WOOD BUFFALO
ENVIRONMENTAL ASSOCIATION

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Wood Buffalo Environmental Association

NOVEMBER 2023

MONTHLY CALIBRATION REPORT

CONTINUOUS MONITORING

December 22, 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

NOVEMBER 2023

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

December 22, 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:	November 1, 2023	Last Cal Date:	October 4, 2023
Start time (MST):	9:15	End time (MST):	14:07
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:	4890

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998709	0.999167	Backgd or Offset:	19.2	19.8
Calibration intercept:	0.106791	-0.353461	Coeff or Slope:	0.887	0.887

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.7	----
as found span	4918	81.3	800.3	796.7	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4918	81.3	800.3	799.6	1.001
second point	4959	40.7	400.6	399.4	1.003
third point	4979	20.3	199.8	198.9	1.005
as left zero	5000	0.0	0.0	0.5	----
as left span	4918	81.3	800.3	798.3	1.002
				Average Correction Factor	1.003

Baseline Corr As found:	796.00	Previous response	799.34	*% 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. Adjusted zero.

Calibration Performed By: Rene Chamberland & Jan Castro

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

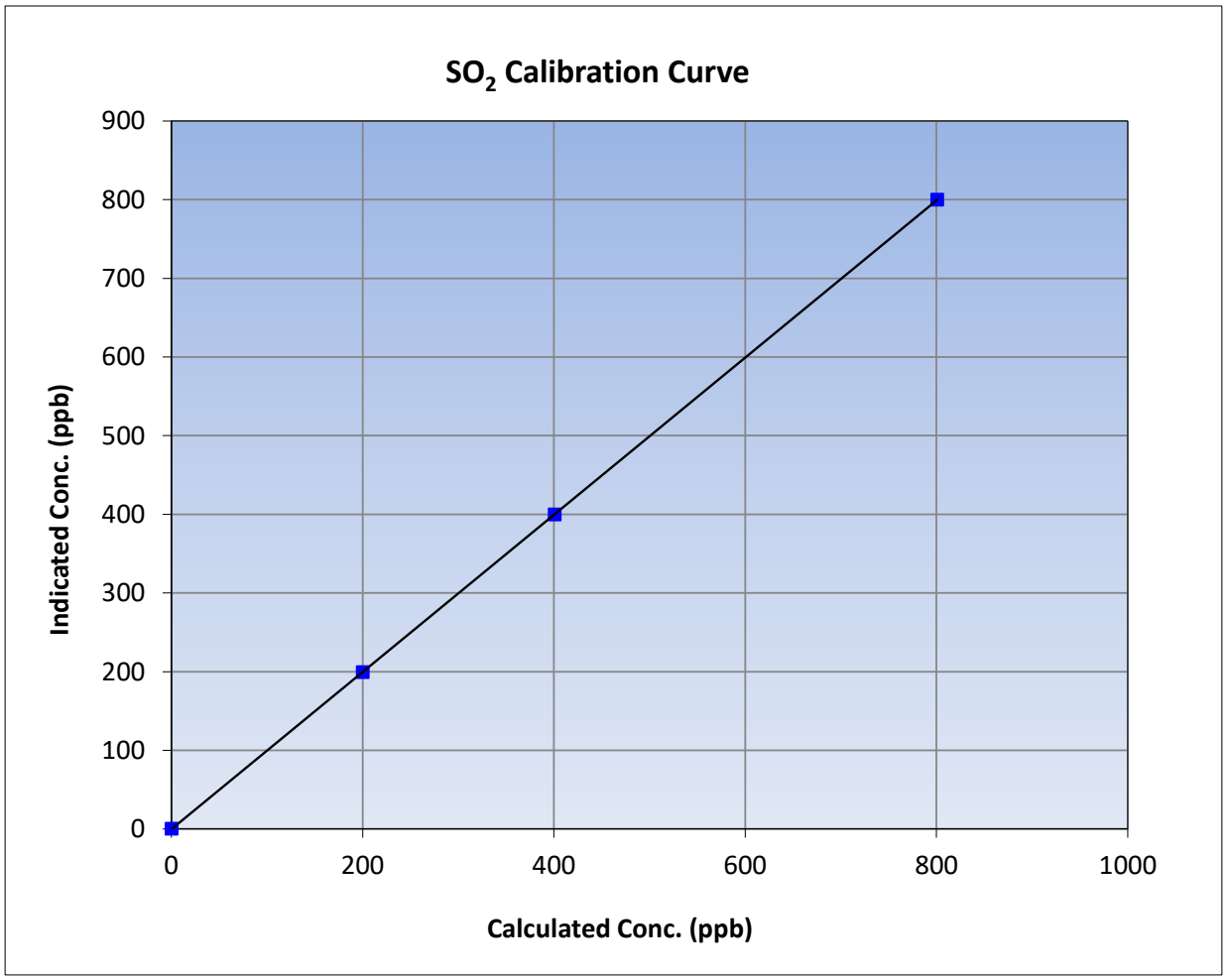
Station Information

Calibration Date:	November 1, 2023	Previous Calibration:	October 4, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:15	End Time (MST):	14:07
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301448

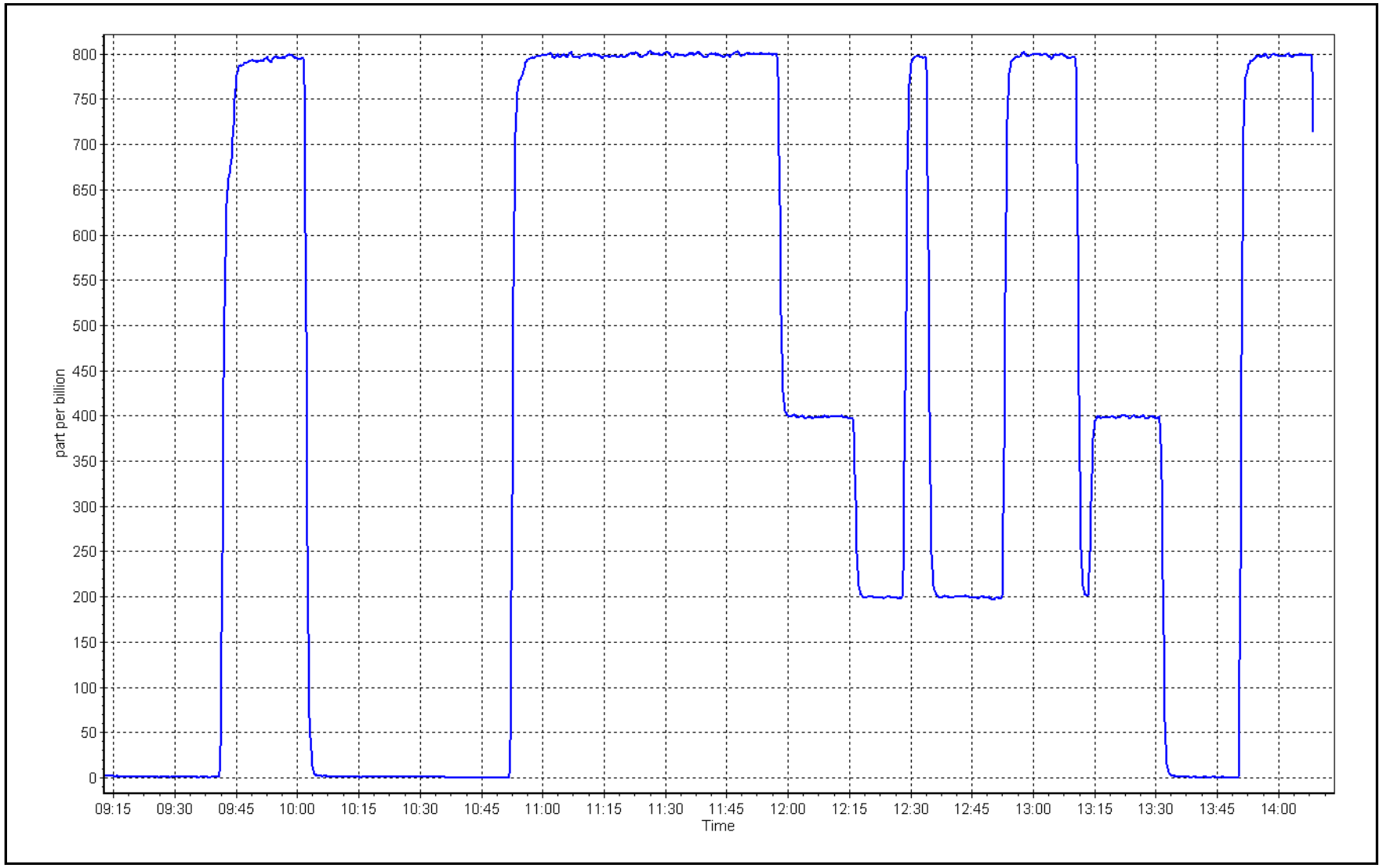
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
800.3	799.6	1.0008
400.6	399.4	1.0030
199.8	198.9	1.0046

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	0.999167	*0.90 - 1.10*
Intercept	-0.353461	*+/-30*



SO2 Calibration Plot Date: October 4, 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:	November 6, 2023	Last Cal Date:	October 16, 2023
Start time (MST):	10:22	End time (MST):	16:48
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1218153461	
Converter make:	CD Nova		Converter serial #:	470	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.993649	0.997792	Backgd or Offset:	2.25	2.28
Calibration intercept:	0.200001	0.180000	Coeff or Slope:	0.906	0.914

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4921	78.4	80.0	79.1	1.013
as found 2nd point	4960	39.2	40.0	40.1	1.000
as found 3rd point	4980	19.6	20.0	20.1	1.000
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4921	78.4	80.0	80.0	1.000
second point	4960	39.2	40.0	40.1	0.997
third point	4980	19.6	20.0	20.1	0.995
as left zero	5000	0.0	0.0	0.3	----
as left span	4921	78.4	80.0	78.8	1.015
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:	79.0	Prev response:	79.69	*% change:	-0.9%
Baseline Corr 2nd AF pt:	40.0	AF Slope:	0.987220	AF Intercept:	0.299995
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999950		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

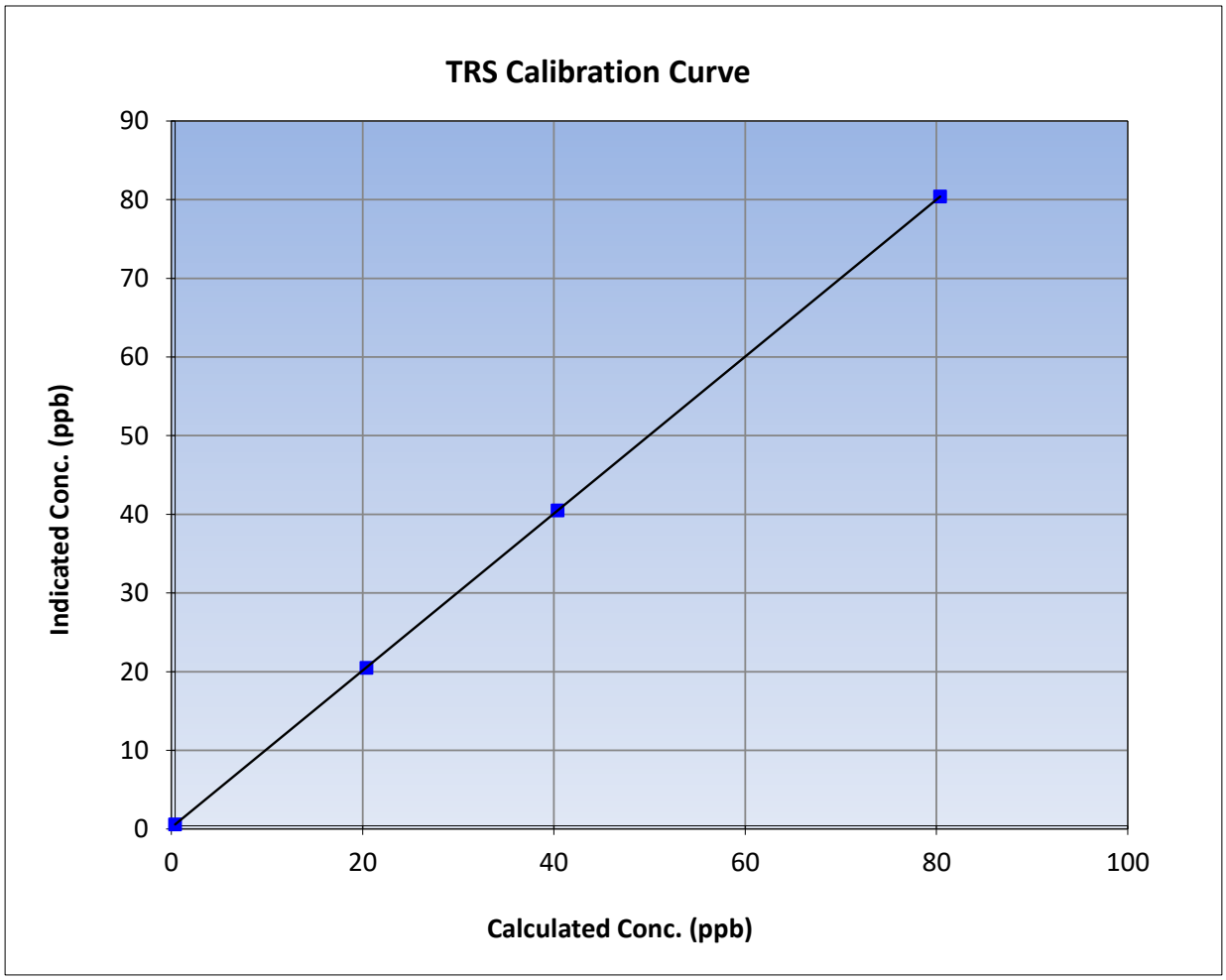
Station Information

Calibration Date:	November 6, 2023	Previous Calibration:	October 16, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:22	End Time (MST):	16:48
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153461

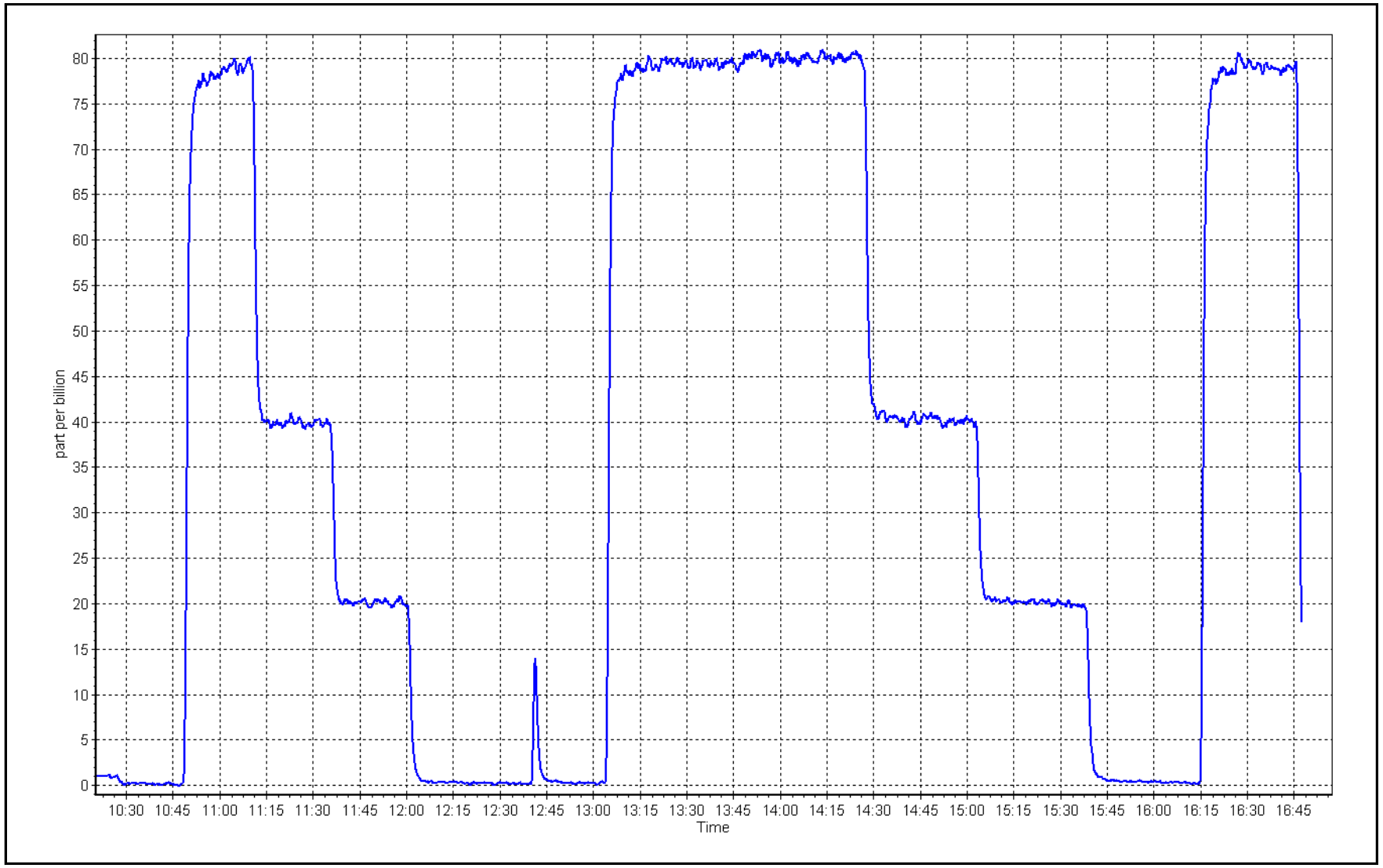
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	80.0	0.9999
40.0	40.1	0.9975
20.0	20.1	0.9949

Statistical Evaluation		*Limits*
Correlation Coefficient	1.000000	*≥0.995*
Slope	0.997792	*0.90 - 1.10*
Intercept	0.180000	*+/-3*



TRS Calibration Plot Date: November 6, 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:	November 6, 2023	Last Cal Date:	October 16, 2023
Start time (MST):	10:22	End time (MST):	16:48
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43iQTL		Analyzer serial #:	1200326167	
Converter make:	Thermo Converter		Converter serial #:	N/A	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.989711	0.995140	Backgd or Offset:	1.71	1.73
Calibration intercept:	0.316799	0.276804	Coeff or Slope:	0.997	1.009

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	79.4	1.008
as found 2nd point	4960	39.2	40.0	40.0	1.002
as found 3rd point	4980	19.6	20.0	20.0	1.005
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4922	78.4	80.0	79.8	1.002
second point	4960	39.2	40.0	40.2	0.995
third point	4980	19.6	20.0	20.2	0.990
as left zero	5000	0.0	0.0	1.0	----
as left span	4922	78.4	80.0	77.8	1.028
SO2 Scrubber Check	4919	81.3	813.0	0.0	----
Date of last scrubber change:		March 21, 2022		Ave Corr Factor	0.996
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.3	Prev response:	79.46	*% change:	-0.2%
Baseline Corr 2nd AF pt:	39.9	AF Slope:	0.991762	AF Intercept:	0.176812
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999989		

* = > +/-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

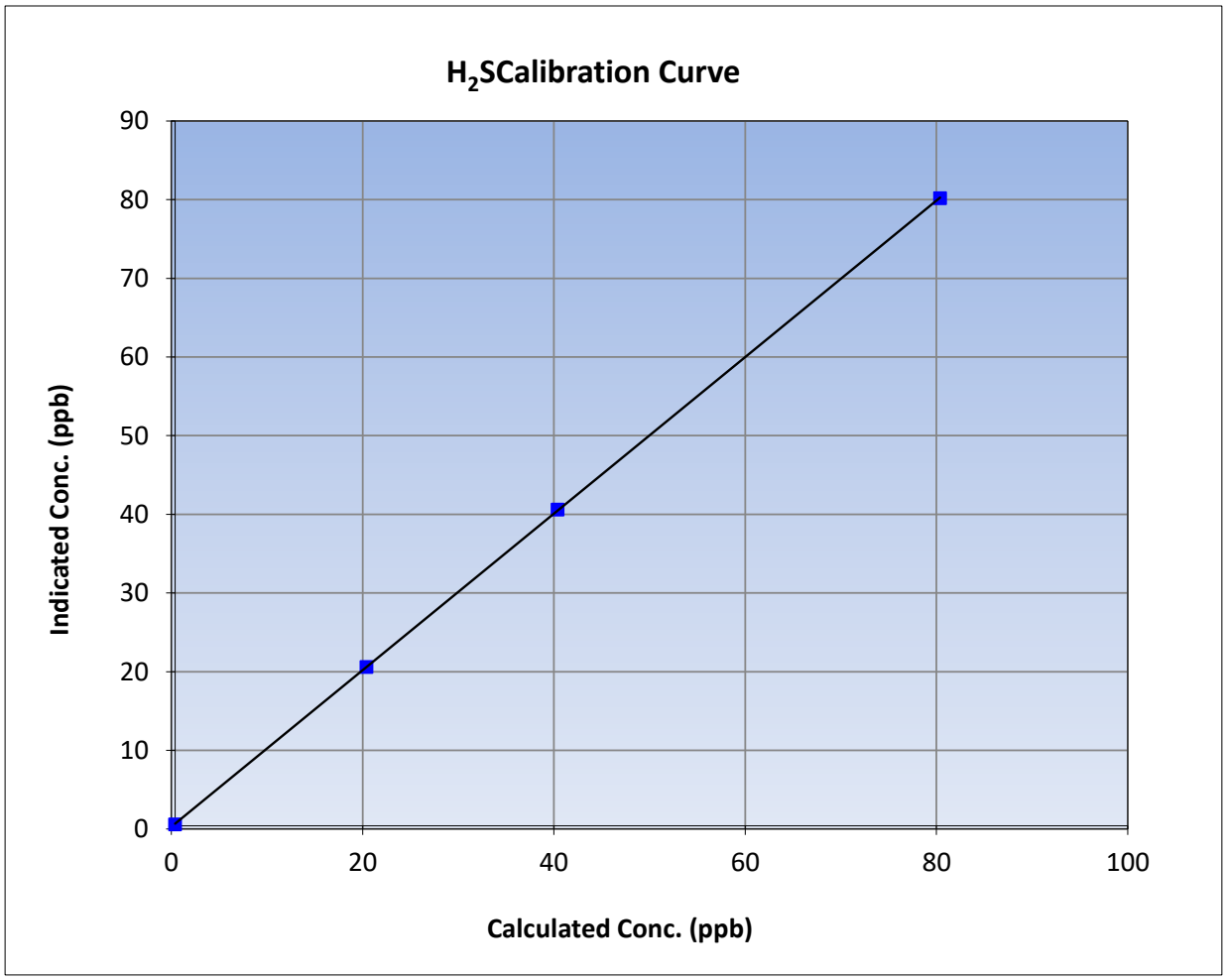
Station Information

Calibration Date:	November 6, 2023	Previous Calibration:	October 16, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:22	End Time (MST):	16:48
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1200326167

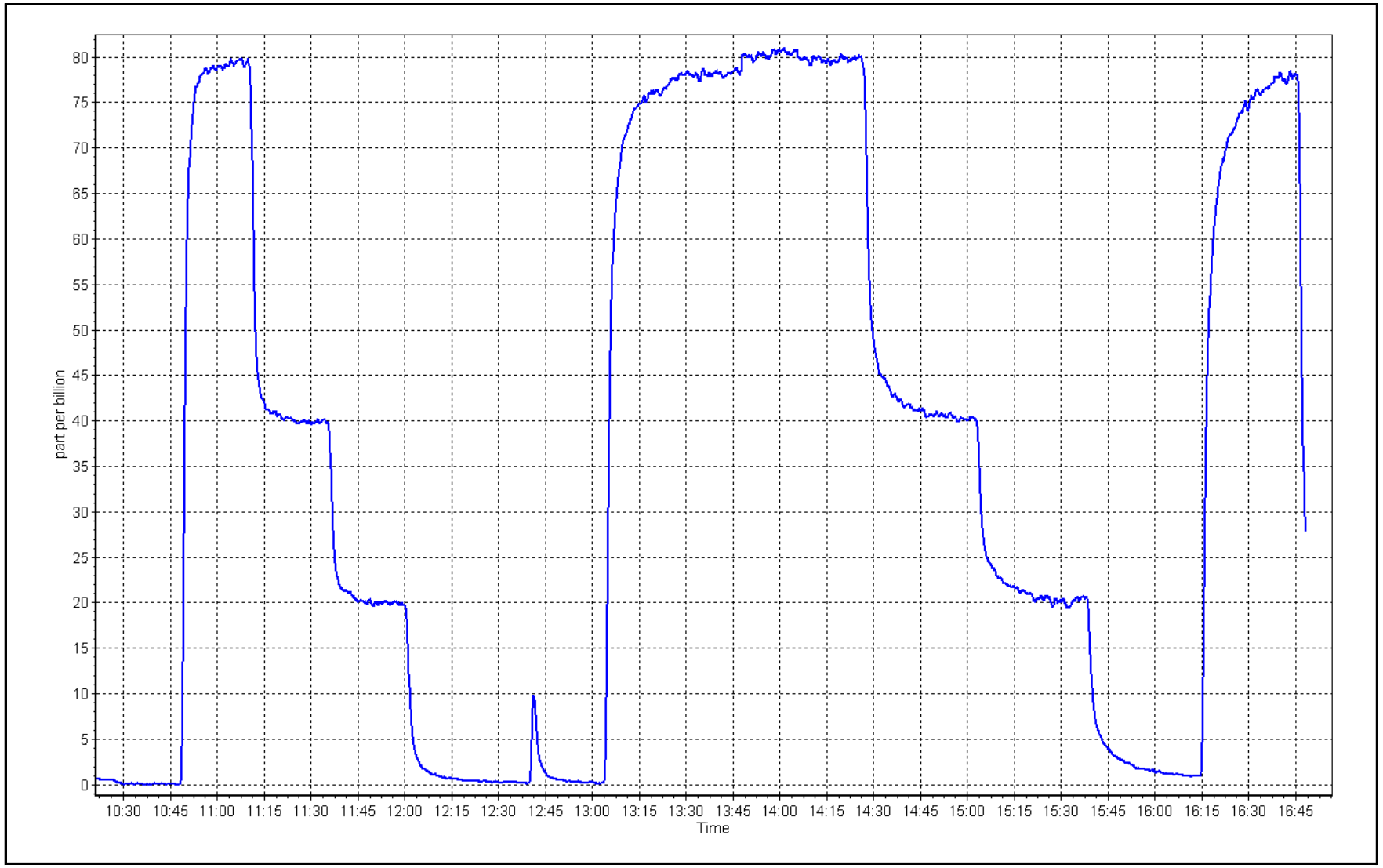
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	79.8	1.0022
40.0	40.2	0.9950
20.0	20.2	0.9900

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999993	*≥0.995*
Slope	0.995140	*0.90 - 1.10*
Intercept	0.276804	*+/-3*



H_2S Calibration Plot Date: November 6, 2023 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	November 1, 2023	Last Cal Date:	October 4, 2023
Start time (MST):	9:15	End time (MST):	14:07
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:	4890	

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:	2.98E-04	3.01E-04	NMHC SP Ratio:	6.57E-05	6.84E-05
CH4 Retention time:	14.6	14.6	NMHC Peak Area:	139930	134289
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	4918	81.3	17.27	16.99	1.016
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	17.26	1.001
second point	4959	40.7	8.64	8.46	1.022
third point	4980	20.3	4.31	4.21	1.023
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	17.27	17.31	0.998
				Average Correction Factor	1.015
Baseline Corr AF:	16.99	Prev response	17.24	*% change	-1.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4918	81.3	9.18	8.97	1.024
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	9.18	9.17	1.002
second point	4959	40.7	4.60	4.53	1.014
third point	4980	20.3	2.29	2.28	1.007
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	9.18	9.22	0.996
				Average Correction Factor	1.008
Baseline Corr AF:	8.97	Prev response	9.21	*% change	-2.7%
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	8.03	1.007
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	8.09	0.999
second point	4959	40.7	4.05	3.93	1.031
third point	4980	20.3	2.02	1.94	1.042
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	8.09	8.09	0.999
				Average Correction Factor	1.024
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:	1.002996	1.000035
THC Cal Offset:	-0.080272	-0.073775
CH4 Cal Slope:	1.000153	1.002522
CH4 Cal Offset:	-0.055151	-0.057596
NMHC Cal Slope:	1.005501	0.998093
NMHC Cal Offset:	-0.025121	-0.016179

Notes: Changed out the inlet filters and N2 cylinder after as founds. Adjusted span only.

Calibration Performed By: Rene Chamberland & Jan Castro

Wood Buffalo Environmental Association

THC Calibration Summary

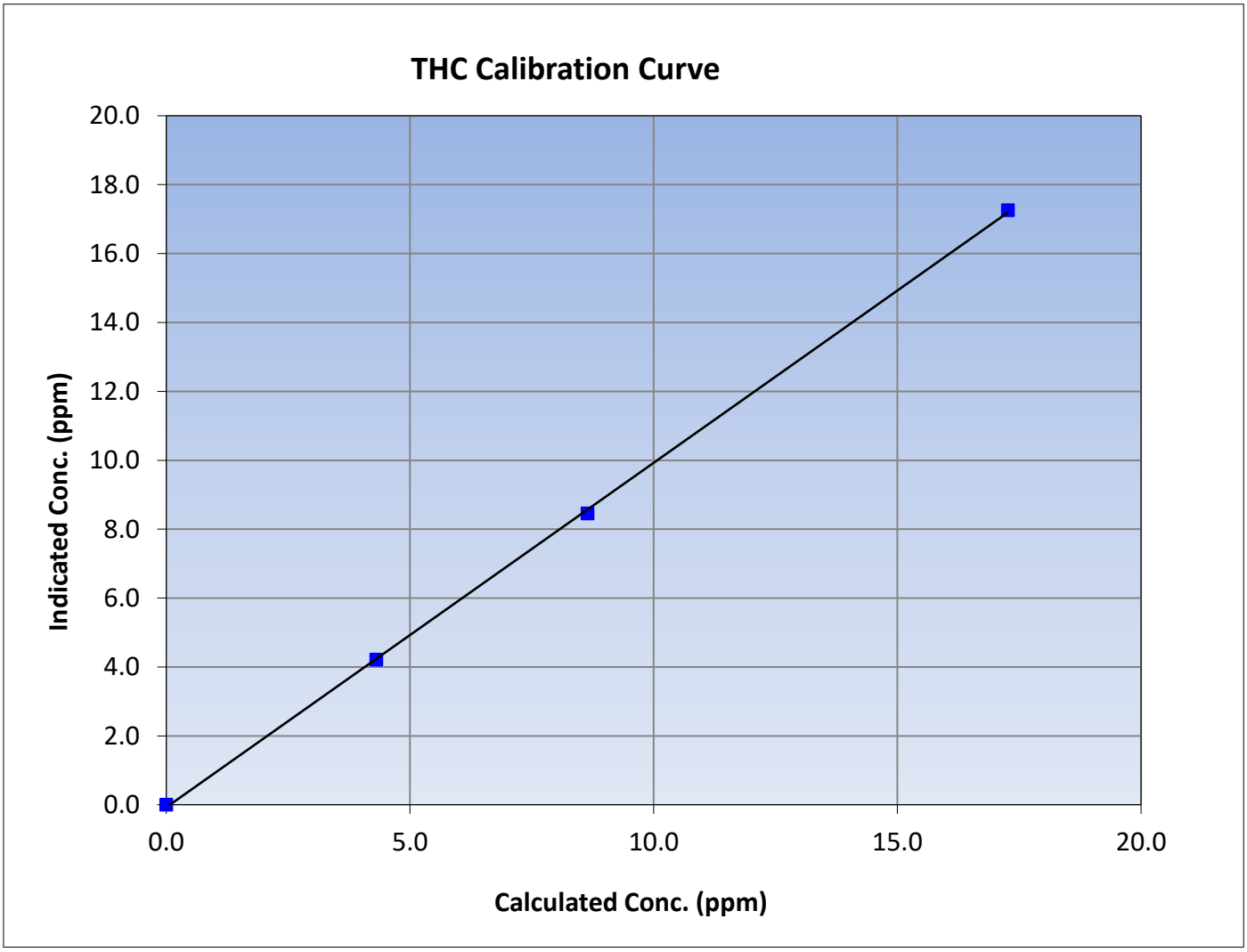
Version-06-2022

Station Information

Calibration Date:	November 1, 2023	Previous Calibration:	October 4, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:15	End Time (MST):	14:07
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	0.999861	≥0.995
17.27	17.26	1.0006			
8.64	8.46	1.0220	Slope	1.000035	0.90 - 1.10
4.31	4.21	1.0230			
			Intercept	-0.073775	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

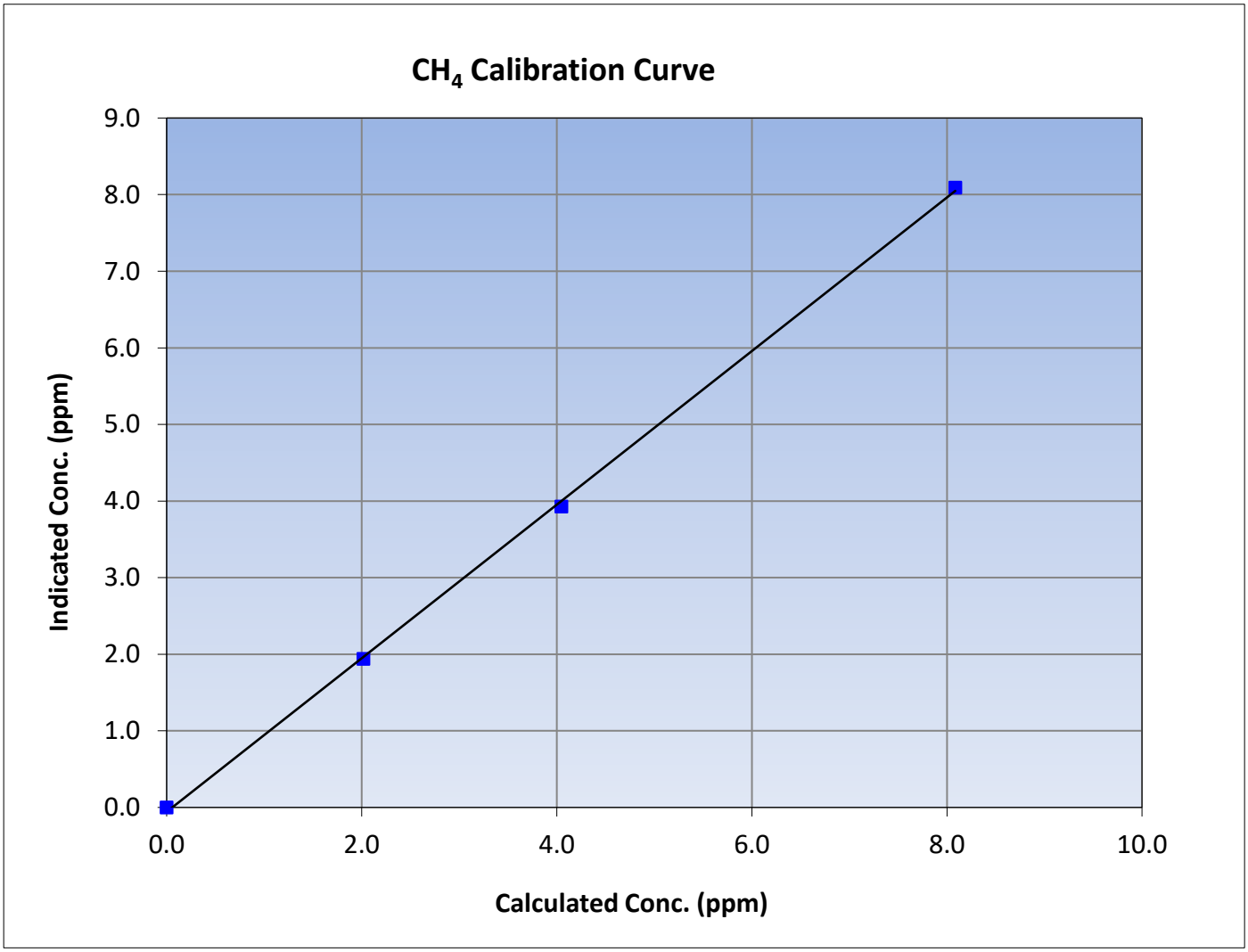
Version-06-2022

Station Information

Calibration Date:	November 1, 2023	Previous Calibration:	October 4, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:15	End Time (MST):	14:07
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	0.999684	*≥0.995*
8.09	8.09	0.9992			
4.05	3.93	1.0307	Slope	1.002522	*0.90 - 1.10*
2.02	1.94	1.0416			
			Intercept	-0.057596	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

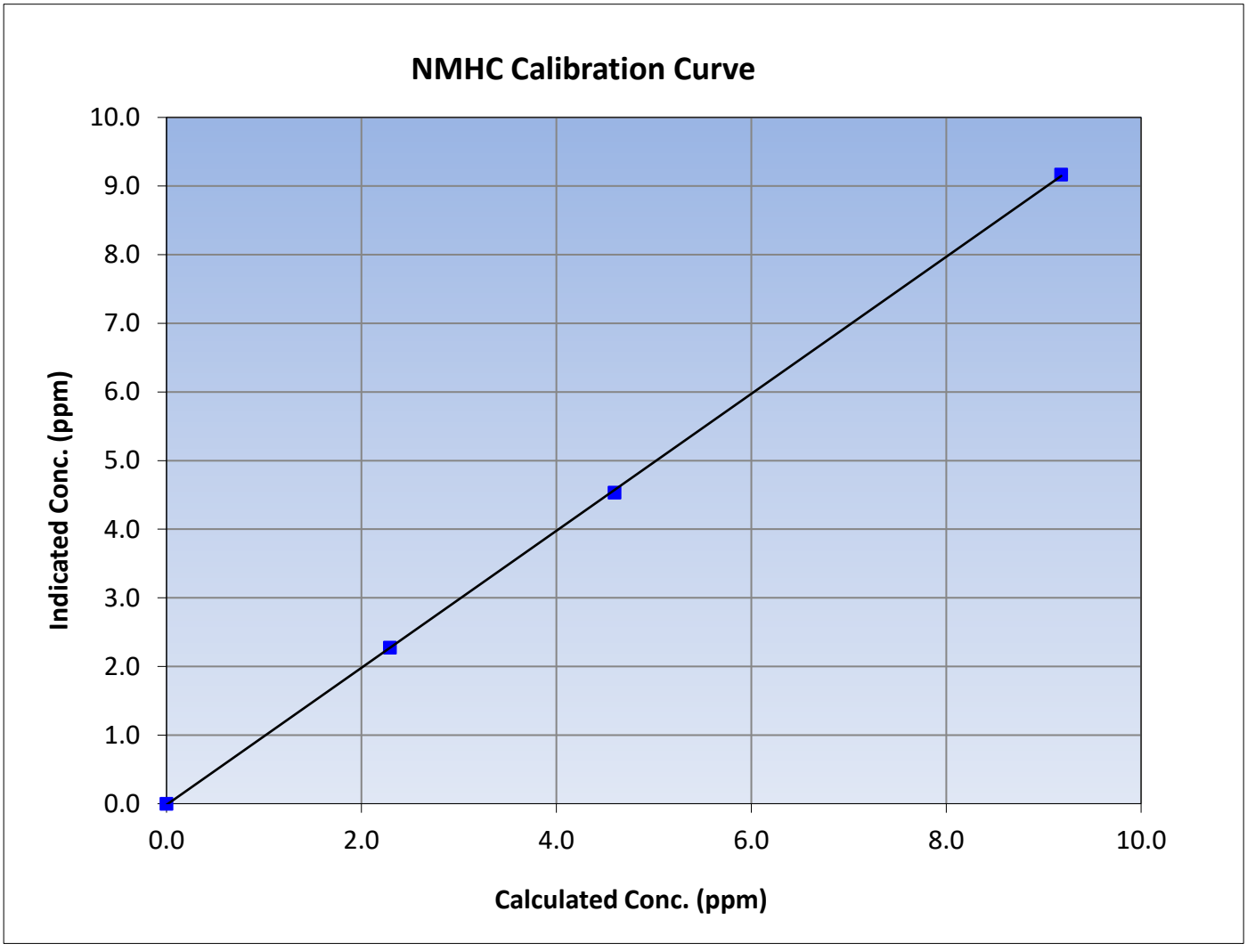
Version-06-2022

Station Information

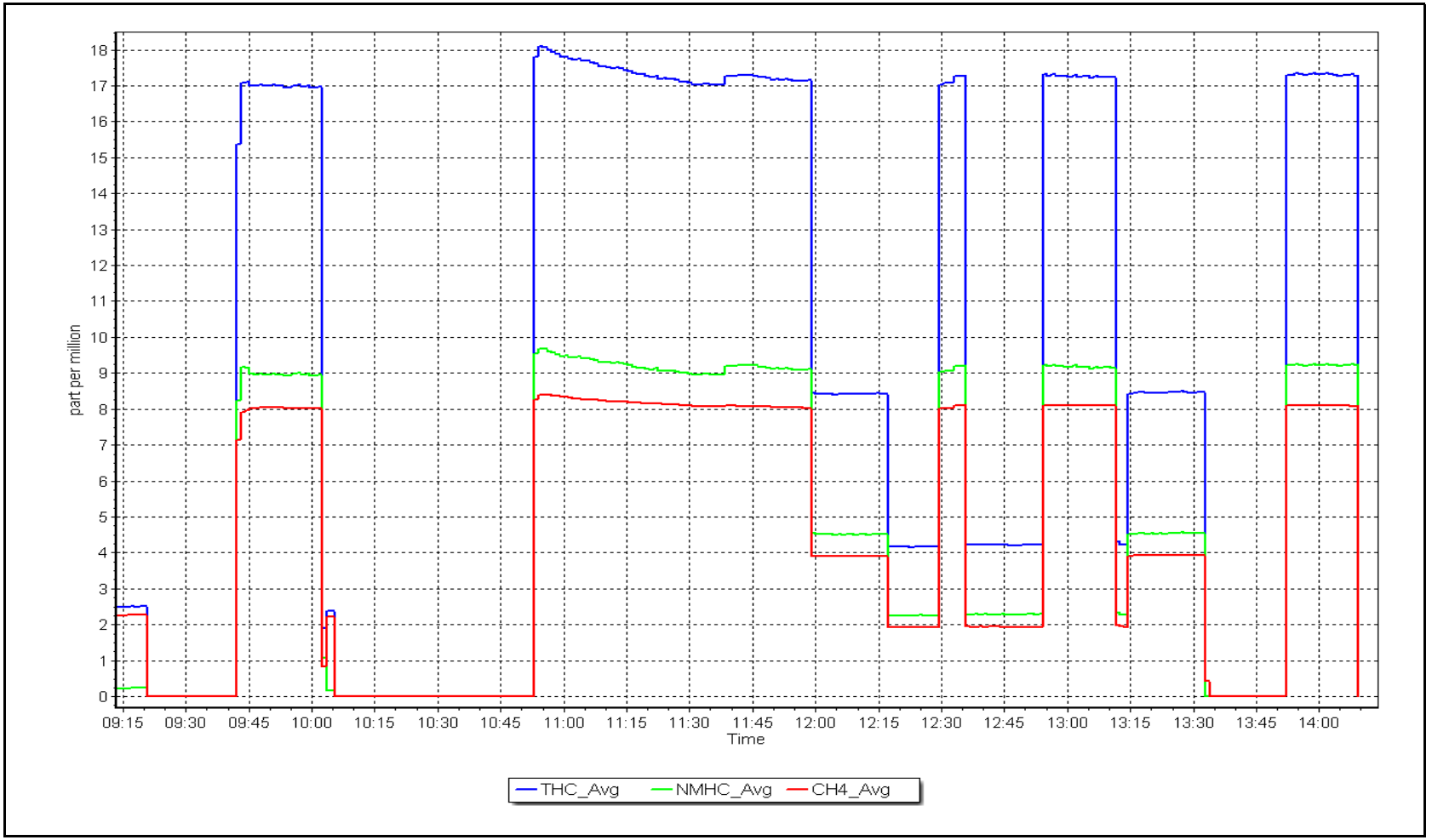
Calibration Date:	November 1, 2023	Previous Calibration:	October 4, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:15	End Time (MST):	14:07
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320040

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999953	*≥0.995*
9.18	9.17	1.0017			
4.60	4.53	1.0141	Slope	0.998093	*0.90 - 1.10*
2.29	2.28	1.0071			
			Intercept	-0.016179	*+/-0.5*



NMHC Calibration Plot Date: November 1, 2023 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	November 10, 2023	Last Cal Date:	November 1, 2023
Start time (MST):	11:58	End time (MST):	13:35
Reason:	Cylinder Change		

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:	4890	

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:	3.01E-04	3.01E-04	NMHC SP Ratio:	6.84E-05	6.84E-05
CH4 Retention time:	14.6	14.6	NMHC Peak Area:	134289	134289
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	4918	81.3	17.27	17.27	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	17.27	17.15	1.007
				Average Correction Factor	
Baseline Corr AF:	17.27	Prev response	17.19	*% 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	0.00	0.00	----
as found span	4918	81.3	9.18	9.17	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	9.18	9.07	1.012
				Average Correction Factor	
Baseline Corr AF:	9.17	Prev response	9.15	*% change	0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4918	81.3	8.09	8.10	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	8.09	8.08	1.001
				Average Correction Factor	
Baseline Corr AF:	8.10	Prev response	8.05	*% change	0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

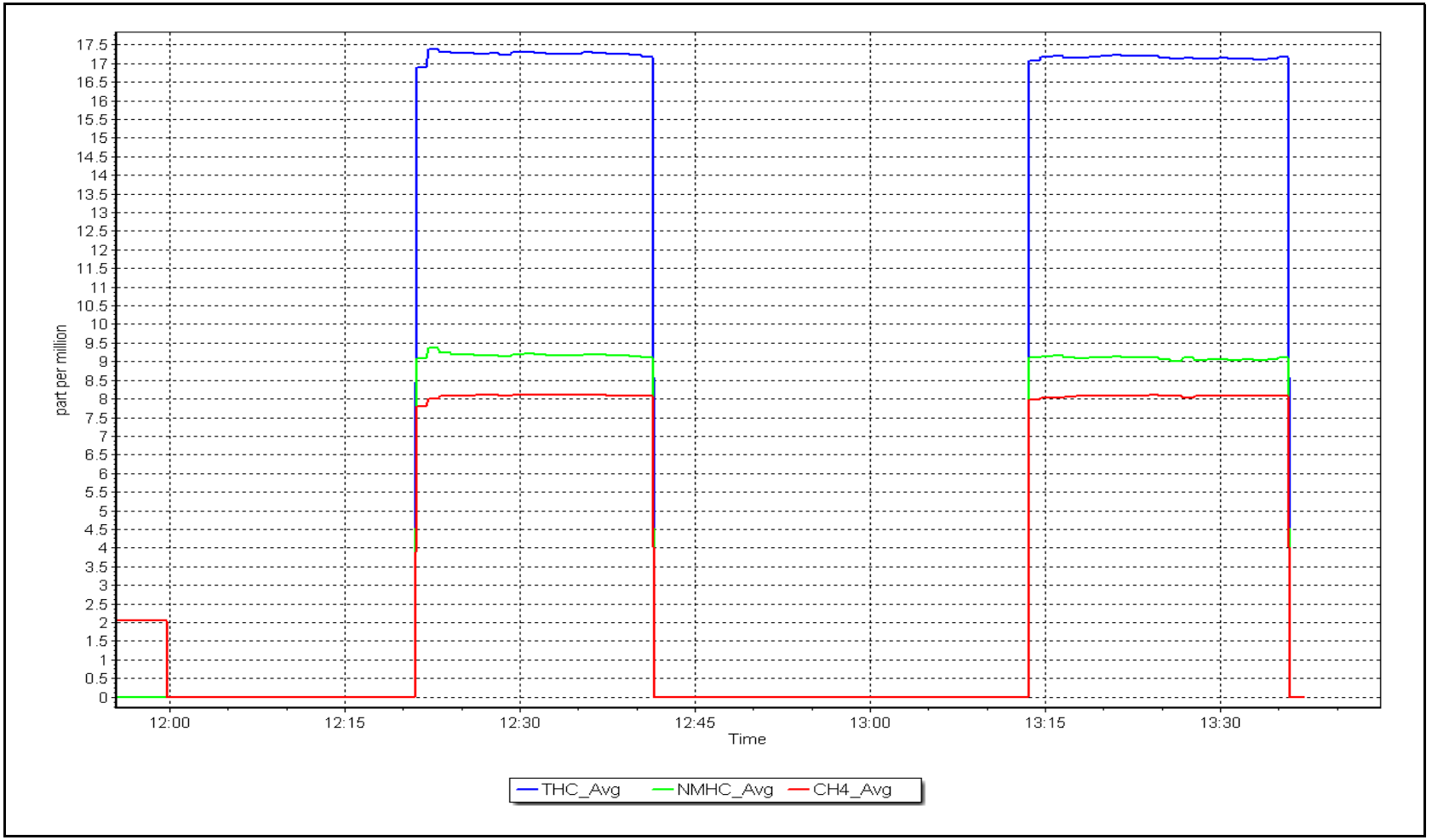
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000035	
THC Cal Offset:	-0.073775	
CH4 Cal Slope:	1.002522	
CH4 Cal Offset:	-0.057596	
NMHC Cal Slope:	0.998093	
NMHC Cal Offset:	-0.016179	

Notes: Changed out H2 cylinder

Calibration Performed By: Rene Chamberland

NMHC Calibration Plot Date: November 10, 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:	November 3, 2023	Last Cal Date:	October 3, 2023
Start time (MST):	9:00	End time (MST):	13:35
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:	4890	

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.378	1.411	NO bkgnd or offset:	7.0	7.2
NOX coeff or slope:	0.991	0.991	NOX bkgnd or offset:	7.8	7.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	191.0	195.4

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999045	0.999719
NO_X Cal Offset:	-0.740000	-0.780000
NO Cal Slope:	0.998016	0.998701
NO Cal Offset:	-1.060000	-1.300000
NO_2 Cal Slope:	1.000561	1.003579
NO_2 Cal Offset:	1.020945	0.884749

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	0.0	-0.3	----	----
as found span	4920	80.0	813.4	800.6	12.8	795.7	780.2	15.5	1.0223	1.0262
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	----	----
high point	4920	80.0	813.4	800.6	12.8	812.8	799.0	13.8	1.0008	1.0021
second point	4960	40.0	406.7	400.3	6.4	405.5	397.7	7.8	1.0030	1.0066
third point	4980	20.0	203.4	200.2	3.2	201.7	197.4	4.3	1.0082	1.0140
as left zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.1	-0.2	----	----
as left span	4920	80.0	813.4	395.8	417.6	811.4	392.4	418.9	1.0025	1.0088
								Average Correction Factor	1.0040	1.0075

Corrected As found	NO_X = 796.0 ppb	NO = 780.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-2.0%
Previous Response	NO_X = 811.9 ppb	NO = 798.0 ppb		*Percent Change	NO =	-2.3%
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)	794.8	390.0	417.6	419.5	0.9955	100.5%
2nd GPT point (200 ppb O3)	794.8	594.2	213.4	215.4	0.9907	100.9%
3rd GPT point (100 ppb O3)	794.8	695.1	112.5	114.9	0.9791	102.1%
				Average Correction Factor	0.9884	101.2%

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

Calibration Performed By: Rene Chamberland & Jan Castro

Wood Buffalo Environmental Association

NO_X Calibration Summary

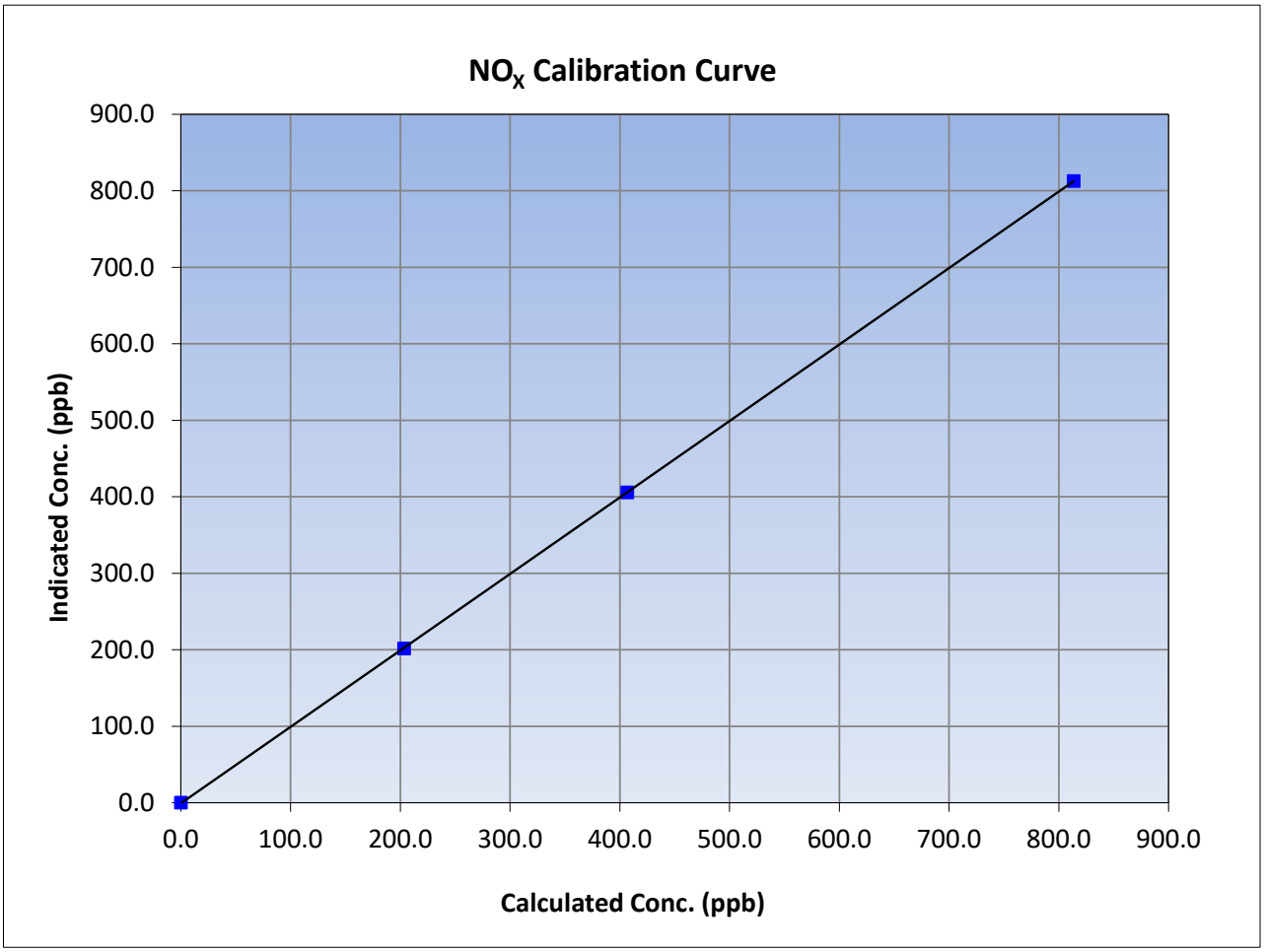
Version-04-2020

Station Information

Calibration Date:	November 3, 2023	Previous Calibration:	October 3, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:00	End Time (MST):	13:35
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999996	≥0.995
813.4	812.8	1.0008			
406.7	405.5	1.0030	Slope	0.999719	0.90 - 1.10
203.4	201.7	1.0082			
			Intercept	-0.780000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

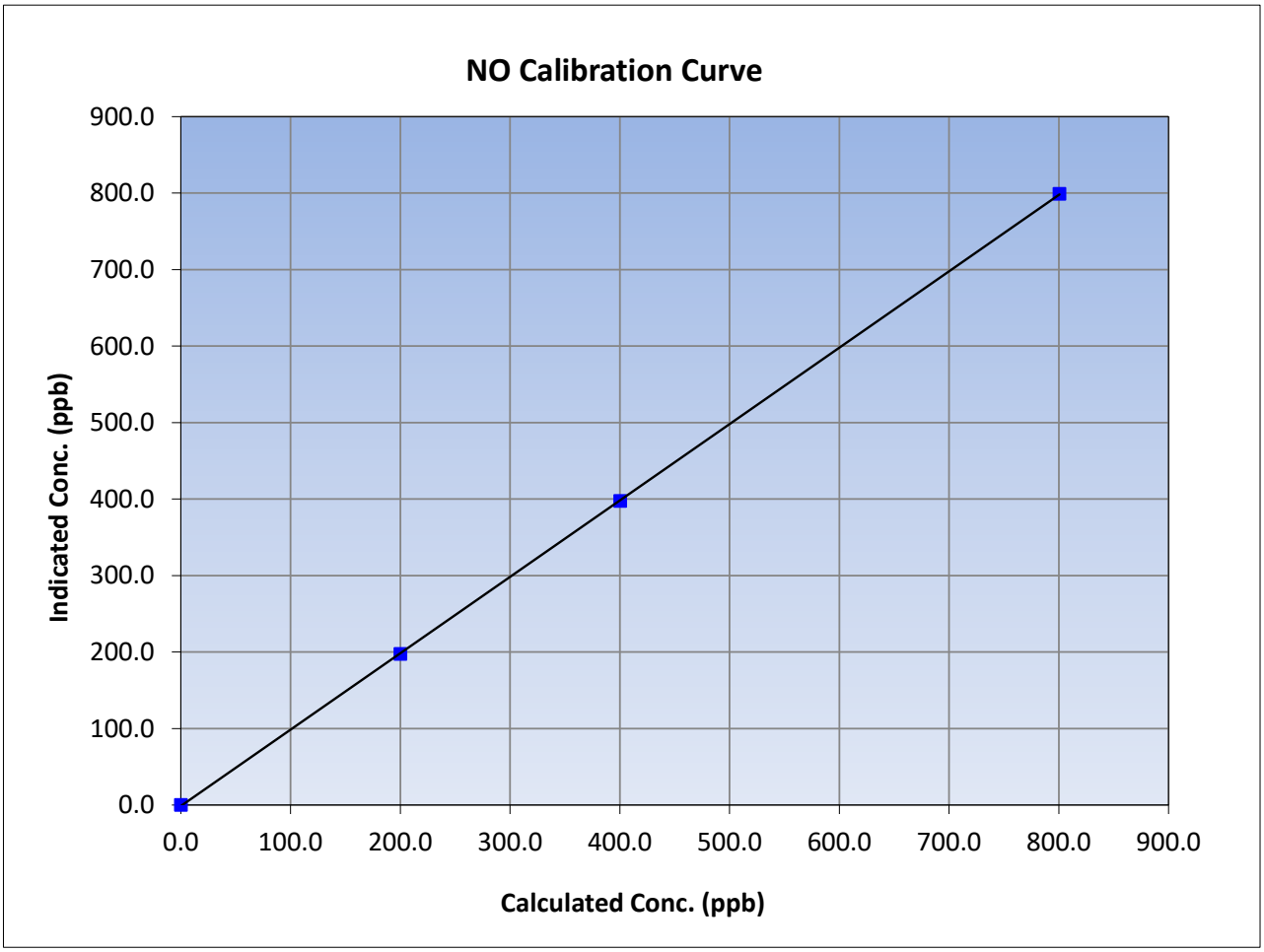
Version-04-2020

Station Information

Calibration Date:	November 3, 2023	Previous Calibration:	October 3, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:00	End Time (MST):	13:35
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999988	*≥0.995*
800.6	799.0	1.0021			
400.3	397.7	1.0066	Slope	0.998701	*0.90 - 1.10*
200.2	197.4	1.0140			
			Intercept	-1.300000	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

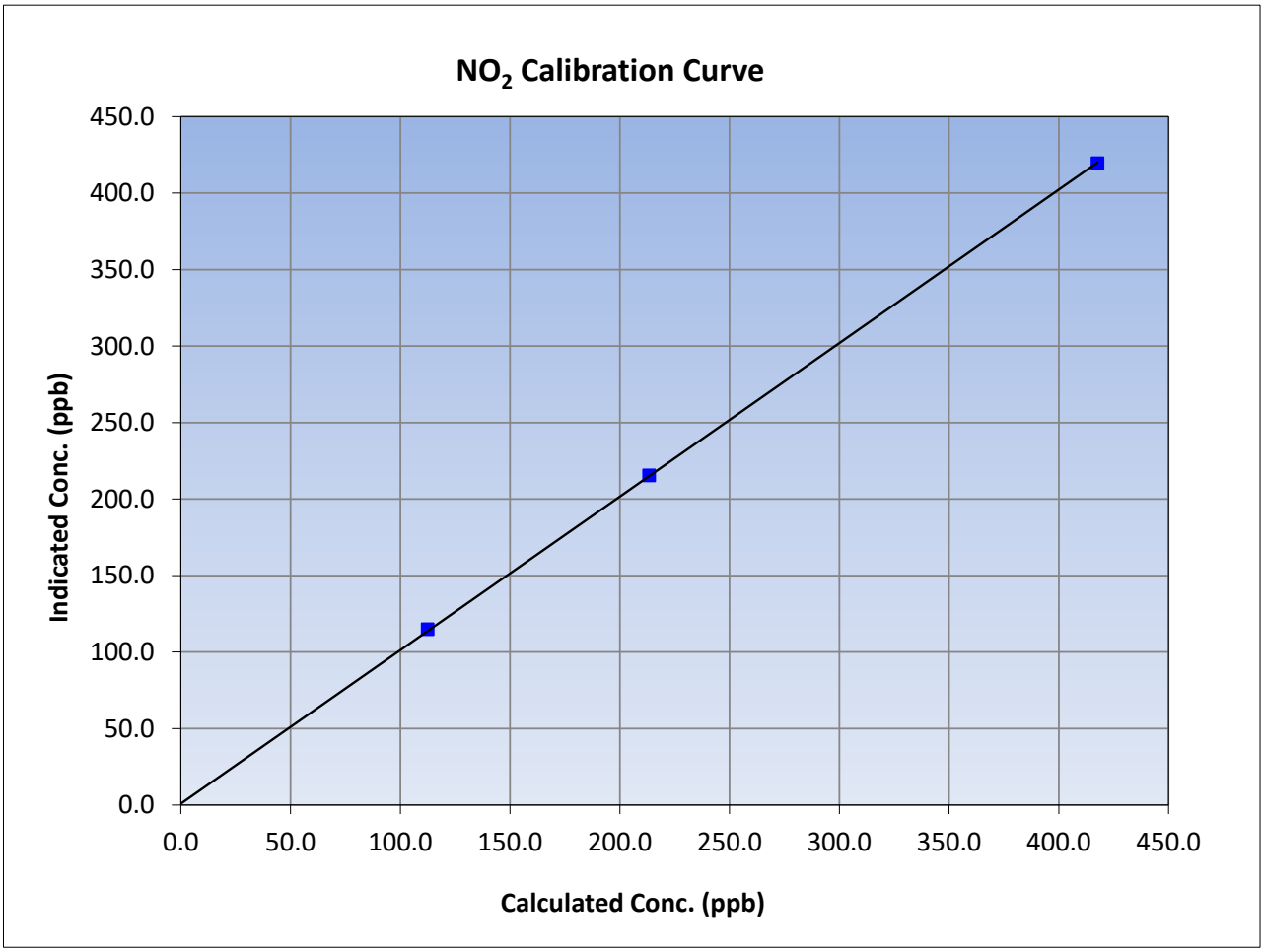
Version-04-2020

Station Information

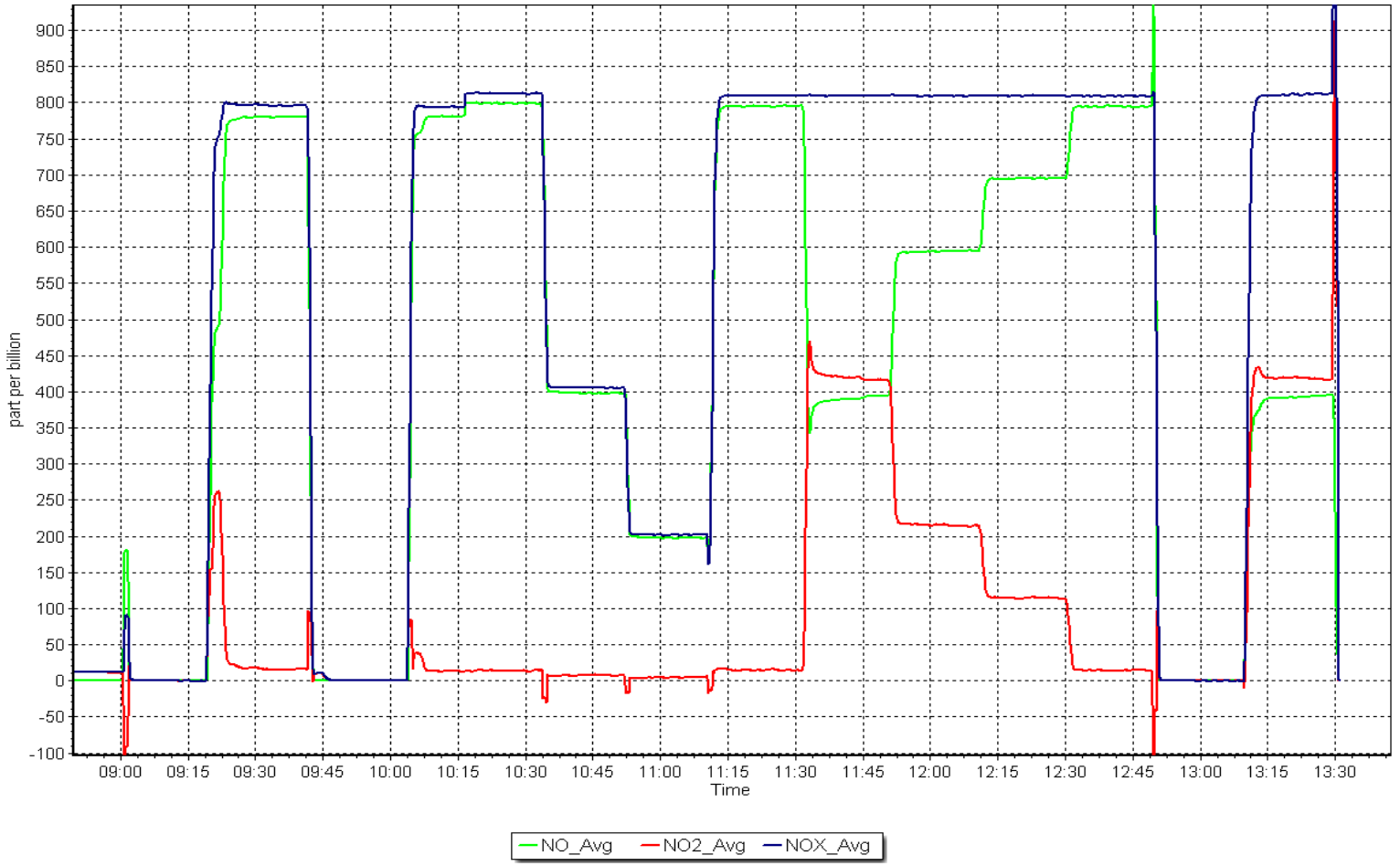
Calibration Date:	November 3, 2023	Previous Calibration:	October 3, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:00	End Time (MST):	13:35
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.1	----	Correlation Coefficient	0.999973	*≥0.995*
417.6	419.5	0.9955			
213.4	215.4	0.9907	Slope	1.003579	*0.90 - 1.10*
112.5	114.9	0.9791			
			Intercept	0.884749	*+/-20*



NO_X Calibration Plot Date: November 3, 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:	November 2, 2023	Last Cal Date:	October 2, 2023
Start time (MST):	9:57	End time (MST):	13:00
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:	4890

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003114	1.000714	Backgd or Offset:	3.2	3.8
Calibration intercept:	0.080000	0.200000	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	0.4	----
as found span	5000	863.1	400.0	401.5	0.996
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	863.1	400.0	400.3	0.999
second point	5000	742.5	200.0	200.7	0.997
third point	5000	651.7	100.0	100.3	0.997
as left zero	5000	0.0	0.0	-0.1	----
as left span	5000	863.1	400.0	403.3	0.992
				Average Correction Factor	0.998

Baseline Corr As found:	401.1	Previous response	401.3	*% 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. Adjusted zero only.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

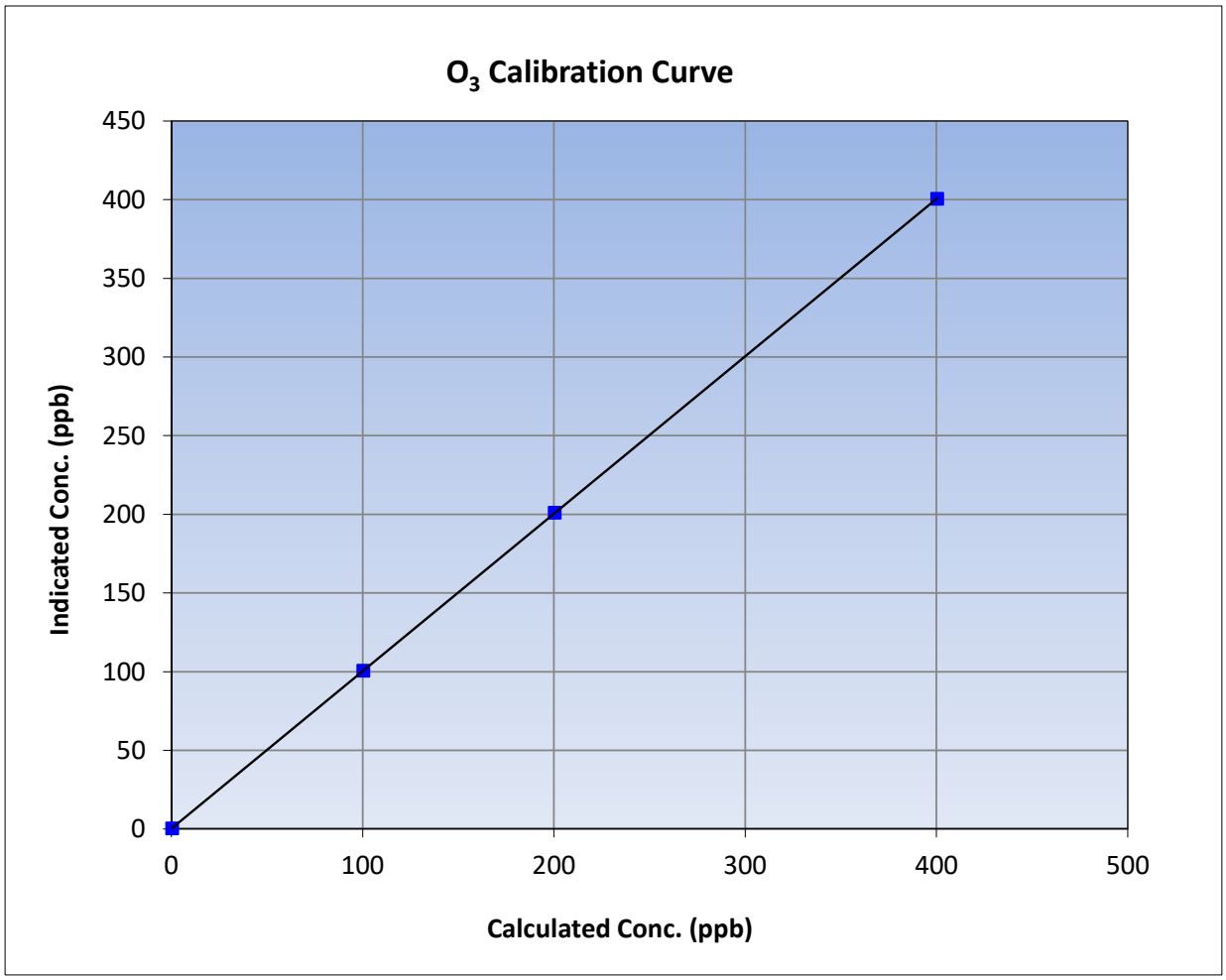
Station Information

Calibration Date:	November 2, 2023	Previous Calibration:	October 2, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:57	End Time (MST):	13:00
Analyzer make:	Teledyne API T400	Analyzer serial #:	1107

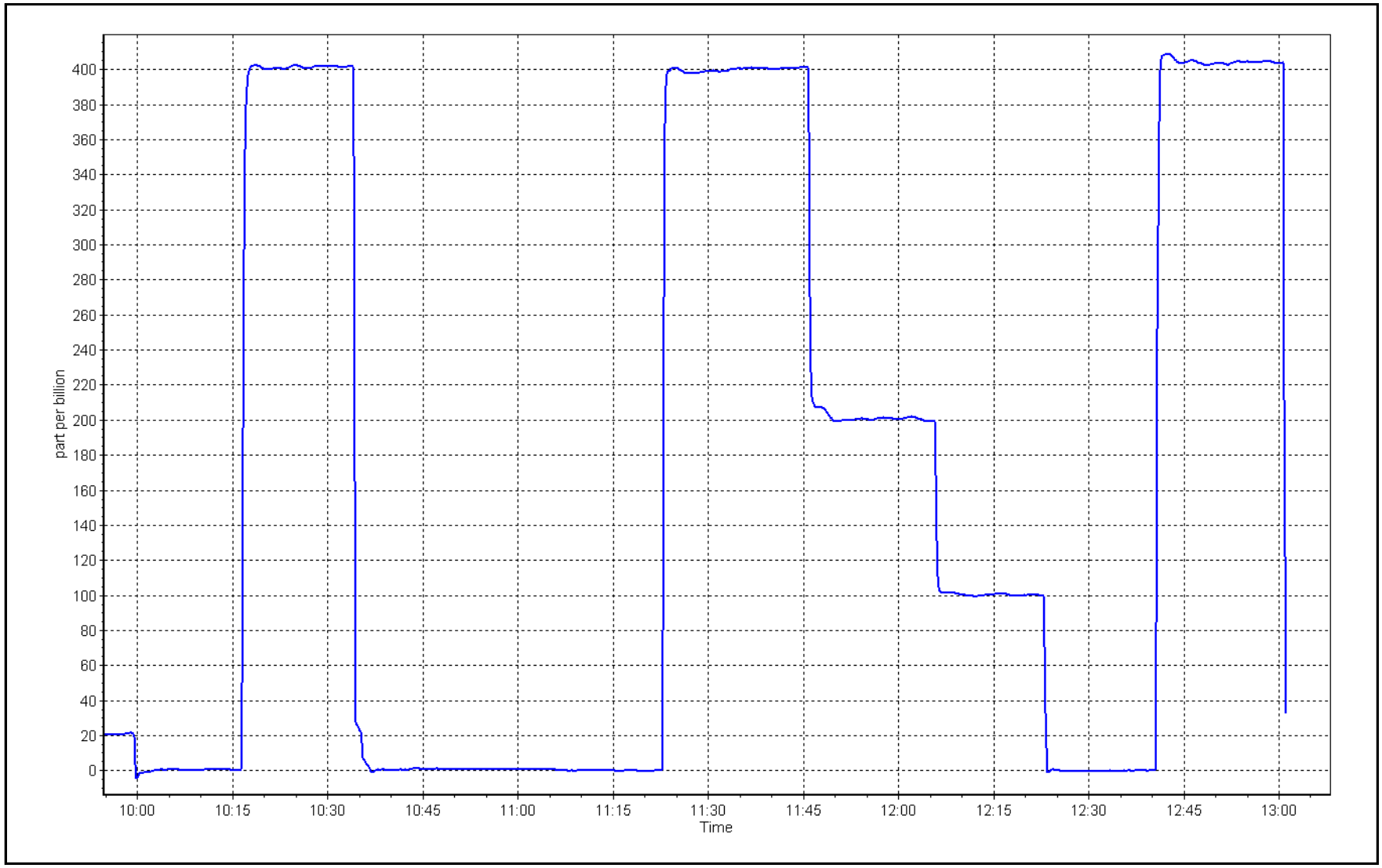
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
400.0	400.3	0.9993
200.0	200.7	0.9965
100.0	100.3	0.9970

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.000714	*0.90 - 1.10*
Intercept	0.200000	*+/- 5*



O_3 Calibration Plot Date: November 2, 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:	November 14, 2023	Last Cal Date:	October 19, 2023
Start time (MST):	12:59	End time (MST):	14:31
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)	1.1	0.4	1.1	☐	+/- 2 °C
P (mmHg)	725.7	723.2	725.7	☐	+/- 10 mmHg
flow (LPM)	5.01	5.10	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: November 14, 2023 Last Cal Date: October 19, 2023

PM w/o HEPA: 6.3 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: October 19, 2023 <0.2 ug/m3

Disposable Filter Changed: October 19, 2023

Annual Maintenance

Date Sample Tube Cleaned: September 14, 2023

Date RH/T Sensor Cleaned: October 19, 2023

Notes: Flow, temperature, and pressure all within limits. Leak check passed.

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:	November 8, 2023	Last Cal Date:	October 23, 2023
Start time (MST):	10:50	End time (MST):	14:38
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:	4890

Analyzer Information

Analyzer make:	Teledyne API T300		Analyzer serial #:	3520	
Analyzer Range:	0 - 50 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000806	1.001848	Backgd or Offset:	-0.012	-0.013
Calibration intercept:	0.185827	0.149849	Coeff or Slope:	0.990	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	0.991
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4933	66.7	40.6	40.6	0.998
second point	4966	33.3	20.2	20.7	0.977
third point	4983	16.7	10.2	10.3	0.986
as left zero	5000	0.0	0.0	0.0	----
as left span	2960	40.0	40.5	40.2	1.009
				Average Correction Factor	0.987

Baseline Corr As found:	40.81	Prev response:	40.77	*% change:	0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

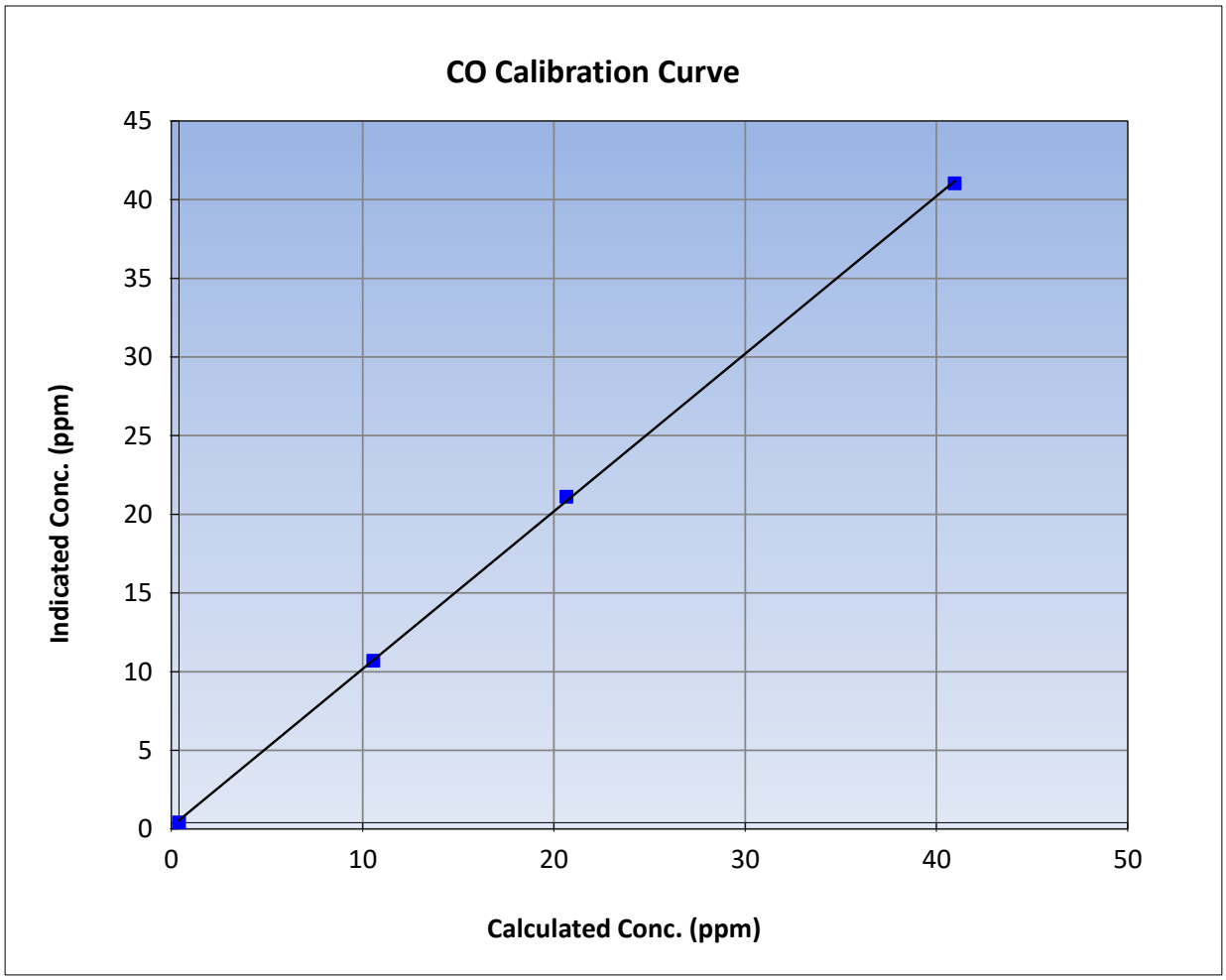
Station Information

Calibration Date:	November 8, 2023	Previous Calibration:	October 23, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:50	End Time (MST):	14:38
Analyzer make:	Teledyne API T300	Analyzer serial #:	3520

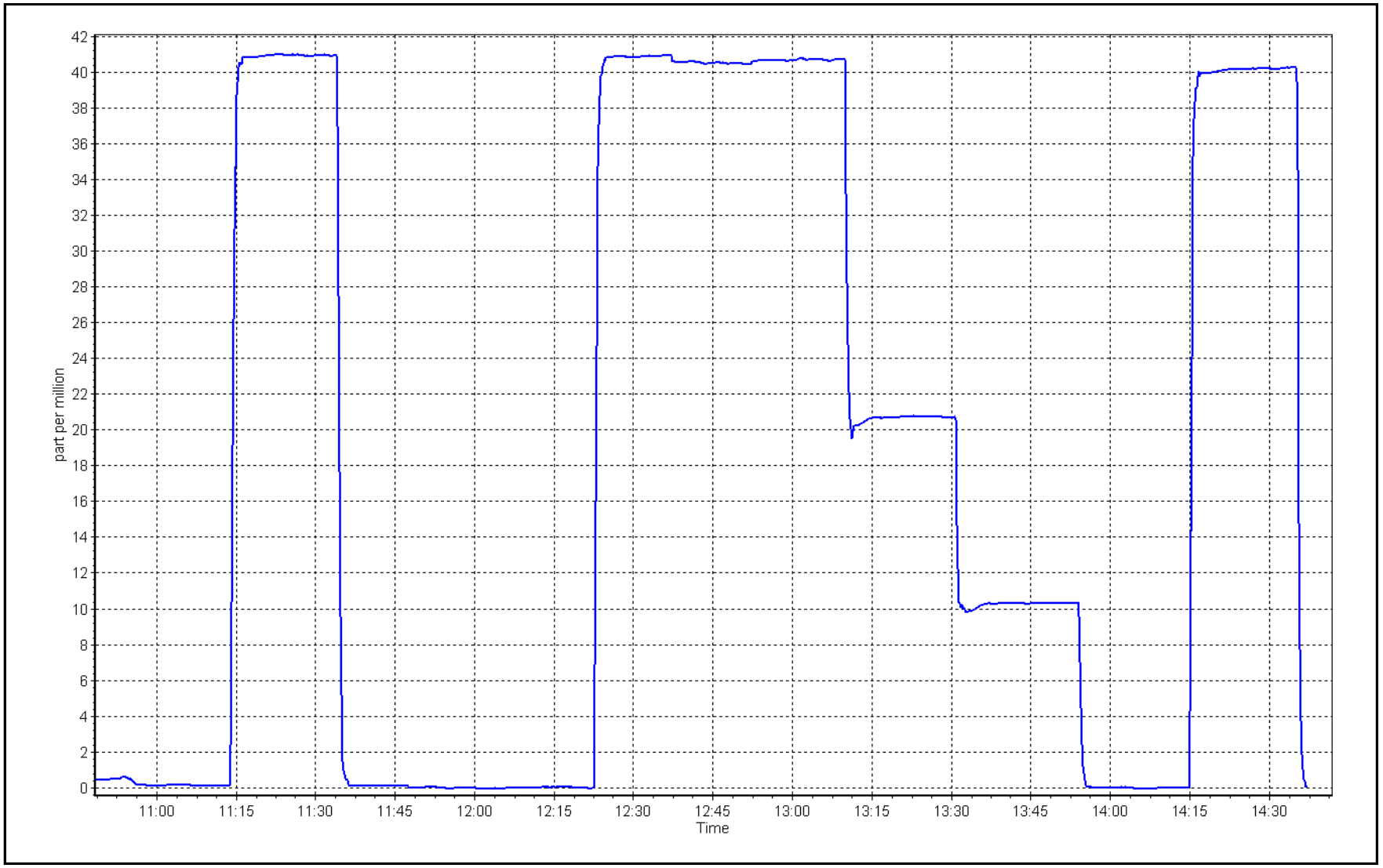
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.6	40.6	0.9979
20.2	20.7	0.9768
10.2	10.3	0.9858

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999863	*≥0.995*
Slope	1.001848	*0.90 - 1.10*
Intercept	0.149849	*+/-1.5*



CO Calibration Plot Date: November 8, 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:	November 7, 2023	Last Cal Date:	October 13, 2023
Start time (MST):	11:06	End time (MST):	14:18
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:	1.001376	1.001056	Backgd or Offset:	0.045	0.045
Calibration intercept:	-5.300000	-6.100000	Coeff or Slope:	0.876	0.874

CO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	3000	0.0	0.0	-0.3	----
as found span	2920	80.0	1605.3	1618.0	0.992
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	1604.0	1.001
second point	2960	40.0	802.7	794.4	1.010
third point	2980	20.0	401.3	389.4	1.031
as left zero	3000	0.0	0.0	-0.1	----
as left span	2960	40.0	802.7	781.7	1.027
				Average Correction Factor	1.014

Baseline Corr As found:	1618.30	Prev response:	1602.24	*% change:	1.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

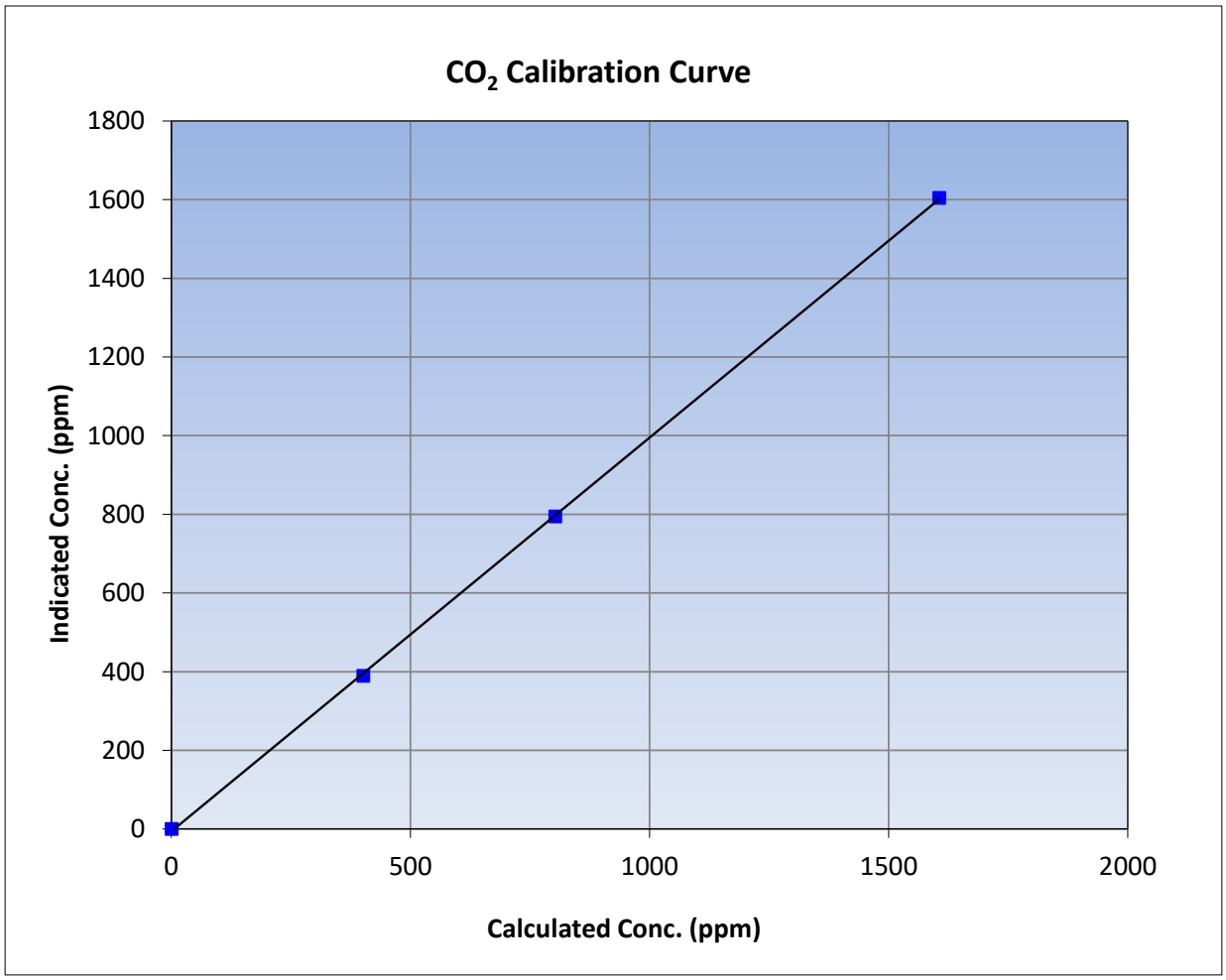
Station Information

Calibration Date	November 7, 2023	Previous Calibration	October 13, 2023
Station Name	Bertha Ganter-Fort McKay	Station Number	AMS01
Start Time (MST)	11:06	End Time (MST)	14:18
Analyzer make	Teledyne API 360	Analyzer serial #	442

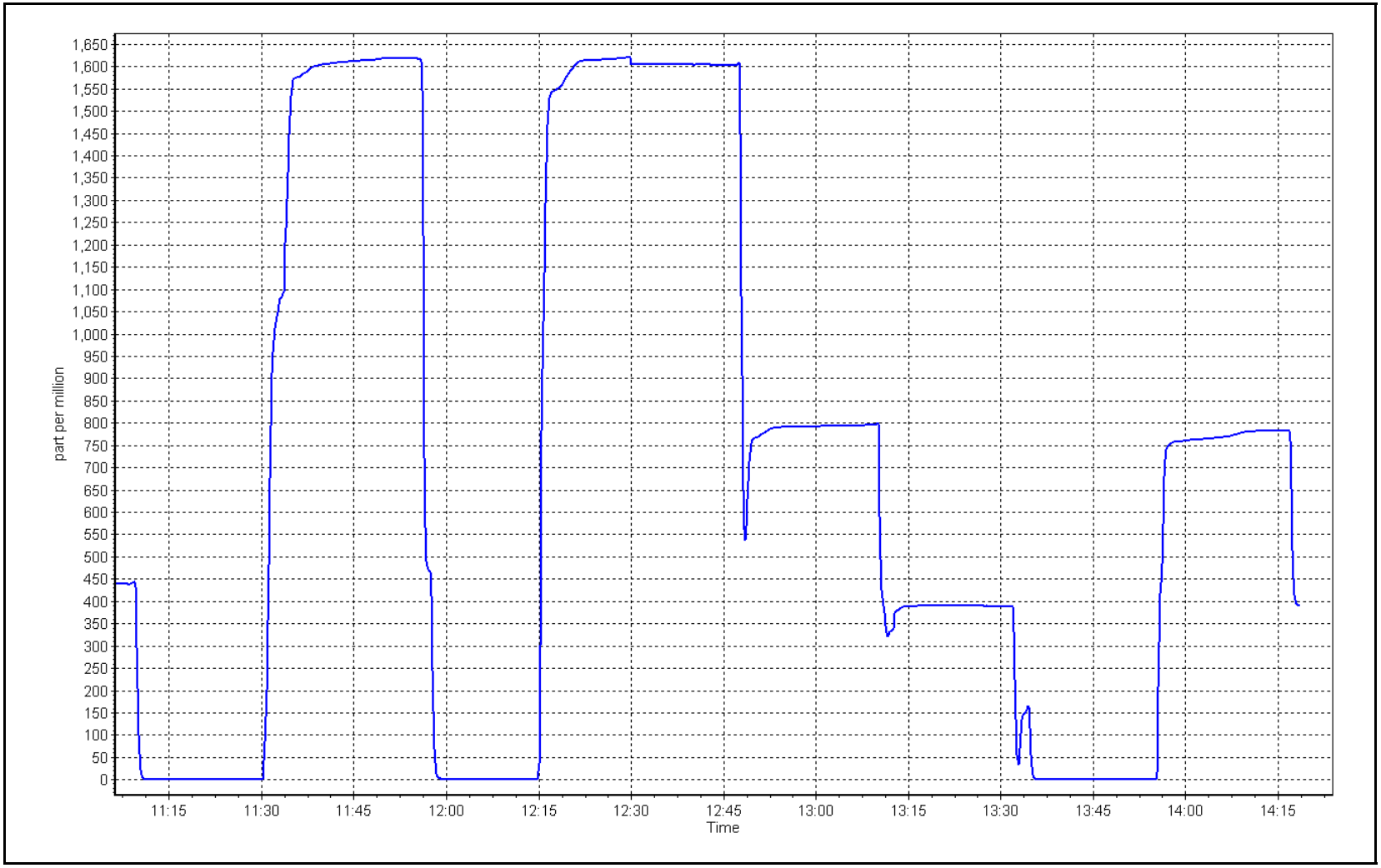
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
1605.3	1604.0	1.0008
802.7	794.4	1.0104
401.3	389.4	1.0306

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999932	*≥0.995*
Slope	1.001056	*0.90 - 1.10*
Intercept	-6.100000	*+/-10*



CO_2 Calibration Plot Date: November 7, 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:	November 14, 2023	Last Cal Date:	October 18, 2023
Start time (MST):	10:53	End time (MST):	15:56
NH3 Cal Date:	November 15, 2023	Last Cal Date:	October 19, 2023
Start time (MST):	11:05	End time (MST):	14:50
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:	76.58	ppm	NH3 Gas Cylinder #:	CC743587
			NH3 Cal Gas Expiry:	August 22, 2024
Removed NH3 Conc:	76.58	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:	4890

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:	5.10
NOX Range (ppb):	0 - 1000 ppb	Sample Flow:	506

	Start	*Finish*		*Start*	*Finish*
NO coefficient:	0.991	0.987	TN coefficient:	0.996	0.989
NOX coefficient:	0.993	0.989	NO bkgrnd:	-0.9	-0.9
NO2 coefficient:	1.000	1.000	NOX bkgrnd:	-0.3	-0.3
NH3 coefficient:	0.943	0.932	TN bkgrnd:	1.2	1.2

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	1.000492	0.999888
NO_X Cal Offset:	-1.780000	-1.540000
NO Cal Slope:	1.000500	0.999686
NO Cal Offset:	-1.880000	-2.120000
NO_2 Cal Slope:	1.000741	0.998244
NO_2 Cal Offset:	-0.538093	-0.546307
NH3 Cal Slope:	0.995734	1.000230
NH3 Cal Offset:	1.216520	-2.765159
TN Cal Slope:	0.998191	1.002817
TN Cal Offset:	1.291202	-2.497861

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	-0.8	-0.8	0.0	----	----
as found NO	4920	80.0	813.4	813.4	----	815.7	815.6	0.3	0.997	----
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
high NO point	4920	80.0	813.4	813.4	----	812.5	813.0	-0.6	1.001	----
NO/O3 point	4920	80.0	813.4	813.4	----	811.6	810.7	1.1	1.002	----
as found NH3	3416	84.1	1840.1	----	1840.1	1784.0	----	1779.1	1.031	1.034
new NH3 cyl rp							----			
first NH3	3418	82.2	1798.5	----	1798.5	1804.0	----	1799.2	0.997	1.000
second NH3	3454	45.7	1000.0	----	1000.0	995.3	----	992.3	1.005	1.008
third NH3	3477	22.8	498.9	----	498.9	497.4	----	495.7	1.003	1.006
								Average Correction Factor	1.0017	1.0046

Corrected As found TN = 816.5 ppb NO_X = 816.4 ppb NH3 = 1779.1 ppb

Previous Response TN = 813.3 ppb NO_X = 812.1 ppb NH3 = 1833.5 ppb

*Percent Change TN = 0.4%

*Percent Change NO_X = 0.5%

*Percent Change NH3 = -3.1%

* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 94.3%

NH3 Current Converter Efficiency = 93.2%

Wood Buffalo Environmental Association

NO_X - NO - NO_2 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.6	-0.6	-0.6	----	----
as found span	4920	80.0	813.4	800.6	813.4	820.7	804.3	821.5	0.9912	0.9954
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.3	0.0	----	----
high point	4920	80.0	813.4	800.6	813.4	813.0	799.9	812.5	1.0005	1.0009
second point	4960	40.0	406.7	400.3	406.7	403.2	395.6	403.5	1.0087	1.0119
third point	4980	20.0	203.4	200.2	203.4	200.9	196.4	199.9	1.0122	1.0191
								Average Correction Factor	1.0072	1.0107

Baseline Corr As fnd TN = 822.1 ppb NO_X = 821.3 ppb NO = 804.9 ppb

Previous Response TN = 813.3 ppb NO_X = 812.1 ppb NO = 799.2 ppb

*Percent Change TN = 1.1%

*Percent Change NO_X = 1.1%

*Percent Change NO = 0.7%

* = > +/-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	0.0	----	----
calibration zero	----	----	0.0	-0.2	----	----
1st GPT point (400 ppb O3)	795.6	387.3	421.1	420.0	1.0026	99.7%
2nd GPT point (200 ppb O3)	795.6	593.8	214.6	213.5	1.0052	99.5%
3rd GPT point (100 ppb O3)	795.6	695.2	113.2	112.1	1.0098	99.0%
				Average Correction Factor	1.0059	99.4%

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

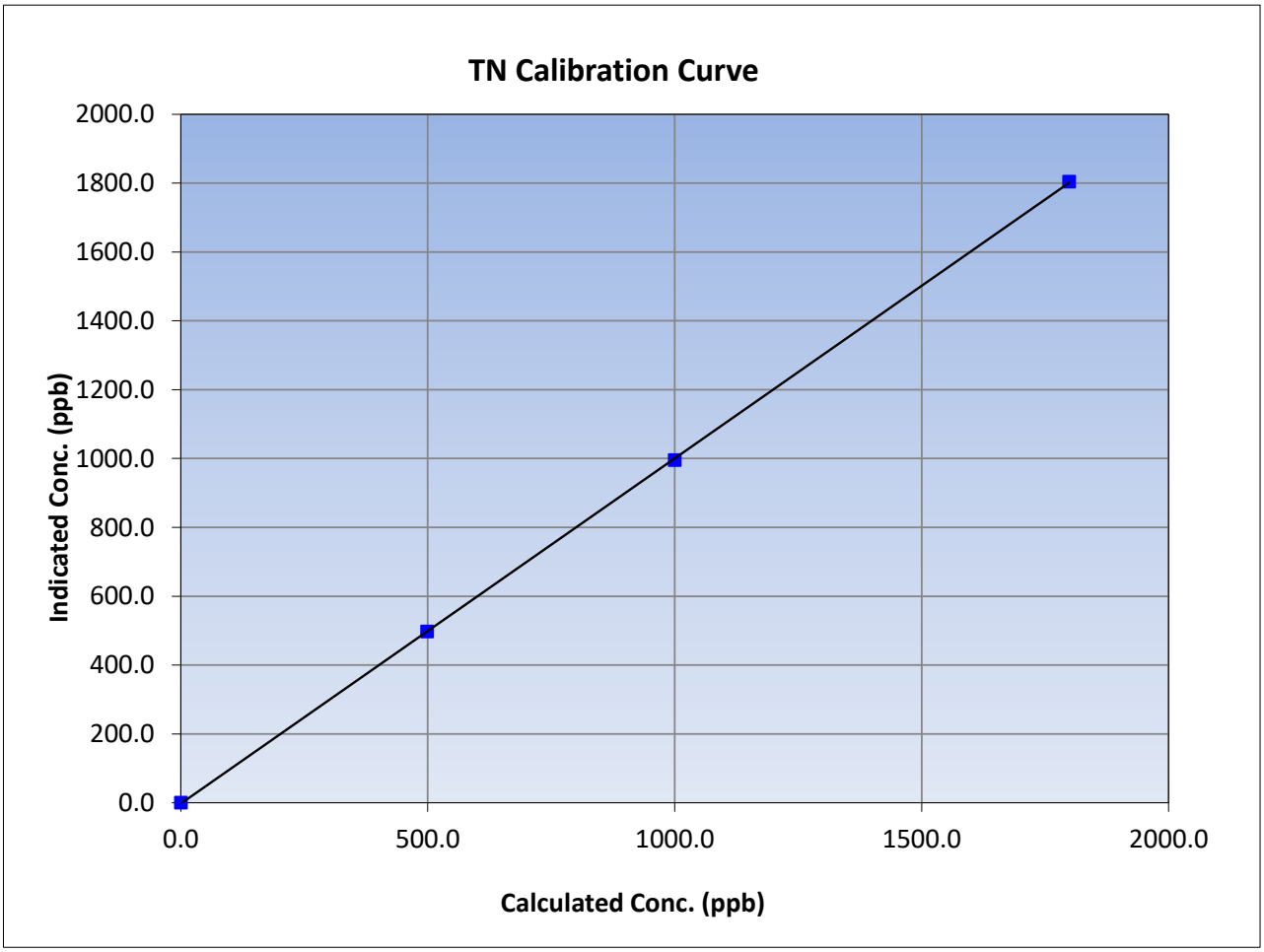
Version-05-2023

Station Information

Calibration Date:	November 15, 2023	Previous Calibration:	October 18, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:53	End Time (MST):	15:56
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	0.999977	≥0.995
1798.5	1804.0	0.9970			
1000.0	995.3	1.0047	Slope	1.002817	0.90 - 1.10
498.9	497.4	1.0029			
			Intercept	-2.497861	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

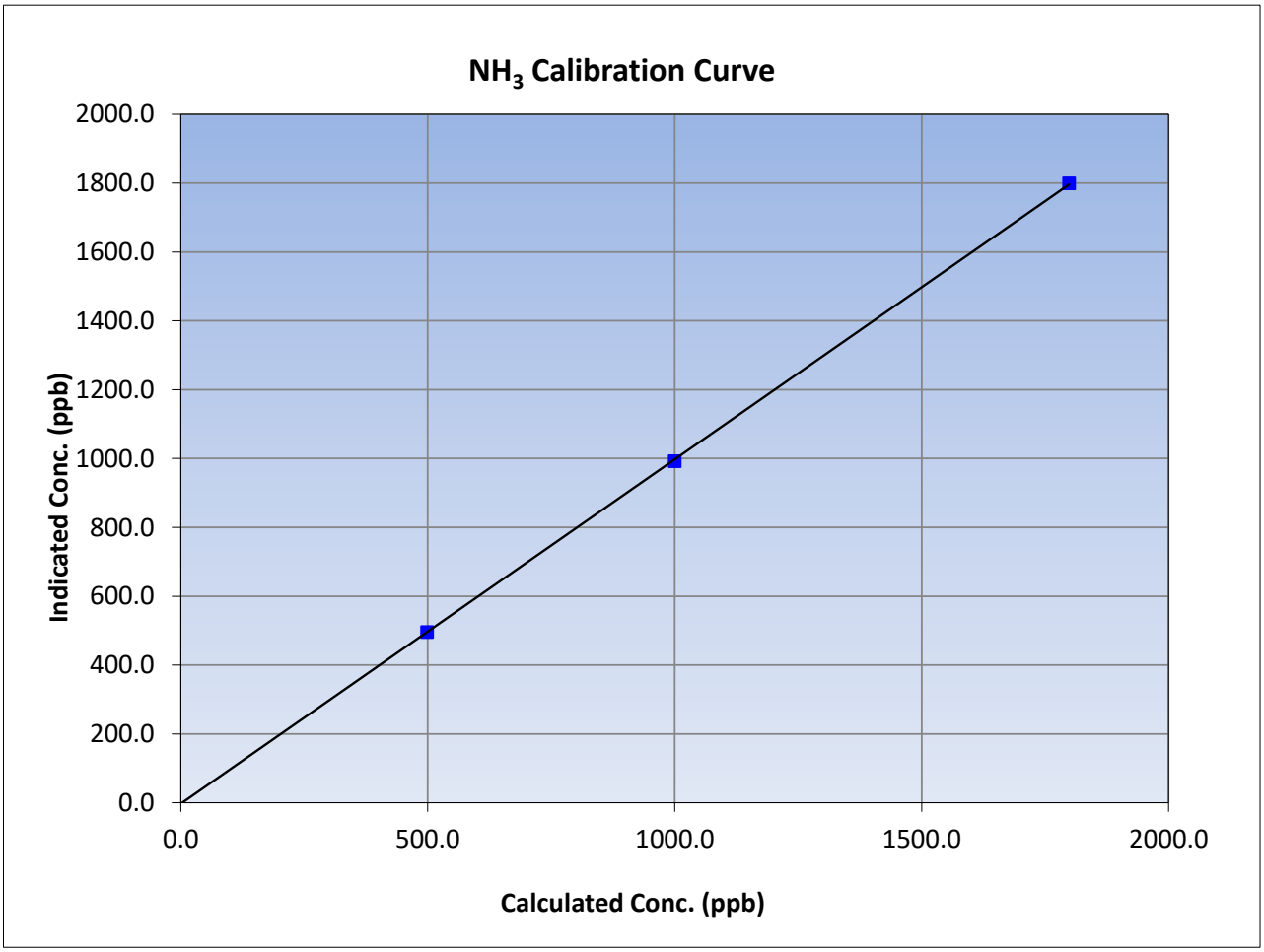
Version-05-2023

Station Information

Calibration Date:	November 15, 2023	Previous Calibration:	October 18, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:53	End Time (MST):	15:56
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	0.999976	≥0.995
1798.5	1799.2	0.9996			
1000.0	992.3	1.0078	Slope	1.000230	0.90 - 1.10
498.9	495.7	1.0064			
			Intercept	-2.765159	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

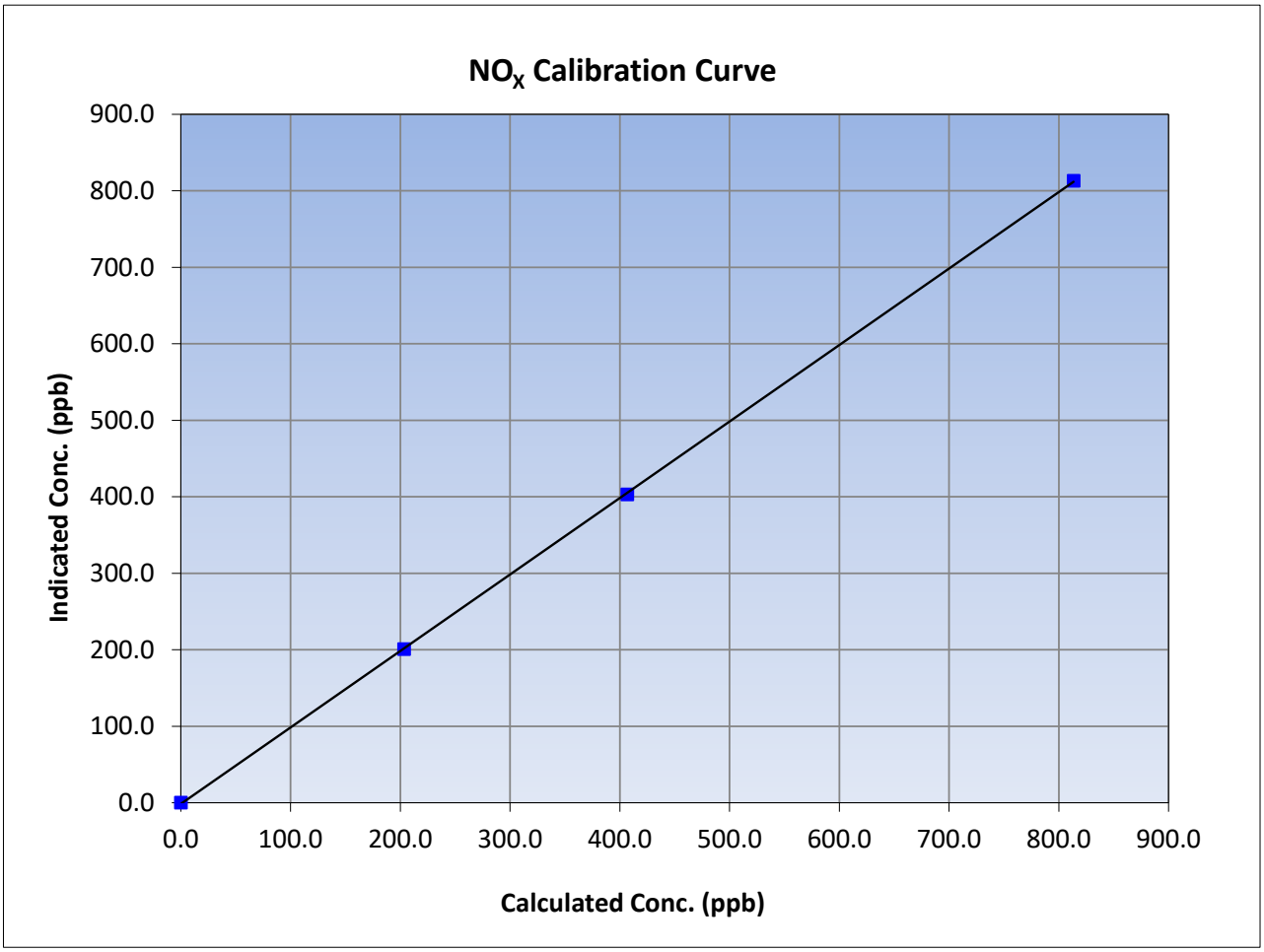
Version-05-2023

Station Information

Calibration Date:	November 14, 2023	Previous Calibration:	October 18, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:53	End Time (MST):	15:56
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	0.999976	≥0.995
813.4	813.0	1.0005			
406.7	403.2	1.0087	Slope	0.999888	0.90 - 1.10
203.4	200.9	1.0122			
			Intercept	-1.540000	+/-20



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NO Calibration Summary

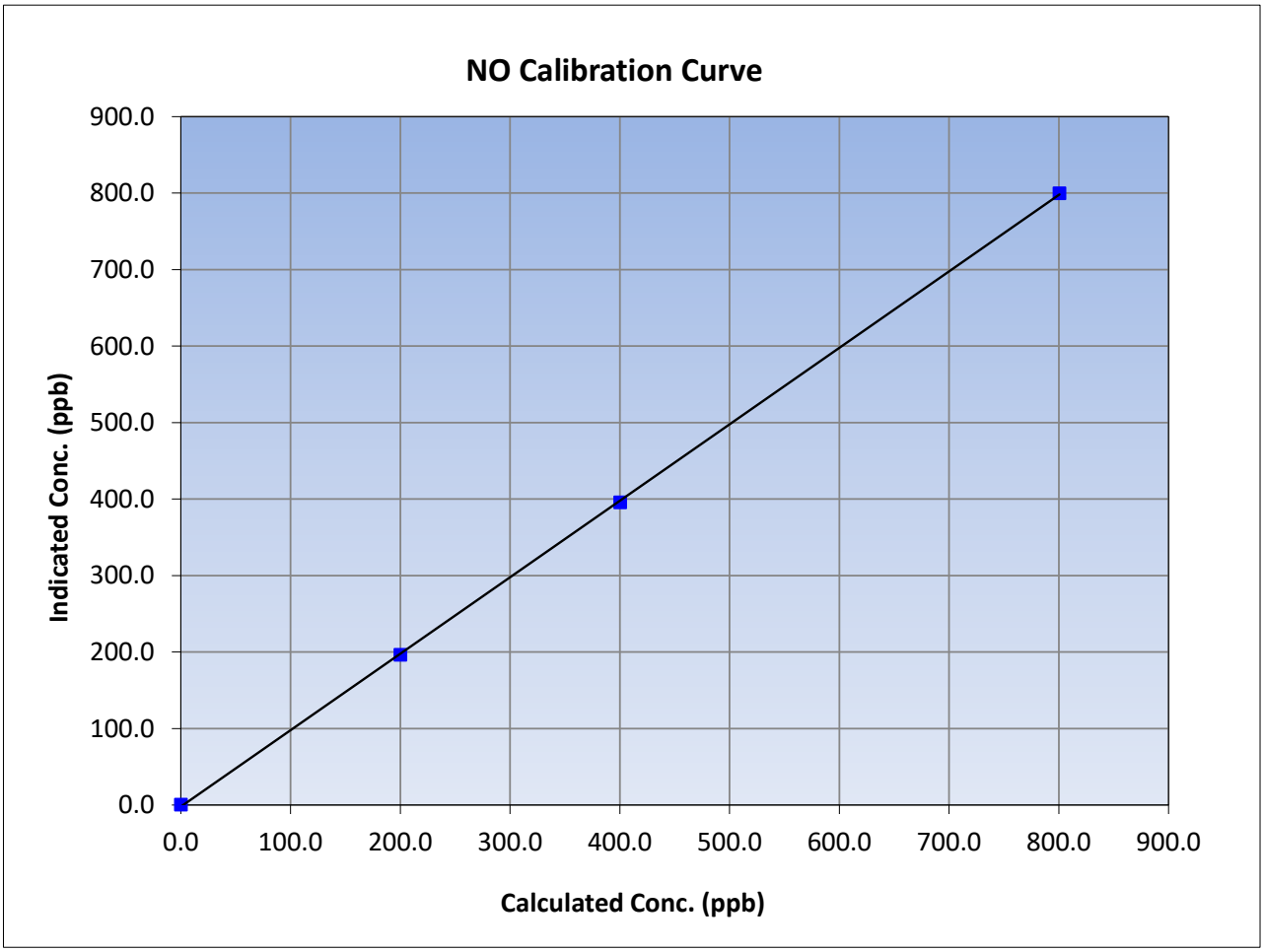
Version-05-2023

Station Information

Calibration Date:	November 14, 2023	Previous Calibration:	October 18, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:53	End Time (MST):	15:56
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	0.999951	≥0.995
800.6	799.9	1.0009			
400.3	395.6	1.0119	Slope	0.999686	0.90 - 1.10
200.2	196.4	1.0191			
			Intercept	-2.120000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

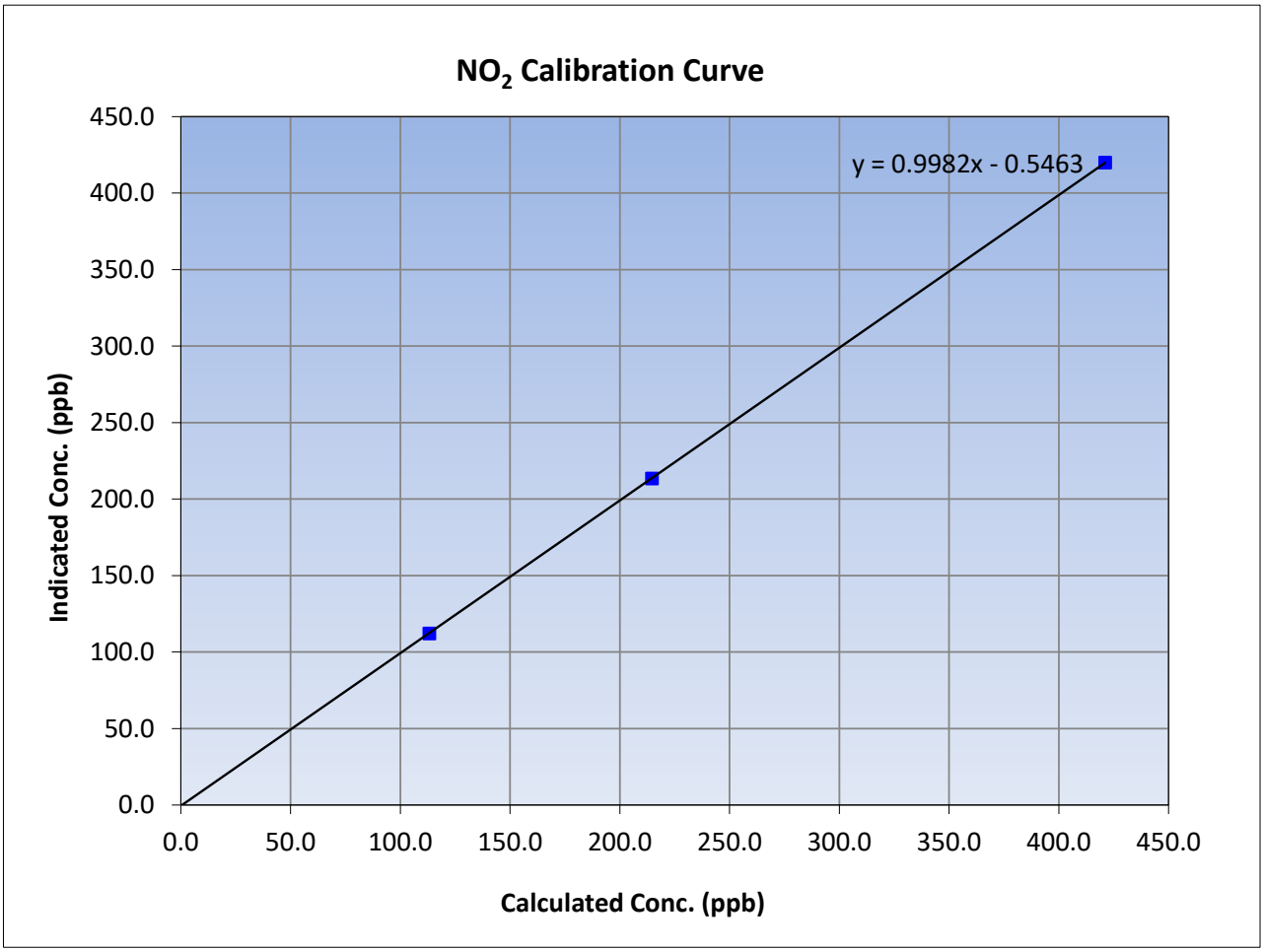
Version-05-2023

Station Information

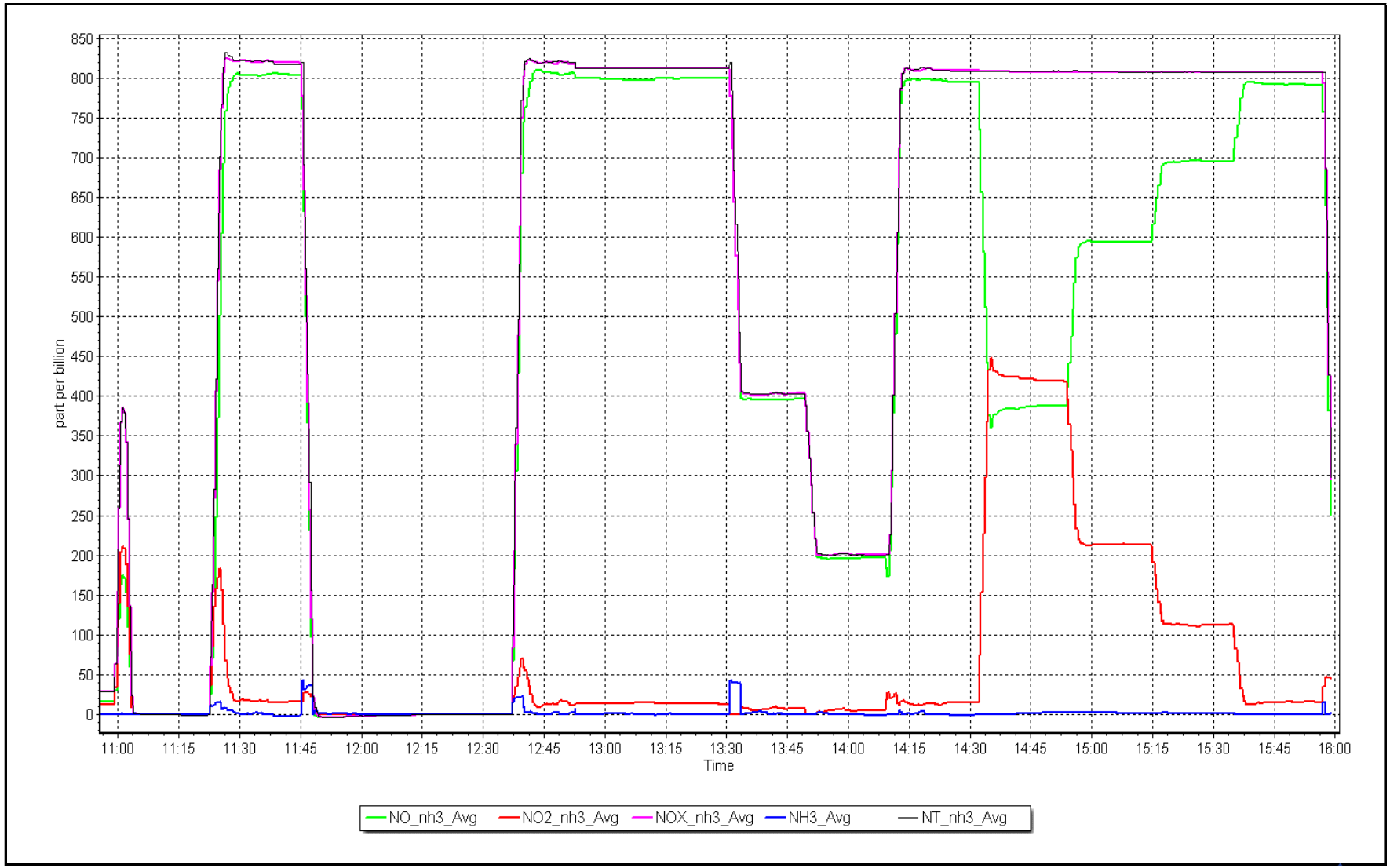
Calibration Date:	November 14, 2023	Previous Calibration:	October 18, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:53	End Time (MST):	15:56
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

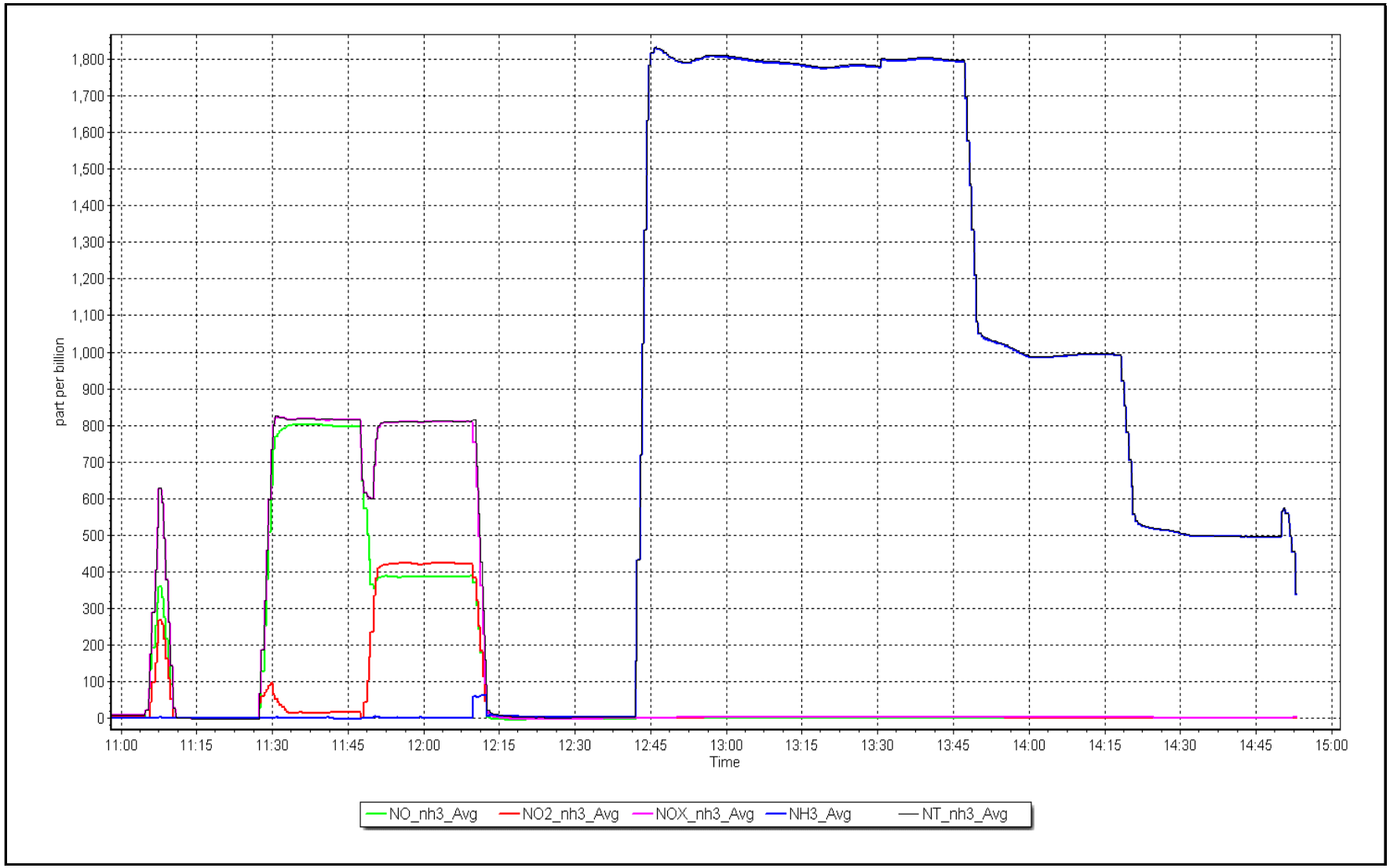
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999997	≥0.995
421.1	420.0	1.0026			
214.6	213.5	1.0052	Slope	0.998244	0.90 - 1.10
113.2	112.1	1.0098			
			Intercept	-0.546307	+/-20



NO_X Calibration Plot Date: November 14, 2023 Location: Bertha Ganter-Fort McKay



NH_3 Calibration Plot Date: November 15, 2023 Location: Bertha Ganter-Fort McKay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS02
MILDRED LAKE
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Mildred Lake	Station number:	AMS02
Calibration Date:	November 22, 2023	Last Cal Date:	October 20, 2023
Start time (MST):	10:25	End time (MST):	11:45
Reason:	As Found		

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:	0.999174		Backgd or Offset:	17.5	17.5
Calibration intercept:	0.714964		Coeff or Slope:	0.774	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	0.5	----
as found span	4920	80.2	801.6	799.3	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	

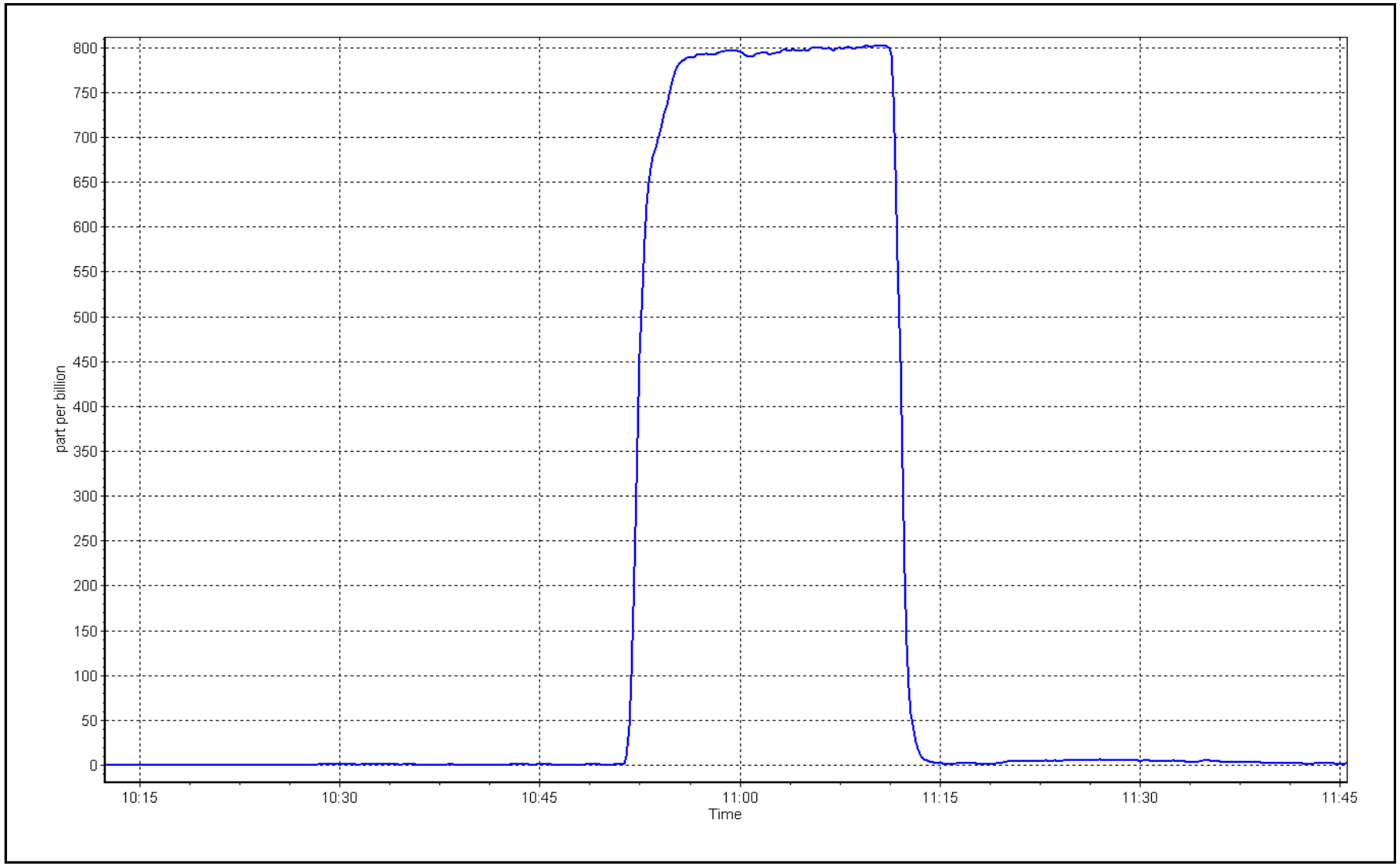
Baseline Corr As found:	798.80	Previous response	801.70	*% change	-0.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Generated as founds for a calibration. Flow dropped to near zero, suspecting a failed pump. Will return November 23 with a replacement.

Calibration Performed By: Jan Castro/ Braiden Boutilier

SO2 Calibration Plot Date: November 22, 2023 Location: Mildred Lake



Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Mildred Lake	Station number:	AMS02
Calibration Date:	November 23, 2023	Last Cal Date:	October 20, 2023
Start time (MST):	13:17	End time (MST):	15:57
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:	0.999174	0.996481	Backgd or Offset:	17.5	20.6
Calibration intercept:	0.714964	-0.365997	Coeff or Slope:	0.774	0.763

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4920	80.2	801.6	798.5	1.004
second point	4960	40.1	400.8	399.4	1.004
third point	4980	20.0	199.9	198.0	1.010
as left zero	5000	0.0	0.0	-0.3	----
as left span	4920	80.2	801.6	798.7	1.004
				Average Correction Factor	1.006

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

* = > +/-5% change initiates investigation

Notes: Changed pump. Adjusted zero and span.

Calibration Performed By: Jan Castro/ Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

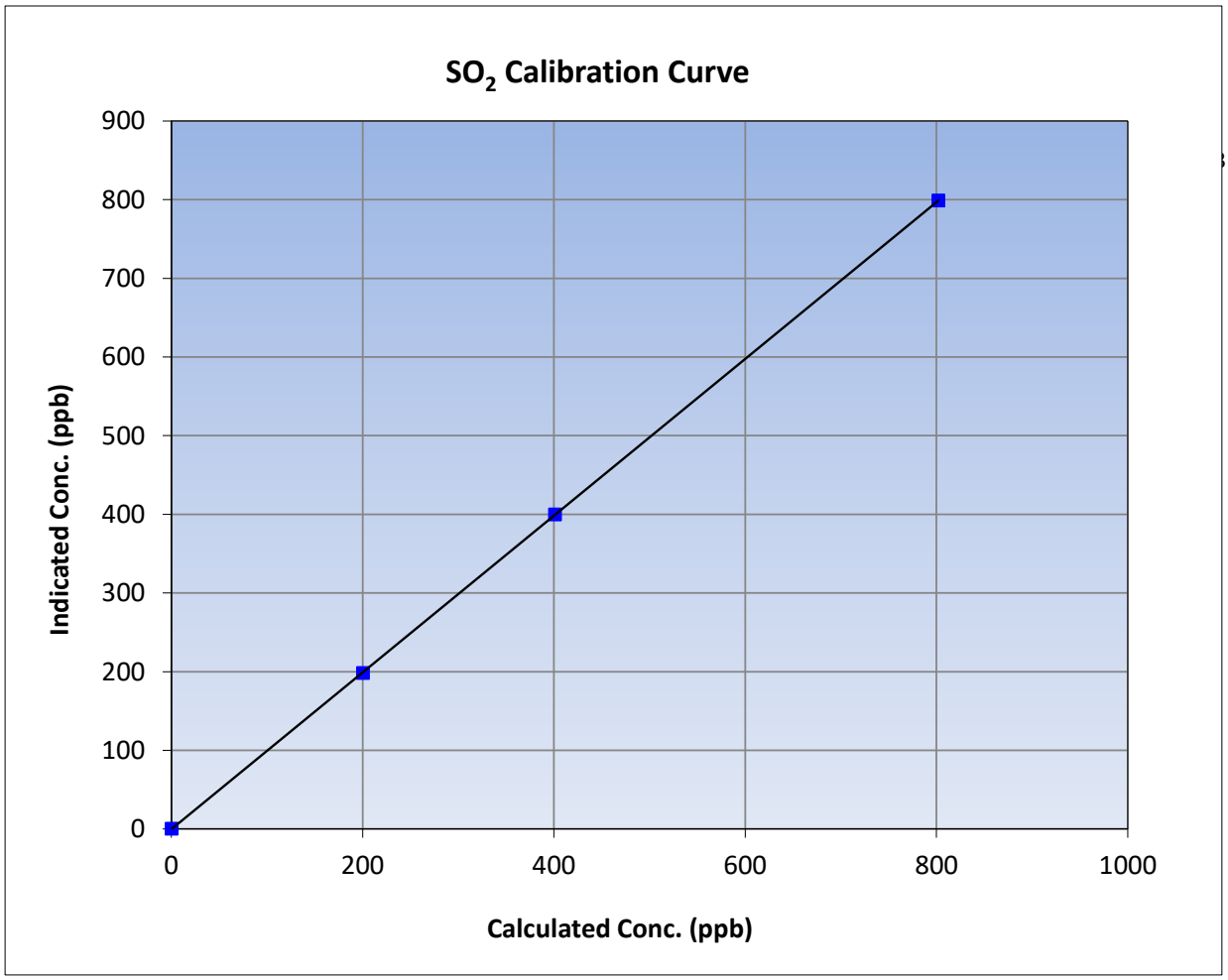
Station Information

Calibration Date:	November 23, 2023	Previous Calibration:	October 20, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	13:17	End Time (MST):	15:57
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1404901075

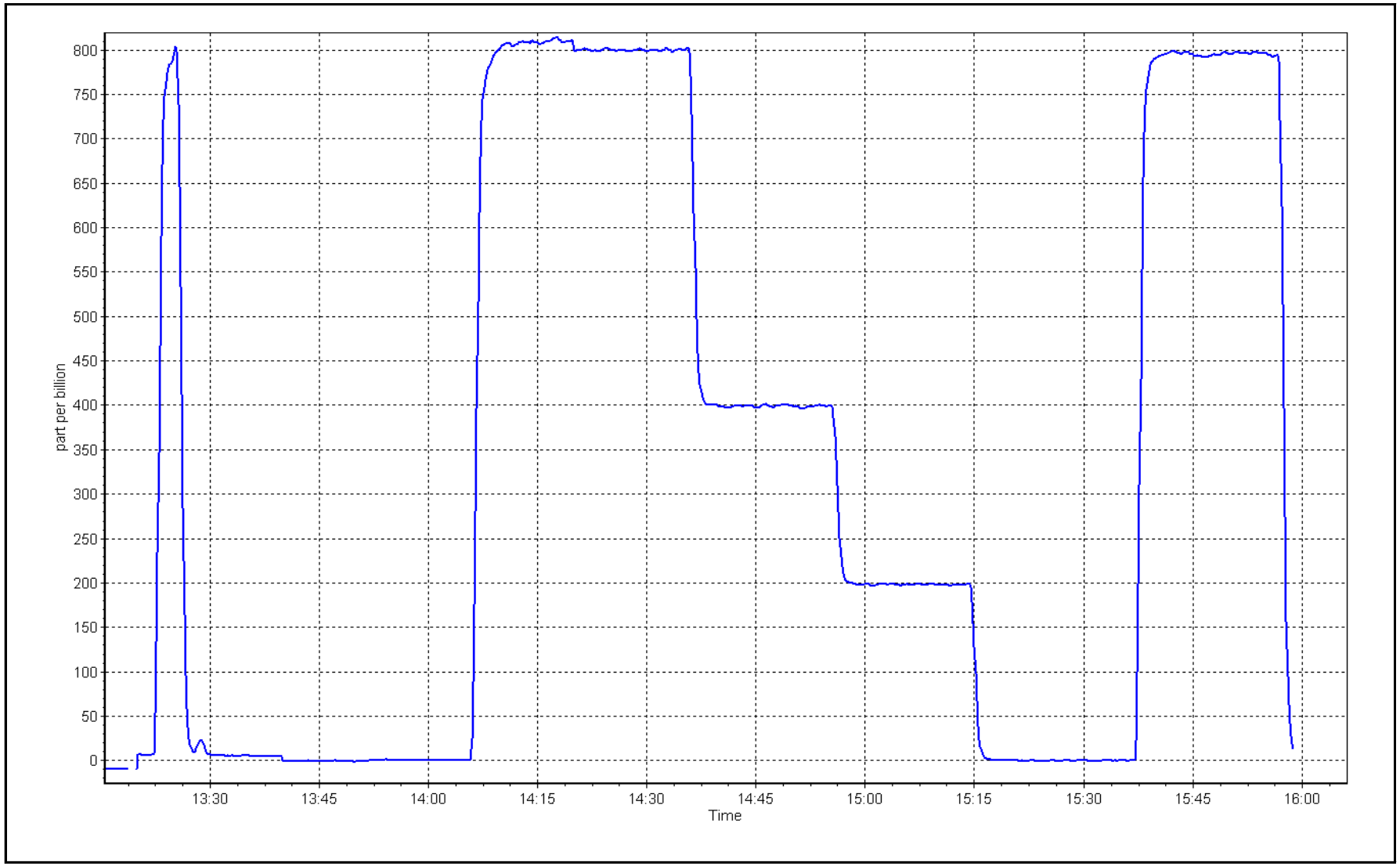
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
801.6	798.5	1.0039
400.8	399.4	1.0036
199.9	198.0	1.0097

Statistical Evaluation		Limits
Correlation Coefficient	0.999997	≥0.995
Slope	0.996481	0.90 - 1.10
Intercept	-0.365997	+/-30



SO2 Calibration Plot Date: November 23, 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:	November 24, 2023	Last Cal Date:	October 25, 2023
Start time (MST):	11:14	End time (MST):	15:13
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:	1.002536	1.010680	Backgd or Offset:	1.71	1.72
Calibration intercept:	-0.059198	-0.019191	Coeff or Slope:	0.754	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	0.1	----
as found span	4924	75.6	80.0	81.1	0.988
as found 2nd point	4962	37.8	40.0	40.4	0.992
as found 3rd point	4981	18.9	20.0	20.1	1.000
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	80.8	0.990
second point	4962	37.8	40.0	40.5	0.988
third point	4981	18.9	20.0	20.1	0.995
as left zero	5000	0.0	0.0	0.1	----
as left span	4924	75.6	80.0	81.1	0.986
SO2 Scrubber Check	4920	80.2	802.0	0.2	----
Date of last scrubber change:		20-Sep-23		Ave Corr Factor	0.991
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.0	Prev response:	80.13	*% change:	1.1%
Baseline Corr 2nd AF pt:	40.3	AF Slope:	1.013394	AF Intercept:	-0.039192
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999986		

* = > +/-5% change initiates investigation

Notes: SO2 scrubber checked passed after the calibrated zero. No adjustment made.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

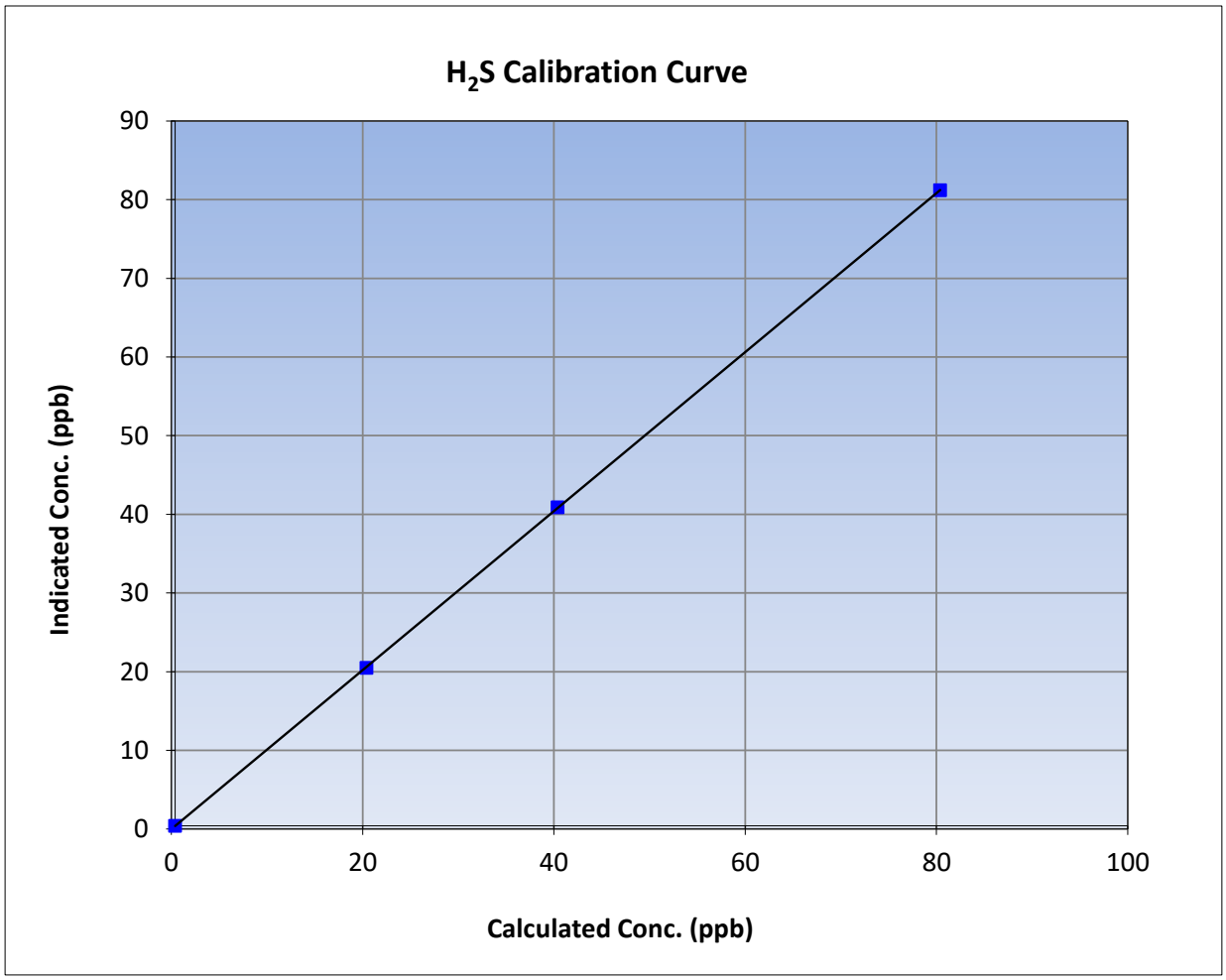
Station Information

Calibration Date:	November 24, 2023	Previous Calibration:	October 25, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	11:14	End Time (MST):	15:13
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	12113311966

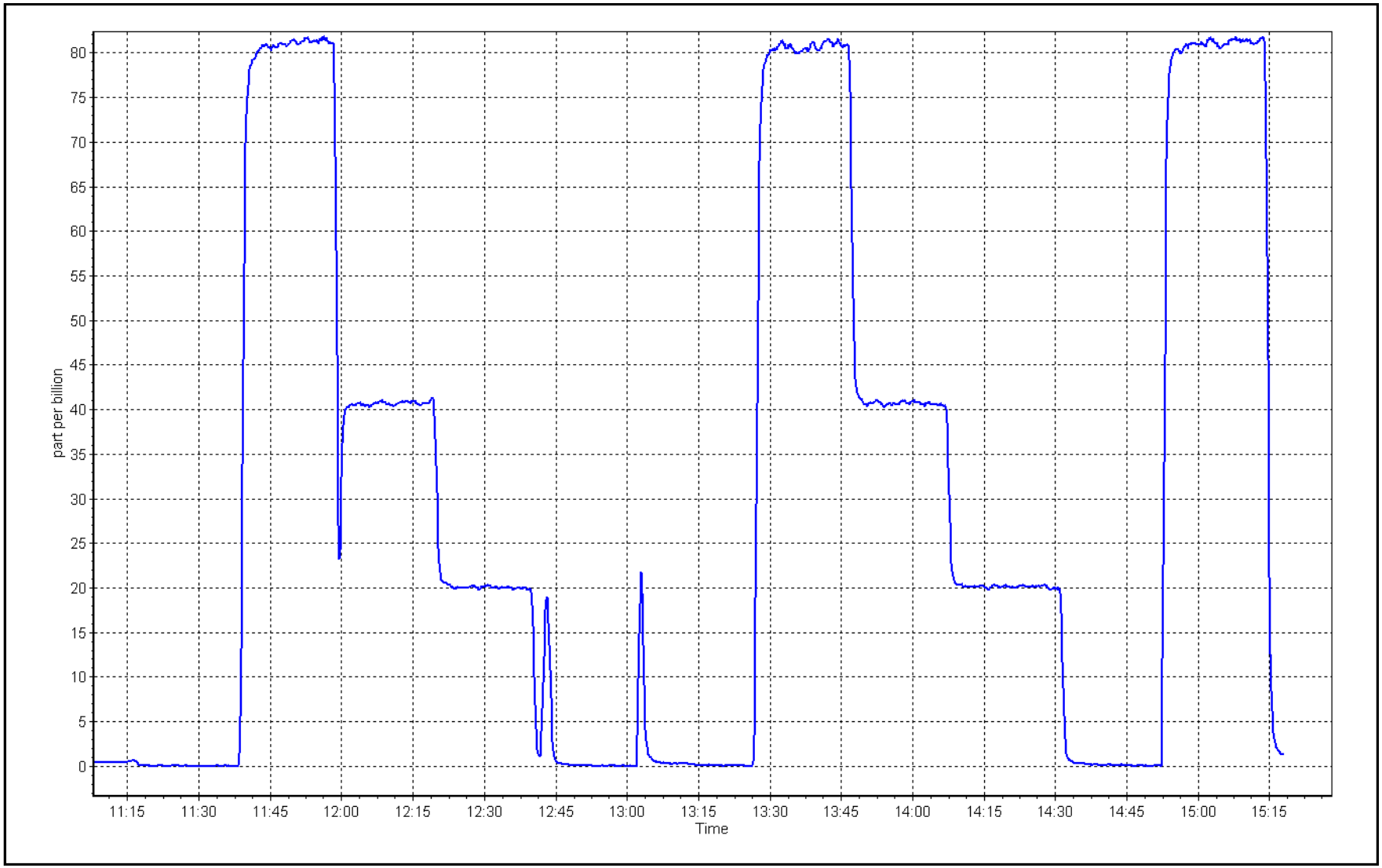
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.8	0.9900
40.0	40.5	0.9875
20.0	20.1	0.9949

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.010680	*0.90 - 1.10*
Intercept	-0.019191	*+/-3*



H_2S Calibration Plot Date: November 24, 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:	November 22, 2023	Last Cal Date:	October 20, 2023
Start time (MST):	10:25	End time (MST):	15:41
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:	3.04E-04	3.07E-04	NMHC SP Ratio:	4.59E-05	4.52E-05
CH4 Retention time:	14.8	15.0	NMHC Peak Area:	191592	194477
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	16.80	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	80.2	16.82	16.79	1.002
second point	4960	40.1	8.41	8.36	1.006
third point	4980	20.0	4.19	4.17	1.007
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	16.82	16.81	1.000
				Average Correction Factor	1.005
Baseline Corr AF:	16.80	Prev response	16.75	*% change	0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-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	8.90	0.988
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	8.80	8.79	1.001
second point	4960	40.1	4.40	4.40	1.000
third point	4980	20.0	2.19	2.20	0.997
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.80	8.76	1.004
				Average Correction Factor	0.999
Baseline Corr AF:	8.90	Prev response	8.80	*% change	1.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	8.02	7.91	1.015
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	8.02	8.00	1.003
second point	4960	40.1	4.01	3.96	1.014
third point	4980	20.0	2.00	1.96	1.019
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.02	8.04	0.998
				Average Correction Factor	1.012
Baseline Corr AF:	7.91	Prev response	7.95	*% change	-0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.996697	0.998545
THC Cal Offset:	-0.011323	-0.015916
CH4 Cal Slope:	0.994304	0.997280
CH4 Cal Offset:	-0.023065	-0.020258
NMHC Cal Slope:	0.998828	0.999088
NMHC Cal Offset:	0.011943	0.003941

Notes: Changed filters after as founds. Change hydrogen and nitrogen cylinder. Span adjusted only.

Calibration Performed By: Jan Castro

Wood Buffalo Environmental Association

THC Calibration Summary

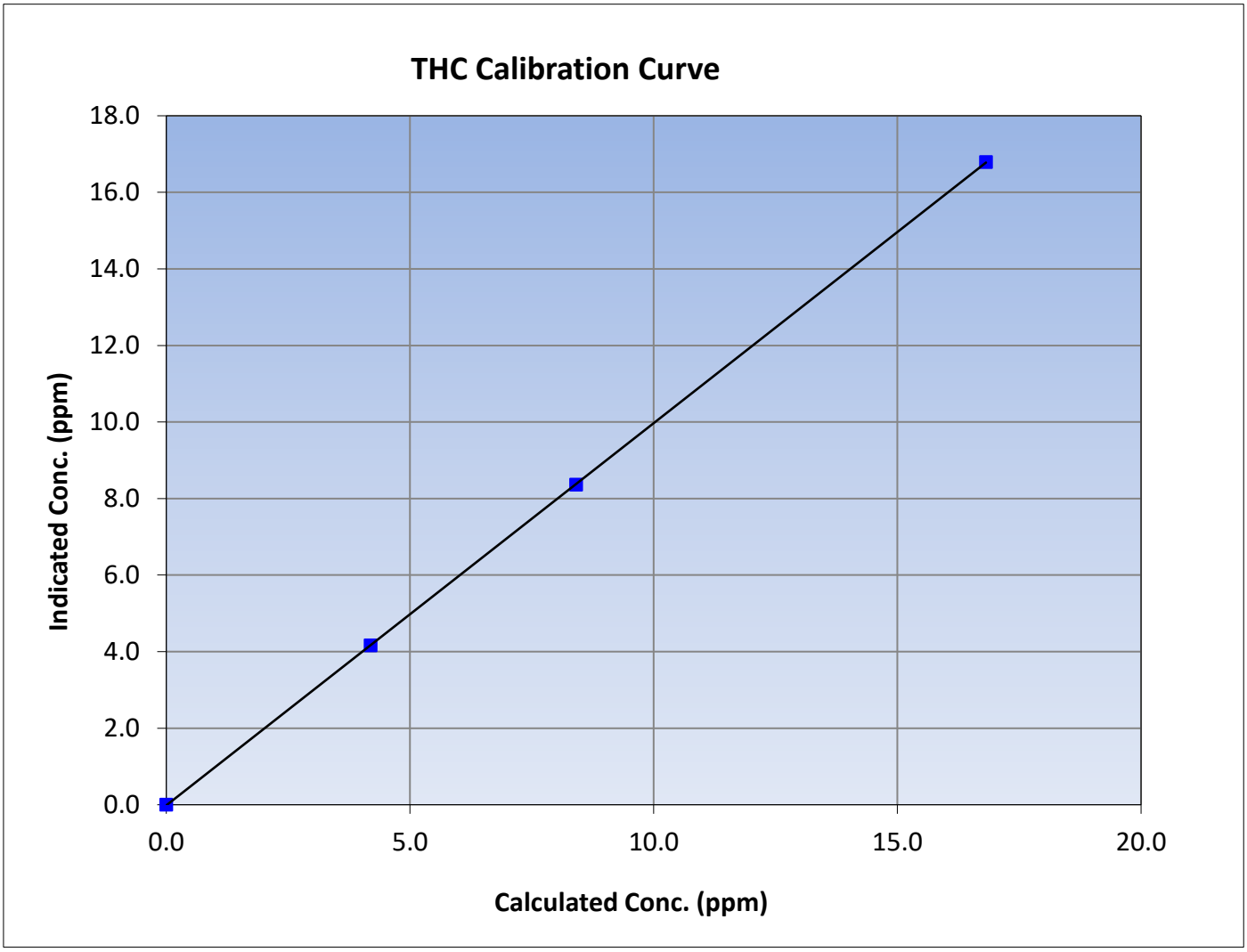
Version-06-2022

Station Information

Calibration Date:	November 22, 2023	Previous Calibration:	October 20, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:25	End Time (MST):	15:41
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	0.999994	*≥0.995*
16.82	16.79	1.0017			
8.41	8.36	1.0059	Slope	0.998545	*0.90 - 1.10*
4.19	4.17	1.0070			
			Intercept	-0.015916	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

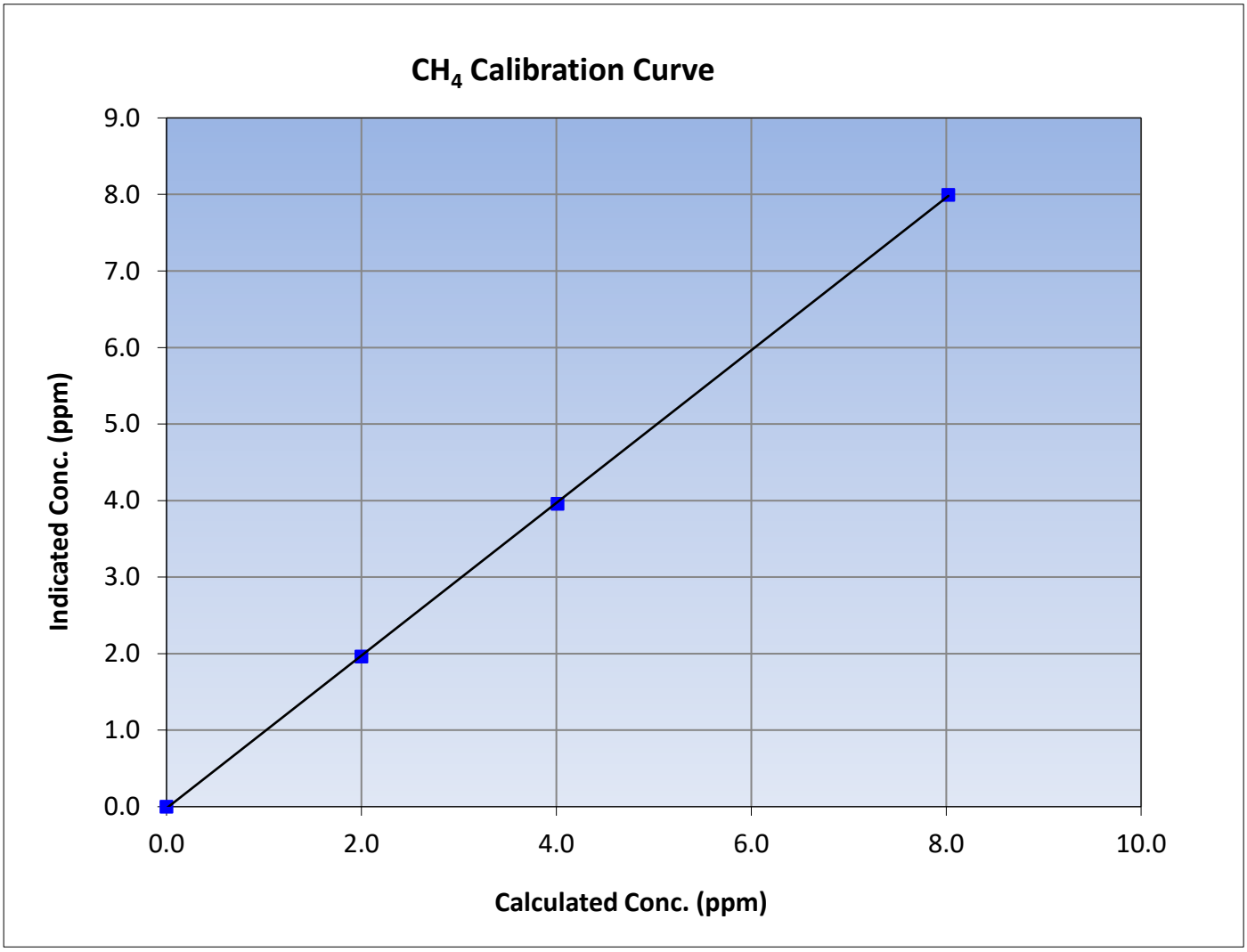
Version-06-2022

Station Information

Calibration Date:	November 22, 2023	Previous Calibration:	October 20, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:25	End Time (MST):	15:41
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	0.999964	*≥0.995*
8.02	8.00	1.0035			
4.01	3.96	1.0135	Slope	0.997280	*0.90 - 1.10*
2.00	1.96	1.0193			
			Intercept	-0.020258	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

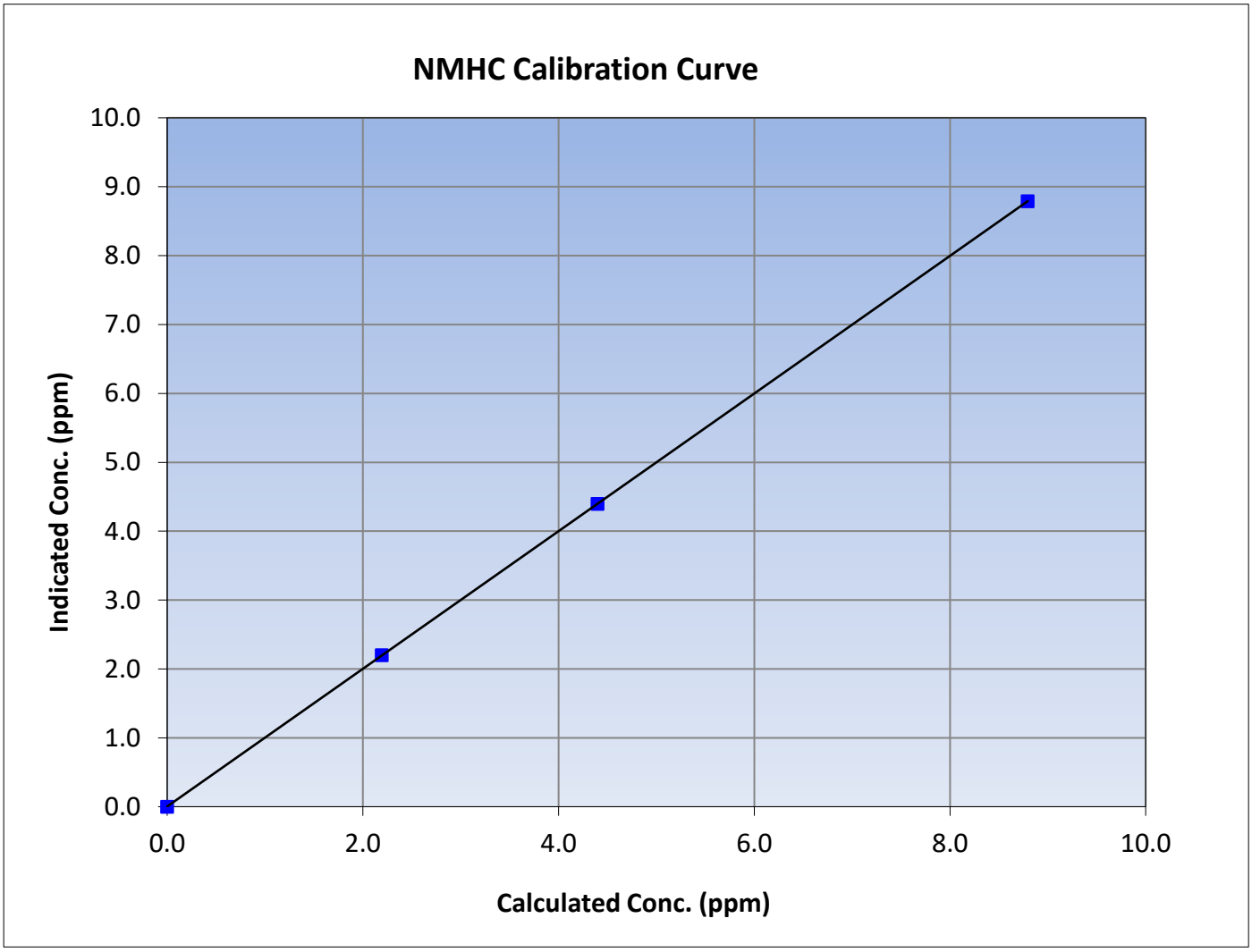
Version-06-2022

Station Information

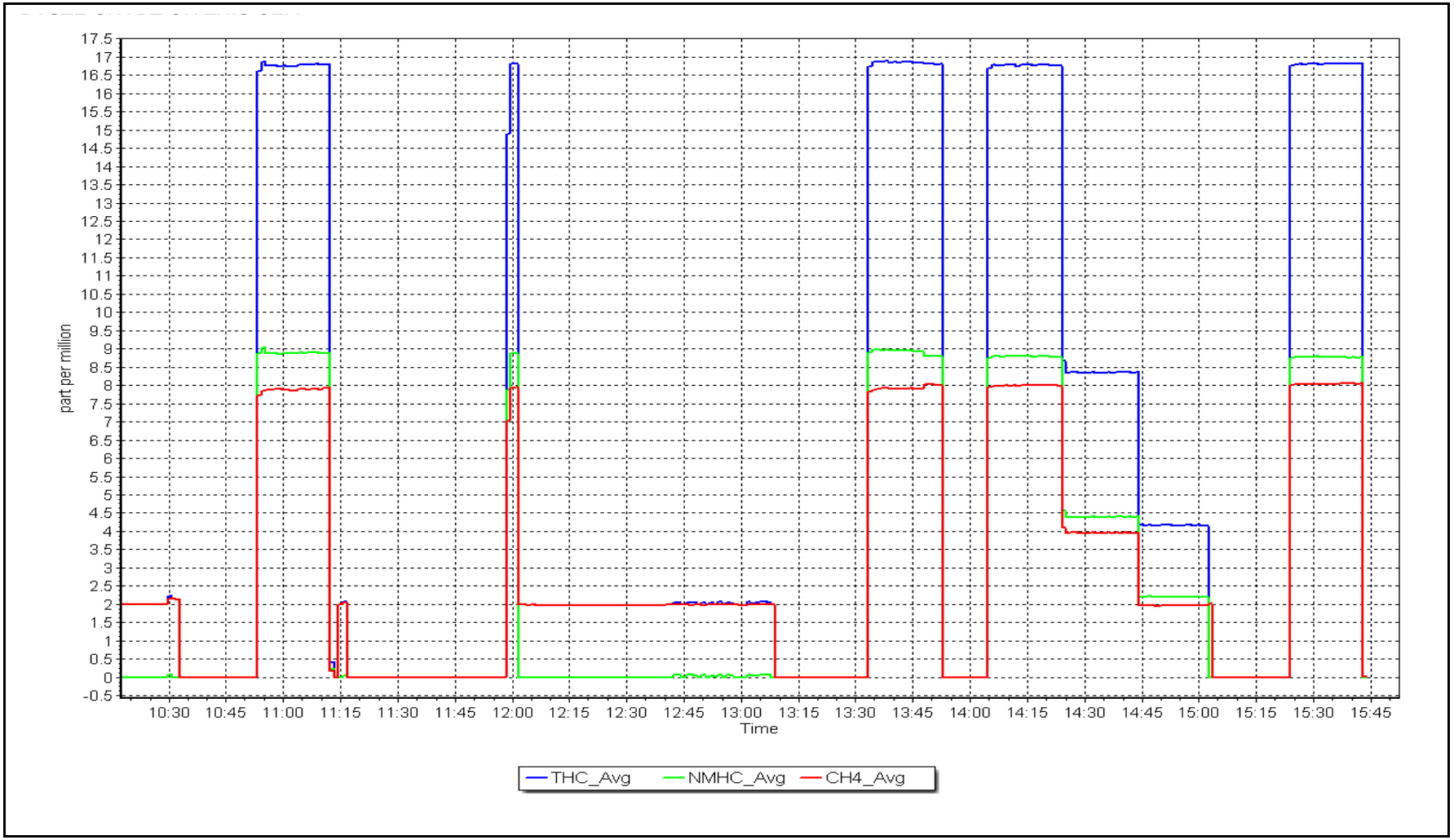
Calibration Date:	November 22, 2023	Previous Calibration:	October 20, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:25	End Time (MST):	15:41
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320038

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999999	*≥0.995*
8.80	8.79	1.0006			
4.40	4.40	1.0002	Slope	0.999088	*0.90 - 1.10*
2.19	2.20	0.9965			
			Intercept	0.003941	*+/-0.5*



NMHC Calibration Plot Date: November 22, 2023 Location: Mildred Lake



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS04
BUFFALO VIEWPOINT
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	November 28, 2023	Last Cal Date:	October 10, 2023
Start time (MST):	8:45	End time (MST):	11:36
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:	1.003929	1.001971	Backgd or Offset:	24.1	24.1
Calibration intercept:	-0.144528	1.315277	Coeff or Slope:	0.873	0.873

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.2	----
as found span	4921	78.6	799.7	804.0	0.995
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.5	----
high point	4921	78.6	799.7	801.9	0.997
second point	4961	39.3	399.8	403.3	0.991
third point	4980	19.6	199.4	201.3	0.991
as left zero	5000	0.0	0.0	0.5	----
as left span	4921	78.6	799.7	808.7	0.989
				Average Correction Factor	0.993

Baseline Corr As found:	803.80	Previous response	802.74	*% change	0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments and maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

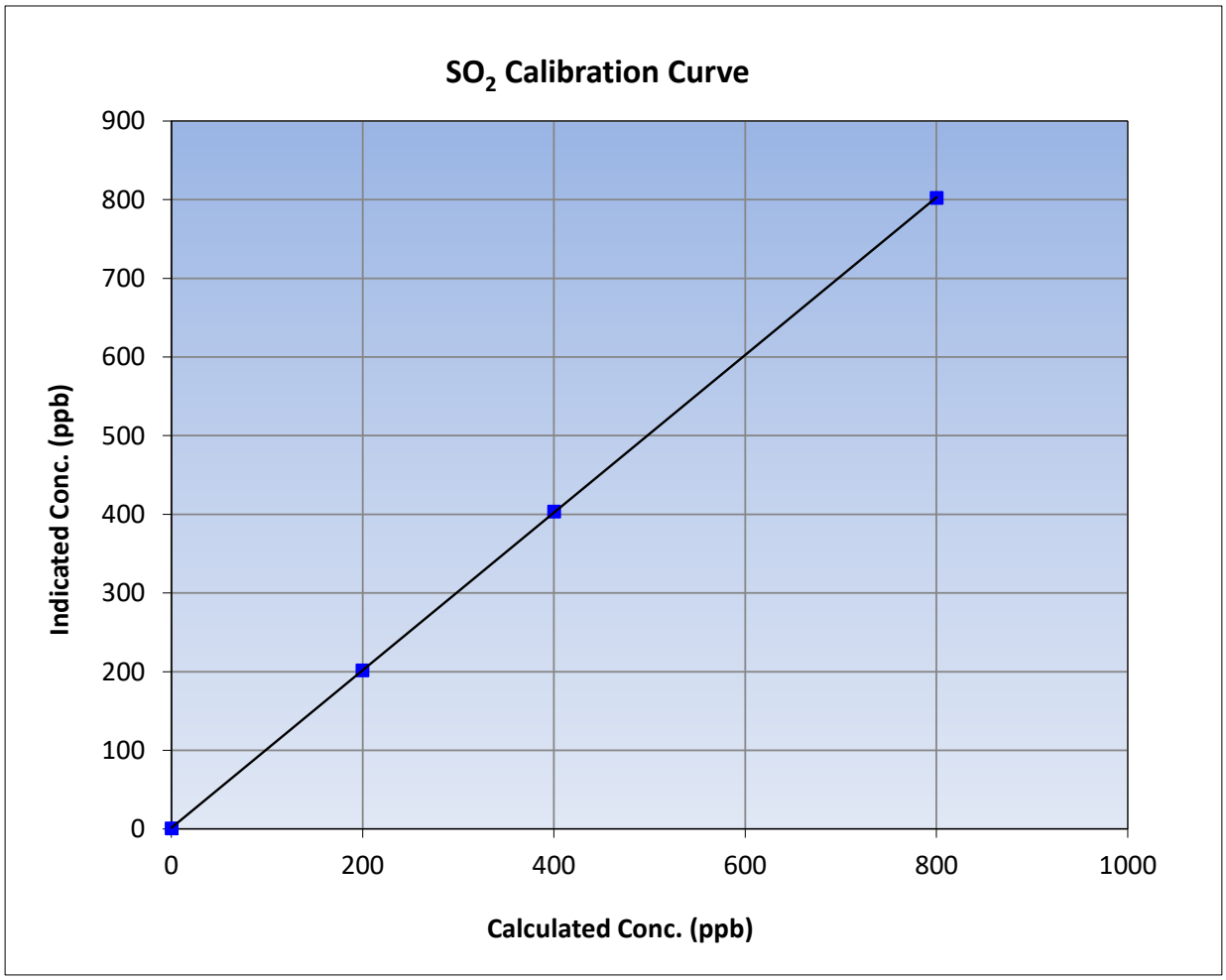
Station Information

Calibration Date:	November 28, 2023	Previous Calibration:	October 10, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:45	End Time (MST):	11:36
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1327300932

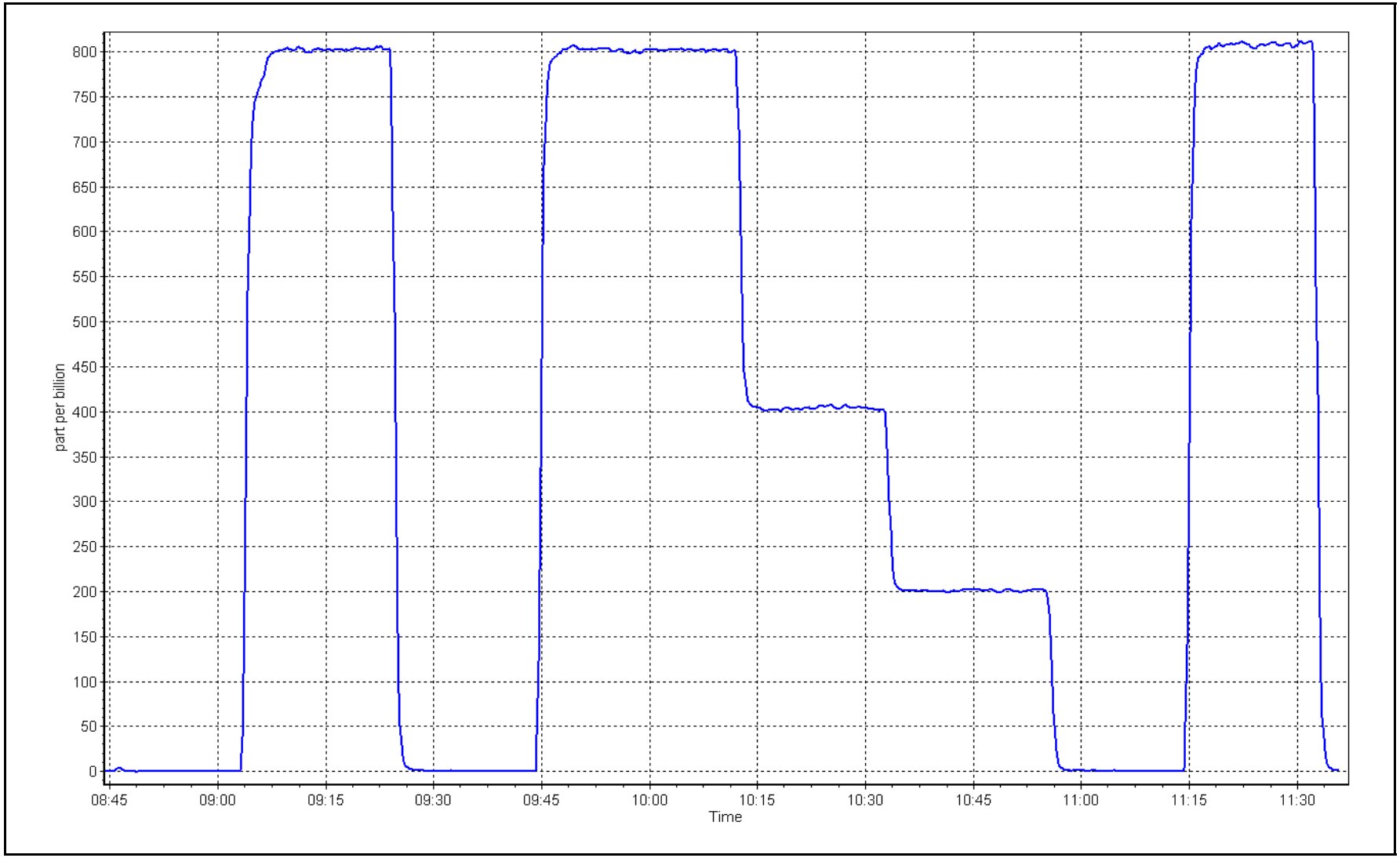
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
799.7	801.9	0.9973
399.8	403.3	0.9914
199.4	201.3	0.9907

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999991	*≥0.995*
Slope	1.001971	*0.90 - 1.10*
Intercept	1.315277	*+/-30*



SO2 Calibration Plot Date: November 28, 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:	November 1, 2023	Last Cal Date:	October 13, 2023
Start time (MST):	6:40	End time (MST):	11:02
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:	0.994226	0.998493	Backgd or Offset:	1.8	1.8
Calibration intercept:	0.082074	0.082213	Coeff or Slope:	1.095	1.115

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4926	74.1	80.3	79.3	1.013
as found 2nd point	4963	37.0	40.1	39.8	1.008
as found 3rd point	4982	18.5	20.1	19.6	1.023
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	80.2	1.002
second point	4963	37.0	40.1	40.4	0.993
third point	4982	18.5	20.1	19.9	1.008
as left zero	5000	0.0	0.0	0.1	----
as left span	4926	74.1	80.3	79.5	1.010
SO2 Scrubber Check	4920	80.0	800.0	0.0	----
Date of last scrubber change:		16-May-23		Ave Corr Factor	1.001
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.3	Prev response:	79.94	*% change:	-0.8%
Baseline Corr 2nd AF pt:	39.8	AF Slope:	0.988393	AF Intercept:	-0.038044
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999978		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

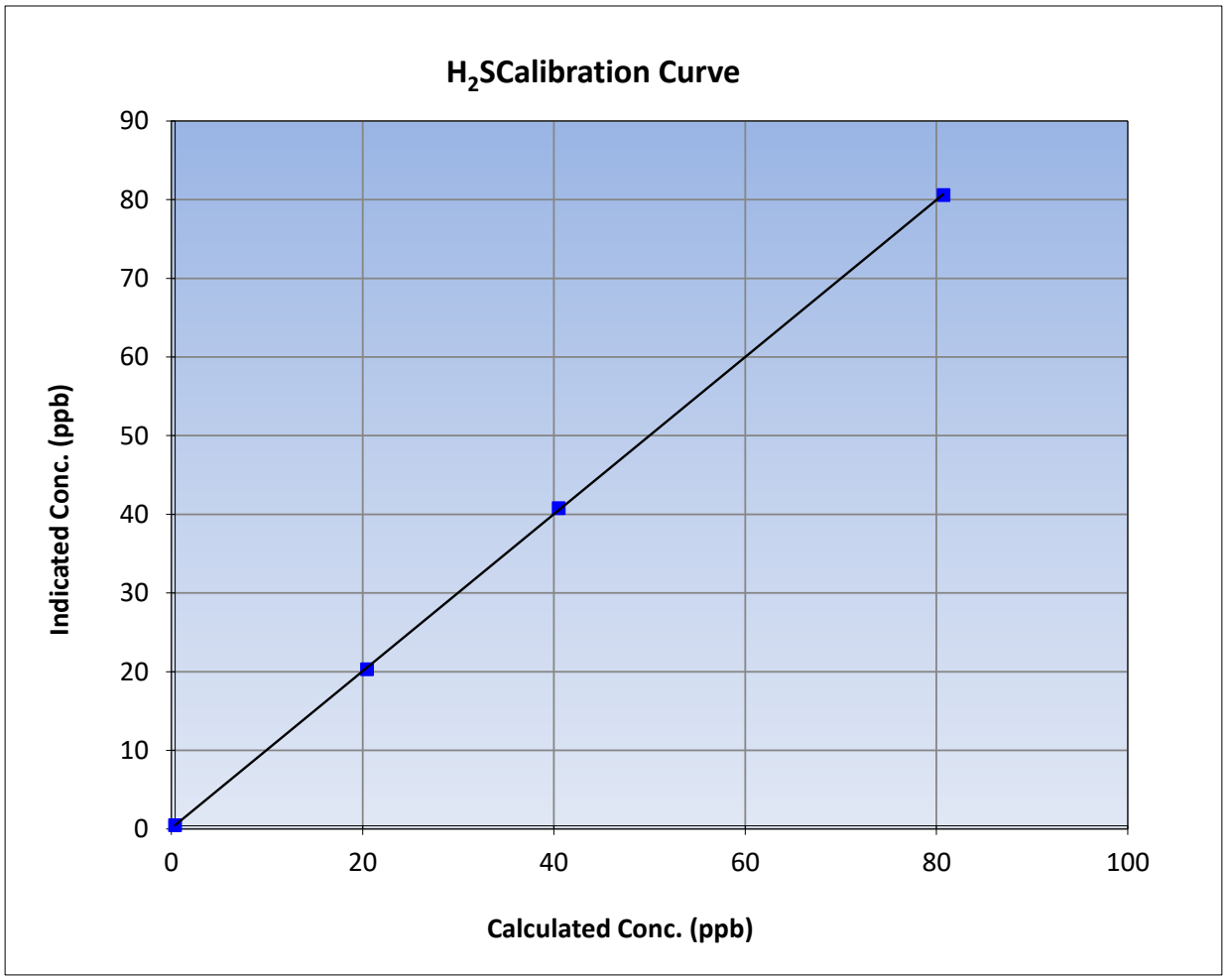
Station Information

Calibration Date:	November 1, 2023	Previous Calibration:	October 13, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:40	End Time (MST):	11:02
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1008841400

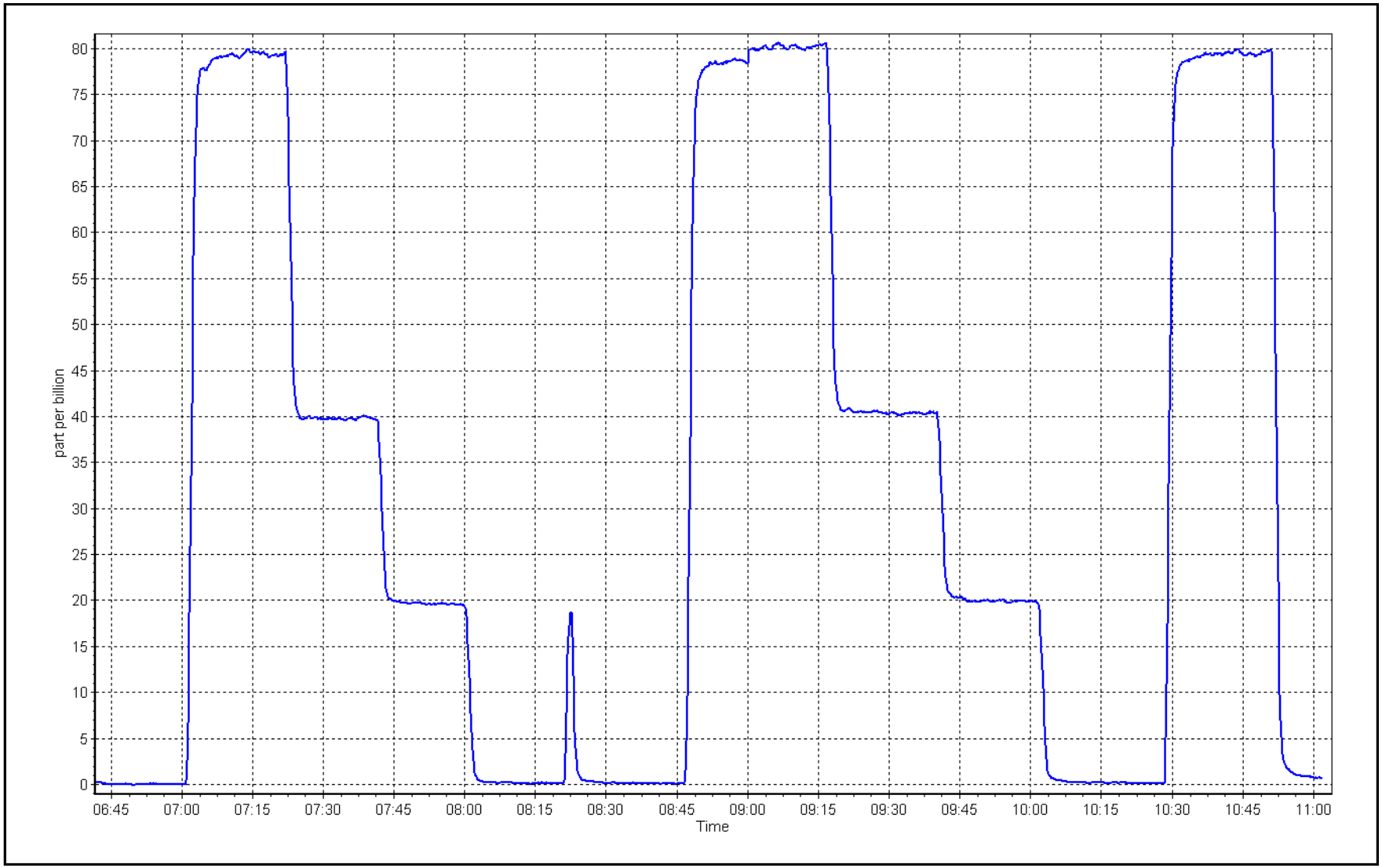
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.3	80.2	1.0015
40.1	40.4	0.9928
20.1	19.9	1.0076

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999965	*≥0.995*
Slope	0.998493	*0.90 - 1.10*
Intercept	0.082213	*+/-3*



H_2S Calibration Plot Date: November 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:	November 28, 2023	Last Cal Date:	October 10, 2023
Start time (MST):	8:45	End time (MST):	11:35
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:	1.95E-04	2.00E-04	NMHC SP Ratio:	4.19E-05	4.38E-05
CH4 Retention time:	11.8	11.8	NMHC Peak Area:	210347	201200
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	16.06	1.036
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	16.61	1.002
second point	4961	39.3	8.32	8.22	1.012
third point	4980	19.6	4.15	4.06	1.022
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	78.6	16.64	16.60	1.002
				Average Correction Factor	1.012
Baseline Corr AF:	16.06	Prev response	16.61	*% change	-3.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	78.6	8.82	8.44	1.045
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	8.80	1.002
second point	4961	39.3	4.41	4.37	1.009
third point	4980	19.6	2.20	2.16	1.018
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	1.010
Baseline Corr AF:	8.44	Prev response	8.80	*% change	-4.2%
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	7.62	1.026
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	7.81	1.001
second point	4961	39.3	3.91	3.85	1.015
third point	4980	19.6	1.95	1.90	1.026
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	78.6	7.82	7.80	1.002
				Average Correction Factor	1.014
Baseline Corr AF:	7.62	Prev response	7.82	*% change	-2.6%
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:	1.000279	0.999538
THC Cal Offset:	-0.027945	-0.049557
CH4 Cal Slope:	1.002623	1.000446
CH4 Cal Offset:	-0.020104	-0.029913
NMHC Cal Slope:	0.998214	0.998967
NMHC Cal Offset:	-0.007641	-0.020044

Notes: No maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

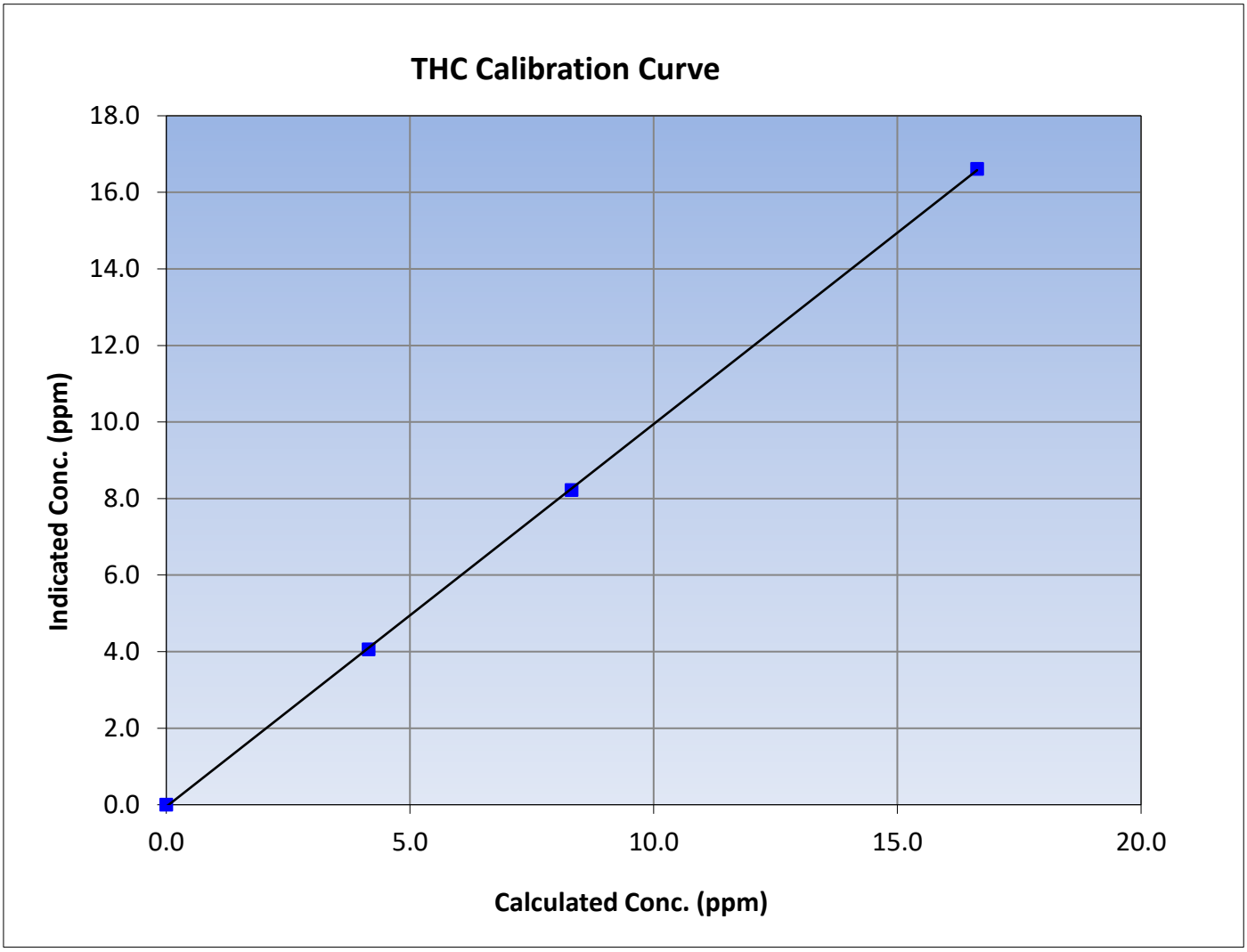
Version-06-2022

Station Information

Calibration Date:	November 28, 2023	Previous Calibration:	October 10, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:45	End Time (MST):	11:35
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	0.999956	≥0.995
16.64	16.61	1.0016			
8.32	8.22	1.0118	Slope	0.999538	0.90 - 1.10
4.15	4.06	1.0218			
			Intercept	-0.049557	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

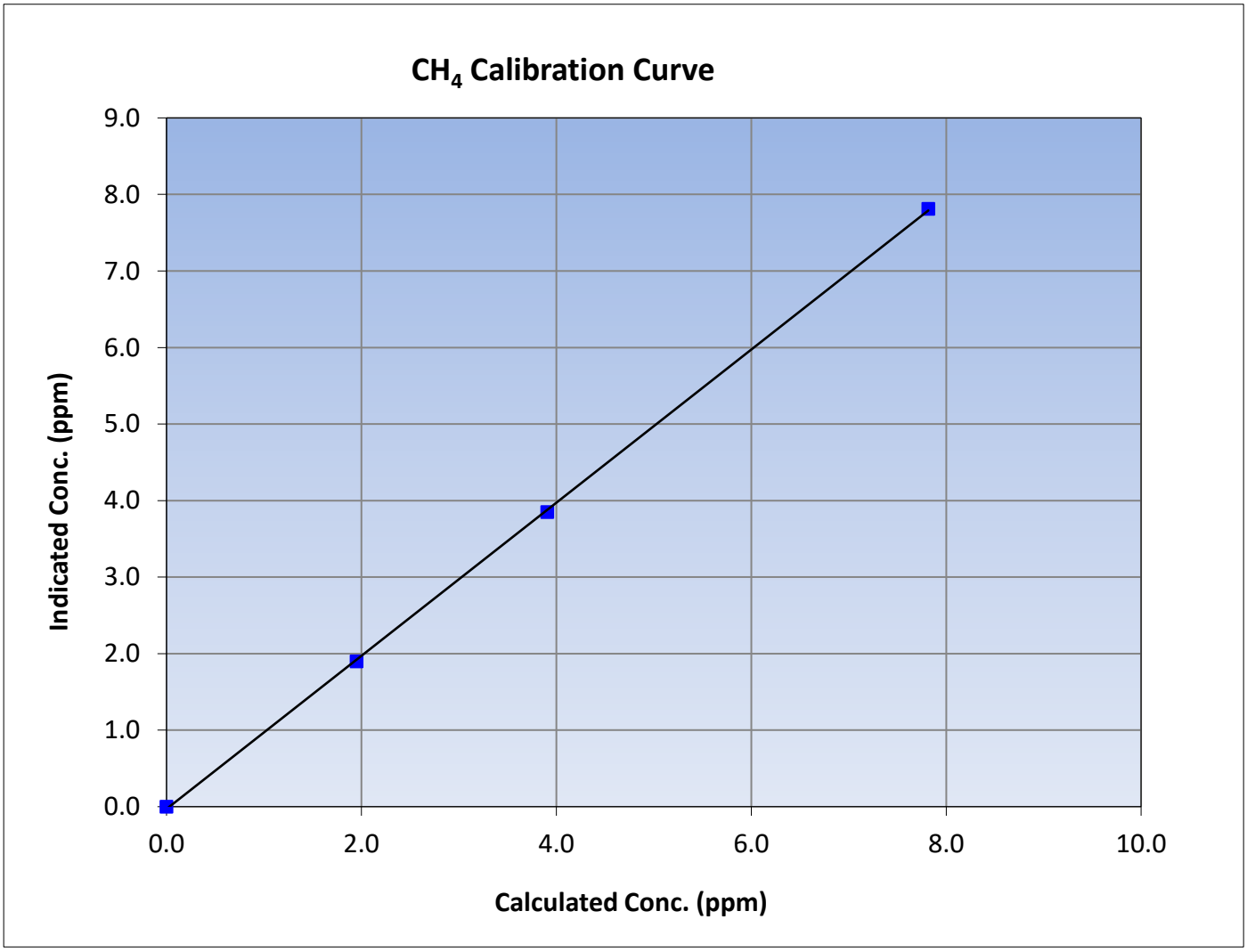
Version-06-2022

Station Information

Calibration Date:	November 28, 2023	Previous Calibration:	October 10, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:45	End Time (MST):	11:35
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	0.999923	*≥0.995*
7.82	7.81	1.0008			
3.91	3.85	1.0150	Slope	1.000446	*0.90 - 1.10*
1.95	1.90	1.0259			
			Intercept	-0.029913	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

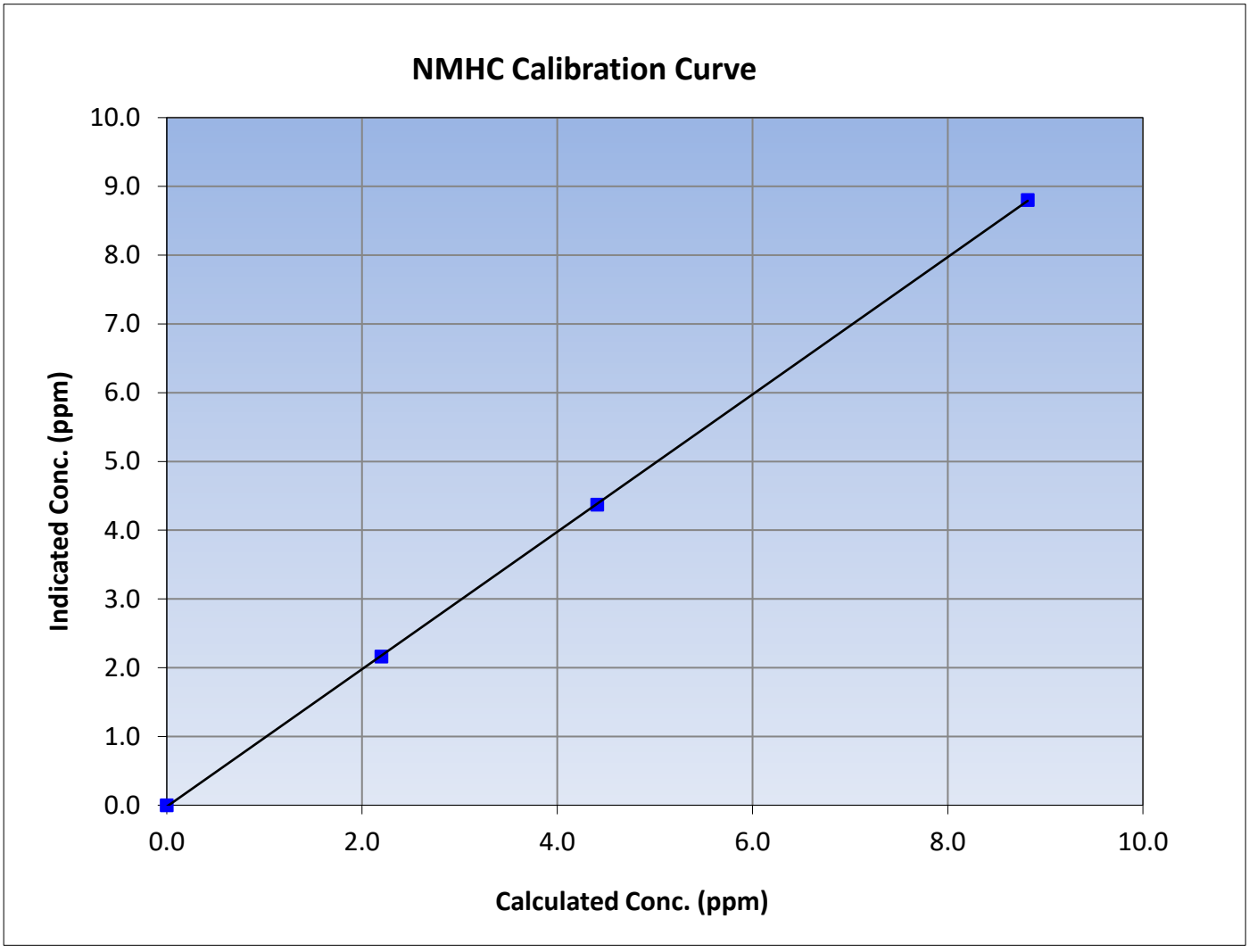
Version-06-2022

Station Information

Calibration Date:	November 28, 2023	Previous Calibration:	October 10, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	8:45	End Time (MST):	11:35
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	0.999976	≥0.995
8.82	8.80	1.0020			
4.41	4.37	1.0090	Slope	0.998967	0.90 - 1.10
2.20	2.16	1.0182			
			Intercept	-0.020044	+/-0.5



NMHC Calibration Plot Date: November 28, 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:	November 6, 2023	Last Cal Date:	October 18, 2023
Start time (MST):	7:10	End time (MST):	12:08
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:	1.180	1.185	NO bkgnd or offset:	-0.6	-0.6
NOX coeff or slope:	1.178	1.181	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:	1.000587	1.001677
NO_X Cal Offset:	-0.272971	-0.753866
NO Cal Slope:	0.998332	0.998936
NO Cal Offset:	-0.653356	-1.613678
NO_2 Cal Slope:	1.005579	0.999002
NO_2 Cal Offset:	-0.636037	0.854730

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.5	0.4	0.1	----	----
as found span	4922	78.1	799.1	795.2	3.9	791.1	784.2	6.9	1.0101	1.0140
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.5	0.5	0.0	----	----
high point	4922	78.1	799.1	795.2	3.9	800.2	793.8	6.5	0.9986	1.0018
second point	4961	39.1	400.1	398.1	2.0	399.7	395.0	4.7	1.0009	1.0079
third point	4981	19.5	199.5	198.5	1.0	197.6	194.6	3.0	1.0096	1.0202
as left zero	5000	0.0	0.0	0.0	0.0	0.5	0.9	-0.4	----	----
as left span	4922	78.1	799.1	381.6	417.5	793.2	378.2	414.9	1.0074	1.0090
								Average Correction Factor	1.0031	1.0099

Corrected As found	NO_X = 790.6 ppb	NO = 783.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -1.1%
Previous Response	NO_X = 799.3 ppb	NO = 793.2 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)	791.7	378.1	417.5	417.5	1.0000	100.0%
2nd GPT point (200 ppb O3)	791.7	583.6	212.0	213.1	0.9949	100.5%
3rd GPT point (100 ppb O3)	791.7	690.3	105.3	106.9	0.9851	101.5%
				Average Correction Factor	0.9933	100.7%

Notes: No Maintenance Done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

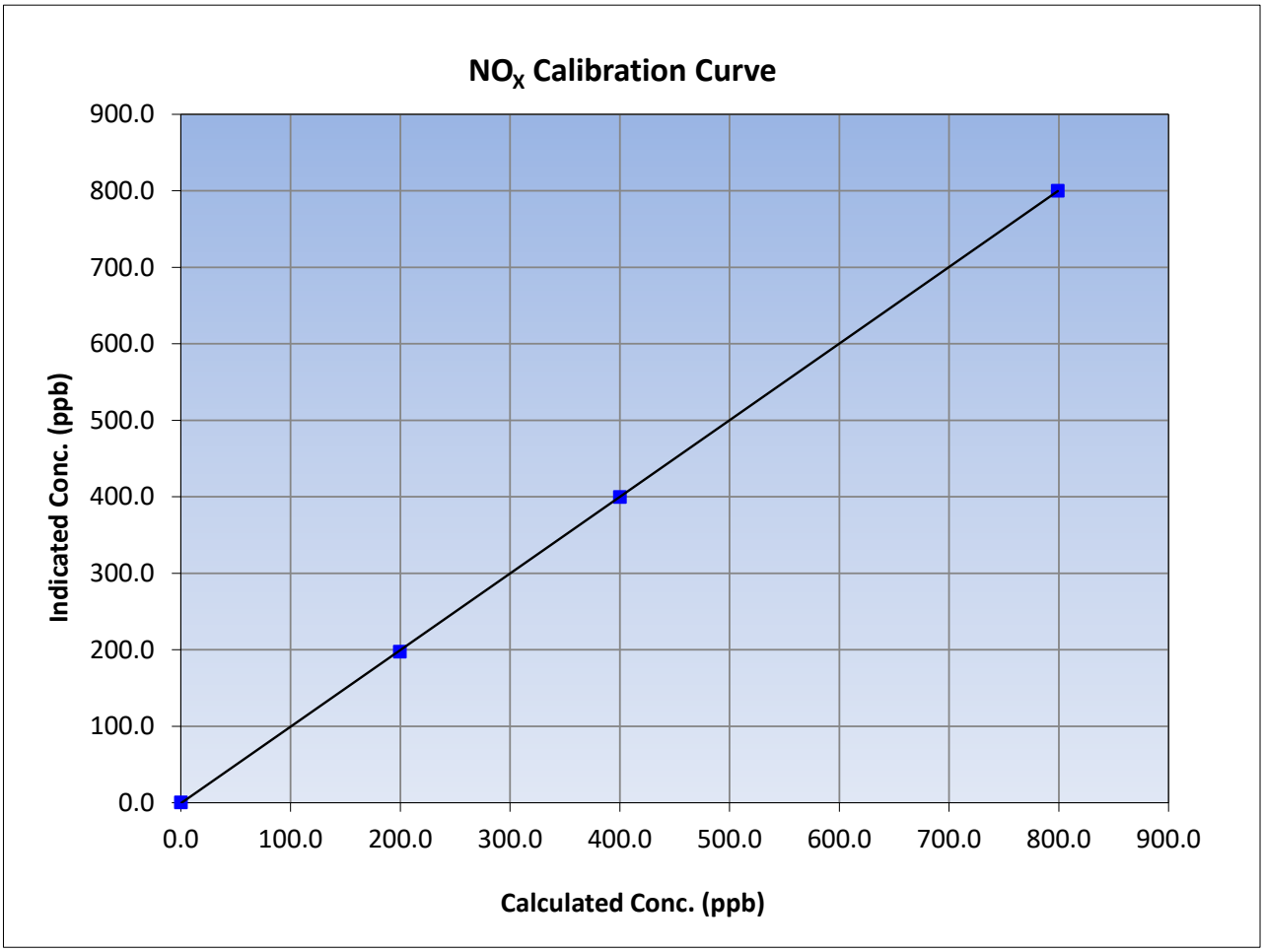
Version-04-2020

Station Information

Calibration Date:	November 6, 2023	Previous Calibration:	October 18, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:10	End Time (MST):	12:08
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	0.999988	≥0.995
799.1	800.2	0.9986			
400.1	399.7	1.0009	Slope	1.001677	0.90 - 1.10
199.5	197.6	1.0096			
			Intercept	-0.753866	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

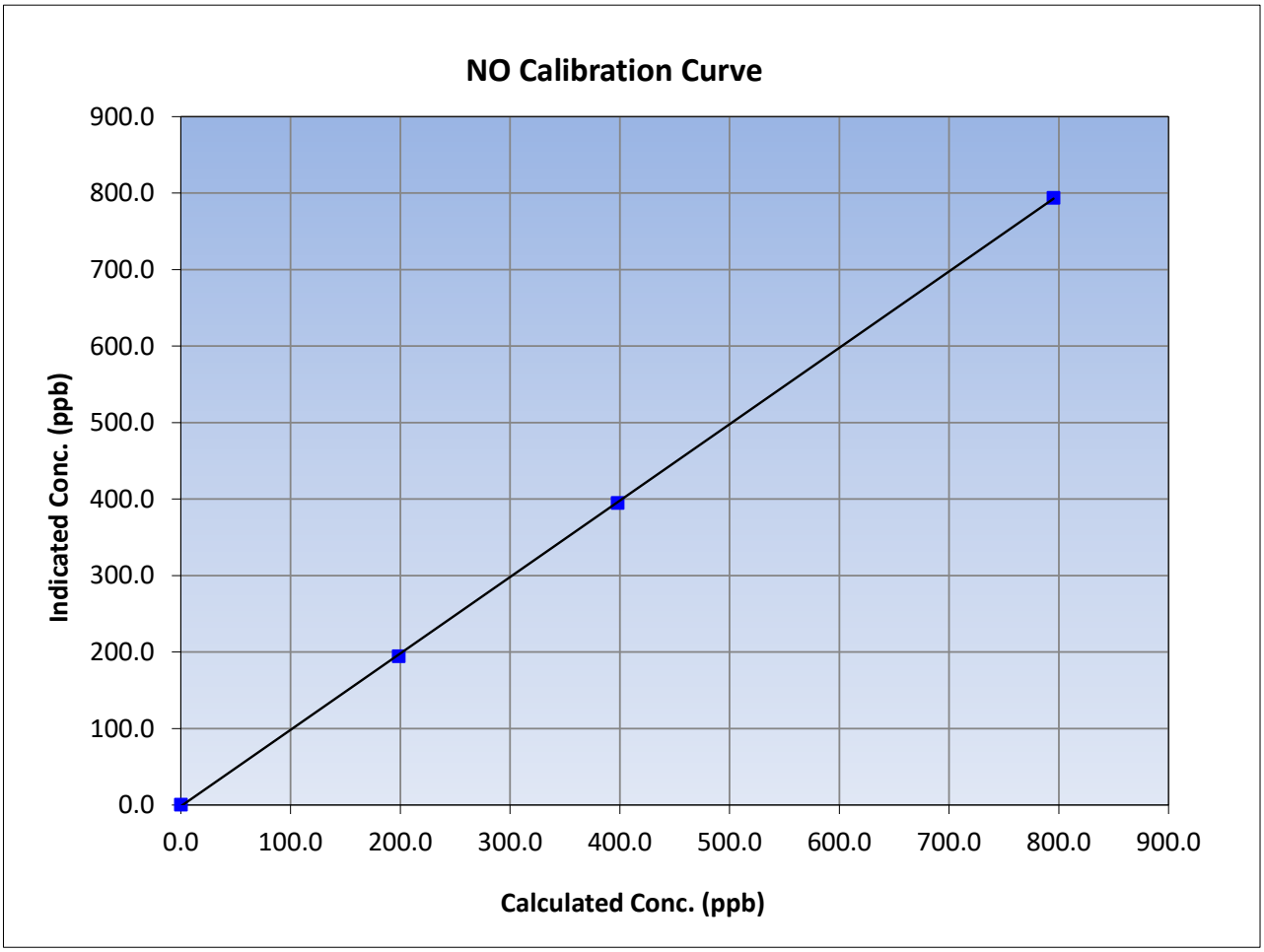
Version-04-2020

Station Information

Calibration Date:	November 6, 2023	Previous Calibration:	October 18, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:10	End Time (MST):	12:08
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	0.999968	≥0.995
795.2	793.8	1.0018			
398.1	395.0	1.0079	Slope	0.998936	0.90 - 1.10
198.5	194.6	1.0202			
			Intercept	-1.613678	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

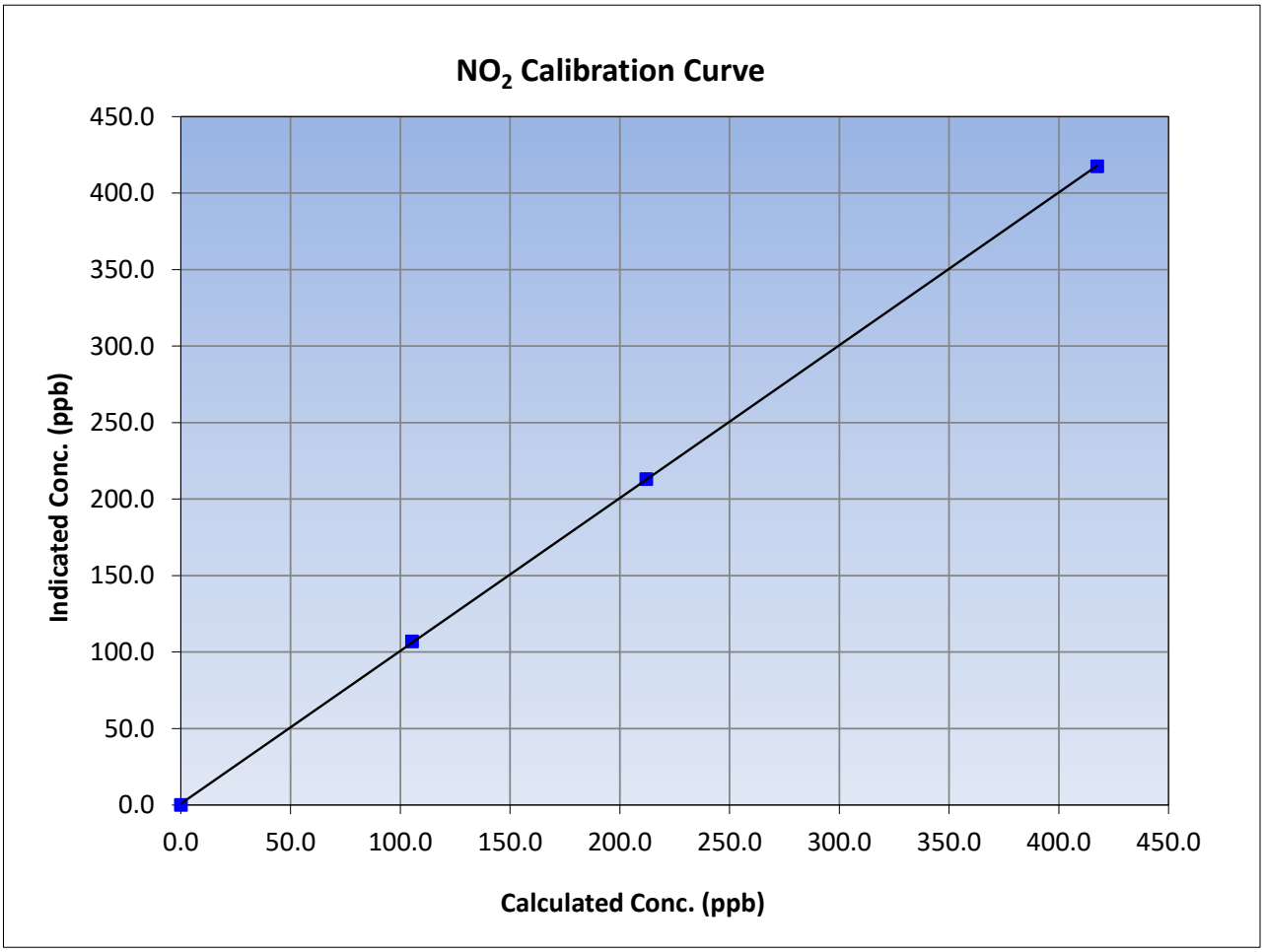
Version-04-2020

Station Information

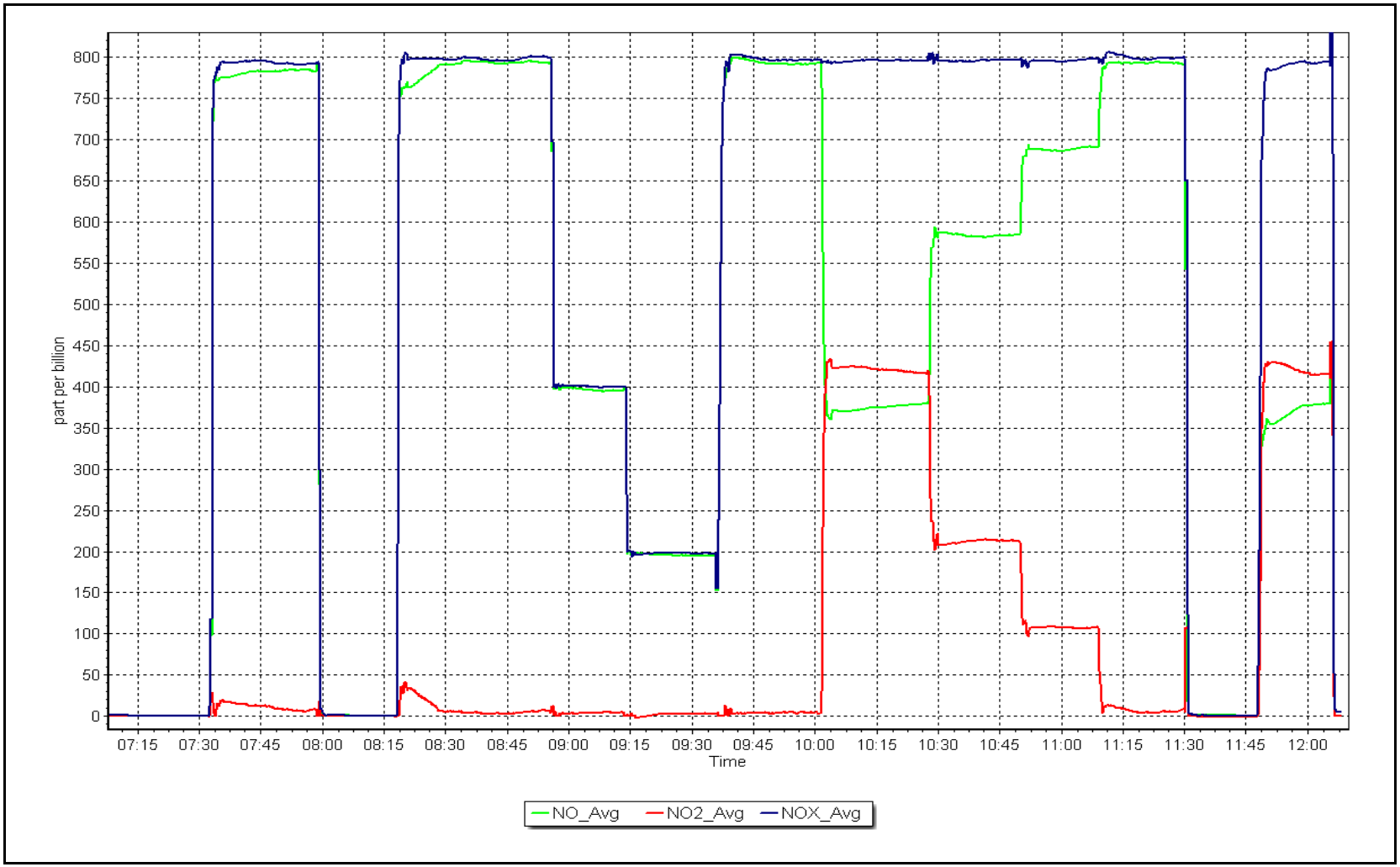
Calibration Date:	November 6, 2023	Previous Calibration:	October 18, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:10	End Time (MST):	12:08
Analyzer make:	API T200	Analyzer serial #:	721

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999981	≥0.995
417.5	417.5	1.0000			
212.0	213.1	0.9949	Slope	0.999002	0.90 - 1.10
105.3	106.9	0.9851			
			Intercept	0.854730	+/-20



NO_X Calibration Plot Date: November 6, 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:	November 22, 2023	Last Cal Date:	October 10, 2023
Start time (MST):	7:15	End time (MST):	8:40
Reason:	Removal		

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:	0.995171		Backgd or Offset:	-2.6	-2.6
Calibration intercept:	0.820000		Coeff or Slope:	1.008	1.008

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.6	----
as found span	5000	978.0	400.0	396.3	1.009
as found 2nd point	5000	811.0	200.0	197.9	1.011
as found 3rd point	5000	700.1	100.0	99.3	1.007
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	

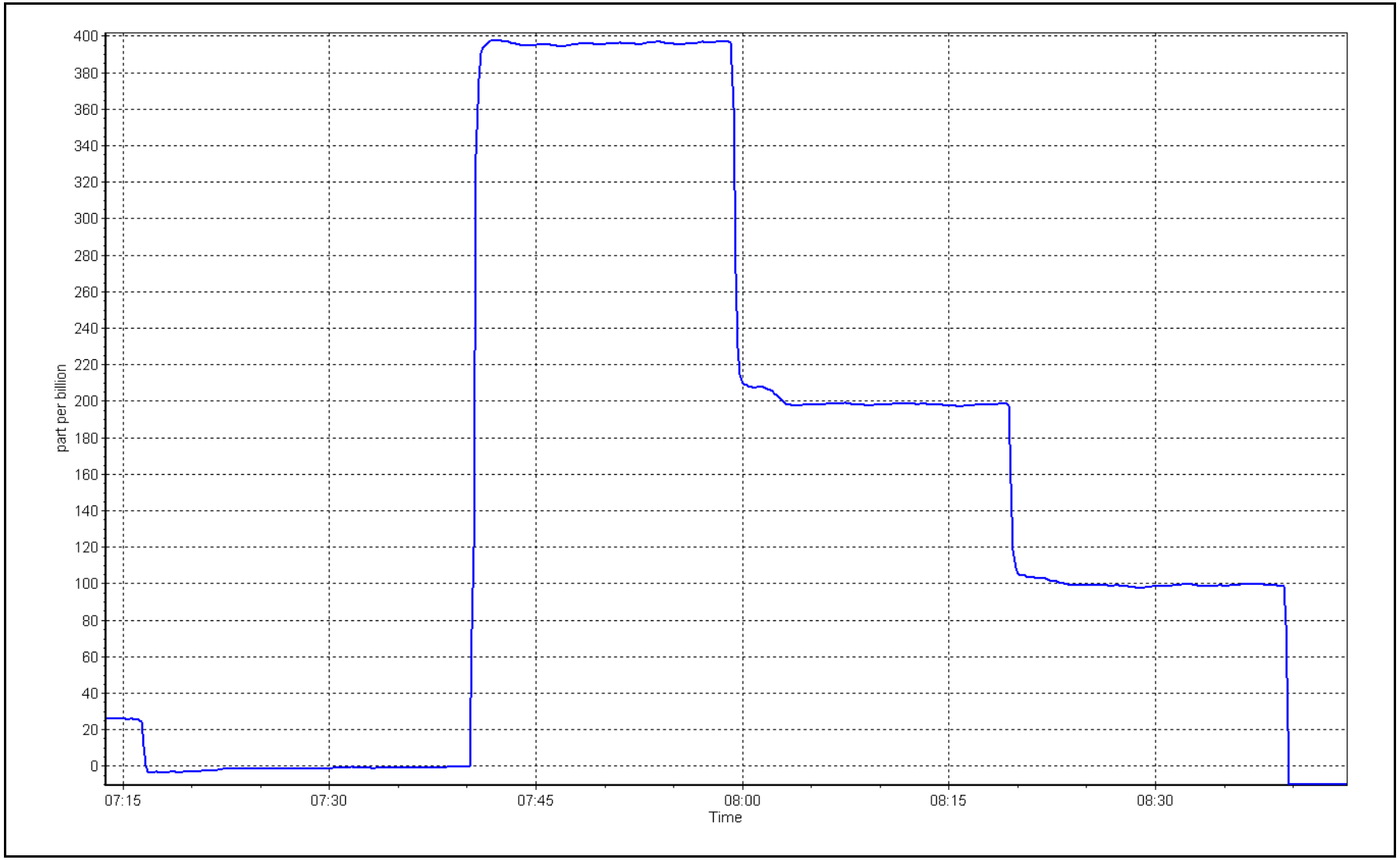
Baseline Corr As found:	396.9	Previous response	398.9	*% change	-0.5%
Baseline Corr 2nd AF pt:	-198.4	AF Slope:	0.991686	AF Intercept:	-0.320000
Baseline Corr 3rd AF pt:	-98.6	AF Correlation:	0.999997		

* = > +/-5% change initiates investigation

Notes: Removal Due to unstable Zero

Calibration Performed By: Melissa Lemay

O_3 Calibration Plot Date: November 22, 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:	November 22, 2023	Last Cal Date:	
Start time (MST):	7:15	End time (MST):	11:39
Reason:	Install		

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 #:	7045
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:		1.005543	Backgd or Offset:		-1.4
Calibration intercept:		0.680000	Coeff or Slope:		1.022

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	0.3	----
high point	5000	980.5	400.0	402.8	0.993
second point	5000	812.0	200.0	201.7	0.992
third point	5000	701.5	100.0	101.8	0.982
as left zero	5000	0.0	0.0	1.1	----
as left span	5000	979.7	400.0	405.4	0.987
				Average Correction Factor	0.989

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: Installed due to Old analyzer having unstable zeroes. Zero and Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

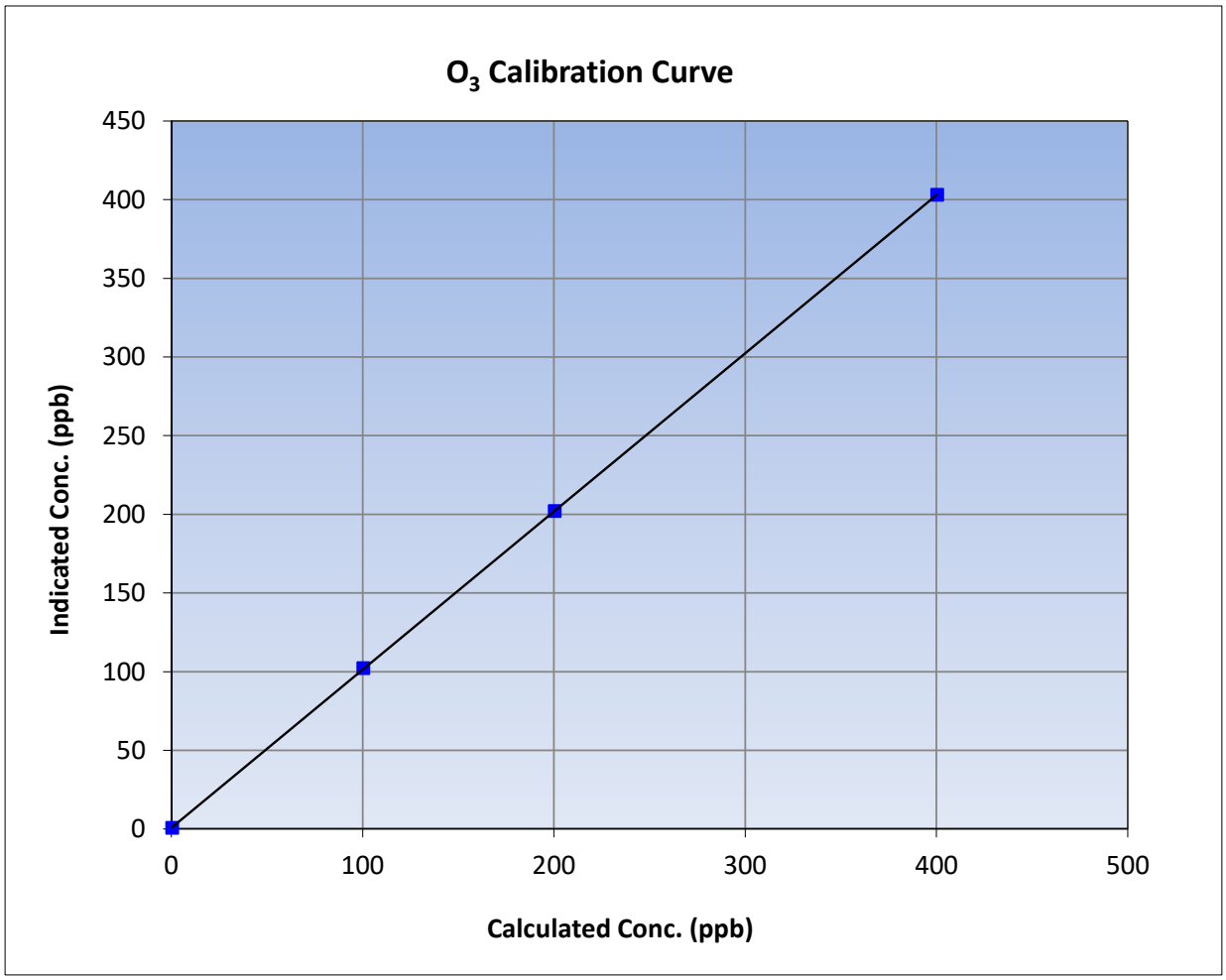
Station Information

Calibration Date:	November 22, 2023	Previous Calibration:	
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:15	End Time (MST):	11:39
Analyzer make:	API T400	Analyzer serial #:	7045

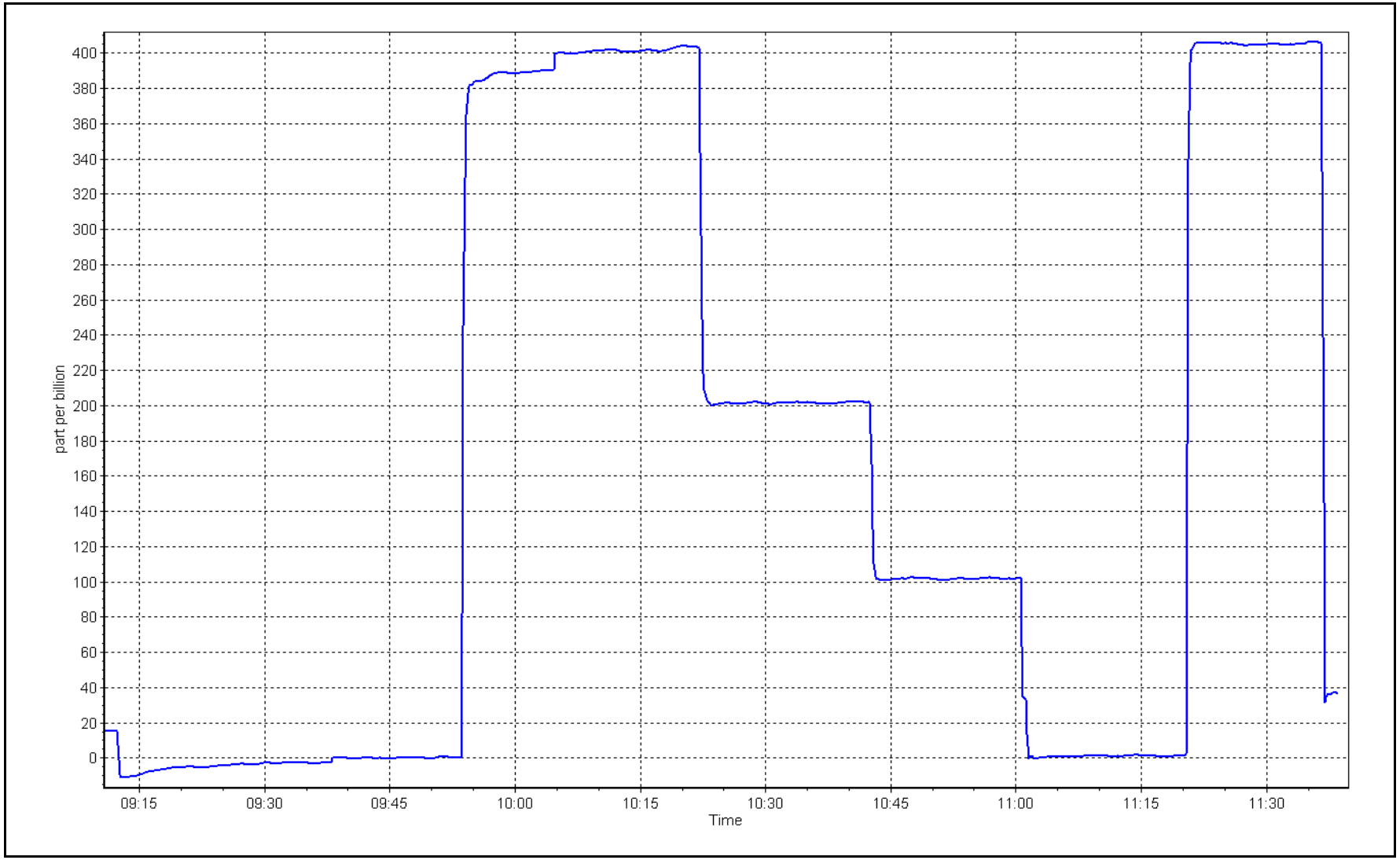
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
400.0	402.8	0.9930
200.0	201.7	0.9916
100.0	101.8	0.9823

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.005543	*0.90 - 1.10*
Intercept	0.680000	*+/- 5*



O_3 Calibration Plot Date: November 22, 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:	November 28, 2023	Last Cal Date:	October 18, 2023
Start time (MST):	7:38	End time (MST):	8:44
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 (^{o}C)	1.1	0.8	1.1	☐	+/- 2 ^{o}C
P (mmHg)	722	723.7	722	☐	+/- 10 mmHg
flow (LPM)	5.03	4.92	5.03	☐	+/- 0.25 LPM

Leak Test: Date of check: November 28, 2023 Last Cal Date: October 18, 2023

PM w/o HEPA: 4.4 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	10.5	10.9	10.9	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 4 w/ HEPA: 0

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

Disposable Filter Changed: November 28, 2023

Annual Maintenance

Date Sample Tube Cleaned: November 28, 2023

Date RH/T Sensor Cleaned: May 23, 2023

Notes: No adjustments done. PM10 leak check at 0.5ug/m3 before cleaning, after cleaning 0.0ug/m3. Leak check, PMT check and Flow checked before and after cleaning.

Calibration by: Melissa Lemay

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS05
MANNIX
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	November 6, 2023	Last Cal Date:	October 4, 2023
Start time (MST):	10:20	End time (MST):	13:43
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:	0.994288	1.001714	Backgd or Offset:	8.9	9.1
Calibration intercept:	1.060000	-0.140000	Coeff or Slope:	0.930	0.944

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.5	----
as found span	4920	80.0	800.3	790.6	1.012
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	801.9	0.998
second point	4960	40.0	400.2	400.5	0.999
third point	4980	20.0	200.1	199.3	1.004
as left zero	5000	0.0	0.0	0.7	----
as left span	4920	80.0	800.3	806.6	0.992
				Average Correction Factor	1.000

Baseline Corr As found:	790.10	Previous response	796.81	*% change	-0.8%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

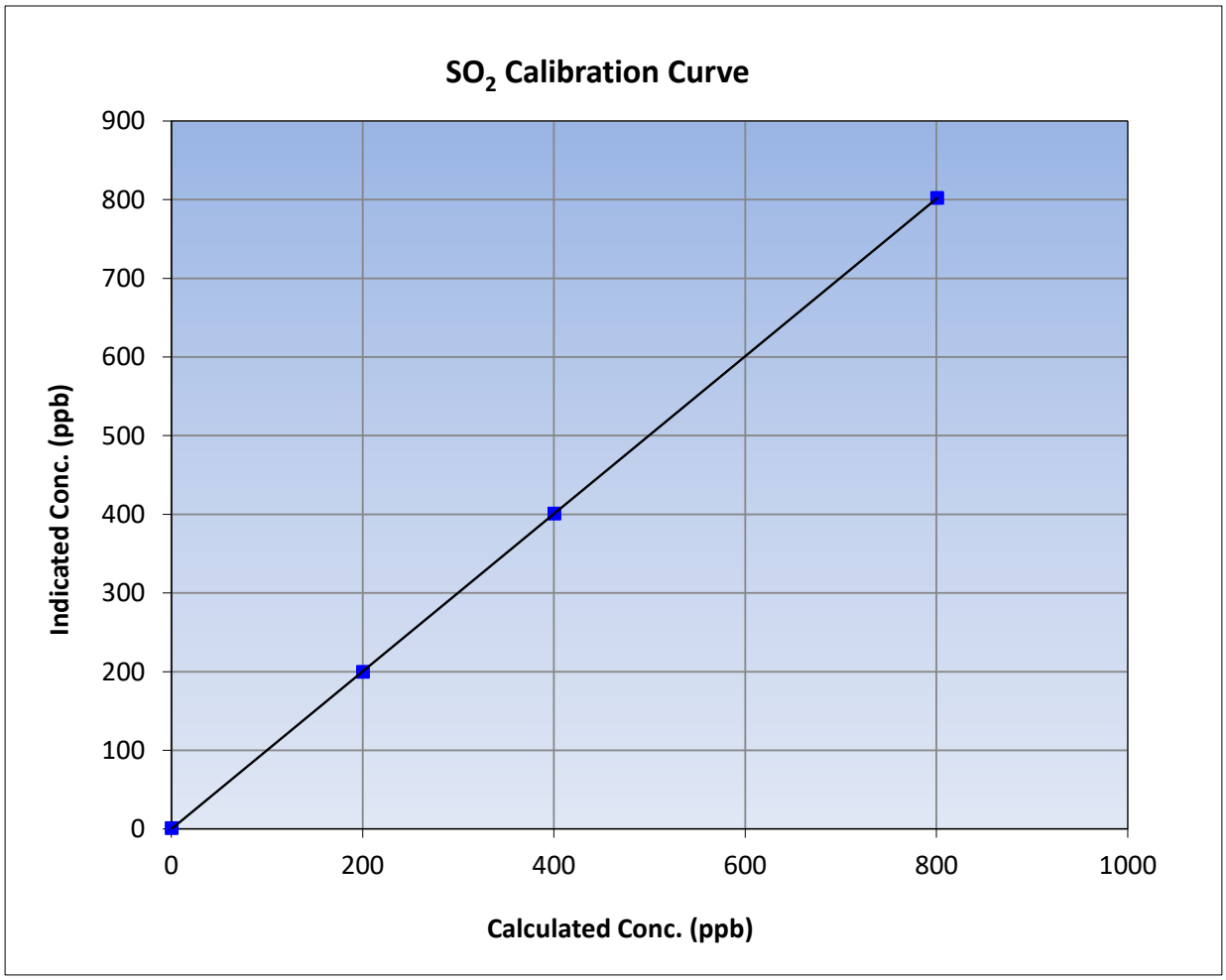
Station Information

Calibration Date:	November 6, 2023	Previous Calibration:	October 4, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	10:20	End Time (MST):	13:43
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841399

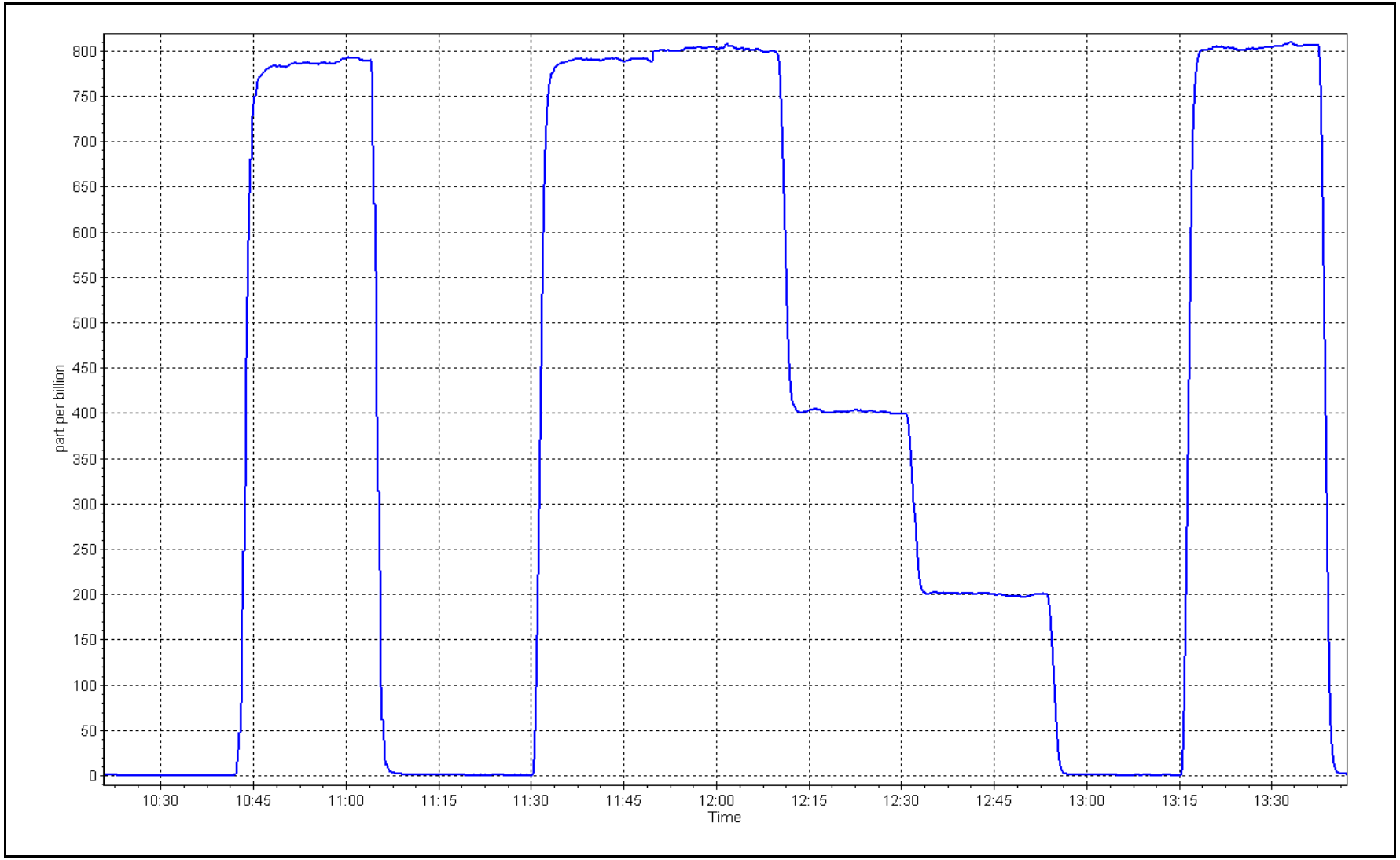
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.7	----
800.3	801.9	0.9980
400.2	400.5	0.9992
200.1	199.3	1.0039

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.001714	*0.90 - 1.10*
Intercept	-0.140000	*+/-30*



SO2 Calibration Plot Date: November 6, 2023 Location: Mannix



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	November 14, 2023	Last Cal Date:	October 16, 2023
Start time (MST):	9:53	End time (MST):	14:44
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43iQTL		Analyzer serial #:	1203169745	
Converter make:	Global		Converter serial #:	2022-196	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.970189	0.993603	Backgd or Offset:	2.18	2.18
Calibration intercept:	0.340566	0.221019	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	0.2	----
as found span	4919	81.3	80.0	80.7	0.994
as found 2nd point	4960	40.7	40.0	40.6	0.991
as found 3rd point	4980	20.3	20.0	20.2	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	0.4	----
high point	4919	81.3	80.0	80.0	1.000
second point	4960	40.7	40.0	39.3	1.019
third point	4980	20.3	20.0	20.3	0.984
as left zero	5000	0.0	0.0	0.9	----
as left span	4919	81.3	80.0	77.1	1.038
SO2 Scrubber Check	4920	80.0	800.0	-0.1	----
Date of last scrubber change:				Ave Corr Factor	1.001
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.5	Prev response:	77.95	*% change:	3.2%
Baseline Corr 2nd AF pt:	40.4	AF Slope:	1.006900	AF Intercept:	0.180576
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999994		

* = > +/-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

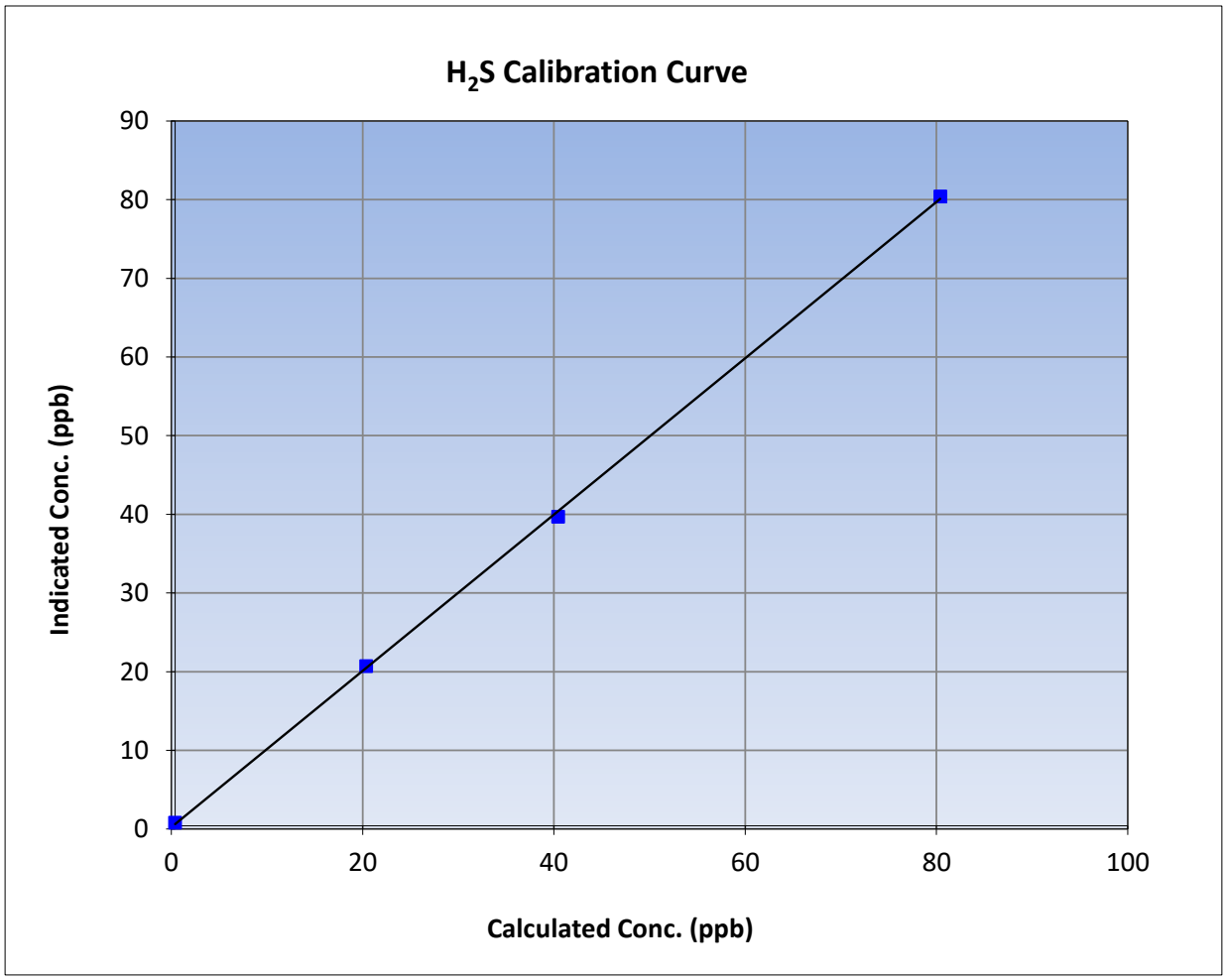
Station Information

Calibration Date:	November 14, 2023	Previous Calibration:	October 16, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	9:53	End Time (MST):	14:44
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1203169745

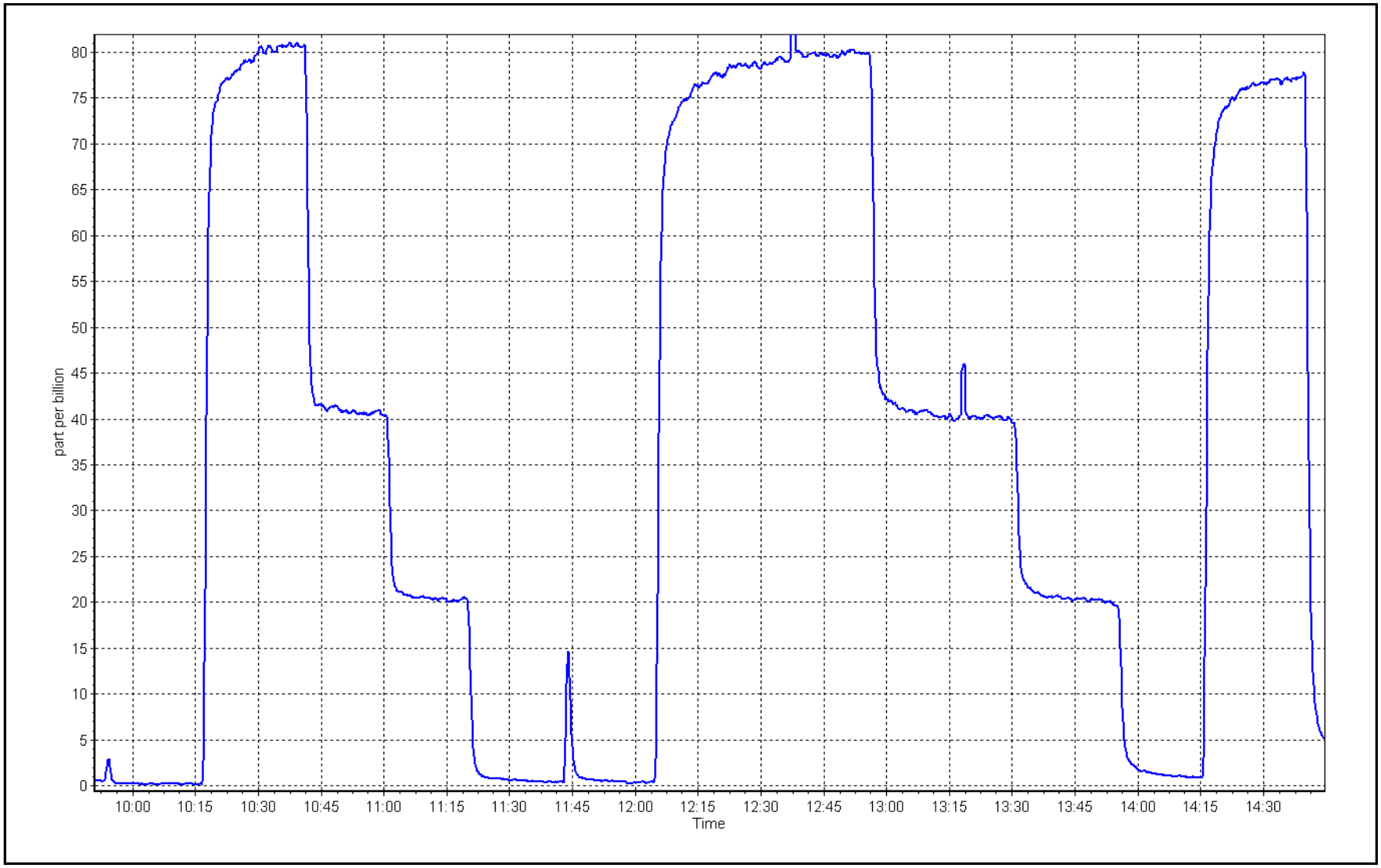
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
80.0	80.0	0.9999
40.0	39.3	1.0189
20.0	20.3	0.9839

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999805	*≥0.995*
Slope	0.993603	*0.90 - 1.10*
Intercept	0.221019	*+/-3*



H_2S Calibration Plot Date: November 14, 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:	November 6, 2023	Last Cal Date:	October 4, 2023
Start time (MST):	10:20	End time (MST):	13:43
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:	2.64E-05	2.61E-05	NMHC SP Ratio:	4.50E-05	4.48E-05
CH4 Retention time:	15.00	15.00	NMHC Peak Area:	203435	204322
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	17.40	0.990
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	17.25	0.999
second point	4960	40.0	8.61	8.62	0.999
third point	4980	20.0	4.31	4.30	1.002
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	17.23	17.36	0.992
				Average Correction Factor	1.000
Baseline Corr AF:	17.40	Prev response	17.23	*% change	1.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-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	9.22	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	80.0	9.15	9.17	0.998
second point	4960	40.0	4.57	4.59	0.996
third point	4980	20.0	2.29	2.30	0.995
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	9.15	9.23	0.991
				Average Correction Factor	0.996
Baseline Corr AF:	9.22	Prev response	9.15	*% change	0.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	8.08	8.18	0.988
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	8.08	8.08	1.000
second point	4960	40.0	4.04	4.03	1.003
third point	4980	20.0	2.02	2.00	1.009
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	8.08	8.13	0.994
				Average Correction Factor	1.004
Baseline Corr AF:	8.18	Prev response	8.07	*% change	1.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999944	1.001390
THC Cal Offset:	0.001800	-0.005600
CH4 Cal Slope:	1.001075	1.000679
CH4 Cal Offset:	-0.012600	-0.010200
NMHC Cal Slope:	0.998844	1.001993
NMHC Cal Offset:	0.014800	0.004200

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

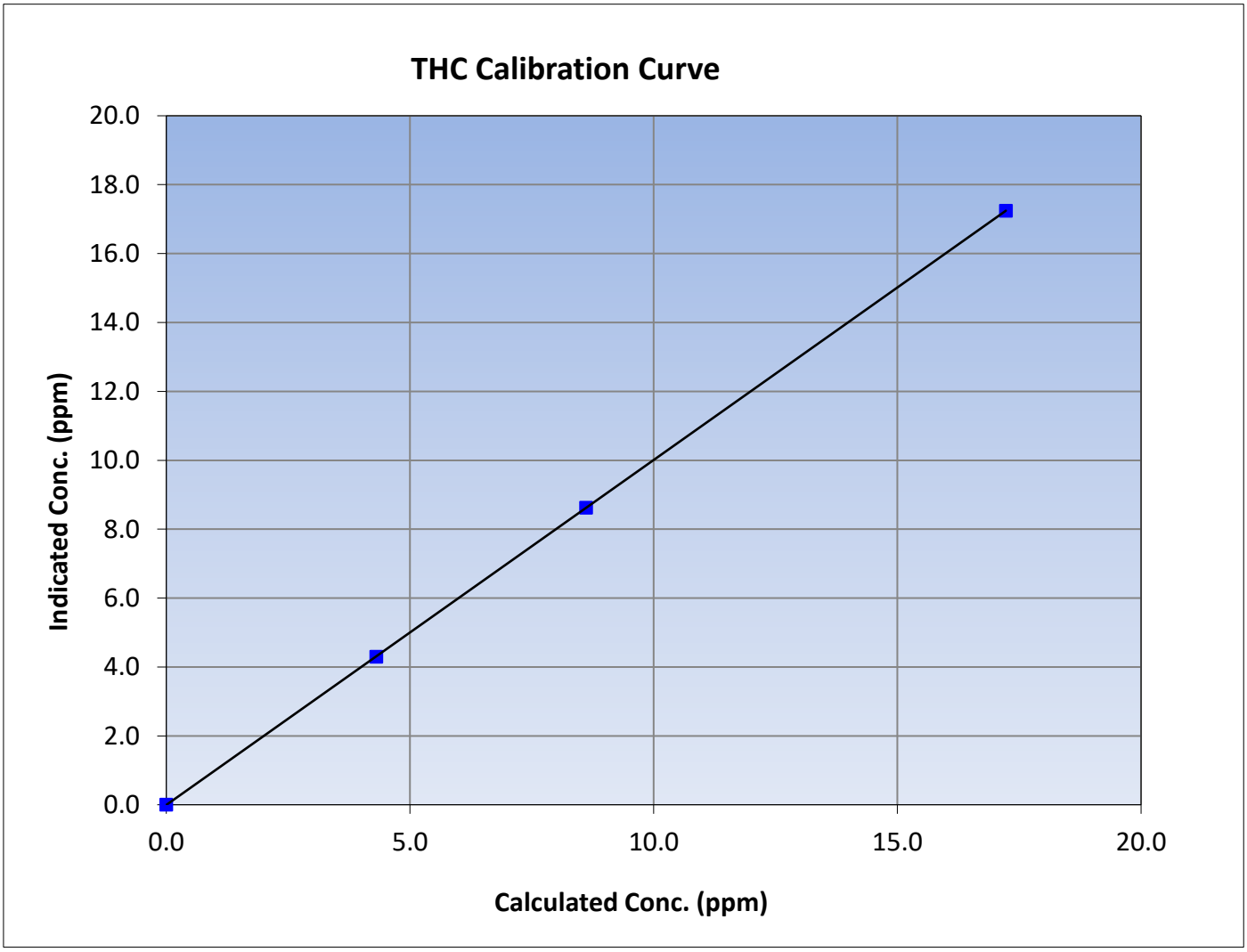
Version-06-2022

Station Information

Calibration Date:	November 6, 2023	Previous Calibration:	October 4, 2023
Station Name:	Mannix	Station Number:	AMS 05
Start Time (MST):	10:20	End Time (MST):	13:43
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999999	*≥0.995*
17.23	17.25	0.9988			
8.61	8.62	0.9992	Slope	1.001390	*0.90 - 1.10*
4.31	4.30	1.0017			
			Intercept	-0.005600	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

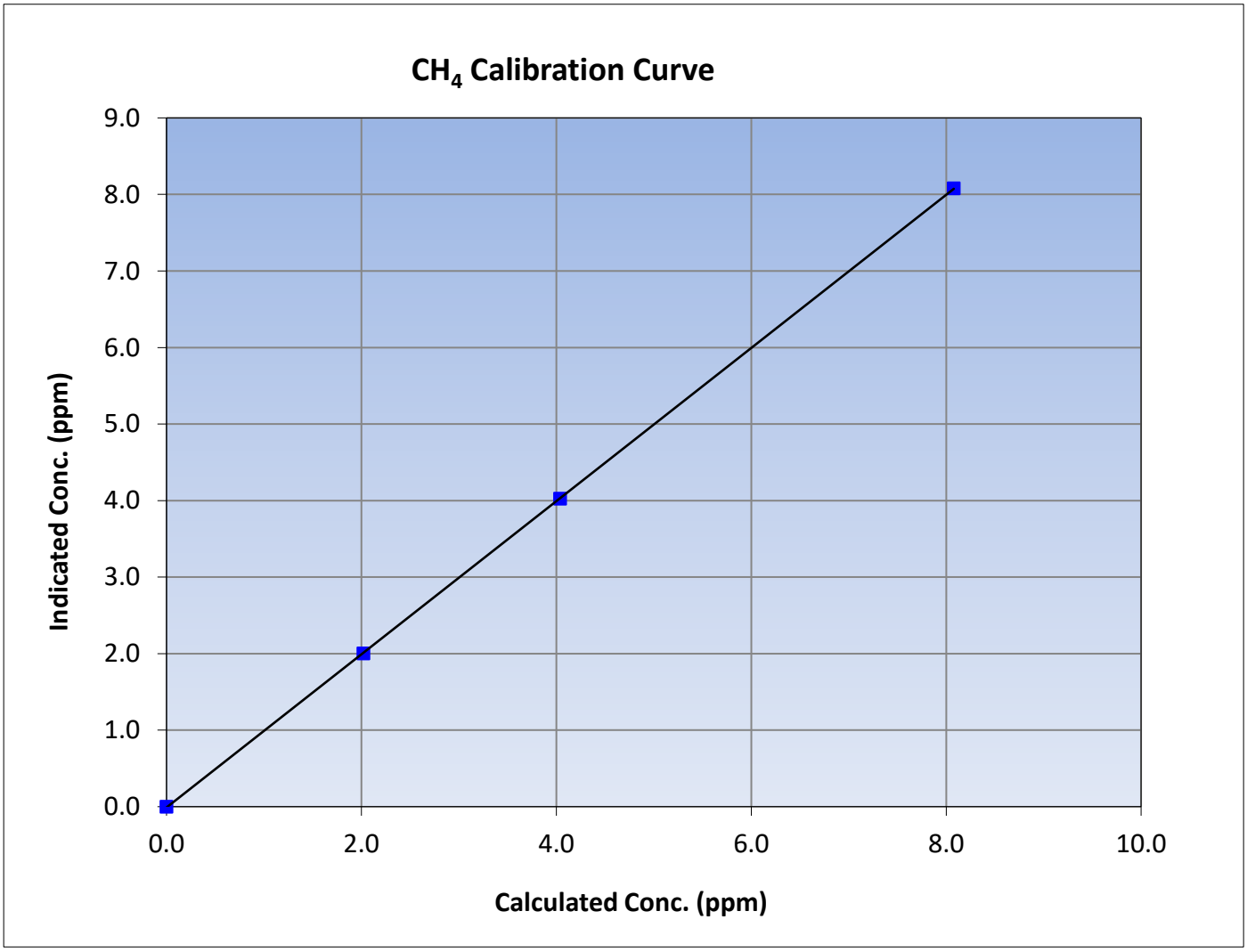
Version-06-2022

Station Information

Calibration Date:	November 6, 2023	Previous Calibration:	October 4, 2023
Station Name:	Mannix	Station Number:	AMS 05
Start Time (MST):	10:20	End Time (MST):	13:43
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999993	*≥0.995*
8.08	8.08	0.9999			
4.04	4.03	1.0033	Slope	1.000679	*0.90 - 1.10*
2.02	2.00	1.0093			
			Intercept	-0.010200	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

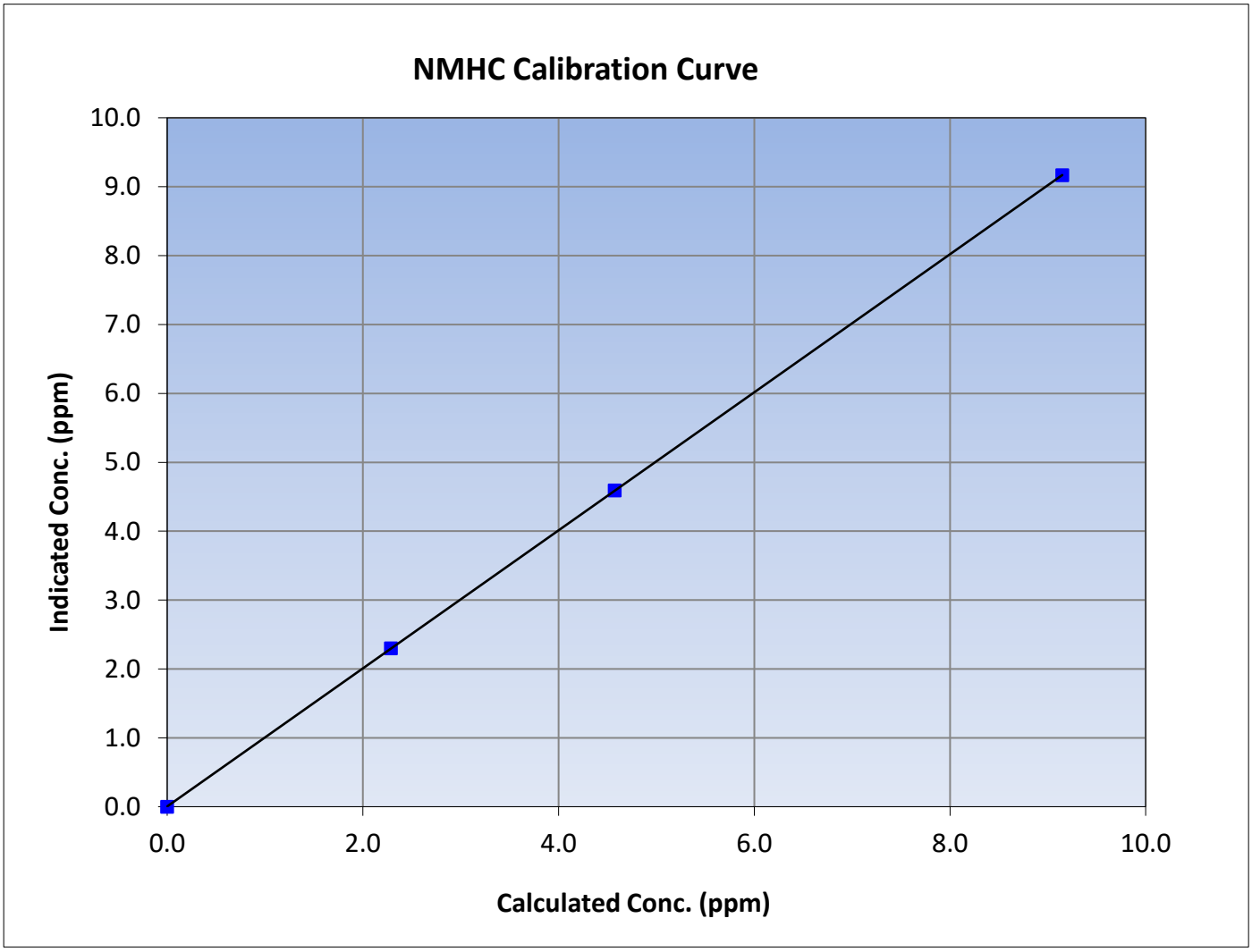
Version-06-2022

Station Information

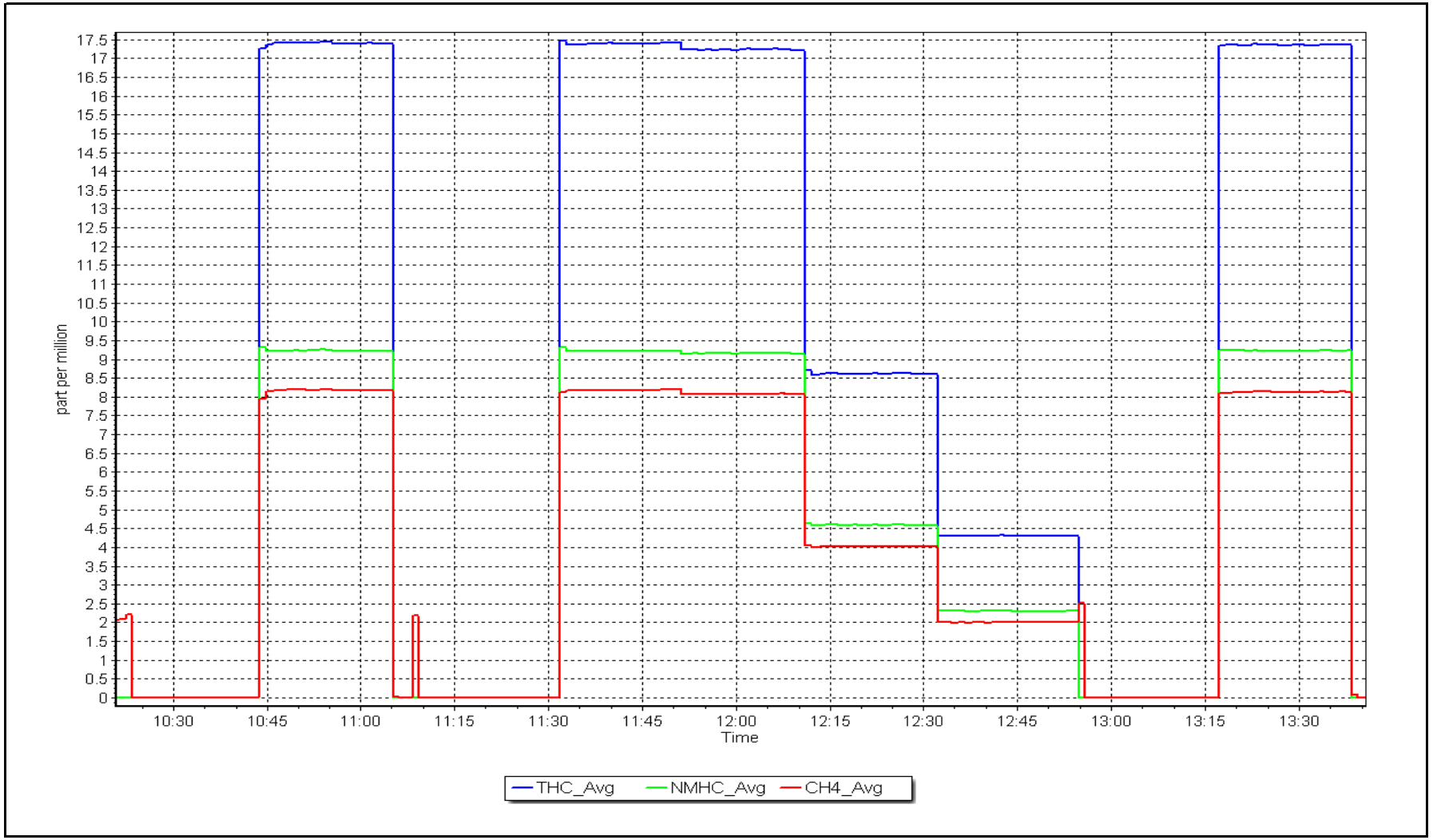
Calibration Date:	November 6, 2023	Previous Calibration:	October 4, 2023
Station Name:	Mannix	Station Number:	AMS 05
Start Time (MST):	10:20	End Time (MST):	13:43
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999999	*≥0.995*
9.15	9.17	0.9979			
4.57	4.59	0.9960	Slope	1.001993	*0.90 - 1.10*
2.29	2.30	0.9952			
			Intercept	0.004200	*+/-0.5*



NMHC Calibration Plot Date: November 6, 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:	November 22, 2023	Last Cal Date:	November 6, 2023
Start time (MST):	10:23	End time (MST):	12:45
Reason:	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:	2.61E-05	2.61E-05	NMHC SP Ratio:	4.48E-05	4.48E-05
CH4 Retention time:	15.00	15.00	NMHC Peak Area:	204322	204322
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	17.52	0.983
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	17.44	0.988
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.988
Baseline Corr AF:	17.52	Prev response	17.24	*% change	1.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-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	9.32	0.982
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	9.15	9.27	0.987
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.987
Baseline Corr AF:	9.32	Prev response	9.17	*% change	1.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	8.08	8.19	0.986
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	8.17	0.989
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.989
Baseline Corr AF:	8.19	Prev response	8.07	*% change	1.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

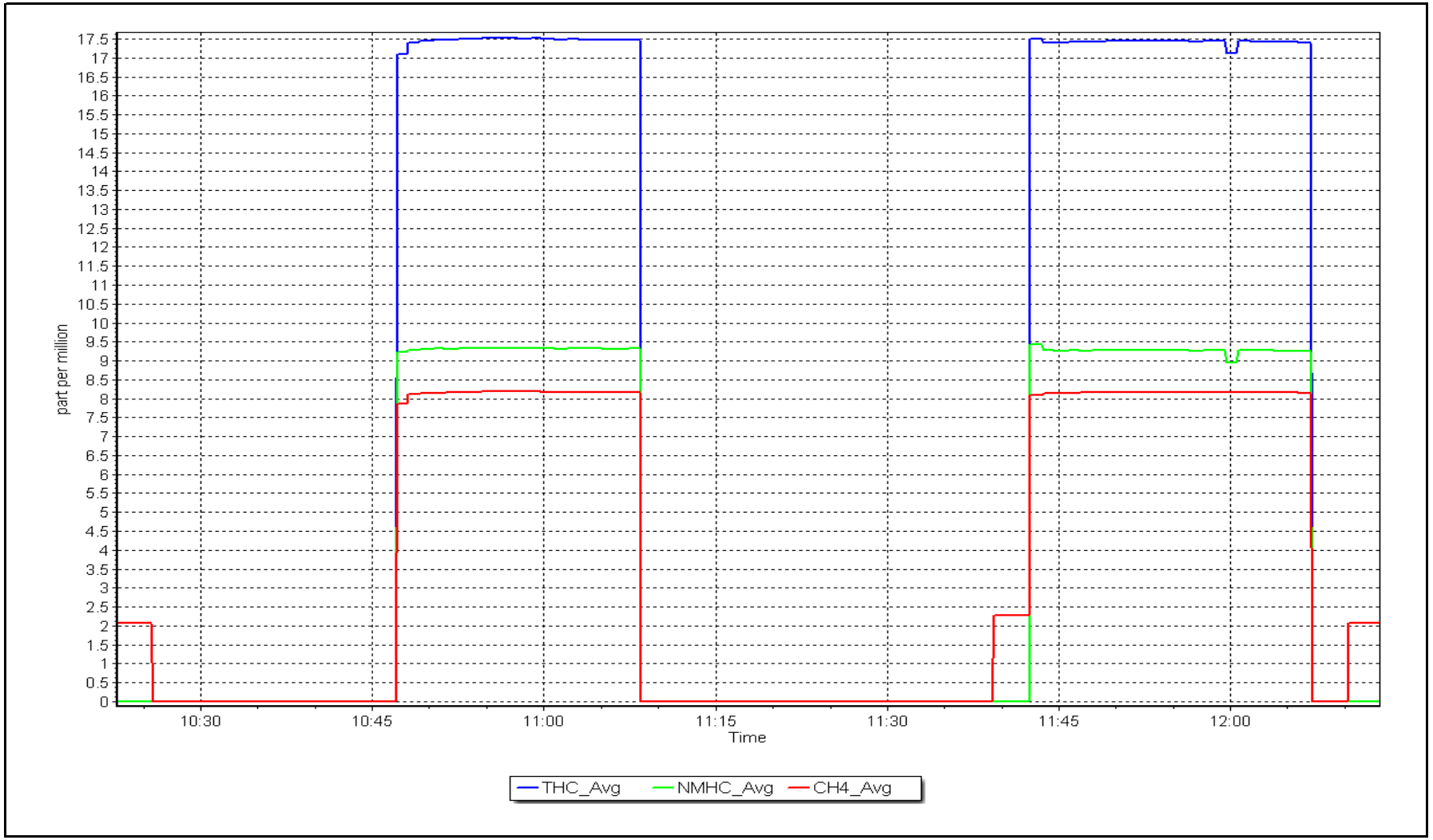
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.001390	1.012539
THC Cal Offset:	-0.005600	0.000000
CH4 Cal Slope:	1.000679	1.011586
CH4 Cal Offset:	-0.010200	0.000000
NMHC Cal Slope:	1.001993	1.013381
NMHC Cal Offset:	0.004200	0.000000

Notes: Changed the N2 and H2 cylinders after as founds.

Calibration Performed By: Max Farrell

NMHC Calibration Plot Date: November 22, 2023 Location: Mannix



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS06
PATRICIA MCINNES
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	November 17, 2023	Last Cal Date:	October 19, 2023
Start time (MST):	9:40	End time (MST):	13:07
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:	0.998819	0.990369	Backgd or Offset:	17.4	17.4
Calibration intercept:	2.459939	2.041893	Coeff or Slope:	0.911	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	-0.2	----
as found span	4920	80.3	799.5	793.0	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4920	80.3	799.5	792.9	1.008
second point	4960	40.2	400.2	399.4	1.002
third point	4980	20.1	200.1	201.9	0.991
as left zero	5000	0.0	0.0	0.2	----
as left span	4920	80.3	799.5	795.5	1.005
				Average Correction Factor	1.001

Baseline Corr As found:	793.20	Previous response	800.98	*% change	-1.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

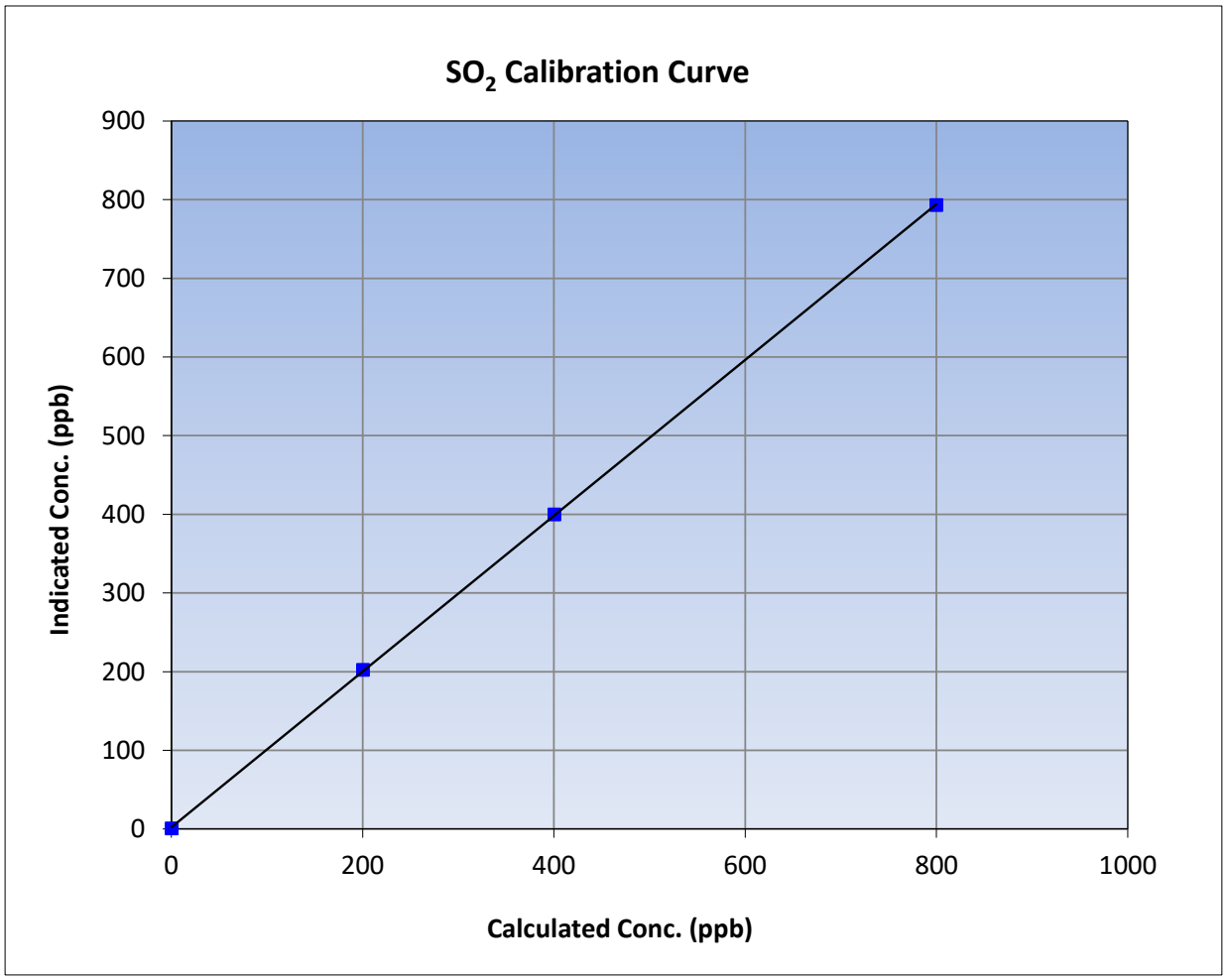
Station Information

Calibration Date:	November 17, 2023	Previous Calibration:	October 19, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:40	End Time (MST):	13:07
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290013

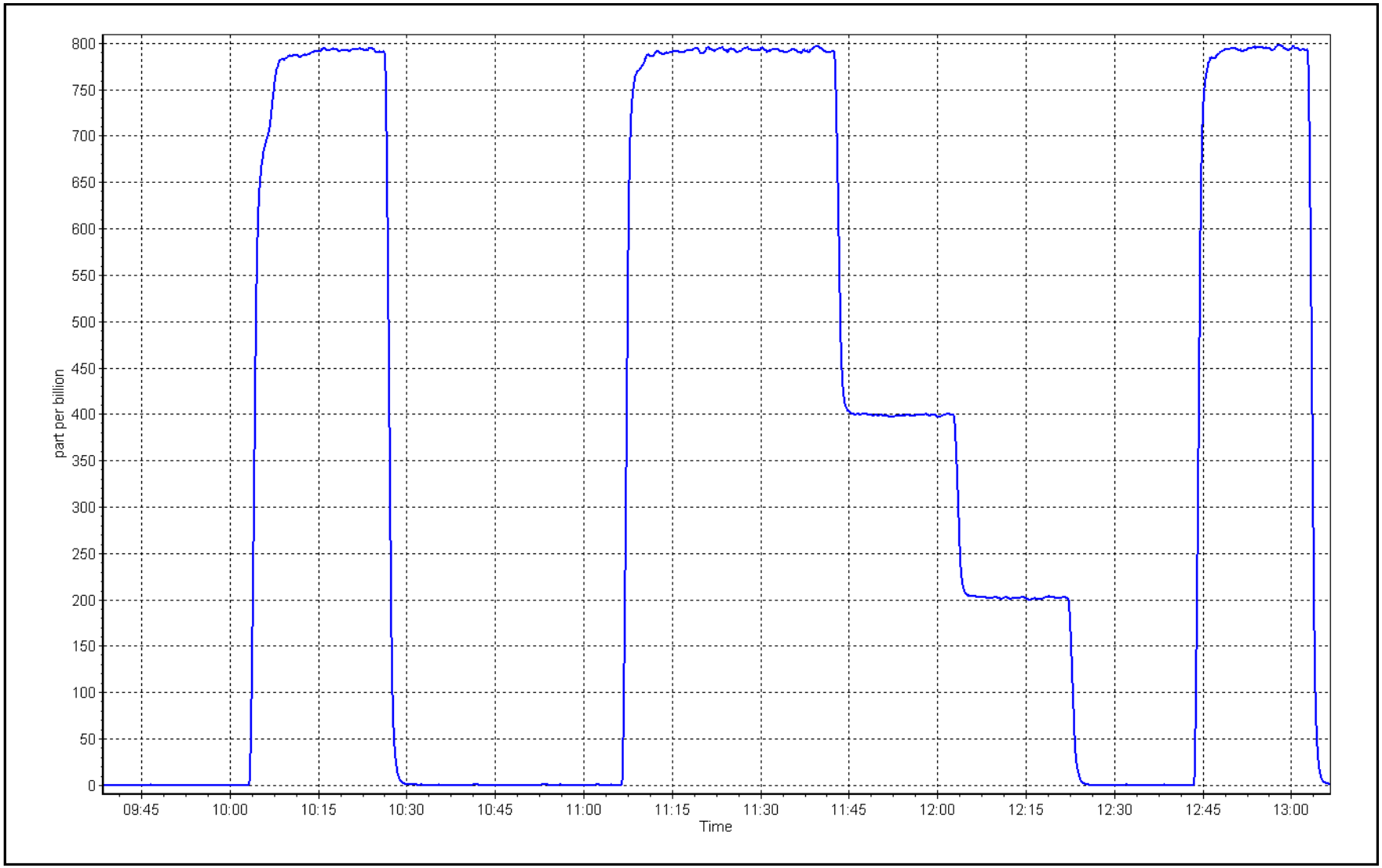
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
799.5	792.9	1.0083
400.2	399.4	1.0021
200.1	201.9	0.9912

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999978	*≥0.995*
Slope	0.990369	*0.90 - 1.10*
Intercept	2.041893	*+/-30*



SO2 Calibration Plot Date: November 17, 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:	November 15, 2023	Last Cal Date:	October 13, 2023
Start time (MST):	9:19	End time (MST):	13:35
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.328	ppm	Cal Gas Exp Date:	February 14, 2025
Cal Gas Cylinder #:	CC506659			
Removed Cal Gas Conc:	5.328	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:	0.995918	1.002314	Backgd or Offset:	2.05	2.01
Calibration intercept:	0.297166	0.340228	Coeff or Slope:	1.189	1.168

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	4925	75.1	80.0	80.3	0.997
as found 2nd point	4963	37.5	40.0	40.7	0.982
as found 3rd point	4981	18.8	20.0	20.7	0.968
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	75.1	80.0	80.4	0.995
second point	4963	37.5	40.0	40.6	0.984
third point	4981	18.8	20.0	20.6	0.973
as left zero	5000	0.0	0.0	0.1	----
as left span	4925	75.1	80.0	80.3	0.997
SO2 Scrubber Check	4920	80.3	803.0	0.0	----
Date of last scrubber change:		December 20, 2021		Ave Corr Factor	0.984
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.3	Prev response:	80.00	*% change:	0.4%
Baseline Corr 2nd AF pt:	40.7	AF Slope:	1.001742	AF Intercept:	0.360261
Baseline Corr 3rd AF pt:	20.7	AF Correlation:	0.999900		

* = > +/-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

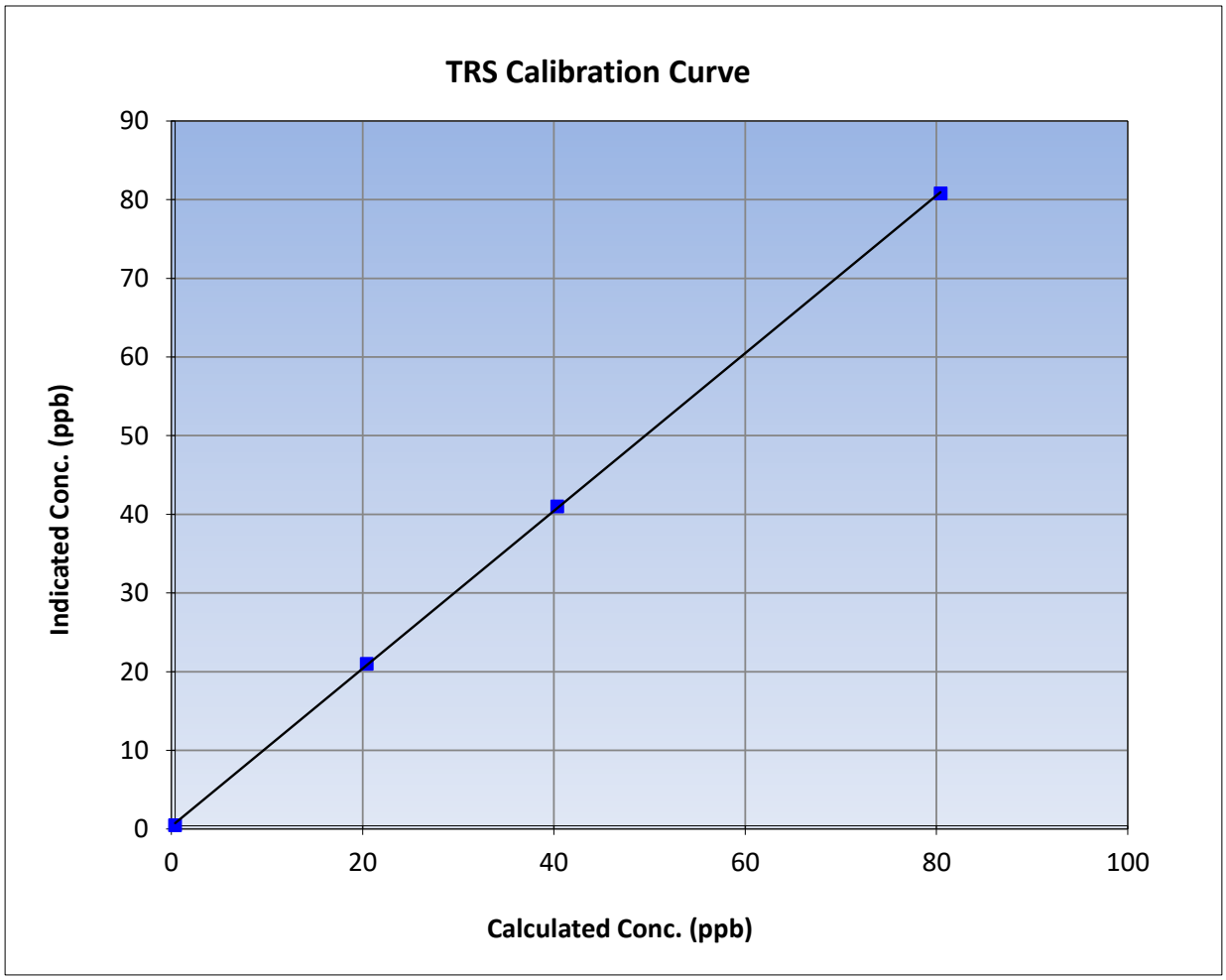
Station Information

Calibration Date:	November 15, 2023	Previous Calibration:	October 13, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:19	End Time (MST):	13:35
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1218153358

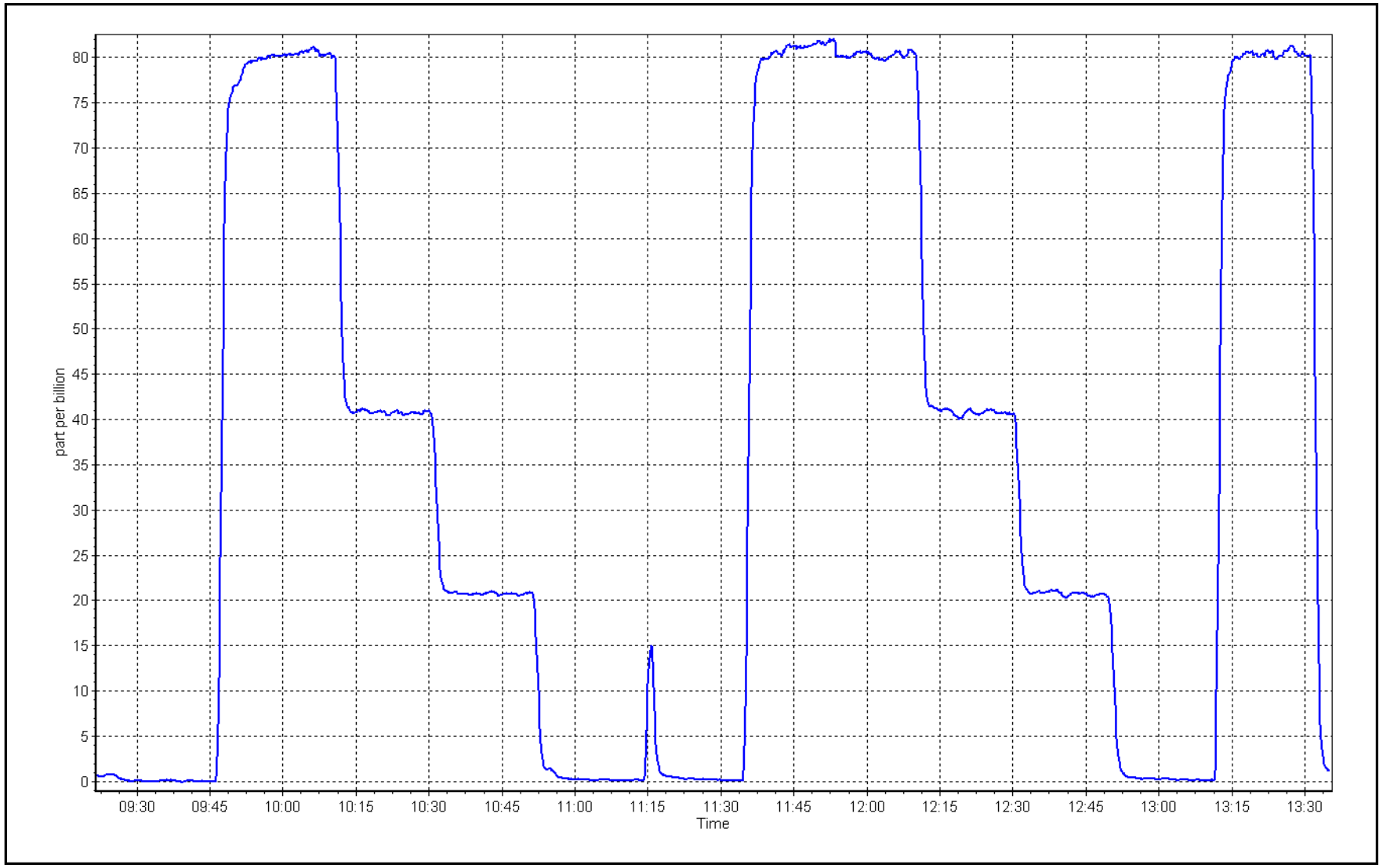
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.4	0.9953
40.0	40.6	0.9841
20.0	20.6	0.9725

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999955	*≥0.995*
Slope	1.002314	*0.90 - 1.10*
Intercept	0.340228	*+/-3*



TRS Calibration Plot Date: November 15, 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:	November 17, 2023	Last Cal Date:	October 19, 2023
Start time (MST):	9:40	End time (MST):	13:06
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:	2.15E-04	2.15E-04	NMHC SP Ratio:	4.87E-05	4.87E-05
CH4 Retention time:	14.0	14.0	NMHC Peak Area:	186260	186260
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	0.01	----
as found span	4920	80.3	17.12	17.11	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	17.12	17.22	0.994
second point	4960	40.2	8.57	8.62	0.994
third point	4980	20.1	4.29	4.36	0.983
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.12	17.15	0.999
				Average Correction Factor	0.991
Baseline Corr AF:	17.11	Prev response	17.16	*% change	-0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-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	9.07	1.000
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	9.14	0.992
second point	4960	40.2	4.54	4.59	0.990
third point	4980	20.1	2.27	2.33	0.974
as left zero	5000	0.0	0.00	0.00	----
as left span	4919.7	80.3	9.07	9.08	0.999
				Average Correction Factor	0.985
Baseline Corr AF:	9.06	Prev response	9.10	*% change	-0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919.7	80.3	8.06	8.05	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919.7	80.3	8.06	8.09	0.996
second point	4960	40.2	4.03	4.04	0.999
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	8.06	0.999
				Average Correction Factor	0.997
Baseline Corr AF:	8.05	Prev response	8.06	*% change	-0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000103	1.004841
THC Cal Offset:	0.036627	0.018616
CH4 Cal Slope:	0.999903	1.003960
CH4 Cal Offset:	0.001645	-0.002161
NMHC Cal Slope:	1.000180	1.006556
NMHC Cal Offset:	0.035381	0.019576

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

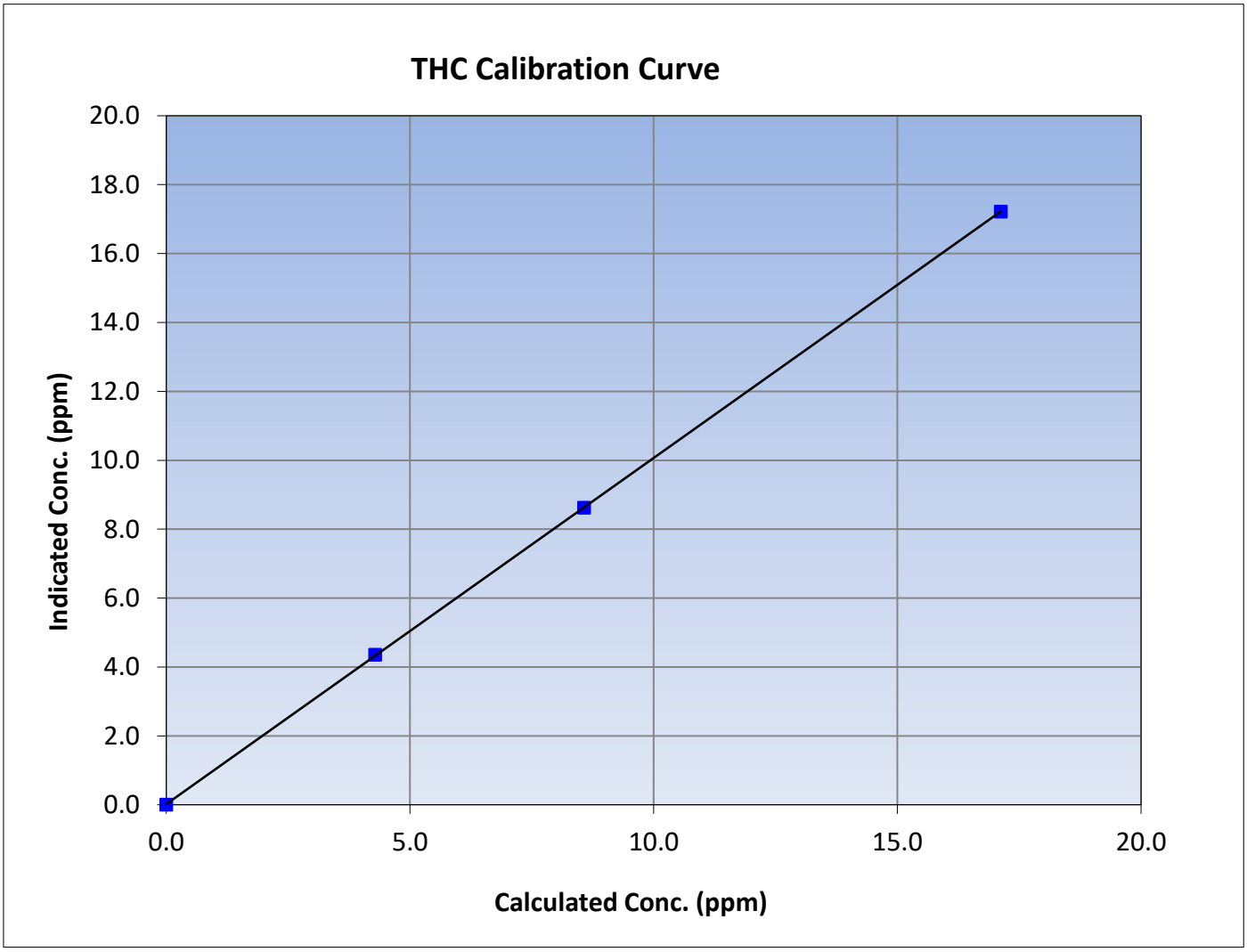
Version-06-2022

Station Information

Calibration Date:	November 17, 2023	Previous Calibration:	October 19, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:40	End Time (MST):	13:06
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	0.999990	*≥0.995*
17.12	17.22	0.9942			
8.57	8.62	0.9944	Slope	1.004841	*0.90 - 1.10*
4.29	4.36	0.9835			
			Intercept	0.018616	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

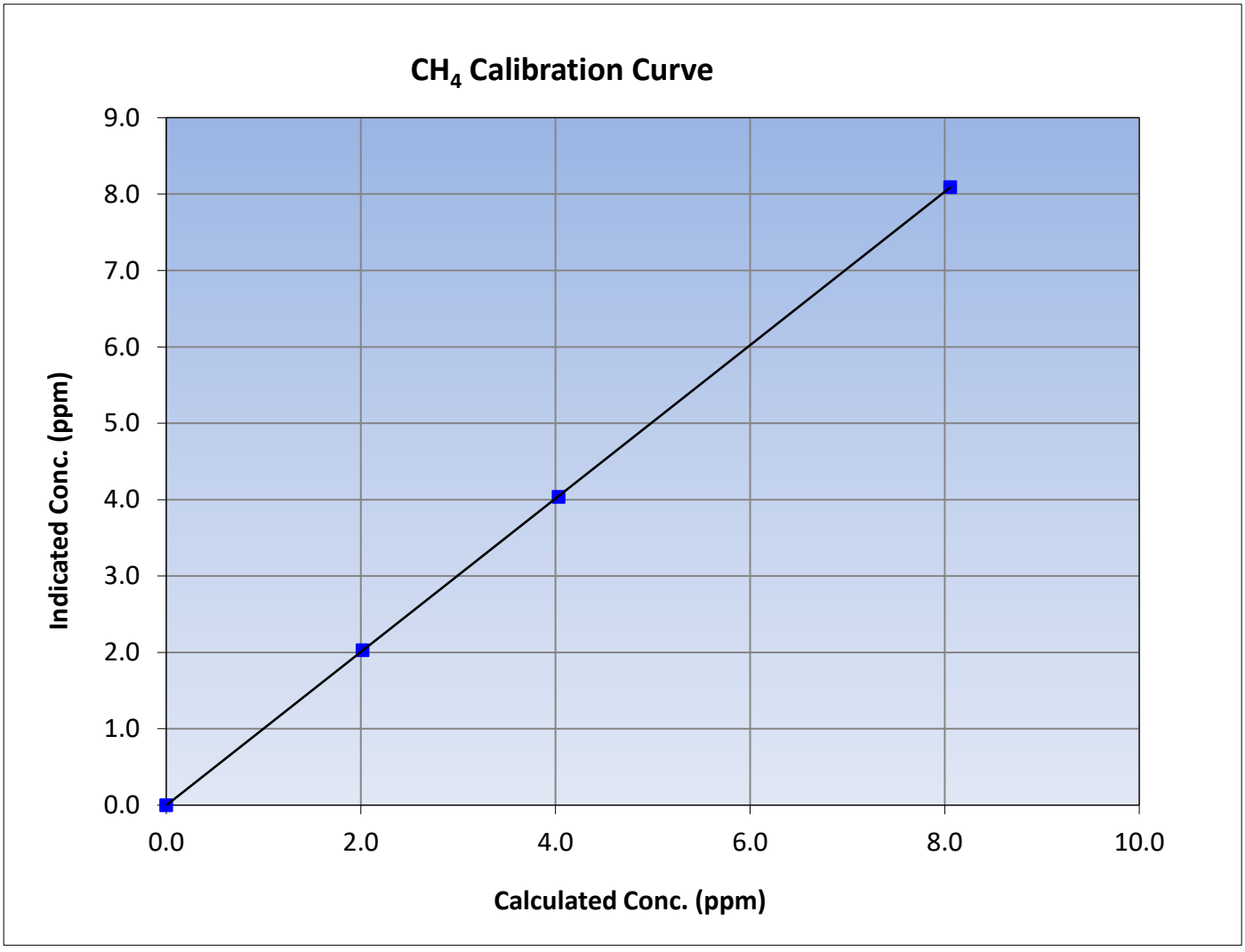
Version-06-2022

Station Information

Calibration Date:	November 17, 2023	Previous Calibration:	October 19, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:40	End Time (MST):	13:06
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	0.999995	≥0.995
8.06	8.09	0.9958			
4.03	4.04	0.9994	Slope	1.003960	0.90 - 1.10
2.02	2.03	0.9948			
			Intercept	-0.002161	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

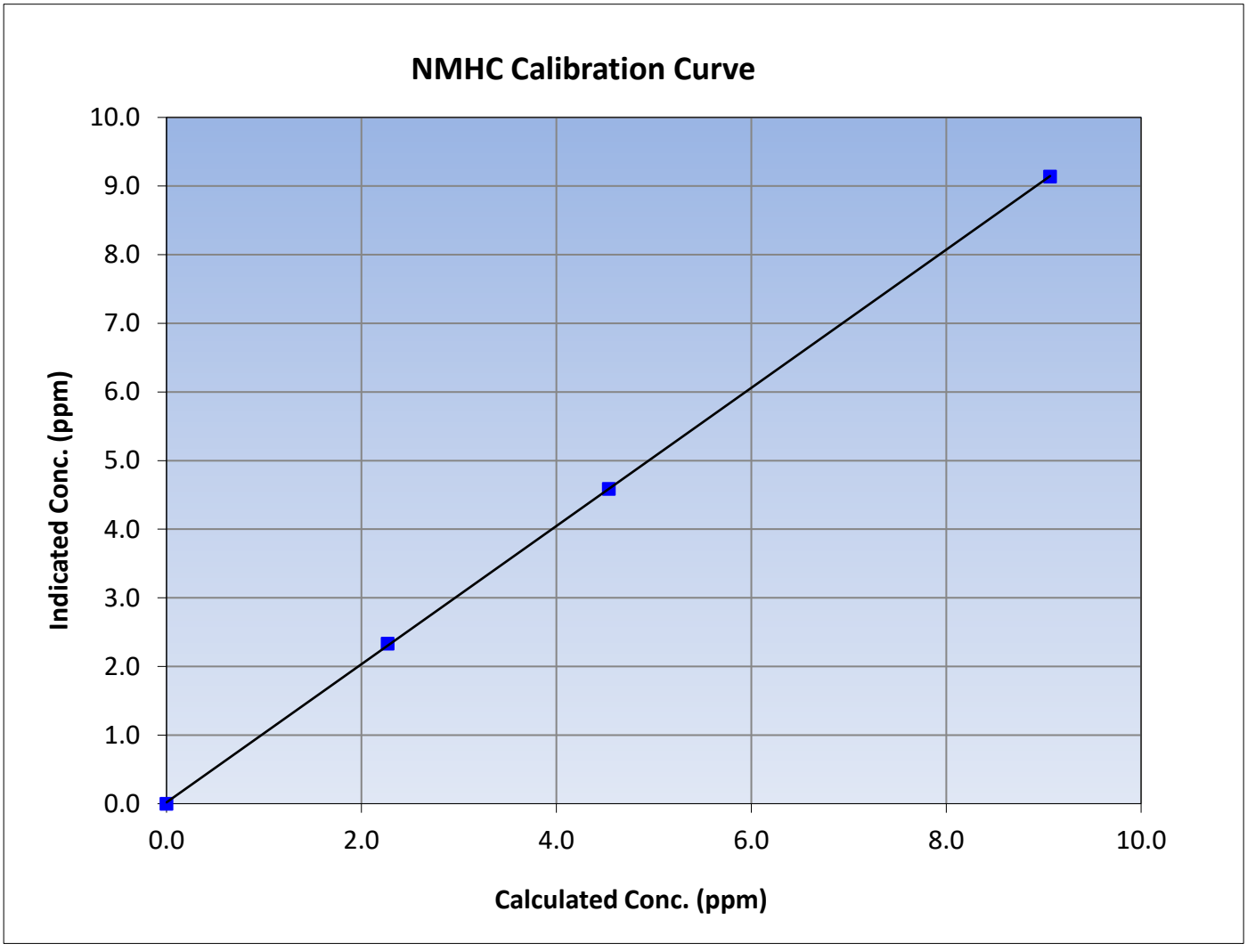
Version-06-2022

Station Information

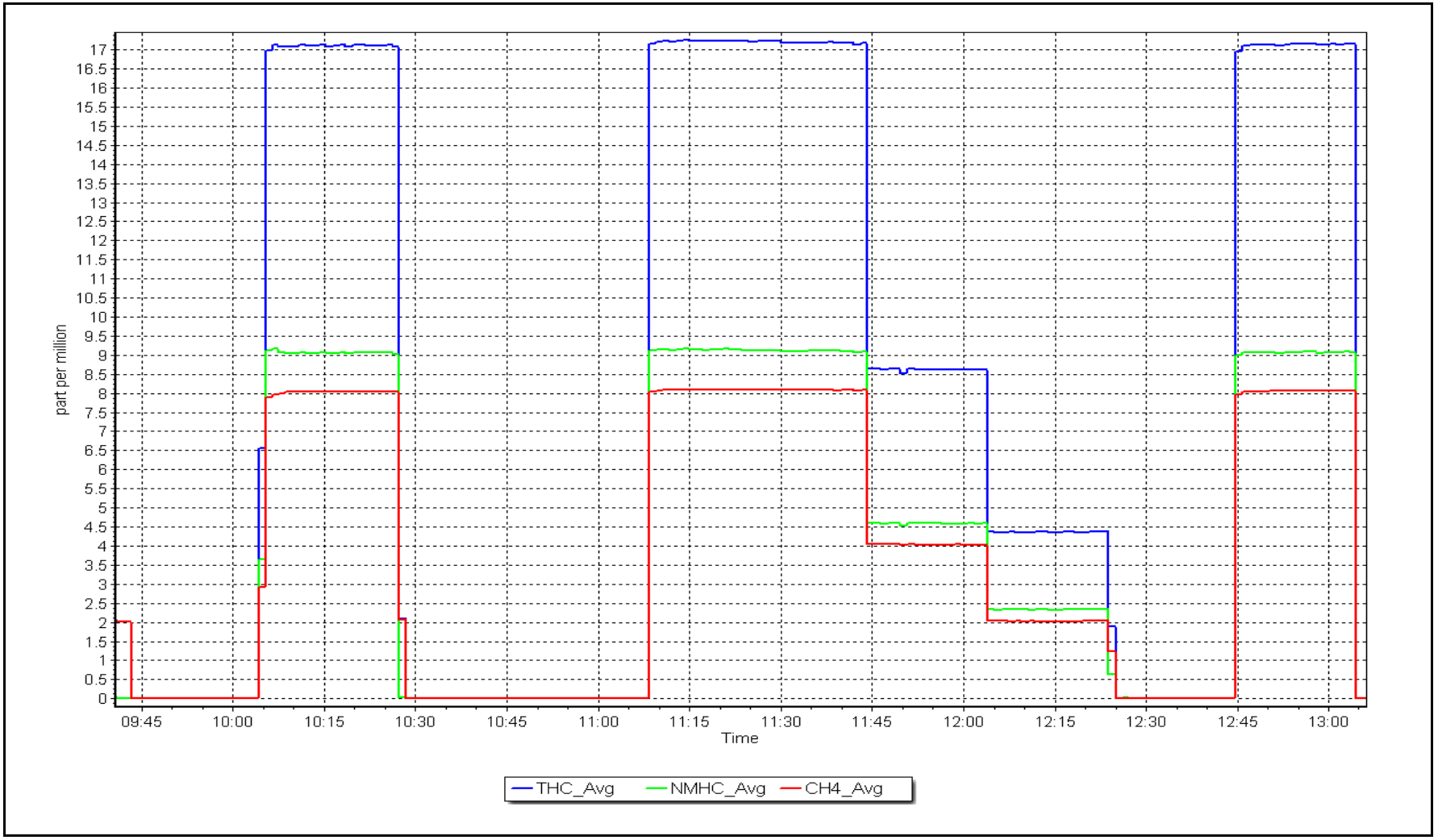
Calibration Date:	November 17, 2023	Previous Calibration:	October 19, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:40	End Time (MST):	13:06
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999975	*≥0.995*
9.07	9.14	0.9920			
4.54	4.59	0.9895	Slope	1.006556	*0.90 - 1.10*
2.27	2.33	0.9736			
			Intercept	0.019576	*+/-0.5*



NMHC Calibration Plot Date: November 17, 2023 Location: Patricia McInnes



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	November 7, 2023	Last Cal Date:	October 12, 2023
Start time (MST):	9:31	End time (MST):	14:13
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:	0.825	0.825	NO bkgnd or offset:	3.2	3.2
NOX coeff or slope:	0.987	0.987	NOX bkgnd or offset:	3.9	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:	1.000493	0.988764
NO_X Cal Offset:	2.095627	2.638018
NO Cal Slope:	1.001945	0.990325
NO Cal Offset:	0.962538	1.304636
NO_2 Cal Slope:	1.003982	0.998490
NO_2 Cal Offset:	-0.085539	0.166835

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.9	0.5	0.4	----	----
as found span	4914	86.2	826.5	799.7	26.7	820.3	790.9	29.3	1.0075	1.0112
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.8	0.5	0.3	----	----
high point	4914	86.2	826.5	799.7	26.7	818.9	793.0	25.9	1.0092	1.0085
second point	4957	43.1	413.2	399.9	13.4	412.1	397.4	14.7	1.0028	1.0062
third point	4978	21.6	207.1	200.4	6.7	209.3	200.8	8.6	0.9896	0.9981
as left zero	5000	0.0	0.0	0.0	0.0	0.5	0.5	0.0	----	----
as left span	4914	86.2	826.5	409.4	417.0	817.7	402.9	414.8	1.0107	1.0162
								Average Correction Factor	1.0005	1.0043

Corrected As found	NO_X = 819.4 ppb	NO = 790.4 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-1.2%
Previous Response	NO_X = 829.0 ppb	NO = 802.2 ppb		*Percent Change	NO =	-1.5%
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)	791.0	400.7	417.0	416.6	1.0010	99.9%
2nd GPT point (200 ppb O3)	791.0	604.7	213.0	212.9	1.0006	99.9%
3rd GPT point (100 ppb O3)	791.0	699.4	118.3	118.1	1.0019	99.8%
				Average Correction Factor	1.0011	99.9%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

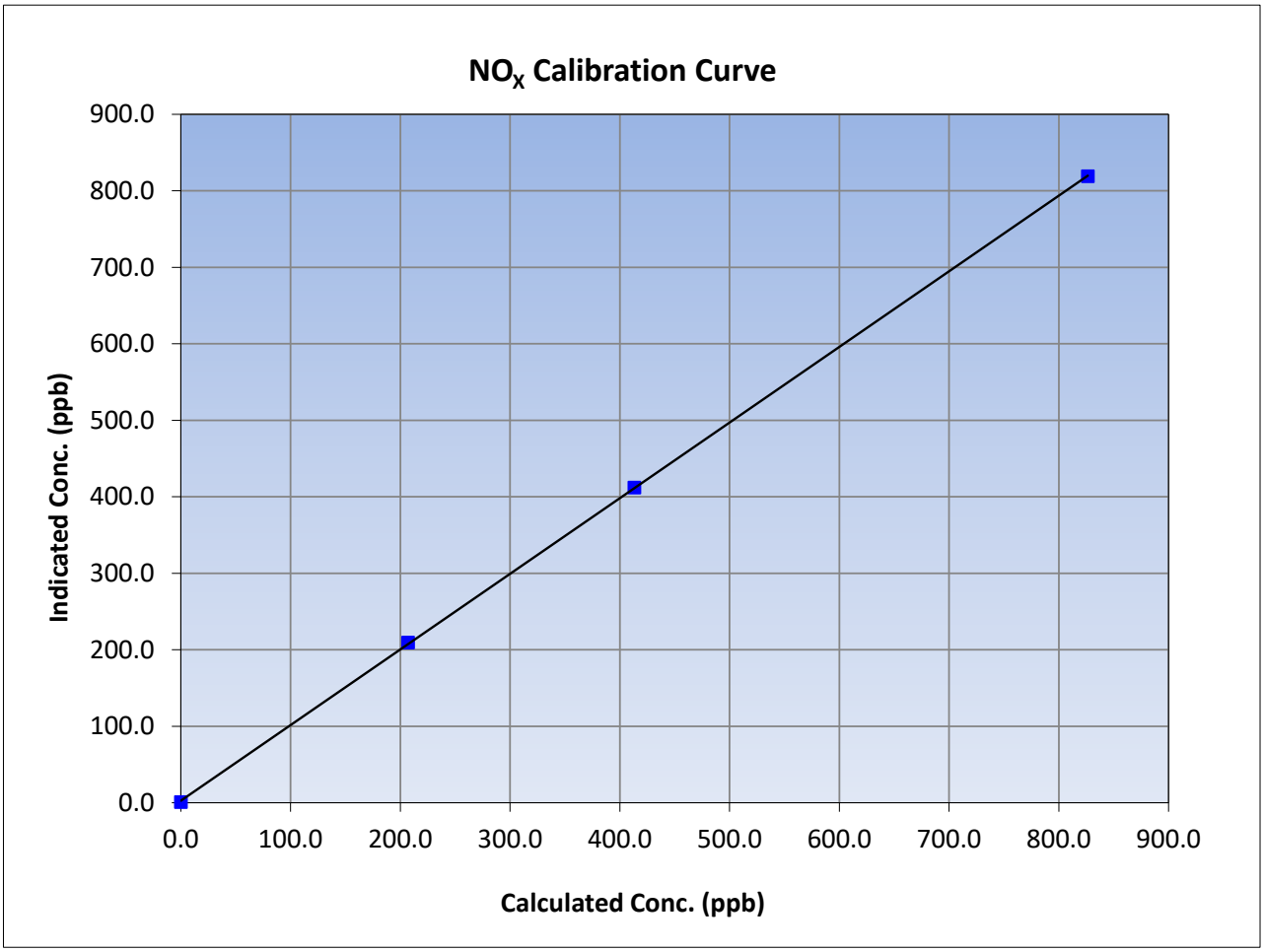
Version-04-2020

Station Information

Calibration Date:	November 7, 2023	Previous Calibration:	October 12, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:31	End Time (MST):	14:13
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	0.8	----	Correlation Coefficient	0.999977	≥0.995
826.5	818.9	1.0092			
413.2	412.1	1.0028	Slope	0.988764	0.90 - 1.10
207.1	209.3	0.9896			
			Intercept	2.638018	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

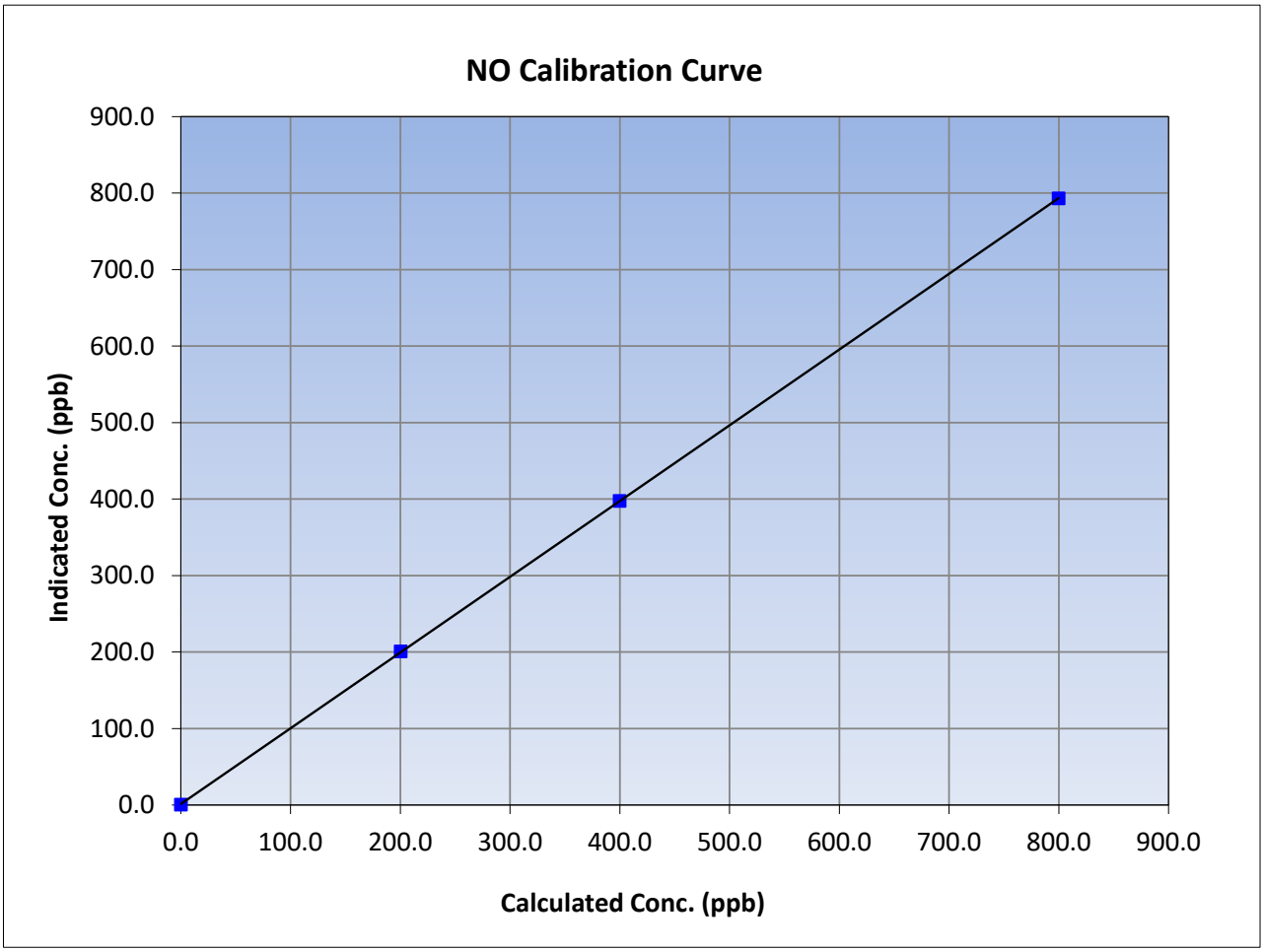
Version-04-2020

Station Information

Calibration Date:	November 7, 2023	Previous Calibration:	October 12, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:31	End Time (MST):	14:13
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	0.999995	*≥0.995*
799.7	793.0	1.0085			
399.9	397.4	1.0062	Slope	0.990325	*0.90 - 1.10*
200.4	200.8	0.9981			
			Intercept	1.304636	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

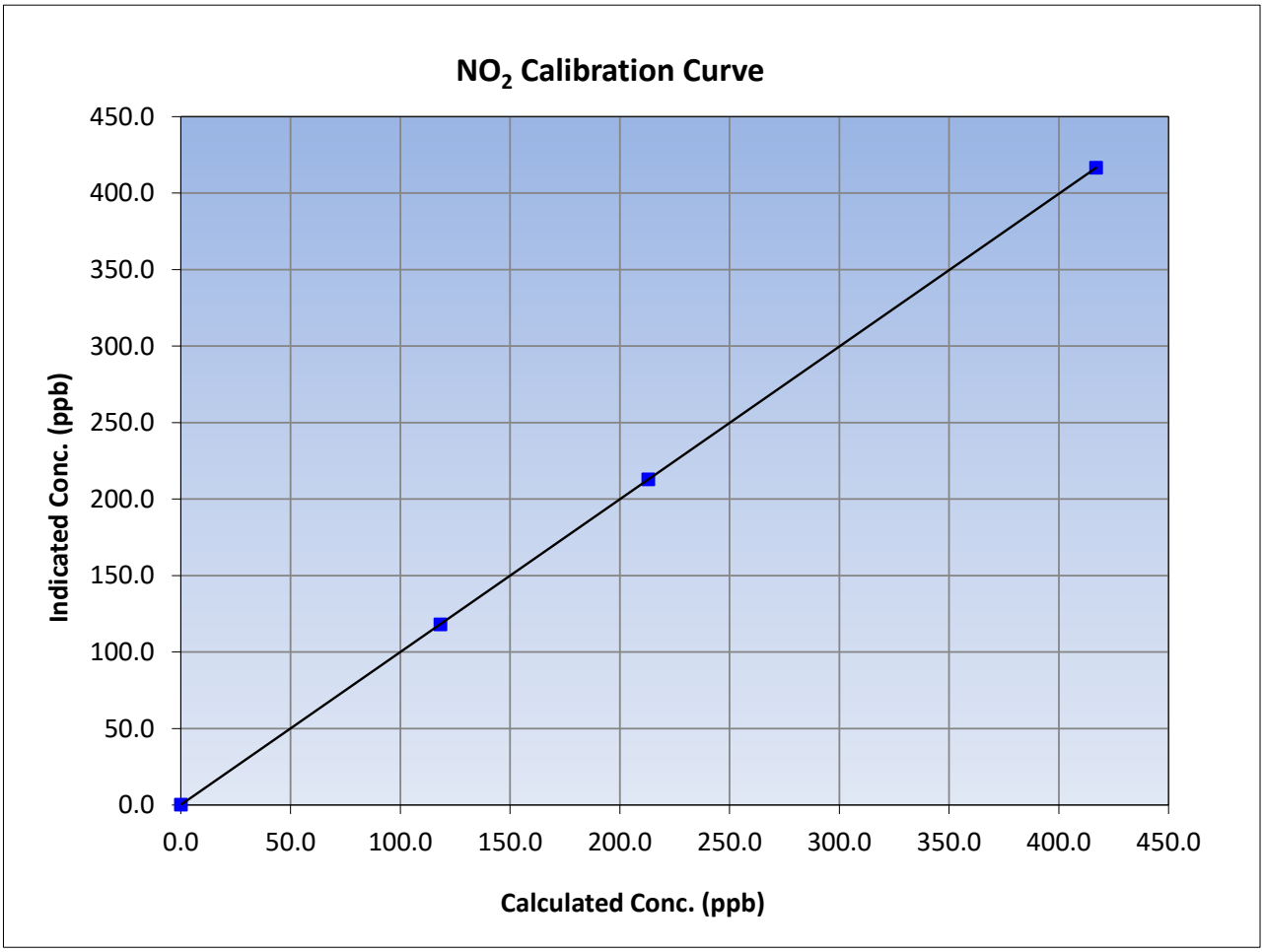
Version-04-2020

Station Information

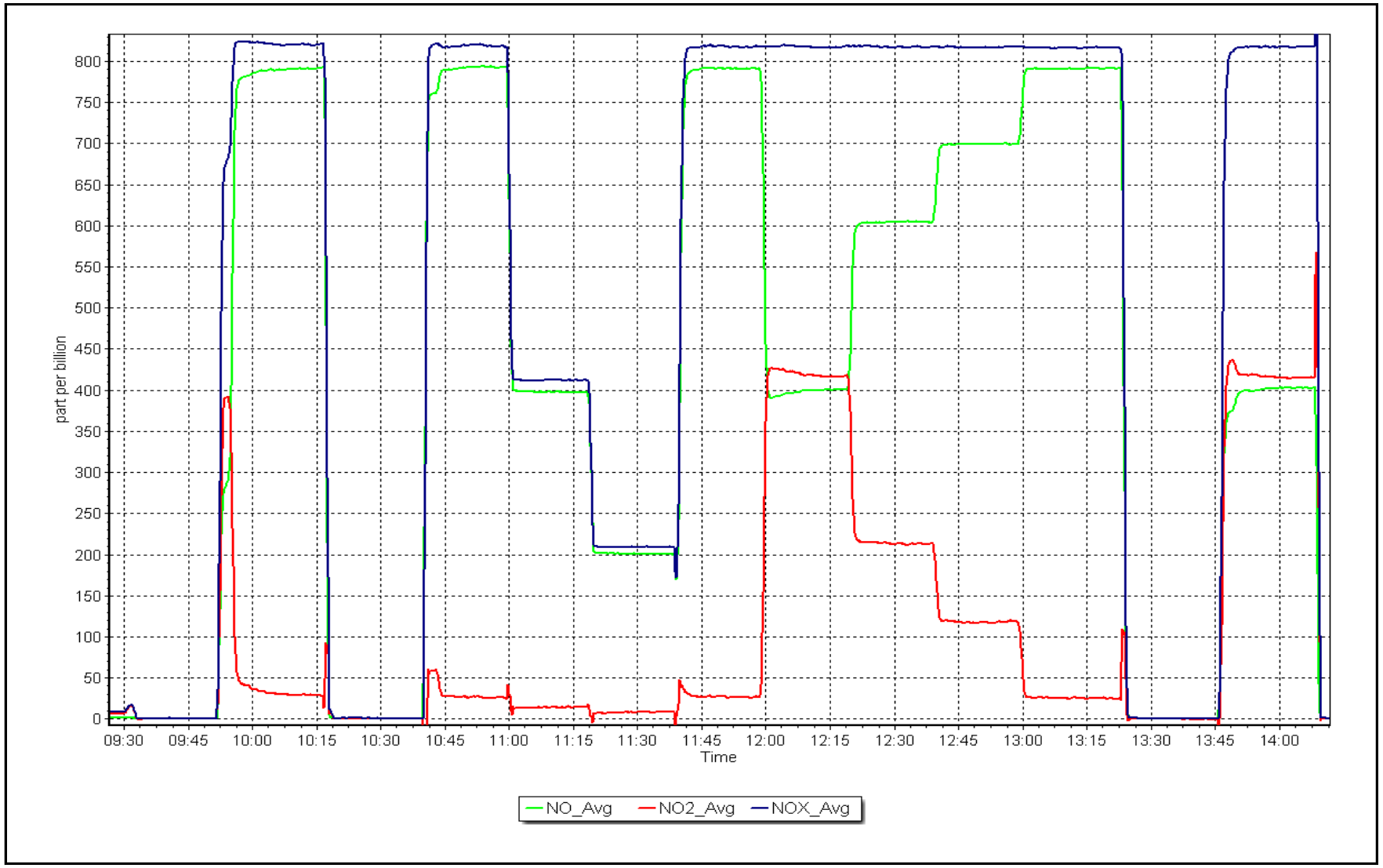
Calibration Date:	November 7, 2023	Previous Calibration:	October 12, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:31	End Time (MST):	14:13
Analyzer make:	Thermo 42i	Analyzer serial #:	1172750022

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.3	----	Correlation Coefficient	0.999999	*≥0.995*
417.0	416.6	1.0010			
213.0	212.9	1.0006	Slope	0.998490	*0.90 - 1.10*
118.3	118.1	1.0019			
			Intercept	0.166835	*+/-20*



NO_X Calibration Plot Date: November 7, 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:	November 10, 2023	Last Cal Date:	October 2, 2023
Start time (MST):	9:48	End time (MST):	12:45
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:	1.003714	1.005971	Backgd or Offset:	-0.2	-0.2
Calibration intercept:	-2.700000	-1.720000	Coeff or Slope:	1.039	1.039

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	800.0	0.0	-0.4	----
as found span	5000	1303.0	400.0	401.6	0.996
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	0.0	----
high point	5000	1303.0	400.0	401.5	0.996
second point	5000	966.5	200.0	198.7	1.007
third point	5000	794.3	100.0	97.1	1.030
as left zero	5000	800.0	0.0	-0.1	----
as left span	5000	1303.0	400.0	405.2	0.987
				Average Correction Factor	1.011

Baseline Corr As found:	402.0	Previous response	398.8	*% change	0.8%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

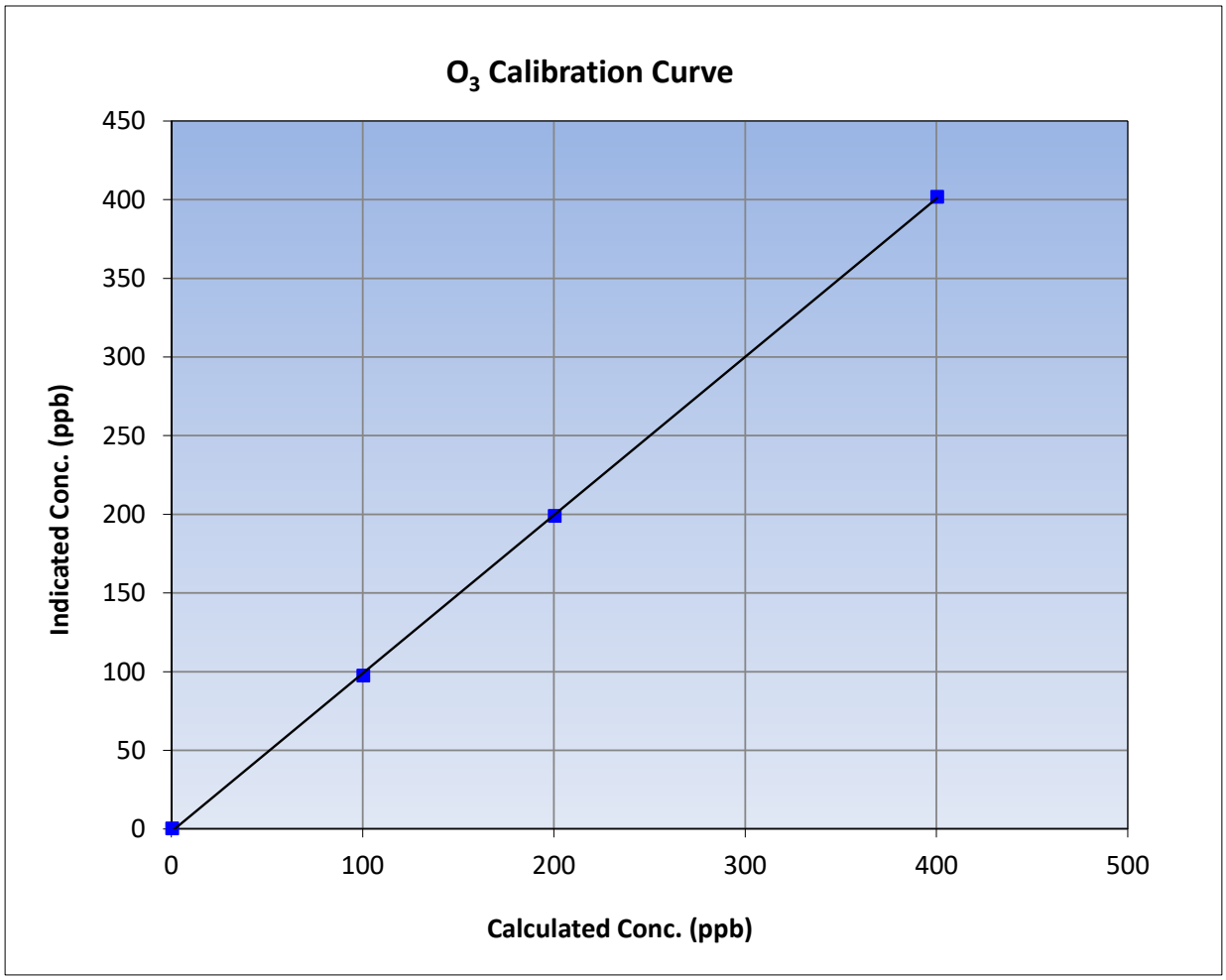
Station Information

Calibration Date:	November 10, 2023	Previous Calibration:	October 2, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:48	End Time (MST):	12:45
Analyzer make:	Thermo 49i	Analyzer serial #:	1300156234

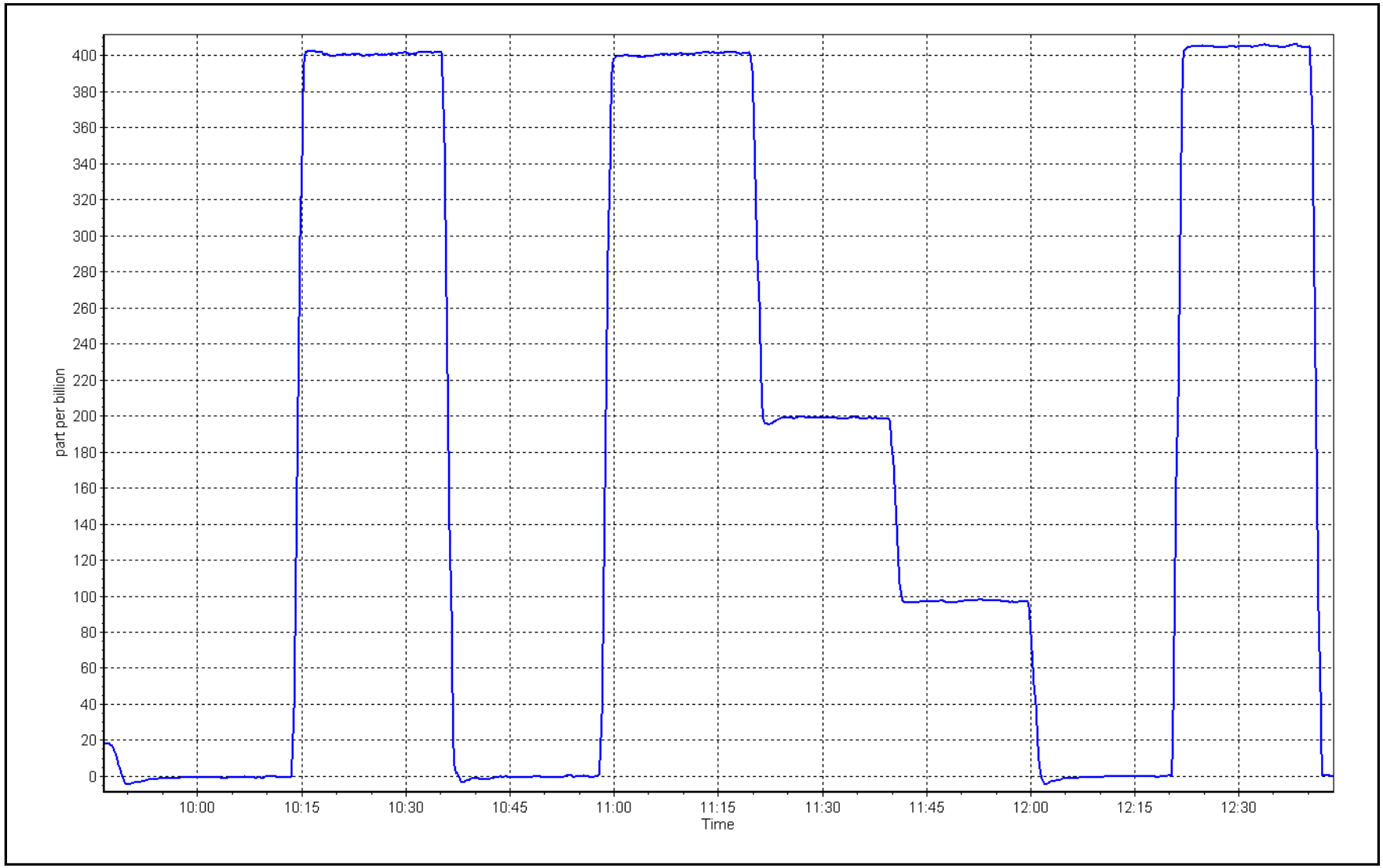
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
400.0	401.5	0.9963
200.0	198.7	1.0065
100.0	97.1	1.0299

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999916	*≥0.995*
Slope	1.005971	*0.90 - 1.10*
Intercept	-1.720000	*+/- 5*



O_3 Calibration Plot Date: November 10, 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:	November 17, 2023	Last Cal Date:	October 19, 2023
Start time (MST):	13:13	End time (MST):	13:45
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)	5.2	4.3	5.2	☐	+/- 2 °C
P (mmHg)	718.1	718.5	718.1	☐	+/- 10 mmHg
flow (LPM)	5.00	4.81	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: November 17, 2023 Last Cal Date: October 19, 2023

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

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: September 22, 2023 <0.2 ug/m3

Disposable Filter Changed: September 22, 2023

Annual Maintenance

Date Sample Tube Cleaned: April 13, 2023

Date RH/T Sensor Cleaned: April 13, 2023

Notes: Quarterly calibration was completed in September. 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:	November 1, 2023	Last Cal Date:	October 3, 2023
Start time (MST):	8:44	End time (MST):	12:30
NH3 Cal Date:	November 1, 2023	Last Cal Date:	October 3, 2023
Start time (MST):	12:31	End time (MST):	15:43
Reason:	Removal	and calibration cylinder change	

Calibration Standards

NOX Cal Gas Conc:	47.94	ppm	NO Gas Cylinder #:	T30YCWN
NO Cal Gas Conc:	46.39	ppm	NO Cal Gas Expiry:	April 11, 2025
Removed NOX Conc:	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:	76.29	ppm	NH3 Gas Cylinder #:	EB0108520
			NH3 Cal Gas Expiry:	August 22, 2024
Removed NH3 Conc:	77.80	ppm	Removed Cylinder #:	CC710812
NH3 gas Diff:	-5.3%		Removed cyl Expiry:	March 30, 2023
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:	0.788	0.788	TN coefficient:	0.789	0.789
NOX coefficient:	0.787	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:	1.004061	1.031267
NO_X Cal Offset:	0.254959	0.789511
NO Cal Slope:	1.000231	1.030718
NO Cal Offset:	1.162694	1.216970
NO_2 Cal Slope:	0.998161	1.002440
NO_2 Cal Offset:	-0.986846	1.111820
NH3 Cal Slope:	0.995038	1.034784
NH3 Cal Offset:	8.227208	10.702884
TN Cal Slope:	1.001184	1.040414
TN Cal Offset:	7.279855	10.906453

Wood Buffalo Environmental Association

TN - NOX - NH_3 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated TN concentration (ppb) (Cc)	Calculated NOX concentration (ppb) (Cc)	Calculated NH3 concentration (ppb) (Cc)	Indicated TN concentration (ppb) (Ic)	Indicated NOX concentration (ppb) (Ic)	Indicated NH3 concentration (ppb) (Ic)	TN Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NH3 Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	1.5	-0.1	1.6	----	----
as found NO	4914	86.2	826.5	826.5	----	858.3	853.0	5.5	0.963	----
calibrator zero	5000	0.0	0.0	0.0	0.0	1.5	-0.1	1.6	----	----
high NO point	4914	86.2	826.5	826.5	----	858.3	853.0	5.5	0.963	----
NO/O3 point	4914	86.2	826.5	826.5	----	853.4	846.9	6.6	0.968	----
as found NH3	3419	81.0	1800.5	----	1800.5	1876.5	----	1866.3	0.960	0.965
new NH3 cyl rp	3417	82.6	1800.6	----	1800.6	1779.5	----	1769.7	1.012	1.017
first NH3	3419	81.0	1800.5	----	1800.5	1876.5	----	1866.3	0.960	0.965
second NH3	3455	45.0	1000.3	----	1000.3	1062.2	----	1056.3	0.942	0.947
third NH3	3478	22.5	500.1	----	500.1	537.7	----	534.3	0.930	0.936
								Average Correction Factor	0.9657	0.9492

Corrected As found TN = 856.8 ppb NO_X = 853.1 ppb NH3 = 1864.7 ppb

Previous Response TN = 834.7 ppb NO_X = 830.1 ppb NH3 = 1799.8 ppb

*Percent Change TN = 2.6%

*Percent Change NO_X = 2.7%

*Percent Change NH3 = 3.5%

* = > +/-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	-0.1	1.5	----	----
as found span	4914	86.2	826.5	799.7	826.5	853.0	824.4	858.3	0.9689	0.9701
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	1.5	----	----
high point	4914	86.2	826.5	799.7	826.5	853.0	824.4	858.3	0.9689	0.9701
second point	4957	43.1	413.2	399.9	413.2	426.3	415.4	431.7	0.9694	0.9626
third point	4978	21.6	207.1	200.4	207.1	216.0	208.2	219.2	0.9589	0.9626
								Average Correction Factor	0.9657	0.9651

Baseline Corr As fnd	TN =	856.8 ppb	NO_X =	853.1 ppb	NO =	824.5 ppb	*Percent Change	TN = 2.6%
Previous Response	TN =	834.7 ppb	NO_X =	830.1 ppb	NO =	801.1 ppb	*Percent Change	NO_X = 2.7%
							*Percent Change	NO = 2.8%

* = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found zero	----	----	0.0	0.0	----	----
calibration zero	----	----	0.0	0.0	----	----
1st GPT point (400 ppb O3)	818.4	414.9	430.2	432.0	0.9959	100.4%
2nd GPT point (200 ppb O3)	818.4	622.7	222.4	223.9	0.9934	100.7%
3rd GPT point (100 ppb O3)	818.4	723.2	121.9	125.0	0.9754	102.5%
				Average Correction Factor	0.9882	101.2%

Notes: Completing removal calibration due to how slow the instrument reaches baseline after daily spans. Completed the removal calibration and changed the NH3 cal gas at the end and ran a span with the new cal gas. Swapped out the instruments, install calibration will be completed tomorrow.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TN Calibration Summary

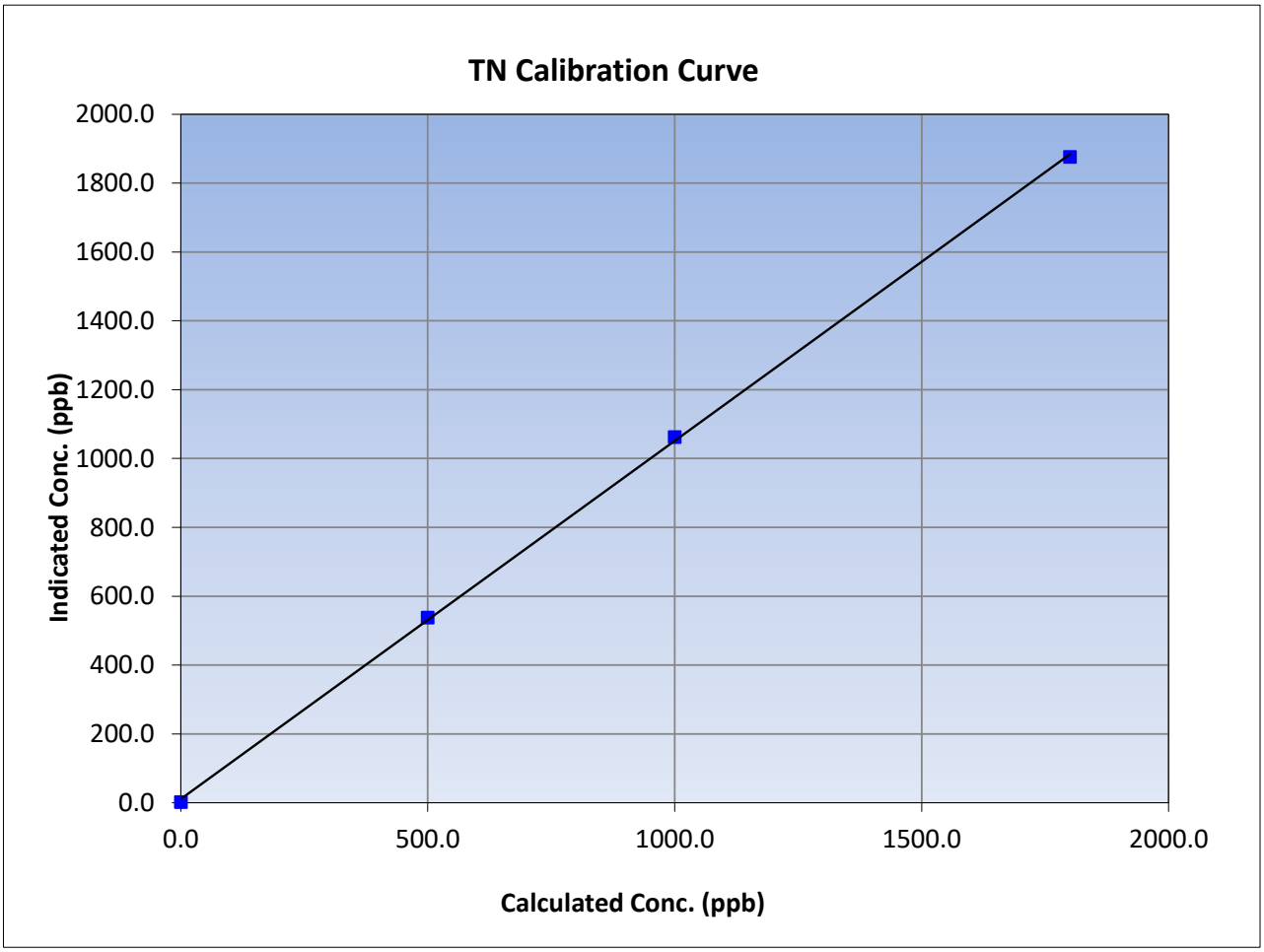
Version-05-2023

Station Information

Calibration Date:	November 1, 2023	Previous Calibration:	October 3, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:44	End Time (MST):	12:30
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	1.5	----	Correlation Coefficient	0.999842	*≥0.995*
1800.5	1876.5	0.9595			
1000.3	1062.2	0.9417	Slope	1.040414	*0.90 - 1.10*
500.1	537.7	0.9300			
			Intercept	10.906453	*+/-20*



Wood Buffalo Environmental Association

NH_3 Calibration Summary

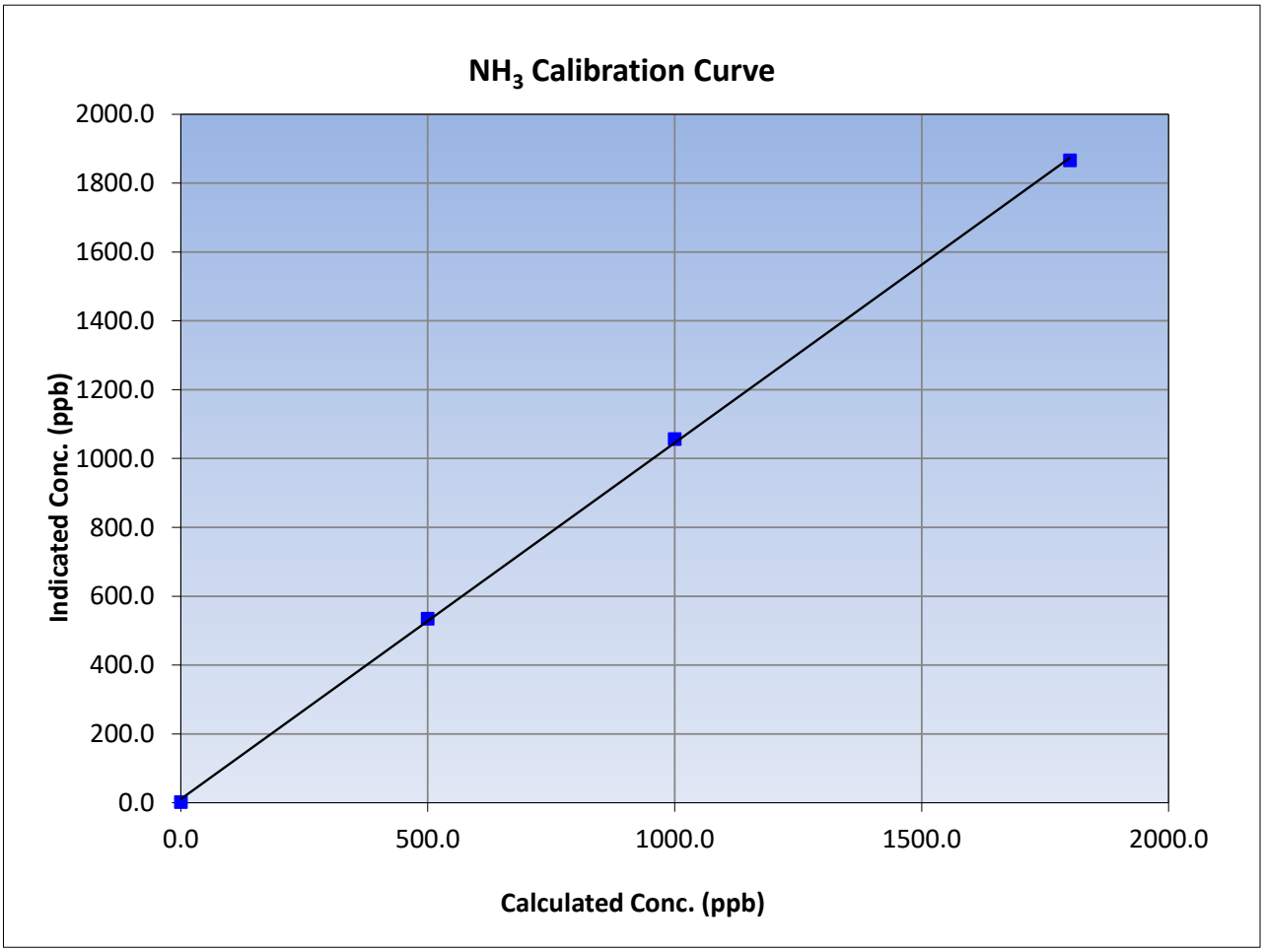
Version-05-2023

Station Information

Calibration Date:	November 1, 2023	Previous Calibration:	October 3, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:44	End Time (MST):	12:30
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	1.6	----	Correlation Coefficient	0.999848	≥0.995
1800.5	1866.3	0.9648			
1000.3	1056.3	0.9470	Slope	1.034784	0.90 - 1.10
500.1	534.3	0.9359			
			Intercept	10.702884	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

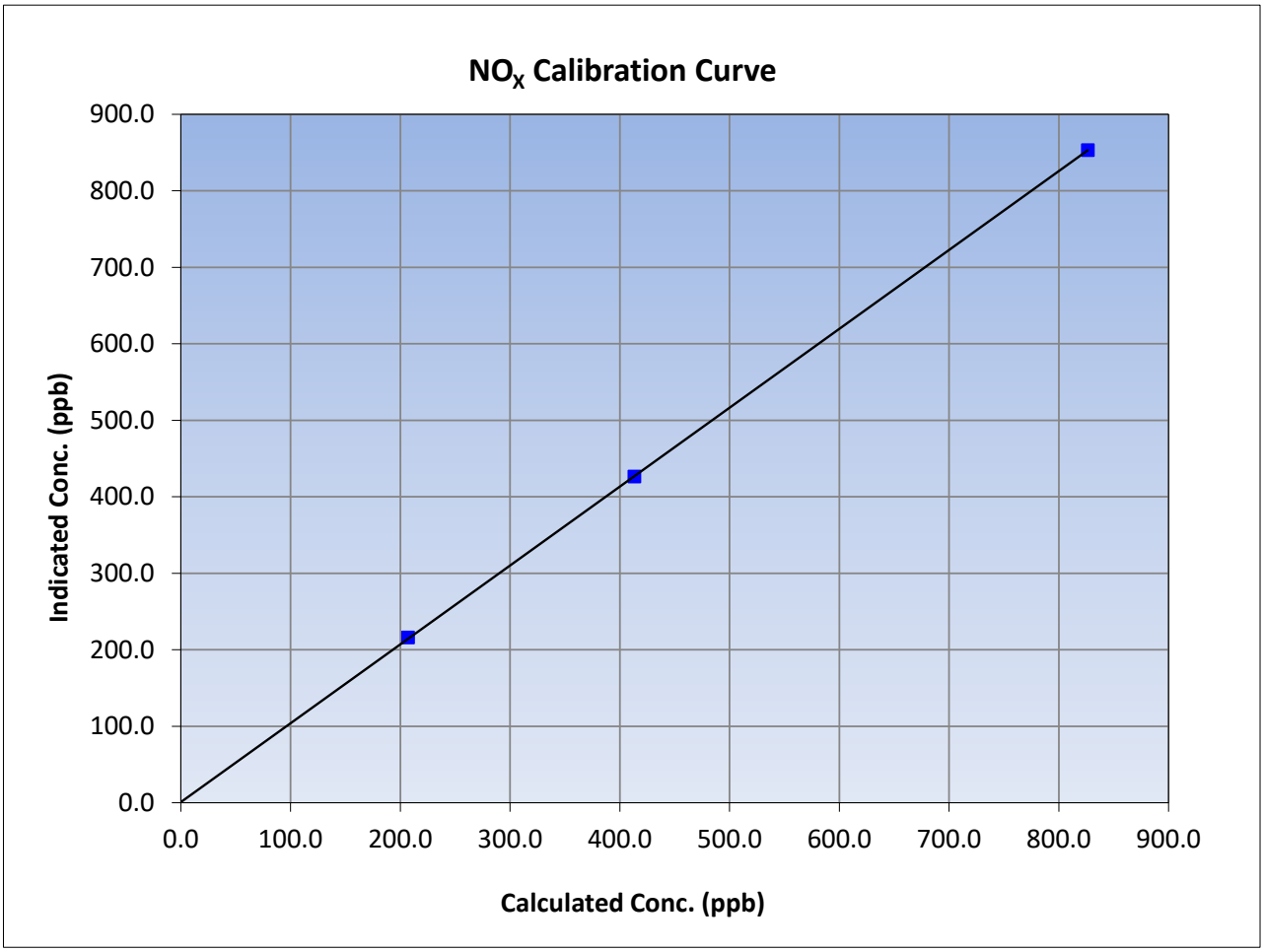
Version-05-2023

Station Information

Calibration Date:	November 1, 2023	Previous Calibration:	October 3, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:44	End Time (MST):	12:30
Analyzer make:	Teledyne API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999990	≥0.995
826.5	853.0	0.9689			
413.2	426.3	0.9694	Slope	1.031267	0.90 - 1.10
207.1	216.0	0.9589			
			Intercept	0.789511	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

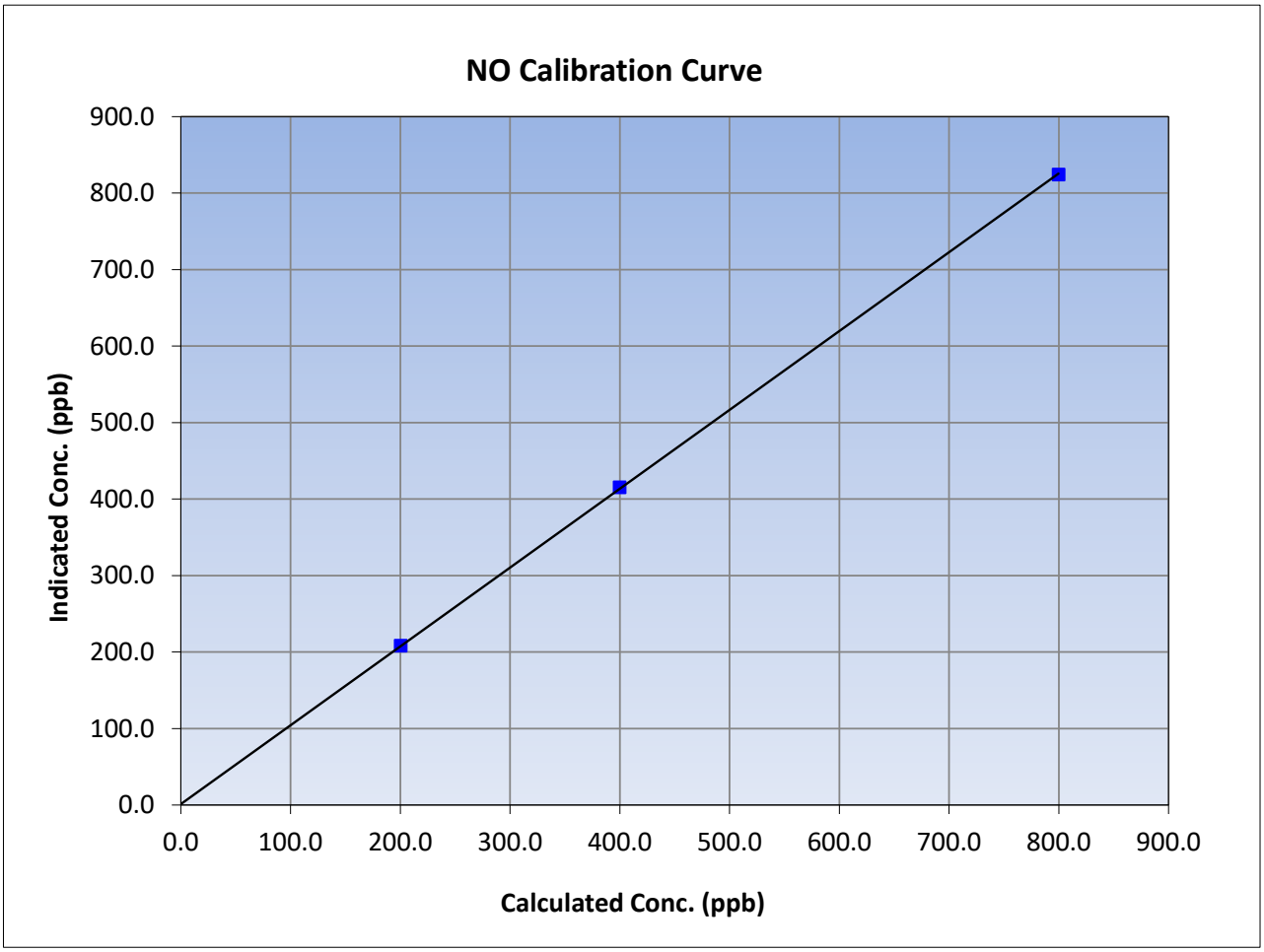
Version-05-2023

Station Information

Calibration Date:	November 1, 2023	Previous Calibration:	October 3, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:44	End Time (MST):	12:30
Analyzer make:	Teledyne API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.1	----	Correlation Coefficient	0.999980	*≥0.995*
799.7	824.4	0.9701			
399.9	415.4	0.9626	Slope	1.030718	*0.90 - 1.10*
200.4	208.2	0.9626			
			Intercept	1.216970	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

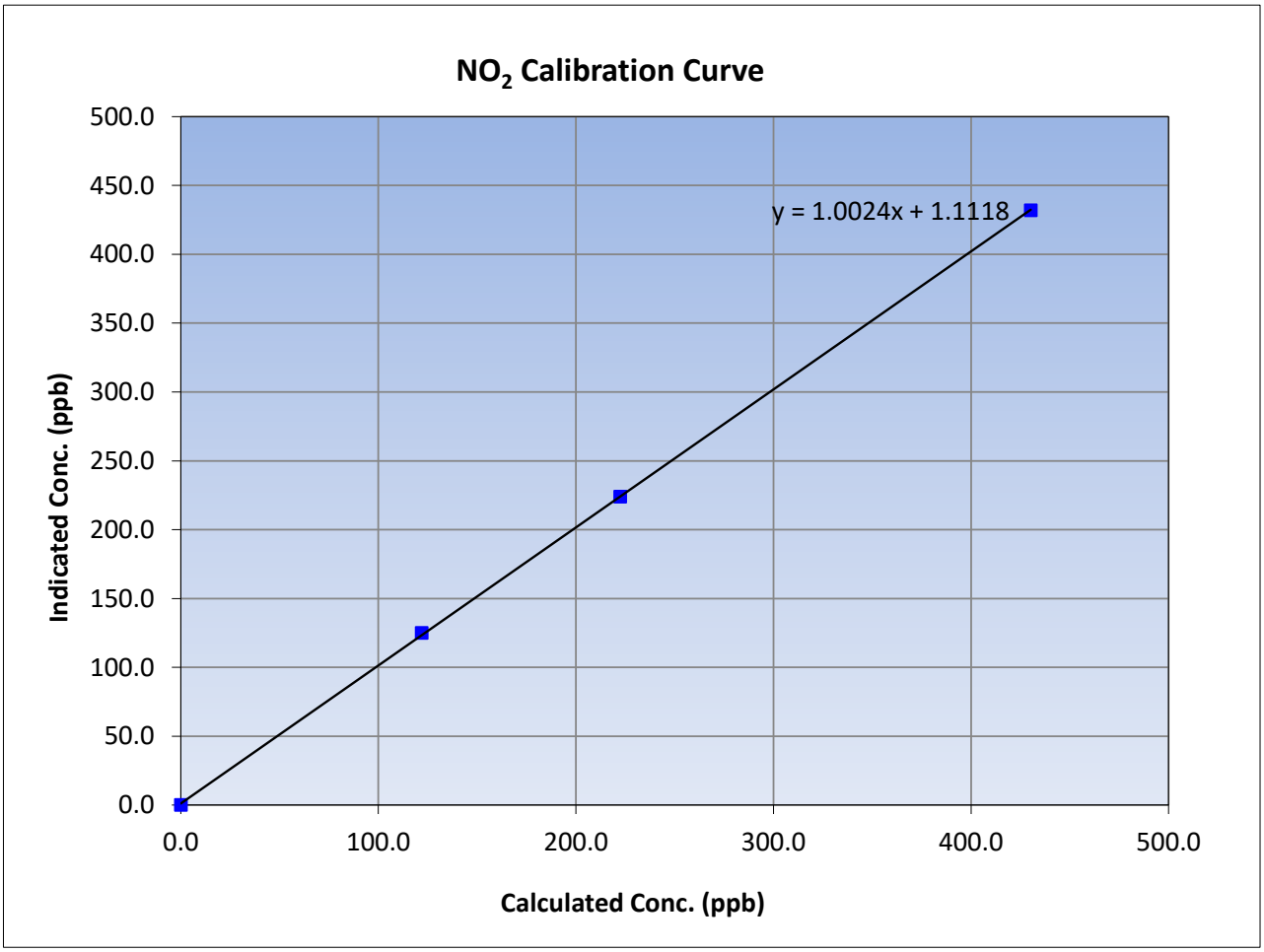
Version-05-2023

Station Information

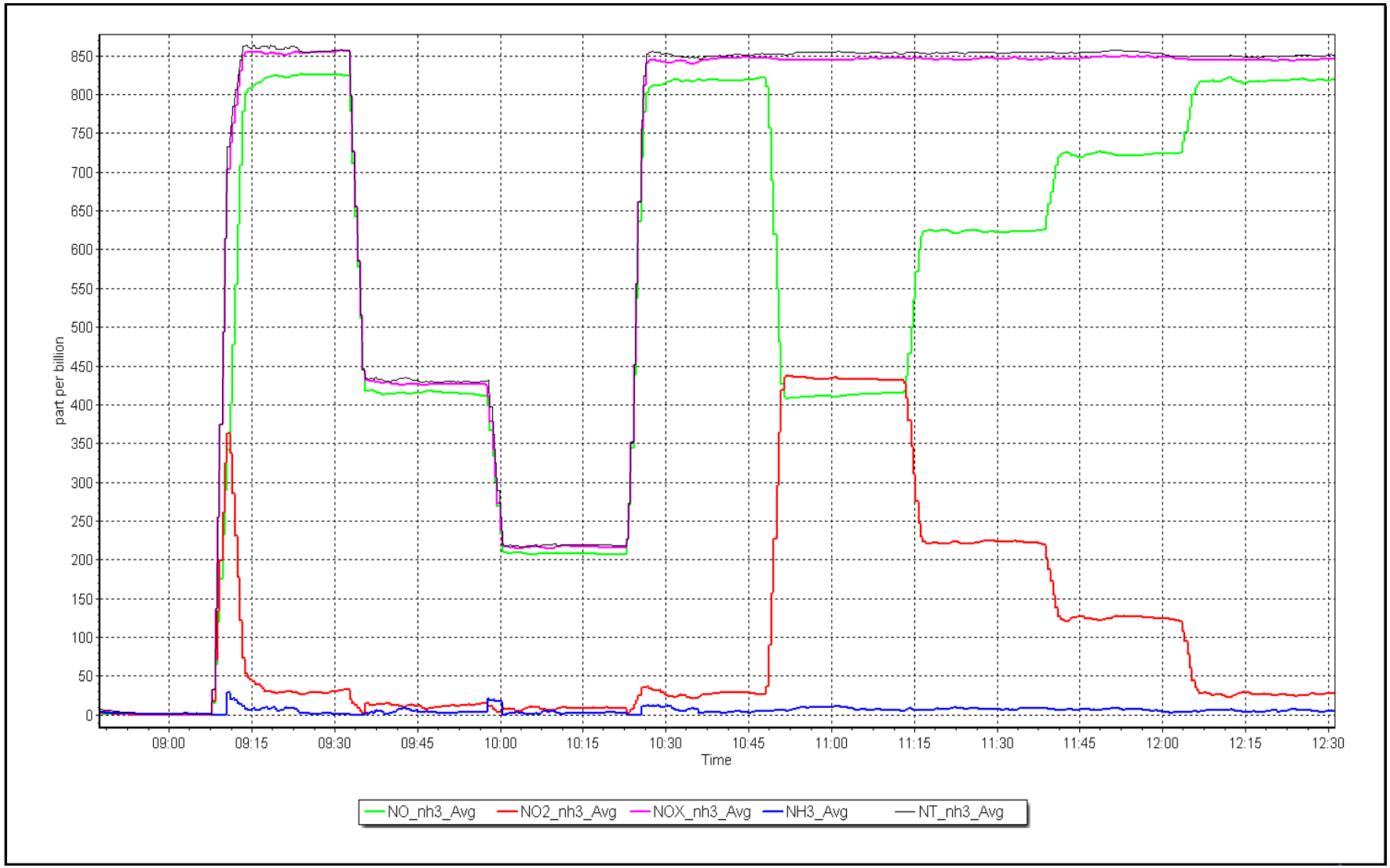
Calibration Date:	November 1, 2023	Previous Calibration:	October 3, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:44	End Time (MST):	12:30
Analyzer make:	Teledyne API T201	Analyzer serial #:	152

Calibration Data

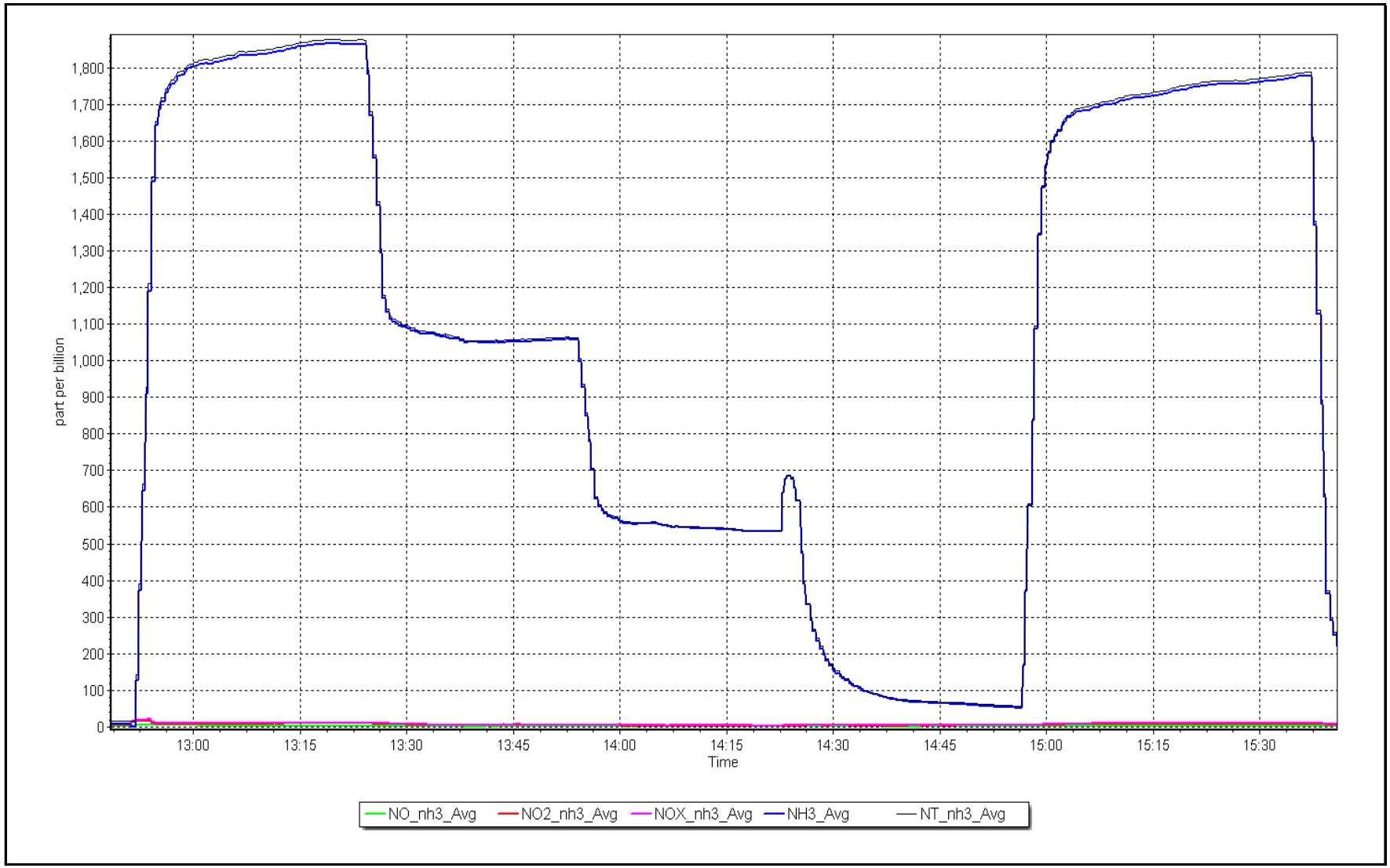
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999958	≥0.995
430.2	432.0	0.9959			
222.4	223.9	0.9934	Slope	1.002440	0.90 - 1.10
121.9	125.0	0.9754			
			Intercept	1.111820	+/-20



NO_X Calibration Plot Date: November 1, 2023 Location: Patricia McInnes



NH_3 Calibration Plot Date: November 1, 2023 Location: Patricia McInnes



Wood Buffalo Environmental Association

TN - NO_X - NH_3 Calibration Report

Version-05-2023

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
NOX Cal Date:	November 2, 2023	Last Cal Date:	N/A
Start time (MST):	8:41	End time (MST):	13:00
NH3 Cal Date:	November 2, 2023	Last Cal Date:	N/A
Start time (MST):	13:00	End time (MST):	15:02
Reason:	Install		

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:	76.29	ppm	NH3 Gas Cylinder #:	EB0108520
			NH3 Cal Gas Expiry:	August 22, 2024
Removed NH3 Conc:	76.29	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 #:	808
Converter model:	Teledyne API T501	Converter serial #:	484
NH3 Range (ppb):	0 - 2000 ppb	Reaction cell Press:	4.80
NOX Range (ppb):	0 - 1000 ppb	Sample Flow:	26.6

	Start	*Finish*		*Start*	*Finish*
NO coefficient:	N/A	0.870	TN coefficient:	N/A	0.858
NOX coefficient:	N/A	0.860	NO bkgrnd:	N/A	-0.985
NO2 coefficient:	N/A	1.000	NOX bkgrnd:	N/A	-0.562
NH3 coefficient:	N/A	0.871	TN bkgrnd:	N/A	5.018

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	N/A	0.996853
NO_X Cal Offset:	N/A	-0.762741
NO Cal Slope:	N/A	1.000156
NO Cal Offset:	N/A	-0.936161
NO_2 Cal Slope:	N/A	1.003217
NO_2 Cal Offset:	N/A	-0.787714
NH3 Cal Slope:	N/A	1.025836
NH3 Cal Offset:	N/A	3.642287
TN Cal Slope:	N/A	1.030917
TN Cal Offset:	N/A	3.830269

Wood Buffalo Environmental Association

TN - NOX - NH_3 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated TN concentration (ppb) (Cc)	Calculated NOX concentration (ppb) (Cc)	Calculated NH3 concentration (ppb) (Cc)	Indicated TN concentration (ppb) (Ic)	Indicated NOX concentration (ppb) (Ic)	Indicated NH3 concentration (ppb) (Ic)	TN Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NH3 Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero										
as found NO										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
high NO point	4914	86.2	826.5	826.5	----	824.9	823.9	0.9	1.002	----
NO/O3 point										
as found NH3										
new NH3 cyl rp							----			
first NH3	3419	81.0	1765.6	----	1765.6	1821.6	----	1812.6	0.969	0.974
second NH3	3455	45.0	980.9	----	980.9	1017.4	----	1012.0	0.964	0.969
third NH3	3478	22.5	490.4	----	490.4	513.2	----	510.4	0.956	0.961
								Average Correction Factor	1.0019	0.9680

Corrected As found TN = NA ppb NO_X = NA ppb NH3 = NA ppb

Previous Response TN = NA ppb NO_X = NA ppb NH3 = NA ppb

*Percent Change TN = NA

*Percent Change NO_X = NA

*Percent Change NH3 = NA

* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = N/A

NH3 Current Converter Efficiency = 87.1%

Wood Buffalo Environmental Association

NO_X - NO - NO_2 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero										
as found span										
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
high point	4914	86.2	826.5	799.7	826.5	823.9	799.2	824.9	1.0031	1.0007
second point	4957	43.1	413.2	399.9	413.2	409.5	399.1	410.6	1.0091	1.0019
third point	4978	21.6	207.1	200.4	207.1	205.8	198.2	205.5	1.0064	1.0112
								Average Correction Factor	1.0062	1.0046

Baseline Corr As fnd TN = NA ppb NO_X = NA ppb NO = NA ppb

Previous Response TN = NA ppb NO_X = NA ppb NO = NA ppb

*Percent Change TN = NA

*Percent Change NO_X = NA

*Percent Change NO = NA

* = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found zero						
calibration zero	----	----	0.0	0.0	----	----
1st GPT point (400 ppb O3)	786.9	399.3	414.3	415.4	0.9974	100.3%
2nd GPT point (200 ppb O3)	786.9	603.5	210.1	209.3	1.0039	99.6%
3rd GPT point (100 ppb O3)	786.9	695.8	117.8	116.8	1.0087	99.1%
				Average Correction Factor	1.0034	99.7%

Notes: Changed the inlet filter prior to the install calibration. Adjusted zero and both NOX and NH3 spans.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TN Calibration Summary

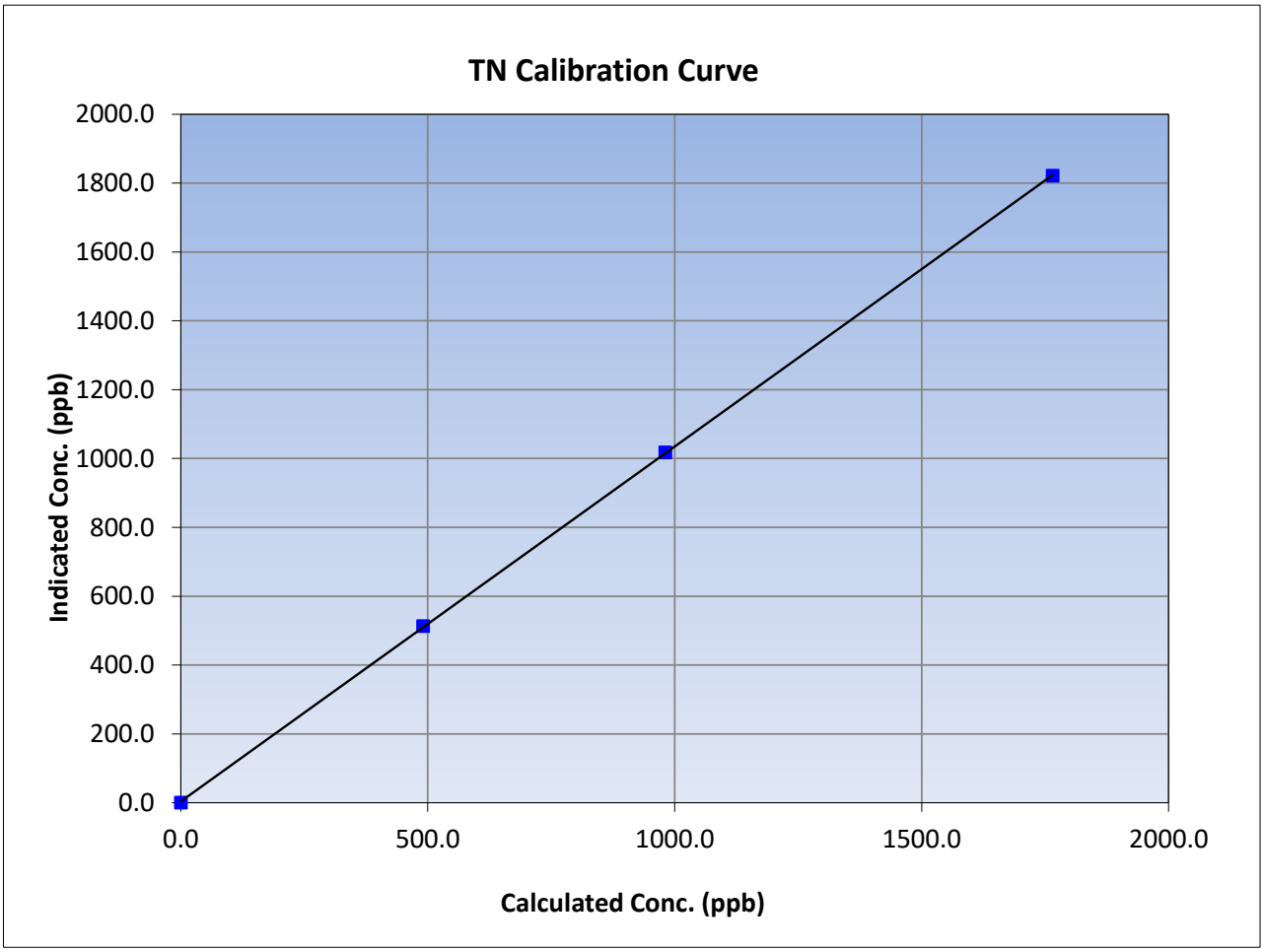
Version-05-2023

Station Information

Calibration Date:	November 2, 2023	Previous Calibration:	N/A
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:41	End Time (MST):	13:00
Analyzer make:	Teledyne API T201	Analyzer serial #:	808

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999977	*≥0.995*
1765.6	1821.6	0.9692			
980.9	1017.4	0.9641	Slope	1.030917	*0.90 - 1.10*
490.4	513.2	0.9555			
			Intercept	3.830269	*+/-20*



Wood Buffalo Environmental Association

NH_3 Calibration Summary

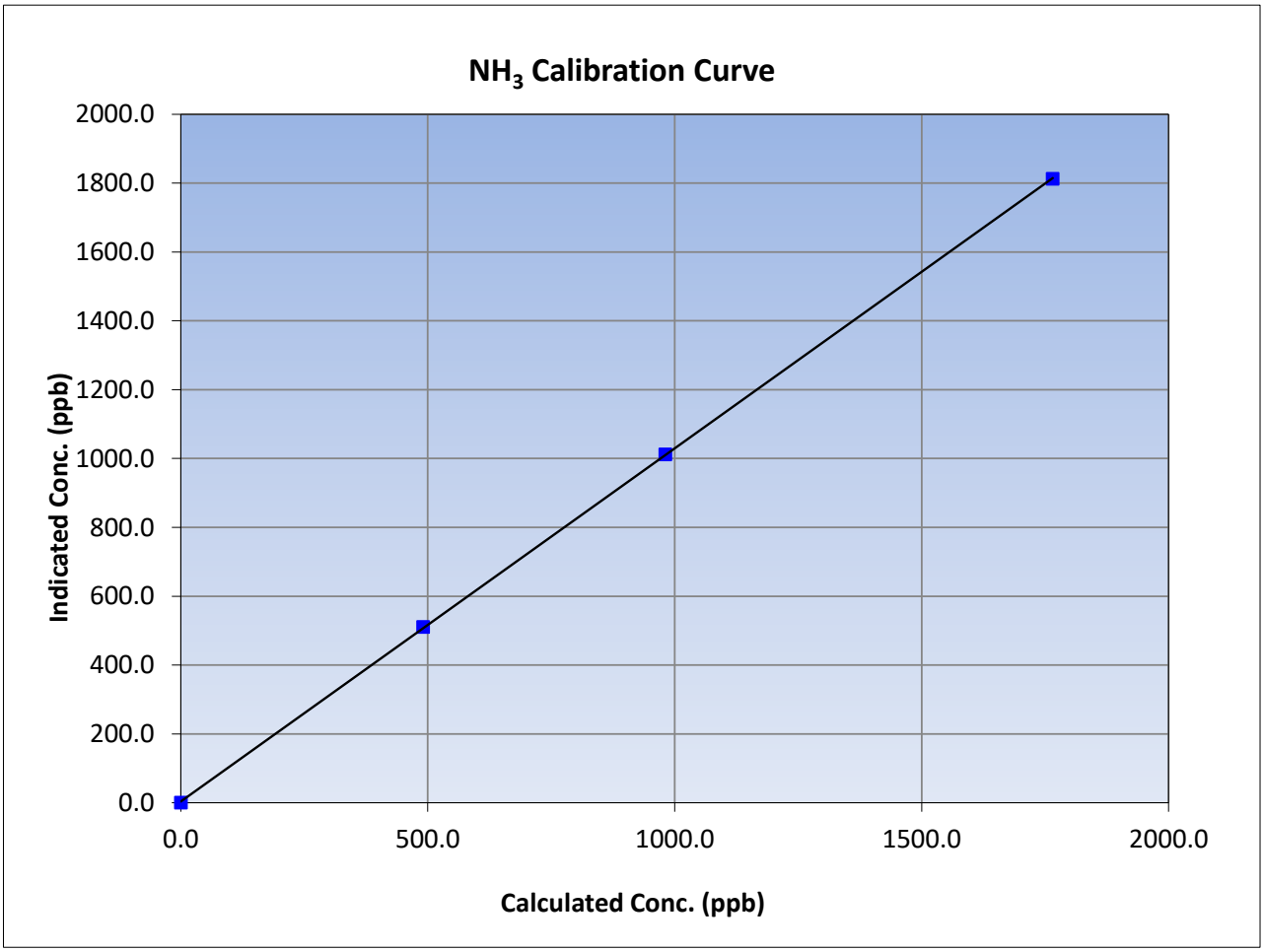
Version-05-2023

Station Information

Calibration Date:	November 2, 2023	Previous Calibration:	N/A
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:41	End Time (MST):	13:00
Analyzer make:	Teledyne API T201	Analyzer serial #:	808

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999980	*≥0.995*
1765.6	1812.6	0.9741			
980.9	1012.0	0.9692	Slope	1.025836	*0.90 - 1.10*
490.4	510.4	0.9607			
			Intercept	3.642287	*+/-20*



Wood Buffalo Environmental Association

NO_X Calibration Summary

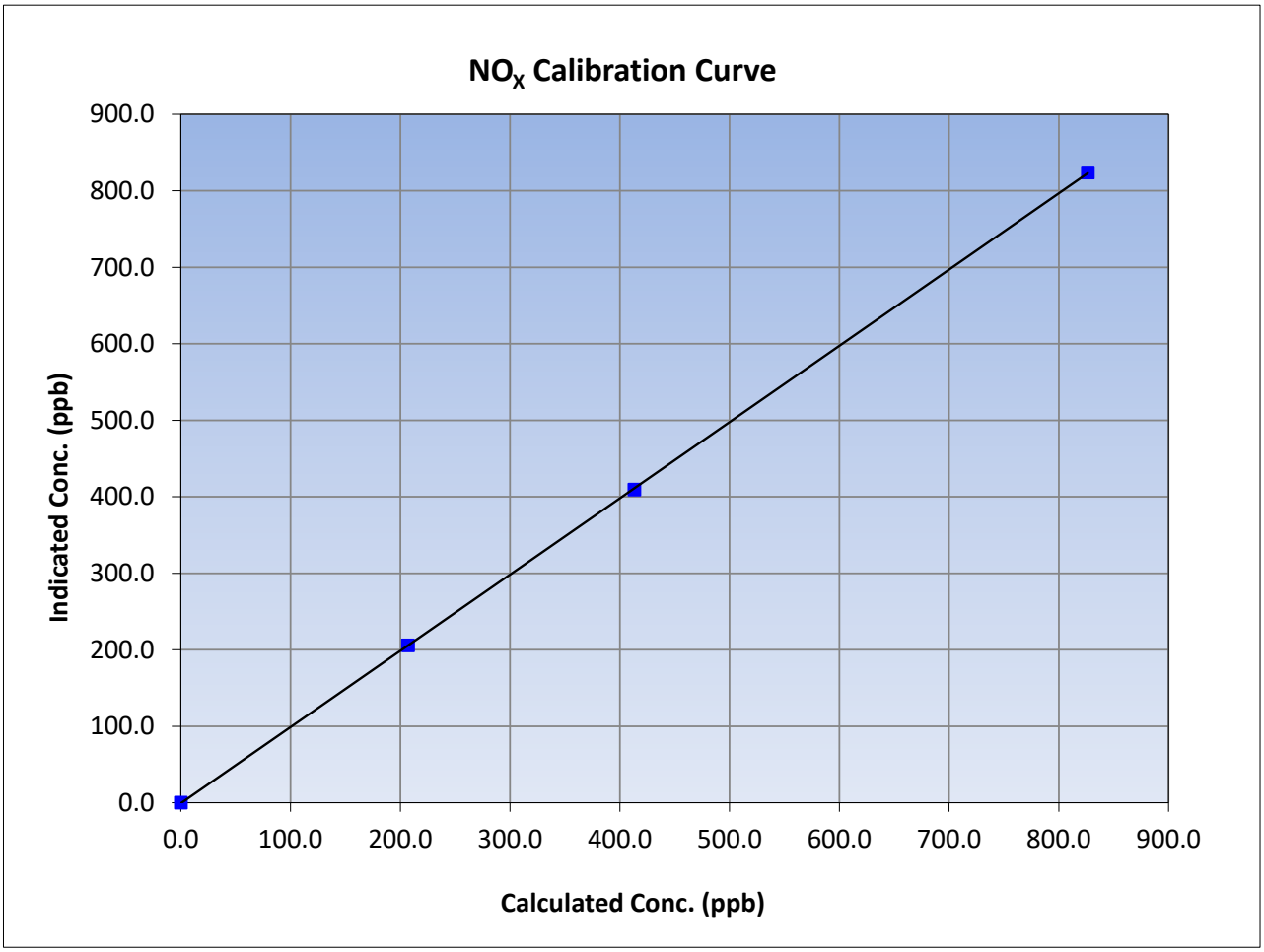
Version-05-2023

Station Information

Calibration Date:	November 2, 2023	Previous Calibration:	N/A
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:41	End Time (MST):	13:00
Analyzer make:	Teledyne API T201	Analyzer serial #:	808

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999989	*≥0.995*
826.5	823.9	1.0031			
413.2	409.5	1.0091	Slope	0.996853	*0.90 - 1.10*
207.1	205.8	1.0064			
			Intercept	-0.762741	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

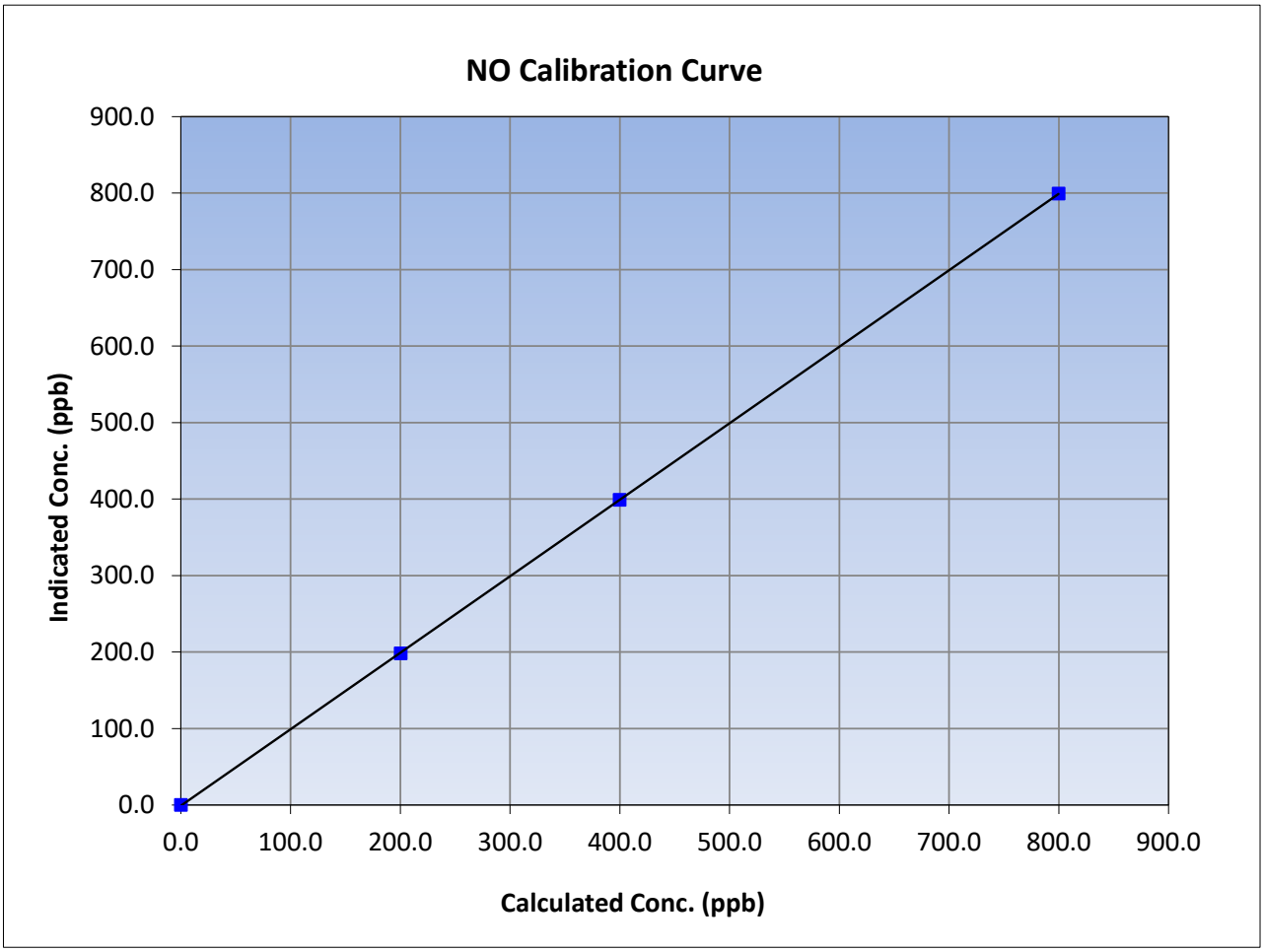
Version-05-2023

Station Information

Calibration Date:	November 2, 2023	Previous Calibration:	N/A
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:41	End Time (MST):	13:00
Analyzer make:	Teledyne API T201	Analyzer serial #:	808

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999992	≥0.995
799.7	799.2	1.0007			
399.9	399.1	1.0019	Slope	1.000156	0.90 - 1.10
200.4	198.2	1.0112			
			Intercept	-0.936161	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

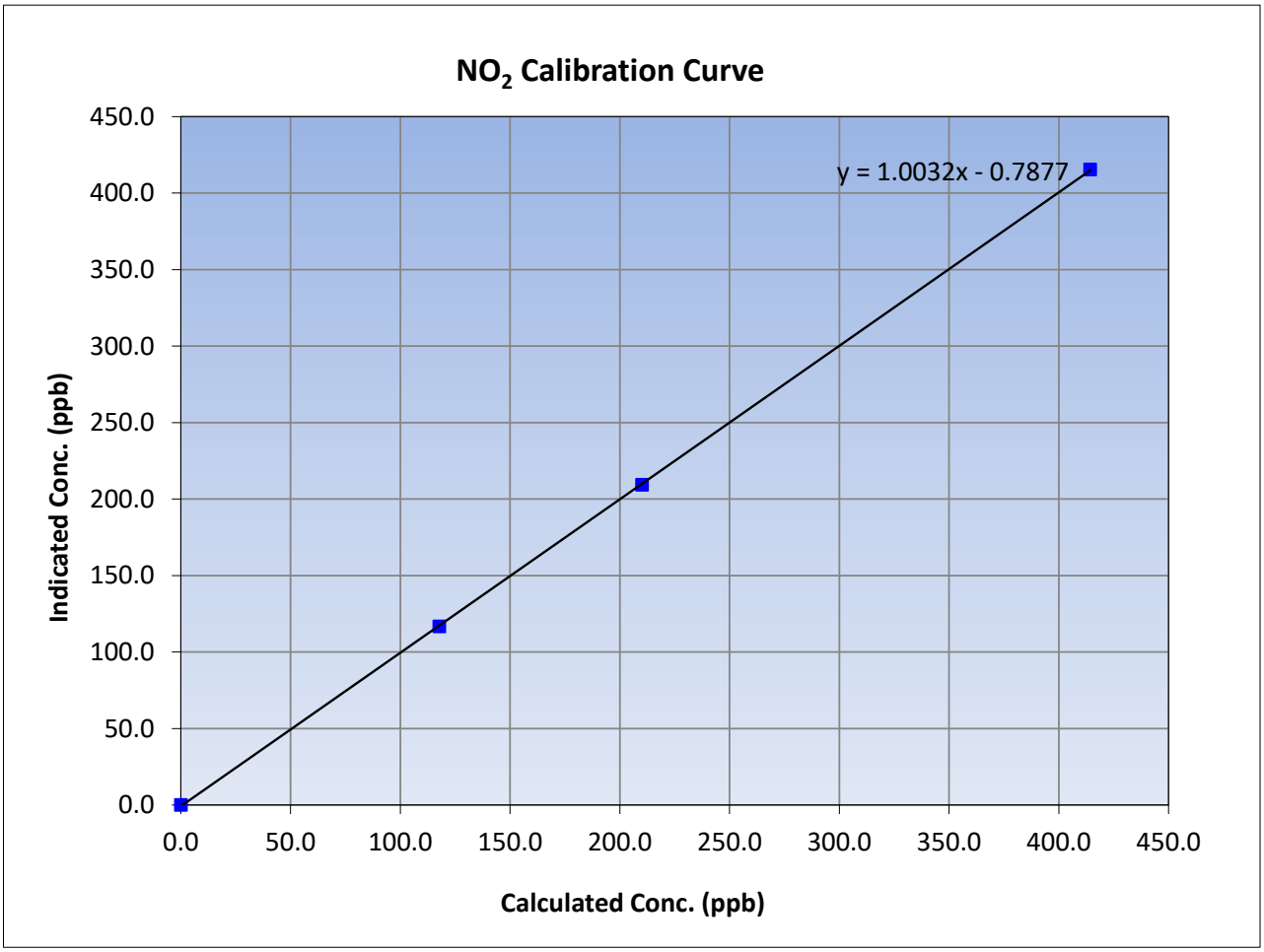
Version-05-2023

Station Information

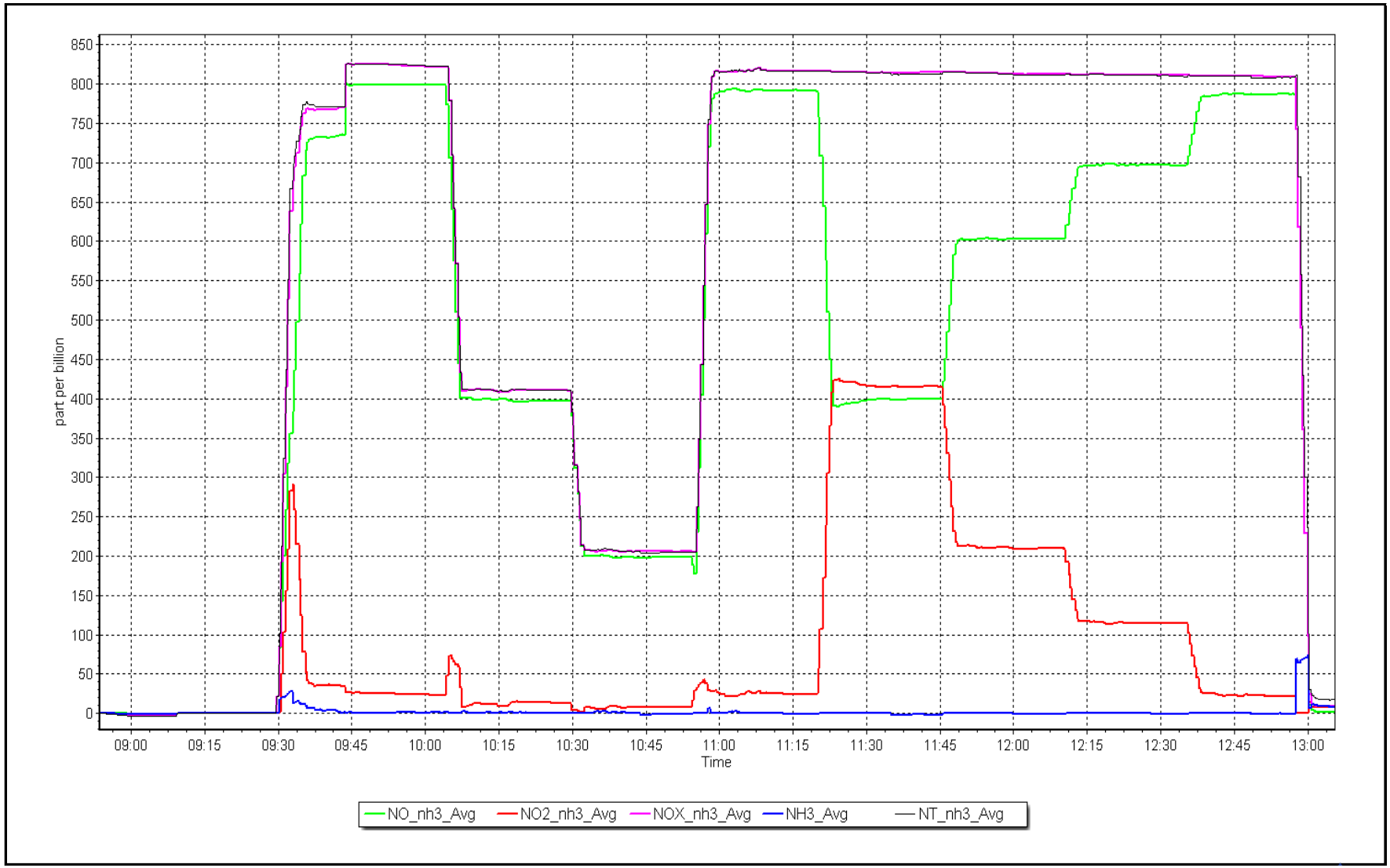
Calibration Date:	November 2, 2023	Previous Calibration:	N/A
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:41	End Time (MST):	13:00
Analyzer make:	Teledyne API T201	Analyzer serial #:	808

Calibration Data

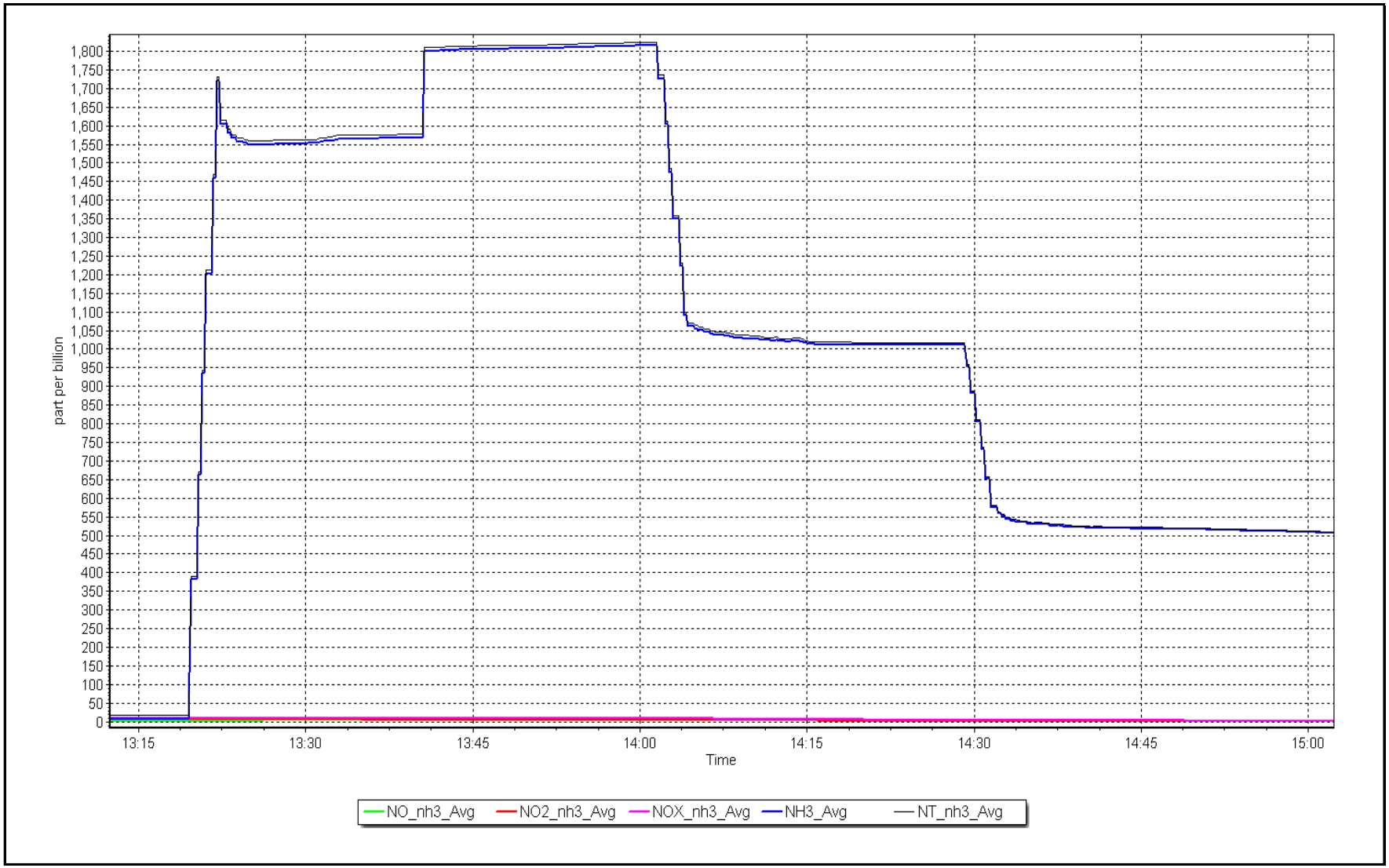
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999981	*≥0.995*
414.3	415.4	0.9974			
210.1	209.3	1.0039	Slope	1.003217	*0.90 - 1.10*
117.8	116.8	1.0087			
			Intercept	-0.787714	*+/-20*



NO_X Calibration Plot Date: November 2, 2023 Location: Patricia McInnes



NH_3 Calibration Plot Date: November 2, 2023 Location: Patricia McInnes



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS07
ATHABASCA VALLEY
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	November 20, 2023	Last Cal Date:	October 19, 2023
Start time (MST):	11:29	End time (MST):	15:12
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001786	1.001046	Backgd or Offset:	2.61	2.59
Calibration intercept:	2.644970	2.304446	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	79.2	800.2	801.3	0.999
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4921	79.3	801.2	802.8	0.998
second point	4960	39.6	400.2	405.4	0.987
third point	4980	19.8	200.1	203.7	0.982
as left zero	5000	0.0	0.0	0.2	----
as left span	4921	79.2	800.2	802.5	0.997
				Average Correction Factor	0.989

Baseline Corr As found:	801.40	Previous response	804.28	*% 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 inlet filters, Hydrogen and Nitrogen cylinders after as founds. No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar/ Jan Castro

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

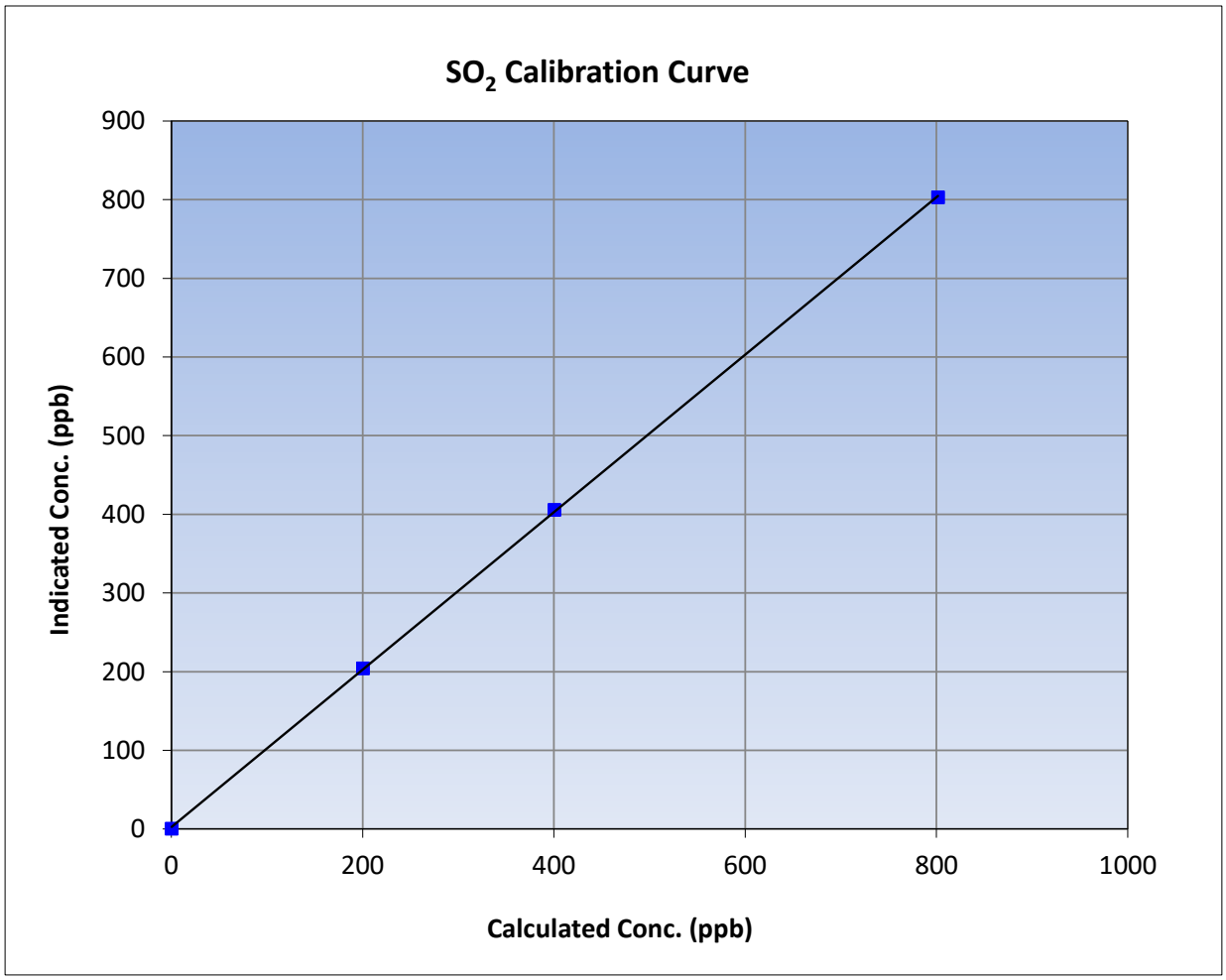
Station Information

Calibration Date:	November 20, 2023	Previous Calibration:	October 19, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	11:29	End Time (MST):	15:12
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1507864683

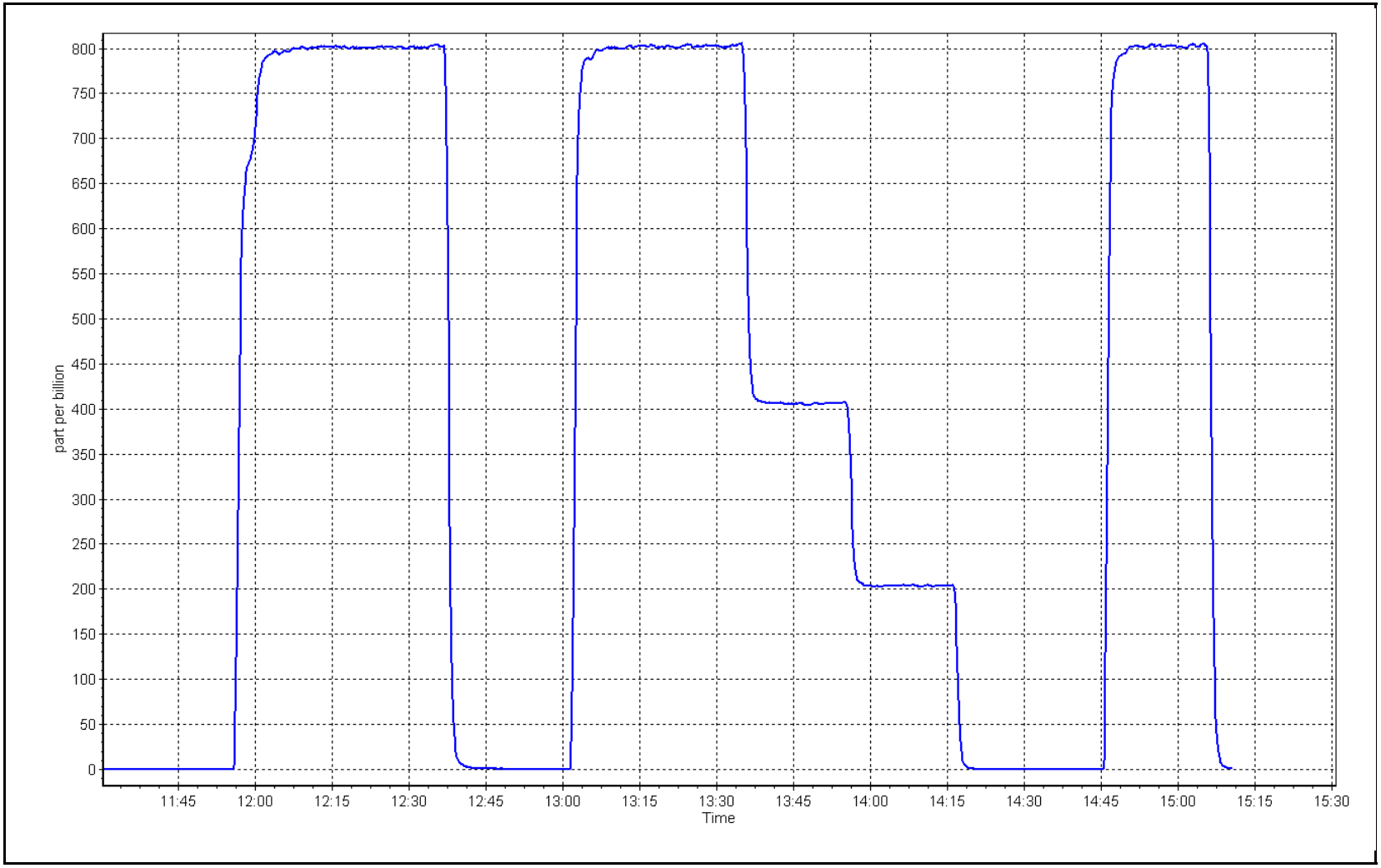
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
801.2	802.8	0.9980
400.2	405.4	0.9871
200.1	203.7	0.9822

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999959	*≥0.995*
Slope	1.001046	*0.90 - 1.10*
Intercept	2.304446	*+/-30*



SO2 Calibration Plot Date: November 20, 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:	November 15, 2023	Last Cal Date:	October 10, 2023
Start time (MST):	10:09	End time (MST):	15:18
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:	1.014626	1.017229	Backgd or Offset:	2.33	2.40
Calibration intercept:	-0.002205	0.057461	Coeff or Slope:	0.899	0.893

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	4925	75.5	79.3	80.3	0.987
as found 2nd point	4962	37.7	39.6	40.3	0.982
as found 3rd point	4981	18.9	19.8	20.1	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	80.9	0.980
second point	4962	37.7	39.6	39.9	0.993
third point	4981	18.9	19.9	20.5	0.969
as left zero	5000	0.0	0.0	0.6	----
as left span	4925	75.5	79.3	79.5	0.998
SO2 Scrubber Check	4921	79.2	800.2	0.0	----
Date of last scrubber change:		25-Feb-22		Ave Corr Factor	0.981
Date of last converter efficiency test:		April 22, 2022		92.6%	efficiency

Baseline Corr As found:	80.3	Prev response:	80.42	*% change:	-0.2%
Baseline Corr 2nd AF pt:	40.3	AF Slope:	1.013330	AF Intercept:	0.037834
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999992		

* = > +/-5% change initiates investigation

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

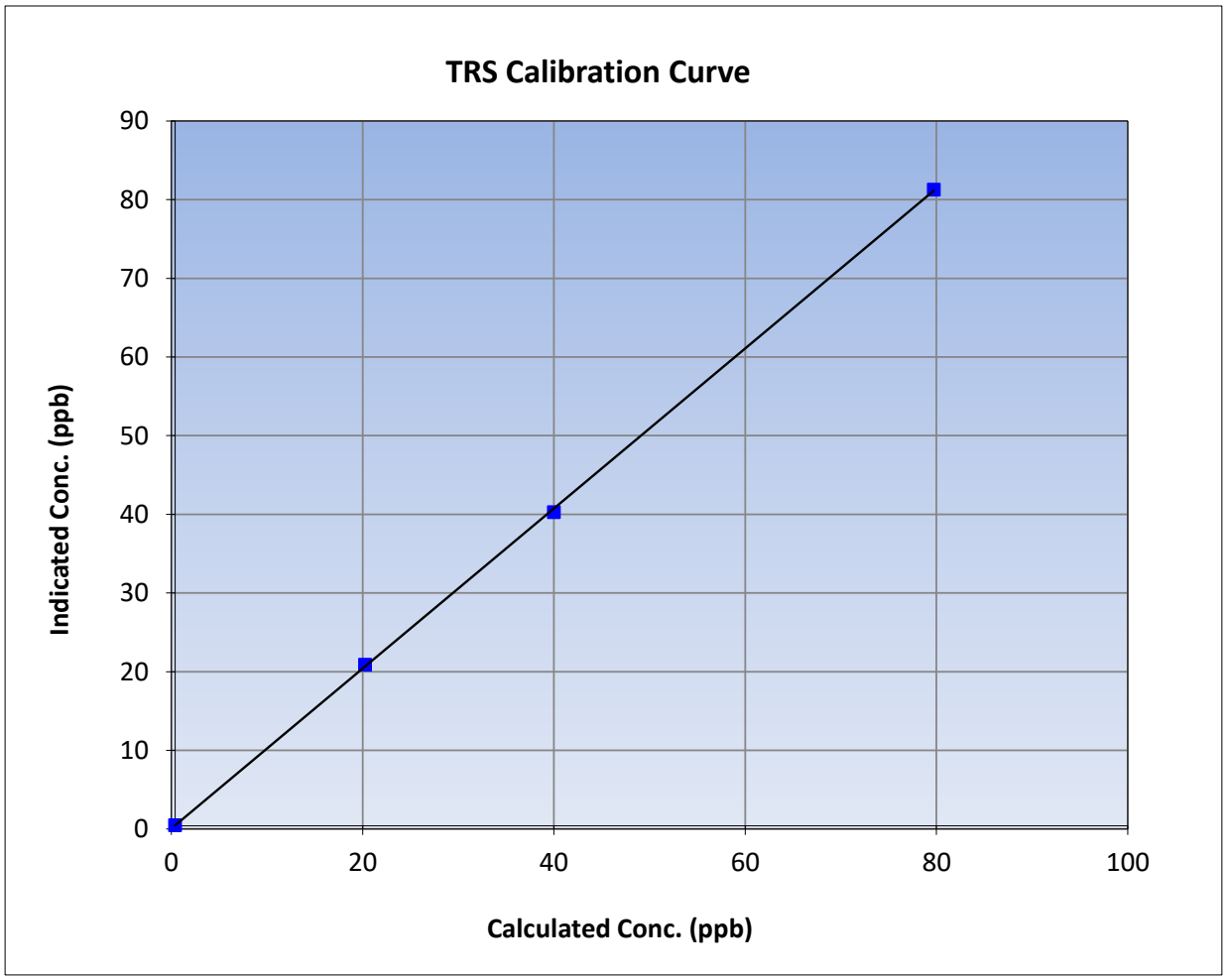
Station Information

Calibration Date:	November 15, 2023	Previous Calibration:	October 10, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:09	End Time (MST):	15:18
Analyzer make:	CDN-101	Analyzer serial #:	551

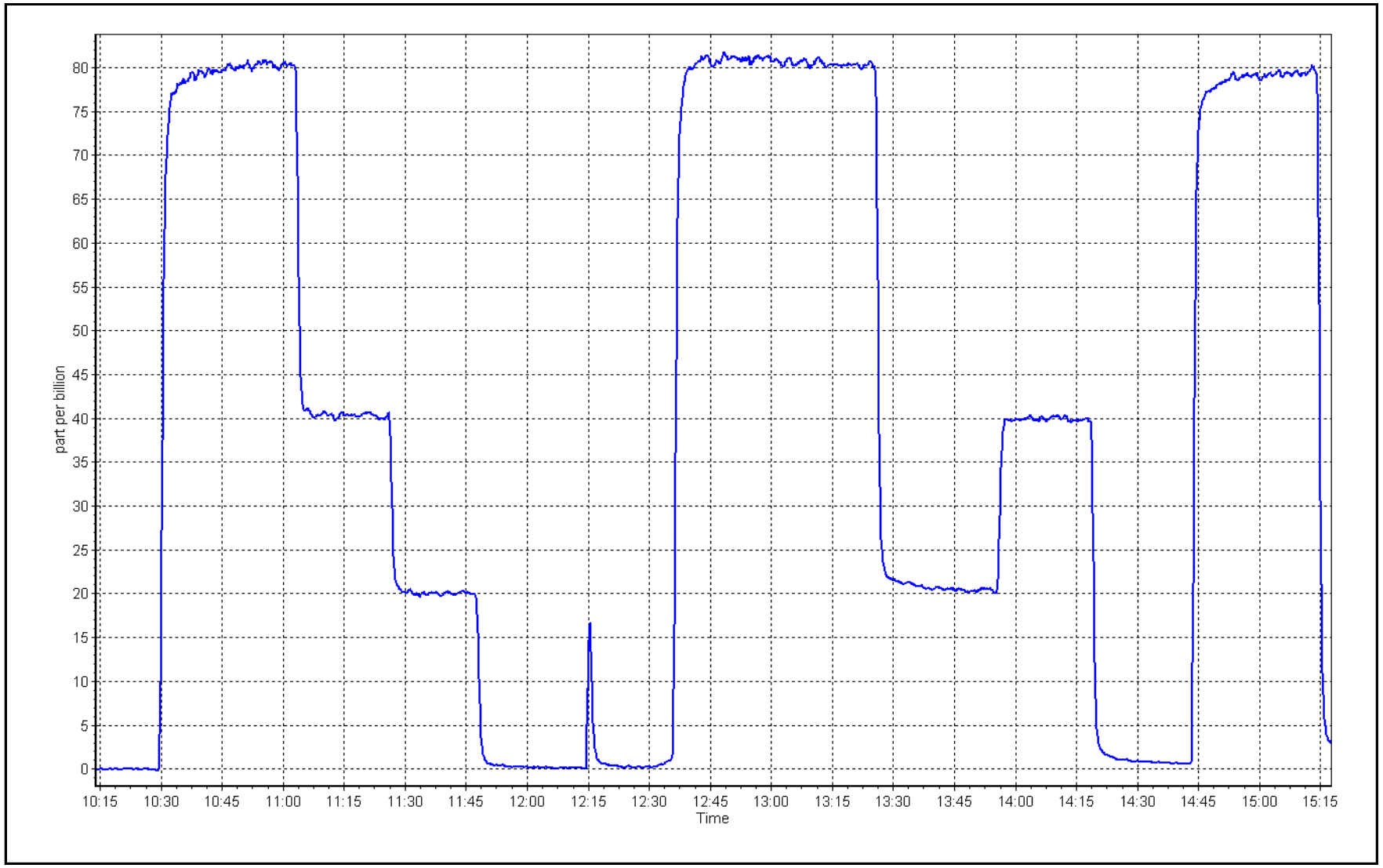
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
79.3	80.9	0.9804
39.6	39.9	0.9927
19.9	20.5	0.9686

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999918	*≥0.995*
Slope	1.017229	*0.90 - 1.10*
Intercept	0.057461	*+/-3*



TRS Calibration Plot Date: November 15, 2023 Location: Athabasca Valley



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	79.2	9.09	9.18	0.991
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	4.61	0.986
third point	4980	19.8	2.27	2.33	0.974
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	9.09	9.13	0.996
				Average Correction Factor	0.987
Baseline Corr AF:	9.18	Prev response	9.10	*% change	0.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	7.94	8.03	0.989
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	3.93	1.011
third point	4980	19.8	1.98	1.94	1.024
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.94	7.95	0.999
				Average Correction Factor	1.011
Baseline Corr AF:	8.03	Prev response	7.93	*% change	1.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999306	0.999689
THC Cal Offset:	0.011259	0.010659
CH4 Cal Slope:	1.001244	1.001158
CH4 Cal Offset:	-0.019158	-0.026358
NMHC Cal Slope:	0.997363	0.998306
NMHC Cal Offset:	0.030417	0.037416

Notes: Changed inlet filters, Hydrogen cylinder and Nitrogen cylinder after as founds. Adjusted span only.

Calibration Performed By: Aswin Sasi Kumar/ Jan Castro

Wood Buffalo Environmental Association

THC Calibration Summary

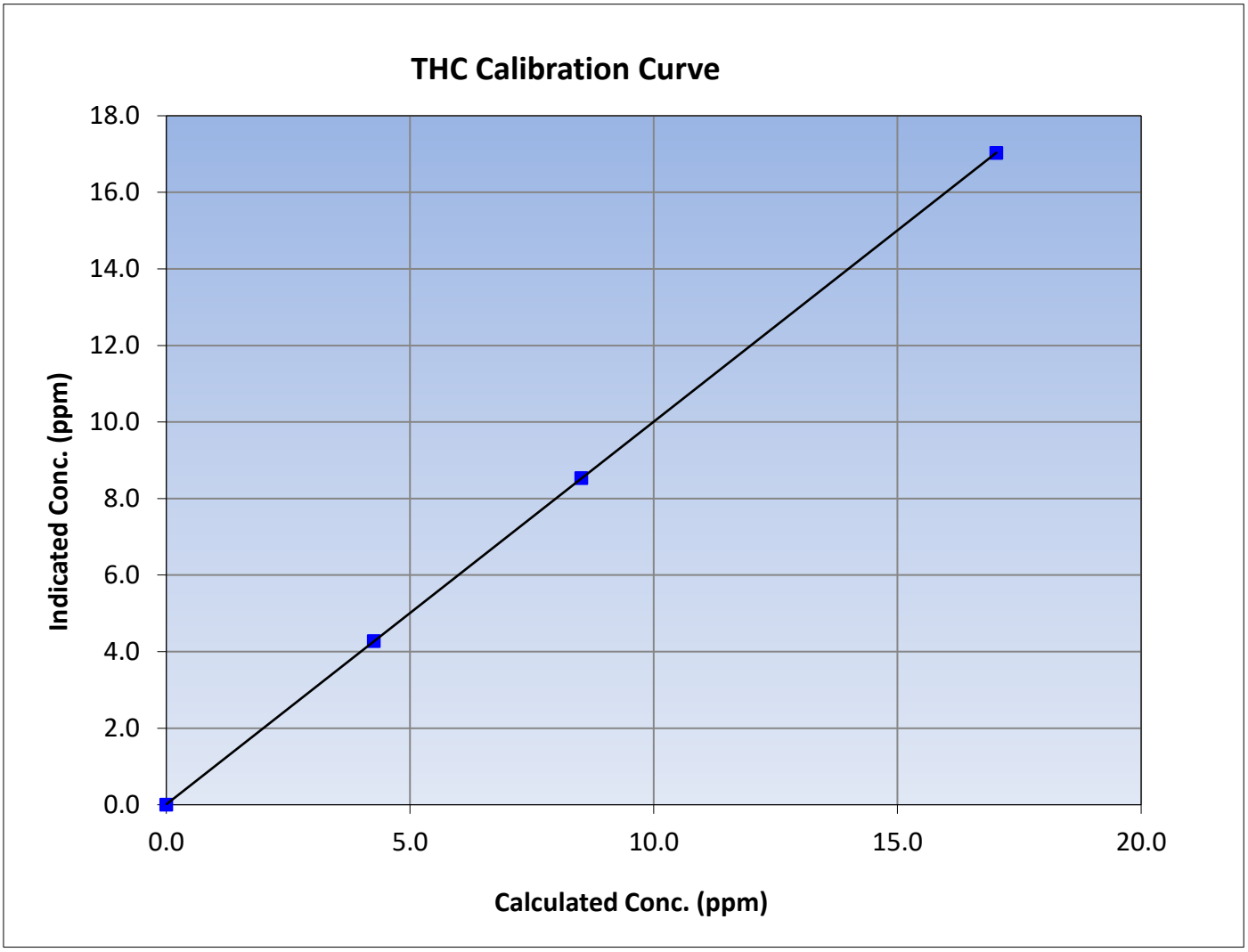
Version-06-2022

Station Information

Calibration Date:	November 20, 2023	Previous Calibration:	October 19, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	11:29	End Time (MST):	15:12
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	0.999998	*≥0.995*
17.03	17.03	1.0001			
8.52	8.54	0.9976	Slope	0.999689	*0.90 - 1.10*
4.26	4.27	0.9964			
			Intercept	0.010659	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

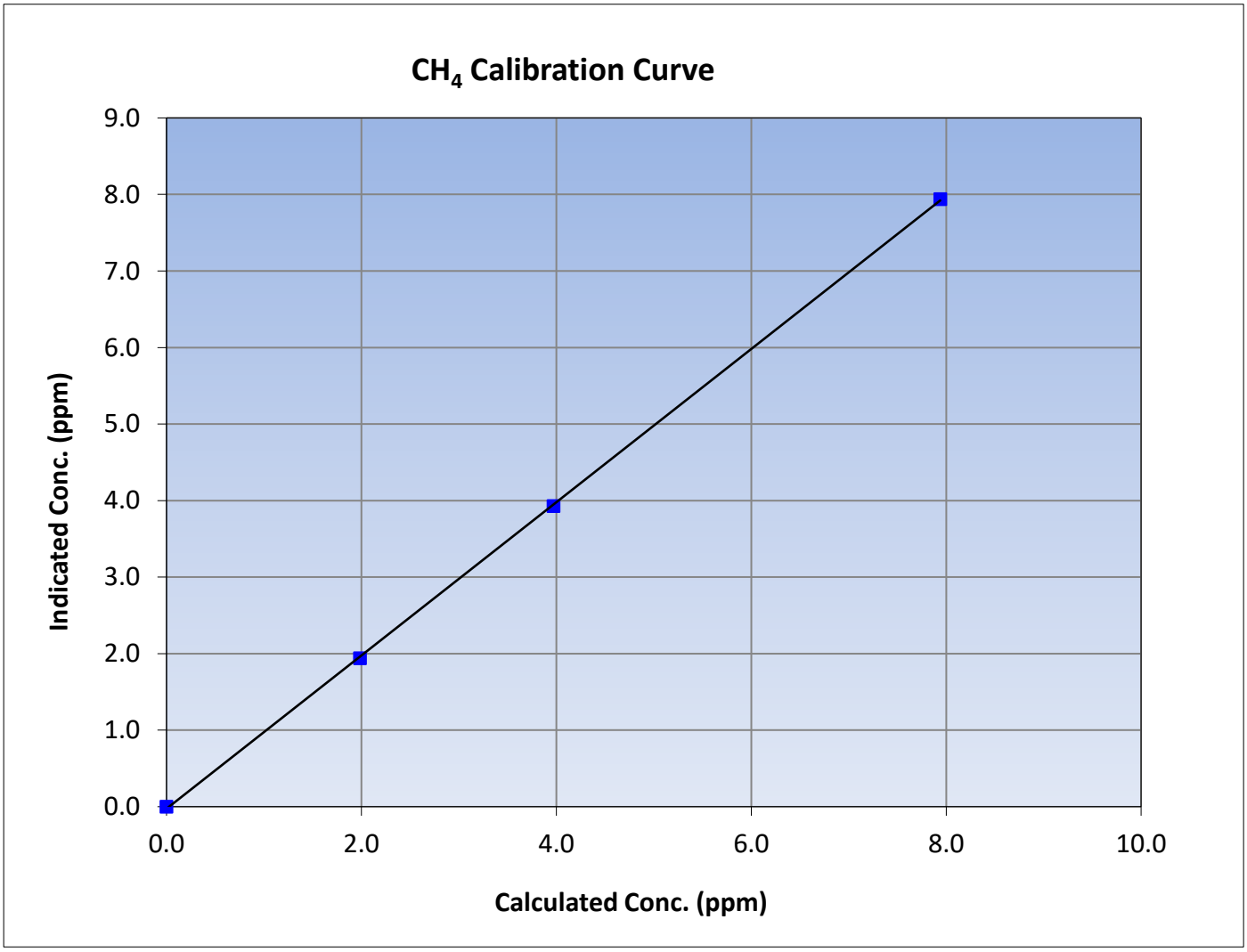
Version-06-2022

Station Information

Calibration Date:	November 20, 2023	Previous Calibration:	October 19, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	11:29	End Time (MST):	15:12
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	0.999948	*≥0.995*
7.94	7.94	1.0002			
3.97	3.93	1.0106	Slope	1.001158	*0.90 - 1.10*
1.98	1.94	1.0236			
			Intercept	-0.026358	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

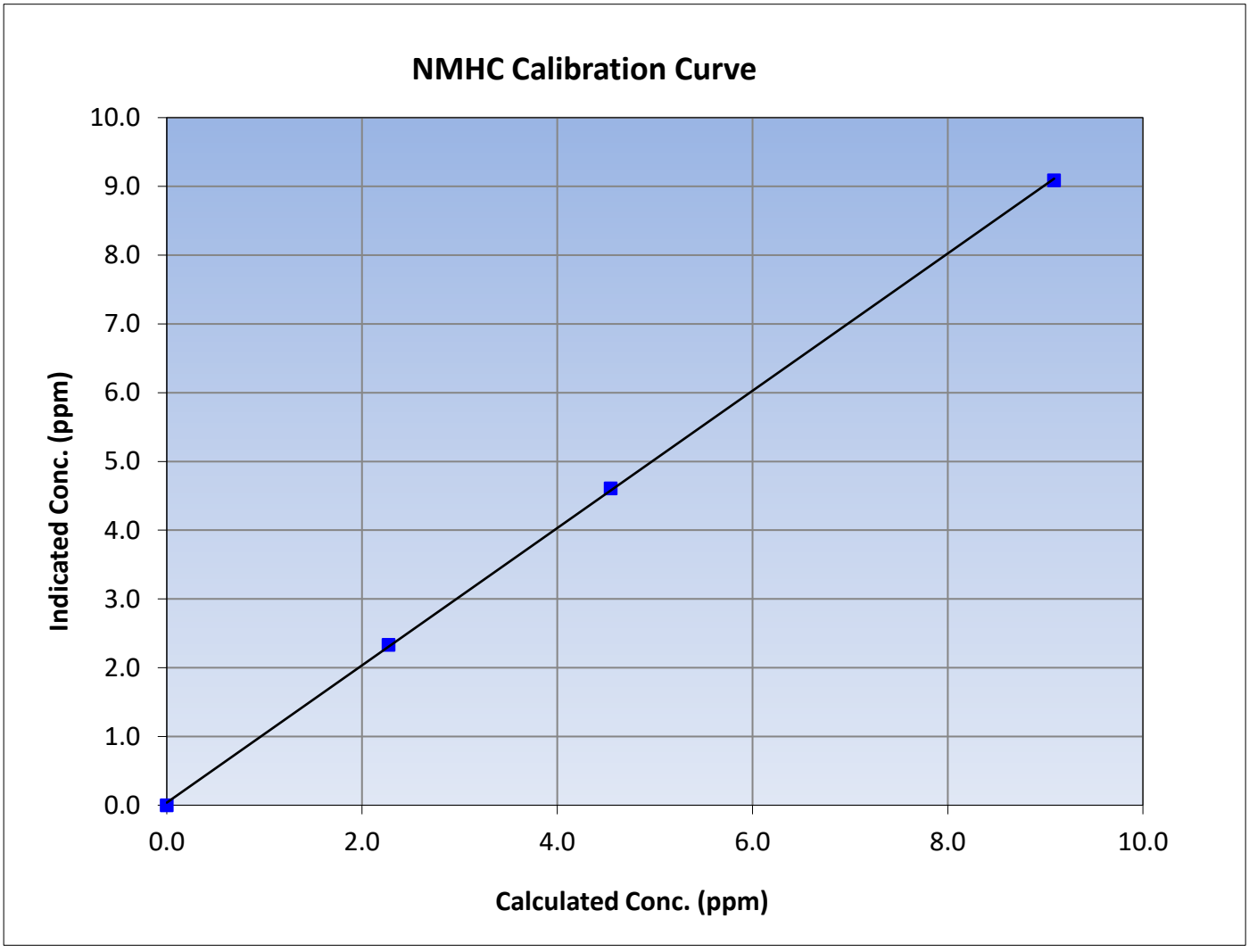
Version-06-2022

Station Information

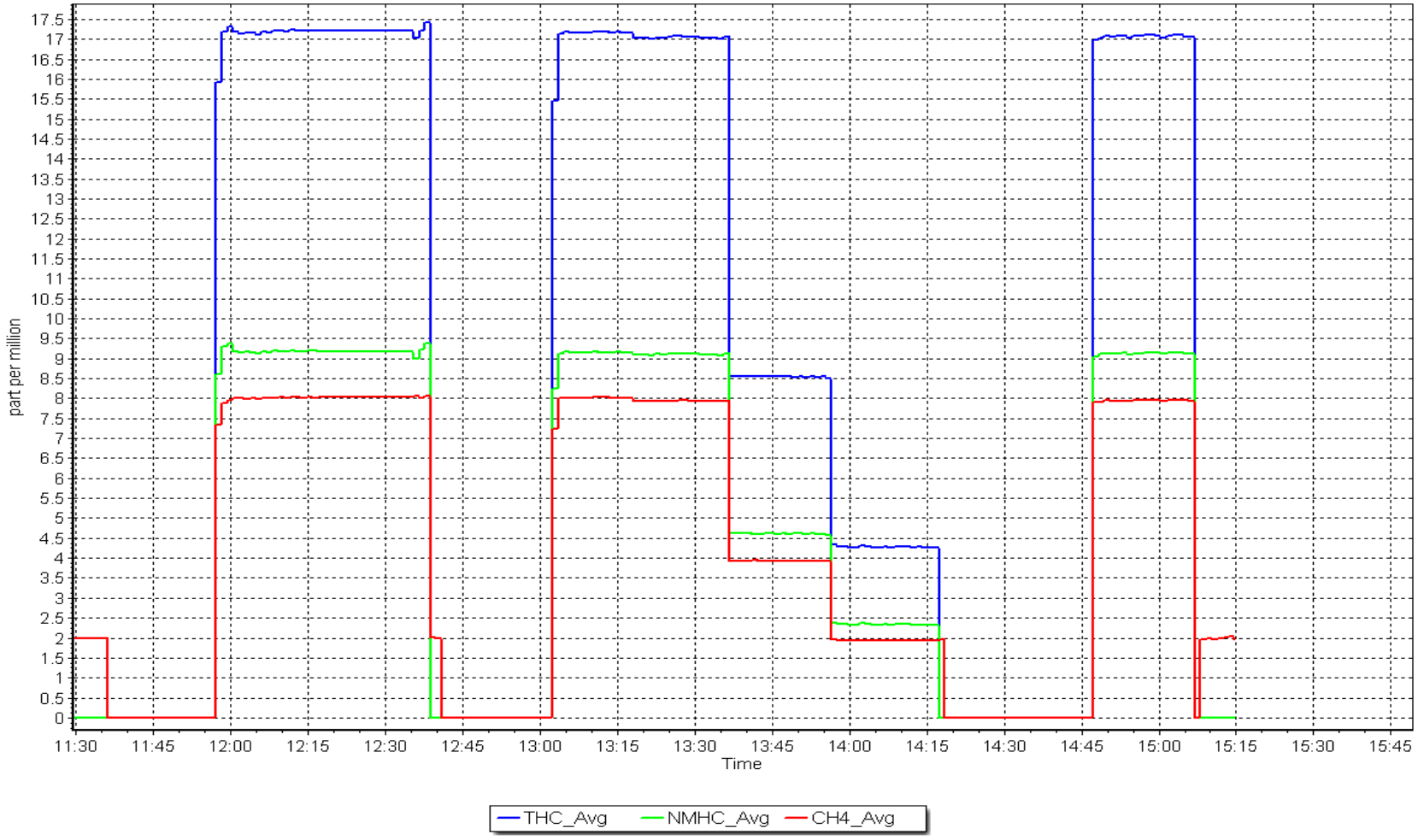
Calibration Date:	November 20, 2023	Previous Calibration:	October 19, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	11:29	End Time (MST):	15:12
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999915	*≥0.995*
9.09	9.09	1.0002			
4.55	4.61	0.9863	Slope	0.998306	*0.90 - 1.10*
2.27	2.33	0.9738			
			Intercept	0.037416	*+/-0.5*



NMHC Calibration Plot Date: November 20, 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:	November 1, 2023	Last Cal Date:	October 6, 2023
Start time (MST):	9:07	End time (MST):	14:21
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:	1.077	1.083	NO bkgnd or offset:	7.6	7.6
NOX coeff or slope:	0.994	0.993	NOX bkgnd or offset:	7.8	7.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	210.8	212.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000077	0.998915
NO_X Cal Offset:	1.278990	1.318809
NO Cal Slope:	1.001202	1.001602
NO Cal Offset:	1.075147	1.035305
NO_2 Cal Slope:	1.000884	0.997138
NO_2 Cal Offset:	-0.671765	0.710095

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.1	-0.1	0.2	----	----
as found span	4920	80.2	816.7	800.7	16.0	814.2	796.7	17.4	1.0031	1.0050
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.2	----	----
high point	4920	80.2	816.7	800.7	16.0	816.3	802.1	14.2	1.0005	0.9982
second point	4960	40.1	408.4	400.4	8.0	410.7	403.7	7.1	0.9943	0.9917
third point	4980	20.0	203.7	199.7	4.0	205.3	201.3	4.0	0.9921	0.9920
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as left span	4920	80.2	816.7	399.3	417.4	822.1	402.5	419.6	0.9935	0.9920
								Average Correction Factor	0.9957	0.9940

Corrected As found	NO_X = 814.1 ppb	NO = 796.8 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-0.5%
Previous Response	NO_X = 818.1 ppb	NO = 802.7 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)	800.4	399.0	417.4	416.9	1.0013	99.9%
2nd GPT point (200 ppb O3)	800.4	596.7	219.7	219.4	1.0015	99.8%
3rd GPT point (100 ppb O3)	800.4	699.5	116.9	118.3	0.9885	101.2%
				Average Correction Factor	0.9971	100.3%

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

NO_X Calibration Summary

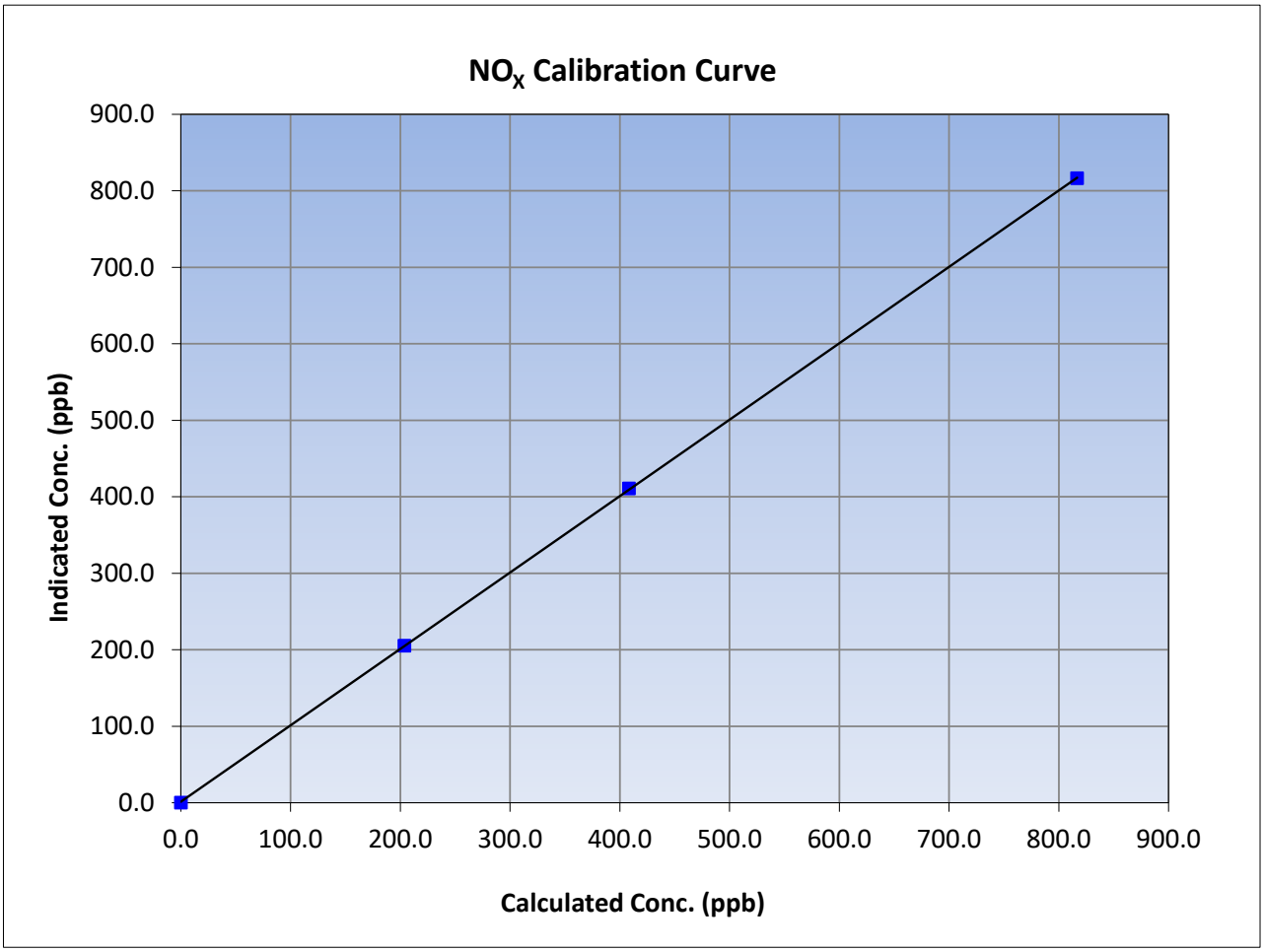
Version-04-2020

Station Information

Calibration Date:	November 1, 2023	Previous Calibration:	October 6, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:07	End Time (MST):	14:21
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	0.999988	≥0.995
816.7	816.3	1.0005			
408.4	410.7	0.9943	Slope	0.998915	0.90 - 1.10
203.7	205.3	0.9921			
			Intercept	1.318809	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

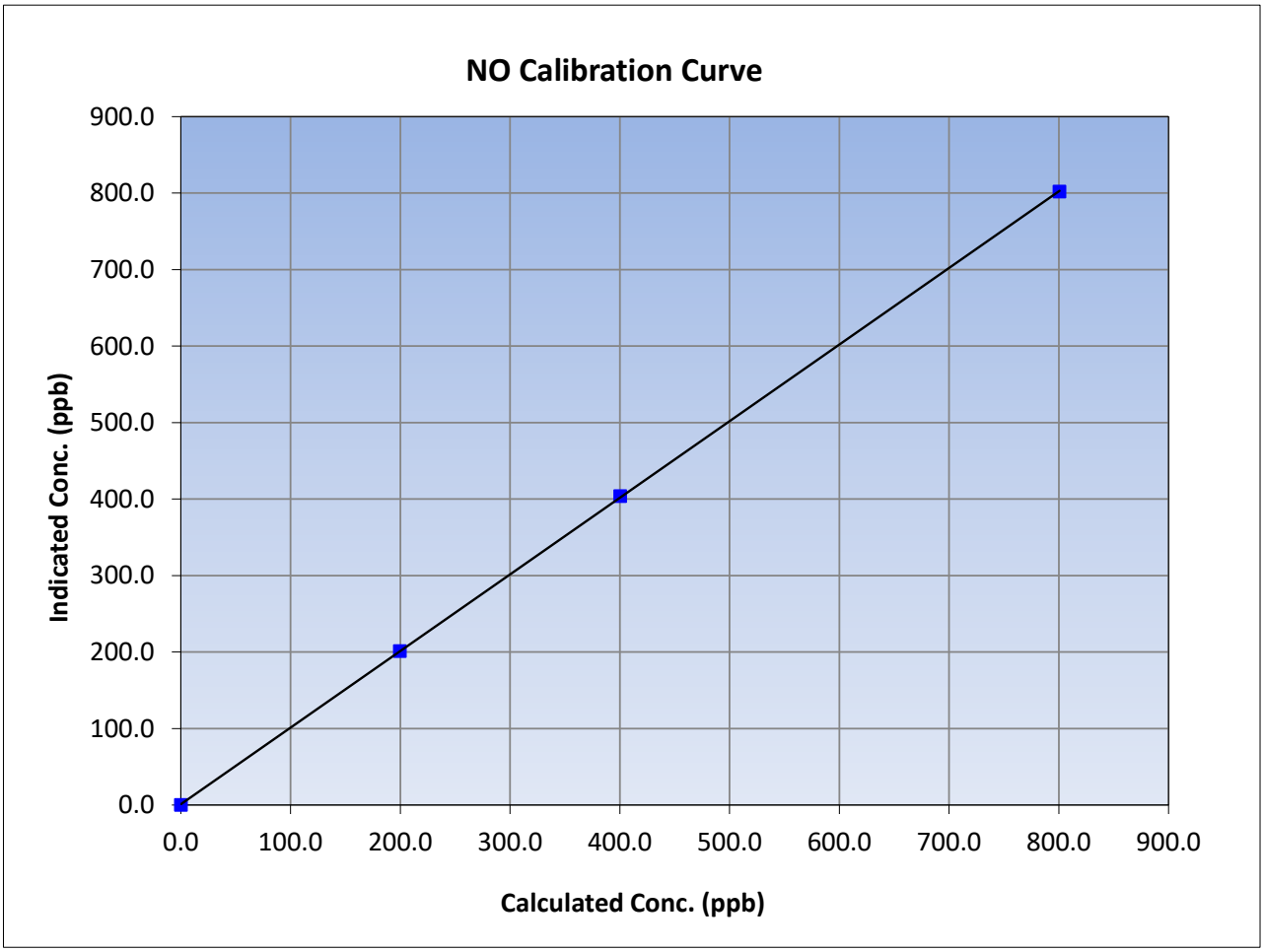
Version-04-2020

Station Information

Calibration Date:	November 1, 2023	Previous Calibration:	October 6, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:07	End Time (MST):	14:21
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	0.999986	*≥0.995*
800.7	802.1	0.9982			
400.4	403.7	0.9917	Slope	1.001602	*0.90 - 1.10*
199.7	201.3	0.9920			
			Intercept	1.035305	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

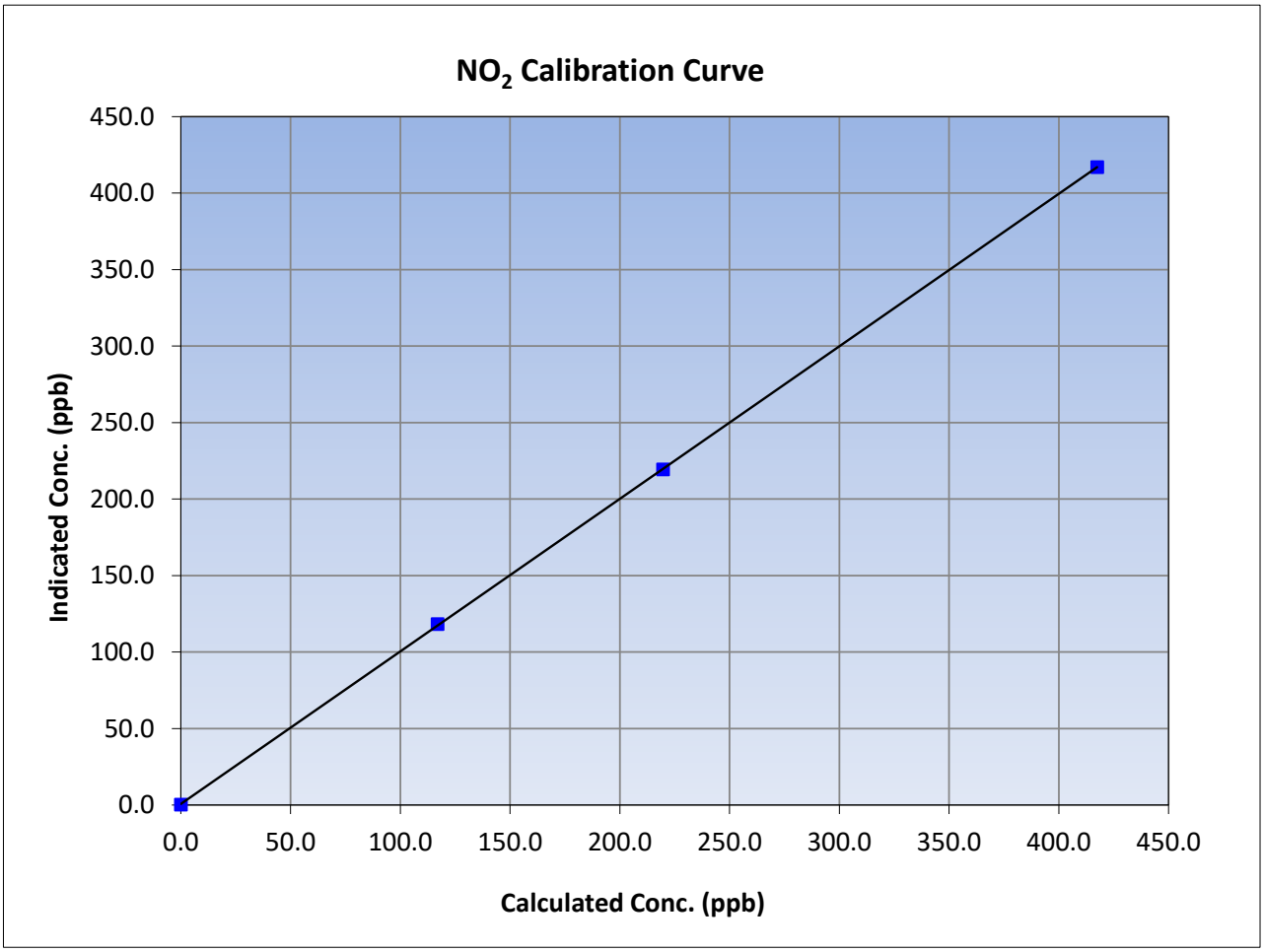
Version-04-2020

Station Information

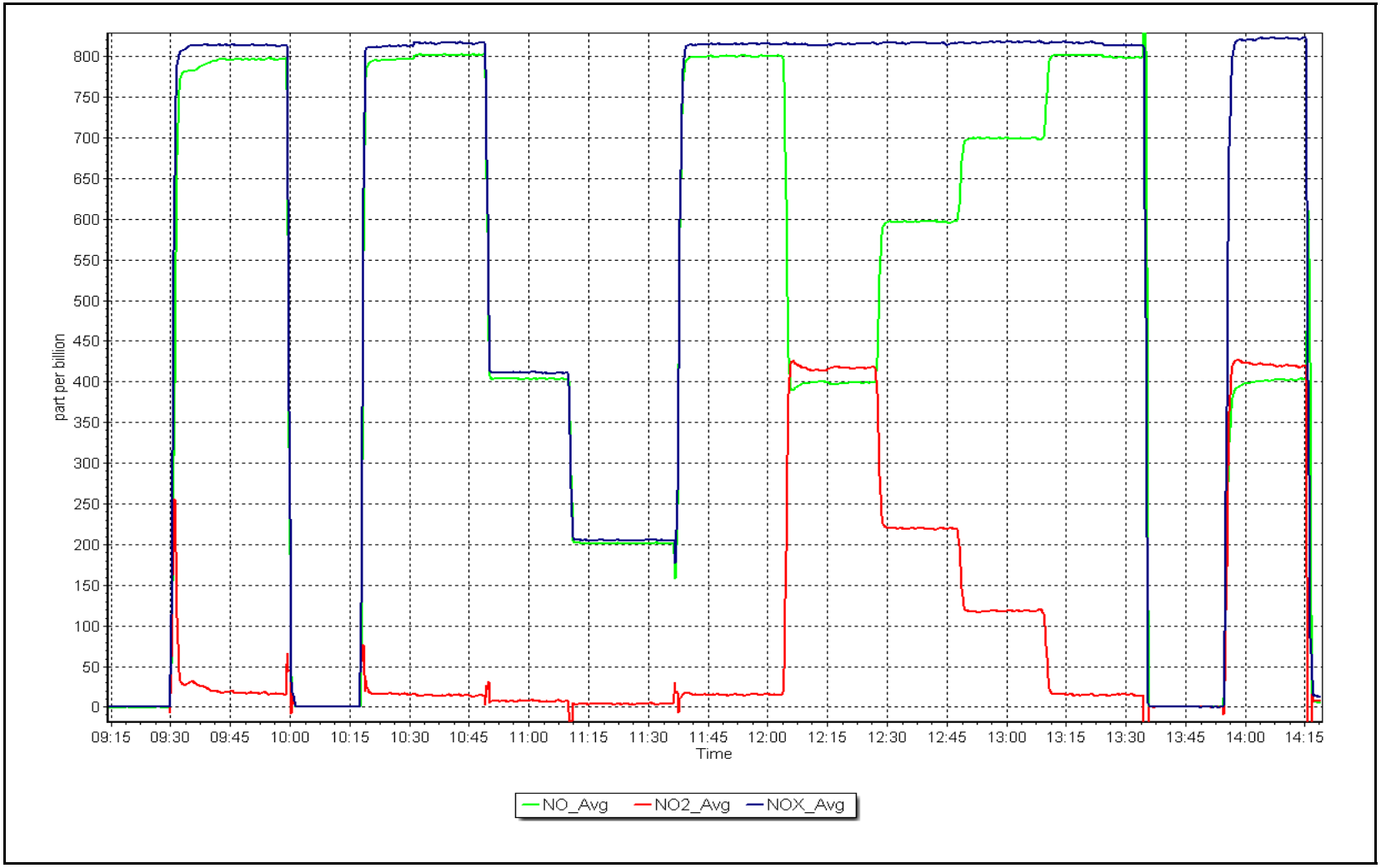
Calibration Date:	November 1, 2023	Previous Calibration:	October 6, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:07	End Time (MST):	14:21
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.2	----	Correlation Coefficient	0.999985	*≥0.995*
417.4	416.9	1.0013			
219.7	219.4	1.0015	Slope	0.997138	*0.90 - 1.10*
116.9	118.3	0.9885			
			Intercept	0.710095	*+/-20*



NO_X Calibration Plot Date: November 1, 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:	November 14, 2023	Last Cal Date:	October 3, 2023
Start time (MST):	10:55	End time (MST):	14:42
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:	1.004229	1.003886	Backgd or Offset:	-2.6	-2.7
Calibration intercept:	0.060000	0.320000	Coeff or Slope:	1.535	1.549

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	-1.8	----
as found span	5000	1414.8	400.0	396.0	1.010
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.7	----
high point	5000	1415.7	400.0	401.4	0.997
second point	5000	1039.9	200.0	201.5	0.993
third point	5000	856.2	100.0	101.8	0.982
as left zero	5000	0.0	0.0	-0.1	----
as left span	5000	1416.0	400.0	403.6	0.991
				Average Correction Factor	0.990

Baseline Corr As found:	397.8	Previous response	401.8	*% 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: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

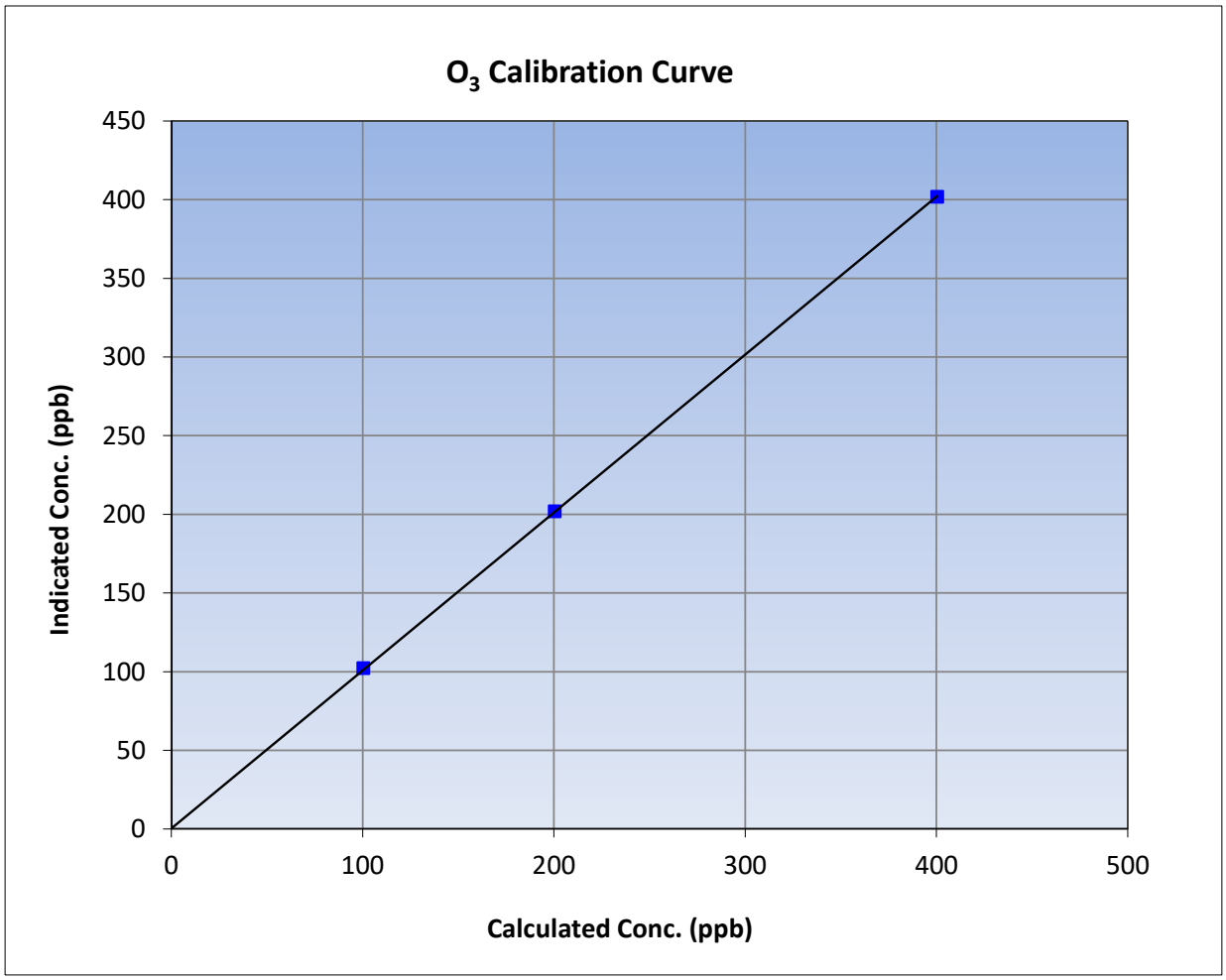
Station Information

Calibration Date:	November 14, 2023	Previous Calibration:	October 3, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:55	End Time (MST):	14:42
Analyzer make:	Thermo 49i	Analyzer serial #:	1152220023

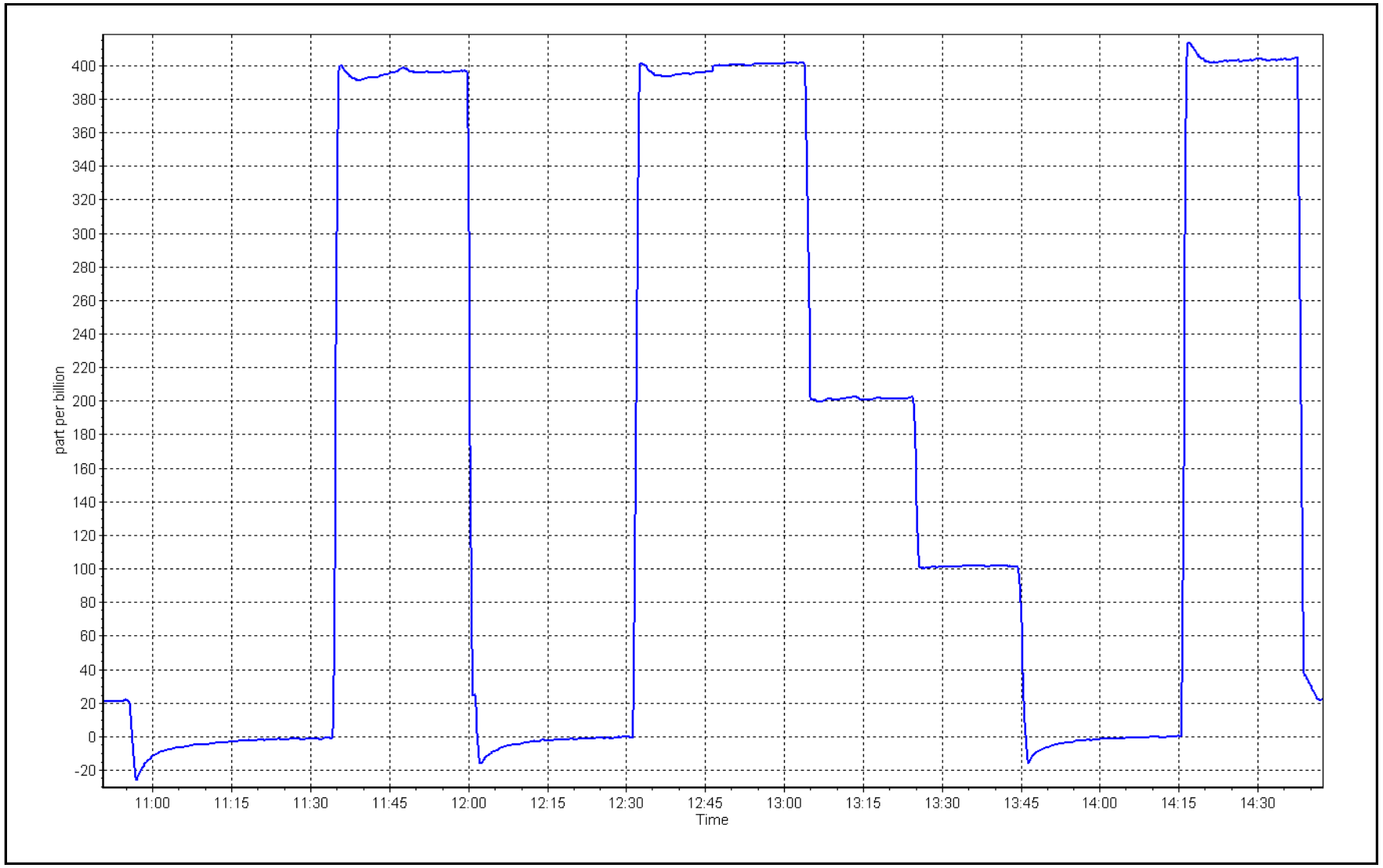
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.7	----
400.0	401.4	0.9965
200.0	201.5	0.9926
100.0	101.8	0.9823

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999970	*≥0.995*
Slope	1.003886	*0.90 - 1.10*
Intercept	0.320000	*+/- 5*



O_3 Calibration Plot Date: November 14, 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:	November 10, 2023	Last Cal Date:	October 19, 2023
Start time (MST):	11:10	End time (MST):	12:35
Analyzer Make:	API T640	S/N:	871
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388754
Temp/RH standard:	Alicat FP-25BT	S/N:	388754

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	0.2	-0.1	0.2	☐	+/- 2 °C
P (mmHg)	729.4	731.6	729.4	☐	+/- 10 mmHg
flow (LPM)	5.08	5.20	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: November 10, 2023 Last Cal Date: October 19, 2023

PM w/o HEPA: 5.5 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	12.9	12.9	10.8	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 3.8 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: November 10, 2023

Disposable Filter Changed: November 10, 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. Changed sample pump as pump power at 100%. Quarterly maintenace carried out, PMT adjusted. Flow confirmed as 5.1 L/min

Calibration by: Ryan Power

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	November 24, 2023	Last Cal Date:	October 13, 2023
Start time (MST):	11:15	End time (MST):	14:48
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:	0.998346	1.000228	Backgd or Offset:	4.336	4.331
Calibration intercept:	0.098508	0.080550	Coeff or Slope:	1.093	1.087

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4933	66.7	40.0	40.1	0.997
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	40.0	1.000
second point	4967	33.3	20.0	20.2	0.990
third point	4983	16.7	10.0	10.1	0.988
as left zero	5000	0.0	0.0	0.1	----
as left span	4933	66.7	40.0	40.0	1.002
				Average Correction Factor	0.992

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

* = > +/-5% change initiates investigation

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

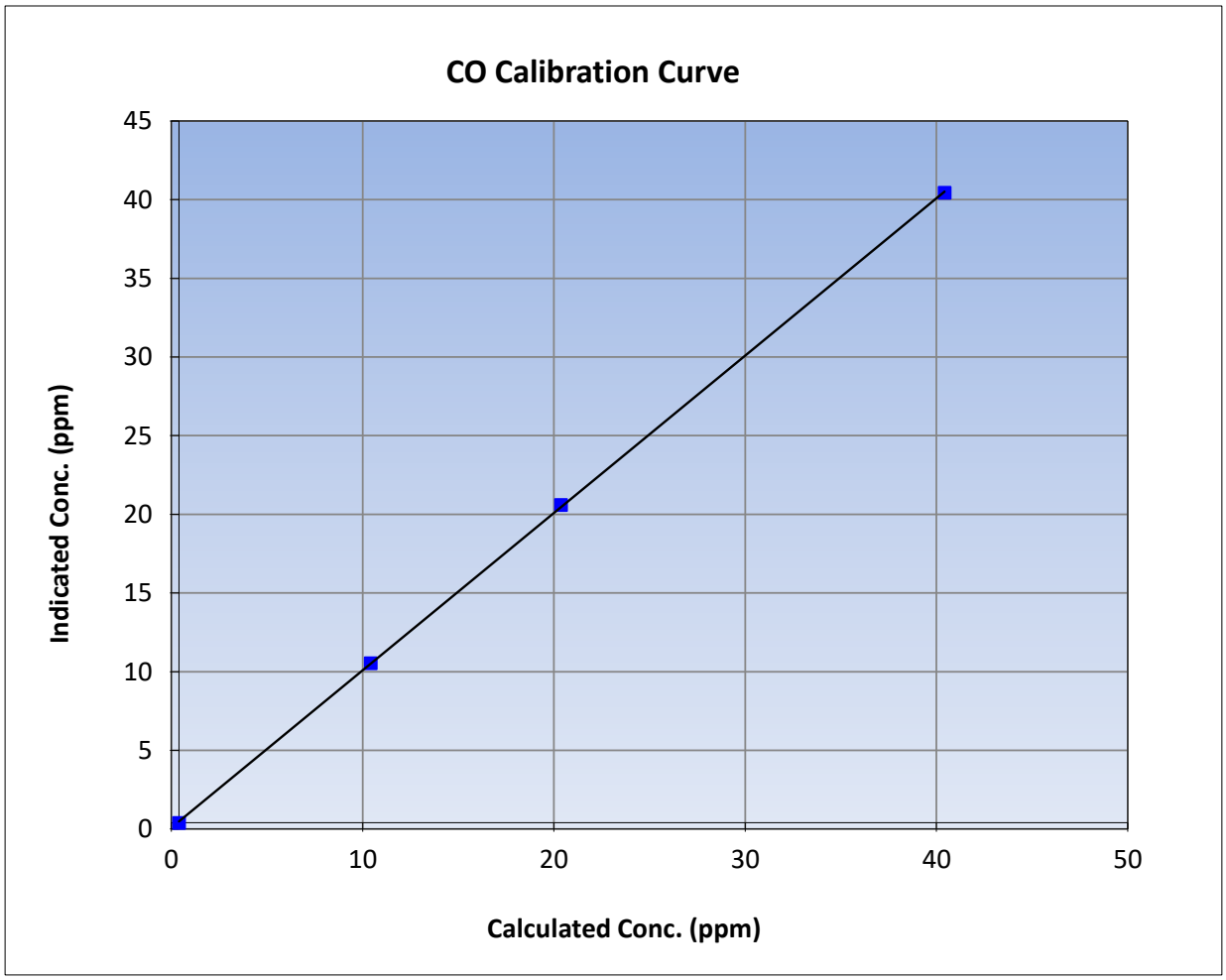
Station Information

Calibration Date:	November 24, 2023	Previous Calibration:	October 13, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	11:15	End Time (MST):	14:48
Analyzer make:	Thermo 48i-LTE	Analyzer serial #:	1408761381

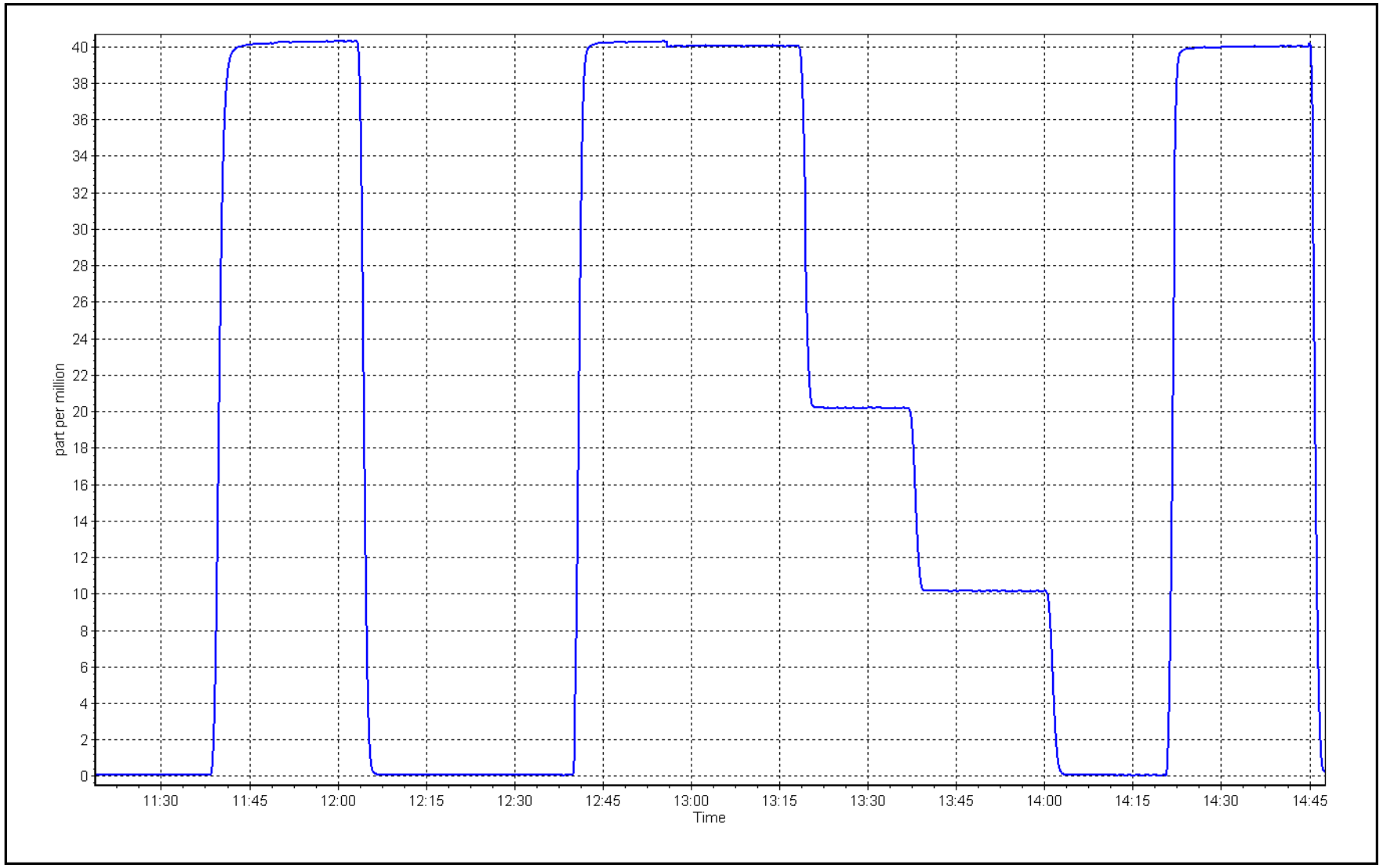
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.0	40.0	0.9996
20.0	20.2	0.9895
10.0	10.1	0.9882

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999965	*≥0.995*
Slope	1.000228	*0.90 - 1.10*
Intercept	0.080550	*+/-1.5*



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



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS08
FORT CHIPEWYAN
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	November 8, 2023	Last Cal Date:	October 11, 2023
Start time (MST):	12:35	End time (MST):	15:17
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:	1.003114	1.000960	Backgd or Offset:	4.65	4.61
Calibration intercept:	-2.624243	-1.244570	Coeff or Slope:	0.955	0.965

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	-3.0	----
as found span	4920	80.3	800.4	788.8	1.015
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-2.6	----
high point	4920	80.3	800.4	799.7	1.001
second point	4960	40.2	400.7	399.1	1.004
third point	4980	20.1	200.4	201.6	0.994
as left zero	5000	0.0	0.0	-2.8	----
as left span	4920	80.3	800.4	799.4	1.001
				Average Correction Factor	1.000

Baseline Corr As found:	791.80	Previous response	800.25	*% change	-1.1%

* = > +/-5% change initiates investigation

Notes: changed inlet filters after as founds. Adjustment made to span.

Calibration Performed By: Morgan Voyageur

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

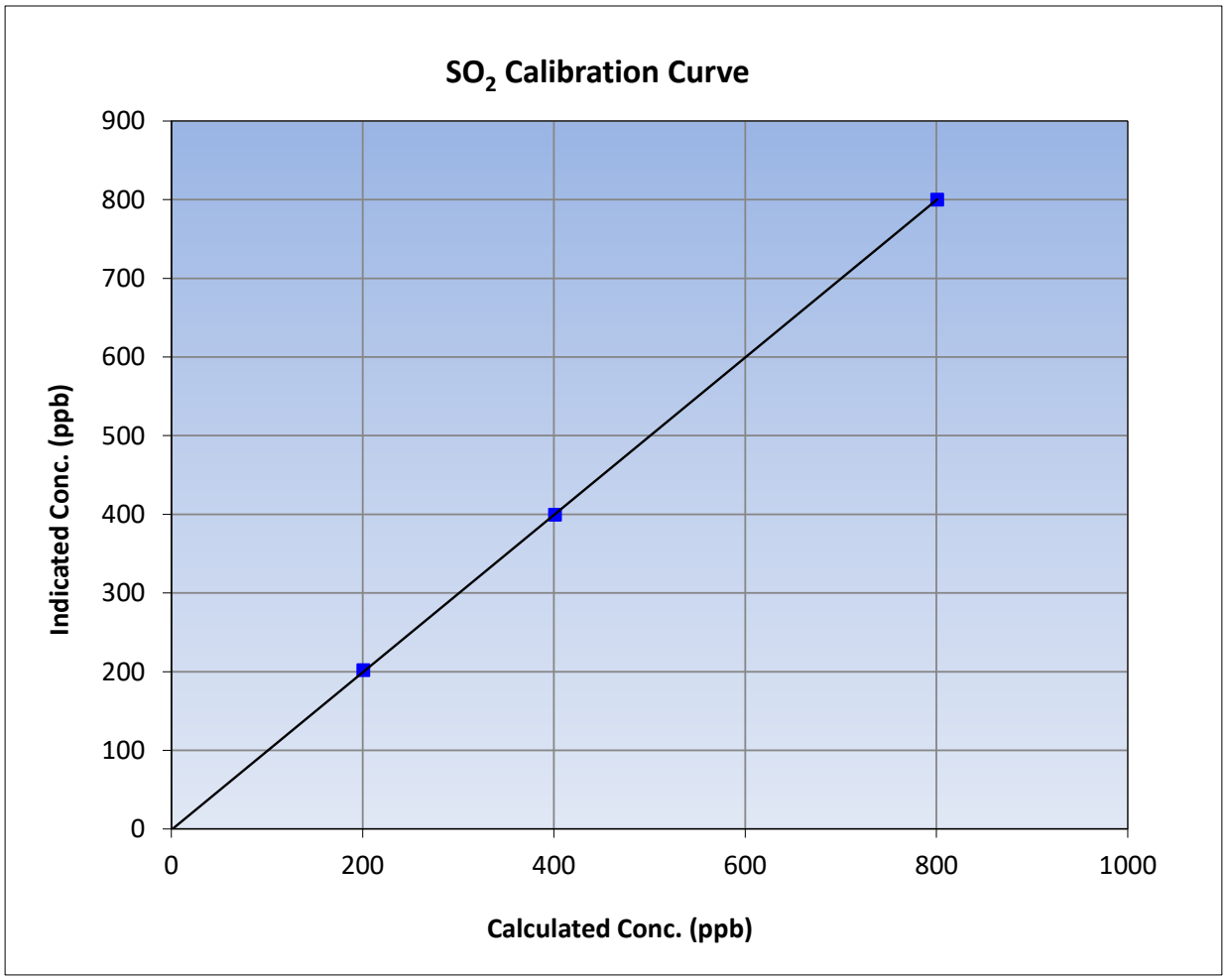
Station Information

Calibration Date:	November 8, 2023	Previous Calibration:	October 11, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	12:35	End Time (MST):	15:17
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1136451241

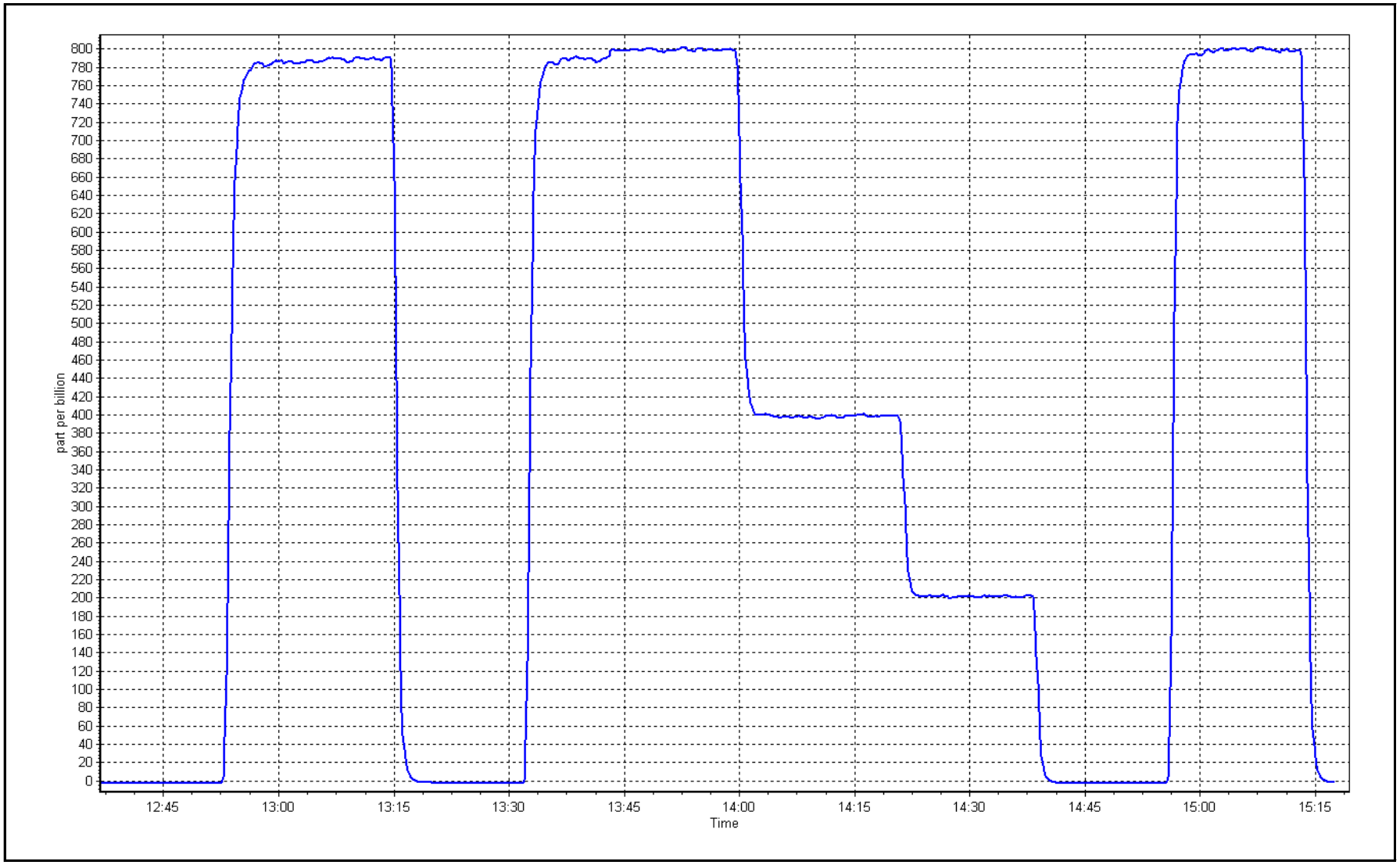
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-2.6	----
800.4	799.7	1.0009
400.7	399.1	1.0040
200.4	201.6	0.9938

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999978	*≥0.995*
Slope	1.000960	*0.90 - 1.10*
Intercept	-1.244570	*+/-30*



SO2 Calibration Plot Date: November 8, 2023 Location: Fort Chipewyan



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	November 8, 2023	Last Cal Date:	October 12, 2023
Start time (MST):	8:49	End time (MST):	12:23
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43iQ-TL		Analyzer serial #:	1203169744	
Converter make:	CDN-101		Converter serial #:	14639	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.016423	0.995282	Backgd or Offset:	0.99	0.98
Calibration intercept:	0.539126	0.578775	Coeff or Slope:	0.752	0.741

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	80.7	0.996
as found 2nd point	4960	40.2	40.0	40.6	0.994
as found 3rd point	4980	20.1	20.0	20.8	0.979
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	80.1	0.999
second point	4960	40.2	40.0	40.5	0.987
third point	4980	20.1	20.0	20.6	0.970
as left zero	5000	0.0	0.0	0.6	----
as left span	4920	80.5	80.0	80.1	0.999
SO2 Scrubber Check	4919.7	80.3	803.0	0.2	----
Date of last scrubber change:		March 7, 2022		Ave Corr Factor	0.985
Date of last converter efficiency test:		March 15, 2022		100.7%	efficiency

Baseline Corr As found:	80.3	Prev response:	81.86	*% change:	-1.9%
Baseline Corr 2nd AF pt:	40.2	AF Slope:	1.002282	AF Intercept:	0.558849
Baseline Corr 3rd AF pt:	20.4	AF Correlation:	0.999979		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Morgan Voyageur

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

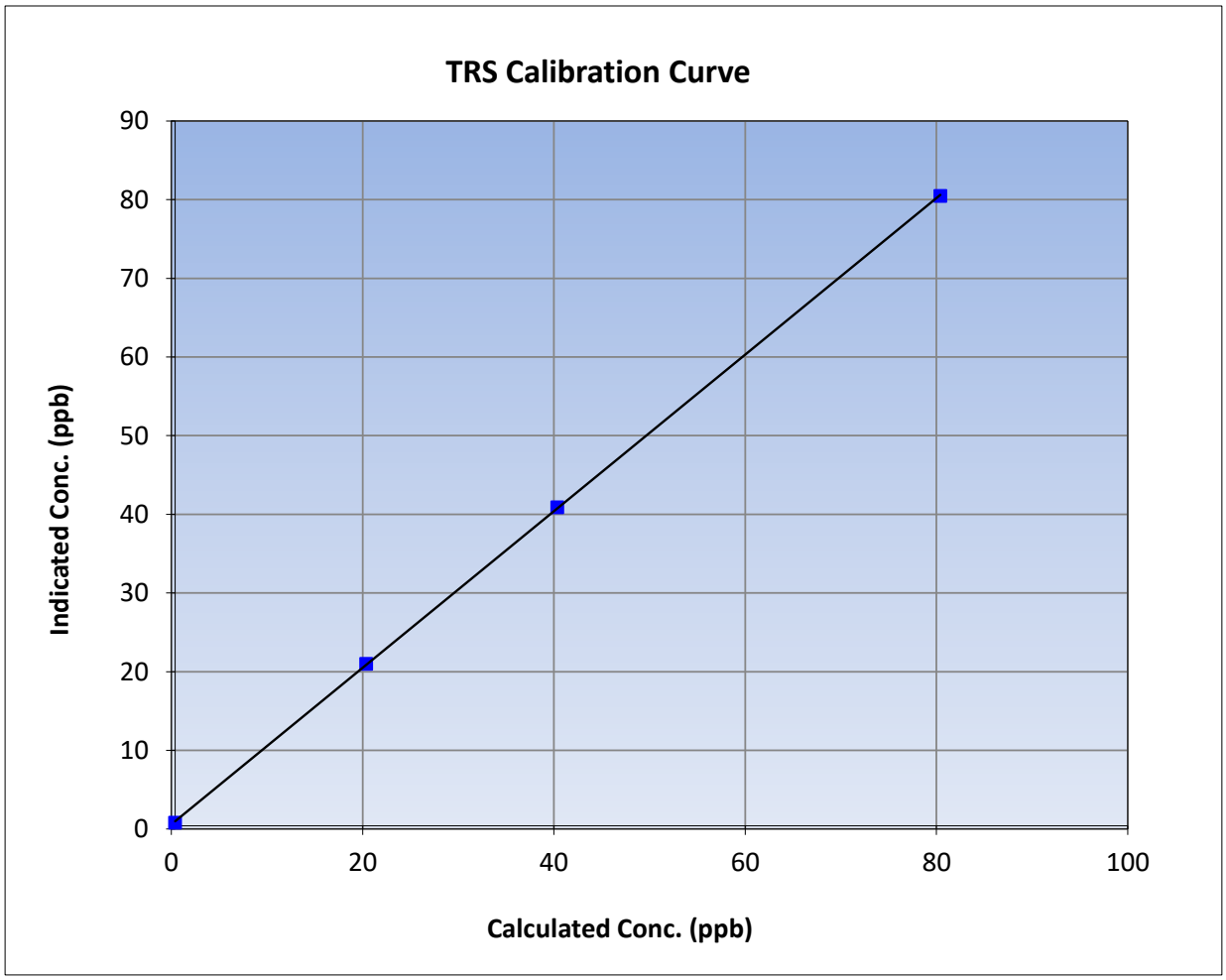
Station Information

Calibration Date:	November 8, 2023	Previous Calibration:	October 12, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:49	End Time (MST):	12:23
Analyzer make:	Thermo 43iQ-TL	Analyzer serial #:	1203169744

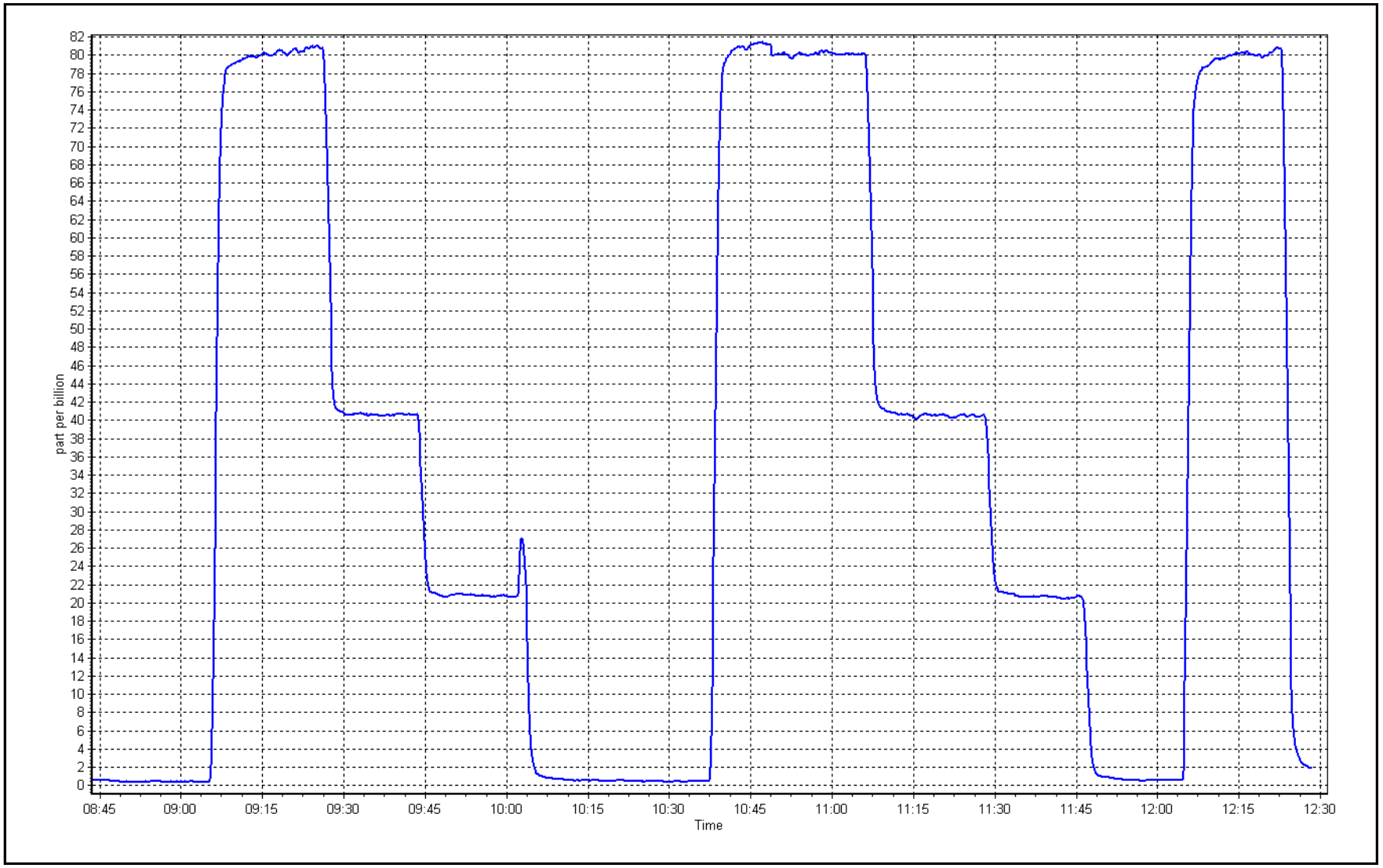
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
80.0	80.1	0.9989
40.0	40.5	0.9866
20.0	20.6	0.9699

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999975	*≥0.995*
Slope	0.995282	*0.90 - 1.10*
Intercept	0.578775	*+/-3*



TRS Calibration Plot Date: November 8, 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:	November 7, 2023	Last Cal Date:	October 12, 2023
Start time (MST):	11:40	End time (MST):	15:59
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:	1.101	1.101	NO bkgnd or offset:	10	10.4
NOX coeff or slope:	0.994	0.994	NOX bkgnd or offset:	11.0	11.3
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	145.7	141.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.993517	0.999072
NO_X Cal Offset:	-0.020000	1.260000
NO Cal Slope:	0.991532	0.997544
NO Cal Offset:	-0.300000	0.920000
NO_2 Cal Slope:	1.008121	0.999622
NO_2 Cal Offset:	1.625692	-0.784149

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.9	-0.6	-0.3	----	----
as found span	4918	82.0	800.3	800.3	0.0	783.0	778.2	4.6	1.0221	1.0284
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-1.0	-0.6	-0.4	----	----
high point	4918	82.0	800.3	800.3	0.0	800.4	799.1	1.2	0.9999	1.0015
second point	4959	41.0	400.2	400.2	0.0	400.1	399.1	1.0	1.0001	1.0027
third point	4980	20.5	200.1	200.1	0.0	204.8	203.2	1.6	0.9770	0.9846
as left zero	5000	0.0	0.0	0.0	0.0	-1.2	-0.4	-0.8	----	----
as left span	4918	82.0	800.3	398.8	401.5	806.4	407.6	398.4	0.9925	0.9785
								Average Correction Factor	0.9923	0.9963

Corrected As found	NO_X = 783.9 ppb	NO = 778.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-1.4%
Previous Response	NO_X = 795.1 ppb	NO = 793.2 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)	807.1	405.6	401.5	400.8	1.0017	99.8%
2nd GPT point (200 ppb O3)	807.1	609.9	197.2	196.0	1.0061	99.4%
3rd GPT point (100 ppb O3)	807.1	708.8	98.3	97.2	1.0113	98.9%
				Average Correction Factor	1.0064	99.4%

Notes: sampled inlet filter changed after as founds. Adjusted Span.

Calibration Performed By: Morgan Voyageur

Wood Buffalo Environmental Association

NO_X Calibration Summary

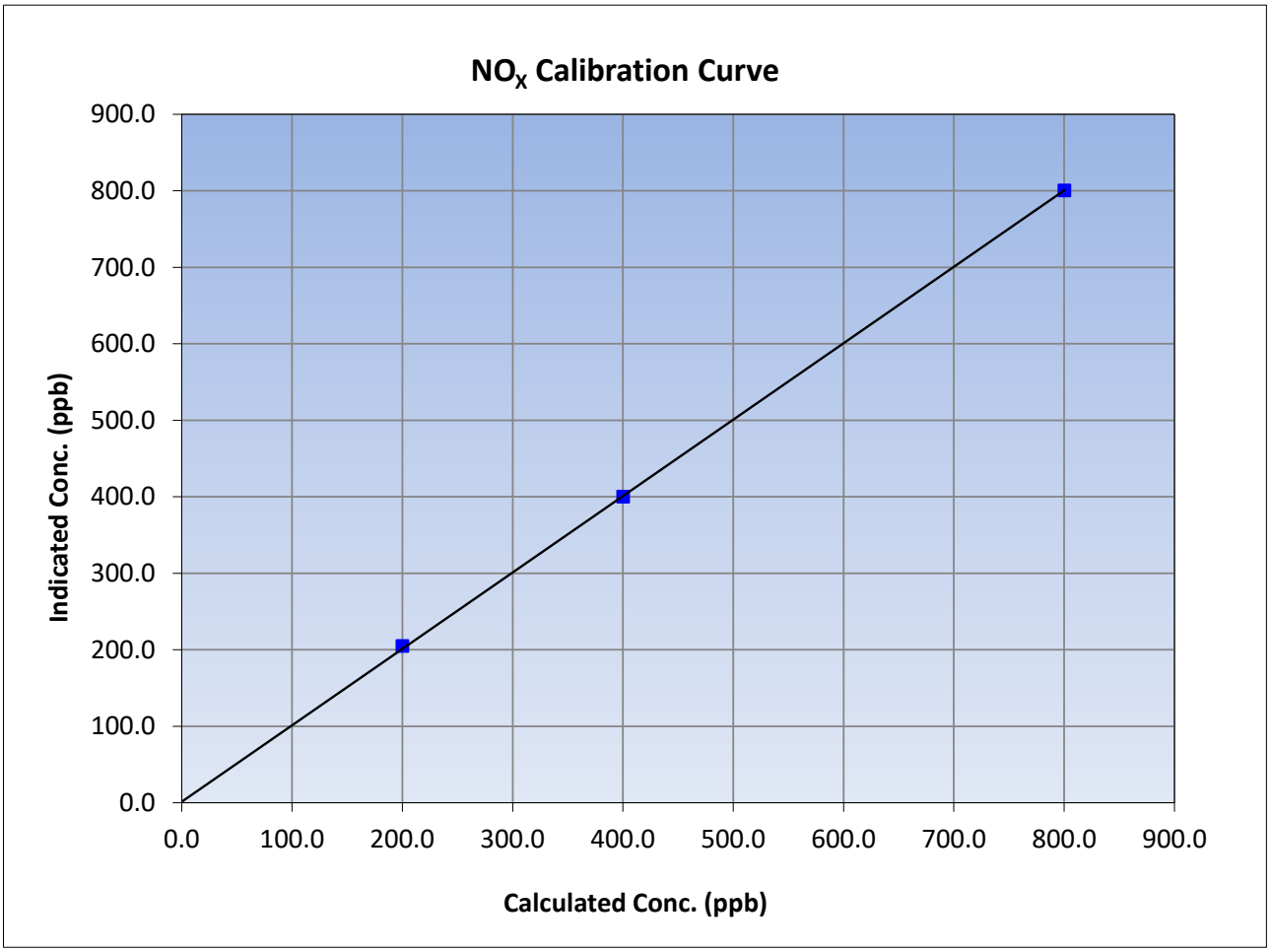
Version-04-2020

Station Information

Calibration Date:	November 7, 2023	Previous Calibration:	October 12, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	11:40	End Time (MST):	15:59
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-1.0	----	Correlation Coefficient	0.999944	≥0.995
800.3	800.4	0.9999			
400.2	400.1	1.0001	Slope	0.999072	0.90 - 1.10
200.1	204.8	0.9770			
			Intercept	1.260000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

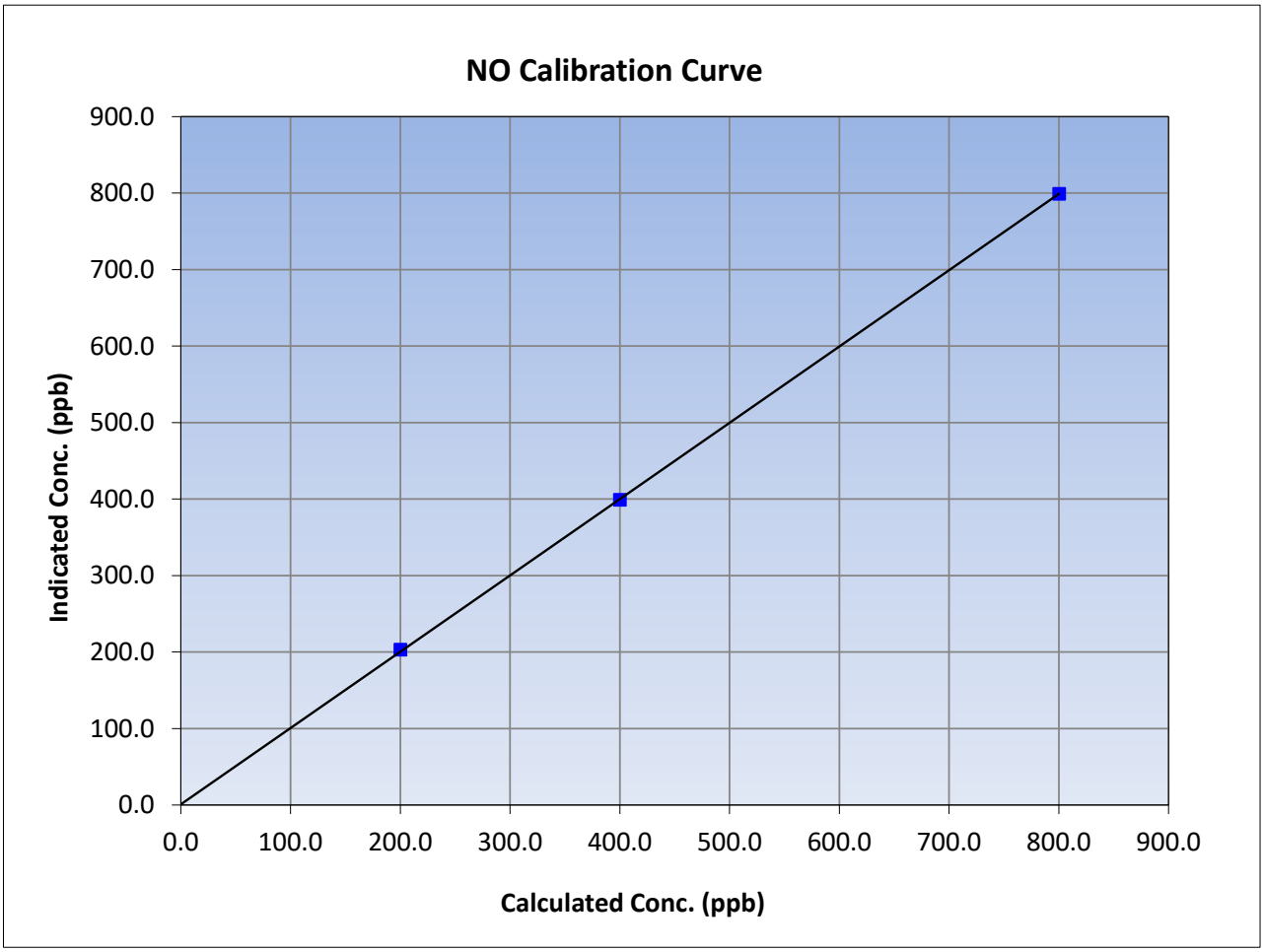
Version-04-2020

Station Information

Calibration Date:	November 7, 2023	Previous Calibration:	October 12, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	11:40	End Time (MST):	15:59
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	0.999970	≥0.995
800.3	799.1	1.0015			
400.2	399.1	1.0027	Slope	0.997544	0.90 - 1.10
200.1	203.2	0.9846			
			Intercept	0.920000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

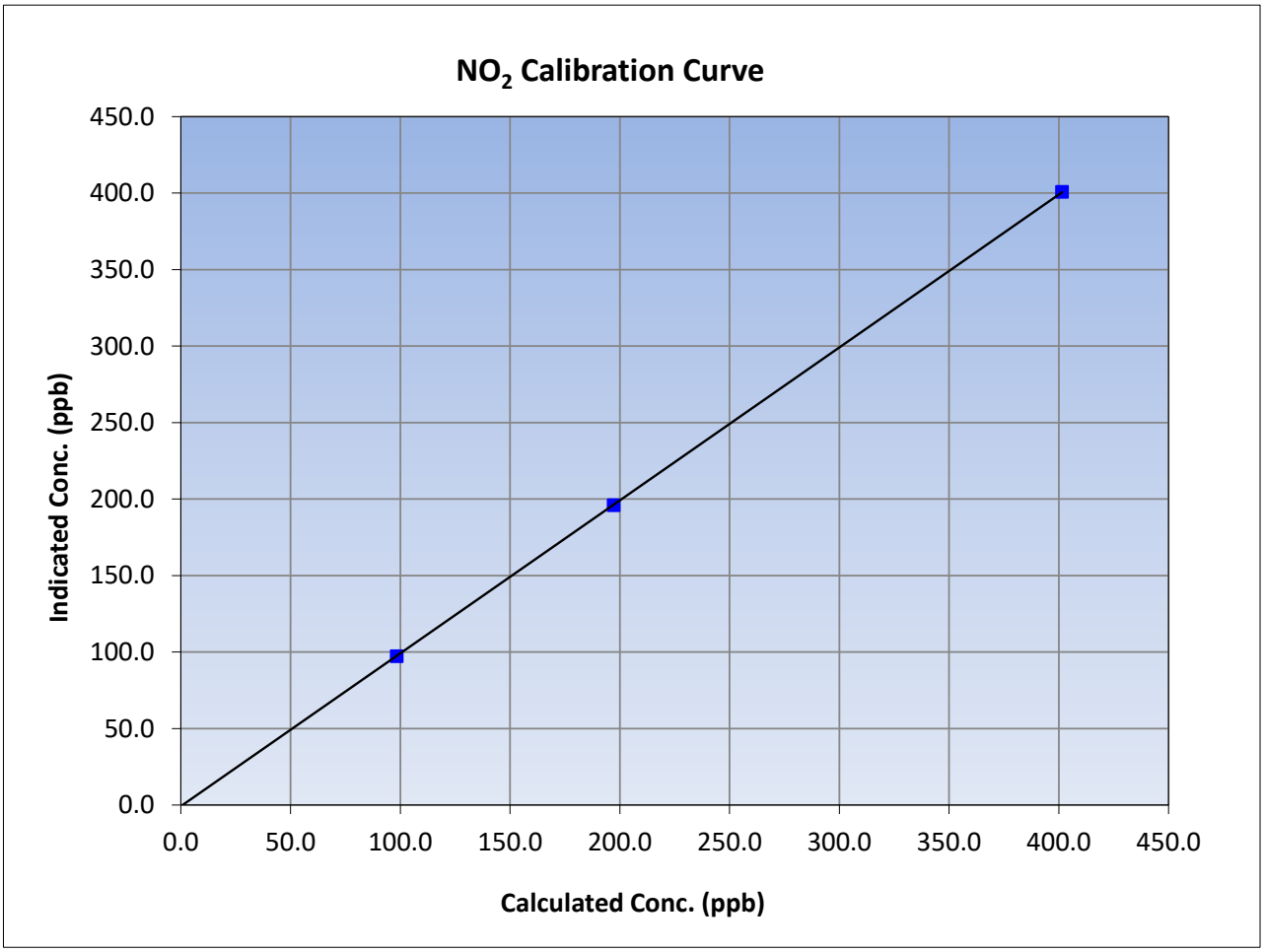
Version-04-2020

Station Information

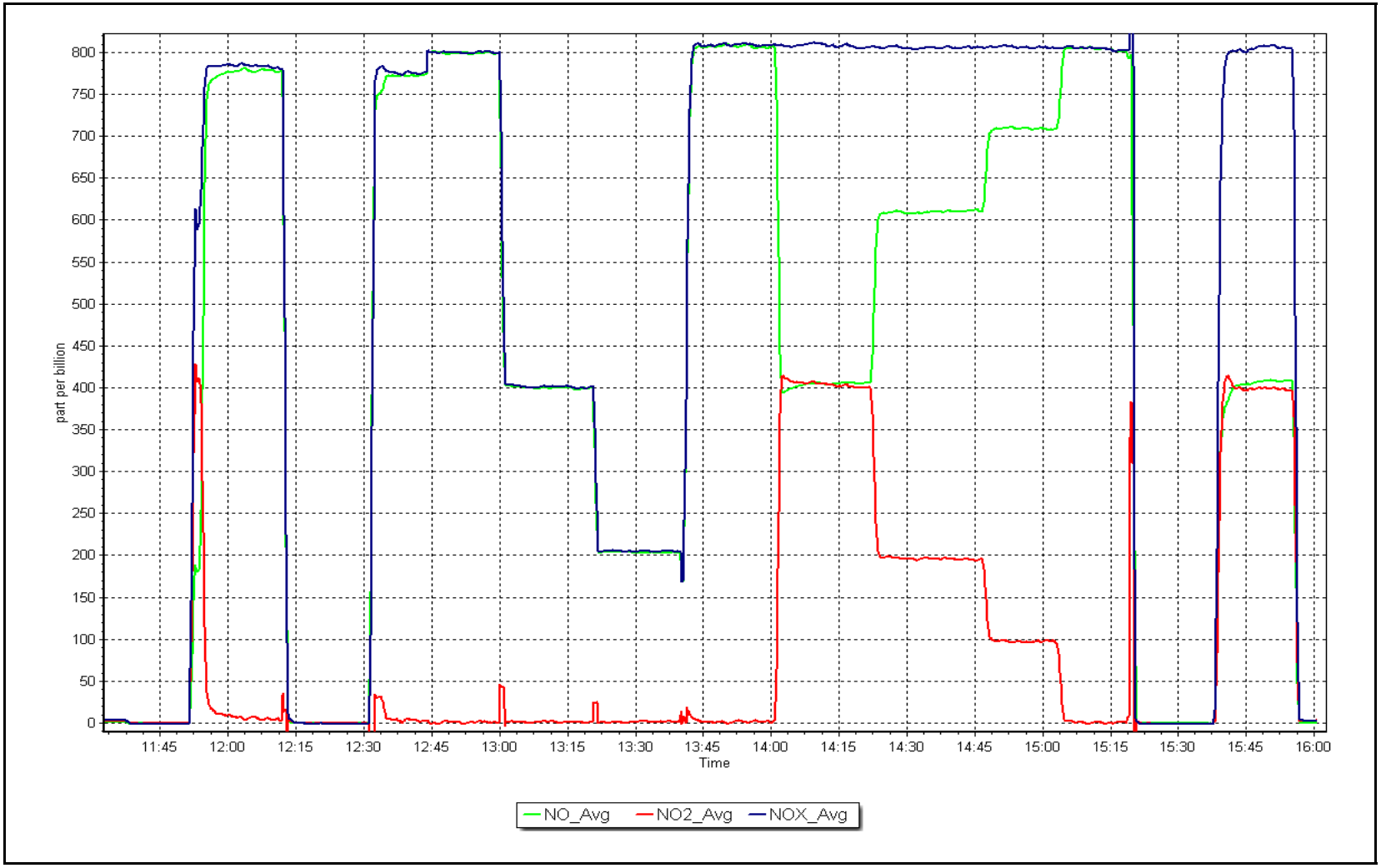
Calibration Date:	November 7, 2023	Previous Calibration:	October 12, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	11:40	End Time (MST):	15:59
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.4	----	Correlation Coefficient	0.999995	≥0.995
401.5	400.8	1.0017			
197.2	196.0	1.0061	Slope	0.999622	0.90 - 1.10
98.3	97.2	1.0113			
			Intercept	-0.784149	+/-20



NO_X Calibration Plot Date: November 7, 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:	November 7, 2023	Last Cal Date:	October 11, 2023
Start time (MST):	9:04	End time (MST):	11:28
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:	1.002143	0.996657	Backgd or Offset:	-2.0	-2.0
Calibration intercept:	-0.200000	-0.240000	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	1.0	----
as found span	5000	913.0	400.0	400.4	0.999
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.8	----
high point	5000	914.7	400.0	399.1	1.002
second point	5000	786.4	200.0	198.1	1.010
third point	5000	701.3	100.0	98.7	1.013
as left zero	5000	0.0	0.0	0.9	----
as left span	5000	963.3	400.0	399.0	1.003
				Average Correction Factor	1.008

Baseline Corr As found:	399.4	Previous response	400.7	*% 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 out inlet filter after as found. No adjustments

Calibration Performed By: Morgan Voyageur

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

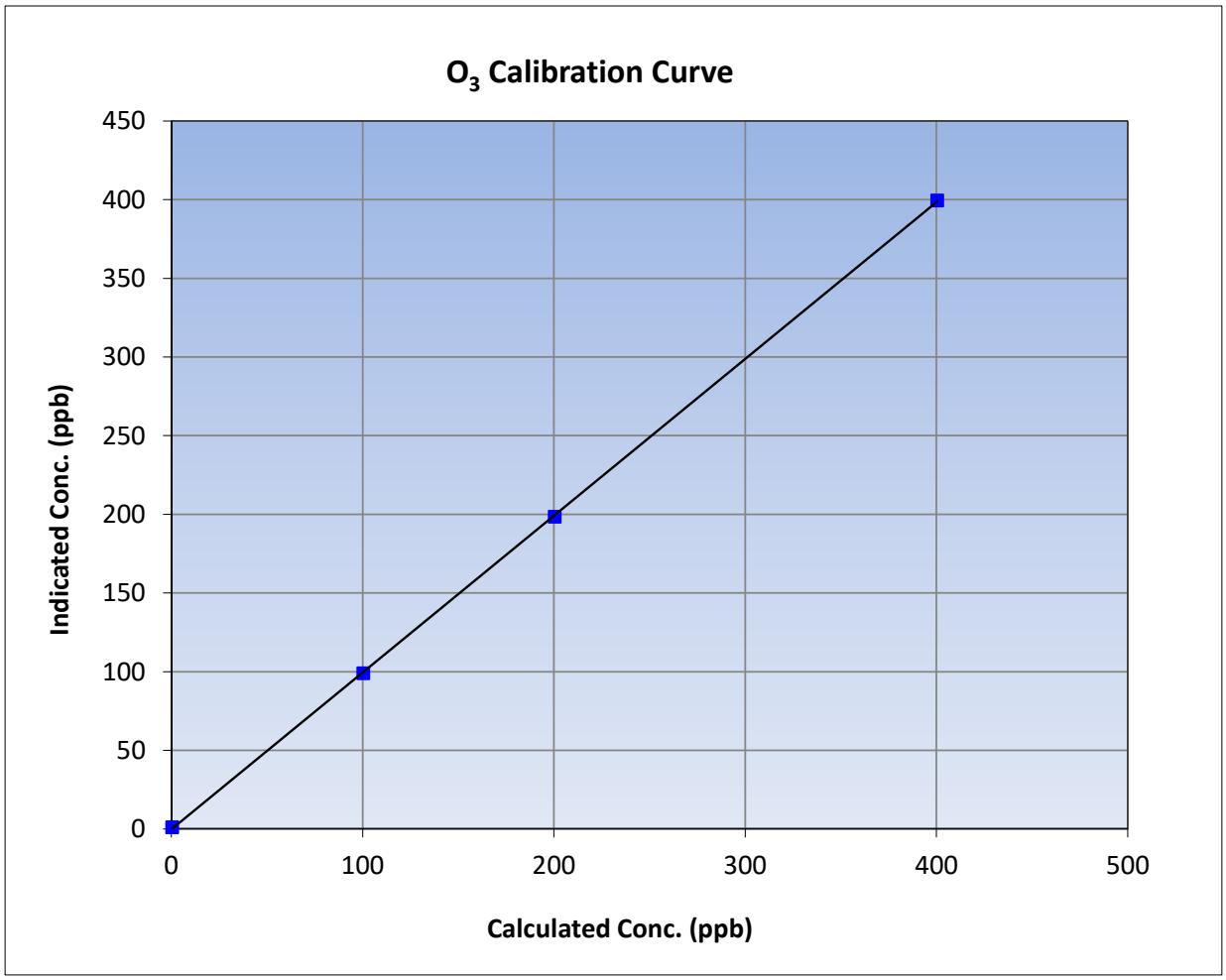
Station Information

Calibration Date:	November 7, 2023	Previous Calibration:	October 11, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	9:04	End Time (MST):	11:28
Analyzer make:	Teledyne API T400	Analyzer serial #:	3872

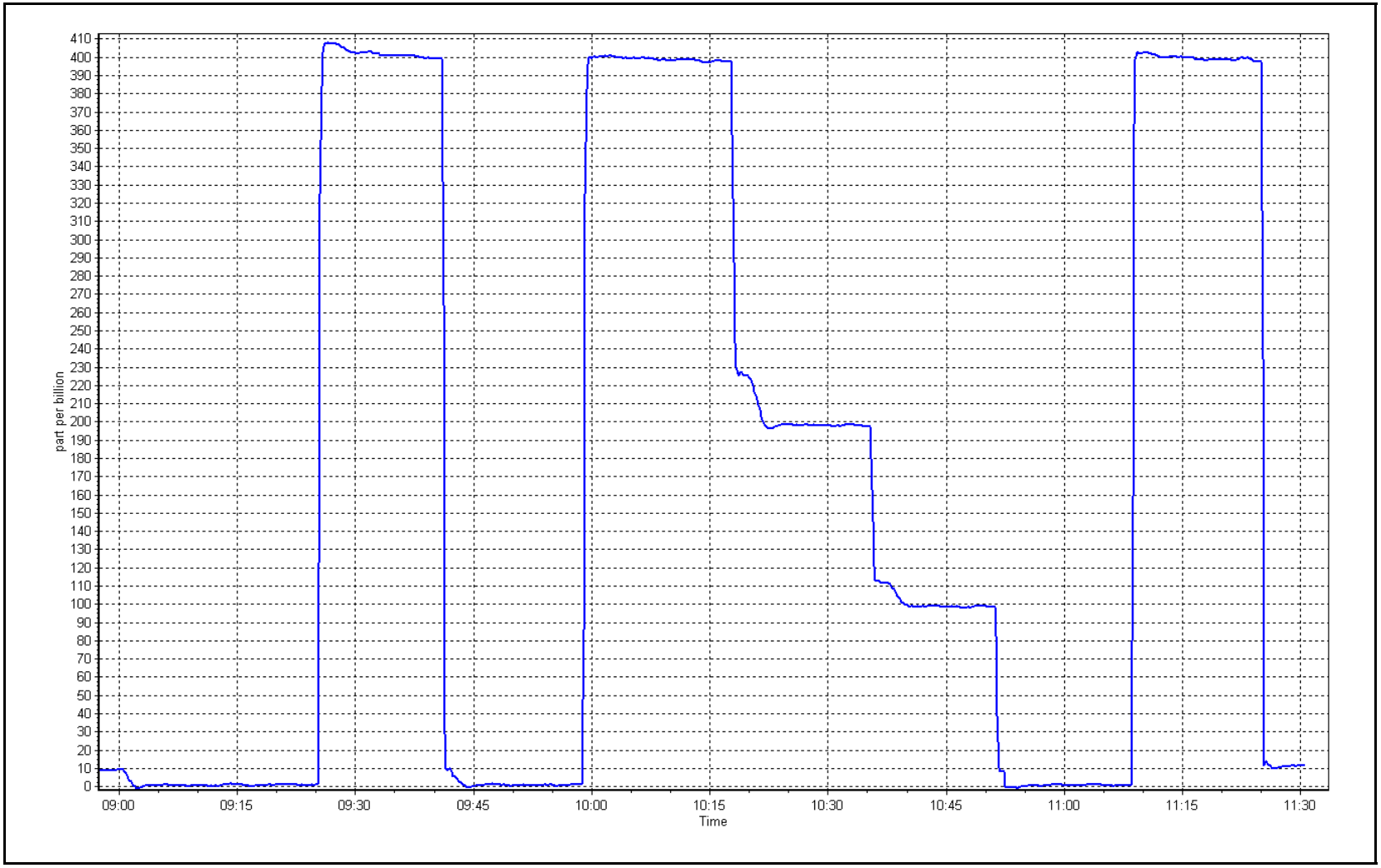
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.8	----
400.0	399.1	1.0023
200.0	198.1	1.0096
100.0	98.7	1.0132

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999965	*≥0.995*
Slope	0.996657	*0.90 - 1.10*
Intercept	-0.240000	*+/- 5*



O_3 Calibration Plot Date: November 7, 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:	November 24, 2023	Last Cal Date:	October 11,2023
Start time (MST):	14:19	End time (MST):	14:56
Analyzer Make:	Teledyne API T640	S/N:	216
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25	S/N:	388747
Temp/RH standard:	Alicat FP-25	S/N:	388747

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (^{o}C)	0.3	0.3	0.3	☐	+/- 2 ^{o}C
P (mmHg)	736.5	738.9	736.5	☐	+/- 10 mmHg
flow (LPM)	4.99	5.02	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: November 24, 2023 Last Cal Date: October 11, 2023

PM w/o HEPA: 4.98 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	11.1	☐	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: No adjustment made

Calibration by: Matthew C

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	November 10, 2023	Last Cal Date:	October 17, 2023
Start time (MST):	8:30	End time (MST):	11:04
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:	1.001383	1.003222	Backgd or Offset:	-0.014	-0.014
Calibration intercept:	0.066908	0.146903	Coeff or Slope:	1.006	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	0.06	----
as found span	4933	66.7	40.4	40.7	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4934	66.7	40.4	40.6	0.994
second point	4967	33.3	20.2	20.5	0.985
third point	4983	16.7	10.1	10.3	0.980
as left zero	5000	0.0	0.0	0.1	----
as left span	2960	40.0	40.4	40.4	1.000
				Average Correction Factor	0.986

Baseline Corr As found:	40.65	Prev response:	40.55	*% change:	0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Matthew C

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

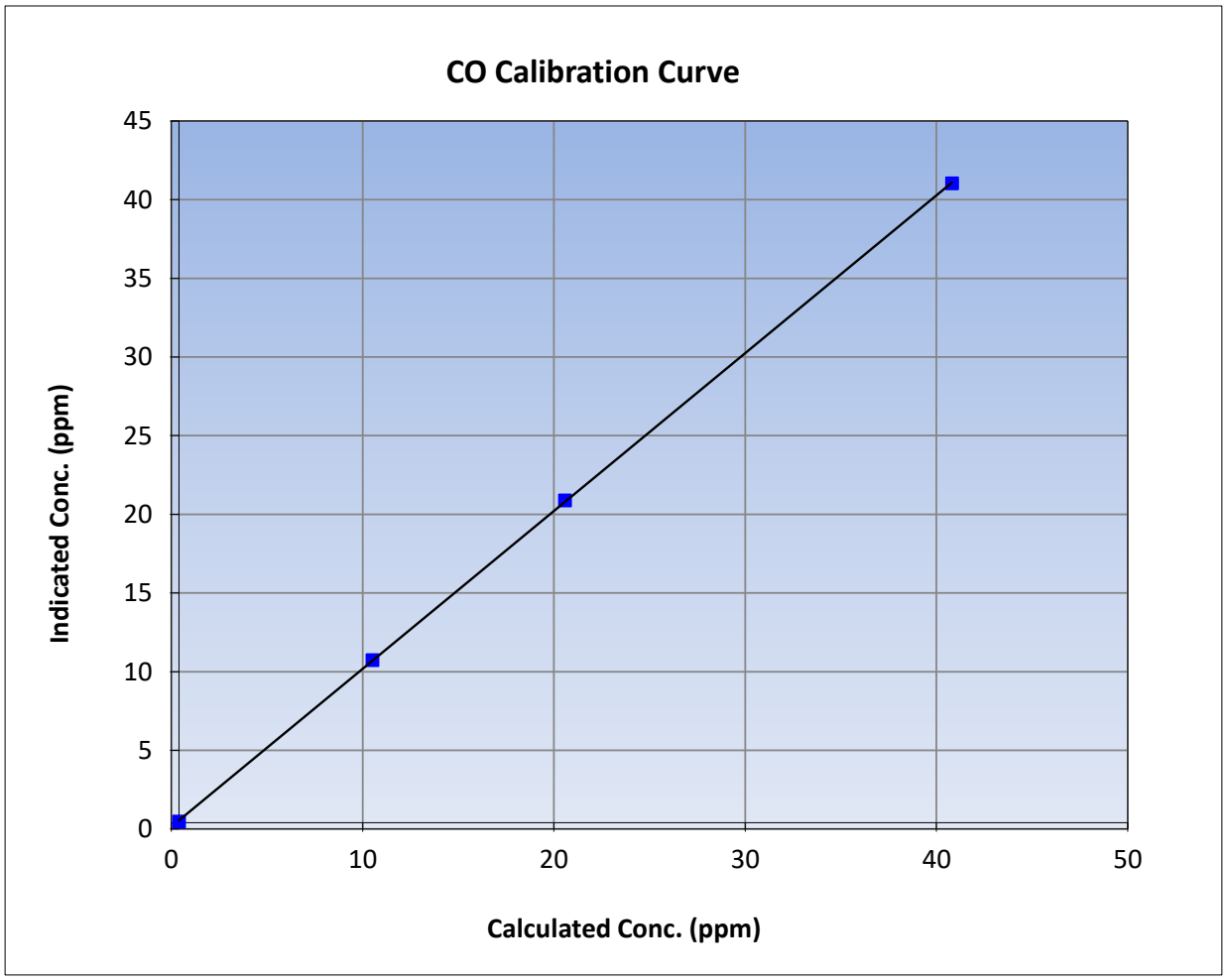
Station Information

Calibration Date:	November 10, 2023	Previous Calibration:	October 17, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:30	End Time (MST):	11:04
Analyzer make:	API T300	Analyzer serial #:	3505

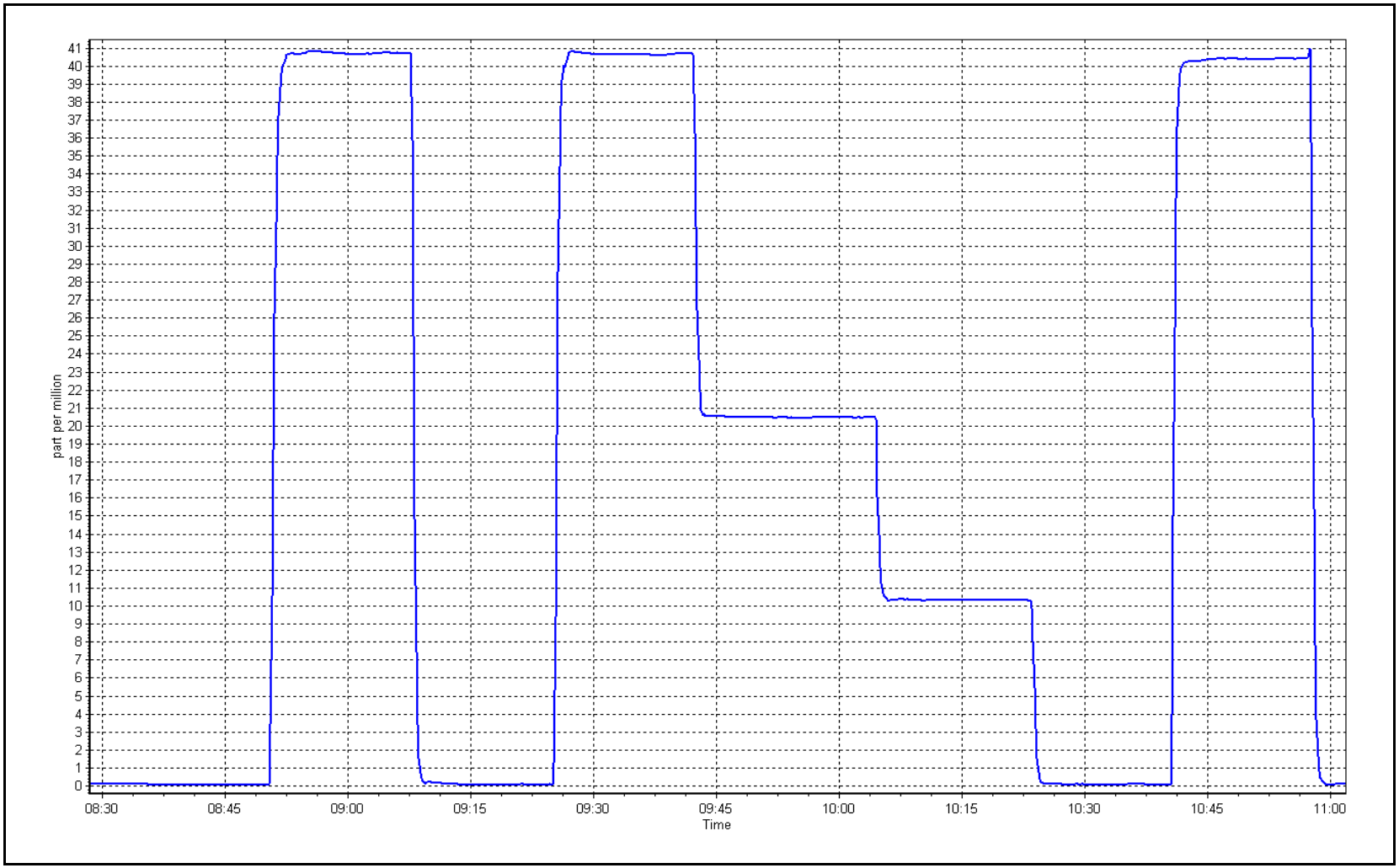
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
40.4	40.6	0.9945
20.2	20.5	0.9853
10.1	10.3	0.9797

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999982	*≥0.995*
Slope	1.003222	*0.90 - 1.10*
Intercept	0.146903	*+/-1.5*



CO Calibration Plot Date: November 10, 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:	November 10, 2023	Last Cal Date:	October 17, 2023
Start time (MST):	11:12	End time (MST):	14:05
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:	0.986227	0.982170	Backgd or Offset:	0.008	0.008
Calibration intercept:	1.960000	4.560000	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	2.3	----
as found span	2920	80.0	1605.9	1583.1	1.014
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	2.7	----
high point	2920	80.0	1605.9	1584.7	1.013
second point	2960	40.0	802.9	782.6	1.026
third point	2980	20.0	401.5	408.4	0.983
as left zero	3000	0.0	0.0	3.4	----
as left span	2960	40.0	802.9	779.4	1.030
				Average Correction Factor	1.007

Baseline Corr As found:	1580.80	Prev response:	1585.71	*% change:	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after as found. No Adjustments made.

Calibration Performed By: Matthew C

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

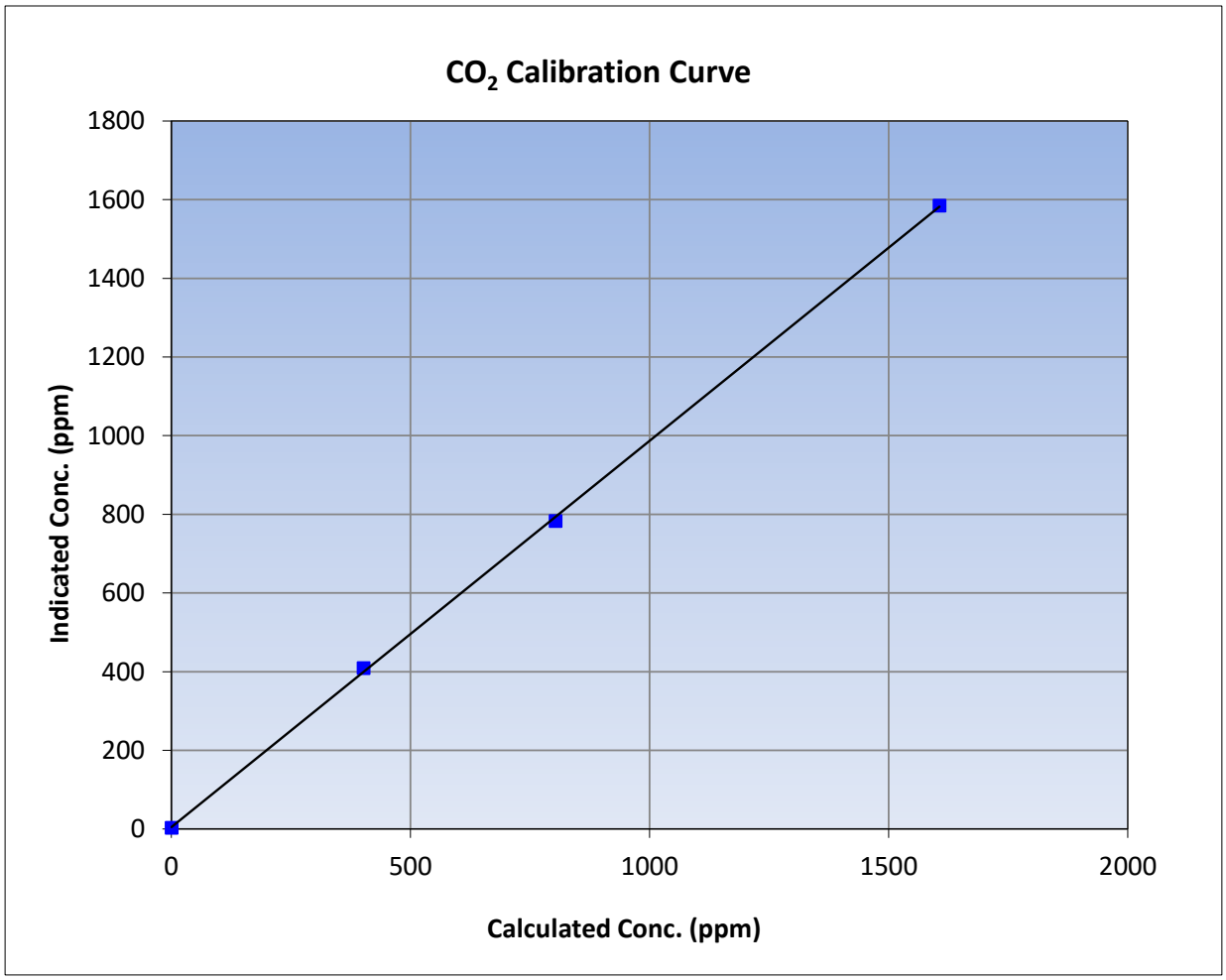
Station Information

Calibration Date	November 10, 2023	Previous Calibration	October 17, 2023
Station Name	Fort Chipewyan	Station Number	AMS08
Start Time (MST)	11:12	End Time (MST)	14:56
Analyzer make	Teledyne API T360	Analyzer serial #	289

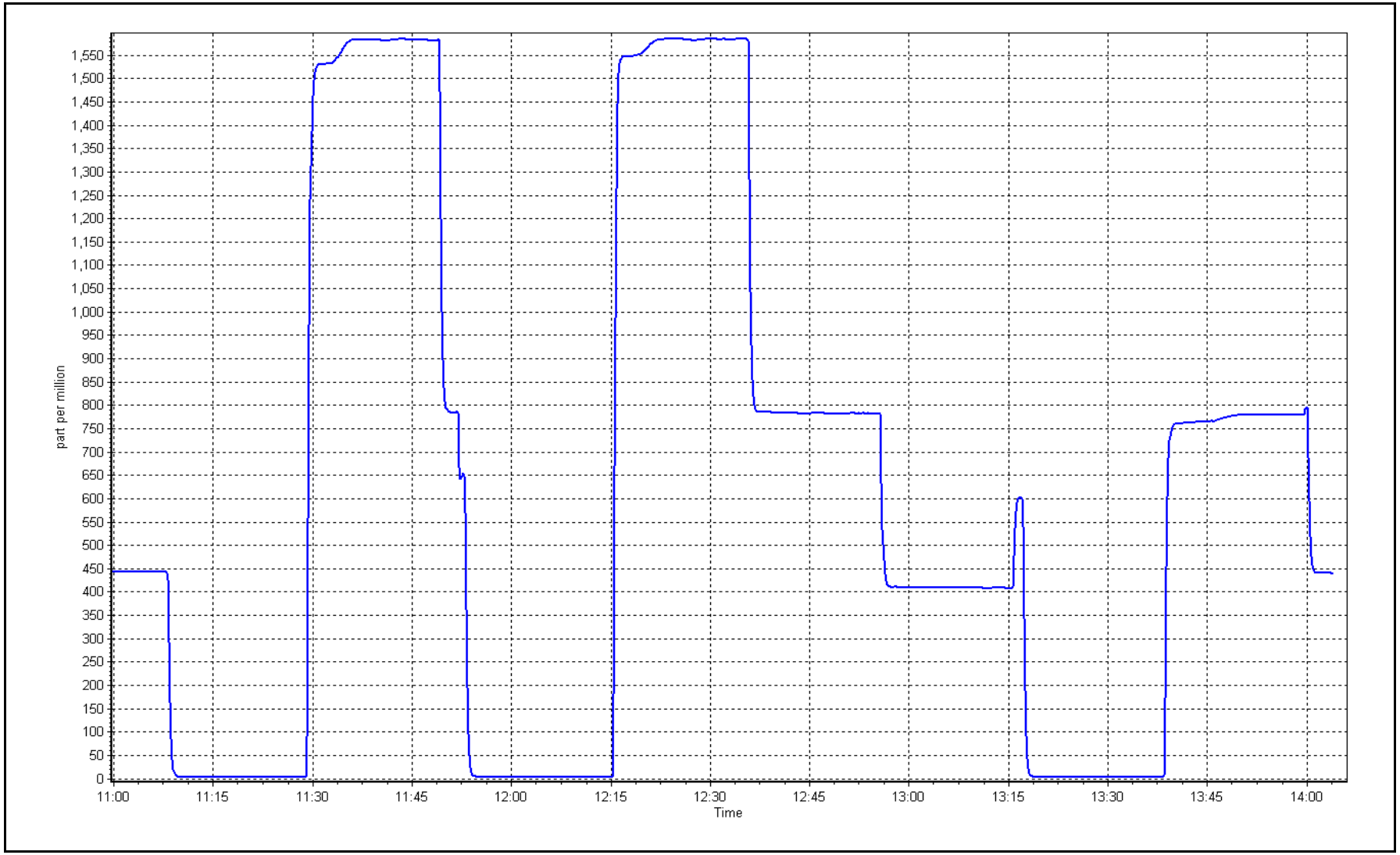
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	2.7	----
1605.9	1584.7	1.0134
802.9	782.6	1.0260
401.5	408.4	0.9830

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999842	*≥0.995*
Slope	0.982170	*0.90 - 1.10*
Intercept	4.560000	*+/-20*



CO_2 Calibration Plot Date: November 10, 2023 Location: Fort Chipewyan



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS09
BARGE LANDING
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	November 10, 2023	Last Cal Date:	October 2, 2023
Start time (MST):	9:47	End time (MST):	12:50
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:	0.995922	1.002594	Backgd or Offset:	10.3	10.3
Calibration intercept:	-0.090033	-0.728669	Coeff or Slope:	0.973	0.970

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.3	----
as found span	4919	80.2	801.5	804.0	0.997
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4919	80.2	801.5	803.2	0.998
second point	4959	40.1	400.8	400.6	1.000
third point	4980	20.0	199.8	199.1	1.004
as left zero	5000	0.0	0.0	-0.2	----
as left span	4919	80.2	801.5	801.7	1.000
				Average Correction Factor	1.001

Baseline Corr As found:	804.30	Previous response	798.13	*% change	0.8%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

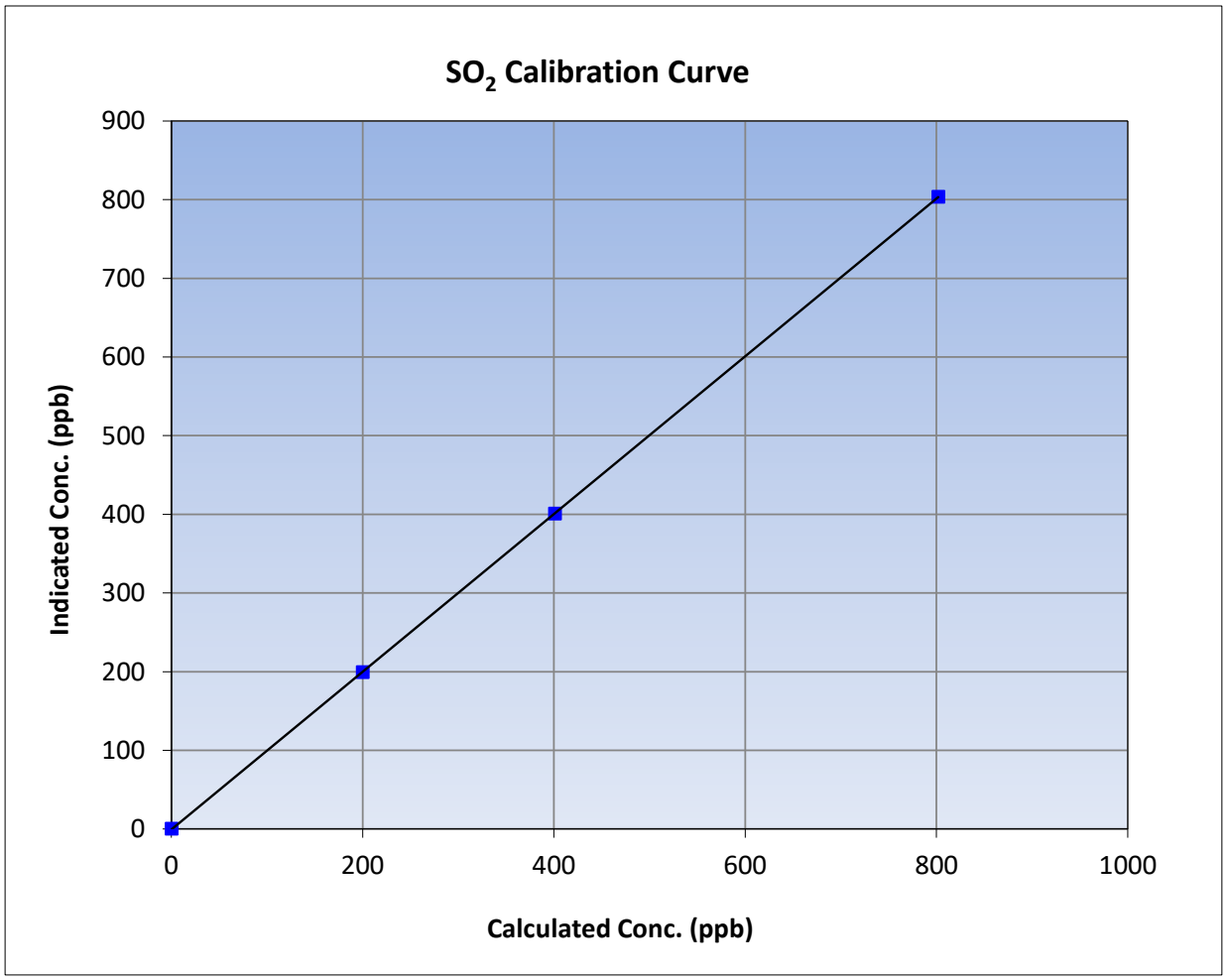
Station Information

Calibration Date:	November 10, 2023	Previous Calibration:	October 2, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:47	End Time (MST):	12:50
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148498

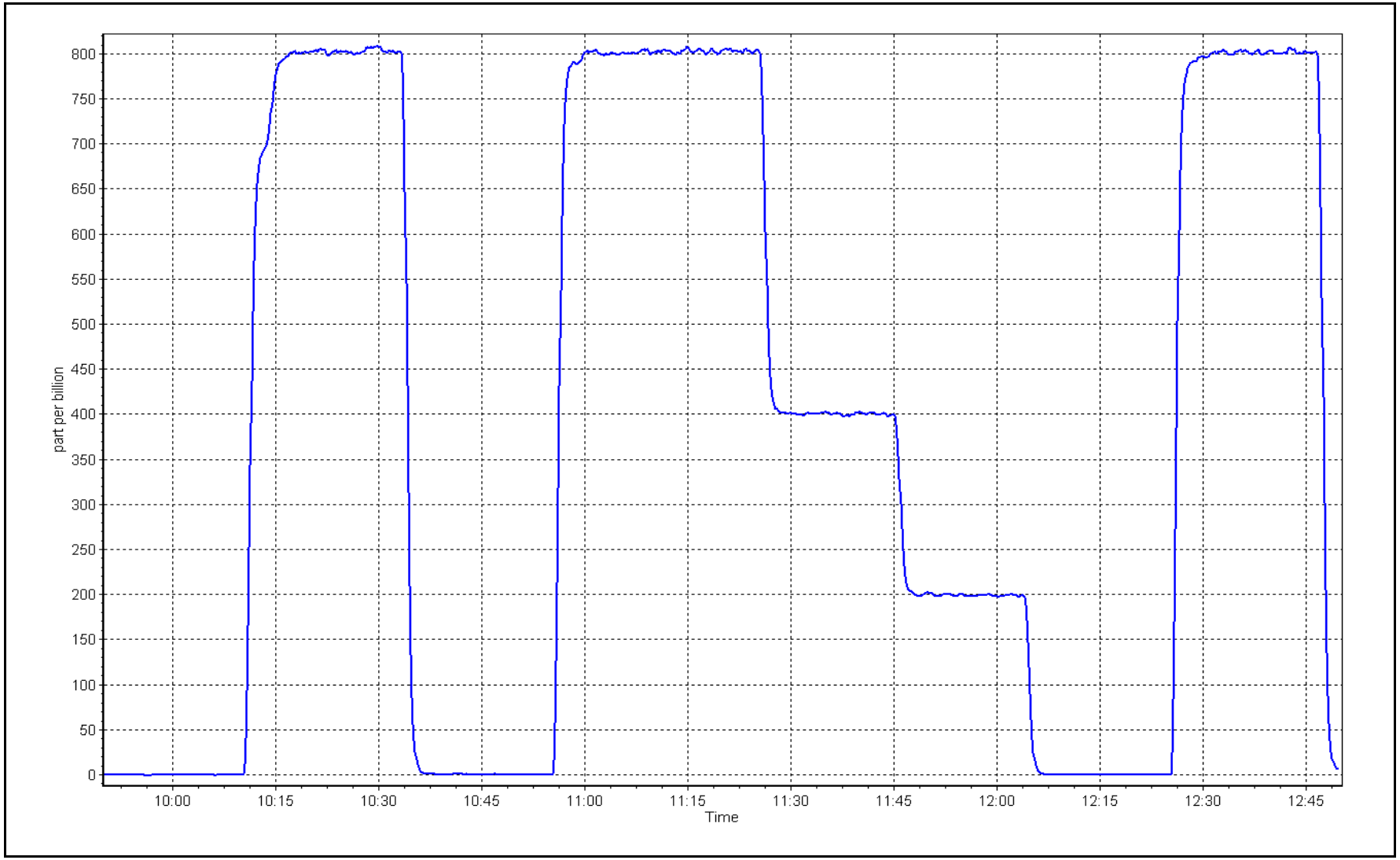
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
801.5	803.2	0.9979
400.8	400.6	1.0004
199.8	199.1	1.0037

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999997	*≥0.995*
Slope	1.002594	*0.90 - 1.10*
Intercept	-0.728669	*+/-30*



SO2 Calibration Plot Date: November 10, 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:	November 1, 2023	Last Cal Date:	October 11, 2023
Start time (MST):	9:14	End time (MST):	13:11
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.171	ppm	Cal Gas Exp Date:	August 22, 2026
Cal Gas Cylinder #:	CC511415			
Removed Cal Gas Conc:	5.171	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:	0.997327	1.009543	Backgd or Offset:	3.06	2.91
Calibration intercept:	0.165639	0.059575	Coeff or Slope:	1.252	1.200

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4923	77.4	80.0	80.9	0.989
as found 2nd point	4961	38.7	40.0	40.6	0.986
as found 3rd point	4981	18.8	19.4	20.1	0.967
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	77.4	80.0	80.8	0.991
second point	4961	38.7	40.0	40.6	0.986
third point	4981	19.3	20.0	20.2	0.988
as left zero	5000	0.0	0.0	0.1	----
as left span	4923	77.4	80.0	80.8	0.991
SO2 Scrubber Check	4920	80.2	802.0	0.0	----
Date of last scrubber change:		28-Feb-23		Ave Corr Factor	0.988
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.9	Prev response:	79.99	*% change:	1.1%
Baseline Corr 2nd AF pt:	40.6	AF Slope:	1.008985	AF Intercept:	0.209020
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999966		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

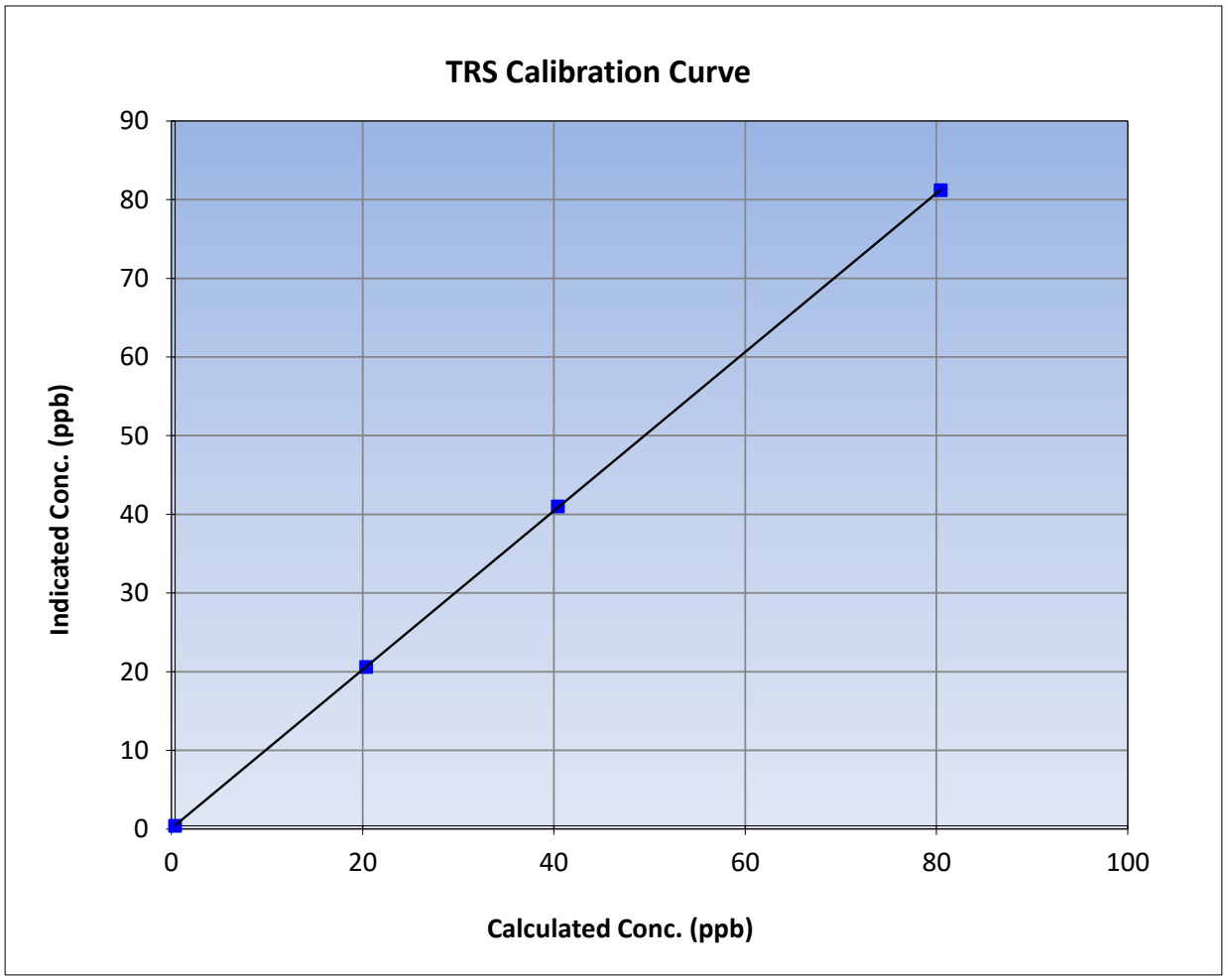
Station Information

Calibration Date:	November 1, 2023	Previous Calibration:	October 11, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:14	End Time (MST):	13:11
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1331259320

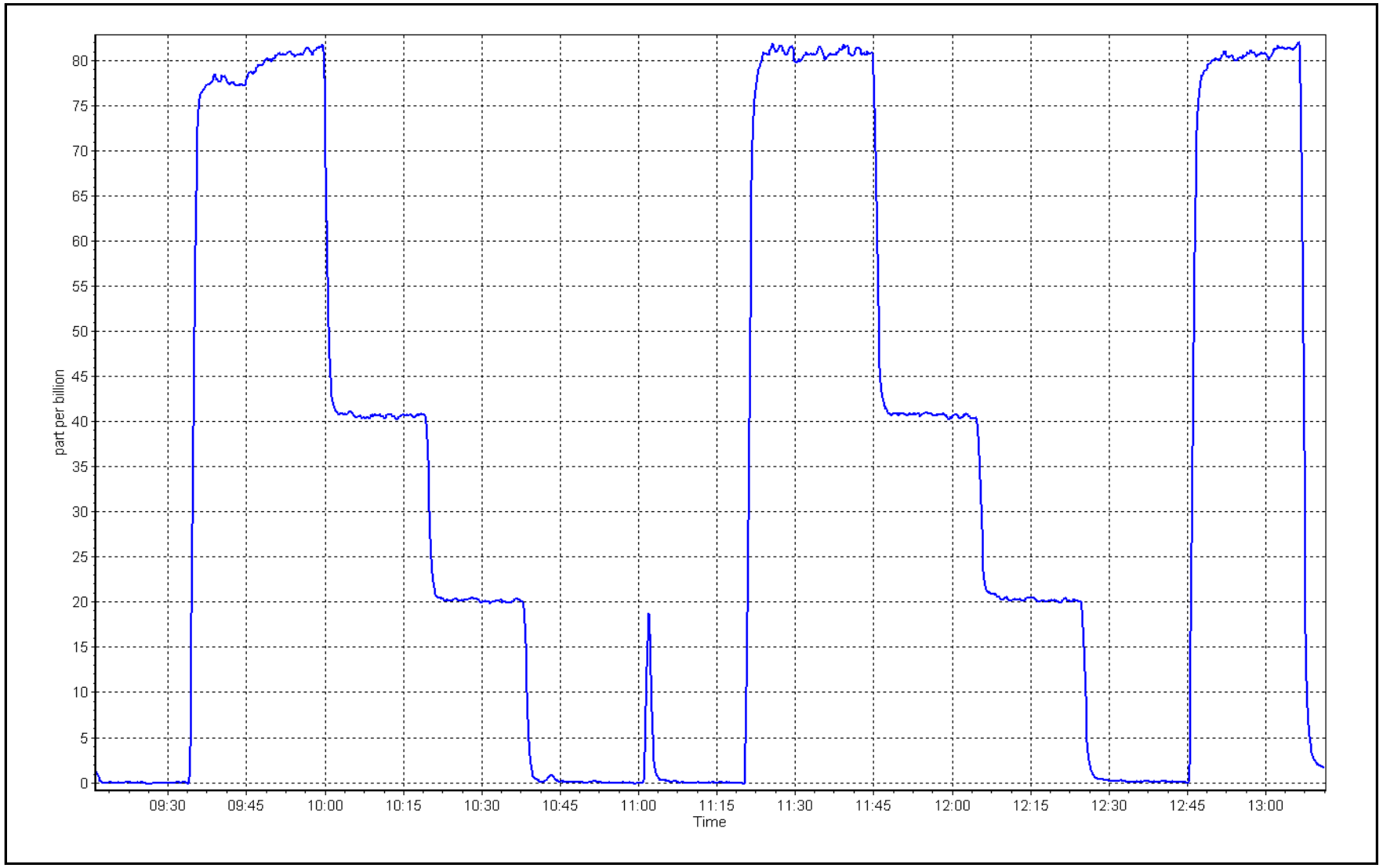
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.8	0.9906
40.0	40.6	0.9859
20.0	20.2	0.9881

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999993	*≥0.995*
Slope	1.009543	*0.90 - 1.10*
Intercept	0.059575	*+/-3*



TRS Calibration Plot Date: November 1, 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:	November 10, 2023	Last Cal Date:	October 2, 2023
Start time (MST):	9:47	End time (MST):	12:50
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:	2.58E-04	2.63E-04	NMHC SP Ratio:	4.85E-05	4.93E-05
CH4 Retention time:	15.80	15.80	NMHC Peak Area:	188320	185351
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	4919	80.2	17.12	16.83	1.017
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	17.12	17.13	1.000
second point	4960	40.1	8.56	8.57	0.999
third point	4980	20.0	4.27	4.29	0.994
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	17.12	17.17	0.997
				ge Correction Factor	0.998
Baseline Corr AF:	16.83	Prev response	17.10	*% change	-1.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	80.2	9.14	8.98	1.017
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	9.13	1.000
second point	4960	40.1	4.57	4.57	0.999
third point	4980	20.0	2.28	2.30	0.992
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	9.14	9.15	0.998
				Average Correction Factor	0.997
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	4919	80.2	7.98	7.85	1.017
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	3.99	0.999
third point	4980	20.0	1.99	2.00	0.997
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	7.98	8.02	0.995
				Average Correction Factor	0.998
Baseline Corr AF:	7.85	Prev response	7.97	*% change	-1.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.997687	0.999996
THC Cal Offset:	0.018043	0.010258
CH4 Cal Slope:	0.997459	1.000951
CH4 Cal Offset:	0.004658	0.001466
NMHC Cal Slope:	0.998099	0.998936
NMHC Cal Offset:	0.012785	0.009192

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

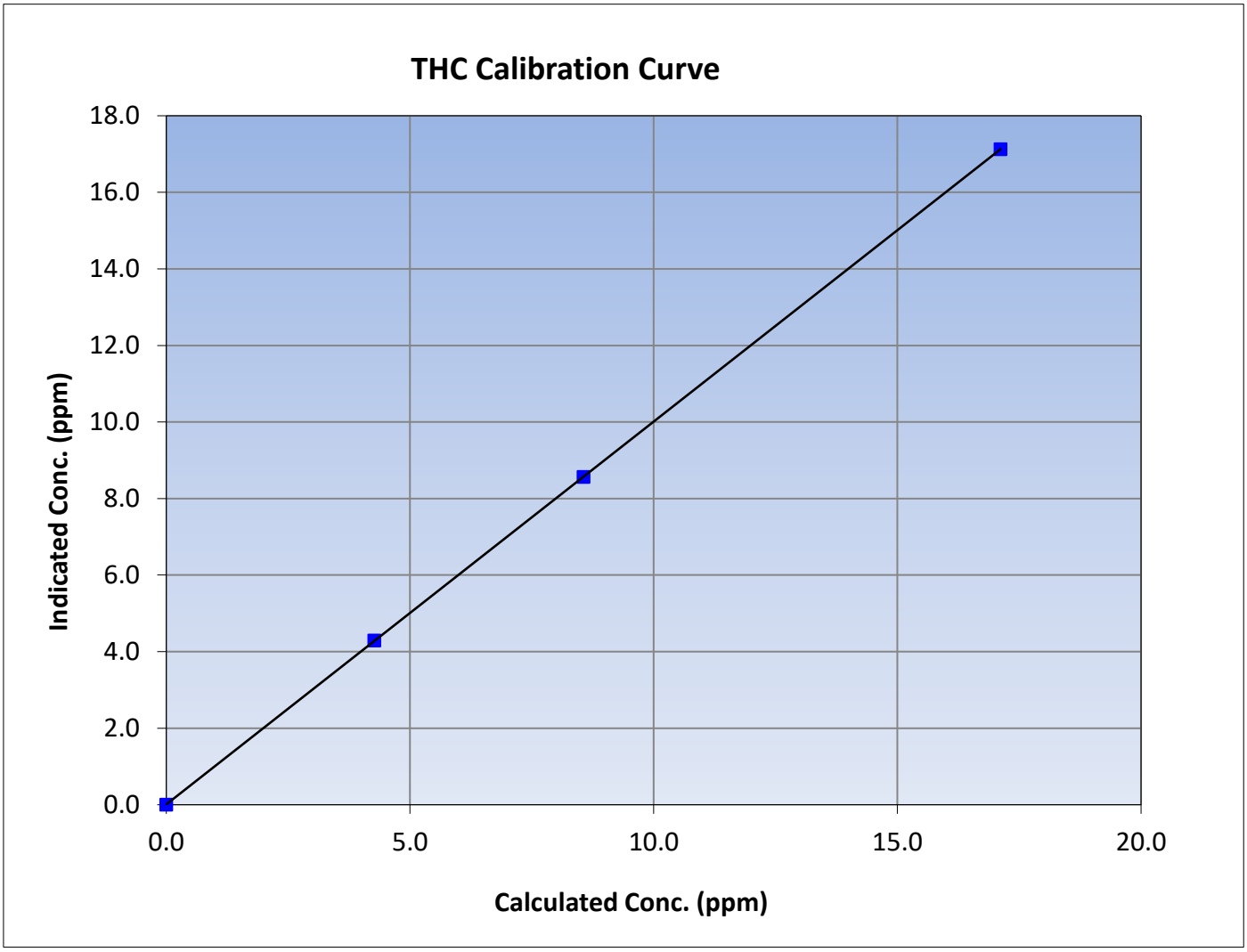
Version-06-2022

Station Information

Calibration Date:	November 10, 2023	Previous Calibration:	October 2, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:47	End Time (MST):	12:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999998	*≥0.995*
17.12	17.13	0.9996			
8.56	8.57	0.9991	Slope	0.999996	*0.90 - 1.10*
4.27	4.29	0.9941			
			Intercept	0.010258	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

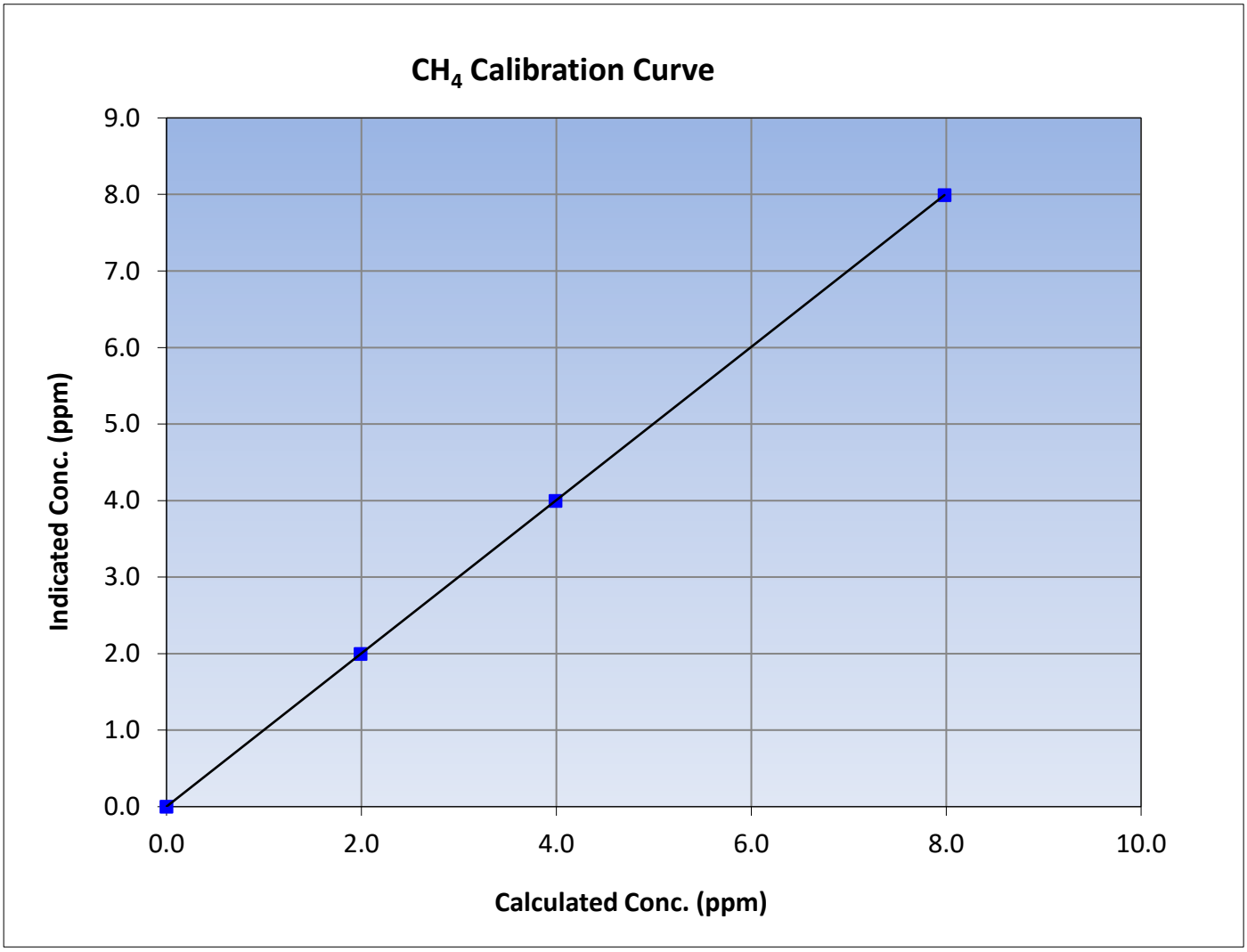
Version-06-2022

Station Information

Calibration Date:	November 10, 2023	Previous Calibration:	October 2, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:47	End Time (MST):	12:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	1.000000	≥0.995
7.98	7.99	0.9988			
3.99	3.99	0.9992	Slope	1.000951	0.90 - 1.10
1.99	2.00	0.9967			
			Intercept	0.001466	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

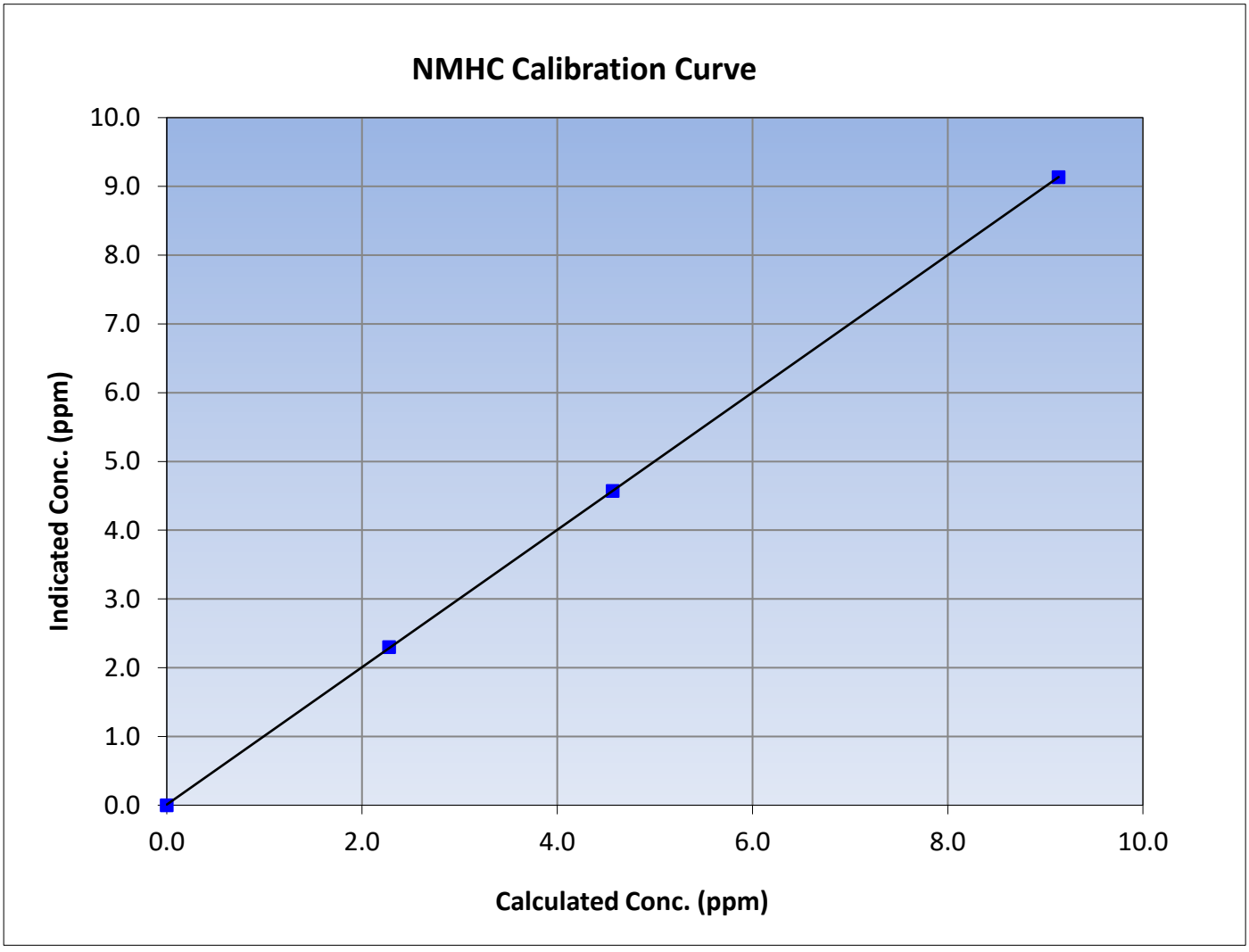
Version-06-2022

Station Information

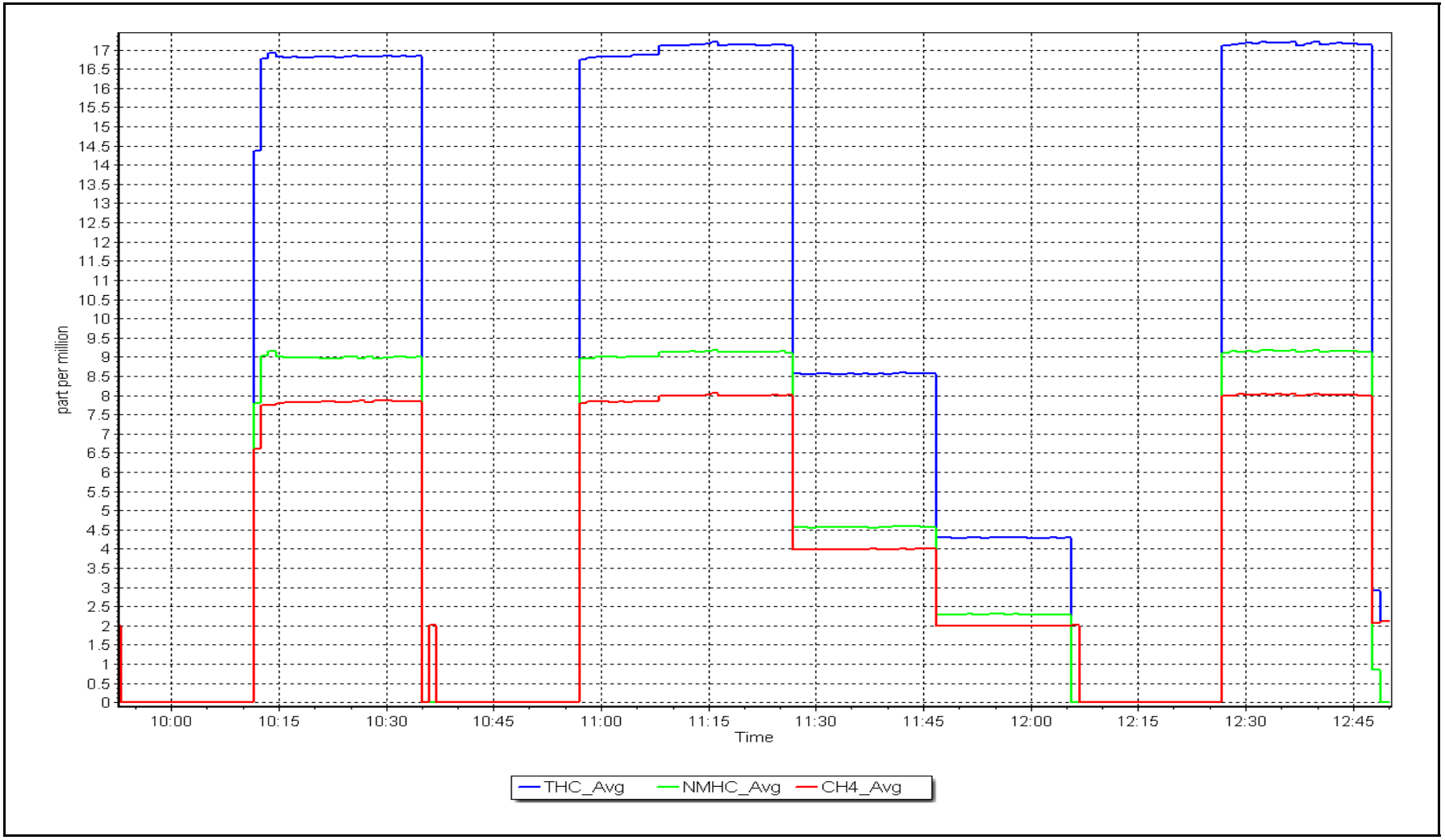
Calibration Date:	November 10, 2023	Previous Calibration:	October 2, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:47	End Time (MST):	12:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999995	≥0.995
9.14	9.13	1.0004			
4.57	4.57	0.9990	Slope	0.998936	0.90 - 1.10
2.28	2.30	0.9918			
			Intercept	0.009192	+/-0.5



NMHC Calibration Plot Date: November 10, 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:	November 15, 2023	Last Cal Date:	November 10, 2023
Start time (MST):	10:12	End time (MST):	13:42
Reason:	Maintenance		

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:	2.63E-04	2.67E-04	NMHC SP Ratio:	4.93E-05	4.84E-05
CH4 Retention time:	15.80	16.20	NMHC Peak Area:	185351	188752
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	4919	80.2	17.12	17.07	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	17.12	17.01	1.006
second point	4960	40.1	8.56	8.51	1.006
third point	4980	20.0	4.27	4.25	1.005
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	17.12	17.02	1.006
				ge Correction Factor	1.006
Baseline Corr AF:	17.07	Prev response	17.13	*% change	-0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-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	9.27	0.986
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	9.14	9.09	1.005
second point	4960	40.1	4.57	4.55	1.004
third point	4980	20.0	2.28	2.27	1.004
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	9.14	9.11	1.003
				Average Correction Factor	1.004
Baseline Corr AF:	9.27	Prev response	9.14	*% change	1.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	80.2	7.98	7.80	1.023
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	7.98	7.92	1.007
second point	4960	40.1	3.99	3.96	1.009
third point	4980	20.0	1.99	1.98	1.006
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	7.98	7.91	1.009
				Average Correction Factor	1.007
Baseline Corr AF:	7.80	Prev response	7.99	*% change	-2.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999996	0.993496
THC Cal Offset:	0.010258	0.004421
CH4 Cal Slope:	1.000951	0.992406
CH4 Cal Offset:	0.001466	0.000046
NMHC Cal Slope:	0.998936	0.994848
NMHC Cal Offset:	0.009192	0.002776

Notes: Baseline dipping seen during daily checks. Calibrated zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

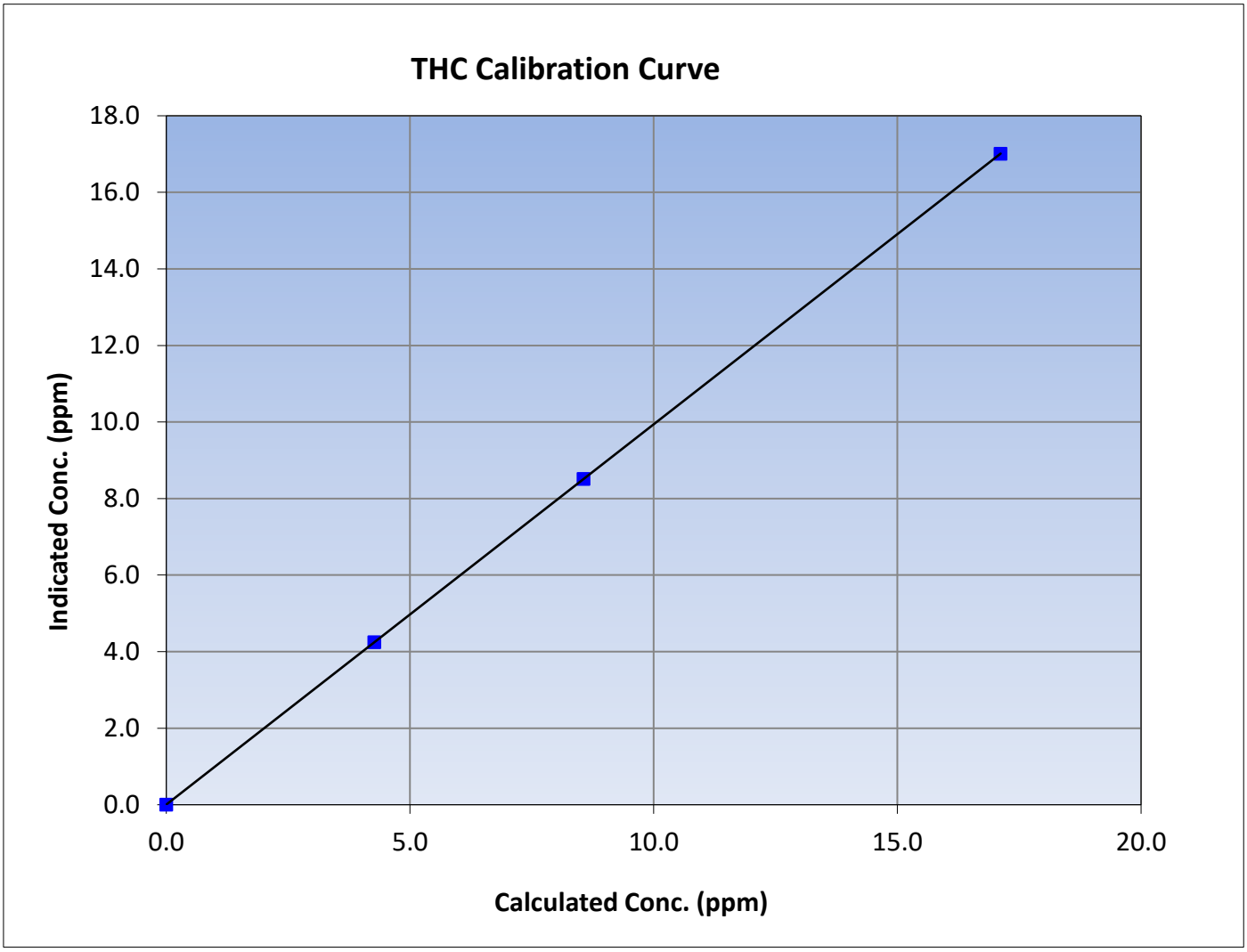
Version-06-2022

Station Information

Calibration Date:	November 15, 2023	Previous Calibration:	November 10, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:12	End Time (MST):	13:42
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	1.000000	*≥0.995*
17.12	17.01	1.0064			
8.56	8.51	1.0057	Slope	0.993496	*0.90 - 1.10*
4.27	4.25	1.0046			
			Intercept	0.004421	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

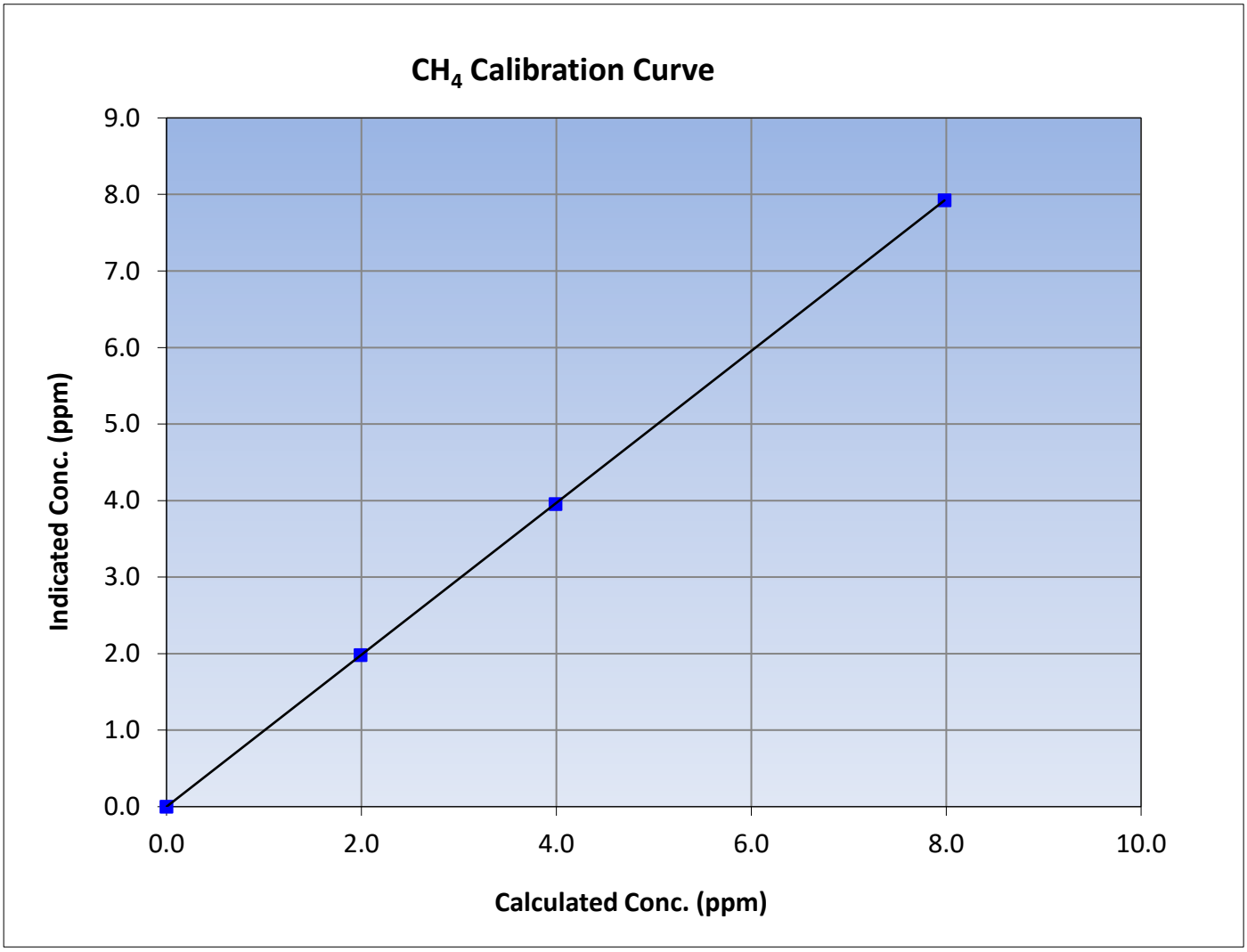
Version-06-2022

Station Information

Calibration Date:	November 15, 2023	Previous Calibration:	November 10, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:12	End Time (MST):	13:42
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999999	*≥0.995*
7.98	7.92	1.0074			
3.99	3.96	1.0090	Slope	0.992406	*0.90 - 1.10*
1.99	1.98	1.0058			
			Intercept	0.000046	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

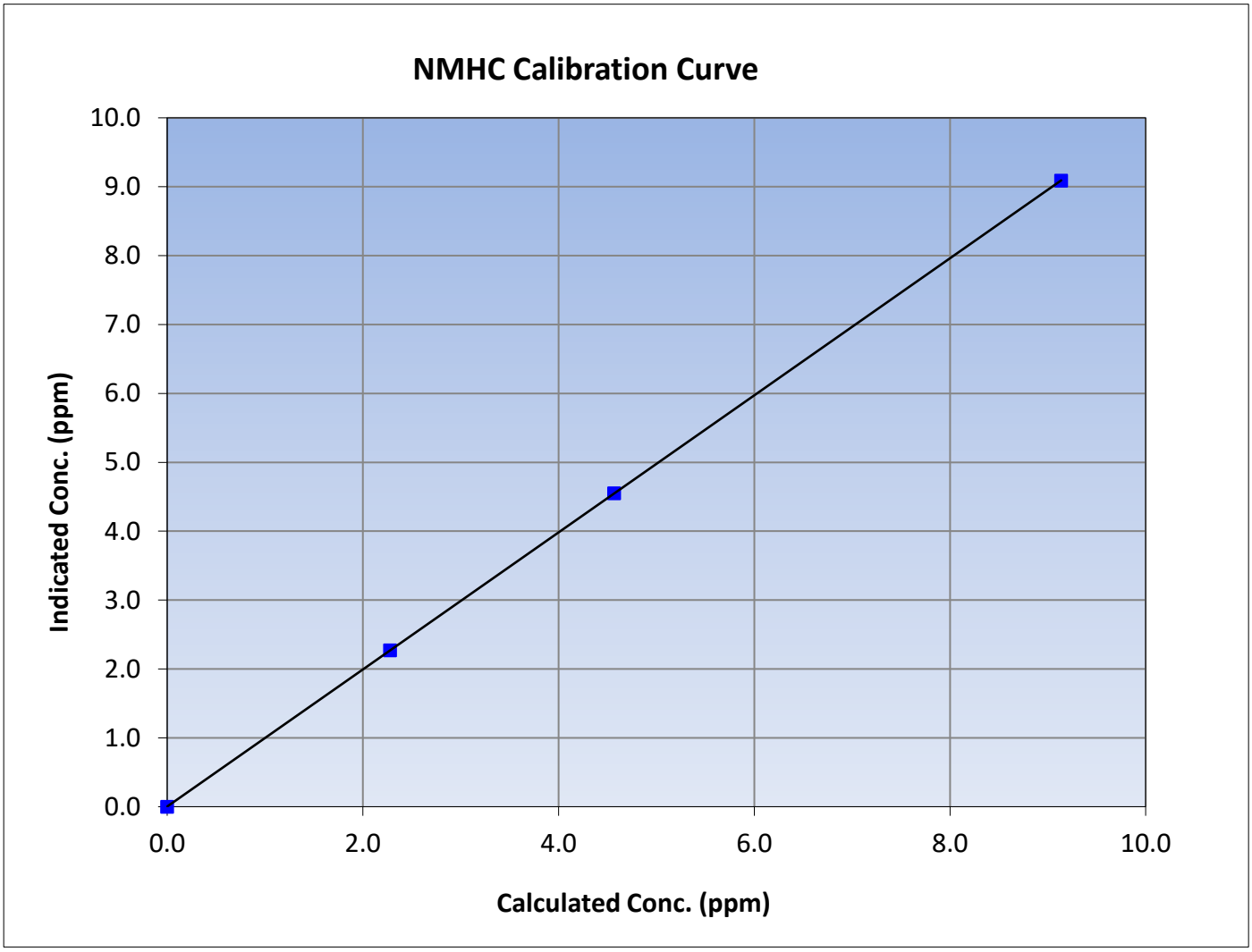
Version-06-2022

Station Information

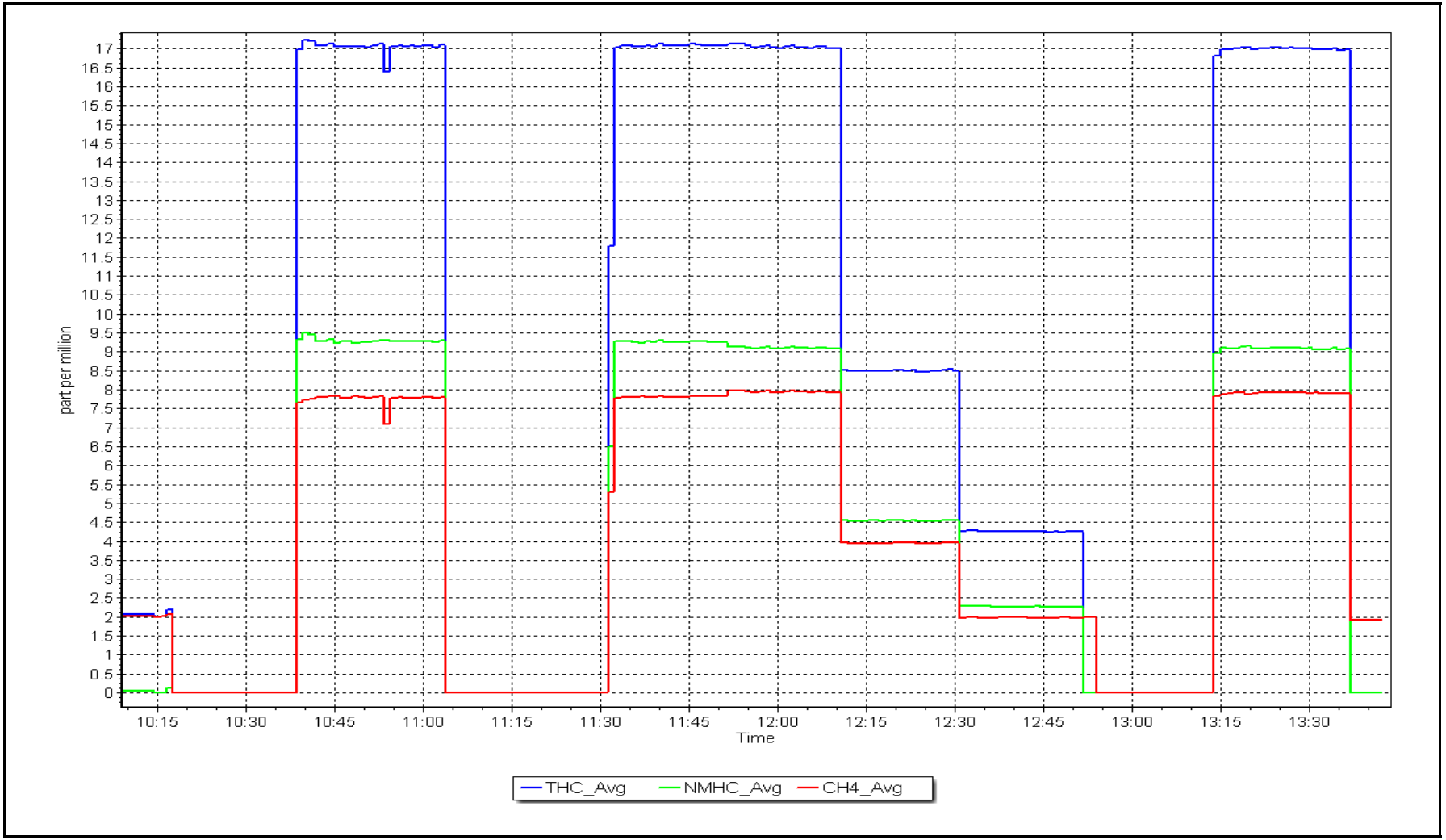
Calibration Date:	November 15, 2023	Previous Calibration:	November 10, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:12	End Time (MST):	13:42
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999999	*≥0.995*
9.14	9.09	1.0051			
4.57	4.55	1.0036	Slope	0.994848	*0.90 - 1.10*
2.28	2.27	1.0036			
			Intercept	0.002776	*+/-0.5*



NMHC Calibration Plot Date: November 15, 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:	November 17, 2023	Last Cal Date:	November 15, 2023
Start time (MST):	10:45	End time (MST):	N/A
Reason:	Removal		

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:	2.67E-04	N/A	NMHC SP Ratio:	4.84E-05	N/A
CH4 Retention time:	16.20	N/A	NMHC Peak Area:	188752	N/A
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	4919	80.2	17.12	13.71	1.249
as found 2nd point	4960	40.1	8.56	7.96	1.075
as found 3rd point	4980	20.0	4.27	4.00	1.068
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					

				;e Correction Factor	
Baseline Corr AF:	13.71	Prev response	17.01	*% change	-24.1%
Baseline Corr 2nd AF:	8.0	AF Slope:	0.796633	AF Intercept:	0.453990
Baseline Corr 3rd AF:	4.0	AF Correlation:	0.991698	* = > +/-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	9.03	1.011
as found 2nd point	4960	40.1	4.57	4.50	1.014
as found 3rd point	4980	20.0	2.28	2.26	1.010
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	9.03	Prev response	9.09	*% change	-0.6%
Baseline Corr 2nd AF:	4.5	AF Slope:	0.988482	AF Intercept:	-0.001039
Baseline Corr 3rd AF:	2.3	AF Correlation:	0.999997	* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	80.2	7.98	4.67	1.708
as found 2nd point	4960	40.1	3.99	3.46	1.153
as found 3rd point	4980	20.0	1.99	1.74	1.143
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	4.67	Prev response	7.92	*% change	-69.5%
Baseline Corr 2nd AF:	3.46	AF Slope:	0.576666	AF Intercept:	0.455628
Baseline Corr 3rd AF:	1.74	AF Correlation:	0.930188	* = > +/-5% change initiates investigation	

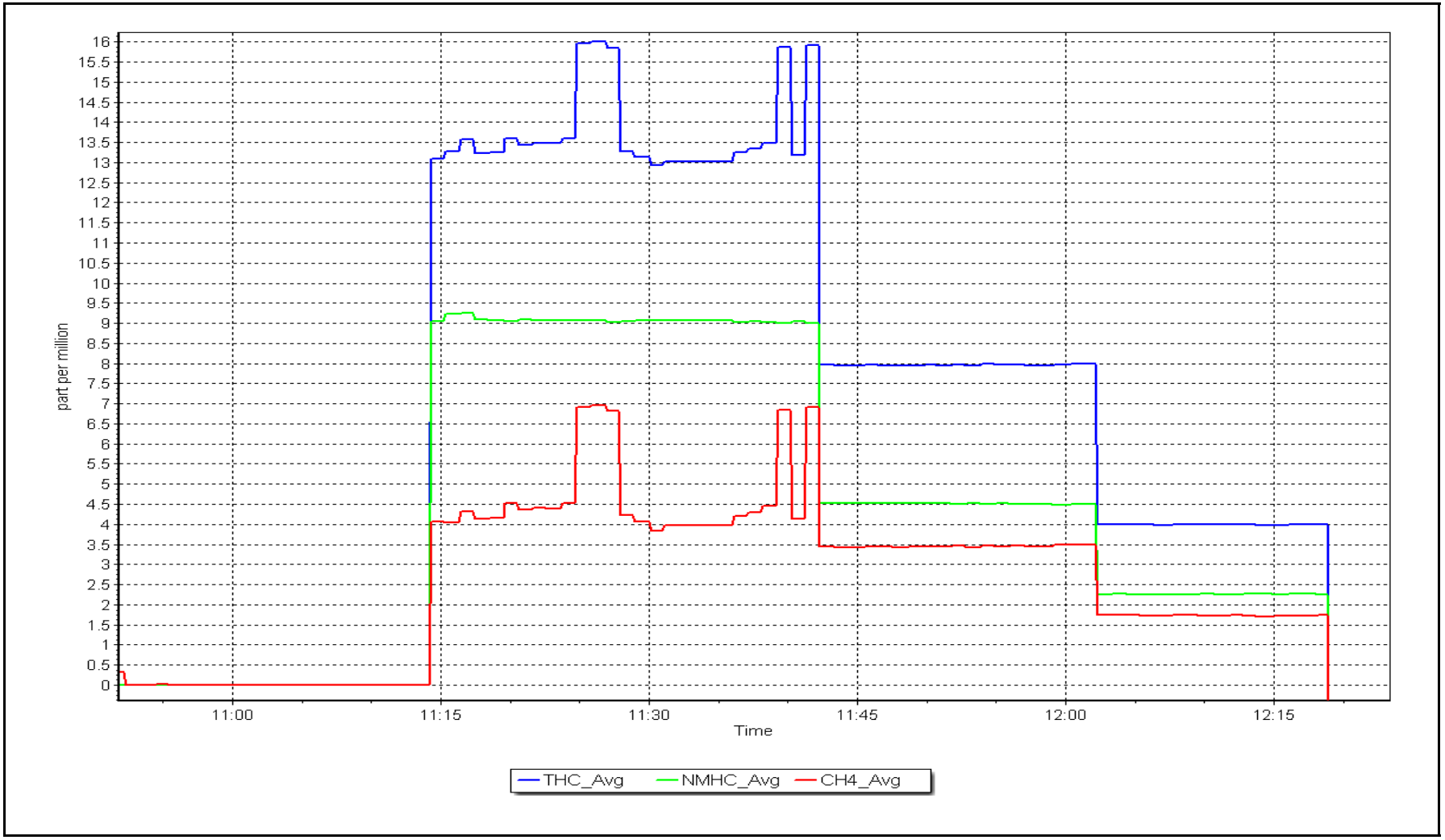
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.993496	
THC Cal Offset:	0.004421	
CH4 Cal Slope:	0.992406	
CH4 Cal Offset:	0.000046	
NMHC Cal Slope:	0.994848	
NMHC Cal Offset:	0.002776	

Notes: Baseline dipping seen during daily checks. Removing instrument for further maintenance at the shop.

Calibration Performed By: Aswin Sasi Kumar

NMHC Calibration Plot Date: November 17, 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:	November 17, 2023	Last Cal Date:	N/A
Start time (MST):	13:00	End time (MST):	15:45
Reason:	Install		

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 #:	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:	N/A	2.53E-04	NMHC SP Ratio:	N/A	4.34E-05
CH4 Retention time:	N/A	15.00	NMHC Peak Area:	N/A	210777
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					
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	80.2	17.12	17.17	0.997
second point	4960	40.1	8.56	8.58	0.998
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	0.997
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	80.2	9.14	9.18	0.995
second point	4960	40.1	4.57	4.59	0.995
third point	4980	20.0	2.28	2.29	0.996
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	9.14	9.20	0.993
				Average Correction Factor	0.995
Baseline Corr AF:	NA	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

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	80.2	7.98	7.99	0.999
second point	4960	40.1	3.99	3.99	1.001
third point	4980	20.0	1.99	1.99	0.998
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	7.98	7.99	0.999
				Average Correction Factor	0.999
Baseline Corr AF:	NA	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	N/A	1.003147
THC Cal Offset:	N/A	-0.002334
CH4 Cal Slope:	N/A	1.001123
CH4 Cal Offset:	N/A	-0.001135
NMHC Cal Slope:	N/A	1.005040
NMHC Cal Offset:	N/A	-0.001199

Notes: Install calibration. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

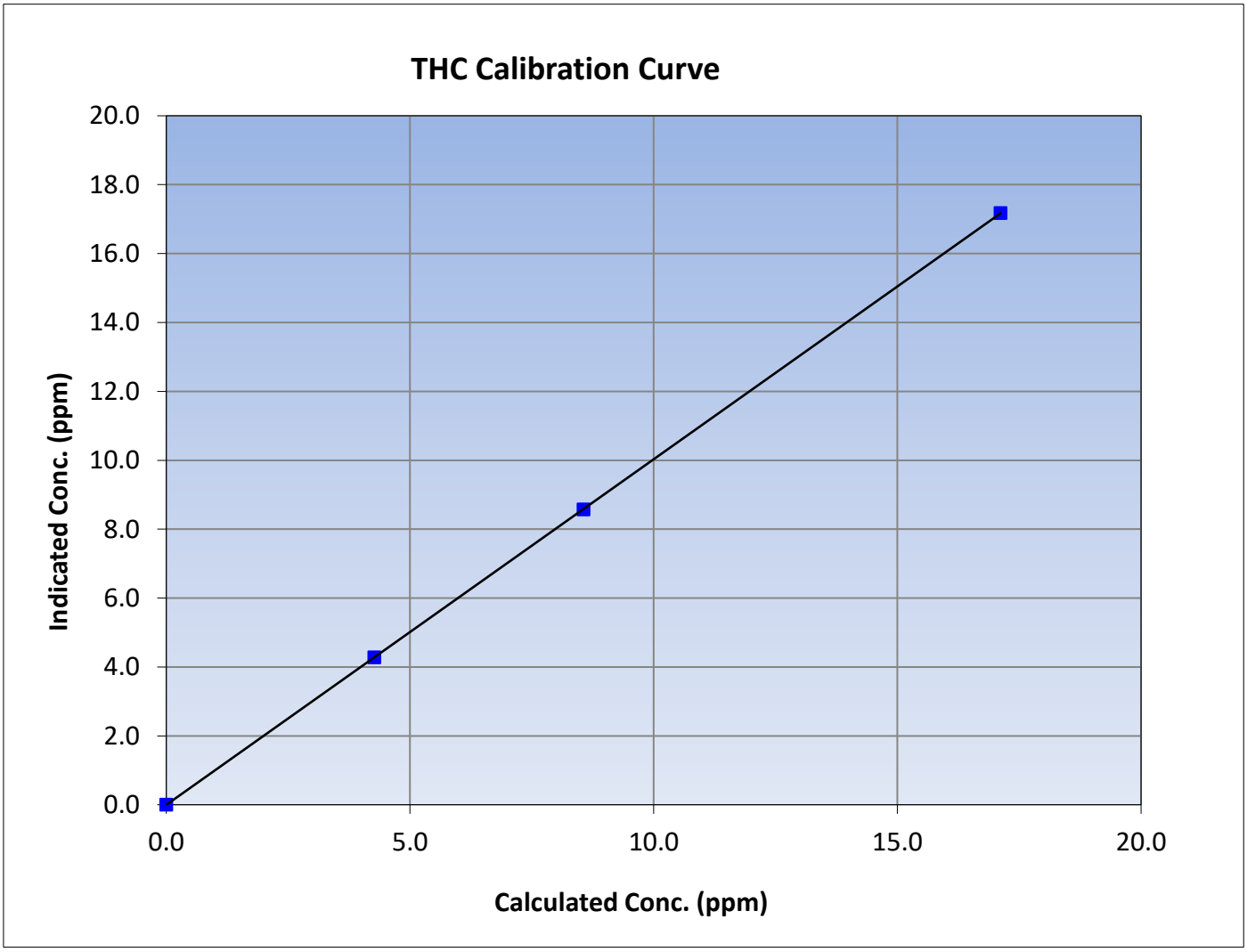
Version-06-2022

Station Information

Calibration Date:	November 17, 2023	Previous Calibration:	N/A
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	13:00	End Time (MST):	15:45
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	1.000000	≥0.995
17.12	17.17	0.9968			
8.56	8.58	0.9979	Slope	1.003147	0.90 - 1.10
4.27	4.28	0.9971			
			Intercept	-0.002334	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

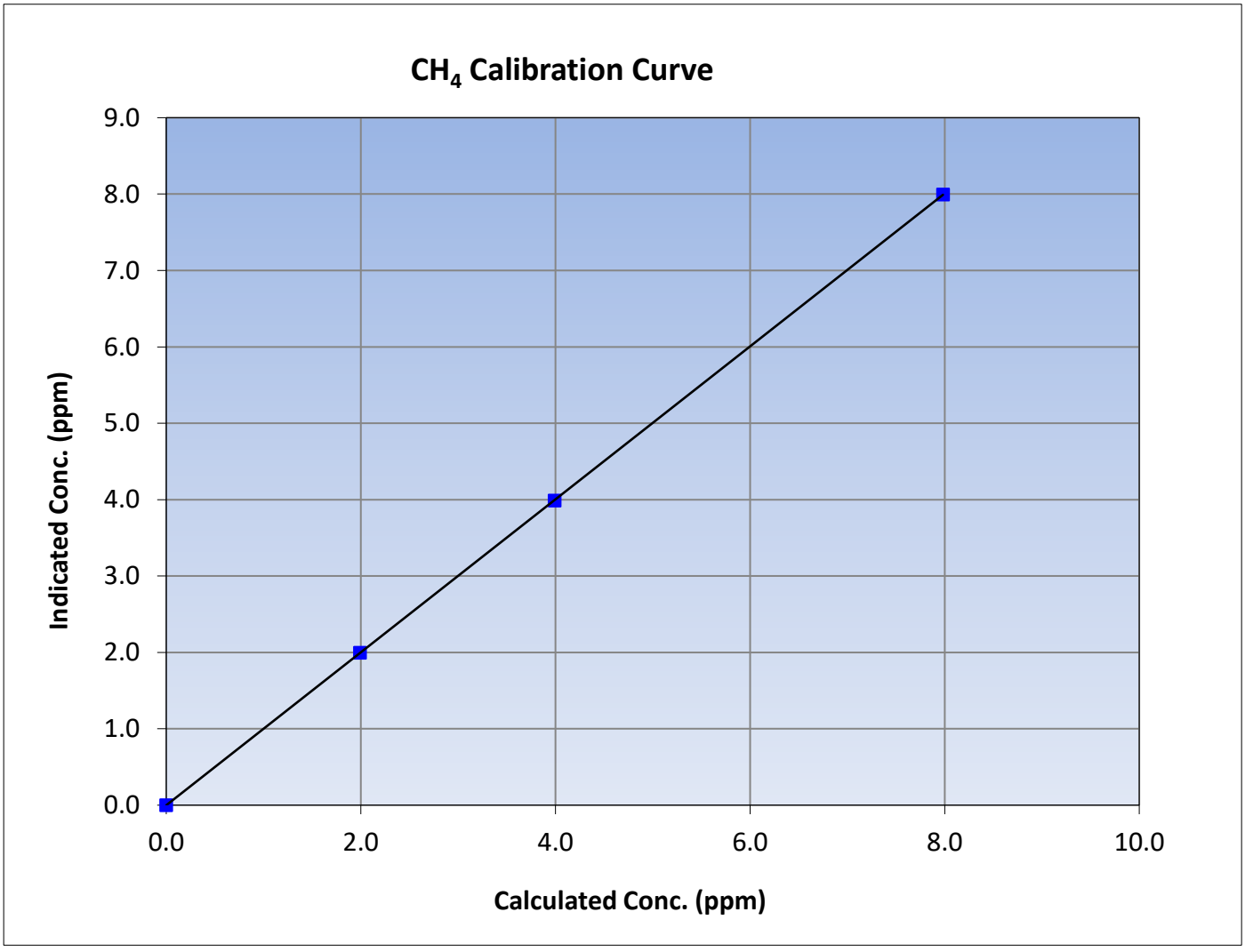
Version-06-2022

Station Information

Calibration Date:	November 17, 2023	Previous Calibration:	N/A
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	13:00	End Time (MST):	15:45
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	0.999999	*≥0.995*
7.98	7.99	0.9987			
3.99	3.99	1.0007	Slope	1.001123	*0.90 - 1.10*
1.99	1.99	0.9982			
			Intercept	-0.001135	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

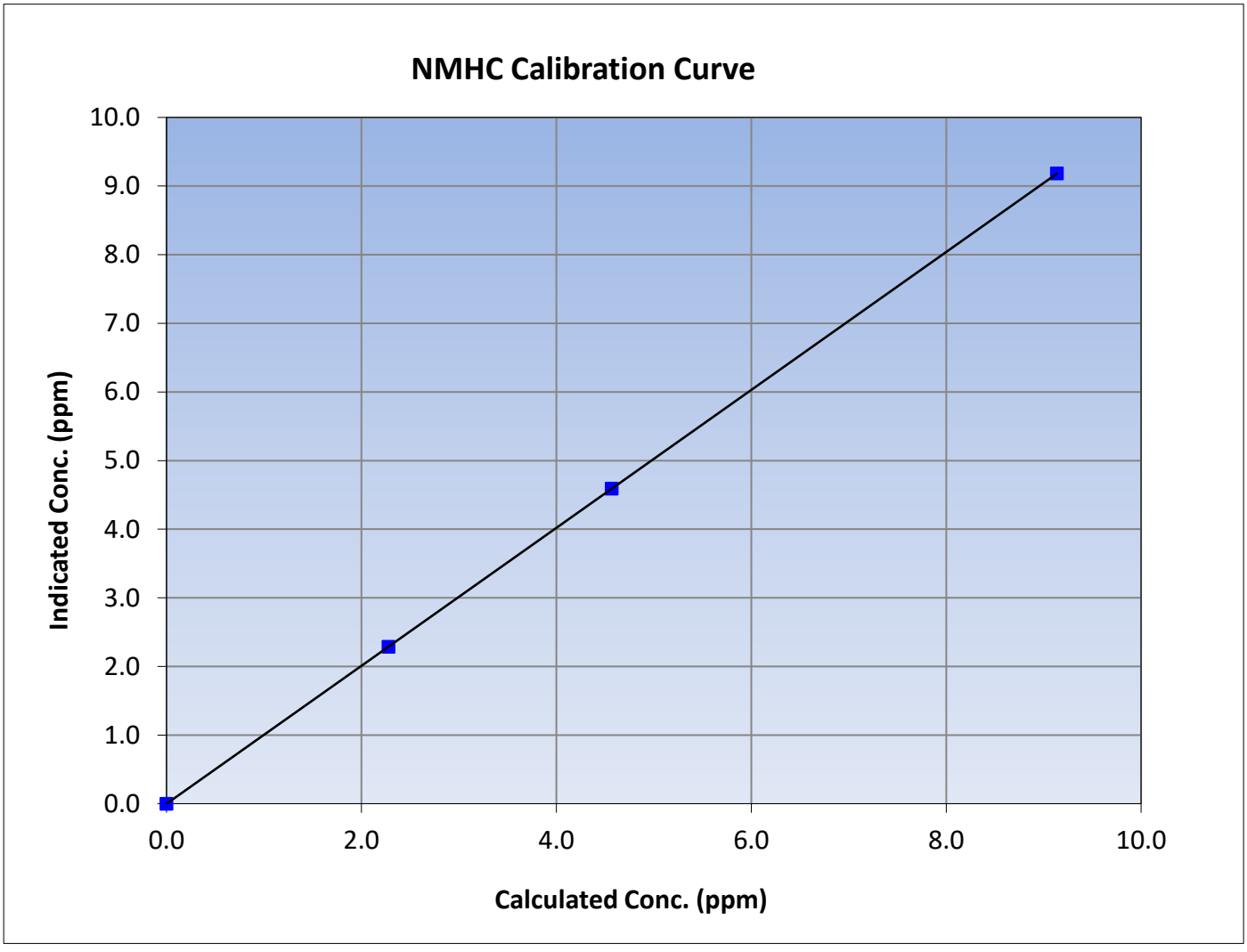
Version-06-2022

Station Information

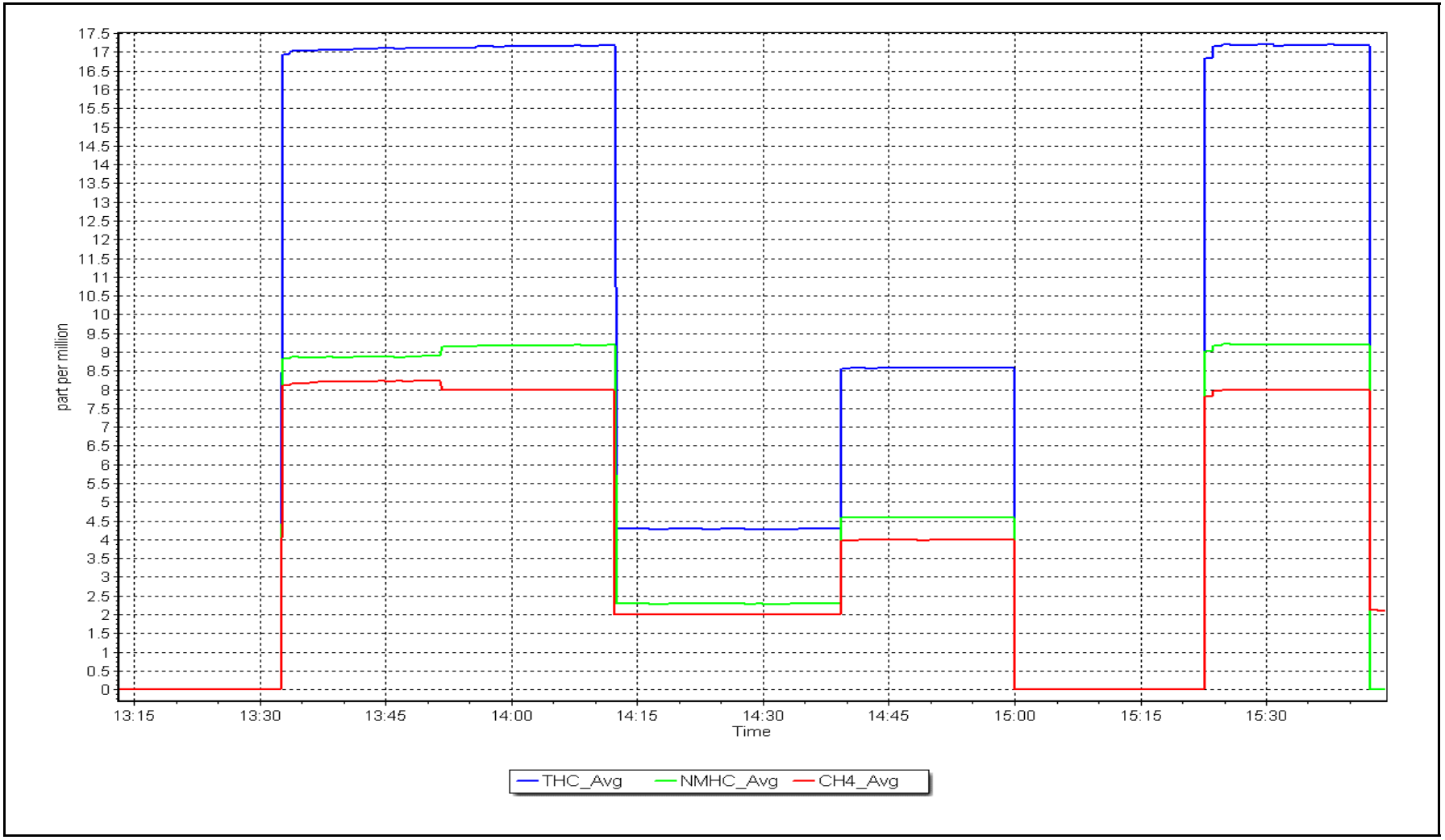
Calibration Date:	November 17, 2023	Previous Calibration:	N/A
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	13:00	End Time (MST):	15:45
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	1.000000	≥0.995
9.14	9.18	0.9951			
4.57	4.59	0.9953	Slope	1.005040	0.90 - 1.10
2.28	2.29	0.9961			
			Intercept	-0.001199	+/-0.5



NMHC Calibration Plot Date: November 17, 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:	November 22, 2023	Last Cal Date:	October 13, 2023
Start time (MST):	10:13	End time (MST):	14:46
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:	1.162	1.128	NO bkgnd or offset:	10.6	10.3
NOX coeff or slope:	0.994	0.992	NOX bkgnd or offset:	10.9	10.6
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	177.7	178.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001860	0.998965
NO_X Cal Offset:	0.949799	0.368958
NO Cal Slope:	1.002626	0.999327
NO Cal Offset:	-0.151784	-0.472648
NO_2 Cal Slope:	1.002309	1.001499
NO_2 Cal Offset:	0.845161	0.067768

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.2	-0.3	----	----
as found span	4919	80.5	805.1	800.3	4.8	834.0	823.9	10.1	0.965	0.971
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	0.0	-0.3	----	----
high point	4919	80.5	805.1	800.3	4.8	804.2	799.4	4.8	1.001	1.001
second point	4959	40.2	402.1	399.7	2.4	402.6	398.9	3.8	0.999	1.002
third point	4979	20.1	201.0	199.8	1.2	201.7	198.6	3.1	0.997	1.006
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	0.0	-0.2	----	----
as left span	4919	80.5	805.1	452.2	352.9	805.3	451.0	354.3	1.000	1.003
								Average Correction Factor	0.999	1.003

Corrected As found	NO_X = 834.5 ppb	NO = 824.1 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	3.2%
Previous Response	NO_X = 807.5 ppb	NO = 802.2 ppb			*Percent Change	NO =	2.7%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	795.3	447.2	352.9	353.3	0.999	100.1%
2nd GPT point (200 ppb O3)	795.3	665.9	134.2	135.1	0.994	100.6%
3rd GPT point (100 ppb O3)	795.3	728.6	71.5	71.7	0.998	100.2%
				Average Correction Factor	0.997	100.3%

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

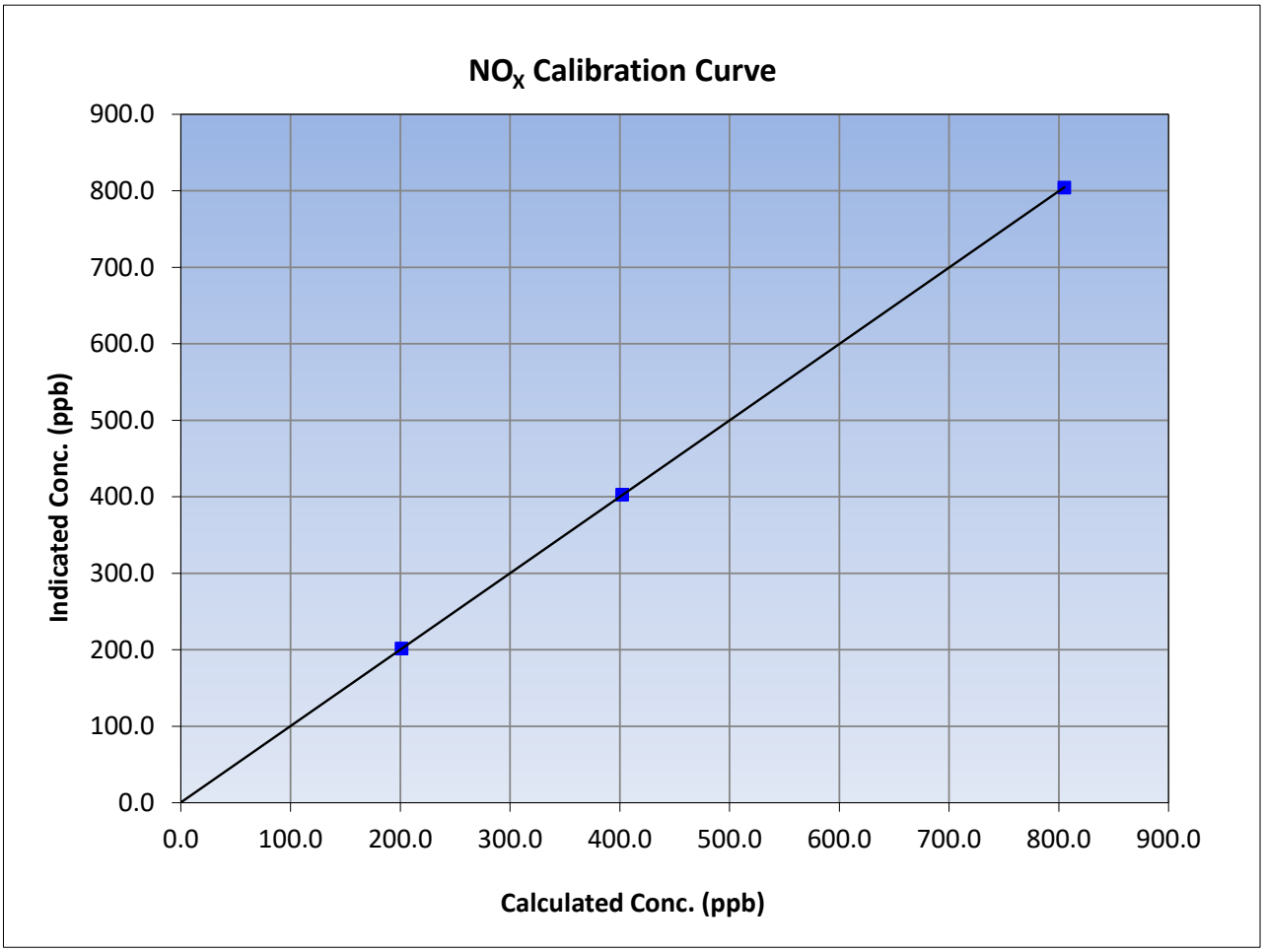
Version-04-2020

Station Information

Calibration Date:	November 22, 2023	Previous Calibration:	October 13, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:13	End Time (MST):	14:46
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.3	----	Correlation Coefficient	0.999997	≥0.995
805.1	804.2	1.0011			
402.1	402.6	0.9987	Slope	0.998965	0.90 - 1.10
201.0	201.7	0.9967			
			Intercept	0.368958	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

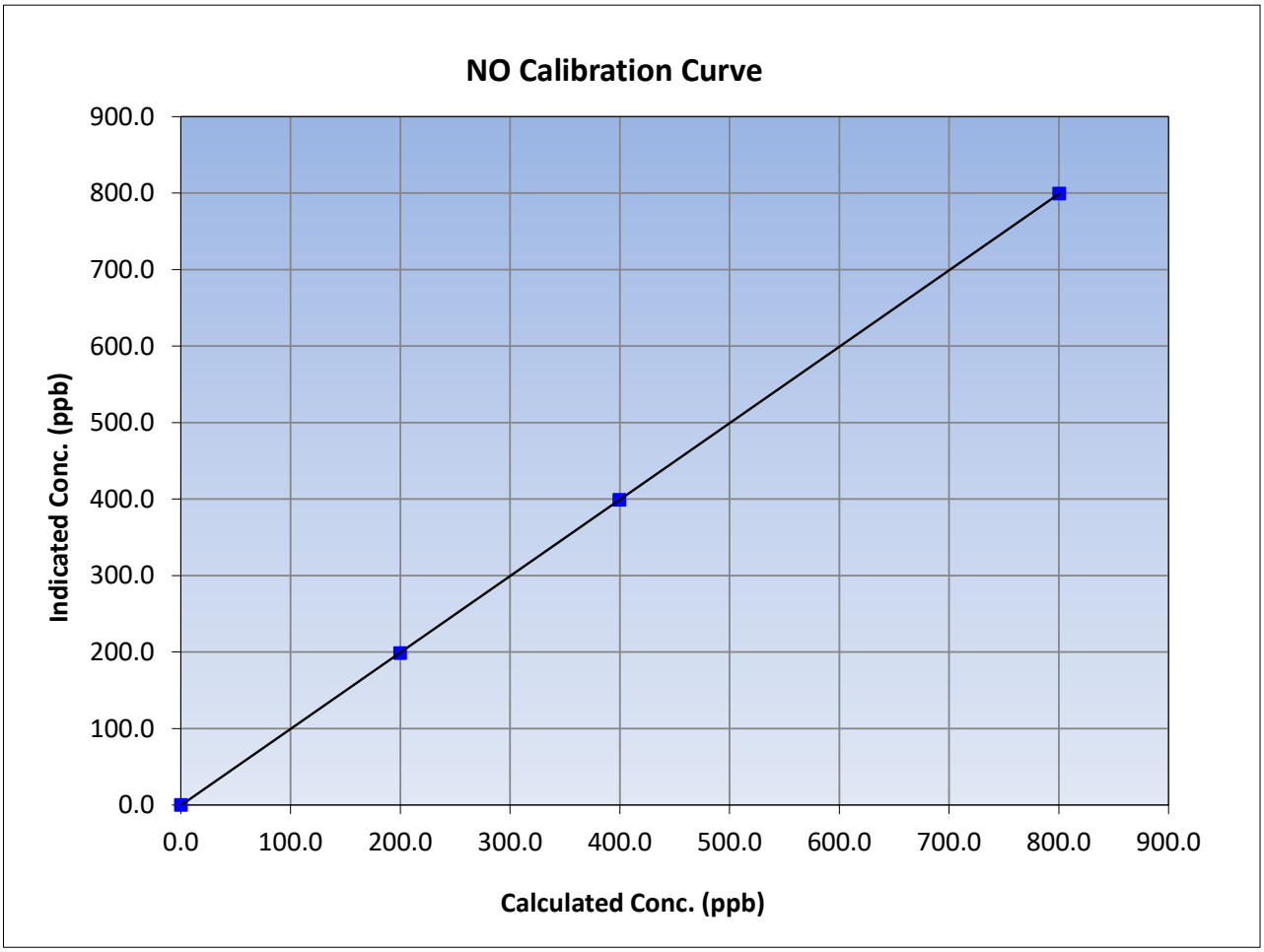
Version-04-2020

Station Information

Calibration Date:	November 22, 2023	Previous Calibration:	October 13, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:13	End Time (MST):	14:46
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999998	≥0.995
800.3	799.4	1.0011			
399.7	398.9	1.0019	Slope	0.999327	0.90 - 1.10
199.8	198.6	1.0062			
			Intercept	-0.472648	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

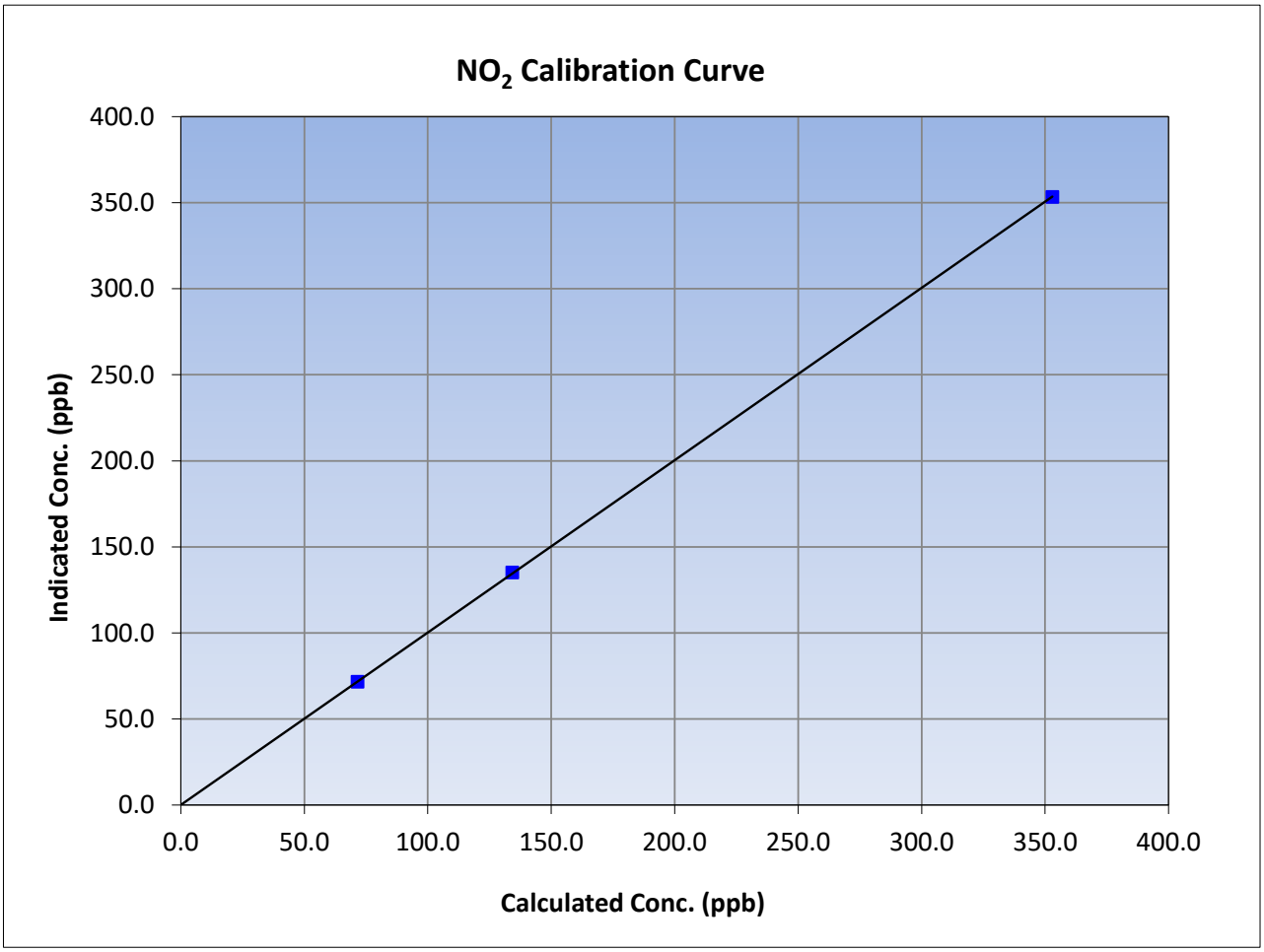
Version-04-2020

Station Information

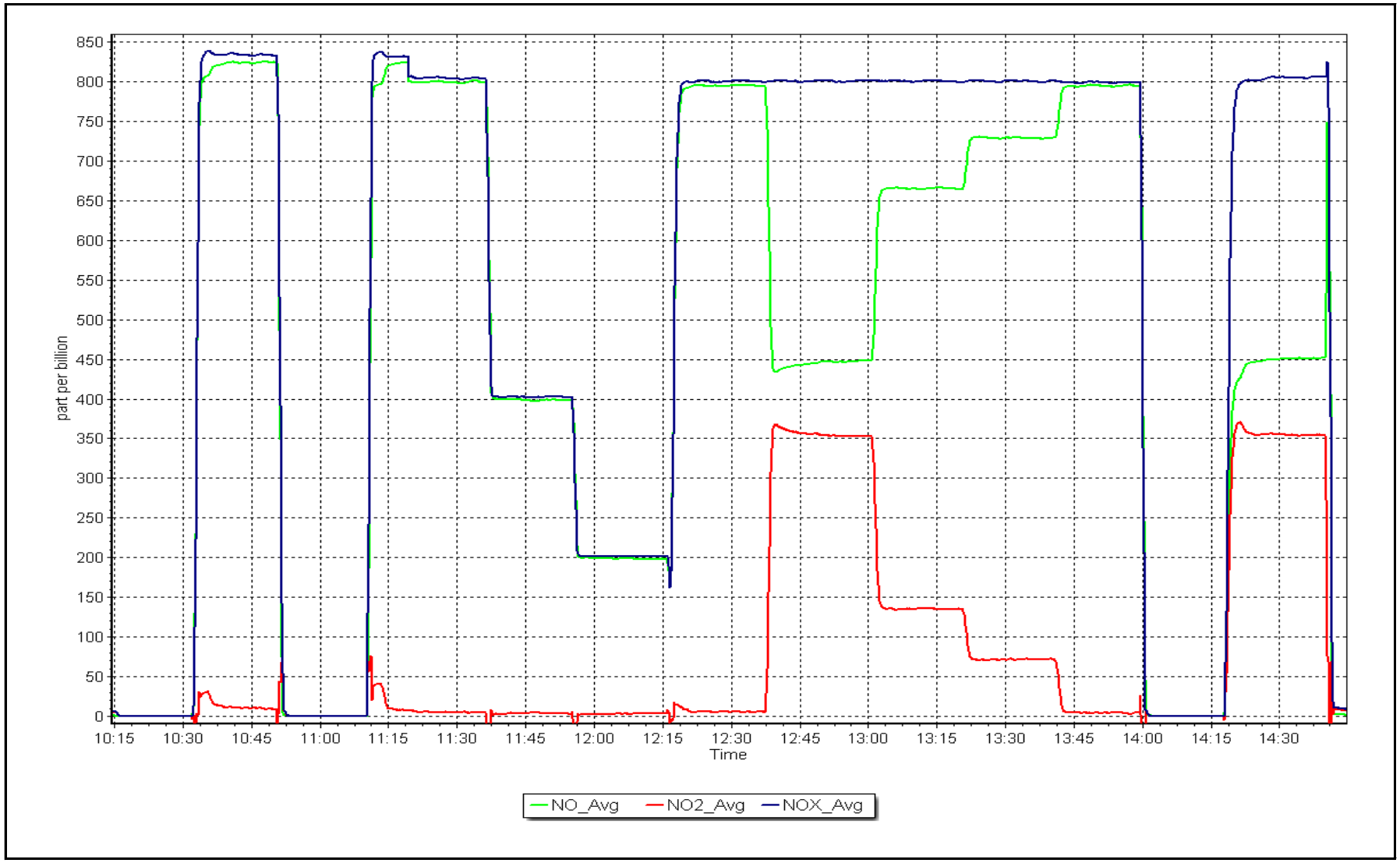
Calibration Date:	November 22, 2023	Previous Calibration:	October 13, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:13	End Time (MST):	14:46
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.3	----	Correlation Coefficient	0.999992	≥0.995
352.9	353.3	0.9990			
134.2	135.1	0.9936	Slope	1.001499	0.90 - 1.10
71.5	71.7	0.9976			
			Intercept	0.067768	+/-20



NO_X Calibration Plot Date: November 22, 2023 Location: Barge Landing



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Barge Landing	Station number:	AMS 09
Calibration Date:	November 22, 2023	Last Cal Date:	October 19, 2023
Start time (MST):	10:39	End time (MST):	11:02
Analyzer Make:	API T640	S/N:	844
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25	S/N:	388746
Temp/RH standard:	Alicat FP-25	S/N:	388746

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (^{o}C)	-13.5	-14.0	-13.5	☐	+/- 2 ^{o}C
P (mmHg)	738.7	745.1	738.7	☐	+/- 10 mmHg
flow (LPM)	5.02	4.94	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: November 22, 2023 Last Cal Date: October 19, 2023

PM w/o HEPA: 4.4 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: October 19, 2023 <0.2 ug/m3

Disposable Filter Changed: October 19, 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.

Calibration by: Sean Bala

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS11
LOWER CAMP

NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Lower Camp	Station number:	AMS11
Calibration Date:	November 22, 2023	Last Cal Date:	October 12, 2023
Start time (MST):	11:51	End time (MST):	15:31
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:	1.003950	0.997987	Backgd or Offset:	14.6	14.5
Calibration intercept:	0.611030	0.750571	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	0.7	----
as found span	4919	81.3	800.8	801.0	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	1.0	----
high point	4919	81.3	800.8	800.1	1.001
second point	4959	40.7	400.9	400.5	1.001
third point	4980	20.3	199.9	200.2	0.999
as left zero	5000	0.0	0.0	0.8	----
as left span	4919	81.3	800.8	802.4	0.998
				Average Correction Factor	1.000

Baseline Corr As found:	800.30	Previous response	804.53	*% change	-0.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

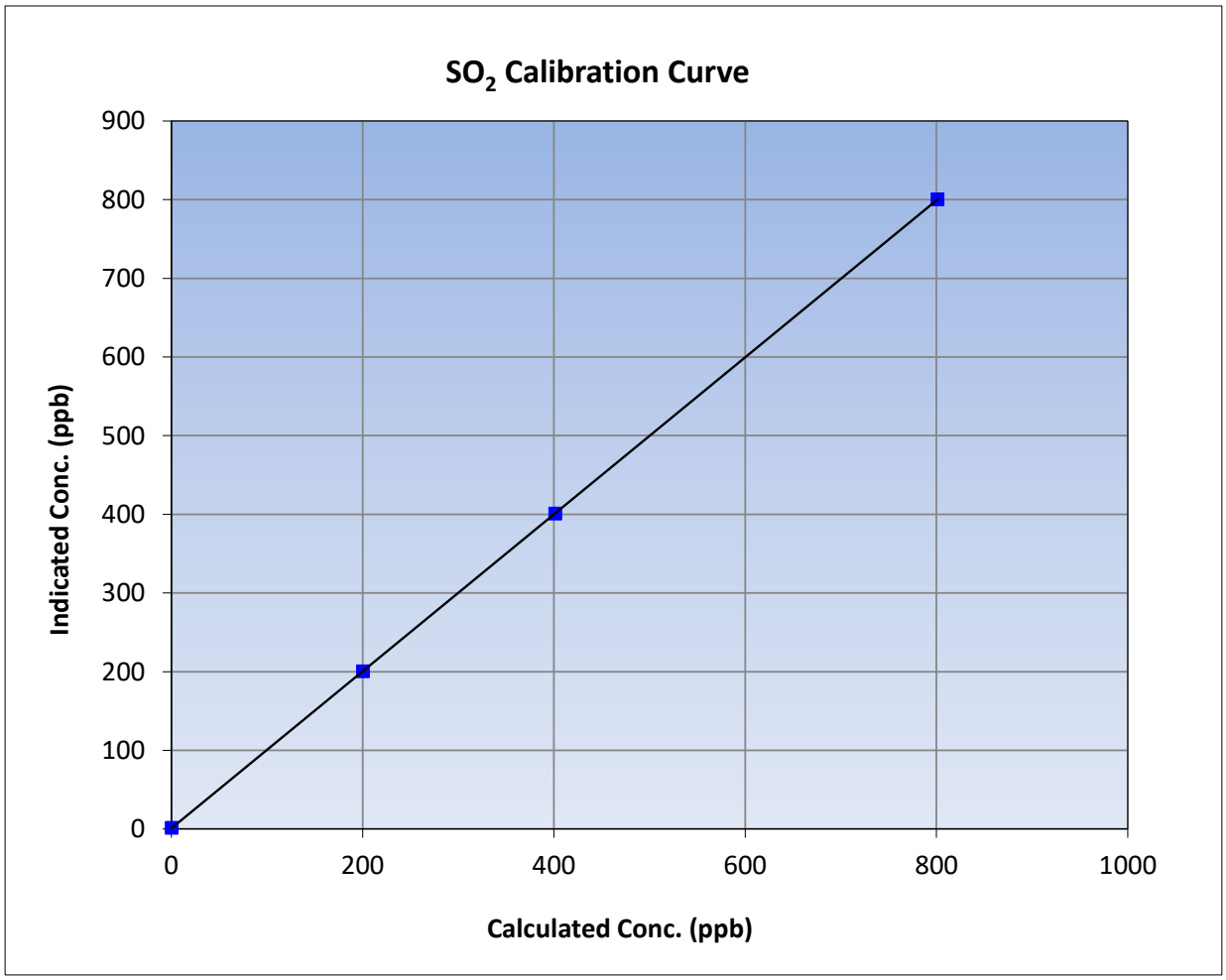
Station Information

Calibration Date:	November 22, 2023	Previous Calibration:	October 12, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	11:51	End Time (MST):	15:31
Analyzer make:	Thermo 43i	Analyzer serial #:	100841398

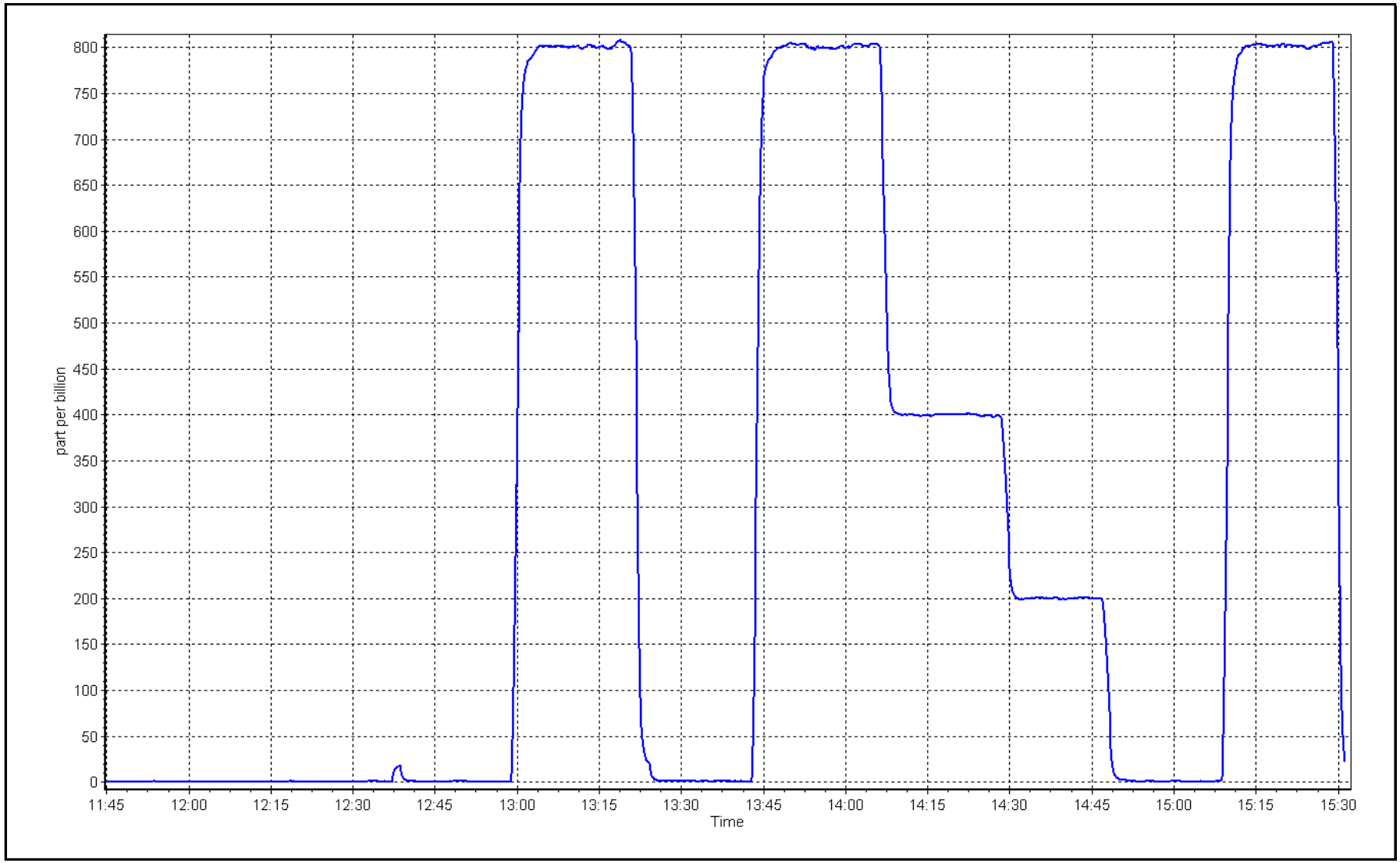
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	1.0	----
800.8	800.1	1.0008
400.9	400.5	1.0010
199.9	200.2	0.9987

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	0.997987	*0.90 - 1.10*
Intercept	0.750571	*+/-30*



SO2 Calibration Plot Date: November 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:	November 30, 2023	Last Cal Date:	October 11, 2023
Start time (MST):	11:13	End time (MST):	15:13
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:	1.022511	1.012622	Backgd or Offset:	14.1	14.2
Calibration intercept:	-0.206756	0.214550	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	81.3	0.987
as found 2nd point	4963	36.8	40.0	40.6	0.992
as found 3rd point	4982	18.6	20.2	20.7	0.990
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	81.3	0.983
second point	4963	36.8	40.0	40.5	0.987
third point	4982	18.6	20.2	20.4	0.990
as left zero	5000	0.0	0.0	0.5	----
as left span	4926	73.6	79.9	81.0	0.987
SO2 Scrubber Check	4919	81.1	811.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.987
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.0	Prev response:	81.51	*% change:	-0.6%
Baseline Corr 2nd AF pt:	40.3	AF Slope:	1.013497	AF Intercept:	0.233916
Baseline Corr 3rd AF pt:	20.4	AF Correlation:	0.999993		

* = > +/-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

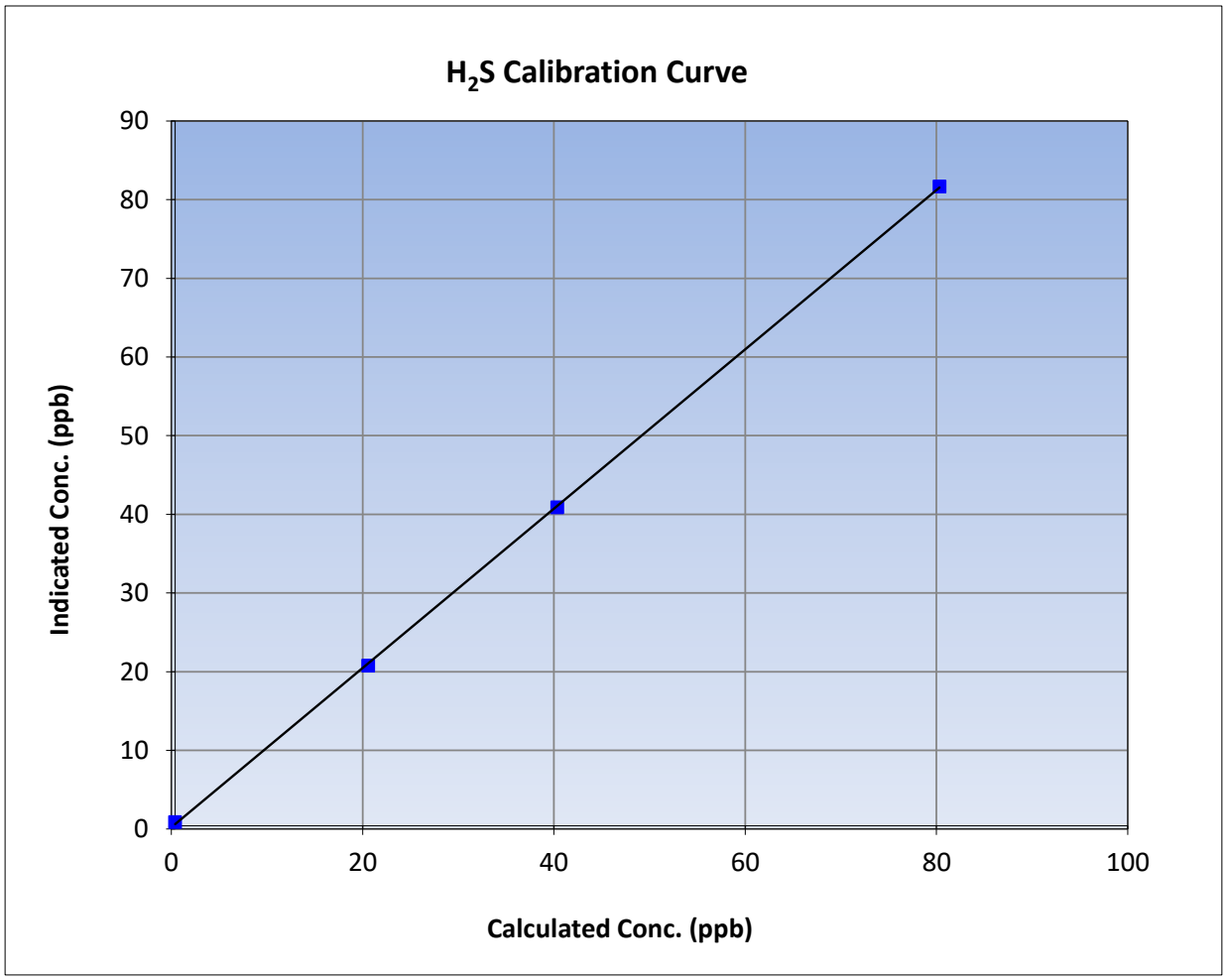
Station Information

Calibration Date:	November 30, 2023	Previous Calibration:	October 11, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	11:13	End Time (MST):	15:13
Analyzer make:	Thermo 450iQ	Analyzer serial #:	CM20080003

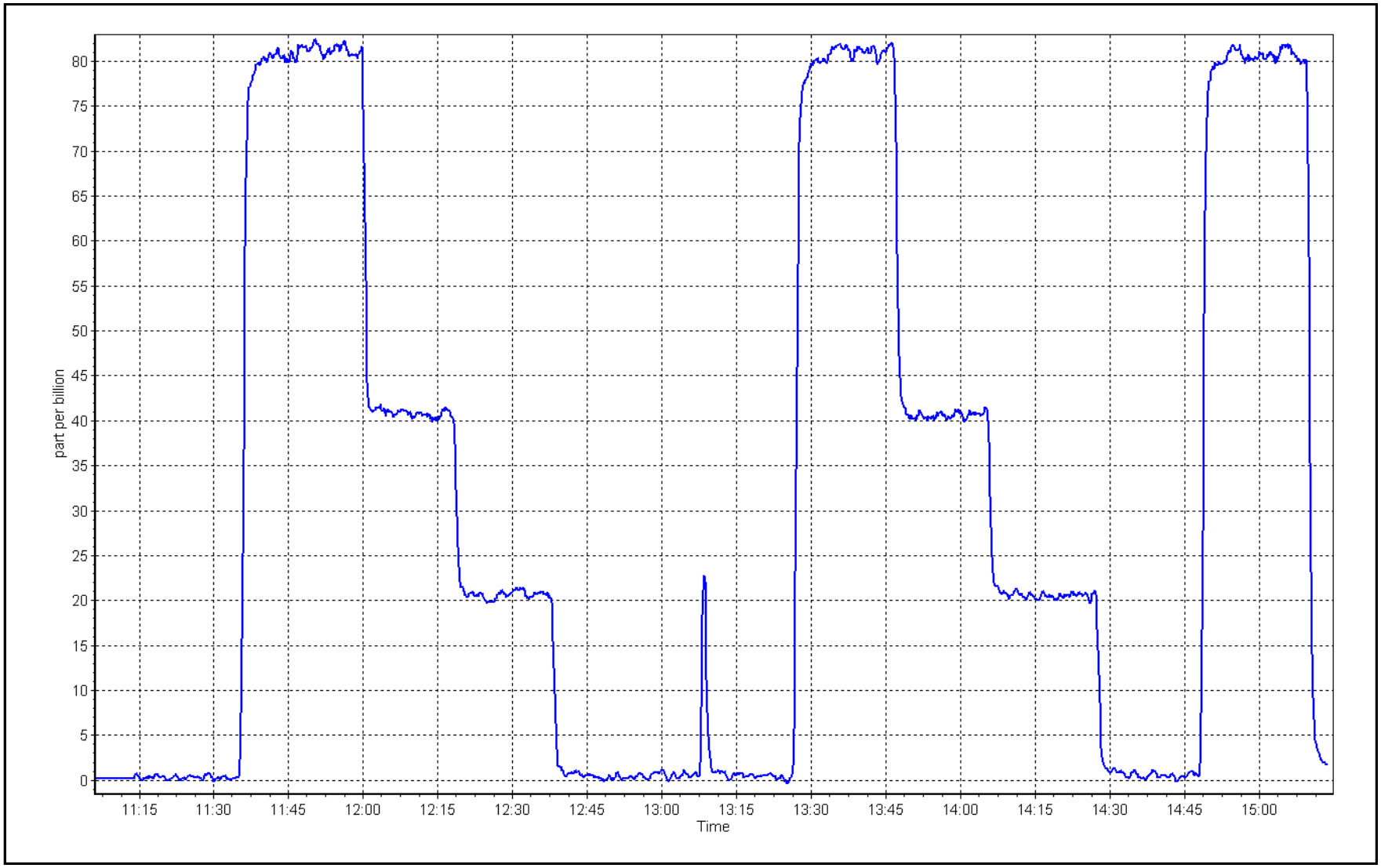
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
79.9	81.3	0.9830
40.0	40.5	0.9866
20.2	20.4	0.9899

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999942	*≥0.995*
Slope	1.012622	*0.90 - 1.10*
Intercept	0.214550	*+/-3*



H_2S Calibration Plot Date: November 30, 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:	November 22, 2023	Last Cal Date:	October 12, 2023
Start time (MST):	11:51	End time (MST):	15:31
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	17.38	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.3	17.35	17.38	0.998
second point	4959	40.7	8.69	8.67	1.002
third point	4980	20.3	4.33	4.33	1.002
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	17.35	17.47	0.993
				Average Correction Factor	1.001

Baseline Corr AF:	17.38	Prev response	17.21	*% change	1.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	9.19	9.22	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.3	9.19	9.23	0.996
second point	4959	40.7	4.60	4.60	0.999
third point	4980	20.3	2.29	2.30	0.998
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	9.19	9.27	0.991
				Average Correction Factor	0.998
Baseline Corr AF:	9.22	Prev response	9.09	*% change	1.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	8.16	8.16	1.000
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	8.15	1.001
second point	4959	40.7	4.09	4.07	1.004
third point	4980	20.3	2.04	2.03	1.005
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	8.16	8.19	0.996
				Average Correction Factor	1.003
Baseline Corr AF:	8.16	Prev response	8.12	*% change	0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.994388	1.001857
THC Cal Offset:	-0.039793	-0.011999
CH4 Cal Slope:	0.996052	0.998980
CH4 Cal Offset:	-0.009288	-0.005496
NMHC Cal Slope:	0.992885	1.004102
NMHC Cal Offset:	-0.030904	-0.005505

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

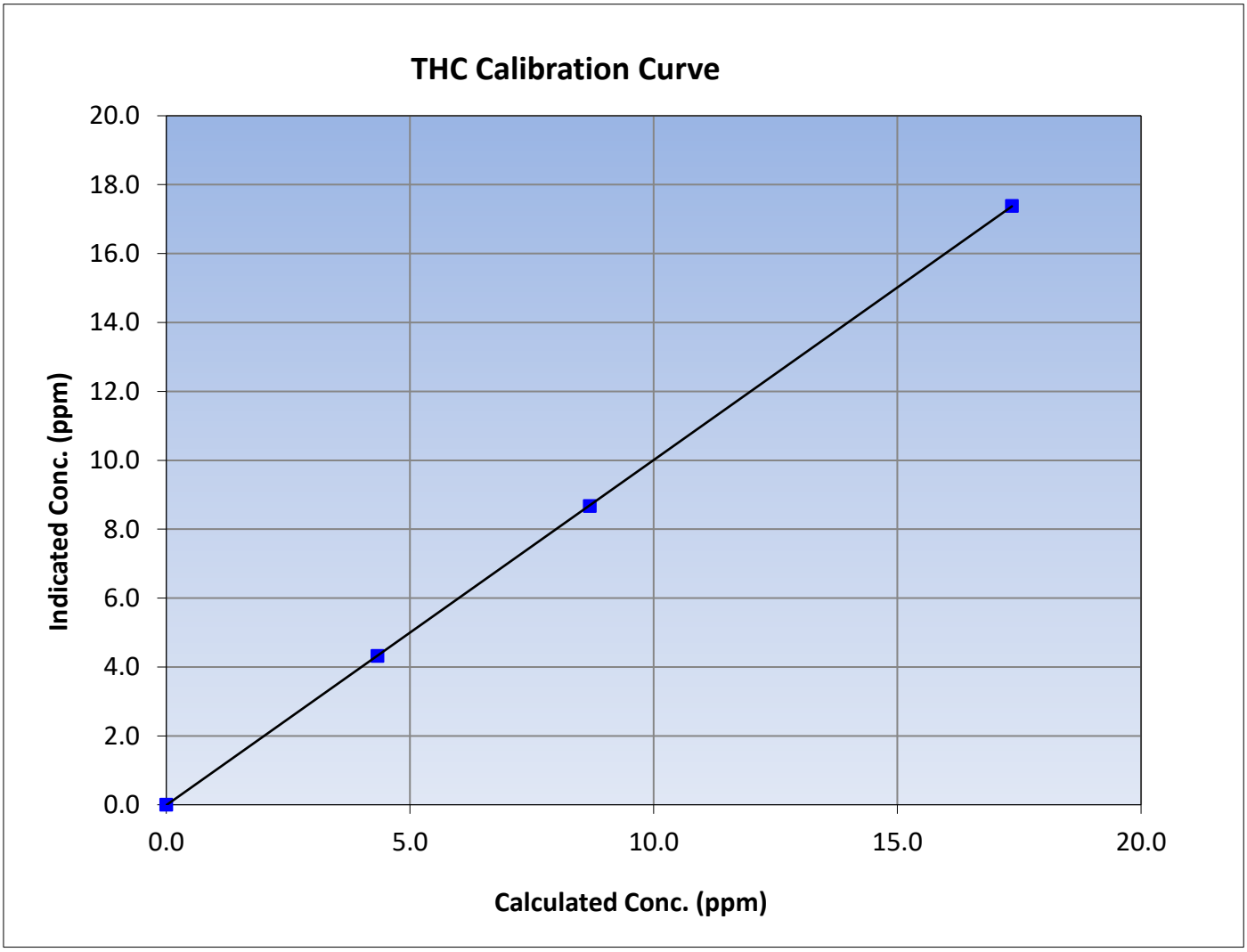
Version-01-2020

Station Information

Calibration Date:	November 22, 2023	Previous Calibration:	October 12, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	11:51	End Time (MST):	15:31
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	0.999996	*≥0.995*
17.35	17.38	0.9982			
8.69	8.67	1.0017	Slope	1.001857	*0.90 - 1.10*
4.33	4.33	1.0017			
			Intercept	-0.011999	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

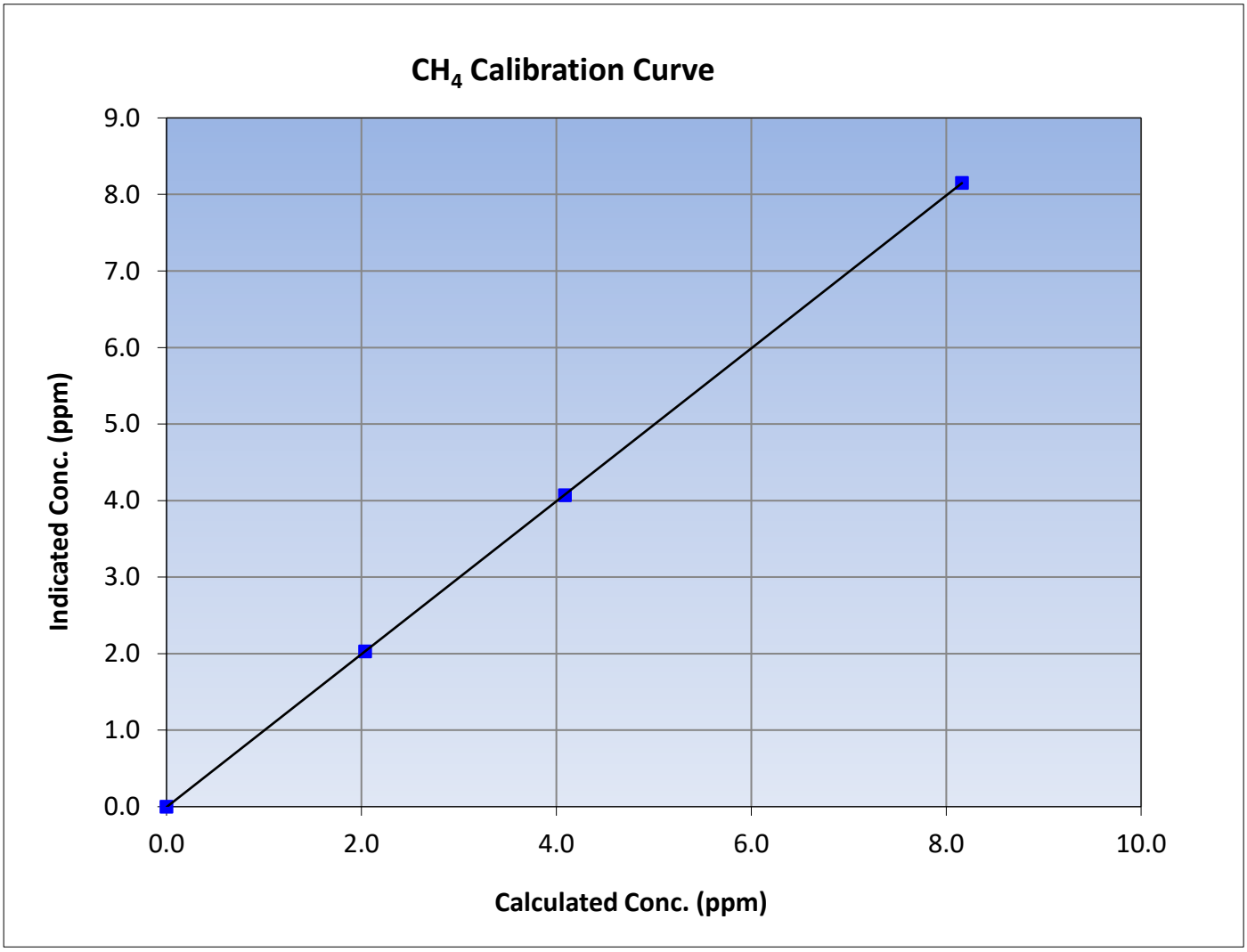
Version-01-2020

Station Information

Calibration Date:	November 22, 2023	Previous Calibration:	October 12, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	11:51	End Time (MST):	15:31
Analyzer make:	Thermo 55i	Analyzer serial #:	1505164381

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999998	*≥0.995*
8.16	8.15	1.0012			
4.09	4.07	1.0038	Slope	0.998980	*0.90 - 1.10*
2.04	2.03	1.0054			
			Intercept	-0.005496	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

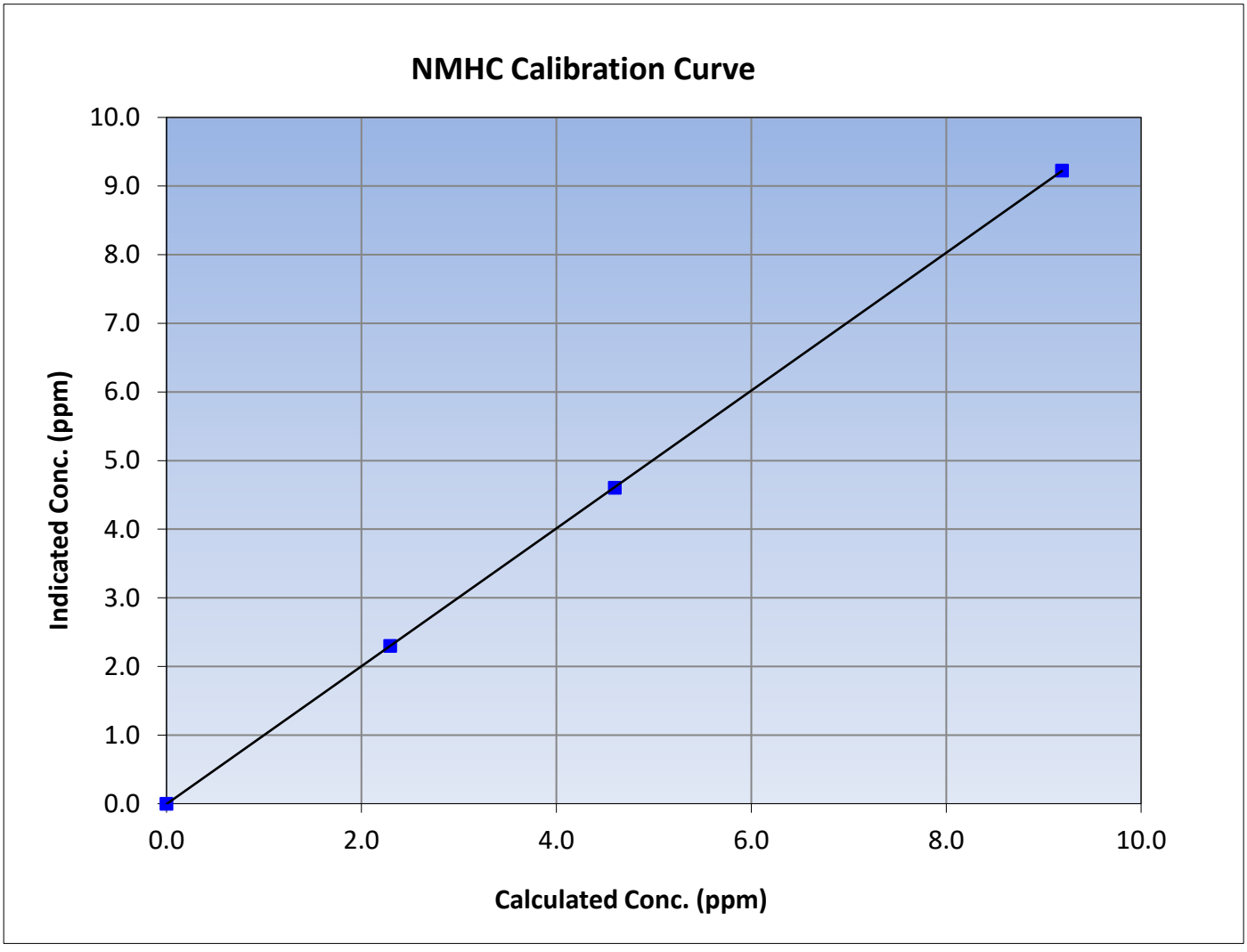
Version-01-2020

Station Information

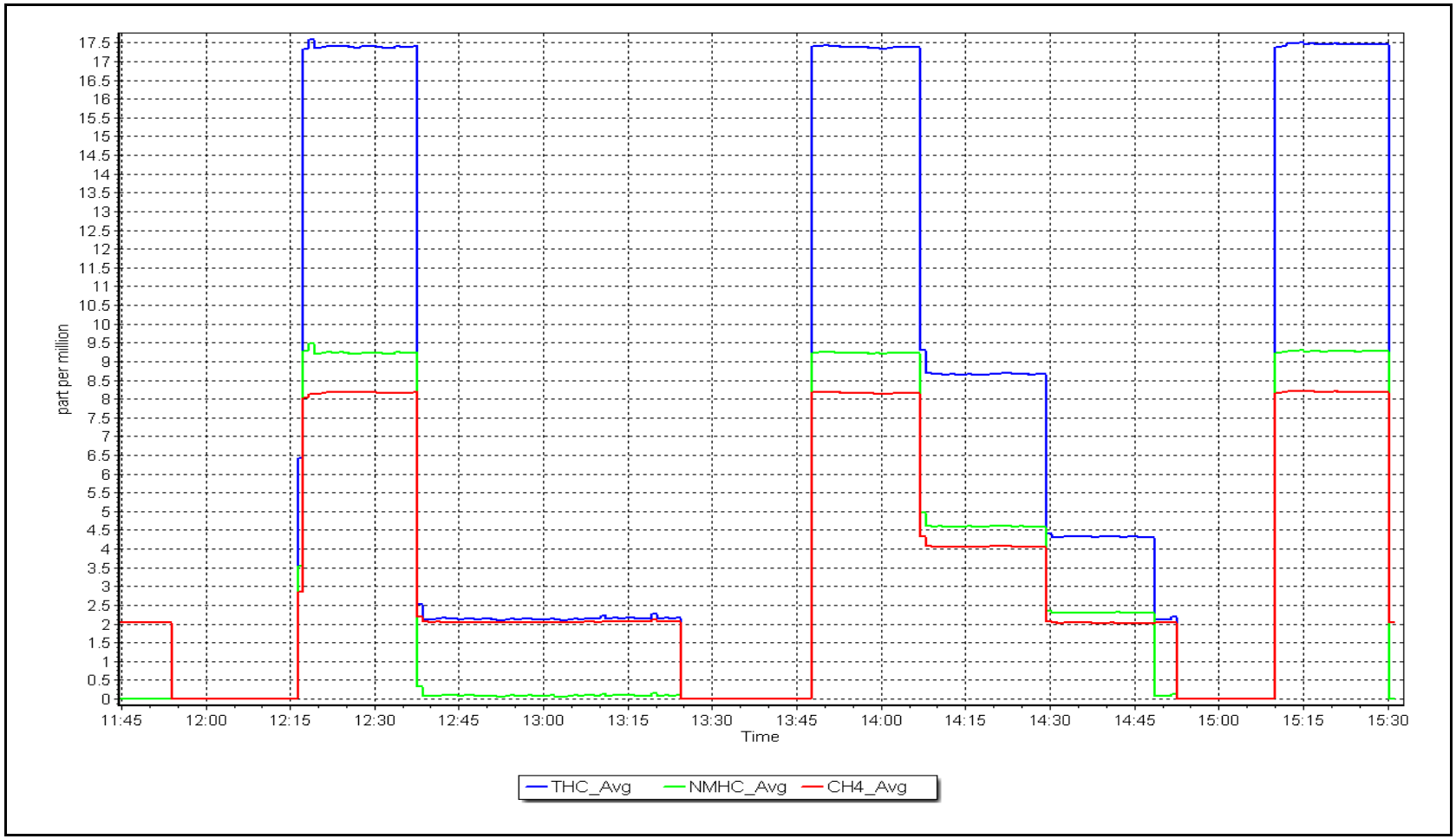
Calibration Date:	November 22, 2023	Previous Calibration:	October 12, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	11:51	End Time (MST):	15:31
Analyzer make:	Thermo 55i	Analyzer serial #:	1505164381

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999996	*≥0.995*
9.19	9.23	0.9959			
4.60	4.60	0.9994	Slope	1.004102	*0.90 - 1.10*
2.29	2.30	0.9984			
			Intercept	-0.005505	*+/-0.5*



NMHC Calibration Plot Date: November 22, 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:	November 30, 2023	Last Cal Date:	November 22, 2023
Start time (MST):	9:49	End time (MST):	11:16
Reason:	Cylinder Change		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1505164381	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	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	17.32	1.002
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	17.33	1.001
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.001

Baseline Corr AF:	17.32	Prev response	17.37	*% change	-0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	9.19	9.17	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.3	9.19	9.16	1.003
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.003
Baseline Corr AF:	9.17	Prev response	9.22	*% 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	8.15	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.3	8.16	8.16	1.000
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.000
Baseline Corr AF:	8.15	Prev response	8.15	*% change	0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

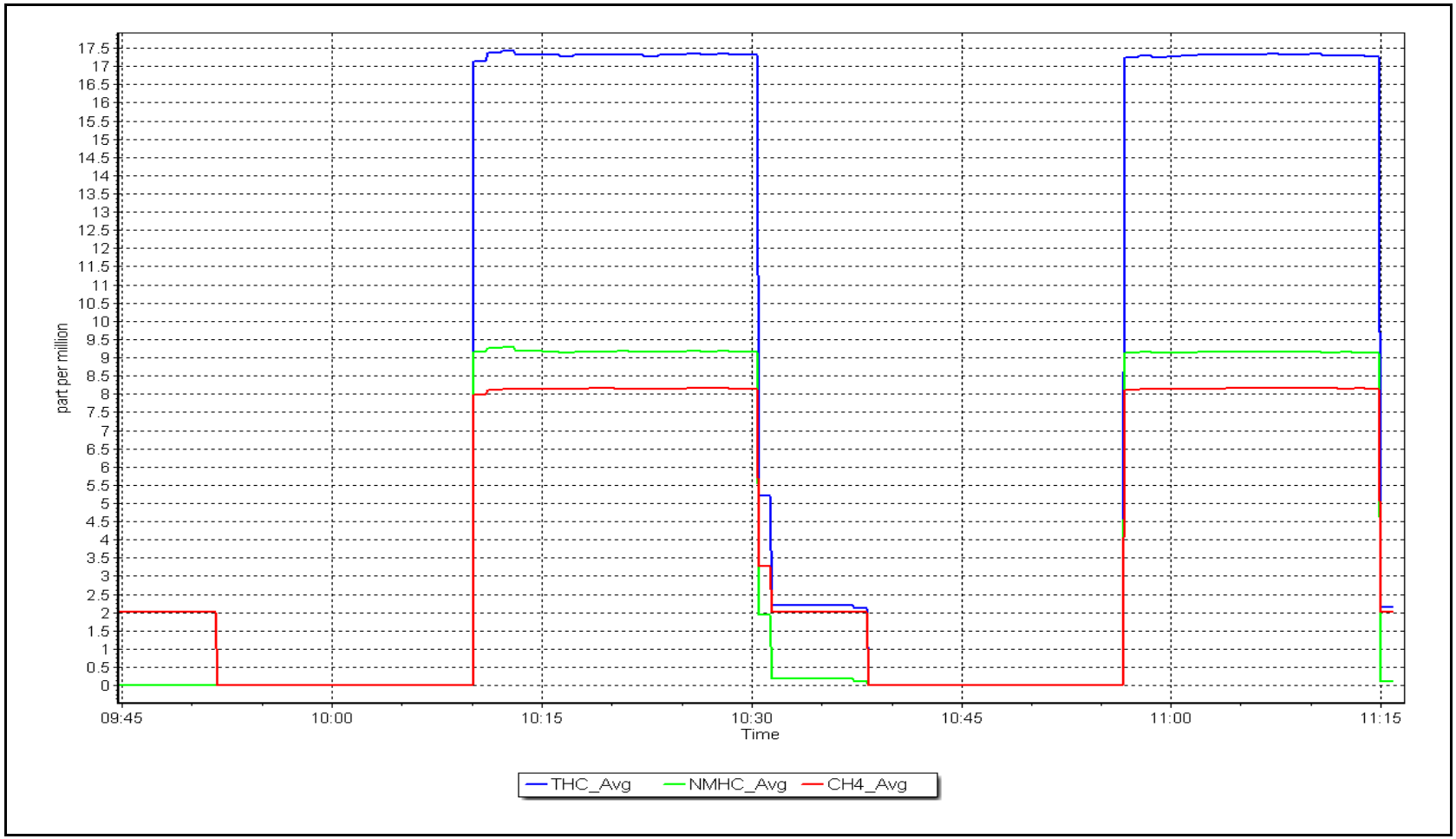
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.001857	0.998535
THC Cal Offset:	-0.011999	0.000000
CH4 Cal Slope:	0.998980	0.999874
CH4 Cal Offset:	-0.005496	0.000000
NMHC Cal Slope:	1.004102	0.997020
NMHC Cal Offset:	-0.005505	0.000000

Notes: Swapped Nitrogen cylinder.

Calibration Performed By: Mohammed Kashif

NMHC Calibration Plot Date: November 30, 2023 Location: Lower Camp



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS13
FORT MCKAY SOUTH
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	November 6, 2023	Last Cal Date:	October 18, 2023
Start time (MST):	10:17	End time (MST):	13:35
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:	1.004043	1.002128	Backgd or Offset:	91.1	91.1
Calibration intercept:	-3.158122	-3.438386	Coeff or Slope:	0.709	0.709

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.5	----
as found span	4921	79.1	799.7	798.3	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.5	----
high point	4921	79.1	799.7	799.4	1.000
second point	4961	39.5	399.3	395.3	1.010
third point	4980	19.8	200.2	194.2	1.031
as left zero	5000	0.0	0.0	-0.5	----
as left span	4921	79.1	799.7	798.2	1.002
				Average Correction Factor	1.014

Baseline Corr As found:	798.80	Previous response	799.76	*% change	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Jan Castro and Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

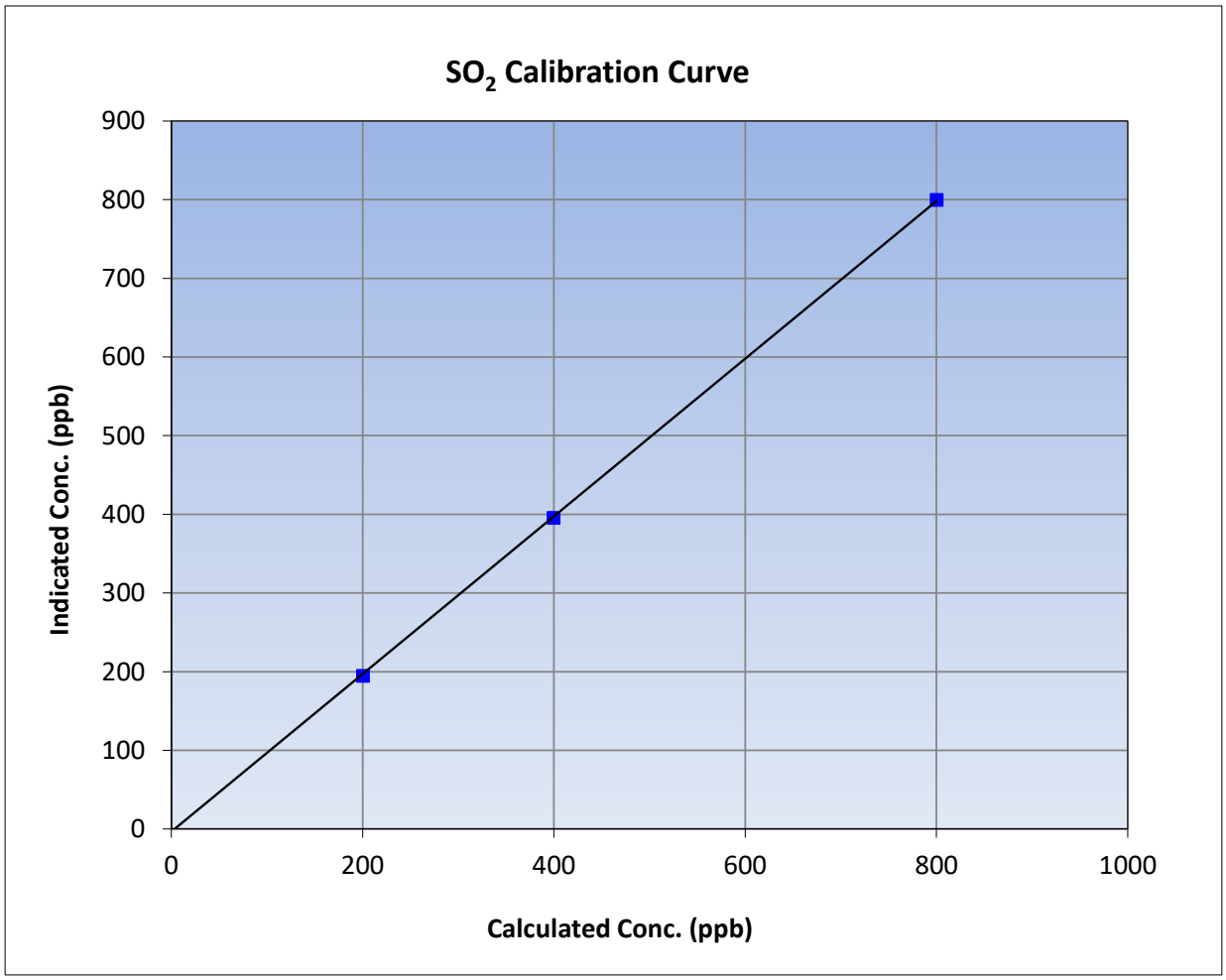
Station Information

Calibration Date:	November 6, 2023	Previous Calibration:	October 18, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:17	End Time (MST):	13:35
Analyzer make:	API T100	Analyzer serial #:	599

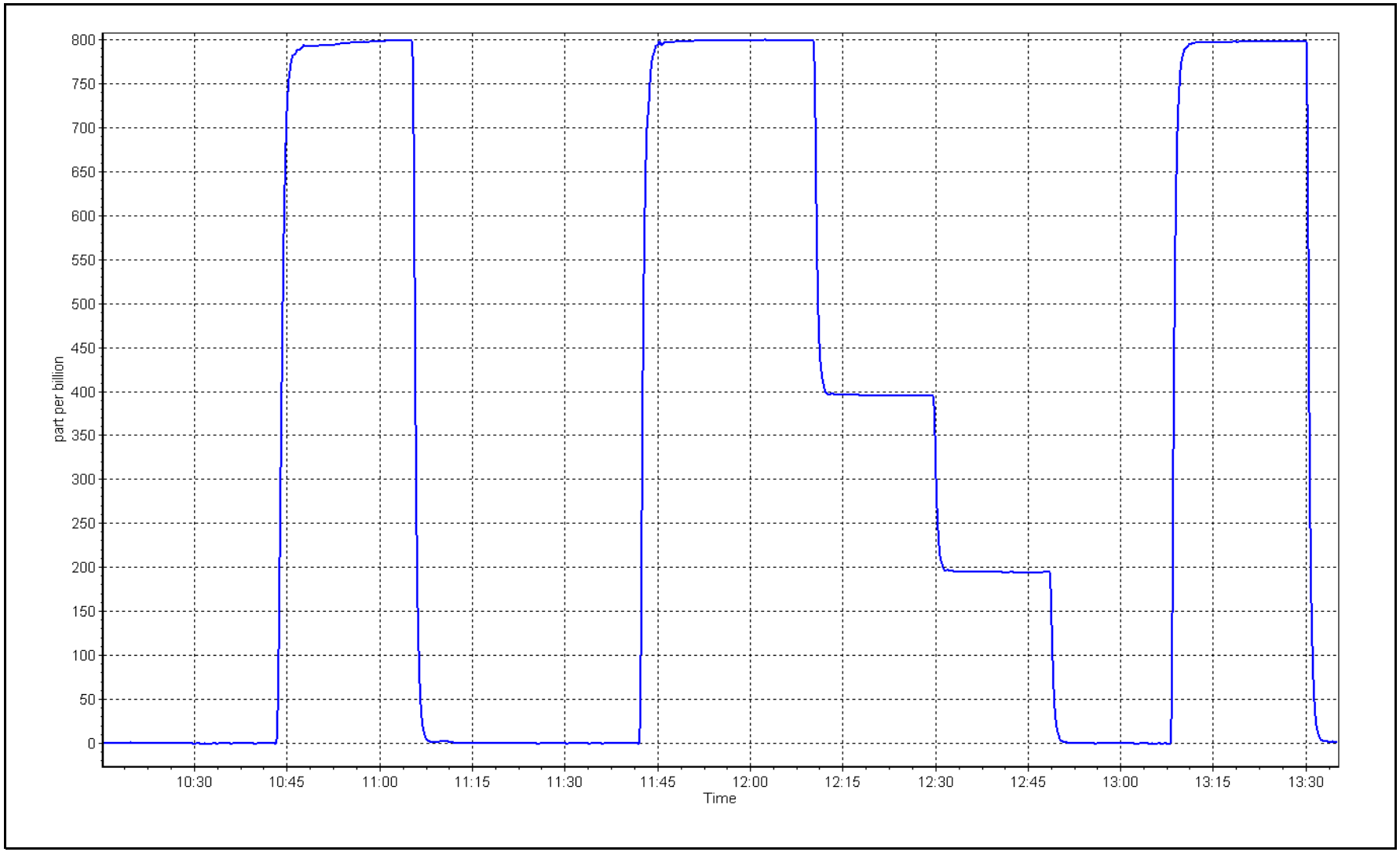
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.5	----
799.7	799.4	1.0004
399.3	395.3	1.0101
200.2	194.2	1.0308

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999939	*≥0.995*
Slope	1.002128	*0.90 - 1.10*
Intercept	-3.438386	*+/-30*



SO2 Calibration Plot Date: November 6, 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:	November 23, 2023	Last Cal Date:	October 12, 2023
Start time (MST):	9:51	End time (MST):	13:55
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:	1.006178	1.003766	Backgd or Offset:	3.77	3.77
Calibration intercept:	-0.262271	-0.102198	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	0.0	----
as found span	4925	75.5	80.6	81.3	0.992
as found 2nd point	4962	37.7	40.3	40.4	0.997
as found 3rd point	4981	18.9	20.2	19.9	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	80.9	0.997
second point	4962	37.7	40.3	40.3	0.999
third point	4981	18.9	20.2	19.9	1.014
as left zero	5000	0.0	0.0	0.2	----
as left span	4925	75.5	80.6	79.5	1.014
SO2 Scrubber Check	4921	79.1	791.0	-0.1	----
Date of last scrubber change:		20-Mar-20		Ave Corr Factor	1.003
Date of last converter efficiency test:		NA			efficiency

Baseline Corr As found:	81.3	Prev response:	80.86	*% change:	0.5%
Baseline Corr 2nd AF pt:	40.4	AF Slope:	1.010004	AF Intercept:	-0.222225
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999964		

* = > +/-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

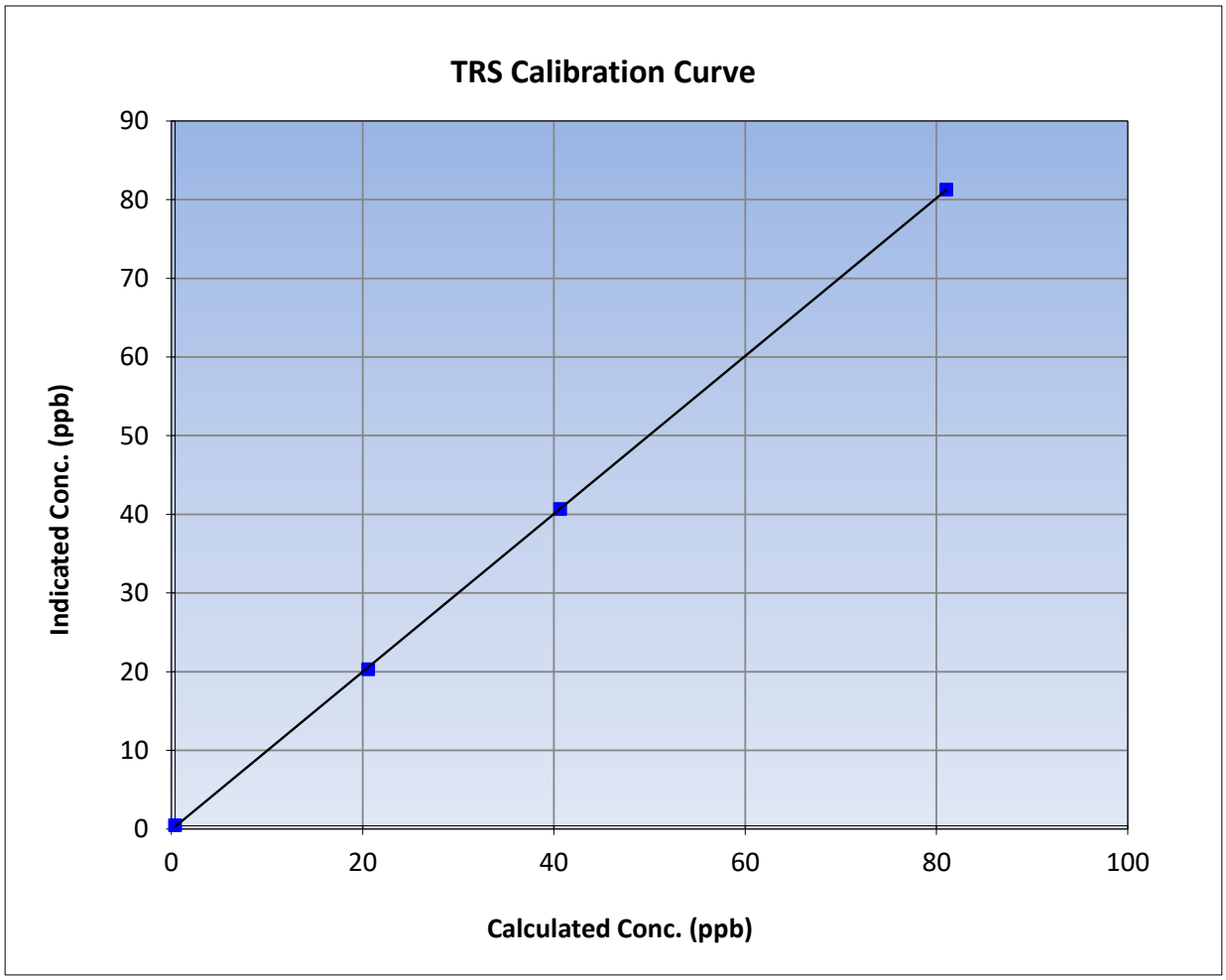
Station Information

Calibration Date:	November 23, 2023	Previous Calibration:	October 12, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	9:51	End Time (MST):	13:55
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1180540017

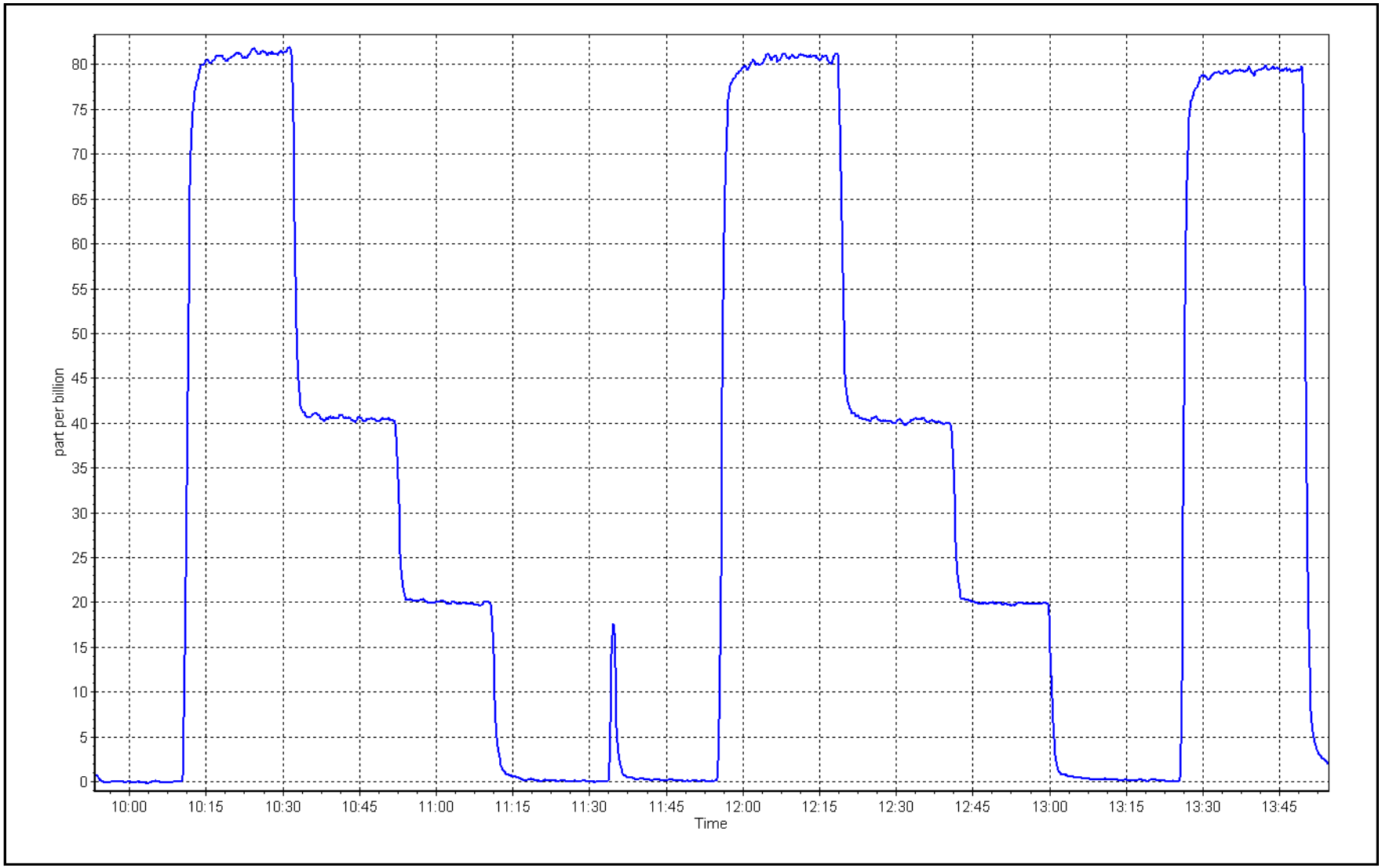
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.6	80.9	0.9966
40.3	40.3	0.9992
20.2	19.9	1.0144

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999968	*≥0.995*
Slope	1.003766	*0.90 - 1.10*
Intercept	-0.102198	*+/-3*



TRS Calibration Plot Date: November 23, 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:	November 6, 2023	Last Cal Date:	October 18, 2023
Start time (MST):	10:17	End time (MST):	13:35
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 #:	1170050130	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.31E-04	2.36E-04	NMHC SP Ratio:	5.16E-05	5.05E-05
CH4 Retention time:	13.40	13.60	NMHC Peak Area:	1756954	179781
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	4921	79.1	17.05	17.20	0.991
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	17.09	0.998
second point	4961	39.5	8.51	8.44	1.008
third point	4980	19.8	4.27	4.14	1.030
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	17.05	17.15	0.994
				Average Correction Factor	1.012
Baseline Corr AF:	17.20	Prev response	17.01	*% change	1.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.1	9.08	9.36	0.970
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	0.997
second point	4961	39.5	4.53	4.51	1.005
third point	4980	19.8	2.27	2.21	1.027
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	9.08	9.14	0.993
				Average Correction Factor	1.010
Baseline Corr AF:	9.36	Prev response	9.06	*% 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	79.1	7.97	7.84	1.016
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	7.99	0.998
second point	4961	39.5	3.98	3.93	1.011
third point	4980	19.8	1.99	1.93	1.034
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	7.97	8.01	0.994
				Average Correction Factor	1.014
Baseline Corr AF:	7.84	Prev response	7.95	*% change	-1.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.002214	1.004439
THC Cal Offset:	-0.072976	-0.071566
CH4 Cal Slope:	1.003429	1.004647
CH4 Cal Offset:	-0.043993	-0.038988
NMHC Cal Slope:	1.001224	1.004722
NMHC Cal Offset:	-0.029785	-0.033179

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

Calibration Performed By: Jan Castro and Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

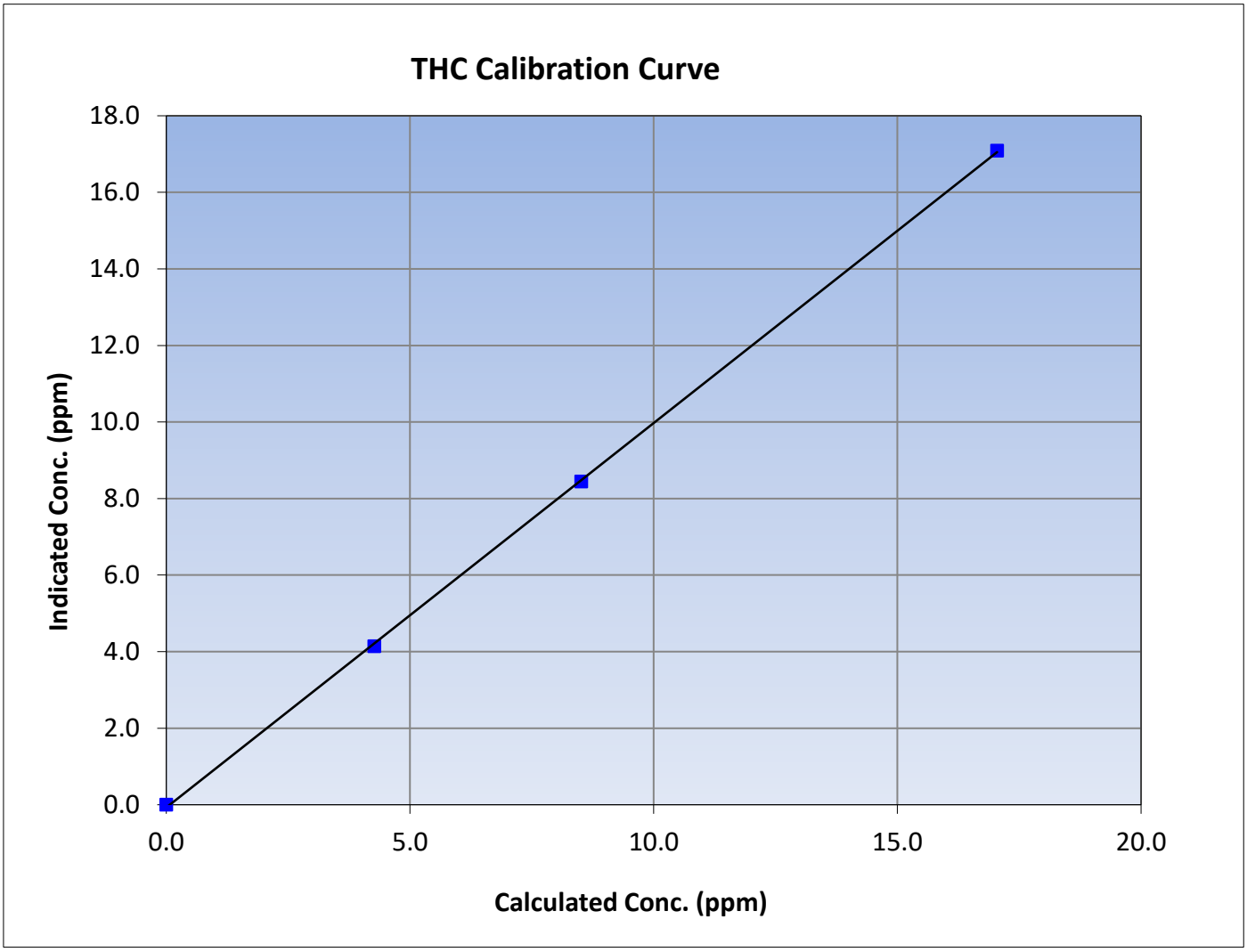
Version-06-2022

Station Information

Calibration Date:	November 6, 2023	Previous Calibration:	October 18, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:17	End Time (MST):	13:35
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050130

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999920	*≥0.995*
17.05	17.09	0.9977			
8.51	8.44	1.0082	Slope	1.004439	*0.90 - 1.10*
4.27	4.14	1.0300			
			Intercept	-0.071566	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

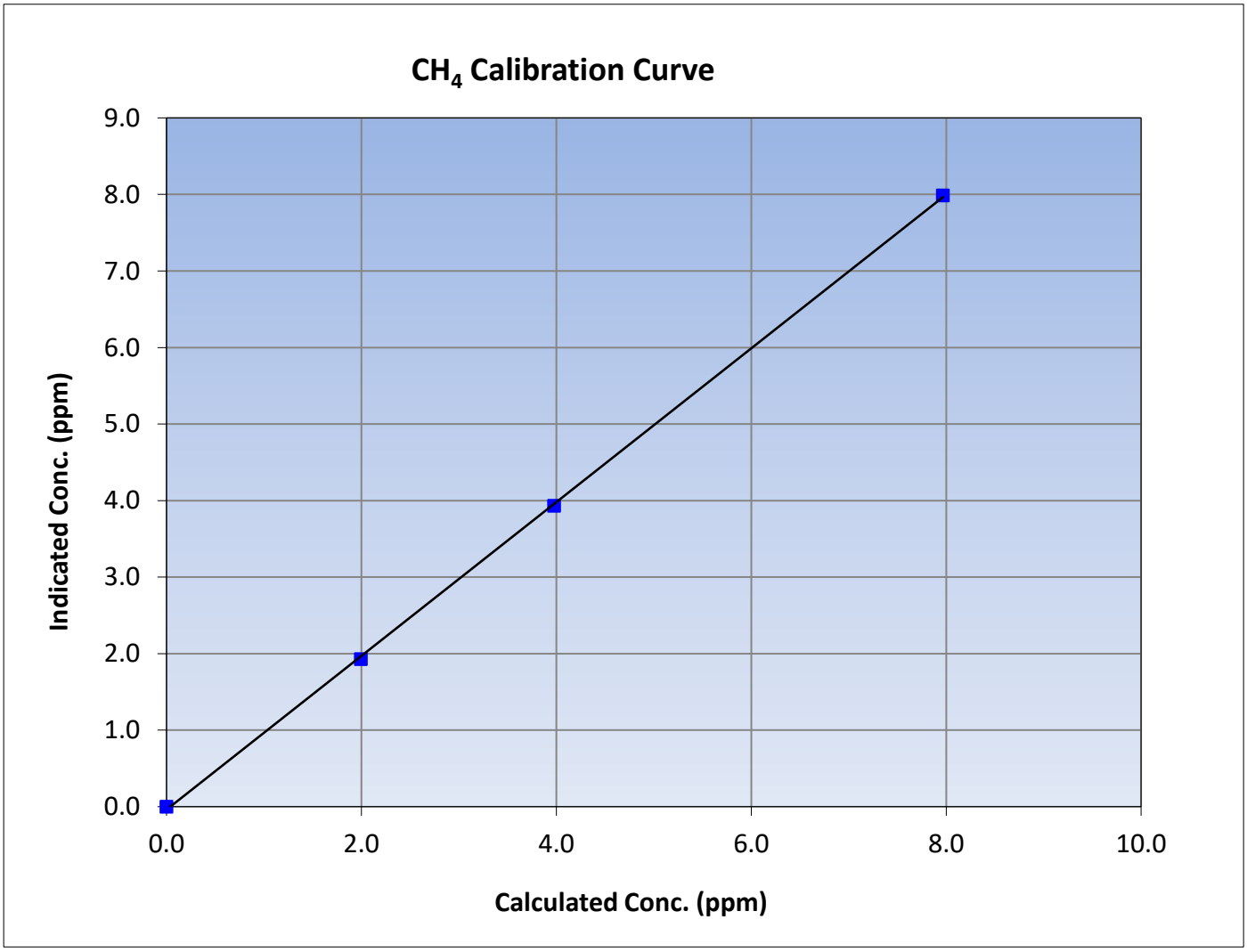
Version-06-2022

Station Information

Calibration Date:	November 6, 2023	Previous Calibration:	October 18, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:17	End Time (MST):	13:35
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050130

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999890	*≥0.995*
7.97	7.99	0.9976			
3.98	3.93	1.0115	Slope	1.004647	*0.90 - 1.10*
1.99	1.93	1.0339			
			Intercept	-0.038988	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

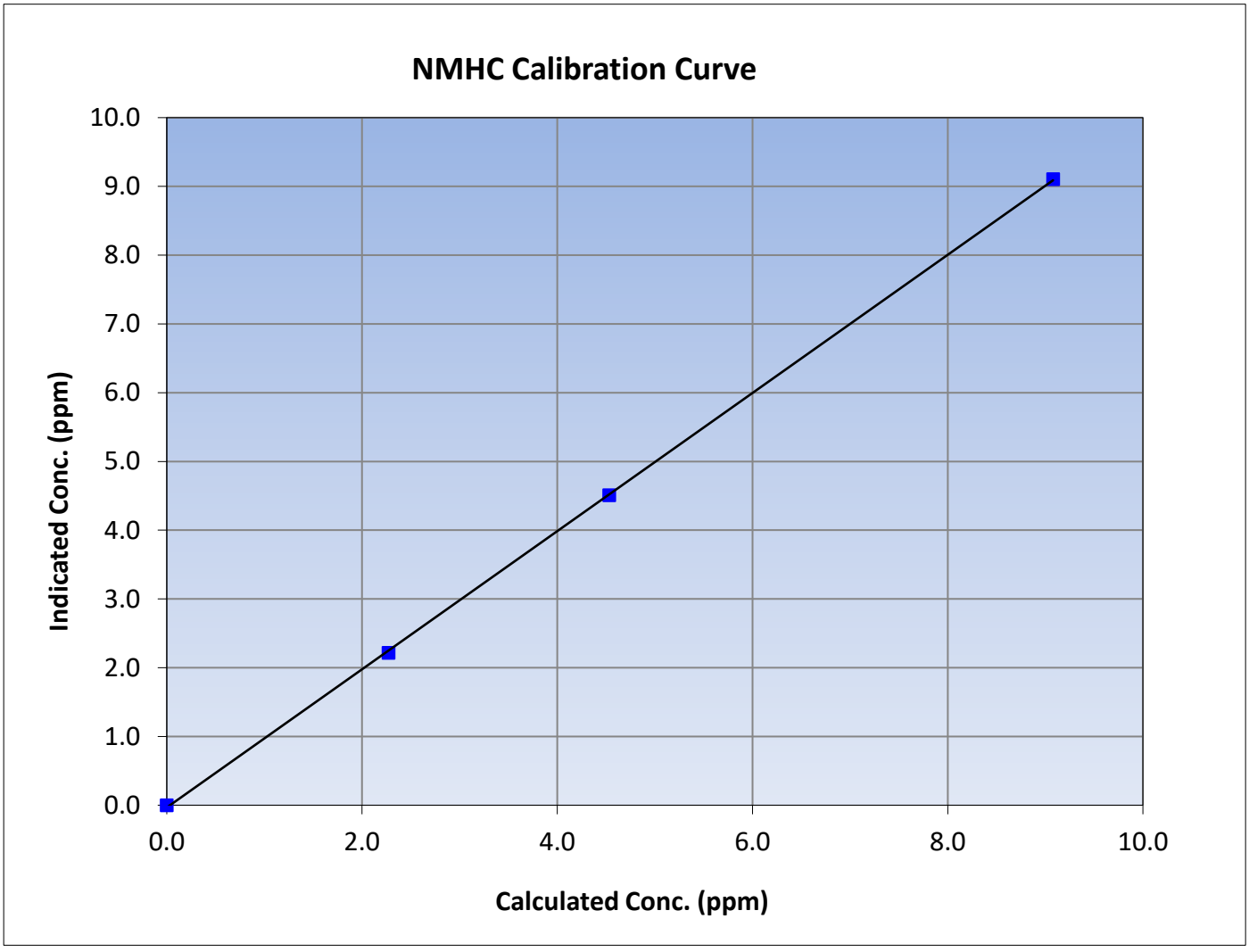
Version-06-2022

Station Information

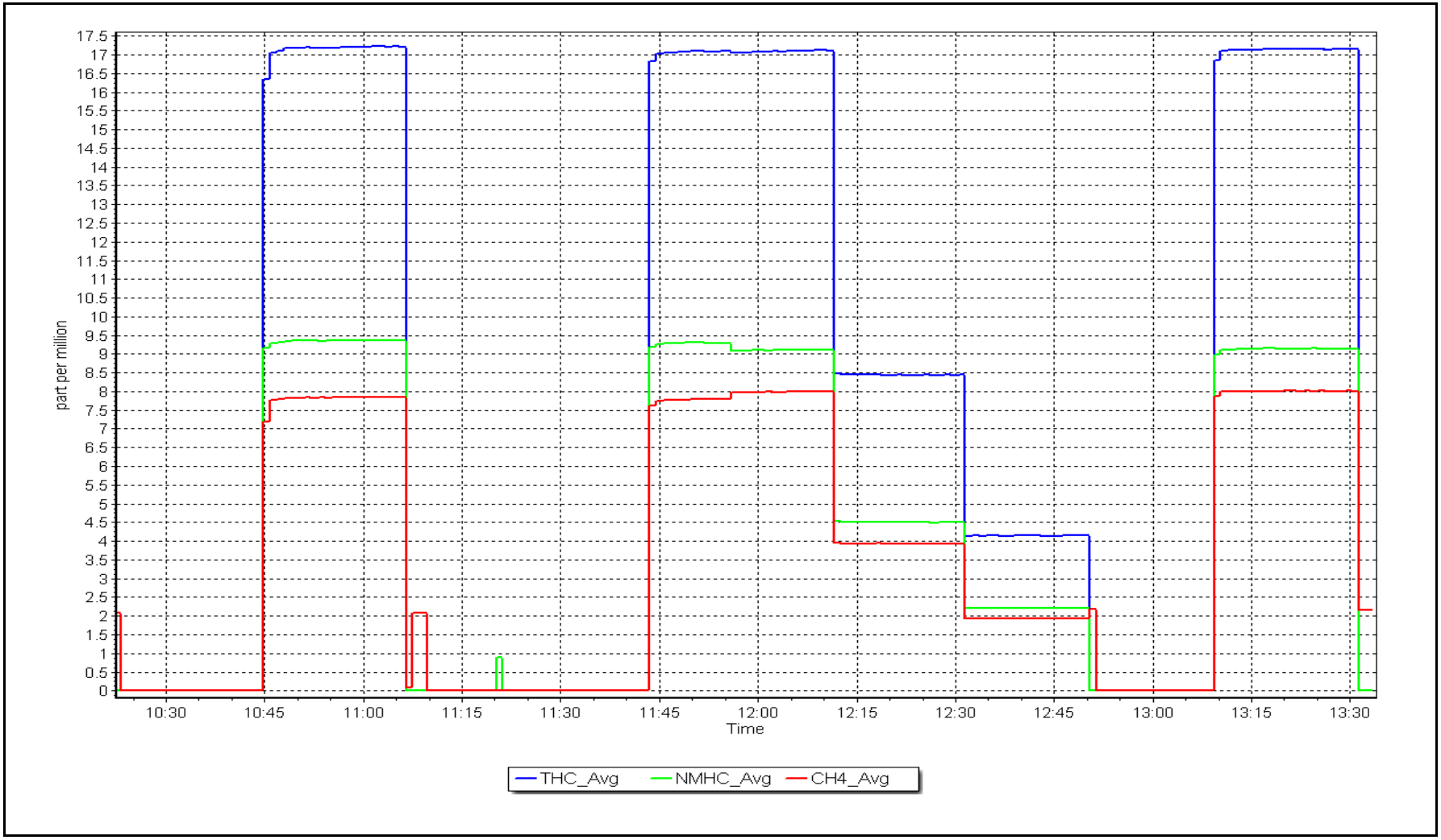
Calibration Date:	November 6, 2023	Previous Calibration:	October 18, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:17	End Time (MST):	13:35
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050130

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999939	≥0.995
9.08	9.10	0.9973			
4.53	4.51	1.0052	Slope	1.004722	0.90 - 1.10
2.27	2.21	1.0266			
			Intercept	-0.033179	+/-0.5



NMHC Calibration Plot Date: November 6, 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:	November 21, 2023	Last Cal Date:	November 6, 2023
Start time (MST):	10:38	End time (MST):	13:36
Reason:	Install		

Calibration Standards

Gas Cert Reference:	CC260812		Cal Gas Expiry Date:	December 29, 2028	
CH4 Cal Gas Conc.	503.6	ppm	CH4 Equiv Conc.	1077.5	ppm
C3H8 Cal Gas Conc.	208.7	ppm			
Removed Gas Cert:	NA		Removed Gas Expiry:		
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 #:	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:	NA	2.76E-04	NMHC SP Ratio:	NA	4.61E-05
CH4 Retention time:	NA	15.00	NMHC Peak Area:	NA	197092
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					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.1	17.05	17.15	0.994
second point	4961	39.5	8.51	8.48	1.004
third point	4980	19.8	4.27	4.16	1.026
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	17.05	16.95	1.006
				Average Correction Factor	1.008

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	4921	79.1	9.08	9.06	1.002
second point	4961	39.5	4.53	4.50	1.007
third point	4980	19.8	2.27	2.20	1.035
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	9.08	8.87	1.023
				Average Correction Factor	1.015
Baseline Corr AF:	NA	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.1	7.97	8.09	0.985
second point	4961	39.5	3.98	3.98	1.000
third point	4980	19.8	1.99	1.96	1.016
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	7.97	8.08	0.986
				Average Correction Factor	1.000
Baseline Corr AF:	NA	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	NA	1.008301
THC Cal Offset:	NA	-0.071364
CH4 Cal Slope:	NA	1.016730
CH4 Cal Offset:	NA	-0.036593
NMHC Cal Slope:	NA	1.000565
NMHC Cal Offset:	NA	-0.034171

Notes: Install calibration. Changed inlet filter. Adjusted span.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

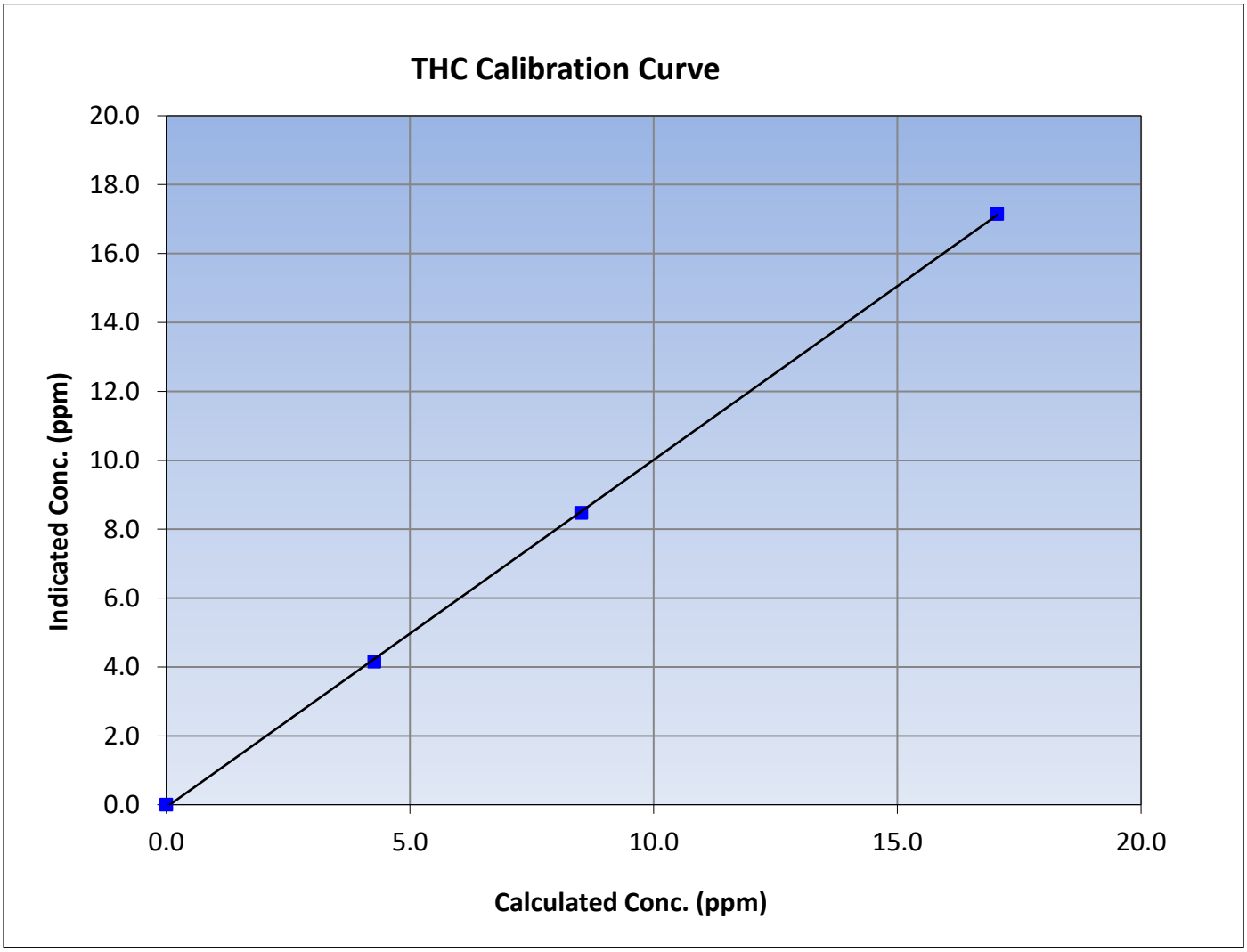
Version-06-2022

Station Information

Calibration Date:	November 21, 2023	Previous Calibration:	November 6, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:38	End Time (MST):	13:36
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	0.999921	*≥0.995*
17.05	17.15	0.9939			
8.51	8.48	1.0040	Slope	1.008301	*0.90 - 1.10*
4.27	4.16	1.0263			
			Intercept	-0.071364	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

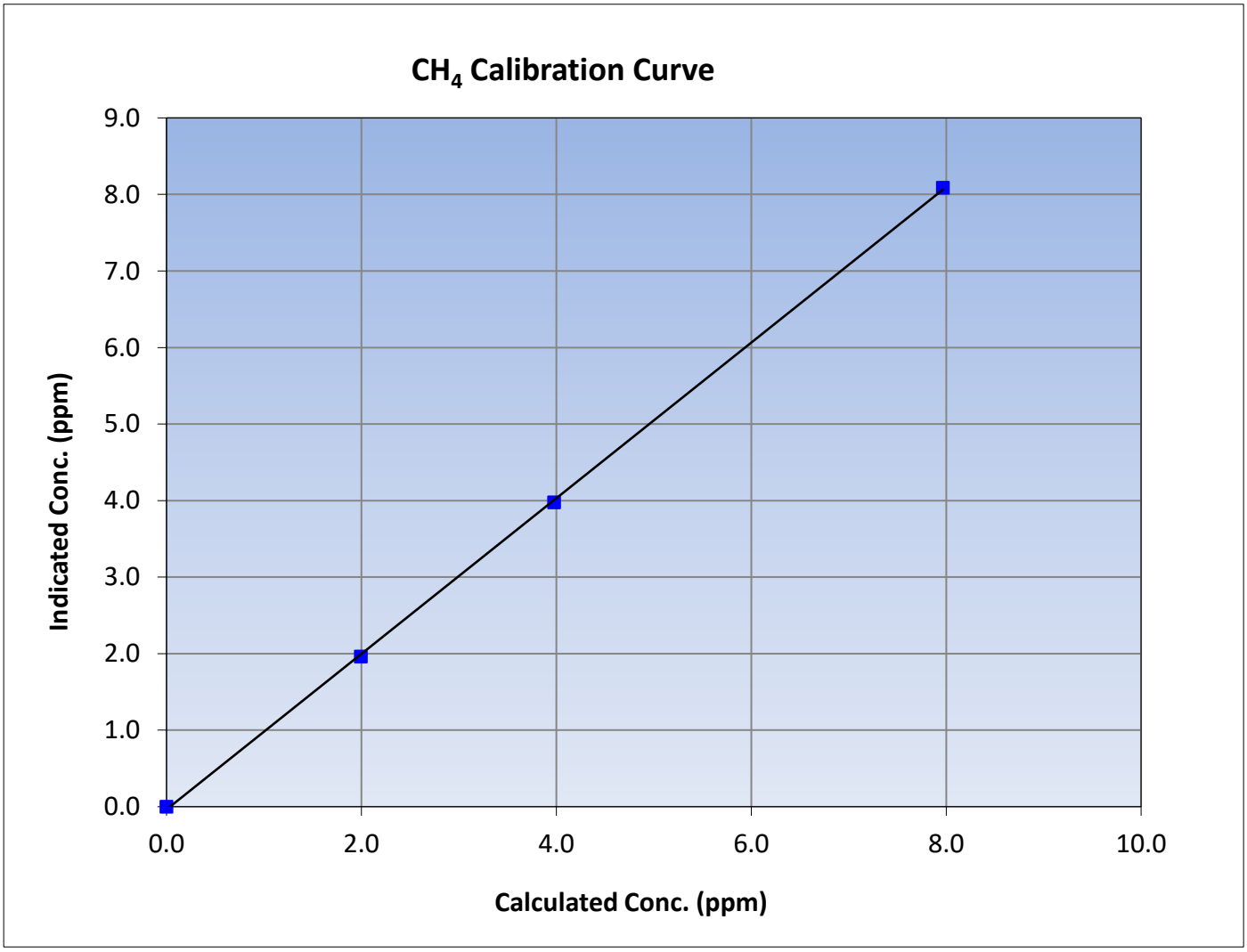
Version-06-2022

Station Information

Calibration Date:	November 21, 2023	Previous Calibration:	November 6, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:38	End Time (MST):	13:36
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	0.999900	*≥0.995*
7.97	8.09	0.9853			
3.98	3.98	1.0003	Slope	1.016730	*0.90 - 1.10*
1.99	1.96	1.0160			
			Intercept	-0.036593	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

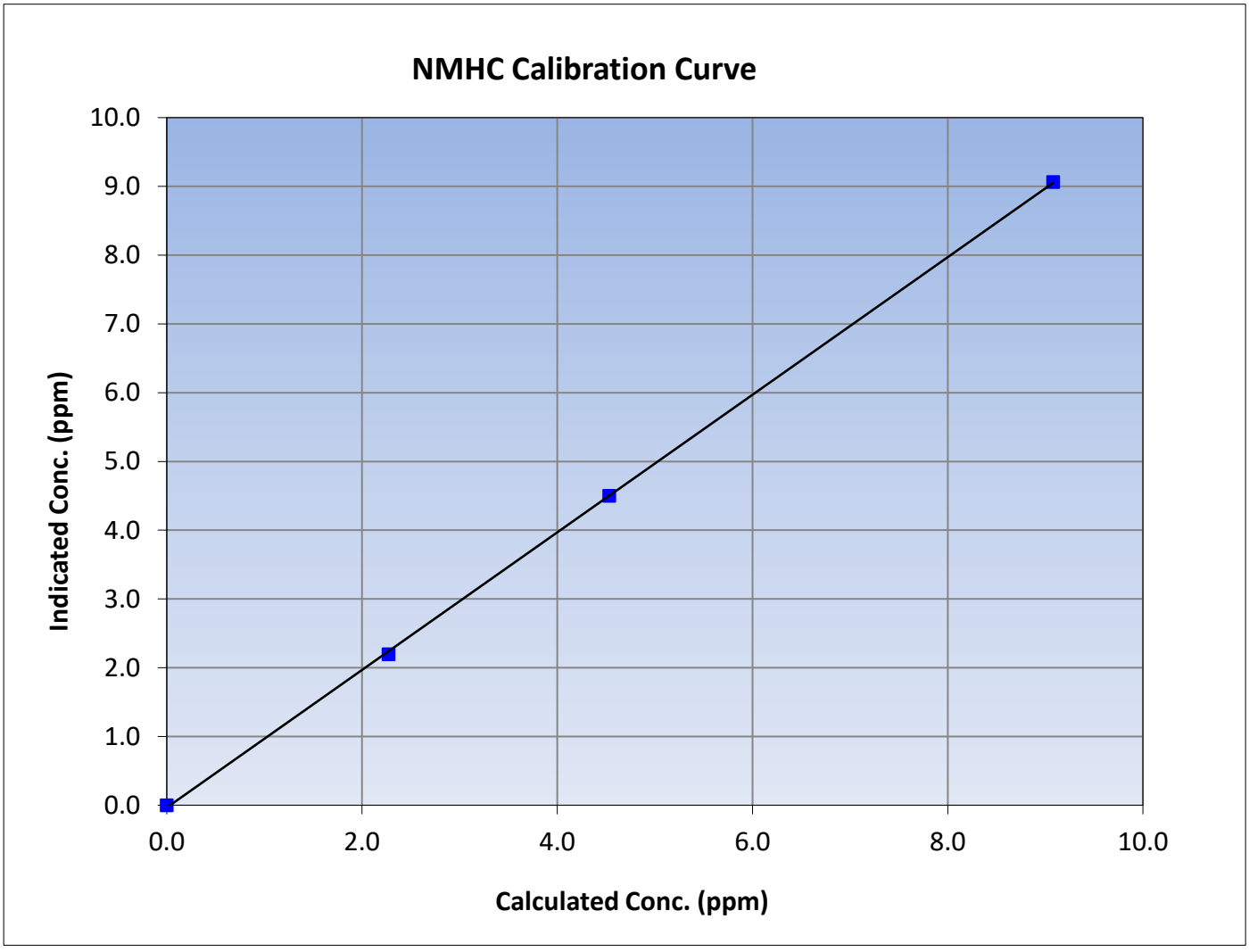
Version-06-2022

Station Information

Calibration Date:	November 21, 2023	Previous Calibration:	November 6, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:38	End Time (MST):	13:36
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	0.999926	≥0.995
9.08	9.06	1.0019			
4.53	4.50	1.0072	Slope	1.000565	0.90 - 1.10
2.27	2.20	1.0355			
			Intercept	-0.034171	+/-0.5



NMHC Calibration Plot Date: November 21, 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:	November 24, 2023	Last Cal Date:	October 24, 2023
Start time (MST):	8:45	End time (MST):	13:04
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:	1.124	1.129	NO bkgnd or offset:	10.4	10.4
NOX coeff or slope:	0.991	0.991	NOX bkgnd or offset:	10.4	10.5
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	160.8	160.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999331	0.999580
NO_X Cal Offset:	-2.071318	-1.911243
NO Cal Slope:	1.002262	1.001676
NO Cal Offset:	-2.945200	-2.864919
NO_2 Cal Slope:	1.001663	1.000024
NO_2 Cal Offset:	-0.500859	-0.523265

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	-0.1	----	----
as found span	4919	81.1	826.9	800.0	26.9	824.5	796.5	28.1	1.0029	1.0043
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	81.1	826.9	800.0	26.9	825.7	800.0	25.7	1.0014	0.9999
second point	4960	40.6	413.9	400.4	13.5	410.7	396.6	14.1	1.0078	1.0097
third point	4980	20.3	207.0	200.2	6.7	202.9	194.7	8.2	1.0200	1.0284
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as left span	4919	81.1	826.9	383.0	443.9	830.9	383.0	448.0	0.9952	0.9999
								Average Correction Factor	1.0098	1.0127

Corrected As found	NO_X = 824.7 ppb	NO = 796.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.1%
Previous Response	NO_X = 824.3 ppb	NO = 798.8 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)	797.6	380.6	443.9	443.5	1.0010	99.9%
2nd GPT point (200 ppb O3)	797.6	589.5	235.0	234.9	1.0005	99.9%
3rd GPT point (100 ppb O3)	797.6	693.6	130.9	129.4	1.0118	98.8%
				Average Correction Factor	1.0044	99.6%

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

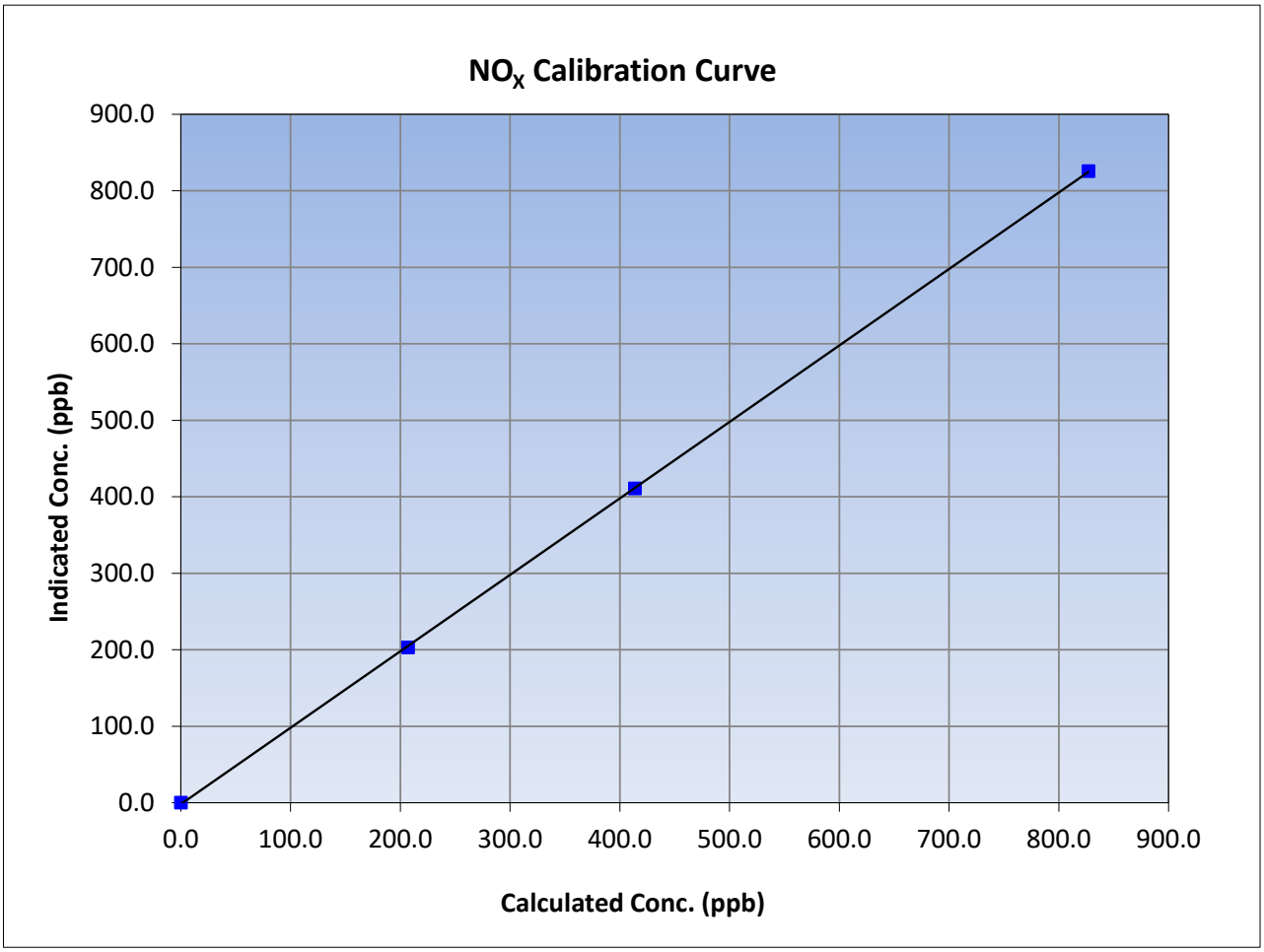
Version-04-2020

Station Information

Calibration Date:	November 24, 2023	Previous Calibration:	October 24, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	8:45	End Time (MST):	13:04
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	0.2	----	Correlation Coefficient	0.999970	*≥0.995*
826.9	825.7	1.0014			
413.9	410.7	1.0078	Slope	0.999580	*0.90 - 1.10*
207.0	202.9	1.0200			
			Intercept	-1.911243	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

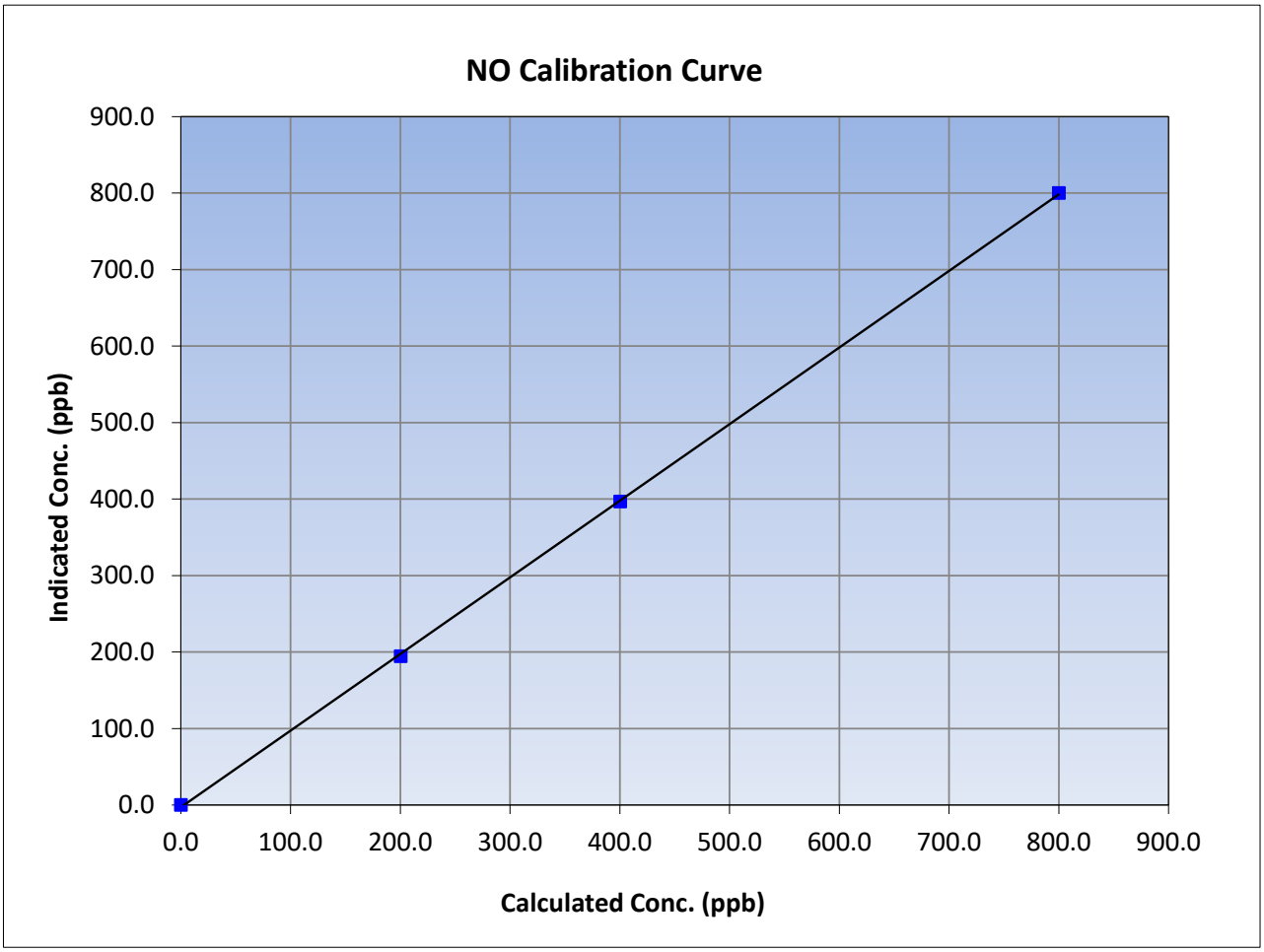
Version-04-2020

Station Information

Calibration Date:	November 24, 2023	Previous Calibration:	October 24, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	8:45	End Time (MST):	13:04
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	0.2	----	Correlation Coefficient	0.999933	≥0.995
800.0	800.0	0.9999			
400.4	396.6	1.0097	Slope	1.001676	0.90 - 1.10
200.2	194.7	1.0284			
			Intercept	-2.864919	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

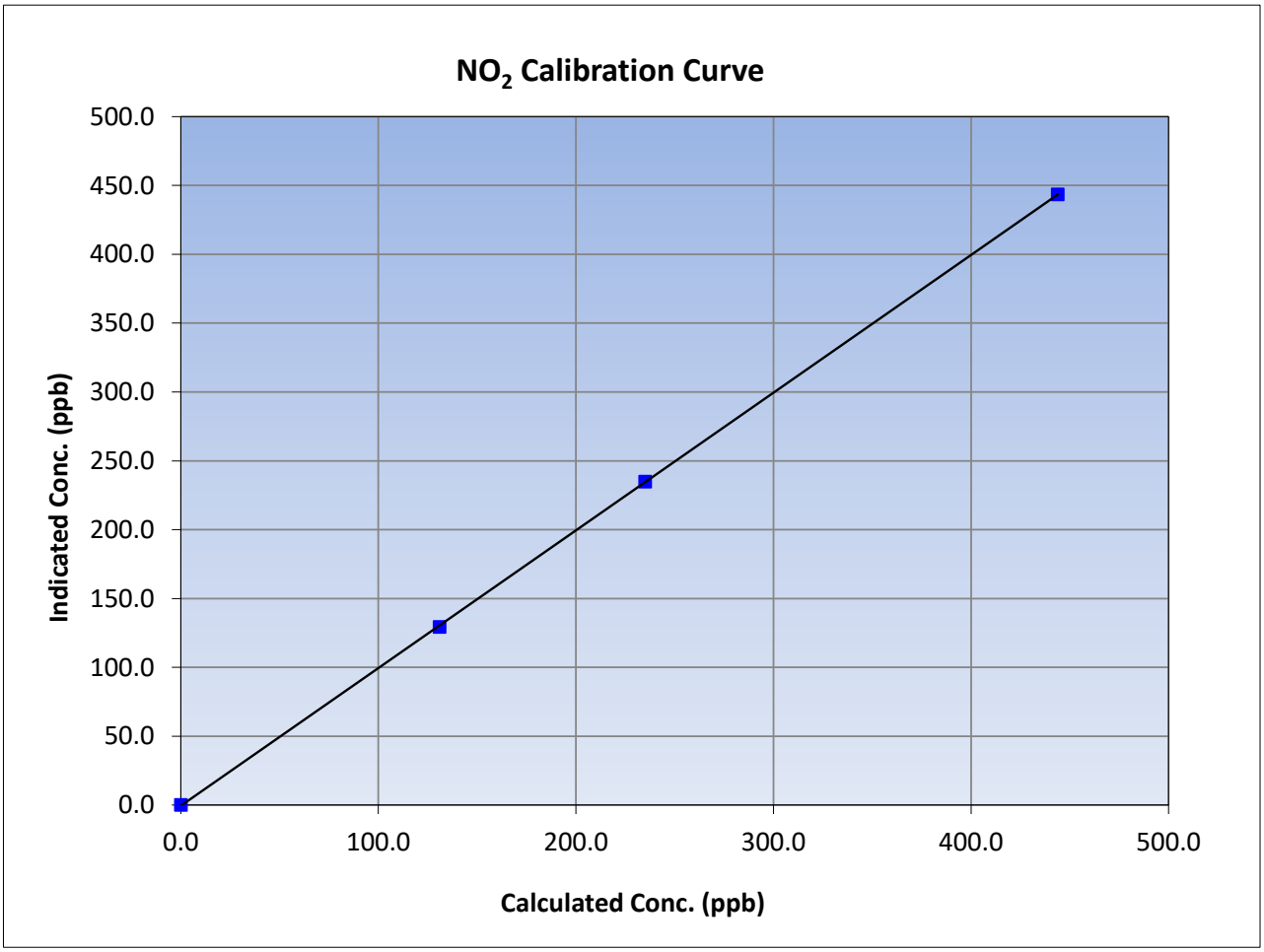
Version-04-2020

Station Information

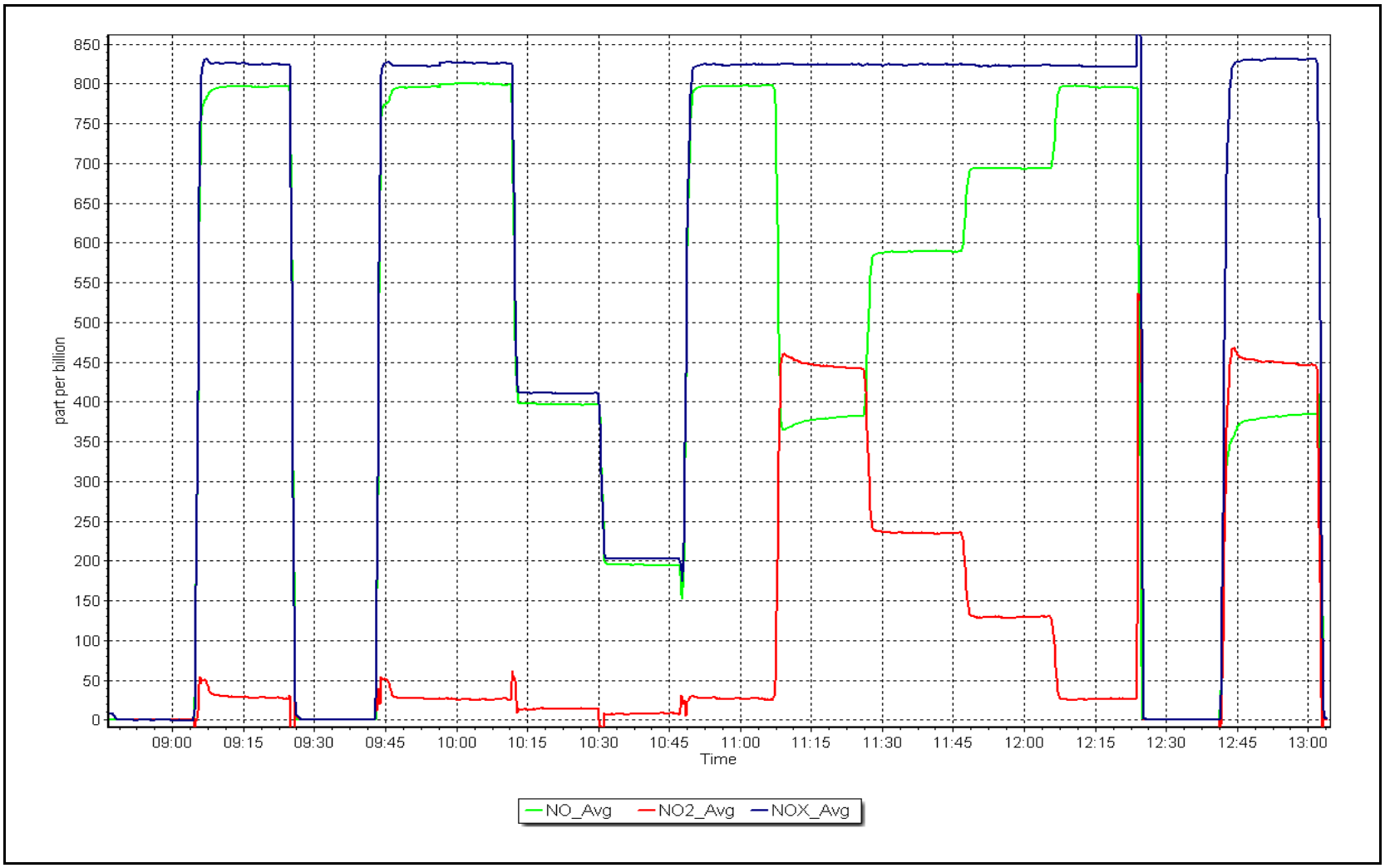
Calibration Date:	November 24, 2023	Previous Calibration:	October 24, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	8:45	End Time (MST):	13:04
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999986	≥0.995
443.9	443.5	1.0010			
235.0	234.9	1.0005	Slope	1.000024	0.90 - 1.10
130.9	129.4	1.0118			
			Intercept	-0.523265	+/-20



NO_X Calibration Plot Date: November 24, 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:	November 20, 2023	Last Cal Date:	October 6, 2023
Start time (MST):	10:08	End time (MST):	13:23
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	Teledyne API T700	Serial Number:	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:	0.998314	0.997971	Backgd or Offset:	2.4	2.4
Calibration intercept:	0.820000	0.780000	Coeff or Slope:	0.967	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	-0.1	----
as found span	5000	977.0	400.0	400.6	0.999
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	977.0	400.0	399.5	1.001
second point	5000	838.0	200.0	200.9	0.996
third point	5000	735.9	100.0	101.4	0.986
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	977.0	400.0	402.9	0.993
				Average Correction Factor	0.994

Baseline Corr As found:	400.7	Previous response	400.1	*% 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 adjustment made.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

O_3 Calibration Summary

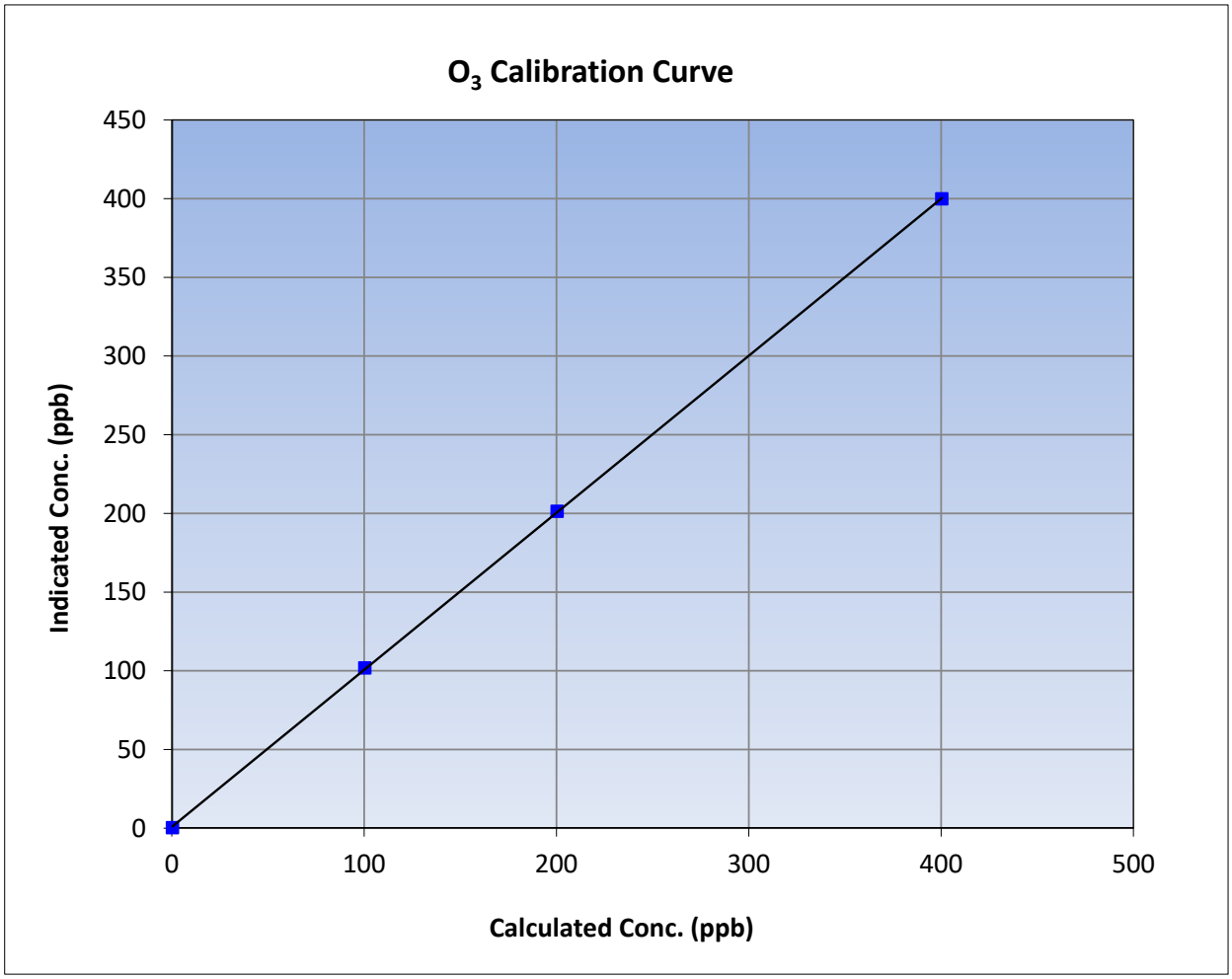
Version-01-2020

Station Information

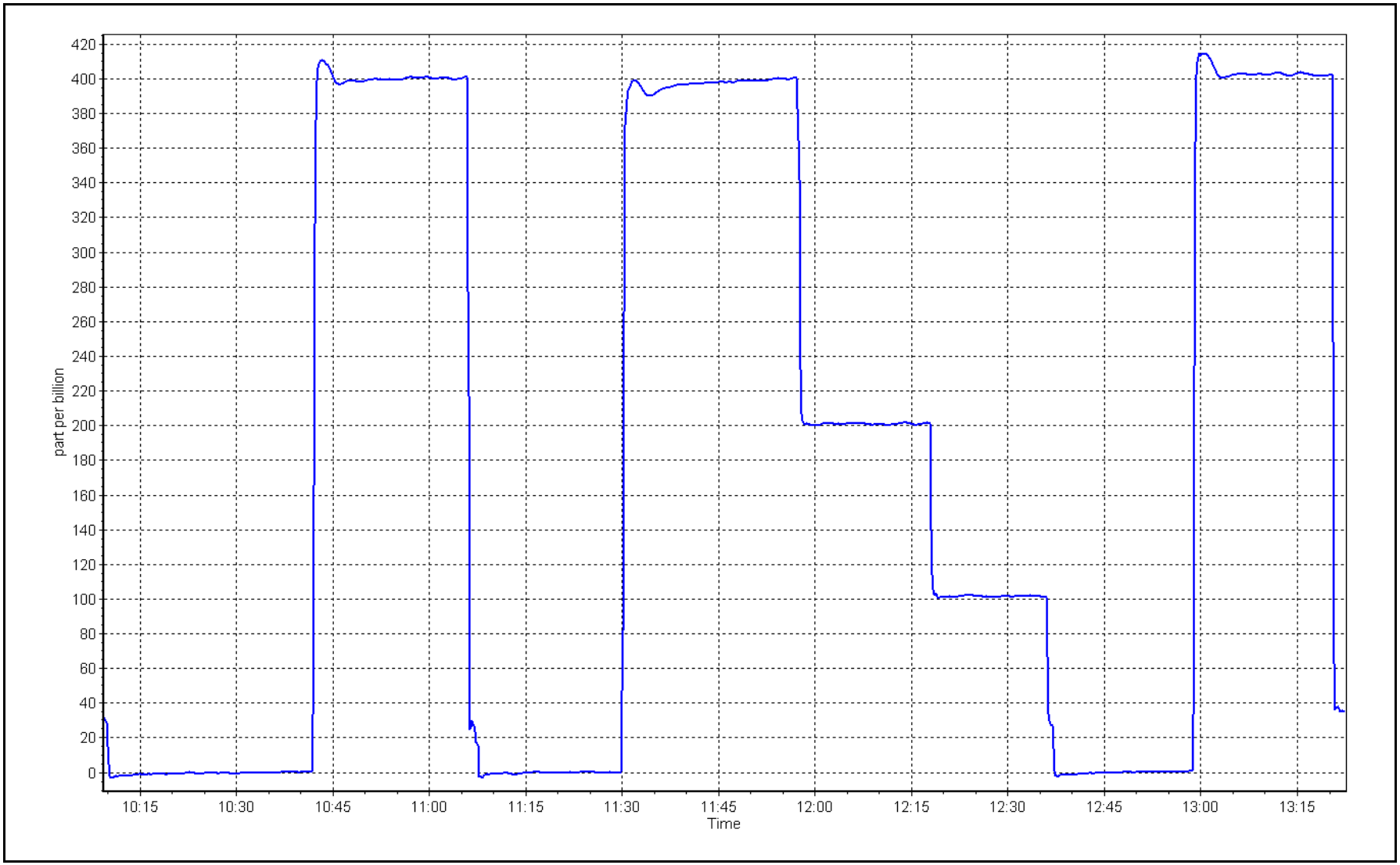
Calibration Date:	November 20, 2023	Previous Calibration:	October 6, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:08	End Time (MST):	13:23
Analyzer make:	Teledyne API T400	Analyzer serial #:	3871

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*
400.0	399.5	1.0013			
200.0	200.9	0.9955	Slope	0.997971	*0.90 - 1.10*
100.0	101.4	0.9862			
			Intercept	0.780000	*+/- 5*



O_3 Calibration Plot Date: November 20, 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:	November 24, 2023	Last Cal Date:	October 24, 2023
Start time (MST):	10:11	End time (MST):	10:37
Analyzer Make:	API T640	S/N:	1335
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25	S/N:	388746
Temp/RH standard:	Alicat FP-25	S/N:	388746

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (^{o}C)	2.00	2.07	2.00	☐	+/- 2 ^{o}C
P (mmHg)	735.50	737.54	735.50	☐	+/- 10 mmHg
flow (LPM)	5.01	4.91	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: November 24, 2023 Last Cal Date: October 24, 2023

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

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

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

Disposable Filter Changed: October 24, 2023

Annual Maintenance

Date Sample Tube Cleaned: June 29, 2023

Date RH/T Sensor Cleaned: June 29, 2023

Leak check passed.

Notes:

Calibration by: Sean Bala

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS14
ANZAC
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	November 7, 2023	Last Cal Date:	October 3, 2023
Start time (MST):	10:54	End time (MST):	14:23
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:	1.006812	0.994980	Backgd or Offset:	25.2	25.3
Calibration intercept:	-2.184734	-1.917407	Coeff or Slope:	0.798	0.798

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.7	----
as found span	4938	80.3	799.3	793.4	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	1.1	----
high point	4938	80.3	799.3	795.1	1.005
second point	4979	40.2	400.1	393.9	1.016
third point	4998	20.2	201.1	195.6	1.028
as left zero	5000	0.0	0.0	1.0	----
as left span	4938	80.3	799.3	794.9	1.005
				Average Correction Factor	1.016

Baseline Corr As found:	792.70	Previous response	802.53	*% change	-1.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

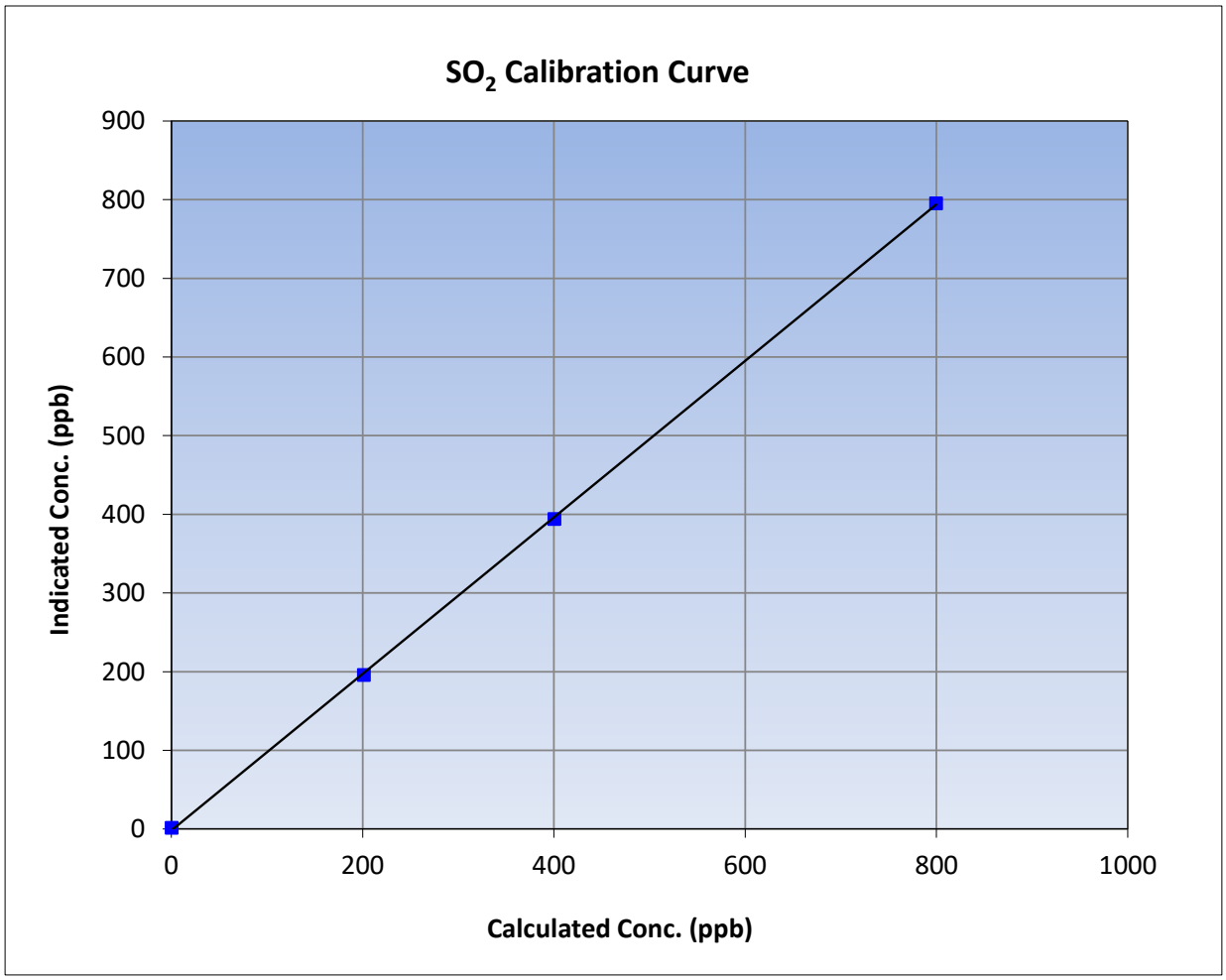
Station Information

Calibration Date:	November 7, 2023	Previous Calibration:	October 3, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	10:54	End Time (MST):	14:23
Analyzer make:	Thermo 43i	Analyzer serial #:	0710321322

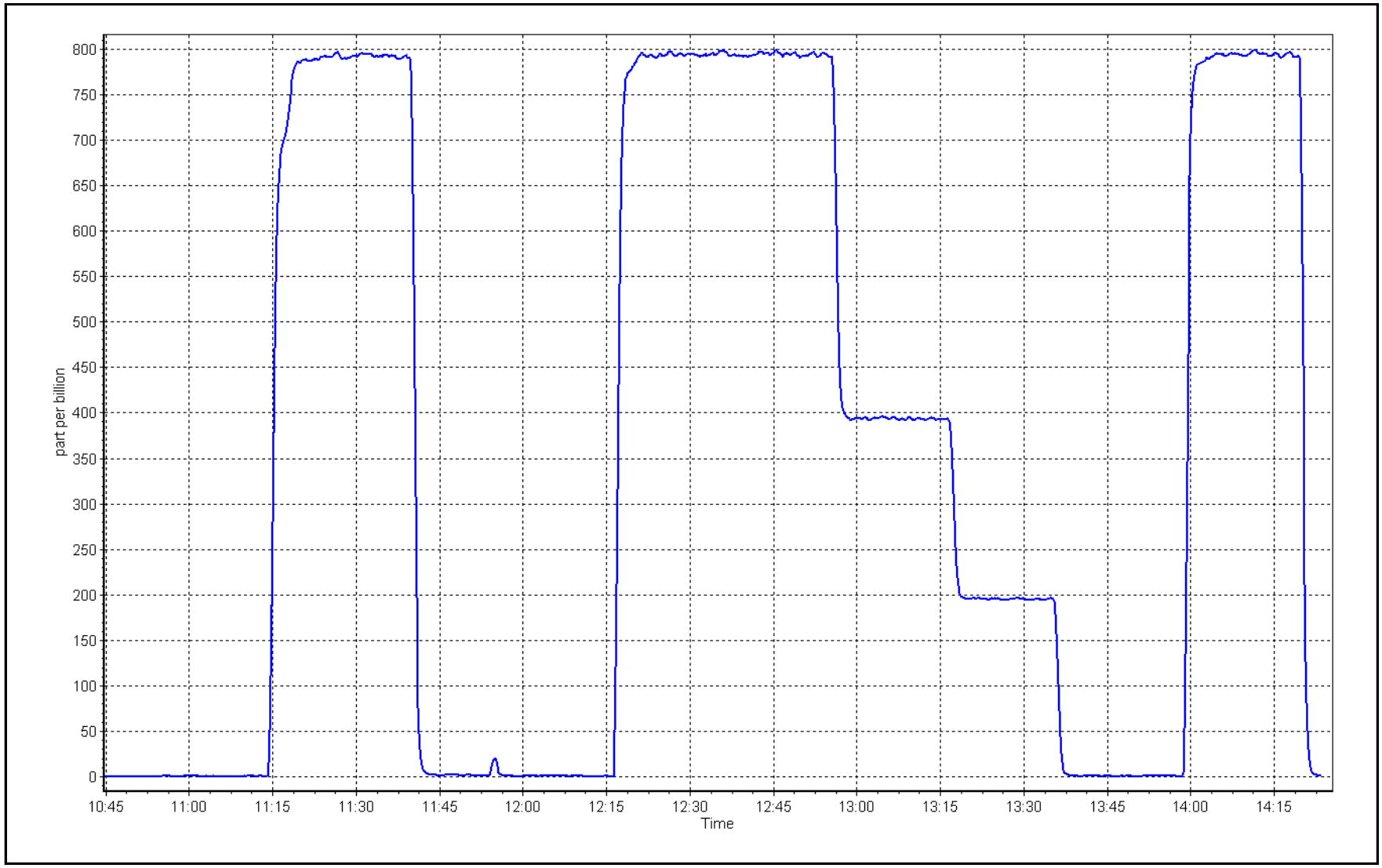
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	1.1	----
799.3	795.1	1.0052
400.1	393.9	1.0156
201.1	195.6	1.0279

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999932	*≥0.995*
Slope	0.994980	*0.90 - 1.10*
Intercept	-1.917407	*+/-30*



SO2 Calibration Plot Date: November 7, 2023 Location: Anzac



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	November 1, 2023	Last Cal Date:	October 5, 2023
Start time (MST):	9:56	End time (MST):	14:07
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:	0.997157	1.008310	Backgd or Offset:	2.28	2.31
Calibration intercept:	-0.105310	-0.045461	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	81.6	0.978
as found 2nd point	4973	38.9	40.0	40.6	0.980
as found 3rd point	4997	19.5	20.0	20.1	0.986
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4938	77.9	80.0	80.6	0.992
second point	4973	38.9	40.0	40.2	0.994
third point	4997	19.5	20.0	20.1	0.996
as left zero	5000	0.0	0.0	0.1	----
as left span	4938	77.9	80.0	79.7	1.003
SO2 Scrubber Check	4936	80.3	800.4	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.994
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.8	Prev response:	79.65	*% change:	2.6%
Baseline Corr 2nd AF pt:	40.8	AF Slope:	1.023352	AF Intercept:	-0.285524
Baseline Corr 3rd AF pt:	20.3	AF Correlation:	0.999995		

* = > +/-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

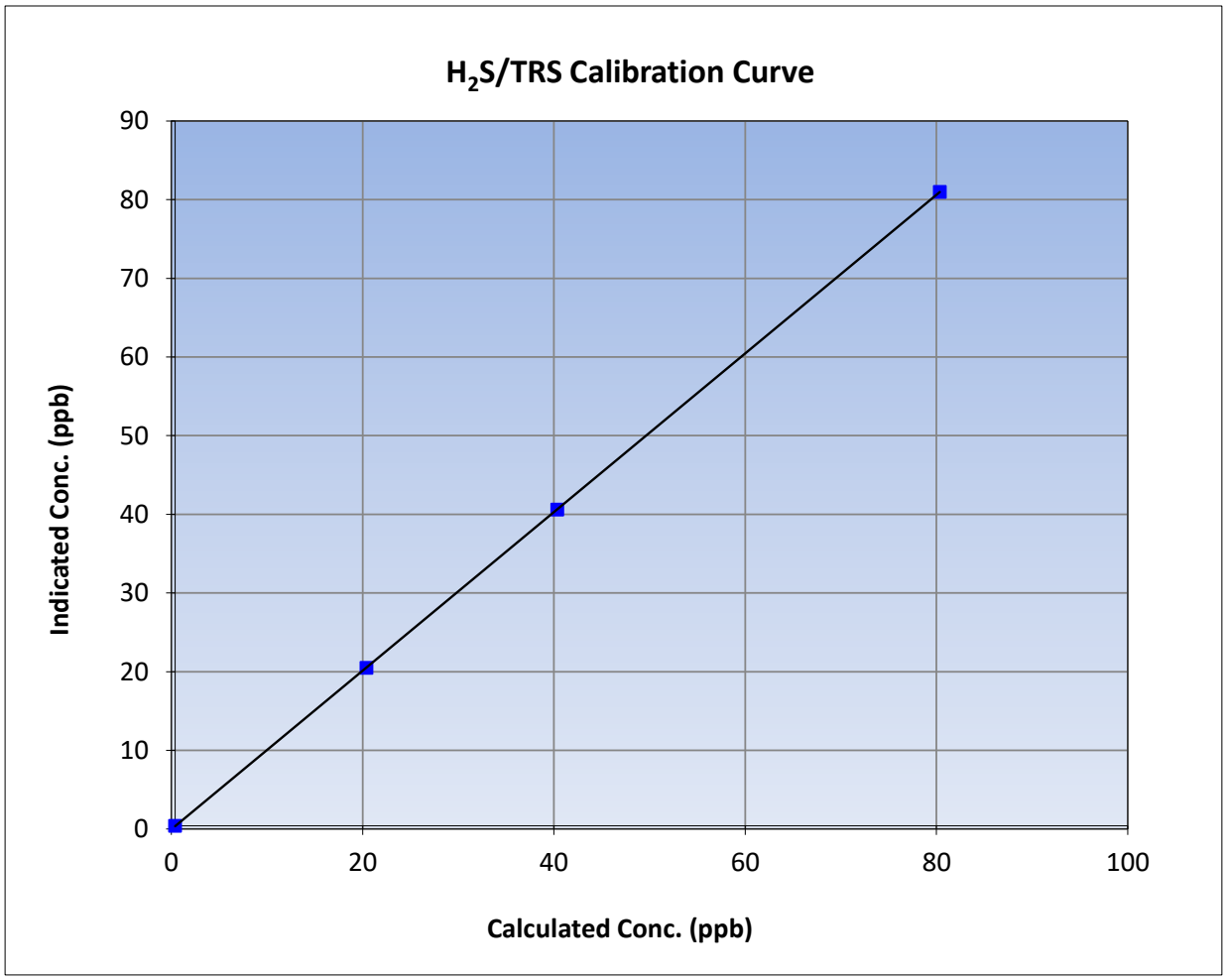
Station Information

Calibration Date:	November 1, 2023	Previous Calibration:	October 5, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	9:56	End Time (MST):	14:07
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153582

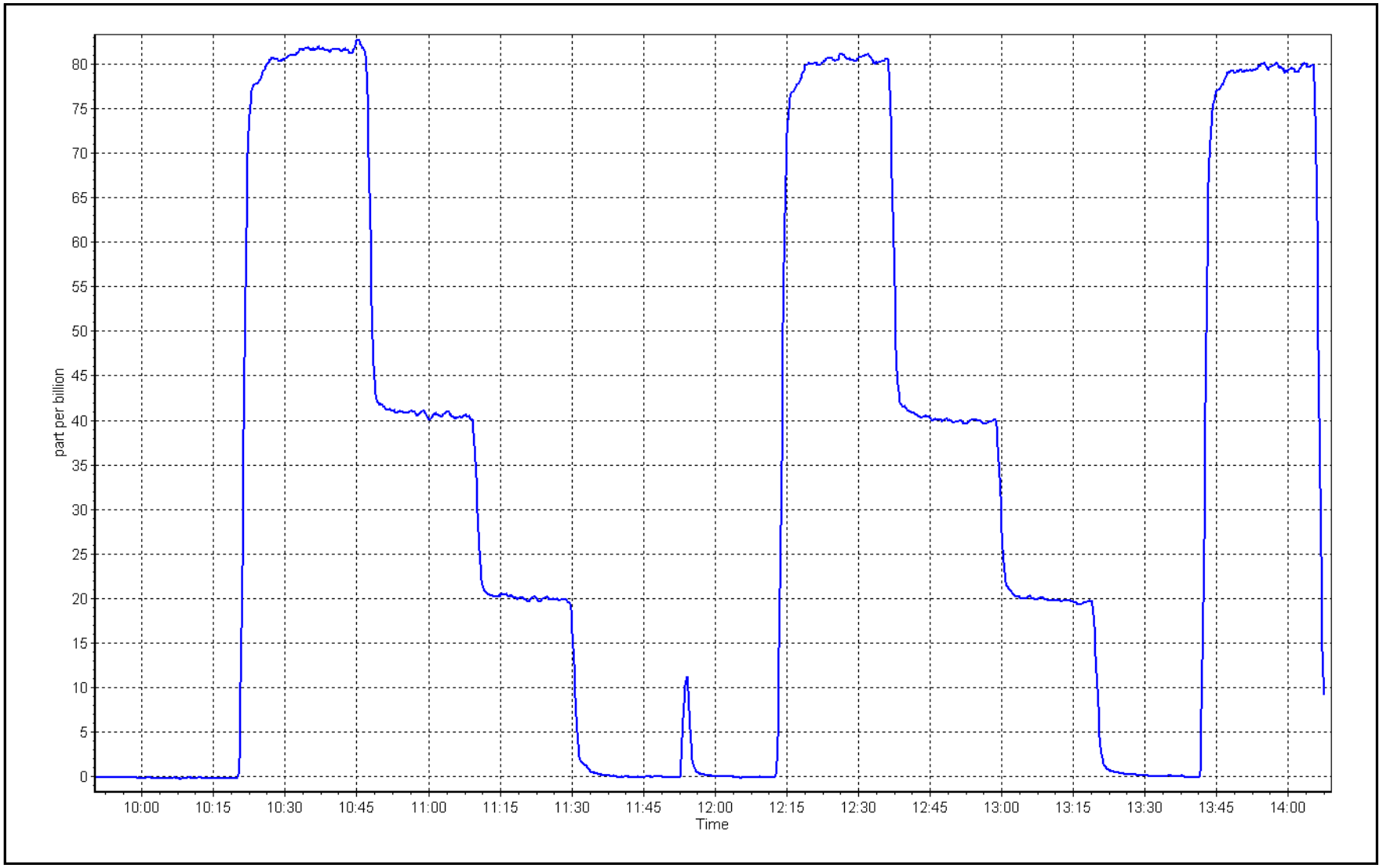
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.6	0.9920
40.0	40.2	0.9939
20.0	20.1	0.9956

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.008310	*0.90 - 1.10*
Intercept	-0.045461	*+/-3*



TRS Calibration Plot Date: November 1, 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:	November 7, 2023	Last Cal Date:	October 3, 2023
Start time (MST):	10:54	End time (MST):	14:23
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:	3.75E-04	3.72E-04	NMHC SP Ratio:	4.49E-05	4.60E-05
CH4 Retention time:	12.20	12.20	NMHC Peak Area:	203038	198214

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	17.02	1.005
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	0.998
second point	4979	40.2	8.56	8.53	1.004
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	17.18	0.996
				Average Correction Factor	1.005

Baseline Corr AF:	17.02	Prev response	17.07	*% change	-0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	9.11	8.96	1.017
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4938	80.3	9.11	9.13	0.998
second point	4979	40.2	4.56	4.56	1.001
third point	4998	20.2	2.29	2.26	1.016
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	9.11	9.18	0.992
				Average Correction Factor	1.005
Baseline Corr AF:	8.96	Prev response	9.03	*% change	-0.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	7.99	8.06	0.991
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	8.00	0.999
second point	4979	40.2	4.00	3.97	1.007
third point	4998	20.2	2.01	1.99	1.013
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	7.99	7.99	1.000
				Average Correction Factor	1.006
Baseline Corr AF:	8.06	Prev response	8.04	*% change	0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000528	1.002761
THC Cal Offset:	-0.040856	-0.036088
CH4 Cal Slope:	1.008350	1.001781
CH4 Cal Offset:	-0.017069	-0.016831
NMHC Cal Slope:	0.994097	1.003445
NMHC Cal Offset:	-0.024989	-0.019055

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

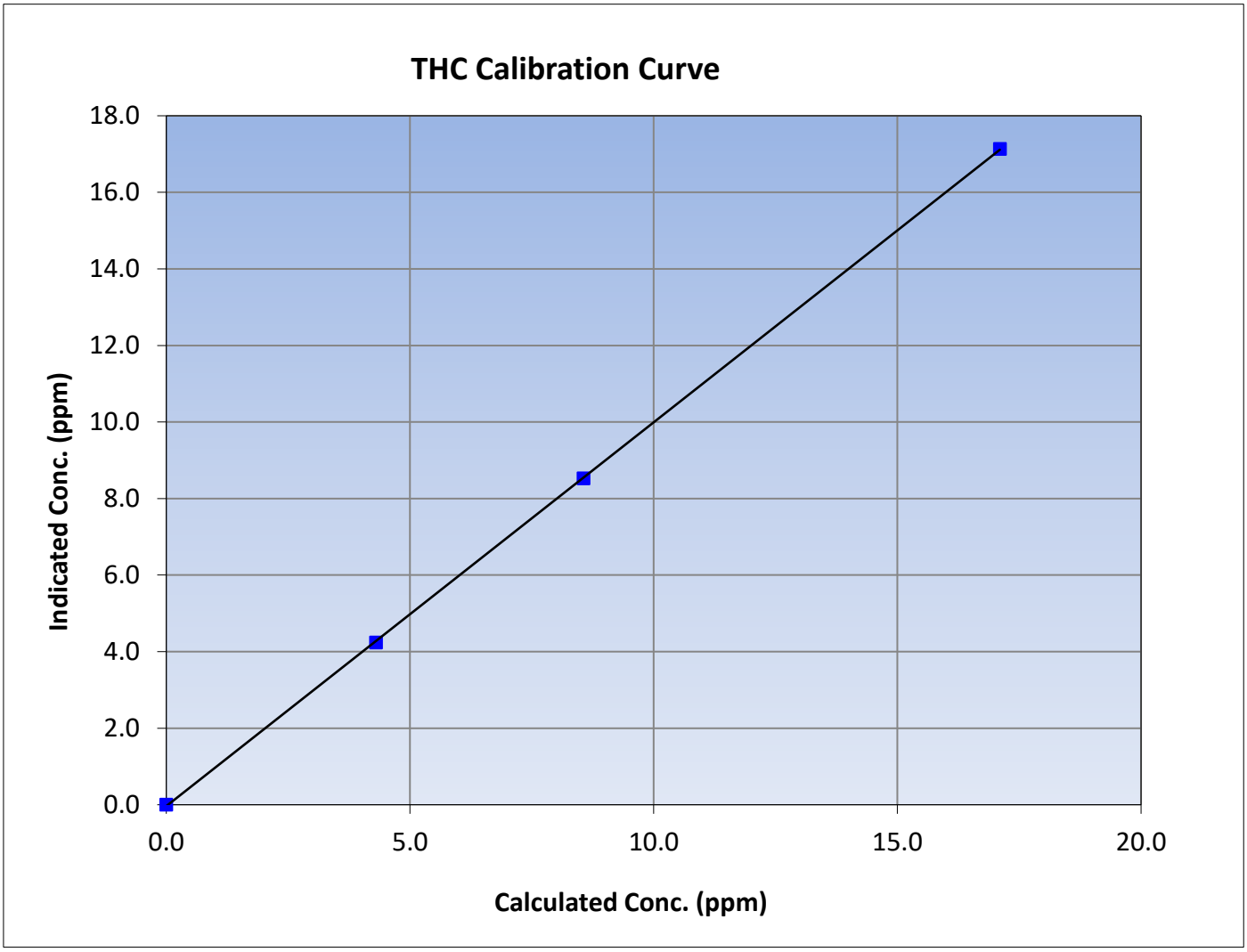
Version-01-2020

Station Information

Calibration Date:	November 7, 2023	Previous Calibration:	October 3, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	10:54	End Time (MST):	14:23
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	0.999980	≥0.995
17.10	17.13	0.9983			
8.56	8.53	1.0036	Slope	1.002761	0.90 - 1.10
4.30	4.24	1.0142			
			Intercept	-0.036088	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

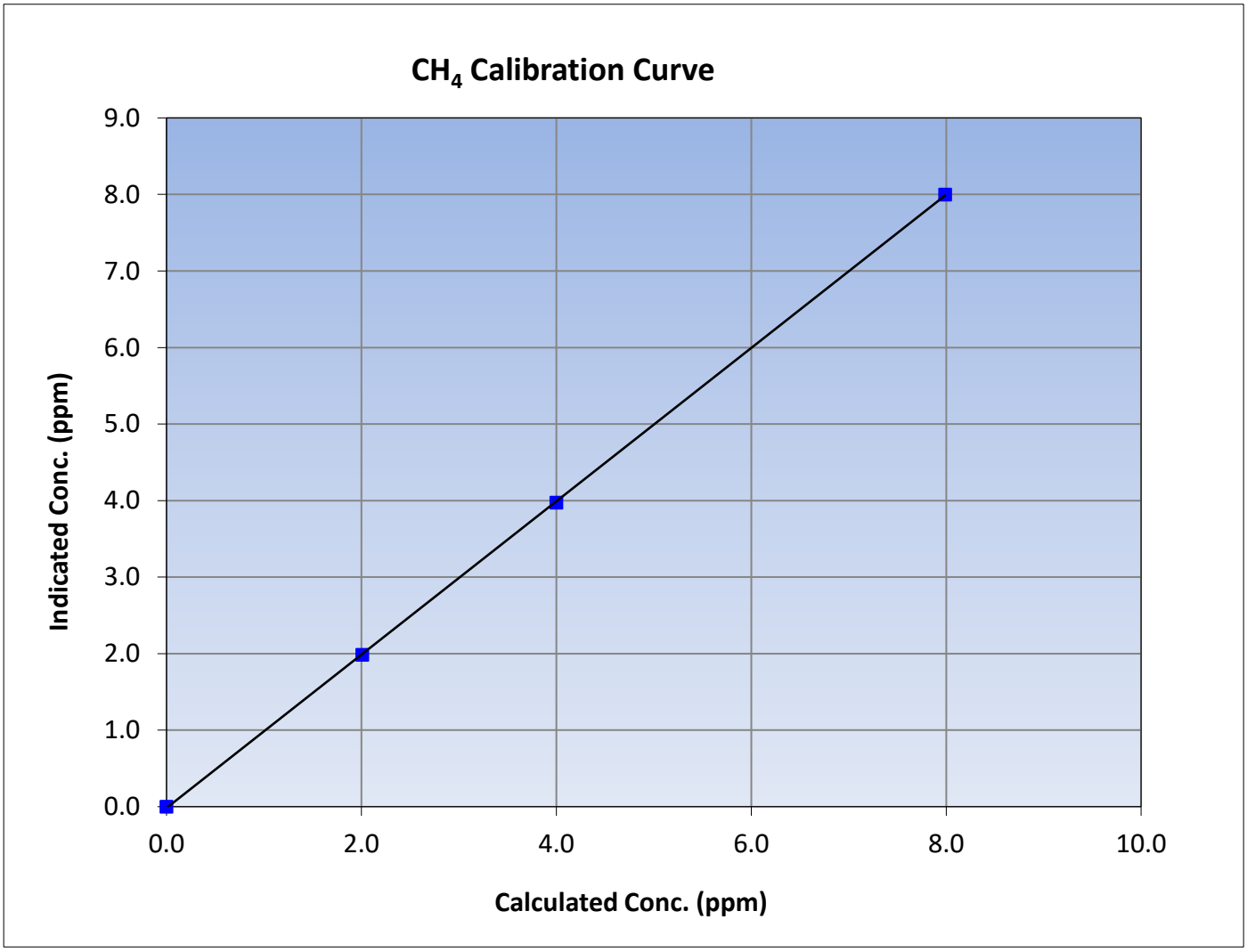
Version-01-2020

Station Information

Calibration Date:	November 7, 2023	Previous Calibration:	October 3, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	10:54	End Time (MST):	14:23
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	0.999977	*≥0.995*
7.99	8.00	0.9989			
4.00	3.97	1.0065	Slope	1.001781	*0.90 - 1.10*
2.01	1.99	1.0125			
			Intercept	-0.016831	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

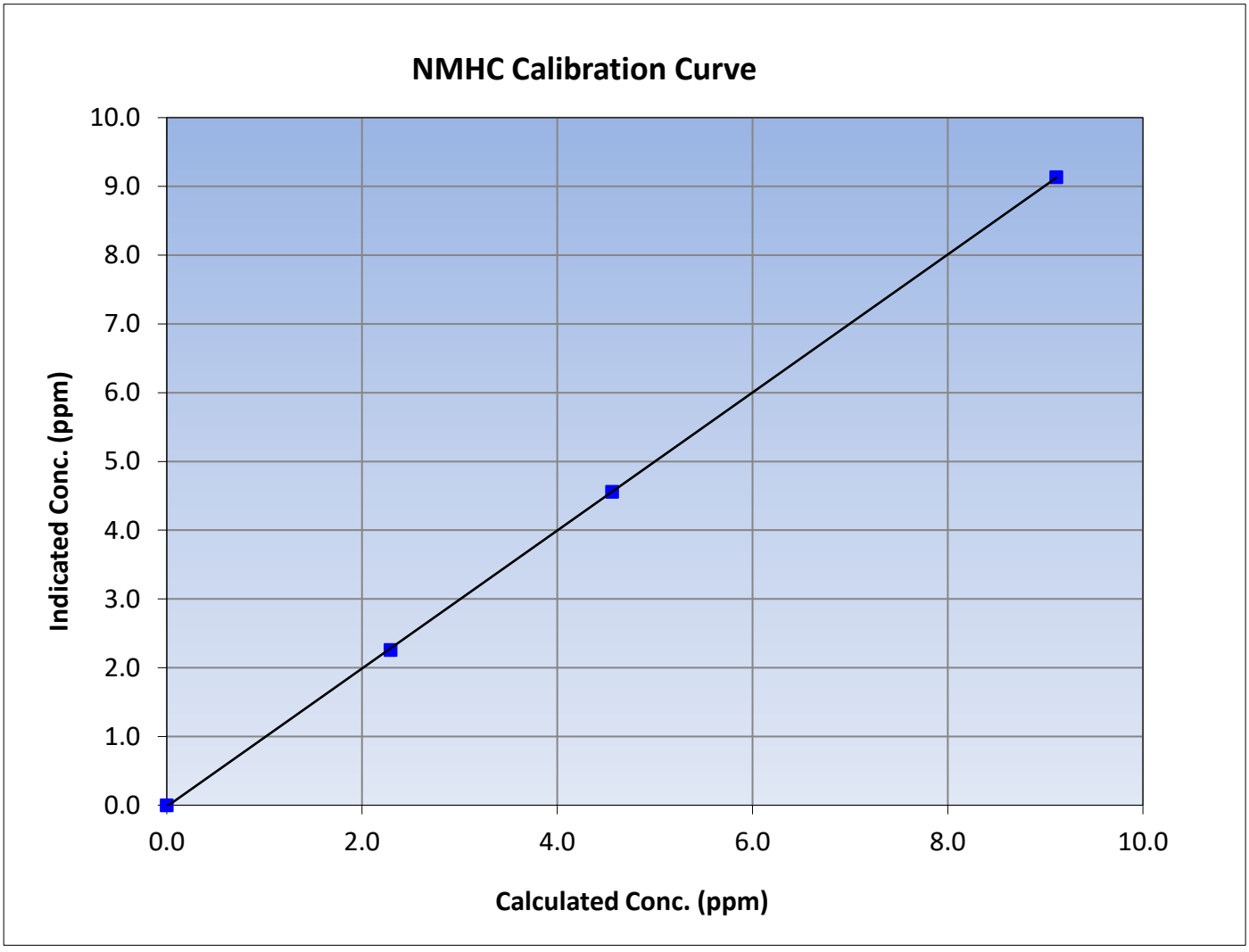
Version-01-2020

Station Information

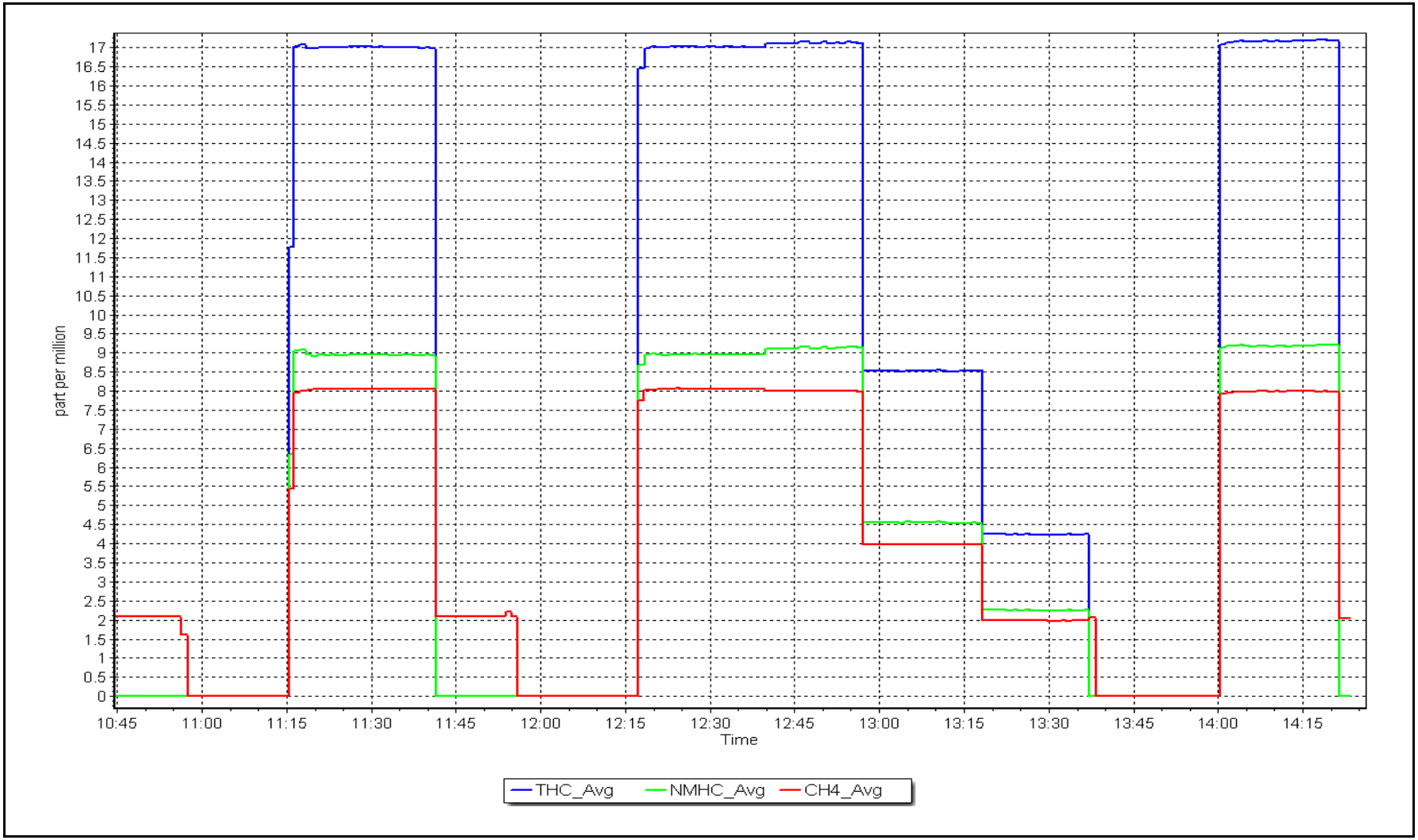
Calibration Date:	November 7, 2023	Previous Calibration:	October 3, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	10:54	End Time (MST):	14:23
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999977	*≥0.995*
9.11	9.13	0.9979			
4.56	4.56	1.0008	Slope	1.003445	*0.90 - 1.10*
2.29	2.26	1.0162			
			Intercept	-0.019055	*+/-0.5*



NMHC Calibration Plot Date: November 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:	November 23, 2023	Last Cal Date:	November 7, 2023
Start time (MST):	12:17	End time (MST):	14:01
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:	3.72E-04	3.72E-04	NMHC SP Ratio:	4.60E-05	4.60E-05
CH4 Retention time:	12.20	12.20	NMHC Peak Area:	198214	198214

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	17.09	1.001
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	17.09	1.001
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.001

Baseline Corr AF:	17.09	Prev response	17.11	*% change	-0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	9.11	9.19	0.992
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	9.20	0.991
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.991
Baseline Corr AF:	9.19	Prev response	9.13	*% 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	4938	80.3	7.99	7.90	1.012
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	7.89	1.013
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.013
Baseline Corr AF:	7.90	Prev response	7.99	*% change	-1.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

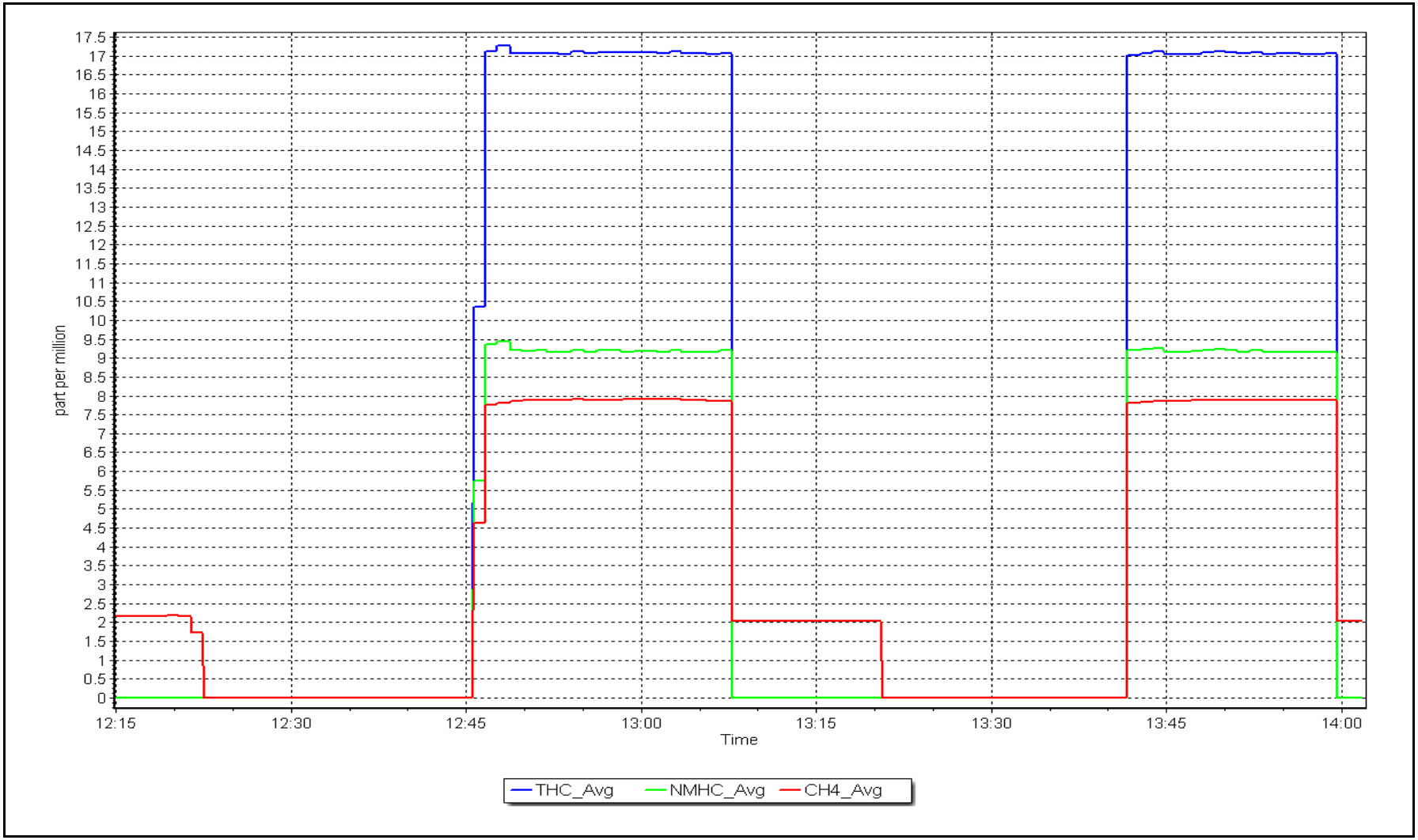
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.002761	0.999080
THC Cal Offset:	-0.036088	0.000000
CH4 Cal Slope:	1.001781	0.987419
CH4 Cal Offset:	-0.016831	0.000000
NMHC Cal Slope:	1.003445	1.008974
NMHC Cal Offset:	-0.019055	0.000000

Notes: Swapped Nitrogen cylinder.

Calibration Performed By: Mohammed Kashif

NMHC Calibration Plot Date: November 23, 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:	November 2, 2023	Last Cal Date:	October 4, 2023
Start time (MST):	9:58	End time (MST):	14:29
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:	1.411	1.411	NO bkgnd or offset:	3.8	3.8
NOX coeff or slope:	0.996	0.996	NOX bkgnd or offset:	3.8	3.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	159.4	160.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.996975	1.002002
NO_X Cal Offset:	-0.888234	-0.728718
NO Cal Slope:	0.996206	1.002134
NO Cal Offset:	-2.526016	-2.326785
NO_2 Cal Slope:	1.005379	1.004193
NO_2 Cal Offset:	1.537643	0.821549

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.1	-0.2	0.3	----	----
as found span	4936	80.2	814.1	800.2	13.9	819.2	800.1	19.2	0.9938	1.0001
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.3	0.0	0.3	----	----
high point	4936	80.2	814.1	800.2	13.9	815.5	800.9	14.7	0.9983	0.9991
second point	4979	40.1	406.8	399.9	7.0	406.5	396.8	9.7	1.0008	1.0077
third point	4999	20.1	203.9	200.4	3.5	202.5	196.5	6.0	1.0070	1.0200
as left zero	5000	0.0	0.0	0.0	0.0	0.4	0.0	0.3	----	----
as left span	4936	80.2	814.1	415.8	398.3	816.2	418.7	397.5	0.9975	0.9931
								Average Correction Factor	1.0020	1.0090

Corrected As found	NO_X = 819.1 ppb	NO = 800.3 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	1.0%
Previous Response	NO_X = 810.8 ppb	NO = 794.6 ppb		*Percent Change	NO =	0.7%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	798.3	413.9	398.3	400.5	0.9945	100.5%
2nd GPT point (200 ppb O3)	798.3	610.9	201.3	203.1	0.9912	100.9%
3rd GPT point (100 ppb O3)	798.3	676.2	136.0	138.1	0.9849	101.5%
				Average Correction Factor	0.9902	101.0%

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

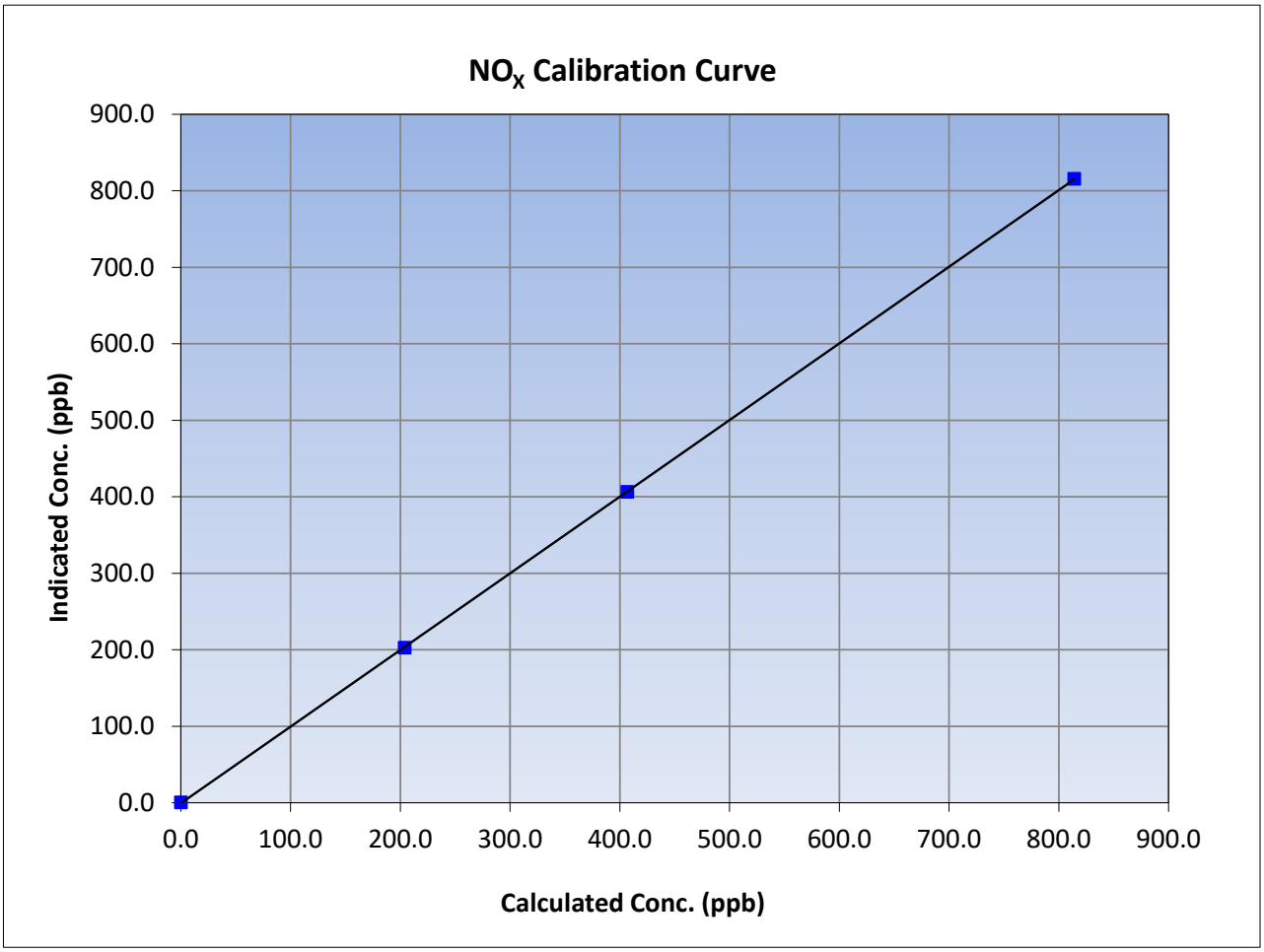
Version-04-2020

Station Information

Calibration Date:	November 2, 2023	Previous Calibration:	October 4, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:58	End Time (MST):	14:29
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	0.999993	*≥0.995*
814.1	815.5	0.9983			
406.8	406.5	1.0008	Slope	1.002002	*0.90 - 1.10*
203.9	202.5	1.0070			
			Intercept	-0.728718	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

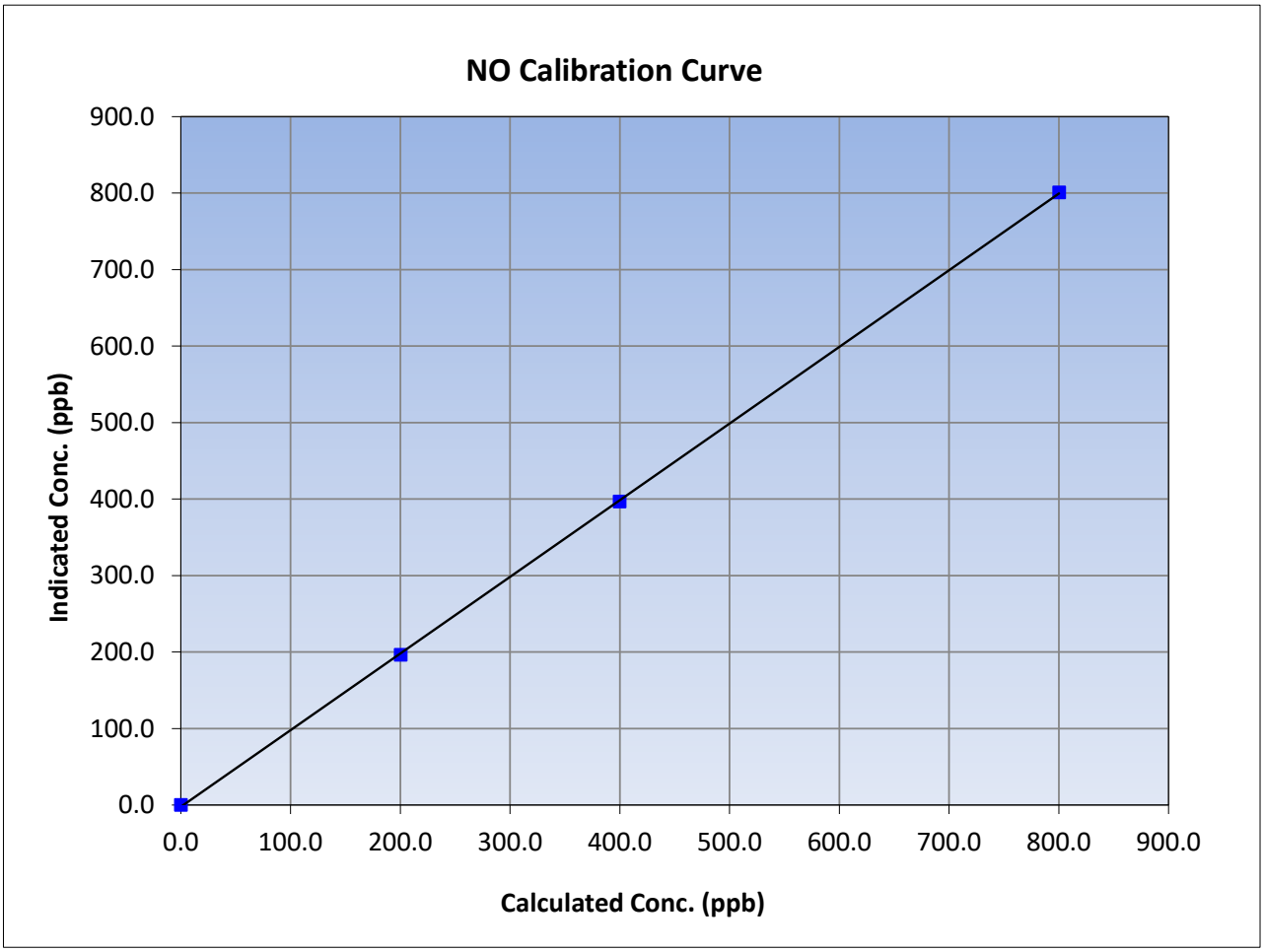
Version-04-2020

Station Information

Calibration Date:	November 2, 2023	Previous Calibration:	October 4, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:58	End Time (MST):	14:29
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	0.999961	≥0.995
800.2	800.9	0.9991			
399.9	396.8	1.0077	Slope	1.002134	0.90 - 1.10
200.4	196.5	1.0200			
			Intercept	-2.326785	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

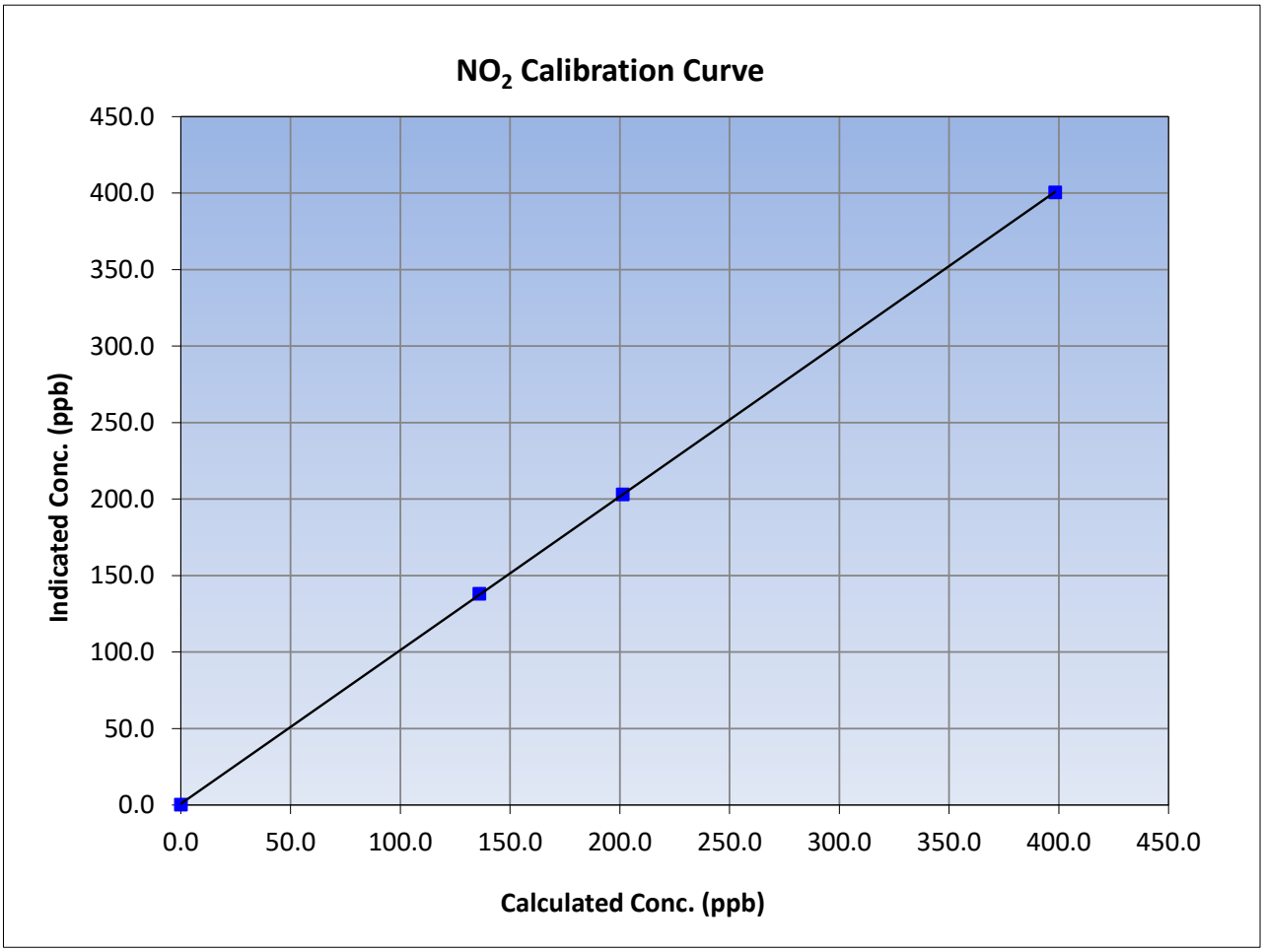
Version-04-2020

Station Information

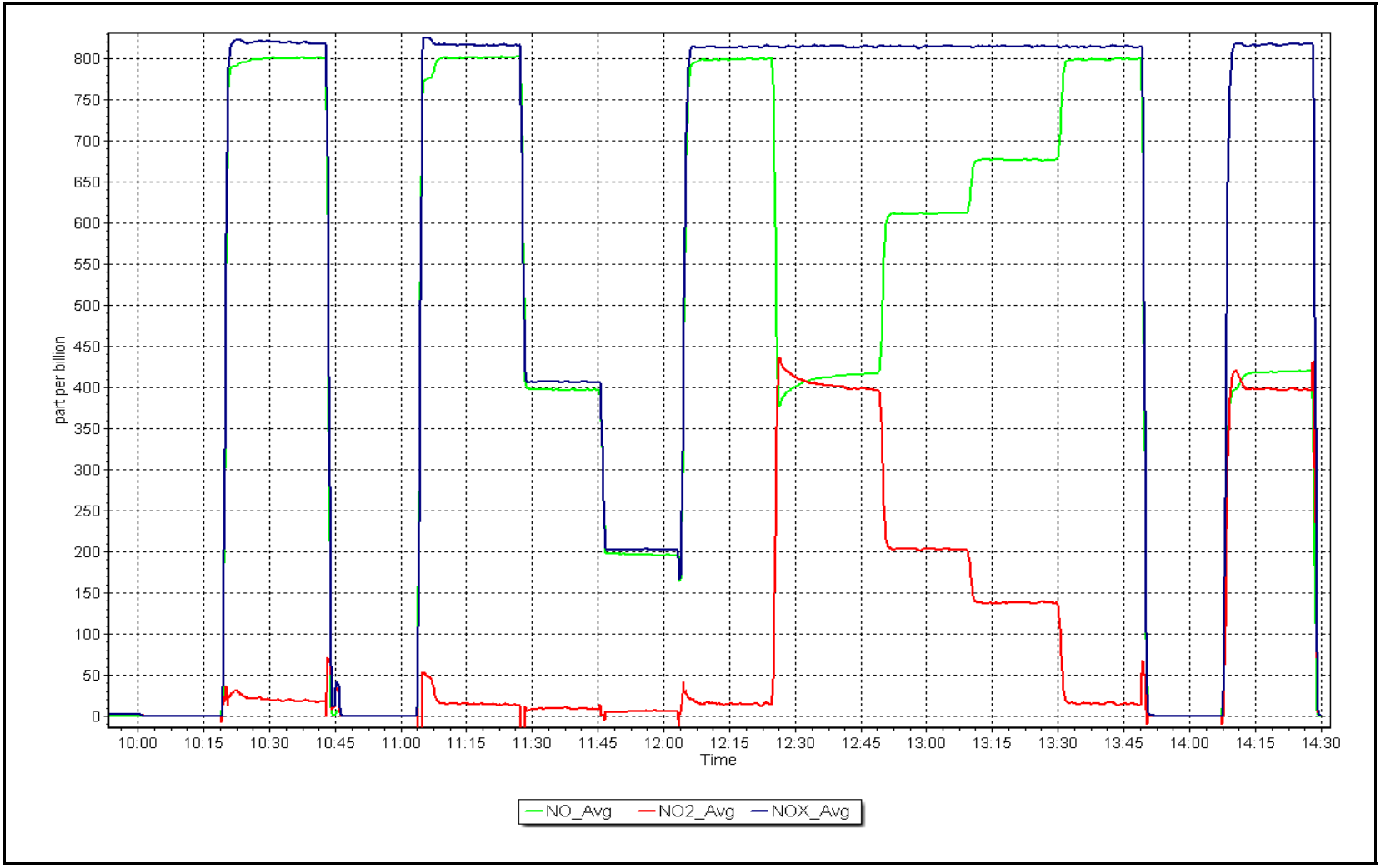
Calibration Date:	November 2, 2023	Previous Calibration:	October 4, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:58	End Time (MST):	14:29
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.3	----	Correlation Coefficient	0.999990	≥0.995
398.3	400.5	0.9945			
201.3	203.1	0.9912	Slope	1.004193	0.90 - 1.10
136.0	138.1	0.9849			
			Intercept	0.821549	+/-20



NO_X Calibration Plot Date: November 2, 2023 Location: Anzac



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	November 6, 2023	Last Cal Date:	October 13, 2023
Start time (MST):	10:48	End time (MST):	15:53
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	API T750	Serial Number:	281
ZAG Make/Model:	API 701H	Serial Number:	357

Analyzer Information

Analyzer make:	Thermo 49i	Analyzer serial #:	1152220026
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997514	1.001200	Backgd or Offset:	-1.5	-1.6
Calibration intercept:	0.360000	0.540000	Coeff or Slope:	1.000	1.013

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	918.1	400.0	385.5	1.038
as found 2nd point	5000	805.1	200.0	193.8	1.032
as found 3rd point	5000	712.5	100.0	97.4	1.027
calibrator zero	5000	0.0	0.0	0.4	----
high point	5000	1080.7	400.0	400.9	0.998
second point	5000	822.6	200.0	201.0	0.995
third point	5000	691.7	100.0	100.7	0.993
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	919.5	400.0	394.9	1.013
				Average Correction Factor	0.995

Baseline Corr As found:	385.6	Previous response	399.4	*% change	-3.6%
Baseline Corr 2nd AF pt:	193.9	AF Slope:	0.963371	AF Intercept:	0.560000
Baseline Corr 3rd AF pt:	97.5	AF Correlation:	0.999986		

* = > +/-5% change initiates investigation

Notes: Performed multi point as founds with station calibrator. 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

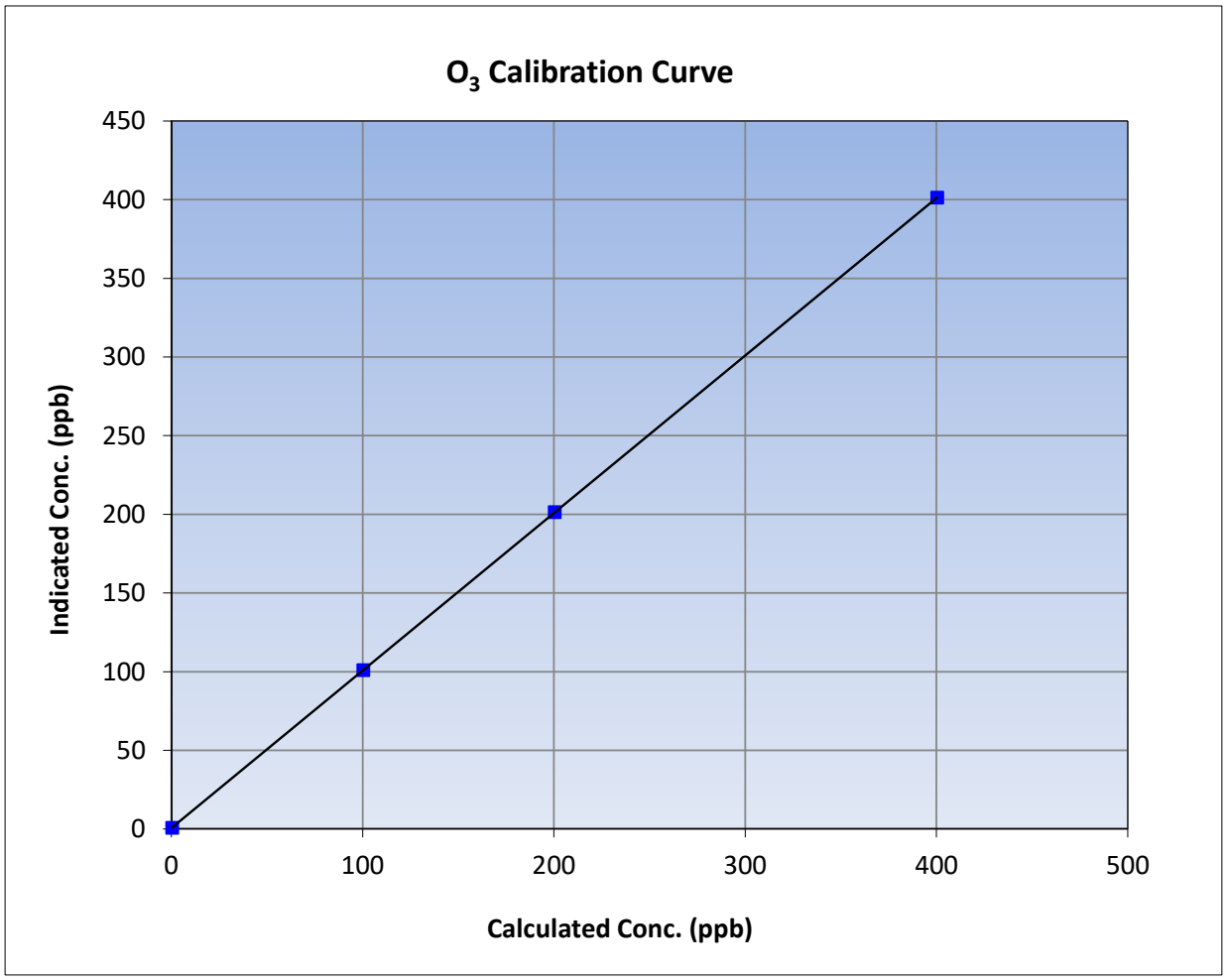
Station Information

Calibration Date:	November 6, 2023	Previous Calibration:	October 13, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	10:48	End Time (MST):	15:53
Analyzer make:	Thermo 49i	Analyzer serial #:	1152220026

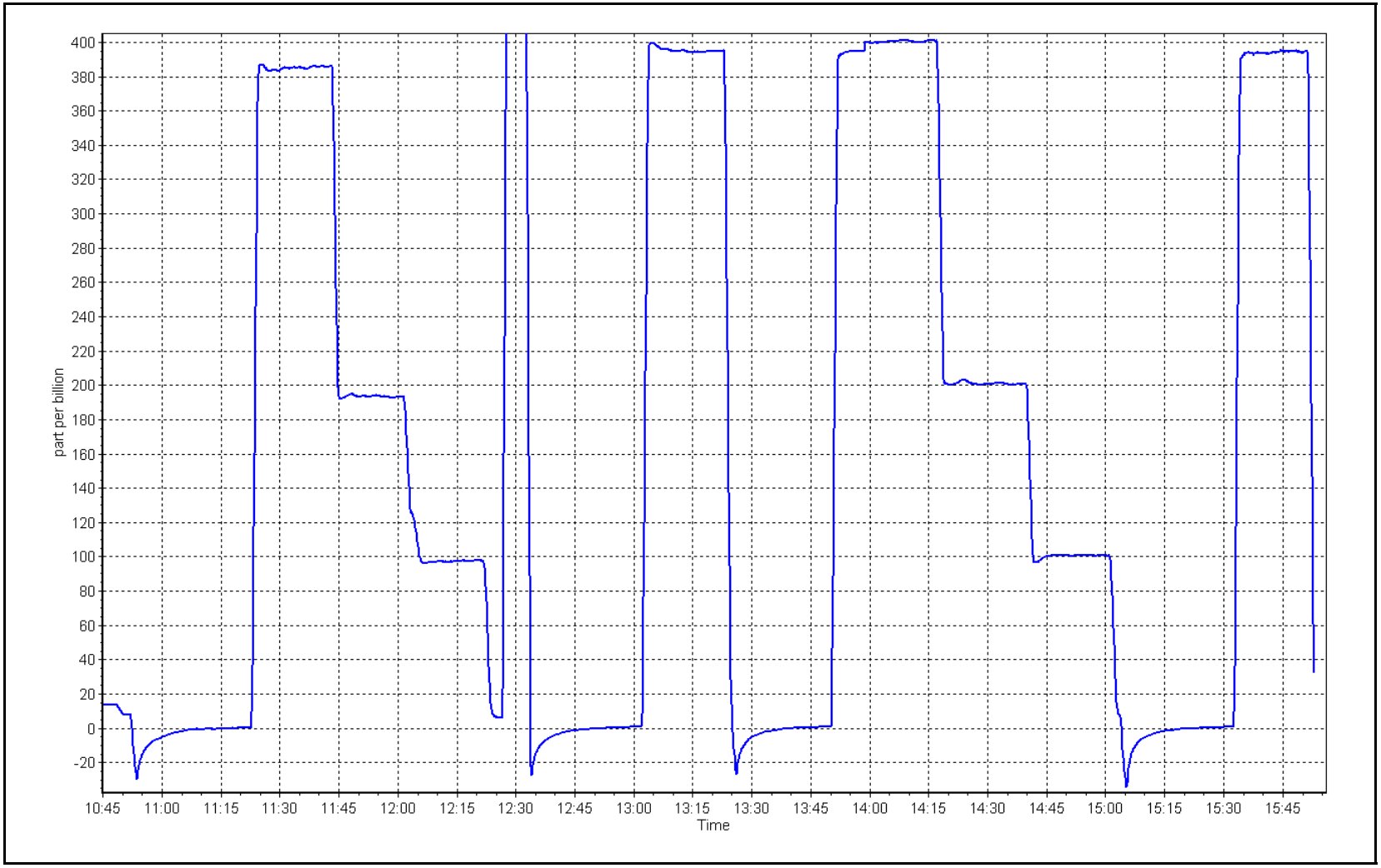
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
400.0	400.9	0.9978
200.0	201.0	0.9950
100.0	100.7	0.9930

Statistical Evaluation		Limits
Correlation Coefficient	0.999999	≥0.995
Slope	1.001200	0.90 - 1.10
Intercept	0.540000	+/- 5



O_3 Calibration Plot Date: November 6, 2023 Location: Anzac



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	November 21, 2023	Last Cal Date:	NA
Start time (MST):	13:28	End time (MST):	15:43
Reason:	Install		

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:	NA	1.002171	Backgd or Offset:	NA	1.4
Calibration intercept:	NA	-0.580000	Coeff or Slope:	NA	1.620

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	0.3	----
high point	5000	1080.7	400.0	400.7	0.998
second point	5000	822.6	200.0	199.5	1.003
third point	5000	691.7	100.0	98.7	1.013
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	919.5	400.0	403.1	0.992
				Average Correction Factor	1.005

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

* = > +/-5% change initiates investigation

Notes: Install calibration. Adjusted span only.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

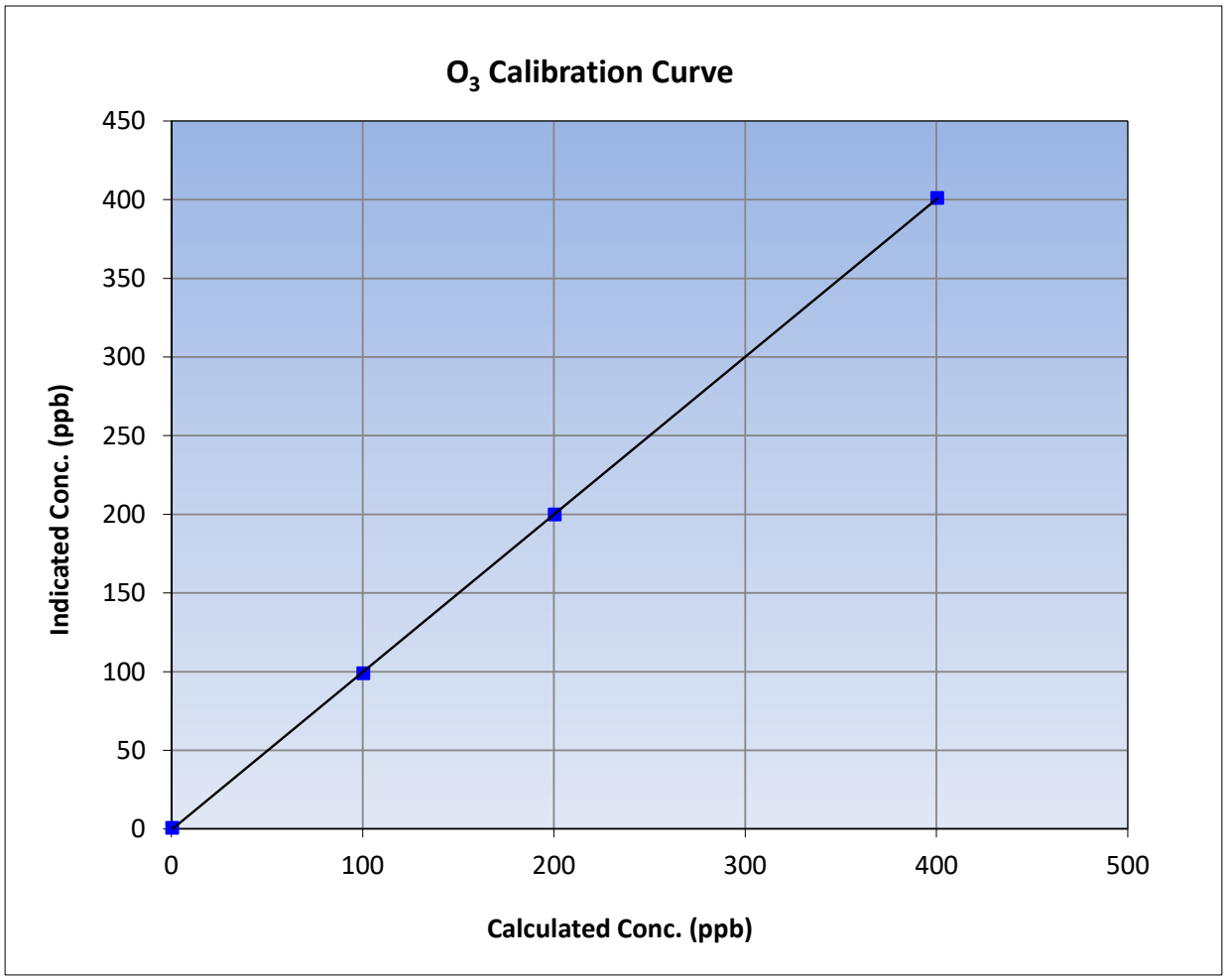
Station Information

Calibration Date:	November 21, 2023	Previous Calibration:	NA
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	13:28	End Time (MST):	15:43
Analyzer make:	Thermo 49i	Analyzer serial #:	1426262595

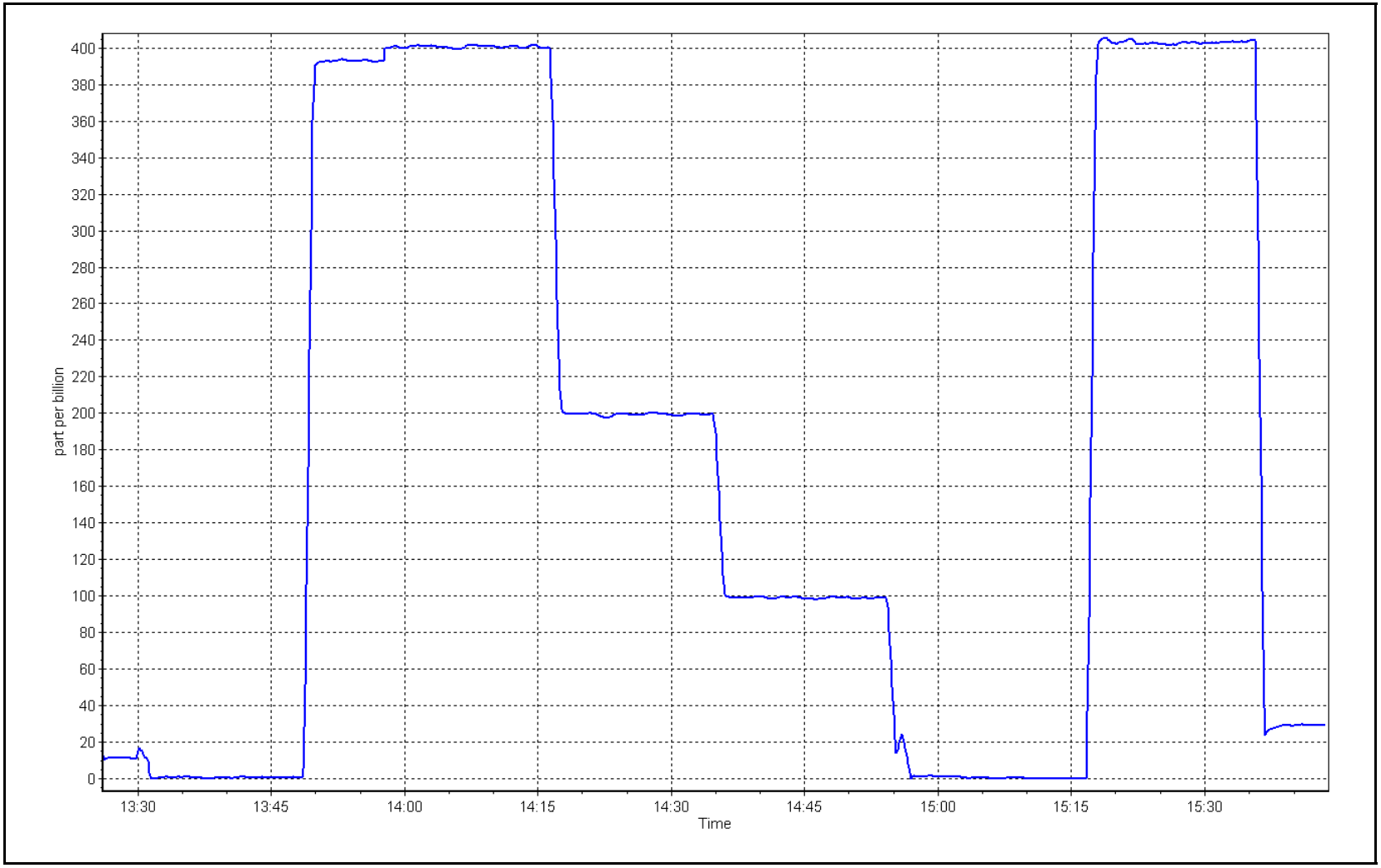
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
400.0	400.7	0.9983
200.0	199.5	1.0025
100.0	98.7	1.0132

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999978	*≥0.995*
Slope	1.002171	*0.90 - 1.10*
Intercept	-0.580000	*+/- 5*



O_3 Calibration Plot Date: November 21, 2023 Location: Anzac



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	November 21, 2023	Last Cal Date:	November 6, 2023
Start time (MST):	10:58	End time (MST):	12:48
Reason:	Removal		

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 #:	1152220026
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001200		Backgd or Offset:	-1.6	NA
Calibration intercept:	0.540000		Coeff or Slope:	1.013	NA

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	918.1	400.0	386.1	1.036
as found 2nd point	5000	805.1	200.0	192.9	1.037
as found 3rd point	5000	712.5	100.0	96.2	1.040
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	

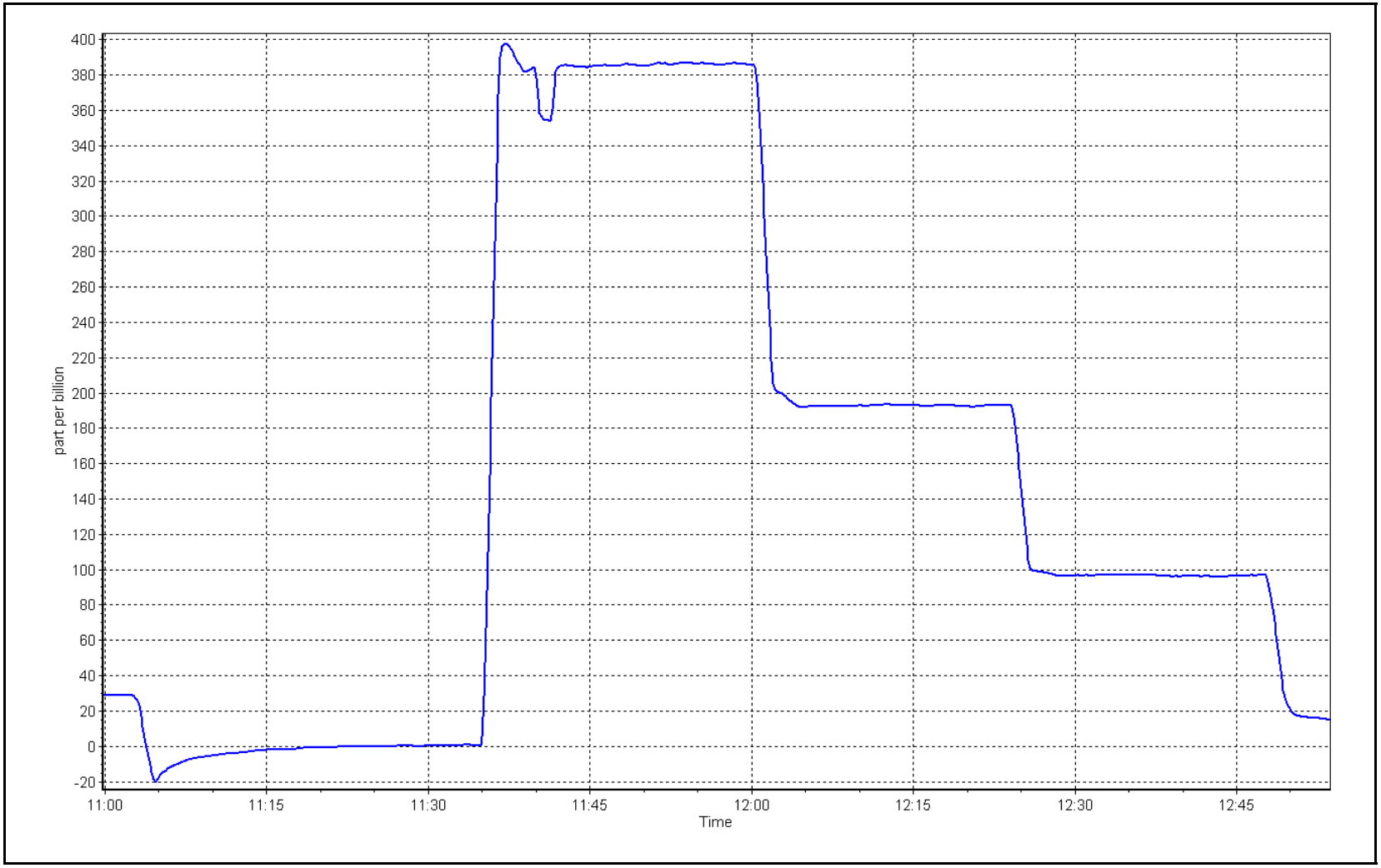
Baseline Corr As found:	385.9	Previous response	401.0	*% change	-3.9%
Baseline Corr 2nd AF pt:	192.7	AF Slope:	0.965086	AF Intercept:	-0.040000
Baseline Corr 3rd AF pt:	96.0	AF Correlation:	0.999998		

* = > +/-5% change initiates investigation

Notes: Removal calibration.

Calibration Performed By: Mohammed Kashif

O_3 Calibration Plot Date: November 21, 2023 Location: Anzac



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	November 7, 2023	Last Cal Date:	October 6, 2023
Start time (MST):	13:23	End time (MST):	13:38
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)	2.7	3.2	2.7	☐	+/- 2 °C
P (mmHg)	705.7	706.5	705.7	☐	+/- 10 mmHg
flow (LPM)	4.99	5.00	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: November 7, 2023 Last Cal Date: October 6, 2023

PM w/o HEPA: 3.4 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: October 6, 2023 <0.2 ug/m3

Disposable Filter Changed: October 6, 2023

Annual Maintenance

Date Sample Tube Cleaned: July 6, 2023

Date RH/T Sensor Cleaned: July 6, 2023

Notes: No adjustments required.

Calibration by: Mohammed Kashif

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS17
WAPASU
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	November 6, 2023	Last Cal Date:	October 11, 2023
Start time (MST):	11:01	End time (MST):	13:52
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:	1.002238	1.000367	Backgd or Offset:	12.6	12.6
Calibration intercept:	-1.839260	-1.259622	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	0.4	----
as found span	4921	79.4	800.0	800.1	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.7	----
high point	4921	79.4	800.0	800.4	0.999
second point	4960	39.7	400.0	396.7	1.008
third point	4980	19.8	199.5	197.2	1.012
as left zero	5000	0.0	0.0	0.6	----
as left span	4920	79.4	800.1	803.6	0.996
				Average Correction Factor	1.007

Baseline Corr As found:	799.70	Previous response	799.92	*% change	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

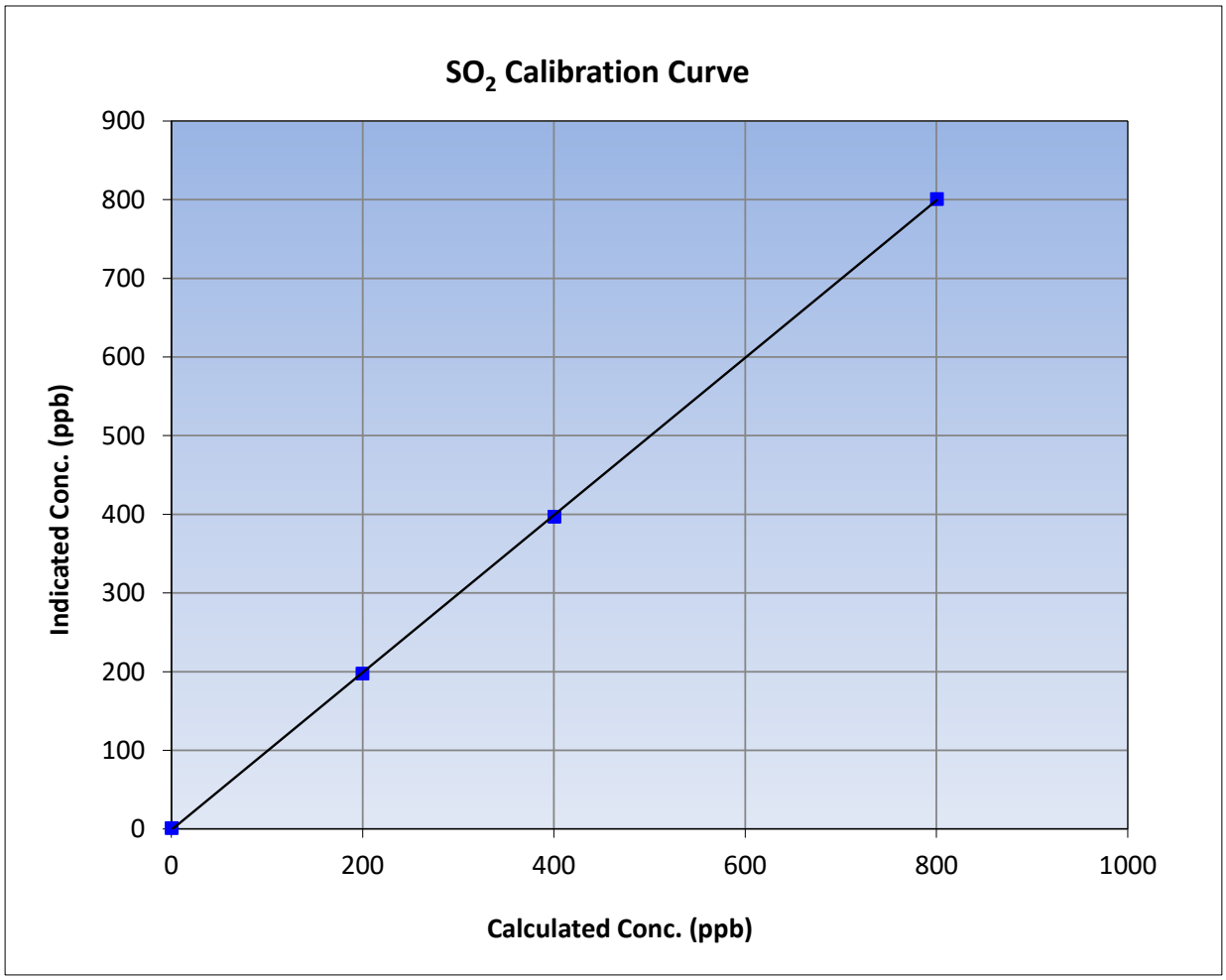
Station Information

Calibration Date:	November 6, 2023	Previous Calibration:	October 11, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:01	End Time (MST):	13:52
Analyzer make:	Thermo 43i	Analyzer serial #:	1218153459

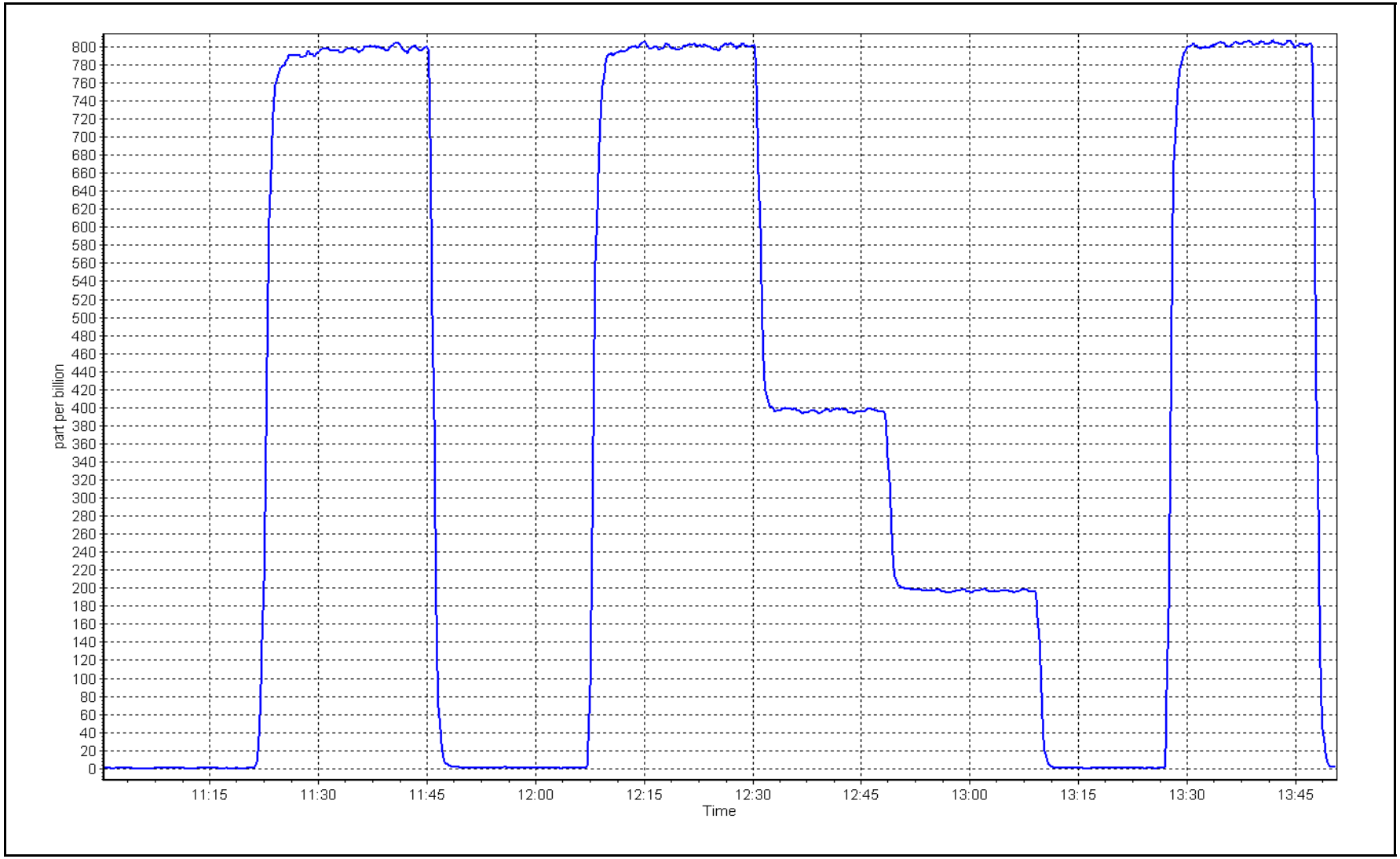
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.7	----
800.0	800.4	0.9995
400.0	396.7	1.0084
199.5	197.2	1.0117

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999966	*≥0.995*
Slope	1.000367	*0.90 - 1.10*
Intercept	-1.259622	*+/-30*



SO2 Calibration Plot Date: November 6, 2023 Location: Wapasu



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	November 28, 2023	Last Cal Date:	October 16, 2023
Start time (MST):	10:35	End time (MST):	15:40
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 450i		Analyzer serial #:	1218153583	
Converter make:	n/a		Converter serial #:	n/a	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001854	1.001426	Backgd or Offset:	12.2	12.2
Calibration intercept:	0.060776	0.000779	Coeff or Slope:	1.114	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	82.3	0.971
as found 2nd point	4961	39.4	40.0	40.9	0.976
as found 3rd point	4980	19.7	20.0	20.5	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	0.1	----
high point	4921	78.8	80.0	80.3	0.996
second point	4961	39.4	40.0	39.6	1.010
third point	4980	19.7	20.0	20.2	0.990
as left zero	5000	0.0	0.0	0.3	----
as left span	4921	78.8	80.0	79.1	1.011
SO2 Scrubber Check	4921	79.4	800.0	0.2	----
Date of last scrubber change:		n/a		Ave Corr Factor	0.999
Date of last converter efficiency test:		n/a			efficiency

Baseline Corr As found:	82.4	Prev response:	80.21	*% change:	2.7%
Baseline Corr 2nd AF pt:	41.0	AF Slope:	1.029711	AF Intercept:	-0.139183
Baseline Corr 3rd AF pt:	20.6	AF Correlation:	0.999992		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

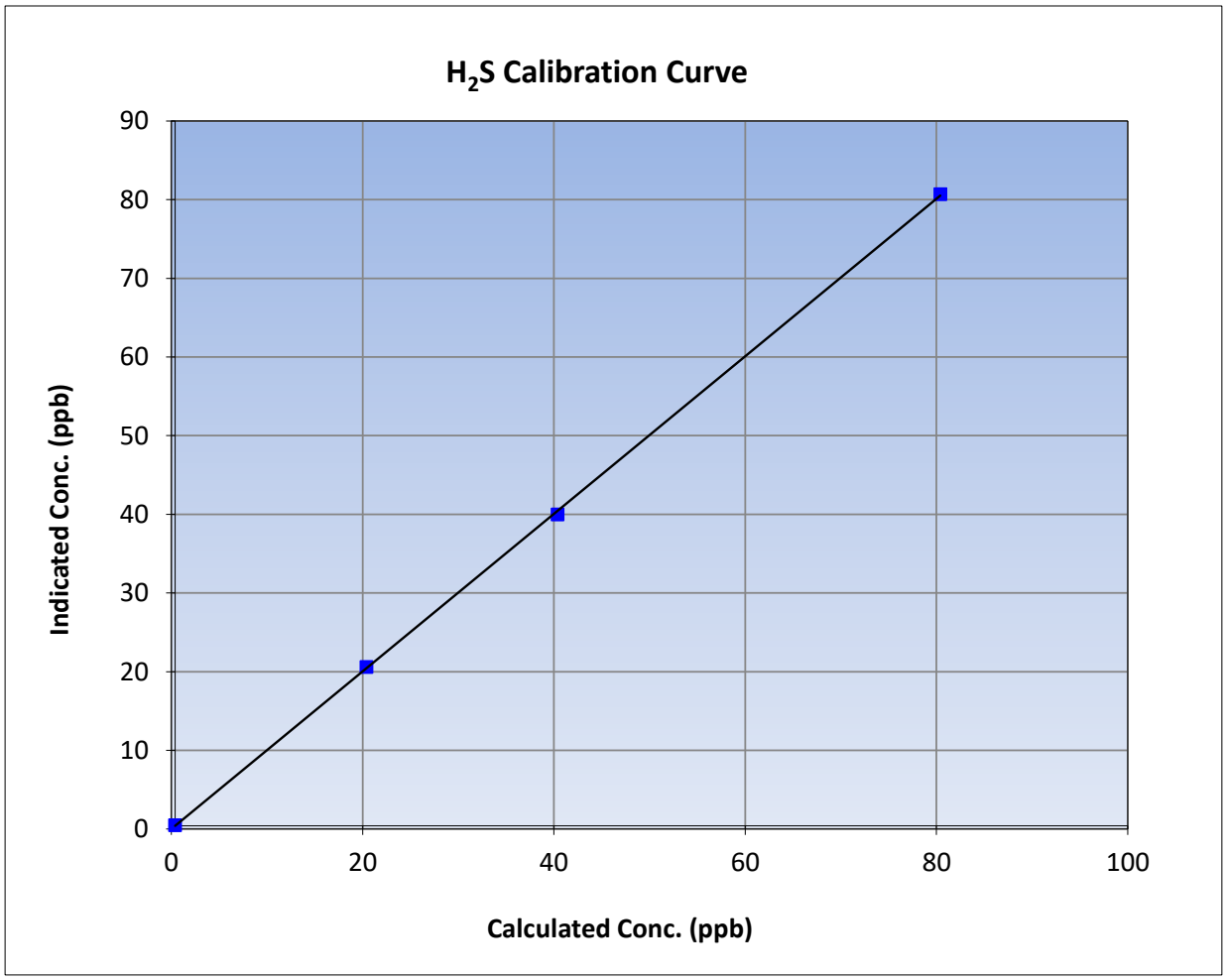
Station Information

Calibration Date:	November 28, 2023	Previous Calibration:	October 16, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:35	End Time (MST):	15:40
Analyzer make:	Thermo 450i	Analyzer serial #:	1218153583

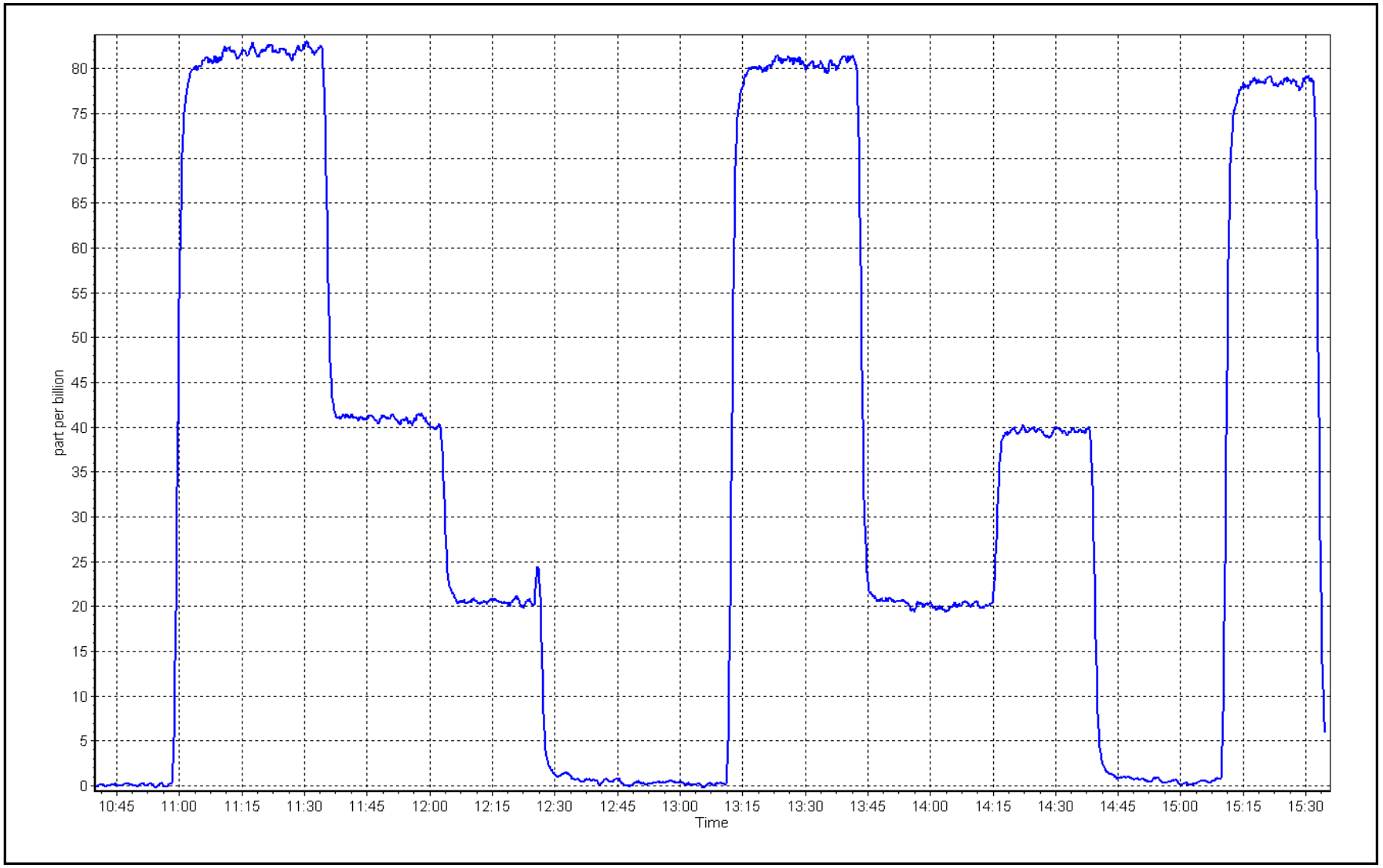
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.3	0.9963
40.0	39.6	1.0100
20.0	20.2	0.9901

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999921	*≥0.995*
Slope	1.001426	*0.90 - 1.10*
Intercept	0.000779	*+/-3*



H_2S Calibration Plot Date: November 28, 2023 Location: Wapasu



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	November 6, 2023	Last Cal Date:	October 11, 2023
Start time (MST):	11:01	End time (MST):	13:52
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 51i-LT		Analyzer serial #:	1218153352	
Analyzer Range:	0 - 20 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005834	1.004169	Background:	3.300	3.300
Calibration intercept:	-0.105515	-0.126321	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	-0.10	----
as found span	4921	79.4	17.09	17.17	0.995
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.08	----
high point	4921	79.4	17.09	17.08	1.001
second point	4960	39.7	8.55	8.38	1.020
third point	4980	19.8	4.26	4.15	1.028
as left zero	5000	0.0	0.00	-0.11	----
as left span	4920	79.4	17.09	17.07	1.001
				Average Correction Factor	1.016

Baseline Corr As found:	17.27	Previous response	17.08	*% 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 adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

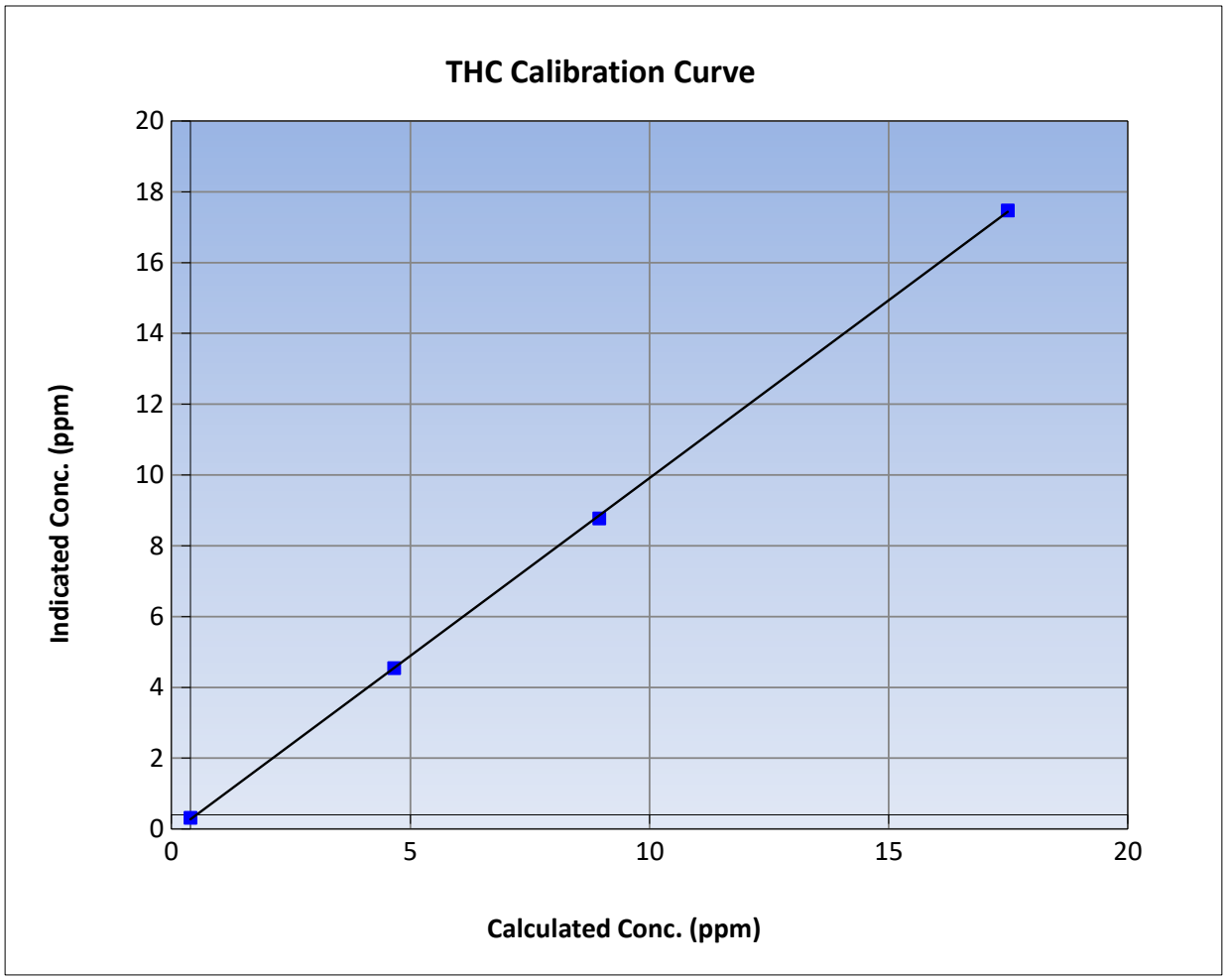
Station Information

Calibration Date:	November 6, 2023	Previous Calibration:	October 11, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:01	End Time (MST):	13:52
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1218153352

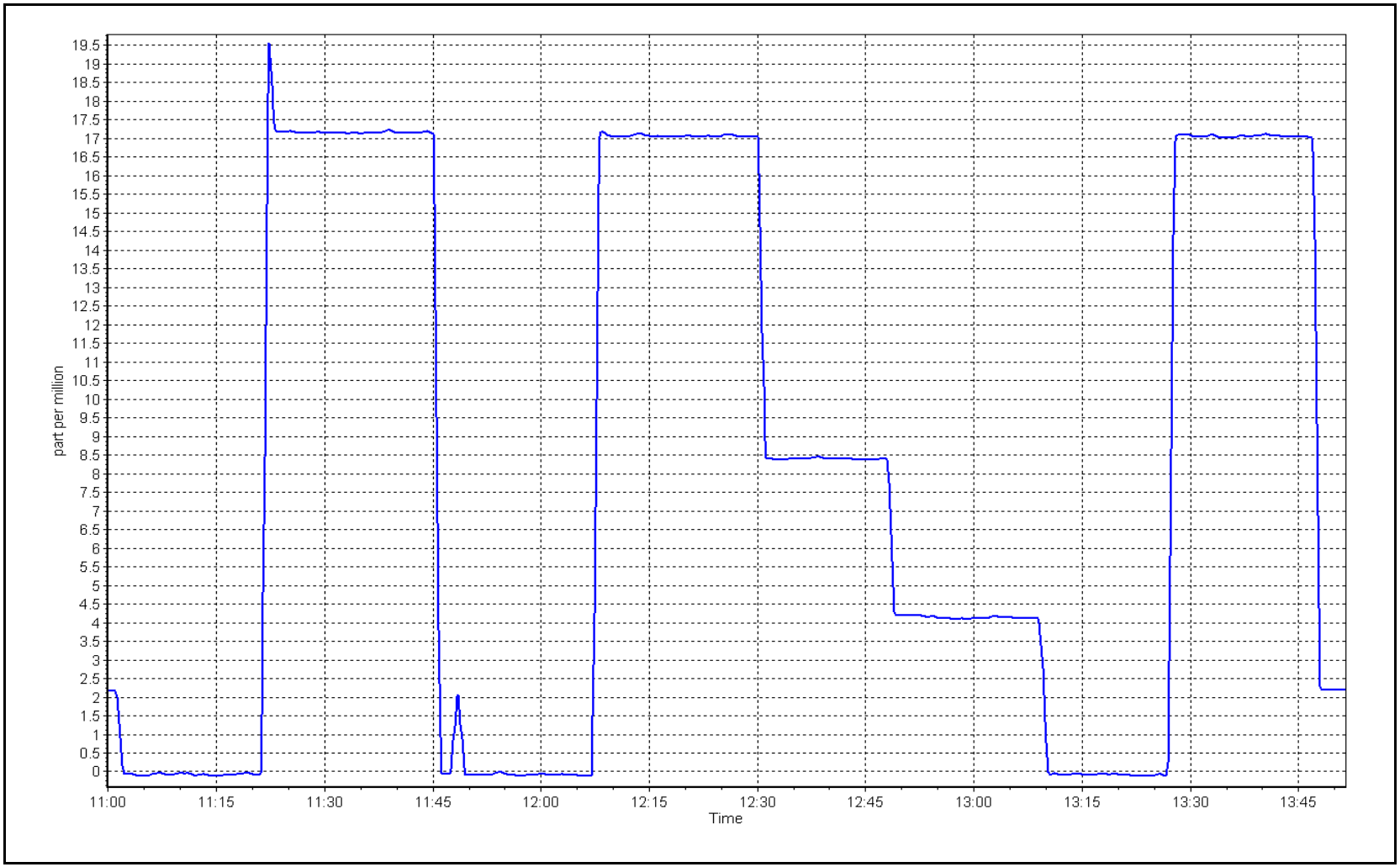
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.08	----
17.09	17.08	1.0009
8.55	8.38	1.0201
4.26	4.15	1.0276

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999940	*≥0.995*
Slope	1.004169	*0.90 - 1.10*
Intercept	-0.126321	*+/-1.5*



THC Calibration Plot Date: November 6, 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:	November 21, 2023	Last Cal Date:	October 18, 2023
Start time (MST):	11:15	End time (MST):	16:07
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:	1.294	1.280	NO bkgnd or offset:	9.2	8.4
NOX coeff or slope:	0.990	0.986	NOX bkgnd or offset:	9.3	8.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	363.7	341.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.002375	1.003061
NO_X Cal Offset:	-3.420000	-4.540000
NO Cal Slope:	1.001687	1.006988
NO Cal Offset:	-3.940000	-5.320000
NO_2 Cal Slope:	1.008551	0.997809
NO_2 Cal Offset:	-0.167241	0.732274

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.5	0.0	----	----
as found span	4917	83.2	817.2	799.9	17.3	827.7	809.6	18.2	0.9873	0.9880
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.3	0.0	----	----
high point	4917	83.2	817.2	799.9	17.3	817.8	803.1	14.8	0.9993	0.9960
second point	4958	41.6	408.6	399.9	8.7	401.6	393.6	8.0	1.0174	1.0161
third point	4979	20.8	204.3	200.0	4.3	197.2	191.9	5.3	1.0360	1.0421
as left zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
as left span	4917	83.2	817.2	395.7	421.5	816.2	396.7	419.6	1.0012	0.9974
								Average Correction Factor	1.0176	1.0181

Corrected As found	NO_X = 828.2 ppb	NO = 810.1 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	1.5%
Previous Response	NO_X = 815.7 ppb	NO = 797.3 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)	801.1	396.9	421.5	420.7	1.0019	99.8%
2nd GPT point (200 ppb O3)	801.1	602.5	215.9	217.2	0.9940	100.6%
3rd GPT point (100 ppb O3)	801.1	704.7	113.7	114.5	0.9931	100.7%
				Average Correction Factor	0.9963	100.4%

Notes: Change filters after as founds. Manifold cleaned. Adjusted span only.

Calibration Performed By: Aswin Sasi Kumar/ Jan Castro

Wood Buffalo Environmental Association

NO_X Calibration Summary

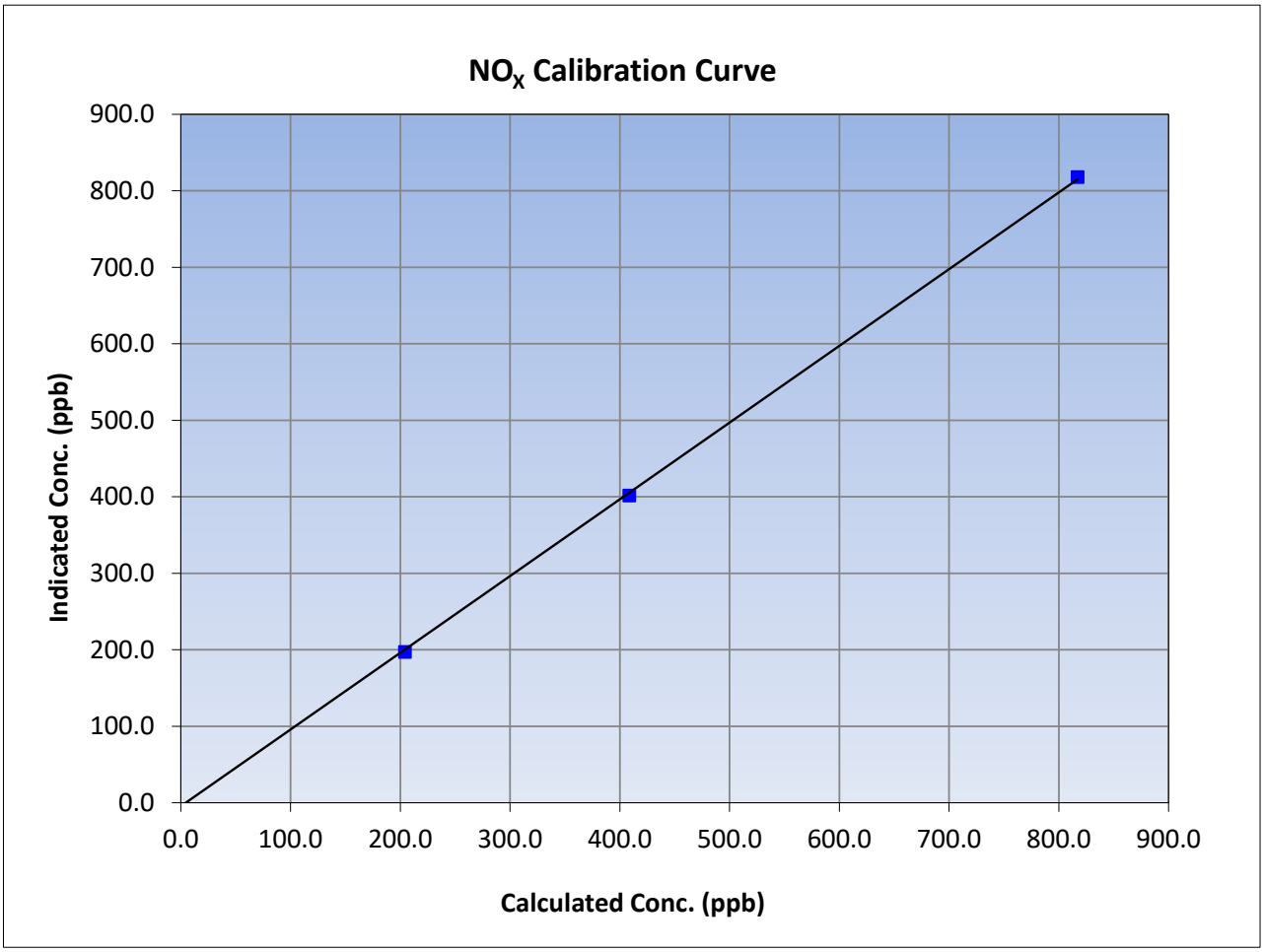
Version-04-2020

Station Information

Calibration Date:	November 21, 2023	Previous Calibration:	October 18, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:15	End Time (MST):	16:07
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	0.999867	≥0.995
817.2	817.8	0.9993			
408.6	401.6	1.0174	Slope	1.003061	0.90 - 1.10
204.3	197.2	1.0360			
			Intercept	-4.540000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

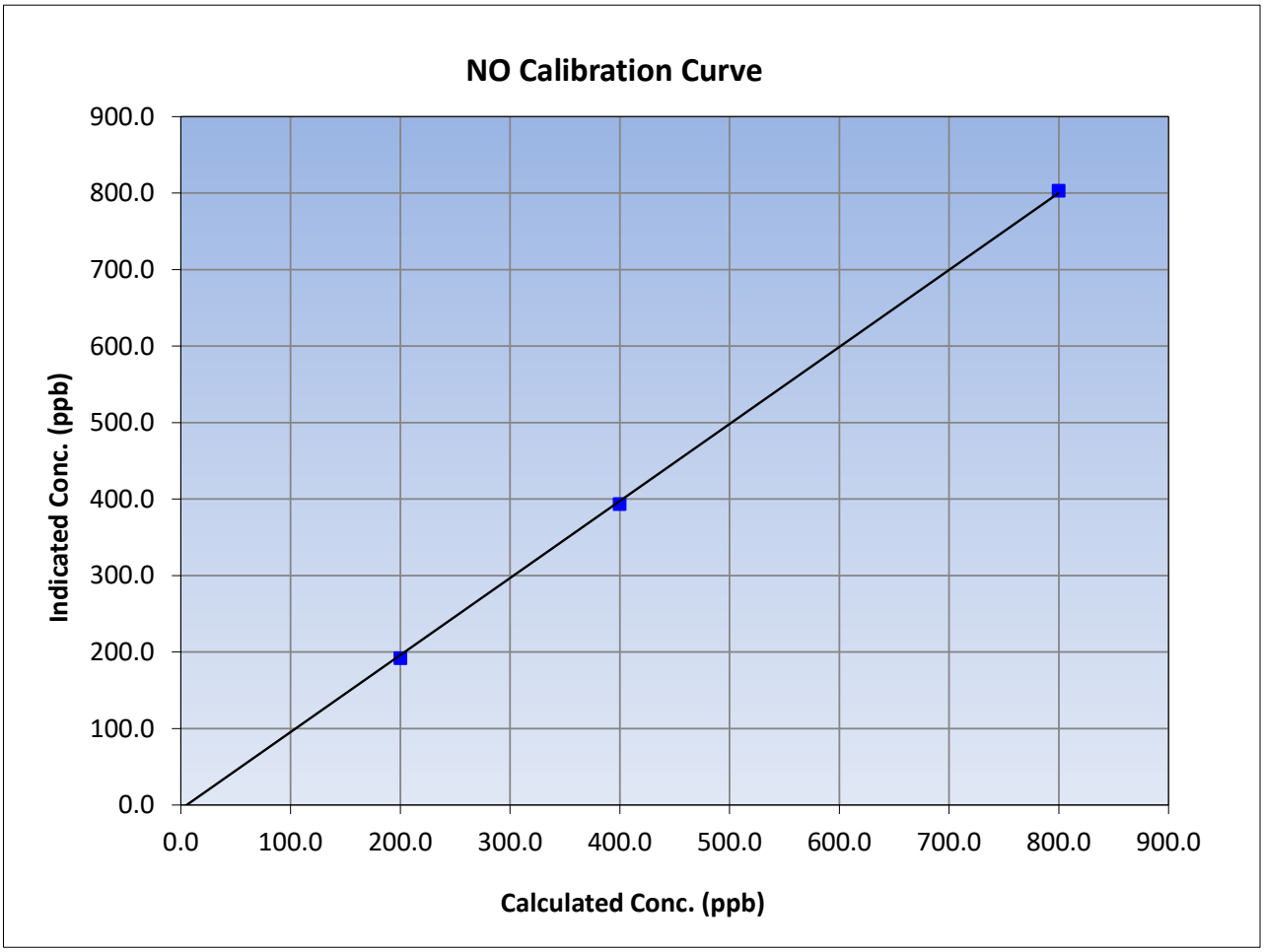
Version-04-2020

Station Information

Calibration Date:	November 21, 2023	Previous Calibration:	October 18, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:15	End Time (MST):	16:07
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	0.999815	*≥0.995*
799.9	803.1	0.9960			
399.9	393.6	1.0161	Slope	1.006988	*0.90 - 1.10*
200.0	191.9	1.0421			
			Intercept	-5.320000	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

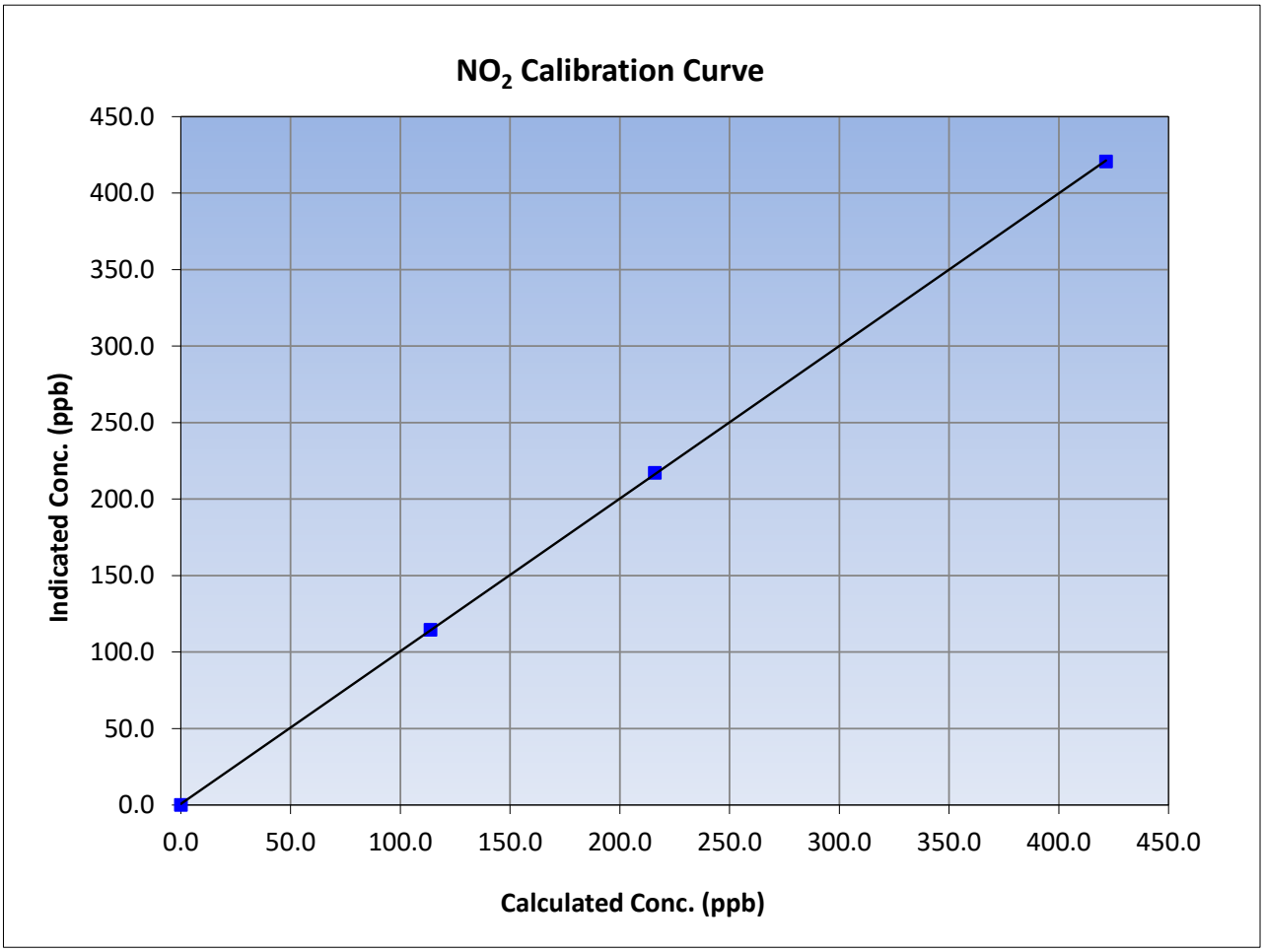
Version-04-2020

Station Information

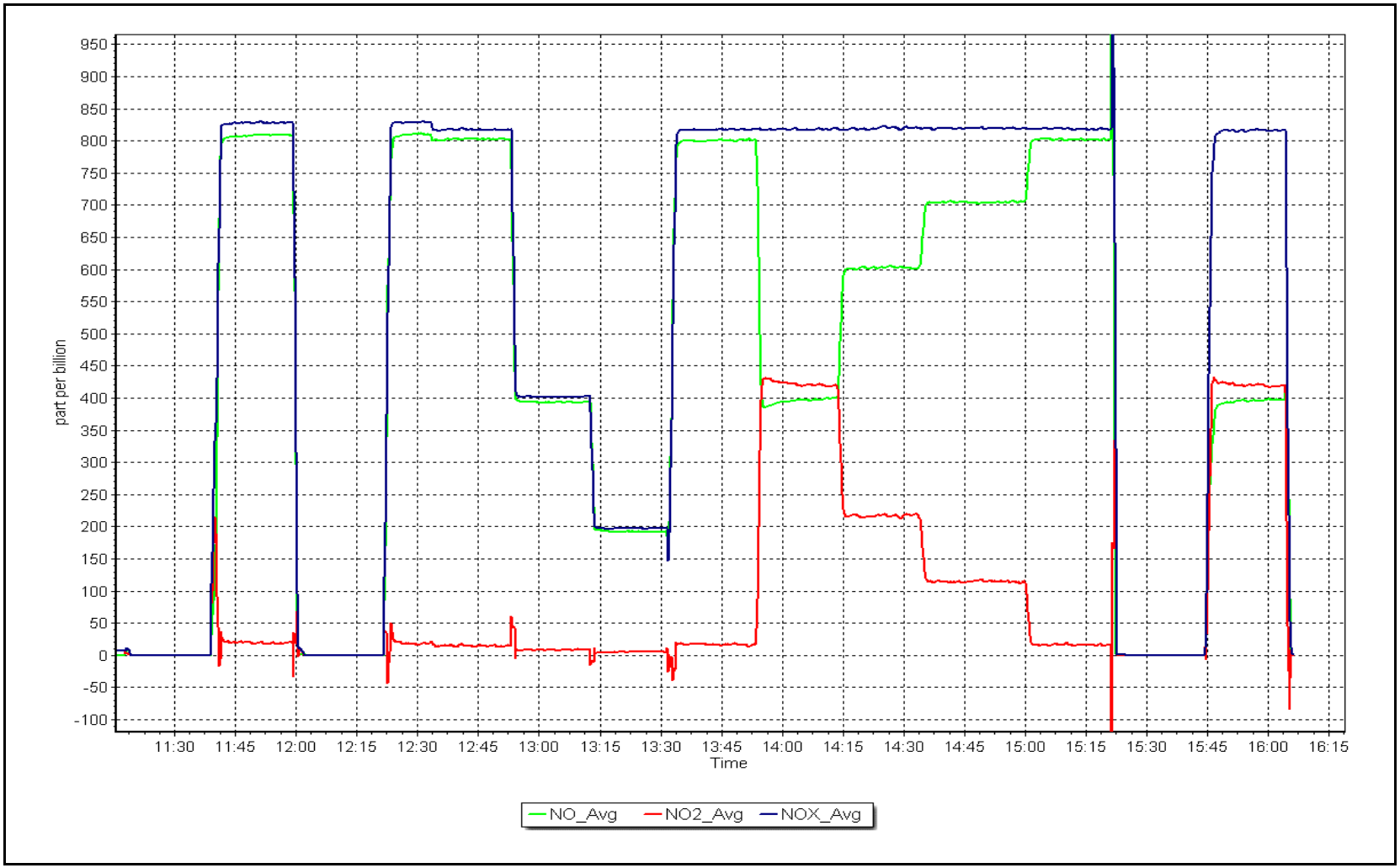
Calibration Date:	November 21, 2023	Previous Calibration:	October 18, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:15	End Time (MST):	16:07
Analyzer make:	Thermo Scientific 42iQ	Analyzer serial #:	12300522720

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999978	*≥0.995*
421.5	420.7	1.0019			
215.9	217.2	0.9940	Slope	0.997809	*0.90 - 1.10*
113.7	114.5	0.9931			
			Intercept	0.732274	*+/-20*



NO_x Calibration Plot Date: November 21, 2023 Location: Wapasu



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	November 2, 2023	Last Cal Date:	October 4, 2023
Start time (MST):	10:32	End time (MST):	13:36
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:	1.002371	1.003143	Backgd or Offset:	-1.8	-1.8
Calibration intercept:	-0.440000	-0.400000	Coeff or Slope:	1.014	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	0.1	----
as found span	5000	1077.3	400.0	400.6	0.999
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	1077.3	400.0	401.1	0.997
second point	5000	900.3	200.0	199.9	1.001
third point	5000	789.5	100.0	99.6	1.004
as left zero	5000	0.0	0.0	0.5	----
as left span	5000	1077.3	400.0	405.7	0.986
				Average Correction Factor	1.001

Baseline Corr As found:	400.5	Previous response	400.5	*% change	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

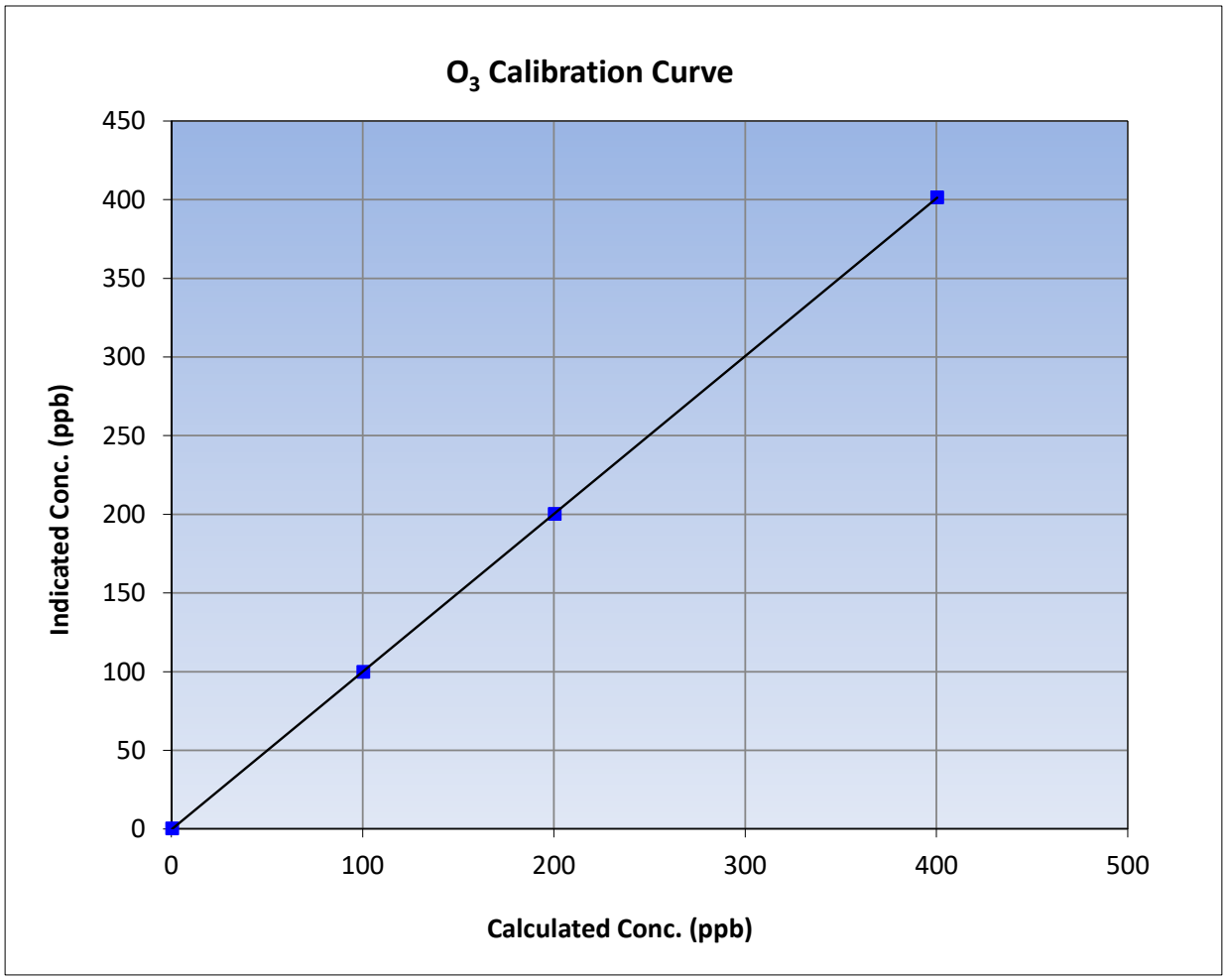
Station Information

Calibration Date:	November 2, 2023	Previous Calibration:	October 4, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:32	End Time (MST):	13:36
Analyzer make:	API T400	Analyzer serial #:	3870

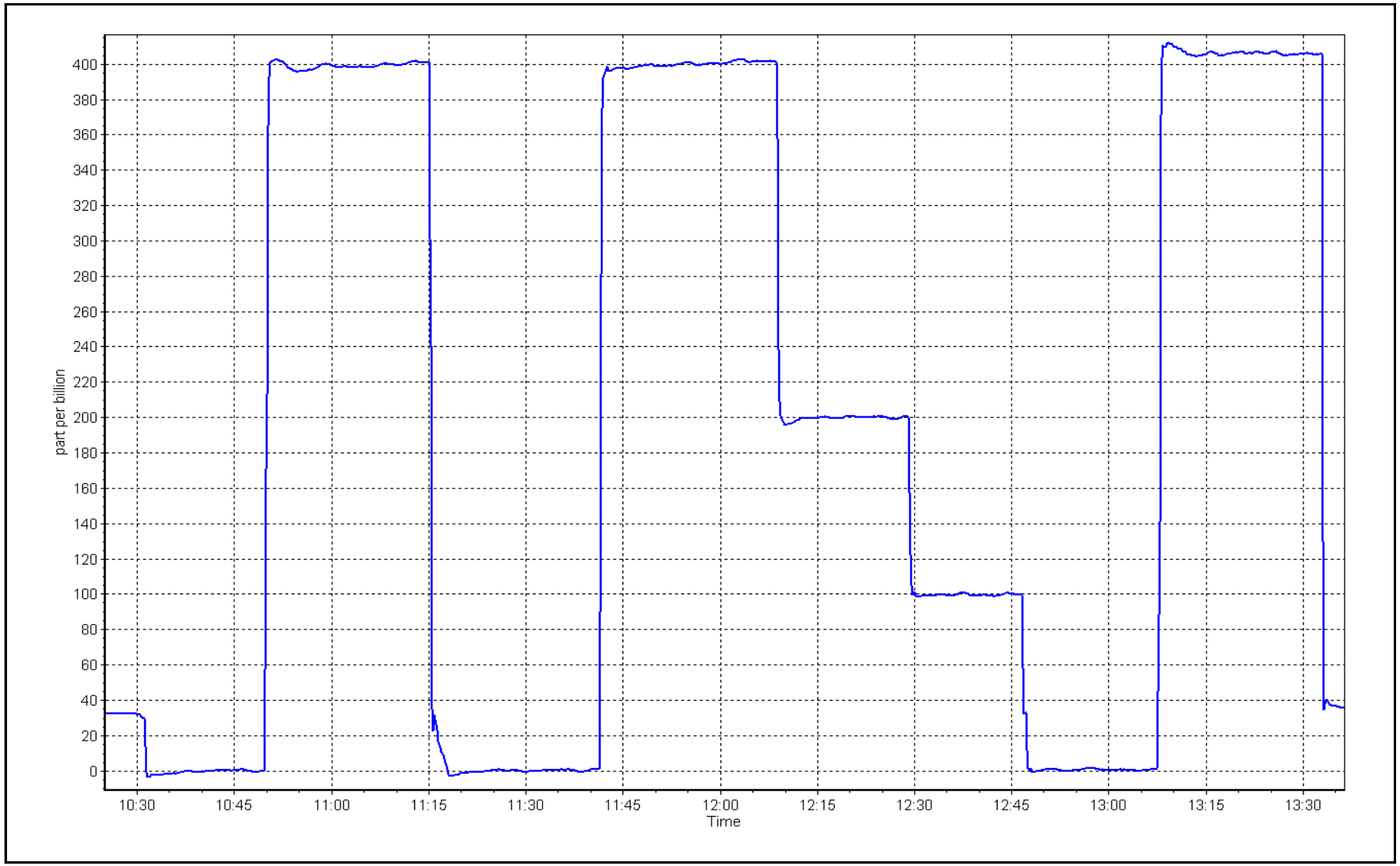
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
400.0	401.1	0.9973
200.0	199.9	1.0005
100.0	99.6	1.0040

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.003143	*0.90 - 1.10*
Intercept	-0.400000	*+/- 5*



O_3 Calibration Plot Date: November 2, 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:	November 28, 2023	Last Cal Date:	October 18, 2023
Start time (MST):	14:25	End time (MST):	15:09
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)	3.0	2.4	3.0	☐	+/- 2 °C
P (mmHg)	706.6	704.2	706.6	☐	+/- 10 mmHg
flow (LPM)	4.99	4.92	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: November 28, 2023 Last Cal Date: September 22, 2023

PM w/o HEPA: 2.7 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: October 18, 2023 <0.2 ug/m3

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.

Calibration by: Aswin Sasi Kumar

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS18
STONY MOUNTAIN
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	November 7, 2023	Last Cal Date:	October 17, 2023
Start time (MST):	11:32	End time (MST):	15:10
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998676	1.003346	Backgd or Offset:	22.2	22.6
Calibration intercept:	-0.203578	-0.163010	Coeff or Slope:	0.795	0.803

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	793.0	1.009
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.5	----
high point	4919	81.0	800.3	803.0	0.997
second point	4959	40.5	400.2	401.4	0.997
third point	4979	20.2	199.6	199.2	1.002
as left zero	5000	0.0	0.0	0.3	----
as left span	4919	81.0	800.3	799.7	1.001
				Average Correction Factor	0.999

Baseline Corr As found:	792.80	Previous response	799.02	*% 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: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

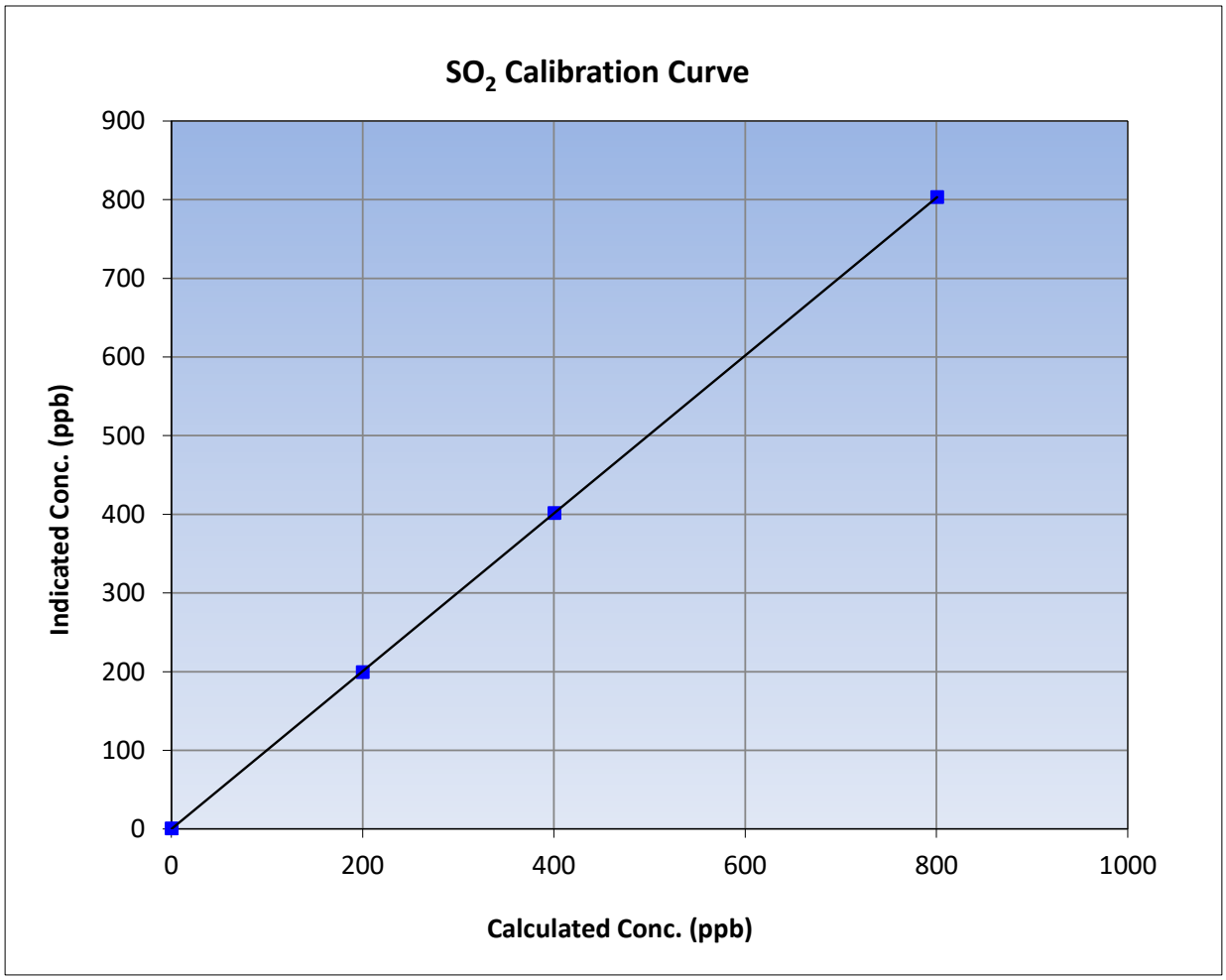
Station Information

Calibration Date:	November 7, 2023	Previous Calibration:	October 17, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:32	End Time (MST):	15:10
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301453

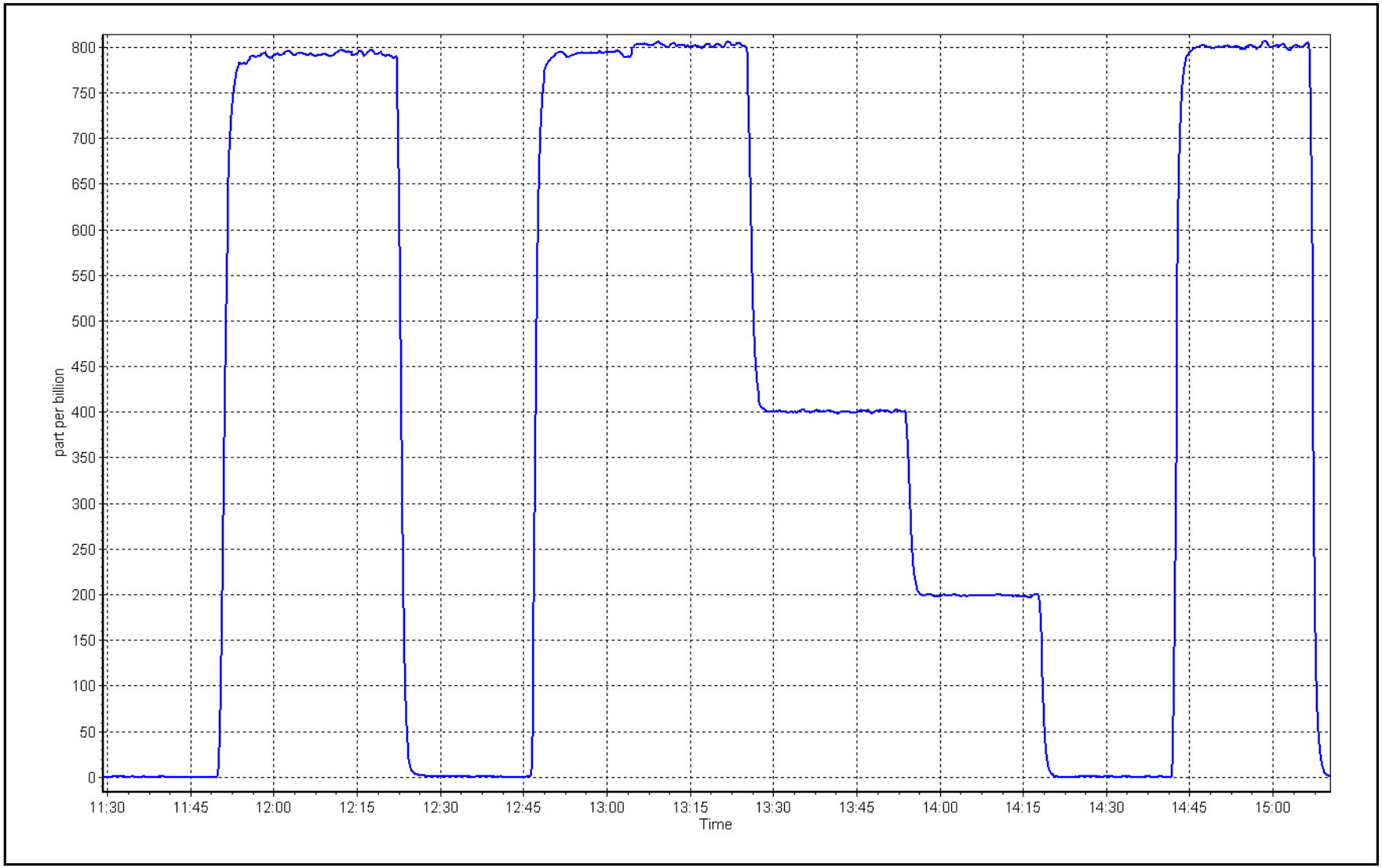
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
800.3	803.0	0.9966
400.2	401.4	0.9970
199.6	199.2	1.0020

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	1.003346	*0.90 - 1.10*
Intercept	-0.163010	*+/-30*



SO2 Calibration Plot Date: November 7, 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:	November 29, 2023	Last Cal Date:	October 26, 2023
Start time (MST):	10:34	End time (MST):	15:15
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1218153359	
Converter make:	CD Nova CDN-101		Converter serial #:	555	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.002584	1.000731	Backgd or Offset:	2.66	2.66
Calibration intercept:	0.401023	0.240905	Coeff or Slope:	1.157	1.157

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	82.2	0.974
as found 2nd point	4964	36.5	40.0	41.5	0.966
as found 3rd point	4983	18.3	20.0	20.5	0.983
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4927	73.0	80.0	80.3	0.996
second point	4964	36.5	40.0	40.2	0.995
third point	4983	18.3	20.0	20.4	0.983
as left zero	5000	0.0	0.0	0.4	----
as left span	4927	73.0	80.0	79.0	1.013
SO2 Scrubber Check	4923	77.1	771.0	0.2	----
Date of last scrubber change:		17-Dec-21		Ave Corr Factor	0.991
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	82.1	Prev response:	80.60	*% change:	1.8%
Baseline Corr 2nd AF pt:	41.4	AF Slope:	1.027591	AF Intercept:	0.100556
Baseline Corr 3rd AF pt:	20.4	AF Correlation:	0.999961		

* = > +/-5% change initiates investigation

Notes: Scrubber check completed after calibrator zero. No adjustments made.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

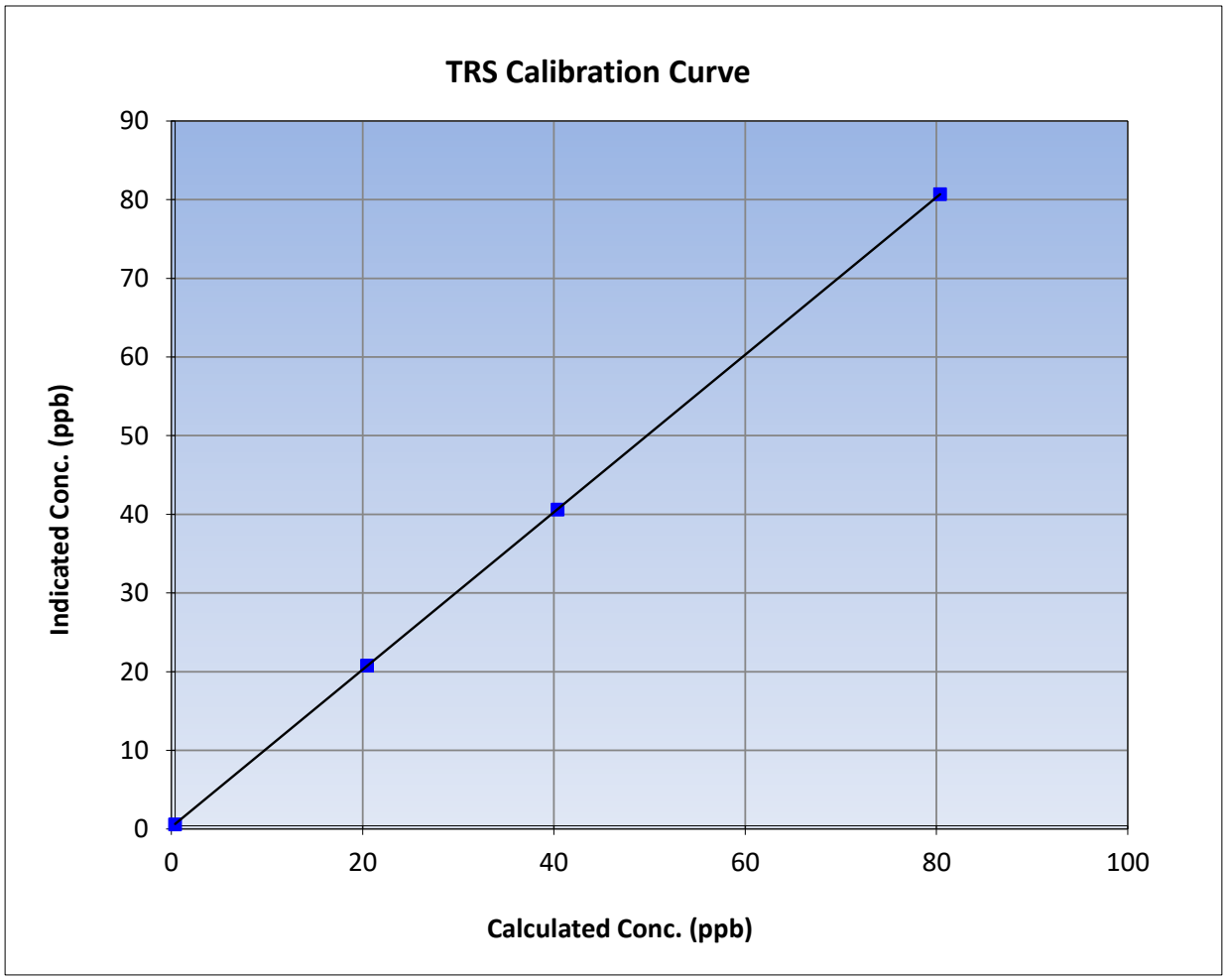
Station Information

Calibration Date:	November 29, 2023	Previous Calibration:	October 26, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	10:34	End Time (MST):	15:15
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153359

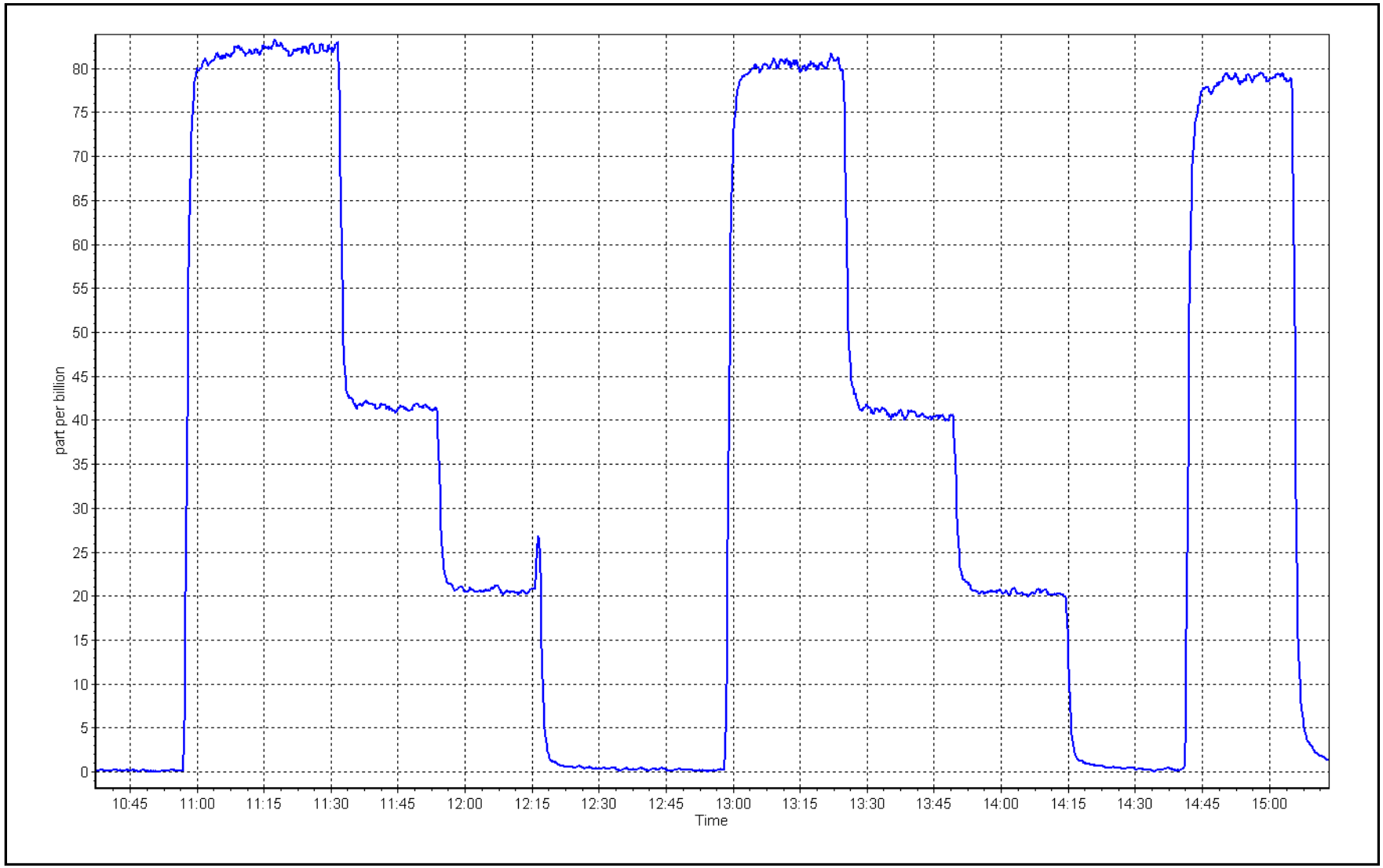
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	80.3	0.9962
40.0	40.2	0.9948
20.0	20.4	0.9827

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	1.000731	*0.90 - 1.10*
Intercept	0.240905	*+/-3*



TRS Calibration Plot Date: November 29, 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:	November 7, 2023	Last Cal Date:	October 17, 2023
Start time (MST):	11:32	End time (MST):	15:10
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320037	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.24E-04	2.25E-04	NMHC SP Ratio:	5.04E-05	5.10E-05
CH4 Retention time:	12.7	12.7	NMHC Peak Area:	182001	179849
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	4919	81.0	17.28	17.14	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.0	17.28	17.25	1.002
second point	4959	40.5	8.64	8.59	1.007
third point	4979	20.2	4.31	4.23	1.019
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	17.28	17.44	0.991
				Average Correction Factor	1.009
Baseline Corr AF:	17.14	Prev response	17.24	*% change	-0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	9.17	9.09	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	81.0	9.17	9.16	1.001
second point	4959	40.5	4.58	4.58	1.000
third point	4979	20.2	2.29	2.28	1.005
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	9.17	9.27	0.989
				Average Correction Factor	1.002
Baseline Corr AF:	9.09	Prev response	9.16	*% 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	4919	81.0	8.11	8.06	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.0	8.11	8.09	1.003
second point	4959	40.5	4.06	4.00	1.013
third point	4979	20.2	2.02	1.95	1.036
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	8.11	8.17	0.993
				Average Correction Factor	1.017
Baseline Corr AF:	8.06	Prev response	8.08	*% change	-0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.998344	0.999178
THC Cal Offset:	-0.008797	-0.036603
CH4 Cal Slope:	0.998456	0.999274
CH4 Cal Offset:	-0.020622	-0.034024
NMHC Cal Slope:	0.998233	0.999119
NMHC Cal Offset:	0.011624	-0.002179

Notes: N2 Cylinder swapped out. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

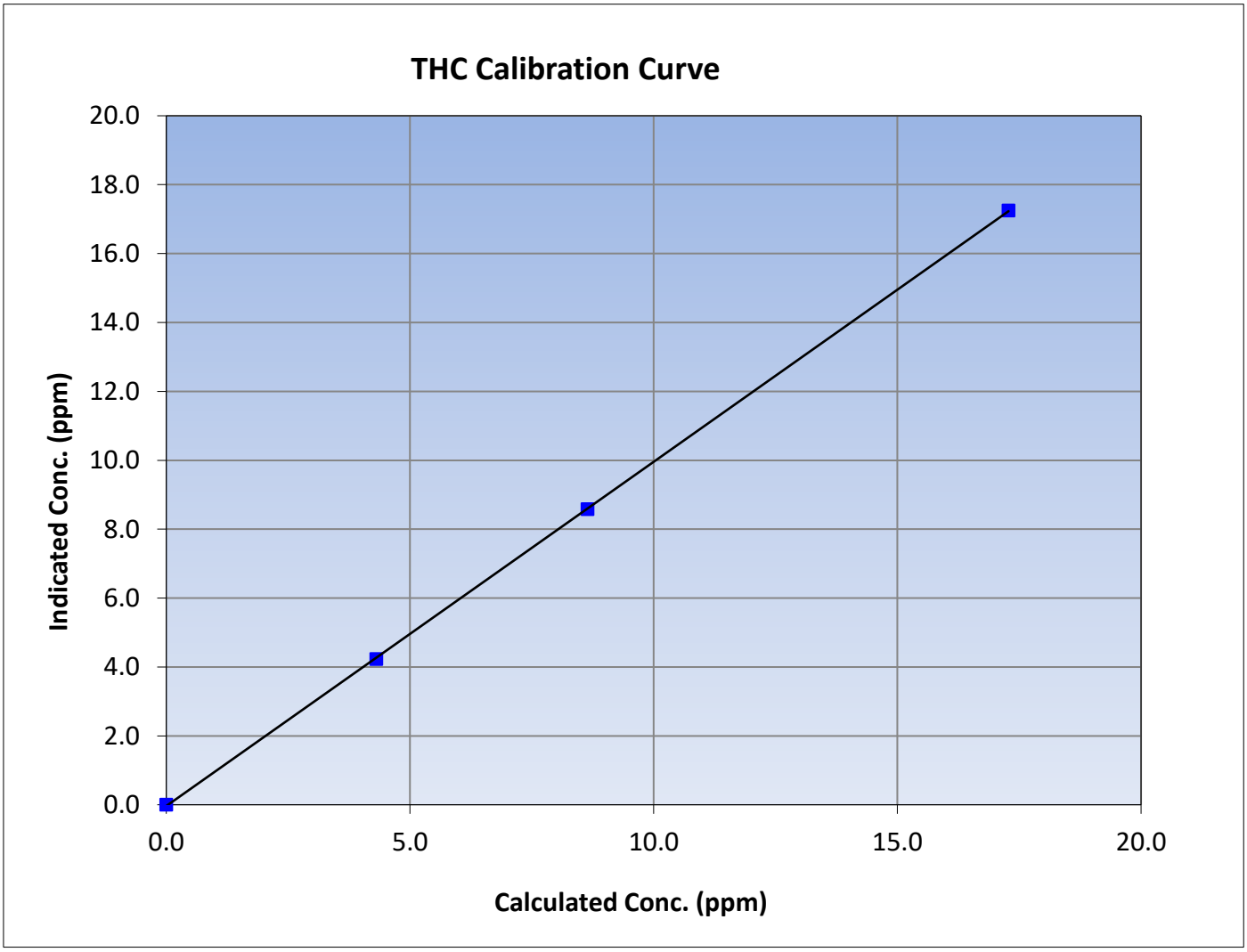
Version-06-2022

Station Information

Calibration Date:	November 7, 2023	Previous Calibration:	October 17, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:32	End Time (MST):	15:10
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	17.25	1.0020			
8.64	8.59	1.0066	Slope	0.999178	*0.90 - 1.10*
4.31	4.23	1.0190			
			Intercept	-0.036603	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

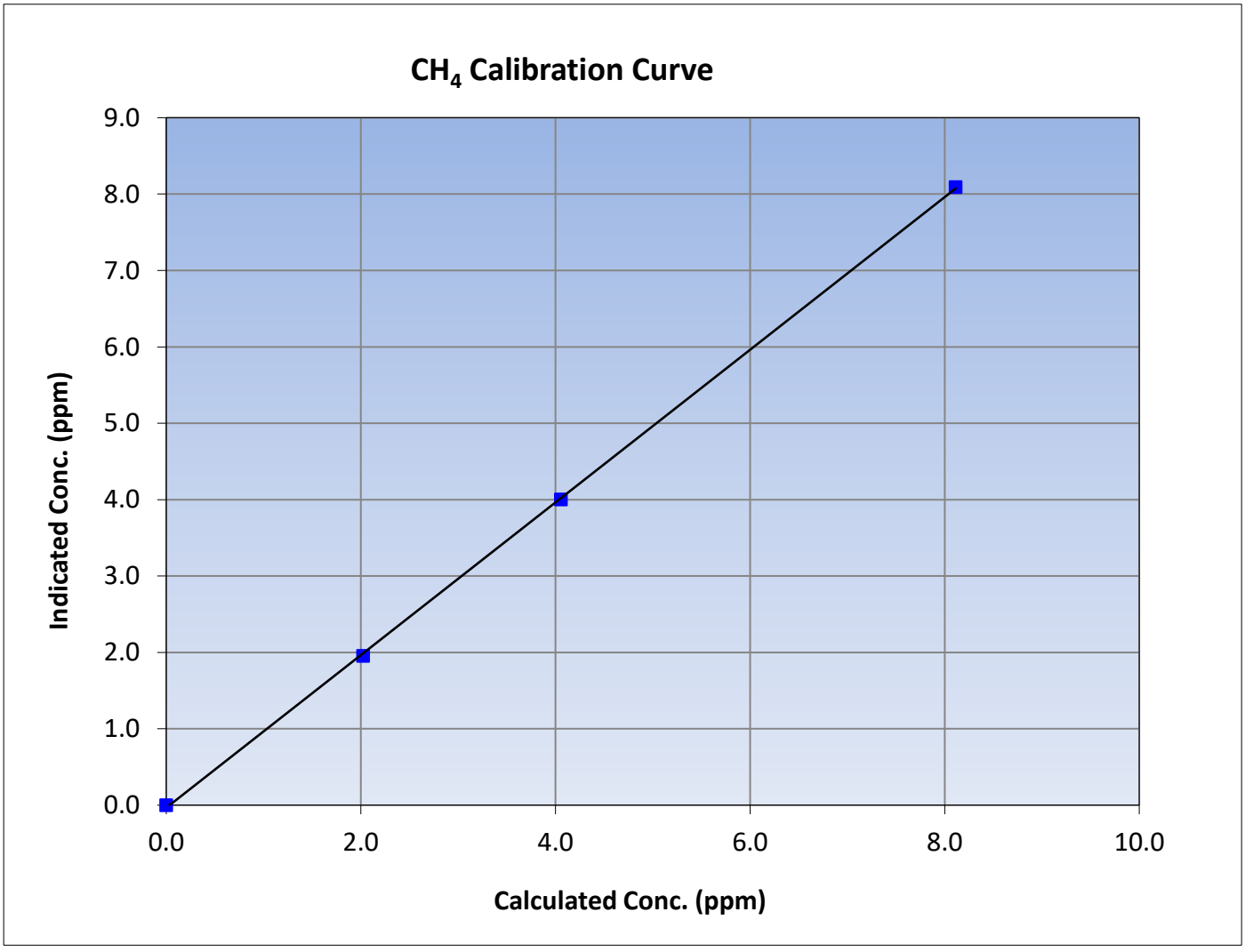
Version-06-2022

Station Information

Calibration Date:	November 7, 2023	Previous Calibration:	October 17, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:32	End Time (MST):	15:10
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	0.999920	*≥0.995*
8.11	8.09	1.0028			
4.06	4.00	1.0135	Slope	0.999274	*0.90 - 1.10*
2.02	1.95	1.0356			
			Intercept	-0.034024	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

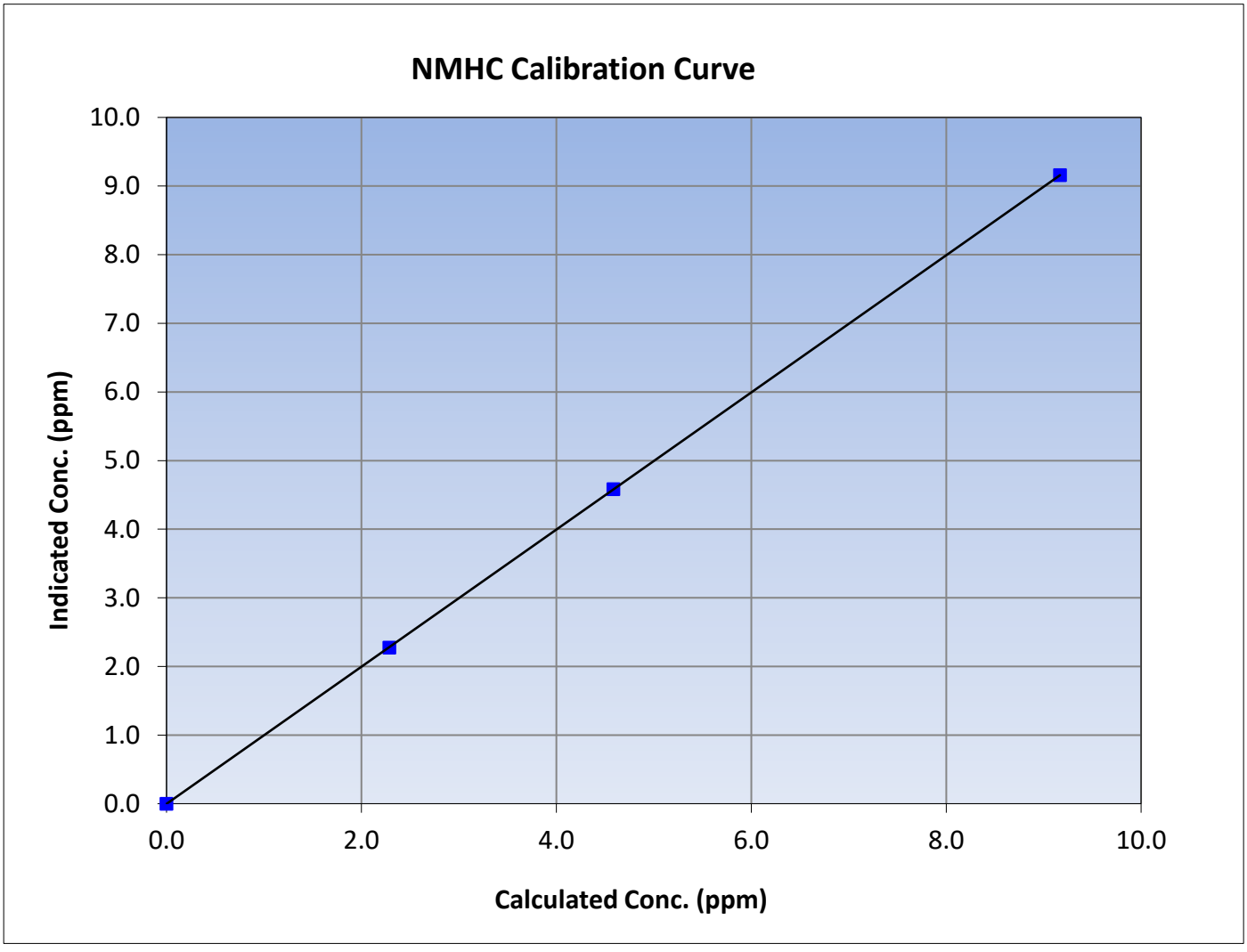
Version-06-2022

Station Information

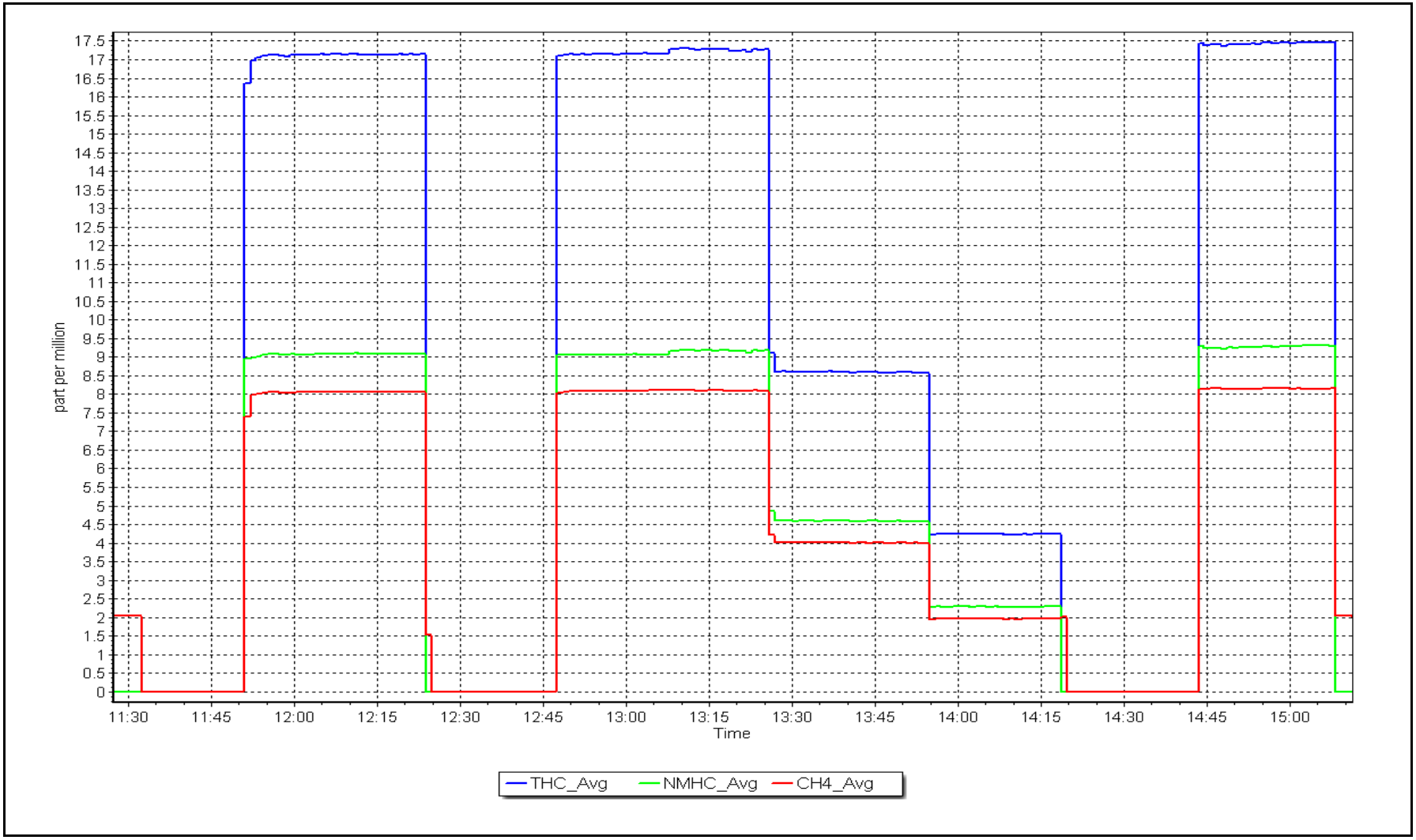
Calibration Date:	November 7, 2023	Previous Calibration:	October 17, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:32	End Time (MST):	15:10
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999998	*≥0.995*
9.17	9.16	1.0012			
4.58	4.58	1.0001	Slope	0.999119	*0.90 - 1.10*
2.29	2.28	1.0047			
			Intercept	-0.002179	*+/-0.5*



NMHC Calibration Plot Date: November 7, 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:	November 30, 2023	Last Cal Date:	October 27, 2023
Start time (MST):	11:33	End time (MST):	16:25
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2XX7ME		Cal Gas Expiry Date:	January 14, 2024	
NOX Cal Gas Conc:	50.48	ppm	NO Cal Gas Conc:	49.22	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	50.48	ppm	Removed Gas NO Conc:	49.22	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	2658	
ZAG make/model:	Teledyne API 701H		Serial Number:	360	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1336160088	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.072	1.087	NO bkgnd or offset:	3.0	3.1
NOX coeff or slope:	0.985	0.985	NOX bkgnd or offset:	3.0	3.1
NO2 coeff or slope:	0.999	0.999	Reaction cell Press:	250.3	248.8

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999718	1.001069
NO_X Cal Offset:	-0.329761	-0.390046
NO Cal Slope:	1.000010	1.001210
NO Cal Offset:	-1.269777	-1.489996
NO_2 Cal Slope:	1.001575	1.001477
NO_2 Cal Offset:	0.299687	1.056533

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as found span	4919	81.3	820.8	800.3	20.5	811.4	787.6	23.8	1.0115	1.0161
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
high point	4919	81.3	820.8	800.3	20.5	821.4	800.3	21.0	0.9992	1.0000
second point	4959	40.7	410.9	400.7	10.3	411.0	399.5	11.5	0.9998	1.0029
third point	4980	20.3	204.9	199.8	5.1	204.1	196.7	7.4	1.0041	1.0159
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.2	----	----
as left span	4919	81.3	820.8	351.3	469.5	825.9	349.8	476.2	0.9938	1.0042
								Average Correction Factor	1.0010	1.0063

Corrected As found	NO_X = 811.5 ppb	NO = 787.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-1.1%
Previous Response	NO_X = 820.2 ppb	NO = 799.0 ppb		*Percent Change	NO =	-1.4%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	799.8	350.8	469.5	470.8	0.9972	100.3%
2nd GPT point (200 ppb O3)	799.8	590.0	230.3	232.0	0.9926	100.7%
3rd GPT point (100 ppb O3)	799.8	697.7	122.6	124.9	0.9815	101.9%
				Average Correction Factor	0.9904	101.0%

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

NO_X Calibration Summary

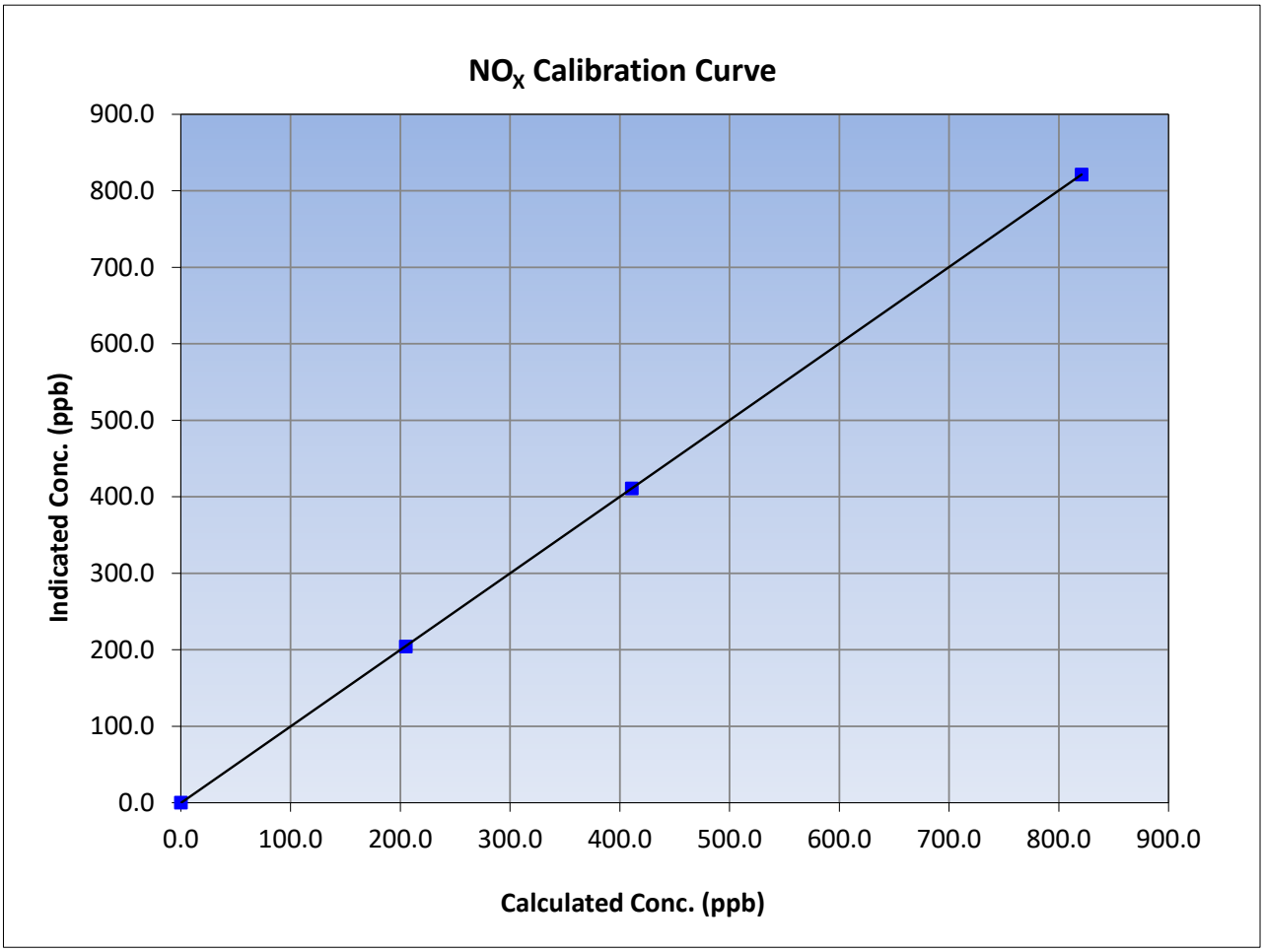
Version-04-2020

Station Information

Calibration Date:	November 30, 2023	Previous Calibration:	October 27, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:33	End Time (MST):	16:25
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999998	≥0.995
820.8	821.4	0.9992			
410.9	411.0	0.9998	Slope	1.001069	0.90 - 1.10
204.9	204.1	1.0041			
			Intercept	-0.390046	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

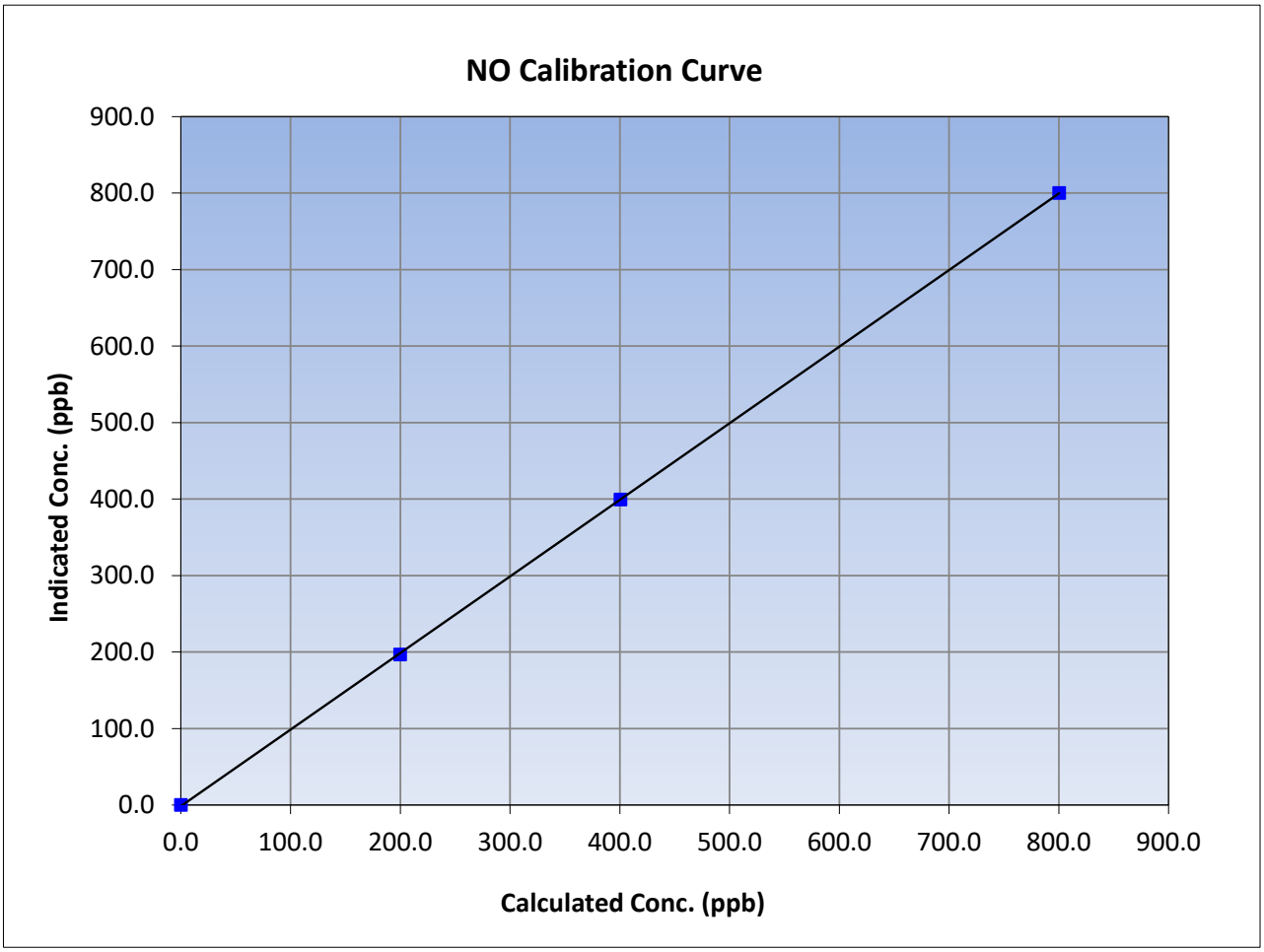
Version-04-2020

Station Information

Calibration Date:	November 30, 2023	Previous Calibration:	October 27, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:33	End Time (MST):	16:25
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999983	≥0.995
800.3	800.3	1.0000			
400.7	399.5	1.0029	Slope	1.001210	0.90 - 1.10
199.8	196.7	1.0159			
			Intercept	-1.489996	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

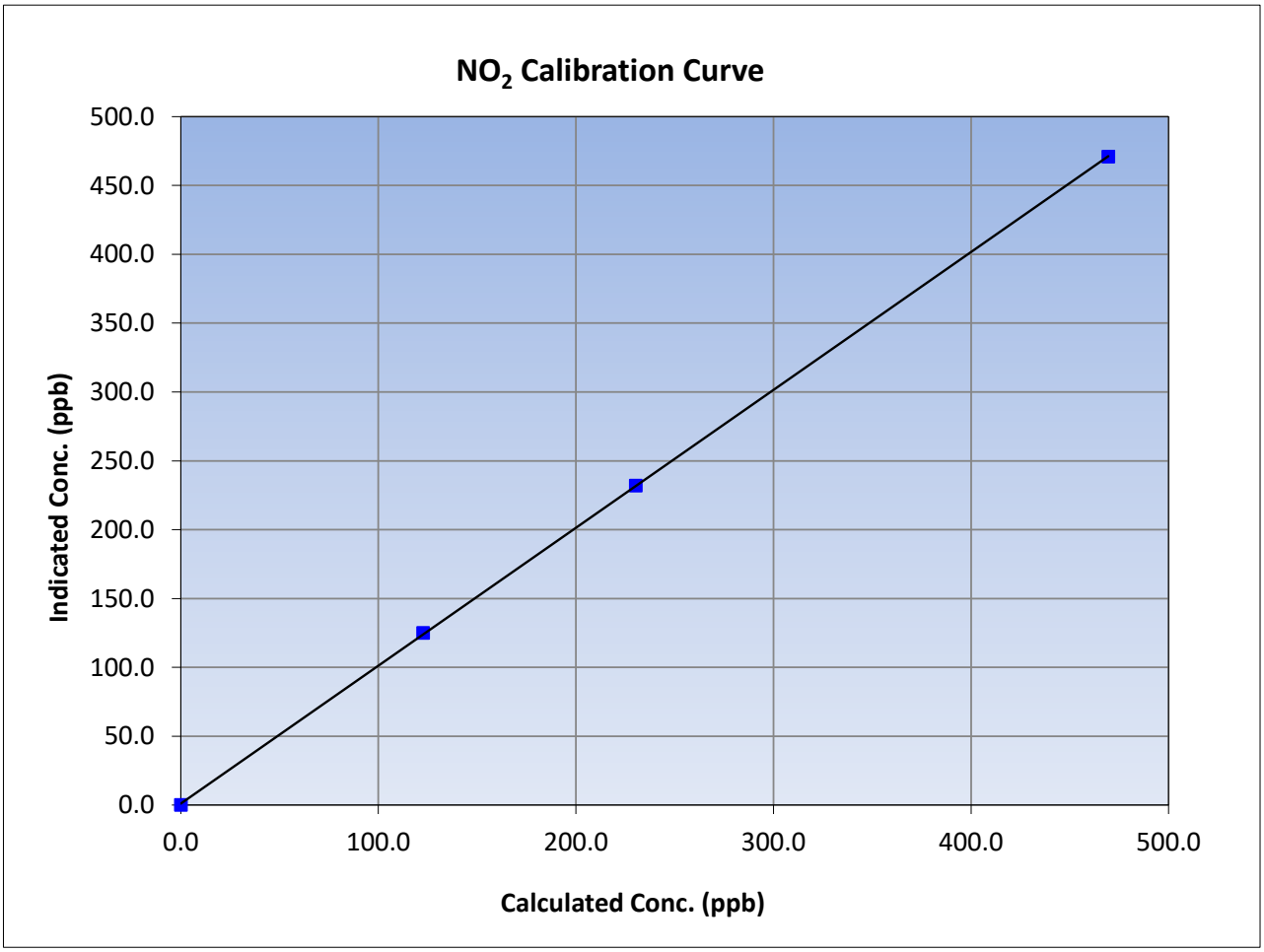
Version-04-2020

Station Information

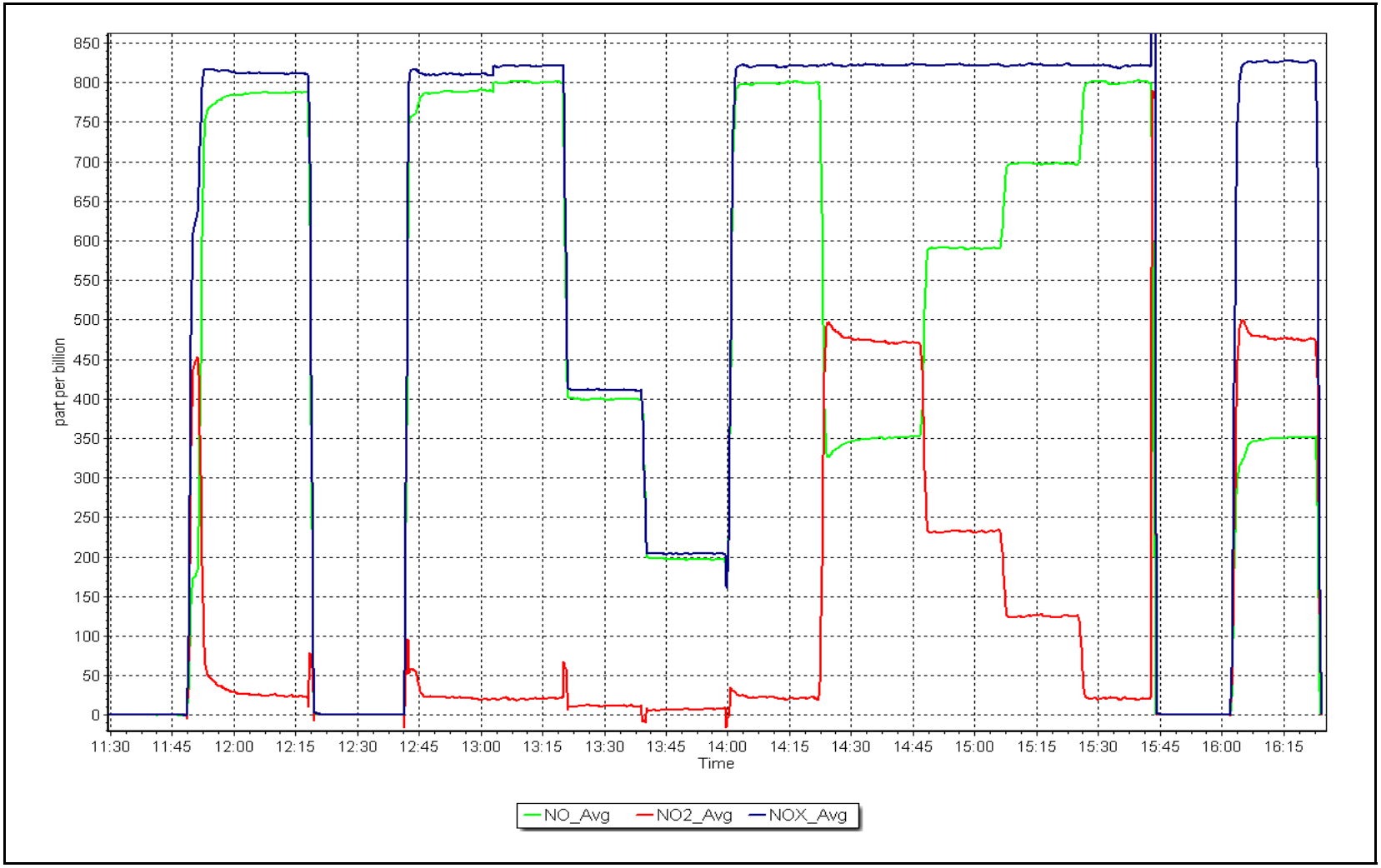
Calibration Date:	November 30, 2023	Previous Calibration:	October 27, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:33	End Time (MST):	16:25
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999980	≥0.995
469.5	470.8	0.9972			
230.3	232.0	0.9926	Slope	1.001477	0.90 - 1.10
122.6	124.9	0.9815			
			Intercept	1.056533	+/-20



NO_X Calibration Plot Date: November 30, 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:	November 23, 2023	Last Cal Date:	October 23, 2023
Start time (MST):	11:40	End time (MST):	15:01
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	Teledyne API T700	Serial Number:	2658
ZAG Make/Model:	Teledyne API 701H	Serial Number:	360

Analyzer Information

Analyzer make: API T400 Analyzer serial #: 825

Analyzer Range 0 - 500 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999771	1.001400	Backgd or Offset:	2.500	2.400
Calibration intercept:	0.240000	-0.220000	Coeff or Slope:	1.007	0.978

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	800.0	0.0	-0.6	----
as found span	4888	1128.7	400.0	412.8	0.969
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	-0.3	----
high point	4888	1101.7	400.0	400.3	0.999
second point	4888	863.9	200.0	200.1	1.000
third point	4888	741.4	100.0	100.0	1.000
as left zero	5000	800.0	0.0	-0.2	----
as left span	4812	1097.9	400.0	402.5	0.994
				Average Correction Factor	1.000

Baseline Corr As found:	413.4	Previous response	400.1	*% change	3.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Adjusted span.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

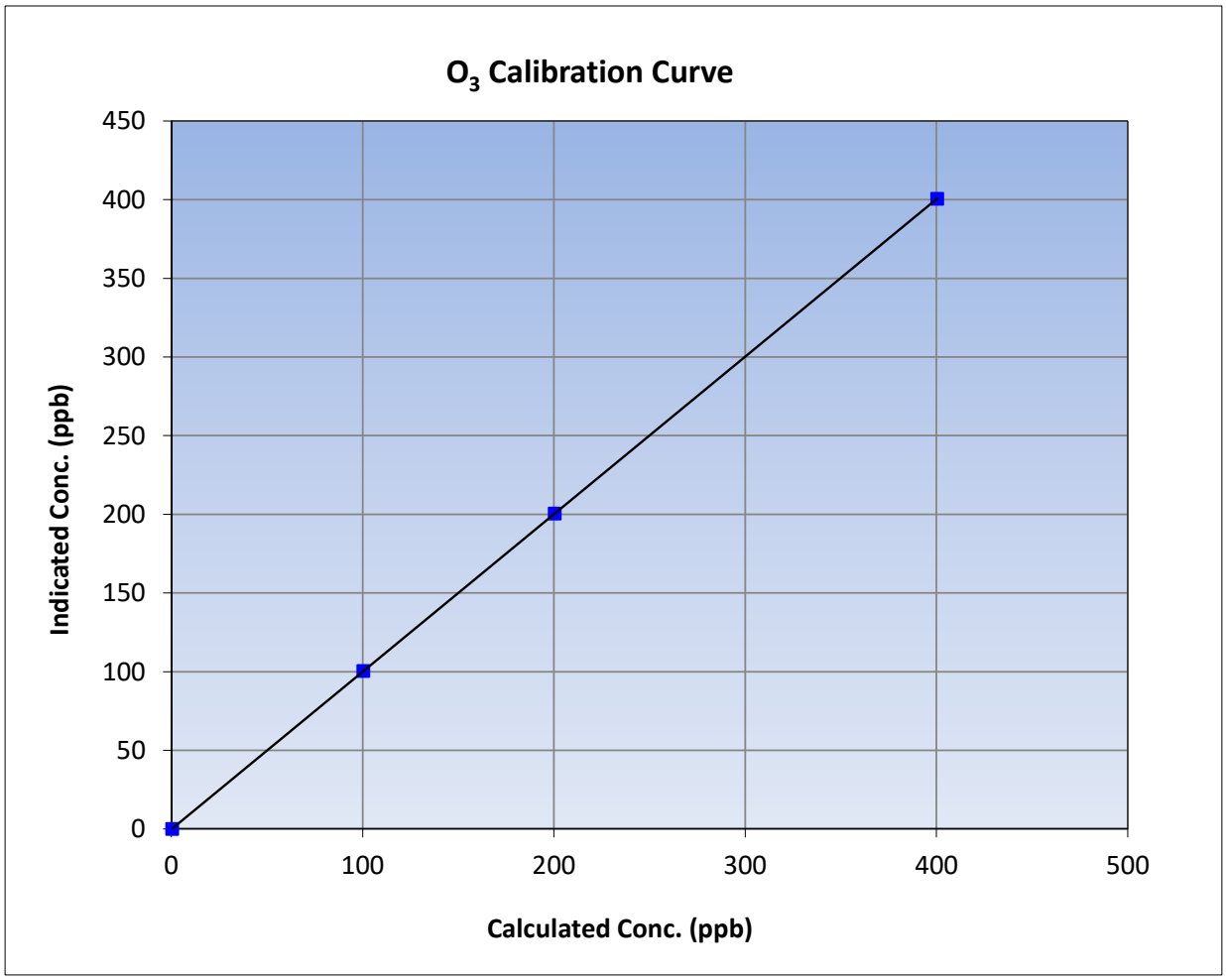
Station Information

Calibration Date:	November 23, 2023	Previous Calibration:	October 23, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	11:40	End Time (MST):	15:01
Analyzer make:	API T400	Analyzer serial #:	825

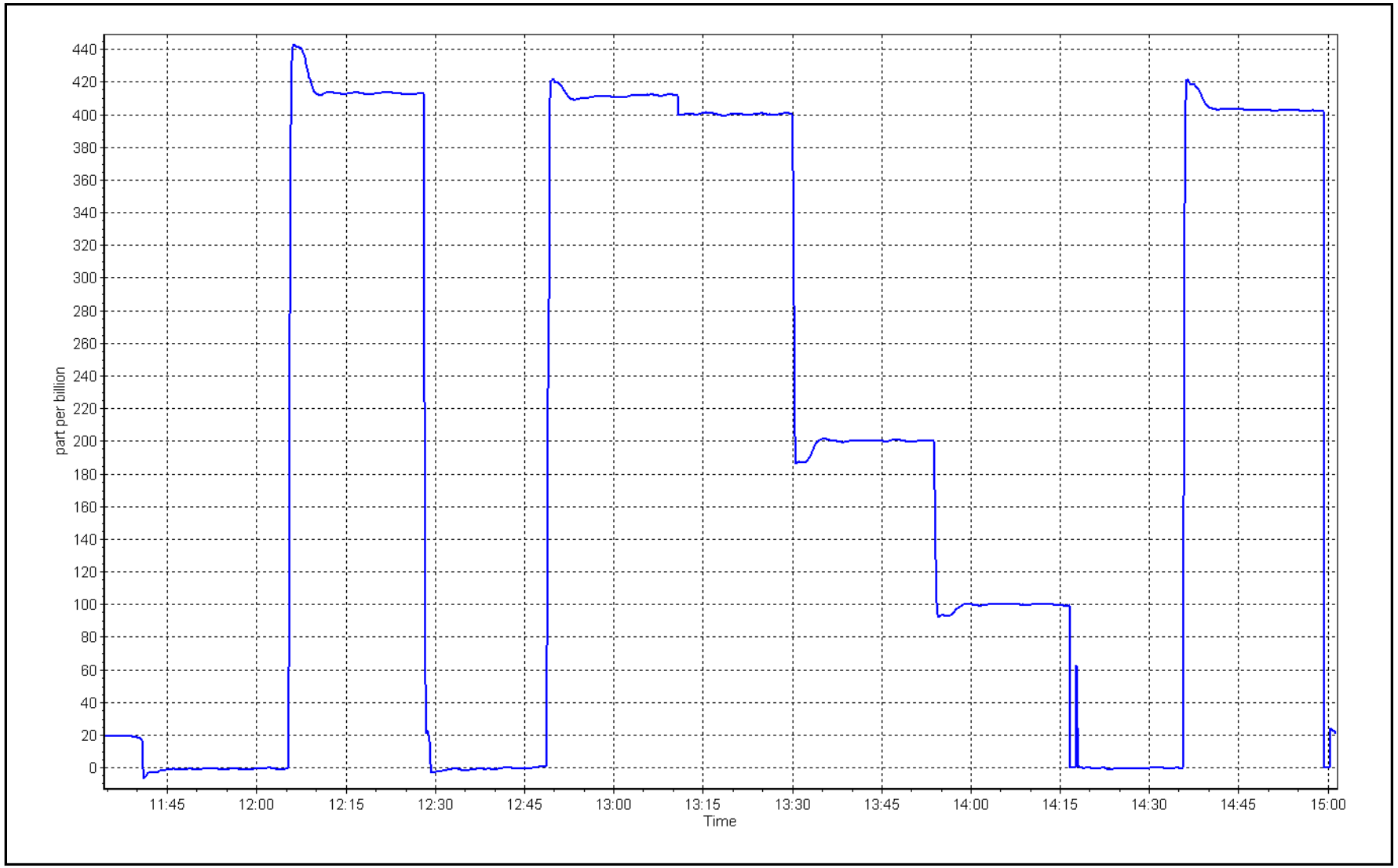
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
400.0	400.3	0.9993
200.0	200.1	0.9995
100.0	100.0	1.0000

Statistical Evaluation		*Limits*
Correlation Coefficient	1.000000	*≥0.995*
Slope	1.001400	*0.90 - 1.10*
Intercept	-0.220000	*+/- 5*



O_3 Calibration Plot Date: November 23, 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:	November 30, 2023	Last Cal Date:	October 27, 2023
Start time (MST):	15:05	End time (MST):	15:55
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 (^{o}C)	-5.5	-6.1	-5.5	☐	+/- 2 ^{o}C
P (mmHg)	697.6	698.3	697.6	☐	+/- 10 mmHg
flow (LPM)	5.05	4.98	5.05	☐	+/- 0.25 LPM

Leak Test: Date of check: November 30, 2023 Last Cal Date: October 27, 2023

PM w/o HEPA: 4.1 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

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

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:	November 8, 2023	Last Cal Date:	October 12, 2023
Start time (MST):	11:32	End time (MST):	14:36
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:	0.991149	0.998397	Backgd or Offset:	-0.010	-0.010
Calibration intercept:	0.191815	0.047809	Coeff or Slope:	0.901	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	0.1	----
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	40.6	1.002
second point	4966	33.3	20.3	20.5	0.990
third point	4983	16.7	10.2	10.2	1.004
as left zero	5000	0.0	0.0	0.1	----
as left span	4933	66.7	40.7	41.0	0.993
				Average Correction Factor	0.999

Baseline Corr As found:	40.45	Prev response:	40.52	*% 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 adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Summary

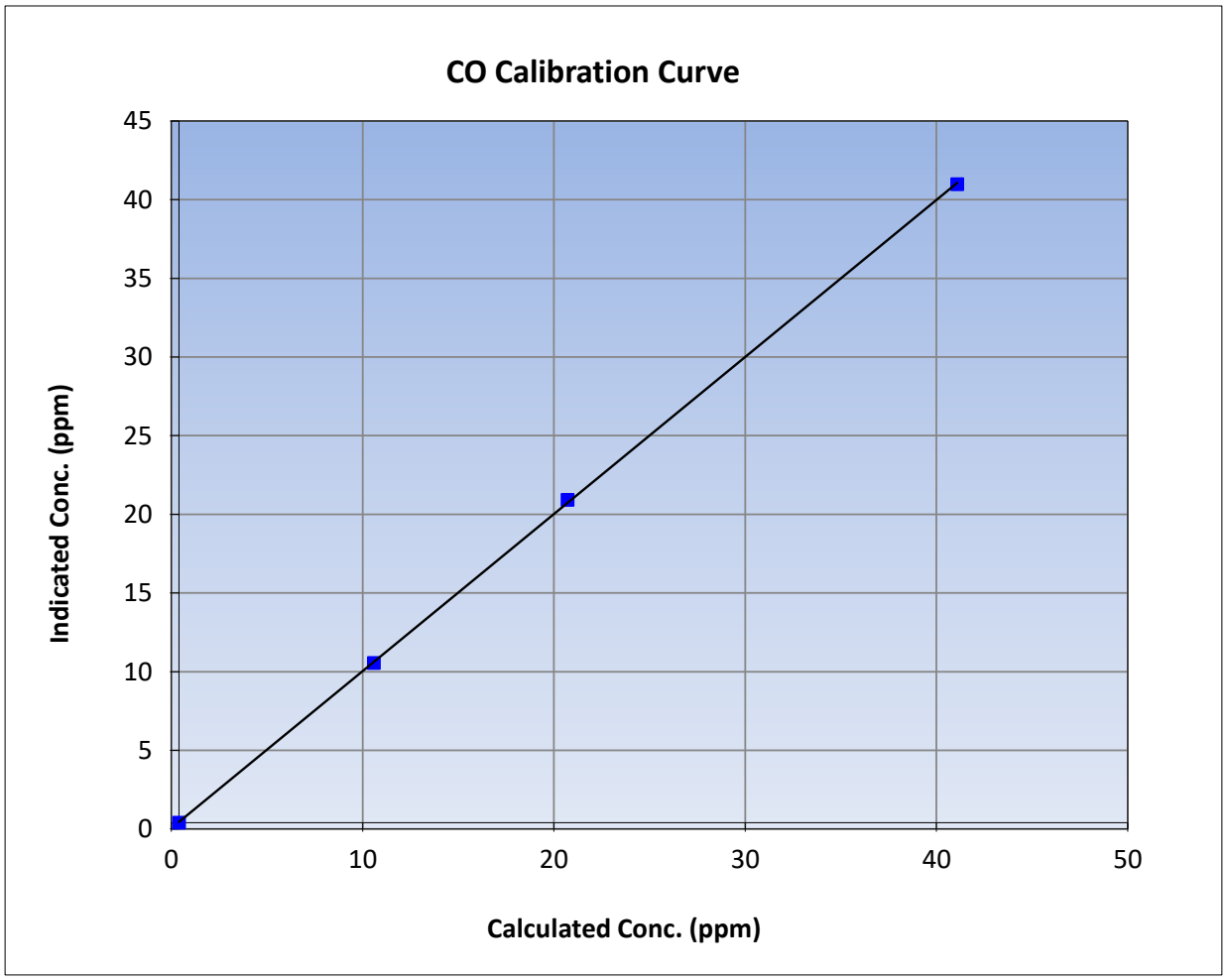
Version-01-2020

Station Information

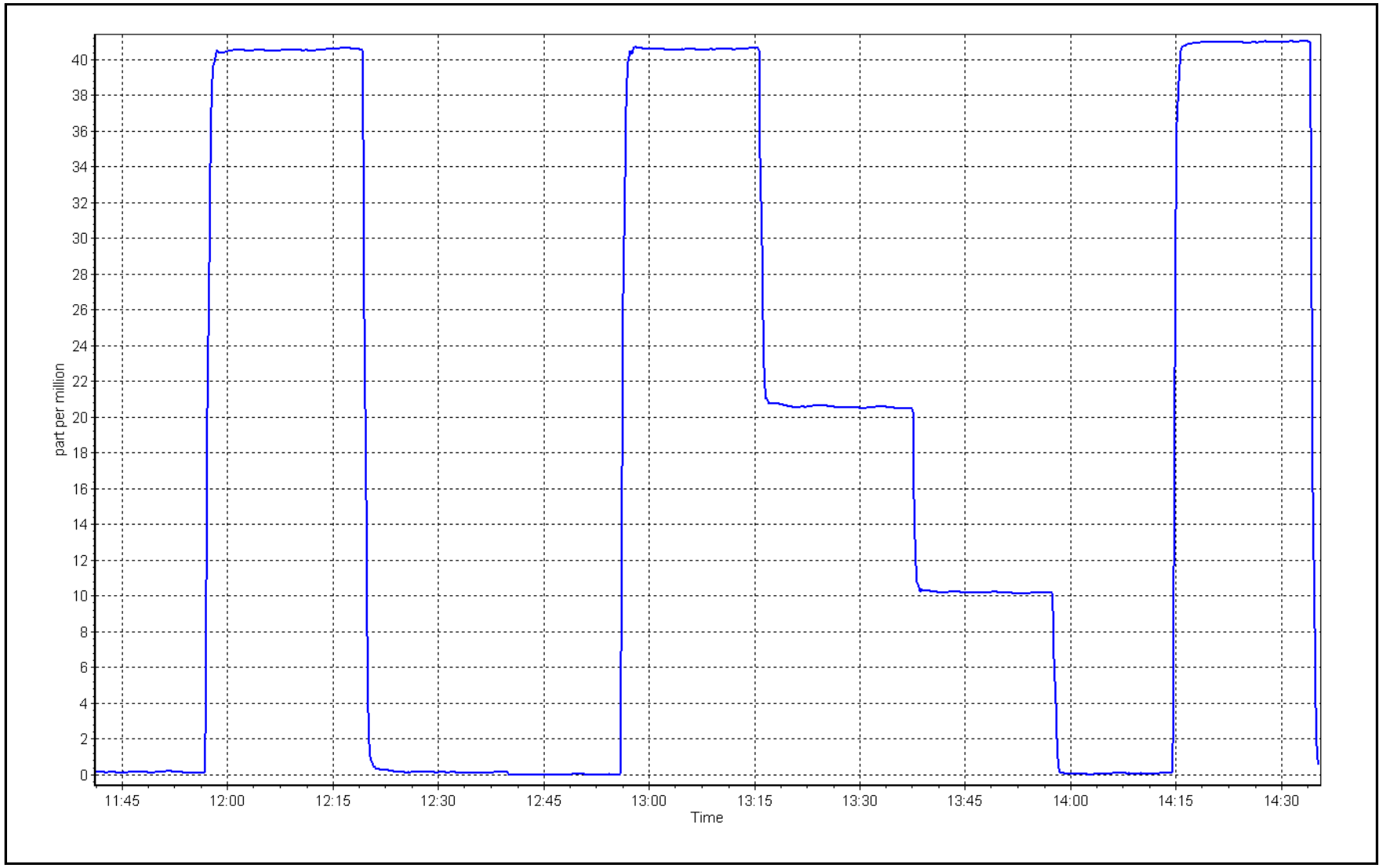
Calibration Date:	November 8, 2023	Previous Calibration:	October 12, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	11:32	End Time (MST):	14:36
Analyzer make:	API T300	Analyzer serial #:	3504

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999941	*≥0.995*
40.7	40.6	1.0024			
20.3	20.5	0.9896	Slope	0.998397	*0.90 - 1.10*
10.2	10.2	1.0037			
			Intercept	0.047809	*+/-1.5*



CO Calibration Plot Date: November 8, 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:	November 16, 2023	Last Cal Date:	October 25, 2023
Start time (MST):	11:45	End time (MST):	15:48
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 #: 489

Analyzer Range 0 - 2,000 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001286	1.002631	Backgd or Offset:	-0.037	-0.037
Calibration intercept:	-6.620000	-3.040000	Coeff or Slope:	0.938	0.938

CO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	3000	0.0	0.0	0.0	----
as found span	2920	80.0	1605.9	1609.0	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	0.8	----
high point	2920	80.0	1605.9	1611.0	0.997
second point	2960	40.0	802.9	794.0	1.011
third point	2980	20.0	401.5	399.7	1.004
as left zero	3000	0.0	0.0	0.1	----
as left span	2930	80.0	1600.5	1609.7	0.994
				Average Correction Factor	1.004

Baseline Corr As found:	1609.00	Prev response:	1601.31	*% 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: Linearity adjustment performed on the third-point. All points verified after linearity adjustment.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

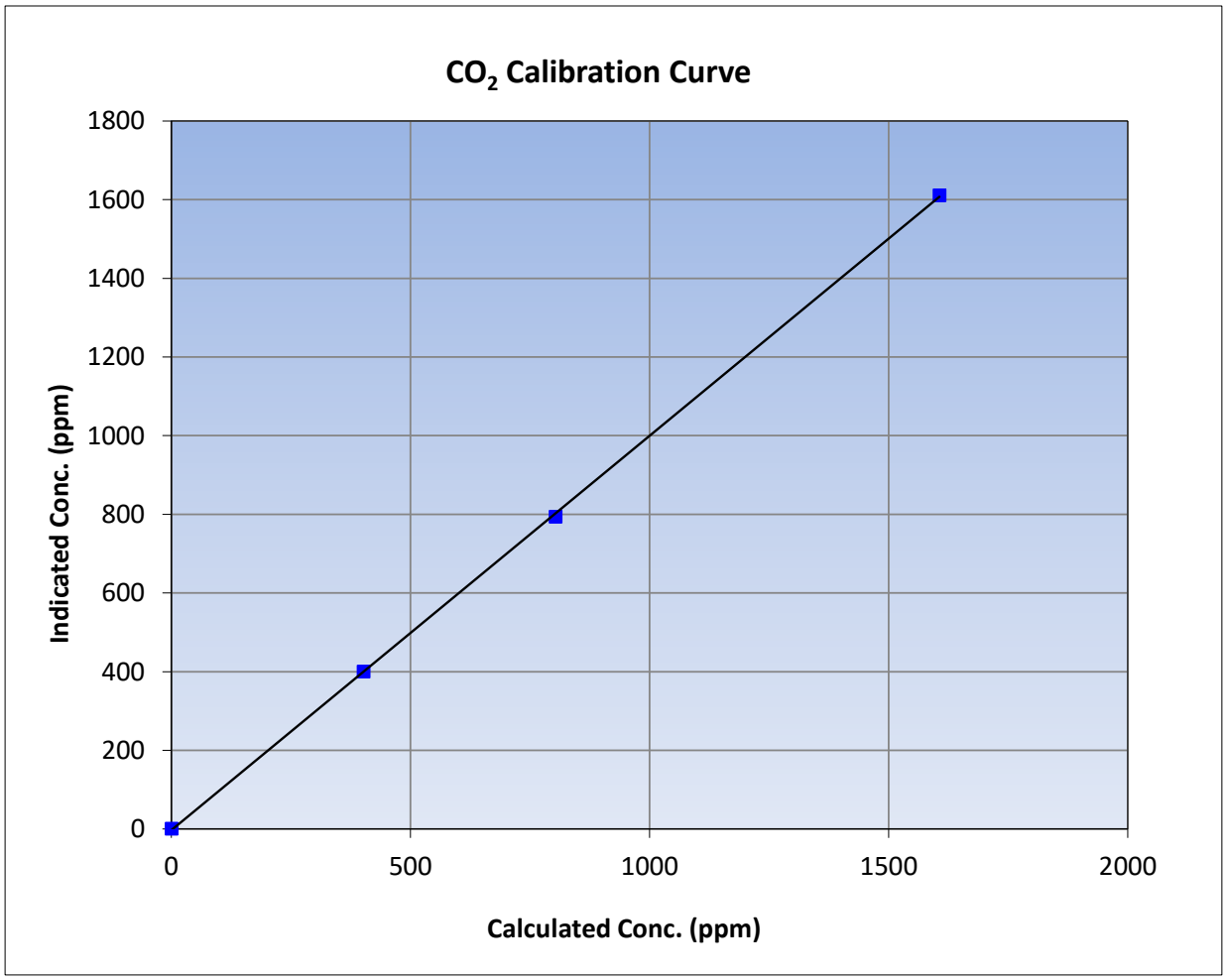
Station Information

Calibration Date	November 16, 2023	Previous Calibration	October 25, 2023
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	11:45	End Time (MST)	15:48
Analyzer make	API T360	Analyzer serial #	489

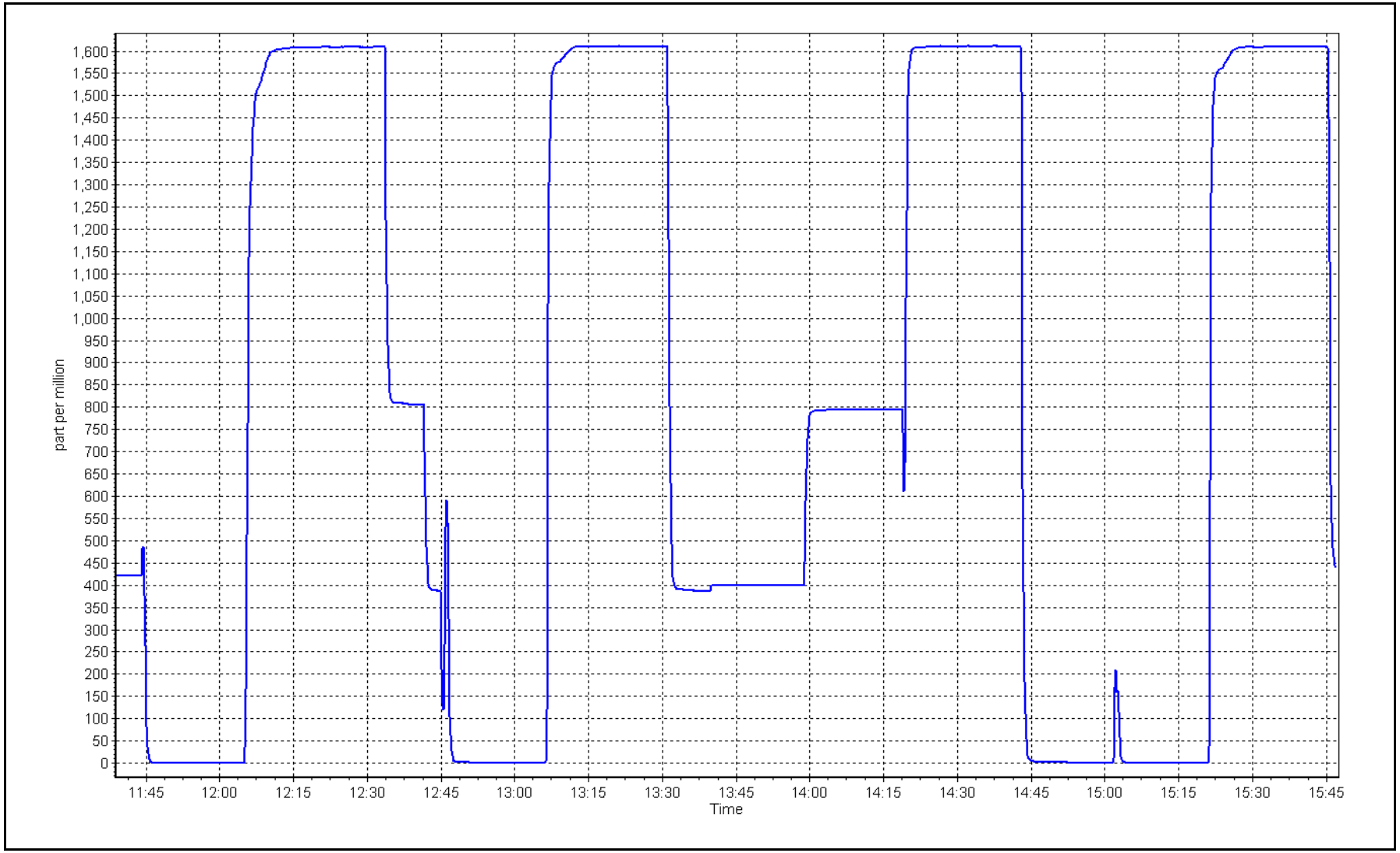
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.8	----
1605.9	1611.0	0.9968
802.9	794.0	1.0113
401.5	399.7	1.0044

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999933	*≥0.995*
Slope	1.002631	*0.90 - 1.10*
Intercept	-3.040000	*+/-10*



CO_2 Calibration Plot Date: November 16, 2023 Location: Stony Mountain



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS19
FIREBAG
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	November 29, 2023	Last Cal Date:	October 27, 2023
Start time (MST):	11:22	End time (MST):	14:58
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:	1.002865	1.000607	Backgd or Offset:	9.8	9.9
Calibration intercept:	0.237458	1.477490	Coeff or Slope:	0.975	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	0.2	----
as found span	4919	81.1	799.5	801.0	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	4999	0.0	0.0	0.5	----
high point	4919	81.1	799.5	801.0	0.998
second point	4959	40.6	400.3	402.3	0.995
third point	4980	20.3	200.1	202.8	0.987
as left zero	4999	0.0	0.0	0.5	----
as left span	4919	81.1	799.5	804.0	0.994
				Average Correction Factor	0.993

Baseline Corr As found:	800.80	Previous response	802.00	*% change	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

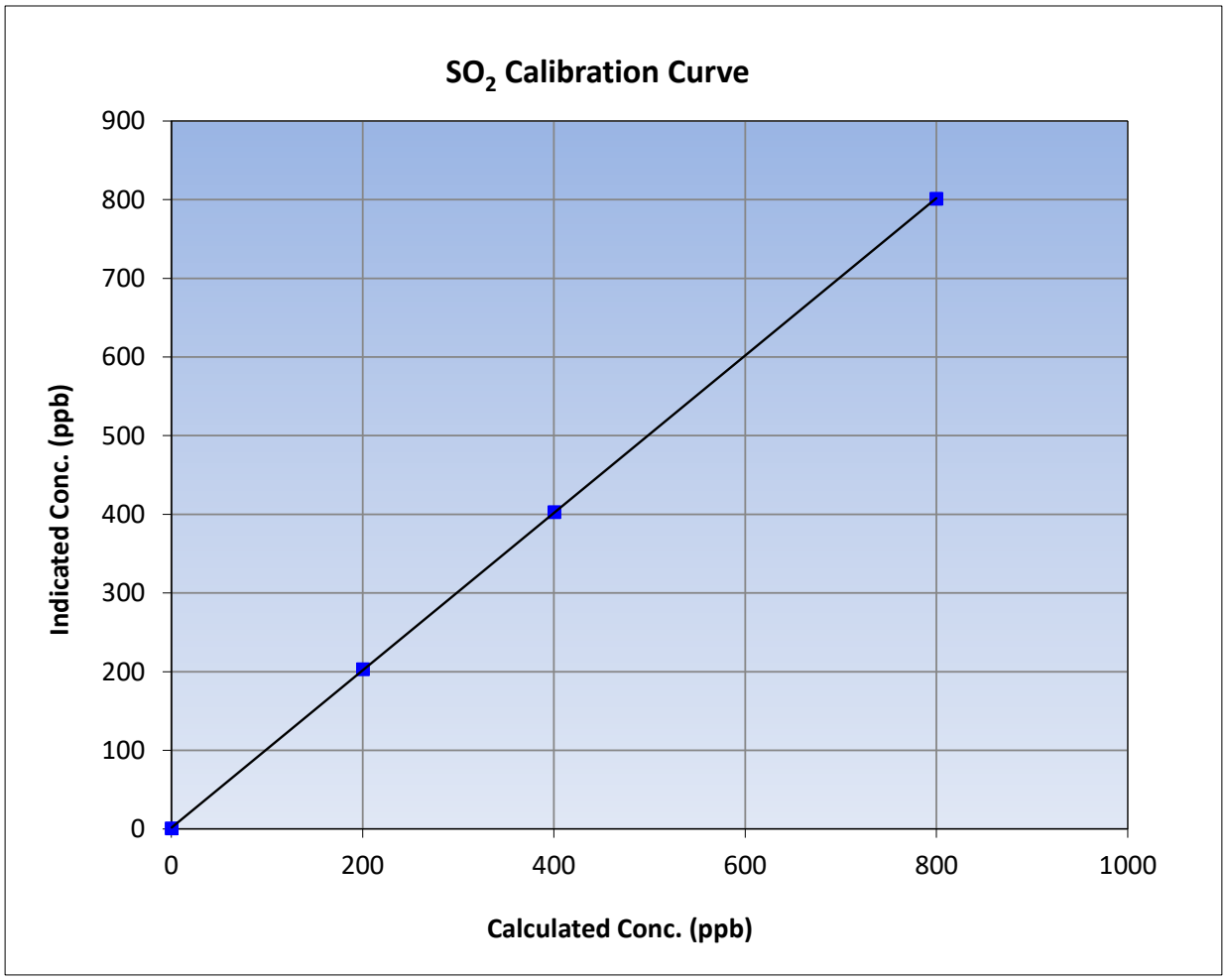
Station Information

Calibration Date:	November 29, 2023	Previous Calibration:	October 27, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	11:22	End Time (MST):	14:58
Analyzer make:	Thermo 43i	Analyzer serial #:	1410661308

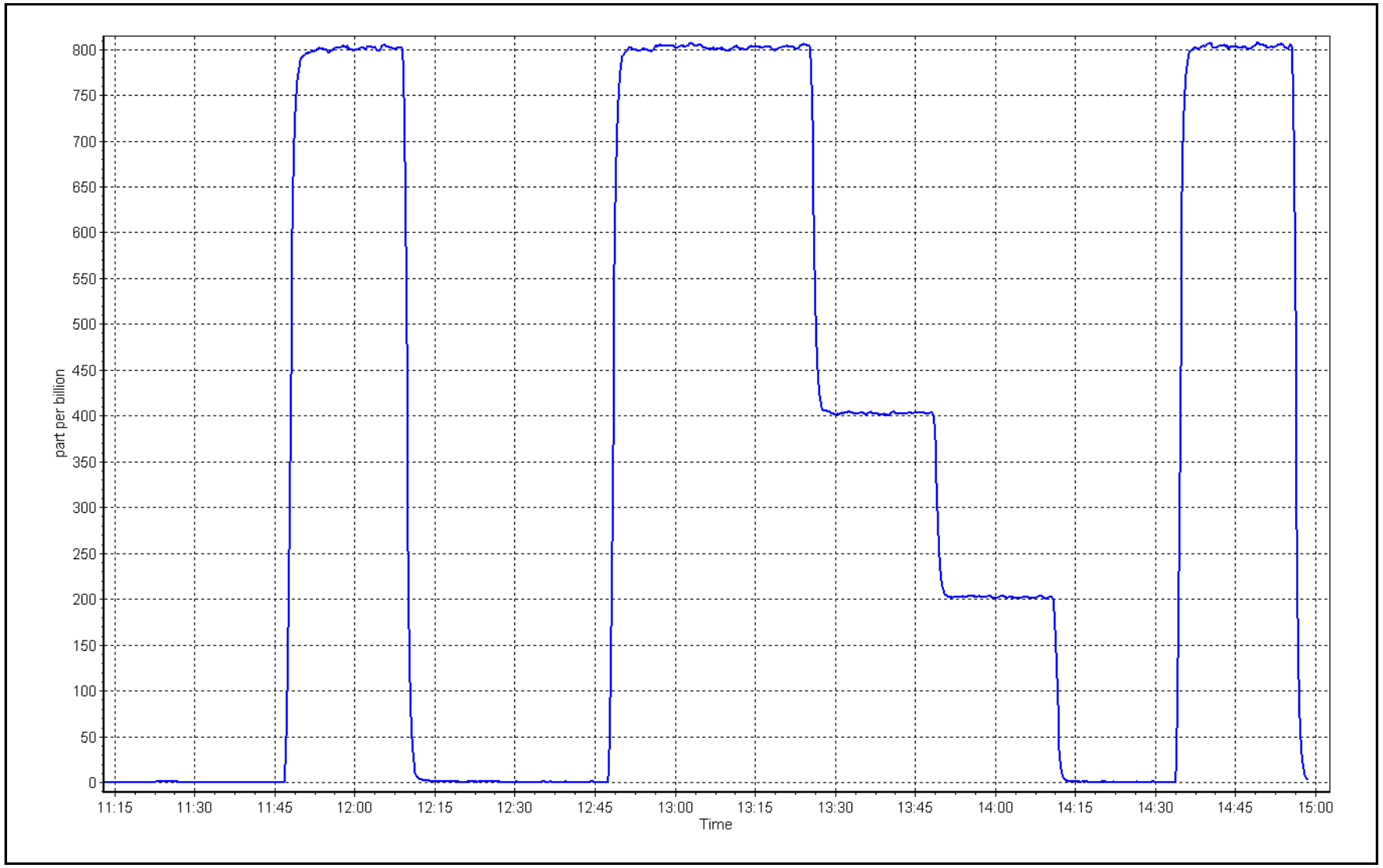
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
799.5	801.0	0.9981
400.3	402.3	0.9949
200.1	202.8	0.9867

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999993	*≥0.995*
Slope	1.000607	*0.90 - 1.10*
Intercept	1.477490	*+/-30*



SO2 Calibration Plot Date: November 29, 2023 Location: Firebag



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Firebag	Station number:	AMS19
Calibration Date:	November 21, 2023	Last Cal Date:	October 3, 2023
Start time (MST):	10:57	End time (MST):	17:04
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:	0.999195	0.995764	Backgd or Offset:	2.57	2.62
Calibration intercept:	-0.101544	0.018558	Coeff or Slope:	1.136	1.164

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4922	78.2	80.0	78.7	1.016
as found 2nd point	4961	39.1	40.0	38.9	1.028
as found 3rd point	4980	19.6	20.0	19.8	1.013
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4922	78.2	80.0	79.7	1.004
second point	4961	39.1	40.0	39.8	1.005
third point	4980	19.6	20.0	19.9	1.007
as left zero	5000	0.0	0.0	0.1	----
as left span	4922	78.2	80.0	80.5	0.994
SO2 Scrubber Check	4922	78.3	800.2	0.0	----
Date of last scrubber change:		January 18, 2023		Ave Corr Factor	1.005
Date of last converter efficiency test:		n/a			efficiency

Baseline Corr As found:	78.7	Prev response:	79.81	*% change:	-1.4%
Baseline Corr 2nd AF pt:	38.9	AF Slope:	0.983047	AF Intercept:	-0.061291
Baseline Corr 3rd AF pt:	19.8	AF Correlation:	0.999950		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

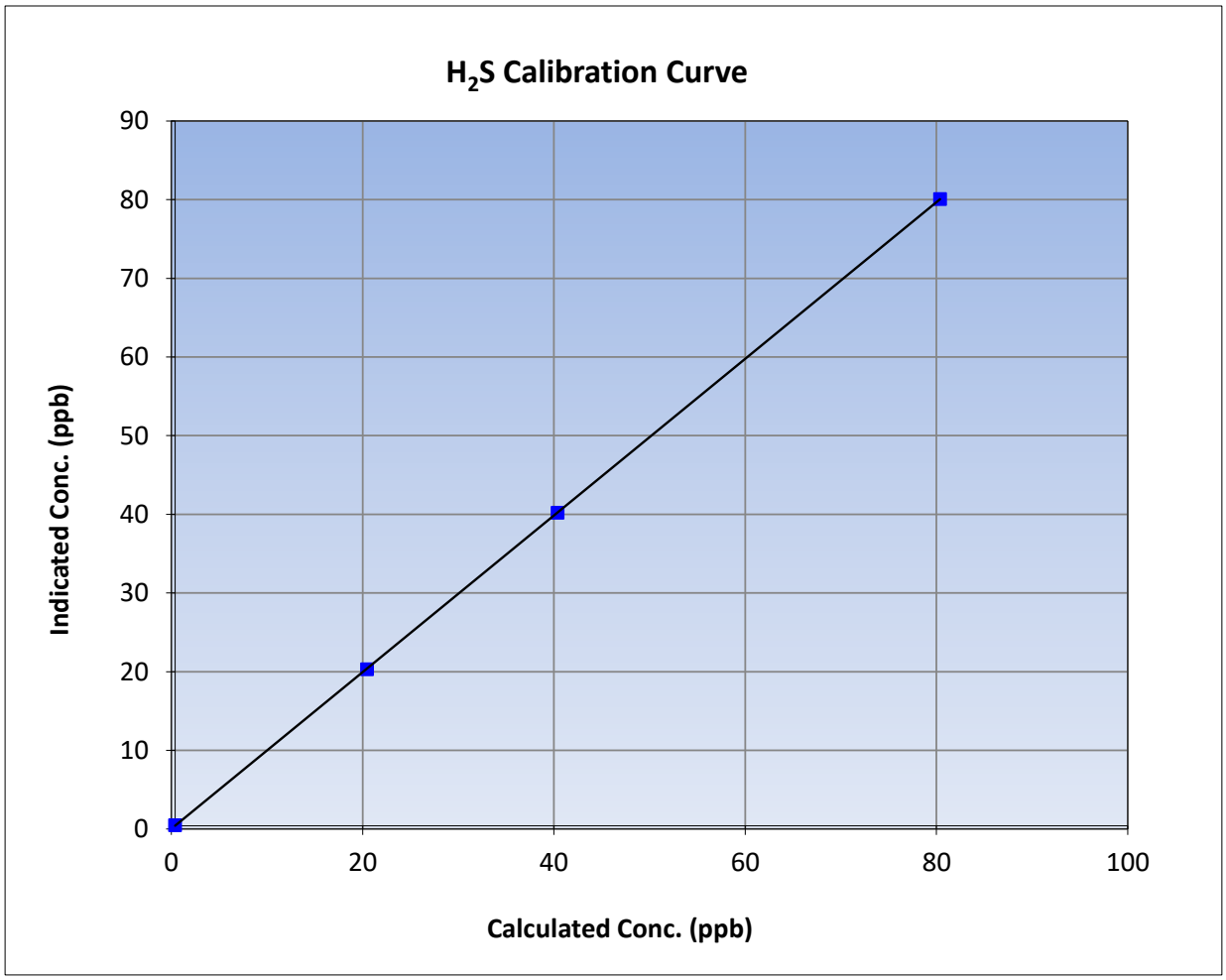
Station Information

Calibration Date:	November 21, 2023	Previous Calibration:	October 3, 2023
Station Name:	Firebag	Station Number:	AMS19
Start Time (MST):	10:57	End Time (MST):	17:04
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1151680032

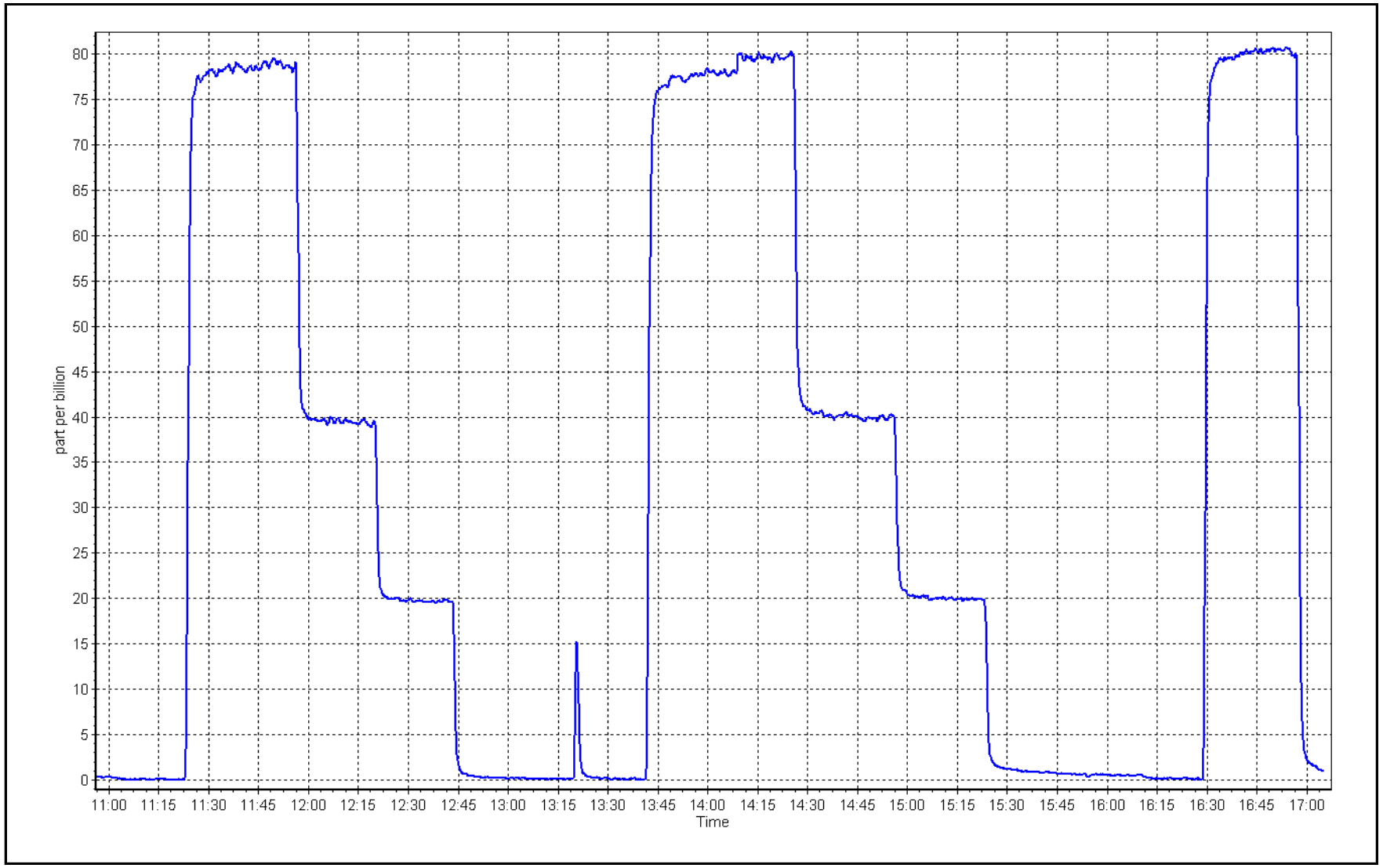
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	79.7	1.0035
40.0	39.8	1.0048
20.0	19.9	1.0075

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	0.995764	*0.90 - 1.10*
Intercept	0.018558	*+/-3*



H_2S Calibration Plot Date: November 21, 2023 Location: Firebag



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	November 29, 2023	Last Cal Date:	October 27, 2023
Start time (MST):	11:22	End time (MST):	14:58
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:	0.998006	1.002039	Background:	2.16	2.04
Calibration intercept:	-0.059333	-0.092137	Coefficient:	3.758	3.793

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	-0.20	----
as found span	4919	81.1	17.31	17.04	1.016
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	4999	0.0	0.00	-0.03	----
high point	4919	81.1	17.31	17.29	1.001
second point	4959	40.6	8.66	8.53	1.016
third point	4980	20.3	4.33	4.20	1.031
as left zero	5000	0.0	0.00	0.05	----
as left span	4919	81.1	17.31	17.36	0.997
				Average Correction Factor	1.016

Baseline Corr As found:	17.24	Previous response	17.21	*% 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 filters after as founds. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

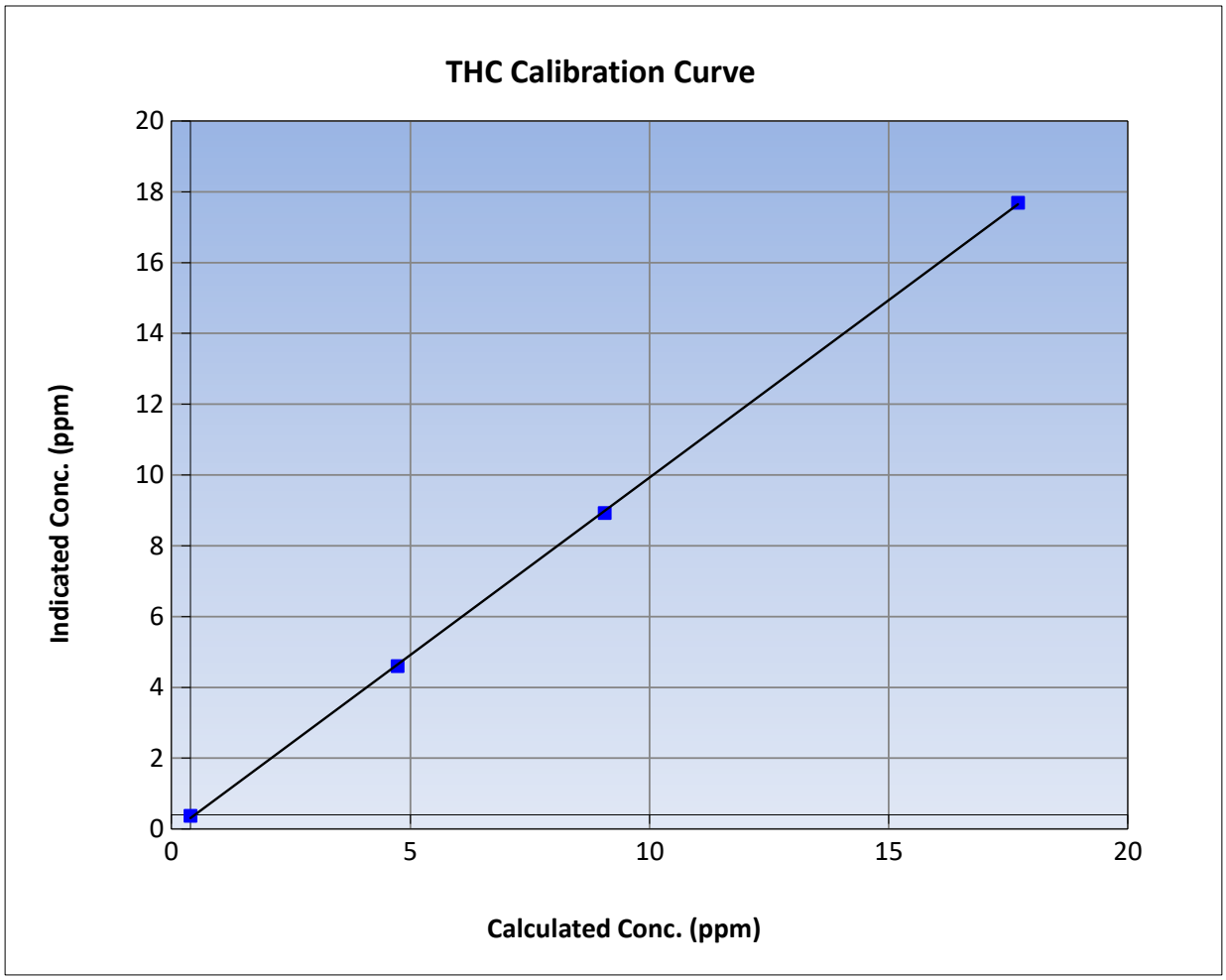
Station Information

Calibration Date:	November 29, 2023	Previous Calibration:	October 27, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	11:22	End Time (MST):	14:58
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1336160089

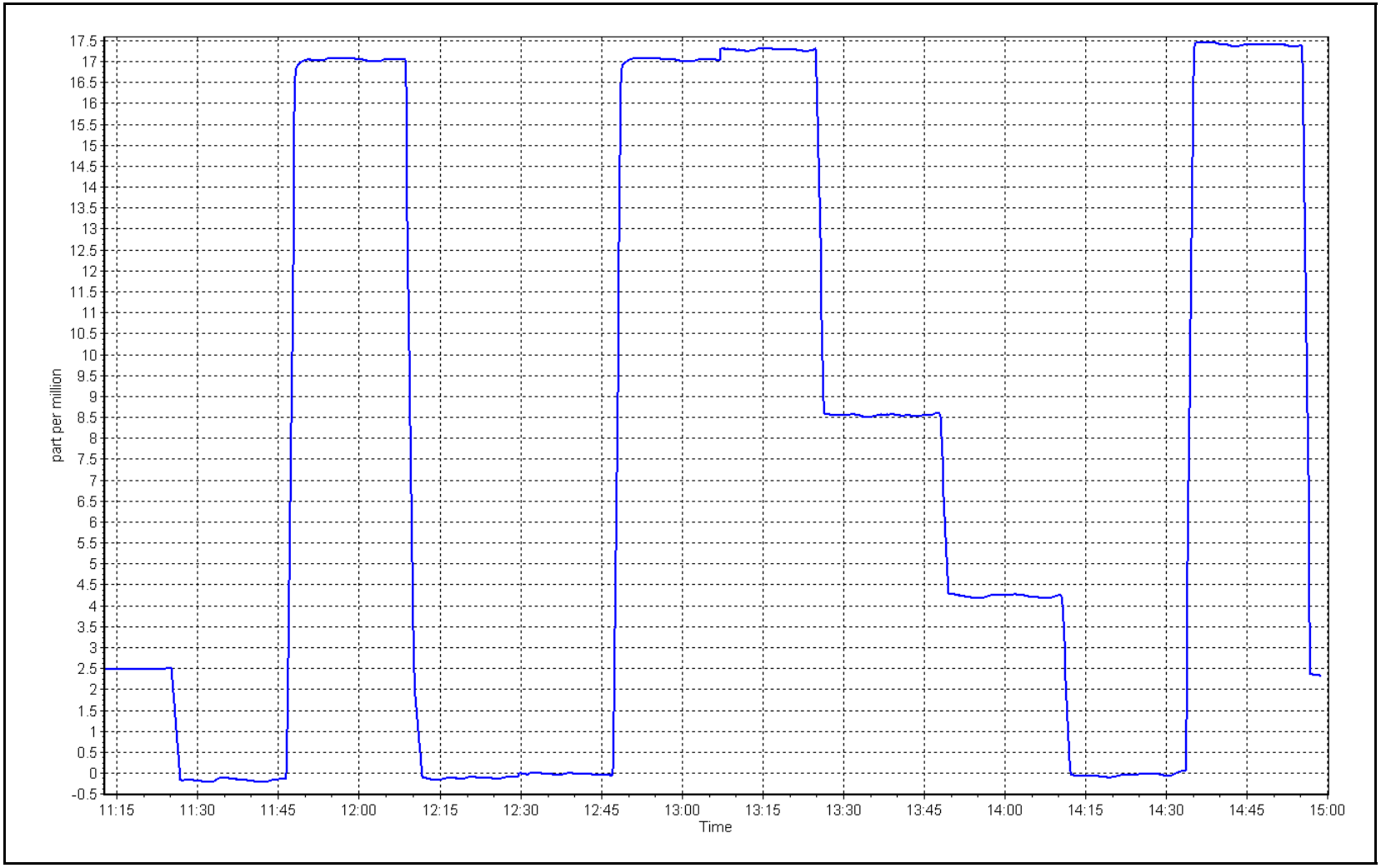
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.03	----
17.31	17.29	1.0009
8.66	8.53	1.0157
4.33	4.20	1.0311

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999928	*≥0.995*
Slope	1.002039	*0.90 - 1.10*
Intercept	-0.092137	*+/-1.5*



THC Calibration Plot Date: November 29, 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:	November 17, 2023	Last Cal Date:	October 26, 2023
Start time (MST):	11:07	End time (MST):	15:51
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:	1.078	1.091	NO bkgnd or offset:	7.5	7.6
NOX coeff or slope:	0.995	0.992	NOX bkgnd or offset:	7.6	7.7
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	217.4	212.4

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.998388	0.998263
NO_X Cal Offset:	0.736136	0.656194
NO Cal Slope:	0.998826	1.002153
NO Cal Offset:	0.248718	0.109347
NO_2 Cal Slope:	0.996831	1.003810
NO_2 Cal Offset:	-0.602383	-1.268713

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	-0.3	-0.2	-0.1	----	----
as found span	4919	81.0	828.1	800.3	27.9	820.0	790.4	29.7	1.0099	1.0125
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	4999	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1	----	----
high point	4919	81.0	828.1	800.3	27.9	827.0	802.0	25.3	1.0014	0.9979
second point	4960	40.5	414.0	400.1	13.9	414.2	401.2	13.0	0.9996	0.9973
third point	4980	20.2	206.5	199.6	6.9	207.8	200.3	7.5	0.9938	0.9963
as left zero	4999	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	----	----
as left span	4919	81.0	828.1	369.7	458.5	827.0	366.9	460.2	1.0014	1.0076
								Average Correction Factor	0.9983	0.9972

Corrected As found	NO_X = 820.3 ppb	NO = 790.6 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.9%
Previous Response	NO_X = 827.5 ppb	NO = 799.6 ppb		*Percent Change	NO =	-1.1%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.9	367.3	458.5	459.7	0.9973	100.3%
2nd GPT point (200 ppb O3)	797.9	583.3	242.5	241.3	1.0048	99.5%
3rd GPT point (100 ppb O3)	797.9	691.4	134.4	132.5	1.0141	98.6%
				Average Correction Factor	1.0054	99.5%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

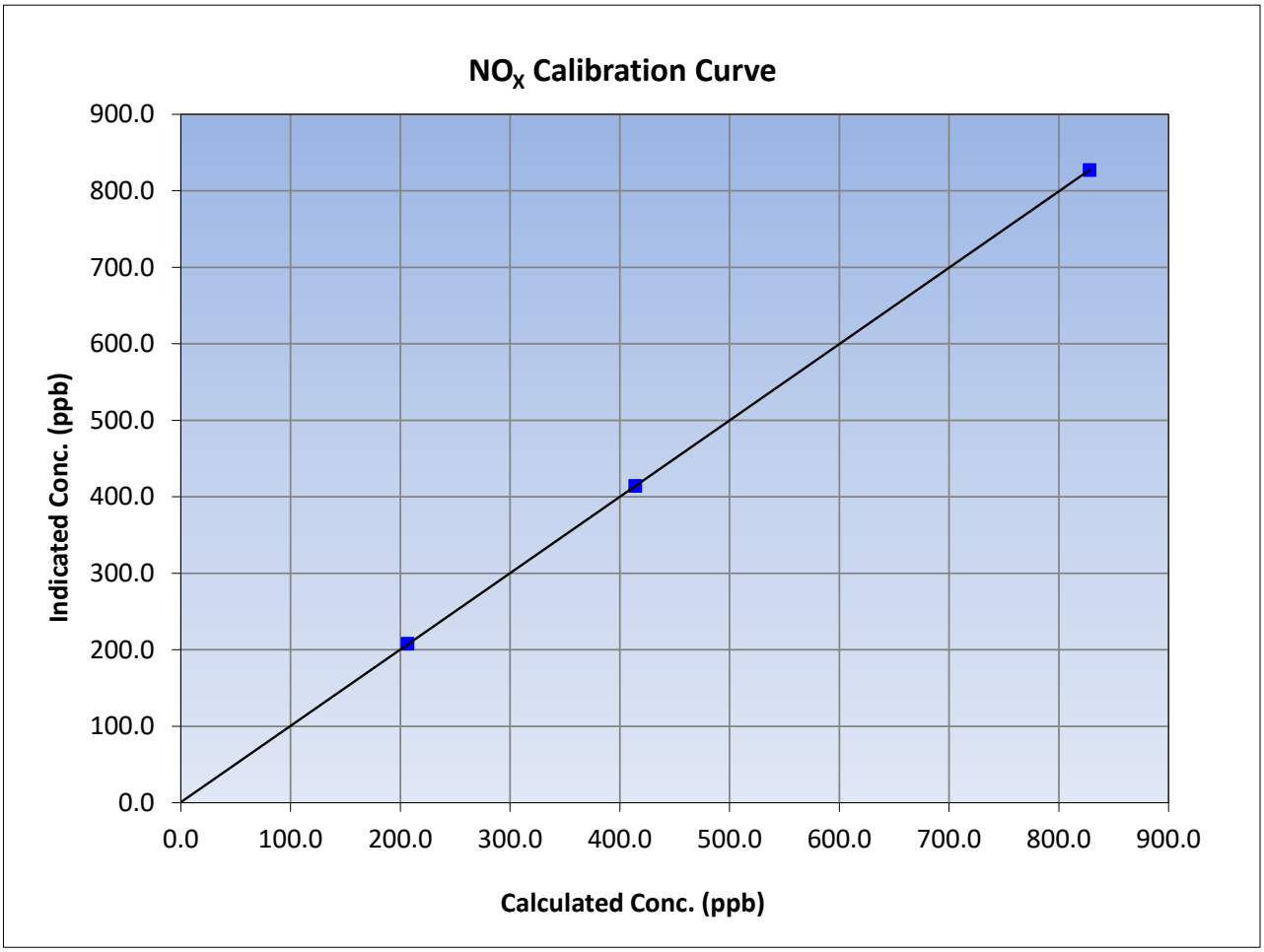
Version-04-2020

Station Information

Calibration Date:	November 17, 2023	Previous Calibration:	October 26, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	11:07	End Time (MST):	15:51
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.2	----	Correlation Coefficient	0.999995	*≥0.995*
828.1	827.0	1.0014			
414.0	414.2	0.9996	Slope	0.998263	*0.90 - 1.10*
206.5	207.8	0.9938			
			Intercept	0.656194	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

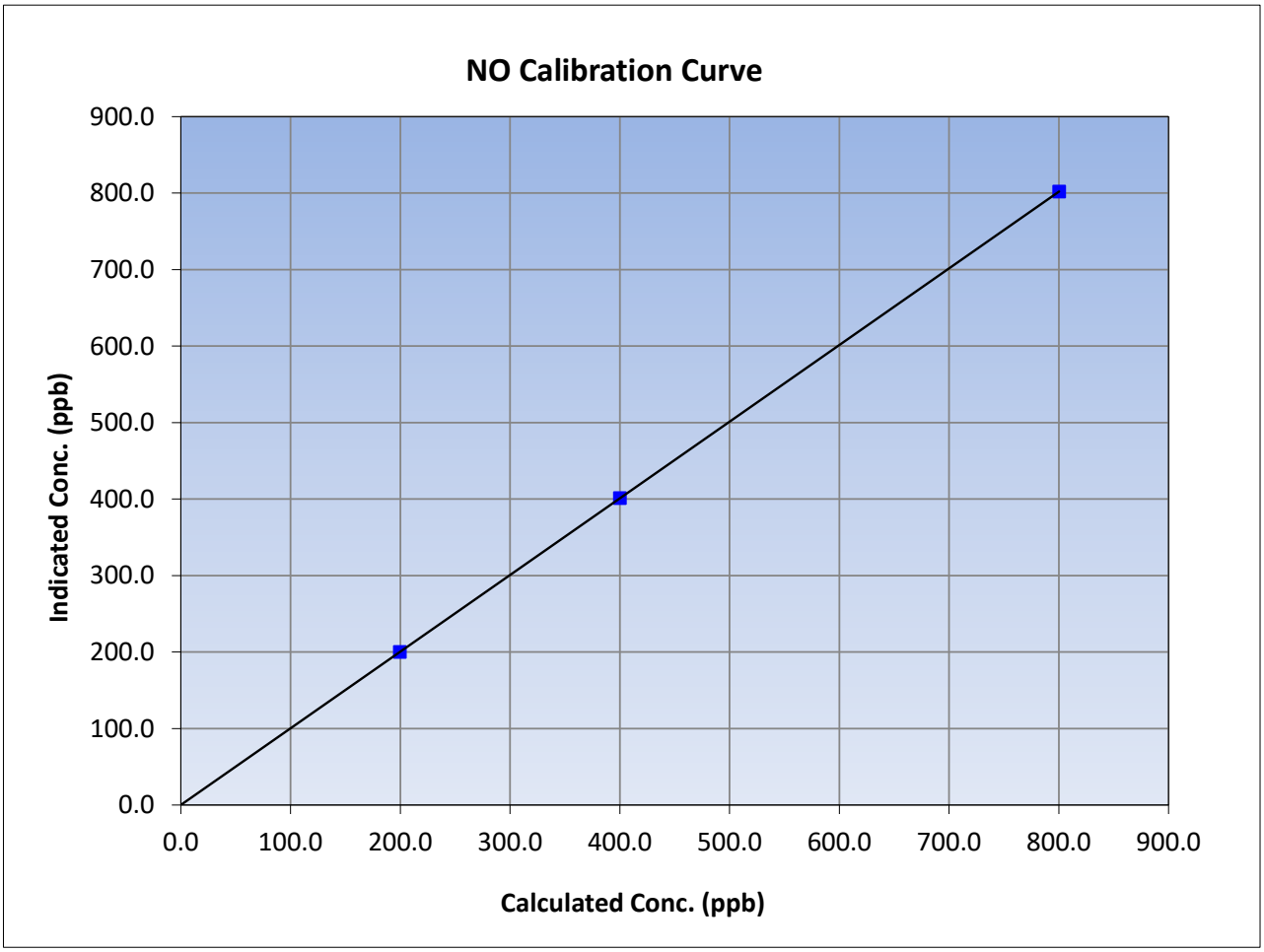
Version-04-2020

Station Information

Calibration Date:	November 17, 2023	Previous Calibration:	October 26, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	11:07	End Time (MST):	15:51
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.1	----	Correlation Coefficient	1.000000	*≥0.995*
800.3	802.0	0.9979			
400.1	401.2	0.9973	Slope	1.002153	*0.90 - 1.10*
199.6	200.3	0.9963			
			Intercept	0.109347	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

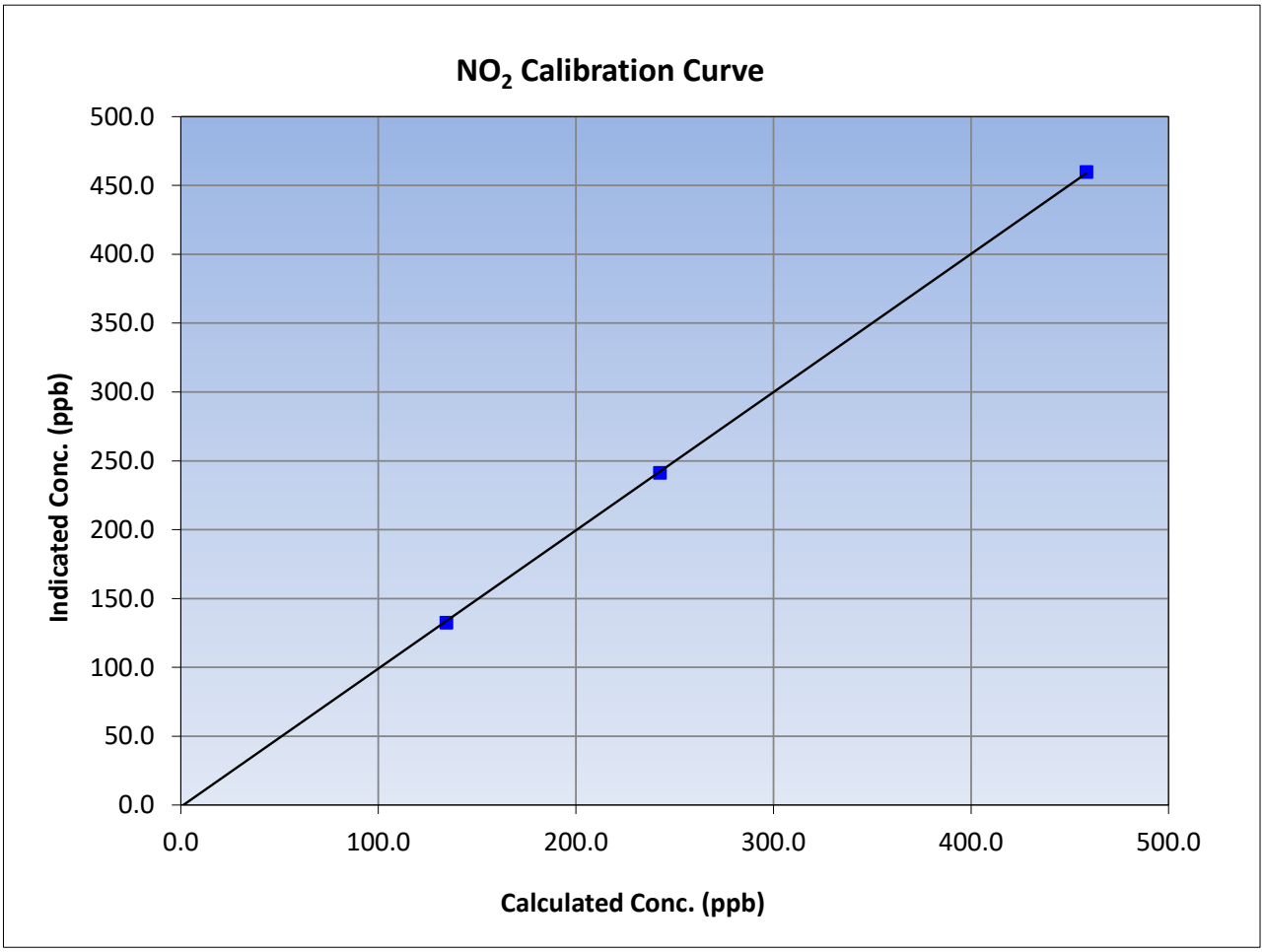
Version-04-2020

Station Information

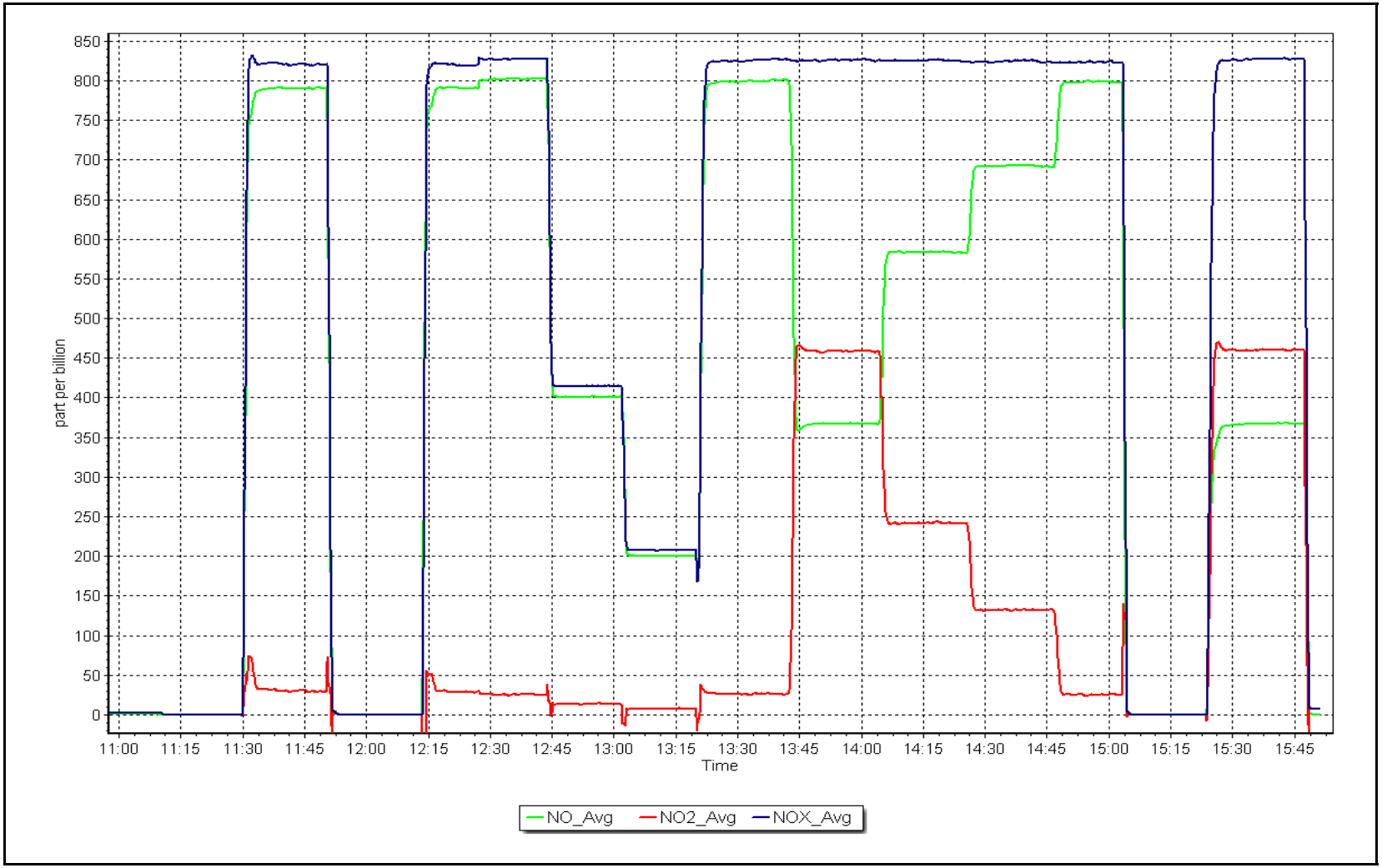
Calibration Date:	November 17, 2023	Previous Calibration:	October 26, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	11:07	End Time (MST):	15:51
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.1	----	Correlation Coefficient	0.999966	*≥0.995*
458.5	459.7	0.9973			
242.5	241.3	1.0048	Slope	1.003810	*0.90 - 1.10*
134.4	132.5	1.0141			
			Intercept	-1.268713	*+/-20*



NO_X Calibration Plot Date: November 17, 2023 Location: Firebag



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS20
MACKAY RIVER
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	November 17, 2023	Last Cal Date:	October 12, 2023
Start time (MST):	8:00	End time (MST):	10:52
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.22 ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC306868		
Removed Cal Gas Conc:	49.22 ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA	Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700	Serial Number:	1220
ZAG Make/Model:	Teledyne API 701	Serial Number:	4522

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1501301450

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005419	0.990612	Backgd or Offset:	18.7	18.7
Calibration intercept:	1.910989	2.671171	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	0.2	----
as found span	4919	81.3	800.3	794.9	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4919	81.3	800.3	794.6	1.007
second point	4959	40.7	400.7	399.7	1.002
third point	4980	20.3	199.8	203.7	0.981
as left zero	5000	0.0	0.0	0.3	----
as left span	4919	81.3	800.3	795.3	1.006
				Average Correction Factor	0.997

Baseline Corr As found:	794.70	Previous response	806.52	*% change	-1.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments or maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

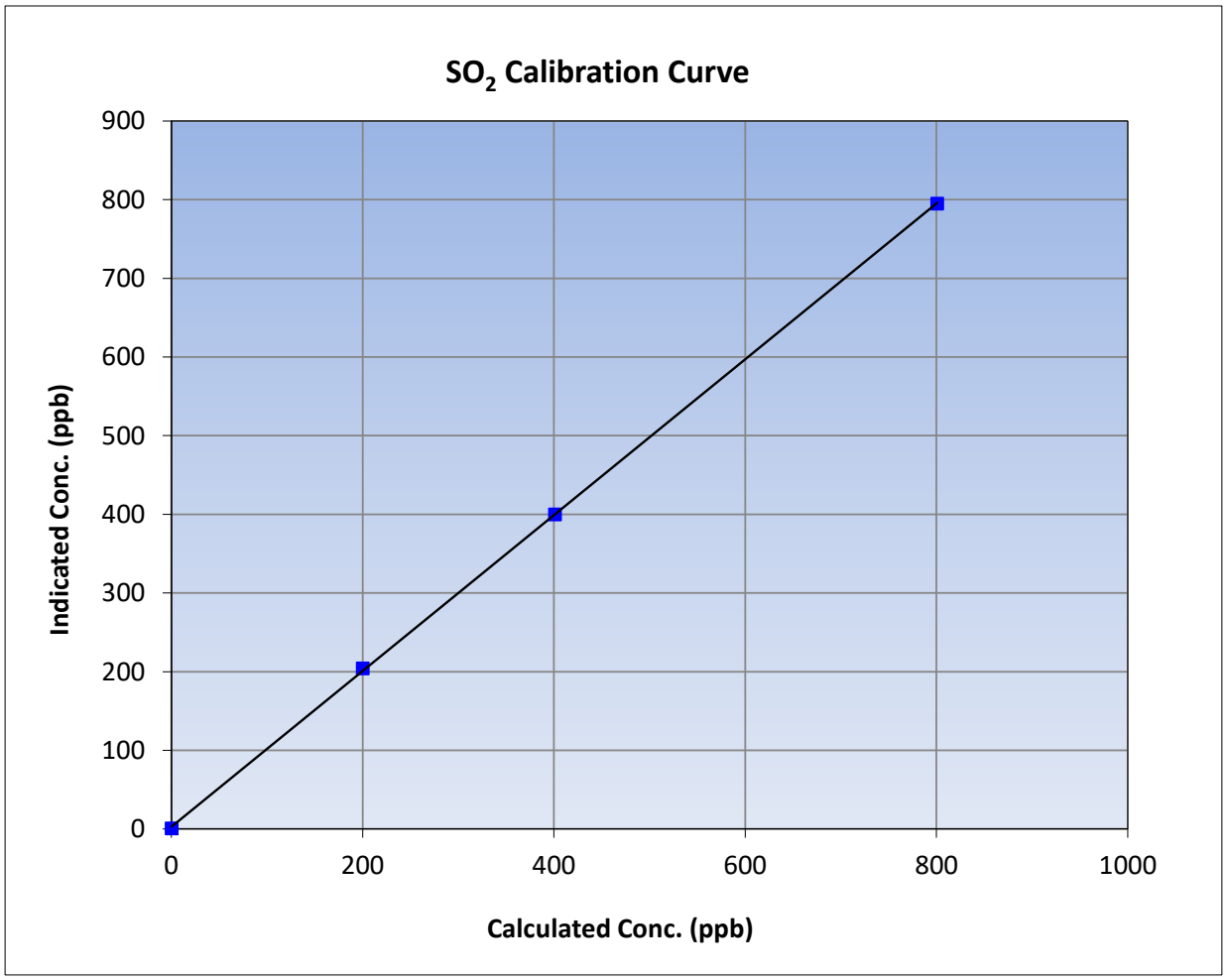
Station Information

Calibration Date:	November 17, 2023	Previous Calibration:	October 12, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	8:00	End Time (MST):	10:52
Analyzer make:	Thermo 43i	Analyzer serial #:	1501301450

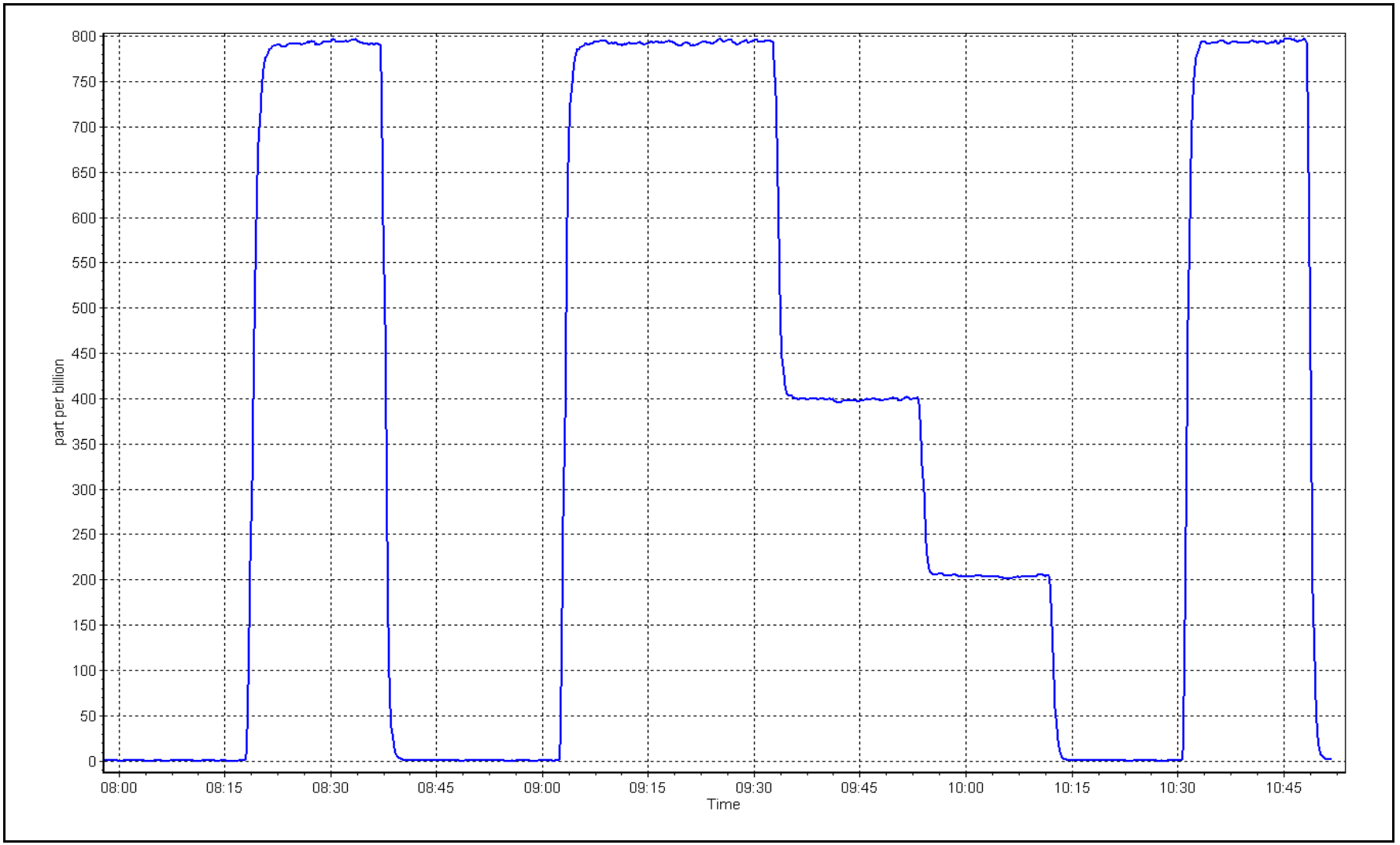
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
800.3	794.6	1.0071
400.7	399.7	1.0024
199.8	203.7	0.9810

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999954	*≥0.995*
Slope	0.990612	*0.90 - 1.10*
Intercept	2.671171	*+/-30*



SO2 Calibration Plot Date: November 17, 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:	November 9, 2023	Last Cal Date:	October 24, 2023
Start time (MST):	8:20	End time (MST):	12:28
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 43i TLE		Analyzer serial #:	1236656117	
Converter make:	Global		Converter serial #:	2022-226	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001813	0.980821	Backgd or Offset:	3.1	3.07
Calibration intercept:	0.239528	0.499202	Coeff or Slope:	1.083	1.083

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	79.9	1.002
as found 2nd point	4961	39.0	39.9	40.1	0.998
as found 3rd point	4980	19.5	20.0	20.3	0.989
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4922	78.1	80.0	78.8	1.016
second point	4961	39.0	40.0	40.0	0.999
third point	4980	19.5	20.0	20.3	0.985
as left zero	5000	0.0	0.0	0.3	----
as left span	4922	78.1	80.0	78.2	1.023
SO2 Scrubber Check	4982	81.3	802.8	-0.1	----
Date of last scrubber change:		May 25, 2023		Ave Corr Factor	1.000
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.8	Prev response:	80.36	*% change:	-0.7%
Baseline Corr 2nd AF pt:	40.0	AF Slope:	0.996881	AF Intercept:	0.239361
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999986		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

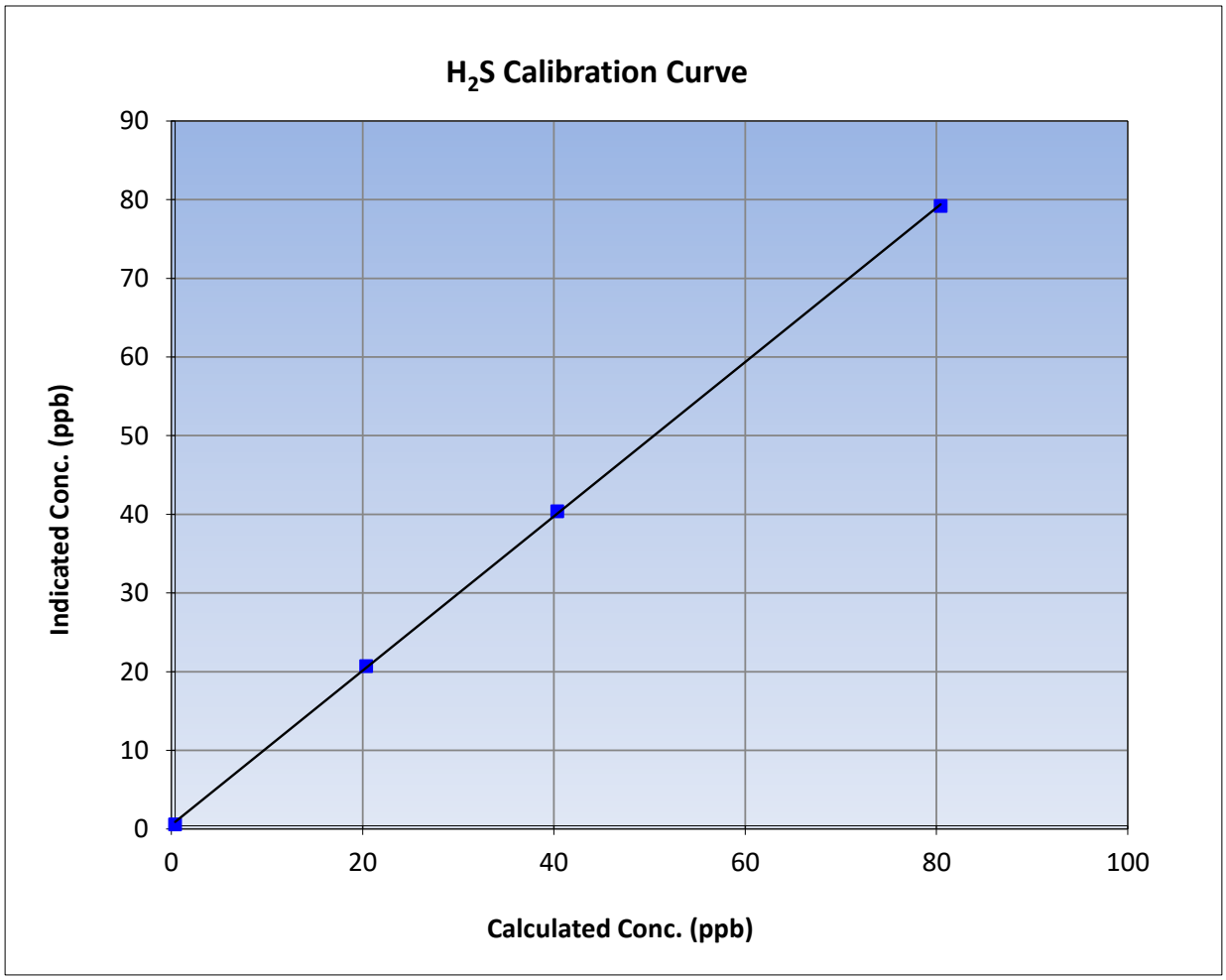
Station Information

Calibration Date:	November 9, 2023	Previous Calibration:	October 24, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	8:20	End Time (MST):	12:28
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1236656117

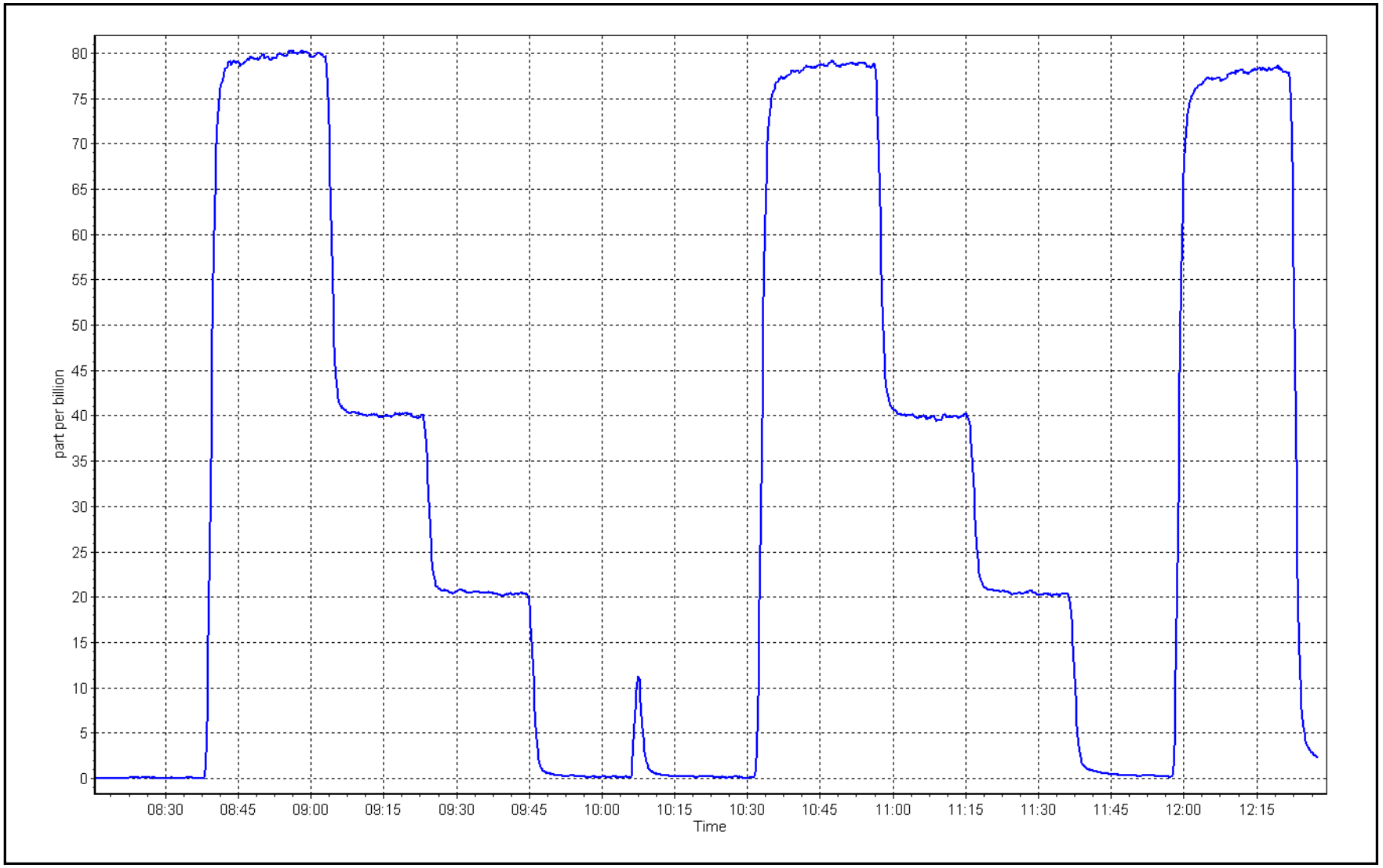
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	78.8	1.0157
40.0	40.0	0.9992
20.0	20.3	0.9845

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999923	*≥0.995*
Slope	0.980821	*0.90 - 1.10*
Intercept	0.499202	*+/-3*



H_2S Calibration Plot Date: November 9, 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:	November 17, 2023	Last Cal Date:	October 12, 2023
Start time (MST):	8:00	End time (MST):	10:50
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:	0.994974	0.998693	Background:	3.520	2.970
Calibration intercept:	0.076785	0.059818	Coefficient:	5.636	5.605

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	-0.46	----
as found span	4919	81.3	17.34	17.05	1.017
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.02	----
high point	4919	81.3	17.34	17.35	0.999
second point	4959	40.7	8.68	8.73	0.994
third point	4980	20.3	4.33	4.49	0.964
as left zero	5000	0.0	0.00	0.17	----
as left span	4919	81.3	17.34	17.16	1.010
				Average Correction Factor	0.986

Baseline Corr As found:	17.51	Previous response	17.33	*% 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 done. Zero and span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

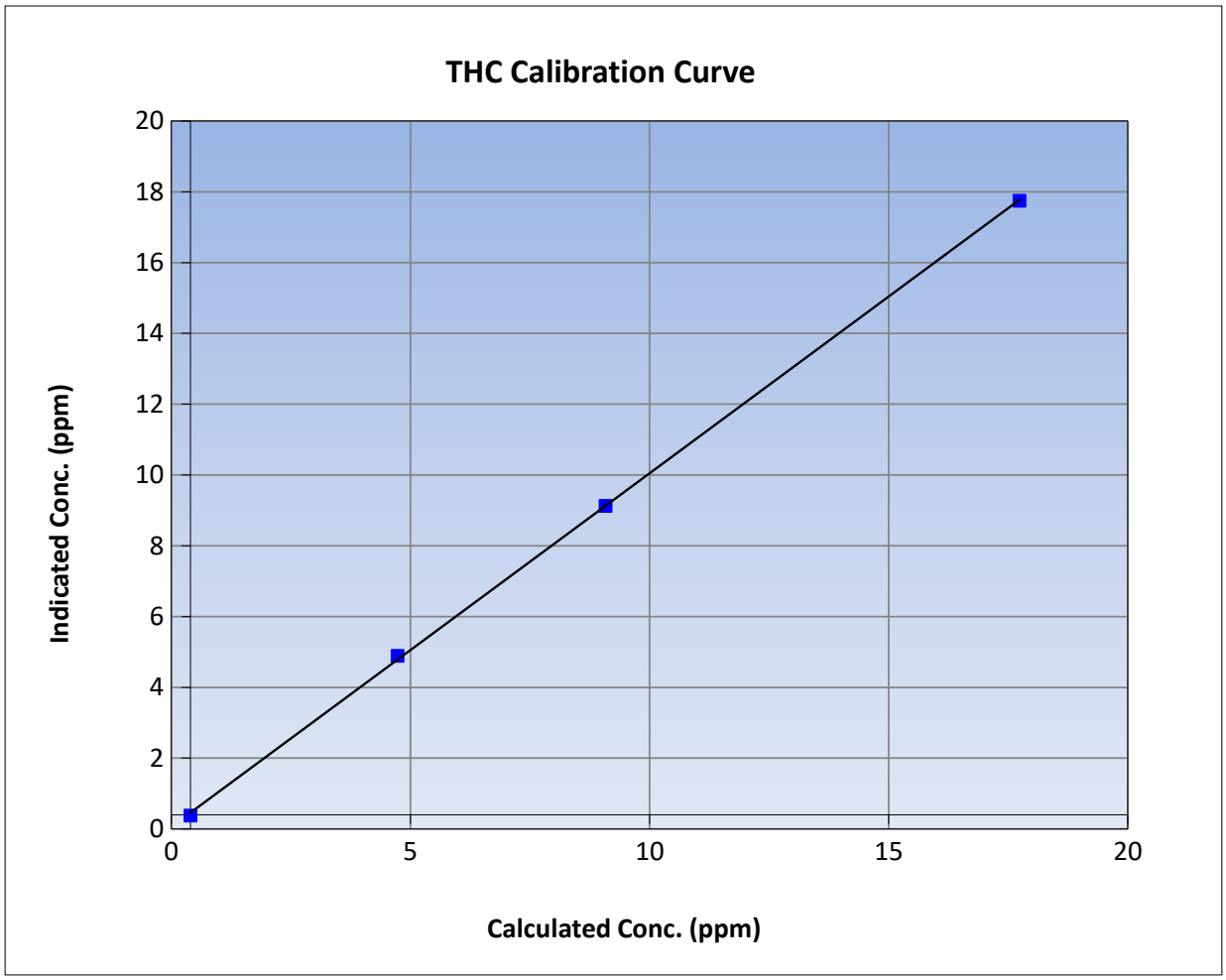
Station Information

Calibration Date:	November 17, 2023	Previous Calibration:	October 12, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	8:00	End Time (MST):	10:50
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1501663727

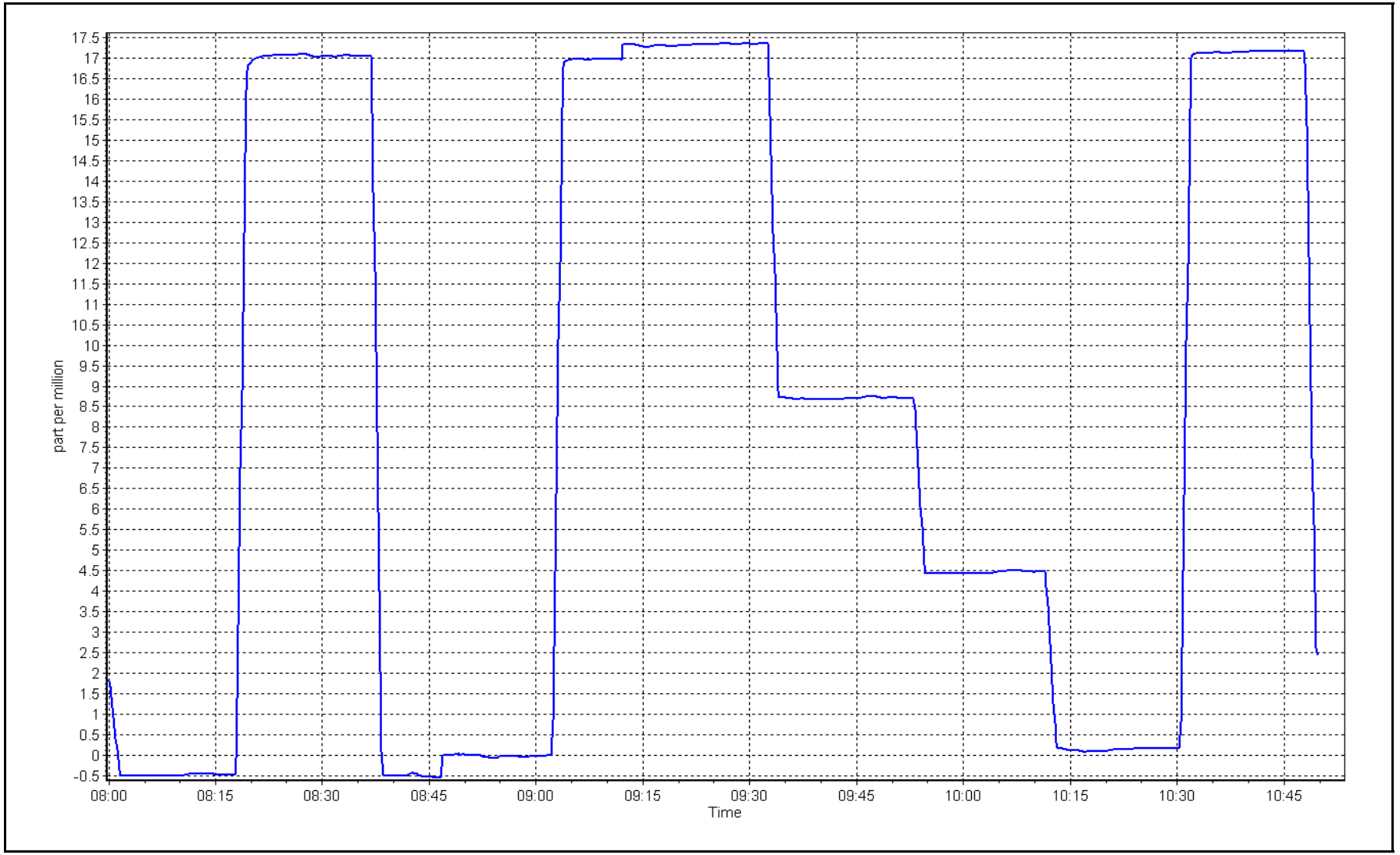
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.02	----
17.34	17.35	0.9994
8.68	8.73	0.9944
4.33	4.49	0.9643

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999888	*≥0.995*
Slope	0.998693	*0.90 - 1.10*
Intercept	0.059818	*+/-1.5*



THC Calibration Plot Date: November 17, 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:	November 8, 2023	Last Cal Date:	October 6, 2023
Start time (MST):	8:20	End time (MST):	12:31
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:	1.486	1.539	NO bkgnd or offset:	4.1	4.3
NOX coeff or slope:	0.994	0.994	NOX bkgnd or offset:	4.1	4.3
NO2 coeff or slope:	0.995	0.995	Reaction cell Press:	190.0	189.4

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.995380	0.996982
NO_X Cal Offset:	3.749814	2.850185
NO Cal Slope:	0.994536	0.997804
NO Cal Offset:	2.591219	1.471555
NO_2 Cal Slope:	1.007687	1.001029
NO_2 Cal Offset:	-0.458883	-0.990724

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
as found span	4917	83.3	819.5	800.3	19.2	800.7	778.9	21.7	1.0234	1.0275
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.1	----	----
high point	4917	83.3	819.5	800.3	19.2	819.0	799.8	19.2	1.0006	1.0006
second point	4956	41.7	410.4	400.8	9.6	411.9	400.6	11.3	0.9964	1.0006
third point	4979	20.8	204.6	199.9	4.8	210.5	203.4	7.1	0.9722	0.9826
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.2	----	----
as left span	4917	83.3	819.5	459.9	359.6	814.7	453.0	361.7	1.0058	1.0152
								Average Correction Factor	0.9897	0.9946

Corrected As found	NO_X = 800.7 ppb	NO = 779.0 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-2.3%
Previous Response	NO_X = 819.4 ppb	NO = 798.5 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)	794.6	454.2	359.6	359.7	0.9996	100.0%
2nd GPT point (200 ppb O3)	794.6	616.0	197.8	196.2	1.0079	99.2%
3rd GPT point (100 ppb O3)	794.6	701.2	112.6	110.6	1.0177	98.3%
				Average Correction Factor	1.0084	99.2%

Notes: No maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

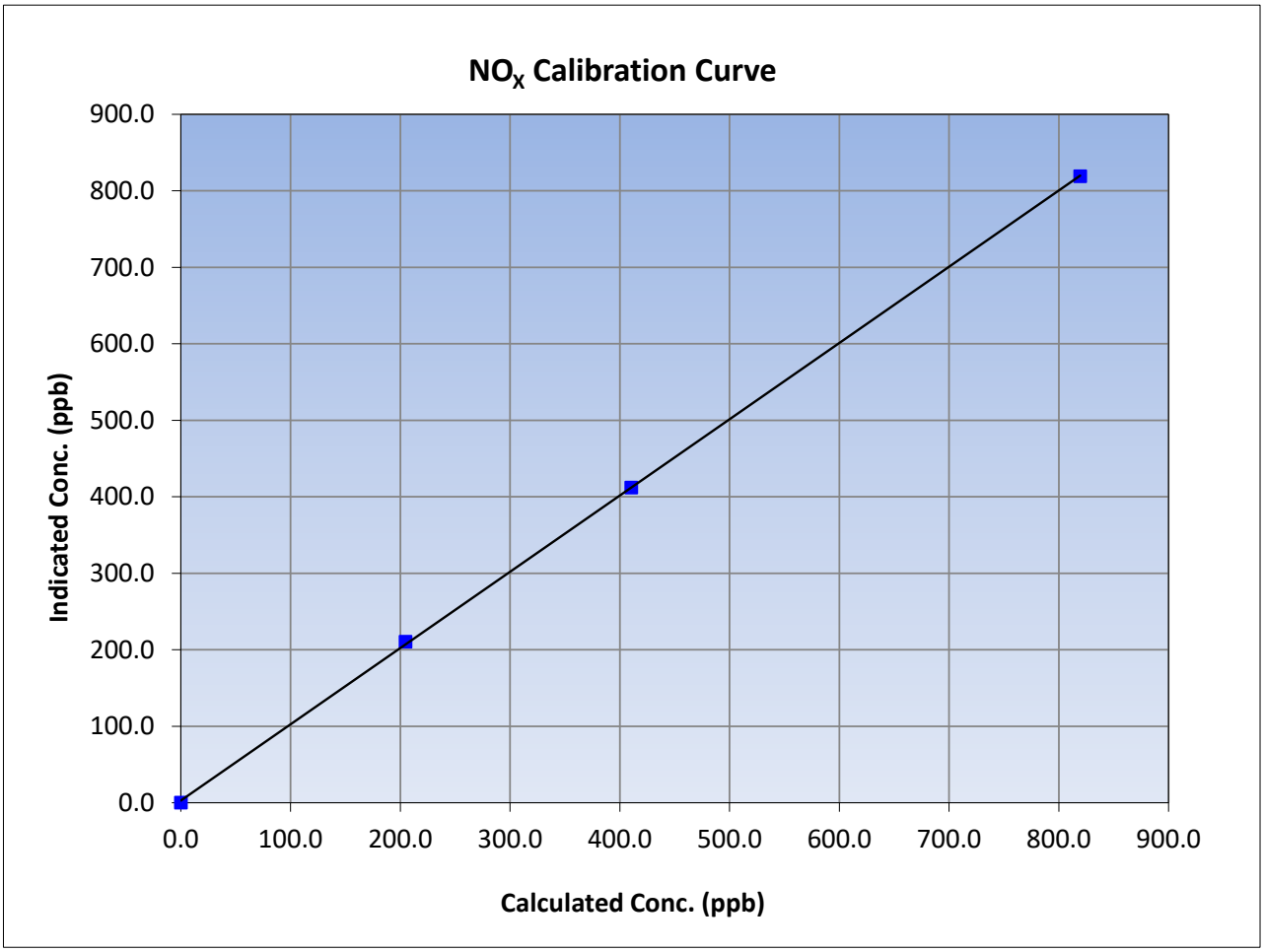
Version-04-2020

Station Information

Calibration Date:	November 8, 2023	Previous Calibration:	October 6, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	8:20	End Time (MST):	12:31
Analyzer make:	Thermo 42i	Analyzer serial #:	1505164379

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.2	----	Correlation Coefficient	0.999943	*≥0.995*
819.5	819.0	1.0006			
410.4	411.9	0.9964	Slope	0.996982	*0.90 - 1.10*
204.6	210.5	0.9722			
			Intercept	2.850185	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

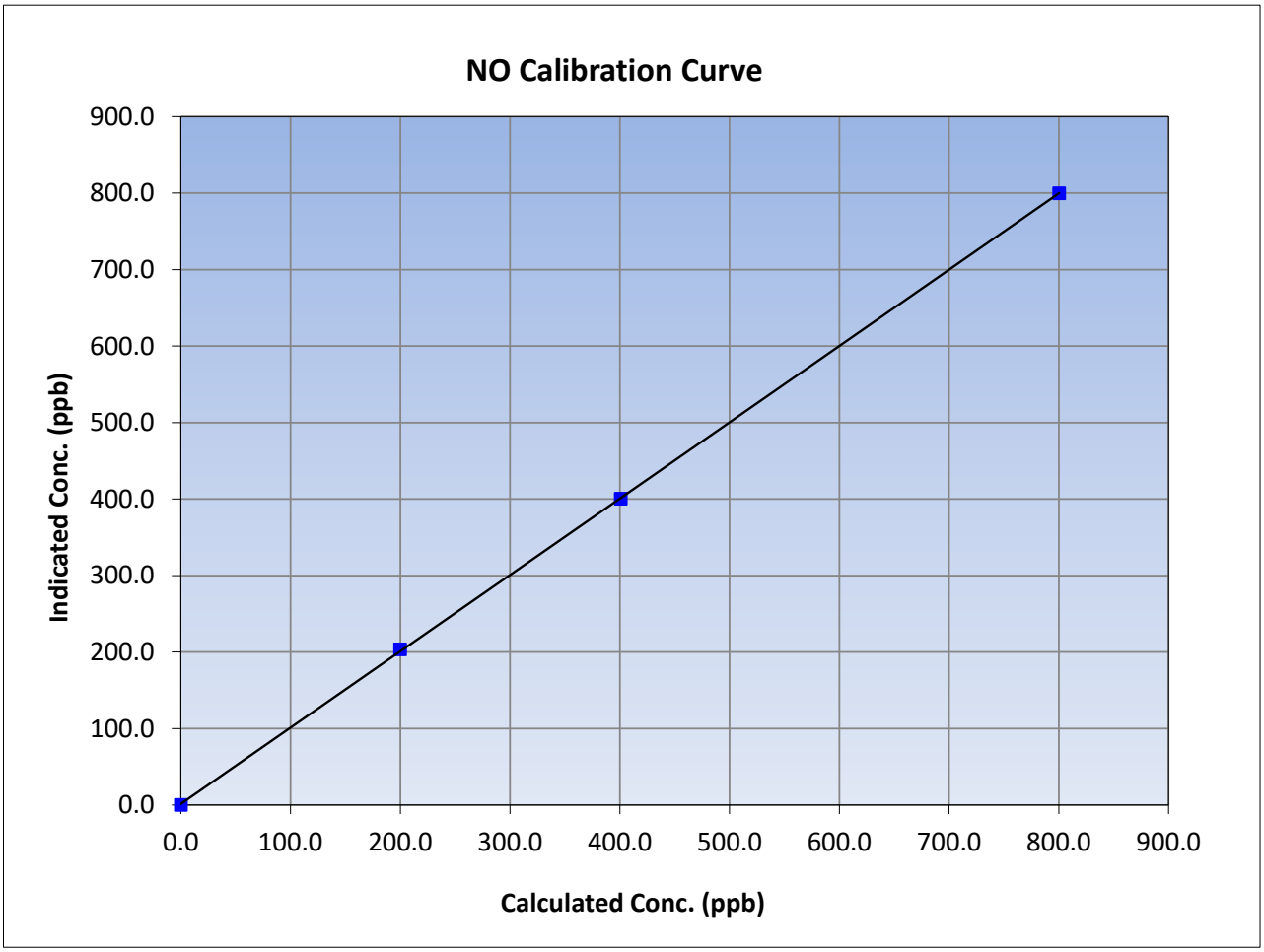
Version-04-2020

Station Information

Calibration Date:	November 8, 2023	Previous Calibration:	October 6, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	8:20	End Time (MST):	12:31
Analyzer make:	Thermo 42i	Analyzer serial #:	1505164379

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999974	≥0.995
800.3	799.8	1.0006			
400.8	400.6	1.0006	Slope	0.997804	0.90 - 1.10
199.9	203.4	0.9826			
			Intercept	1.471555	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

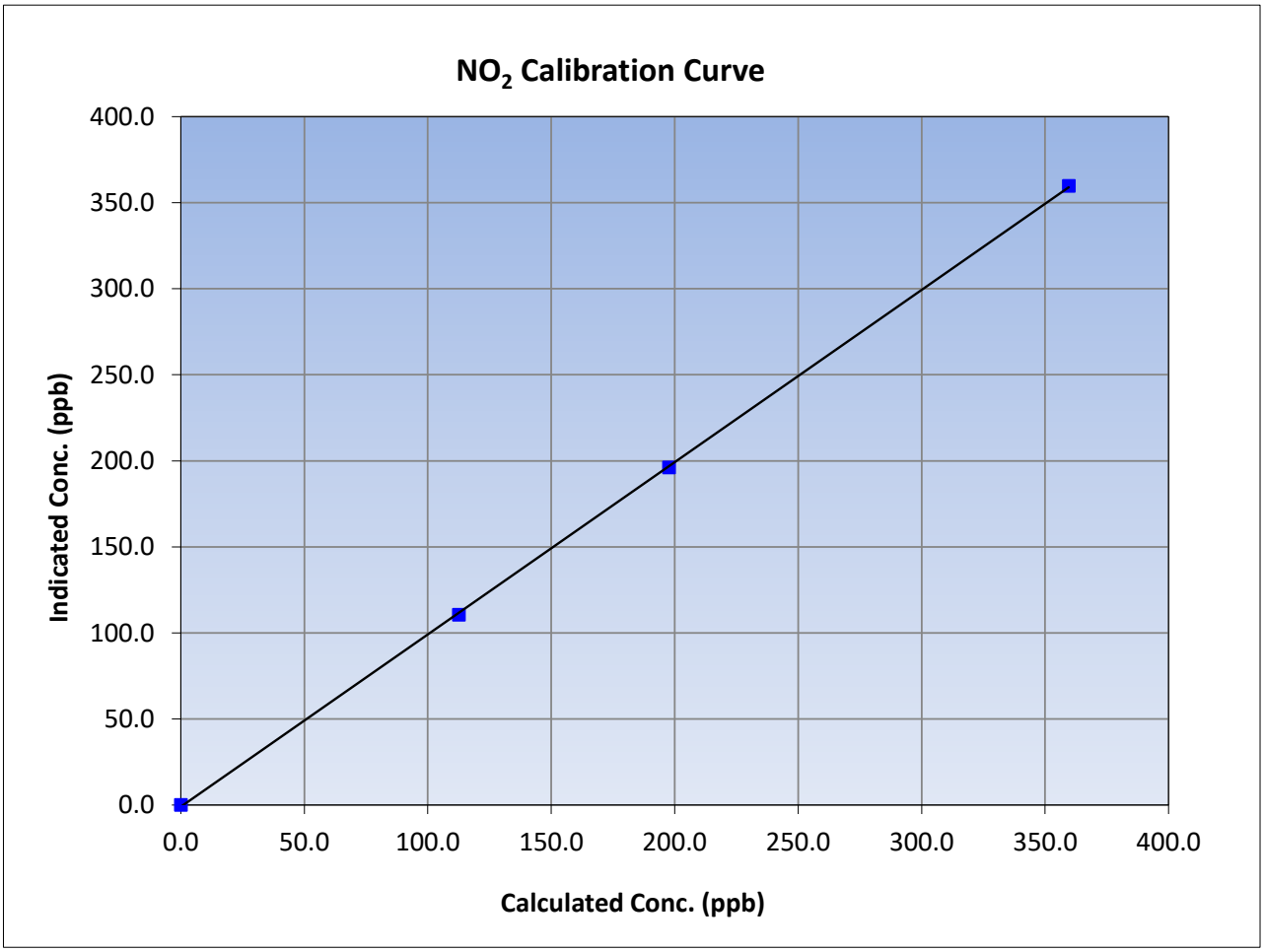
Version-04-2020

Station Information

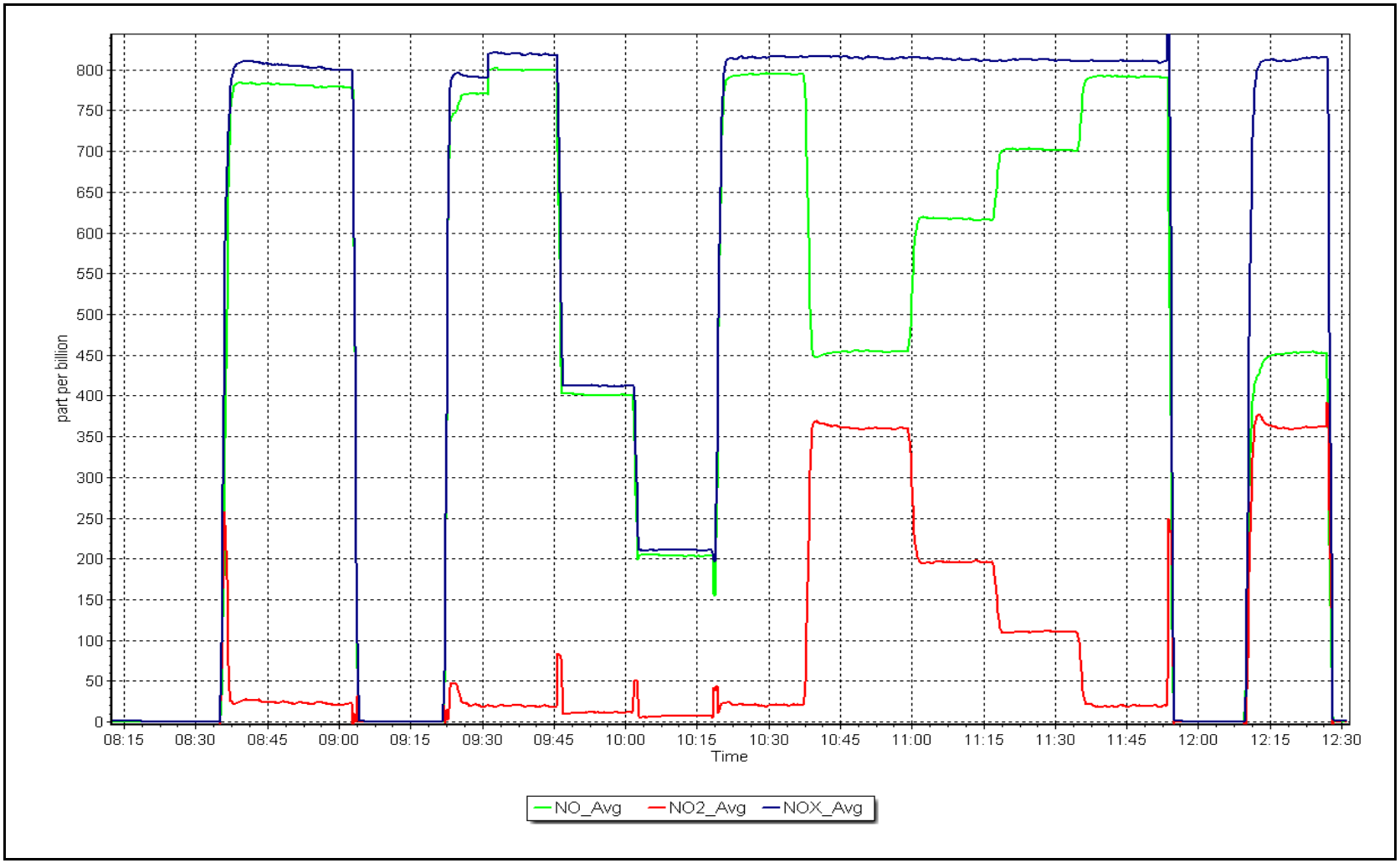
Calibration Date:	November 8, 2023	Previous Calibration:	October 6, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	8:20	End Time (MST):	12:31
Analyzer make:	Thermo 42i	Analyzer serial #:	1505164379

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.1	----	Correlation Coefficient	0.999949	*≥0.995*
359.6	359.7	0.9996			
197.8	196.2	1.0079	Slope	1.001029	*0.90 - 1.10*
112.6	110.6	1.0177			
			Intercept	-0.990724	*+/-20*



NO_x Calibration Plot Date: November 8, 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:	November 30, 2023	Last Cal Date:	November 8, 2023
Start time (MST):	8:00	End time (MST):	10:49
Reason:	As Found	Pump and Charcoal Change	

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:	1.539	1.539	NO bkgnd or offset:	4.3	
NOX coeff or slope:	0.994	0.994	NOX bkgnd or offset:	4.3	
NO2 coeff or slope:	0.995	0.995	Reaction cell Press:	194.7	

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.996982	
NO_X Cal Offset:	2.850185	
NO Cal Slope:	0.997804	
NO Cal Offset:	1.471555	
NO_2 Cal Slope:	1.001029	
NO_2 Cal Offset:	-0.990724	

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as found span	4917	83.3	819.5	800.3	19.2	830.7	808.7	22.0	0.9865	0.9896
as found 2nd	4956	41.7	410.4	400.8	9.6	417.0	404.9	12.1	0.9843	0.9900
as found 3rd	4979	20.8	204.6	199.9	4.8	212.7	205.2	7.5	0.9621	0.9739
new cyl resp										
calibrator zero										
high point										
second point										
third point										
as left zero										
as left span										
								Average Correction Factor		

Corrected As found	NO_X = 830.8 ppb	NO = 808.8 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	1.3%
Previous Response	NO_X = 819.8 ppb	NO = 800.0 ppb			*Percent Change	NO =	1.1%
Baseline Corr 2nd pt	NO_X = 417.1 ppb	NO = 405.0 ppb	As found	NO_X r^2: 0.999953	Nx Sl: 1.011748	Nx Int:	2.230
Baseline Corr 3rd pt	NO_X = 212.8 ppb	NO = 205.3 ppb	As found	NO r^2: 0.999978	NO Sl: 1.009183	NO Int:	1.211
			As found	NO_2 r^2: 0.999944	NO2 Sl: 1.004982	NO_2 Int:	-1.156

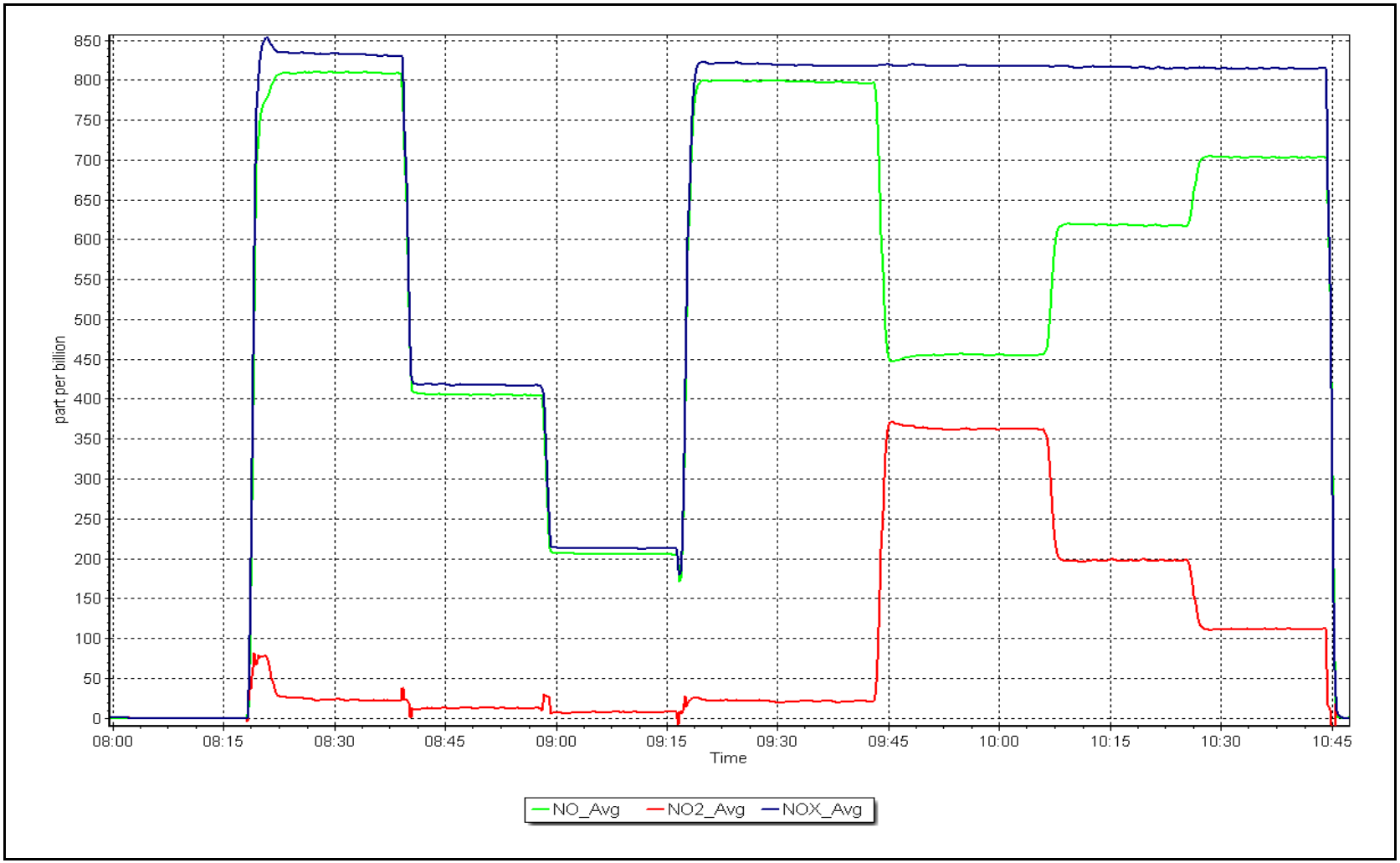
GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero	----	----	0.0	0.0	----	----
as found GPT point (400 ppb NO2)	796.8	454.7	361.3	362.7	0.9960	100.4%
as found GPT point (200 ppb NO2)	796.8	617.5	198.5	197.5	1.0048	99.5%
as found GPT point (100 ppb NO2)	796.8	702.9	113.1	111.3	1.0158	98.4%
1st GPT point (400 ppb O3)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
				Average Correction Factor		

Notes: As founds to change the Pump and Charcoal.

Calibration Performed By: Melissa Lemay

NO_x Calibration Plot Date: November 30, 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:	December 1, 2023	Last Cal Date:	November 30, 2023
Start time (MST):	8:02	End time (MST):	12:14
Reason:	Routine	Pump and Charcoal Change, PMT adjusted	

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:	1.005	0.981	NO bkgnd or offset:	4.4	4.0
NOX coeff or slope:	0.994	0.997	NOX bkgnd or offset:	4.5	4.1
NO2 coeff or slope:	1.006	0.995	Reaction cell Press:	190.6	190.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.996982	1.007887
NO_X Cal Offset:	2.850185	2.589374
NO Cal Slope:	0.997804	0.995492
NO Cal Offset:	1.471555	1.631214
NO_2 Cal Slope:	1.001029	1.005354
NO_2 Cal Offset:	-0.990724	0.716865

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero										
as found span										
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
high point	4917	83.3	819.5	800.3	19.2	827.6	797.9	29.7	0.9902	1.0030
second point	4956	41.7	410.4	400.8	9.6	416.4	400.4	16.0	0.9857	1.0011
third point	4979	20.8	204.6	199.9	4.8	212.2	202.8	9.4	0.9644	0.9855
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.2	0.0	----	----
as left span	4917	83.3	819.5	456.5	363.0	819.7	456.2	363.4	0.9997	1.0007
								Average Correction Factor	0.9801	0.9965

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

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	795.1	451.3	363.0	365.6	0.9928	100.7%
2nd GPT point (200 ppb O3)	795.1	611.0	203.3	204.0	0.9964	100.4%
3rd GPT point (100 ppb O3)	795.1	697.0	117.3	120.5	0.9731	102.8%
				Average Correction Factor	0.9874	101.3%

Notes: Calibration from Pump and Charcoal changed, and PMT adjusted November 30,2023. Zero and 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

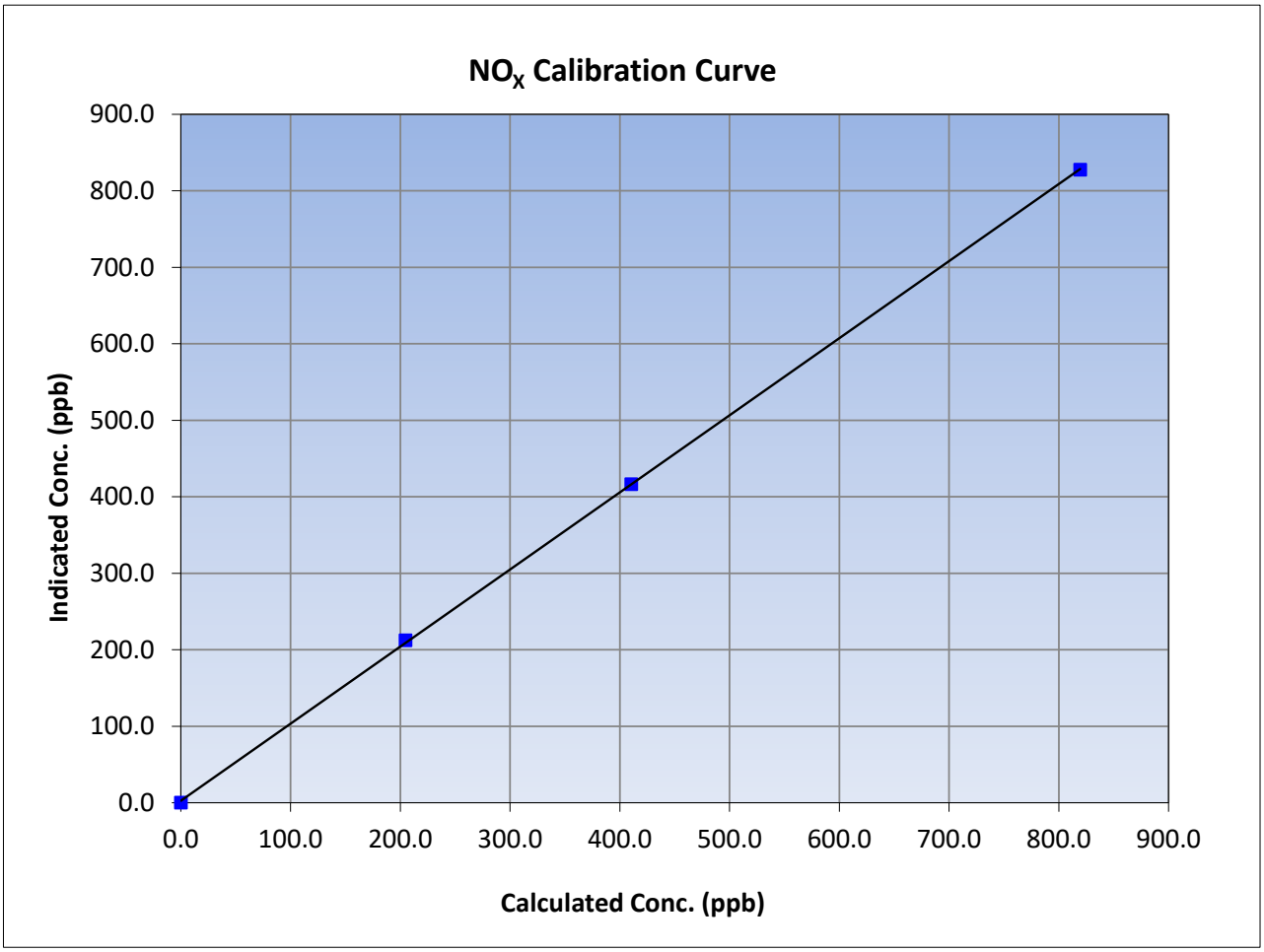
Version-04-2020

Station Information

Calibration Date:	December 1, 2023	Previous Calibration:	November 30, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	8:02	End Time (MST):	12:14
Analyzer make:	Thermo 42i	Analyzer serial #:	1505164379

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999950	≥0.995
819.5	827.6	0.9902			
410.4	416.4	0.9857	Slope	1.007887	0.90 - 1.10
204.6	212.2	0.9644			
			Intercept	2.589374	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

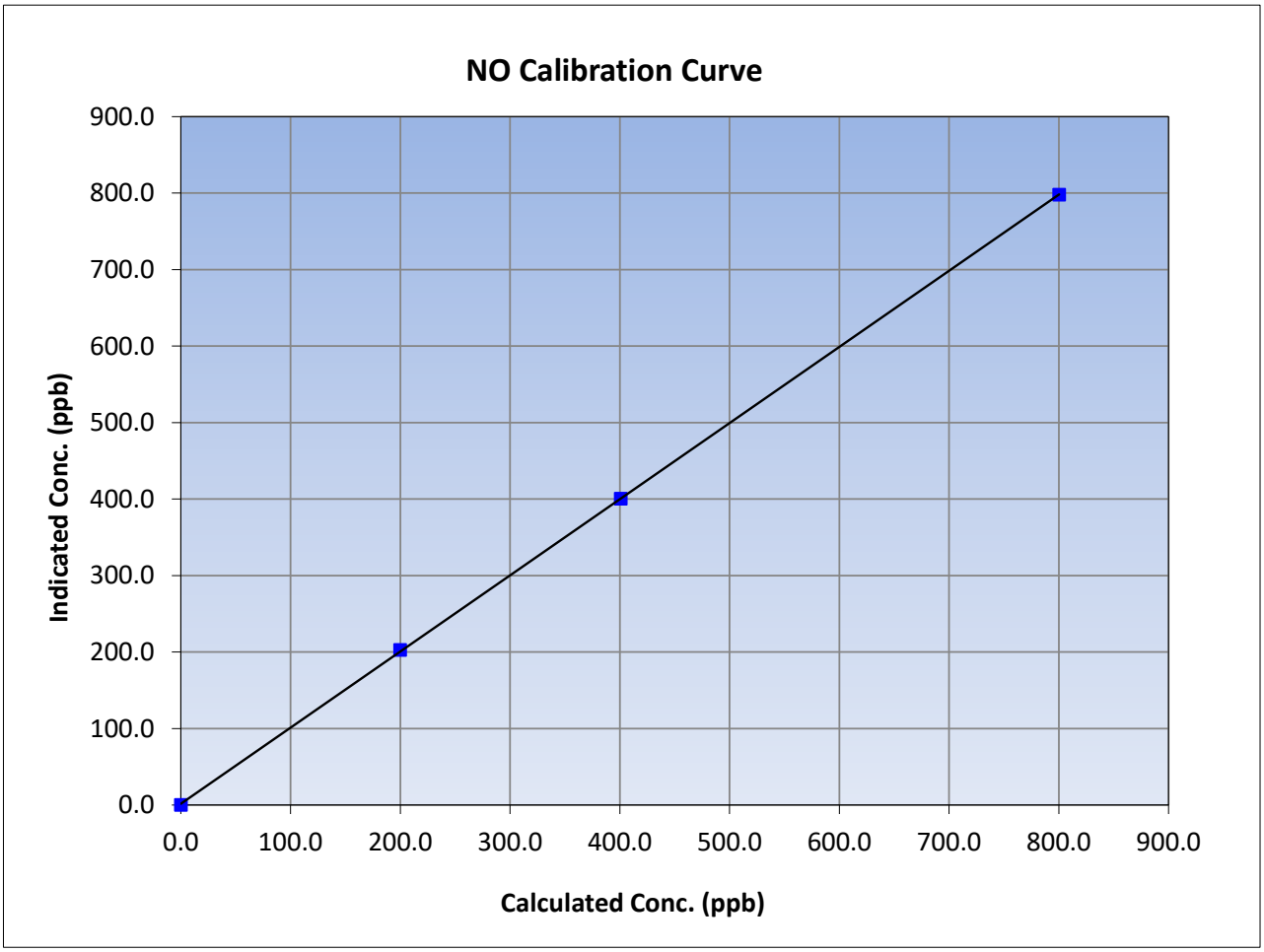
Version-04-2020

Station Information

Calibration Date:	December 1, 2023	Previous Calibration:	November 30, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	8:02	End Time (MST):	12:14
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	0.999978	≥0.995
800.3	797.9	1.0030			
400.8	400.4	1.0011	Slope	0.995492	0.90 - 1.10
199.9	202.8	0.9855			
			Intercept	1.631214	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

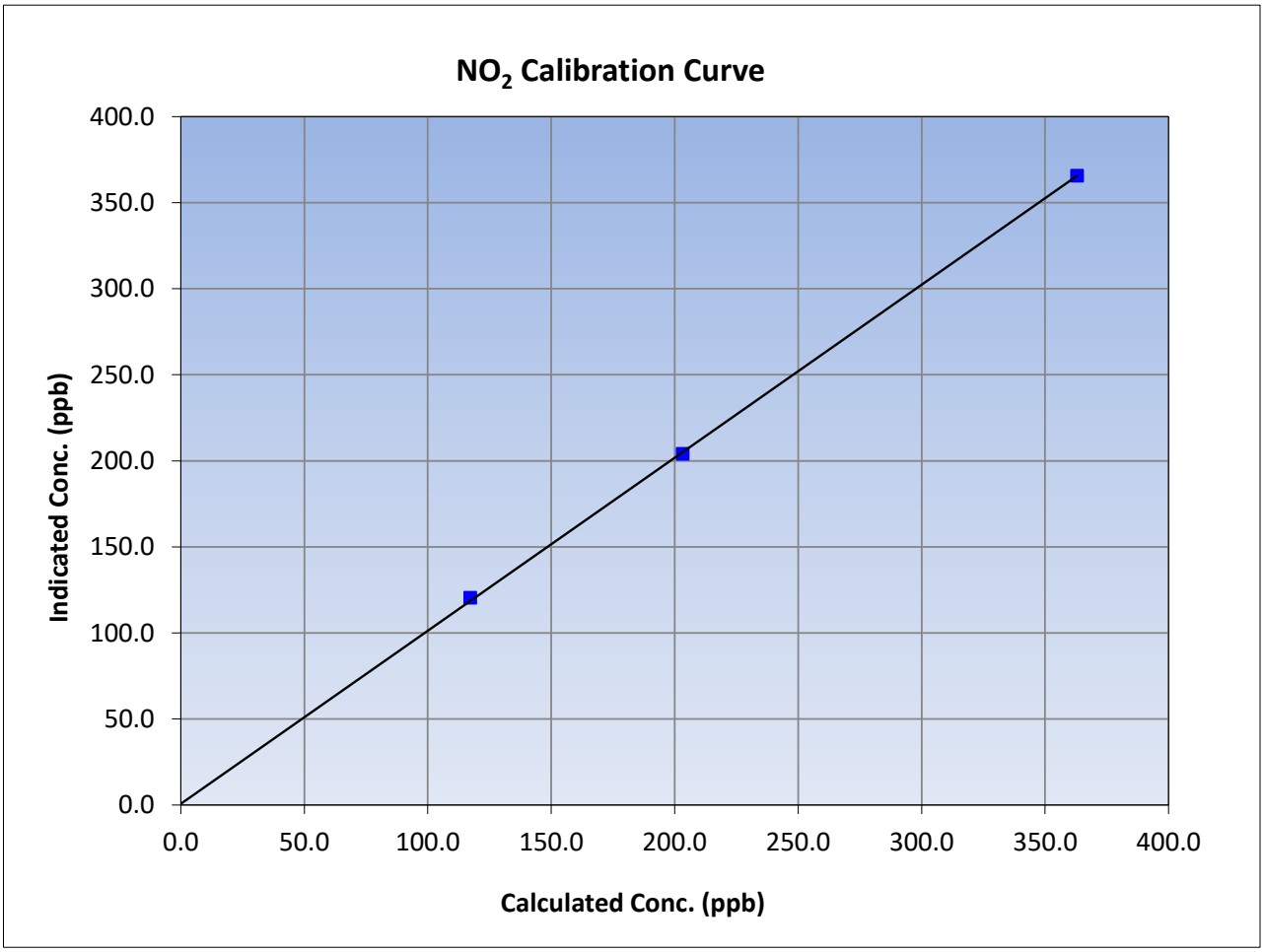
Version-04-2020

Station Information

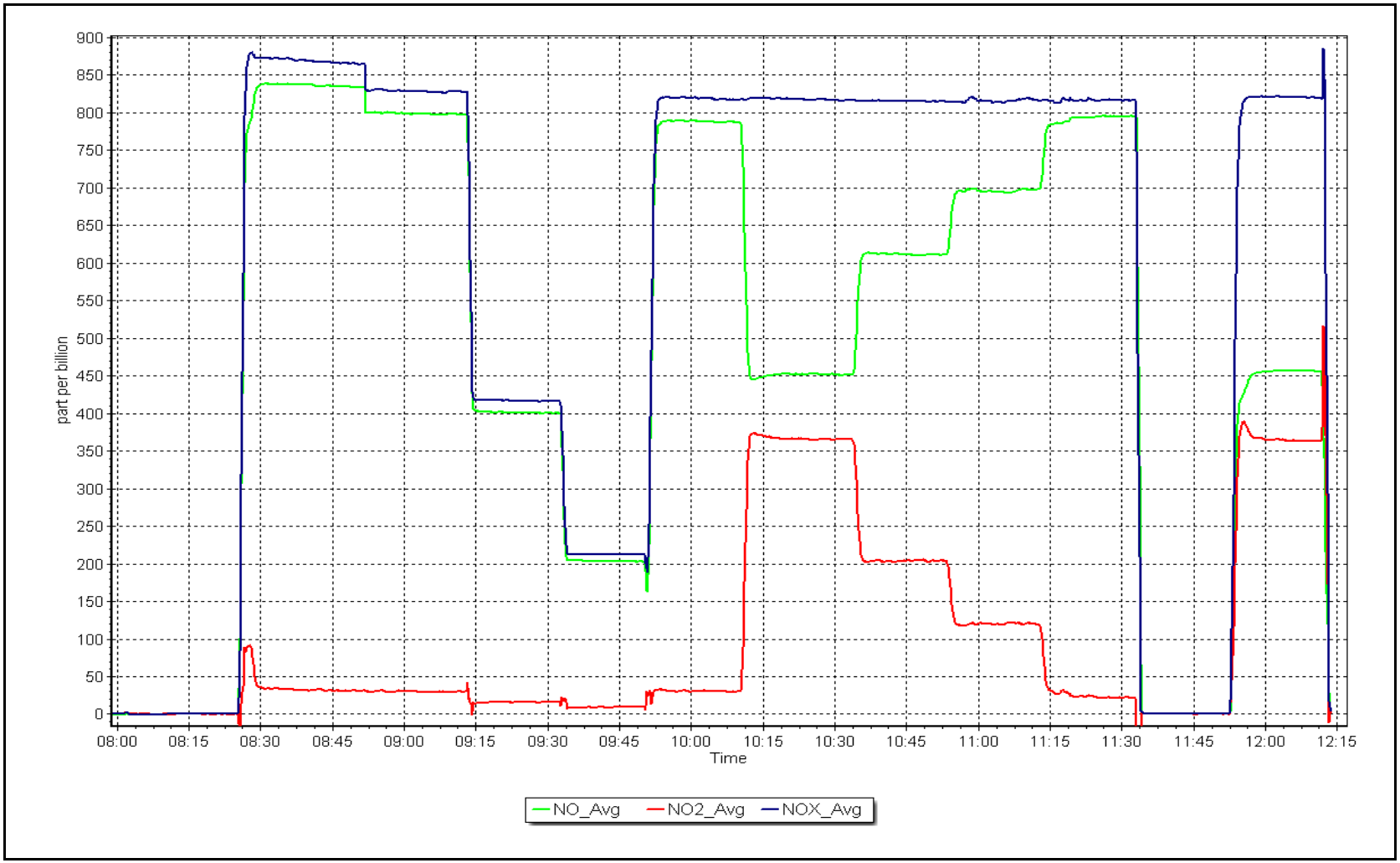
Calibration Date:	December 1, 2023	Previous Calibration:	November 30, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	8:02	End Time (MST):	12:14
Analyzer make:	Thermo 42i	Analyzer serial #:	1505164379

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.1	----	Correlation Coefficient	0.999924	*≥0.995*
363.0	365.6	0.9928			
203.3	204.0	0.9964	Slope	1.005354	*0.90 - 1.10*
117.3	120.5	0.9731			
			Intercept	0.716865	*+/-20*



NO_X Calibration Plot Date: December 1, 2023 Location: MacKay River



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS21
CONKLIN
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	November 30, 2023	Last Cal Date:	October 20, 2023
Start time (MST):	12:41	End time (MST):	15:52
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 #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3810
ZAG Make/Model:	Teledyne API 701		Serial Number:	691

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1428701363

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997591	0.998475	Backgd or Offset:	27.4	27.7
Calibration intercept:	0.795745	1.835846	Coeff or Slope:	0.892	0.904

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	0.5	----
as found span	4920	80.2	800.8	788.8	1.015
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5005	0.0	0.0	0.5	----
high point	4920	80.2	800.8	800.8	1.000
second point	4960	40.1	400.4	402.3	0.995
third point	4980	20.0	200.1	203.0	0.986
as left zero	5005	0.0	0.0	0.6	----
as left span	4920	80.2	800.8	802.9	0.997
				Average Correction Factor	0.994

Baseline Corr As found:	788.30	Previous response	799.71	*% change	-1.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed 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

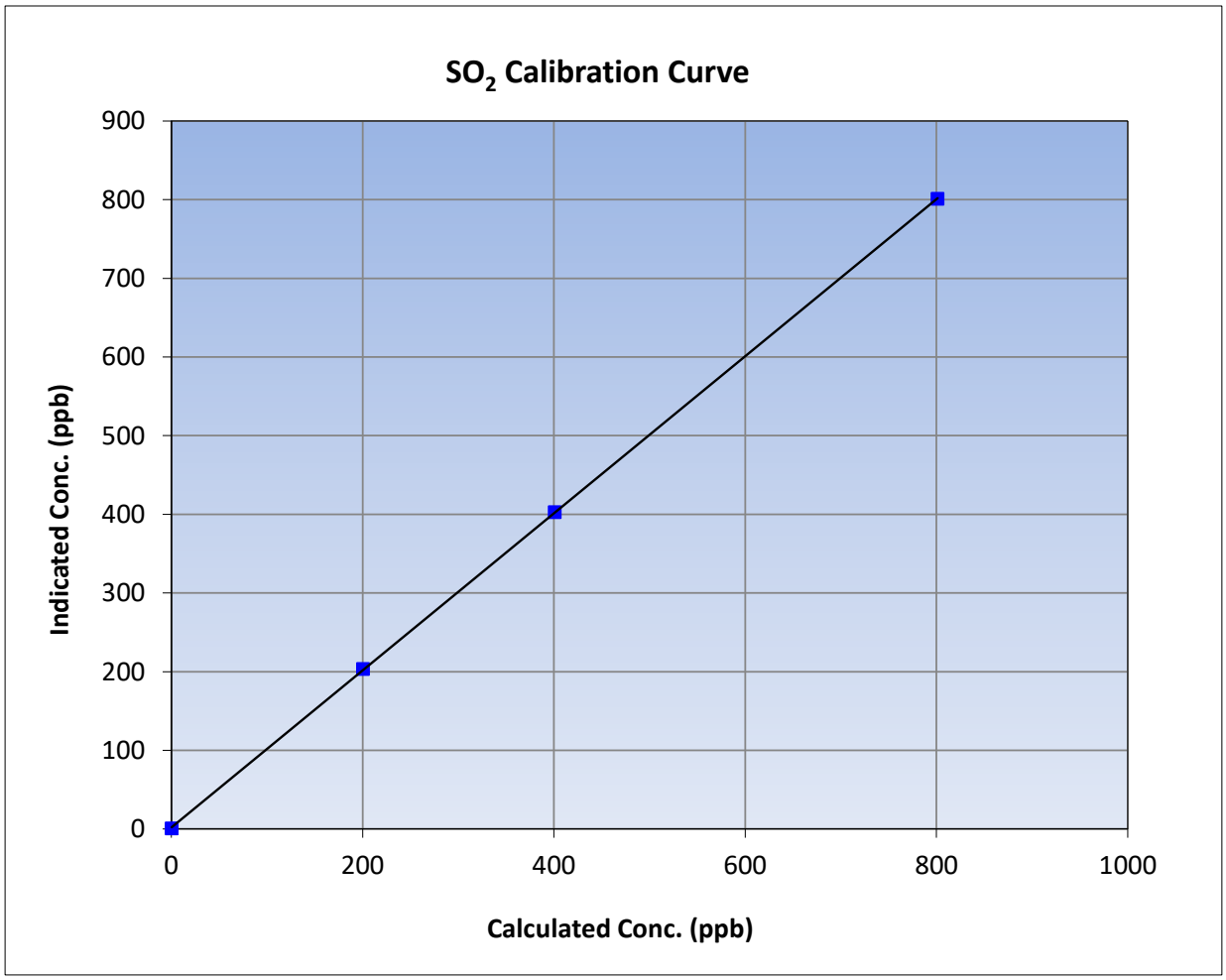
Station Information

Calibration Date:	November 30, 2023	Previous Calibration:	October 20, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	12:41	End Time (MST):	15:52
Analyzer make:	Thermo 43i	Analyzer serial #:	1428701363

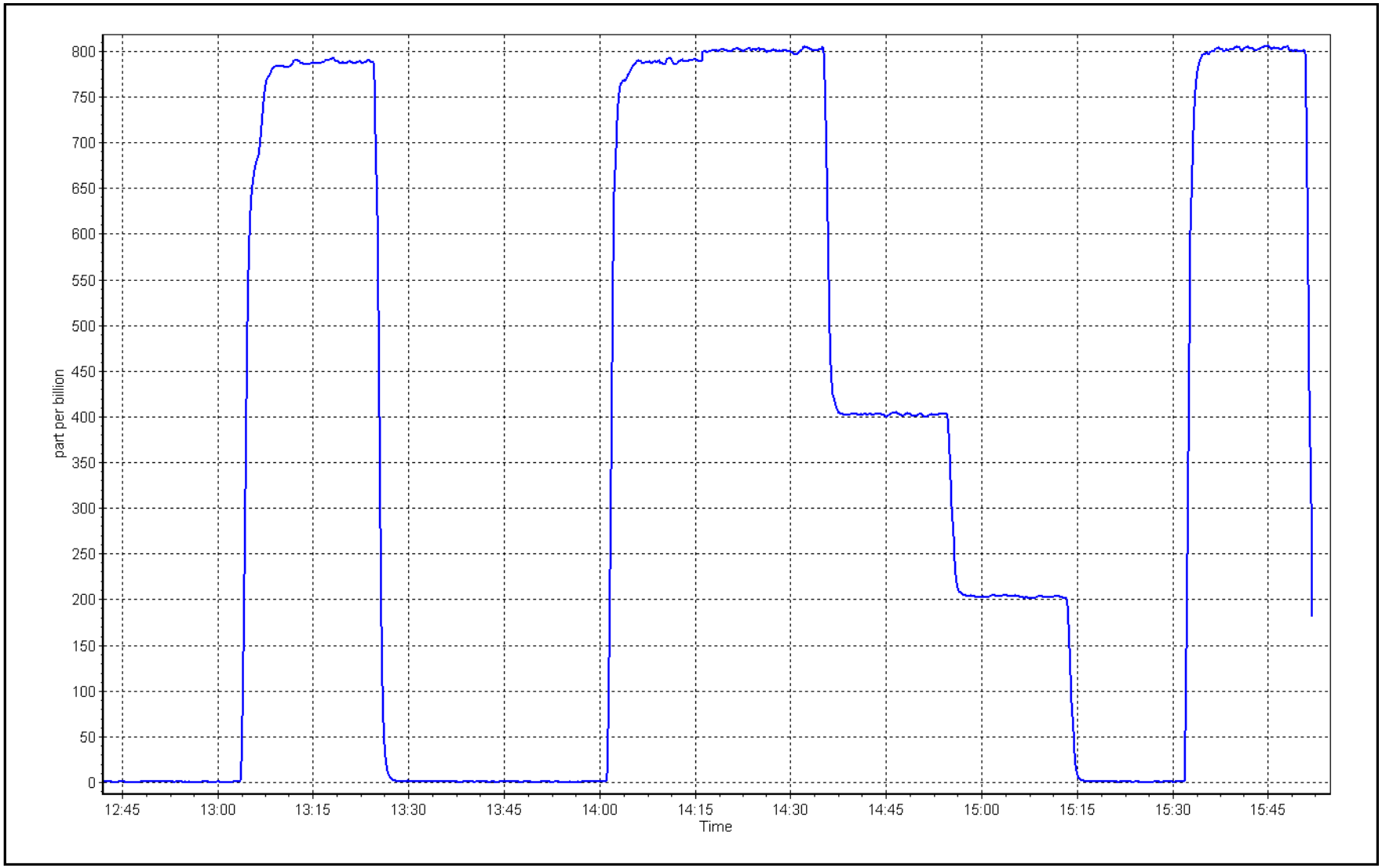
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
800.8	800.8	1.0001
400.4	402.3	0.9954
200.1	203.0	0.9858

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999987	*≥0.995*
Slope	0.998475	*0.90 - 1.10*
Intercept	1.835846	*+/-30*



SO2 Calibration Plot Date: November 30, 2023 Location: Conklin



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	November 28, 2023	Last Cal Date:	October 17, 2023
Start time (MST):	11:50	End time (MST):	17:15
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:	Teledyne API T700		Serial Number:	3810
ZAG Make/Model:	Teledyne 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:	0.994857	0.997143	Backgd or Offset:	2.3	2.38
Calibration intercept:	0.180000	0.200000	Coeff or Slope:	0.947	0.963

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	79.0	1.013
as found 2nd point	4960	40.0	40.0	39.6	1.010
as found 3rd point	4980	20.0	20.0	20.0	1.000
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	79.9	1.001
second point	4960	40.0	40.0	40.2	0.995
third point	4980	20.0	20.0	20.2	0.990
as left zero	5000	0.0	0.0	0.2	----
as left span	4920	80.0	80.0	79.0	1.013
SO2 Scrubber Check	4920	80.2	802.0	0.1	----
Date of last scrubber change:				Ave Corr Factor	0.995
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.0	Prev response:	79.77	*% change:	-1.0%
Baseline Corr 2nd AF pt:	39.6	AF Slope:	0.986571	AF Intercept:	0.120000
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999989		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

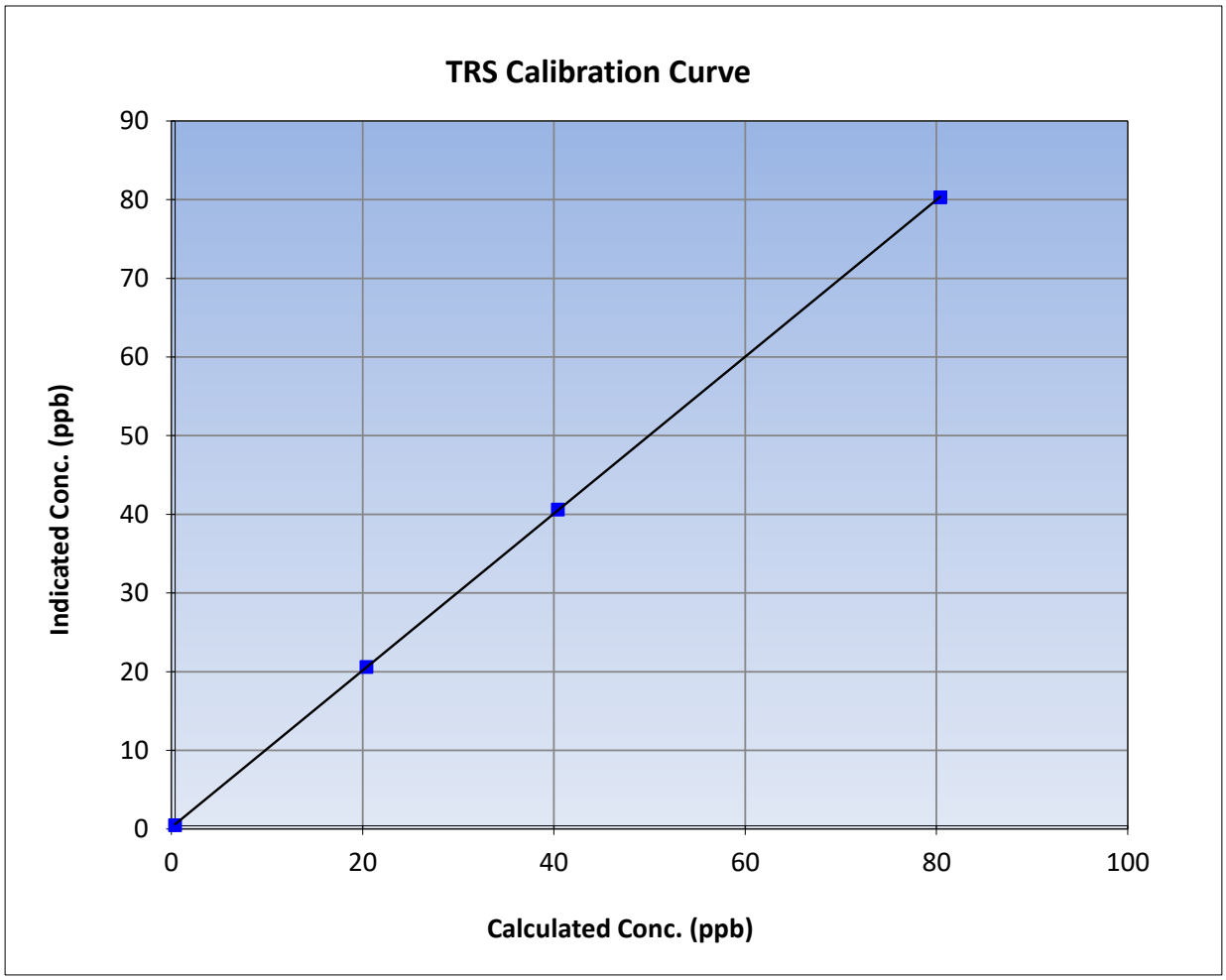
Station Information

Calibration Date:	November 28, 2023	Previous Calibration:	October 17, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:50	End Time (MST):	17:15
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1236656116

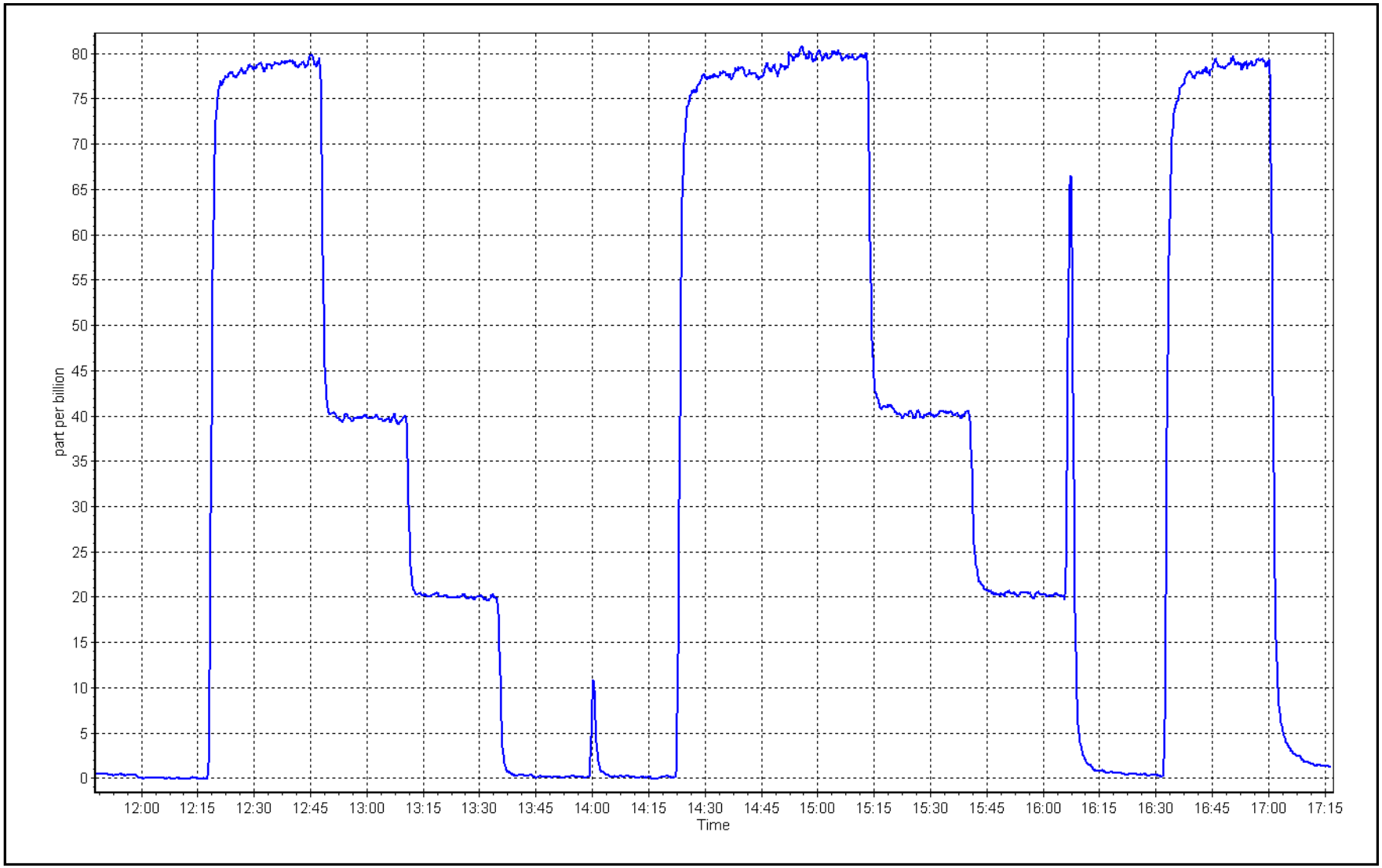
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	79.9	1.0013
40.0	40.2	0.9950
20.0	20.2	0.9901

Statistical Evaluation		Limits
Correlation Coefficient	0.999991	≥0.995
Slope	0.997143	0.90 - 1.10
Intercept	0.200000	+/-3



TRS Calibration Plot Date: November 28, 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:	November 30, 2023	Last Cal Date:	October 25, 2023
Start time (MST):	12:41	End time (MST):	15:52
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 #:	1426262594	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	4.01E-04	3.82E-04	NMHC SP Ratio:	9.22E-05	9.44E-05
CH4 Retention time:	14.6	14.2	NMHC Peak Area:	99089	96823
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	17.13	17.07	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	17.13	17.11	1.001
second point	4960	40.1	8.56	8.57	0.999
third point	4980	20.0	4.28	4.34	0.985
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	17.13	17.15	0.998
				Average Correction Factor	0.995

Baseline Corr AF:	17.07	Prev response	17.03	*% change	0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	9.14	9.13	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	80.2	9.14	9.14	1.000
second point	4960	40.1	4.57	4.57	1.001
third point	4980	20.0	2.28	2.30	0.995
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	9.14	9.16	0.998
				Average Correction Factor	0.998
Baseline Corr AF:	9.13	Prev response	9.08	*% change	0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	7.99	7.94	1.006
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	7.99	7.96	1.003
second point	4960	40.1	3.99	4.00	0.998
third point	4980	20.0	2.00	2.05	0.974
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	7.99	8.00	0.999
				Average Correction Factor	0.992
Baseline Corr AF:	7.94	Prev response	7.95	*% 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:	0.993314	0.997585
THC Cal Offset:	0.021764	0.030767
CH4 Cal Slope:	0.995000	0.995028
CH4 Cal Offset:	0.007556	0.026958
NMHC Cal Slope:	0.991515	0.999806
NMHC Cal Offset:	0.015007	0.003609

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

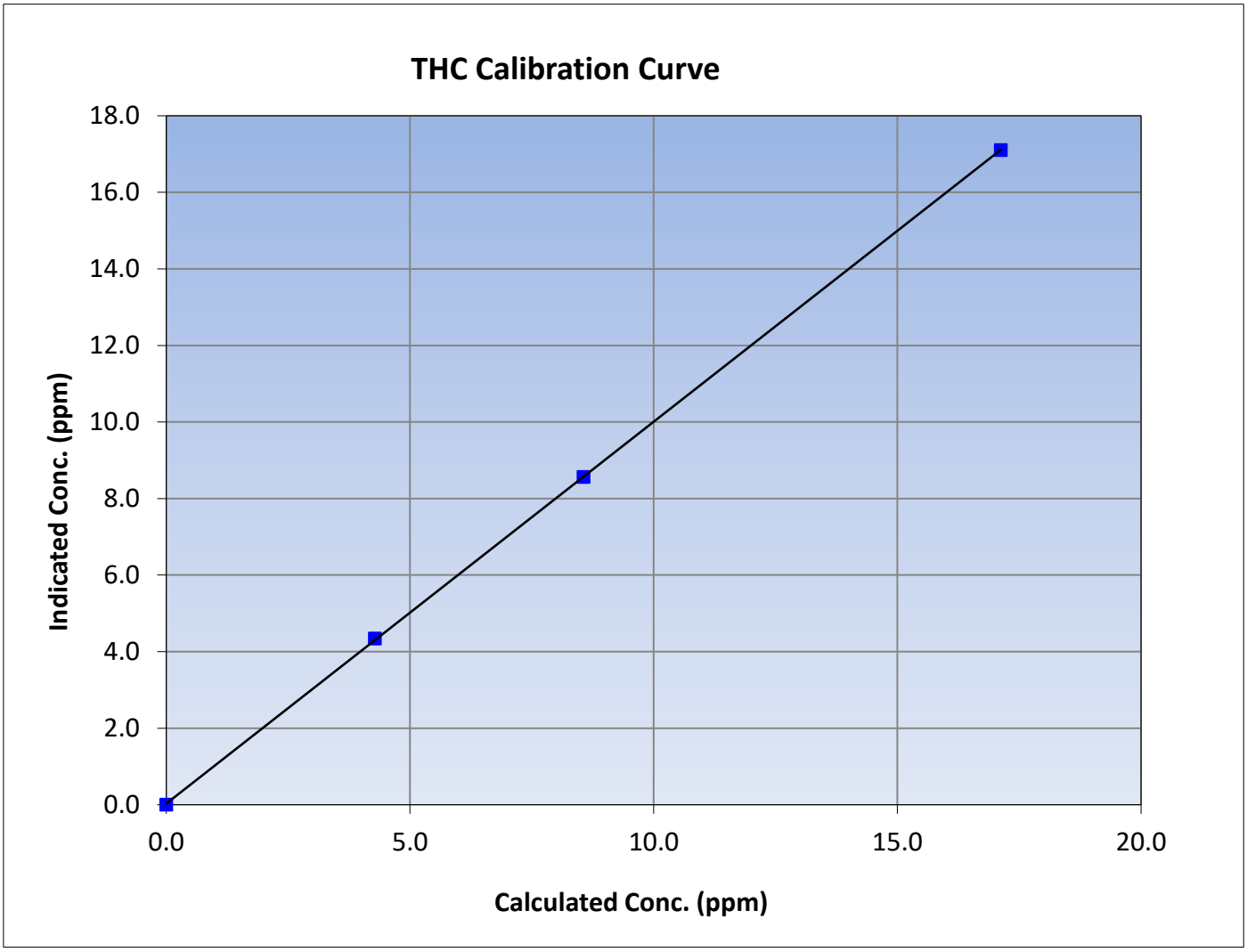
Version-06-2022

Station Information

Calibration Date:	November 30, 2023	Previous Calibration:	October 25, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	12:41	End Time (MST):	15:52
Analyzer make:	Thermo 55i	Analyzer serial #:	1426262594

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999981	*≥0.995*
17.13	17.11	1.0011			
8.56	8.57	0.9994	Slope	0.997585	*0.90 - 1.10*
4.28	4.34	0.9851			
			Intercept	0.030767	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

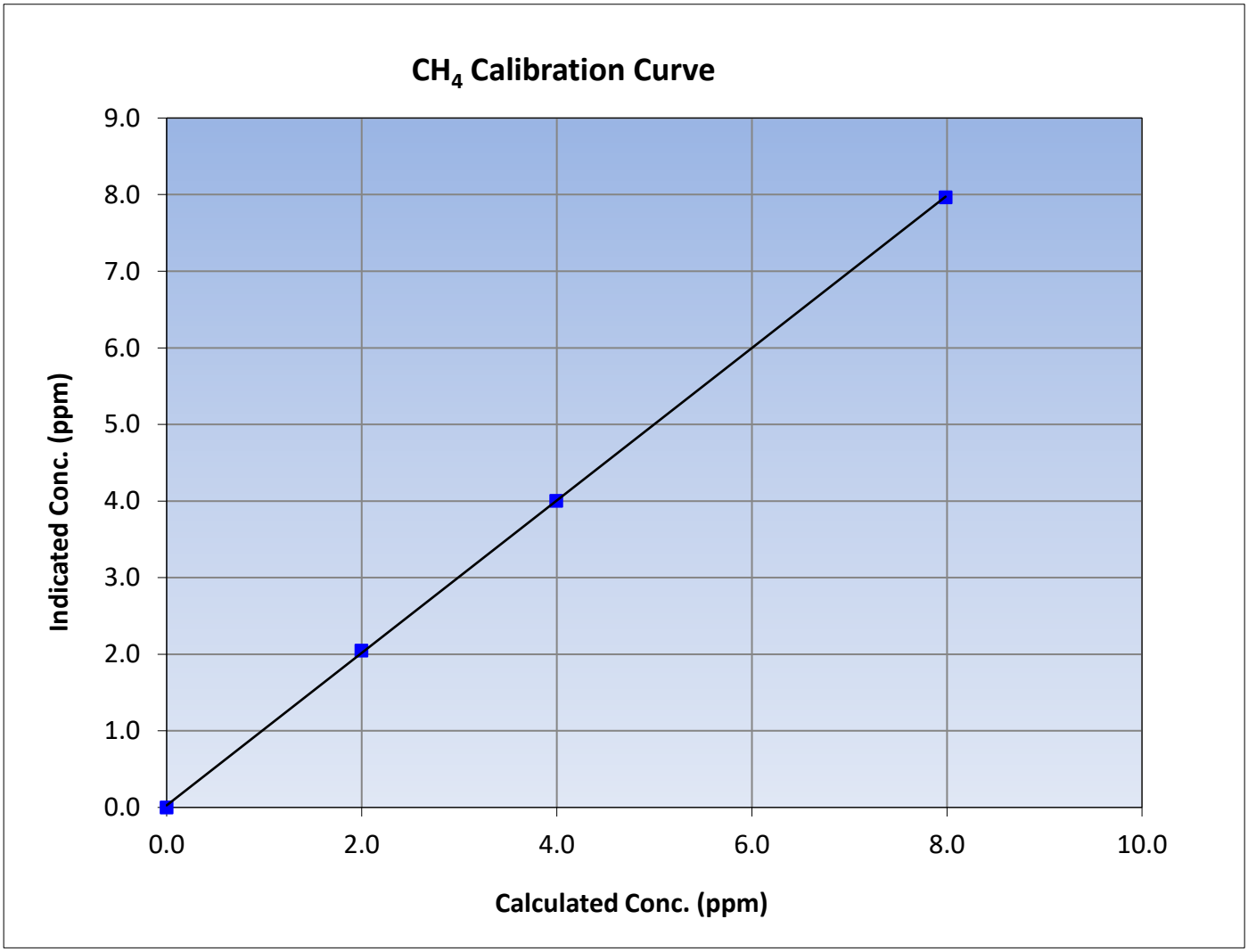
Version-06-2022

Station Information

Calibration Date:	November 30, 2023	Previous Calibration:	October 25, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	12:41	End Time (MST):	15:52
Analyzer make:	Thermo 55i	Analyzer serial #:	1426262594

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999940	*≥0.995*
7.99	7.96	1.0028			
3.99	4.00	0.9980	Slope	0.995028	*0.90 - 1.10*
2.00	2.05	0.9744			
			Intercept	0.026958	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

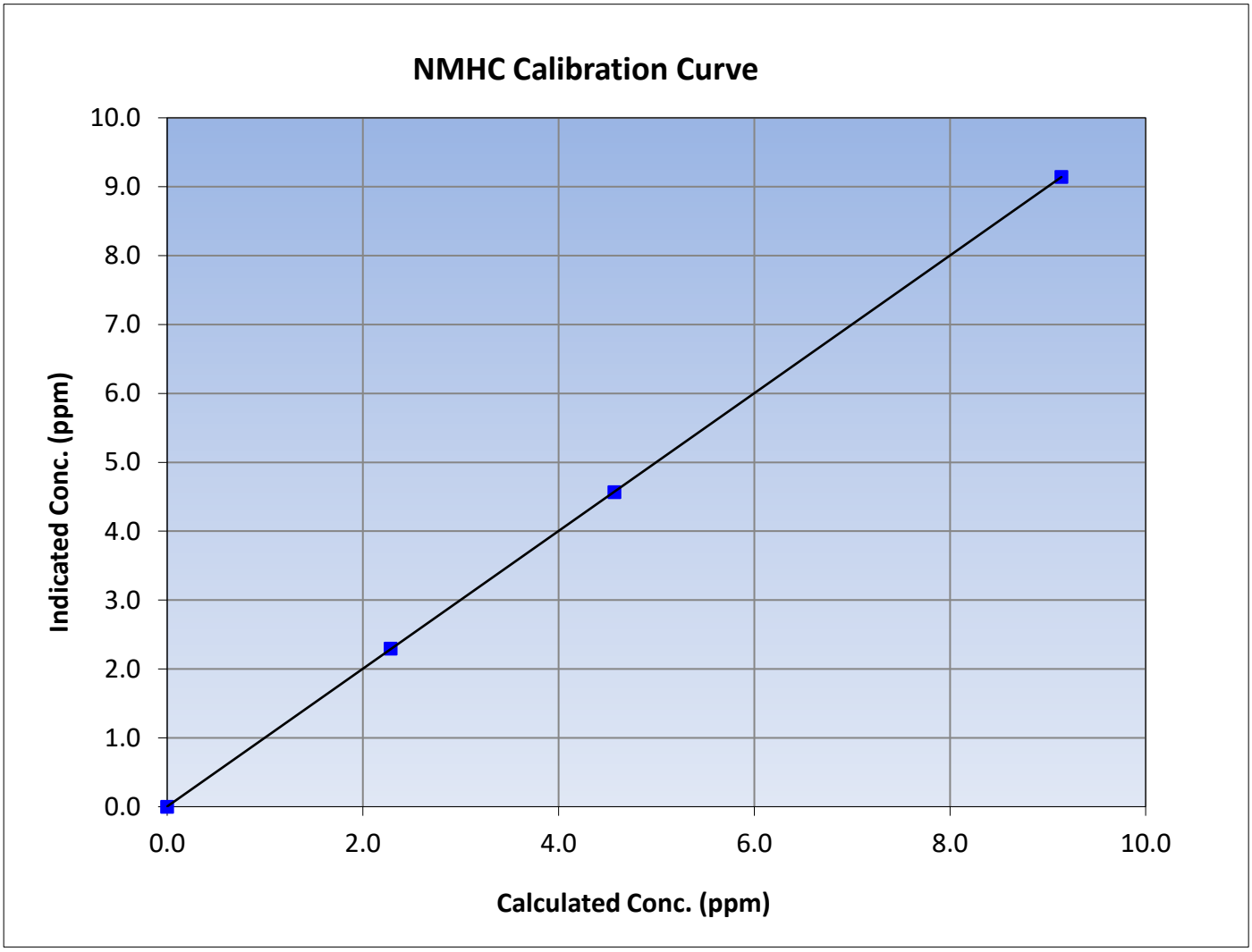
Version-06-2022

Station Information

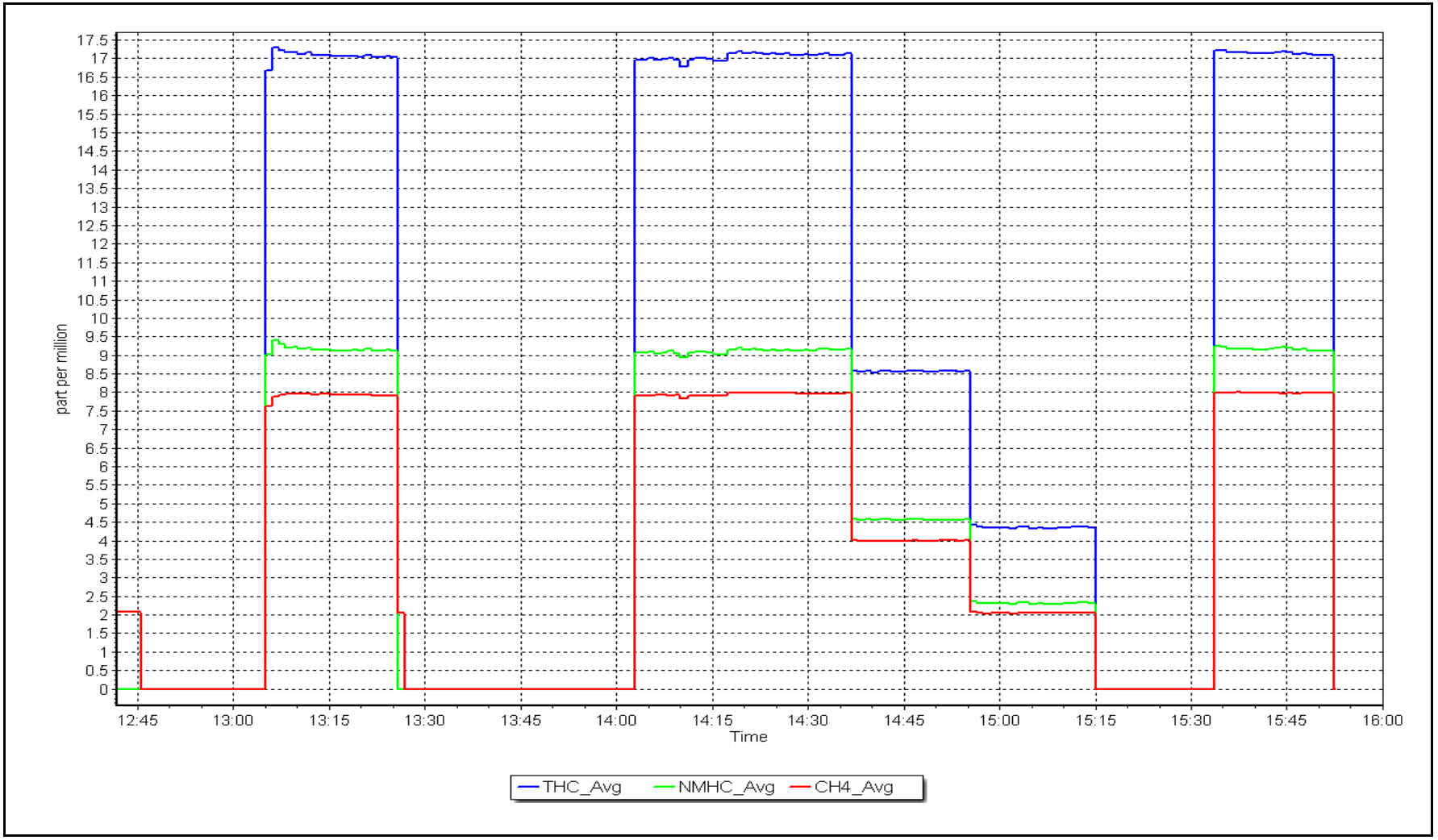
Calibration Date:	November 30, 2023	Previous Calibration:	October 25, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	12:41	End Time (MST):	15:52
Analyzer make:	Thermo 55i	Analyzer serial #:	1426262594

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999997	*≥0.995*
9.14	9.14	0.9997			
4.57	4.57	1.0008	Slope	0.999806	*0.90 - 1.10*
2.28	2.30	0.9947			
			Intercept	0.003609	*+/-0.5*



NMHC Calibration Plot Date: November 30, 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:	November 29, 2023	Last Cal Date:	October 27, 2023
Start time (MST):	12:21	End time (MST):	16:37
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 #:			Removed Gas Exp Date:		
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:	1.094	1.094	NO bkgnd or offset:	10.9	10.9
NOX coeff or slope:	1.000	1.000	NOX bkgnd or offset:	11.0	11.1
NO2 coeff or slope:	0.999	0.999	Reaction cell Press:	153.0	167.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999869	1.003588
NO_X Cal Offset:	2.584550	2.465024
NO Cal Slope:	1.002036	1.004807
NO Cal Offset:	1.361881	1.242275
NO_2 Cal Slope:	1.004241	1.006340
NO_2 Cal Offset:	-0.358712	-0.474448

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	-0.5	-0.1	----	----
as found span	4921	79.4	811.2	800.1	11.1	817.4	801.8	15.6	0.9925	0.9979
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.3	0.0	----	----
high point	4921	79.4	811.2	800.1	11.1	815.1	804.4	10.8	0.9953	0.9947
second point	4960	39.7	405.7	400.1	5.6	411.4	404.2	7.2	0.9861	0.9899
third point	4980	19.8	202.3	199.6	2.8	208.0	203.2	4.8	0.9727	0.9820
as left zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.4	0.1	----	----
as left span	4921	79.4	811.2	385.1	426.1	810.5	381.9	428.6	1.0009	1.0085
								Average Correction Factor	0.9847	0.9889

Corrected As found	NO_X = 818.0 ppb	NO = 802.3 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.5%
Previous Response	NO_X = 813.7 ppb	NO = 803.1 ppb		*Percent Change	NO =	-0.1%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl: ;	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.3	382.3	426.1	428.8	0.9937	100.6%
2nd GPT point (200 ppb O3)	797.3	594.9	213.5	213.5	1.0001	100.0%
3rd GPT point (100 ppb O3)	797.3	698.4	110.0	110.2	0.9983	100.2%
				Average Correction Factor	0.9974	100.3%

Notes: Changed the inlet filter after as founds. No adjustments made. Used the 2nd GPT reference point because of drift.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

NO_X Calibration Summary

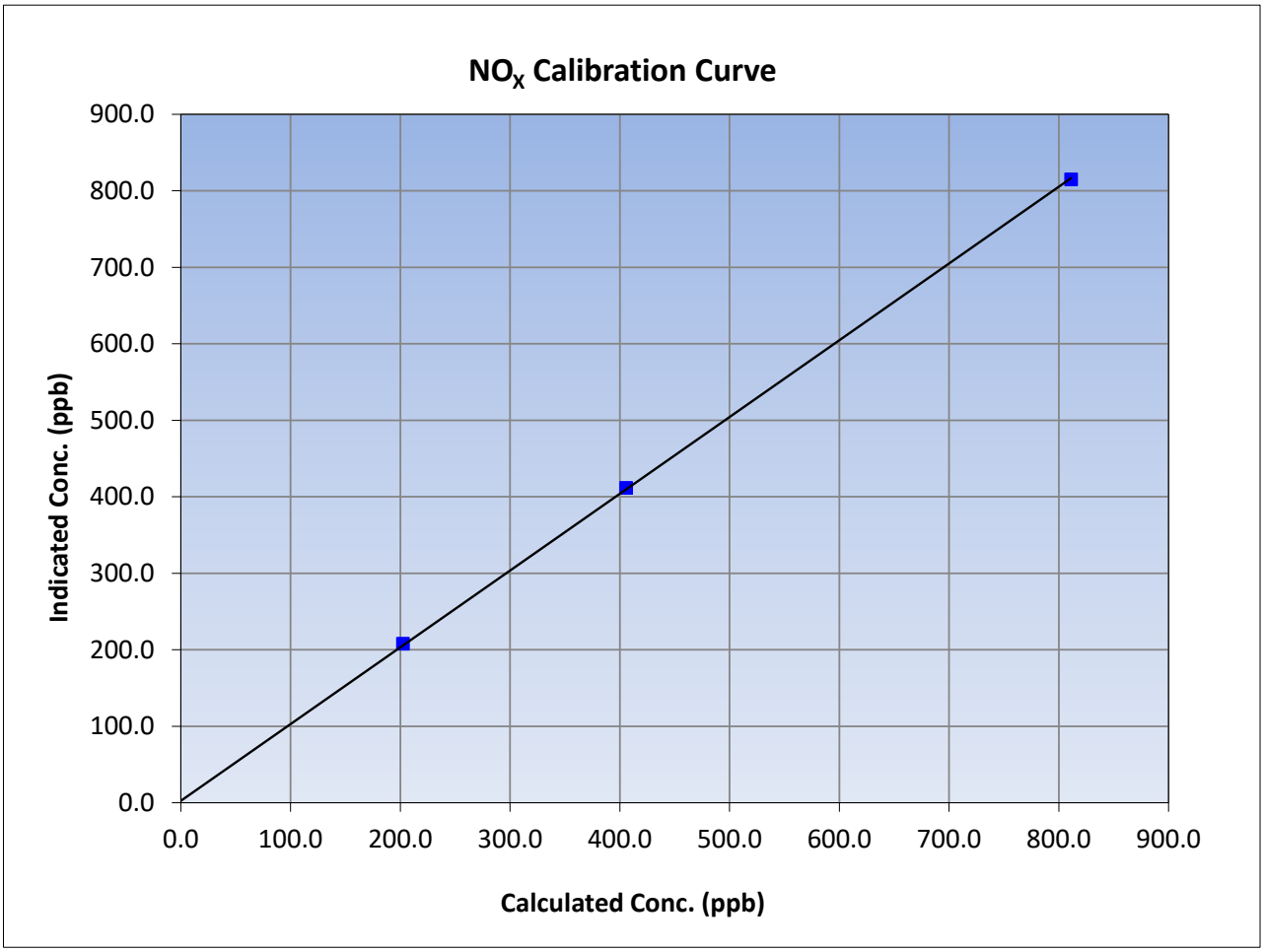
Version-04-2020

Station Information

Calibration Date:	November 29, 2023	Previous Calibration:	October 27, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	12:21	End Time (MST):	16:37
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	-0.3	----	Correlation Coefficient	0.999947	*≥0.995*
811.2	815.1	0.9953			
405.7	411.4	0.9861	Slope	1.003588	*0.90 - 1.10*
202.3	208.0	0.9727			
			Intercept	2.465024	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

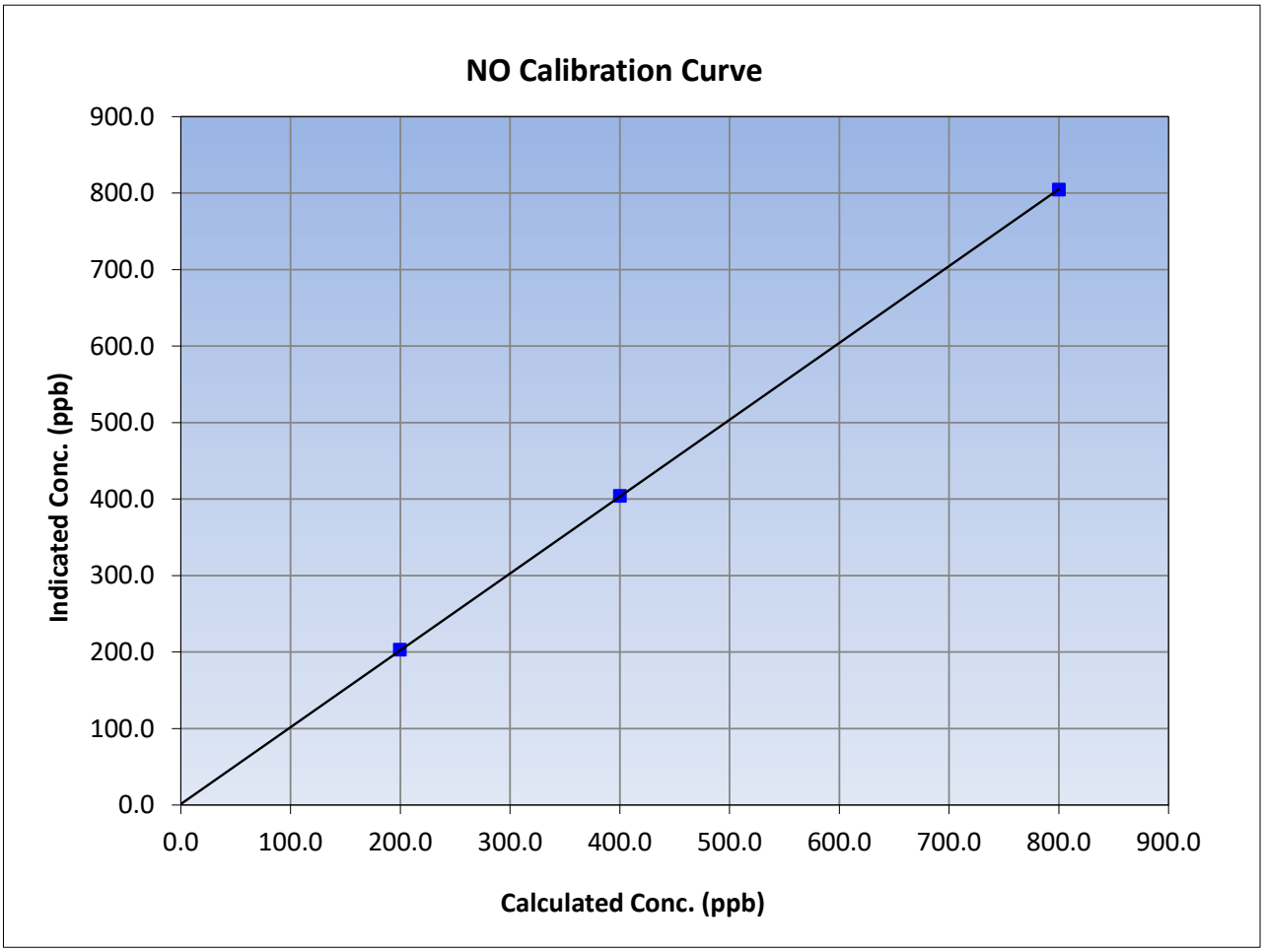
Version-04-2020

Station Information

Calibration Date:	November 29, 2023	Previous Calibration:	October 27, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	12:21	End Time (MST):	16:37
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	-0.3	----	Correlation Coefficient	0.999983	≥0.995
800.1	804.4	0.9947			
400.1	404.2	0.9899	Slope	1.004807	0.90 - 1.10
199.6	203.2	0.9820			
			Intercept	1.242275	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

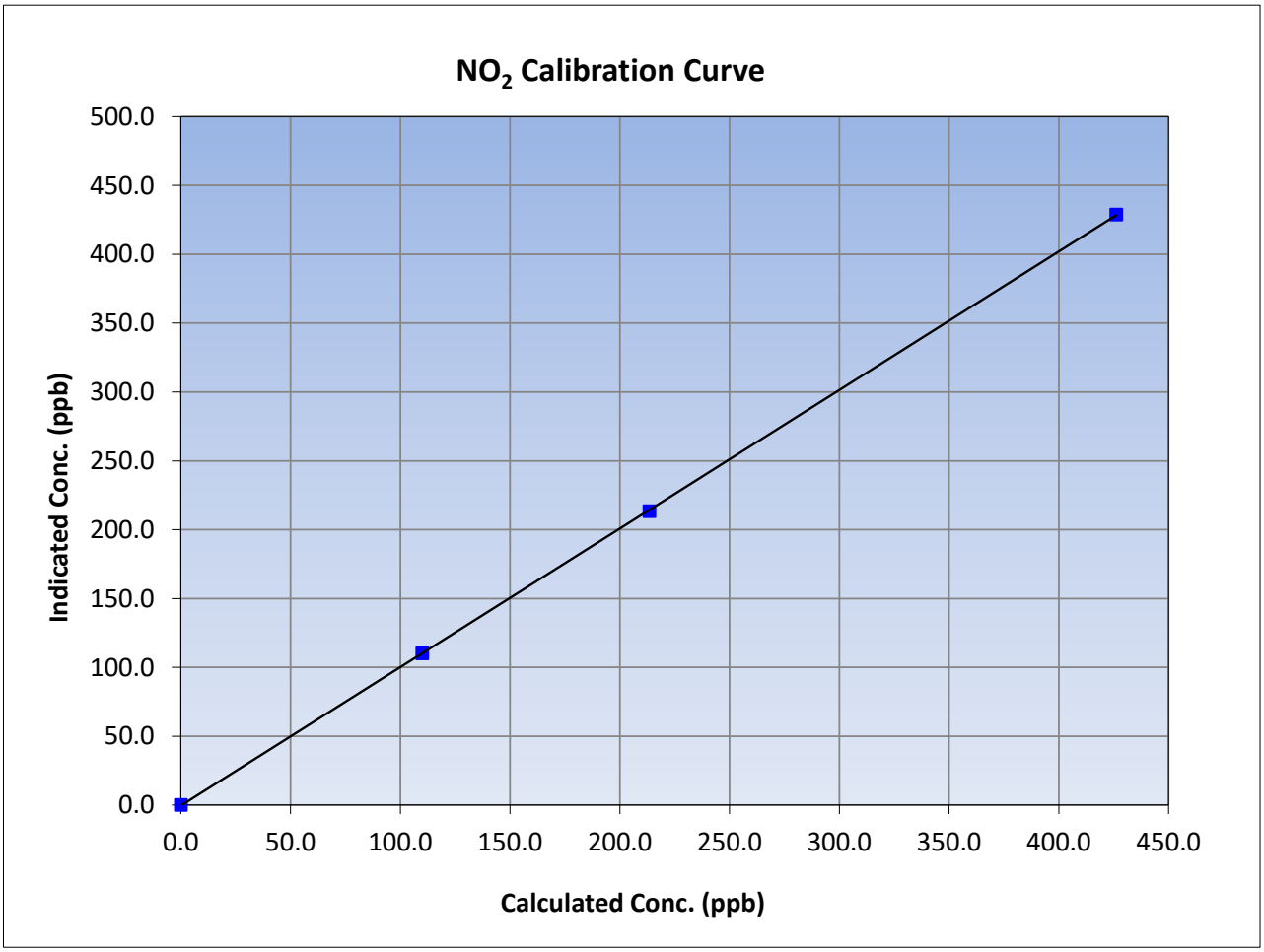
Version-04-2020

Station Information

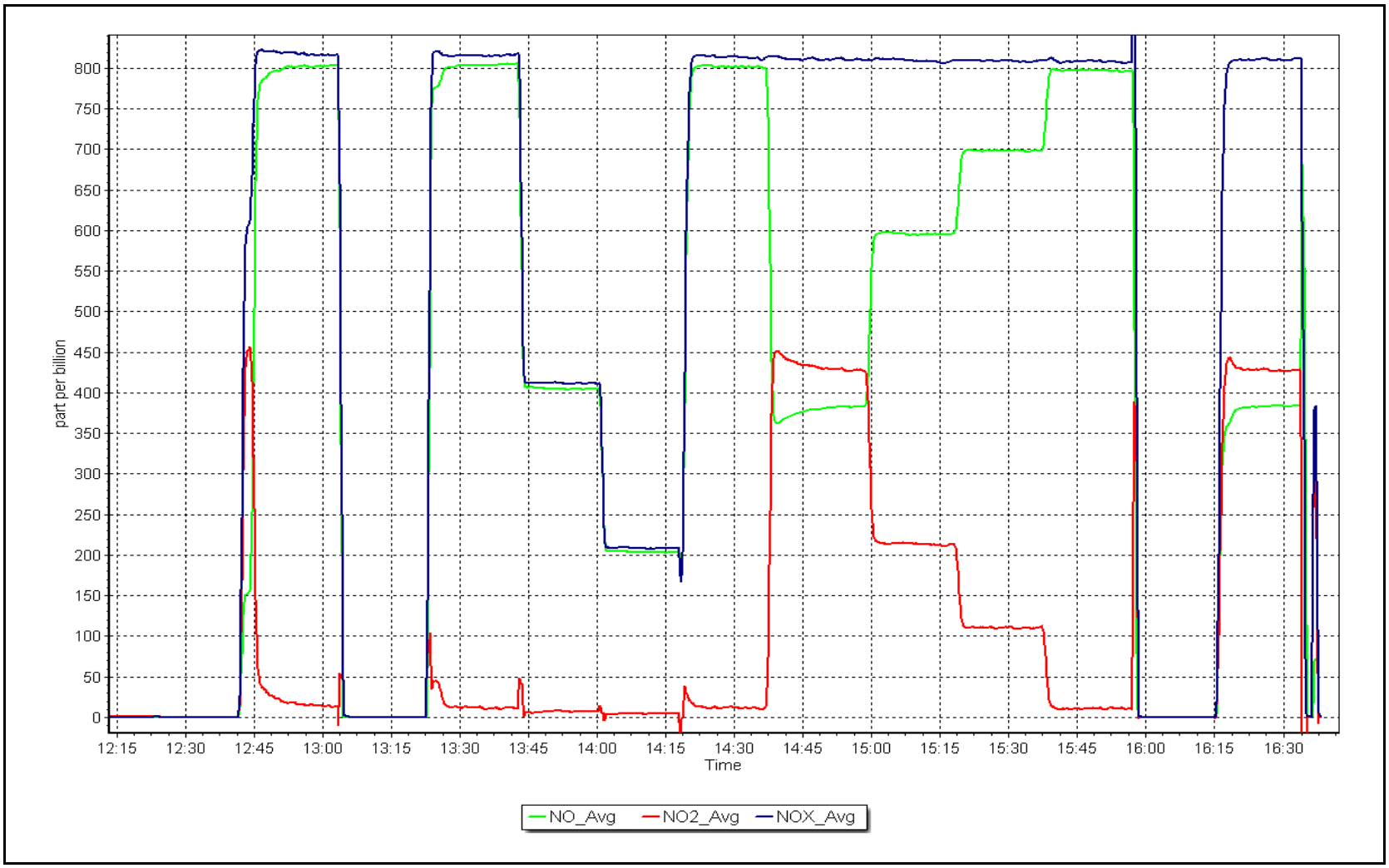
Calibration Date:	November 29, 2023	Previous Calibration:	October 27, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	12:21	End Time (MST):	16:37
Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999988	*≥0.995*
426.1	428.8	0.9937			
213.5	213.5	1.0001	Slope	1.006340	*0.90 - 1.10*
110.0	110.2	0.9983			
			Intercept	-0.474448	*+/-20*



NO_X Calibration Plot Date: November 29, 2023 Location: Conklin



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	November 22, 2023	Last Cal Date:	October 27, 2023
Start time (MST):	11:50	End time (MST):	15:52
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:	1.001314	1.000543	Backgd or Offset:	-0.3	-1.1
Calibration intercept:	1.520000	0.280000	Coeff or Slope:	1.005	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	-1.5	----
as found span	5000	1564.0	400.0	397.7	1.006
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	950.9	400.0	400.5	0.999
second point	5000	804.0	200.0	200.3	0.999
third point	5000	703.6	100.0	100.5	0.995
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	936.0	400.0	402.4	0.994
				Average Correction Factor	0.997

Baseline Corr As found:	399.2	Previous response	402.0	*% 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: Zero adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

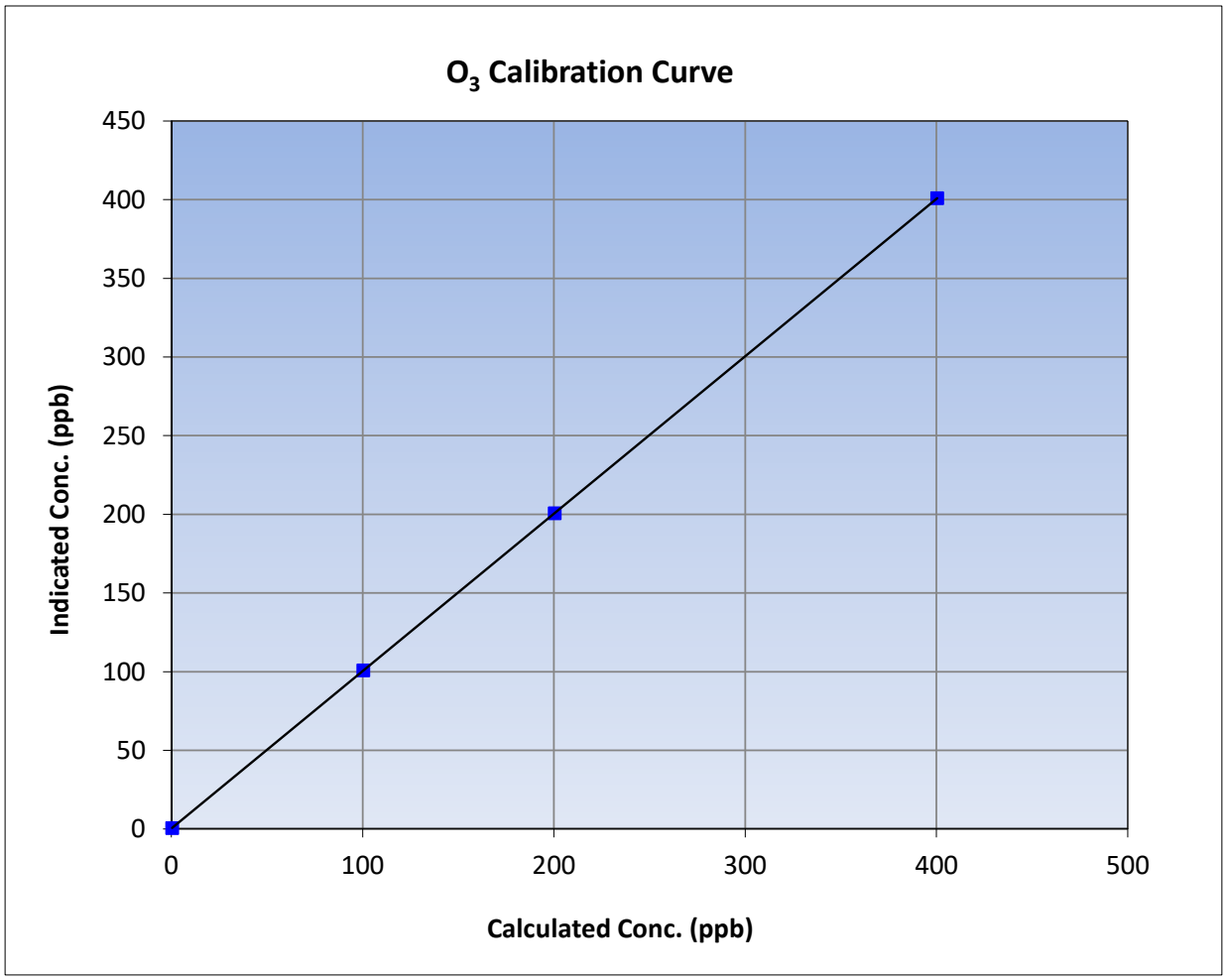
Station Information

Calibration Date:	November 22, 2023	Previous Calibration:	October 27, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:50	End Time (MST):	15:52
Analyzer make:	Thermo 49i	Analyzer serial #:	1501663734

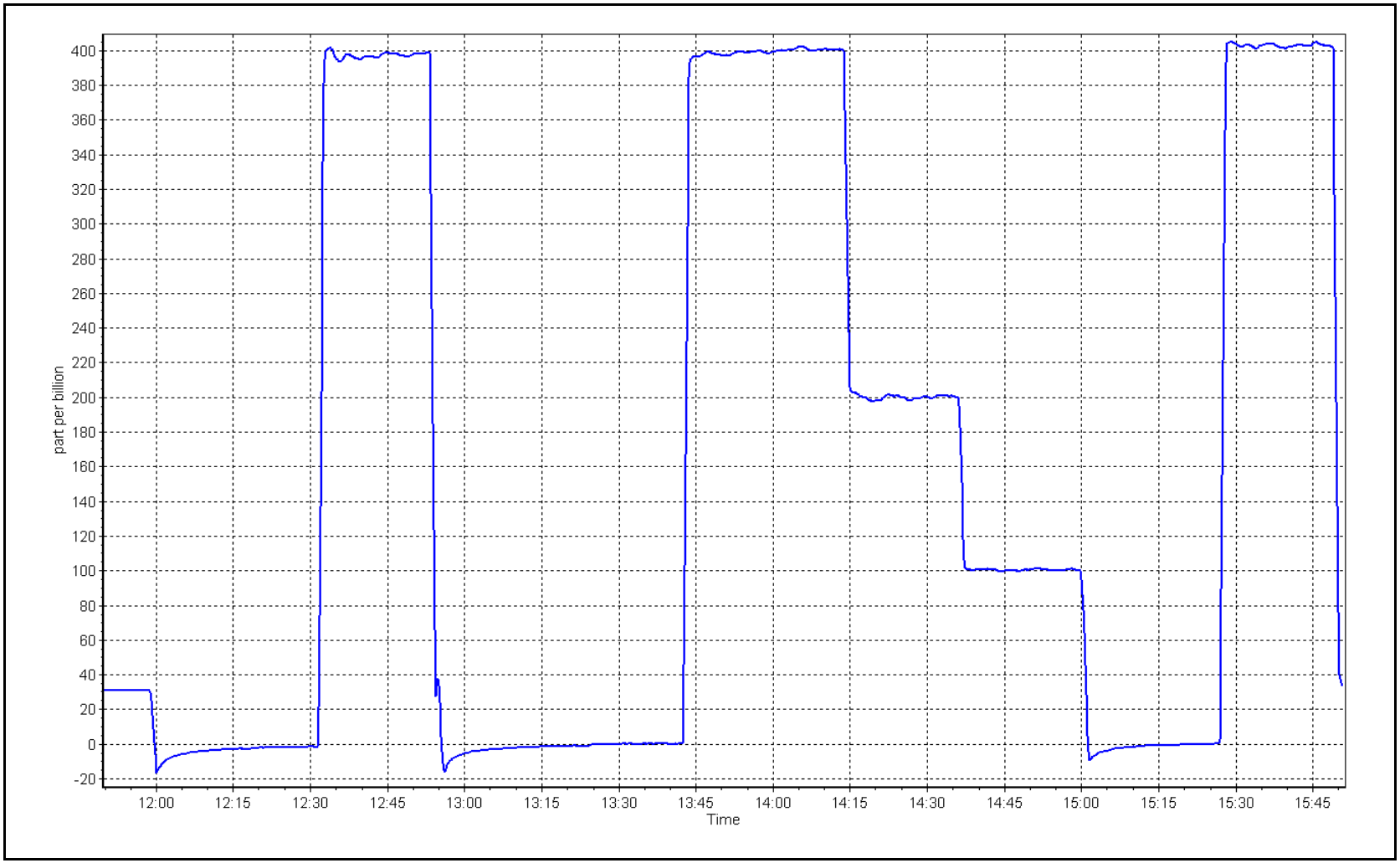
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
400.0	400.5	0.9988
200.0	200.3	0.9985
100.0	100.5	0.9950

Statistical Evaluation		*Limits*
Correlation Coefficient	1.000000	*≥0.995*
Slope	1.000543	*0.90 - 1.10*
Intercept	0.280000	*+/- 5*



O_3 Calibration Plot Date: November 22, 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:	November 30, 2023	Last Cal Date:	October 27, 2023
Start time (MST):	12:49	End time (MST):	13:40
Analyzer Make:	API T640	S/N:	326
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	DeltaCal	S/N:	1450
Temp/RH standard:	DeltaCal	S/N:	1450

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (^{o}C)	-3	-3.4	-3	☐	+/- 2 ^{o}C
P (mmHg)	706	705.2	706	☐	+/- 10 mmHg
flow (LPM)	5.02	5.05	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: November 30, 2023 Last Cal Date: October 27, 2023

PM w/o HEPA: 4.2 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

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

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: Verfied flow, temperature, and pressure. Leak check passed. No adjustments made. Firmware updated

Calibration by: Rene Chamberland

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS22
JANVIER
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	November 3, 2023	Last Cal Date:	October 5, 2023
Start time (MST):	8:58	End time (MST):	13:03
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.11	ppm	Cal Gas Exp Date:	January 18, 2029
Cal Gas Cylinder #:	CC281519			
Removed Cal Gas Conc:	50.11	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3806
ZAG Make/Model:	Teledyne API T701		Serial Number:	4890

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1152430006

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.996104	1.001365	Backgd or Offset:	20.7	21.2
Calibration intercept:	1.485197	1.843975	Coeff or Slope:	0.997	0.996

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	1.3	----
as found span	4920	79.8	799.8	787.6	1.015
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	1.5	----
high point	4920	79.8	799.8	802.5	0.997
second point	4960	39.9	399.9	402.6	0.993
third point	4980	20.0	200.4	202.8	0.988
as left zero	5000	0.0	0.0	1.4	----
as left span	4920	79.8	799.8	803.7	0.995
				Average Correction Factor	0.993

Baseline Corr As found:	786.30	Previous response	798.16	*% change	-1.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. Adjusted the span only. Multipoint as found are completed for NMHC calibration.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

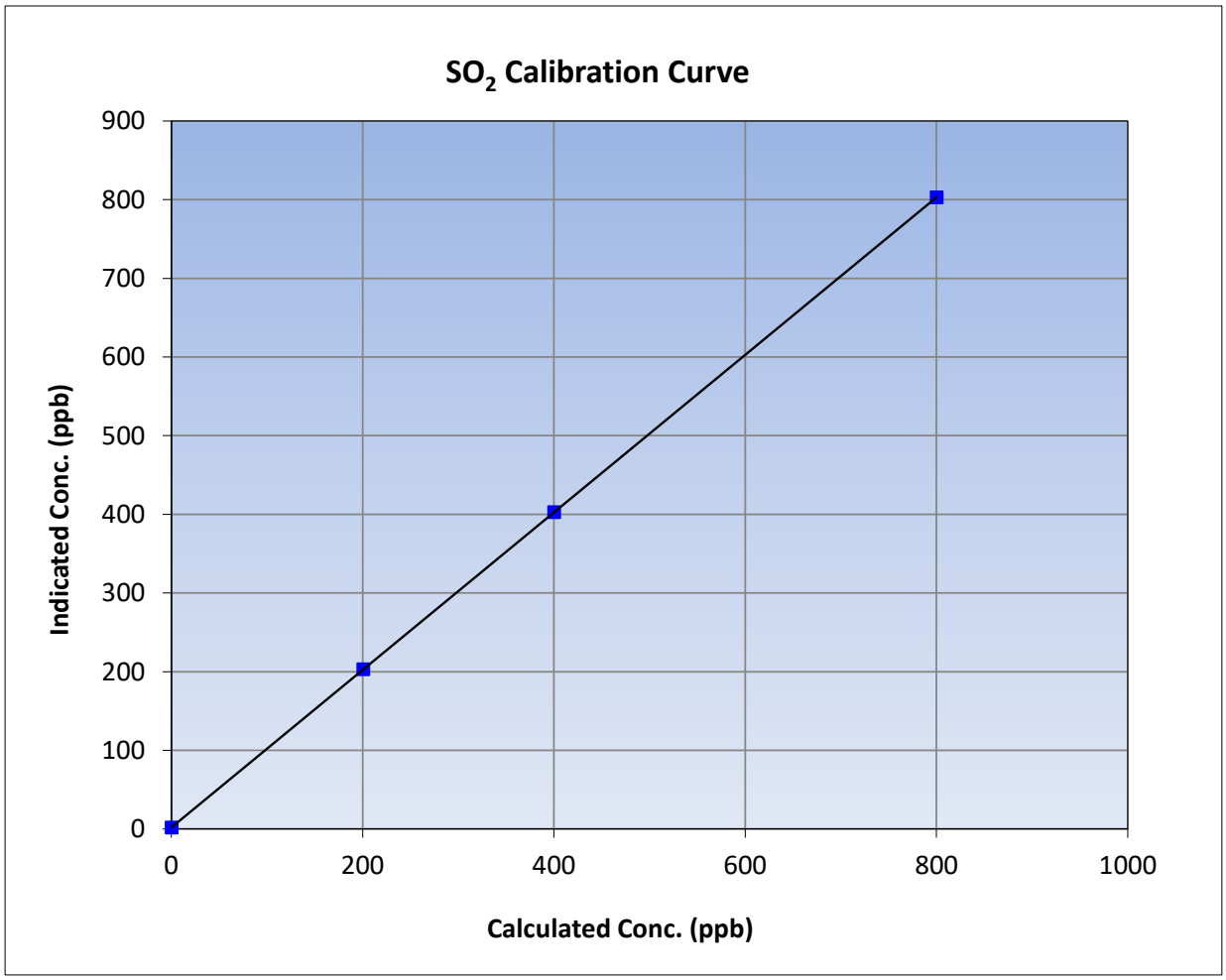
Station Information

Calibration Date:	November 3, 2023	Previous Calibration:	October 5, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	8:58	End Time (MST):	13:03
Analyzer make:	Thermo 43i	Analyzer serial #:	1152430006

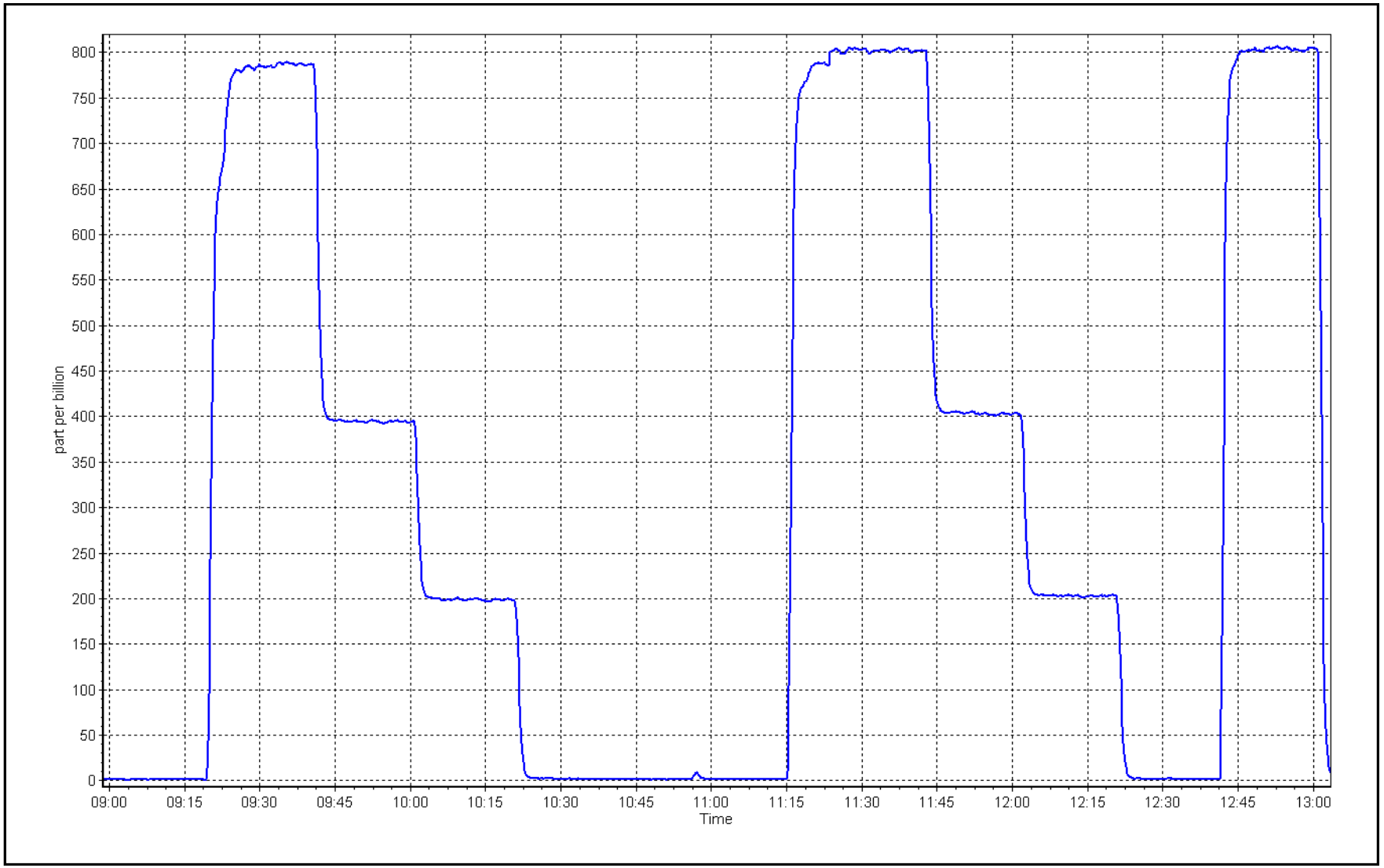
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	1.5	----
799.8	802.5	0.9966
399.9	402.6	0.9933
200.4	202.8	0.9884

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	1.001365	*0.90 - 1.10*
Intercept	1.843975	*+/-30*



SO2 Calibration Plot Date: November 3, 2023 Location: Janvier



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Janvier	Station number:	AMS22
Calibration Date:	November 9, 2023	Last Cal Date:	October 18, 2023
Start time (MST):	10:44	End time (MST):	14:58
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.03	ppm	Cal Gas Exp Date:	April 16, 2022
Cal Gas Cylinder #:	DT0018680			
Removed Cal Gas Conc:	5.03	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3806
ZAG Make/Model:	Teledyne API T701		Serial Number:	4890

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1151680031	
Converter make:	CDN-101		Converter serial #:	587	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.011516	0.986936	Backgd or Offset:	3.04	3.04
Calibration intercept:	0.060524	0.621094	Coeff or Slope:	1.161	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	5000	0.0	0.0	0.4	----
as found span	4920	79.5	80.0	78.3	1.027
as found 2nd point	4960	39.8	40.0	40.0	1.011
as found 3rd point	4980	19.9	20.0	20.3	1.006
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.4	----
high point	4920	79.5	80.0	79.4	1.007
second point	4960	39.8	40.0	40.4	0.991
third point	4980	19.9	20.0	20.5	0.977
as left zero	5000	0.0	0.0	0.5	----
as left span	4920	79.5	80.0	79.7	1.004
SO2 Scrubber Check	4920	79.8	798.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.992
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	77.9	Prev response:	80.97	*% change:	-3.9%
Baseline Corr 2nd AF pt:	39.6	AF Slope:	0.973077	AF Intercept:	0.681308
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999918		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

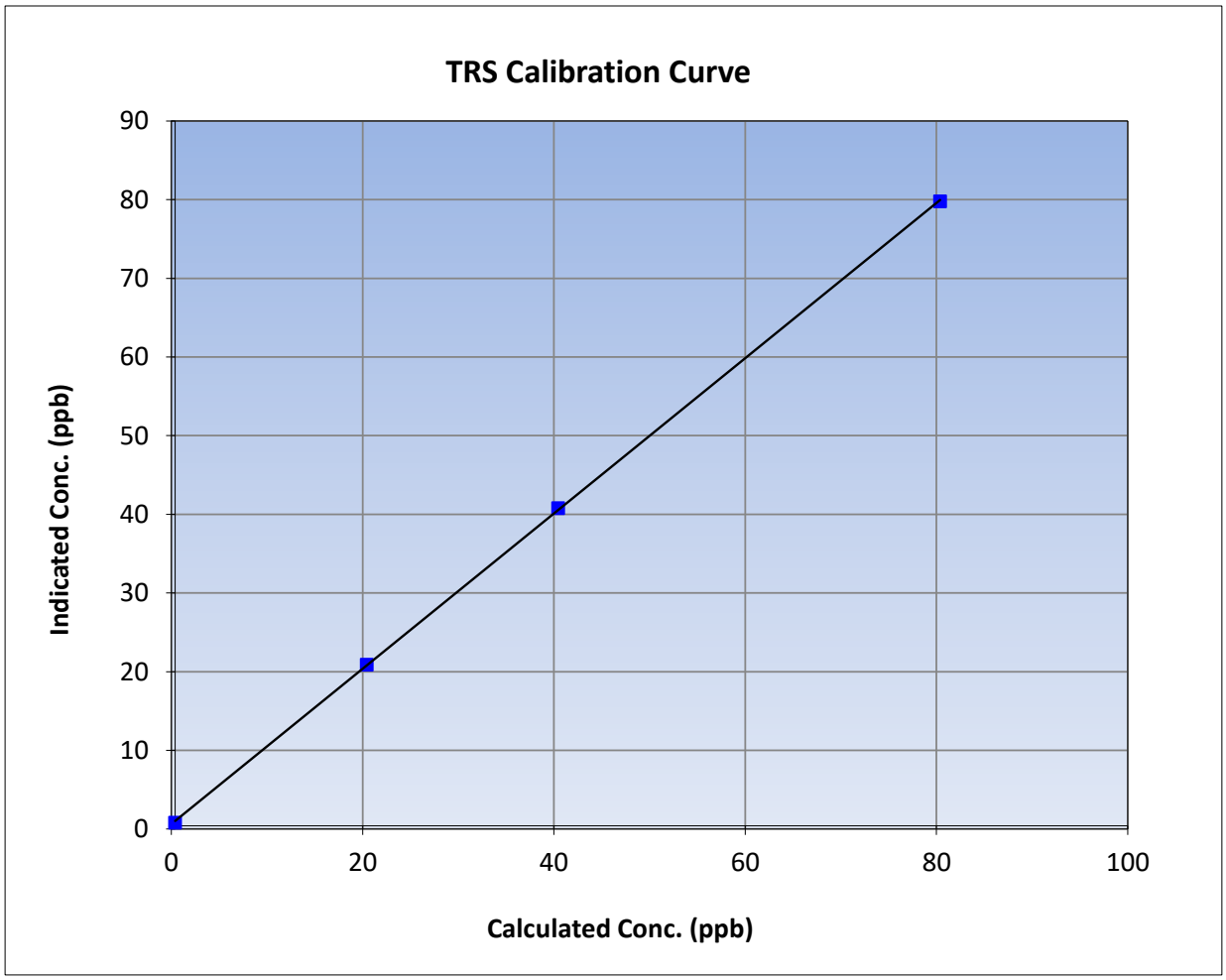
Station Information

Calibration Date:	November 9, 2023	Previous Calibration:	October 18, 2023
Station Name:	Janvier	Station Number:	AMS22
Start Time (MST):	10:44	End Time (MST):	14:58
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1151680031

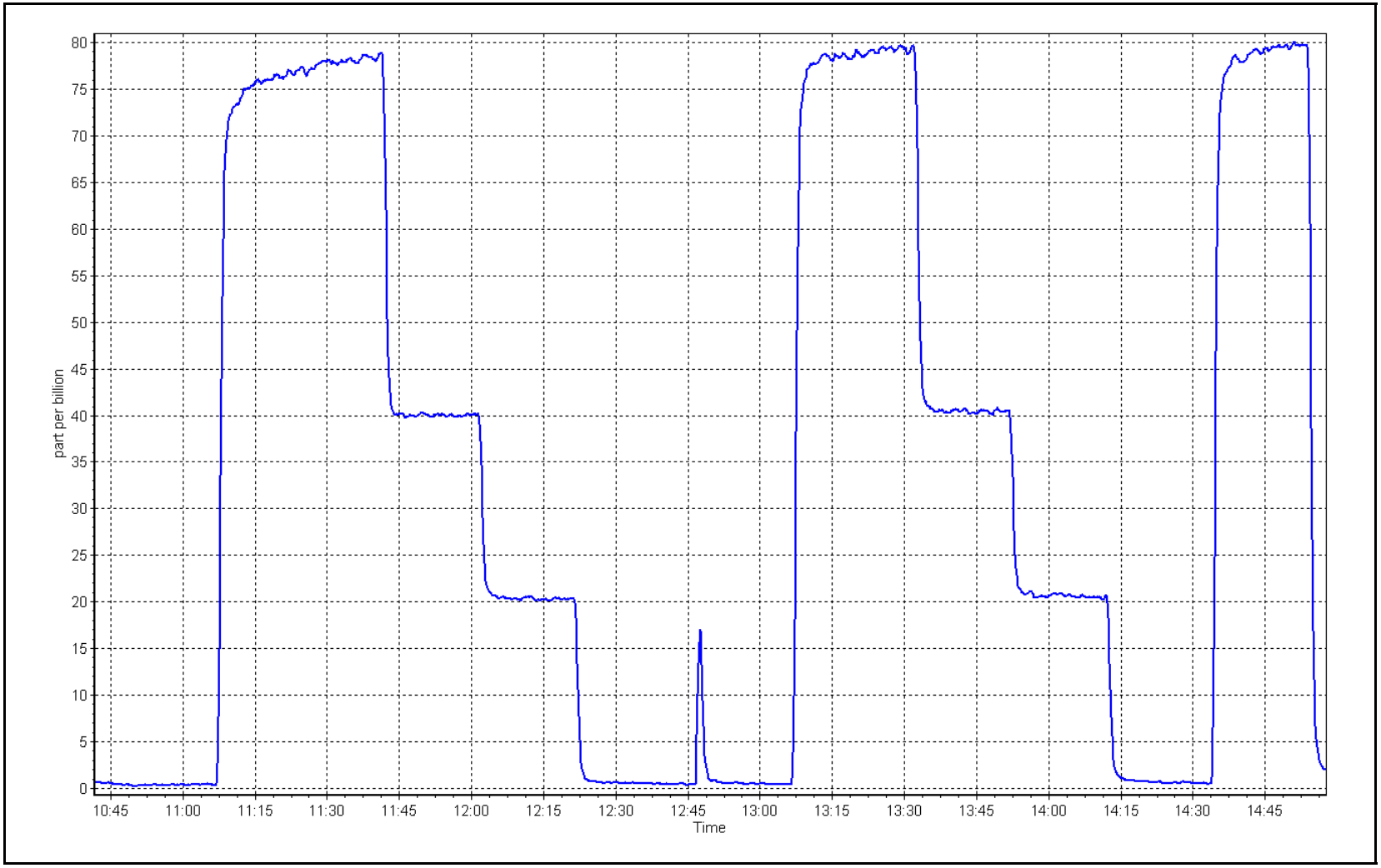
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
80.0	79.4	1.0074
40.0	40.4	0.9911
20.0	20.5	0.9766

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999954	*≥0.995*
Slope	0.986936	*0.90 - 1.10*
Intercept	0.621094	*+/-3*



TRS Calibration Plot Date: November 9, 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:	November 3, 2023	Last Cal Date:	October 5, 2023
Start time (MST):	8:58	End time (MST):	10:20
Reason:	Removal		

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:	2.200E-04	2.200E-04	NMHC SP Ratio:	4.43E-05	4.43E-05
CH4 Retention time:	13.8	13.8	NMHC Peak Area:	206448	206448
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	16.86	1.019
as found 2nd point	4960	39.9	8.59	8.37	1.026
as found 3rd point	4980	20.0	4.30	4.21	1.023
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	16.86	Prev response	17.17	*% change	-1.8%
Baseline Corr 2nd AF:	8.4	AF Slope:	0.981757	AF Intercept:	-0.019524
Baseline Corr 3rd AF:	4.2	AF Correlation:	0.999985	* = > +/-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	8.96	1.021
as found 2nd point	4960	39.9	4.57	4.46	1.025
as found 3rd point	4980	20.0	2.29	2.22	1.035
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	8.96	Prev response	9.11	*% change	-1.7%
Baseline Corr 2nd AF:	4.5	AF Slope:	0.980695	AF Intercept:	-0.016186
Baseline Corr 3rd AF:	2.2	AF Correlation:	0.999985	* = > +/-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	7.90	1.016
as found 2nd point	4960	39.9	4.01	3.91	1.027
as found 3rd point	4980	20.0	2.01	1.99	1.011
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	
Baseline Corr AF:	7.90	Prev response	8.06	*% change	-2.1%
Baseline Corr 2nd AF:	3.91	AF Slope:	0.982868	AF Intercept:	-0.003738
Baseline Corr 3rd AF:	1.99	AF Correlation:	0.999955	* = > +/-5% change initiates investigation	

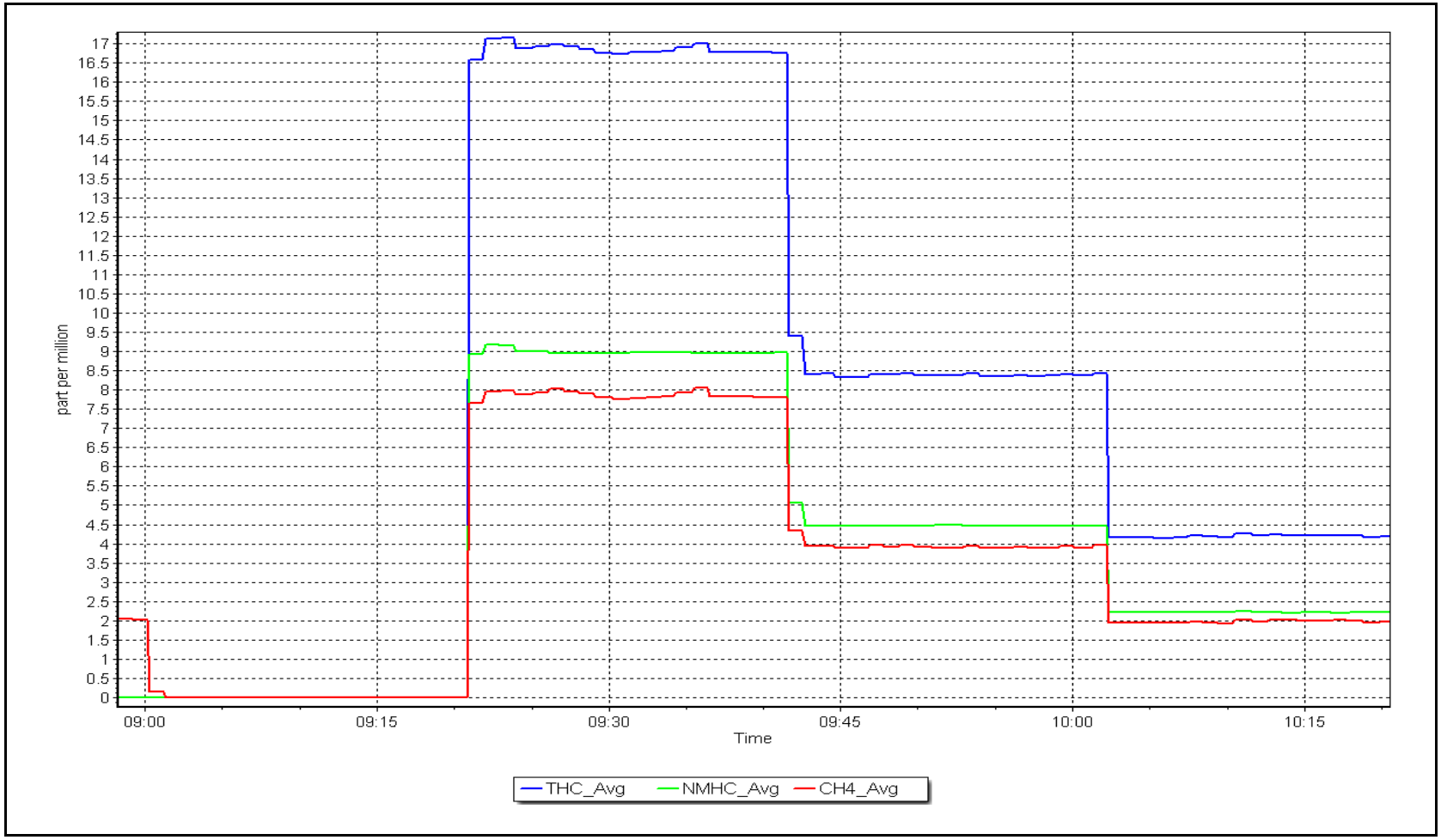
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.003343	
THC Cal Offset:	-0.059000	
CH4 Cal Slope:	1.008361	
CH4 Cal Offset:	-0.033775	
NMHC Cal Slope:	0.998915	
NMHC Cal Offset:	-0.024625	

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

Calibration Performed By: Max Farrell

NMHC Calibration Plot Date: November 3, 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:	November 3, 2023	Last Cal Date:	N/A
Start time (MST):	10:50	End time (MST):	13:03
Reason:	Install		

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 #:	1331259520	
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	2.470E-04	NMHC SP Ratio:	N/A	4.94E-05
CH4 Retention time:	N/A	15.0	NMHC Peak Area:	N/A	185124
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					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	79.8	17.17	17.09	1.005
second point	4960	39.9	8.59	8.61	0.997
third point	4980	20.0	4.30	4.40	0.979
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	17.17	17.01	1.010
				Average Correction Factor	0.993

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

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	79.8	9.15	9.07	1.008
second point	4960	39.9	4.57	4.60	0.994
third point	4980	20.0	2.29	2.37	0.966
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	9.15	8.97	1.020
				Average Correction Factor	0.989
Baseline Corr AF:	NA	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	79.8	8.03	8.02	1.001
second point	4960	39.9	4.01	4.01	1.000
third point	4980	20.0	2.01	2.02	0.994
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	8.03	8.04	0.998
				Average Correction Factor	0.998
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:	N/A	0.993524
THC Cal Offset:	N/A	0.058796
CH4 Cal Slope:	N/A	0.998422
CH4 Cal Offset:	N/A	0.006635
NMHC Cal Slope:	N/A	0.989089
NMHC Cal Offset:	N/A	0.052961

Notes: Install calibration. Swapped out the H2 cylinder and the inlet filter prior to the calibration. Adjusted the span only.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

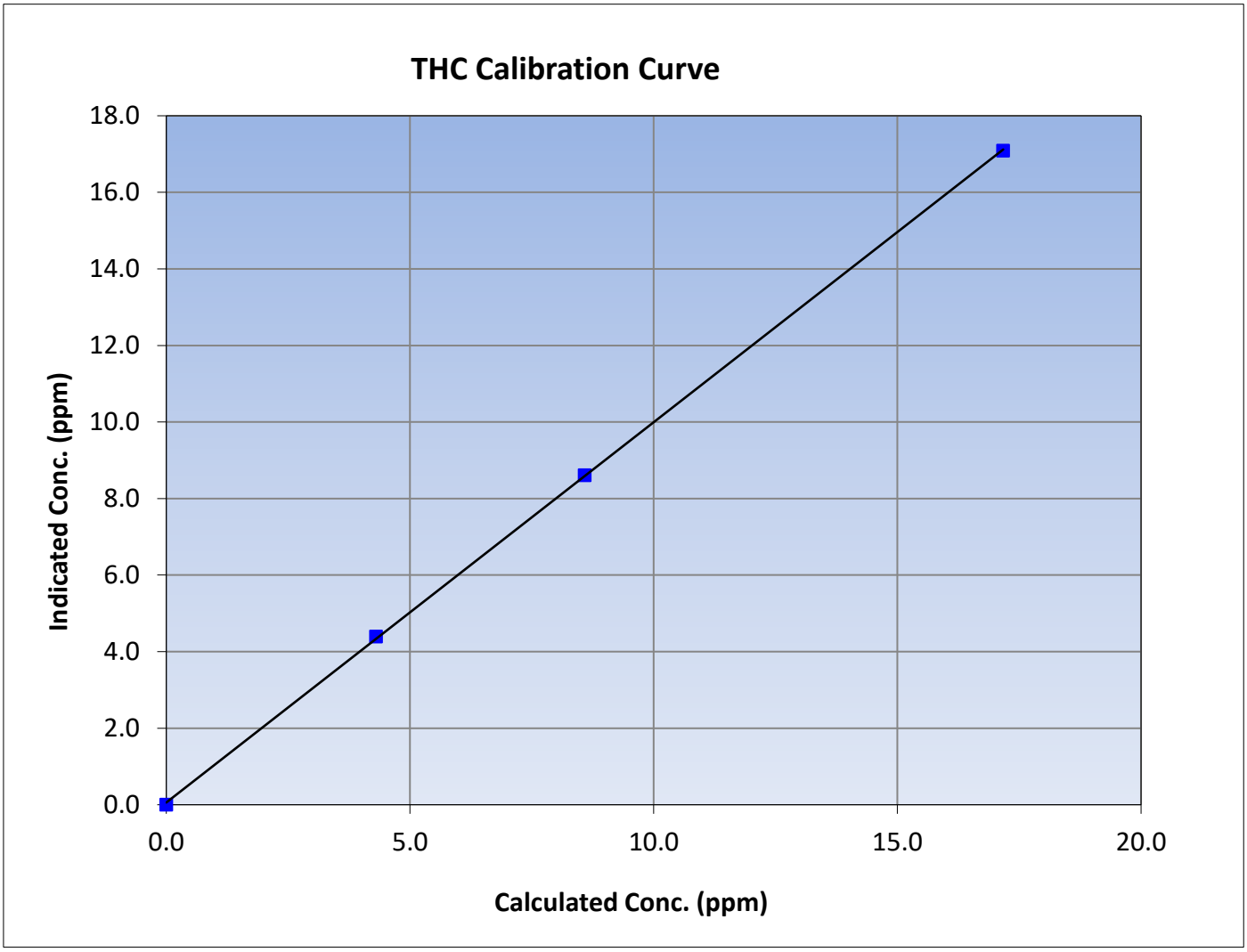
Version-06-2022

Station Information

Calibration Date:	November 3, 2023	Previous Calibration:	N/A
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:50	End Time (MST):	13:03
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259520

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999945	≥0.995
17.17	17.09	1.0047			
8.59	8.61	0.9968	Slope	0.993524	0.90 - 1.10
4.30	4.40	0.9788			
			Intercept	0.058796	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

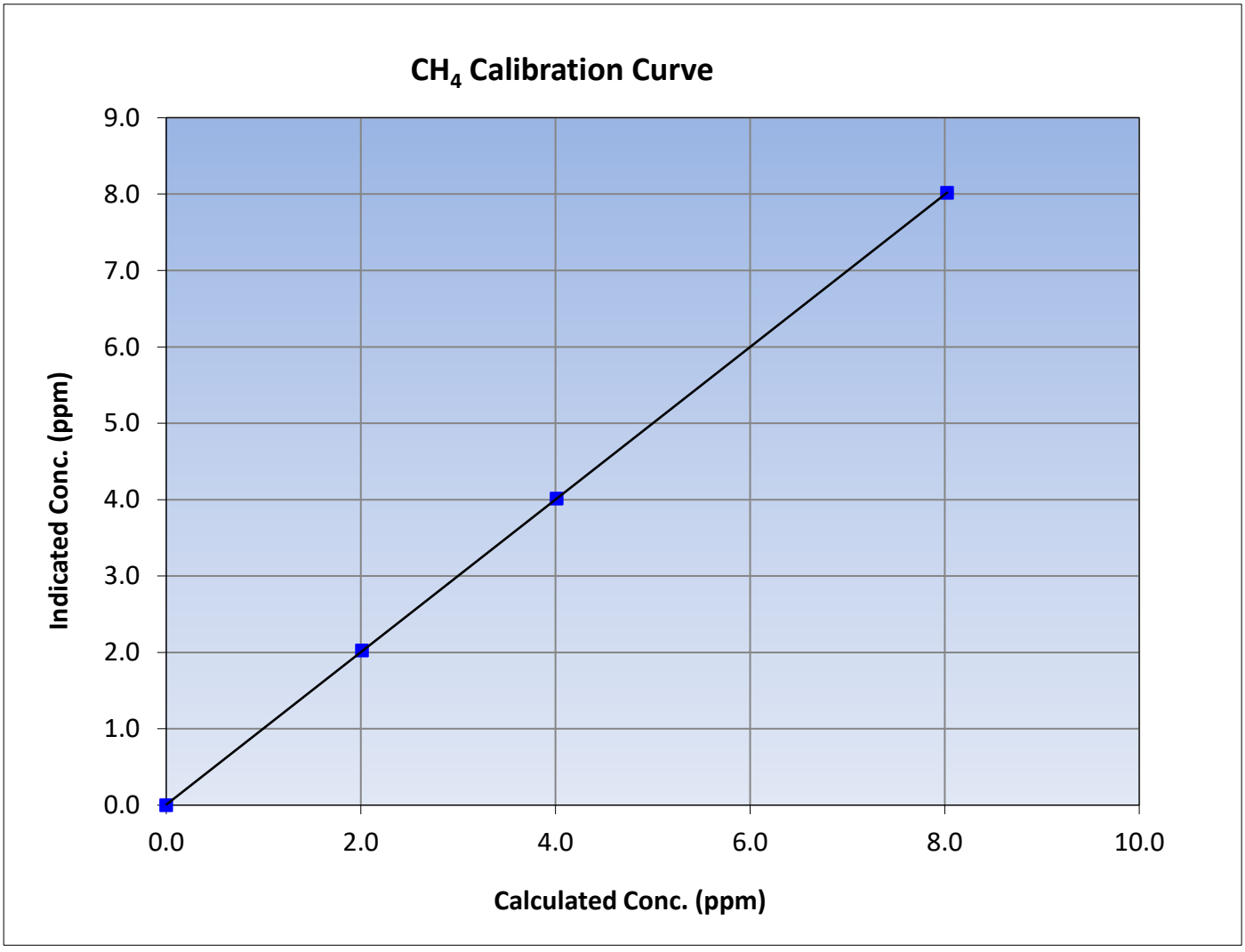
Version-06-2022

Station Information

Calibration Date:	November 3, 2023	Previous Calibration:	N/A
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:50	End Time (MST):	13:03
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259520

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*
8.03	8.02	1.0010			
4.01	4.01	1.0001	Slope	0.998422	*0.90 - 1.10*
2.01	2.02	0.9937			
			Intercept	0.006635	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

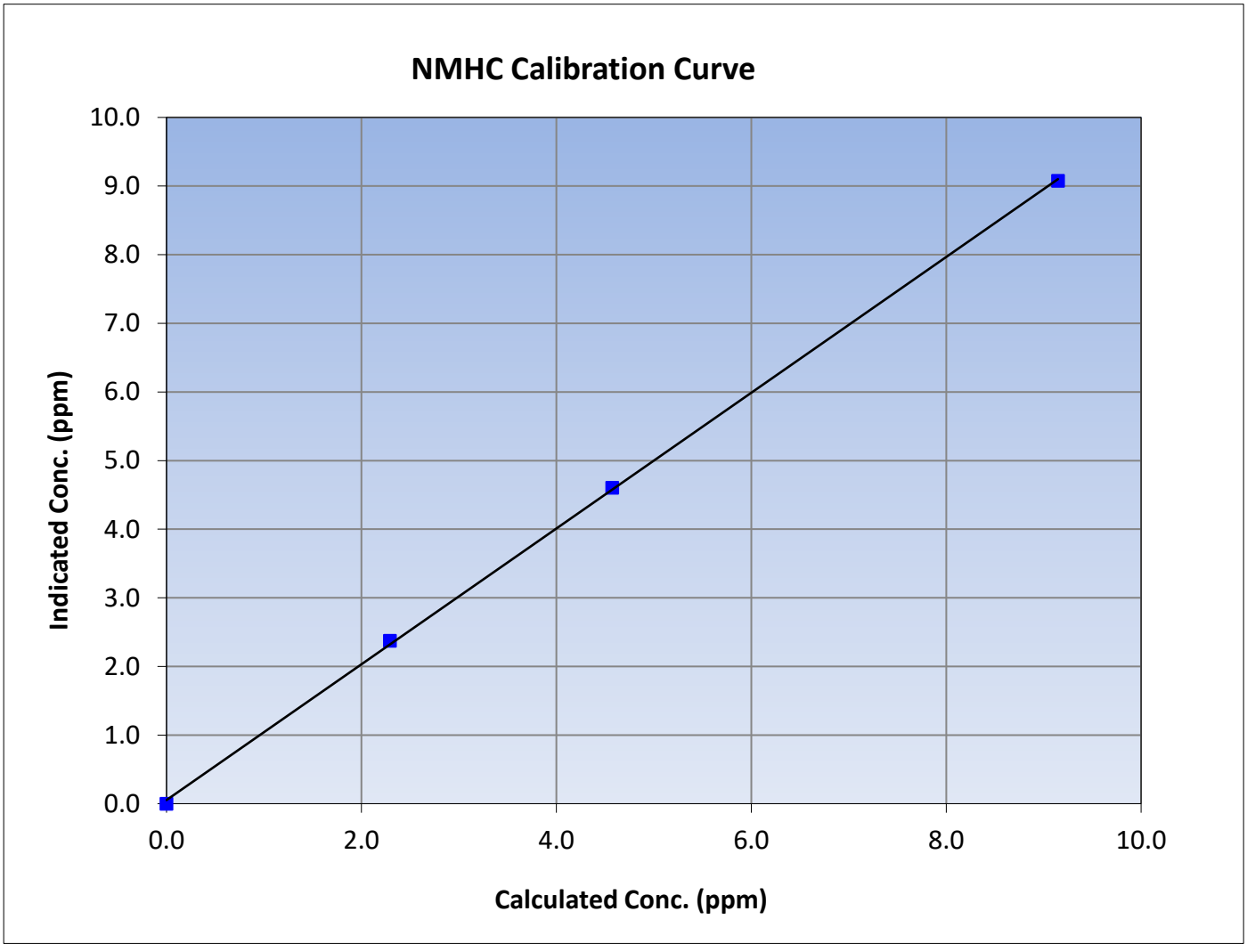
Version-06-2022

Station Information

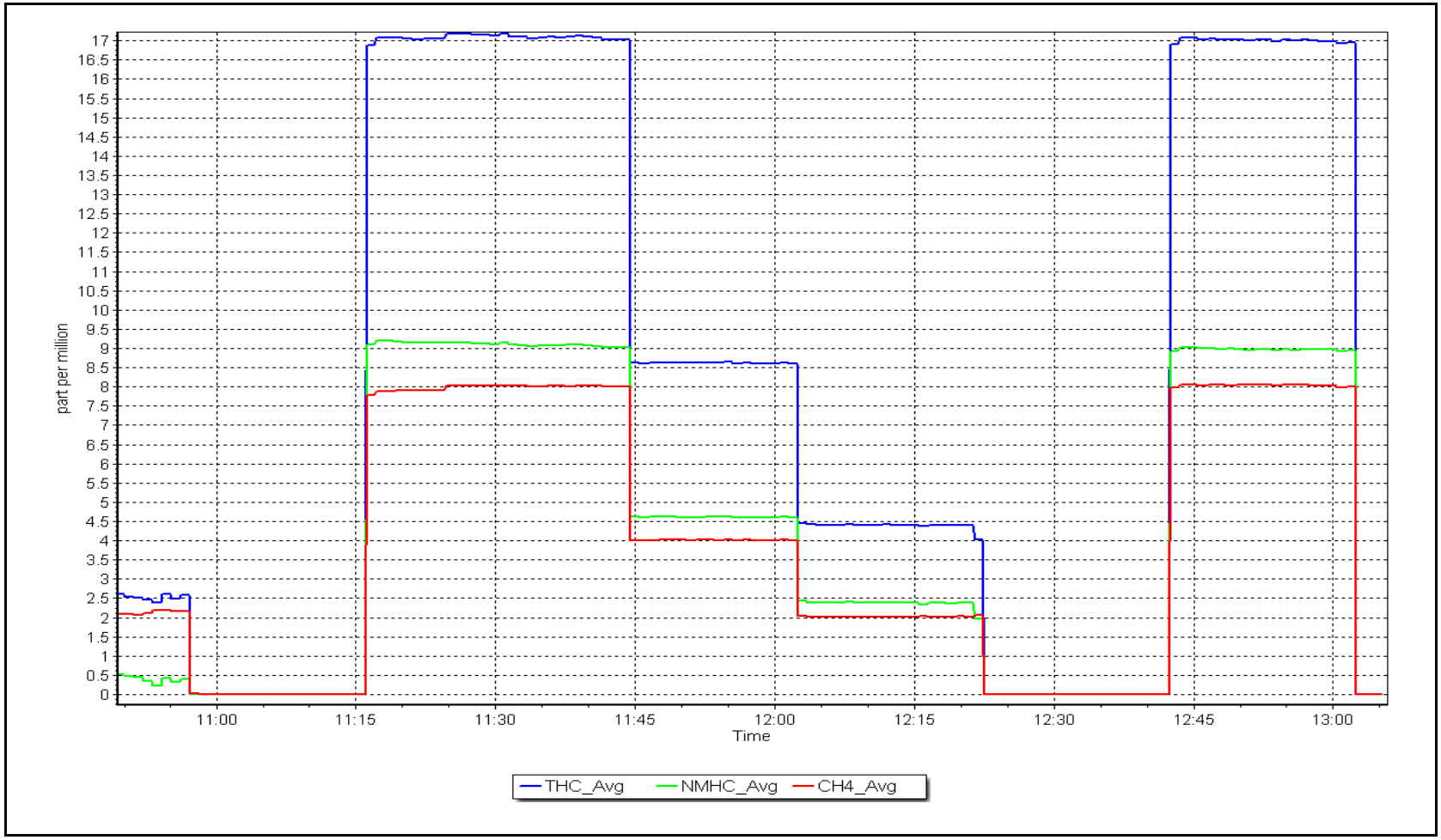
Calibration Date:	November 3, 2023	Previous Calibration:	N/A
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:50	End Time (MST):	13:03
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259520

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999843	≥0.995
9.15	9.07	1.0080			
4.57	4.60	0.9938	Slope	0.989089	0.90 - 1.10
2.29	2.37	0.9656			
			Intercept	0.052961	+/-0.5



NMHC Calibration Plot Date: November 3, 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:	November 8, 2023	Last Cal Date:	October 17, 2023
Start time (MST):	10:25	End time (MST):	14:56
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:	0.826	0.826	NO bkgnd or offset:	-5.6	-5.6
NOX coeff or slope:	0.815	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:	0.991915	0.990857
NO_X Cal Offset:	2.589941	2.110476
NO Cal Slope:	0.989600	0.989570
NO Cal Offset:	2.050558	1.211114
NO_2 Cal Slope:	0.999193	1.001094
NO_2 Cal Offset:	0.162793	0.263799

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	1.9	2.1	-0.2	----	----
as found span	4918	82.3	799.9	799.9	0.0	792.3	786.9	5.5	1.0096	1.0165
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	1.5	2.0	-0.5	----	----
high point	4918	82.3	799.9	799.9	0.0	794.6	793.1	1.5	1.0067	1.0086
second point	4959	41.2	400.4	400.4	0.0	398.6	397.3	1.3	1.0046	1.0079
third point	4980	20.6	200.2	200.2	0.0	201.5	198.4	3.1	0.9936	1.0091
as left zero	5000	0.0	0.0	0.0	0.0	1.7	2.3	-0.6	----	----
as left span	4918	82.3	799.9	409.4	390.5	789.9	399.5	390.4	1.0127	1.0248
								Average Correction Factor	1.0016	1.0085

Corrected As found	NO_X = 790.4 ppb	NO = 784.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -0.7%
Previous Response	NO_X = 796.0 ppb	NO = 793.6 ppb		*Percent Change	NO = -1.1%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	789.9	399.4	390.5	390.7	0.9995	100.1%
2nd GPT point (200 ppb O3)	789.9	596.5	193.4	194.6	0.9938	100.6%
3rd GPT point (100 ppb O3)	789.9	692.7	97.2	98.1	0.9908	100.9%
				Average Correction Factor	0.9947	100.5%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

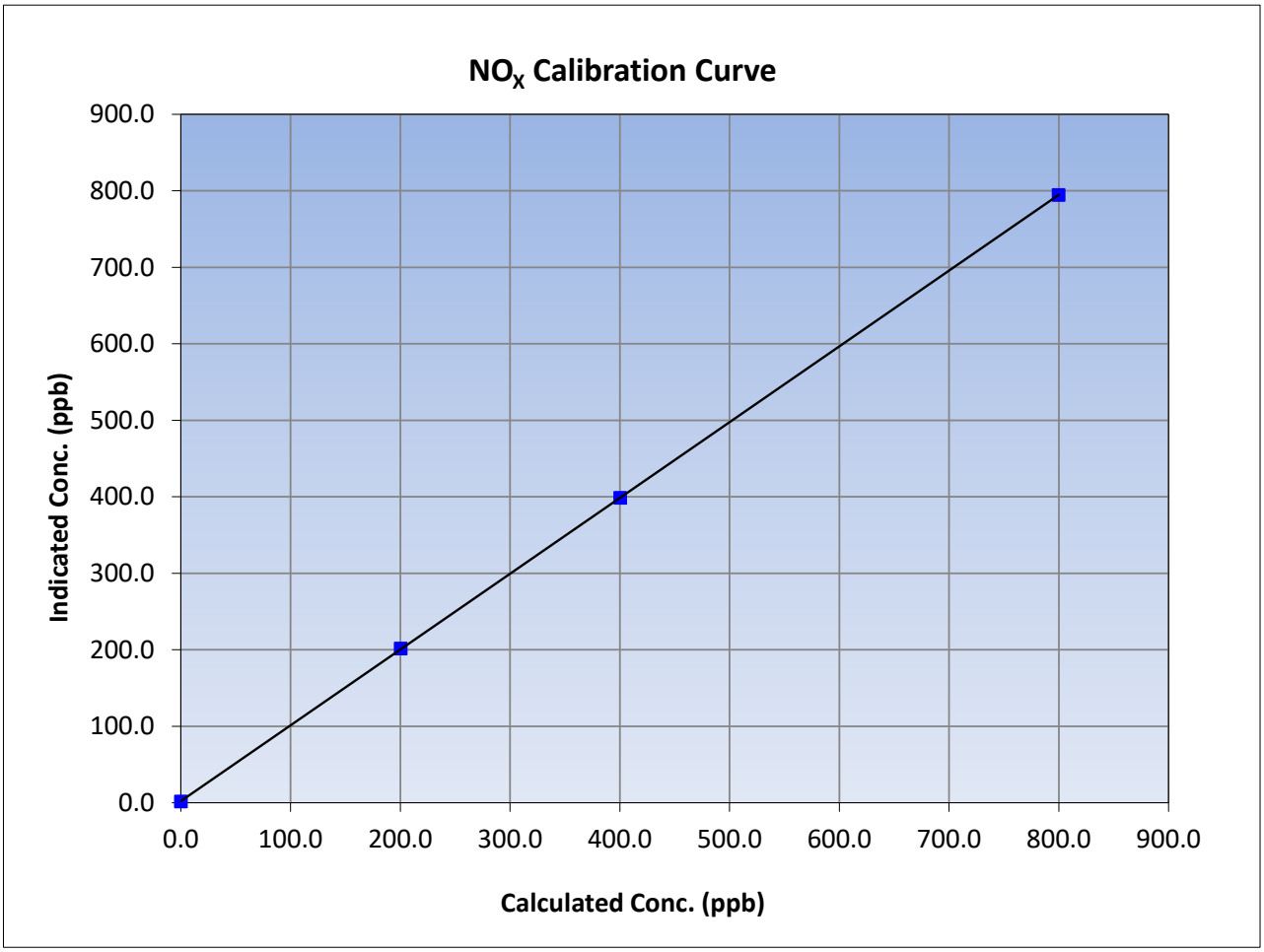
Version-04-2020

Station Information

Calibration Date:	November 8, 2023	Previous Calibration:	October 17, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:25	End Time (MST):	14:56
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	1.5	----	Correlation Coefficient	0.999996	≥0.995
799.9	794.6	1.0067			
400.4	398.6	1.0046	Slope	0.990857	0.90 - 1.10
200.2	201.5	0.9936			
			Intercept	2.110476	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

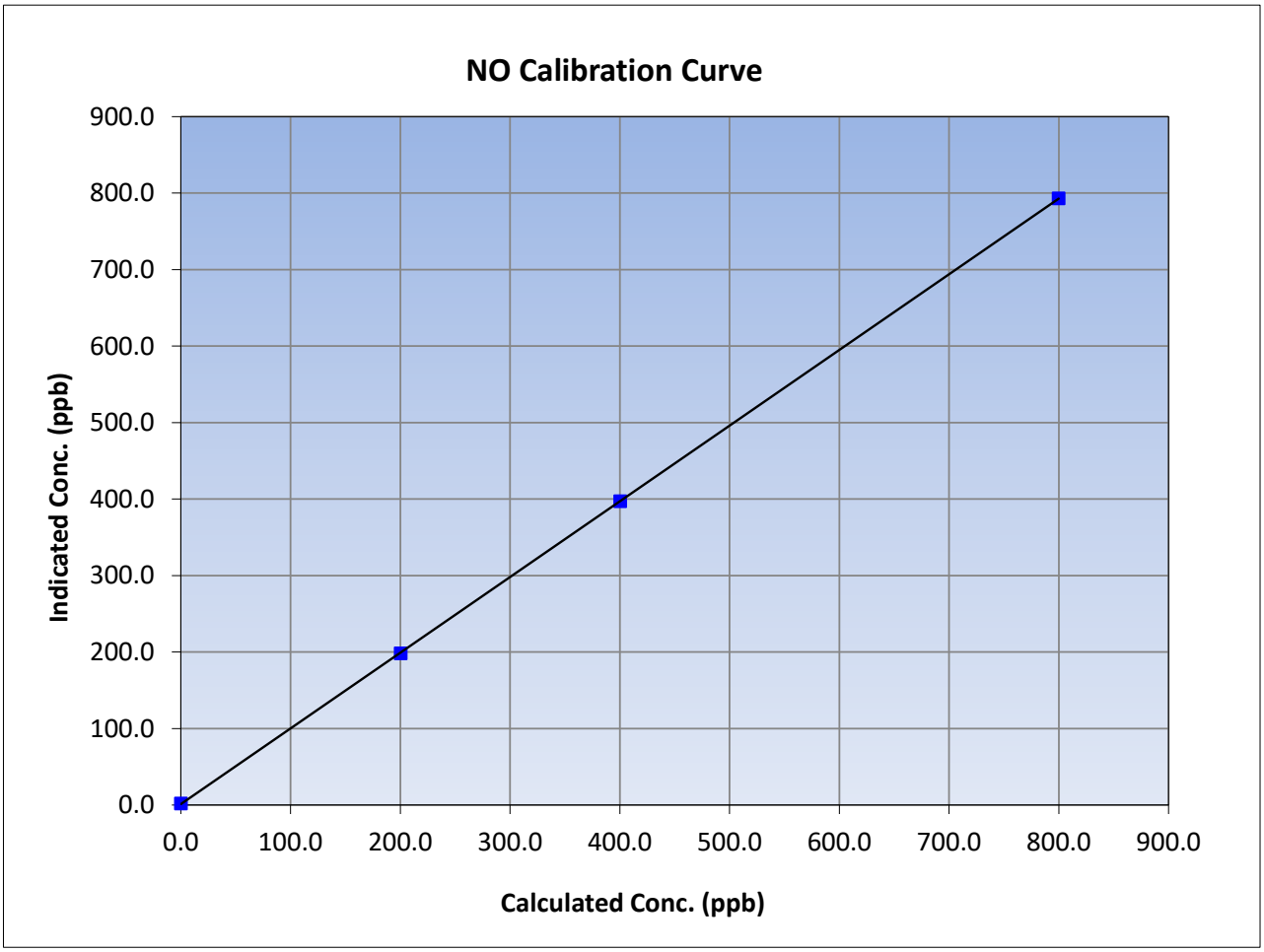
Version-04-2020

Station Information

Calibration Date:	November 8, 2023	Previous Calibration:	October 17, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:25	End Time (MST):	14:56
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	2.0	----	Correlation Coefficient	0.999995	≥0.995
799.9	793.1	1.0086			
400.4	397.3	1.0079	Slope	0.989570	0.90 - 1.10
200.2	198.4	1.0091			
			Intercept	1.211114	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

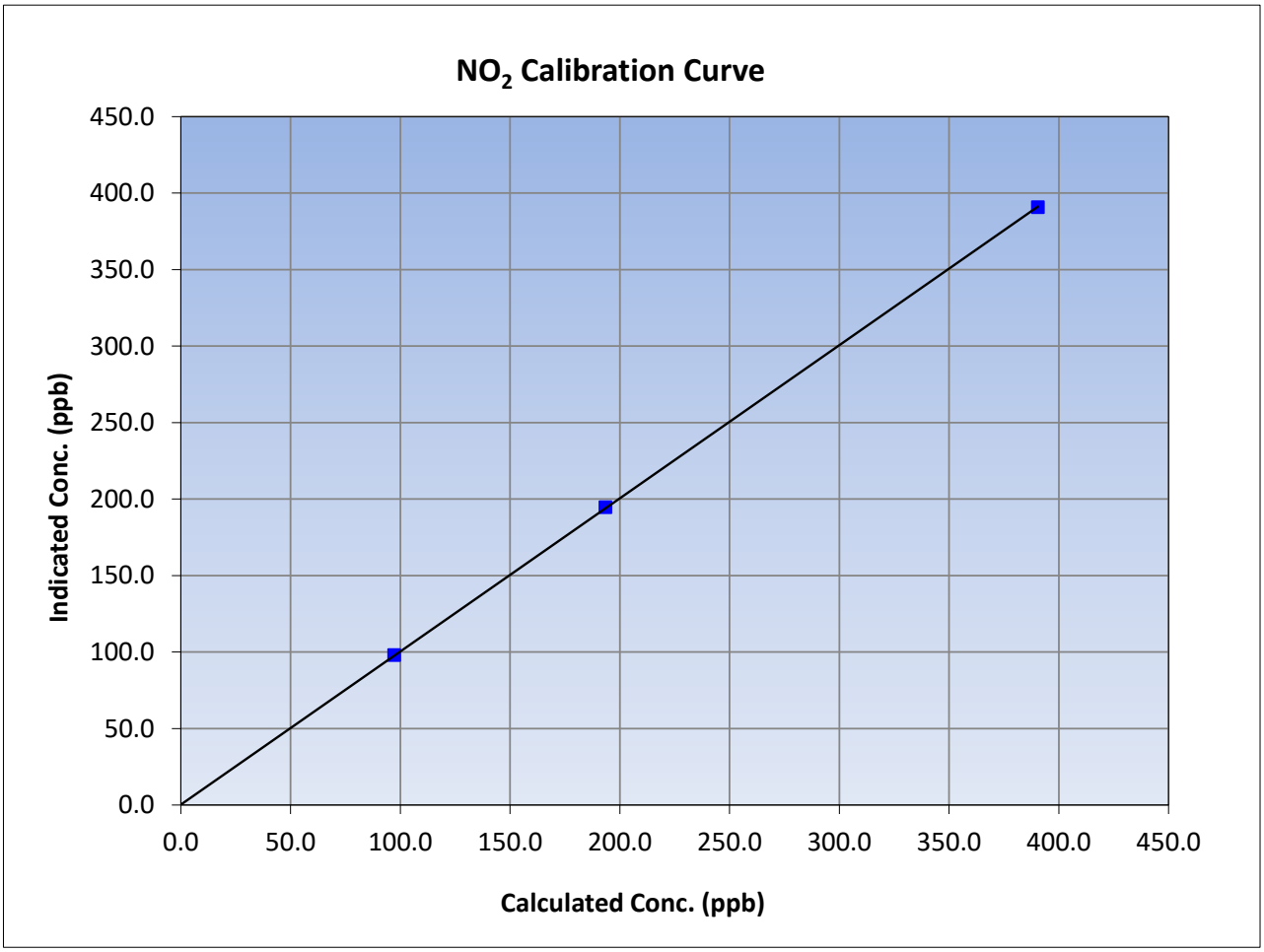
Version-04-2020

Station Information

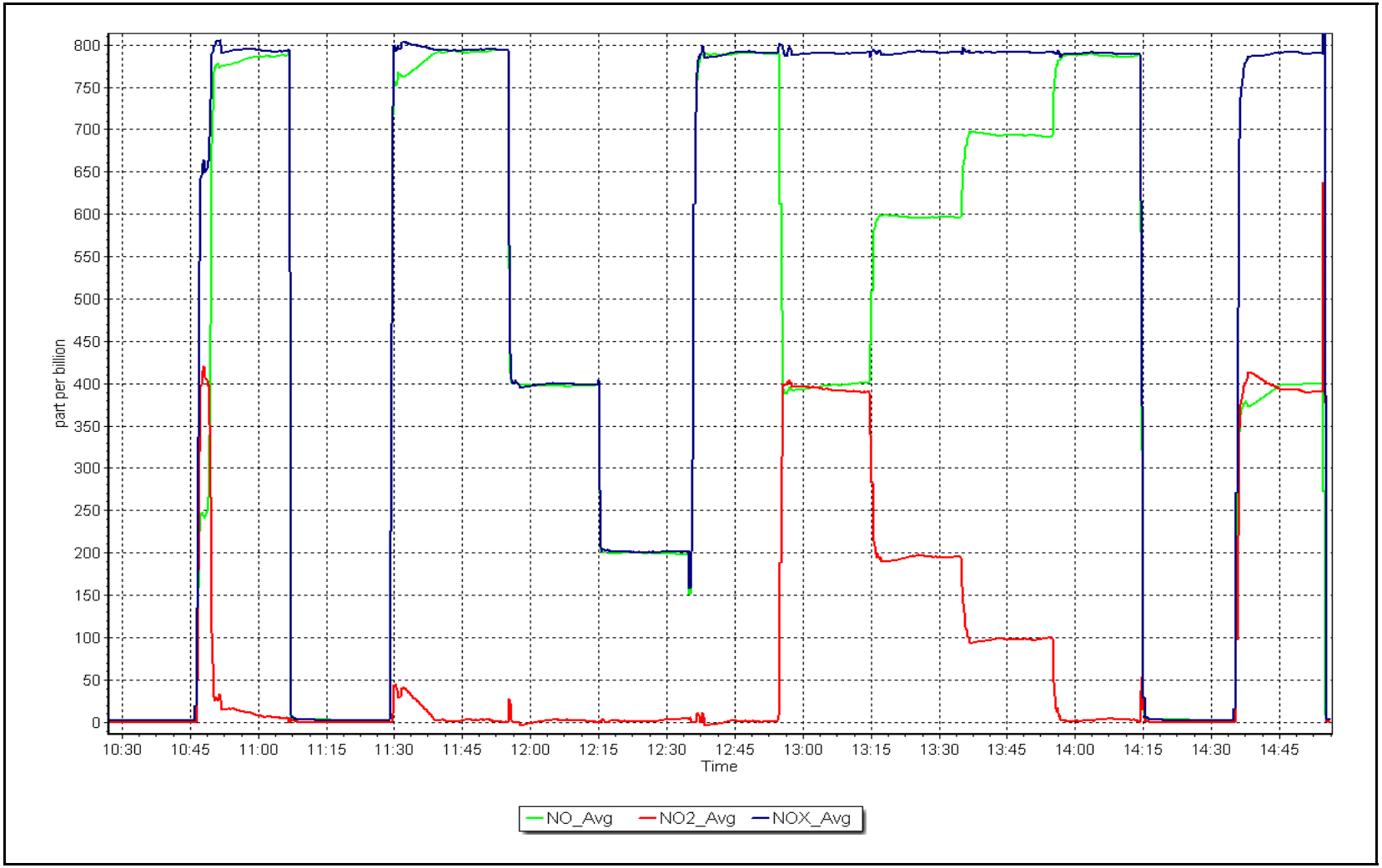
Calibration Date:	November 8, 2023	Previous Calibration:	October 17, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:25	End Time (MST):	14:56
Analyzer make:	API T200	Analyzer serial #:	833

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.5	----	Correlation Coefficient	0.999980	≥0.995
390.5	390.7	0.9995			
193.4	194.6	0.9938	Slope	1.001094	0.90 - 1.10
97.2	98.1	0.9908			
			Intercept	0.263799	+/-20



NO_X Calibration Plot Date: November 8, 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:	November 23, 2023	Last Cal Date:	October 20, 2023
Start time (MST):	10:19	End time (MST):	13:41
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:	691

Analyzer Information

Analyzer make:	Teledyne API T400	Analyzer serial #:	7046
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.996857	1.006114	Backgd or Offset:	-0.2	-0.2
Calibration intercept:	1.800000	0.780000	Coeff or Slope:	1.021	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	1.8	----
as found span	4895	905.3	400.0	402.8	0.993
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	0.8	----
high point	4895	905.3	400.0	403.1	0.992
second point	4895	756.7	200.0	202.4	0.988
third point	4895	656.1	100.0	101.1	0.989
as left zero	5000	800.0	0.0	0.8	----
as left span	4895	904.3	400.0	403.2	0.992
				Average Correction Factor	0.990

Baseline Corr As found:	401.0	Previous response	400.5	*% change	0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

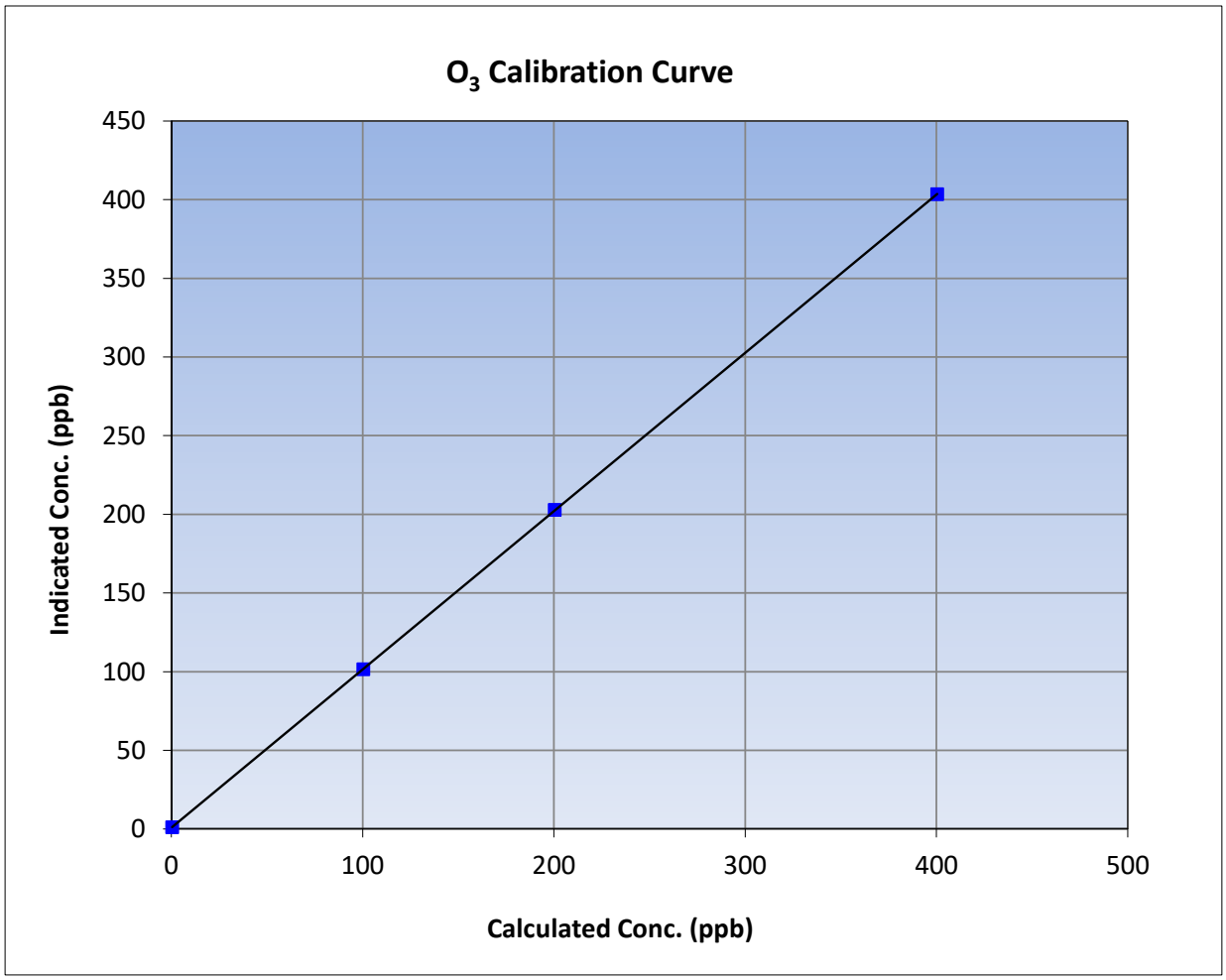
Station Information

Calibration Date:	November 23, 2023	Previous Calibration:	October 20, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:19	End Time (MST):	13:41
Analyzer make:	Teledyne API T400	Analyzer serial #:	7046

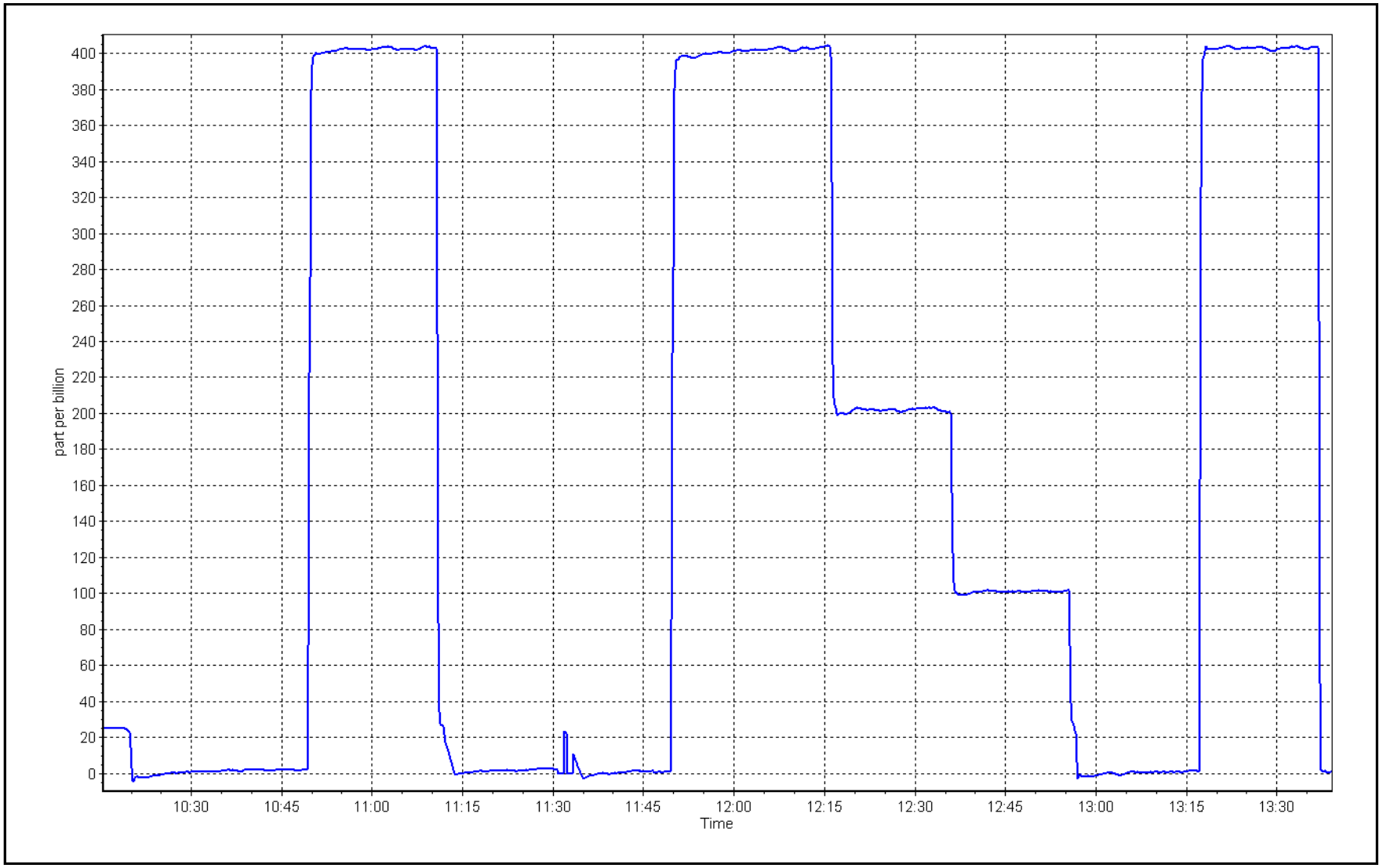
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.8	----
400.0	403.1	0.9923
200.0	202.4	0.9881
100.0	101.1	0.9891

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999997	*≥0.995*
Slope	1.006114	*0.90 - 1.10*
Intercept	0.780000	*+/- 5*



O_3 Calibration Plot Date: November 23, 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:	November 23, 2023	Last Cal Date:	October 20, 2023
Start time (MST):	13:43	End time (MST):	14:01
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)	-3.3	-3.7	-3.3	☐	+/- 2 °C
P (mmHg)	726.5	727.1	726.5	☐	+/- 10 mmHg
flow (LPM)	5.00	5.10	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: November 23, 2023 Last Cal Date: October 20, 2023

PM w/o HEPA: 7.3 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

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

Disposable Filter Changed: October 20, 2023

Annual Maintenance

Date Sample Tube Cleaned: July 26, 2023

Date RH/T Sensor Cleaned: July 26, 2023

Notes:

Quarterly calibration was completed in October. 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
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	November 20, 2023	Last Cal Date:	October 17, 2023
Start time (MST):	9:45	End time (MST):	12:20
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.76	ppm	Cal Gas Exp Date:	January 5, 2025
Cal Gas Cylinder #:	CC281425			
Removed Cal Gas Conc:	49.76	ppm	Rem Gas Exp Date:	N/A
Removed Gas Cyl #:	N/A		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	451
ZAG Make/Model:	API T701		Serial Number:	5611

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1160290012

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999149	0.993772	Backgd or Offset:	17.8	17.8
Calibration intercept:	-0.923240	-0.642432	Coeff or Slope:	1.040	1.040

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.3	----
as found span	4920	80.3	799.1	793.2	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4920	80.3	799.1	793.6	1.007
second point	4960	40.2	400.1	397.2	1.007
third point	4980	20.1	200.0	197.1	1.015
as left zero	5000	0.0	0.0	0.4	----
as left span	4920	80.3	799.1	794.1	1.006
				Average Correction Factor	1.010

Baseline Corr As found:	792.90	Previous response	797.49	*% change	-0.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments or maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

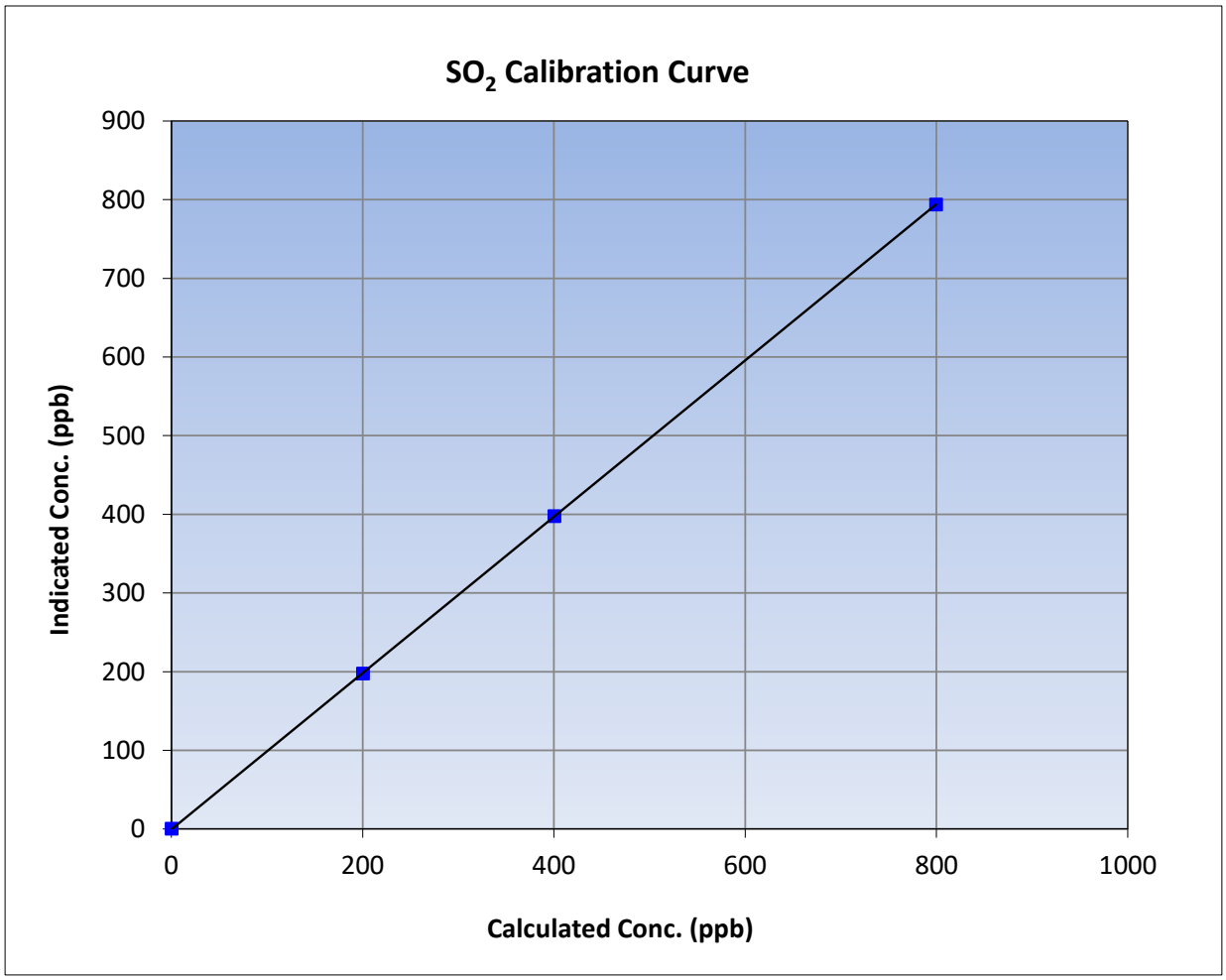
Station Information

Calibration Date:	November 20, 2023	Previous Calibration:	October 17, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:45	End Time (MST):	12:20
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290012

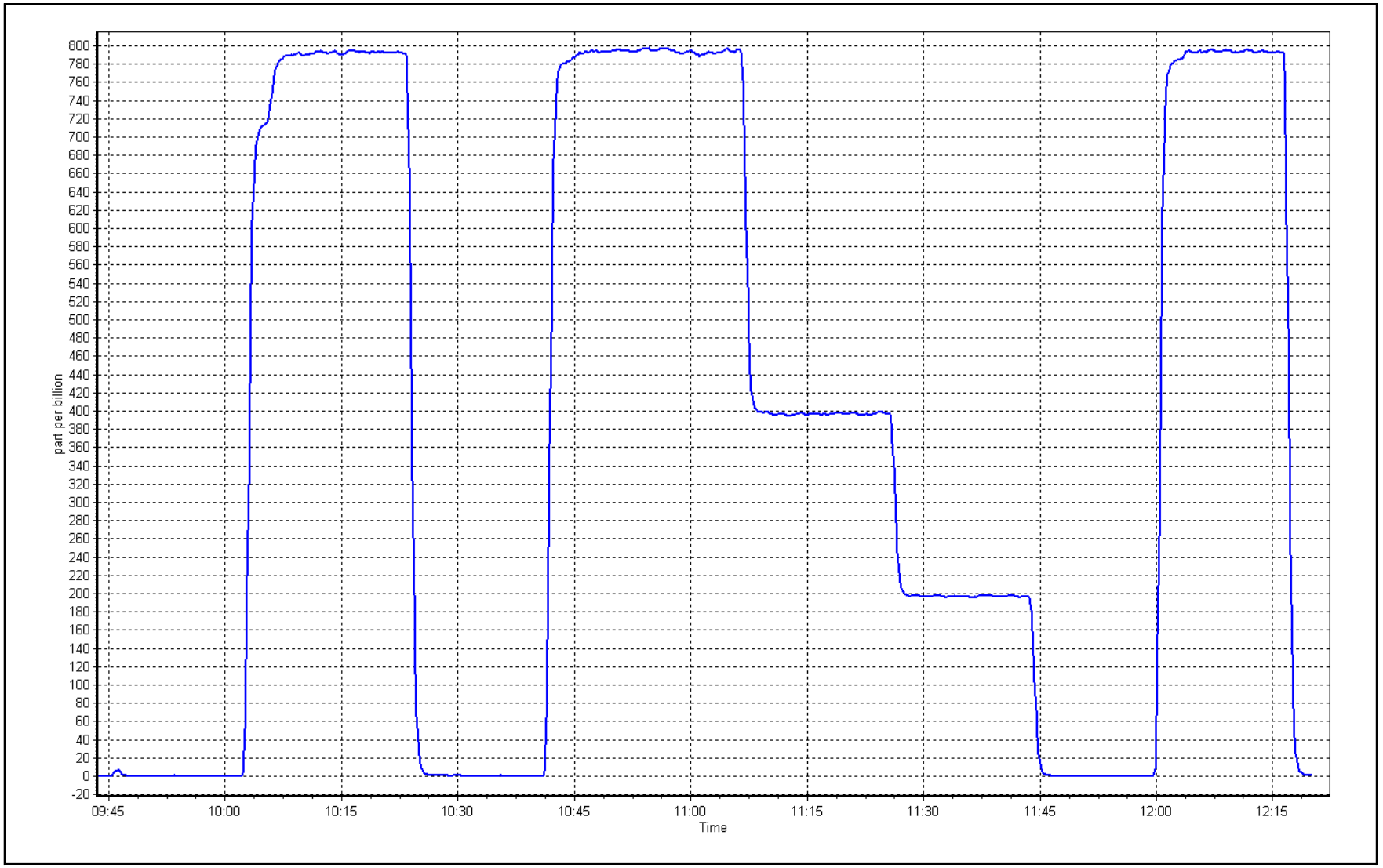
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
799.1	793.6	1.0069
400.1	397.2	1.0072
200.0	197.1	1.0149

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	0.993772	*0.90 - 1.10*
Intercept	-0.642432	*+/-30*



SO2 Calibration Plot Date: November 20, 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:	November 15, 2023	Last Cal Date:	October 2, 2023
Start time (MST):	8:58	End time (MST):	12:49
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:	1.004317	1.000174	Backgd or Offset:	1.19	1.19
Calibration intercept:	-0.038148	-0.118216	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	79.0	1.011
as found 2nd point	4962	38.5	40.0	39.6	1.007
as found 3rd point	4981	19.2	19.9	19.6	1.013
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	79.9	1.001
second point	4962	38.5	40.0	40.0	1.000
third point	4981	19.2	19.9	19.6	1.018
as left zero	5000	0.0	0.0	0.0	----
as left span	4923	77.0	80.0	80.2	0.998
SO2 Scrubber Check	4920	80.3	803.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.006
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.1	Prev response:	80.31	*% change:	-1.5%
Baseline Corr 2nd AF pt:	39.7	AF Slope:	0.989031	AF Intercept:	-0.078363
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999994		

* = > +/-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

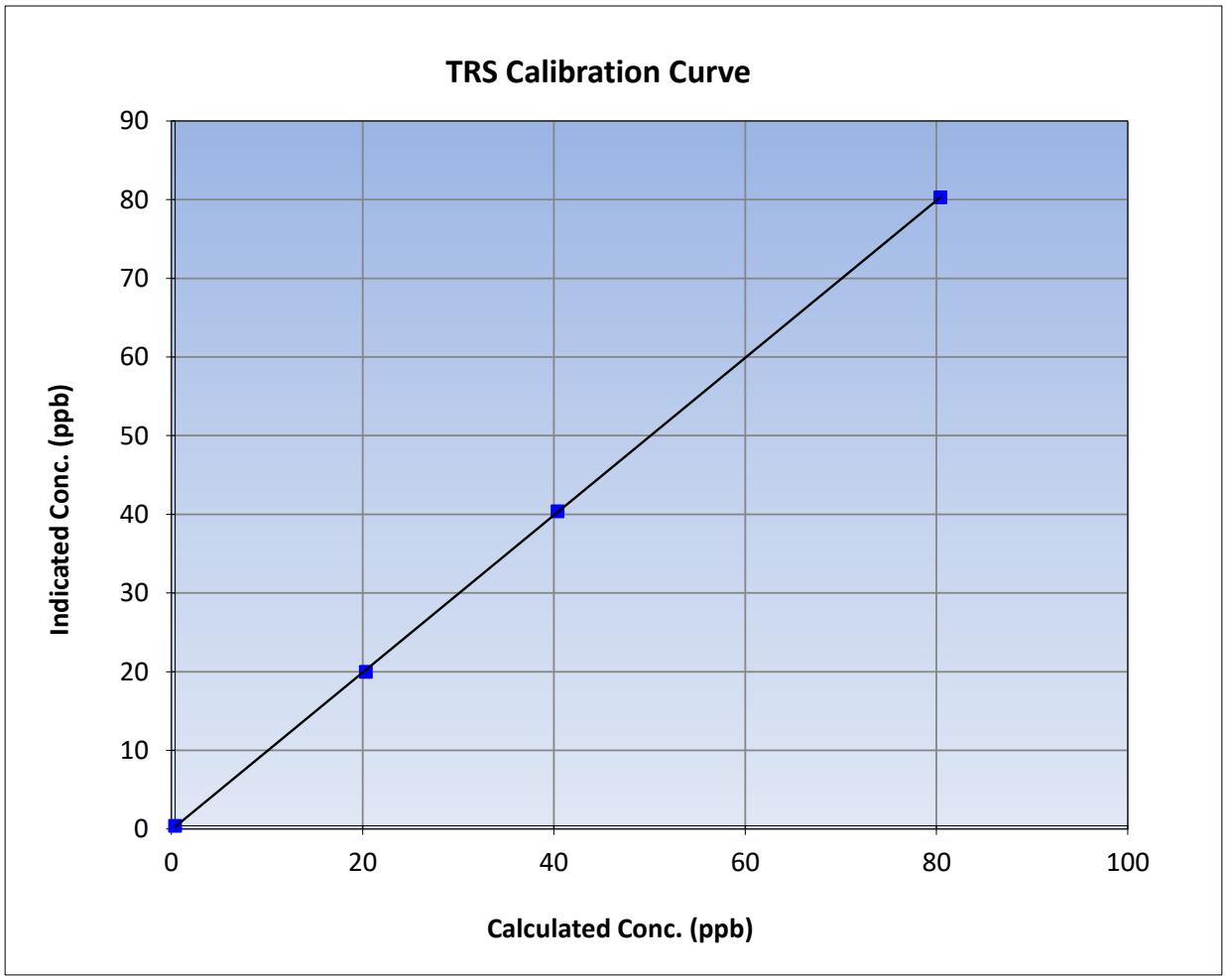
Station Information

Calibration Date:	November 15, 2023	Previous Calibration:	October 2, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:58	End Time (MST):	12:49
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1300156232

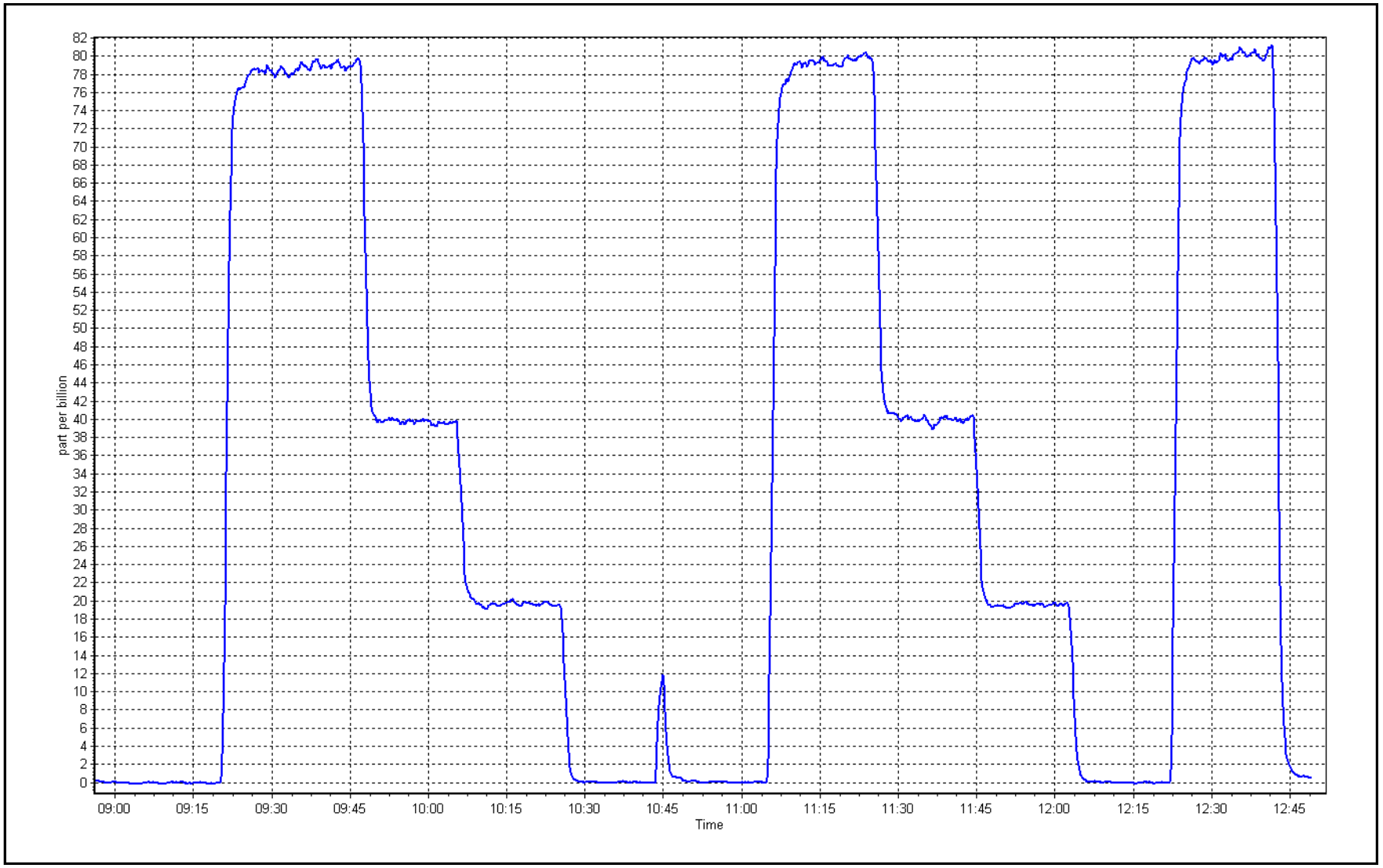
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	79.9	1.0013
40.0	40.0	0.9999
19.9	19.6	1.0178

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999977	*≥0.995*
Slope	1.000174	*0.90 - 1.10*
Intercept	-0.118216	*+/-3*



TRS Calibration Plot Date: November 15, 2023 Location: Fort Hills



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	November 20, 2023	Last Cal Date:	October 17, 2023
Start time (MST):	9:45	End time (MST):	12:19
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:	2.34E-04	2.34E-04	NMHC SP Ratio:	5.10E-05	5.01E-05
CH4 Retention time:	13.0	13.0	NMHC Peak Area:	180460	183497
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	80.3	17.19	17.48	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	17.19	17.30	0.994
second point	4960	40.2	8.61	8.65	0.995
third point	4980	20.1	4.30	4.33	0.994
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.19	17.31	0.993
				Average Correction Factor	0.994
Baseline Corr AF:	17.48	Prev response	17.30	*% change	1.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-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	80.3	9.16	9.38	0.976
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	9.23	0.992
second point	4960	40.2	4.59	4.65	0.986
third point	4980	20.1	2.29	2.34	0.980
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	9.16	9.24	0.991
				Average Correction Factor	0.986
Baseline Corr AF:	9.38	Prev response	9.22	*% 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	80.3	8.03	8.10	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	8.03	8.07	0.995
second point	4960	40.2	4.02	4.00	1.005
third point	4980	20.1	2.01	1.99	1.010
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	8.03	8.07	0.995
				Average Correction Factor	1.004
Baseline Corr AF:	8.10	Prev response	8.08	*% change	0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.006154	1.006220
THC Cal Offset:	0.005584	-0.002409
CH4 Cal Slope:	1.007912	1.005350
CH4 Cal Offset:	-0.014057	-0.020045
NMHC Cal Slope:	1.004487	1.006983
NMHC Cal Offset:	0.017645	0.017636

Notes: Span adjusted. No Maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

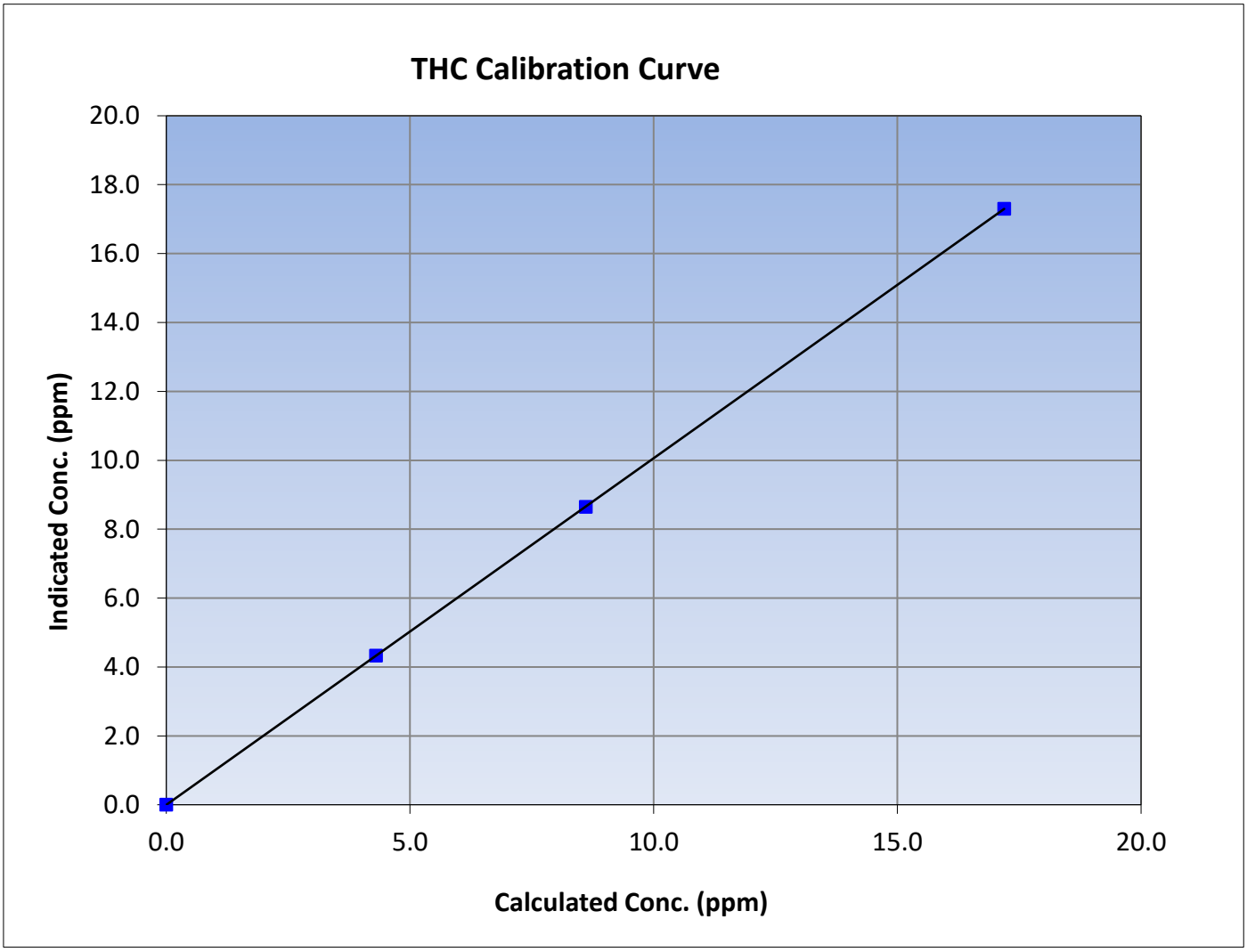
Version-06-2022

Station Information

Calibration Date:	November 20, 2023	Previous Calibration:	October 17, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:45	End Time (MST):	12:19
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	0.999999	*≥0.995*
17.19	17.30	0.9938			
8.61	8.65	0.9950	Slope	1.006220	*0.90 - 1.10*
4.30	4.33	0.9939			
			Intercept	-0.002409	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

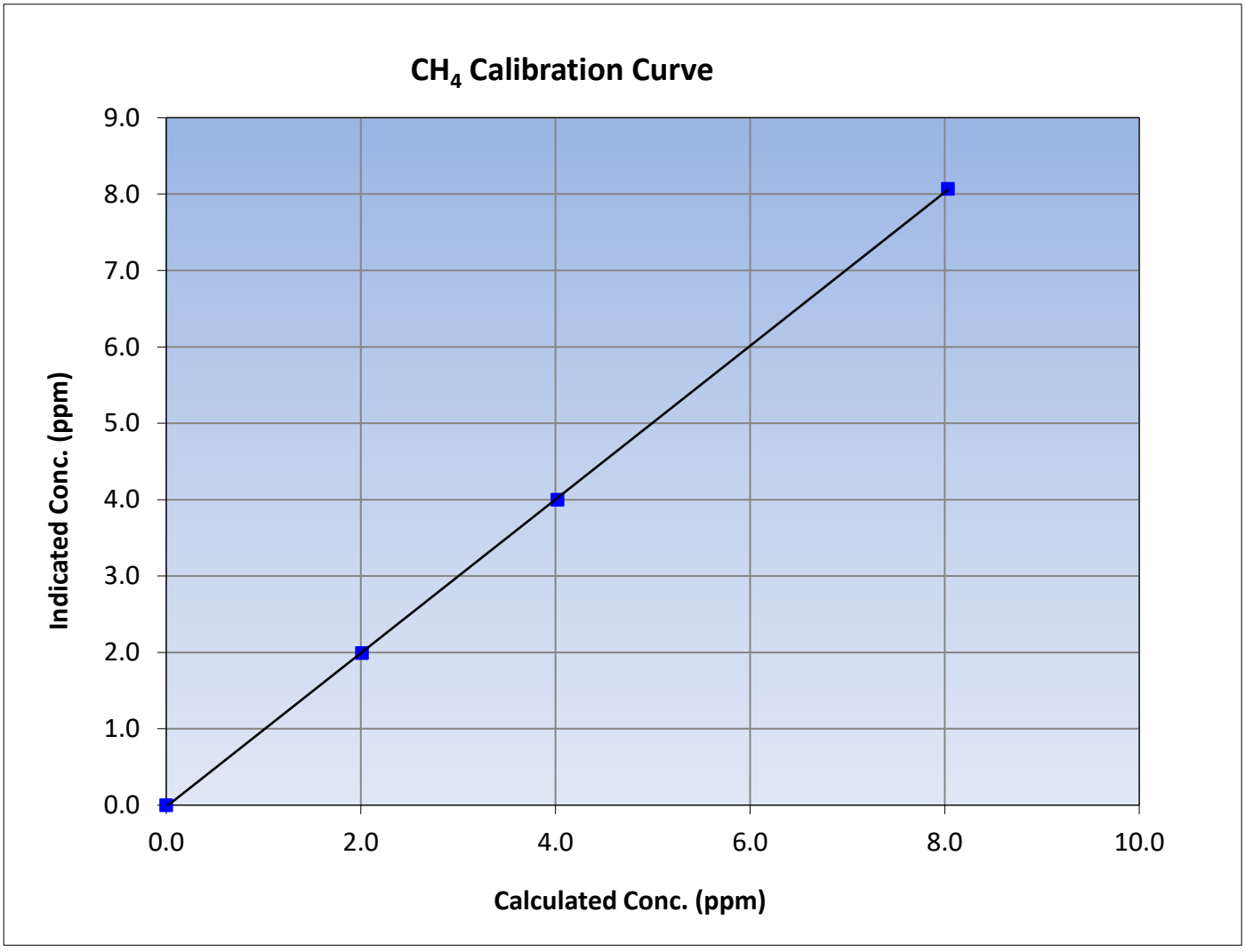
Version-06-2022

Station Information

Calibration Date:	November 20, 2023	Previous Calibration:	October 17, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:45	End Time (MST):	12:19
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	0.999965	*≥0.995*
8.03	8.07	0.9954			
4.02	4.00	1.0054	Slope	1.005350	*0.90 - 1.10*
2.01	1.99	1.0104			
			Intercept	-0.020045	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

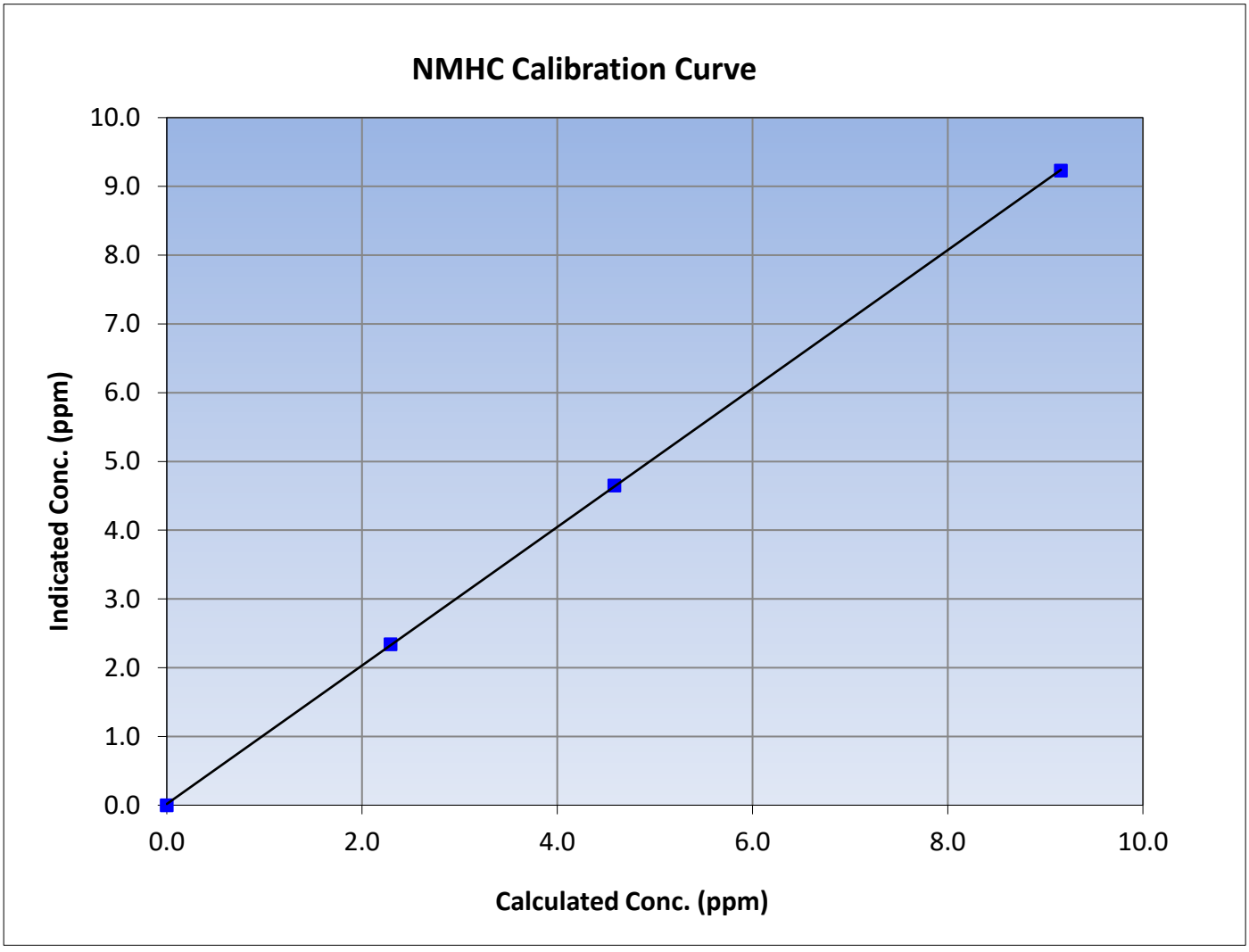
Version-06-2022

Station Information

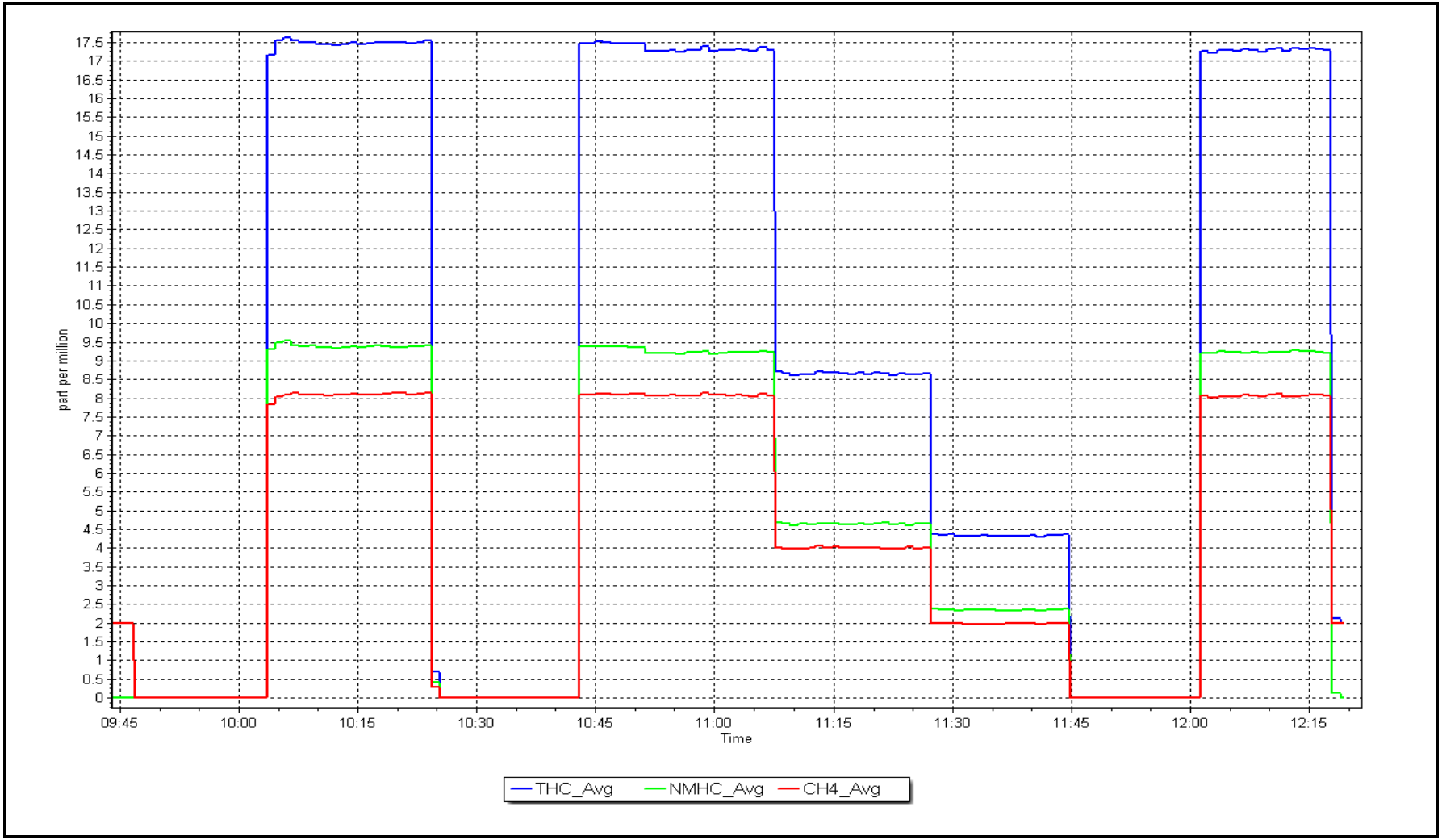
Calibration Date:	November 20, 2023	Previous Calibration:	October 17, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:45	End Time (MST):	12:19
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585648

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999982	≥0.995
9.16	9.23	0.9923			
4.59	4.65	0.9861	Slope	1.006983	0.90 - 1.10
2.29	2.34	0.9798			
			Intercept	0.017636	+/-0.5



NMHC Calibration Plot Date: November 20, 2023 Location: Fort Hills



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	November 28, 2023	Last Cal Date:	November 20, 2023
Start time (MST):	8:35	End time (MST):	10:05
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:	2.34E-04	2.34E-04	NMHC SP Ratio:	5.01E-05	5.01E-05
CH4 Retention time:	13.0	13.0	NMHC Peak Area:	183497	183497
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	80.3	17.19	17.06	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	17.19	17.30	0.994
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.994
Baseline Corr AF:	17.06	Prev response	17.30	*% change	-1.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	9.16	9.12	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	9.16	9.23	0.992
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.992
Baseline Corr AF:	9.12	Prev response	9.24	*% change	-1.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	8.03	7.94	1.012
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	8.03	8.07	0.995
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.995
Baseline Corr AF:	7.94	Prev response	8.06	*% change	-1.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

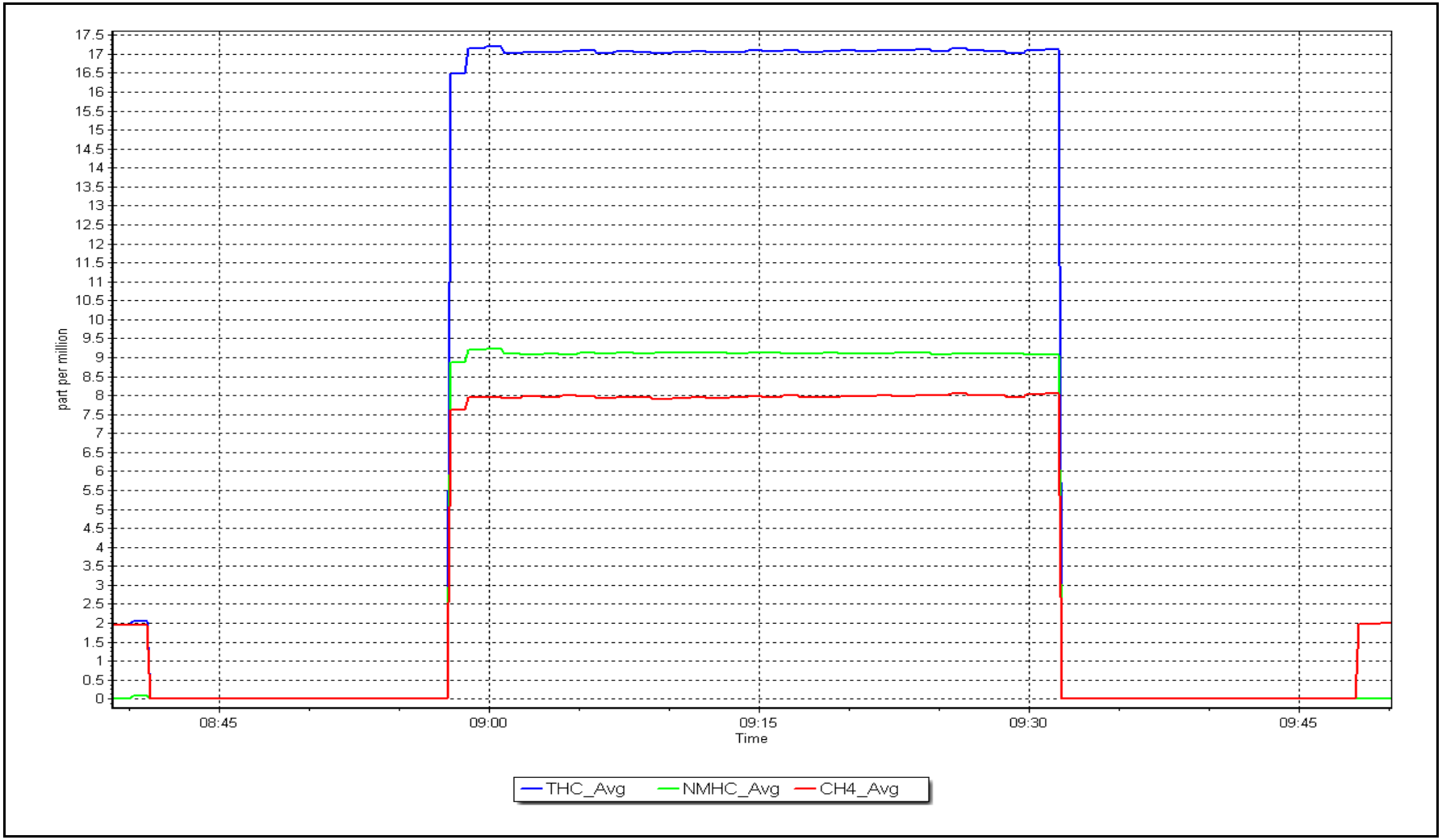
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.006220	1.006282
THC Cal Offset:	-0.002409	0.000000
CH4 Cal Slope:	1.005350	1.004640
CH4 Cal Offset:	-0.020045	0.000000
NMHC Cal Slope:	1.006983	1.007722
NMHC Cal Offset:	0.017636	0.000000

Notes: Nitrogen Cylinder Changed.

Calibration Performed By: Melissa Lemay

NMHC Calibration Plot Date: November 28, 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:	November 7, 2023	Last Cal Date:	October 11, 2023
Start time (MST):	7:35	End time (MST):	12:04
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:	1.089	1.089	NO bkgnd or offset:	3.3	3
NOX coeff or slope:	0.993	0.993	NOX bkgnd or offset:	3.8	3.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	161.6	161.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000322	1.003266
NO_X Cal Offset:	0.004208	0.024268
NO Cal Slope:	0.999781	1.001225
NO Cal Offset:	-0.956508	-1.036547
NO_2 Cal Slope:	1.002559	1.003745
NO_2 Cal Offset:	-0.119059	0.698395

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	-0.5	-0.1	----	----
as found span	4920	80.5	800.2	800.2	0.0	802.7	794.4	8.3	0.997	1.007
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
high point	4920	80.5	800.2	800.2	0.0	802.8	800.5	2.2	0.997	1.000
second point	4960	40.2	399.6	399.6	0.0	401.0	398.9	2.1	0.996	1.002
third point	4980	20.1	199.8	199.8	0.0	200.3	197.7	2.6	0.997	1.011
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
as left span	4920	80.5	800.2	447.8	352.4	802.1	447.9	354.4	0.998	1.000
								Average Correction Factor	0.997	1.004

Corrected As found	NO_X = 803.3 ppb	NO = 794.9 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = 0.4%
Previous Response	NO_X = 800.4 ppb	NO = 799.0 ppb		*Percent Change	NO = -0.5%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	799.9	447.5	352.4	354.3	0.995	100.5%
2nd GPT point (200 ppb O3)	799.9	625.1	174.8	175.9	0.994	100.6%
3rd GPT point (100 ppb O3)	799.9	711.3	88.6	90.6	0.978	102.3%
				Average Correction Factor	0.989	101.1%

Notes: No maintenance done. Zero adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

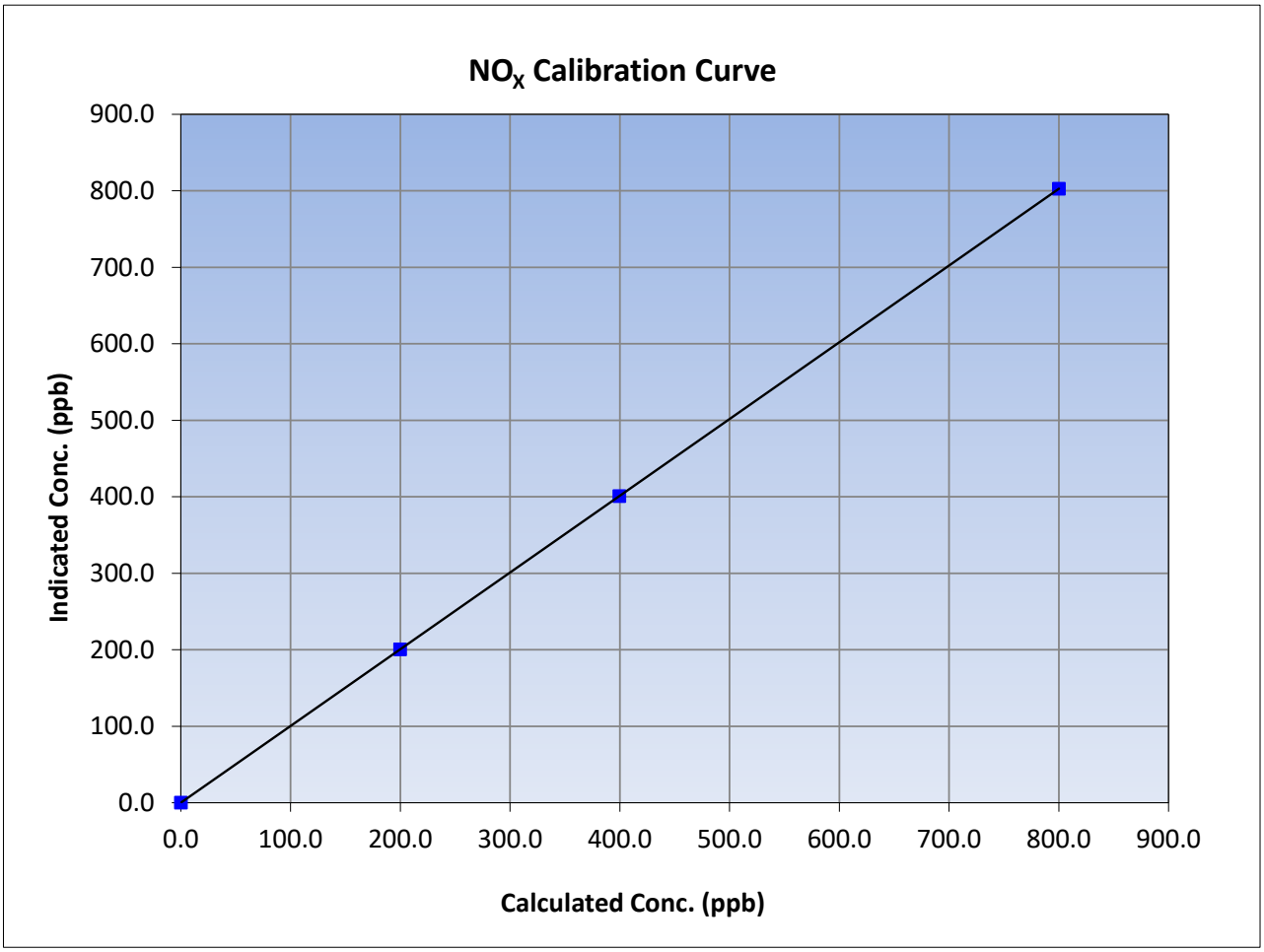
Version-04-2020

Station Information

Calibration Date:	November 7, 2023	Previous Calibration:	October 11, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	7:35	End Time (MST):	12:04
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.1	----	Correlation Coefficient	1.000000	*≥0.995*
800.2	802.8	0.9967			
399.6	401.0	0.9964	Slope	1.003266	*0.90 - 1.10*
199.8	200.3	0.9975			
			Intercept	0.024268	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

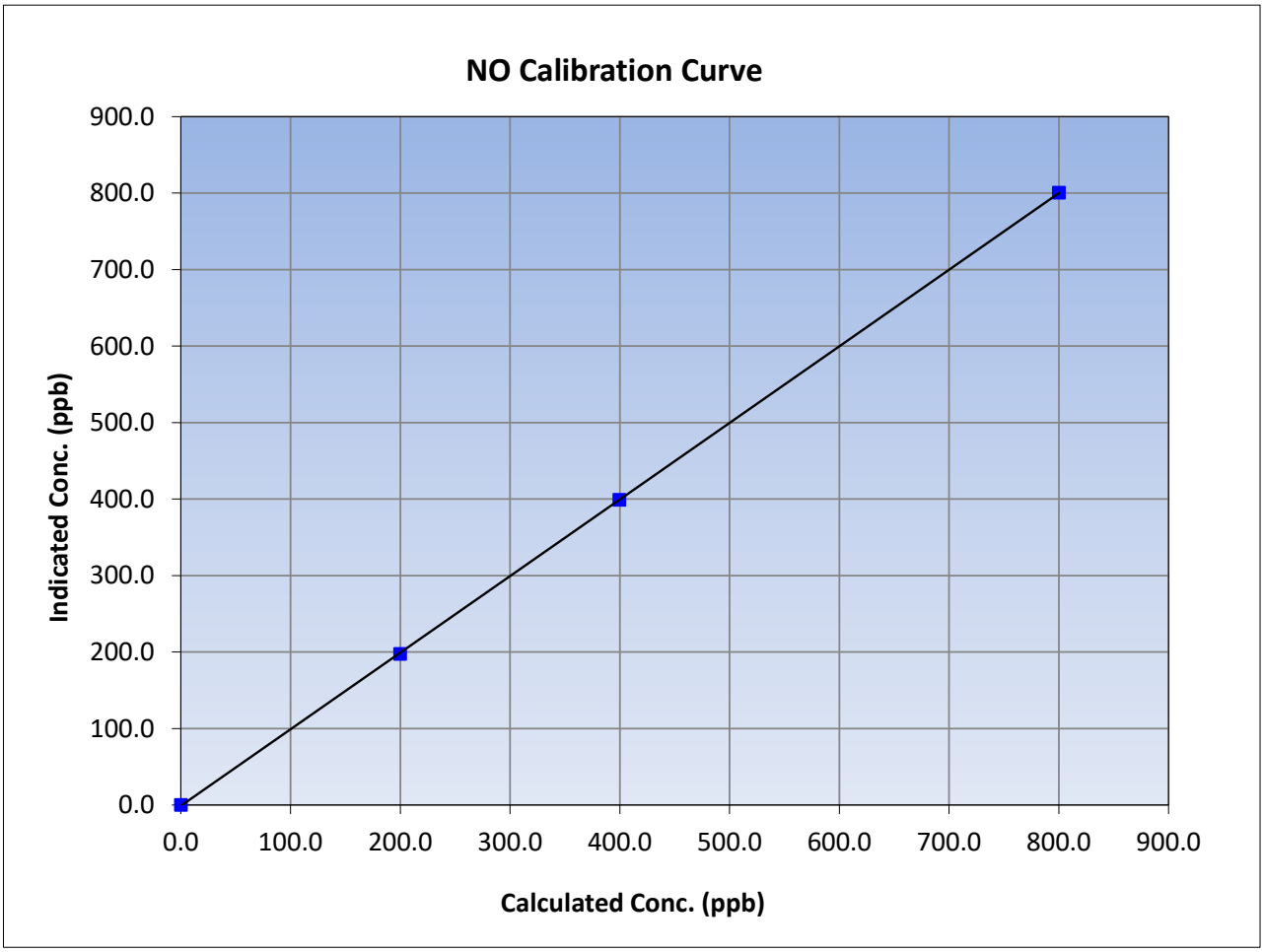
Version-04-2020

Station Information

Calibration Date:	November 7, 2023	Previous Calibration:	October 11, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	7:35	End Time (MST):	12:04
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	0.999992	≥0.995
800.2	800.5	0.9996			
399.6	398.9	1.0017	Slope	1.001225	0.90 - 1.10
199.8	197.7	1.0106			
			Intercept	-1.036547	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

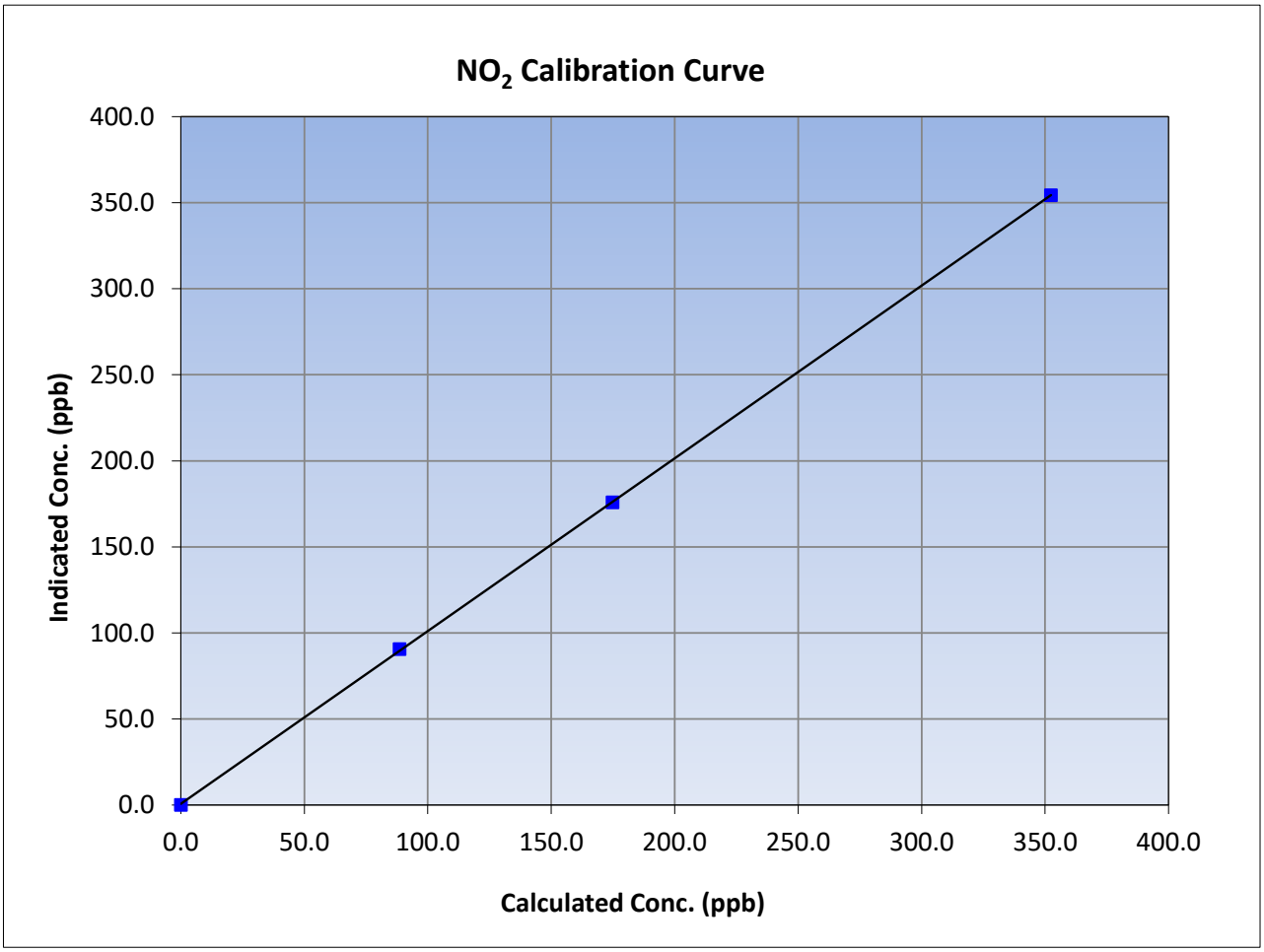
Version-04-2020

Station Information

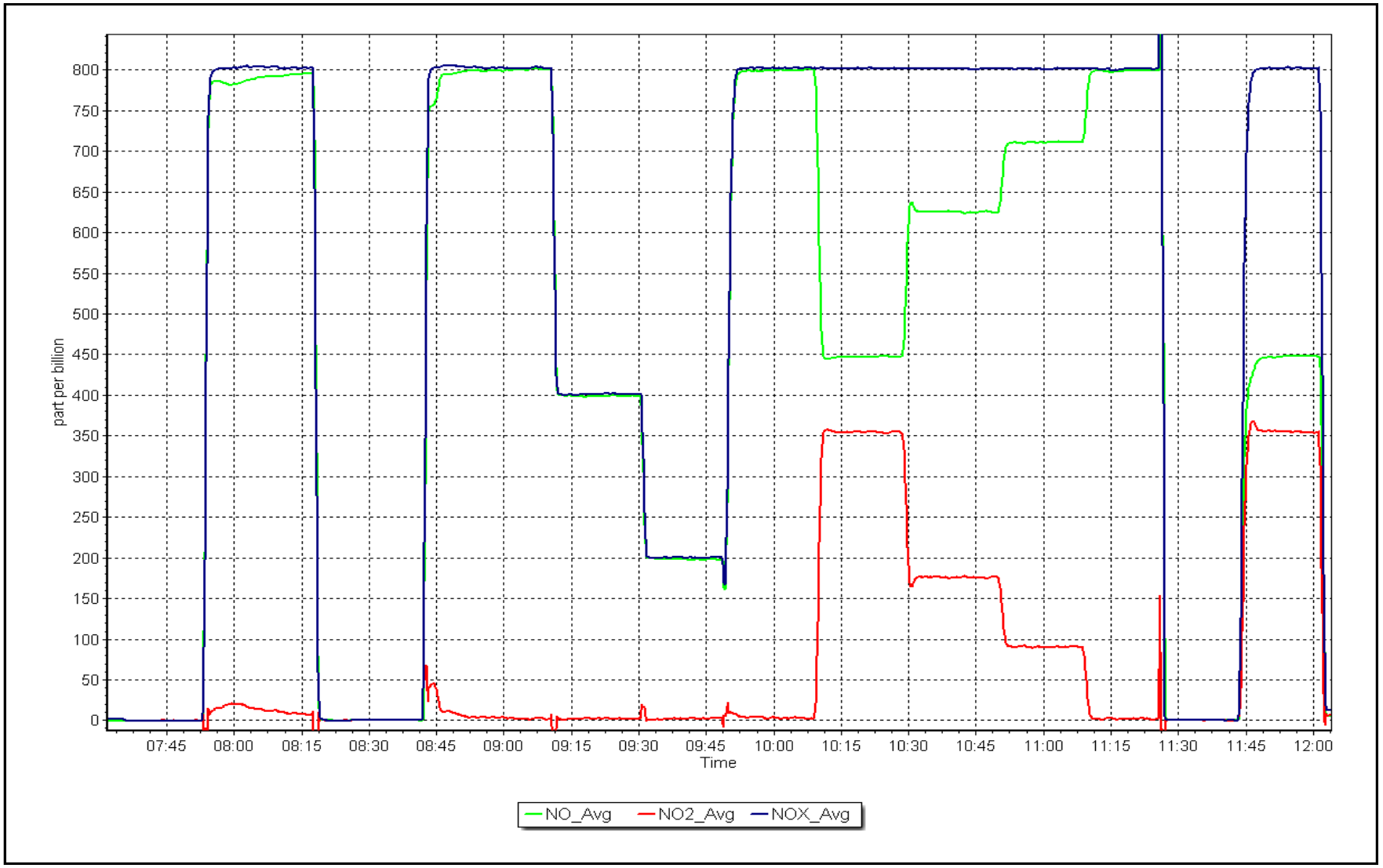
Calibration Date:	November 7, 2023	Previous Calibration:	October 11, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	7:35	End Time (MST):	12:04
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999980	≥0.995
352.4	354.3	0.9946			
174.8	175.9	0.9937	Slope	1.003745	0.90 - 1.10
88.6	90.6	0.9779			
			Intercept	0.698395	+/-20



NO_X Calibration Plot Date: November 7, 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:	November 20, 2023	Last Cal Date:	October 17, 2023
Start time (MST):	8:42	End time (MST):	9:44
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)	-7.1	-7.06	-7.1	☐	+/- 2 °C
P (mmHg)	740.1	739.97	740.1	☐	+/- 10 mmHg
flow (LPM)	5.00	5.13	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: November 20, 2023 Last Cal Date: October 17, 2023

PM w/o HEPA: 6.4 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	10.8	10.7	10.7	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 15.6 w/ HEPA: 0.0

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

Disposable Filter Changed: November 20, 2023

Annual Maintenance

Date Sample Tube Cleaned: October 17, 2023

Date RH/T Sensor Cleaned: October 17, 2023

Notes: Leak check passed before and after cleaning. No adjustments done. Head cleaned. Low memory Warning before cleaning, disappeared after cleaning.

Calibration by: Melissa Lemay

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS25
WASKŌW OHCI PIMÂTISIWIN
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Waskow ohci Pimatisiwin	Station number:	AMS25
Calibration Date:	November 21, 2023	Last Cal Date:	October 19, 2023
Start time (MST):	10:35	End time (MST):	13:35
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:	0.998007	0.995565	Backgd or Offset:	9.9	9.9
Calibration intercept:	0.803956	0.584063	Coeff or Slope:	1.001	1.011

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.4	----
as found span	4921	79.2	800.5	789.0	1.015
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.7	----
high point	4921	79.2	800.5	797.6	1.004
second point	4960	39.6	400.3	399.1	1.003
third point	4980	19.8	200.1	199.7	1.002
as left zero	5000	0.0	0.0	0.8	----
as left span	4921	79.2	800.5	796.6	1.005
				Average Correction Factor	1.003

Baseline Corr As found:	788.60	Previous response	799.73	*% change	-1.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

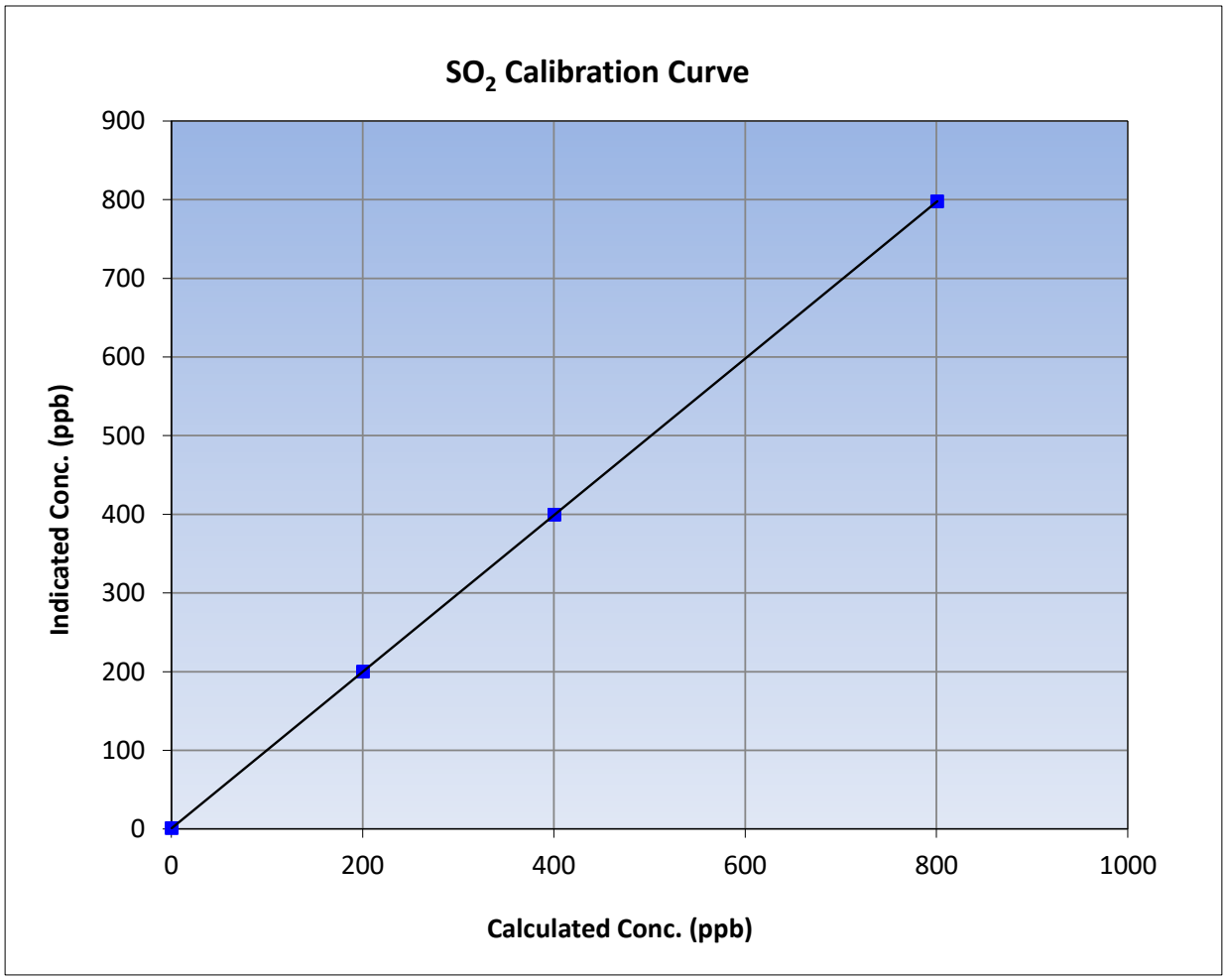
Station Information

Calibration Date:	November 21, 2023	Previous Calibration:	October 19, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	10:35	End Time (MST):	13:35
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148497

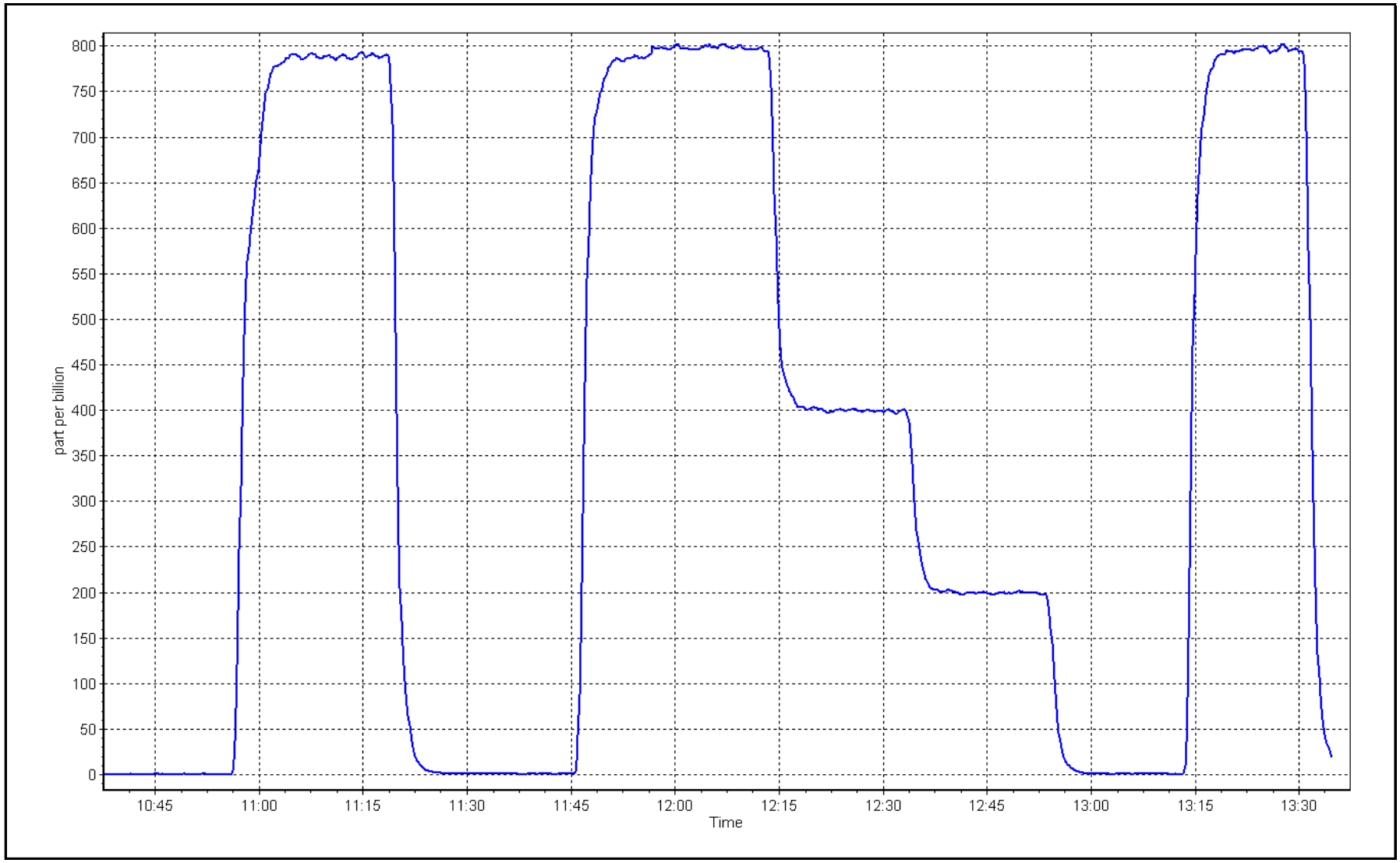
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.7	----
800.5	797.6	1.0037
400.3	399.1	1.0030
200.1	199.7	1.0022

Statistical Evaluation		Limits
Correlation Coefficient	1.000000	≥0.995
Slope	0.995565	0.90 - 1.10
Intercept	0.584063	+/-30



SO2 Calibration Plot Date: November 21, 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:	November 24, 2023	Last Cal Date:	October 20, 2023
Start time (MST):	7:08	End time (MST):	11:52
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:	1.004258	0.998073	Backgd or Offset:	3.30	3.30
Calibration intercept:	0.140000	0.180000	Coeff or Slope:	1.108	1.108

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4920	80.0	79.5	79.7	0.997
as found 2nd point	4960	40.0	39.7	40.0	0.993
as found 3rd point	4980	20.0	19.9	20.0	0.993
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4920	80.0	79.5	79.4	1.001
second point	4960	40.0	39.7	40.0	0.993
third point	4980	20.0	19.9	20.0	0.993
as left zero	5000	0.0	0.0	0.2	----
as left span	4920	80.0	800.0	795.1	1.006
SO2 Scrubber Check	4921	79.2	800.0	0.0	----
Date of last scrubber change:		20-Jun-23		Ave Corr Factor	0.996
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.7	Prev response:	79.93	*% change:	-0.3%
Baseline Corr 2nd AF pt:	40.0	AF Slope:	1.002963	AF Intercept:	0.060000
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999996		

* = > +/-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

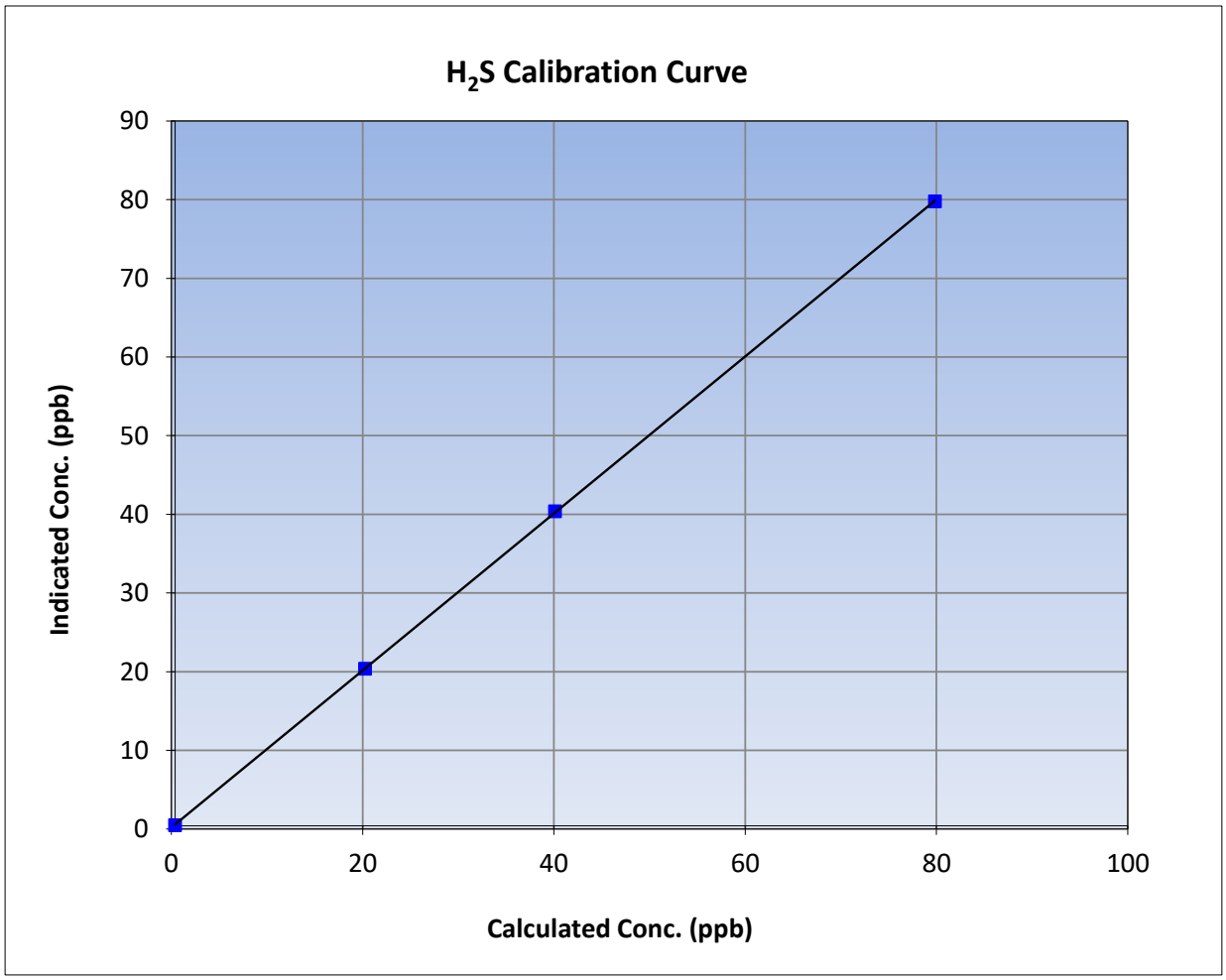
Station Information

Calibration Date:	November 24, 2023	Previous Calibration:	October 20, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	7:08	End Time (MST):	11:52
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1170050146

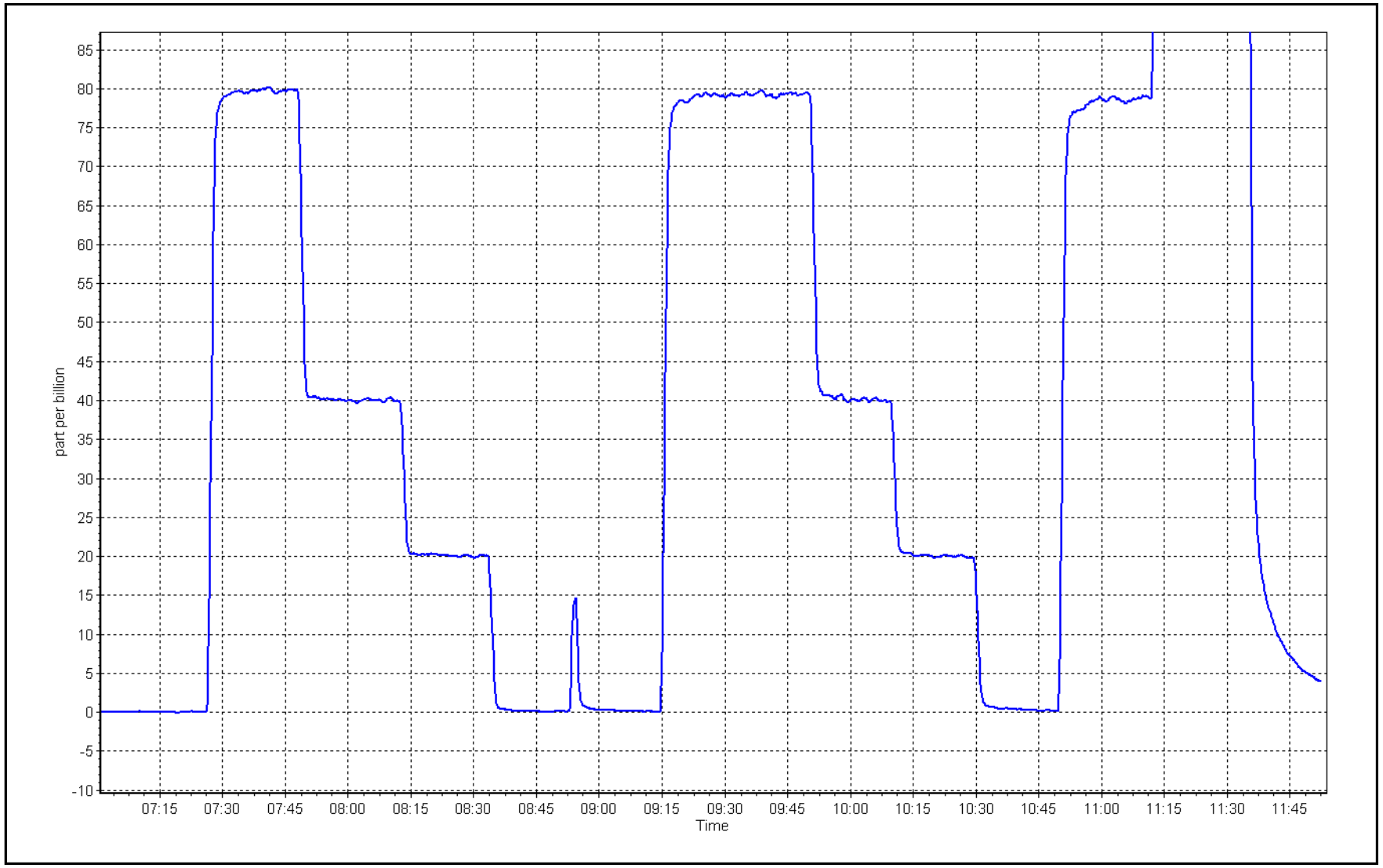
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
79.5	79.4	1.0007
39.7	40.0	0.9932
19.9	20.0	0.9932

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999988	*≥0.995*
Slope	0.998073	*0.90 - 1.10*
Intercept	0.180000	*+/-3*



H_2S Calibration Plot Date: November 24, 2023 Location: Waskow ohci Pimatisiwin



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS26
CHRISTINA LAKE
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Christina Lake	Station number:	AMS 26
Calibration Date:	November 29, 2023	Last Cal Date:	October 26, 2023
Start time (MST):	9:12	End time (MST):	12:00
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:	281
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:	1.010565	0.999235	Backgd or Offset:	16.0	15.6
Calibration intercept:	-1.377444	0.269171	Coeff or Slope:	0.900	0.868

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	1.0	----
as found span	4931	80.9	800.0	826.2	0.968
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	1.2	----
high point	4931	80.9	800.0	800.1	1.000
second point	4970	40.5	400.6	400.1	1.001
third point	4994	20.4	201.6	200.8	1.004
as left zero	5000	0.0	0.0	1.1	----
as left span	4929	80.9	800.3	800.4	1.000
				Average Correction Factor	1.002

Baseline Corr As found:	825.20	Previous response	807.05	*% change	2.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif and Jan Castro

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

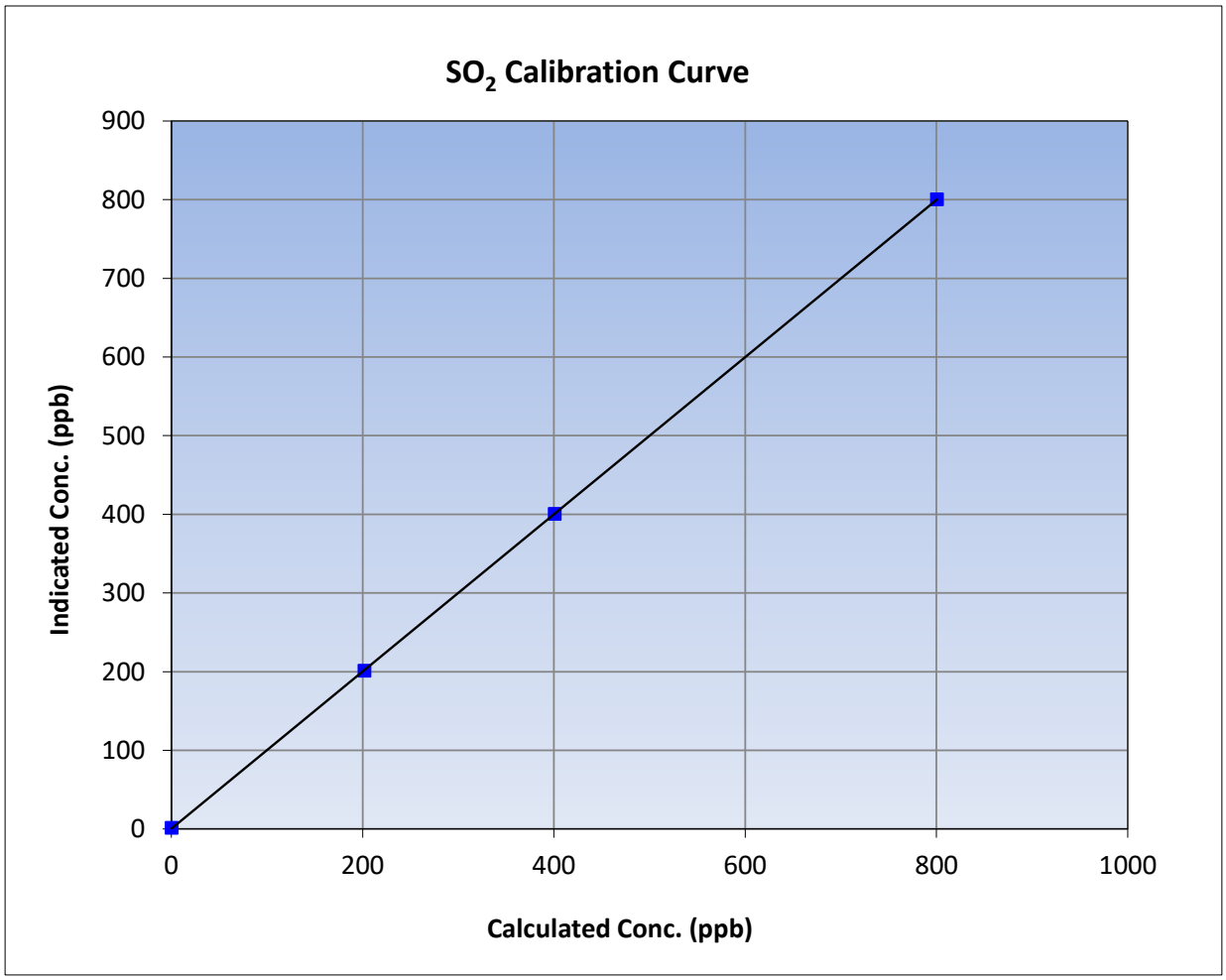
Station Information

Calibration Date:	November 29, 2023	Previous Calibration:	October 26, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	9:12	End Time (MST):	12:00
Analyzer make:	Thermo 43i	Analyzer serial #:	1173410001

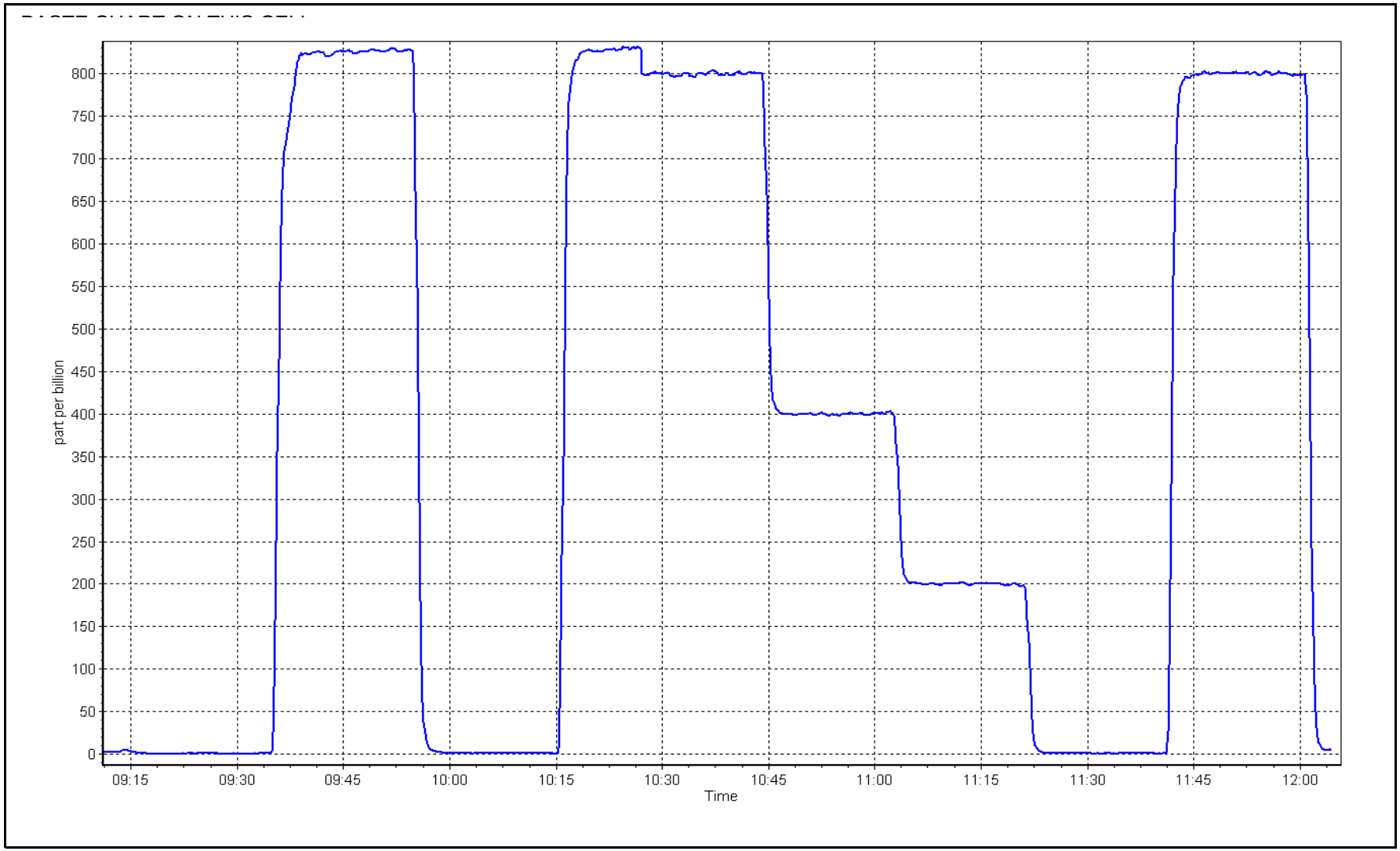
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	1.2	----
800.0	800.1	0.9998
400.6	400.1	1.0012
201.6	200.8	1.0041

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999994	*≥0.995*
Slope	0.999235	*0.90 - 1.10*
Intercept	0.269171	*+/-30*



SO2 Calibration Plot Date: November 29, 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:	November 29, 2023	Last Cal Date:	October 27, 2023
Start time (MST):	12:06	End time (MST):	15:56
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:	281
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:	0.992122	1.002002	Backgd or Offset:	33.6	33.9
Calibration intercept:	0.528176	0.607400	Coeff or Slope:	1.060	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	0.3	----
as found span	4930	81.9	79.9	81.2	0.988
as found 2nd point	4972	41.0	40.0	41.1	0.980
as found 3rd point	4994	20.6	20.1	20.8	0.980
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.6	----
high point	4930	81.9	79.9	80.7	0.990
second point	4972	41.0	40.0	40.6	0.985
third point	4994	20.6	20.1	20.8	0.966
as left zero	5000	0.0	0.0	0.7	----
as left span	4926	81.9	80.0	81.5	0.981
SO2 Scrubber Check	4931	80.9	807.1	0.1	----
Date of last scrubber change:		27-Feb-19		Ave Corr Factor	0.980
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.9	Prev response:	79.81	*% change:	1.4%
Baseline Corr 2nd AF pt:	40.8	AF Slope:	1.012163	AF Intercept:	0.426783
Baseline Corr 3rd AF pt:	20.5	AF Correlation:	0.999981		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after MAF's. Ran scrubber check after calibrator zero passed. No adjustment made.

Calibration Performed By: Mohammed Kashif and Jan Castro

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

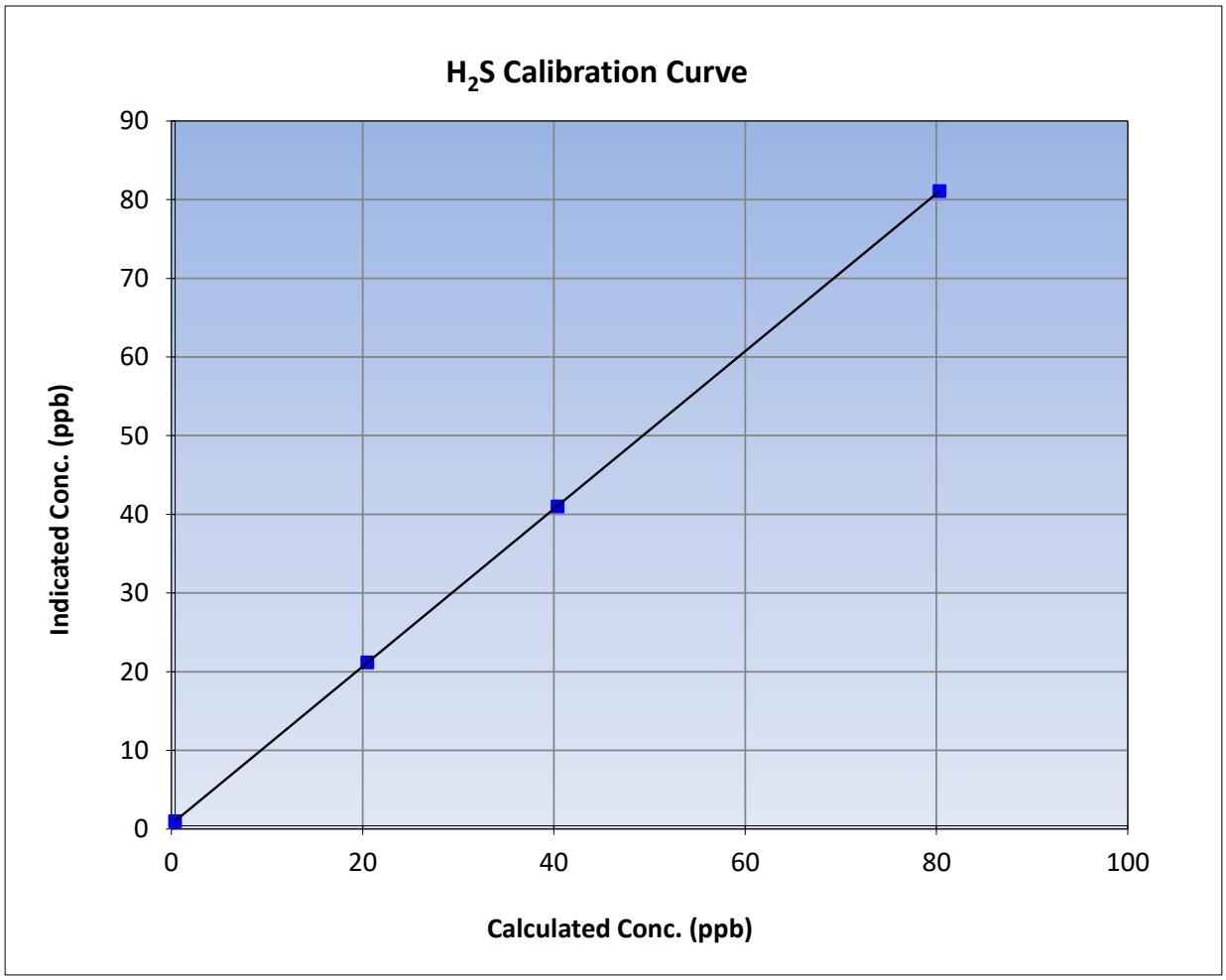
Station Information

Calibration Date:	November 29, 2023	Previous Calibration:	October 27, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	12:06	End Time (MST):	15:56
Analyzer make:	Thermo 450i	Analyzer serial #:	1180030032

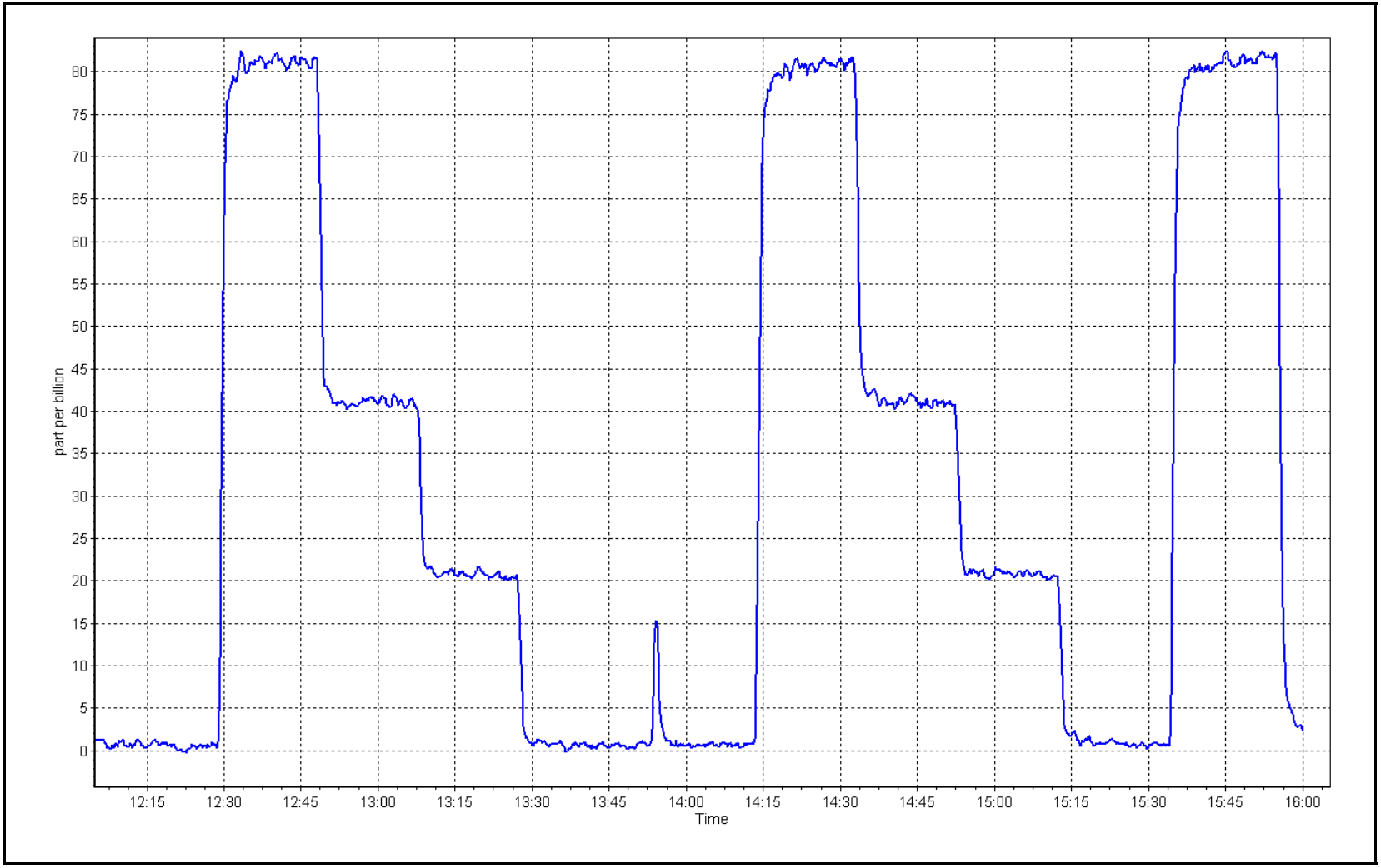
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.6	----
79.9	80.7	0.9902
40.0	40.6	0.9851
20.1	20.8	0.9658

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999997	*≥0.995*
Slope	1.002002	*0.90 - 1.10*
Intercept	0.607400	*+/-3*



H_2S Calibration Plot Date: November 29, 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:	November 28, 2023	Last Cal Date:	October 26, 2023
Start time (MST):	13:26	End time (MST):	18:03
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:	3253	
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:	1.300	1.300	NO bkgnd or offset:	2.5	2.5
NOX coeff or slope:	0.997	0.997	NOX bkgnd or offset:	3.2	3.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	162.5	160.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001847	0.994041
NO_X Cal Offset:	-0.048939	0.380000
NO Cal Slope:	1.001247	0.993160
NO Cal Offset:	-0.399872	0.280000
NO_2 Cal Slope:	1.005662	1.004527
NO_2 Cal Offset:	-0.810879	-0.038830

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	-0.1	-0.7	----	----
as found span	4920	80.0	813.1	800.3	12.8	809.0	794.7	14.8	1.0051	1.0071
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.6	0.0	-0.7	----	----
high point	4920	80.0	813.1	800.3	12.8	808.0	795.0	12.6	1.0063	1.0067
second point	4960	40.0	406.6	400.2	6.4	405.5	397.8	7.7	1.0026	1.0059
third point	4980	20.0	203.3	200.1	3.2	203.1	199.3	3.8	1.0009	1.0039
as left zero	5000	0.0	0.0	0.0	0.0	-0.7	0.0	-0.6	----	----
as left span	4920	80.0	813.1	411.6	401.5	807.0	408.3	398.3	1.0076	1.0081
								Average Correction Factor	1.0033	1.0055

Corrected As found	NO_X = 809.8 ppb	NO = 794.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -0.6%
Previous Response	NO_X = 814.6 ppb	NO = 800.9 ppb		*Percent Change	NO = -0.8%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	791.8	403.1	401.5	403.1	0.9960	100.4%
2nd GPT point (200 ppb O3)	791.8	596.4	208.2	208.9	0.9966	100.3%
3rd GPT point (100 ppb O3)	791.8	695.2	109.4	110.9	0.9865	101.4%
				Average Correction Factor	0.9931	100.7%

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

Calibration Performed By: Mohammed Kashif and Jan Castro

Wood Buffalo Environmental Association

NO_X Calibration Summary

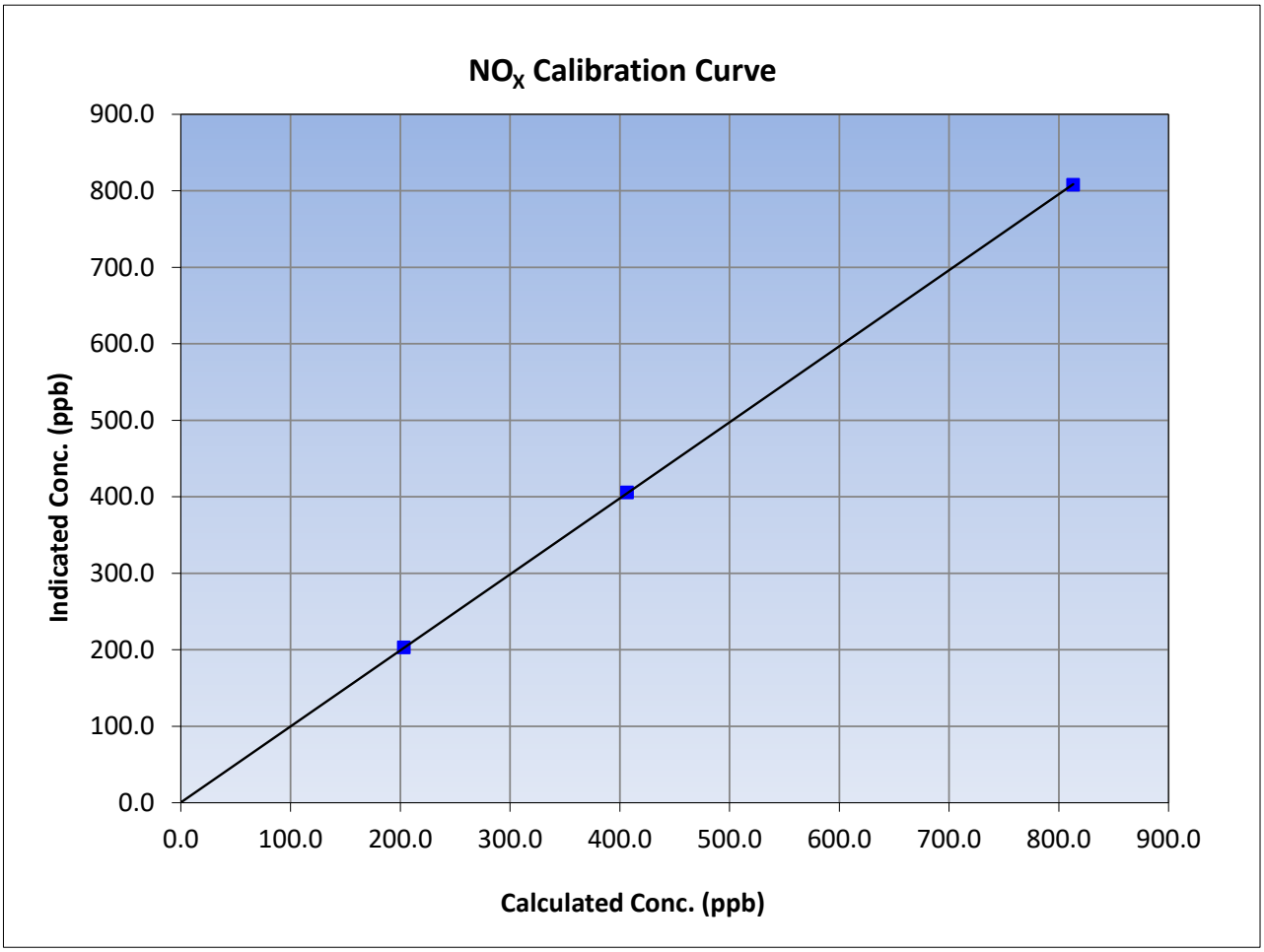
Version-04-2020

Station Information

Calibration Date:	November 28, 2023	Previous Calibration:	October 26, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	13:26	End Time (MST):	18:03
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	-0.6	----	Correlation Coefficient	0.999992	*≥0.995*
813.1	808.0	1.0063			
406.6	405.5	1.0026	Slope	0.994041	*0.90 - 1.10*
203.3	203.1	1.0009			
			Intercept	0.380000	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

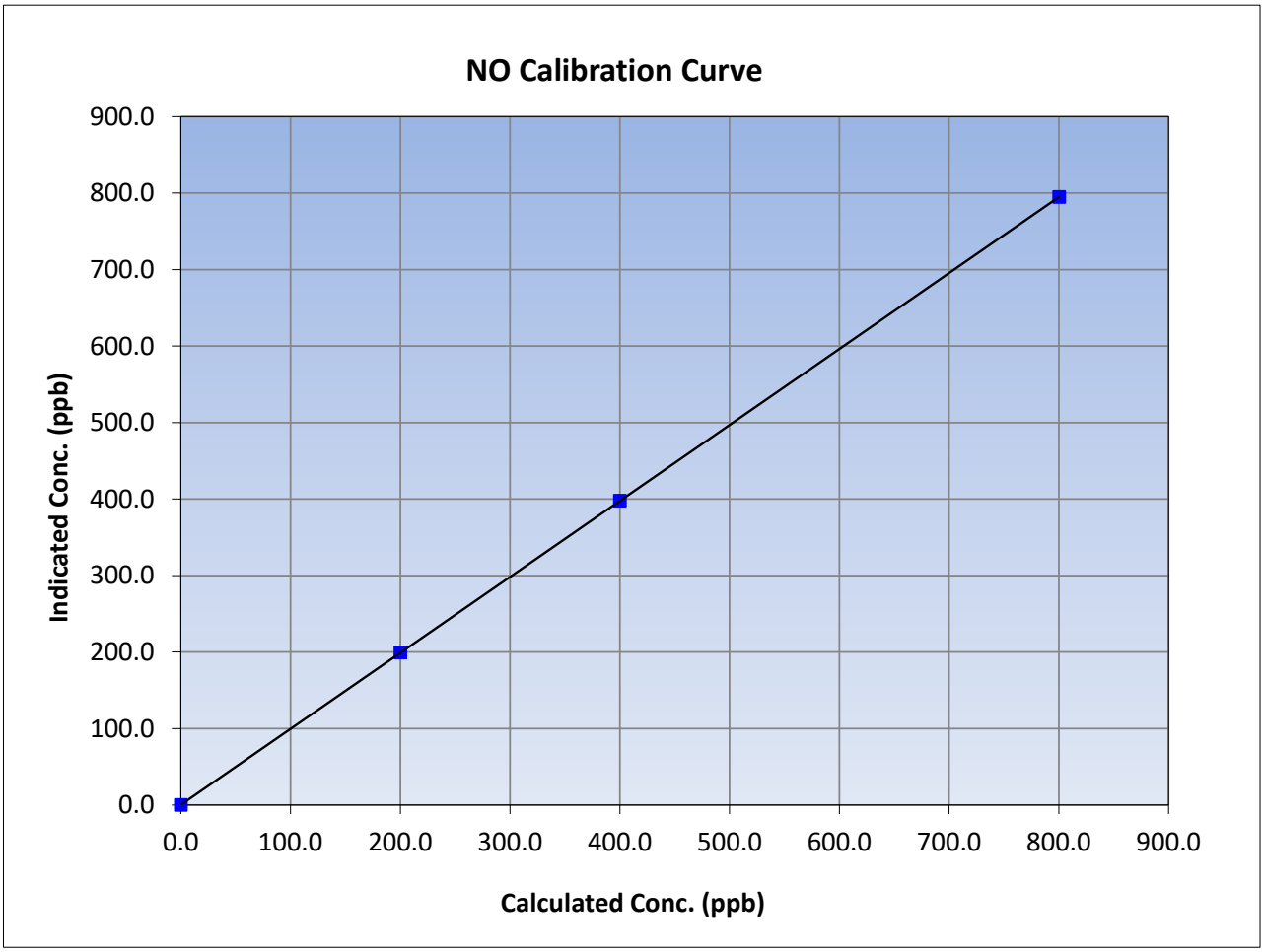
Version-04-2020

Station Information

Calibration Date:	November 28, 2023	Previous Calibration:	October 26, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	13:26	End Time (MST):	18:03
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	0.999999	≥0.995
800.3	795.0	1.0067			
400.2	397.8	1.0059	Slope	0.993160	0.90 - 1.10
200.1	199.3	1.0039			
			Intercept	0.280000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

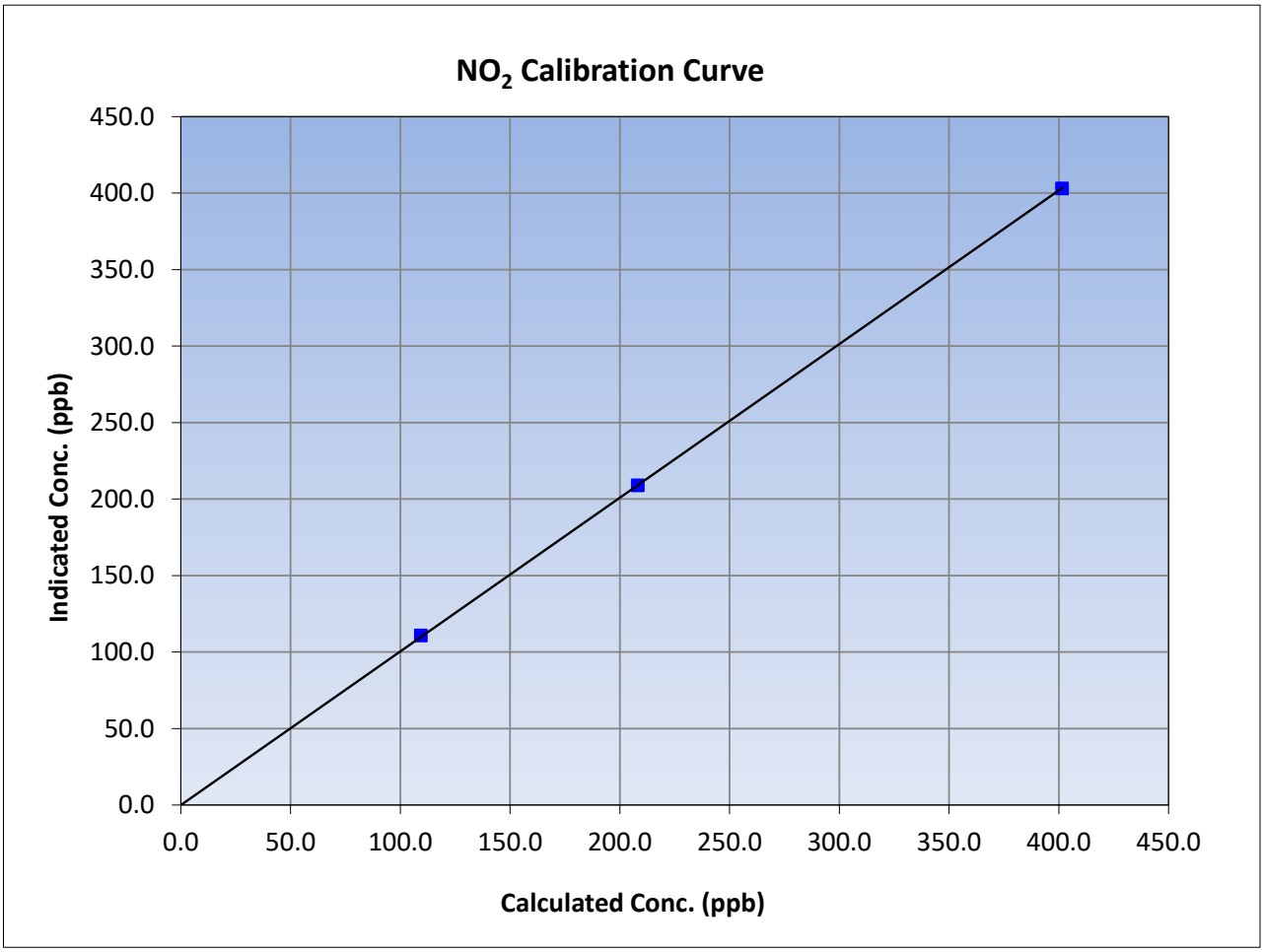
Version-04-2020

Station Information

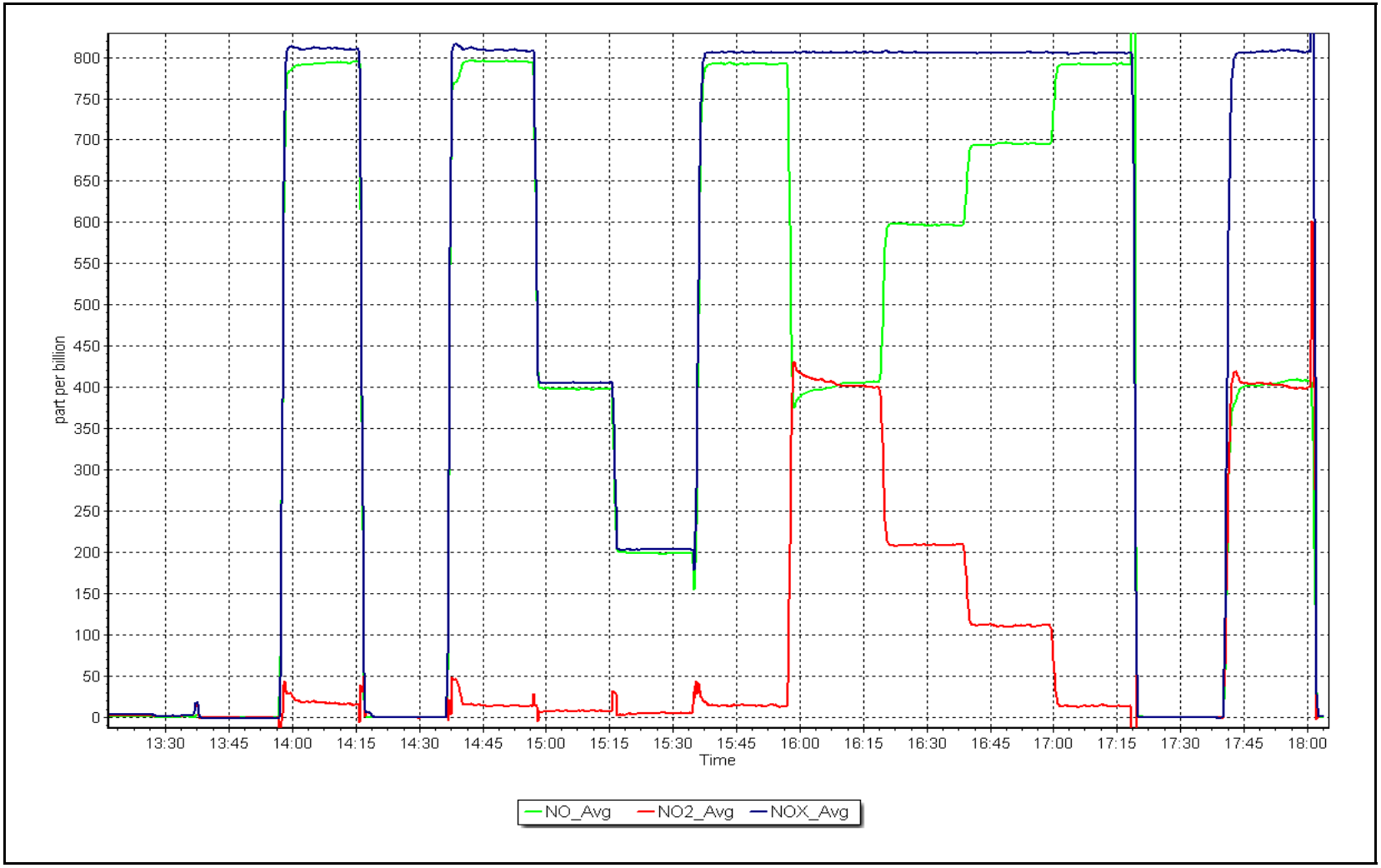
Calibration Date:	November 28, 2023	Previous Calibration:	October 26, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	13:26	End Time (MST):	18:03
Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.7	----	Correlation Coefficient	0.999982	≥0.995
401.5	403.1	0.9960			
208.2	208.9	0.9966	Slope	1.004527	0.90 - 1.10
109.4	110.9	0.9865			
			Intercept	-0.038830	+/-20



NO_X Calibration Plot Date: November 28, 2023 Location: Christina Lake



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS27
JACKFISH 2/3
NOVEMBER 2023

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

December 22, 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:	November 14, 2023	Last Cal Date:	October 18, 2023
Start time (MST):	12:25	End time (MST):	16:05
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:	0.999819	0.999320	Backgd or Offset:	7.3	7.7
Calibration intercept:	-2.538114	-2.038541	Coeff or Slope:	0.900	0.950

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4921	79.1	800.2	756.0	1.058
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4921	79.1	800.2	798.8	1.002
second point	4961	39.5	399.5	395.9	1.009
third point	4980	19.8	200.3	195.9	1.022
as left zero	5000	0.0	0.0	0.2	----
as left span	4921	79.1	800.2	800.3	1.000
				Average Correction Factor	1.011

Baseline Corr As found:	755.90	Previous response	797.48	*% change	-5.5%
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 sample inlet filter after as founds. Adjusted span only.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

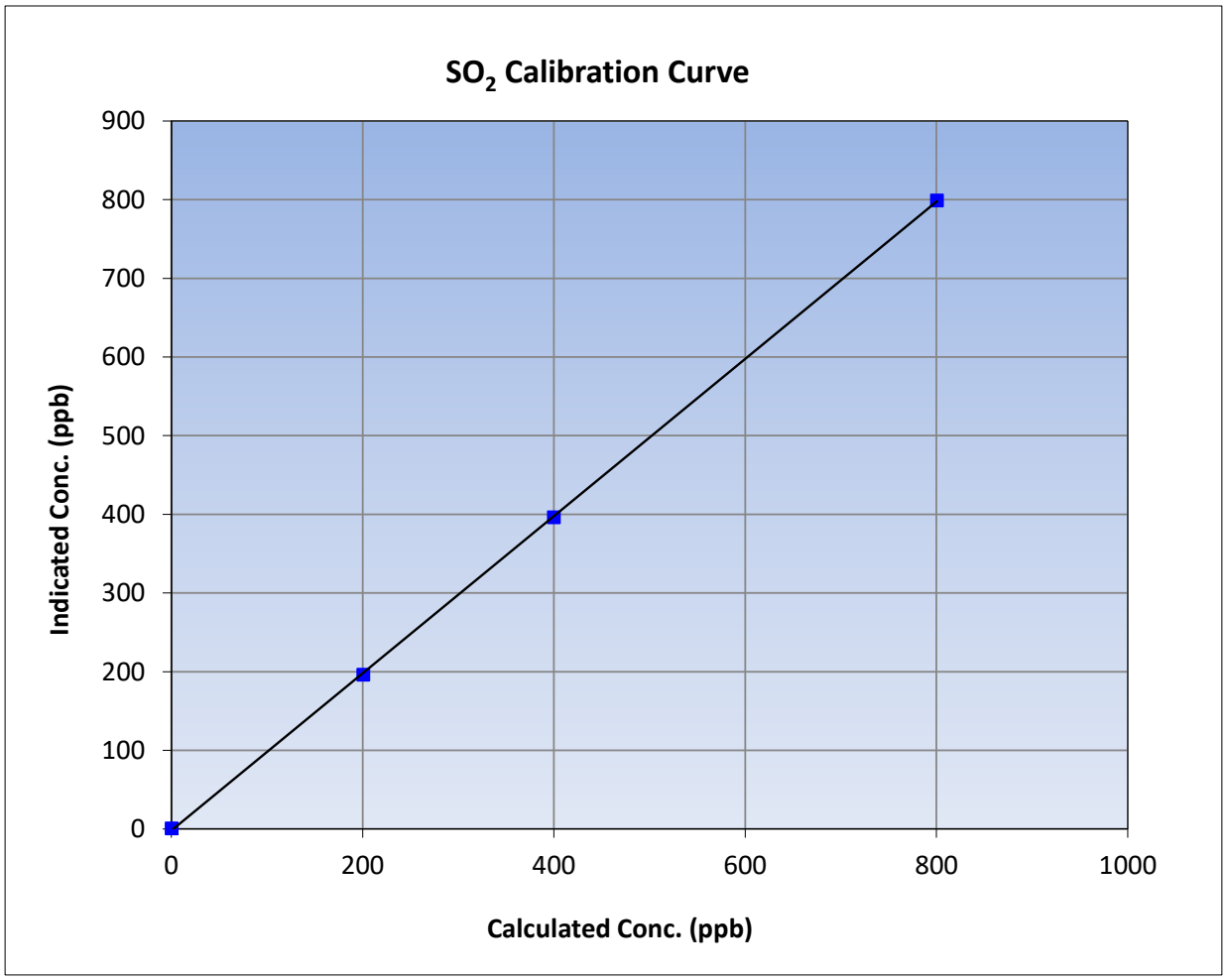
Station Information

Calibration Date:	November 14, 2023	Previous Calibration:	October 18, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS 27
Start Time (MST):	12:25	End Time (MST):	16:05
Analyzer make:	Thermo 43iQ	Analyzer serial #:	12124313138

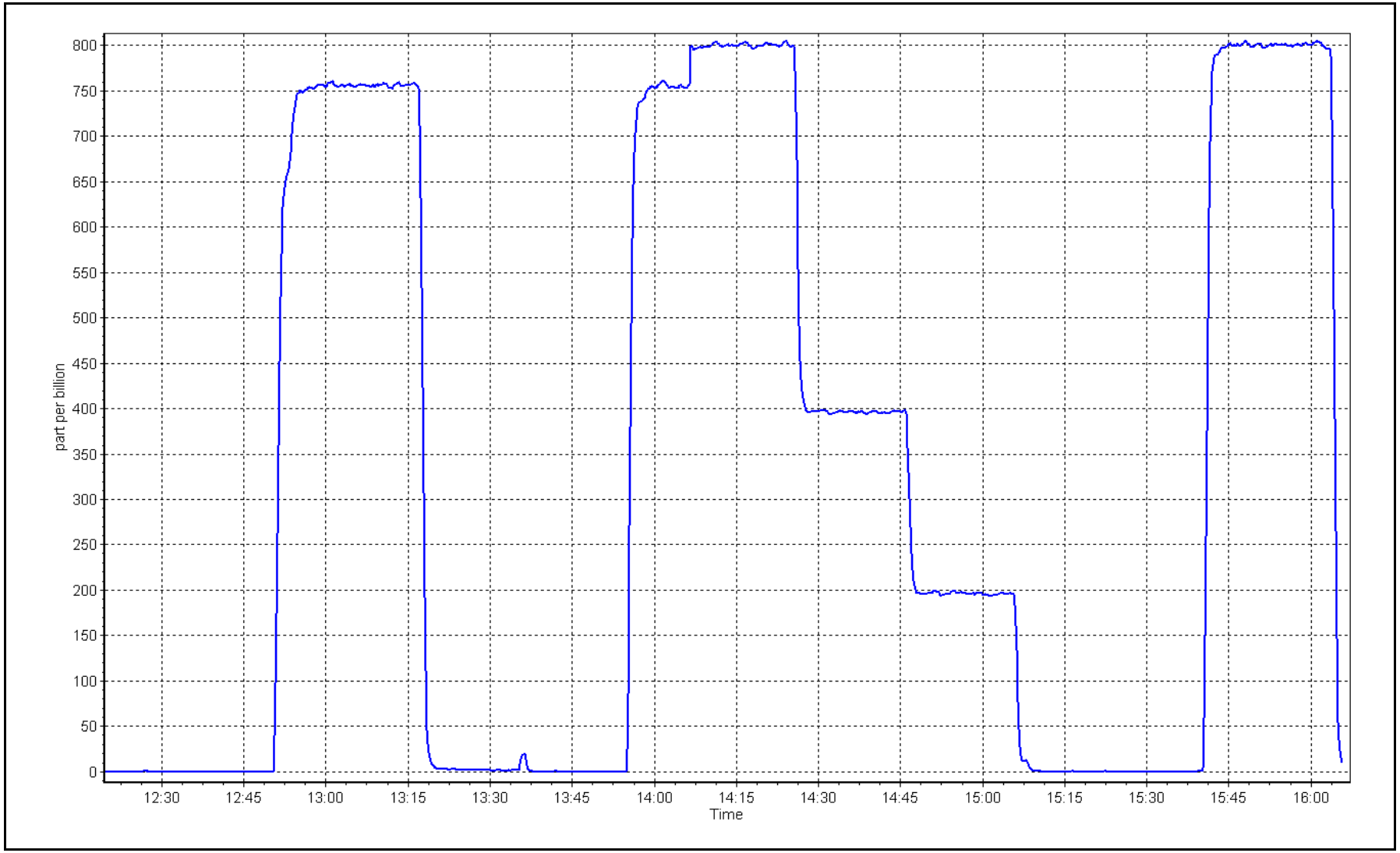
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
800.2	798.8	1.0017
399.5	395.9	1.0092
200.3	195.9	1.0225

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999961	*≥0.995*
Slope	0.999320	*0.90 - 1.10*
Intercept	-2.038541	*+/-30*



SO2 Calibration Plot Date: November 14, 2023 Location: Jackfish 2/3



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Jackfish 2/3	Station number:	AMS27
Calibration Date:	November 15, 2023	Last Cal Date:	October 17, 2023
Start time (MST):	9:05	End time (MST):	14:24
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:	1.010889	0.996209	Backgd or Offset:	29.9	29.9
Calibration intercept:	-0.037634	-0.098000	Coeff or Slope:	0.928	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	0.3	----
as found span	4926	74.1	80.2	80.9	0.995
as found 2nd point	4963	37.0	40.0	40.3	1.001
as found 3rd point	4982	18.5	20.0	19.9	1.021
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4926	74.1	80.2	79.8	1.005
second point	4963	37.0	40.0	39.9	1.003
third point	4982	18.5	20.0	19.5	1.026
as left zero	5000	0.0	0.0	0.2	----
as left span	4926	74.1	80.2	80.5	0.996
SO2 Scrubber Check	4921	79.1	791.0	0.1	----
Date of last scrubber change:				Ave Corr Factor	1.011
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.6	Prev response:	81.01	*% change:	-0.5%
Baseline Corr 2nd AF pt:	40.0	AF Slope:	1.007187	AF Intercept:	0.042159
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999952		

* = > +/-5% change initiates investigation

Notes: Changed the sample inlet filter after as founds. Completed a 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

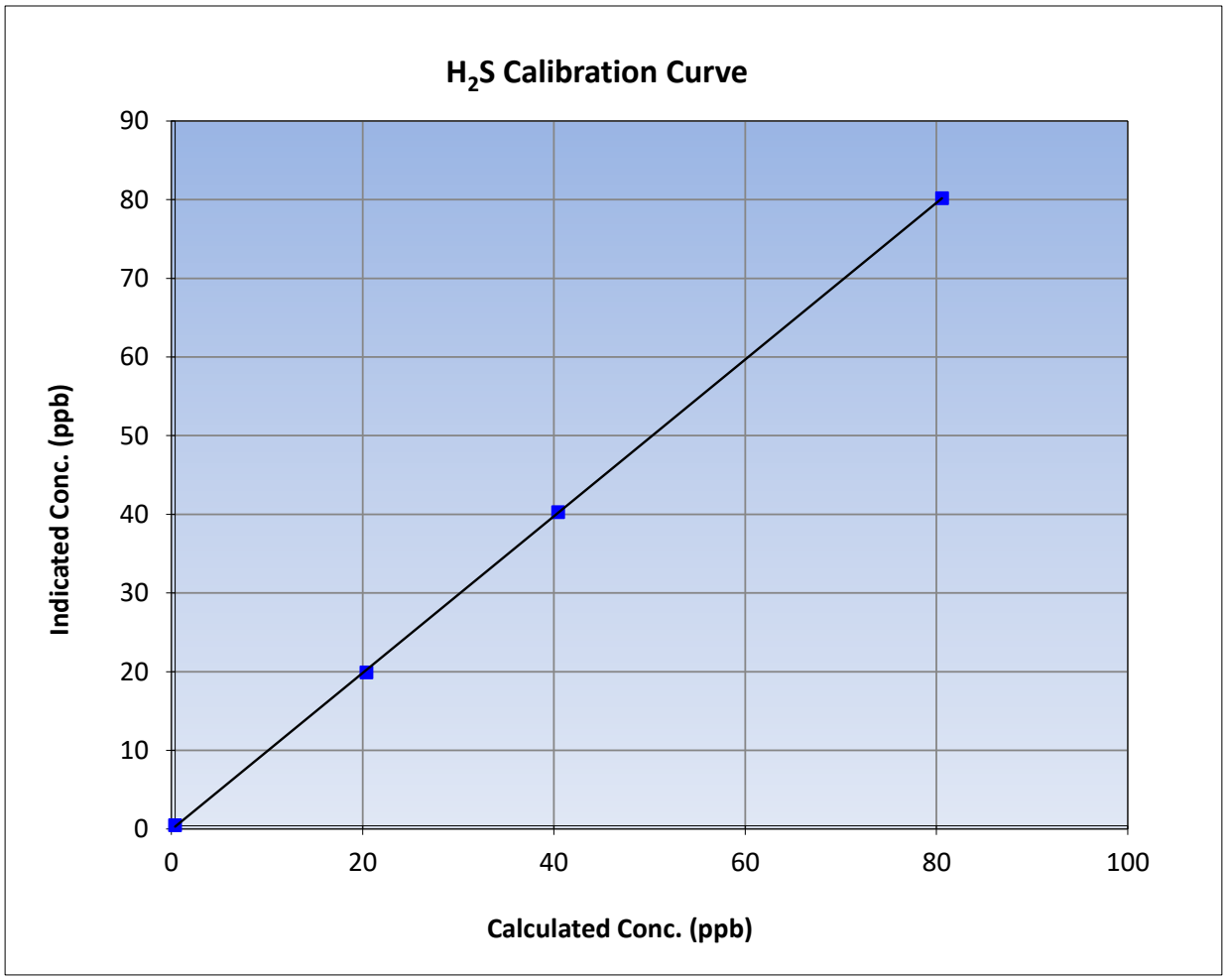
Station Information

Calibration Date:	November 15, 2023	Previous Calibration:	October 17, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:05	End Time (MST):	14:24
Analyzer make:	API T101	Analyzer serial #:	621

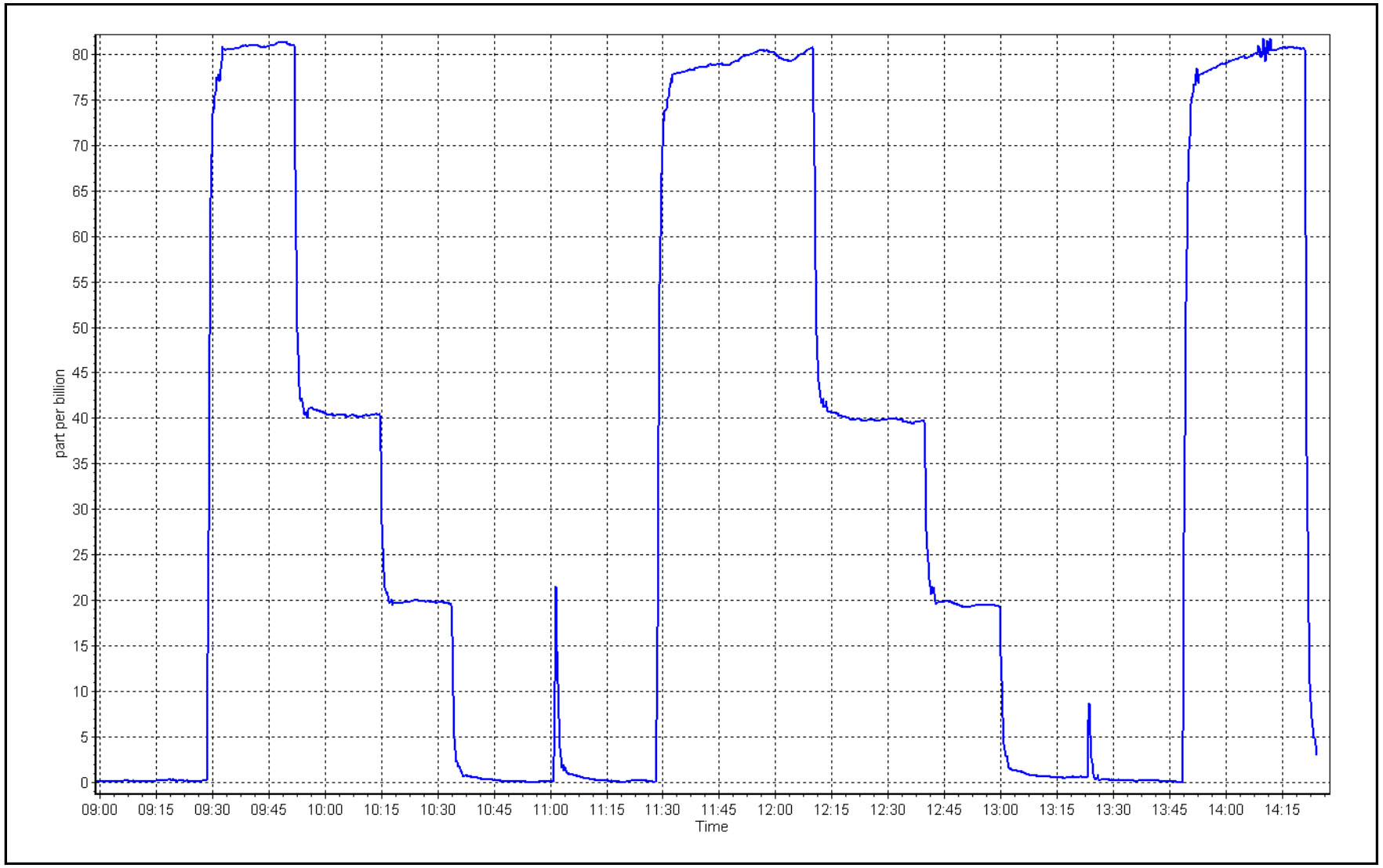
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.2	79.8	1.0047
40.0	39.9	1.0034
20.0	19.5	1.0264

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999951	*≥0.995*
Slope	0.996209	*0.90 - 1.10*
Intercept	-0.098000	*+/-3*



H_2S Calibration Plot Date: November 15, 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:	November 9, 2023	Last Cal Date:	October 19, 2023
Start time (MST):	10:33	End time (MST):	15:39
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:	1.123	1.123	NO bkgnd or offset:	0.3	0.3
NOX coeff or slope:	1.110	1.110	NOX bkgnd or offset:	1.2	1.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	7.6	9.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.995490	1.005005
NO_X Cal Offset:	-2.256328	-2.855689
NO Cal Slope:	0.998987	1.007782
NO Cal Offset:	-2.840289	-2.818947
NO_2 Cal Slope:	0.999566	0.986277
NO_2 Cal Offset:	-0.710230	0.637074

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.4	-0.1	----	----
as found span	4921	79.4	816.8	800.3	16.5	817.6	801.1	16.5	0.9990	0.9990
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.1	-0.2	----	----
high point	4921	79.4	816.8	800.3	16.5	819.5	805.3	14.2	0.9967	0.9938
second point	4960	39.7	408.5	400.2	8.3	406.0	398.6	7.4	1.0061	1.0040
third point	4980	19.8	203.7	199.6	4.1	199.3	195.7	3.6	1.0221	1.0199
as left zero	5000	0.0	0.0	0.0	0.0	-0.5	0.1	-0.6	----	----
as left span	4921	79.4	816.8	424.1	405.2	816.1	423.3	392.7	1.0009	1.0019
								Average Correction Factor	1.0083	1.0059

Corrected As found	NO_X = 818.1 ppb	NO = 801.5 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.9%
Previous Response	NO_X = 810.9 ppb	NO = 796.6 ppb		*Percent Change	NO =	0.6%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	805.7	417.0	405.2	399.8	1.0135	98.7%
2nd GPT point (200 ppb O3)	805.7	628.7	193.5	192.2	1.0068	99.3%
3rd GPT point (100 ppb O3)	805.7	722.1	100.1	100.0	1.0011	99.9%
				Average Correction Factor	1.0072	99.3%

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

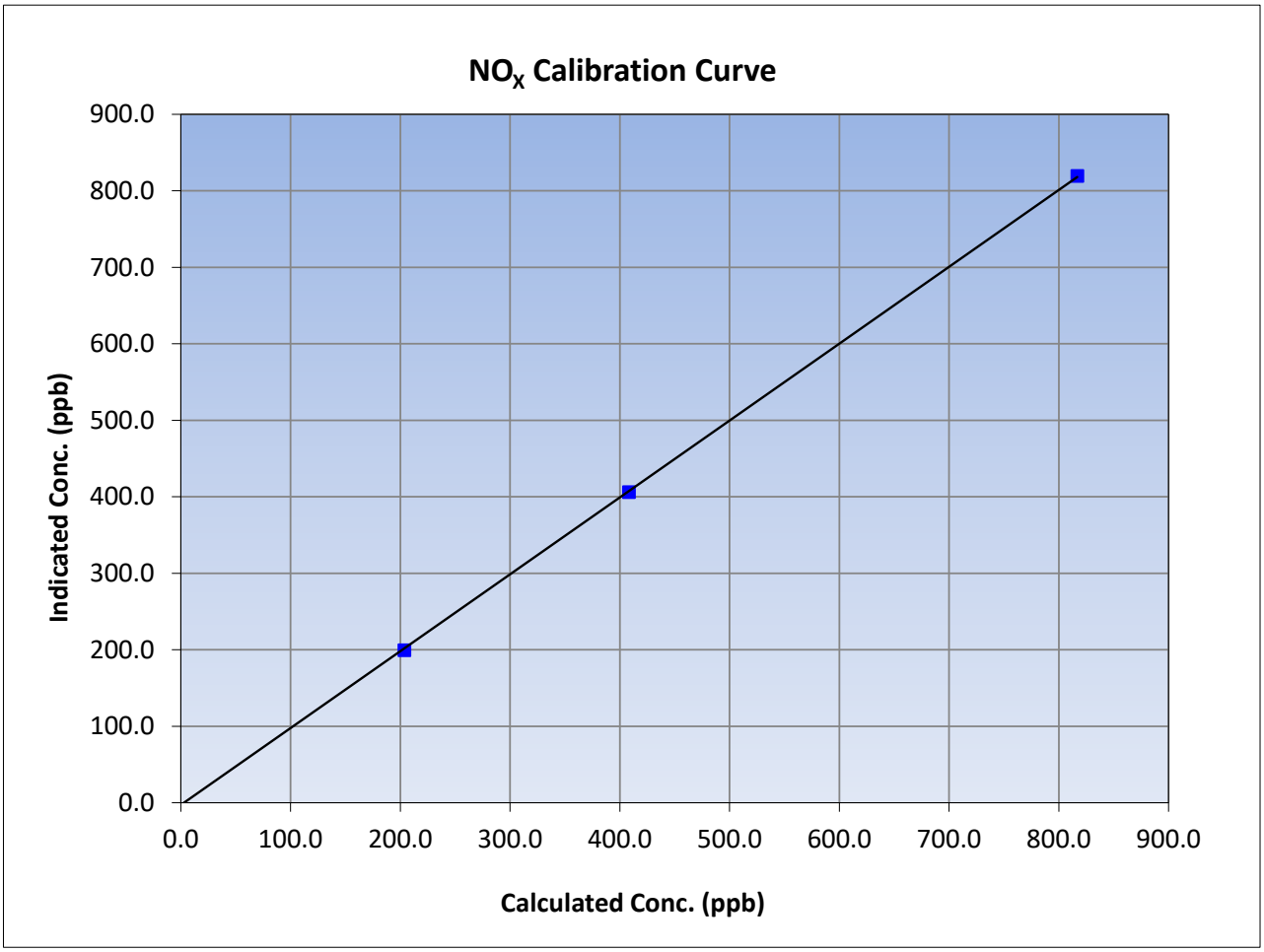
Version-04-2020

Station Information

Calibration Date:	November 9, 2023	Previous Calibration:	October 19, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	10:33	End Time (MST):	15:39
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	0.999948	≥0.995
816.8	819.5	0.9967			
408.5	406.0	1.0061	Slope	1.005005	0.90 - 1.10
203.7	199.3	1.0221			
			Intercept	-2.855689	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

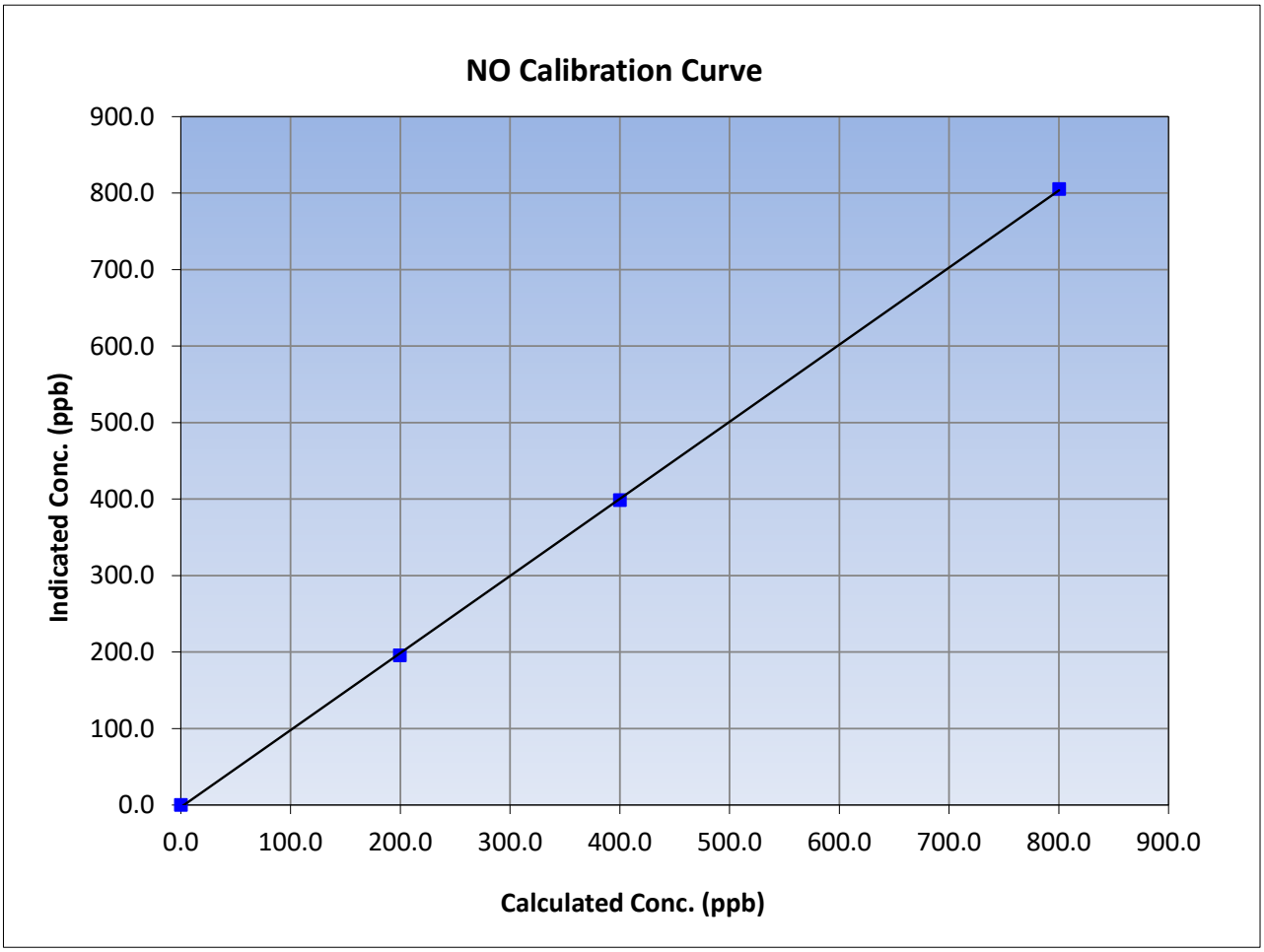
Version-04-2020

Station Information

Calibration Date:	November 9, 2023	Previous Calibration:	October 19, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	10:33	End Time (MST):	15:39
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	0.999939	≥0.995
800.3	805.3	0.9938			
400.2	398.6	1.0040	Slope	1.007782	0.90 - 1.10
199.6	195.7	1.0199			
			Intercept	-2.818947	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

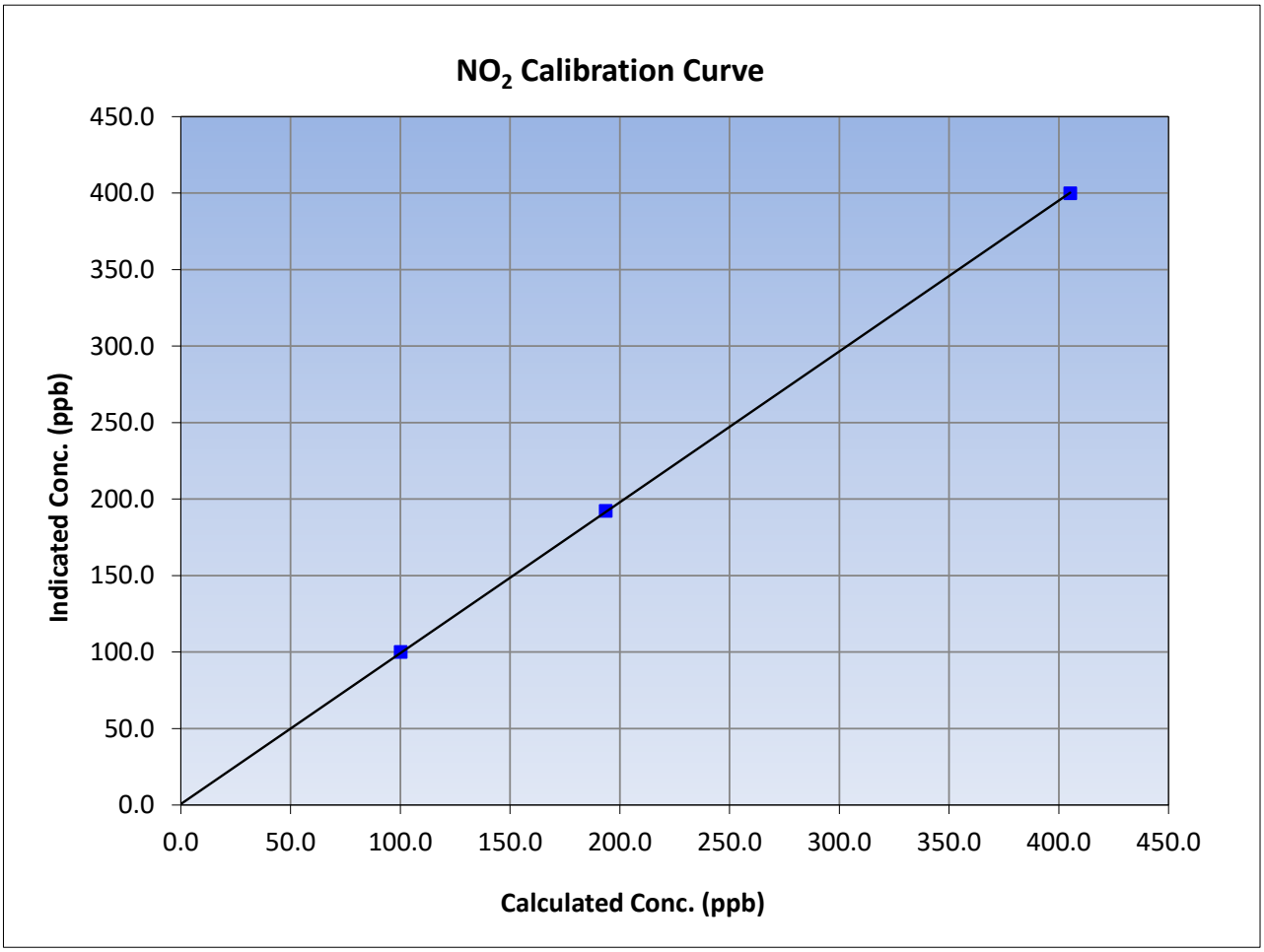
Version-04-2020

Station Information

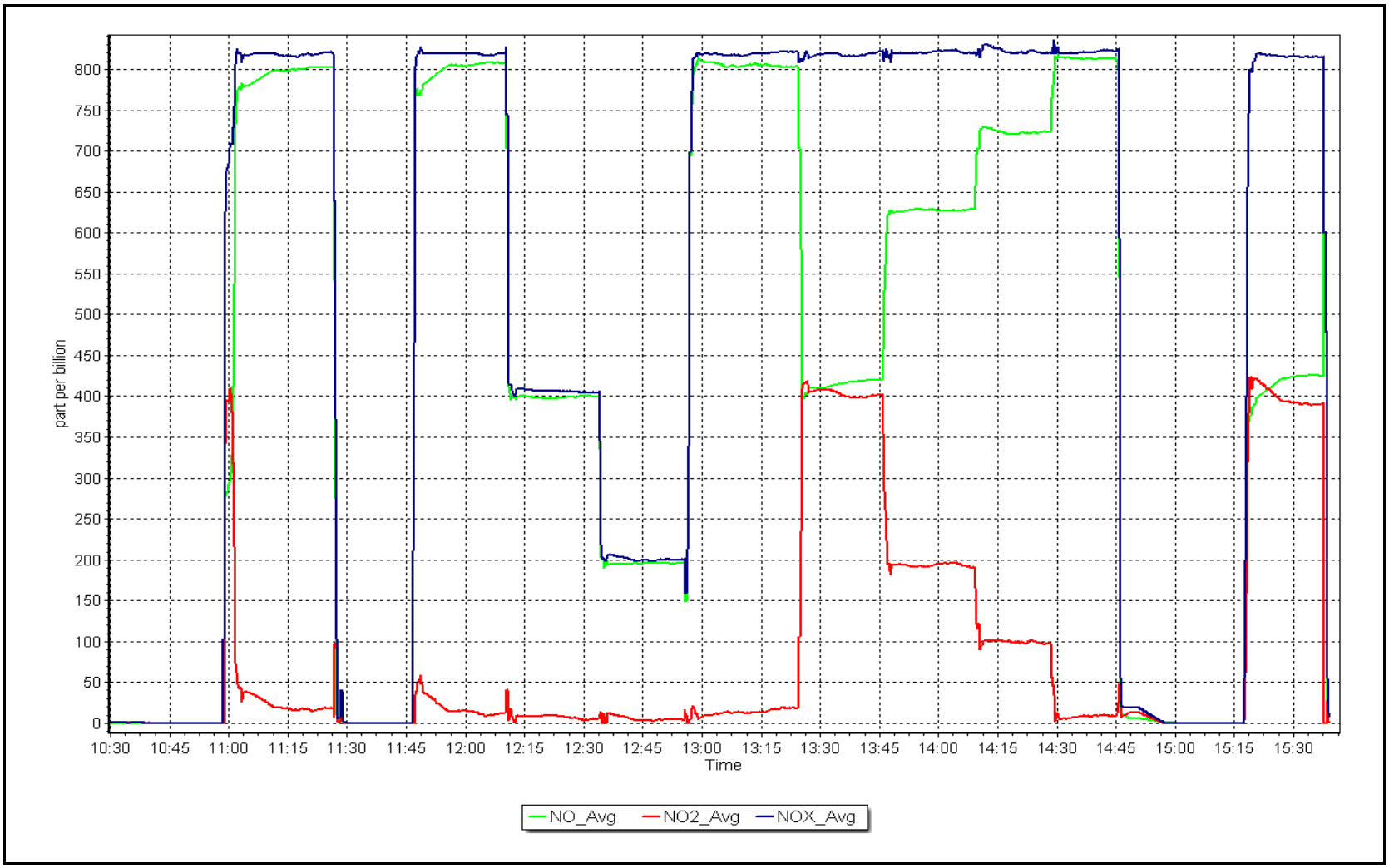
Calibration Date:	November 9, 2023	Previous Calibration:	October 19, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	10:33	End Time (MST):	15:39
Analyzer make:	API T200	Analyzer serial #:	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999979	≥0.995
405.2	399.8	1.0135			
193.5	192.2	1.0068	Slope	0.986277	0.90 - 1.10
100.1	100.0	1.0011			
			Intercept	0.637074	+/-20



NO_X Calibration Plot Date: November 9, 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:	November 20, 2023	Last Cal Date:	November 9, 2023
Start time (MST):	12:17	End time (MST):	16:59
Reason:	Maintenance		

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:	1.123	1.193	NO bkgnd or offset:	0.3	0.3
NOX coeff or slope:	1.110	1.169	NOX bkgnd or offset:	1.2	1.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	9.2	3.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.005005	1.000794
NO_X Cal Offset:	-2.855689	-2.976420
NO Cal Slope:	1.007782	0.998689
NO Cal Offset:	-2.818947	-3.261265
NO_2 Cal Slope:	0.986277	0.994531
NO_2 Cal Offset:	0.637074	-1.480680

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero										
as found span										
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1	----	----
high point	4921	79.4	816.8	800.3	16.5	816.0	797.2	18.8	1.0010	1.0039
second point	4960	39.7	408.5	400.2	8.3	404.0	395.9	8.1	1.0110	1.0109
third point	4980	19.8	203.7	199.6	4.1	198.4	192.2	6.3	1.0268	1.0385
as left zero	5000	0.0	0.0	0.0	0.0	1.5	1.3	0.3	----	----
as left span	4921	79.4	816.8	412.3	399.1	808.0	403.3	404.5	1.0109	1.0223
								Average Correction Factor	1.0129	1.0177

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

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	802.0	419.4	399.1	395.9	1.0081	99.2%
2nd GPT point (200 ppb O3)	802.0	623.9	194.6	192.2	1.0126	98.8%
3rd GPT point (100 ppb O3)	802.0	714.0	104.5	100.5	1.0399	96.2%
				Average Correction Factor	1.0202	98.0%

Notes: Swapped external pump. As founds not done due to low span response. Adjusted span only.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

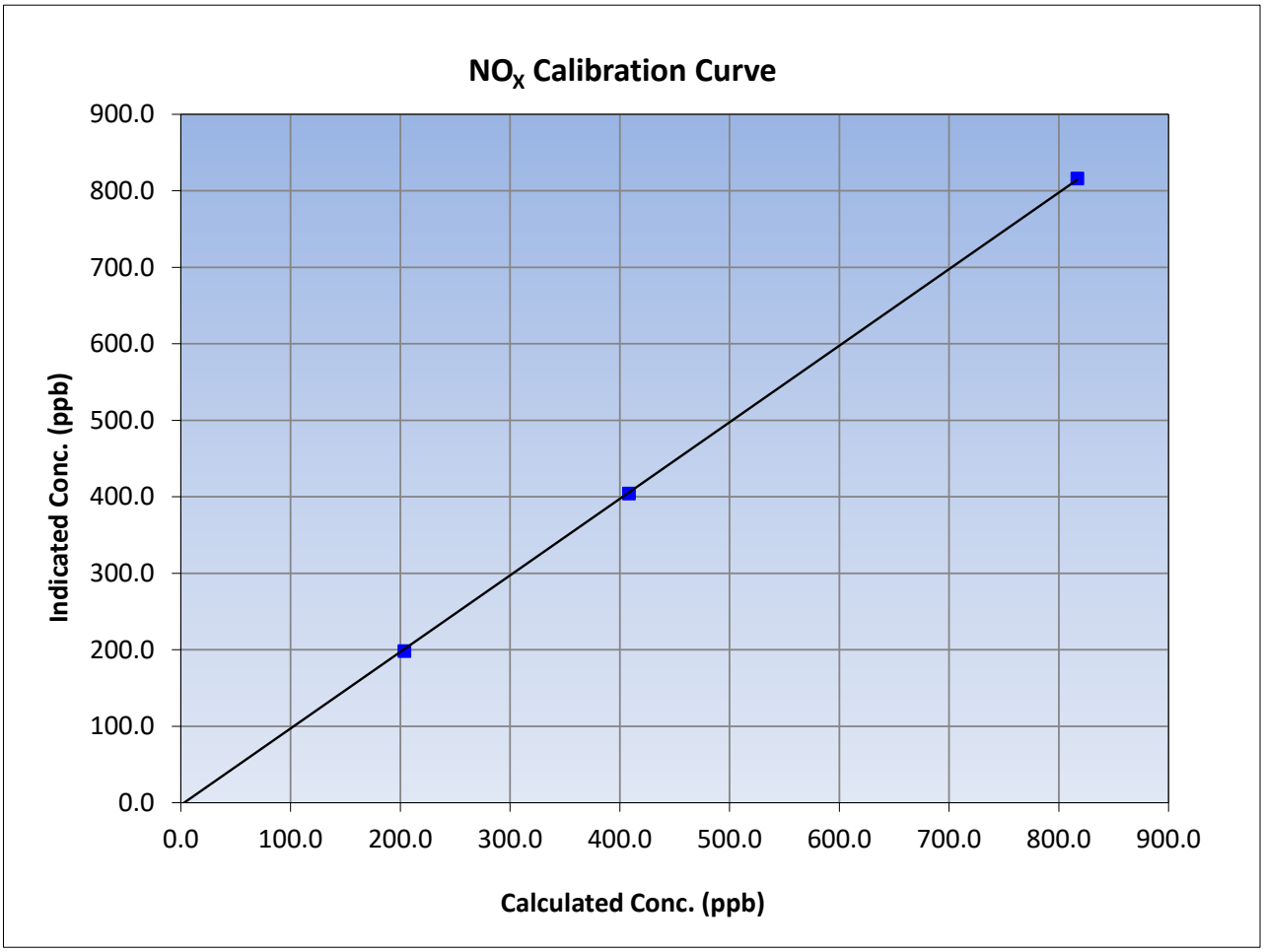
Version-04-2020

Station Information

Calibration Date:	November 20, 2023	Previous Calibration:	November 9, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	12:17	End Time (MST):	16:59
Analyzer make:	API T200	Analyzer serial #:	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.2	----	Correlation Coefficient	0.999947	*≥0.995*
816.8	816.0	1.0010			
408.5	404.0	1.0110	Slope	1.000794	*0.90 - 1.10*
203.7	198.4	1.0268			
			Intercept	-2.976420	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

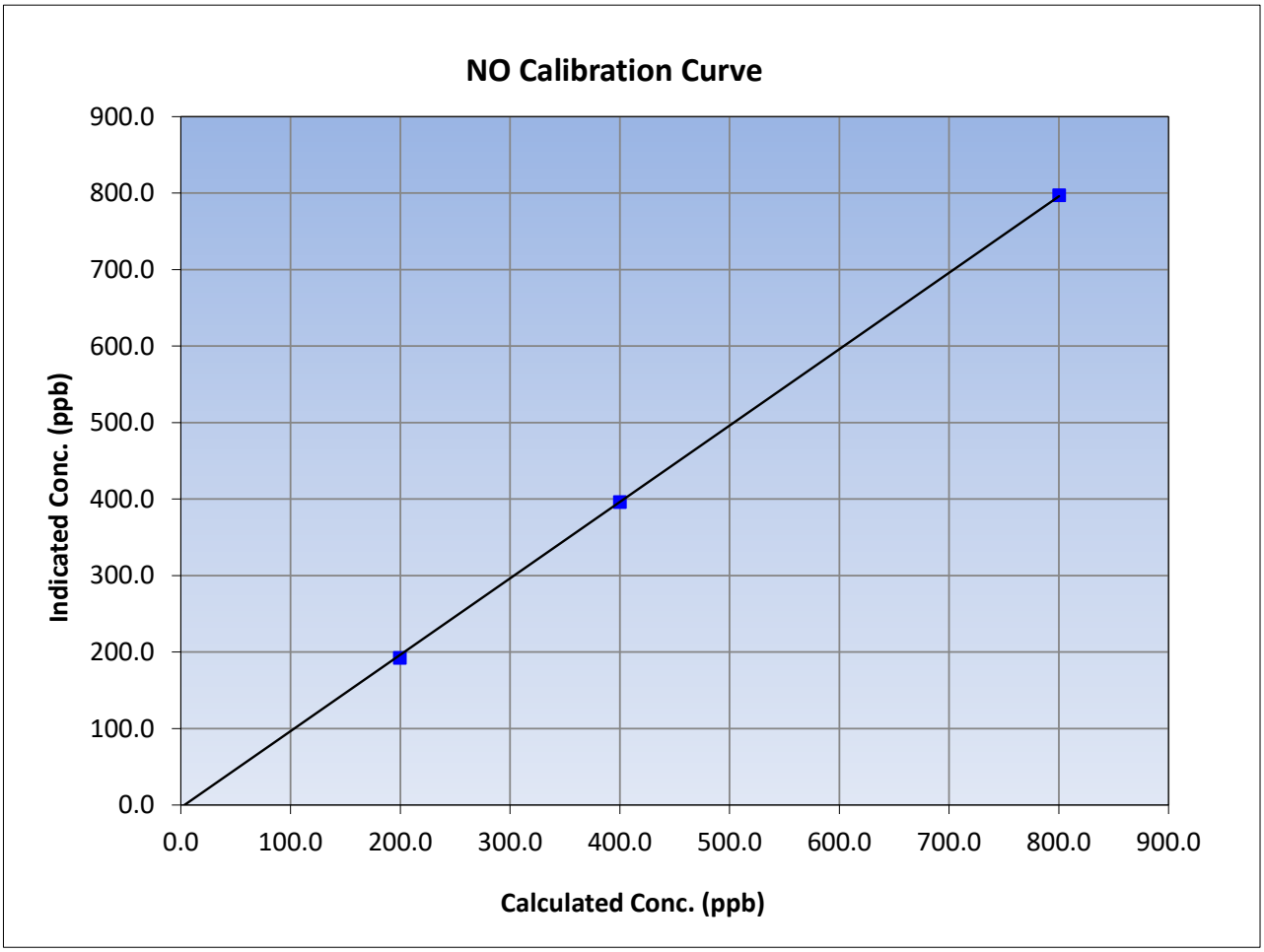
Version-04-2020

Station Information

Calibration Date:	November 20, 2023	Previous Calibration:	November 9, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	12:17	End Time (MST):	16:59
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	0.999924	≥0.995
800.3	797.2	1.0039			
400.2	395.9	1.0109	Slope	0.998689	0.90 - 1.10
199.6	192.2	1.0385			
			Intercept	-3.261265	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

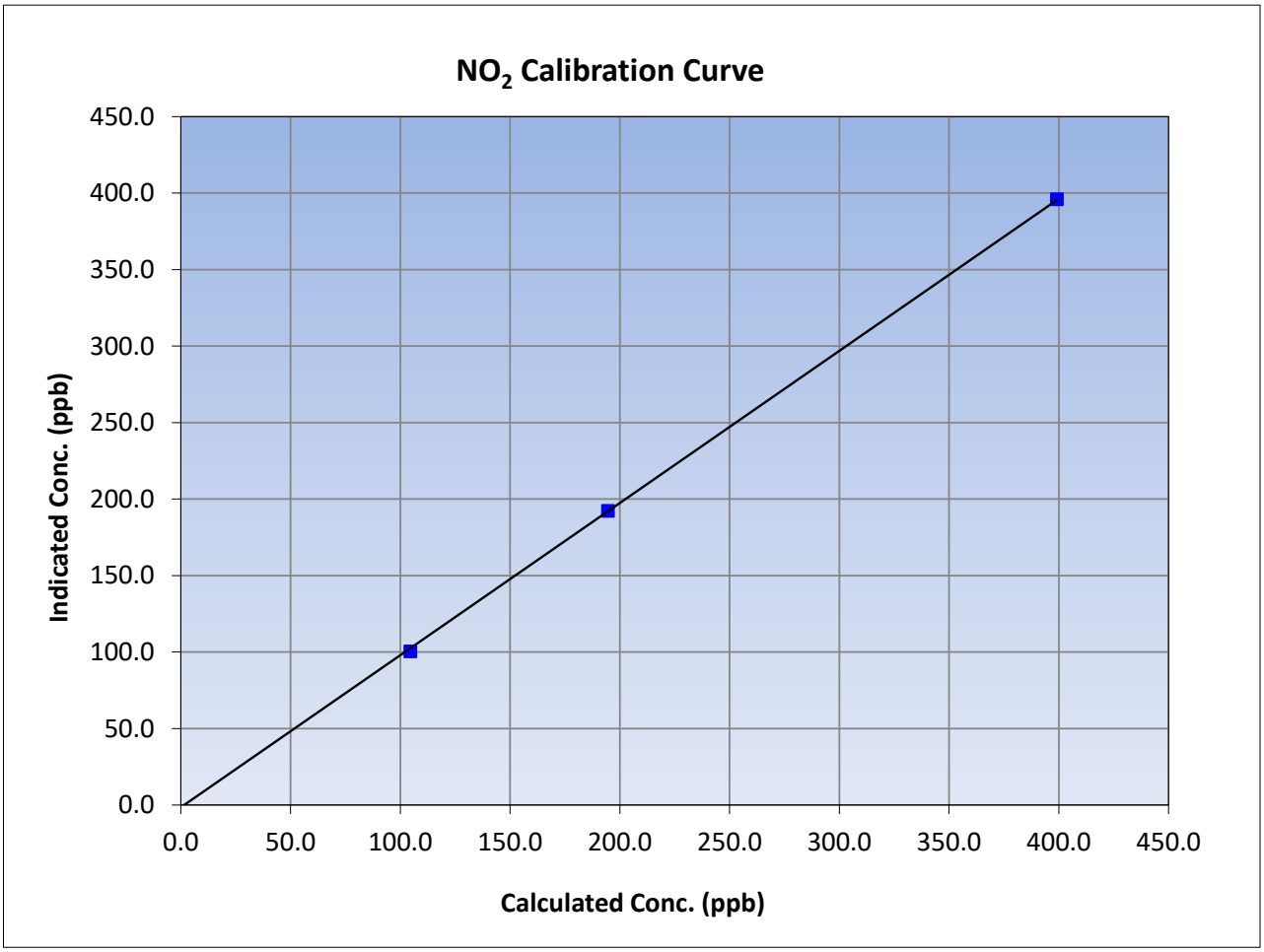
Version-04-2020

Station Information

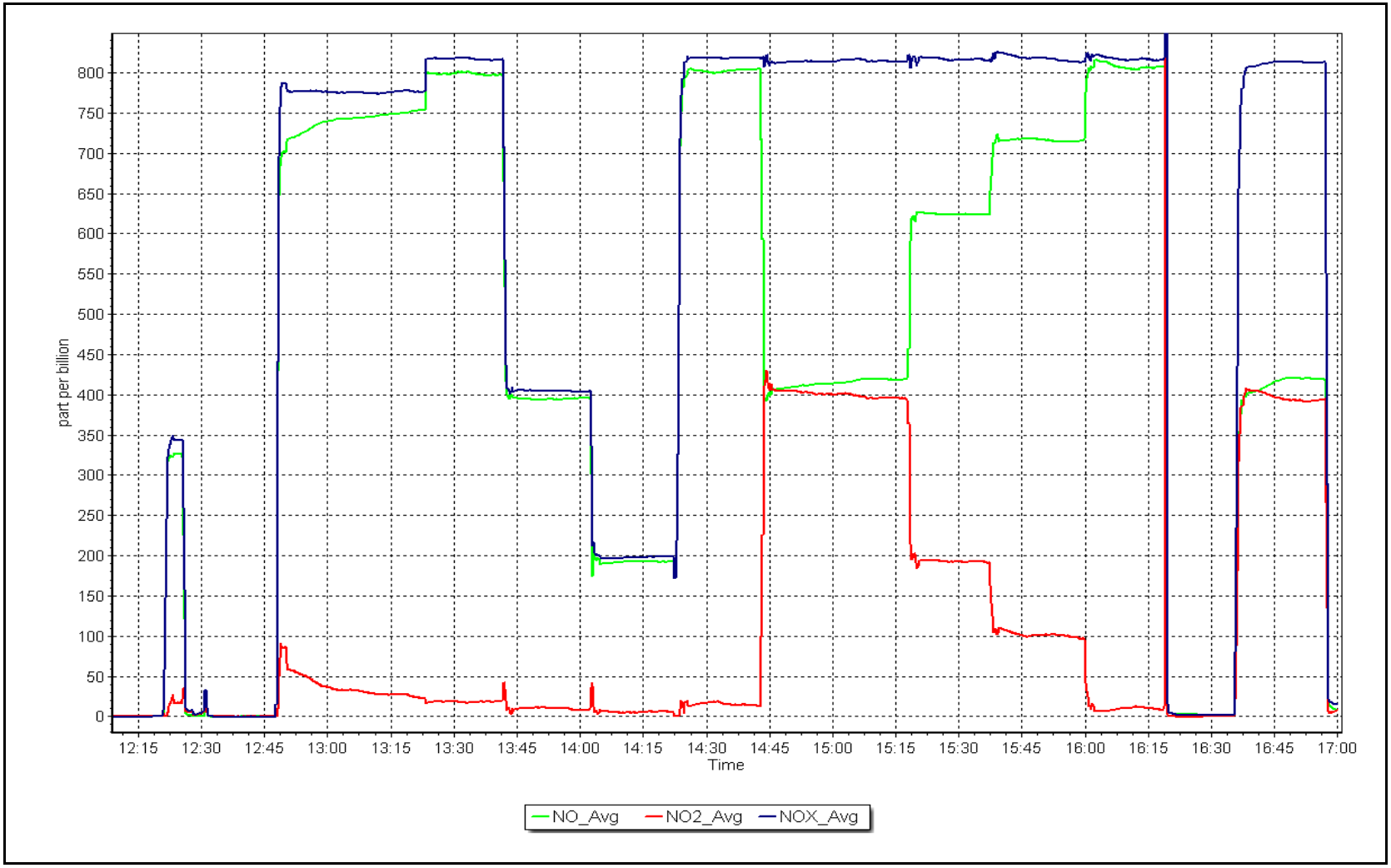
Calibration Date:	November 20, 2023	Previous Calibration:	November 9, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	12:17	End Time (MST):	16:59
Analyzer make:	API T200	Analyzer serial #:	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999930	≥0.995
399.1	395.9	1.0081			
194.6	192.2	1.0126	Slope	0.994531	0.90 - 1.10
104.5	100.5	1.0399			
			Intercept	-1.480680	+/-20



NO_X Calibration Plot Date: November 20, 2023 Location: Jackfish 2/3



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS29
SURMONT 2
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	November 16, 2023	Last Cal Date:	October 23, 2023
Start time (MST):	10:55	End time (MST):	17:02
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:	1.001516	1.005729	Backgd or Offset:	13.0	12.5
Calibration intercept:	-1.785913	-1.086069	Coeff or Slope:	0.937	0.937

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.8	----
as found span	4919	81.3	800.1	803.0	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4919	81.3	800.1	804.0	0.995
second point	4959	40.7	400.6	401.8	0.997
third point	4979	20.3	199.8	198.3	1.008
as left zero	5000	0.0	0.0	0.2	----
as left span	4919	81.3	800.1	805.0	0.994
				Average Correction Factor	1.000

Baseline Corr As found:	803.80	Previous response	799.53	*% change	0.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

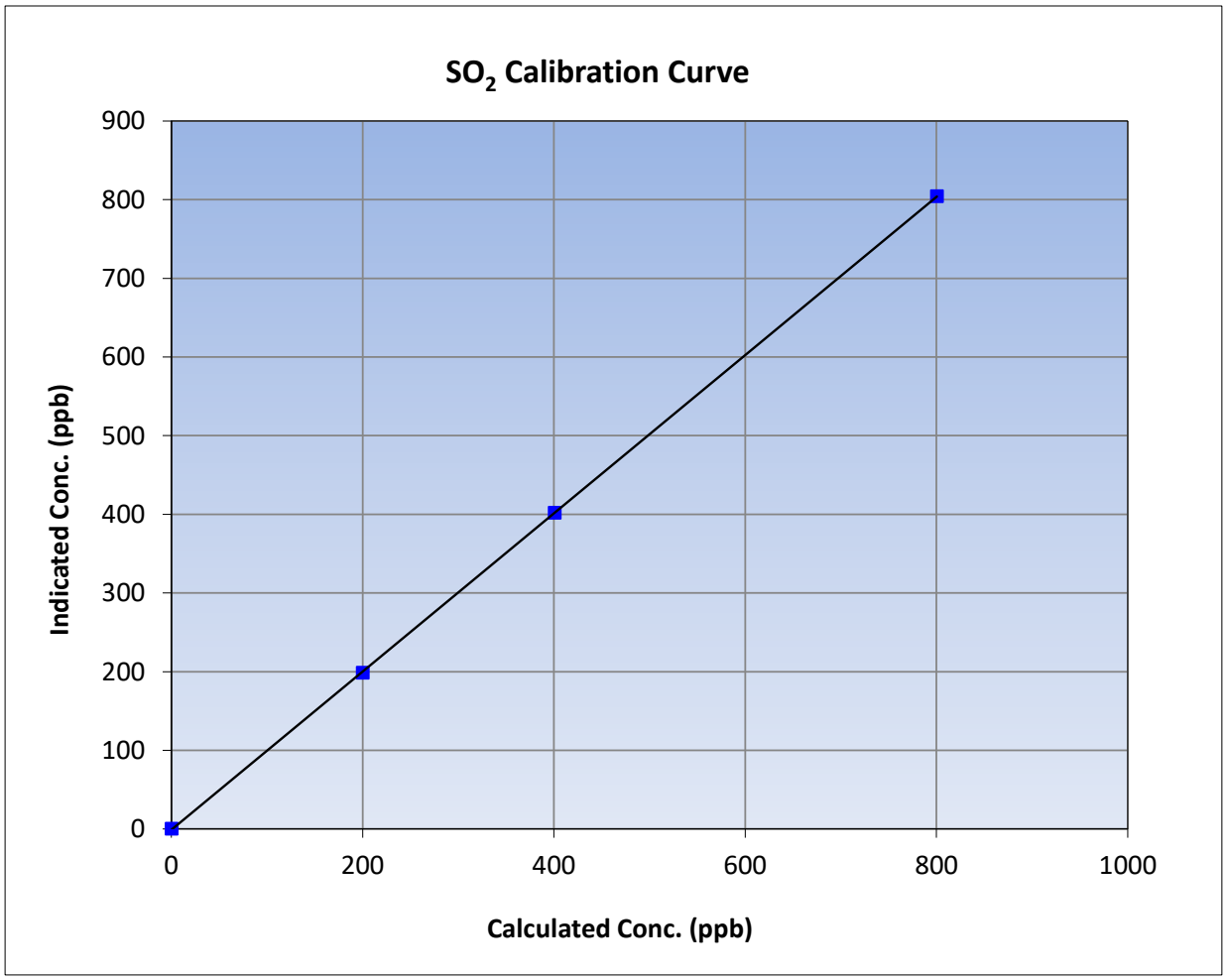
Station Information

Calibration Date:	November 16, 2023	Previous Calibration:	October 23, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:55	End Time (MST):	17:02
Analyzer make:	Thermo 43i	Analyzer serial #:	1170050150

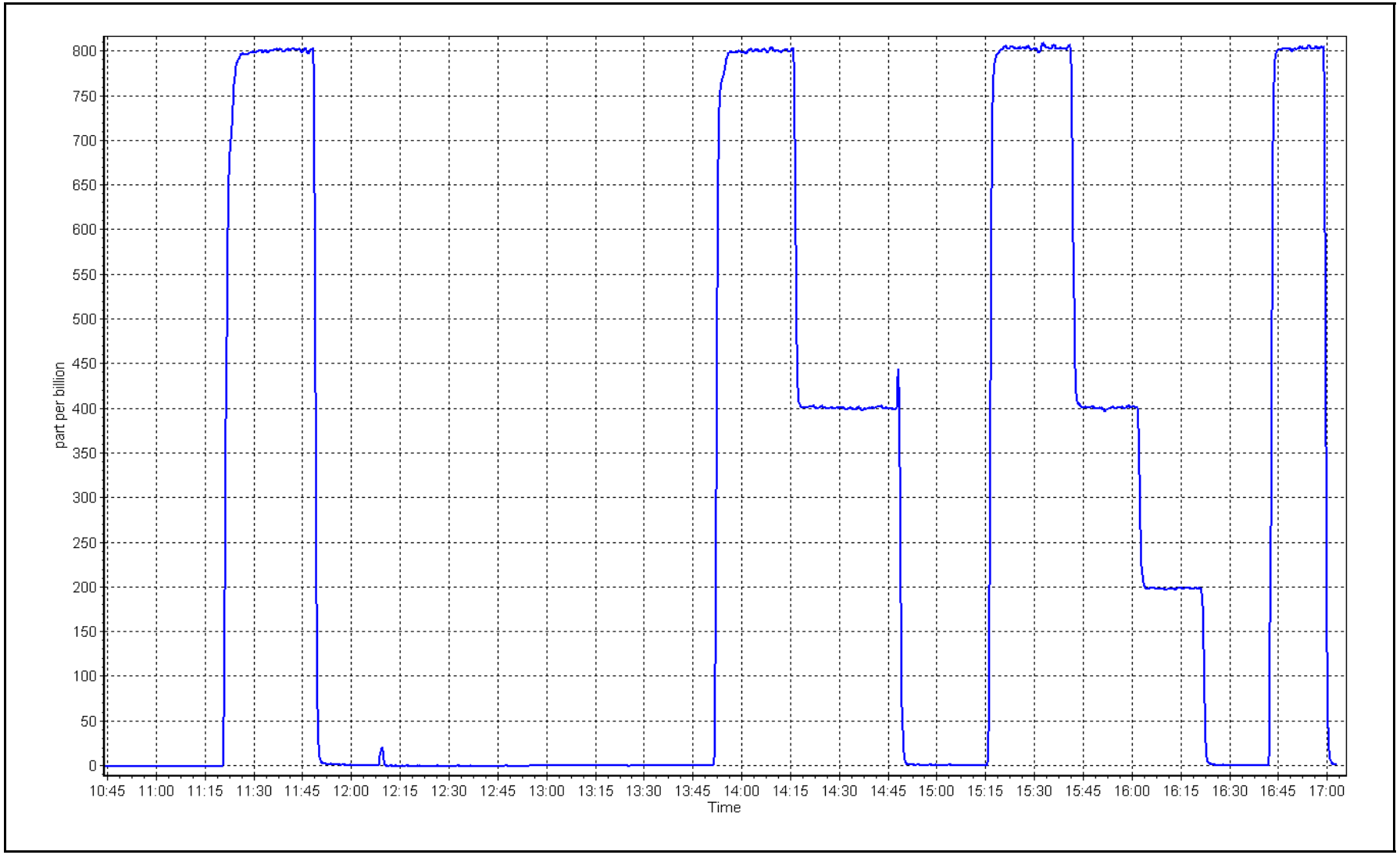
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
800.1	804.0	0.9952
400.6	401.8	0.9970
199.8	198.3	1.0077

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999989	*≥0.995*
Slope	1.005729	*0.90 - 1.10*
Intercept	-1.086069	*+/-30*



SO2 Calibration Plot Date: November 16, 2023 Location: Surmont 2



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	November 1, 2023	Last Cal Date:	October 24, 2023
Start time (MST):	9:44	End time (MST):	14:25
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 #:	2022-220	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003047	1.001467	Backgd or Offset:	0.92	0.92
Calibration intercept:	-0.022987	-0.142608	Coeff or Slope:	1.080	1.080

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.2	----
as found span	4926	74.2	80.0	80.7	0.989
as found 2nd point	4963	37.2	40.1	40.1	0.995
as found 3rd point	4982	18.6	20.1	20.0	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	0.0	----
high point	4926	74.2	80.0	80.1	0.999
second point	4963	37.2	40.1	39.8	1.008
third point	4982	18.6	20.1	19.9	1.008
as left zero	5000	0.0	0.0	0.0	----
as left span	4926	74.2	80.0	79.5	1.006
SO2 Scrubber Check	4919	81.3	813.0	-0.1	----
Date of last scrubber change:				Ave Corr Factor	1.005
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.9	Prev response:	80.22	*% change:	0.8%
Baseline Corr 2nd AF pt:	40.3	AF Slope:	1.011184	AF Intercept:	-0.283103
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999988		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. No adjustments made. Scrubber check done after cal zero, passed.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

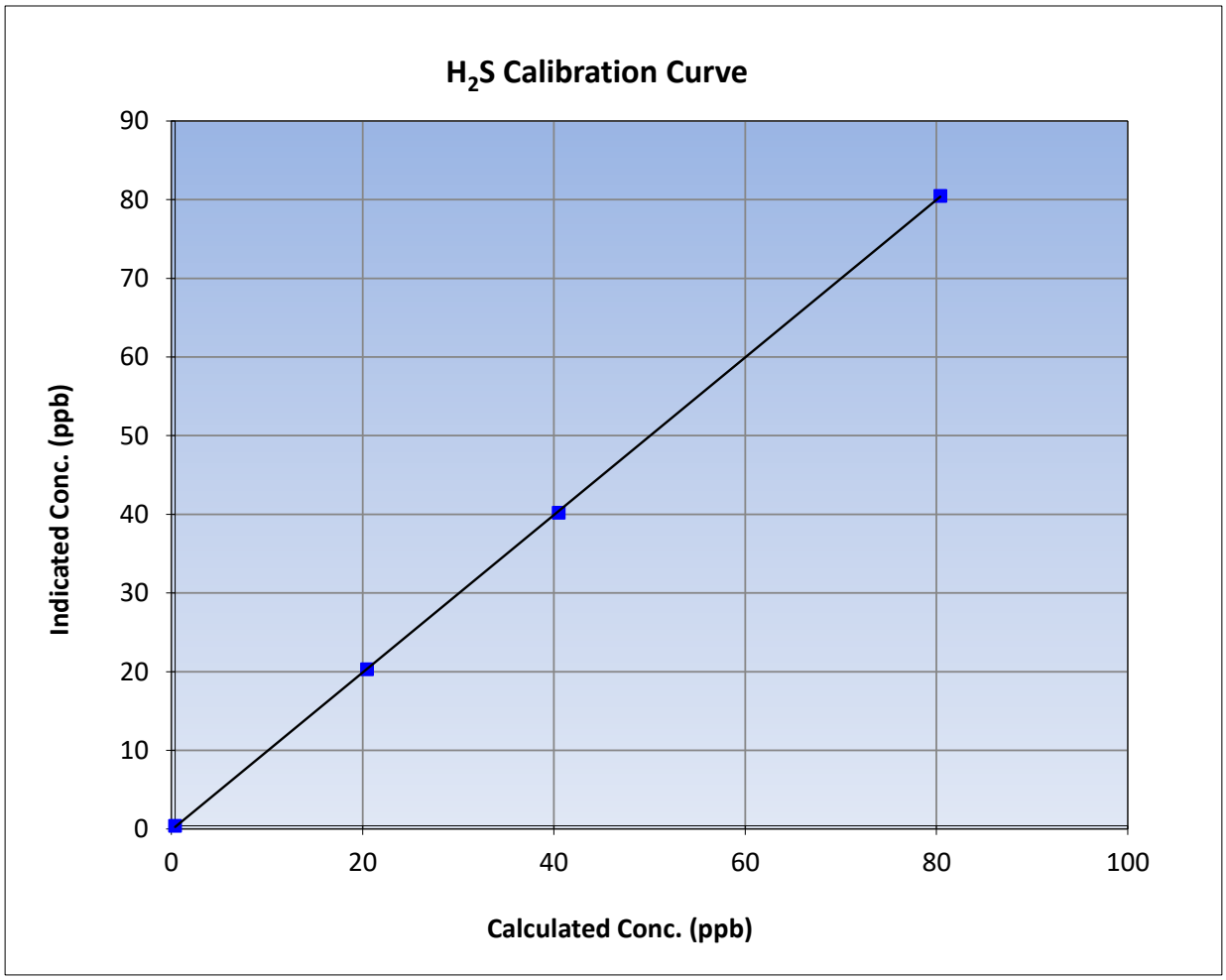
Station Information

Calibration Date:	November 1, 2023	Previous Calibration:	October 24, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:44	End Time (MST):	14:25
Analyzer make:	Thermo 43iQ-TLE	Analyzer serial #:	1200326170

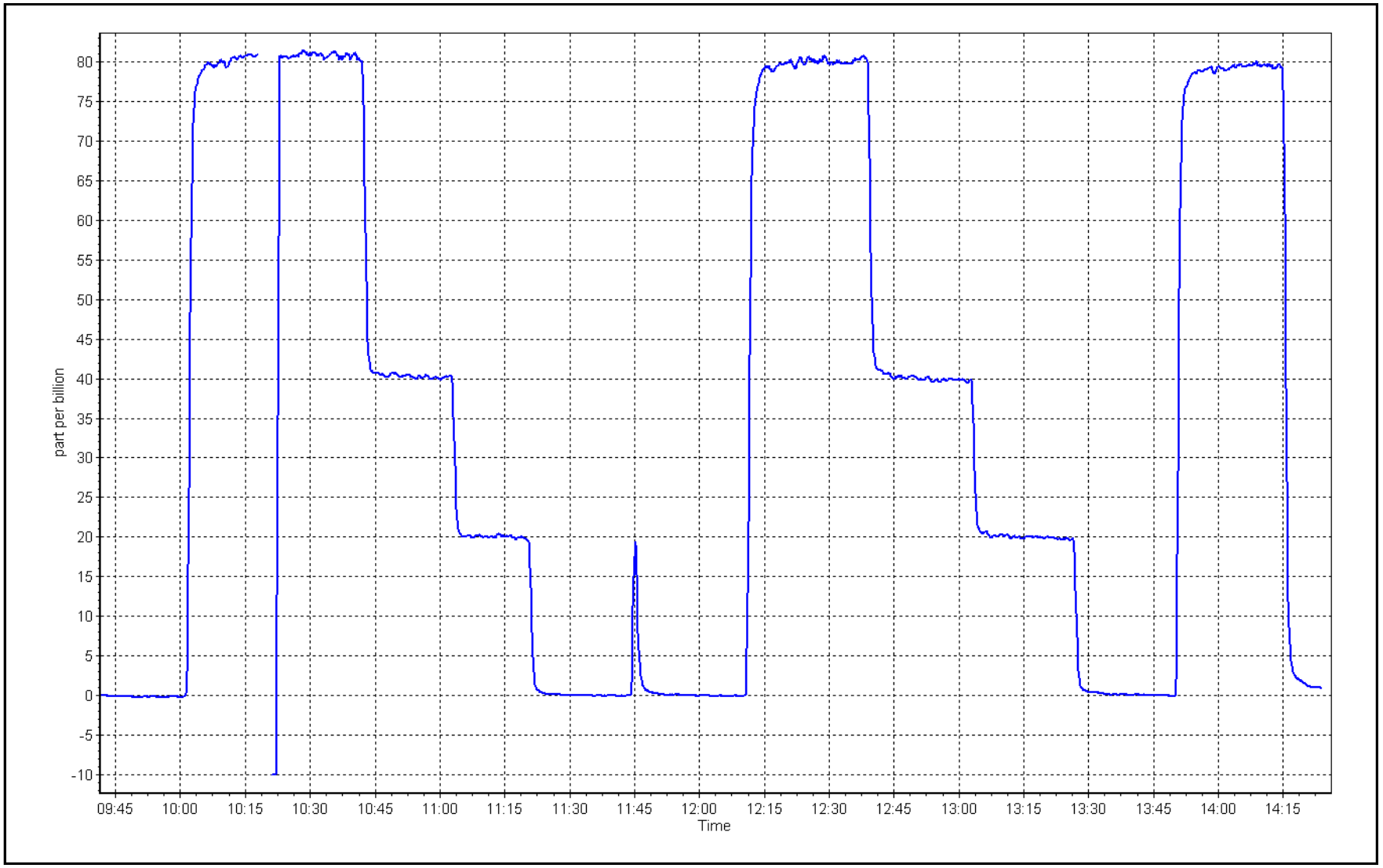
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.1	0.9988
40.1	39.8	1.0077
20.1	19.9	1.0077

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999975	*≥0.995*
Slope	1.001467	*0.90 - 1.10*
Intercept	-0.142608	*+/-3*



H_2S Calibration Plot Date: November 1, 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:	November 16, 2023	Last Cal Date:	October 23, 2023
Start time (MST):	10:55	End time (MST):	17:02
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:	1.007852	0.998269	Background:	3.64	3.53
Calibration intercept:	-0.102215	-0.044666	Coefficient:	3.987	3.986

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	-0.12	----
as found span	4918	81.3	17.31	17.12	1.011
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	17.26	1.003
second point	4959	40.6	8.65	8.54	1.012
third point	4979	20.3	4.32	4.28	1.010
as left zero	5000	0.0	0.00	-0.04	----
as left span	4918	81.3	17.31	17.42	0.994
				Average Correction Factor	1.008

Baseline Corr As found:	17.24	Previous response	17.35	*% 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 out Hydrogen cylinder. Flame extinguished, causing drift. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

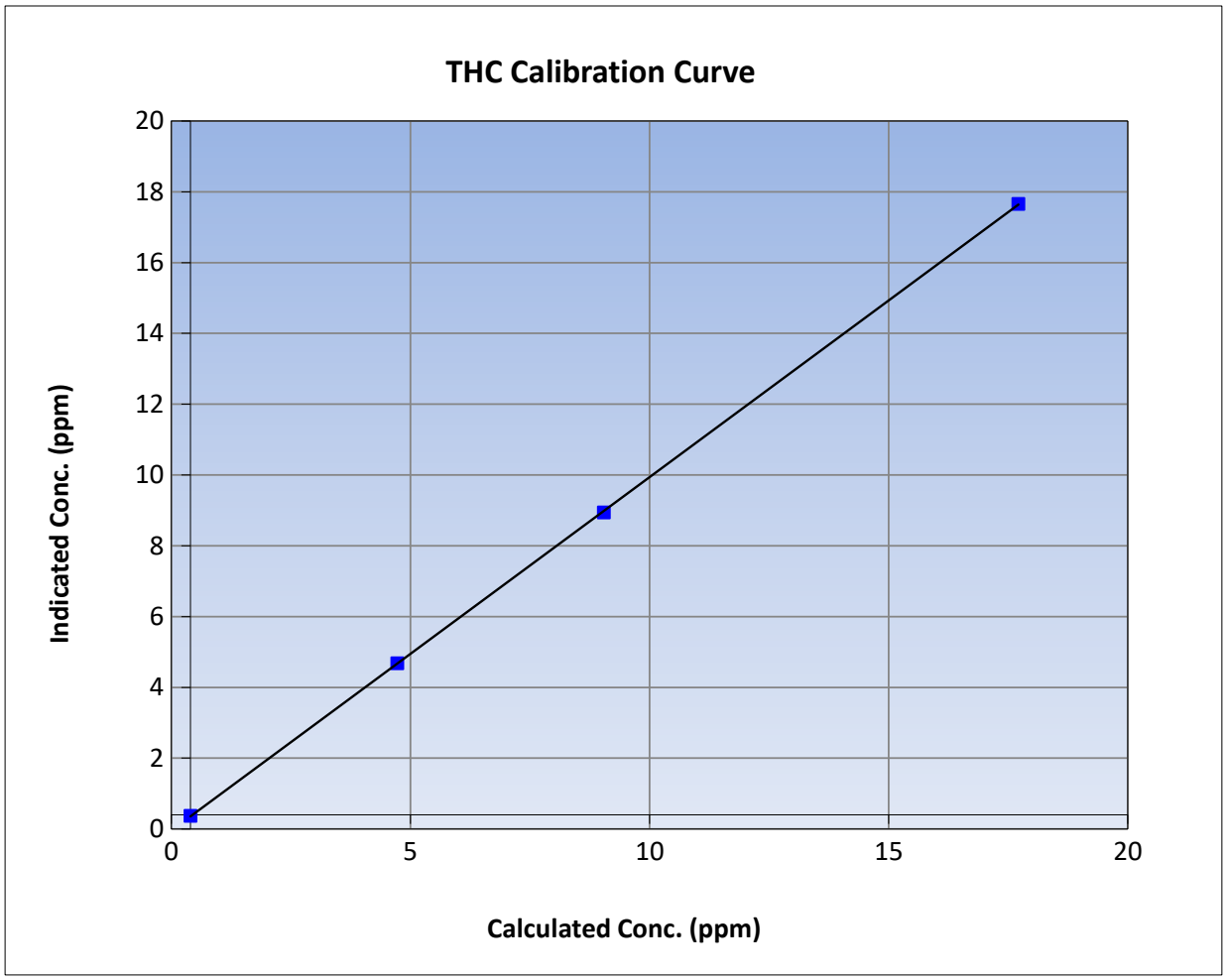
Station Information

Calibration Date:	November 16, 2023	Previous Calibration:	October 23, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:55	End Time (MST):	17:02
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1170050149

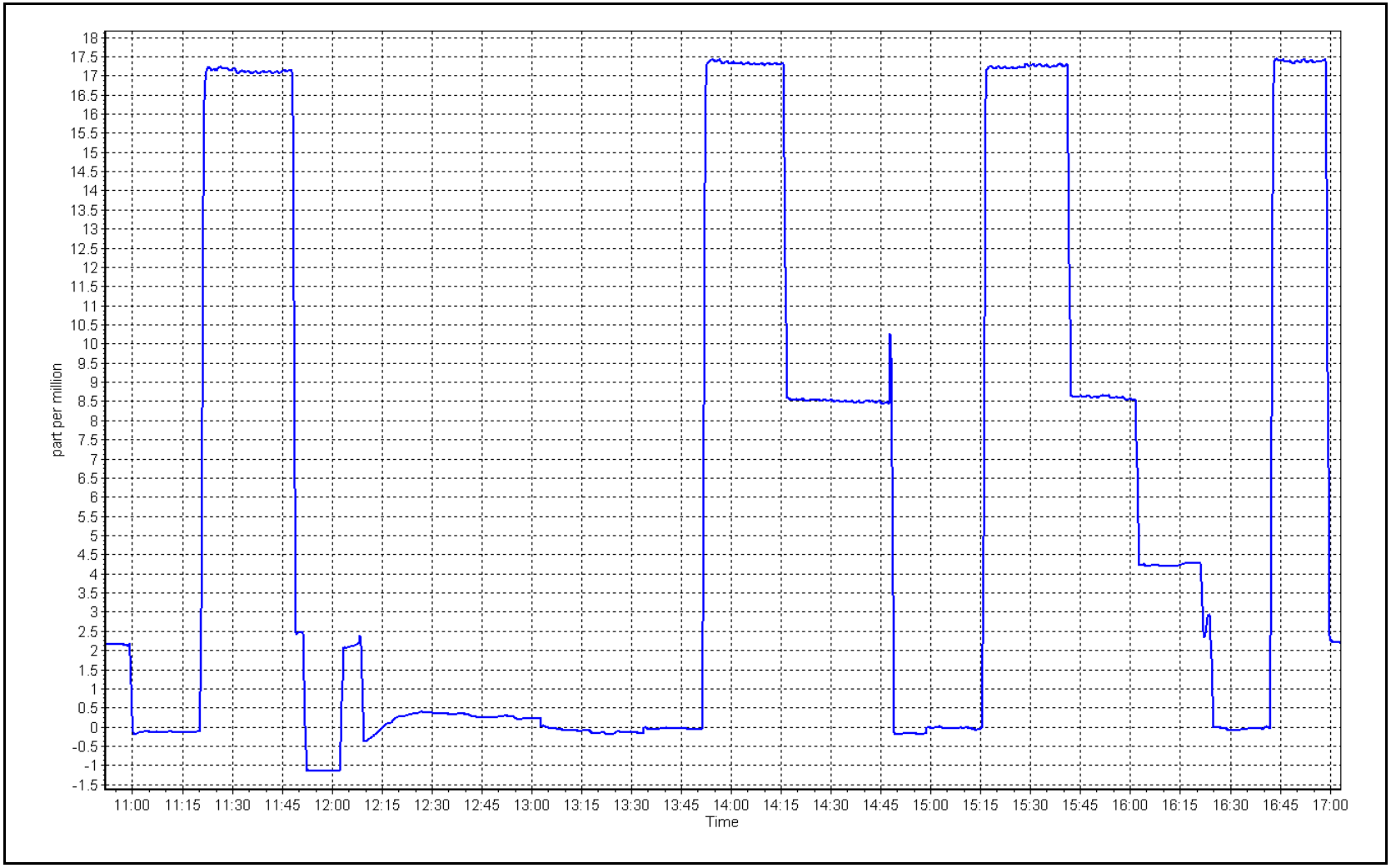
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.03	----
17.31	17.26	1.0031
8.65	8.54	1.0124
4.32	4.28	1.0099

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999982	*≥0.995*
Slope	0.998269	*0.90 - 1.10*
Intercept	-0.044666	*+/-1.5*



THC Calibration Plot Date: November 16, 2023 Location: Surmont 2



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	November 14, 2023	Last Cal Date:	October 25, 2023
Start time (MST):	10:46	End time (MST):	15:55
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:	1.386	1.366	NO bkgnd or offset:	1.4	1.3
NOX coeff or slope:	0.996	0.995	NOX bkgnd or offset:	1.4	1.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	175.9	173.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.006760	0.999094
NO_X Cal Offset:	-0.933669	0.047580
NO Cal Slope:	1.006372	1.003756
NO Cal Offset:	-1.673031	-1.632802
NO_2 Cal Slope:	0.995839	0.994951
NO_2 Cal Offset:	0.777688	0.472711

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	----	----
as found span	4916	84.2	799.2	799.2	0.0	812.0	809.0	2.2	0.9842	0.9879
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.2	0.1	----	----
high point	4916	84.2	799.2	799.2	0.0	797.9	801.0	-3.4	1.0016	0.9977
second point	4958	42.1	399.6	399.6	0.0	401.0	399.6	1.3	0.9965	1.0000
third point	4979	21.1	200.3	200.3	0.0	199.2	197.4	1.8	1.0054	1.0146
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as left span	4916	84.2	799.2	409.3	389.9	797.5	406.4	391.1	1.0021	1.0071
								Average Correction Factor	1.0012	1.0041

Corrected As found	NO_X = 812.2 ppb	NO = 809.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	1.1%
Previous Response	NO_X = 803.7 ppb	NO = 802.6 ppb		*Percent Change	NO =	0.8%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	796.1	406.2	389.9	388.2	1.0044	99.6%
2nd GPT point (200 ppb O3)	796.1	609.3	186.8	186.6	1.0011	99.9%
3rd GPT point (100 ppb O3)	796.1	701.2	94.9	95.2	0.9968	100.3%
				Average Correction Factor	1.0008	99.9%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

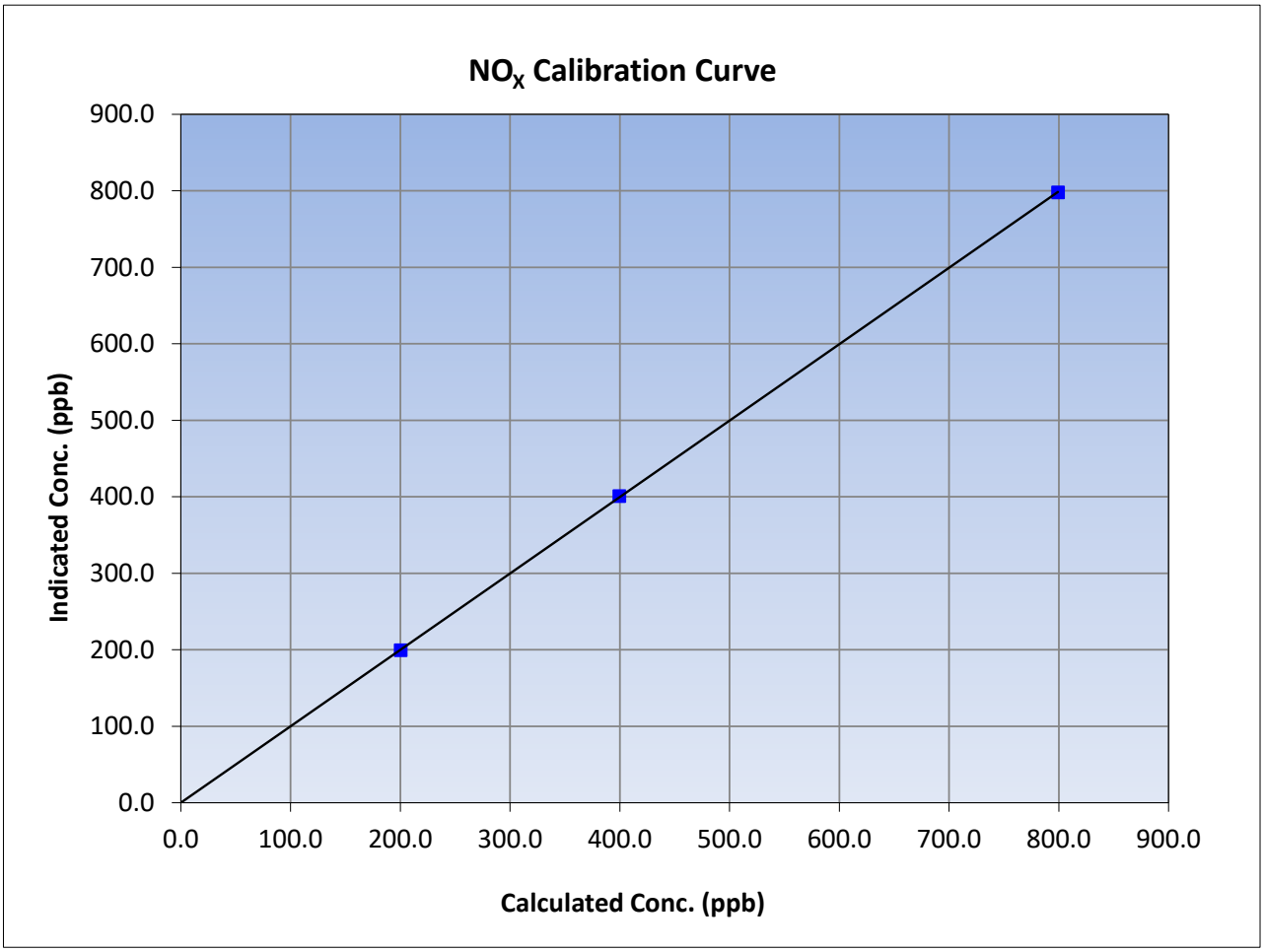
Version-04-2020

Station Information

Calibration Date:	November 14, 2023	Previous Calibration:	October 25, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:46	End Time (MST):	15:55
Analyzer make:	Thermo 42i	Analyzer serial #:	1170050148

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.1	----	Correlation Coefficient	0.999988	*≥0.995*
799.2	797.9	1.0016			
399.6	401.0	0.9965	Slope	0.999094	*0.90 - 1.10*
200.3	199.2	1.0054			
			Intercept	0.047580	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

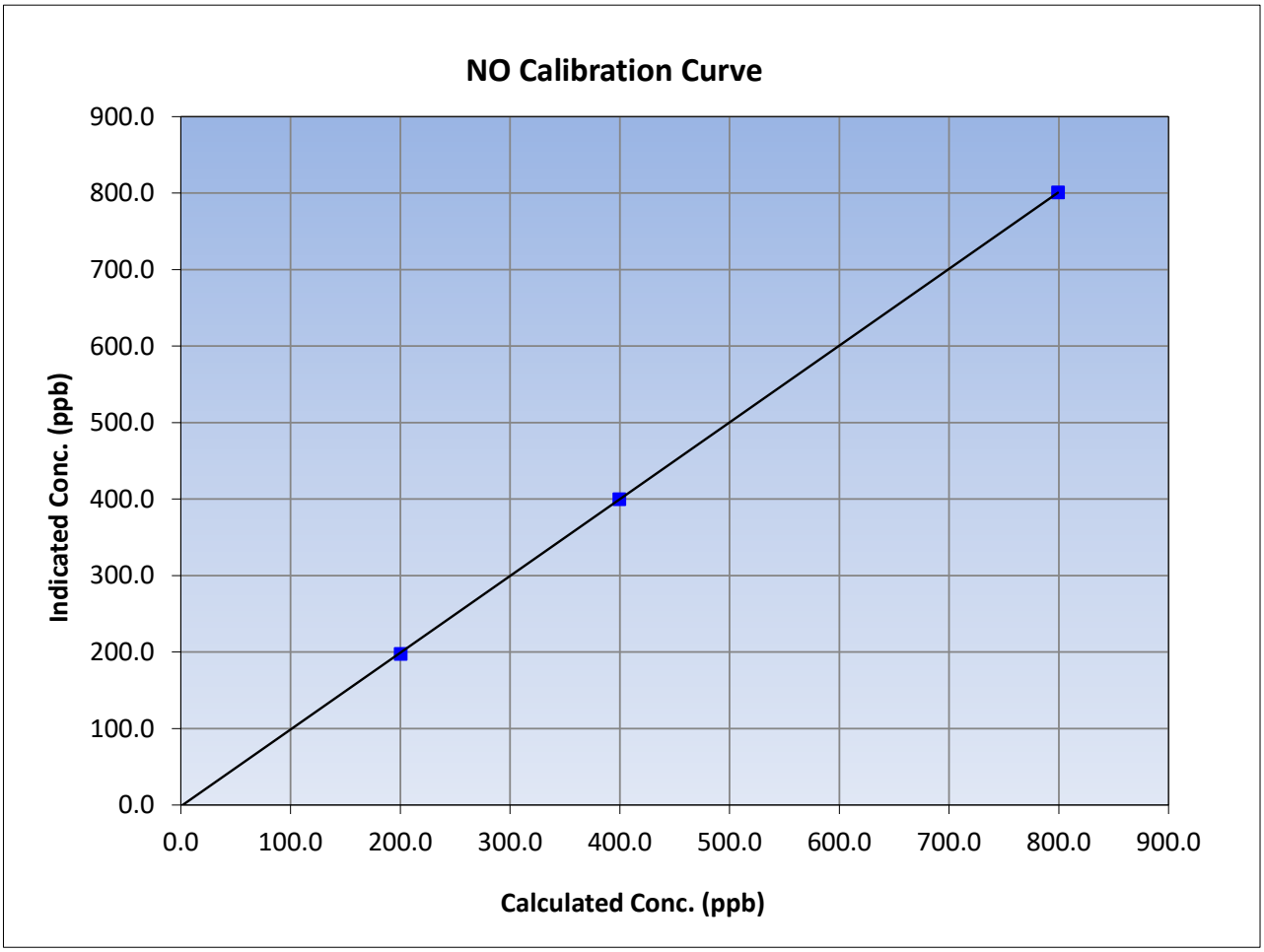
Version-04-2020

Station Information

Calibration Date:	November 14, 2023	Previous Calibration:	October 25, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:46	End Time (MST):	15:55
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	0.999982	*≥0.995*
799.2	801.0	0.9977			
399.6	399.6	1.0000	Slope	1.003756	*0.90 - 1.10*
200.3	197.4	1.0146			
			Intercept	-1.632802	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

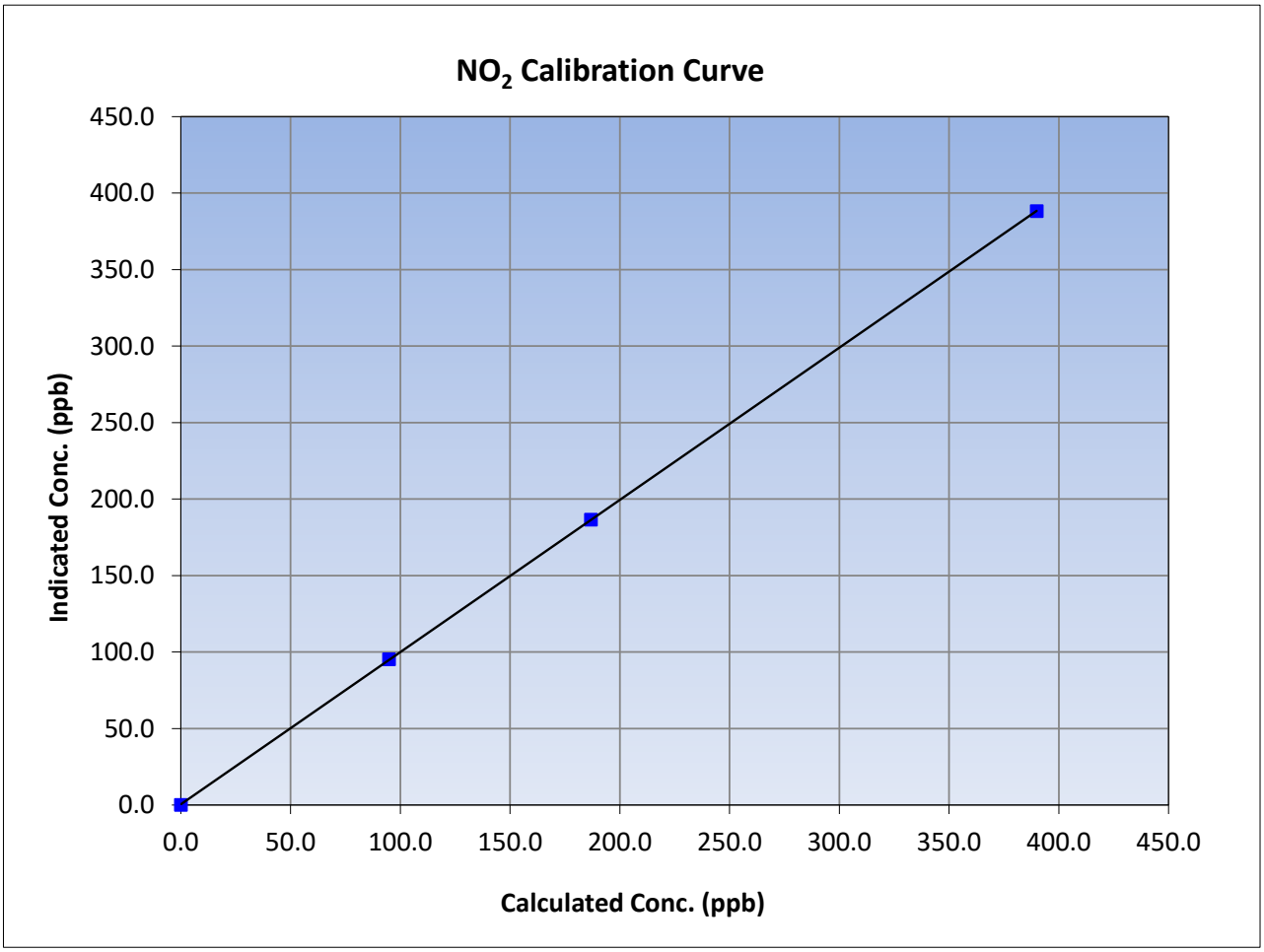
Version-04-2020

Station Information

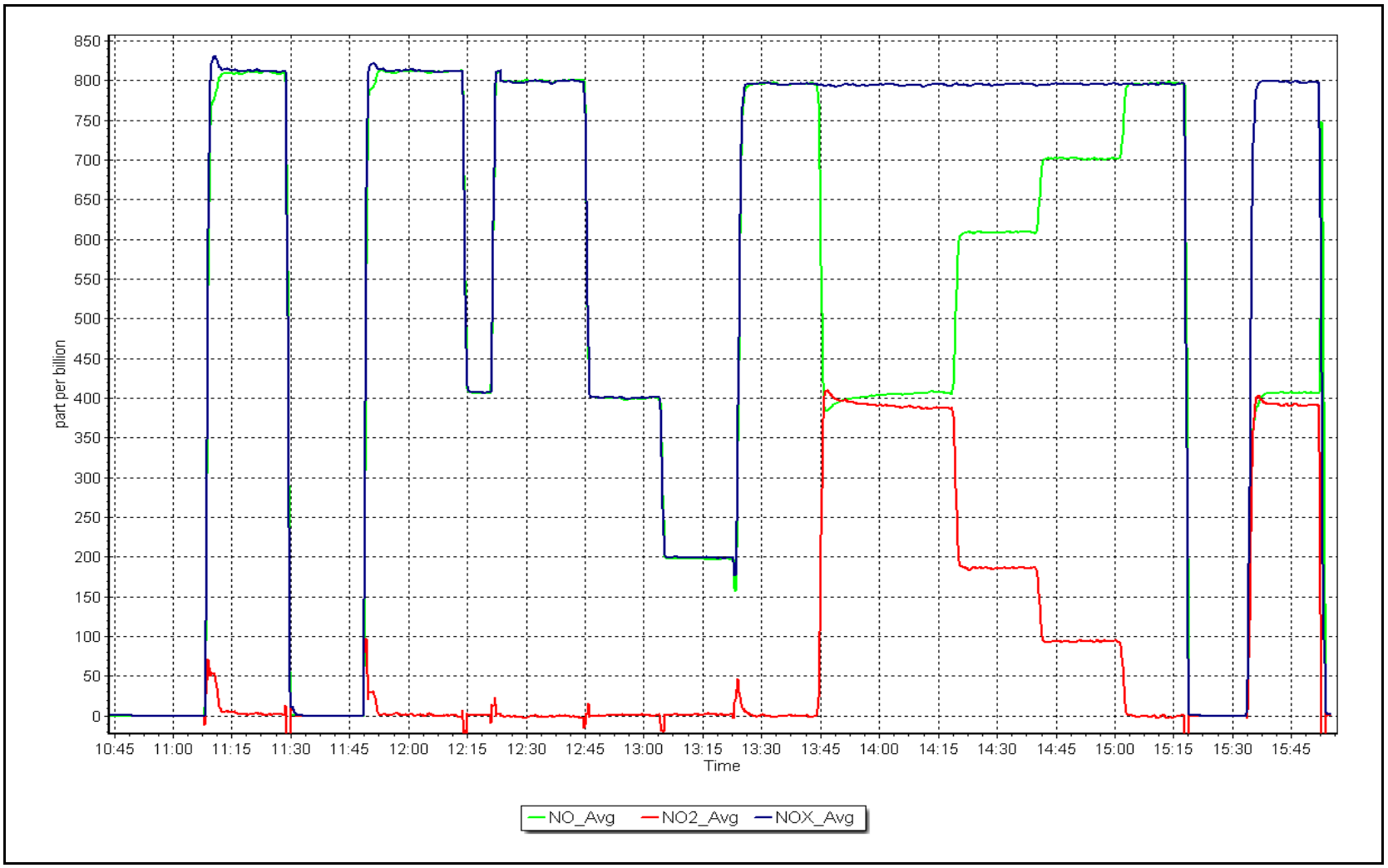
Calibration Date:	November 14, 2023	Previous Calibration:	October 25, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:46	End Time (MST):	15:55
Analyzer make:	Thermo 42i	Analyzer serial #:	1170050148

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999996	≥0.995
389.9	388.2	1.0044			
186.8	186.6	1.0011	Slope	0.994951	0.90 - 1.10
94.9	95.2	0.9968			
			Intercept	0.472711	+/-20



NO_X Calibration Plot Date: November 14, 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:	November 16, 2023	Last Cal Date:	October 25, 2023
Start time (MST):	14:31	End time (MST):	15:40
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)	-1.7	-2.09	-1.7	☐	+/- 2 °C
P (mmHg)	699.7	700.17	699.7	☐	+/- 10 mmHg
flow (LPM)	5.00	5.139	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: November 16, 2023 Last Cal Date: October 25, 2023

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

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

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

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

Disposable Filter Changed: October 25, 2023

Annual Maintenance

Date Sample Tube Cleaned: October 25, 2023

Date RH/T Sensor Cleaned: October 25, 2023

Notes: No adjustments made. Leak check passed.

Calibration by: Braiden Boutilier

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS30
ELLS RIVER
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Ells River	Station number:	AMS 30
Calibration Date:	November 8, 2023	Last Cal Date:	October 3, 2023
Start time (MST):	10:49	End time (MST):	14:53
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.53	ppm	Cal Gas Exp Date:	December 29, 2028
Cal Gas Cylinder #:	CC494126			
Removed Cal Gas Conc:	50.53	ppm	Rem Gas Exp Date:	
Removed Gas Cyl #:			Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3061
ZAG Make/Model:	API T701H		Serial Number:	358

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1008841397

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000474	1.002373	Backgd or Offset:	9.5	9.5
Calibration intercept:	-2.915894	-3.655880	Coeff or Slope:	0.982	0.982

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	795.8	1.006
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4921	79.2	800.4	800.6	1.000
second point	4960	39.6	400.2	395.1	1.013
third point	4980	19.8	200.1	193.8	1.033
as left zero	5000	0.0	0.0	-0.2	----
as left span	4921	79.2	800.4	799.5	1.001
				Average Correction Factor	1.015

Baseline Corr As found:	796.10	Previous response	797.83	*% change	-0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Inlet filter changed after As Founds, no adjustments required.

Calibration Performed By: Mohammed Kashif and Jan Castro

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

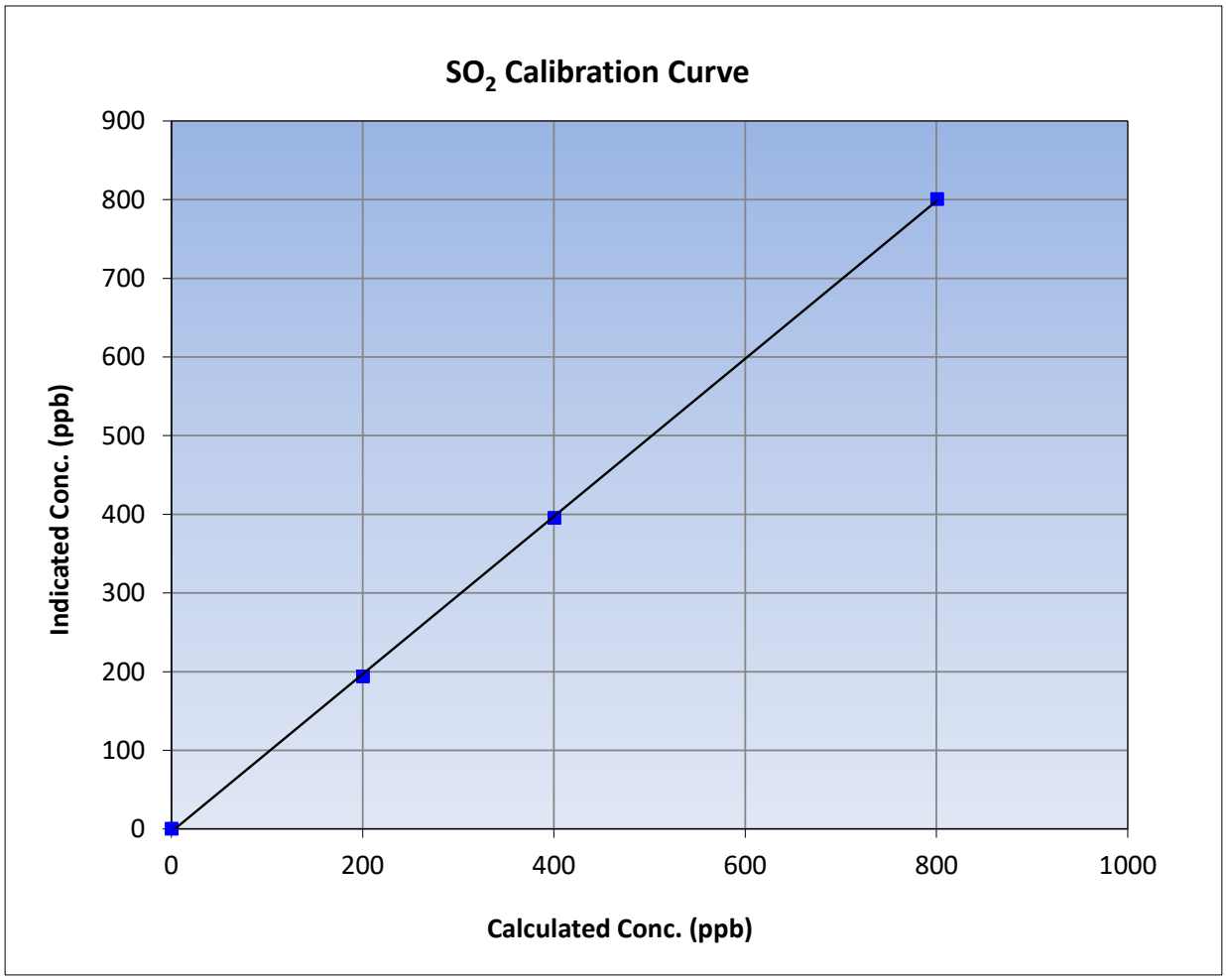
Station Information

Calibration Date:	November 8, 2023	Previous Calibration:	October 3, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	10:49	End Time (MST):	14:53
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841397

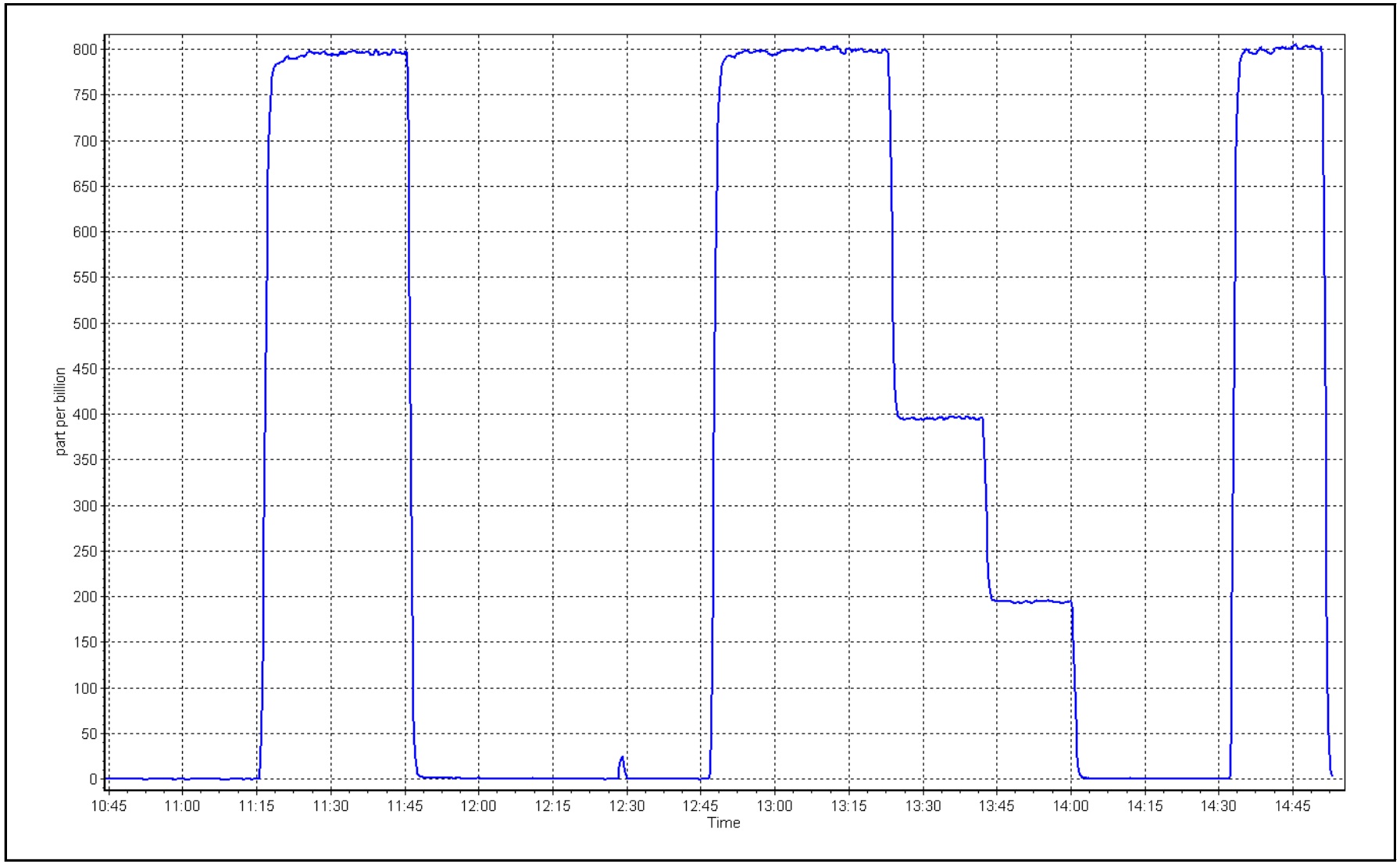
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
800.4	800.6	0.9997
400.2	395.1	1.0130
200.1	193.8	1.0325

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999908	*≥0.995*
Slope	1.002373	*0.90 - 1.10*
Intercept	-3.655880	*+/-30*



SO2 Calibration Plot Date: November 8, 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:	November 30, 2023	Last Cal Date:	October 26, 2023
Start time (MST):	11:43	End time (MST):	15:15
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:	0.998492	1.001780	Backgd or Offset:	1.55	1.57
Calibration intercept:	-0.099119	-0.139199	Coeff or Slope:	1.100	1.100

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4921	78.7	80.0	79.8	1.002
as found 2nd point	4961	39.4	40.0	39.5	1.013
as found 3rd point	4980	19.7	20.0	19.7	1.016
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4921	78.7	80.0	80.0	1.000
second point	4961	39.4	40.0	40.0	1.001
third point	4980	19.7	20.0	19.7	1.016
as left zero	5000	0.0	0.0	0.2	----
as left span	4921	78.7	80.0	80.3	0.996
SO2 Scrubber Check	4921	79.2	800.4	0.1	----
Date of last scrubber change:		N/A		Ave Corr Factor	1.005
Date of last converter efficiency test:		N/A			efficiency

Baseline Corr As found:	79.8	Prev response:	79.74	*% change:	0.1%
Baseline Corr 2nd AF pt:	39.5	AF Slope:	0.998489	AF Intercept:	-0.199028
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999959		

* = > +/-5% change initiates investigation

Notes: SOx scrubber check done after calibrator zero, passed. No adjustments made.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

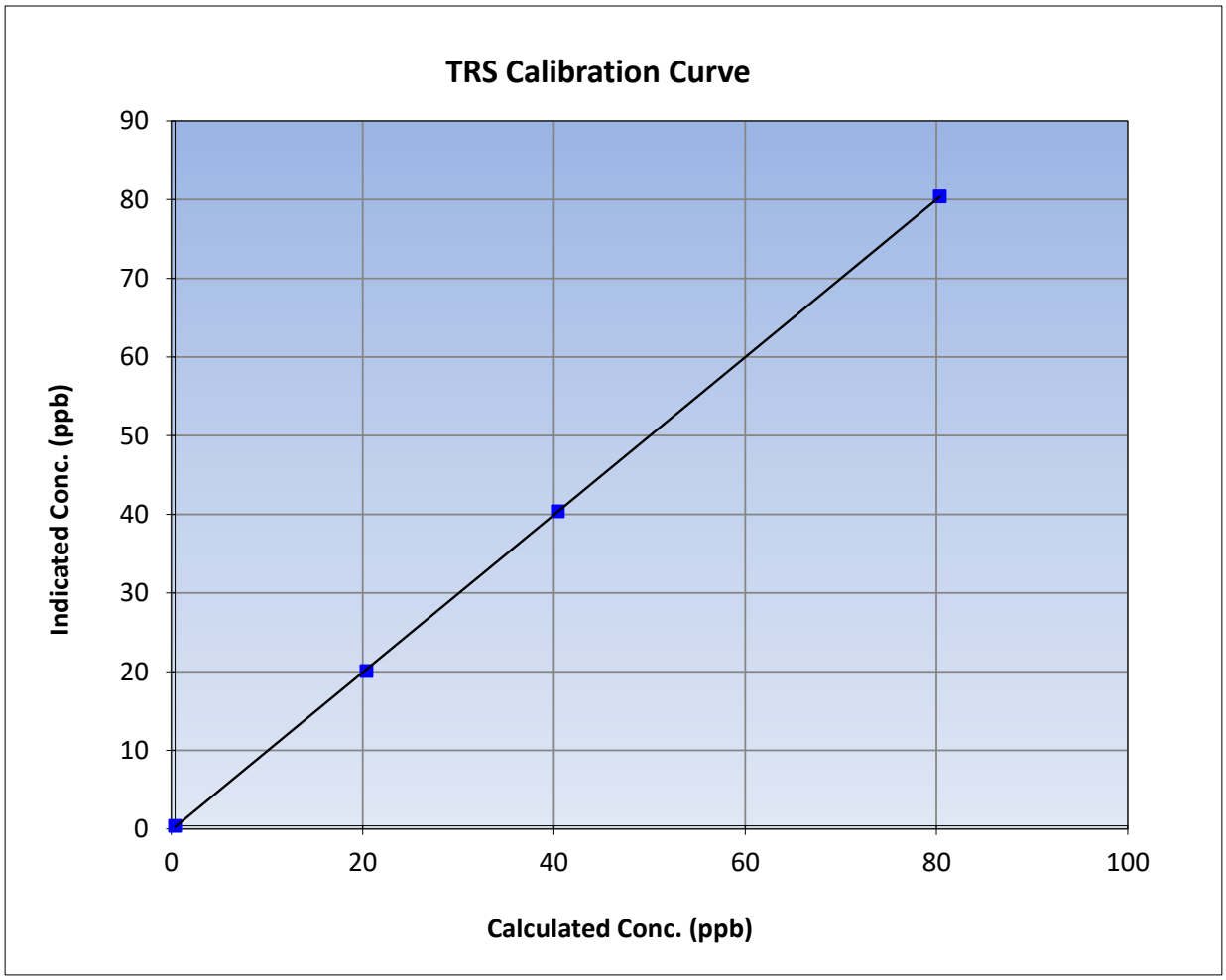
Station Information

Calibration Date:	November 30, 2023	Previous Calibration:	October 26, 2023
Station Name:	Ells River	Station Number:	AMS30
Start Time (MST):	11:43	End Time (MST):	15:15
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1410661331

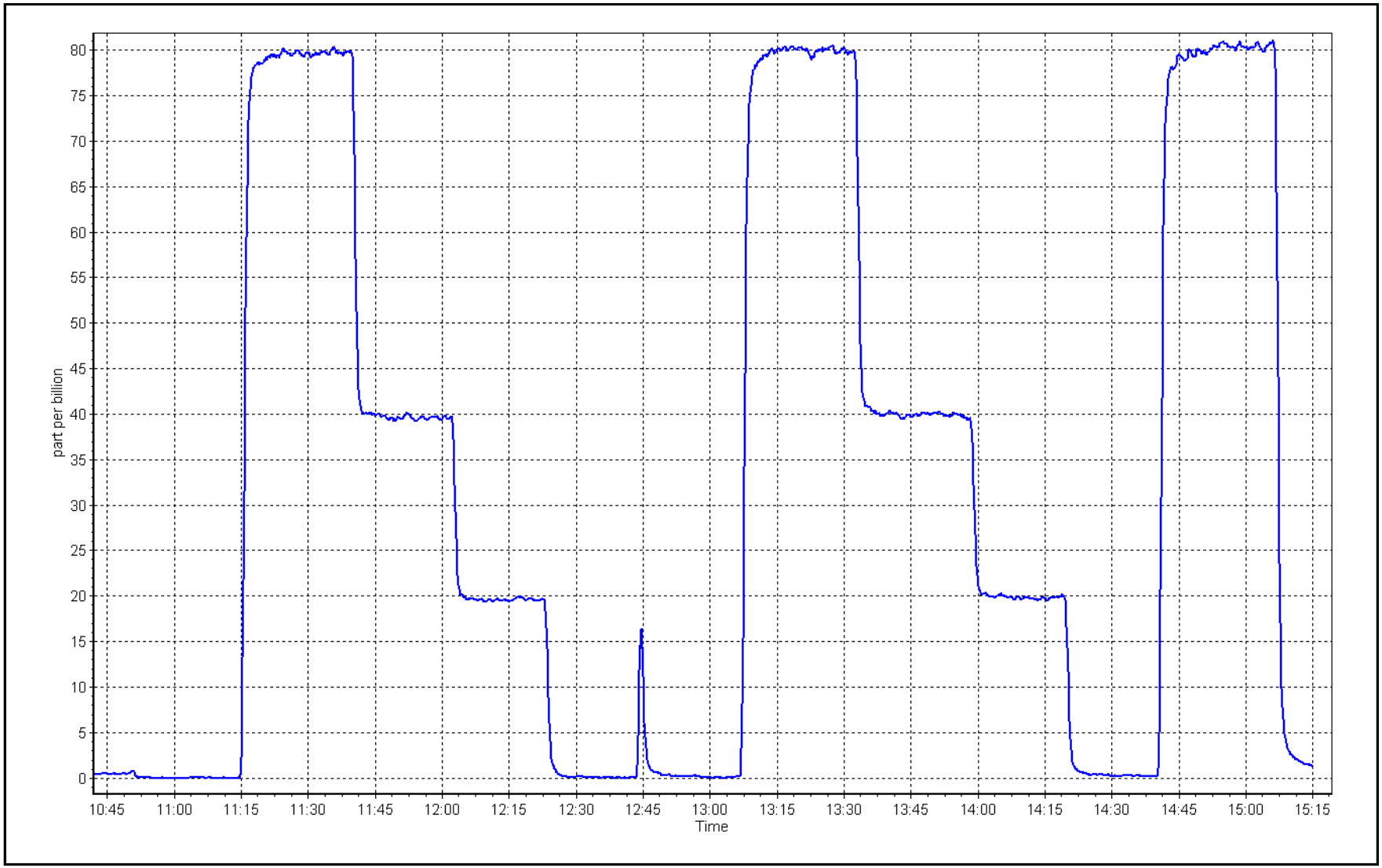
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.0	0.9995
40.0	40.0	1.0007
20.0	19.7	1.0161

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999981	*≥0.995*
Slope	1.001780	*0.90 - 1.10*
Intercept	-0.139199	*+/-3*



TRS Calibration Plot Date: November 30, 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:	November 8, 2023	Last Cal Date:	October 3, 2023
Start time (MST):	10:49	End time (MST):	14:53
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:	2.45E-04	2.46E-04	NMHC SP Ratio:	4.75E-05	5.47E-05
CH4 Retention time:	14.2	14.2	NMHC Peak Area:	191712	166643

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	17.03	15.77	1.080
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	4.17	1.022
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	17.07	0.998
				Average Correction Factor	1.011

Baseline Corr AF:	15.77	Prev response	16.97	*% change	-7.6%
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	7.93	1.150
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	9.09	1.002
second point	4960	39.6	4.56	4.53	1.006
third point	4980	19.8	2.28	2.24	1.016
as left zero	5000	0	0.00	0.00	----
as left span	4921	79.2	9.11	9.15	0.996
				Average Correction Factor	1.008
Baseline Corr AF:	7.93	Prev response	9.07	*% change	-14.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	7.91	7.84	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	79.2	7.91	7.91	1.000
second point	4960	39.6	3.96	3.90	1.014
third point	4980	19.8	1.98	1.92	1.029
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.91	7.92	0.999
				Average Correction Factor	1.015
Baseline Corr AF:	7.84	Prev response	7.90	*% change	-0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000476	1.000046
THC Cal Offset:	-0.062338	-0.048138
CH4 Cal Slope:	1.000886	1.001246
CH4 Cal Offset:	-0.022757	-0.032757
NMHC Cal Slope:	0.999995	0.998929
NMHC Cal Offset:	-0.039581	-0.015582

Notes: Inlet filter and N2 cylinder changed after As Founds, adjusted span only.

Calibration Performed By: Mohammed Kashif and Jan Castro

Wood Buffalo Environmental Association

THC Calibration Summary

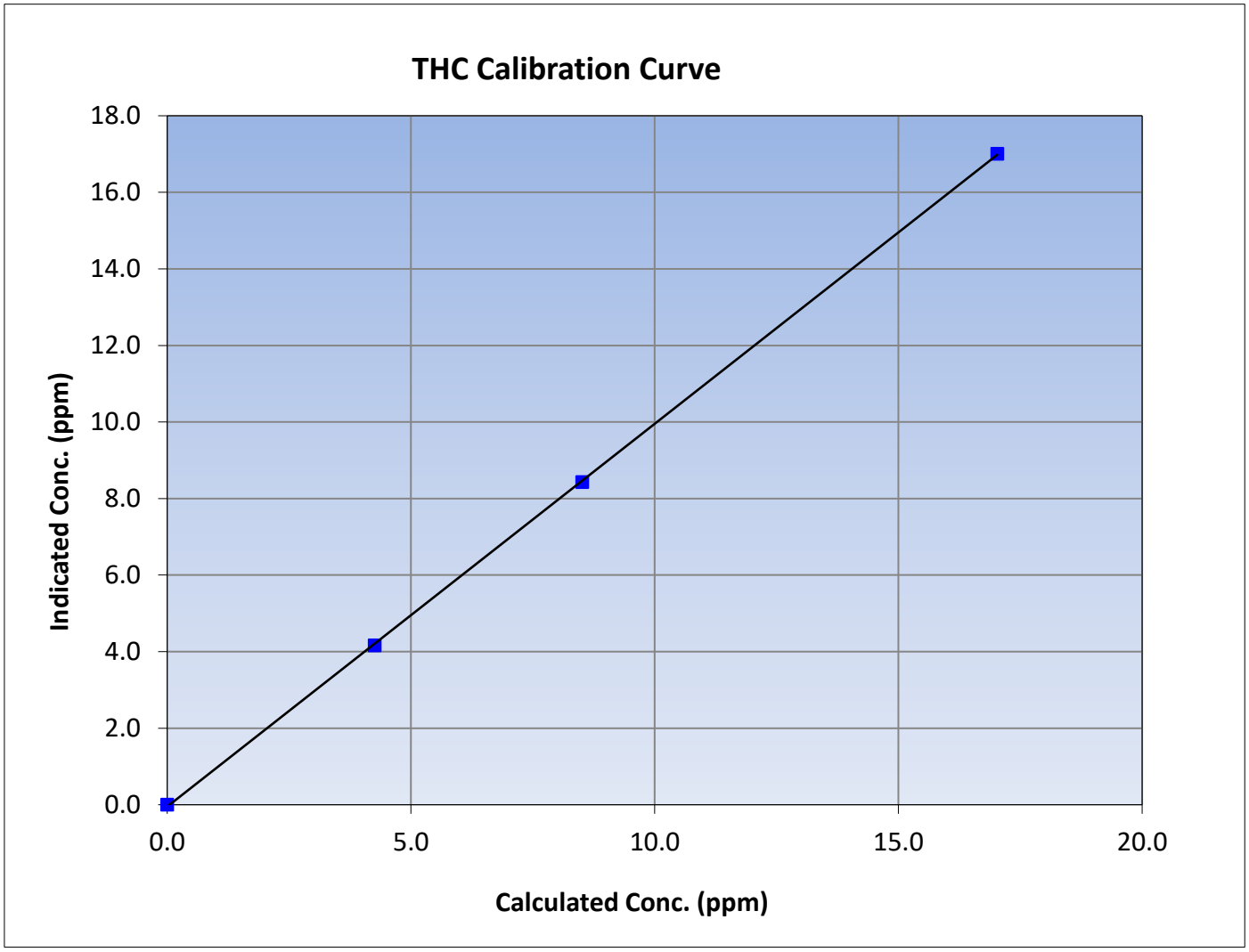
Version-01-2020

Station Information

Calibration Date:	November 8, 2023	Previous Calibration:	October 3, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	10:49	End Time (MST):	14:53
Analyzer make:	Thermo 55i	Analyzer serial #:	1181490018

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999963	*≥0.995*
17.03	17.01	1.0012			
8.51	8.43	1.0096	Slope	1.000046	*0.90 - 1.10*
4.26	4.17	1.0216			
			Intercept	-0.048138	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

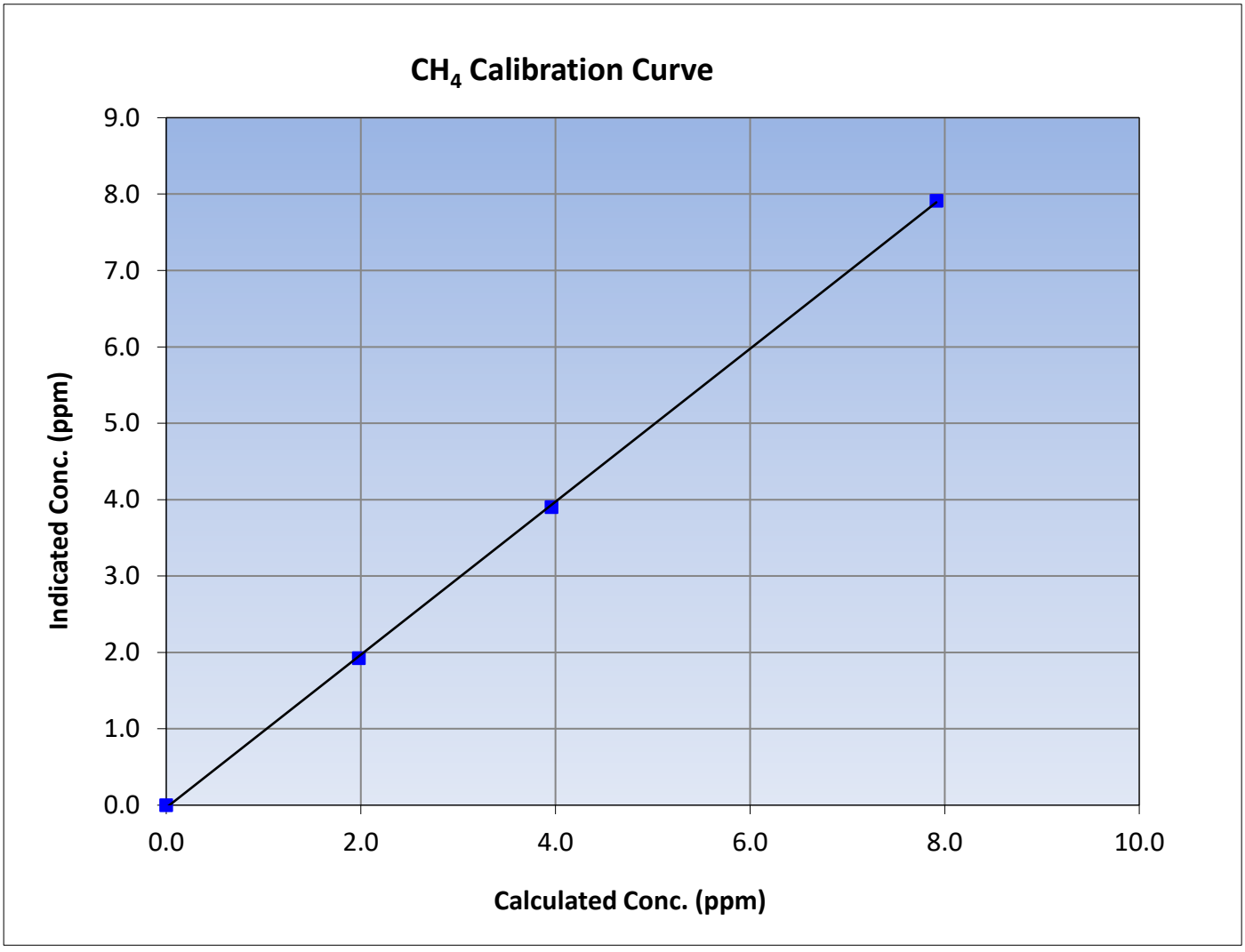
Version-01-2020

Station Information

Calibration Date:	November 8, 2023	Previous Calibration:	October 3, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	10:49	End Time (MST):	14:53
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	0.999917	*≥0.995*
7.91	7.91	1.0004			
3.96	3.90	1.0141	Slope	1.001246	*0.90 - 1.10*
1.98	1.92	1.0291			
			Intercept	-0.032757	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

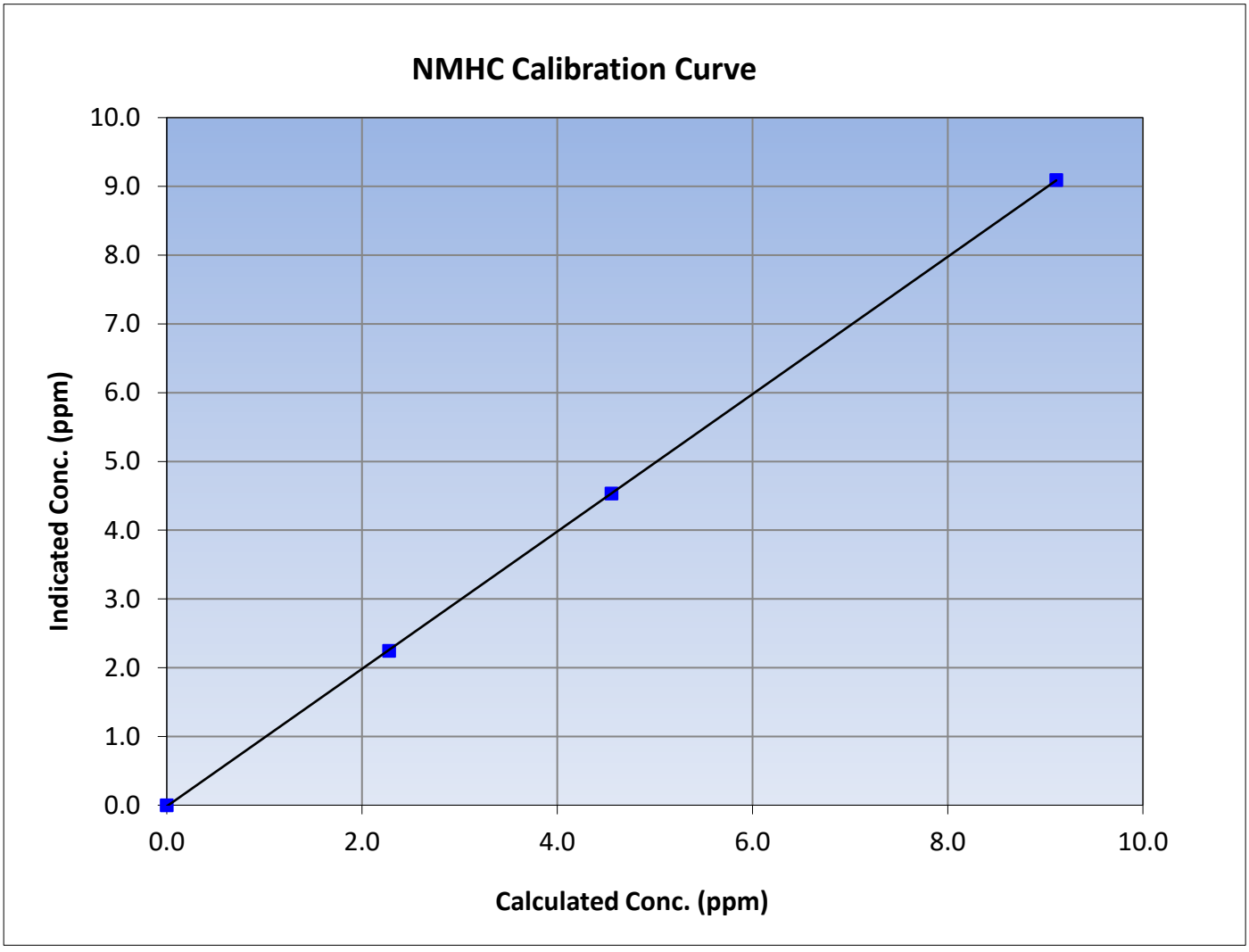
Version-01-2020

Station Information

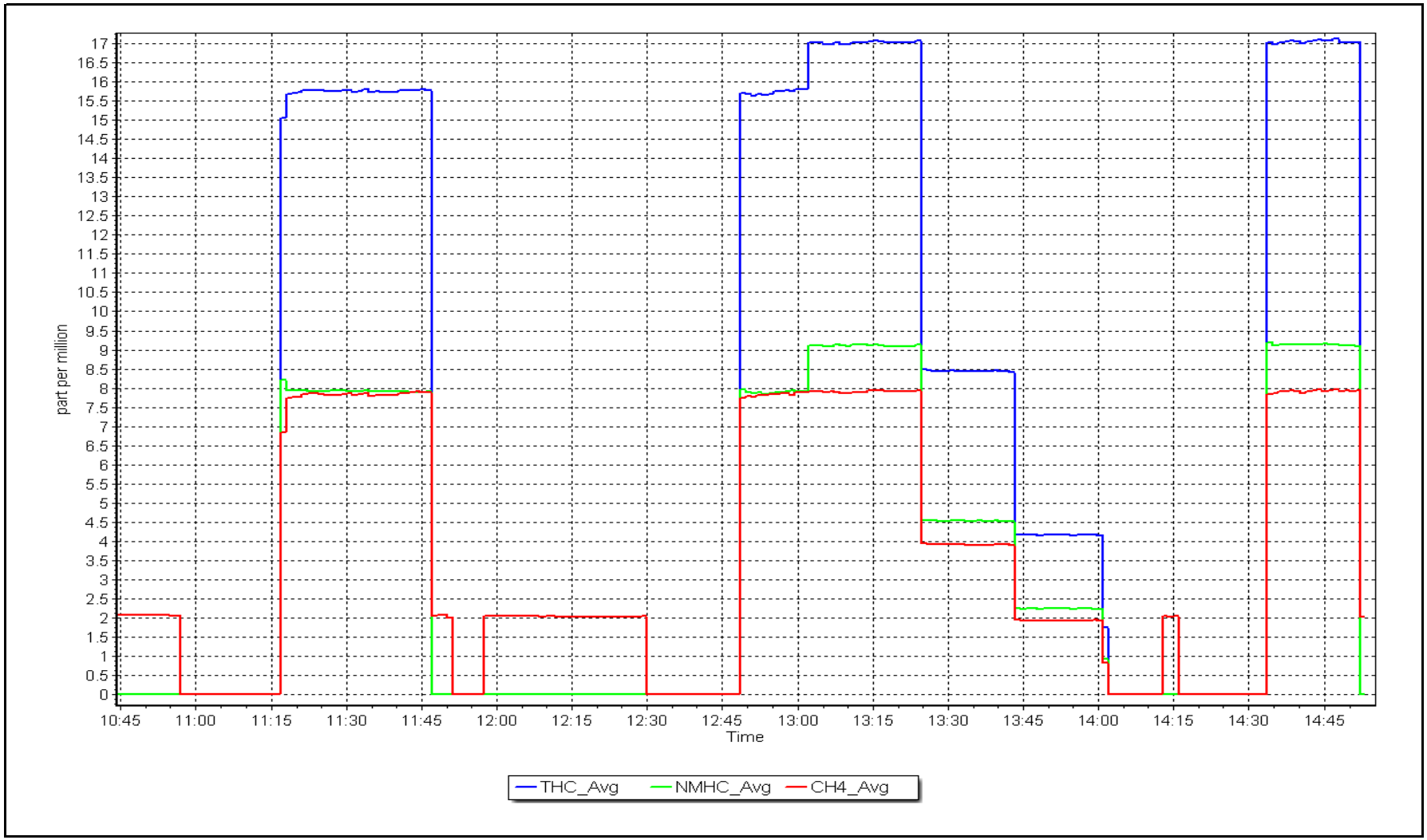
Calibration Date:	November 8, 2023	Previous Calibration:	October 3, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	10:49	End Time (MST):	14:53
Analyzer make:	Thermo 55i	Analyzer serial #:	1181490018

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999986	*≥0.995*
9.11	9.09	1.0020			
4.56	4.53	1.0057	Slope	0.998929	*0.90 - 1.10*
2.28	2.24	1.0157			
			Intercept	-0.015582	*+/-0.5*



NMHC Calibration Plot Date: November 8, 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:	November 28, 2023	Last Cal Date:	October 20, 2023
Start time (MST):	9:46	End time (MST):	14:34
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:	1.147	1.147	NO bkgnd or offset:	14.0	14.0
NOX coeff or slope:	0.992	0.992	NOX bkgnd or offset:	14.0	14.0
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	190.3	190.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001461	0.995096
NO_X Cal Offset:	-1.680000	-1.240000
NO Cal Slope:	1.000029	0.993053
NO Cal Offset:	-2.600000	-2.360000
NO_2 Cal Slope:	1.004460	1.003095
NO_2 Cal Offset:	0.734060	0.737995

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	-0.7	-0.1	----	----
as found span	4920	80.0	813.3	799.5	13.8	812.9	794.0	18.9	1.0005	1.0070
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.4	0.0	----	----
high point	4920	80.0	813.3	799.5	13.8	808.4	792.7	15.7	1.0060	1.0086
second point	4960	40.0	406.6	399.8	6.9	403.1	393.3	9.8	1.0088	1.0164
third point	4980	20.0	203.3	199.9	3.4	200.3	194.4	5.9	1.0151	1.0282
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	----	----
as left span	4920	80.0	813.3	436.7	376.6	808.6	429.2	379.3	1.0058	1.0175
								Average Correction Factor	1.0100	1.0177

Corrected As found	NO_X = 813.7 ppb	NO = 794.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.1%
Previous Response	NO_X = 812.8 ppb	NO = 796.9 ppb		*Percent Change	NO =	-0.3%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found NO r^2:	NO Sl:	NO Int:	
			As found NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	788.4	425.6	376.6	377.9	0.9965	100.4%
2nd GPT point (200 ppb O3)	788.4	615.3	186.9	189.1	0.9882	101.2%
3rd GPT point (100 ppb O3)	788.4	697.4	104.8	106.2	0.9864	101.4%
				Average Correction Factor	0.9903	101.0%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

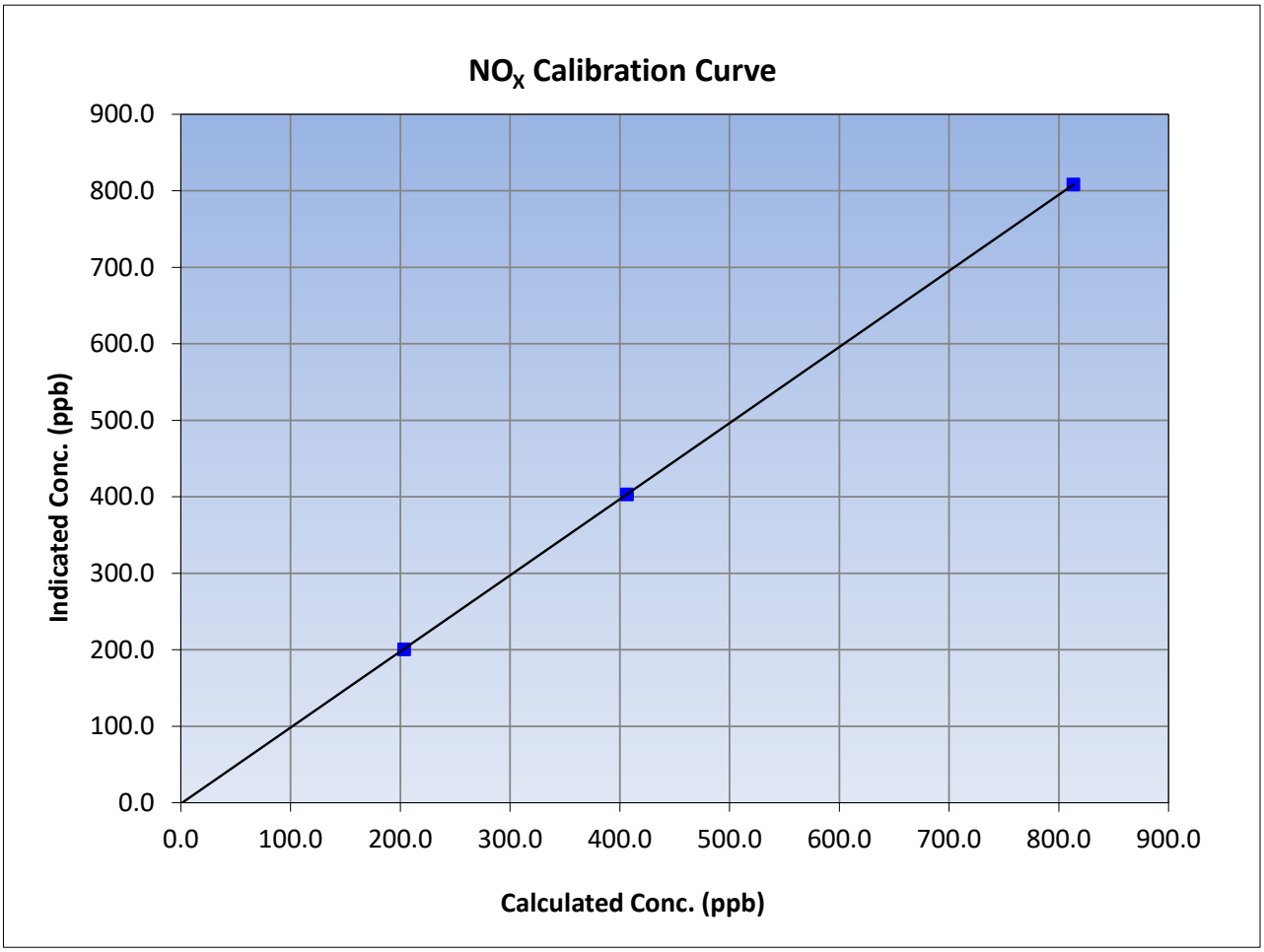
Version-04-2020

Station Information

Calibration Date:	November 28, 2023	Previous Calibration:	October 20, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:46	End Time (MST):	14:34
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	-0.5	----	Correlation Coefficient	0.999996	*≥0.995*
813.3	808.4	1.0060			
406.6	403.1	1.0088	Slope	0.995096	*0.90 - 1.10*
203.3	200.3	1.0151			
			Intercept	-1.240000	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

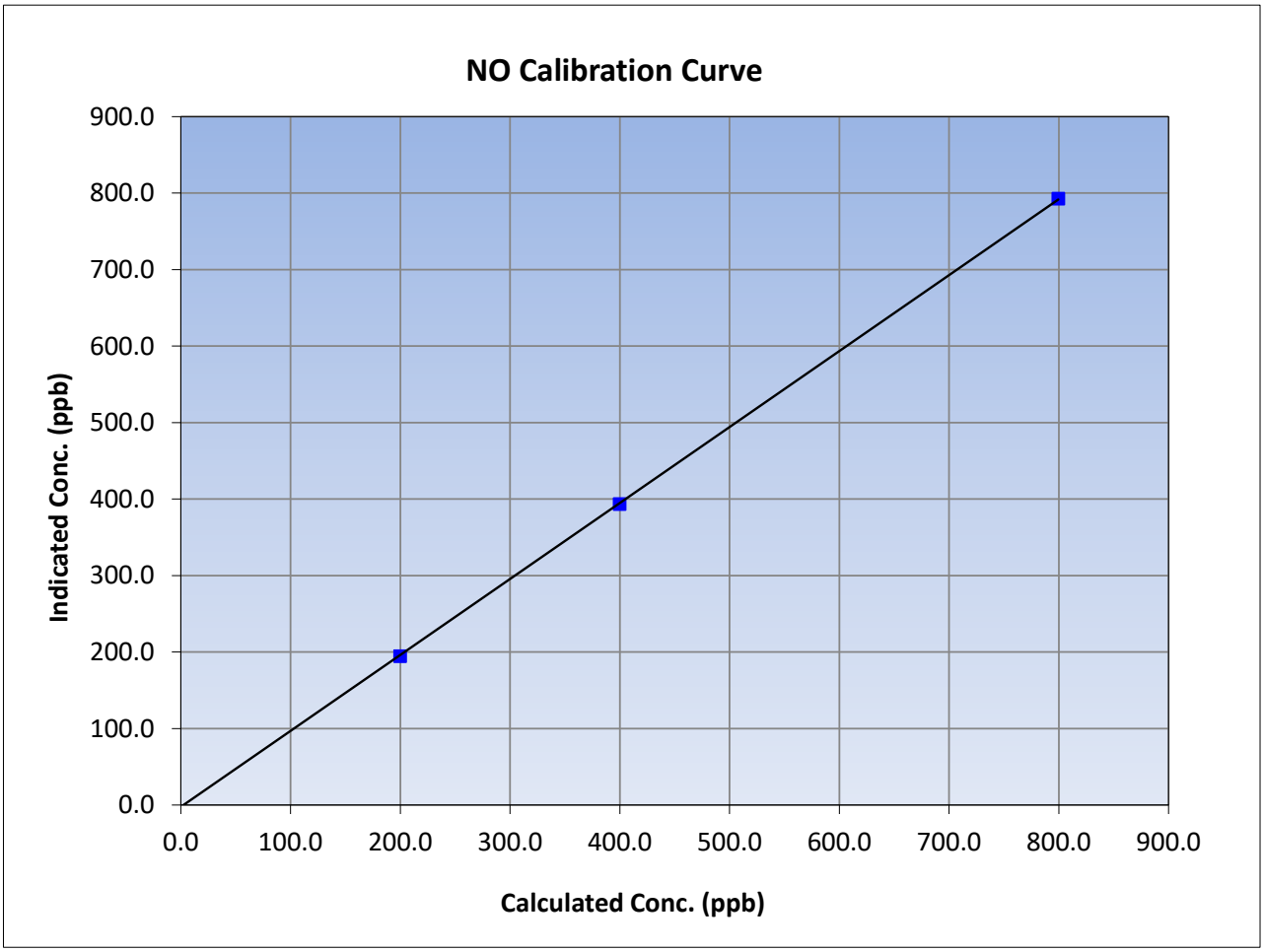
Version-04-2020

Station Information

Calibration Date:	November 28, 2023	Previous Calibration:	October 20, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:46	End Time (MST):	14:34
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	-0.4	----	Correlation Coefficient	0.999972	*≥0.995*
799.5	792.7	1.0086			
399.8	393.3	1.0164	Slope	0.993053	*0.90 - 1.10*
199.9	194.4	1.0282			
			Intercept	-2.360000	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

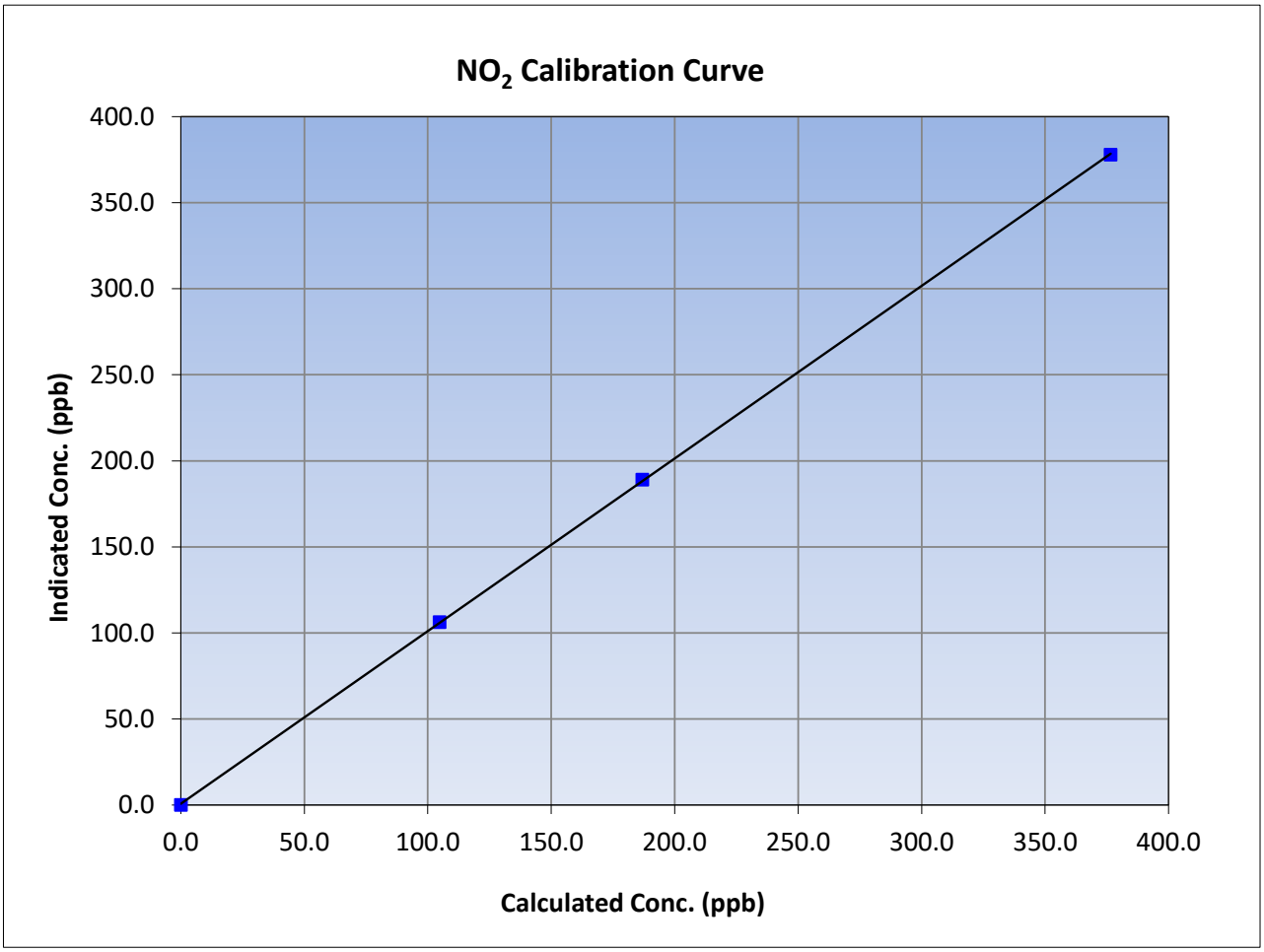
Version-04-2020

Station Information

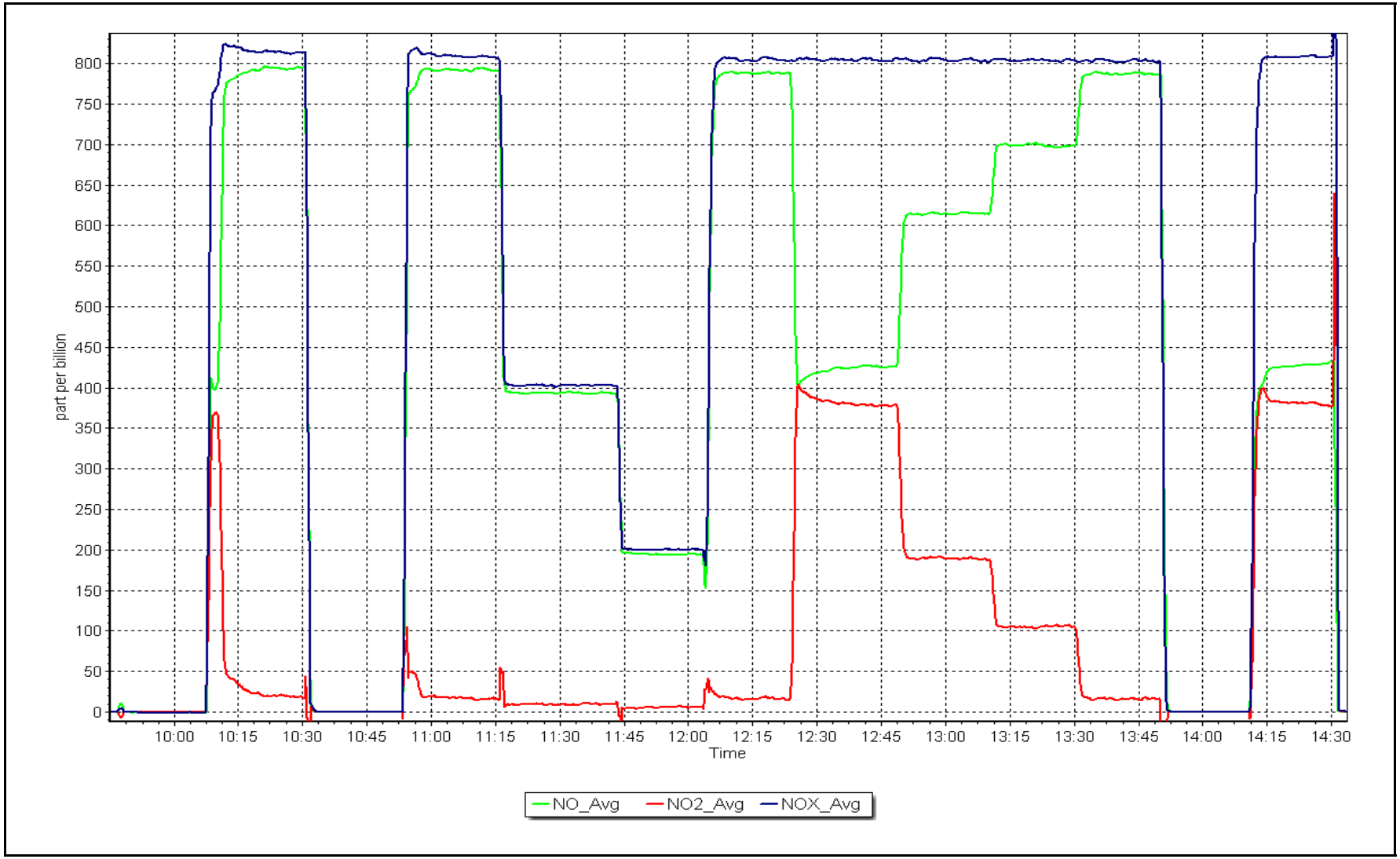
Calibration Date:	November 28, 2023	Previous Calibration:	October 20, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:46	End Time (MST):	14:34
Analyzer make:	Thermo 42i	Analyzer serial #:	710321429

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999976	≥0.995
376.6	377.9	0.9965			
186.9	189.1	0.9882	Slope	1.003095	0.90 - 1.10
104.8	106.2	0.9864			
			Intercept	0.737995	+/-20



NO_X Calibration Plot Date: November 28, 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:	November 30, 2023	Last Cal Date:	October 27, 2023
Start time (MST):	10:59	End time (MST):	12:37
Analyzer Make:	API T640	S/N:	875
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388750
Temp/RH standard:	Alicat FP-25BT	S/N:	388750

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (^{o}C)	-5.1	-5.23	-5.1	☐	
P (mmHg)	729.7	731.6	729.7	☐	+/- 10 mmHg
flow (LPM)	5.00	5.126	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: November 30, 2023 Last Cal Date: October 27, 2023

PM w/o HEPA: 2.1 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: October 27, 2023 <0.2 ug/m3

Disposable Filter Changed: October 27, 2023

Annual Maintenance

Date Sample Tube Cleaned: October 27, 2023

Date RH/T Sensor Cleaned: November 30, 2023

Notes: No adjustments made. Cleaned RH/T sensor.

Calibration by: Braiden Boutilier

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS501
LEISMER
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Leismer	Station number:	AMS501
Calibration Date:	November 28, 2023	Last Cal Date:	October 18, 2023
Start time (MST):	13:38	End time (MST):	16:23
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:		50.52 ppm	Cal Gas Exp Date:	December 29, 2028
Cal Gas Cylinder #:	CC274266			
Removed Cal Gas Conc:		50.52 ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	2659
ZAG Make/Model:	API 701		Serial Number:	4427

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1160290011

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.004314	1.003829	Backgd or Offset:	19.1	19.2
Calibration intercept:	-1.416108	-1.496012	Coeff or Slope:	0.960	0.971

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.2	----
as found span	4921	79.2	800.2	791.9	1.010
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4921	79.2	800.2	802.5	0.997
second point	4960	39.6	400.2	399.7	1.001
third point	4980	19.8	200.1	197.4	1.014
as left zero	5000	0.0	0.0	-0.1	----
as left span	4921	79.2	800.2	800.9	0.999
				Average Correction Factor	1.004

Baseline Corr As found:	792.10	Previous response	802.24	*% change	-1.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

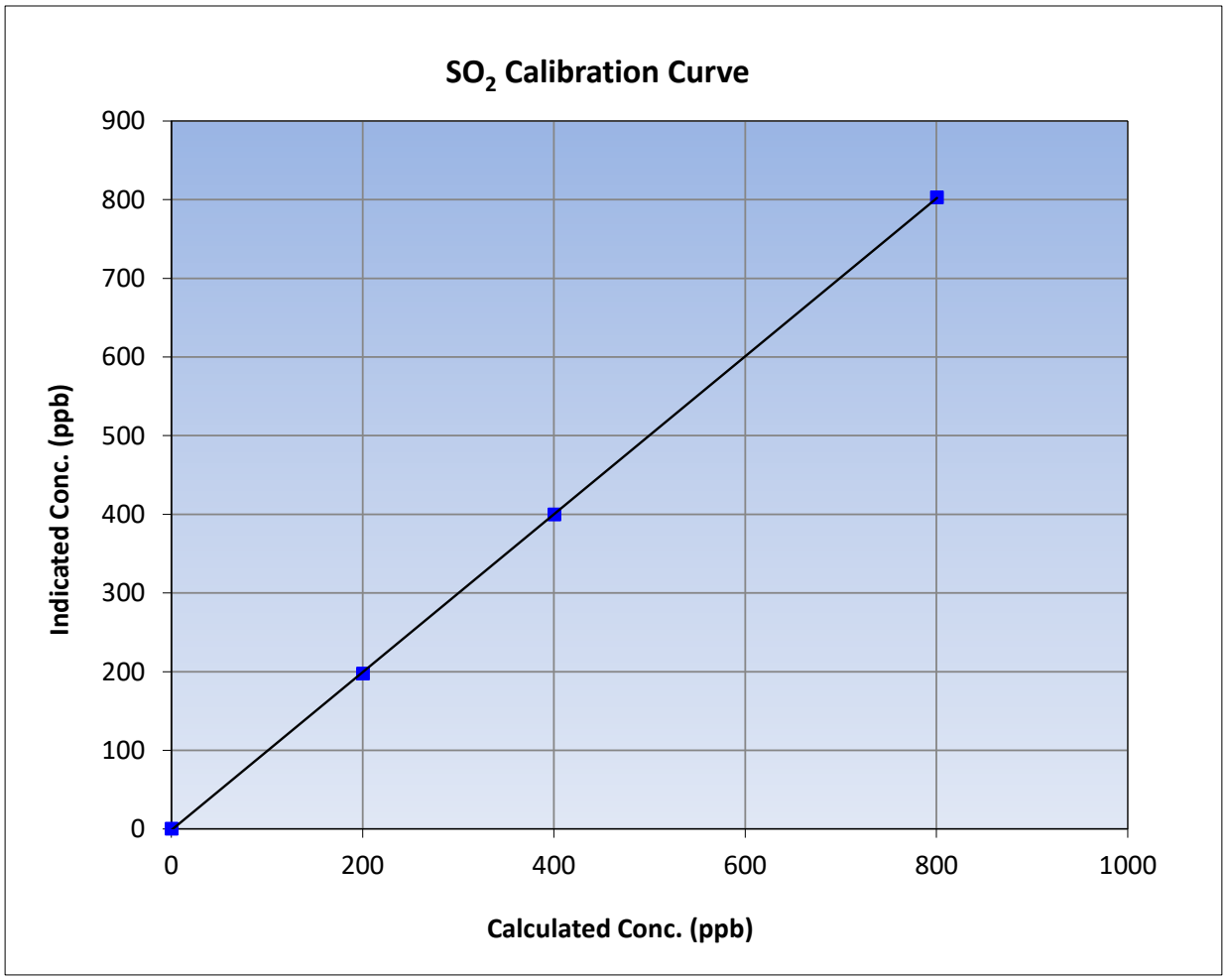
Station Information

Calibration Date:	November 28, 2023	Previous Calibration:	October 18, 2023
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	13:38	End Time (MST):	16:23
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290011

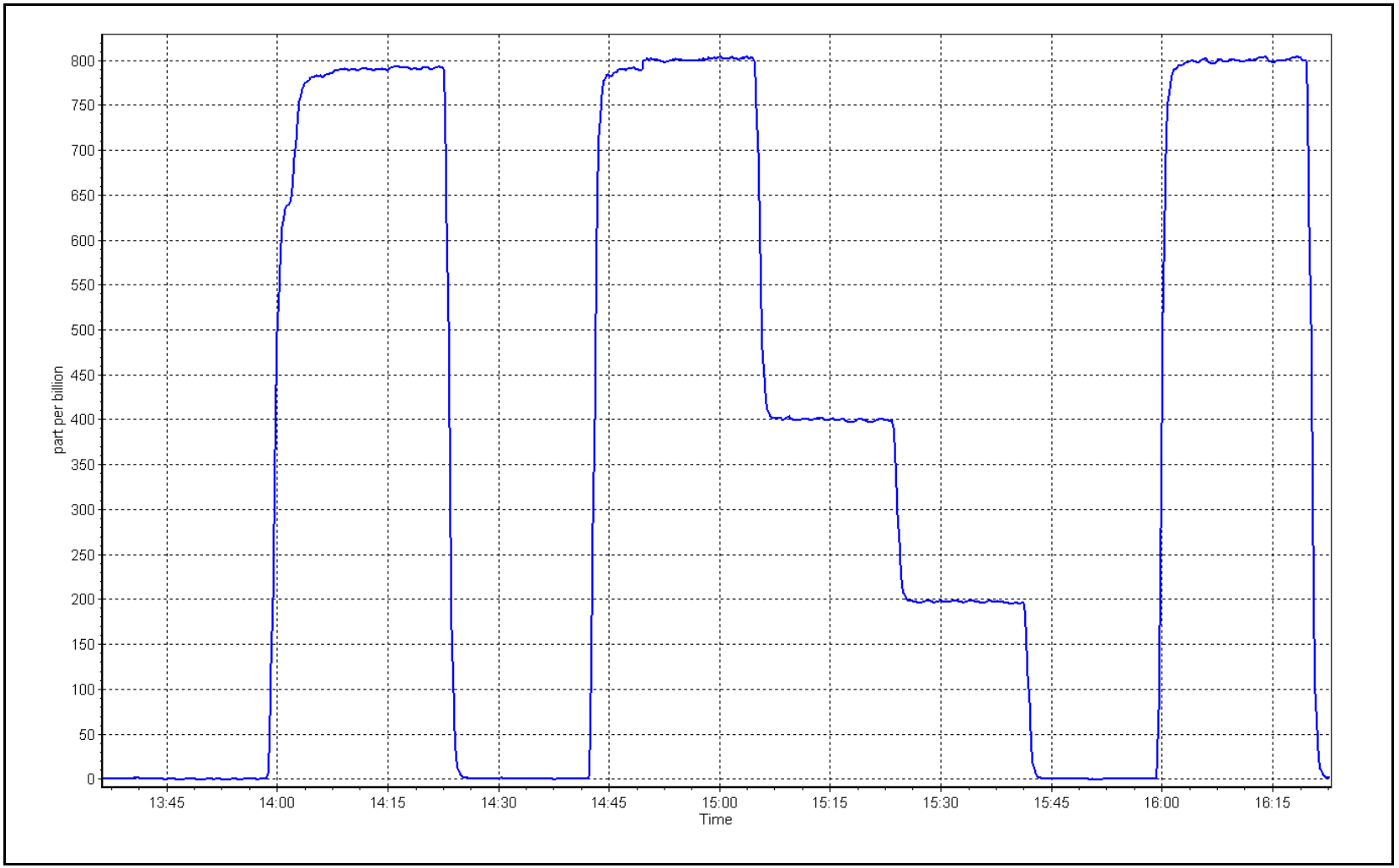
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
800.2	802.5	0.9971
400.2	399.7	1.0011
200.1	197.4	1.0135

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999979	*≥0.995*
Slope	1.003829	*0.90 - 1.10*
Intercept	-1.496012	*+/-30*



SO2 Calibration Plot Date: November 28, 2023 Location: Leismer



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Leismer	Station number:	AMS501
Calibration Date:	November 29, 2023	Last Cal Date:	October 17, 2023
Start time (MST):	8:15	End time (MST):	12:23
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.14	ppm	Cal Gas Exp Date:	September 16, 2024
Cal Gas Cylinder #:	CC511843			
Removed Cal Gas Conc:	5.14	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	2659
ZAG Make/Model:	API 701		Serial Number:	4427

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1180540020	
Converter make:	Global G150		Converter serial #:	2022-218	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.006859	1.002431	Backgd or Offset:	3.41	3.47
Calibration intercept:	-0.318205	-0.138350	Coeff or Slope:	1.082	1.105

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.2	----
as found span	4922	77.8	80.0	78.4	1.018
as found 2nd point	4961	38.9	40.0	39.1	1.018
as found 3rd point	4981	19.4	19.9	19.2	1.028
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4922	77.8	80.0	80.0	1.000
second point	4961	38.9	40.0	40.1	0.997
third point	4981	19.4	19.9	19.7	1.012
as left zero	5000	0.0	0.0	-0.1	----
as left span	4922	77.8	80.0	80.3	0.996
SO2 Scrubber Check	4921	79.2	792.0	0.0	----
Date of last scrubber change:		24-Feb-23		Ave Corr Factor	1.003
Date of last converter efficiency test:		December 1, 2022			efficiency

Baseline Corr As found:	78.6	Prev response:	80.21	*% change:	-2.1%
Baseline Corr 2nd AF pt:	39.3	AF Slope:	0.983574	AF Intercept:	-0.278750
Baseline Corr 3rd AF pt:	19.4	AF Correlation:	0.999992		

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after as founds. Scrubber test done after calibrator zero. Adjusted span only.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

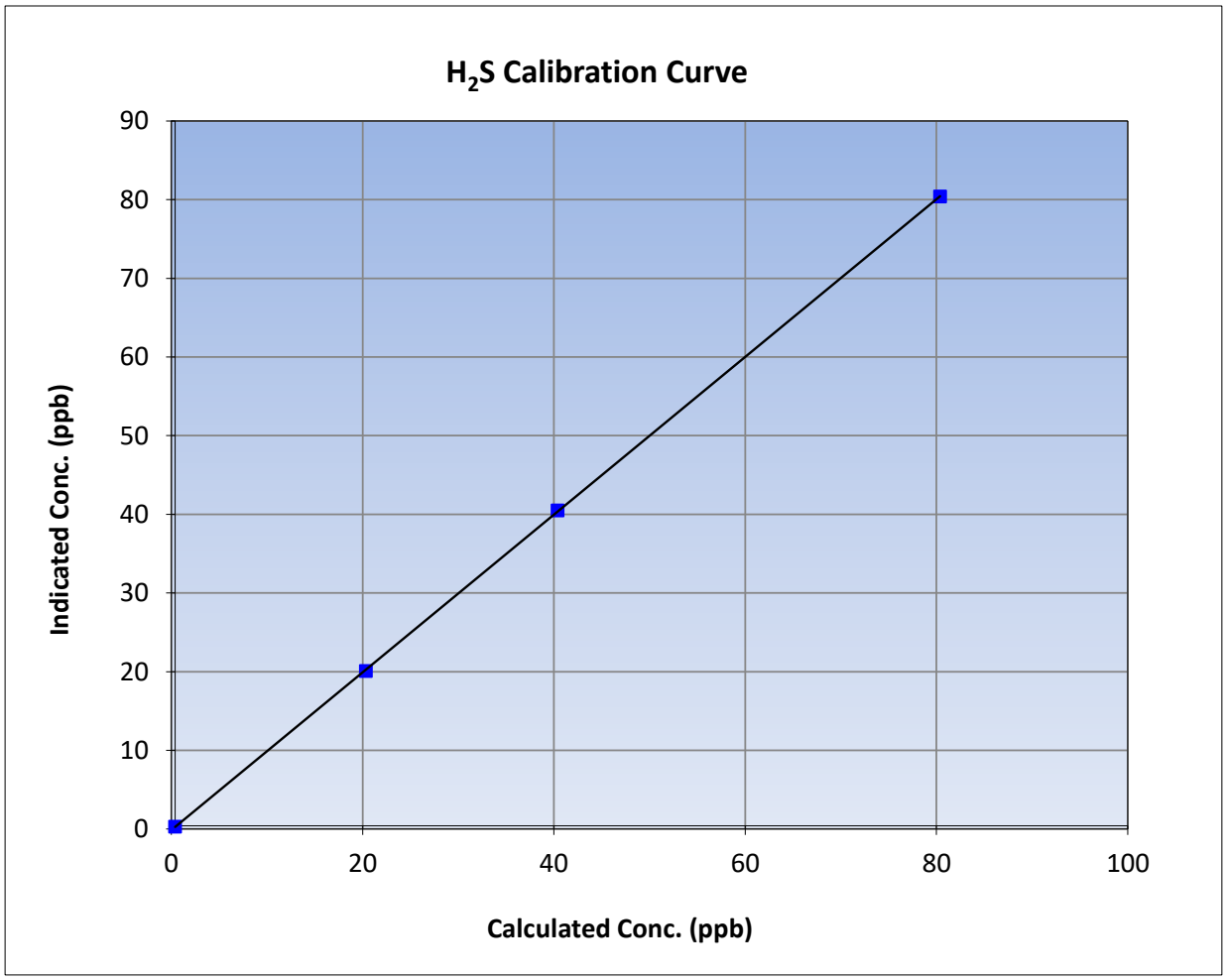
Station Information

Calibration Date:	November 29, 2023	Previous Calibration:	October 17, 2023
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	8:15	End Time (MST):	12:23
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1180540020

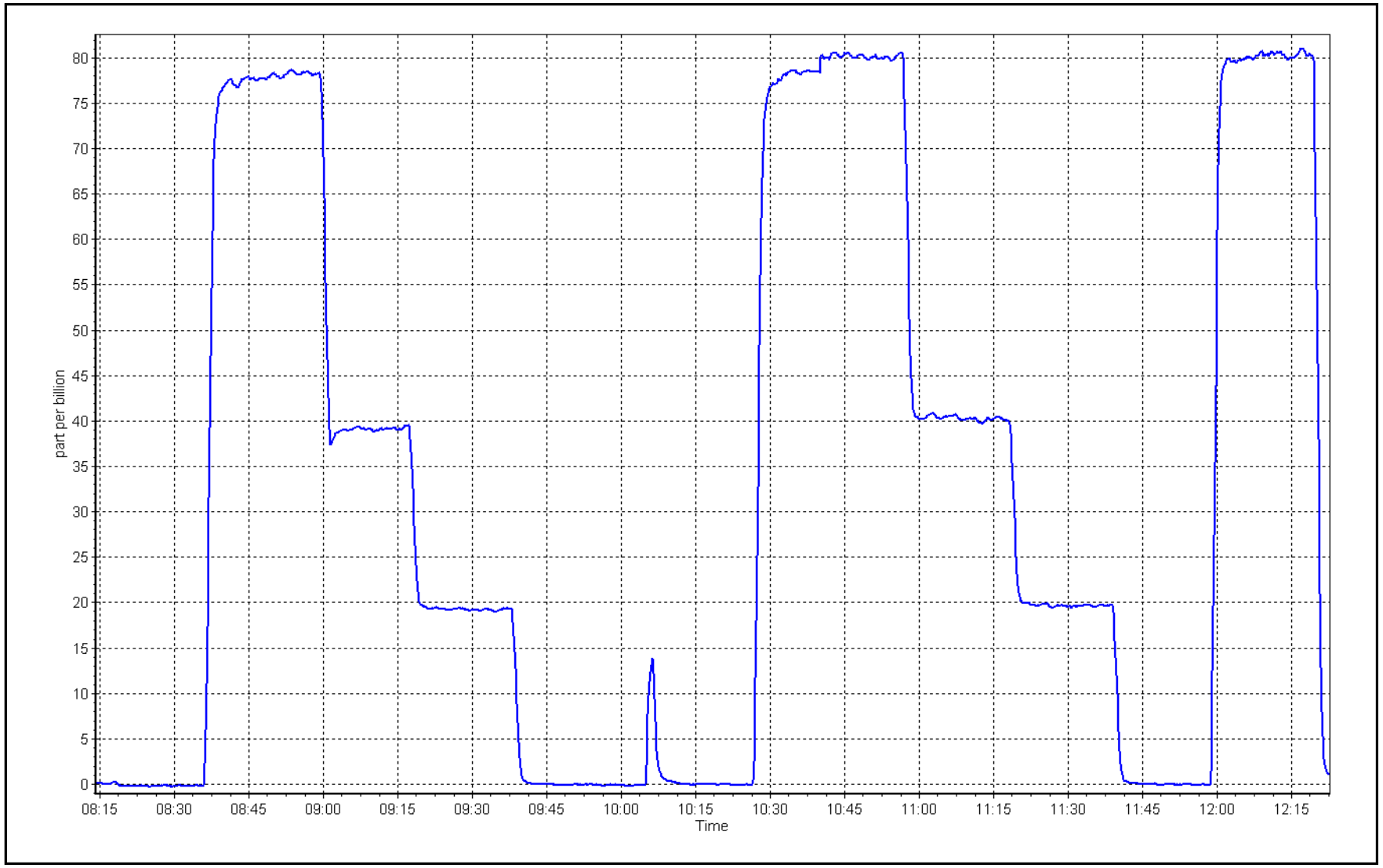
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.0	0.9998
40.0	40.1	0.9973
19.9	19.7	1.0123

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999986	*≥0.995*
Slope	1.002431	*0.90 - 1.10*
Intercept	-0.138350	*+/-3*



H_2S Calibration Plot Date: November 29, 2023 Location: Leismer



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Leismer	Station number:	AMS501
Calibration Date:	November 28, 2023	Last Cal Date:	October 26, 2023
Start time (MST):	9:23	End time (MST):	13:42
Reason:	Removal		

Calibration Standards

NO Gas Cylinder #:		T26811M	Cal Gas Expiry Date:	October 30, 2024	
NOX Cal Gas Conc:	47.46	ppm	NO Cal Gas Conc:	47.39	ppm
Removed Cylinder #:		NA	Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	47.46	ppm	Removed Gas NO Conc:	47.39	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	2659	
ZAG make/model:	API 701		Serial Number:	4427	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1218153356	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.301	1.225	NO bkgnd or offset:	3.9	3.6
NOX coeff or slope:	0.995	0.992	NOX bkgnd or offset:	4.1	3.6
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	169.2	165.0

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.009935	1.007139
NO_X Cal Offset:	-4.483299	-3.748007
NO Cal Slope:	1.007430	1.006069
NO Cal Offset:	-5.190972	-4.627968
NO_2 Cal Slope:	1.006440	0.997452
NO_2 Cal Offset:	-0.613191	0.289298

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.3	-0.1	----	----
as found span	4916	84.4	801.1	799.9	1.2	840.3	833.5	6.8	0.9533	0.9597
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
high point	4916	84.4	801.1	799.9	1.2	804.3	801.9	2.6	0.9960	0.9975
second point	4958	42.2	400.5	400.0	0.6	399.6	396.9	2.6	1.0024	1.0077
third point	4979	21.1	200.3	200.0	0.3	193.0	191.1	2.0	1.0377	1.0465
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.2	0.1	----	----
as left span	4916	84.4	801.1	378.2	422.9	806.6	390.4	416.2	0.9931	0.9687
								Average Correction Factor	1.0120	1.0172

Corrected As found	NO_X = 840.7 ppb	NO = 833.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	4.3%
Previous Response	NO_X = 804.5 ppb	NO = 800.6 ppb		*Percent Change	NO =	4.0%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	808.3	386.6	422.9	422.1	1.0019	99.8%
2nd GPT point (200 ppb O3)	808.3	597.5	212.0	211.5	1.0023	99.8%
3rd GPT point (100 ppb O3)	808.3	697.9	111.6	112.0	0.9963	100.4%
				Average Correction Factor	1.0001	100.0%

Notes: Changed inlet filter after as founds. Adjusted zero and span. Used 2nd NO reference point due to drift.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

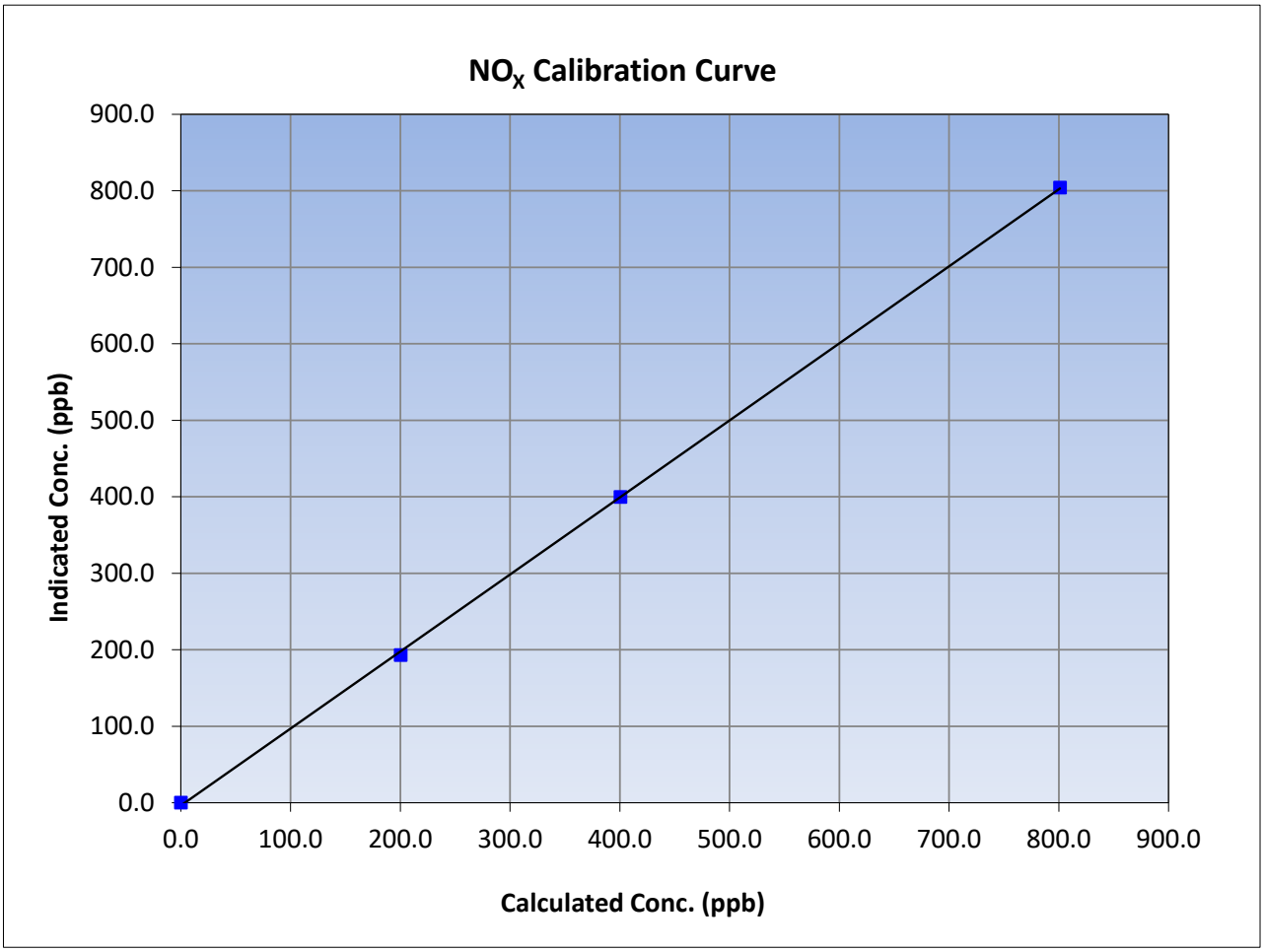
Version-04-2020

Station Information

Calibration Date:	November 28, 2023	Previous Calibration:	October 26, 2023
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	9:23	End Time (MST):	13:42
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999887	*≥0.995*
801.1	804.3	0.9960			
400.5	399.6	1.0024	Slope	1.007139	*0.90 - 1.10*
200.3	193.0	1.0377			
			Intercept	-3.748007	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

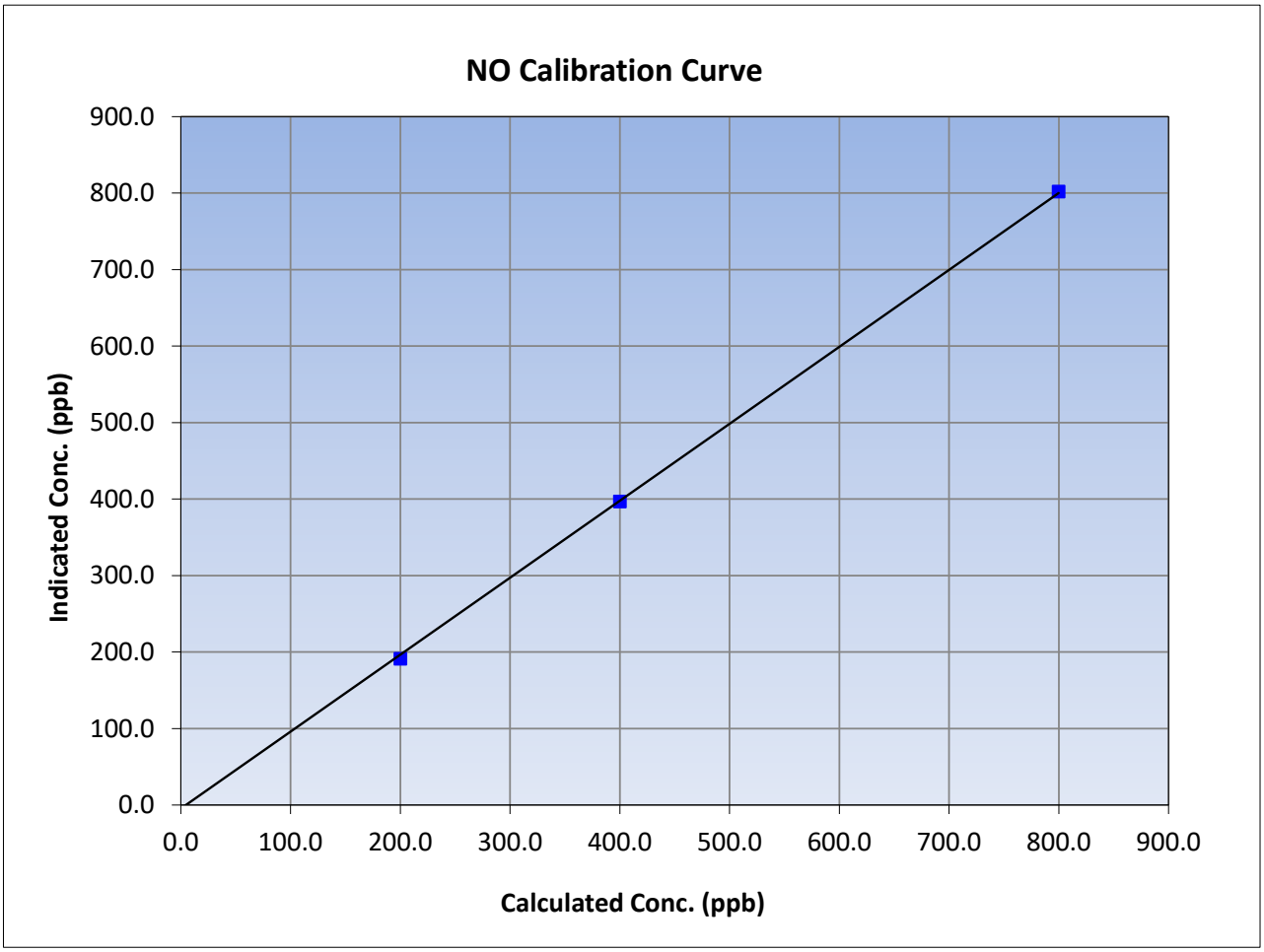
Version-04-2020

Station Information

Calibration Date:	November 28, 2023	Previous Calibration:	October 26, 2023
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	9:23	End Time (MST):	13:42
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999847	≥0.995
799.9	801.9	0.9975			
400.0	396.9	1.0077	Slope	1.006069	0.90 - 1.10
200.0	191.1	1.0465			
			Intercept	-4.627968	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

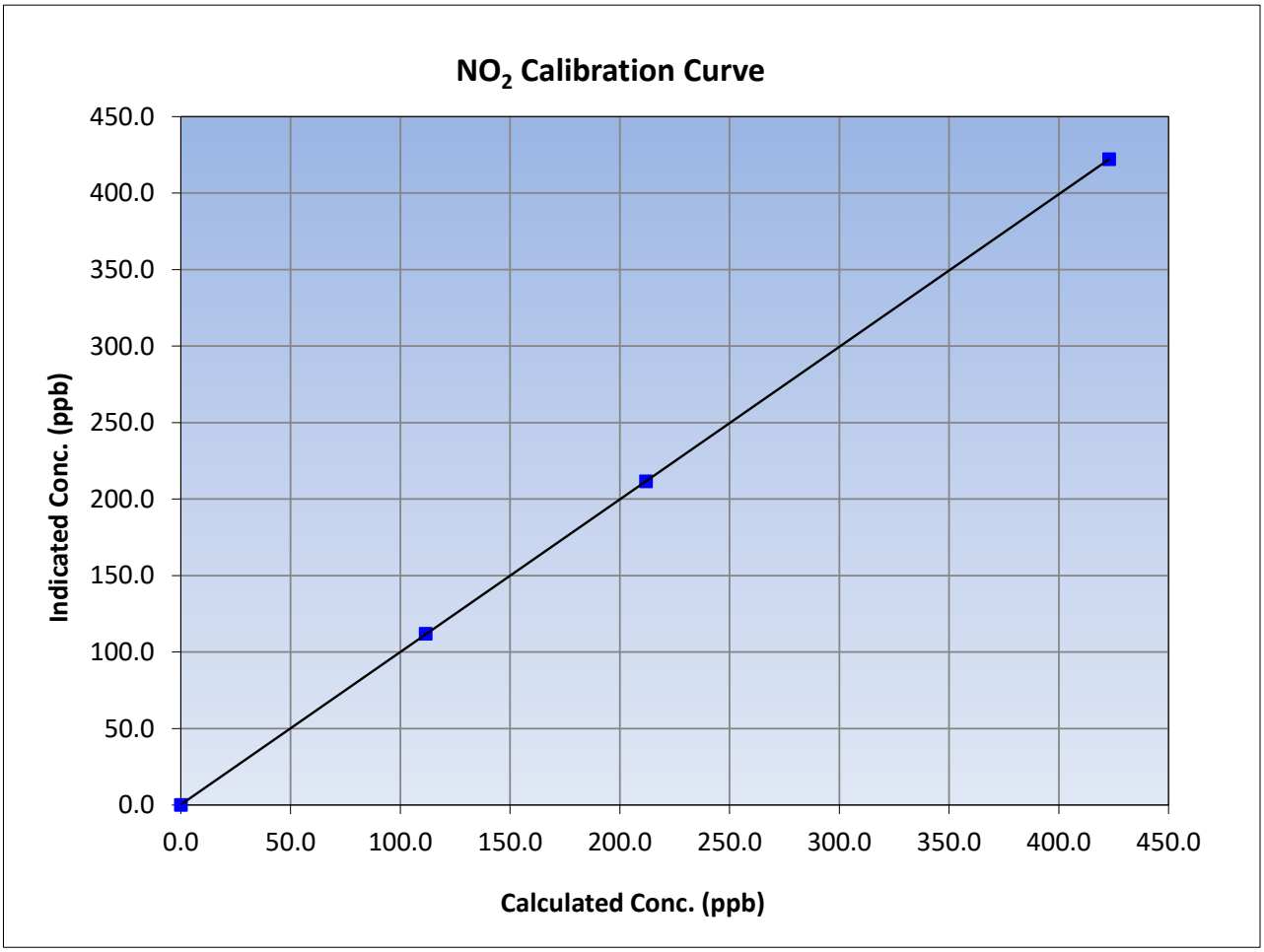
Version-04-2020

Station Information

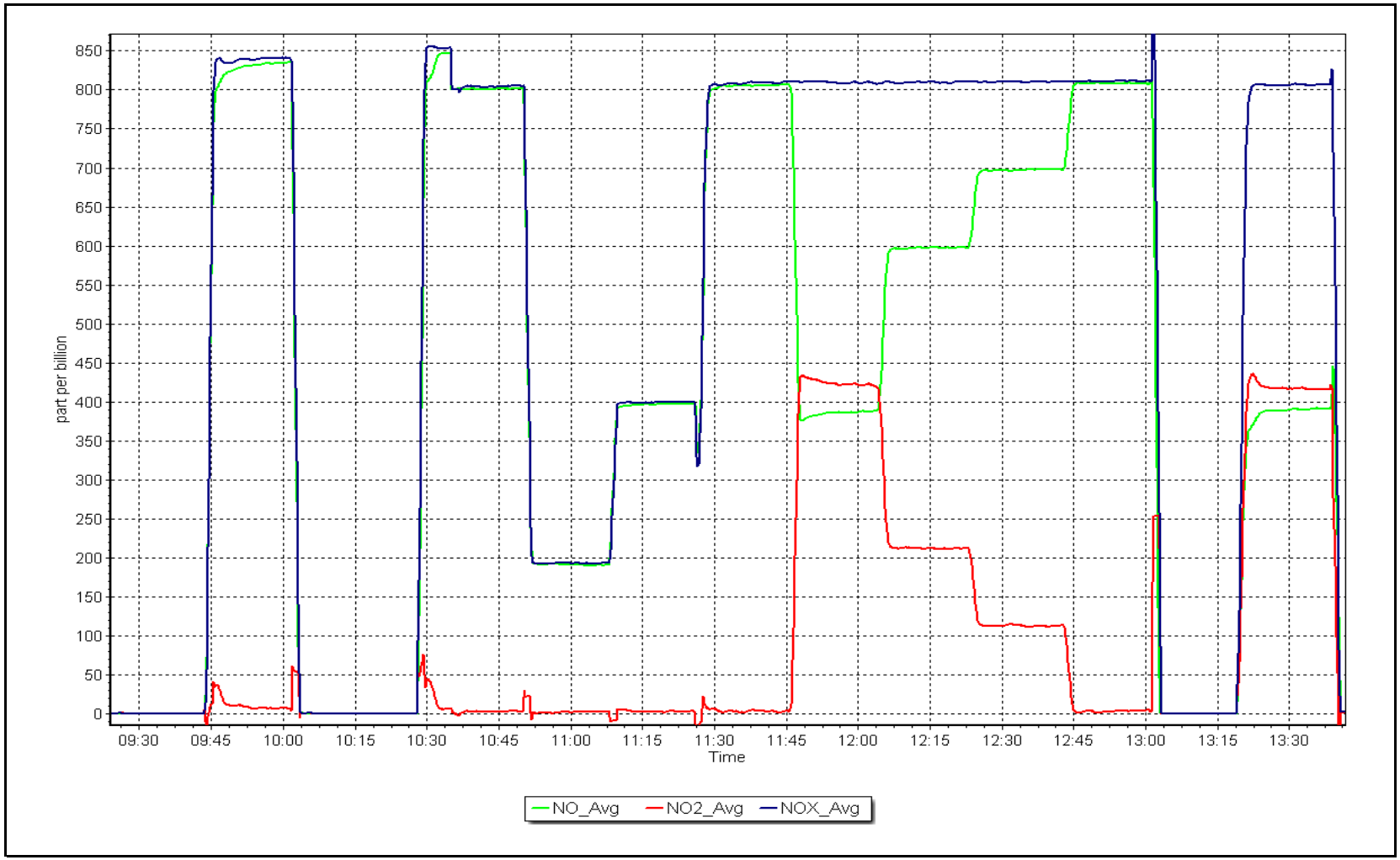
Calibration Date:	November 28, 2023	Previous Calibration:	October 26, 2023
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	9:23	End Time (MST):	13:42
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999997	≥0.995
422.9	422.1	1.0019			
212.0	211.5	1.0023	Slope	0.997452	0.90 - 1.10
111.6	112.0	0.9963			
			Intercept	0.289298	+/-20



NO_x Calibration Plot Date: November 28, 2023 Location: Leismer



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS505
SAWBONES BAY
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Sawbones Bay	Station number:	AMS505
Calibration Date:	November 8, 2023	Last Cal Date:	October 6, 2023
Start time (MST):	13:47	End time (MST):	16:26
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:	1.001967	0.999808	Backgd or Offset:	20.3	20.3
Calibration intercept:	-1.152684	-1.371905	Coeff or Slope:	0.995	0.987

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.5	----
as found span	4922	77.8	799.8	803.0	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4922	77.8	799.8	798.7	1.001
second point	4961	38.9	399.9	398.5	1.004
third point	4981	19.5	200.4	197.3	1.016
as left zero	5000	0.0	0.0	-0.2	----
as left span	4922	77.8	799.8	799.1	1.001
				Average Correction Factor	1.007

Baseline Corr As found:	803.50	Previous response	800.24	*% 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 inlet filter. Adjusted span.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

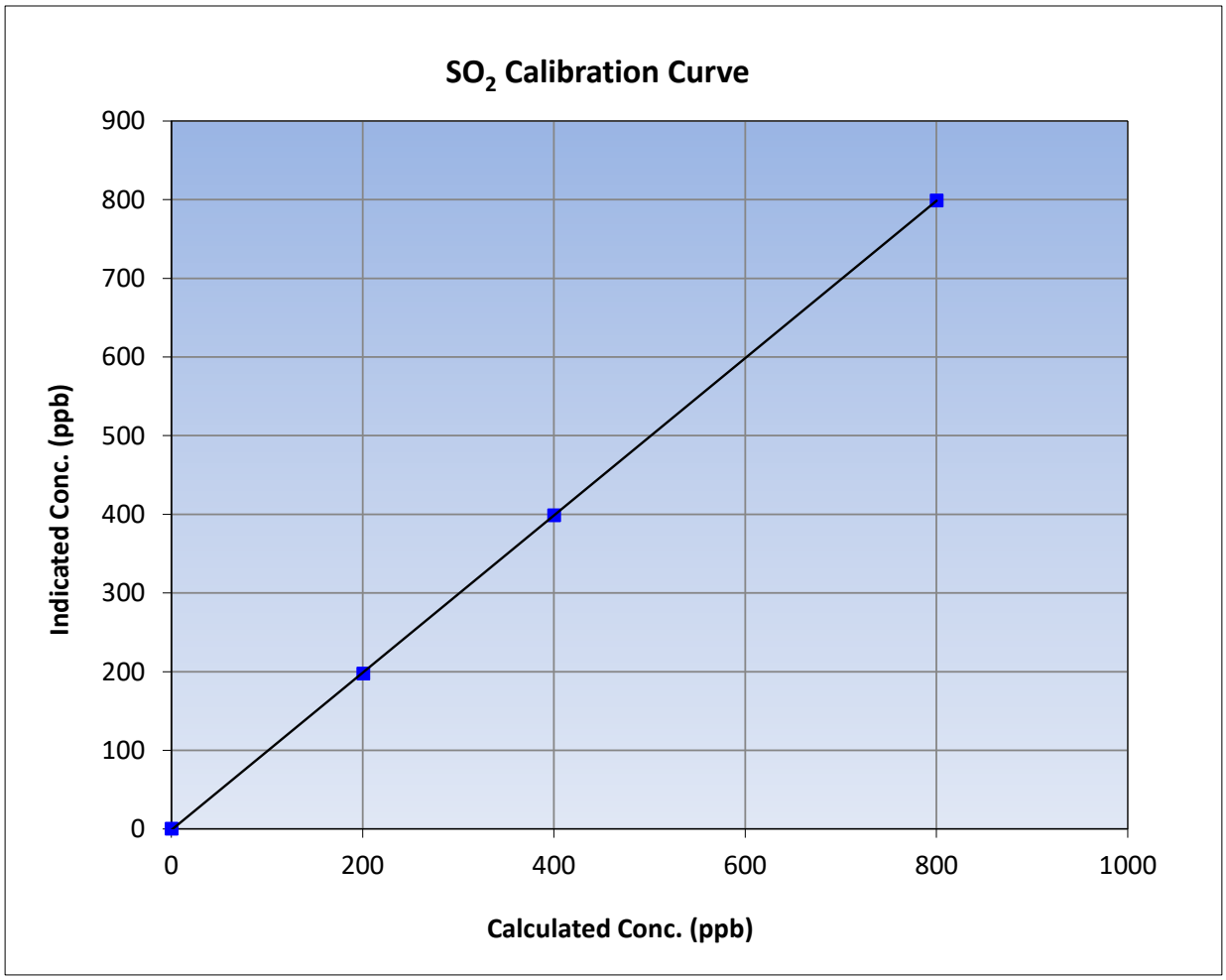
Station Information

Calibration Date:	November 8, 2023	Previous Calibration:	October 6, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	13:47	End Time (MST):	16:26
Analyzer make:	Thermo 43i	Analyzer serial #:	0710321323

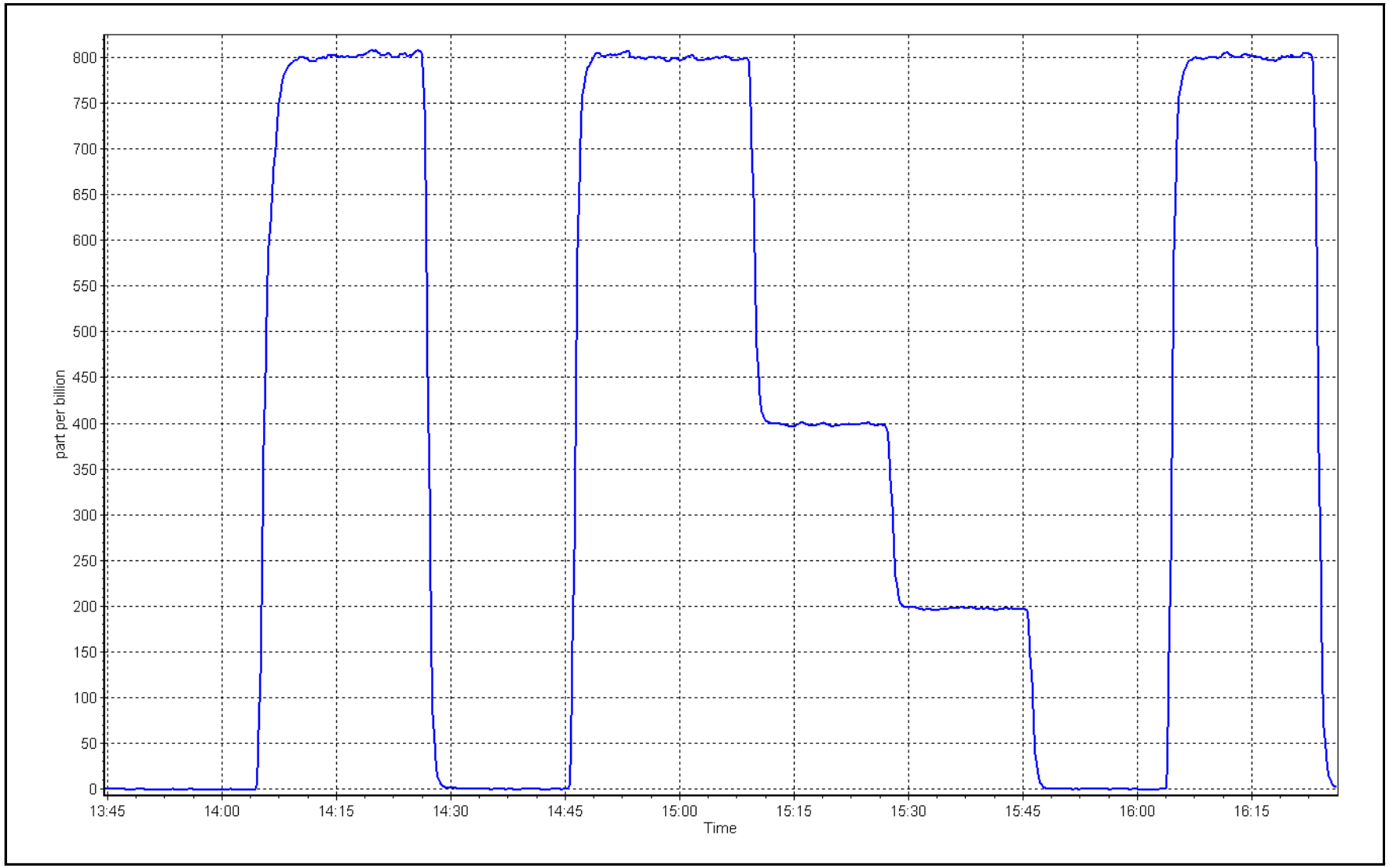
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
799.8	798.7	1.0014
399.9	398.5	1.0035
200.4	197.3	1.0159

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999986	*≥0.995*
Slope	0.999808	*0.90 - 1.10*
Intercept	-1.371905	*+/-30*



SO2 Calibration Plot Date: November 8, 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:	November 9, 2023	Last Cal Date:	October 5, 2023
Start time (MST):	8:22	End time (MST):	12:31
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.15	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517397			
Removed Cal Gas Conc:	5.15	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5112
ZAG Make/Model:	Teledyne API T701		Serial Number:	690

Analyzer Information

Analyzer make:	Thermo 43iQ		Analyzer serial #:	1228021057	
Converter make:	Global 150		Converter serial #:	2022-224	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.008501	0.994794	Backgd or Offset:	2.21	2.21
Calibration intercept:	0.082063	0.261745	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	80.0	1.002
as found 2nd point	4961	38.8	40.0	40.4	0.992
as found 3rd point	4981	19.4	20.0	20.2	0.994
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.3	----
high point	4922	77.7	80.0	79.9	1.002
second point	4961	38.8	40.0	40.0	0.999
third point	4981	19.4	20.0	20.1	0.994
as left zero	5000	0.0	0.0	0.4	----
as left span	4922	77.7	80.0	79.6	1.005
SO2 Scrubber Check	4922	77.8	778.0	-0.1	----
Date of last scrubber change:				Ave Corr Factor	0.998
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.9	Prev response:	80.80	*% change:	-1.1%
Baseline Corr 2nd AF pt:	40.3	AF Slope:	0.998216	AF Intercept:	0.241983
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999969		

* = > +/-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

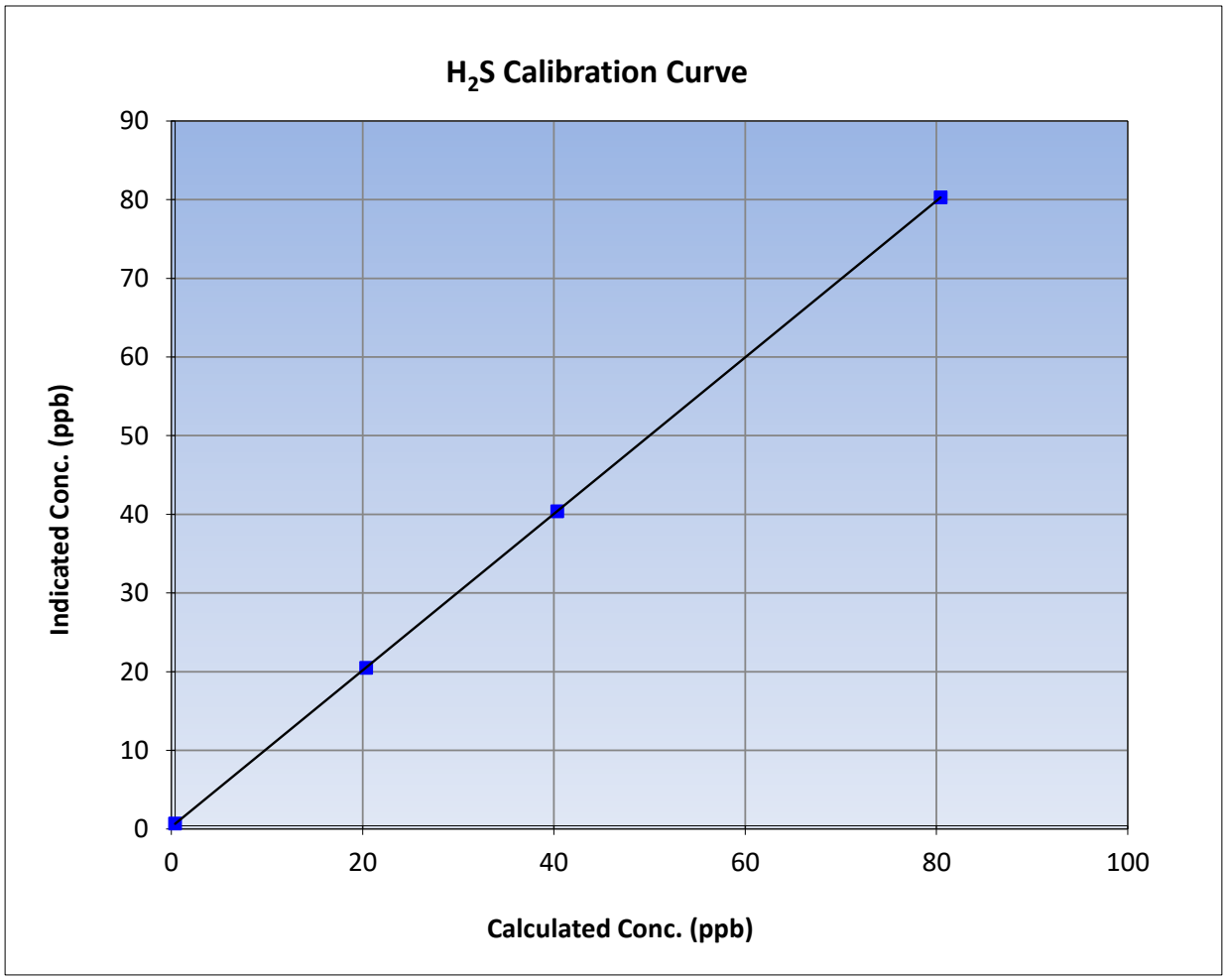
Station Information

Calibration Date:	November 9, 2023	Previous Calibration:	October 5, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:22	End Time (MST):	12:31
Analyzer make:	Thermo 43iQ	Analyzer serial #:	1228021057

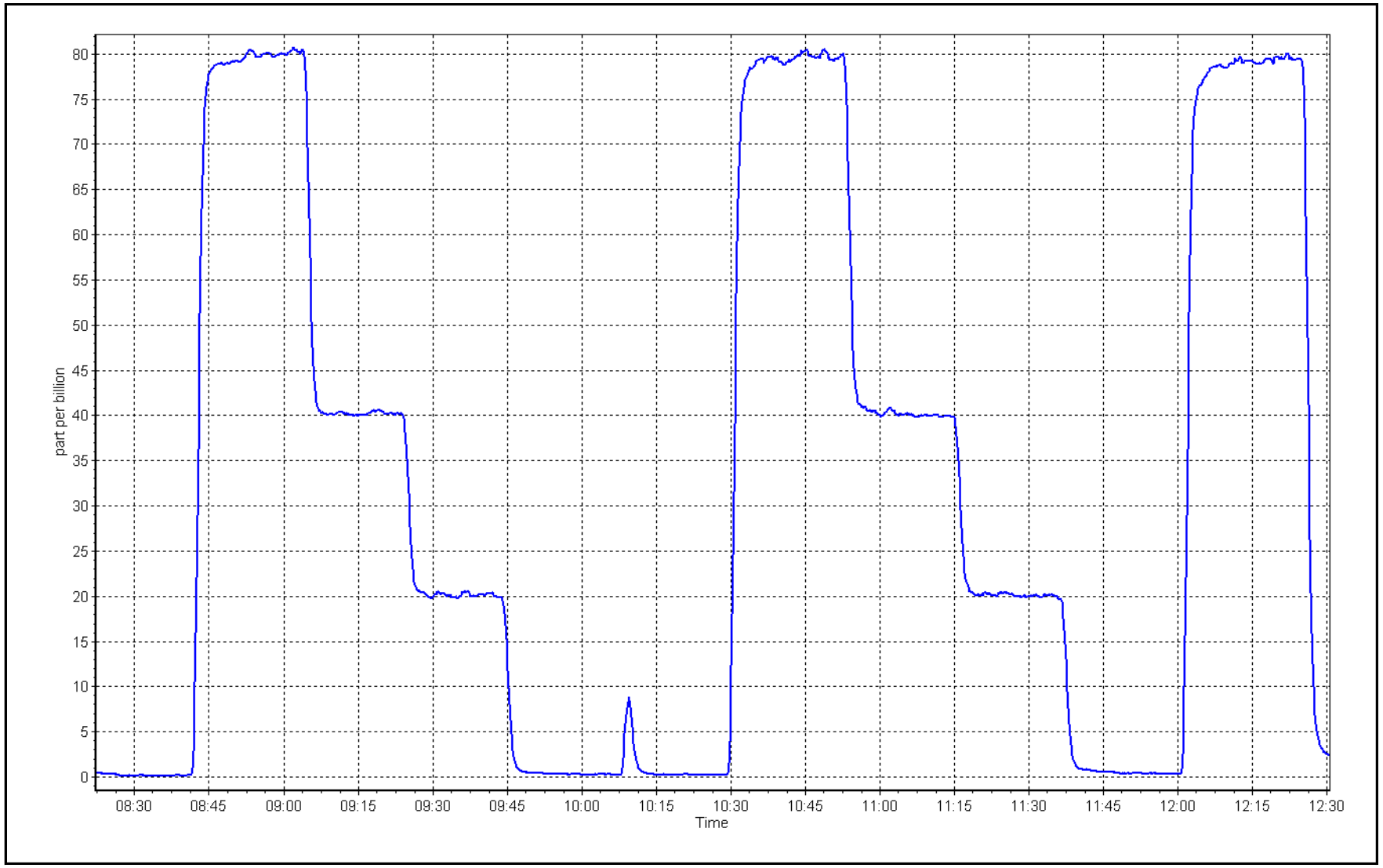
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
80.0	79.9	1.0017
40.0	40.0	0.9991
20.0	20.1	0.9940

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	0.994794	*0.90 - 1.10*
Intercept	0.261745	*+/-3*



H_2S Calibration Plot Date: November 9, 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:	November 8, 2023	Last Cal Date:	October 4, 2023
Start time (MST):	8:53	End time (MST):	13:50
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:	1.074	1.069	NO bkgnd or offset:	0.4	0.4
NOX coeff or slope:	1.066	1.065	NOX bkgnd or offset:	1.3	1.3
NO2 coeff or slope:	NA	NA	Reaction cell Press:	7.7	7.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.002452	1.003423
NO_X Cal Offset:	-0.711135	-1.650848
NO Cal Slope:	1.005224	1.003879
NO Cal Offset:	-1.131231	-1.810600
NO_2 Cal Slope:	0.995052	1.000996
NO_2 Cal Offset:	-1.022252	-0.666972

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	0.5	----	----
as found span	4917	83.4	799.6	799.6	0.0	802.3	803.7	-1.3	0.9966	0.9949
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.1	-0.3	----	----
high point	4917	83.4	799.6	799.6	0.0	801.2	801.4	-0.4	0.9980	0.9977
second point	4958	41.7	399.8	399.8	0.0	399.3	399.7	-0.4	1.0014	1.0004
third point	4979	20.9	200.4	200.4	0.0	197.8	197.0	0.8	1.0131	1.0172
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	332.4	467.3	795.9	332.5	463.4	1.0048	0.9998
								Average Correction Factor	1.0041	1.0051

Corrected As found NO_X = 802.0 ppb NO = 804.0 ppb

Previous Response NO_X = 800.8 ppb NO = 802.6 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 = 0.1%

*Percent Change NO = 0.2%

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)	797.5	330.2	467.3	467.3	1.0000	100.0%
2nd GPT point (200 ppb O3)	797.5	543.5	254.0	253.5	1.0020	99.8%
3rd GPT point (100 ppb O3)	797.5	647.7	149.8	148.8	1.0067	99.3%
				Average Correction Factor	1.0029	99.7%

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

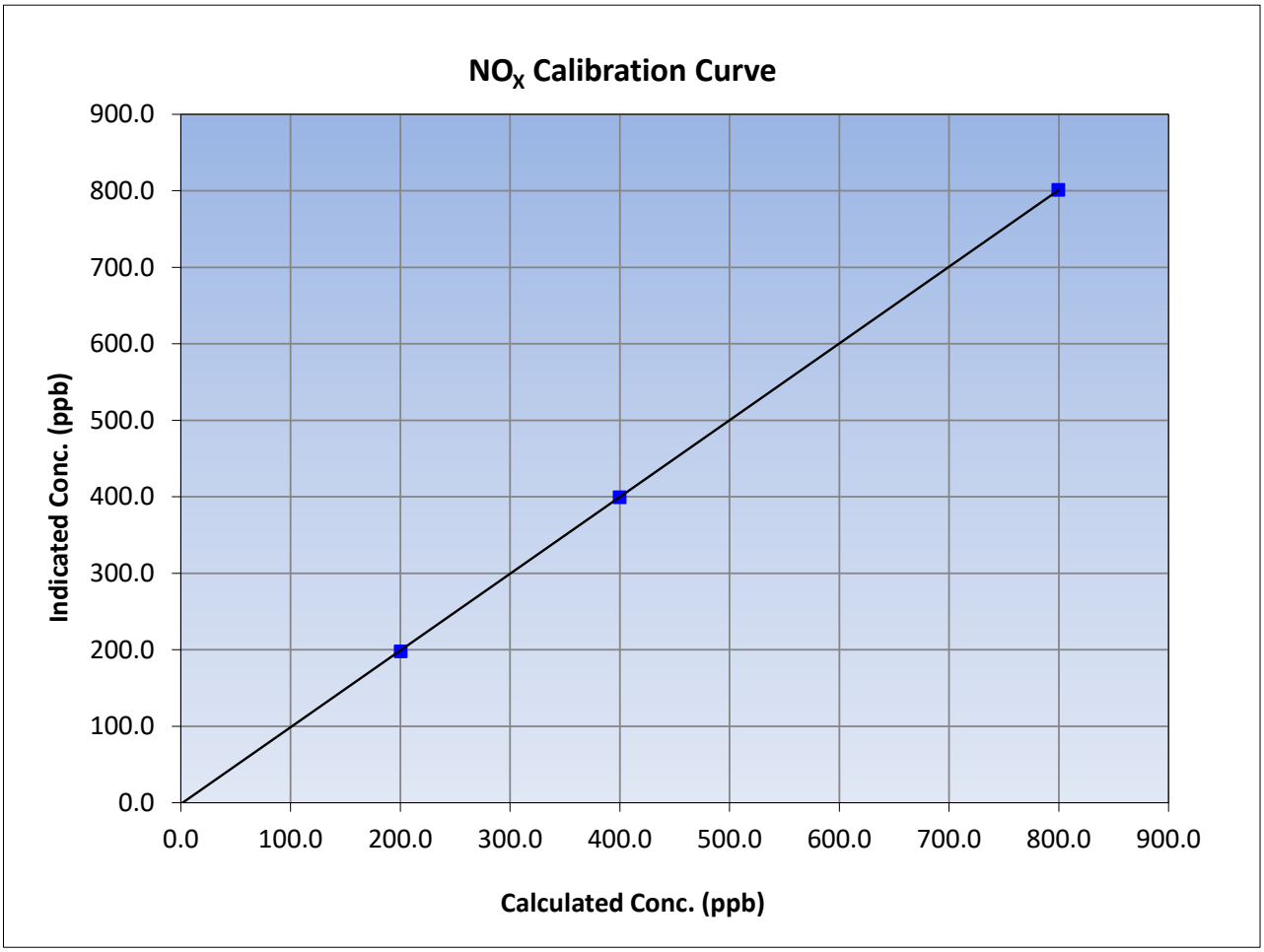
Version-04-2020

Station Information

Calibration Date:	November 8, 2023	Previous Calibration:	October 4, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:53	End Time (MST):	13:50
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	0.999986	≥0.995
799.6	801.2	0.9980			
399.8	399.3	1.0014	Slope	1.003423	0.90 - 1.10
200.4	197.8	1.0131			
			Intercept	-1.650848	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

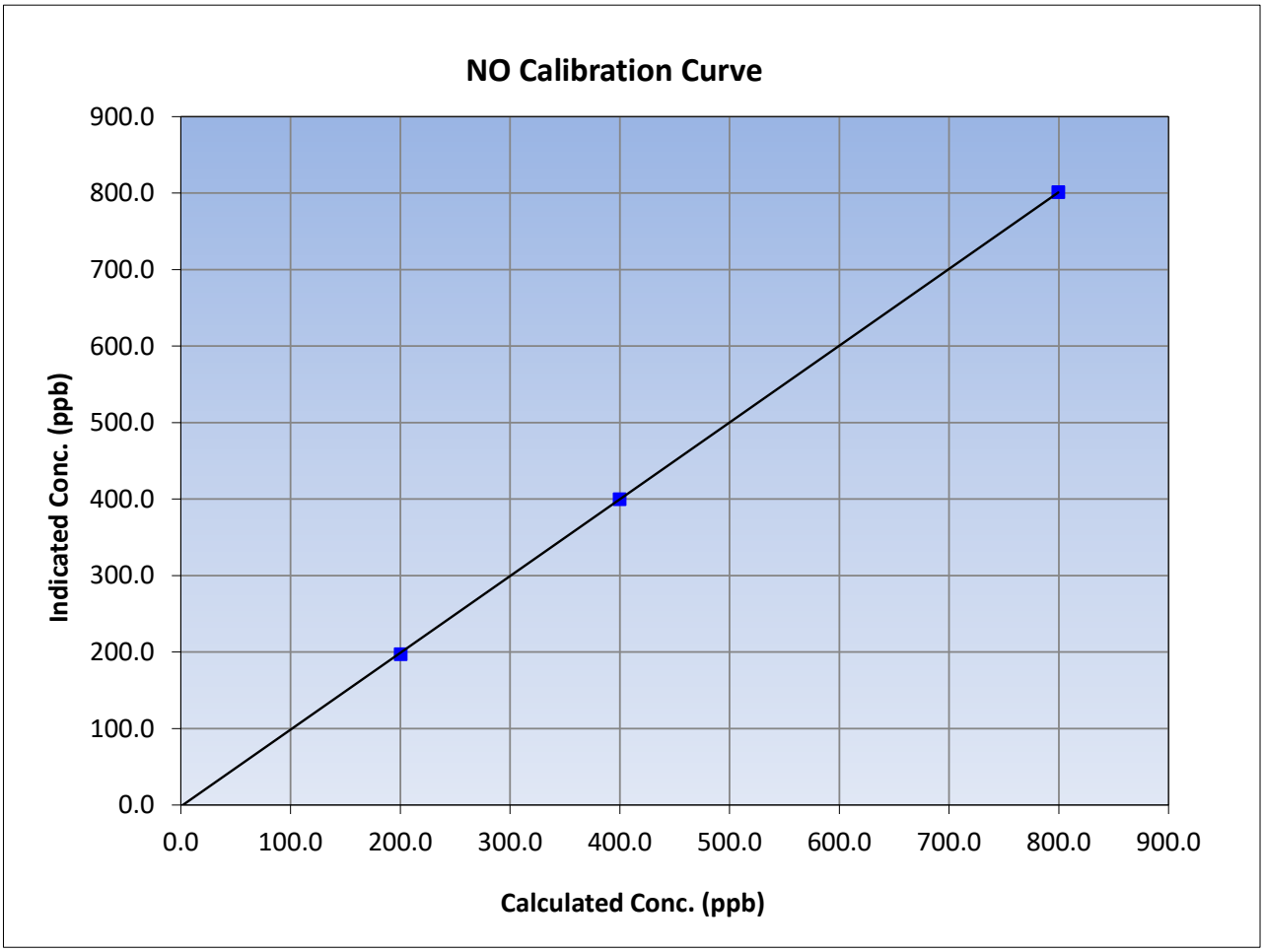
Version-04-2020

Station Information

Calibration Date:	November 8, 2023	Previous Calibration:	October 4, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:53	End Time (MST):	13:50
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	0.999975	≥0.995
799.6	801.4	0.9977			
399.8	399.7	1.0004	Slope	1.003879	0.90 - 1.10
200.4	197.0	1.0172			
			Intercept	-1.810600	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

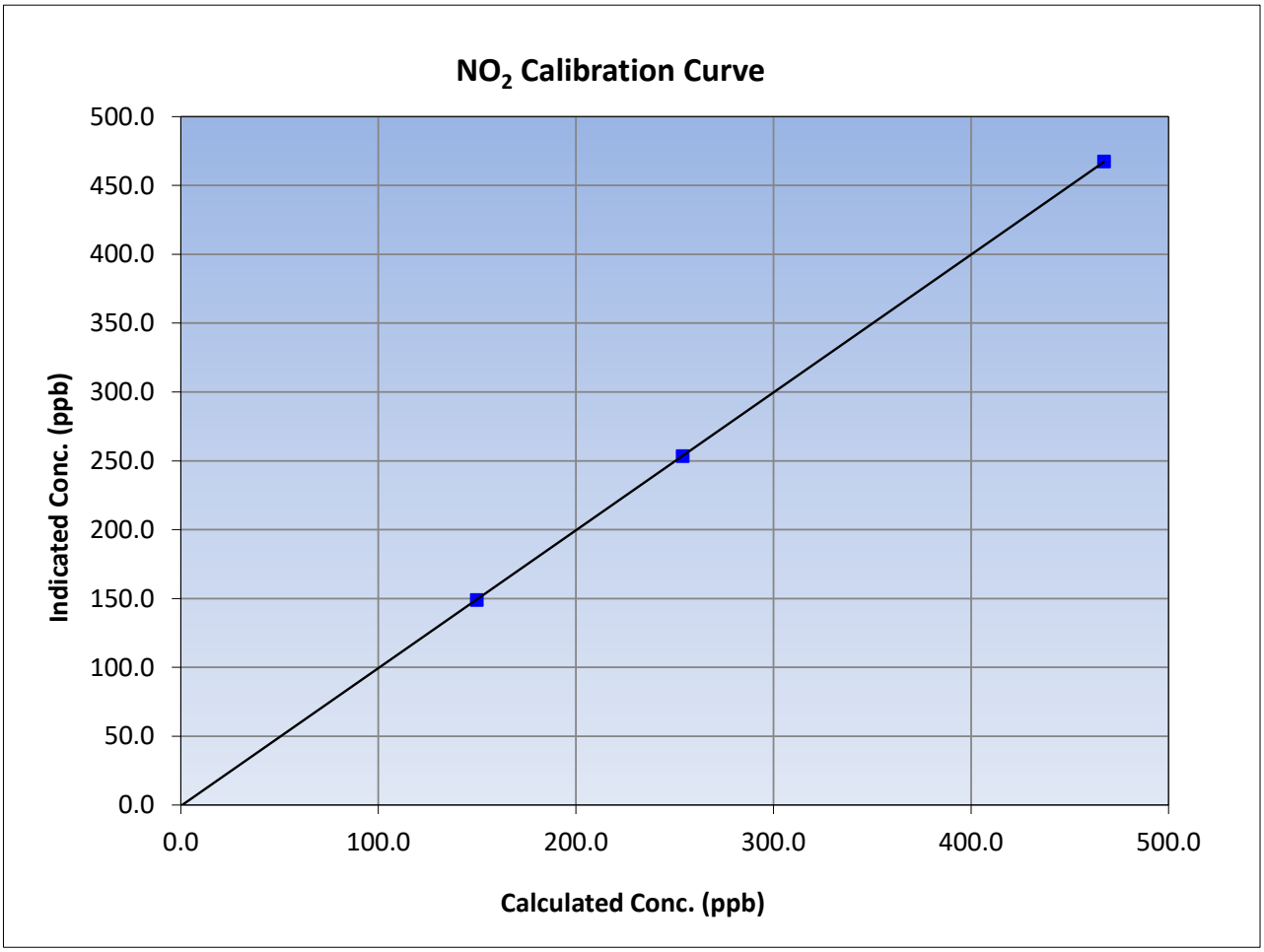
Version-04-2020

Station Information

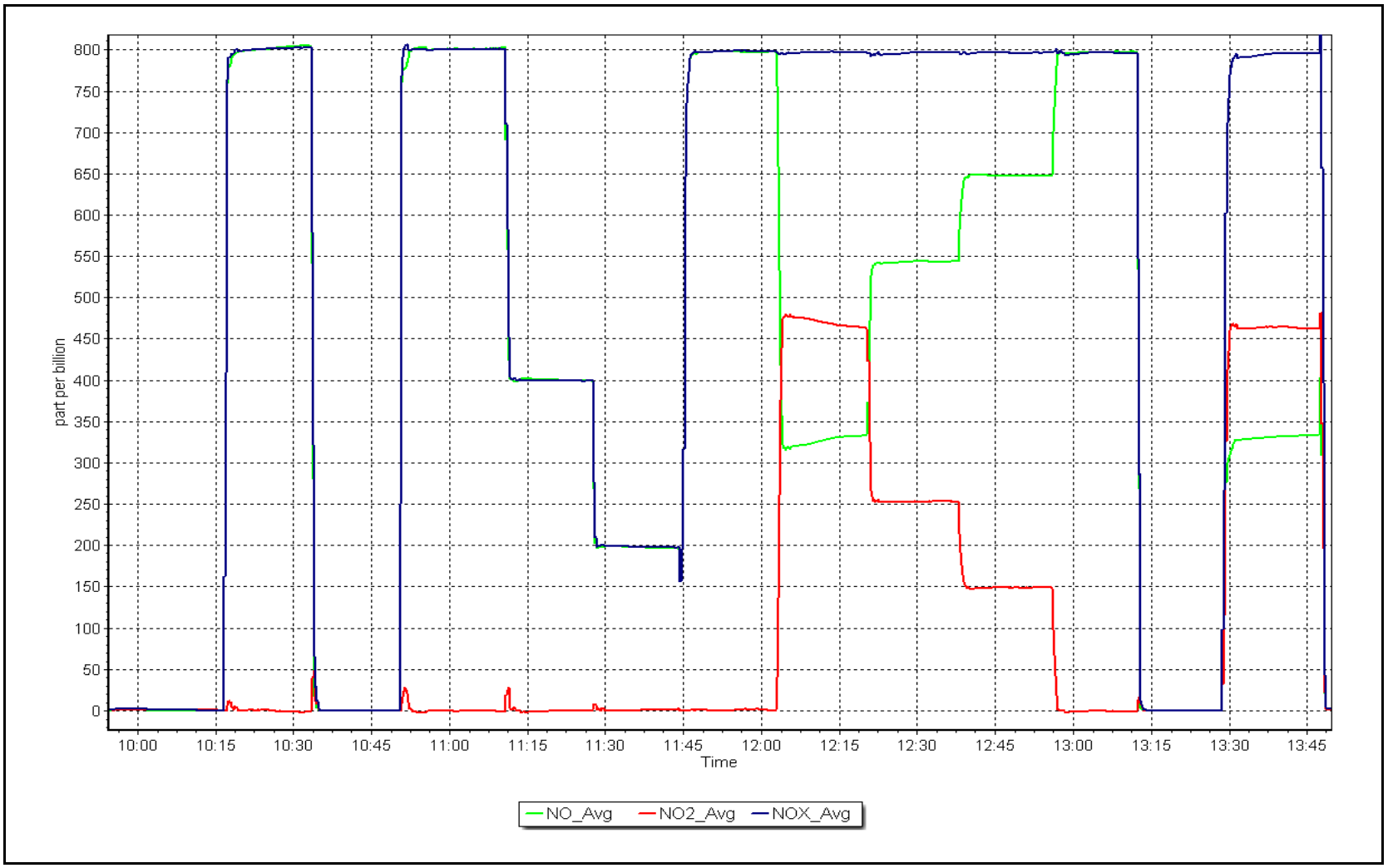
Calibration Date:	November 8, 2023	Previous Calibration:	October 4, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:53	End Time (MST):	13:50
Analyzer make:	API T200	Analyzer serial #:	4260

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.3	----	Correlation Coefficient	0.999996	≥0.995
467.3	467.3	1.0000			
254.0	253.5	1.0020	Slope	1.000996	0.90 - 1.10
149.8	148.8	1.0067			
			Intercept	-0.666972	+/-20



NO_X Calibration Plot Date: November 8, 2023 Location: Sawbones Bay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS507
KIRBY SOUTH
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Kirby South	Station number:	AMS 507
Calibration Date:	November 6, 2023	Last Cal Date:	October 4, 2023
Start time (MST):	13:24	End time (MST):	16:48
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.18	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC303554			
Removed Cal Gas Conc:	49.18	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3804
ZAG Make/Model:	API T701H		Serial Number:	880

Analyzer Information

Analyzer make: Thermo 43iQ — Analyzer serial #: 1182340007

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.004435	1.005777	Backgd or Offset:	20.0	20.7
Calibration intercept:	-1.308487	-1.328222	Coeff or Slope:	1.135	1.158

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.7	----
as found span	4919	81.3	799.6	778.0	1.028
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	799.6	804.0	0.995
second point	4959	40.7	400.3	398.9	1.004
third point	4980	20.3	199.7	200.0	0.998
as left zero	5000	0.0	0.0	-0.6	----
as left span	4919	81.3	799.6	803.0	0.996
				Average Correction Factor	0.999

Baseline Corr As found:	778.70	Previous response	801.86	*% 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.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

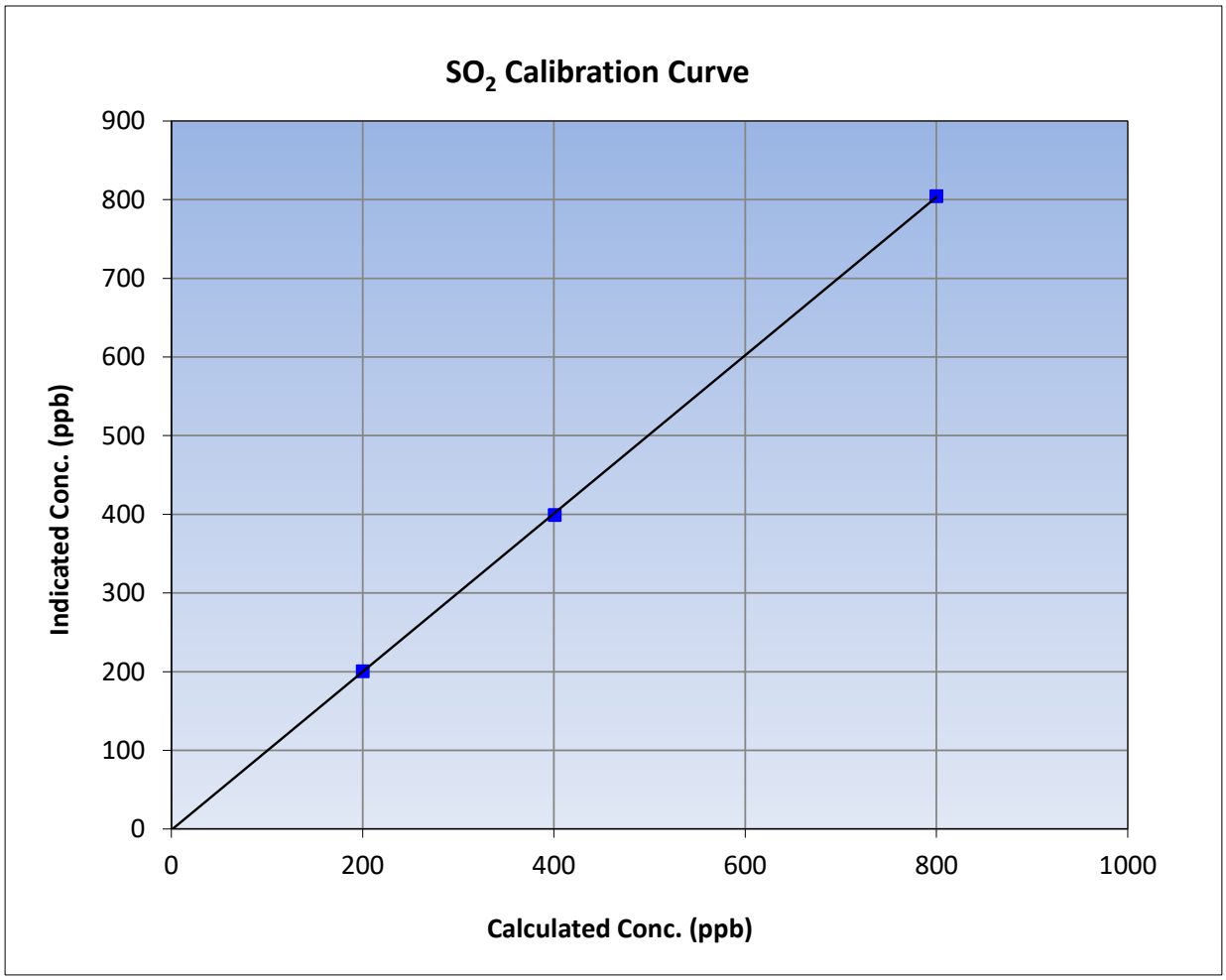
Station Information

Calibration Date:	November 6, 2023	Previous Calibration:	October 4, 2023
Station Name:	Kirby South	Station Number:	AMS 507
Start Time (MST):	13:24	End Time (MST):	16:48
Analyzer make:	Thermo 43iQ	Analyzer serial #:	1182340007

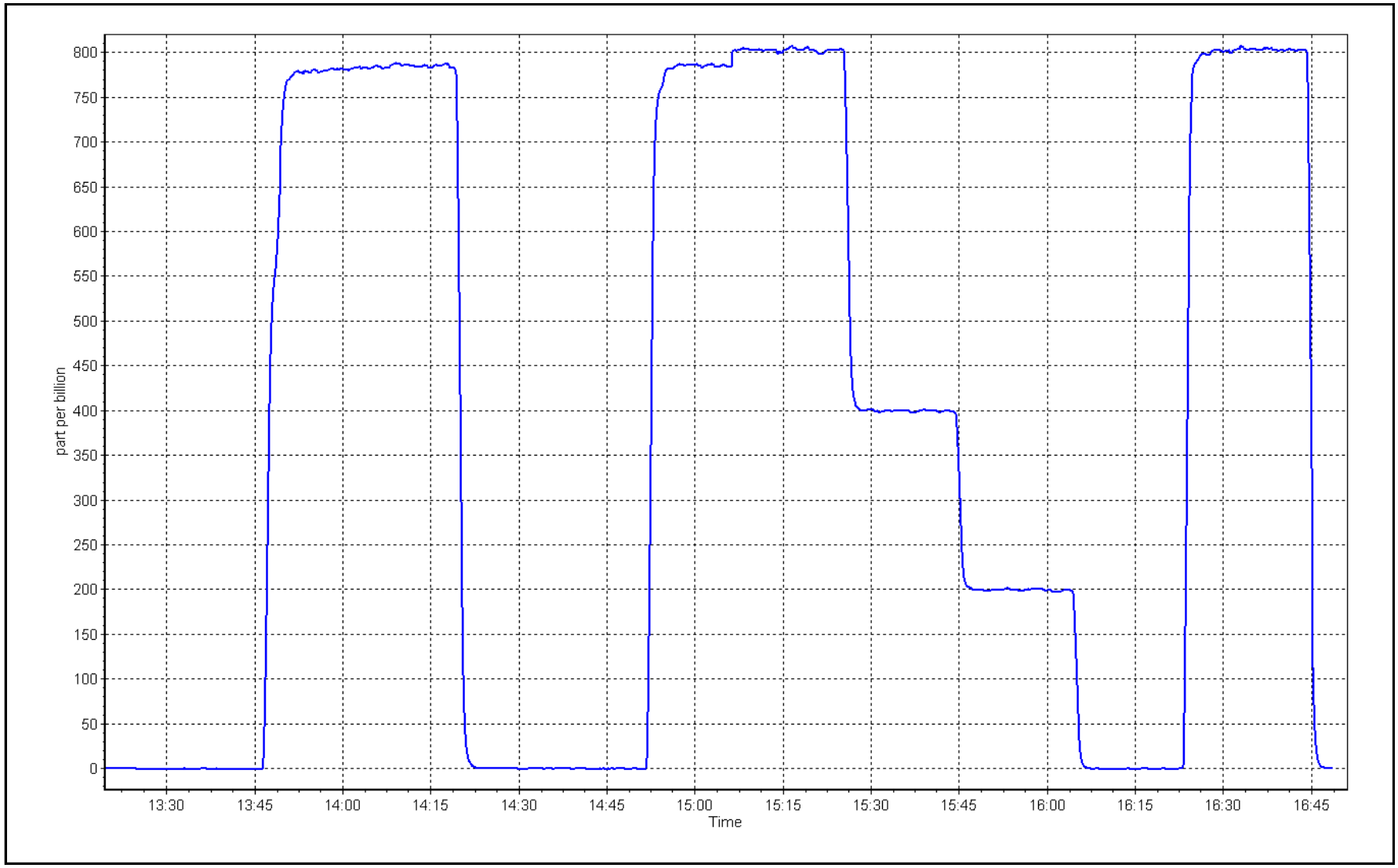
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.5	----
799.6	804.0	0.9946
400.3	398.9	1.0036
199.7	200.0	0.9983

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999977	*≥0.995*
Slope	1.005777	*0.90 - 1.10*
Intercept	-1.328222	*+/-30*



SO2 Calibration Plot Date: November 6, 2023 Location: Kirby South



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Kirby South	Station number:	AMS507
Calibration Date:	November 8, 2023	Last Cal Date:	October 4, 2023
Start time (MST):	11:17	End time (MST):	16:37
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 T750		Serial Number:	282
ZAG Make/Model:	API T751H		Serial Number:	321

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:	1.003178	1.004602	Backgd or Offset:	1.75	1.98
Calibration intercept:	-0.041177	0.058972	Coeff or Slope:	1.068	1.058

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4923	77.4	80.0	81.4	0.984
as found 2nd point	4961	38.8	40.1	40.4	0.995
as found 3rd point	4981	19.3	19.9	20.3	0.987
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4923	77.4	80.0	80.4	0.995
second point	4961	38.8	40.1	40.3	0.995
third point	4981	19.3	19.9	20.2	0.987
as left zero	5000	0.0	0.0	0.1	----
as left span	4923	77.4	80.0	78.4	1.020
SO2 Scrubber Check	4919	80.0	800.2	0.1	----
Date of last scrubber change:		25-Jul-23		Ave Corr Factor	0.992
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.3	Prev response:	80.19	*% change:	1.4%
Baseline Corr 2nd AF pt:	40.3	AF Slope:	1.016164	AF Intercept:	-0.020760
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999960		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. Scrubber check done after MPAF's, passed. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

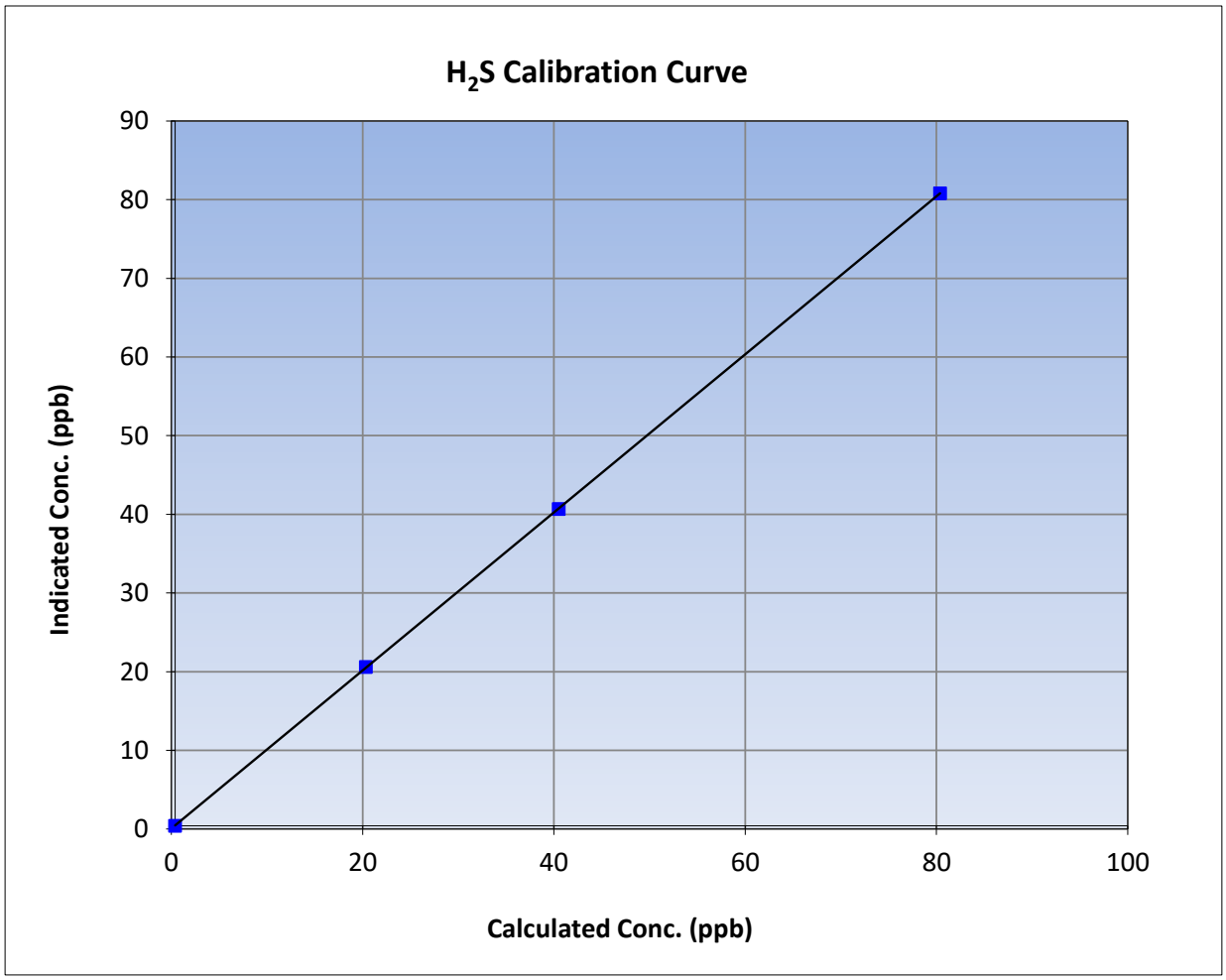
Version-11-2021

Station Information

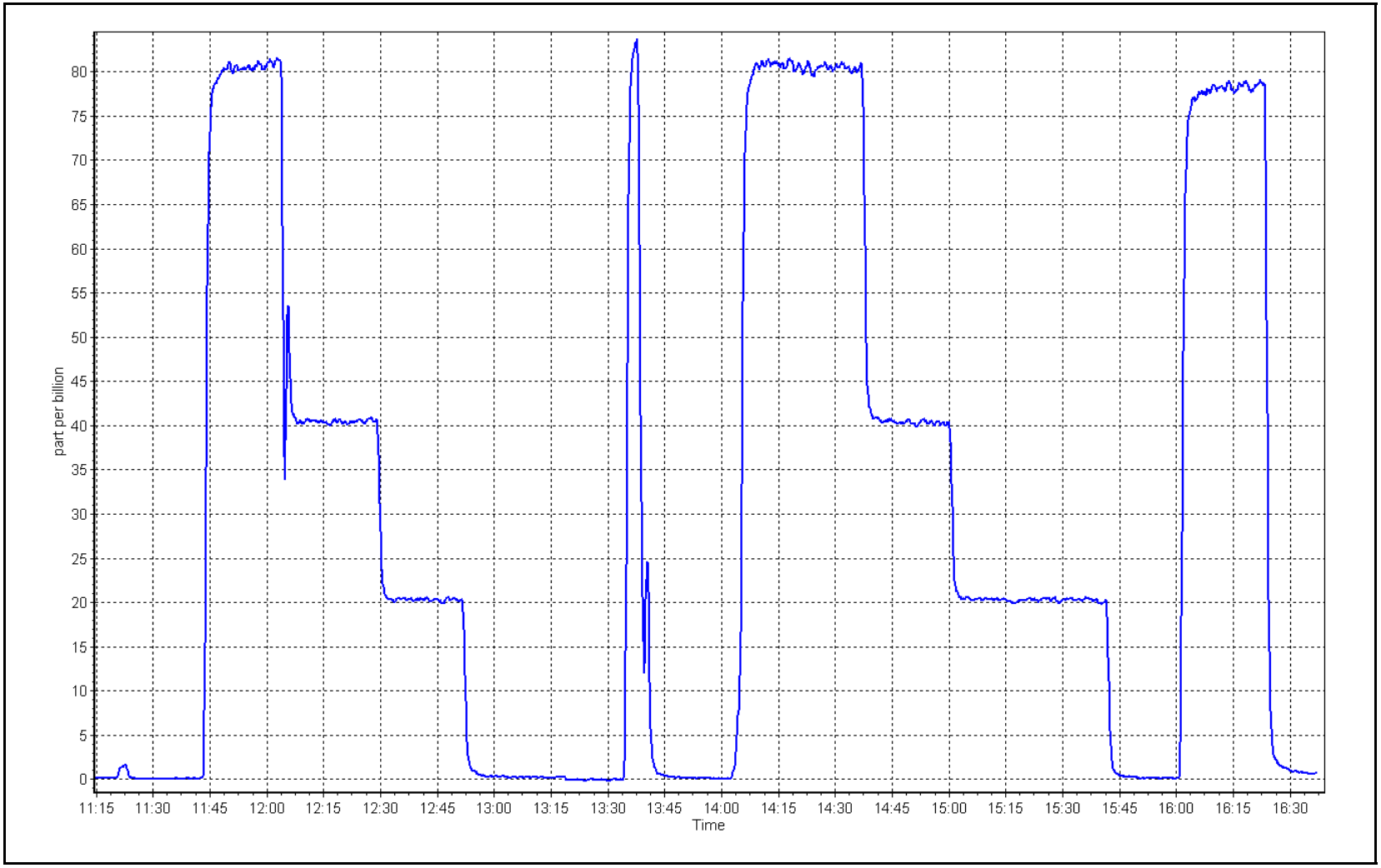
Calibration Date:	November 8, 2023	Previous Calibration:	October 4, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	11:17	End Time (MST):	16:37
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1150840012

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999995	*≥0.995*
80.0	80.4	0.9948			
40.1	40.3	0.9950	Slope	1.004602	*0.90 - 1.10*
19.9	20.2	0.9873			
			Intercept	0.058972	*+/-3*



H_2S Calibration Plot Date: November 8, 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:	November 6, 2023	Last Cal Date:	October 19, 2023
Start time (MST):	13:24	End time (MST):	16:48
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:	0.997581	1.004599	Background:	3.12	3.15
Calibration intercept:	-0.000204	-0.117967	Coefficient:	3.720	3.755

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	17.10	1.010
as found 2nd point	4959	40.7	8.64		
as found 3rd point	4980	20.3	4.31		
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.09	----
high point	4919	81.3	17.26	17.26	1.000
second point	4959	40.7	8.64	8.49	1.018
third point	4980	20.3	4.31	4.22	1.022
as left zero	5000	0.0	0.00	-0.12	----
as left span	4919	81.3	17.26	17.23	1.002
				Average Correction Factor	1.013

Baseline Corr As found:	17.17	Previous response	17.22	*% change	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

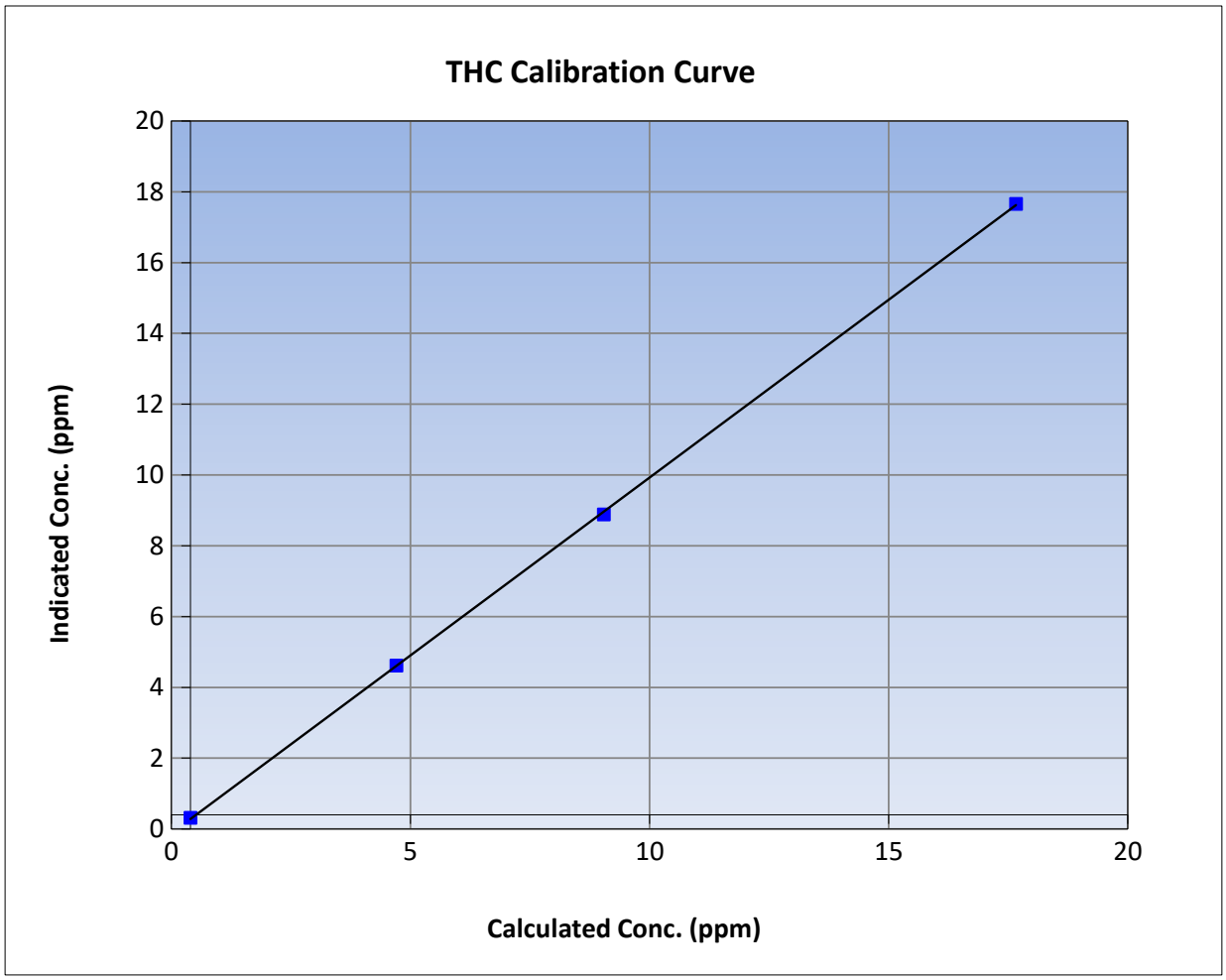
Station Information

Calibration Date:	November 6, 2023	Previous Calibration:	October 19, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	13:24	End Time (MST):	16:48
Analyzer make:	Thermo 51i	Analyzer serial #:	1182340005

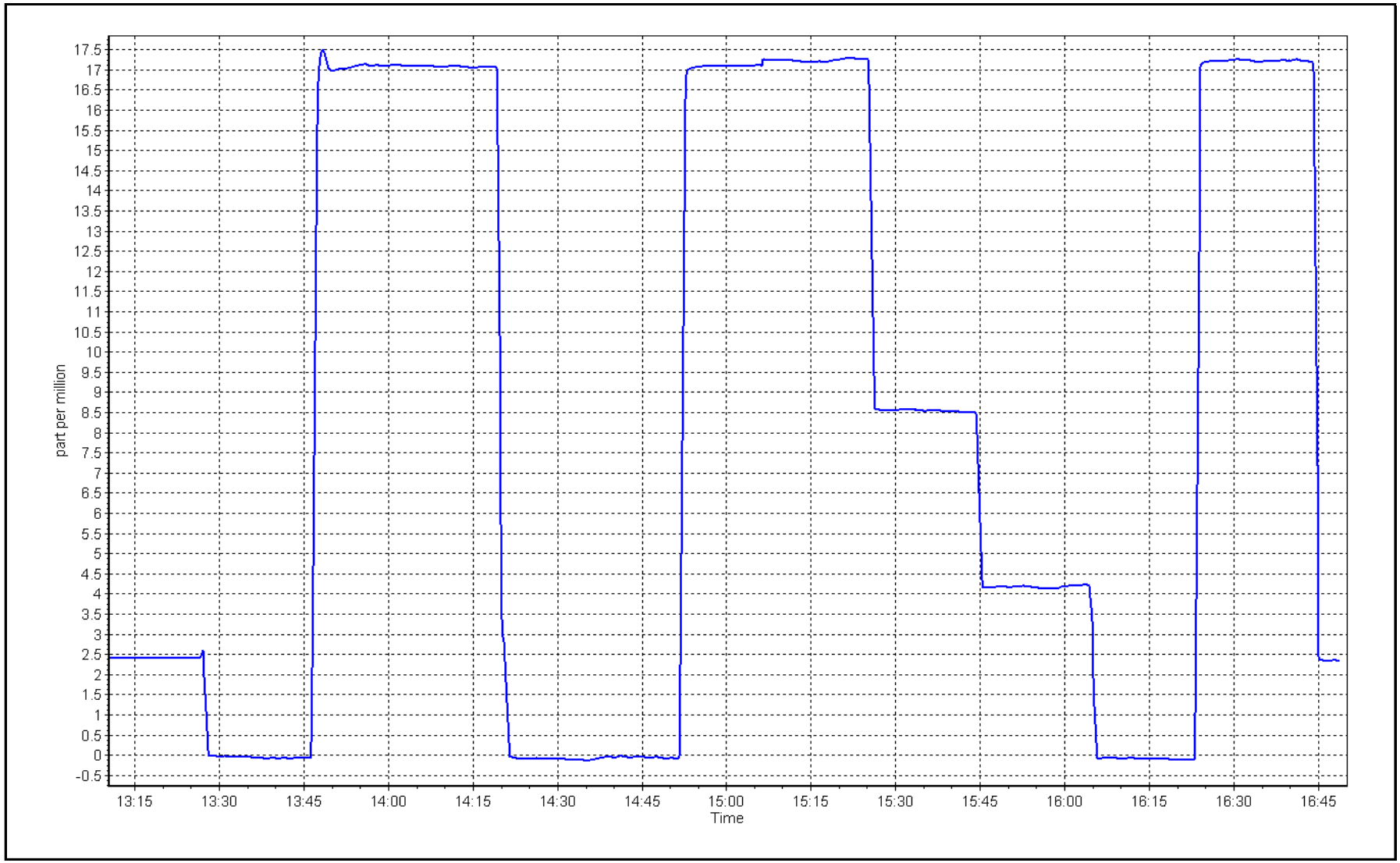
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.09	----
17.26	17.26	1.0002
8.64	8.49	1.0180
4.31	4.22	1.0219

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999951	*≥0.995*
Slope	1.004599	*0.90 - 1.10*
Intercept	-0.117967	*+/-1.5*



THC Calibration Plot Date: November 6, 2023 Location: Kirby South



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Kirby South	Station number:	AMS507
Calibration Date:	November 8, 2023	Last Cal Date:	October 4, 2023
Start time (MST):	11:17	End time (MST):	16:48
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:	1.424	1.424	NO bkgnd or offset:	1.5	1.7
NOX coeff or slope:	0.997	0.997	NOX bkgnd or offset:	1.6	1.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	168.83	202.82

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001586	1.007732
NO_X Cal Offset:	-1.471182	-4.271621
NO Cal Slope:	1.001191	1.008462
NO Cal Offset:	-1.933293	-5.833654
NO_2 Cal Slope:	0.995145	1.005705
NO_2 Cal Offset:	0.363035	0.483774

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.5	0.0	----	----
as found span	4919	81.0	800.1	794.1	6.0	810.0	797.8	12.0	0.9878	0.9954
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.3	-0.1	----	----
high point	4919	81.0	800.1	794.1	6.0	804.0	798.1	5.7	0.9952	0.9950
second point	4960	40.5	400.0	397.0	3.0	396.8	390.8	6.0	1.0081	1.0159
third point	4980	20.2	199.5	198.0	1.5	193.0	189.0	4.1	1.0338	1.0478
as left zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.3	-0.1	----	----
as left span	4919	81.0	800.1	417.6	382.5	801.0	411.4	389.1	0.9989	1.0151
								Average Correction Factor	1.0124	1.0196

Corrected As found	NO_X = 810.5 ppb	NO = 798.3 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	1.3%
Previous Response	NO_X = 799.9 ppb	NO = 793.1 ppb		*Percent Change	NO =	0.6%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	794.1	417.6	382.5	384.7	0.9943	100.6%
2nd GPT point (200 ppb O3)	794.1	634.3	165.8	168.3	0.9851	101.5%
3rd GPT point (100 ppb O3)	794.1	720.3	79.8	80.7	0.9888	101.1%
				Average Correction Factor	0.9894	101.1%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

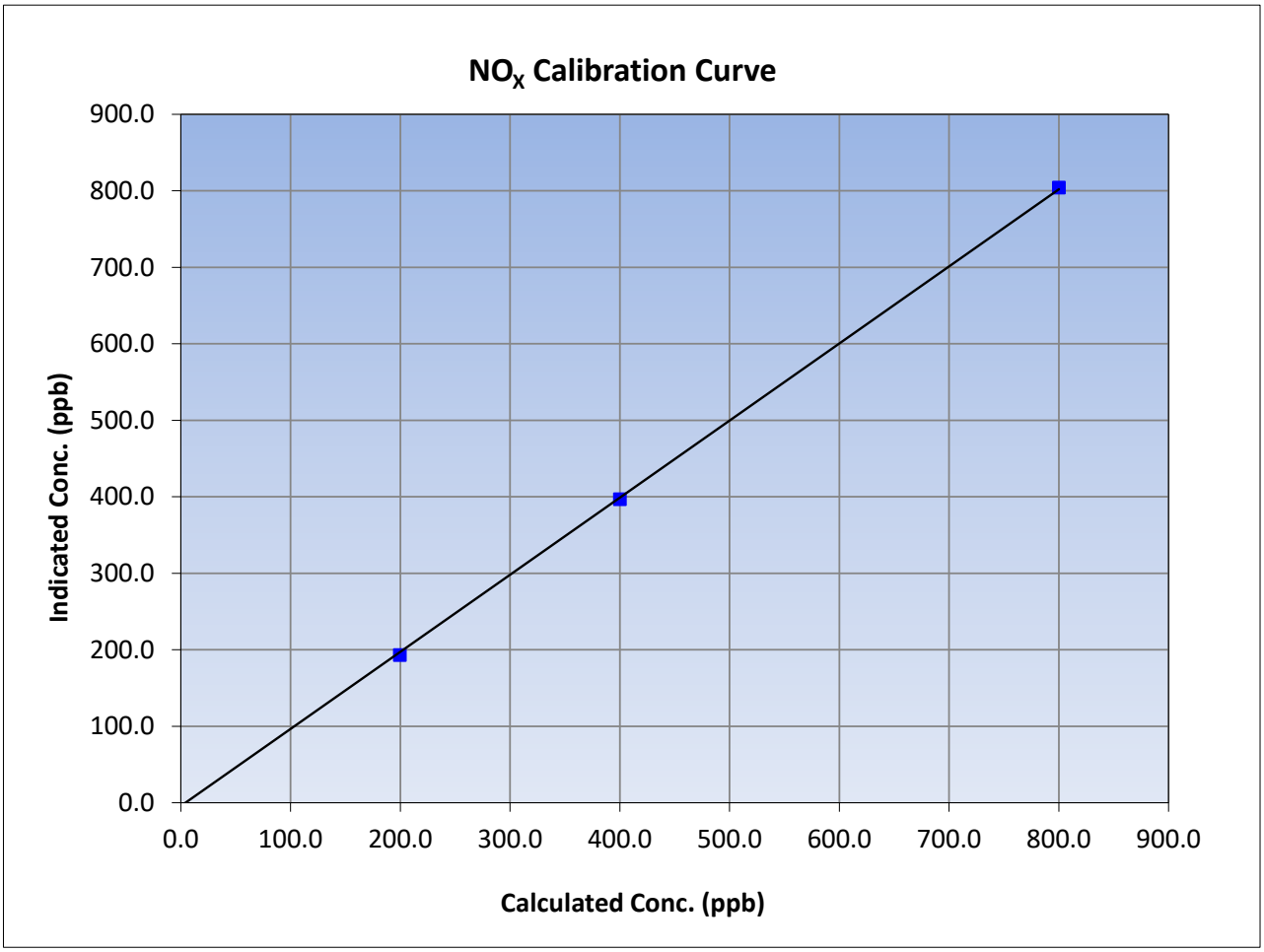
Version-04-2020

Station Information

Calibration Date:	November 8, 2023	Previous Calibration:	October 4, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	11:17	End Time (MST):	16:48
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	-0.4	----	Correlation Coefficient	0.999895	*≥0.995*
800.1	804.0	0.9952			
400.0	396.8	1.0081	Slope	1.007732	*0.90 - 1.10*
199.5	193.0	1.0338			
			Intercept	-4.271621	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

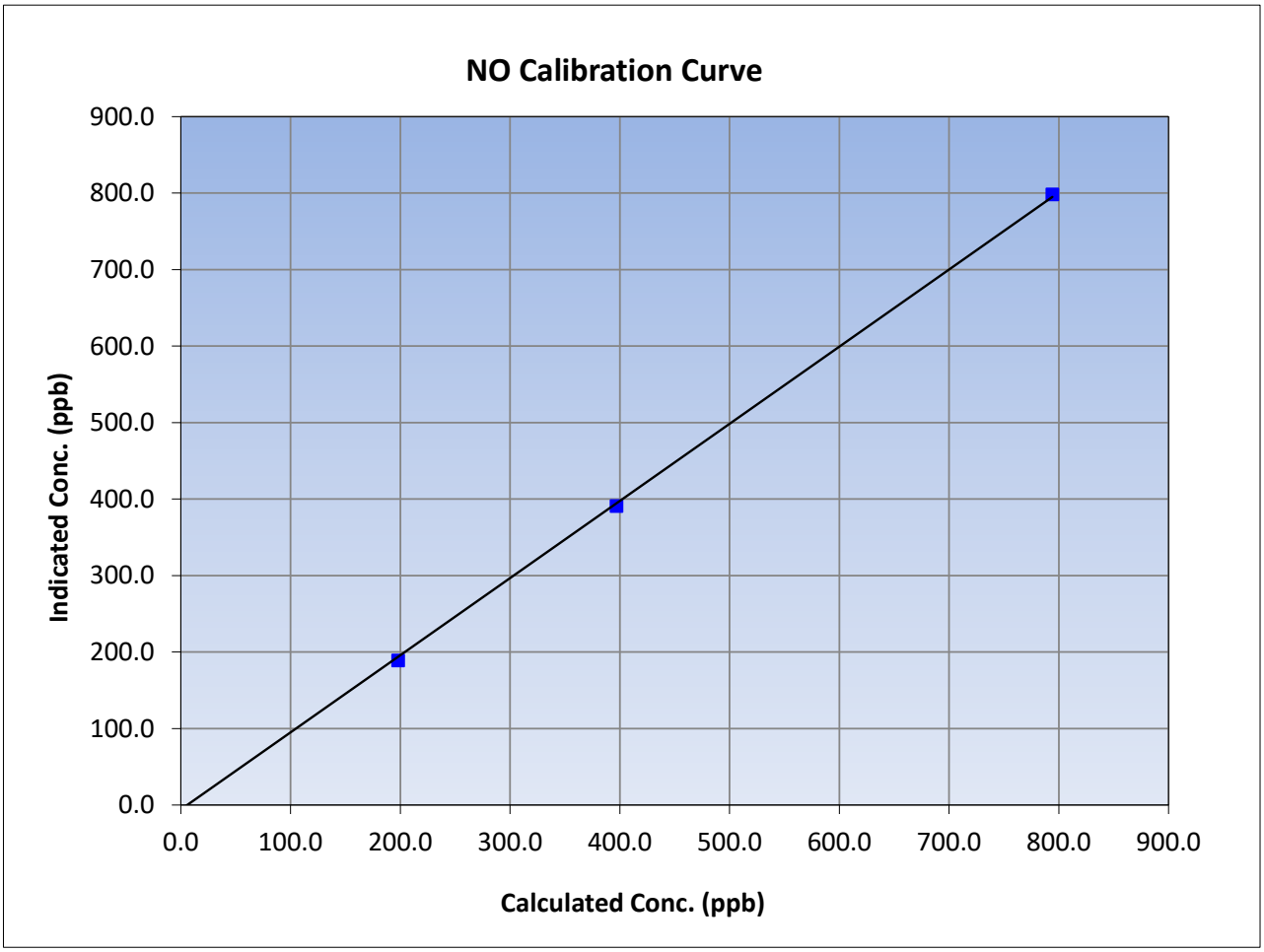
Version-04-2020

Station Information

Calibration Date:	November 8, 2023	Previous Calibration:	October 4, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	11:17	End Time (MST):	16:48
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	-0.3	----	Correlation Coefficient	0.999778	≥0.995
794.1	798.1	0.9950			
397.0	390.8	1.0159	Slope	1.008462	0.90 - 1.10
198.0	189.0	1.0478			
			Intercept	-5.833654	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

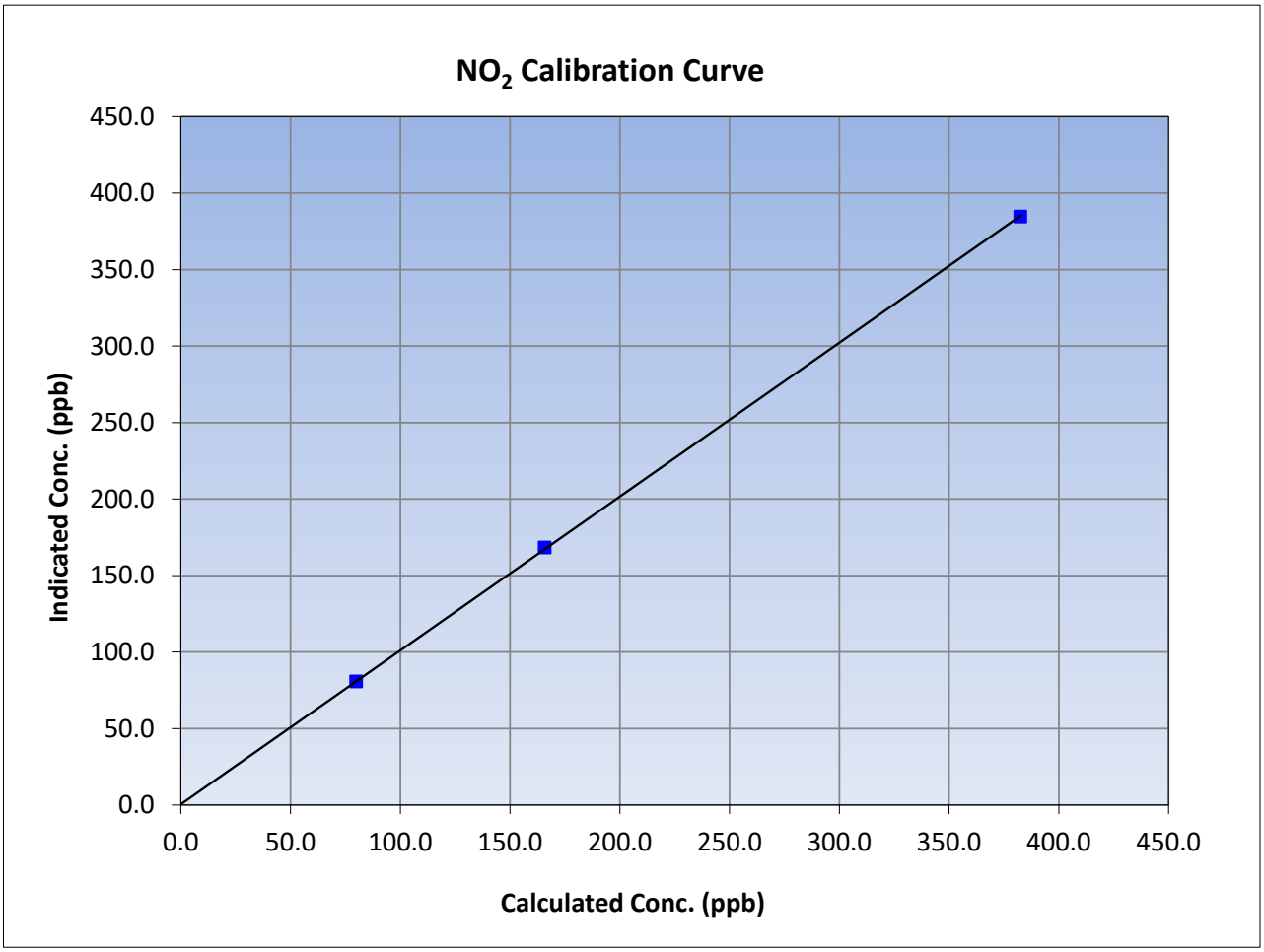
Version-04-2020

Station Information

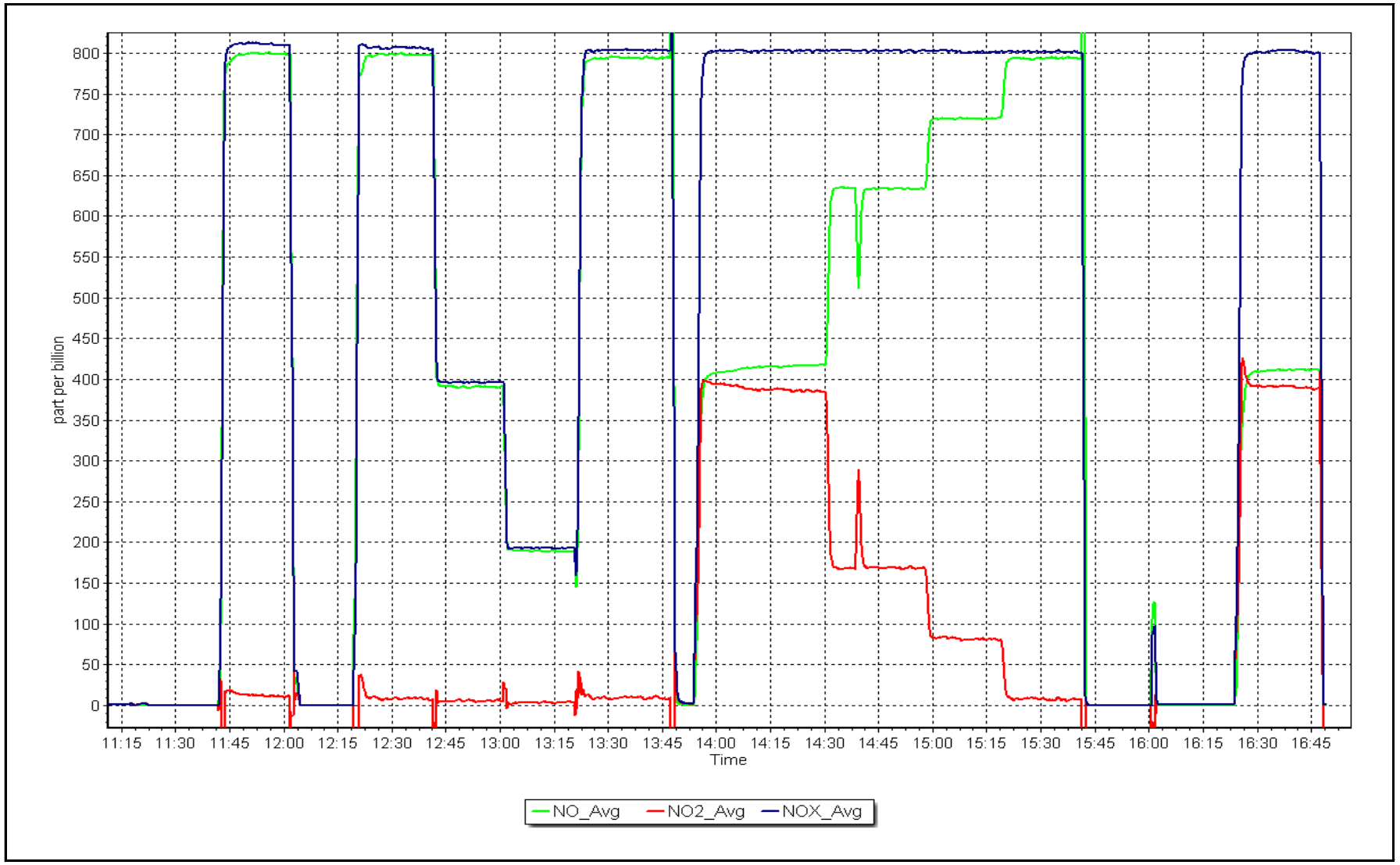
Calibration Date:	November 8, 2023	Previous Calibration:	October 4, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	11:17	End Time (MST):	16:48
Analyzer make:	Thermo 42iQ	Analyzer serial #:	1182340006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999979	≥0.995
382.5	384.7	0.9943			
165.8	168.3	0.9851	Slope	1.005705	0.90 - 1.10
79.8	80.7	0.9888			
			Intercept	0.483774	+/-20



NO_X Calibration Plot Date: November 8, 2023 Location: Kirby South



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS511
BLACKGOLD
NOVEMBER 2023

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

December 22, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Blackgold	Station number:	AMS511
Calibration Date:	November 7, 2023	Last Cal Date:	October 5, 2023
Start time (MST):	9:54	End time (MST):	13:22
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.06 ppm	Cal Gas Exp Date:	January 5, 2029
Cal Gas Cylinder #:	CC147416		
Removed Cal Gas Conc:	50.06 ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA	Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700	Serial Number:	5258
ZAG Make/Model:	Teledyne API 701	Serial Number:	138

Analyzer Information

Analyzer make: Thermo scientific Analyzer serial #: 1160290014

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001162	1.002724	Backgd or Offset:	31.8	34.9
Calibration intercept:	-1.503208	-1.426148	Coeff or Slope:	1.107	1.156

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.9	----
as found span	4926	80.0	800.0	766.1	1.044
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4926	80.0	800.0	801.0	0.999
second point	4968	40.1	400.8	401.0	1.000
third point	4987	20.2	202.0	199.1	1.014
as left zero	5000	0.0	0.0	0.1	----
as left span	4926	80.0	800.0	802.0	0.998
				Average Correction Factor	1.004

Baseline Corr As found:	765.20	Previous response	799.43	*% change	-4.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

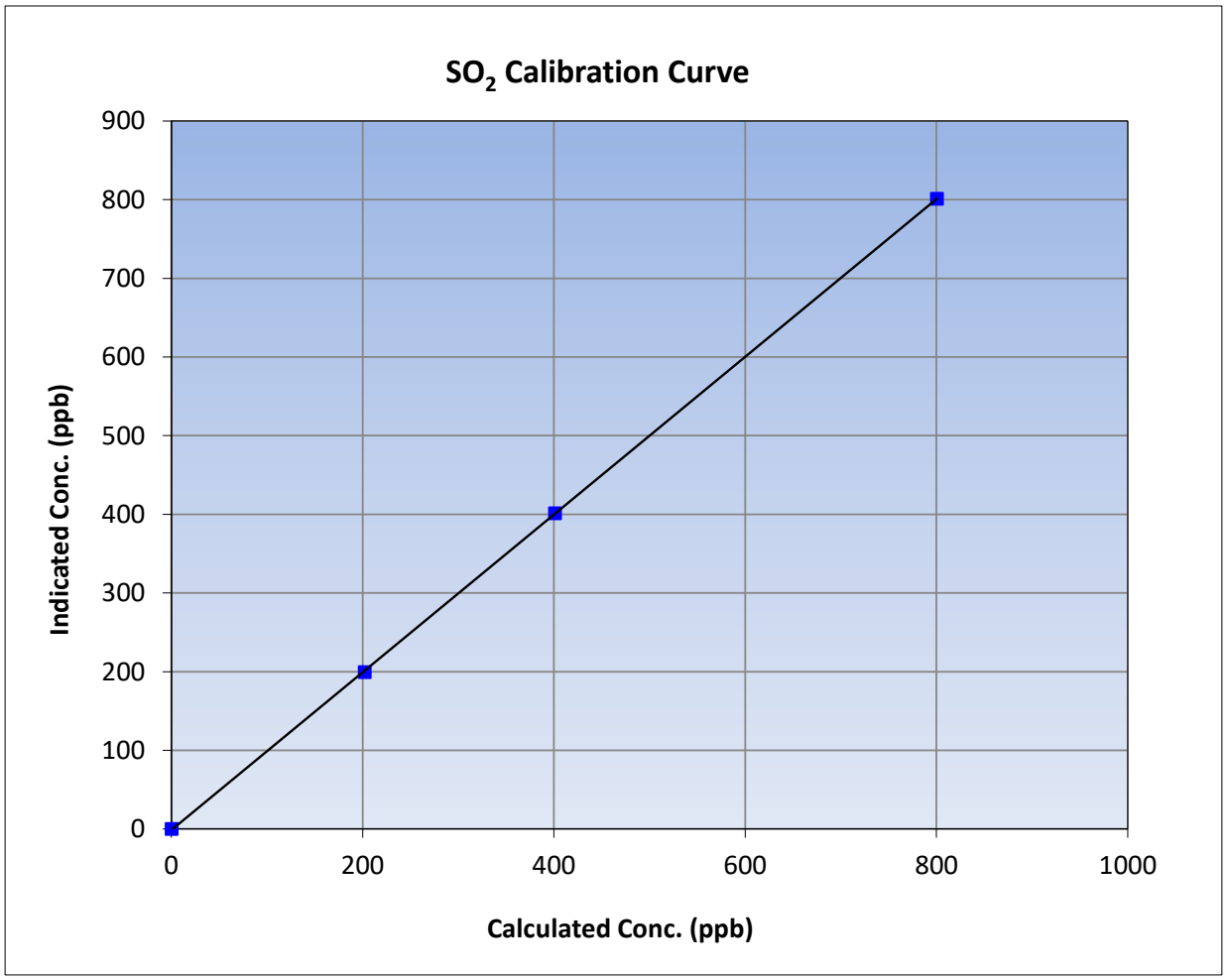
Station Information

Calibration Date:	November 7, 2023	Previous Calibration:	October 5, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	9:54	End Time (MST):	13:22
Analyzer make:	Thermo scientific	Analyzer serial #:	1160290014

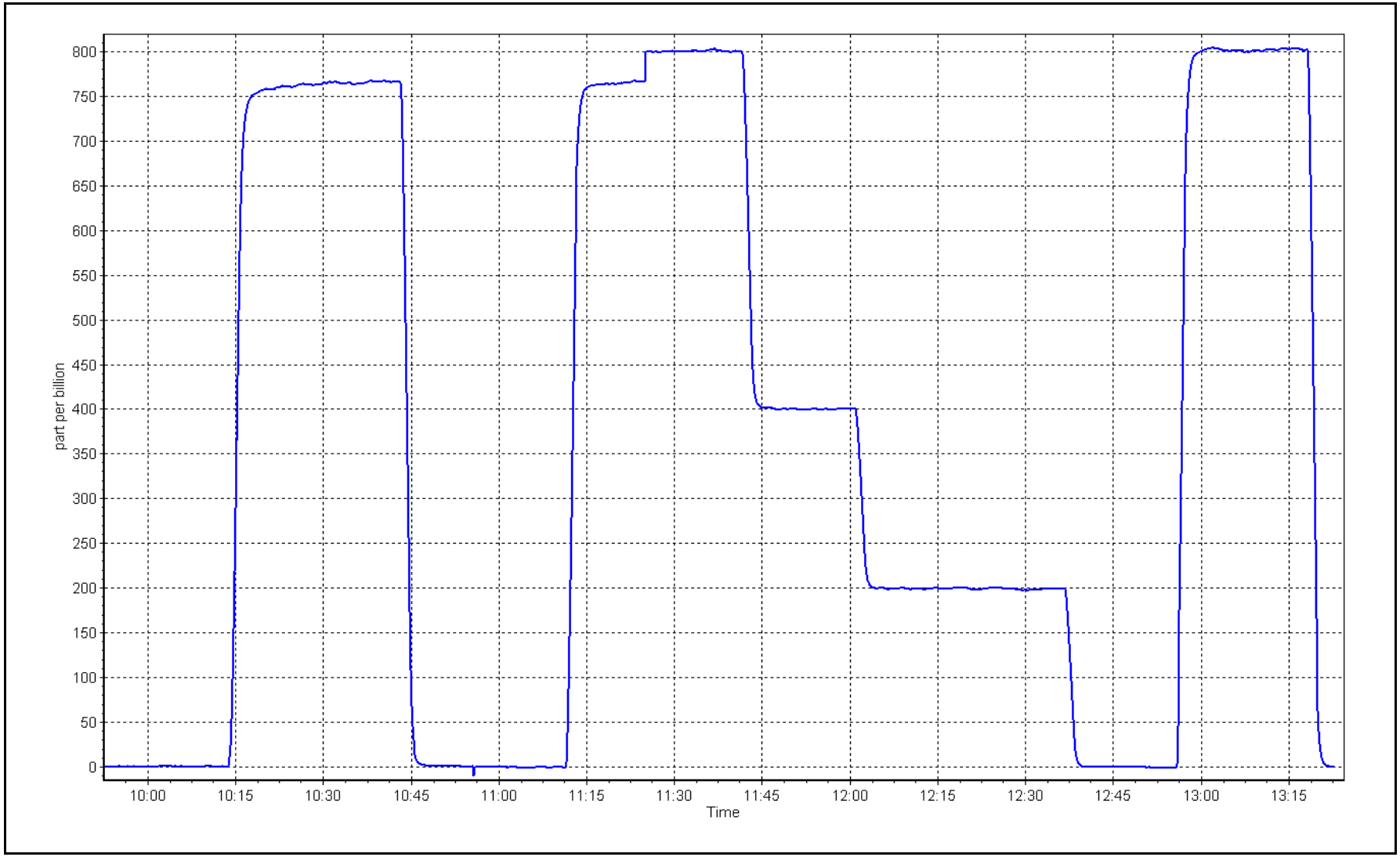
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
800.0	801.0	0.9988
400.8	401.0	0.9996
202.0	199.1	1.0143

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999984	*≥0.995*
Slope	1.002724	*0.90 - 1.10*
Intercept	-1.426148	*+/-30*



SO2 Calibration Plot Date: November 7, 2023 Location: Blackgold



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Blackgold	Station number:	AMS511
Calibration Date:	November 9, 2023	Last Cal Date:	October 5, 2023
Start time (MST):	8:13	End time (MST):	14:17
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.139	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC511397			
Removed Cal Gas Conc:	5.139	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T750		Serial Number:	282
ZAG Make/Model:	API T751H		Serial Number:	321

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1336160090	
Converter make:	Global G150		Converter serial #:	2022-227	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999059	1.006353	Backgd or Offset:	3.08	3.37
Calibration intercept:	-0.039168	-0.019423	Coeff or Slope:	1.137	1.159

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.3	----
as found span	4922	77.8	80.0	80.2	1.001
as found 2nd point	4961	38.9	40.0	39.9	1.010
as found 3rd point	4981	19.5	20.0	20.3	1.002
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4922	77.8	80.0	80.5	0.993
second point	4961	38.9	40.0	40.1	0.997
third point	4981	19.5	20.0	20.2	0.992
as left zero	5000	0.0	0.0	0.0	----
as left span	4922	77.9	80.0	79.3	1.009
SO2 Scrubber Check	4920	80.0	800.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.994
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.9	Prev response:	79.85	*% change:	0.1%
Baseline Corr 2nd AF pt:	39.6	AF Slope:	0.998777	AF Intercept:	0.220716
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999975		

* = > +/-5% change initiates investigation

Notes: Scrubber check done after cal zero. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

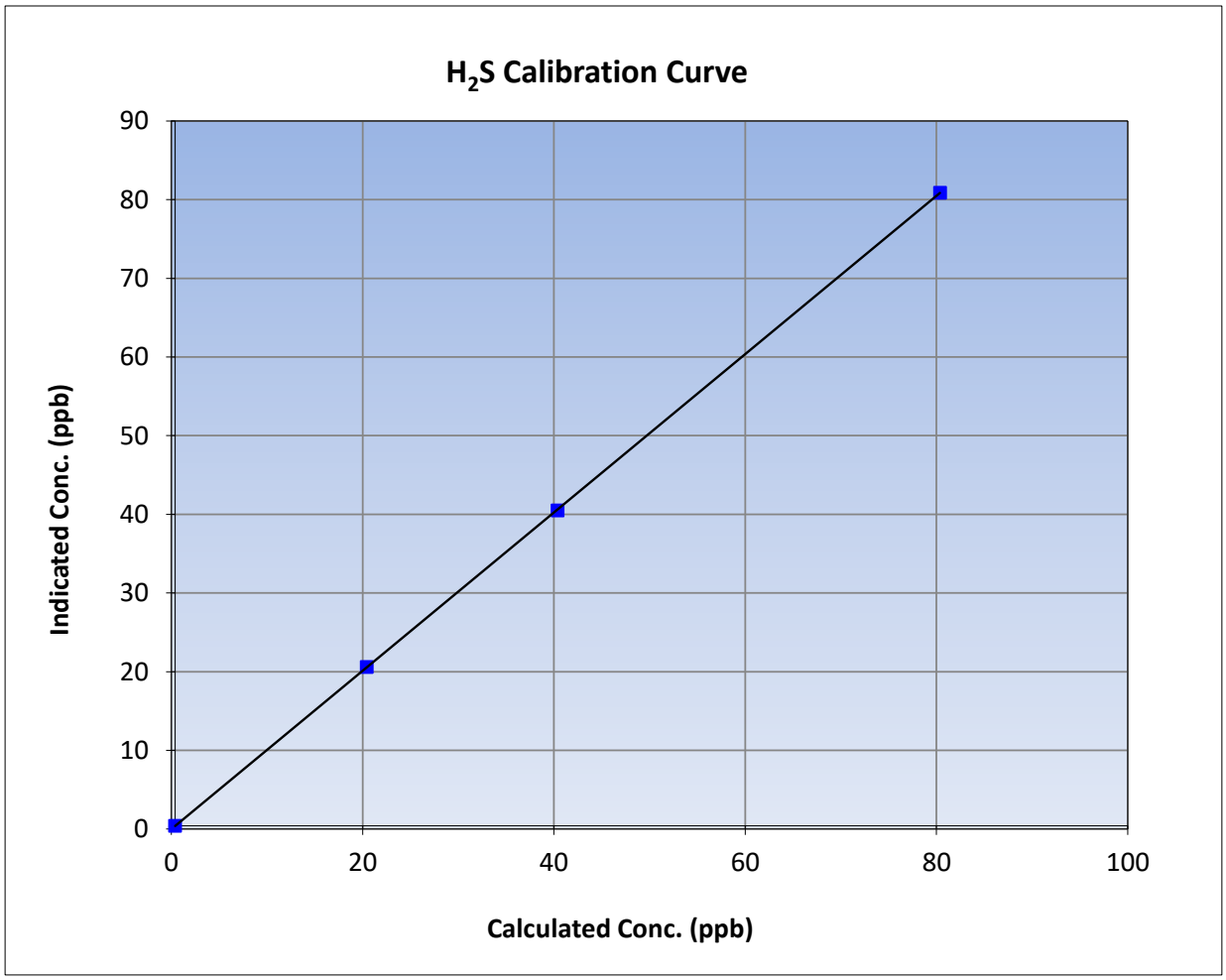
Station Information

Calibration Date:	November 9, 2023	Previous Calibration:	October 5, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	8:13	End Time (MST):	14:17
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1336160090

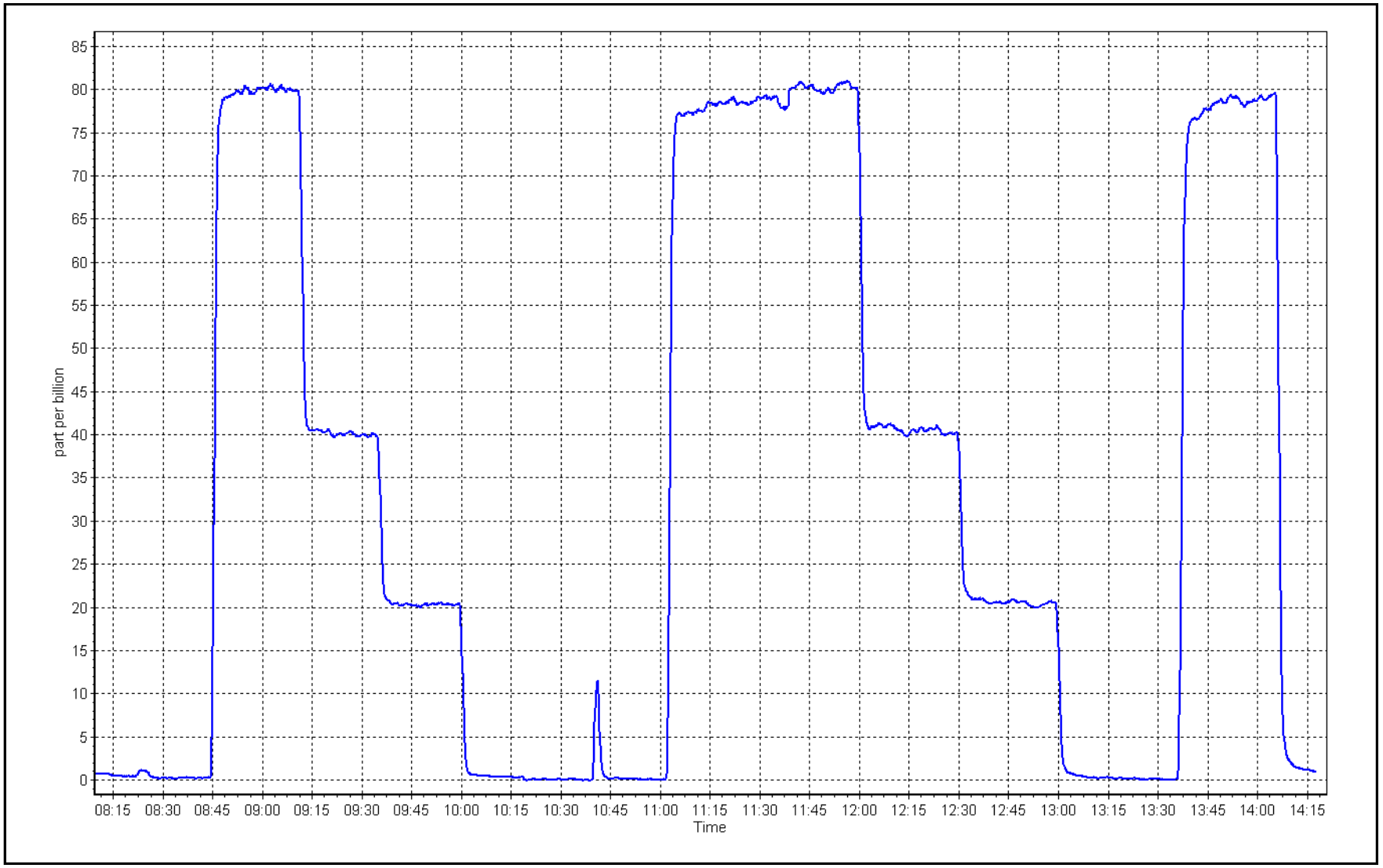
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.5	0.9934
40.0	40.1	0.9971
20.0	20.2	0.9921

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.006353	*0.90 - 1.10*
Intercept	-0.019423	*+/-3*



H_2S Calibration Plot Date: November 9, 2023 Location: Blackgold



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Blackgold	Station number:	AMS511
Calibration Date:	November 7, 2023	Last Cal Date:	October 5, 2023
Start time (MST):	9:54	End time (MST):	13:22
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	CC147416		Cal Gas Expiry Date:	January 5, 2029	
CH4 Cal Gas Conc.	498.90	ppm	CH4 Equiv Conc.	1070.90	ppm
C3H8 Cal Gas Conc.	208.00	ppm			
Removed Gas Cert:	NA		Removed Gas Expiry:	NA	
Removed CH4 Conc.	498.90	ppm	CH4 Equiv Conc.	1070.90	ppm
Removed C3H8 Conc.	208.00	ppm	Diff between cyl:		
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5258	
ZAG Make/Model:	Teledyne API 701		Serial Number:	138	

Analyzer Information

Analyzer make:	Thermo 51i-LT		Analyzer serial #:	1317958295	
Analyzer Range:	0 - 20 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997401	1.000266	Background:	0.94	0.93
Calibration intercept:	-0.038565	-0.072772	Coefficient:	0.550	0.595

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	-0.08	----
as found span	4920	79.9	17.11	15.73	1.088
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.01	----
high point	4920	79.9	17.11	17.09	1.001
second point	4960	40.0	8.57	8.43	1.016
third point	4980	20.0	4.28	4.17	1.028
as left zero	5000	0.0	0.00	-0.02	----
as left span	4926	80.0	17.11	17.11	1.000
				Average Correction Factor	1.015

Baseline Corr As found:	15.81	Previous response	17.03	*% change	-7.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

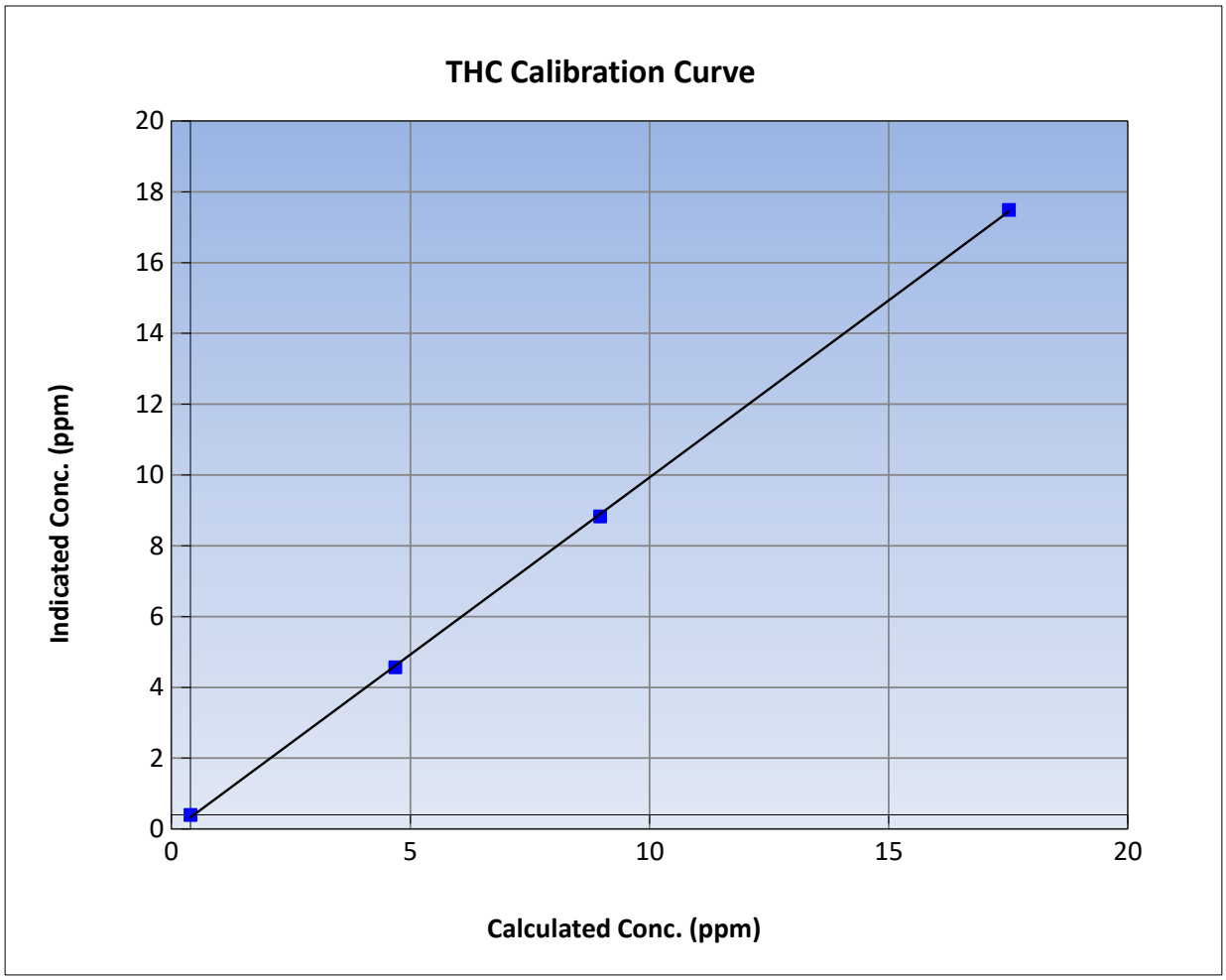
Station Information

Calibration Date:	November 7, 2023	Previous Calibration:	October 5, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	9:54	End Time (MST):	13:22
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1317958295

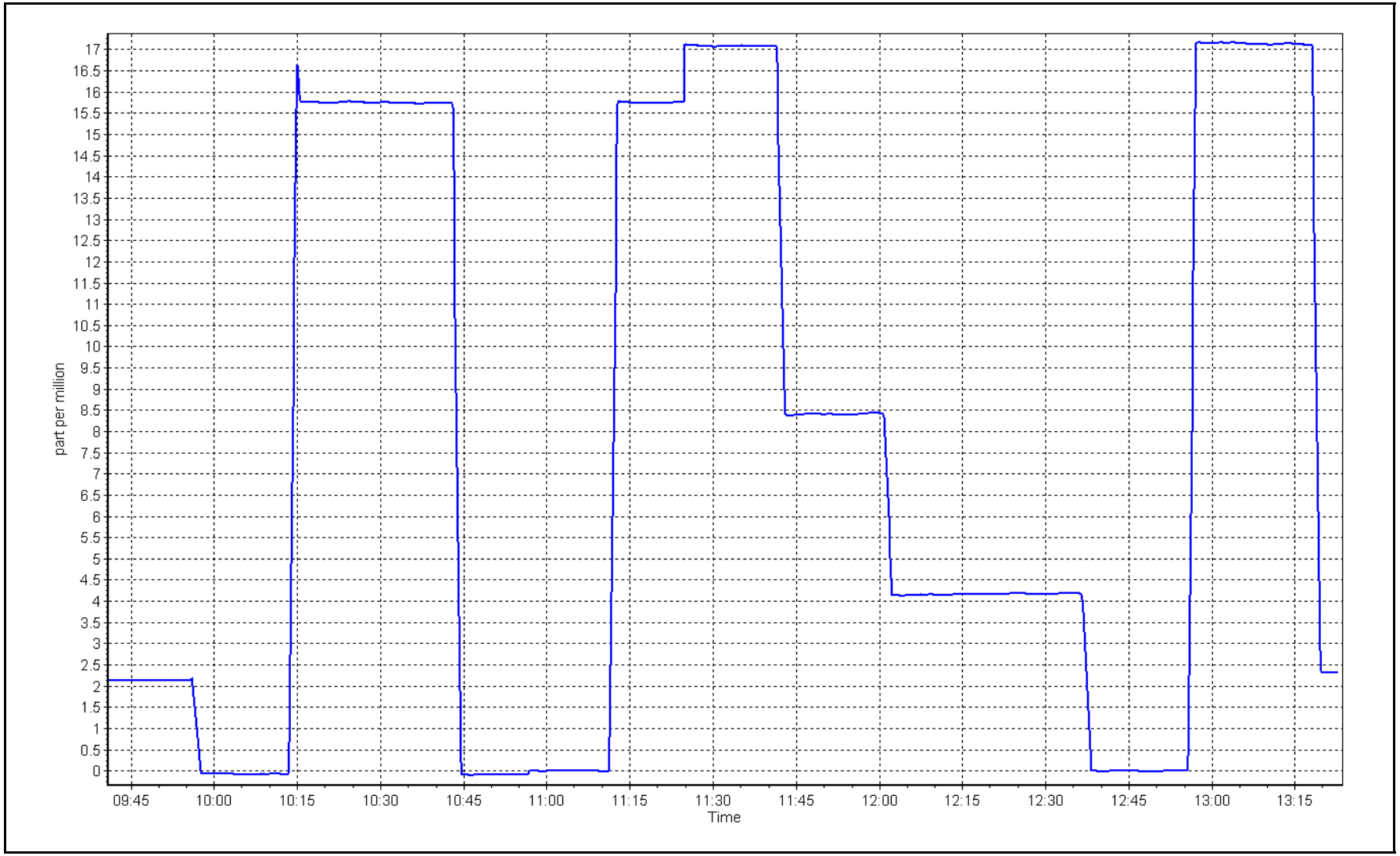
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.01	----
17.11	17.09	1.0014
8.57	8.43	1.0163
4.28	4.17	1.0282

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999918	*≥0.995*
Slope	1.000266	*0.90 - 1.10*
Intercept	-0.072772	*+/-1.5*



THC Calibration Plot Date: November 7, 2023 Location: Blackgold



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Blackgold	Station number:	AMS511
Calibration Date:	November 9, 2023	Last Cal Date:	October 5, 2023
Start time (MST):	8:13	End time (MST):	14:33
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T0F8P52		Cal Gas Expiry Date:	August 16, 2026	
NOX Cal Gas Conc:	47.4	ppm	NO Cal Gas Conc:	47.4	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	47.4	ppm	Removed Gas NO Conc:	47.4	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	2445	
ZAG make/model:	Teledyne API T701		Serial Number:	138	

Analyzer Information

Analyzer make:	Teledyne API T200	Analyzer serial #:	7029
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.029	1.041	NO bkgnd or offset:	0.2	0.2
NOX coeff or slope:	1.029	1.038	NOX bkgnd or offset:	1.1	0.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	4.1	4.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.994686	1.004049
NO_X Cal Offset:	1.102483	-1.772798
NO Cal Slope:	0.983189	1.003178
NO Cal Offset:	2.228032	-2.292773
NO_2 Cal Slope:	1.005880	1.000729
NO_2 Cal Offset:	0.450694	0.157575

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.3	-0.3	----	----
as found span	4916	84.4	800.6	800.6	0.0	790.6	781.0	9.6	1.0126	1.0250
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high point	4916	84.4	800.6	800.6	0.0	803.0	802.0	1.4	0.9970	0.9982
second point	4958	42.2	400.3	400.3	0.0	398.9	397.9	1.0	1.0035	1.0061
third point	4979	21.1	200.2	200.2	0.0	197.8	196.5	1.3	1.0119	1.0186
as left zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	----	----
as left span	4916	84.4	800.6	404.3	396.3	798.8	403.5	395.3	1.0022	1.0019
								Average Correction Factor	1.0041	1.0076

Corrected As found	NO_X = 791.1 ppb	NO = 781.3 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -0.8%
Previous Response	NO_X = 797.4 ppb	NO = 789.3 ppb		*Percent Change	NO = -1.0%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	798.0	401.7	396.3	396.7	0.9990	100.1%
2nd GPT point (200 ppb O3)	798.0	631.2	166.8	167.1	0.9982	100.2%
3rd GPT point (100 ppb O3)	798.0	716.6	81.4	81.8	0.9951	100.5%
				Average Correction Factor	0.9974	100.3%

Notes: Adjusted zero and span. No other maintenance done.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

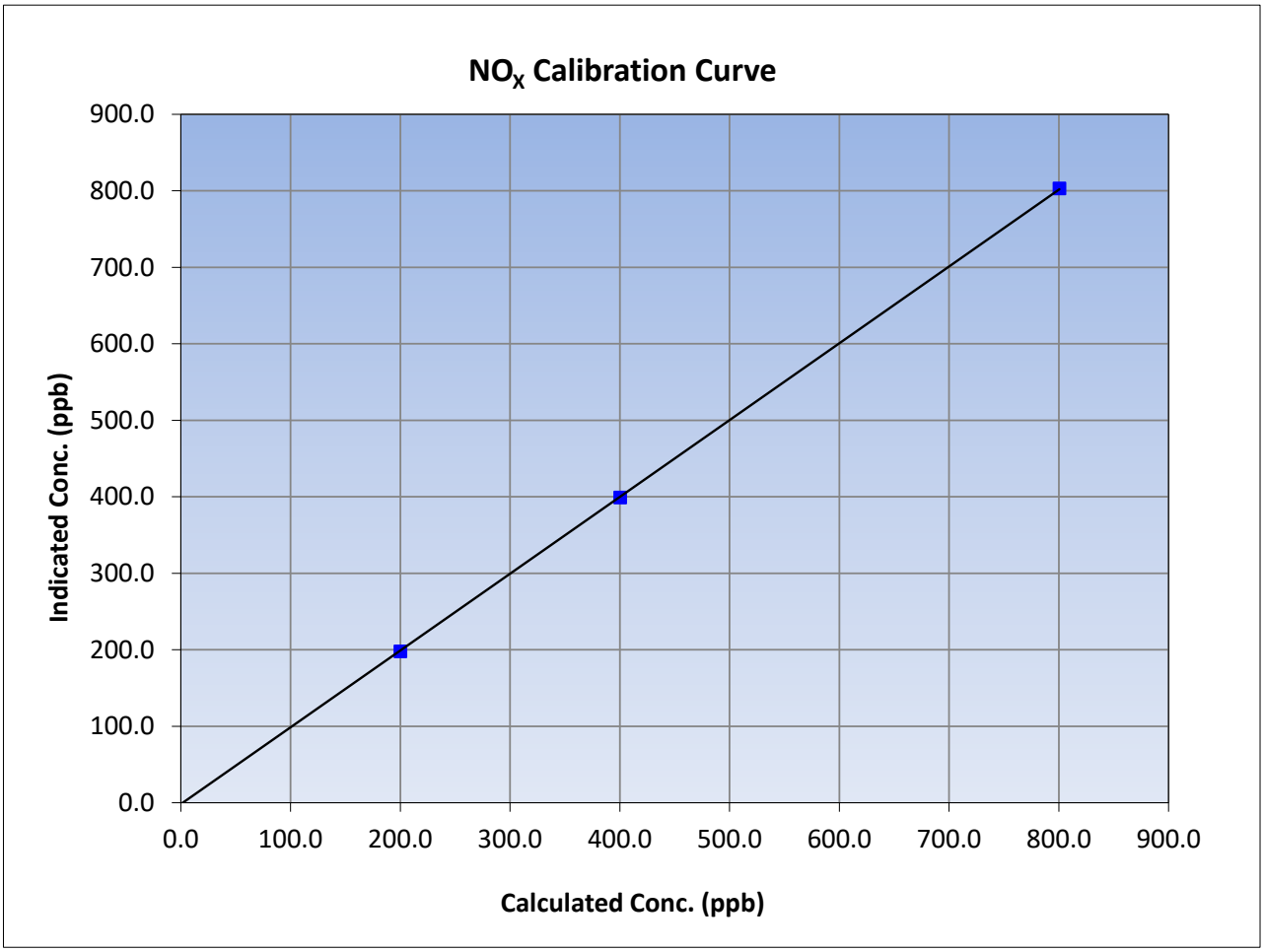
Version-04-2020

Station Information

Calibration Date:	November 9, 2023	Previous Calibration:	October 5, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	8:13	End Time (MST):	14:33
Analyzer make:	Teledyne API T200	Analyzer serial #:	7029

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.1	----	Correlation Coefficient	0.999979	*≥0.995*
800.6	803.0	0.9970			
400.3	398.9	1.0035	Slope	1.004049	*0.90 - 1.10*
200.2	197.8	1.0119			
			Intercept	-1.772798	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

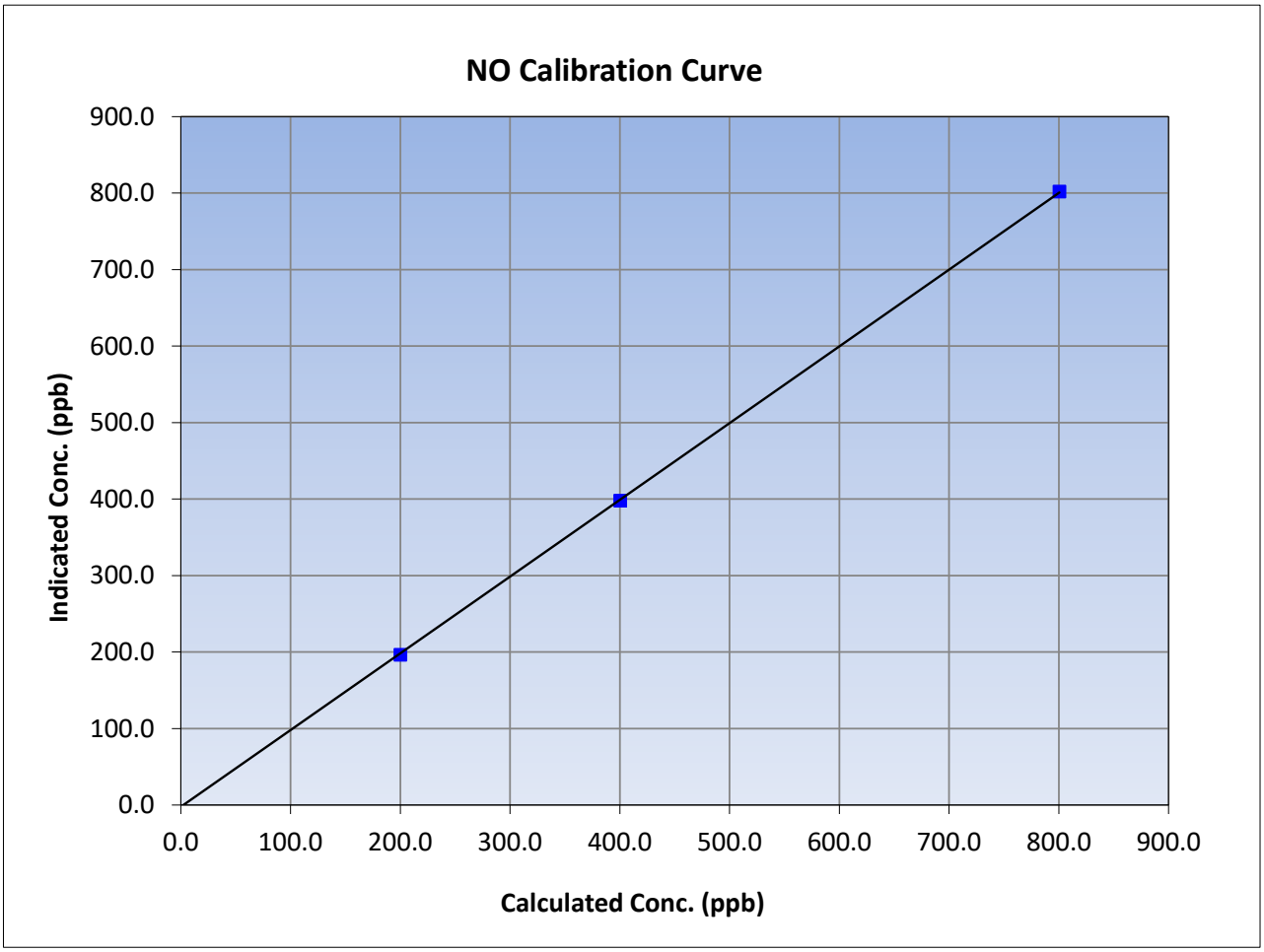
Version-04-2020

Station Information

Calibration Date:	November 9, 2023	Previous Calibration:	October 5, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	8:13	End Time (MST):	14:33
Analyzer make:	Teledyne API T200	Analyzer serial #:	7029

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999966	≥0.995
800.6	802.0	0.9982			
400.3	397.9	1.0061	Slope	1.003178	0.90 - 1.10
200.2	196.5	1.0186			
			Intercept	-2.292773	+/-20



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NO_2 Calibration Summary

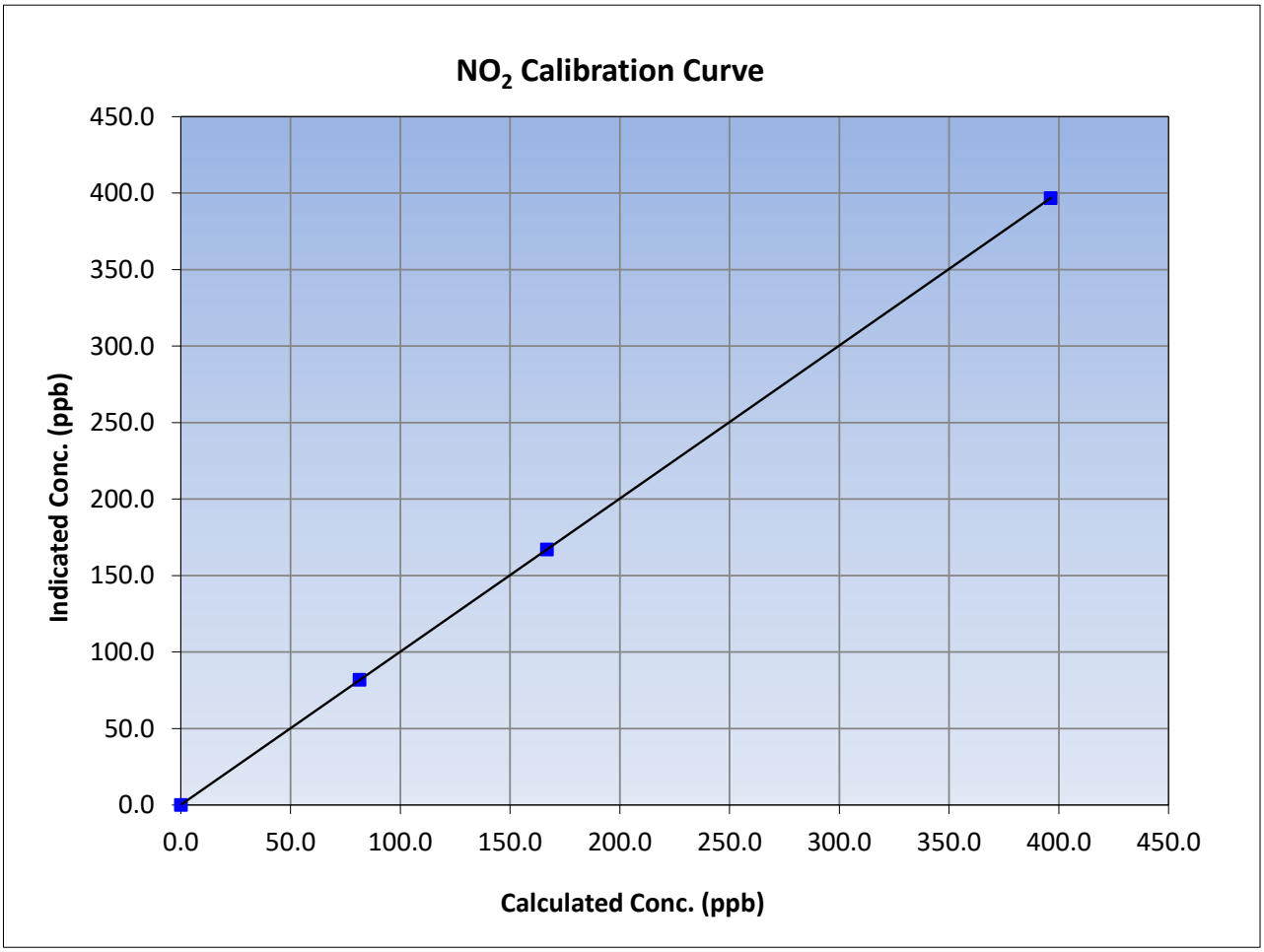
Version-04-2020

Station Information

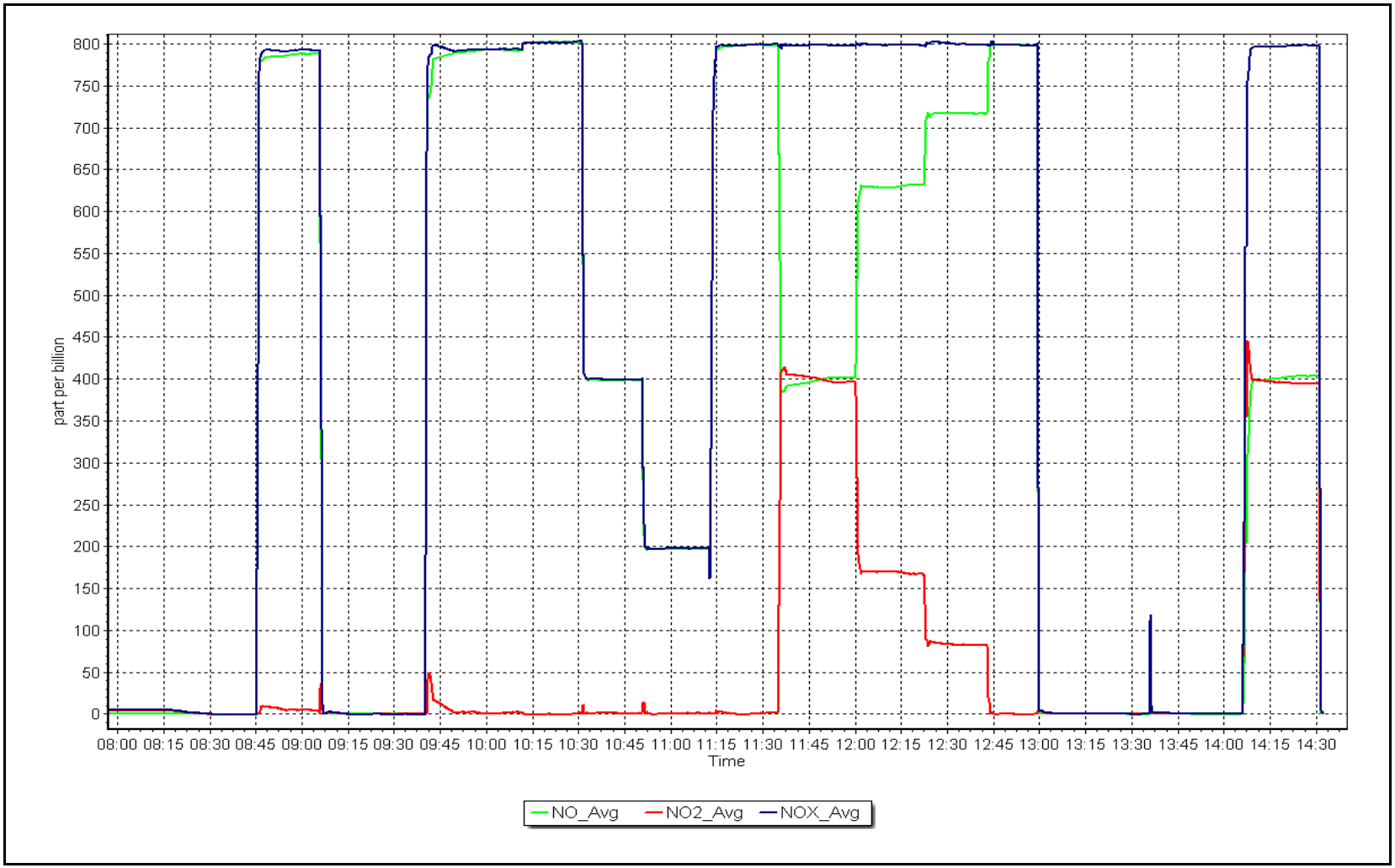
Calibration Date:	November 9, 2023	Previous Calibration:	October 5, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	8:13	End Time (MST):	14:33
Analyzer make:	Teledyne API T200	Analyzer serial #:	7029

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999999	*≥0.995*
396.3	396.7	0.9990			
166.8	167.1	0.9982	Slope	1.000729	*0.90 - 1.10*
81.4	81.8	0.9951			
			Intercept	0.157575	*+/-20*



NO_X Calibration Plot Date: November 9, 2023 Location: Blackgold



End of Report