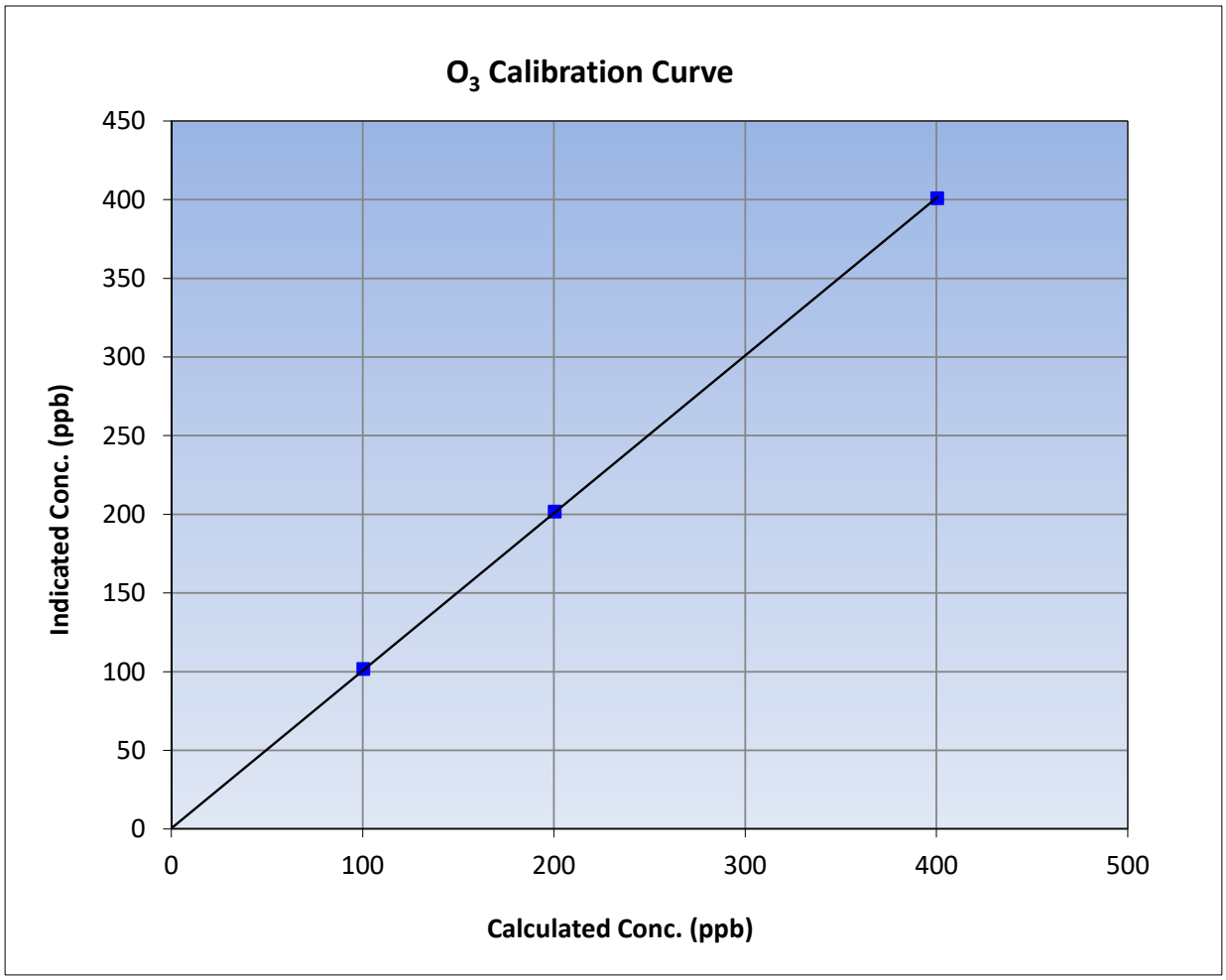
Station Information

Calibration Date:	September 11, 2023	Previous Calibration:	August 15, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:32	End Time (MST):	13:51
Analyzer make:	Thermo 49i	Analyzer serial #:	1501663734

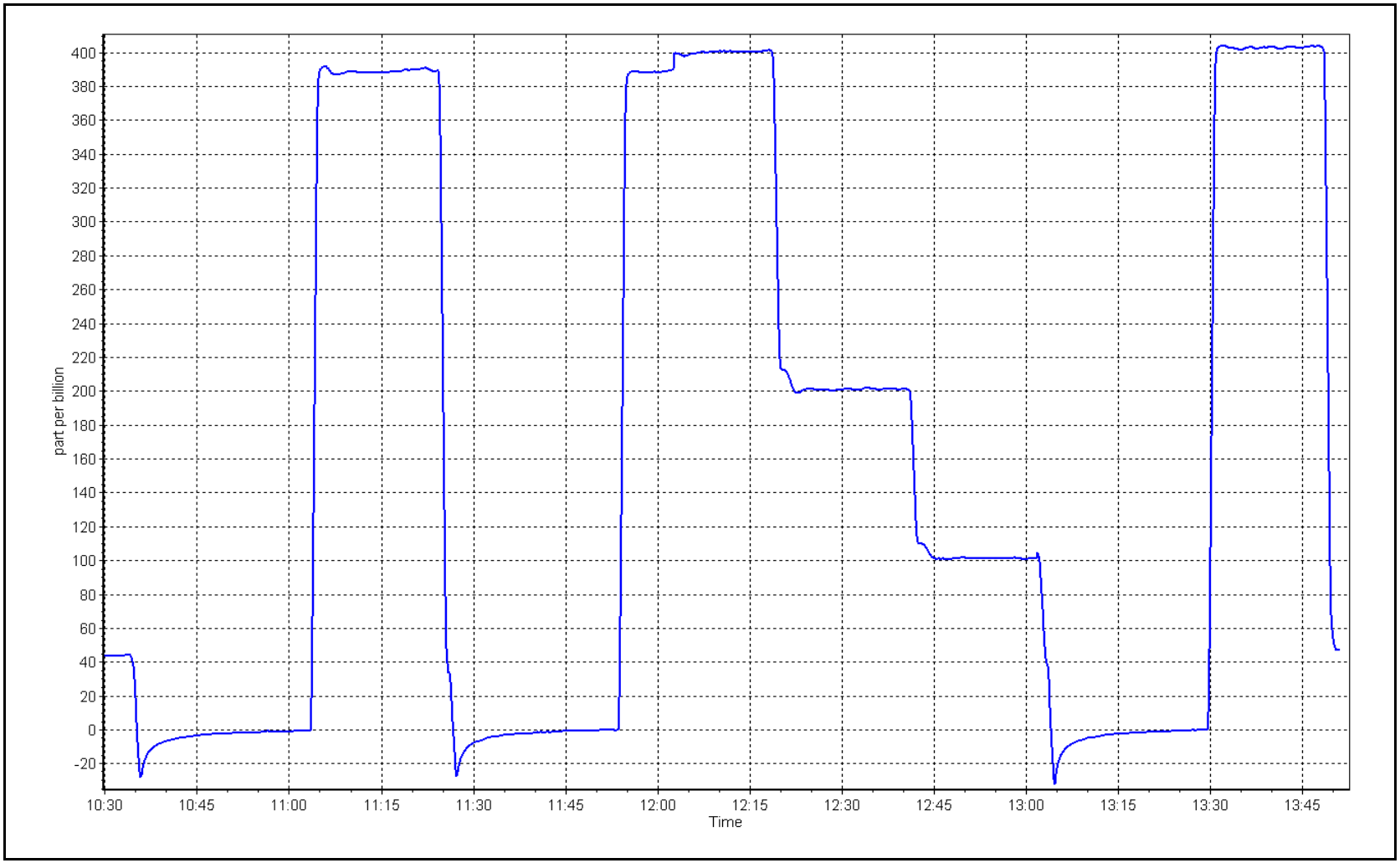
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.5	----
400.0	400.6	0.9985
200.0	201.3	0.9935
100.0	101.4	0.9862

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999977	*≥0.995*
Slope	1.001714	*0.90 - 1.10*
Intercept	0.400000	*+/- 5*



O_3 Calibration Plot Date: September 11, 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:	September 26, 2023	Last Cal Date:	August 18, 2023
Start time (MST):	11:20	End time (MST):	12:35
Analyzer Make:	API T640	S/N:	326
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat	S/N:	388744
Temp/RH standard:	Alicat	S/N:	388744

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (^{o}C)	22.5	22.58	22.5	☐	+/- 2 ^{o}C
P (mmHg)	703.3	705.02	703.3	☐	+/- 10 mmHg
flow (LPM)	5.02	5.127	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: September 26, 2023 Last Cal Date: August 18, 2023

PM w/o HEPA: 14.7 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	11.8	11.8	10.8	☒	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 13.1 w/ HEPA: 0

Date Optical Chamber Cleaned: September 26, 2023 <0.2 ug/m3

Disposable Filter Changed: September 26, 2023

Annual Maintenance

Date Sample Tube Cleaned: _____

Date RH/T Sensor Cleaned: _____

Notes: Adjusted PMT peak, both leak checks passed.

Calibration by: Braiden Boutilier

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS22
JANVIER
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	September 28, 2023	Last Cal Date:	August 23, 2023
Start time (MST):	9:38	End time (MST):	12:50
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:	1.005224	1.005095	Backgd or Offset:	21.4	21.4
Calibration intercept:	1.843010	2.463336	Coeff or Slope:	0.989	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	1.2	----
as found span	4920	79.8	799.8	804.0	0.995
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	1.7	----
high point	4920	79.8	799.8	805.6	0.993
second point	4960	39.9	399.9	405.8	0.985
third point	4980	20.0	200.4	204.0	0.983
as left zero	5000	0.0	0.0	1.2	----
as left span	4920	79.8	799.8	804.6	0.994
				Average Correction Factor	0.987

Baseline Corr As found:	802.80	Previous response	805.81	*% 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

SO_2 Calibration Summary

Version-01-2020

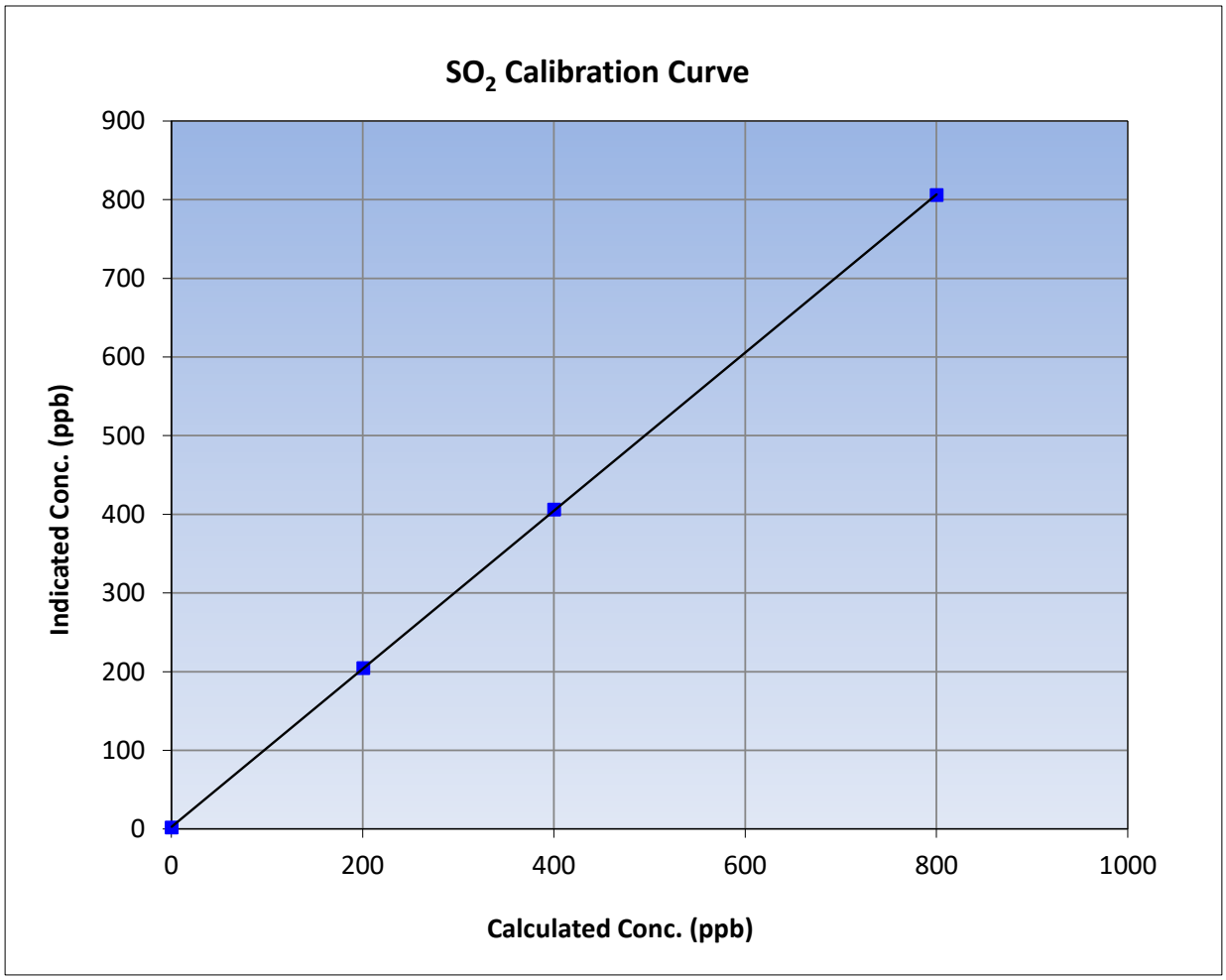
Station Information

Calibration Date:	September 28, 2023	Previous Calibration:	August 23, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:38	End Time (MST):	12:50
Analyzer make:	Thermo 43i	Analyzer serial #:	1152430006

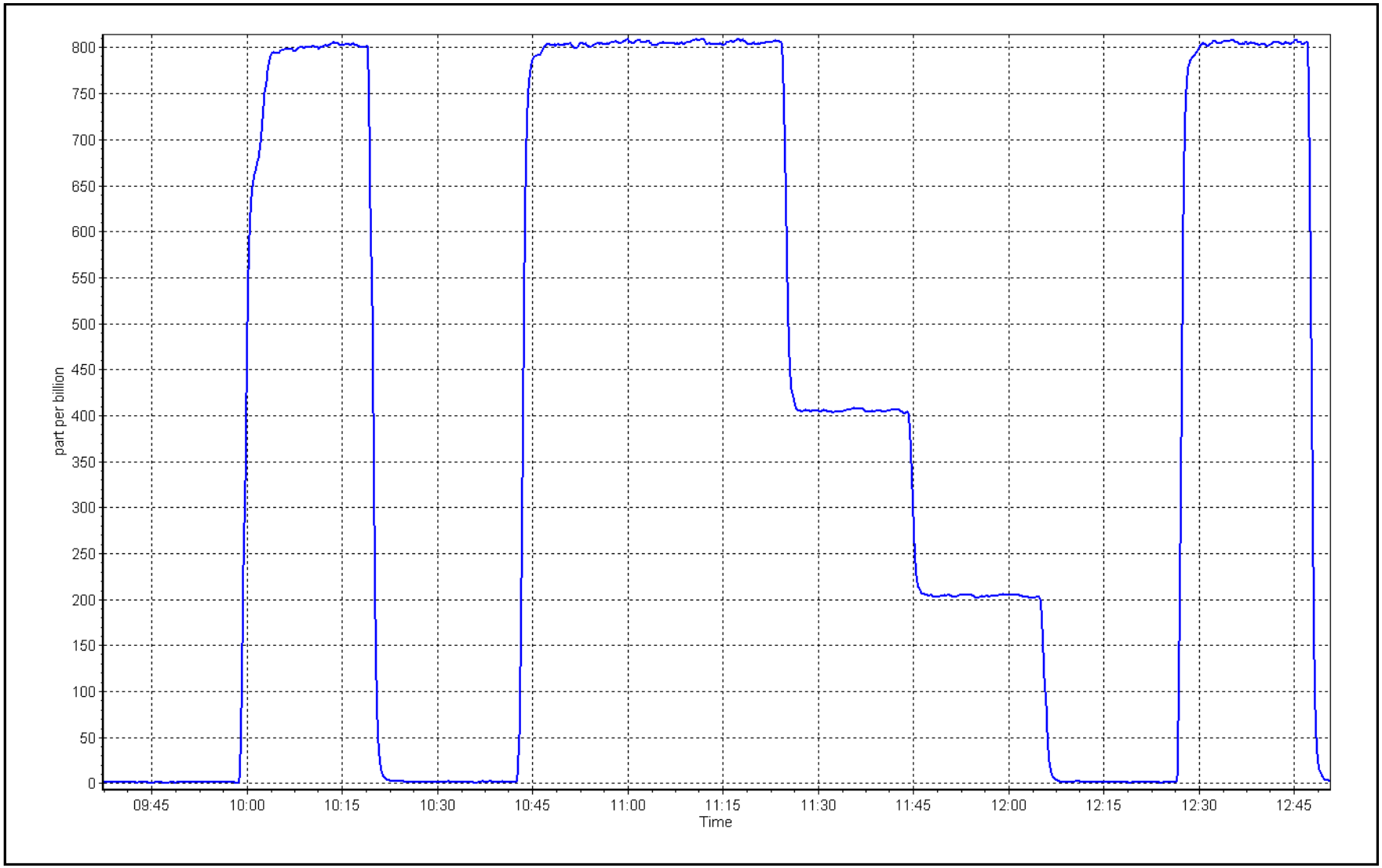
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	1.7	----
799.8	805.6	0.9928
399.9	405.8	0.9854
200.4	204.0	0.9825

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999991	*≥0.995*
Slope	1.005095	*0.90 - 1.10*
Intercept	2.463336	*+/-30*



SO2 Calibration Plot Date: September 28, 2023 Location: Janvier



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Janvier	Station number:	AMS22
Calibration Date:	September 21, 2023	Last Cal Date:	August 29, 2023
Start time (MST):	8:58	End time (MST):	10:25
Reason:	Removal		

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:	1.004358		Backgd or Offset:	1.01	
Calibration intercept:	-0.338889		Coeff or Slope:	0.926	

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4920	79.5	80.0	74.1	1.081
as found 2nd point	4960	39.8	40.0	35.4	1.134
as found 3rd point	4980	19.9	20.0	17.2	1.171
new cylinder response					

TRS Calibration Data

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

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

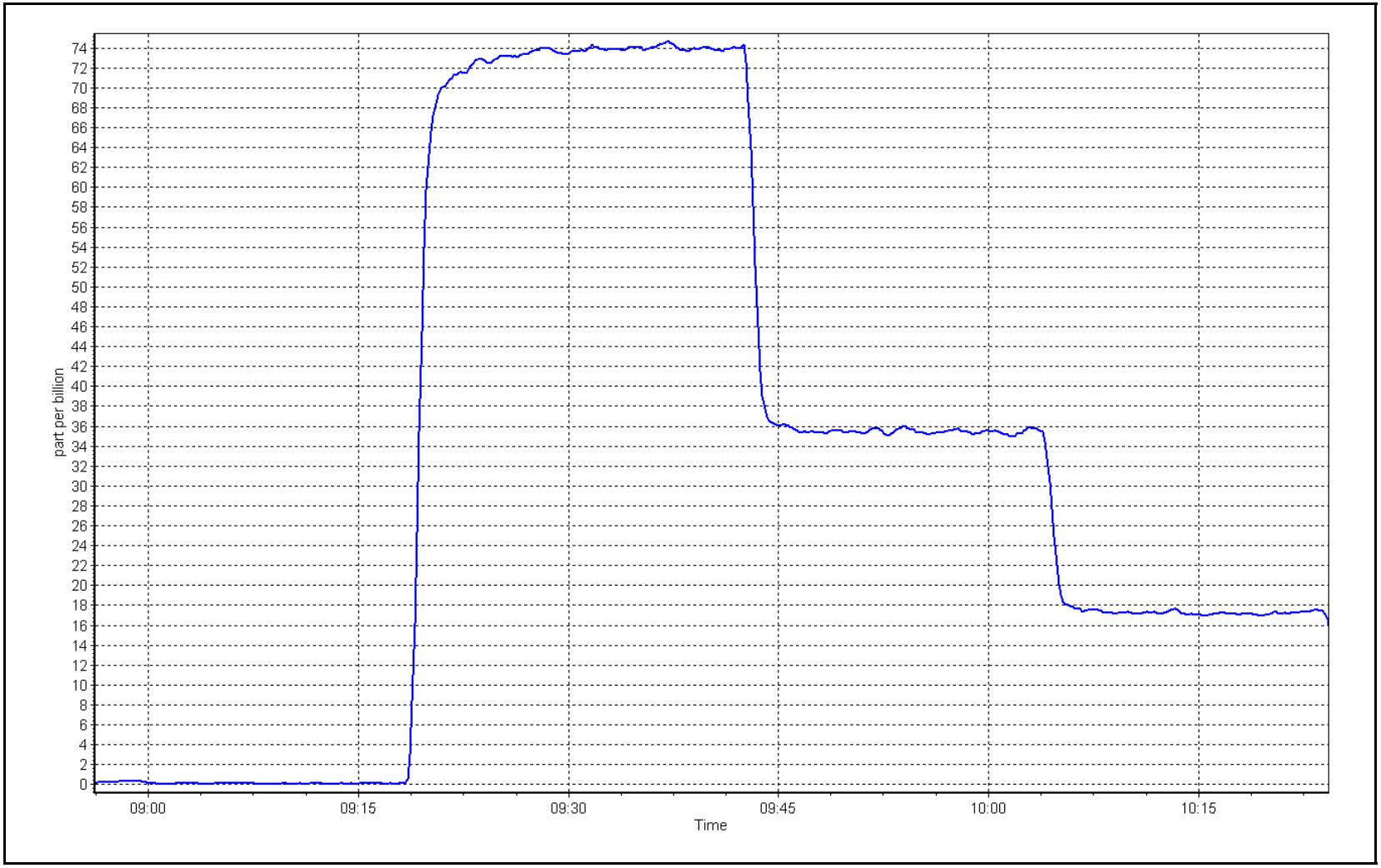
Baseline Corr As found:	74.0	Prev response:	79.99	*% change:	-8.1%
Baseline Corr 2nd AF pt:	35.3	AF Slope:	0.928759	AF Intercept:	-0.817046
Baseline Corr 3rd AF pt:	17.1	AF Correlation:	0.999168		

* = > +/-5% change initiates investigation

Notes: Completed multipoint as founds to replace the instrument due to linearity and drifting issues.

Calibration Performed By: Max Farrell

TRS Calibration Plot Date: September 21, 2023 Location: Janvier



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TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Janvier	Station number:	AMS22
Calibration Date:	September 21, 2023	Last Cal Date:	N/A
Start time (MST):	10:33	End time (MST):	13:31
Reason:	Install		

Calibration Standards

Cal Gas Concentration:	5.03	ppm	Cal Gas Exp Date:	April 16, 2022
Cal Gas Cylinder #:	DT0018680			
Removed Cal Gas Conc:	5.03	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3806
ZAG Make/Model:	Teledyne API T701		Serial Number:	4890

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1151680031	
Converter make:	CDN-101		Converter serial #:	587	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	N/A	1.003650	Backgd or Offset:	N/A	3.04
Calibration intercept:	N/A	-0.039106	Coeff or Slope:	N/A	1.161

TRS As Found Data

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

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4920	79.5	80.0	80.2	0.997
second point	4960	39.8	40.0	40.2	0.996
third point	4980	19.9	20.0	20.1	0.996
as left zero	5000	0.0	0.0	0.2	----
as left span	4920	79.5	80.0	81.7	0.979
SO2 Scrubber Check	4920	79.8	798.0	0.2	----
Date of last scrubber change:				Ave Corr Factor	0.996
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 calibrations after replacement of the analzyer due to linearity and drift issues. Adjusted the span only.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

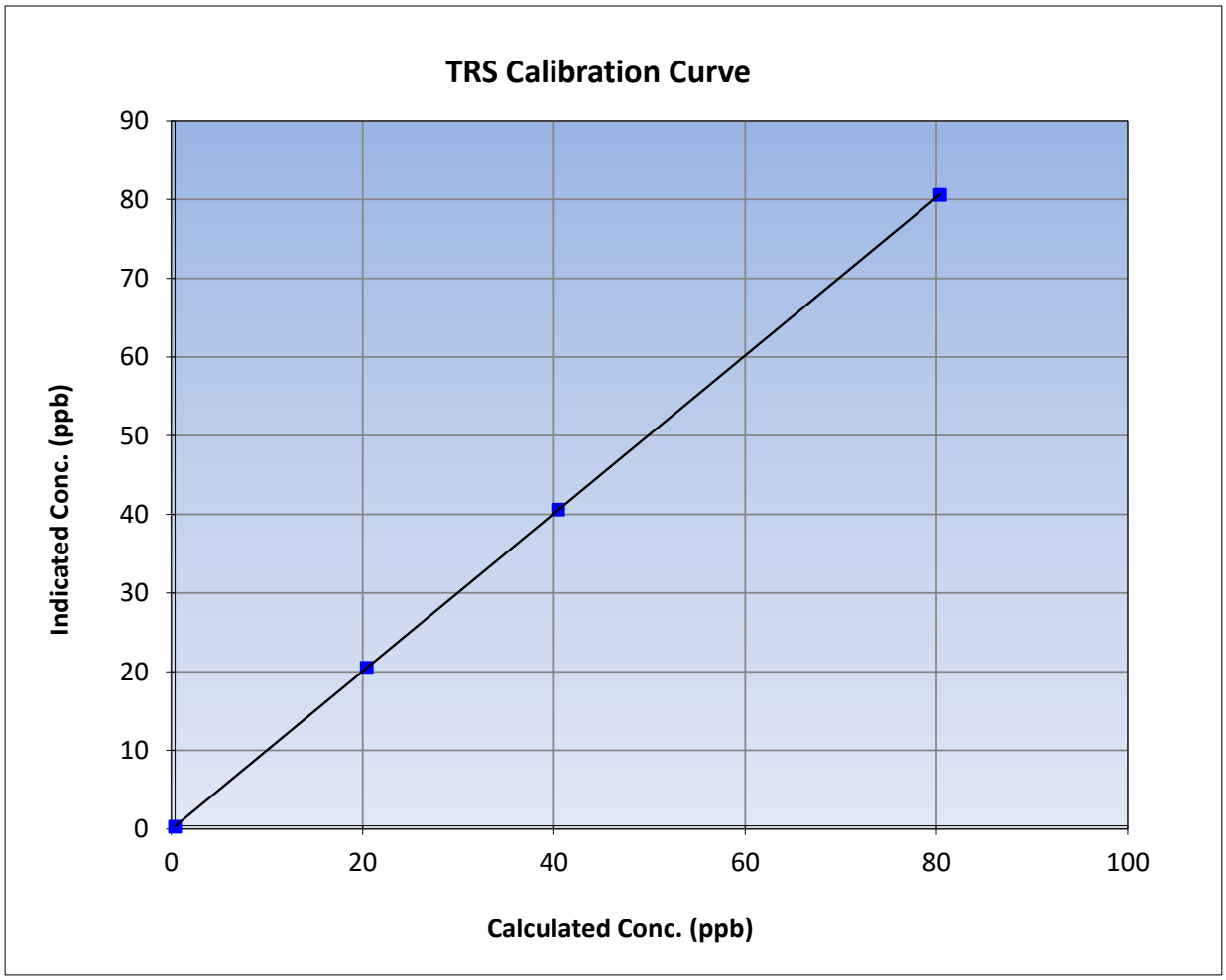
Station Information

Calibration Date:	September 21, 2023	Previous Calibration:	N/A
Station Name:	Janvier	Station Number:	AMS22
Start Time (MST):	10:33	End Time (MST):	13:31
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1151680031

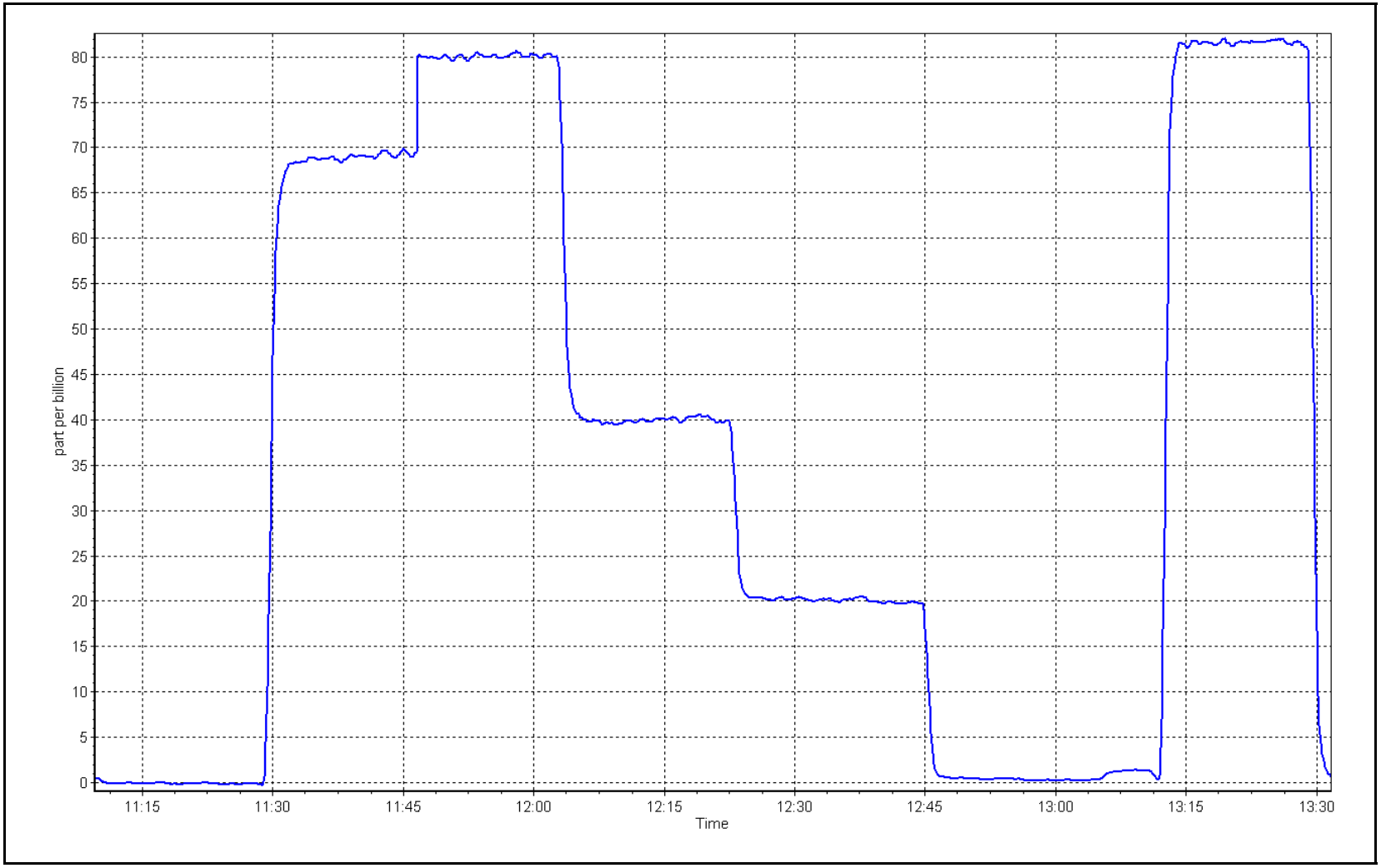
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.2	0.9973
40.0	40.2	0.9960
20.0	20.1	0.9960

Statistical Evaluation		Limits
Correlation Coefficient	0.999997	≥0.995
Slope	1.003650	0.90 - 1.10
Intercept	-0.039106	+/-3



TRS Calibration Plot Date: September 21, 2023 Location: Janvier



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	September 28, 2023	Last Cal Date:	August 23, 2023
Start time (MST):	9:38	End time (MST):	12:50
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:			Removed Gas Expiry:		
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:	2.190E-04	2.240E-04	NMHC SP Ratio:	4.39E-05	4.50E-05
CH4 Retention time:	13.6	13.6	NMHC Peak Area:	208229	203170
Zero Chromatogram:	OFF	OFF	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	79.8	17.17	17.20	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	79.8	17.17	17.18	1.000
second point	4960	39.9	8.59	8.58	1.000
third point	4980	20.0	4.30	4.29	1.002
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	17.17	17.49	0.982
				Average Correction Factor	1.001
Baseline Corr AF:	17.20	Prev response	17.12	*% change	0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	79.8	9.15	9.15	0.999
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	79.8	9.15	9.15	1.000
second point	4960	39.9	4.57	4.57	1.002
third point	4980	20.0	2.29	2.28	1.005
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	9.15	9.28	0.986
				Average Correction Factor	1.002
Baseline Corr AF:	9.15	Prev response	9.12	*% change	0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	79.8	8.03	8.05	0.997
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	79.8	8.03	8.03	0.999
second point	4960	39.9	4.01	4.02	0.999
third point	4980	20.0	2.01	2.01	0.999
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	8.03	8.21	0.978
				Average Correction Factor	0.999
Baseline Corr AF:	8.05	Prev response	8.00	*% change	0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.997041	1.000655
THC Cal Offset:	-0.005391	-0.005800
CH4 Cal Slope:	0.996940	1.000614
CH4 Cal Offset:	-0.003162	0.000436
NMHC Cal Slope:	0.997018	1.000704
NMHC Cal Offset:	-0.002029	-0.007036

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

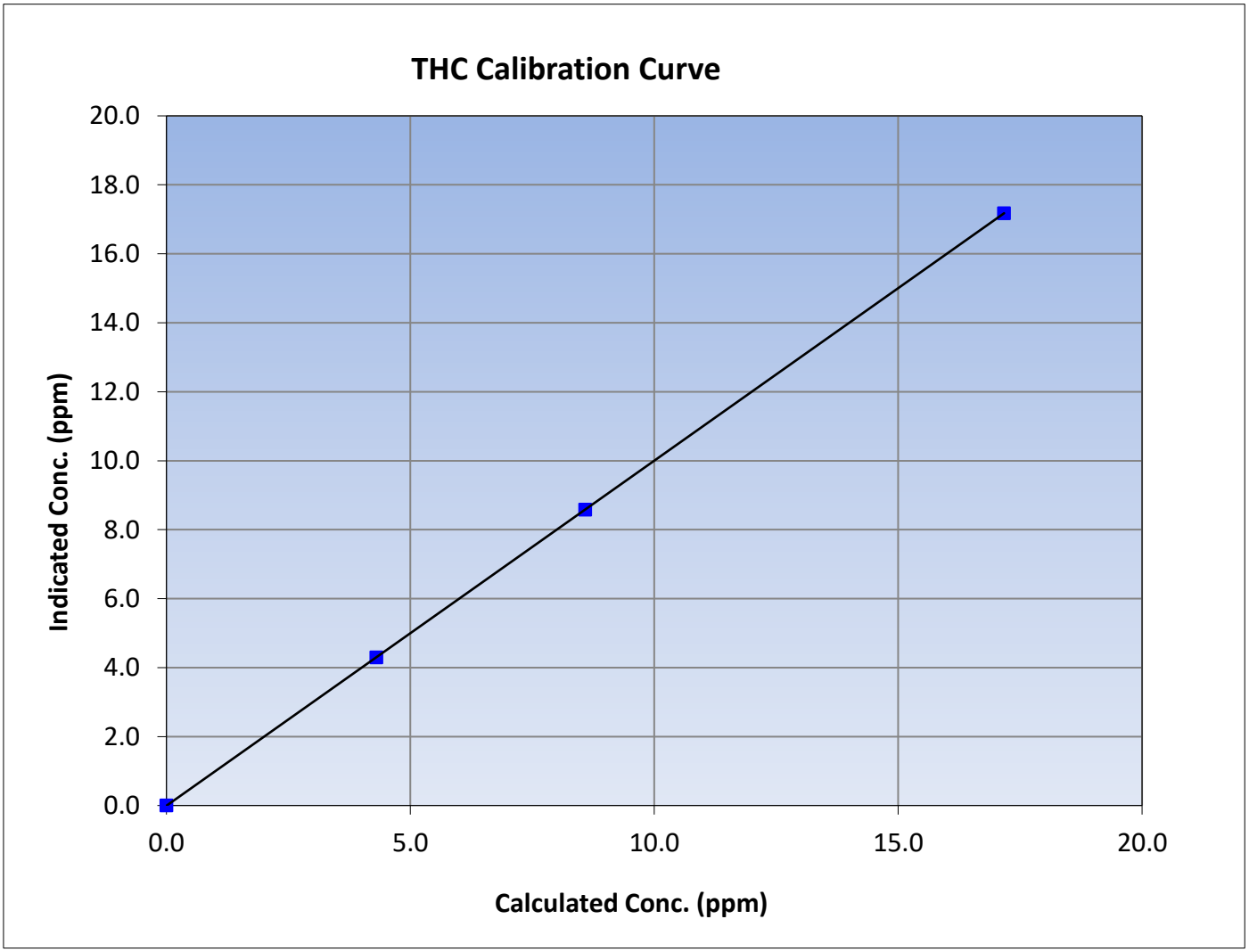
Version-06-2022

Station Information

Calibration Date:	September 28, 2023	Previous Calibration:	August 23, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:38	End Time (MST):	12:50
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	0.999999	≥0.995
17.17	17.18	0.9995			
8.59	8.58	1.0002	Slope	1.000655	0.90 - 1.10
4.30	4.29	1.0022			
			Intercept	-0.005800	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

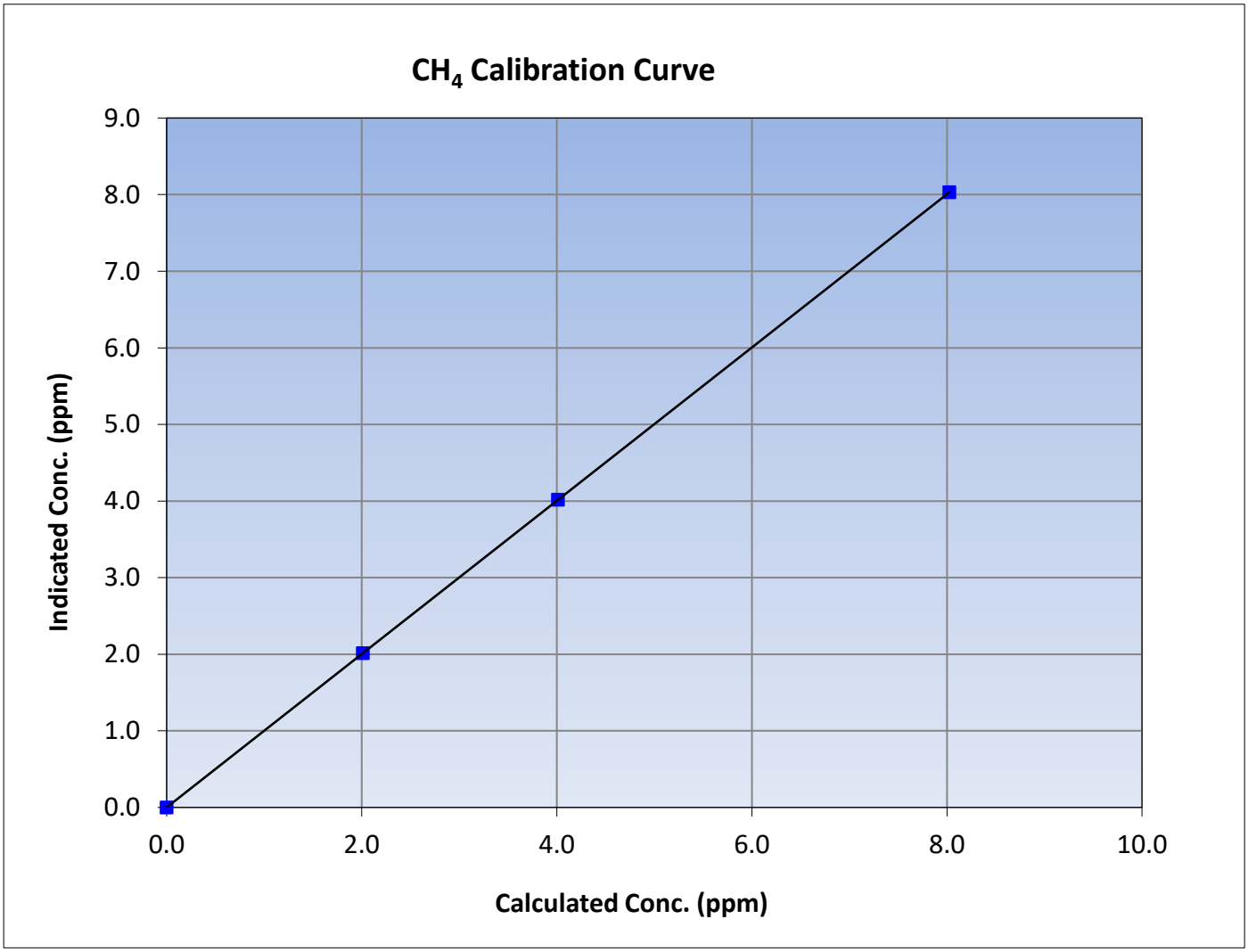
Version-06-2022

Station Information

Calibration Date:	September 28, 2023	Previous Calibration:	August 23, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:38	End Time (MST):	12:50
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	8.03	0.9994			
4.01	4.02	0.9991	Slope	1.000614	*0.90 - 1.10*
2.01	2.01	0.9991			
			Intercept	0.000436	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

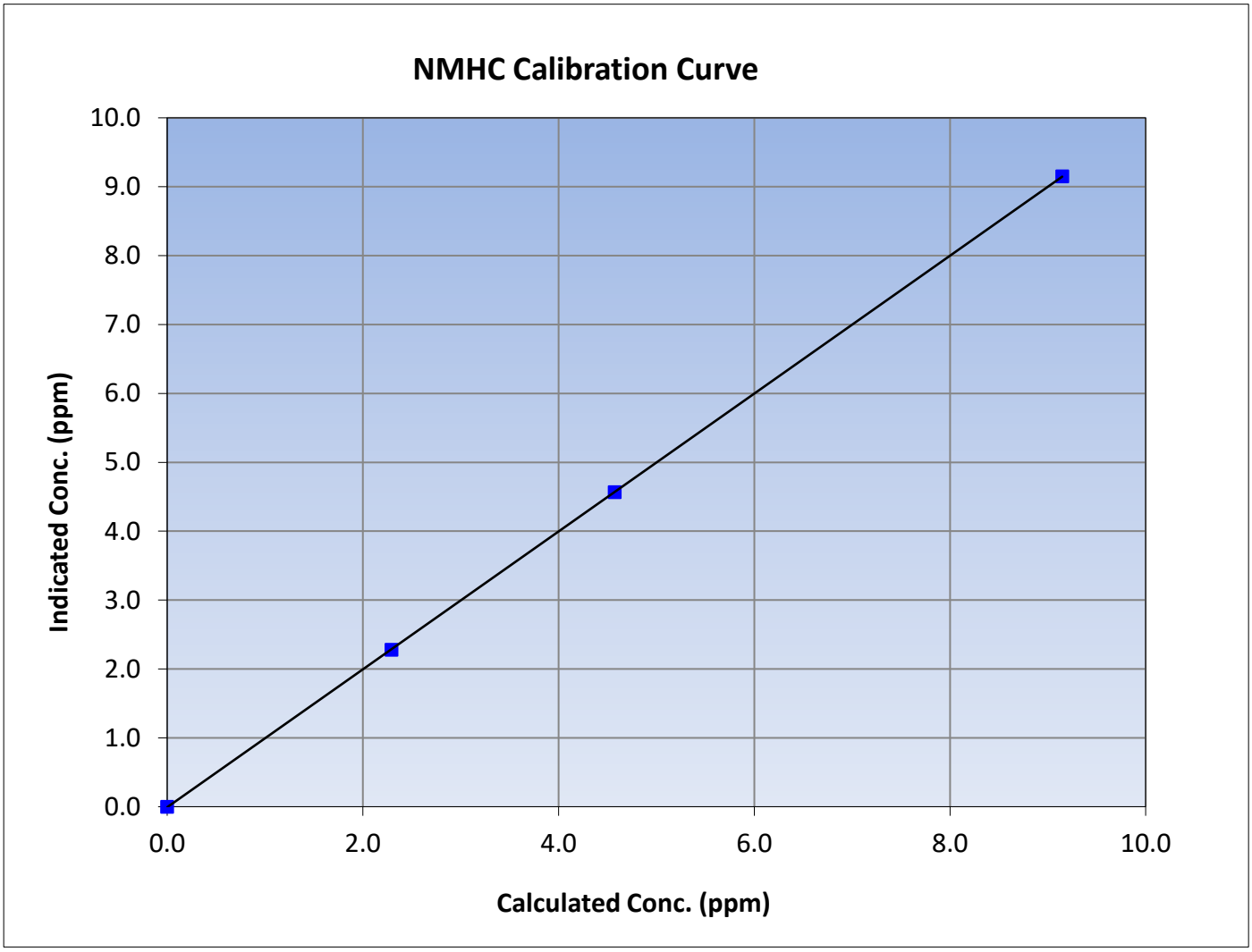
Version-06-2022

Station Information

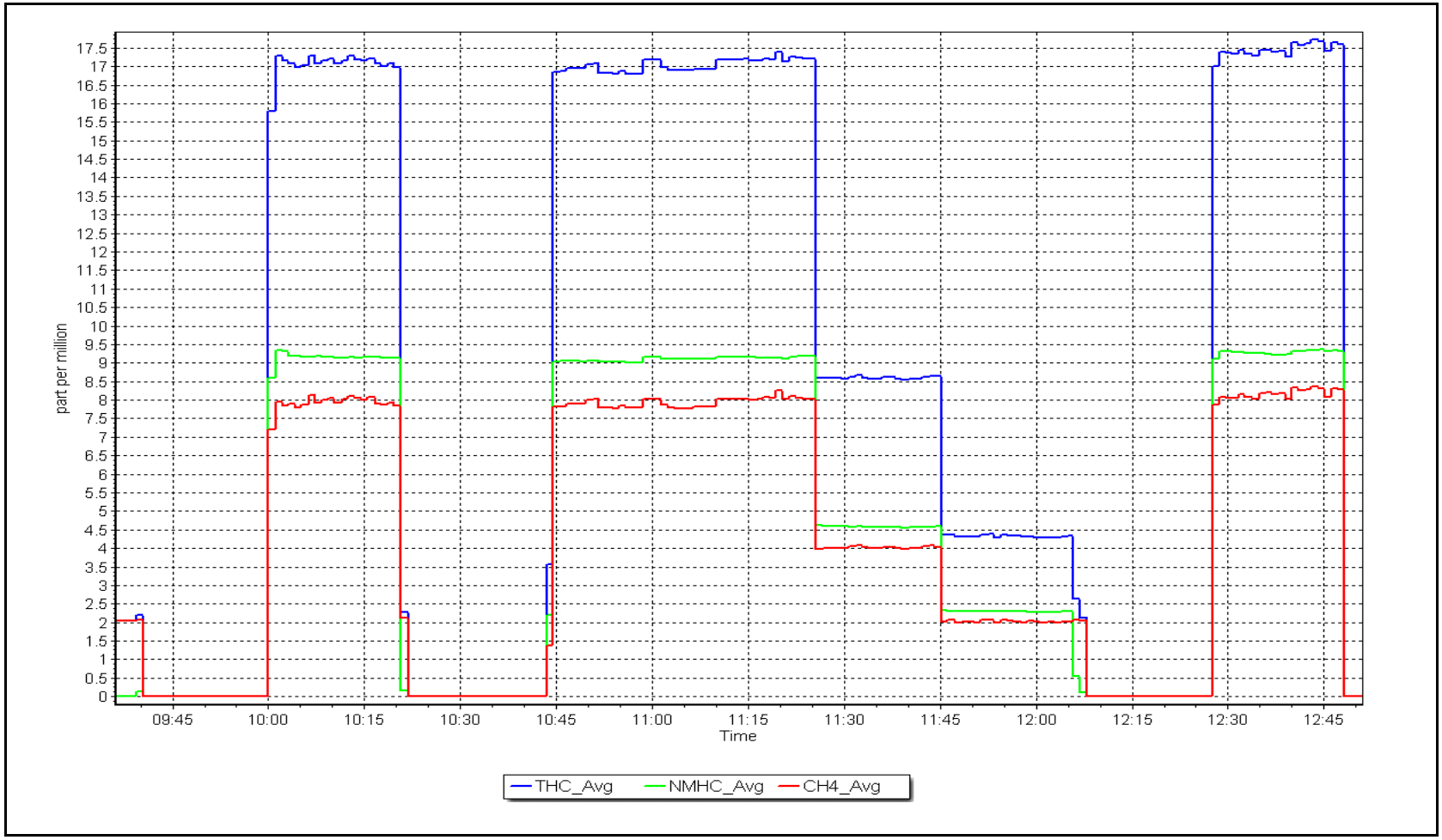
Calibration Date:	September 28, 2023	Previous Calibration:	August 23, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:38	End Time (MST):	12:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750023

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999997	≥0.995
9.15	9.15	0.9997			
4.57	4.57	1.0016	Slope	1.000704	0.90 - 1.10
2.29	2.28	1.0054			
			Intercept	-0.007036	+/-0.5



NMHC Calibration Plot Date: September 28, 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:	September 19, 2023	Last Cal Date:	August 16, 2023
Start time (MST):	9:38	End time (MST):	14:32
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	CC424183		Cal Gas Expiry Date:	April 16, 2023	
NOX Cal Gas Conc:	48.60	ppm	NO Cal Gas Conc:	48.60	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	48.60	ppm	Removed Gas NO Conc:	48.60	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	3806	
ZAG make/model:	Teledyne API T701		Serial Number:	201	

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	0.808	0.826	NO bkgnd or offset:	-5.6	-5.6
NOX coeff or slope:	0.799	0.815	NOX bkgnd or offset:	-3.9	-3.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	5.0	5.0

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.995773	0.998659
NO_X Cal Offset:	2.689123	2.728523
NO Cal Slope:	0.994314	0.998929
NO Cal Offset:	1.949881	2.308958
NO_2 Cal Slope:	1.001315	0.997414
NO_2 Cal Offset:	-0.151118	-0.454360

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	1.5	2.1	-0.5	----	----
as found span	4918	82.3	799.9	799.9	0.0	785.0	779.1	6.0	1.0190	1.0267
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	1.9	2.3	-0.4	----	----
high point	4918	82.3	799.9	799.9	0.0	801.0	801.3	-0.3	0.9986	0.9983
second point	4959	41.2	400.4	400.4	0.0	403.5	402.5	1.0	0.9924	0.9949
third point	4980	20.6	200.2	200.2	0.0	203.2	202.2	1.0	0.9853	0.9901
as left zero	5000	0.0	0.0	0.0	0.0	1.9	2.3	-0.4	----	----
as left span	4918	82.3	799.9	409.7	390.2	797.0	404.9	392.1	1.0036	1.0119
								Average Correction Factor	0.9921	0.9944

Corrected As found	NO_X = 783.5 ppb	NO = 777.0 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -2.0%		
Previous Response	NO_X = 799.2 ppb	NO = 797.3 ppb		*Percent Change	NO = -2.6%		
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	799.3	409.1	390.2	388.8	1.0036	99.6%
2nd GPT point (200 ppb O3)	799.3	599.9	199.4	198.3	1.0055	99.4%
3rd GPT point (100 ppb O3)	799.3	699.5	99.8	99.1	1.0071	99.3%
				Average Correction Factor	1.0054	99.5%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

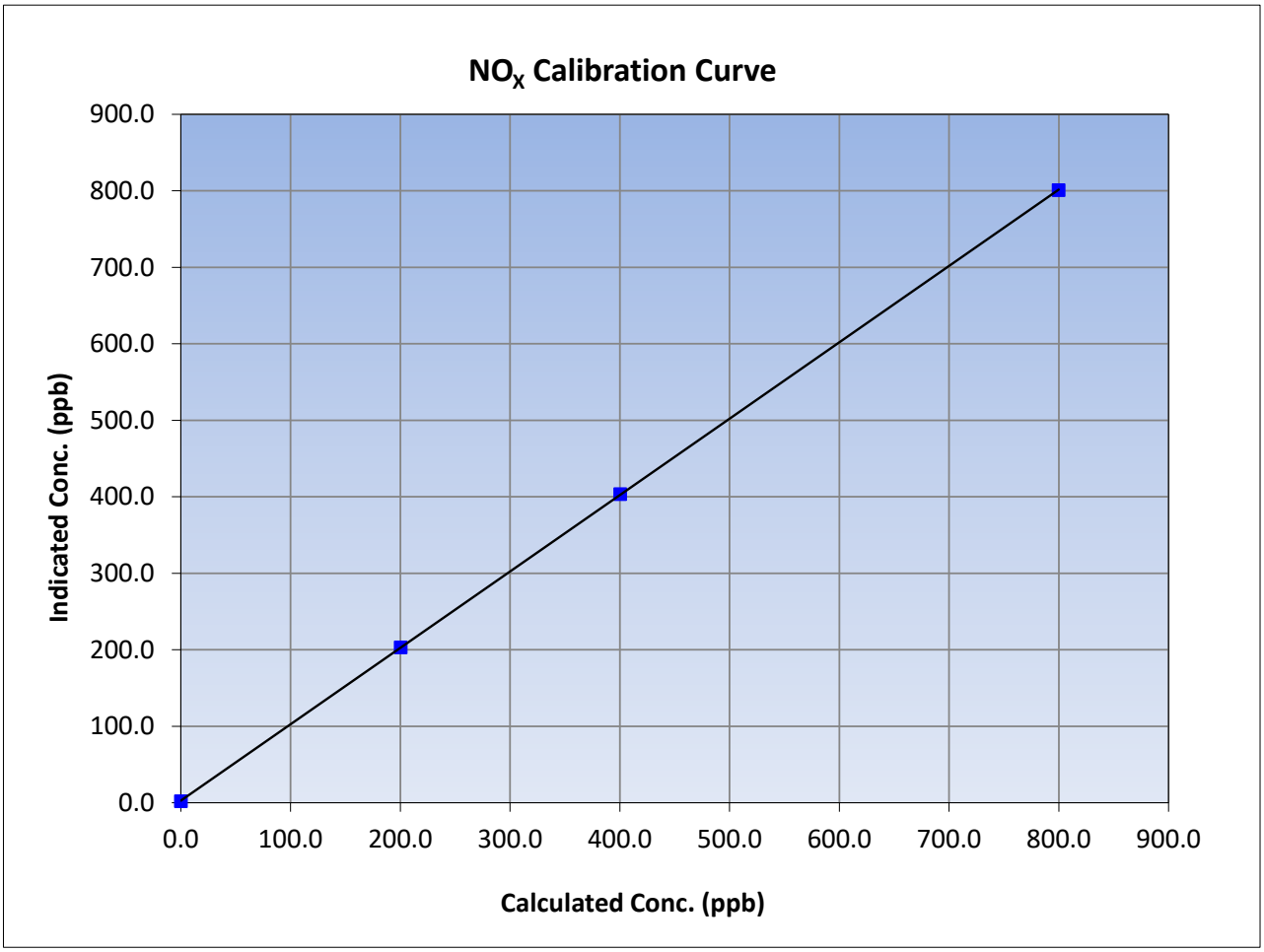
Version-04-2020

Station Information

Calibration Date:	September 19, 2023	Previous Calibration:	August 16, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:38	End Time (MST):	14:32
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	1.9	----	Correlation Coefficient	0.999994	≥0.995
799.9	801.0	0.9986			
400.4	403.5	0.9924	Slope	0.998659	0.90 - 1.10
200.2	203.2	0.9853			
			Intercept	2.728523	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

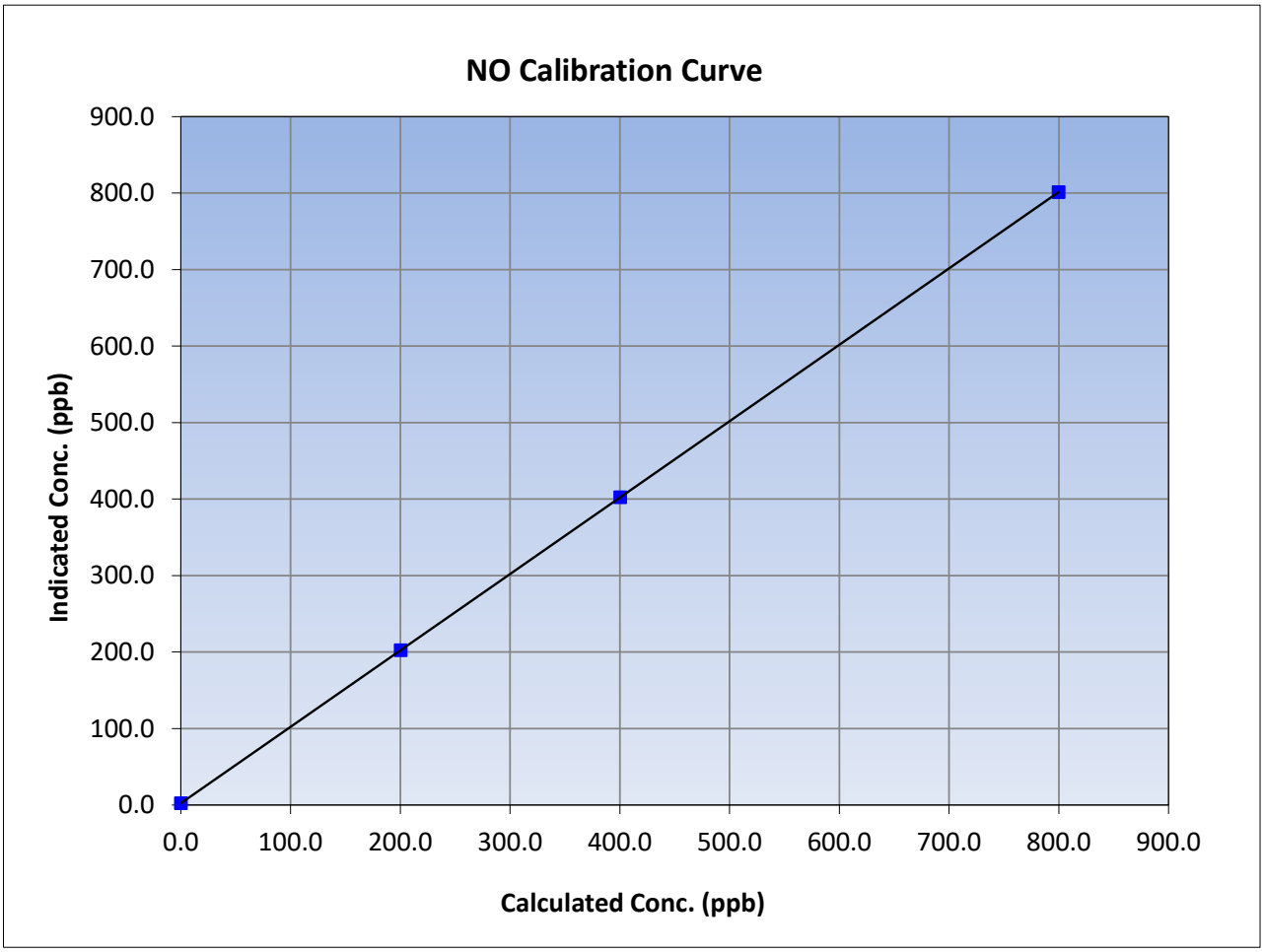
Version-04-2020

Station Information

Calibration Date:	September 19, 2023	Previous Calibration:	August 16, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:38	End Time (MST):	14:32
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	2.3	----	Correlation Coefficient	1.000000	≥0.995
799.9	801.3	0.9983			
400.4	402.5	0.9949	Slope	0.998929	0.90 - 1.10
200.2	202.2	0.9901			
			Intercept	2.308958	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

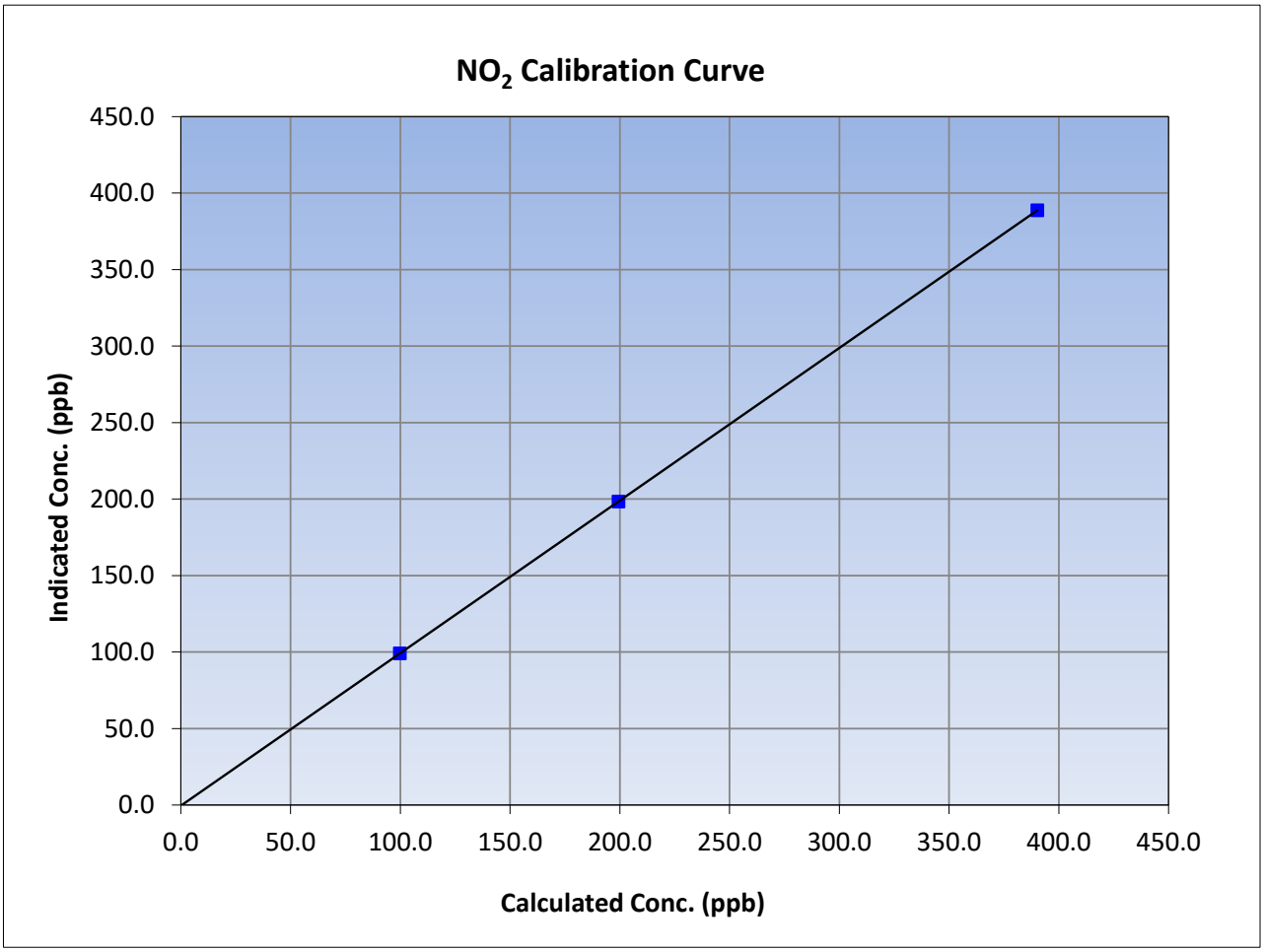
Version-04-2020

Station Information

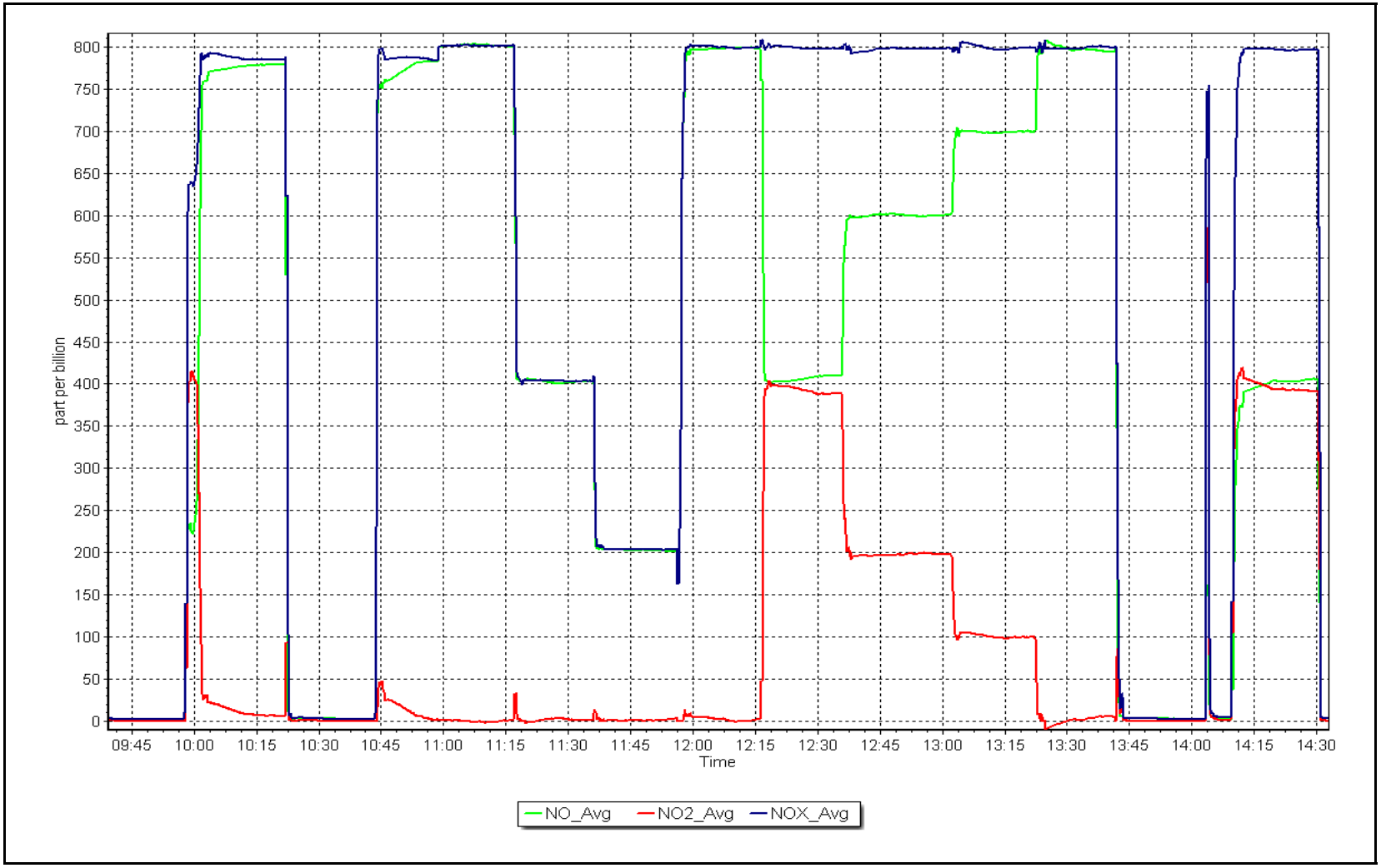
Calibration Date:	September 19, 2023	Previous Calibration:	August 16, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:38	End Time (MST):	14:32
Analyzer make:	API T200	Analyzer serial #:	833

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.4	----	Correlation Coefficient	1.000000	≥0.995
390.2	388.8	1.0036			
199.4	198.3	1.0055	Slope	0.997414	0.90 - 1.10
99.8	99.1	1.0071			
			Intercept	-0.454360	+/-20



NO_X Calibration Plot Date: September 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:	September 7, 2023	Last Cal Date:	August 18, 2023
Start time (MST):	9:21	End time (MST):	13:45
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:	1.001114	1.000914	Backgd or Offset:	-0.1	-0.2
Calibration intercept:	2.780000	0.840000	Coeff or Slope:	0.922	1.021

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	0.7	----
as found span	4895	905.3	400.0	359.6	1.112
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	0.4	----
high point	4895	905.3	400.0	400.9	0.998
second point	4895	756.7	200.0	201.5	0.993
third point	4895	656.1	100.0	101.2	0.988
as left zero	5000	800.0	0.0	0.9	----
as left span	4895	904.3	400.0	401.6	0.996
				Average Correction Factor	0.993

Baseline Corr As found:	358.9	Previous response	403.2	*% change	-12.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Completed as found span before the zero by mistake. Changed the inlet filter after as founds. As founds are 11% low due to the O3 pump that was changed recently on the calibrator. Adjusted the span only. See docit note for more info.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

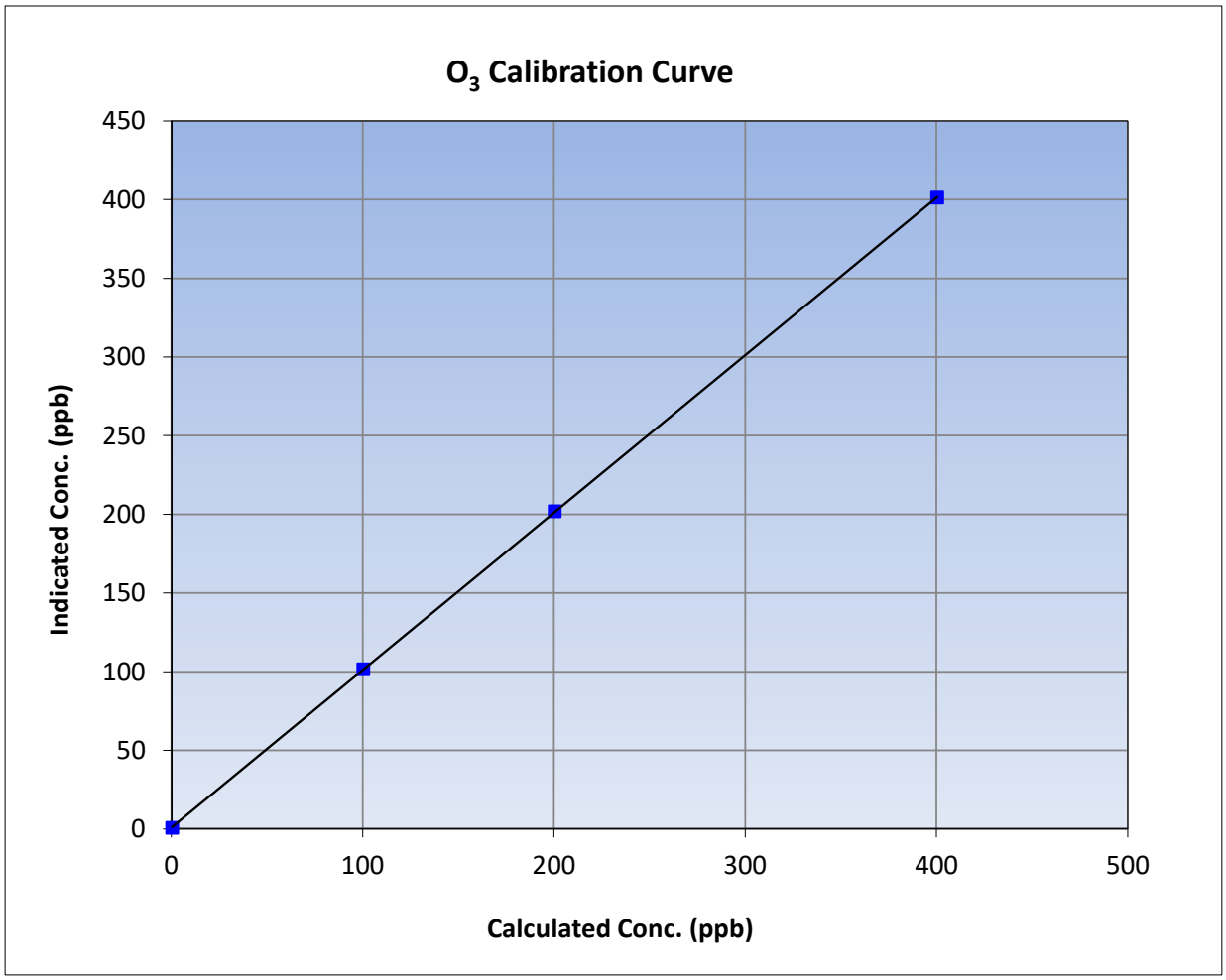
Station Information

Calibration Date:	September 7, 2023	Previous Calibration:	August 18, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:21	End Time (MST):	13:45
Analyzer make:	Teledyne API T400	Analyzer serial #:	7046

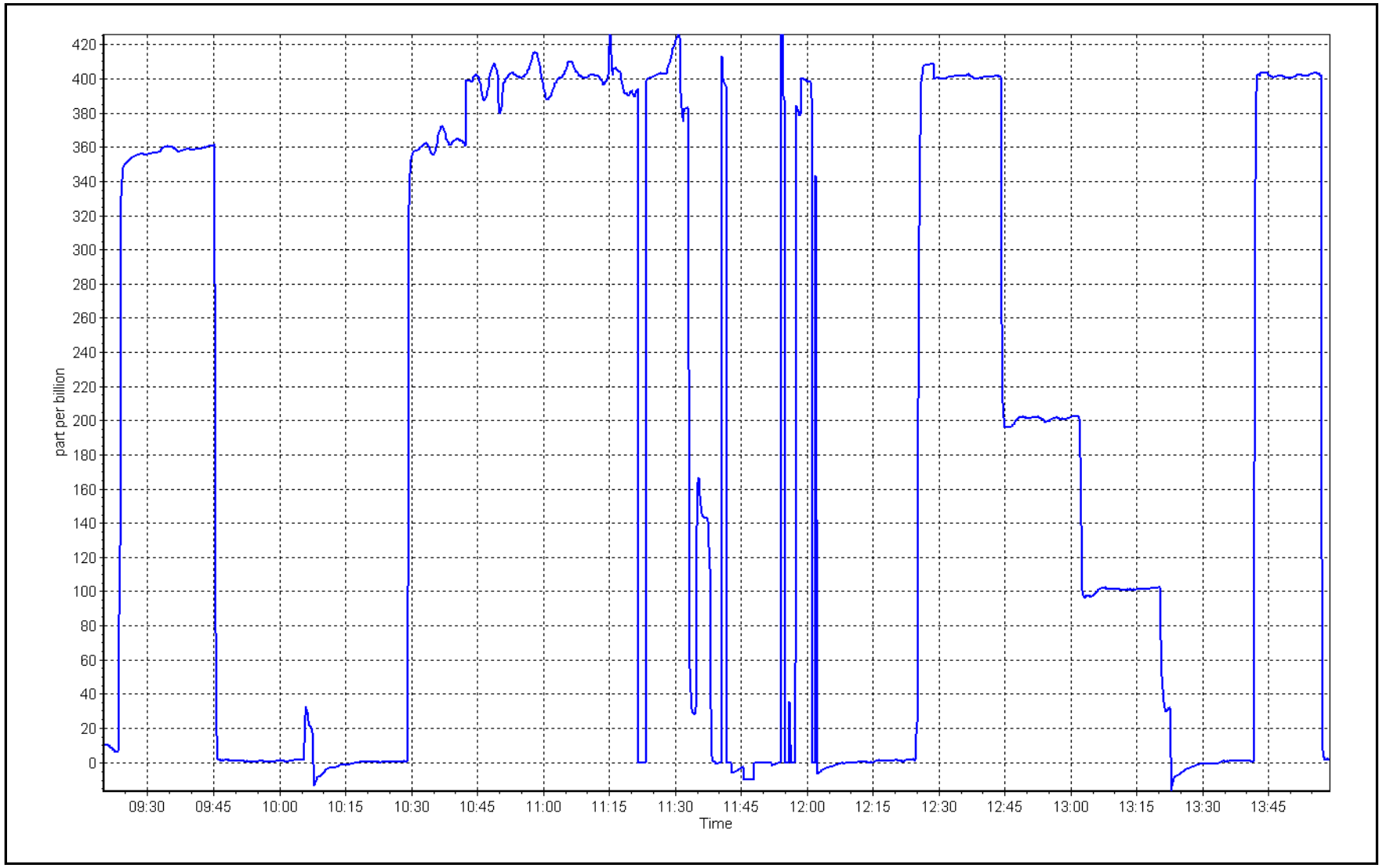
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
400.0	400.9	0.9978
200.0	201.5	0.9926
100.0	101.2	0.9881

Statistical Evaluation		Limits
Correlation Coefficient	0.999993	≥0.995
Slope	1.000914	0.90 - 1.10
Intercept	0.840000	+/- 5



O_3 Calibration Plot Date: September 7, 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:	September 28, 2023	Last Cal Date:	August 23, 2023
Start time (MST):	12:36	End time (MST):	12:54
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)	18.2	17.5	18.2	☐	+/- 2 °C
P (mmHg)	712.2	712.8	712.2	☐	+/- 10 mmHg
flow (LPM)	4.99	5.07	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: September 28, 2023 Last Cal Date: August 23, 2023

PM w/o HEPA: 7.4 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				☐	10.9 +/- 0.5

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

Date Optical Chamber Cleaned: July 26, 2023 <0.2 ug/m3

Disposable Filter Changed: July 26, 2023

Annual Maintenance

Date Sample Tube Cleaned: July 26, 2023

Date RH/T Sensor Cleaned: July 26, 2023

Notes:

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
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	September 7, 2023	Last Cal Date:	August 10, 2023
Start time (MST):	8:18	End time (MST):	10:49
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:	1.000337	1.002497	Backgd or Offset:	17.8	17.8
Calibration intercept:	-0.563797	-0.744078	Coeff or Slope:	1.040	1.031

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.2	----
as found span	4920	80.3	799.1	808.9	0.988
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4920	80.3	799.1	800.6	0.998
second point	4960	40.2	400.1	400.4	0.999
third point	4980	20.1	200.0	198.6	1.007
as left zero	5000	0.0	0.0	0.0	----
as left span	4920	80.3	799.1	799.1	1.000
				Average Correction Factor	1.001

Baseline Corr As found:	809.10	Previous response	798.80	*% change	1.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

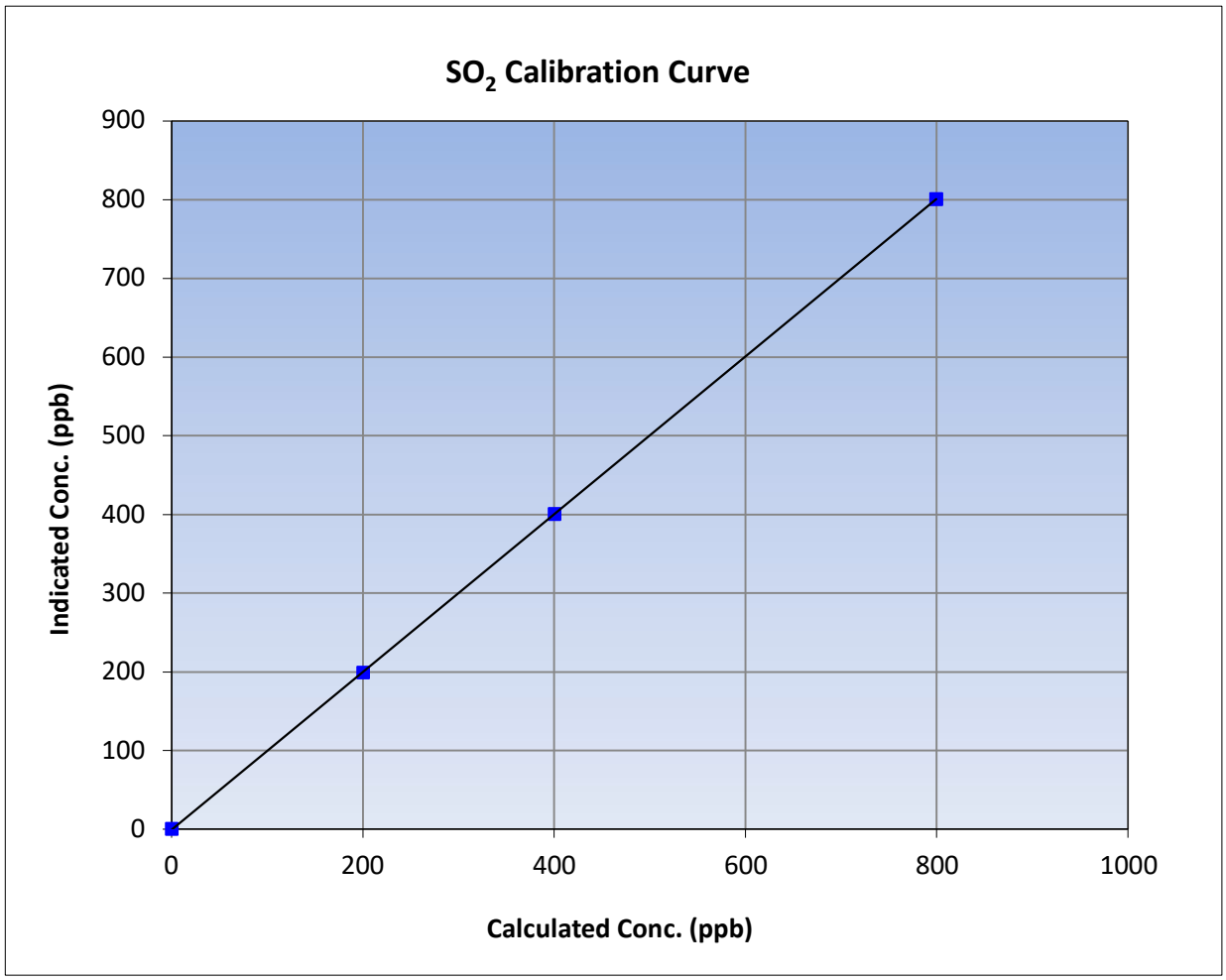
Station Information

Calibration Date:	September 7, 2023	Previous Calibration:	August 10, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:18	End Time (MST):	10:49
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290012

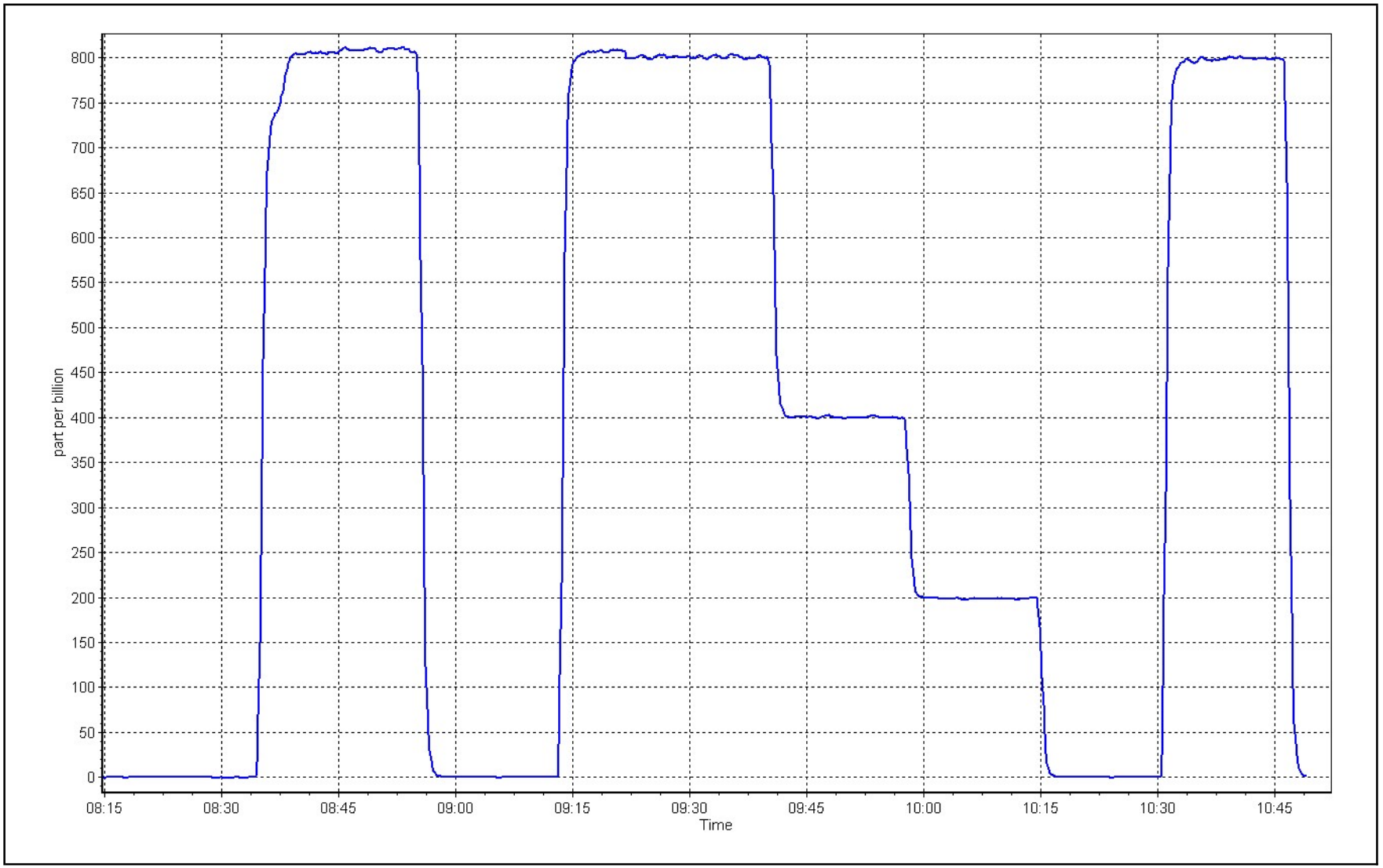
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
799.1	800.6	0.9981
400.1	400.4	0.9991
200.0	198.6	1.0072

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999994	*≥0.995*
Slope	1.002497	*0.90 - 1.10*
Intercept	-0.744078	*+/-30*



SO2 Calibration Plot Date: September 7, 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:	September 6, 2023	Last Cal Date:	August 17, 2023
Start time (MST):	6:55	End time (MST):	11:02
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 43i TLE		Analyzer serial #:	1300156232	
Converter make:	CDN-101		Converter serial #:	594	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.011740	1.001459	Backgd or Offset:	1.19	1.19
Calibration intercept:	0.002125	0.061824	Coeff or Slope:	1.124	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	78.3	1.020
as found 2nd point	4962	38.5	40.0	39.4	1.013
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	0.0	----
high point	4923	77.0	80.0	80.0	1.000
second point	4962	38.5	40.0	40.6	0.985
third point	4981	19.2	19.9	19.8	1.007
as left zero	5000	0.0	0.0	0.0	----
as left span	4923	77.0	80.0	81.0	0.988
SO2 Scrubber Check	4920	80.3	803.0	-0.1	----
Date of last scrubber change:				Ave Corr Factor	0.998
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.4	Prev response:	80.94	*% change:	-3.2%
Baseline Corr 2nd AF pt:	39.5	AF Slope:	0.980176	AF Intercept:	-0.018544
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999981		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

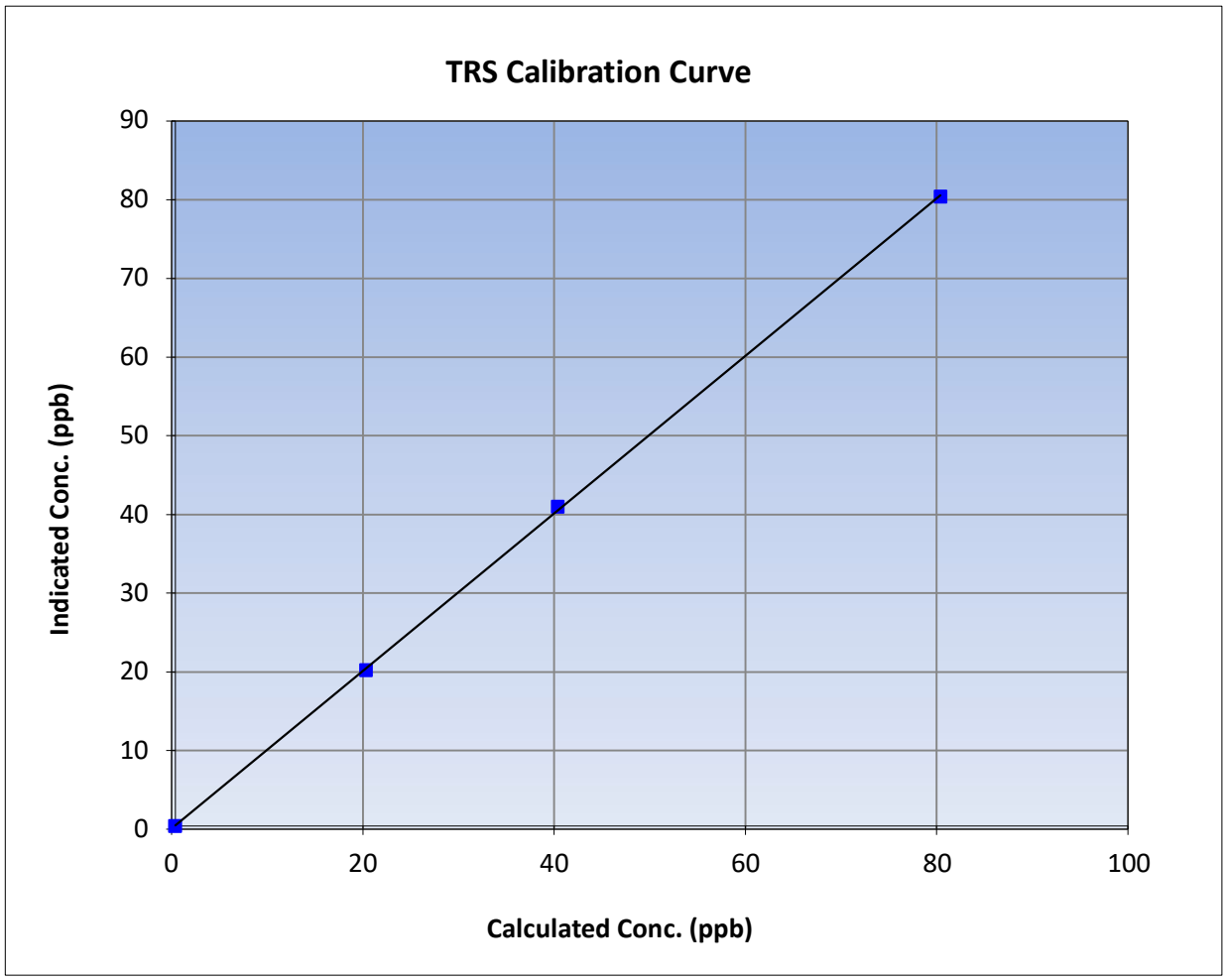
Station Information

Calibration Date:	September 6, 2023	Previous Calibration:	August 17, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	6:55	End Time (MST):	11:02
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1300156232

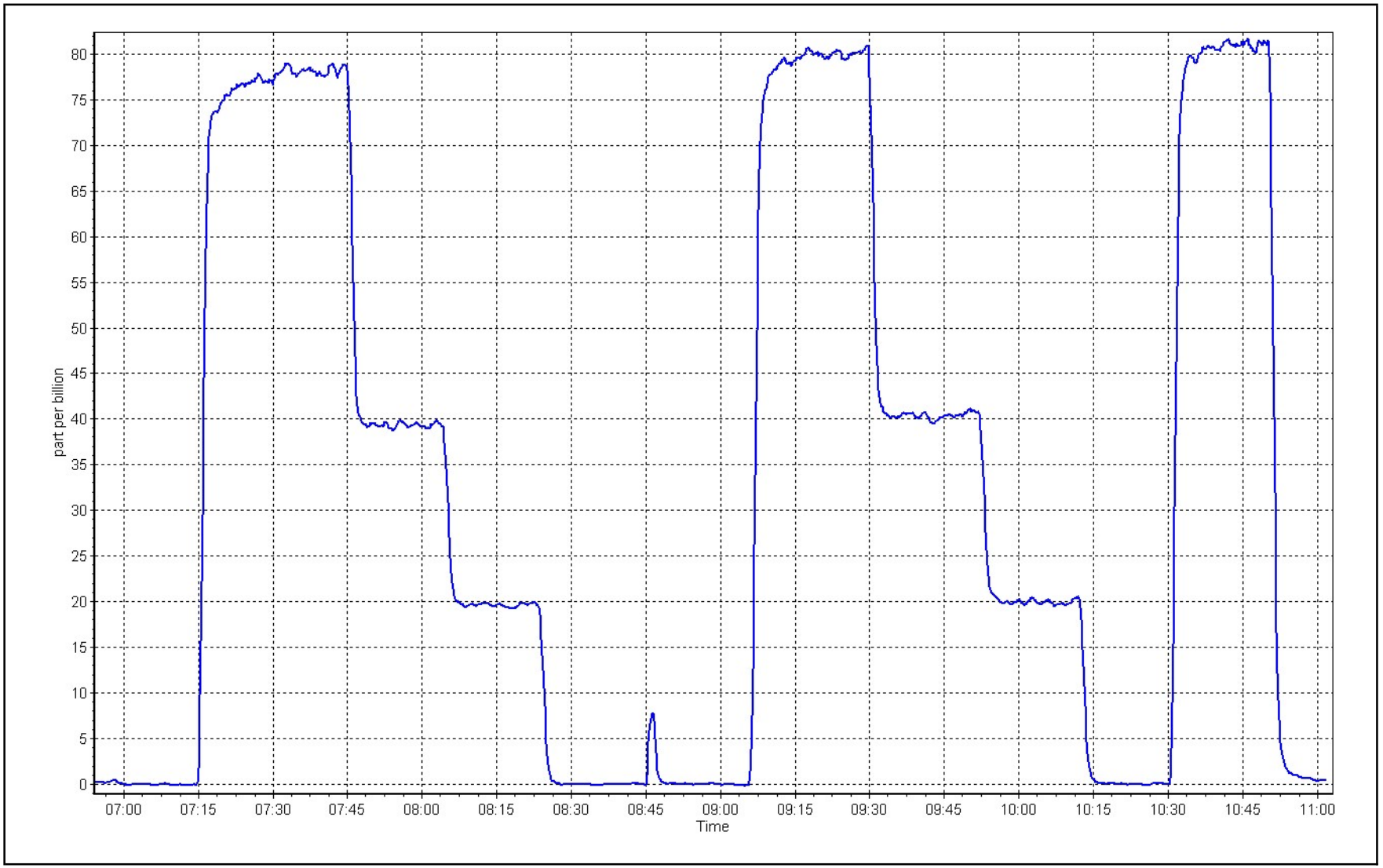
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.0	1.0000
40.0	40.6	0.9852
19.9	19.8	1.0075

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999907	*≥0.995*
Slope	1.001459	*0.90 - 1.10*
Intercept	0.061824	*+/-3*



TRS Calibration Plot Date: September 6, 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:	September 7, 2023	Last Cal Date:	August 10, 2023
Start time (MST):	8:18	End time (MST):	10:48
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:	2.39E-04	2.34E-04	NMHC SP Ratio:	5.21E-05	5.10E-05
CH4 Retention time:	13.0	13.0	NMHC Peak Area:	176470	180460

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	17.58	0.978
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	17.28	0.995
second point	4960	40.2	8.61	8.62	0.998
third point	4980	20.1	4.30	4.30	1.001
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.19	17.33	0.992
				Average Correction Factor	0.998

Baseline Corr AF:	17.58	Prev response	17.28	*% change	1.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	9.16	9.42	0.972
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	9.16	9.20	0.996
second point	4960	40.2	4.59	4.64	0.988
third point	4980	20.1	2.29	2.33	0.984
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	9.16	9.22	0.993
				Average Correction Factor	0.989
Baseline Corr AF:	9.42	Prev response	9.22	*% change	2.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	8.03	8.16	0.984
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	8.07	0.995
second point	4960	40.2	4.02	3.98	1.010
third point	4980	20.1	2.01	1.97	1.021
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	8.03	8.12	0.989
				Average Correction Factor	1.009
Baseline Corr AF:	8.16	Prev response	8.05	*% 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:	1.005681	1.005421
THC Cal Offset:	-0.013606	-0.016398
CH4 Cal Slope:	1.005023	1.005916
CH4 Cal Offset:	-0.021648	-0.032039
NMHC Cal Slope:	1.006196	1.003864
NMHC Cal Offset:	0.008043	0.017642

Notes: No maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

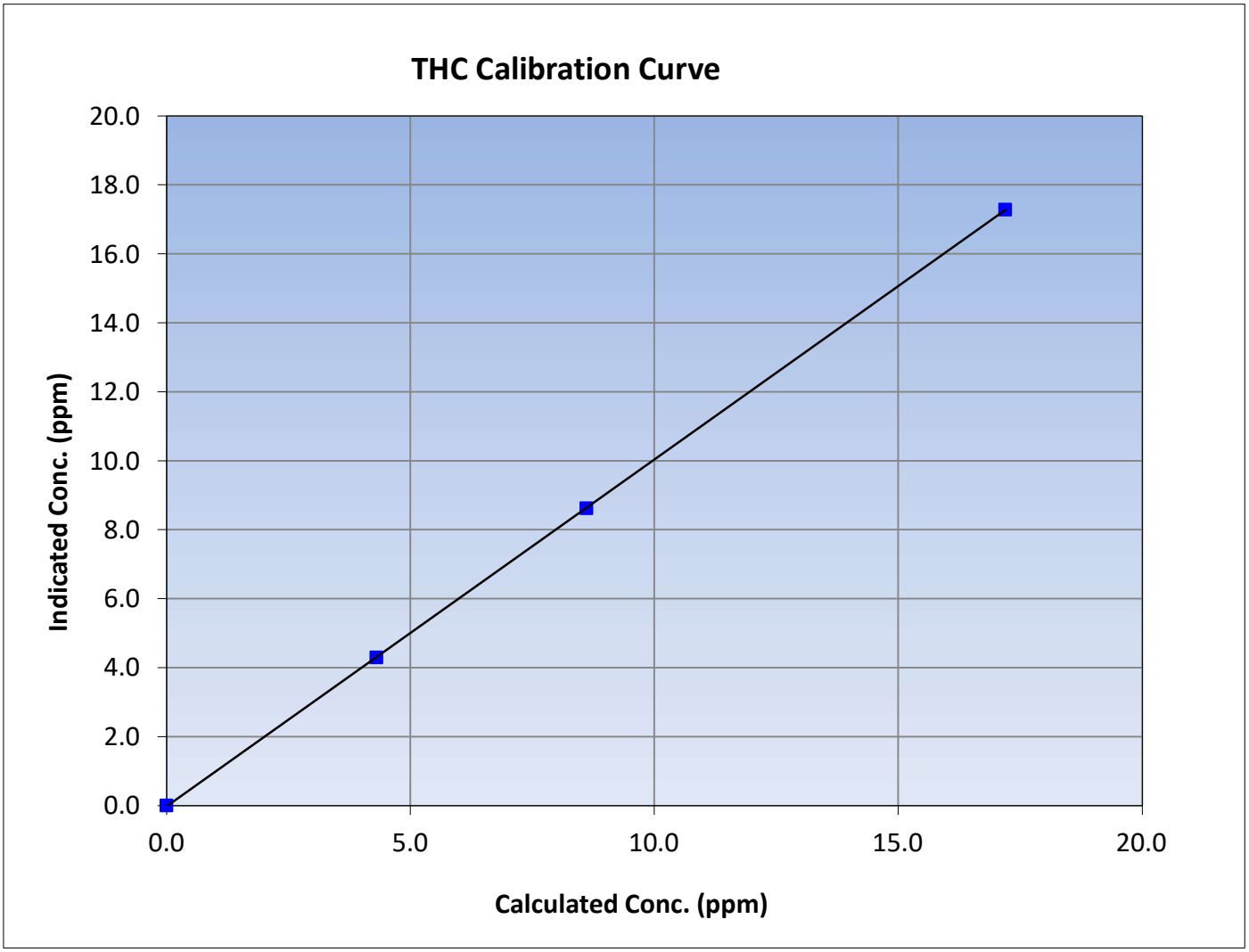
Version-01-2020

Station Information

Calibration Date:	September 7, 2023	Previous Calibration:	August 10, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:18	End Time (MST):	10:48
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	0.999995	*≥0.995*
17.19	17.28	0.9949			
8.61	8.62	0.9985	Slope	1.005421	*0.90 - 1.10*
4.30	4.30	1.0008			
			Intercept	-0.016398	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

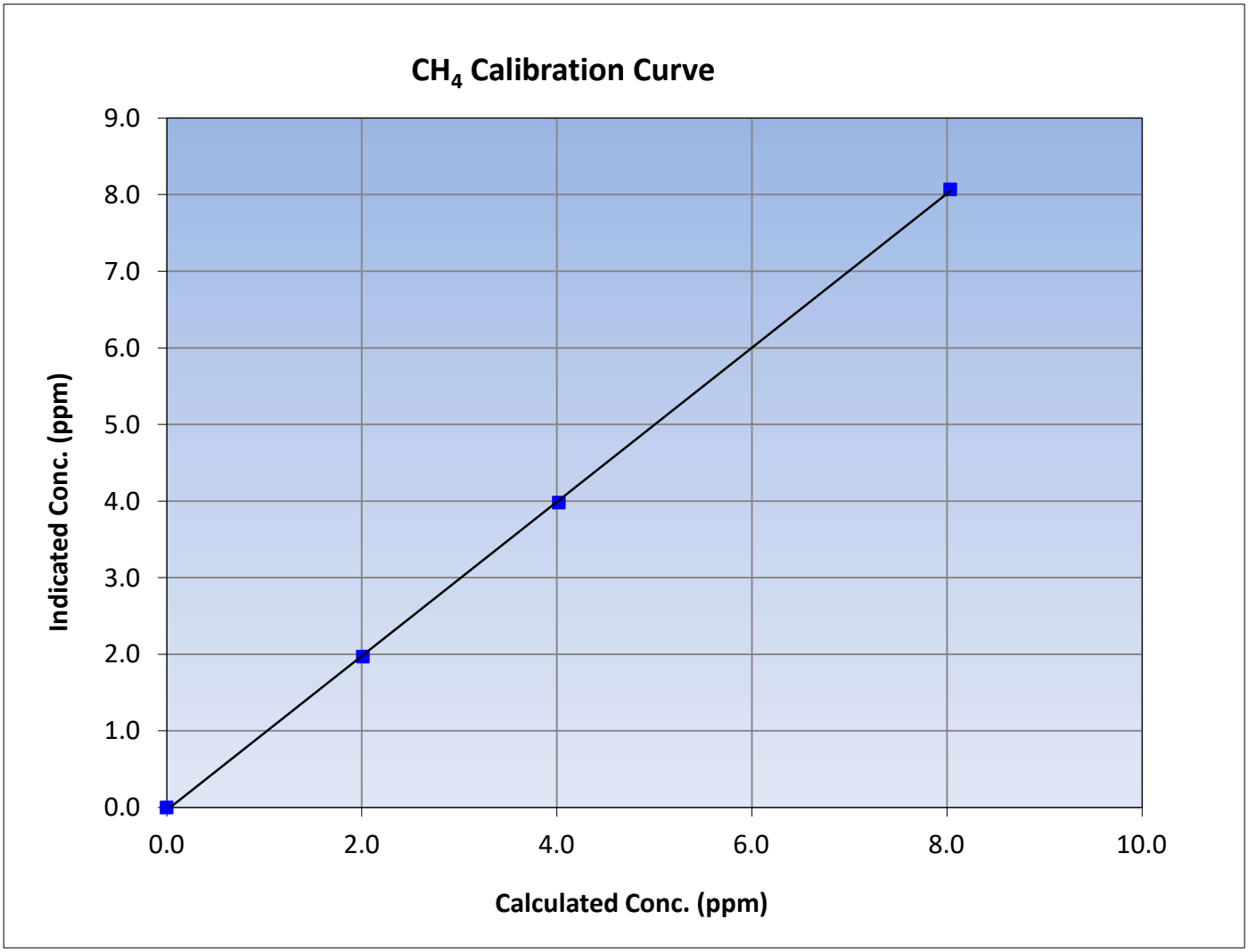
Version-01-2020

Station Information

Calibration Date:	September 7, 2023	Previous Calibration:	August 10, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:18	End Time (MST):	10:48
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	0.999915	*≥0.995*
8.03	8.07	0.9954			
4.02	3.98	1.0104	Slope	1.005916	*0.90 - 1.10*
2.01	1.97	1.0207			
			Intercept	-0.032039	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

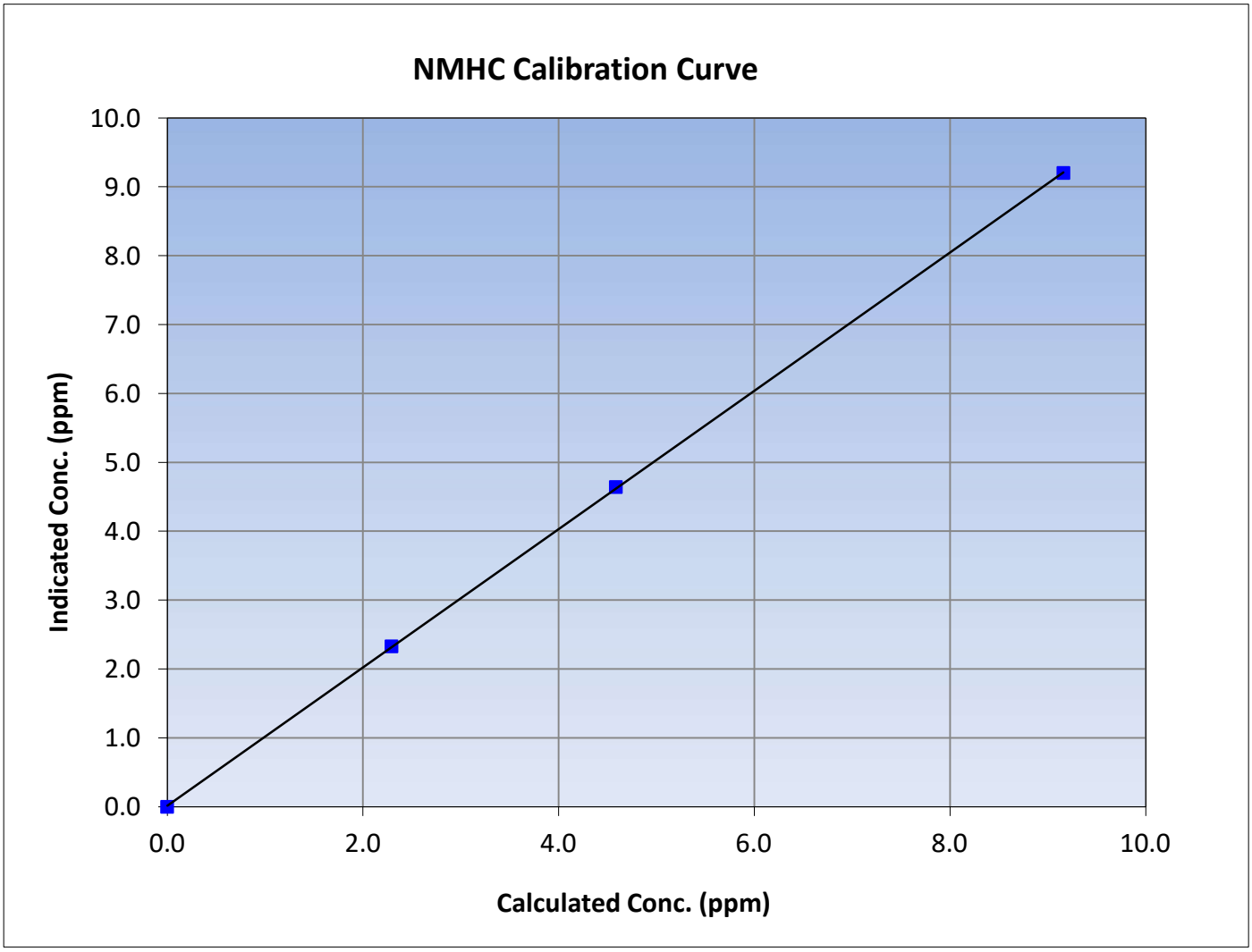
Version-01-2020

Station Information

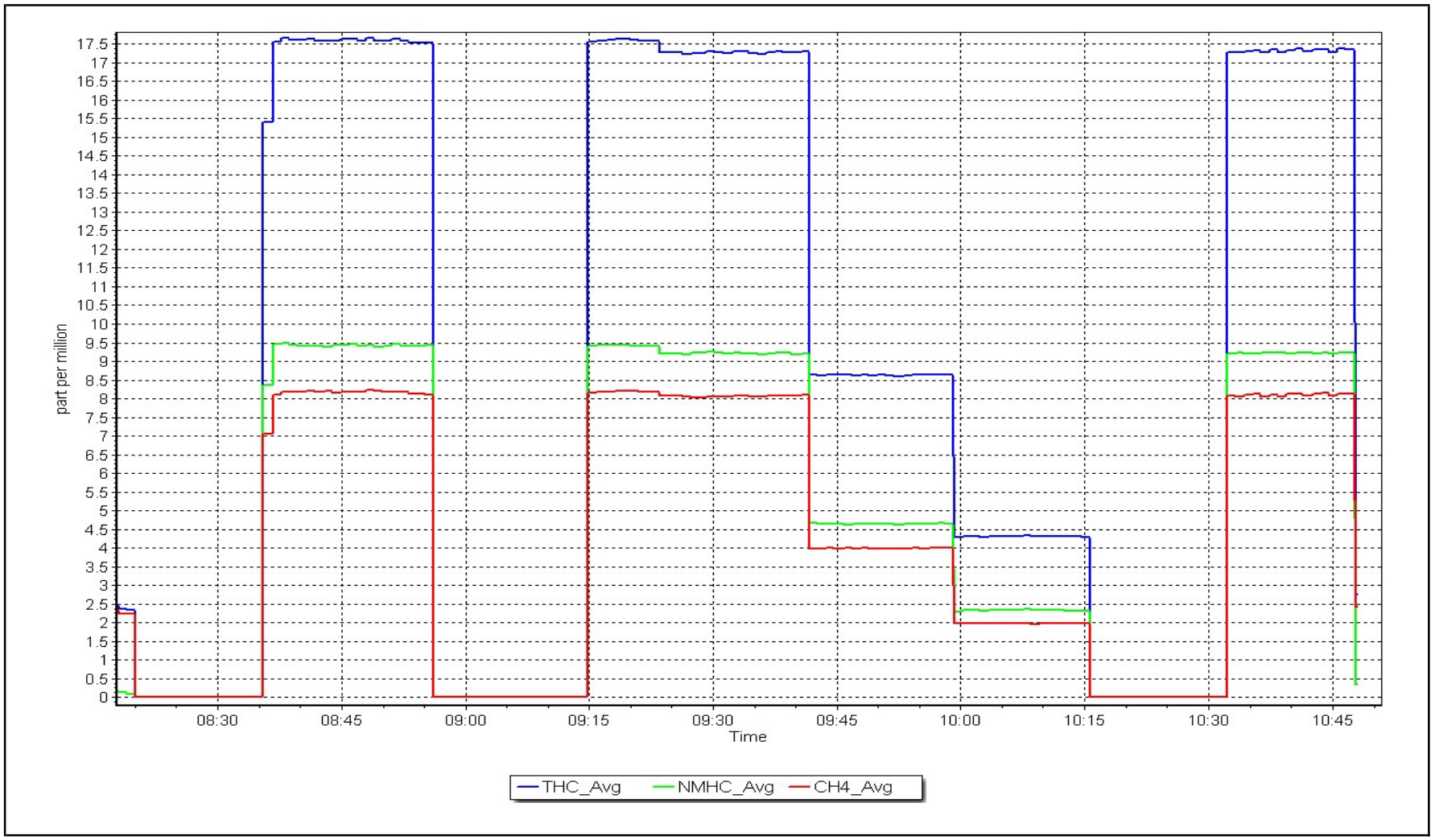
Calibration Date:	September 7, 2023	Previous Calibration:	August 10, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:18	End Time (MST):	10:48
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585648

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999980	≥0.995
9.16	9.20	0.9956			
4.59	4.64	0.9882	Slope	1.003864	0.90 - 1.10
2.29	2.33	0.9840			
			Intercept	0.017642	+/-0.5



NMHC Calibration Plot Date: September 7, 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:	September 27, 2023	Last Cal Date:	September 7, 2023
Start time (MST):	11:00	End time (MST):	12:12
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 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:	2.39E-04	2.34E-04	NMHC SP Ratio:	5.21E-05	5.10E-05
CH4 Retention time:	13.0	13.0	NMHC Peak Area:	176470	180460

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	5000	0.0	0.00	0.00	----
high point	4920	80.3	17.19	17.33	0.992
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.992

Baseline Corr AF:	17.33	Prev response	17.27	*% 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	80.3	9.16	9.18	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	9.16	9.18	0.998
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.998
Baseline Corr AF:	9.18	Prev response	9.21	*% change	-0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	8.03	8.14	0.987
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	8.03	8.15	0.986
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.986
Baseline Corr AF:	8.14	Prev response	8.05	*% change	1.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

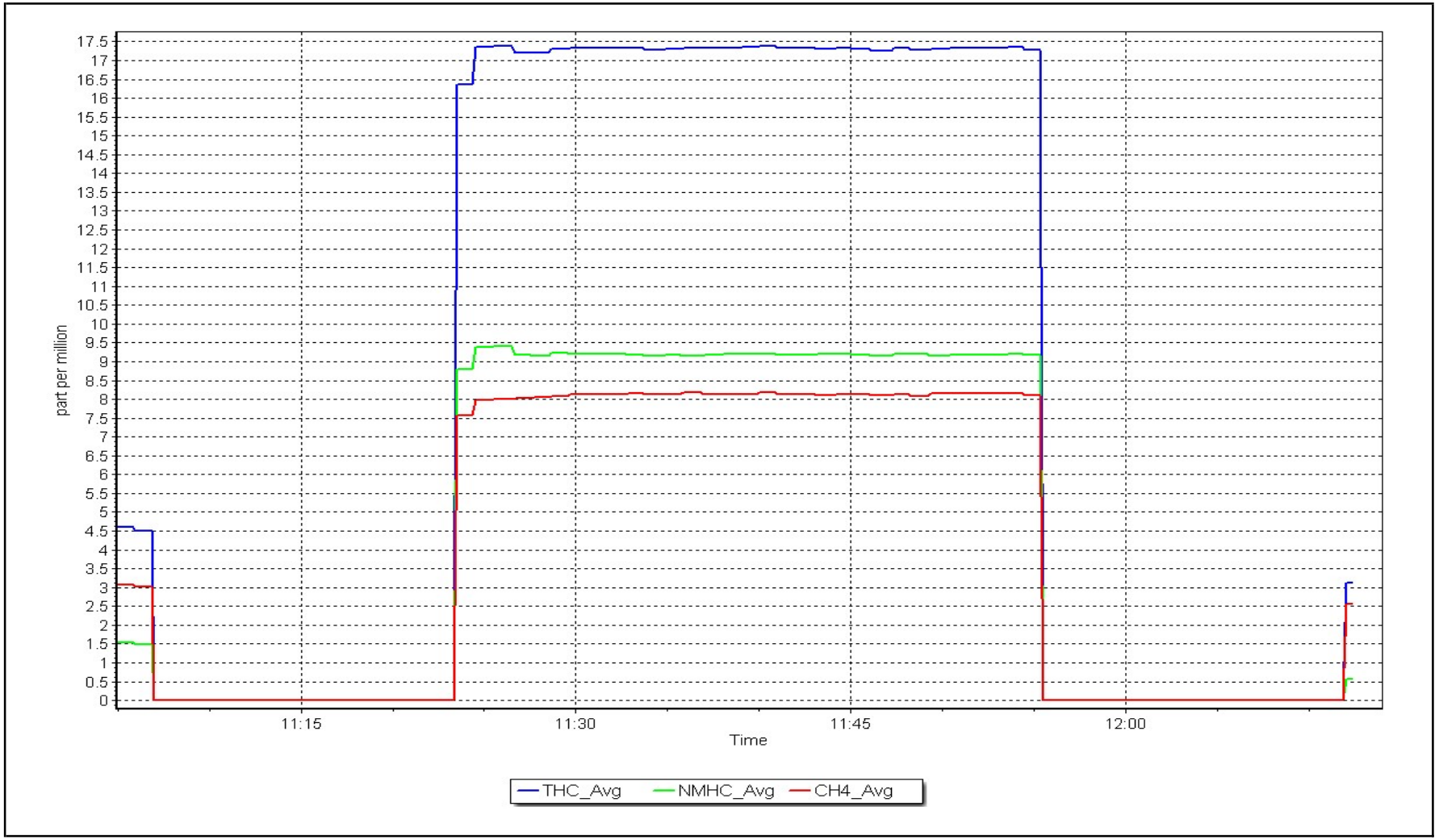
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.005421	1.008027
THC Cal Offset:	-0.016398	0.000000
CH4 Cal Slope:	1.005916	1.014599
CH4 Cal Offset:	-0.032039	0.000000
NMHC Cal Slope:	1.003864	1.002263
NMHC Cal Offset:	0.017642	0.000000

Notes: Nitrogen cylinder changed.

Calibration Performed By: Melissa Lemay

NMHC Calibration Plot Date: September 27, 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:	September 5, 2023	Last Cal Date:	August 1, 2023
Start time (MST):	7:35	End time (MST):	11:56
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:	1.107	1.076	NO bkgnd or offset:	3.4	3.3
NOX coeff or slope:	0.995	0.991	NOX bkgnd or offset:	3.8	3.7
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	163.8	163.8

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999964	0.996239
NO_X Cal Offset:	0.504456	-0.017022
NO Cal Slope:	1.001151	0.998440
NO Cal Offset:	-0.335801	-1.437143
NO_2 Cal Slope:	0.997897	1.016048
NO_2 Cal Offset:	-0.698579	0.951555

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.3	0.1	----	----
as found span	4920	80.5	800.2	800.2	0.0	826.1	821.4	4.7	0.969	0.974
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.2	0.2	----	----
high point	4920	80.5	800.2	800.2	0.0	797.0	797.9	-0.9	1.004	1.003
second point	4960	40.2	399.6	399.6	0.0	398.5	397.5	1.1	1.003	1.005
third point	4980	20.1	199.8	199.8	0.0	198.7	196.4	2.3	1.005	1.017
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.2	0.1	----	----
as left span	4920	80.5	800.2	455.6	344.6	784.3	436.5	347.8	1.020	1.044
								Average Correction Factor	1.004	1.008

Corrected As found	NO_X = 826.3 ppb	NO = 821.7 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	3.1%
Previous Response	NO_X = 800.6 ppb	NO = 800.8 ppb			*Percent Change	NO =	2.5%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	783.7	439.1	344.6	350.5	0.983	101.7%
2nd GPT point (200 ppb O3)	783.7	615.3	168.4	173.1	0.973	102.8%
3rd GPT point (100 ppb O3)	783.7	698.9	84.8	87.4	0.970	103.1%
				Average Correction Factor	0.975	102.5%

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

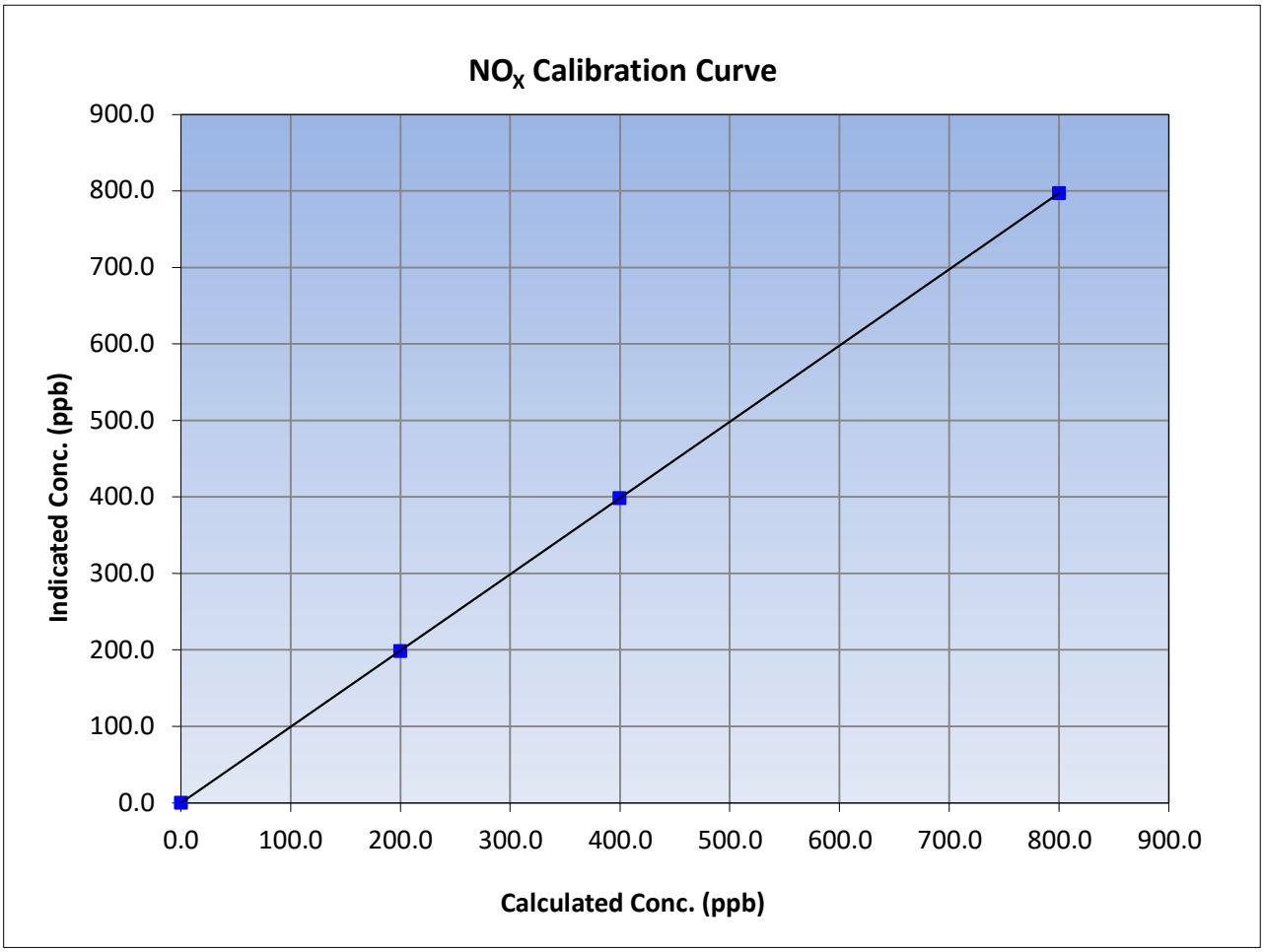
Version-04-2020

Station Information

Calibration Date:	September 5, 2023	Previous Calibration:	August 1, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	7:35	End Time (MST):	11:56
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999999	*≥0.995*
800.2	797.0	1.0040			
399.6	398.5	1.0027	Slope	0.996239	*0.90 - 1.10*
199.8	198.7	1.0055			
			Intercept	-0.017022	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

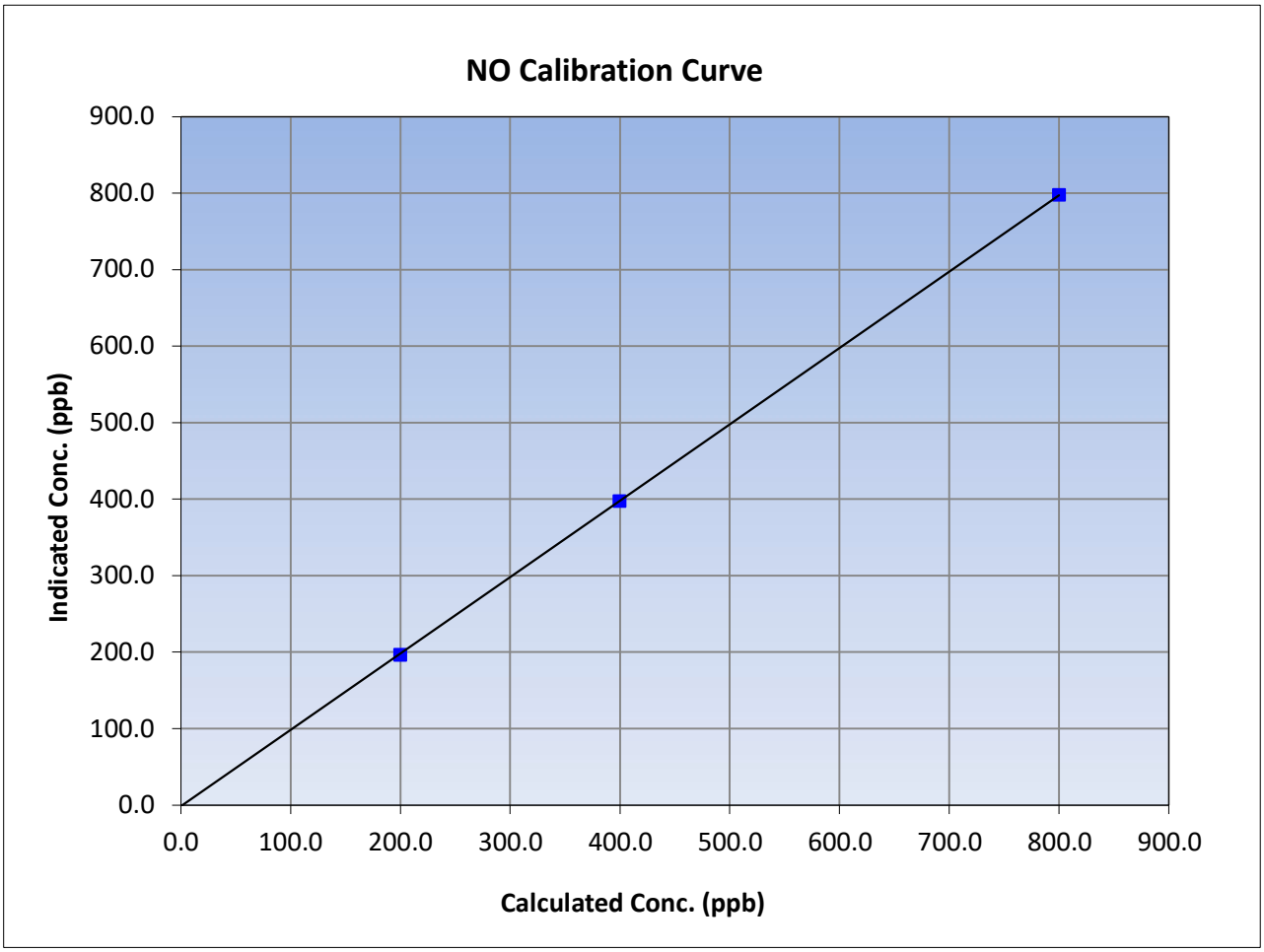
Version-04-2020

Station Information

Calibration Date:	September 5, 2023	Previous Calibration:	August 1, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	7:35	End Time (MST):	11:56
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.2	----	Correlation Coefficient	0.999987	*≥0.995*
800.2	797.9	1.0028			
399.6	397.5	1.0052	Slope	0.998440	*0.90 - 1.10*
199.8	196.4	1.0173			
			Intercept	-1.437143	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

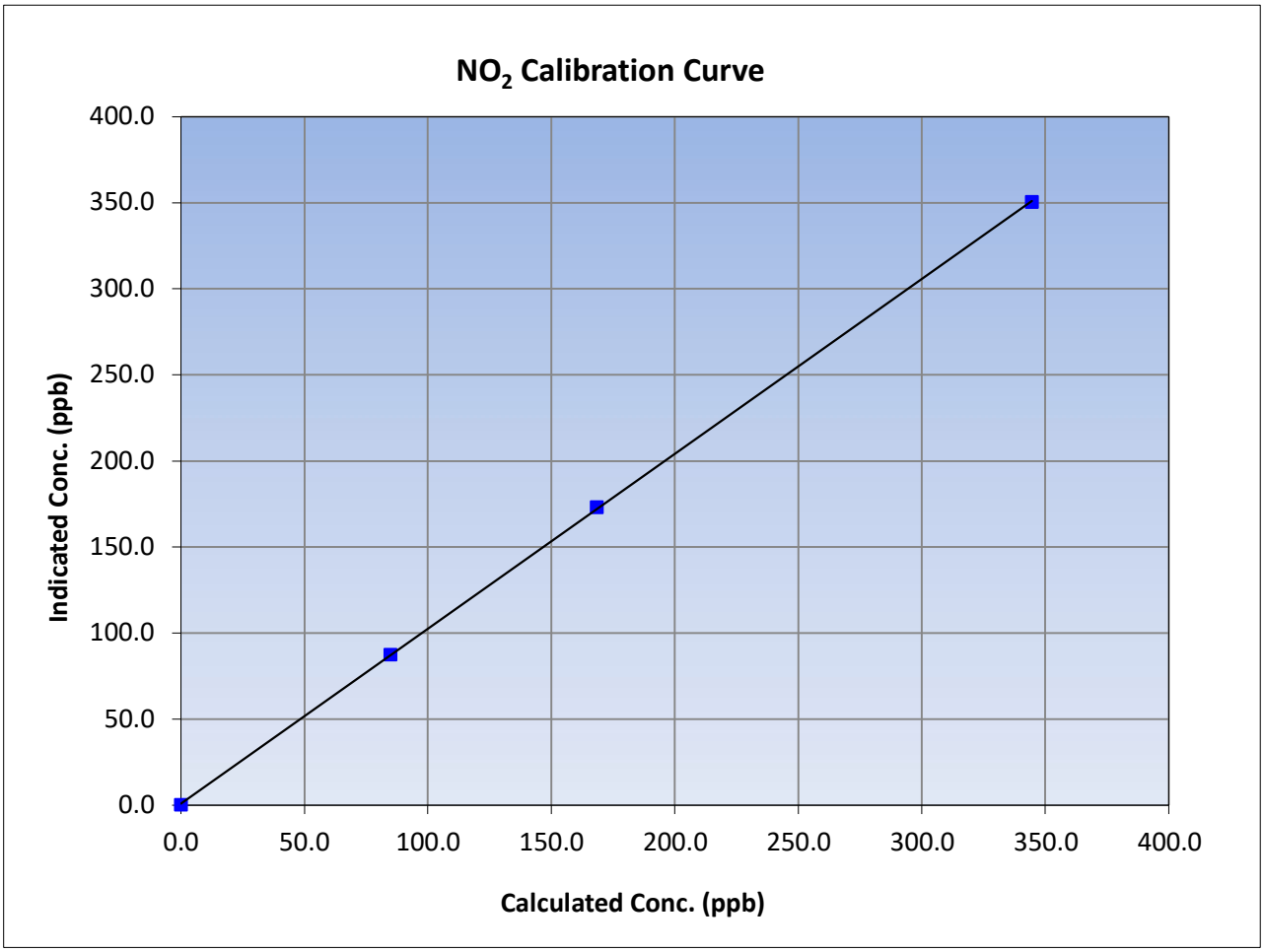
Version-04-2020

Station Information

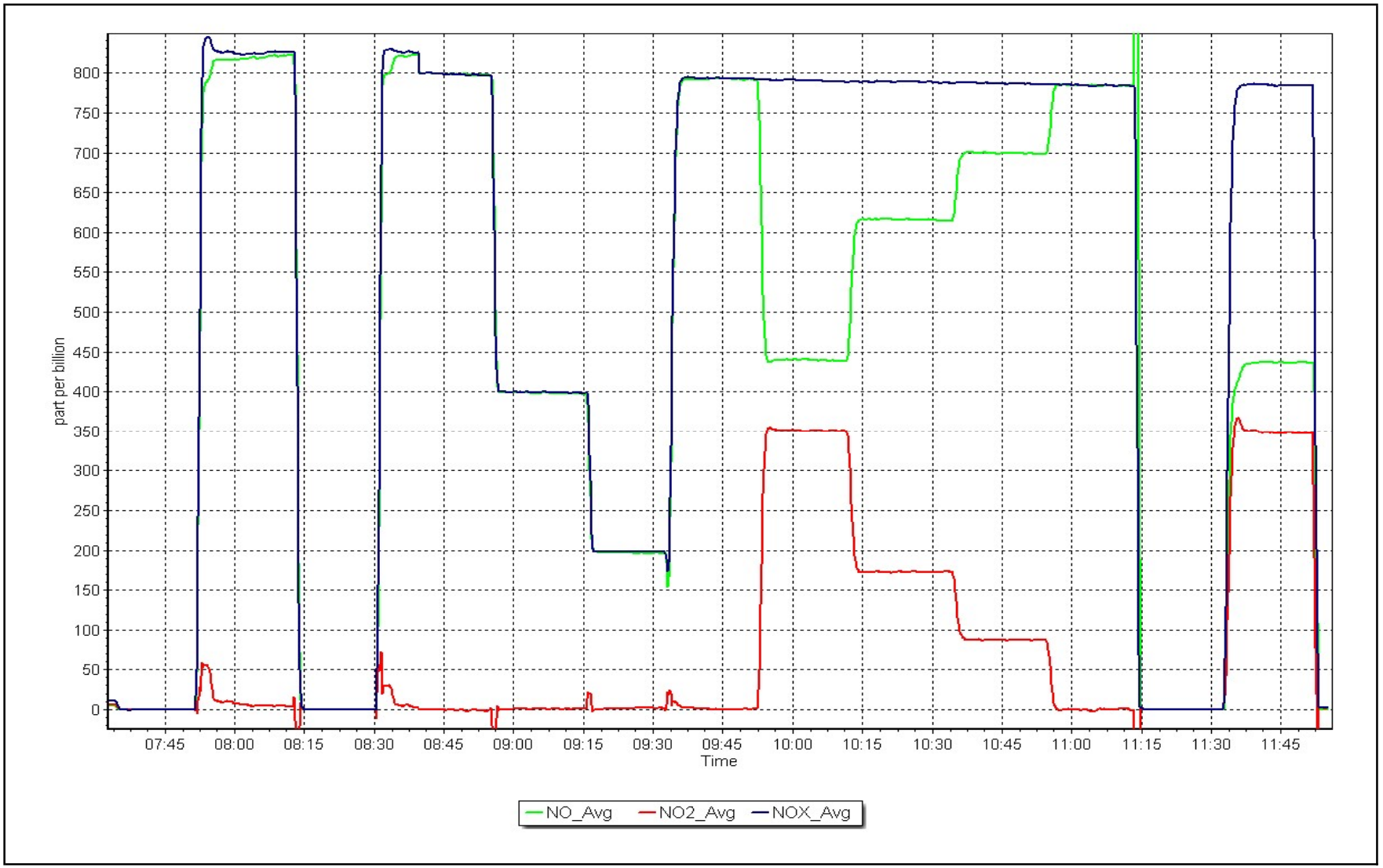
Calibration Date:	September 5, 2023	Previous Calibration:	August 1, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	7:35	End Time (MST):	11:56
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999969	≥0.995
344.6	350.5	0.9832			
168.4	173.1	0.9728	Slope	1.016048	0.90 - 1.10
84.8	87.4	0.9703			
			Intercept	0.951555	+/-20



NO_X Calibration Plot Date: September 5, 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:	September 7, 2023	Last Cal Date:	August 17, 2023
Start time (MST):	6:40	End time (MST):	7:40
Analyzer Make:	API T640	S/N:	1546
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388753
Temp/RH standard:	Alicat FP-25BT	S/N:	388753

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	6.9	6.8	6.9	☐	+/- 2 °C
P (mmHg)	732.9	732.1	732.9	☐	+/- 10 mmHg
flow (LPM)	5.00	5.1	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: September 7, 2023 Last Cal Date: August 17, 2023

PM w/o HEPA: 66.1 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	9	12	10.7	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 65.3 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: September 7, 2023

Disposable Filter Changed: September 7, 2023

Annual Maintenance

Date Sample Tube Cleaned: May 10, 2023

Date RH/T Sensor Cleaned: May 10, 2023

Leak check passed before and after cleaning. PMT adjusted. Head cleaned.

Notes:

Calibration by: Melissa Lemay

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS25
WASKŌW OHCI PIMÂTISIWIN
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Waskow ohci Pimatisiwin	Station number:	AMS25
Calibration Date:	September 28, 2023	Last Cal Date:	August 29, 2023
Start time (MST):	7:25	End time (MST):	10:28
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:	0.997792	0.990940	Backgd or Offset:	9.7	9.7
Calibration intercept:	0.703977	0.604127	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	0.3	----
as found span	4921	79.2	800.5	790.9	1.012
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	800.5	793.8	1.008
second point	4960	39.6	400.3	397.4	1.007
third point	4980	19.8	200.1	199.0	1.006
as left zero	5000	0.0	0.0	0.5	----
as left span	4921	79.2	800.5	794.0	1.008
				Average Correction Factor	1.007

Baseline Corr As found:	790.60	Previous response	799.46	*% change	-1.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

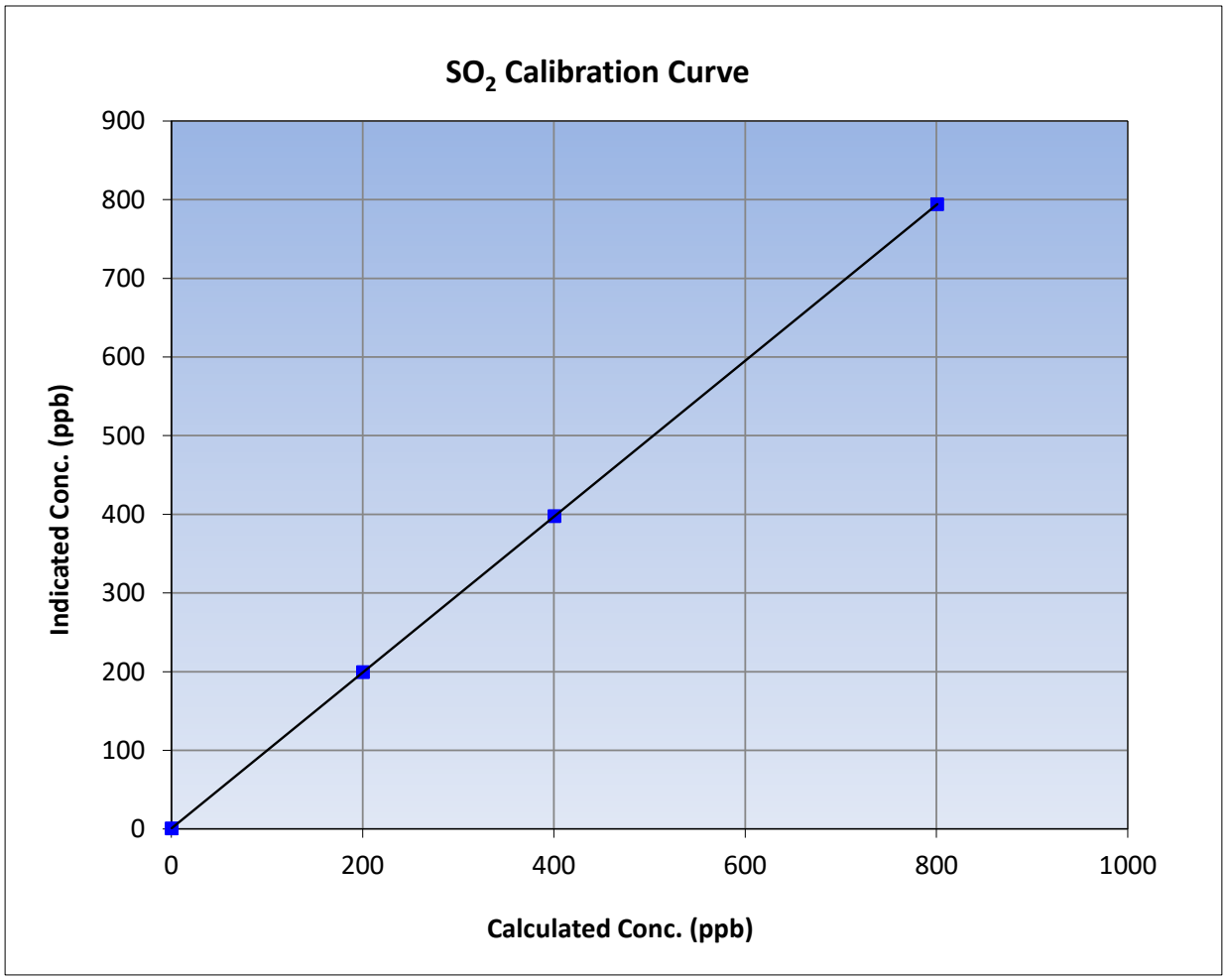
Station Information

Calibration Date:	September 28, 2023	Previous Calibration:	August 29, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	7:25	End Time (MST):	10:28
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148497

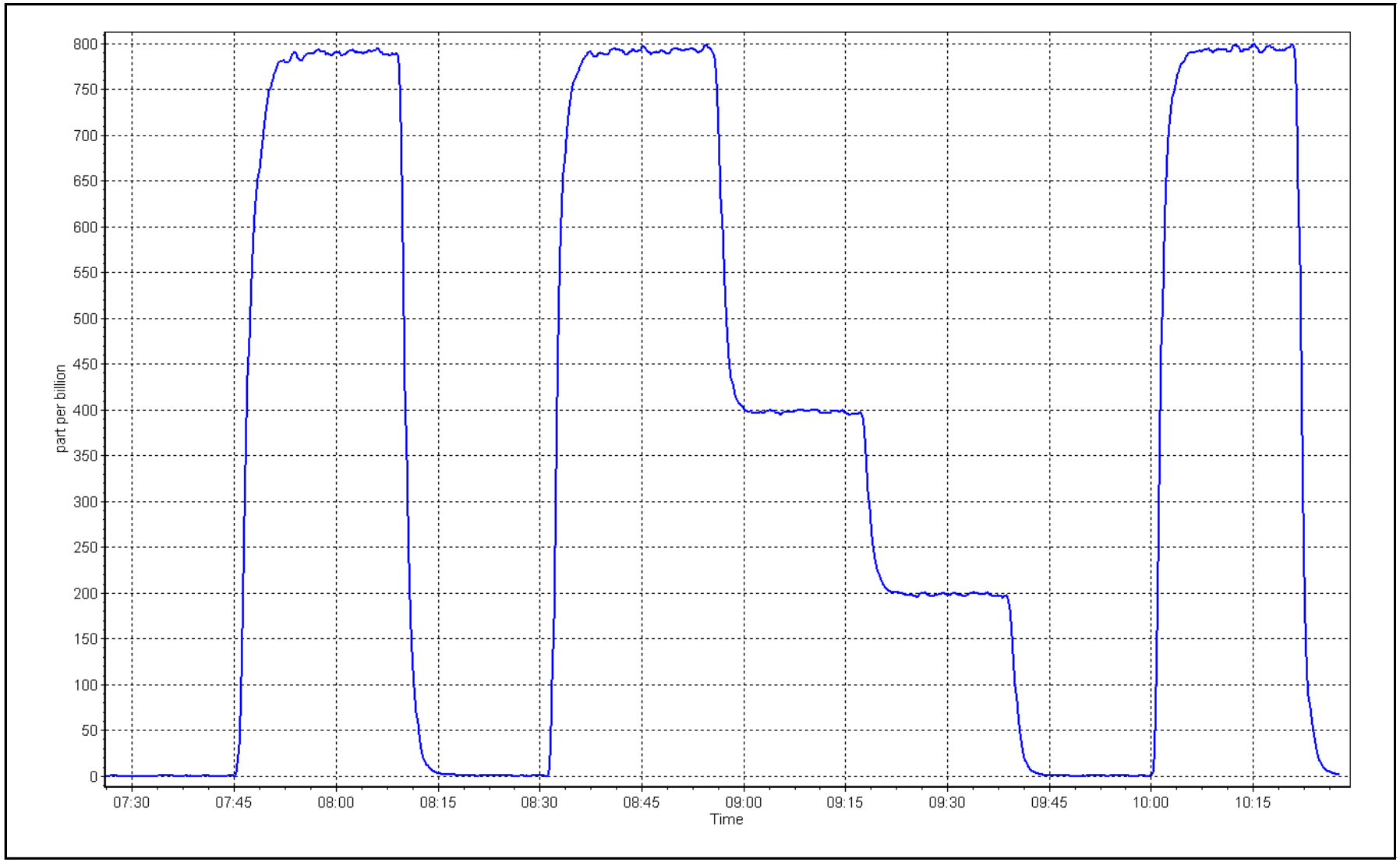
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
800.5	793.8	1.0085
400.3	397.4	1.0073
200.1	199.0	1.0058

Statistical Evaluation		*Limits*
Correlation Coefficient	1.000000	*≥0.995*
Slope	0.990940	*0.90 - 1.10*
Intercept	0.604127	*+/-30*



SO2 Calibration Plot Date: September 28, 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:	September 26, 2023	Last Cal Date:	August 18, 2023
Start time (MST):	6:45	End time (MST):	11:06
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:	0.991600	0.980956	Backgd or Offset:	3.25	3.25
Calibration intercept:	0.080000	0.100000	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	78.6	1.010
as found 2nd point	4960	40.0	39.7	39.6	1.001
as found 3rd point	4980	20.0	19.9	19.7	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	0.0	----
high point	4920	80.0	79.5	78.0	1.019
second point	4960	40.0	39.7	39.1	1.016
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	786.8	1.017
SO2 Scrubber Check	4921	79.2	800.0	-0.1	----
Date of last scrubber change:		20-Jun-23		Ave Corr Factor	1.014
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.7	Prev response:	78.87	*% change:	-0.2%
Baseline Corr 2nd AF pt:	39.7	AF Slope:	0.990449	AF Intercept:	0.020000
Baseline Corr 3rd AF pt:	19.8	AF Correlation:	0.999976		

* = > +/-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

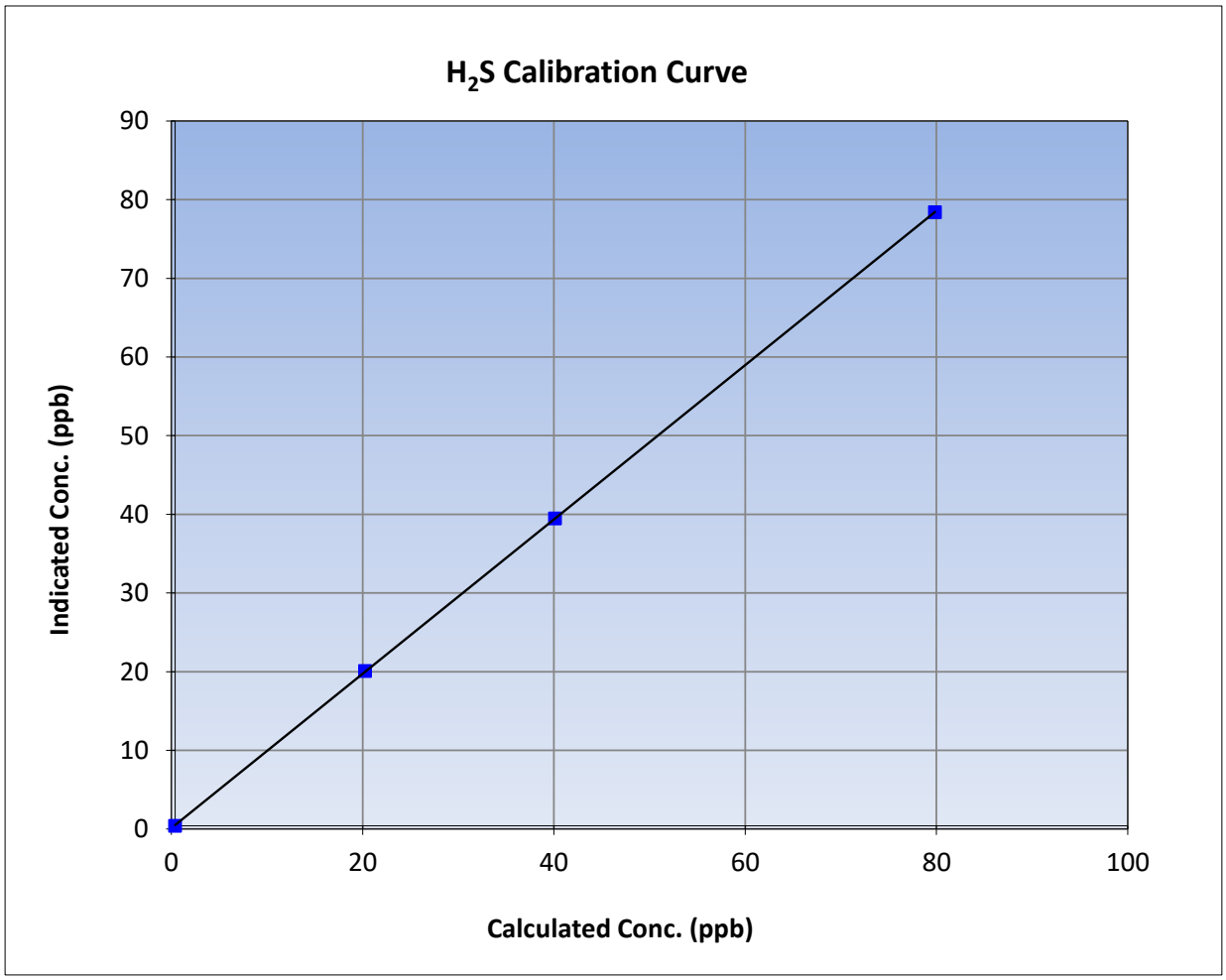
Station Information

Calibration Date:	September 26, 2023	Previous Calibration:	August 18, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	6:45	End Time (MST):	11:06
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1170050146

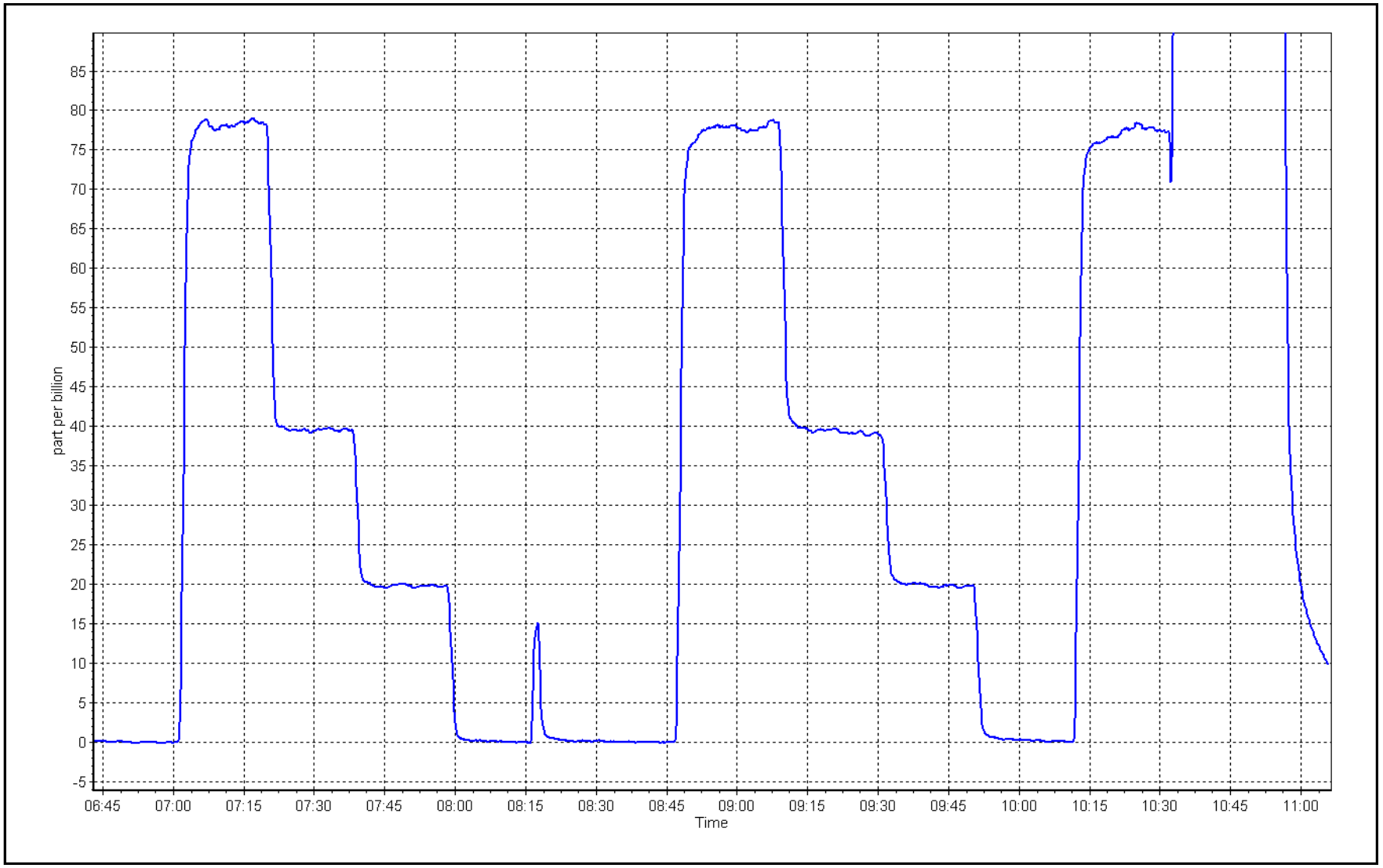
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
79.5	78.0	1.0187
39.7	39.1	1.0161
19.9	19.7	1.0083

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	0.980956	*0.90 - 1.10*
Intercept	0.100000	*+/-3*



H_2S Calibration Plot Date: September 26, 2023 Location: Waskow ohci Pimatisiwin



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS26
CHRISTINA LAKE
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Christina Lake	Station number:	AMS 26
Calibration Date:	September 19, 2023	Last Cal Date:	August 17, 2023
Start time (MST):	14:16	End time (MST):	16:57
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:	1.018405	1.009149	Backgd or Offset:	16.2	16.1
Calibration intercept:	-2.239175	-2.177877	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	0.5	----
as found span	4919	80.6	799.0	804.4	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.8	----
high point	4919	80.6	799.0	805.7	0.992
second point	4960	40.3	399.4	399.1	1.001
third point	4980	20.2	200.2	197.1	1.016
as left zero	5000	0.0	0.0	0.7	----
as left span	4919	80.6	799.0	807.6	0.989
				Average Correction Factor	1.003

Baseline Corr As found:	803.90	Previous response	811.44	*% change	-0.9%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

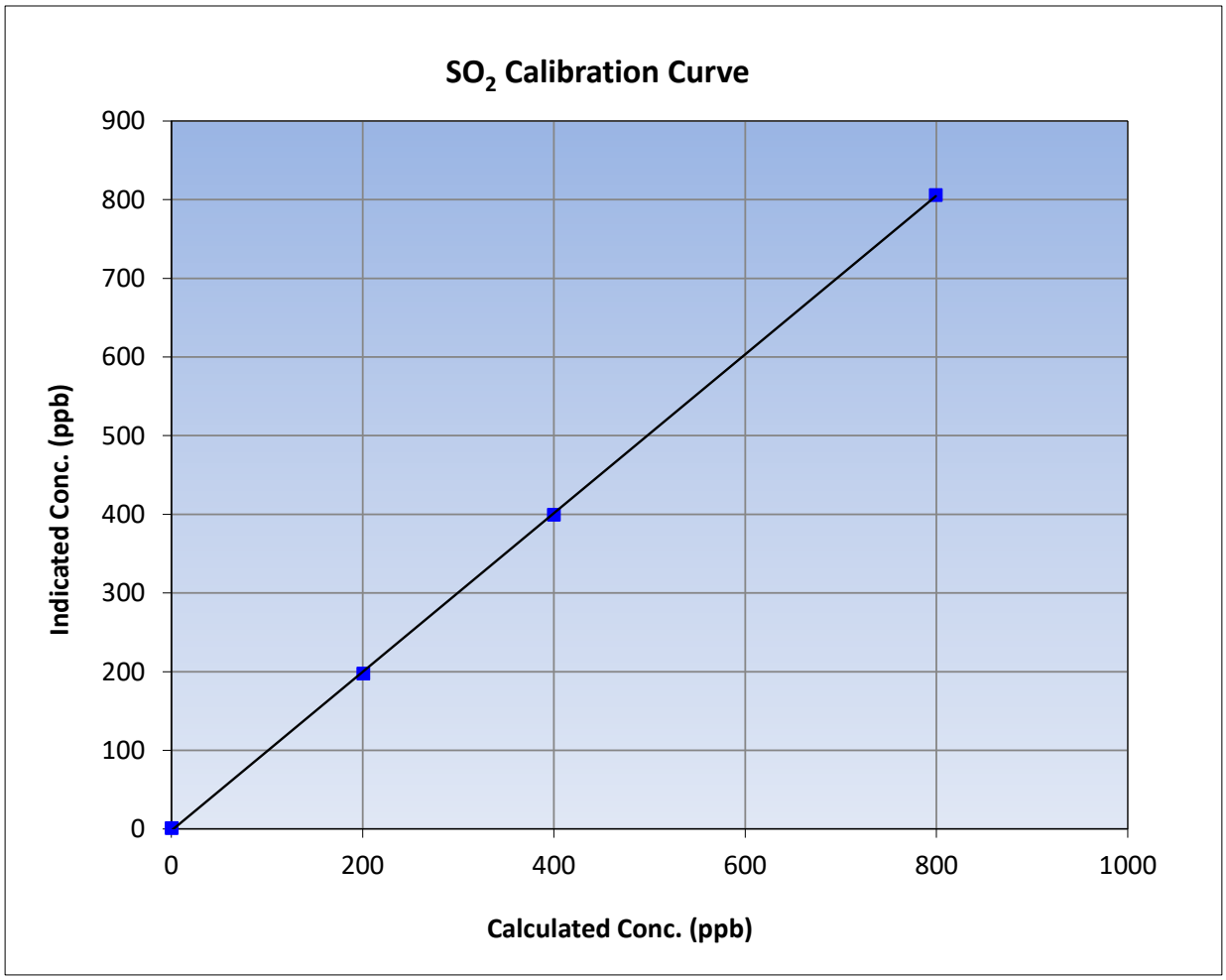
Station Information

Calibration Date:	September 19, 2023	Previous Calibration:	August 17, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	14:16	End Time (MST):	16:57
Analyzer make:	Thermo 43i	Analyzer serial #:	1173410001

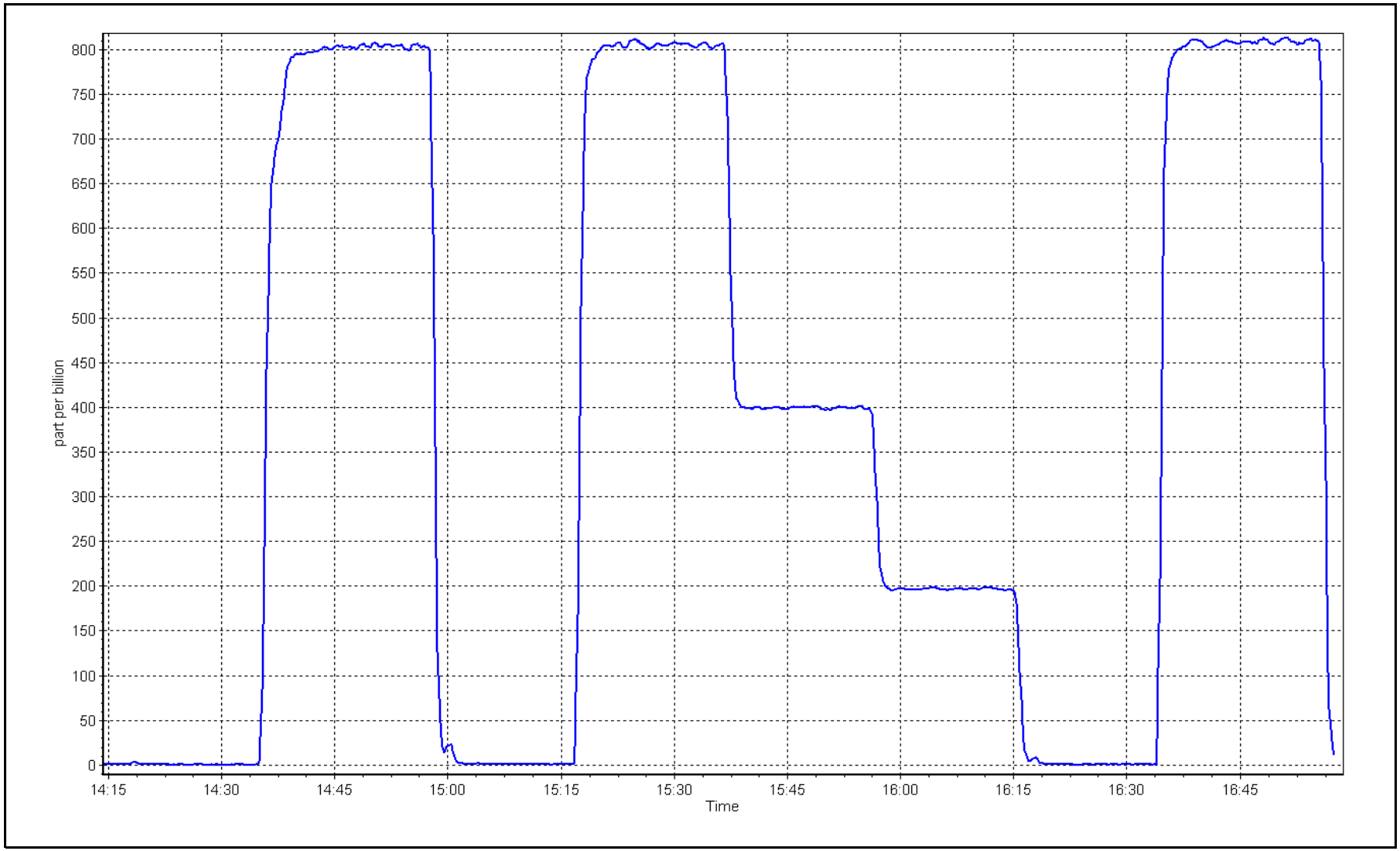
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.8	----
799.0	805.7	0.9916
399.4	399.1	1.0008
200.2	197.1	1.0158

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999937	*≥0.995*
Slope	1.009149	*0.90 - 1.10*
Intercept	-2.177877	*+/-30*



SO2 Calibration Plot Date: September 19, 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:	September 20, 2023	Last Cal Date:	August 17, 2023
Start time (MST):	6:50	End time (MST):	10:51
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:	1.002610	1.010898	Backgd or Offset:	35.4	35.0
Calibration intercept:	0.119119	0.179125	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	79.2	1.014
as found 2nd point	4959	40.9	40.0	39.8	1.013
as found 3rd point	4979	20.4	20.0	19.5	1.039
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.4	----
high point	4918	81.8	80.0	81.1	0.986
second point	4959	40.9	40.0	40.7	0.983
third point	4979	20.4	20.0	20.0	0.998
as left zero	5000	0.0	0.0	0.3	----
as left span	4918	81.8	80.0	80.6	0.993
SO2 Scrubber Check	4919	80.6	806.1	0.0	----
Date of last scrubber change:		27-Feb-19		Ave Corr Factor	0.989
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.9	Prev response:	80.33	*% change:	-1.8%
Baseline Corr 2nd AF pt:	39.5	AF Slope:	0.988332	AF Intercept:	0.118700
Baseline Corr 3rd AF pt:	19.2	AF Correlation:	0.999950		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after MAF's. Ran scrubber check after calibrator zero. No adjustments made.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

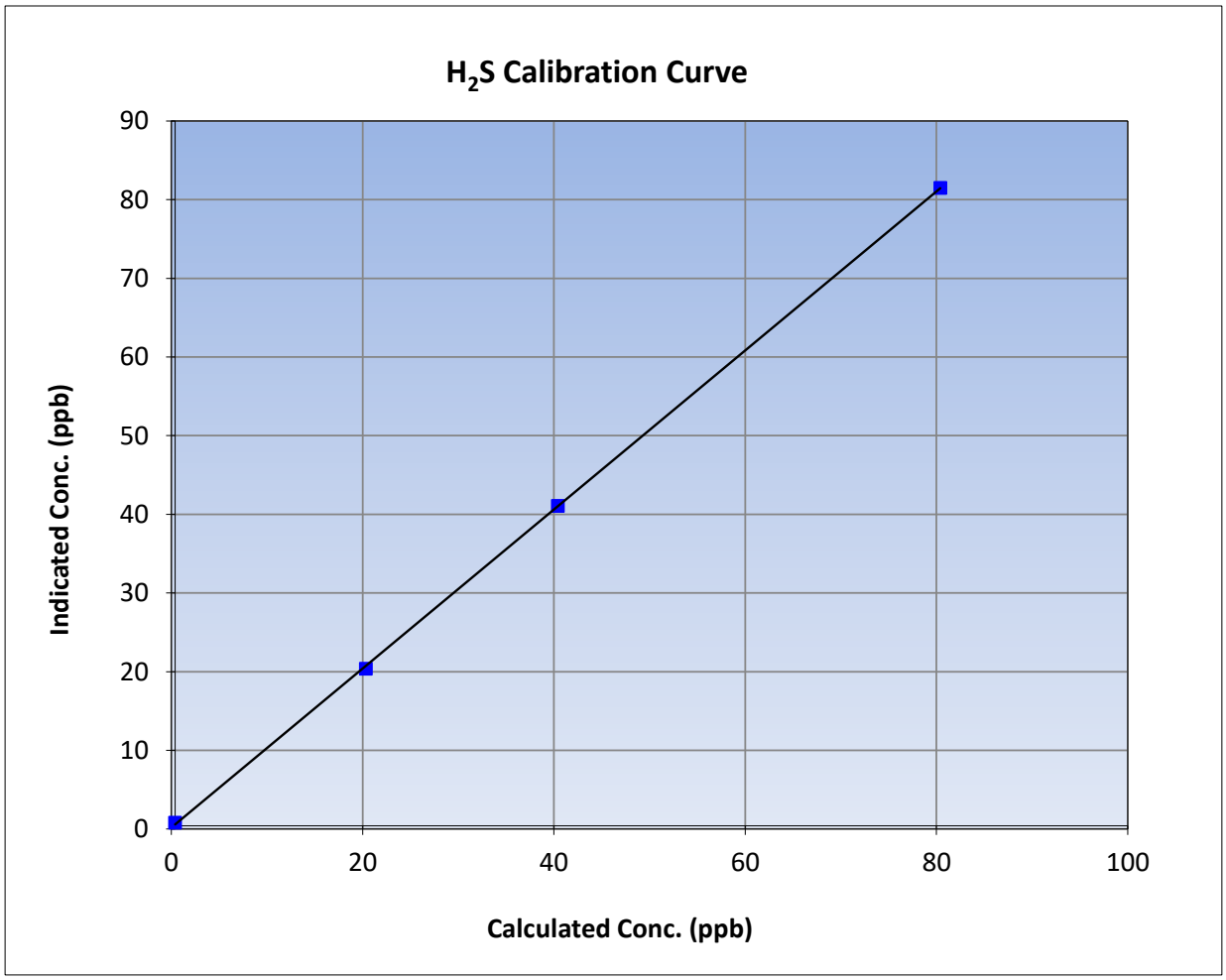
Station Information

Calibration Date:	September 20, 2023	Previous Calibration:	August 17, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	6:50	End Time (MST):	10:51
Analyzer make:	Thermo 450i	Analyzer serial #:	1180030032

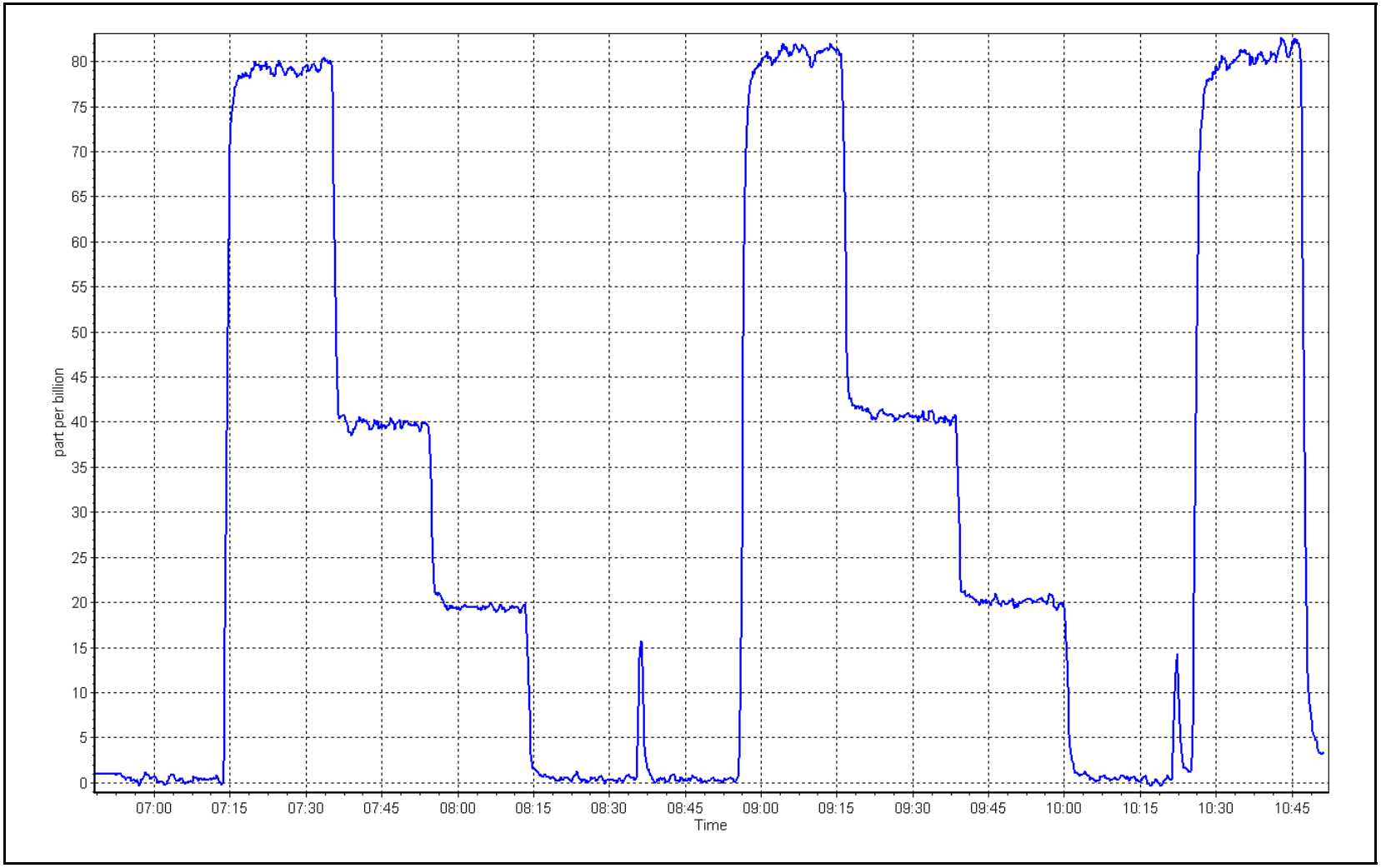
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
80.0	81.1	0.9865
40.0	40.7	0.9828
20.0	20.0	0.9977

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999950	*≥0.995*
Slope	1.010898	*0.90 - 1.10*
Intercept	0.179125	*+/-3*



H_2S Calibration Plot Date: September 20, 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:	September 19, 2023	Last Cal Date:	August 17, 2023
Start time (MST):	10:35	End time (MST):	17:46
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2Y1P4C		Cal Gas Expiry Date:	November 12, 2023	
NOX Cal Gas Conc:	50.82	ppm	NO Cal Gas Conc:	50.02	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	50.82	ppm	Removed Gas NO Conc:	50.02	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	2447	
ZAG make/model:	API T701H		Serial Number:	832	

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.370	1.370	NO bkgnd or offset:	2.6	2.6
NOX coeff or slope:	0.991	0.991	NOX bkgnd or offset:	3.4	3.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	160.7	161.0

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.996528	1.000604
NO_X Cal Offset:	-1.780000	-2.180000
NO Cal Slope:	1.001328	1.004213
NO Cal Offset:	-2.380000	-2.740000
NO_2 Cal Slope:	0.995894	0.995671
NO_2 Cal Offset:	-1.805192	-0.892478

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.7	-0.2	-0.6	----	----
as found span	4920	80.0	813.1	800.3	12.8	812.6	801.6	11.1	1.0006	0.9984
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.5	0.0	-0.5	----	----
high point	4920	80.0	813.1	800.3	12.8	812.2	802.2	9.8	1.0011	0.9977
second point	4960	40.0	406.6	400.2	6.4	404.0	398.1	5.9	1.0063	1.0052
third point	4980	20.0	203.3	200.1	3.2	199.4	195.2	4.2	1.0195	1.0250
as left zero	5000	0.0	0.0	0.0	0.0	-0.7	-0.1	-0.6	----	----
as left span	4920	80.0	813.1	394.8	418.3	811.7	395.4	416.2	1.0017	0.9985
								Average Correction Factor	1.0090	1.0093

Corrected As found	NO_X = 813.3 ppb	NO = 801.8 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	0.6%
Previous Response	NO_X = 808.5 ppb	NO = 799.0 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)	799.2	393.7	418.3	415.9	1.0058	99.4%
2nd GPT point (200 ppb O3)	799.2	595.5	216.5	214.2	1.0107	98.9%
3rd GPT point (100 ppb O3)	799.2	700.7	111.3	109.7	1.0146	98.6%
				Average Correction Factor	1.0104	99.0%

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

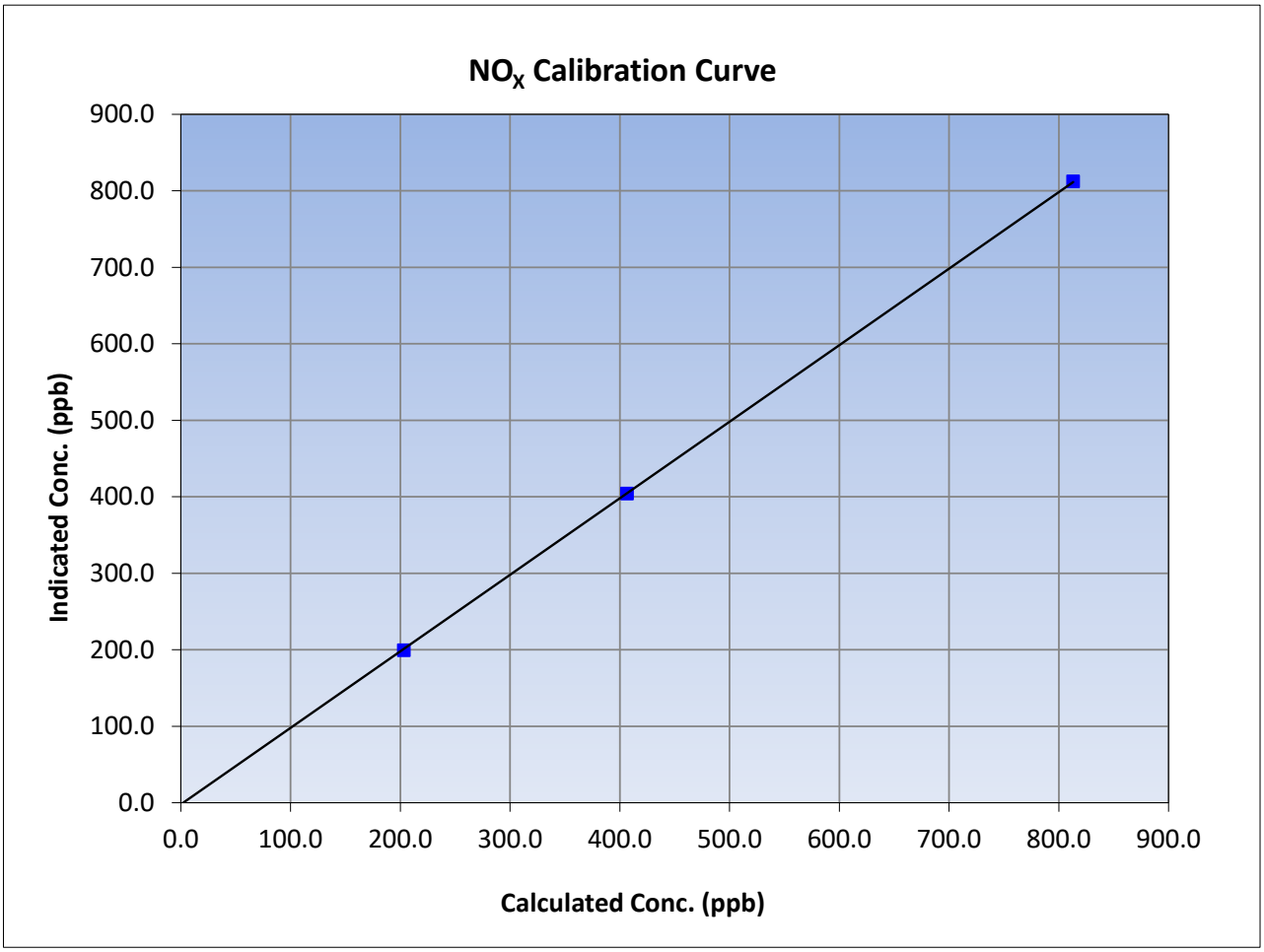
Version-04-2020

Station Information

Calibration Date:	September 19, 2023	Previous Calibration:	August 17, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	10:35	End Time (MST):	17:46
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	-0.5	----	Correlation Coefficient	0.999980	*≥0.995*
813.1	812.2	1.0011			
406.6	404.0	1.0063	Slope	1.000604	*0.90 - 1.10*
203.3	199.4	1.0195			
			Intercept	-2.180000	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

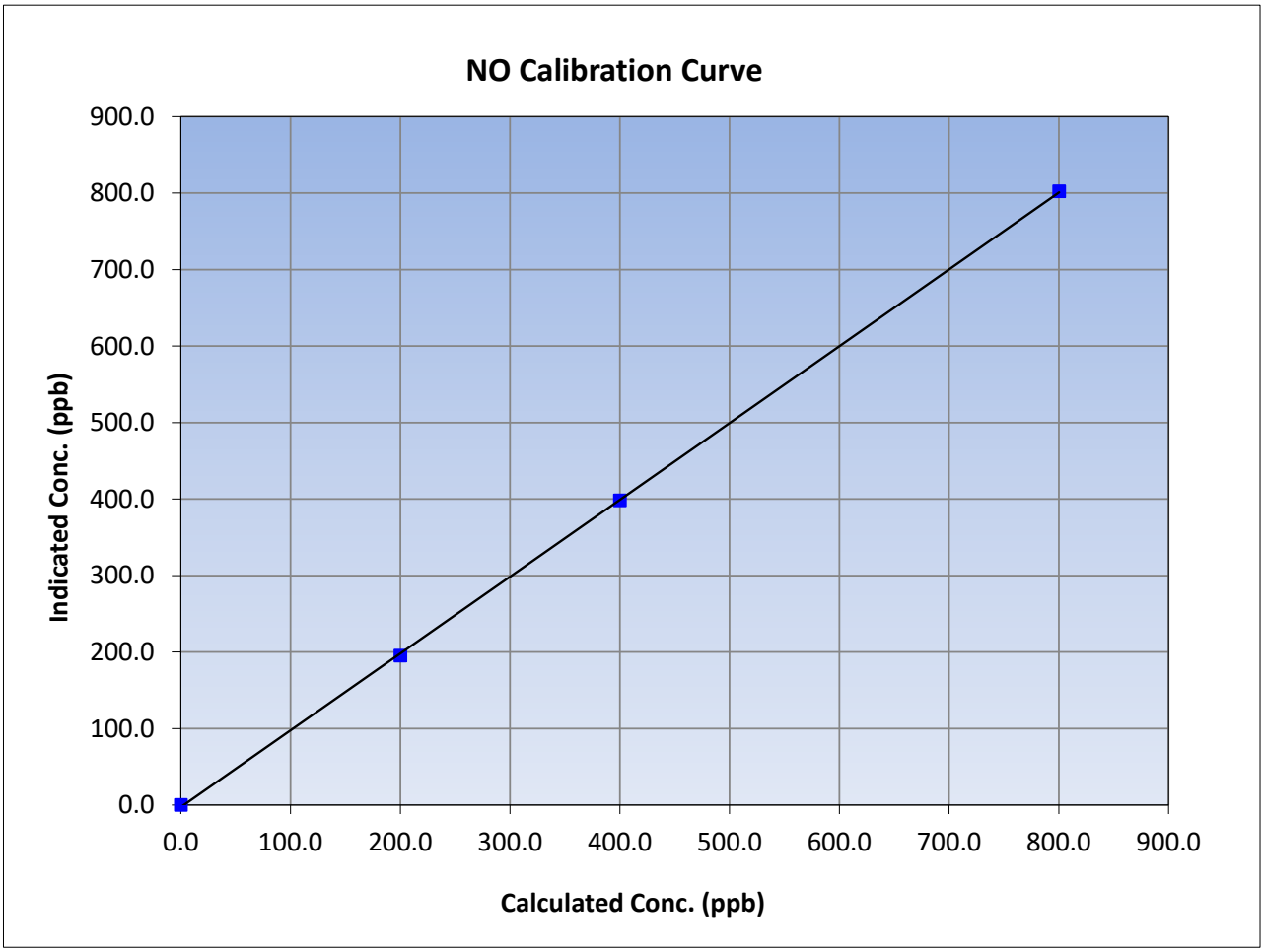
Version-04-2020

Station Information

Calibration Date:	September 19, 2023	Previous Calibration:	August 17, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	10:35	End Time (MST):	17:46
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	0.999946	≥0.995
800.3	802.2	0.9977			
400.2	398.1	1.0052	Slope	1.004213	0.90 - 1.10
200.1	195.2	1.0250			
			Intercept	-2.740000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

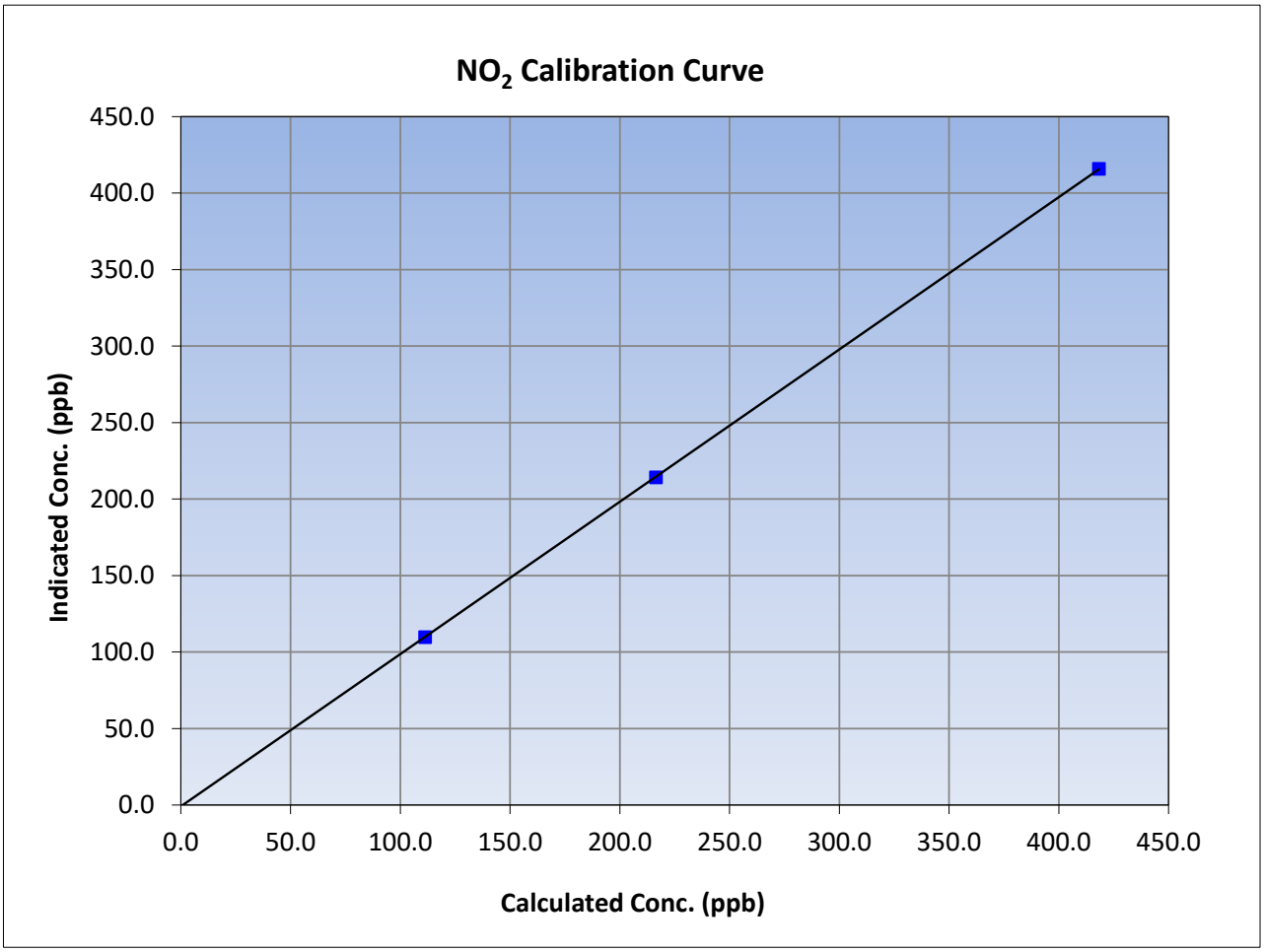
Version-04-2020

Station Information

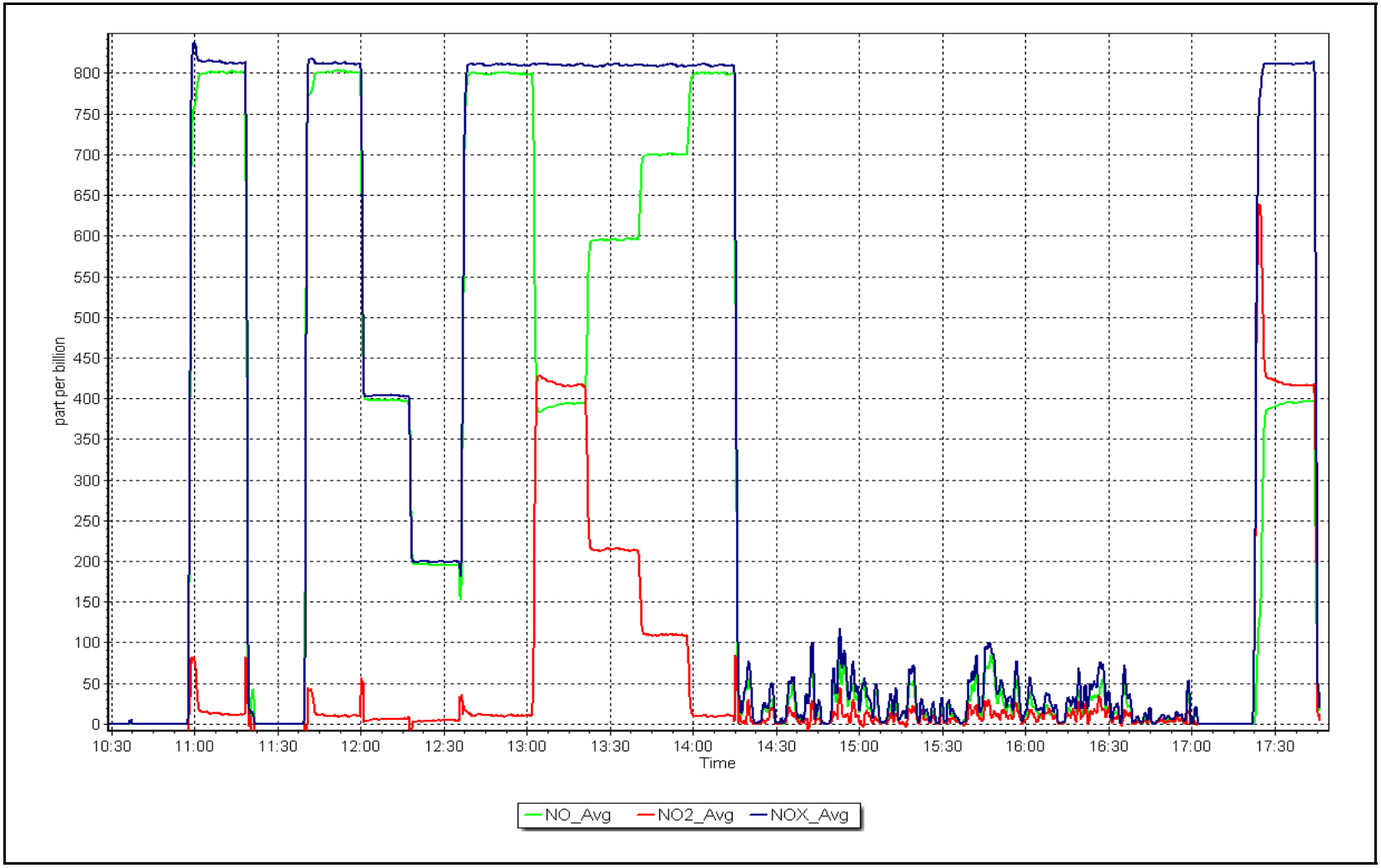
Calibration Date:	September 19, 2023	Previous Calibration:	August 17, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	10:35	End Time (MST):	17:46
Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.5	----	Correlation Coefficient	0.999995	*≥0.995*
418.3	415.9	1.0058			
216.5	214.2	1.0107	Slope	0.995671	*0.90 - 1.10*
111.3	109.7	1.0146			
			Intercept	-0.892478	*+/-20*



NO_X Calibration Plot Date: September 19, 2023 Location: Christina Lake



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS27
JACKFISH 2/3
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Jackfish 2/3	Station number:	AMS 27
Calibration Date:	September 28, 2023	Last Cal Date:	August 23, 2023
Start time (MST):	7:58	End time (MST):	10:48
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: Thermo 43iQ — Analyzer serial #: 12124313138

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000975	0.990232	Backgd or Offset:	7.2	7.2
Calibration intercept:	-1.618030	-2.057655	Coeff or Slope:	0.891	0.891

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	----
as found span	4921	79.1	800.2	789.4	1.014
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	791.0	1.012
second point	4961	39.5	399.5	393.6	1.015
third point	4980	19.8	200.3	193.4	1.036
as left zero	5000	0.0	0.0	0.3	----
as left span	4921	79.1	800.2	792.8	1.009
				Average Correction Factor	1.021

Baseline Corr As found:	789.40	Previous response	799.32	*% 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 the sample inlet filter after as founds. No adjustments required.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

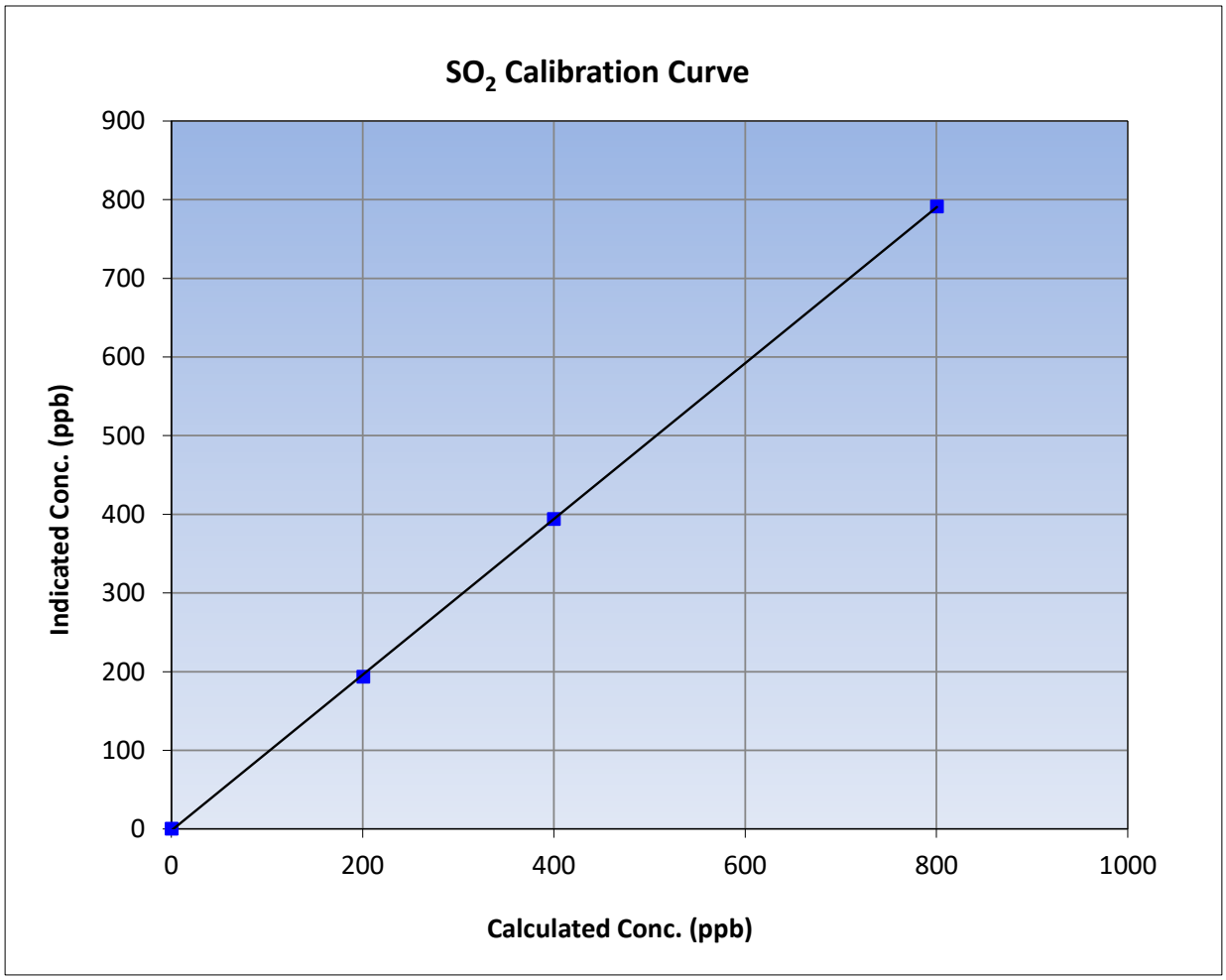
Station Information

Calibration Date:	September 28, 2023	Previous Calibration:	August 23, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS 27
Start Time (MST):	7:58	End Time (MST):	10:48
Analyzer make:	Thermo 43iQ	Analyzer serial #:	12124313138

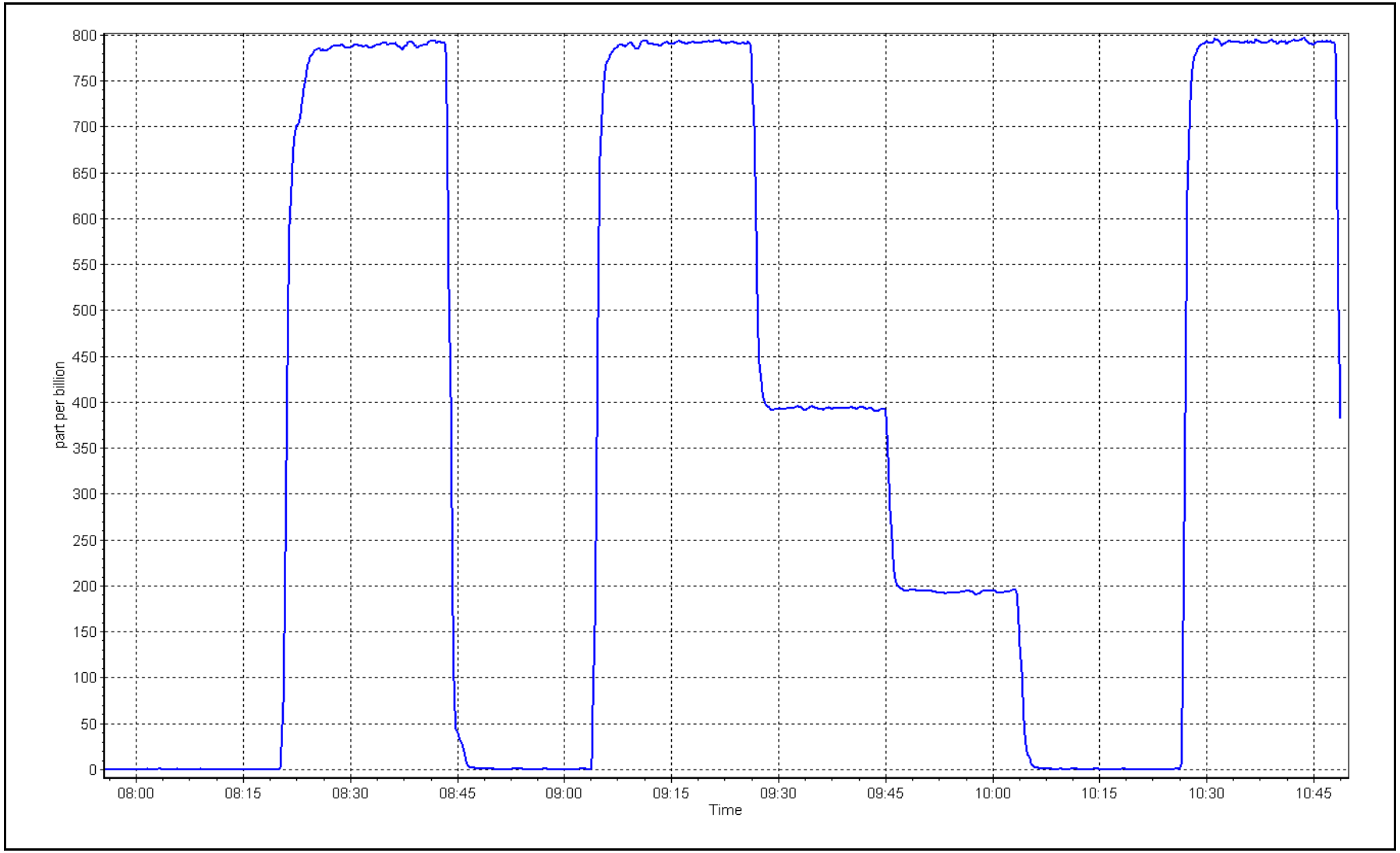
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
800.2	791.0	1.0116
399.5	393.6	1.0151
200.3	193.4	1.0357

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999961	*≥0.995*
Slope	0.990232	*0.90 - 1.10*
Intercept	-2.057655	*+/-30*



SO2 Calibration Plot Date: September 28, 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:	September 27, 2023	Last Cal Date:	August 2, 2023
Start time (MST):	12:02	End time (MST):	16:13
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:	1.006901	1.002337	Backgd or Offset:	28.3	29.9
Calibration intercept:	-0.097803	-0.137809	Coeff or Slope:	0.944	0.928

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	0.7	----
as found span	4926	74.1	80.2	83.8	0.965
as found 2nd point	4963	37.0	40.0	41.9	0.972
as found 3rd point	4982	18.5	20.0	20.7	1.001
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4926	74.1	80.2	80.2	1.000
second point	4963	37.0	40.0	40.2	0.996
third point	4982	18.5	20.0	19.6	1.021
as left zero	5000	0.0	0.0	0.3	----
as left span	4926	74.1	80.2	79.6	1.007
SO2 Scrubber Check	4921	79.1	791.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.006
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	83.1	Prev response:	80.63	*% change:	3.0%
Baseline Corr 2nd AF pt:	41.2	AF Slope:	1.039259	AF Intercept:	0.342836
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999909		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

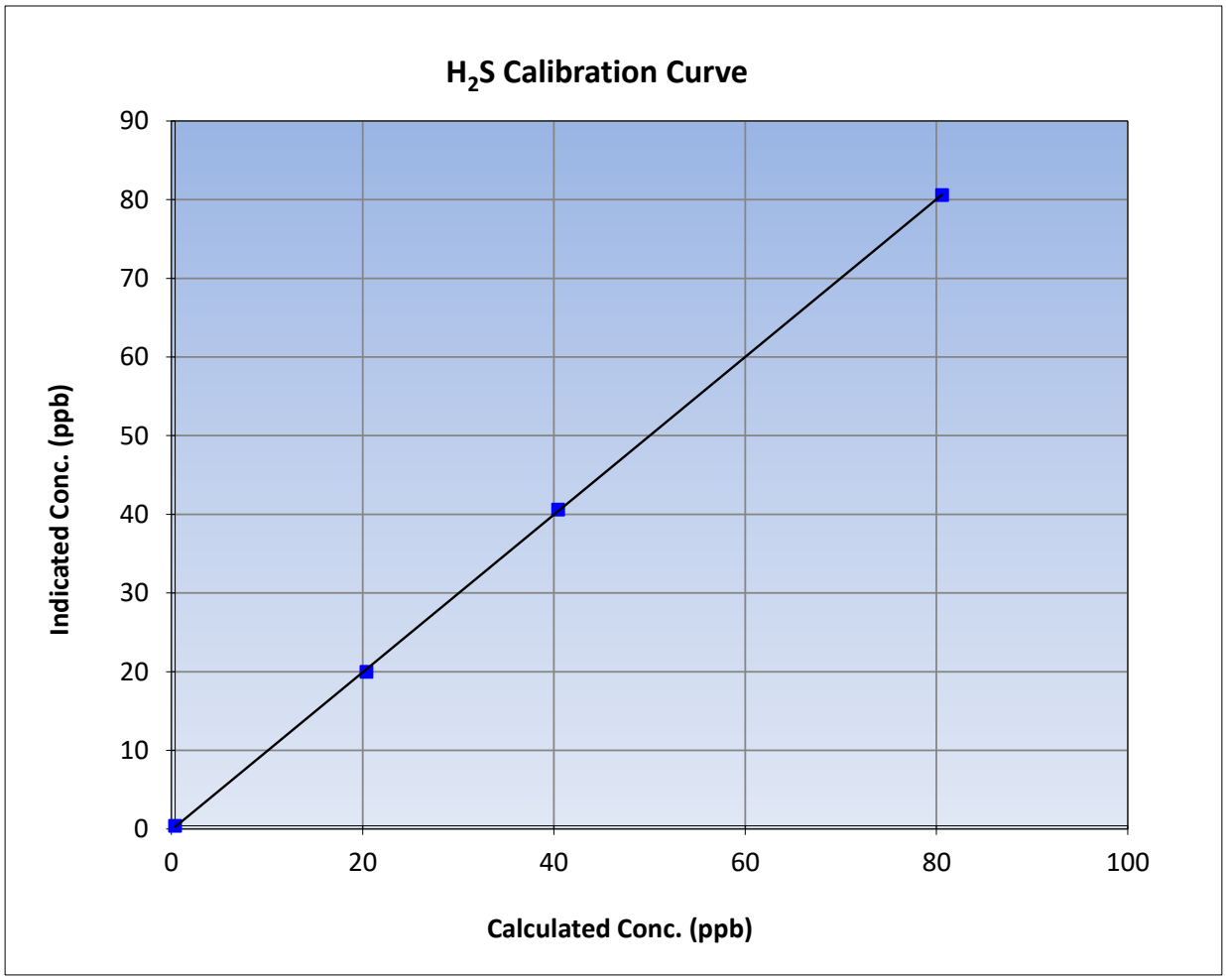
Station Information

Calibration Date:	September 27, 2023	Previous Calibration:	August 2, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	12:02	End Time (MST):	16:13
Analyzer make:	API T101	Analyzer serial #:	621

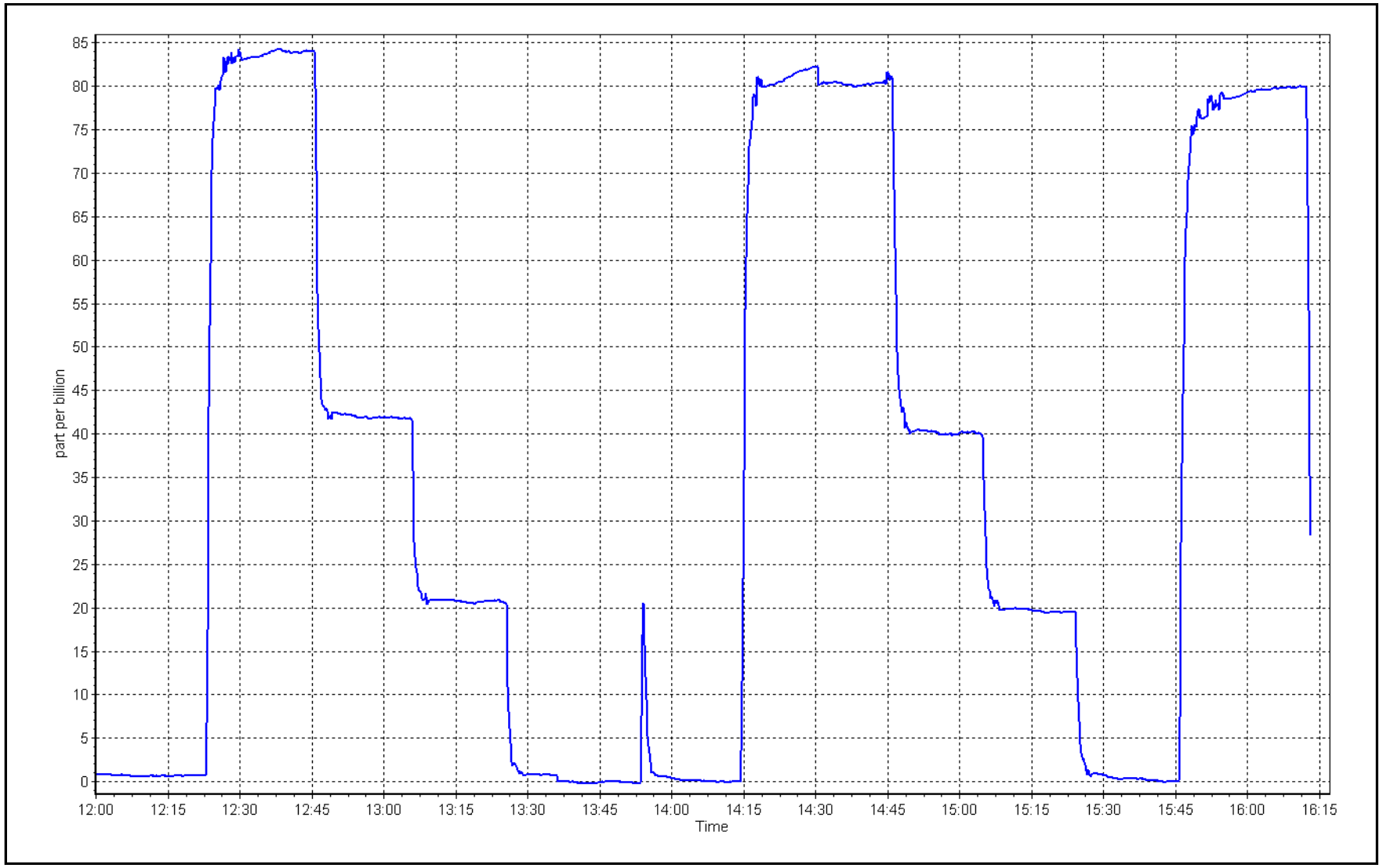
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.2	80.2	0.9997
40.0	40.2	0.9959
20.0	19.6	1.0212

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999952	*≥0.995*
Slope	1.002337	*0.90 - 1.10*
Intercept	-0.137809	*+/-3*



H_2S Calibration Plot Date: September 27, 2023 Location: Jackfish 2/3



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Jackfish 2/3	Station number:	AMS27
Calibration Date:	September 28, 2023	Last Cal Date:	August 8, 2023
Start time (MST):	10:49	End time (MST):	15:19
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:	1.109	1.123	NO bkgnd or offset:	0.3	0.3
NOX coeff or slope:	1.087	1.110	NOX bkgnd or offset:	1.2	1.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	5.6	7.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000358	0.997982
NO_X Cal Offset:	-1.195601	-1.996793
NO Cal Slope:	1.010851	1.003585
NO Cal Offset:	-1.717915	-2.899642
NO_2 Cal Slope:	0.972010	0.994749
NO_2 Cal Offset:	0.660630	-0.945227

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	-0.9	0.7	----	----
as found span	4921	79.4	816.8	800.3	16.5	796.1	786.3	9.8	1.0260	1.0178
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
high point	4921	79.4	816.8	800.3	16.5	814.2	801.9	12.3	1.0032	0.9980
second point	4960	39.7	408.5	400.2	8.3	404.6	396.7	7.8	1.0095	1.0088
third point	4980	19.8	203.7	199.6	4.1	199.2	194.9	4.3	1.0226	1.0241
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.6	-0.6	----	----
as left span	4921	79.4	816.8	420.5	399.2	812.4	416.0	396.3	1.0054	1.0108
								Average Correction Factor	1.0118	1.0103

Corrected As found	NO_X = 796.3 ppb	NO = 787.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-2.5%
Previous Response	NO_X = 815.9 ppb	NO = 807.3 ppb		*Percent Change	NO =	-2.5%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	798.4	415.7	399.2	396.1	1.0079	99.2%
2nd GPT point (200 ppb O3)	798.4	618.9	196.0	195.4	1.0031	99.7%
3rd GPT point (100 ppb O3)	798.4	713.0	101.9	98.1	1.0389	96.3%
				Average Correction Factor	1.0166	98.4%

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

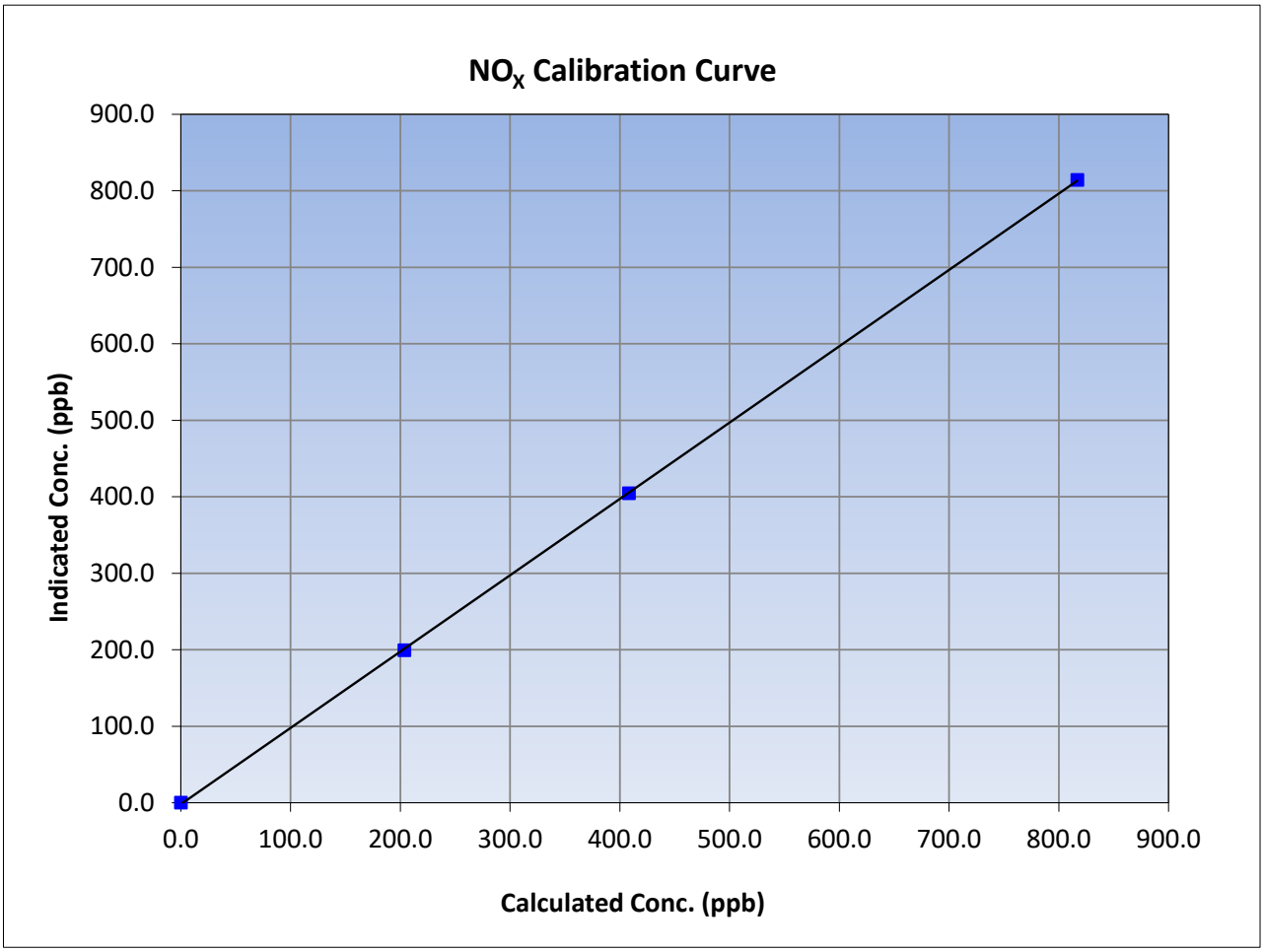
Version-04-2020

Station Information

Calibration Date:	September 28, 2023	Previous Calibration:	August 8, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	10:49	End Time (MST):	15:19
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	0.999970	≥0.995
816.8	814.2	1.0032			
408.5	404.6	1.0095	Slope	0.997982	0.90 - 1.10
203.7	199.2	1.0226			
			Intercept	-1.996793	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

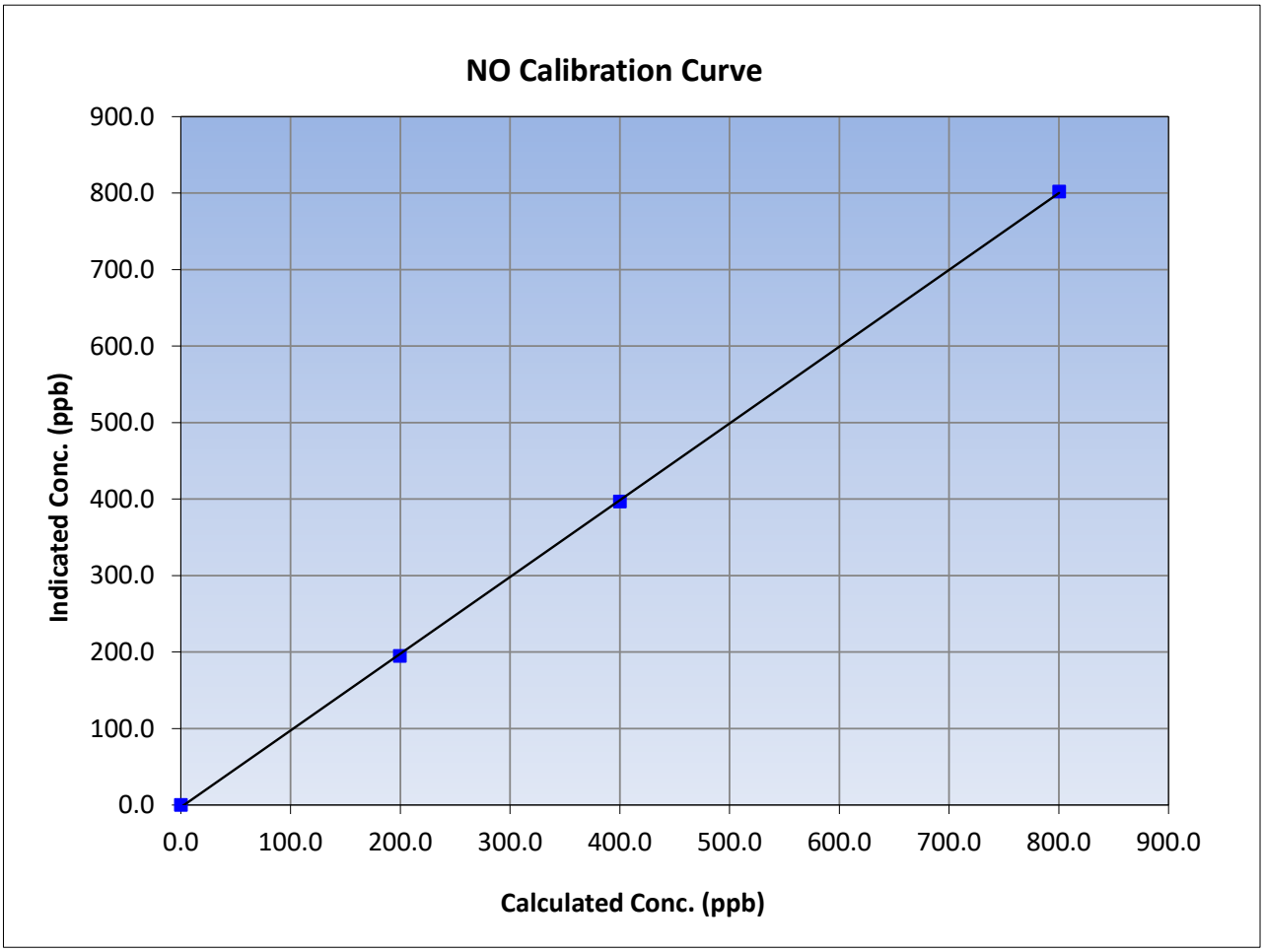
Version-04-2020

Station Information

Calibration Date:	September 28, 2023	Previous Calibration:	August 8, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	10:49	End Time (MST):	15:19
Analyzer make:	API T200	Analyzer serial #:	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999939	≥0.995
800.3	801.9	0.9980			
400.2	396.7	1.0088	Slope	1.003585	0.90 - 1.10
199.6	194.9	1.0241			
			Intercept	-2.899642	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

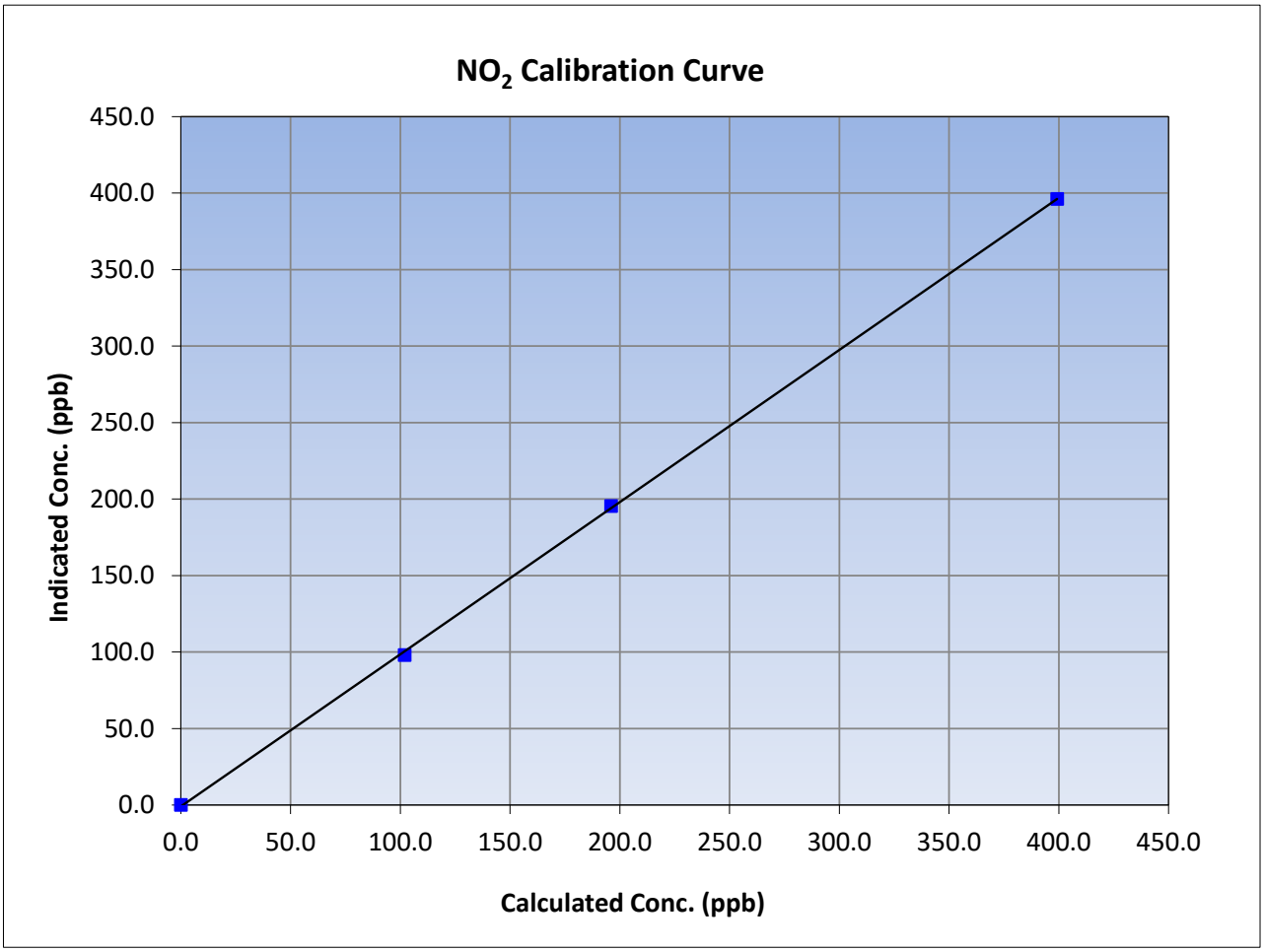
Version-04-2020

Station Information

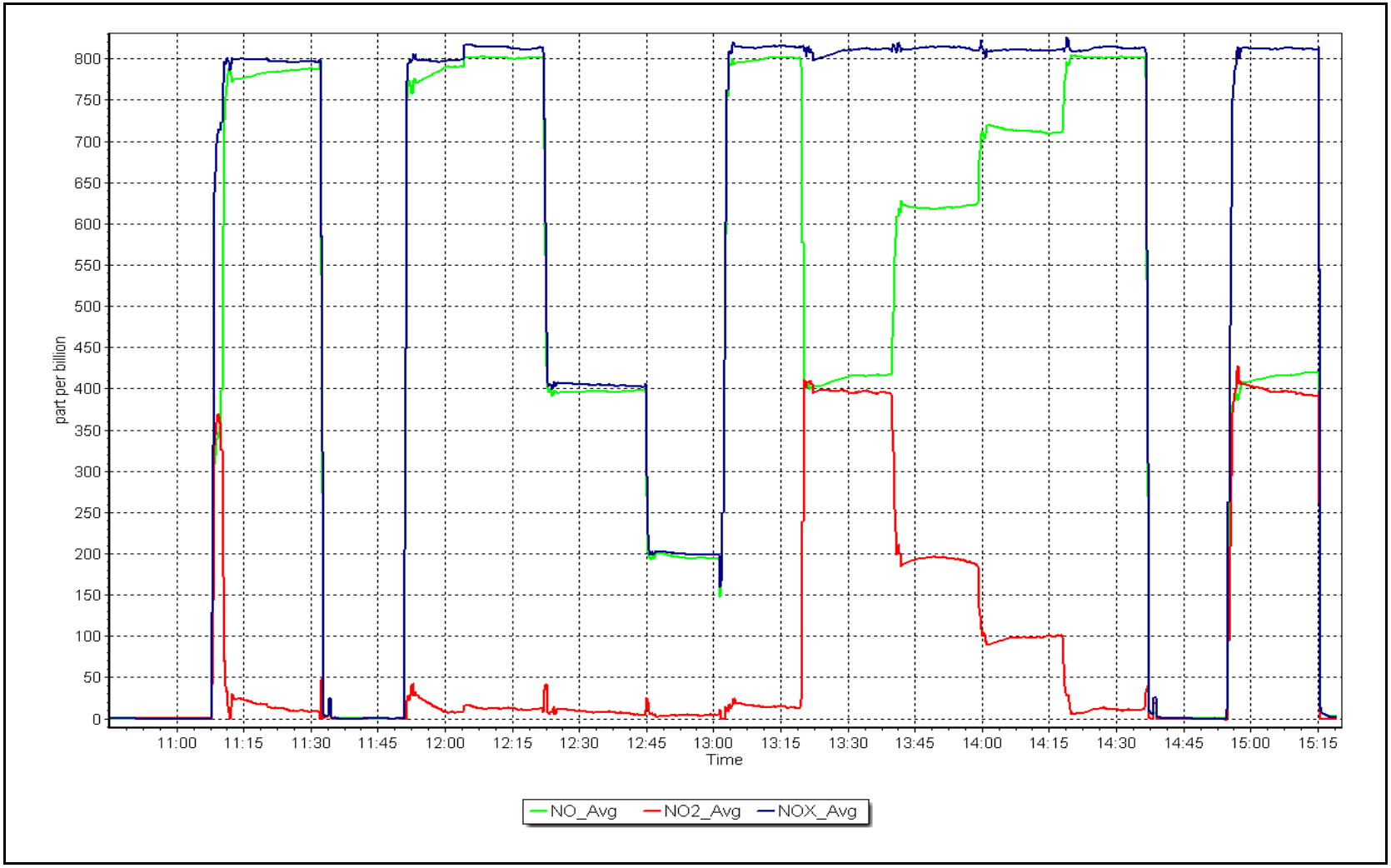
Calibration Date:	September 28, 2023	Previous Calibration:	August 8, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	10:49	End Time (MST):	15:19
Analyzer make:	API T200	Analyzer serial #:	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999902	≥0.995
399.2	396.1	1.0079			
196.0	195.4	1.0031	Slope	0.994749	0.90 - 1.10
101.9	98.1	1.0389			
			Intercept	-0.945227	+/-20



NO_X Calibration Plot Date: September 28, 2023 Location: Jackfish 2/3



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS29
SURMONT 2
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	September 5, 2023	Last Cal Date:	August 8, 2023
Start time (MST):	10:41	End time (MST):	13:37
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:	1.001658	1.008955	Backgd or Offset:	13.1	13.2
Calibration intercept:	-0.685685	-2.265490	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	-0.6	----
as found span	4919	81.3	800.1	802.0	0.998
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	800.1	806.0	0.993
second point	4959	40.7	400.6	400.7	1.000
third point	4979	20.3	199.8	197.8	1.010
as left zero	5000	0.0	0.0	-0.3	----
as left span	4919	81.3	800.1	806.0	0.993
				Average Correction Factor	1.001

Baseline Corr As found:	802.60	Previous response	800.75	*% 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: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

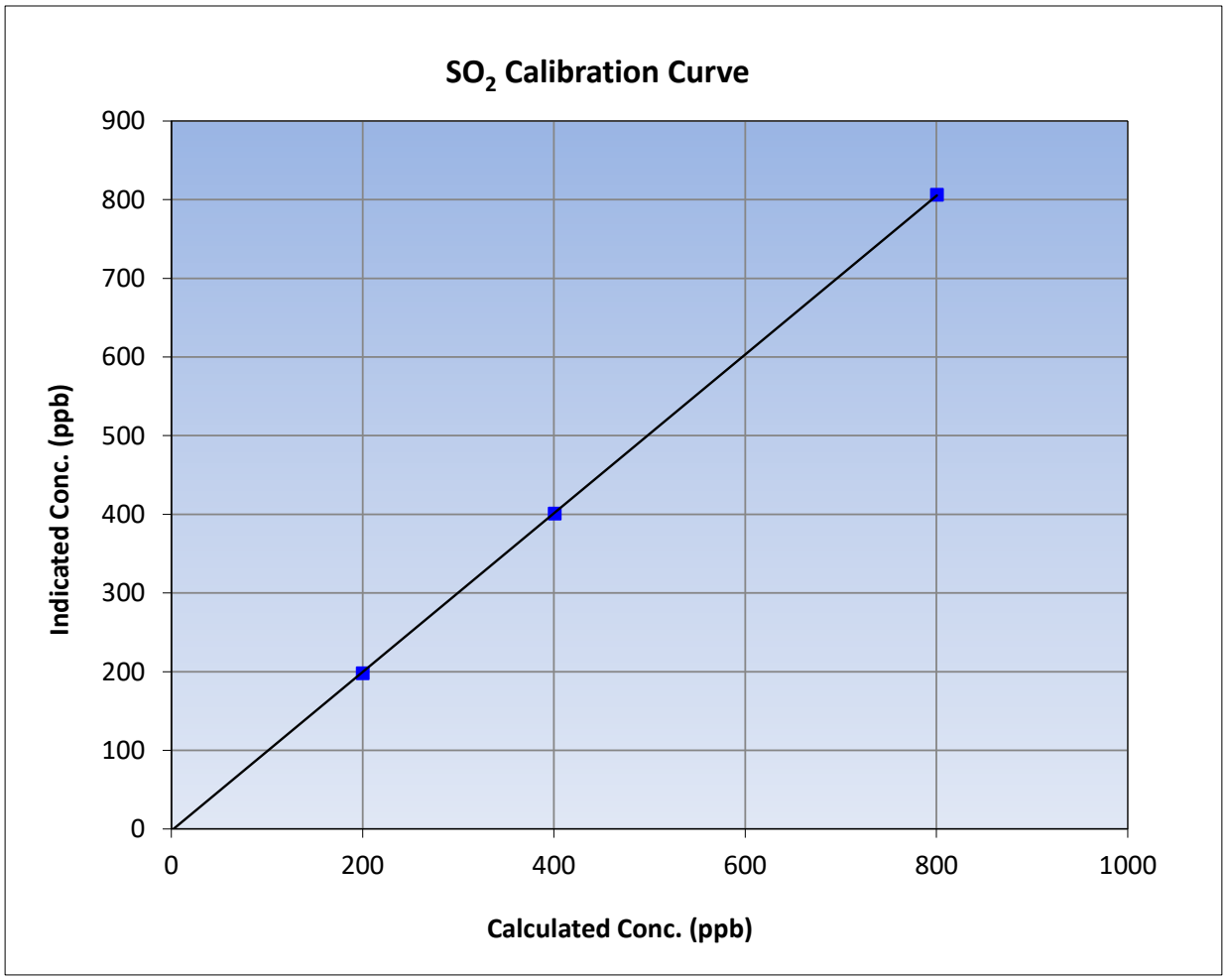
Station Information

Calibration Date:	September 5, 2023	Previous Calibration:	August 8, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:41	End Time (MST):	13:37
Analyzer make:	Thermo 43i	Analyzer serial #:	1170050150

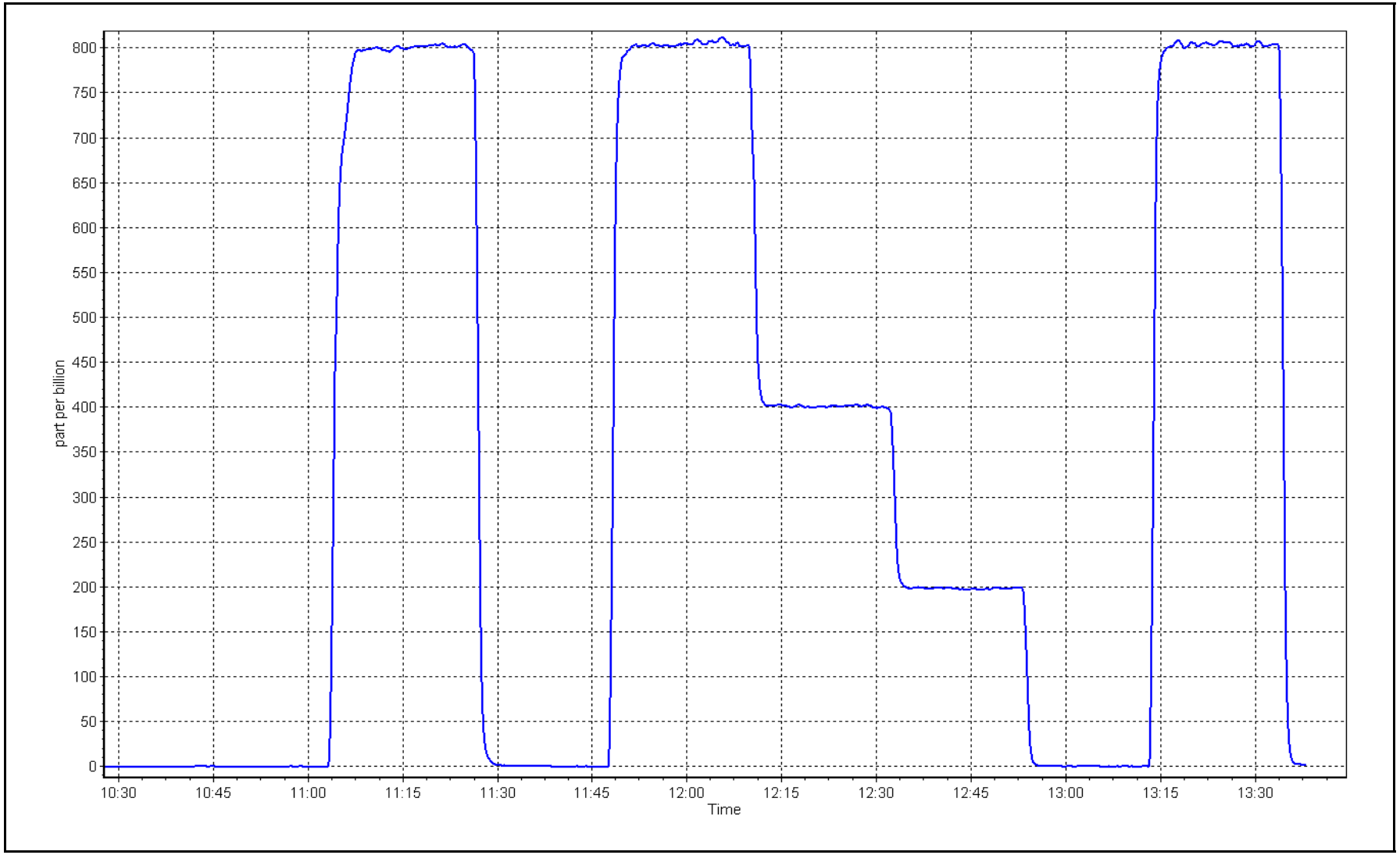
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.5	----
800.1	806.0	0.9927
400.6	400.7	0.9997
199.8	197.8	1.0102

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999978	*≥0.995*
Slope	1.008955	*0.90 - 1.10*
Intercept	-2.265490	*+/-30*



SO2 Calibration Plot Date: September 5, 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:	September 7, 2023	Last Cal Date:	August 1, 2023
Start time (MST):	10:14	End time (MST):	15:47
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:	1.001190	1.005044	Backgd or Offset:	0.82	0.83
Calibration intercept:	-0.182890	-0.142944	Coeff or Slope:	1.049	1.060

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	79.8	1.000
as found 2nd point	4963	37.2	40.1	39.7	1.005
as found 3rd point	4982	18.6	20.1	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	-0.1	----
high point	4926	74.2	80.0	80.3	0.996
second point	4963	37.2	40.1	40.1	1.000
third point	4982	18.6	20.1	20.0	1.003
as left zero	5000	0.0	0.0	0.0	----
as left span	4926	74.2	80.0	79.3	1.009
SO2 Scrubber Check	4919	81.3	813.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.000
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.0	Prev response:	79.91	*% change:	0.1%
Baseline Corr 2nd AF pt:	39.9	AF Slope:	0.998614	AF Intercept:	-0.142639
Baseline Corr 3rd AF pt:	20.3	AF Correlation:	0.999972		

* = > +/-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

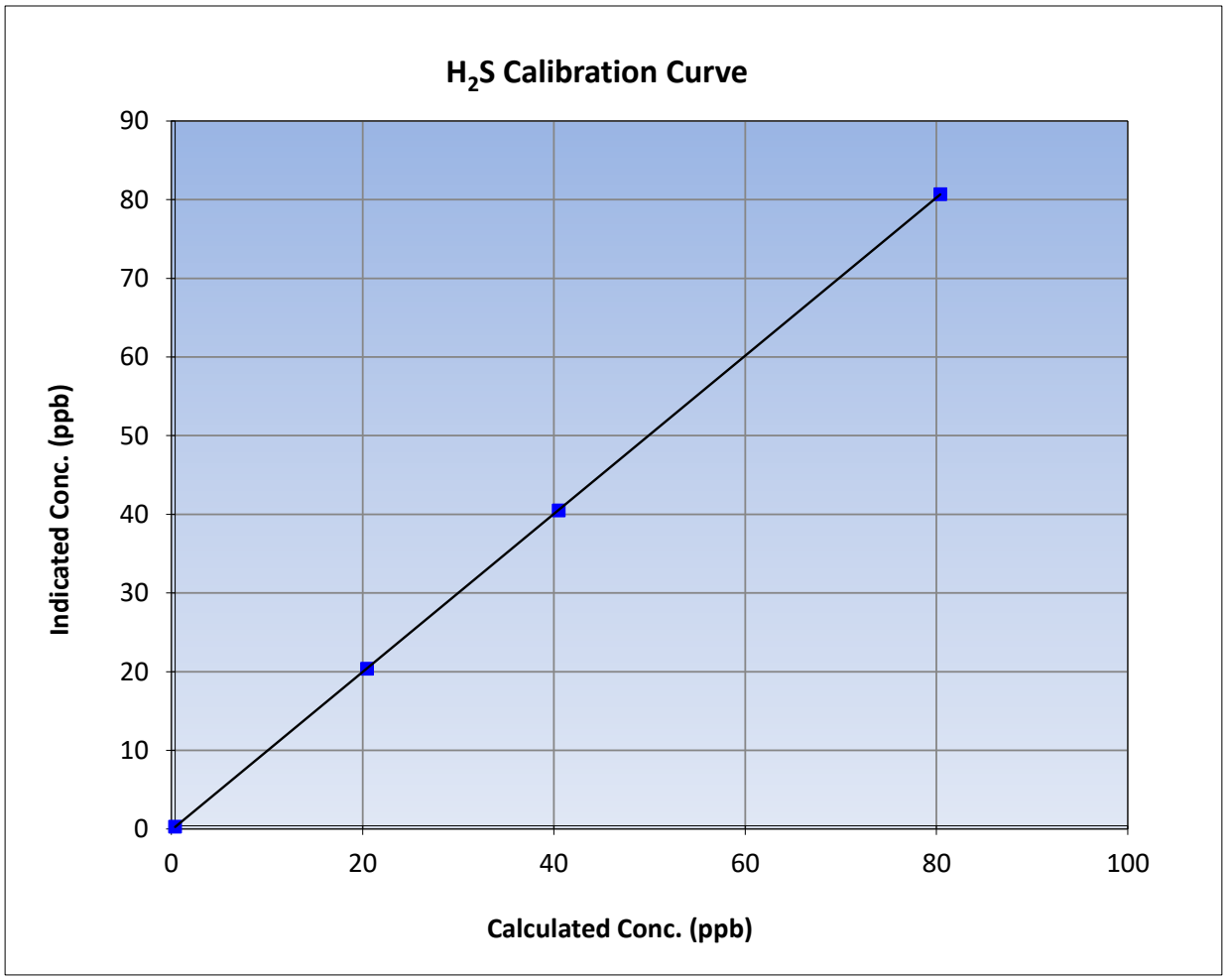
Station Information

Calibration Date:	September 7, 2023	Previous Calibration:	August 1, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:14	End Time (MST):	15:47
Analyzer make:	Thermo 43iQ-TLE	Analyzer serial #:	1200326170

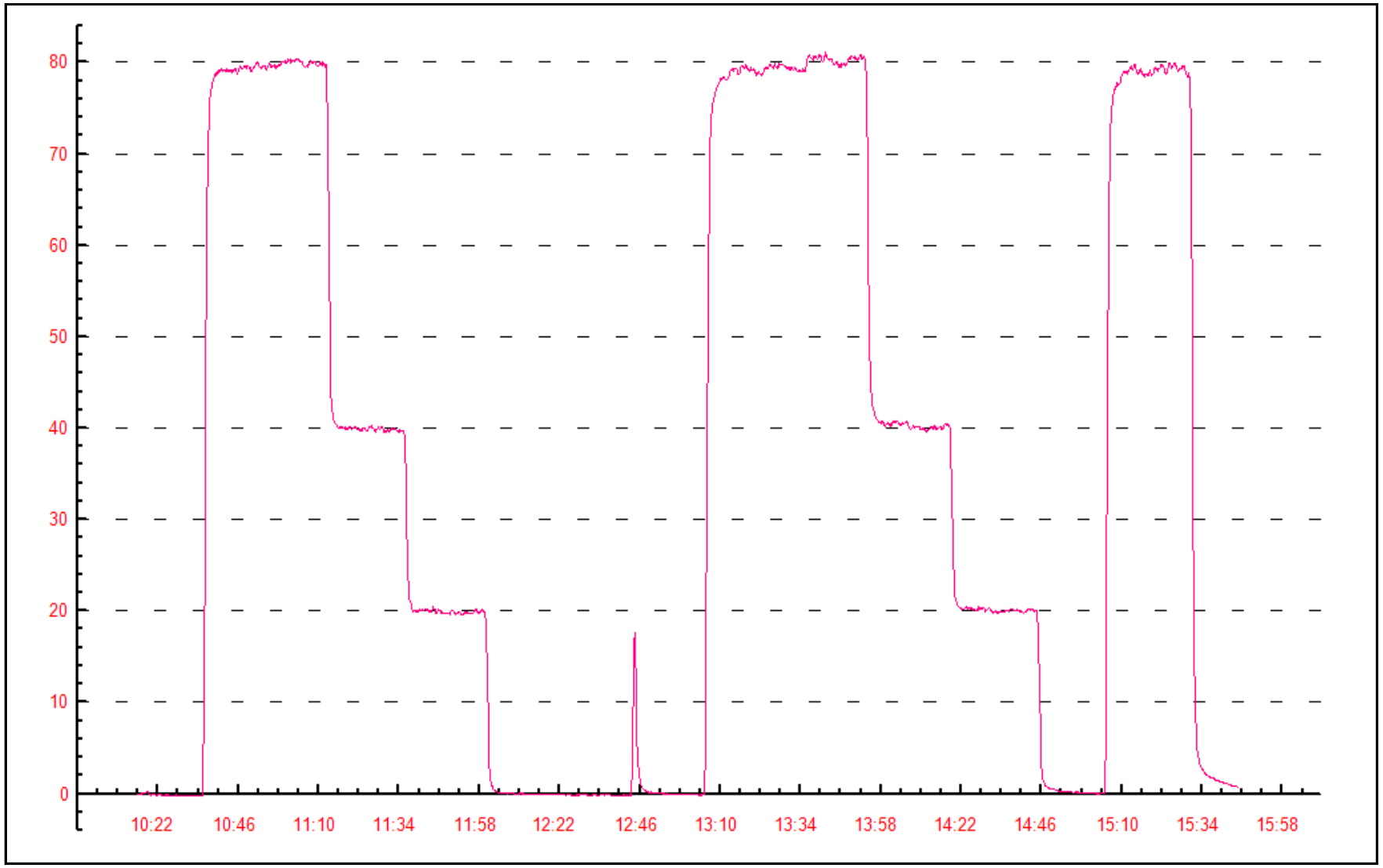
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.3	0.9963
40.1	40.1	1.0002
20.1	20.0	1.0027

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.005044	*0.90 - 1.10*
Intercept	-0.142944	*+/-3*



H_2S Calibration Plot Date: September 7, 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:	September 19, 2023	Last Cal Date:	September 7, 2023
Start time (MST):	10:09	End time (MST):	16:20
Reason:	Maintenance		

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 #:	2022-220	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005044	1.005327	Backgd or Offset:	0.83	1.19
Calibration intercept:	-0.142944	-0.202877	Coeff or Slope:	1.060	1.080

H_2S As Found Data

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

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4926	74.2	80.0	80.3	0.996
second point	4963	37.2	40.1	40.1	1.000
third point	4982	18.6	20.1	19.7	1.018
as left zero	5000	0.0	0.0	-0.1	----
as left span	4926	74.2	80.0	80.1	0.999

SO2 Scrubber Check

Date of last scrubber change:				Ave Corr Factor	1.005
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: Swapped old converter out with a new one as it was DOA. Calibrated after replacement. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

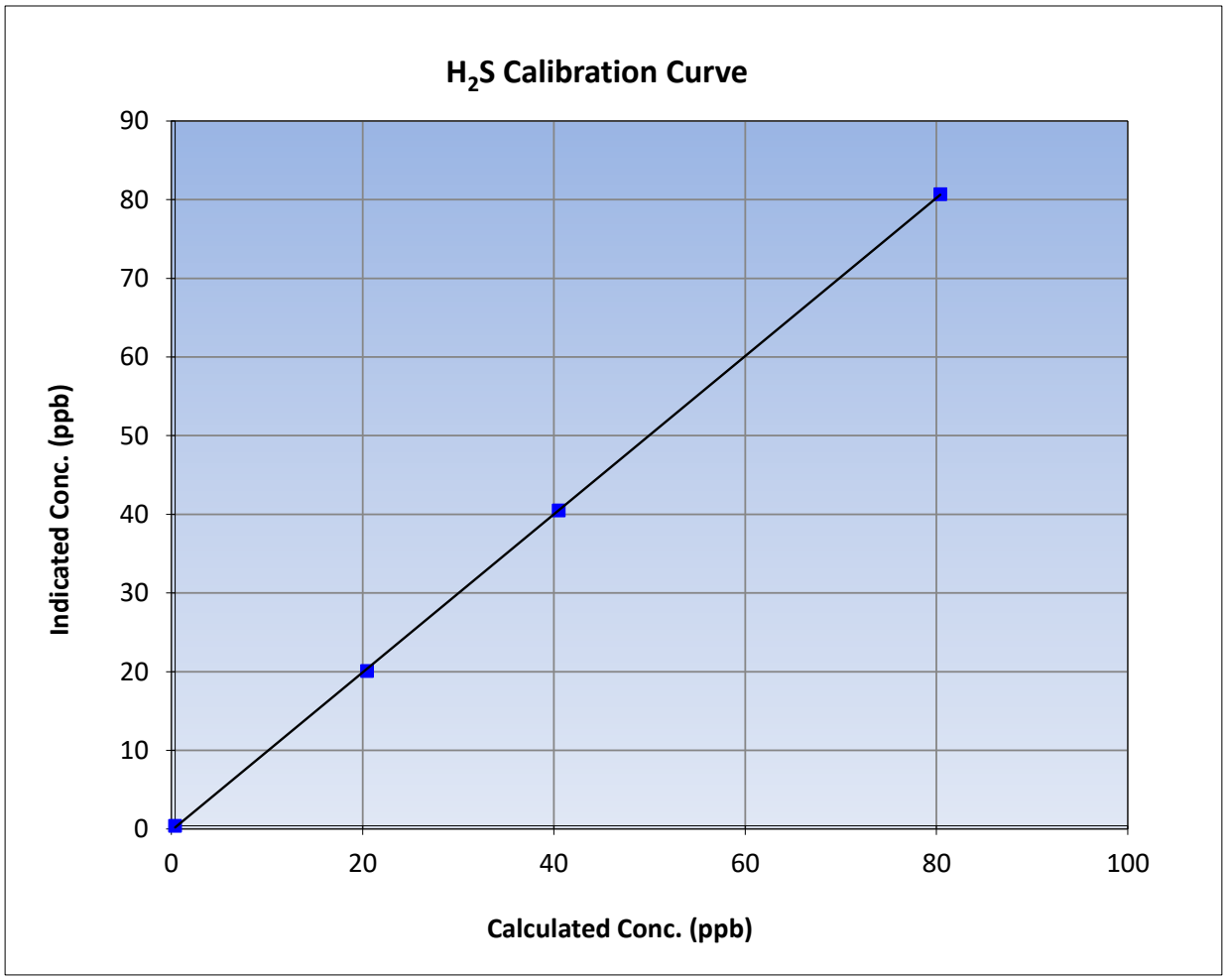
Station Information

Calibration Date:	September 19, 2023	Previous Calibration:	September 7, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:09	End Time (MST):	16:20
Analyzer make:	Thermo 43iQ-TLE	Analyzer serial #:	1200326170

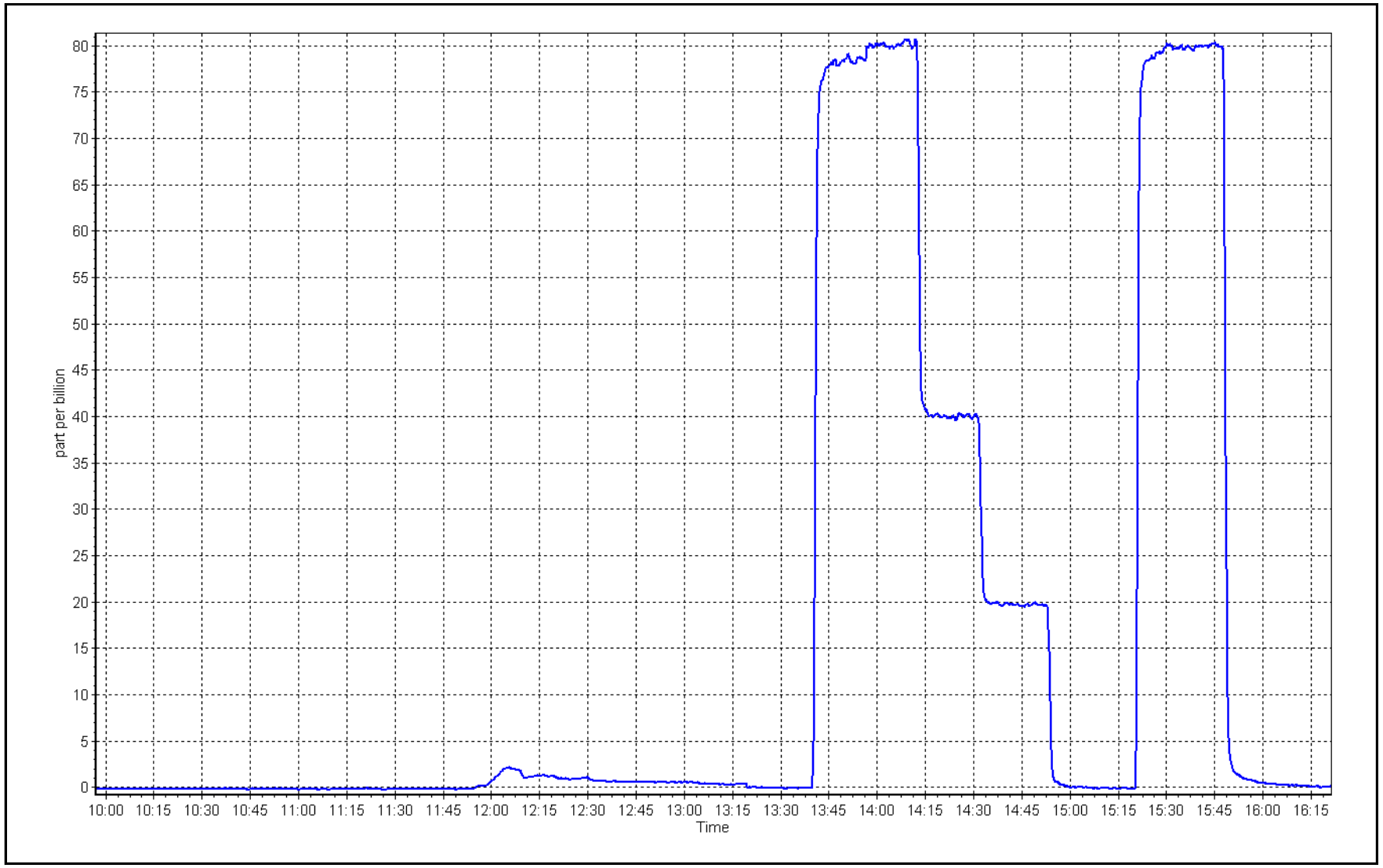
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.3	0.9963
40.1	40.1	1.0002
20.1	19.7	1.0180

Statistical Evaluation		Limits
Correlation Coefficient	0.999968	≥0.995
Slope	1.005327	0.90 - 1.10
Intercept	-0.202877	+/-3



H_2S Calibration Plot Date: September 19, 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:	September 5, 2023	Last Cal Date:	August 8, 2023
Start time (MST):	10:31	End time (MST):	13:37
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:	1.000971	1.006607	Background:	3.64	3.64
Calibration intercept:	-0.017870	-0.029039	Coefficient:	3.987	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	-0.01	----
as found span	4918	81.3	17.31	17.42	0.994
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.03	----
high point	4918	81.3	17.31	17.43	0.993
second point	4959	40.6	8.65	8.64	1.001
third point	4979	20.3	4.32	4.27	1.013
as left zero	5000	0.0	0.00	-0.02	----
as left span	4918	81.3	17.31	17.45	0.992
				Average Correction Factor	1.002

Baseline Corr As found:	17.43	Previous response	17.31	*% change	0.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

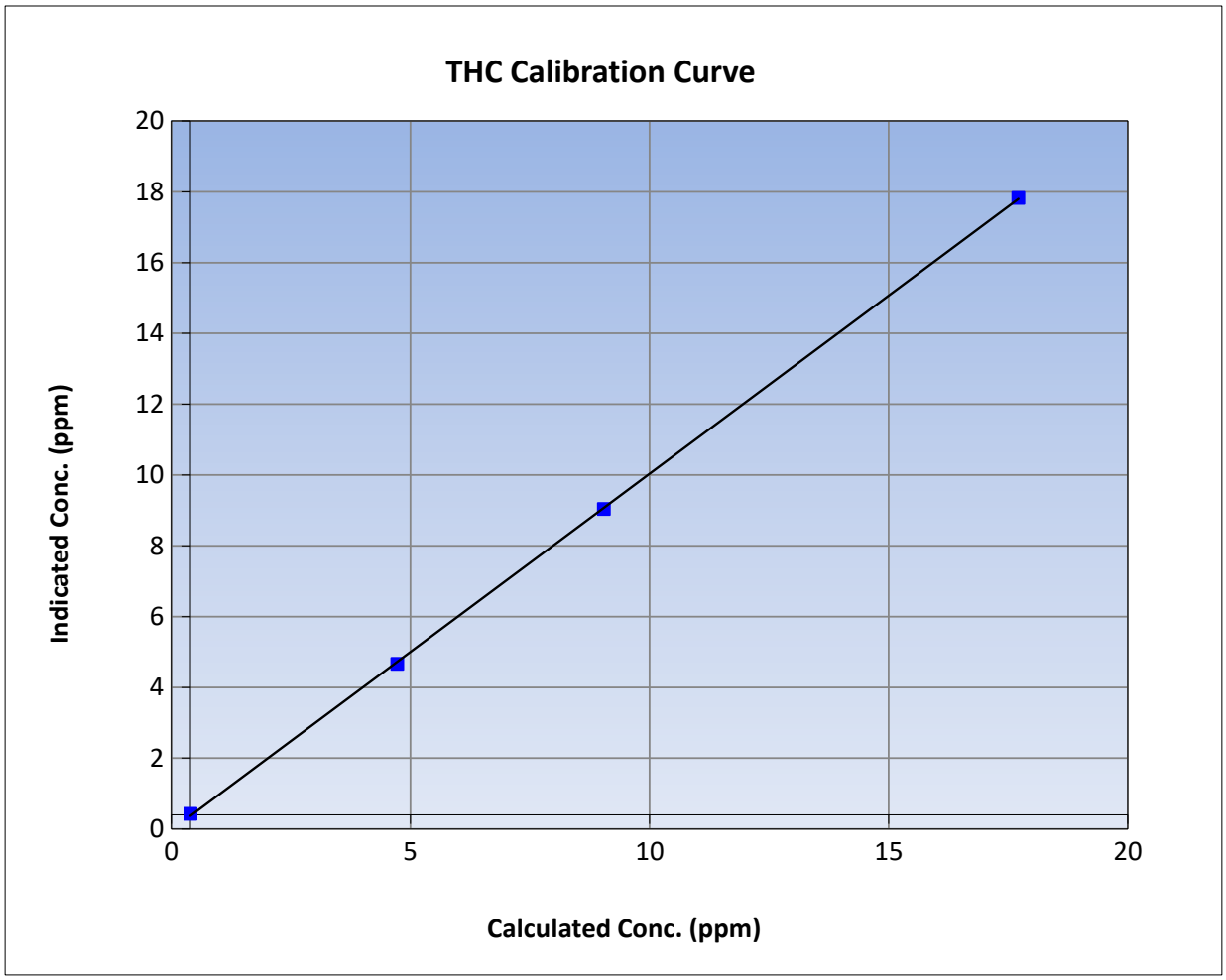
Station Information

Calibration Date:	September 5, 2023	Previous Calibration:	August 8, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:31	End Time (MST):	13:37
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1170050149

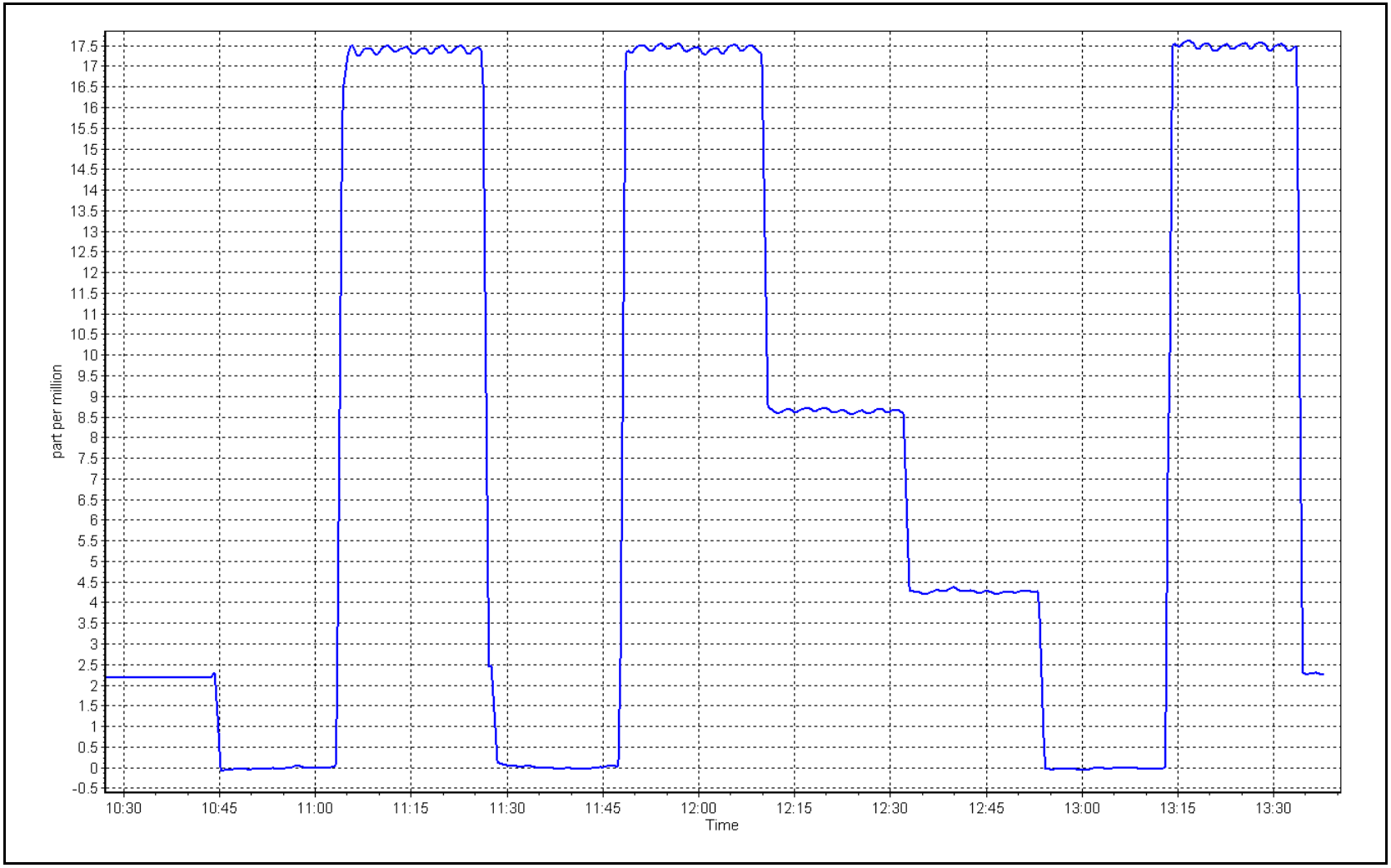
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.03	----
17.31	17.43	0.9933
8.65	8.64	1.0007
4.32	4.27	1.0129

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999949	*≥0.995*
Slope	1.006607	*0.90 - 1.10*
Intercept	-0.029039	*+/-1.5*



THC Calibration Plot Date: September 5, 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:	September 6, 2023	Last Cal Date:	August 9, 2023
Start time (MST):	9:45	End time (MST):	15:02
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T12YYFE		Cal Gas Expiry Date:	October 30, 2024	
NOX Cal Gas Conc:	47.46	ppm	NO Cal Gas Conc:	47.46	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	47.46	ppm	Removed Gas NO Conc:	47.46	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	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	1.386	NO bkgnd or offset:	1.3	1.4
NOX coeff or slope:	0.995	0.996	NOX bkgnd or offset:	1.4	1.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	176.2	178.0

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000454	0.997951
NO_X Cal Offset:	-0.253155	0.647509
NO Cal Slope:	1.000066	0.996977
NO Cal Offset:	-0.992422	-0.611801
NO_2 Cal Slope:	1.000433	0.993705
NO_2 Cal Offset:	0.227914	1.353170

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.4	0.0	0.4	----	----
as found span	4916	84.2	799.2	799.2	0.0	788.8	789.0	-0.2	1.0132	1.0129
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.6	0.2	0.4	----	----
high point	4916	84.2	799.2	799.2	0.0	798.0	796.3	1.7	1.0015	1.0036
second point	4958	42.1	399.6	399.6	0.0	400.0	398.2	1.8	0.9990	1.0035
third point	4979	21.1	200.3	200.3	0.0	200.2	197.7	2.5	1.0004	1.0130
as left zero	5000	0.0	0.0	0.0	0.0	0.5	0.1	0.4	----	----
as left span	4916	84.2	799.2	411.4	387.8	792.2	402.9	389.3	1.0088	1.0211
								Average Correction Factor	1.0003	1.0067

Corrected As found	NO_X = 788.4 ppb	NO = 789.0 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-1.4%
Previous Response	NO_X = 799.3 ppb	NO = 798.3 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)	789.8	402.0	387.8	386.4	1.0036	99.6%
2nd GPT point (200 ppb O3)	789.8	601.7	188.1	188.3	0.9989	100.1%
3rd GPT point (100 ppb O3)	789.8	696.5	93.3	95.3	0.9790	102.1%
				Average Correction Factor	0.9939	100.6%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

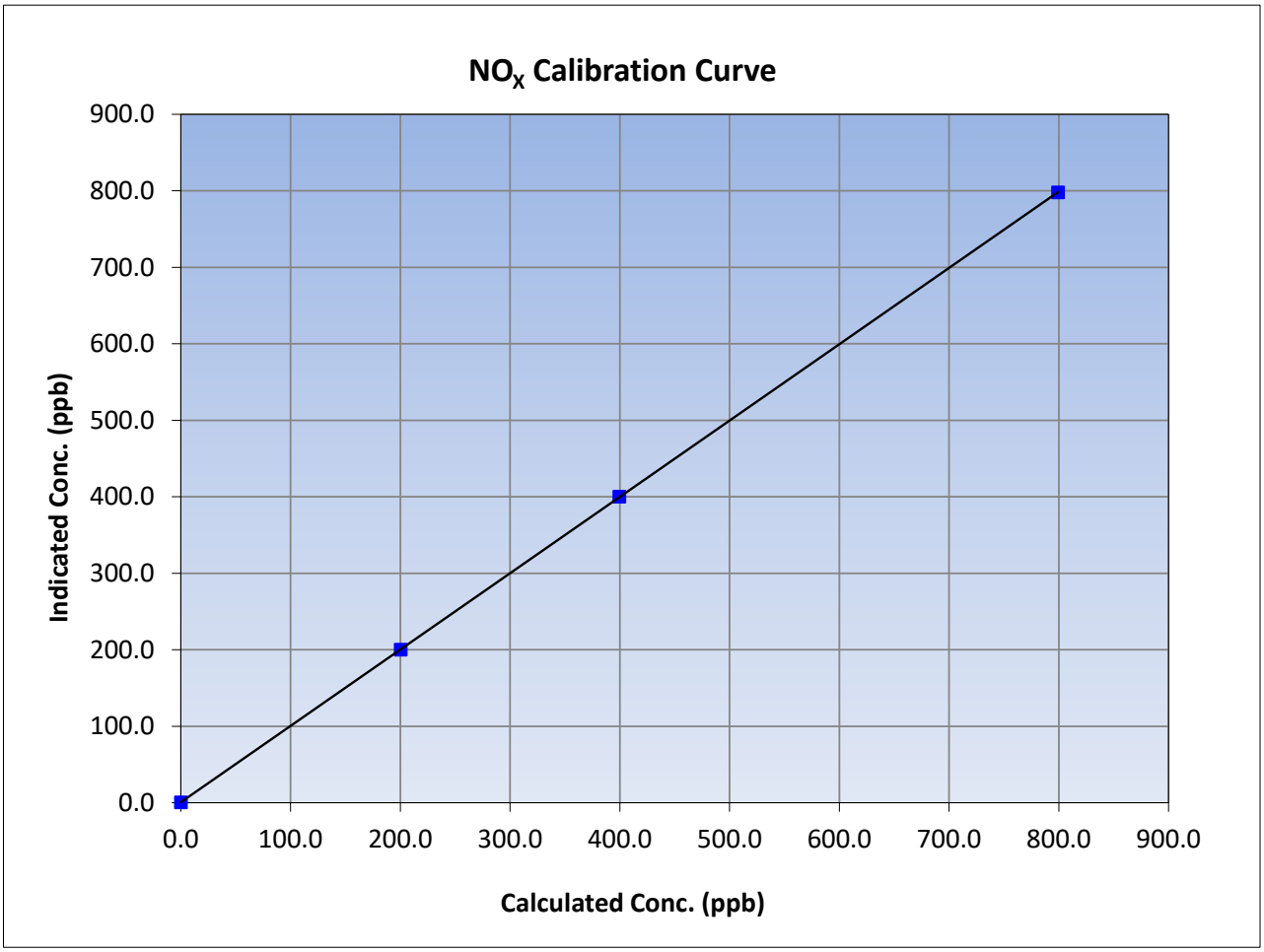
Version-04-2020

Station Information

Calibration Date:	September 6, 2023	Previous Calibration:	August 9, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:45	End Time (MST):	15:02
Analyzer make:	Thermo 42i	Analyzer serial #:	1170050148

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.6	----	Correlation Coefficient	0.999999	≥0.995
799.2	798.0	1.0015			
399.6	400.0	0.9990	Slope	0.997951	0.90 - 1.10
200.3	200.2	1.0004			
			Intercept	0.647509	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

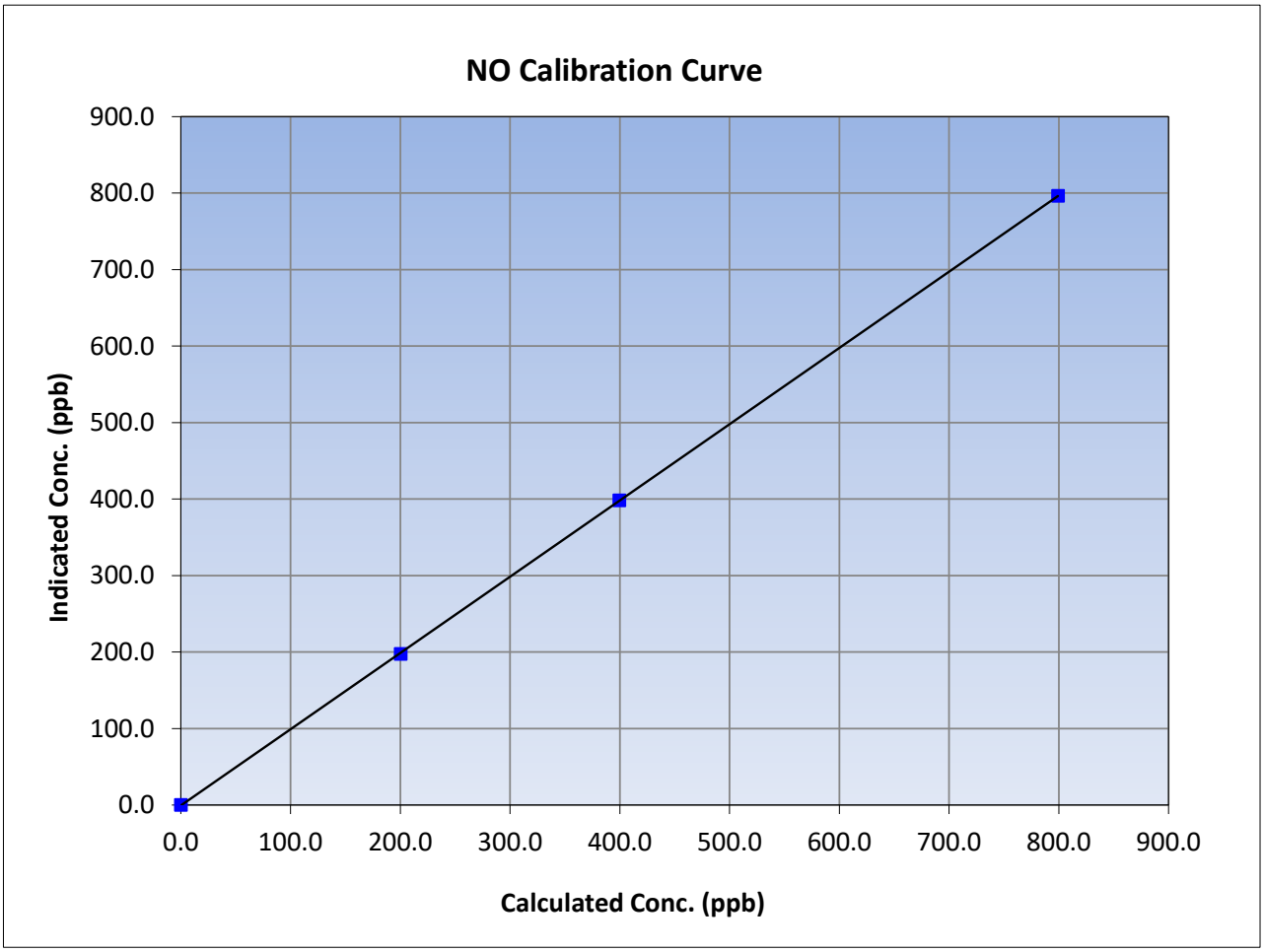
Version-04-2020

Station Information

Calibration Date:	September 6, 2023	Previous Calibration:	August 9, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:45	End Time (MST):	15:02
Analyzer make:	Thermo 42i	Analyzer serial #:	1170050148

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999992	≥0.995
799.2	796.3	1.0036			
399.6	398.2	1.0035	Slope	0.996977	0.90 - 1.10
200.3	197.7	1.0130			
			Intercept	-0.611801	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

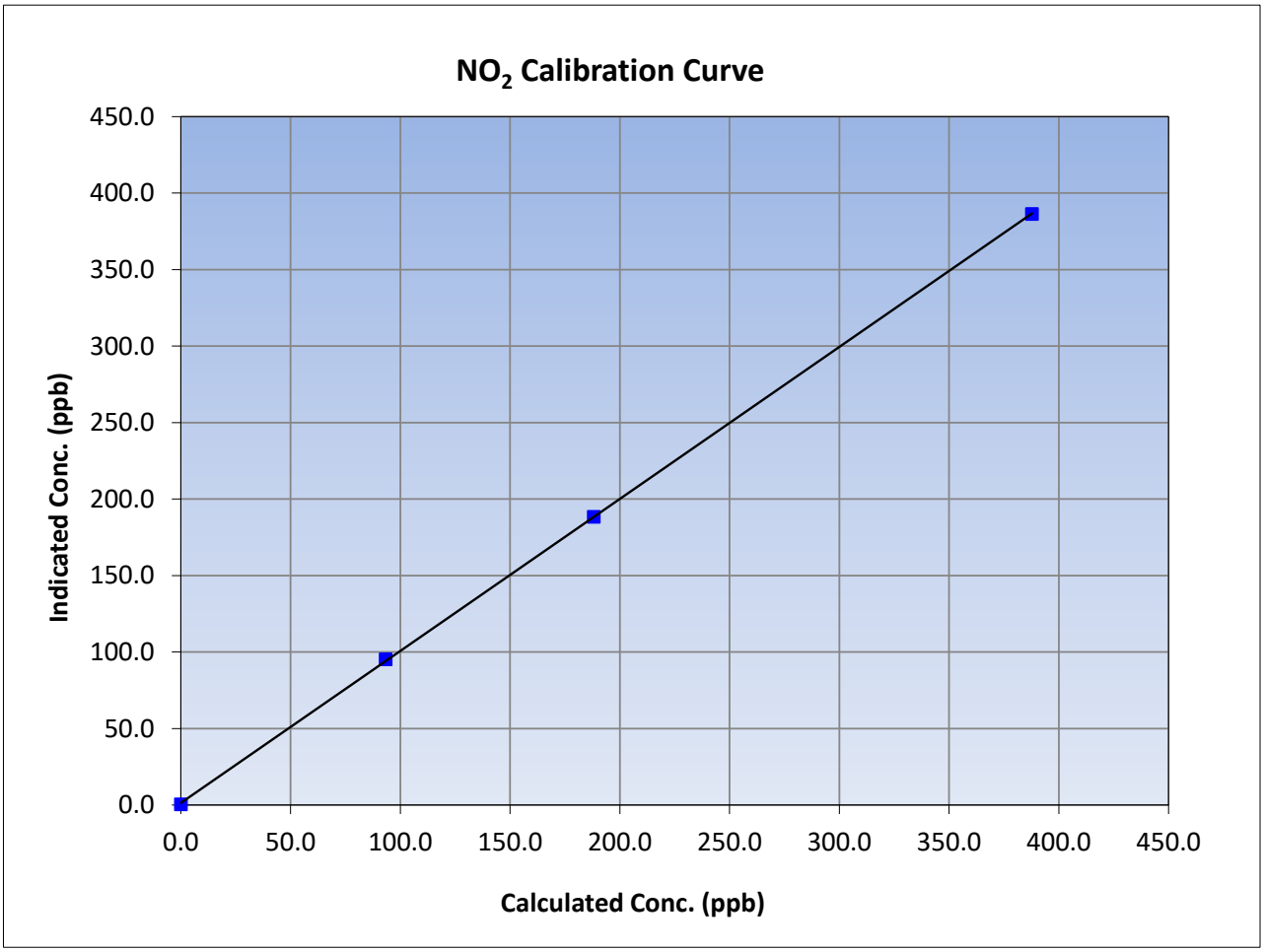
Version-04-2020

Station Information

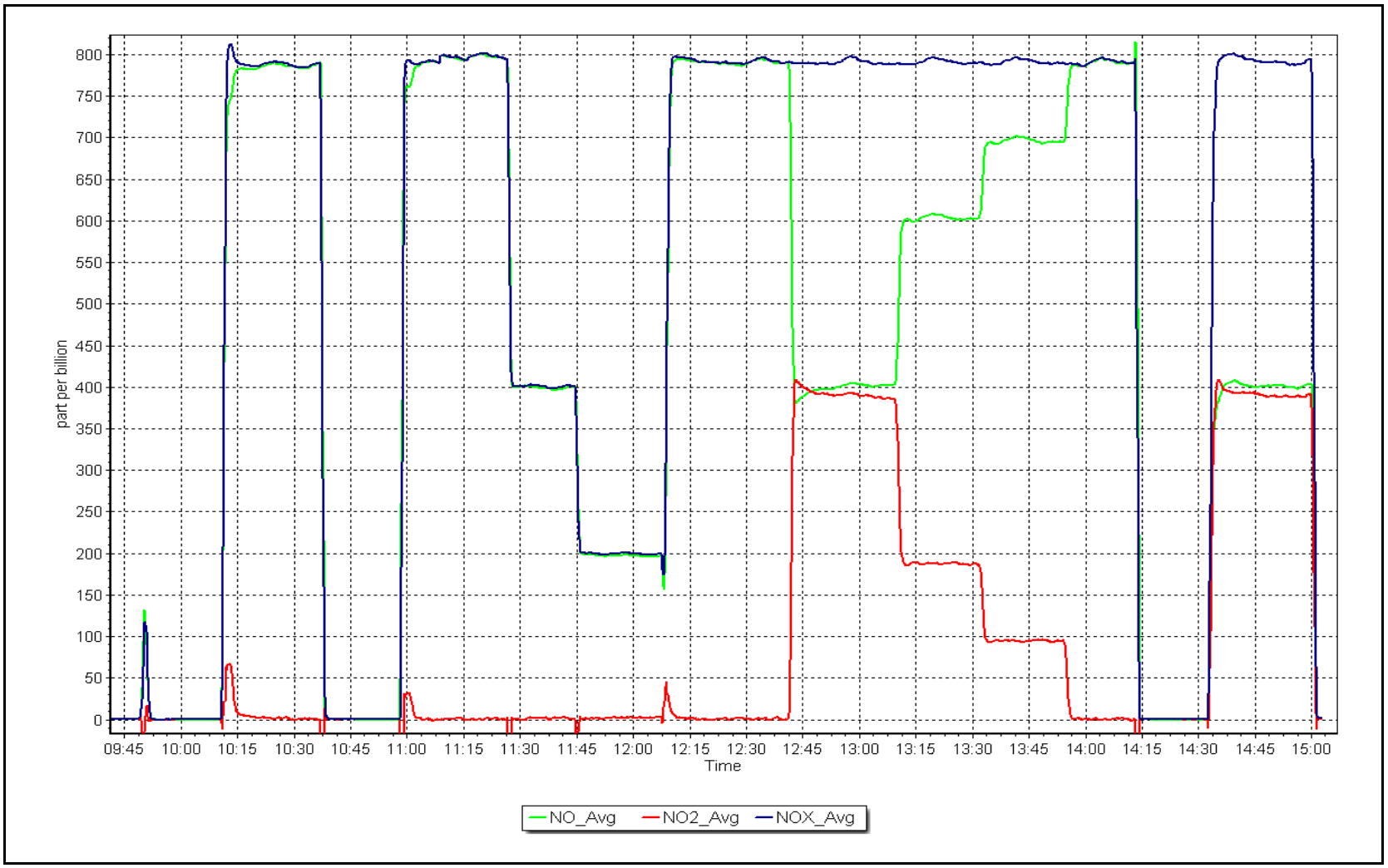
Calibration Date:	September 6, 2023	Previous Calibration:	August 9, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:45	End Time (MST):	15:02
Analyzer make:	Thermo 42i	Analyzer serial #:	1170050148

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.4	----	Correlation Coefficient	0.999969	≥0.995
387.8	386.4	1.0036			
188.1	188.3	0.9989	Slope	0.993705	0.90 - 1.10
93.3	95.3	0.9790			
			Intercept	1.353170	+/-20



NO_X Calibration Plot Date: September 6, 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:	September 7, 2023	Last Cal Date:	August 9, 2023
Start time (MST):	11:46	End time (MST):	14:35
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)	15.2	14.71	15.2	☐	+/- 2 °C
P (mmHg)	708.8	710.30	708.8	☐	+/- 10 mmHg
flow (LPM)	4.99	5.160	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: September 7, 2023 Last Cal Date: August 9, 2023

PM w/o HEPA: 52.1 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	11.1	11.0	11.0	☐	11.3 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 52.1 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: September 7, 2023

Disposable Filter Changed: September 7, 2023

Annual Maintenance

Date Sample Tube Cleaned: September 30, 2022

Date RH/T Sensor Cleaned: October 6, 2022

Notes: No adjustments made.

Calibration by: Braiden Boutilier

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS30
ELLS RIVER
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Ells River	Station number:	AMS 30
Calibration Date:	September 1, 2023	Last Cal Date:	August 1, 2023
Start time (MST):	9:04	End time (MST):	11:40
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:	0.999617	1.006471	Backgd or Offset:	9.6	9.6
Calibration intercept:	-2.615868	-2.616011	Coeff or Slope:	0.988	0.994

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	800.4	798.8	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4921	79.2	800.4	804.2	0.995
second point	4960	39.6	400.2	399.0	1.003
third point	4980	19.8	200.1	196.1	1.020
as left zero	5000	0.0	0.0	-0.1	----
as left span	4921	79.2	800.4	805.5	0.994
				Average Correction Factor	1.006

Baseline Corr As found:	799.10	Previous response	797.44	*% change	0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Adjusted the span only.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

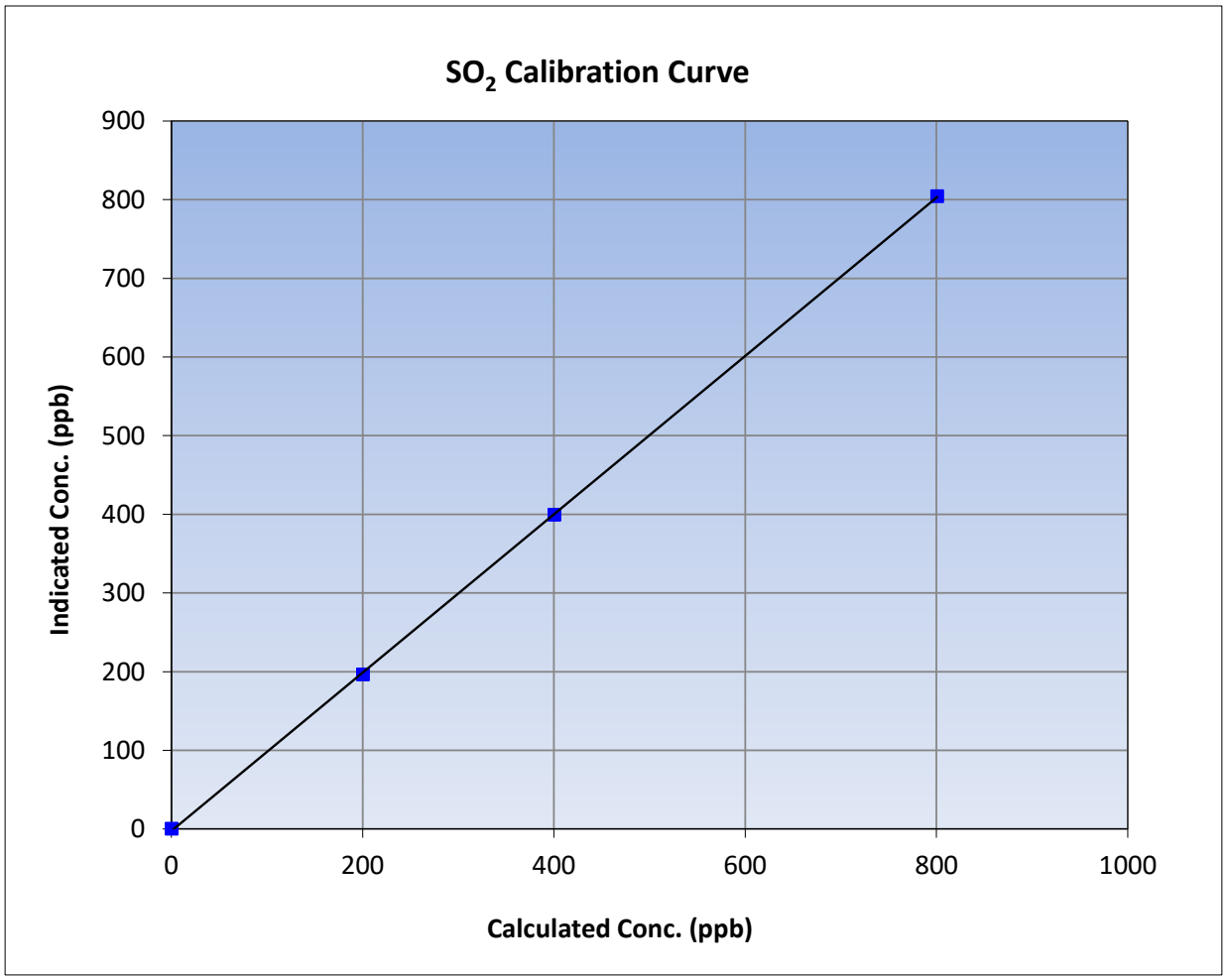
Station Information

Calibration Date:	September 1, 2023	Previous Calibration:	August 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:04	End Time (MST):	11:40
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841397

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
800.4	804.2	0.9952
400.2	399.0	1.0031
200.1	196.1	1.0204

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999952	*≥0.995*
Slope	1.006471	*0.90 - 1.10*
Intercept	-2.616011	*+/-30*



SO2 Calibration Plot Date: September 1, 2023 Location: Ells River

Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Ells River	Station number:	AMS30
Calibration Date:	September 7, 2023	Last Cal Date:	August 16, 2023
Start time (MST):	8:23	End time (MST):	12:15
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:	1.003494	1.001492	Backgd or Offset:	1.63	1.60
Calibration intercept:	-0.199209	-0.079138	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	80.5	0.993
as found 2nd point	4961	39.4	40.0	40.0	1.001
as found 3rd point	4980	19.7	20.0	19.8	1.011
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4921	78.7	80.0	80.1	0.998
second point	4961	39.4	40.0	39.9	1.003
third point	4980	19.7	20.0	19.8	1.011
as left zero	5000	0.0	0.0	0.1	----
as left span	4921	78.7	80.0	80.0	1.000
SO2 Scrubber Check	4921	79.2	800.4	0.0	----
Date of last scrubber change:		N/A		Ave Corr Factor	1.004
Date of last converter efficiency test:		N/A			efficiency

Baseline Corr As found:	80.5	Prev response:	80.04	*% change:	0.6%
Baseline Corr 2nd AF pt:	40.0	AF Slope:	1.007781	AF Intercept:	-0.199243
Baseline Corr 3rd AF pt:	19.8	AF Correlation:	0.999971		

* = > +/-5% change initiates investigation

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

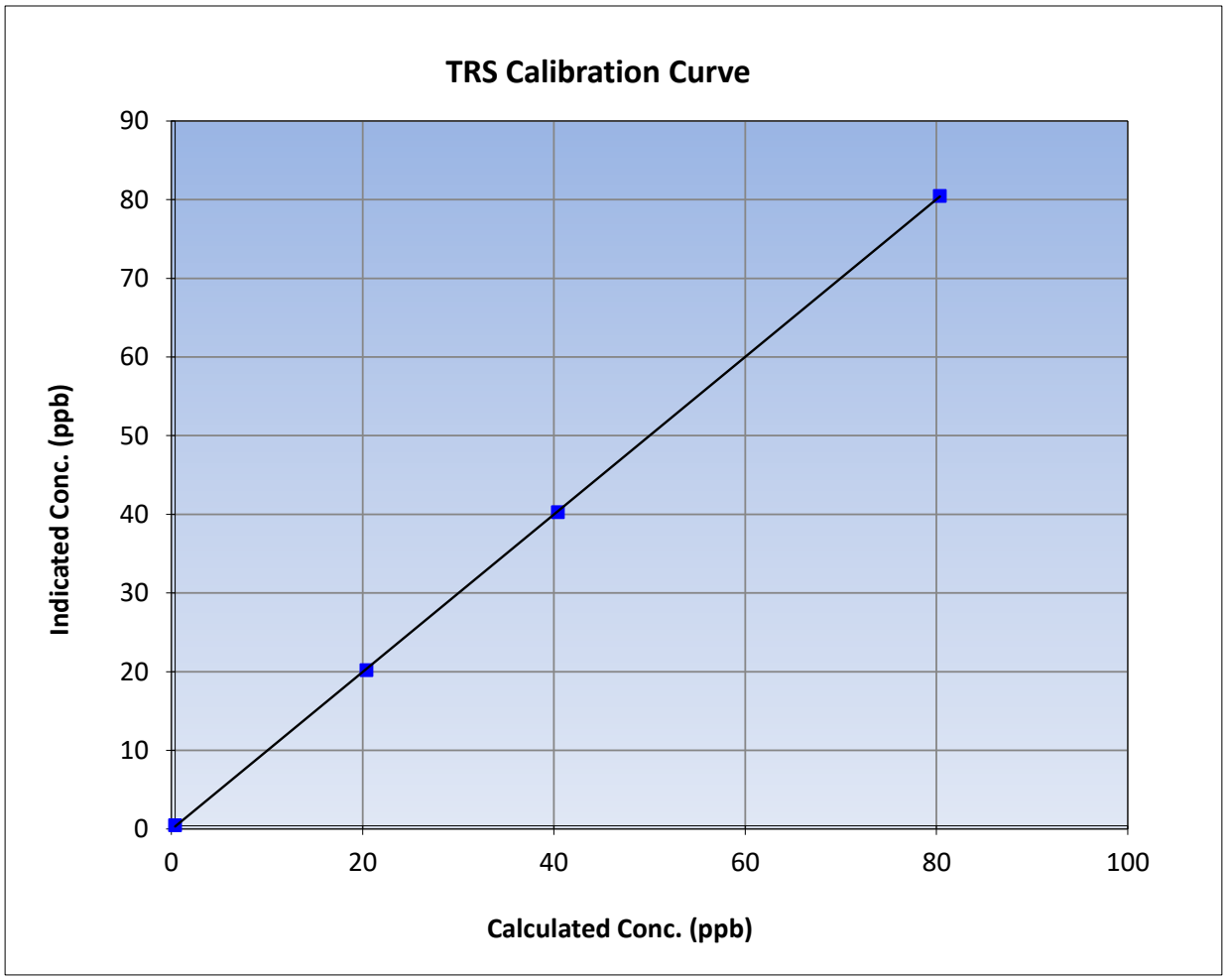
Station Information

Calibration Date:	September 7, 2023	Previous Calibration:	August 16, 2023
Station Name:	Ells River	Station Number:	AMS30
Start Time (MST):	8:23	End Time (MST):	12:15
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1410661331

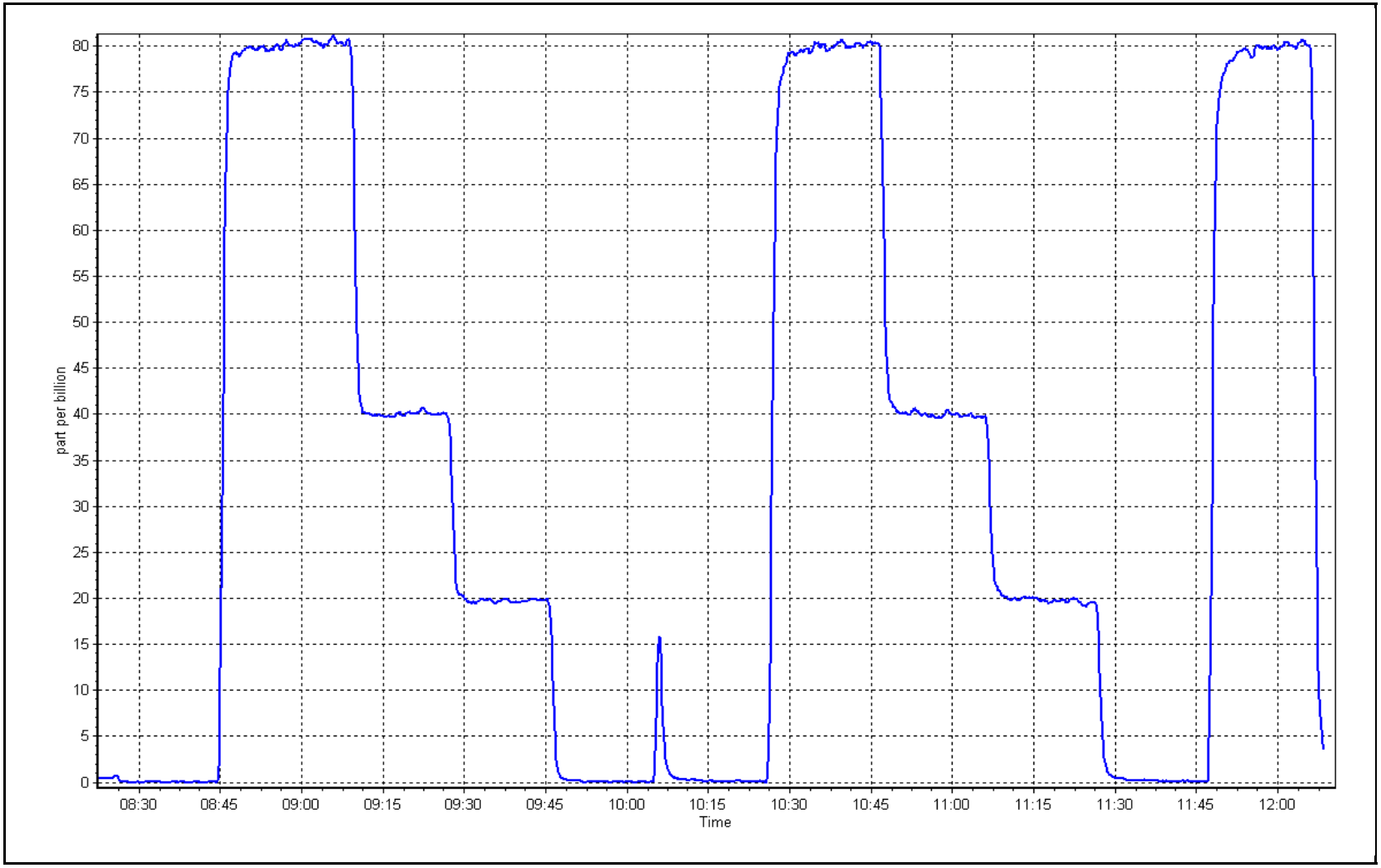
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.1	0.9983
40.0	39.9	1.0032
20.0	19.8	1.0109

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999977	*≥0.995*
Slope	1.001492	*0.90 - 1.10*
Intercept	-0.079138	*+/-3*



TRS Calibration Plot Date: September 7, 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:	September 1, 2023	Last Cal Date:	August 1, 2023
Start time (MST):	9:04	End time (MST):	11:40
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:	0.000252	0.000244	NMHC SP Ratio:	4.67E-05	4.53E-05
CH4 Retention time:	14.4	14.2	NMHC Peak Area:	195284	201064

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	16.71	1.019
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	17.03	17.01	1.001
second point	4960	39.6	8.51	8.43	1.010
third point	4980	19.8	4.26	4.15	1.027
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	17.08	0.997
				Average Correction Factor	1.013
Baseline Corr AF:	16.71	Prev response	17.14	*% change	-2.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4921	79.2	9.11	8.89	1.025
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	9.08	1.003
second point	4960	39.6	4.56	4.50	1.012
third point	4980	19.8	2.28	2.21	1.031
as left zero	5000	0	0.00	0.00	----
as left span	4921	79.2	9.11	9.15	0.996
				Average Correction Factor	1.015
Baseline Corr AF:	8.89	Prev response	9.22	*% change	-3.7%
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	4921	79.2	7.91	7.82	1.012
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	7.91	7.93	0.998
second point	4960	39.6	3.96	3.93	1.008
third point	4980	19.8	1.98	1.94	1.022
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.91	7.94	0.997
				Average Correction Factor	1.009
Baseline Corr AF:	7.82	Prev response	7.92	*% 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:	1.010450	1.000637
THC Cal Offset:	-0.062141	-0.057538
CH4 Cal Slope:	1.003947	1.002936
CH4 Cal Offset:	-0.026358	-0.025358
NMHC Cal Slope:	1.016086	0.998741
NMHC Cal Offset:	-0.035983	-0.032581

Notes: Adjusted the span only.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

THC Calibration Summary

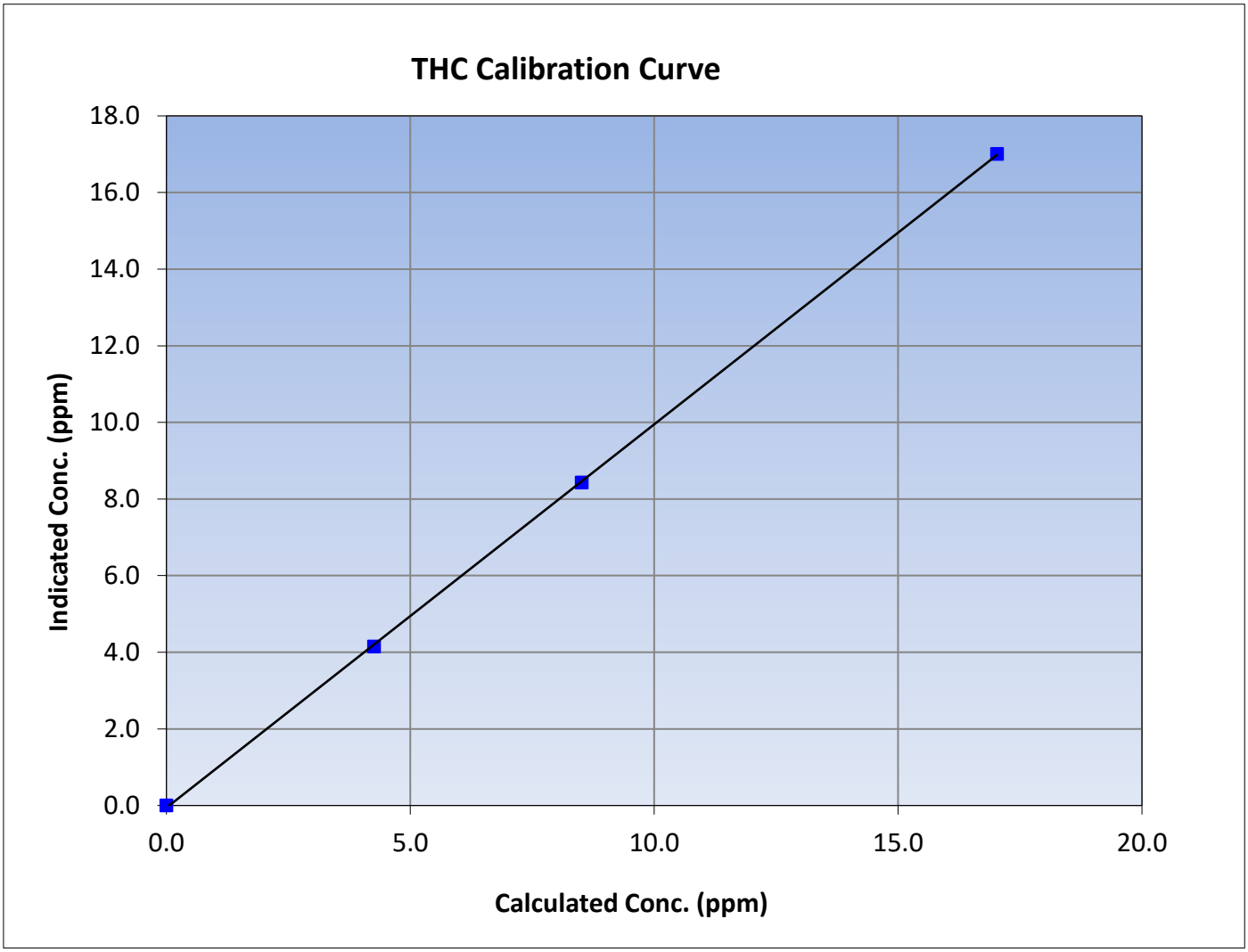
Version-01-2020

Station Information

Calibration Date:	September 1, 2023	Previous Calibration:	August 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:04	End Time (MST):	11:40
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	0.999948	*≥0.995*
17.03	17.01	1.0010			
8.51	8.43	1.0098	Slope	1.000637	*0.90 - 1.10*
4.26	4.15	1.0268			
			Intercept	-0.057538	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

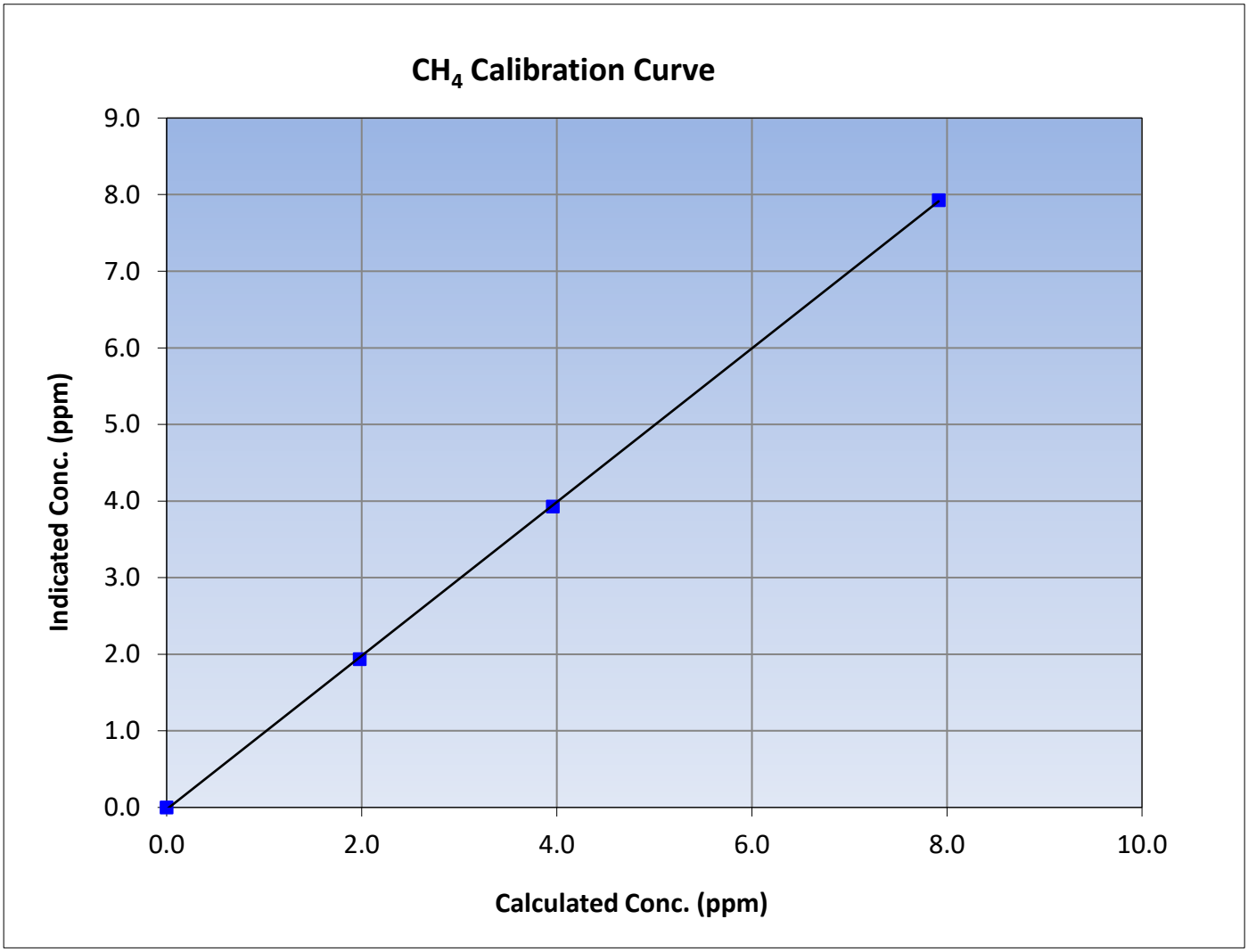
Version-01-2020

Station Information

Calibration Date:	September 1, 2023	Previous Calibration:	August 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:04	End Time (MST):	11:40
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	7.93	0.9985			
3.96	3.93	1.0079	Slope	1.002936	*0.90 - 1.10*
1.98	1.94	1.0216			
			Intercept	-0.025358	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

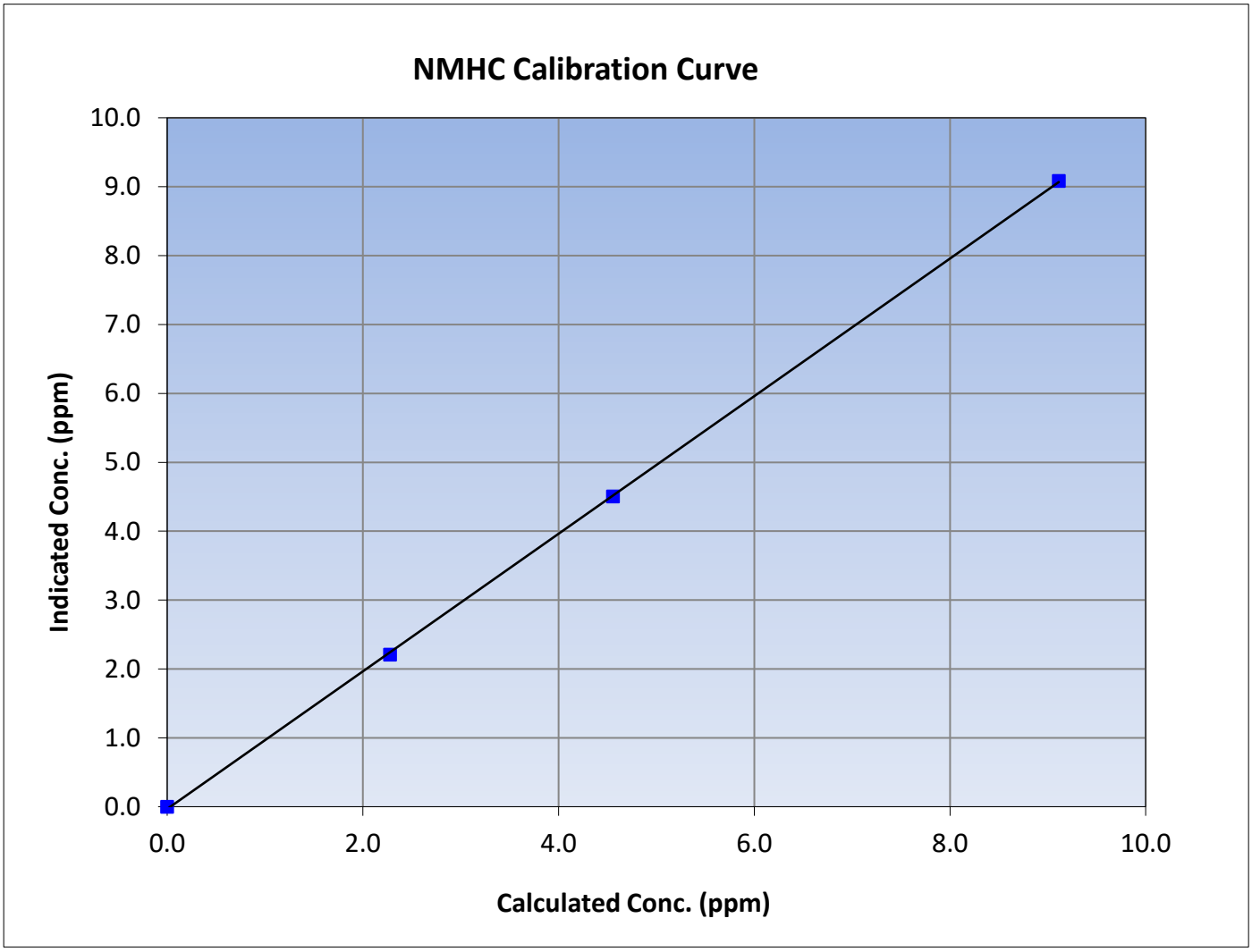
Version-01-2020

Station Information

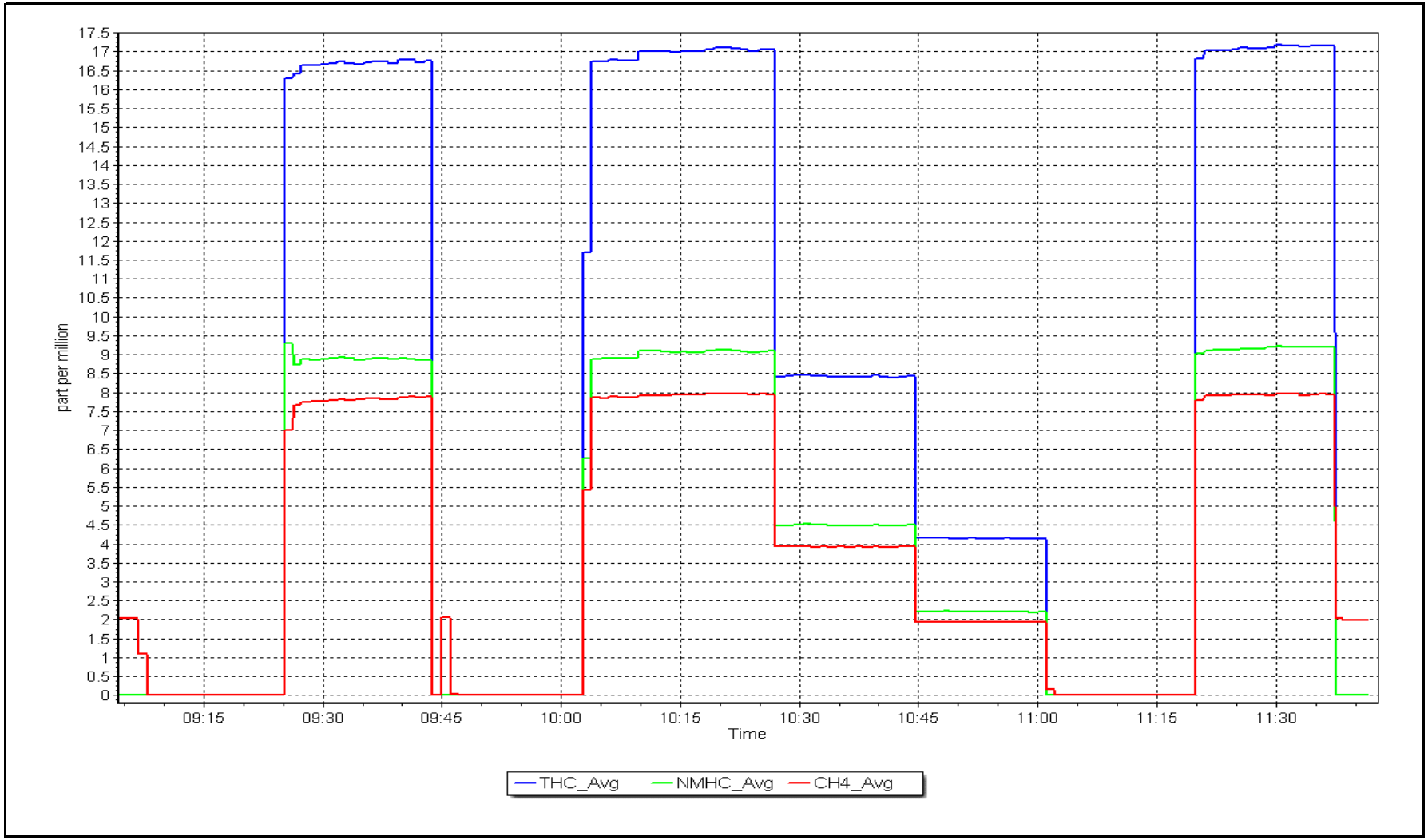
Calibration Date:	September 1, 2023	Previous Calibration:	August 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:04	End Time (MST):	11:40
Analyzer make:	Thermo 55i	Analyzer serial #:	1181490018

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999941	*≥0.995*
9.11	9.08	1.0031			
4.56	4.50	1.0117	Slope	0.998741	*0.90 - 1.10*
2.28	2.21	1.0314			
			Intercept	-0.032581	*+/-0.5*



NMHC Calibration Plot Date: September 1, 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:	September 6, 2023	Last Cal Date:	August 9, 2023
Start time (MST):	8:39	End time (MST):	12:55
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:	1.099	1.129	NO bkgnd or offset:	13.5	13.8
NOX coeff or slope:	0.989	0.986	NOX bkgnd or offset:	13.5	13.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	188.1	189.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.004722	0.996459
NO_X Cal Offset:	-1.140000	-1.100000
NO Cal Slope:	1.006504	1.000500
NO Cal Offset:	-2.140000	-2.240000
NO_2 Cal Slope:	1.001553	0.993934
NO_2 Cal Offset:	0.383629	-0.960703

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.3	0.1	----	----
as found span	4920	80.0	813.3	799.5	13.8	793.2	777.5	15.7	1.0253	1.0283
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.2	0.2	----	----
high point	4920	80.0	813.3	799.5	13.8	809.9	798.7	11.2	1.0042	1.0010
second point	4960	40.0	406.6	399.8	6.9	403.4	396.7	6.7	1.0080	1.0077
third point	4980	20.0	203.3	199.9	3.4	200.5	195.7	4.7	1.0141	1.0214
as left zero	5000	0.0	0.0	0.0	0.0	0.2	-0.1	0.2	----	----
as left span	4920	80.0	813.3	423.7	389.6	812.6	426.0	386.5	1.0008	0.9946
								Average Correction Factor	1.0088	1.0100

Corrected As found	NO_X = 793.4 ppb	NO = 777.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-2.8%
Previous Response	NO_X = 816.0 ppb	NO = 802.6 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)	796.0	420.2	389.6	387.0	1.0066	99.3%
2nd GPT point (200 ppb O3)	796.0	620.1	189.7	186.4	1.0175	98.3%
3rd GPT point (100 ppb O3)	796.0	707.0	102.8	100.4	1.0235	97.7%
				Average Correction Factor	1.0159	98.4%

Notes: Adjusted the span only.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

NO_X Calibration Summary

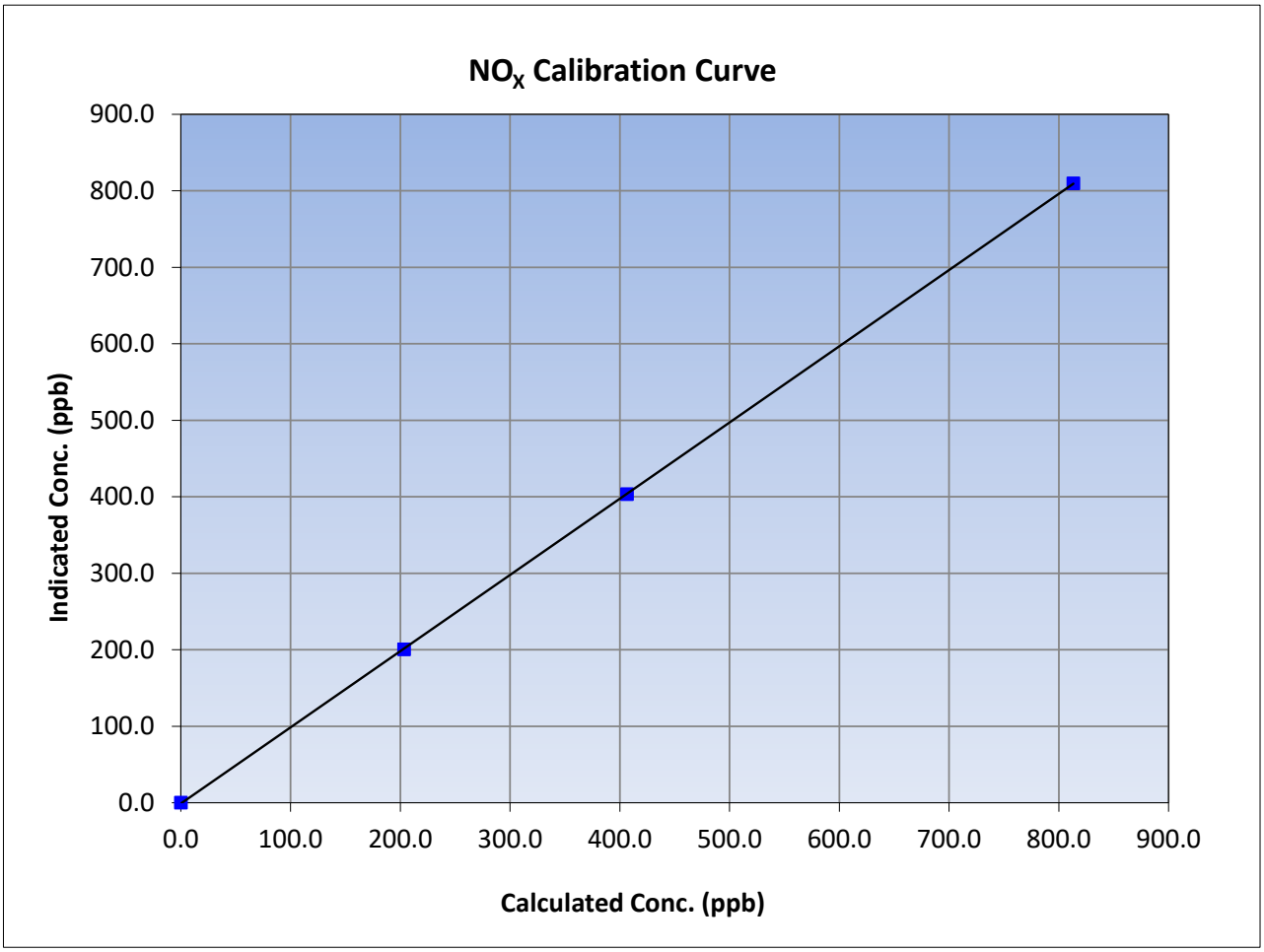
Version-04-2020

Station Information

Calibration Date:	September 6, 2023	Previous Calibration:	August 9, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	8:39	End Time (MST):	12:55
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	0.999991	≥0.995
813.3	809.9	1.0042			
406.6	403.4	1.0080	Slope	0.996459	0.90 - 1.10
203.3	200.5	1.0141			
			Intercept	-1.100000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

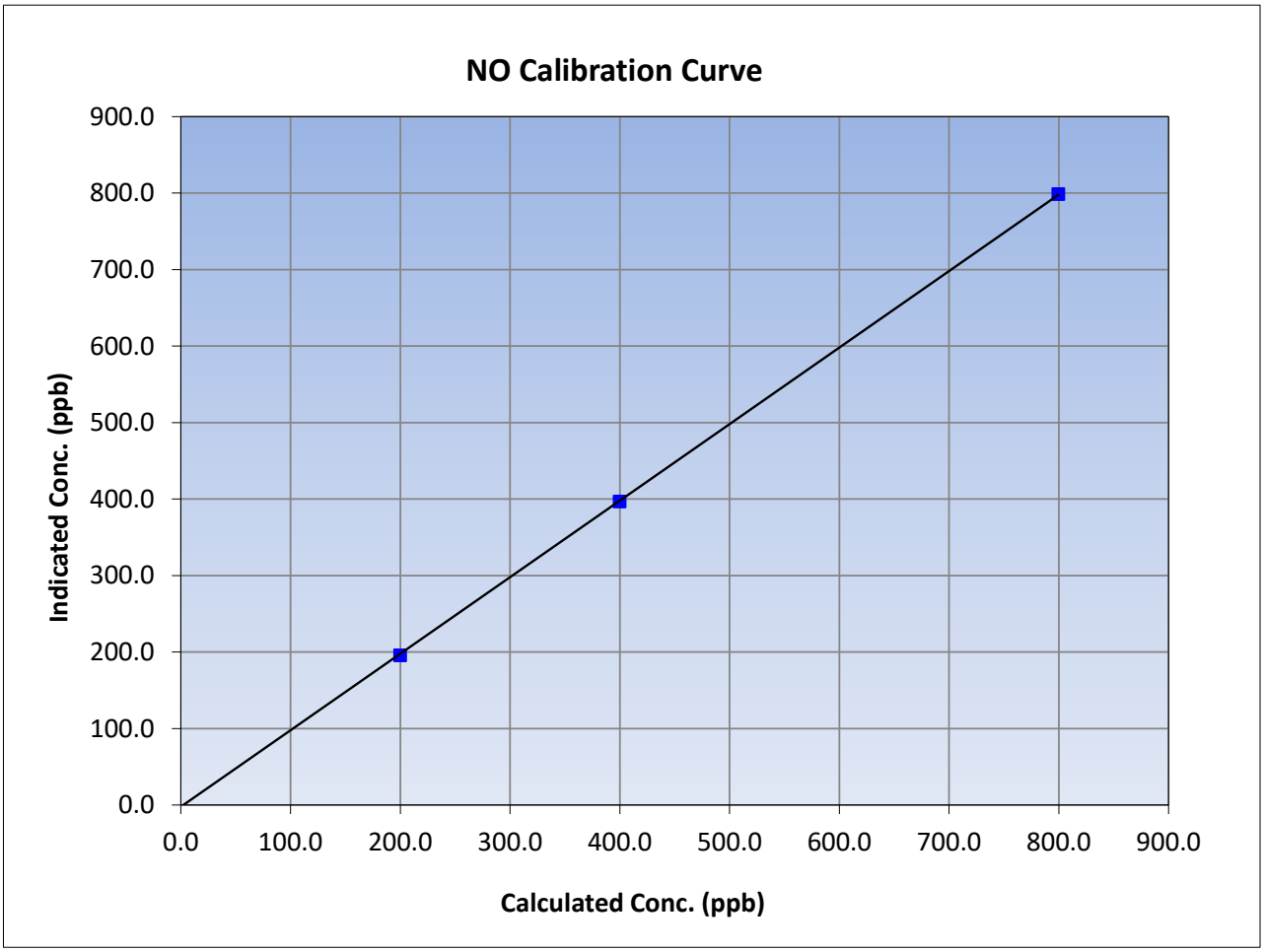
Version-04-2020

Station Information

Calibration Date:	September 6, 2023	Previous Calibration:	August 9, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	8:39	End Time (MST):	12:55
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	-0.2	----	Correlation Coefficient	0.999970	≥0.995
799.5	798.7	1.0010			
399.8	396.7	1.0077	Slope	1.000500	0.90 - 1.10
199.9	195.7	1.0214			
			Intercept	-2.240000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

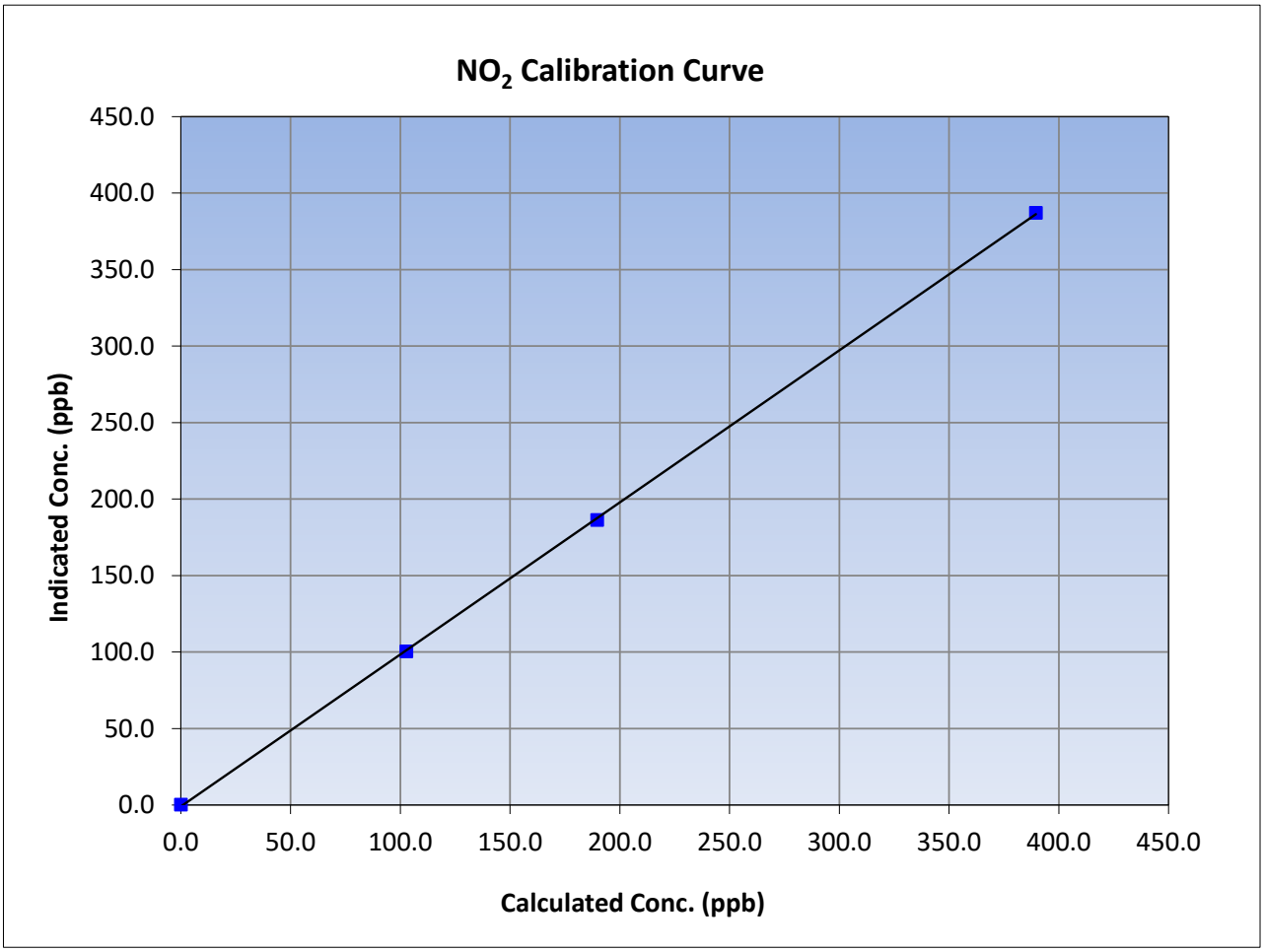
Version-04-2020

Station Information

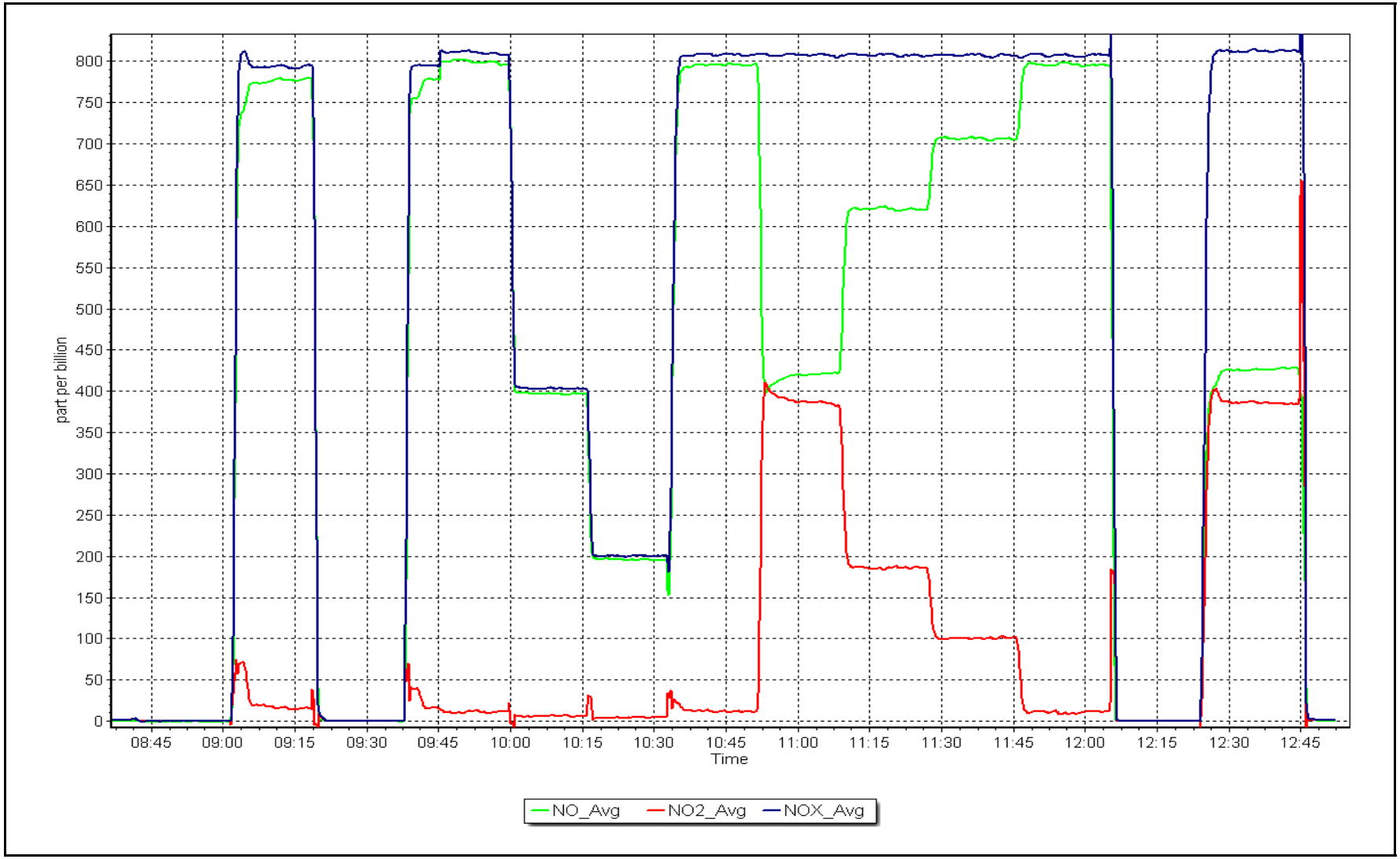
Calibration Date:	September 6, 2023	Previous Calibration:	August 9, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	8:39	End Time (MST):	12:55
Analyzer make:	Thermo 42i	Analyzer serial #:	710321429

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999952	≥0.995
389.6	387.0	1.0066			
189.7	186.4	1.0175	Slope	0.993934	0.90 - 1.10
102.8	100.4	1.0235			
			Intercept	-0.960703	+/-20



NO_X Calibration Plot Date: September 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:	September 8, 2023	Last Cal Date:	August 25, 2023
Start time (MST):	11:28	End time (MST):	12:20
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)	19.7	19.5	19.7	☐	
P (mmHg)	733.6	735.9	733.6	☐	+/- 10 mmHg
flow (LPM)	4.98	4.75	4.98	☐	+/- 0.25 LPM

Leak Test: Date of check: September 8, 2023 Last Cal Date: August 25, 2023

PM w/o HEPA: 17.4 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	10.6	10.2	10.8	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 12.6 w/ HEPA: 0 <0.2 ug/m3

Date Optical Chamber Cleaned: September 8, 2023

Disposable Filter Changed: September 8, 2023

Annual Maintenance

Date Sample Tube Cleaned:

Date RH/T Sensor Cleaned:

Notes: Adjusted PMT peak test. Inlet head still clean.

Calibration by: Denny Ray Estador

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS505
SAWBONES BAY
SEPTEMBER 2023

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

October 30, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Sawbones Bay	Station number:	AMS505
Calibration Date:	September 22, 2023	Last Cal Date:	August 9, 2023
Start time (MST):	8:28	End time (MST):	11:18
Reason:	Routine		

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:	1.000823	1.000437	Backgd or Offset:	19.2	19.3
Calibration intercept:	-0.552184	-0.691921	Coeff or Slope:	0.995	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	0.1	----
as found span	4922	77.8	799.8	799.2	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	----
high point	4922	77.8	799.8	799.6	1.000
second point	4961	38.9	399.9	400.1	1.000
third point	4981	19.5	200.4	197.9	1.013
as left zero	5000	0.0	0.0	0.5	----
as left span	4922	77.8	799.8	804.3	0.994
				Average Correction Factor	1.004

Baseline Corr As found:	799.10	Previous response	799.92	*% 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. Adjusted span only.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

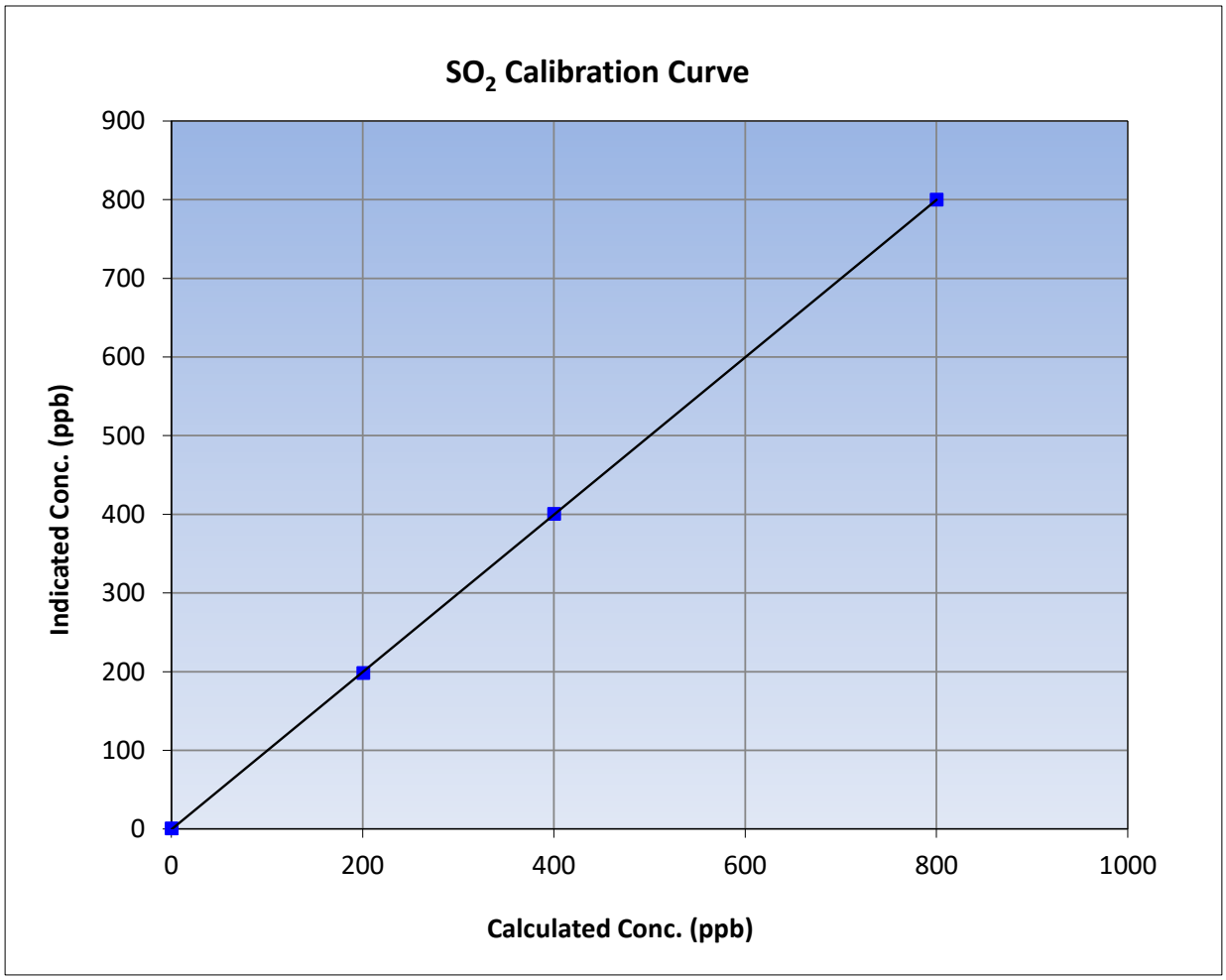
Station Information

Calibration Date:	September 22, 2023	Previous Calibration:	August 9, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:28	End Time (MST):	11:18
Analyzer make:	Thermo 43i	Analyzer serial #:	0710321323

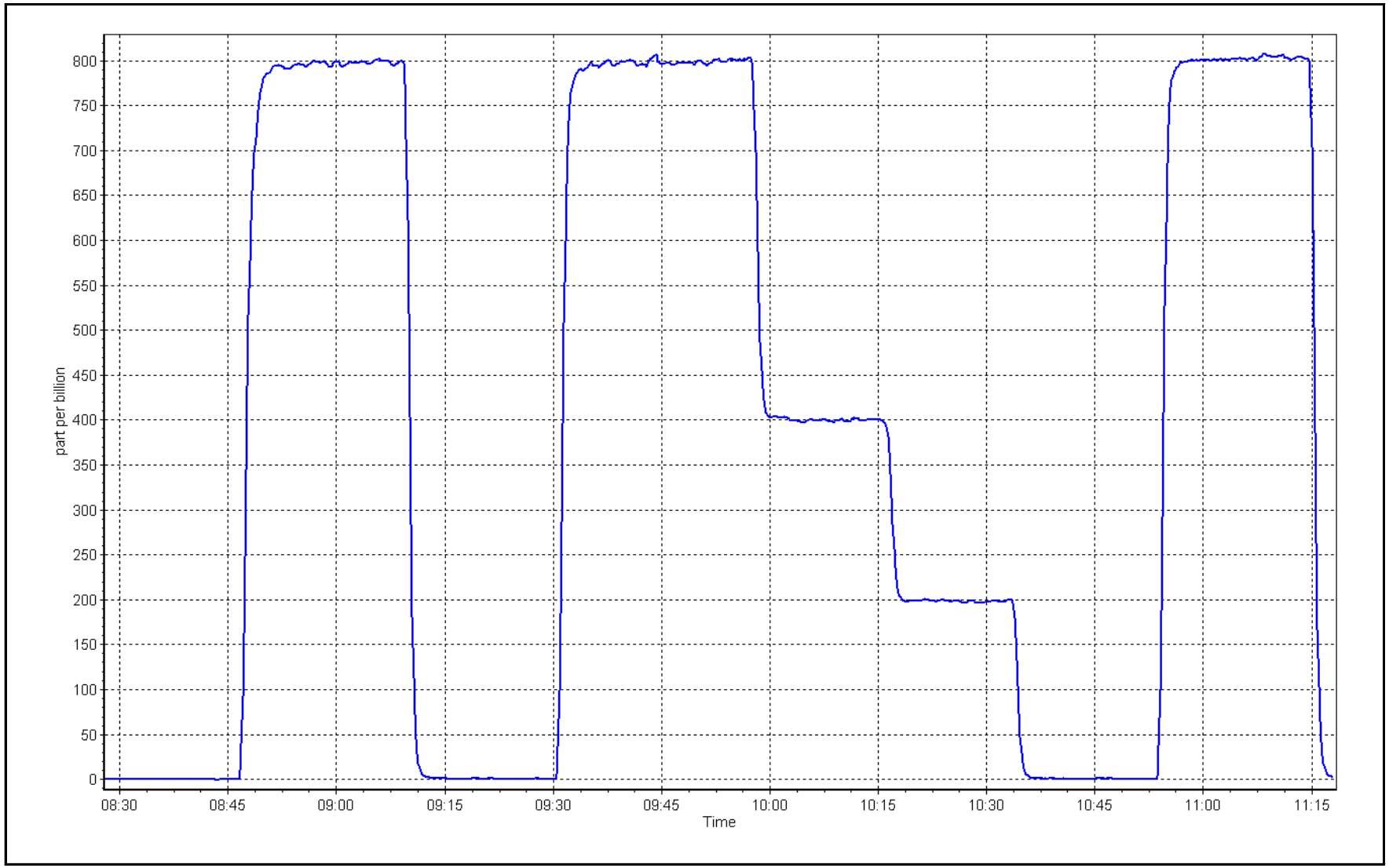
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
799.8	799.6	1.0003
399.9	400.1	0.9995
200.4	197.9	1.0128

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999984	*≥0.995*
Slope	1.000437	*0.90 - 1.10*
Intercept	-0.691921	*+/-30*



SO2 Calibration Plot Date: September 22, 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:	September 21, 2023	Last Cal Date:	August 30, 2023
Start time (MST):	8:18	End time (MST):	12:16
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:	0.998506	1.003503	Backgd or Offset:	2.21	2.21
Calibration intercept:	-0.018155	0.081954	Coeff or Slope:	1.021	1.021

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	80.8	0.992
as found 2nd point	4961	38.8	40.0	40.5	0.989
as found 3rd point	4981	19.4	20.0	20.1	0.999
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4922	77.7	80.0	80.4	0.995
second point	4961	38.8	40.0	40.2	0.994
third point	4981	19.4	20.0	20.1	0.994
as left zero	5000	0.0	0.0	0.2	----
as left span	4922	77.7	80.0	80.1	0.999
SO2 Scrubber Check	4922	77.8	778.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.995
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.7	Prev response:	79.90	*% change:	1.0%
Baseline Corr 2nd AF pt:	40.4	AF Slope:	1.009071	AF Intercept:	0.062101
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999992		

* = > +/-5% change initiates investigation

Notes: Changed inlet filter 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

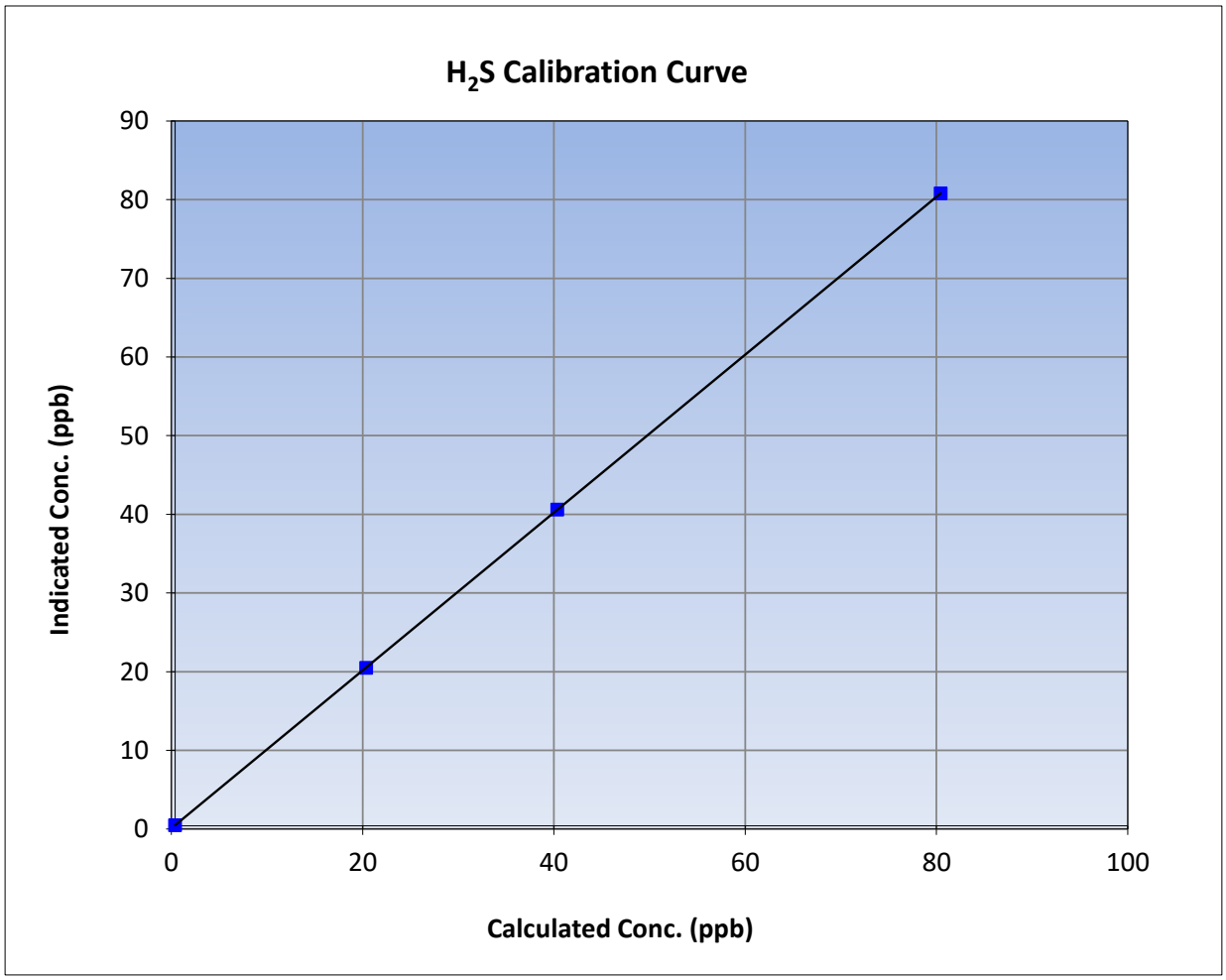
Station Information

Calibration Date:	September 21, 2023	Previous Calibration:	August 30, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:18	End Time (MST):	12:16
Analyzer make:	Thermo 43iQ	Analyzer serial #:	1228021057

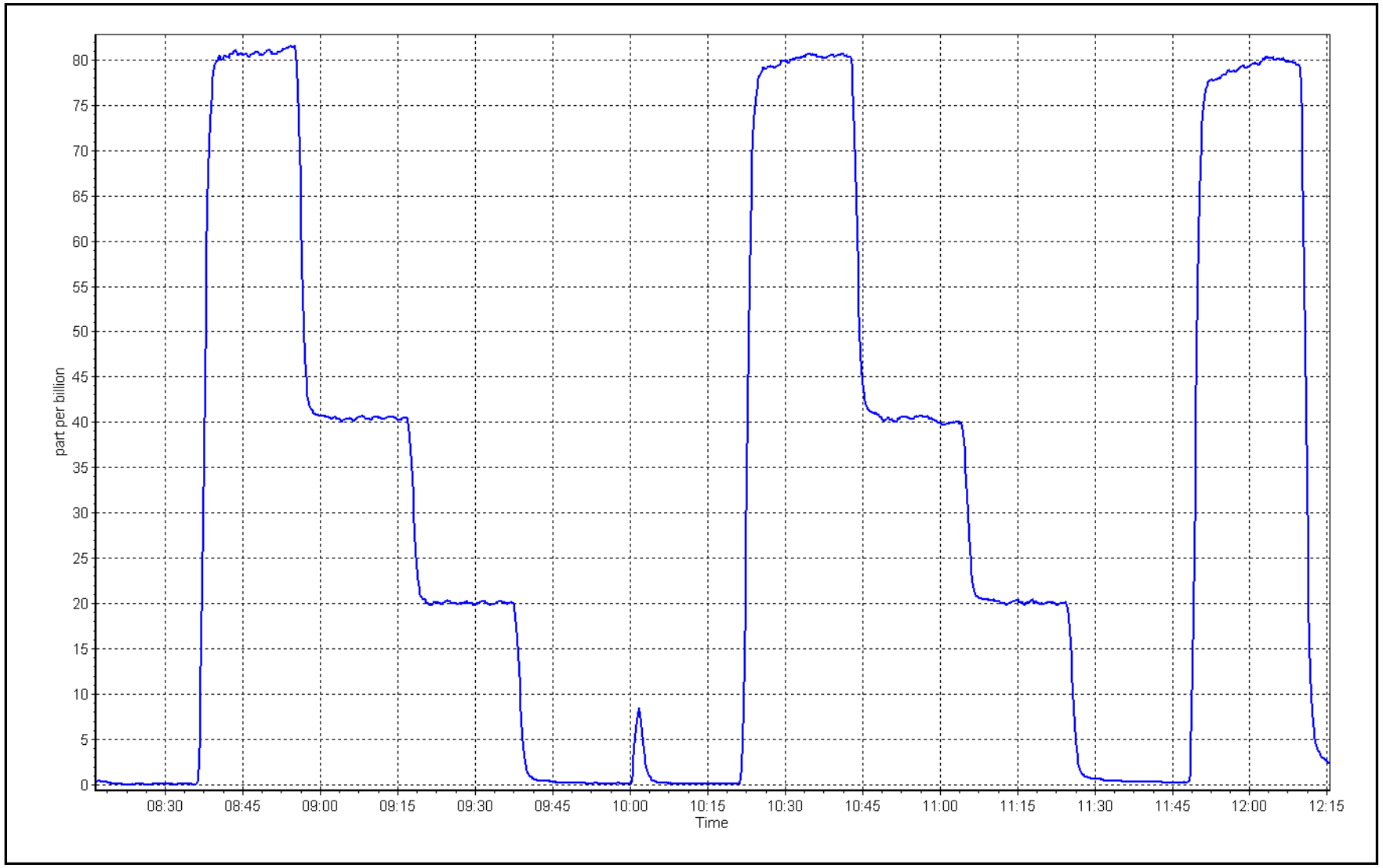
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.4	0.9955
40.0	40.2	0.9942
20.0	20.1	0.9940

Statistical Evaluation		Limits
Correlation Coefficient	1.000000	≥0.995
Slope	1.003503	0.90 - 1.10
Intercept	0.081954	+/-3



H_2S Calibration Plot Date: September 21, 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:	September 20, 2023	Last Cal Date:	August 4, 2023
Start time (MST):	8:36	End time (MST):	13:00
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:	1.038	1.055	NO bkgnd or offset:	-0.1	0.4
NOX coeff or slope:	1.036	1.052	NOX bkgnd or offset:	3.1	1.3
NO2 coeff or slope:	NA	NA	Reaction cell Press:	8.3	7.8

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.003179	1.001507
NO_X Cal Offset:	-3.190449	-1.530484
NO Cal Slope:	1.001620	1.001793
NO Cal Offset:	-2.069911	-1.830393
NO_2 Cal Slope:	1.000764	0.999010
NO_2 Cal Offset:	-1.369113	0.464663

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.7	0.0	0.6	----	----
as found span	4917	83.4	799.6	799.6	0.0	786.4	783.8	2.6	1.0168	1.0201
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
high point	4917	83.4	799.6	799.6	0.0	799.7	799.9	-0.3	0.9998	0.9996
second point	4958	41.7	399.8	399.8	0.0	398.8	398.2	0.6	1.0026	1.0041
third point	4979	20.9	200.4	200.4	0.0	197.6	197.1	0.5	1.0141	1.0167
as left zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.1	-0.3	----	----
as left span	4916	83.4	799.7	339.8	459.9	793.6	335.7	457.9	1.0077	1.0123
								Average Correction Factor	1.0055	1.0068

Corrected As found	NO_X = 785.7 ppb	NO = 783.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-1.7%
Previous Response	NO_X = 798.9 ppb	NO = 798.8 ppb		*Percent Change	NO =	-1.9%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	795.2	335.3	459.9	459.5	1.0009	99.9%
2nd GPT point (200 ppb O3)	795.2	539.3	255.9	256.5	0.9977	100.2%
3rd GPT point (100 ppb O3)	795.2	643.4	151.8	152.7	0.9941	100.6%
				Average Correction Factor	0.9975	100.2%

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

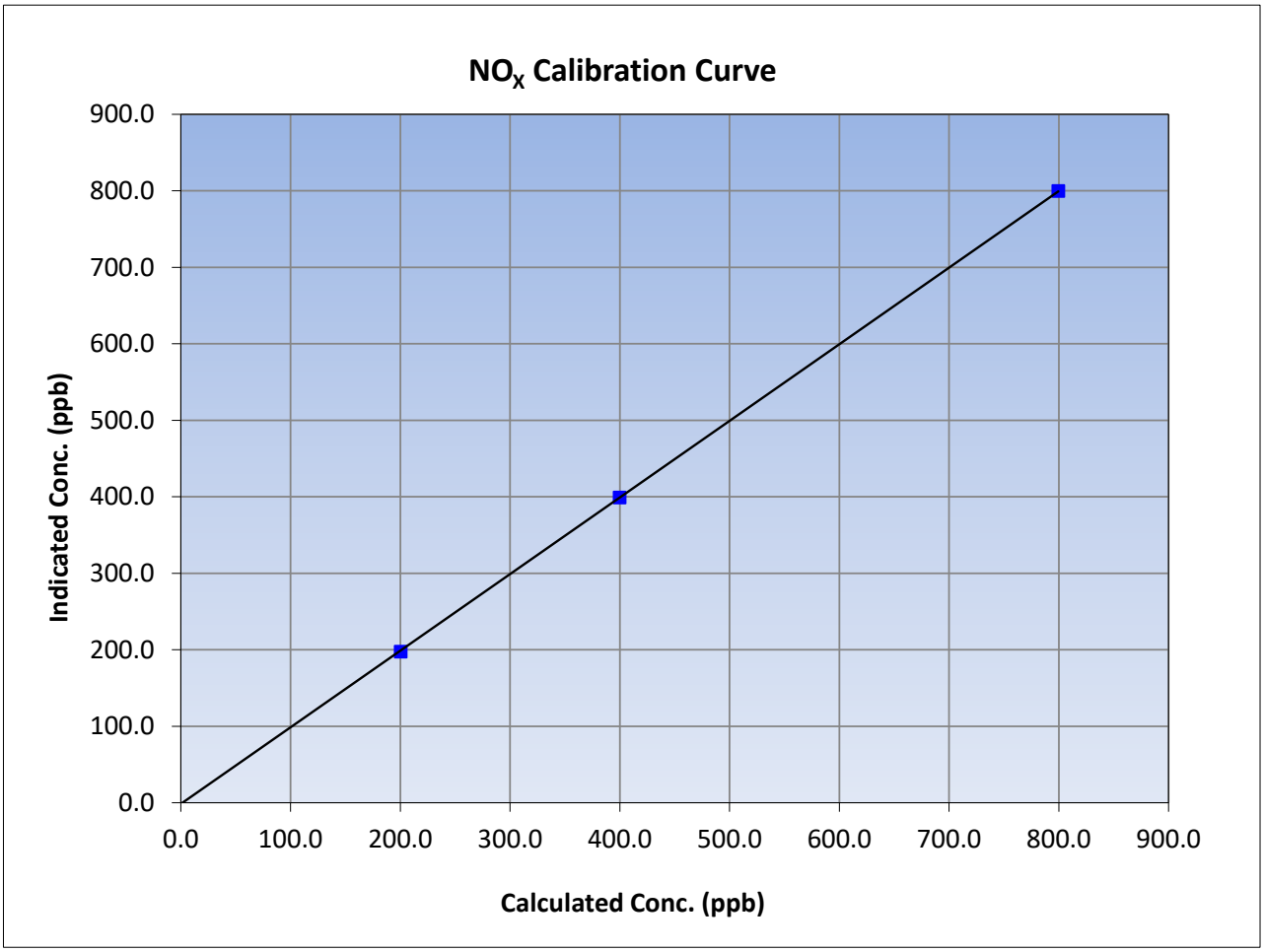
Version-04-2020

Station Information

Calibration Date:	September 20, 2023	Previous Calibration:	August 4, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:36	End Time (MST):	13:00
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	-0.3	----	Correlation Coefficient	0.999988	≥0.995
799.6	799.7	0.9998			
399.8	398.8	1.0026	Slope	1.001507	0.90 - 1.10
200.4	197.6	1.0141			
			Intercept	-1.530484	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

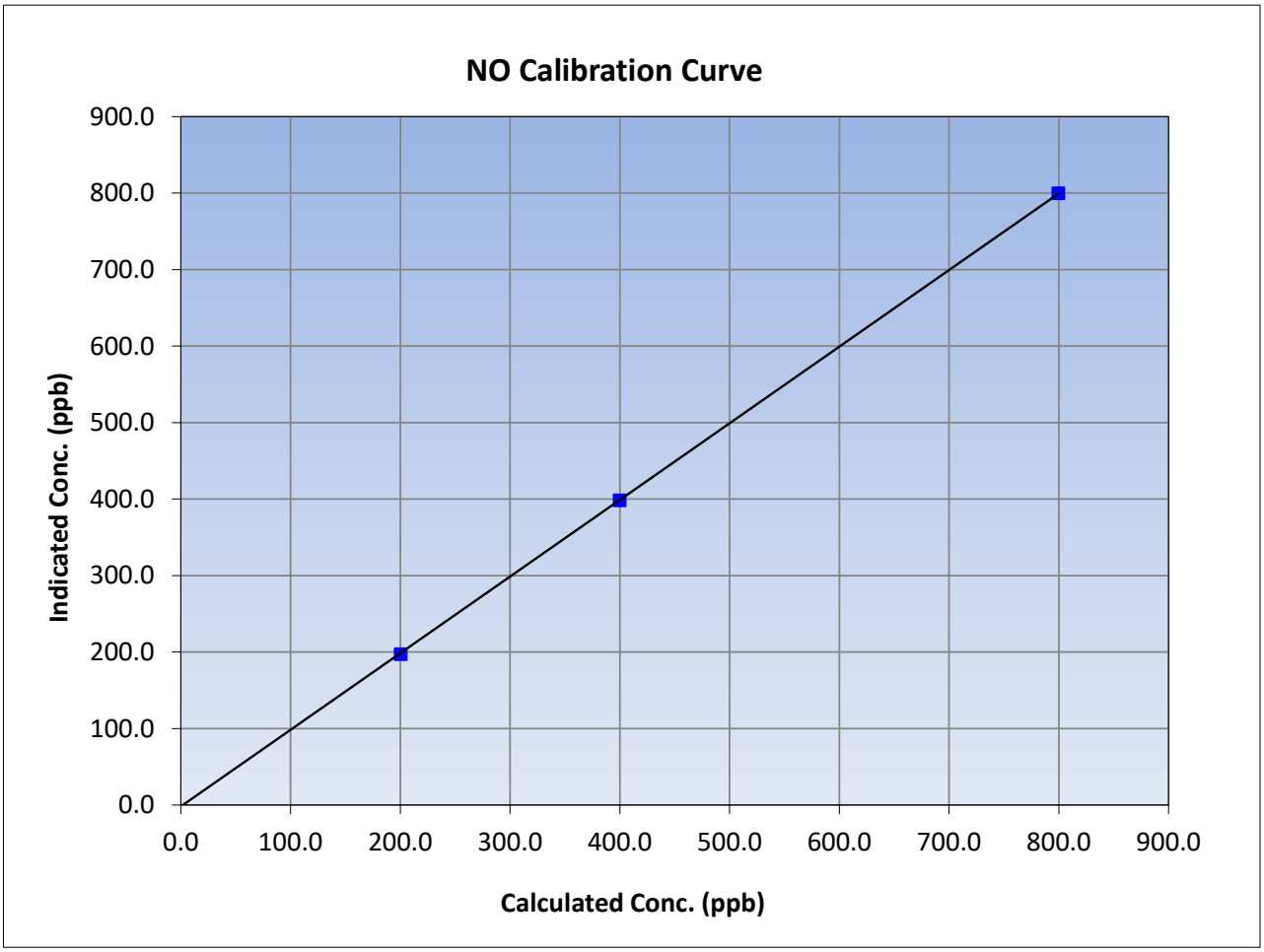
Version-04-2020

Station Information

Calibration Date:	September 20, 2023	Previous Calibration:	August 4, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:36	End Time (MST):	13:00
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	0.999981	≥0.995
799.6	799.9	0.9996			
399.8	398.2	1.0041	Slope	1.001793	0.90 - 1.10
200.4	197.1	1.0167			
			Intercept	-1.830393	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

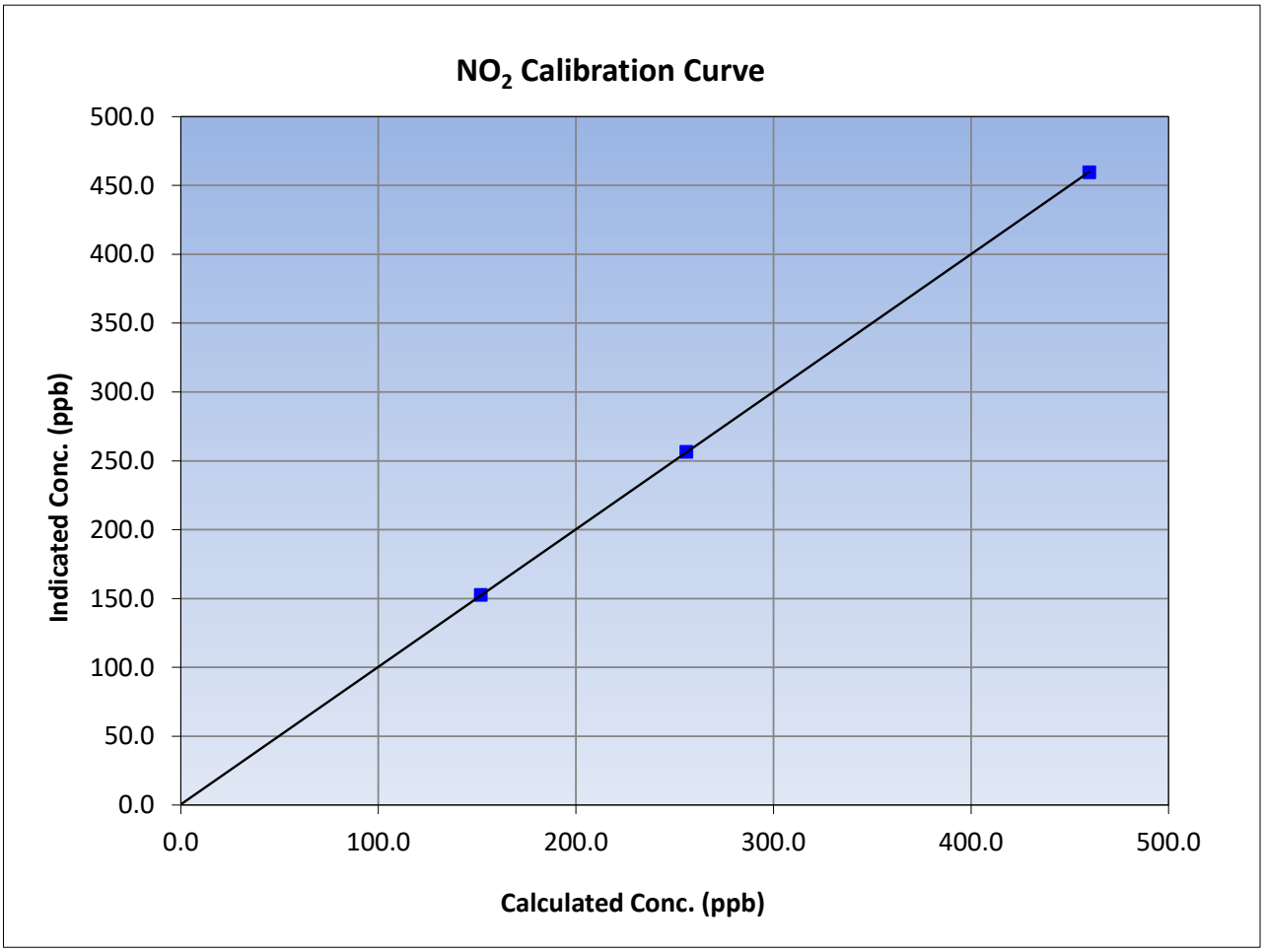
Version-04-2020

Station Information

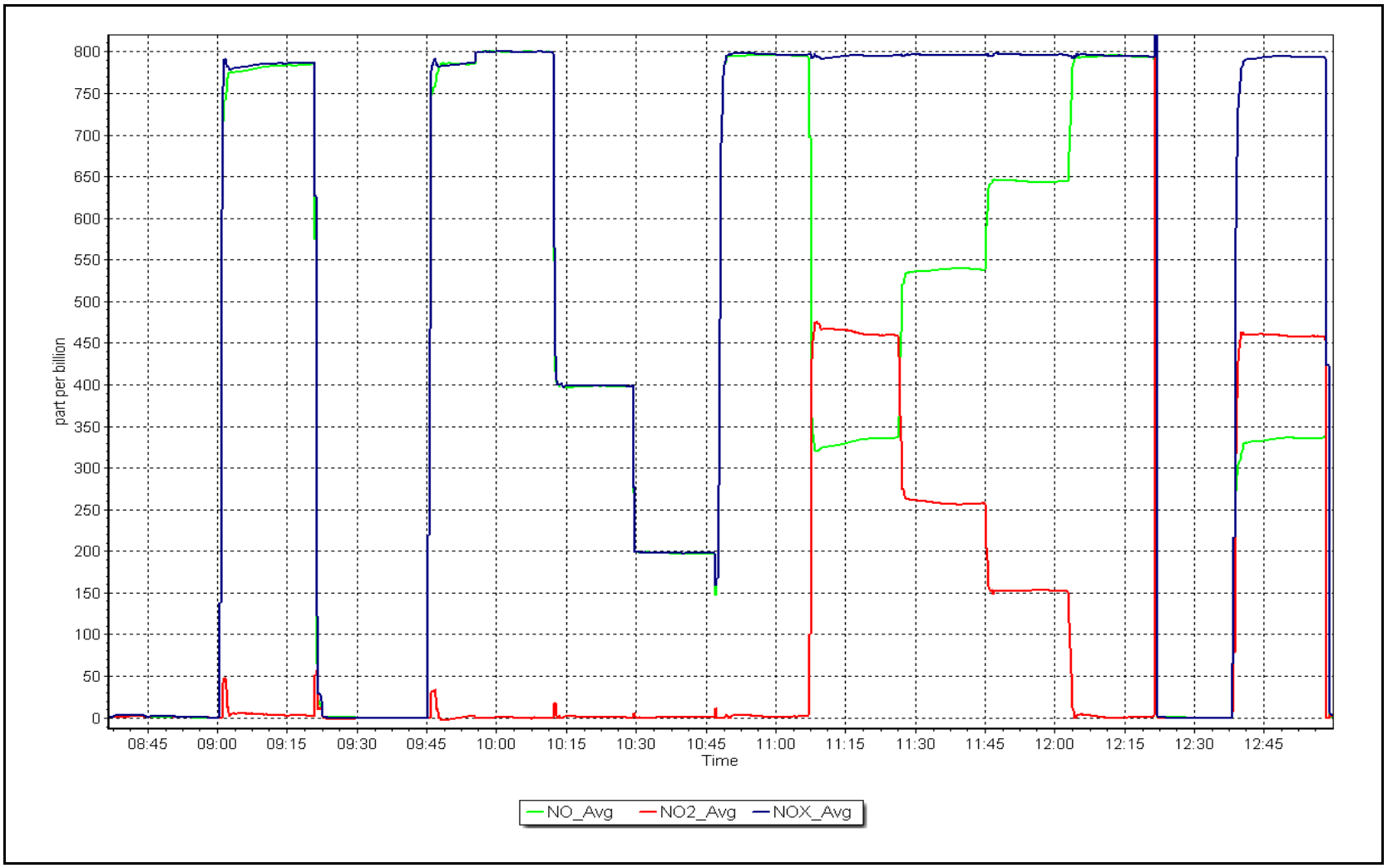
Calibration Date:	September 20, 2023	Previous Calibration:	August 4, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:36	End Time (MST):	13:00
Analyzer make:	API T200	Analyzer serial #:	4260

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999991	≥0.995
459.9	459.5	1.0009			
255.9	256.5	0.9977	Slope	0.999010	0.90 - 1.10
151.8	152.7	0.9941			
			Intercept	0.464663	+/-20



NO_X Calibration Plot Date: September 20, 2023 Location: Sawbones Bay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS507
KIRBY SOUTH
SEPTEMBER 2023

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

October 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Kirby South	Station number:	AMS 507
Calibration Date:	September 14, 2023	Last Cal Date:	August 3, 2023
Start time (MST):	9:47	End time (MST):	12:39
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.18	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC303554			
Removed Cal Gas Conc:	49.18	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3804
ZAG Make/Model:	API T701H		Serial Number:	880

Analyzer Information

Analyzer make: Thermo 43iQ — Analyzer serial #: 1182340007

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	0.999847	1.004608	Backgd or Offset:	19.0	20.1
Calibration intercept:	-1.128170	-0.669160	Coeff or Slope:	1.135	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	5000	0.0	0.0	0.8	----
as found span	4919	81.3	799.6	804.0	0.995
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.4	----
high point	4919	81.3	799.6	803.0	0.996
second point	4959	40.7	400.3	400.7	0.999
third point	4980	20.3	199.7	200.1	0.998
as left zero	5000	0.0	0.0	-0.5	----
as left span	4919	81.3	799.6	803.0	0.996
				Average Correction Factor	0.998

Baseline Corr As found:	803.20	Previous response	798.37	*% change	0.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

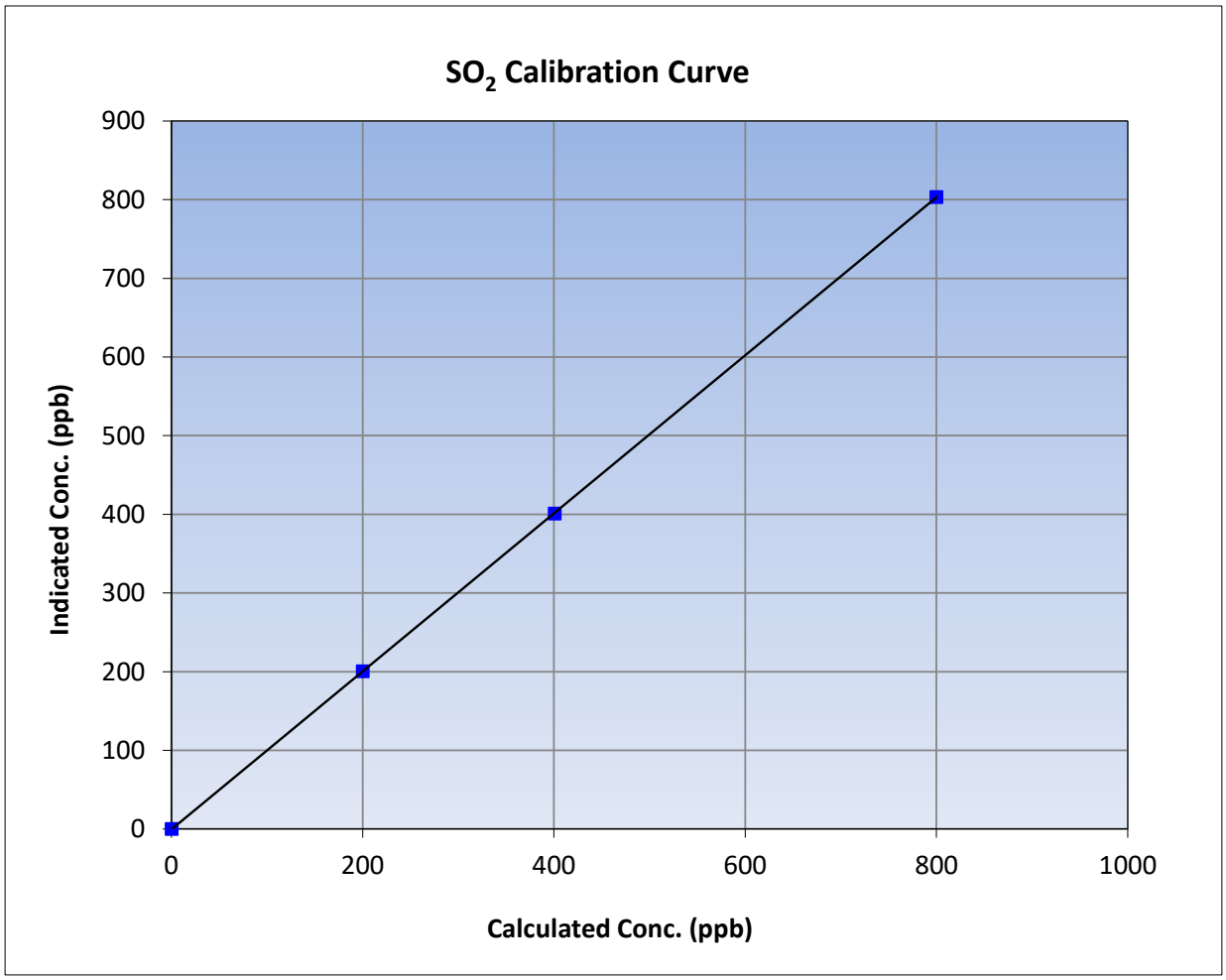
Station Information

Calibration Date:	September 14, 2023	Previous Calibration:	August 3, 2023
Station Name:	Kirby South	Station Number:	AMS 507
Start Time (MST):	9:47	End Time (MST):	12:39
Analyzer make:	Thermo 43iQ	Analyzer serial #:	1182340007

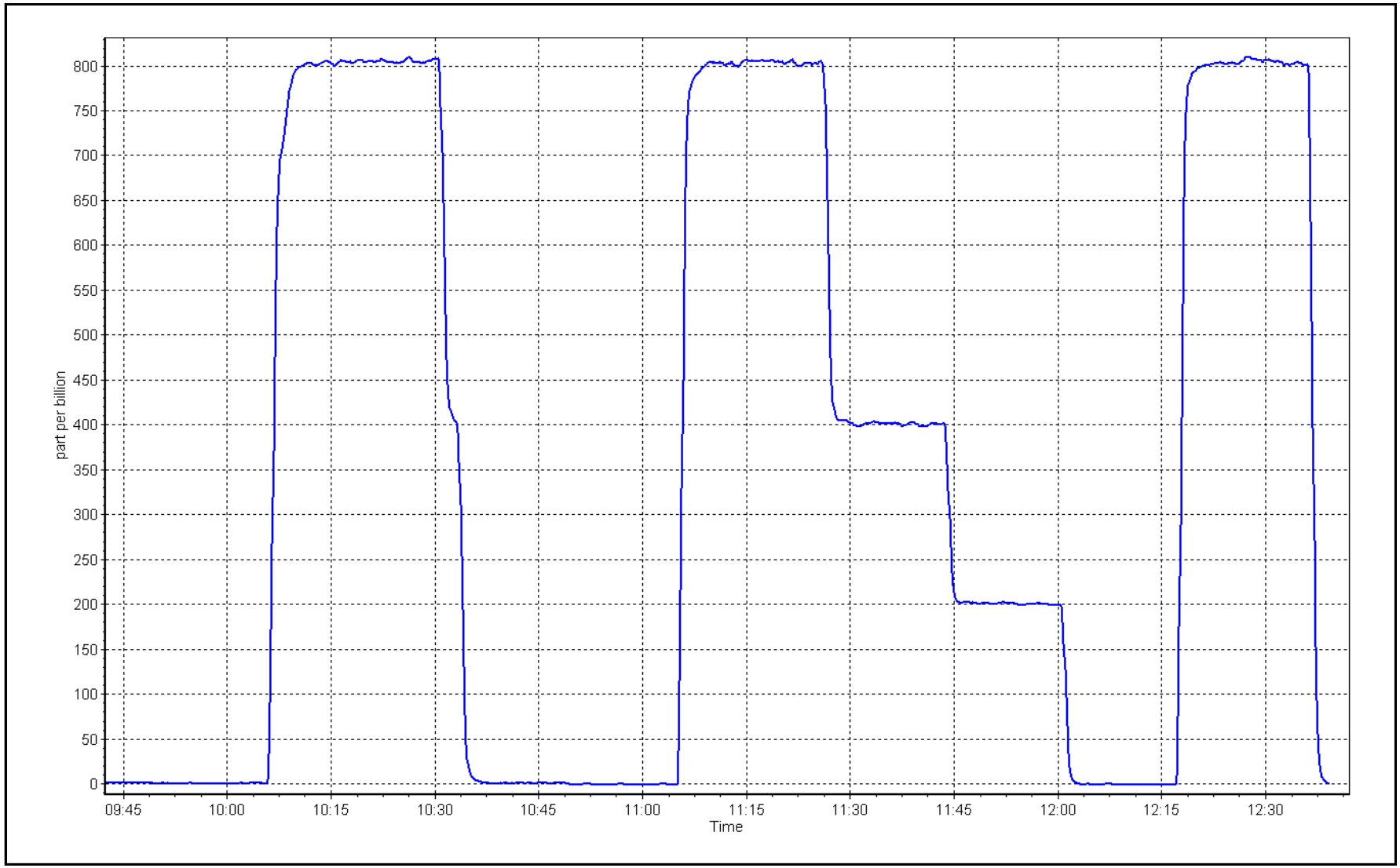
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.4	----
799.6	803.0	0.9958
400.3	400.7	0.9991
199.7	200.1	0.9978

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999997	*≥0.995*
Slope	1.004608	*0.90 - 1.10*
Intercept	-0.669160	*+/-30*



SO2 Calibration Plot Date: September 14, 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:	September 14, 2023	Last Cal Date:	August 2, 2023
Start time (MST):	12:39	End time (MST):	17:10
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.167	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517378			
Removed Cal Gas Conc:	5.167	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3804
ZAG Make/Model:	API T701H		Serial Number:	880

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1150840012	
Converter make:	Global		Converter serial #:	2022-197	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001457	0.992888	Backgd or Offset:	1.53	1.54
Calibration intercept:	0.019070	0.019018	Coeff or Slope:	1.048	1.048

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	79.5	1.006
as found 2nd point	4961	38.8	40.1	39.5	1.015
as found 3rd point	4981	19.3	19.9	19.7	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	0.1	----
high point	4923	77.4	80.0	79.5	1.006
second point	4961	38.8	40.1	39.7	1.010
third point	4981	19.3	19.9	19.8	1.007
as left zero	5000	0.0	0.0	0.2	----
as left span	4923	77.4	80.0	79.0	1.012
SO2 Scrubber Check	4919	80.0	800.2	-0.1	----
Date of last scrubber change:		25-Jul-23		Ave Corr Factor	1.008
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.5	Prev response:	80.11	*% change:	-0.8%
Baseline Corr 2nd AF pt:	39.5	AF Slope:	0.994027	AF Intercept:	-0.120860
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999975		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. Scrubber check done after MPAF's, passed. No adjustments made.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

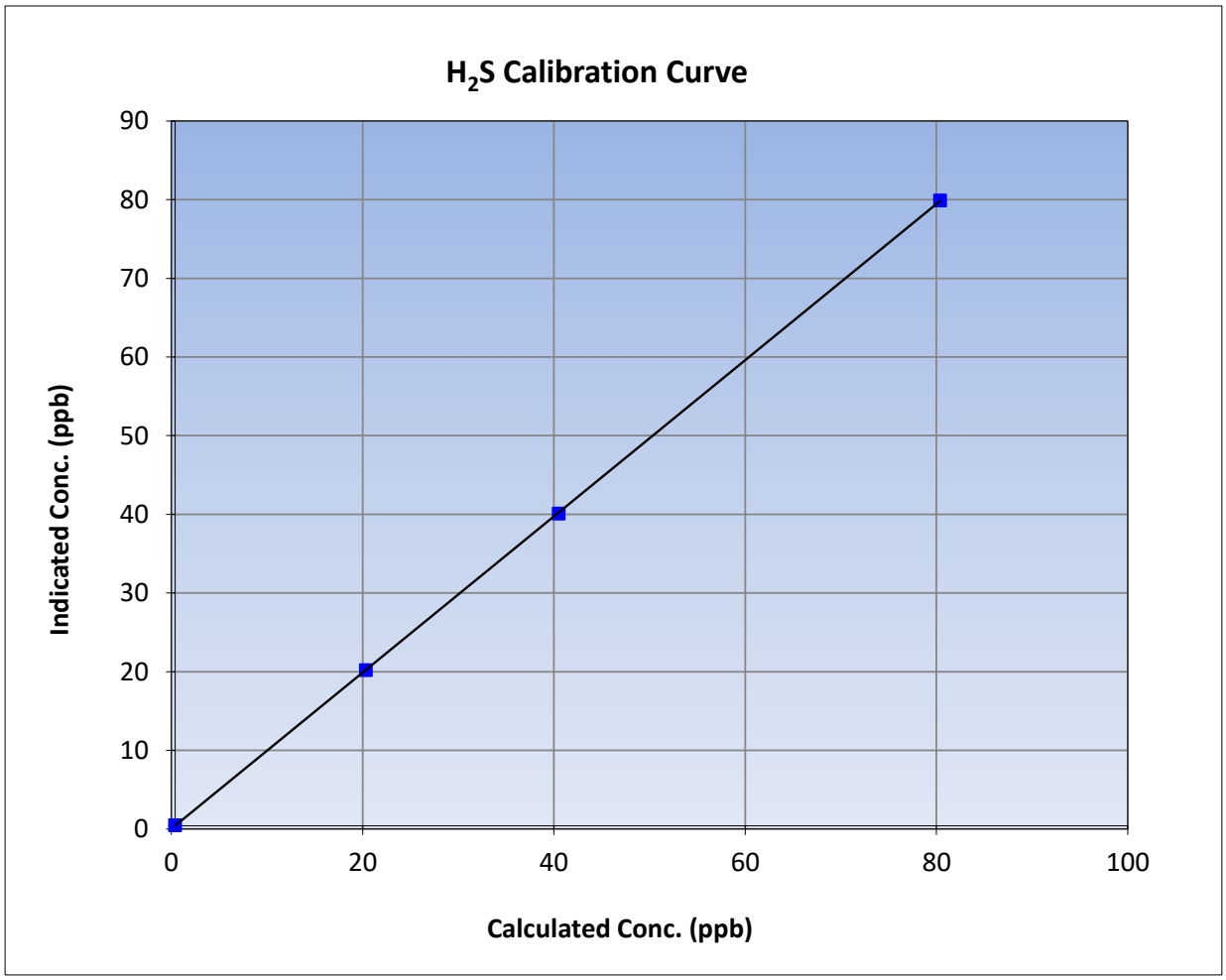
Station Information

Calibration Date:	September 14, 2023	Previous Calibration:	August 2, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	12:39	End Time (MST):	17:10
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1150840012

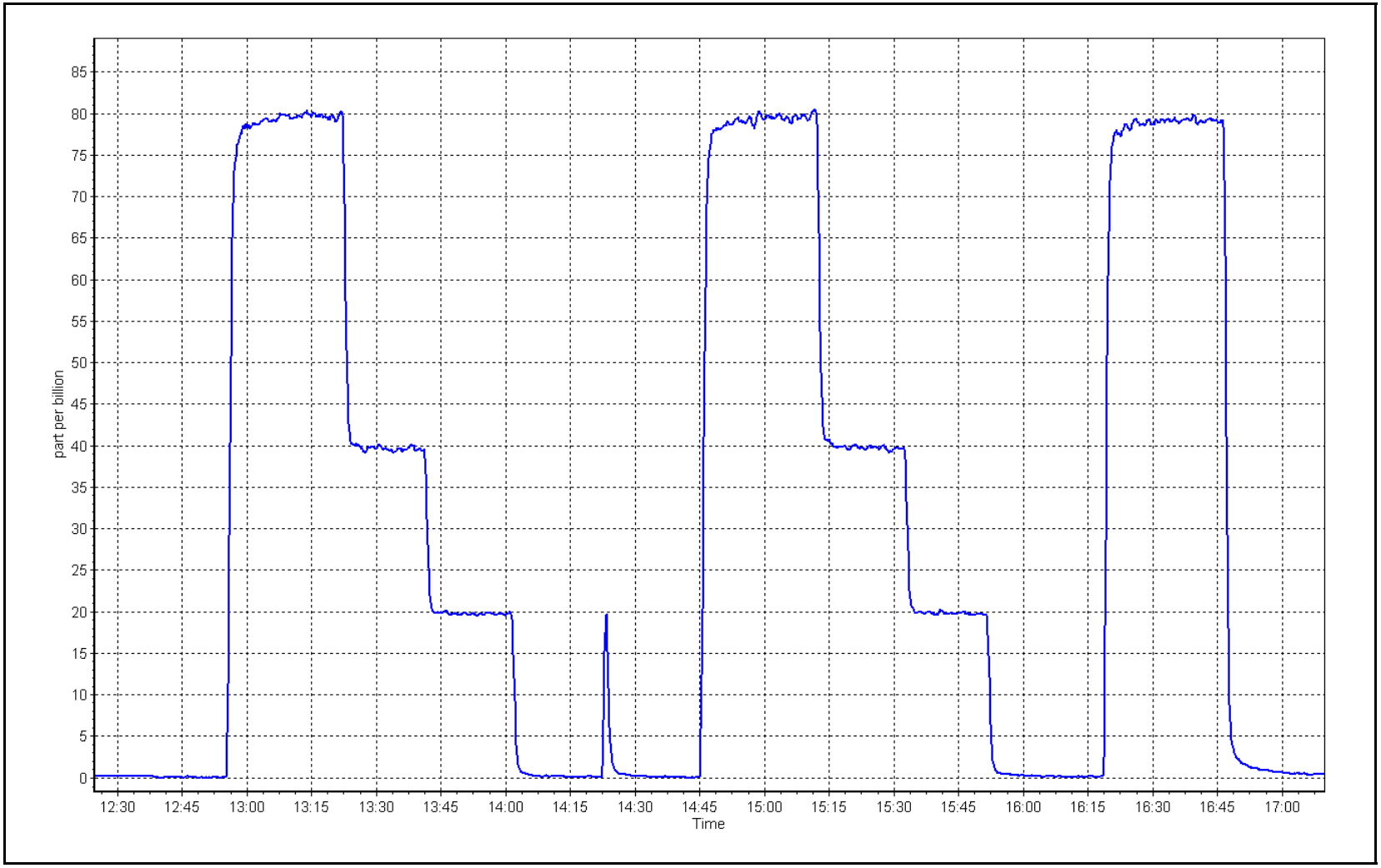
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	79.5	1.0060
40.1	39.7	1.0100
19.9	19.8	1.0072

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	0.992888	*0.90 - 1.10*
Intercept	0.019018	*+/-3*



H_2S Calibration Plot Date: September 14, 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:	September 14, 2023	Last Cal Date:	August 3, 2023
Start time (MST):	9:47	End time (MST):	12:39
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC303554	Cal Gas Expiry Date:	March 23, 2025	
CH4 Cal Gas Conc.	496.6	ppm	CH4 Equiv Conc.	1061.7	ppm
C3H8 Cal Gas Conc.	205.5	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	496.6	ppm	CH4 Equiv Conc.	1061.7	ppm
Removed C3H8 Conc.	205.5	ppm	Diff between cyl:		
Calibrator Make/Model:	API T700		Serial Number:	3804	
ZAG Make/Model:	API T701H		Serial Number:	880	

Analyzer Information

Analyzer make:	Thermo 51i		Analyzer serial #:	1182340005	
Analyzer Range:	0 - 20 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999381	0.999942	Background:	2.64	2.83
Calibration intercept:	-0.016800	0.005209	Coefficient:	3.799	3.975

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	-0.07	----
as found span	4919	81.3	17.26	16.50	1.046
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	17.29	0.998
second point	4959	40.7	8.64	8.61	1.004
third point	4980	20.3	4.31	4.30	1.003
as left zero	5000	0.0	0.00	0.01	----
as left span	4919	81.3	17.26	17.18	1.005
				Average Correction Factor	1.002

Baseline Corr As found:	16.57	Previous response	17.24	*% change	-4.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

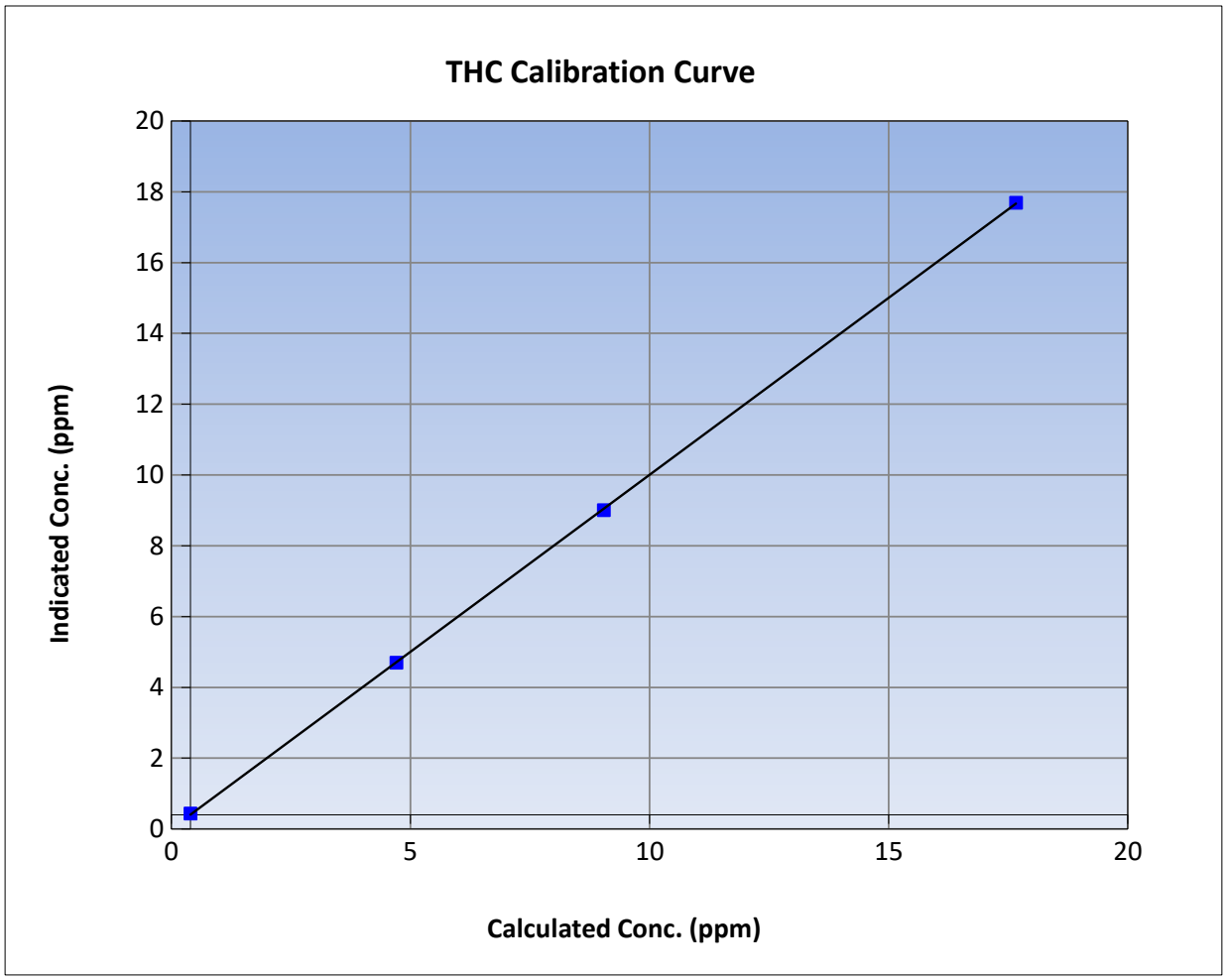
Version-01-2020

Station Information

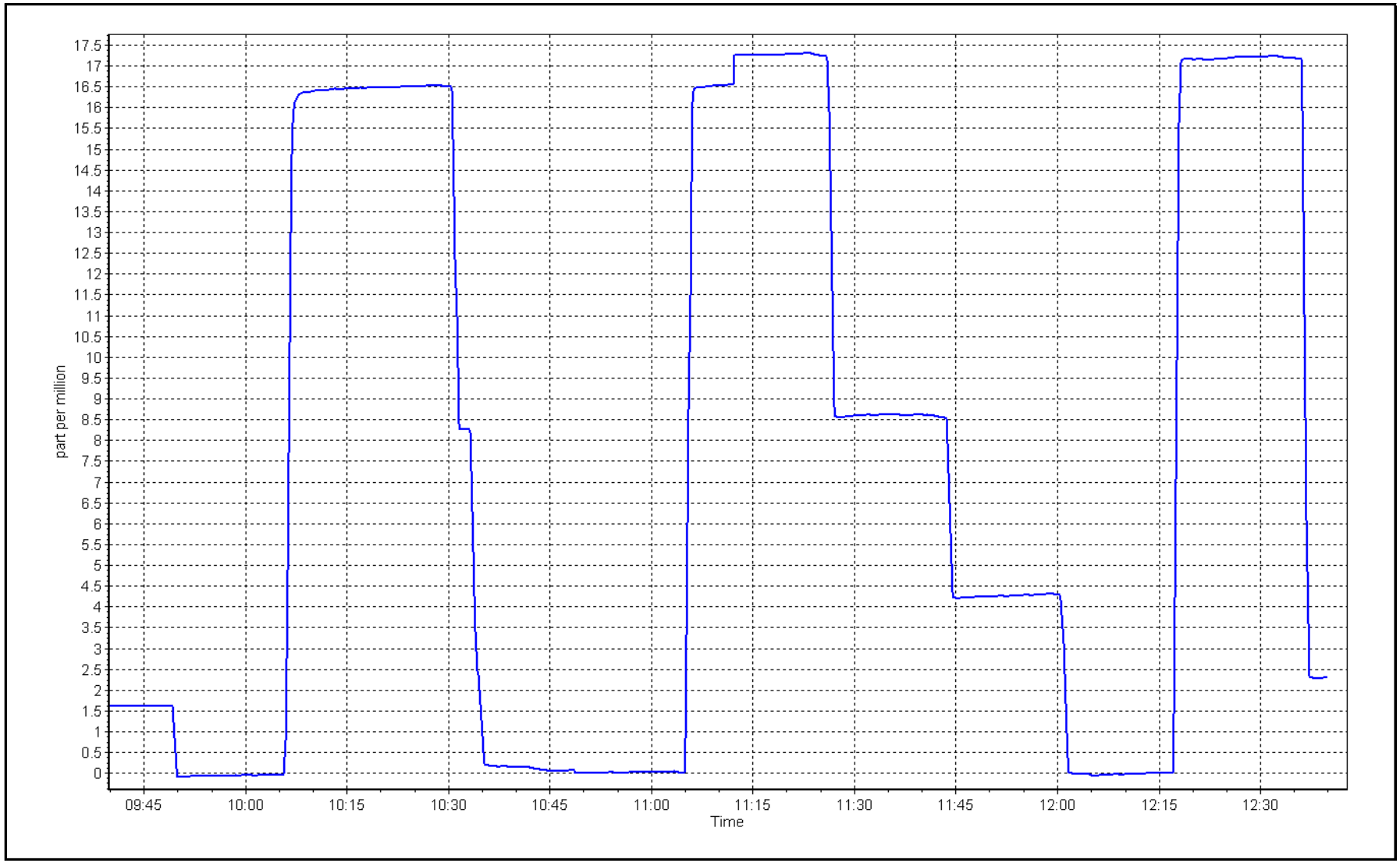
Calibration Date:	September 14, 2023	Previous Calibration:	August 3, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	9:47	End Time (MST):	12:39
Analyzer make:	Thermo 51i	Analyzer serial #:	1182340005

Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.04	----	Correlation Coefficient	0.999980	*≥0.995*
17.26	17.29	0.9984			
8.64	8.61	1.0038	Slope	0.999942	*0.90 - 1.10*
4.31	4.30	1.0029			
			Intercept	0.005209	*+/-1.5*



THC Calibration Plot Date: September 14, 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:	September 15, 2023	Last Cal Date:	August 3, 2023
Start time (MST):	8:45	End time (MST):	13:40
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:		T34ULGL	Cal Gas Expiry Date:	March 8, 2025	
NOX Cal Gas Conc:	49.39	ppm	NO Cal Gas Conc:	49.02	ppm
Removed Cylinder #:		NA	Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	49.39	ppm	Removed Gas NO Conc:	49.02	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3804	
ZAG make/model:	API 701H		Serial Number:	880	

Analyzer Information

Analyzer make:	Thermo 42iQ	Analyzer serial #:	1182340006
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.485	1.485	NO bkgnd or offset:	1.5	1.5
NOX coeff or slope:	0.994	0.994	NOX bkgnd or offset:	1.6	1.6
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	160.75	167.97

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.006090	1.009702
NO_X Cal Offset:	-4.471991	-4.611056
NO Cal Slope:	1.005987	1.011497
NO Cal Offset:	-5.373912	-5.412656
NO_2 Cal Slope:	1.007635	1.004706
NO_2 Cal Offset:	1.168421	1.319502

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.3	0.0	----	----
as found span	4919	81.0	800.1	794.1	6.0	804.0	798.9	5.1	0.9952	0.9940
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	----	----
high point	4919	81.0	800.1	794.1	6.0	806.0	801.0	5.0	0.9927	0.9914
second point	4960	40.5	400.0	397.0	3.0	395.5	391.9	3.6	1.0114	1.0131
third point	4980	20.2	199.5	198.0	1.5	193.5	190.8	2.7	1.0312	1.0379
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	----	----
as left span	4919	81.0	800.1	379.9	420.2	803.0	381.6	420.9	0.9964	0.9956
								Average Correction Factor	1.0118	1.0141

Corrected As found NO_X = 804.3 ppb NO = 799.2 ppb

Previous Response NO_X = 800.5 ppb NO = 793.5 ppb

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

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

* = > +/-5% change initiates investigation

*Percent Change NO_X = 0.5%

*Percent Change NO = 0.7%

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

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

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

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.2	383.0	420.2	422.6	0.9943	100.6%
2nd GPT point (200 ppb O3)	797.2	622.1	181.1	185.2	0.9778	102.3%
3rd GPT point (100 ppb O3)	797.2	716.0	87.2	89.2	0.9775	102.3%
				Average Correction Factor	0.9832	101.7%

Notes: No adjustments made.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

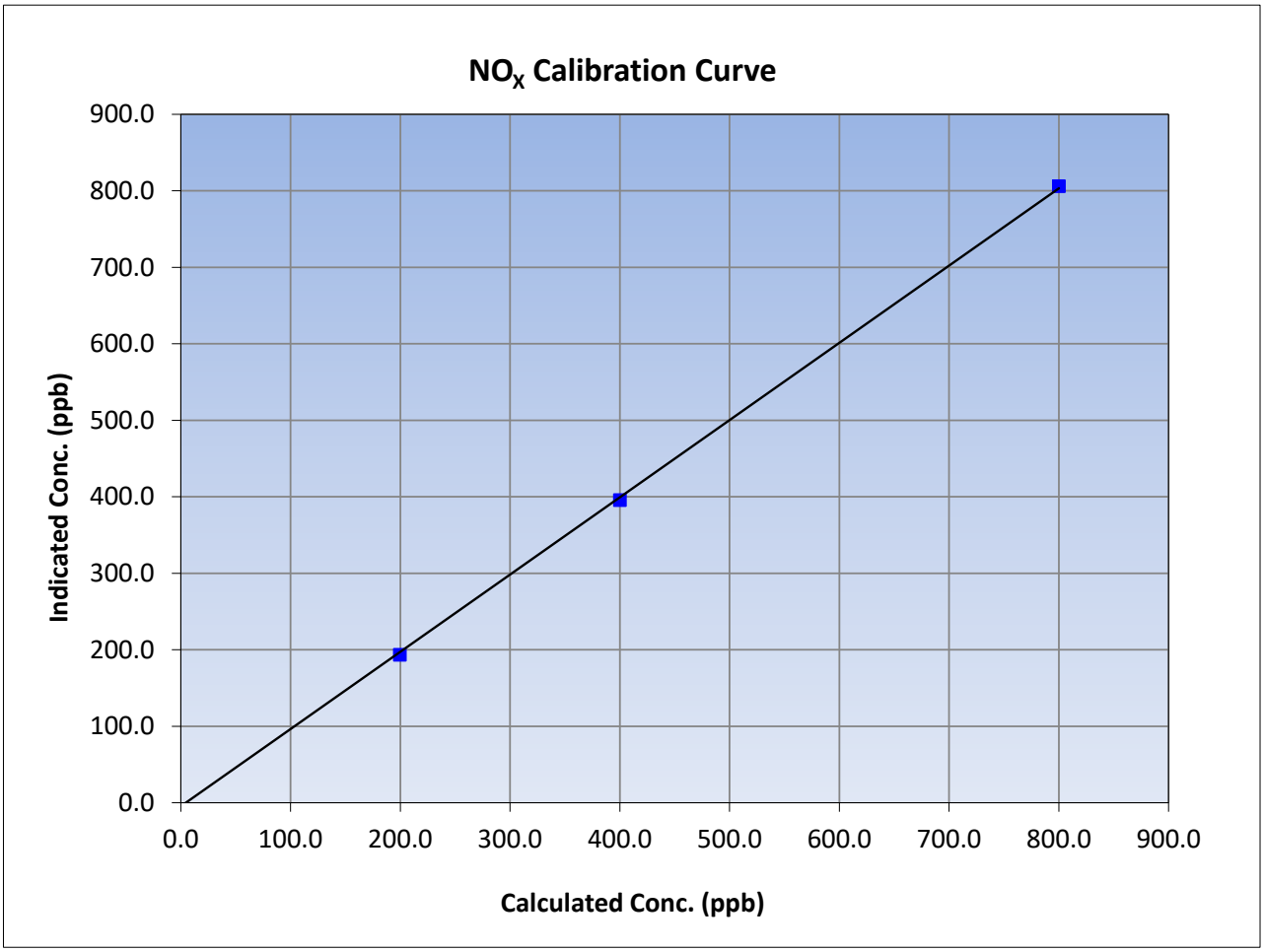
Version-04-2020

Station Information

Calibration Date:	September 15, 2023	Previous Calibration:	August 3, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	8:45	End Time (MST):	13:40
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	-0.2	----	Correlation Coefficient	0.999853	≥0.995
800.1	806.0	0.9927			
400.0	395.5	1.0114	Slope	1.009702	0.90 - 1.10
199.5	193.5	1.0312			
			Intercept	-4.611056	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

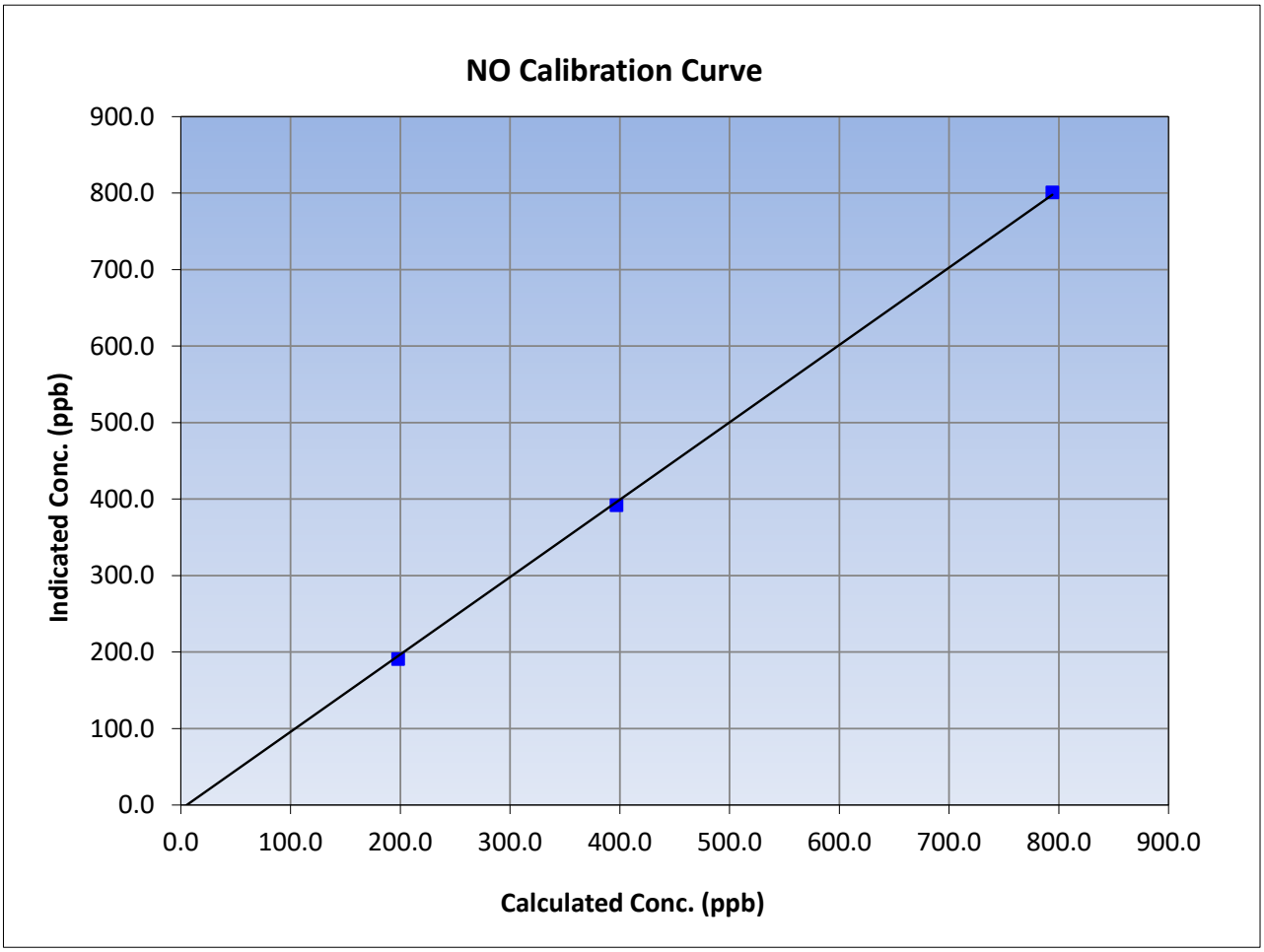
Version-04-2020

Station Information

Calibration Date:	September 15, 2023	Previous Calibration:	August 3, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	8:45	End Time (MST):	13:40
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	-0.2	----	Correlation Coefficient	0.999796	≥0.995
794.1	801.0	0.9914			
397.0	391.9	1.0131	Slope	1.011497	0.90 - 1.10
198.0	190.8	1.0379			
			Intercept	-5.412656	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

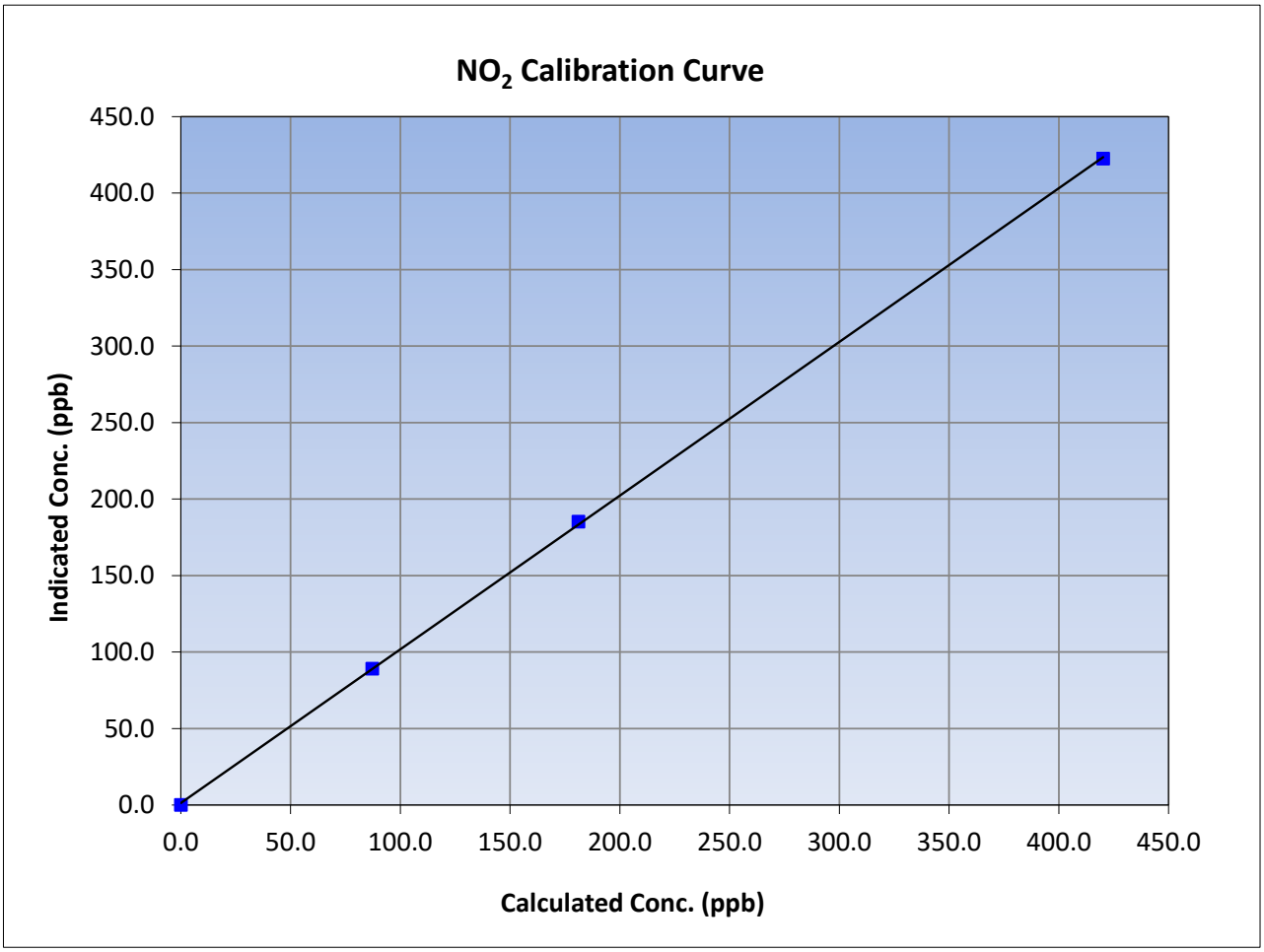
Version-04-2020

Station Information

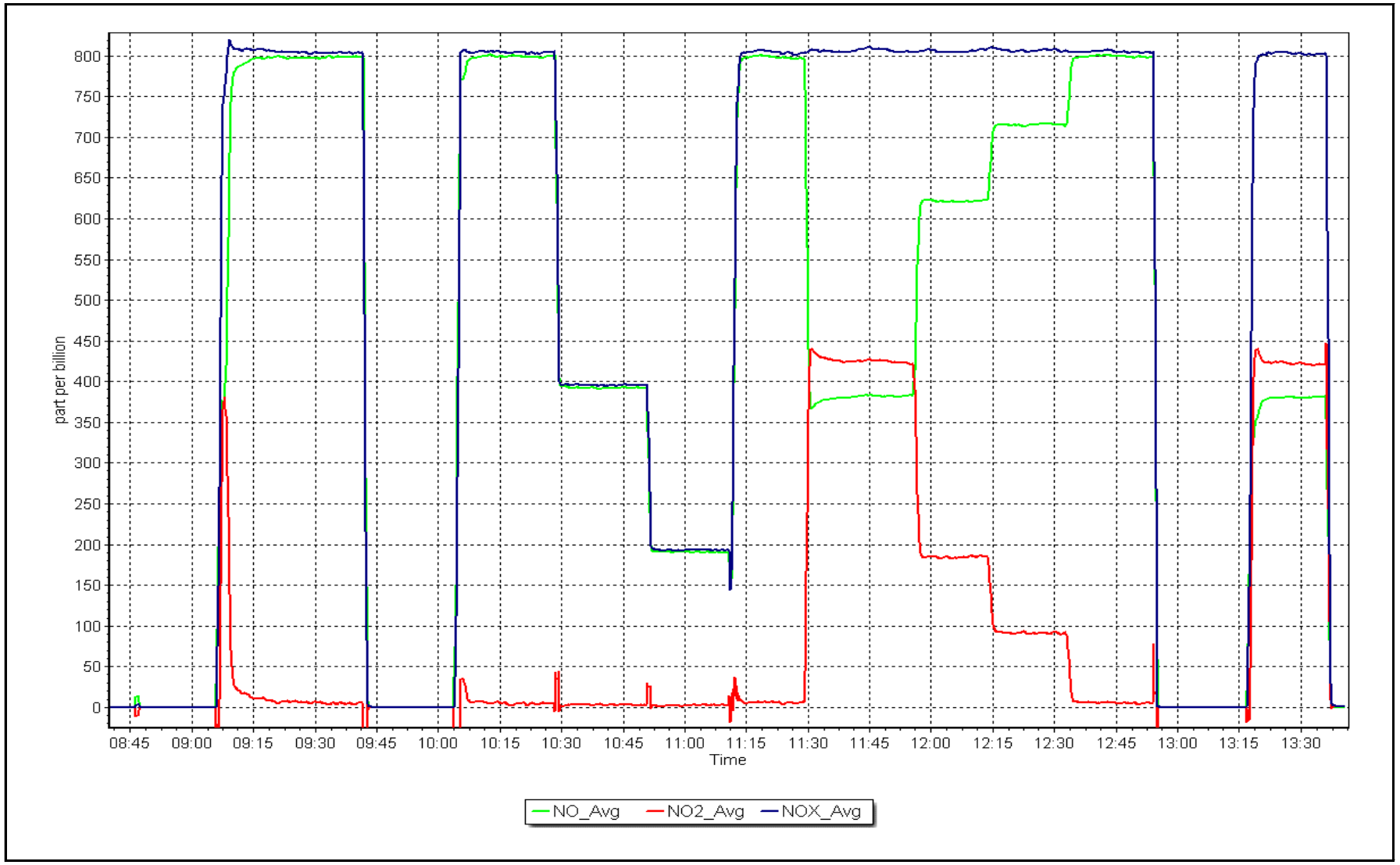
Calibration Date:	September 15, 2023	Previous Calibration:	August 3, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	8:45	End Time (MST):	13:40
Analyzer make:	Thermo 42iQ	Analyzer serial #:	1182340006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999936	≥0.995
420.2	422.6	0.9943			
181.1	185.2	0.9778	Slope	1.004706	0.90 - 1.10
87.2	89.2	0.9775			
			Intercept	1.319502	+/-20



NO_X Calibration Plot Date: September 15, 2023 Location: Kirby South



End of Report