WOOD BUFFALO
ENVIRONMENTAL ASSOCIATION

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Wood Buffalo Environmental Association

OCTOBER 2023

MONTHLY CALIBRATION REPORT

CONTINUOUS MONITORING

November 29, 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

OCTOBER 2023

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

November 29, 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:	October 4, 2023	Last Cal Date:	September 12, 2023
Start time (MST):	7:26	End time (MST):	10:30
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.21	ppm	Cal Gas Exp Date:	March 10, 2031
Cal Gas Cylinder #:	CC418809			
Removed Cal Gas Conc:	49.21	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3565
ZAG Make/Model:	Teledyne API T701		Serial Number:	5609

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999839	0.998709	Backgd or Offset:	19.3	19.2
Calibration intercept:	-0.113750	0.106791	Coeff or Slope:	0.890	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	0.5	----
as found span	4918	81.3	800.3	796.0	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.6	----
high point	4918	81.3	800.3	799.8	1.001
second point	4959	40.7	400.6	399.3	1.003
third point	4979	20.3	199.8	199.6	1.001
as left zero	5000	0.0	0.0	0.7	----
as left span	4918	81.3	800.3	800.7	0.999
				Average Correction Factor	1.002

Baseline Corr As found:	795.50	Previous response	800.02	*% change	-0.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

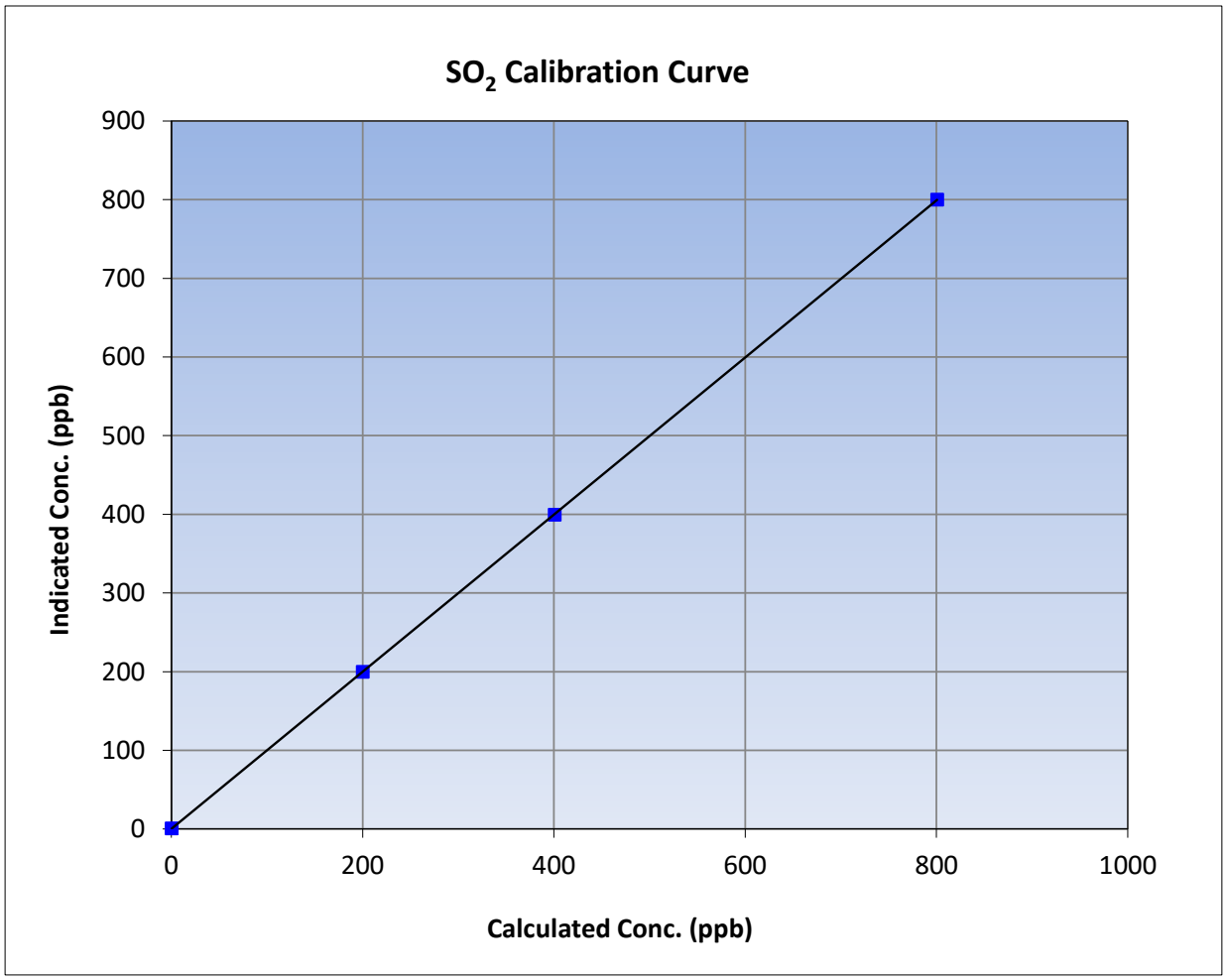
Station Information

Calibration Date:	October 4, 2023	Previous Calibration:	September 12, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	7:26	End Time (MST):	10:30
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301448

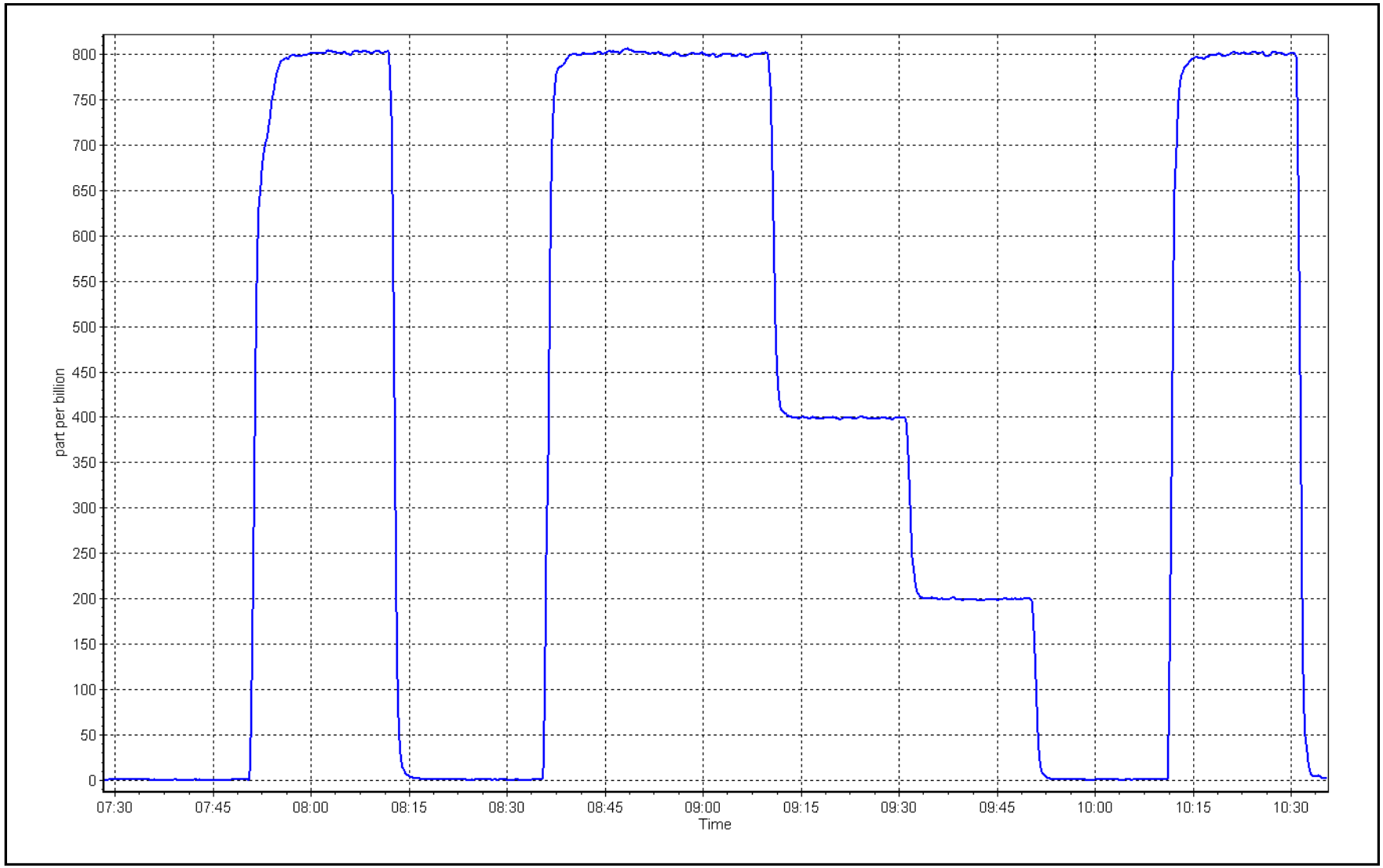
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.6	----
800.3	799.8	1.0006
400.6	399.3	1.0032
199.8	199.6	1.0011

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	0.998709	*0.90 - 1.10*
Intercept	0.106791	*+/-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:	October 16, 2023	Last Cal Date:	September 11, 2023
Start time (MST):	9:39	End time (MST):	15:15
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:	0.995649	0.993649	Backgd or Offset:	2.26	2.25
Calibration intercept:	0.279998	0.200001	Coeff or Slope:	0.906	0.906

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.2	----
as found span	4921	78.4	80.0	78.9	1.016
as found 2nd point	4960	39.2	40.0	39.7	1.013
as found 3rd point	4980	19.6	20.0	19.8	1.020
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4921	78.4	80.0	79.7	1.004
second point	4960	39.2	40.0	39.9	1.002
third point	4980	19.6	20.0	20.1	0.995
as left zero	5000	0.0	0.0	0.3	----
as left span	4921	78.4	80.0	81.0	0.988
SO2 Scrubber Check	4919	81.3	813.0	0.0	----
Date of last scrubber change:		December 17, 2021		Ave Corr Factor	1.000
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.7	Prev response:	79.93	*% change:	-1.6%
Baseline Corr 2nd AF pt:	39.5	AF Slope:	0.984363	AF Intercept:	0.199997
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999993		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

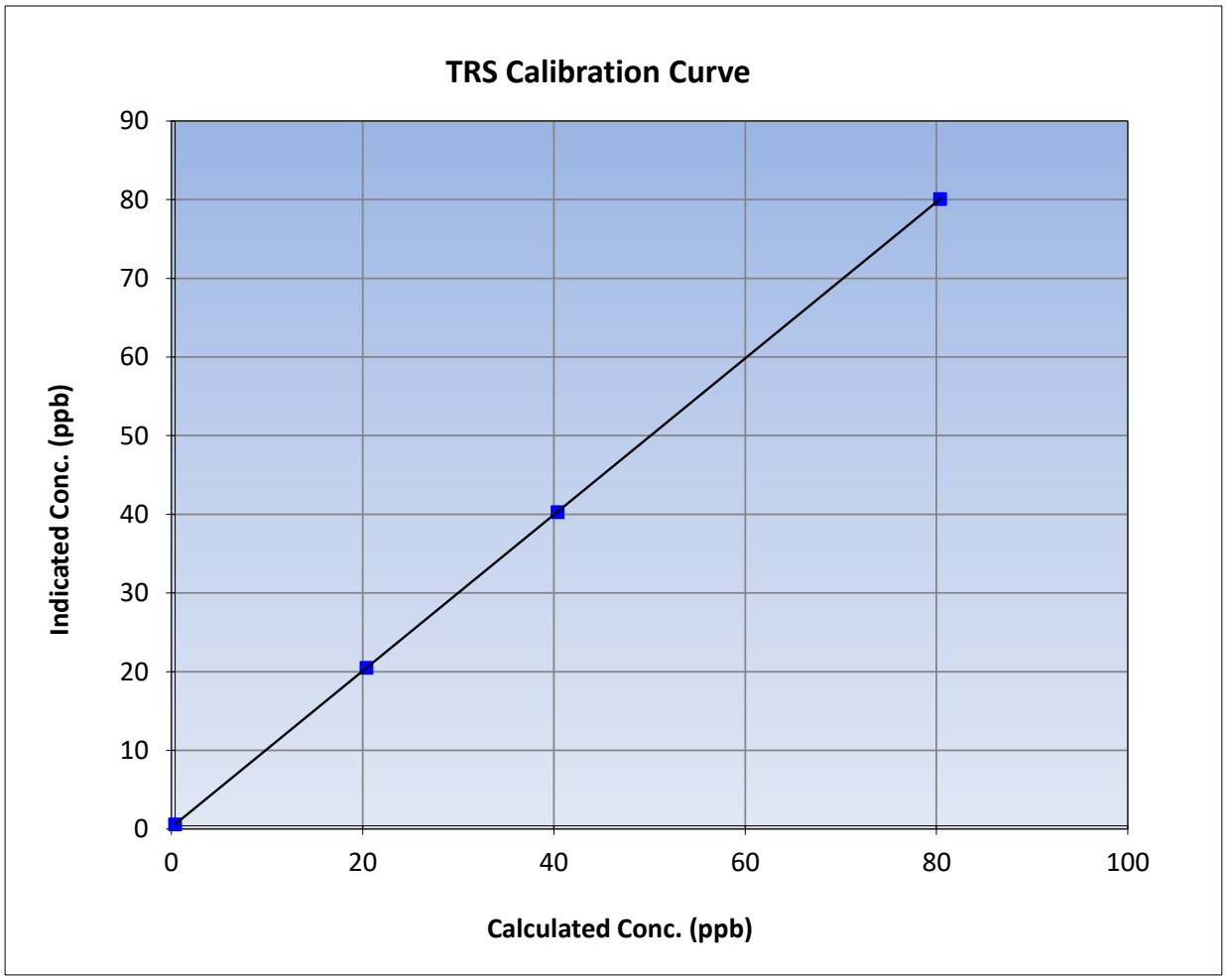
Station Information

Calibration Date:	October 16, 2023	Previous Calibration:	September 11, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:39	End Time (MST):	15:15
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153461

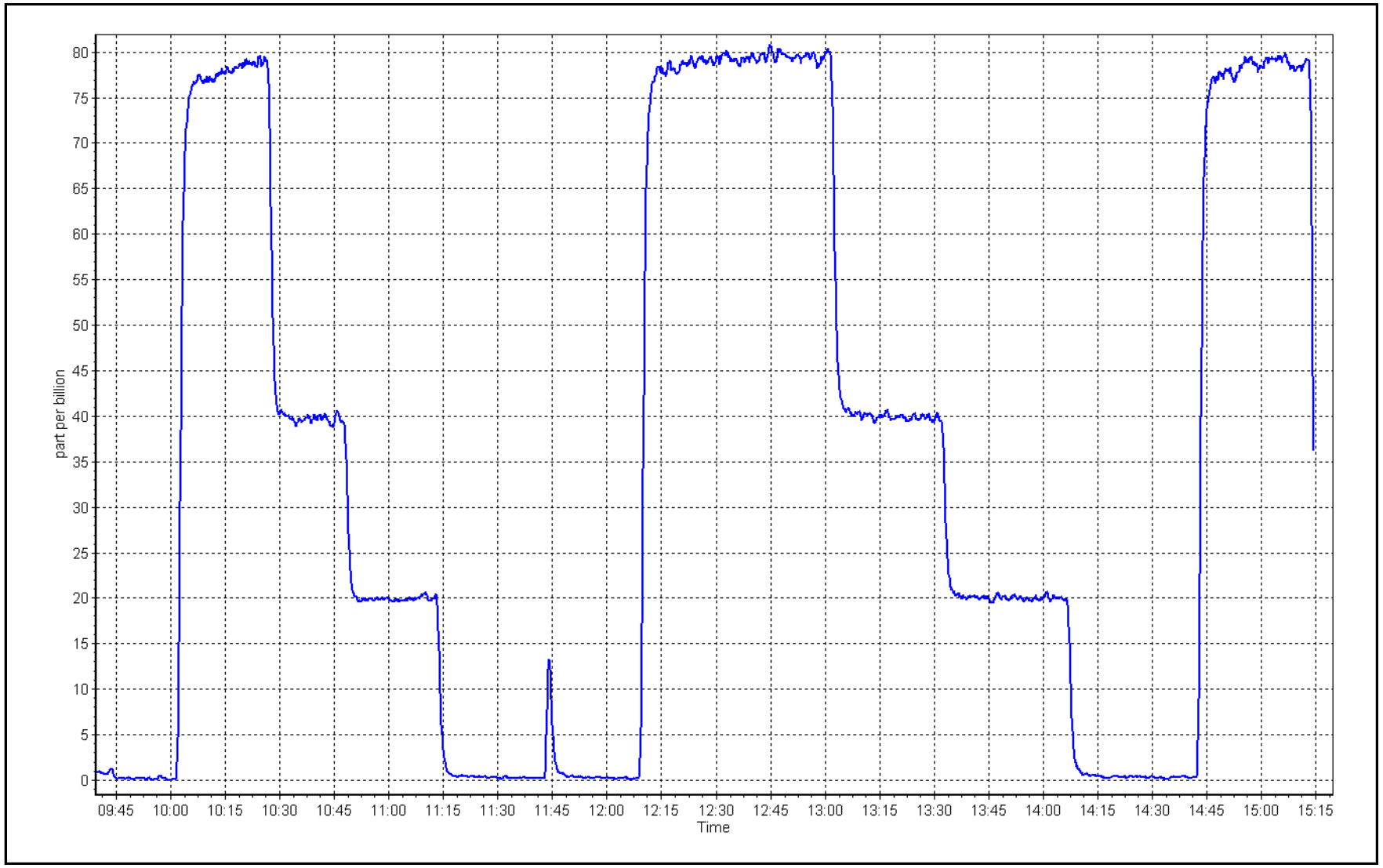
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	79.7	1.0037
40.0	39.9	1.0025
20.0	20.1	0.9949

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	0.993649	*0.90 - 1.10*
Intercept	0.200001	*+/-3*



TRS Calibration Plot Date: October 16, 2023 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	October 16, 2023	Last Cal Date:	September 11, 2023
Start time (MST):	9:39	End time (MST):	15:15
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:	0.997856	0.989711	Backgd or Offset:	1.70	1.71
Calibration intercept:	0.156776	0.316799	Coeff or Slope:	0.997	0.997

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4922	78.4	80.0	80.4	0.995
as found 2nd point	4960	39.2	40.0	41.5	0.964
as found 3rd point	4980	19.6	20.0	20.1	0.995
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4922	78.4	80.0	79.3	1.009
second point	4960	39.2	40.0	40.3	0.993
third point	4980	19.6	20.0	20.0	1.000
as left zero	5000	0.0	0.0	0.8	----
as left span	4922	78.4	80.0	77.7	1.029
SO2 Scrubber Check	4919	81.3	813.0	0.0	----
Date of last scrubber change:		March 21, 2022		Ave Corr Factor	1.000
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.4	Prev response:	79.95	*% change:	0.6%
Baseline Corr 2nd AF pt:	41.5	AF Slope:	1.007343	AF Intercept:	0.256695
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999651		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

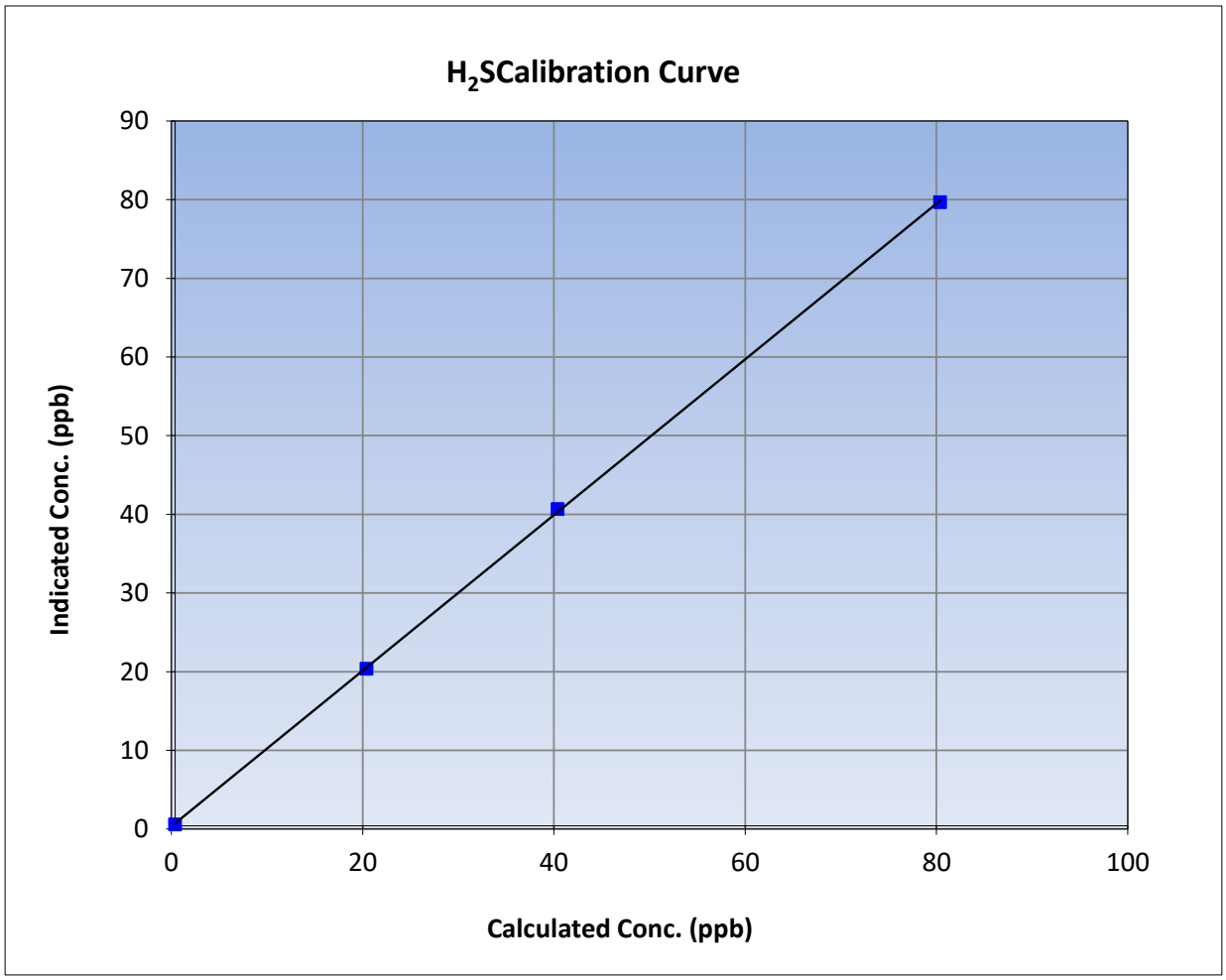
Station Information

Calibration Date:	October 16, 2023	Previous Calibration:	September 11, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:39	End Time (MST):	15:15
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1200326167

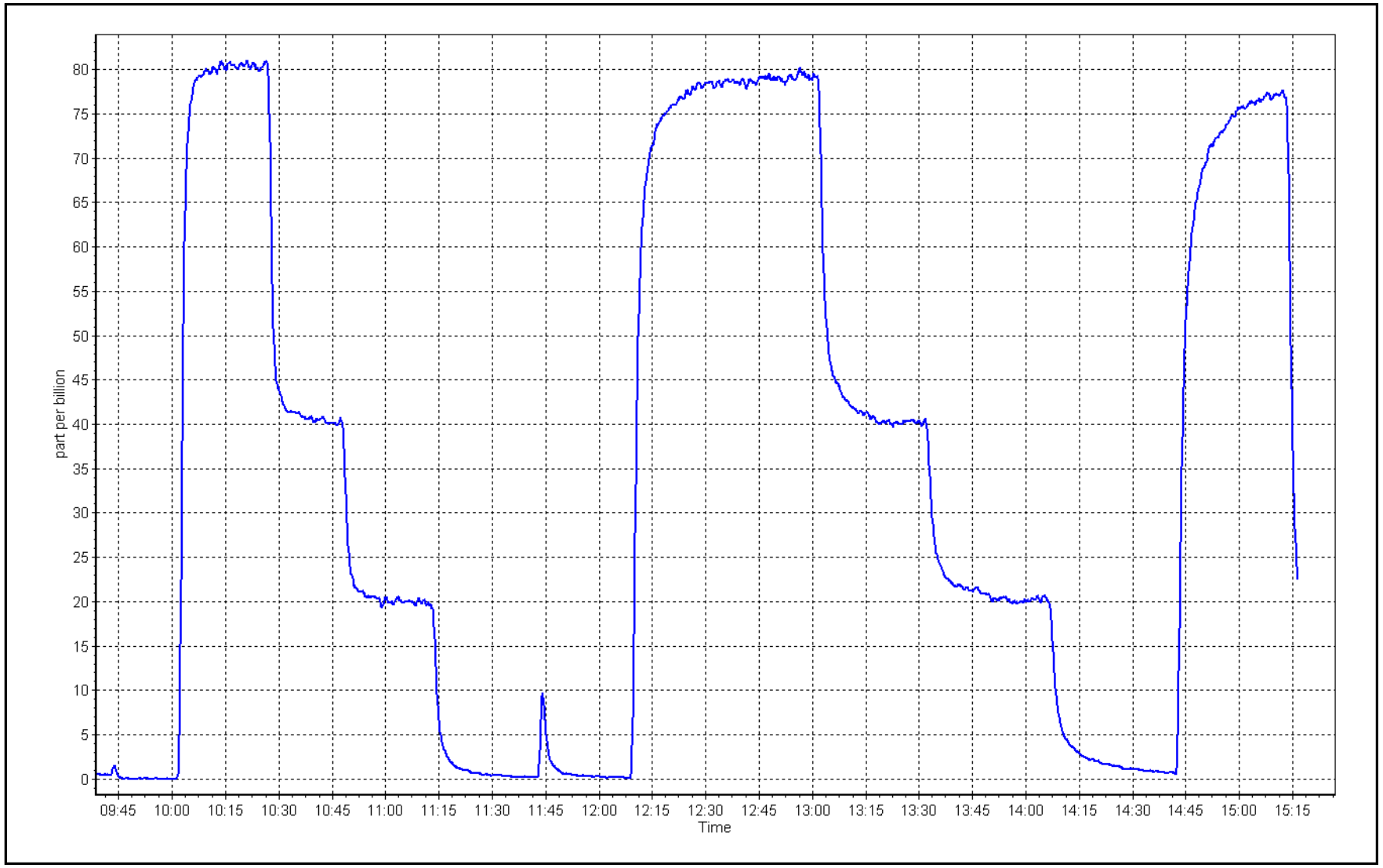
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	79.3	1.0085
40.0	40.3	0.9925
20.0	20.0	0.9999

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999938	*≥0.995*
Slope	0.989711	*0.90 - 1.10*
Intercept	0.316799	*+/-3*



H_2S Calibration Plot Date: October 16, 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:	October 4, 2023	Last Cal Date:	September 12, 2023
Start time (MST):	7:26	End time (MST):	10:30
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC418809	Cal Gas Expiry Date:	March 10, 2031	
CH4 Cal Gas Conc.	497.2	ppm	CH4 Equiv Conc.	1061.8	ppm
C3H8 Cal Gas Conc.	205.3	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.2	ppm	CH4 Equiv Conc.	1061.8	ppm
Removed C3H8 Conc.	205.3	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	3565	
ZAG make/model:	Teledyne API T701		Serial Number:	5609	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320040	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.97E-04	2.98E-04	NMHC SP Ratio:	6.42E-05	6.57E-05
CH4 Retention time:	14.6	14.6	NMHC Peak Area:	143189	139930
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	17.04	1.013
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4918	81.3	17.27	17.30	0.998
second point	4959	40.7	8.64	8.47	1.020
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	17.23	1.002
				Average Correction Factor	1.014
Baseline Corr AF:	17.04	Prev response	17.19	*% change	-0.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4918	81.3	9.18	9.09	1.010
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4918	81.3	9.18	9.23	0.995
second point	4959.3	40.7	4.60	4.55	1.010
third point	4979.7	20.3	2.29	2.28	1.006
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	9.18	9.16	1.002
				Average Correction Factor	1.004
Baseline Corr AF:	9.09	Prev response	9.15	*% change	-0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4918	81.3	8.09	7.95	1.017
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4918	81.3	8.09	8.07	1.002
second point	4959.3	40.7	4.05	3.92	1.031
third point	4979.7	20.3	2.02	1.94	1.043
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	8.09	8.07	1.002
				Average Correction Factor	1.025
Baseline Corr AF:	7.95	Prev response	8.04	*% 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:	0.998565	1.002996
THC Cal Offset:	-0.056289	-0.080272
CH4 Cal Slope:	1.000577	1.000153
CH4 Cal Offset:	-0.051154	-0.055151
NMHC Cal Slope:	0.996780	1.005501
NMHC Cal Offset:	-0.004336	-0.025121

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

THC Calibration Summary

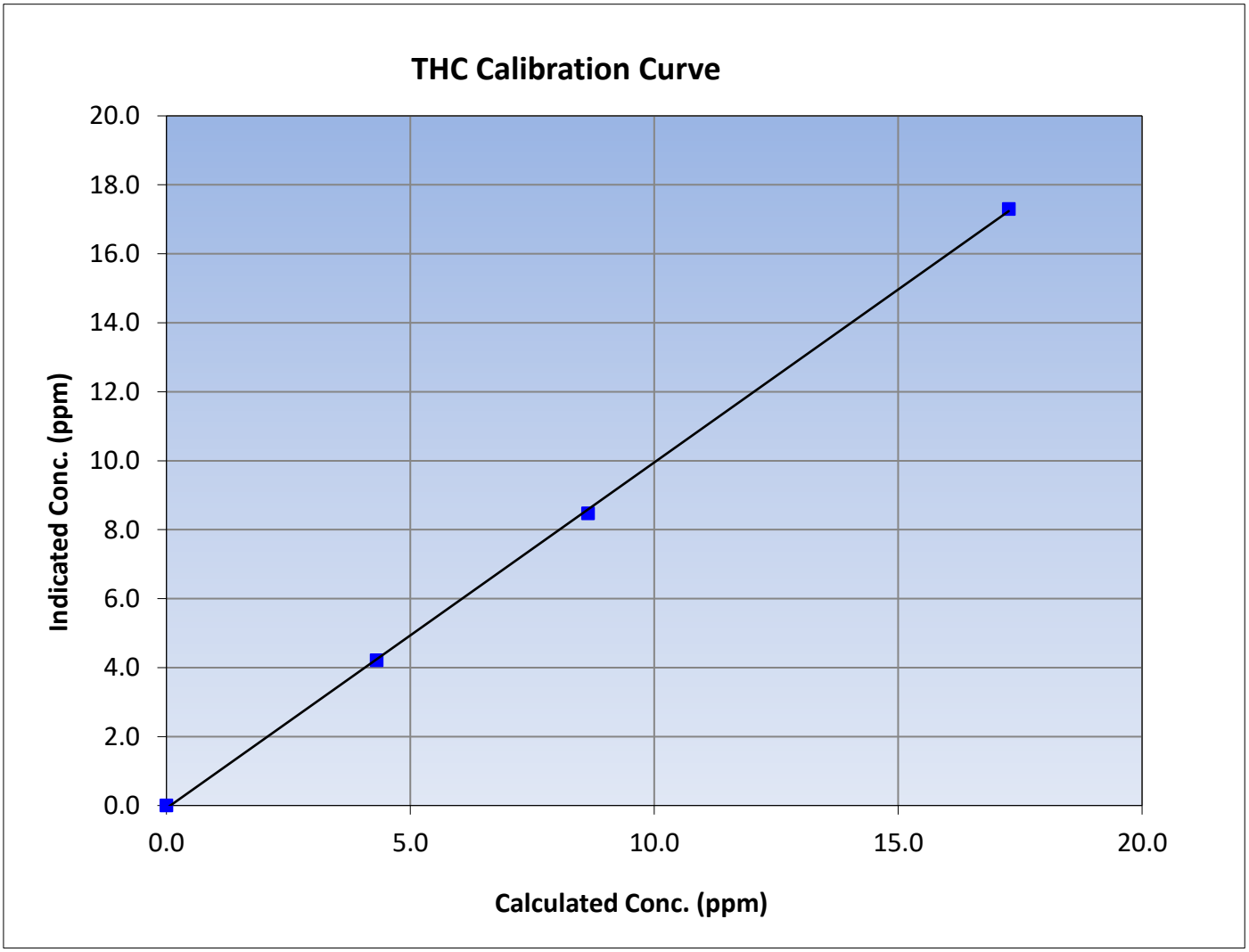
Version-06-2022

Station Information

Calibration Date:	October 4, 2023	Previous Calibration:	September 12, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	7:26	End Time (MST):	10:30
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	0.999847	≥0.995
17.27	17.30	0.9979			
8.64	8.47	1.0202	Slope	1.002996	0.90 - 1.10
4.31	4.21	1.0230			
			Intercept	-0.080272	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

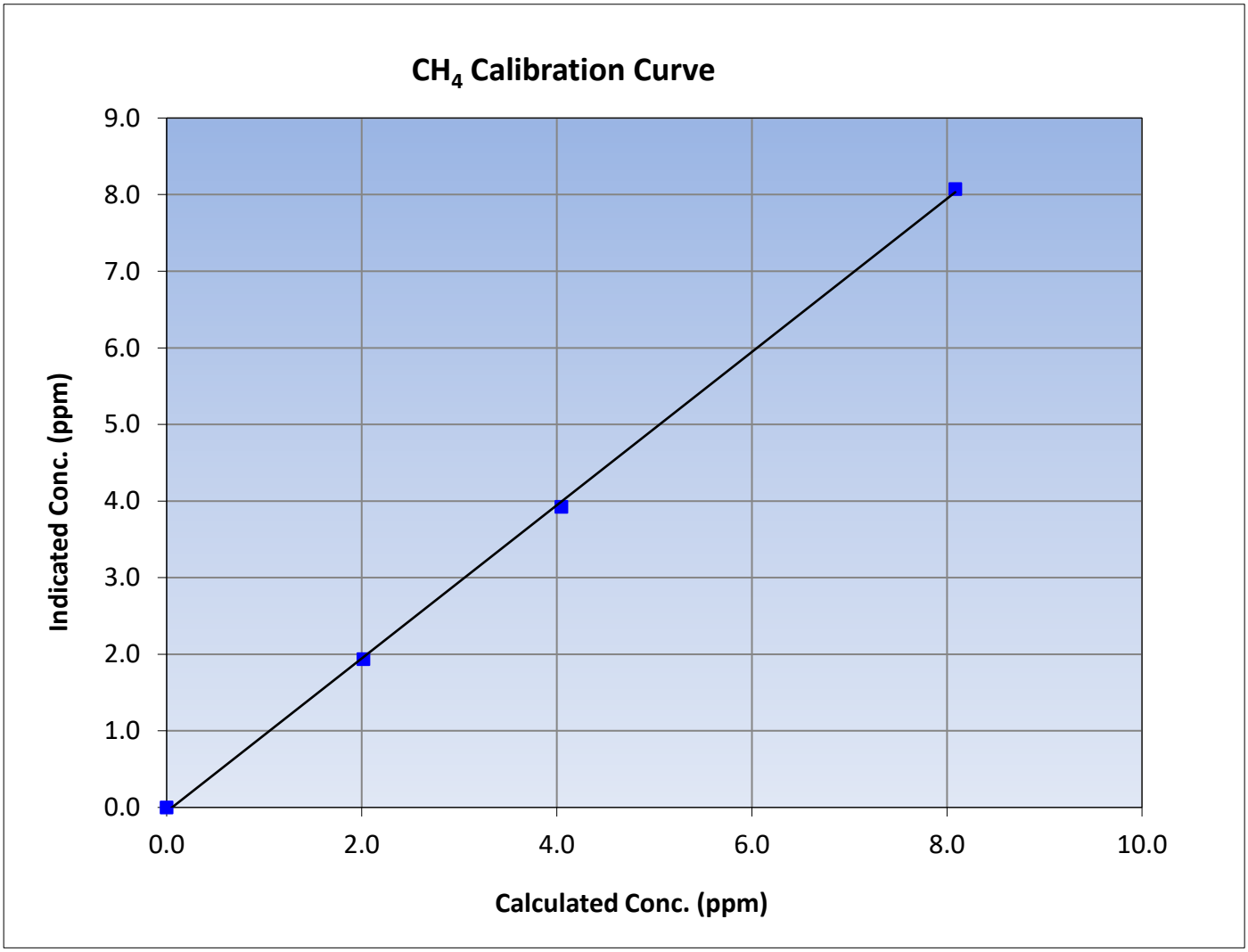
Version-06-2022

Station Information

Calibration Date:	October 4, 2023	Previous Calibration:	September 12, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	7:26	End Time (MST):	10:30
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	0.999714	*≥0.995*
8.09	8.07	1.0016			
4.05	3.92	1.0314	Slope	1.000153	*0.90 - 1.10*
2.02	1.94	1.0427			
			Intercept	-0.055151	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

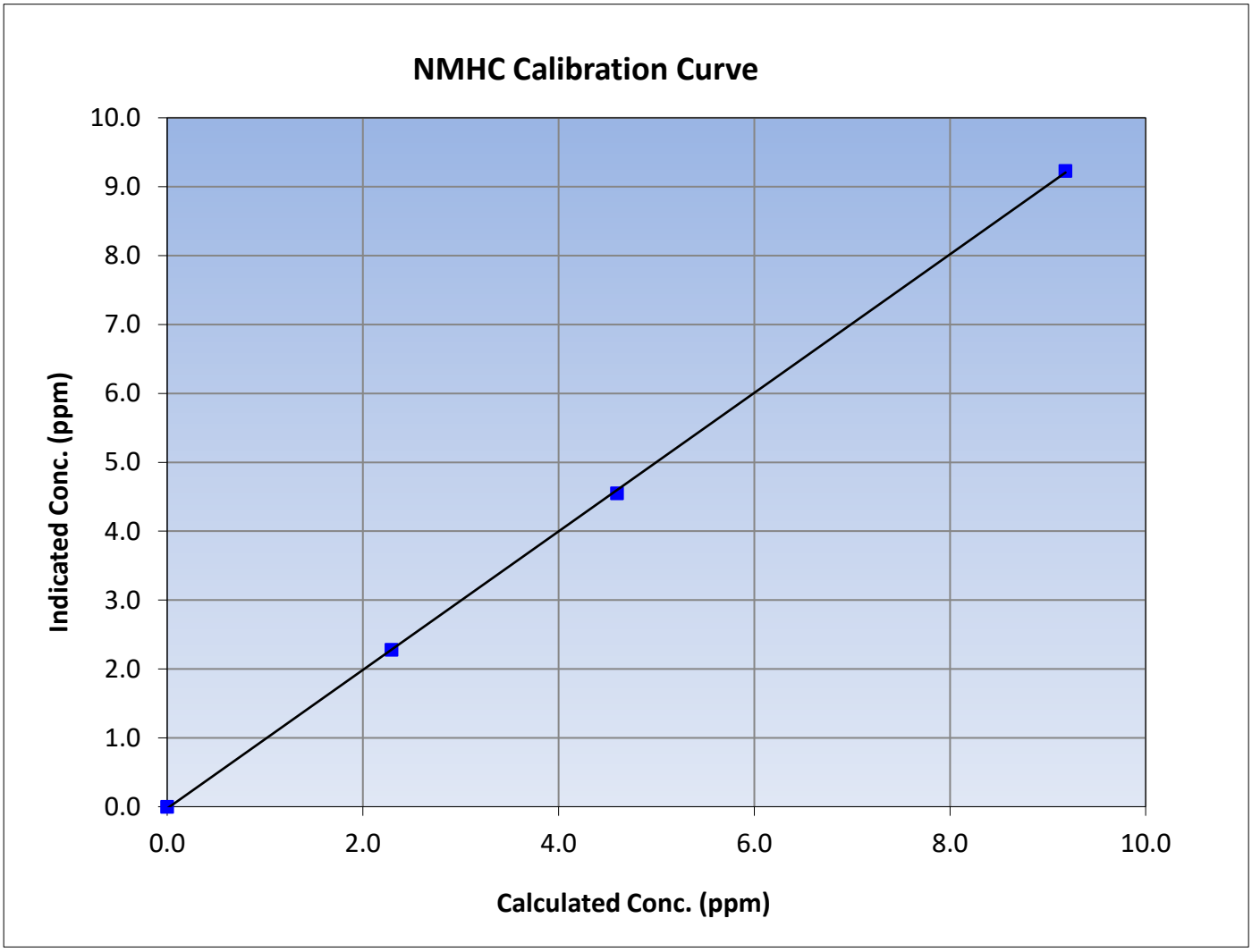
Version-06-2022

Station Information

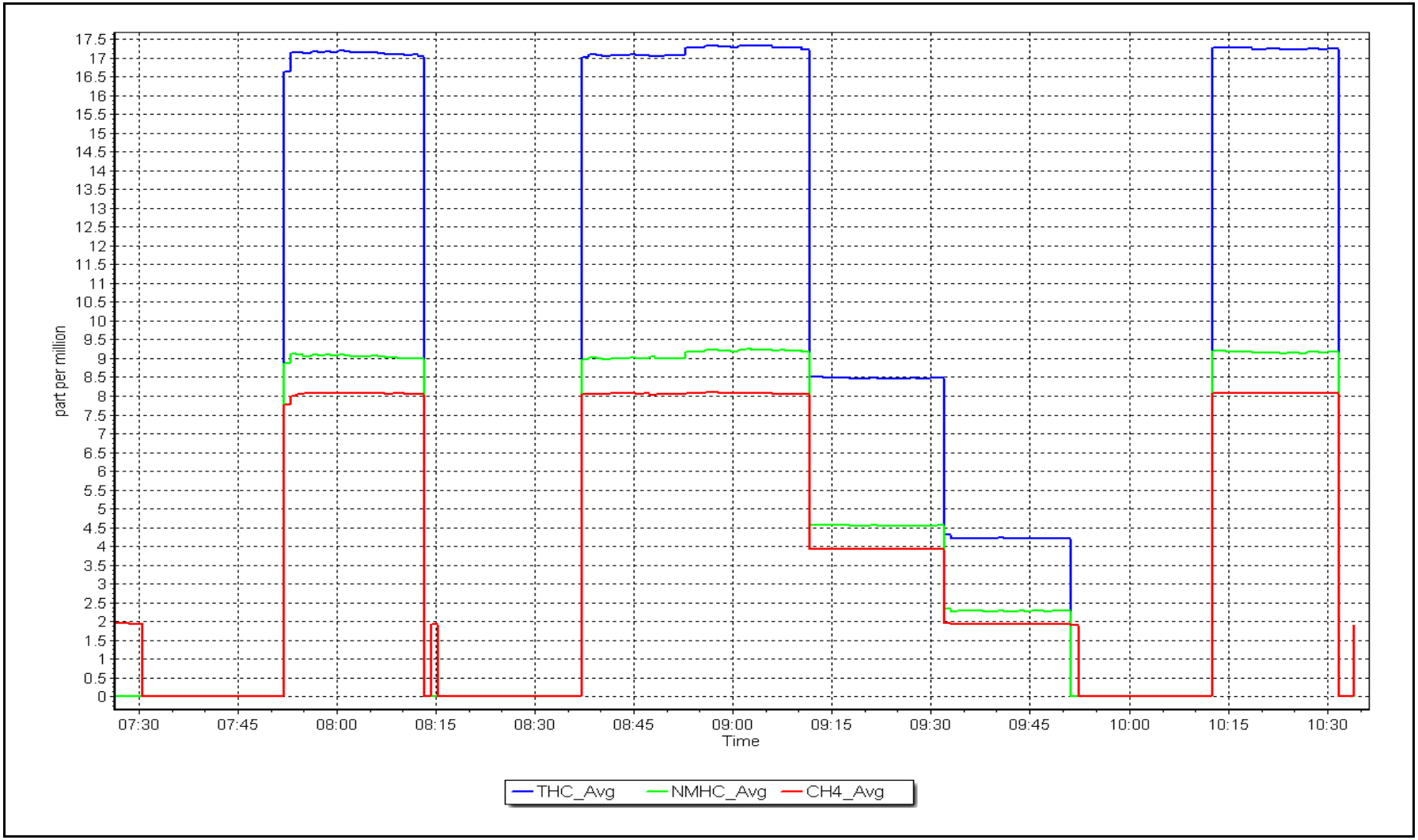
Calibration Date:	October 4, 2023	Previous Calibration:	September 12, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	7:26	End Time (MST):	10:30
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320040

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999925	≥0.995
9.18	9.23	0.9946			
4.60	4.55	1.0105	Slope	1.005501	0.90 - 1.10
2.29	2.28	1.0062			
			Intercept	-0.025121	+/-0.5



NMHC Calibration Plot Date: October 4, 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:	October 25, 2023	Last Cal Date:	October 4, 2023
Start time (MST):	10:19	End time (MST):	13:05
Reason:	As Found		

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	2.98E-04	NMHC SP Ratio:	6.57E-05	6.57E-05
CH4 Retention time:	14.6	14.6	NMHC Peak Area:	139930	139930
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	0.12	----
as found span	4918	81.3	17.27	17.15	1.007
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	17.02	1.015
				Average Correction Factor	
Baseline Corr AF:	17.02	Prev response	17.19	*% 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	4918	81.3	9.18	8.97	1.023
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	9.18	8.98	1.023
				Average Correction Factor	
Baseline Corr AF:	8.97	Prev response	9.15	*% change	-1.9%
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	0.12	----
as found span	4918	81.3	8.09	8.17	0.989
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	8.09	8.04	1.006
				Average Correction Factor	
Baseline Corr AF:	8.05	Prev response	8.04	*% change	0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

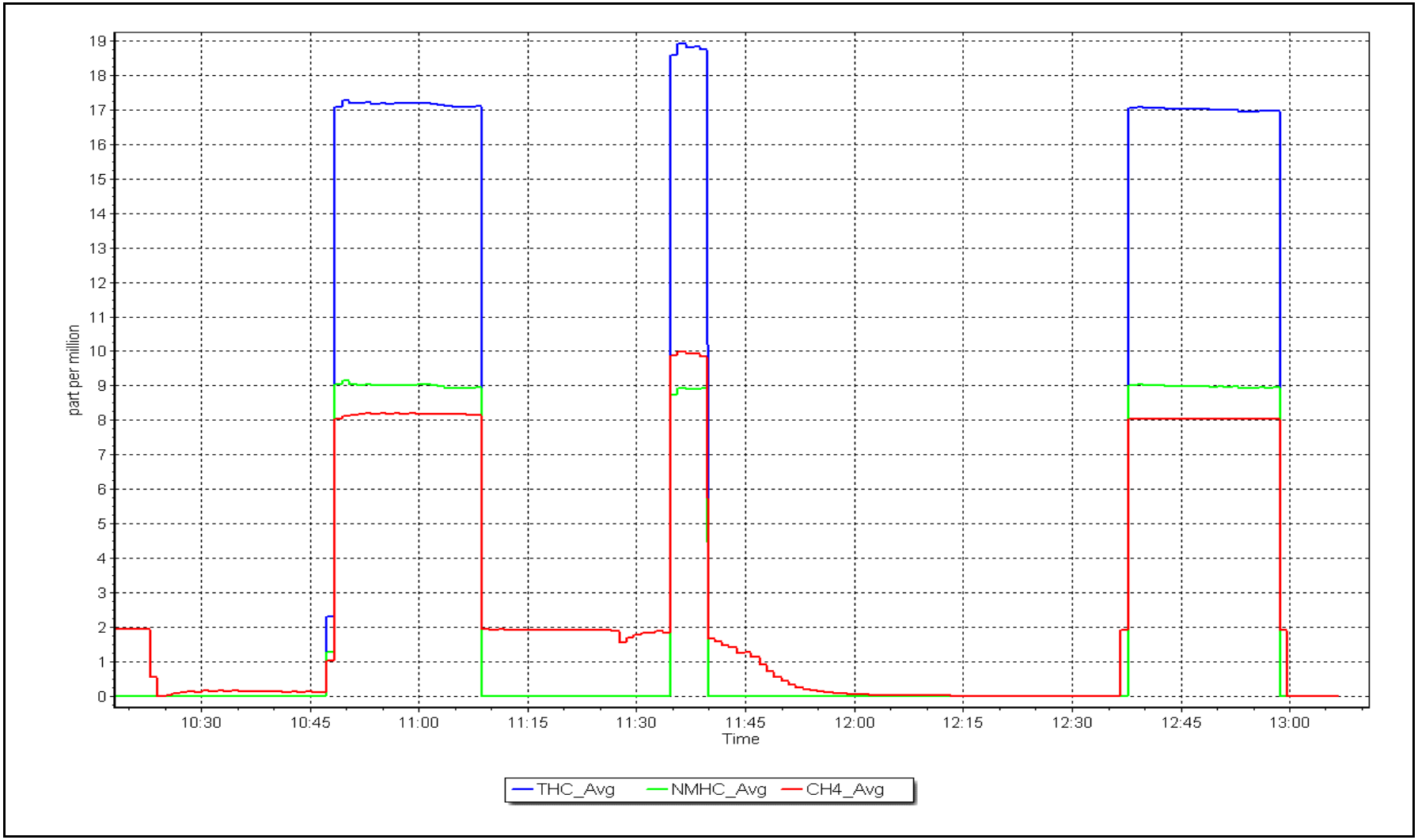
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.998565	
THC Cal Offset:	-0.056289	
CH4 Cal Slope:	1.000577	
CH4 Cal Offset:	-0.051154	
NMHC Cal Slope:	0.996780	
NMHC Cal Offset:	-0.004336	

Notes: Changed out the ZAG.

Calibration Performed By: Rene Chamberland

NMHC Calibration Plot Date: October 25, 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:	October 3, 2023	Last Cal Date:	September 6, 2023
Start time (MST):	9:21	End time (MST):	13:49
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2Y1P9L		Cal Gas Expiry Date:	December 11, 2023	
NOX Cal Gas Conc:	50.84	ppm	NO Cal Gas Conc:	50.04	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	50.84	ppm	Removed Gas NO Conc:	50.04	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	3565	
ZAG make/model:	Teledyne API T701		Serial Number:	5609	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1218153357	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.357	1.378	NO bkgnd or offset:	7.0	7.0
NOX coeff or slope:	0.991	0.991	NOX bkgnd or offset:	7.7	7.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	190.7	191.0

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999396	0.999045
NO_X Cal Offset:	-0.540000	-0.740000
NO Cal Slope:	0.999215	0.998016
NO Cal Offset:	-1.080000	-1.060000
NO_2 Cal Slope:	1.001909	1.000561
NO_2 Cal Offset:	-0.228647	1.020945

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.4	0.0	-0.4	----	----
as found span	4920	80.0	813.4	800.6	12.8	809.0	789.2	19.8	1.0055	1.0145
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.1	-0.2	----	----
high point	4920	80.0	813.4	800.6	12.8	812.2	798.6	13.6	1.0015	1.0026
second point	4960	40.0	406.7	400.3	6.4	405.4	397.8	7.7	1.0033	1.0063
third point	4980	20.0	203.4	200.2	3.2	201.7	197.6	4.1	1.0082	1.0130
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
as left span	4920	80.0	813.4	394.6	418.8	812.3	396.5	415.8	1.0014	0.9953
								Average Correction Factor	1.0043	1.0073

Corrected As found	NO_X = 809.4 ppb	NO = 789.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.4%
Previous Response	NO_X = 812.4 ppb	NO = 798.9 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)	795.4	389.4	418.8	419.3	0.9988	100.1%
2nd GPT point (200 ppb O3)	795.4	595.8	212.4	214.5	0.9902	101.0%
3rd GPT point (100 ppb O3)	795.4	697.4	110.8	112.9	0.9814	101.9%
				Average Correction Factor	0.9901	101.0%

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

NO_X Calibration Summary

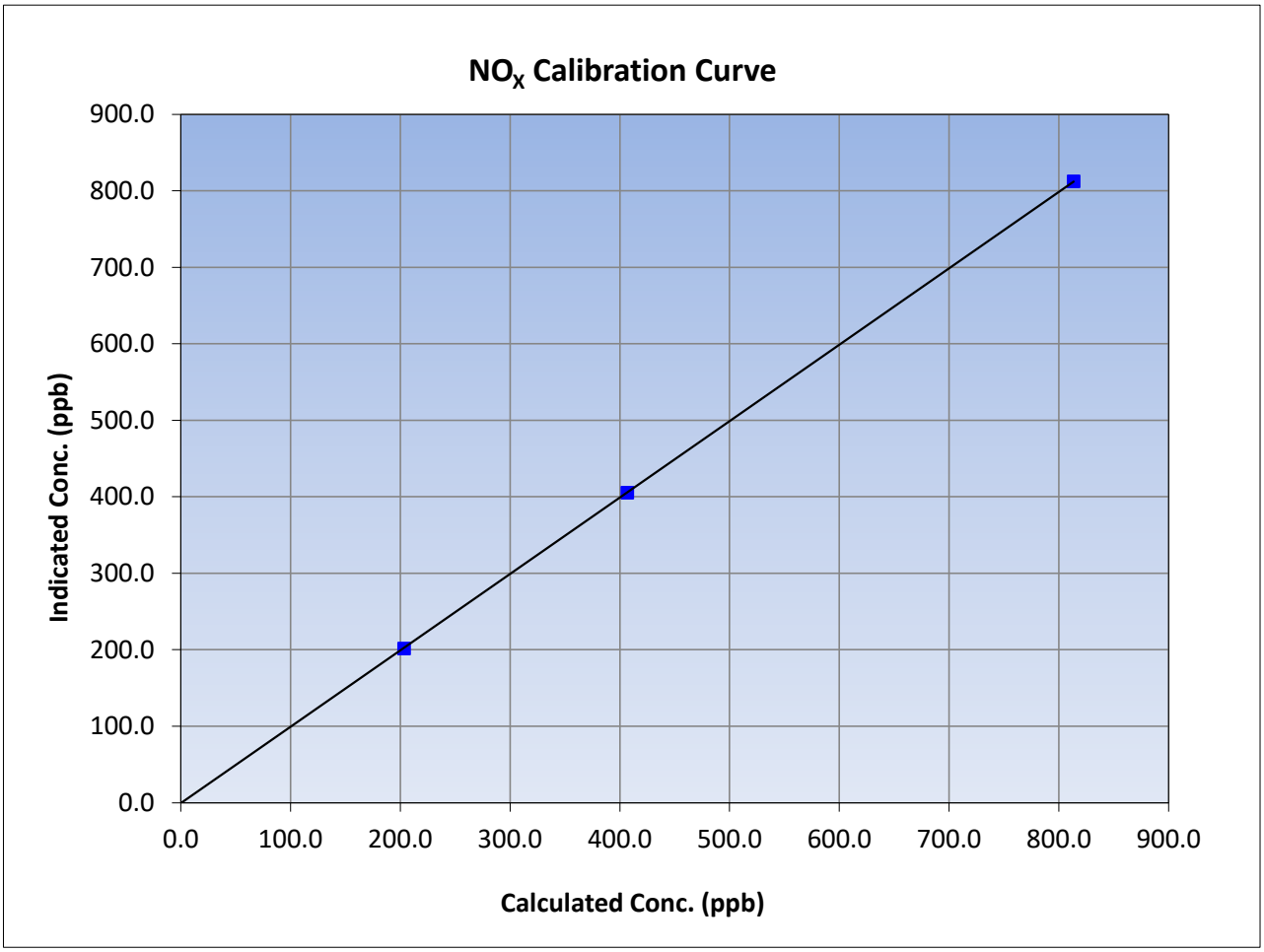
Version-04-2020

Station Information

Calibration Date:	October 3, 2023	Previous Calibration:	September 6, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:21	End Time (MST):	13:49
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	0.999997	≥0.995
813.4	812.2	1.0015			
406.7	405.4	1.0033	Slope	0.999045	0.90 - 1.10
203.4	201.7	1.0082			
			Intercept	-0.740000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

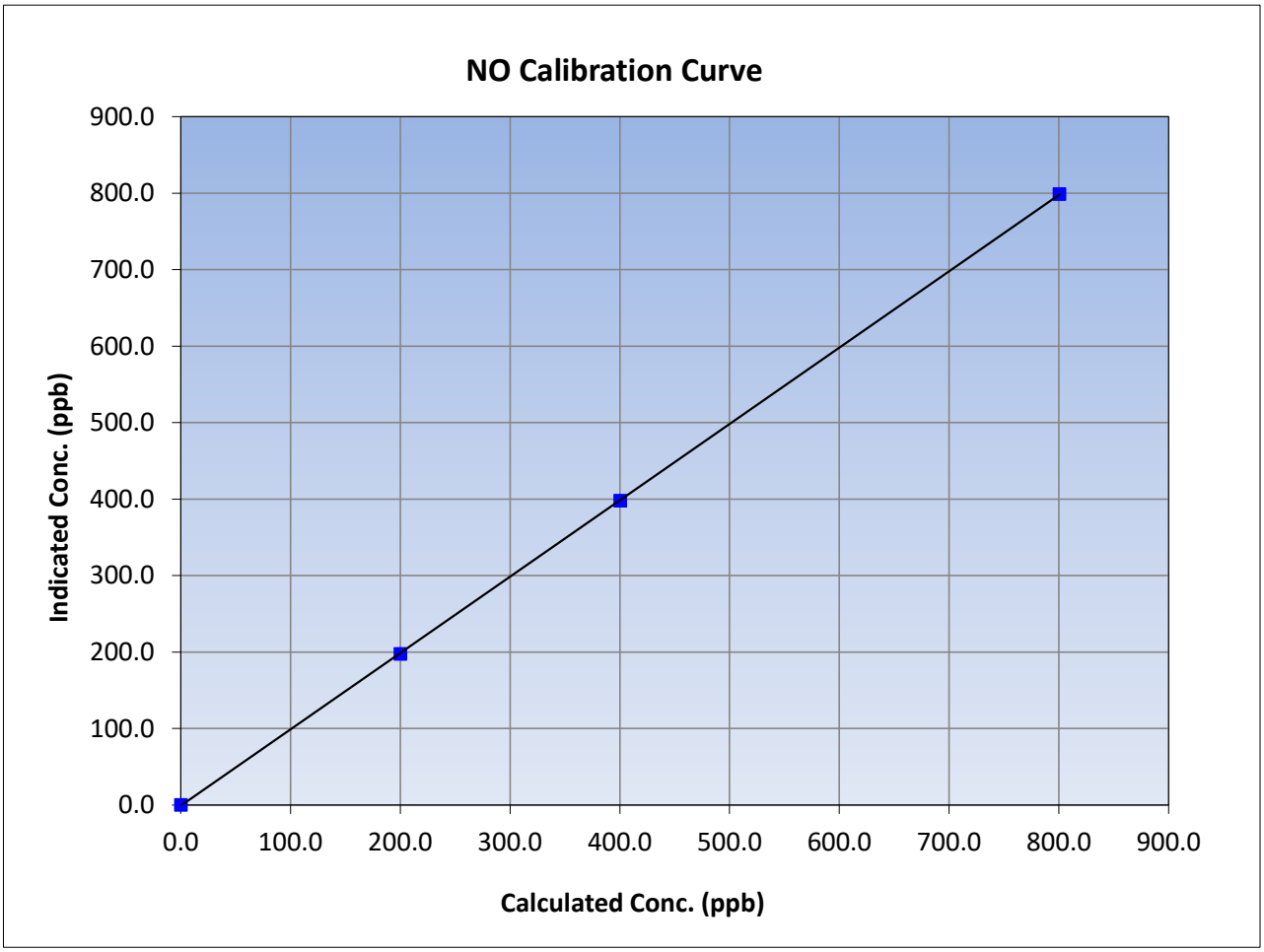
Version-04-2020

Station Information

Calibration Date:	October 3, 2023	Previous Calibration:	September 6, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:21	End Time (MST):	13:49
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999990	≥0.995
800.6	798.6	1.0026			
400.3	397.8	1.0063	Slope	0.998016	0.90 - 1.10
200.2	197.6	1.0130			
			Intercept	-1.060000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

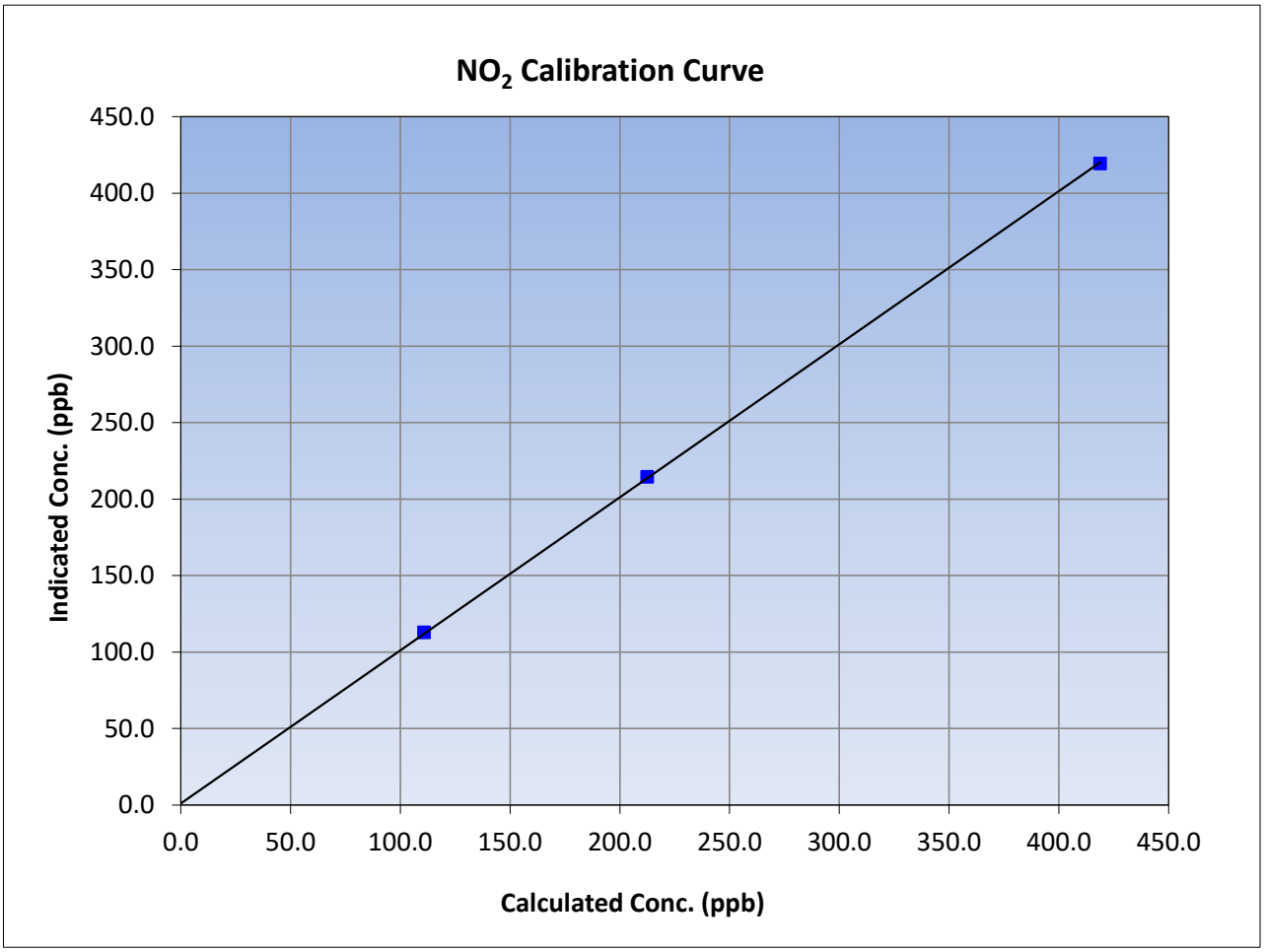
Version-04-2020

Station Information

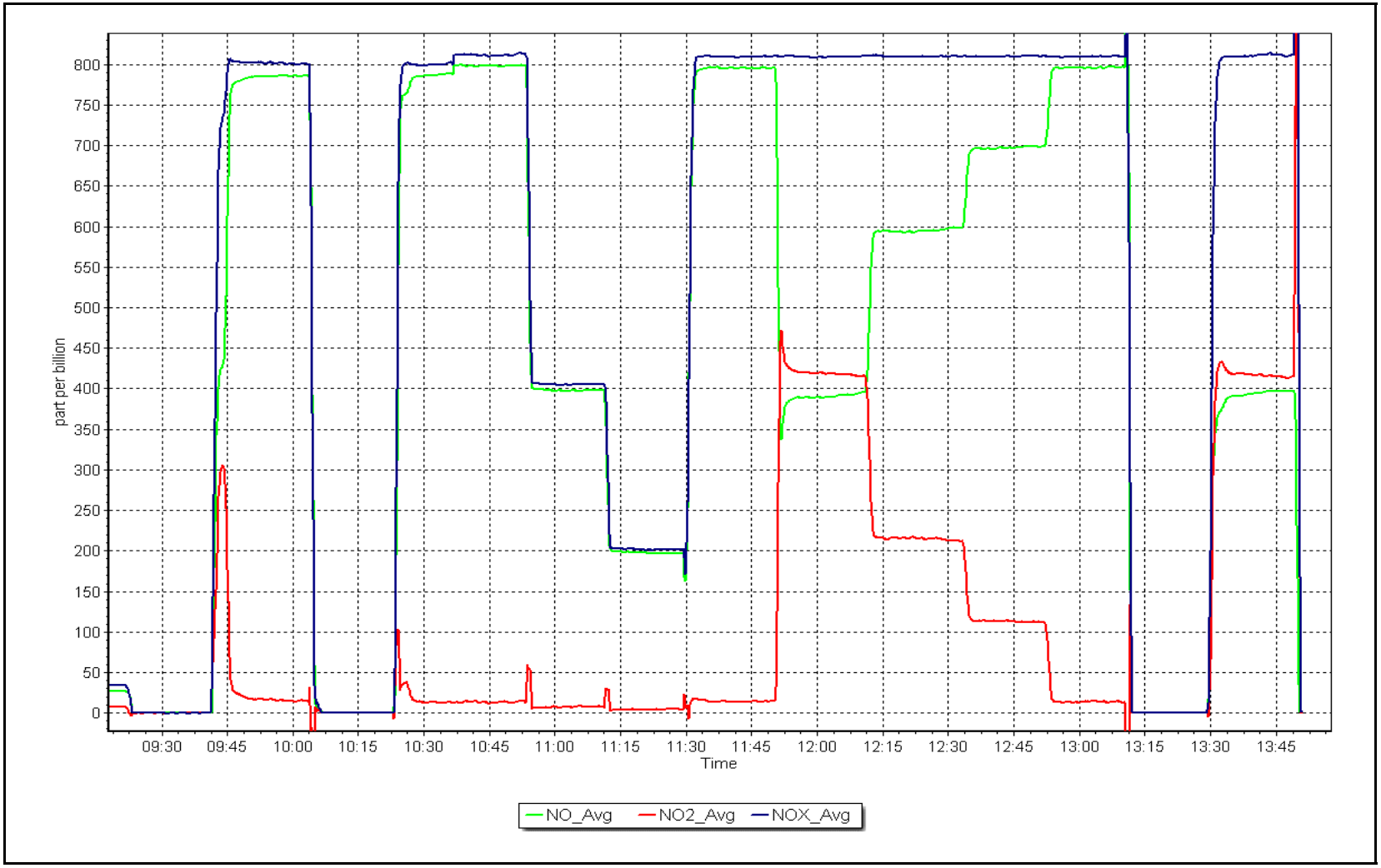
Calibration Date:	October 3, 2023	Previous Calibration:	September 6, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:21	End Time (MST):	13:49
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999958	≥0.995
418.8	419.3	0.9988			
212.4	214.5	0.9902	Slope	1.000561	0.90 - 1.10
110.8	112.9	0.9814			
			Intercept	1.020945	+/-20



NO_X Calibration Plot Date: October 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:	October 2, 2023	Last Cal Date:	September 1, 2023
Start time (MST):	9:35	End time (MST):	12:29
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999943	1.003114	Backgd or Offset:	3.2	3.2
Calibration intercept:	0.060000	0.080000	Coeff or Slope:	1.010	1.010

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.1	----
as found span	5000	863.1	400.0	400.8	0.998
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	863.1	400.0	401.4	0.997
second point	5000	742.5	200.0	200.6	0.997
third point	5000	651.7	100.0	100.3	0.997
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	863.1	400.0	404.7	0.988
				Average Correction Factor	0.997

Baseline Corr As found:	400.9	Previous response	400.0	*% change	0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

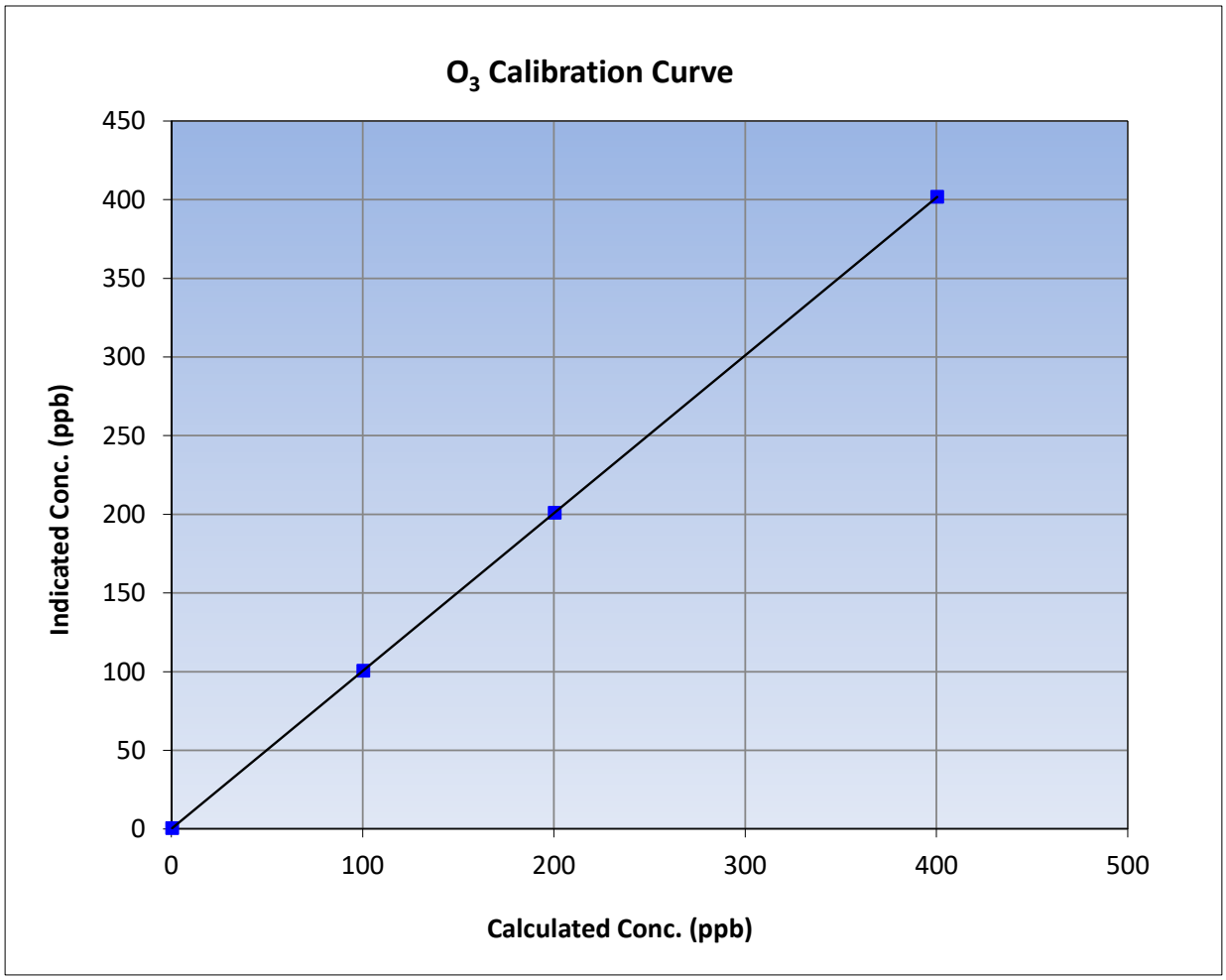
Station Information

Calibration Date:	October 2, 2023	Previous Calibration:	September 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:35	End Time (MST):	12:29
Analyzer make:	Teledyne API T400	Analyzer serial #:	1107

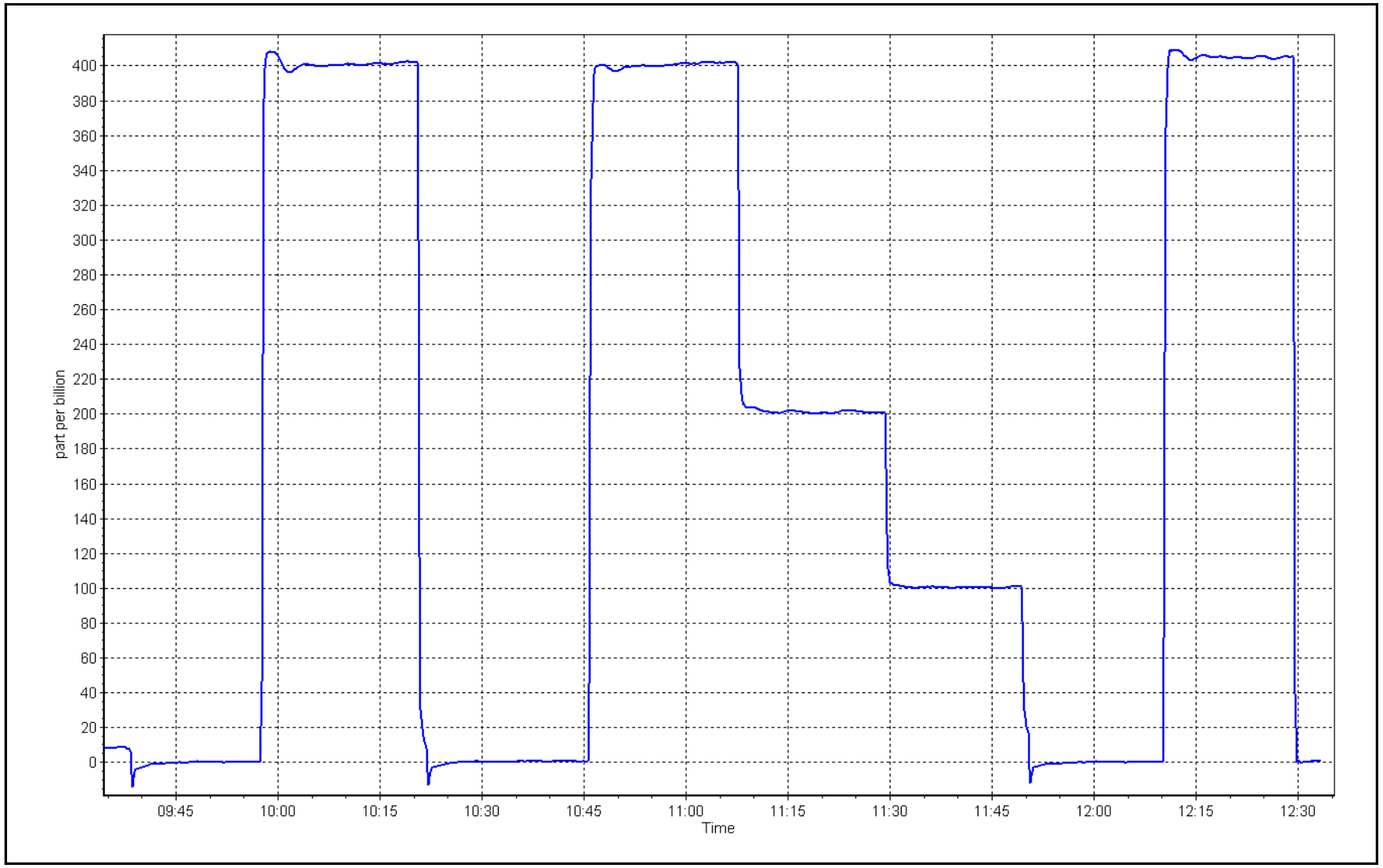
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
400.0	401.4	0.9965
200.0	200.6	0.9970
100.0	100.3	0.9970

Statistical Evaluation		*Limits*
Correlation Coefficient	1.000000	*≥0.995*
Slope	1.003114	*0.90 - 1.10*
Intercept	0.080000	*+/- 5*



O_3 Calibration Plot Date: October 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:	October 19, 2023	Last Cal Date:	September 14, 2023
Start time (MST):	12:56	End time (MST):	15:27
Analyzer Make:	Teledyne API T640	S/N:	324
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	1450
Temp/RH standard:	Delta Cal	S/N:	1450

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	17.6	17.1	17.6	☐	+/- 2 °C
P (mmHg)	725.4	724	725.4	☐	+/- 10 mmHg
flow (LPM)	5.03	5.09	5.03	☐	+/- 0.25 LPM

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

PM w/o HEPA: 1.7 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	11.0	11.2	11.2	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 1.9 w/ HEPA: 0 <0.2 ug/m3

Date Optical Chamber Cleaned: October 19, 2023

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 checks passed. Displosable filter changed. PMT peak test verified. Optical chamber and RH/T sensor cleaned.

Calibration by: Rene Chamberland

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	October 23, 2023	Last Cal Date:	September 14, 2023
Start time (MST):	10:27	End time (MST):	13:11
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range: 0 - 50 ppm

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.000977	1.000806	Backgd or Offset:	-0.012	-0.012
Calibration intercept:	0.127800	0.185827	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	0.0	----
as found span	4933	66.7	40.6	40.6	0.998
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	10.4	0.979
as left zero	5000	0.0	0.0	0.0	----
as left span	2960	40.0	40.5	40.2	1.008
				Average Correction Factor	0.985

Baseline Corr As found:	40.59	Prev response:	40.72	*% change:	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

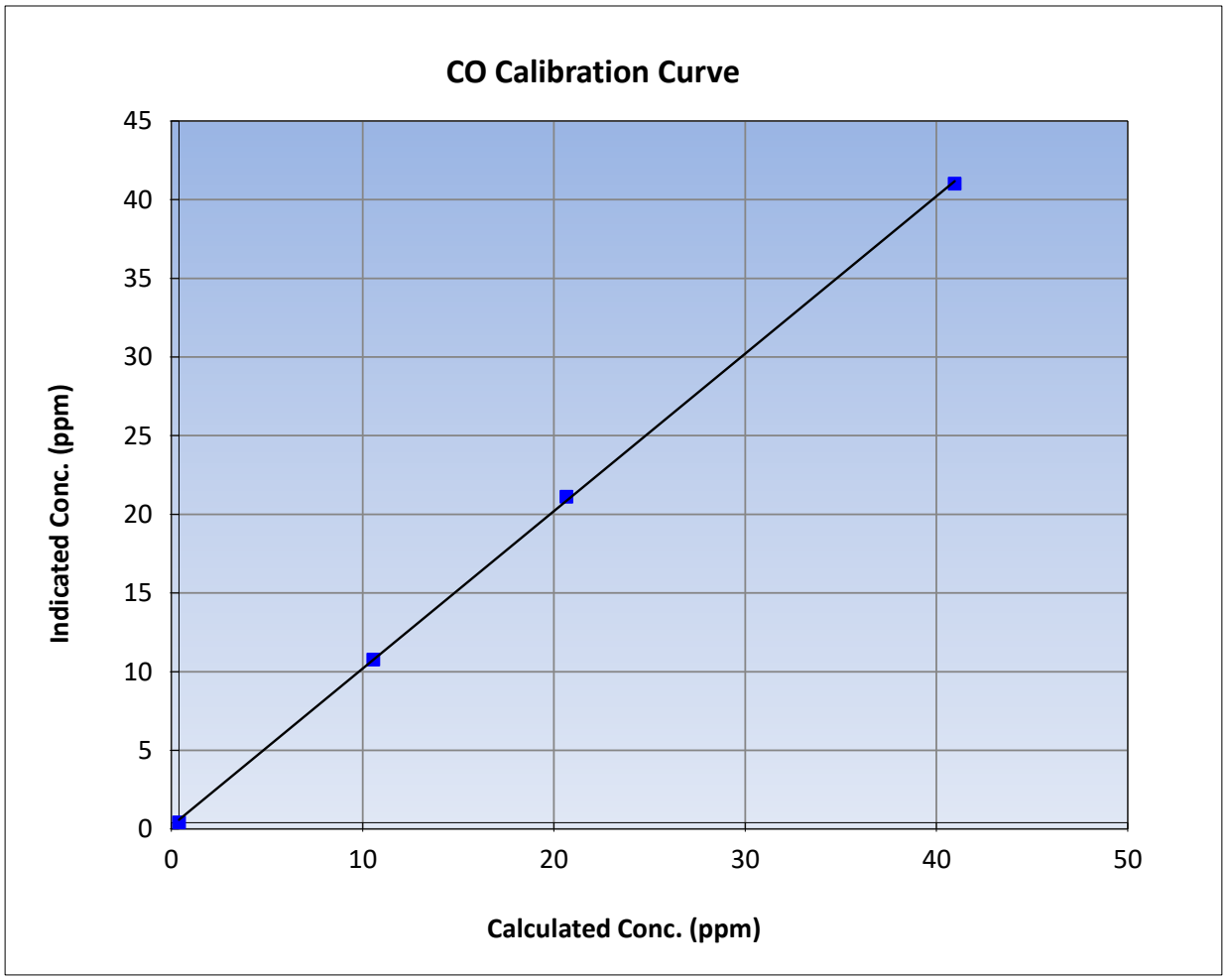
Station Information

Calibration Date:	October 23, 2023	Previous Calibration:	September 14, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:27	End Time (MST):	13:11
Analyzer make:	Teledyne API T300	Analyzer serial #:	3520

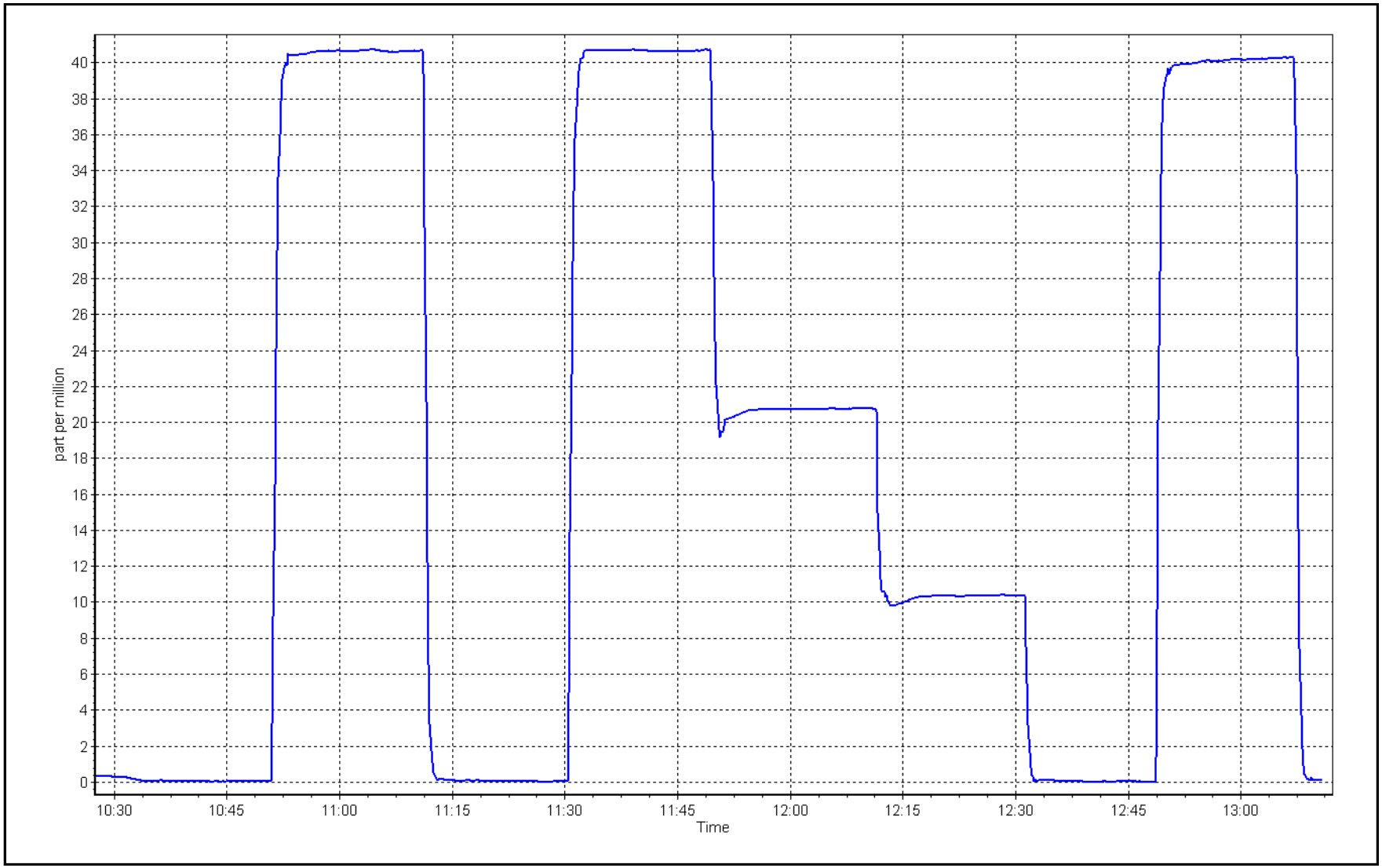
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.6	40.6	0.9982
20.2	20.7	0.9768
10.2	10.4	0.9792

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999863	*≥0.995*
Slope	1.000806	*0.90 - 1.10*
Intercept	0.185827	*+/-1.5*



CO Calibration Plot Date: October 23, 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:	October 13, 2023	Last Cal Date:	September 5, 2023
Start time (MST):	9:45	End time (MST):	12:54
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:	1.001868	1.001376	Backgd or Offset:	0.045	0.045
Calibration intercept:	-5.320000	-5.300000	Coeff or Slope:	0.875	0.876

CO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	3000	0.0	0.0	-0.2	----
as found span	2920	80.0	1605.3	1596.1	1.006
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	0.2	----
high point	2920	80.0	1605.3	1604.9	1.000
second point	2960	40.0	802.7	796.0	1.008
third point	2980	20.0	401.3	390.9	1.027
as left zero	3000	0.0	0.0	0.2	----
as left span	2960	40.0	802.7	784.2	1.024
				Average Correction Factor	1.012

Baseline Corr As found:	1596.30	Prev response:	1603.01	*% 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 span only.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

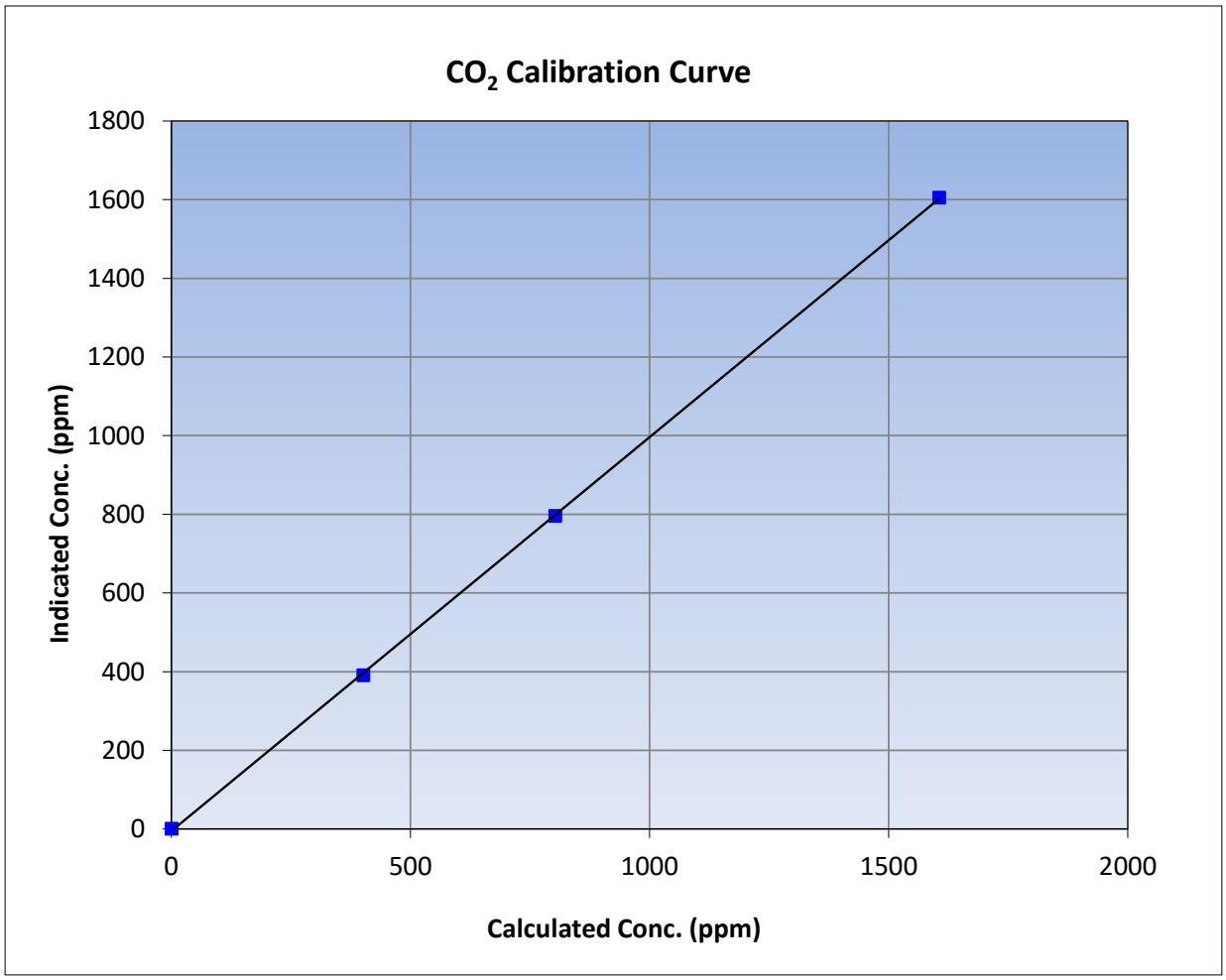
Station Information

Calibration Date	October 13, 2023	Previous Calibration	September 5, 2023
Station Name	Bertha Ganter-Fort McKay	Station Number	AMS01
Start Time (MST)	9:45	End Time (MST)	12:54
Analyzer make	Teledyne API 360	Analyzer serial #	442

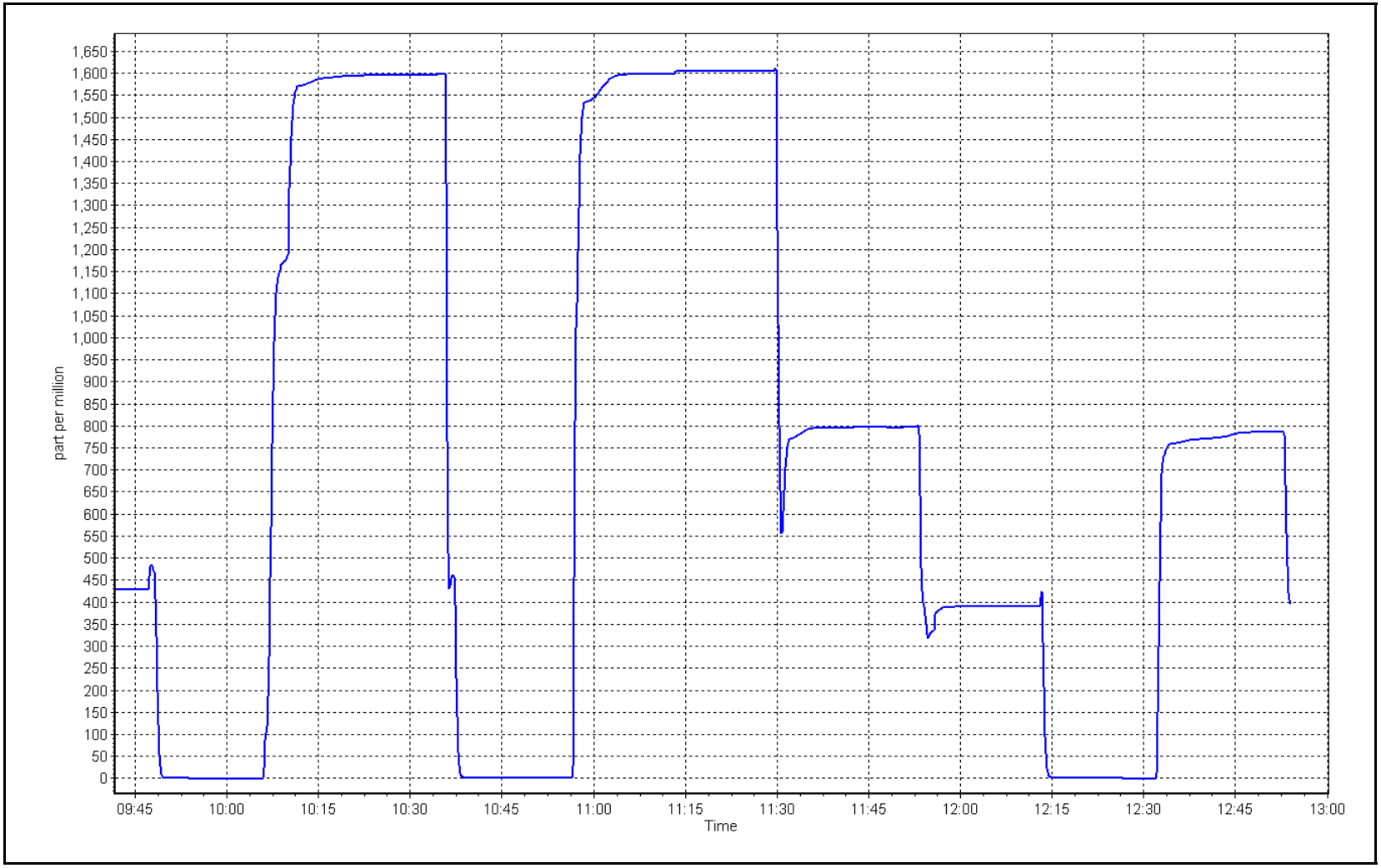
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
1605.3	1604.9	1.0003
802.7	796.0	1.0084
401.3	390.9	1.0267

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999946	*≥0.995*
Slope	1.001376	*0.90 - 1.10*
Intercept	-5.300000	*+/-10*



CO_2 Calibration Plot Date: October 13, 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:	October 18, 2023	Last Cal Date:	September 7, 2023
Start time (MST):	9:39	End time (MST):	15:05
NH3 Cal Date:	October 19, 2023	Last Cal Date:	September 8, 2023
Start time (MST):	10:04	End time (MST):	15:50
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:	74.90	ppm	Removed Cylinder #:	CC744566
NH3 gas Diff:	-3.5%		Removed cyl Expiry:	December 21, 2023
Calibrator Model:	Teledyne API T700		Serial Number:	3565
ZAG make/model:	Teledyne API T701		Serial Number:	5609

Analyzer Information

Analyzer model:	Teledyne API T201	Analyzer serial #:	475
Converter model:	Teledyne API T501	Converter serial #:	824
NH3 Range (ppb):	0 - 2000 ppb	Reaction cell Press:	5.10
NOX Range (ppb):	0 - 1000 ppb	Sample Flow:	506

	Start	*Finish*		*Start*	*Finish*
NO coefficient:	0.996	0.991	TN coefficient:	1.001	0.996
NOX coefficient:	0.999	0.993	NO bkgrnd:	-0.9	-0.9
NO2 coefficient:	1.000	1.000	NOX bkgrnd:	-0.3	-0.3
NH3 coefficient:	0.995	0.943	TN bkgrnd:	1.2	1.2

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	0.999916	1.000492
NO_X Cal Offset:	-2.000000	-1.780000
NO Cal Slope:	0.999929	1.000500
NO Cal Offset:	-2.380000	-1.880000
NO_2 Cal Slope:	0.997369	1.000741
NO_2 Cal Offset:	0.086604	-0.538093
NH3 Cal Slope:	1.003196	0.995734
NH3 Cal Offset:	-1.081485	1.216520
TN Cal Slope:	1.005635	0.998191
TN Cal Offset:	-0.793819	1.291202

Wood Buffalo Environmental Association

TN - NOX - NH_3 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated TN concentration (ppb) (Cc)	Calculated NOX concentration (ppb) (Cc)	Calculated NH3 concentration (ppb) (Cc)	Indicated TN concentration (ppb) (Ic)	Indicated NOX concentration (ppb) (Ic)	Indicated NH3 concentration (ppb) (Ic)	TN Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NH3 Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.3	-0.1	----	----
as found NO	4920	80.0	813.4	813.4	----	812.5	811.9	0.5	1.001	----
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1	----	----
high NO point	4920	80.0	813.4	813.4	----	814.0	813.0	1.3	0.999	----
NO/O3 point	4920	80.0	813.4	813.4	----	811.5	809.7	1.8	1.002	----
as found NH3	3416	84.1	1799.7	----	1799.7	1775.2	----	1770.2	1.014	1.017
new NH3 cyl rp	3418	82.2	1798.5	----	1798.5	1715.2	----	1710.4	1.049	1.052
first NH3	3418	82.2	1798.5	----	1798.5	1795.3	----	1790.9	1.002	1.004
second NH3	3454	45.7	1000.0	----	1000.0	1001.3	----	998.7	0.999	1.001
third NH3	3477	22.8	498.9	----	498.9	500.2	----	498.7	0.997	1.000
								Average Correction Factor	1.0009	1.0020

Corrected As found TN = 812.8 ppb NO_X = 812.2 ppb NH3 = 1770.3 ppb

Previous Response TN = 817.2 ppb NO_X = 811.4 ppb NH3 = 1804.4 ppb

*Percent Change TN = -0.5%

*Percent Change NO_X = 0.1%

*Percent Change NH3 = -1.9%

* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 99.5%

NH3 Current Converter Efficiency = 94.3%

Wood Buffalo Environmental Association

NO_X - NO - NO_2 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.3	-0.3	----	----
as found span	4920	80.0	813.4	800.6	813.4	819.3	803.1	821.9	0.9928	0.9969
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.1	-0.2	----	----
high point	4920	80.0	813.4	800.6	813.4	813.0	800.0	814.0	1.0005	1.0008
second point	4960	40.0	406.7	400.3	406.7	404.0	398.1	406.3	1.0067	1.0056
third point	4980	20.0	203.4	200.2	203.4	200.2	196.1	200.8	1.0158	1.0207
								Average Correction Factor	1.0077	1.0090

Baseline Corr As fnd	TN =	822.2 ppb	NO_X =	819.6 ppb	NO =	803.4 ppb	*Percent Change	TN = 0.6%
Previous Response	TN =	817.2 ppb	NO_X =	811.4 ppb	NO =	798.2 ppb	*Percent Change	NO_X = 1.0%
							*Percent Change	NO = 0.6%

* = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found zero	----	----	0.0	0.0	----	----
calibration zero	----	----	0.0	-0.2	----	----
1st GPT point (400 ppb O3)	796.2	395.1	413.9	413.4	1.0012	99.9%
2nd GPT point (200 ppb O3)	796.2	592.7	216.3	217.1	0.9963	100.4%
3rd GPT point (100 ppb O3)	796.2	693.9	115.1	113.4	1.0150	98.5%
				Average Correction Factor	1.0042	99.6%

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TN Calibration Summary

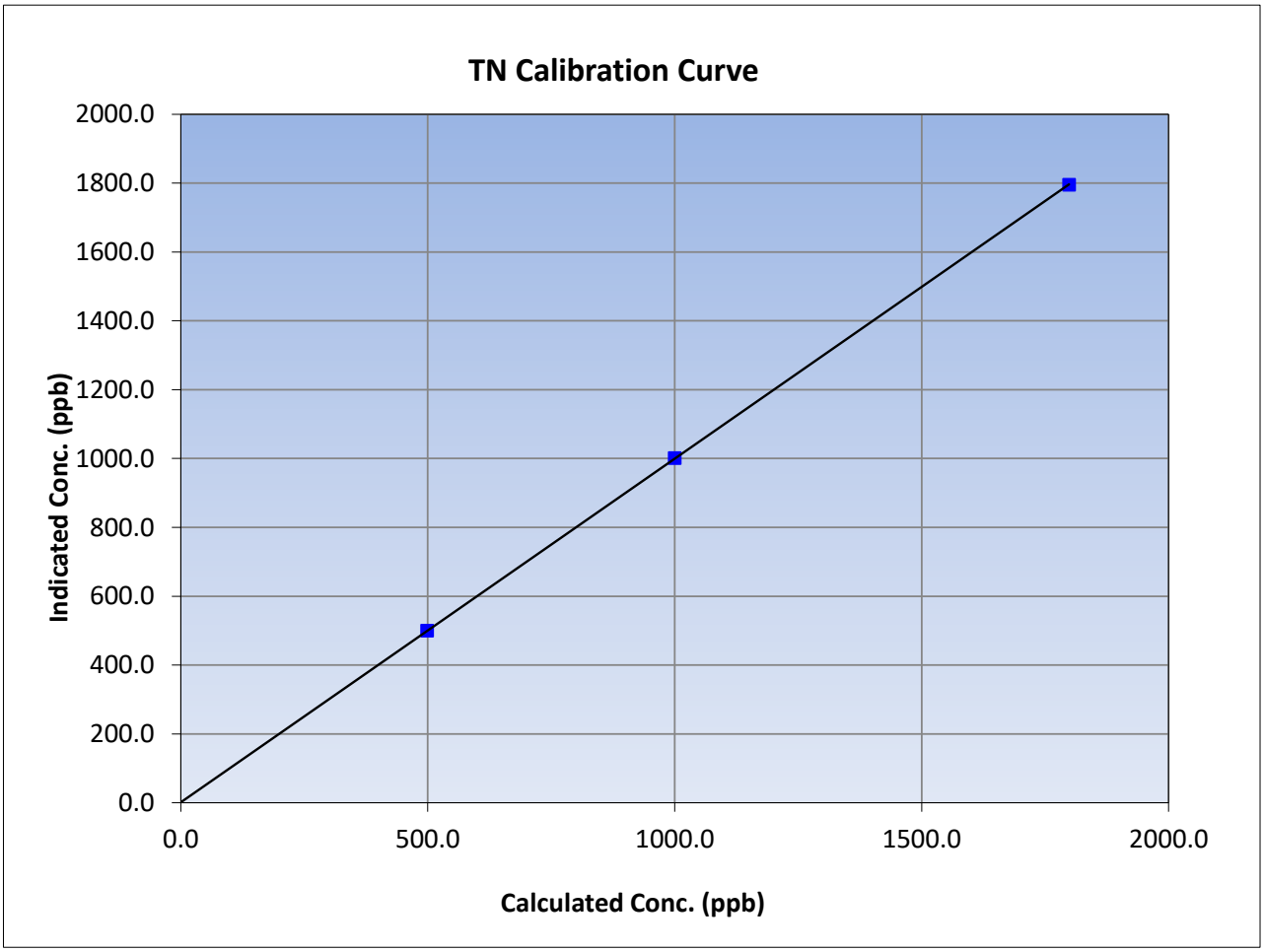
Version-05-2023

Station Information

Calibration Date:	October 19, 2023	Previous Calibration:	September 7, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:39	End Time (MST):	15:05
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	0.999995	≥0.995
1798.5	1795.3	1.0018			
1000.0	1001.3	0.9987	Slope	0.998191	0.90 - 1.10
498.9	500.2	0.9973			
			Intercept	1.291202	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

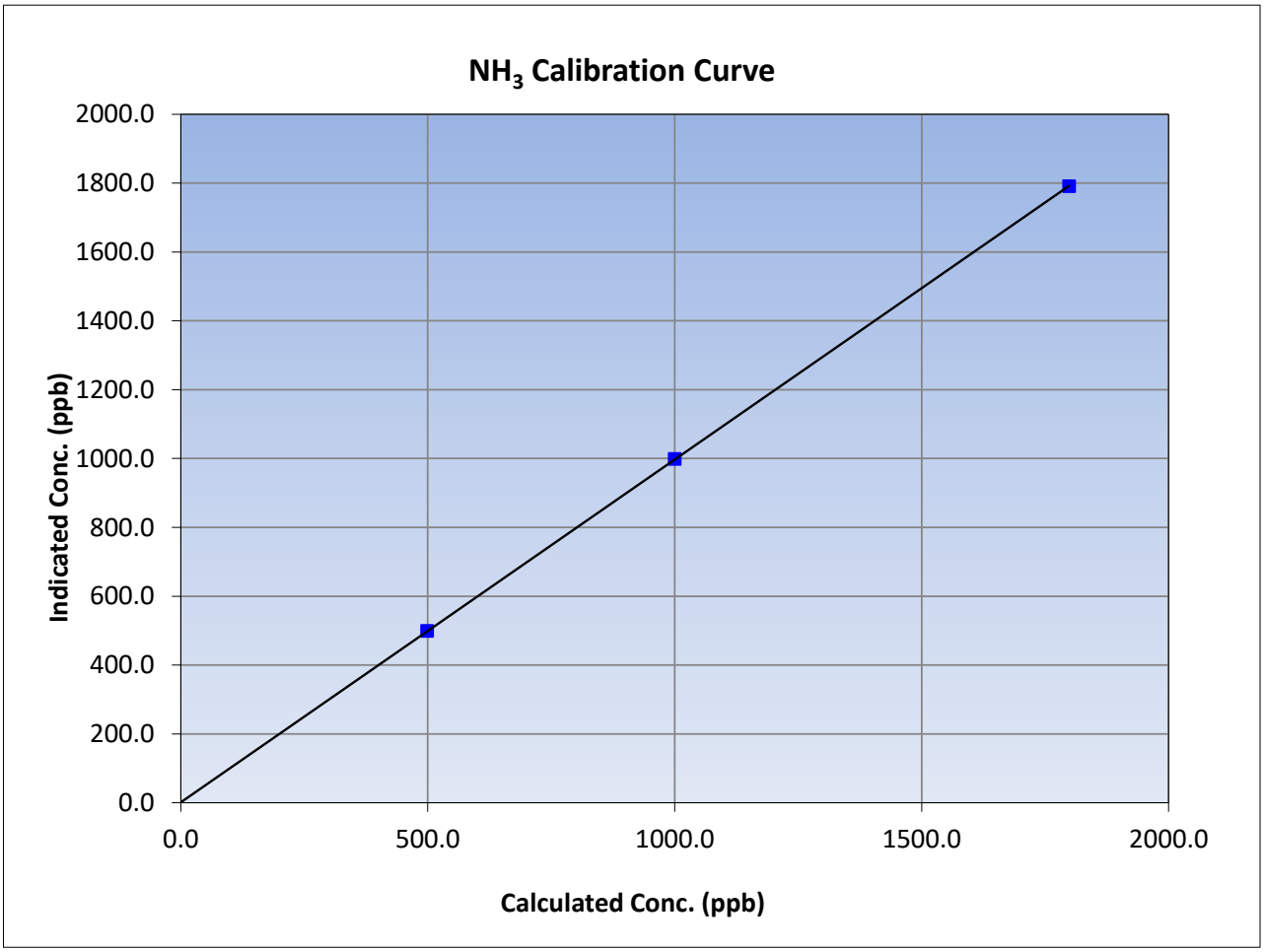
Version-05-2023

Station Information

Calibration Date:	October 19, 2023	Previous Calibration:	September 7, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:39	End Time (MST):	15:05
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	0.999996	≥0.995
1798.5	1790.9	1.0043			
1000.0	998.7	1.0013	Slope	0.995734	0.90 - 1.10
498.9	498.7	1.0003			
			Intercept	1.216520	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

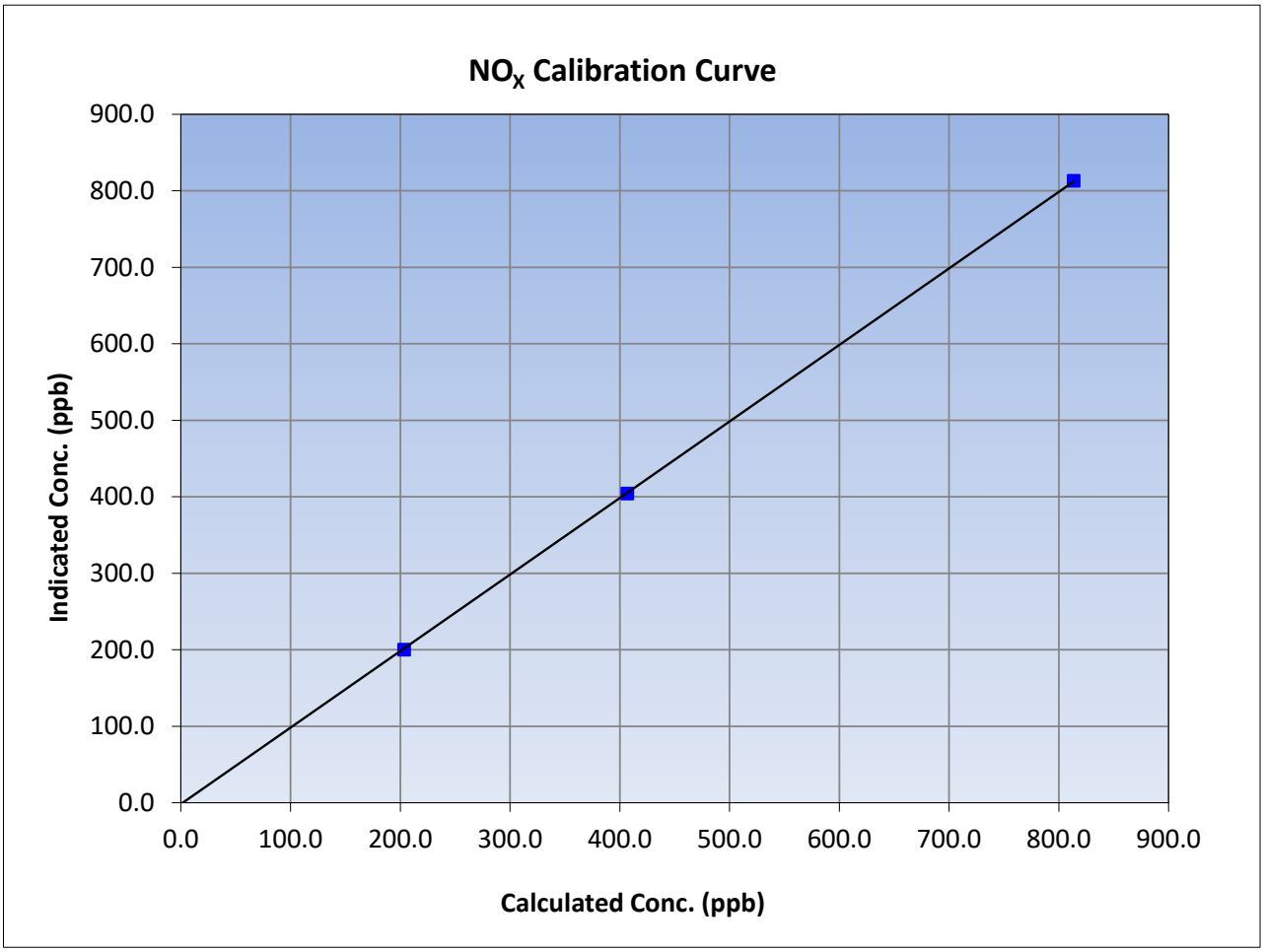
Version-05-2023

Station Information

Calibration Date:	October 18, 2023	Previous Calibration:	September 7, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:39	End Time (MST):	15:05
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	0.999980	≥0.995
813.4	813.0	1.0005			
406.7	404.0	1.0067	Slope	1.000492	0.90 - 1.10
203.4	200.2	1.0158			
			Intercept	-1.780000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

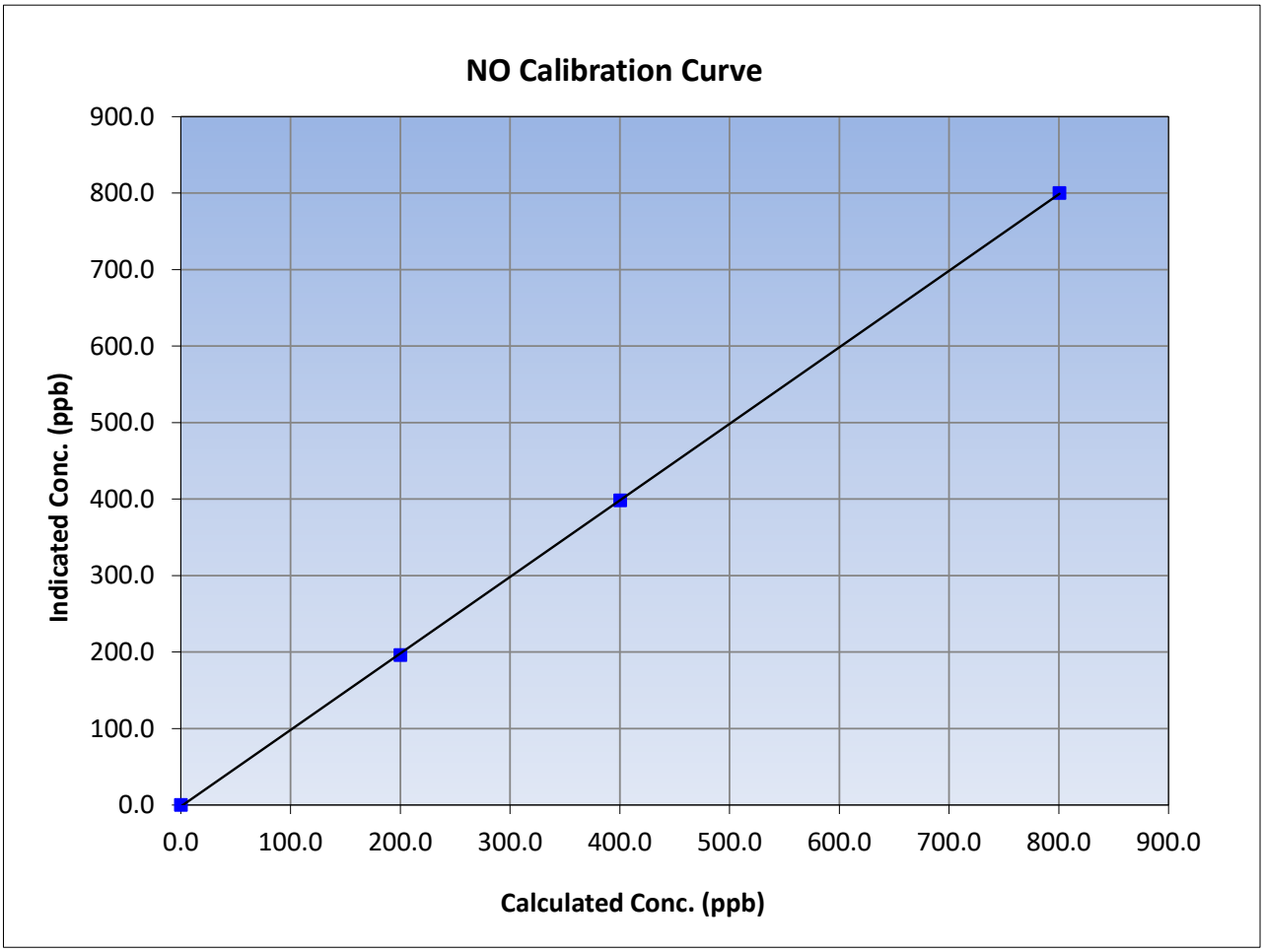
Version-05-2023

Station Information

Calibration Date:	October 18, 2023	Previous Calibration:	September 7, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:39	End Time (MST):	15:05
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	0.999971	≥0.995
800.6	800.0	1.0008			
400.3	398.1	1.0056	Slope	1.000500	0.90 - 1.10
200.2	196.1	1.0207			
			Intercept	-1.880000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

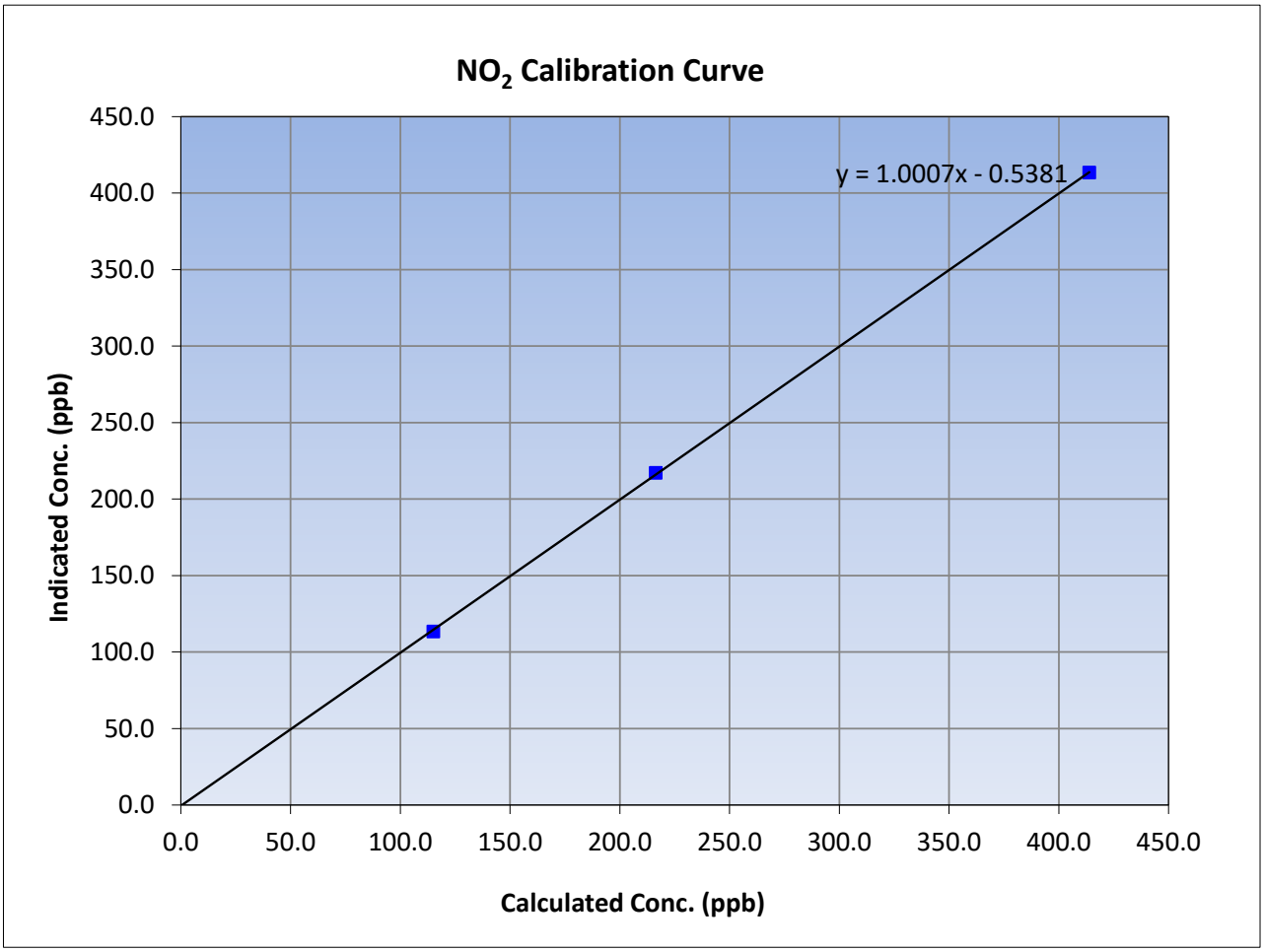
Version-05-2023

Station Information

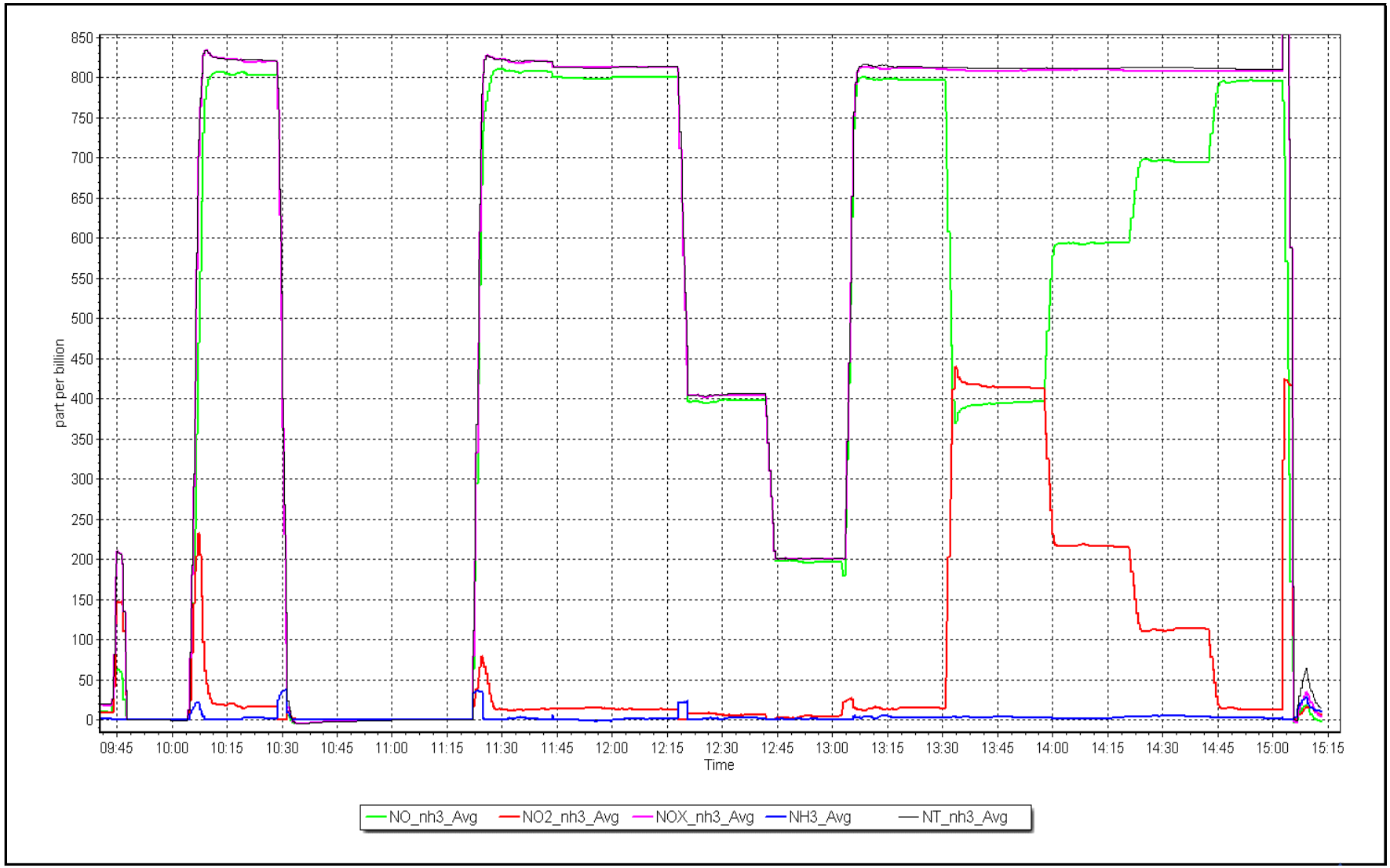
Calibration Date:	October 18, 2023	Previous Calibration:	September 7, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:39	End Time (MST):	15:05
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

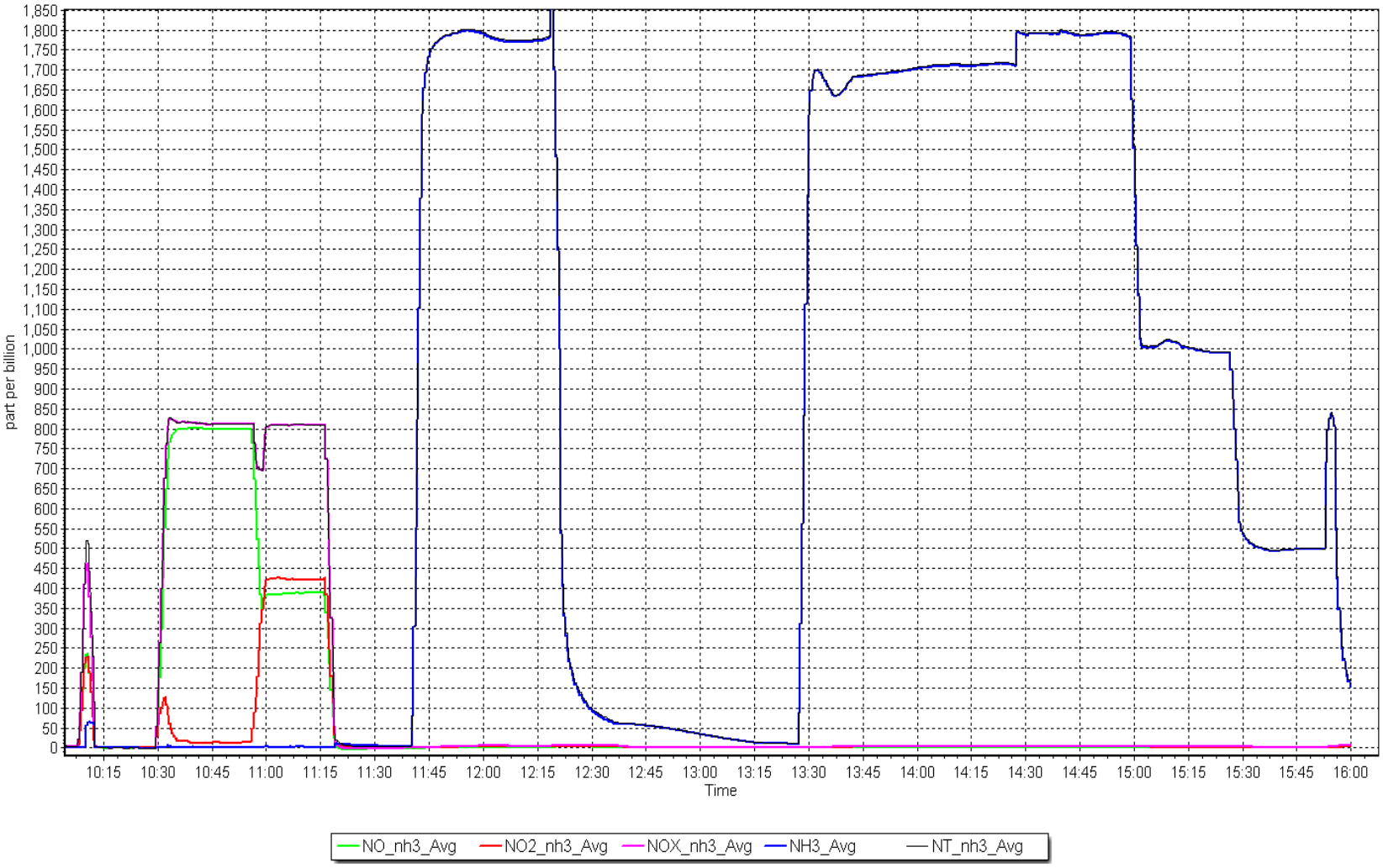
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999966	≥0.995
413.9	413.4	1.0012			
216.3	217.1	0.9963	Slope	1.000741	0.90 - 1.10
115.1	113.4	1.0150			
			Intercept	-0.538093	+/-20



NO_X Calibration Plot Date: October 18, 2023 Location: Bertha Ganter-Fort McKay



NH_3 Calibration Plot Date: October 19, 2023 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

PLUVIO CALIBRATION

Version-07-2017

Station Information

Station Name:	**Fort McKay - Bertha Ganter**	Station number:	**AMS 01**
Calibration Date:	October 13, 2023	Last Cal Date:	April 21, 2023
Start time (MST):	12:05	End time (MST):	13:15
Make/Model#:	OTT Pluvio 2	Pluvio Serial #:	363525

Annual Weight Test

Date of Check:	**October 13, 2023**	Previous Check Date:	**April 21, 2023**
Weights Serial #:	59781	Passed/Failed:	Pass

Spring Drip Test

Date of Check:	April 21, 2023	Previous Check Date:	October 5, 2022
Start Time:	14:00	Stop Time:	14:30
Nozzle Size Used:	100		
Amount of Water Used:	1 L	Data Logger Total:	24.47 mm
Converted Amount of Water used:	25 mm		

Rainfall (mm) = 1 L / 0.04 m2 = 25 mm is what we should be reading.

Fall Drip Test

Date of Check:	October 13, 2023	Previous Check Date:	April 21, 2023
Start Time:	12:45	Stop Time:	13:15
Nozzle Size Used:	100		
Amount of Water Used:	1 L	Data Logger Total:	24 mm
Converted Amount of Water used:	25 mm		

Rainfall (mm) = 1 L / 0.04 m2 = 25 mm is what we should be reading.

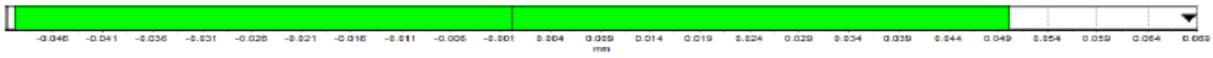
Notes:

Performed By: Tyler Tracksell

OTT Pluvio2 - Guided accuracy test

See test details below:

Date:	2023-10-13 13:11:13
OTT Pluvio2 type:	OTT Pluvio2
Bucket type:	400 cm²
Serial number / HW Index:	363525 /f3
Firmware version:	V1.40.1
Intensity units:	mm/min
Measured total weight:	5338.08 gram (133.45 mm;5.254 inch)
Information of applied weight:	1000.00 gram (25.00 mm;0.984 inch)
Measured test weight:	1002.72 gram (25.07 mm;0.987 inch)
Permitted deviation:	+-2.00 gram (+-0.05 mm;+-0.002 inch)
Deviation:	2.72 gram (0.07 mm;0.003 inch)
base weight	4335.36 gram (108.38 mm;4.267 inch)
Test passed:	Yes



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS02
MILDRED LAKE
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

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

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

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

SO_2 Calibration Data

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

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

* = > +/-5% change initiates investigation

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

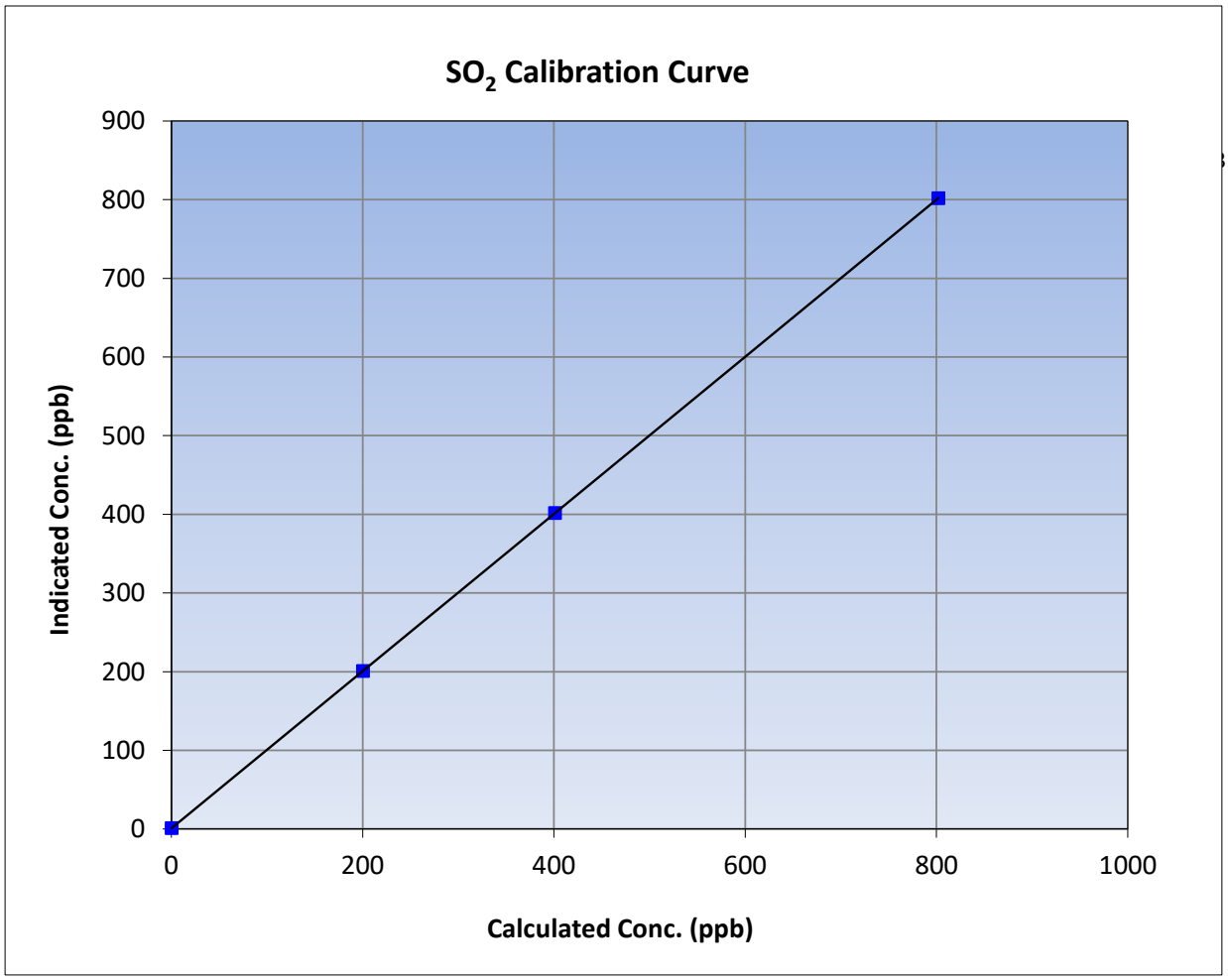
Station Information

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

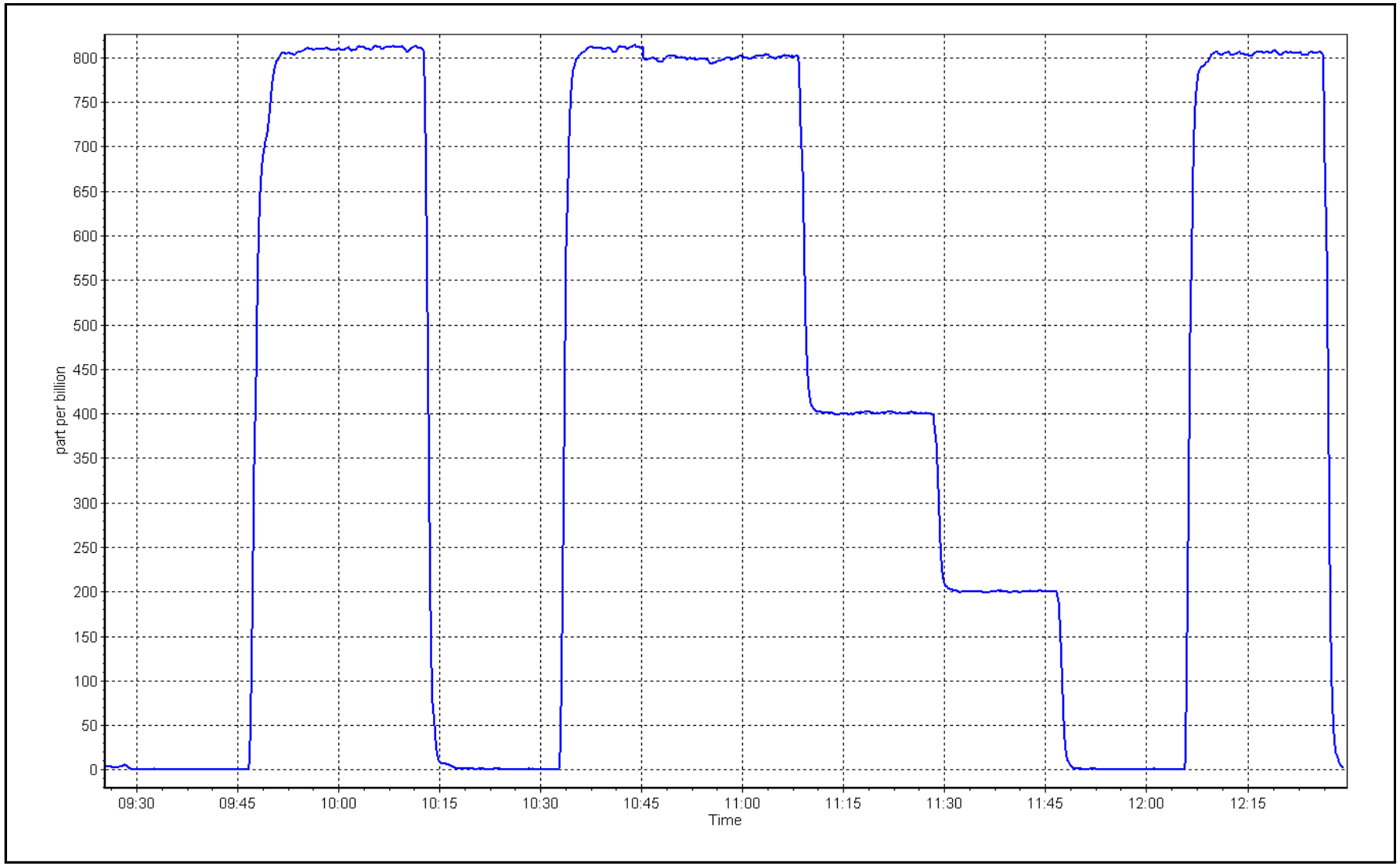
Calibration Data

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

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



SO2 Calibration Plot Date: October 20, 2023 Location: Mildred Lake



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Mildred Lake	Station number:	AMS02
Calibration Date:	October 25, 2023	Last Cal Date:	September 20, 2023
Start time (MST):	6:45	End time (MST):	10:54
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43iQTL		Analyzer serial #:	12113311966	
Converter make:	Global G150		Converter serial #:	2022-198	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.004536	1.002536	Backgd or Offset:	1.78	1.71
Calibration intercept:	0.220806	-0.059198	Coeff or Slope:	0.781	0.754

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4924	75.6	80.0	83.2	0.961
as found 2nd point	4962	37.8	40.0	41.6	0.961
as found 3rd point	4981	18.9	20.0	20.6	0.971
new cylinder response					

H_2S Calibration Data

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

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

* = > +/-5% change initiates investigation

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

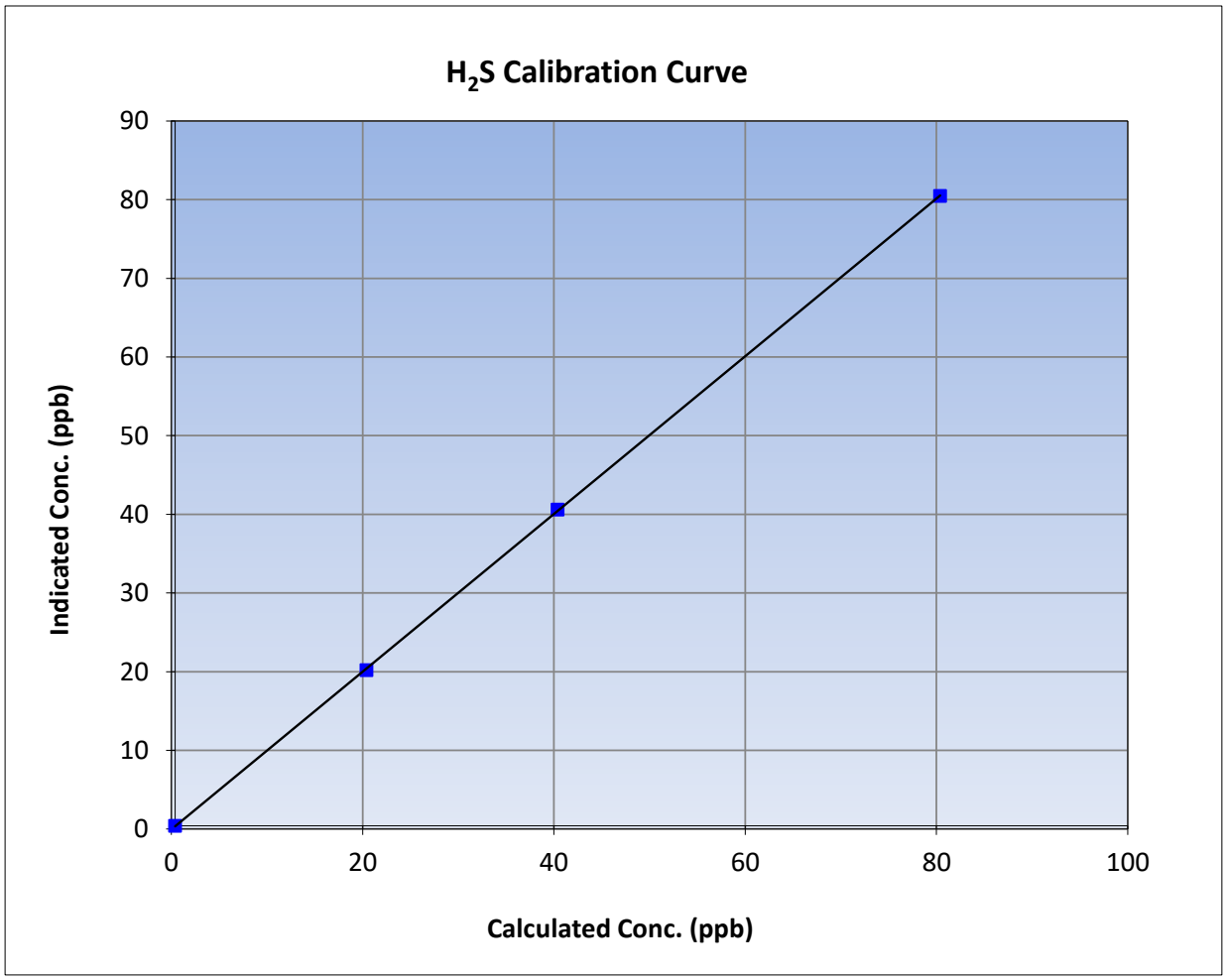
Station Information

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

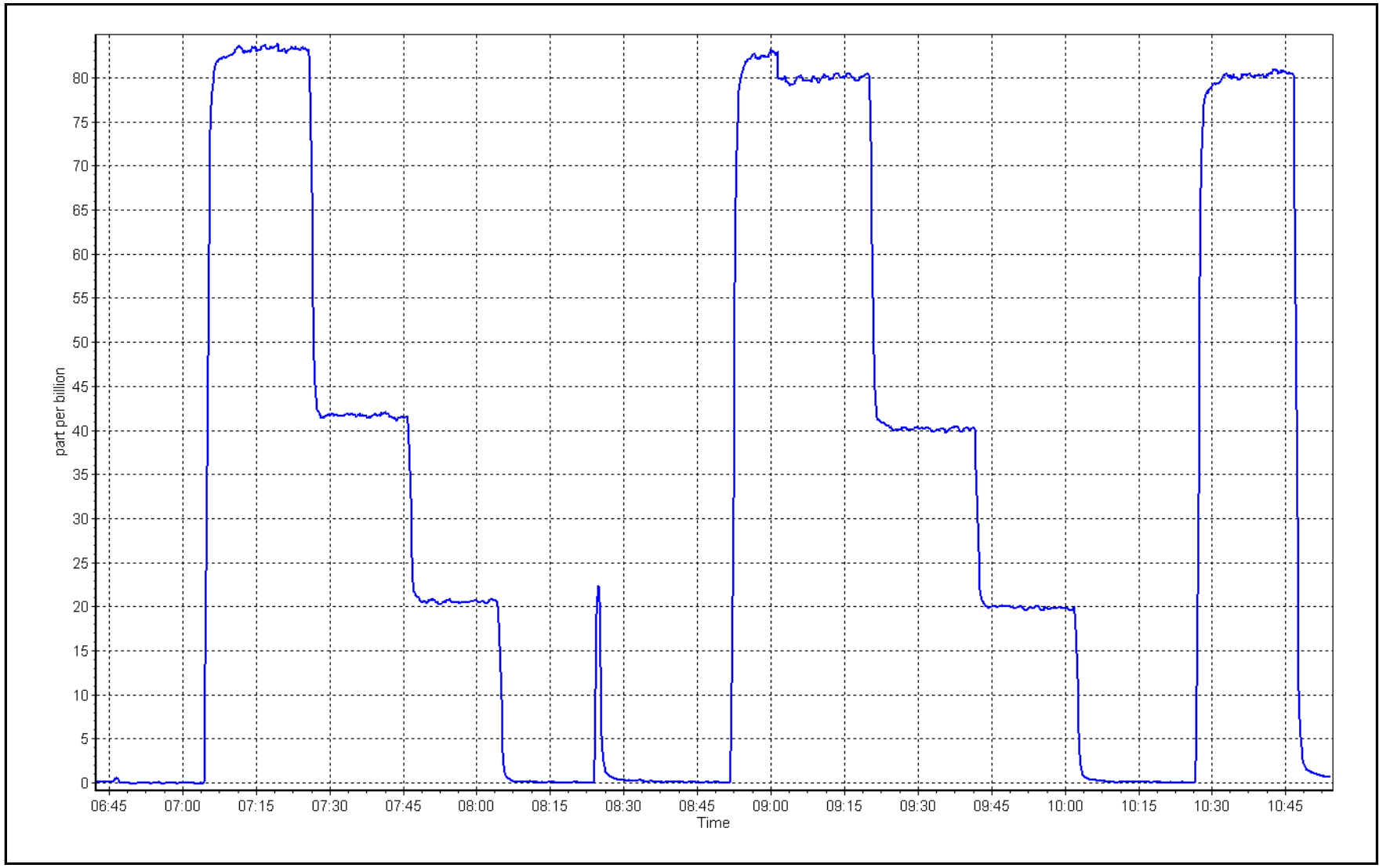
Calibration Data

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

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



H_2S Calibration Plot Date: October 25, 2023 Location: Mildred Lake



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

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

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320038	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.99E-04	3.04E-04	NMHC SP Ratio:	4.58E-05	4.59E-05
CH4 Retention time:	14.6	14.8	NMHC Peak Area:	192179	191592
Zero Chromatogram:	ON	ON	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	16.82	16.67	1.009
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	16.82	16.76	1.003
second point	4960	40.1	8.41	8.36	1.006
third point	4980	20.0	4.19	4.16	1.007
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	16.82	16.78	1.002
				Average Correction Factor	1.006
Baseline Corr AF:	16.67	Prev response	16.78	*% change	-0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	8.80	8.78	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	8.80	8.79	1.001
second point	4960	40.1	4.40	4.41	0.997
third point	4980	20.0	2.19	2.21	0.991
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.80	8.83	0.997
				Average Correction Factor	0.996
Baseline Corr AF:	8.78	Prev response	8.79	*% change	-0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	8.02	7.88	1.018
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	8.02	7.97	1.007
second point	4960	40.1	4.01	3.94	1.018
third point	4980	20.0	2.00	1.95	1.025
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.02	7.96	1.008
				Average Correction Factor	1.017
Baseline Corr AF:	7.88	Prev response	7.99	*% change	-1.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.998613	0.996697
THC Cal Offset:	-0.013917	-0.011323
CH4 Cal Slope:	0.999502	0.994304
CH4 Cal Offset:	-0.025057	-0.023065
NMHC Cal Slope:	0.998932	0.998828
NMHC Cal Offset:	0.008542	0.011943

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

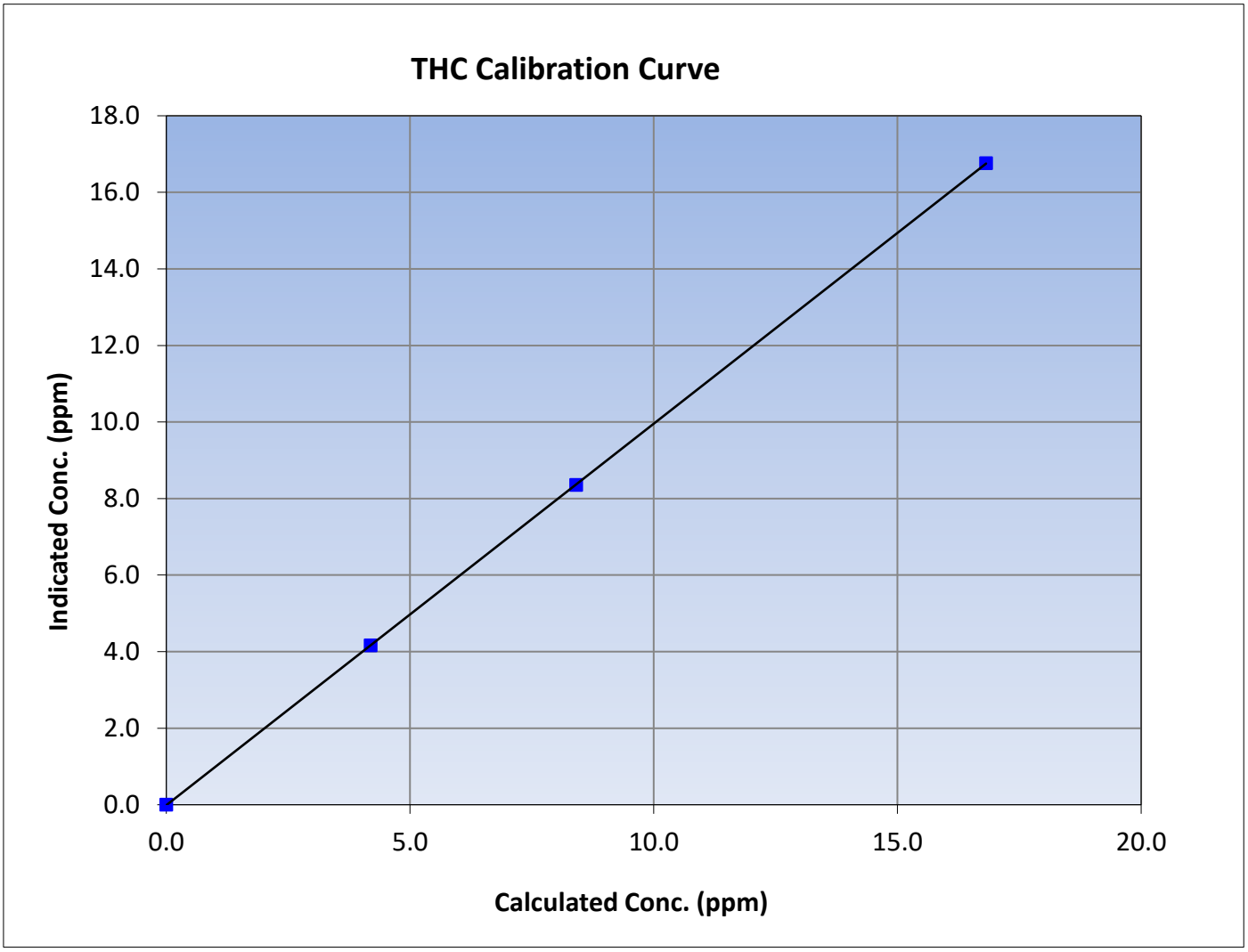
Version-06-2022

Station Information

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

Calibration Data

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



Wood Buffalo Environmental Association

CH_4 Calibration Summary

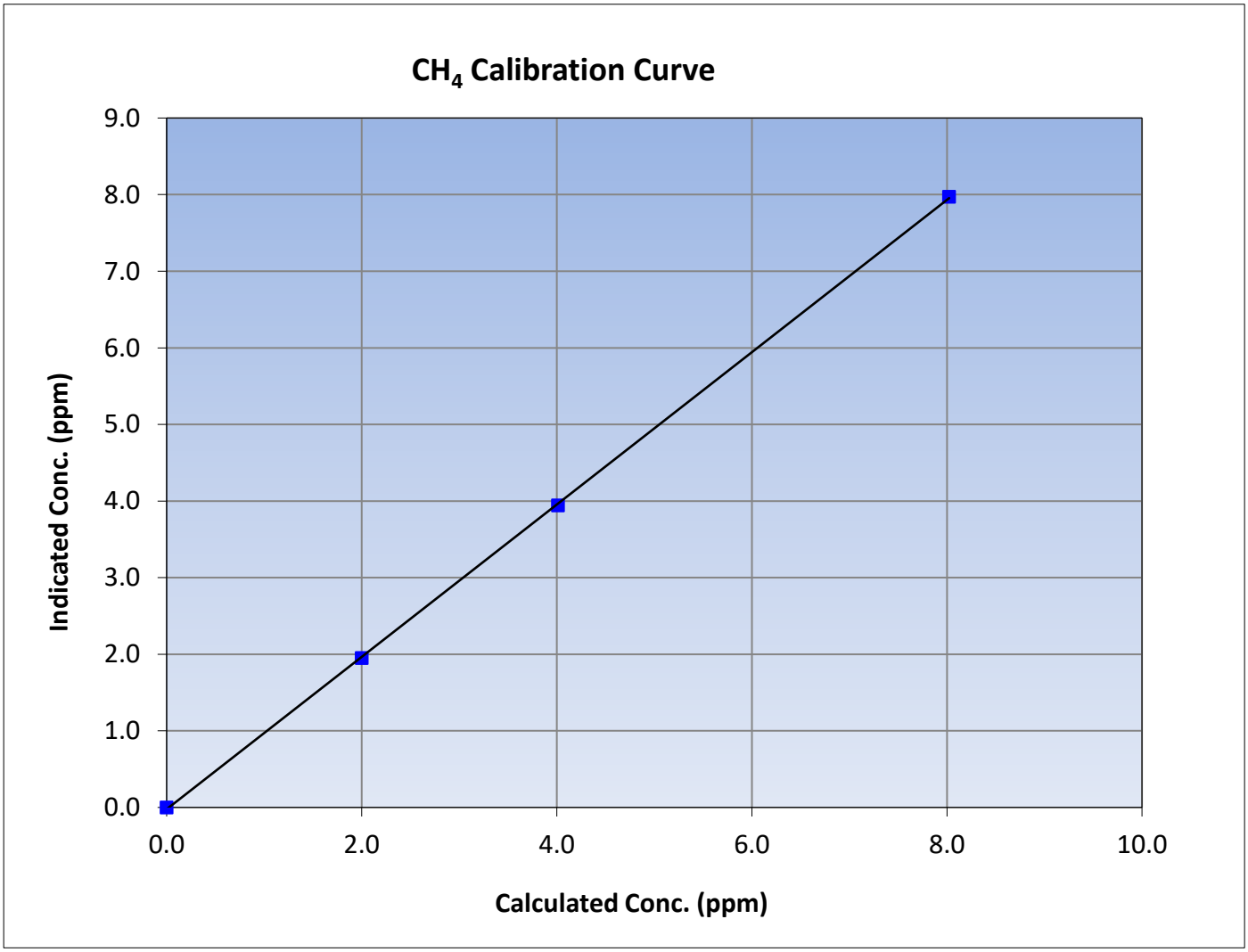
Version-06-2022

Station Information

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

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999954	*≥0.995*
8.02	7.97	1.0066			
4.01	3.94	1.0179	Slope	0.994304	*0.90 - 1.10*
2.00	1.95	1.0250			
			Intercept	-0.023065	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

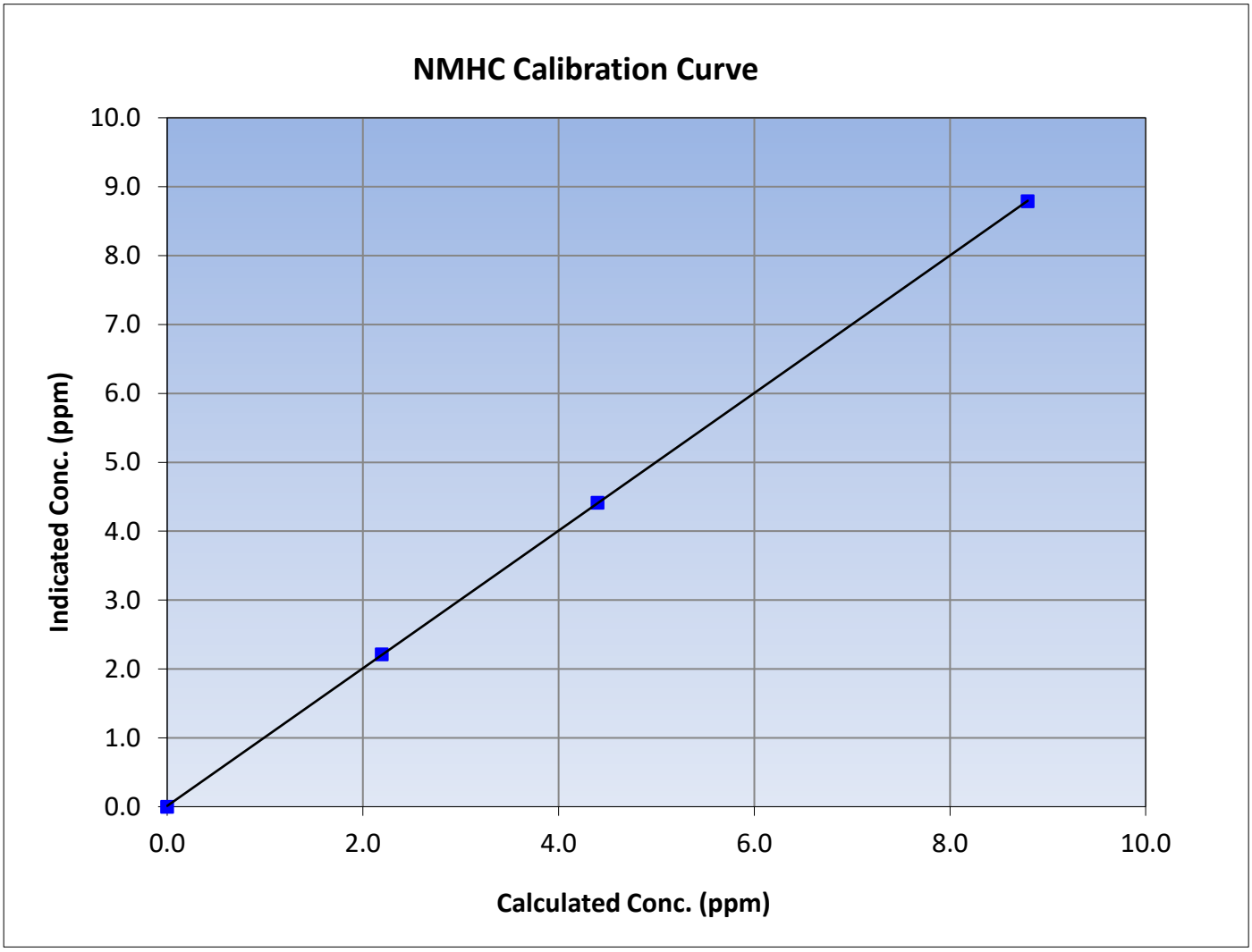
Version-06-2022

Station Information

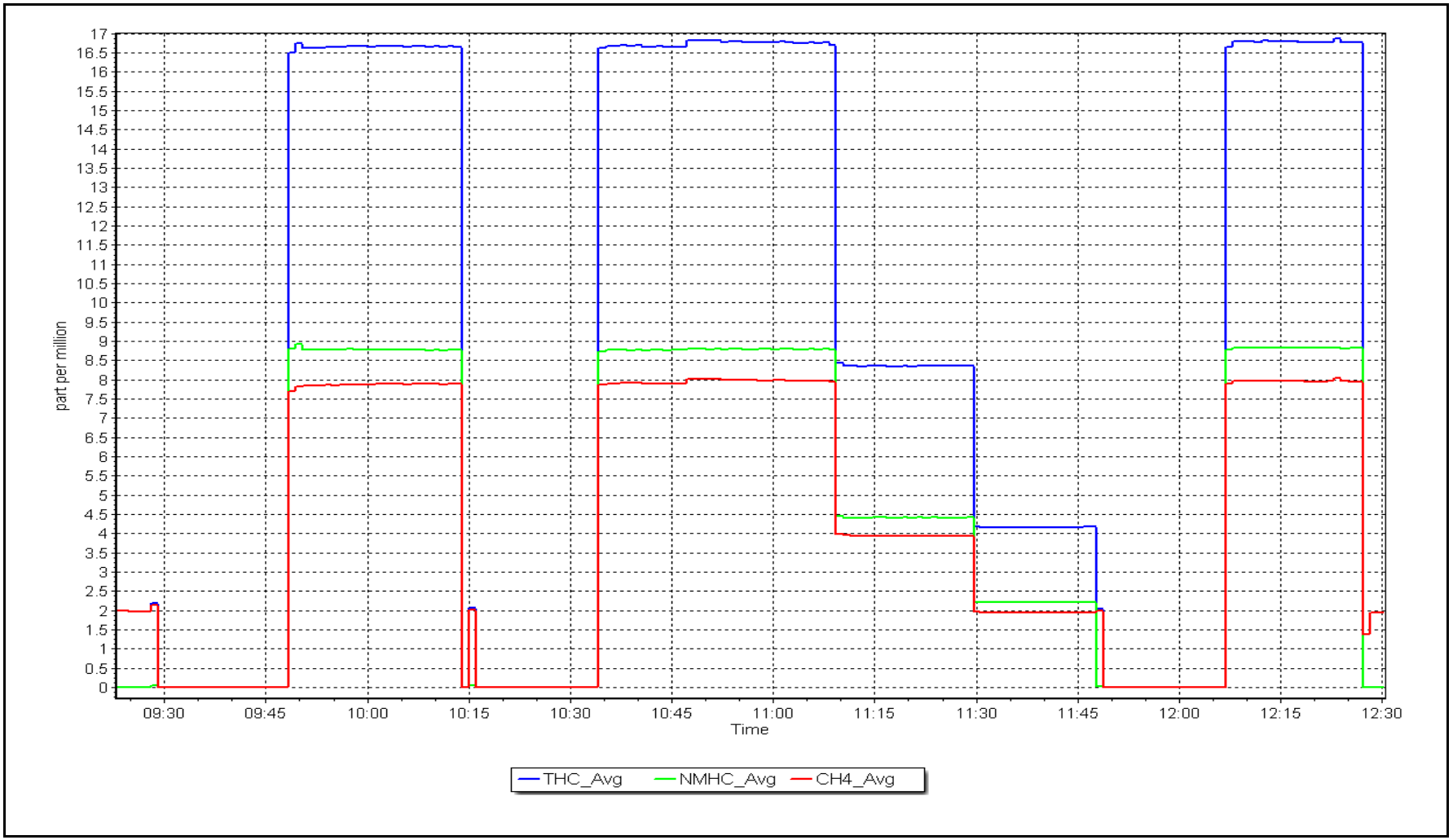
Calibration Date:	October 20, 2023	Previous Calibration:	September 25, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	9:27	End Time (MST):	12:30
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320038

Calibration Data

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



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



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS04
BUFFALO VIEWPOINT
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	October 10, 2023	Last Cal Date:	September 13, 2023
Start time (MST):	9:20	End time (MST):	12:04
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.87	ppm	Cal Gas Exp Date:	March 10, 2031
Cal Gas Cylinder #:	CC446753			
Removed Cal Gas Conc:	50.87	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3808
ZAG Make/Model:	API T701		Serial Number:	362

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.994771	1.003929	Backgd or Offset:	22.1	24.1
Calibration intercept:	2.033465	-0.144528	Coeff or Slope:	0.860	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	0.8	----
as found span	4921	78.6	799.7	792.7	1.009
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4921	78.6	799.7	802.6	0.996
second point	4961	39.3	399.8	401.6	0.996
third point	4980	19.6	199.4	199.9	0.998
as left zero	5000	0.0	0.0	-0.4	----
as left span	4921	78.6	799.7	804.5	0.994
				Average Correction Factor	0.997

Baseline Corr As found:	791.90	Previous response	797.59	*% change	-0.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No Maintenance done. Zero and span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

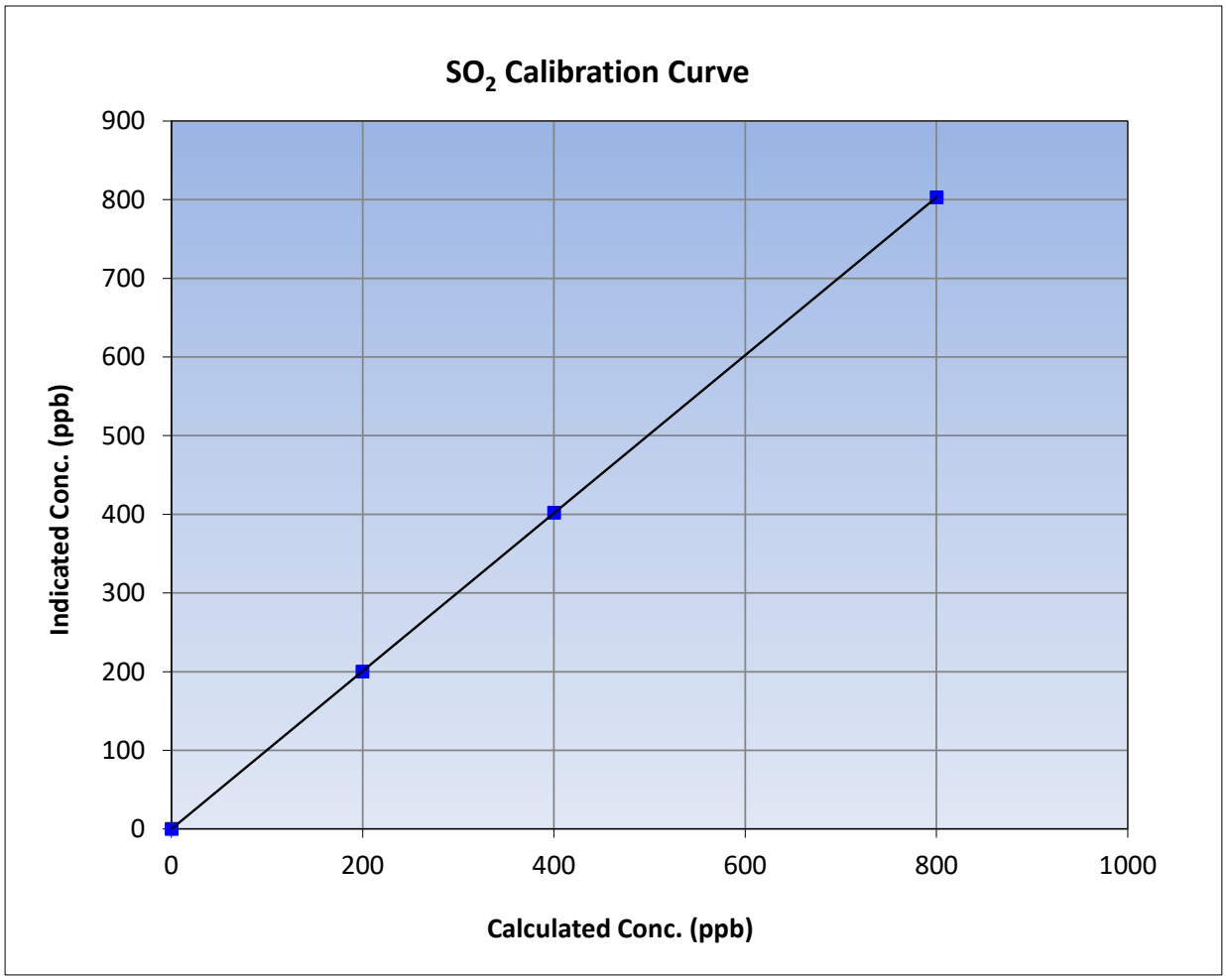
Station Information

Calibration Date:	October 10, 2023	Previous Calibration:	September 13, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	9:20	End Time (MST):	12:04
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1327300932

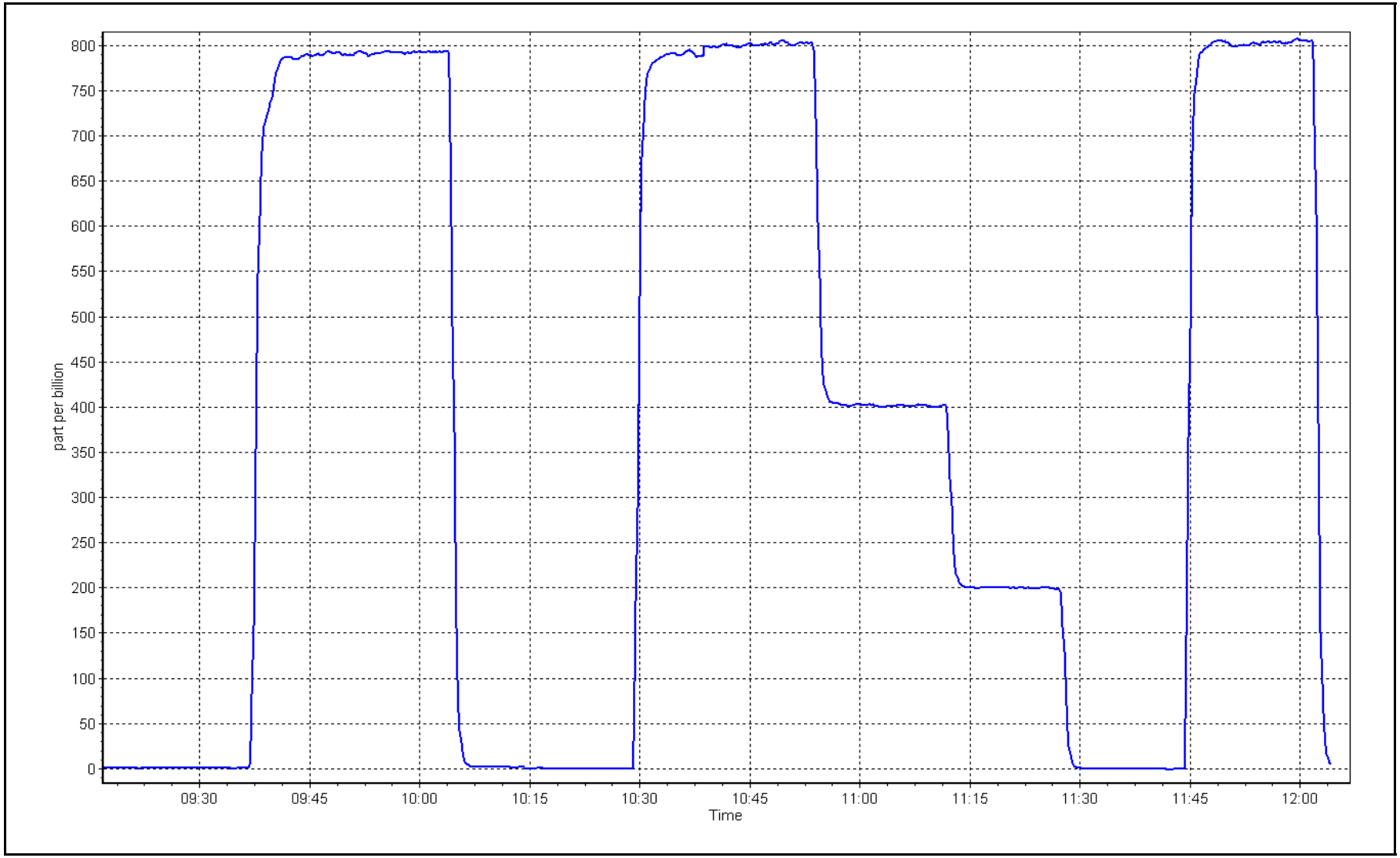
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
799.7	802.6	0.9964
399.8	401.6	0.9956
199.4	199.9	0.9976

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	1.003929	*0.90 - 1.10*
Intercept	-0.144528	*+/-30*



SO2 Calibration Plot Date: October 10, 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:	October 13, 2023	Last Cal Date:	September 1, 2023
Start time (MST):	6:15	End time (MST):	10:11
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i-LTE		Analyzer serial #:	1008841400	
Converter make:	Global		Converter serial #:	2022-200	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.004754	0.994226	Backgd or Offset:	1.8	1.8
Calibration intercept:	-0.037663	0.082074	Coeff or Slope:	1.095	1.095

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4926	74.1	80.3	80.3	1.000
as found 2nd point	4963	37.0	40.1	40.2	0.998
as found 3rd point	4982	18.5	20.1	19.9	1.008
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4926	74.1	80.3	79.9	1.005
second point	4963	37.0	40.1	40.1	1.000
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	79.4	1.012
SO2 Scrubber Check	4920	80.0	800.0	-0.1	----
Date of last scrubber change:		16-May-23		Ave Corr Factor	1.004
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.3	Prev response:	80.67	*% change:	-0.5%
Baseline Corr 2nd AF pt:	40.2	AF Slope:	1.000487	AF Intercept:	-0.037805
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999992		

* = > +/-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

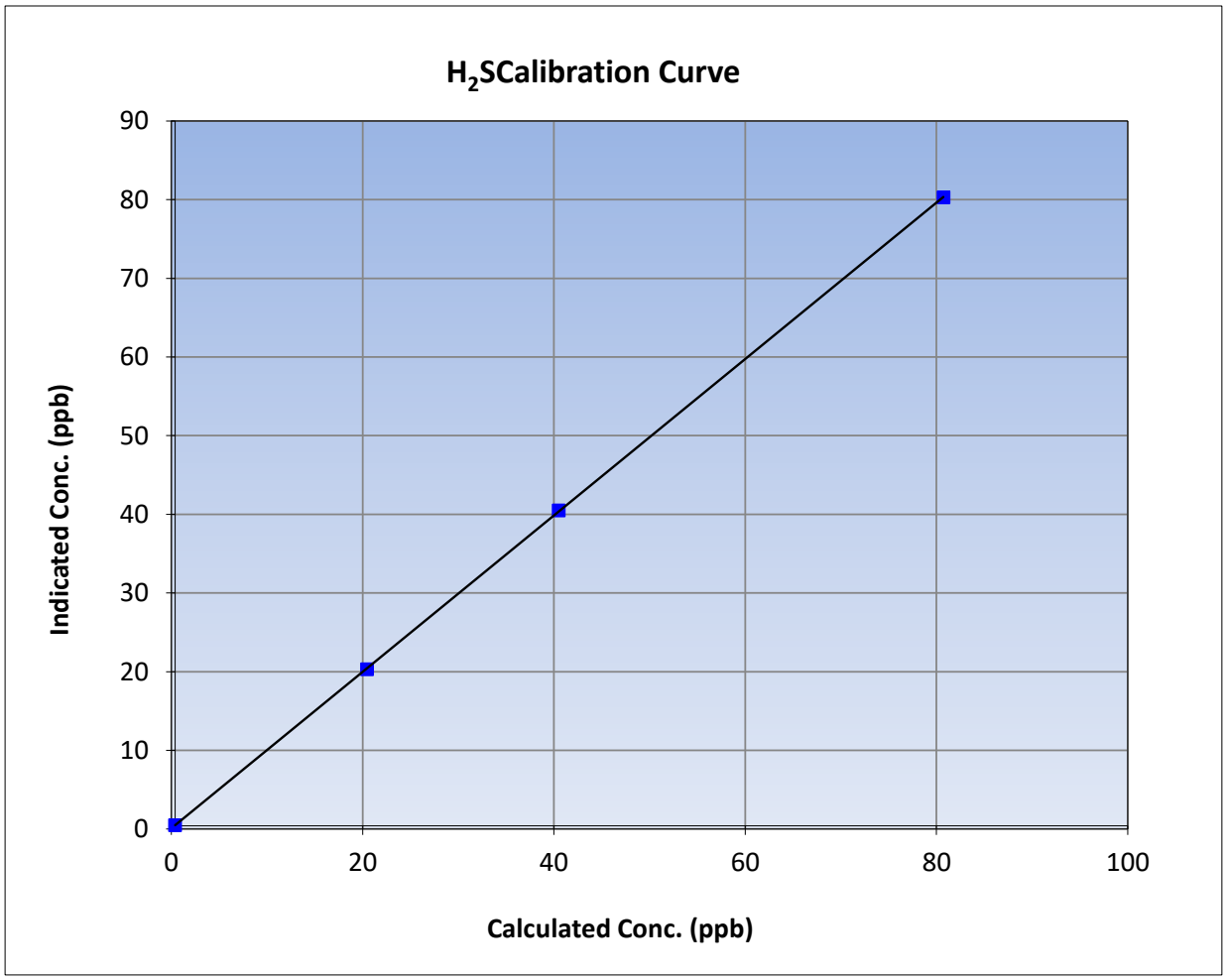
Station Information

Calibration Date:	October 13, 2023	Previous Calibration:	September 1, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:15	End Time (MST):	10:11
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1008841400

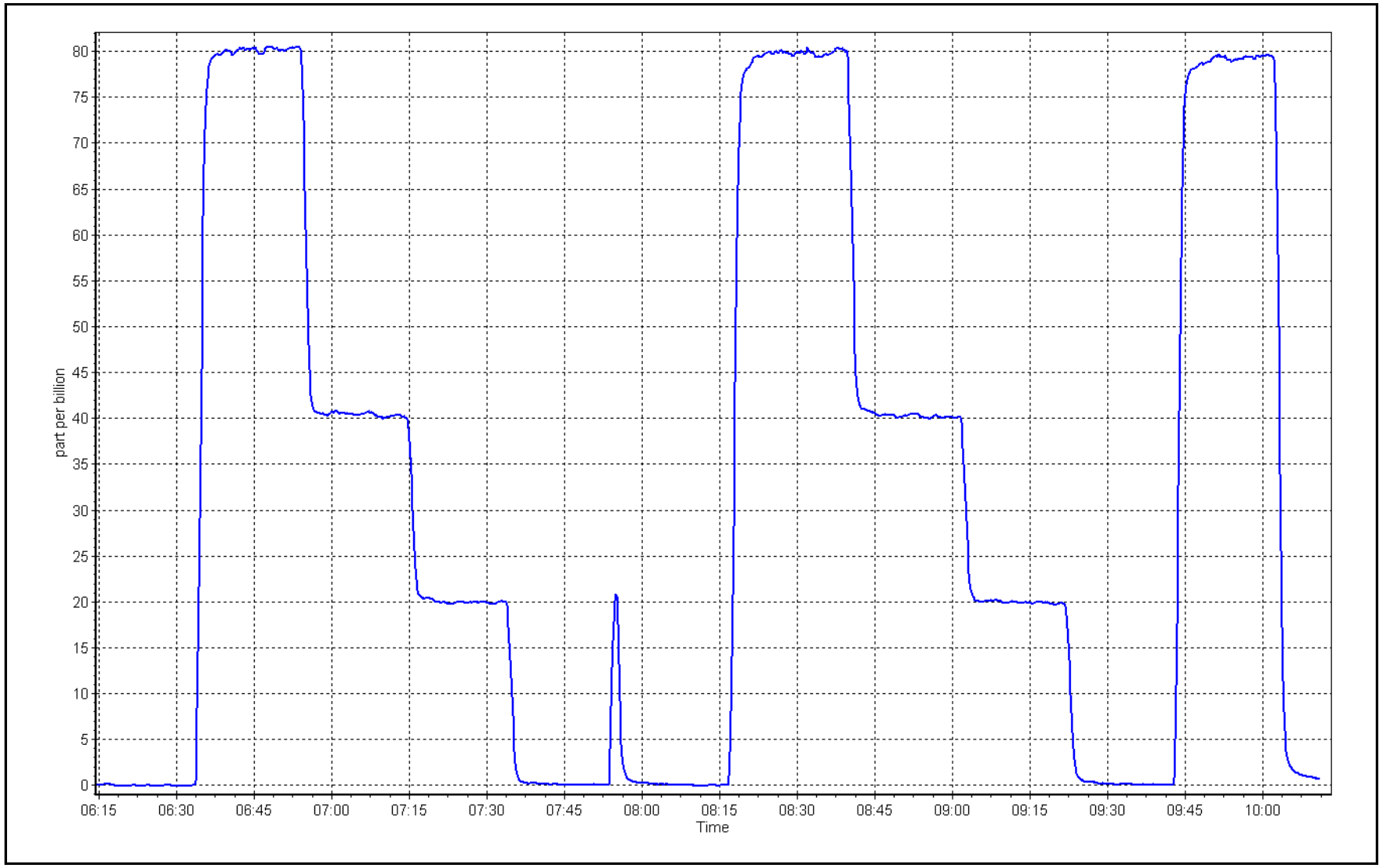
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.3	79.9	1.0053
40.1	40.1	1.0002
20.1	19.9	1.0076

Statistical Evaluation		Limits
Correlation Coefficient	0.999990	≥0.995
Slope	0.994226	0.90 - 1.10
Intercept	0.082074	+/-3



H_2S Calibration Plot Date: October 13, 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:	October 10, 2023	Last Cal Date:	September 13, 2023
Start time (MST):	9:20	End time (MST):	12:03
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:	1.91E-04	1.95E-04	NMHC SP Ratio:	4.09E-05	4.19E-05
CH4 Retention time:	11.8	11.8	NMHC Peak Area:	215814	210347
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	16.26	1.023
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	78.6	16.64	16.63	1.000
second point	4961	39.3	8.32	8.27	1.006
third point	4980	19.6	4.15	4.10	1.012
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	78.6	16.64	16.57	1.004
				Average Correction Factor	1.006
Baseline Corr AF:	16.26	Prev response	16.61	*% change	-2.1%
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	78.6	8.82	8.59	1.027
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	78.6	8.82	8.80	1.002
second point	4961	39.3	4.41	4.39	1.004
third point	4980	19.6	2.20	2.18	1.009
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	78.6	8.82	8.76	1.007
				Average Correction Factor	1.005
Baseline Corr AF:	8.59	Prev response	8.81	*% change	-2.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	78.6	7.82	7.67	1.019
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	78.6	7.82	7.83	0.998
second point	4961	39.3	3.91	3.88	1.007
third point	4980	19.6	1.95	1.92	1.015
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	78.6	7.82	7.81	1.001
				Average Correction Factor	1.007
Baseline Corr AF:	7.67	Prev response	7.81	*% change	-1.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999330	1.000279
THC Cal Offset:	-0.015543	-0.027945
CH4 Cal Slope:	1.000443	1.002623
CH4 Cal Offset:	-0.009902	-0.020104
NMHC Cal Slope:	0.999120	0.998214
NMHC Cal Offset:	-0.003636	-0.007641

Notes: Hydrogen and nitrogen cylinder changed. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

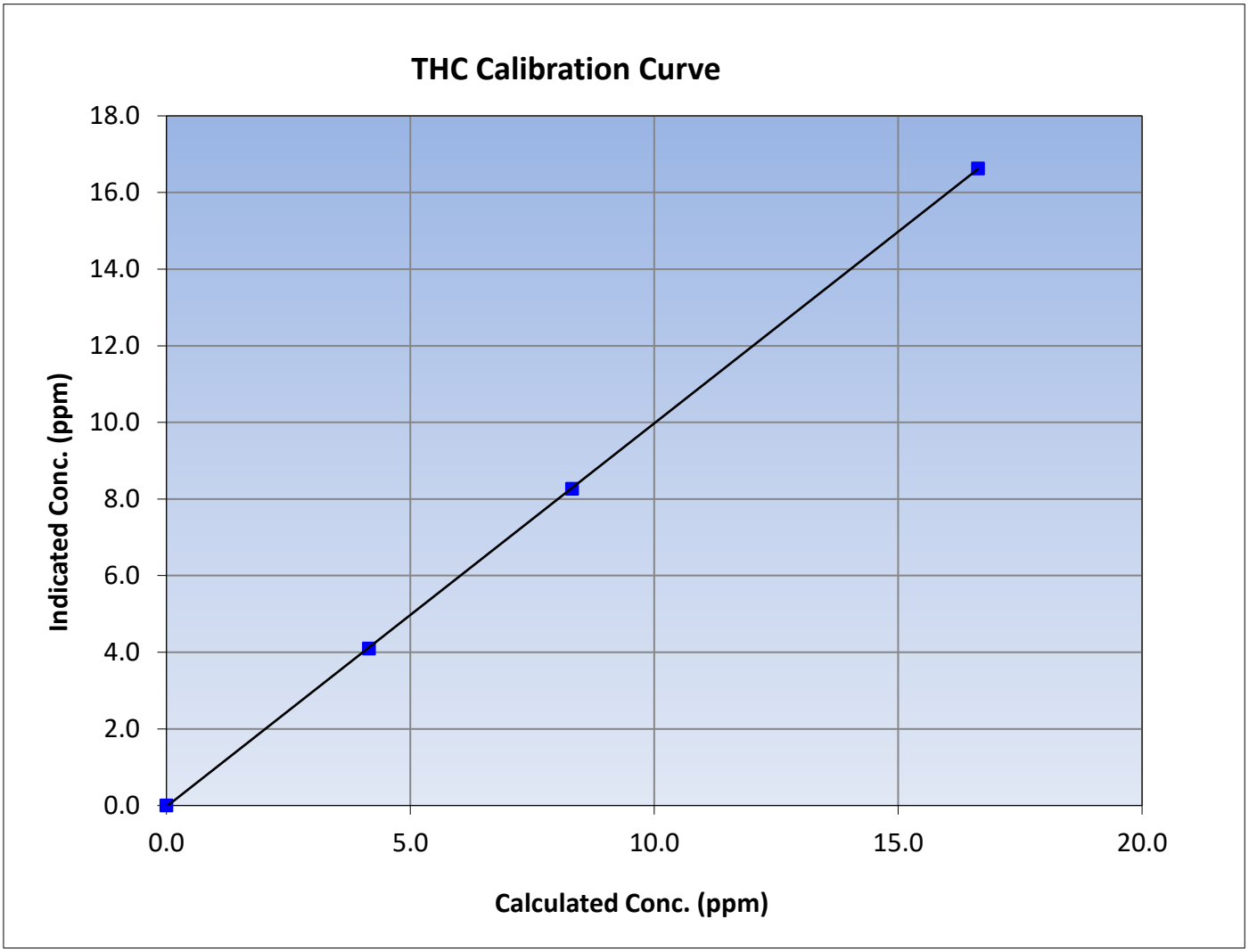
Version-06-2022

Station Information

Calibration Date:	October 10, 2023	Previous Calibration:	September 13, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	9:20	End Time (MST):	12:03
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	0.999986	*≥0.995*
16.64	16.63	1.0004			
8.32	8.27	1.0059	Slope	1.000279	*0.90 - 1.10*
4.15	4.10	1.0118			
			Intercept	-0.027945	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

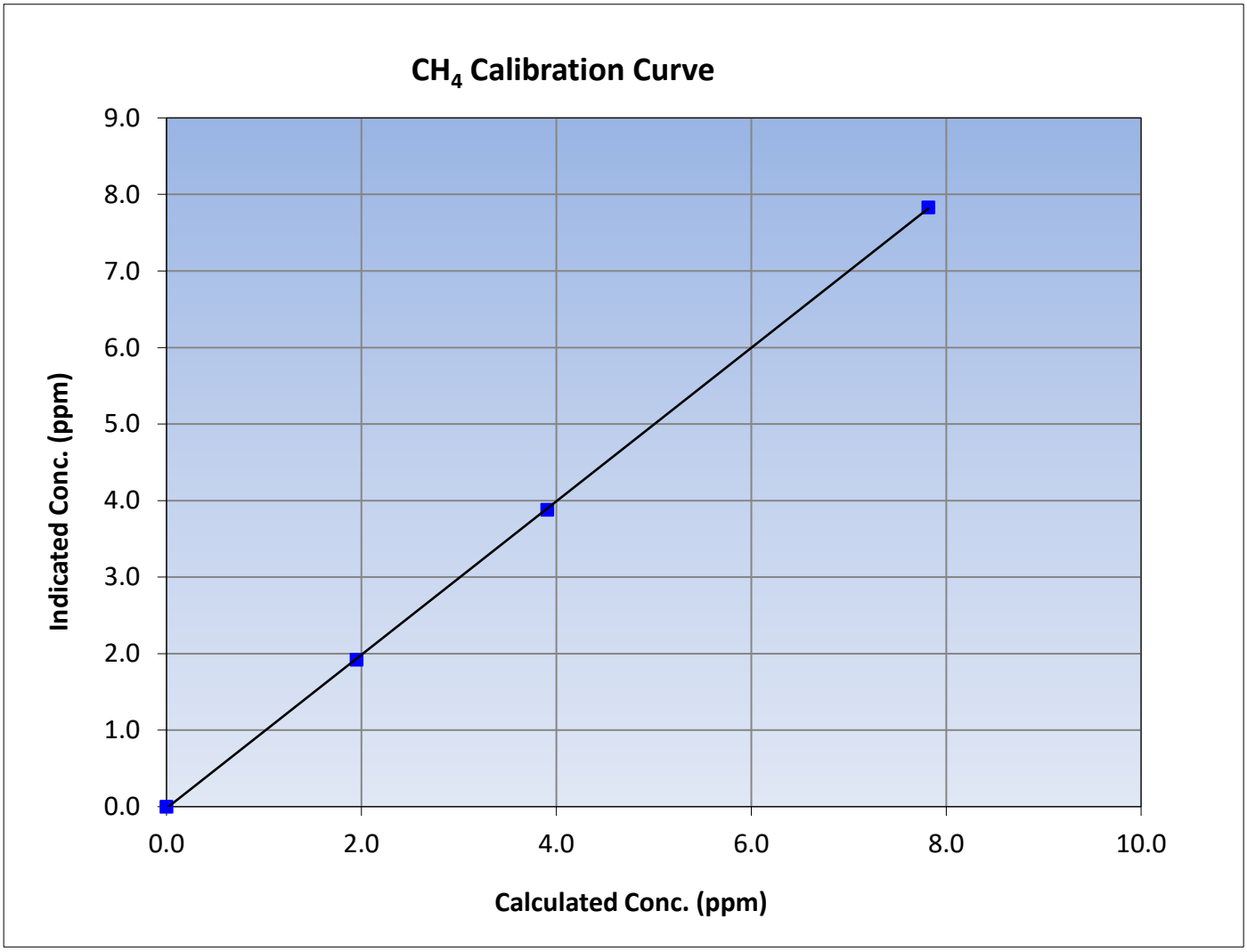
Version-06-2022

Station Information

Calibration Date:	October 10, 2023	Previous Calibration:	September 13, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	9:20	End Time (MST):	12:03
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	0.999966	≥0.995
7.82	7.83	0.9983			
3.91	3.88	1.0074	Slope	1.002623	0.90 - 1.10
1.95	1.92	1.0152			
			Intercept	-0.020104	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

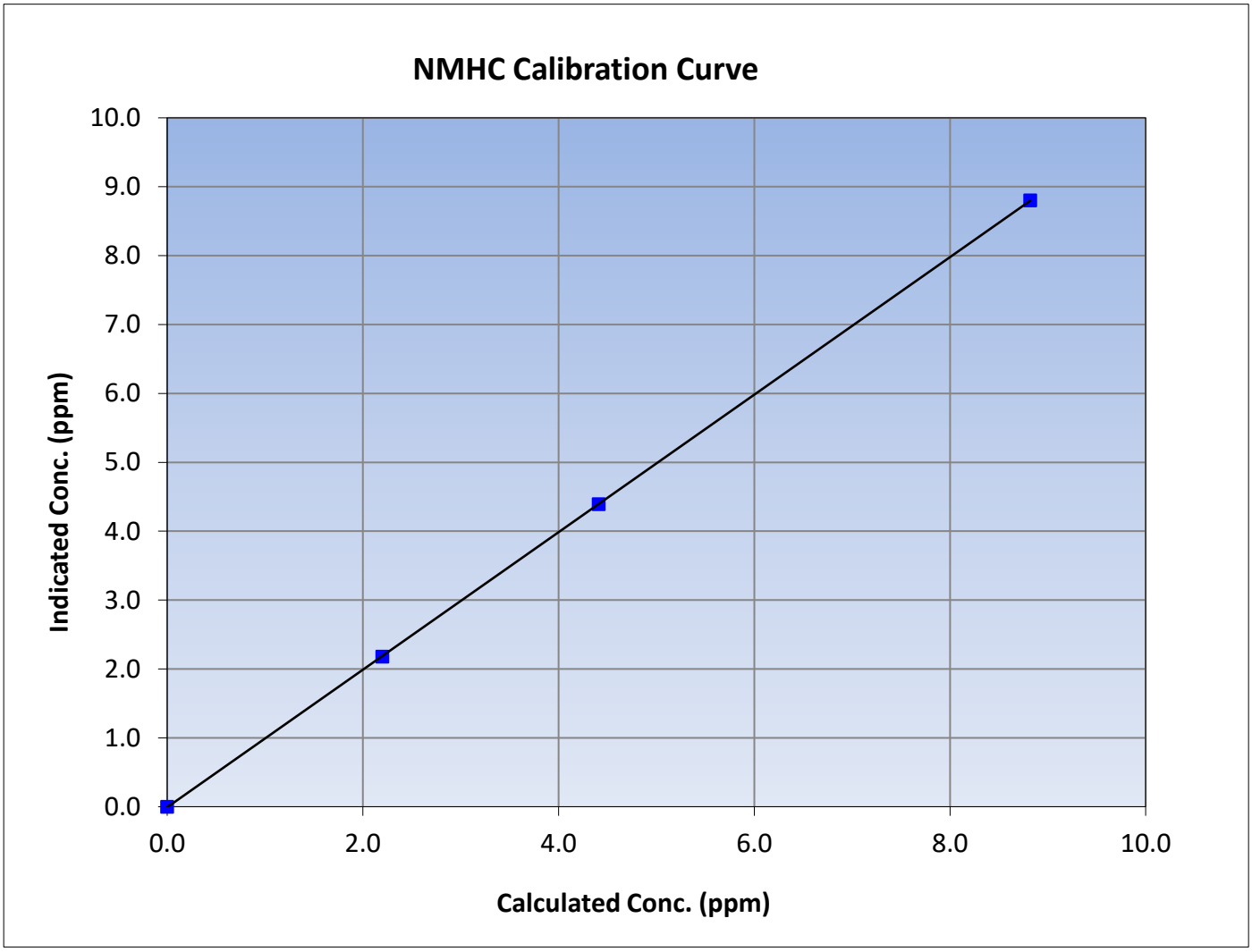
Version-06-2022

Station Information

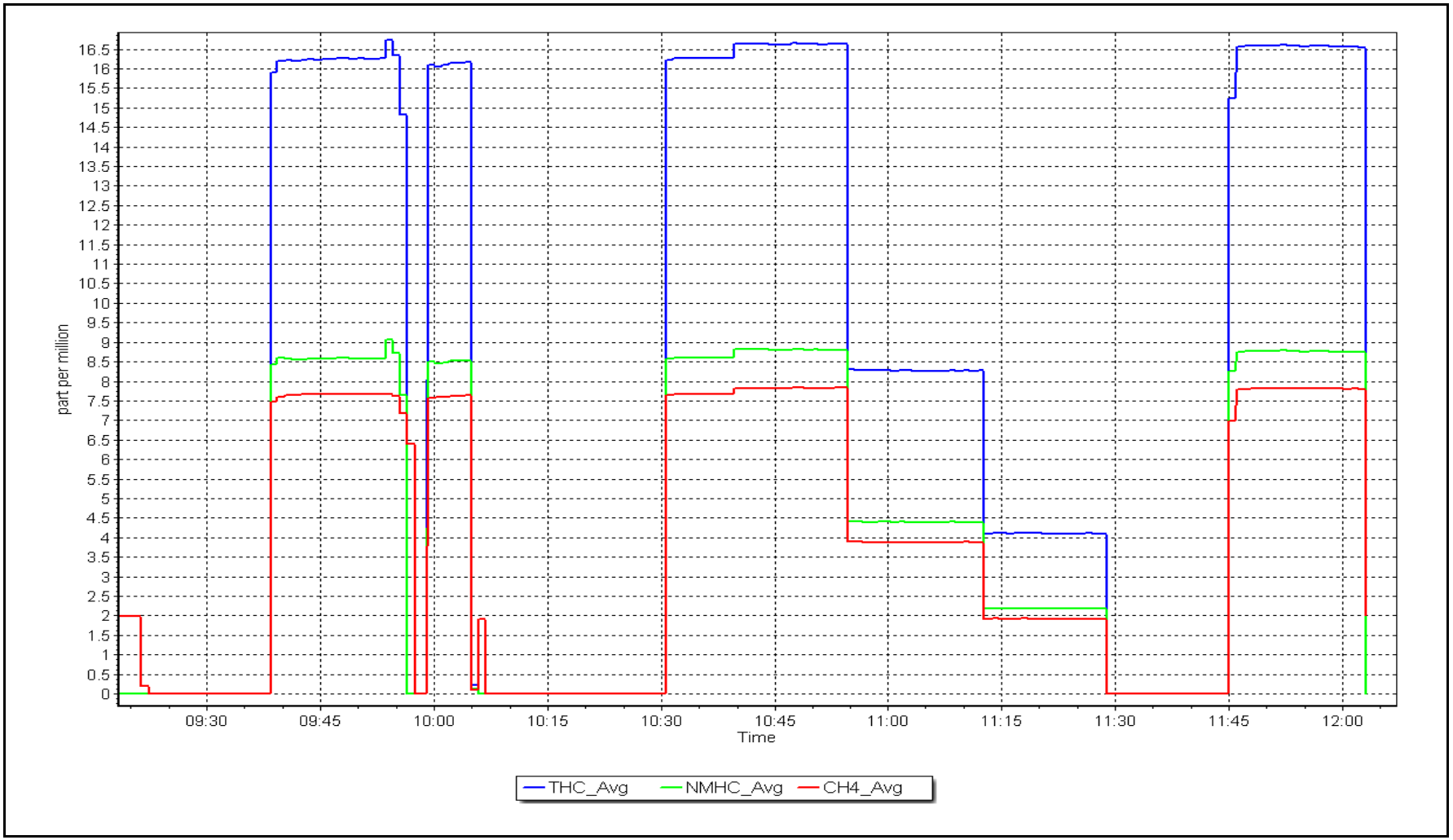
Calibration Date:	October 10, 2023	Previous Calibration:	September 13, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	9:20	End Time (MST):	12:03
Analyzer make:	Thermo 55i	Analyzer serial #:	1222762077

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999997	≥0.995
8.82	8.80	1.0022			
4.41	4.39	1.0044	Slope	0.998214	0.90 - 1.10
2.20	2.18	1.0089			
			Intercept	-0.007641	+/-0.5



NMHC Calibration Plot Date: October 10, 2023 Location: Buffalo Viewpoint



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	October 18, 2023	Last Cal Date:	September 8, 2023
Start time (MST):	6:20	End time (MST):	11:39
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:	1.164	1.180	NO bkgnd or offset:	-0.6	-0.6
NOX coeff or slope:	1.159	1.178	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:	1.001176	1.000587
NO_X Cal Offset:	0.046144	-0.272971
NO Cal Slope:	1.001222	0.998332
NO Cal Offset:	-0.434177	-0.653356
NO_2 Cal Slope:	0.996415	1.005579
NO_2 Cal Offset:	-1.016897	-0.636037

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.4	0.1	0.3	----	----
as found span	4922	78.1	799.1	795.2	3.9	785.7	780.6	5.1	1.0171	1.0187
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.3	0.6	-0.3	----	----
high point	4922	78.1	799.1	795.2	3.9	799.9	794.0	5.8	0.9990	1.0015
second point	4961	39.1	400.1	398.1	2.0	398.8	395.7	3.2	1.0032	1.0061
third point	4981	19.5	199.5	198.5	1.0	199.4	196.6	2.9	1.0005	1.0098
as left zero	5000	0.0	0.0	0.0	0.0	1.0	1.2	-0.2	----	----
as left span	4922	78.1	799.1	383.1	416.0	793.6	380.1	413.6	1.0069	1.0079
								Average Correction Factor	1.0009	1.0058

Corrected As found NO_X = 785.3 ppb NO = 780.5 ppb

Previous Response NO_X = 800.1 ppb NO = 795.7 ppb

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

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

* = > +/-5% change initiates investigation

*Percent Change NO_X = -1.9%

*Percent Change NO = -2.0%

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

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

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

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	792.3	380.2	416.0	417.9	0.9955	100.5%
2nd GPT point (200 ppb O3)	792.3	582.3	213.9	214.2	0.9986	100.1%
3rd GPT point (100 ppb O3)	792.3	686.0	110.2	109.9	1.0028	99.7%
				Average Correction Factor	0.9990	100.1%

Notes: No Maintenance Done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

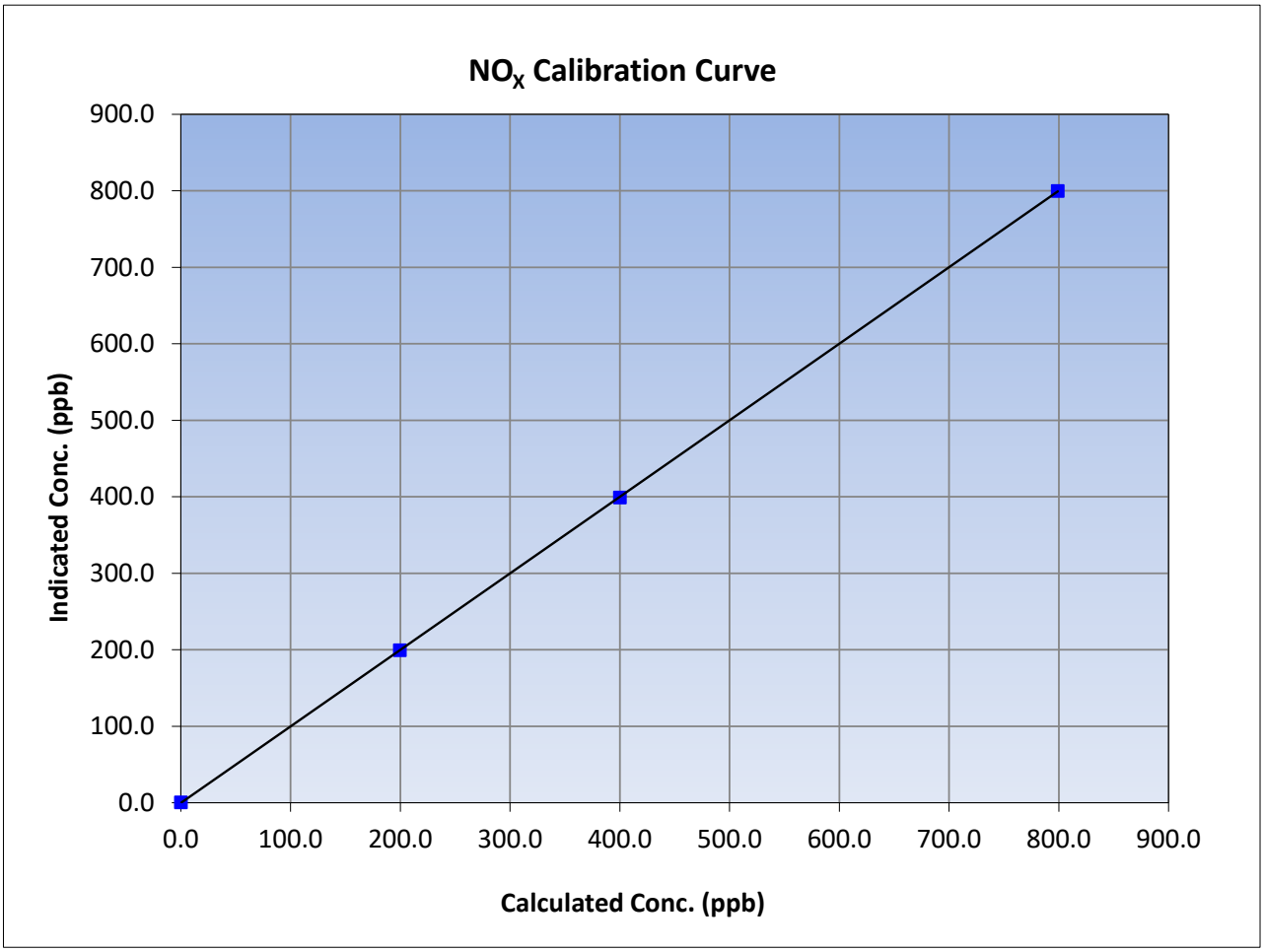
Version-04-2020

Station Information

Calibration Date:	October 18, 2023	Previous Calibration:	September 8, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:20	End Time (MST):	11:39
Analyzer make:	API T200	Analyzer serial #:	721

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.3	----	Correlation Coefficient	0.999994	≥0.995
799.1	799.9	0.9990			
400.1	398.8	1.0032	Slope	1.000587	0.90 - 1.10
199.5	199.4	1.0005			
			Intercept	-0.272971	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

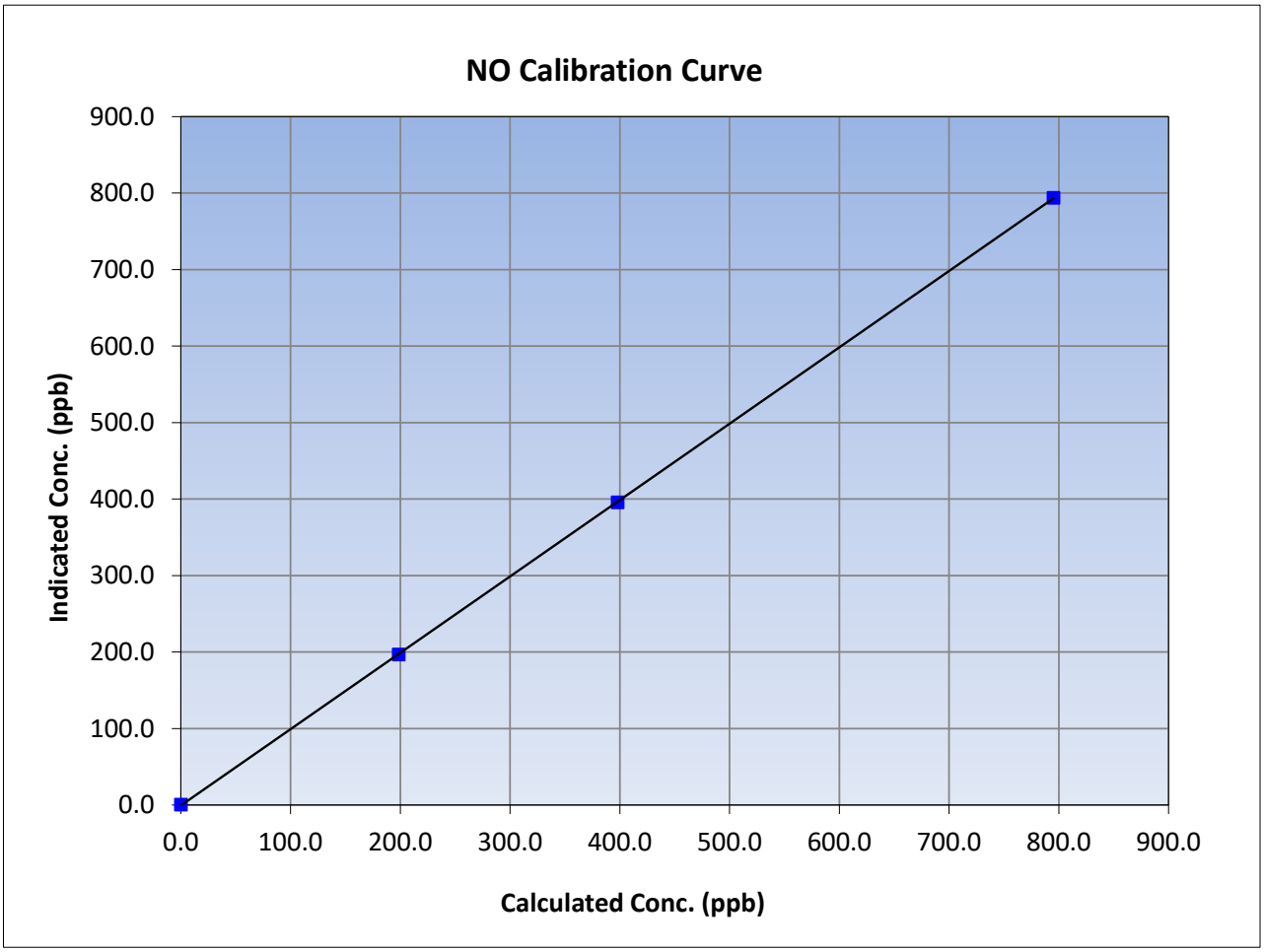
Version-04-2020

Station Information

Calibration Date:	October 18, 2023	Previous Calibration:	September 8, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:20	End Time (MST):	11:39
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	0.6	----	Correlation Coefficient	0.999988	≥0.995
795.2	794.0	1.0015			
398.1	395.7	1.0061	Slope	0.998332	0.90 - 1.10
198.5	196.6	1.0098			
			Intercept	-0.653356	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

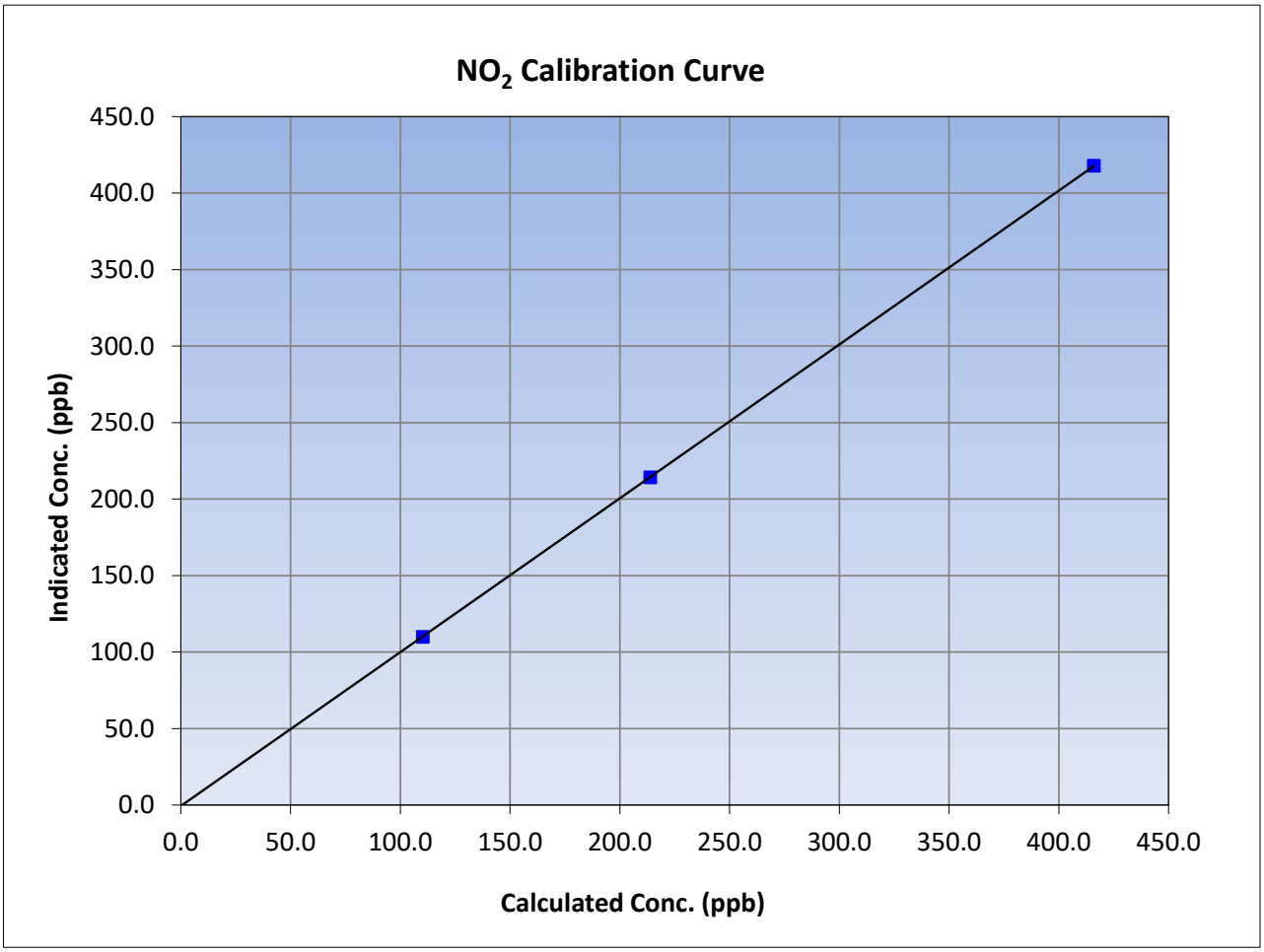
Version-04-2020

Station Information

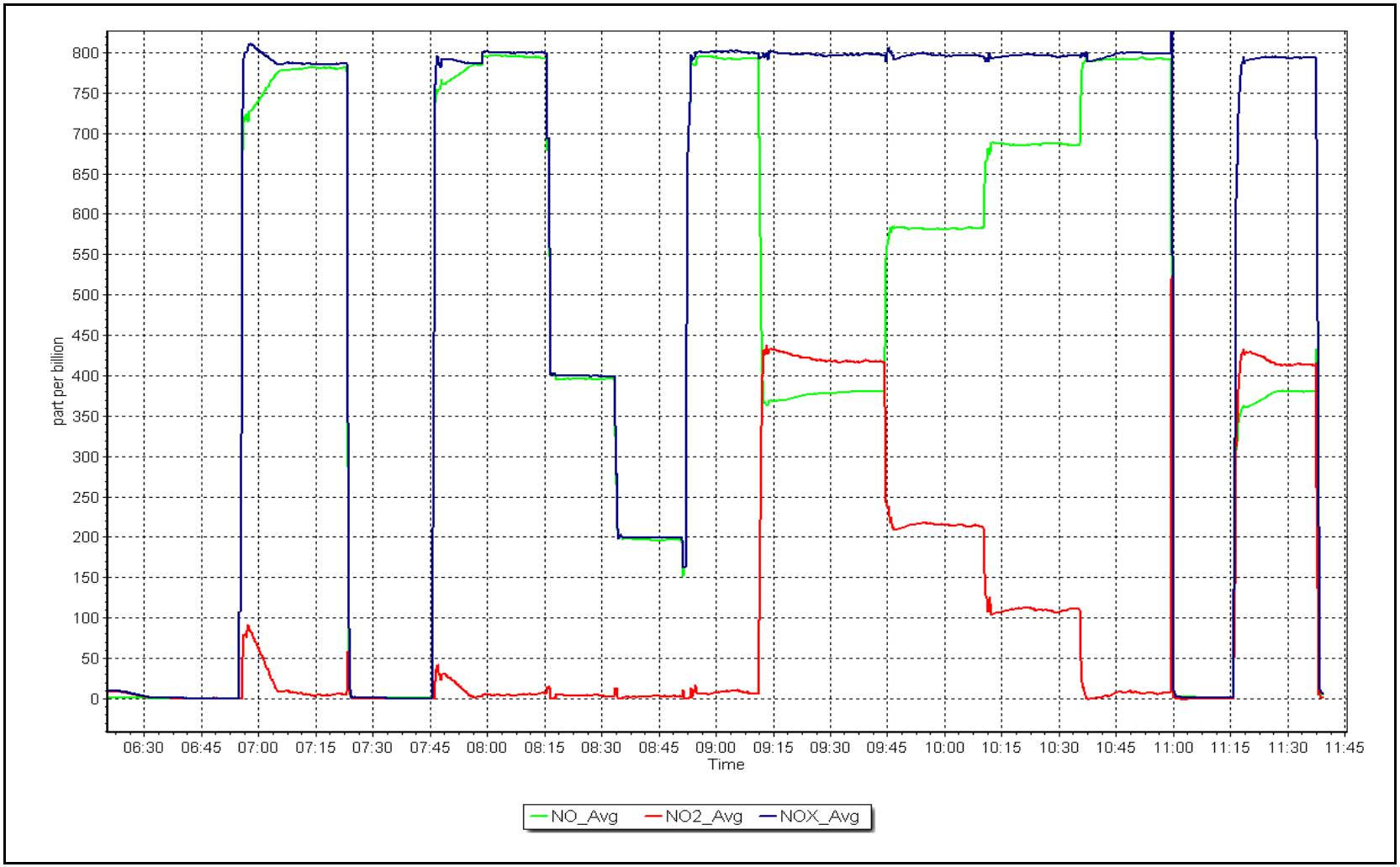
Calibration Date:	October 18, 2023	Previous Calibration:	September 8, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:20	End Time (MST):	11:39
Analyzer make:	API T200	Analyzer serial #:	721

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.3	----	Correlation Coefficient	0.999997	≥0.995
416.0	417.9	0.9955			
213.9	214.2	0.9986	Slope	1.005579	0.90 - 1.10
110.2	109.9	1.0028			
			Intercept	-0.636037	+/-20



NO_X Calibration Plot Date: October 18, 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:	October 10, 2023	Last Cal Date:	September 13, 2023
Start time (MST):	7:00	End time (MST):	9:22
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997486	0.995171	Backgd or Offset:	-2.6	-2.6
Calibration intercept:	-0.460000	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	-0.8	----
as found span	5000	986.7	400.0	396.9	1.008
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.4	----
high point	5000	986.9	400.0	398.5	1.004
second point	5000	817.4	200.0	200.6	0.997
third point	5000	707.7	100.0	100.4	0.996
as left zero	5000	0.0	0.0	0.8	----
as left span	5000	989.6	400.0	398.8	1.003
				Average Correction Factor	0.999

Baseline Corr As found:	397.7	Previous response	398.5	*% change	-0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments or maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

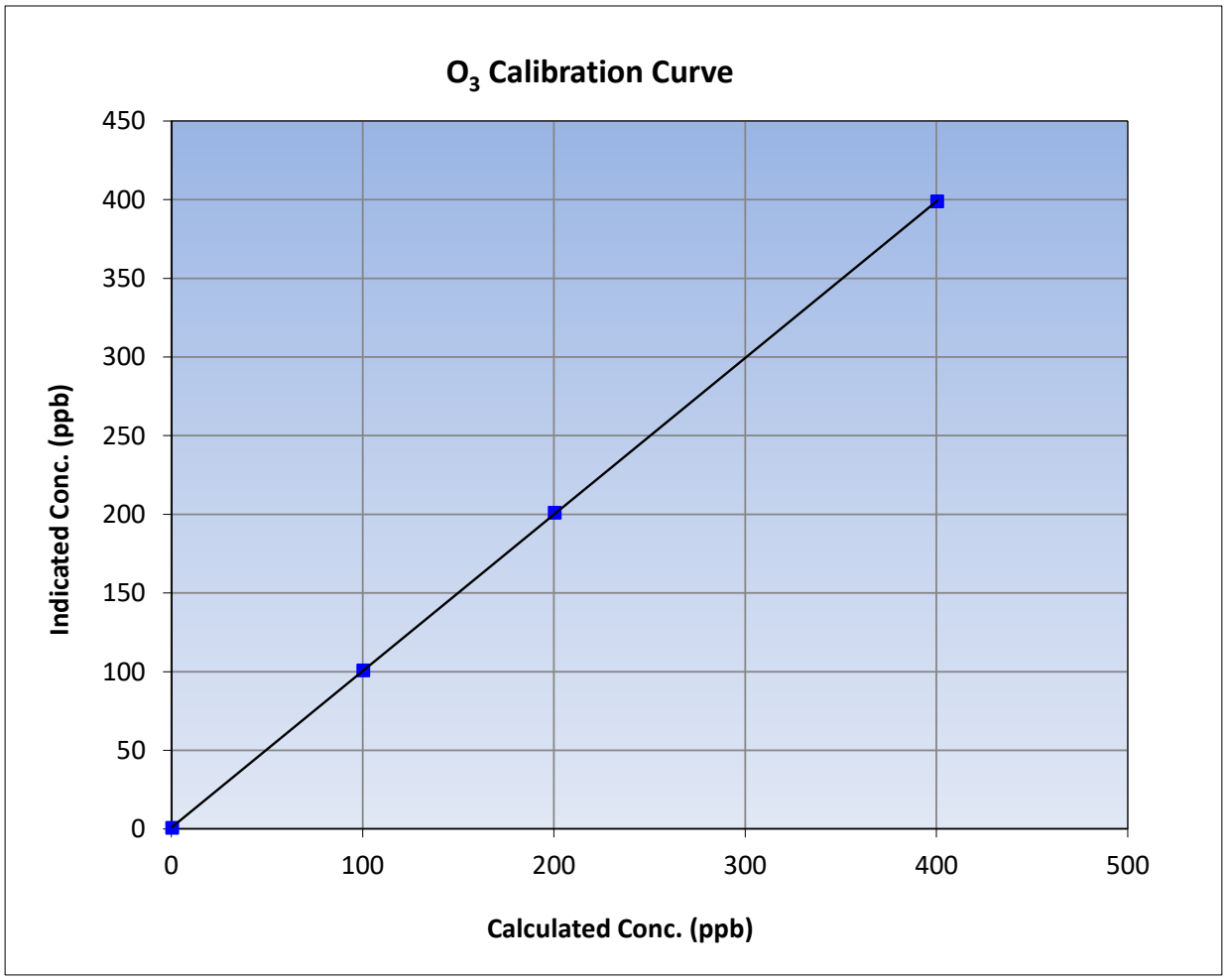
Station Information

Calibration Date:	October 10, 2023	Previous Calibration:	September 13, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	7:00	End Time (MST):	9:22
Analyzer make:	API T400	Analyzer serial #:	2961

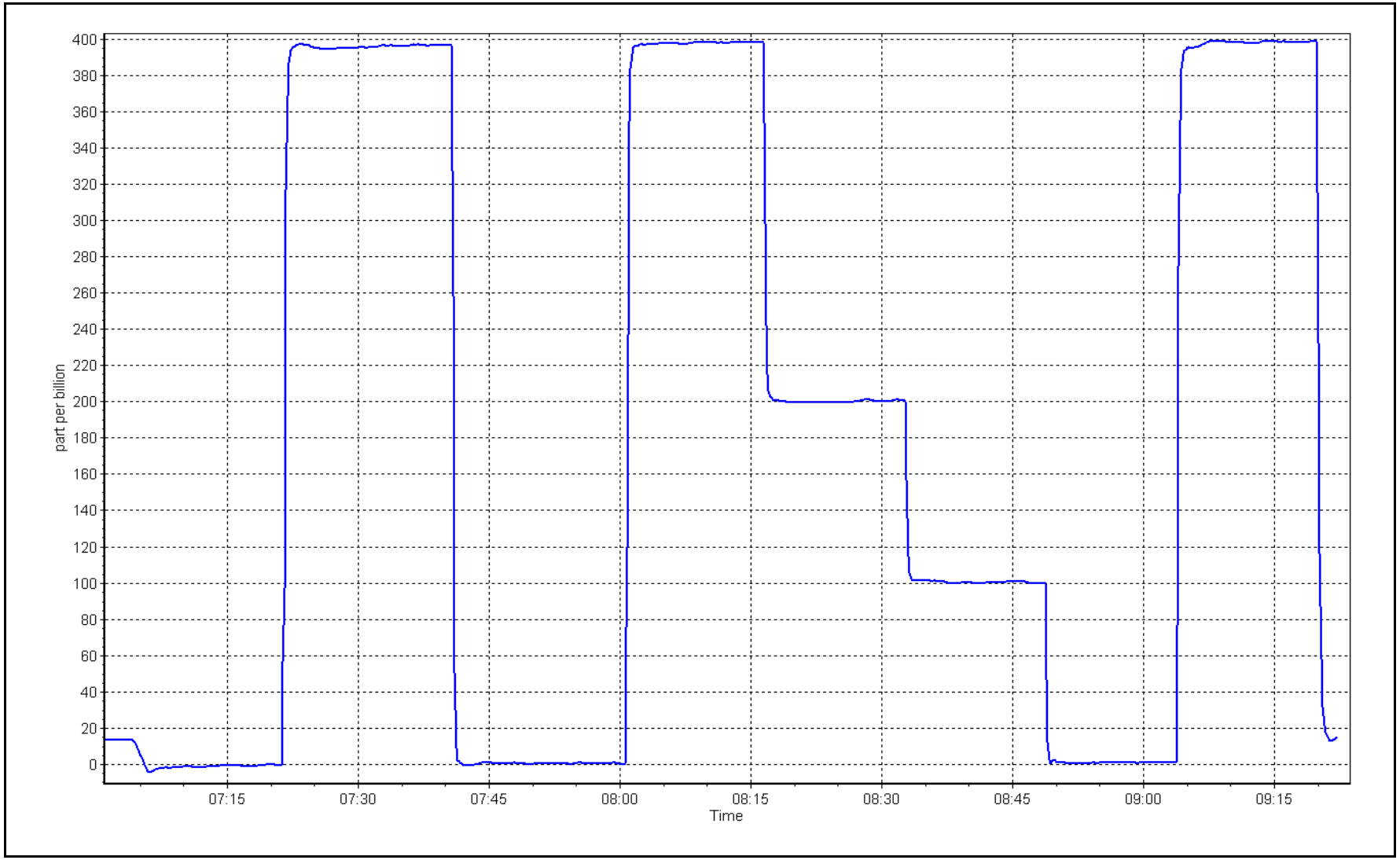
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
400.0	398.5	1.0038
200.0	200.6	0.9970
100.0	100.4	0.9960

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999990	*≥0.995*
Slope	0.995171	*0.90 - 1.10*
Intercept	0.820000	*+/- 5*



O_3 Calibration Plot Date: October 10, 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:	October 18, 2023	Last Cal Date:	September 13, 2023
Start time (MST):	6:54	End time (MST):	8:07
Analyzer Make:	API T640	S/N:	322
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Deltacal	S/N:	1451
Temp/RH standard:	Deltacal	S/N:	1451

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	4	4	4	☐	+/- 2 °C
P (mmHg)	722.8	724.4	722.8	☐	+/- 10 mmHg
flow (LPM)	5.03	4.92	5.03	☐	+/- 0.25 LPM

Leak Test: Date of check: October 18, 2023 Last Cal Date: September 13, 2023

PM w/o HEPA: 24 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	10	10	10.7	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 12.8 w/ HEPA: 0

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

Disposable Filter Changed: October 18, 2023

Annual Maintenance

Date Sample Tube Cleaned: October 18, 2023

Date RH/T Sensor Cleaned: May 23, 2023

Notes: PMT adjusted. No other adjustments done. Head cleaned.

Calibration by: Melissa Lemay

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS05
MANNIX
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	October 4, 2023	Last Cal Date:	September 15, 2023
Start time (MST):	9:05	End time (MST):	12:45
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:	0.998615	0.994288	Backgd or Offset:	8.9	8.9
Calibration intercept:	0.320000	1.060000	Coeff or Slope:	0.930	0.930

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.7	----
as found span	4920	80.0	800.3	794.4	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.8	----
high point	4920	80.0	800.3	796.7	1.005
second point	4960	40.0	400.2	399.0	1.003
third point	4980	20.0	200.1	200.3	0.999
as left zero	5000	0.0	0.0	0.7	----
as left span	4920	80.0	800.3	799.1	1.002
				Average Correction Factor	1.002

Baseline Corr As found:	793.70	Previous response	799.53	*% change	-0.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

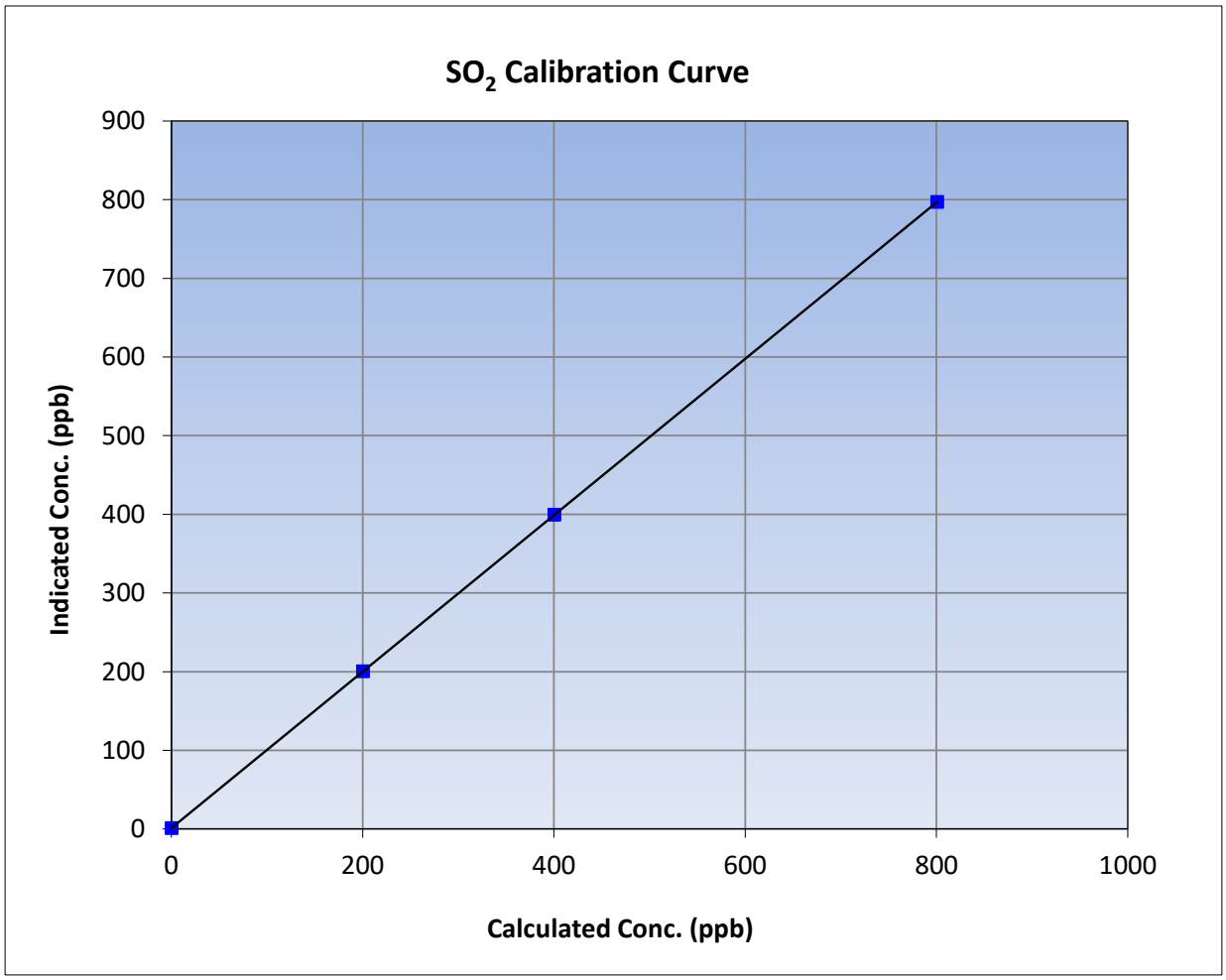
Station Information

Calibration Date:	October 4, 2023	Previous Calibration:	September 15, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	9:05	End Time (MST):	12:45
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841399

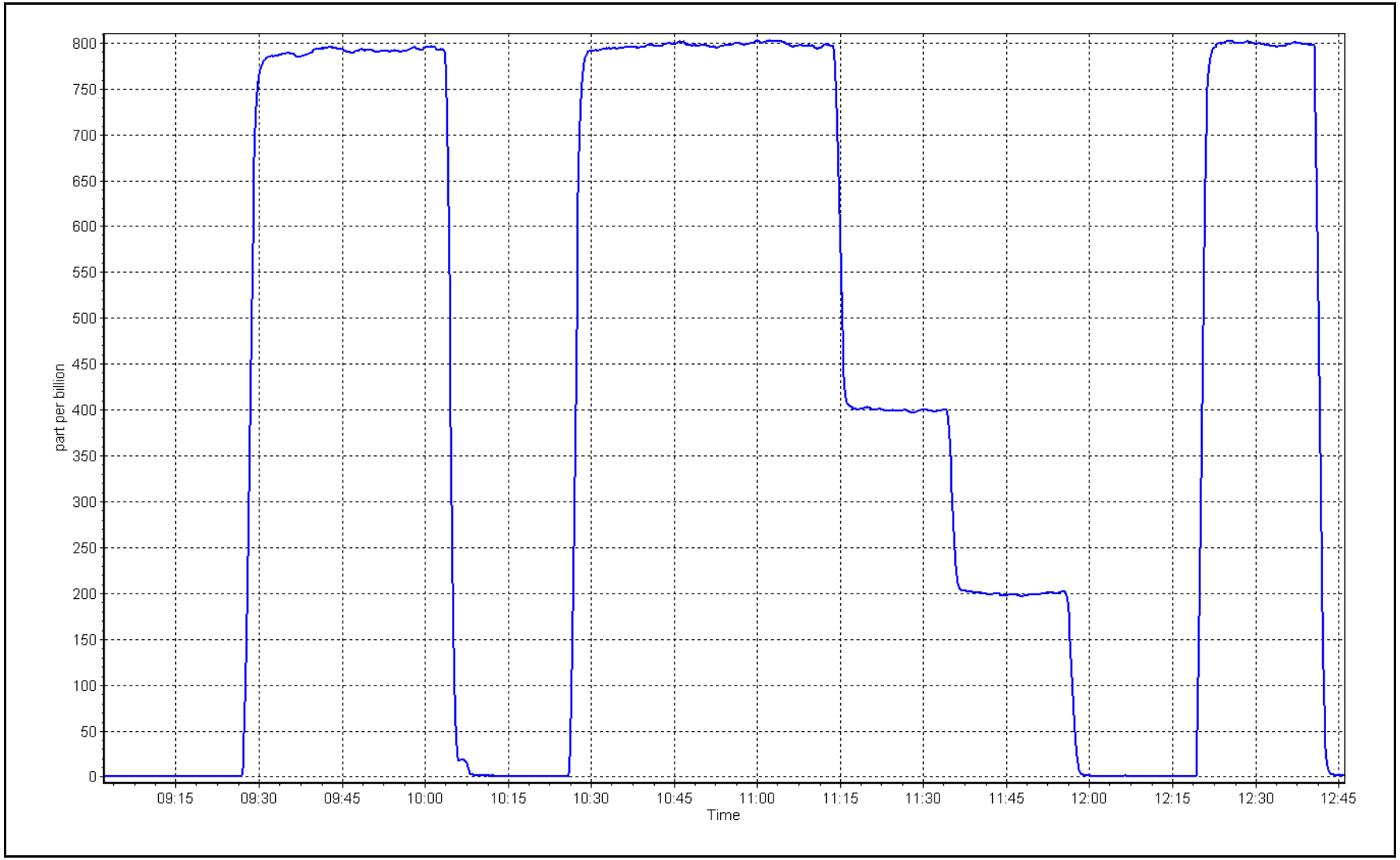
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.8	----
800.3	796.7	1.0045
400.2	399.0	1.0029
200.1	200.3	0.9989

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	0.994288	*0.90 - 1.10*
Intercept	1.060000	*+/-30*



SO2 Calibration Plot Date: October 4, 2023 Location: Mannix



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	October 16, 2023	Last Cal Date:	September 18, 2023
Start time (MST):	9:33	End time (MST):	14:18
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:	0.994760	0.970189	Backgd or Offset:	2.18	2.18
Calibration intercept:	0.380518	0.340566	Coeff or Slope:	0.866	0.866

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4919	81.3	80.0	81.0	0.989
as found 2nd point	4960	40.7	40.0	40.4	0.994
as found 3rd point	4980	20.3	20.0	19.7	1.019
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.3	----
high point	4919	81.3	80.0	77.9	1.027
second point	4960	40.7	40.0	39.3	1.019
third point	4980	20.3	20.0	19.7	1.014
as left zero	5000	0.0	0.0	0.9	----
as left span	4919	81.3	80.0	76.4	1.047
SO2 Scrubber Check	4920	80.0	800.0	-0.1	----
Date of last scrubber change:				Ave Corr Factor	1.020
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.9	Prev response:	79.96	*% change:	1.2%
Baseline Corr 2nd AF pt:	40.3	AF Slope:	1.013614	AF Intercept:	-0.179437
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999938		

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after as founds. Ran a SO2 scrubber check after calibrator zero. There is 3ppb of difference between as found and calibrator span, suspecting this is caused by the zero-air drying out the scrubber beads, this is why no adjustments made.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

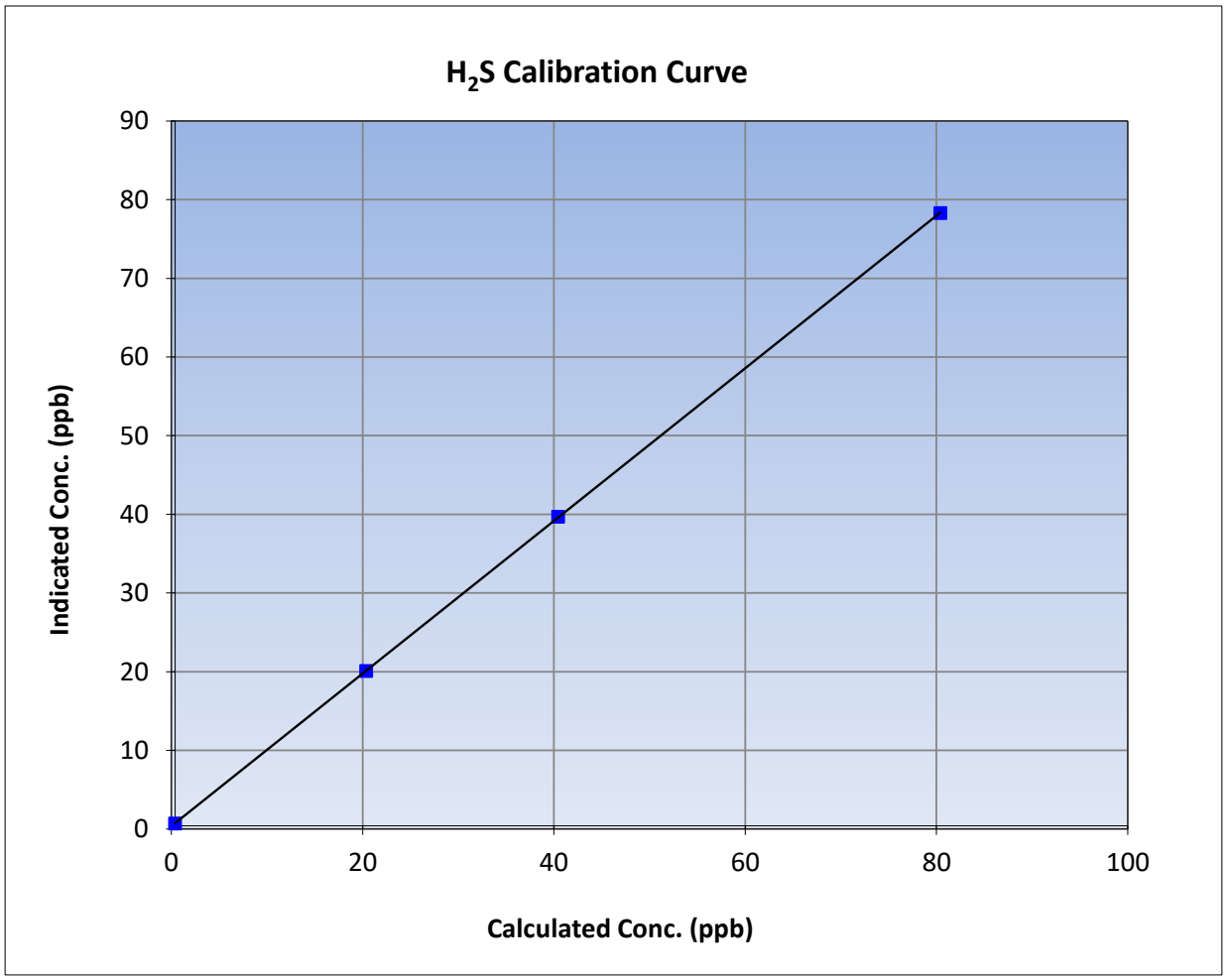
Station Information

Calibration Date:	October 16, 2023	Previous Calibration:	September 18, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	9:33	End Time (MST):	14:18
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1203169745

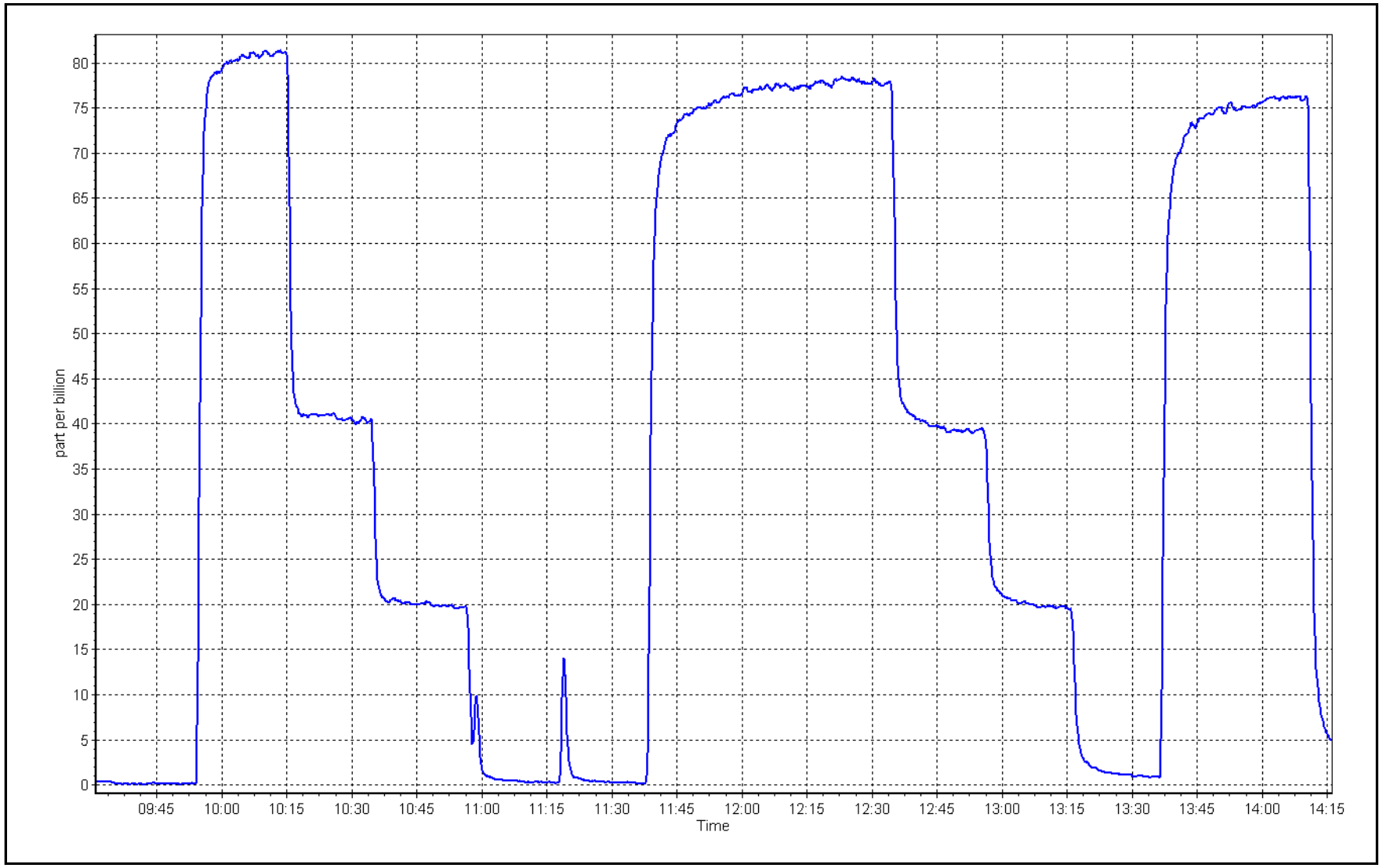
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
80.0	77.9	1.0269
40.0	39.3	1.0189
20.0	19.7	1.0139

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	0.970189	*0.90 - 1.10*
Intercept	0.340566	*+/-3*



H_2S Calibration Plot Date: October 16, 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:	October 4, 2023	Last Cal Date:	September 15, 2023
Start time (MST):	9:04	End time (MST):	12:45
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1152430011	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.62E-05	2.64E-05	NMHC SP Ratio:	4.44E-05	4.50E-05
CH4 Retention time:	15.00	15.00	NMHC Peak Area:	206221	203435
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	17.04	1.011
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	17.23	17.23	1.000
second point	4960	40.0	8.61	8.61	1.000
third point	4980	20.0	4.31	4.31	0.999
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	17.23	17.39	0.991
				Average Correction Factor	1.000
Baseline Corr AF:	17.04	Prev response	17.07	*% 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	80.0	9.15	9.03	1.013
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	9.15	9.14	1.001
second point	4960	40.0	4.57	4.60	0.995
third point	4980	20.0	2.29	2.31	0.990
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	9.15	9.25	0.989
				Average Correction Factor	0.995
Baseline Corr AF:	9.03	Prev response	9.07	*% change	-0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	8.08	8.00	1.010
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	8.08	8.08	0.999
second point	4960	40.0	4.04	4.02	1.005
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	8.14	0.993
				Average Correction Factor	1.005
Baseline Corr AF:	8.00	Prev response	8.00	*% change	0.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.991126	0.999944
THC Cal Offset:	0.001000	0.001800
CH4 Cal Slope:	0.992078	1.001075
CH4 Cal Offset:	-0.010800	-0.012600
NMHC Cal Slope:	0.990661	0.998844
NMHC Cal Offset:	0.011800	0.014800

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

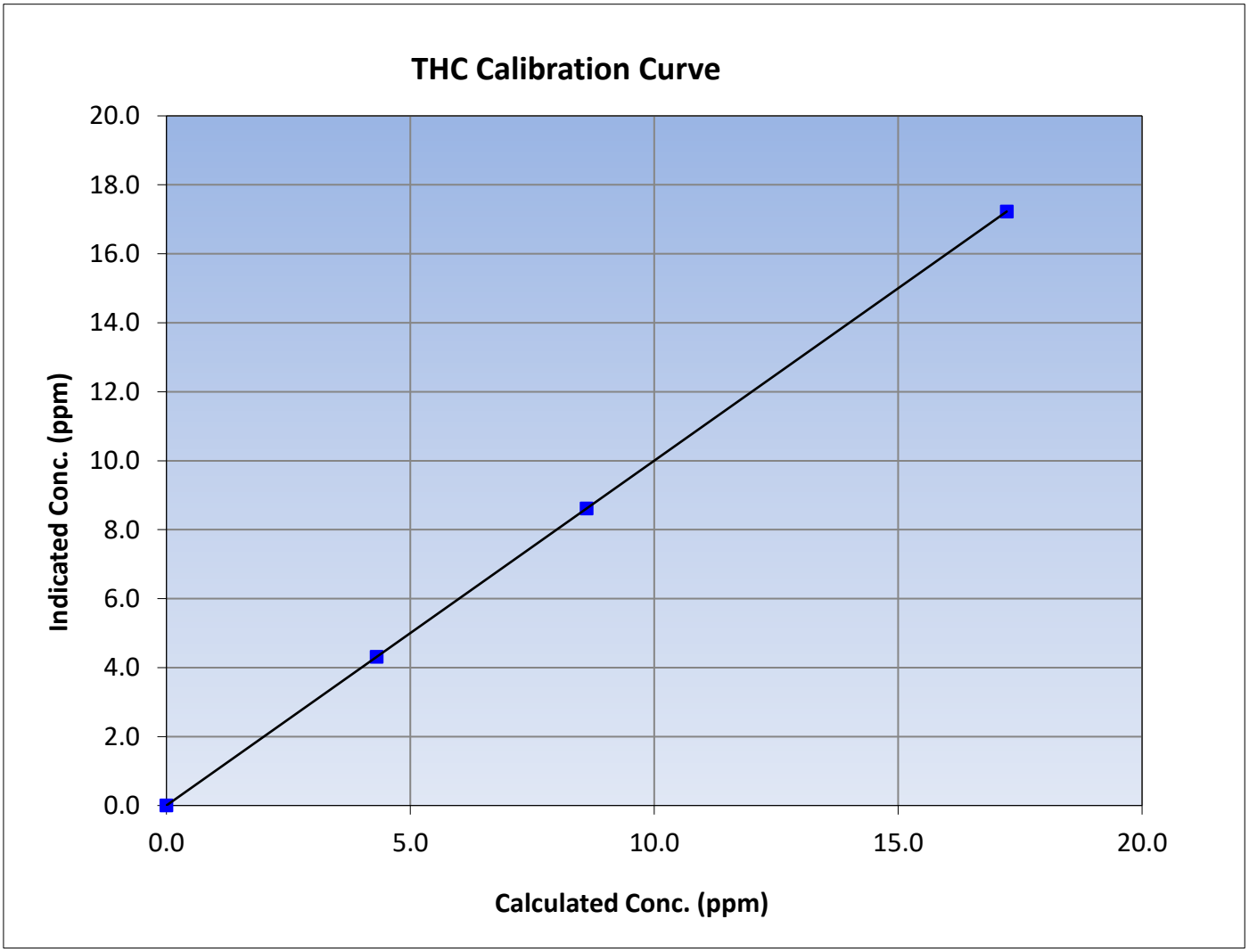
Version-06-2022

Station Information

Calibration Date:	October 4, 2023	Previous Calibration:	September 15, 2023
Station Name:	Mannix	Station Number:	AMS 05
Start Time (MST):	9:04	End Time (MST):	12:45
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	1.000000	≥0.995
17.23	17.23	0.9999			
8.61	8.61	1.0001	Slope	0.999944	0.90 - 1.10
4.31	4.31	0.9987			
			Intercept	0.001800	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

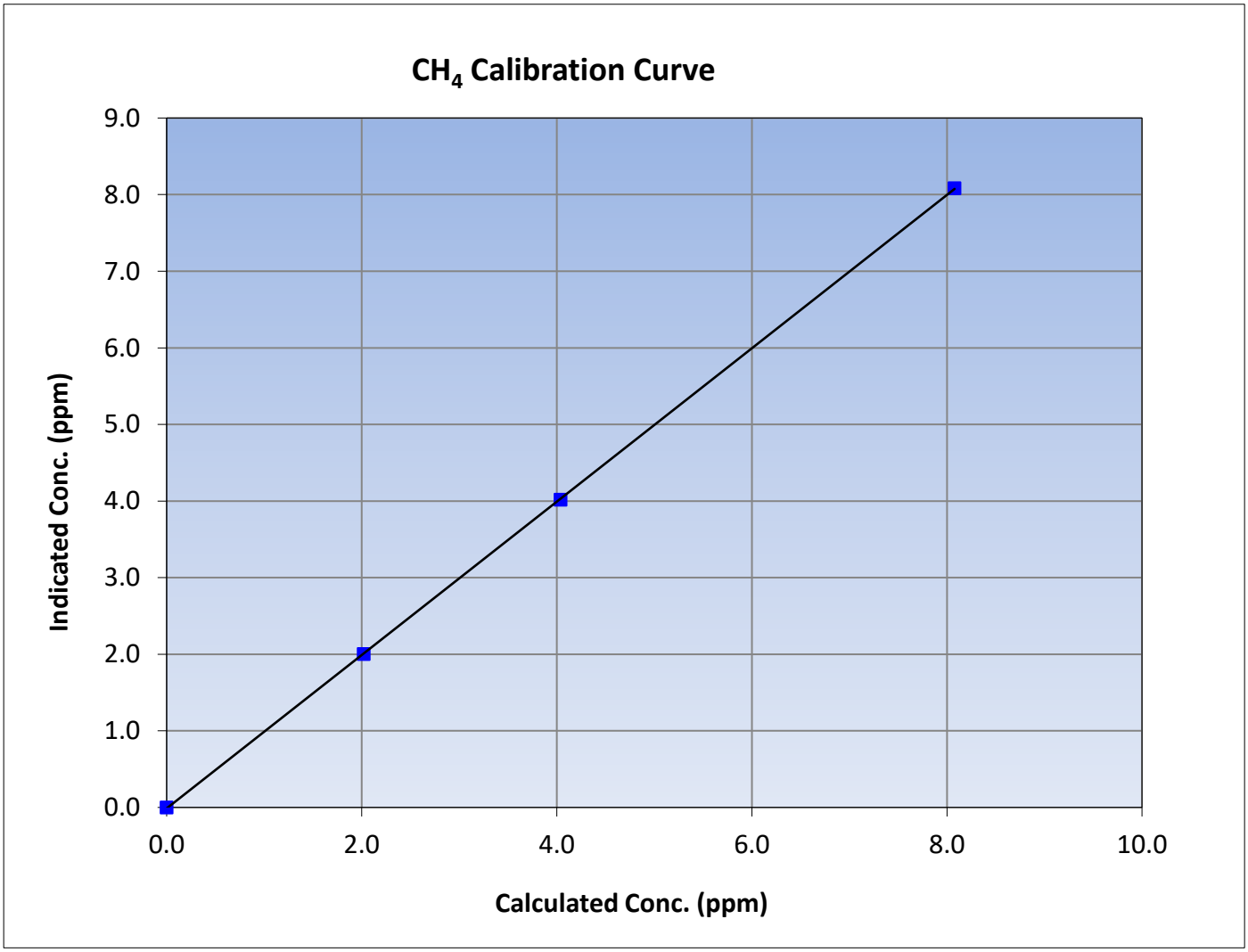
Version-06-2022

Station Information

Calibration Date:	October 4, 2023	Previous Calibration:	September 15, 2023
Station Name:	Mannix	Station Number:	AMS 05
Start Time (MST):	9:04	End Time (MST):	12:45
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	0.999987	*≥0.995*
8.08	8.08	0.9994			
4.04	4.02	1.0053	Slope	1.001075	*0.90 - 1.10*
2.02	2.00	1.0093			
			Intercept	-0.012600	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

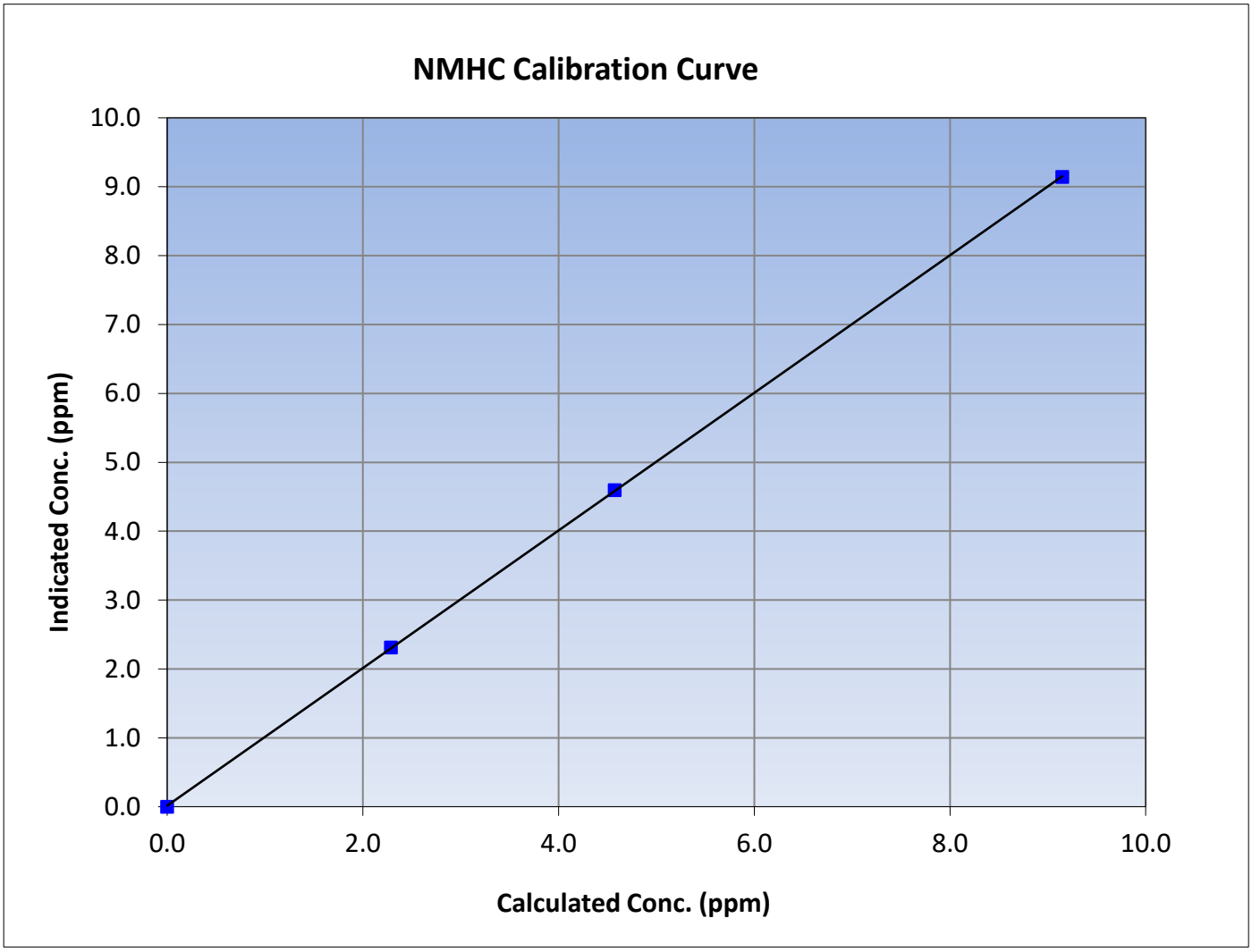
Version-06-2022

Station Information

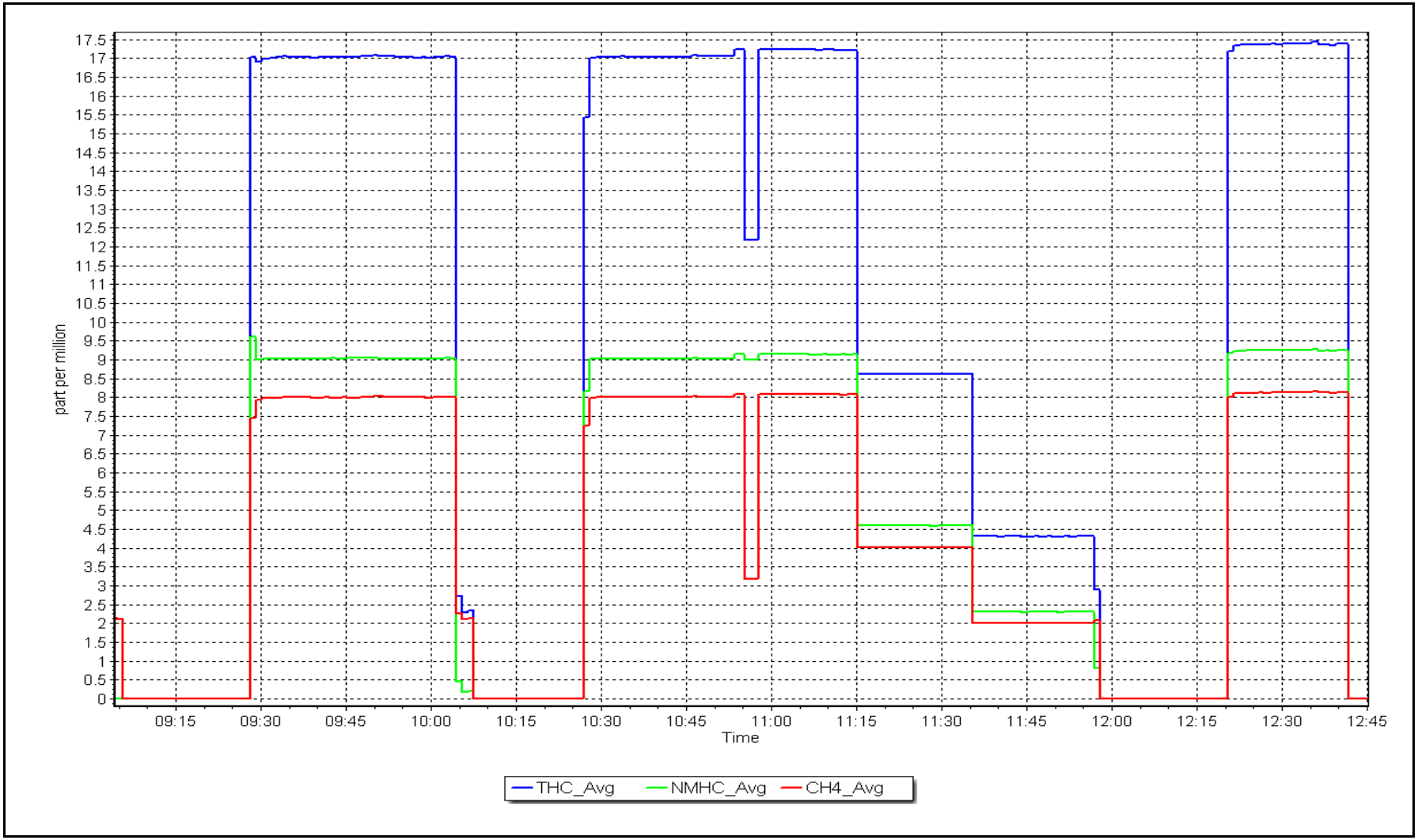
Calibration Date:	October 4, 2023	Previous Calibration:	September 15, 2023
Station Name:	Mannix	Station Number:	AMS 05
Start Time (MST):	9:04	End Time (MST):	12:45
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999987	*≥0.995*
9.15	9.14	1.0005			
4.57	4.60	0.9954	Slope	0.998844	*0.90 - 1.10*
2.29	2.31	0.9896			
			Intercept	0.014800	*+/-0.5*



NMHC Calibration Plot Date: October 4, 2023 Location: Mannix



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS06
PATRICIA MCINNES
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	October 19, 2023	Last Cal Date:	September 14, 2023
Start time (MST):	8:52	End time (MST):	12:45
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000605	0.998819	Backgd or Offset:	17.4	17.4
Calibration intercept:	1.660053	2.459939	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	0.0	----
as found span	4920	80.3	799.5	797.5	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4920	80.3	799.5	799.8	1.000
second point	4960	40.2	400.2	403.5	0.992
third point	4980	20.1	200.1	204.5	0.979
as left zero	5000	0.0	0.0	0.1	----
as left span	4920	80.3	799.5	800.9	0.998
				Average Correction Factor	0.990

Baseline Corr As found:	797.50	Previous response	801.61	*% change	-0.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

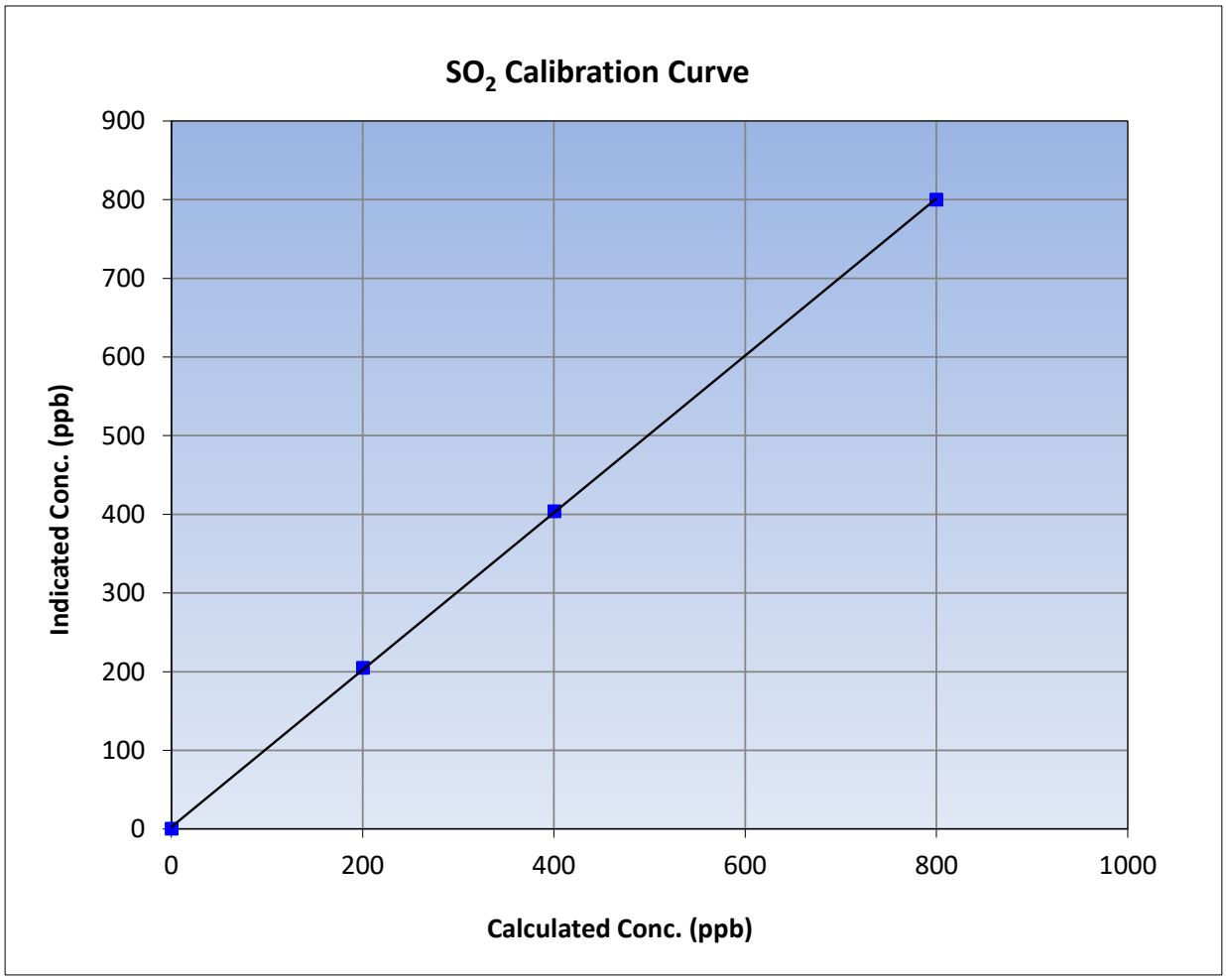
Station Information

Calibration Date:	October 19, 2023	Previous Calibration:	September 14, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:52	End Time (MST):	12:45
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290013

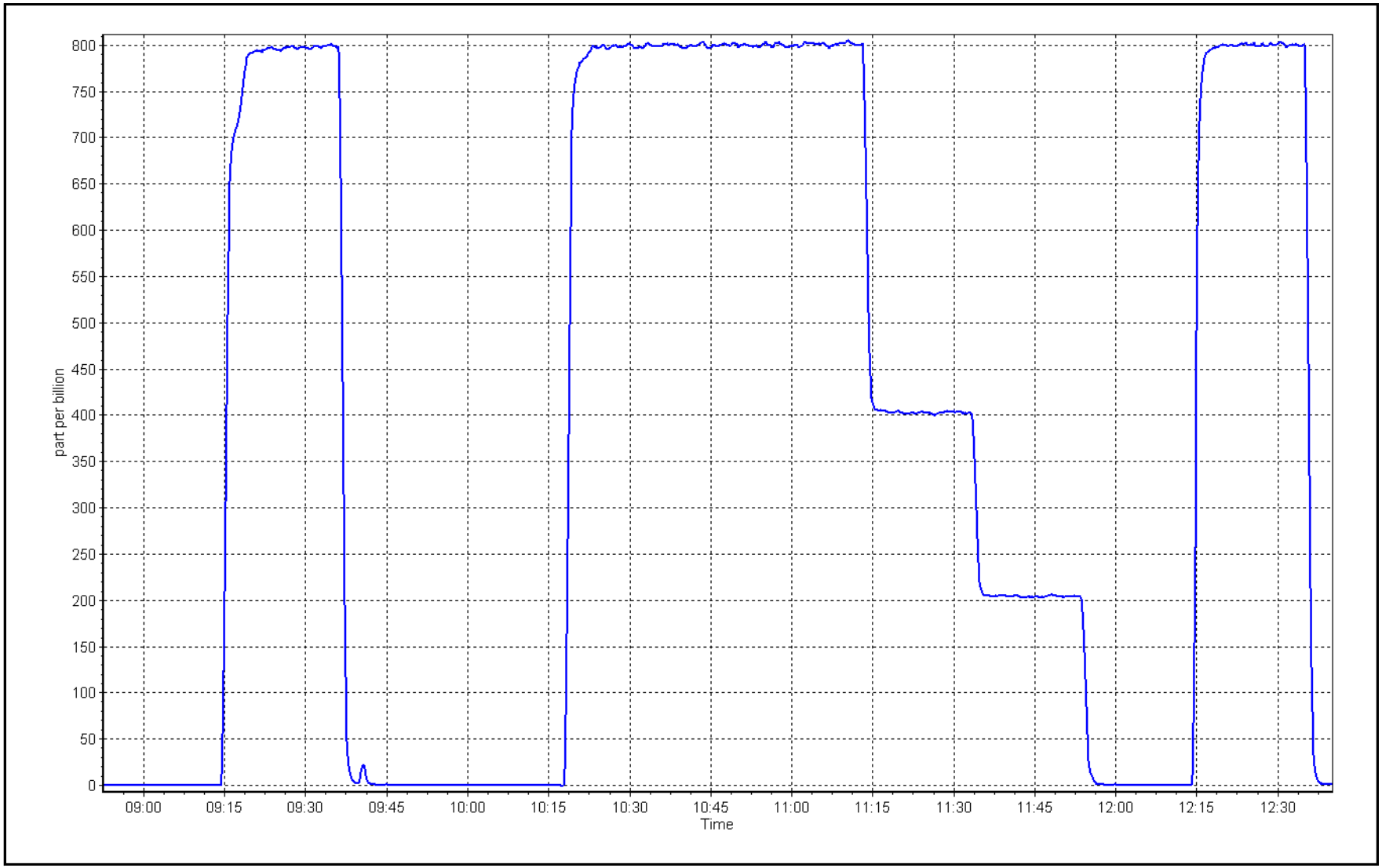
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
799.5	799.8	0.9996
400.2	403.5	0.9919
200.1	204.5	0.9786

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999963	*≥0.995*
Slope	0.998819	*0.90 - 1.10*
Intercept	2.459939	*+/-30*



SO2 Calibration Plot Date: October 19, 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:	October 13, 2023	Last Cal Date:	September 22, 2023
Start time (MST):	9:25	End time (MST):	13:29
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.38	ppm	Cal Gas Exp Date:	March 2, 2023
Cal Gas Cylinder #:	EY0000809			
Removed Cal Gas Conc:	5.38	ppm	Rem Gas Exp Date:	N/A
Removed Gas Cyl #:	N/A		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3566
ZAG Make/Model:	API T701		Serial Number:	4602

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1218153358	
Converter make:	CDN-101		Converter serial #:	517	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.004636	0.995918	Backgd or Offset:	2.05	2.05
Calibration intercept:	0.217058	0.297166	Coeff or Slope:	1.189	1.189

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4926	74.3	79.9	78.6	1.017
as found 2nd point	4963	37.2	40.0	39.5	1.013
as found 3rd point	4981	18.6	20.0	19.9	1.006
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4926	74.3	79.9	79.8	1.002
second point	4963	37.2	40.0	40.3	0.993
third point	4981	18.6	20.0	20.4	0.981
as left zero	5000	0.0	0.0	0.2	----
as left span	4926	74.3	79.9	80.7	0.991
SO2 Scrubber Check	4920	80.3	803.0	0.0	----
Date of last scrubber change:		December 20, 2021		Ave Corr Factor	0.992
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.6	Prev response:	80.53	*% change:	-2.5%
Baseline Corr 2nd AF pt:	39.5	AF Slope:	0.982477	AF Intercept:	0.117533
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999990		

* = > +/-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

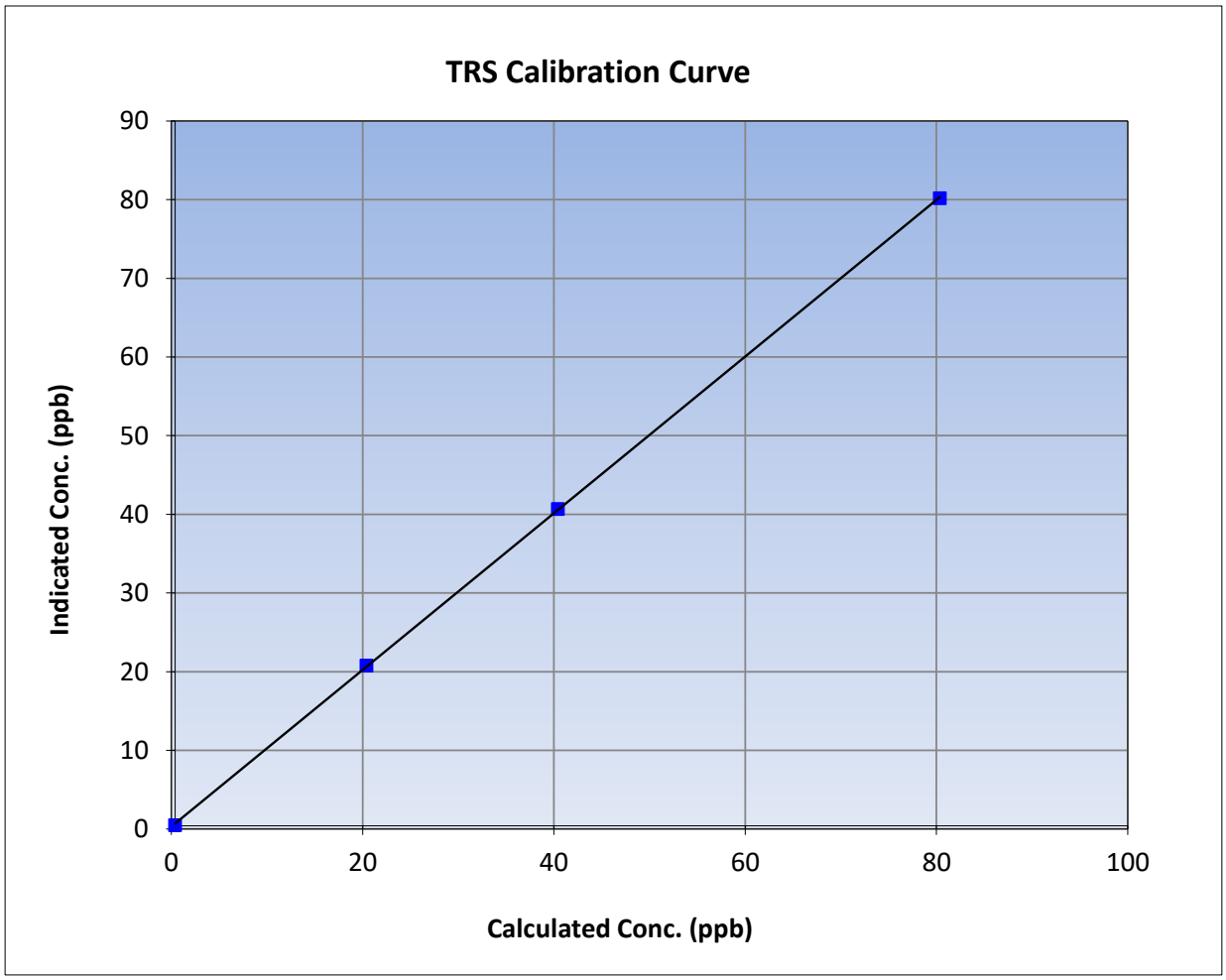
Station Information

Calibration Date:	October 13, 2023	Previous Calibration:	September 22, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:25	End Time (MST):	13:29
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1218153358

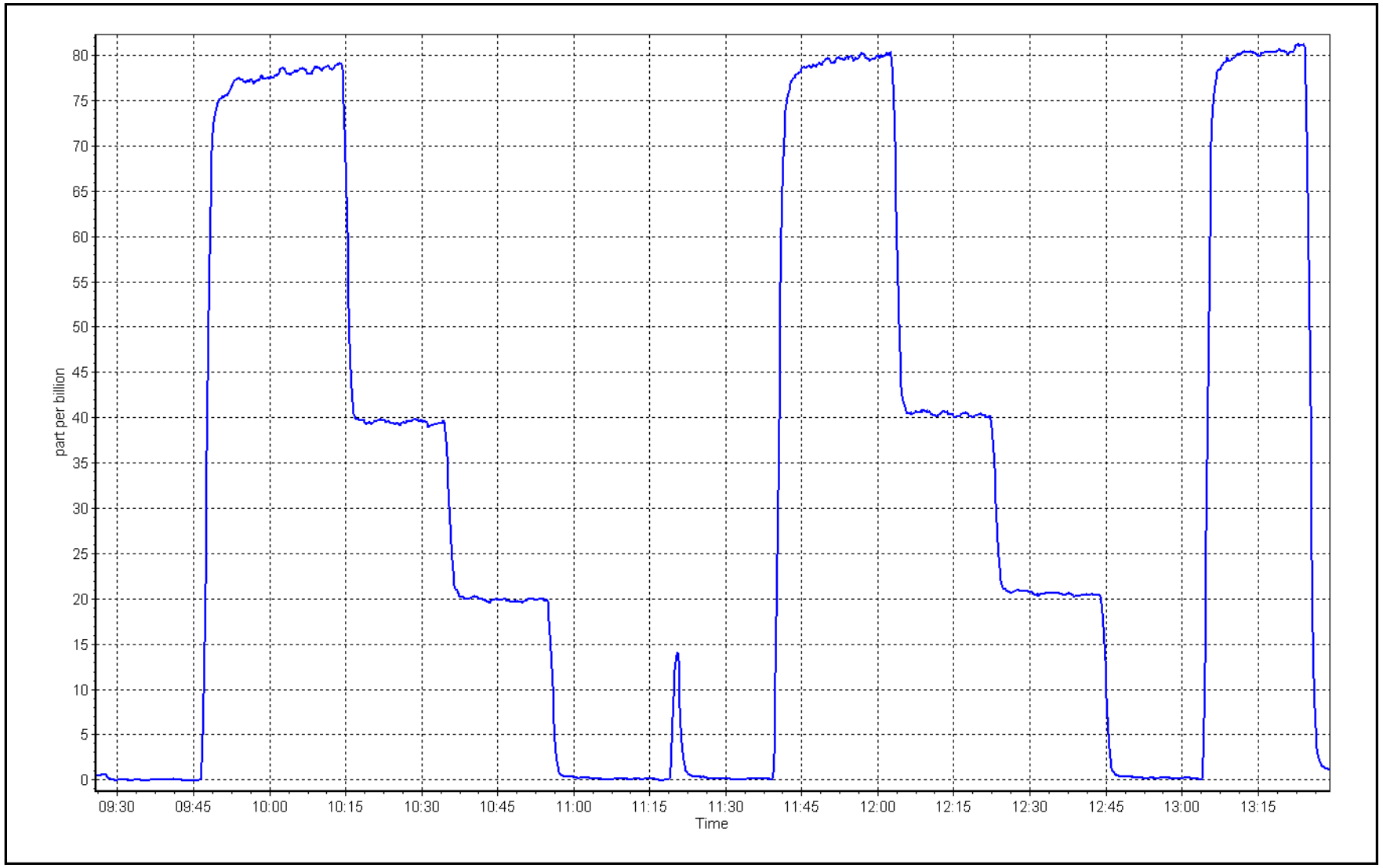
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
79.9	79.8	1.0018
40.0	40.3	0.9932
20.0	20.4	0.9811

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999971	*≥0.995*
Slope	0.995918	*0.90 - 1.10*
Intercept	0.297166	*+/-3*



TRS Calibration Plot Date: October 13, 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:	October 19, 2023	Last Cal Date:	September 14, 2023
Start time (MST):	8:52	End time (MST):	12:45
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:	2.12E-04	2.15E-04	NMHC SP Ratio:	4.80E-05	4.87E-05
CH4 Retention time:	14.0	14.0	NMHC Peak Area:	189064	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	16.97	1.009
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	17.12	17.15	0.998
second point	4960	40.2	8.57	8.61	0.996
third point	4980	20.1	4.29	4.37	0.980
as left zero	5000	0.0	0.00	0.01	----
as left span	4920	80.3	17.12	17.20	0.995
				Average Correction Factor	0.991
Baseline Corr AF:	16.96	Prev response	17.17	*% change	-1.2%
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	0.01	----
as found span	4919.7	80.3	9.07	9.00	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919.7	80.3	9.07	9.09	0.998
second point	4960	40.2	4.54	4.59	0.990
third point	4980	20.1	2.27	2.35	0.967
as left zero	5000	0.0	0.00	0.01	----
as left span	4919.7	80.3	9.07	9.13	0.994
				Average Correction Factor	0.985
Baseline Corr AF:	8.98	Prev response	9.11	*% 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	4919.7	80.3	8.06	7.97	1.010
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919.7	80.3	8.06	8.06	0.999
second point	4960	40.2	4.03	4.02	1.003
third point	4980	20.1	2.02	2.03	0.994
as left zero	5000	0.0	0.00	0.00	----
as left span	4919.7	80.3	8.06	8.08	0.997
				Average Correction Factor	0.999
Baseline Corr AF:	7.97	Prev response	8.06	*% 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:	1.000464	1.000103
THC Cal Offset:	0.038421	0.036627
CH4 Cal Slope:	1.000059	0.999903
CH4 Cal Offset:	0.001844	0.001645
NMHC Cal Slope:	1.000823	1.000180
NMHC Cal Offset:	0.036578	0.035381

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

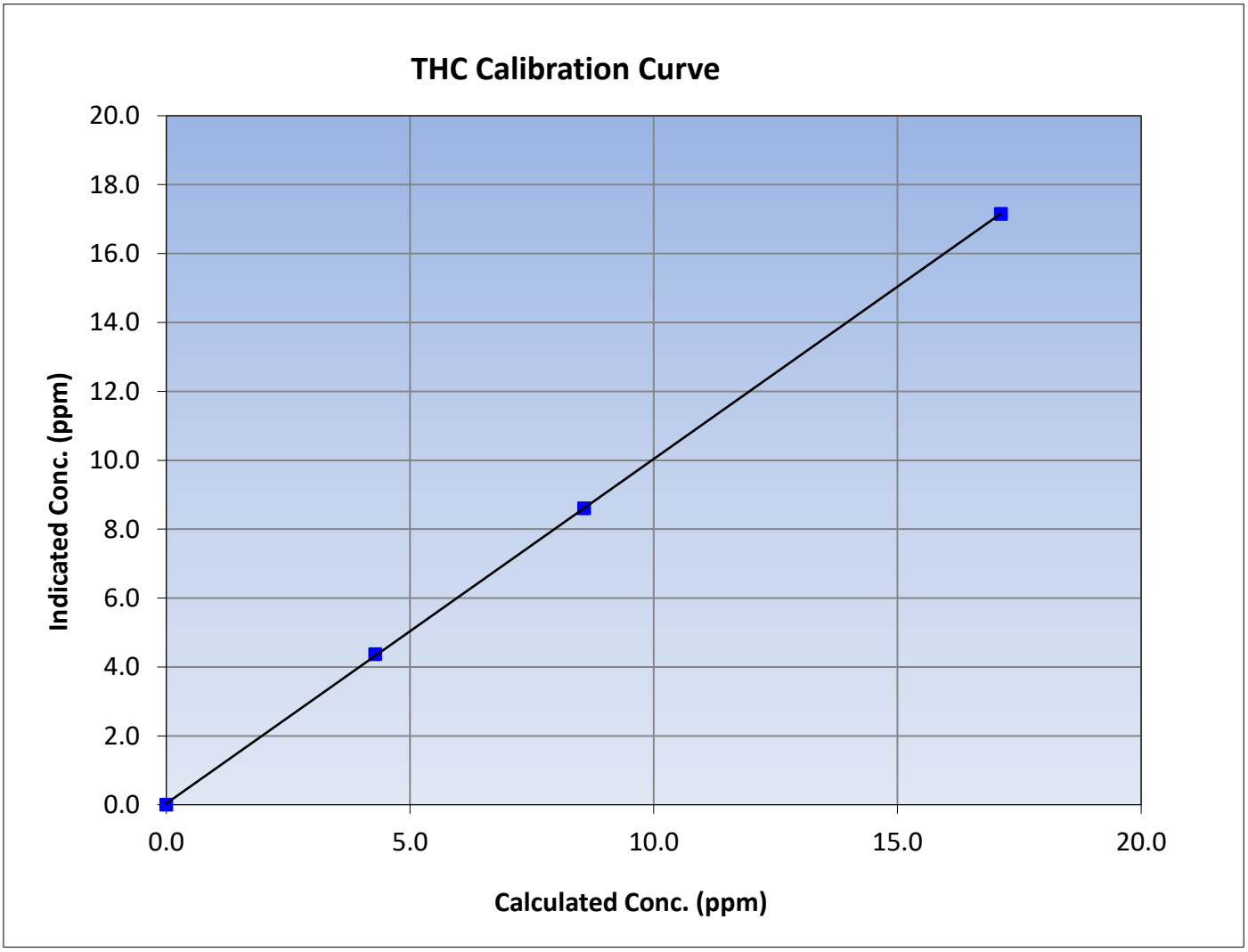
Version-06-2022

Station Information

Calibration Date:	October 19, 2023	Previous Calibration:	September 14, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:52	End Time (MST):	12:45
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
17.12	17.15	0.9984			
8.57	8.61	0.9960	Slope	1.000103	0.90 - 1.10
4.29	4.37	0.9799			
			Intercept	0.036627	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

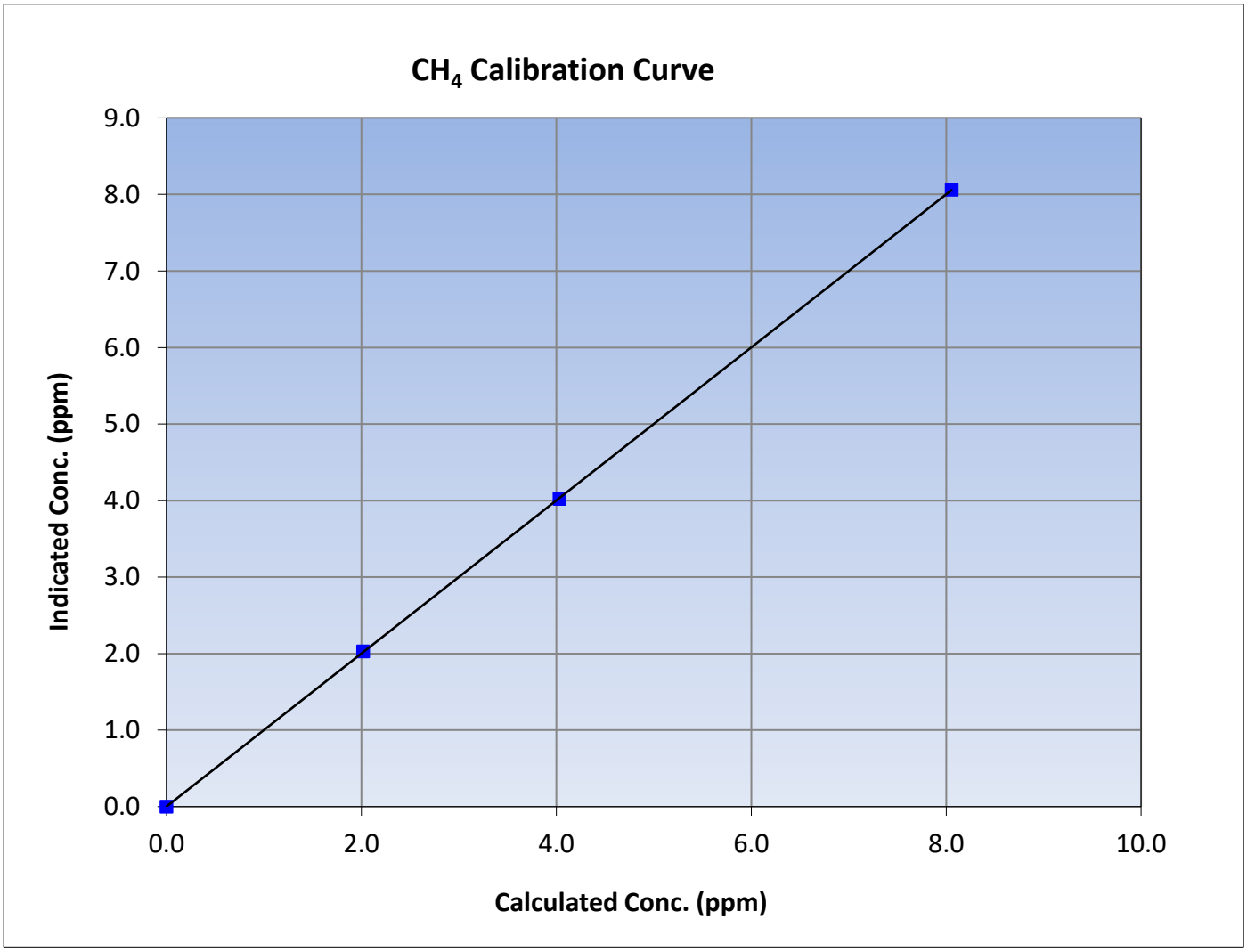
Version-06-2022

Station Information

Calibration Date:	October 19, 2023	Previous Calibration:	September 14, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:52	End Time (MST):	12:45
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	0.999993	≥0.995
8.06	8.06	0.9995			
4.03	4.02	1.0027	Slope	0.999903	0.90 - 1.10
2.02	2.03	0.9943			
			Intercept	0.001645	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

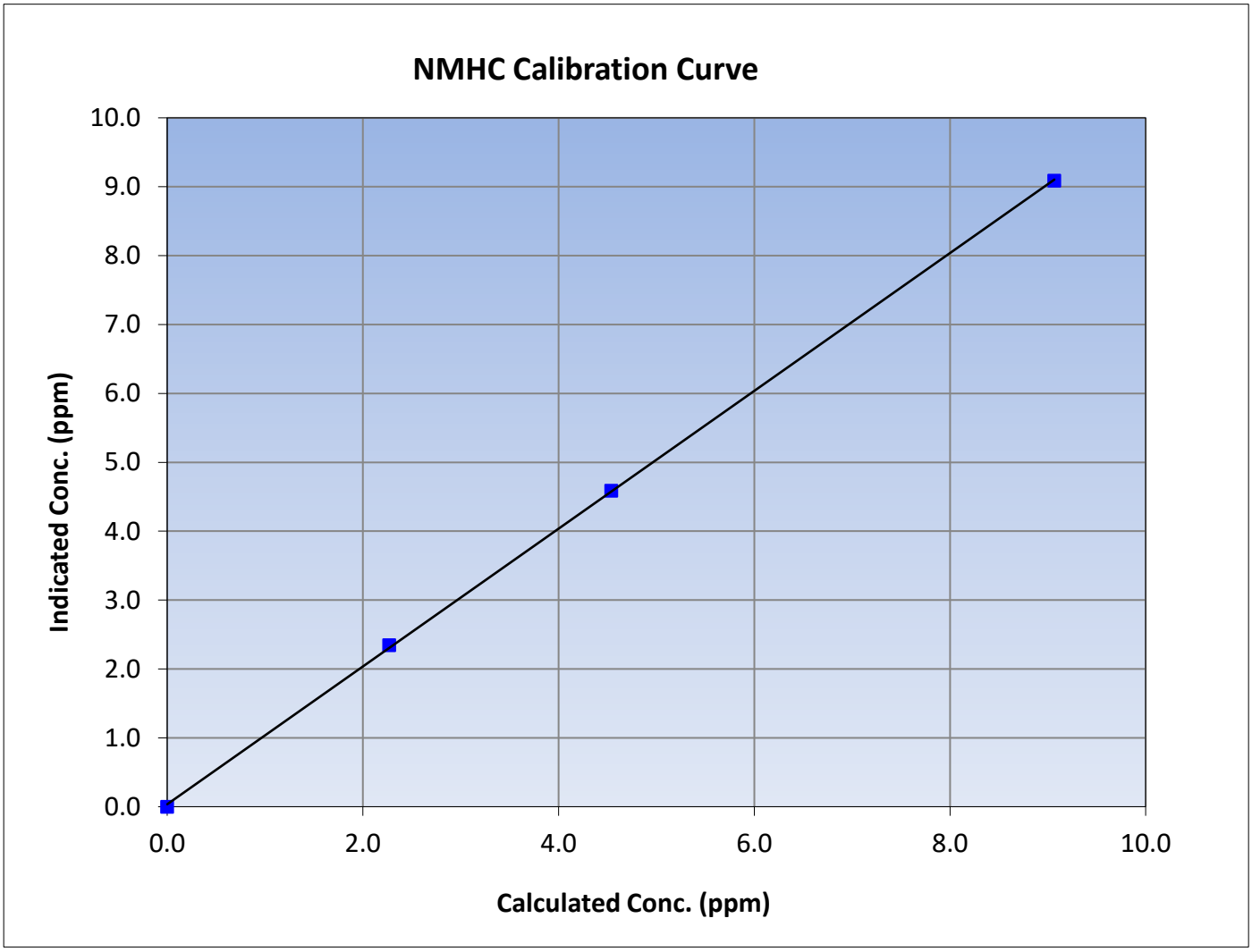
Version-06-2022

Station Information

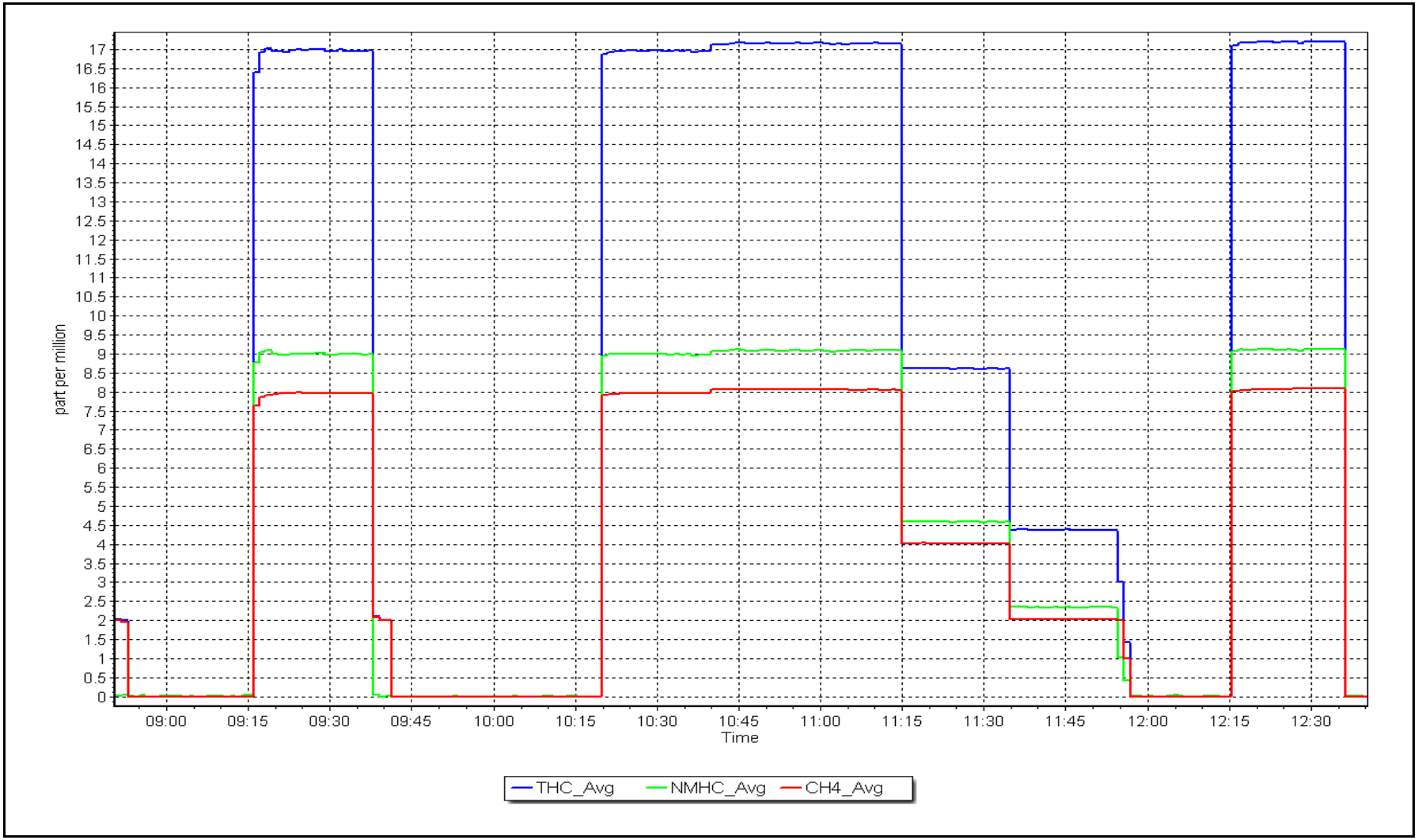
Calibration Date:	October 19, 2023	Previous Calibration:	September 14, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:52	End Time (MST):	12:45
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148495

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999928	≥0.995
9.07	9.09	0.9976			
4.54	4.59	0.9900	Slope	1.000180	0.90 - 1.10
2.27	2.35	0.9674			
			Intercept	0.035381	+/-0.5



NMHC Calibration Plot Date: October 19, 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:	October 12, 2023	Last Cal Date:	September 20, 2023
Start time (MST):	8:50	End time (MST):	13:26
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:	0.997367	1.000493
NO_X Cal Offset:	2.676082	2.095627
NO Cal Slope:	0.999173	1.001945
NO Cal Offset:	1.382870	0.962538
NO_2 Cal Slope:	1.001949	1.003982
NO_2 Cal Offset:	0.485373	-0.085539

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	0.3	-0.1	----	----
as found span	4914	86.2	826.5	799.7	26.7	827.6	798.6	29.0	0.9986	1.0014
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.3	0.4	-0.1	----	----
high point	4914	86.2	826.5	799.7	26.7	828.1	802.0	26.3	0.9980	0.9972
second point	4957	43.1	413.2	399.9	13.4	416.3	401.8	14.5	0.9926	0.9952
third point	4978	21.6	207.1	200.4	6.7	211.2	202.4	8.8	0.9807	0.9902
as left zero	5000	0.0	0.0	0.0	0.0	0.4	0.5	0.0	----	----
as left span	4914	86.2	826.5	400.6	425.8	824.0	405.2	418.7	1.0030	0.9887
								Average Correction Factor	0.9904	0.9942

Corrected As found	NO_X = 827.5 ppb	NO = 798.3 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = 0.1%
Previous Response	NO_X = 827.0 ppb	NO = 800.5 ppb		*Percent Change	NO = -0.3%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	801.1	402.0	425.8	427.4	0.9963	100.4%
2nd GPT point (200 ppb O3)	801.1	604.7	223.1	224.0	0.9961	100.4%
3rd GPT point (100 ppb O3)	801.1	703.4	124.4	124.8	0.9970	100.3%
				Average Correction Factor	0.9964	100.4%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

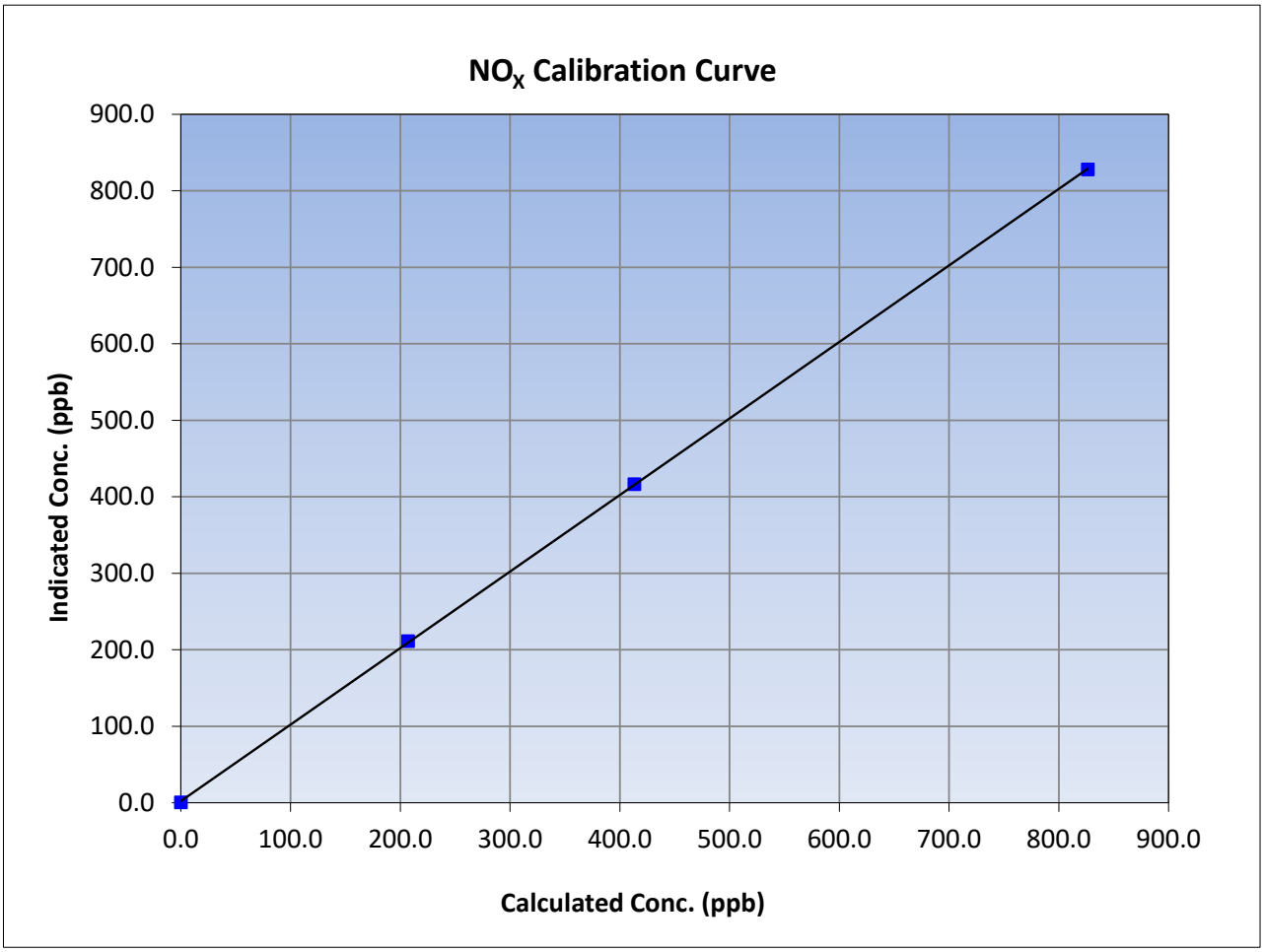
Version-04-2020

Station Information

Calibration Date:	October 12, 2023	Previous Calibration:	September 20, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:50	End Time (MST):	13:26
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	0.999978	*≥0.995*
826.5	828.1	0.9980			
413.2	416.3	0.9926	Slope	1.000493	*0.90 - 1.10*
207.1	211.2	0.9807			
			Intercept	2.095627	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

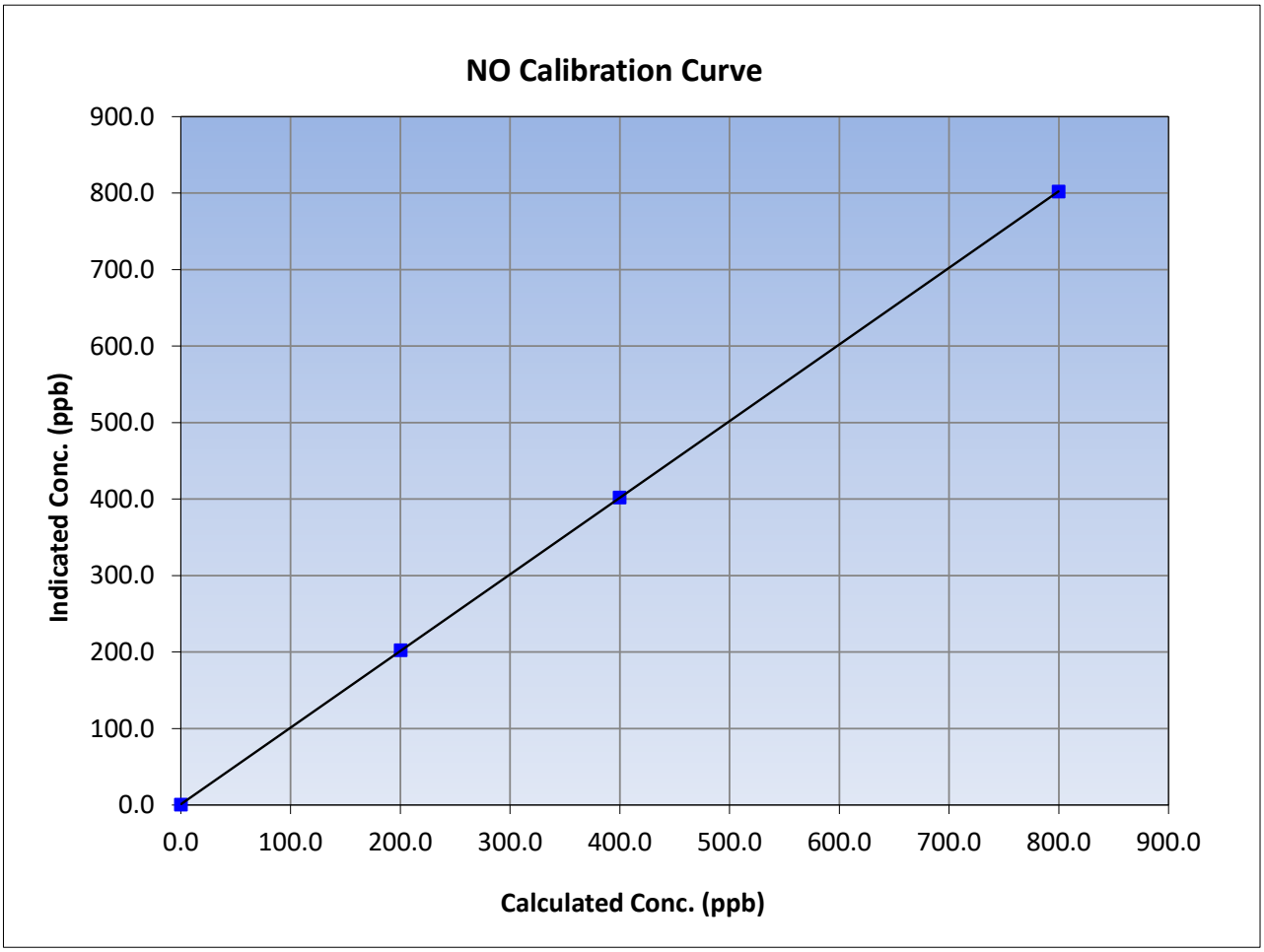
Version-04-2020

Station Information

Calibration Date:	October 12, 2023	Previous Calibration:	September 20, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:50	End Time (MST):	13:26
Analyzer make:	Thermo 42i	Analyzer serial #:	1172750022

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.4	----	Correlation Coefficient	0.999998	≥0.995
799.7	802.0	0.9972			
399.9	401.8	0.9952	Slope	1.001945	0.90 - 1.10
200.4	202.4	0.9902			
			Intercept	0.962538	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

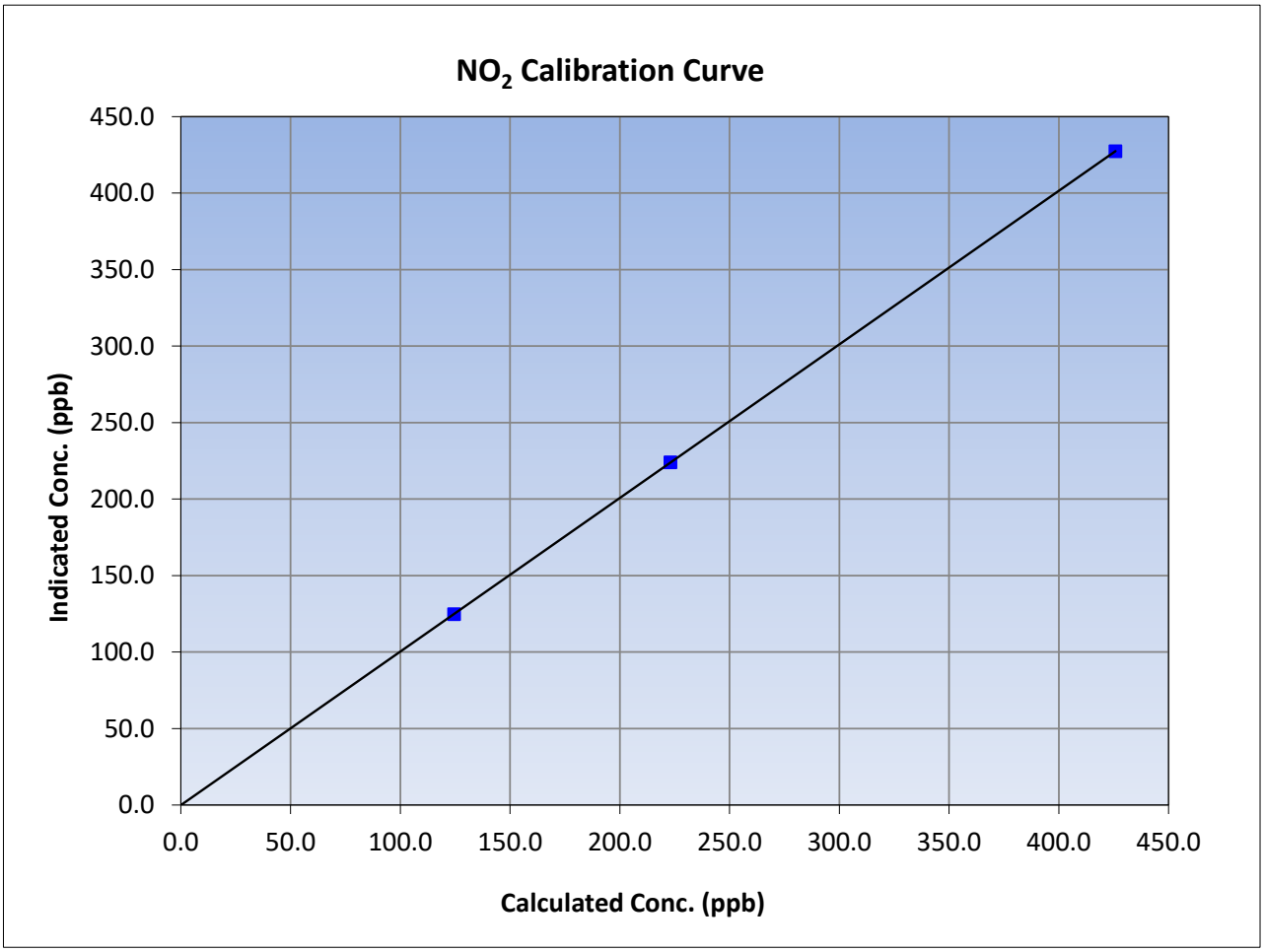
Version-04-2020

Station Information

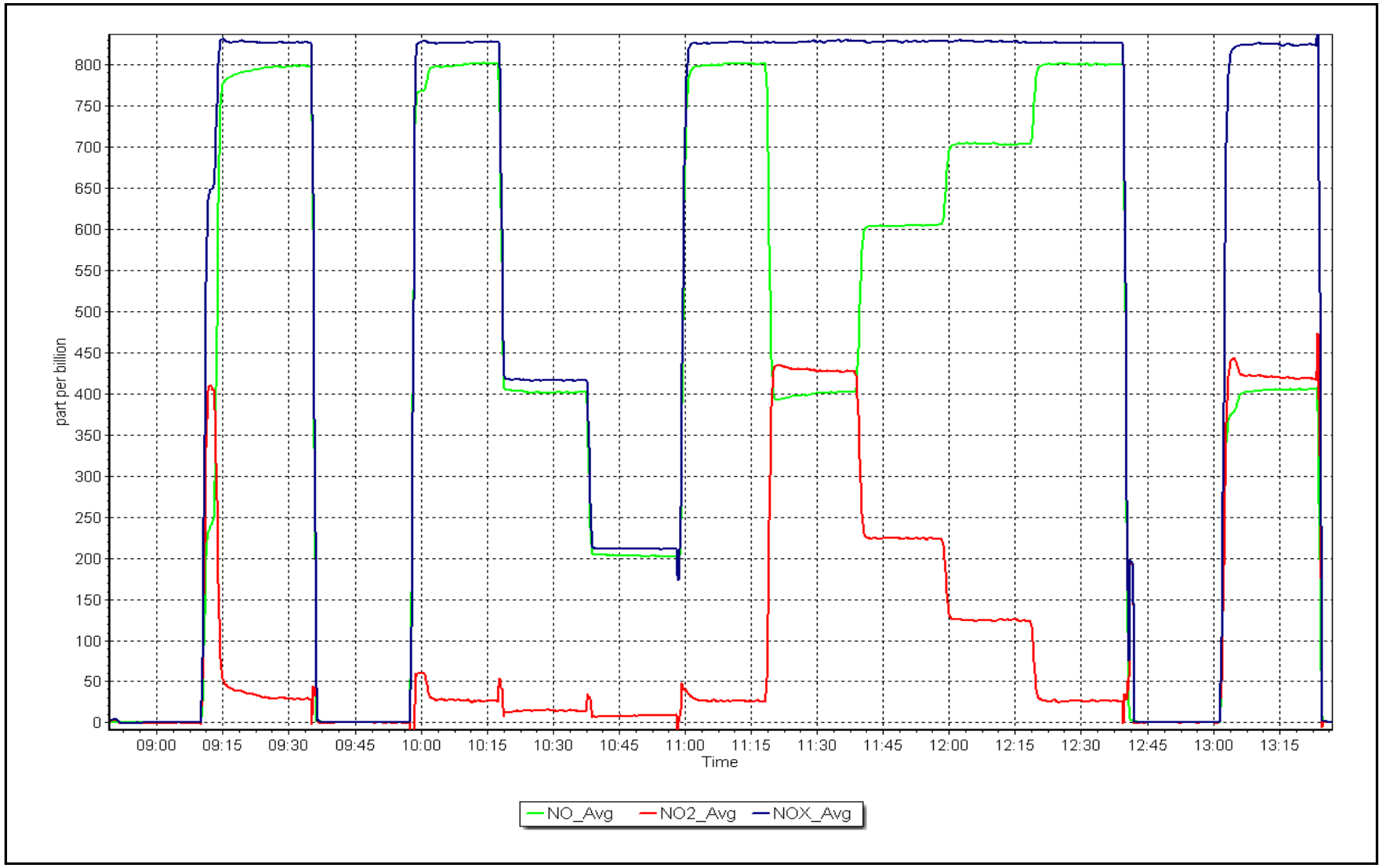
Calibration Date:	October 12, 2023	Previous Calibration:	September 20, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	8:50	End Time (MST):	13:26
Analyzer make:	Thermo 42i	Analyzer serial #:	1172750022

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.1	----	Correlation Coefficient	1.000000	*≥0.995*
425.8	427.4	0.9963			
223.1	224.0	0.9961	Slope	1.003982	*0.90 - 1.10*
124.4	124.8	0.9970			
			Intercept	-0.085539	*+/-20*



NO_X Calibration Plot Date: October 12, 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:	October 2, 2023	Last Cal Date:	September 5, 2023
Start time (MST):	9:03	End time (MST):	12:50
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:	1.005743	1.003714	Backgd or Offset:	-0.2	-0.2
Calibration intercept:	-0.480000	-2.700000	Coeff or Slope:	1.019	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	-0.7	----
as found span	5000	1303.0	400.0	391.8	1.021
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	-0.3	----
high point	5000	1303.0	400.0	400.0	1.000
second point	5000	966.5	200.0	196.8	1.016
third point	5000	794.3	100.0	95.3	1.049
as left zero	5000	800.0	0.0	-0.8	----
as left span	5000	1303.0	400.0	404.1	0.990
				Average Correction Factor	1.022

Baseline Corr As found:	392.5	Previous response	401.8	*% change	-2.4%
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 the span only.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

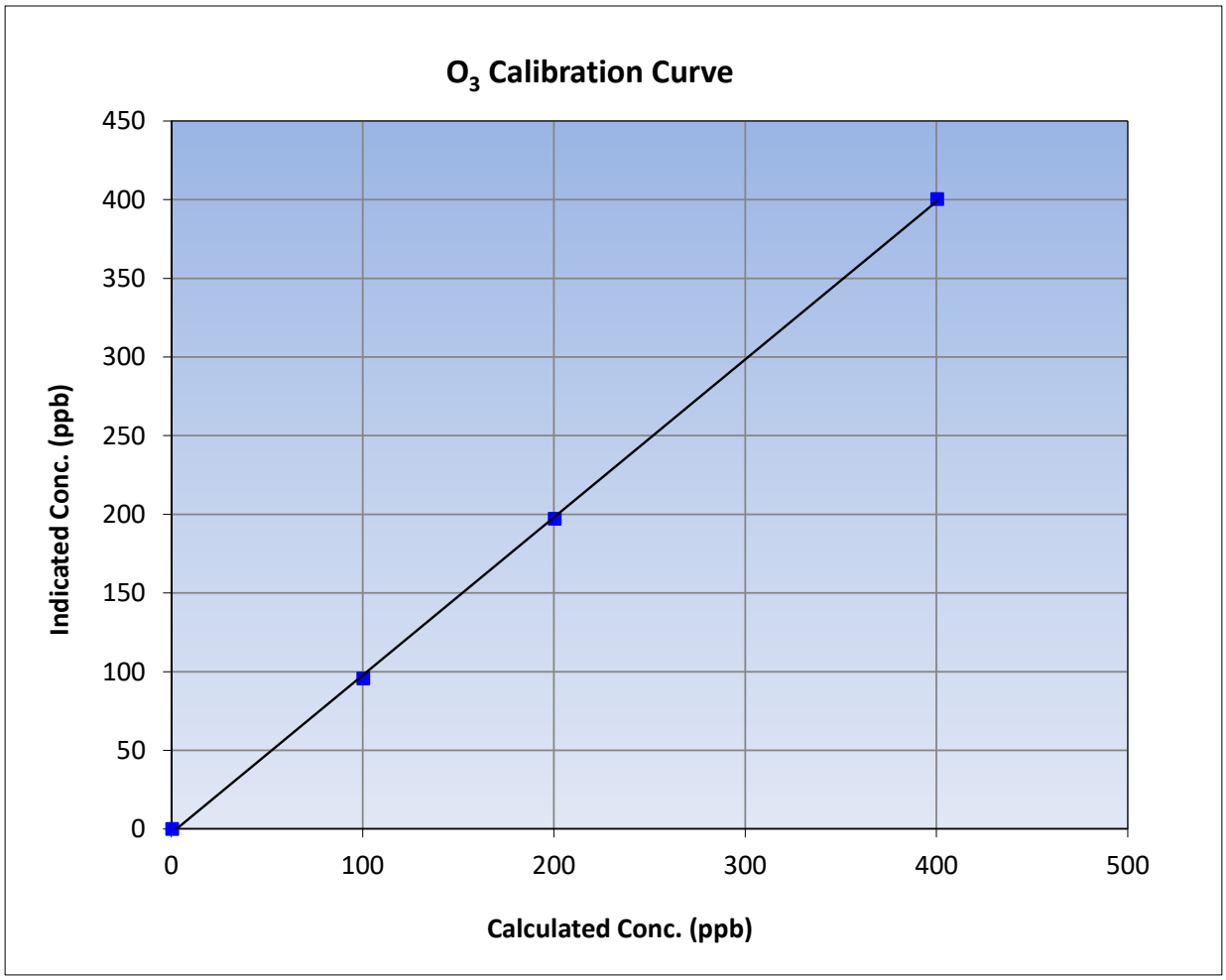
Station Information

Calibration Date:	October 2, 2023	Previous Calibration:	September 5, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:03	End Time (MST):	12:50
Analyzer make:	Thermo 49i	Analyzer serial #:	1300156234

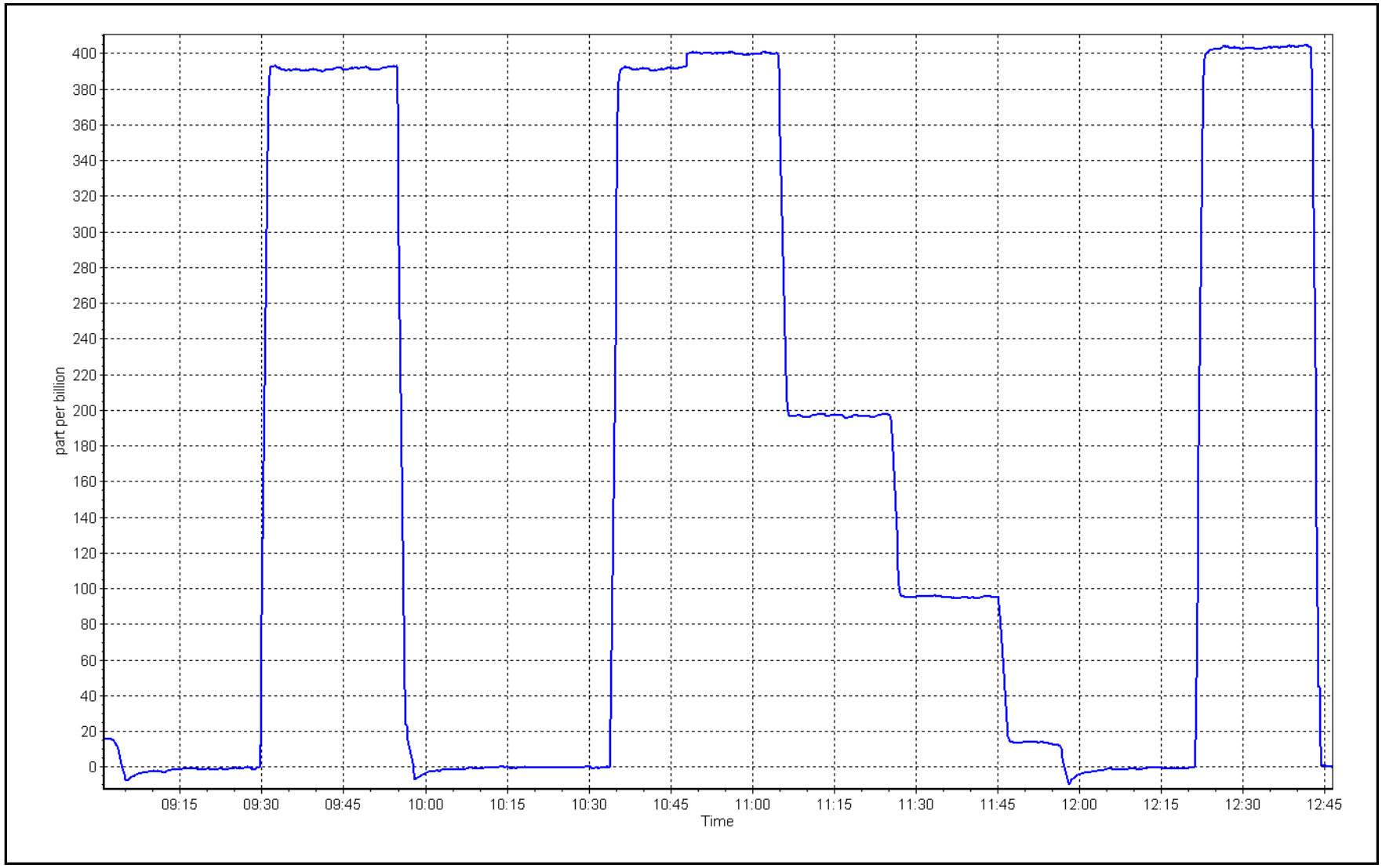
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
400.0	400.0	1.0000
200.0	196.8	1.0163
100.0	95.3	1.0493

Statistical Evaluation		Limits
Correlation Coefficient	0.999837	≥0.995
Slope	1.003714	0.90 - 1.10
Intercept	-2.700000	+/- 5



O_3 Calibration Plot Date: October 2, 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:	October 19, 2023	Last Cal Date:	September 22, 2023
Start time (MST):	13:05	End time (MST):	13:47
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)	17.2	16.8	17.2	☐	+/- 2 °C
P (mmHg)	716.1	717.5	716.1	☐	+/- 10 mmHg
flow (LPM)	5.05	4.82	5.05	☐	+/- 0.25 LPM

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

PM w/o HEPA: 3.3 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: 4.7 w/ HEPA: 0

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: PMT peak test 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:	October 3, 2023	Last Cal Date:	September 12, 2023
Start time (MST):	8:30	End time (MST):	12:45
NH3 Cal Date:	October 3, 2023	Last Cal Date:	September 12, 2023
Start time (MST):	12:50	End time (MST):	14:55
Reason:	Routine		

Calibration Standards

NOX Cal Gas Conc:	47.94	ppm	NO Gas Cylinder #:	T30YCWN
NO Cal Gas Conc:	46.39	ppm	NO Cal Gas Expiry:	April 11, 2025
Removed NOX Conc:	47.94	ppm	Removed Cylinder #:	NA
Removed NO Conc:	46.39	ppm	Removed cyl Expiry:	NA
NOX gas Diff:			NO gas Diff:	
NH3 Cal Gas Conc:	77.8	ppm	NH3 Gas Cylinder #:	CC710812
			NH3 Cal Gas Expiry:	March 30, 2023
Removed NH3 Conc:	77.8	ppm	Removed Cylinder #:	NA
NH3 gas Diff:			Removed cyl Expiry:	NA
Calibrator Model:	API T700		Serial Number:	3566
ZAG make/model:	API T701		Serial Number:	4602

Analyzer Information

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

	Start	*Finish*		*Start*	*Finish*
NO coefficient:	0.788	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:	1.000369	1.004061
NO_X Cal Offset:	1.915538	0.254959
NO Cal Slope:	1.000758	1.000231
NO Cal Offset:	0.303018	1.162694
NO_2 Cal Slope:	1.006122	0.998161
NO_2 Cal Offset:	-2.141943	-0.986846
NH3 Cal Slope:	0.985421	0.995038
NH3 Cal Offset:	7.387990	8.227208
TN Cal Slope:	0.991067	1.001184
TN Cal Offset:	7.203693	7.279855

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	0.4	-0.4	0.8	----	----
as found NO	4914	86.2	826.5	826.5	----	833.3	829.5	4.1	0.992	----
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	-0.9	1.0	----	----
high NO point	4914	86.2	826.5	826.5	----	829.4	829.8	-0.5	0.996	----
NO/O3 point	4914	86.2	826.5	826.5	----	830.2	826.4	3.8	0.995	----
as found NH3	3419	81.0	1800.5	----	1800.5	1804.8	----	1794.7	0.998	1.003
new NH3 cyl rp							----			
first NH3	3419	81.0	1800.5	----	1800.5	1804.8	----	1794.7	0.998	1.003
second NH3	3455	45.0	1000.3	----	1000.3	1014.9	----	1009.6	0.986	0.991
third NH3	3478	22.5	500.1	----	500.1	514.1	----	512.1	0.973	0.977
								Average Correction Factor	0.9960	0.9902

Corrected As found TN = 832.9 ppb NO_X = 829.9 ppb NH3 = 1793.9 ppb

Previous Response TN = 826.3 ppb NO_X = 828.7 ppb NH3 = 1781.7 ppb

*Percent Change TN = 0.8%

*Percent Change NO_X = 0.1%

*Percent Change NH3 = 0.7%

* = > +/-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	-0.4	-0.4	0.4	----	----
as found span	4914	86.2	826.5	799.7	826.5	829.5	798.8	833.3	0.9963	1.0012
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.9	-0.5	0.1	----	----
high point	4914	86.2	826.5	799.7	826.5	829.8	799.9	829.4	0.9960	0.9998
second point	4957	43.1	413.2	399.9	413.2	414.8	403.0	418.0	0.9962	0.9922
third point	4978	21.6	207.1	200.4	207.1	210.0	202.6	211.7	0.9863	0.9892
								Average Correction Factor	0.9928	0.9938

Baseline Corr As fnd	TN =	832.9 ppb	NO_X =	829.9 ppb	NO =	799.2 ppb	*Percent Change TN = 0.8%
Previous Response	TN =	826.3 ppb	NO_X =	828.7 ppb	NO =	800.6 ppb	*Percent Change NO_X = 0.1%
							*Percent Change NO = -0.2%

* = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found zero	----	----	0.0	0.0	----	----
calibration zero	----	----	0.0	-0.4	----	----
1st GPT point (400 ppb O3)	800.8	403.8	423.7	422.5	1.0029	99.7%
2nd GPT point (200 ppb O3)	800.8	605.6	221.9	219.6	1.0106	99.0%
3rd GPT point (100 ppb O3)	800.8	703.6	123.9	122.5	1.0116	98.9%
				Average Correction Factor	1.0084	99.2%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TN Calibration Summary

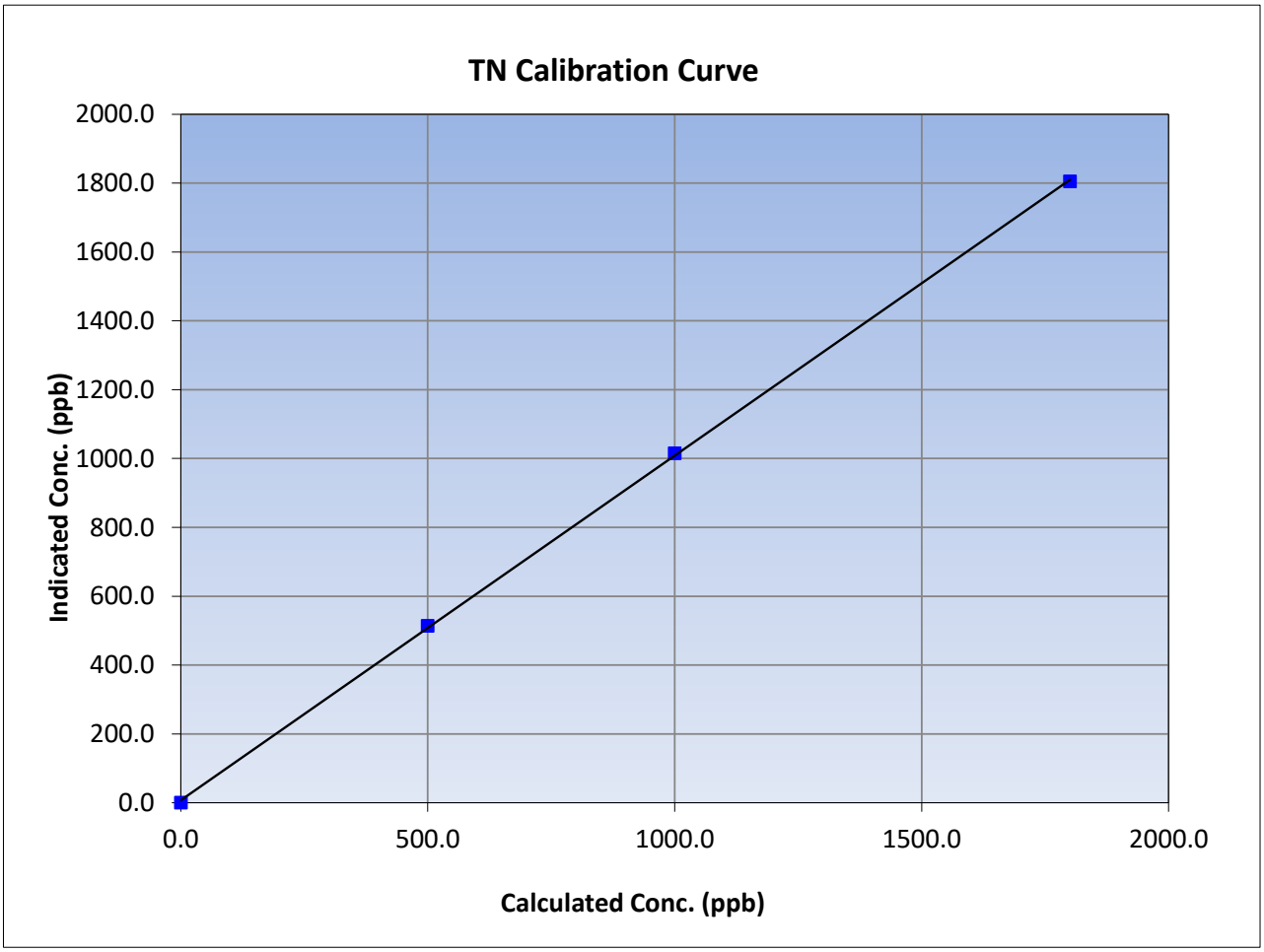
Version-05-2023

Station Information

Calibration Date:	October 3, 2023	Previous Calibration:	September 12, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:30	End Time (MST):	12:45
Analyzer make:	Teledyne API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999913	≥0.995
1800.5	1804.8	0.9976			
1000.3	1014.9	0.9856	Slope	1.001184	0.90 - 1.10
500.1	514.1	0.9727			
			Intercept	7.279855	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

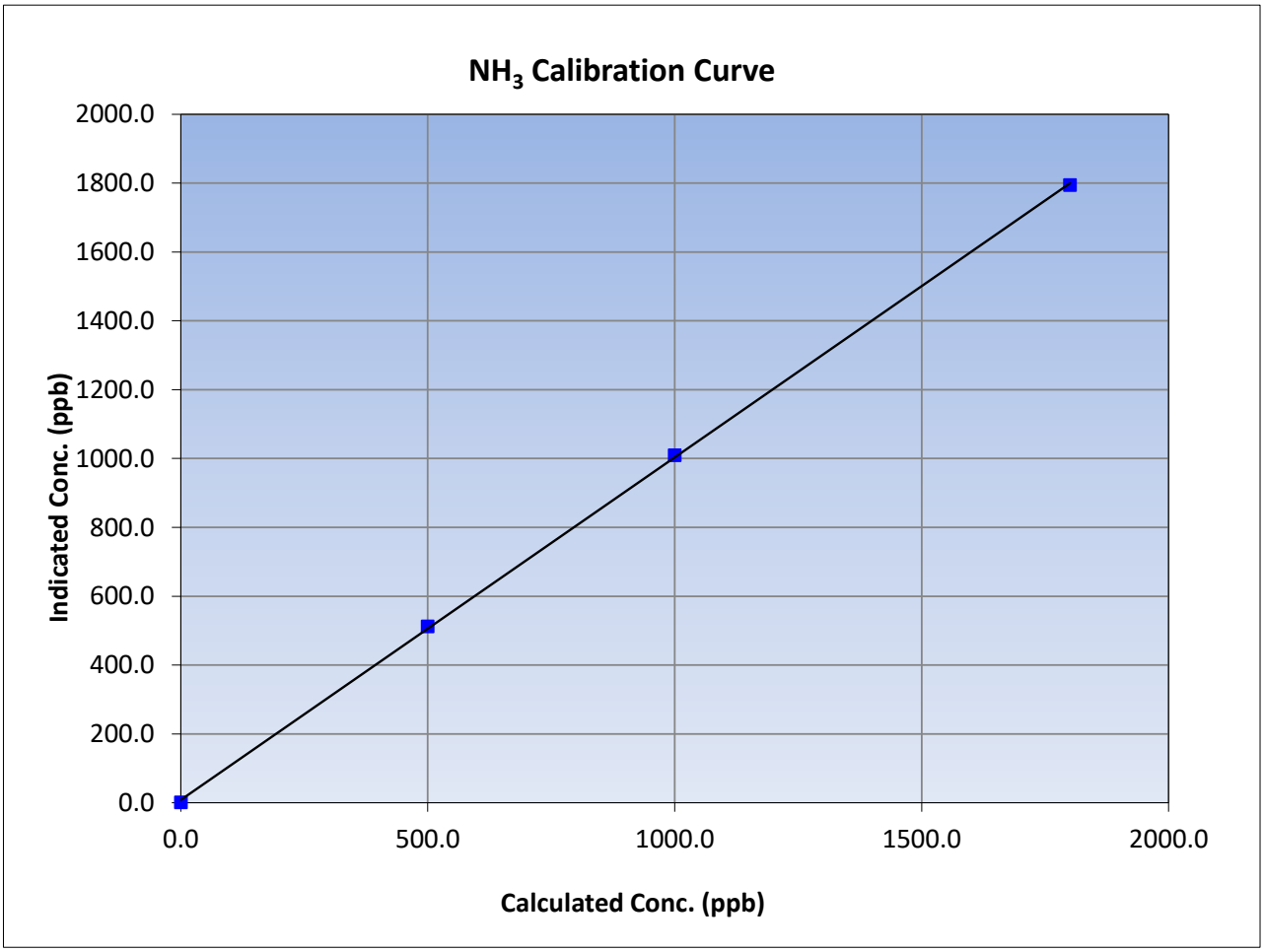
Version-05-2023

Station Information

Calibration Date:	October 3, 2023	Previous Calibration:	September 12, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:30	End Time (MST):	12:45
Analyzer make:	Teledyne API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	1.0	----	Correlation Coefficient	0.999912	≥0.995
1800.5	1794.7	1.0032			
1000.3	1009.6	0.9908	Slope	0.995038	0.90 - 1.10
500.1	512.1	0.9765			
			Intercept	8.227208	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

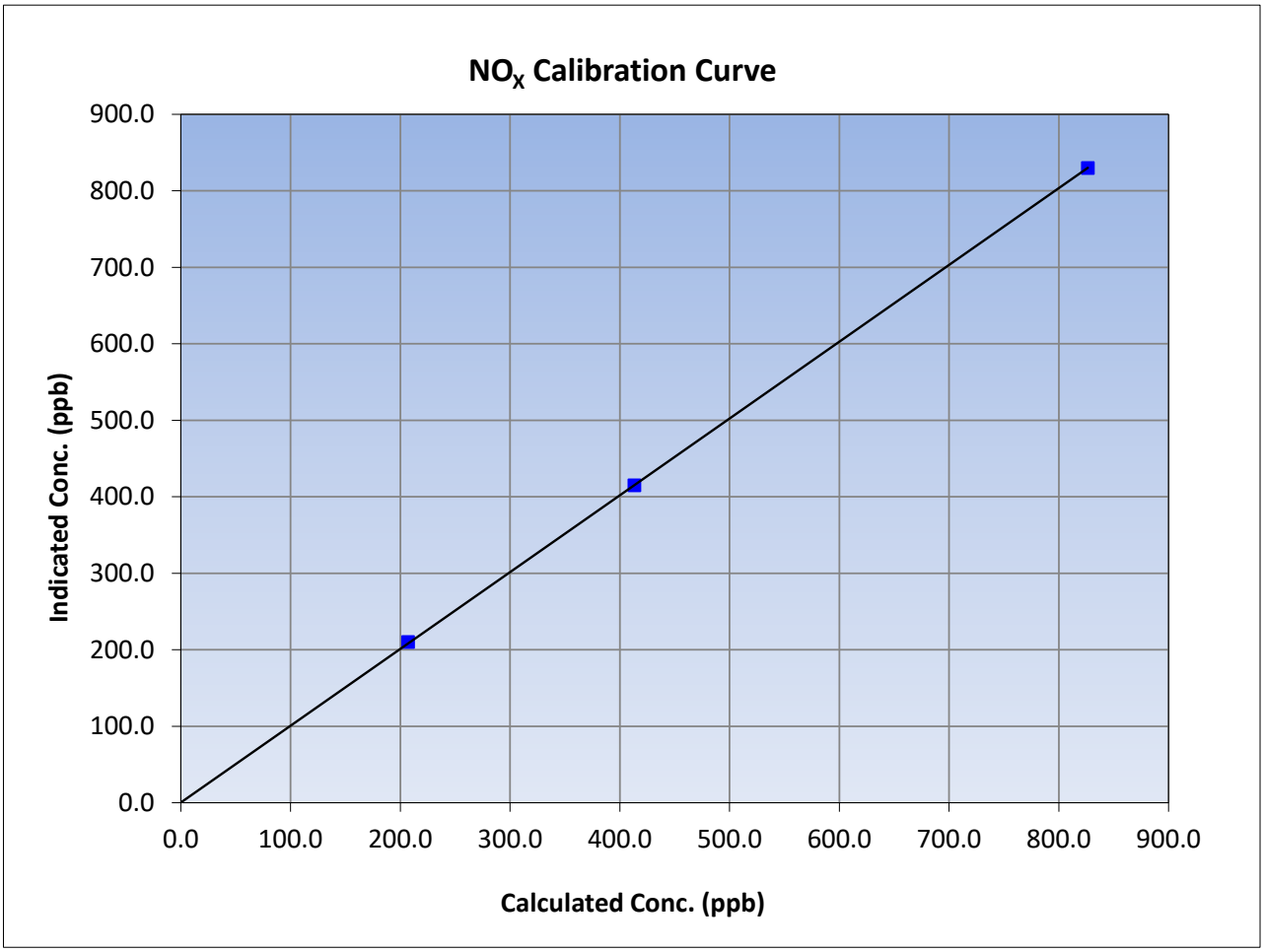
Version-05-2023

Station Information

Calibration Date:	October 3, 2023	Previous Calibration:	September 12, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:30	End Time (MST):	12:45
Analyzer make:	Teledyne API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.9	----	Correlation Coefficient	0.999987	≥0.995
826.5	829.8	0.9960			
413.2	414.8	0.9962	Slope	1.004061	0.90 - 1.10
207.1	210.0	0.9863			
			Intercept	0.254959	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

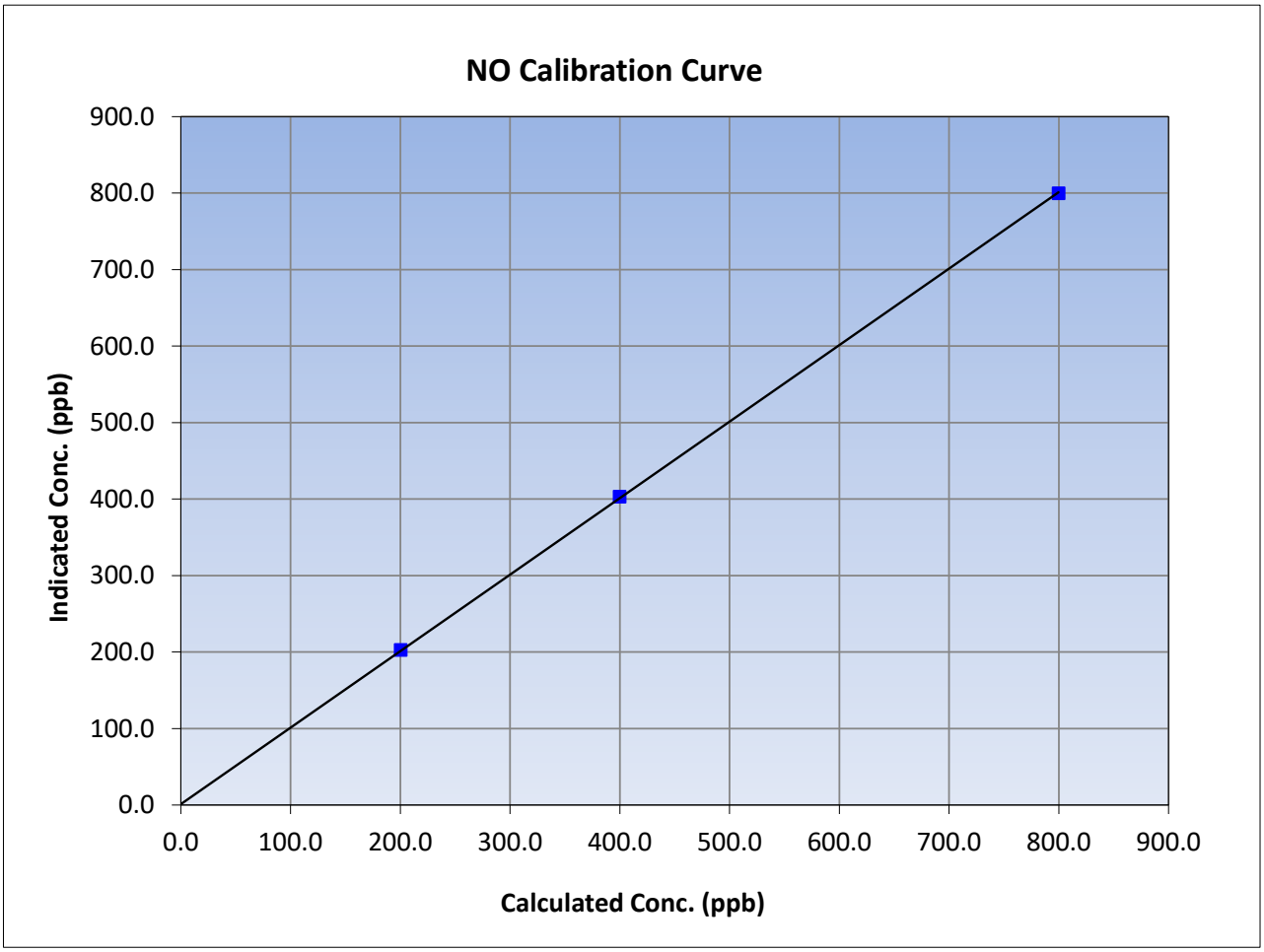
Version-05-2023

Station Information

Calibration Date:	October 3, 2023	Previous Calibration:	September 12, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:30	End Time (MST):	12:45
Analyzer make:	Teledyne API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.5	----	Correlation Coefficient	0.999975	≥0.995
799.7	799.9	0.9998			
399.9	403.0	0.9922	Slope	1.000231	0.90 - 1.10
200.4	202.6	0.9892			
			Intercept	1.162694	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

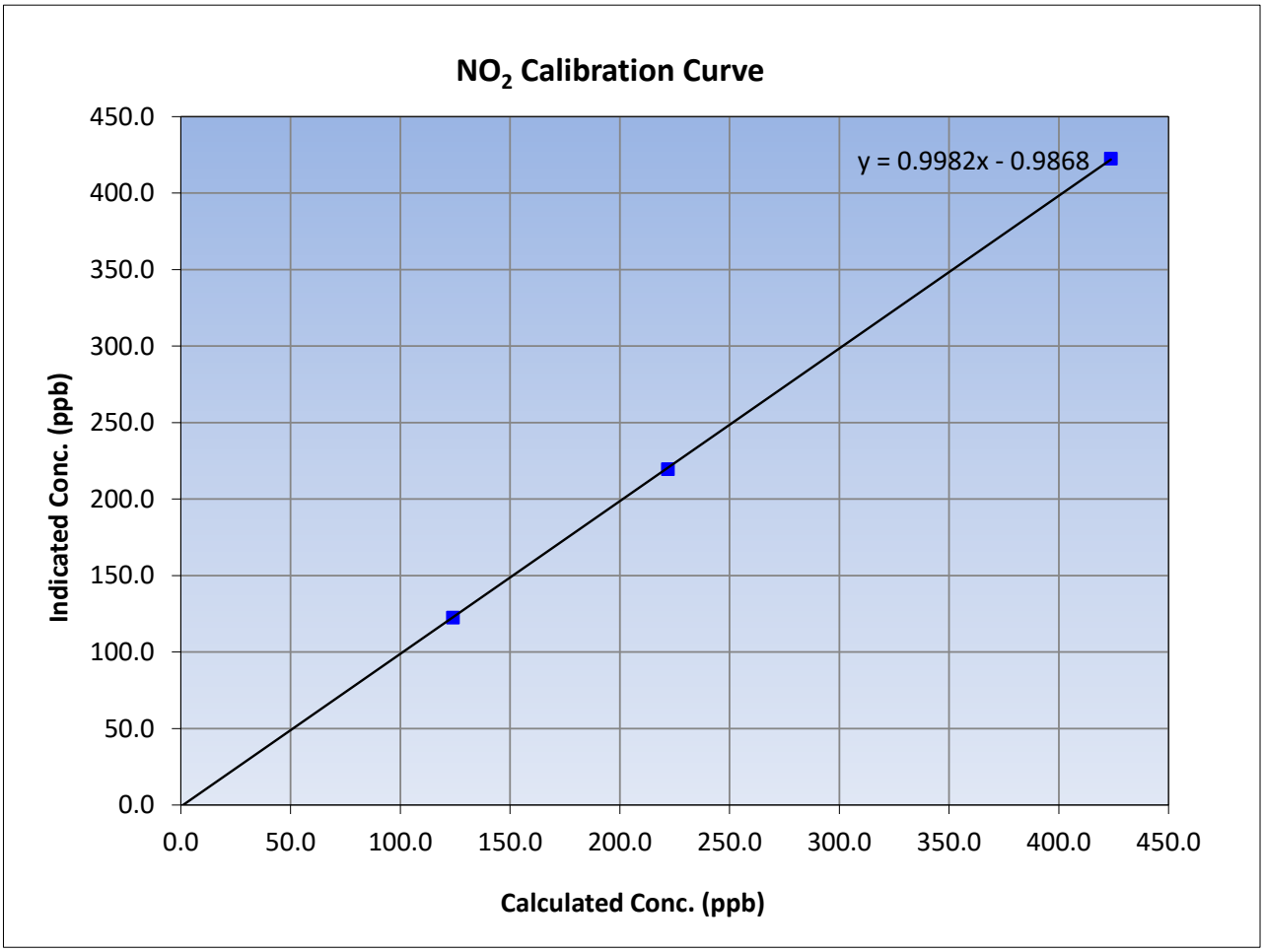
Version-05-2023

Station Information

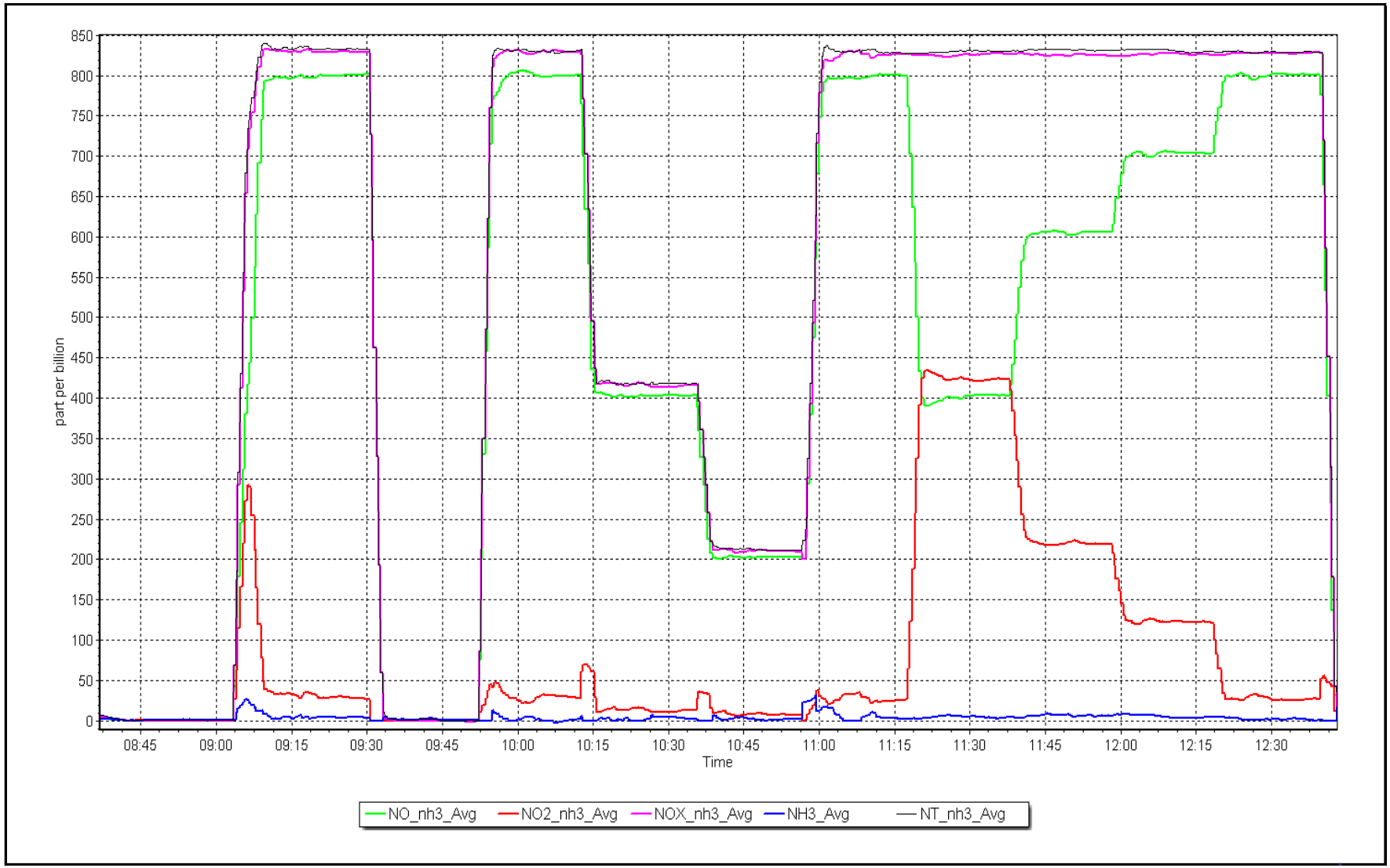
Calibration Date:	October 3, 2023	Previous Calibration:	September 12, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:30	End Time (MST):	12:45
Analyzer make:	Teledyne API T201	Analyzer serial #:	152

Calibration Data

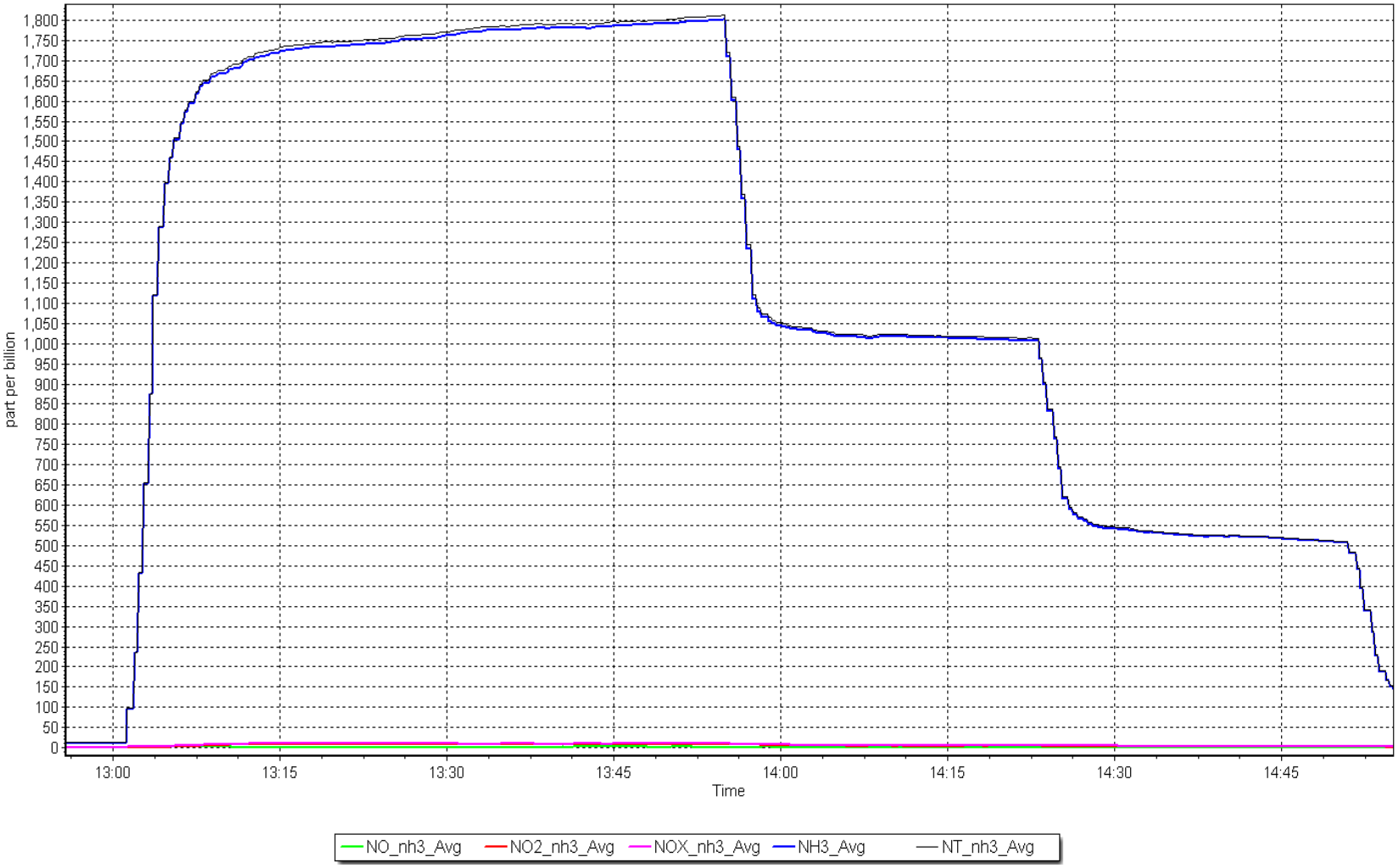
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.4	----	Correlation Coefficient	0.999984	≥0.995
423.7	422.5	1.0029			
221.9	219.6	1.0106	Slope	0.998161	0.90 - 1.10
123.9	122.5	1.0116			
			Intercept	-0.986846	+/-20



NO_X Calibration Plot Date: October 3, 2023 Location: Patricia McInnes



NH_3 Calibration Plot Date: October 3, 2023 Location: Patricia McInnes



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS07
ATHABASCA VALLEY
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	October 19, 2023	Last Cal Date:	September 6, 2023
Start time (MST):	9:10	End time (MST):	12:56
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.992516	1.001786	Backgd or Offset:	2.61	2.61
Calibration intercept:	1.942886	2.644970	Coeff or Slope:	0.834	0.834

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4921	79.3	801.2	804.3	0.996
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	803.3	0.997
second point	4960	39.6	400.2	407.0	0.983
third point	4980	19.8	200.1	204.0	0.981
as left zero	5000	0.0	0.0	0.1	----
as left span	4921	79.2	800.2	804.8	0.994
				Average Correction Factor	0.987

Baseline Corr As found:	804.40	Previous response	797.15	*% change	0.9%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

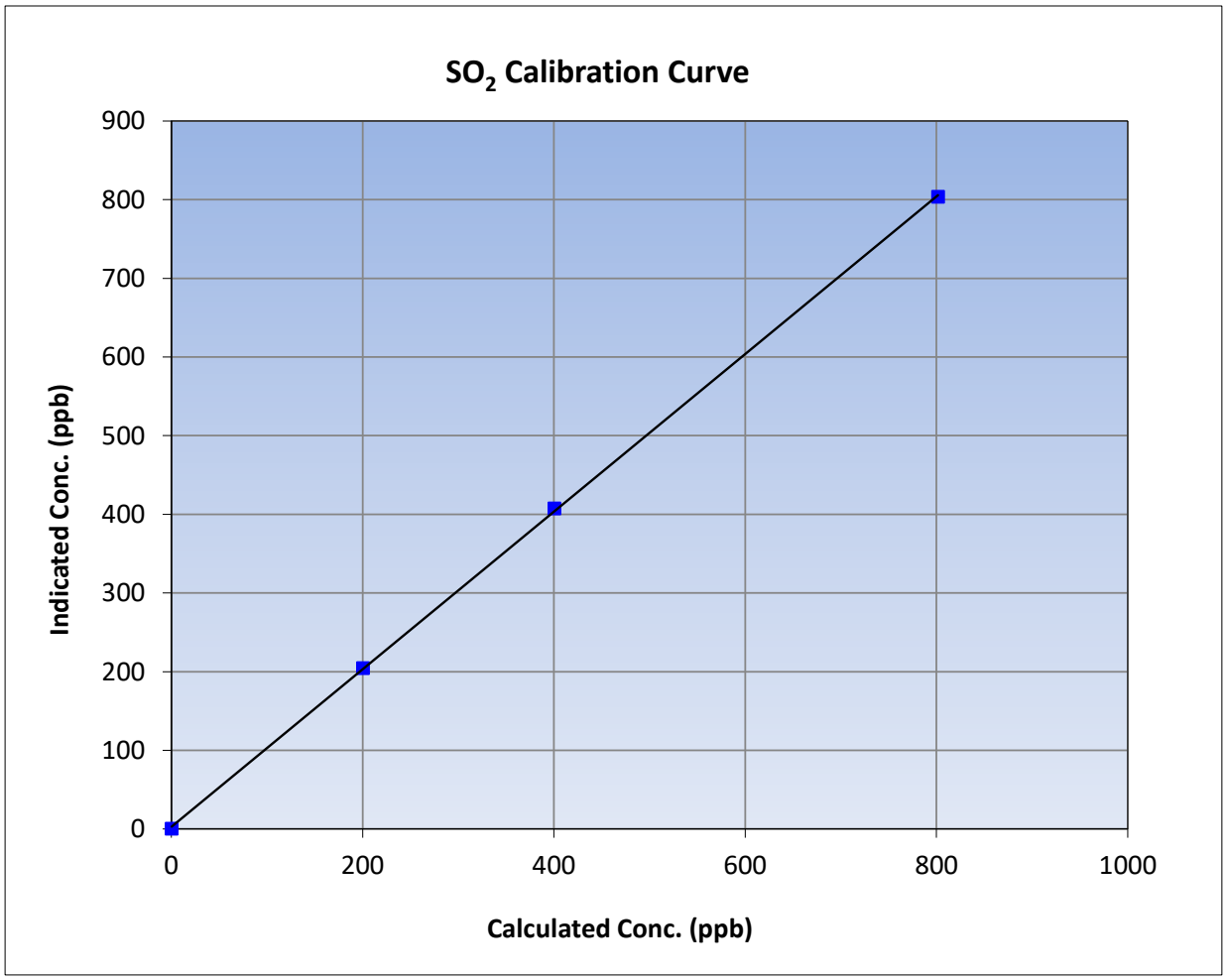
Station Information

Calibration Date:	October 19, 2023	Previous Calibration:	September 6, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:10	End Time (MST):	12:56
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1507864683

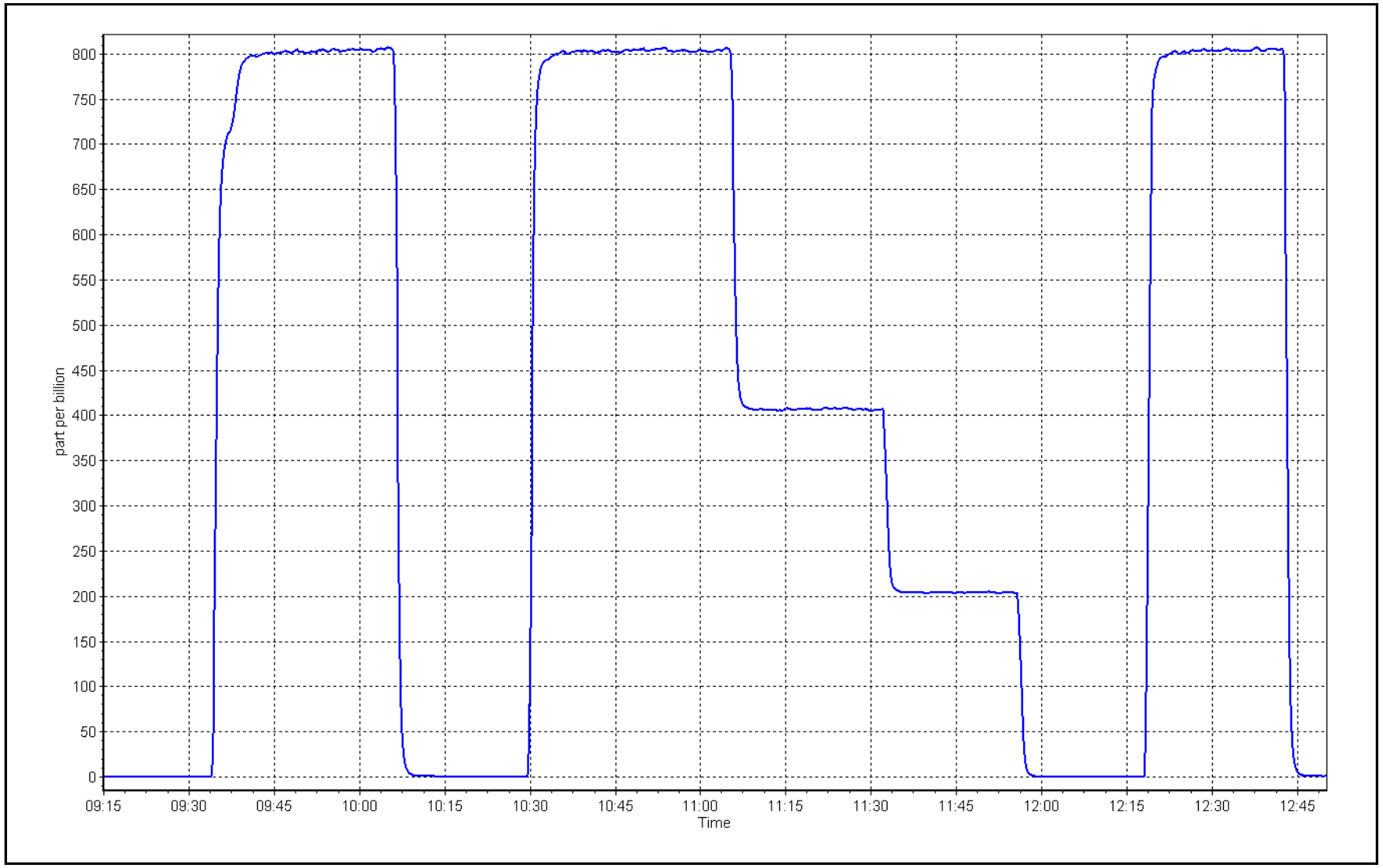
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
801.2	803.3	0.9974
400.2	407.0	0.9832
200.1	204.0	0.9807

Statistical Evaluation		Limits
Correlation Coefficient	0.999935	≥0.995
Slope	1.001786	0.90 - 1.10
Intercept	2.644970	+/-30



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



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	October 10, 2023	Last Cal Date:	September 18, 2023
Start time (MST):	9:46	End time (MST):	14:53
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:	1.012468	1.014626	Backgd or Offset:	2.33	2.33
Calibration intercept:	-0.002341	-0.002205	Coeff or Slope:	0.899	0.899

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4925	75.5	79.3	80.3	0.987
as found 2nd point	4962	37.7	39.6	40.0	0.990
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	80.5	0.985
second point	4962	37.7	39.6	40.2	0.985
third point	4981	18.9	19.9	20.0	0.993
as left zero	5000	0.0	0.0	0.1	----
as left span	4925	75.5	79.3	80.5	0.985
SO2 Scrubber Check	4921	79.2	800.2	0.0	----
Date of last scrubber change:		25-Feb-22		Ave Corr Factor	0.988
Date of last converter efficiency test:		April 22, 2022		92.6%	efficiency

Baseline Corr As found:	80.3	Prev response:	80.25	*% change:	0.1%
Baseline Corr 2nd AF pt:	40.0	AF Slope:	1.012901	AF Intercept:	-0.022289
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999998		

* = > +/-5% change initiates investigation

Notes: Pump changed out after as founds. No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

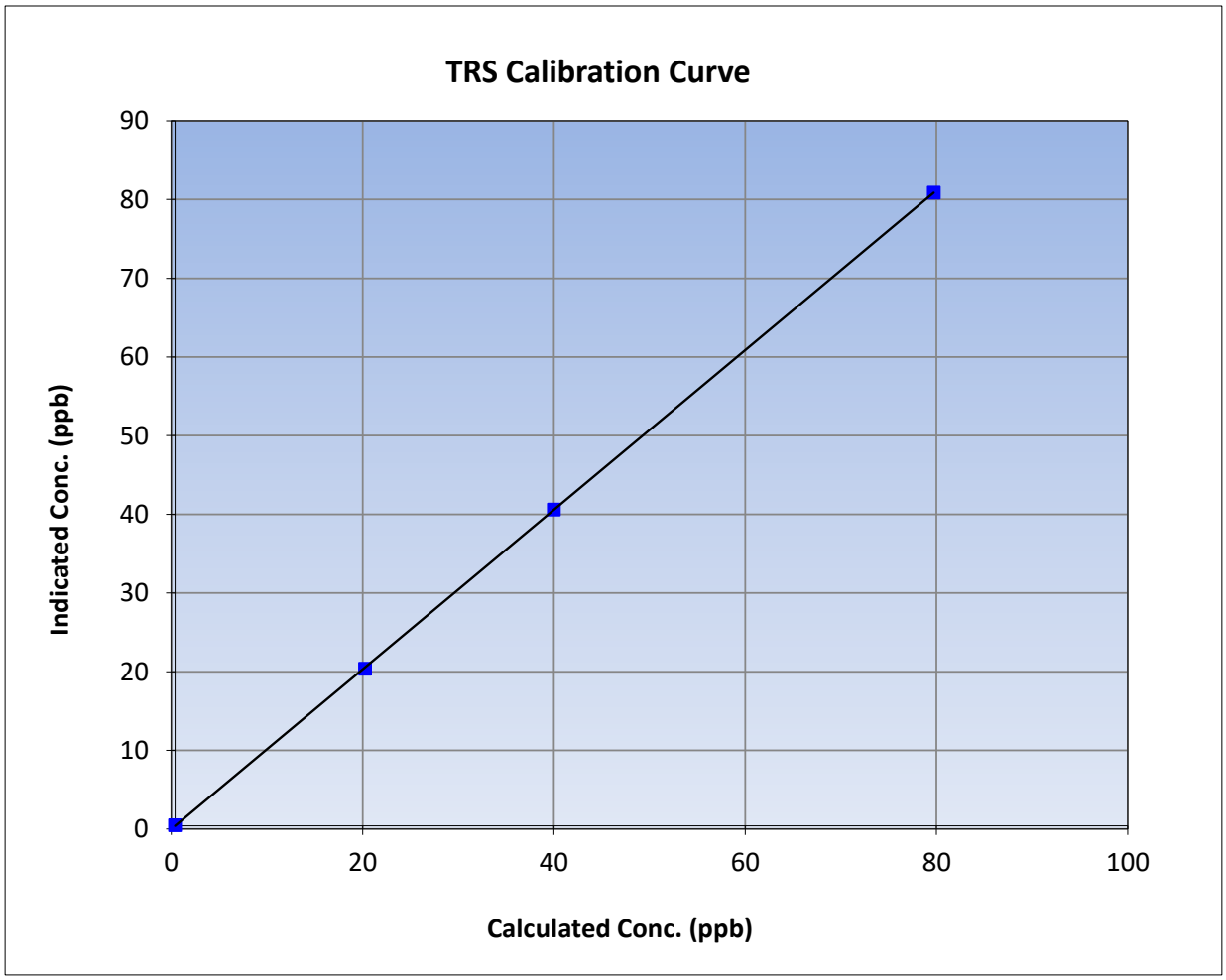
Station Information

Calibration Date:	October 10, 2023	Previous Calibration:	September 18, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:46	End Time (MST):	14:53
Analyzer make:	CDN-101	Analyzer serial #:	551

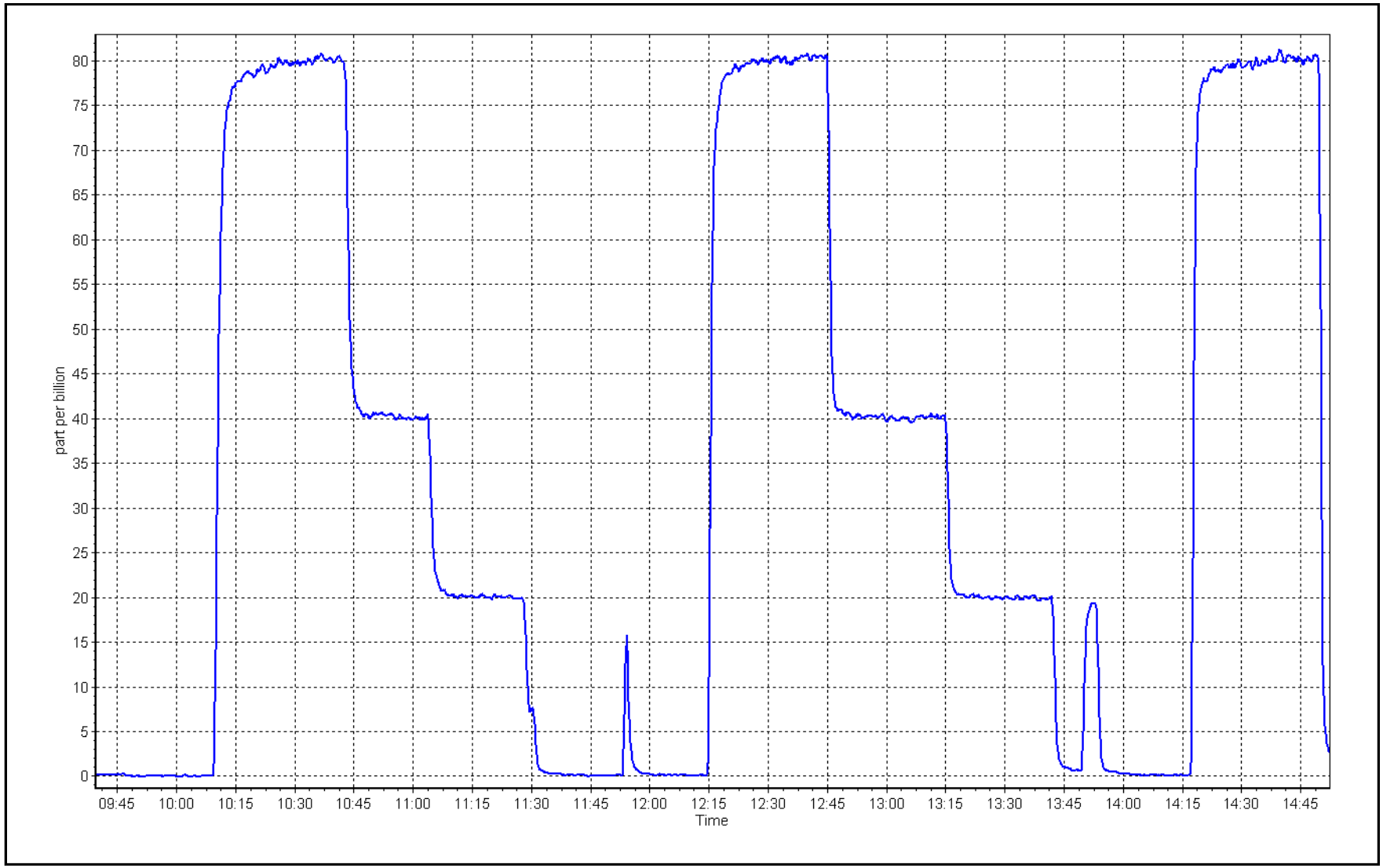
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
79.3	80.5	0.9852
39.6	40.2	0.9853
19.9	20.0	0.9928

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999991	*≥0.995*
Slope	1.014626	*0.90 - 1.10*
Intercept	-0.002205	*+/-3*



TRS Calibration Plot Date: October 10, 2023 Location: Athabasca Valley



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	October 19, 2023	Last Cal Date:	September 6, 2023
Start time (MST):	9:10	End time (MST):	12:56
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1152430012	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	0.000249	0.000247	NMHC SP Ratio:	4.17E-05	4.27E-05
CH4 Retention time:	14.0	13.8	NMHC Peak Area:	218242	212776
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	4921	79.2	17.03	16.83	1.012
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	17.03	17.02	1.001
second point	4960	39.6	8.52	8.54	0.998
third point	4980	19.8	4.26	4.27	0.997
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	17.03	1.000
				Average Correction Factor	0.998
Baseline Corr AF:	16.83	Prev response	17.03	*% change	-1.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	9.09	8.87	1.025
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	9.08	1.001
second point	4960	39.6	4.55	4.59	0.990
third point	4980	19.8	2.27	2.32	0.980
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	9.09	9.10	0.999
				Average Correction Factor	0.990
Baseline Corr AF:	8.87	Prev response	9.10	*% change	-2.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	7.94	7.96	0.997
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	7.94	7.94	1.000
second point	4960	39.6	3.97	3.94	1.007
third point	4980	19.8	1.98	1.95	1.017
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.94	7.92	1.002
				Average Correction Factor	1.008
Baseline Corr AF:	7.96	Prev response	7.93	*% 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:	0.999300	0.999306
THC Cal Offset:	0.010060	0.011259
CH4 Cal Slope:	1.001057	1.001244
CH4 Cal Offset:	-0.015758	-0.019158
NMHC Cal Slope:	0.997865	0.997363
NMHC Cal Offset:	0.025418	0.030417

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

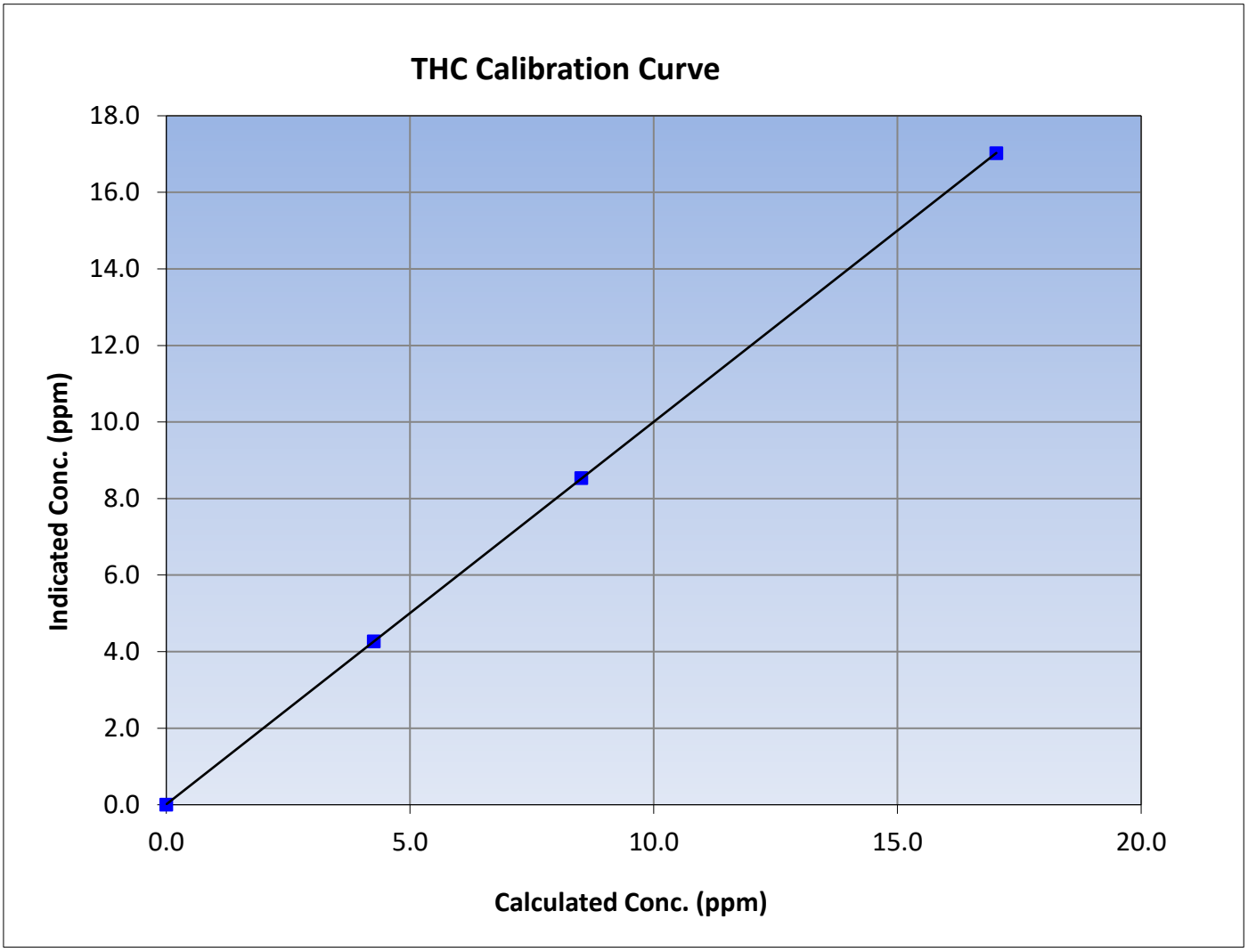
Version-06-2022

Station Information

Calibration Date:	October 19, 2023	Previous Calibration:	September 6, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:10	End Time (MST):	12:56
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	0.999997	≥0.995
17.03	17.02	1.0005			
8.52	8.54	0.9976	Slope	0.999306	0.90 - 1.10
4.26	4.27	0.9969			
			Intercept	0.011259	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

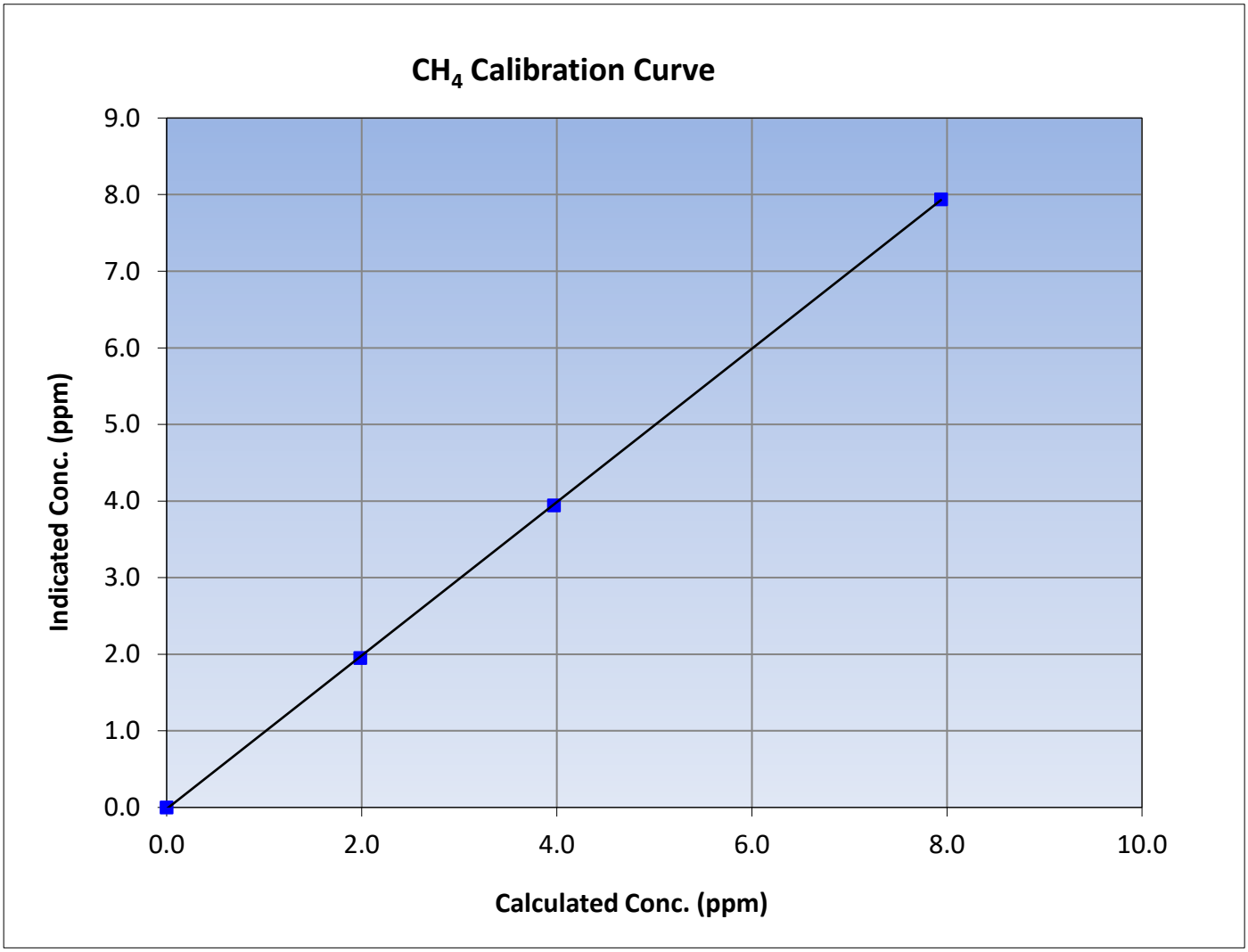
Version-06-2022

Station Information

Calibration Date:	October 19, 2023	Previous Calibration:	September 6, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:10	End Time (MST):	12:56
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	0.999973	*≥0.995*
7.94	7.94	0.9998			
3.97	3.94	1.0068	Slope	1.001244	*0.90 - 1.10*
1.98	1.95	1.0173			
			Intercept	-0.019158	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

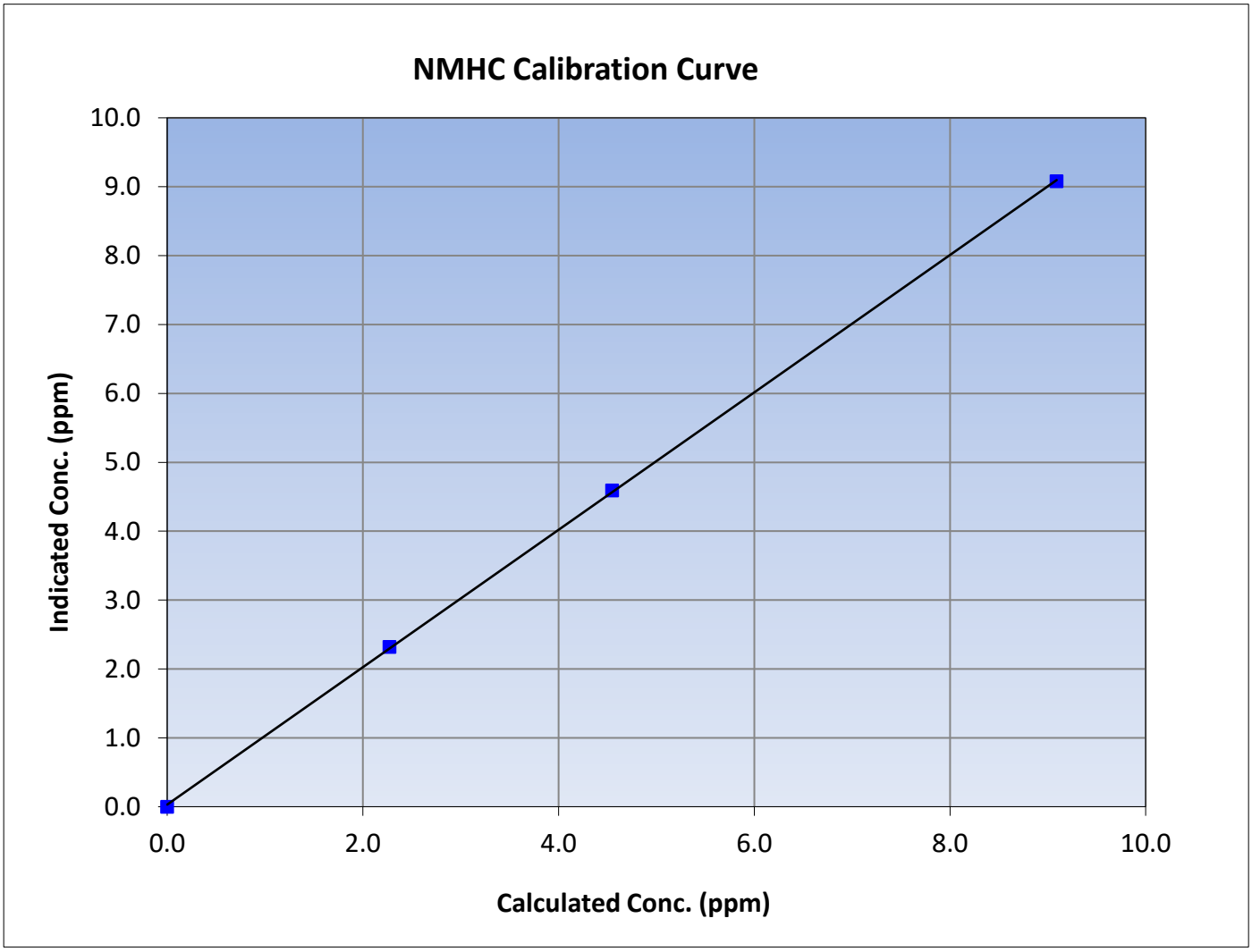
Version-06-2022

Station Information

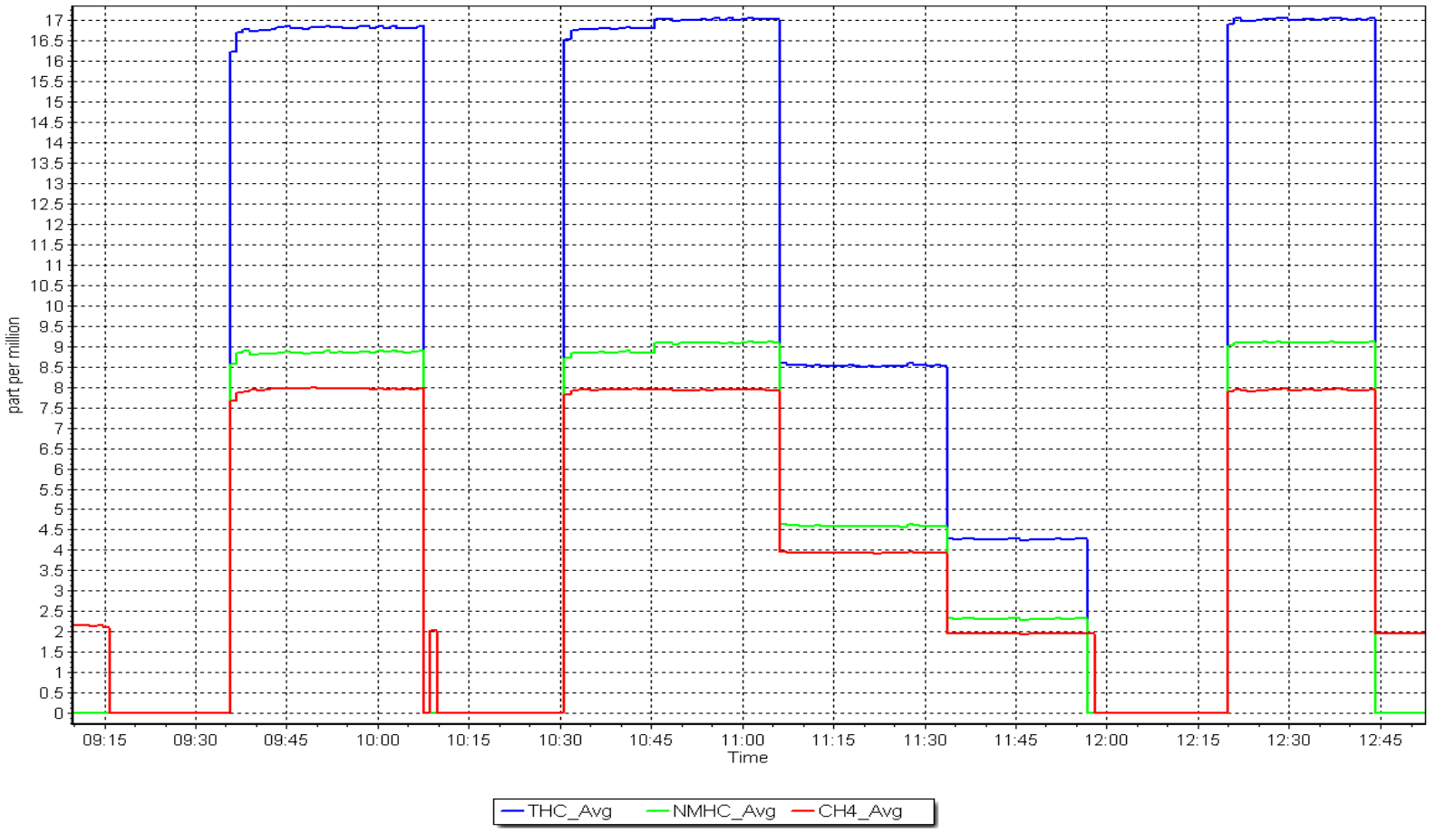
Calibration Date:	October 19, 2023	Previous Calibration:	September 6, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:10	End Time (MST):	12:56
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999944	≥0.995
9.09	9.08	1.0014			
4.55	4.59	0.9902	Slope	0.997363	0.90 - 1.10
2.27	2.32	0.9797			
			Intercept	0.030417	+/-0.5



NMHC Calibration Plot Date: October 19, 2023 Location: Athabasca Valley



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	October 6, 2023	Last Cal Date:	September 15, 2023
Start time (MST):	8:38	End time (MST):	13:55
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:	1.075	1.077	NO bkgnd or offset:	7.6	7.6
NOX coeff or slope:	0.995	0.994	NOX bkgnd or offset:	7.8	7.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	210.8	211.4

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000426	1.000077
NO_X Cal Offset:	1.179077	1.278990
NO Cal Slope:	1.000774	1.001202
NO Cal Offset:	0.875112	1.075147
NO_2 Cal Slope:	0.997679	1.000884
NO_2 Cal Offset:	1.130689	-0.671765

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as found span	4920	80.2	816.7	800.7	16.0	816.7	799.2	17.5	1.0000	1.0019
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
high point	4920	80.2	816.7	800.7	16.0	817.1	801.8	15.2	0.9995	0.9986
second point	4960	40.1	408.4	400.4	8.0	411.4	403.7	7.7	0.9926	0.9917
third point	4980	20.0	203.7	199.7	4.0	205.4	201.1	4.3	0.9916	0.9929
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as left span	4920	80.2	816.7	398.6	418.1	822.4	403.3	419.2	0.9931	0.9883
								Average Correction Factor	0.9946	0.9944

Corrected As found	NO_X = 816.7 ppb	NO = 799.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.2%
Previous Response	NO_X = 818.3 ppb	NO = 802.2 ppb		*Percent Change	NO =	-0.4%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found NO r^2:	NO Sl:	NO Int:	
			As found NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	800.4	398.3	418.1	418.5	0.9991	100.1%
2nd GPT point (200 ppb O3)	800.4	595.5	220.9	219.3	1.0075	99.3%
3rd GPT point (100 ppb O3)	800.4	698.8	117.6	116.9	1.0063	99.4%
				Average Correction Factor	1.0043	99.6%

Notes: No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

NO_X Calibration Summary

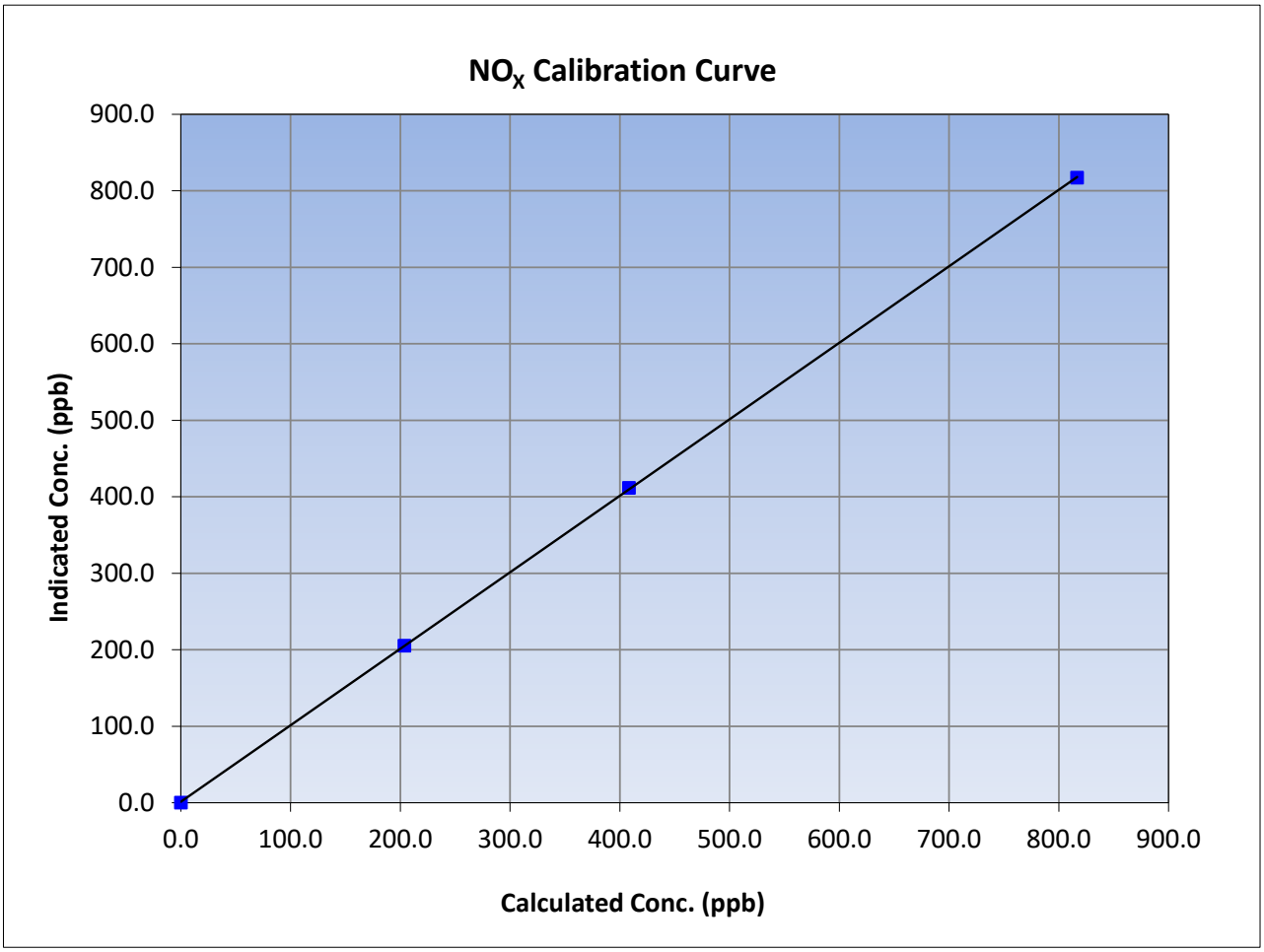
Version-04-2020

Station Information

Calibration Date:	October 6, 2023	Previous Calibration:	September 15, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	8:38	End Time (MST):	13:55
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999985	≥0.995
816.7	817.1	0.9995			
408.4	411.4	0.9926	Slope	1.000077	0.90 - 1.10
203.7	205.4	0.9916			
			Intercept	1.278990	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

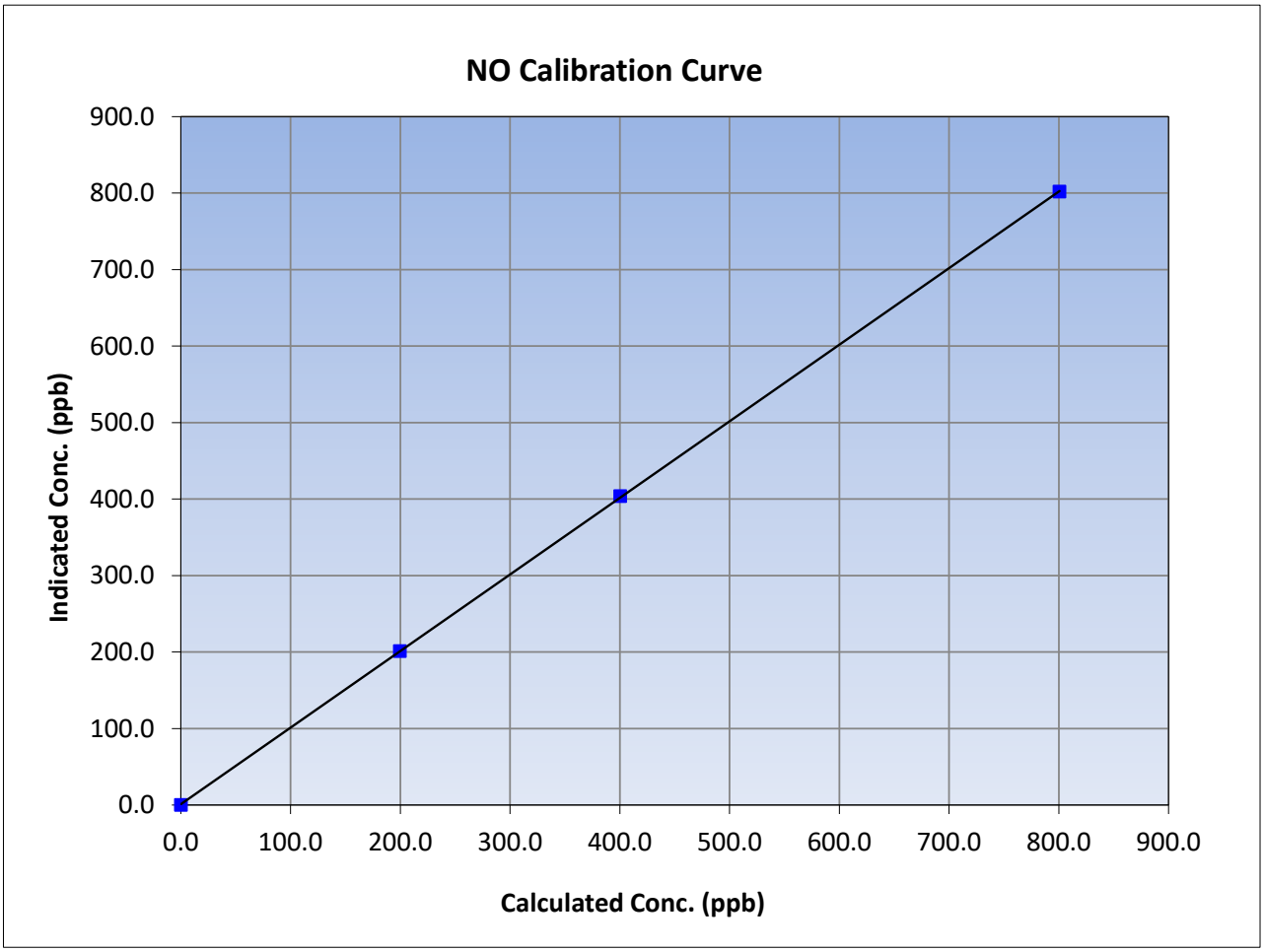
Version-04-2020

Station Information

Calibration Date:	October 6, 2023	Previous Calibration:	September 15, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	8:38	End Time (MST):	13:55
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999986	≥0.995
800.7	801.8	0.9986			
400.4	403.7	0.9917	Slope	1.001202	0.90 - 1.10
199.7	201.1	0.9929			
			Intercept	1.075147	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

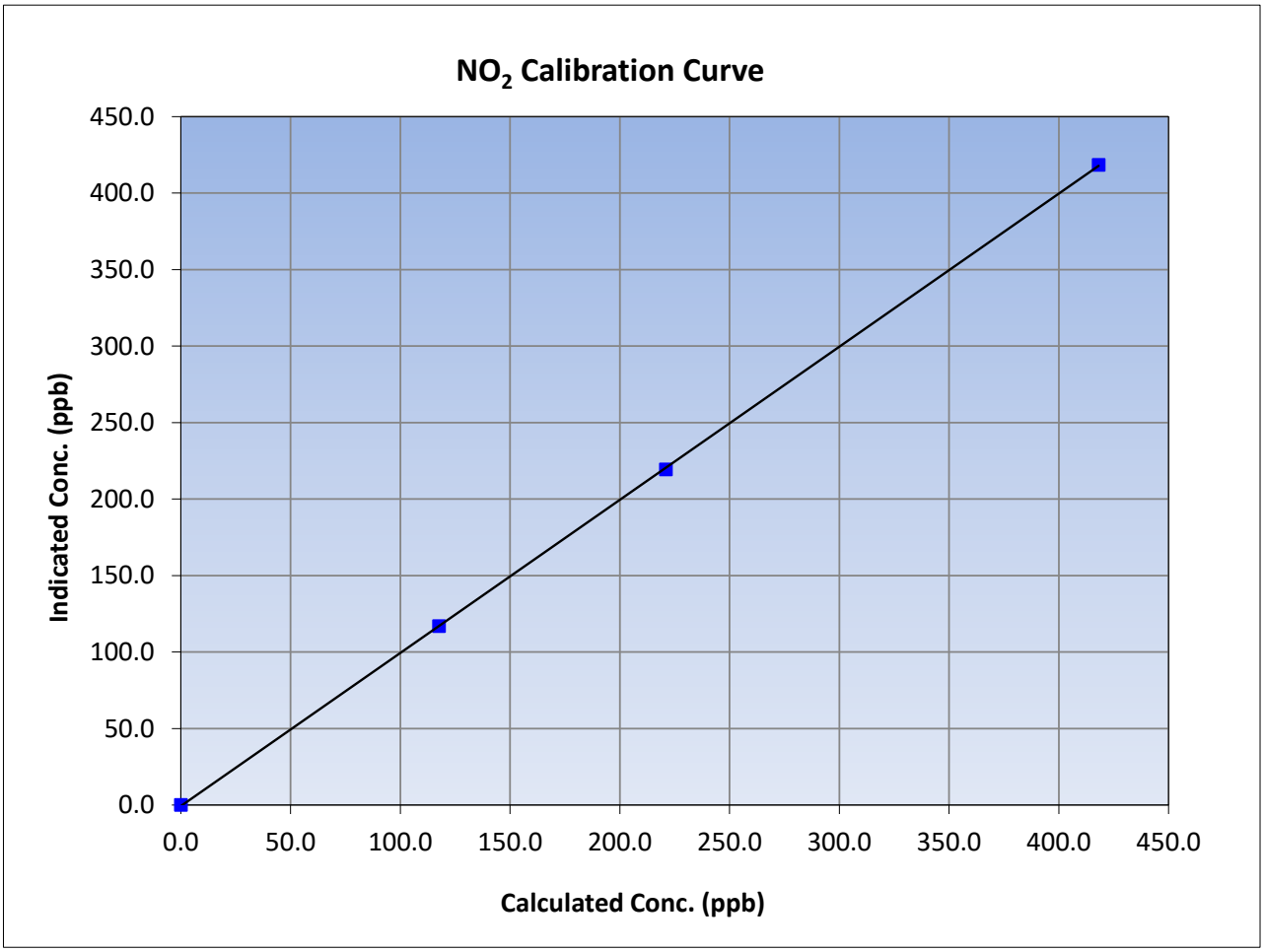
Version-04-2020

Station Information

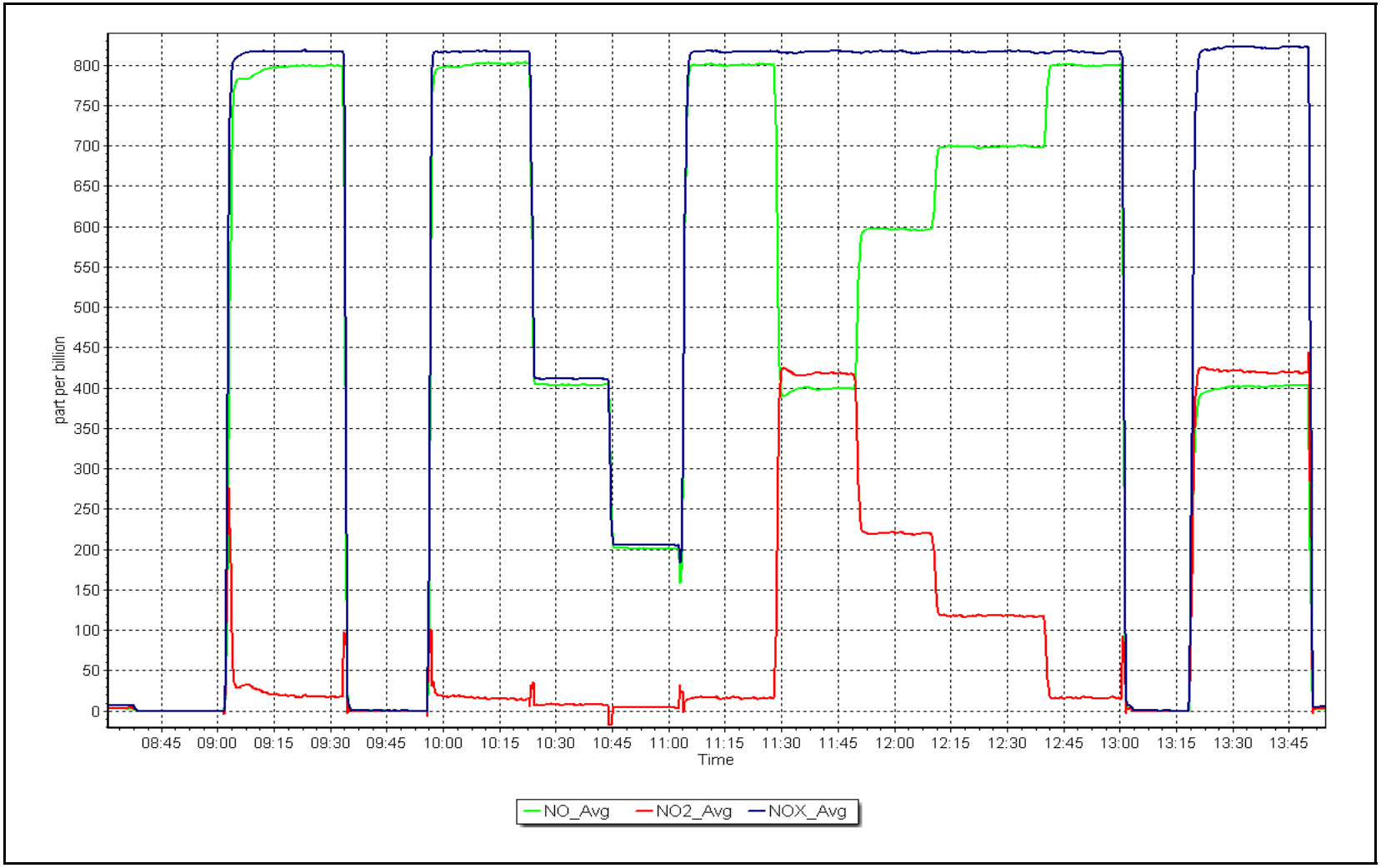
Calibration Date:	October 6, 2023	Previous Calibration:	September 15, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	8:38	End Time (MST):	13:55
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999976	*≥0.995*
418.1	418.5	0.9991			
220.9	219.3	1.0075	Slope	1.000884	*0.90 - 1.10*
117.6	116.9	1.0063			
			Intercept	-0.671765	*+/-20*



NO_X Calibration Plot Date: October 6, 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:	October 3, 2023	Last Cal Date:	September 20, 2023
Start time (MST):	10:17	End time (MST):	14:05
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	Finish		Start	Finish
Calibration slope:	0.997143	1.004229	Backgd or Offset:	-2.6	-2.6
Calibration intercept:	0.600000	0.060000	Coeff or Slope:	1.522	1.535

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	397.5	1.006
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.7	----
high point	5000	1415.7	400.0	401.5	0.996
second point	5000	1039.9	200.0	200.9	0.996
third point	5000	856.2	100.0	101.5	0.985
as left zero	5000	0.0	0.0	-0.6	----
as left span	5000	1416.0	400.0	404.4	0.989
				Average Correction Factor	0.992

Baseline Corr As found:	399.3	Previous response	399.5	*% change	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Athabasca Valley	Station number:	AMS 07
Calibration Date:	October 19, 2023	Last Cal Date:	September 27, 2023
Start time (MST):	12:16	End time (MST):	12:54
Analyzer Make:	API T640	S/N:	871
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388748
Temp/RH standard:	Alicat FP-25BT	S/N:	388748

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	(Limits)
T (°C)	18.0	17.4	18	☐	+/- 2 °C
P (mmHg)	725.3	727	725.3	☐	+/- 10 mmHg
flow (LPM)	4.99	5.05	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: October 19, 2023 Last Cal Date: September 27, 2023

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

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: September 27, 2023 <0.2 ug/m3

Disposable Filter Changed: August 28, 2023

Annual Maintenance

Date Sample Tube Cleaned: December 5, 2022

Date RH/T Sensor Cleaned: December 5, 2022

Notes: Temp, flow and pressure checked. Leak check passed.

Calibration by: Aswin Sasi Kumar

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

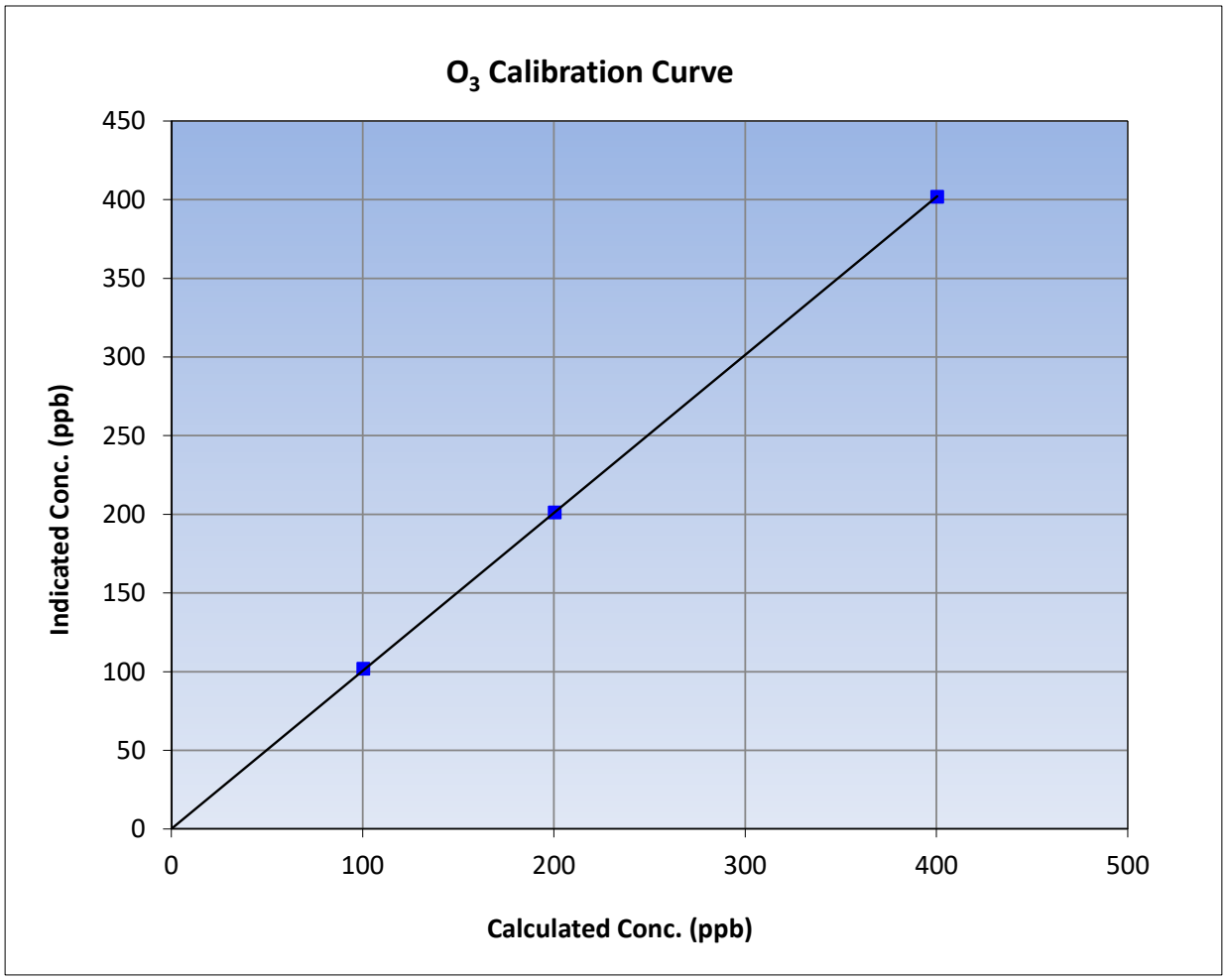
Station Information

Calibration Date:	October 3, 2023	Previous Calibration:	September 20, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:17	End Time (MST):	14:05
Analyzer make:	Thermo 49i	Analyzer serial #:	1152220023

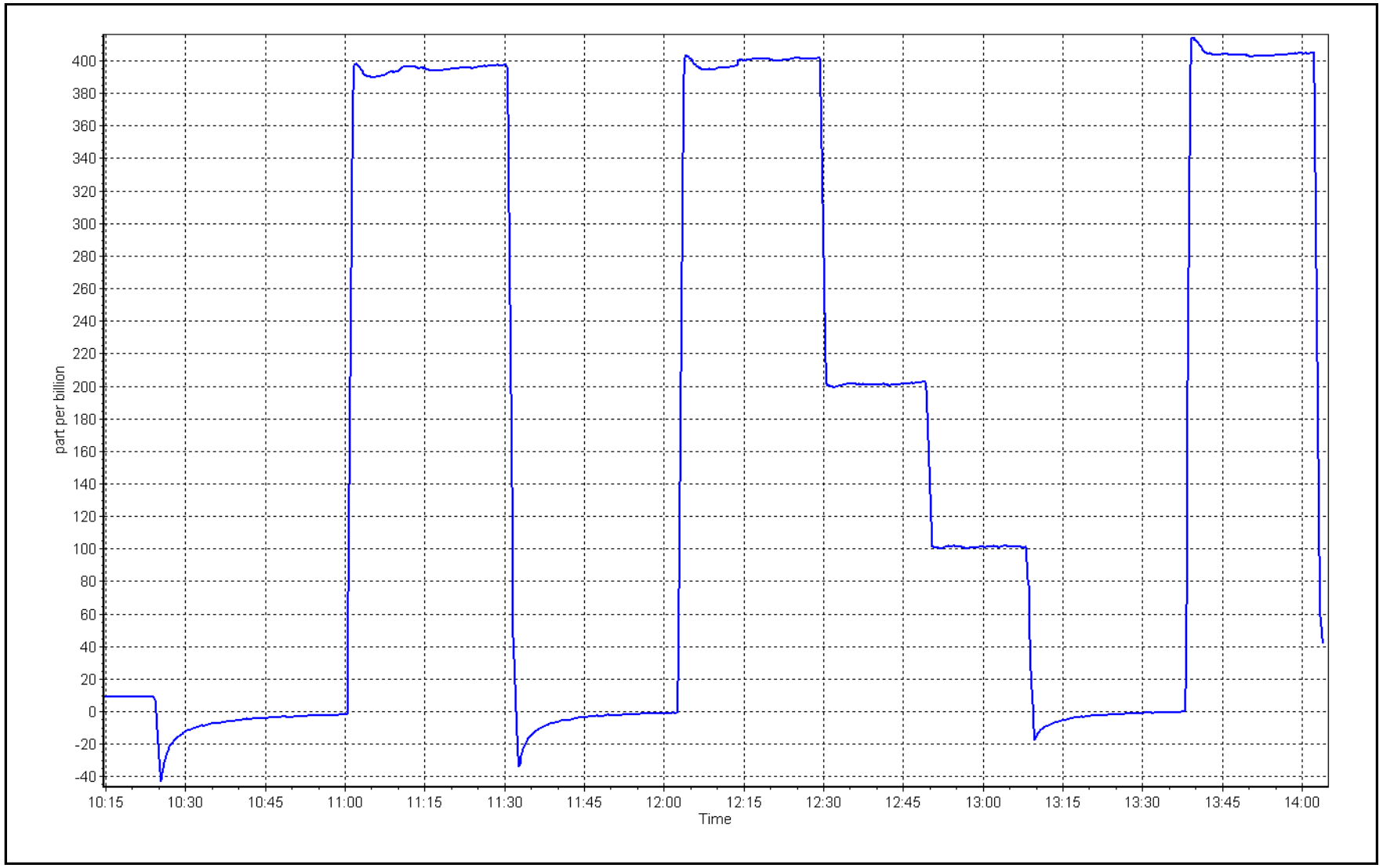
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.7	----
400.0	401.5	0.9963
200.0	200.9	0.9955
100.0	101.5	0.9852

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999981	*≥0.995*
Slope	1.004229	*0.90 - 1.10*
Intercept	0.060000	*+/- 5*



O_3 Calibration Plot Date: October 3, 2023 Location: Athabasca Valley



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Athabasca Valley	Station number:	AMS 07
Calibration Date:	October 19, 2023	Last Cal Date:	September 27, 2023
Start time (MST):	12:16	End time (MST):	12:54
Analyzer Make:	API T640	S/N:	871
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388748
Temp/RH standard:	Alicat FP-25BT	S/N:	388748

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	(Limits)
T (°C)	18.0	17.4	18	☐	+/- 2 °C
P (mmHg)	725.3	727	725.3	☐	+/- 10 mmHg
flow (LPM)	4.99	5.05	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: October 19, 2023 Last Cal Date: September 27, 2023

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

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: September 27, 2023 <0.2 ug/m3

Disposable Filter Changed: August 28, 2023

Annual Maintenance

Date Sample Tube Cleaned: December 5, 2022

Date RH/T Sensor Cleaned: December 5, 2022

Notes: Temp, flow and pressure checked. Leak check passed.

Calibration by: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	October 13, 2023	Last Cal Date:	September 27, 2023
Start time (MST):	10:15	End time (MST):	13:21
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:	1.003398	0.998346	Backgd or Offset:	4.225	4.336
Calibration intercept:	0.092559	0.098508	Coeff or Slope:	1.086	1.093

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	1.001
second point	4967	33.3	20.0	20.1	0.992
third point	4983	16.7	10.0	10.2	0.983
as left zero	5000	0.0	0.0	0.0	----
as left span	4933	66.7	40.0	40.0	1.002
				Average Correction Factor	0.992

Baseline Corr As found:	39.99	Prev response:	40.25	*% 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 and span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

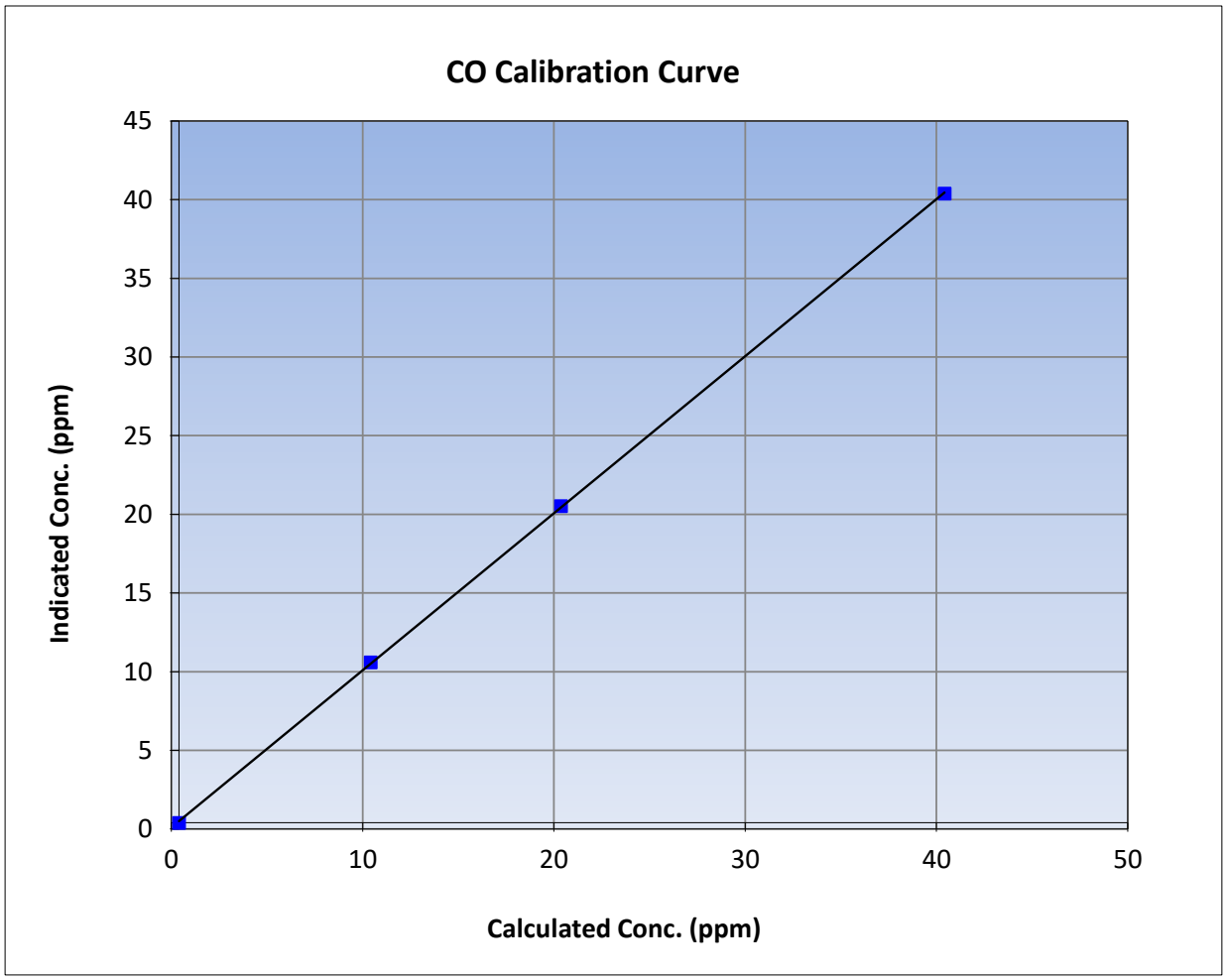
Station Information

Calibration Date:	October 13, 2023	Previous Calibration:	September 27, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:15	End Time (MST):	13:21
Analyzer make:	Thermo 48i-LTE	Analyzer serial #:	1408761381

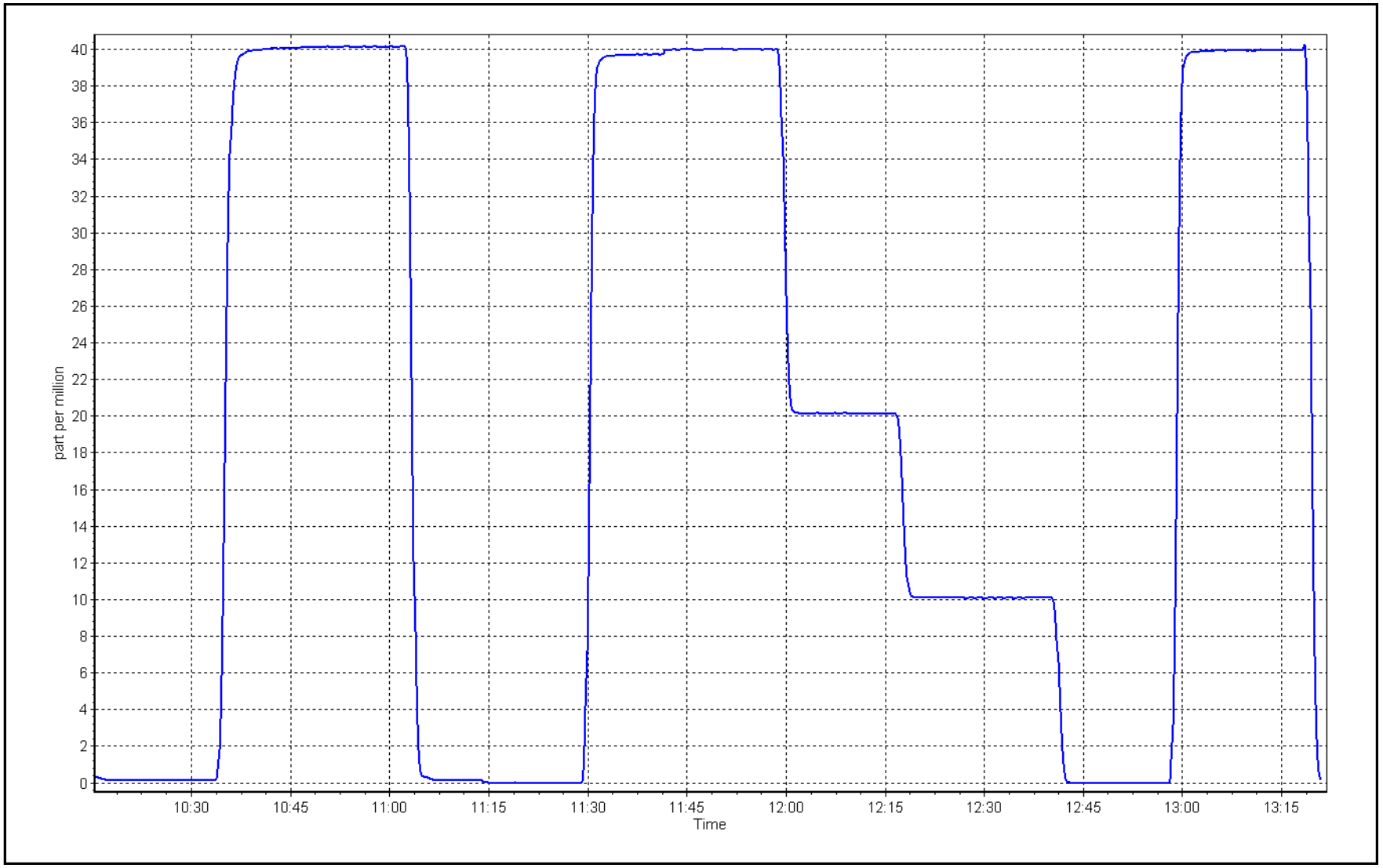
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.0	40.0	1.0008
20.0	20.1	0.9925
10.0	10.2	0.9834

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999965	*≥0.995*
Slope	0.998346	*0.90 - 1.10*
Intercept	0.098508	*+/-1.5*



CO Calibration Plot Date: October 13, 2023 Location: Athabasca Valley



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS08
FORT CHIPEWYAN
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	October 11, 2023	Last Cal Date:	September 6, 2023
Start time (MST):	10:57	End time (MST):	13:42
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:	1.004228	1.003114	Backgd or Offset:	4.64	4.65
Calibration intercept:	-1.764623	-2.624243	Coeff or Slope:	0.963	0.955

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	804.2	0.995
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-2.9	----
high point	4920	80.3	800.4	800.8	0.999
second point	4960	40.2	400.7	397.4	1.008
third point	4980	20.1	200.4	200.0	1.002
as left zero	5000	0.0	0.0	-3.0	----
as left span	4920	80.3	800.4	801.1	0.999
				Average Correction Factor	1.003

Baseline Corr As found: 807.20 Previous response 802.00 *% change 0.6%

* = > +/-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

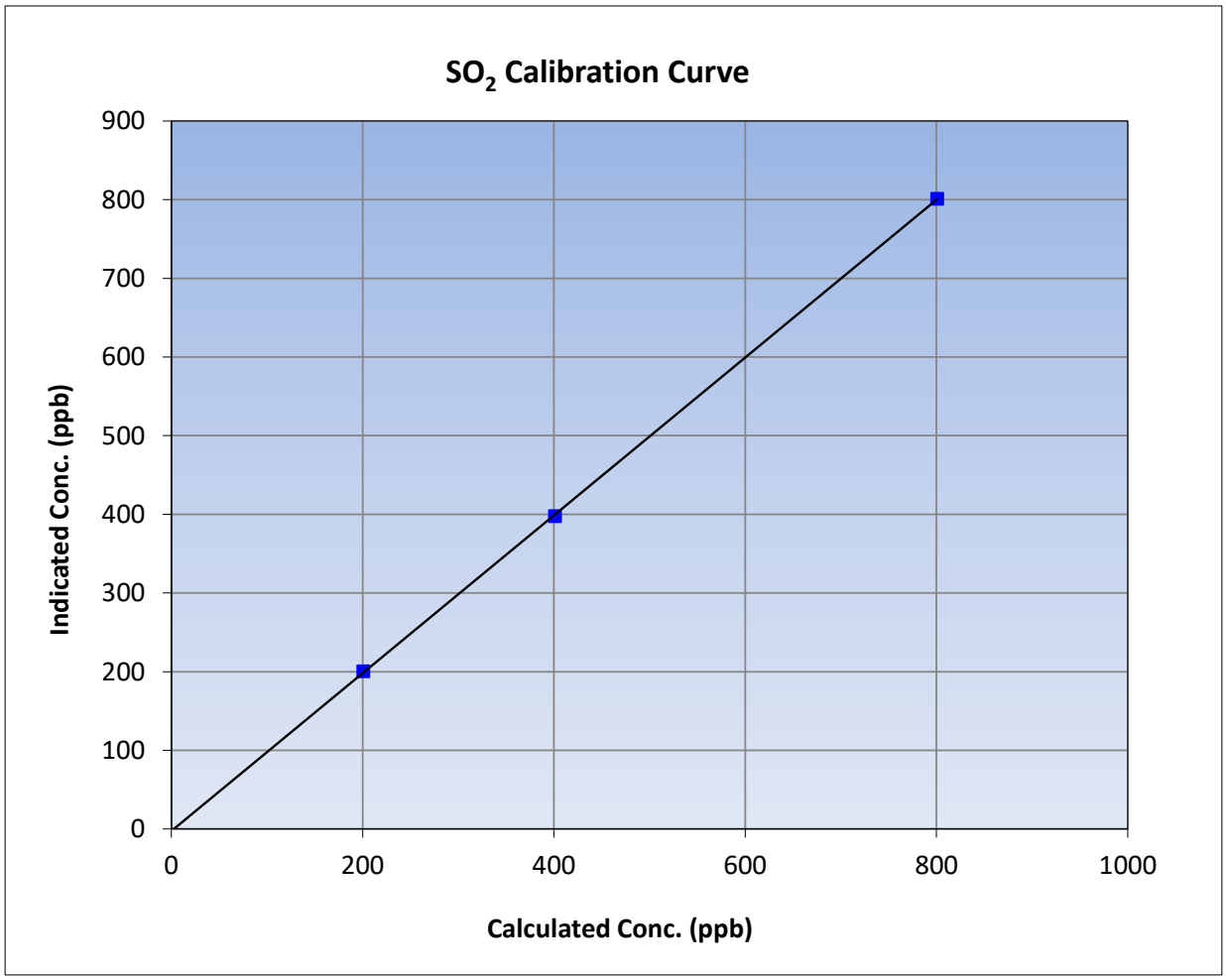
Station Information

Calibration Date:	October 11, 2023	Previous Calibration:	September 6, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	10:57	End Time (MST):	13:42
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1136451241

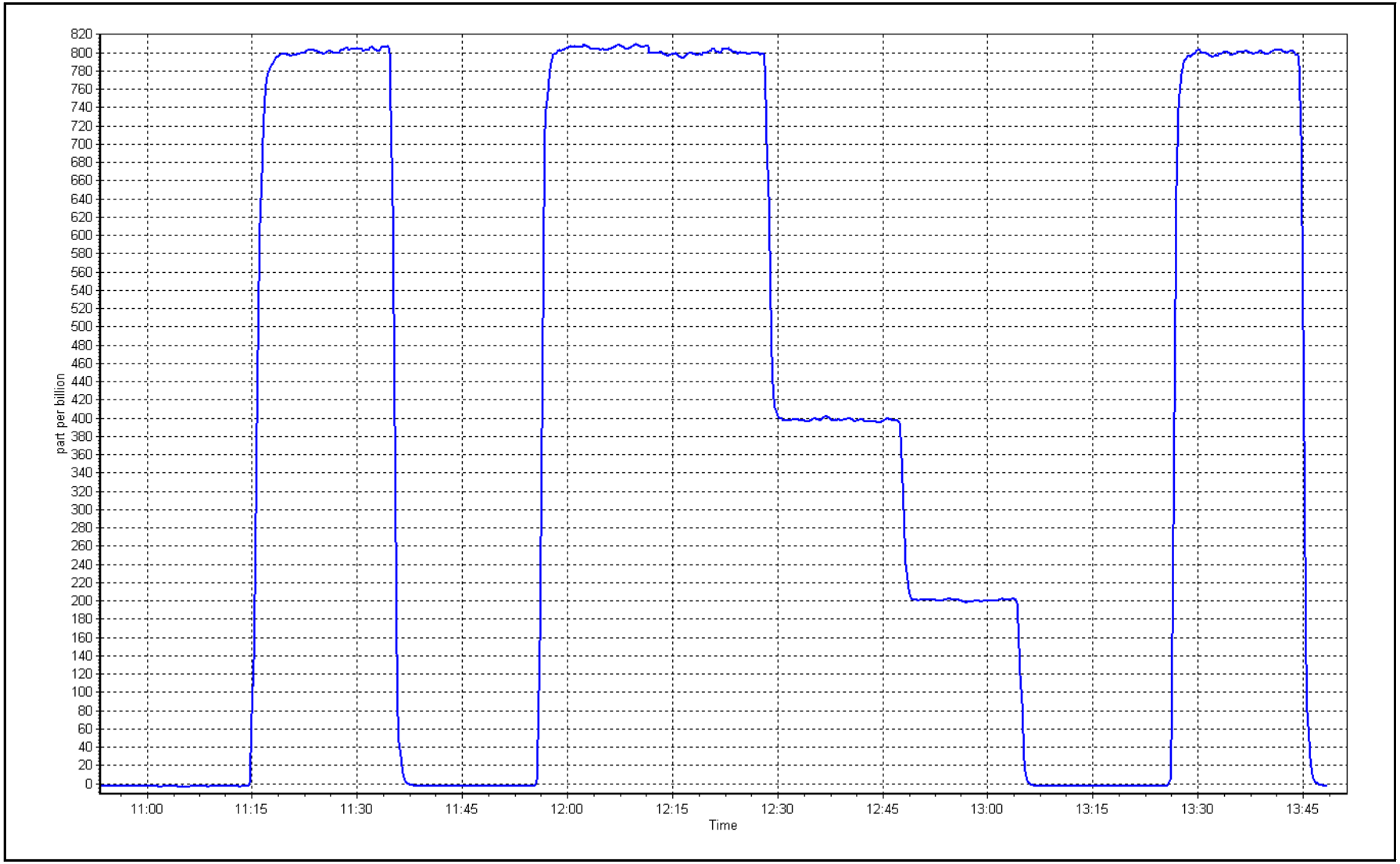
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-2.9	----
800.4	800.8	0.9995
400.7	397.4	1.0083
200.4	200.0	1.0018

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999981	*≥0.995*
Slope	1.003114	*0.90 - 1.10*
Intercept	-2.624243	*+/-30*



SO2 Calibration Plot Date: October 11, 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:	October 12, 2023	Last Cal Date:	September 21, 2023
Start time (MST):	12:44	End time (MST):	16:40
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:	1.011429	1.016423	Backgd or Offset:	1.00	0.99
Calibration intercept:	0.338843	0.539126	Coeff or Slope:	0.752	0.752

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.4	----
as found span	4920	80.5	80.0	80.3	1.001
as found 2nd point	4960	40.2	40.0	40.6	0.994
as found 3rd point	4980	20.1	20.0	20.5	0.994
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.4	----
high point	4920	80.5	80.0	81.8	0.978
second point	4960	40.2	40.0	41.2	0.970
third point	4980	20.1	20.0	21.0	0.951
as left zero	5000	0.0	0.0	0.5	----
as left span	4920	80.5	80.0	82.3	0.972
SO2 Scrubber Check	4919.7	80.3	803.0	0.1	----
Date of last scrubber change:		March 7, 2022		Ave Corr Factor	0.966
Date of last converter efficiency test:		March 15, 2022		100.7%	efficiency

Baseline Corr As found:	79.9	Prev response:	81.26	*% change:	-1.7%
Baseline Corr 2nd AF pt:	40.2	AF Slope:	0.998424	AF Intercept:	0.518826
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999983		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Matthew Courtoreille

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

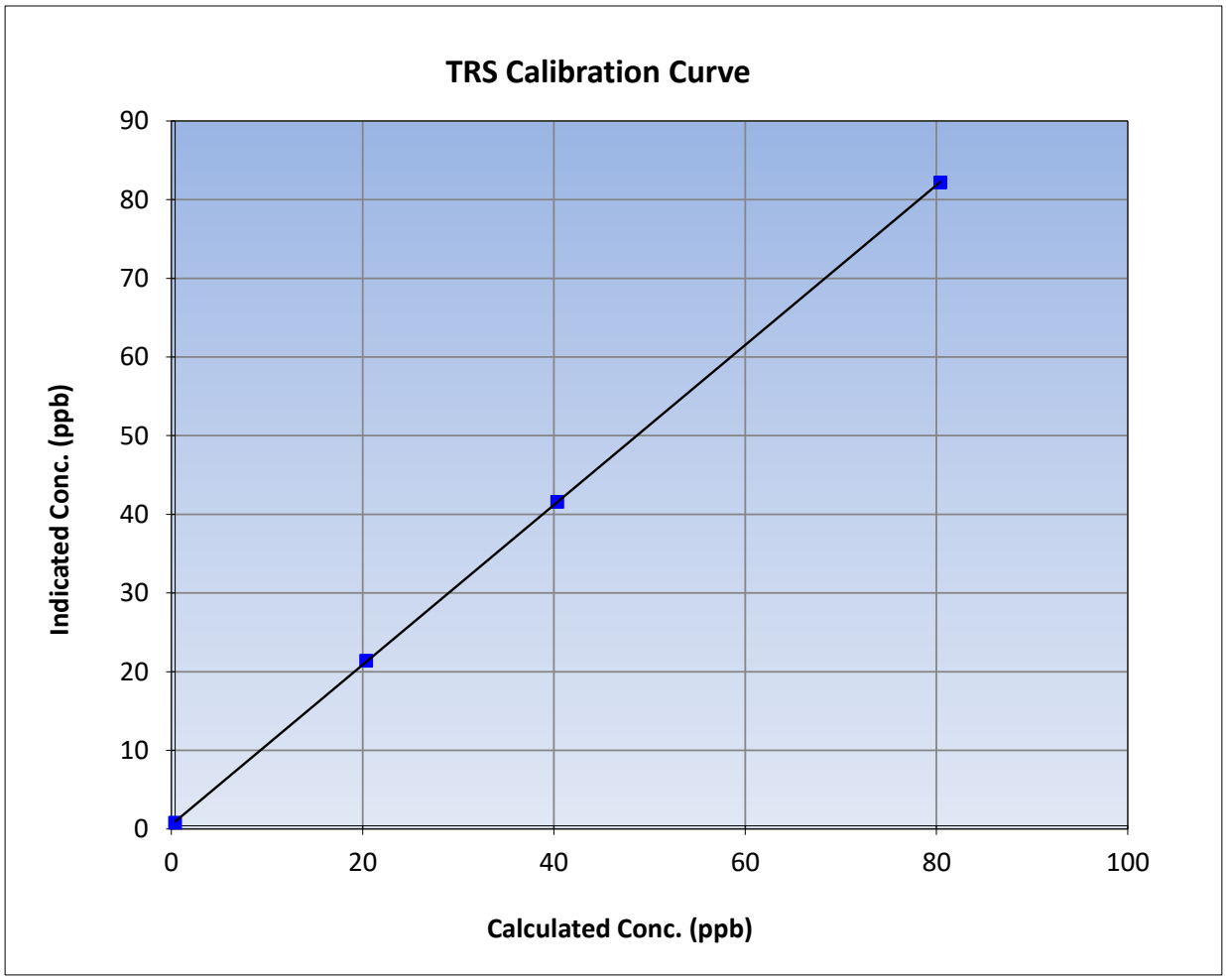
Station Information

Calibration Date:	October 12, 2023	Previous Calibration:	September 21, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	12:44	End Time (MST):	16:20
Analyzer make:	Thermo 43iQ-TL	Analyzer serial #:	1203169744

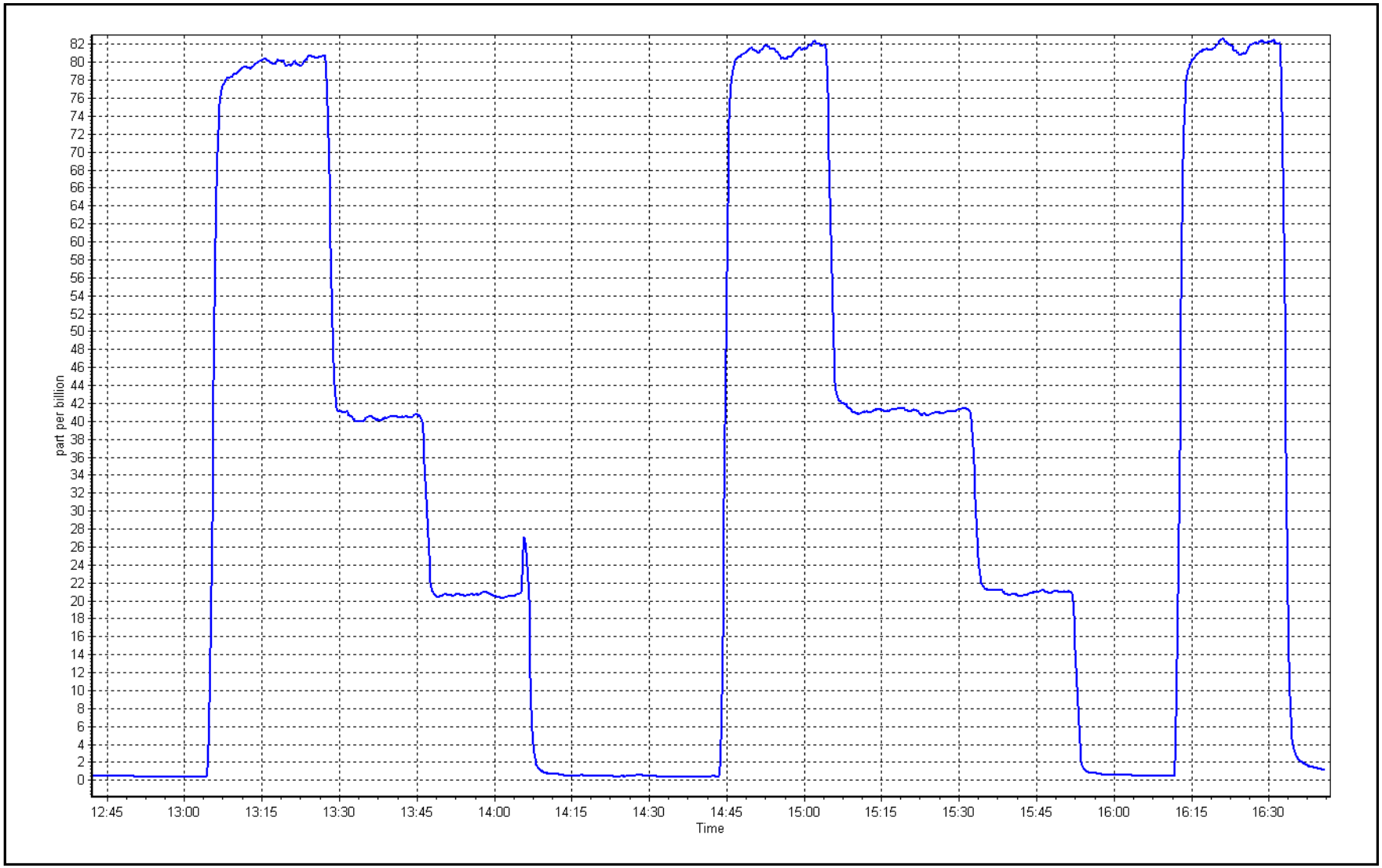
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
80.0	81.8	0.9781
40.0	41.2	0.9698
20.0	21.0	0.9514

Statistical Evaluation		Limits
Correlation Coefficient	0.999986	≥0.995
Slope	1.016423	0.90 - 1.10
Intercept	0.539126	+/-3



TRS Calibration Plot Date: October 12, 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:	October 12, 2023	Last Cal Date:	September 21, 2023
Start time (MST):	8:00	End time (MST):	12:40
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:	1.078	1.101	NO bkgnd or offset:	9.8	10
NOX coeff or slope:	0.992	0.994	NOX bkgnd or offset:	10.7	11.0
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	145.7	145.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.993131	0.993517
NO_X Cal Offset:	1.940000	-0.020000
NO Cal Slope:	0.994931	0.991532
NO Cal Offset:	1.260000	-0.300000
NO_2 Cal Slope:	0.991090	1.008121
NO_2 Cal Offset:	-1.074507	1.625692

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	-1.4	-0.6	-0.8	----	----
as found span	4918	82.0	800.3	800.3	0.0	780.4	779.0	1.4	1.0255	1.0274
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-1.3	-0.4	-0.8	----	----
high point	4918	82.0	800.3	800.3	0.0	793.9	792.6	1.2	1.0081	1.0097
second point	4959	41.0	400.2	400.2	0.0	399.9	398.3	1.4	1.0007	1.0047
third point	4980	20.5	200.1	200.1	0.0	198.9	197.0	1.9	1.0059	1.0156
as left zero	5000	0.0	0.0	0.0	0.0	-1.3	-0.3	-0.9	----	----
as left span	4918	82.0	800.3	401.2	399.1	790.5	395.4	394.9	1.0124	1.0147
								Average Correction Factor	1.0049	1.0100

Corrected As found	NO_X = 781.8 ppb	NO = 779.6 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-1.9%
Previous Response	NO_X = 796.8 ppb	NO = 797.5 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)	797.1	398.0	399.1	402.1	0.9925	100.8%
2nd GPT point (200 ppb O3)	797.1	603.2	193.9	200.5	0.9671	103.4%
3rd GPT point (100 ppb O3)	797.1	700.9	96.2	99.5	0.9668	103.4%
				Average Correction Factor	0.9755	102.5%

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

Calibration Performed By: Matthew C

Wood Buffalo Environmental Association

NO_X Calibration Summary

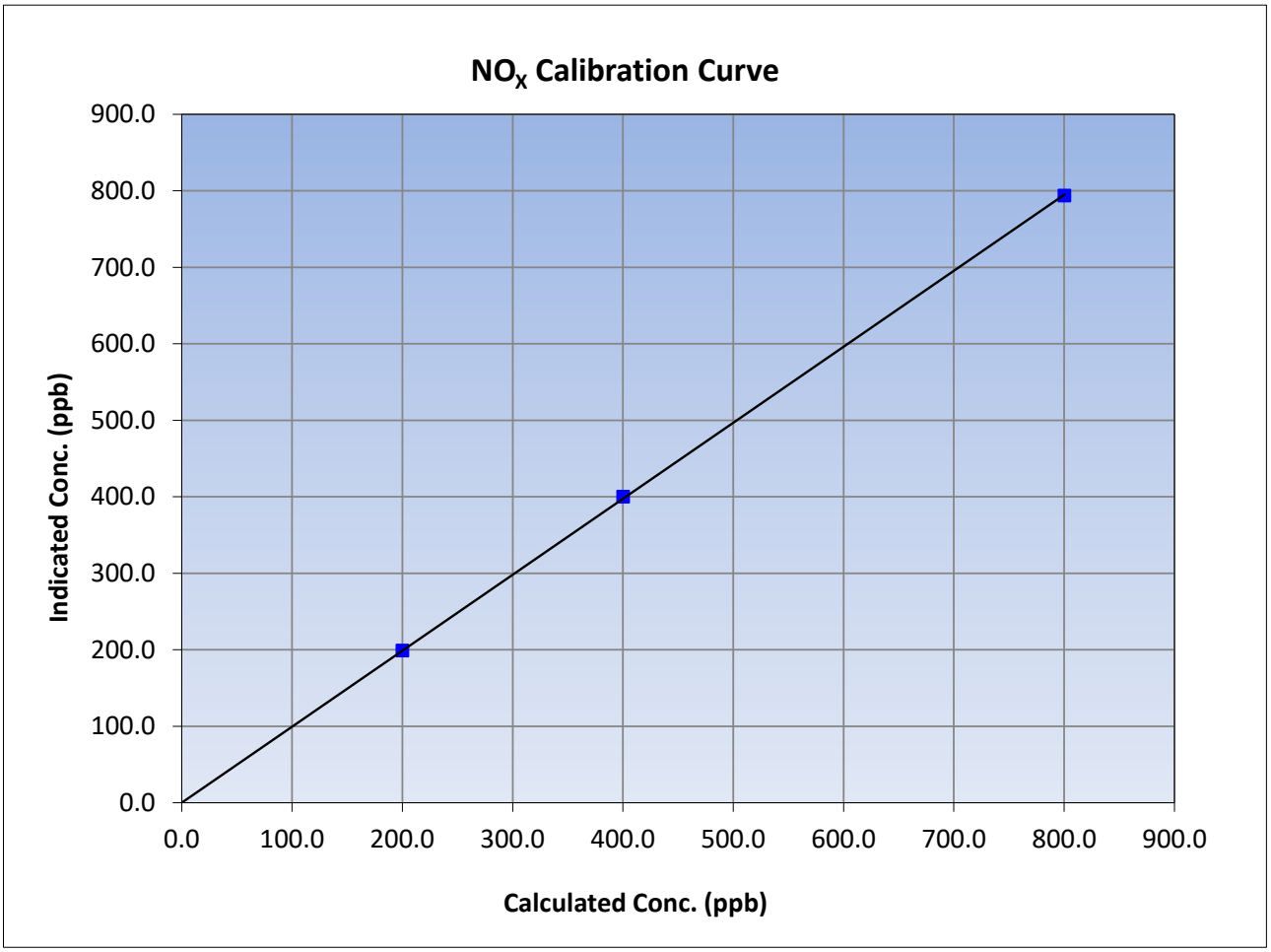
Version-04-2020

Station Information

Calibration Date:	October 12, 2023	Previous Calibration:	September 21, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:00	End Time (MST):	12:40
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	-1.3	----	Correlation Coefficient	0.999975	≥0.995
800.3	793.9	1.0081			
400.2	399.9	1.0007	Slope	0.993517	0.90 - 1.10
200.1	198.9	1.0059			
			Intercept	-0.020000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

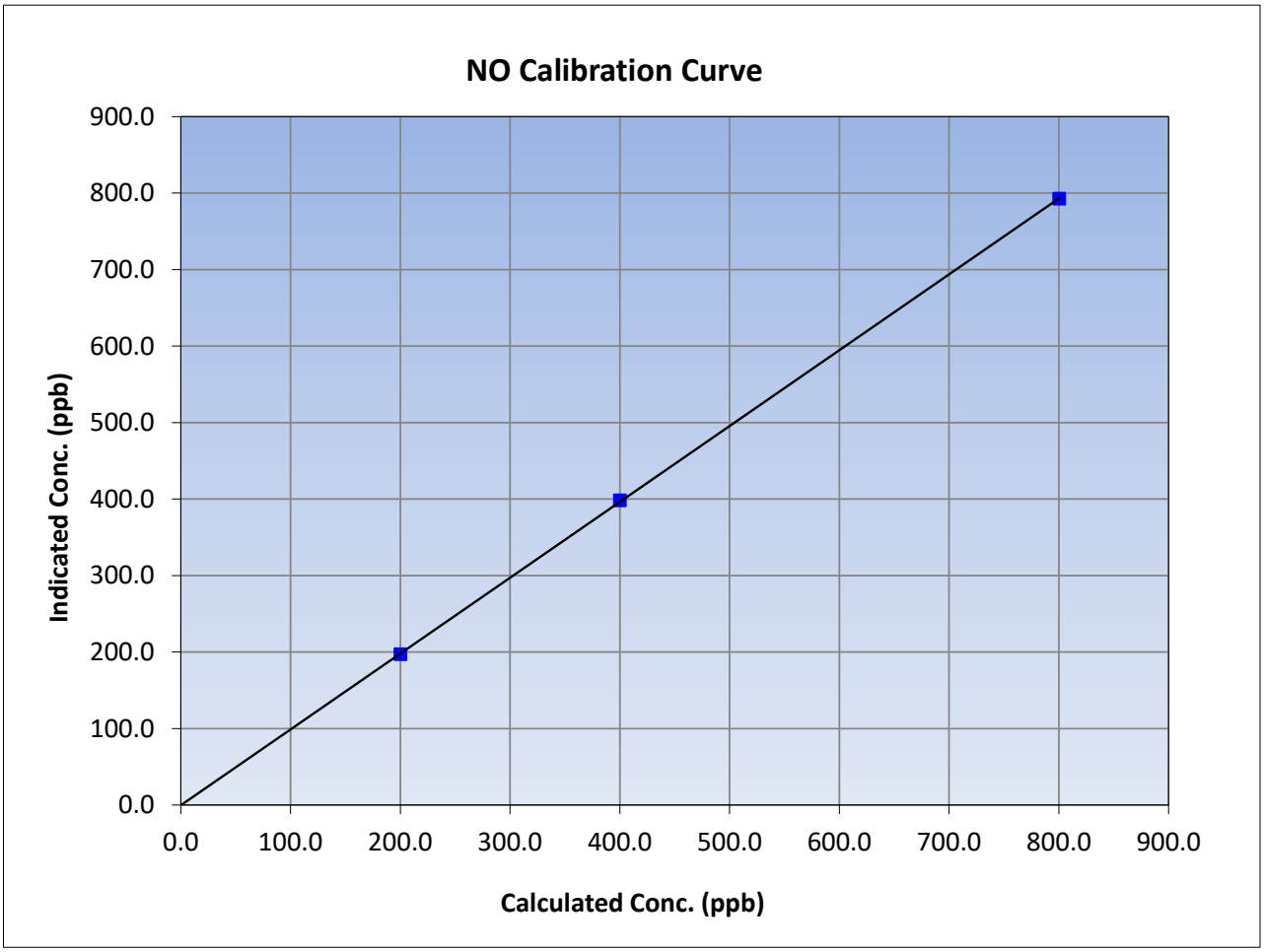
Version-04-2020

Station Information

Calibration Date:	October 12, 2023	Previous Calibration:	September 21, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:00	End Time (MST):	12:40
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	0.999986	≥0.995
800.3	792.6	1.0097			
400.2	398.3	1.0047	Slope	0.991532	0.90 - 1.10
200.1	197.0	1.0156			
			Intercept	-0.300000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

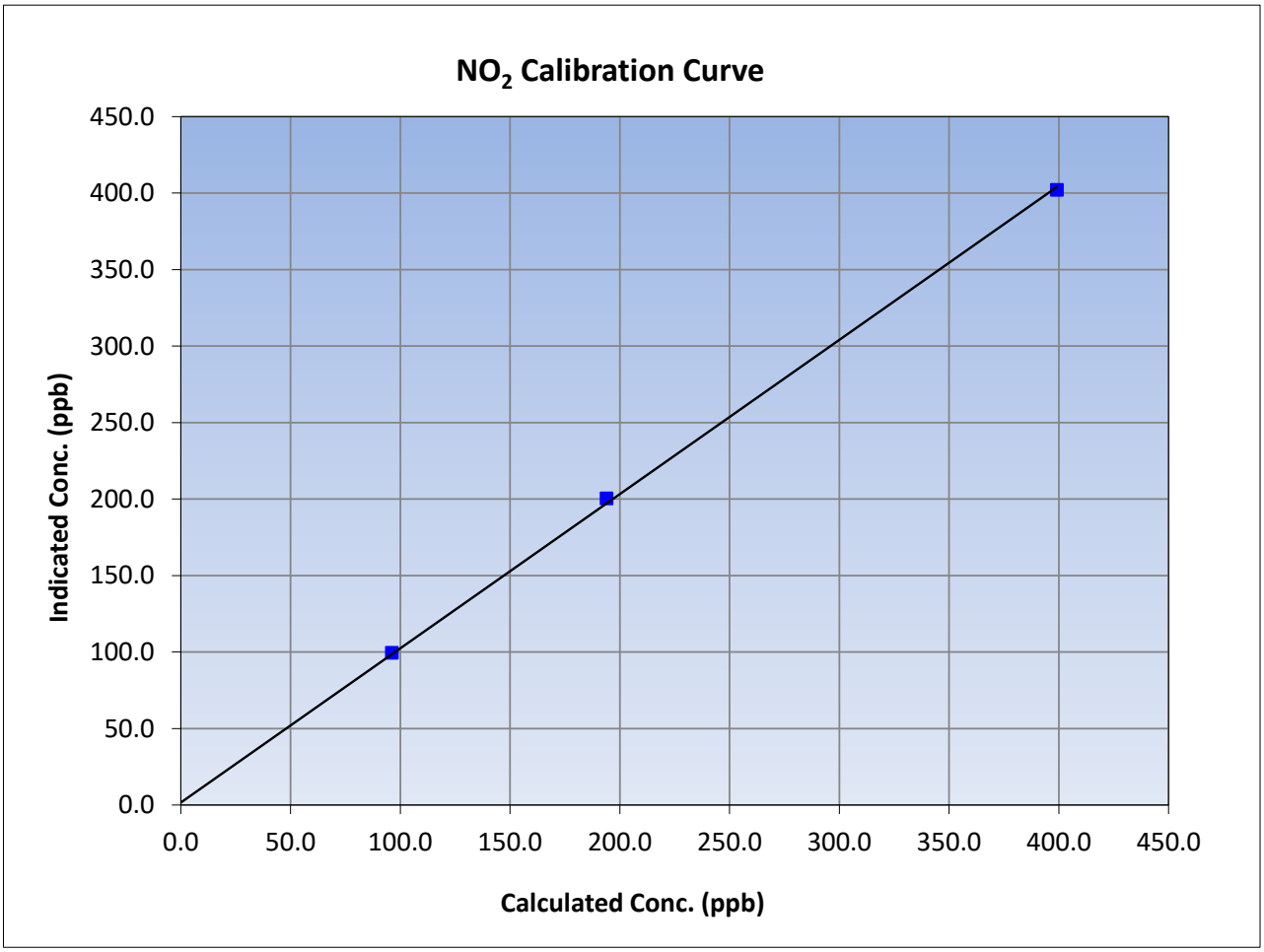
Version-04-2020

Station Information

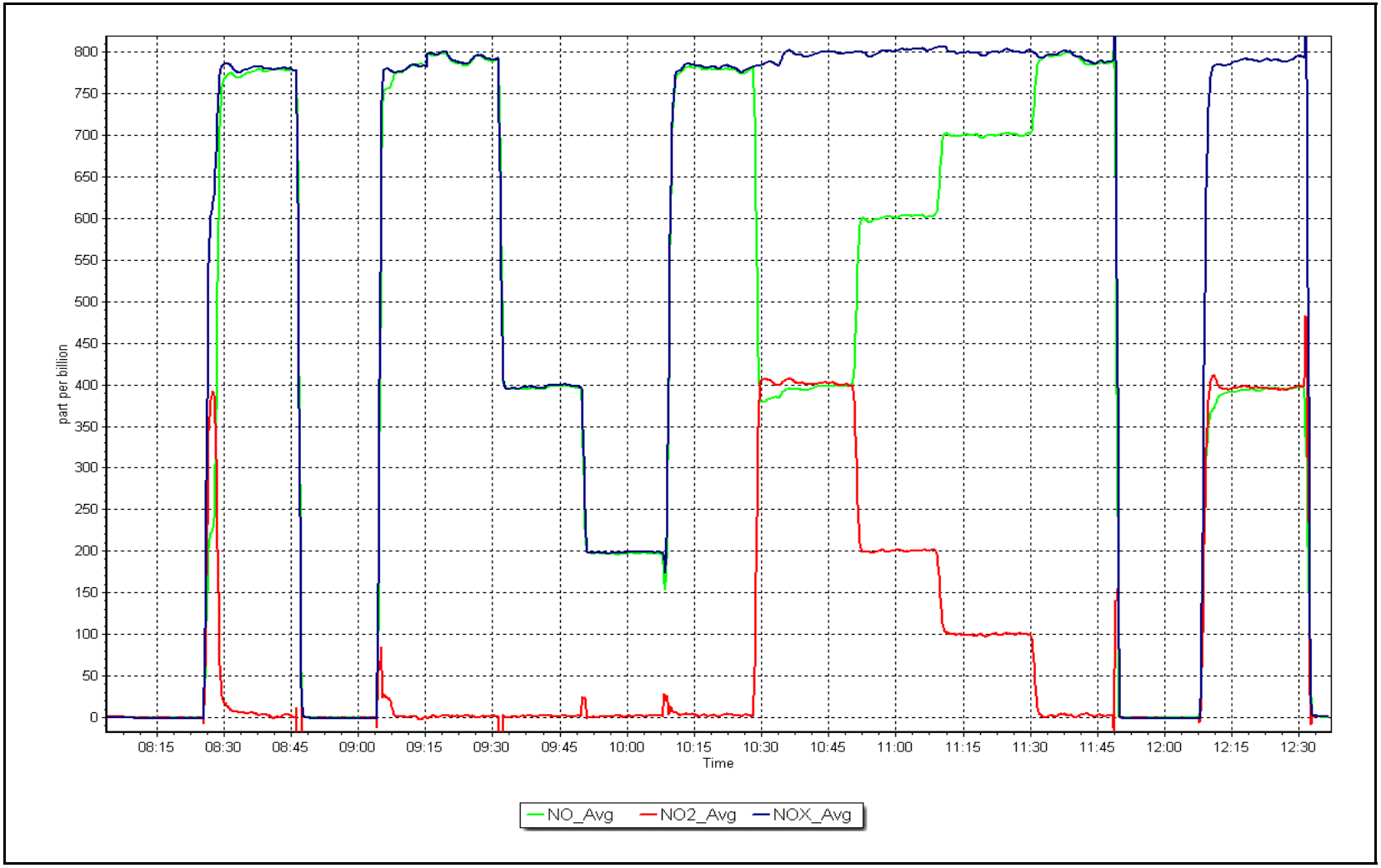
Calibration Date:	October 12, 2023	Previous Calibration:	September 21, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:00	End Time (MST):	12:40
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.8	----	Correlation Coefficient	0.999755	≥0.995
399.1	402.1	0.9925			
193.9	200.5	0.9671	Slope	1.008121	0.90 - 1.10
96.2	99.5	0.9668			
			Intercept	1.625692	+/-20



NO_X Calibration Plot Date: October 12, 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:	October 11, 2023	Last Cal Date:	September 6, 2023
Start time (MST):	8:02	End time (MST):	10:58
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:	1.018086	1.002143	Backgd or Offset:	-2.0	-2.0
Calibration intercept:	-0.940000	-0.200000	Coeff or Slope:	1.036	1.036

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.9	----
as found span	5000	913.0	400.0	402.2	0.995
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	1.1	----
high point	5000	914.7	400.0	401.3	0.997
second point	5000	786.4	200.0	199.6	1.002
third point	5000	701.3	100.0	98.7	1.013
as left zero	5000	0.0	0.0	0.5	----
as left span	5000	963.3	400.0	400.6	0.999
				Average Correction Factor	1.004

Baseline Corr As found:	401.3	Previous response	406.3	*% 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: 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

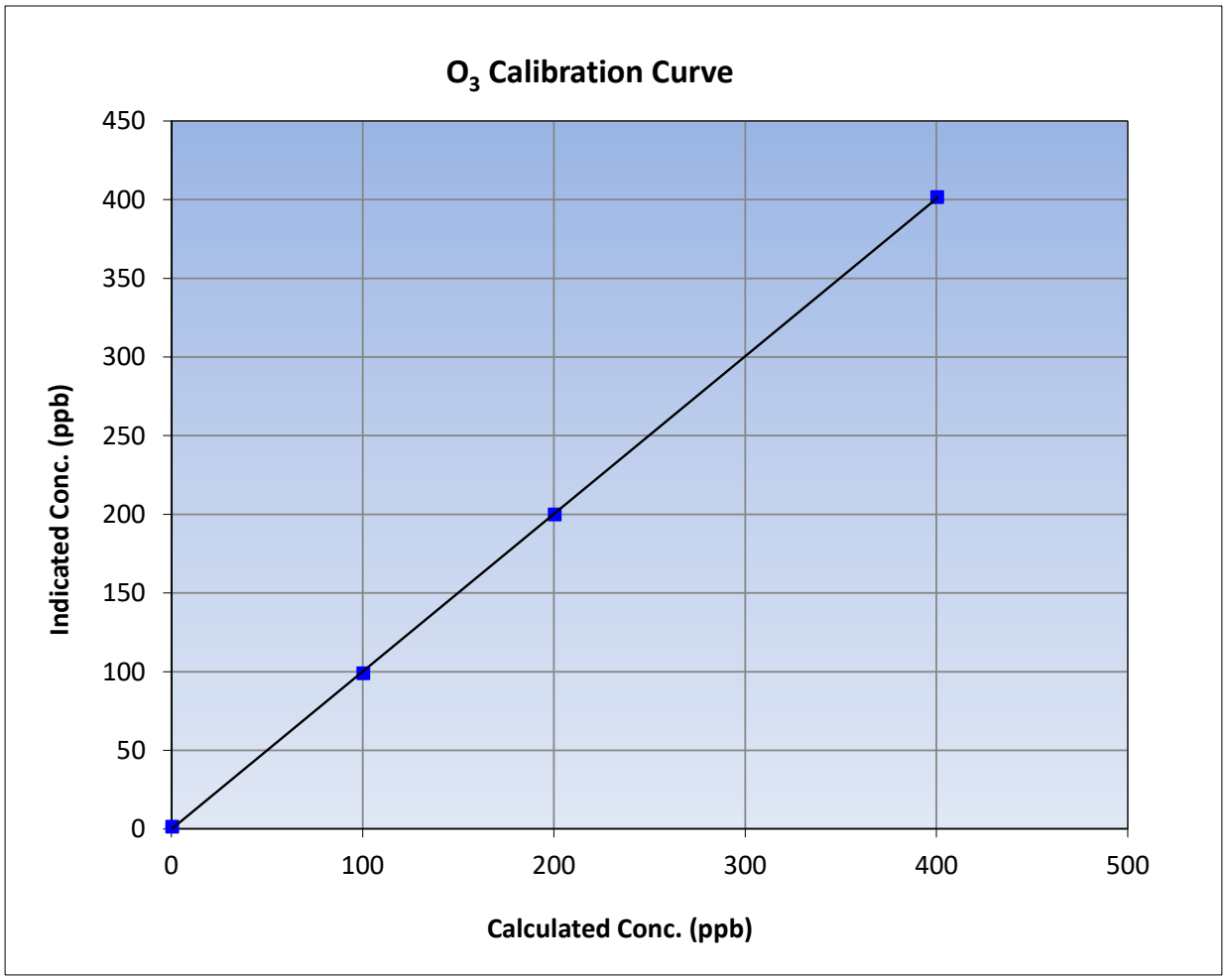
Station Information

Calibration Date:	October 11, 2023	Previous Calibration:	September 6, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:02	End Time (MST):	10:58
Analyzer make:	Teledyne API T400	Analyzer serial #:	3872

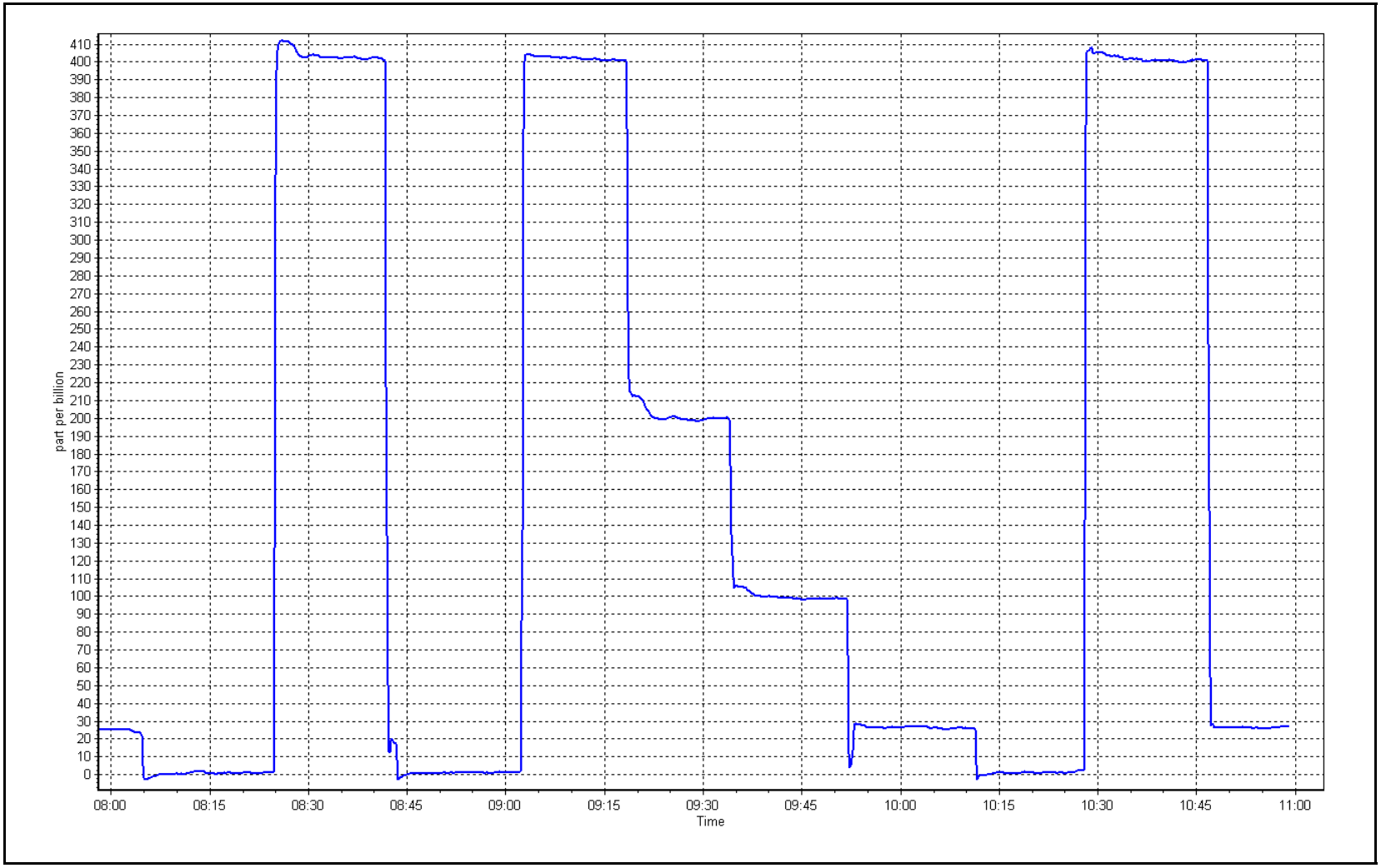
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	1.1	----
400.0	401.3	0.9968
200.0	199.6	1.0020
100.0	98.7	1.0132

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999952	*≥0.995*
Slope	1.002143	*0.90 - 1.10*
Intercept	-0.200000	*+/- 5*



O_3 Calibration Plot Date: October 11, 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:	October 11, 2023	Last Cal Date:	September 21, 2023
Start time (MST):	9:38	End time (MST):	12:27
Analyzer Make:	Teledyne API T640	S/N:	216
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	FP-25	S/N:	388747
Temp/RH standard:	FP-25	S/N:	388747

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	(Limits)
T (°C)	12.7	13.7	12.7	☐	+/- 2 °C
P (mmHg)	730.9	731.0	730.9	☐	+/- 10 mmHg
flow (LPM)	4.99	4.99	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: September 21, 2023 Last Cal Date: July25,2023

PM w/o HEPA: 0 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: July 25, 2023

Disposable Filter Changed: July 25, 2023

Annual Maintenance

Date Sample Tube Cleaned: July 25, 2023

Date RH/T Sensor Cleaned: July 25, 2023

Notes: No adjustment made

Calibration by: Morgan Voyageur

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	October 17, 2023	Last Cal Date:	September 22, 2023
Start time (MST):	8:15	End time (MST):	10:47
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:	1.000563	1.001383	Backgd or Offset:	-0.014	-0.014
Calibration intercept:	0.028916	0.066908	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	0.02	----
as found span	4933	66.7	40.4	40.5	0.997
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4934	66.7	40.4	40.5	0.998
second point	4967	33.3	20.2	20.4	0.992
third point	4983	16.7	10.1	10.2	0.992
as left zero	5000	0.0	0.0	0.0	----
as left span	2960	40.0	40.4	40.3	1.003
				Average Correction Factor	0.994

Baseline Corr As found:	40.51	Prev response:	40.47	*% change:	0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Matthew C

Wood Buffalo Environmental Association

CO Calibration Summary

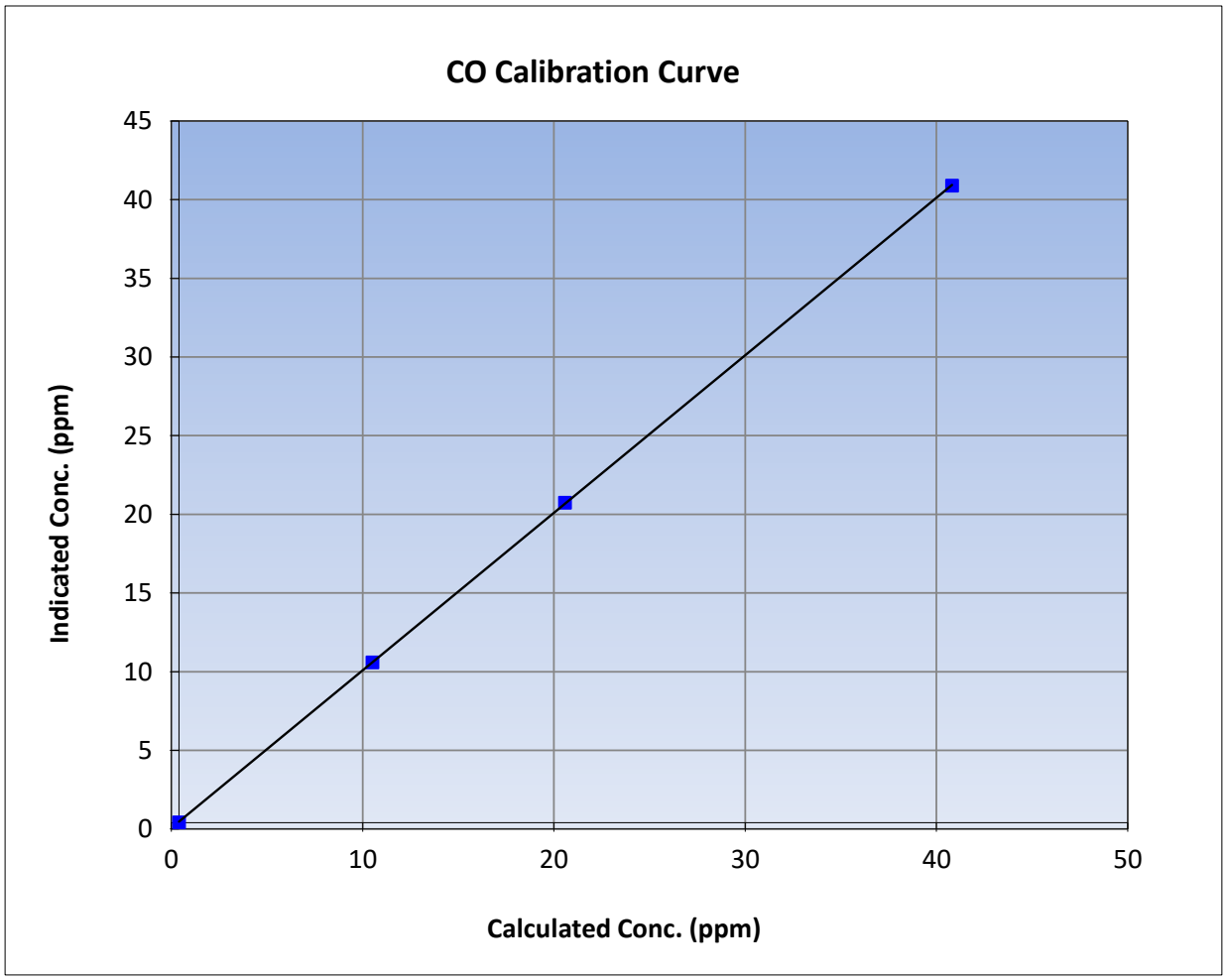
Version-01-2020

Station Information

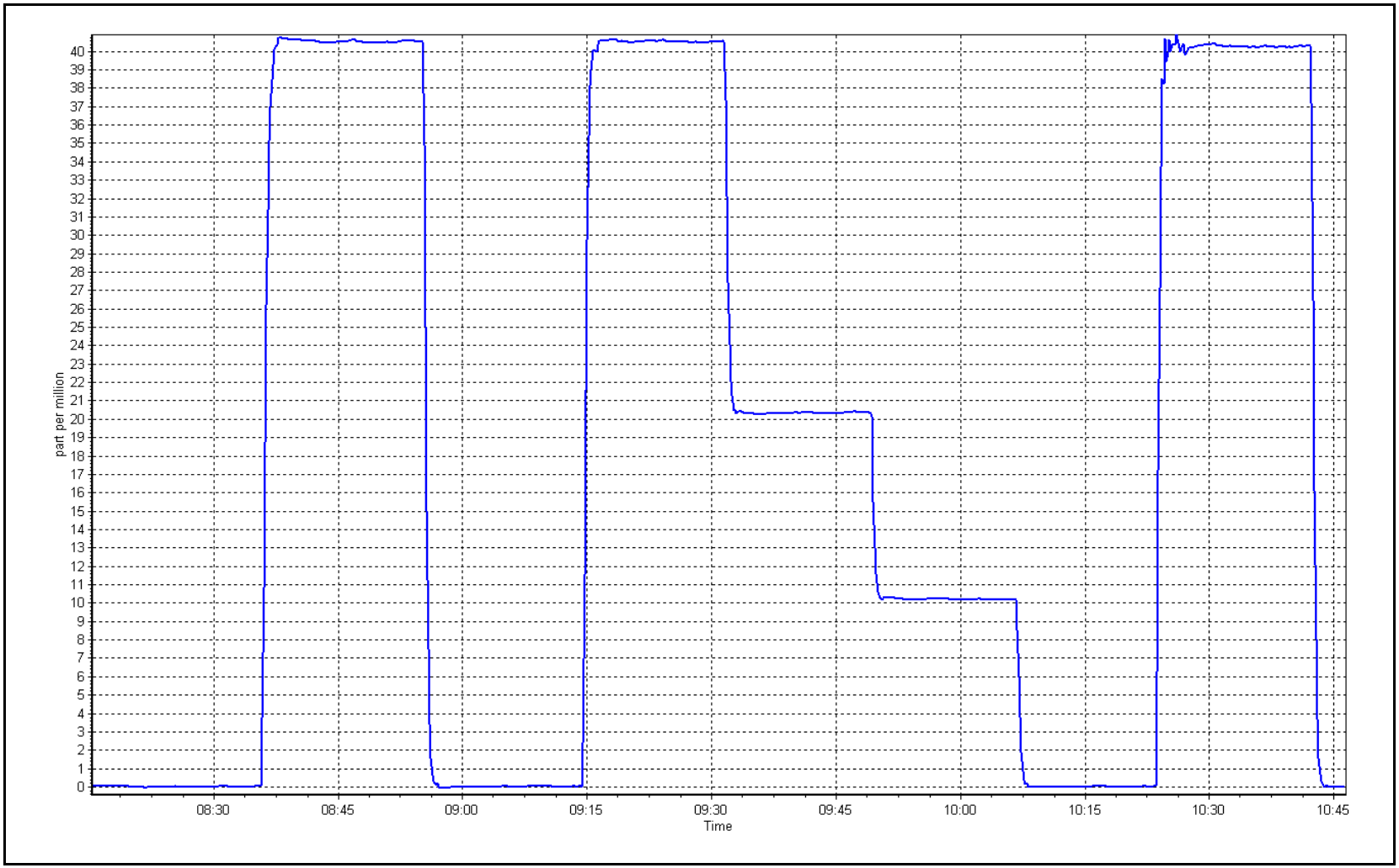
Calibration Date:	October 17, 2023	Previous Calibration:	September 22, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:15	End Time (MST):	10:47
Analyzer make:	API T300	Analyzer serial #:	3505

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	0.999991	*≥0.995*
40.4	40.5	0.9979			
20.2	20.4	0.9916	Slope	1.001383	*0.90 - 1.10*
10.1	10.2	0.9922			
			Intercept	0.066908	*+/-1.5*



CO Calibration Plot Date: October 17, 2023 Location: Fort Chipewyan



Wood Buffalo Environmental Association

CO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	October 17, 2023	Last Cal Date:	September 22, 2023
Start time (MST):	11:00	End time (MST):	14:56
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:	0.989394	0.986227	Backgd or Offset:	0.008	0.008
Calibration intercept:	-0.140000	1.960000	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	1.6	----
as found span	2920	80.0	1605.9	1590.3	1.010
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	2.1	----
high point	2920	80.0	1605.9	1590.2	1.010
second point	2960	40.0	802.9	780.5	1.029
third point	2980	20.0	401.5	406.6	0.987
as left zero	3000	0.0	0.0	3.0	----
as left span	2960	40.0	802.9	779.6	1.030
				Average Correction Factor	1.009

Baseline Corr As found:	1588.70	Prev response:	1588.69	*% change:	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Matthew C

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

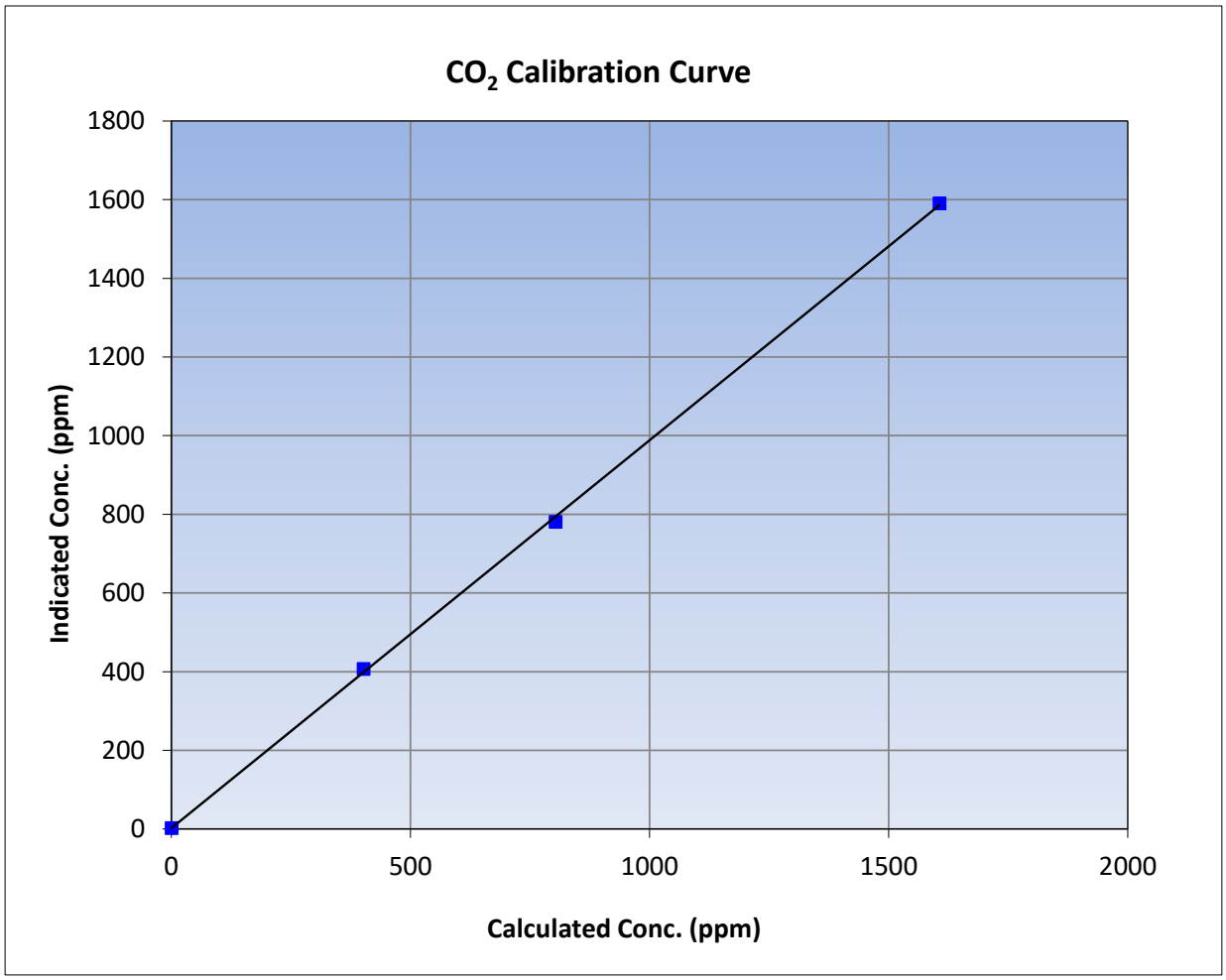
Station Information

Calibration Date	October 17, 2023	Previous Calibration	September 22, 2023
Station Name	Fort Chipewyan	Station Number	AMS08
Start Time (MST)	11:00	End Time (MST)	14:56
Analyzer make	Teledyne API T360	Analyzer serial #	289

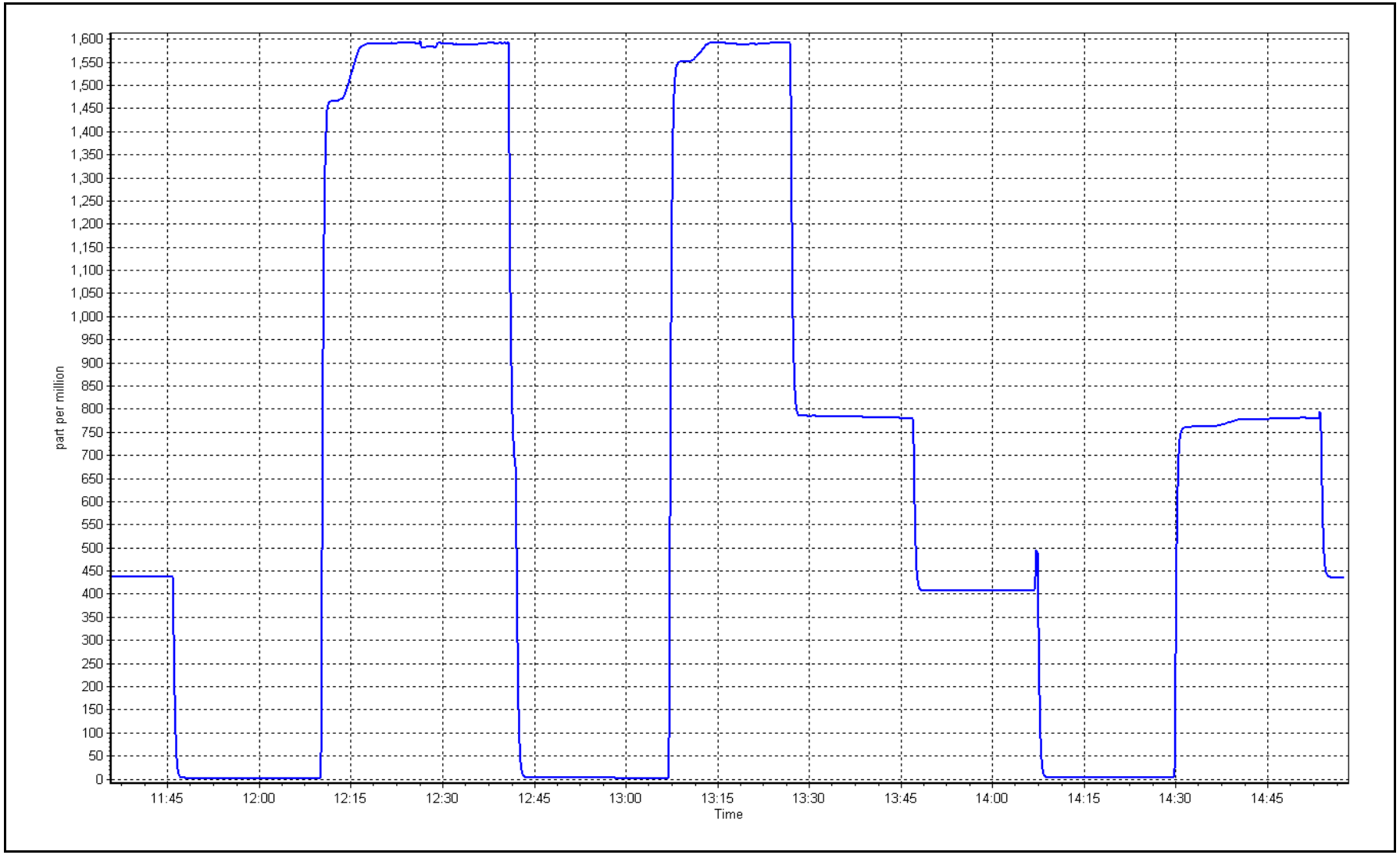
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	2.1	----
1605.9	1590.2	1.0099
802.9	780.5	1.0287
401.5	406.6	0.9874

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999800	*≥0.995*
Slope	0.986227	*0.90 - 1.10*
Intercept	1.960000	*+/-20*



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



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS09
BARGE LANDING
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	October 3, 2023	Last Cal Date:	September 5, 2023
Start time (MST):	9:07	End time (MST):	11:51
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000440	0.995922	Backgd or Offset:	10.3	10.3
Calibration intercept:	-0.648667	-0.090033	Coeff or Slope:	0.979	0.973

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	800.6	1.001
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	798.1	1.004
second point	4959	40.1	400.8	399.3	1.004
third point	4980	20.0	199.8	198.5	1.007
as left zero	5000	0.0	0.0	-0.2	----
as left span	4919	80.2	801.5	799.2	1.003
				Average Correction Factor	1.005

Baseline Corr As found:	800.90	Previous response	801.19	*% change	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

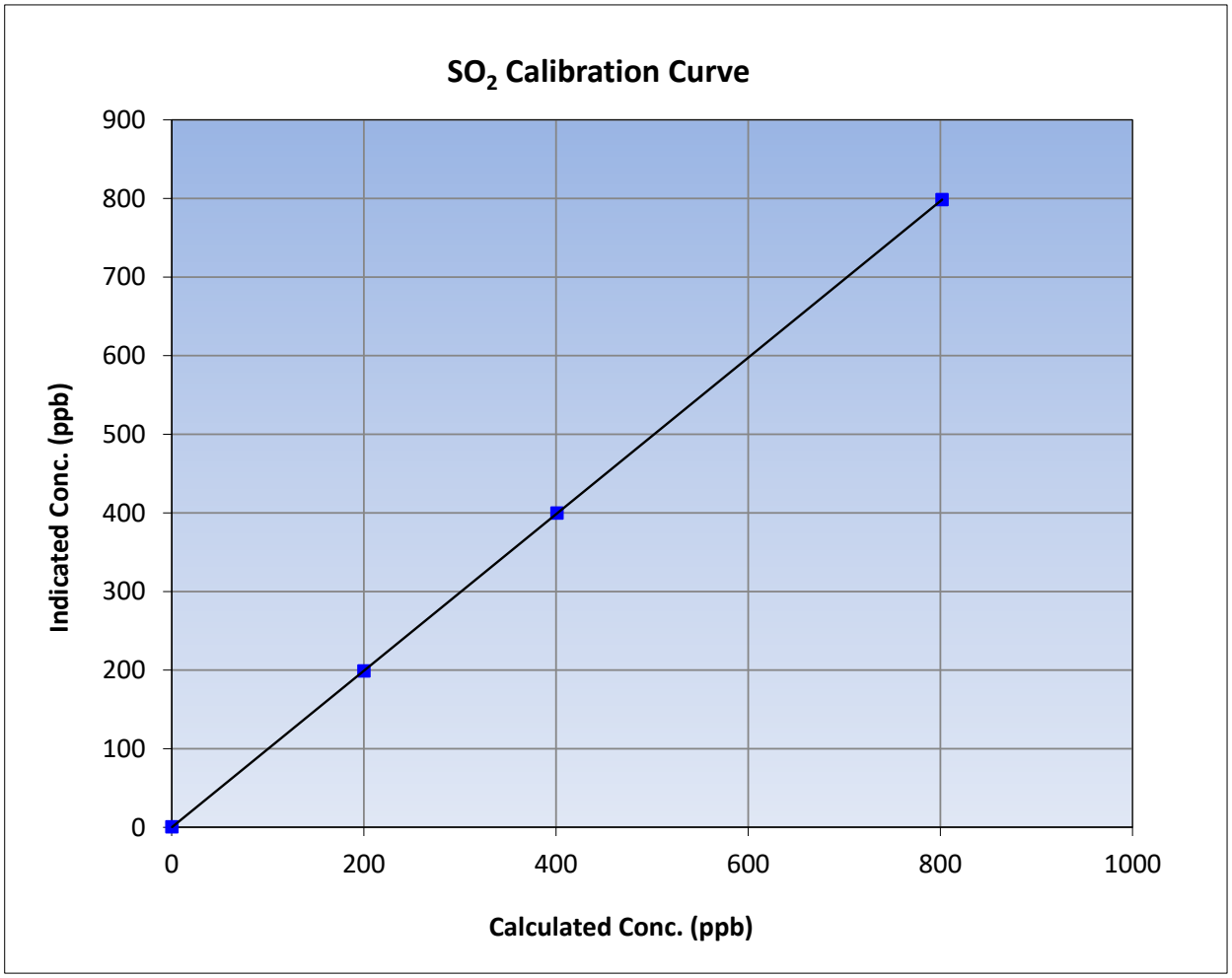
Version-01-2020

Station Information

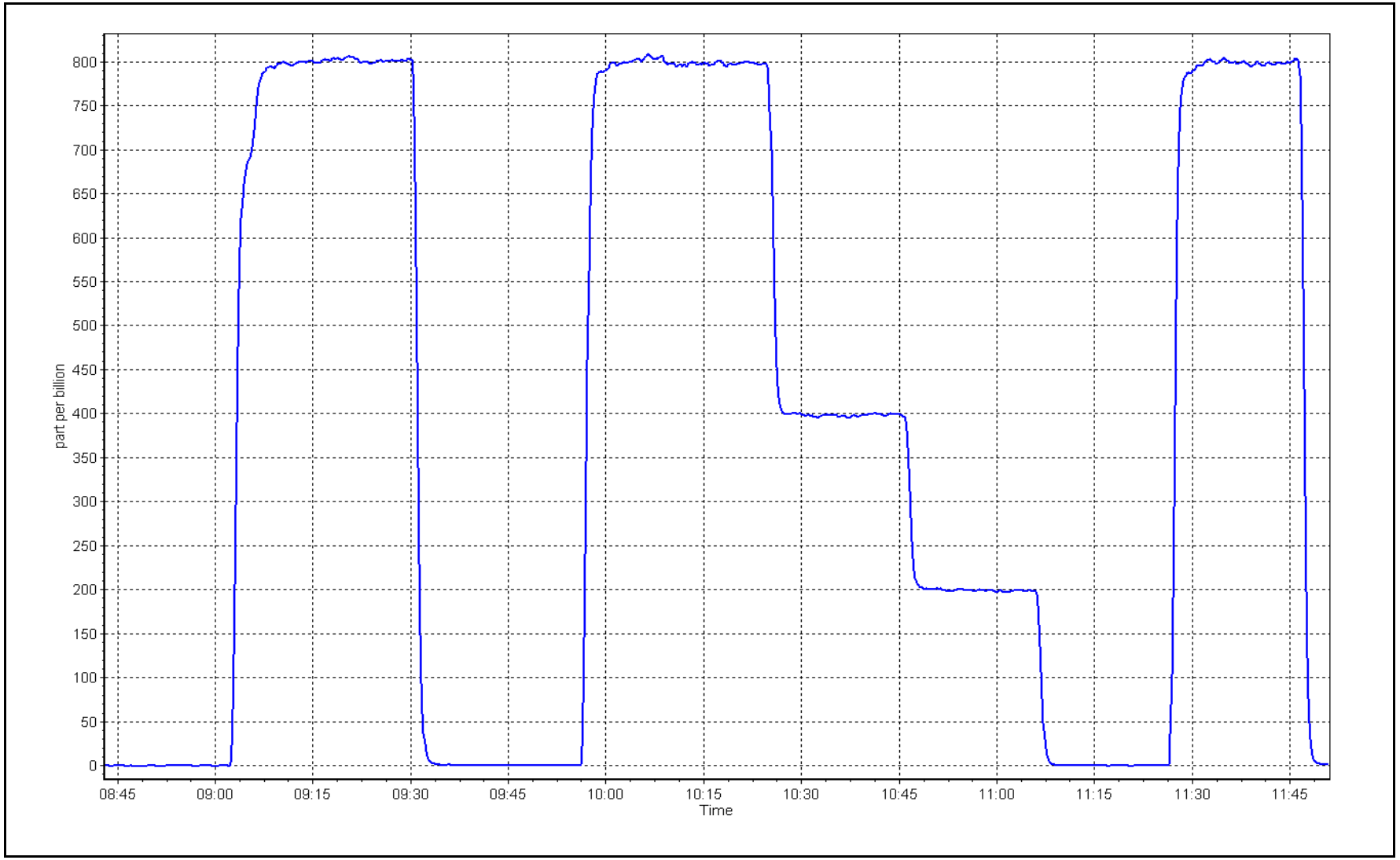
Calibration Date:	October 3, 2023	Previous Calibration:	September 5, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:07	End Time (MST):	11:51
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148498

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.1	----			
801.5	798.1	1.0042	Correlation Coefficient	0.999999	*≥0.995*
400.8	399.3	1.0036	Slope	0.995922	*0.90 - 1.10*
199.8	198.5	1.0068			
			Intercept	-0.090033	*+/-30*



SO2 Calibration Plot Date: October 3, 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:	October 11, 2023	Last Cal Date:	September 7, 2023
Start time (MST):	11:30	End time (MST):	14:09
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:	5.320	ppm	Rem Gas Exp Date:	August 22, 2026
Removed Gas Cyl #:	CC511710		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3812
ZAG Make/Model:	API T701		Serial Number:	4888

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1331259320	
Converter make:	CDN-101		Converter serial #:	519	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000594	0.997327	Backgd or Offset:	2.77	3.06
Calibration intercept:	-0.001606	0.165639	Coeff or Slope:	1.134	1.252

TRS As Found Data

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

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4923	77.4	80.0	79.8	1.003
second point	4961	38.7	40.0	40.4	0.991
third point	4981	18.8	19.4	19.7	0.987
as left zero	5000	0.0	0.0	0.0	----
as left span	4923	77.4	80.0	79.5	1.007
SO2 Scrubber Check	4920	80.2	802.0		----
Date of last scrubber change:		28-Feb-23		Ave Corr Factor	0.994
Date of last converter efficiency test:					efficiency

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

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter. SOx scrubber check done after calibrator zero. Swapped the failed CGA cylinder with a new one. Adjusted span only.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

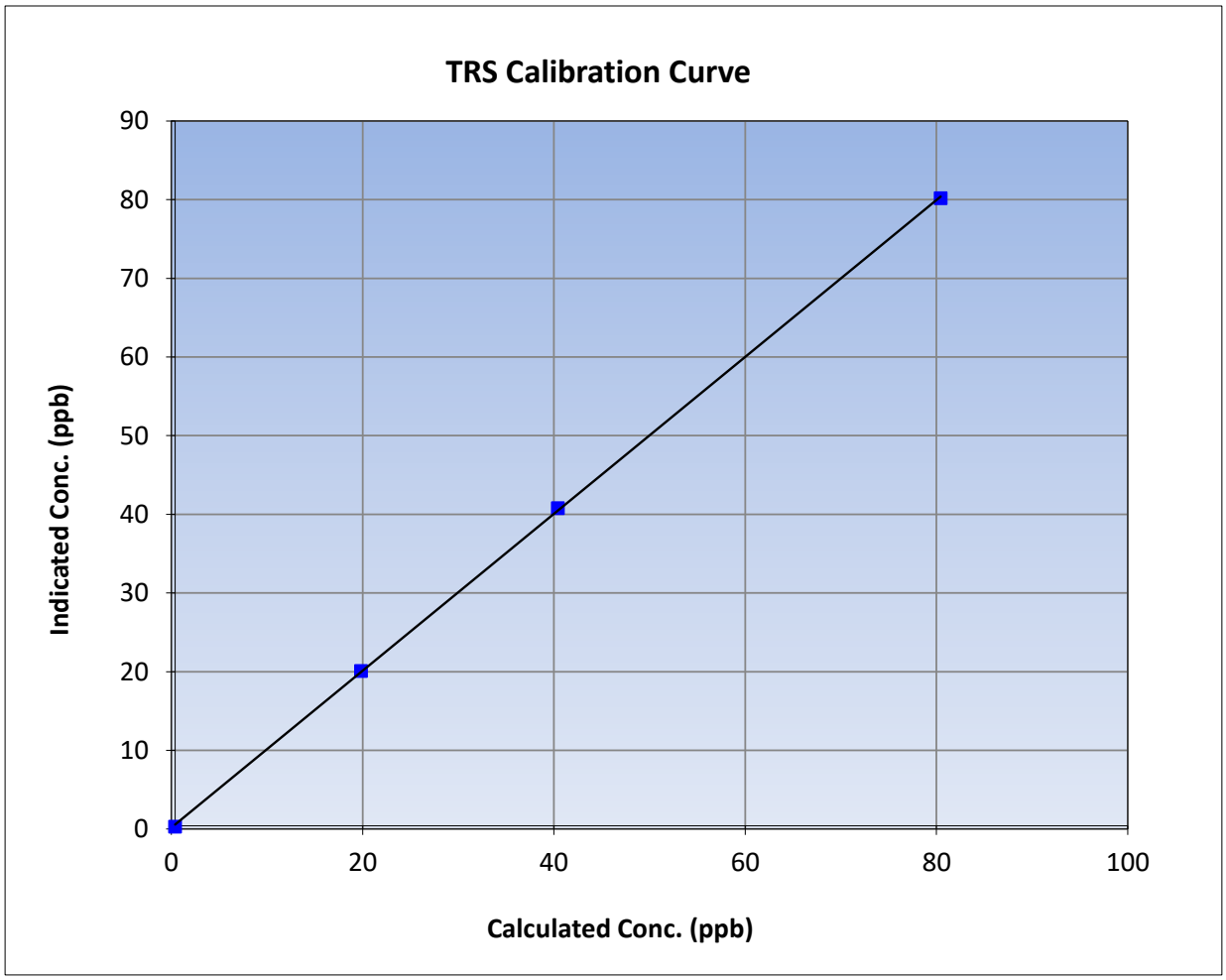
Station Information

Calibration Date:	October 11, 2023	Previous Calibration:	September 7, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	11:30	End Time (MST):	14:09
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1331259320

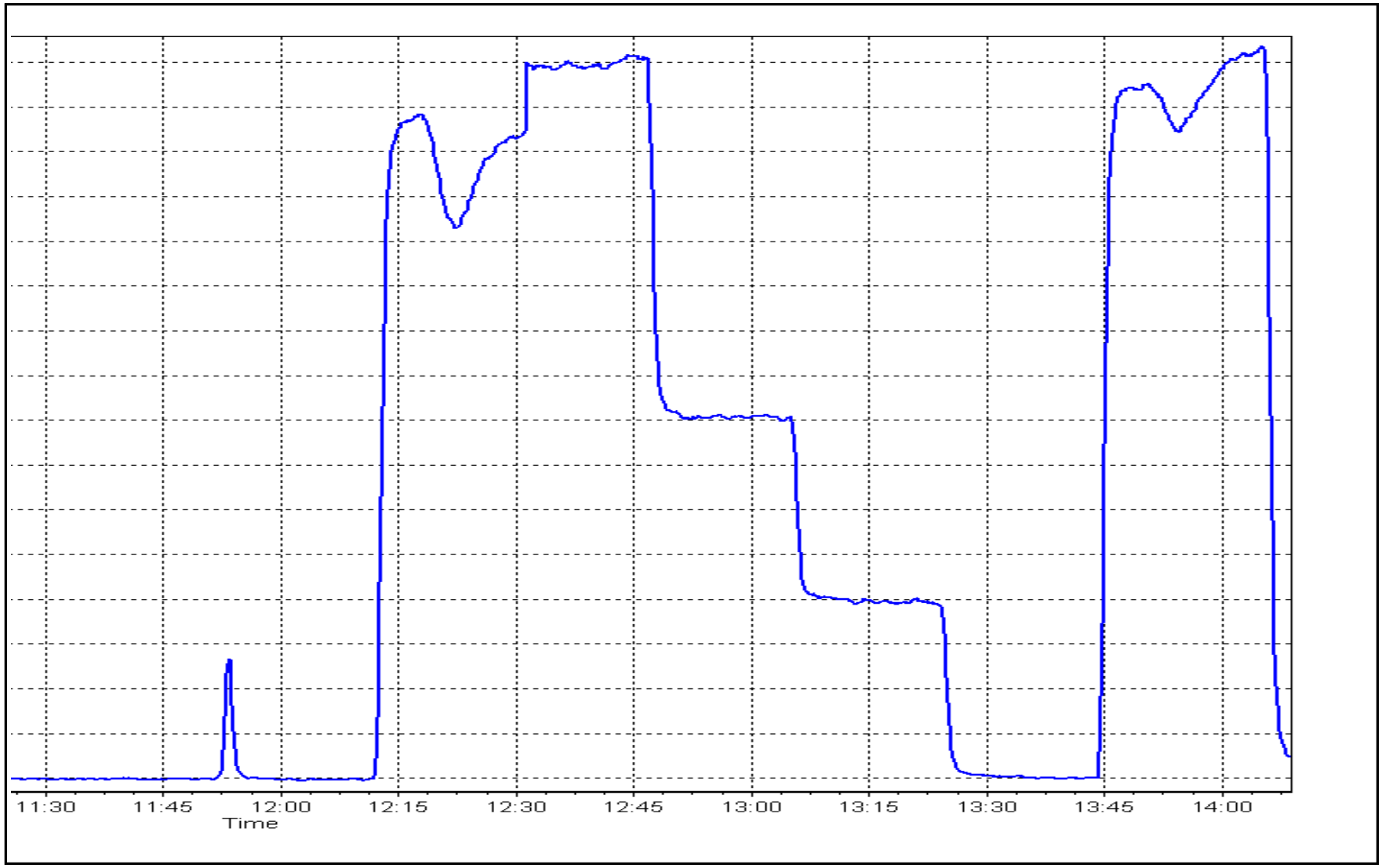
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	79.8	1.0030
40.0	40.4	0.9907
19.4	19.7	0.9870

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999935	*≥0.995*
Slope	0.997327	*0.90 - 1.10*
Intercept	0.165639	*+/-3*



TRS Calibration Plot Date: October 11, 2023 Location: Barge Landing



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	October 16, 2023	Last Cal Date:	October 11, 2023
Start time (MST):	9:26	End time (MST):	13:23
Reason:	Maintenance		

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	1.006260	Backgd or Offset:	3.06	2.95
Calibration intercept:	0.165639	-0.200515	Coeff or Slope:	1.252	1.217

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	77.4	80.0	81.8	0.977
as found 2nd point	4961	38.7	40.0	41.0	0.974
as found 3rd point	4981	19.3	20.0	20.3	0.978
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4923	77.4	80.0	80.4	0.996
second point	4961	38.7	40.0	40.0	1.001
third point	4981	19.3	20.0	19.8	1.008
as left zero	5000	0.0	0.0	0.1	----
as left span	4923	77.4	80.0	80.0	1.001

SO2 Scrubber Check

Date of last scrubber change:	28-Feb-23	Ave Corr Factor	1.001
Date of last converter efficiency test:			efficiency

Baseline Corr As found:	81.9	Prev response:	79.99	*% change:	2.3%
Baseline Corr 2nd AF pt:	41.1	AF Slope:	1.023533	AF Intercept:	-0.080172
Baseline Corr 3rd AF pt:	20.4	AF Correlation:	0.999995		

* = > +/-5% change initiates investigation

Notes: Purge the regulator and line during as found zero to remedy span response. Multi-point as founds within limits and linear. Adjusted span.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

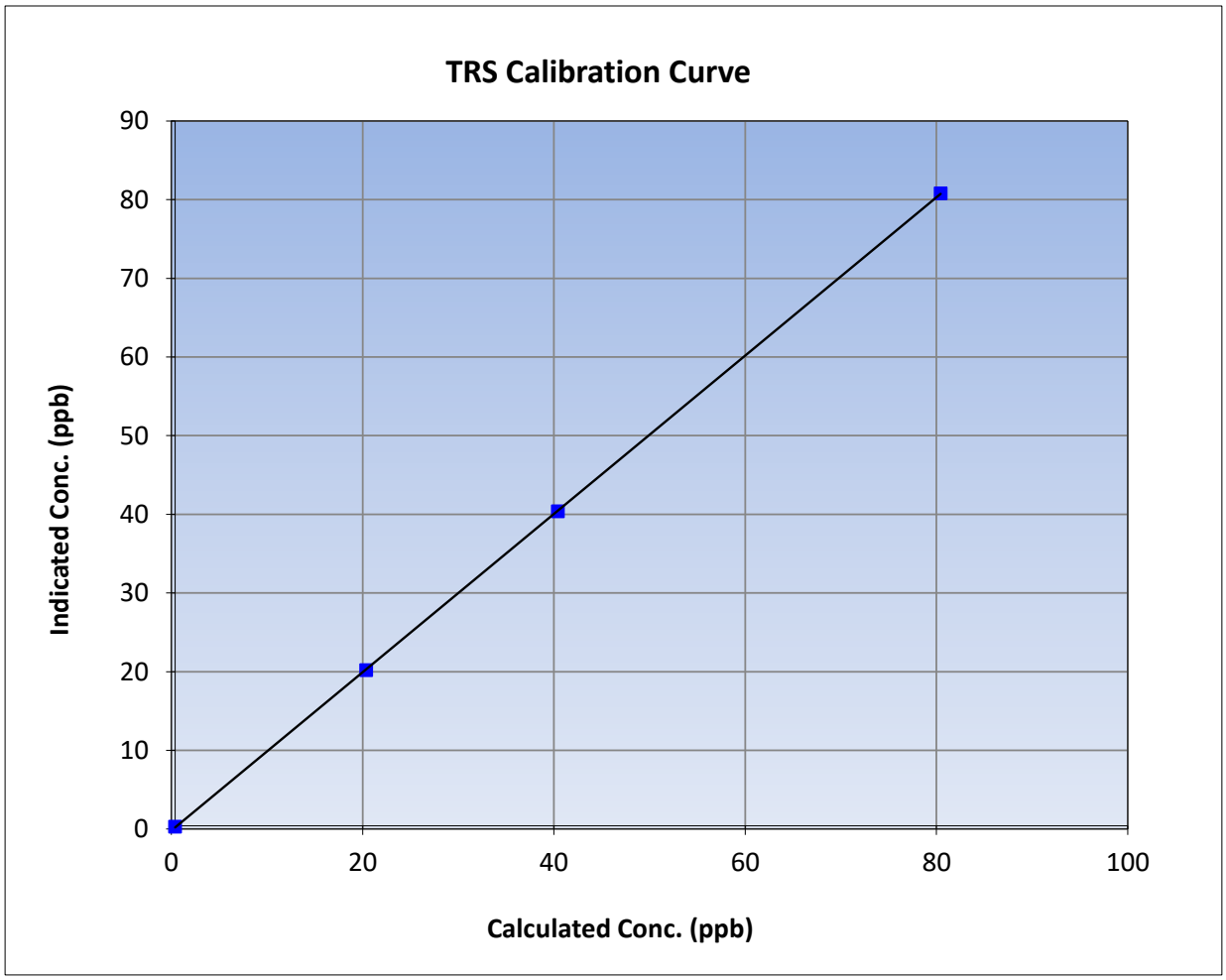
Station Information

Calibration Date:	October 16, 2023	Previous Calibration:	October 11, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:26	End Time (MST):	13:23
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1331259320

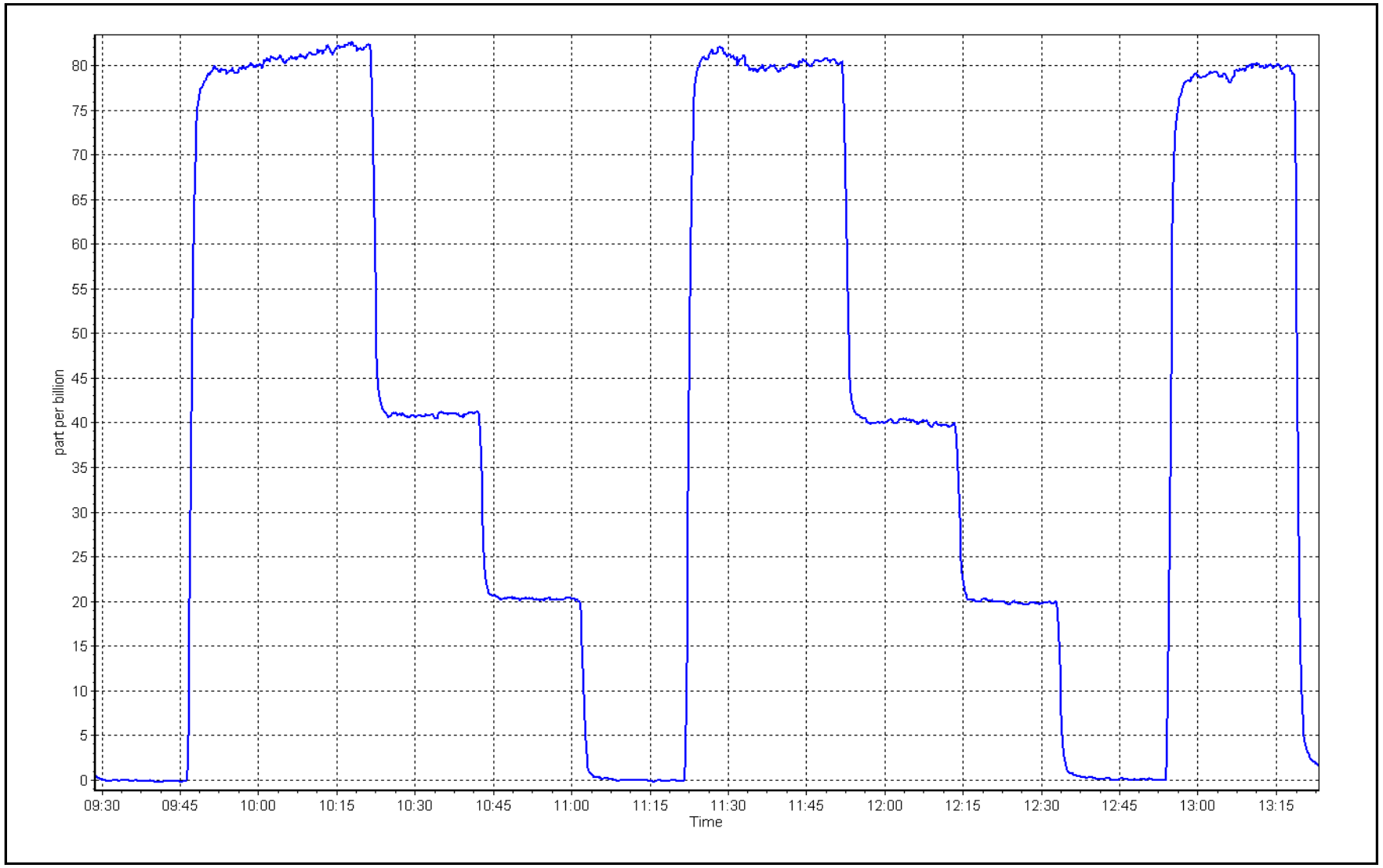
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.4	0.9955
40.0	40.0	1.0006
20.0	19.8	1.0080

Statistical Evaluation		Limits
Correlation Coefficient	0.999993	≥0.995
Slope	1.006260	0.90 - 1.10
Intercept	-0.200515	+/-3



TRS Calibration Plot Date: October 16, 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:	October 2, 2023	Last Cal Date:	September 5, 2023
Start time (MST):	9:07	End time (MST):	11:51
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC151285	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	497.6	ppm	CH4 Equiv Conc.	1067.1	ppm
C3H8 Cal Gas Conc.	207.1	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:		
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:	2.52E-04	2.58E-04	NMHC SP Ratio:	4.87E-05	4.85E-05
CH4 Retention time:	15.40	15.80	NMHC Peak Area:	187823	188320
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	17.08	1.002
second point	4960	40.1	8.56	8.59	0.996
third point	4980	20.0	4.27	4.28	0.998
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	17.12	17.20	0.995
				ge Correction Factor	0.999
Baseline Corr AF:	17.07	Prev response	17.14	*% change	-0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	80.2	9.14	9.24	0.989
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	9.12	1.002
second point	4960	40.1	4.57	4.60	0.993
third point	4980	20.0	2.28	2.29	0.997
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	9.14	9.18	0.995
				Average Correction Factor	0.997
Baseline Corr AF:	9.24	Prev response	9.15	*% 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	80.2	7.98	7.83	1.020
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	7.96	1.002
second point	4960	40.1	3.99	3.99	1.000
third point	4980	20.0	1.99	1.99	0.999
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	7.98	8.01	0.996
				Average Correction Factor	1.000
Baseline Corr AF:	7.83	Prev response	7.98	*% change	-2.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.001164	0.997687
THC Cal Offset:	-0.002739	0.018043
CH4 Cal Slope:	1.000766	0.997459
CH4 Cal Offset:	-0.005136	0.004658
NMHC Cal Slope:	1.001350	0.998099
NMHC Cal Offset:	0.002797	0.012785

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

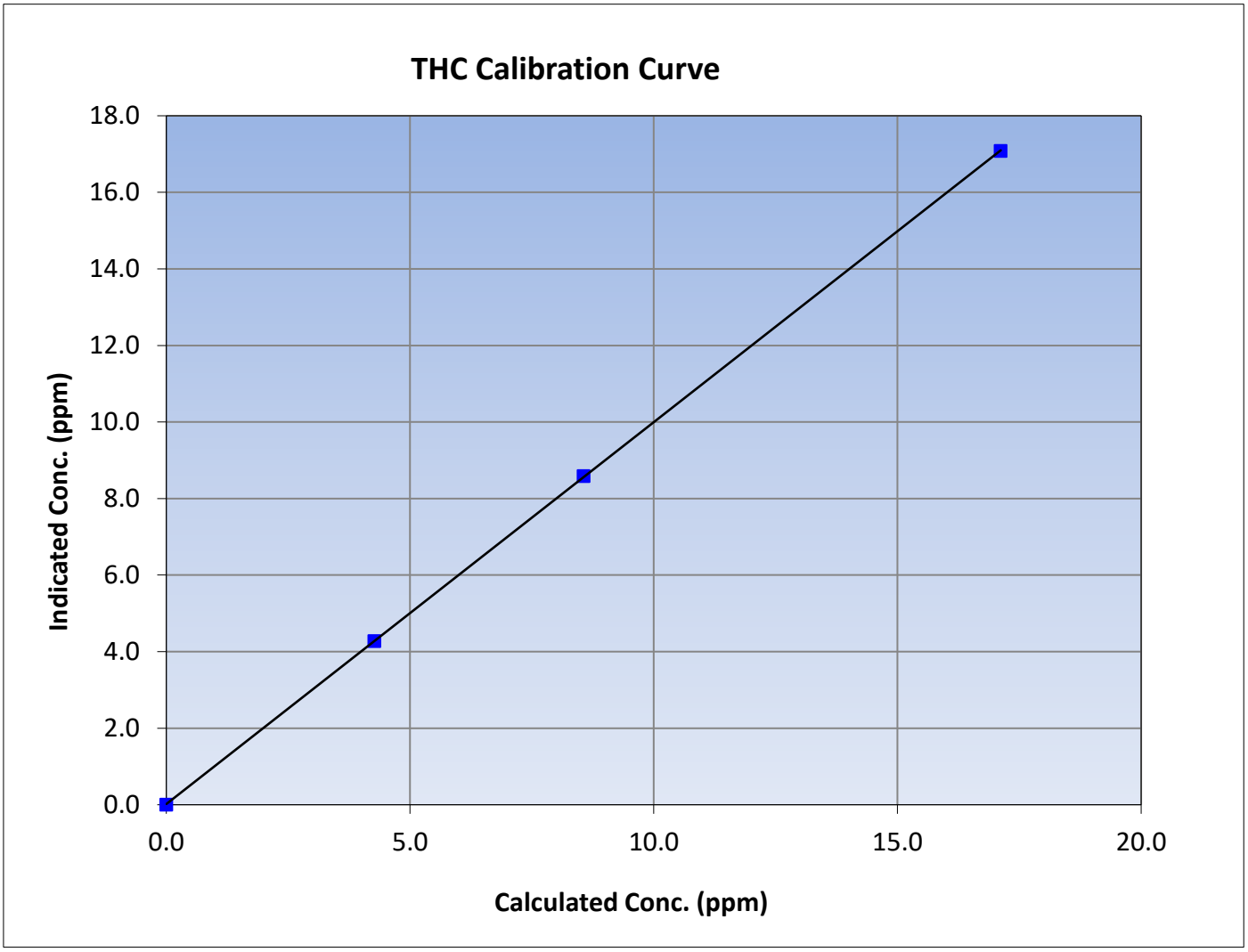
Version-06-2022

Station Information

Calibration Date:	October 2, 2023	Previous Calibration:	September 5, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:07	End Time (MST):	11:51
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999989	*≥0.995*
17.12	17.08	1.0022			
8.56	8.59	0.9964	Slope	0.997687	*0.90 - 1.10*
4.27	4.28	0.9975			
			Intercept	0.018043	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

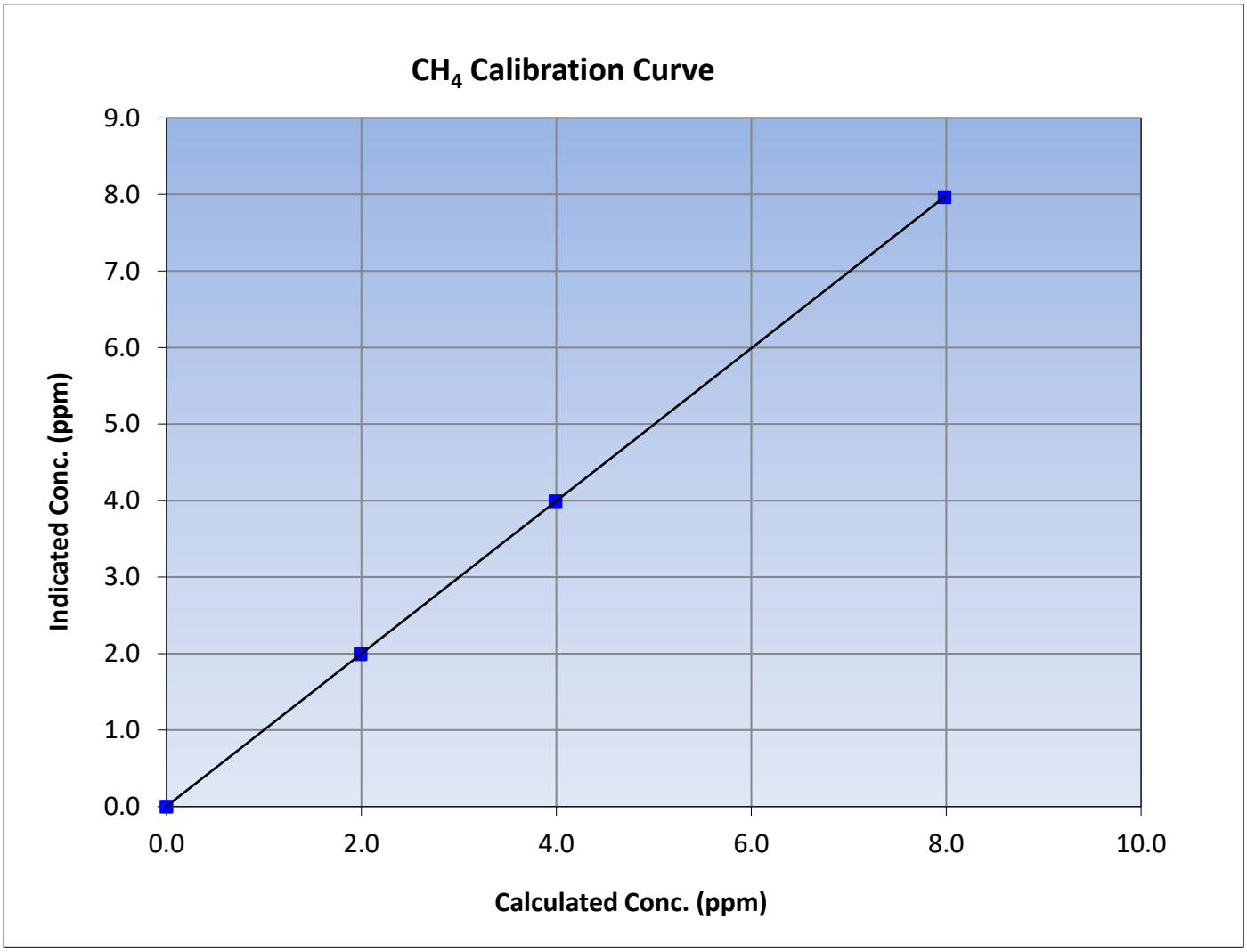
Version-06-2022

Station Information

Calibration Date:	October 2, 2023	Previous Calibration:	September 5, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:07	End Time (MST):	11:51
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999998	*≥0.995*
7.98	7.96	1.0024			
3.99	3.99	1.0002	Slope	0.997459	*0.90 - 1.10*
1.99	1.99	0.9987			
			Intercept	0.004658	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

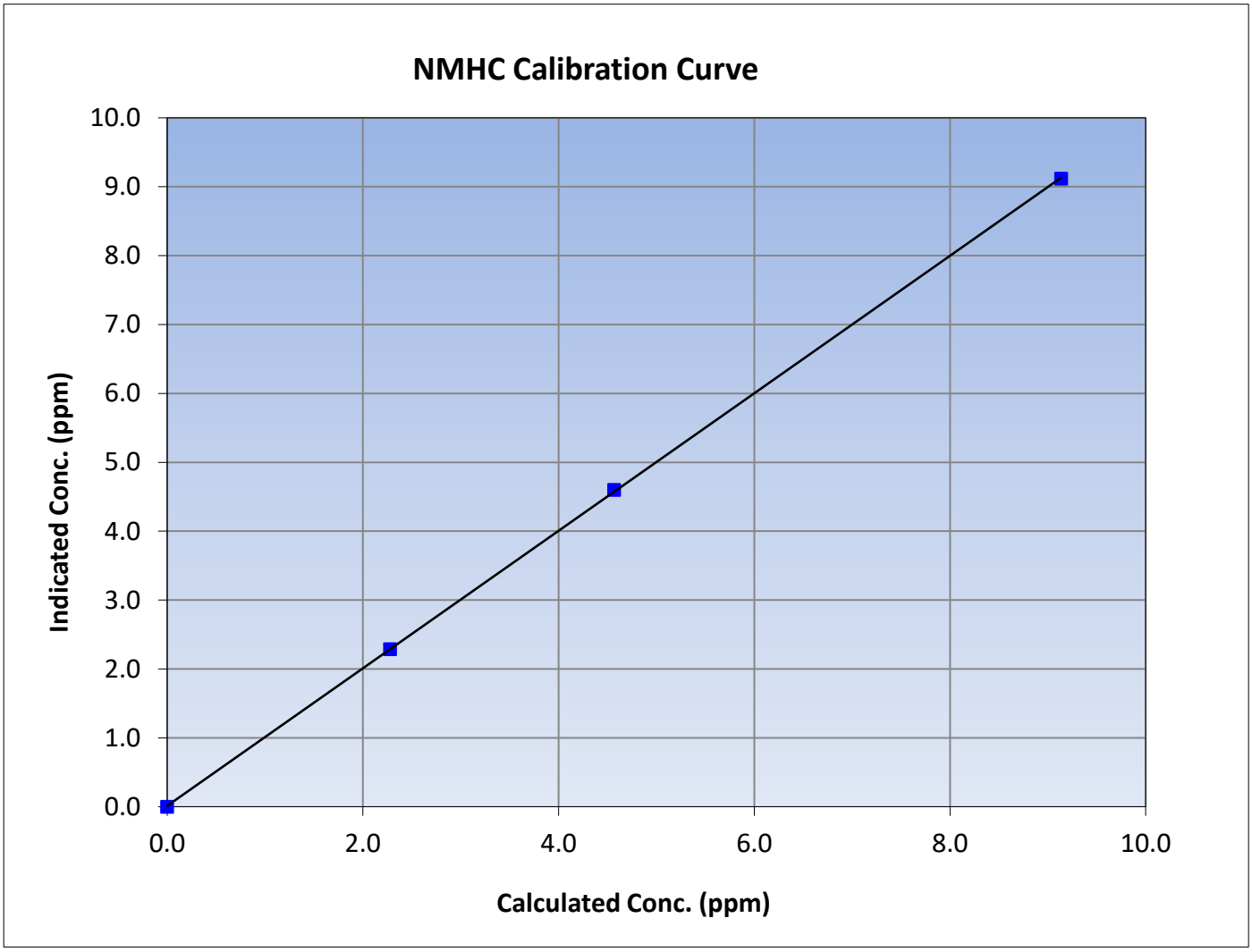
Version-06-2022

Station Information

Calibration Date:	October 2, 2023	Previous Calibration:	September 5, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:07	End Time (MST):	11:51
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999977	≥0.995
9.14	9.12	1.0019			
4.57	4.60	0.9934	Slope	0.998099	0.90 - 1.10
2.28	2.29	0.9965			
			Intercept	0.012785	+/-0.5



NMHC Calibration Plot Date: October 2, 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:	October 13, 2023	Last Cal Date:	September 6, 2023
Start time (MST):	9:02	End time (MST):	13:09
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	1.162	NO bkgnd or offset:	10.6	10.6
NOX coeff or slope:	0.994	0.994	NOX bkgnd or offset:	10.9	10.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	175.2	177.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000087	1.001860
NO_X Cal Offset:	1.049154	0.949799
NO Cal Slope:	1.000827	1.002626
NO Cal Offset:	-0.572366	-0.151784
NO_2 Cal Slope:	1.000344	1.002309
NO_2 Cal Offset:	0.677077	0.845161

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.3	0.0	----	----
as found span	4919	80.5	805.1	800.3	4.8	809.8	802.5	7.4	0.994	0.997
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	4919	80.5	805.1	800.3	4.8	806.8	802.1	4.9	0.998	0.998
second point	4959	40.2	402.1	399.7	2.4	404.9	400.9	4.0	0.993	0.997
third point	4979	20.1	201.0	199.8	1.2	203.0	199.9	3.2	0.990	1.000
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	0.0	-0.1	----	----
as left span	4919	80.5	805.1	444.1	361.0	806.7	444.3	362.4	0.998	0.999
								Average Correction Factor	0.994	0.998

Corrected As found	NO_X = 810.1 ppb	NO = 802.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.5%
Previous Response	NO_X = 806.2 ppb	NO = 800.3 ppb		*Percent Change	NO =	0.3%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	799.0	442.8	361.0	362.4	0.996	100.4%
2nd GPT point (200 ppb O3)	799.0	663.5	140.3	141.9	0.989	101.1%
3rd GPT point (100 ppb O3)	799.0	730.2	73.6	75.4	0.977	102.4%
				Average Correction Factor	0.987	101.3%

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

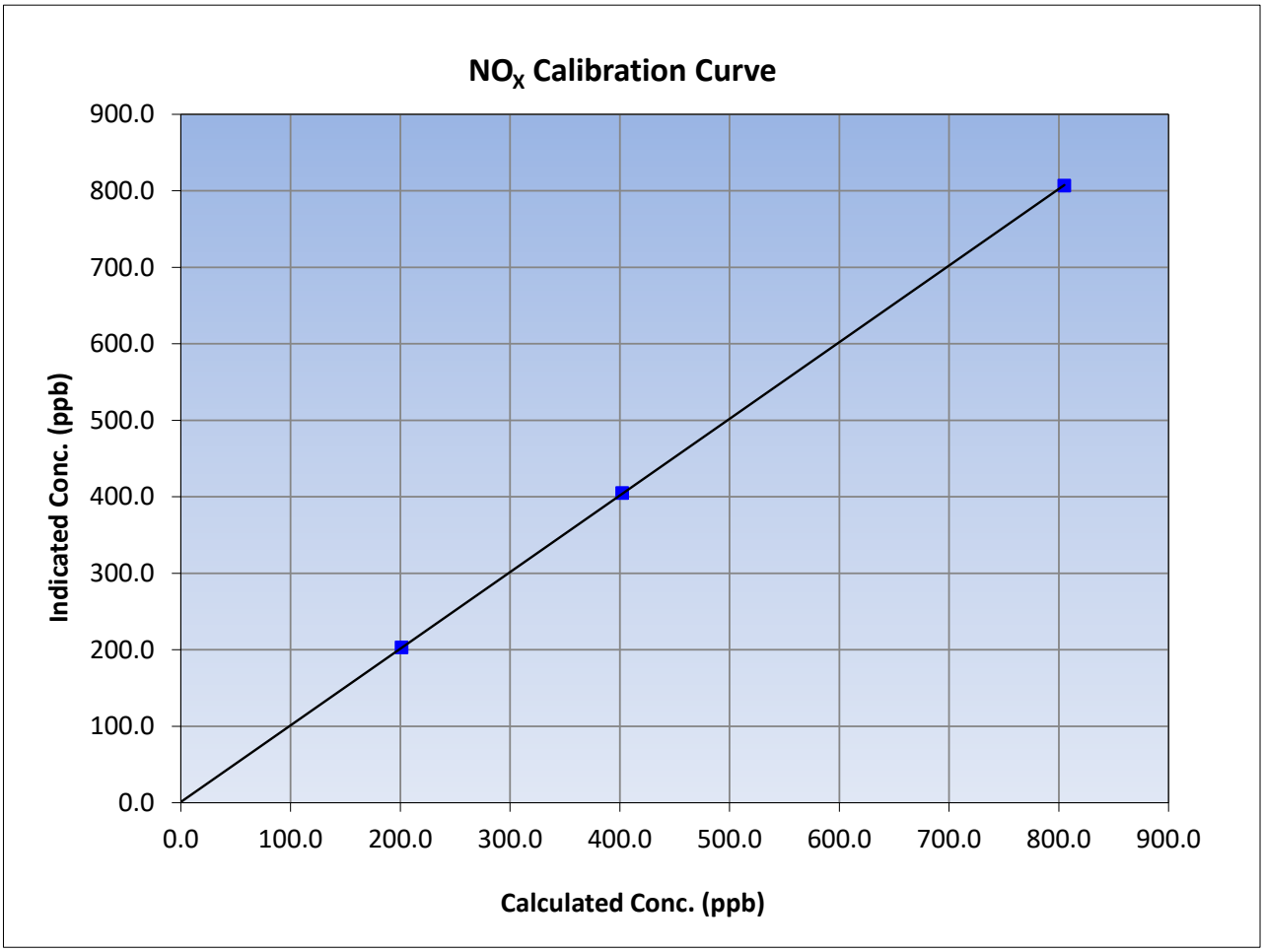
Version-04-2020

Station Information

Calibration Date:	October 13, 2023	Previous Calibration:	September 6, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:02	End Time (MST):	13:09
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999991	≥0.995
805.1	806.8	0.9979			
402.1	404.9	0.9930	Slope	1.001860	0.90 - 1.10
201.0	203.0	0.9903			
			Intercept	0.949799	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

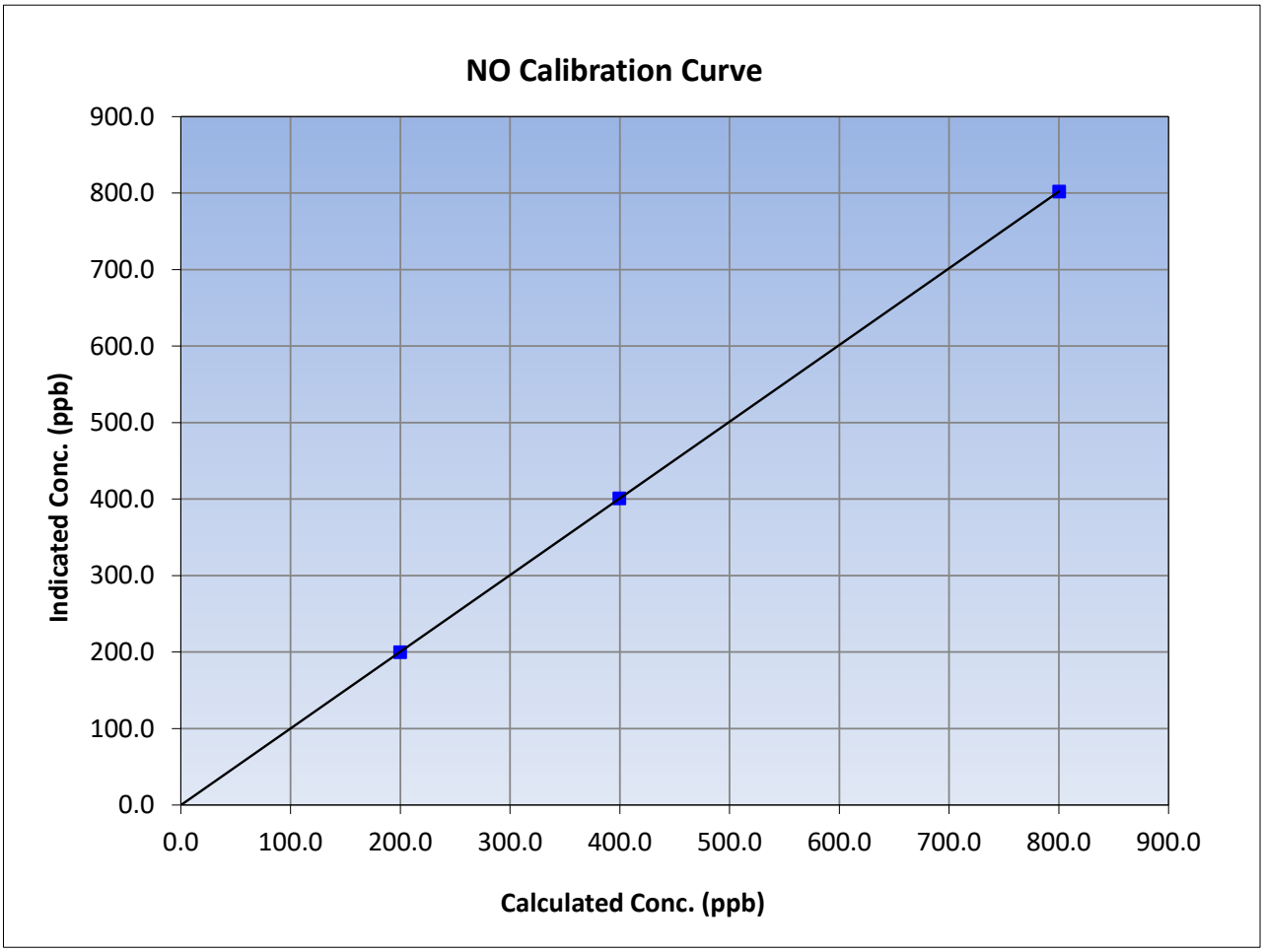
Version-04-2020

Station Information

Calibration Date:	October 13, 2023	Previous Calibration:	September 6, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:02	End Time (MST):	13:09
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999999	≥0.995
800.3	802.1	0.9977			
399.7	400.9	0.9969	Slope	1.002626	0.90 - 1.10
199.8	199.9	0.9996			
			Intercept	-0.151784	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

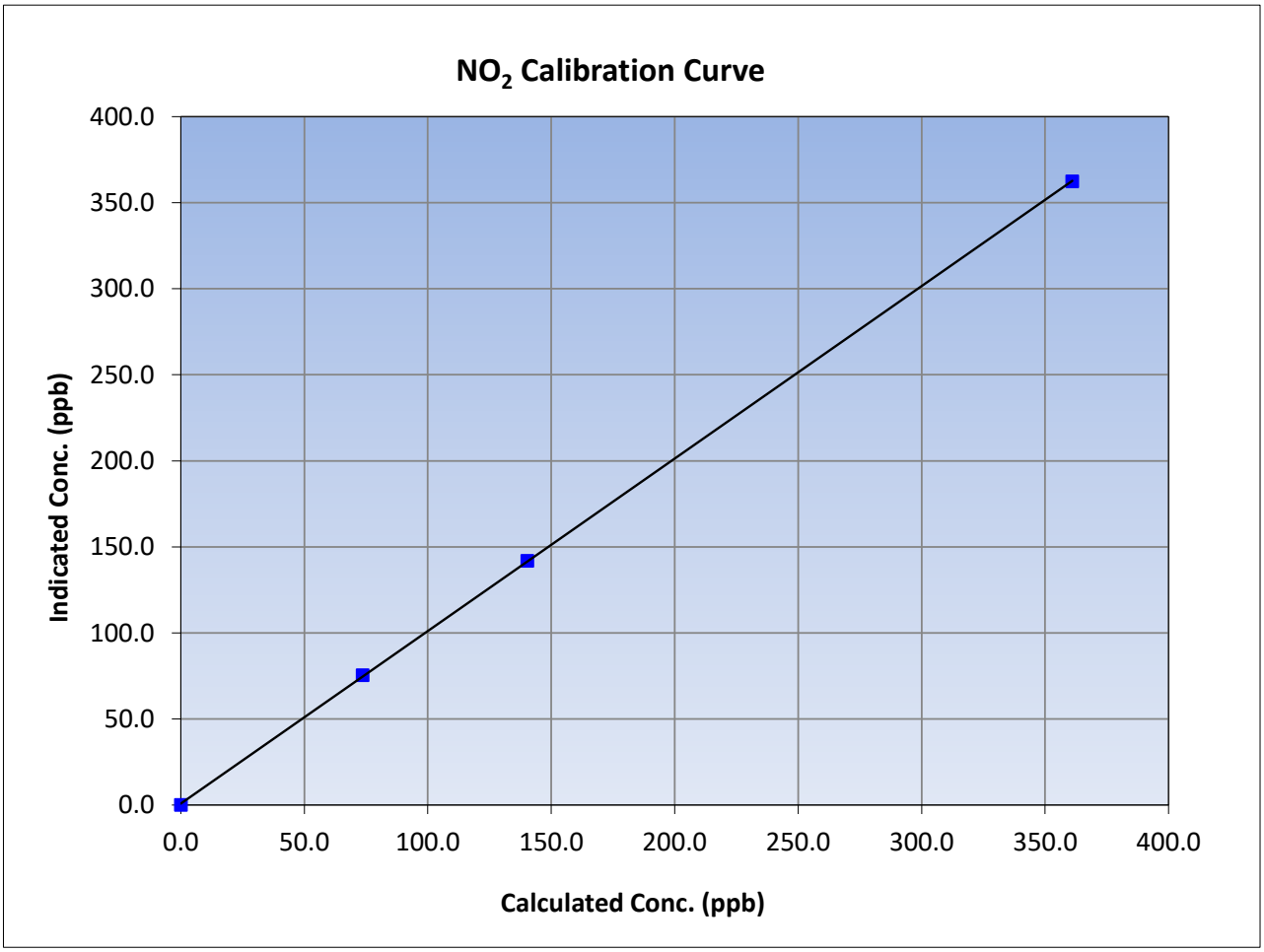
Version-04-2020

Station Information

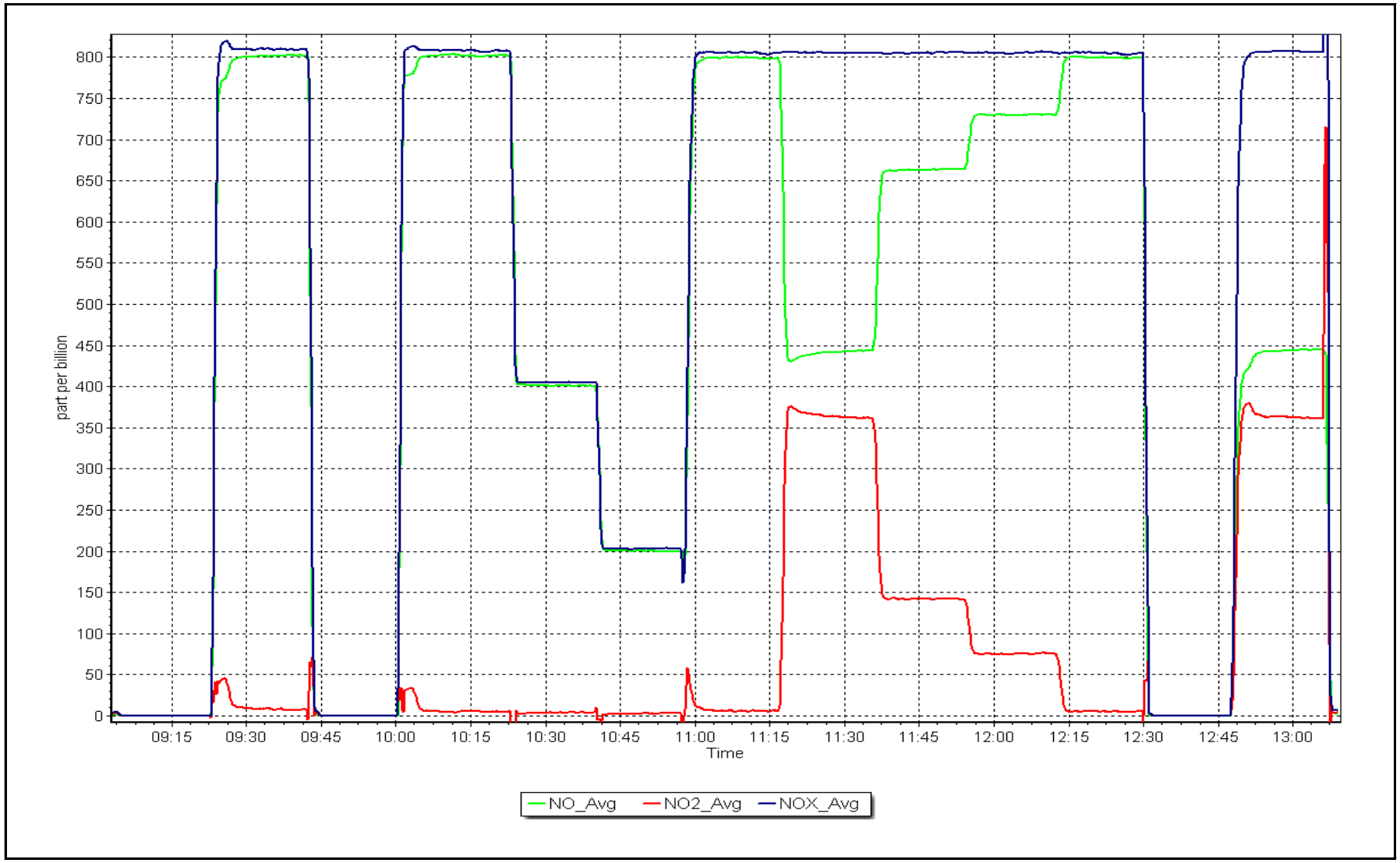
Calibration Date:	October 13, 2023	Previous Calibration:	September 6, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	9:02	End Time (MST):	13:09
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999979	≥0.995
361.0	362.4	0.9962			
140.3	141.9	0.9889	Slope	1.002309	0.90 - 1.10
73.6	75.4	0.9765			
			Intercept	0.845161	+/-20



NO_X Calibration Plot Date: October 13, 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:	October 19, 2023	Last Cal Date:	September 7, 2023
Start time (MST):	9:33	End time (MST):	10:25
Analyzer Make:	API T640	S/N:	844
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25	S/N:	1451
Temp/RH standard:	Alicat FP-25	S/N:	1451

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	11.4	10.9	11.4	☐	+/- 2 °C
P (mmHg)	717.7	724.9	717.7	☐	+/- 10 mmHg
flow (LPM)	4.96	4.99	4.96	☐	+/- 0.25 LPM

Leak Test: Date of check: October 19, 2023 Last Cal Date: September 29, 2023

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

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	11.1	10.8	10.8	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 7.9 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: October 19, 2023

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. Filter was changed. PMT Peak test no adjustment.

Calibration by: Sean Bala

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS11
LOWER CAMP

OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Lower Camp	Station number:	AMS11
Calibration Date:	October 12, 2023	Last Cal Date:	September 22, 2023
Start time (MST):	10:32	End time (MST):	13:52
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:	1.005149	1.003950	Backgd or Offset:	14.7	14.6
Calibration intercept:	-0.308964	0.611030	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	0.4	----
as found span	4919	81.3	800.8	804.7	0.995
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.9	----
high point	4919	81.3	800.8	805.0	0.995
second point	4959	40.7	400.9	402.0	0.997
third point	4980	20.3	199.9	201.7	0.991
as left zero	5000	0.0	0.0	1.0	----
as left span	4919	81.3	800.8	807.6	0.992
				Average Correction Factor	0.994

Baseline Corr As found:	804.30	Previous response	804.57	*% change	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

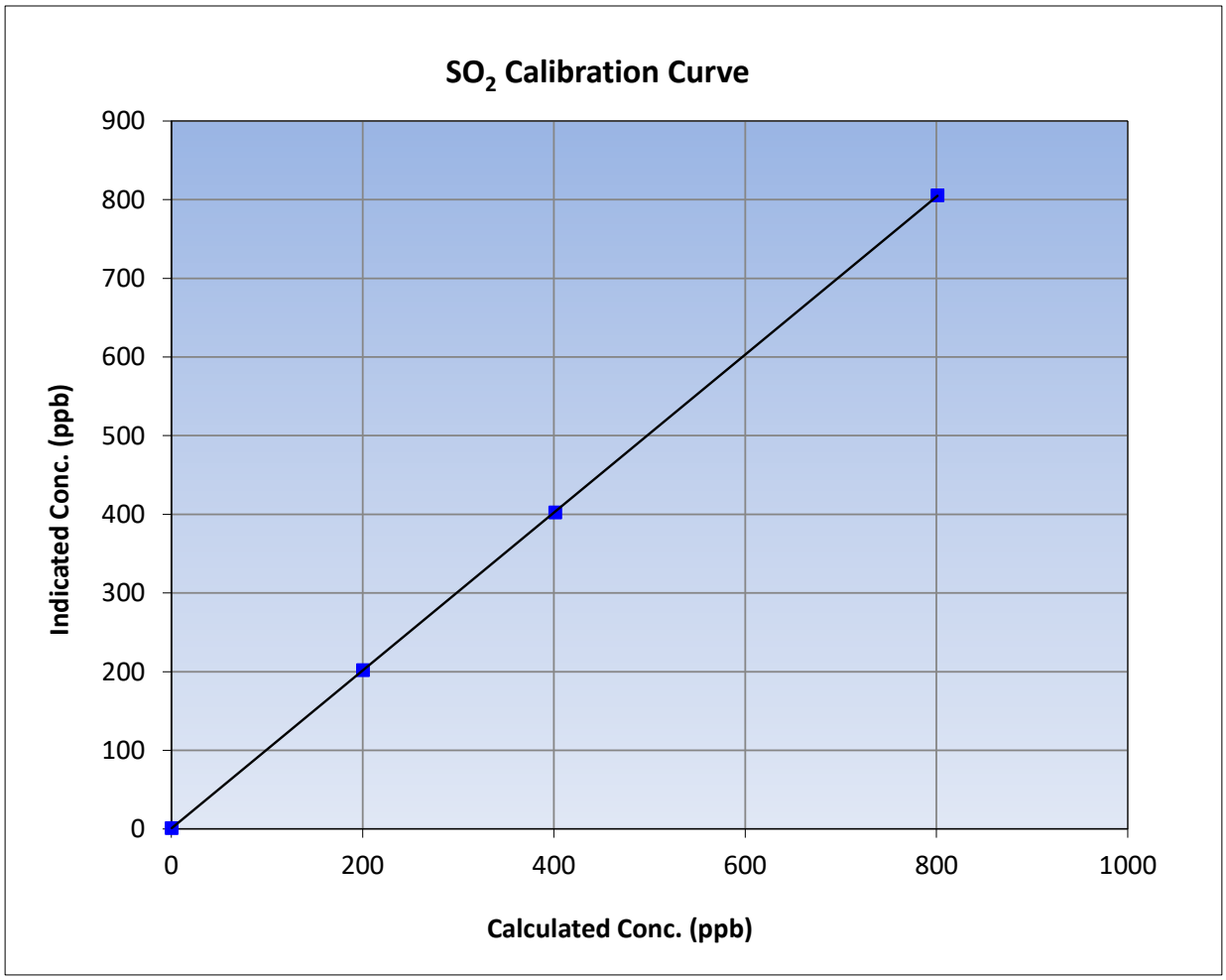
Station Information

Calibration Date:	October 12, 2023	Previous Calibration:	September 22, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:32	End Time (MST):	13:52
Analyzer make:	Thermo 43i	Analyzer serial #:	100841398

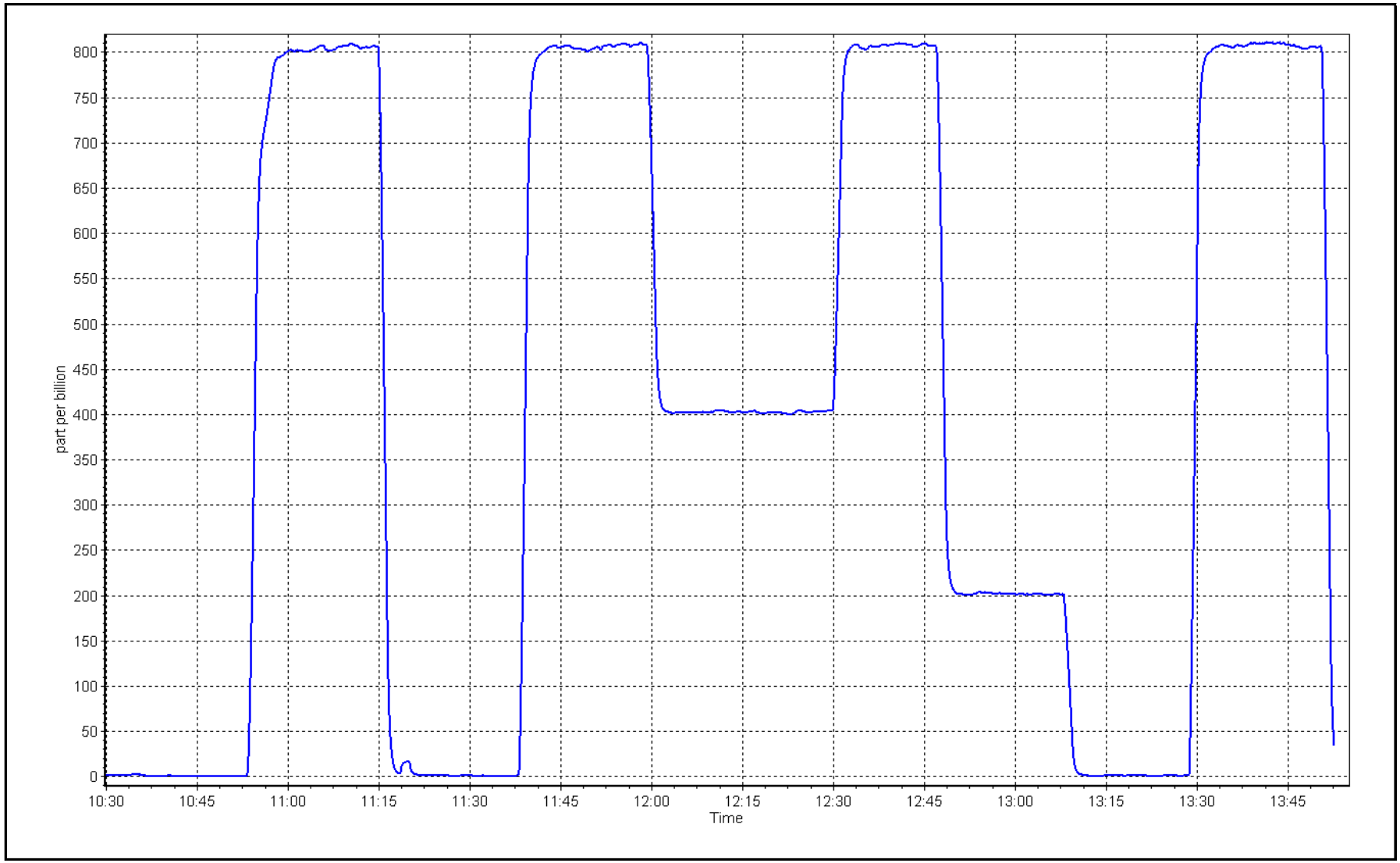
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.9	----
800.8	805.0	0.9947
400.9	402.0	0.9973
199.9	201.7	0.9913

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.003950	*0.90 - 1.10*
Intercept	0.611030	*+/-30*



SO2 Calibration Plot Date: October 12, 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:	October 11, 2023	Last Cal Date:	September 12, 2023
Start time (MST):	9:00	End time (MST):	14:49
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:	1.024520	1.022511	Backgd or Offset:	14.2	14.1
Calibration intercept:	-0.427099	-0.206756	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	-0.1	----
as found span	4926	73.6	79.9	81.3	0.982
as found 2nd point	4963	36.8	40.0	40.5	0.984
as found 3rd point	4982	18.6	20.2	20.3	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	-0.3	----
high point	4926	73.6	79.9	81.4	0.982
second point	4963	36.8	40.0	40.9	0.977
third point	4982	18.6	20.2	20.4	0.990
as left zero	5000	0.0	0.0	-0.1	----
as left span	4926	73.6	79.9	81.8	0.977
SO2 Scrubber Check	4919	81.1	811.0	0.1	----
Date of last scrubber change:				Ave Corr Factor	0.983
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.4	Prev response:	81.45	*% change:	-0.1%
Baseline Corr 2nd AF pt:	40.6	AF Slope:	1.019073	AF Intercept:	-0.186359
Baseline Corr 3rd AF pt:	20.4	AF Correlation:	0.999995		

* = > +/-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

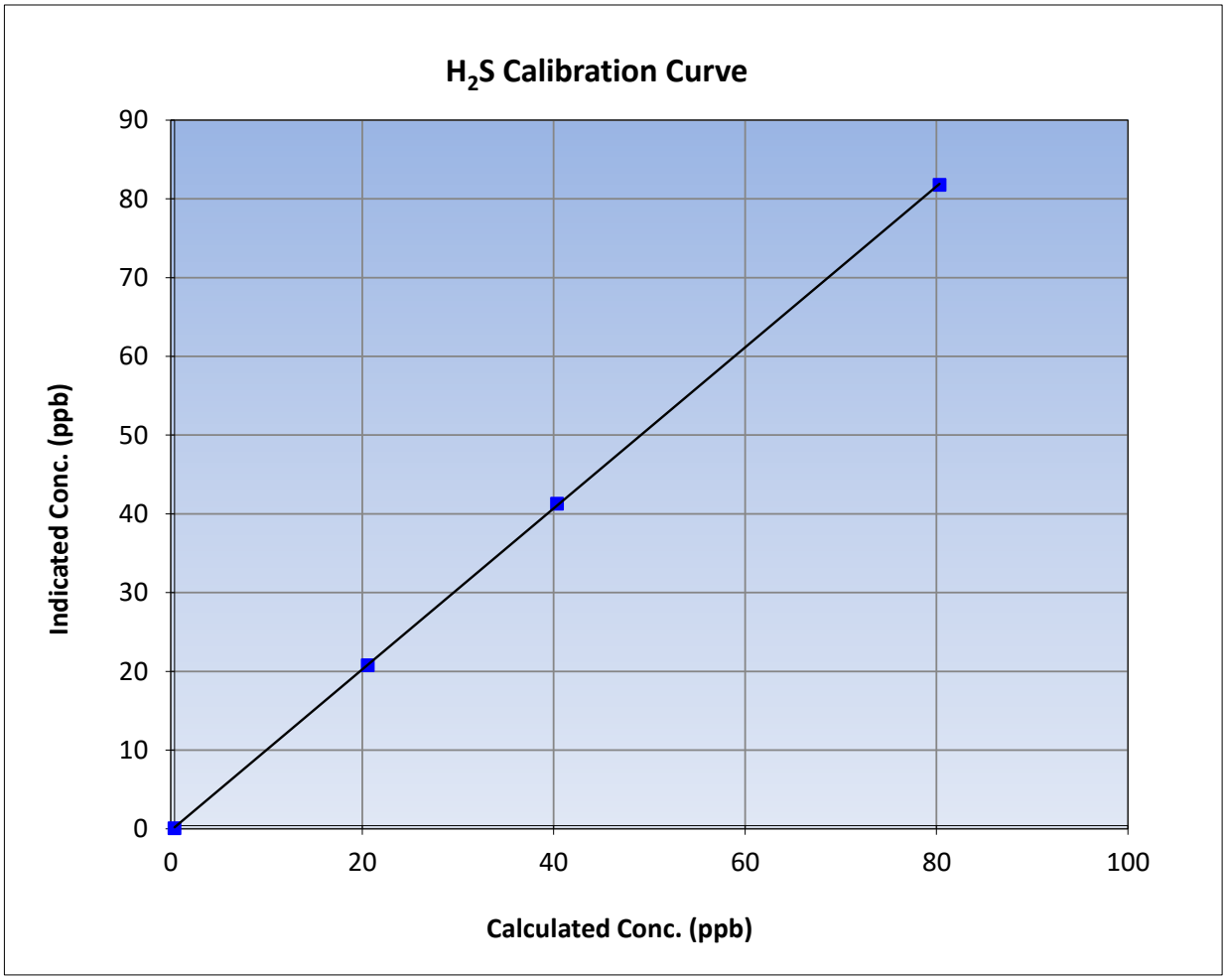
Station Information

Calibration Date:	October 11, 2023	Previous Calibration:	September 12, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:00	End Time (MST):	14:49
Analyzer make:	Thermo 450iQ	Analyzer serial #:	CM20080003

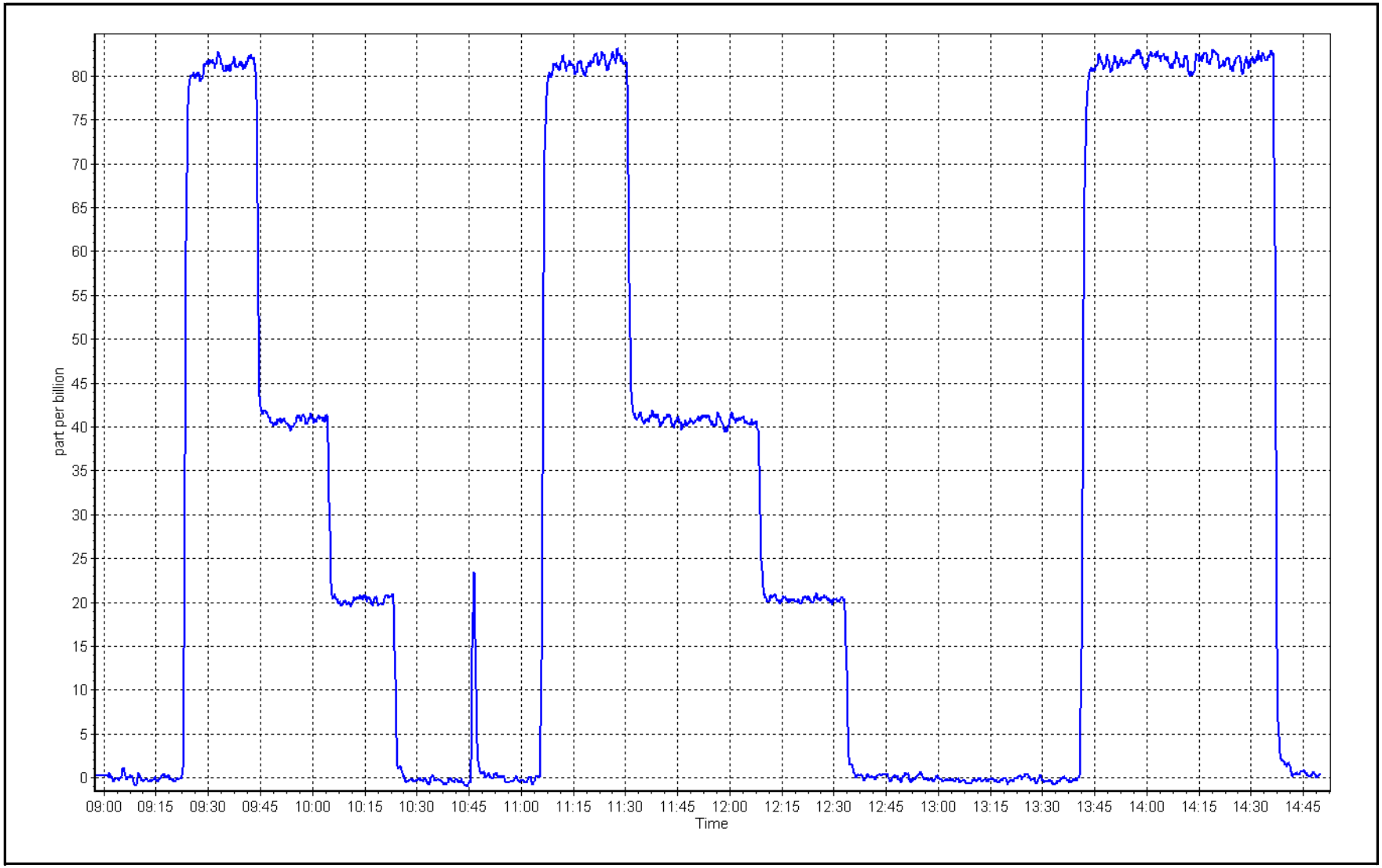
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
79.9	81.4	0.9818
40.0	40.9	0.9770
20.2	20.4	0.9899

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999977	*≥0.995*
Slope	1.022511	*0.90 - 1.10*
Intercept	-0.206756	*+/-3*



H_2S Calibration Plot Date: October 11, 2023 Location: Lower Camp



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Lower Camp	Station number:	AMS11
Calibration Date:	October 12, 2023	Last Cal Date:	September 22, 2023
Start time (MST):	10:32	End time (MST):	13:52
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	17.23	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.3	17.35	17.24	1.006
second point	4959	40.7	8.69	8.56	1.015
third point	4980	20.3	4.33	4.24	1.022
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	17.35	17.36	0.999
				Average Correction Factor	1.014
Baseline Corr AF:	17.23	Prev response	17.24	*% change	-0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	9.19	9.10	1.009
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.3	9.19	9.11	1.009
second point	4959	40.7	4.60	4.51	1.019
third point	4980	20.3	2.29	2.22	1.033
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	9.19	9.17	1.002
				Average Correction Factor	1.020
Baseline Corr AF:	9.10	Prev response	9.13	*% change	-0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	8.16	8.13	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.3	8.16	8.13	1.004
second point	4959	40.7	4.09	4.04	1.011
third point	4980	20.3	2.04	2.02	1.009
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	8.16	8.19	0.997
				Average Correction Factor	1.008
Baseline Corr AF:	8.13	Prev response	8.12	*% 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:	0.995046	0.994388
THC Cal Offset:	-0.021788	-0.039793
CH4 Cal Slope:	0.995660	0.996052
CH4 Cal Offset:	-0.010886	-0.009288
NMHC Cal Slope:	0.994824	0.992885
NMHC Cal Offset:	-0.011701	-0.030904

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

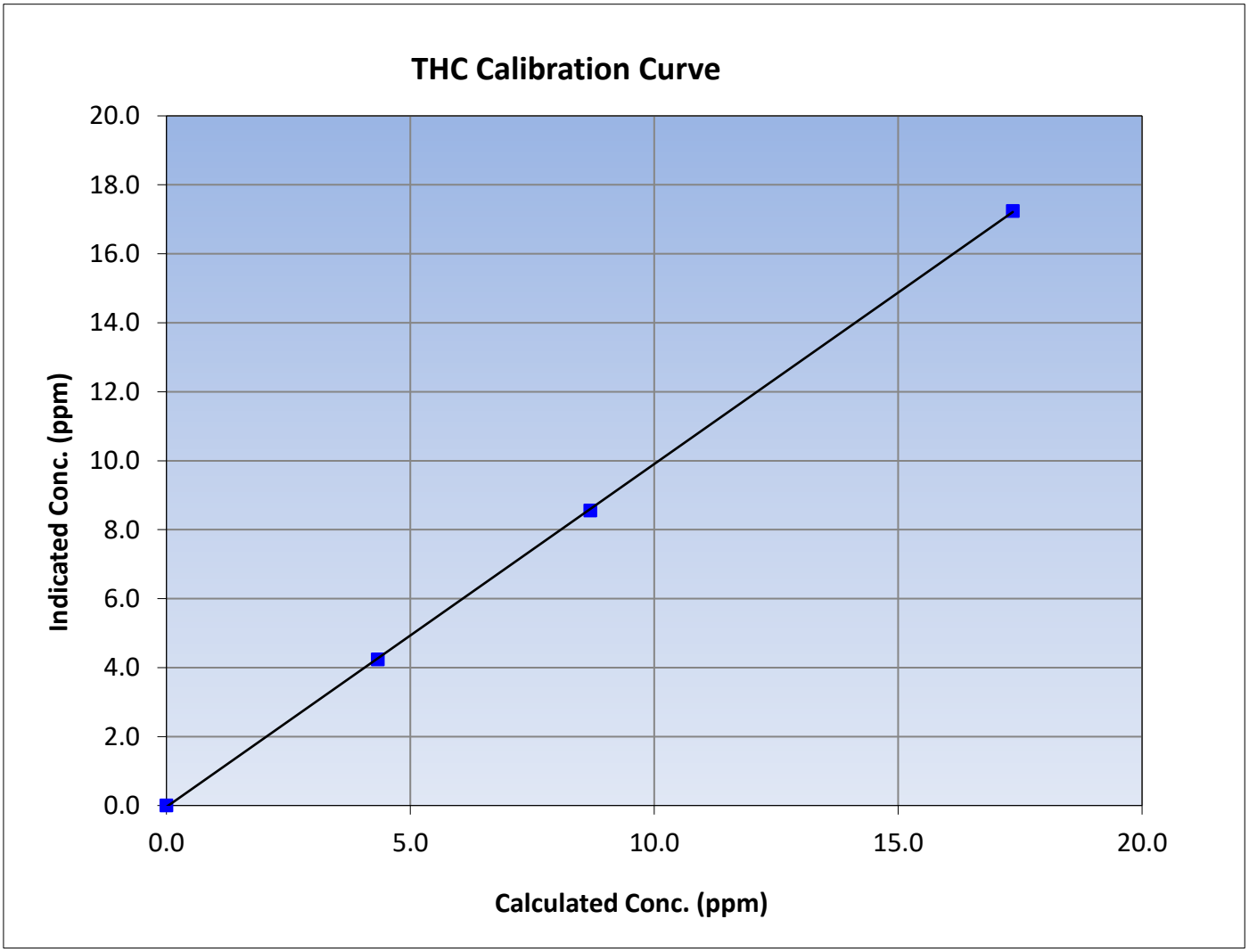
Version-01-2020

Station Information

Calibration Date:	October 12, 2023	Previous Calibration:	September 22, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:32	End Time (MST):	13:52
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	0.999971	≥0.995
17.35	17.24	1.0064			
8.69	8.56	1.0149	Slope	0.994388	0.90 - 1.10
4.33	4.24	1.0218			
			Intercept	-0.039793	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

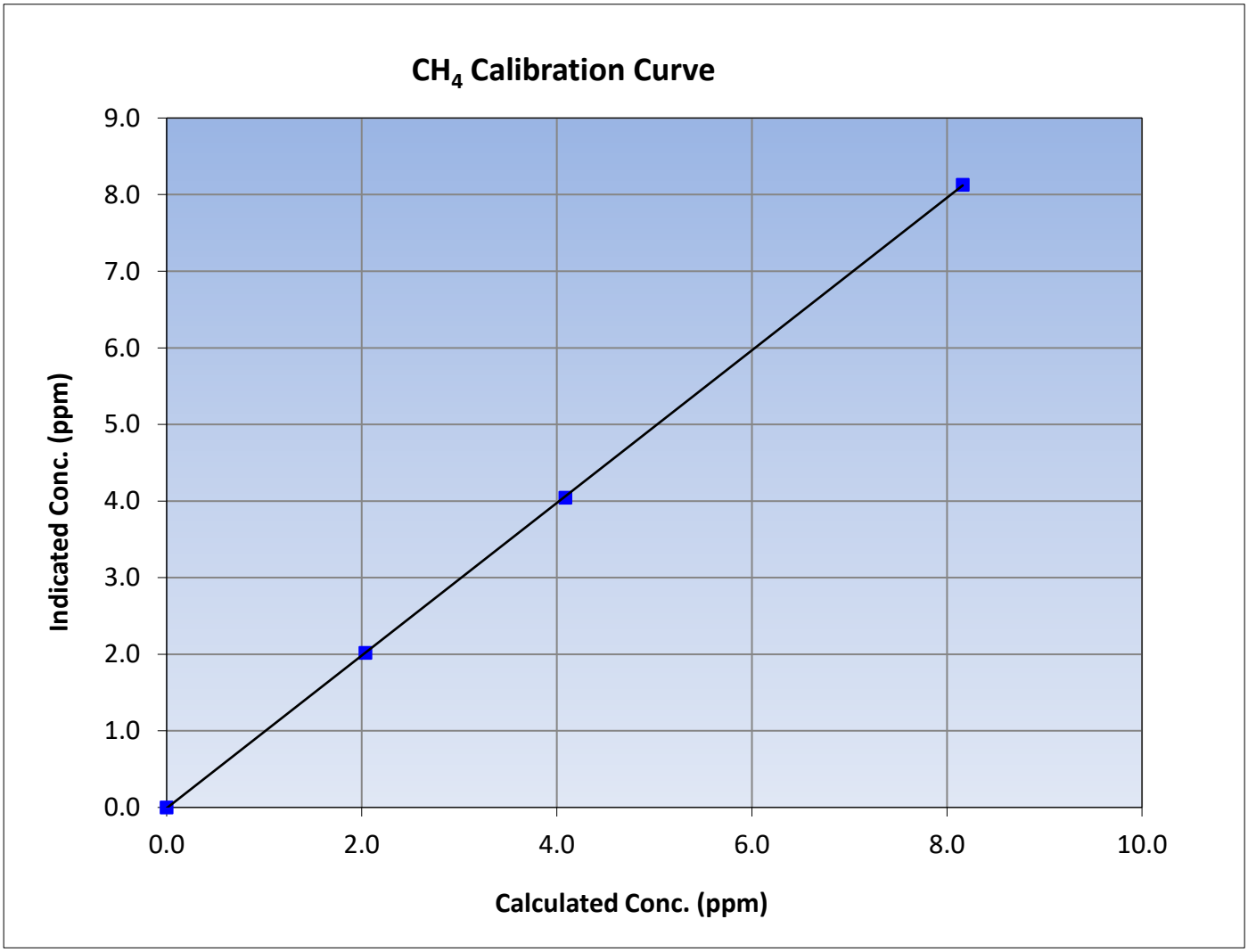
Version-01-2020

Station Information

Calibration Date:	October 12, 2023	Previous Calibration:	September 22, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:32	End Time (MST):	13:52
Analyzer make:	Thermo 55i	Analyzer serial #:	1505164381

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999985	*≥0.995*
8.16	8.13	1.0039			
4.09	4.04	1.0108	Slope	0.996052	*0.90 - 1.10*
2.04	2.02	1.0094			
			Intercept	-0.009288	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

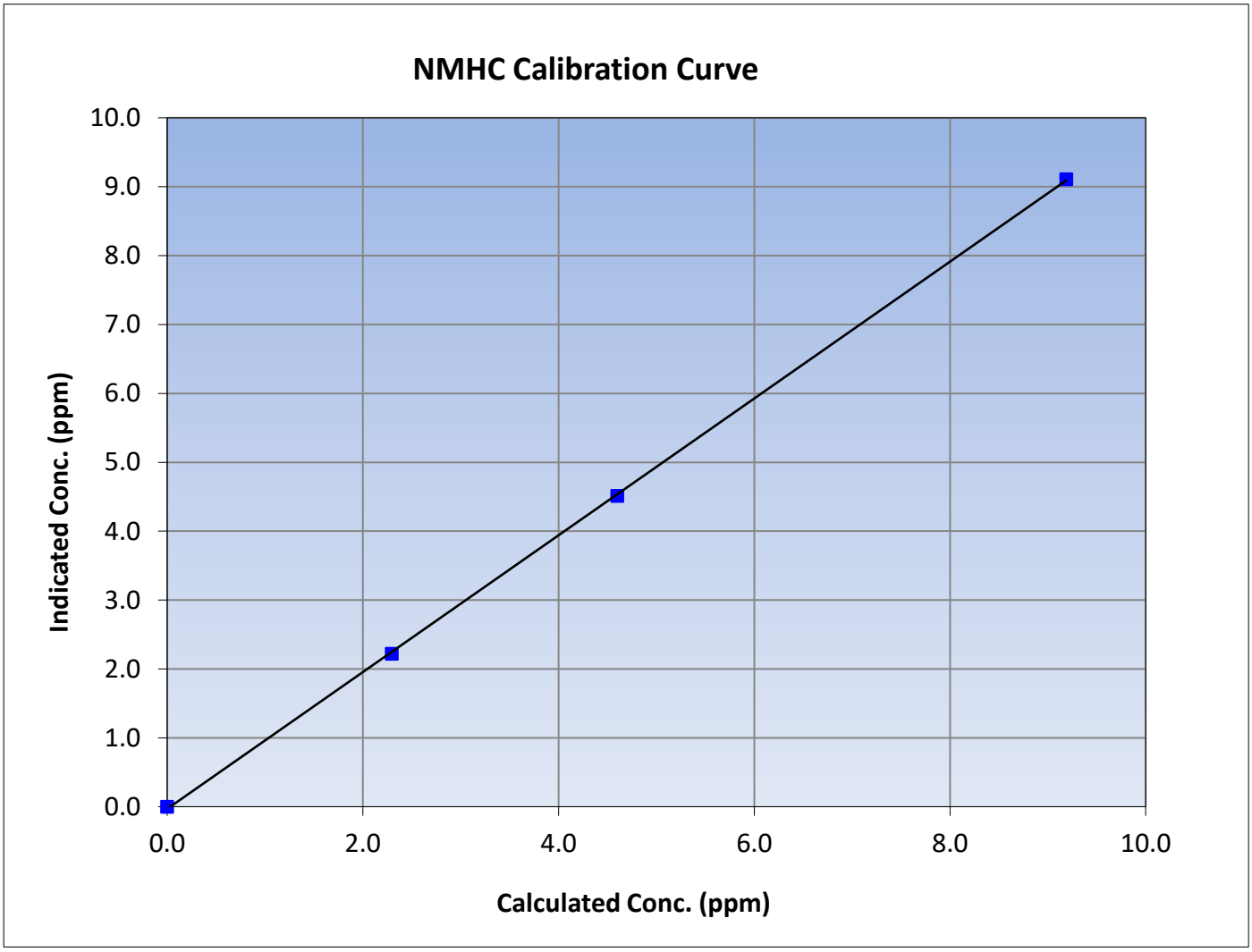
Version-01-2020

Station Information

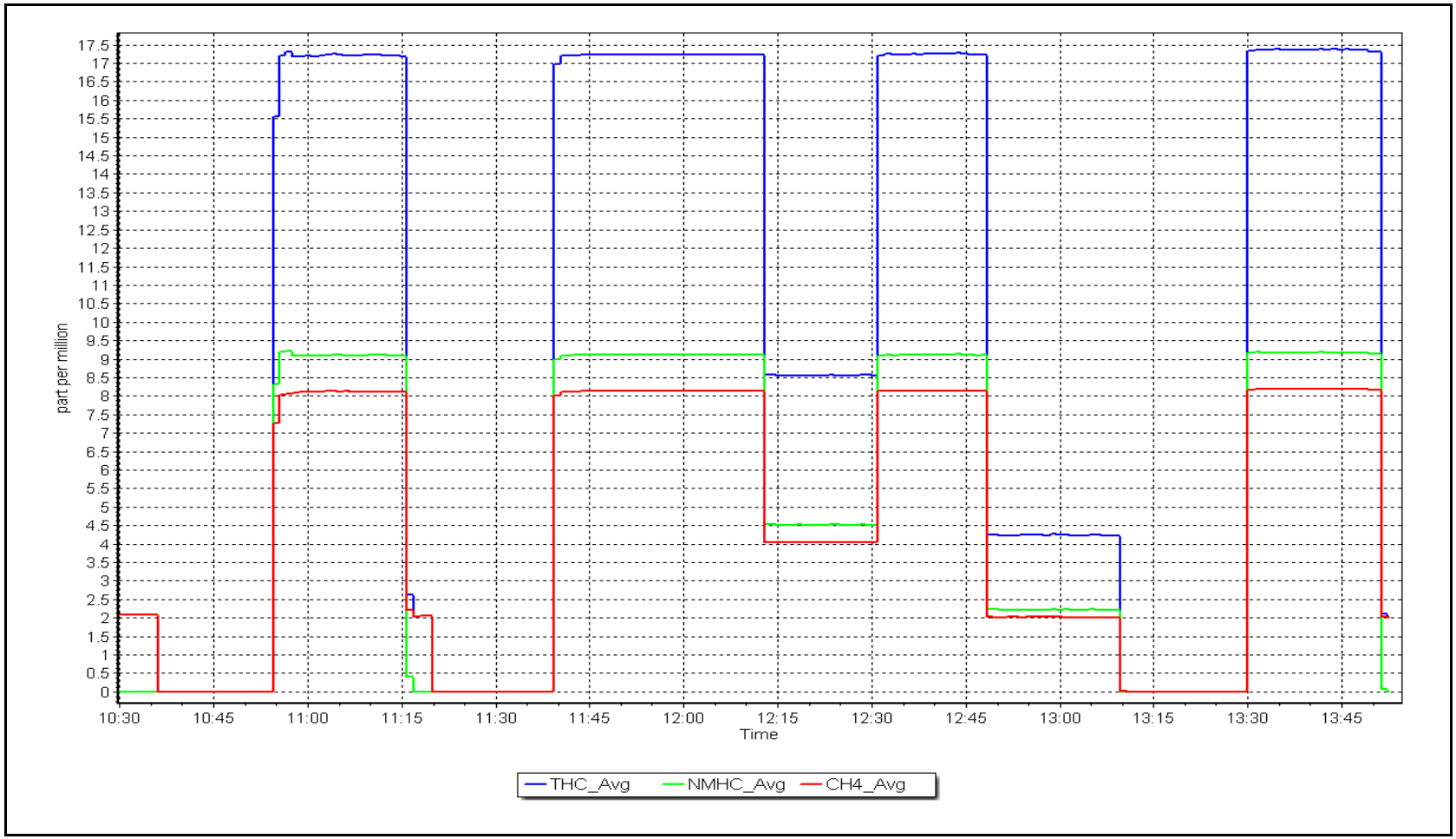
Calibration Date:	October 12, 2023	Previous Calibration:	September 22, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:32	End Time (MST):	13:52
Analyzer make:	Thermo 55i	Analyzer serial #:	1505164381

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999946	≥0.995
9.19	9.11	1.0086			
4.60	4.51	1.0191	Slope	0.992885	0.90 - 1.10
2.29	2.22	1.0330			
			Intercept	-0.030904	+/-0.5



NMHC Calibration Plot Date: October 12, 2023 Location: Lower Camp



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS13
FORT MCKAY SOUTH
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	October 18, 2023	Last Cal Date:	September 15, 2023
Start time (MST):	8:55	End time (MST):	12:25
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:	1.002912	1.004043	Backgd or Offset:	86.3	91.1
Calibration intercept:	-1.537784	-3.158122	Coeff or Slope:	0.715	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	1.0	----
as found span	4921	79.1	799.7	806.1	0.992
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.4	----
high point	4921	79.1	799.7	801.0	0.998
second point	4961	39.5	399.3	396.8	1.006
third point	4980	19.8	200.2	194.8	1.028
as left zero	5000	0.0	0.0	-0.4	----
as left span	4921	79.1	799.7	798.5	1.001
				Average Correction Factor	1.011

Baseline Corr As found:	805.10	Previous response	800.48	*% change	0.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Devin Russell Jan Castro

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

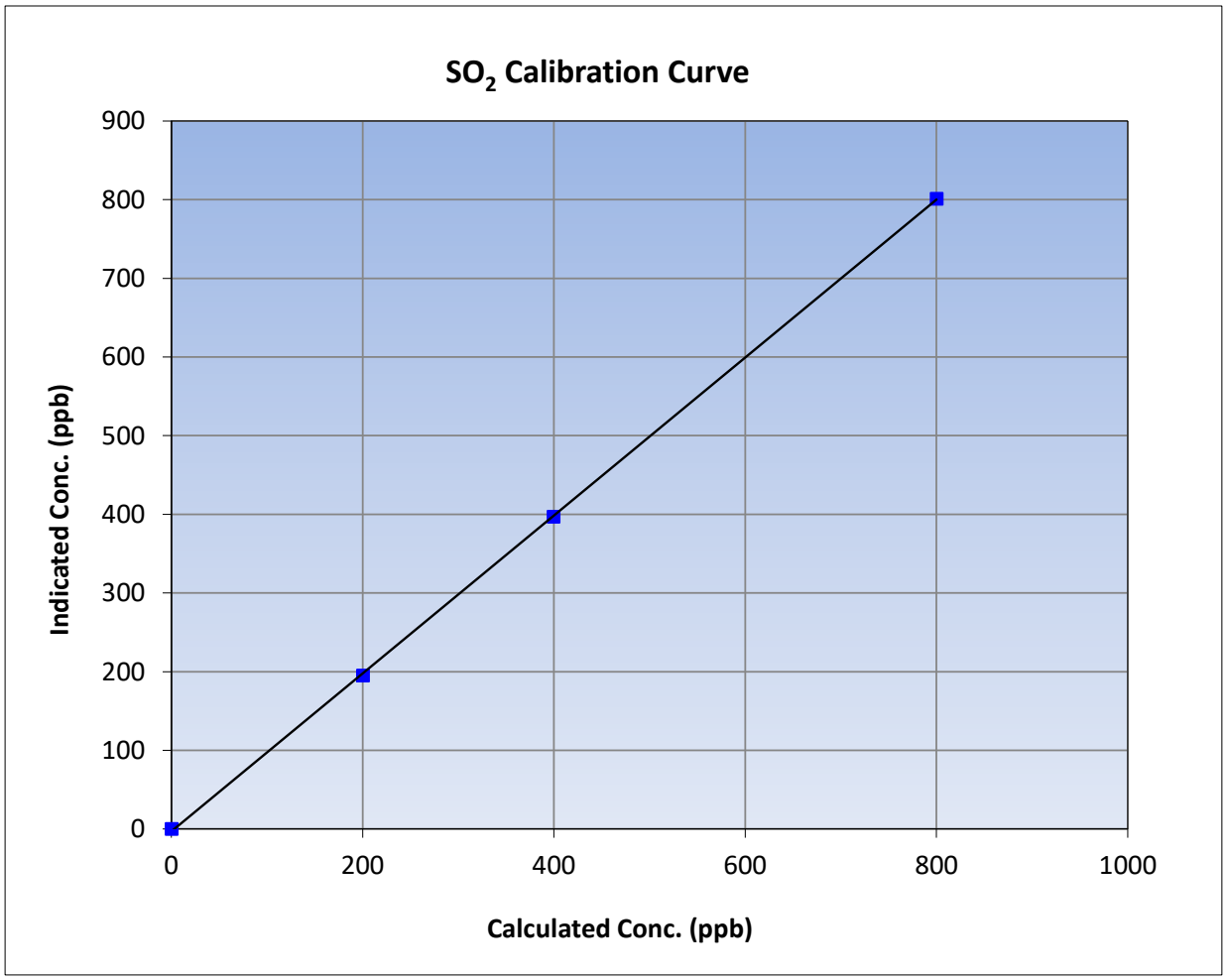
Station Information

Calibration Date:	October 18, 2023	Previous Calibration:	September 15, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:55	End Time (MST):	12:25
Analyzer make:	API T100	Analyzer serial #:	599

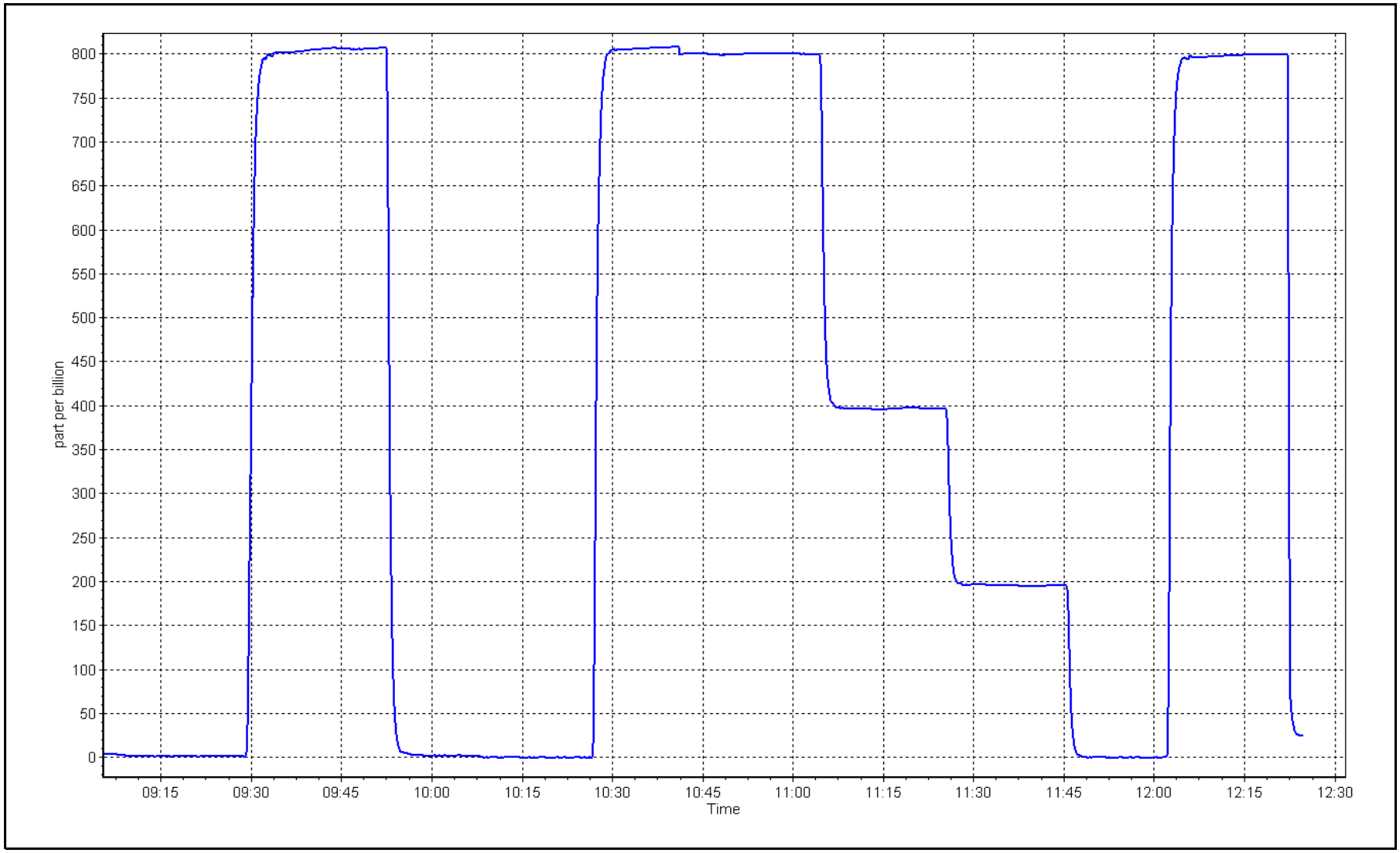
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.4	----
799.7	801.0	0.9984
399.3	396.8	1.0063
200.2	194.8	1.0276

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999945	*≥0.995*
Slope	1.004043	*0.90 - 1.10*
Intercept	-3.158122	*+/-30*



SO2 Calibration Plot Date: October 18, 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:	October 12, 2023	Last Cal Date:	September 19, 2023
Start time (MST):	7:55	End time (MST):	11:33
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:	1.004193	1.006178	Backgd or Offset:	3.77	3.77
Calibration intercept:	-0.442262	-0.262271	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	0.3	----
as found span	4925	75.5	80.6	82.3	0.983
as found 2nd point	4962	37.7	40.3	40.7	0.997
as found 3rd point	4981	18.9	20.2	19.9	1.030
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4925	75.5	80.6	81.0	0.995
second point	4962	37.7	40.3	40.1	1.004
third point	4981	18.9	20.2	19.8	1.019
as left zero	5000	0.0	0.0	0.1	----
as left span	4925	75.5	80.6	80.2	1.005
SO2 Scrubber Check	4921	79.1	791.0	0.0	----
Date of last scrubber change:		20-Mar-20		Ave Corr Factor	1.006
Date of last converter efficiency test:		NA			efficiency

Baseline Corr As found:	82.0	Prev response:	80.52	*% change:	1.8%
Baseline Corr 2nd AF pt:	40.4	AF Slope:	1.020212	AF Intercept:	-0.182247
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999842		

* = > +/-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

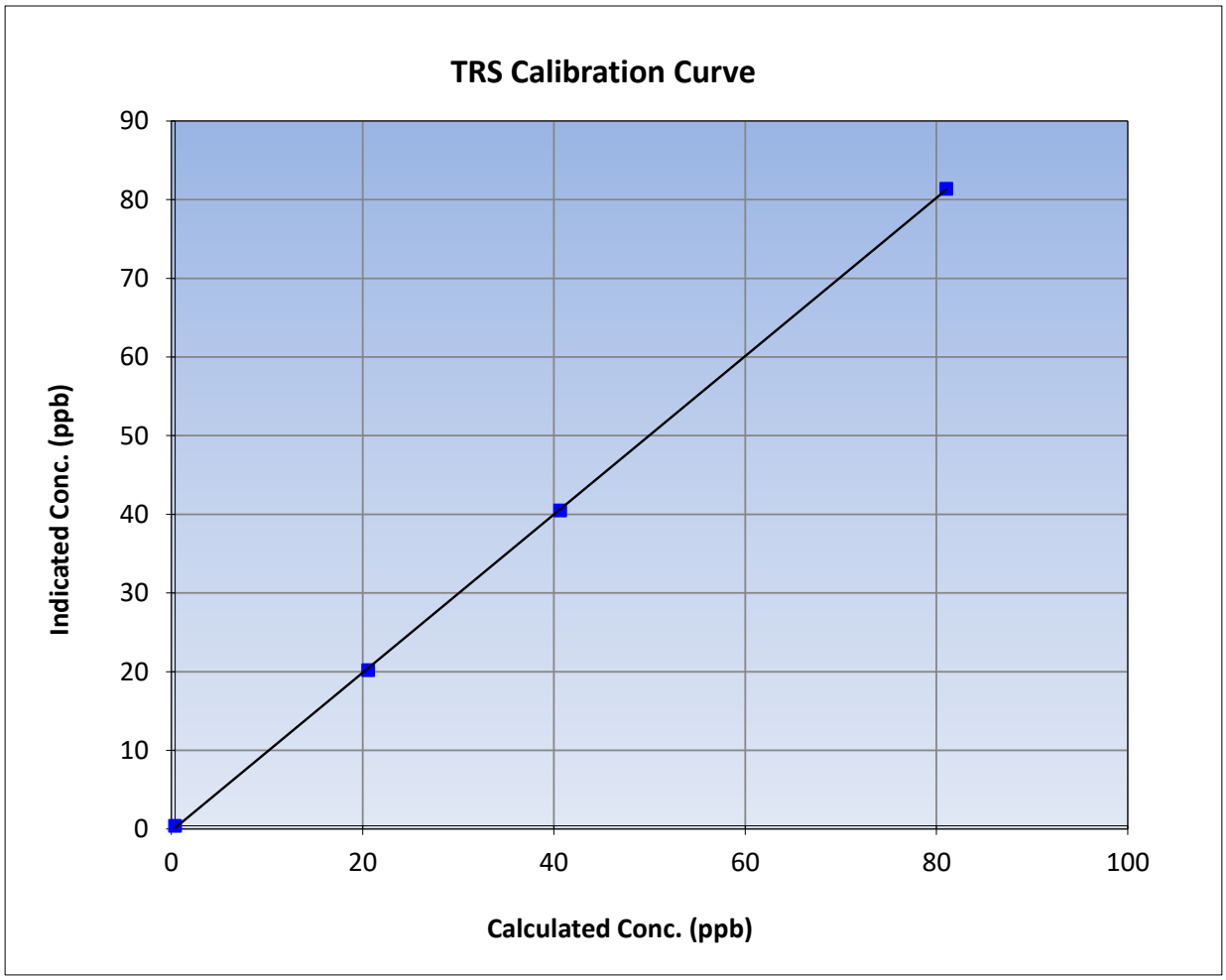
Station Information

Calibration Date:	October 12, 2023	Previous Calibration:	September 19, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	7:55	End Time (MST):	11:33
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1180540017

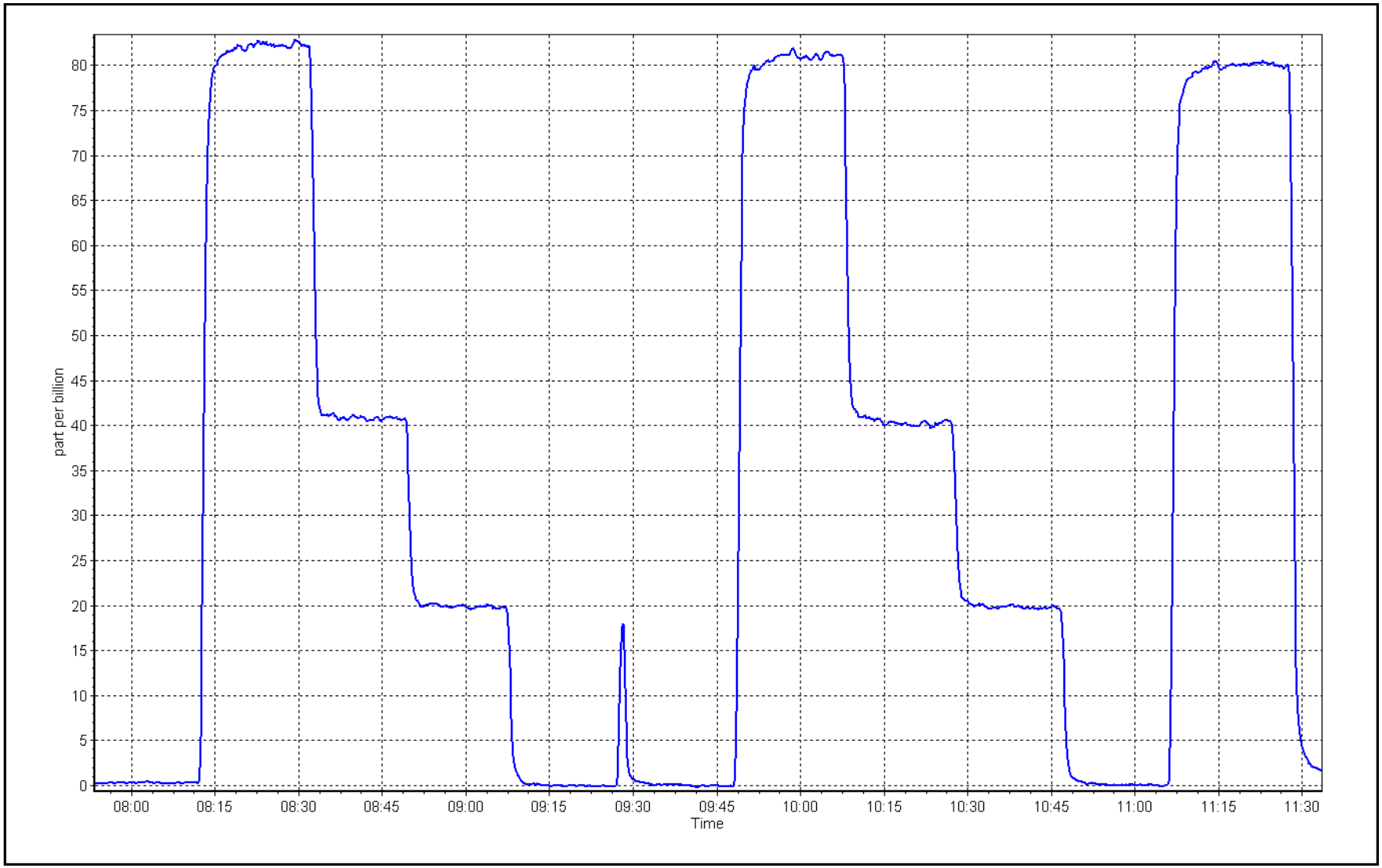
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.6	81.0	0.9954
40.3	40.1	1.0041
20.2	19.8	1.0195

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999952	*≥0.995*
Slope	1.006178	*0.90 - 1.10*
Intercept	-0.262271	*+/-3*



TRS Calibration Plot Date: October 12, 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:	October 18, 2023	Last Cal Date:	September 15, 2023
Start time (MST):	8:55	End time (MST):	12:25
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:	2.24E-04	2.31E-04	NMHC SP Ratio:	5.16E-05	5.16E-05
CH4 Retention time:	13.00	13.40	NMHC Peak Area:	176051	1756954
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	16.84	1.012
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.1	17.05	17.05	1.000
second point	4961	39.5	8.51	8.41	1.012
third point	4980	19.8	4.27	4.14	1.031
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	17.05	17.03	1.001
				Average Correction Factor	1.014
Baseline Corr AF:	16.84	Prev response	17.02	*% 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	9.11	0.997
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.1	9.08	9.08	1.000
second point	4961	39.5	4.53	4.49	1.010
third point	4980	19.8	2.27	2.22	1.024
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	9.08	9.06	1.003
				Average Correction Factor	1.011
Baseline Corr AF:	9.11	Prev response	9.07	*% change	0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.1	7.97	7.73	1.031
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.1	7.97	7.98	0.999
second point	4961	39.5	3.98	3.91	1.016
third point	4980	19.8	1.99	1.92	1.038
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	7.97	7.97	0.999
				Average Correction Factor	1.018
Baseline Corr AF:	7.73	Prev response	7.96	*% change	-2.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.003320	1.002214
THC Cal Offset:	-0.078975	-0.072976
CH4 Cal Slope:	1.004551	1.003429
CH4 Cal Offset:	-0.047351	-0.043993
NMHC Cal Slope:	1.002546	1.001224
NMHC Cal Offset:	-0.032763	-0.029785

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

Calibration Performed By: Devin Russell Jan Castro

Wood Buffalo Environmental Association

THC Calibration Summary

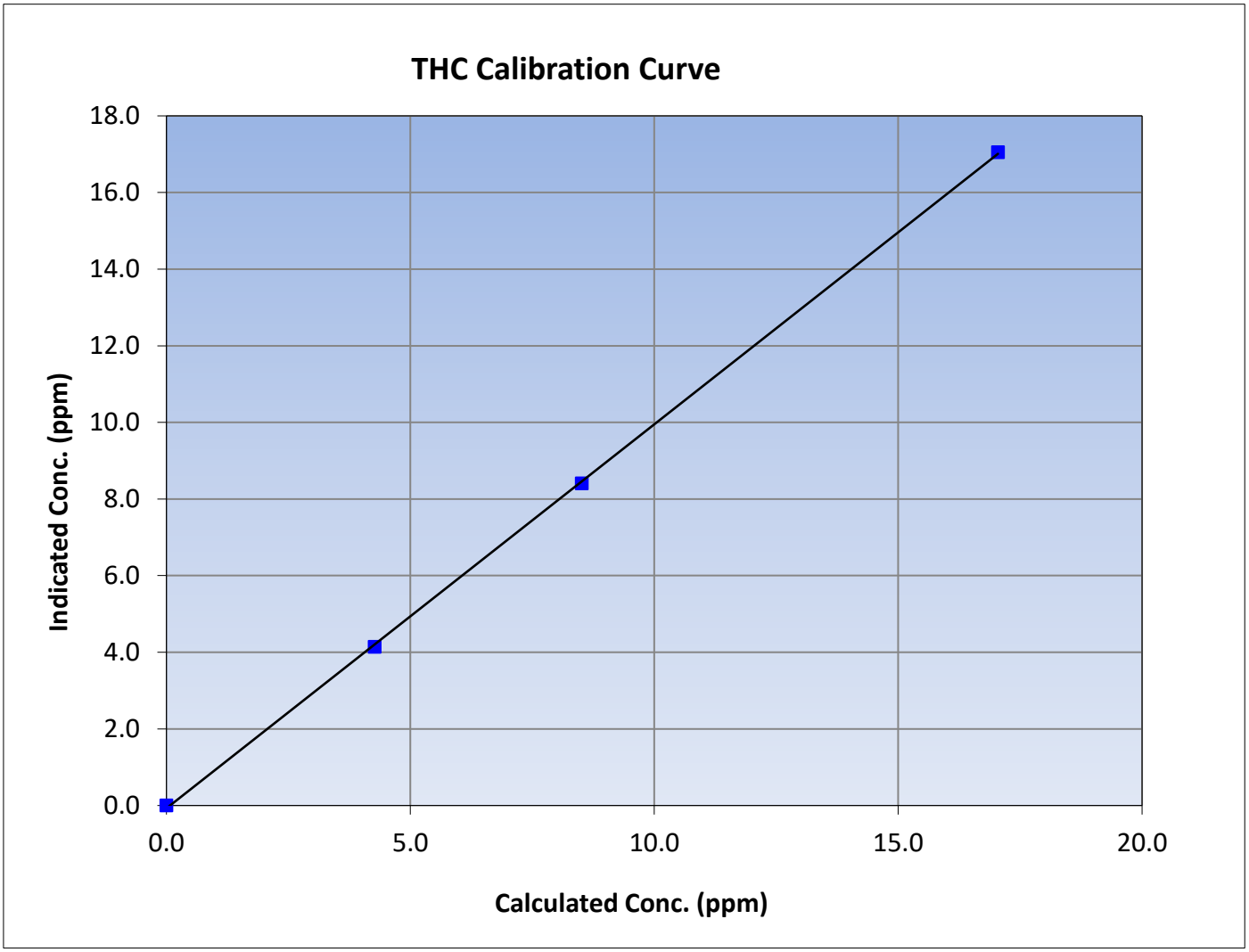
Version-06-2022

Station Information

Calibration Date:	October 18, 2023	Previous Calibration:	September 15, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:55	End Time (MST):	12:25
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	0.999915	*≥0.995*
17.05	17.05	0.9997			
8.51	8.41	1.0124	Slope	1.002214	*0.90 - 1.10*
4.27	4.14	1.0307			
			Intercept	-0.072976	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

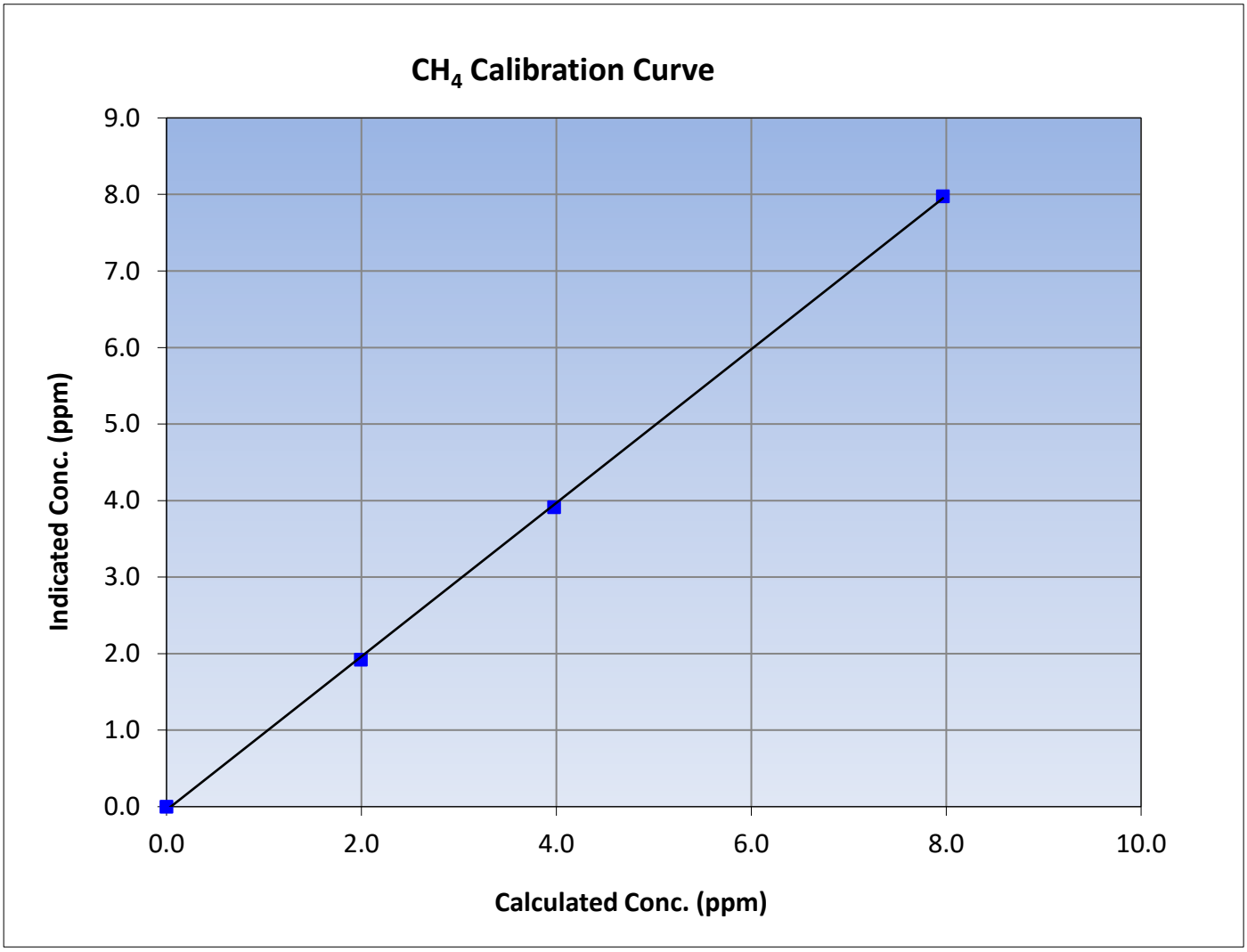
Version-06-2022

Station Information

Calibration Date:	October 18, 2023	Previous Calibration:	September 15, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:55	End Time (MST):	12:25
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	0.999855	*≥0.995*
7.97	7.98	0.9988			
3.98	3.91	1.0164	Slope	1.003429	*0.90 - 1.10*
1.99	1.92	1.0382			
			Intercept	-0.043993	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

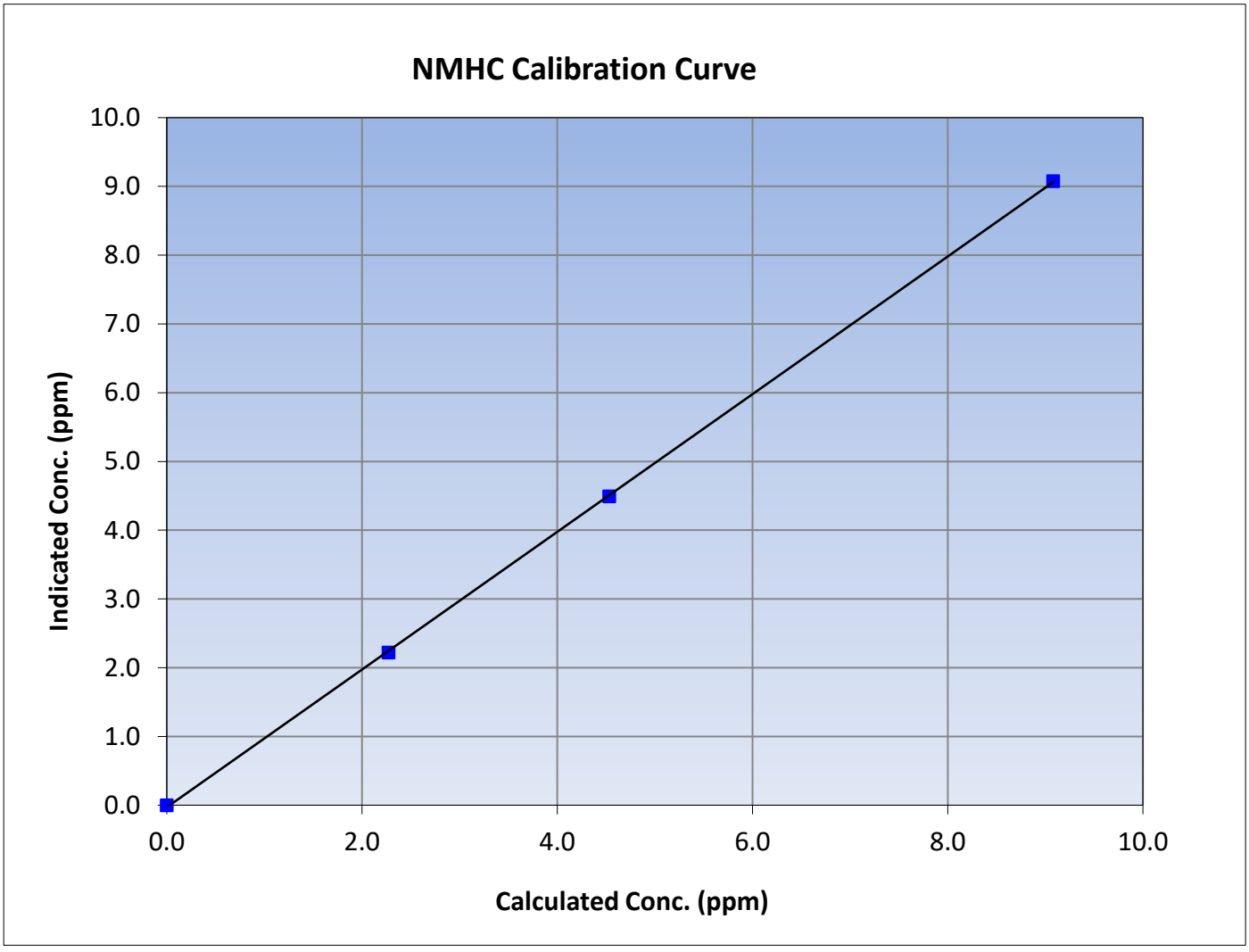
Version-06-2022

Station Information

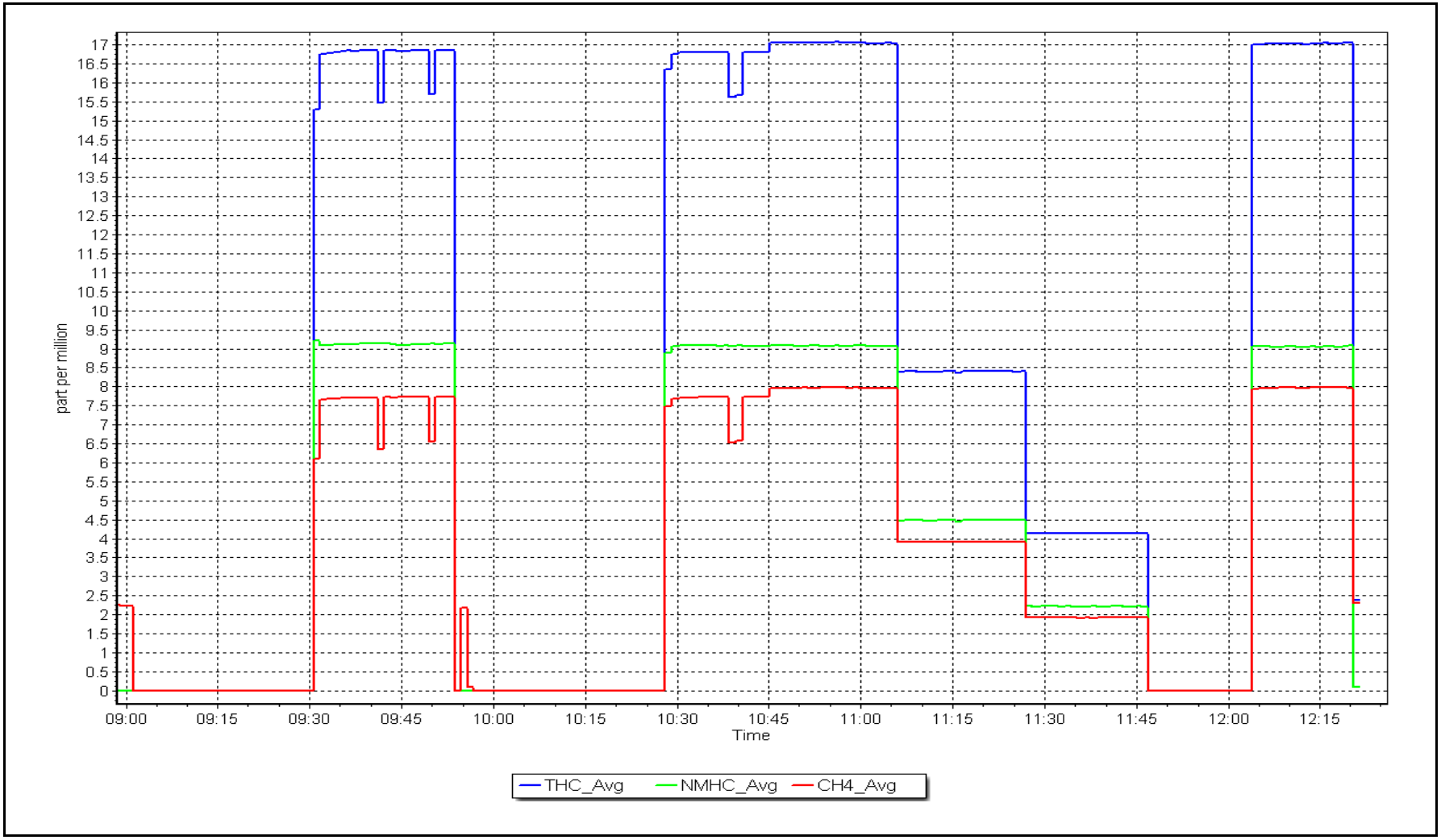
Calibration Date:	October 18, 2023	Previous Calibration:	September 15, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:55	End Time (MST):	12:25
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050130

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999950	≥0.995
9.08	9.08	1.0003			
4.53	4.49	1.0097	Slope	1.001224	0.90 - 1.10
2.27	2.22	1.0243			
			Intercept	-0.029785	+/-0.5



NMHC Calibration Plot Date: October 18, 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:	October 24, 2023	Last Cal Date:	September 26, 2023
Start time (MST):	8:23	End time (MST):	13:10
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:	1.120	1.124	NO bkgnd or offset:	10.1	10.4
NOX coeff or slope:	0.991	0.991	NOX bkgnd or offset:	10.8	10.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	158.4	160.8

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999304	0.999331
NO_X Cal Offset:	-1.811346	-2.071318
NO Cal Slope:	1.002205	1.002262
NO Cal Offset:	-2.825167	-2.945200
NO_2 Cal Slope:	0.995992	1.001663
NO_2 Cal Offset:	-1.479105	-0.500859

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.7	0.0	-0.7	----	----
as found span	4919	81.1	826.9	800.0	26.9	825.8	799.2	26.6	1.0013	1.0009
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	4919	81.1	826.9	800.0	26.9	825.2	800.2	24.9	1.0020	0.9997
second point	4960	40.6	413.9	400.4	13.5	410.7	397.1	13.5	1.0078	1.0084
third point	4980	20.3	207.0	200.2	6.7	202.7	194.8	7.9	1.0210	1.0279
as left zero	5000	0.0	0.0	0.0	0.0	0.5	0.4	0.1	----	----
as left span	4919	80.1	816.8	380.1	436.7	828.4	387.8	440.6	0.9861	0.9802
								Average Correction Factor	1.0103	1.0120

Corrected As found	NO_X = 826.5 ppb	NO = 799.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.2%
Previous Response	NO_X = 824.5 ppb	NO = 798.9 ppb		*Percent Change	NO =	0.0%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	794.0	384.2	436.7	437.4	0.9985	100.2%
2nd GPT point (200 ppb O3)	794.0	588.4	232.5	231.7	1.0036	99.6%
3rd GPT point (100 ppb O3)	794.0	690.8	130.1	129.6	1.0040	99.6%
				Average Correction Factor	1.0020	99.8%

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

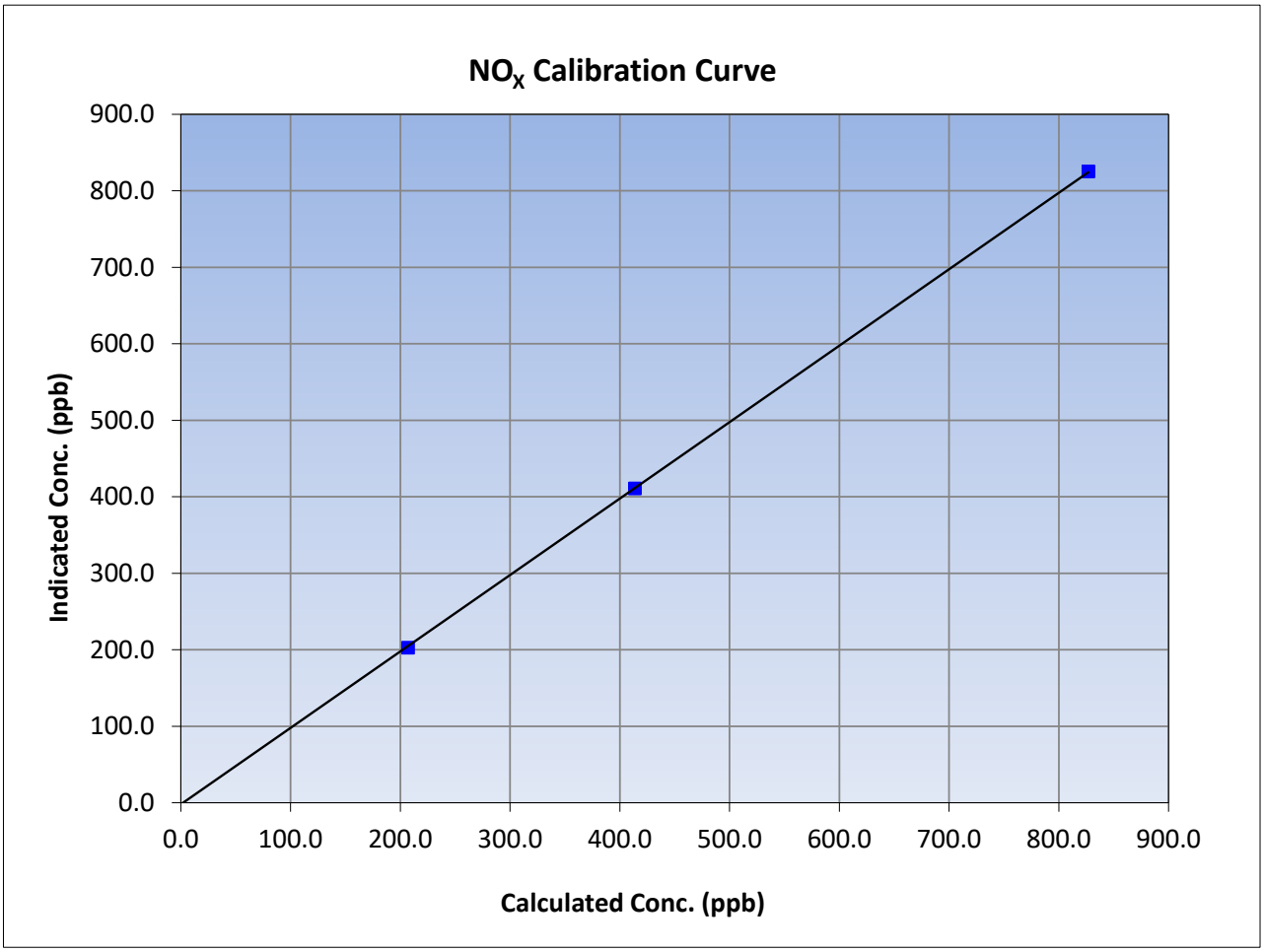
Version-04-2020

Station Information

Calibration Date:	October 24, 2023	Previous Calibration:	September 26, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	8:23	End Time (MST):	13:10
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999974	≥0.995
826.9	825.2	1.0020			
413.9	410.7	1.0078	Slope	0.999331	0.90 - 1.10
207.0	202.7	1.0210			
			Intercept	-2.071318	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

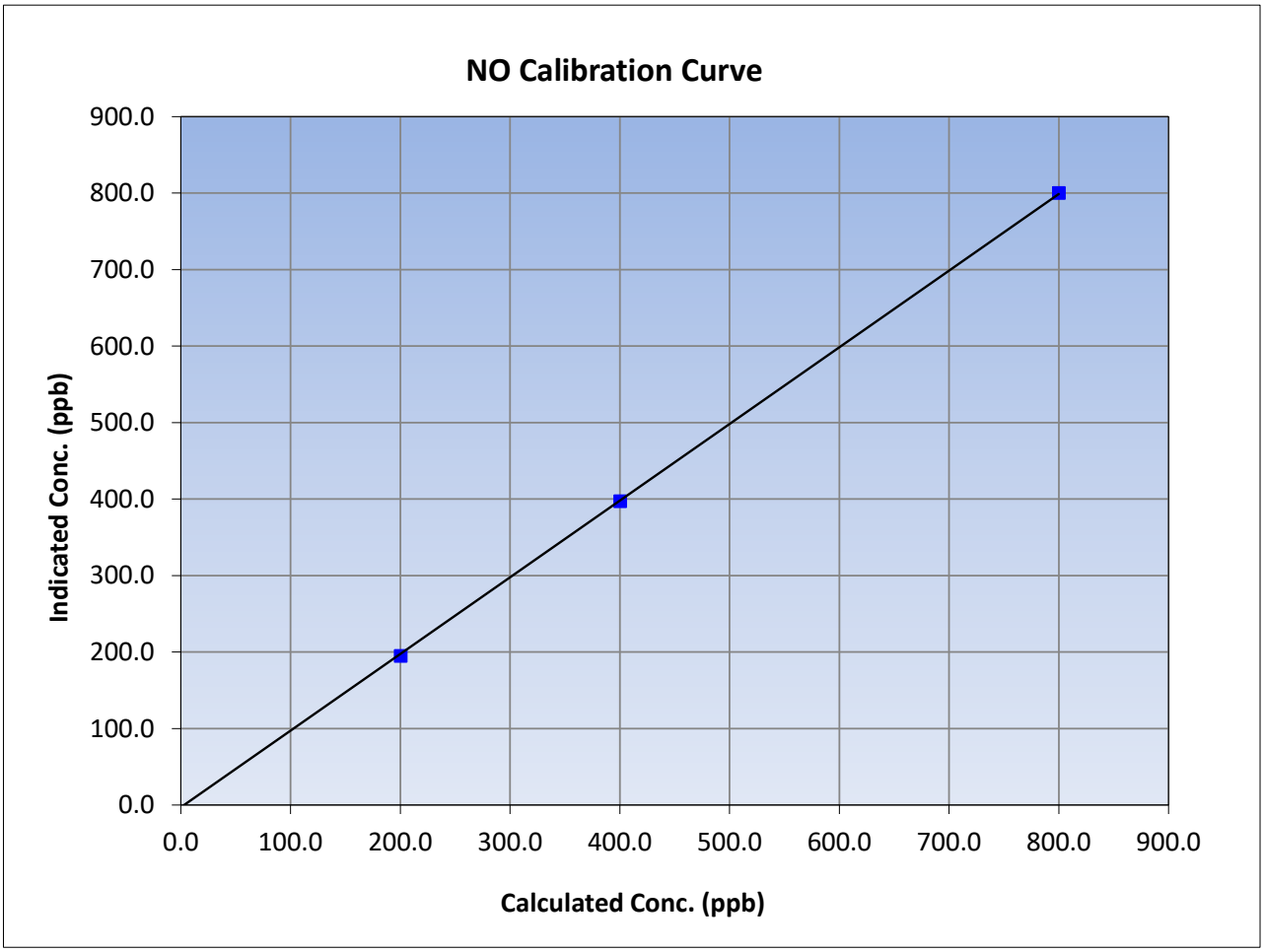
Version-04-2020

Station Information

Calibration Date:	October 24, 2023	Previous Calibration:	September 26, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	8:23	End Time (MST):	13:10
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999942	≥0.995
800.0	800.2	0.9997			
400.4	397.1	1.0084	Slope	1.002262	0.90 - 1.10
200.2	194.8	1.0279			
			Intercept	-2.945200	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

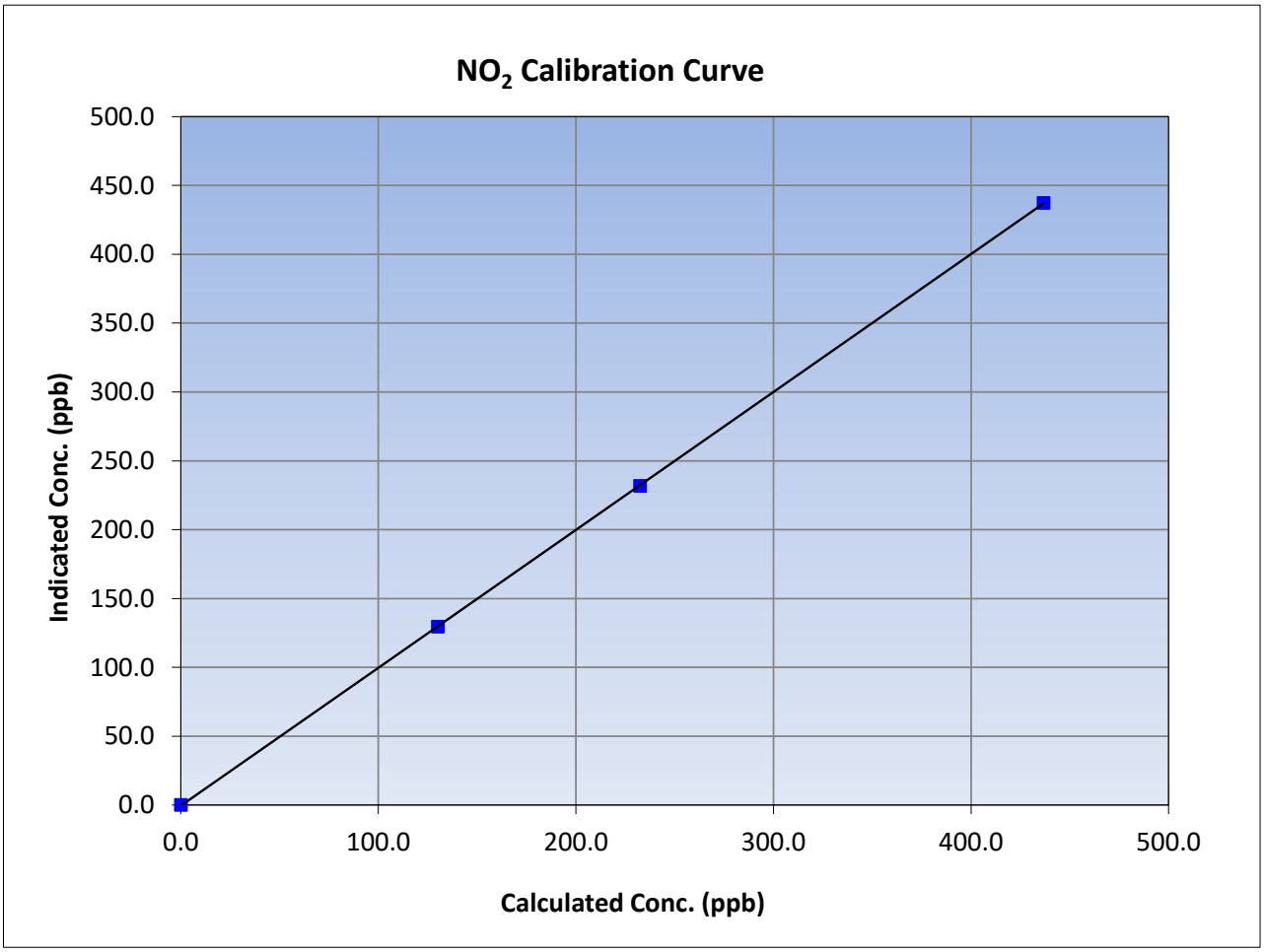
Version-04-2020

Station Information

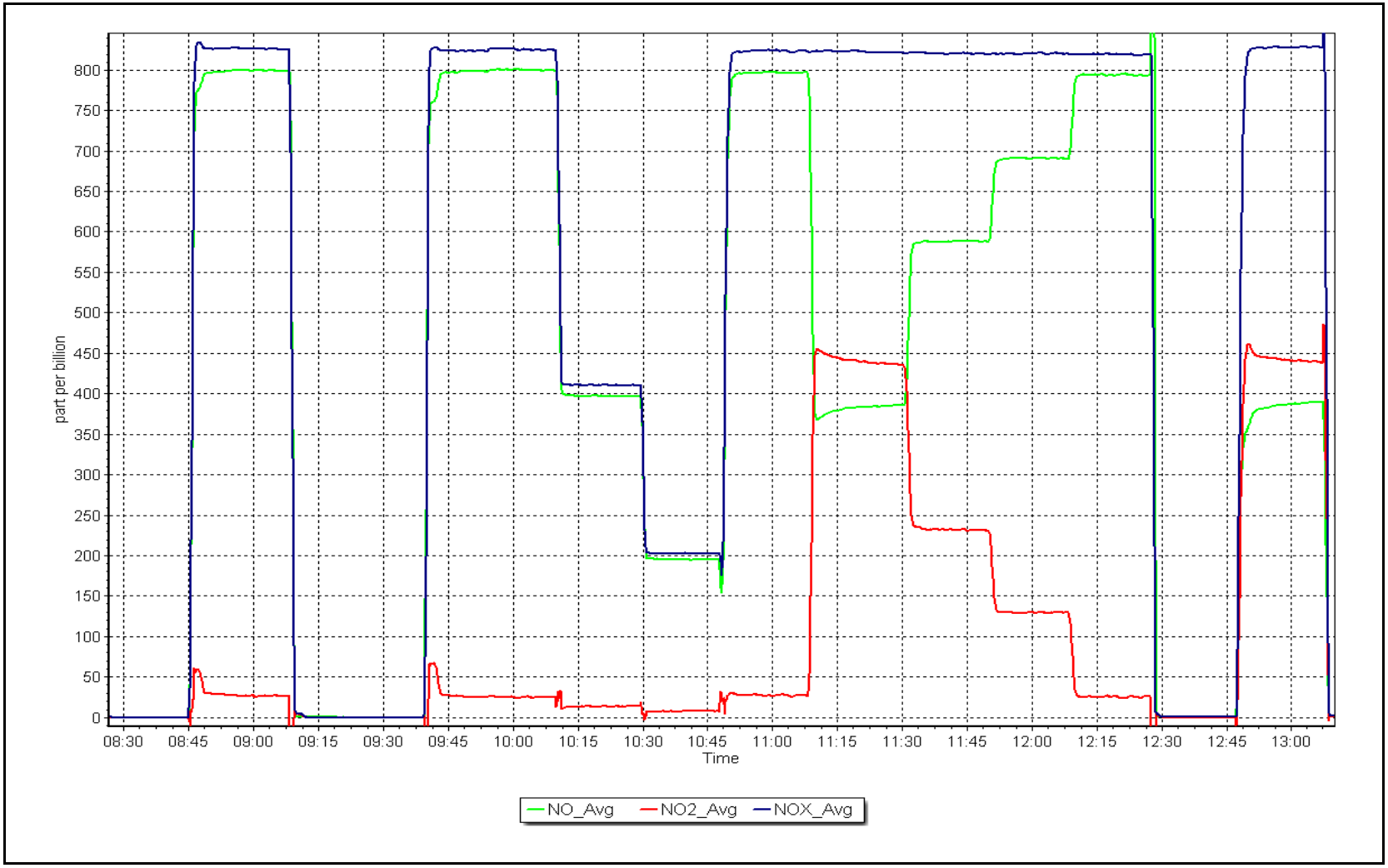
Calibration Date:	October 24, 2023	Previous Calibration:	September 26, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	8:23	End Time (MST):	13:10
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999990	≥0.995
436.7	437.4	0.9985			
232.5	231.7	1.0036	Slope	1.001663	0.90 - 1.10
130.1	129.6	1.0040			
			Intercept	-0.500859	+/-20



NO_X Calibration Plot Date: October 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:	October 2, 2023	Last Cal Date:	September 8, 2023
Start time (MST):	10:12	End time (MST):	13:13
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:	0.999886	0.998314	Backgd or Offset:	2.4	2.4
Calibration intercept:	1.020000	0.820000	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	398.5	1.004
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	977.0	400.0	399.4	1.002
second point	5000	838.0	200.0	201.7	0.992
third point	5000	735.9	100.0	101.2	0.988
as left zero	5000	0.0	0.0	-0.2	----
as left span	5000	977.0	400.0	402.2	0.995
				Average Correction Factor	0.994

Baseline Corr As found:	398.6	Previous response	401.0	*% change	-0.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after as founds. No adjustment made. Graph was taken from MDS.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

O_3 Calibration Summary

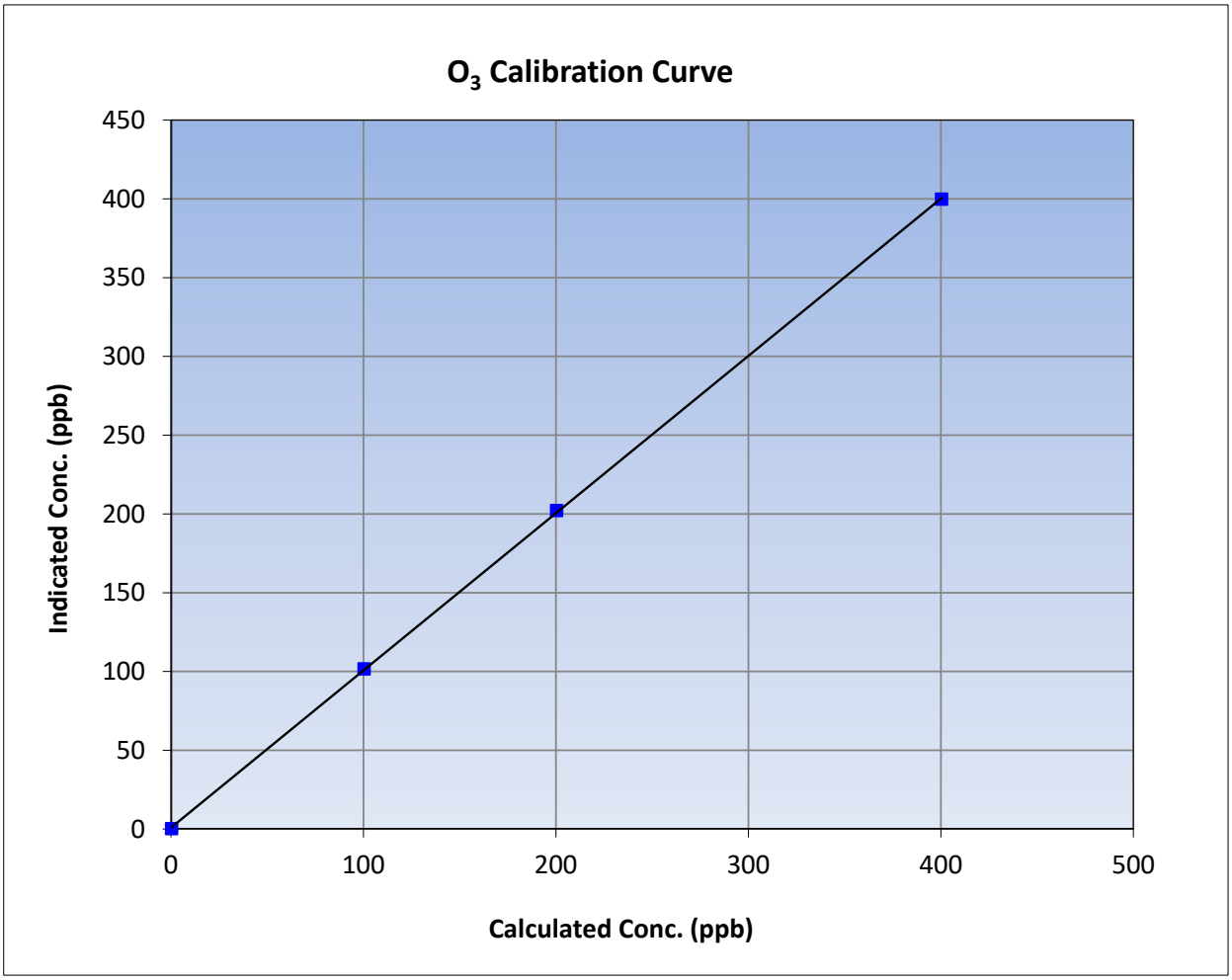
Version-01-2020

Station Information

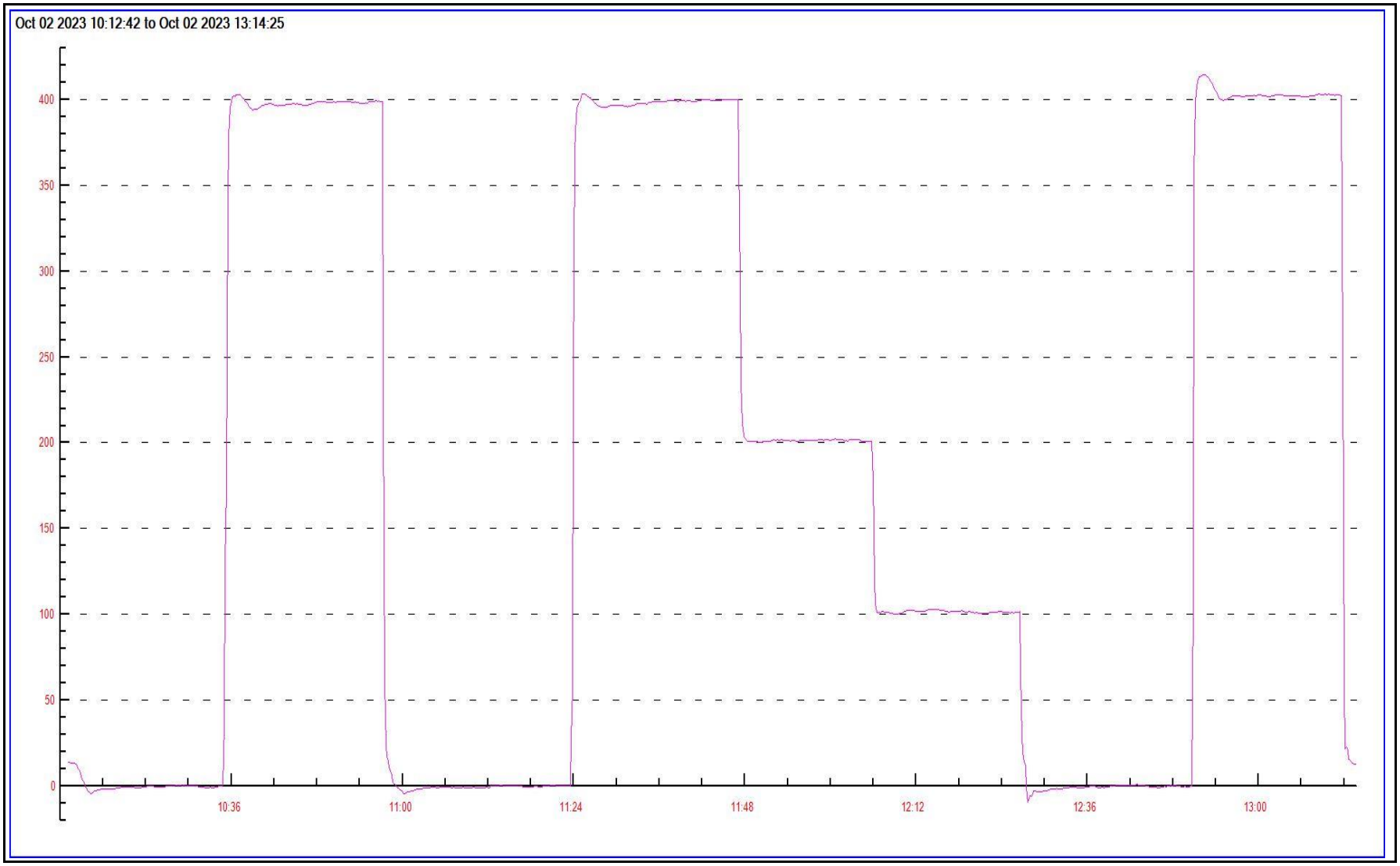
Calibration Date:	October 2, 2023	Previous Calibration:	September 8, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	10:12	End Time (MST):	13:13
Analyzer make:	Teledyne API T400	Analyzer serial #:	3871

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.2	----	Correlation Coefficient	0.999961	*≥0.995*
400.0	399.4	1.0015			
200.0	201.7	0.9916	Slope	0.998314	*0.90 - 1.10*
100.0	101.2	0.9881			
			Intercept	0.820000	*+/- 5*



O_3 Calibration Plot Date: October 2, 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:	October 6, 2023	Last Cal Date:	October 2, 2023
Start time (MST):	8:56	End time (MST):	11:54
Reason:	Maintenance		

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	1.004514	Backgd or Offset:	2.4	2.4
Calibration intercept:	0.820000	1.260000	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	-0.2	----
as found span	5000	977.0	400.0	401.4	0.997
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.6	----
high point	5000	977.0	400.0	402.6	0.994
second point	5000	838.0	200.0	202.9	0.986
third point	5000	735.9	100.0	102.1	0.979
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	0.986

Baseline Corr As found:	401.6	Previous response	400.1	*% 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: Lamp was adjusted yesterday, O3 ref was reading at 2500mV and now its at 4590mV. No adjustment made.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

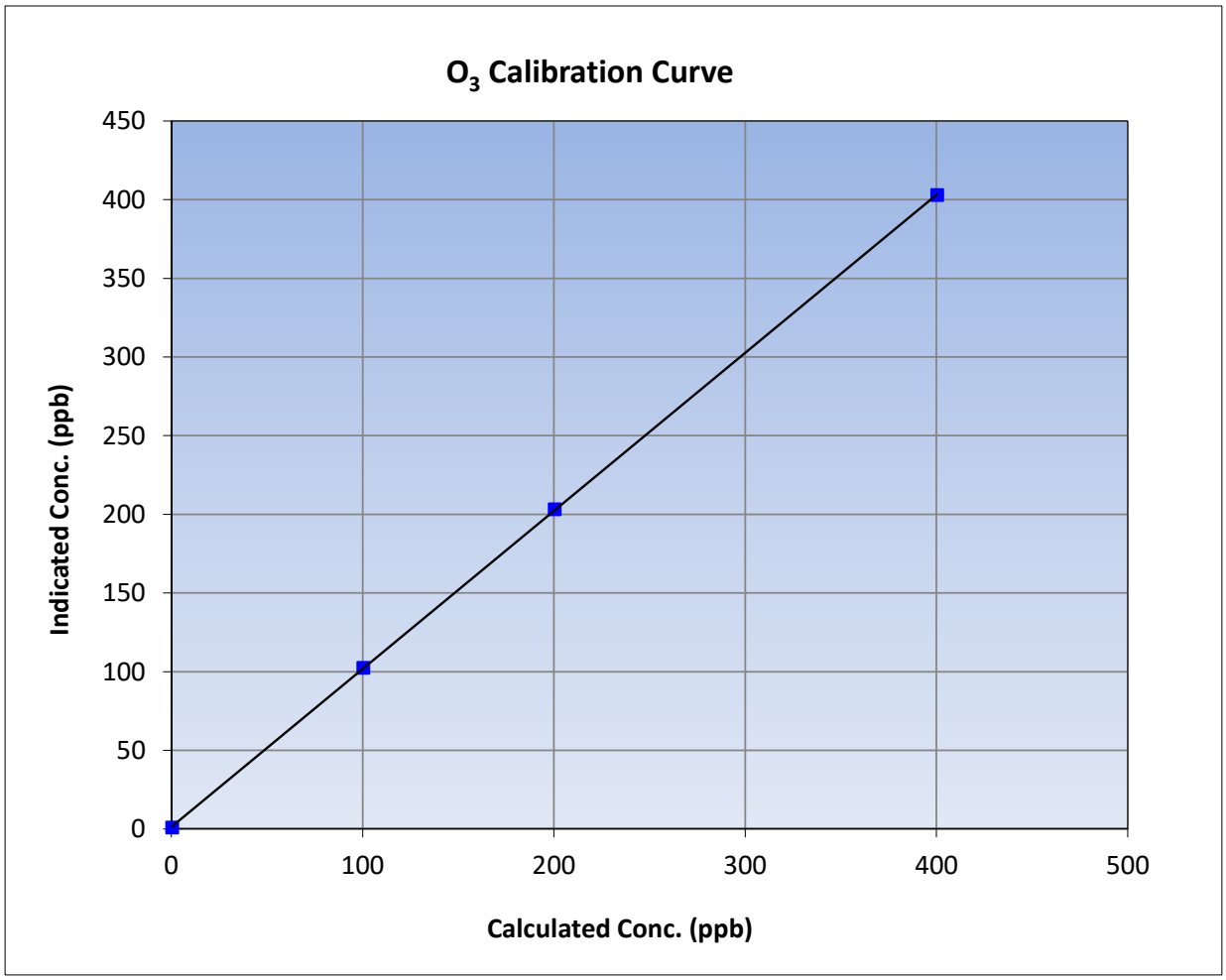
Station Information

Calibration Date:	October 6, 2023	Previous Calibration:	October 2, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:56	End Time (MST):	11:54
Analyzer make:	Teledyne API T400	Analyzer serial #:	3871

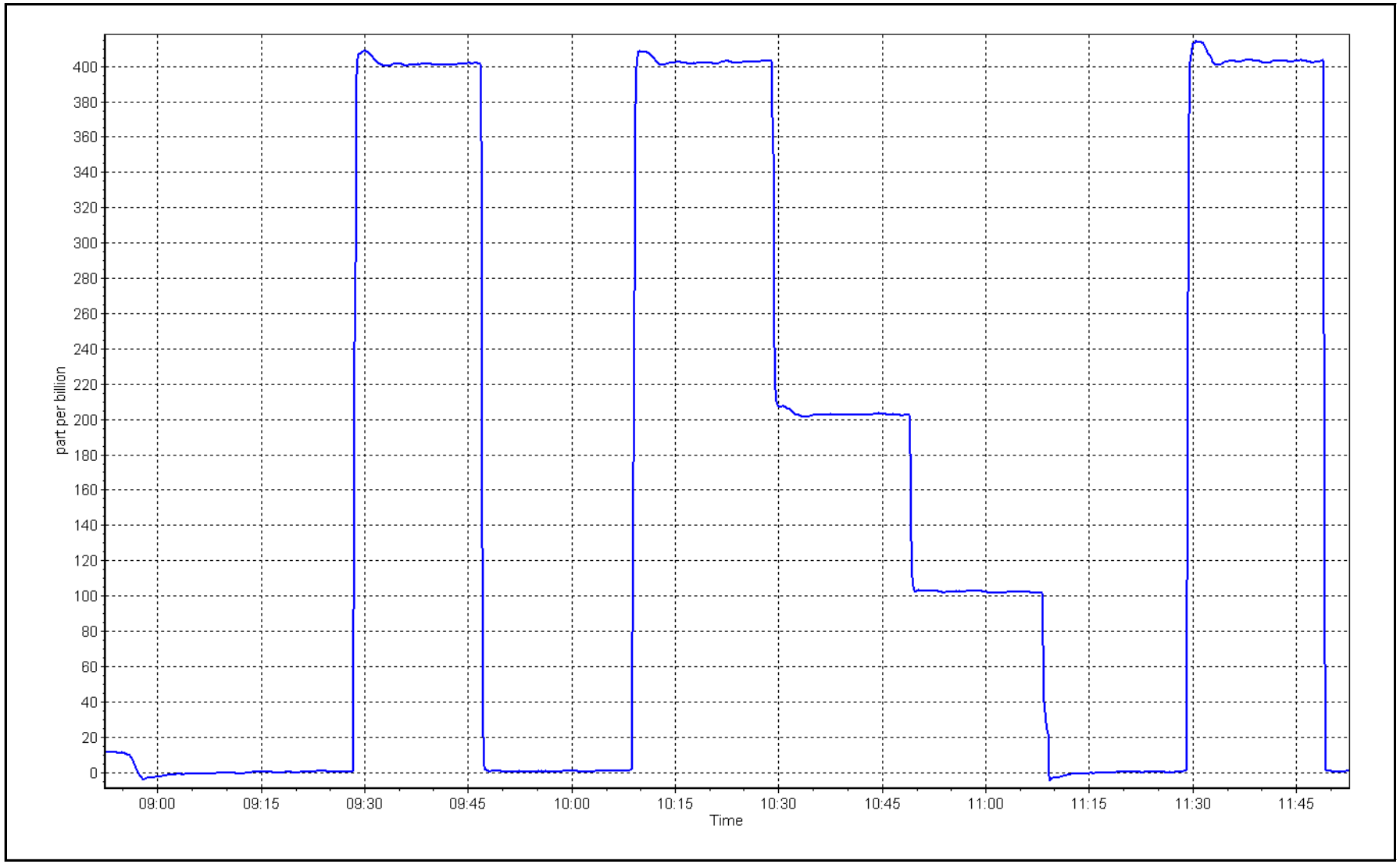
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.6	----
400.0	402.6	0.9935
200.0	202.9	0.9857
100.0	102.1	0.9794

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999985	*≥0.995*
Slope	1.004514	*0.90 - 1.10*
Intercept	1.260000	*+/- 5*



O_3 Calibration Plot Date: October 6, 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:	October 24, 2023	Last Cal Date:	September 29, 2023
Start time (MST):	8:56	End time (MST):	10:04
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)	-7.10	-7.80	-7.10	☐	+/- 2 ^{o}C
P (mmHg)	740.70	742.44	740.70	☐	+/- 10 mmHg
flow (LPM)	4.96	4.79	4.96	☐	+/- 0.25 LPM

Leak Test: Date of check: October 24, 2023 Last Cal Date: September 29, 2023

PM w/o HEPA: 6.8 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	10.1	10.9	10.9	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 11.6 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: October 24, 2023

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. PMT peak test adjusted.

Notes:

Calibration by: Sean Bala

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS14
ANZAC
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	October 3, 2023	Last Cal Date:	September 6, 2023
Start time (MST):	9:18	End time (MST):	12:22
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:	1.017069	1.006812	Backgd or Offset:	25.2	25.2
Calibration intercept:	-1.850638	-2.184734	Coeff or Slope:	0.798	0.798

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.5	----
as found span	4938	80.3	799.3	803.7	0.994
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.7	----
high point	4938	80.3	799.3	804.4	0.994
second point	4979	40.2	400.1	397.9	1.005
third point	4998	20.2	201.1	198.2	1.014
as left zero	5000	0.0	0.0	0.6	----
as left span	4938	80.3	799.3	805.7	0.992
				Average Correction Factor	1.005

Baseline Corr As found:	803.20	Previous response	811.06	*% change	-1.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

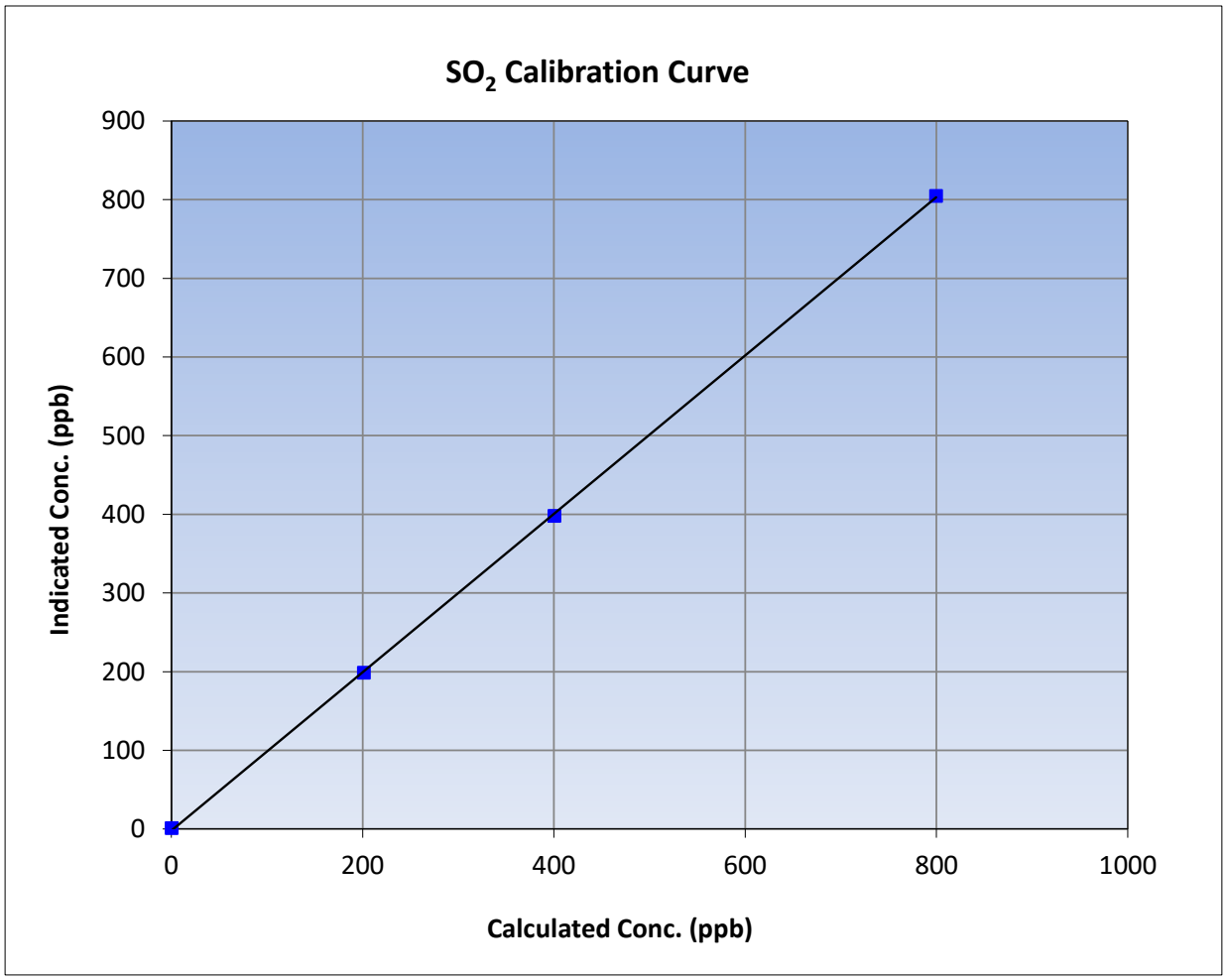
Station Information

Calibration Date:	October 3, 2023	Previous Calibration:	September 6, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:18	End Time (MST):	12:22
Analyzer make:	Thermo 43i	Analyzer serial #:	0710321322

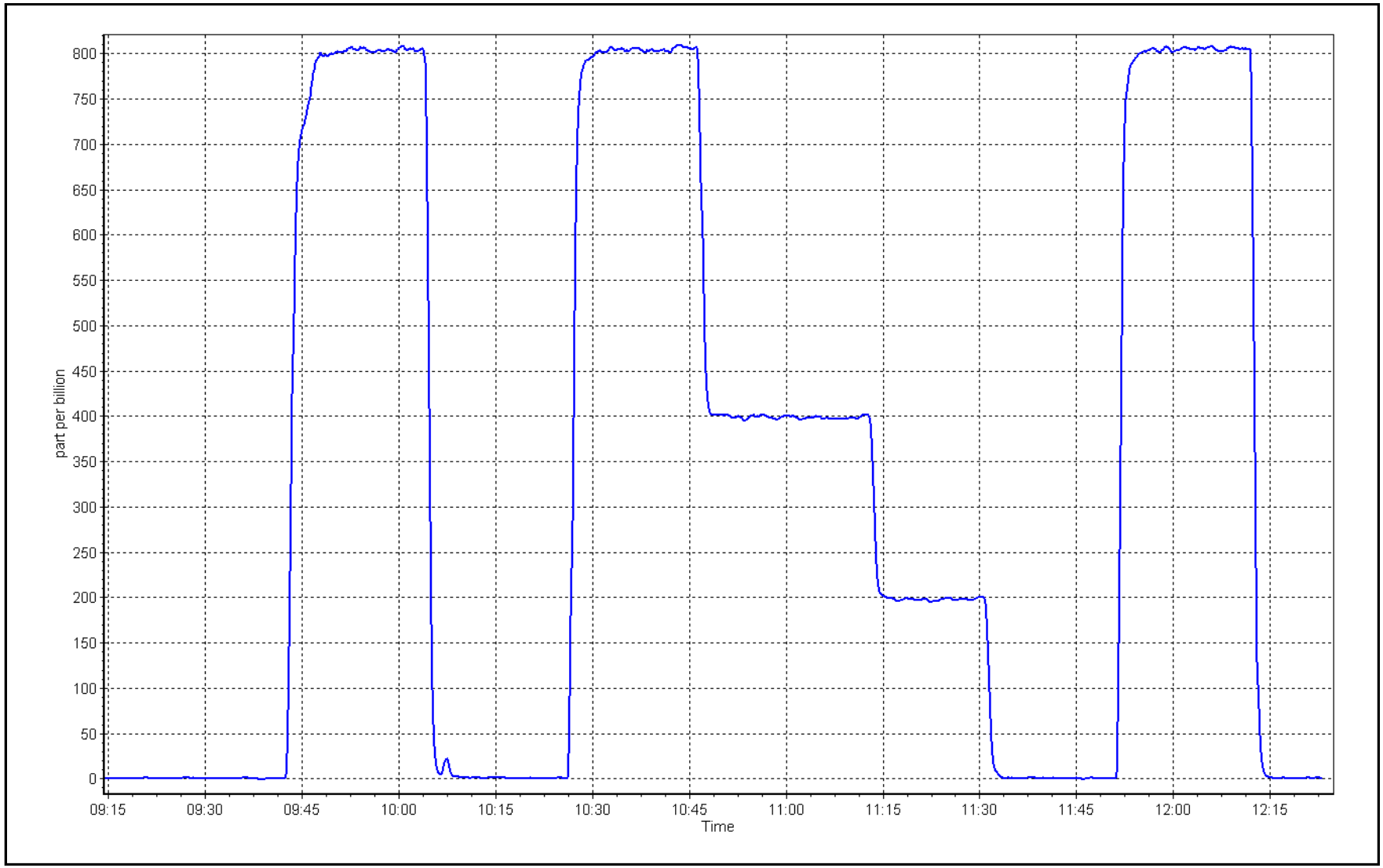
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.7	----
799.3	804.4	0.9936
400.1	397.9	1.0054
201.1	198.2	1.0145

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999934	*≥0.995*
Slope	1.006812	*0.90 - 1.10*
Intercept	-2.184734	*+/-30*



SO2 Calibration Plot Date: October 3, 2023 Location: Anzac



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	October 5, 2023	Last Cal Date:	September 7, 2023
Start time (MST):	10:36	End time (MST):	14:44
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:	0.992584	0.997157	Backgd or Offset:	2.31	2.28
Calibration intercept:	-0.245370	-0.105310	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	80.1	0.996
as found 2nd point	4973	38.9	40.0	40.1	0.992
as found 3rd point	4997	19.5	20.0	19.7	1.006
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4938	77.9	80.0	79.6	1.004
second point	4973	38.9	40.0	39.9	1.001
third point	4997	19.5	20.0	19.6	1.021
as left zero	5000	0.0	0.0	0.1	----
as left span	4938	77.9	80.0	78.2	1.022
SO2 Scrubber Check	4936	80.3	800.4	-0.1	----
Date of last scrubber change:				Ave Corr Factor	1.009
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.3	Prev response:	79.14	*% change:	1.4%
Baseline Corr 2nd AF pt:	40.3	AF Slope:	1.005058	AF Intercept:	-0.245371
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999982		

* = > +/-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

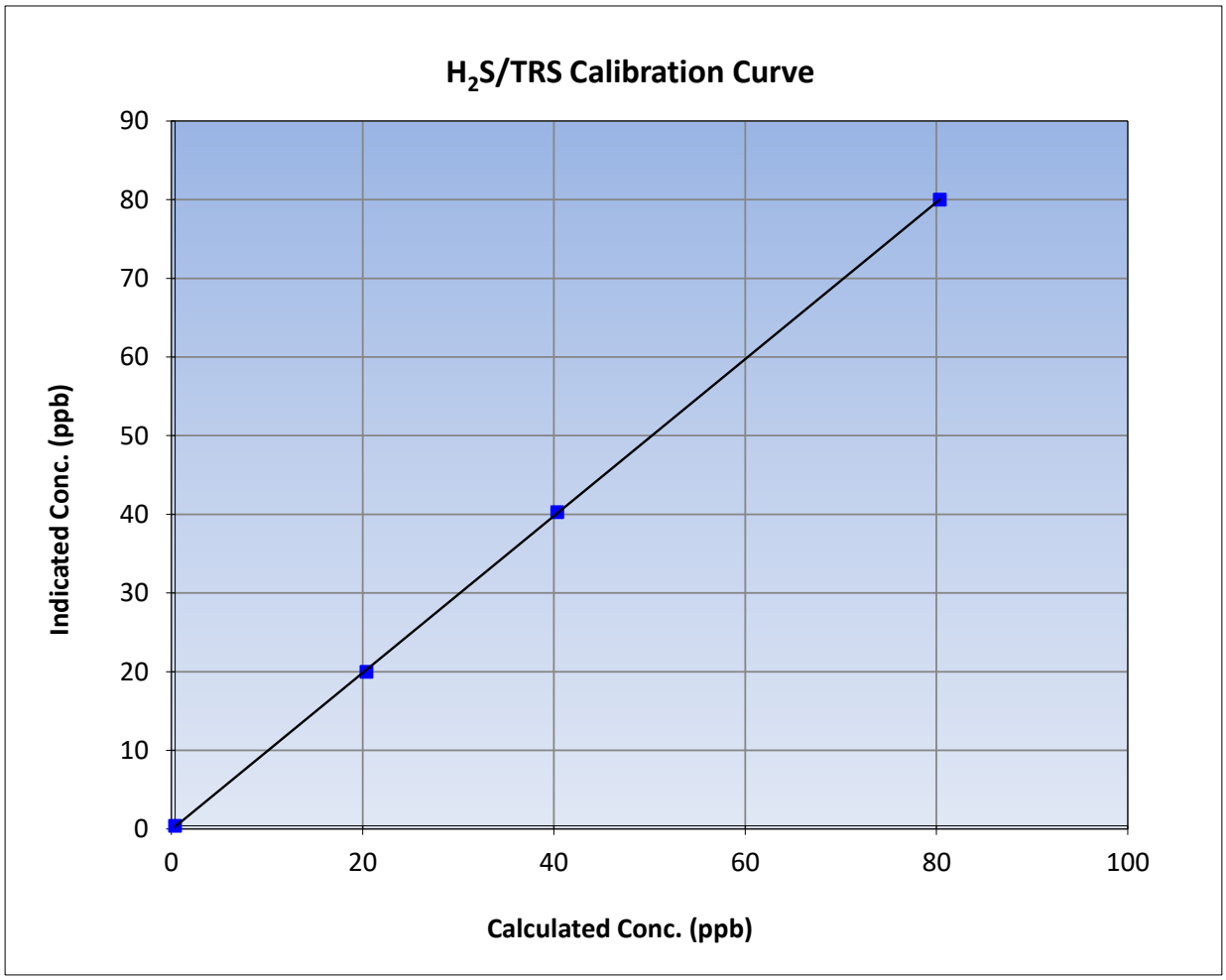
Station Information

Calibration Date:	October 5, 2023	Previous Calibration:	September 7, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	10:36	End Time (MST):	14:44
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153582

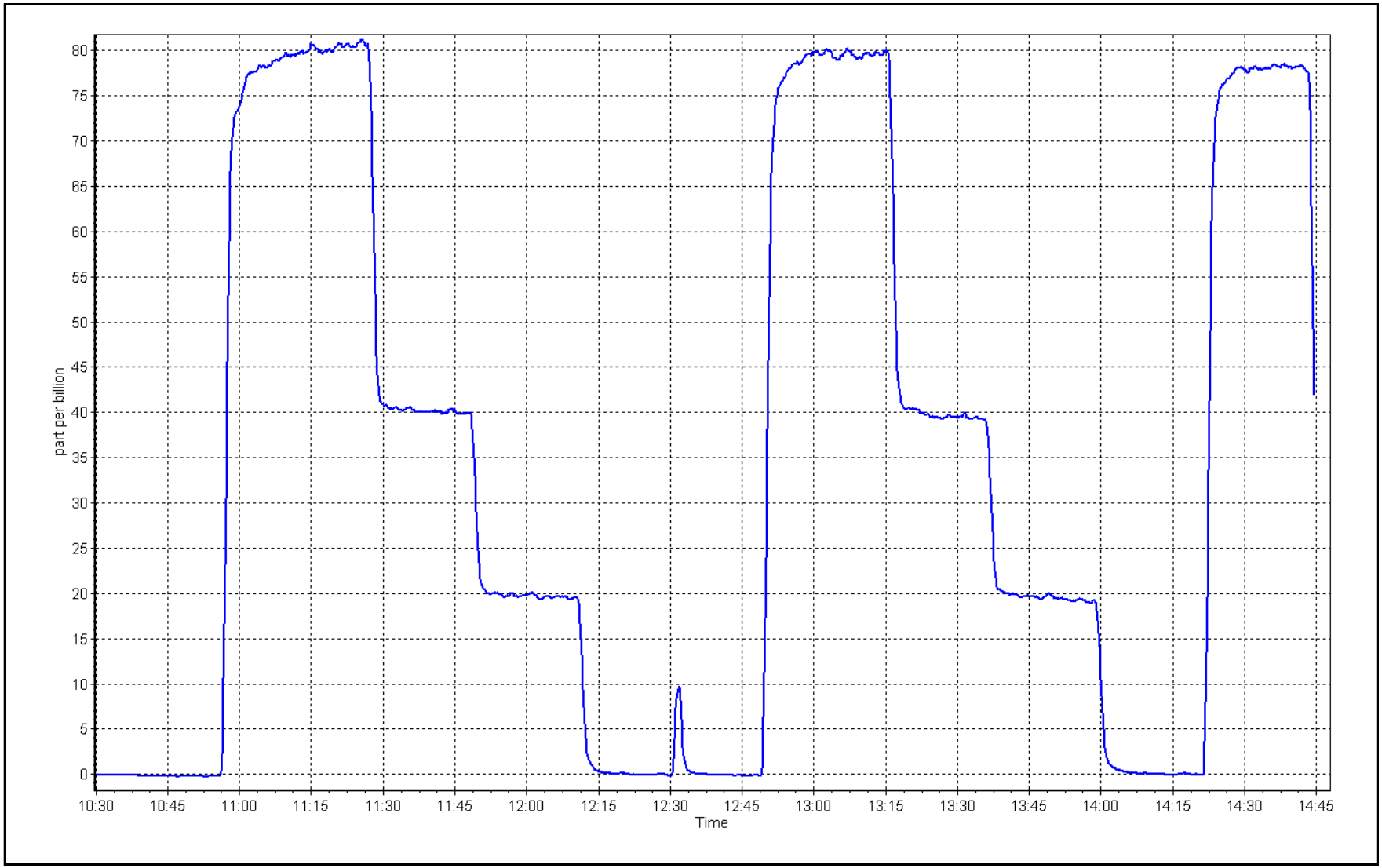
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	79.6	1.0044
40.0	39.9	1.0014
20.0	19.6	1.0210

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999971	*≥0.995*
Slope	0.997157	*0.90 - 1.10*
Intercept	-0.105310	*+/-3*



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



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	October 3, 2023	Last Cal Date:	September 6, 2023
Start time (MST):	9:18	End time (MST):	12:22
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	3.75E-04	NMHC SP Ratio:	4.49E-05	4.49E-05
CH4 Retention time:	12.20	12.20	NMHC Peak Area:	203038	203038

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	17.10	17.13	0.998
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	4979	40.2	8.56	8.50	1.008
third point	4998	20.2	4.30	4.23	1.018
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	17.10	17.10	1.000
				Average Correction Factor	1.009

Baseline Corr AF:	17.13	Prev response	17.11	*% change	0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	9.11	9.08	1.004
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	9.05	1.007
second point	4979	40.2	4.56	4.49	1.015
third point	4998	20.2	2.29	2.23	1.028
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	9.11	9.06	1.006
				Average Correction Factor	1.017
Baseline Corr AF:	9.08	Prev response	9.11	*% change	-0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	7.99	8.05	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	7.99	8.05	0.992
second point	4979	40.2	4.00	4.00	1.000
third point	4998	20.2	2.01	2.00	1.006
as left zero	5000	0.0	0.00	0.00	----
as left span	4938	80.3	7.99	8.04	0.994
				Average Correction Factor	1.000
Baseline Corr AF:	8.05	Prev response	8.00	*% change	0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.002474	1.000528
THC Cal Offset:	-0.037684	-0.040856
CH4 Cal Slope:	1.003084	1.008350
CH4 Cal Offset:	-0.015639	-0.017069
NMHC Cal Slope:	1.001701	0.994097
NMHC Cal Offset:	-0.021844	-0.024989

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

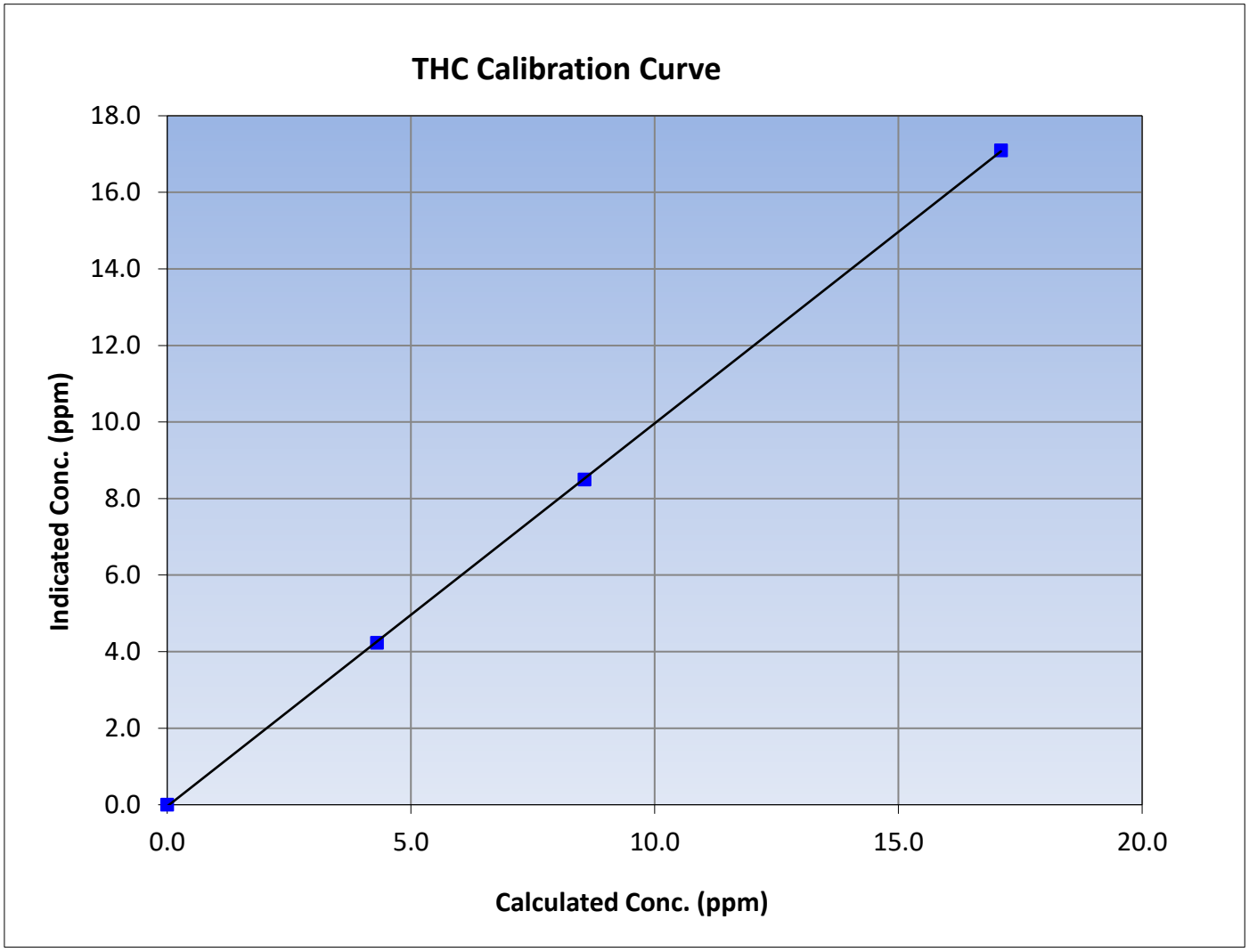
Version-01-2020

Station Information

Calibration Date:	October 3, 2023	Previous Calibration:	September 6, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:18	End Time (MST):	12:22
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	0.999973	*≥0.995*
17.10	17.09	1.0005			
8.56	8.50	1.0076	Slope	1.000528	*0.90 - 1.10*
4.30	4.23	1.0176			
			Intercept	-0.040856	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

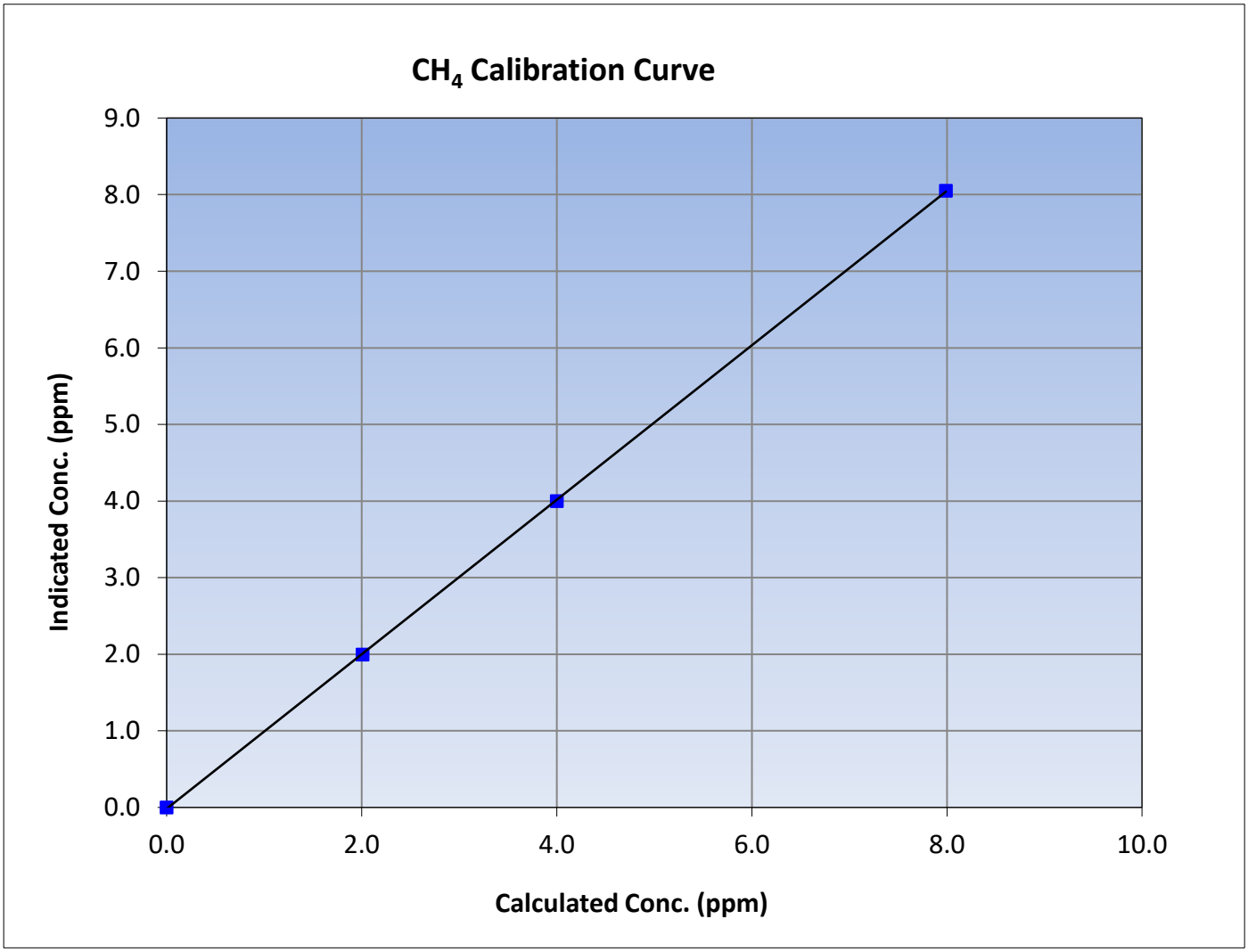
Version-01-2020

Station Information

Calibration Date:	October 3, 2023	Previous Calibration:	September 6, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:18	End Time (MST):	12:22
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	8.05	0.9925			
4.00	4.00	0.9998	Slope	1.008350	*0.90 - 1.10*
2.01	2.00	1.0064			
			Intercept	-0.017069	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

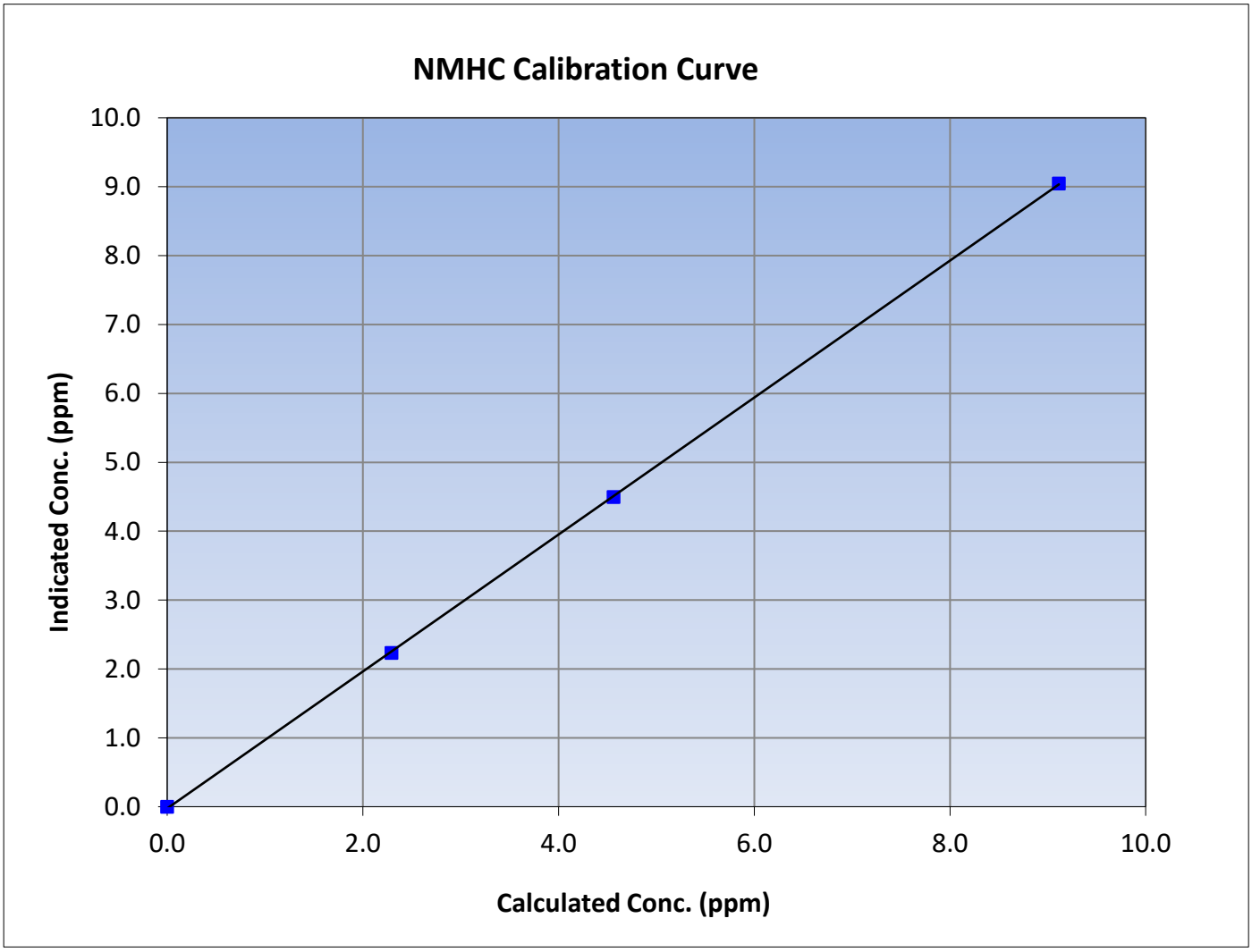
Version-01-2020

Station Information

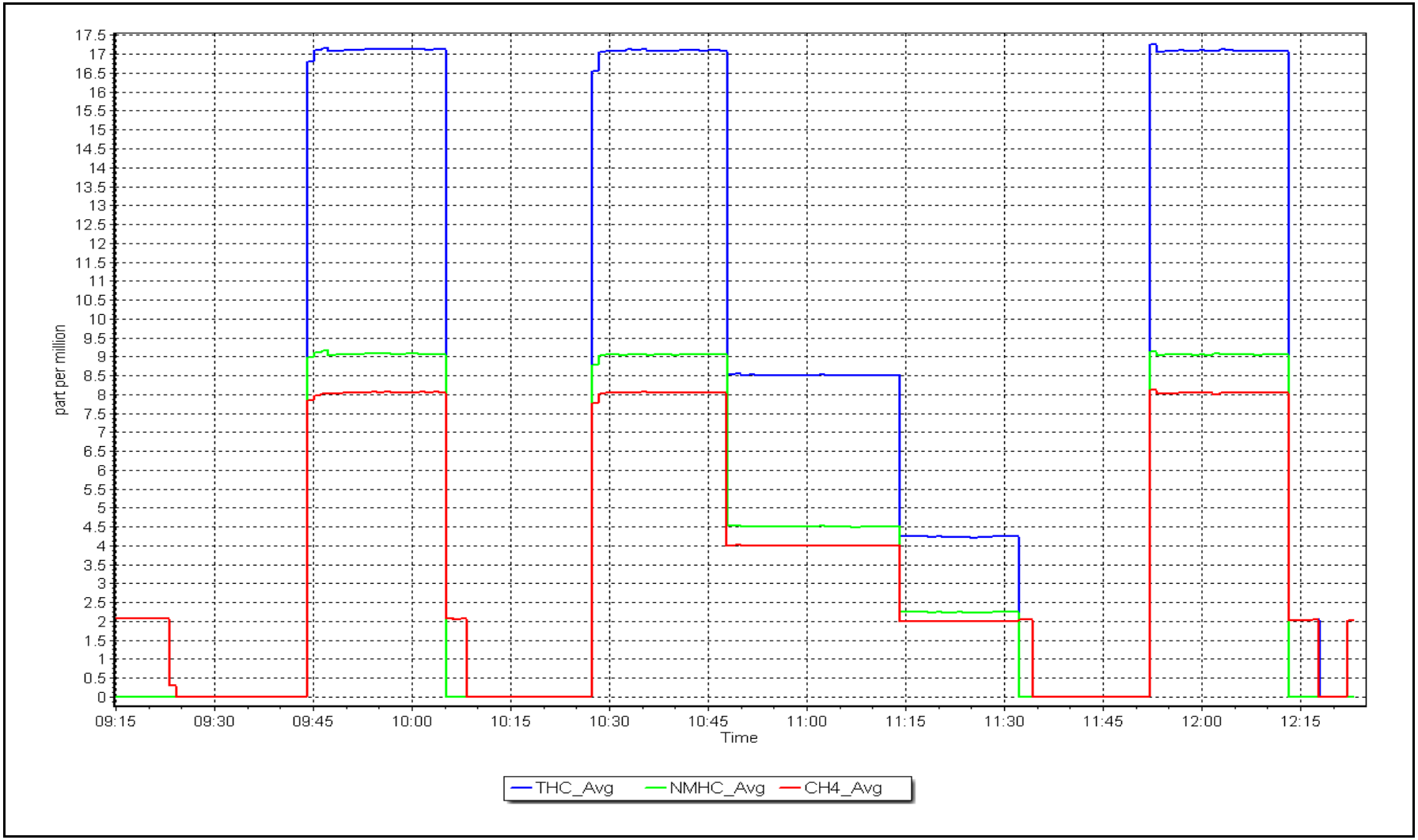
Calibration Date:	October 3, 2023	Previous Calibration:	September 6, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:18	End Time (MST):	12:22
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999965	*≥0.995*
9.11	9.05	1.0072			
4.56	4.49	1.0150	Slope	0.994097	*0.90 - 1.10*
2.29	2.23	1.0276			
			Intercept	-0.024989	*+/-0.5*



NMHC Calibration Plot Date: October 3, 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:	October 16, 2023	Last Cal Date:	October 3, 2023
Start time (MST):	10:48	End time (MST):	12:21
Reason:	Cylinder Change		

Calibration Standards

Gas Cert Reference:		CC279389	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
C3H8 Cal Gas Conc.	207.1	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:		NA
Removed CH4 Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
Removed C3H8 Conc.	207.1	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3060	
ZAG make/model:	API 701H		Serial Number:	357	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1118148494	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.75E-04	3.75E-04	NMHC SP Ratio:	4.49E-05	4.49E-05
CH4 Retention time:	12.20	12.20	NMHC Peak Area:	203038	203038

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	17.10	17.08	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	17.05	1.003
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.003

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

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	9.11	9.07	1.004
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	9.07	1.005
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.005
Baseline Corr AF:	9.07	Prev response	9.03	*% change	0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4938	80.3	7.99	8.01	0.998
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	7.98	1.001
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.001
Baseline Corr AF:	8.01	Prev response	8.04	*% change	-0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

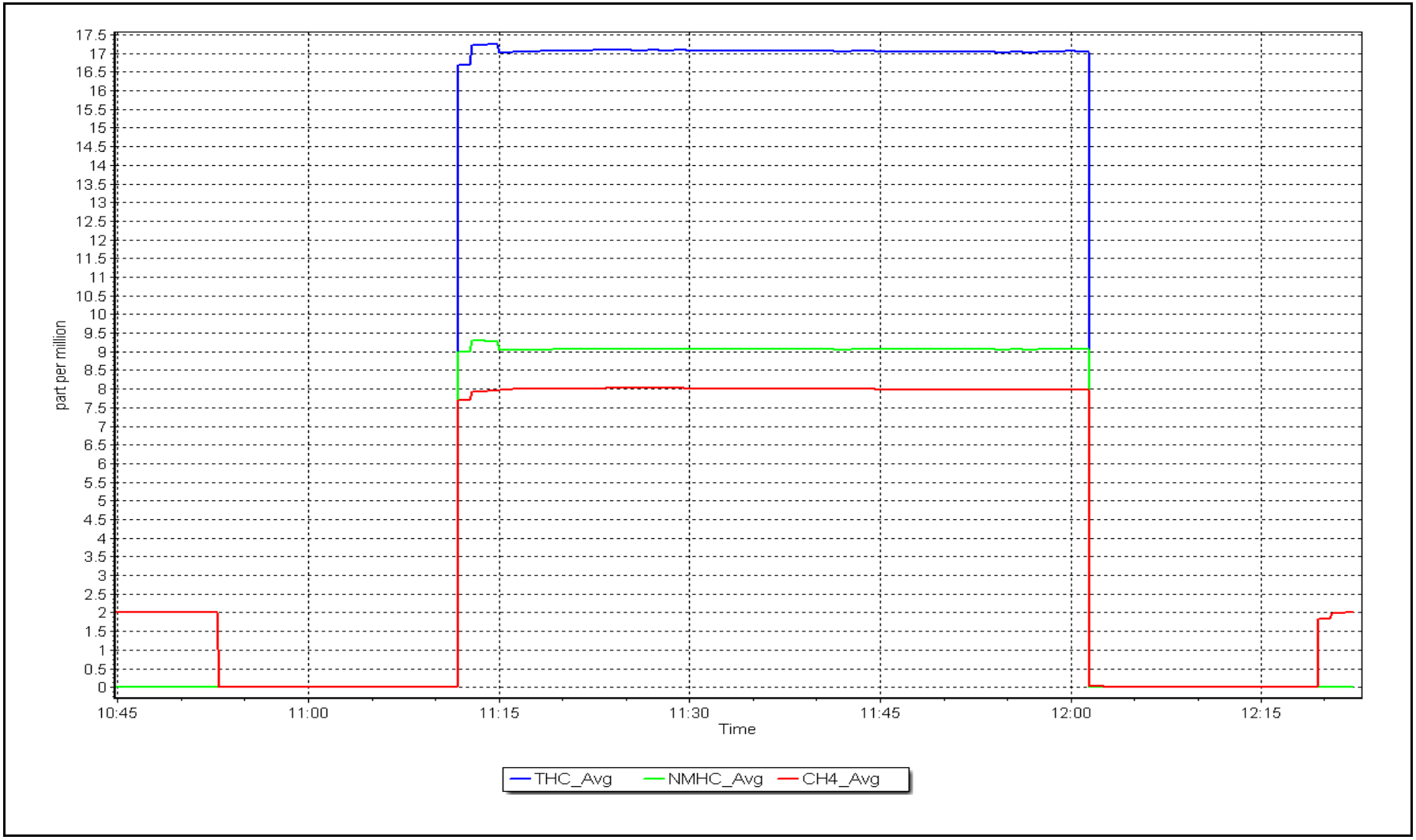
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000528	0.996683
THC Cal Offset:	-0.040856	0.000000
CH4 Cal Slope:	1.008350	0.999059
CH4 Cal Offset:	-0.017069	0.000000
NMHC Cal Slope:	0.994097	0.994819
NMHC Cal Offset:	-0.024989	0.000000

Notes: Nitrogen cylinder change.

Calibration Performed By: Mohammed Kashif

NMHC Calibration Plot Date: October 16, 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:	October 4, 2023	Last Cal Date:	September 5, 2023
Start time (MST):	8:48	End time (MST):	13:21
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:	160.3	159.4

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000191	0.996975
NO_X Cal Offset:	-0.708567	-0.888234
NO Cal Slope:	1.000876	0.996206
NO Cal Offset:	-2.586342	-2.526016
NO_2 Cal Slope:	1.002633	1.005379
NO_2 Cal Offset:	0.926052	1.537643

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	811.6	793.6	18.0	1.0031	1.0083
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	811.4	796.0	15.4	1.0034	1.0053
second point	4979	40.1	406.8	399.9	7.0	404.0	394.3	9.7	1.0070	1.0141
third point	4999	20.1	203.9	200.4	3.5	201.3	194.8	6.4	1.0130	1.0289
as left zero	5000	0.0	0.0	0.0	0.0	0.3	-0.1	0.3	----	----
as left span	4936	80.2	814.1	418.0	396.1	812.8	413.3	399.4	1.0016	1.0114
								Average Correction Factor	1.0078	1.0161

Corrected As found	NO_X = 811.5 ppb	NO = 793.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.3%
Previous Response	NO_X = 813.6 ppb	NO = 798.3 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)	793.9	411.7	396.1	399.1	0.9925	100.8%
2nd GPT point (200 ppb O3)	793.9	612.9	194.9	198.3	0.9829	101.7%
3rd GPT point (100 ppb O3)	793.9	707.2	100.6	103.8	0.9693	103.2%
				Average Correction Factor	0.9816	101.9%

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

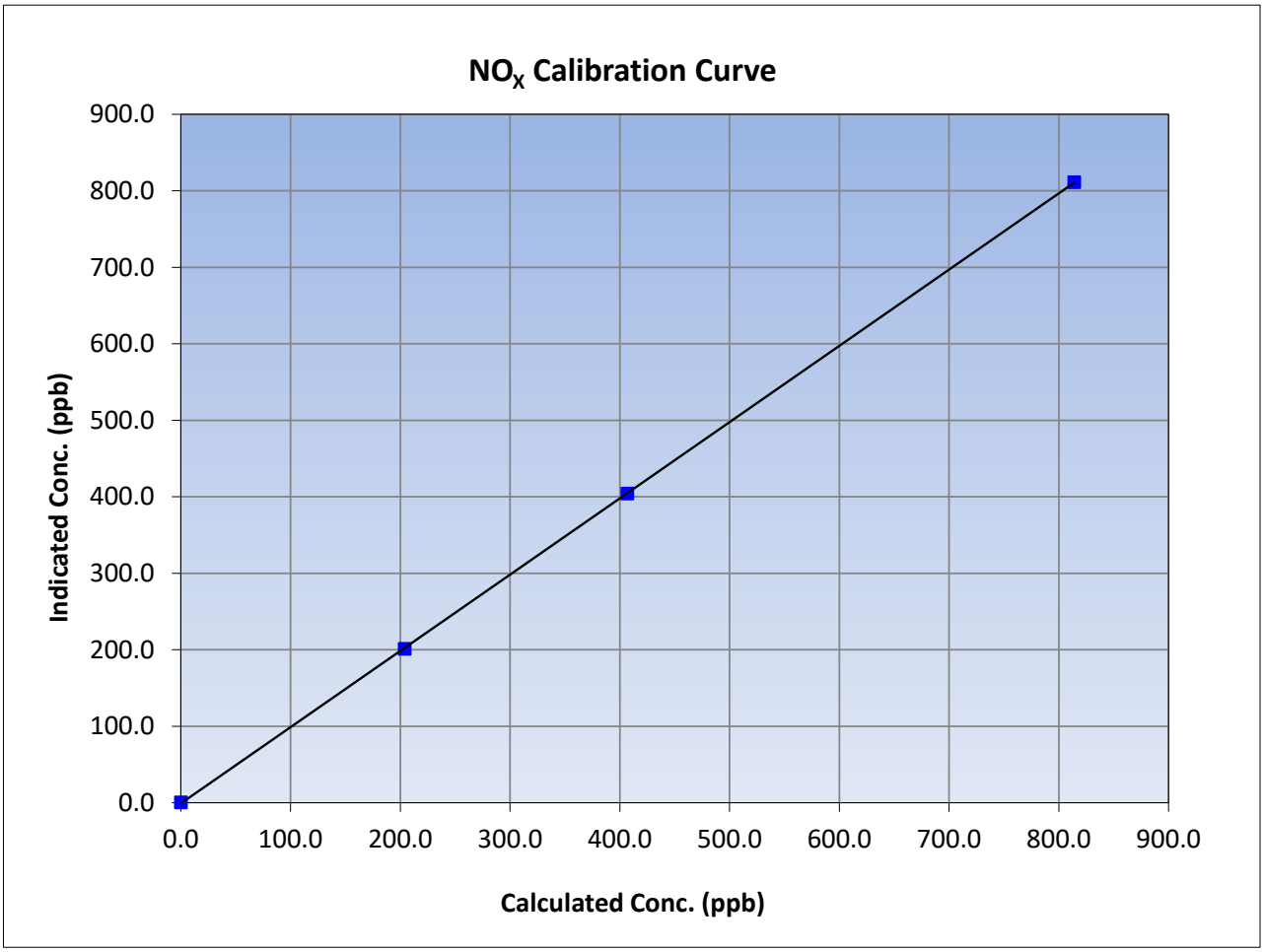
Version-04-2020

Station Information

Calibration Date:	October 4, 2023	Previous Calibration:	September 5, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	8:48	End Time (MST):	13:21
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
814.1	811.4	1.0034			
406.8	404.0	1.0070	Slope	0.996975	0.90 - 1.10
203.9	201.3	1.0130			
			Intercept	-0.888234	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

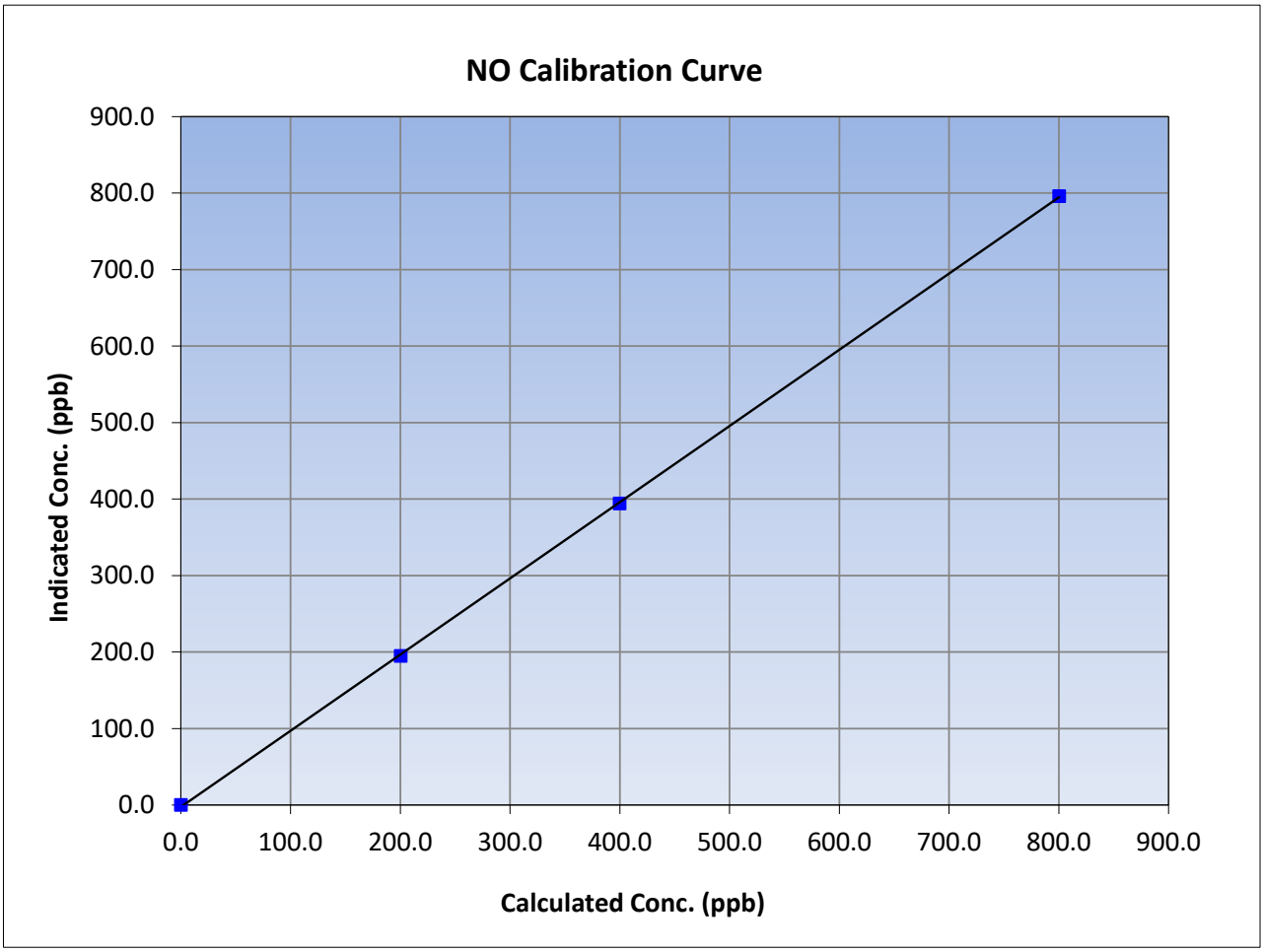
Version-04-2020

Station Information

Calibration Date:	October 4, 2023	Previous Calibration:	September 5, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	8:48	End Time (MST):	13:21
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	0.999954	≥0.995
800.2	796.0	1.0053			
399.9	394.3	1.0141	Slope	0.996206	0.90 - 1.10
200.4	194.8	1.0289			
			Intercept	-2.526016	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

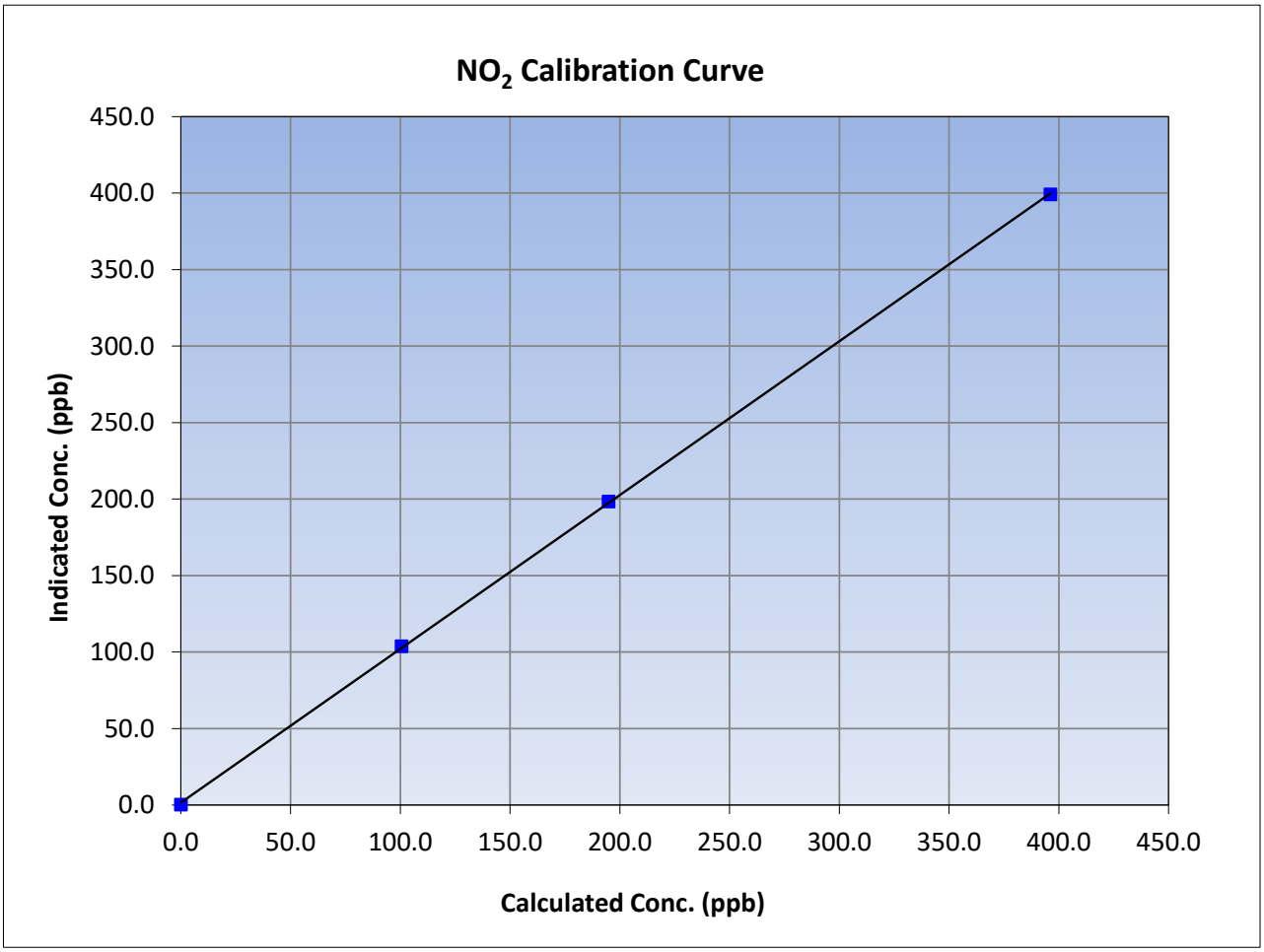
Version-04-2020

Station Information

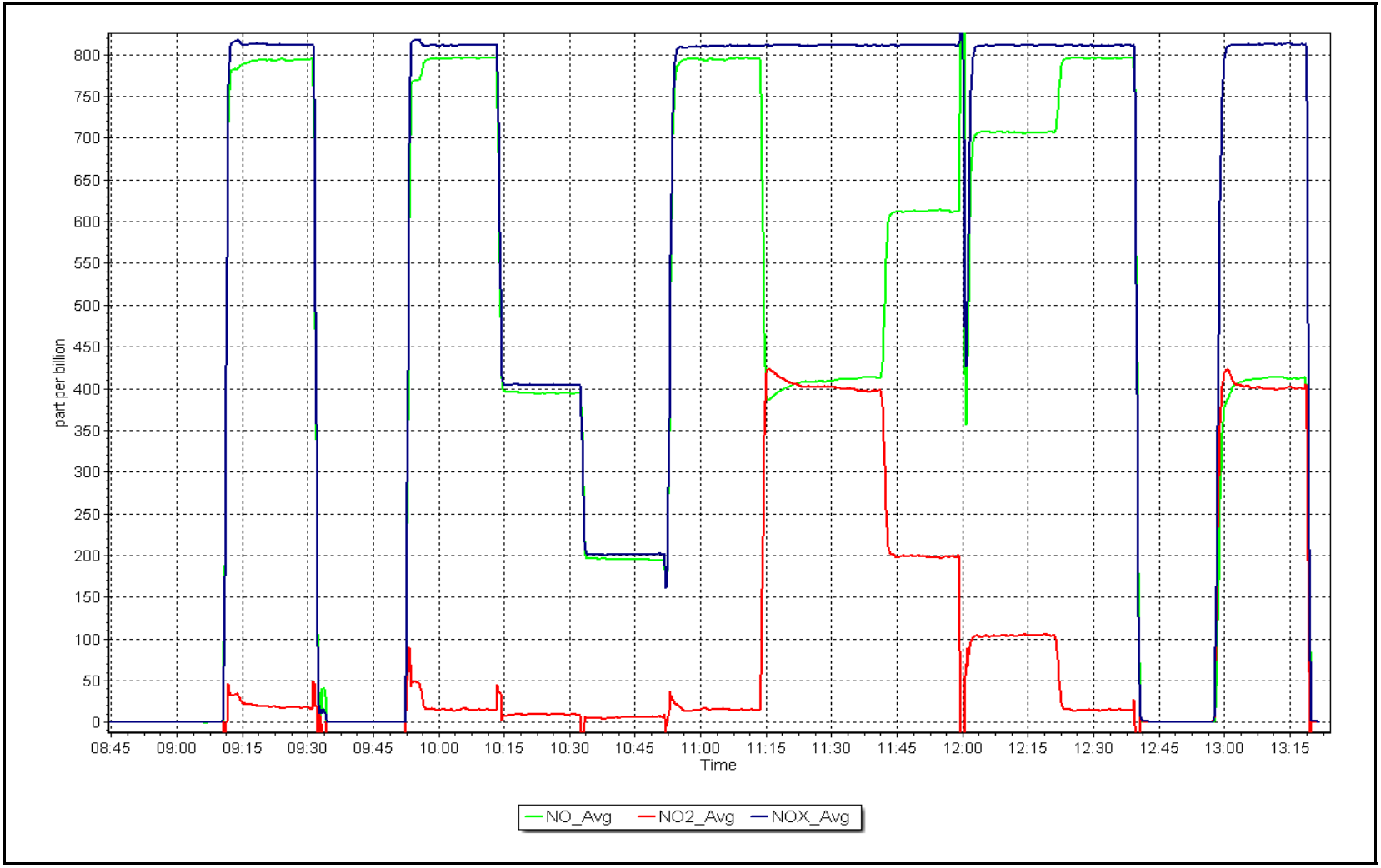
Calibration Date:	October 4, 2023	Previous Calibration:	September 5, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	8:48	End Time (MST):	13:21
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.3	----	Correlation Coefficient	0.999955	≥0.995
396.1	399.1	0.9925			
194.9	198.3	0.9829	Slope	1.005379	0.90 - 1.10
100.6	103.8	0.9693			
			Intercept	1.537643	+/-20



NO_X Calibration Plot Date: October 4, 2023 Location: Anzac



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	October 6, 2023	Last Cal Date:	September 1, 2023
Start time (MST):	8:47	End time (MST):	12:18
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	API T700	Serial Number:	3060
ZAG Make/Model:	API 701H	Serial Number:	357

Analyzer Information

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

	Start	Finish		Start	Finish
Calibration slope:	1.004857	1.009371	Backgd or Offset:	1.4	1.4
Calibration intercept:	-2.500000	-2.440000	Coeff or Slope:	1.604	1.631

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.5	----
as found span	5000	920.5	400.0	394.0	1.015
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.6	----
high point	5000	920.5	400.0	402.9	0.993
second point	5000	793.4	200.0	197.7	1.012
third point	5000	686.0	100.0	95.6	1.046
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	920.5	400.0	406.2	0.985
				Average Correction Factor	1.017

Baseline Corr As found:	393.5	Previous response	399.4	*% change	-1.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

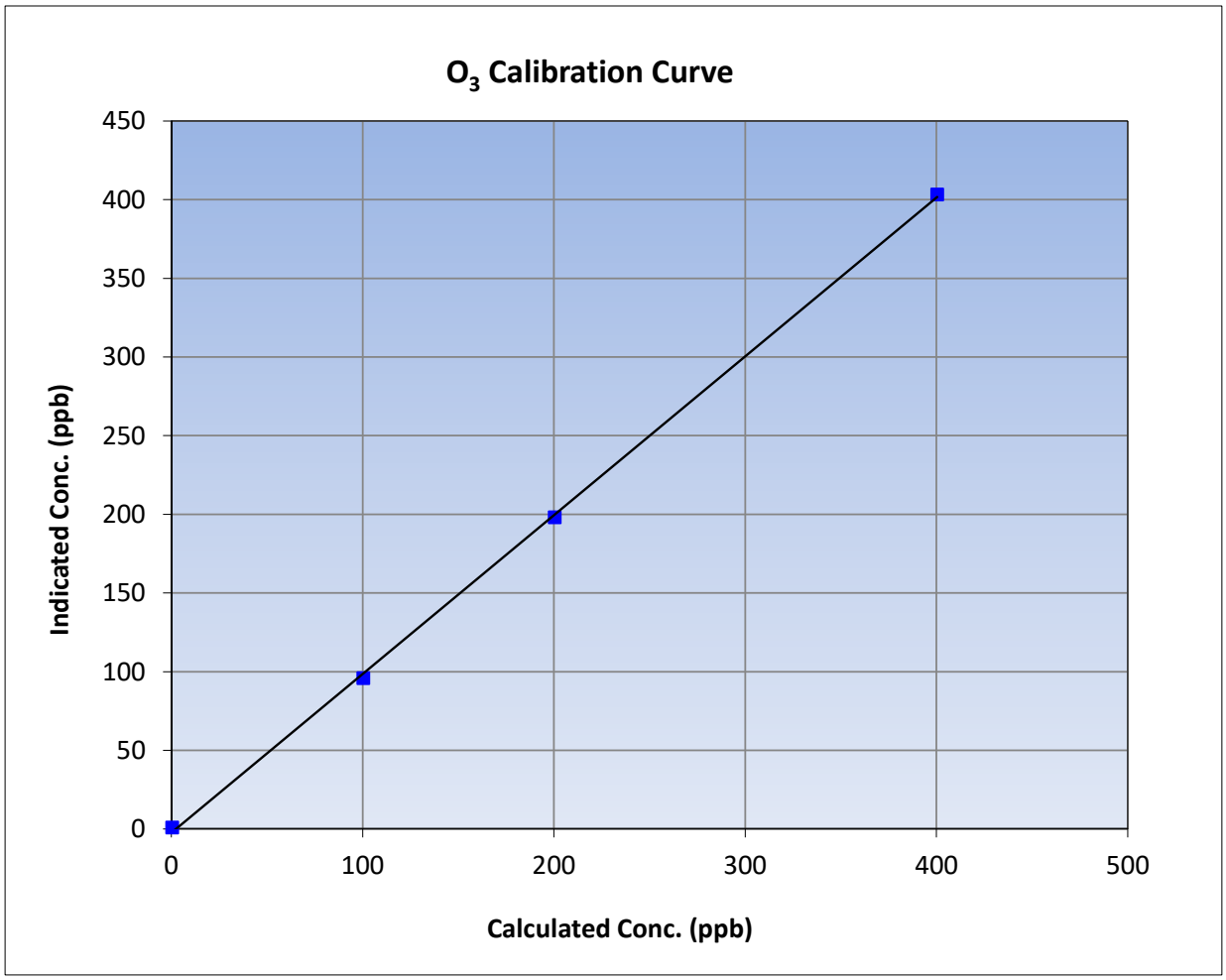
Station Information

Calibration Date:	October 6, 2023	Previous Calibration:	September 1, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	8:47	End Time (MST):	12:18
Analyzer make:	Thermo 49i	Analyzer serial #:	1426262595

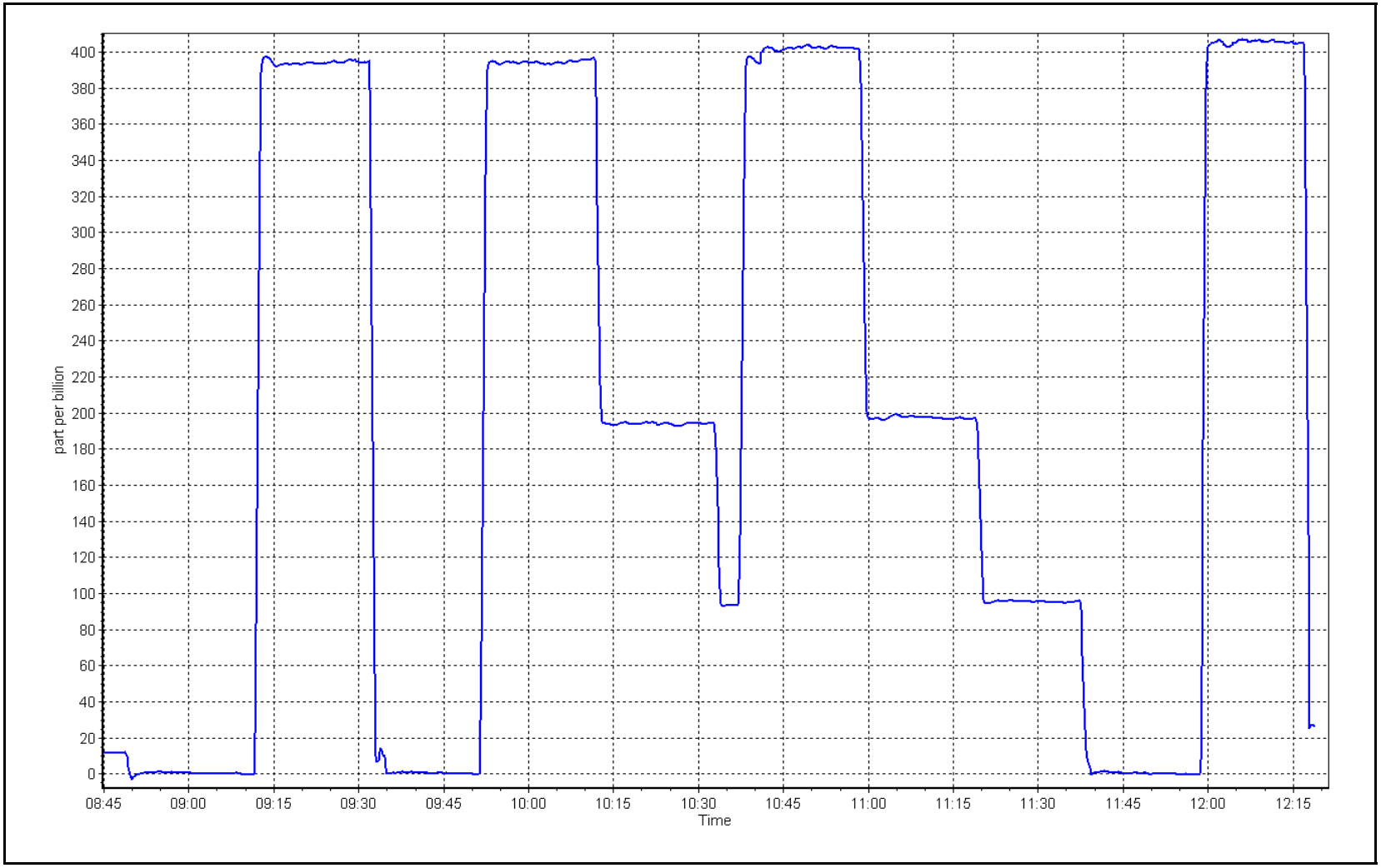
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.6	----
400.0	402.9	0.9928
200.0	197.7	1.0116
100.0	95.6	1.0460

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999740	*≥0.995*
Slope	1.009371	*0.90 - 1.10*
Intercept	-2.440000	*+/- 5*



O_3 Calibration Plot Date: October 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:	October 13, 2023	Last Cal Date:	October 6, 2023
Start time (MST):	11:45	End time (MST):	13:12
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 #:	1426262595
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.009371		Backgd or Offset:	1.4	NA
Calibration intercept:	-2.440000		Coeff or Slope:	1.631	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	0.1	----
as found span	5000	920.5	400.0	403.1	0.992
as found 2nd point	5000	793.4	200.0	199.4	1.003
as found 3rd point	5000	686.0	100.0	95.8	1.044
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	

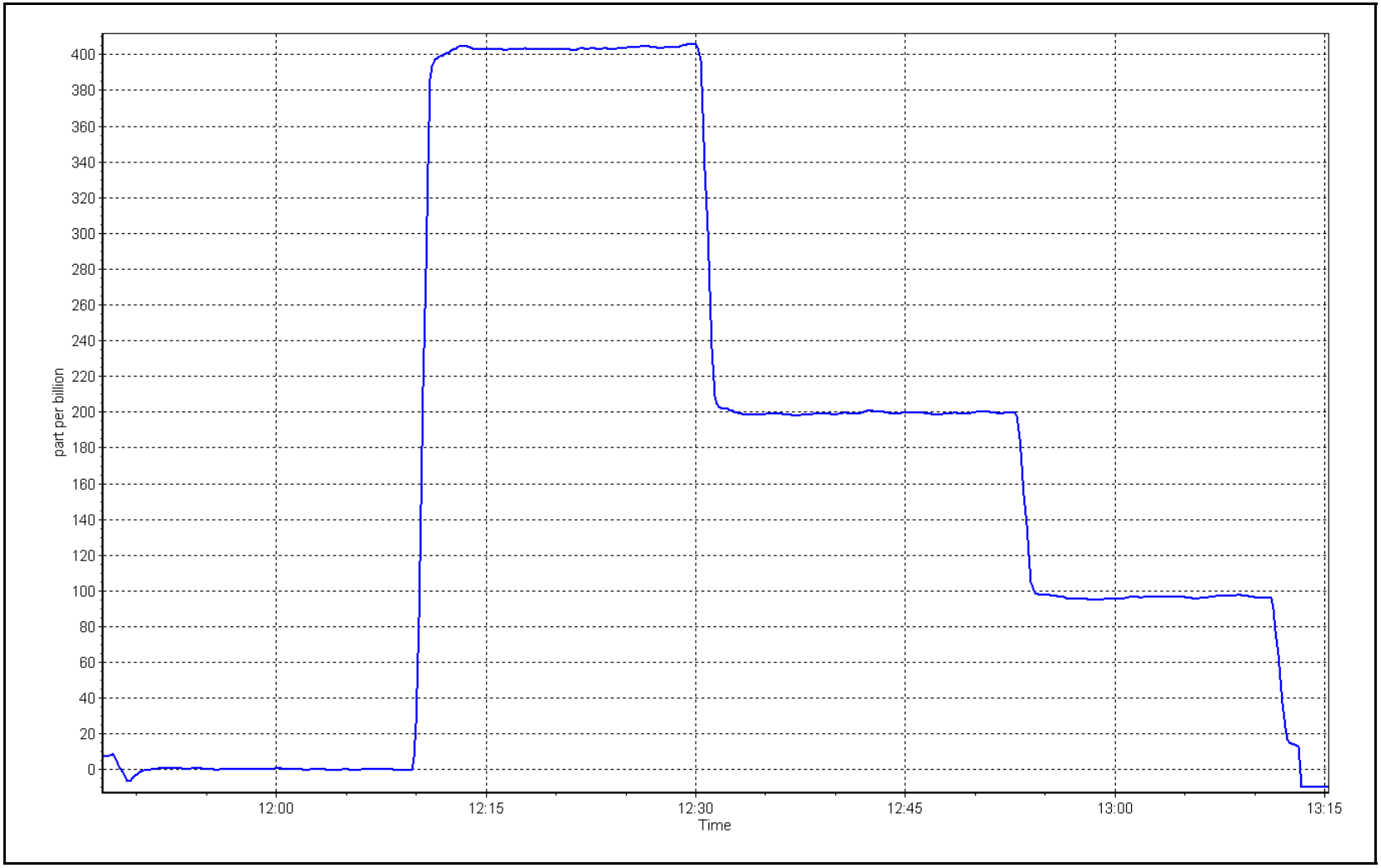
Baseline Corr As found:	403.0	Previous response	401.3	*% change	0.4%
Baseline Corr 2nd AF pt:	199.3	AF Slope:	1.011200	AF Intercept:	-2.360000
Baseline Corr 3rd AF pt:	95.7	AF Correlation:	0.999821		

* = > +/-5% change initiates investigation

Notes: Calibrator's ozone gen lamp was swapped and then performed removal cal.

Calibration Performed By: Mohammed Kashif

O_3 Calibration Plot Date: October 13, 2023 Location: Anzac



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	October 13, 2023	Last Cal Date:	October 13, 2023
Start time (MST):	16:02	End time (MST):	18:37
Reason:	Install		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	API T700	Serial Number:	282
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:	NA	0.997514	Backgd or Offset:	NA	-1.5
Calibration intercept:	NA	0.360000	Coeff or Slope:	NA	1.000

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	0.5	----
high point	5000	1154.5	400.0	399.4	1.002
second point	5000	876.8	200.0	199.9	1.001
third point	5000	727.1	100.0	99.9	1.001
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	906.1	400.0	387.4	1.033
				Average Correction Factor	1.001

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

* = > +/-5% change initiates investigation

Notes: Installation. Calibration was carried out using a portable calibrator; adjusted span only. Performed as lefts using station calibrator.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

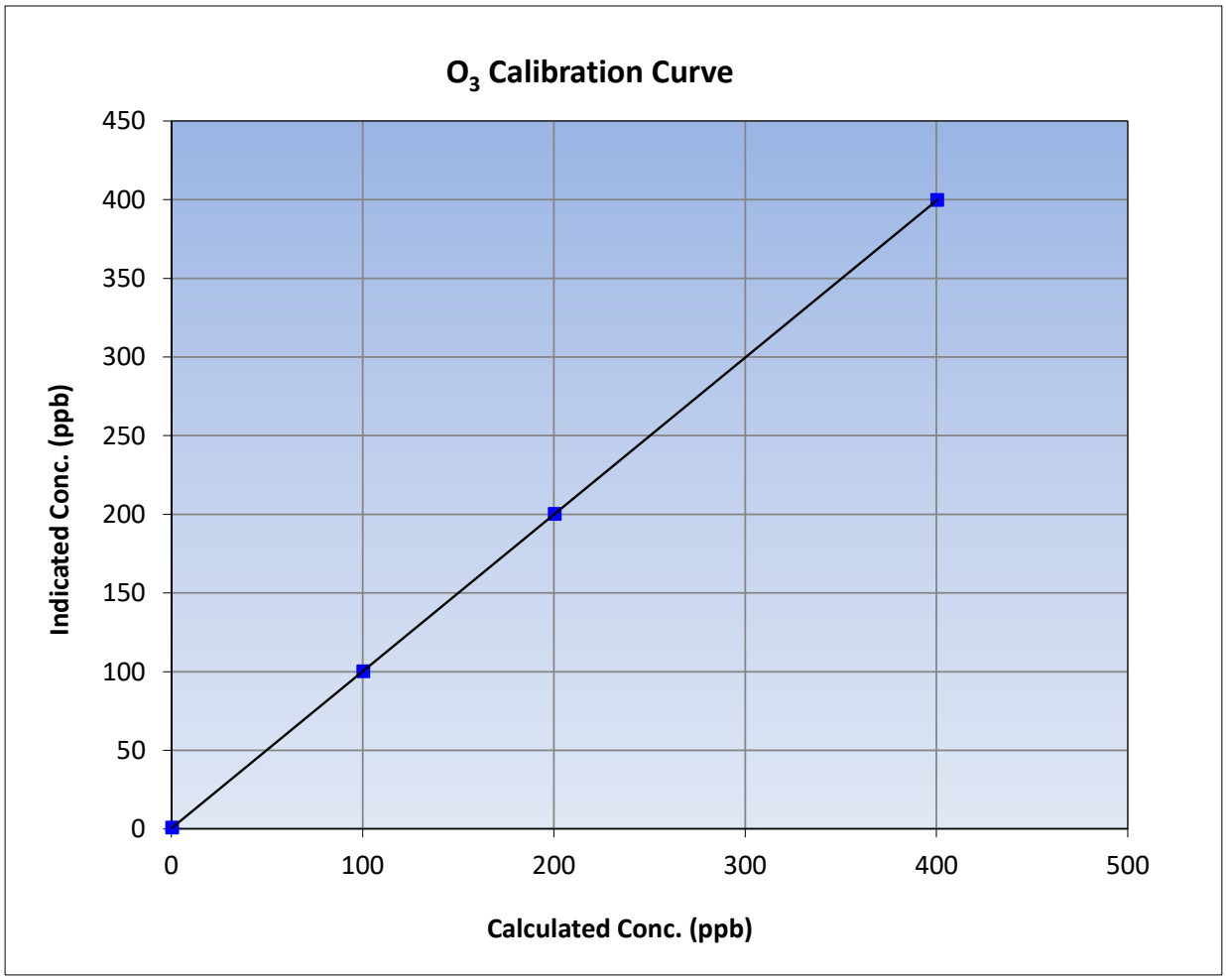
Station Information

Calibration Date:	October 13, 2023	Previous Calibration:	October 13, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	16:02	End Time (MST):	18:37
Analyzer make:	Thermo 49i	Analyzer serial #:	1152220026

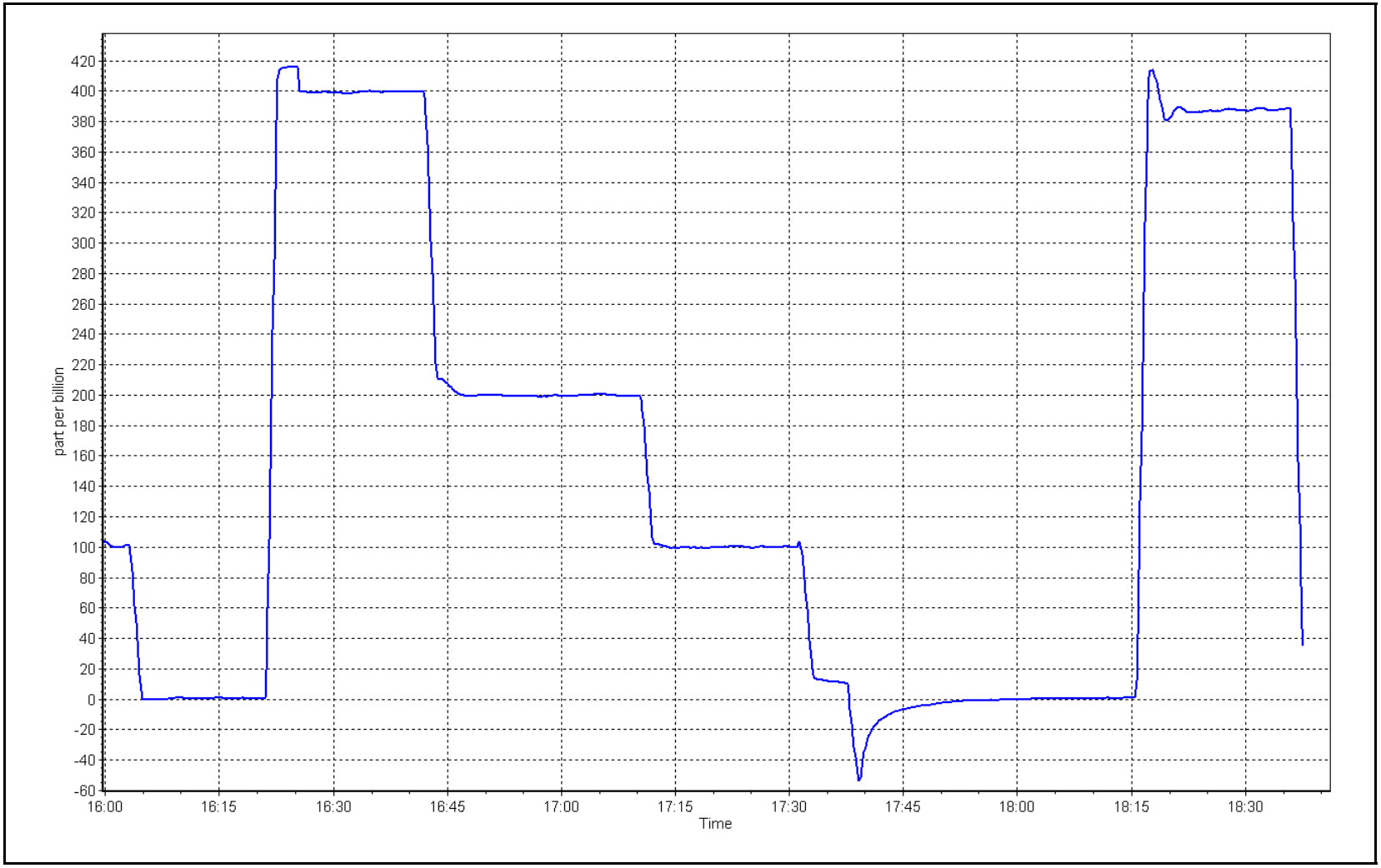
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
400.0	399.4	1.0015
200.0	199.9	1.0005
100.0	99.9	1.0010

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	0.997514	*0.90 - 1.10*
Intercept	0.360000	*+/- 5*



O_3 Calibration Plot Date: October 13, 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:	October 6, 2023	Last Cal Date:	September 8, 2023
Start time (MST):	9:49	End time (MST):	10:34
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)	5.2	6.3	5.2	☐	+/- 2 °C
P (mmHg)	718.5	719.6	718.5	☐	+/- 10 mmHg
flow (LPM)	4.98	5.03	4.98	☐	+/- 0.25 LPM

Leak Test: Date of check: October 6, 2023 Last Cal Date: September 8, 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	10.7	10	10.8	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 4 w/ HEPA: 0 <0.2 ug/m3

Date Optical Chamber Cleaned: October 6, 2023

Disposable Filter Changed: October 6, 2023

Annual Maintenance

Date Sample Tube Cleaned: July 6, 2023

Date RH/T Sensor Cleaned: July 6, 2023

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

Calibration by: Mohammed Kashif

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS17
WAPASU
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	October 11, 2023	Last Cal Date:	September 5, 2023
Start time (MST):	10:25	End time (MST):	13:15
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:	1.001653	1.002238	Backgd or Offset:	12.6	12.6
Calibration intercept:	-1.759511	-1.839260	Coeff or Slope:	1.111	1.111

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4921	79.4	800.0	798.3	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4921	79.4	800.0	801.5	0.998
second point	4960	39.7	400.0	396.5	1.009
third point	4980	19.8	199.5	197.0	1.013
as left zero	5000	0.0	0.0	0.6	----
as left span	4920	79.4	800.1	799.8	1.000
				Average Correction Factor	1.007

Baseline Corr As found:	798.20	Previous response	799.53	*% change	-0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

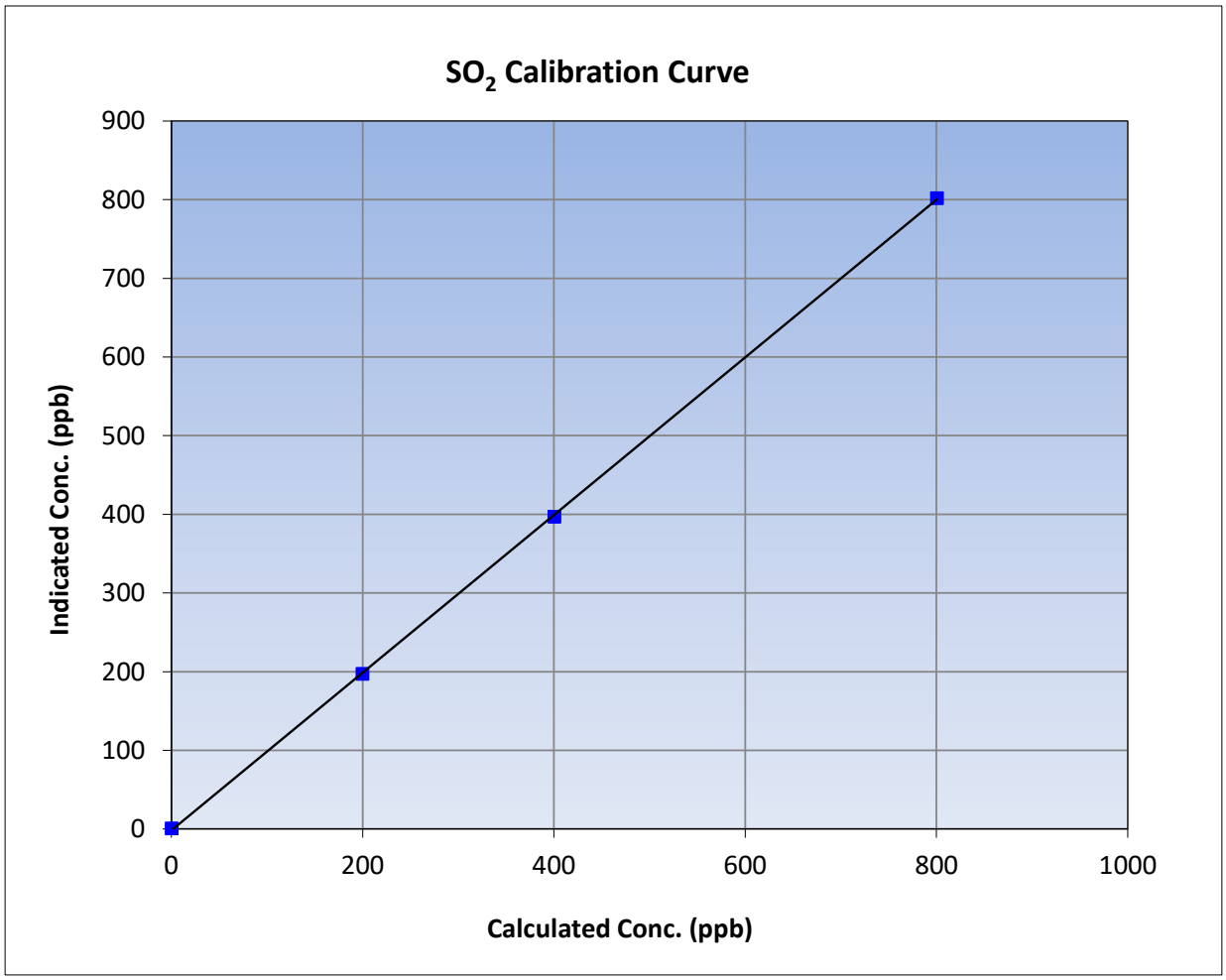
Station Information

Calibration Date:	October 11, 2023	Previous Calibration:	September 5, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:25	End Time (MST):	13:15
Analyzer make:	Thermo 43i	Analyzer serial #:	1218153459

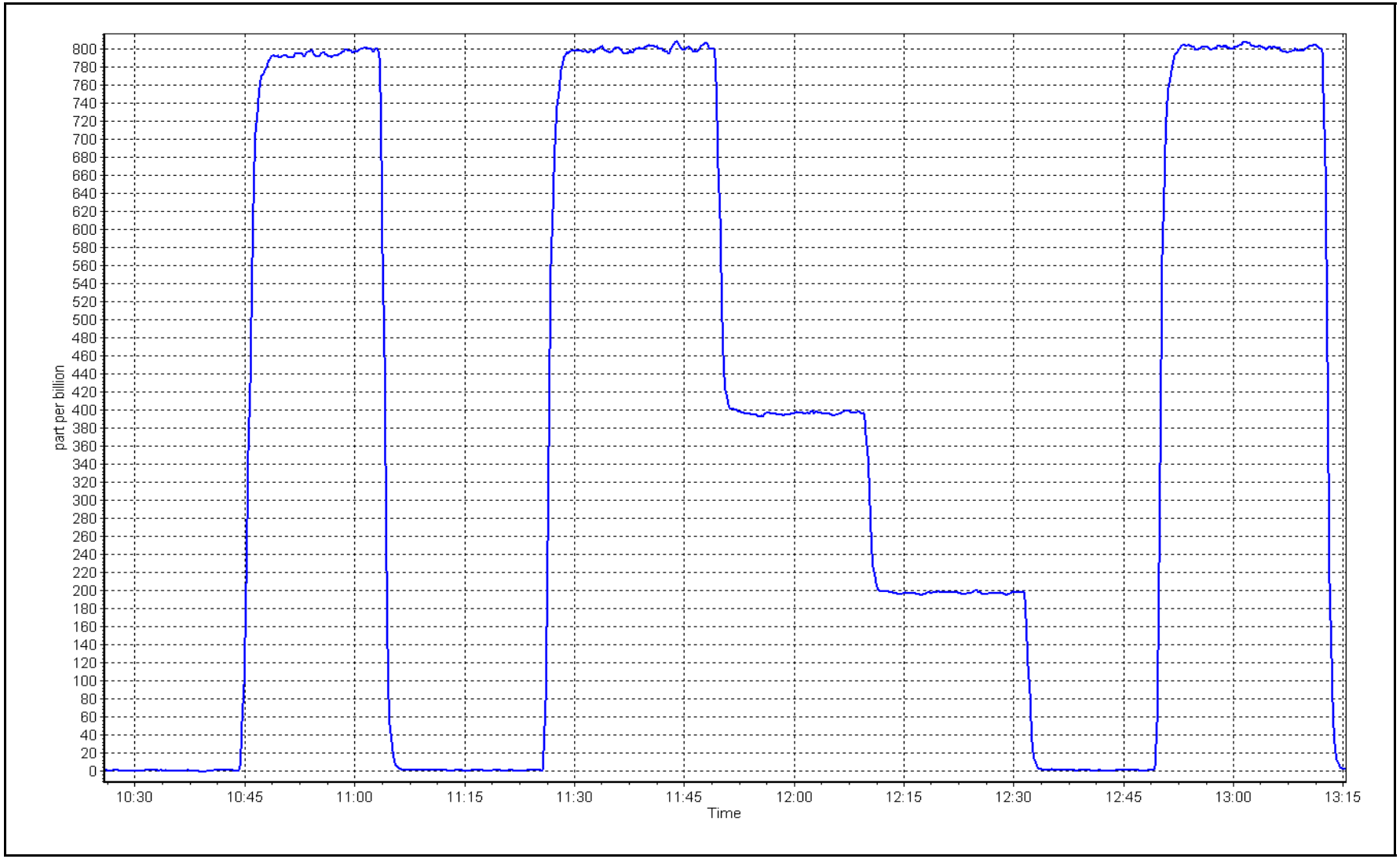
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
800.0	801.5	0.9981
400.0	396.5	1.0089
199.5	197.0	1.0128

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999957	*≥0.995*
Slope	1.002238	*0.90 - 1.10*
Intercept	-1.839260	*+/-30*



SO2 Calibration Plot Date: October 11, 2023 Location: Wapasu



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	October 16, 2023	Last Cal Date:	September 7, 2023
Start time (MST):	10:42	End time (MST):	15:25
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 450i		Analyzer serial #:	1218153583	
Converter make:	n/a		Converter serial #:	n/a	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.990569	1.001854	Backgd or Offset:	12.2	12.2
Calibration intercept:	-0.219241	0.060776	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	81.9	0.976
as found 2nd point	4961	39.4	40.0	40.9	0.976
as found 3rd point	4980	19.7	20.0	20.1	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	0.4	----
high point	4921	78.8	80.0	80.5	0.994
second point	4961	39.4	40.0	39.6	1.010
third point	4980	19.7	20.0	20.0	1.000
as left zero	5000	0.0	0.0	0.5	----
as left span	4921	78.8	80.0	78.6	1.018
SO2 Scrubber Check	4921	79.4	800.0	-0.3	----
Date of last scrubber change:		n/a		Ave Corr Factor	1.001
Date of last converter efficiency test:		n/a			efficiency

Baseline Corr As found:	82.0	Prev response:	79.03	*% change:	3.6%
Baseline Corr 2nd AF pt:	41.0	AF Slope:	1.026282	AF Intercept:	-0.219175
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999983		

* = > +/-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

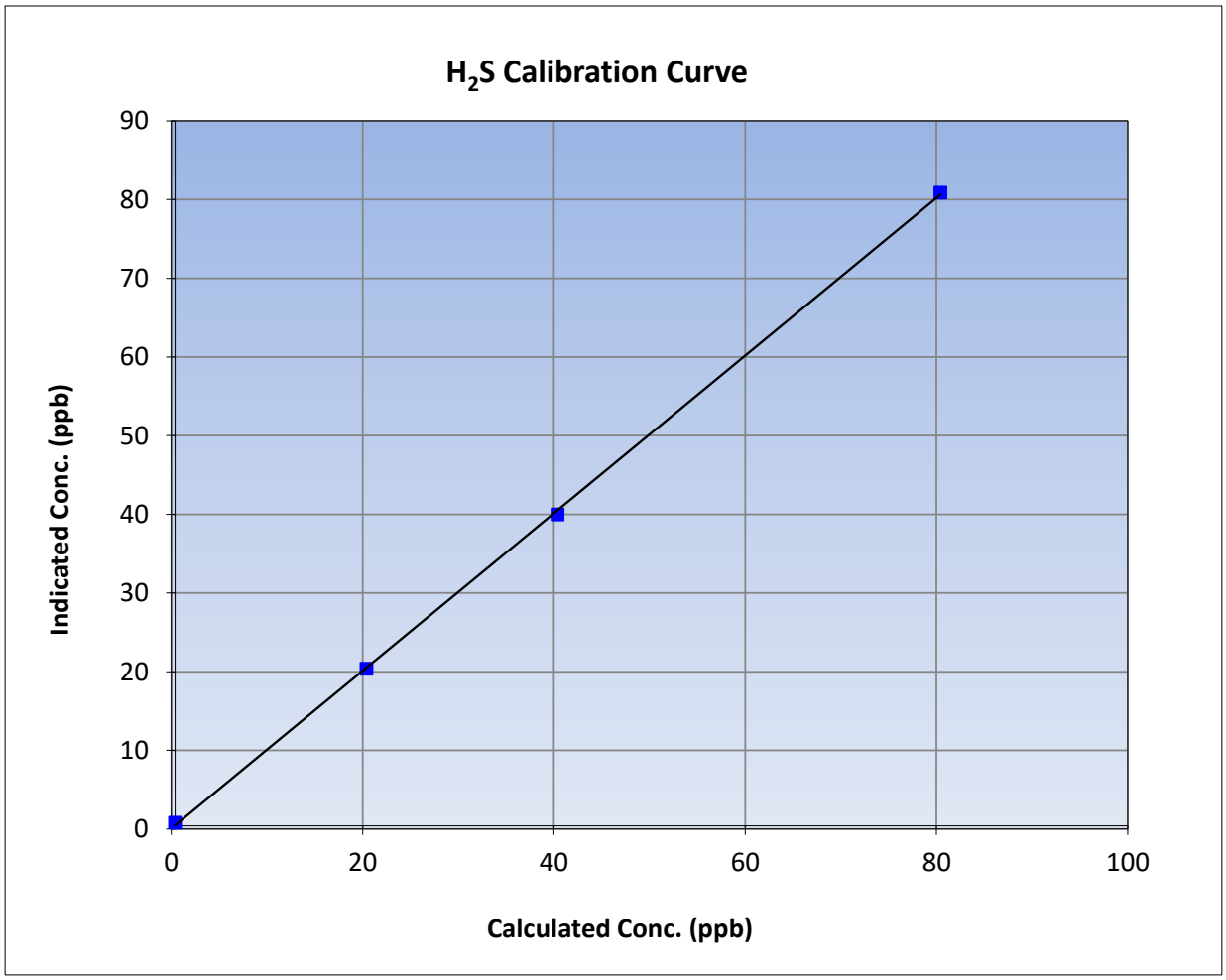
Station Information

Calibration Date:	October 16, 2023	Previous Calibration:	September 7, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:42	End Time (MST):	15:25
Analyzer make:	Thermo 450i	Analyzer serial #:	1218153583

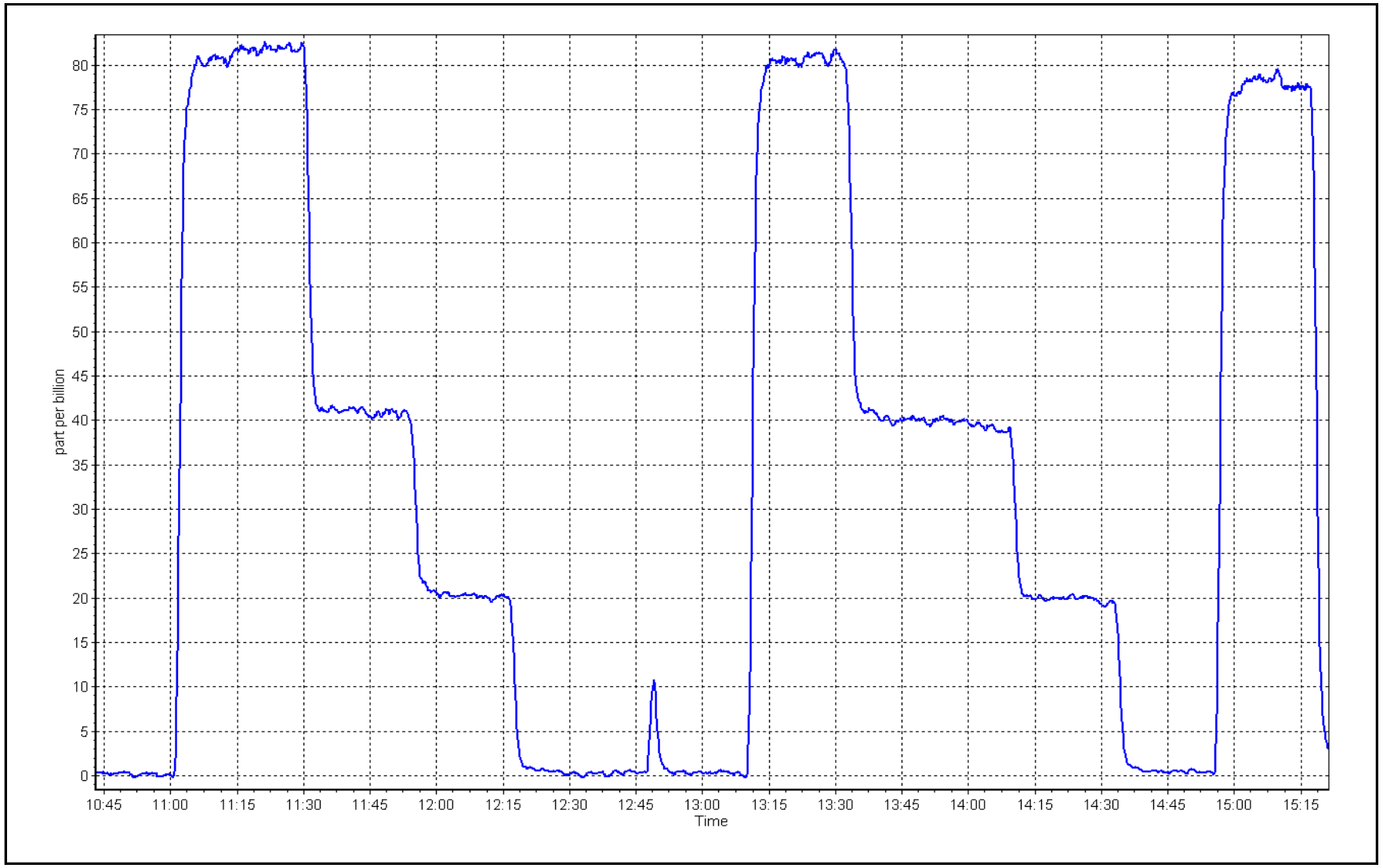
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
80.0	80.5	0.9938
40.0	39.6	1.0100
20.0	20.0	1.0000

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999860	*≥0.995*
Slope	1.001854	*0.90 - 1.10*
Intercept	0.060776	*+/-3*



H_2S Calibration Plot Date: October 16, 2023 Location: Wapasu



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	October 11, 2023	Last Cal Date:	September 5, 2023
Start time (MST):	10:25	End time (MST):	13:15
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:	1.001763	1.005834	Background:	3.300	3.300
Calibration intercept:	-0.062338	-0.105515	Coefficient:	4.460	4.460

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	-0.05	----
as found span	4921	79.4	17.09	17.03	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.07	----
high point	4921	79.4	17.09	17.12	0.998
second point	4960	39.7	8.55	8.42	1.015
third point	4980	19.8	4.26	4.18	1.020
as left zero	5000	0.0	0.00	-0.05	----
as left span	4920	79.4	17.09	17.07	1.001
				Average Correction Factor	1.011

Baseline Corr As found:	17.08	Previous response	17.06	*% 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 needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

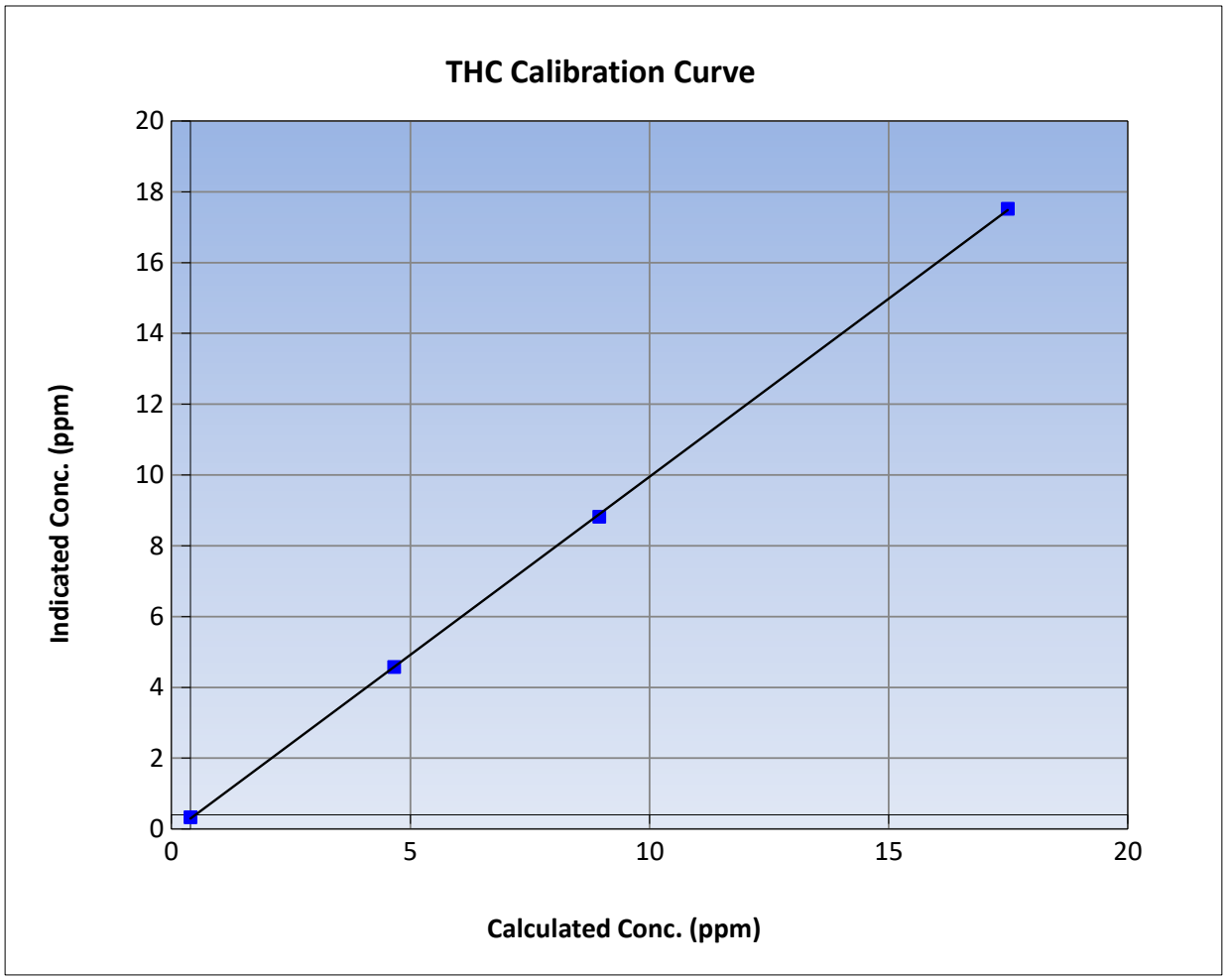
Station Information

Calibration Date:	October 11, 2023	Previous Calibration:	September 5, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:25	End Time (MST):	13:15
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1218153352

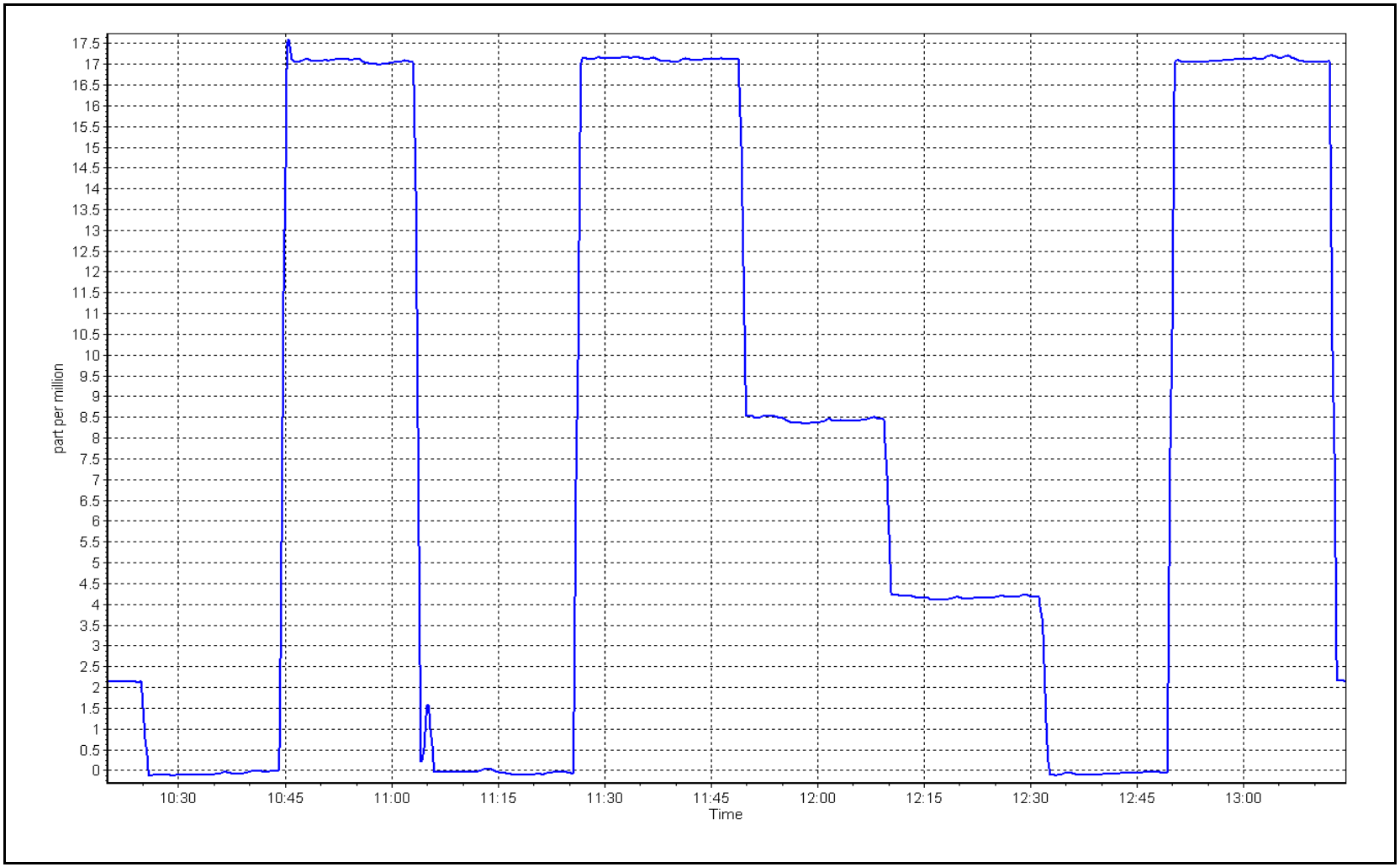
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.07	----
17.09	17.12	0.9983
8.55	8.42	1.0147
4.26	4.18	1.0204

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999955	*≥0.995*
Slope	1.005834	*0.90 - 1.10*
Intercept	-0.105515	*+/-1.5*



THC Calibration Plot Date: October 11, 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:	October 18, 2023	Last Cal Date:	September 22, 2023
Start time (MST):	9:57	End time (MST):	14:43
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:	1.269	1.294	NO bkgnd or offset:	9.0	9.2
NOX coeff or slope:	0.989	0.990	NOX bkgnd or offset:	9.1	9.3
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	363.7	363.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000361	1.002375
NO_X Cal Offset:	-3.500000	-3.420000
NO Cal Slope:	1.002373	1.001687
NO Cal Offset:	-4.480000	-3.940000
NO_2 Cal Slope:	0.998879	1.008551
NO_2 Cal Offset:	-1.541001	-0.167241

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	4917	83.2	817.2	799.9	17.3	792.0	776.0	16.0	1.0318	1.0308
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.3	0.0	----	----
high point	4917	83.2	817.2	799.9	17.3	818.2	800.0	18.1	0.9988	0.9999
second point	4958	41.6	408.6	399.9	8.7	402.3	392.8	9.5	1.0156	1.0182
third point	4979	20.8	204.3	200.0	4.3	199.1	193.3	5.8	1.0261	1.0345
as left zero	5000	0.0	0.0	0.0	0.0	0.4	0.5	-0.1	----	----
as left span	4917	83.2	817.2	395.2	422.0	814.5	392.8	421.6	1.0033	1.0060
								Average Correction Factor	1.0135	1.0175

Corrected As found	NO_X = 791.8 ppb	NO = 775.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -2.8%
Previous Response	NO_X = 814.0 ppb	NO = 797.3 ppb		*Percent Change	NO = -2.8%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	801.4	396.7	422.0	425.7	0.9913	100.9%
2nd GPT point (200 ppb O3)	801.4	603.0	215.7	216.8	0.9950	100.5%
3rd GPT point (100 ppb O3)	801.4	701.9	116.8	117.8	0.9916	100.9%
				Average Correction Factor	0.9926	100.7%

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

NO_X Calibration Summary

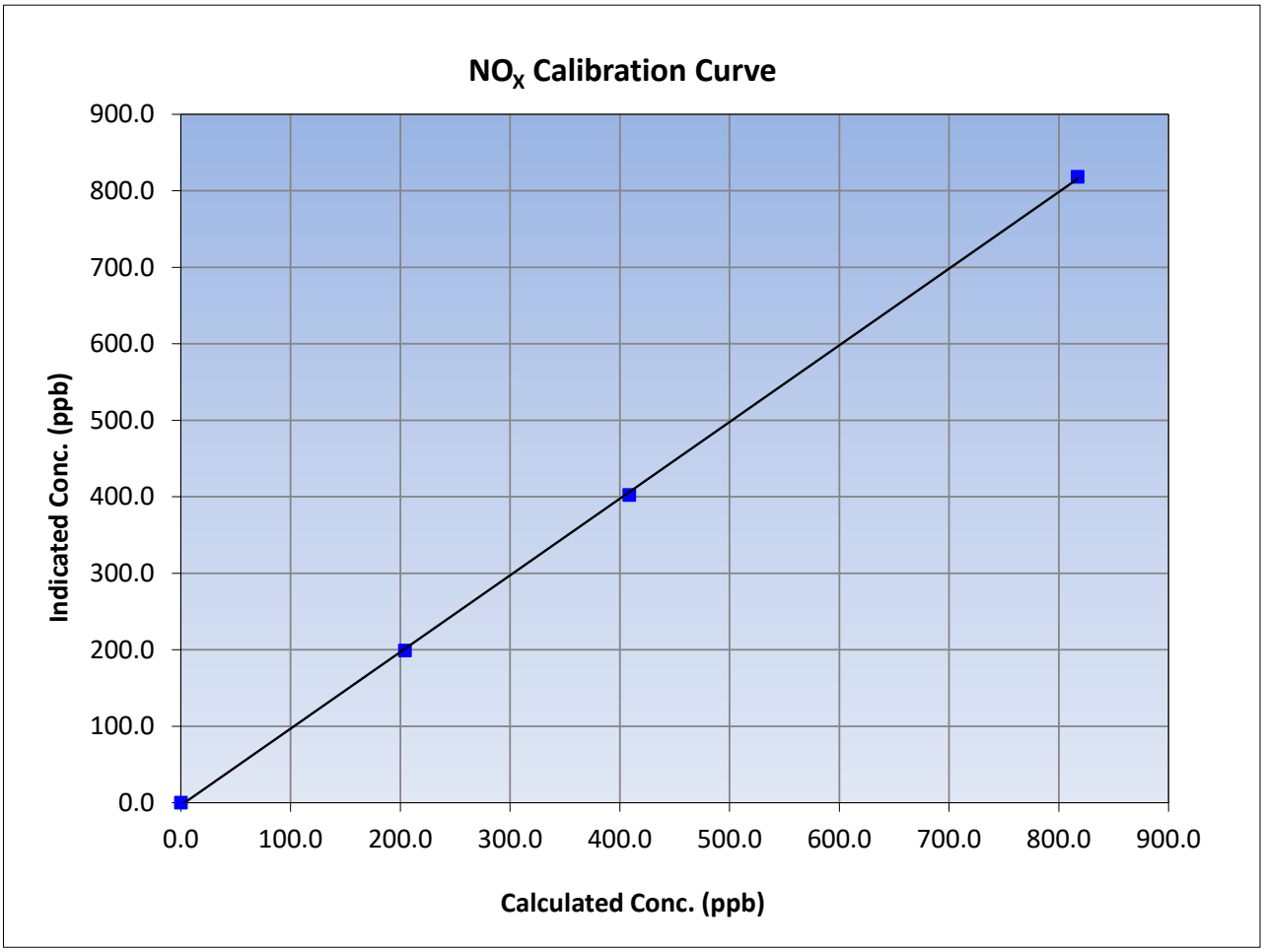
Version-04-2020

Station Information

Calibration Date:	October 18, 2023	Previous Calibration:	September 22, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:57	End Time (MST):	14:43
Analyzer make:	Thermo Scientific 42iQ	Analyzer serial #:	12300522720

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999893	≥0.995
817.2	818.2	0.9988			
408.6	402.3	1.0156	Slope	1.002375	0.90 - 1.10
204.3	199.1	1.0261			
			Intercept	-3.420000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

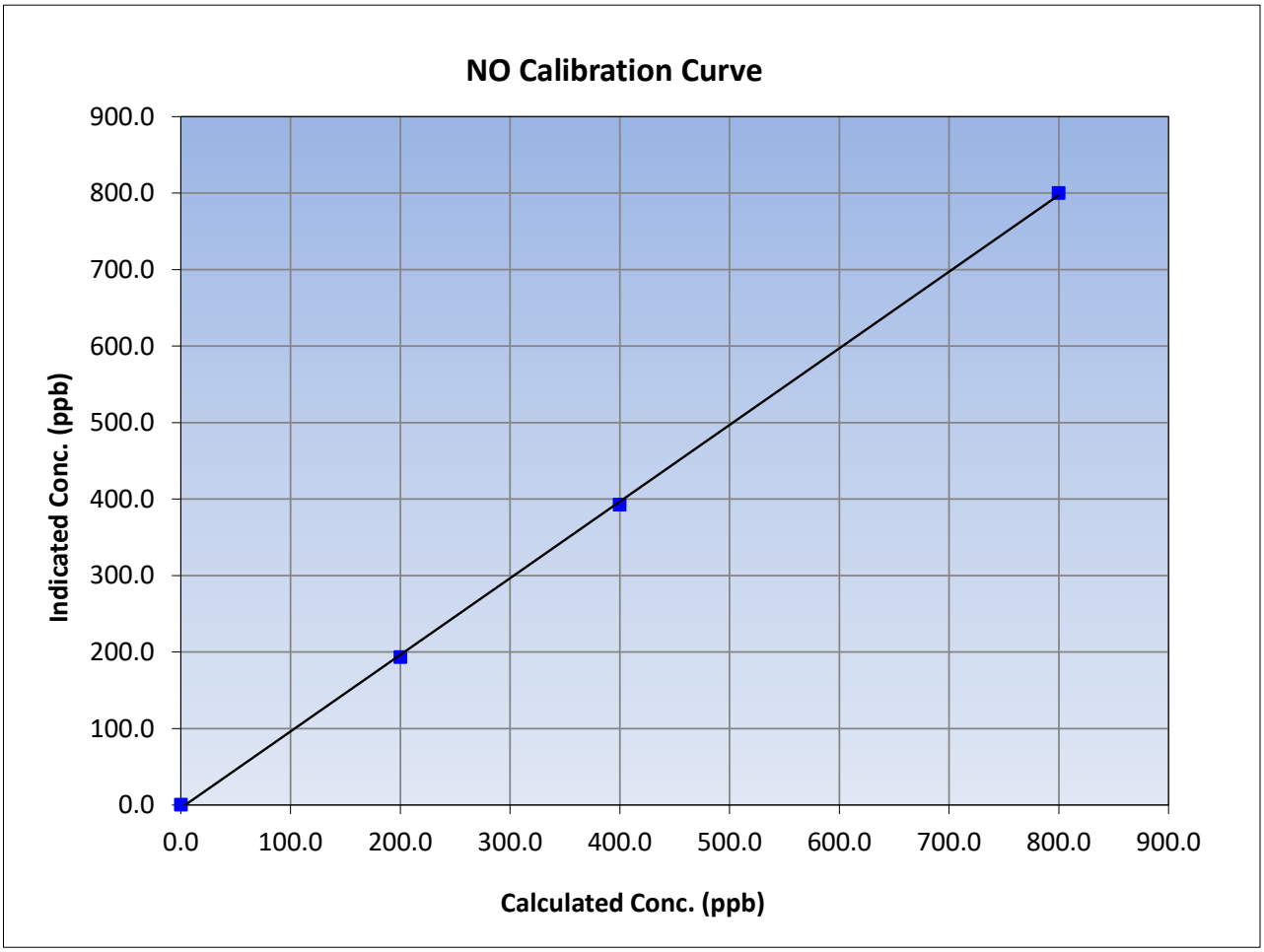
Version-04-2020

Station Information

Calibration Date:	October 18, 2023	Previous Calibration:	September 22, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:57	End Time (MST):	14:43
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	0.999858	≥0.995
799.9	800.0	0.9999			
399.9	392.8	1.0182	Slope	1.001687	0.90 - 1.10
200.0	193.3	1.0345			
			Intercept	-3.940000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

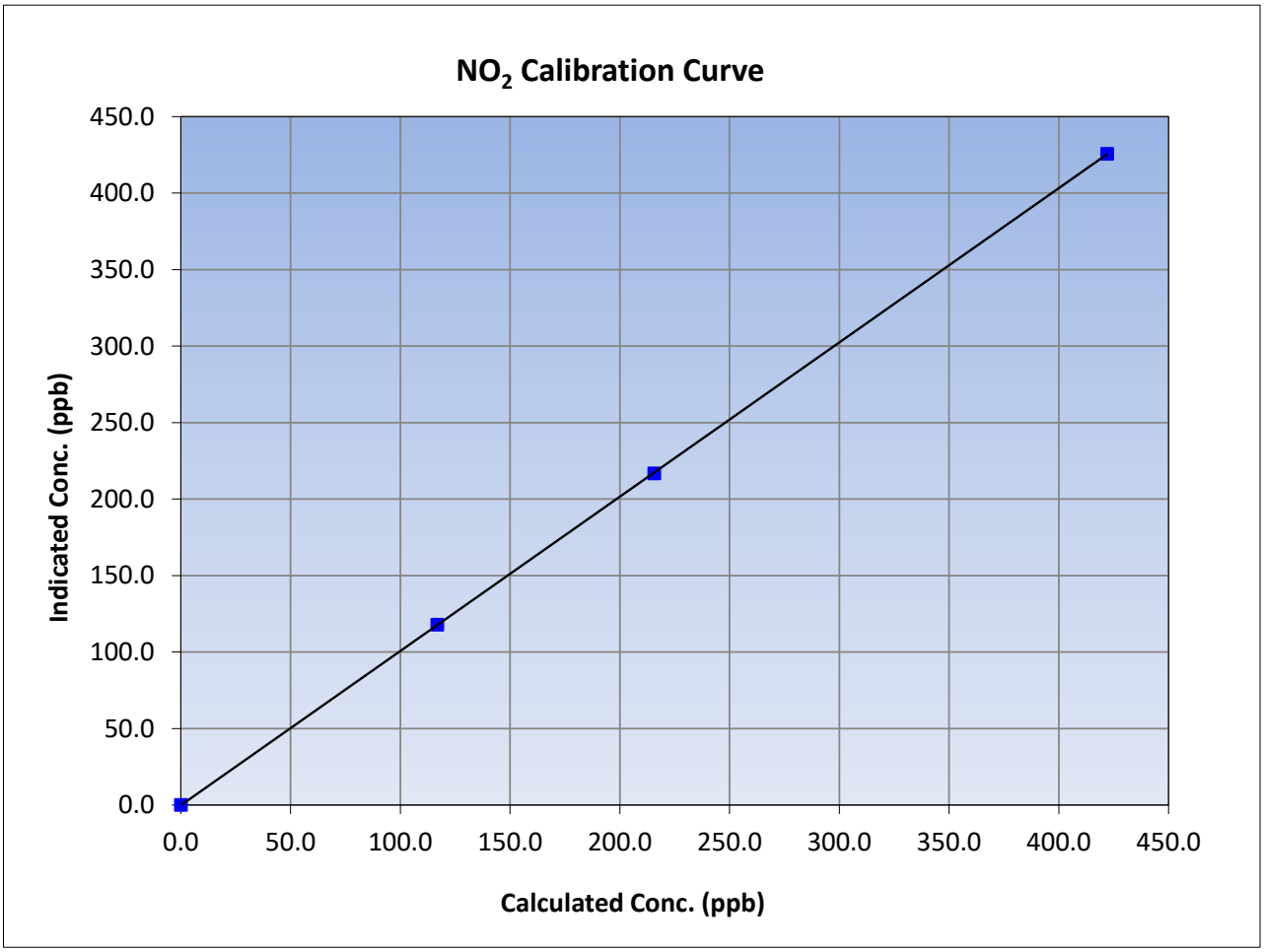
Version-04-2020

Station Information

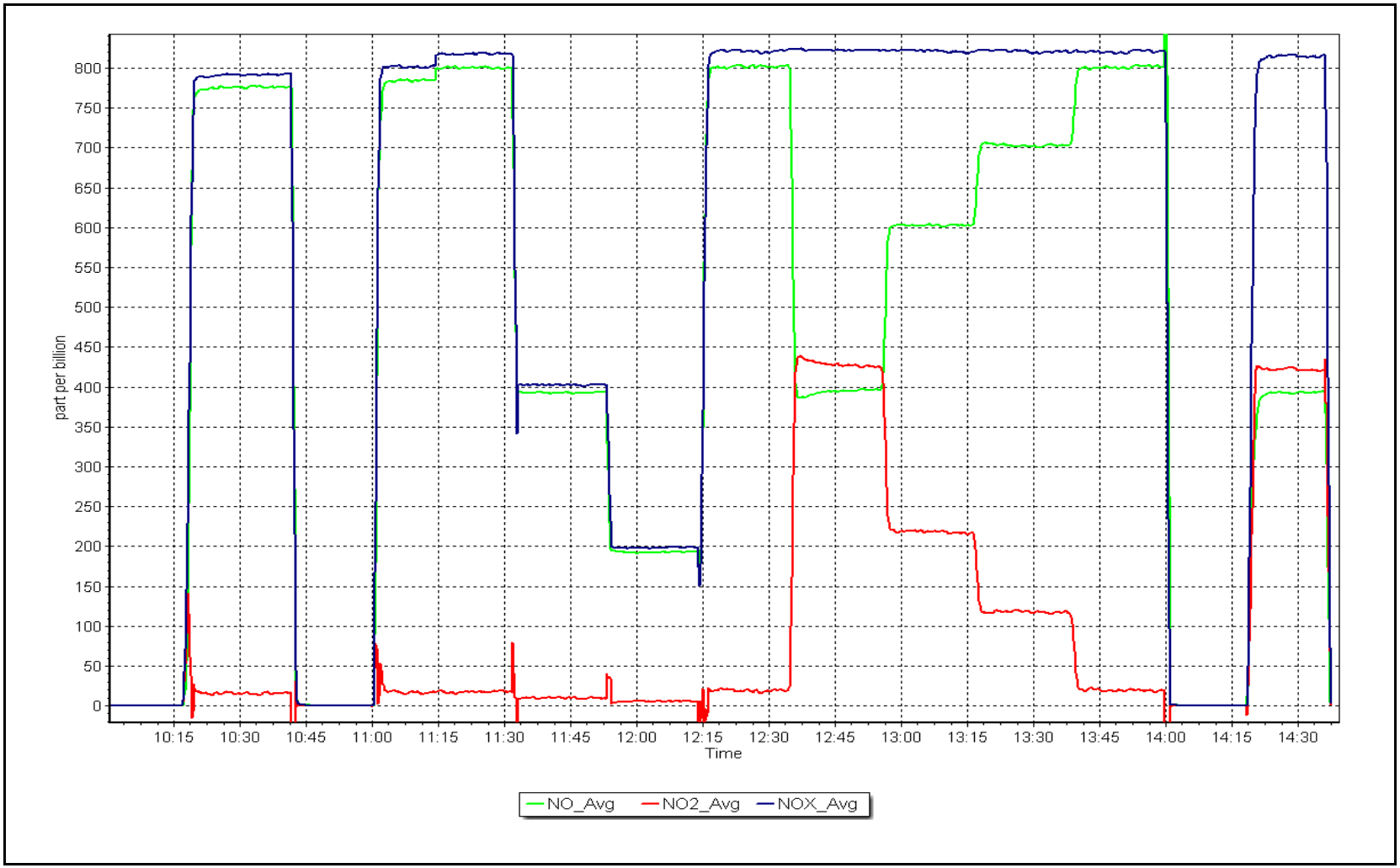
Calibration Date:	October 18, 2023	Previous Calibration:	September 22, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:57	End Time (MST):	14:43
Analyzer make:	Thermo Scientific 42iQ	Analyzer serial #:	12300522720

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999995	≥0.995
422.0	425.7	0.9913			
215.7	216.8	0.9950	Slope	1.008551	0.90 - 1.10
116.8	117.8	0.9916			
			Intercept	-0.167241	+/-20



NO_X Calibration Plot Date: October 18, 2023 Location: Wapasu



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	October 4, 2023	Last Cal Date:	September 14, 2023
Start time (MST):	10:10	End time (MST):	13:06
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:	1.004971	1.002371	Backgd or Offset:	-1.8	-1.8
Calibration intercept:	-1.120000	-0.440000	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	-0.8	----
as found span	5000	1077.3	400.0	400.2	1.000
as found 2nd point	5000	900.3	200.0		
as found 3rd point	5000	789.5	100.0		
calibrator zero	5000	0.0	0.0	0.3	----
high point	5000	1077.3	400.0	400.8	0.998
second point	5000	900.3	200.0	199.9	1.001
third point	5000	789.5	100.0	98.9	1.011
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	1077.3	400.0	405.9	0.985
				Average Correction Factor	1.003

Baseline Corr As found:	401.0	Previous response	400.9	*% 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

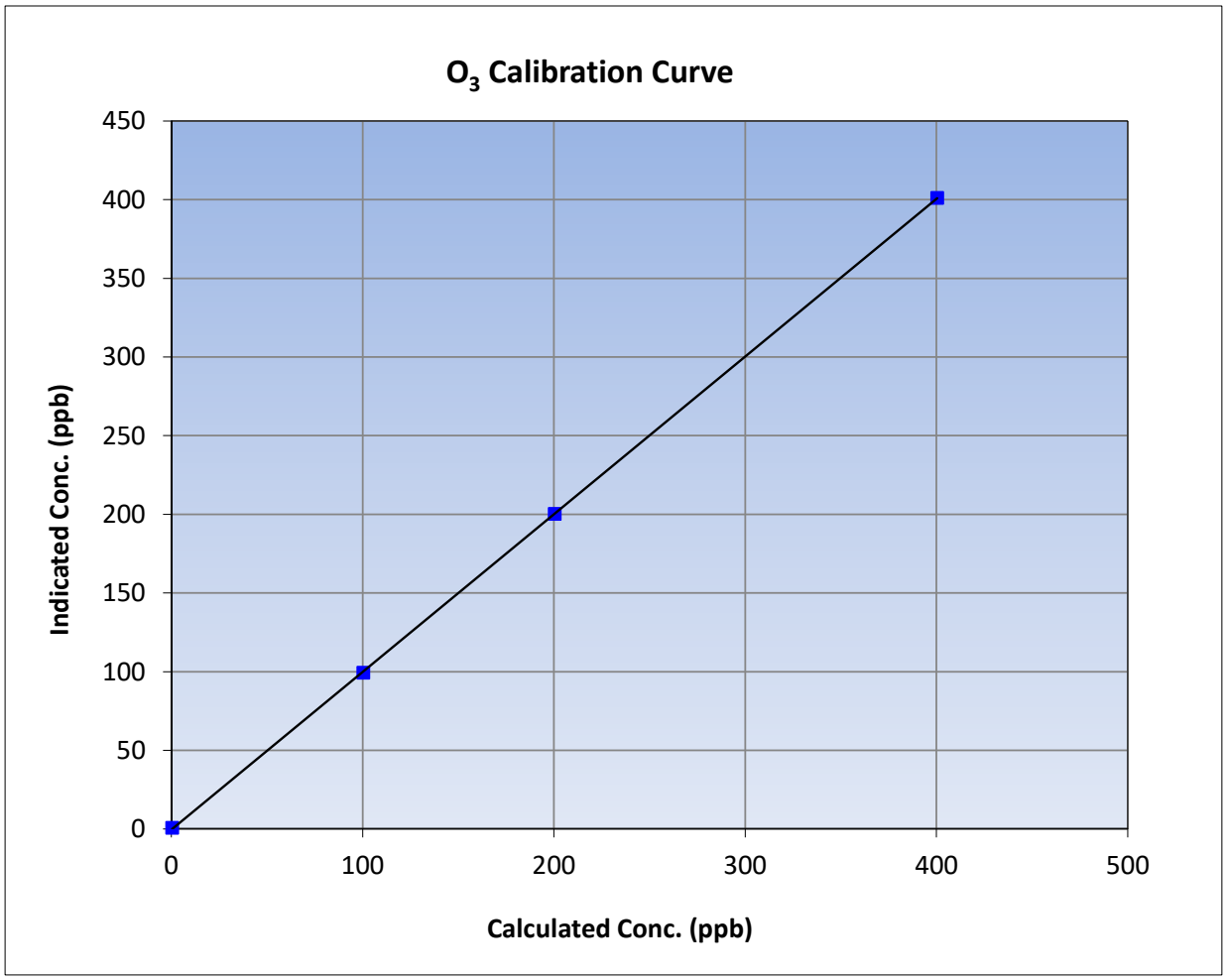
Station Information

Calibration Date:	October 4, 2023	Previous Calibration:	September 14, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:10	End Time (MST):	13:06
Analyzer make:	API T400	Analyzer serial #:	3870

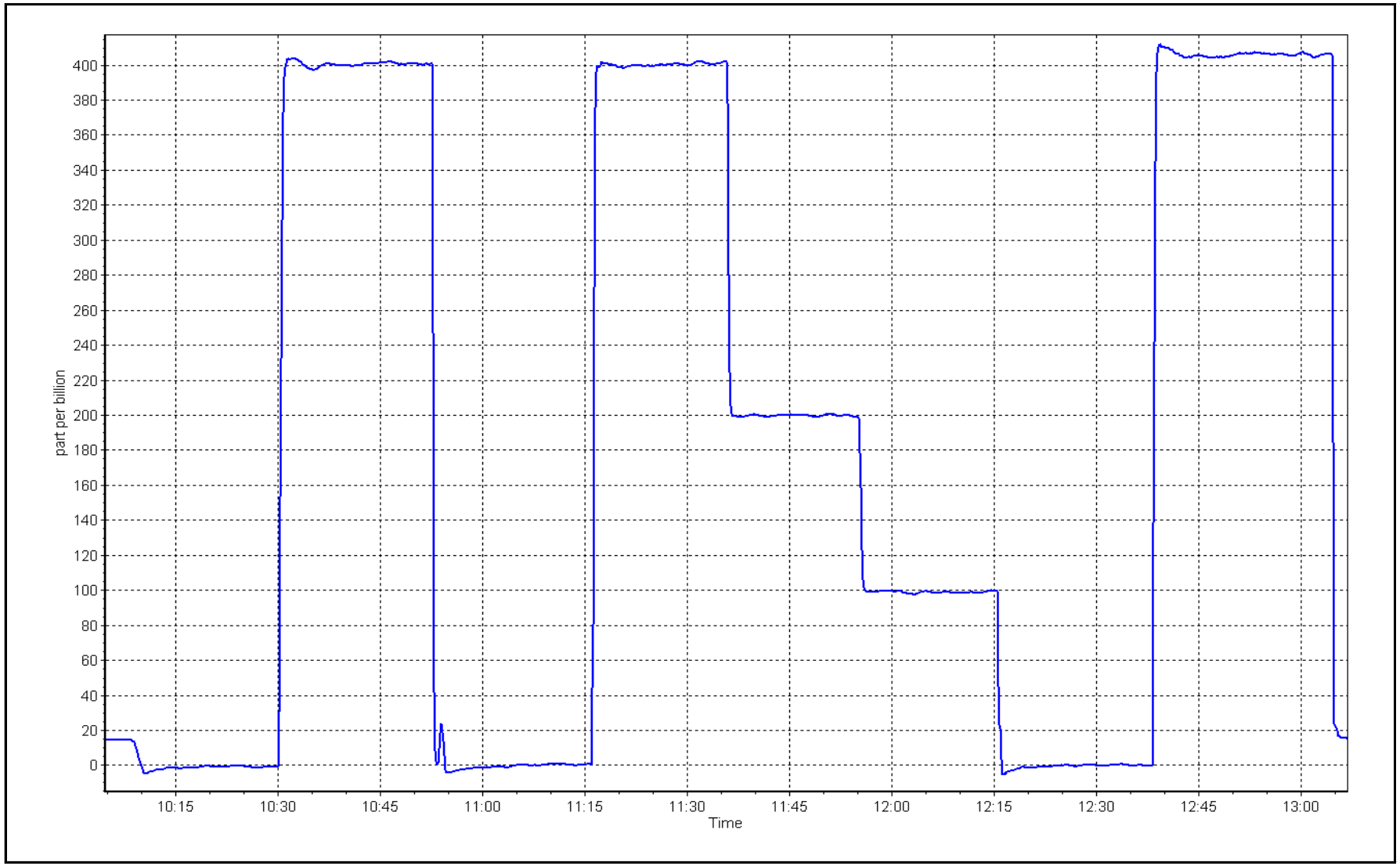
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
400.0	400.8	0.9980
200.0	199.9	1.0005
100.0	98.9	1.0111

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999983	*≥0.995*
Slope	1.002371	*0.90 - 1.10*
Intercept	-0.440000	*+/- 5*



O_3 Calibration Plot Date: October 4, 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:	October 18, 2023	Last Cal Date:	August 15, 2023
Start time (MST):	11:42	End time (MST):	14:00
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)	10.9	10.9	11.3	☐	+/- 2 °C
P (mmHg)	705.3	708.2	704.9	☐	+/- 10 mmHg
flow (LPM)	4.45	4.58	5.00	☐	+/- 0.25 LPM

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

PM w/o HEPA: 3.5 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	(Limits)
PMT Peak Test	11.2		11.2	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 3.4 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: October 18, 2023

Disposable Filter Changed: September 22, 2023

Annual Maintenance

Date Sample Tube Cleaned:

Date RH/T Sensor Cleaned:

Notes: Temp, pressure and flow checked. Flow was low, pump swapped after as found checks. Leak check passed. Chamber cleaned. PMT checked.

Calibration by: Aswin Sasi Kumar

Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Wapasu	Station Number:	AMS 17
Calibration Date:	October 16, 2023	Prev Cal Date:	October 18, 2022
Start Time (MST):	12:26	End Time (MST):	13:49
Tower Height (m):	9.5	Reason:	Routine

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	N14664
WS Calibrator:	MetOne 053	Serial Number:	CA 03845

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

	Start	***Finish***	*Limits*
Correl Coeff (r^2)		1.000000	*≥0.9995*
Calculated slope		0.999465	*0.90 - 1.10*
Calculated intercept		-0.013446	*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	P19942
As Found Declination (deg east of True North):		As Left Declination (deg east of True North):	
Solar noon time (MST):	13:10	Calc Declination*:	13.34 Degrees
Deadband calc:	1.0 degrees (*Limit 4 deg*)		* - calculated declination as per NOAA website

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	% Error (based on 357° FS) *Limit = +/- 1.0%*
0	2.0	---
90	90.8	0.2%
180	179.8	-0.1%
270	269.3	-0.2%
357	358.0	0.3%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)		0.999980	*≥0.9995*
Calculated slope		1.003932	*0.90 - 1.10*
Calculated intercept		-1.287608	*+/- 4*

Notes: No issues.

Calibration Performed By: Aswin Sasi Kumar

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS18
STONY MOUNTAIN
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	October 17, 2023	Last Cal Date:	September 8, 2023
Start time (MST):	10:40	End time (MST):	13:42
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:	0.999906	0.998676	Backgd or Offset:	22.2	22.2
Calibration intercept:	-1.183922	-0.203578	Coeff or Slope:	0.795	0.795

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5009	0.0	0.0	0.2	----
as found span	4919	81.0	800.3	797.0	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.6	----
high point	4919	81.0	800.3	799.6	1.001
second point	4959	40.5	400.2	398.5	1.004
third point	4979	20.2	199.6	198.7	1.005
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	1.003

Baseline Corr As found:	796.80	Previous response	799.02	*% change	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

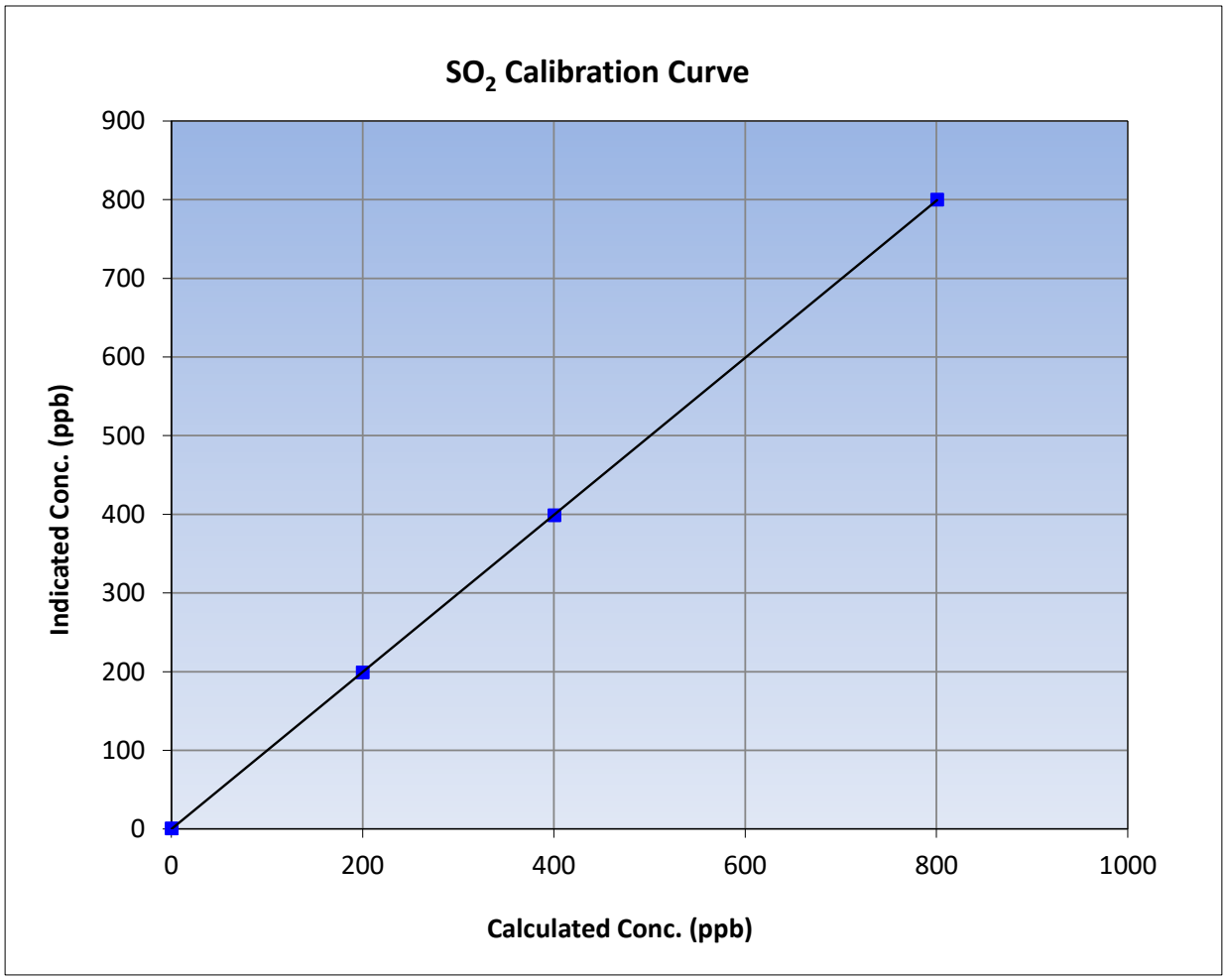
Station Information

Calibration Date:	October 17, 2023	Previous Calibration:	September 8, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:40	End Time (MST):	13:42
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301453

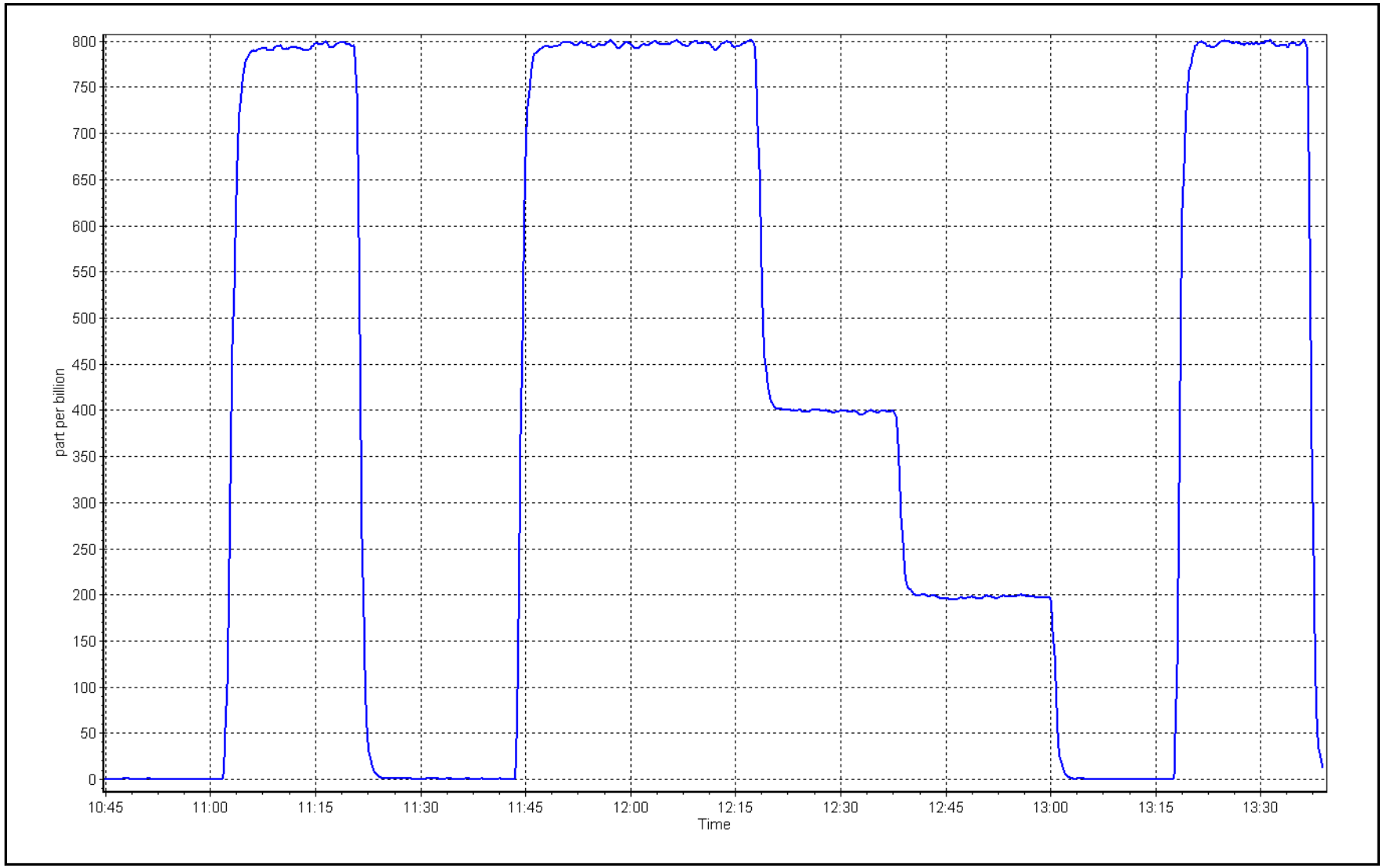
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.6	----
800.3	799.6	1.0009
400.2	398.5	1.0042
199.6	198.7	1.0046

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999994	*≥0.995*
Slope	0.998676	*0.90 - 1.10*
Intercept	-0.203578	*+/-30*



SO2 Calibration Plot Date: October 17, 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:	October 26, 2023	Last Cal Date:	September 25, 2023
Start time (MST):	10:34	End time (MST):	15:05
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:	1.005299	1.002584	Backgd or Offset:	2.66	2.66
Calibration intercept:	-0.019011	0.401023	Coeff or Slope:	1.173	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	83.2	0.963
as found 2nd point	4964	36.5	40.0	42.0	0.954
as found 3rd point	4983	18.3	20.0	20.9	0.964
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	0.5	----
high point	4927	73.0	80.0	80.6	0.992
second point	4964	36.5	40.0	40.6	0.985
third point	4983	18.3	20.0	20.3	0.988
as left zero	5000	0.0	0.0	0.4	----
as left span	4927	73.0	80.0	79.0	1.013
SO2 Scrubber Check	4923	77.1	771.0	-0.1	----
Date of last scrubber change:		17-Dec-21		Ave Corr Factor	0.988
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	83.1	Prev response:	80.40	*% change:	3.3%
Baseline Corr 2nd AF pt:	41.9	AF Slope:	1.039454	AF Intercept:	0.160278
Baseline Corr 3rd AF pt:	20.8	AF Correlation:	0.999974		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

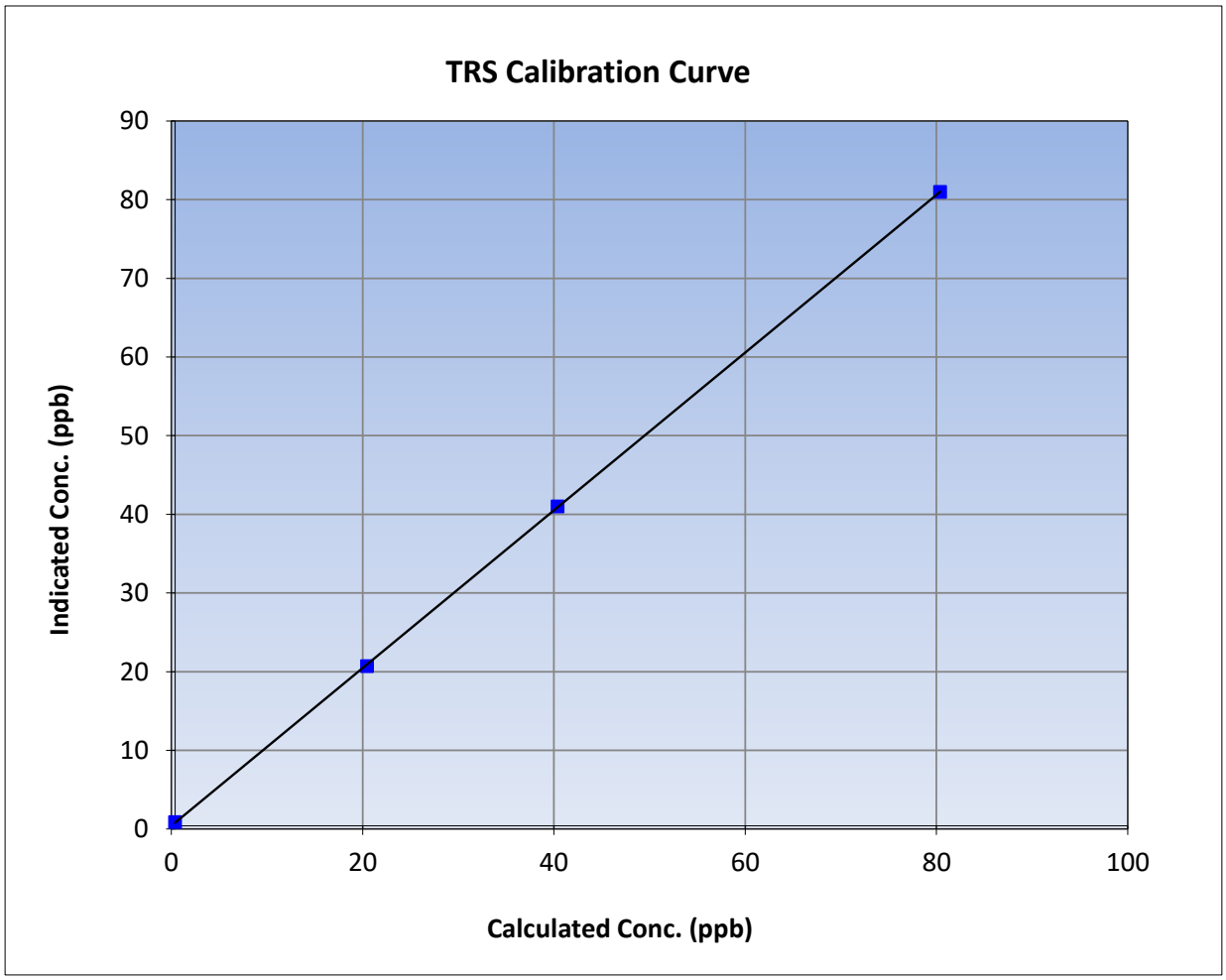
Station Information

Calibration Date:	October 26, 2023	Previous Calibration:	September 25, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	10:34	End Time (MST):	15:05
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153359

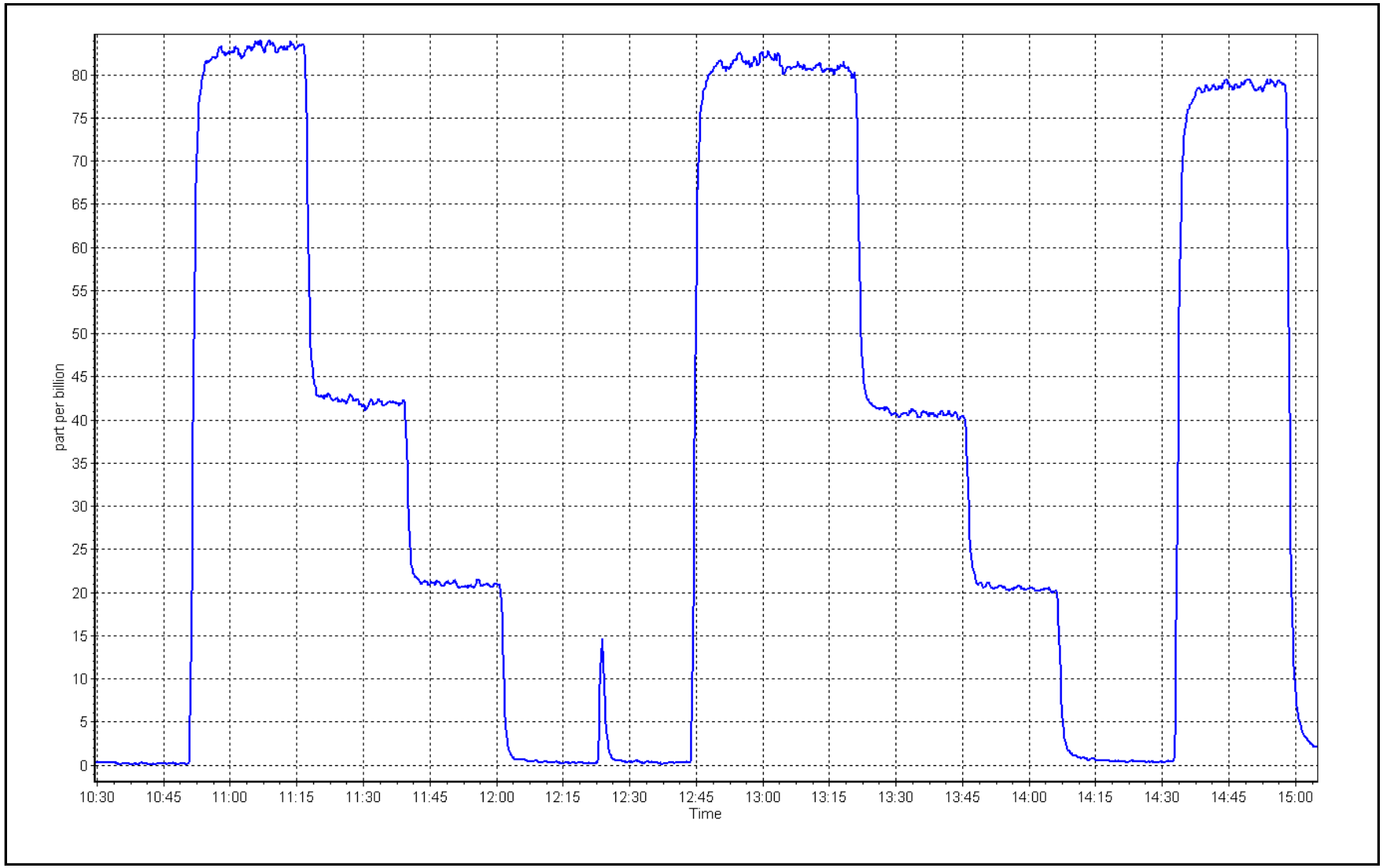
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
80.0	80.6	0.9925
40.0	40.6	0.9850
20.0	20.3	0.9876

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999983	*≥0.995*
Slope	1.002584	*0.90 - 1.10*
Intercept	0.401023	*+/-3*



TRS Calibration Plot Date: October 26, 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:	October 17, 2023	Last Cal Date:	September 8, 2023
Start time (MST):	10:40	End time (MST):	13:42
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:	2.23E-04	2.24E-04	NMHC SP Ratio:	4.19E-05	5.04E-05
CH4 Retention time:	12.9	12.7	NMHC Peak Area:	186711	182001
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	16.96	1.019
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	17.24	1.002
second point	4959	40.5	8.64	8.63	1.001
third point	4979	20.2	4.31	4.28	1.008
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	1.004
Baseline Corr AF:	16.96	Prev response	17.32	*% change	-2.1%
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	4919	81.0	9.17	8.92	1.027
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	4.60	0.996
third point	4979	20.2	2.29	2.30	0.994
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	0.997
Baseline Corr AF:	8.92	Prev response	9.24	*% change	-3.5%
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	81.0	8.11	8.04	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	8.11	8.09	1.003
second point	4959	40.5	4.06	4.03	1.008
third point	4979	20.2	2.02	1.98	1.025
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	1.012
Baseline Corr AF:	8.04	Prev response	8.09	*% 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:	1.004309	0.998344
THC Cal Offset:	-0.036379	-0.008797
CH4 Cal Slope:	1.001484	0.998456
CH4 Cal Offset:	-0.032618	-0.020622
NMHC Cal Slope:	1.007917	0.998233
NMHC Cal Offset:	-0.005959	0.011624

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

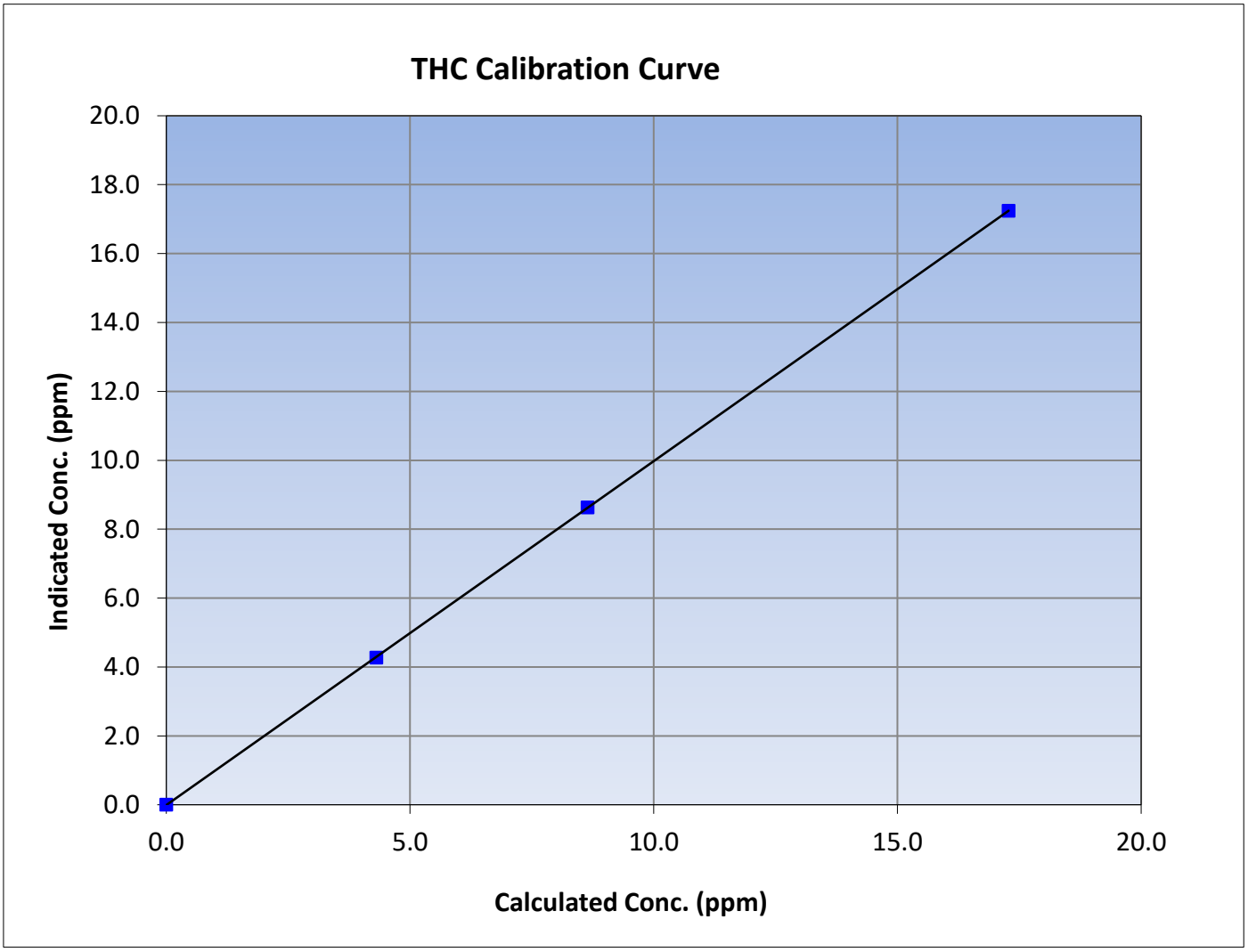
Version-06-2022

Station Information

Calibration Date:	October 17, 2023	Previous Calibration:	September 8, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:40	End Time (MST):	13:42
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999996	≥0.995
17.28	17.24	1.0022			
8.64	8.63	1.0013	Slope	0.998344	0.90 - 1.10
4.31	4.28	1.0083			
			Intercept	-0.008797	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

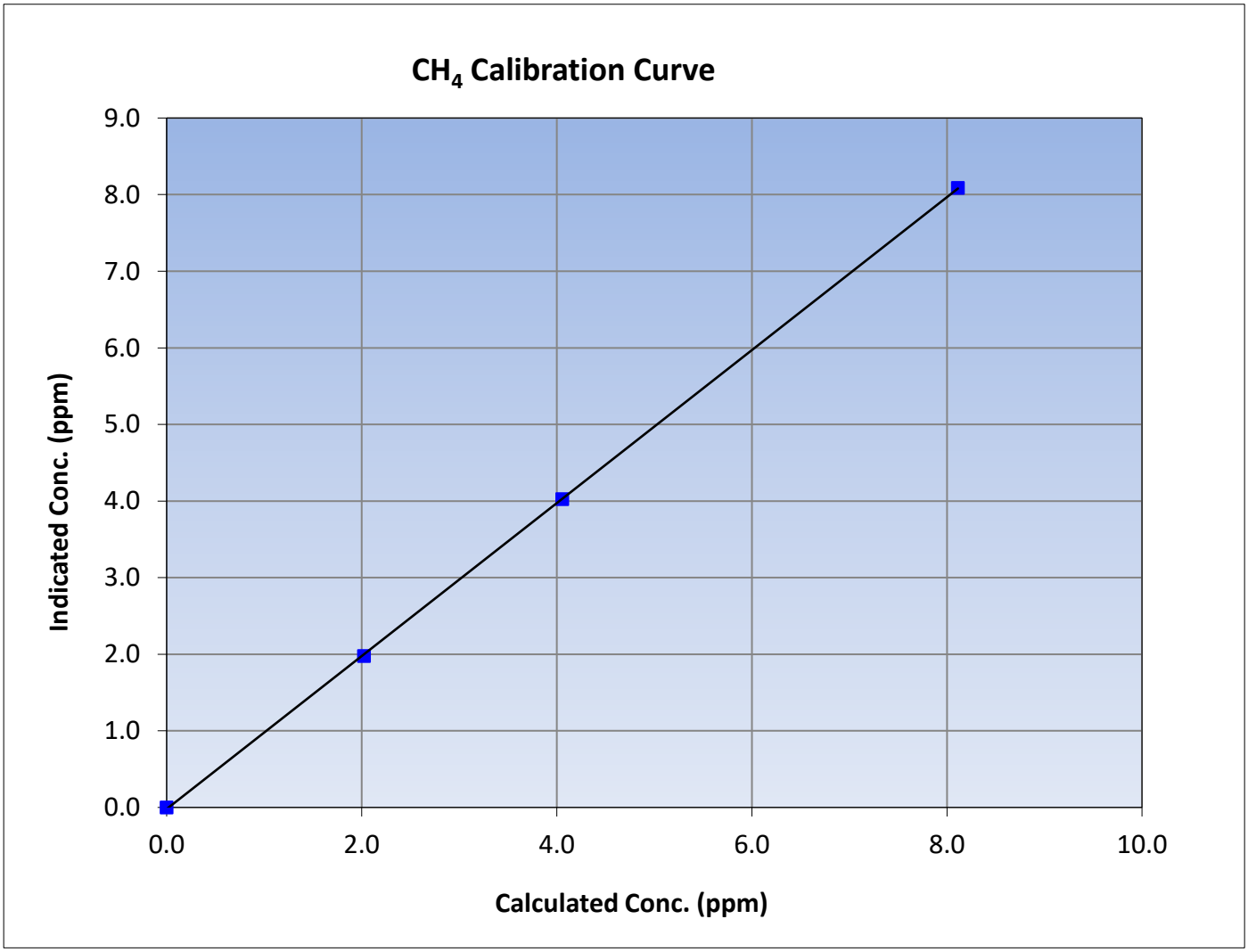
Version-06-2022

Station Information

Calibration Date:	October 17, 2023	Previous Calibration:	September 8, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:40	End Time (MST):	13:42
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	0.999969	*≥0.995*
8.11	8.09	1.0031			
4.06	4.03	1.0077	Slope	0.998456	*0.90 - 1.10*
2.02	1.98	1.0246			
			Intercept	-0.020622	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

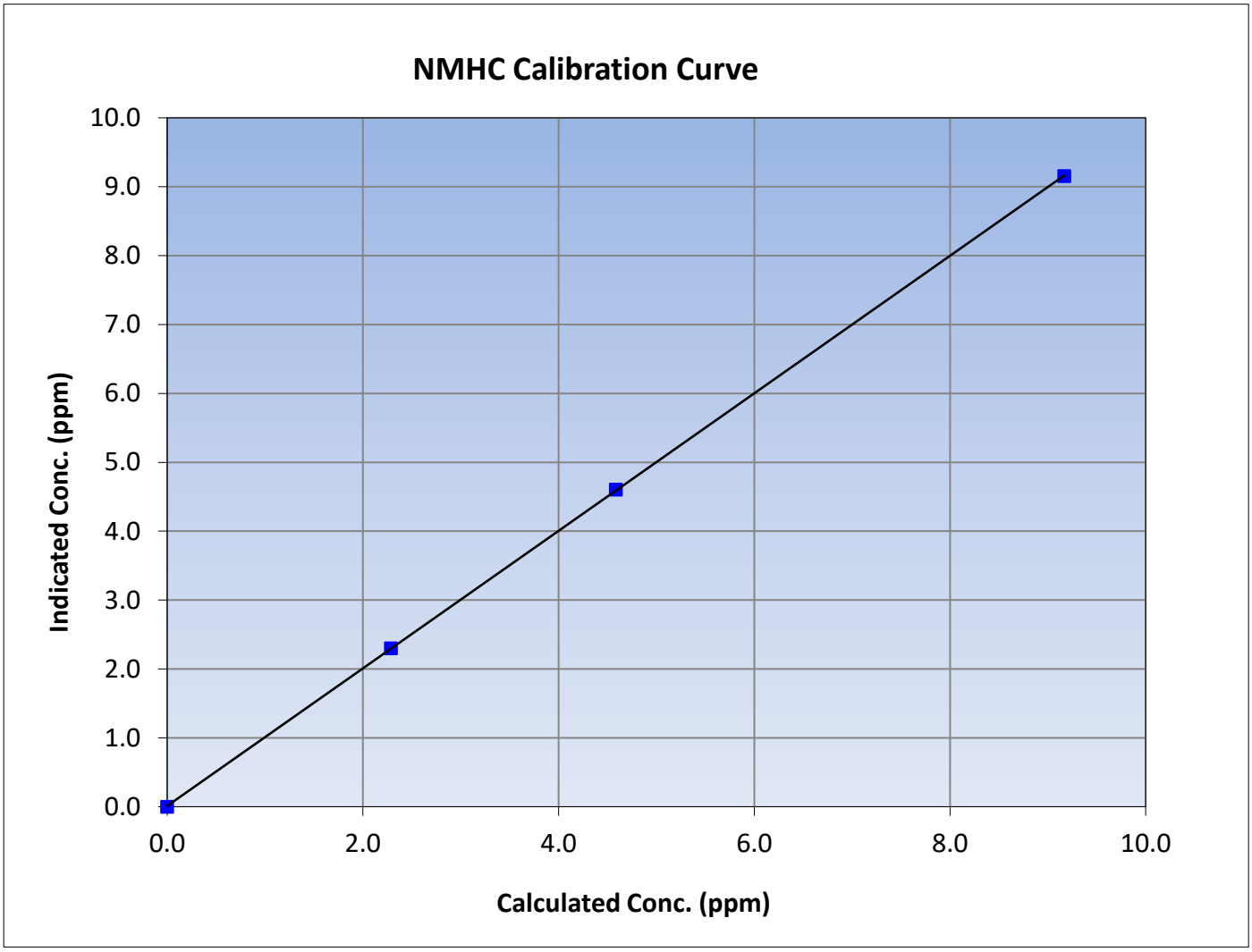
Version-06-2022

Station Information

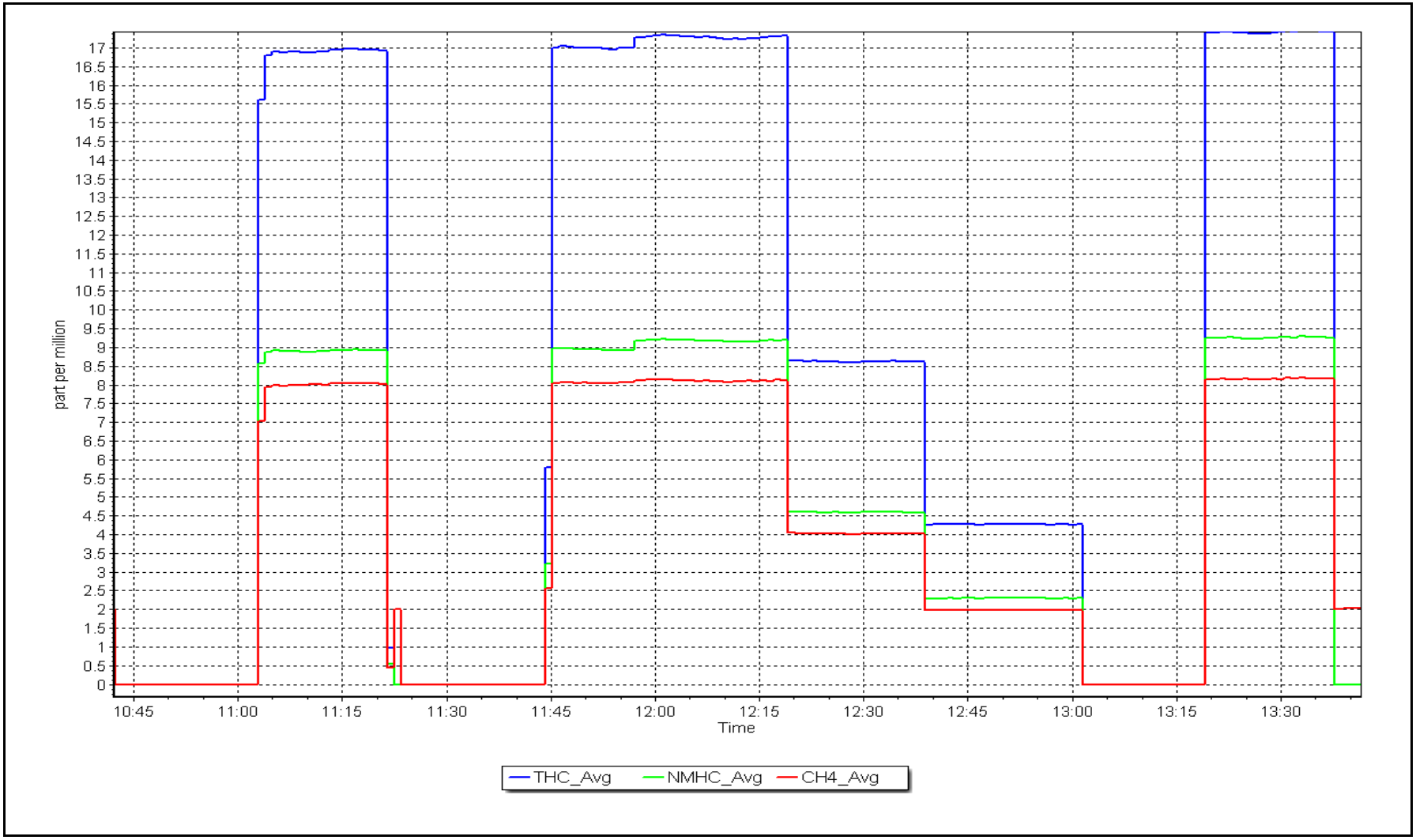
Calibration Date:	October 17, 2023	Previous Calibration:	September 8, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:40	End Time (MST):	13:42
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999990	≥0.995
9.17	9.16	1.0015			
4.58	4.60	0.9960	Slope	0.998233	0.90 - 1.10
2.29	2.30	0.9943			
			Intercept	0.011624	+/-0.5



NMHC Calibration Plot Date: October 17, 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:	October 27, 2023	Last Cal Date:	September 19, 2023
Start time (MST):	10:25	End time (MST):	15:36
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:	1.029	1.072	NO bkgnd or offset:	2.9	3.0
NOX coeff or slope:	0.984	0.985	NOX bkgnd or offset:	2.9	3.0
NO2 coeff or slope:	0.999	0.999	Reaction cell Press:	235.3	250.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000359	0.999718
NO_X Cal Offset:	-0.310049	-0.329761
NO Cal Slope:	1.001795	1.000010
NO Cal Offset:	-1.669844	-1.269777
NO_2 Cal Slope:	0.998696	1.001575
NO_2 Cal Offset:	-0.059273	0.299687

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	787.9	767.0	21.0	1.0417	1.0434
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.1	----	----
high point	4919	81.3	820.8	800.3	20.5	820.5	799.6	20.8	1.0003	1.0008
second point	4959	40.7	410.9	400.7	10.3	410.1	399.0	11.1	1.0020	1.0042
third point	4980	20.3	204.9	199.8	5.1	204.1	197.0	7.1	1.0041	1.0143
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	372.6	448.2	824.3	371.2	453.1	0.9957	1.0037
								Average Correction Factor	1.0021	1.0065

Corrected As found	NO_X = 788.0 ppb	NO = 767.1 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -4.2%
Previous Response	NO_X = 820.7 ppb	NO = 800.0 ppb		*Percent Change	NO = -4.3%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	799.3	371.6	448.2	449.1	0.9980	100.2%
2nd GPT point (200 ppb O3)	799.3	597.8	222.0	222.7	0.9968	100.3%
3rd GPT point (100 ppb O3)	799.3	701.3	118.5	119.2	0.9940	100.6%
				Average Correction Factor	0.9963	100.4%

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

NO_X Calibration Summary

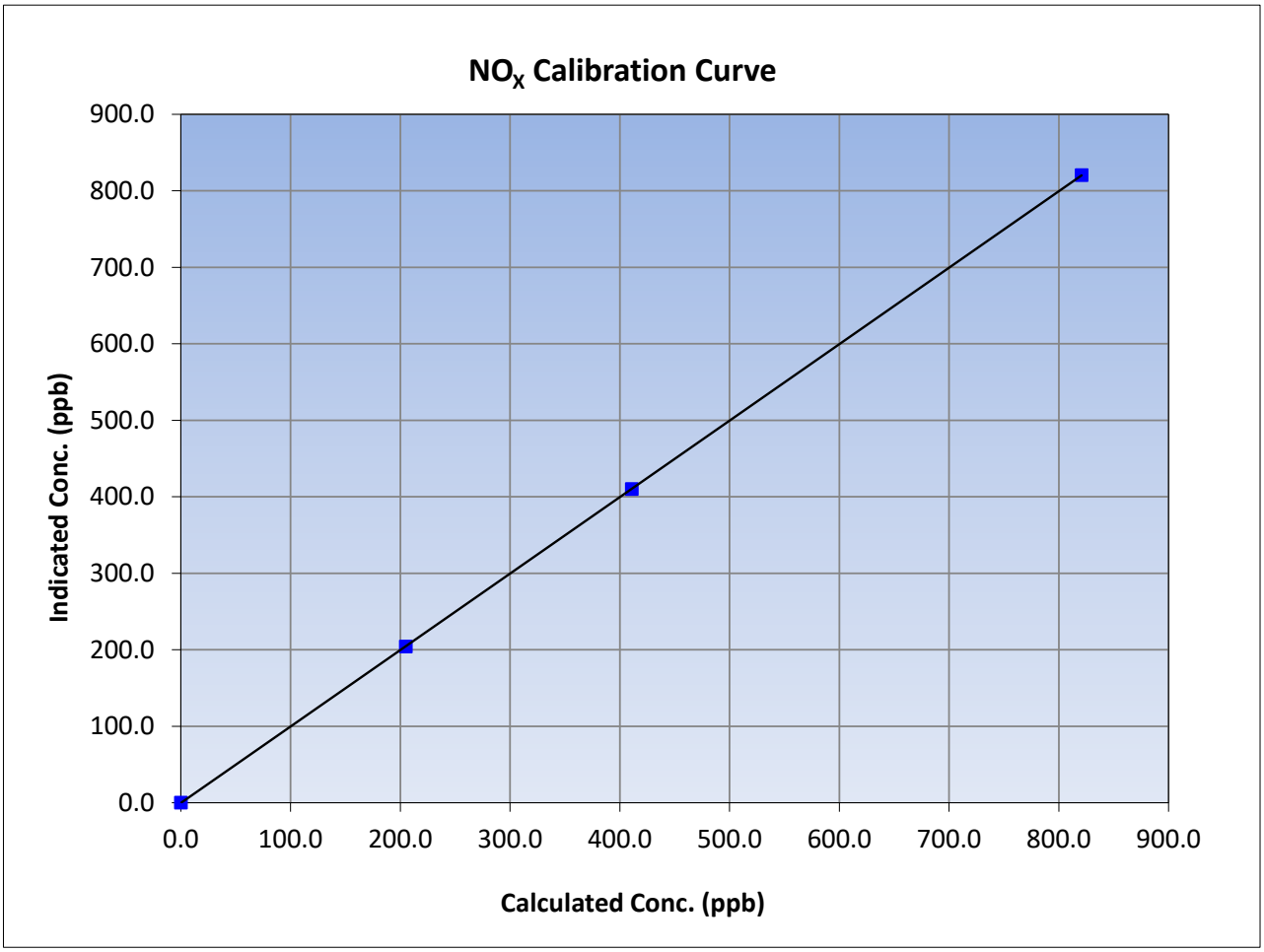
Version-04-2020

Station Information

Calibration Date:	October 27, 2023	Previous Calibration:	September 19, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:25	End Time (MST):	15:36
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999998	≥0.995
820.8	820.5	1.0003			
410.9	410.1	1.0020	Slope	0.999718	0.90 - 1.10
204.9	204.1	1.0041			
			Intercept	-0.329761	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

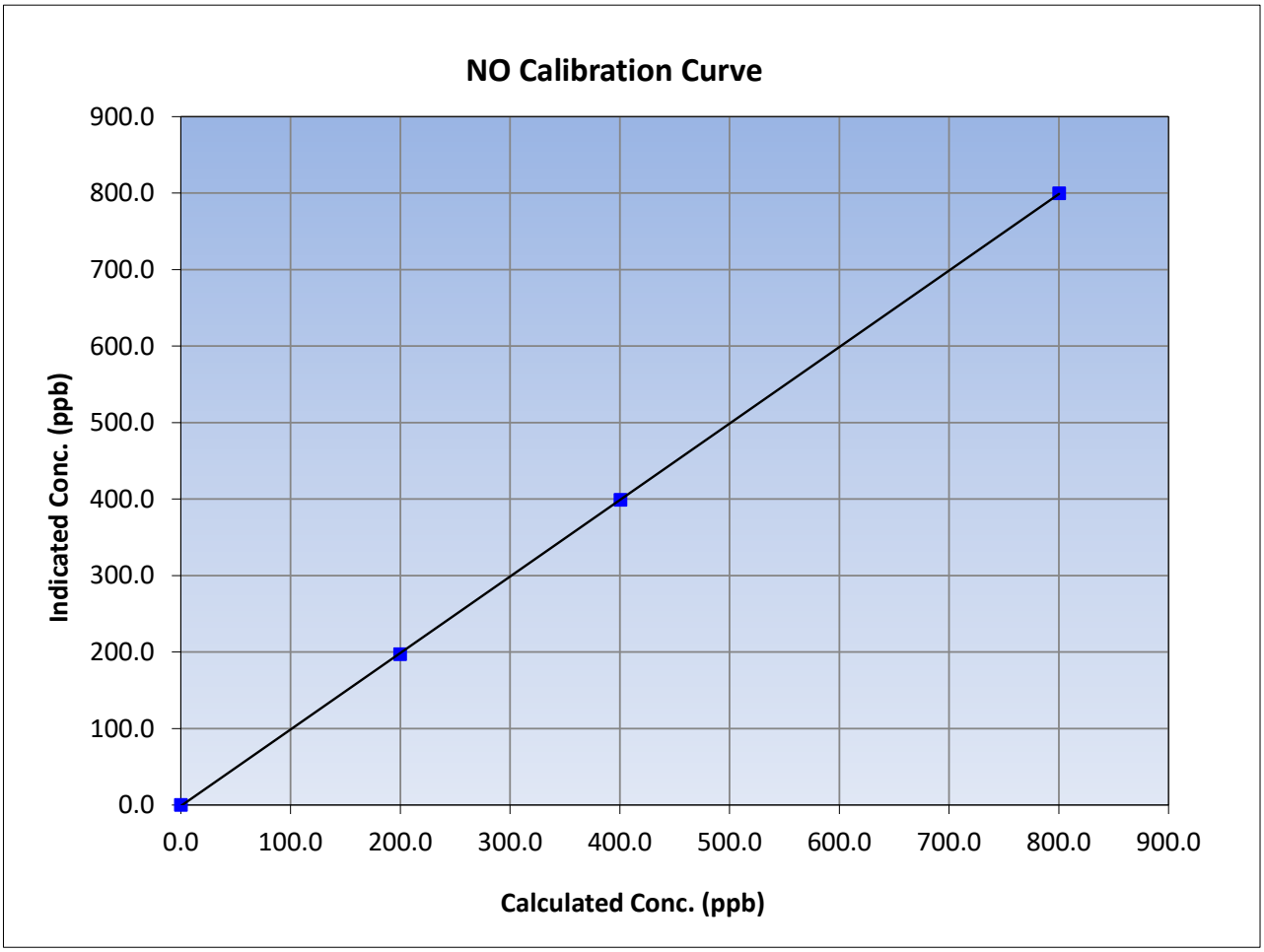
Version-04-2020

Station Information

Calibration Date:	October 27, 2023	Previous Calibration:	September 19, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:25	End Time (MST):	15:36
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	0.999986	≥0.995
800.3	799.6	1.0008			
400.7	399.0	1.0042	Slope	1.000010	0.90 - 1.10
199.8	197.0	1.0143			
			Intercept	-1.269777	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

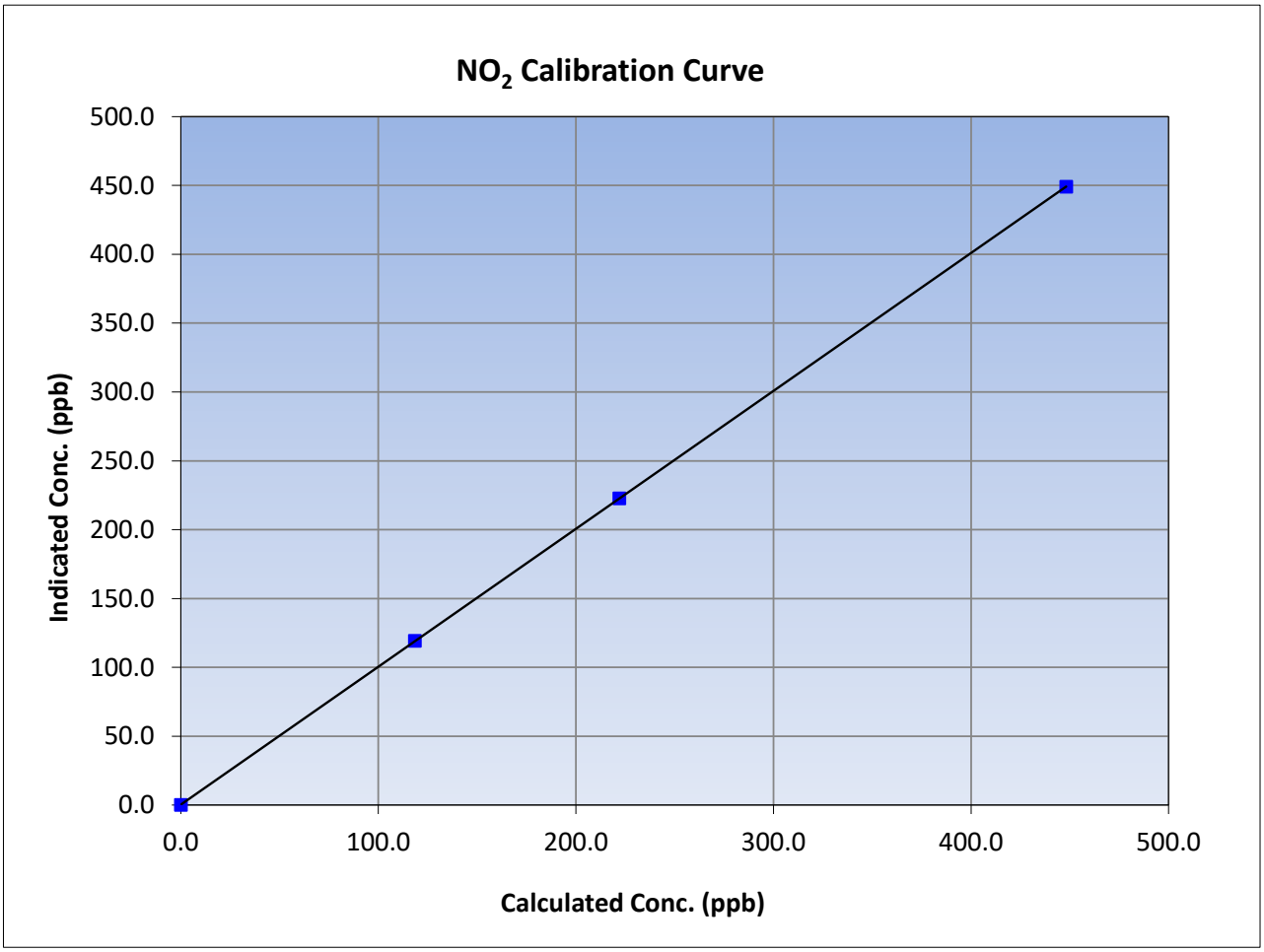
Version-04-2020

Station Information

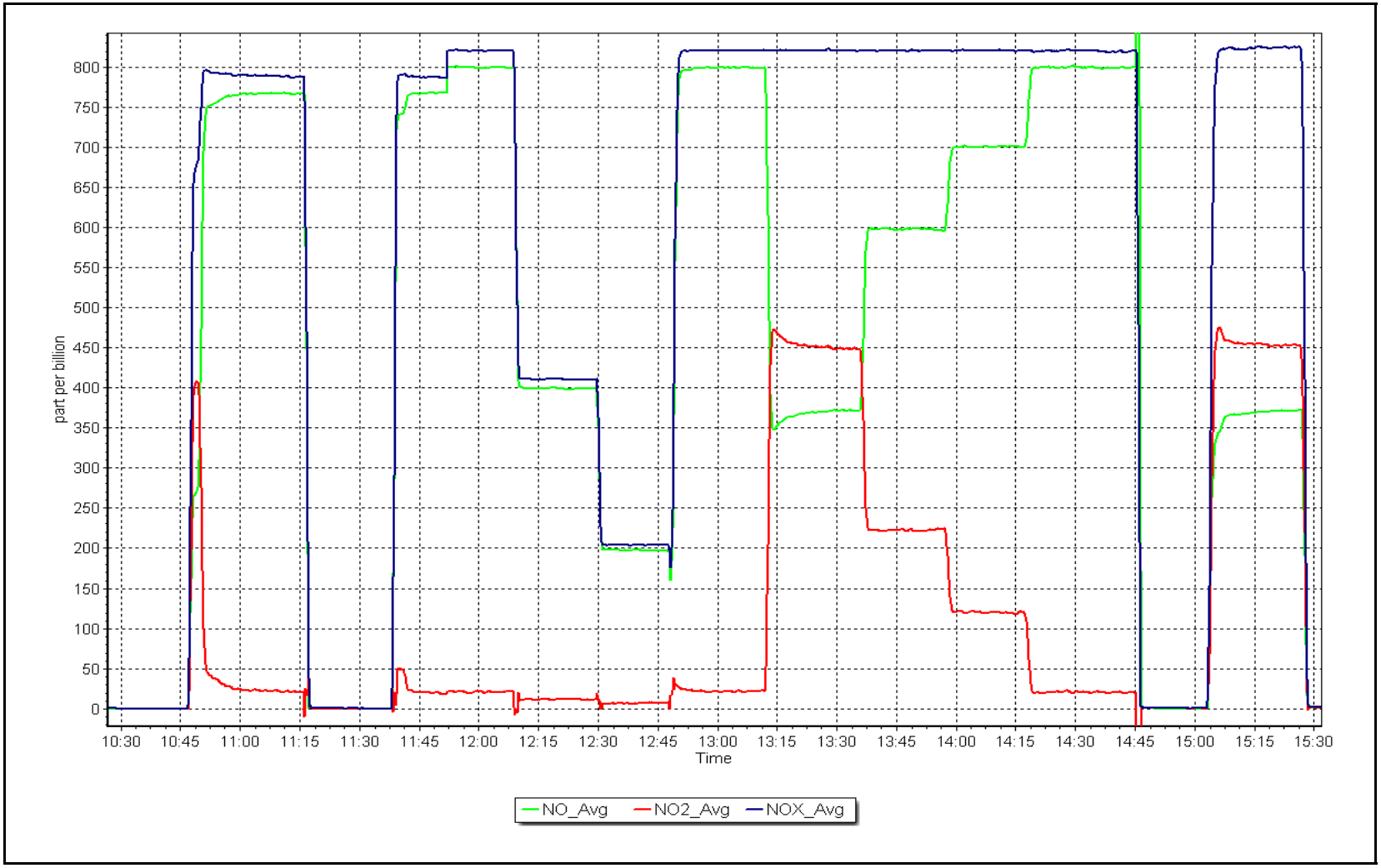
Calibration Date:	October 27, 2023	Previous Calibration:	September 19, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:25	End Time (MST):	15:36
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999999	≥0.995
448.2	449.1	0.9980			
222.0	222.7	0.9968	Slope	1.001575	0.90 - 1.10
118.5	119.2	0.9940			
			Intercept	0.299687	+/-20



NO_X Calibration Plot Date: October 27, 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:	October 23, 2023	Last Cal Date:	September 21, 2023
Start time (MST):	10:30	End time (MST):	14:22
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	Teledyne API T750	Serial Number:	282
ZAG Make/Model:	Teledyne API T751H	Serial Number:	355

Analyzer Information

Analyzer make:	API T400	Analyzer serial #:	825
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003943	0.999771	Backgd or Offset:	1.300	2.500
Calibration intercept:	-0.340000	0.240000	Coeff or Slope:	0.996	1.007

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	1096.9	400.0	397.6	1.006
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	0.8	----
high point	4888	1101.7	400.0	400.1	1.000
second point	4888	863.9	200.0	200.9	0.996
third point	4888	741.4	100.0	99.0	1.010
as left zero	5000	800.0	0.0	-0.6	----
as left span	4812	1097.9	400.0	415.4	0.963
				Average Correction Factor	1.002

Baseline Corr As found:	397.0	Previous response	401.2	*% change	-1.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Sample inlet filter changed after as founds. Using portable calibrator for the calibration. Portable zero air was not able to keep pressure, switched to station zero air support for the rest of the calibration. Zero and span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

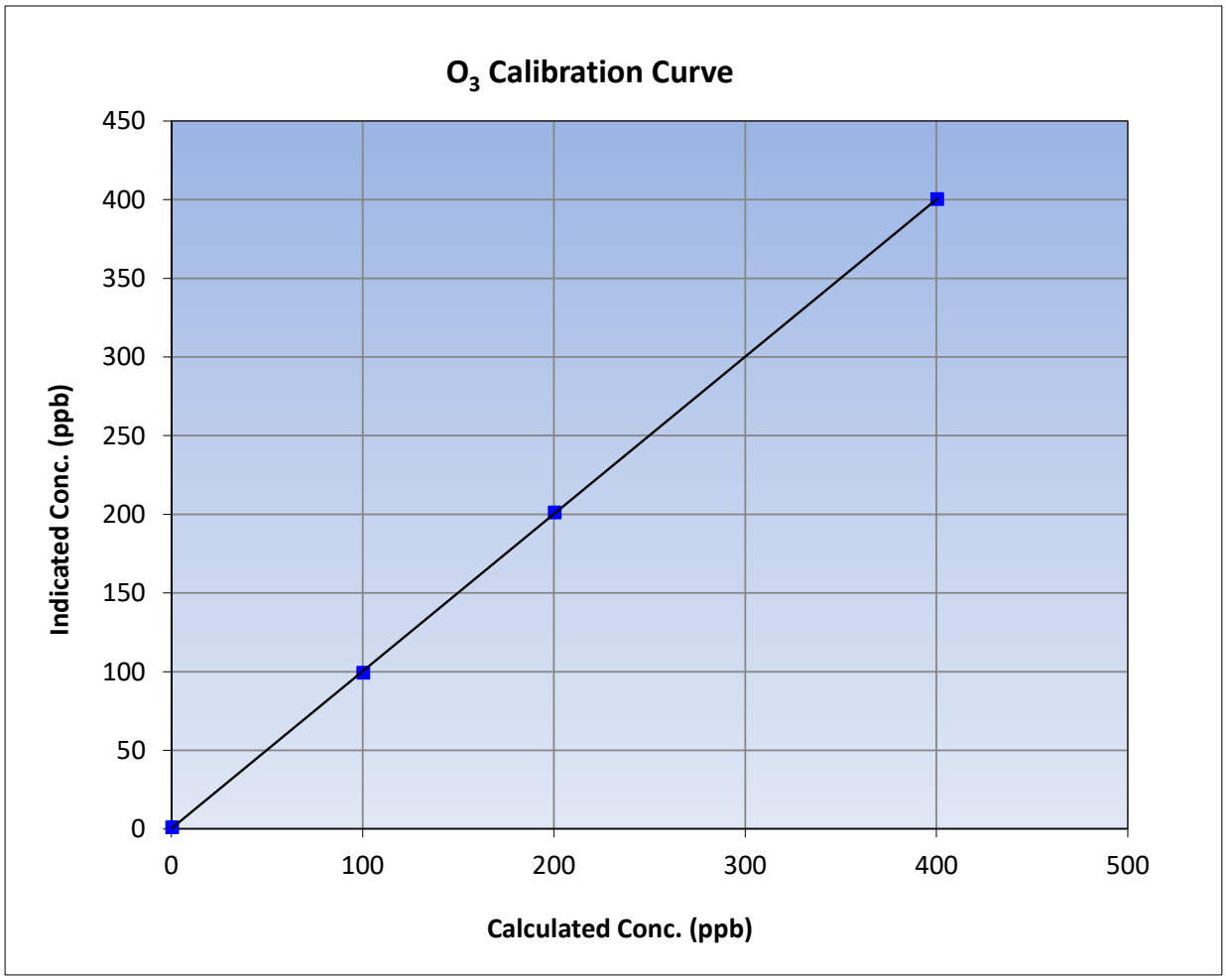
Station Information

Calibration Date:	October 23, 2023	Previous Calibration:	September 21, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	10:30	End Time (MST):	14:22
Analyzer make:	API T400	Analyzer serial #:	825

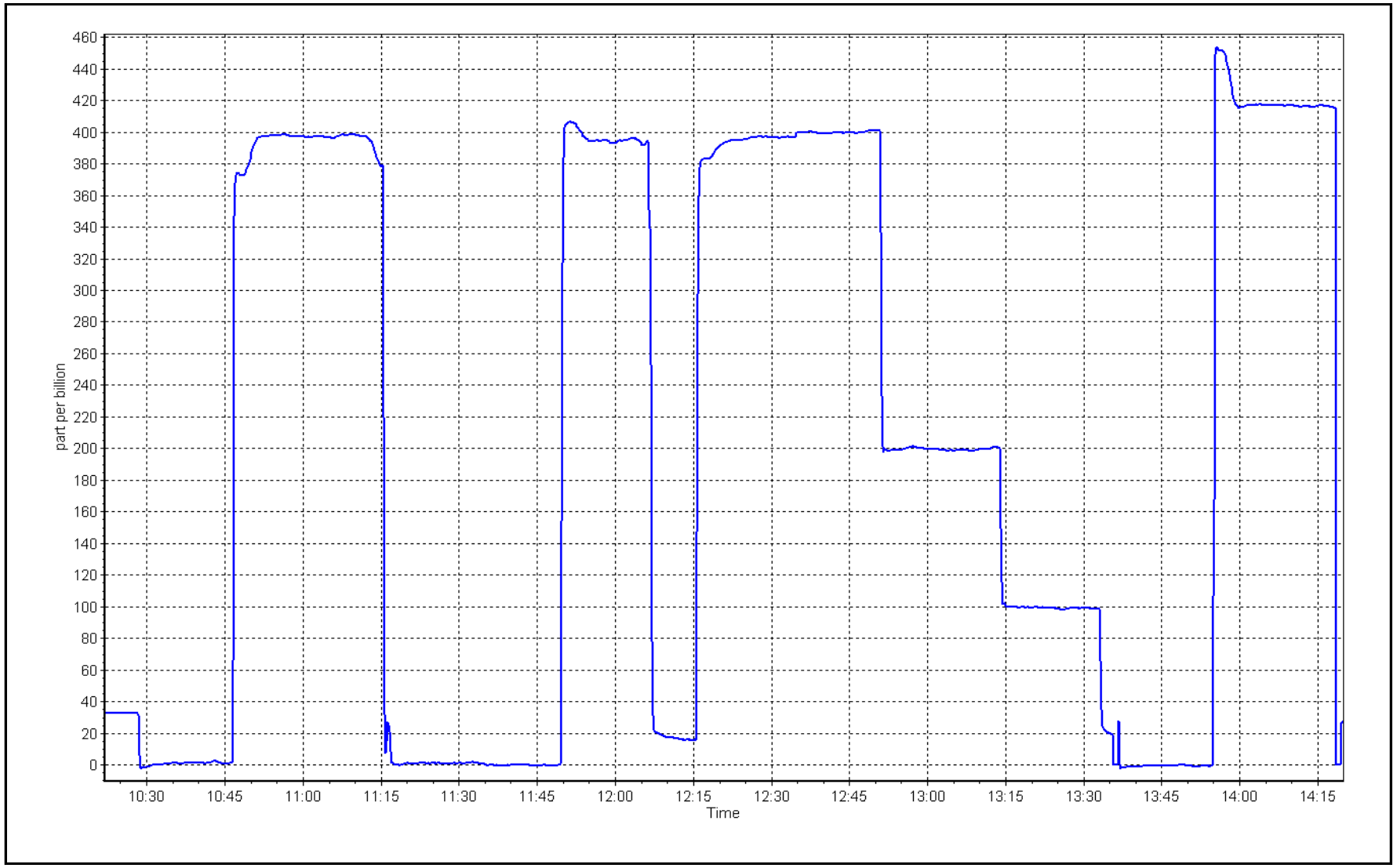
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.8	----
400.0	400.1	0.9998
200.0	200.9	0.9955
100.0	99.0	1.0101

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999974	*≥0.995*
Slope	0.999771	*0.90 - 1.10*
Intercept	0.240000	*+/- 5*



O_3 Calibration Plot Date: October 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:	October 27, 2023	Last Cal Date:	September 25, 2023
Start time (MST):	13:30	End time (MST):	15:17
Analyzer Make:	API T640	S/N:	1162
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388748
Temp/RH standard:	Alicat FP-25BT	S/N:	388748

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-5.4	-5.2	-5.4	☐	+/- 2 °C
P (mmHg)	707.3	704.3	707.3	☐	+/- 10 mmHg
flow (LPM)	4.99	4.98	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: October 27, 2023 Last Cal Date: September 25, 2023

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

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: September 25, 2023

Disposable Filter Changed: September 25, 2023

Annual Maintenance

Date Sample Tube Cleaned: August 30, 2022

Date RH/T Sensor Cleaned: August 30, 2022

Notes: No adjustments needed.

Calibration by: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	October 12, 2023	Last Cal Date:	September 11, 2023
Start time (MST):	9:50	End time (MST):	12:50
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:	0.995840	0.991149	Backgd or Offset:	-0.010	-0.010
Calibration intercept:	0.085810	0.191815	Coeff or Slope:	0.906	0.901

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4933	66.7	40.7	41.0	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4933	66.7	40.7	40.4	1.007
second point	4966	33.3	20.3	20.6	0.988
third point	4983	16.7	10.2	10.3	0.990
as left zero	5000	0.0	0.0	0.1	----
as left span	4933	66.7	40.7	40.7	0.999
				Average Correction Factor	0.995

Baseline Corr As found:	40.84	Prev response:	40.61	*% 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: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

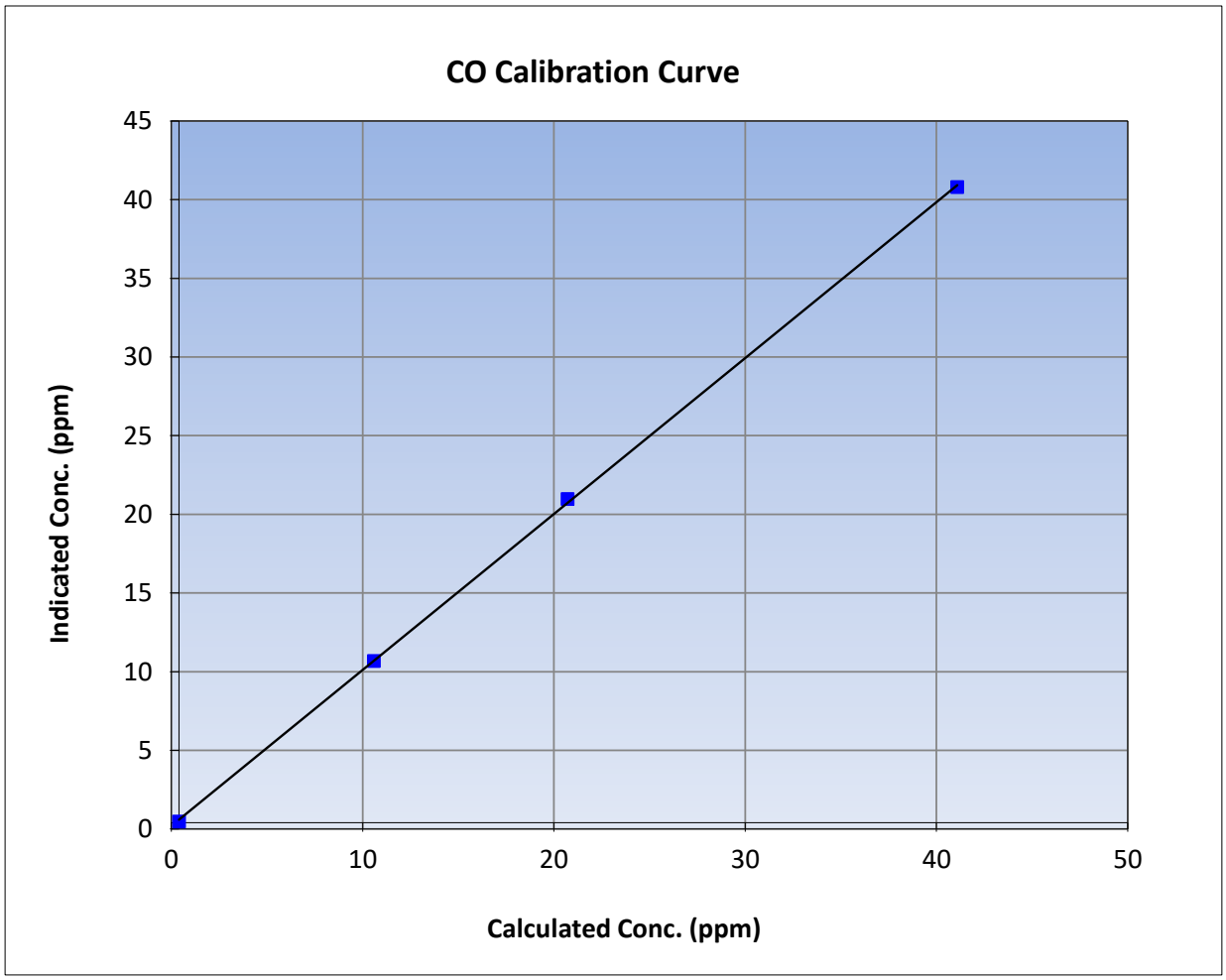
Station Information

Calibration Date:	October 12, 2023	Previous Calibration:	September 11, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	9:50	End Time (MST):	12:50
Analyzer make:	API T300	Analyzer serial #:	3504

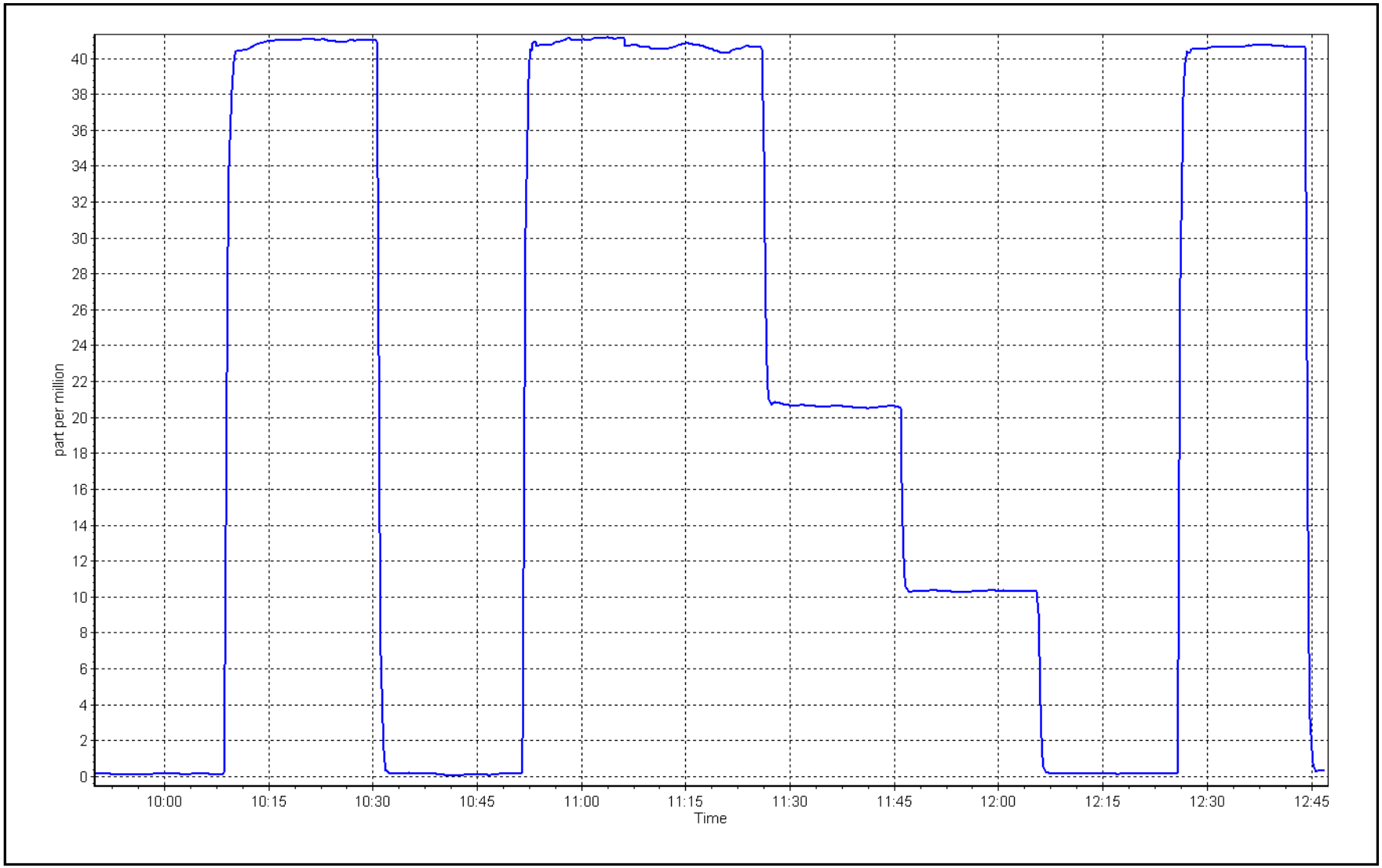
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
40.7	40.4	1.0072
20.3	20.6	0.9876
10.2	10.3	0.9900

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999901	*≥0.995*
Slope	0.991149	*0.90 - 1.10*
Intercept	0.191815	*+/-1.5*



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



Wood Buffalo Environmental Association

CO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	October 5, 2023	Last Cal Date:	September 29, 2023
Start time (MST):	10:17	End time (MST):	14:45
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:	0.998830	0.998453	Backgd or Offset:	-0.002	-0.175
Calibration intercept:	-5.420000	-5.780000	Coeff or Slope:	1.051	1.062

CO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	3000	0.0	0.0	-1.1	----
as found span	2920	80.0	1605.9	1601.1	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	4.0	----
high point	2920	80.0	1605.9	1610.0	0.997
second point	2960	40.0	802.9	768.5	1.045
third point	2980	20.0	401.5	400.3	1.003
as left zero	3000	0.0	0.0	5.5	----
as left span	2930	80.0	1600.5	1614.5	0.991
				Average Correction Factor	1.015

Baseline Corr As found:	1602.20	Prev response:	1598.57	*% change:	0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Instrument installation calibration, linearity adjustment performed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

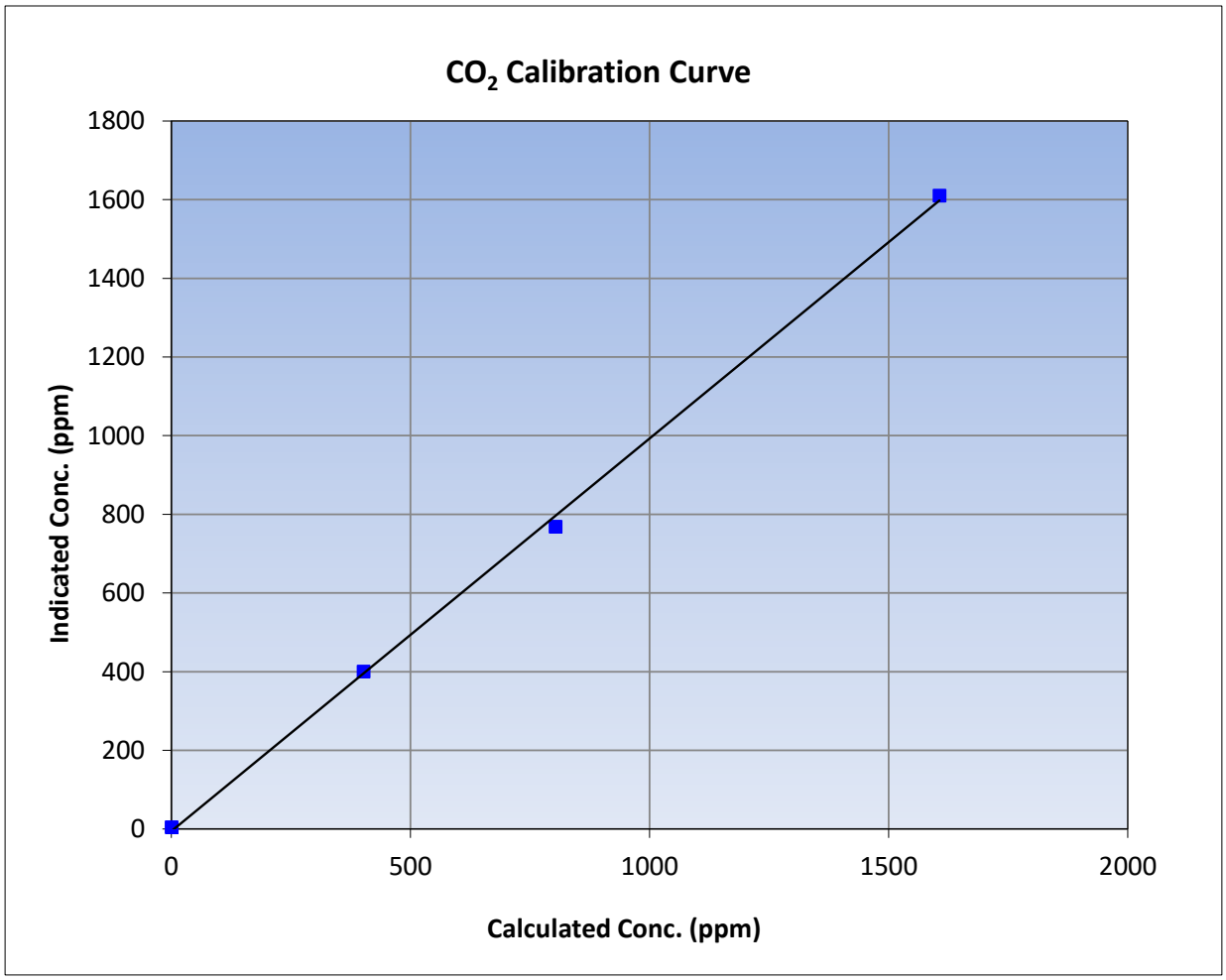
Station Information

Calibration Date	October 5, 2023	Previous Calibration	September 29, 2023
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:17	End Time (MST)	14:45
Analyzer make	API T360	Analyzer serial #	489

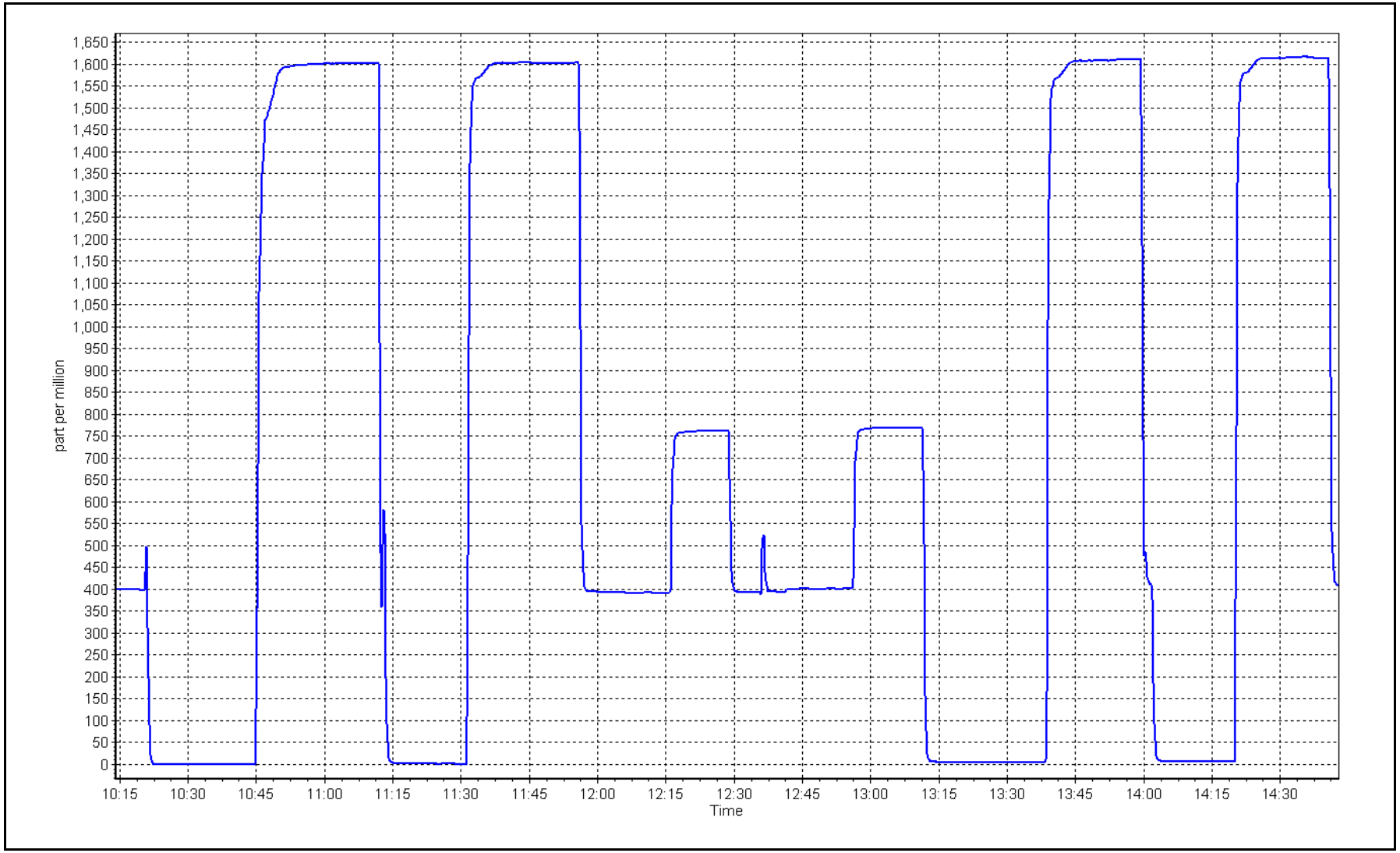
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	4.0	----
1605.9	1610.0	0.9974
802.9	768.5	1.0448
401.5	400.3	1.0029

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999269	*≥0.995*
Slope	0.998453	*0.90 - 1.10*
Intercept	-5.780000	*+/-10*



CO_2 Calibration Plot Date: October 5, 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:	October 25, 2023	Last Cal Date:	October 5, 2023
Start time (MST):	10:34	End time (MST):	14:52
Reason:	Maintenance		

Calibration Standards

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

Analyzer Information

Analyzer make: API T360 — Analyzer serial #: 489

Analyzer Range 0 - 2,000 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998453	1.001286	Backgd or Offset:	-0.175	-0.037
Calibration intercept:	-5.780000	-6.620000	Coeff or Slope:	1.062	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	95.8	----
as found span	2920	80.0	1605.9	1715.6	0.936
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	-0.2	----
high point	2920	80.0	1605.9	1601.9	1.002
second point	2960	40.0	802.9	802.0	1.001
third point	2980	20.0	401.5	383.7	1.046
as left zero	3000	0.0	0.0	-0.2	----
as left span	2930	80.0	1600.5	1598.0	1.002
				Average Correction Factor	1.017

Baseline Corr As found:	1619.80	Prev response:	1597.60	*% 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: Nitrogen generator swapped out after as founds. linearity adjustment performed on the midpoint.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

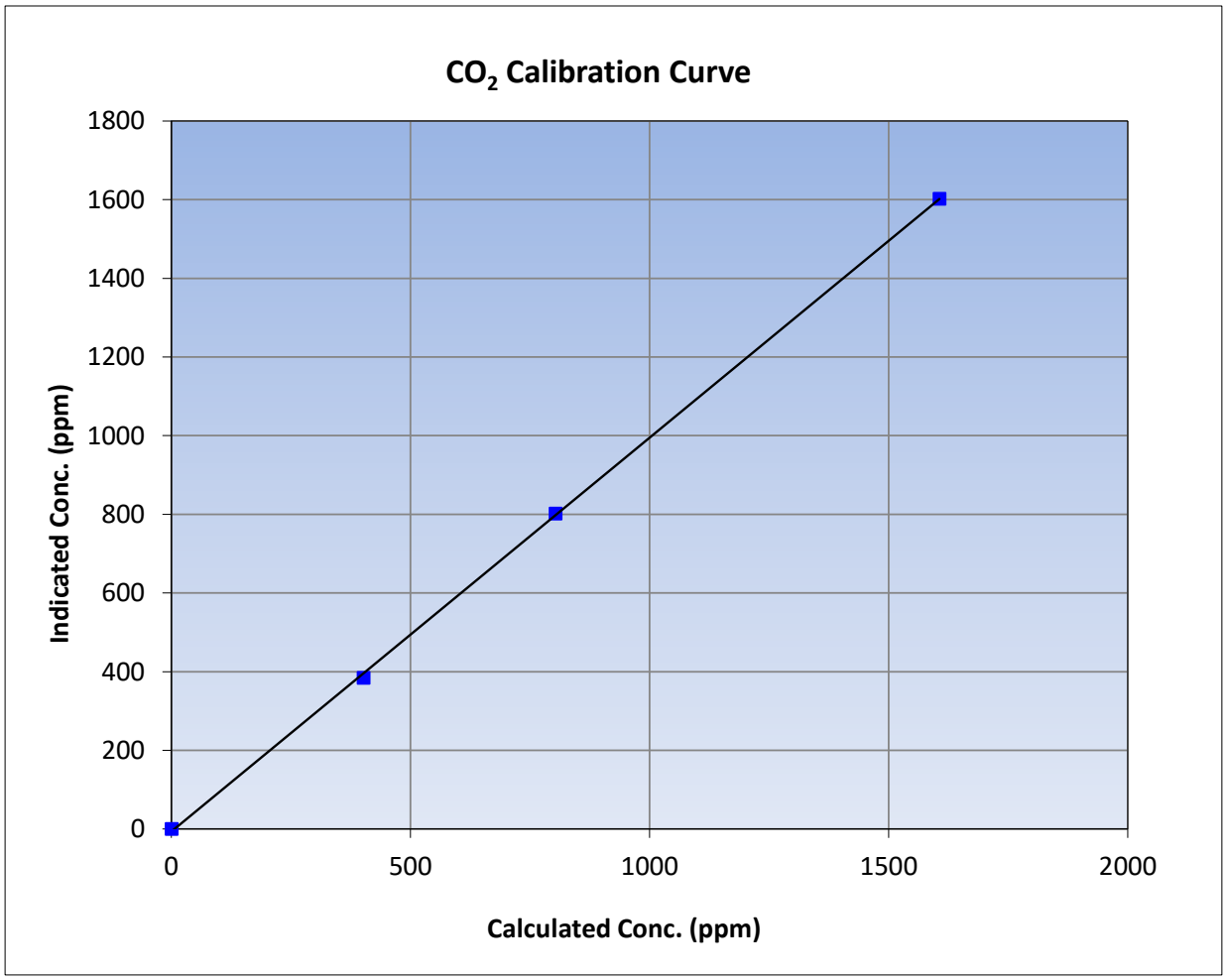
Station Information

Calibration Date	October 25, 2023	Previous Calibration	October 5, 2023
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:34	End Time (MST)	14:52
Analyzer make	API T360	Analyzer serial #	489

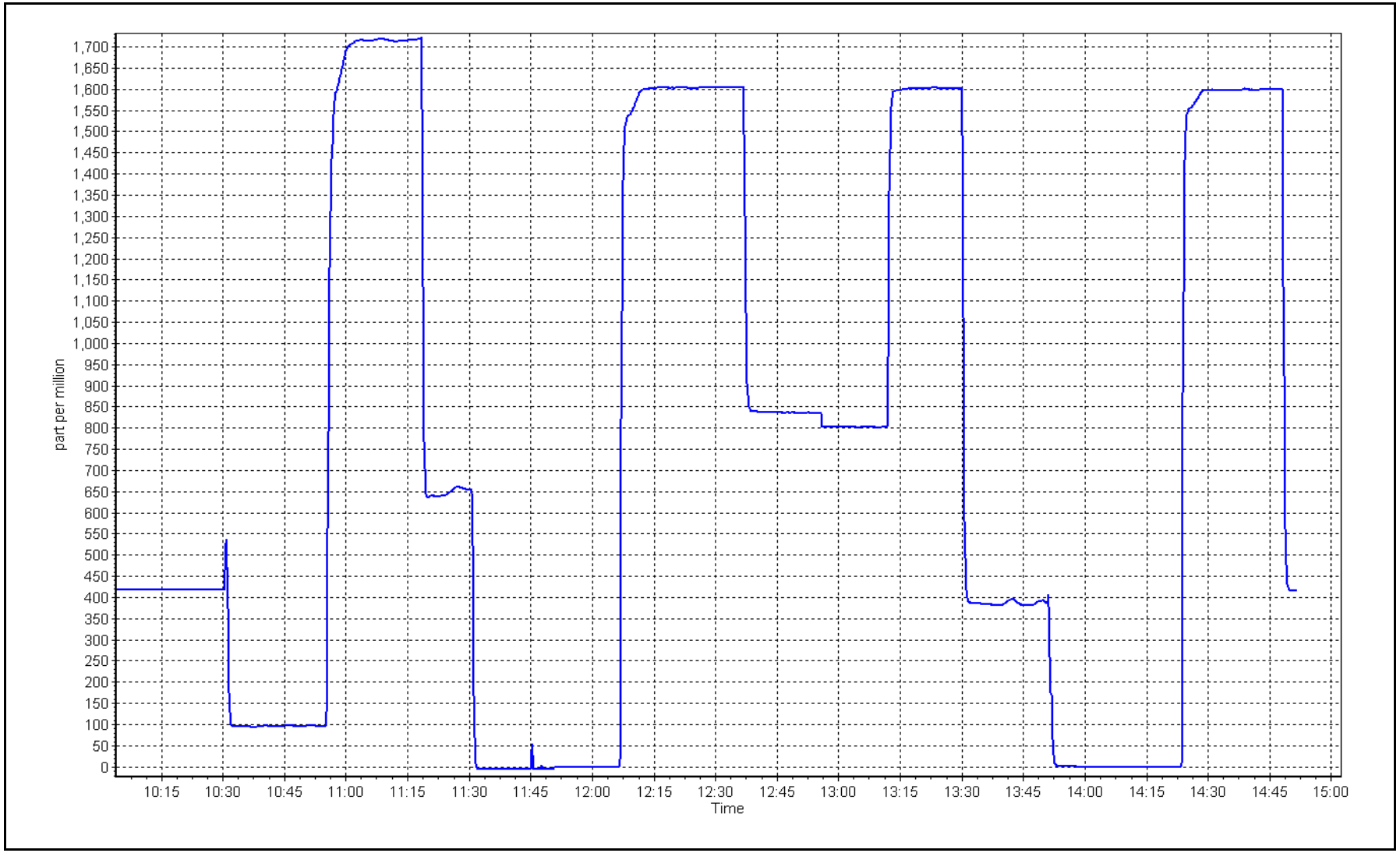
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
1605.9	1601.9	1.0025
802.9	802.0	1.0012
401.5	383.7	1.0463

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999859	*≥0.995*
Slope	1.001286	*0.90 - 1.10*
Intercept	-6.620000	*+/-10*



CO_2 Calibration Plot Date: October 25, 2023 Location: Stony Mountain



Wood Buffalo Environmental Association

PLUVIO CALIBRATION

Version-07-2017

Station Information

Station Name:	**Stony Mountain**	Station number:	**AMS 18**
Calibration Date:	October 11, 2023	Last Cal Date:	April 20, 2023
Start time (MST):	11:50	End time (MST):	13:00
Make/Model#:	OTT Pluvio 2	Pluvio Serial #:	363526

Annual Weight Test

Date of Check:	**October 11, 2023**	Previous Check Date:	**April 20, 2023**
Weights Serial #:	59781	Passed/Failed:	Pass

Spring Drip Test

Date of Check:	April 20, 2022	Previous Check Date:	October 22, 2021
Start Time:	11:45	Stop Time:	12:25
Nozzle Size Used:	100		
Amount of Water Used:	1 L	Data Logger Total:	24.08 mm
Converted Amount of Water used:	25 mm		

Rainfall (mm) = 1 L / 0.04 m2 = 25 mm is what we should be reading.

Fall Drip Test

Date of Check:	October 11, 2023	Previous Check Date:	April 20, 2023
Start Time:	12:30	Stop Time:	13:00
Nozzle Size Used:	100		
Amount of Water Used:	1 L	Data Logger Total:	24.3 mm
Converted Amount of Water used:	25 mm		

Rainfall (mm) = 1 L / 0.04 m2 = 25 mm is what we should be reading.

Notes:

Performed By: Tyler Tracksell

Pluvio Calibration Plot Date: October 11, 2023 Location: Stony Mountain

OTT Pluvio2 - Guided accuracy test

See test details below:

Date:	2023-10-10 13:07:05
OTT Pluvio2 type:	OTT Pluvio2
Bucket type:	400 cm²
Serial number / HW Index:	363523 /f3
Firmware version:	V1.50.3
Intensity units:	mm/min
Measured total weight:	4339.92 gram (108.50 mm;4.272 inch)
Information of applied weight:	500.00 gram (12.50 mm;0.492 inch)
Measured test weight:	502.24 gram (12.56 mm;0.494 inch)
Permitted deviation:	+-4.00 gram (+-0.10 mm;+-0.004 inch)
Deviation:	2.24 gram (0.06 mm;0.002 inch)
base weight	3837.68 gram (95.94 mm;3.777 inch)

Test passed:	Yes

http://www.ott.com

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS19
FIREBAG
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	October 27, 2023	Last Cal Date:	September 28, 2023
Start time (MST):	10:18	End time (MST):	13:54
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999292	1.002865	Backgd or Offset:	10.8	9.8
Calibration intercept:	0.237822	0.237458	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	-0.8	----
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	0.4	----
high point	4919	81.1	799.5	802.0	0.997
second point	4959	40.6	400.3	401.8	0.996
third point	4980	20.3	200.1	200.6	0.998
as left zero	4999	0.0	0.0	0.4	----
as left span	4919	81.1	799.5	806.0	0.992
				Average Correction Factor	0.997

Baseline Corr As found:	801.80	Previous response	799.14	*% change	0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

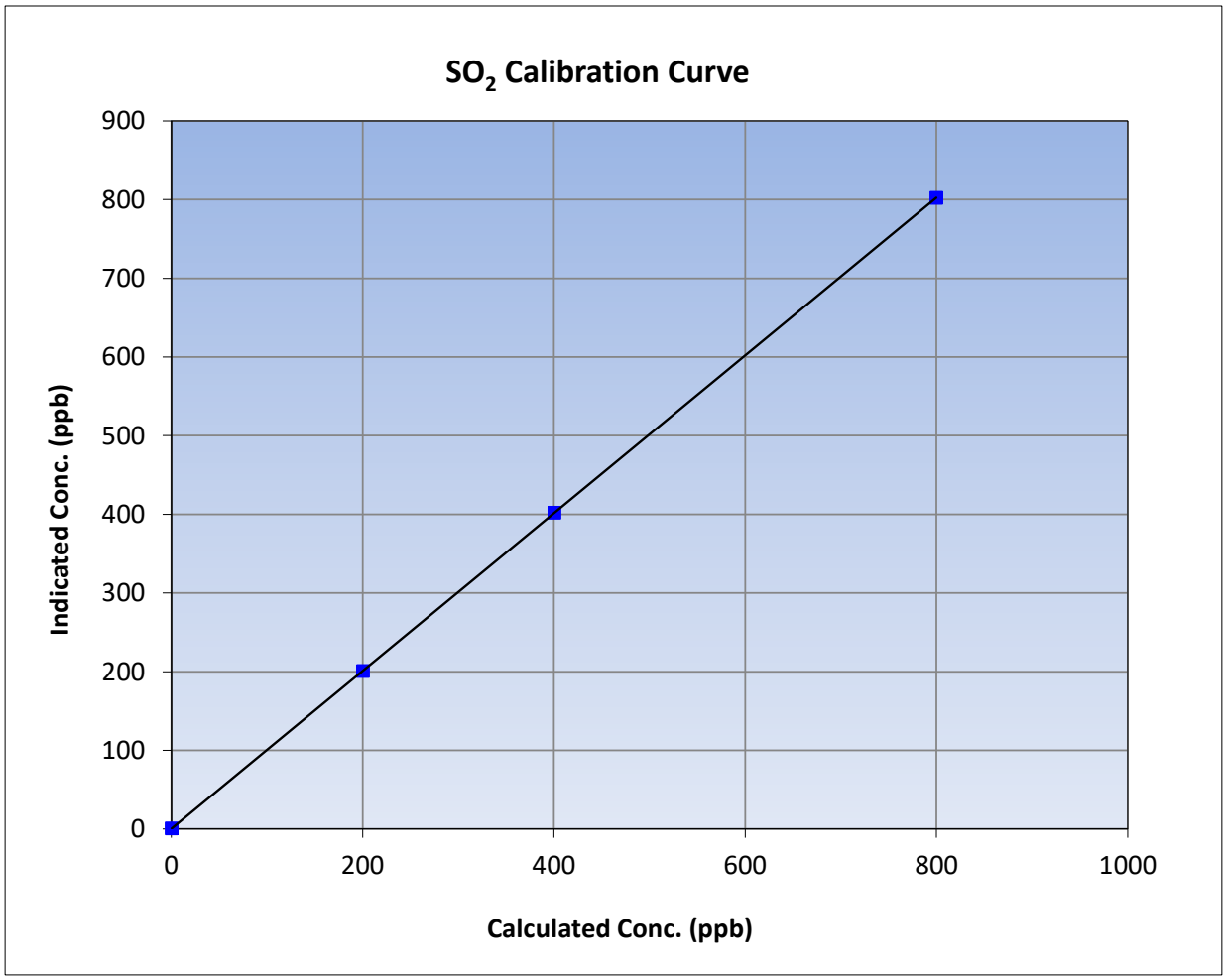
Station Information

Calibration Date:	October 27, 2023	Previous Calibration:	September 28, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:18	End Time (MST):	13:54
Analyzer make:	Thermo 43i	Analyzer serial #:	1410661308

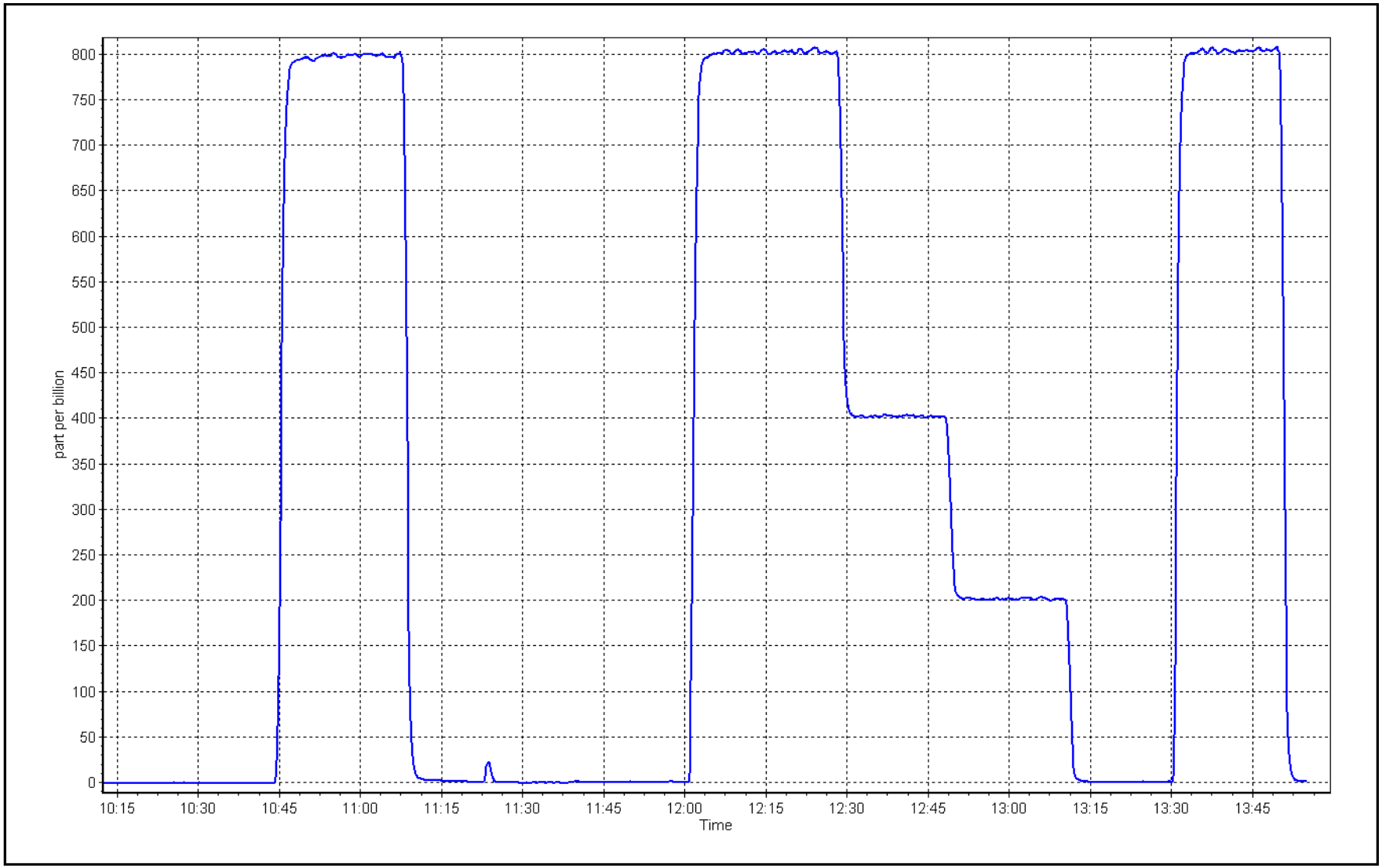
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
799.5	802.0	0.9968
400.3	401.8	0.9962
200.1	200.6	0.9975

Statistical Evaluation		Limits
Correlation Coefficient	1.000000	≥0.995
Slope	1.002865	0.90 - 1.10
Intercept	0.237458	+/-30



SO2 Calibration Plot Date: October 27, 2023 Location: Firebag



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Firebag	Station number:	AMS19
Calibration Date:	October 3, 2023	Last Cal Date:	September 11, 2023
Start time (MST):	9:39	End time (MST):	14:34
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:	0.993765	0.999195	Backgd or Offset:	2.53	2.57
Calibration intercept:	-0.161463	-0.101544	Coeff or Slope:	1.122	1.136

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.2	----
as found span	4922	78.2	80.0	79.7	1.001
as found 2nd point	4961	39.1	40.0	39.8	1.000
as found 3rd point	4980	19.6	20.0	19.8	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	-0.1	----
high point	4922	78.2	80.0	79.8	1.002
second point	4961	39.1	40.0	39.9	1.002
third point	4980	19.6	20.0	19.9	1.007
as left zero	5000	0.0	0.0	0.0	----
as left span	4922	78.2	80.0	78.6	1.018
SO2 Scrubber Check	4922	78.3	800.2	0.0	----
Date of last scrubber change:		January 18, 2023		Ave Corr Factor	1.004
Date of last converter efficiency test:		n/a			efficiency

Baseline Corr As found:	79.9	Prev response:	79.32	*% change:	0.7%
Baseline Corr 2nd AF pt:	40.0	AF Slope:	0.999195	AF Intercept:	-0.201544
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999999		

* = > +/-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

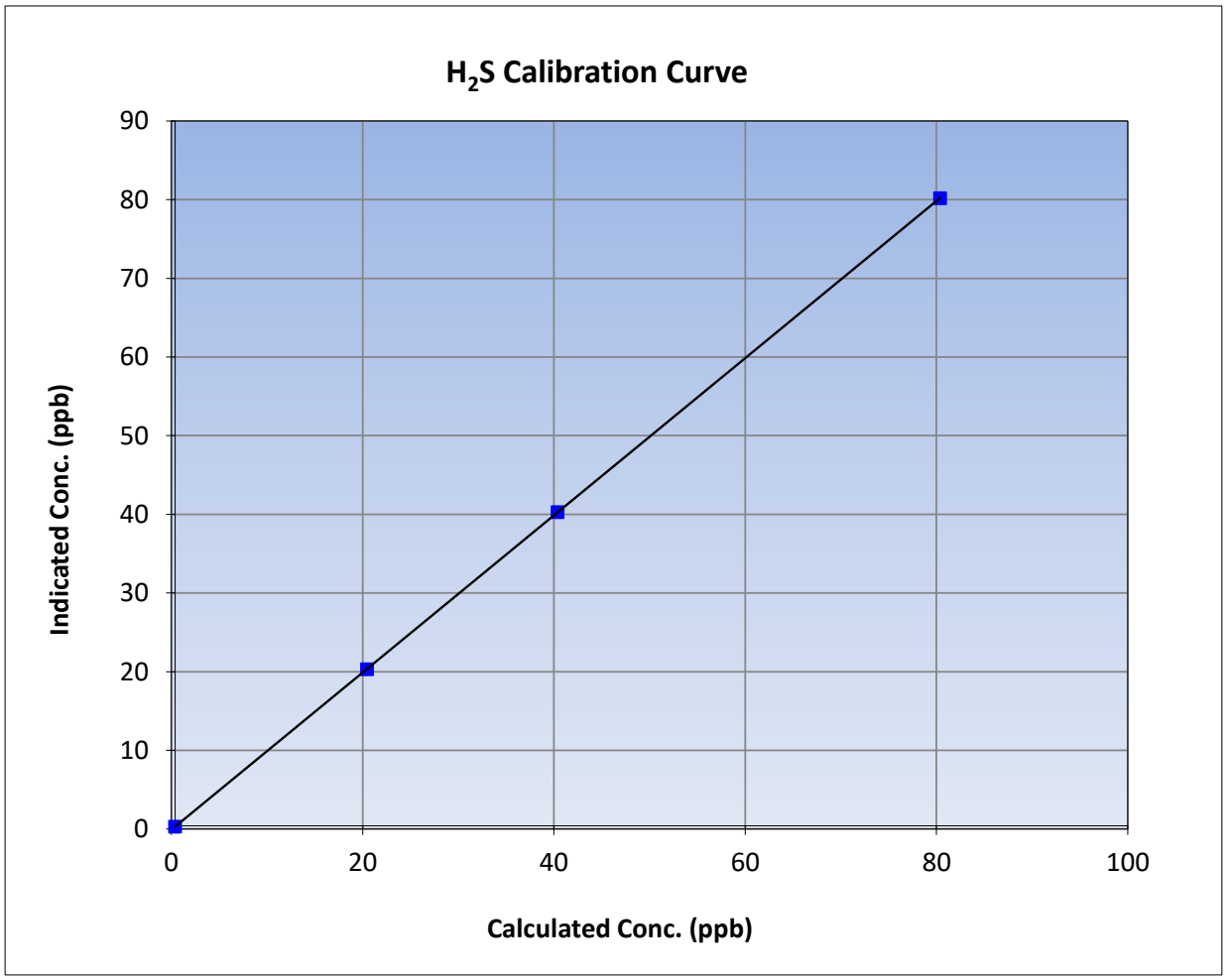
Station Information

Calibration Date:	October 3, 2023	Previous Calibration:	September 11, 2023
Station Name:	Firebag	Station Number:	AMS19
Start Time (MST):	9:39	End Time (MST):	14:34
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1151680032

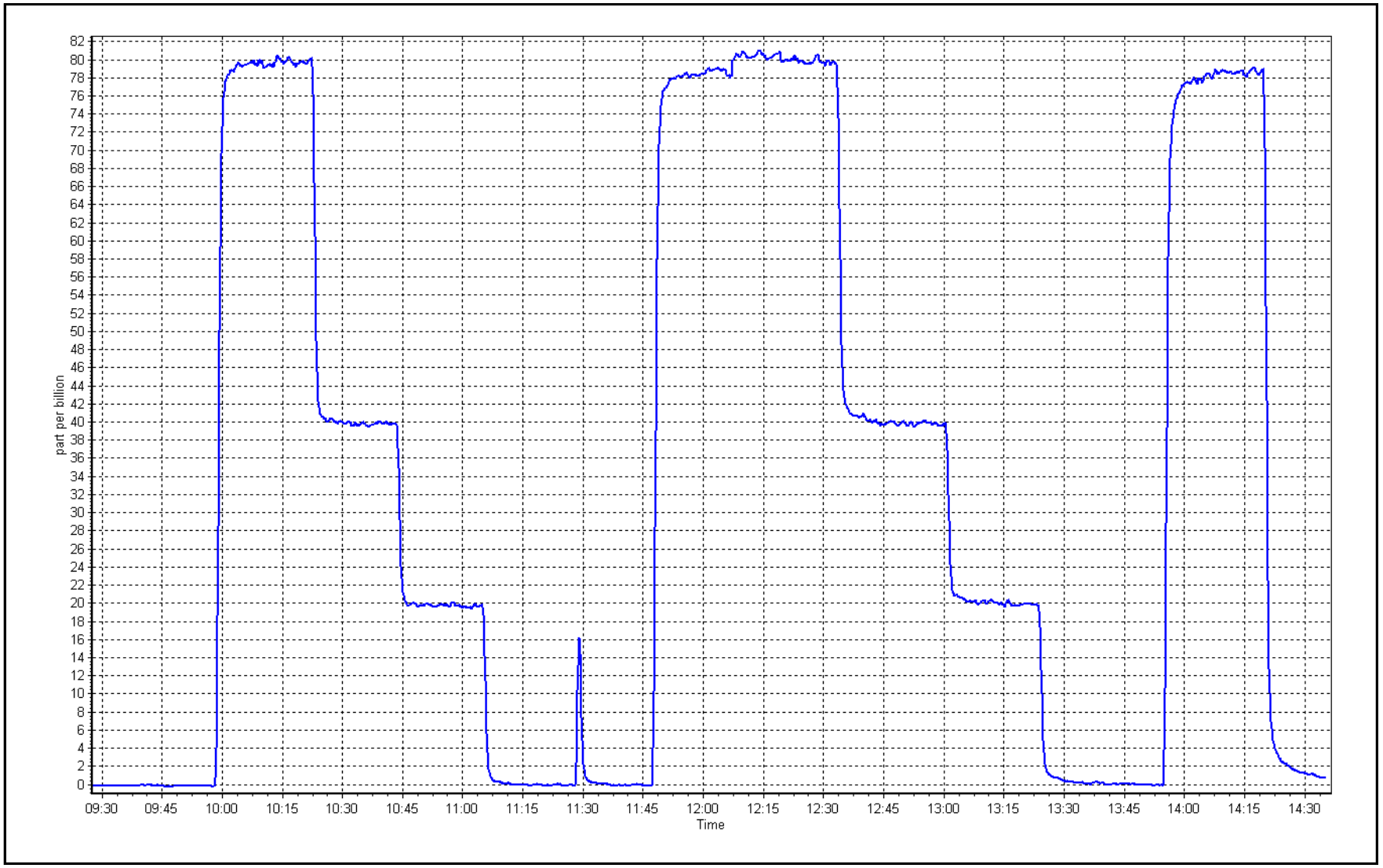
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	79.8	1.0023
40.0	39.9	1.0023
20.0	19.9	1.0075

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	0.999195	*0.90 - 1.10*
Intercept	-0.101544	*+/-3*



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



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	October 27, 2023	Last Cal Date:	September 28, 2023
Start time (MST):	10:18	End time (MST):	13:54
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:	0.998771	0.998006	Background:	3.48	2.16
Calibration intercept:	-0.052126	-0.059333	Coefficient:	3.796	3.758

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	0.29	----
as found span	4919	81.1	17.31	17.73	0.976
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	4999	0.0	0.00	-0.02	----
high point	4919	81.1	17.31	17.24	1.004
second point	4959	40.6	8.66	8.54	1.015
third point	4980	20.3	4.33	4.24	1.021
as left zero	5000	0.0	0.00	-0.02	----
as left span	4919	81.1	17.31	17.31	1.000
				Average Correction Factor	1.013

Baseline Corr As found:	17.44	Previous response	17.23	*% 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: Swapped Hydrogen cylinder after as founds. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

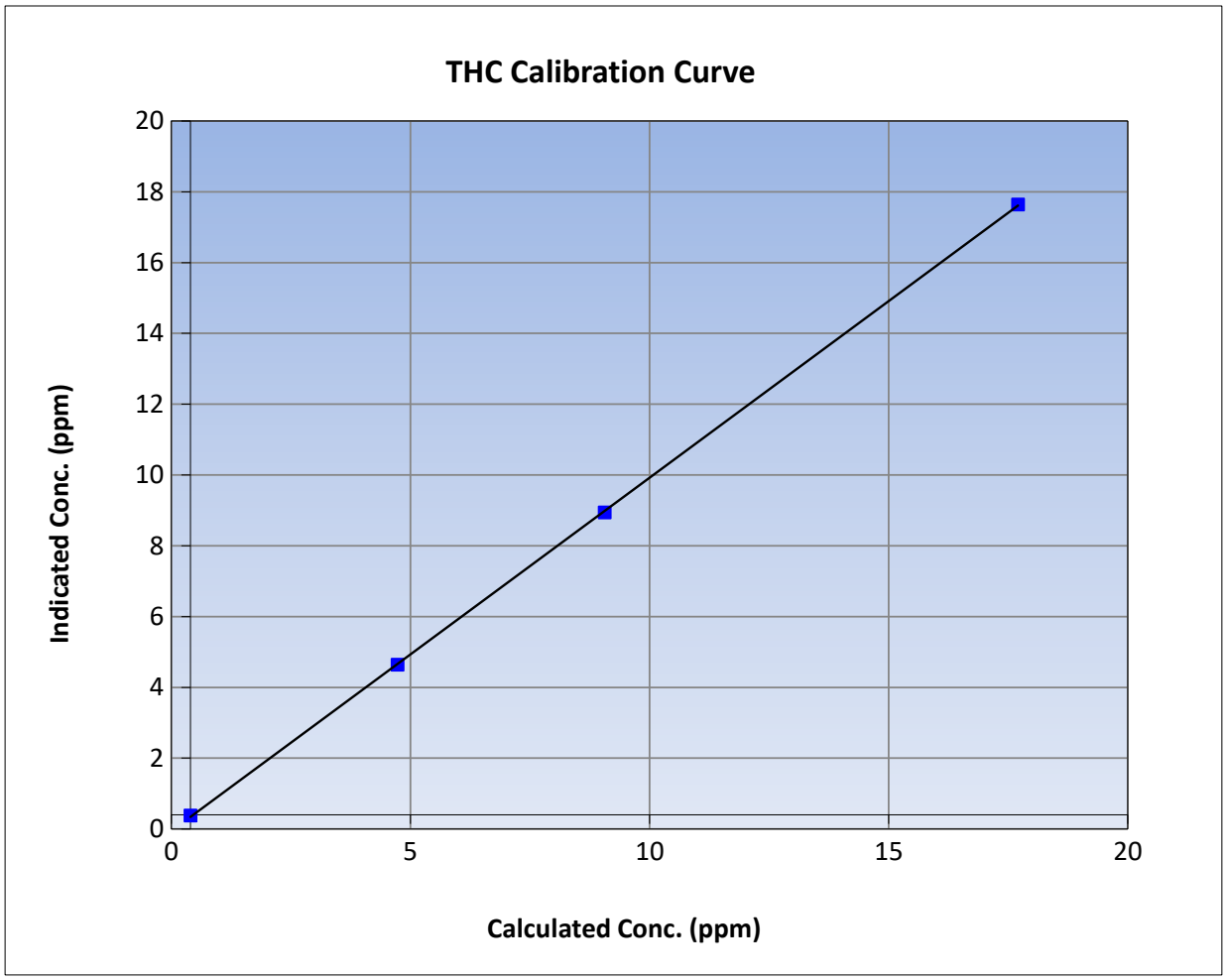
Station Information

Calibration Date:	October 27, 2023	Previous Calibration:	September 28, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:18	End Time (MST):	13:54
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1336160089

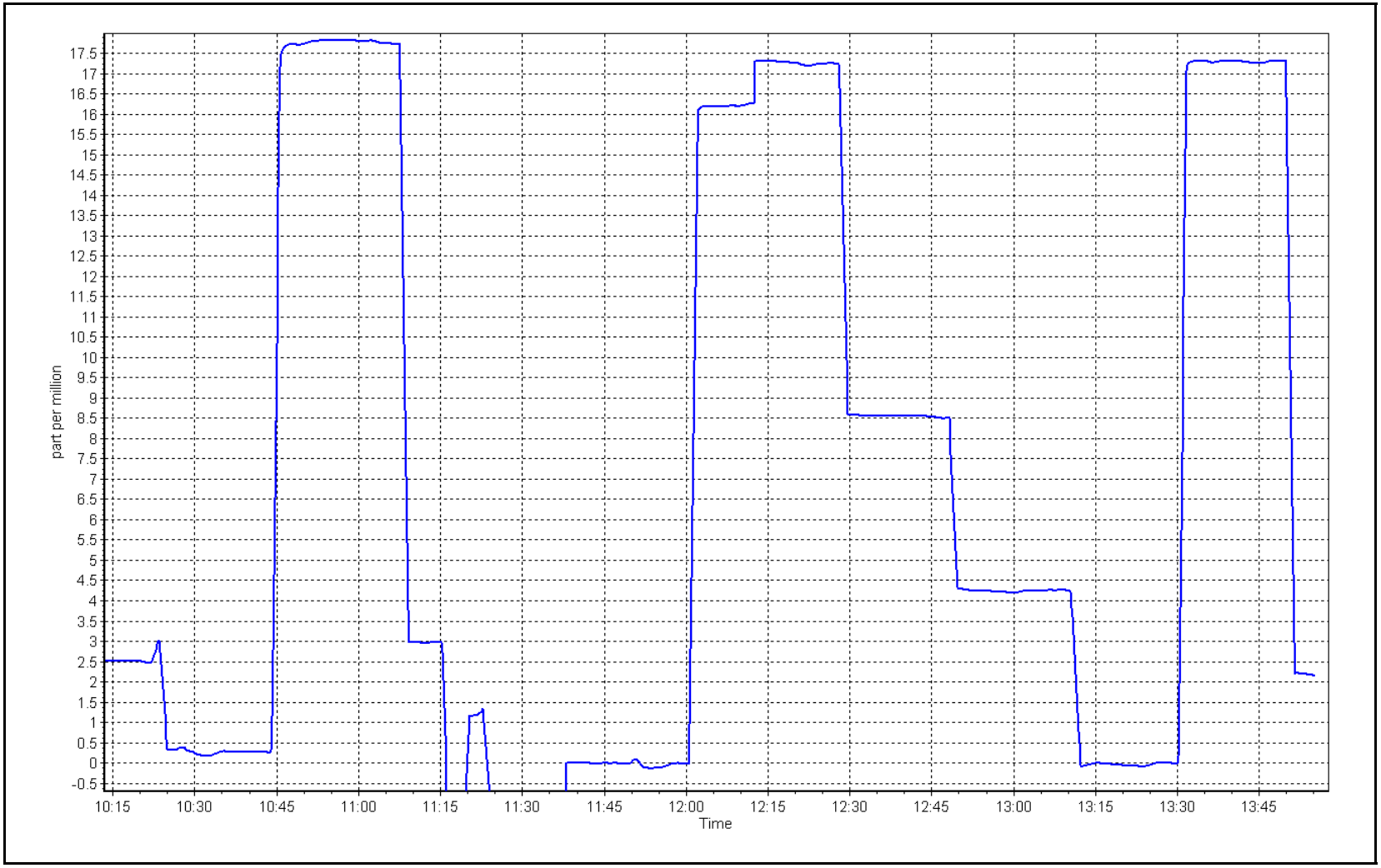
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.02	----
17.31	17.24	1.0038
8.66	8.54	1.0145
4.33	4.24	1.0206

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999970	*≥0.995*
Slope	0.998006	*0.90 - 1.10*
Intercept	-0.059333	*+/-1.5*



THC Calibration Plot Date: October 27, 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:	October 26, 2023	Last Cal Date:	September 29, 2023
Start time (MST):	10:08	End time (MST):	14:52
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:	1.098	1.078	NO bkgnd or offset:	7.6	7.5
NOX coeff or slope:	0.993	0.995	NOX bkgnd or offset:	8.6	7.6
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	213.1	217.4

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.998622	0.998388
NO_X Cal Offset:	0.176163	0.736136
NO Cal Slope:	1.000897	0.998826
NO Cal Offset:	0.249004	0.248718
NO_2 Cal Slope:	0.998565	0.996831
NO_2 Cal Offset:	-1.744715	-0.602383

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	-1.1	-0.1	-1.0	----	----
as found span	4919	81.0	828.1	800.3	27.9	842.0	809.0	33.9	0.9835	0.9892
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	799.4	27.9	1.0014	1.0011
second point	4960	40.5	414.0	400.1	13.9	414.8	400.1	14.8	0.9981	1.0000
third point	4980	20.2	206.5	199.6	6.9	207.7	199.9	7.8	0.9943	0.9983
as left zero	4999	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as left span	4919	81.0	828.1	364.9	463.3	826.0	361.6	464.7	1.0026	1.0091
								Average Correction Factor	0.9979	0.9998

Corrected As found	NO_X = 843.1 ppb	NO = 809.1 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	1.9%
Previous Response	NO_X = 827.2 ppb	NO = 801.2 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)	797.5	362.1	463.3	461.7	1.0034	99.7%
2nd GPT point (200 ppb O3)	797.5	578.6	246.8	244.5	1.0093	99.1%
3rd GPT point (100 ppb O3)	797.5	689.0	136.4	135.2	1.0086	99.1%
				Average Correction Factor	1.0071	99.3%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

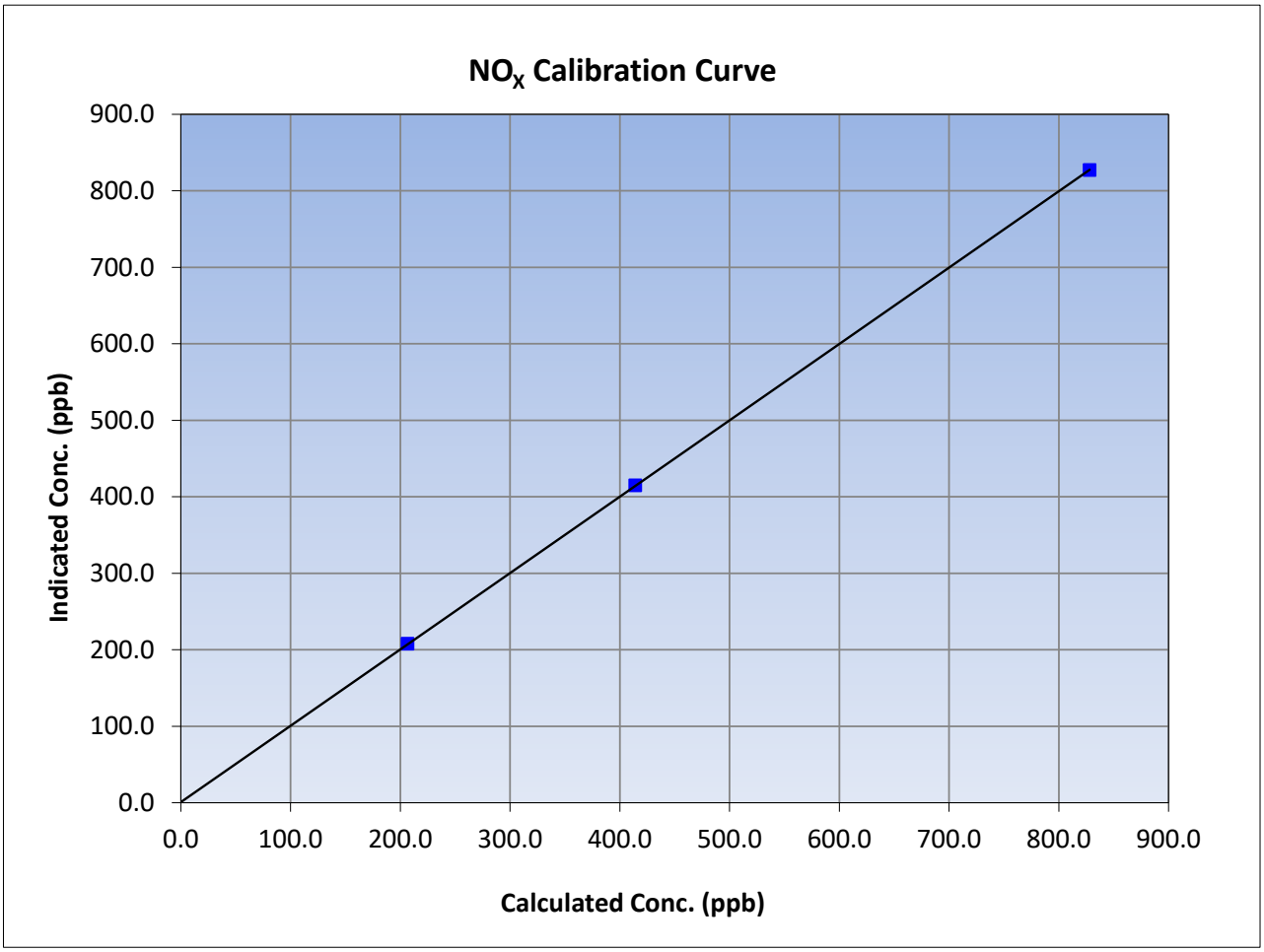
Version-04-2020

Station Information

Calibration Date:	October 26, 2023	Previous Calibration:	September 29, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:08	End Time (MST):	14:52
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	0.999994	≥0.995
828.1	827.0	1.0014			
414.0	414.8	0.9981	Slope	0.998388	0.90 - 1.10
206.5	207.7	0.9943			
			Intercept	0.736136	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

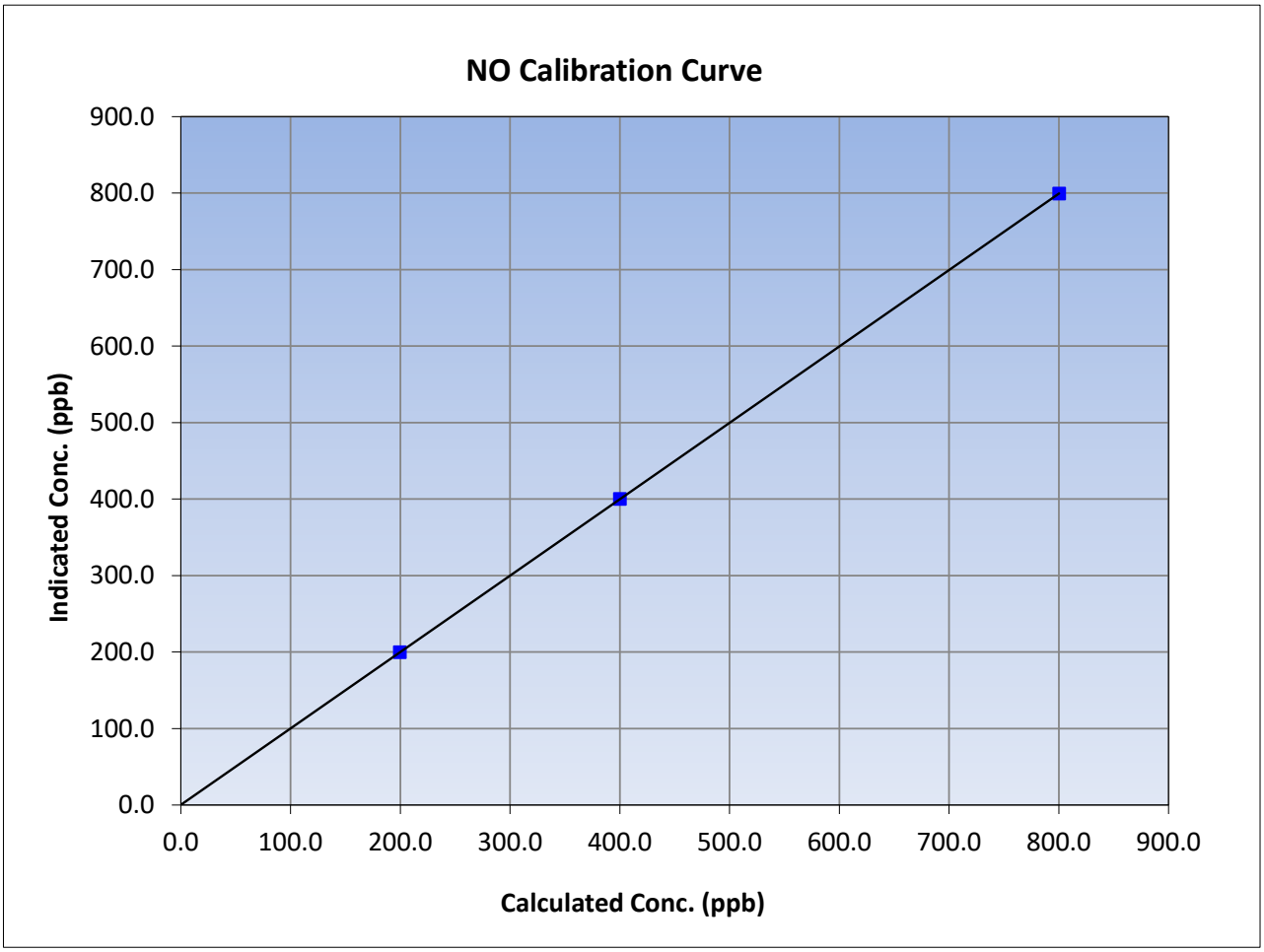
Version-04-2020

Station Information

Calibration Date:	October 26, 2023	Previous Calibration:	September 29, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:08	End Time (MST):	14:52
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999999	≥0.995
800.3	799.4	1.0011			
400.1	400.1	1.0000	Slope	0.998826	0.90 - 1.10
199.6	199.9	0.9983			
			Intercept	0.248718	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

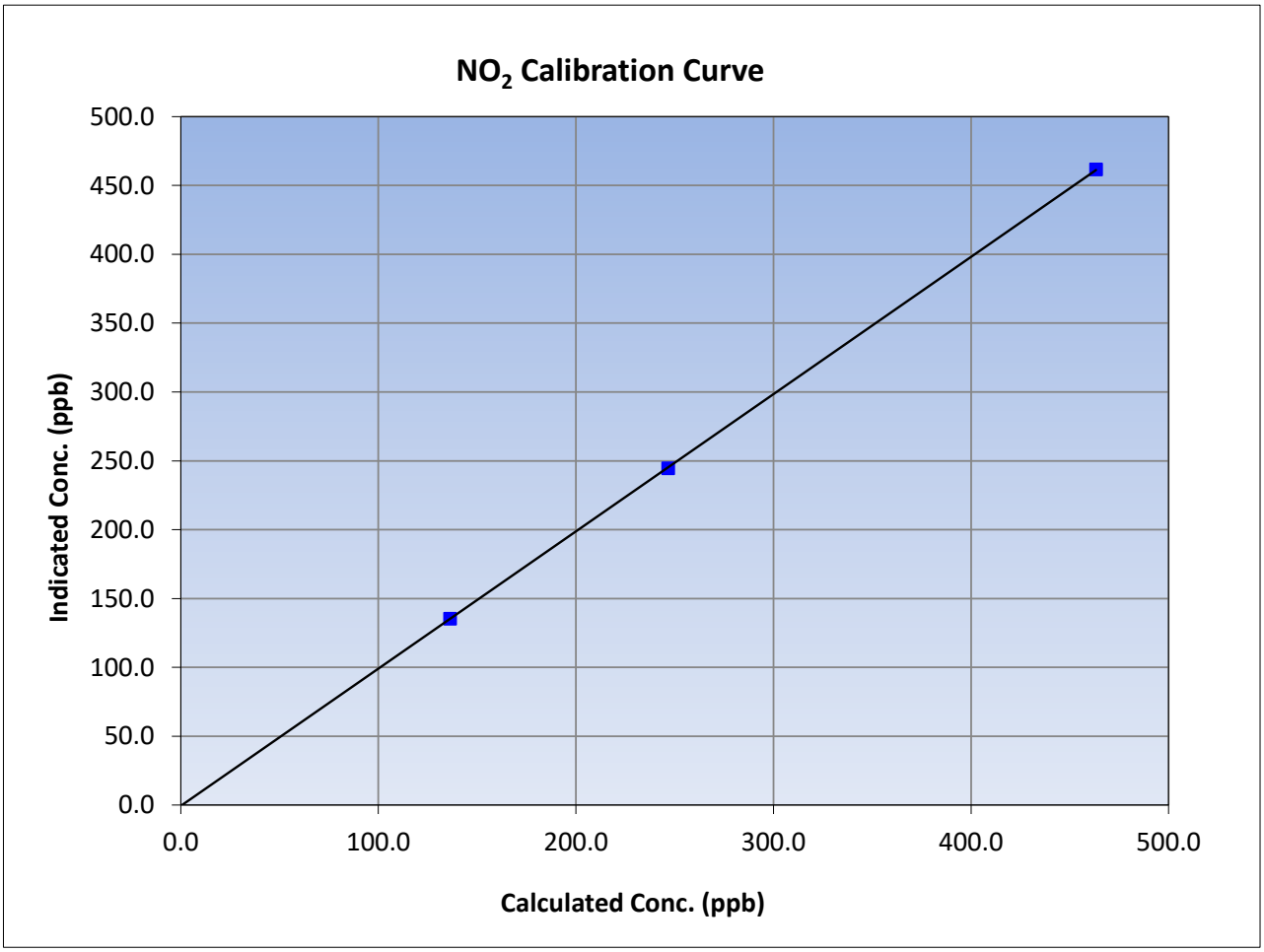
Version-04-2020

Station Information

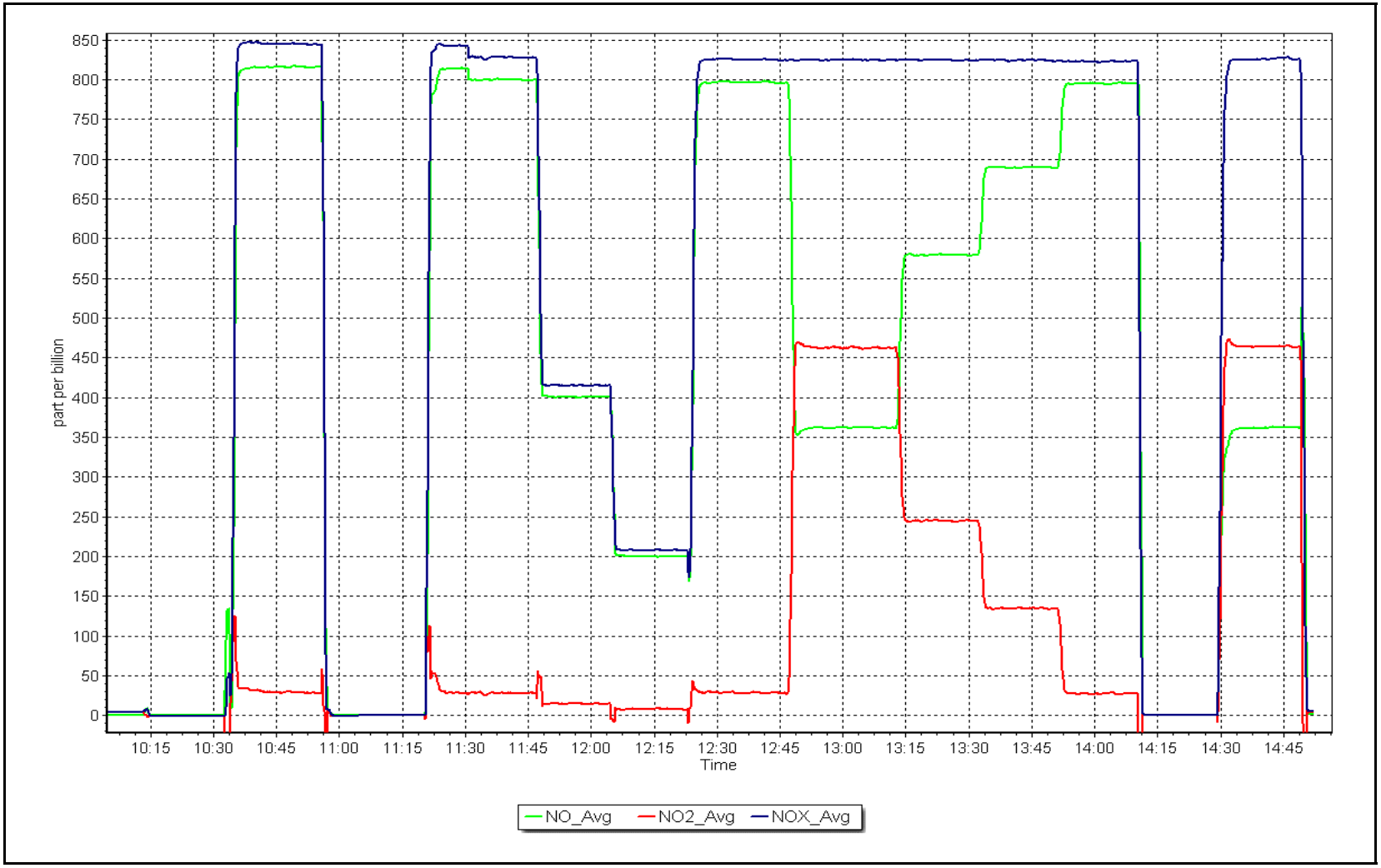
Calibration Date:	October 26, 2023	Previous Calibration:	September 29, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:08	End Time (MST):	14:52
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999989	≥0.995
463.3	461.7	1.0034			
246.8	244.5	1.0093	Slope	0.996831	0.90 - 1.10
136.4	135.2	1.0086			
			Intercept	-0.602383	+/-20



NO_X Calibration Plot Date: October 26, 2023 Location: Firebag



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS20
MACKAY RIVER
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	October 12, 2023	Last Cal Date:	September 12, 2023
Start time (MST):	7:37	End time (MST):	10:10
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	0.998878	1.005419	Backgd or Offset:	18.2	18.7
Calibration intercept:	3.251492	1.910989	Coeff or Slope:	0.945	0.945

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.8	----
as found span	4919	81.3	800.3	805.3	0.994
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.4	----
high point	4919	81.3	800.3	805.7	0.993
second point	4959	40.7	400.7	404.9	0.990
third point	4980	20.3	199.8	205.8	0.971
as left zero	5000	0.0	0.0	0.2	----
as left span	4919	81.3	800.3	804.9	0.994
				Average Correction Factor	0.985

Baseline Corr As found:	804.50	Previous response	802.62	*% 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. No maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

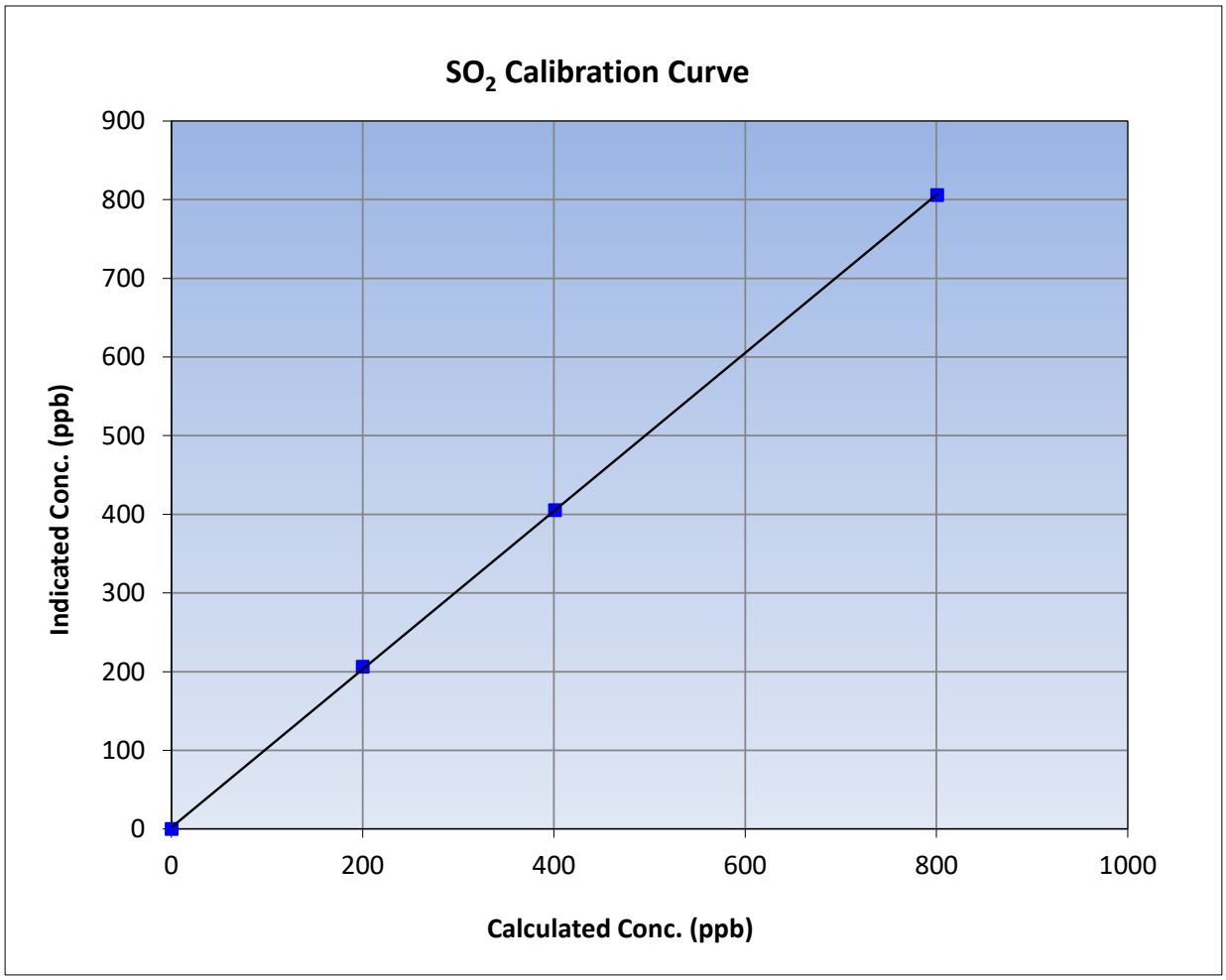
Station Information

Calibration Date:	October 12, 2023	Previous Calibration:	September 12, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	7:37	End Time (MST):	10:10
Analyzer make:	Thermo 43i	Analyzer serial #:	1501301450

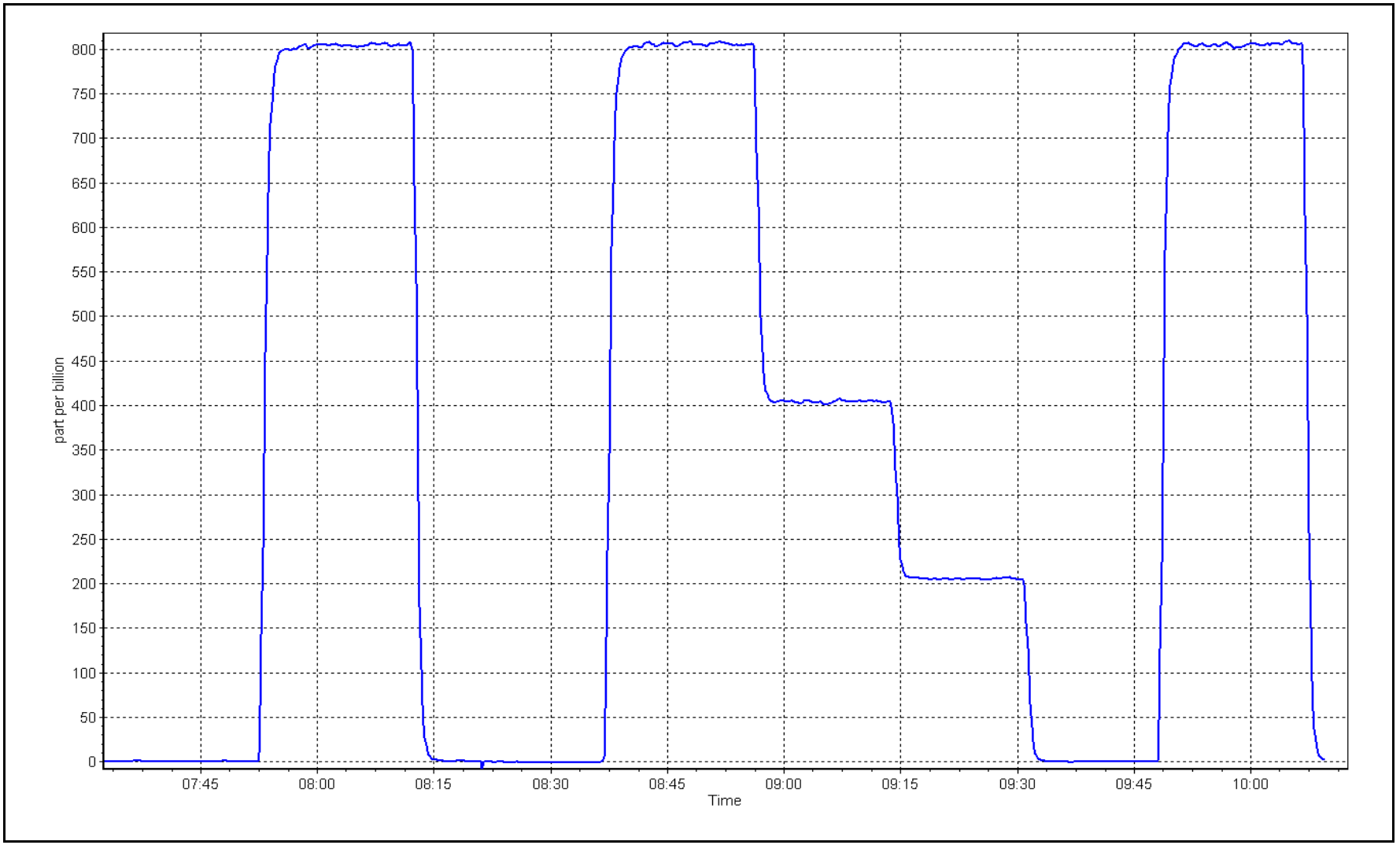
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.4	----
800.3	805.7	0.9933
400.7	404.9	0.9896
199.8	205.8	0.9709

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999958	*≥0.995*
Slope	1.005419	*0.90 - 1.10*
Intercept	1.910989	*+/-30*



SO2 Calibration Plot Date: October 12, 2023 Location: MacKay River



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	October 5, 2023	Last Cal Date:	September 11, 2023
Start time (MST):	7:02	End time (MST):	11:00
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.12	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC515997			
Removed Cal Gas Conc:	5.12	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	1220
ZAG Make/Model:	Teledyne API 701		Serial Number:	4522

Analyzer Information

Analyzer make:	Thermo 43iQ TLE		Analyzer serial #:	12124313139	
Converter make:	Global		Converter serial #:	2022-226	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.995379	1.009229	Backgd or Offset:	0.9	0.91
Calibration intercept:	0.407078	0.247261	Coeff or Slope:	0.501	0.501

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.2	----
as found span	4922	78.1	80.0	82.3	0.974
as found 2nd point	4961	39.0	39.9	41.3	0.972
as found 3rd point	4980	19.5	20.0	21.1	0.956
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	78.1	80.0	81.0	0.988
second point	4961	39.0	40.0	40.7	0.982
third point	4980	19.5	20.0	20.3	0.986
as left zero	5000	0.0	0.0	0.4	----
as left span	4922	78.1	80.0	80.5	0.994
SO2 Scrubber Check	4919	80.0	800.2	0.0	----
Date of last scrubber change:		May 25, 2023		Ave Corr Factor	0.985
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	82.1	Prev response:	80.01	*% change:	2.5%
Baseline Corr 2nd AF pt:	41.1	AF Slope:	1.025033	AF Intercept:	0.379896
Baseline Corr 3rd AF pt:	20.9	AF Correlation:	0.999973		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

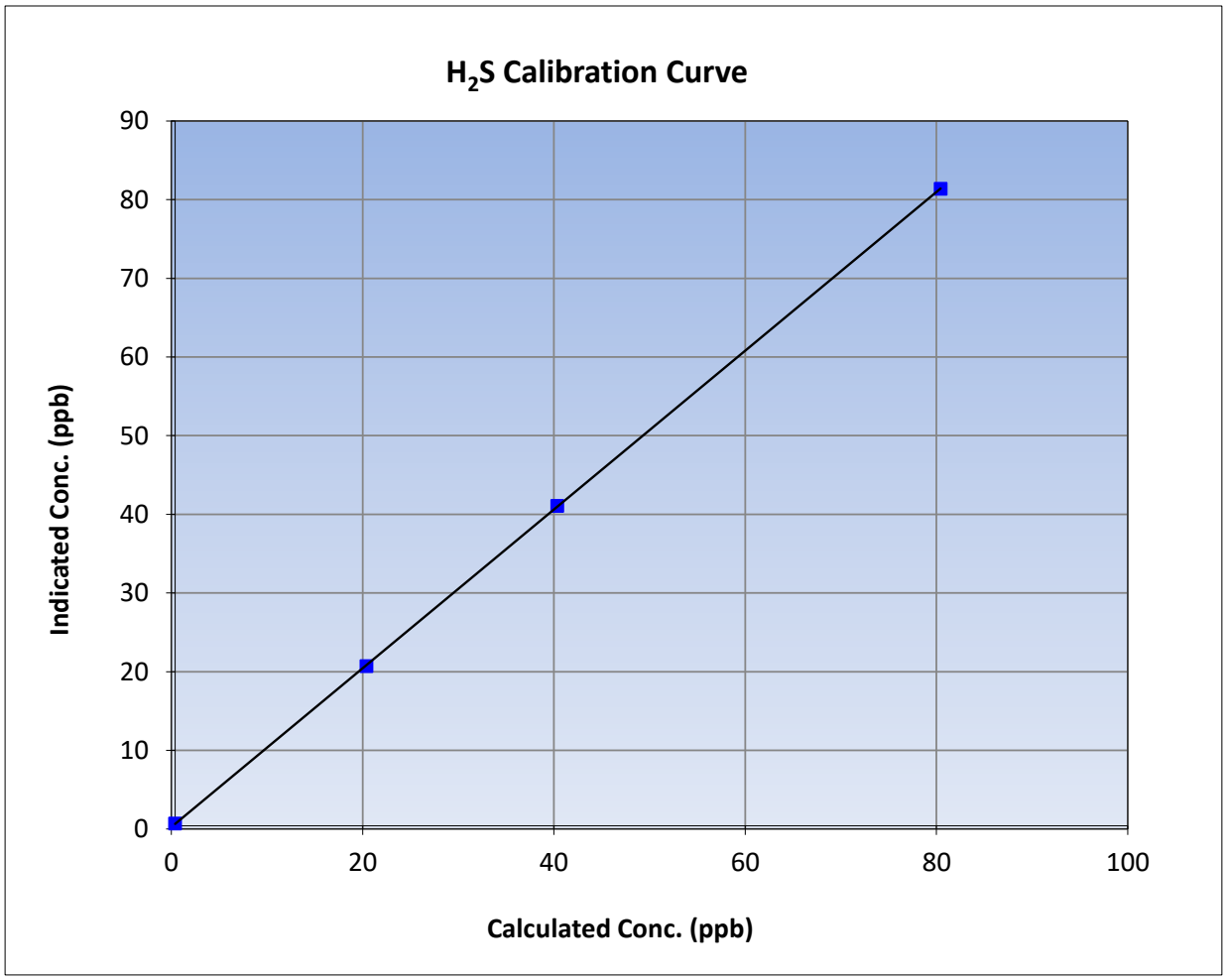
Station Information

Calibration Date:	October 5, 2023	Previous Calibration:	September 11, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	7:02	End Time (MST):	11:00
Analyzer make:	Thermo 43iQ TLE	Analyzer serial #:	12124313139

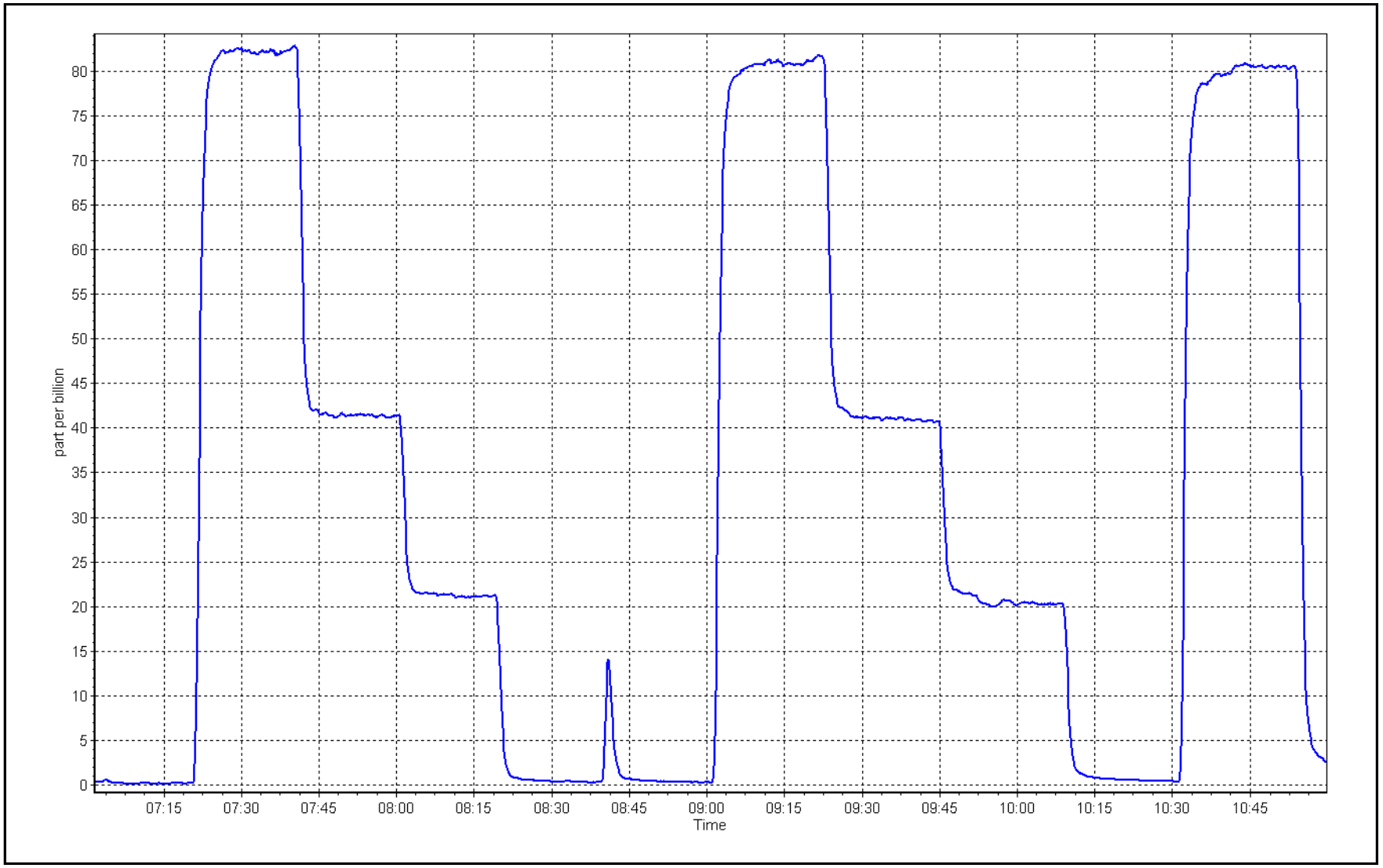
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
80.0	81.0	0.9881
40.0	40.7	0.9820
20.0	20.3	0.9860

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999989	*≥0.995*
Slope	1.009229	*0.90 - 1.10*
Intercept	0.247261	*+/-3*



H_2S Calibration Plot Date: October 5, 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:	October 23, 2023	Last Cal Date:	October 5, 2023
Start time (MST):	10:20	End time (MST):	12:00
Reason:	Removal		

Calibration Standards

Cal Gas Concentration:	5.12	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC515997			
Removed Cal Gas Conc:	5.12	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	1220
ZAG Make/Model:	Teledyne API 701		Serial Number:	4522

Analyzer Information

Analyzer make:	Thermo 43iQ TLE		Analyzer serial #:	12124313139
Converter make:	Global		Converter serial #:	2022-226
Analyzer Range	0 - 100 ppb			

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.009229		Backgd or Offset:	0.9	0.91
Calibration intercept:	0.247261		Coeff or Slope:	0.501	0.501

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.3	----
as found span	4922	78.1	80.0	83.7	0.959
as found 2nd point	4961	39.0	39.9	42.0	0.958
as found 3rd point	4980	19.5	20.0	21.5	0.942
new cylinder response					

H_2S Calibration Data

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

Date of last scrubber change:	May 25, 2023	Ave Corr Factor	
Date of last converter efficiency test:			efficiency

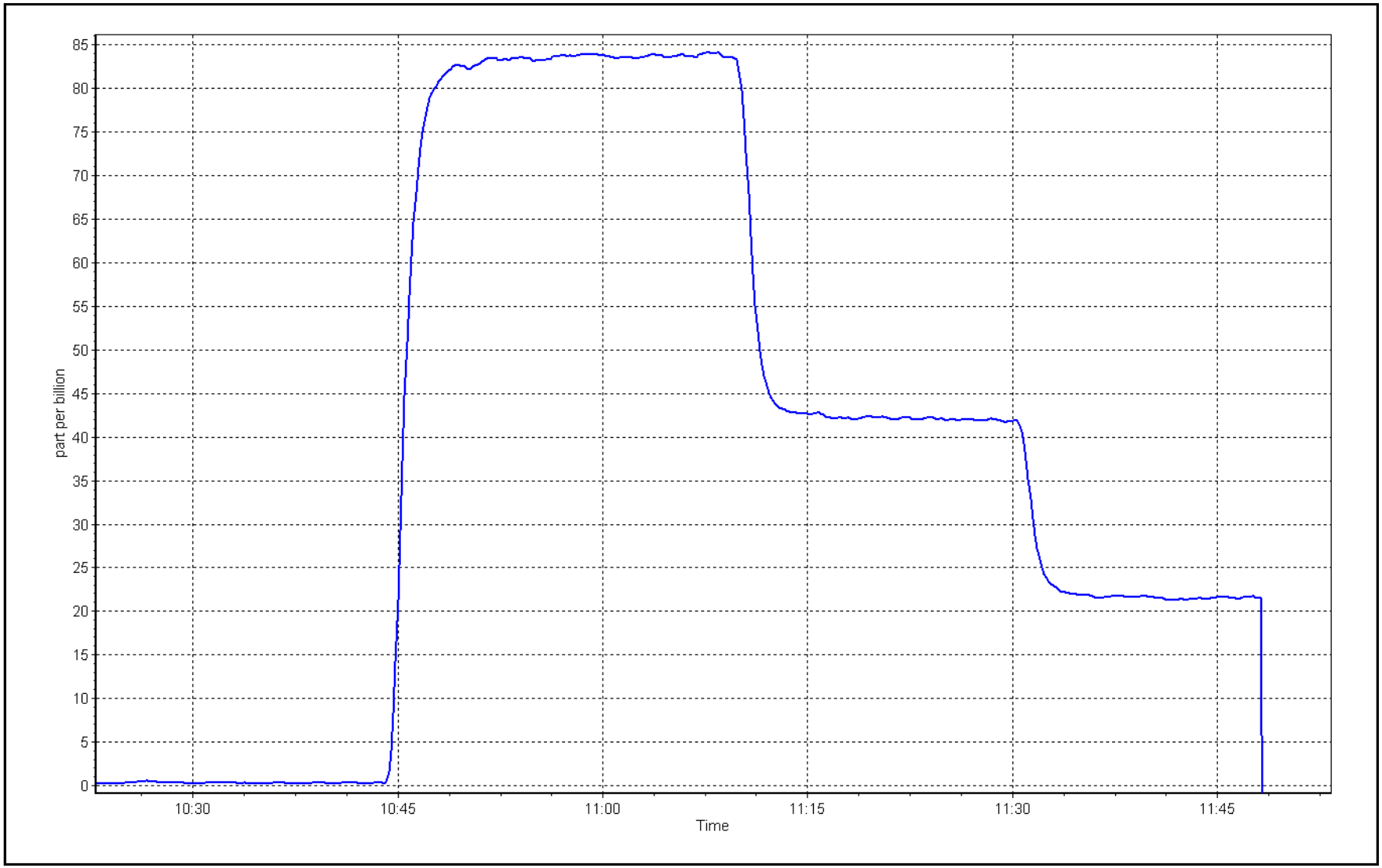
Baseline Corr As found:	83.4	Prev response:	80.96	*% change:	2.9%
Baseline Corr 2nd AF pt:	41.7	AF Slope:	1.041325	AF Intercept:	0.460195
Baseline Corr 3rd AF pt:	21.2	AF Correlation:	0.999977		

* = > +/-5% change initiates investigation

Notes: Removal Due to Lamp intensity increasing beyond limits.

Calibration Performed By: Melissa Lemay

H_2S Calibration Plot Date: October 23, 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:	October 24, 2023	Last Cal Date:	
Start time (MST):	6:50	End time (MST):	9:31
Reason:	Install		

Calibration Standards

Cal Gas Concentration:	5.12	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC515997			
Removed Cal Gas Conc:	5.12	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	1220
ZAG Make/Model:	Teledyne API 701		Serial Number:	4522

Analyzer Information

Analyzer make:	Thermo 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	Backgd or Offset:		3.07
Calibration intercept:		0.239528	Coeff or Slope:		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					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4922	78.1	80.0	80.3	0.997
second point	4961	39.0	40.0	40.4	0.989
third point	4980	19.5	20.0	20.5	0.975
as left zero	5000	0.0	0.0	0.2	----
as left span	4922	78.1	80.0	79.3	1.009

SO2 Scrubber Check

Date of last scrubber change:	May 25, 2023	Ave Corr Factor	0.987
Date of last converter efficiency test:			efficiency

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

* = > +/-5% change initiates investigation

Notes: Analyzer installed due to removed analyzer not working properly. Zero and Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

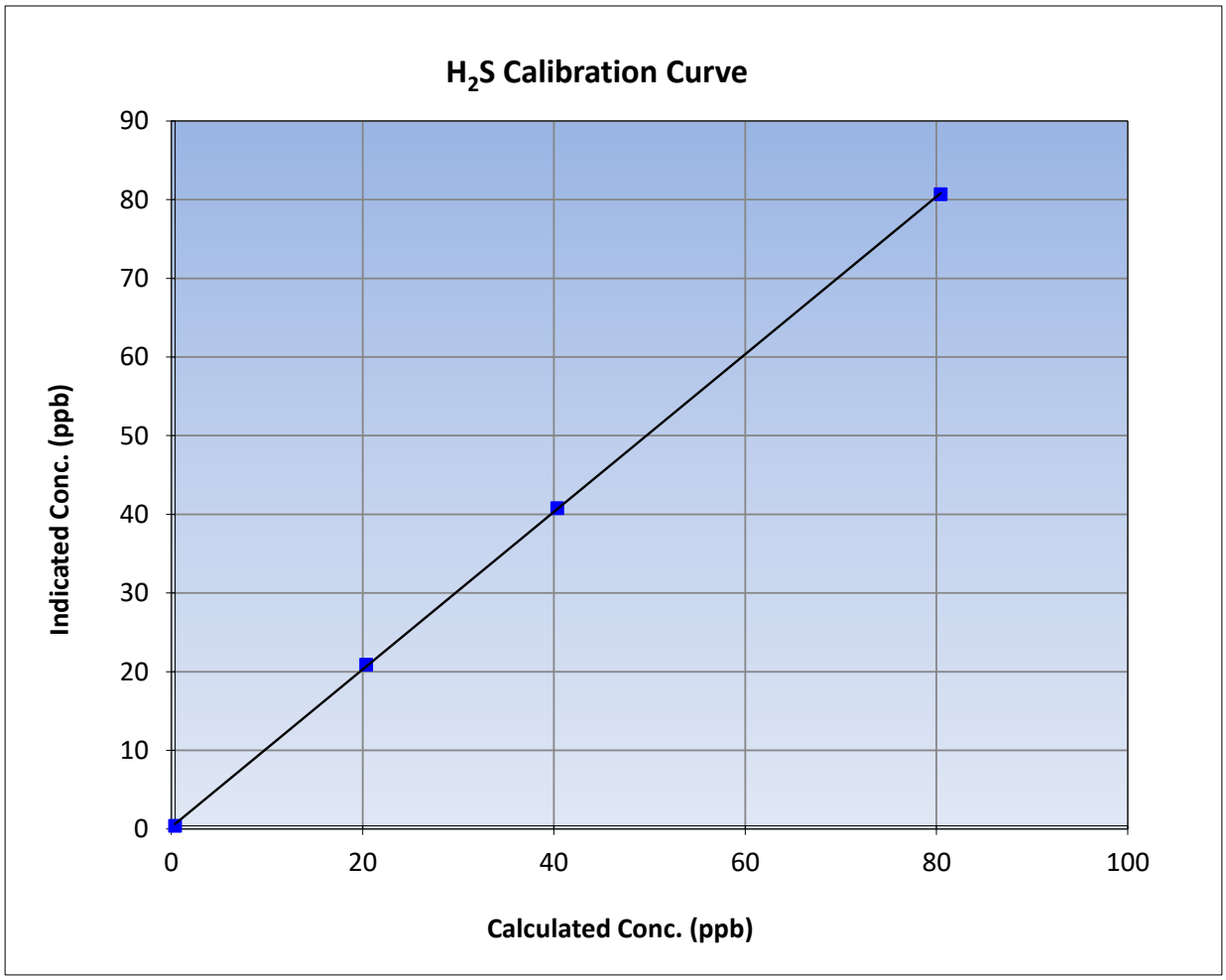
Station Information

Calibration Date:	October 24, 2023	Previous Calibration:	
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	6:50	End Time (MST):	9:31
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1236656117

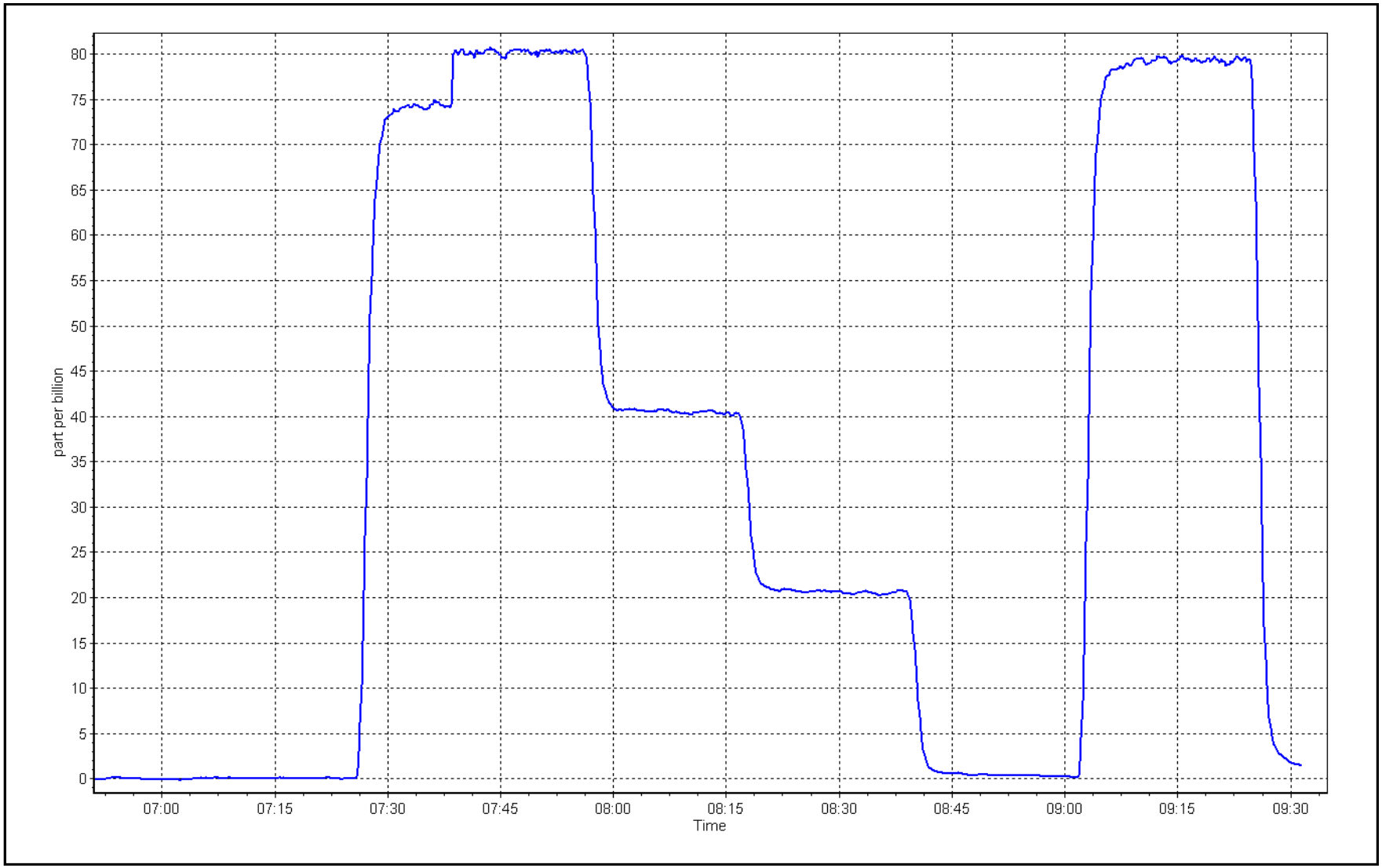
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.3	0.9967
40.0	40.4	0.9893
20.0	20.5	0.9749

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999959	*≥0.995*
Slope	1.001813	*0.90 - 1.10*
Intercept	0.239528	*+/-3*



H_2S Calibration Plot Date: October 24, 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:	October 12, 2023	Last Cal Date:	September 12, 2023
Start time (MST):	7:36	End time (MST):	10:09
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:	0.991950	0.994974	Background:	3.330	3.520
Calibration intercept:	0.123233	0.076785	Coefficient:	5.583	5.636

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	0.20	----
as found span	4919	81.3	17.34	17.39	0.997
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.03	----
high point	4919	81.3	17.34	17.30	1.002
second point	4959	40.7	8.68	8.75	0.992
third point	4980	20.3	4.33	4.43	0.977
as left zero	5000	0.0	0.00	0.01	----
as left span	4919	81.3	17.34	17.30	1.002
				Average Correction Factor	0.991

Baseline Corr As found:	17.19	Previous response	17.32	*% change	-0.8%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No maintenance done. Zero adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

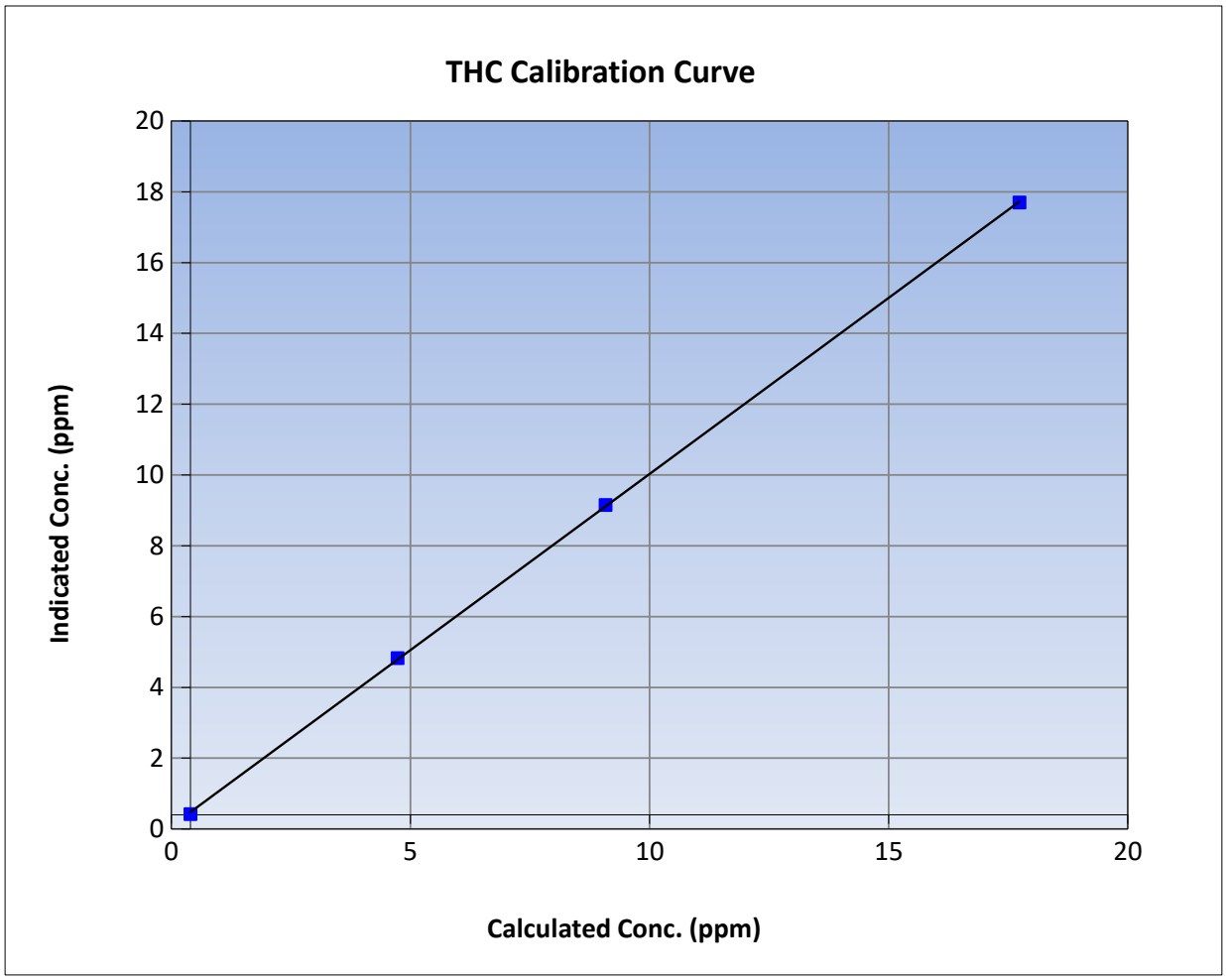
Station Information

Calibration Date:	October 12, 2023	Previous Calibration:	September 12, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	7:36	End Time (MST):	10:09
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1501663727

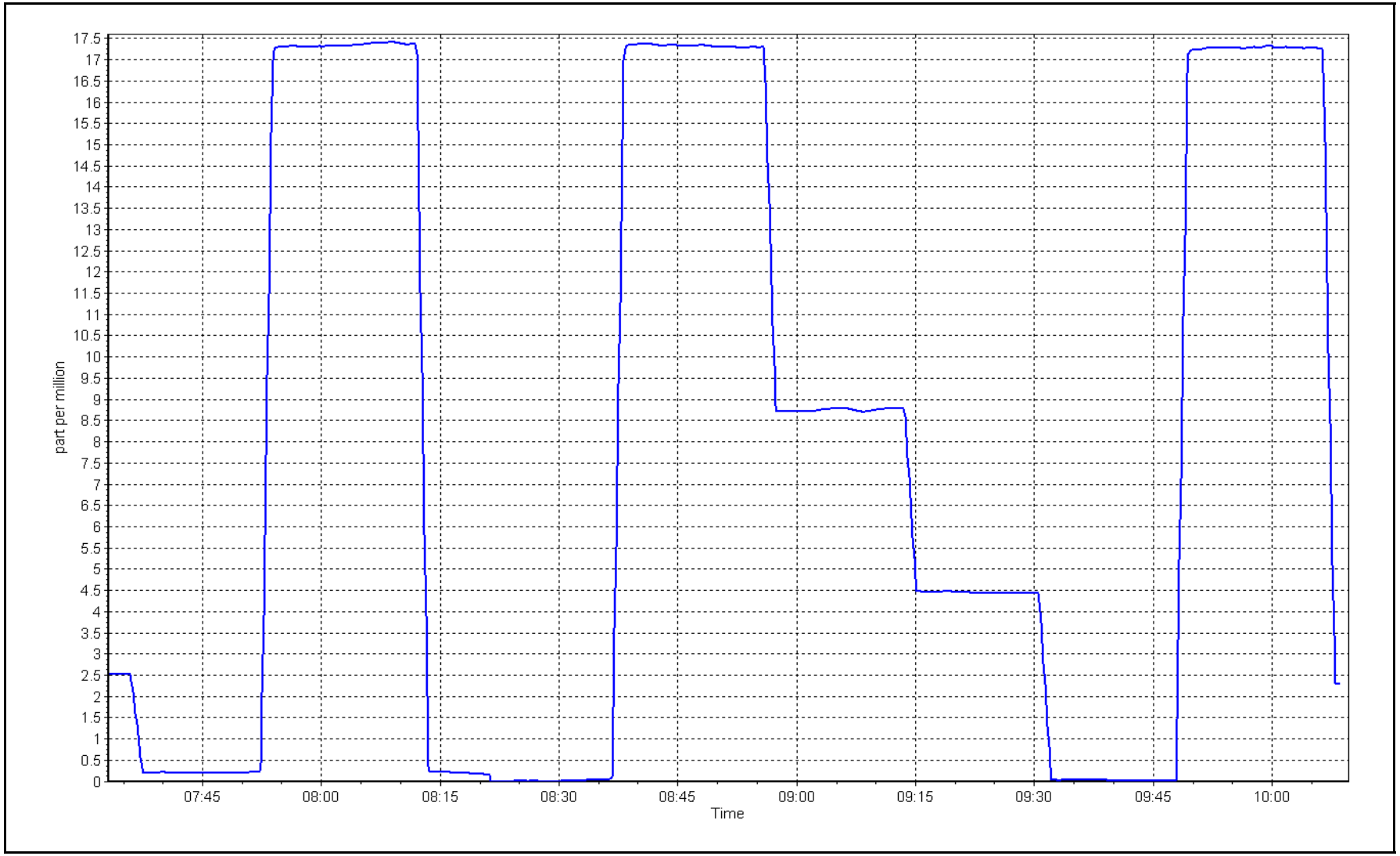
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.03	----
17.34	17.30	1.0023
8.68	8.75	0.9922
4.33	4.43	0.9773

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999958	*≥0.995*
Slope	0.994974	*0.90 - 1.10*
Intercept	0.076785	*+/-1.5*



THC Calibration Plot Date: October 12, 2023 Location: MacKay River



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	October 6, 2023	Last Cal Date:	September 14, 2023
Start time (MST):	6:45	End time (MST):	10:58
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:	1.536	1.486	NO bkgnd or offset:	4.3	4.1
NOX coeff or slope:	0.992	0.994	NOX bkgnd or offset:	4.3	4.1
NO2 coeff or slope:	0.995	0.995	Reaction cell Press:	189.4	189.4

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.996495	0.995380
NO_X Cal Offset:	3.649884	3.749814
NO Cal Slope:	0.997991	0.994536
NO Cal Offset:	2.330879	2.591219
NO_2 Cal Slope:	1.001543	1.007687
NO_2 Cal Offset:	-0.862665	-0.458883

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	0.0	----	----
as found span	4917	83.3	819.5	800.3	19.2	849.0	828.0	21.0	0.9652	0.9665
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	818.0	797.6	20.4	1.0018	1.0034
second point	4956	41.7	410.4	400.8	9.6	413.0	401.4	11.6	0.9938	0.9986
third point	4979	20.8	204.6	199.9	4.8	211.7	204.7	7.0	0.9666	0.9763
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as left span	4917	83.3	819.5	442.7	376.8	817.6	437.1	380.4	1.0023	1.0128
								Average Correction Factor	0.9874	0.9928

Corrected As found	NO_X = 849.0 ppb	NO = 828.1 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	3.4%
Previous Response	NO_X = 820.2 ppb	NO = 801.0 ppb		*Percent Change	NO =	3.3%
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)	794.9	437.3	376.8	379.4	0.9930	100.7%
2nd GPT point (200 ppb O3)	794.9	608.9	205.2	206.4	0.9940	100.6%
3rd GPT point (100 ppb O3)	794.9	698.4	115.7	115.2	1.0040	99.6%
				Average Correction Factor	0.9970	100.3%

Notes: No maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

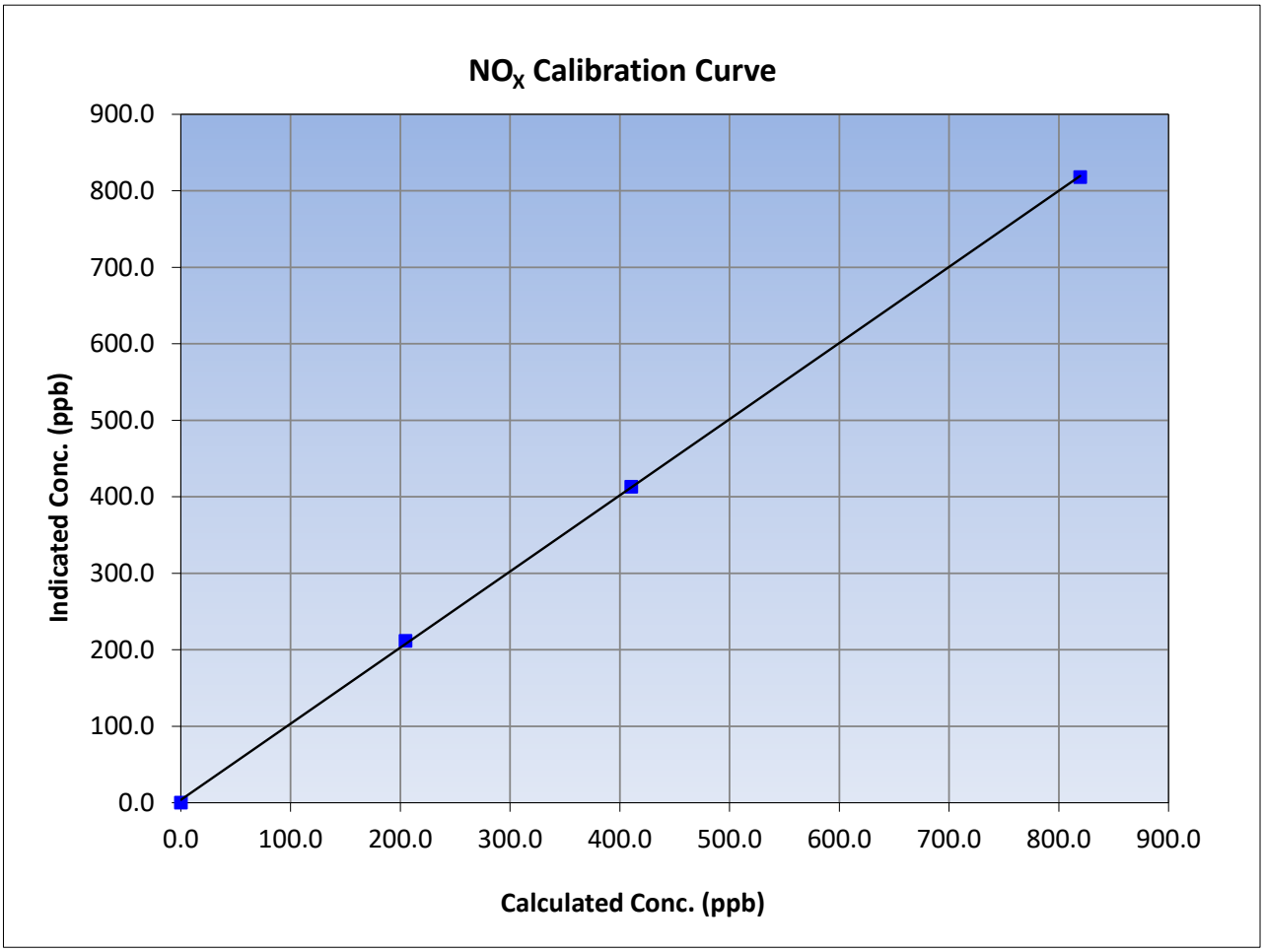
Version-04-2020

Station Information

Calibration Date:	October 6, 2023	Previous Calibration:	September 14, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	6:45	End Time (MST):	10:58
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	0.999909	≥0.995
819.5	818.0	1.0018			
410.4	413.0	0.9938	Slope	0.995380	0.90 - 1.10
204.6	211.7	0.9666			
			Intercept	3.749814	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

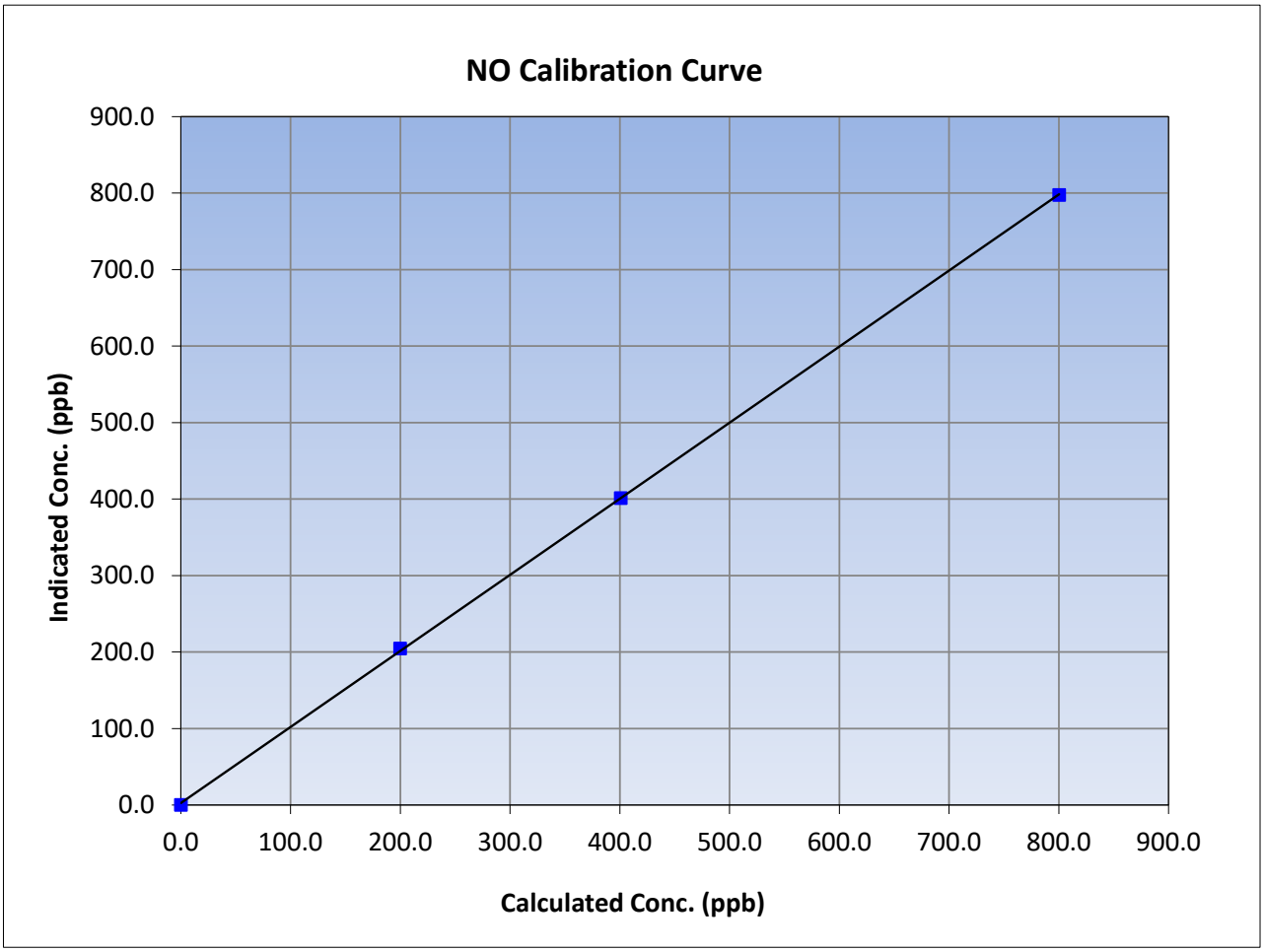
Version-04-2020

Station Information

Calibration Date:	October 6, 2023	Previous Calibration:	September 14, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	6:45	End Time (MST):	10:58
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	0.999946	≥0.995
800.3	797.6	1.0034			
400.8	401.4	0.9986	Slope	0.994536	0.90 - 1.10
199.9	204.7	0.9763			
			Intercept	2.591219	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

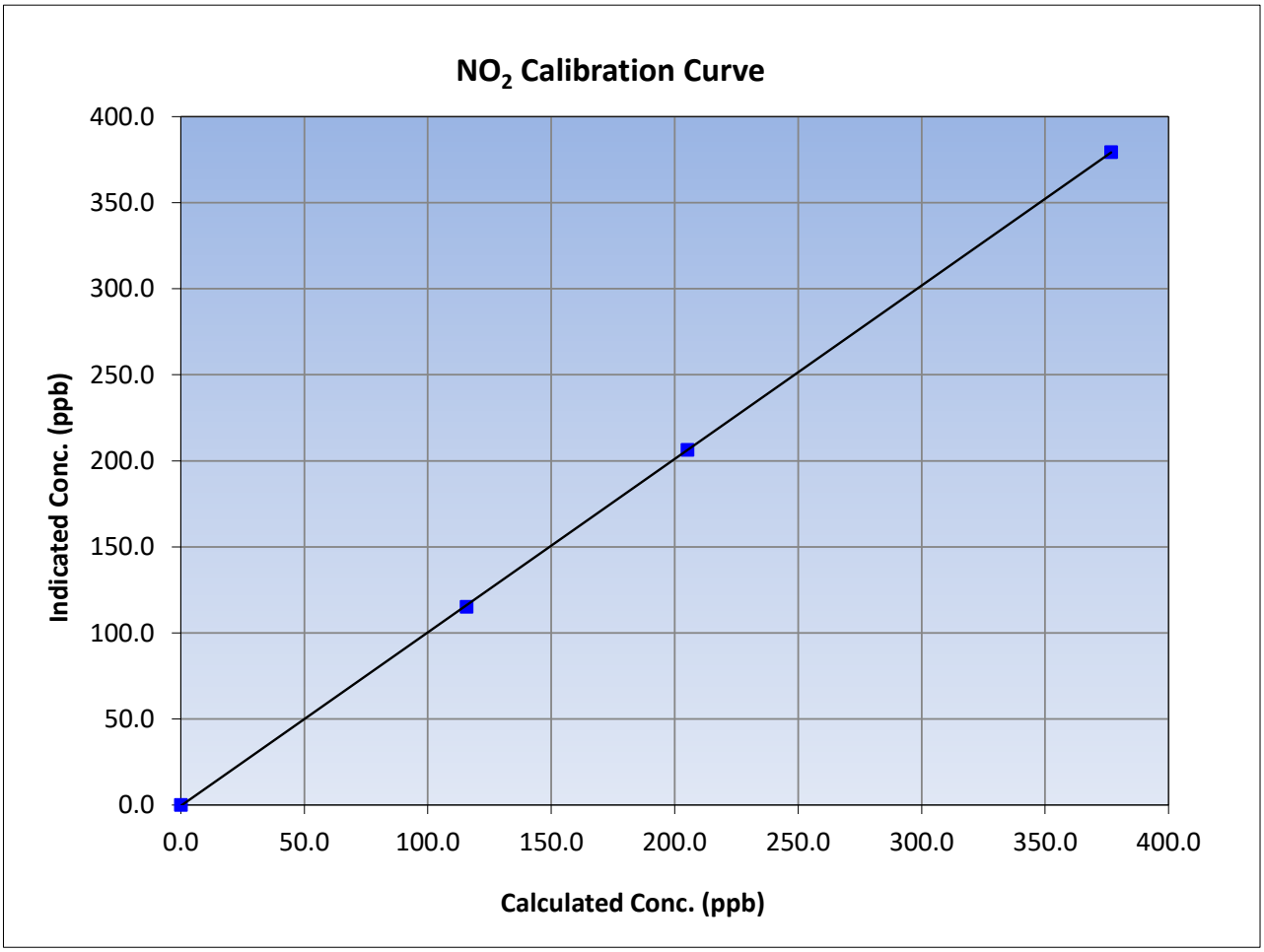
Version-04-2020

Station Information

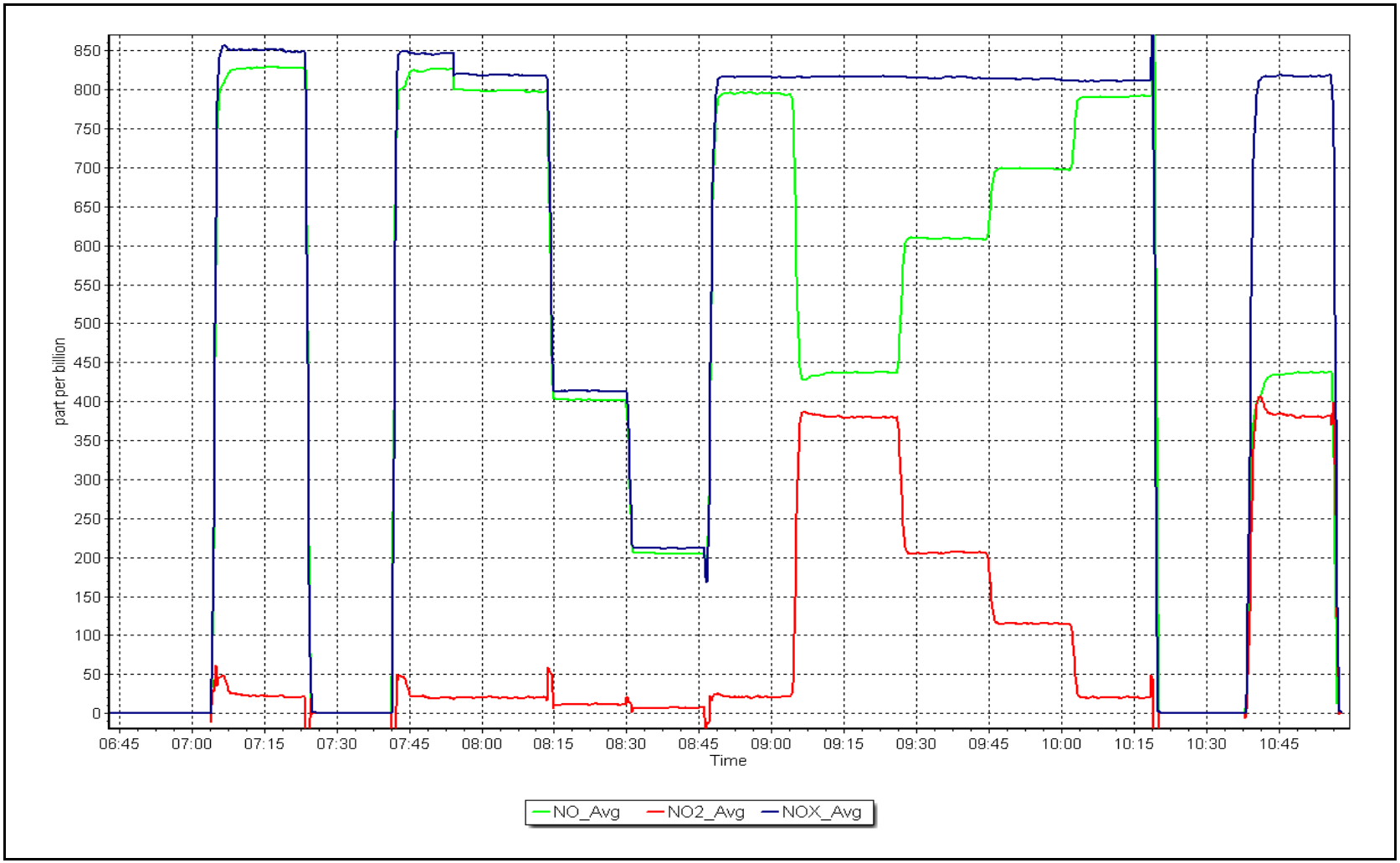
Calibration Date:	October 6, 2023	Previous Calibration:	September 14, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	6:45	End Time (MST):	10:58
Analyzer make:	Thermo 42i	Analyzer serial #:	1505164379

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999985	≥0.995
376.8	379.4	0.9930			
205.2	206.4	0.9940	Slope	1.007687	0.90 - 1.10
115.7	115.2	1.0040			
			Intercept	-0.458883	+/-20



NO_X Calibration Plot Date: October 6, 2023 Location: MacKay River



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS21
CONKLIN
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	October 20, 2023	Last Cal Date:	September 26, 2023
Start time (MST):	11:21	End time (MST):	15:33
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:	1.000644	0.997591	Backgd or Offset:	26.8	27.4
Calibration intercept:	0.775866	0.795745	Coeff or Slope:	0.883	0.892

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5005	0.0	0.0	0.2	----
as found span	4920	80.2	800.8	798.5	1.003
as found 2nd point	4960	40.1	400.4	400.4	1.000
as found 3rd point	4980	20.0	200.1	201.7	0.992
new cylinder response					
calibrator zero	5005	0.0	0.0	0.3	----
high point	4920	80.2	800.8	799.5	1.002
second point	4960	40.1	400.4	400.4	1.000
third point	4980	20.0	200.1	201.0	0.996
as left zero	5005	0.0	0.0	0.2	----
as left span	4920	80.2	800.8	799.5	1.002
				Average Correction Factor	0.999

Baseline Corr As found:	798.30	Previous response	802.14	*% change	-0.5%
Baseline Corr 2nd AF pt:	400.20	AF Slope:	0.996106	AF Intercept:	1.215744
Baseline Corr 3rd AF pt:	201.50	AF Correlation:	0.999992		

* = > +/-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

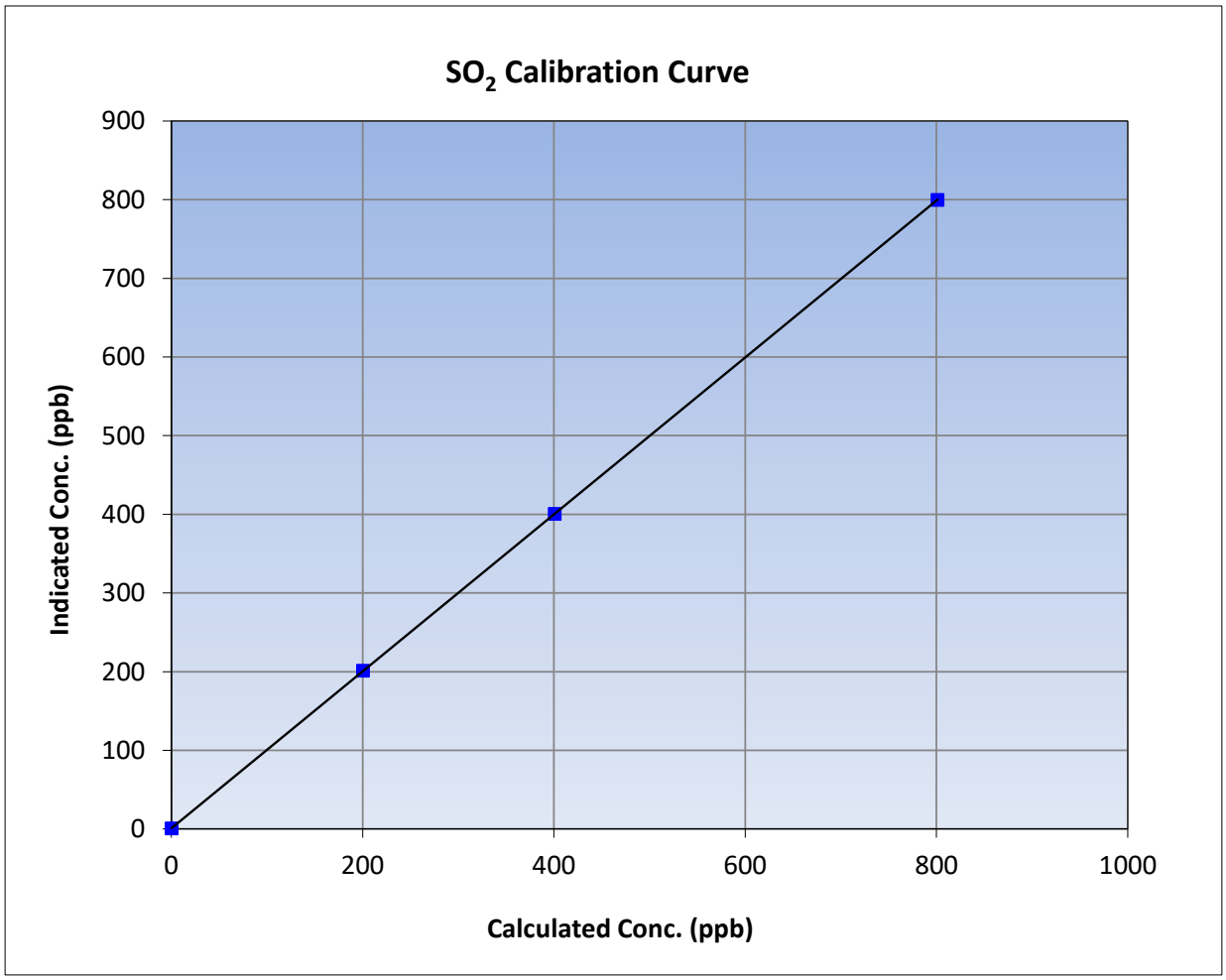
Station Information

Calibration Date:	October 20, 2023	Previous Calibration:	September 26, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:21	End Time (MST):	15:33
Analyzer make:	Thermo 43i	Analyzer serial #:	1428701363

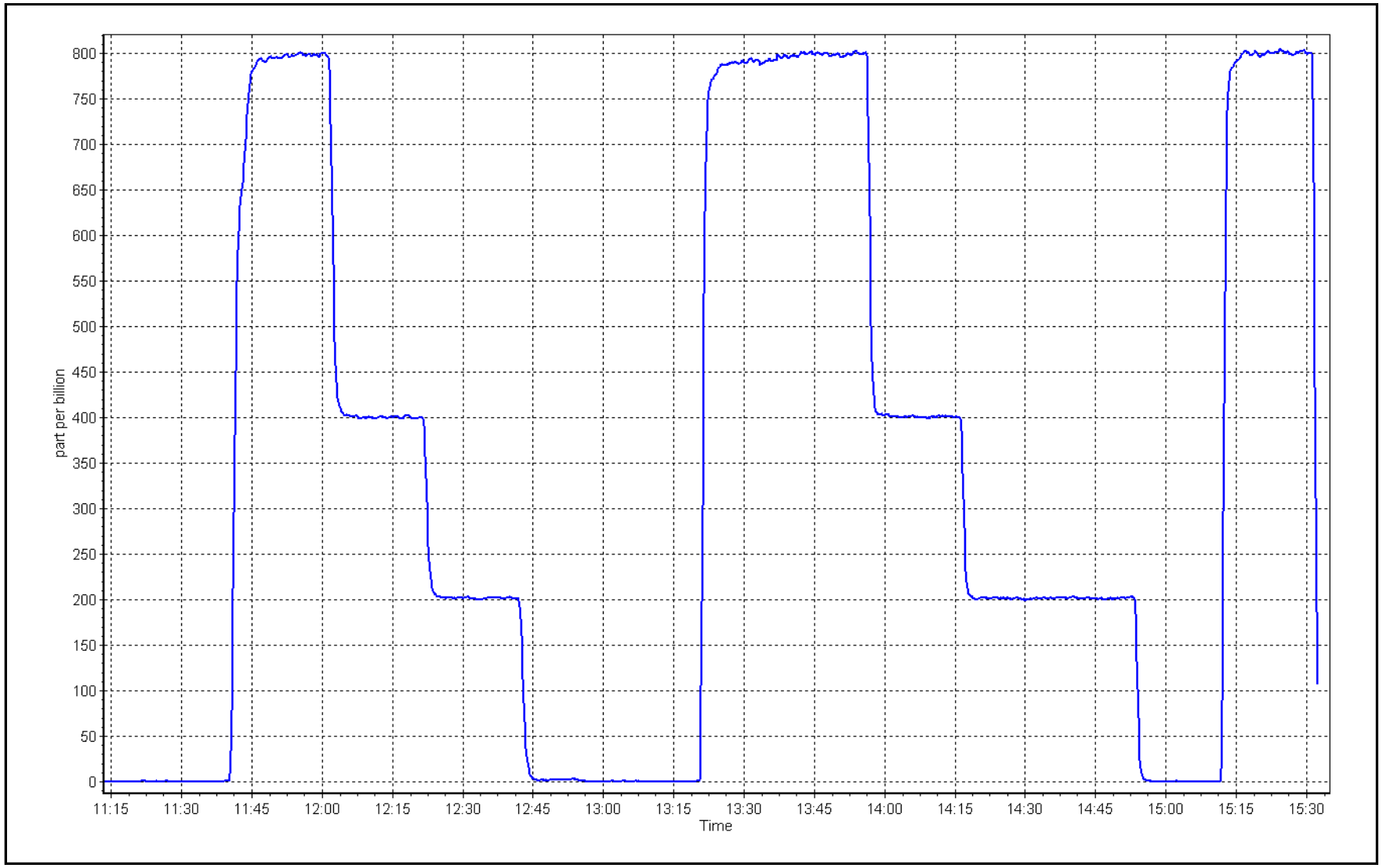
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
800.8	799.5	1.0017
400.4	400.4	1.0001
200.1	201.0	0.9956

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	0.997591	*0.90 - 1.10*
Intercept	0.795745	*+/-30*



SO2 Calibration Plot Date: October 20, 2023 Location: Conklin



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	October 17, 2023	Last Cal Date:	September 14, 2023
Start time (MST):	11:07	End time (MST):	15:56
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:	1.007429	0.994857	Backgd or Offset:	2.4	2.3
Calibration intercept:	0.140000	0.180000	Coeff or Slope:	0.958	0.947

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4920	80.0	80.0	80.2	0.998
as found 2nd point	4960	40.0	40.0	40.6	0.985
as found 3rd point	4980	20.0	20.0	20.2	0.990
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	79.7	1.004
second point	4960	40.0	40.0	40.1	0.998
third point	4980	20.0	20.0	20.1	0.995
as left zero	5000	0.0	0.0	0.4	----
as left span	4920	80.0	80.0	78.4	1.020
SO2 Scrubber Check	4920	80.2	802.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.999
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.2	Prev response:	80.73	*% change:	-0.7%
Baseline Corr 2nd AF pt:	40.6	AF Slope:	1.002571	AF Intercept:	0.160000
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999953		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

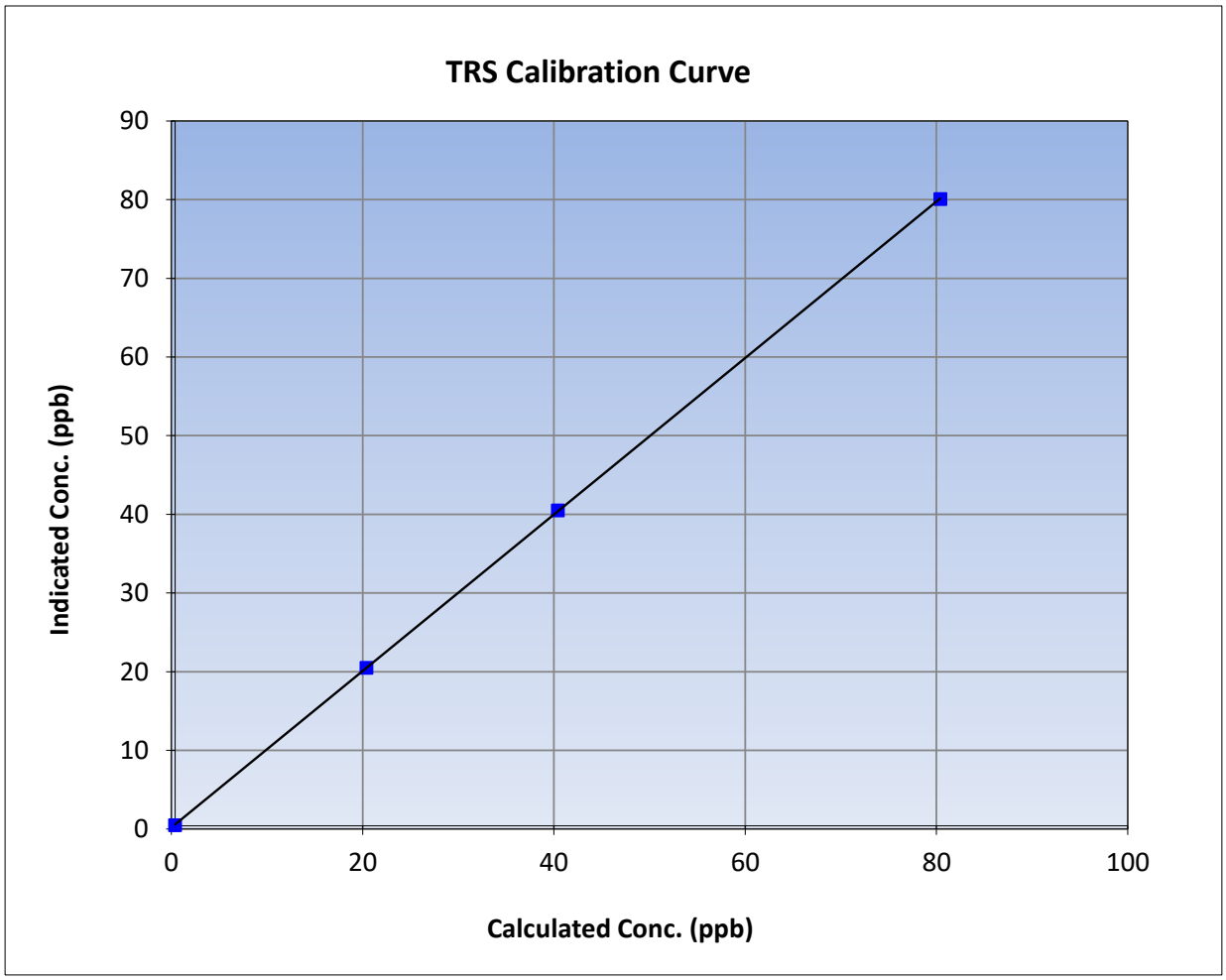
Station Information

Calibration Date:	October 17, 2023	Previous Calibration:	September 14, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:07	End Time (MST):	15:56
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1236656116

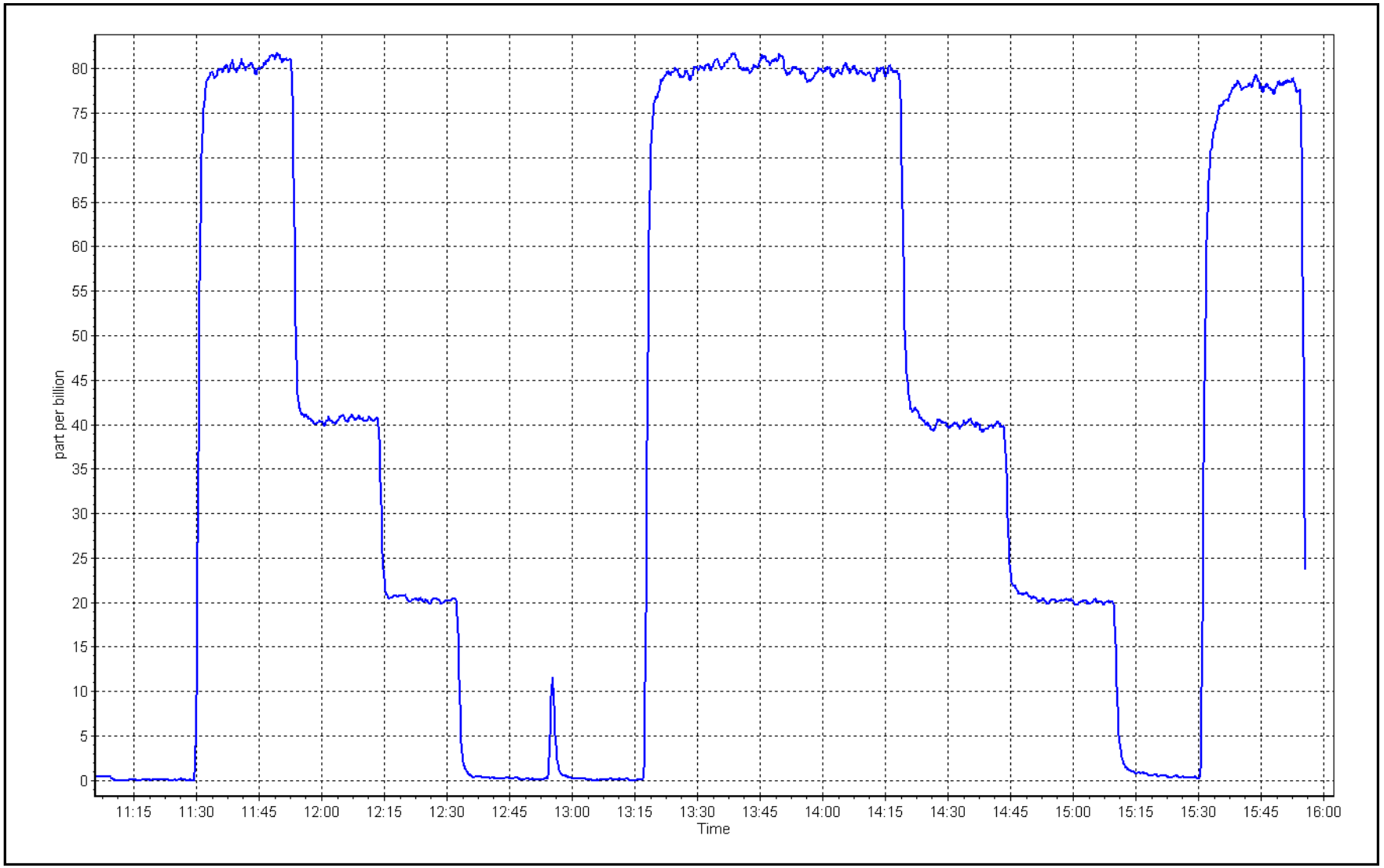
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	79.7	1.0038
40.0	40.1	0.9975
20.0	20.1	0.9950

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	0.994857	*0.90 - 1.10*
Intercept	0.180000	*+/-3*



TRS Calibration Plot Date: October 17, 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:	October 20, 2023	Last Cal Date:	September 26, 2023
Start time (MST):	11:21	End time (MST):	15:33
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC259455	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
C3H8 Cal Gas Conc.	207.2	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
Removed C3H8 Conc.	207.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	3810	
ZAG make/model:	Teledyne API 701H		Serial Number:	691	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1331259521	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.29E-04	2.32E-04	NMHC SP Ratio:	5.09E-05	5.30E-05
CH4 Retention time:	12.00	12.00	NMHC Peak Area:	179681	172466

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	17.13	16.68	1.027
as found 2nd point	4960	40.1	8.56	8.30	1.032
as found 3rd point	4980	20.0	4.28	4.17	1.026
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	17.13	17.13	1.000
second point	4960	40.1	8.56	8.53	1.003
third point	4980	20.0	4.27	4.29	0.996
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	17.13	17.11	1.001
				Average Correction Factor	1.000

Baseline Corr AF:	16.68	Prev response	17.10	*% change	-2.5%
Baseline Corr 2nd AF:	8.3	AF Slope:	0.973575	AF Intercept:	-0.007854
Baseline Corr 3rd AF:	4.2	AF Correlation:	0.999991	* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0	
as found span	4920	80.2	9.14	8.79	1.039
as found 2nd point	4960	40.1	4.57	4.40	1.040
as found 3rd point	4980	20.0	2.28	2.21	1.031
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	9.14	9.14	0.999
second point	4960	40.1	4.57	4.58	0.998
third point	4980	20.0	2.28	2.31	0.987
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	9.14	9.14	1.000
				Average Correction Factor	0.995
Baseline Corr AF:	8.79	Prev response	9.09	*% change	-3.4%
Baseline Corr 2nd AF:	4.4	AF Slope:	0.961354	AF Intercept:	0.006594
Baseline Corr 3rd AF:	2.2	AF Correlation:	0.999995	* = > +/-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	7.88	1.013
as found 2nd point	4960	40.1	3.99	3.90	1.023
as found 3rd point	4980	20.0	2.00	1.96	1.021
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	7.99	7.99	0.999
second point	4960	40.1	3.99	3.95	1.010
third point	4980	20.0	1.99	1.98	1.006
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	7.99	7.98	1.001
				Average Correction Factor	1.005
Baseline Corr AF:	7.88	Prev response	8.01	*% change	-1.6%
Baseline Corr 2nd AF:	3.90	AF Slope:	0.987302	AF Intercept:	-0.014048
Baseline Corr 3rd AF:	1.96	AF Correlation:	0.999968	* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.998108	0.999923
THC Cal Offset:	0.004967	-0.000623
CH4 Cal Slope:	1.004174	1.000697
CH4 Cal Offset:	-0.009247	-0.013854
NMHC Cal Slope:	0.992770	0.999521
NMHC Cal Offset:	0.013615	0.012632

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

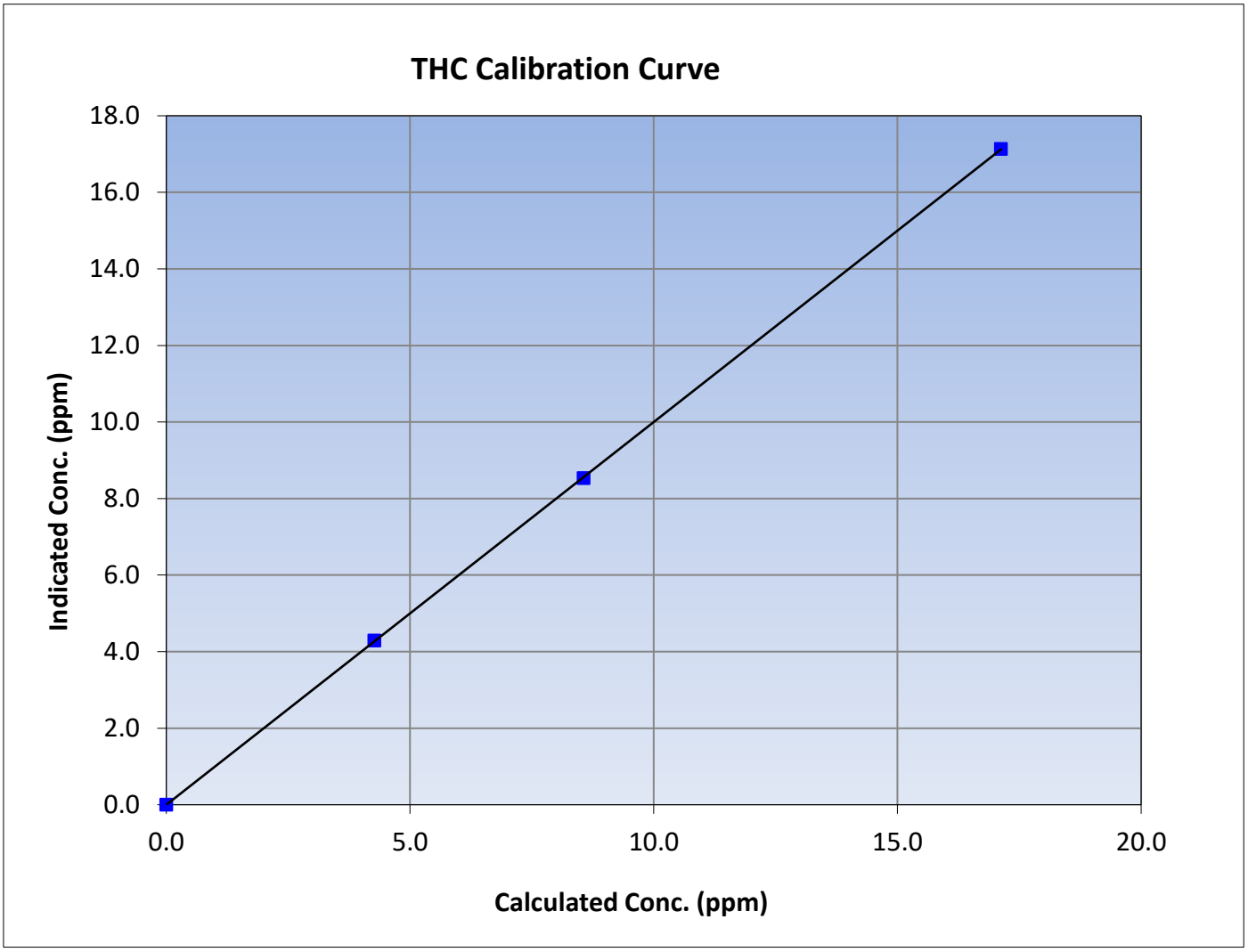
Version-06-2022

Station Information

Calibration Date:	October 20, 2023	Previous Calibration:	September 26, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:21	End Time (MST):	15:33
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	0.999992	*≥0.995*
17.13	17.13	0.9995			
8.56	8.53	1.0035	Slope	0.999923	*0.90 - 1.10*
4.27	4.29	0.9960			
			Intercept	-0.000623	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

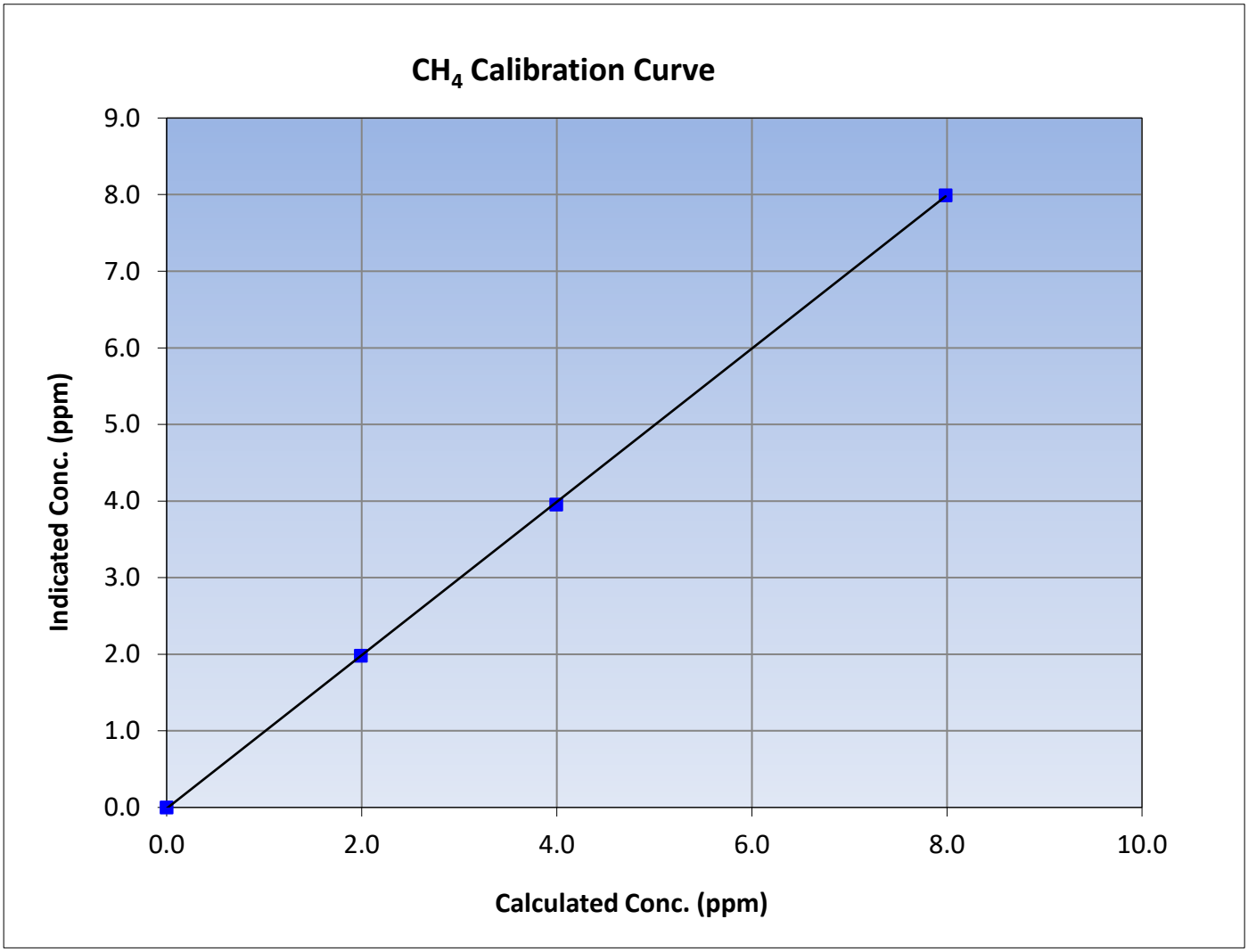
Version-06-2022

Station Information

Calibration Date:	October 20, 2023	Previous Calibration:	September 26, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:21	End Time (MST):	15:33
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	0.999965	*≥0.995*
7.99	7.99	0.9992			
3.99	3.95	1.0101	Slope	1.000697	*0.90 - 1.10*
1.99	1.98	1.0059			
			Intercept	-0.013854	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

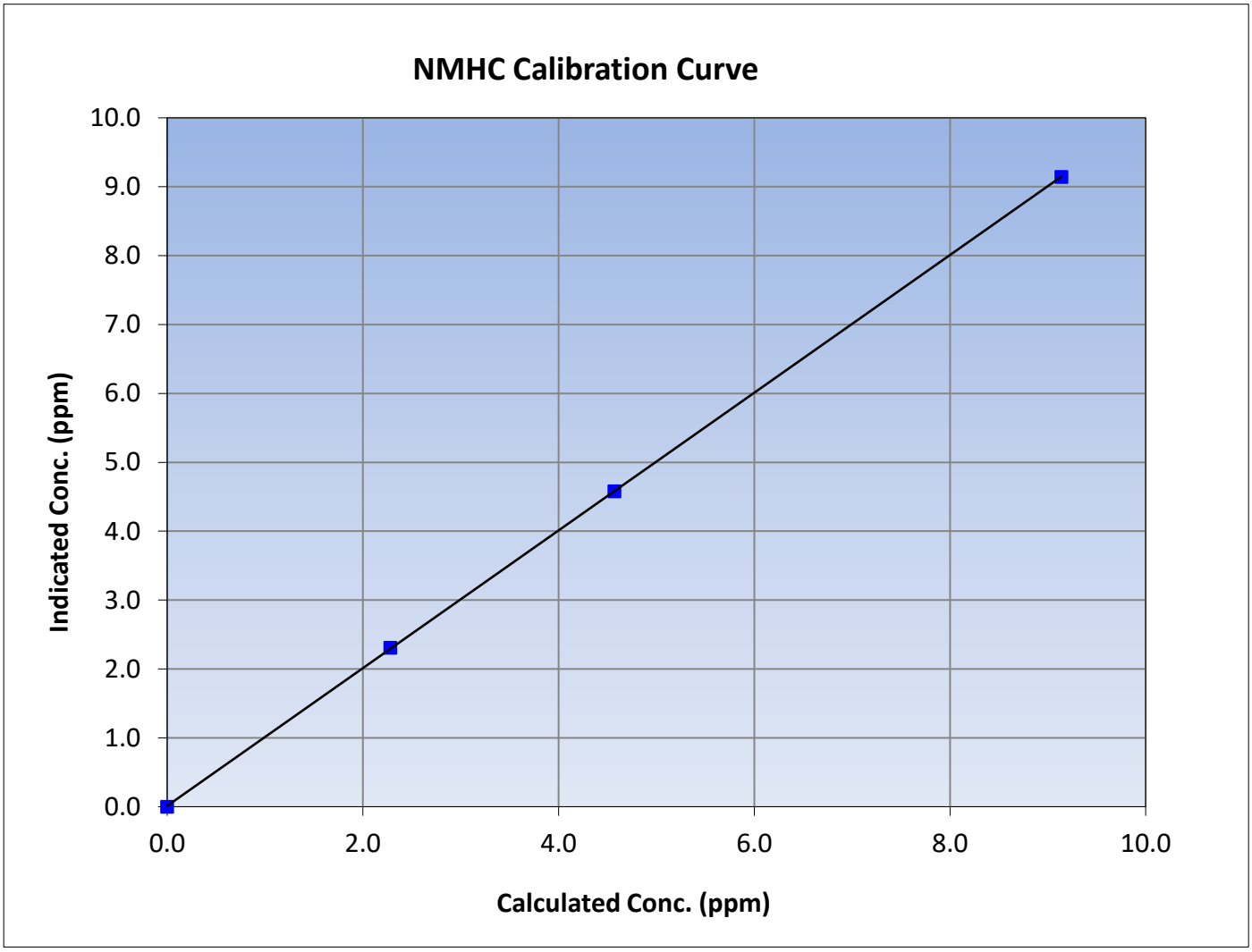
Version-06-2022

Station Information

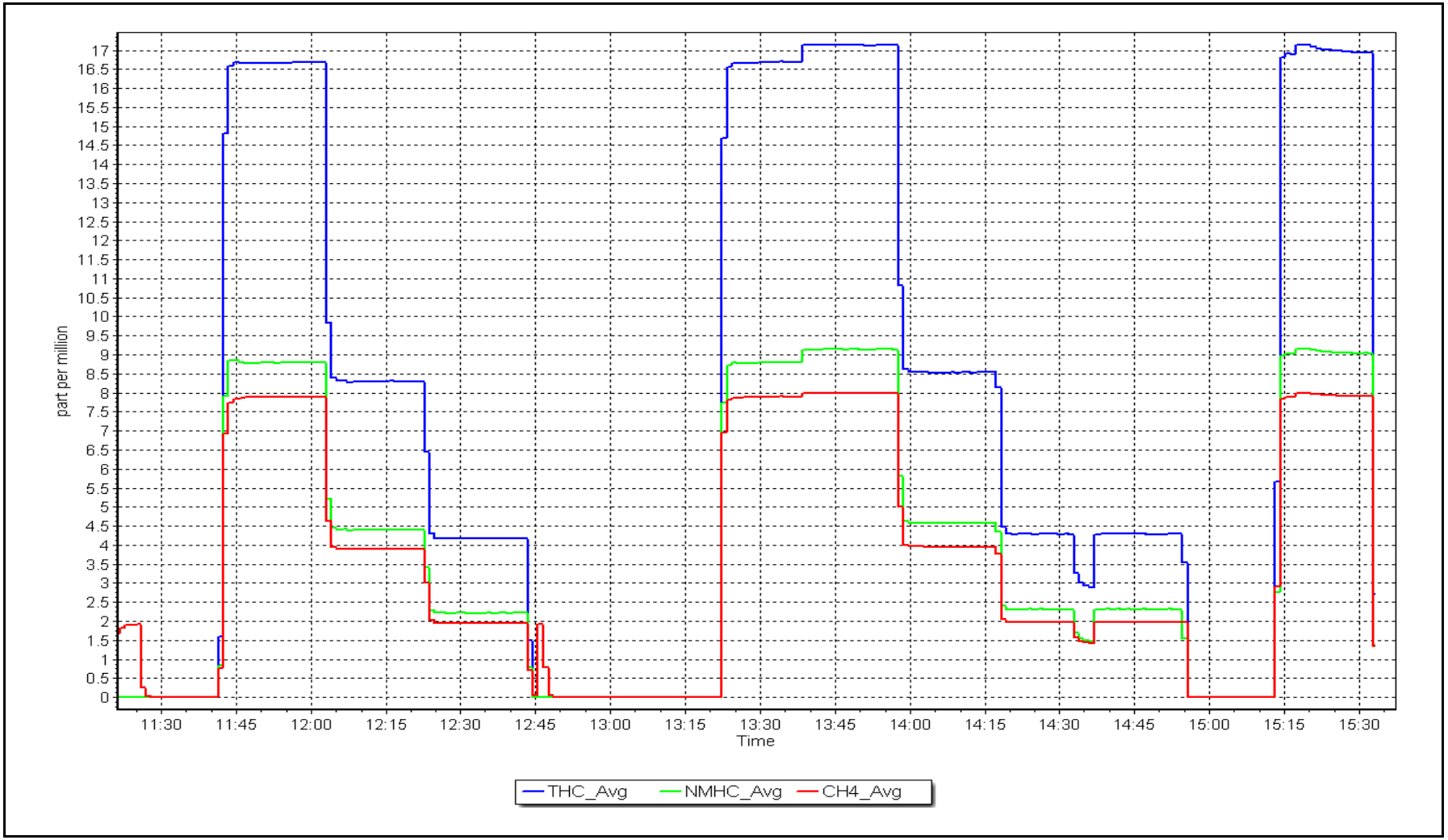
Calibration Date:	October 20, 2023	Previous Calibration:	September 26, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:21	End Time (MST):	15:33
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999989	≥0.995
9.14	9.14	0.9995			
4.57	4.58	0.9982	Slope	0.999521	0.90 - 1.10
2.28	2.31	0.9871			
			Intercept	0.012632	+/-0.5



NMHC Calibration Plot Date: October 20, 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:	October 24, 2023	Last Cal Date:	NA
Start time (MST):	10:10	End time (MST):	15:22
Reason:	Install		

Calibration Standards

Gas Cert Reference:		CC259455	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
C3H8 Cal Gas Conc.	207.2	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
Removed C3H8 Conc.	207.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	3810	
ZAG make/model:	Teledyne API 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:	NA	4.01E-04	NMHC SP Ratio:	NA	9.22E-05
CH4 Retention time:	NA	14.6	NMHC Peak Area:	NA	99089
Zero Chromatogram:	OFF	ON	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	17.13	17.06	1.004
second point	4960	40.1	8.56	8.56	1.000
third point	4980	20.0	4.28	4.32	0.991
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	17.13	17.06	1.004
				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	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	9.14	9.11	1.004
second point	4960	40.1	4.57	4.57	1.000
third point	4980	20.0	2.28	2.31	0.989
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	9.14	9.08	1.006
				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	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	7.99	7.95	1.004
second point	4960	40.1	3.99	3.99	1.001
third point	4980	20.0	2.00	2.01	0.993
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	7.99	7.98	1.000
				Average Correction Factor	0.999
Baseline Corr AF:	NA	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:		0.995269
THC Cal Offset:		0.028364
CH4 Cal Slope:		0.995272
CH4 Cal Offset:		0.011356
NMHC Cal Slope:		0.995141
NMHC Cal Offset:		0.017008

Notes: Installing a new NMHC instrument. Optimized flame. Enabled "use zero chromatogram". Adjusted span only.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

THC Calibration Summary

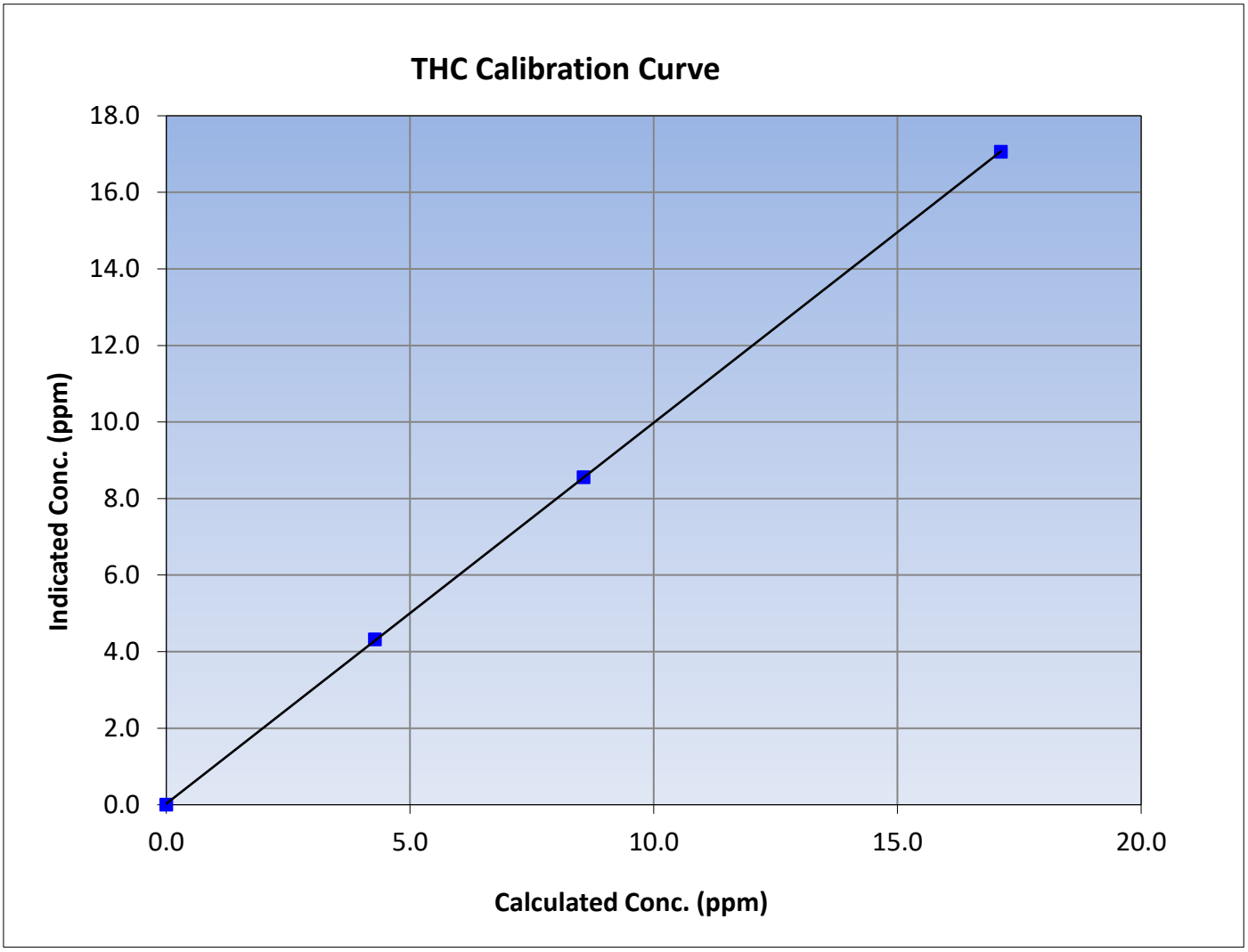
Version-06-2022

Station Information

Calibration Date:	October 24, 2023	Previous Calibration:	NA
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:10	End Time (MST):	15:22
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	0.999987	≥0.995
17.13	17.06	1.0038			
8.56	8.56	1.0003	Slope	0.995269	0.90 - 1.10
4.28	4.32	0.9908			
			Intercept	0.028364	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

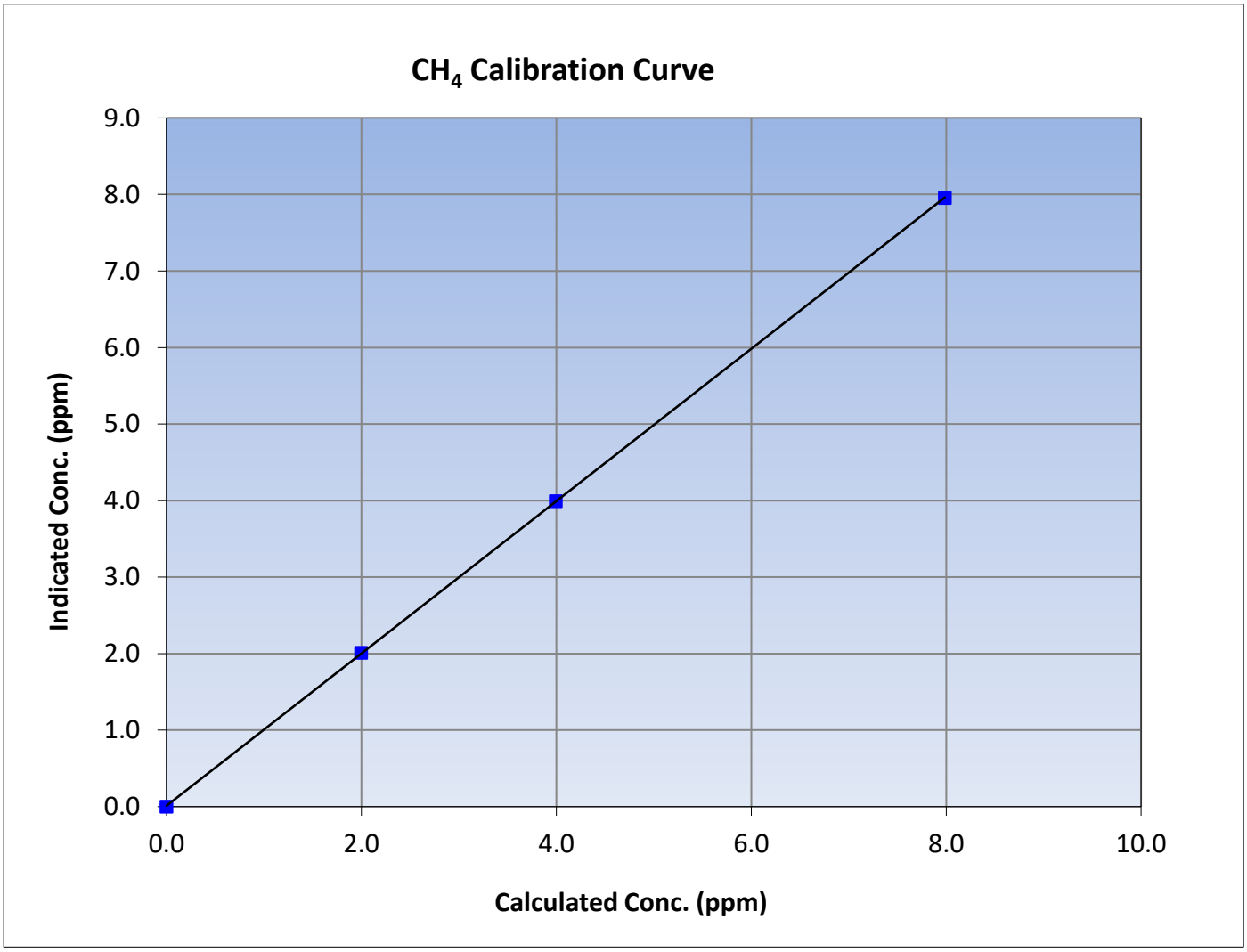
Version-06-2022

Station Information

Calibration Date:	October 24, 2023	Previous Calibration:	NA
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:10	End Time (MST):	15:22
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	0.999991	*≥0.995*
7.99	7.95	1.0040			
3.99	3.99	1.0005	Slope	0.995272	*0.90 - 1.10*
2.00	2.01	0.9933			
			Intercept	0.011356	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

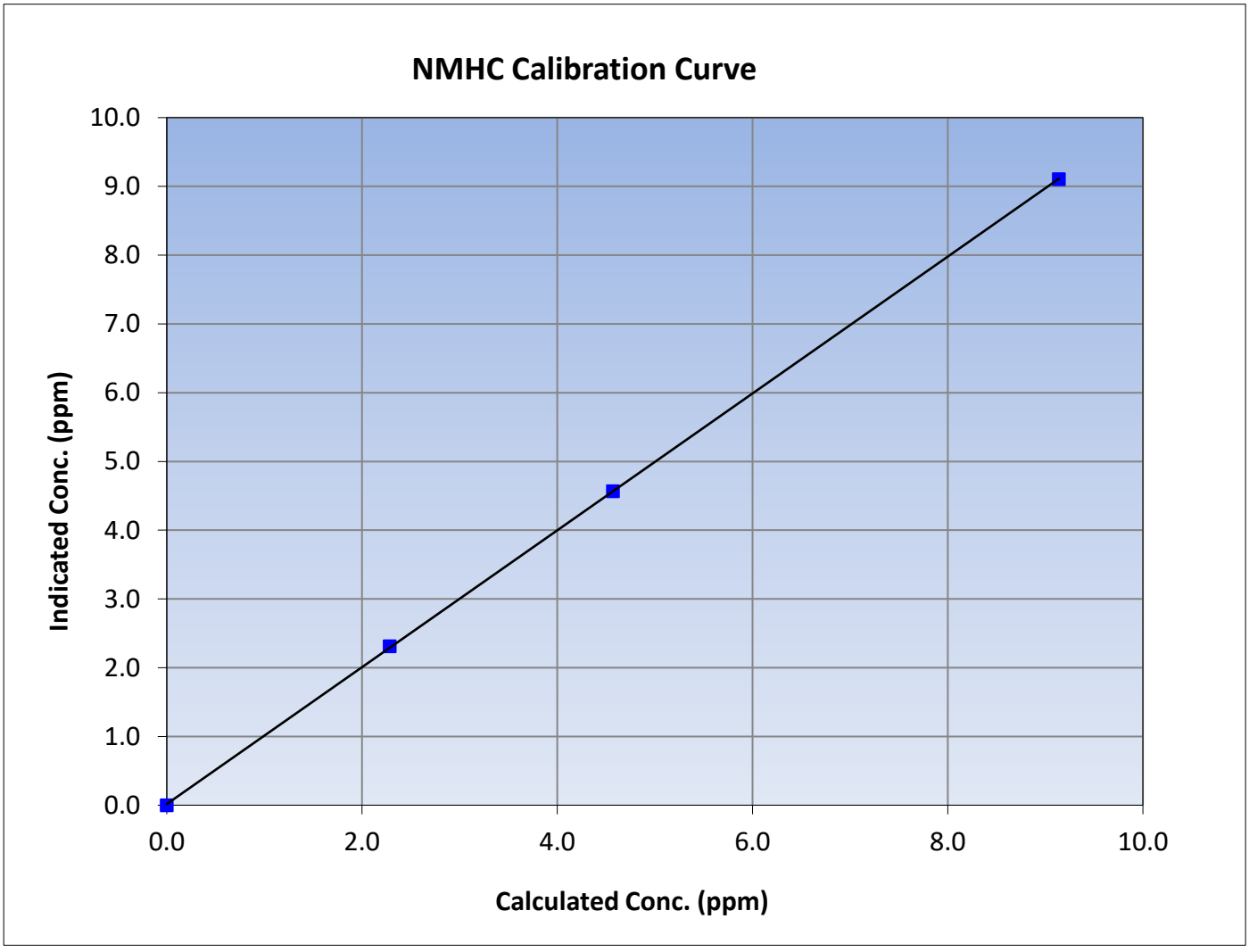
Version-06-2022

Station Information

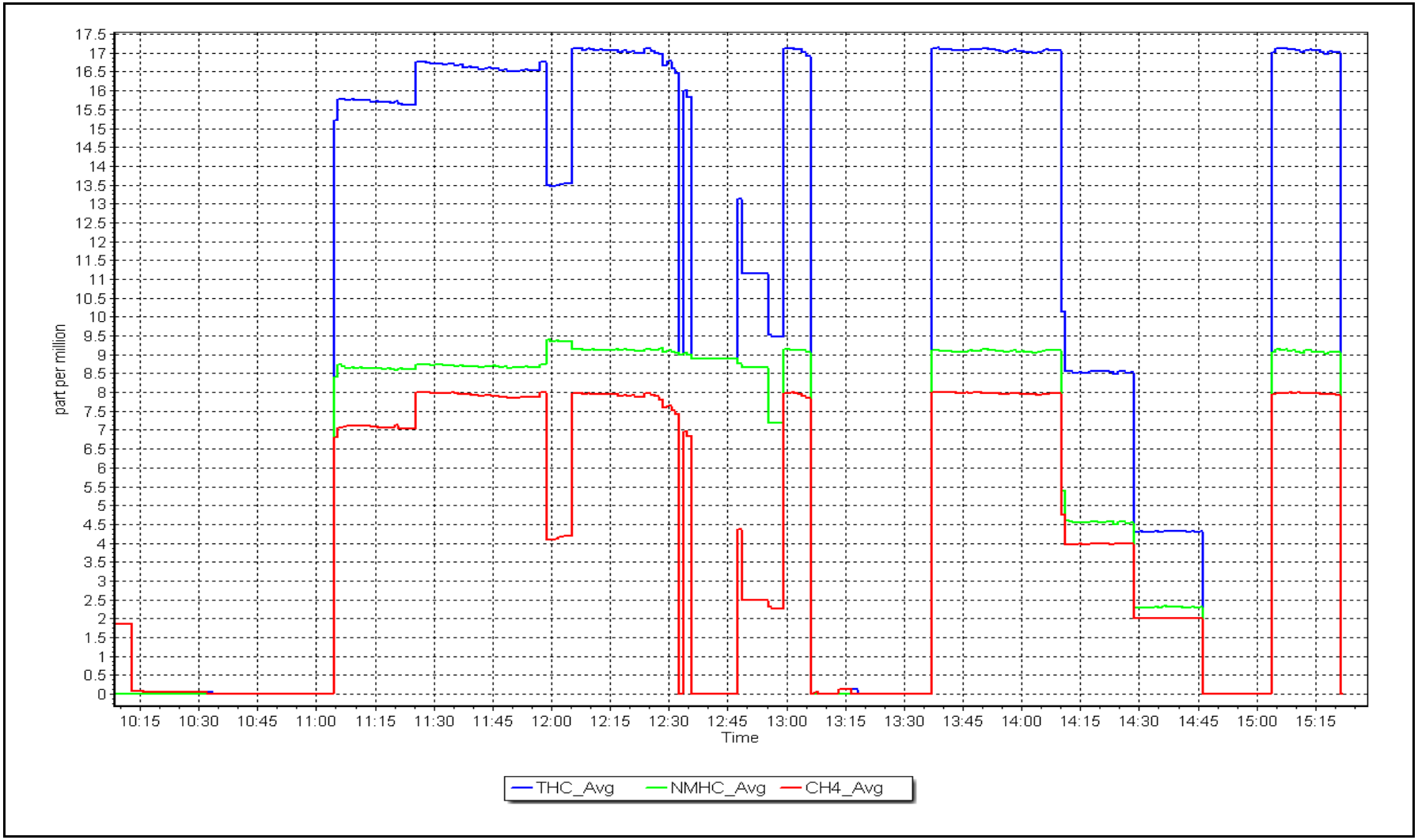
Calibration Date:	October 24, 2023	Previous Calibration:	NA
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:10	End Time (MST):	15:22
Analyzer make:	Thermo 55i	Analyzer serial #:	1426262594

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999983	*≥0.995*
9.14	9.11	1.0038			
4.57	4.57	1.0004	Slope	0.995141	*0.90 - 1.10*
2.28	2.31	0.9886			
			Intercept	0.017008	*+/-0.5*



NMHC Calibration Plot Date: October 24, 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:	October 25, 2023	Last Cal Date:	October 24, 2023
Start time (MST):	11:50	End time (MST):	15:50
Reason:	Maintenance		

Calibration Standards

Gas Cert Reference:		CC259455	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
C3H8 Cal Gas Conc.	207.2	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm
Removed C3H8 Conc.	207.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	3810	
ZAG make/model:	Teledyne API 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:	NA	4.01E-04	NMHC SP Ratio:	NA	9.22E-05
CH4 Retention time:	NA	14.6	NMHC Peak Area:	NA	99089
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	17.04	1.005
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	17.03	1.006
second point	4960	40.1	8.56	8.51	1.006
third point	4980	20.0	4.28	4.31	0.993
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	17.13	17.06	1.004
				Average Correction Factor	1.001

Baseline Corr AF:	17.04	Prev response	17.07	*% 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	8.93	1.024
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	9.07	1.007
second point	4960	40.1	4.57	4.54	1.007
third point	4980	20.0	2.28	2.30	0.991
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	9.14	9.11	1.003
				Average Correction Factor	1.002
Baseline Corr AF:	8.93	Prev response	9.11	*% change	-2.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	7.99	8.12	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	80.2	7.99	7.95	1.004
second point	4960	40.1	3.99	3.98	1.005
third point	4980	20.0	2.00	2.01	0.994
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	7.99	7.95	1.005
				Average Correction Factor	1.001
Baseline Corr AF:	8.12	Prev response	7.96	*% change	2.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.995269	0.993314
THC Cal Offset:	0.028364	0.021764
CH4 Cal Slope:	0.995272	0.995000
CH4 Cal Offset:	0.011356	0.007556
NMHC Cal Slope:	0.995141	0.991515
NMHC Cal Offset:	0.017008	0.015007

Notes: Some baseline dips occurred in last 24 hrs, found retention time moved up. Some maintenance items done, no change to chromatography, new zero chromatrogram captured.

Calibration Performed By: Kelly Baragar

Wood Buffalo Environmental Association

THC Calibration Summary

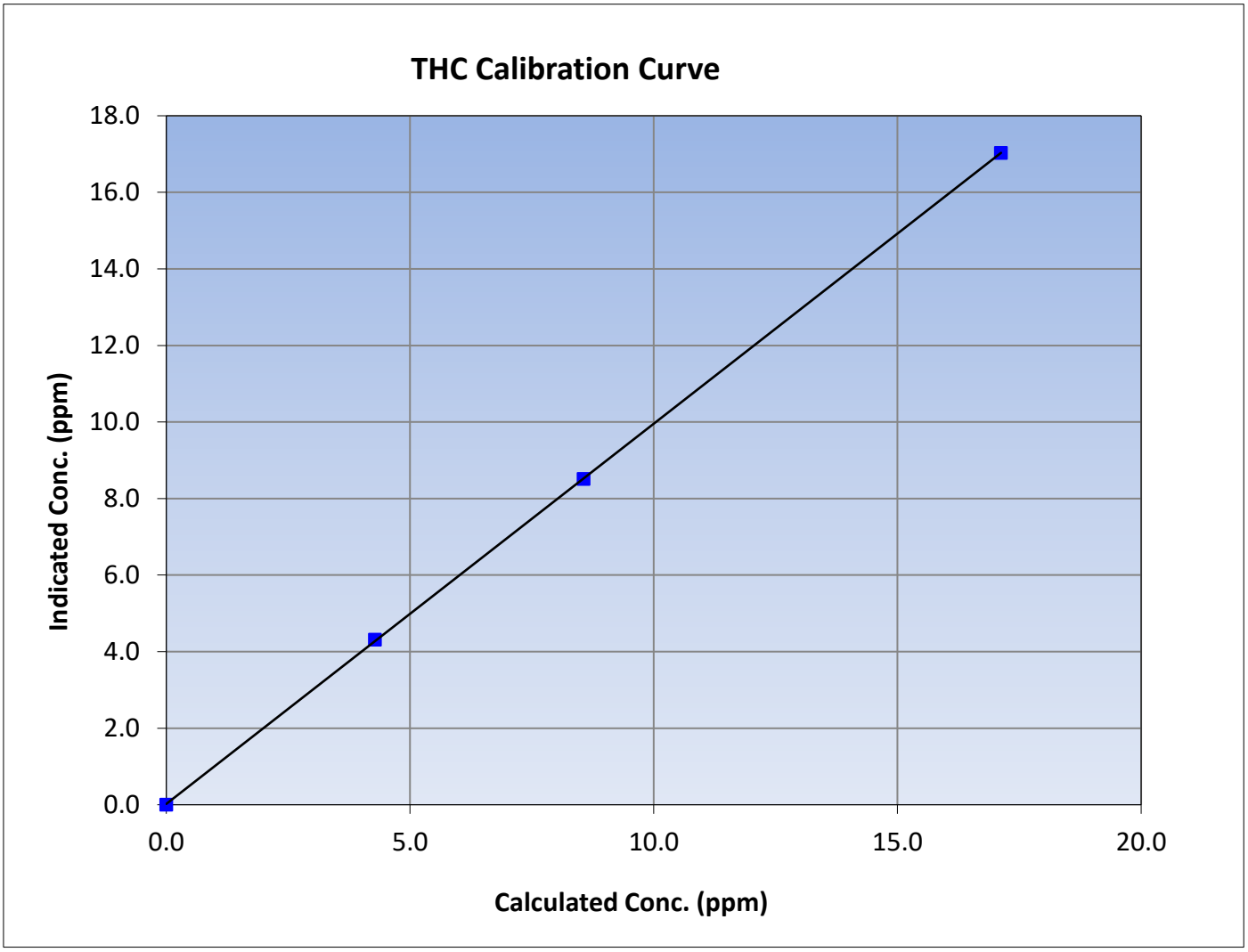
Version-06-2022

Station Information

Calibration Date:	October 25, 2023	Previous Calibration:	October 24, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:50	End Time (MST):	15:50
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	0.999986	*≥0.995*
17.13	17.03	1.0056			
8.56	8.51	1.0058	Slope	0.993314	*0.90 - 1.10*
4.28	4.31	0.9926			
			Intercept	0.021764	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

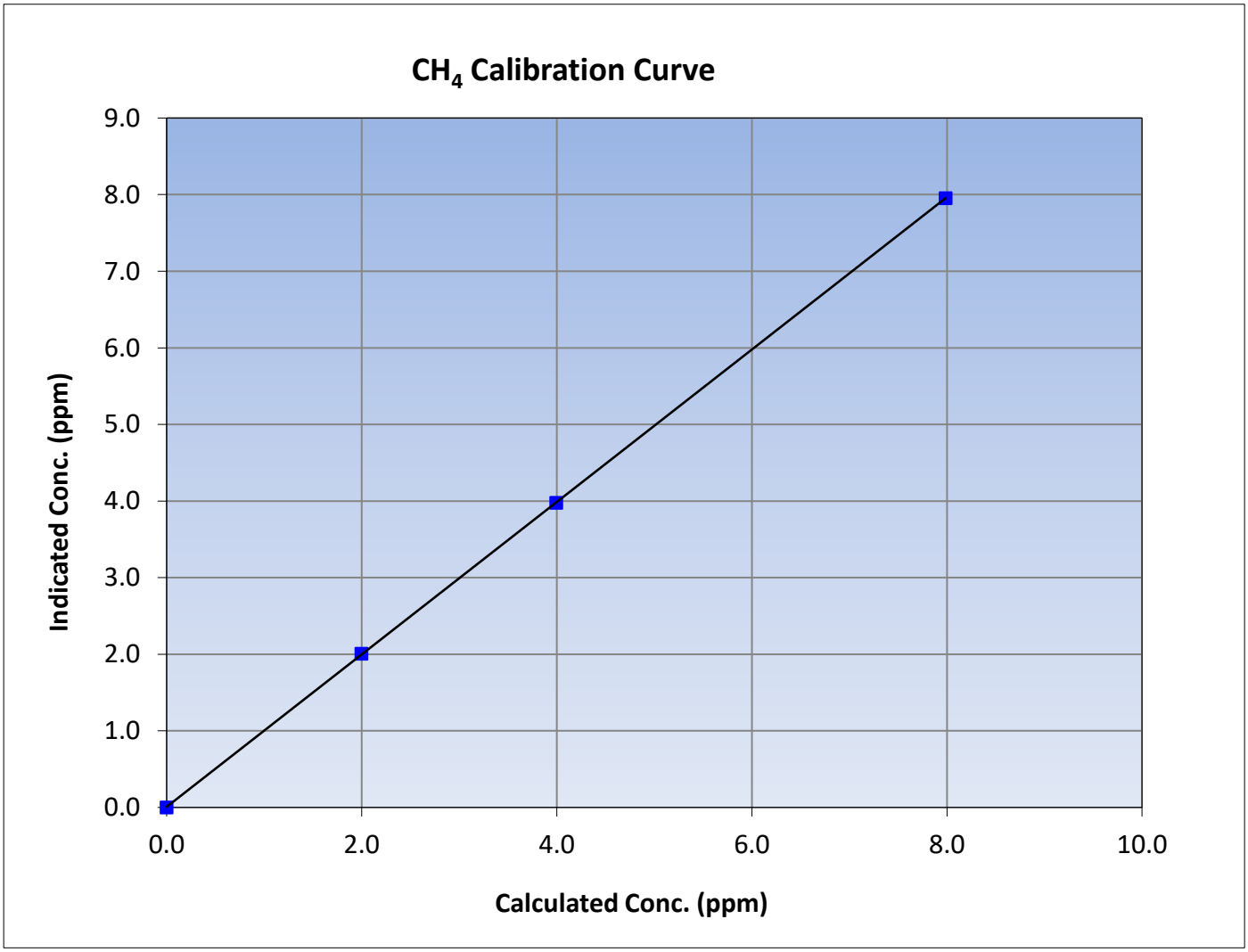
Version-06-2022

Station Information

Calibration Date:	October 25, 2023	Previous Calibration:	October 24, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:50	End Time (MST):	15:50
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	0.999992	*≥0.995*
7.99	7.95	1.0041			
3.99	3.98	1.0045	Slope	0.995000	*0.90 - 1.10*
2.00	2.01	0.9943			
			Intercept	0.007556	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

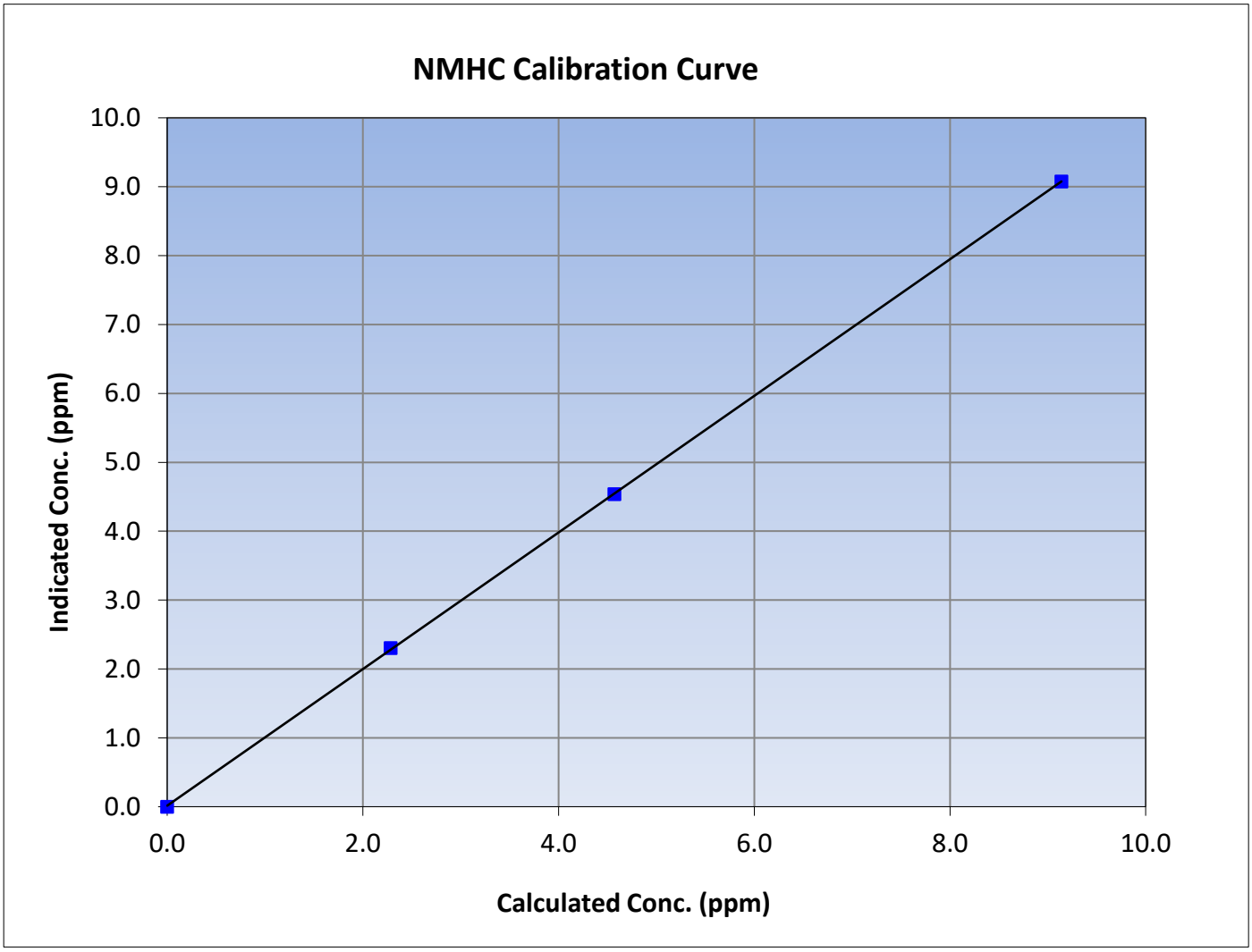
Version-06-2022

Station Information

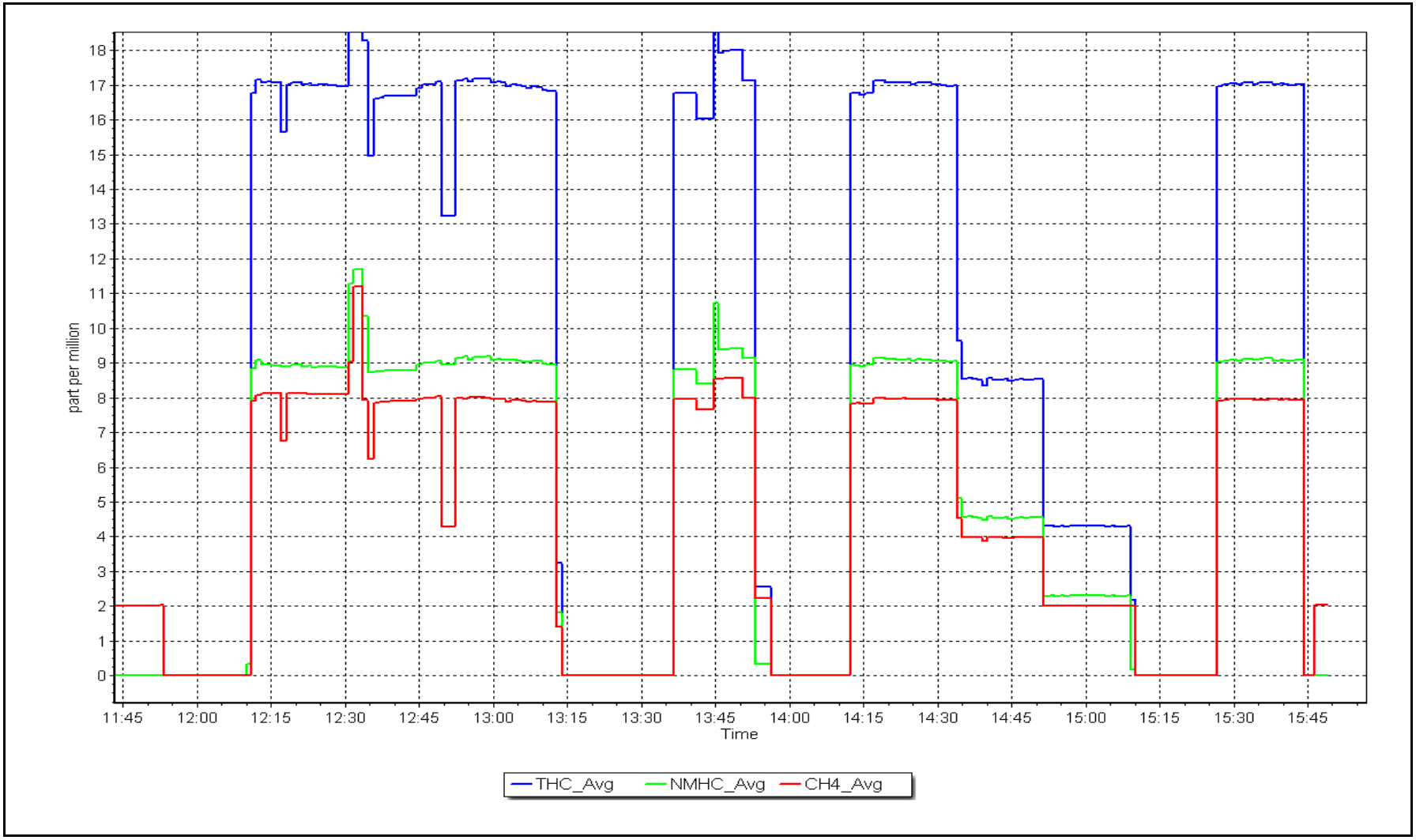
Calibration Date:	October 25, 2023	Previous Calibration:	October 24, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	11:50	End Time (MST):	15:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1426262594

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999980	*≥0.995*
9.14	9.07	1.0072			
4.57	4.54	1.0068	Slope	0.991515	*0.90 - 1.10*
2.28	2.30	0.9912			
			Intercept	0.015007	*+/-0.5*



NMHC Calibration Plot Date: October 25, 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:	October 27, 2023	Last Cal Date:	September 21, 2023
Start time (MST):	10:02	End time (MST):	14:45
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:	1.104	1.094	NO bkgnd or offset:	11	10.9
NOX coeff or slope:	1.000	1.000	NOX bkgnd or offset:	11.1	11.0
NO2 coeff or slope:	1.000	0.999	Reaction cell Press:	167.3	167.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.993898	0.999869
NO_X Cal Offset:	2.303154	2.584550
NO Cal Slope:	0.994967	1.002036
NO Cal Offset:	1.360599	1.361881
NO_2 Cal Slope:	0.989964	1.004241
NO_2 Cal Offset:	-0.688924	-0.358712

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.7	-0.5	-0.1	----	----
as found span	4921	79.4	811.2	800.1	11.1	821.5	808.0	13.5	0.9875	0.9902
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.4	-0.1	----	----
high point	4921	79.4	811.2	800.1	11.1	812.1	802.2	10.0	0.9989	0.9974
second point	4960	39.7	405.7	400.1	5.6	410.0	403.3	6.7	0.9895	0.9921
third point	4980	19.8	202.3	199.6	2.8	207.8	203.0	4.8	0.9737	0.9830
as left zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.4	-0.1	----	----
as left span	4921	79.4	811.2	389.0	422.2	813.8	391.0	422.7	0.9969	0.9950
								Average Correction Factor	0.9874	0.9909

Corrected As found	NO_X = 822.2 ppb	NO = 808.5 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	1.7%
Previous Response	NO_X = 808.6 ppb	NO = 797.4 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)	803.1	392.0	422.2	423.5	0.9970	100.3%
2nd GPT point (200 ppb O3)	803.1	597.8	216.4	217.7	0.9941	100.6%
3rd GPT point (100 ppb O3)	803.1	700.7	113.5	112.8	1.0063	99.4%
				Average Correction Factor	0.9991	100.1%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

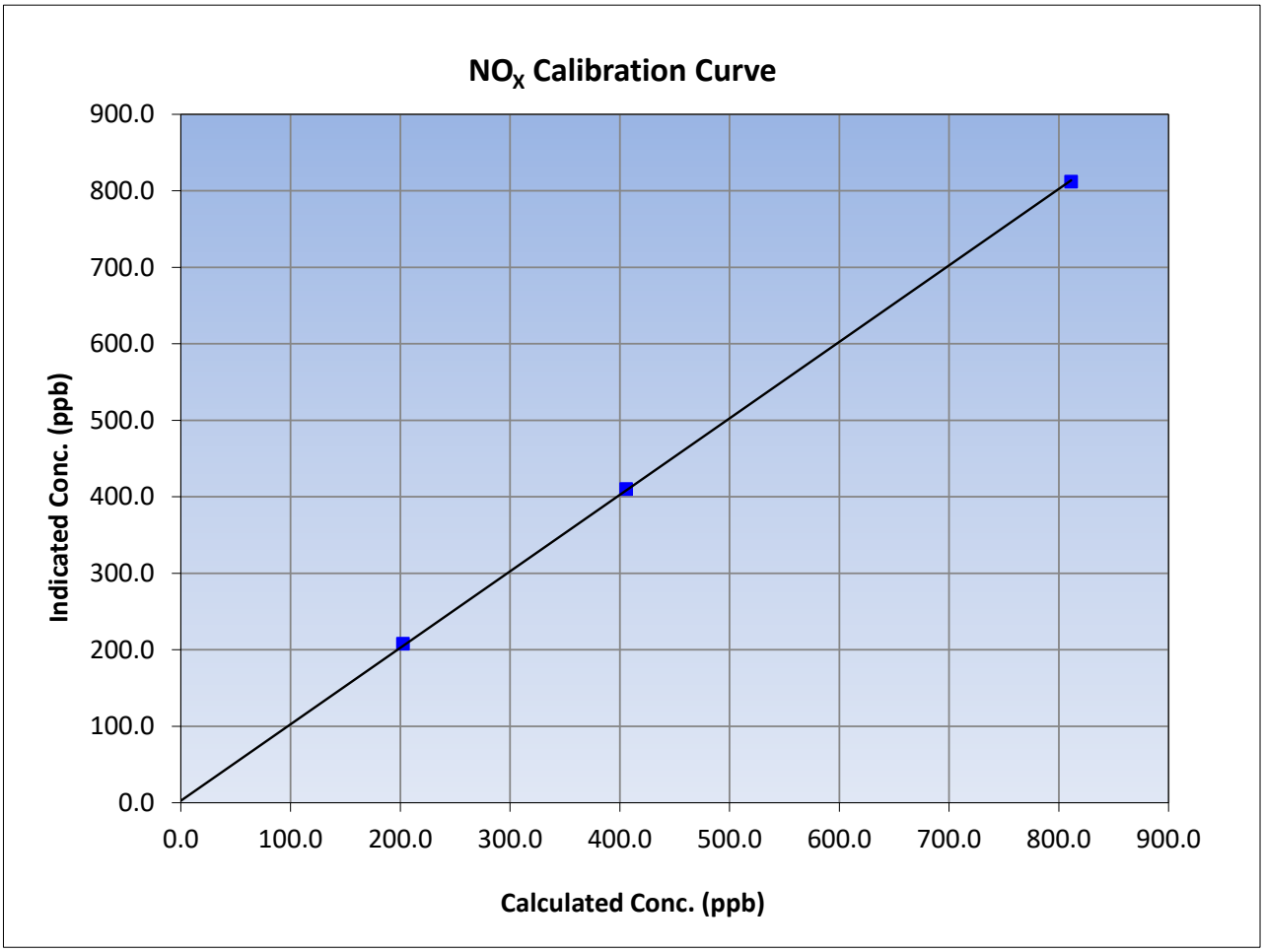
Version-04-2020

Station Information

Calibration Date:	October 27, 2023	Previous Calibration:	September 21, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:02	End Time (MST):	14:45
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	-0.5	----	Correlation Coefficient	0.999934	≥0.995
811.2	812.1	0.9989			
405.7	410.0	0.9895	Slope	0.999869	0.90 - 1.10
202.3	207.8	0.9737			
			Intercept	2.584550	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

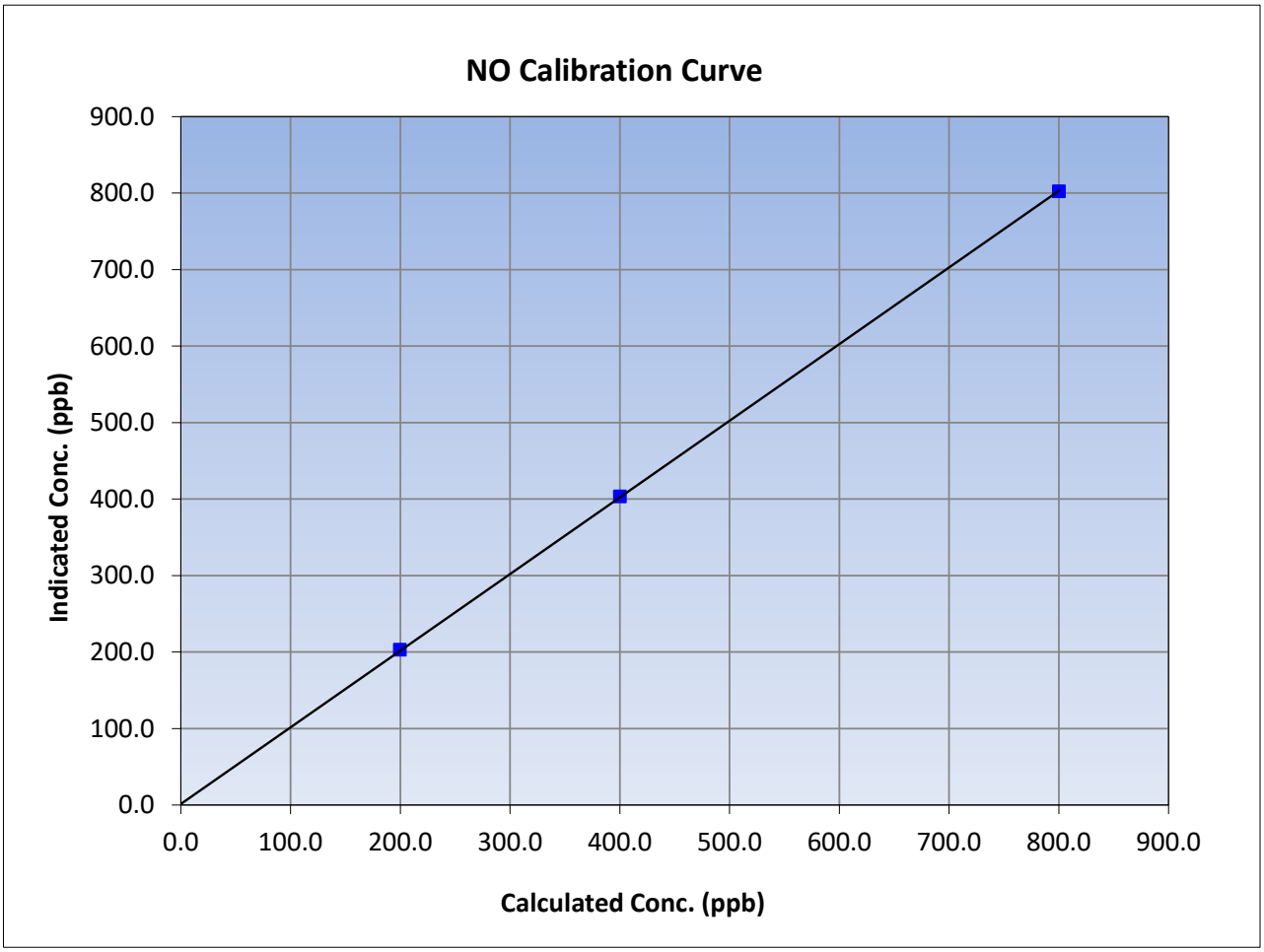
Version-04-2020

Station Information

Calibration Date:	October 27, 2023	Previous Calibration:	September 21, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:02	End Time (MST):	14:45
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	-0.4	----	Correlation Coefficient	0.999978	≥0.995
800.1	802.2	0.9974			
400.1	403.3	0.9921	Slope	1.002036	0.90 - 1.10
199.6	203.0	0.9830			
			Intercept	1.361881	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

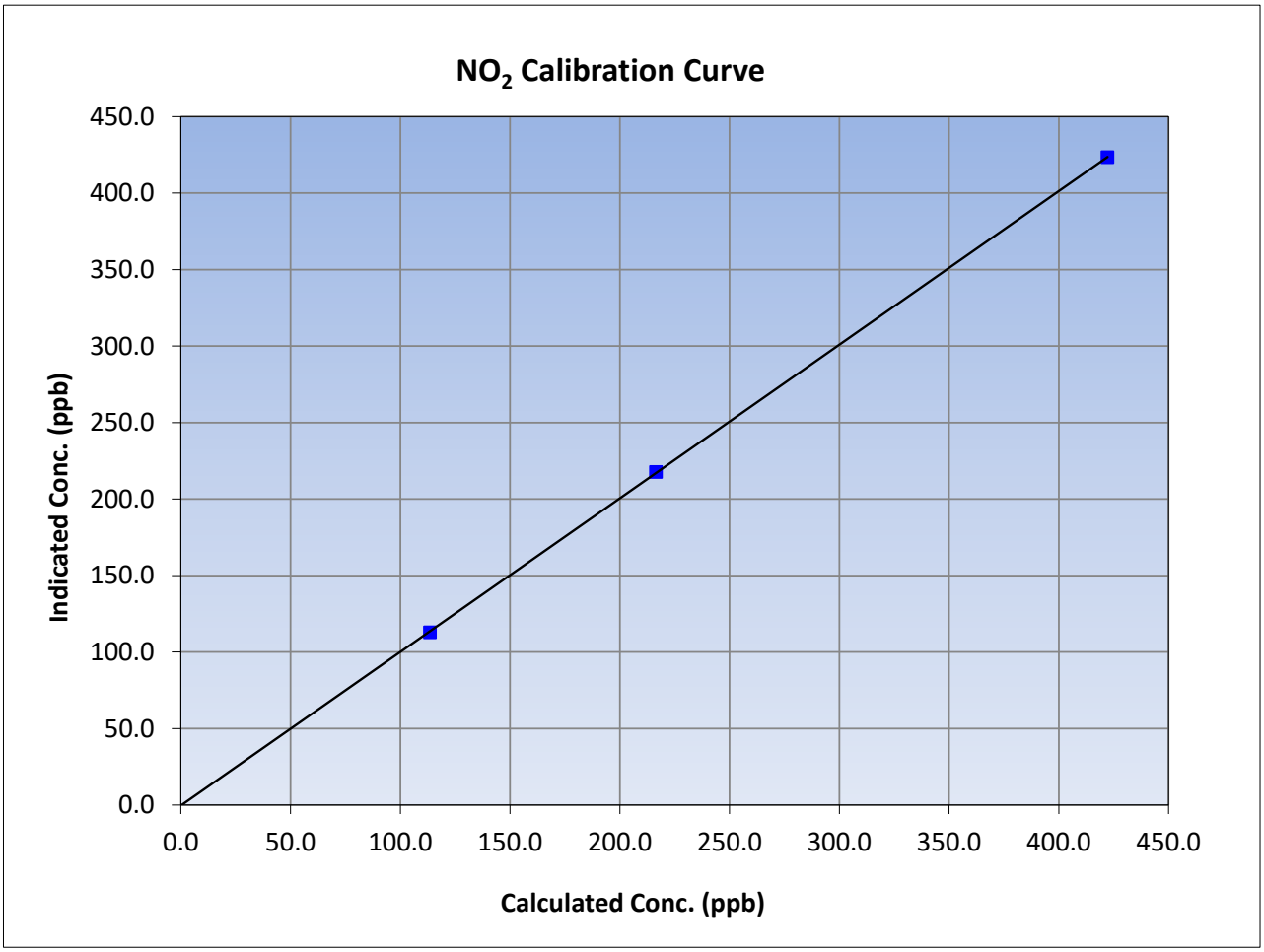
Version-04-2020

Station Information

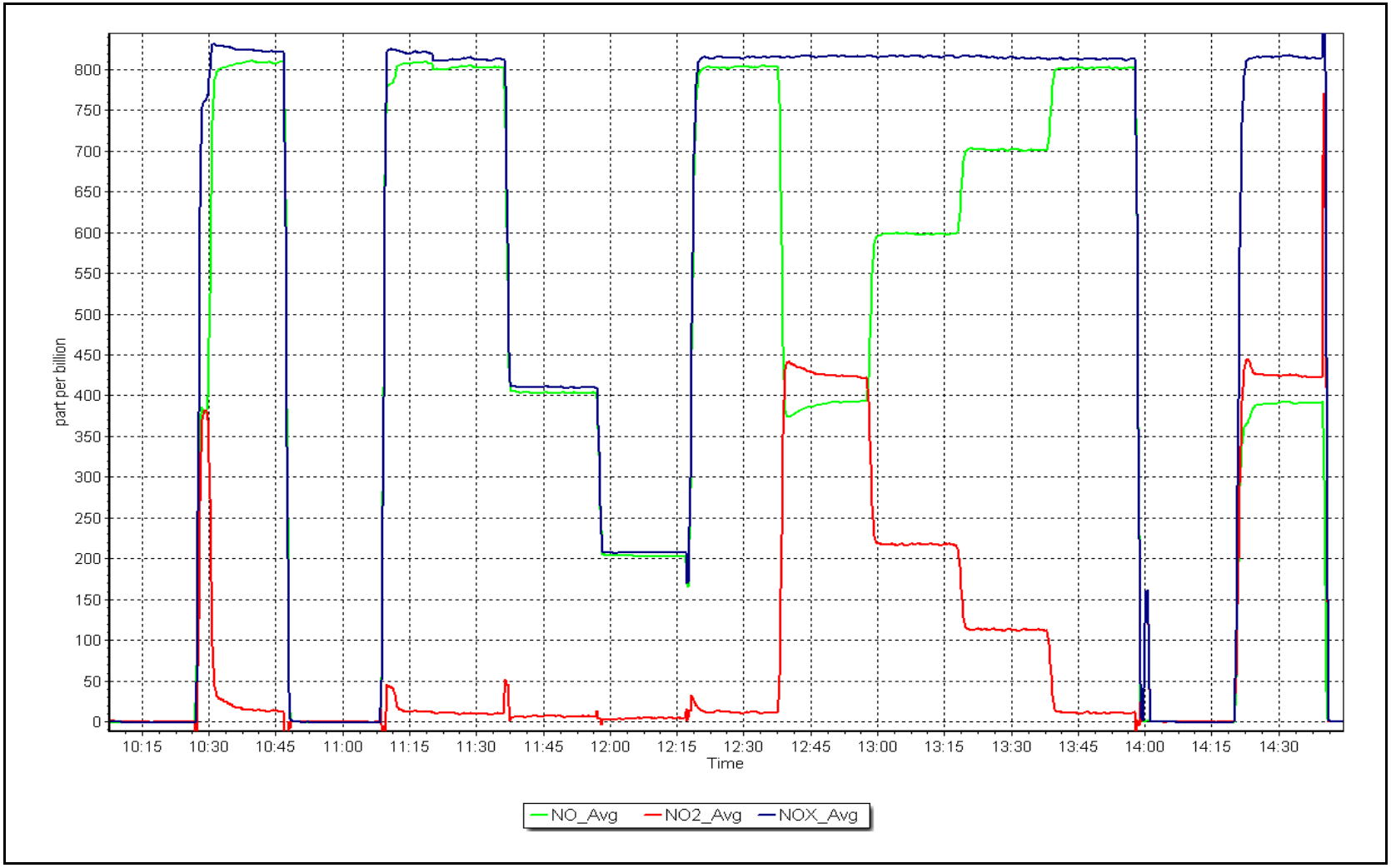
Calibration Date:	October 27, 2023	Previous Calibration:	September 21, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:02	End Time (MST):	14:45
Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999986	≥0.995
422.2	423.5	0.9970			
216.4	217.7	0.9941	Slope	1.004241	0.90 - 1.10
113.5	112.8	1.0063			
			Intercept	-0.358712	+/-20



NO_X Calibration Plot Date: October 27, 2023 Location: Conklin



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	October 27, 2023	Last Cal Date:	September 11, 2023
Start time (MST):	10:11	End time (MST):	14:00
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	Teledyne API T750	Serial Number:	72
ZAG Make/Model:	Teledyne API 751H	Serial Number:	77

Analyzer Information

Analyzer make: Thermo 49i Analyzer serial #: 1501663734

Analyzer Range 0 - 500 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001714	1.001314	Backgd or Offset:	-2.0	-0.3
Calibration intercept:	0.400000	1.520000	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	1.2	----
as found span	5000	1564.0	400.0	401.2	0.997
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	950.9	400.0	400.6	0.999
second point	5000	804.0	200.0	204.5	0.978
third point	5000	703.6	100.0	102.0	0.980
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	936.0	400.0	401.4	0.997
				Average Correction Factor	0.986

Baseline Corr As found:	400.0	Previous response	401.1	*% 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: Used a portable calibrator and zero air for the calibration. Changed the inlet filter after as founds. Adjusted the zero only.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

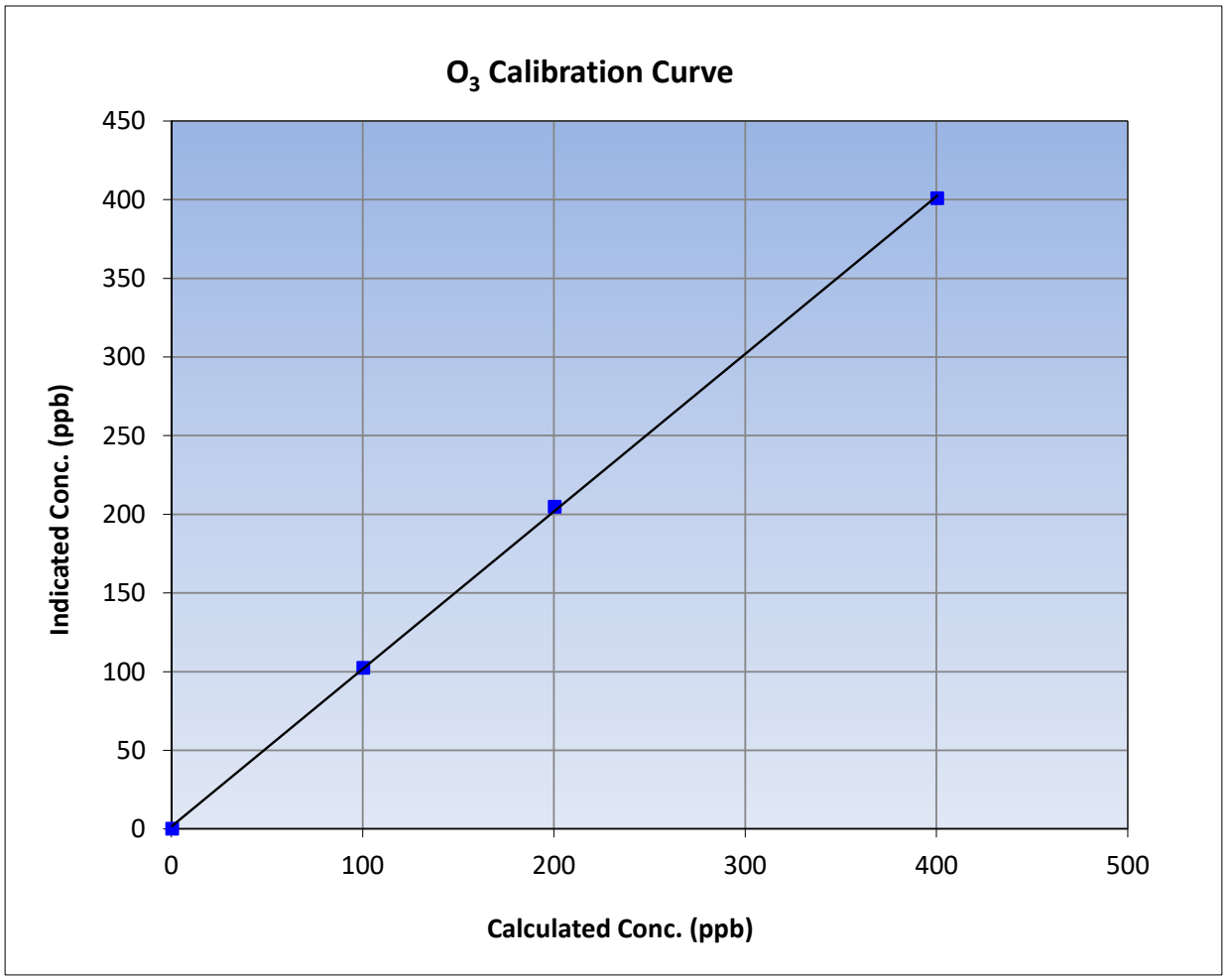
Station Information

Calibration Date:	October 27, 2023	Previous Calibration:	September 11, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:11	End Time (MST):	14:00
Analyzer make:	Thermo 49i	Analyzer serial #:	1501663734

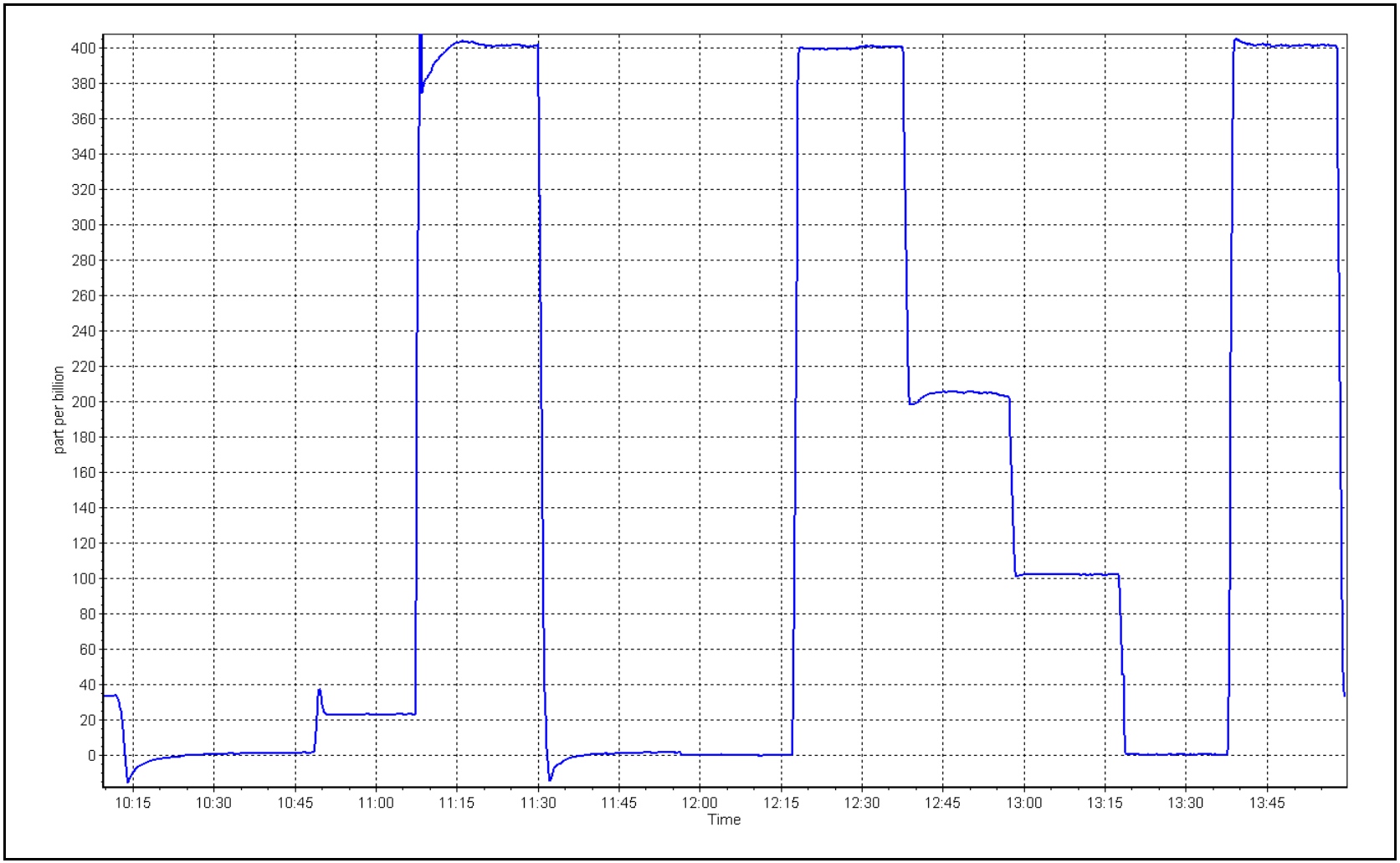
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
400.0	400.6	0.9985
200.0	204.5	0.9780
100.0	102.0	0.9804

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999861	*≥0.995*
Slope	1.001314	*0.90 - 1.10*
Intercept	1.520000	*+/- 5*



O_3 Calibration Plot Date: October 27, 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:	October 27, 2023	Last Cal Date:	September 26, 2023
Start time (MST):	14:03	End time (MST):	14:27
Analyzer Make:	API T640	S/N:	326
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat	S/N:	388755
Temp/RH standard:	Alicat	S/N:	388755

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (^{o}C)	-4.1	-4.7	-4.1	☐	+/- 2 ^{o}C
P (mmHg)	715.4	716.95	715.4	☐	+/- 10 mmHg
flow (LPM)	4.93	5.12	4.93	☐	+/- 0.25 LPM

Leak Test: Date of check: October 27, 2023 Last Cal Date: September 26, 2023

PM w/o HEPA: 11.2 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: PMT check was completed in September. Leak check passed, no adjustments made.

Calibration by: Max Farrell

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS22
JANVIER
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	October 5, 2023	Last Cal Date:	September 28, 2023
Start time (MST):	9:12	End time (MST):	12:46
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.11	ppm	Cal Gas Exp Date:	January 18, 2029
Cal Gas Cylinder #:	CC281519			
Removed Cal Gas Conc:	50.11	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3806
ZAG Make/Model:	Teledyne API T701		Serial Number:	4890

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1152430006

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005095	0.996104	Backgd or Offset:	21.4	20.7
Calibration intercept:	2.463336	1.485197	Coeff or Slope:	0.989	0.997

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	1.2	----
as found span	4920	79.8	799.8	805.0	0.994
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	1.3	----
high point	4920	79.8	799.8	797.9	1.002
second point	4960	39.9	399.9	400.4	0.999
third point	4980	20.0	200.4	201.0	0.997
as left zero	5000	0.0	0.0	1.6	----
as left span	4920	79.8	799.8	796.5	1.004
				Average Correction Factor	0.999

Baseline Corr As found:	803.80	Previous response	806.33	*% change	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

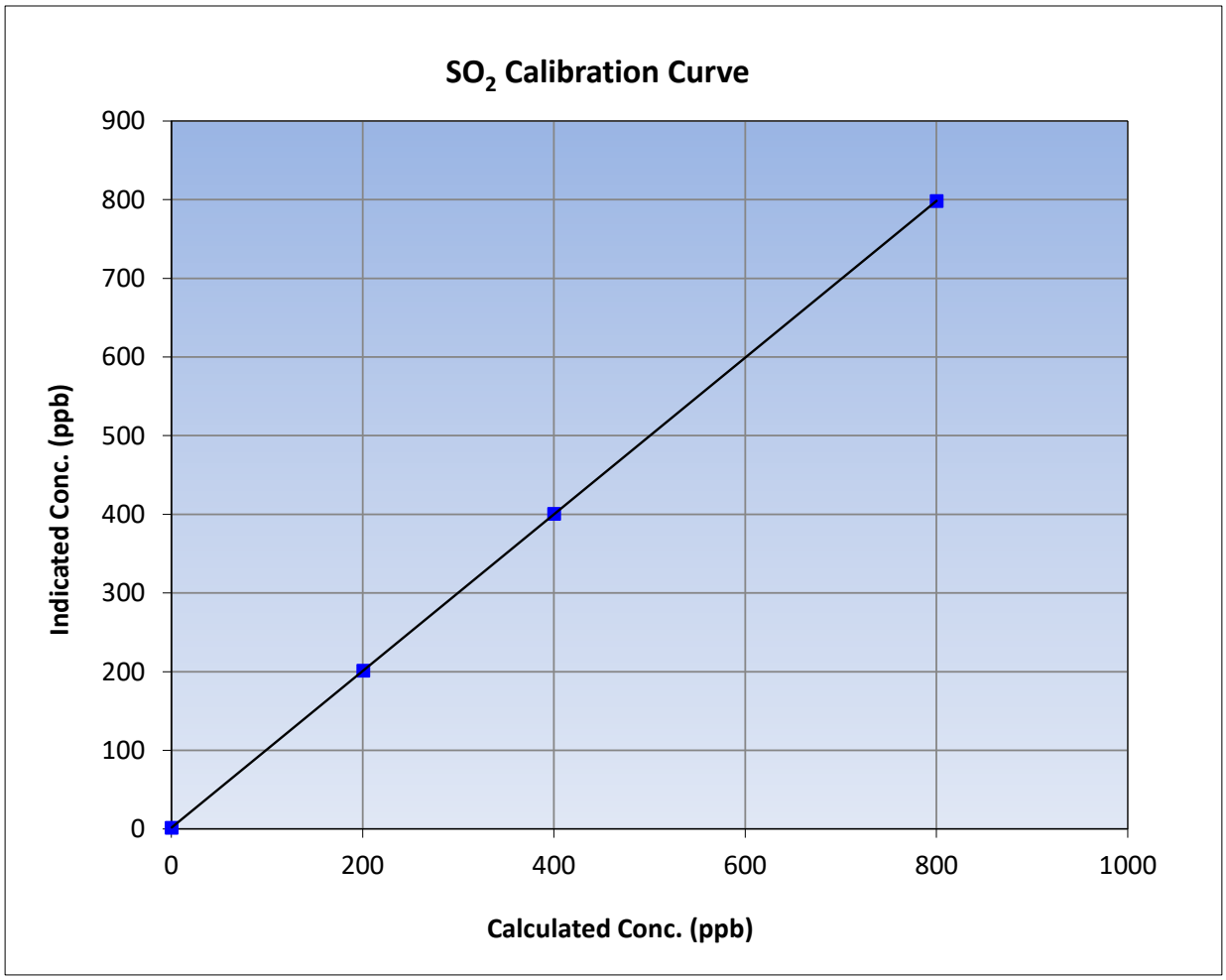
Station Information

Calibration Date:	October 5, 2023	Previous Calibration:	September 28, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:12	End Time (MST):	12:46
Analyzer make:	Thermo 43i	Analyzer serial #:	1152430006

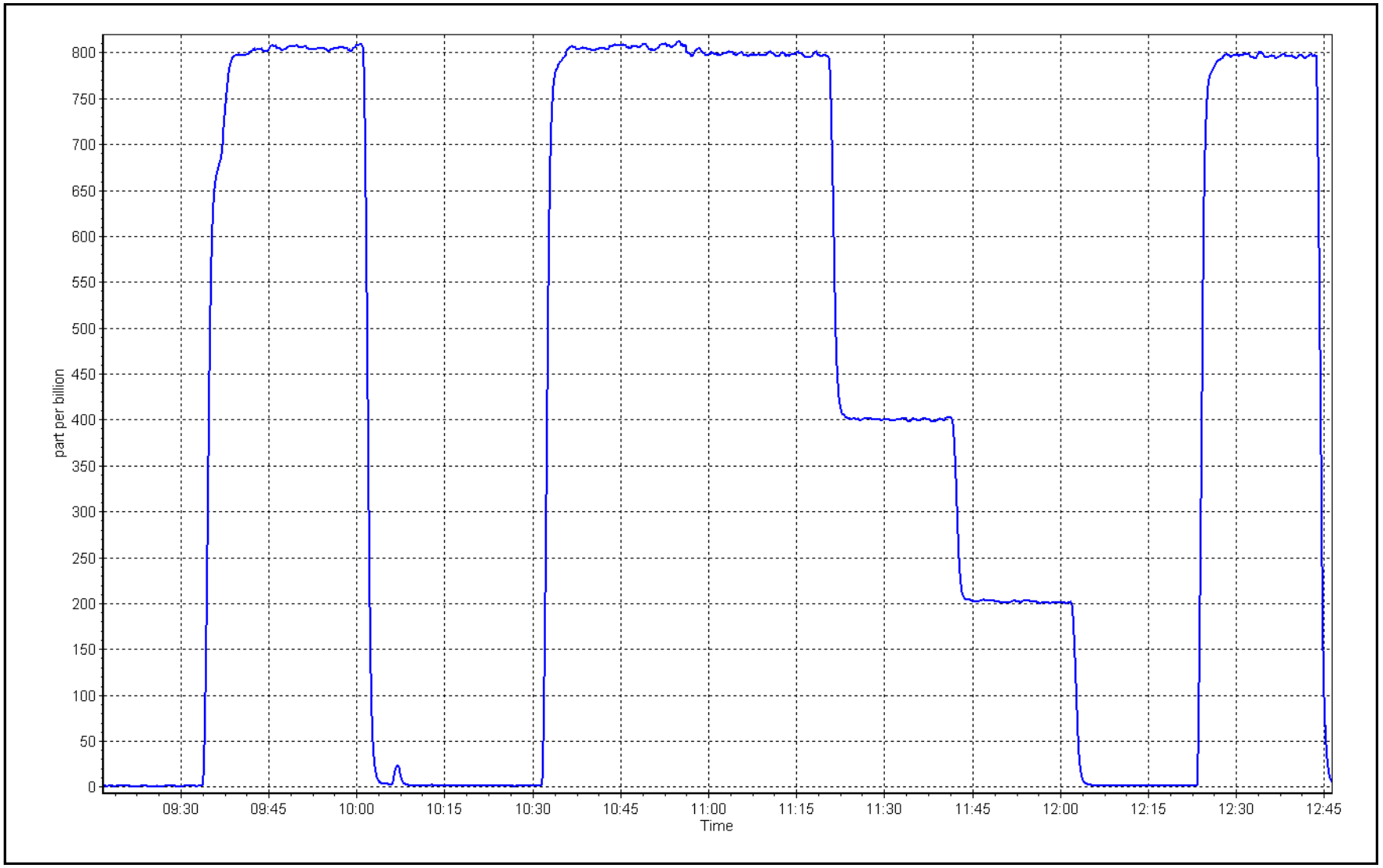
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	1.3	----
799.8	797.9	1.0024
399.9	400.4	0.9987
200.4	201.0	0.9972

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	0.996104	*0.90 - 1.10*
Intercept	1.485197	*+/-30*



SO2 Calibration Plot Date: October 5, 2023 Location: Janvier



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Janvier	Station number:	AMS22
Calibration Date:	October 18, 2023	Last Cal Date:	September 21, 2023
Start time (MST):	9:18	End time (MST):	14:18
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.03	ppm	Cal Gas Exp Date:	April 16, 2022
Cal Gas Cylinder #:	DT0018680			
Removed Cal Gas Conc:	5.03	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3806
ZAG Make/Model:	Teledyne API T701		Serial Number:	4890

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1151680031	
Converter make:	CDN-101		Converter serial #:	587	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003650	1.011516	Backgd or Offset:	3.04	3.04
Calibration intercept:	-0.039106	0.060524	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	0.1	----
as found span	4920	79.5	80.0	73.7	1.087
as found 2nd point	4960	39.8	40.0	36.9	1.088
as found 3rd point	4980	19.9	20.0	18.5	1.088
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4920	79.5	80.0	80.7	0.991
second point	4960	39.8	40.0	41.2	0.972
third point	4980	19.9	20.0	20.1	0.996
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	79.5	80.0	81.1	0.986
SO2 Scrubber Check	4920	79.8	798.0	0.3	----
Date of last scrubber change:				Ave Corr Factor	0.986
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	73.6	Prev response:	80.24	*% change:	-9.0%
Baseline Corr 2nd AF pt:	36.8	AF Slope:	0.920202	AF Intercept:	0.082530
Baseline Corr 3rd AF pt:	18.4	AF Correlation:	1.000000		

* = > +/-5% change initiates investigation

Notes: As found span is 9% low, completed an investigation and searched for leaks. Throughout the calibration the scrubber beads must have dried enough to reach the target span as there were no adjustments made and the span reached target. See docit for more info.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

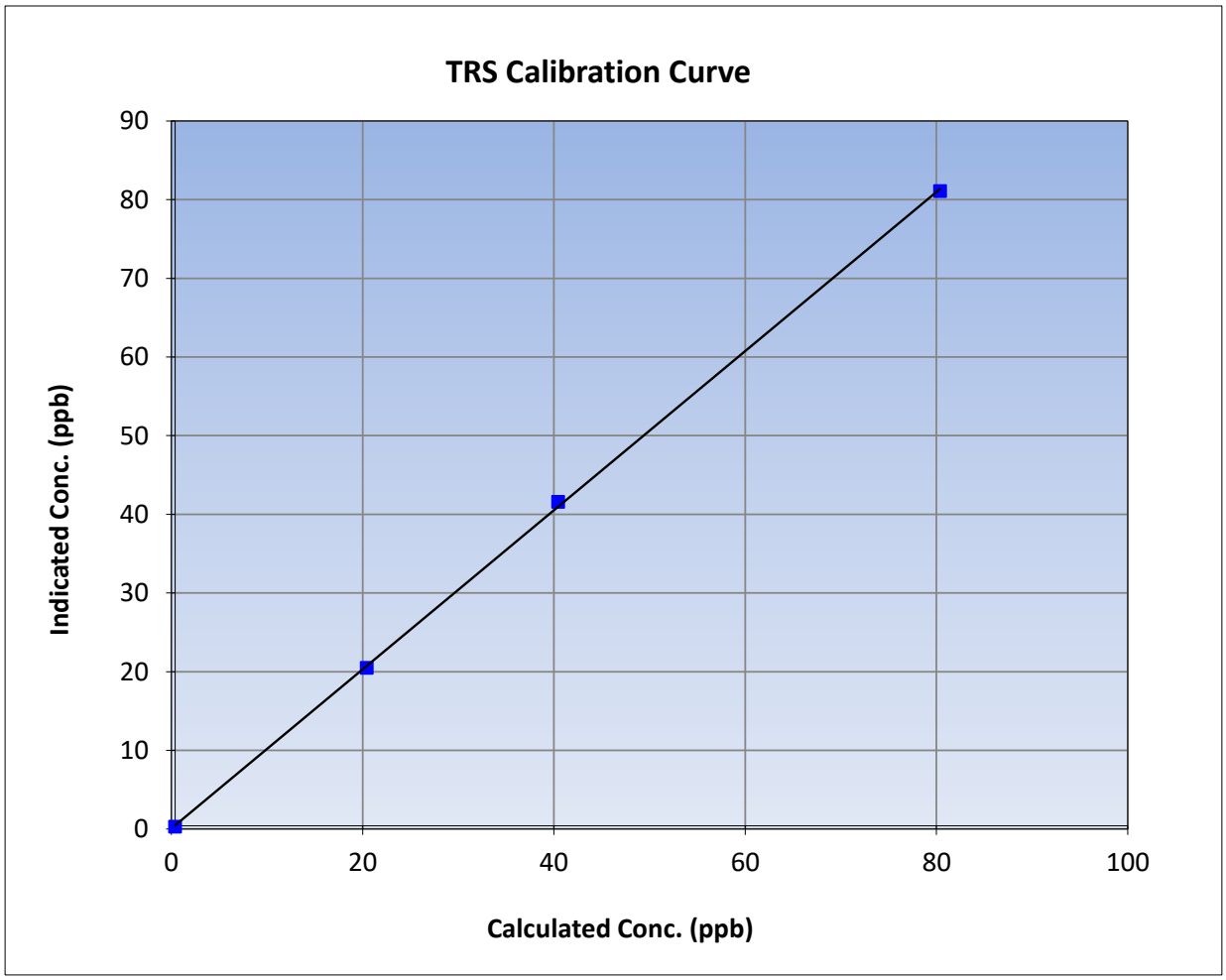
Station Information

Calibration Date:	October 18, 2023	Previous Calibration:	September 21, 2023
Station Name:	Janvier	Station Number:	AMS22
Start Time (MST):	9:18	End Time (MST):	14:18
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1151680031

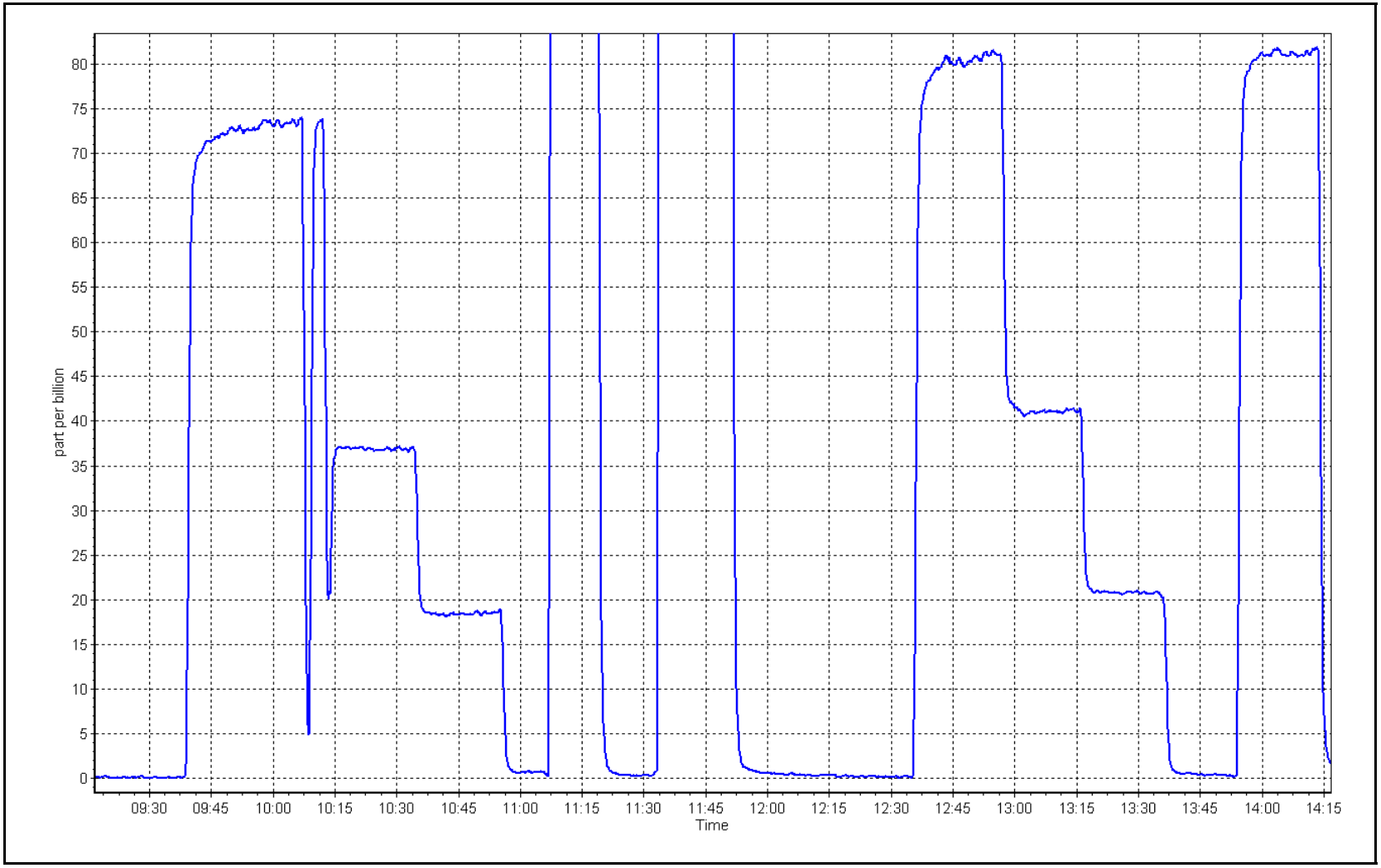
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.7	0.9911
40.0	41.2	0.9719
20.0	20.1	0.9960

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999847	*≥0.995*
Slope	1.011516	*0.90 - 1.10*
Intercept	0.060524	*+/-3*



TRS Calibration Plot Date: October 18, 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:	October 5, 2023	Last Cal Date:	September 28, 2023
Start time (MST):	9:13	End time (MST):	12:47
Reason:	Routine		

Calibration Standards

Gas Cert Reference:	CC281519		Cal Gas Expiry Date:	January 18, 2029	
CH4 Cal Gas Conc.	502.8	ppm	CH4 Equiv Conc.	1075.9	ppm
C3H8 Cal Gas Conc.	208.4	ppm			
Removed Gas Cert:			Removed Gas Expiry:		
Removed CH4 Conc.	502.8	ppm	CH4 Equiv Conc.	1075.9	ppm
Removed C3H8 Conc.	208.4	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API 700		Serial Number:	3806	
ZAG make/model:	Teledyne API 701		Serial Number:	4890	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1172750023	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.240E-04	2.200E-04	NMHC SP Ratio:	4.50E-05	4.43E-05
CH4 Retention time:	13.6	13.8	NMHC Peak Area:	203170	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	17.70	0.970
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	17.21	0.998
second point	4960	39.9	8.59	8.48	1.012
third point	4980	20.0	4.30	4.23	1.018
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	17.17	16.93	1.015
				Average Correction Factor	1.009
Baseline Corr AF:	17.70	Prev response	17.18	*% change	3.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	79.8	9.15	9.58	0.955
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	9.13	1.002
second point	4960	39.9	4.57	4.53	1.011
third point	4980	20.0	2.29	2.25	1.021
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	9.15	9.05	1.011
				Average Correction Factor	1.011
Baseline Corr AF:	9.58	Prev response	9.15	*% change	4.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	79.8	8.03	8.12	0.988
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	79.8	8.03	8.09	0.992
second point	4960	39.9	4.01	3.96	1.013
third point	4980	20.0	2.01	1.98	1.014
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	8.03	7.88	1.018
				Average Correction Factor	1.006
Baseline Corr AF:	8.12	Prev response	8.03	*% 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:	1.000655	1.003343
THC Cal Offset:	-0.005800	-0.059000
CH4 Cal Slope:	1.000614	1.008361
CH4 Cal Offset:	0.000436	-0.033775
NMHC Cal Slope:	1.000704	0.998915
NMHC Cal Offset:	-0.007036	-0.024625

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

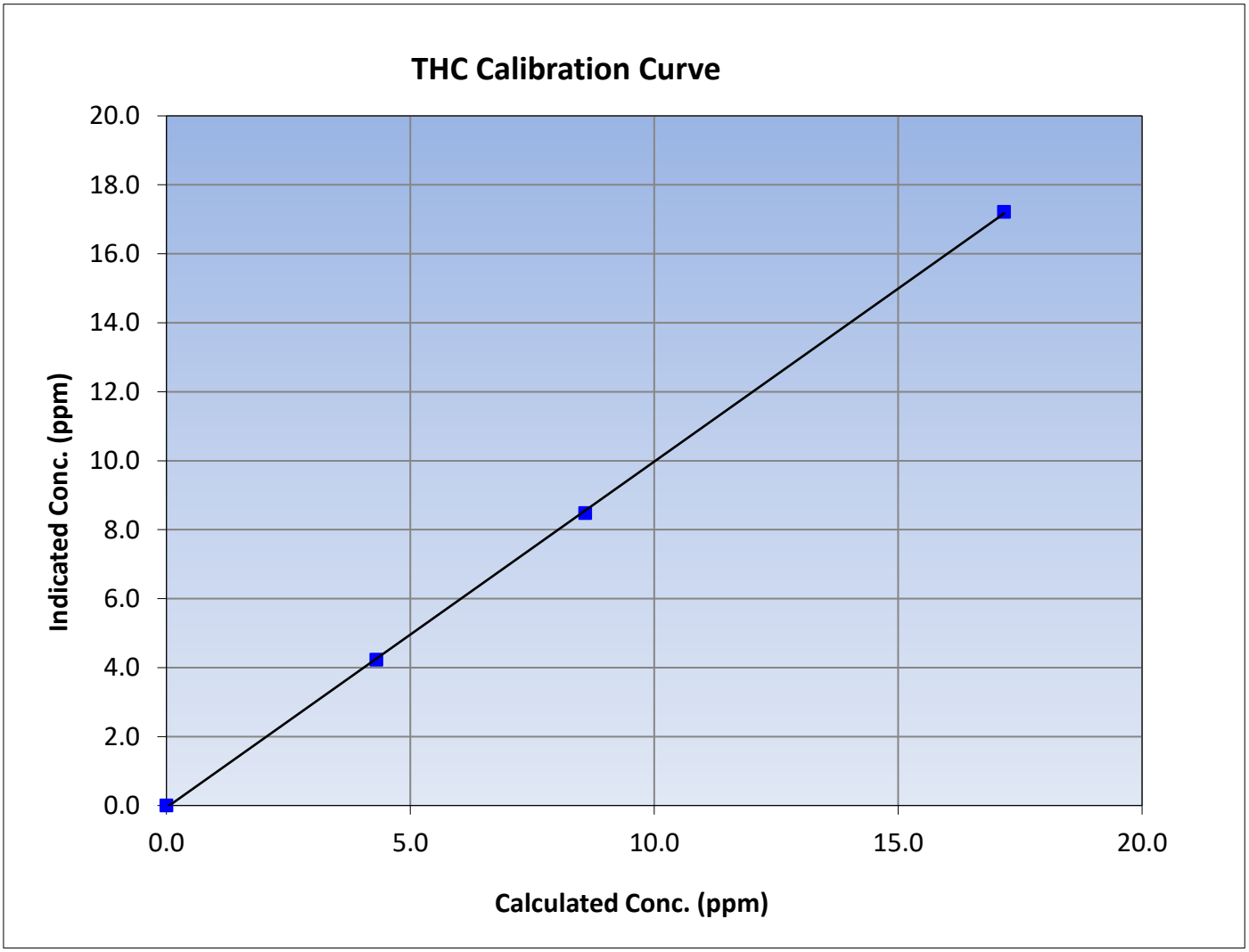
Version-06-2022

Station Information

Calibration Date:	October 5, 2023	Previous Calibration:	September 28, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:13	End Time (MST):	12:47
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	0.999929	≥0.995
17.17	17.21	0.9976			
8.59	8.48	1.0120	Slope	1.003343	0.90 - 1.10
4.30	4.23	1.0179			
			Intercept	-0.059000	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

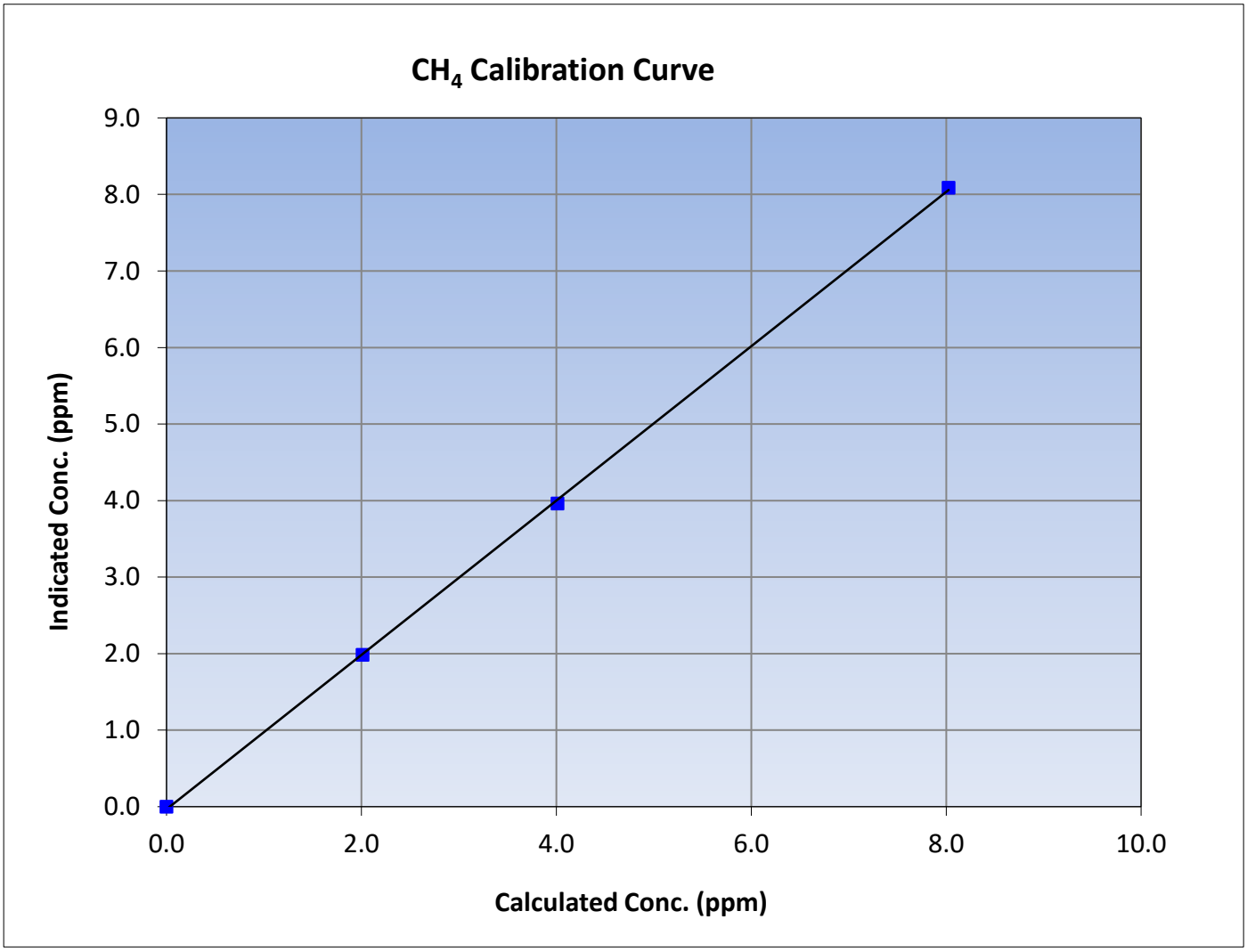
Version-06-2022

Station Information

Calibration Date:	October 5, 2023	Previous Calibration:	September 28, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:13	End Time (MST):	12:47
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	0.999866	*≥0.995*
8.03	8.09	0.9923			
4.01	3.96	1.0132	Slope	1.008361	*0.90 - 1.10*
2.01	1.98	1.0137			
			Intercept	-0.033775	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

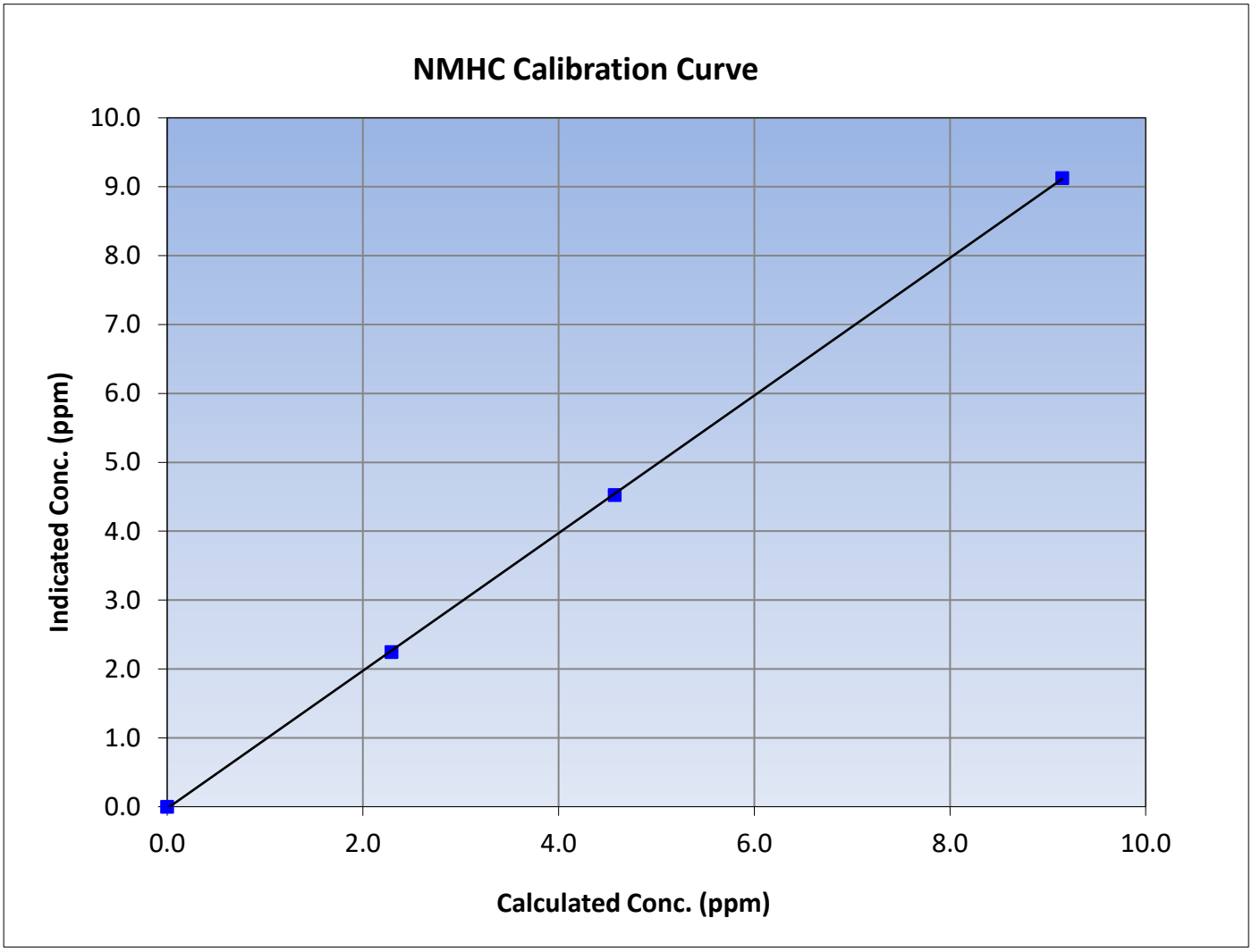
Version-06-2022

Station Information

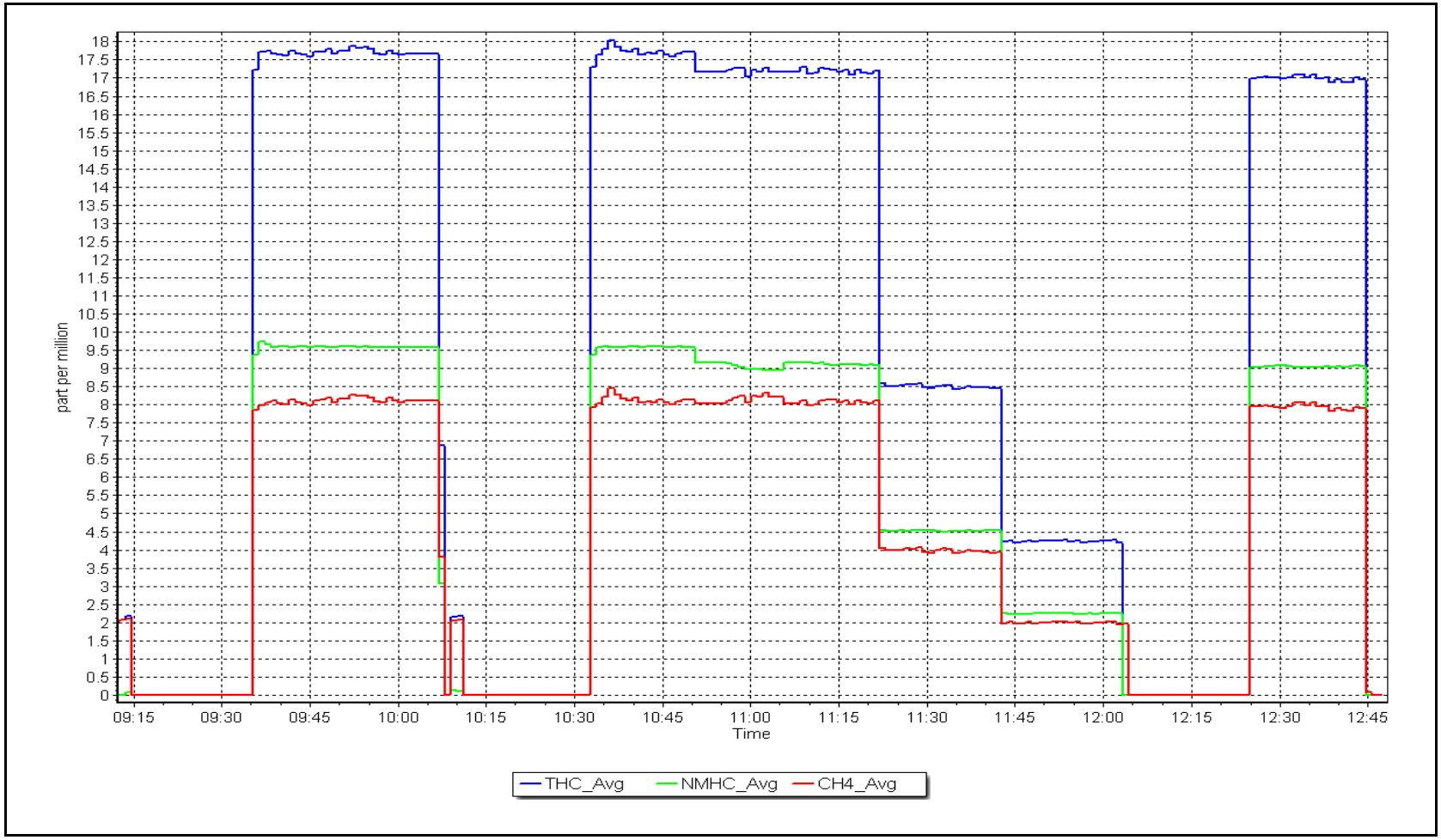
Calibration Date:	October 5, 2023	Previous Calibration:	September 28, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:13	End Time (MST):	12:47
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750023

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999965	≥0.995
9.15	9.13	1.0022			
4.57	4.53	1.0107	Slope	0.998915	0.90 - 1.10
2.29	2.25	1.0211			
			Intercept	-0.024625	+/-0.5



NMHC Calibration Plot Date: October 5, 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:	October 17, 2023	Last Cal Date:	September 19, 2023
Start time (MST):	10:00	End time (MST):	14:39
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:	0.998659	0.991915
NO_X Cal Offset:	2.728523	2.589941
NO Cal Slope:	0.998929	0.989600
NO Cal Offset:	2.308958	2.050558
NO_2 Cal Slope:	0.997414	0.999193
NO_2 Cal Offset:	-0.454360	0.162793

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	1.8	2.0	-0.3	----	----
as found span	4918	82.3	799.9	799.9	0.0	797.8	789.4	8.3	1.0026	1.0133
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	2.0	2.1	-0.1	----	----
high point	4918	82.3	799.9	799.9	0.0	795.6	793.4	2.2	1.0054	1.0082
second point	4959	41.2	400.4	400.4	0.0	400.5	399.1	1.4	0.9999	1.0034
third point	4980	20.6	200.2	200.2	0.0	201.5	199.6	1.9	0.9936	1.0030
as left zero	5000	0.0	0.0	0.0	0.0	1.9	2.2	-0.3	----	----
as left span	4918	82.3	799.9	406.7	393.2	792.3	400.2	392.2	1.0096	1.0163
								Average Correction Factor	0.9996	1.0049

Corrected As found NO_X = 796.0 ppb NO = 787.4 ppb

Previous Response NO_X = 801.6 ppb NO = 801.4 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 = -0.7%

*Percent Change NO = -1.8%

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

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

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

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	792.1	398.9	393.2	392.8	1.0010	99.9%
2nd GPT point (200 ppb O3)	792.1	599.2	192.9	193.4	0.9974	100.3%
3rd GPT point (100 ppb O3)	792.1	694.9	97.2	97.3	0.9990	100.1%
				Average Correction Factor	0.9991	100.1%

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

NO_X Calibration Summary

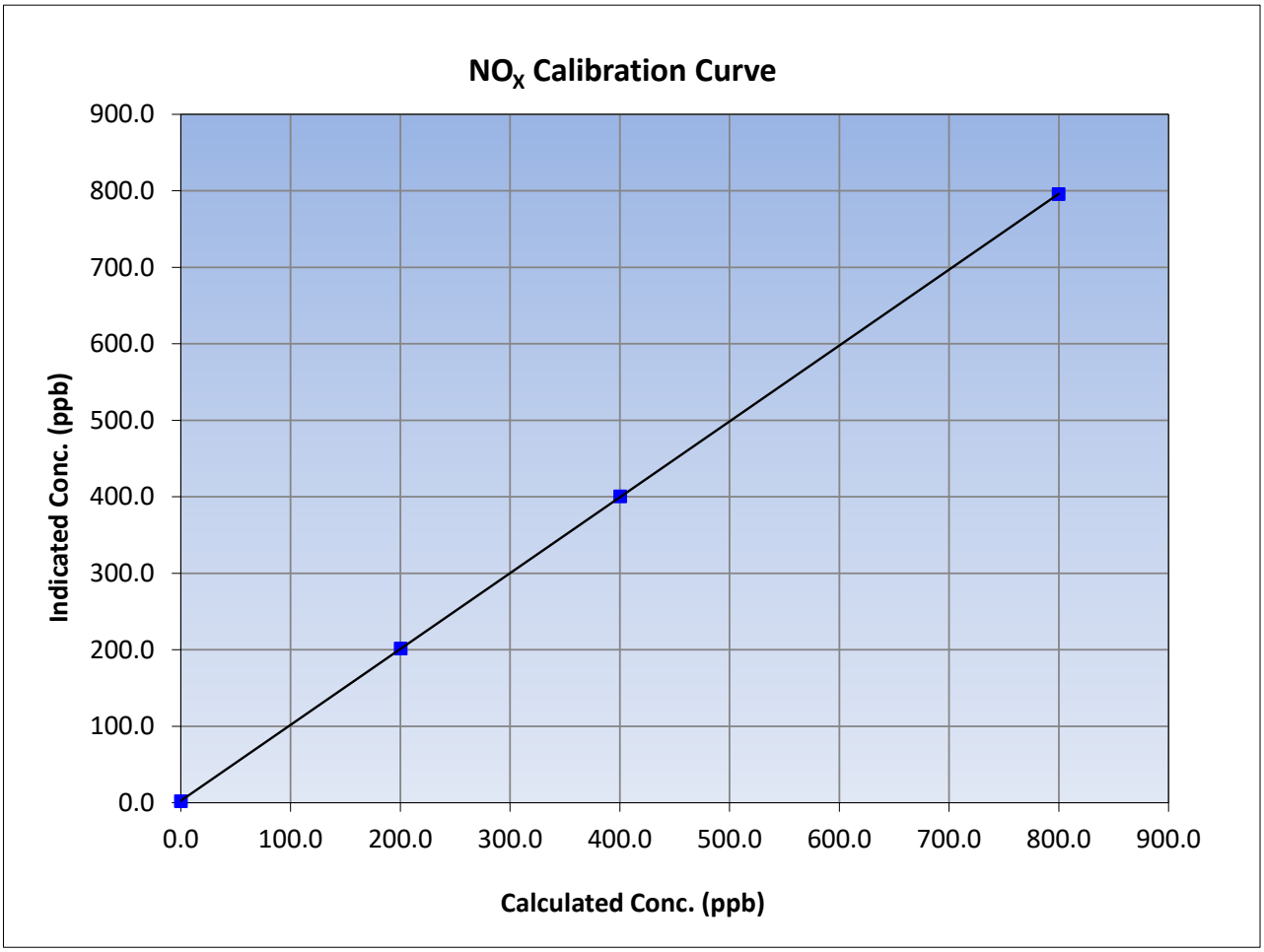
Version-04-2020

Station Information

Calibration Date:	October 17, 2023	Previous Calibration:	September 19, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:00	End Time (MST):	14:39
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	0.999997	≥0.995
799.9	795.6	1.0054			
400.4	400.5	0.9999	Slope	0.991915	0.90 - 1.10
200.2	201.5	0.9936			
			Intercept	2.589941	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

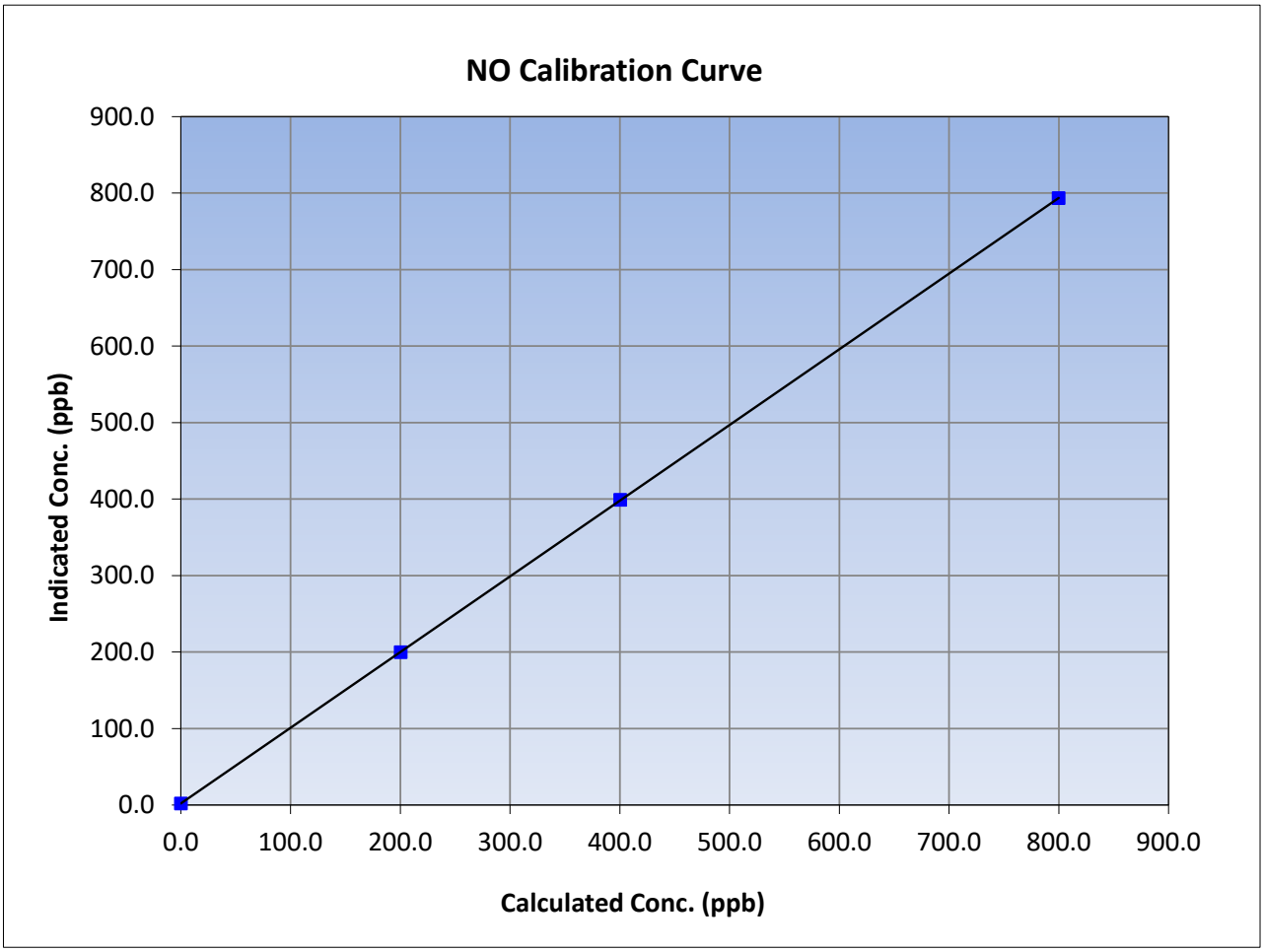
Version-04-2020

Station Information

Calibration Date:	October 17, 2023	Previous Calibration:	September 19, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:00	End Time (MST):	14:39
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	2.1	----	Correlation Coefficient	0.999997	≥0.995
799.9	793.4	1.0082			
400.4	399.1	1.0034	Slope	0.989600	0.90 - 1.10
200.2	199.6	1.0030			
			Intercept	2.050558	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

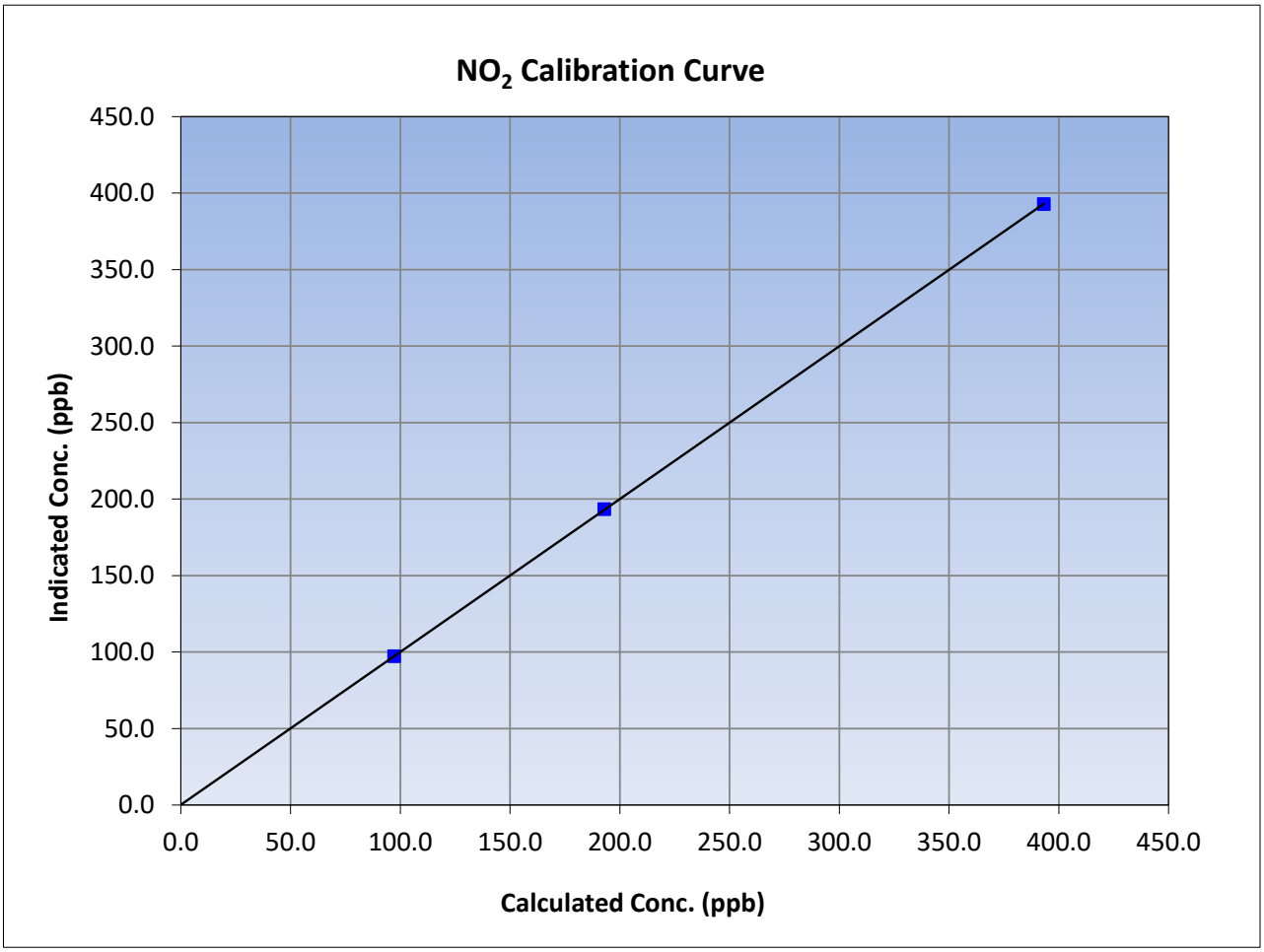
Version-04-2020

Station Information

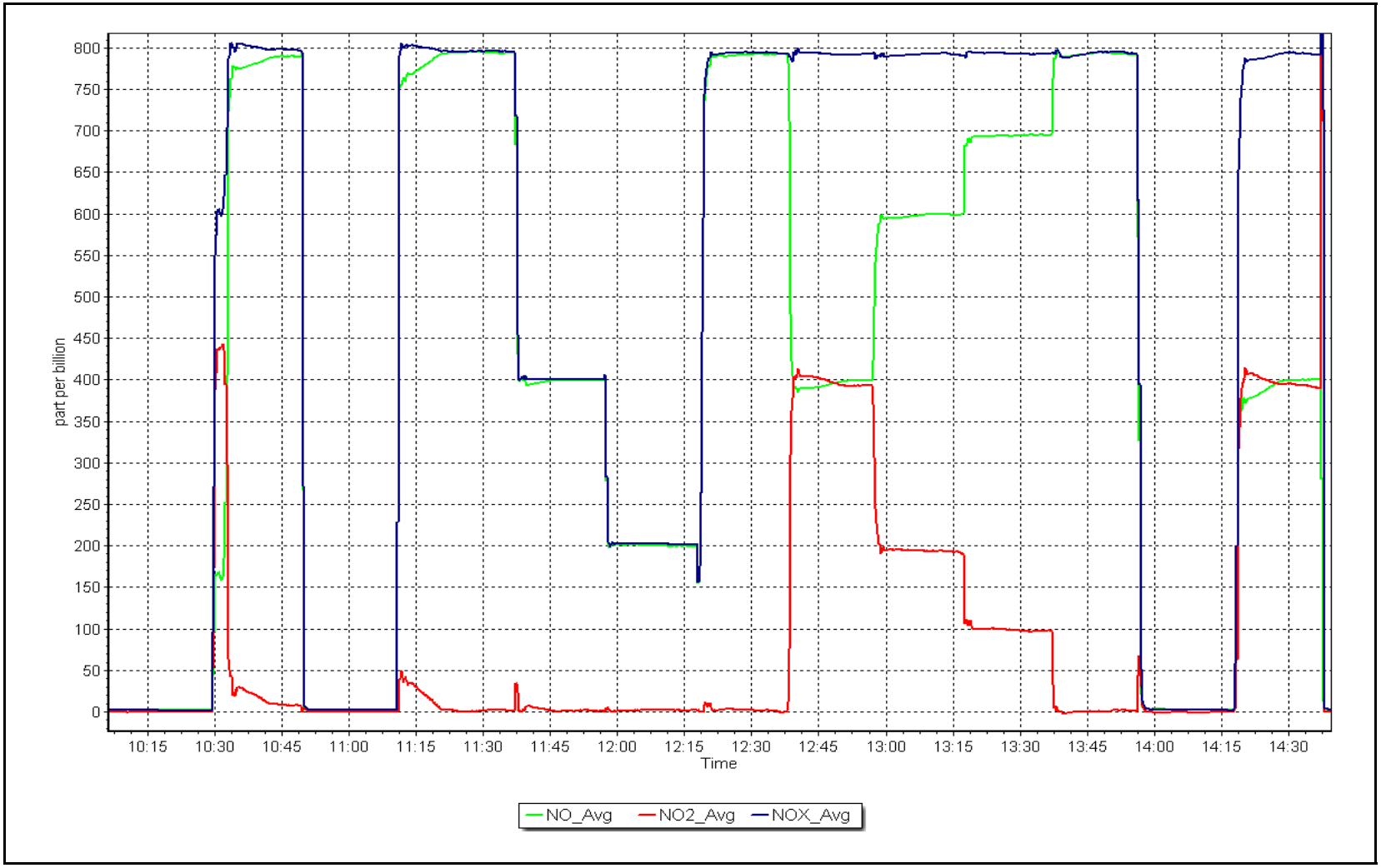
Calibration Date:	October 17, 2023	Previous Calibration:	September 19, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:00	End Time (MST):	14:39
Analyzer make:	API T200	Analyzer serial #:	833

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999996	≥0.995
393.2	392.8	1.0010			
192.9	193.4	0.9974	Slope	0.999193	0.90 - 1.10
97.2	97.3	0.9990			
			Intercept	0.162793	+/-20



NO_X Calibration Plot Date: October 17, 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:	October 20, 2023	Last Cal Date:	September 7, 2023
Start time (MST):	9:18	End time (MST):	12:12
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	Teledyne API T700	Serial Number:	3806
ZAG Make/Model:	Teledyne API T701H	Serial Number:	201

Analyzer Information

Analyzer make:	Teledyne API T400	Analyzer serial #:	7046
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000914	0.996857	Backgd or Offset:	-0.2	-0.2
Calibration intercept:	0.840000	1.800000	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	0.6	----
as found span	4895	905.3	400.0	401.2	0.997
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	1.1	----
high point	4895	905.3	400.0	400.1	1.000
second point	4895	756.7	200.0	201.8	0.991
third point	4895	656.1	100.0	102.0	0.980
as left zero	5000	800.0	0.0	1.5	----
as left span	4895	904.3	400.0	403.3	0.992
				Average Correction Factor	0.990

Baseline Corr As found:	400.6	Previous response	401.2	*% change	-0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

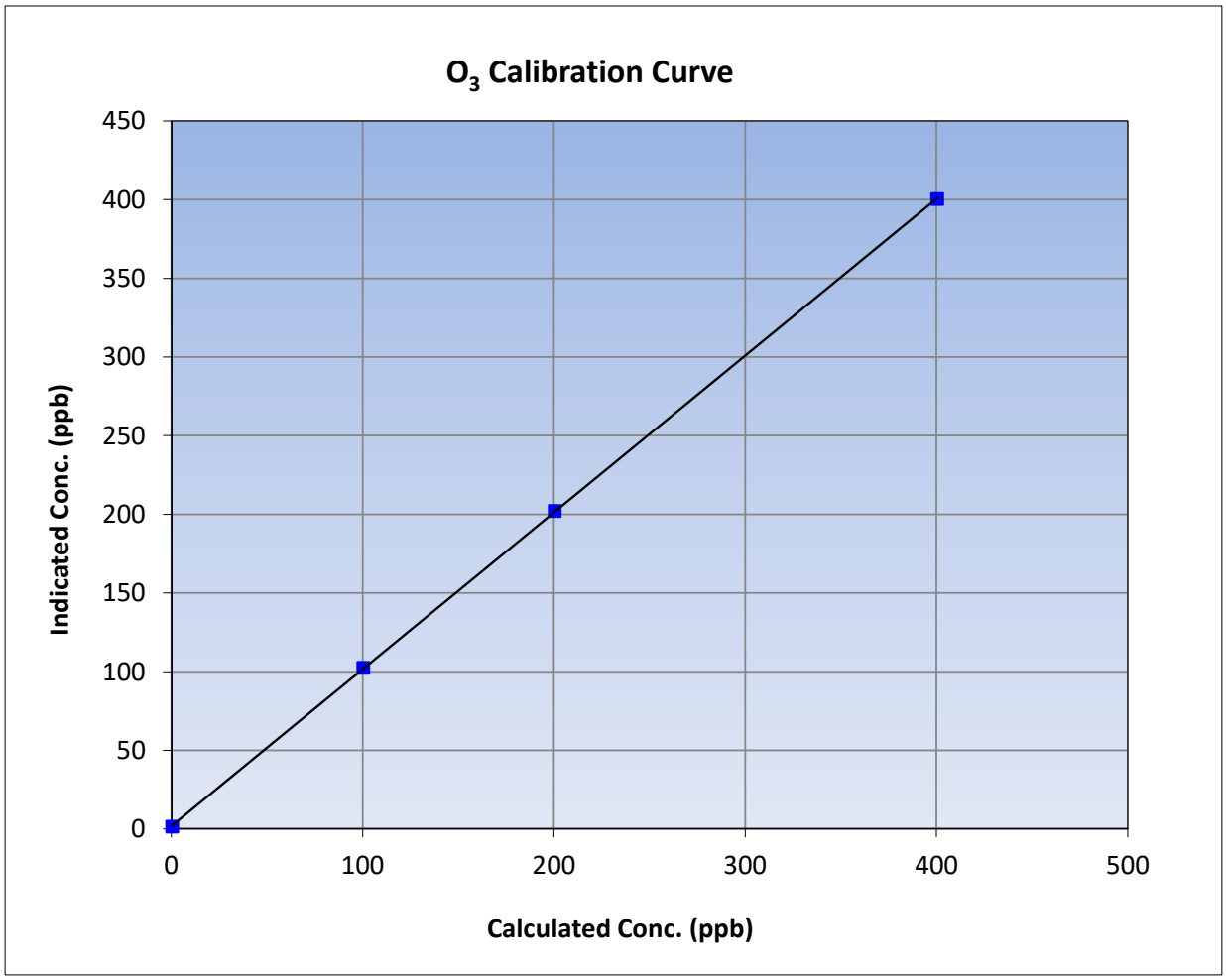
Station Information

Calibration Date:	October 20, 2023	Previous Calibration:	September 7, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:18	End Time (MST):	12:12
Analyzer make:	Teledyne API T400	Analyzer serial #:	7046

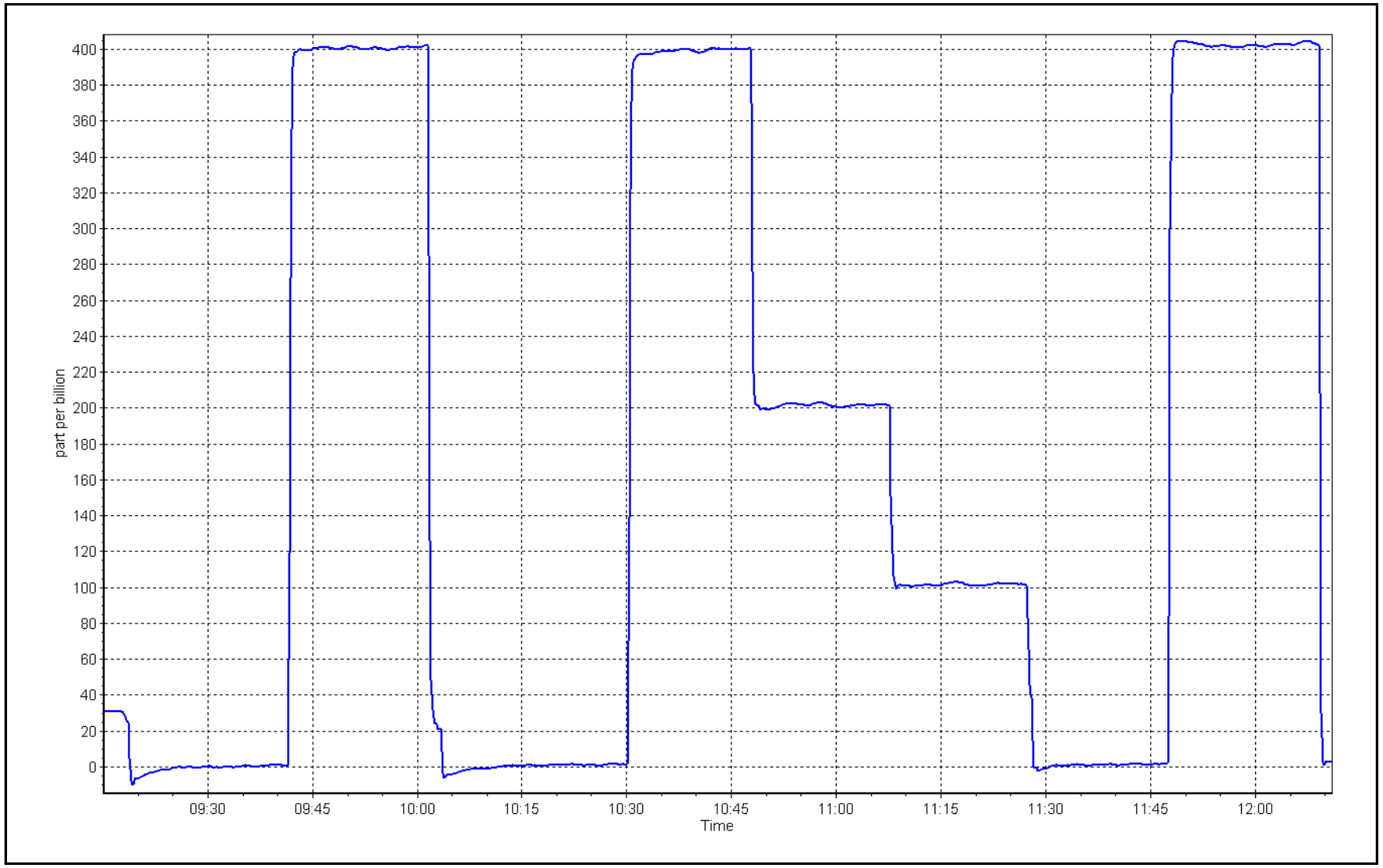
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	1.1	----
400.0	400.1	0.9998
200.0	201.8	0.9911
100.0	102.0	0.9804

Statistical Evaluation		Limits
Correlation Coefficient	0.999985	≥0.995
Slope	0.996857	0.90 - 1.10
Intercept	1.800000	+/- 5



O_3 Calibration Plot Date: October 20, 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:	October 20, 2023	Last Cal Date:	September 28, 2023
Start time (MST):	12:16	End time (MST):	13:13
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)	14.1	13.5	14.1	☐	+/- 2 °C
P (mmHg)	713.8	714.4	713.8	☐	+/- 10 mmHg
flow (LPM)	4.99	5.01	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: October 20, 2023 Last Cal Date: September 28, 2023

PM w/o HEPA: 9.8 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	11.1	11.1	11.1	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 16.2 w/ HEPA: 0 <0.2 ug/m3

Date Optical Chamber Cleaned: October 20, 2023

Disposable Filter Changed: October 20, 2023

Annual Maintenance

Date Sample Tube Cleaned: July 26, 2023

Date RH/T Sensor Cleaned: July 26, 2023

Notes:

No adjustments needed. Leak check passed.

Calibration by: Max Farrell

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS23
FORT HILLS
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	October 17, 2023	Last Cal Date:	September 7, 2023
Start time (MST):	8:20	End time (MST):	11:16
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.76	ppm	Cal Gas Exp Date:	January 5, 2025
Cal Gas Cylinder #:	CC281425			
Removed Cal Gas Conc:	49.76	ppm	Rem Gas Exp Date:	N/A
Removed Gas Cyl #:	N/A		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	451
ZAG Make/Model:	API T701		Serial Number:	5611

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1160290012

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.002497	0.999149	Backgd or Offset:	17.8	17.8
Calibration intercept:	-0.744078	-0.923240	Coeff or Slope:	1.031	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	-0.1	----
as found span	4920	80.3	799.1	790.1	1.011
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4920	80.3	799.1	797.9	1.002
second point	4960	40.2	400.1	398.6	1.004
third point	4980	20.1	200.0	197.7	1.012
as left zero	5000	0.0	0.0	-0.1	----
as left span	4920	80.3	799.1	799.6	0.999
				Average Correction Factor	1.006

Baseline Corr As found:	790.20	Previous response	800.35	*% change	-1.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

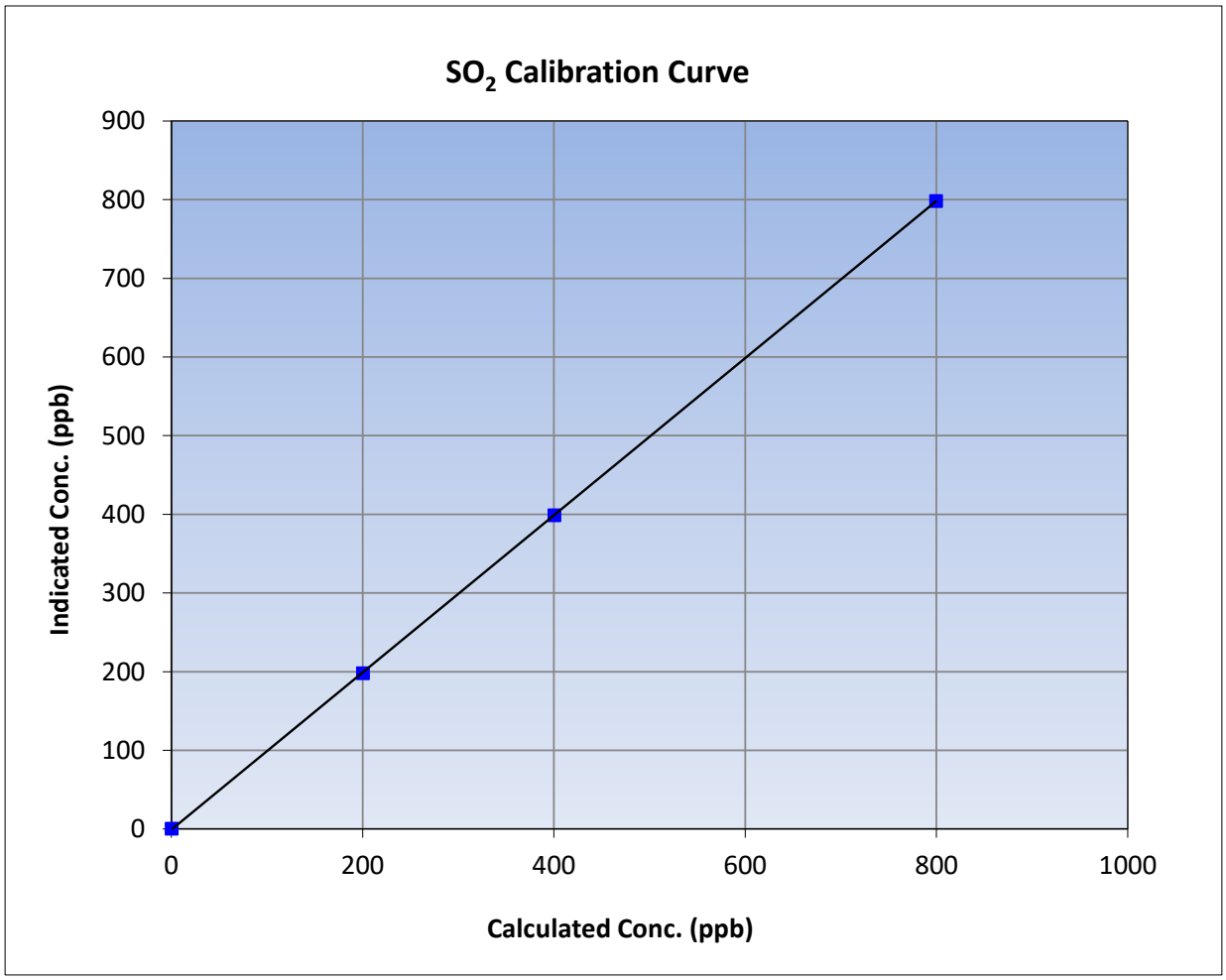
Station Information

Calibration Date:	October 17, 2023	Previous Calibration:	September 7, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:20	End Time (MST):	11:16
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290012

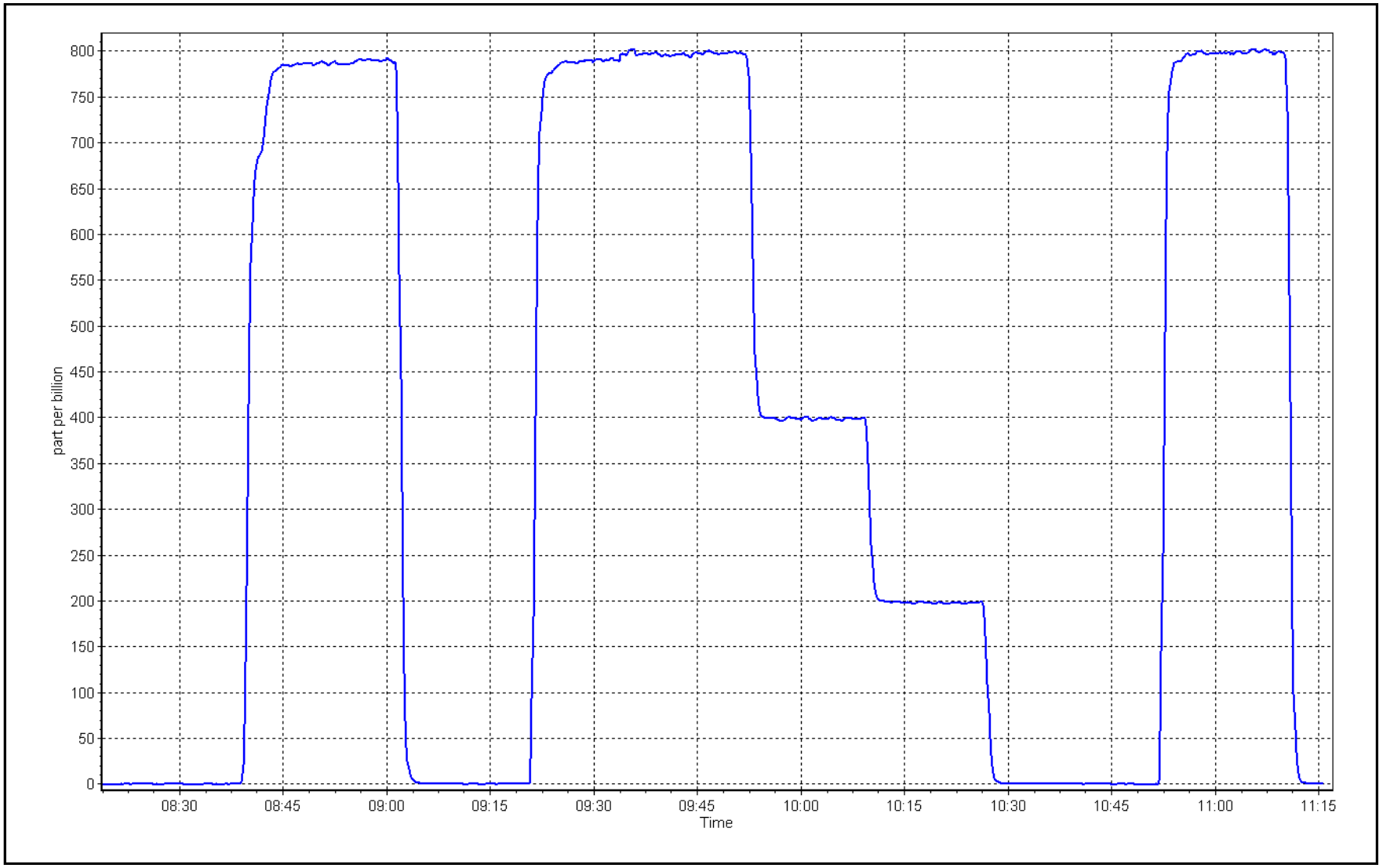
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
799.1	797.9	1.0015
400.1	398.6	1.0036
200.0	197.7	1.0118

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	0.999149	*0.90 - 1.10*
Intercept	-0.923240	*+/-30*



SO2 Calibration Plot Date: October 17, 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:	October 2, 2023	Last Cal Date:	September 6, 2023
Start time (MST):	8:30	End time (MST):	12:18
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:	1.001459	1.004317	Backgd or Offset:	1.19	1.19
Calibration intercept:	0.061824	-0.038148	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	0.0	----
as found span	4923	77.0	80.0	77.0	1.039
as found 2nd point	4962	38.5	40.0	38.7	1.034
as found 3rd point	4981	19.2	19.9	19.7	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	80.2	0.998
second point	4962	38.5	40.0	40.5	0.988
third point	4981	19.2	19.9	19.7	1.013
as left zero	5000	0.0	0.0	0.0	----
as left span	4923	77.0	80.0	80.8	0.990
SO2 Scrubber Check	4920	80.3	803.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.999
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	77.0	Prev response:	80.18	*% change:	-4.1%
Baseline Corr 2nd AF pt:	38.7	AF Slope:	0.960605	AF Intercept:	0.241194
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999952		

* = > +/-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

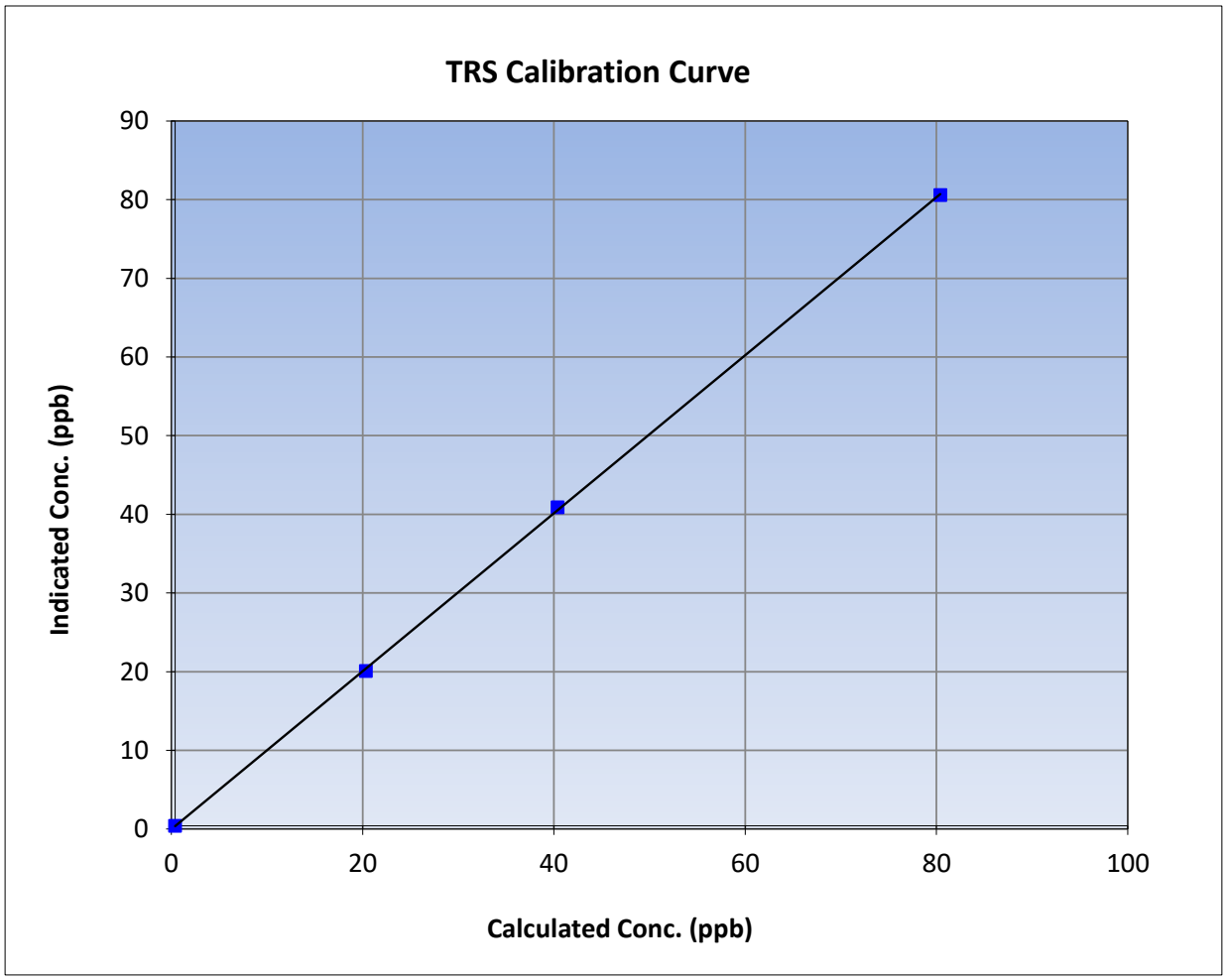
Station Information

Calibration Date:	October 2, 2023	Previous Calibration:	September 6, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:30	End Time (MST):	12:18
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1300156232

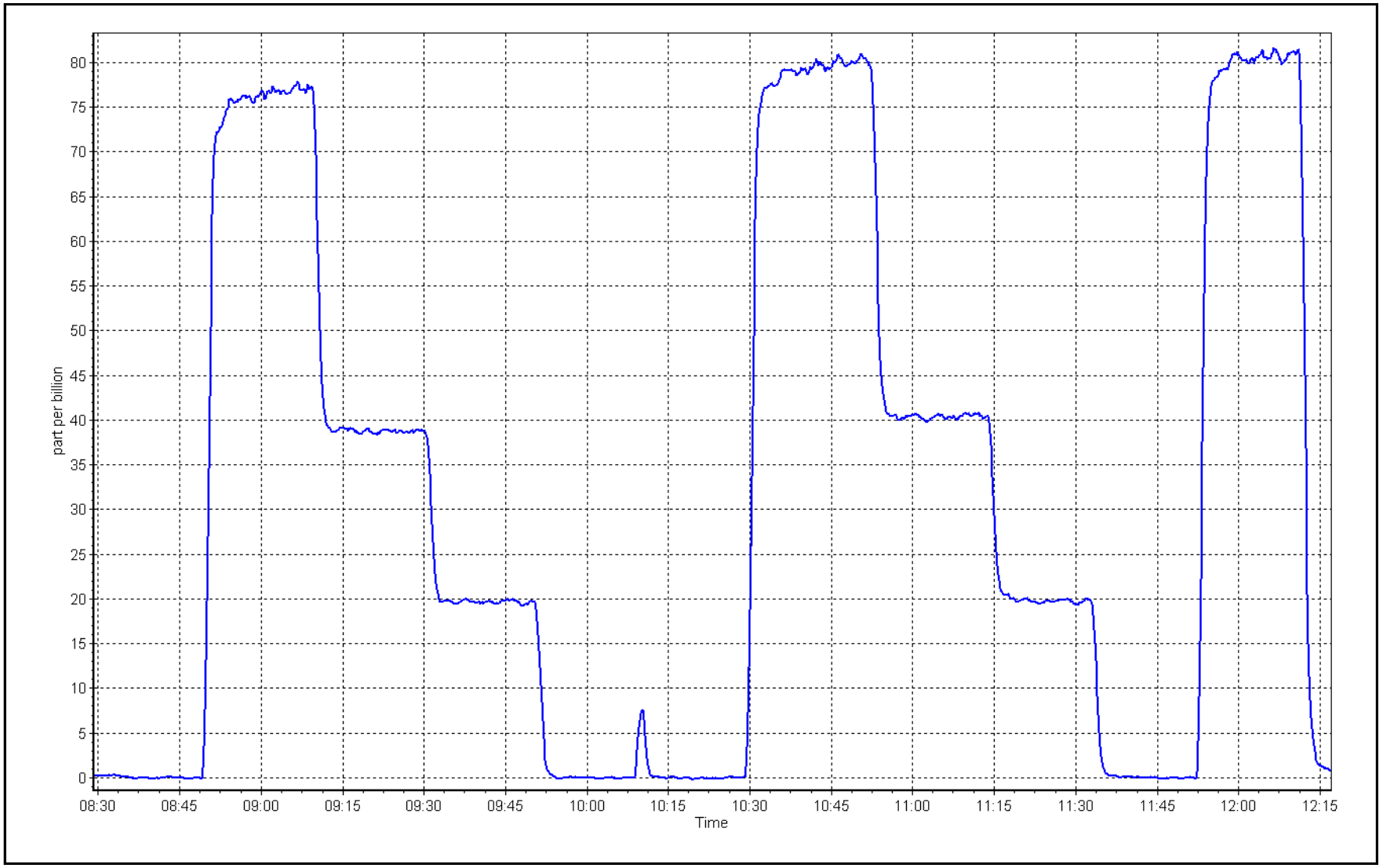
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.2	0.9975
40.0	40.5	0.9876
19.9	19.7	1.0126

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999933	*≥0.995*
Slope	1.004317	*0.90 - 1.10*
Intercept	-0.038148	*+/-3*



TRS Calibration Plot Date: October 2, 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:	October 17, 2023	Last Cal Date:	September 7, 2023
Start time (MST):	8:20	End time (MST):	11:13
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	5.10E-05
CH4 Retention time:	13.0	13.0	NMHC Peak Area:	180460	180460
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	17.29	0.994
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	17.19	17.30	0.994
second point	4960	40.2	8.61	8.67	0.993
third point	4980	20.1	4.30	4.34	0.992
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.19	17.32	0.993
				Average Correction Factor	0.993
Baseline Corr AF:	17.29	Prev response	17.27	*% change	0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	9.16	9.20	0.995
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	9.16	9.21	0.994
second point	4960	40.2	4.59	4.63	0.990
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	9.21	0.994
				Average Correction Factor	0.988
Baseline Corr AF:	9.20	Prev response	9.21	*% change	-0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	8.03	8.09	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	8.03	8.09	0.993
second point	4960	40.2	4.02	4.03	0.998
third point	4980	20.1	2.01	2.00	1.005
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	8.03	8.11	0.990
				Average Correction Factor	0.999
Baseline Corr AF:	8.09	Prev response	8.05	*% change	0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.005421	1.006154
THC Cal Offset:	-0.016398	0.005584
CH4 Cal Slope:	1.005916	1.007912
CH4 Cal Offset:	-0.032039	-0.014057
NMHC Cal Slope:	1.003864	1.004487
NMHC Cal Offset:	0.017642	0.017645

Notes: No maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

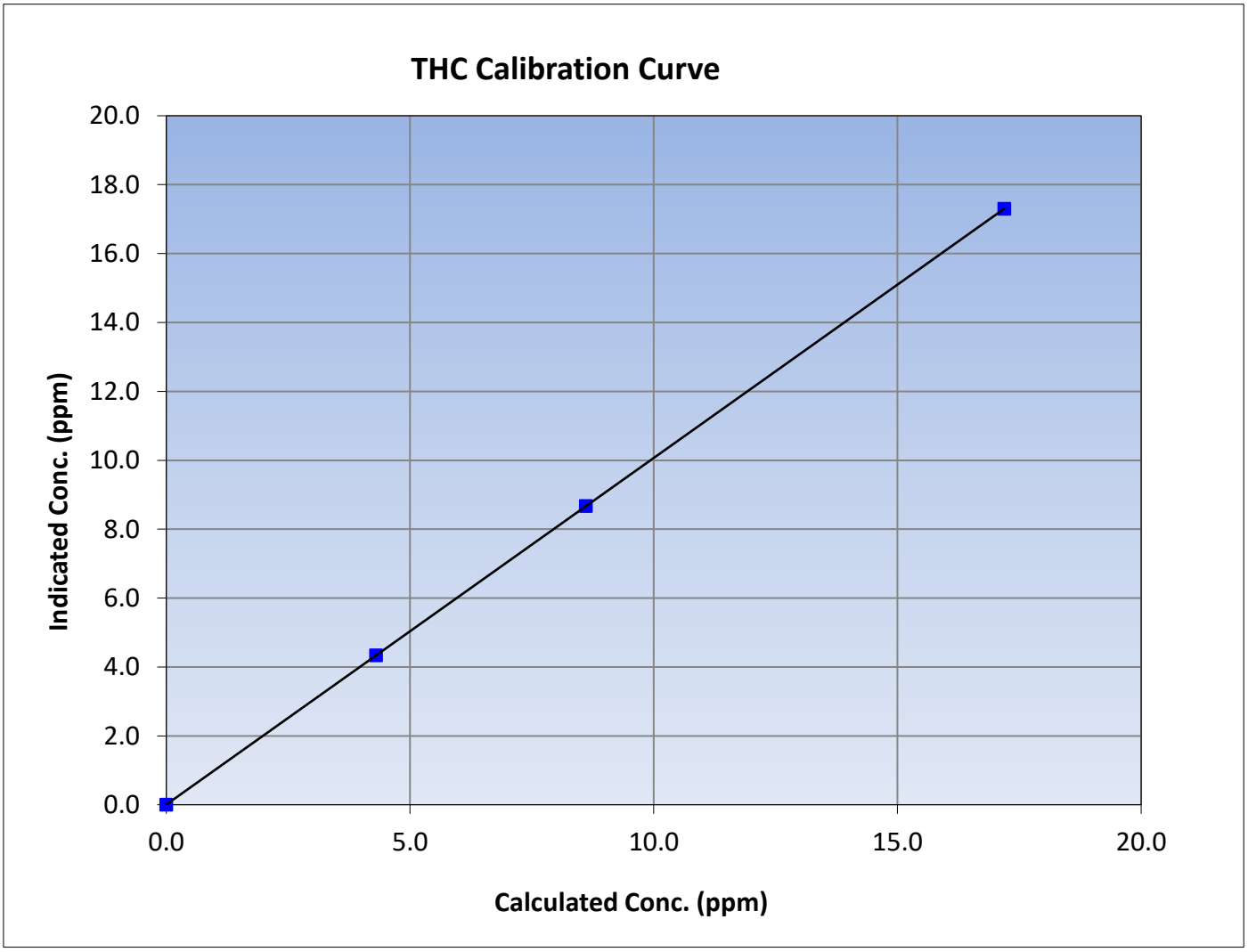
Version-06-2022

Station Information

Calibration Date:	October 17, 2023	Previous Calibration:	September 7, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:20	End Time (MST):	11:13
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	8.67	0.9927	Slope	1.006154	*0.90 - 1.10*
4.30	4.34	0.9916			
			Intercept	0.005584	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

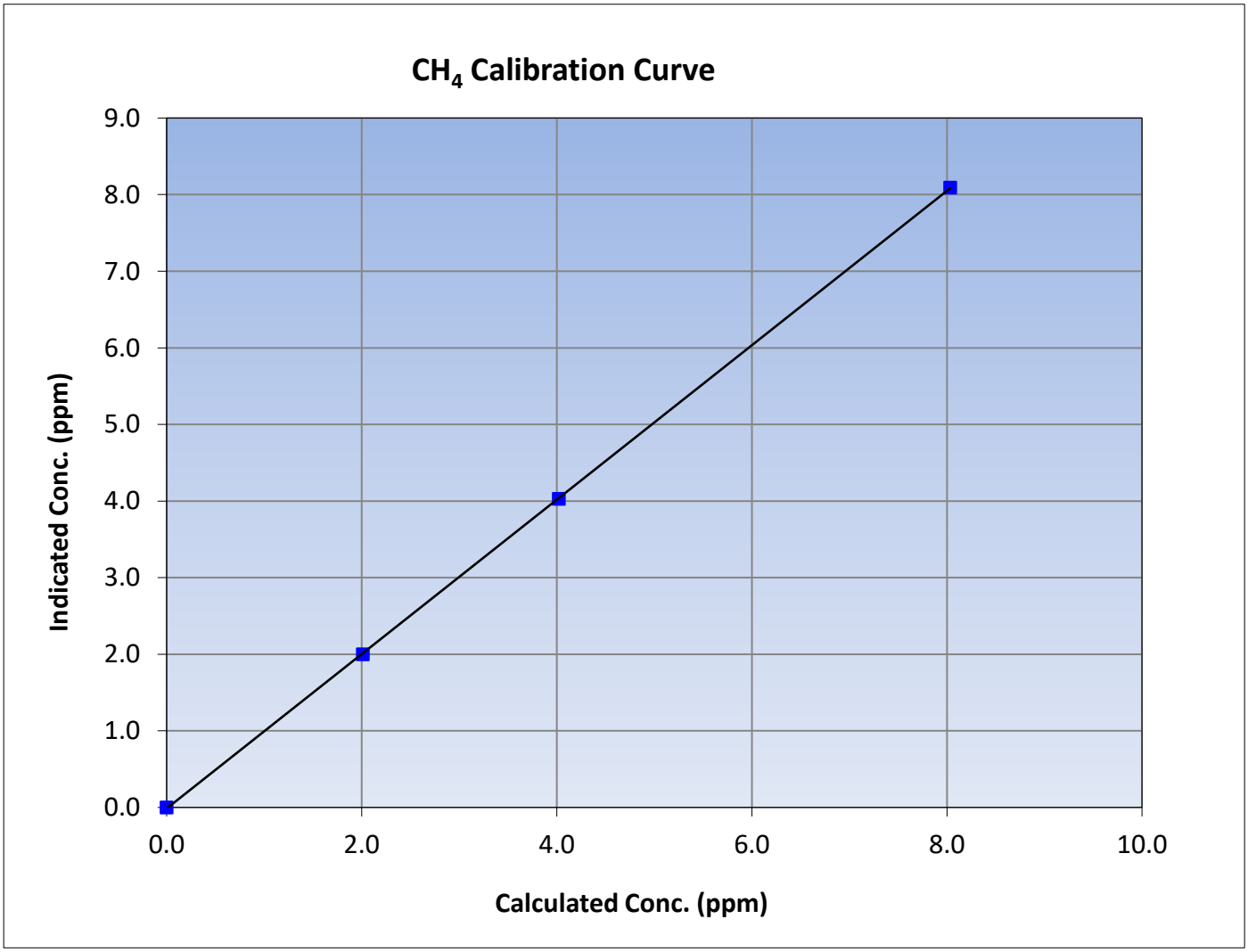
Version-06-2022

Station Information

Calibration Date:	October 17, 2023	Previous Calibration:	September 7, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:20	End Time (MST):	11:13
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	0.999986	*≥0.995*
8.03	8.09	0.9929			
4.02	4.03	0.9979	Slope	1.007912	*0.90 - 1.10*
2.01	2.00	1.0054			
			Intercept	-0.014057	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

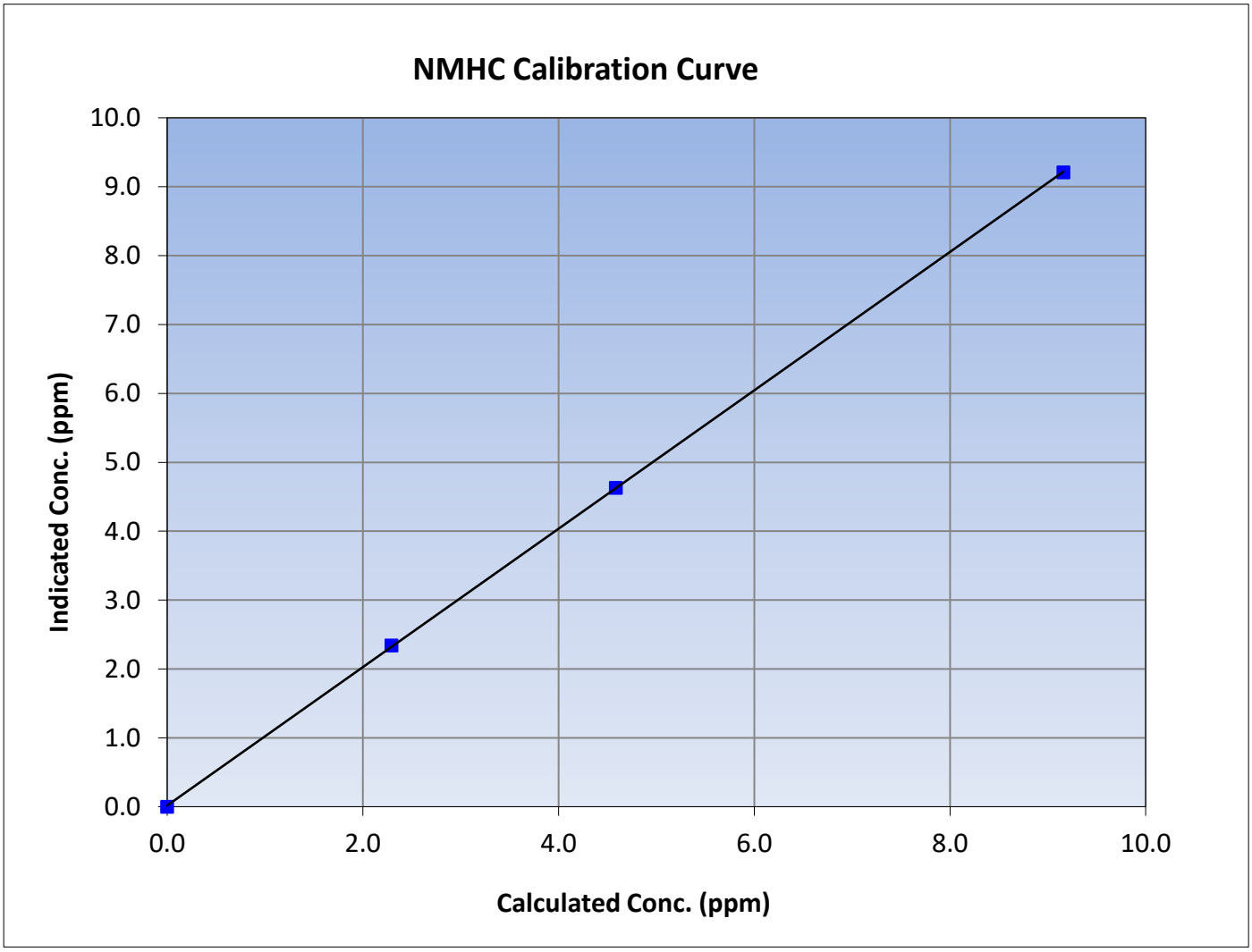
Version-06-2022

Station Information

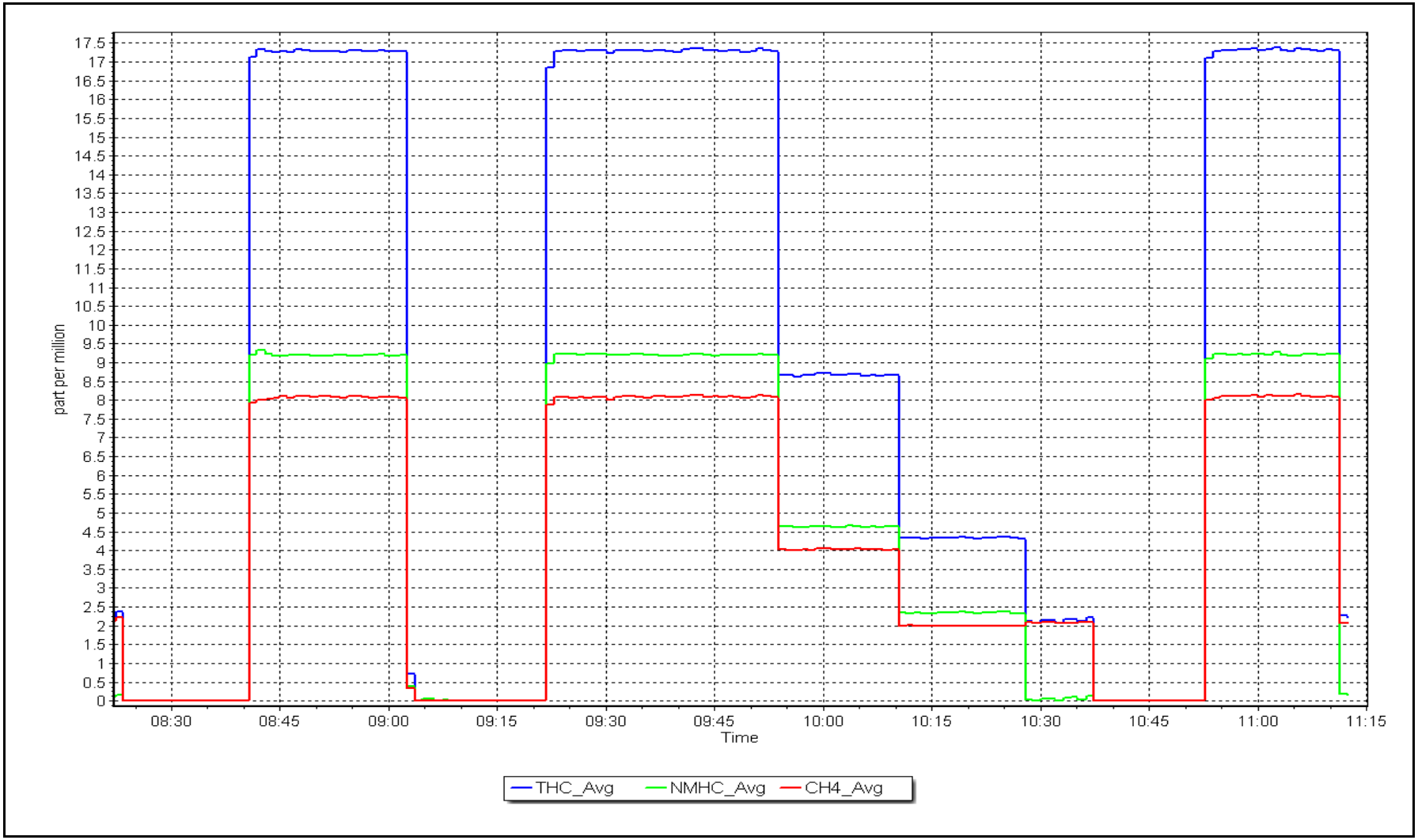
Calibration Date:	October 17, 2023	Previous Calibration:	September 7, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	8:20	End Time (MST):	11:13
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585648

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999983	≥0.995
9.16	9.21	0.9945			
4.59	4.63	0.9904	Slope	1.004487	0.90 - 1.10
2.29	2.34	0.9798			
			Intercept	0.017645	+/-0.5



NMHC Calibration Plot Date: October 17, 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:	October 11, 2023	Last Cal Date:	September 5, 2023
Start time (MST):	7:00	End time (MST):	11:19
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:	1.076	1.089	NO bkgnd or offset:	3.3	3.3
NOX coeff or slope:	0.991	0.993	NOX bkgnd or offset:	3.7	3.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	161.6	161.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.996239	1.000322
NO_X Cal Offset:	-0.017022	0.004208
NO Cal Slope:	0.998440	0.999781
NO Cal Offset:	-1.437143	-0.956508
NO_2 Cal Slope:	1.016048	1.002559
NO_2 Cal Offset:	0.951555	-0.119059

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	-0.1	----	----
as found span	4920	80.5	800.2	800.2	0.0	790.0	788.9	0.9	1.013	1.014
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	4920	80.5	800.2	800.2	0.0	799.9	799.1	0.8	1.000	1.001
second point	4960	40.2	399.6	399.6	0.0	400.9	399.0	1.9	0.997	1.001
third point	4980	20.1	199.8	199.8	0.0	199.6	197.6	1.9	1.001	1.011
as left zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.3	-0.2	----	----
as left span	4920	80.5	800.2	448.1	352.1	799.7	446.1	353.6	1.001	1.004
								Average Correction Factor	0.999	1.005

Corrected As found NO_X = 790.5 ppb NO = 789.2 ppb

Previous Response NO_X = 797.1 ppb NO = 797.5 ppb

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

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

* = > +/-5% change initiates investigation

*Percent Change NO_X = -0.8%

*Percent Change NO = -1.0%

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

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

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

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.8	445.7	352.1	352.8	0.998	100.2%
2nd GPT point (200 ppb O3)	797.8	623.2	174.6	175.2	0.997	100.3%
3rd GPT point (100 ppb O3)	797.8	708.5	89.3	89.2	1.001	99.9%
				Average Correction Factor	0.999	100.1%

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

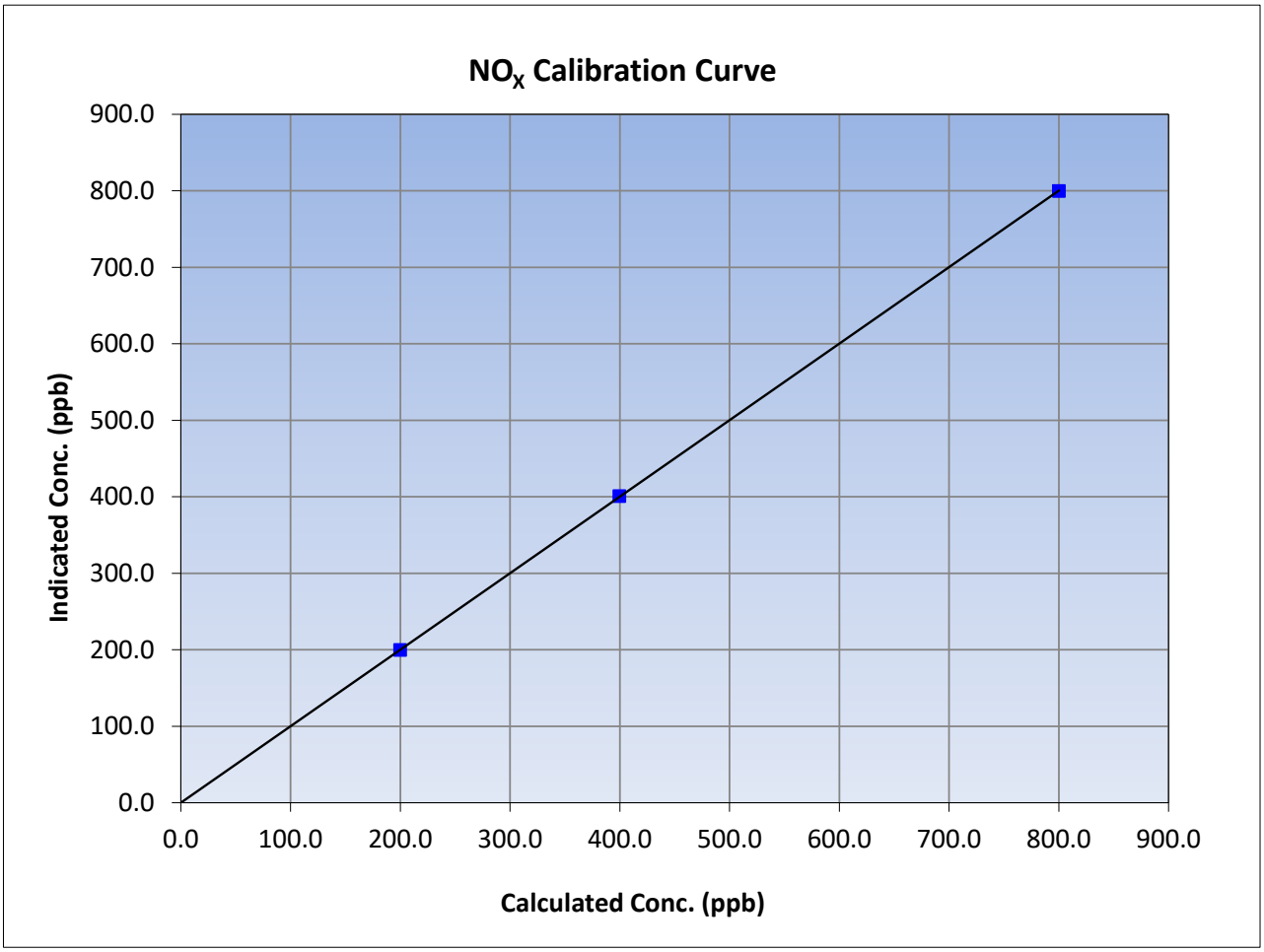
Version-04-2020

Station Information

Calibration Date:	October 11, 2023	Previous Calibration:	September 5, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	7:00	End Time (MST):	11:19
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	-0.4	----	Correlation Coefficient	0.999994	*≥0.995*
800.2	799.9	1.0003			
399.6	400.9	0.9967	Slope	1.000322	*0.90 - 1.10*
199.8	199.6	1.0010			
			Intercept	0.004208	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

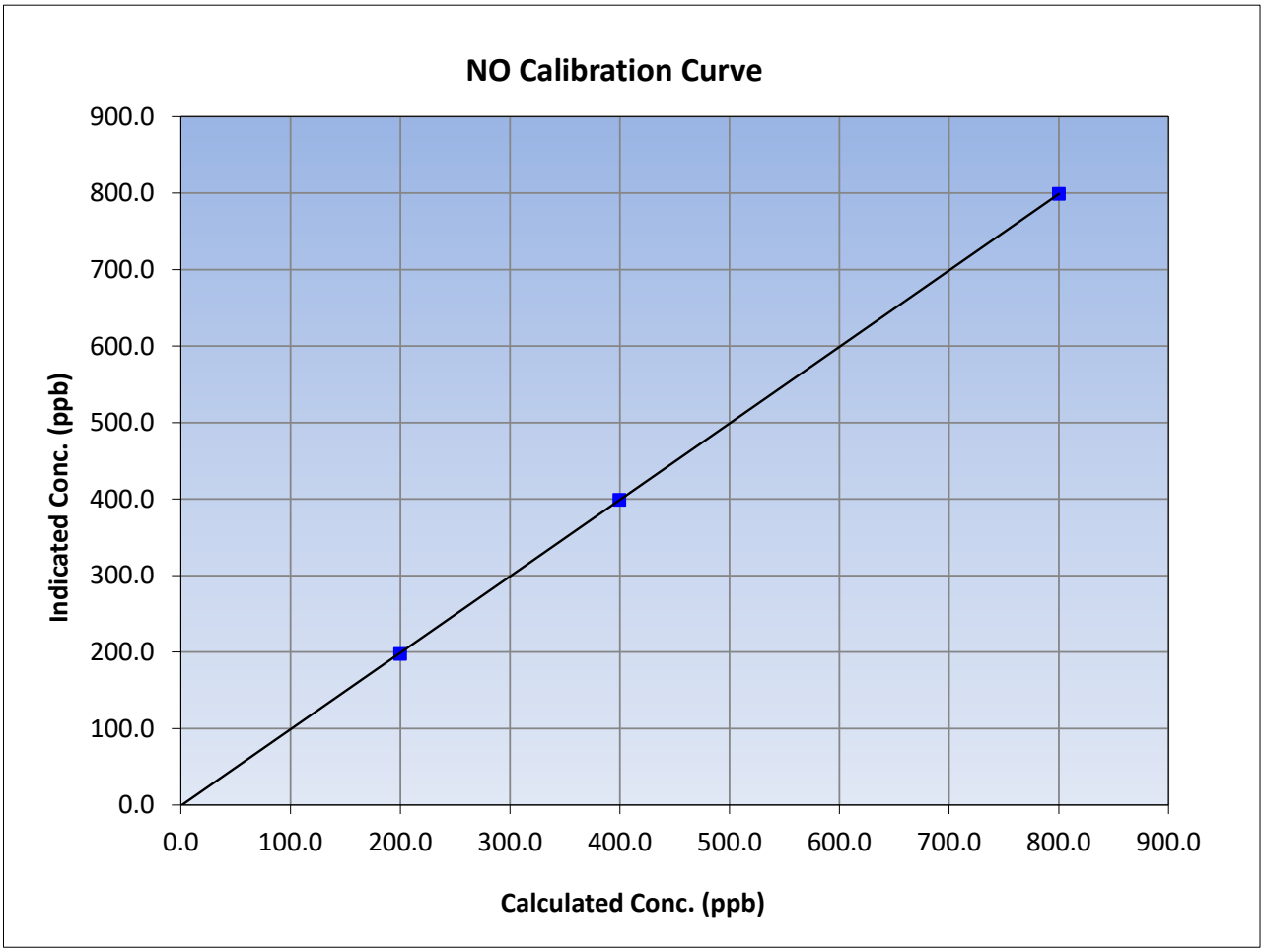
Version-04-2020

Station Information

Calibration Date:	October 11, 2023	Previous Calibration:	September 5, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	7:00	End Time (MST):	11:19
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	-0.3	----	Correlation Coefficient	0.999994	≥0.995
800.2	799.1	1.0013			
399.6	399.0	1.0014	Slope	0.999781	0.90 - 1.10
199.8	197.6	1.0111			
			Intercept	-0.956508	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

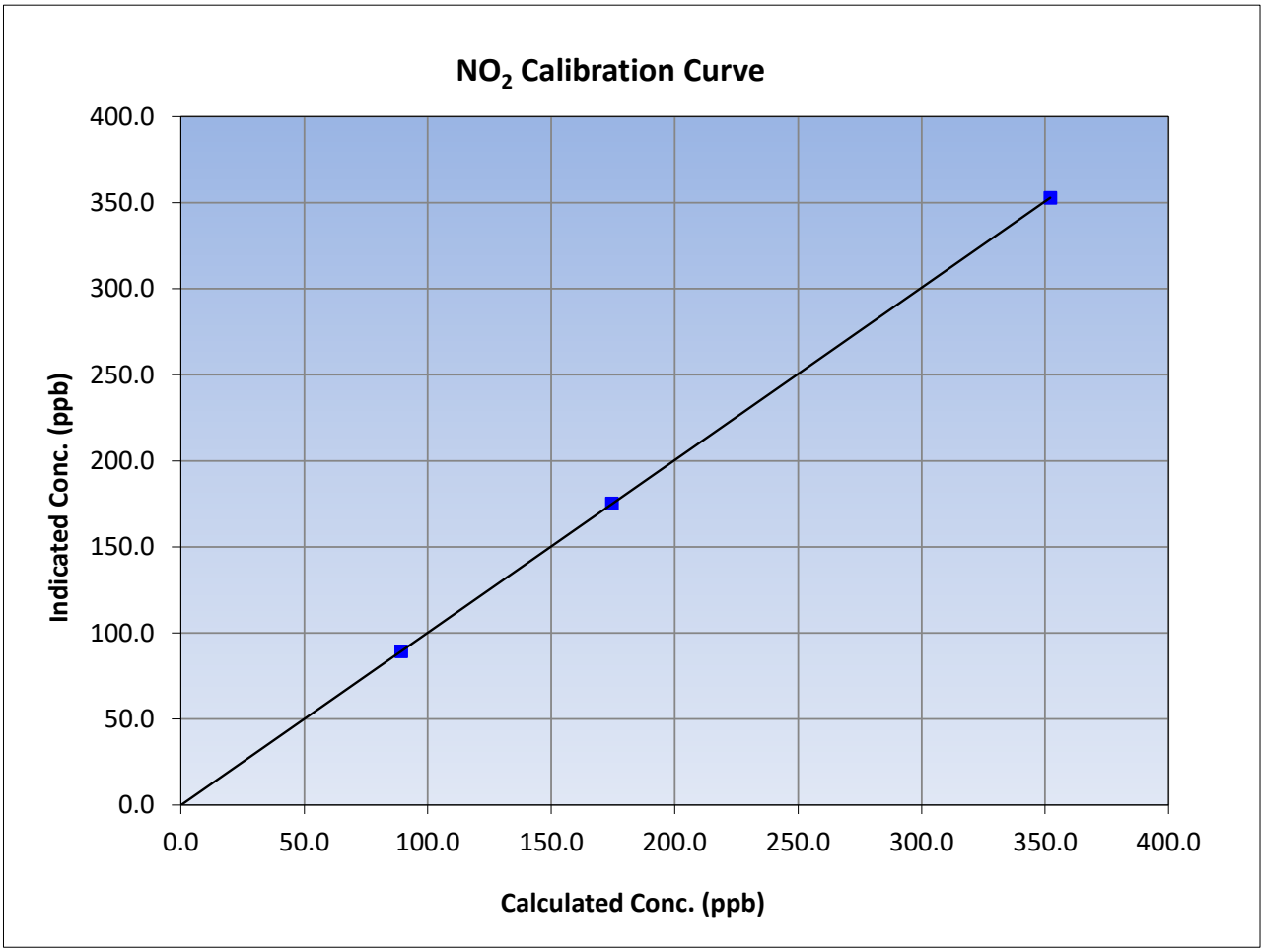
Version-04-2020

Station Information

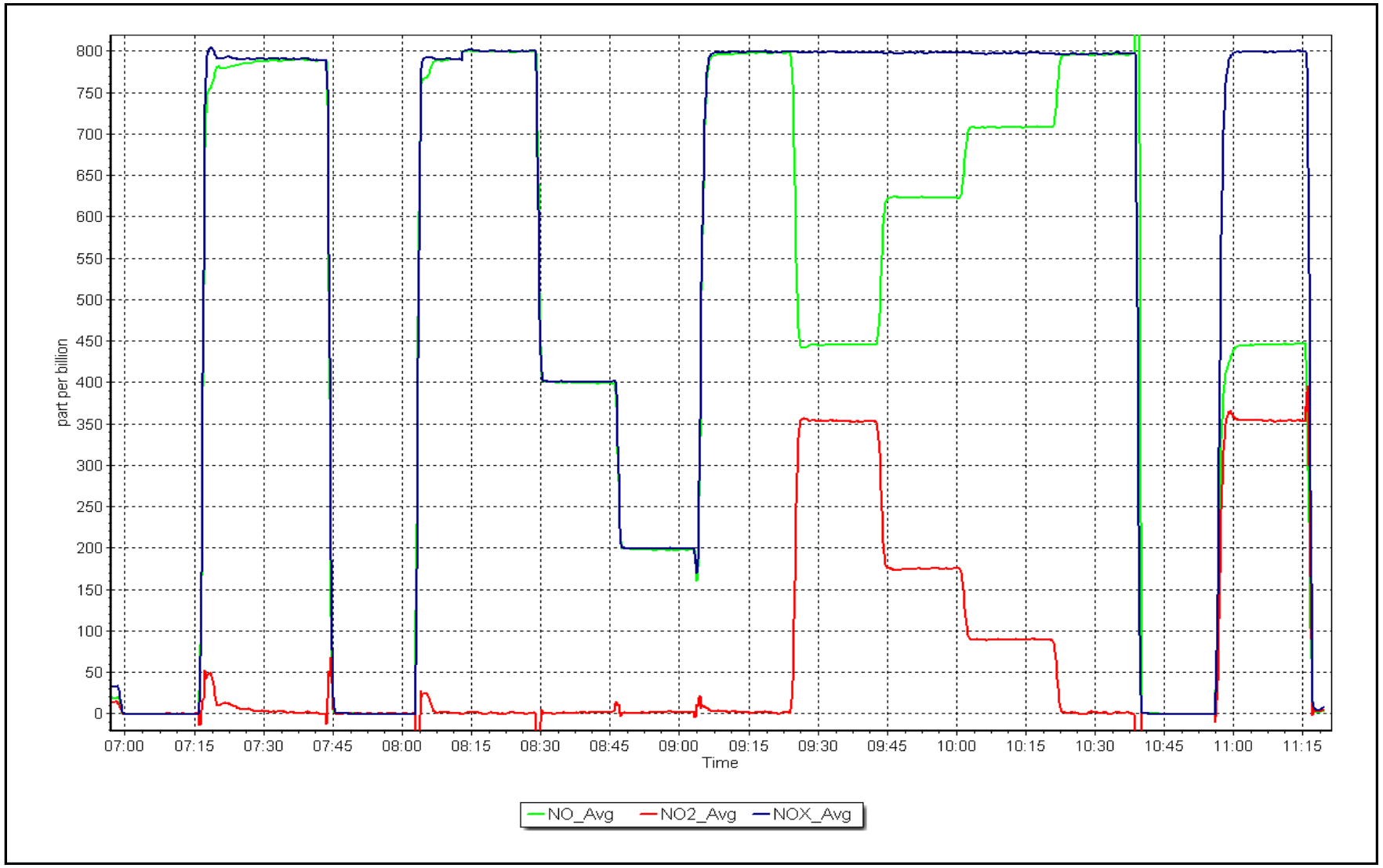
Calibration Date:	October 11, 2023	Previous Calibration:	September 5, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	7:00	End Time (MST):	11:19
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999998	≥0.995
352.1	352.8	0.9980			
174.6	175.2	0.9966	Slope	1.002559	0.90 - 1.10
89.3	89.2	1.0011			
			Intercept	-0.119059	+/-20



NO_X Calibration Plot Date: October 11, 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:	October 17, 2023	Last Cal Date:	September 7, 2023
Start time (MST):	7:14	End time (MST):	8:31
Analyzer Make:	API T640	S/N:	1546
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388753
Temp/RH standard:	Alicat FP-25BT	S/N:	388753

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	6.3	6	6.3	☐	+/- 2 °C
P (mmHg)	730.1	726.6	730.1	☐	+/- 10 mmHg
flow (LPM)	5.00	5.08	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: October 17, 2023 Last Cal Date: September 7, 2023

PM w/o HEPA: 18 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

Post-maintenance leak check: PM w/o HEPA: 400 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: October 17, 2023

Disposable Filter Changed: October 17, 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.

Calibration by: Melissa Lemay

Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Fort Hills	Station Number:	AMS 23
Calibration Date:	October 2, 2023	Prev Cal Date:	July 20, 2022
Start Time (MST):	7:55	End Time (MST):	8:30
Tower Height (m):	10m	Reason:	Install

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	P19837
WS Calibrator:	MetOne 053	Serial Number:	R10866

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

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

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	B14267
As Found Declination (deg east of True North):	14	As Left Declination (deg east of True North):	14
Solar noon time (MST):	12:13:40	Calc Declination*:	13.76 Degrees
Deadband calc:	357.0 degrees (*Limit 4 deg*)		* - calculated declination as per NOAA website

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	% Error (based on 357° FS) *Limit = +/- 1.0%*
0		---
90		
180		
270		
357		

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

Notes: Installed new WS as old WS failed torque test.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Fort Hills	Station Number:	AMS 23
Calibration Date:	October 2, 2023	Prev Cal Date:	July 20, 2022
Start Time (MST):	7:55	End Time (MST):	8:30
Tower Height (m):	10m	Reason:	Removal

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	B17268
WS Calibrator:	MetOne 053	Serial Number:	R10866

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

	Start	***Finish***	*Limits*
Correl Coeff (r^2)	0.999955	0.999999	*≥0.9995*
Calculated slope	1.030888	0.999473	*0.90 - 1.10*
Calculated intercept	-0.371642	0.026227	*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	B14267
As Found Declination (deg east of True North):	14	As Left Declination (deg east of True North):	14
Solar noon time (MST):	12:13:40	Calc Declination*:	13.76 Degrees
Deadband calc:	0.5 degrees (*Limit 4 deg*)		* - calculated declination as per NOAA website

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	% Error (based on 357° FS) *Limit = +/- 1.0%*
0	0.1	---
90	91.3	0.4%
180	179.9	0.0%
270	269.8	-0.1%
357	356.6	-0.1%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)	0.999993	0.999993	*≥0.9995*
Calculated slope	0.990386	1.002788	*0.90 - 1.10*
Calculated intercept	0.352148	-0.640493	*+/- 4*

Notes: Checked cross arm with solarnoon before and after tower take down. WS removed due to torque test fail.

Calibration Performed By: Melissa Lemay

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS25
WASKŌW OHCI PIMÂTISIWIN
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Waskow ohci Pimatisiwin	Station number:	AMS25
Calibration Date:	October 19, 2023	Last Cal Date:	September 28, 2023
Start time (MST):	7:25	End time (MST):	10:43
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:	0.990940	0.998007	Backgd or Offset:	9.7	9.9
Calibration intercept:	0.604127	0.803956	Coeff or Slope:	0.988	1.001

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	800.5	787.6	1.016
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	----
high point	4921	79.2	800.5	799.1	1.002
second point	4960	39.6	400.3	401.8	0.996
third point	4980	19.8	200.1	200.1	1.000
as left zero	5000	0.0	0.0	0.4	----
as left span	4921	79.2	800.5	805.5	0.994
				Average Correction Factor	0.999

Baseline Corr As found:	787.50	Previous response	793.87	*% change	-0.8%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

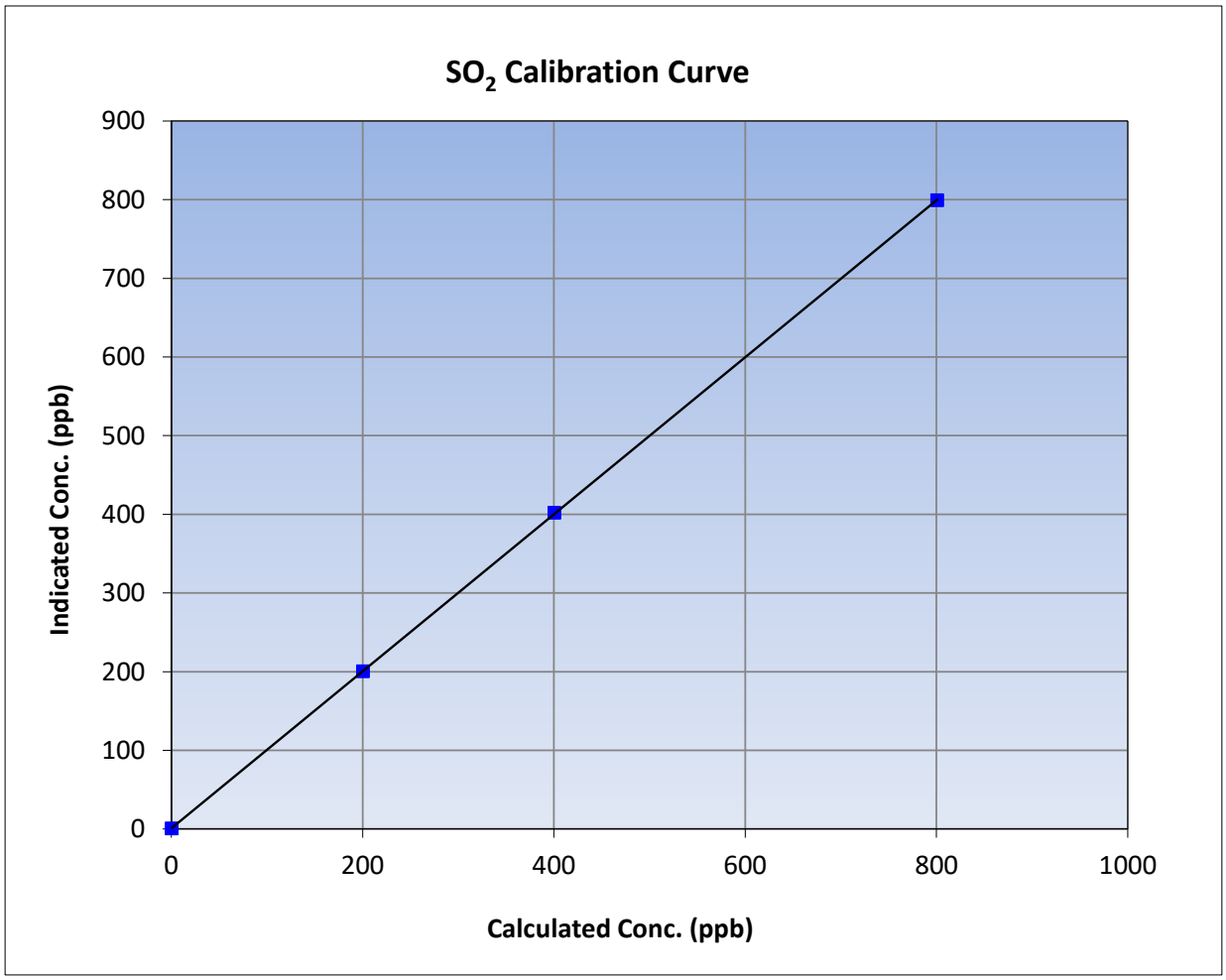
Station Information

Calibration Date:	October 19, 2023	Previous Calibration:	September 28, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	7:25	End Time (MST):	10:43
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148497

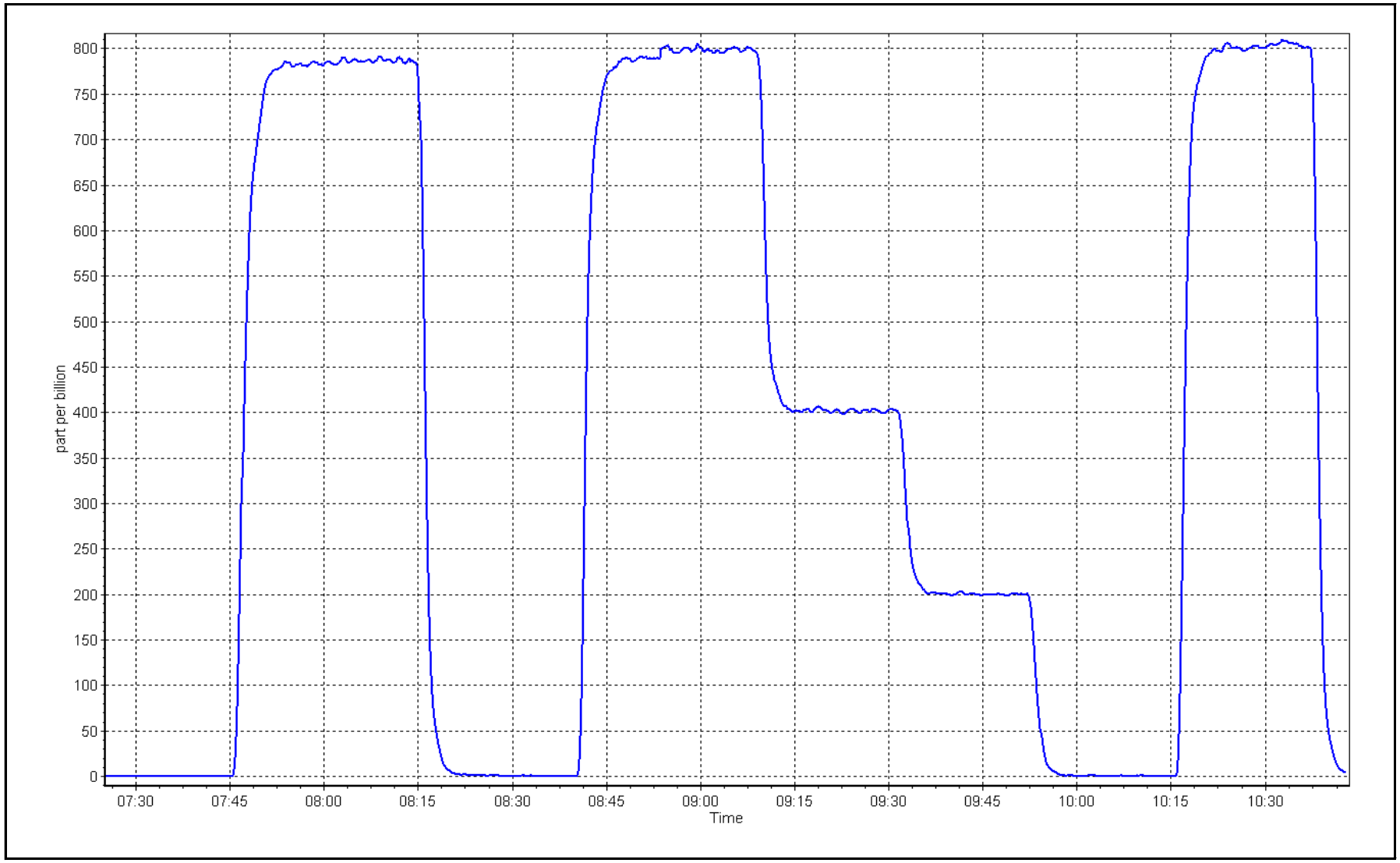
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
800.5	799.1	1.0018
400.3	401.8	0.9963
200.1	200.1	1.0002

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999991	*≥0.995*
Slope	0.998007	*0.90 - 1.10*
Intercept	0.803956	*+/-30*



SO2 Calibration Plot Date: October 19, 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:	October 20, 2023	Last Cal Date:	September 26, 2023
Start time (MST):	6:20	End time (MST):	10:52
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:	0.980956	1.004258	Backgd or Offset:	3.25	3.30
Calibration intercept:	0.100000	0.140000	Coeff or Slope:	1.079	1.108

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4920	80.0	79.5	78.0	1.017
as found 2nd point	4960	40.0	39.7	39.0	1.016
as found 3rd point	4980	20.0	19.9	19.5	1.013
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4920	80.0	79.5	79.7	0.997
second point	4960	40.0	39.7	40.6	0.979
third point	4980	20.0	19.9	19.9	0.998
as left zero	5000	0.0	0.0	0.1	----
as left span	4920	80.0	800.0	803.0	0.996
SO2 Scrubber Check	4921	79.2	800.0	0.0	----
Date of last scrubber change:		20-Jun-23		Ave Corr Factor	0.991
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.1	Prev response:	78.04	*% change:	0.1%
Baseline Corr 2nd AF pt:	39.1	AF Slope:	0.982682	AF Intercept:	-0.060000
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999999		

* = > +/-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

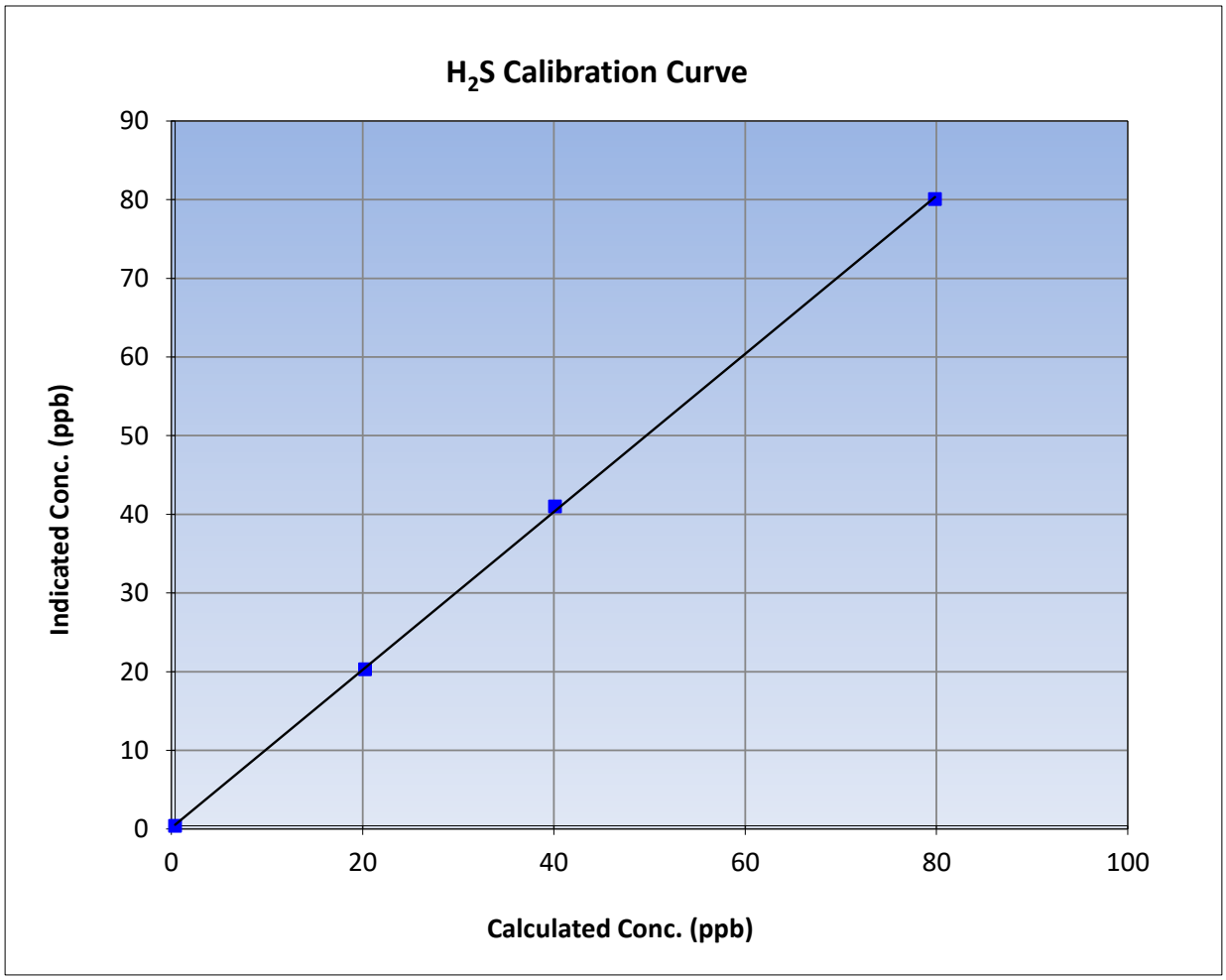
Station Information

Calibration Date:	October 20, 2023	Previous Calibration:	September 26, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	6:20	End Time (MST):	10:52
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1170050146

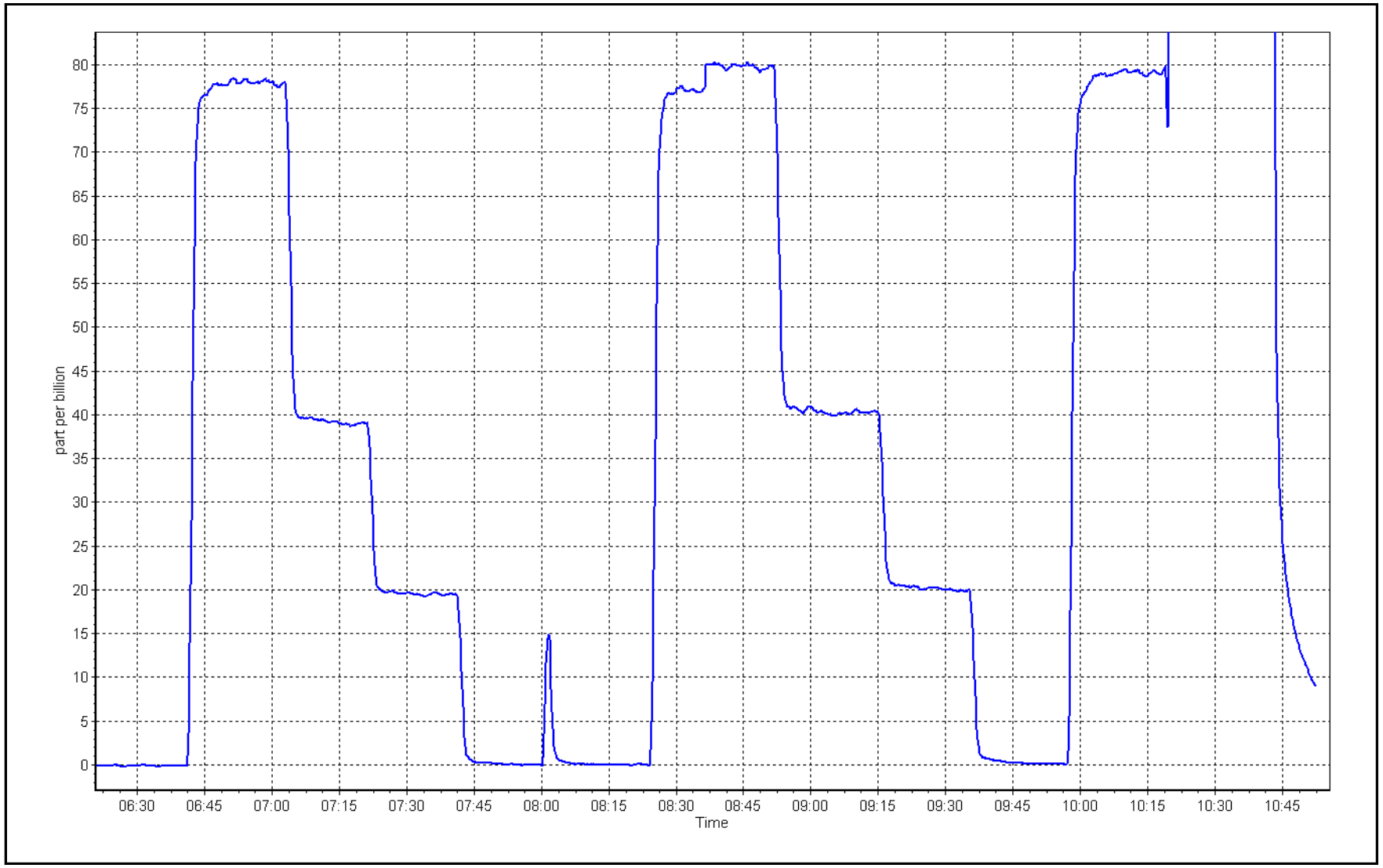
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
79.5	79.7	0.9969
39.7	40.6	0.9785
19.9	19.9	0.9982

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999877	*≥0.995*
Slope	1.004258	*0.90 - 1.10*
Intercept	0.140000	*+/-3*



H_2S Calibration Plot Date: October 20, 2023 Location: Waskow ohci Pimatisiwin



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS26
CHRISTINA LAKE
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Christina Lake	Station number:	AMS 26
Calibration Date:	October 26, 2023	Last Cal Date:	September 19, 2023
Start time (MST):	12:14	End time (MST):	16:06
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:	1.009149	1.010565	Backgd or Offset:	16.1	16.0
Calibration intercept:	-2.177877	-1.377444	Coeff or Slope:	0.900	0.900

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.9	----
as found span	4931	80.9	800.0	807.8	0.990
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	1.0	----
high point	4931	80.9	800.0	808.7	0.989
second point	4970	40.5	400.6	400.9	0.999
third point	4994	20.4	201.6	200.9	1.004
as left zero	5000	0.0	0.0	0.8	----
as left span	4929	80.9	800.3	824.3	0.971
				Average Correction Factor	0.997

Baseline Corr As found:	806.90	Previous response	805.12	*% change	0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

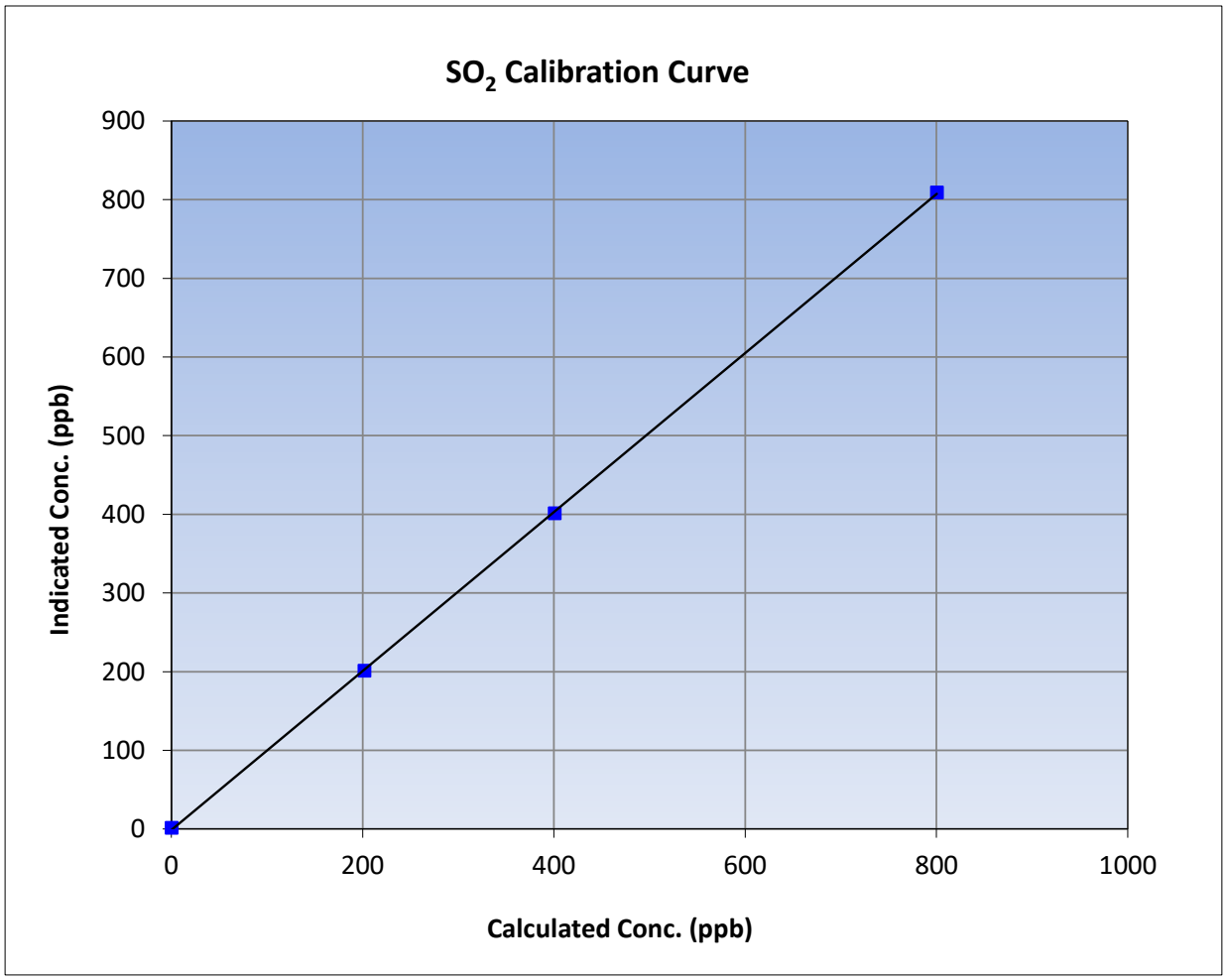
Station Information

Calibration Date:	October 26, 2023	Previous Calibration:	September 19, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	12:14	End Time (MST):	16:06
Analyzer make:	Thermo 43i	Analyzer serial #:	1173410001

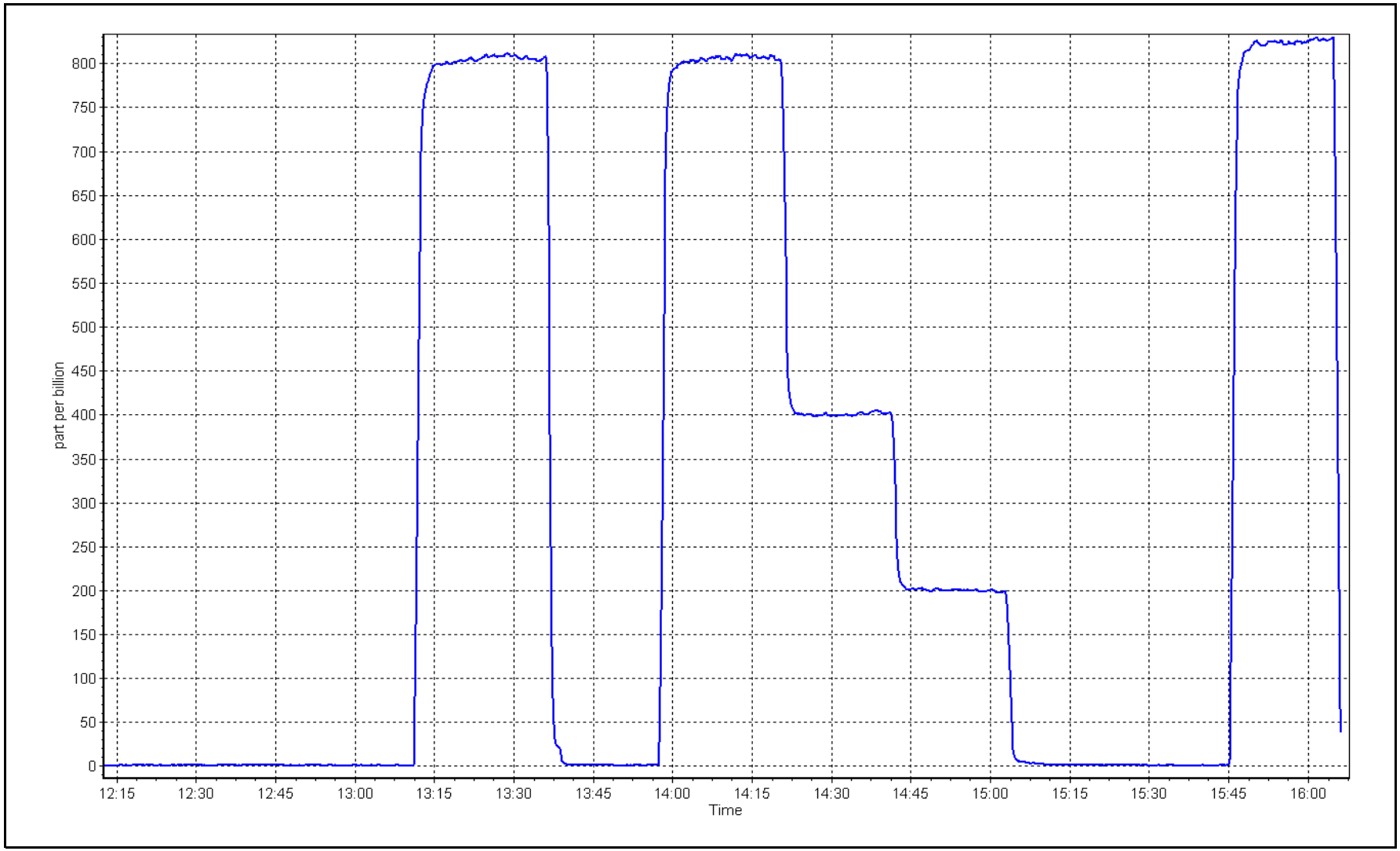
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	1.0	----
800.0	808.7	0.9892
400.6	400.9	0.9992
201.6	200.9	1.0036

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999952	*≥0.995*
Slope	1.010565	*0.90 - 1.10*
Intercept	-1.377444	*+/-30*



SO2 Calibration Plot Date: October 26, 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:	October 27, 2023	Last Cal Date:	September 20, 2023
Start time (MST):	8:08	End time (MST):	12:41
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:	1.010898	0.992122	Backgd or Offset:	35.0	33.6
Calibration intercept:	0.179125	0.528176	Coeff or Slope:	1.093	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	0.6	----
as found span	4930	81.9	79.9	83.5	0.964
as found 2nd point	4972	41.0	40.0	41.8	0.971
as found 3rd point	4994	20.6	20.1	21.4	0.966
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	0.7	----
high point	4930	81.9	79.9	79.9	1.000
second point	4972	41.0	40.0	40.1	0.997
third point	4994	20.6	20.1	20.3	0.990
as left zero	5000	0.0	0.0	0.7	----
as left span	4926	81.9	80.0	81.4	0.982
SO2 Scrubber Check	4931	80.9	807.1	-0.1	----
Date of last scrubber change:		27-Feb-19		Ave Corr Factor	0.996
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	82.9	Prev response:	80.96	*% change:	2.3%
Baseline Corr 2nd AF pt:	41.2	AF Slope:	1.037198	AF Intercept:	0.525632
Baseline Corr 3rd AF pt:	20.8	AF Correlation:	0.999984		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after MAF's. Ran scrubber check after calibrator zero. Adjusted span only.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

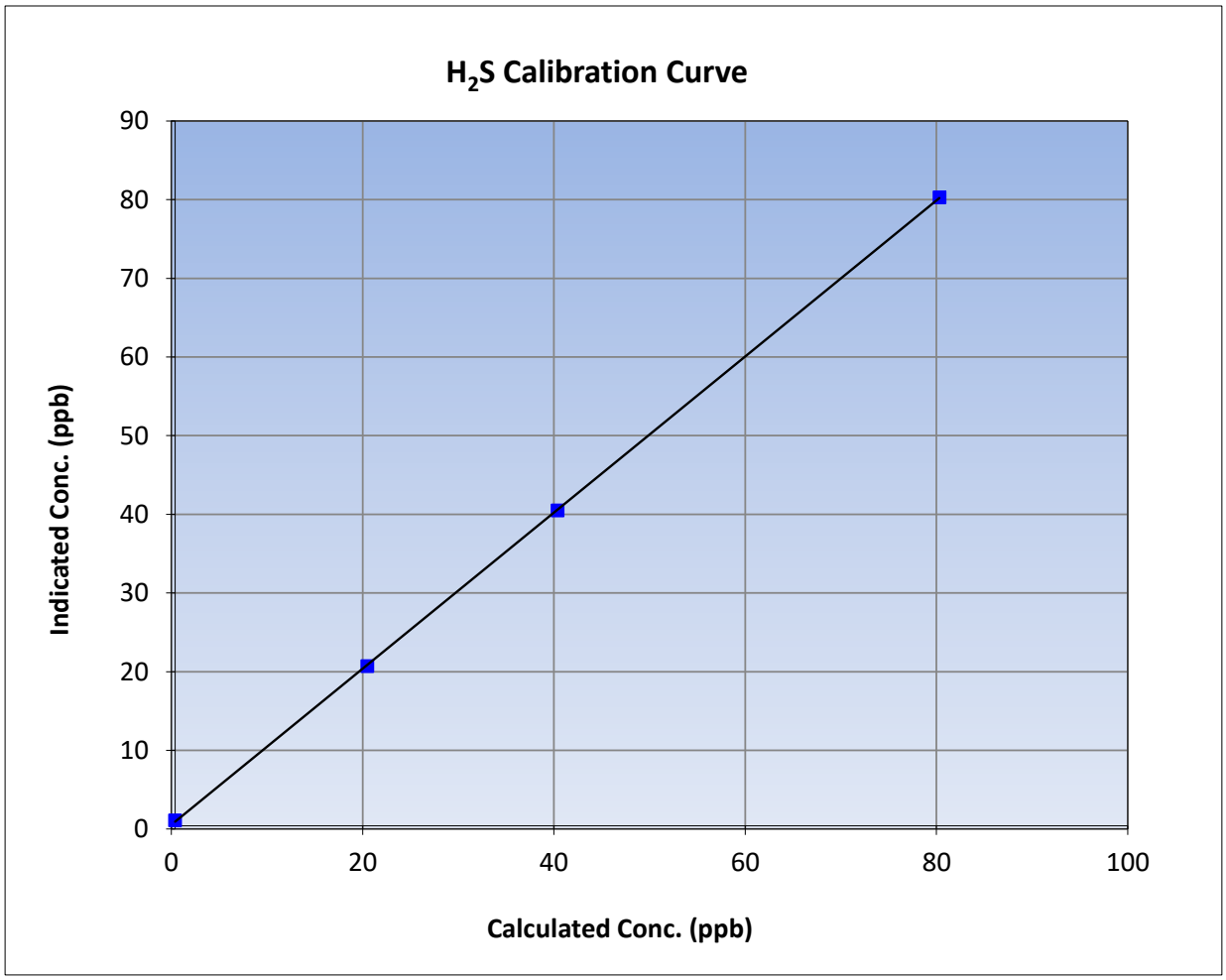
Station Information

Calibration Date:	October 27, 2023	Previous Calibration:	September 20, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	8:08	End Time (MST):	12:41
Analyzer make:	Thermo 450i	Analyzer serial #:	1180030032

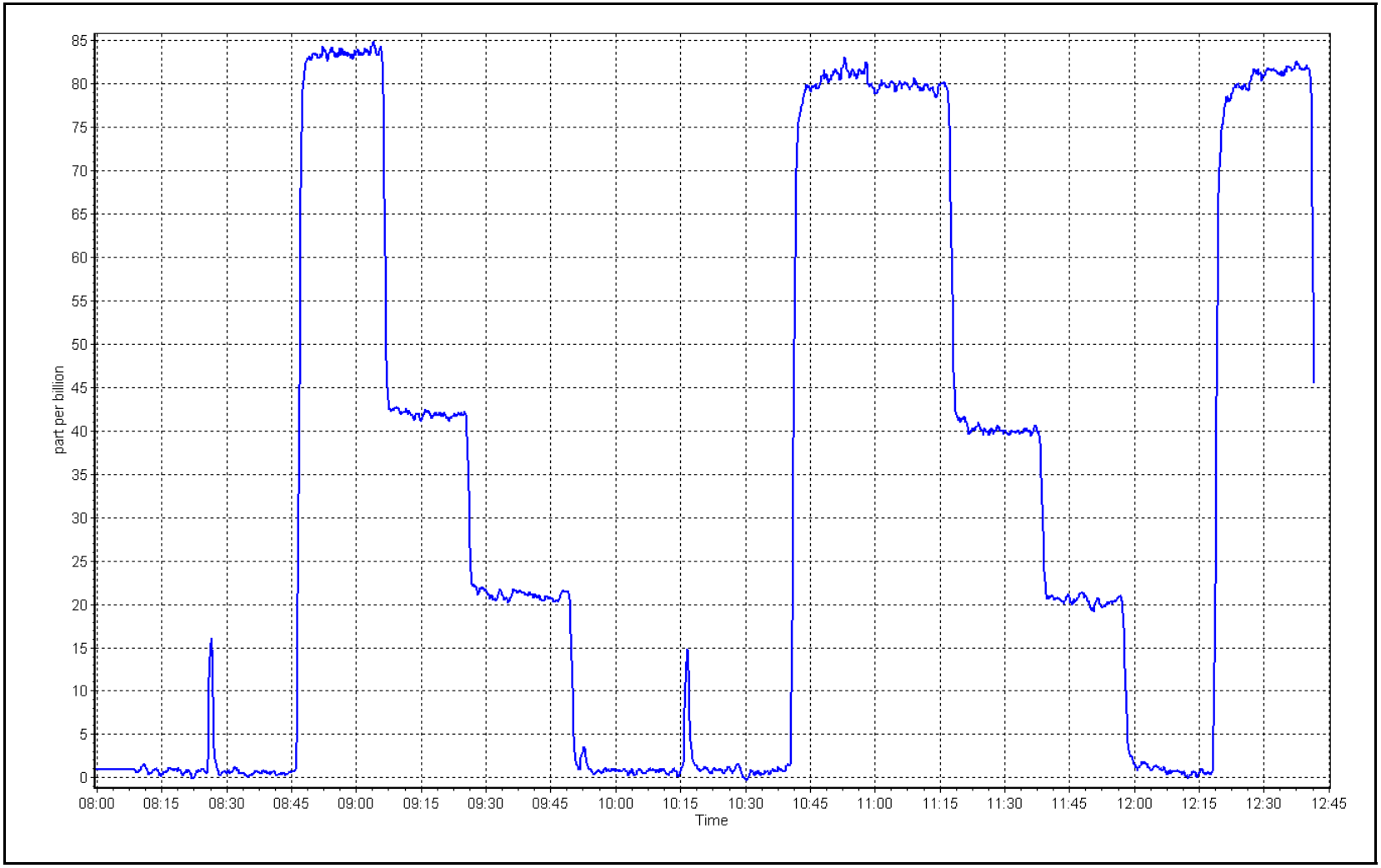
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.7	----
79.9	79.9	1.0001
40.0	40.1	0.9974
20.1	20.3	0.9896

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999978	*≥0.995*
Slope	0.992122	*0.90 - 1.10*
Intercept	0.528176	*+/-3*



H_2S Calibration Plot Date: October 27, 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:	October 26, 2023	Last Cal Date:	September 19, 2023
Start time (MST):	10:59	End time (MST):	16:55
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:	1.370	1.300	NO bkgnd or offset:	2.6	2.5
NOX coeff or slope:	0.991	0.997	NOX bkgnd or offset:	3.4	3.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	161.0	162.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000604	1.001847
NO_X Cal Offset:	-2.180000	-0.048939
NO Cal Slope:	1.004213	1.001247
NO Cal Offset:	-2.740000	-0.399872
NO_2 Cal Slope:	0.995671	1.005662
NO_2 Cal Offset:	-0.892478	-0.810879

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	-0.1	-0.7	----	----
as found span	4928	80.1	812.8	800.0	12.8	855.4	841.9	13.5	0.9502	0.9503
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	4928	80.1	812.8	800.0	12.8	813.8	800.7	13.1	0.9988	0.9992
second point	4969	40.1	406.8	400.4	6.4	408.4	400.7	7.7	0.9962	0.9993
third point	4982	20.1	204.2	201.0	3.2	204.7	200.2	4.5	0.9976	1.0040
as left zero	5000	0.0	0.0	0.0	0.0	-0.6	0.0	-0.6	----	----
as left span	4822	80.1	830.4	422.0	408.4	814.7	420.3	394.3	1.0193	1.0040
								Average Correction Factor	0.9975	1.0008

Corrected As found	NO_X = 856.3 ppb	NO = 842.0 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	5.3%
Previous Response	NO_X = 811.1 ppb	NO = 800.7 ppb		*Percent Change	NO =	4.9%
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)	797.7	402.1	408.4	409.8	0.9966	100.3%
2nd GPT point (200 ppb O3)	797.7	597.0	213.5	214.3	0.9962	100.4%
3rd GPT point (100 ppb O3)	797.7	698.1	112.4	111.8	1.0053	99.5%
				Average Correction Factor	0.9994	100.1%

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

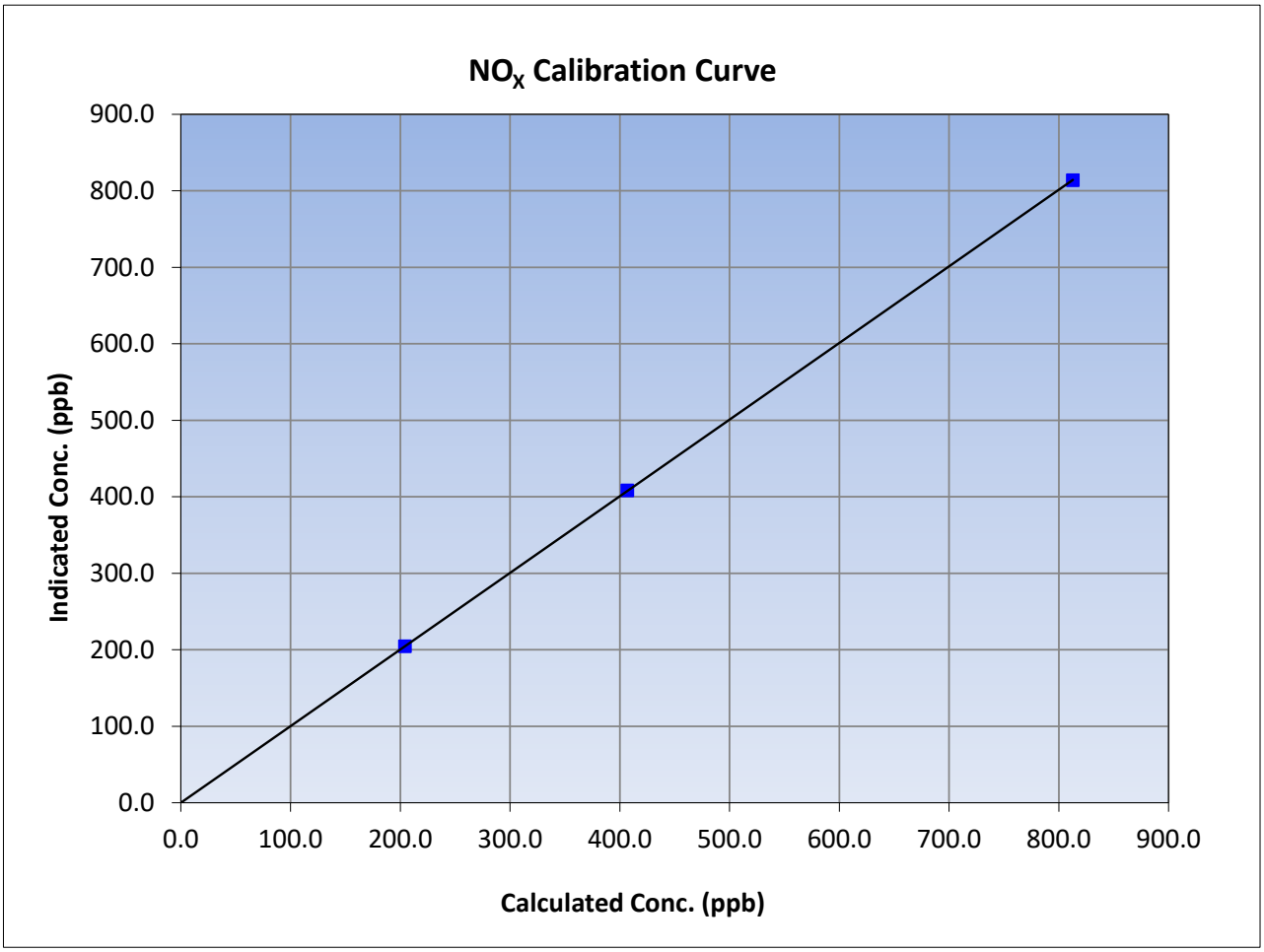
Version-04-2020

Station Information

Calibration Date:	October 26, 2023	Previous Calibration:	September 19, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	10:59	End Time (MST):	16:55
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	0.999996	≥0.995
812.8	813.8	0.9988			
406.8	408.4	0.9962	Slope	1.001847	0.90 - 1.10
204.2	204.7	0.9976			
			Intercept	-0.048939	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

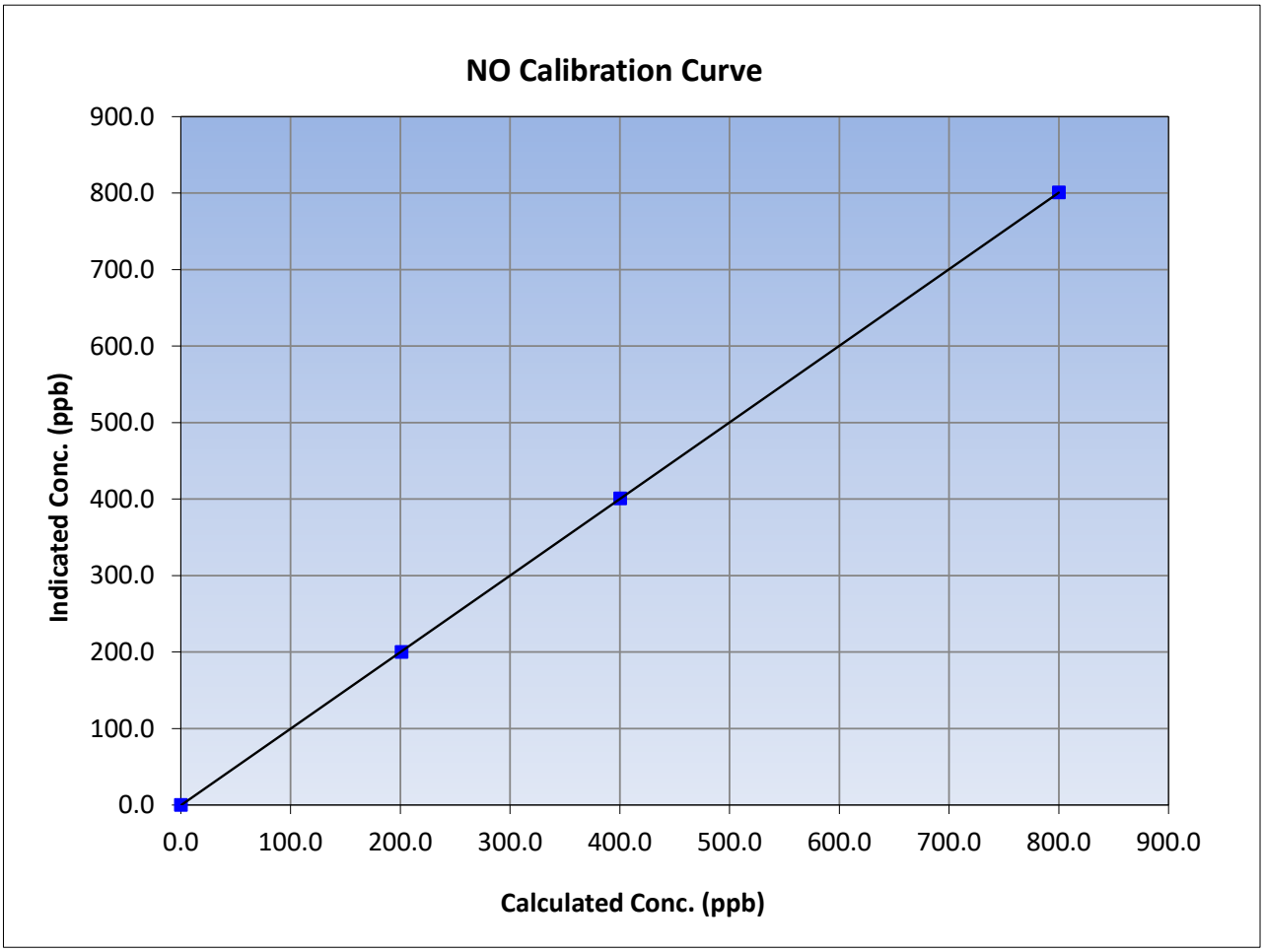
Version-04-2020

Station Information

Calibration Date:	October 26, 2023	Previous Calibration:	September 19, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	10:59	End Time (MST):	16:55
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	0.999998	≥0.995
800.0	800.7	0.9992			
400.4	400.7	0.9993	Slope	1.001247	0.90 - 1.10
201.0	200.2	1.0040			
			Intercept	-0.399872	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

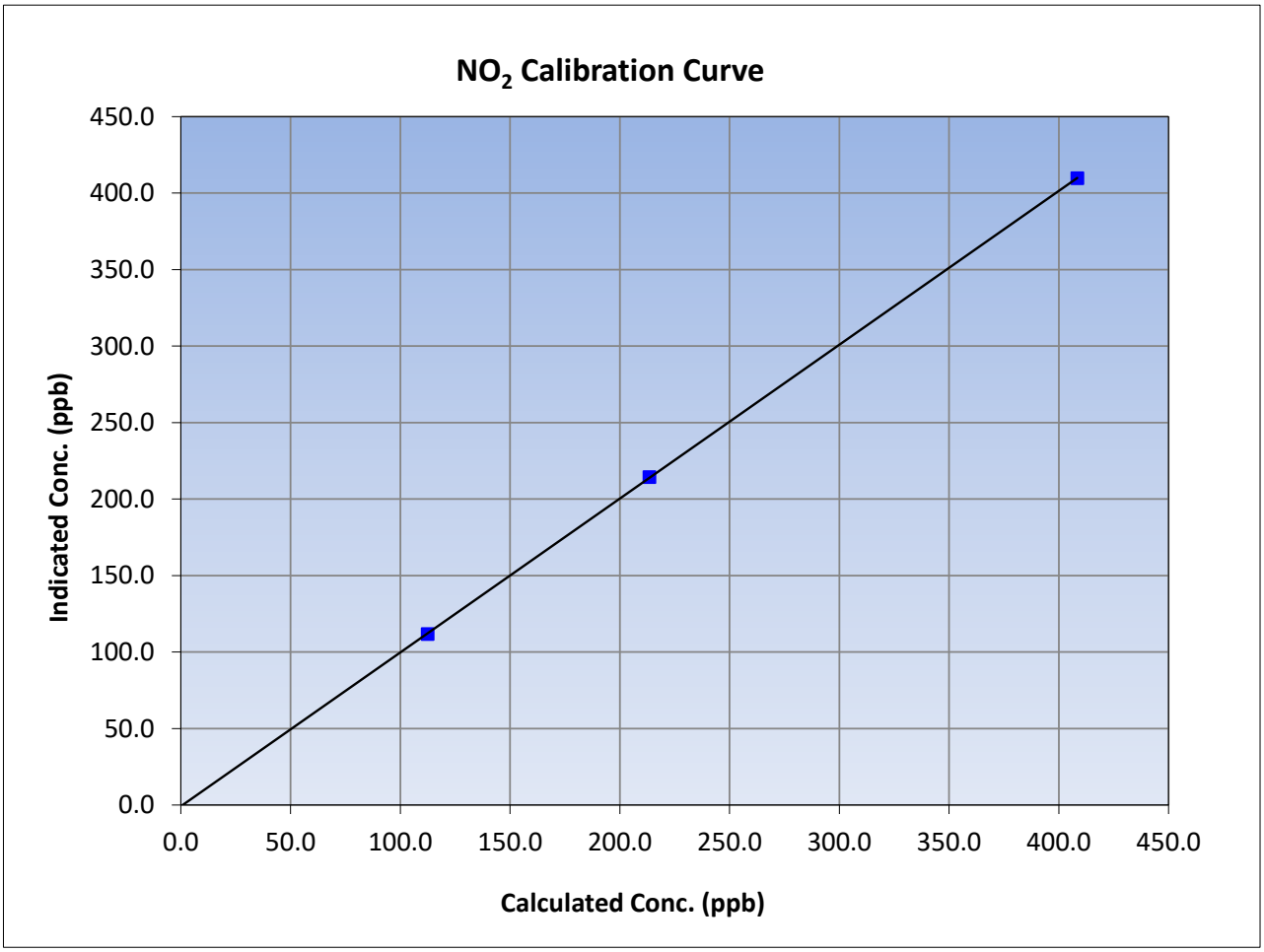
Version-04-2020

Station Information

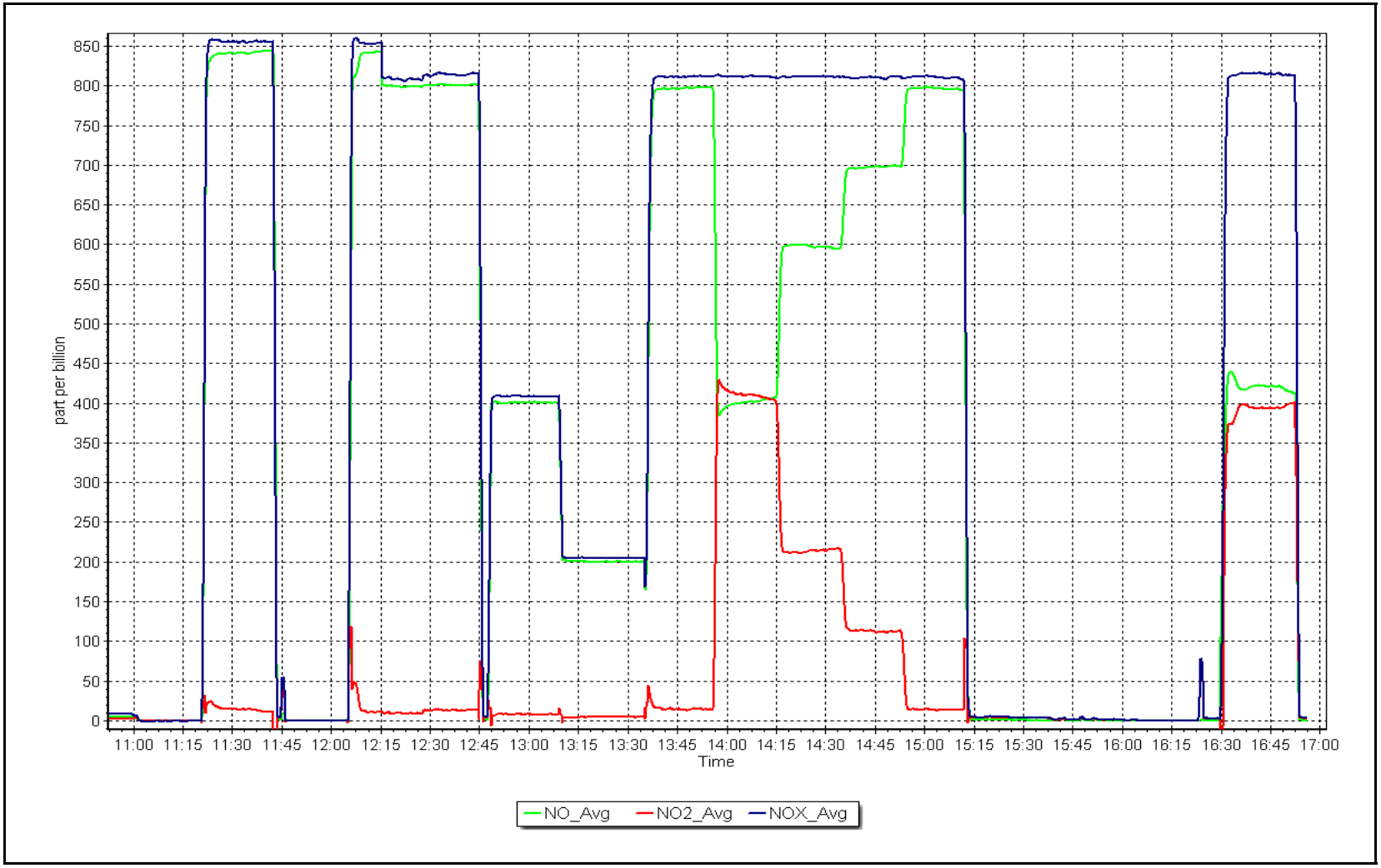
Calibration Date:	October 26, 2023	Previous Calibration:	September 19, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	10:59	End Time (MST):	16:55
Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.7	----	Correlation Coefficient	0.999996	≥0.995
408.4	409.8	0.9966			
213.5	214.3	0.9962	Slope	1.005662	0.90 - 1.10
112.4	111.8	1.0053			
			Intercept	-0.810879	+/-20



NO_X Calibration Plot Date: October 26, 2023 Location: Christina Lake



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS27
JACKFISH 2/3
OCTOBER 2023

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

November 29, 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:	October 18, 2023	Last Cal Date:	September 28, 2023
Start time (MST):	9:31	End time (MST):	12:20
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:	0.990232	0.999819	Backgd or Offset:	7.2	7.3
Calibration intercept:	-2.057655	-2.538114	Coeff or Slope:	0.891	0.900

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	----
as found span	4921	79.1	800.2	788.8	1.014
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	----
high point	4921	79.1	800.2	798.8	1.002
second point	4961	39.5	399.5	395.9	1.009
third point	4980	19.8	200.3	194.5	1.030
as left zero	5000	0.0	0.0	0.3	----
as left span	4921	79.1	800.2	800.8	0.999
				Average Correction Factor	1.014

Baseline Corr As found:	788.80	Previous response	790.29	*% change	-0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed 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

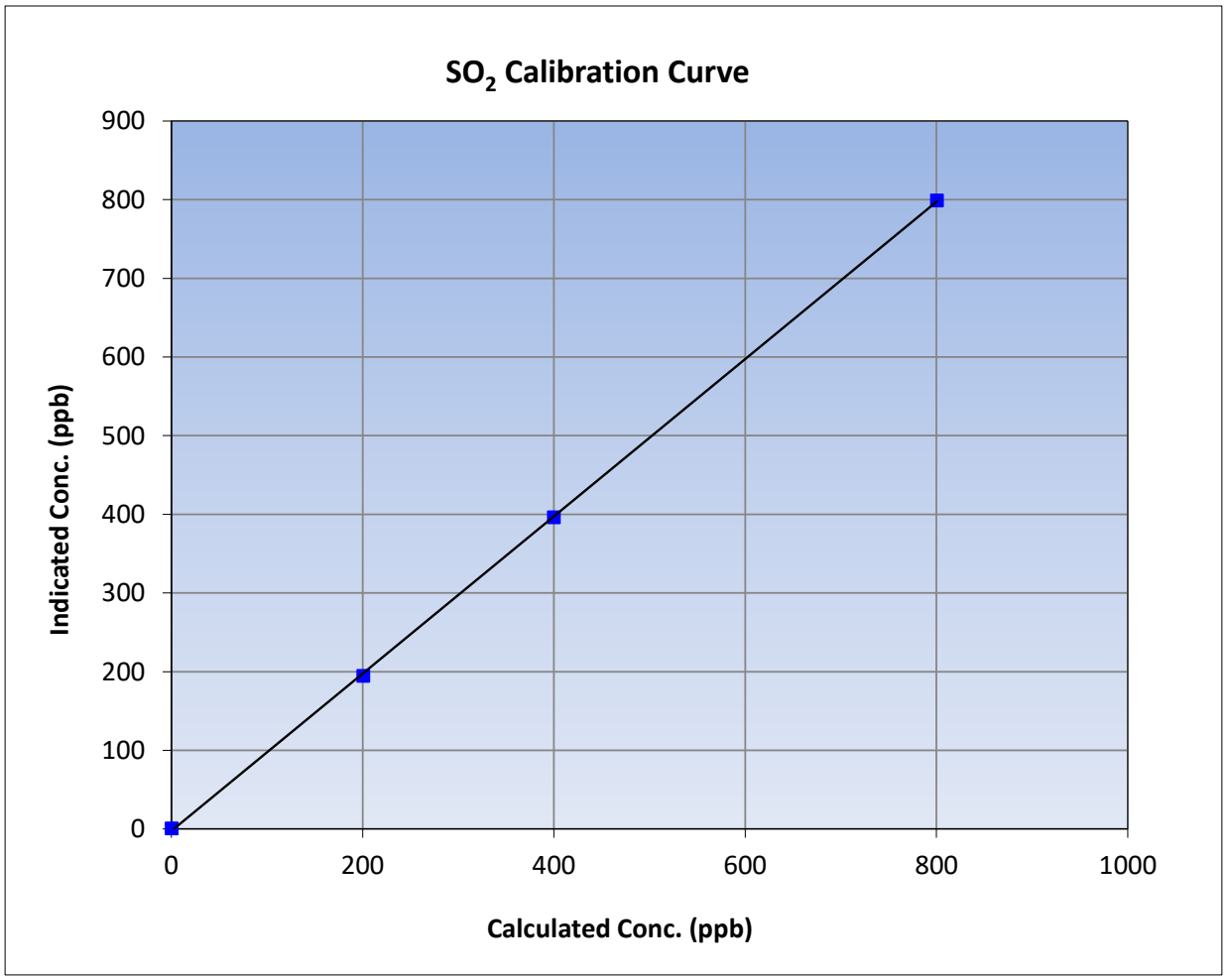
Station Information

Calibration Date:	October 18, 2023	Previous Calibration:	September 28, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS 27
Start Time (MST):	9:31	End Time (MST):	12:20
Analyzer make:	Thermo 43iQ	Analyzer serial #:	12124313138

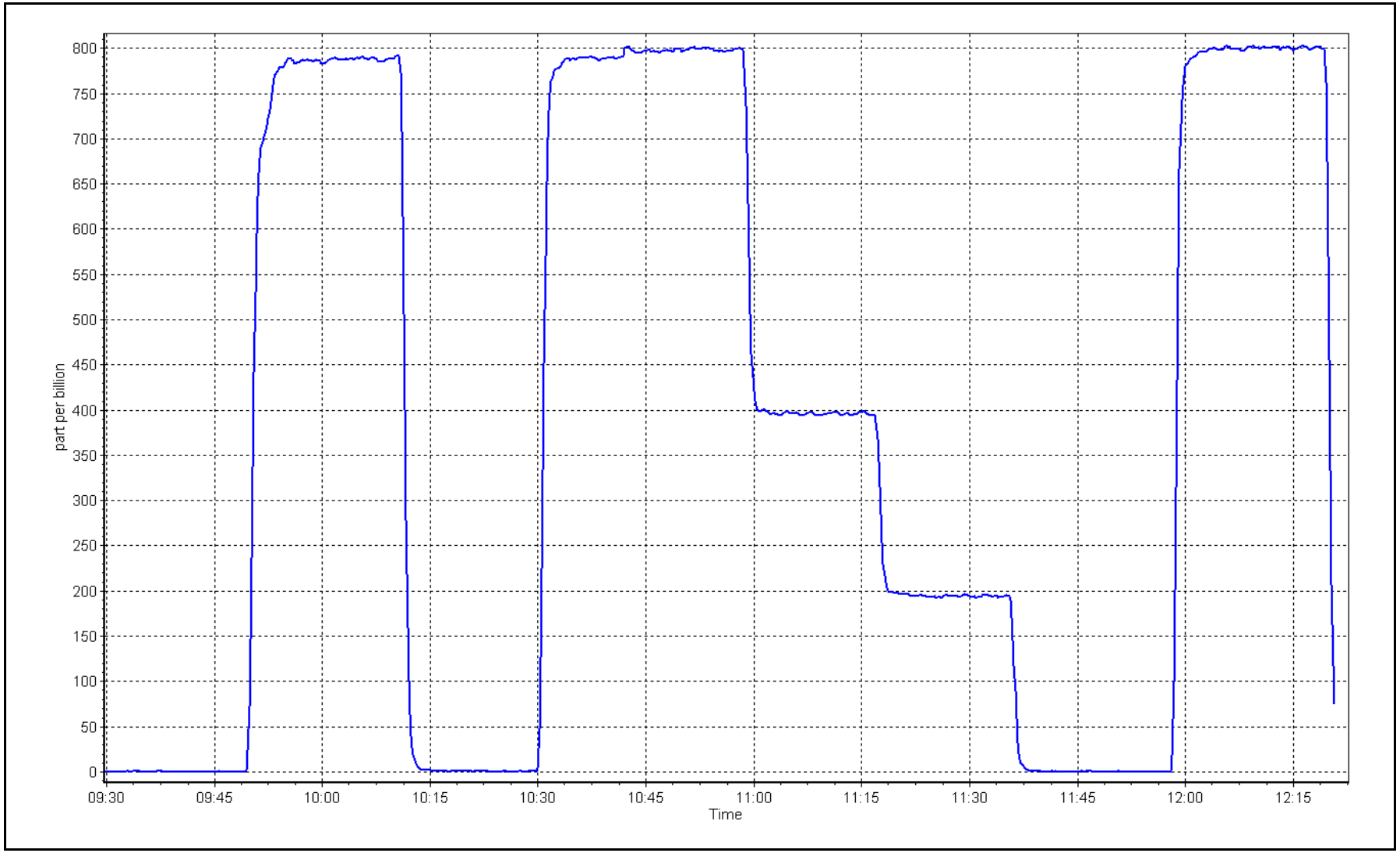
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
800.2	798.8	1.0017
399.5	395.9	1.0092
200.3	194.5	1.0298

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999937	*≥0.995*
Slope	0.999819	*0.90 - 1.10*
Intercept	-2.538114	*+/-30*



SO2 Calibration Plot Date: October 18, 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:	October 17, 2023	Last Cal Date:	September 27, 2023
Start time (MST):	8:47	End time (MST):	12:34
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:	1.002337	1.010889	Backgd or Offset:	29.9	29.9
Calibration intercept:	-0.137809	-0.037634	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	0.2	----
as found span	4926	74.1	80.2	82.0	0.980
as found 2nd point	4963	37.0	40.0	40.9	0.984
as found 3rd point	4982	18.5	20.0	19.9	1.016
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	81.0	0.990
second point	4963	37.0	40.0	40.6	0.986
third point	4982	18.5	20.0	19.9	1.006
as left zero	5000	0.0	0.0	0.2	----
as left span	4926	74.1	80.2	79.9	1.003
SO2 Scrubber Check	4921	79.1	791.0	0.2	----
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:	80.22	*% change:	1.9%
Baseline Corr 2nd AF pt:	40.7	AF Slope:	1.023151	AF Intercept:	-0.117470
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999912		

* = > +/-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

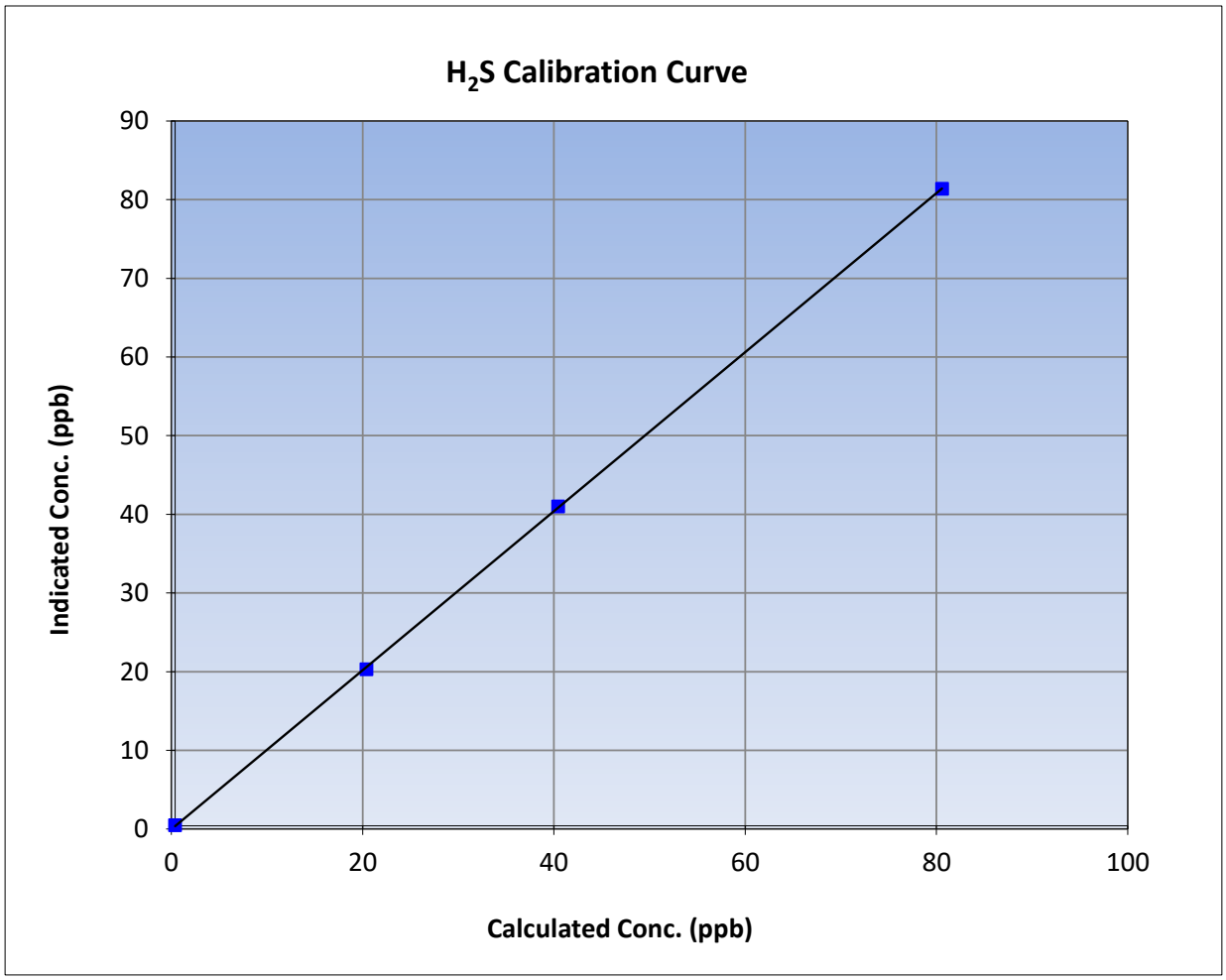
Station Information

Calibration Date:	October 17, 2023	Previous Calibration:	September 27, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	8:47	End Time (MST):	12:34
Analyzer make:	API T101	Analyzer serial #:	621

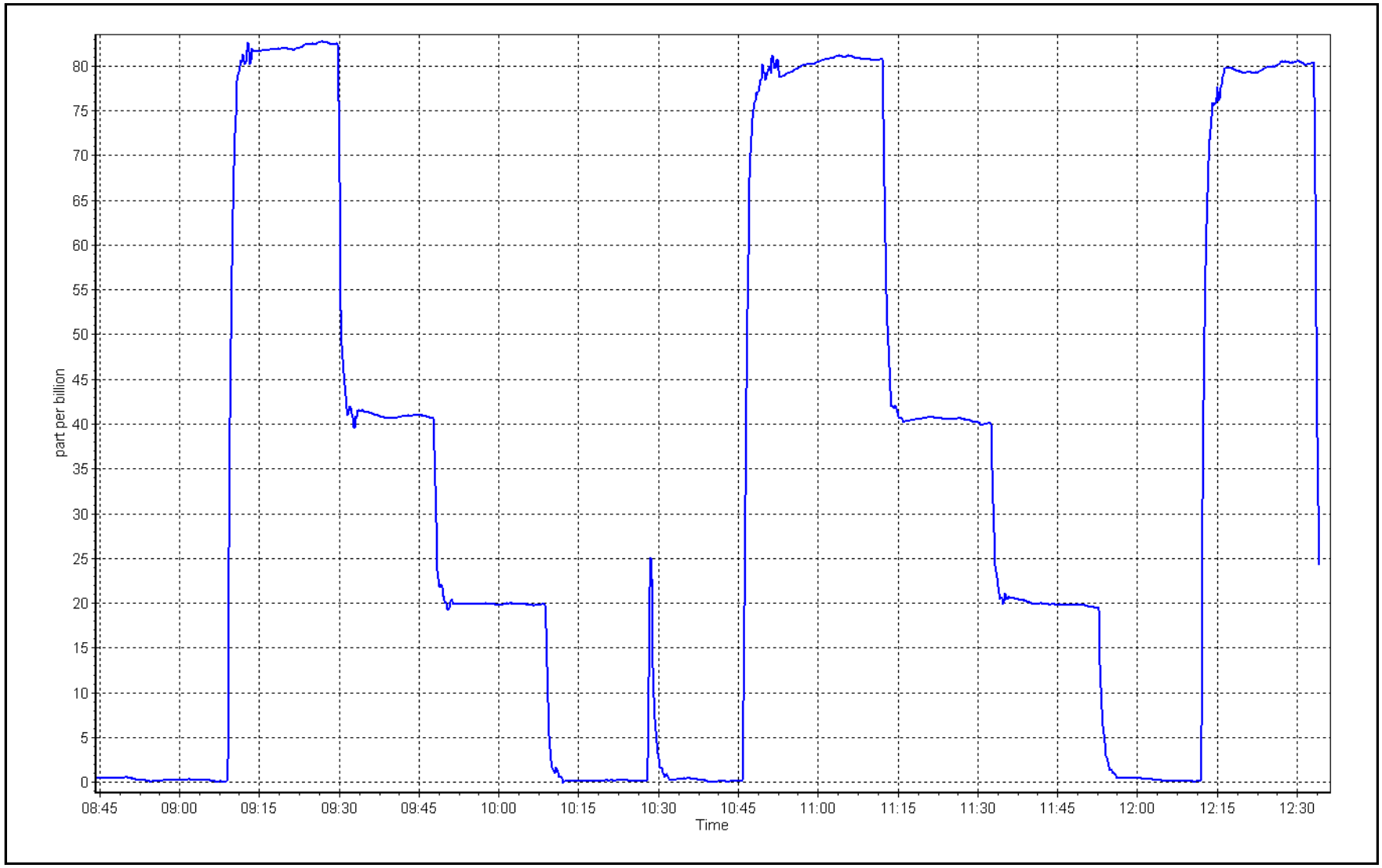
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.2	81.0	0.9898
40.0	40.6	0.9861
20.0	19.9	1.0058

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999963	*≥0.995*
Slope	1.010889	*0.90 - 1.10*
Intercept	-0.037634	*+/-3*



H_2S Calibration Plot Date: October 17, 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:	October 19, 2023	Last Cal Date:	September 28, 2023
Start time (MST):	9:35	End time (MST):	14:42
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:	7.1	7.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.997982	0.995490
NO_X Cal Offset:	-1.996793	-2.256328
NO Cal Slope:	1.003585	0.998987
NO Cal Offset:	-2.899642	-2.840289
NO_2 Cal Slope:	0.994749	0.999566
NO_2 Cal Offset:	-0.945227	-0.710230

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.2	0.1	----	----
as found span	4921	79.4	816.8	800.3	16.5	809.8	789.9	20.0	1.0086	1.0132
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.1	-0.2	----	----
high point	4921	79.4	816.8	800.3	16.5	812.6	798.3	14.2	1.0052	1.0025
second point	4960	39.7	408.5	400.2	8.3	401.1	394.7	6.4	1.0183	1.0139
third point	4980	19.8	203.7	199.6	4.1	200.1	194.4	5.8	1.0180	1.0267
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	1.2	-1.2	----	----
as left span	4921	79.4	816.8	420.5	400.0	812.4	416.0	396.3	1.0054	1.0108
								Average Correction Factor	1.0139	1.0144

Corrected As found	NO_X = 809.9 ppb	NO = 790.1 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -0.4%
Previous Response	NO_X = 813.2 ppb	NO = 800.3 ppb		*Percent Change	NO = -1.3%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	795.1	411.6	400.0	399.4	1.0015	99.8%
2nd GPT point (200 ppb O3)	795.1	620.3	191.3	190.2	1.0059	99.4%
3rd GPT point (100 ppb O3)	795.1	710.1	101.5	100.3	1.0121	98.8%
				Average Correction Factor	1.0065	99.4%

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

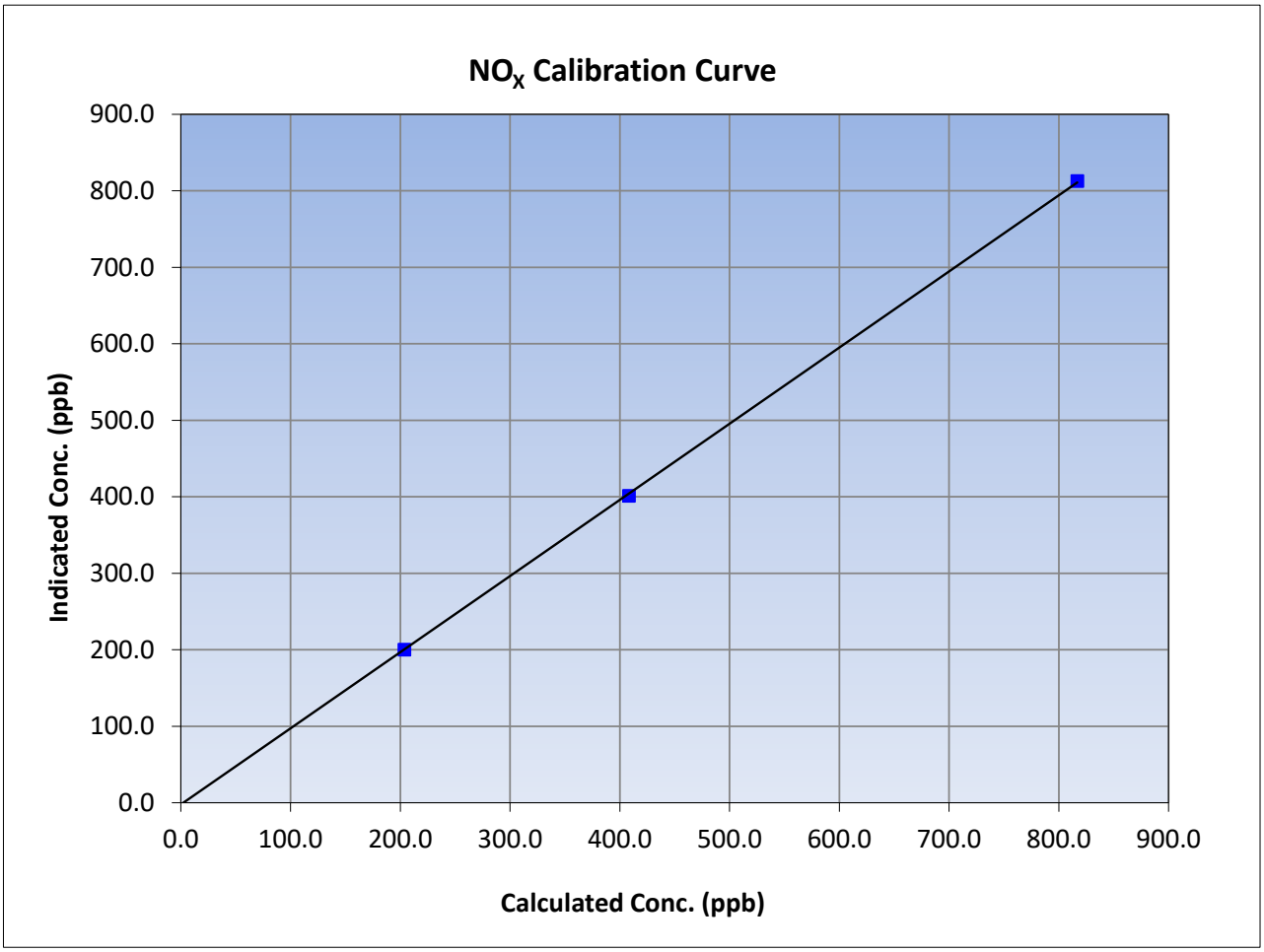
Version-04-2020

Station Information

Calibration Date:	October 19, 2023	Previous Calibration:	September 28, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:35	End Time (MST):	14:42
Analyzer make:	API T200	Analyzer serial #:	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.3	----	Correlation Coefficient	0.999951	≥0.995
816.8	812.6	1.0052			
408.5	401.1	1.0183	Slope	0.995490	0.90 - 1.10
203.7	200.1	1.0180			
			Intercept	-2.256328	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

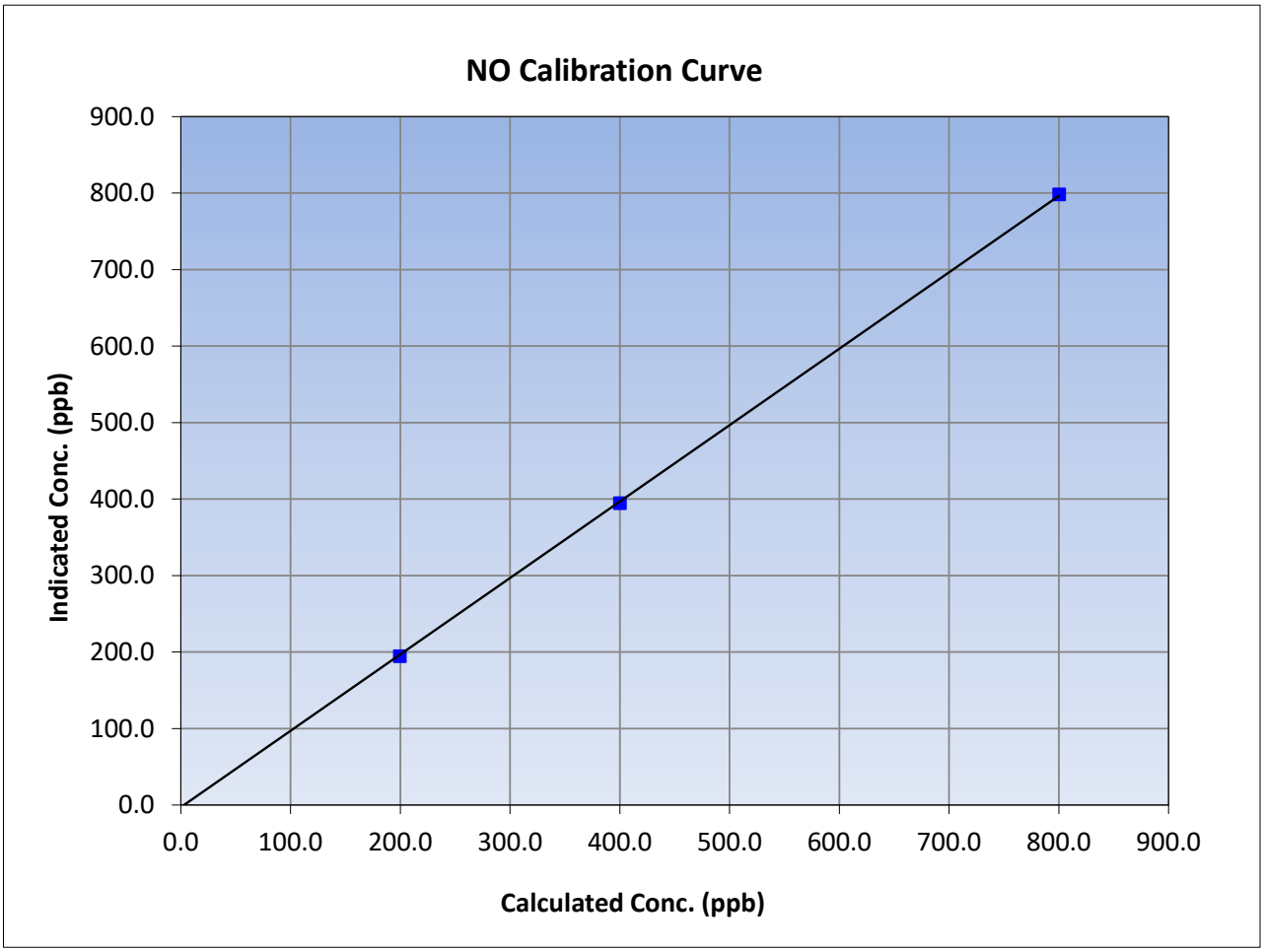
Version-04-2020

Station Information

Calibration Date:	October 19, 2023	Previous Calibration:	September 28, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:35	End Time (MST):	14:42
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	0.999943	≥0.995
800.3	798.3	1.0025			
400.2	394.7	1.0139	Slope	0.998987	0.90 - 1.10
199.6	194.4	1.0267			
			Intercept	-2.840289	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

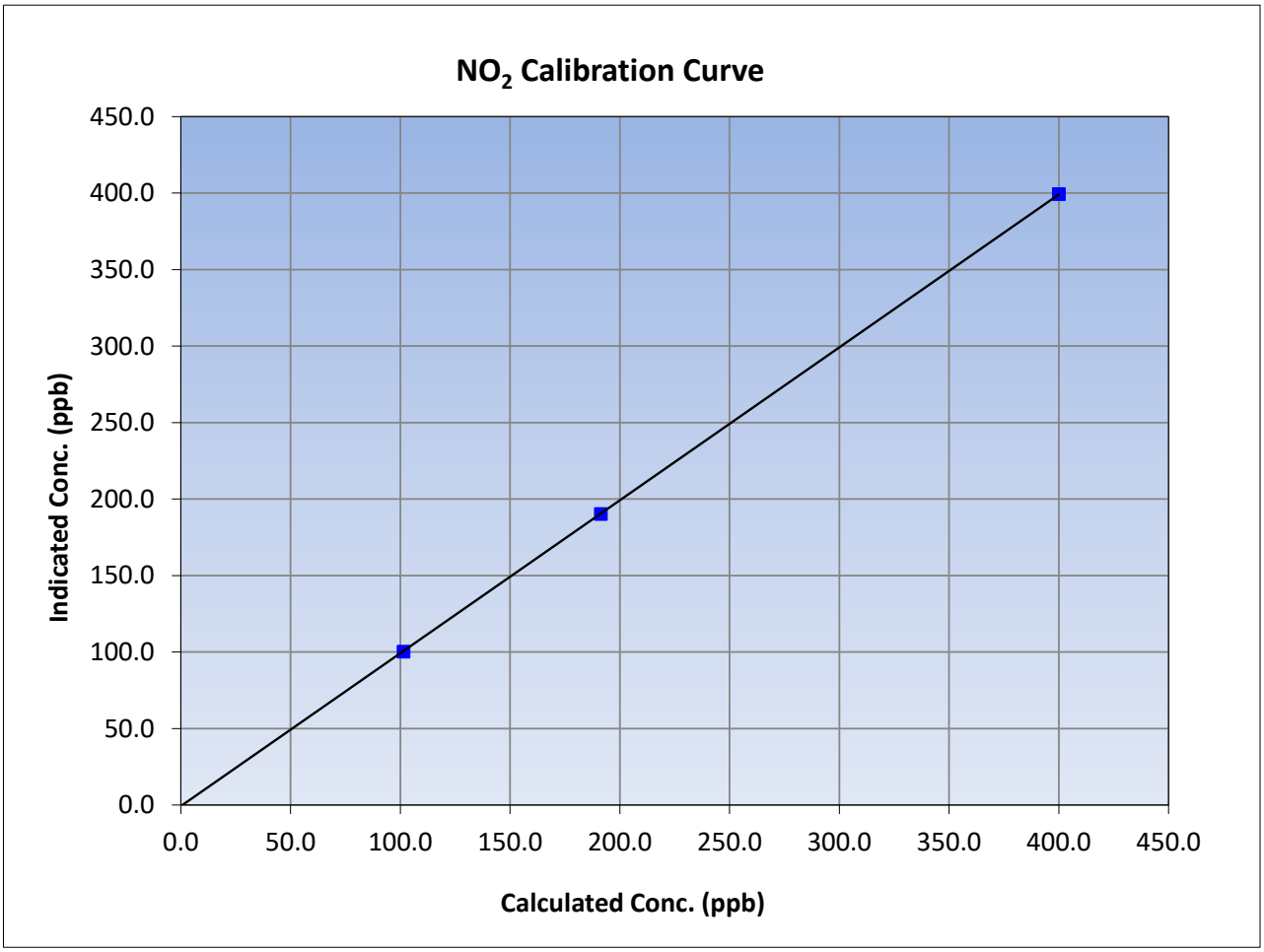
Version-04-2020

Station Information

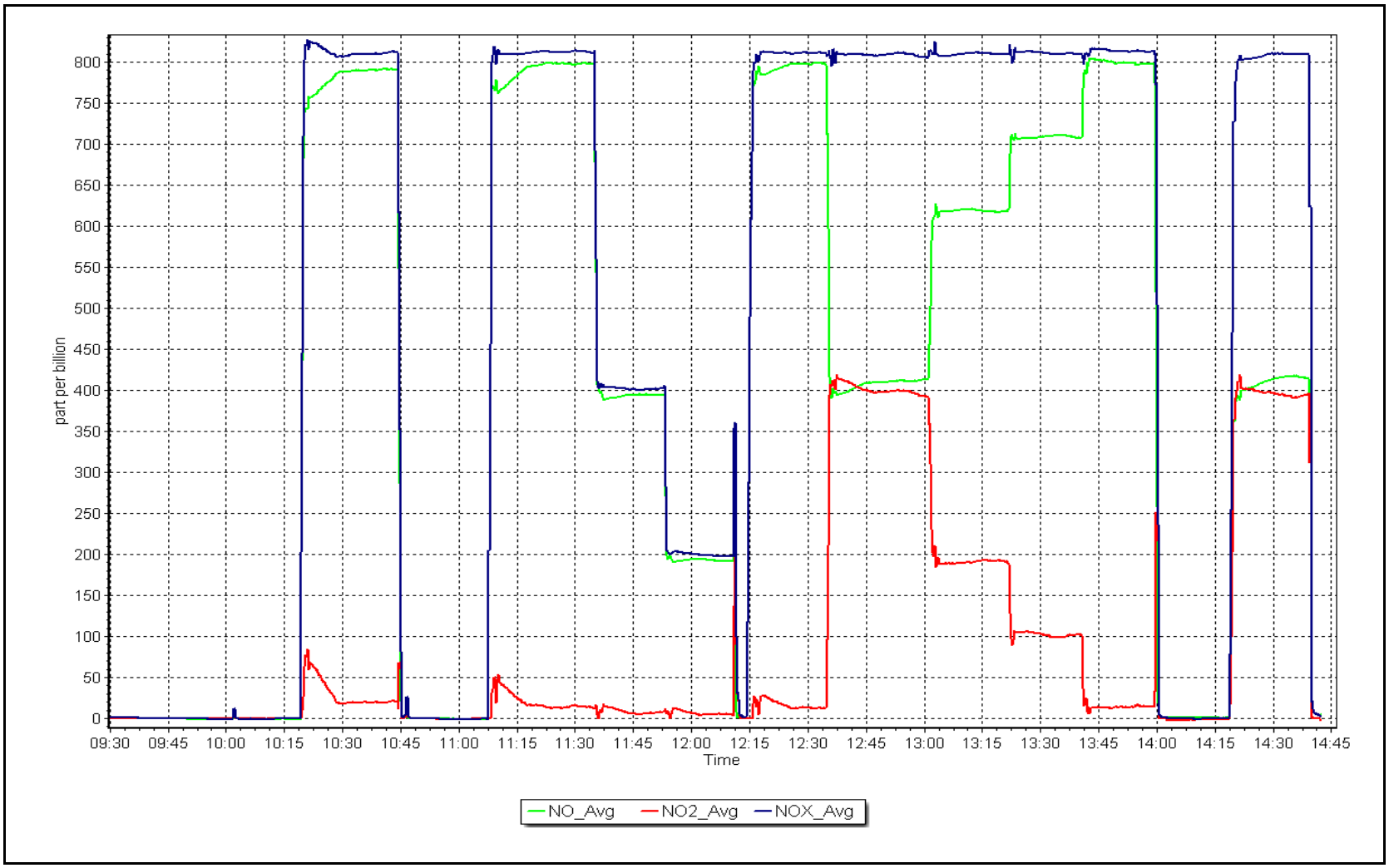
Calibration Date:	October 19, 2023	Previous Calibration:	September 28, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:35	End Time (MST):	14:42
Analyzer make:	API T200	Analyzer serial #:	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999993	≥0.995
400.0	399.4	1.0015			
191.3	190.2	1.0059	Slope	0.999566	0.90 - 1.10
101.5	100.3	1.0121			
			Intercept	-0.710230	+/-20



NO_X Calibration Plot Date: October 19, 2023 Location: Jackfish 2/3



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS29
SURMONT 2
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	October 23, 2023	Last Cal Date:	September 5, 2023
Start time (MST):	10:59	End time (MST):	13:58
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:	1.008955	1.001516	Backgd or Offset:	13.2	13.0
Calibration intercept:	-2.265490	-1.785913	Coeff or Slope:	0.942	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	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	4919	81.3	800.1	800.0	1.000
second point	4959	40.7	400.6	399.3	1.003
third point	4979	20.3	199.8	196.7	1.016
as left zero	5000	0.0	0.0	-0.6	----
as left span	4919	81.3	800.1	801.0	0.999
				Average Correction Factor	1.006

Baseline Corr As found:	804.80	Previous response	805.01	*% change	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

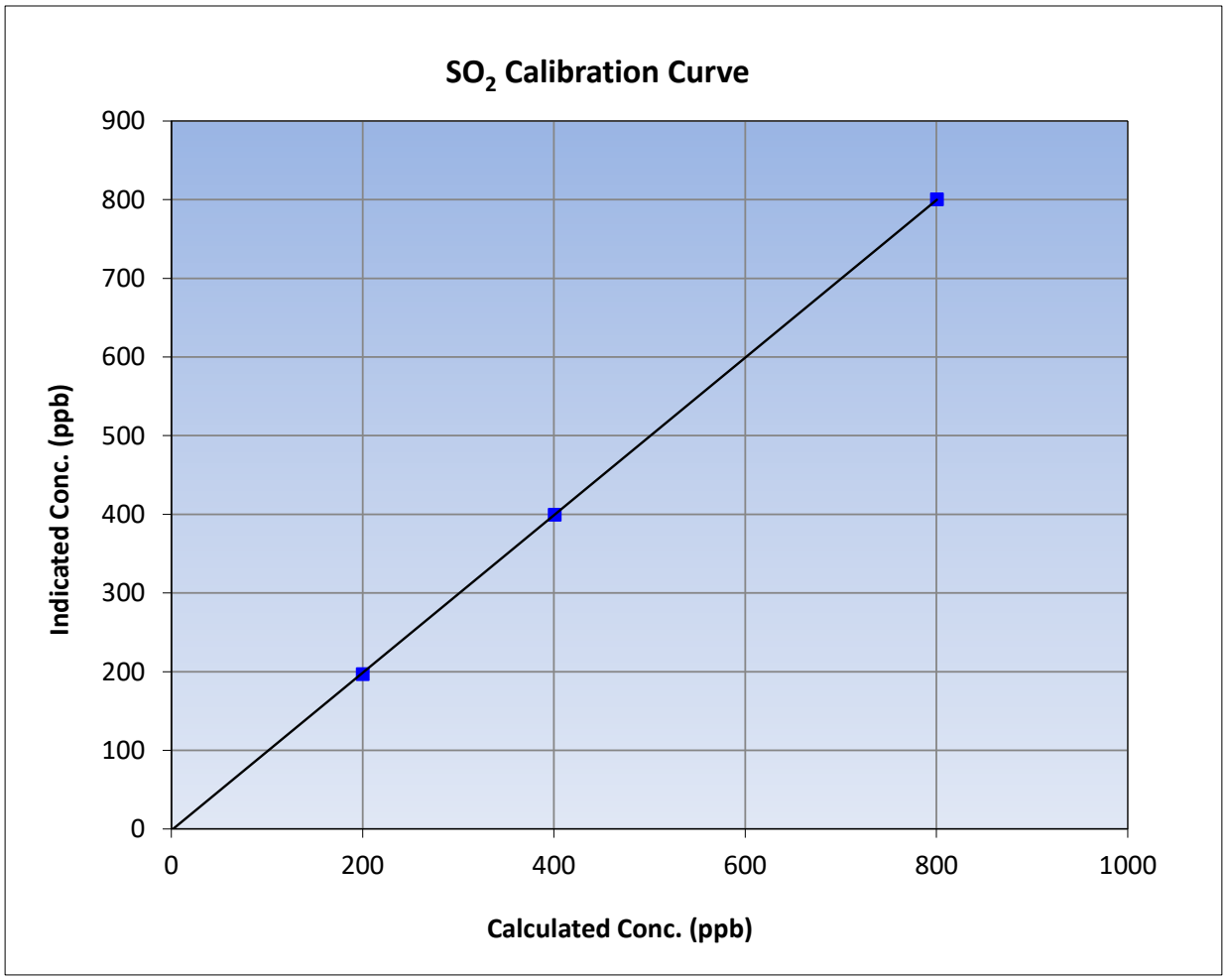
Station Information

Calibration Date:	October 23, 2023	Previous Calibration:	September 5, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:59	End Time (MST):	13:58
Analyzer make:	Thermo 43i	Analyzer serial #:	1170050150

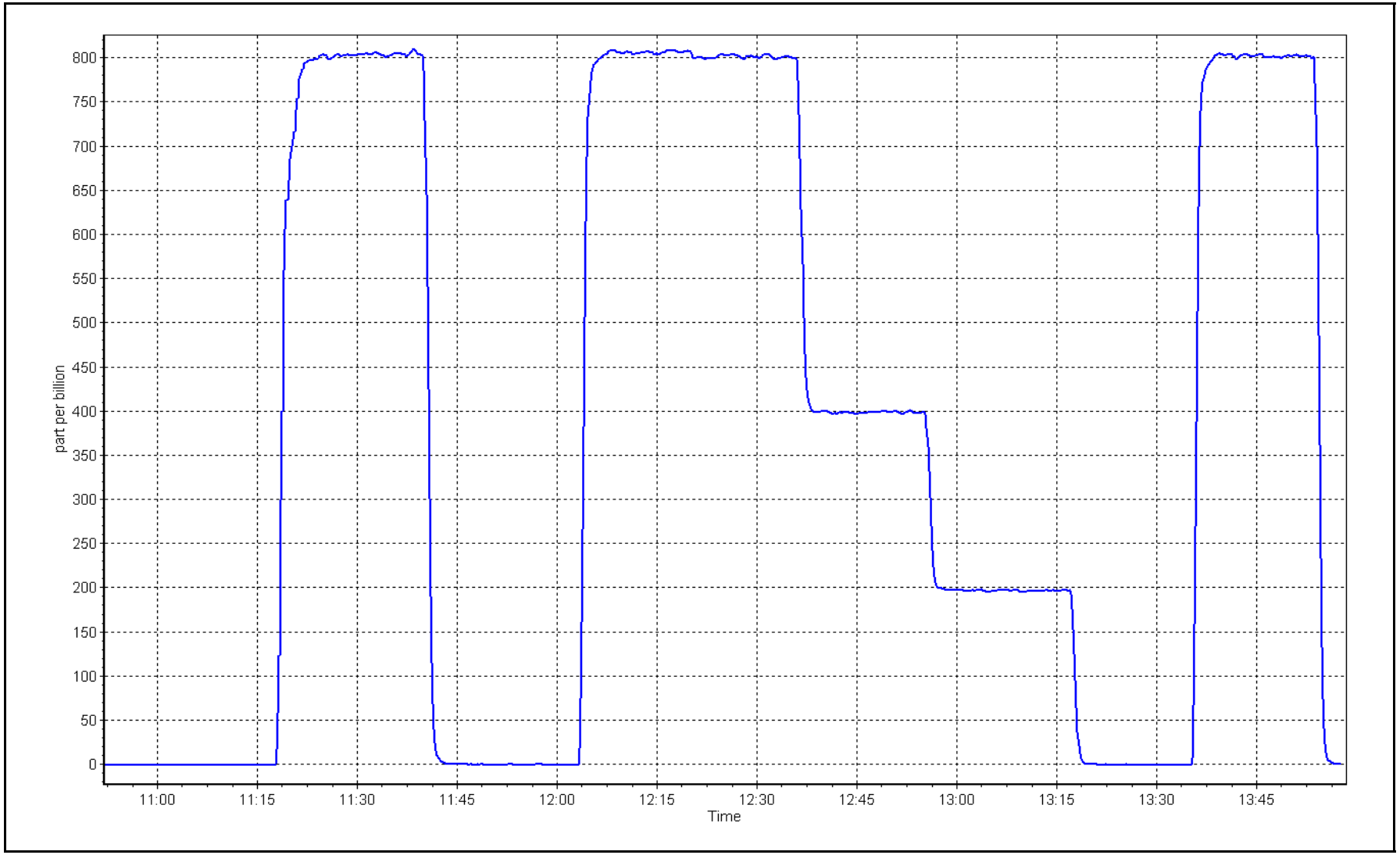
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.5	----
800.1	800.0	1.0001
400.6	399.3	1.0032
199.8	196.7	1.0159

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999987	*≥0.995*
Slope	1.001516	*0.90 - 1.10*
Intercept	-1.785913	*+/-30*



SO2 Calibration Plot Date: October 23, 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:	October 24, 2023	Last Cal Date:	September 19, 2023
Start time (MST):	9:38	End time (MST):	14:34
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:	1.005327	1.003047	Backgd or Offset:	1.19	0.92
Calibration intercept:	-0.202877	-0.022987	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	-0.4	----
as found span	4926	74.2	80.0	81.1	0.982
as found 2nd point	4963	37.2	40.1	40.3	0.985
as found 3rd point	4982	18.6	20.1	19.9	0.988
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4926	74.2	80.0	80.2	0.998
second point	4963	37.2	40.1	40.3	0.995
third point	4982	18.6	20.1	20.0	1.003
as left zero	5000	0.0	0.0	0.0	----
as left span	4926	74.2	80.0	79.2	1.010
SO2 Scrubber Check	4919	81.3	813.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.998
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.5	Prev response:	80.23	*% change:	1.6%
Baseline Corr 2nd AF pt:	40.7	AF Slope:	1.019043	AF Intercept:	-0.483499
Baseline Corr 3rd AF pt:	20.3	AF Correlation:	0.999994		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. Adjusted zero. Scrubber check done after cal zero, passed.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

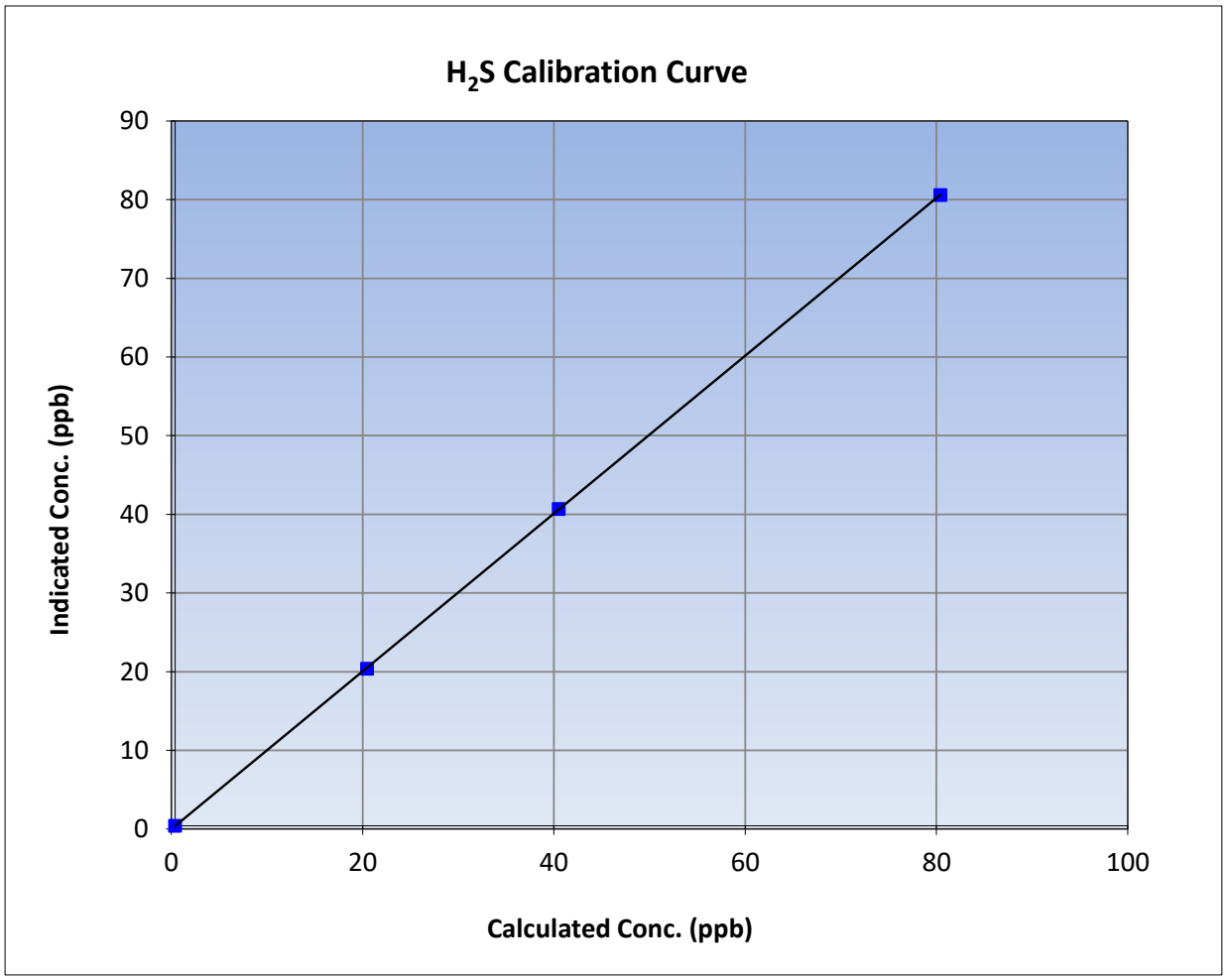
Station Information

Calibration Date:	October 24, 2023	Previous Calibration:	September 19, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:38	End Time (MST):	14:34
Analyzer make:	Thermo 43iQ-TLE	Analyzer serial #:	1200326170

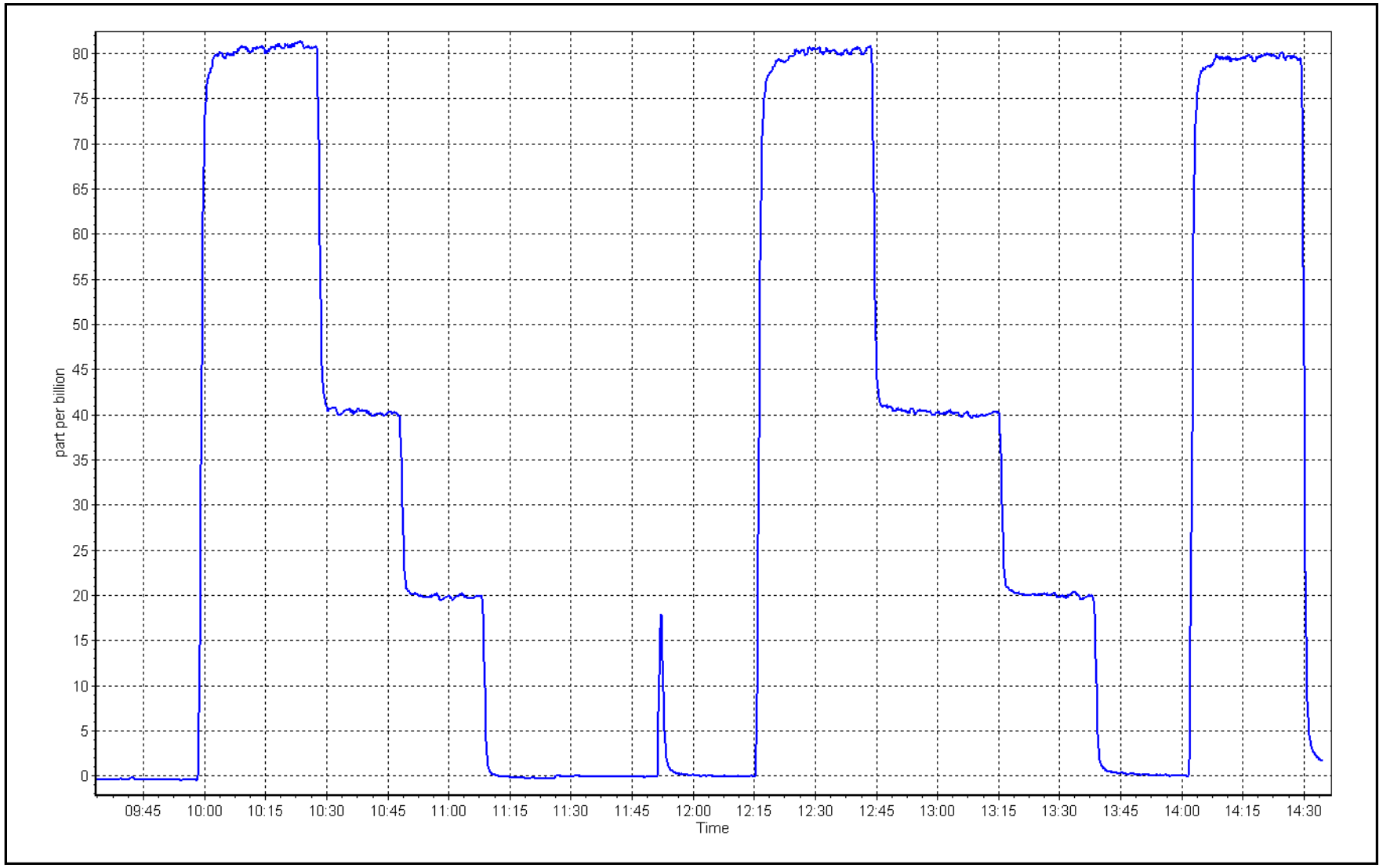
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.2	0.9975
40.1	40.3	0.9952
20.1	20.0	1.0027

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.003047	*0.90 - 1.10*
Intercept	-0.022987	*+/-3*



H_2S Calibration Plot Date: October 24, 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:	October 23, 2023	Last Cal Date:	September 5, 2023
Start time (MST):	10:59	End time (MST):	13:58
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:	1.006607	1.007852	Background:	3.64	3.64
Calibration intercept:	-0.029039	-0.102215	Coefficient:	3.987	3.987

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	-0.09	----
as found span	4918	81.3	17.31	17.33	0.999
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.08	----
high point	4918	81.3	17.31	17.36	0.997
second point	4959	40.6	8.65	8.60	1.005
third point	4979	20.3	4.32	4.23	1.022
as left zero	5000	0.0	0.00	-0.10	----
as left span	4918	81.3	17.31	17.38	0.996
				Average Correction Factor	1.008

Baseline Corr As found:	17.42	Previous response	17.40	*% change	0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

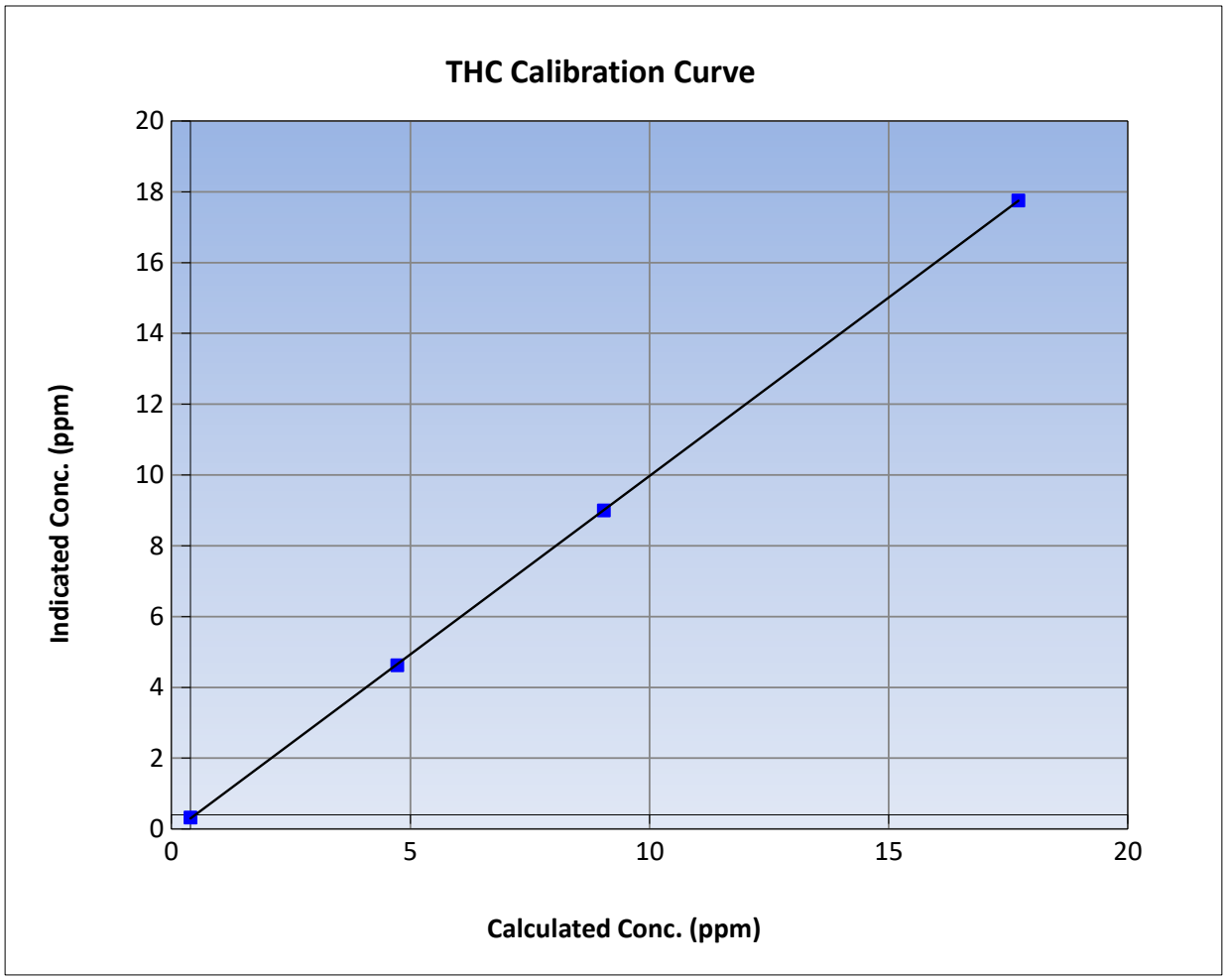
Station Information

Calibration Date:	October 23, 2023	Previous Calibration:	September 5, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:59	End Time (MST):	13:58
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1170050149

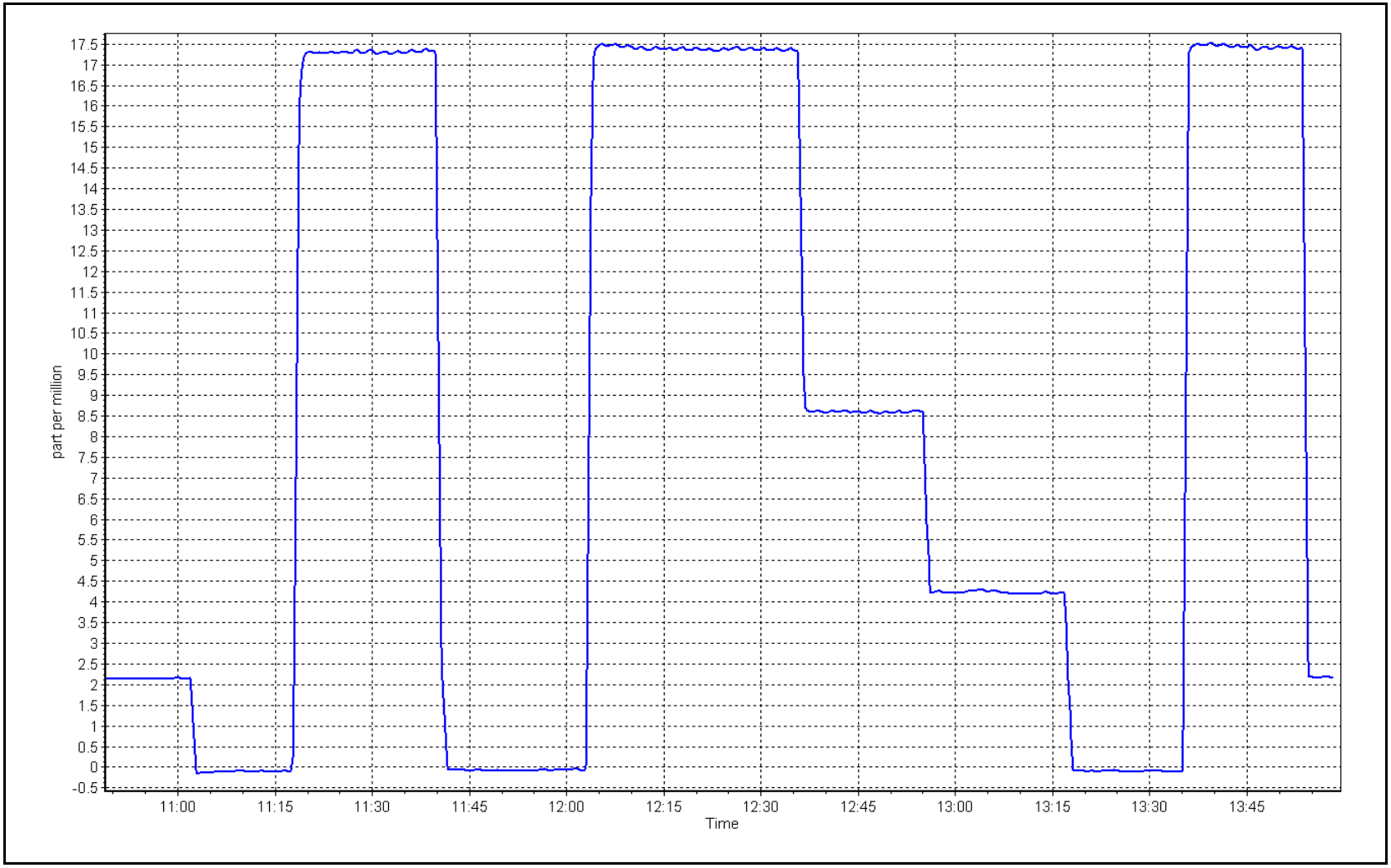
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.08	----
17.31	17.36	0.9974
8.65	8.60	1.0053
4.32	4.23	1.0223

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999990	*≥0.995*
Slope	1.007852	*0.90 - 1.10*
Intercept	-0.102215	*+/-1.5*



THC Calibration Plot Date: October 23, 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:	October 25, 2023	Last Cal Date:	September 6, 2023
Start time (MST):	9:38	End time (MST):	14:35
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	1.386	NO bkgnd or offset:	1.4	1.4
NOX coeff or slope:	0.996	0.996	NOX bkgnd or offset:	1.4	1.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	178.0	175.9

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.997951	1.006760
NO_X Cal Offset:	0.647509	-0.933669
NO Cal Slope:	0.996977	1.006372
NO Cal Offset:	-0.611801	-1.673031
NO_2 Cal Slope:	0.993705	0.995839
NO_2 Cal Offset:	1.353170	0.777688

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1	----	----
as found span	4916	84.2	799.2	799.2	0.0	803.0	801.0	1.6	0.9953	0.9977
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
high point	4916	84.2	799.2	799.2	0.0	804.0	803.0	1.0	0.9940	0.9953
second point	4958	42.1	399.6	399.6	0.0	401.4	401.0	0.4	0.9955	0.9965
third point	4979	21.1	200.3	200.3	0.0	199.3	197.3	2.0	1.0049	1.0151
as left zero	5000	0.0	0.0	0.0	0.0	0.1	-0.1	0.2	----	----
as left span	4916	84.2	799.2	410.3	388.9	800.0	410.7	389.3	0.9990	0.9990
								Average Correction Factor	0.9982	1.0023

Corrected As found	NO_X = 803.2 ppb	NO = 801.1 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.6%
Previous Response	NO_X = 798.2 ppb	NO = 796.2 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)	796.6	407.7	388.9	387.9	1.0026	99.7%
2nd GPT point (200 ppb O3)	796.6	604.9	191.7	191.5	1.0010	99.9%
3rd GPT point (100 ppb O3)	796.6	701.7	94.9	96.3	0.9855	101.5%
				Average Correction Factor	0.9964	100.4%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

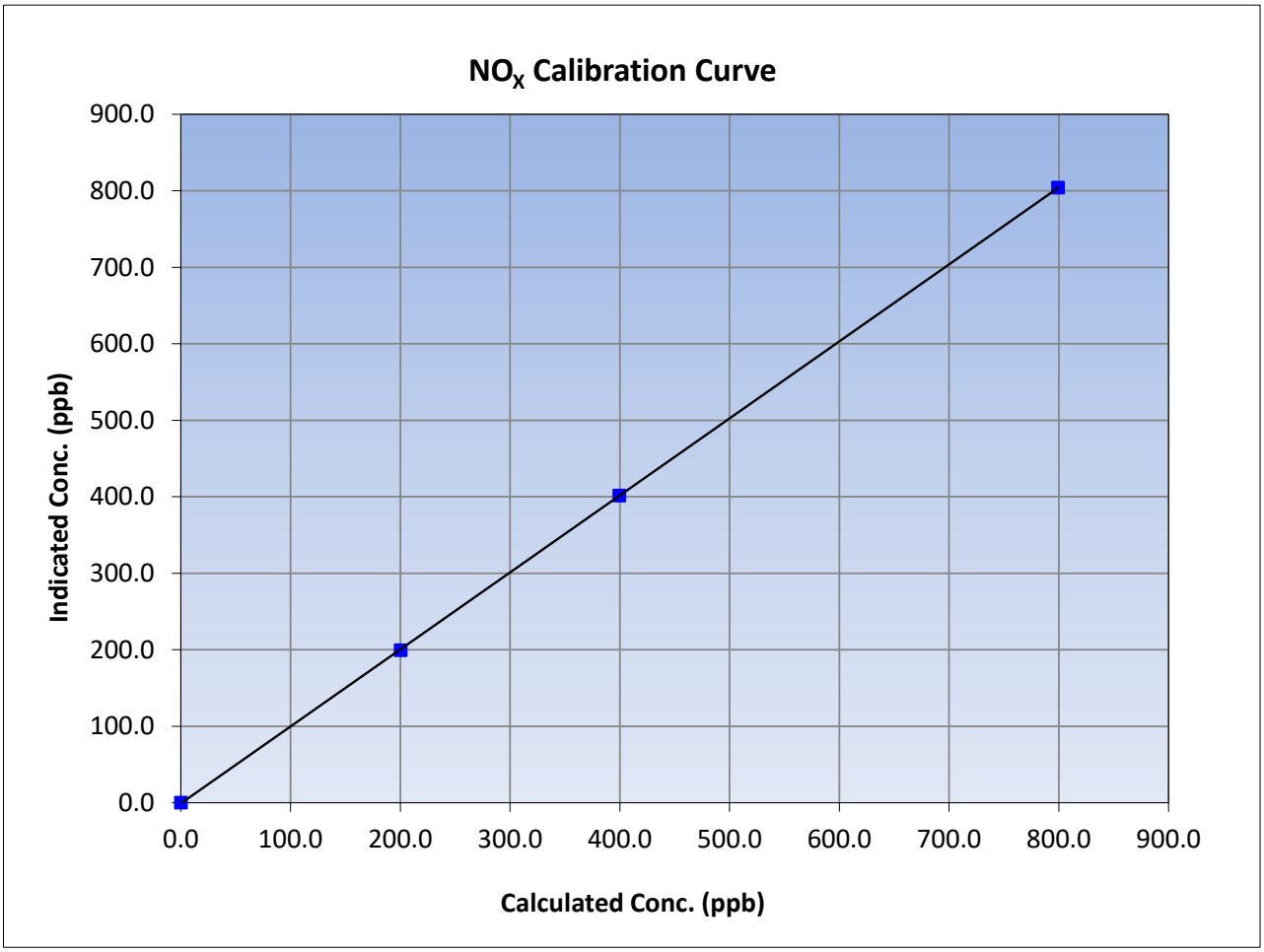
Version-04-2020

Station Information

Calibration Date:	October 25, 2023	Previous Calibration:	September 6, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:38	End Time (MST):	14:35
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	0.999991	≥0.995
799.2	804.0	0.9940			
399.6	401.4	0.9955	Slope	1.006760	0.90 - 1.10
200.3	199.3	1.0049			
			Intercept	-0.933669	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

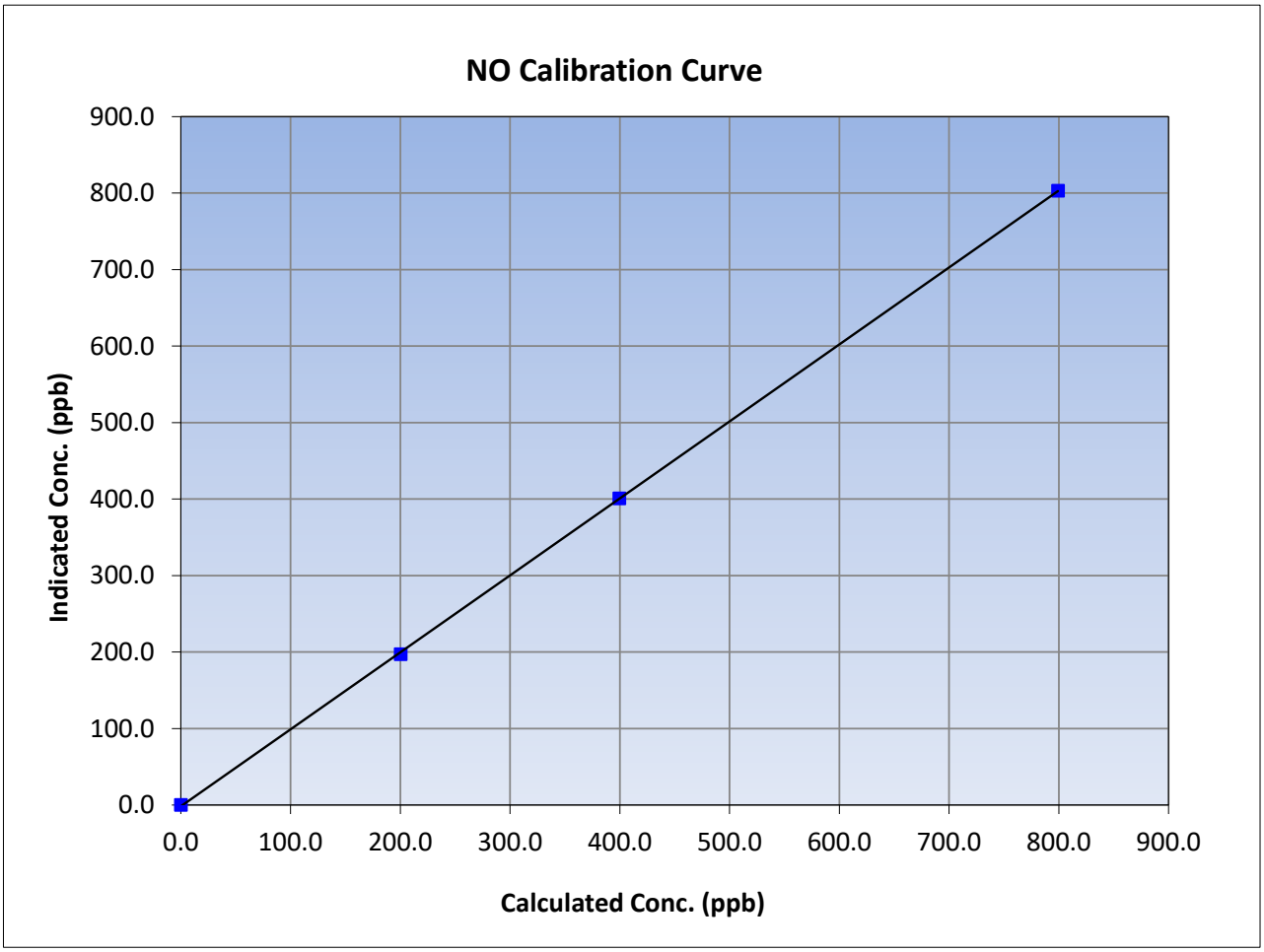
Version-04-2020

Station Information

Calibration Date:	October 25, 2023	Previous Calibration:	September 6, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:38	End Time (MST):	14:35
Analyzer make:	Thermo 42i	Analyzer serial #:	1170050148

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999972	≥0.995
799.2	803.0	0.9953			
399.6	401.0	0.9965	Slope	1.006372	0.90 - 1.10
200.3	197.3	1.0151			
			Intercept	-1.673031	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

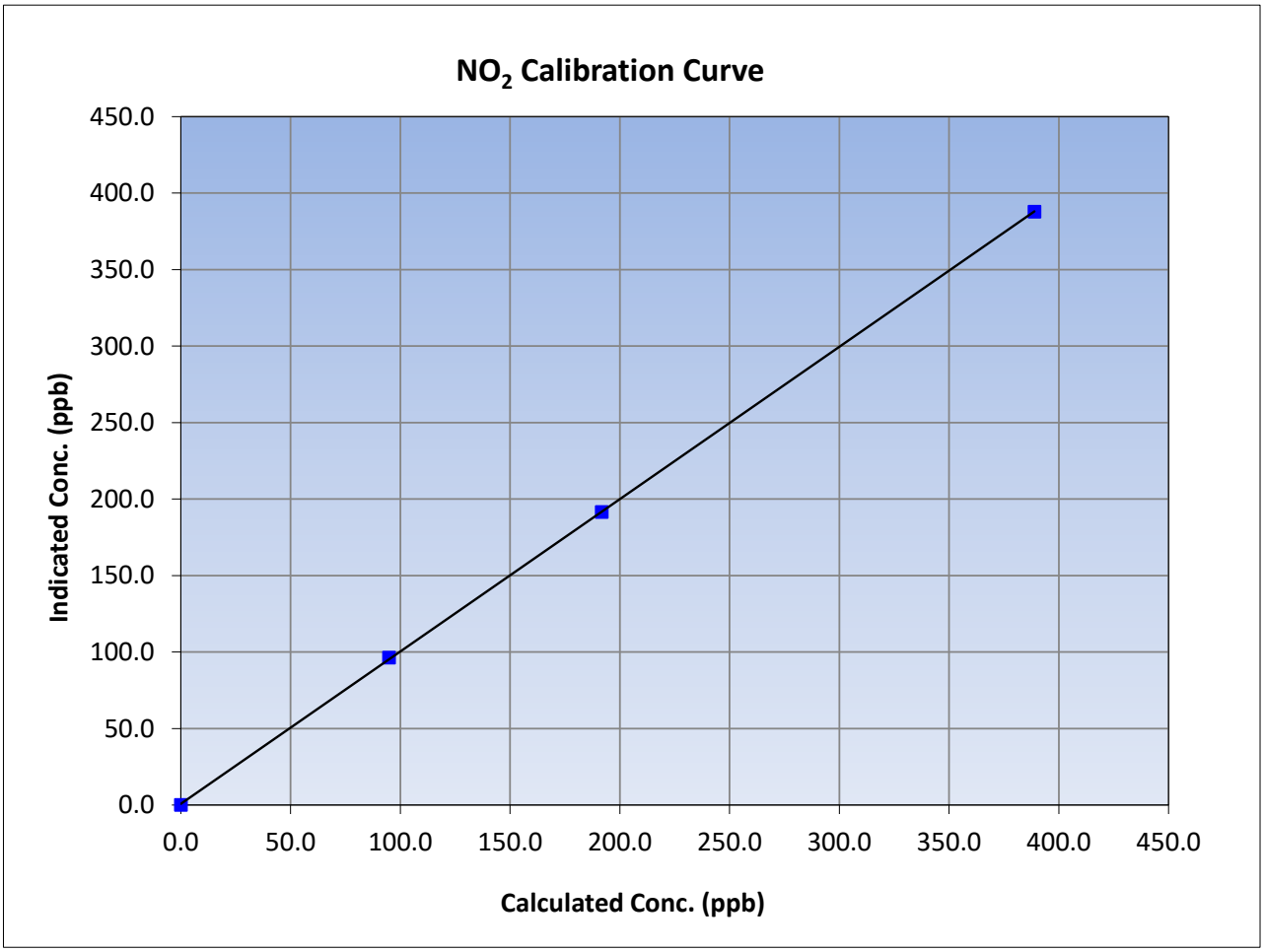
Version-04-2020

Station Information

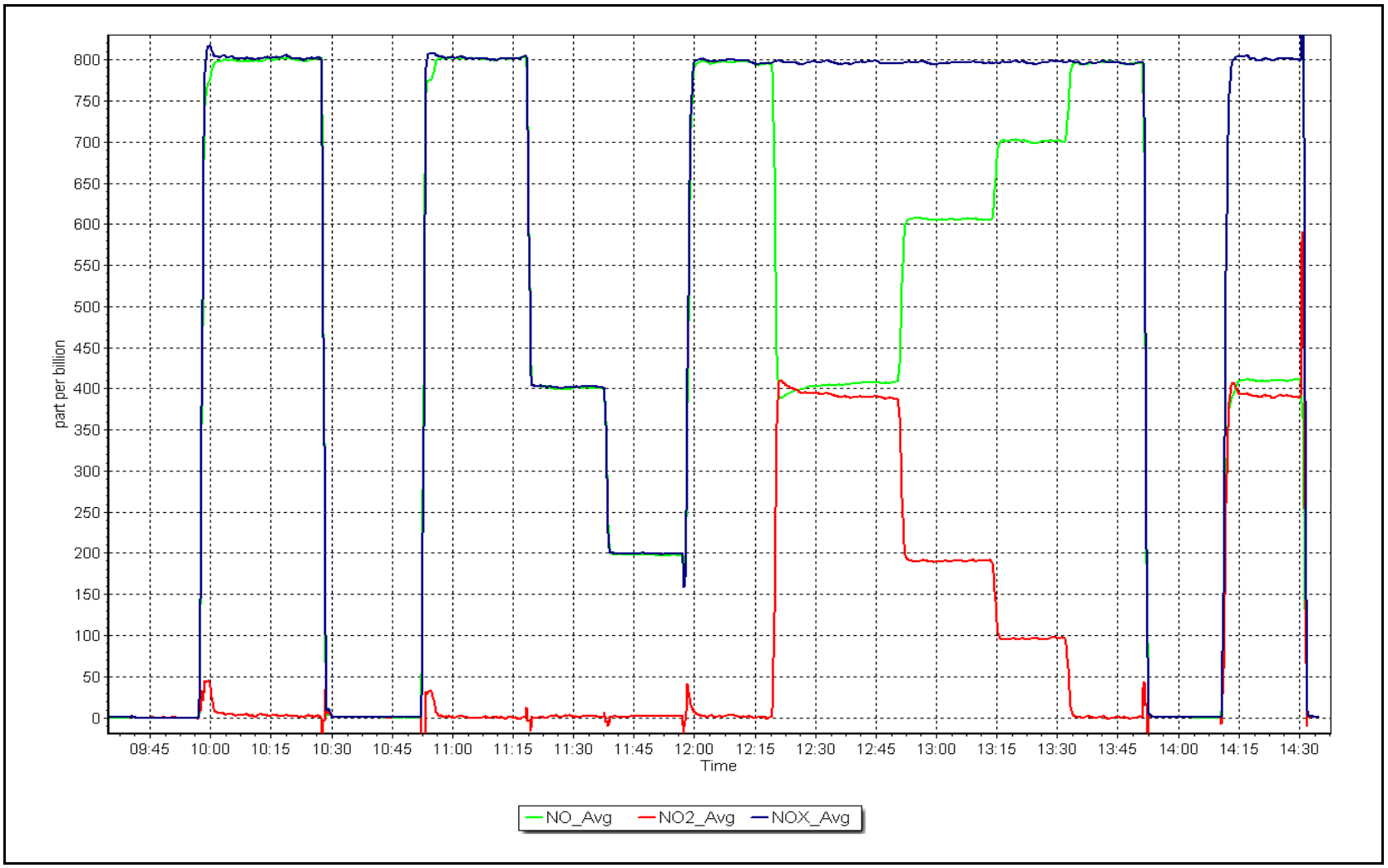
Calibration Date:	October 25, 2023	Previous Calibration:	September 6, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:38	End Time (MST):	14:35
Analyzer make:	Thermo 42i	Analyzer serial #:	1170050148

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999981	≥0.995
388.9	387.9	1.0026			
191.7	191.5	1.0010	Slope	0.995839	0.90 - 1.10
94.9	96.3	0.9855			
			Intercept	0.777688	+/-20



NO_X Calibration Plot Date: October 25, 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:	October 25, 2023	Last Cal Date:	September 7, 2023
Start time (MST):	9:49	End time (MST):	11:50
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)	-5.8	-6.00	-5.8	☐	+/- 2 °C
P (mmHg)	715.7	716.80	715.7	☐	+/- 10 mmHg
flow (LPM)	4.93	5.092	4.93	☐	+/- 0.25 LPM

Leak Test: Date of check: October 25, 2023 Last Cal Date: September 7, 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	11.2	11.2	☐	11.3 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 2.9 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: October 25, 2023

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. Completed annual and quarterly maintenance.

Calibration by: Braiden Boutilier

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS30
ELLS RIVER
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Ells River	Station number:	AMS 30
Calibration Date:	October 3, 2023	Last Cal Date:	September 1, 2023
Start time (MST):	9:26	End time (MST):	12:25
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:	1.006471	1.000474	Backgd or Offset:	9.6	9.5
Calibration intercept:	-2.616011	-2.915894	Coeff or Slope:	0.994	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	-0.4	----
as found span	4921	79.2	800.4	808.7	0.990
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4921	79.2	800.4	799.3	1.001
second point	4960	39.6	400.2	395.8	1.011
third point	4980	19.8	200.1	194.8	1.027
as left zero	5000	0.0	0.0	-0.1	----
as left span	4921	79.2	800.4	802.0	0.998
				Average Correction Factor	1.013

Baseline Corr As found:	809.10	Previous response	802.93	*% 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: Inlet filter changed after As Founds, span adjusted.

Calibration Performed By: Ryan Power

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

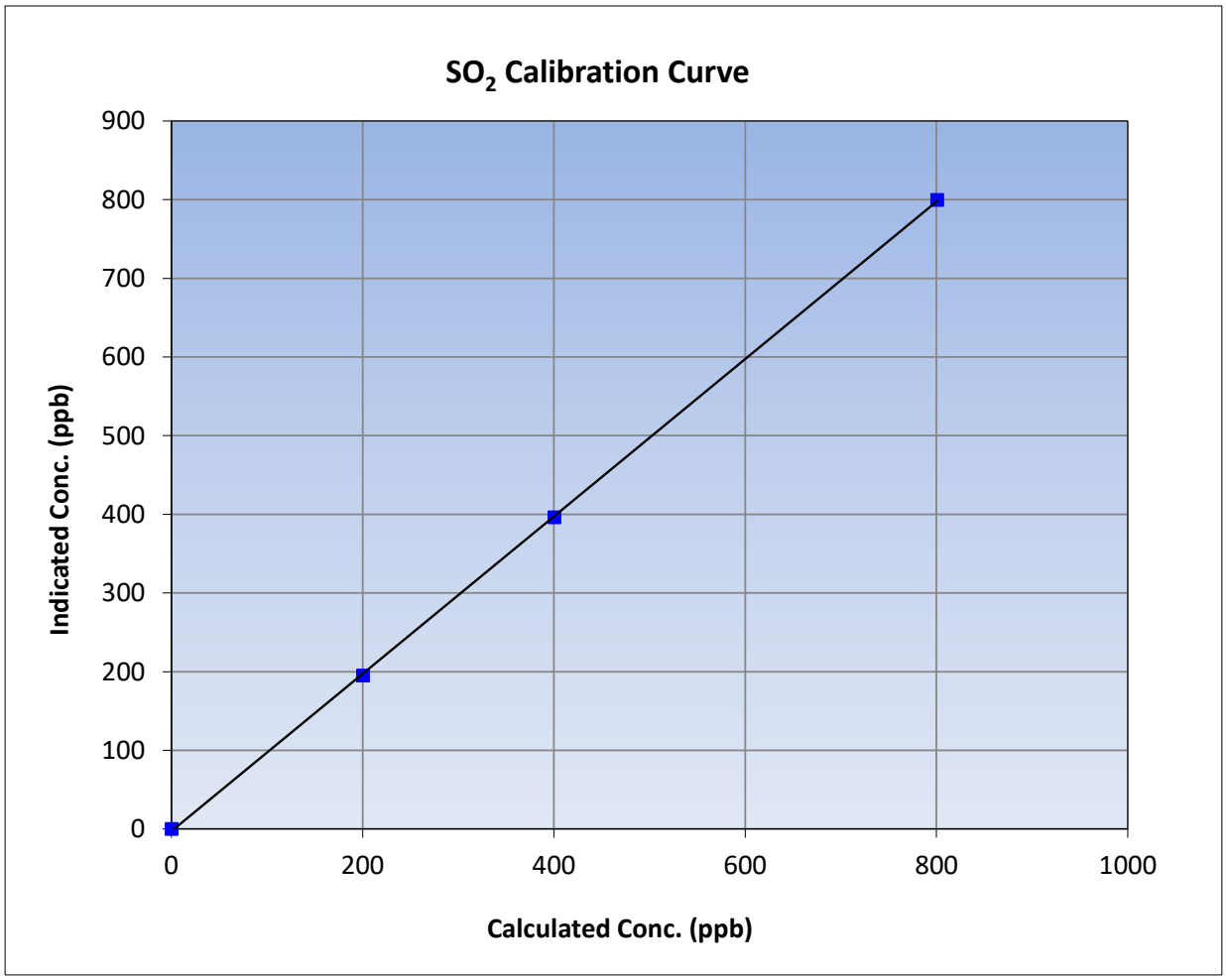
Station Information

Calibration Date:	October 3, 2023	Previous Calibration:	September 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:26	End Time (MST):	12:25
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841397

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
800.4	799.3	1.0013
400.2	395.8	1.0112
200.1	194.8	1.0272

Statistical Evaluation		Limits
Correlation Coefficient	0.999947	≥0.995
Slope	1.000474	0.90 - 1.10
Intercept	-2.915894	+/-30



SO2 Calibration Plot Date: October 3, 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:	October 26, 2023	Last Cal Date:	September 7, 2023
Start time (MST):	8:05	End time (MST):	11:54
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.08	ppm	Cal Gas Exp Date:	February 9, 2024
Cal Gas Cylinder #:	EY0002443			
Removed Cal Gas Conc:	5.08	ppm	Rem Gas Exp Date:	
Removed Gas Cyl #:			Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3061
ZAG Make/Model:	API T701H		Serial Number:	358

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1410661331	
Converter make:	CDN - 101		Converter serial #:	562	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001492	0.998492	Backgd or Offset:	1.60	1.55
Calibration intercept:	-0.079138	-0.099119	Coeff or Slope:	1.136	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	82.3	0.972
as found 2nd point	4961	39.4	40.0	40.9	0.979
as found 3rd point	4980	19.7	20.0	20.1	0.996
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4921	78.7	80.0	79.8	1.002
second point	4961	39.4	40.0	39.8	1.006
third point	4980	19.7	20.0	19.8	1.011
as left zero	5000	0.0	0.0	0.1	----
as left span	4921	78.7	80.0	80.2	0.997
SO2 Scrubber Check	4921	79.2	800.4	0.1	----
Date of last scrubber change:		N/A		Ave Corr Factor	1.006
Date of last converter efficiency test:		N/A			efficiency

Baseline Corr As found:	82.3	Prev response:	80.00	*% change:	2.8%
Baseline Corr 2nd AF pt:	40.9	AF Slope:	1.030935	AF Intercept:	-0.259676
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999954		

* = > +/-5% change initiates investigation

Notes: No maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

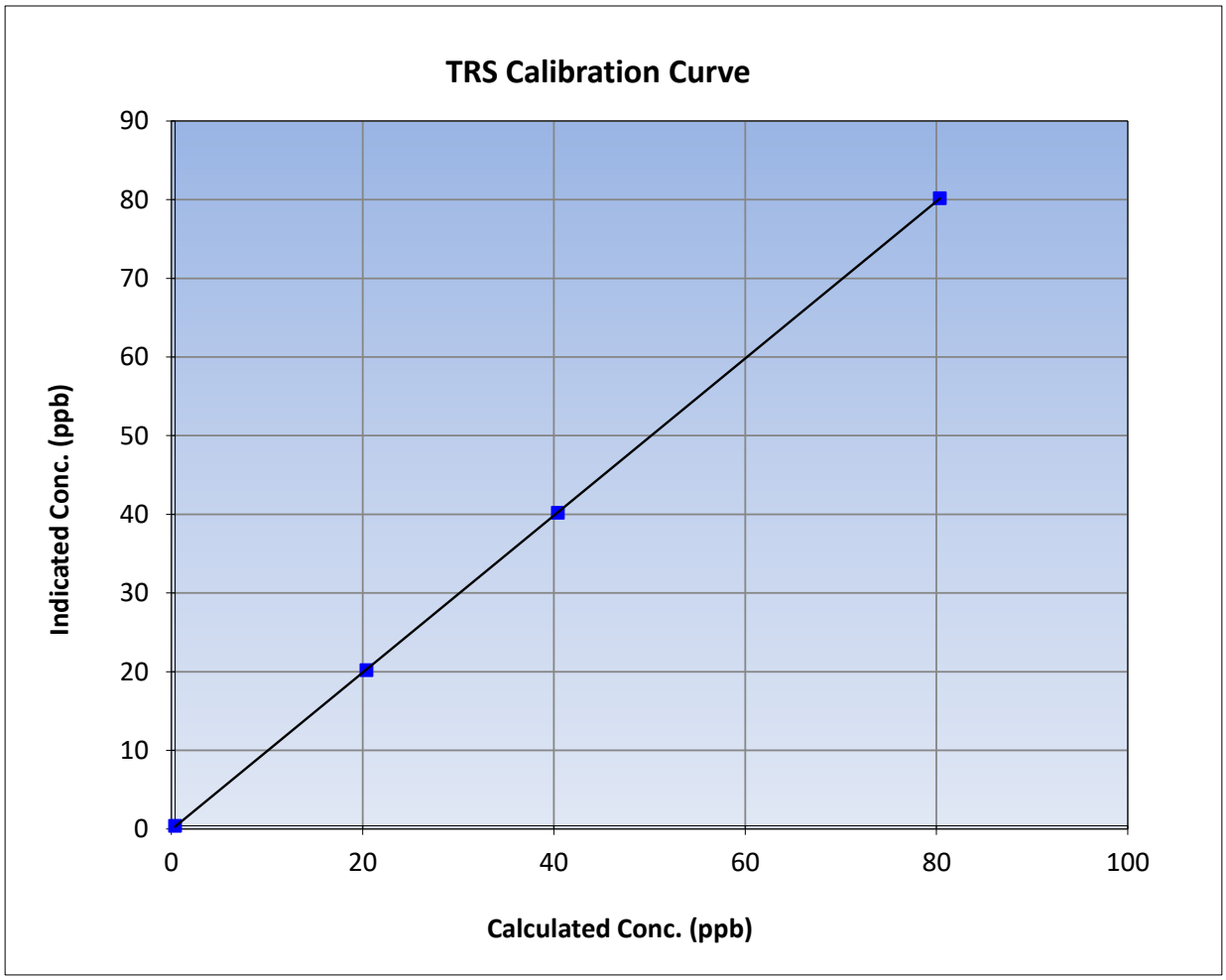
Station Information

Calibration Date:	October 26, 2023	Previous Calibration:	September 7, 2023
Station Name:	Ells River	Station Number:	AMS30
Start Time (MST):	8:05	End Time (MST):	11:54
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1410661331

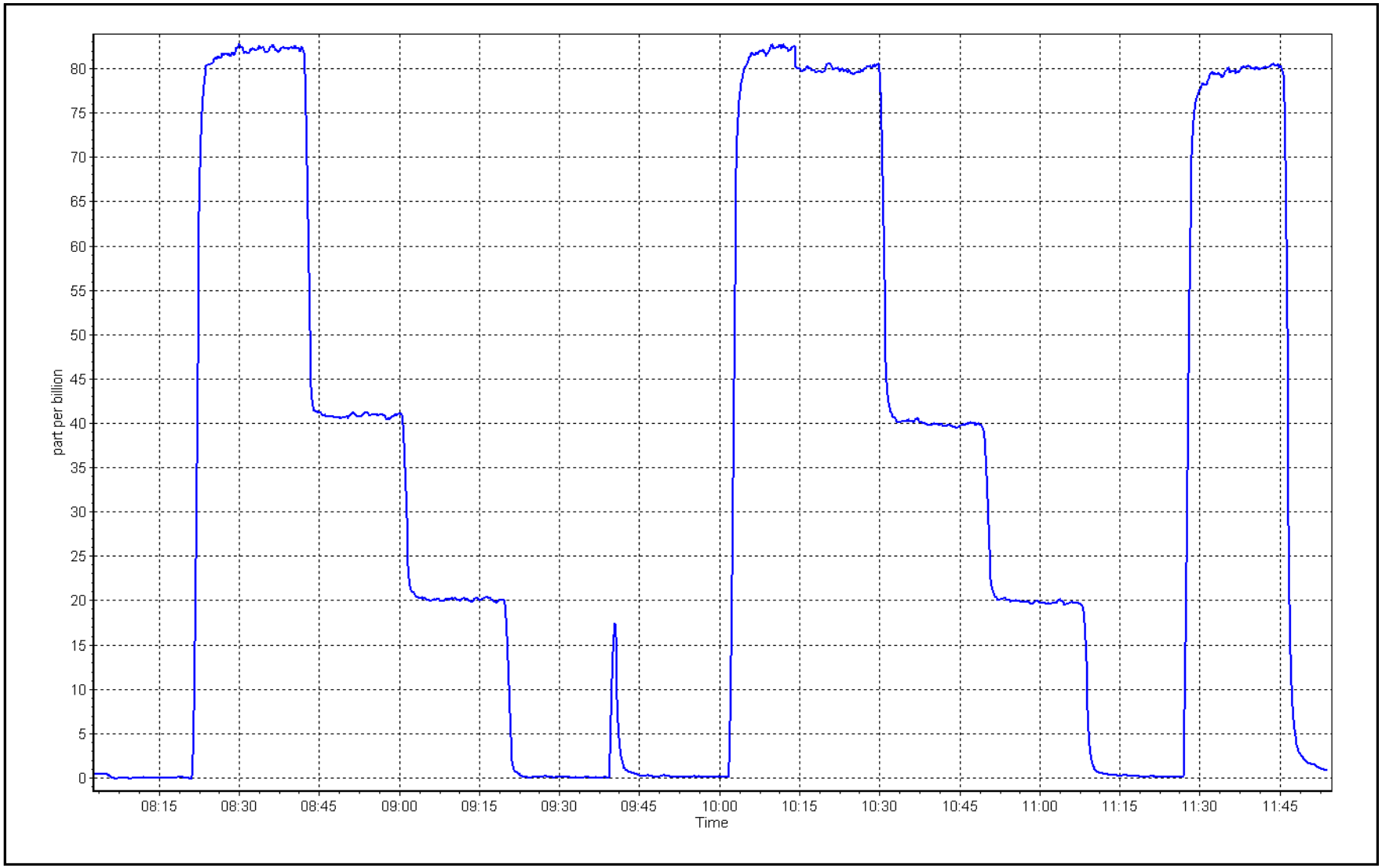
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	79.8	1.0021
40.0	39.8	1.0057
20.0	19.8	1.0109

Statistical Evaluation		Limits
Correlation Coefficient	0.999993	≥0.995
Slope	0.998492	0.90 - 1.10
Intercept	-0.099119	+/-3



TRS Calibration Plot Date: October 26, 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:	October 3, 2023	Last Cal Date:	September 1, 2023
Start time (MST):	9:26	End time (MST):	12:24
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:	2.44E-04	2.45E-04	NMHC SP Ratio:	4.53E-05	4.75E-05
CH4 Retention time:	14.2	14.2	NMHC Peak Area:	201064	191712

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	17.03	16.59	1.027
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	17.03	17.01	1.001
second point	4960	39.6	8.51	8.42	1.012
third point	4980	19.8	4.26	4.14	1.028
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	16.98	1.003
				Average Correction Factor	1.014

Baseline Corr AF:	16.59	Prev response	16.98	*% change	-2.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4921	79.2	9.11	8.73	1.044
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	4.49	1.014
third point	4980	19.8	2.28	2.20	1.035
as left zero	5000	0	0.00	0.00	----
as left span	4921	79.2	9.11	9.10	1.001
				Average Correction Factor	1.017
Baseline Corr AF:	8.73	Prev response	9.07	*% change	-3.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	7.91	7.86	1.007
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	3.92	1.009
third point	4980	19.8	1.98	1.94	1.021
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.91	7.88	1.005
				Average Correction Factor	1.010
Baseline Corr AF:	7.86	Prev response	7.91	*% 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:	1.000637	1.000476
THC Cal Offset:	-0.057538	-0.062338
CH4 Cal Slope:	1.002936	1.000886
CH4 Cal Offset:	-0.025358	-0.022757
NMHC Cal Slope:	0.998741	0.999995
NMHC Cal Offset:	-0.032581	-0.039581

Notes: Inlet filter changed after As Founds, span adjusted.

Calibration Performed By: Ryan Power

Wood Buffalo Environmental Association

THC Calibration Summary

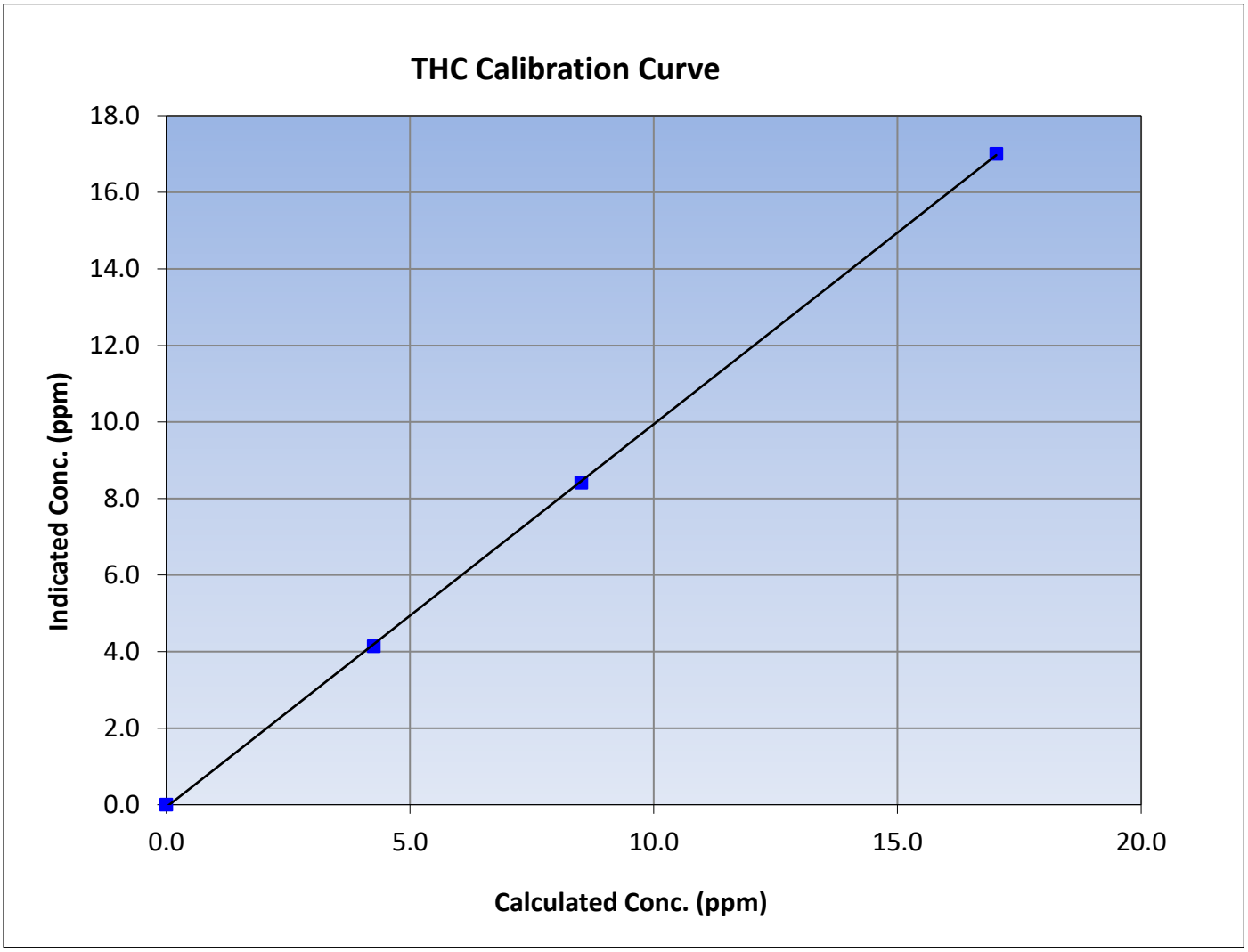
Version-01-2020

Station Information

Calibration Date:	October 3, 2023	Previous Calibration:	September 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:26	End Time (MST):	12:24
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	0.999938	≥0.995
17.03	17.01	1.0012			
8.51	8.42	1.0116	Slope	1.000476	0.90 - 1.10
4.26	4.14	1.0283			
			Intercept	-0.062338	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

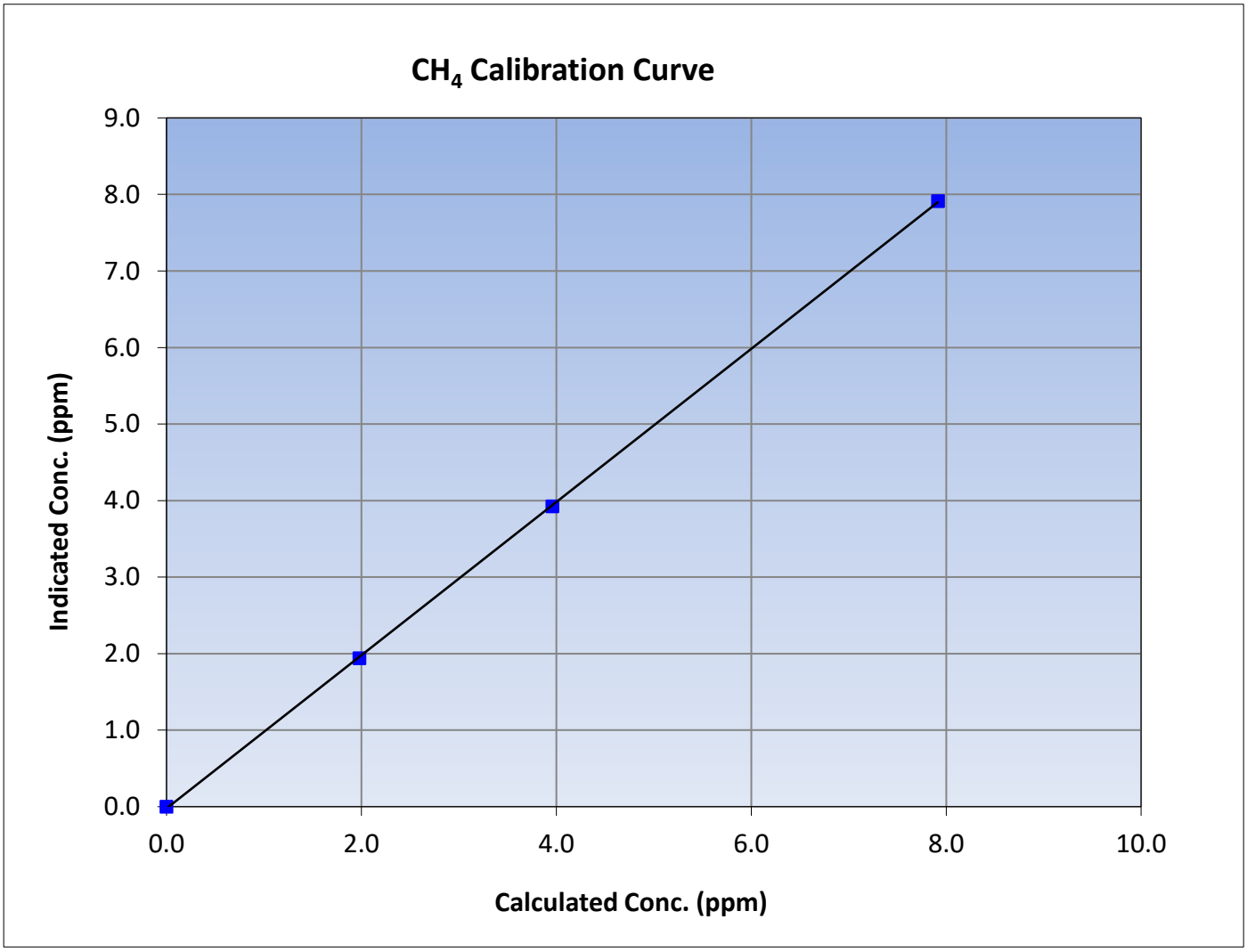
Version-01-2020

Station Information

Calibration Date:	October 3, 2023	Previous Calibration:	September 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:26	End Time (MST):	12:24
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	0.999961	*≥0.995*
7.91	7.91	1.0004			
3.96	3.92	1.0089	Slope	1.000886	*0.90 - 1.10*
1.98	1.94	1.0211			
			Intercept	-0.022757	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

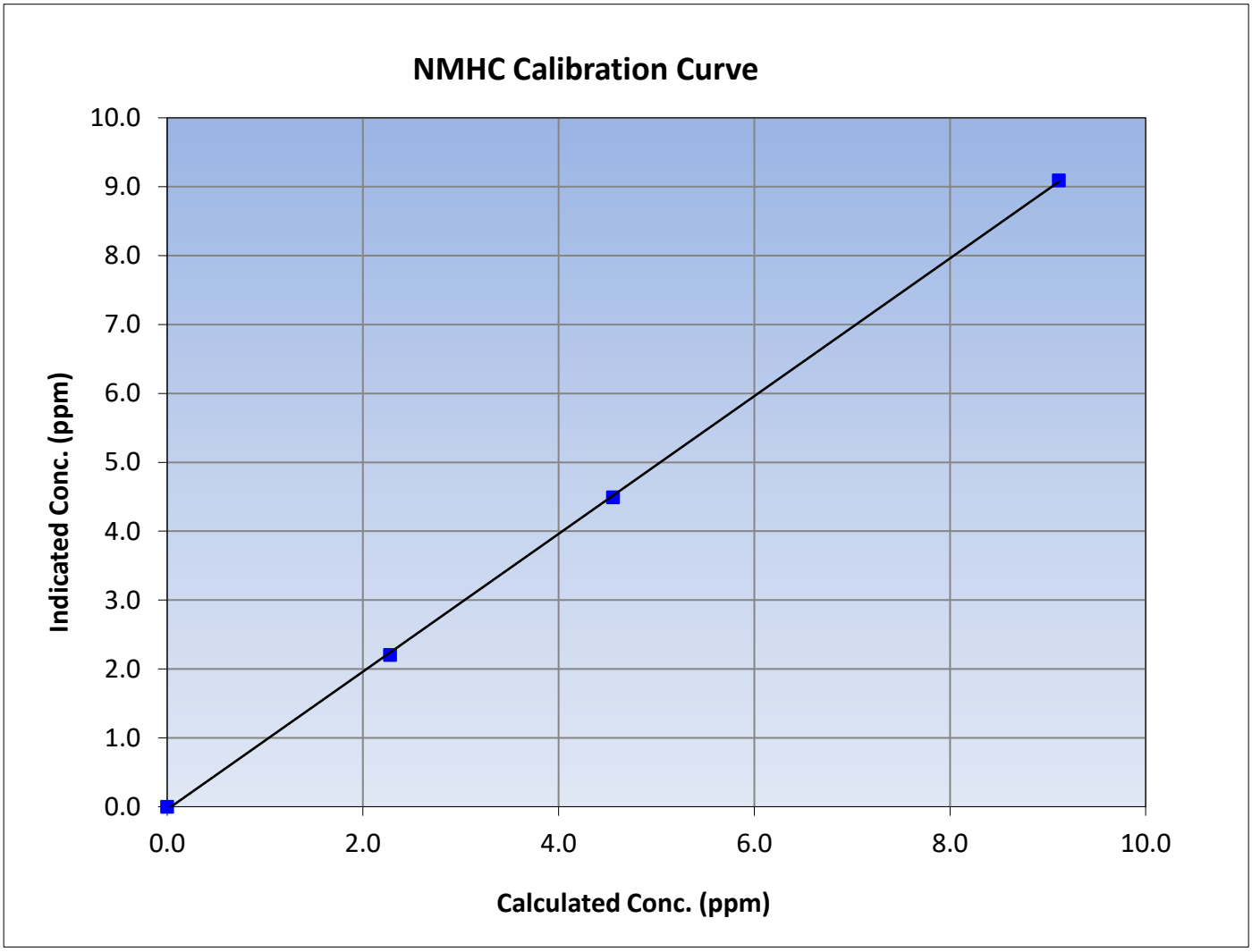
Version-01-2020

Station Information

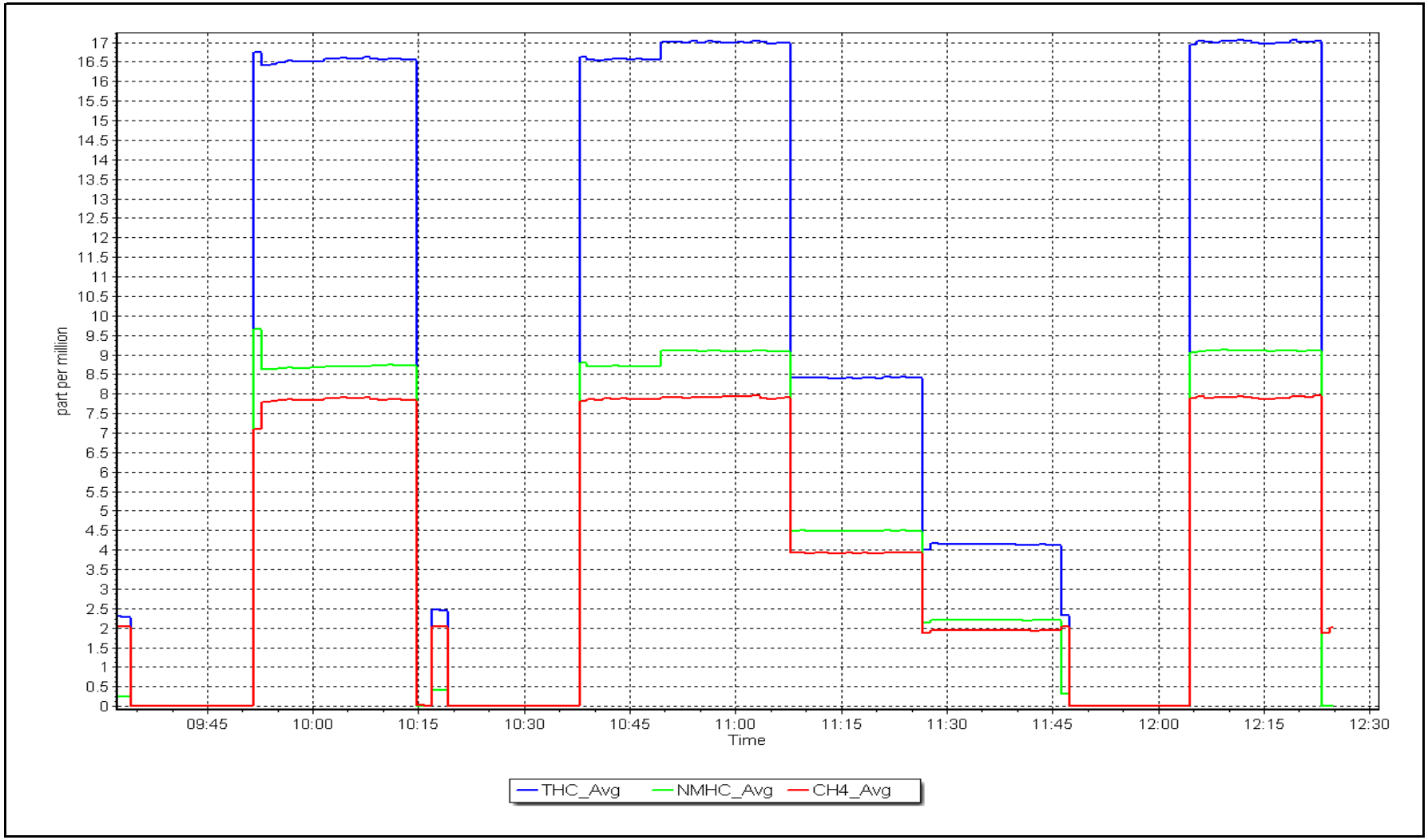
Calibration Date:	October 3, 2023	Previous Calibration:	September 1, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:26	End Time (MST):	12:24
Analyzer make:	Thermo 55i	Analyzer serial #:	1181490018

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999913	≥0.995
9.11	9.09	1.0020			
4.56	4.49	1.0142	Slope	0.999995	0.90 - 1.10
2.28	2.20	1.0346			
			Intercept	-0.039581	+/-0.5



NMHC Calibration Plot Date: October 3, 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:	October 20, 2023	Last Cal Date:	September 6, 2023
Start time (MST):	9:12	End time (MST):	13:41
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:	1.129	1.147	NO bkgnd or offset:	13.8	14.0
NOX coeff or slope:	0.986	0.992	NOX bkgnd or offset:	13.8	14.0
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	189.7	190.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.996459	1.001461
NO_X Cal Offset:	-1.100000	-1.680000
NO Cal Slope:	1.000500	1.000029
NO Cal Offset:	-2.240000	-2.600000
NO_2 Cal Slope:	0.993934	1.004460
NO_2 Cal Offset:	-0.960703	0.734060

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.7	-0.7	0.0	----	----
as found span	4920	80.0	813.3	799.5	13.8	799.7	786.2	13.6	1.0170	1.0169
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.4	0.0	----	----
high point	4920	80.0	813.3	799.5	13.8	813.4	798.0	15.4	0.9999	1.0019
second point	4960	40.0	406.6	399.8	6.9	405.0	396.2	8.8	1.0040	1.0090
third point	4980	20.0	203.3	199.9	3.4	200.6	195.0	5.6	1.0136	1.0250
as left zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.4	0.0	----	----
as left span	4920	80.0	813.3	425.2	388.1	815.8	422.8	393.0	0.9969	1.0057
								Average Correction Factor	1.0058	1.0120

Corrected As found	NO_X = 800.4 ppb	NO = 786.9 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-1.1%
Previous Response	NO_X = 809.3 ppb	NO = 797.7 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)	795.2	420.9	388.1	390.2	0.9945	100.6%
2nd GPT point (200 ppb O3)	795.2	613.6	195.4	197.1	0.9912	100.9%
3rd GPT point (100 ppb O3)	795.2	701.0	108.0	110.1	0.9806	102.0%
				Average Correction Factor	0.9888	101.1%

Notes: Adjusted the span only. Noticed the background shifted a bit from the previous calibration.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

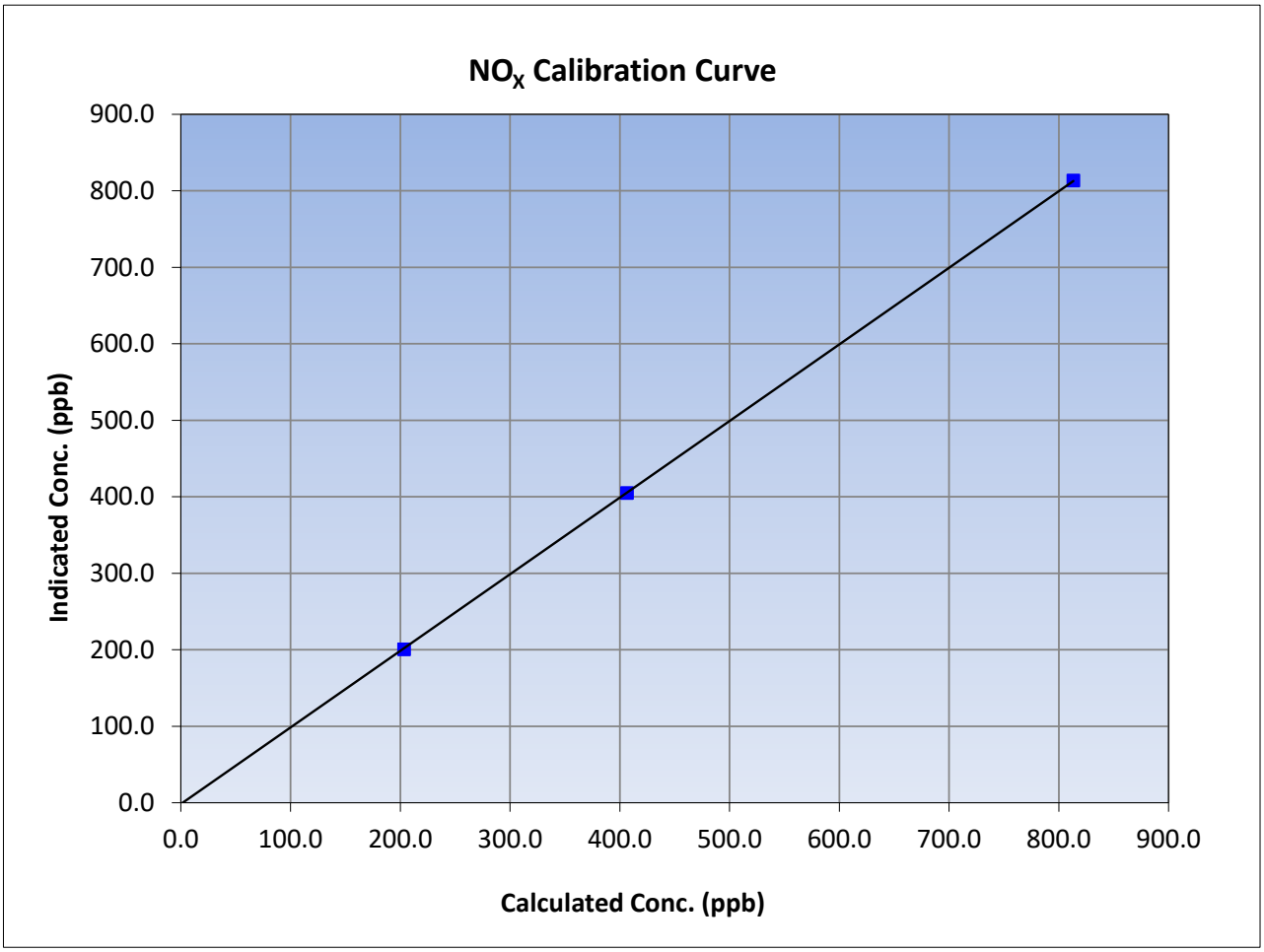
Version-04-2020

Station Information

Calibration Date:	October 20, 2023	Previous Calibration:	September 6, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:12	End Time (MST):	13:41
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	0.999989	≥0.995
813.3	813.4	0.9999			
406.6	405.0	1.0040	Slope	1.001461	0.90 - 1.10
203.3	200.6	1.0136			
			Intercept	-1.680000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

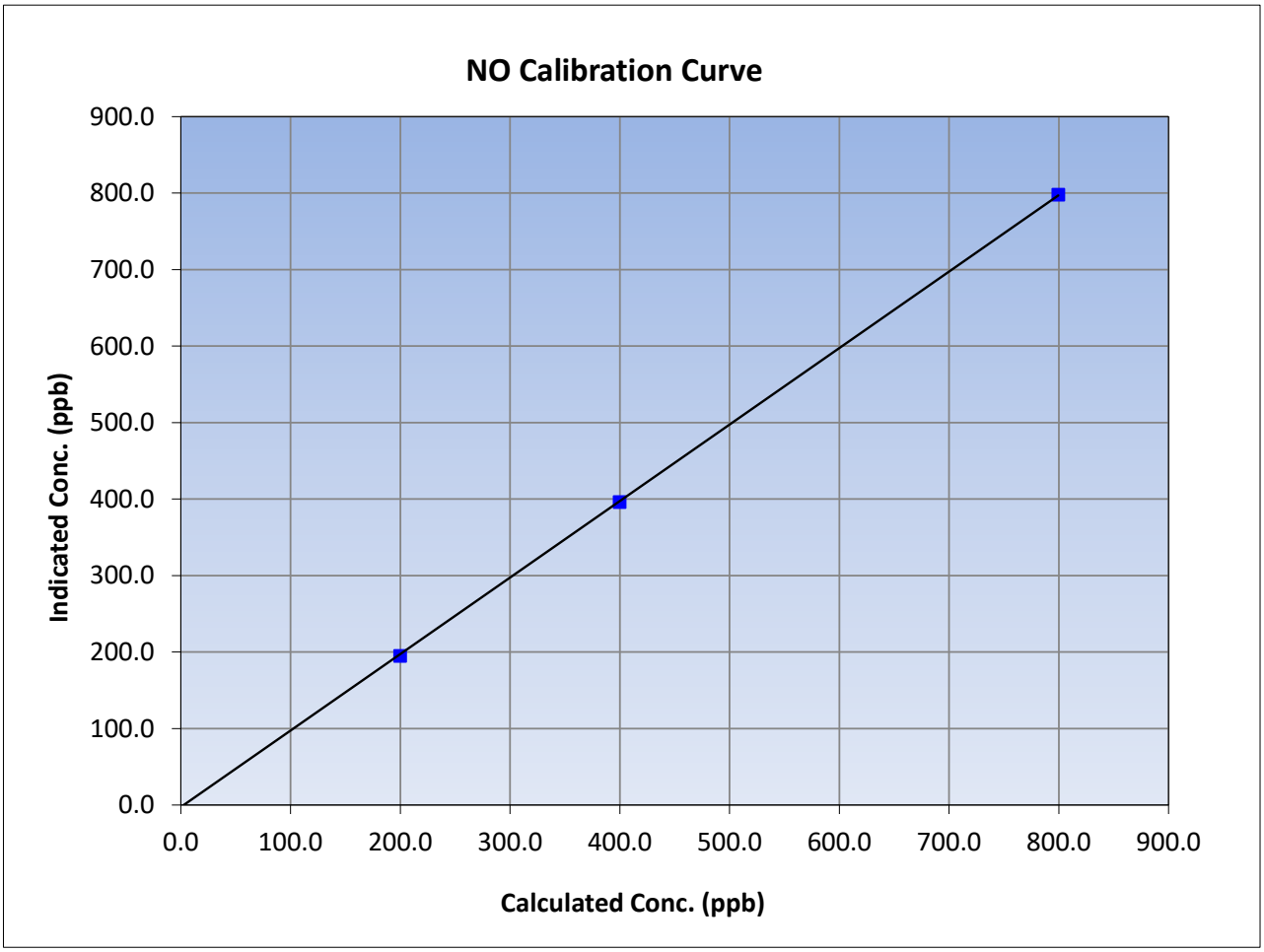
Version-04-2020

Station Information

Calibration Date:	October 20, 2023	Previous Calibration:	September 6, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:12	End Time (MST):	13:41
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	0.999965	≥0.995
799.5	798.0	1.0019			
399.8	396.2	1.0090	Slope	1.000029	0.90 - 1.10
199.9	195.0	1.0250			
			Intercept	-2.600000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

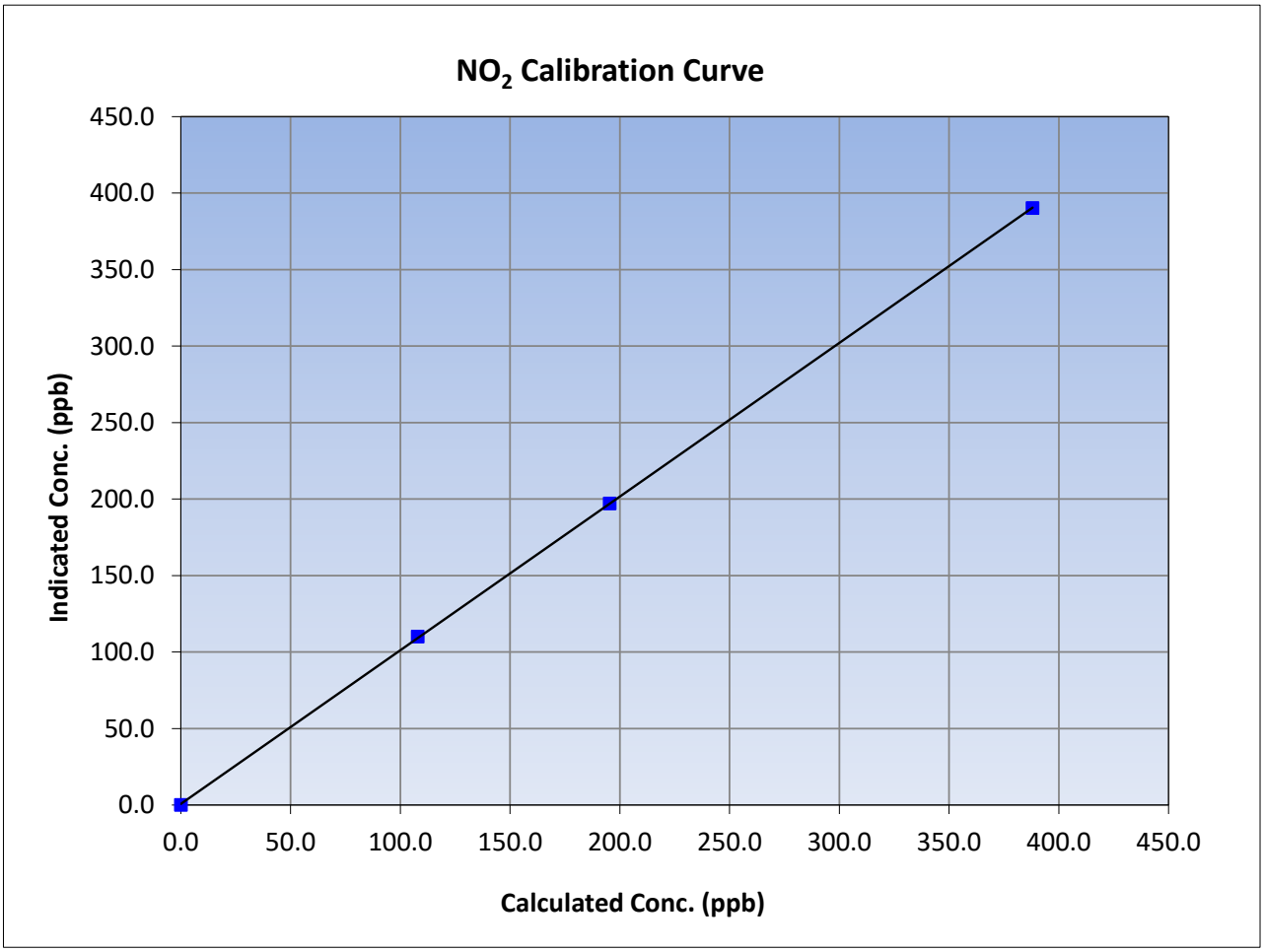
Version-04-2020

Station Information

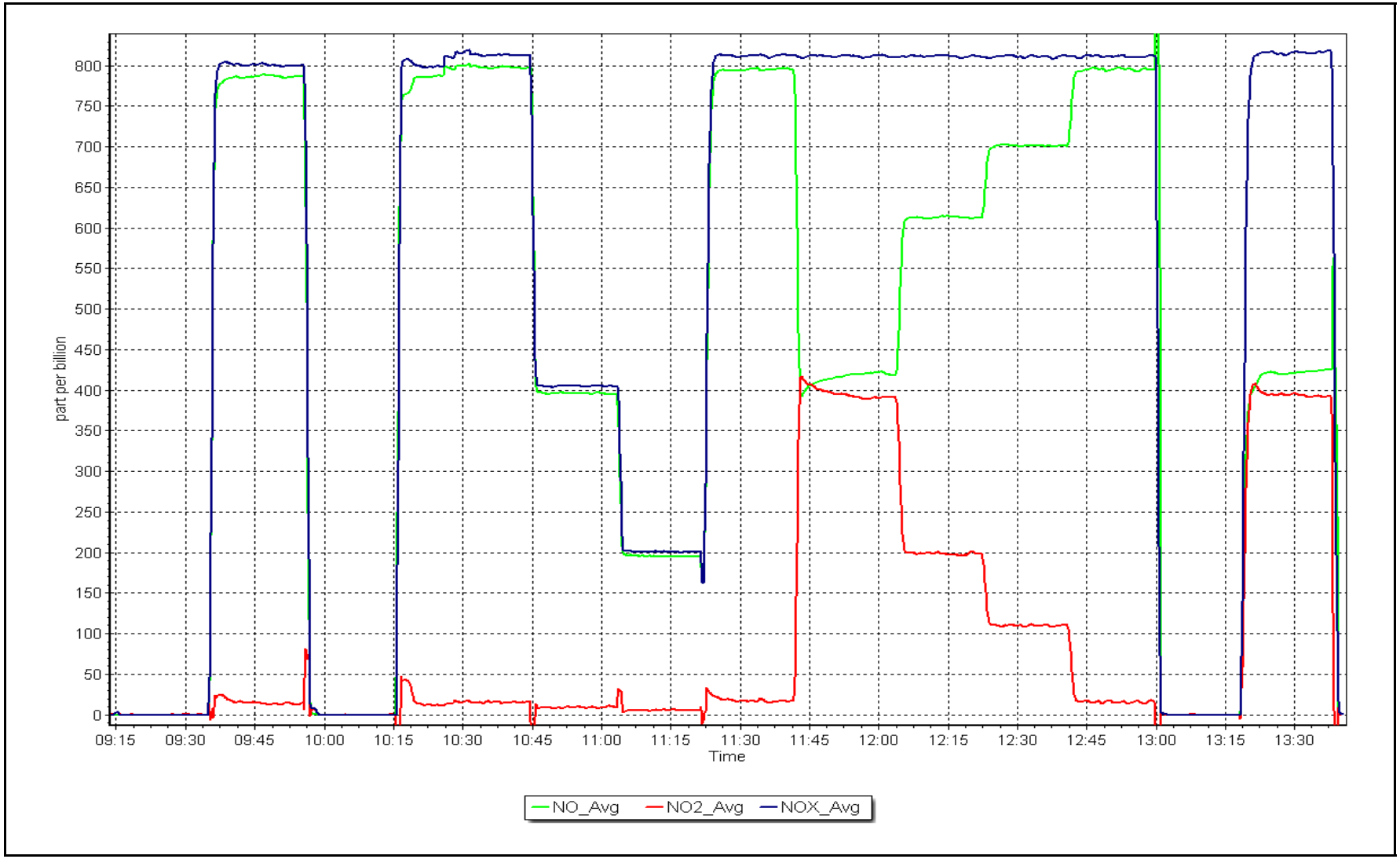
Calibration Date:	October 20, 2023	Previous Calibration:	September 6, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:12	End Time (MST):	13:41
Analyzer make:	Thermo 42i	Analyzer serial #:	710321429

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999981	≥0.995
388.1	390.2	0.9945			
195.4	197.1	0.9912	Slope	1.004460	0.90 - 1.10
108.0	110.1	0.9806			
			Intercept	0.734060	+/-20



NO_X Calibration Plot Date: October 20, 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:	October 27, 2023	Last Cal Date:	September 8, 2023
Start time (MST):	8:08	End time (MST):	9:12
Analyzer Make:	API T640	S/N:	875
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat	S/N:	388753
Temp/RH standard:	Alicat	S/N:	388753

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-7.6	-7.8	-7.6	☐	
P (mmHg)	739.4	741	739.4	☐	+/- 10 mmHg
flow (LPM)	5.00	4.96	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: October 27, 2023 Last Cal Date: September 8, 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	10.7	10.8	10.8	☐	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 8.8 w/ HEPA: 0 <0.2 ug/m3

Date Optical Chamber Cleaned: October 27, 2023

Disposable Filter Changed: October 27, 2023

Annual Maintenance

Date Sample Tube Cleaned: October 27, 2023

Date RH/T Sensor Cleaned:

Notes: No adjustments done. Head cleaned. Flow, PMT and Leak checked before and after cleaning.

Calibration by: Melissa Lemay

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS501
LEISMER
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Leismer	Station number:	AMS501
Calibration Date:	September 12, 2023	Last Cal Date:	NA
Start time (MST):	12:45	End time (MST):	14:58
Reason:	Install		

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:	NA	1.002329	Backgd or Offset:	NA	17.9
Calibration intercept:	NA	-0.996068	Coeff or Slope:	NA	0.956

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	4921	79.2	800.2	801.0	0.999
second point	4960	39.6	400.2	401.4	0.997
third point	4980	19.8	200.1	197.2	1.015
as left zero	5000	0.0	0.0	0.3	----
as left span	4921	79.2	800.2	804.5	0.995
				Average Correction Factor	1.003

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

* = > +/-5% change initiates investigation

Notes: Install calibration.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

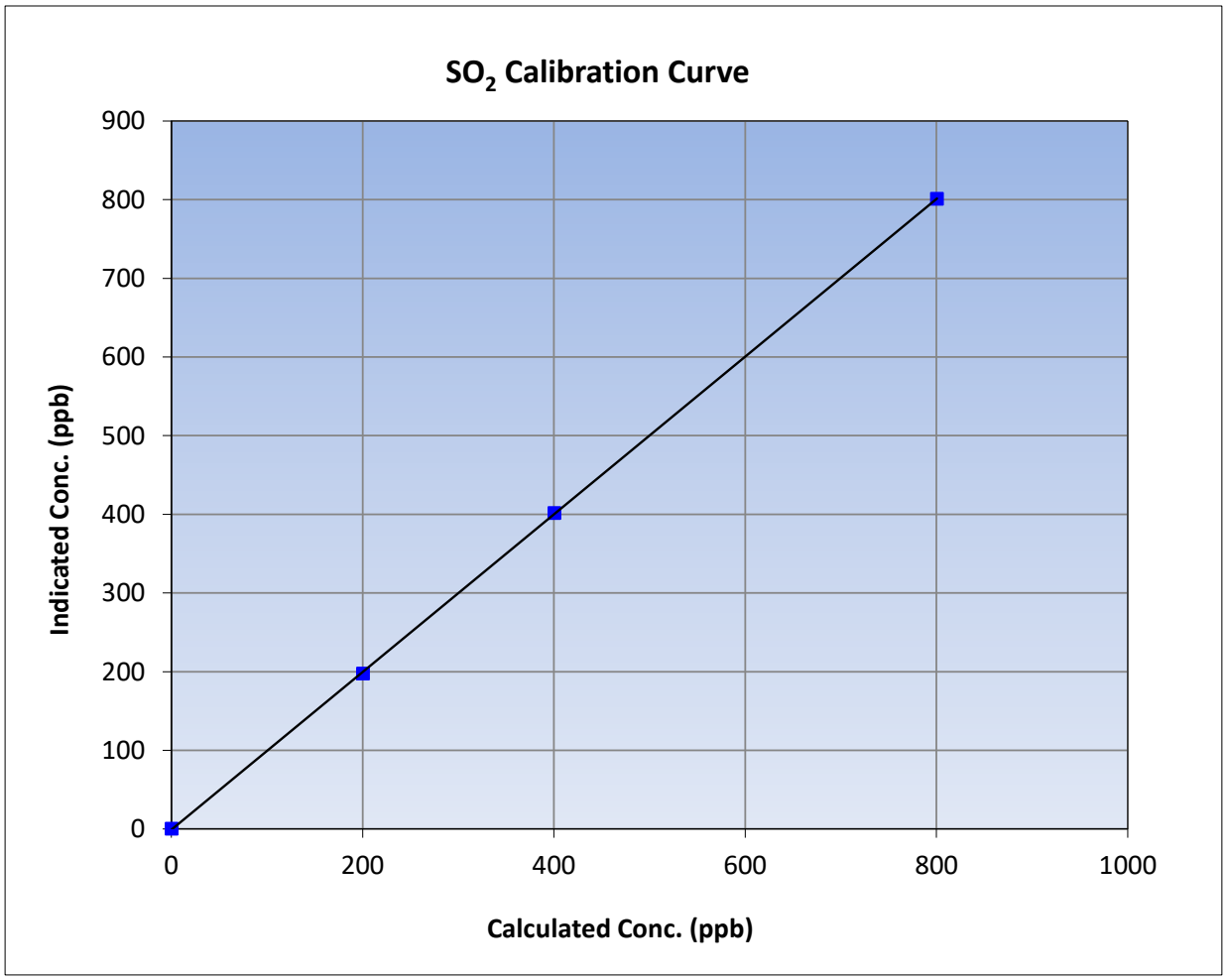
Station Information

Calibration Date:	September 12, 2023	Previous Calibration:	NA
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	12:45	End Time (MST):	14:58
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290011

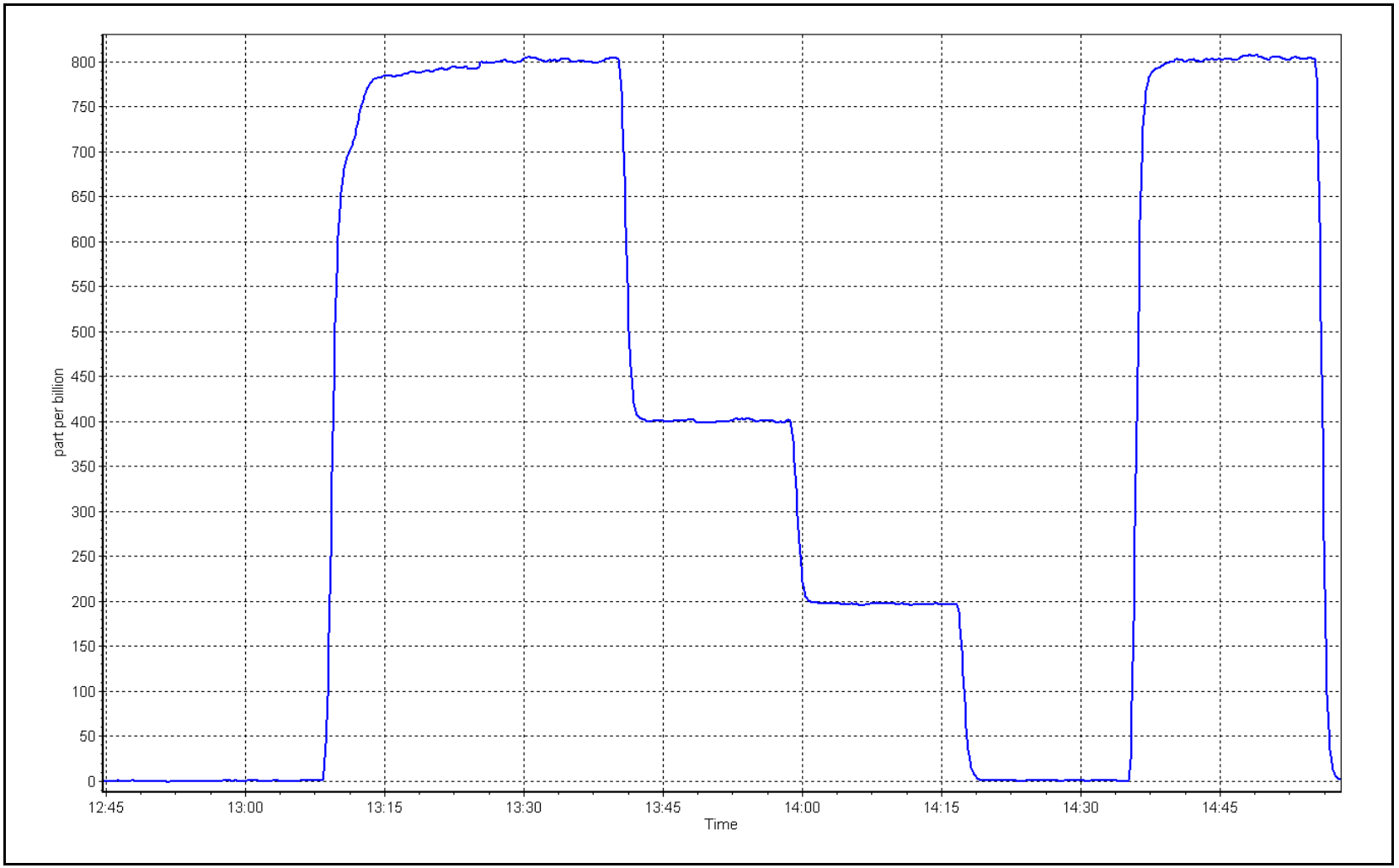
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
800.2	801.0	0.9990
400.2	401.4	0.9969
200.1	197.2	1.0145

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999976	*≥0.995*
Slope	1.002329	*0.90 - 1.10*
Intercept	-0.996068	*+/-30*



SO2 Calibration Plot Date: September 12, 2023 Location: Leismer



Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Leismer	Station number:	AMS501
Calibration Date:	October 18, 2023	Last Cal Date:	September 12, 2023
Start time (MST):	9:01	End time (MST):	11:58
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:	1.002329	1.004314	Backgd or Offset:	17.9	19.1
Calibration intercept:	-0.996068	-1.416108	Coeff or Slope:	0.956	0.960

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.8	----
as found span	4921	79.2	800.2	796.0	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.3	----
high point	4921	79.2	800.2	802.1	0.998
second point	4960	39.6	400.2	402.0	0.995
third point	4980	19.8	200.1	197.0	1.016
as left zero	5000	0.0	0.0	-0.1	----
as left span	4921	79.2	800.2	805.8	0.993
				Average Correction Factor	1.003

Baseline Corr As found:	795.20	Previous response	801.07	*% change	-0.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

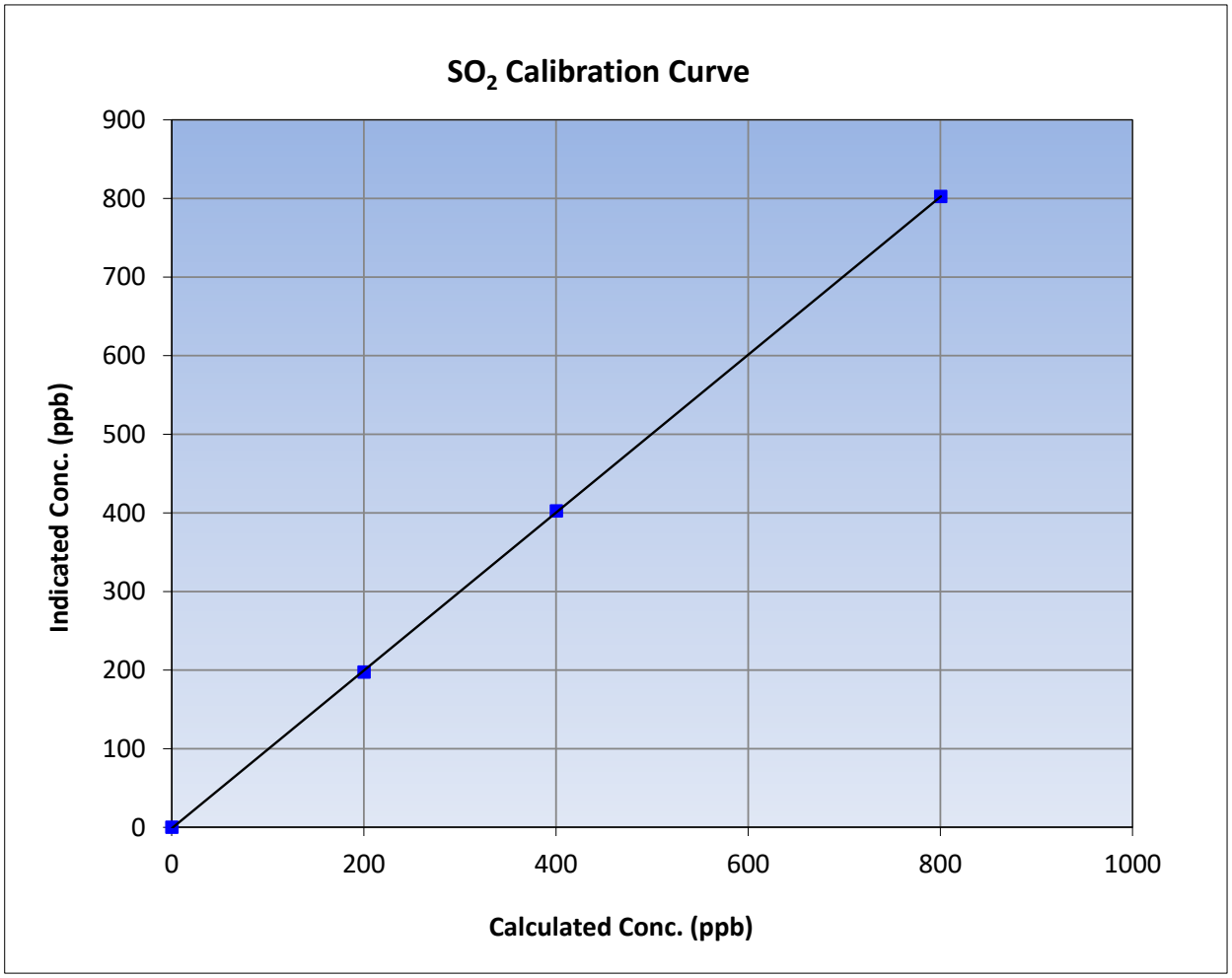
Version-01-2020

Station Information

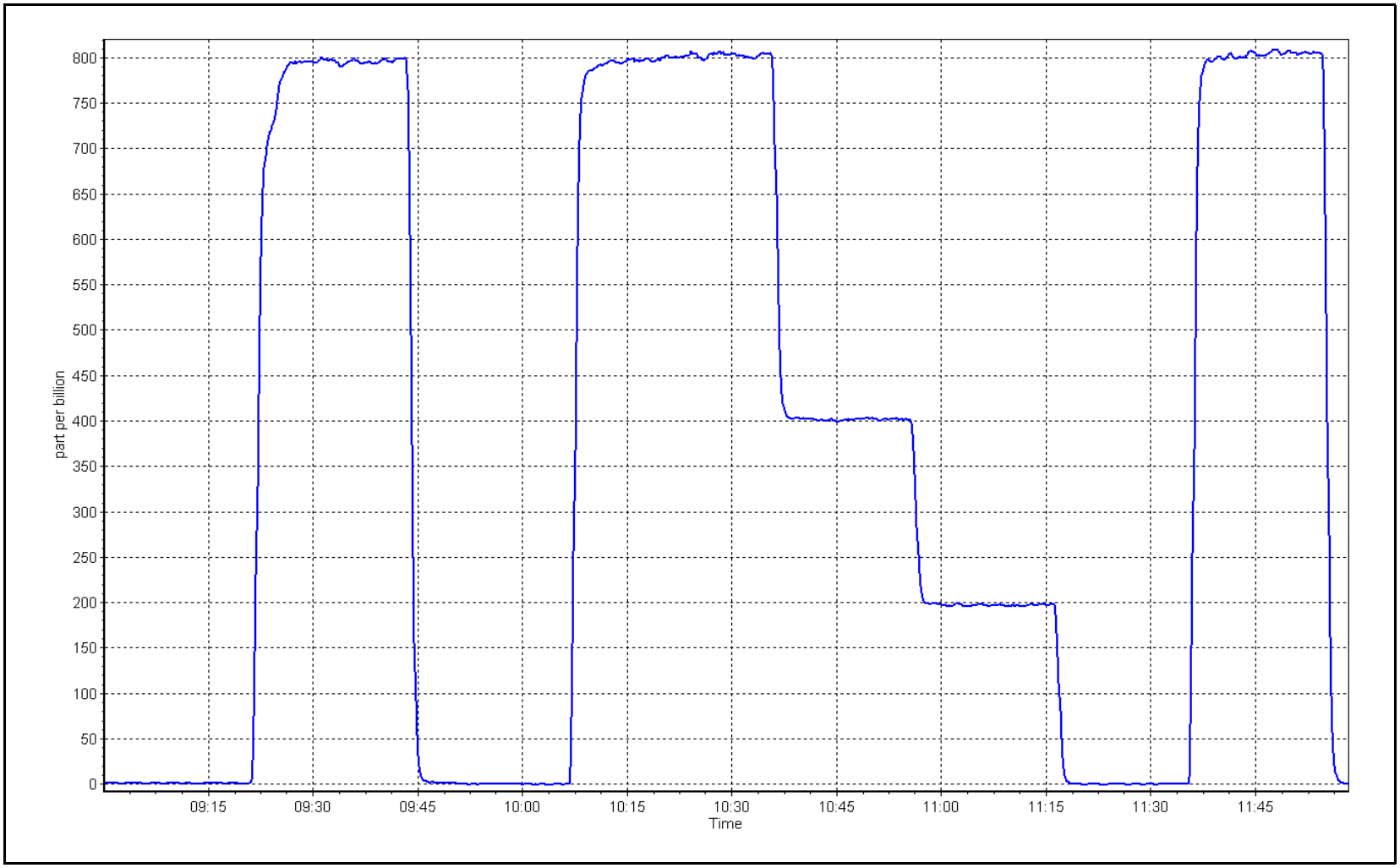
Calibration Date:	October 18, 2023	Previous Calibration:	September 12, 2023
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	9:01	End Time (MST):	11:58
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290011

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.3	----	Correlation Coefficient	0.999972	*≥0.995*
800.2	802.1	0.9976			
400.2	402.0	0.9954	Slope	1.004314	*0.90 - 1.10*
200.1	197.0	1.0156			
			Intercept	-1.416108	*+/-30*



SO2 Calibration Plot Date: October 18, 2023 Location: Leismer



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Leismer	Station number:	AMS501
Calibration Date:	September 12, 2023	Last Cal Date:	NA
Start time (MST):	9:51	End time (MST):	12:48
Reason:	Install		

Calibration Standards

Cal Gas Concentration:	5.14	ppm	Cal Gas Exp Date:	September 16, 2024
Cal Gas Cylinder #:	CC511843			
Removed Cal Gas Conc:	5.14	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T750		Serial Number:	282
ZAG Make/Model:	API 751H		Serial Number:	321

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1180540020	
Converter make:	Global G150		Converter serial #:	2022-218	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	NA	1.011146	Backgd or Offset:	NA	3.35
Calibration intercept:	NA	-0.518157	Coeff or Slope:	NA	1.066

H_2S As Found Data

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

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.5	----
high point	4922	77.8	80.0	80.3	0.996
second point	4961	38.9	40.0	40.1	0.997
third point	4981	19.4	19.9	19.5	1.023
as left zero	5000	0.0	0.0	-0.3	----
as left span	4922	77.8	80.0	80.9	0.989
SO2 Scrubber Check	4921	79.2	792.0	0.0	----
Date of last scrubber change:		24-Feb-23		Ave Corr Factor	1.005
Date of last converter efficiency test:		December 1, 2022			efficiency

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

* = > +/-5% change initiates investigation

Notes: Install Calibration.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

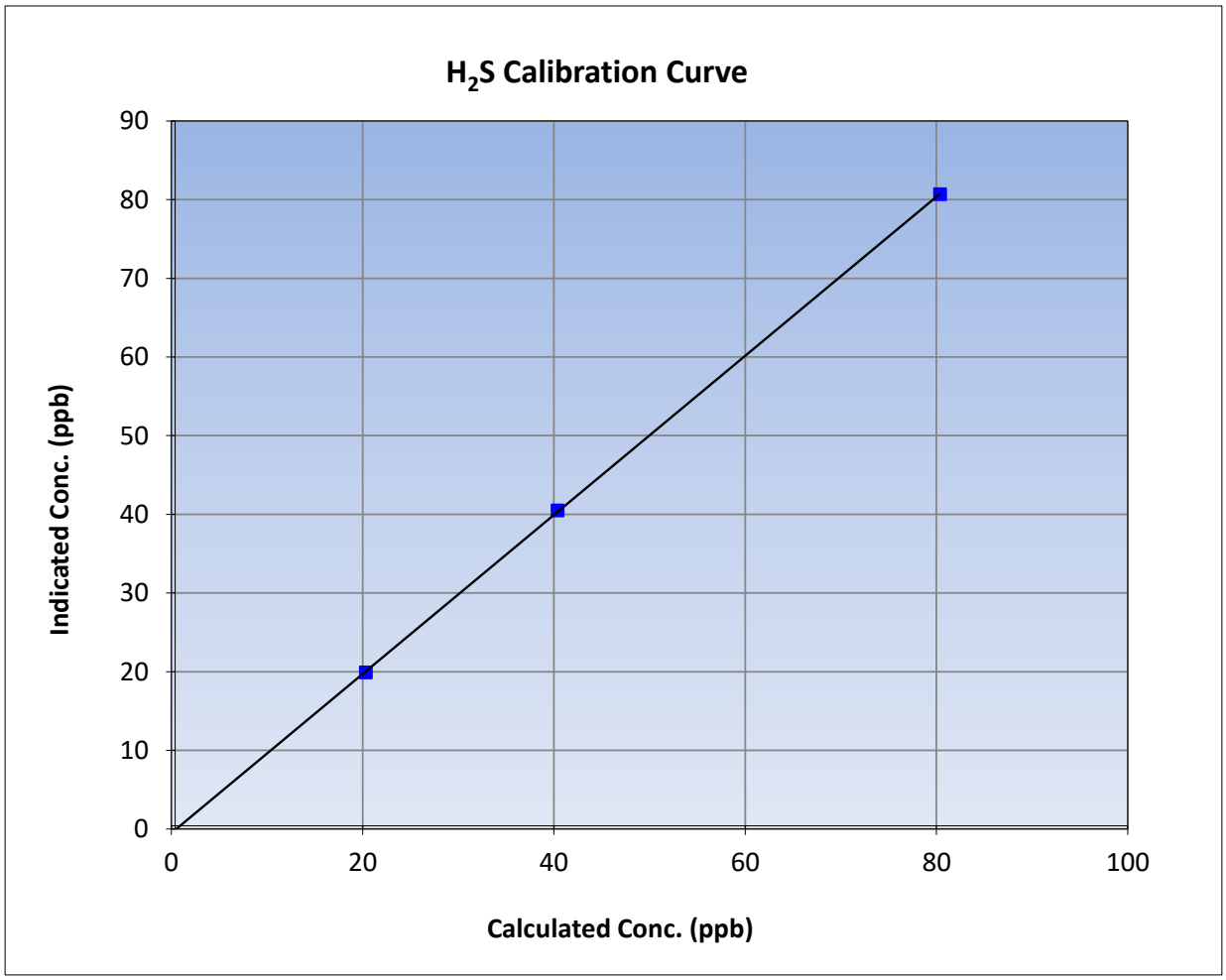
Station Information

Calibration Date:	September 12, 2023	Previous Calibration:	NA
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	9:51	End Time (MST):	12:48
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1180540020

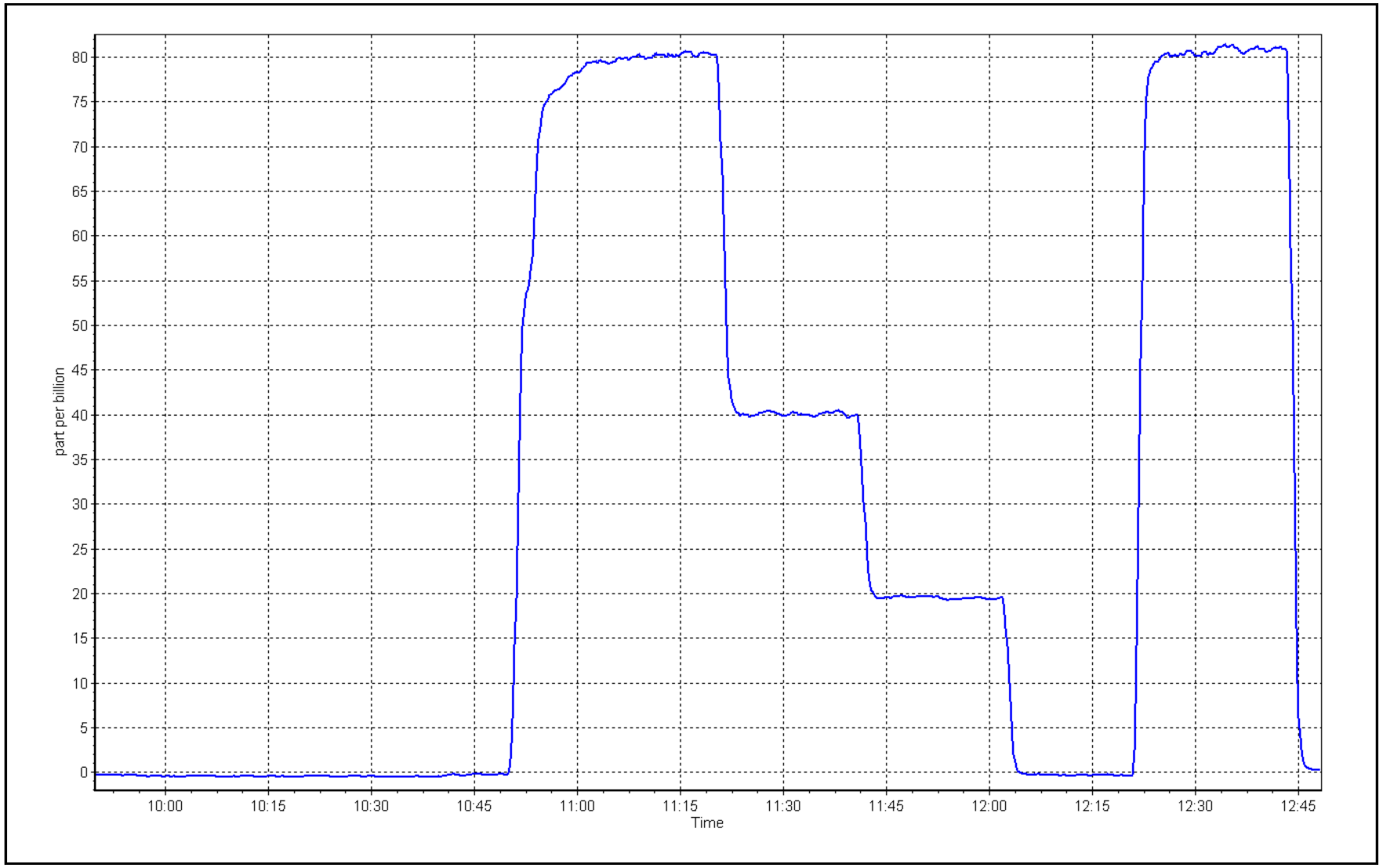
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.5	----
80.0	80.3	0.9960
40.0	40.1	0.9973
19.9	19.5	1.0226

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999984	*≥0.995*
Slope	1.011146	*0.90 - 1.10*
Intercept	-0.518157	*+/-3*



H_2S Calibration Plot Date: September 12, 2023 Location: Leismer



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Leismer	Station number:	AMS501
Calibration Date:	October 17, 2023	Last Cal Date:	September 12, 2023
Start time (MST):	9:06	End time (MST):	13:19
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:	1.011146	1.006859	Backgd or Offset:	3.41	3.41
Calibration intercept:	-0.518157	-0.318205	Coeff or Slope:	1.066	1.082

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.3	----
as found span	4922	77.8	80.0	78.8	1.011
as found 2nd point	4961	38.9	40.0	39.3	1.010
as found 3rd point	4981	19.4	19.9	19.2	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	-0.3	----
high point	4922	77.8	80.0	80.2	0.997
second point	4961	38.9	40.0	40.0	1.000
third point	4981	19.4	19.9	19.7	1.012
as left zero	5000	0.0	0.0	-0.2	----
as left span	4922	77.8	80.0	80.1	0.999
SO2 Scrubber Check	4921	79.2	792.0	0.1	----
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:	79.1	Prev response:	80.35	*% change:	-1.6%
Baseline Corr 2nd AF pt:	39.6	AF Slope:	0.990003	AF Intercept:	-0.378626
Baseline Corr 3rd AF pt:	19.5	AF Correlation:	0.999988		

* = > +/-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

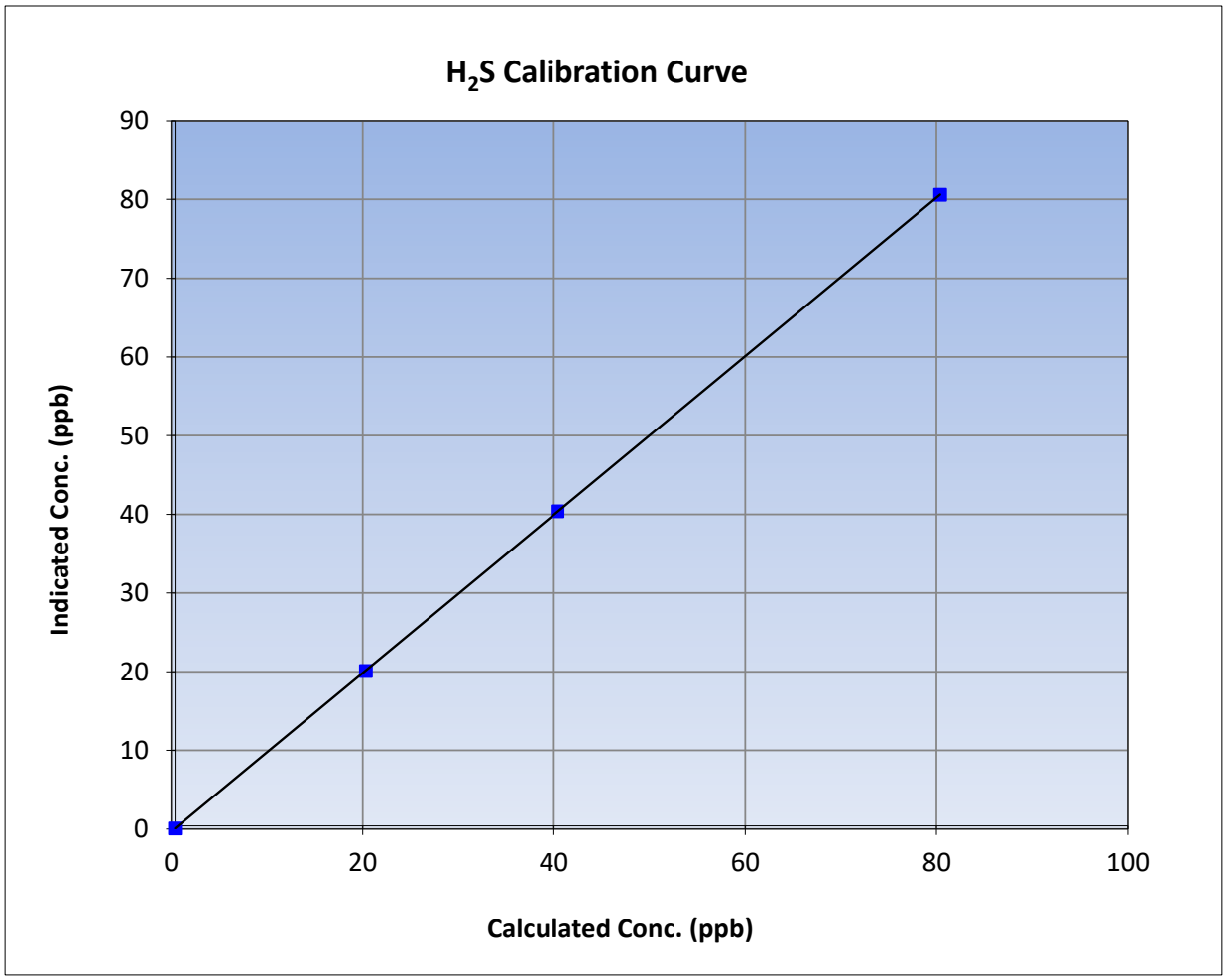
Station Information

Calibration Date:	October 17, 2023	Previous Calibration:	September 12, 2023
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	9:06	End Time (MST):	13:19
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1180540020

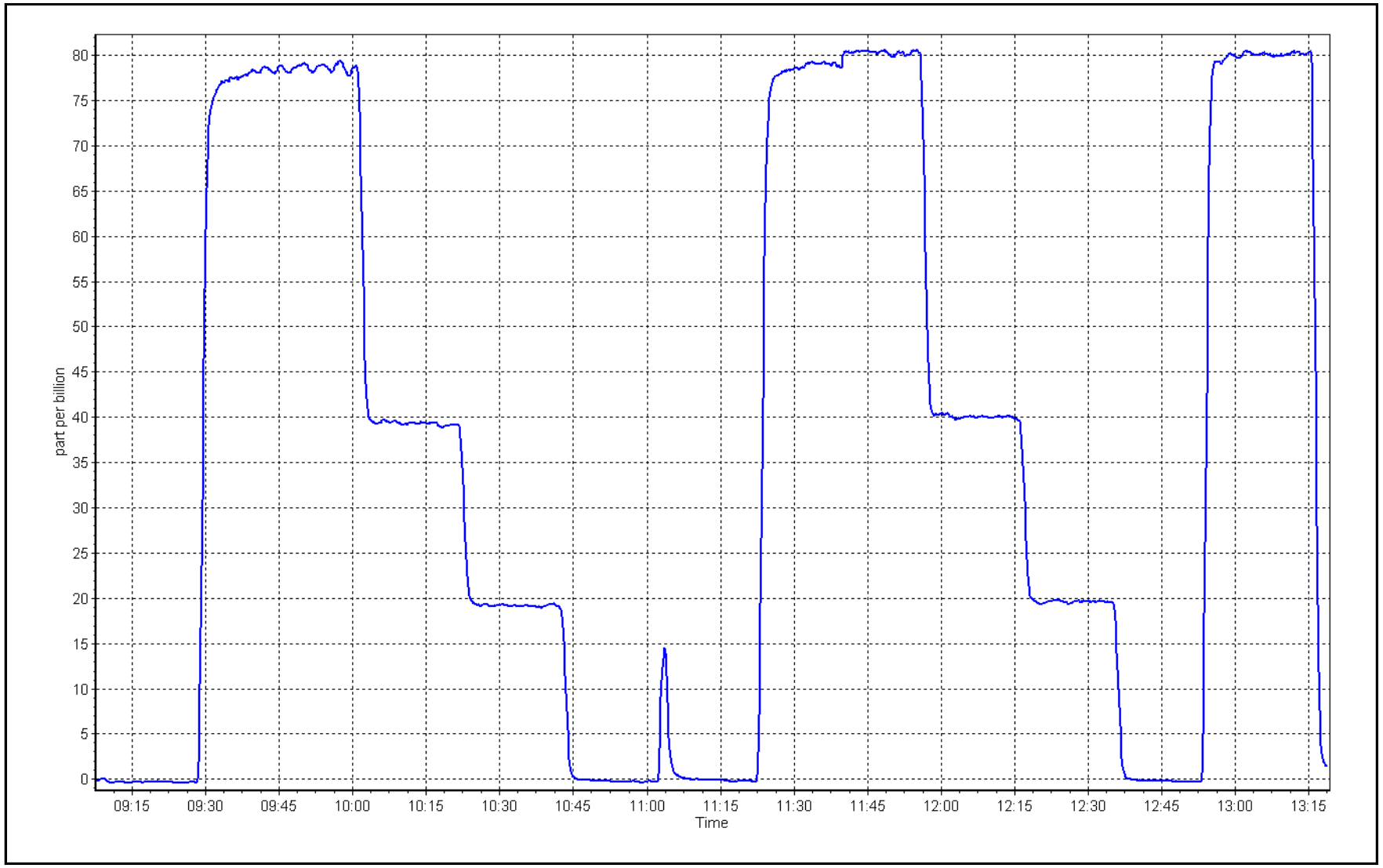
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
80.0	80.2	0.9973
40.0	40.0	0.9997
19.9	19.7	1.0123

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.006859	*0.90 - 1.10*
Intercept	-0.318205	*+/-3*



H_2S Calibration Plot Date: October 17, 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:	September 14, 2023	Last Cal Date:	NA
Start time (MST):	9:13	End time (MST):	13:15
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:	NA	1.408	NO bkgnd or offset:	NA	4.6
NOX coeff or slope:	NA	0.991	NOX bkgnd or offset:	NA	4.9
NO2 coeff or slope:	NA	1.000	Reaction cell Press:	NA	169.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	NA	0.999520
NO_X Cal Offset:	NA	-0.528014
NO Cal Slope:	NA	1.000654
NO Cal Offset:	NA	-1.507988
NO_2 Cal Slope:	NA	0.991533
NO_2 Cal Offset:	NA	0.027894

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero										
as found span										
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.2	-0.2	----	----
high point	4916	84.4	801.1	799.9	1.2	799.8	799.1	0.8	1.0016	1.0010
second point	4958	42.2	400.5	400.0	0.6	401.0	399.4	1.6	0.9989	1.0014
third point	4979	21.1	200.3	200.0	0.3	198.7	196.4	2.3	1.0079	1.0182
as left zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.4	-0.2	----	----
as left span	4916	84.4	801.1	403.8	397.3	807.3	409.0	398.4	0.9923	0.9872
								Average Correction Factor	1.0028	1.0069

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)	804.7	408.6	397.3	393.9	1.0086	99.1%
2nd GPT point (200 ppb O3)	804.7	606.0	199.9	198.1	1.0090	99.1%
3rd GPT point (100 ppb O3)	804.7	699.6	106.3	105.8	1.0046	99.5%
				Average Correction Factor	1.0074	99.3%

Notes: Install calibration. Adjusted span. Used 2nd NO reference point due to drift. Accidentally powered off the router that cause the communication drop shown in the graph.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

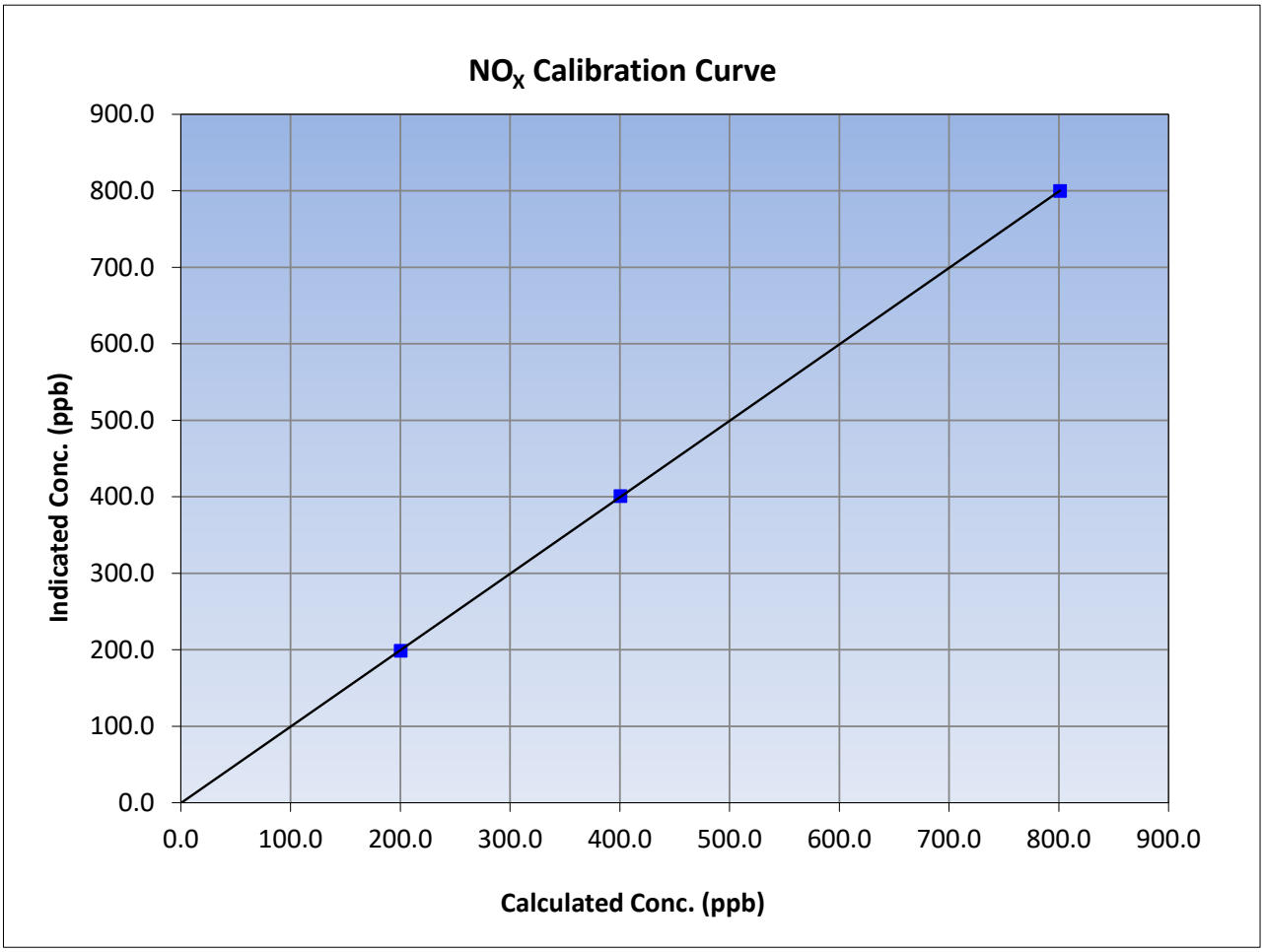
Version-04-2020

Station Information

Calibration Date:	September 14, 2023	Previous Calibration:	NA
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	9:13	End Time (MST):	13:15
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	-0.4	----	Correlation Coefficient	0.999993	≥0.995
801.1	799.8	1.0016			
400.5	401.0	0.9989	Slope	0.999520	0.90 - 1.10
200.3	198.7	1.0079			
			Intercept	-0.528014	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

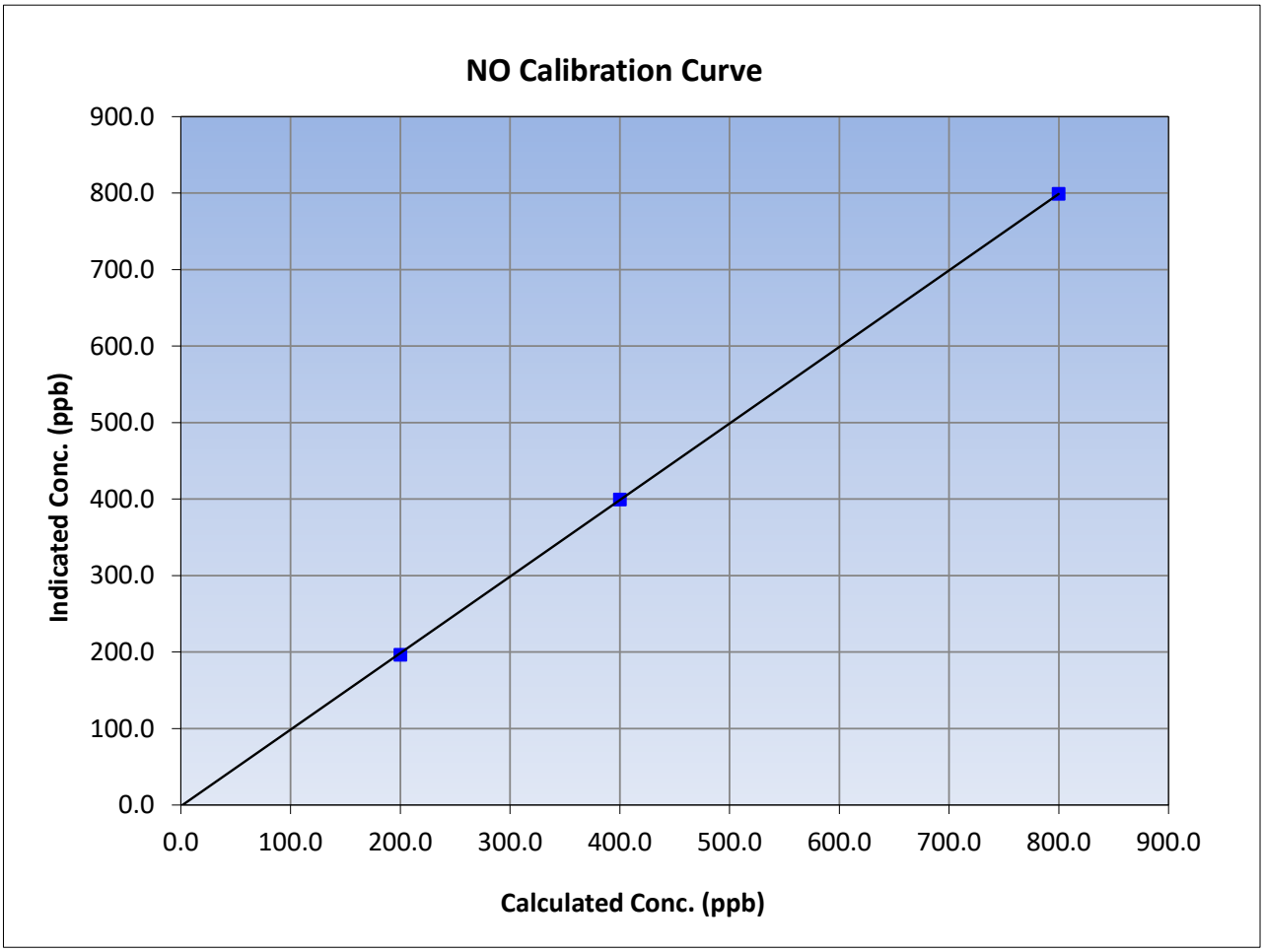
Version-04-2020

Station Information

Calibration Date:	September 14, 2023	Previous Calibration:	NA
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	9:13	End Time (MST):	13:15
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999980	≥0.995
799.9	799.1	1.0010			
400.0	399.4	1.0014	Slope	1.000654	0.90 - 1.10
200.0	196.4	1.0182			
			Intercept	-1.507988	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

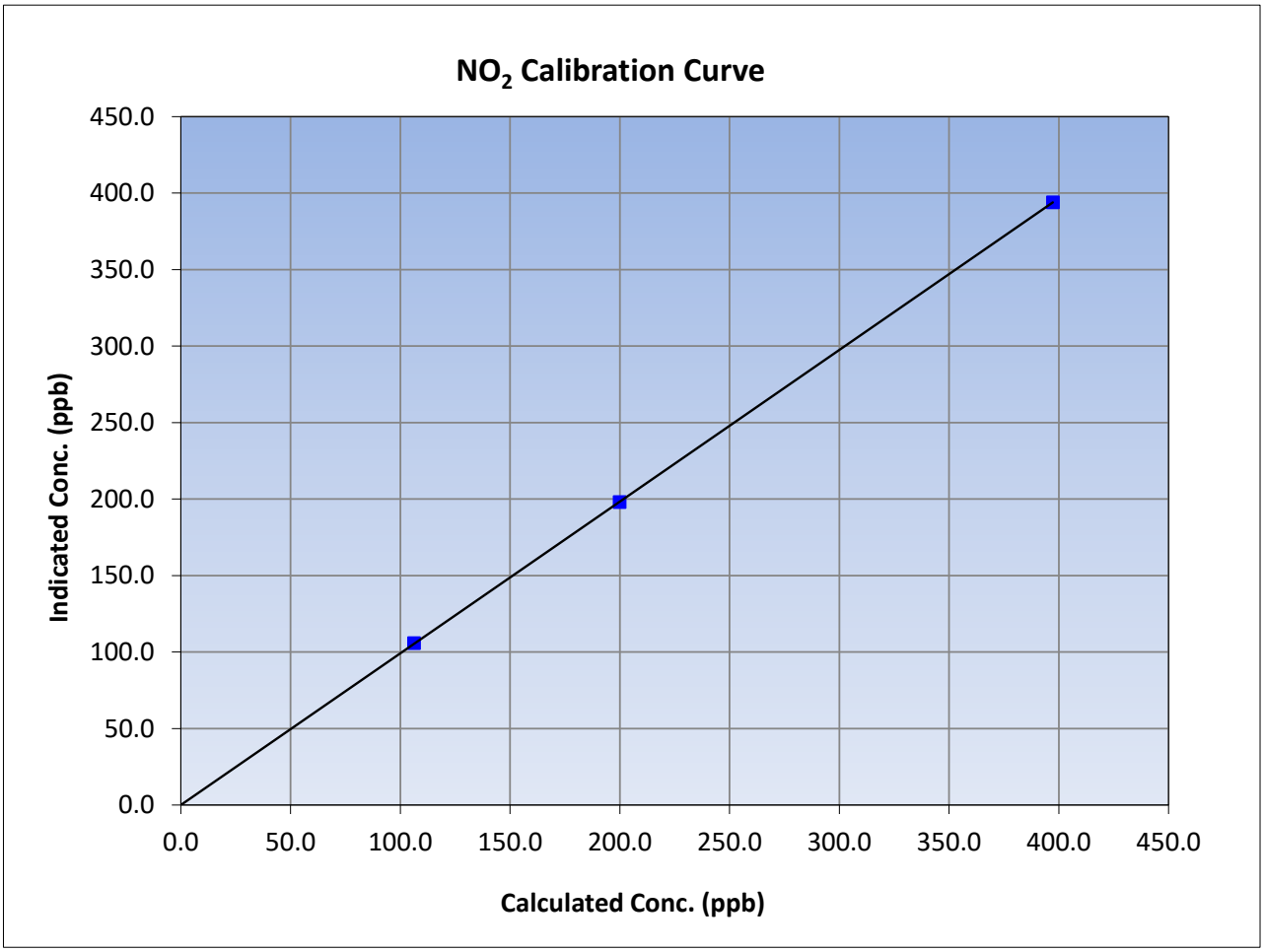
Version-04-2020

Station Information

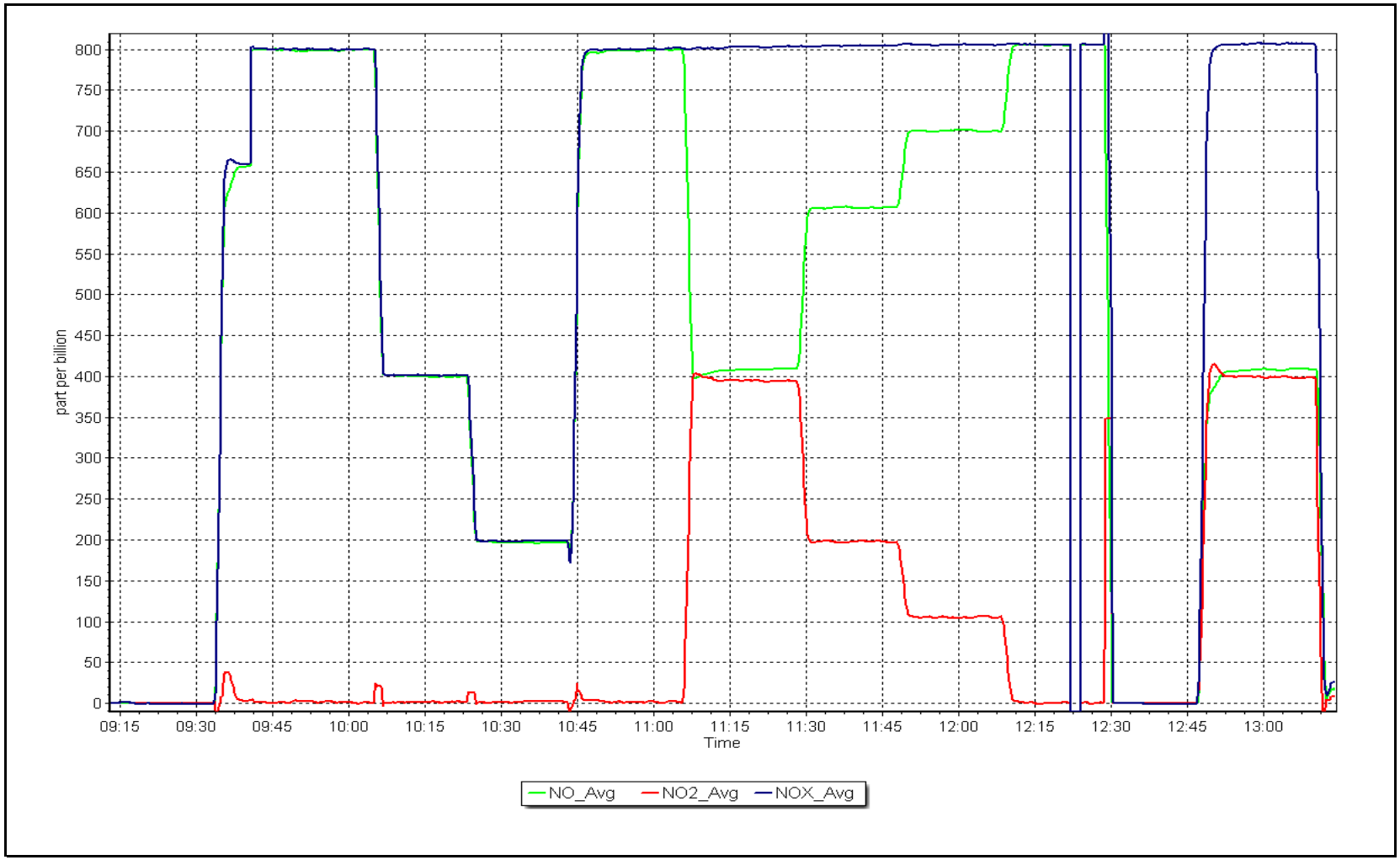
Calibration Date:	September 14, 2023	Previous Calibration:	NA
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	9:13	End Time (MST):	13:15
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999997	≥0.995
397.3	393.9	1.0086			
199.9	198.1	1.0090	Slope	0.991533	0.90 - 1.10
106.3	105.8	1.0046			
			Intercept	0.027894	+/-20



NO_x Calibration Plot Date: September 14, 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:	October 26, 2023	Last Cal Date:	September 14, 2023
Start time (MST):	8:43	End time (MST):	14:30
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:	1.408	1.301	NO bkgnd or offset:	4.6	3.9
NOX coeff or slope:	0.991	0.995	NOX bkgnd or offset:	4.9	4.1
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	169.5	169.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999520	1.009935
NO_X Cal Offset:	-0.528014	-4.483299
NO Cal Slope:	1.000654	1.007430
NO Cal Offset:	-1.507988	-5.190972
NO_2 Cal Slope:	0.991533	1.006440
NO_2 Cal Offset:	0.027894	-0.613191

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	4916	84.4	801.1	799.9	1.2	861.2	857.8	3.5	0.9302	0.9325
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	4870	83.4	799.1	797.9	1.2	805.0	801.4	3.5	0.9926	0.9956
second point	4923	41.8	399.6	399.0	0.6	396.0	393.6	2.4	1.0090	1.0137
third point	4947	20.6	196.8	196.5	0.3	190.5	188.0	2.5	1.0331	1.0453
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
as left span	4870	83.4	799.1	400.4	398.7	797.7	403.0	394.7	1.0017	0.9936
								Average Correction Factor	1.0116	1.0182

Corrected As found	NO_X = 862.0 ppb	NO = 858.5 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	7.2%
Previous Response	NO_X = 800.1 ppb	NO = 798.9 ppb		*Percent Change	NO =	6.9%
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)	797.7	400.2	398.7	400.7	0.9950	100.5%
2nd GPT point (200 ppb O3)	797.7	600.2	198.7	199.7	0.9949	100.5%
3rd GPT point (100 ppb O3)	797.7	694.8	104.1	103.2	1.0085	99.2%
				Average Correction Factor	0.9995	100.1%

Notes: Changed inlet filter after as founds. Adjusted zero and span. 3rd point was failing, used the Dilution and Source flows from the flow meters (Alicat).

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

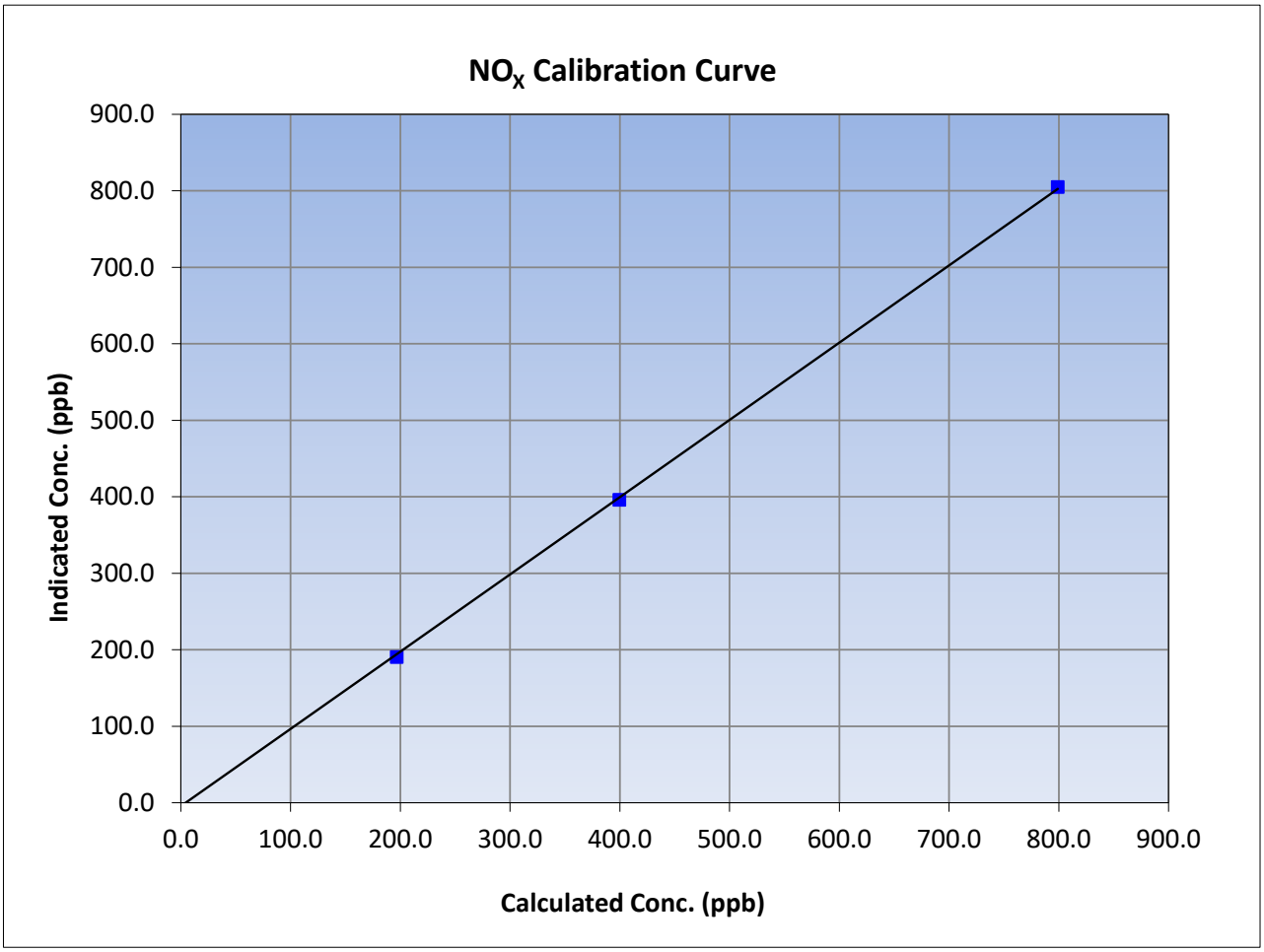
Version-04-2020

Station Information

Calibration Date:	October 26, 2023	Previous Calibration:	September 14, 2023
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	8:43	End Time (MST):	14:30
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999863	≥0.995
799.1	805.0	0.9926			
399.6	396.0	1.0090	Slope	1.009935	0.90 - 1.10
196.8	190.5	1.0331			
			Intercept	-4.483299	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

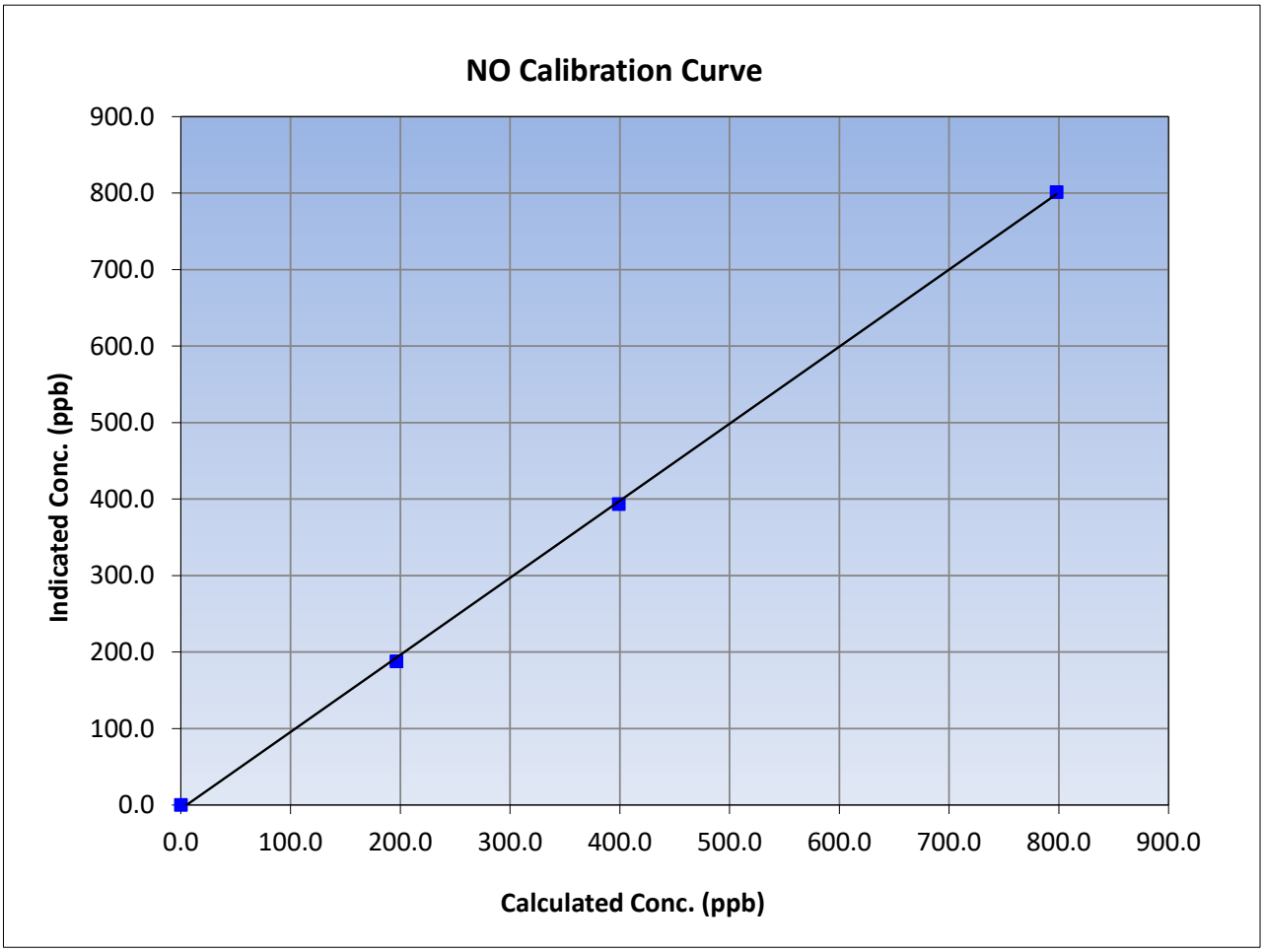
Version-04-2020

Station Information

Calibration Date:	October 26, 2023	Previous Calibration:	September 14, 2023
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	8:43	End Time (MST):	14:30
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999809	≥0.995
797.9	801.4	0.9956			
399.0	393.6	1.0137	Slope	1.007430	0.90 - 1.10
196.5	188.0	1.0453			
			Intercept	-5.190972	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

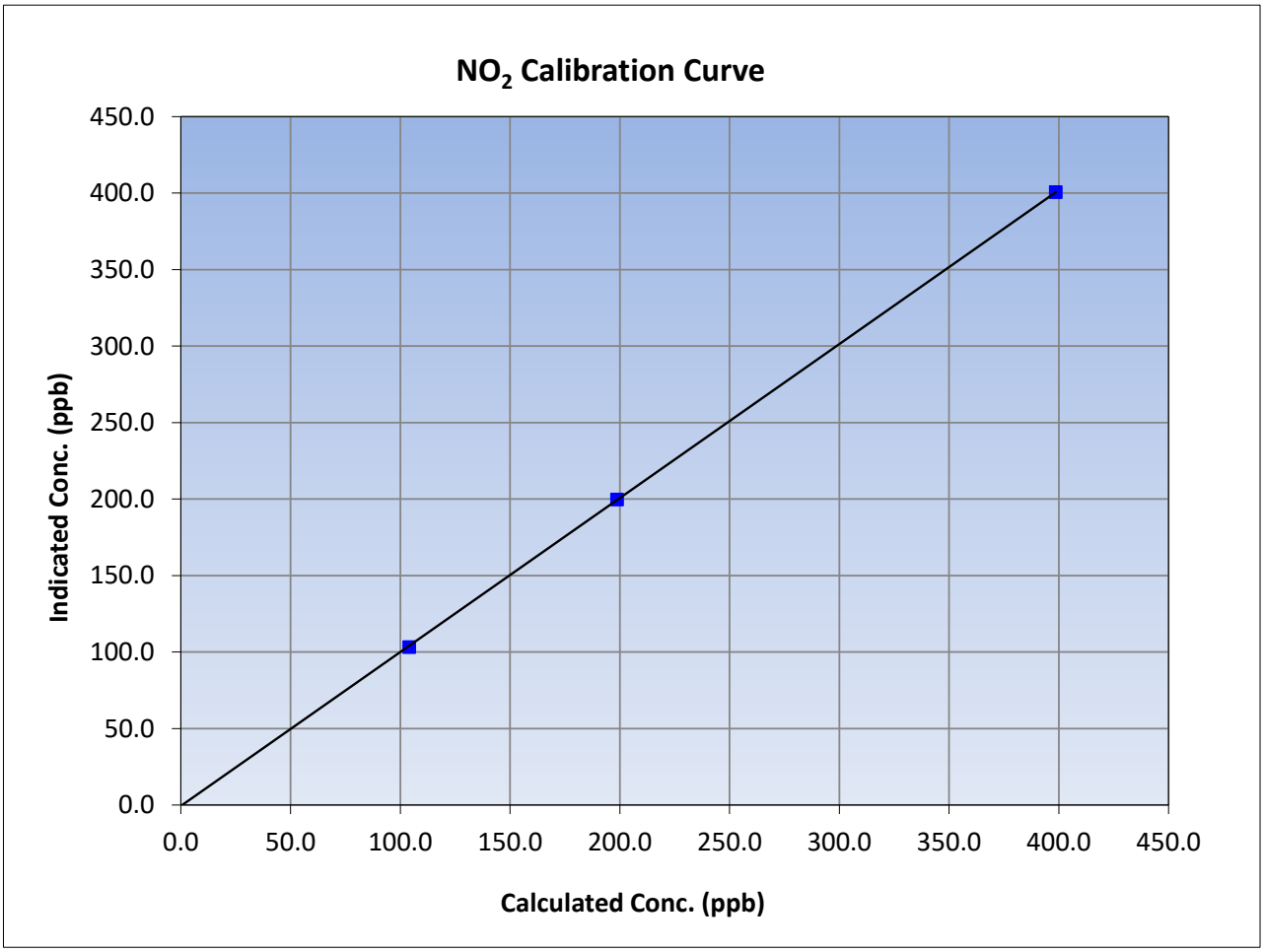
Version-04-2020

Station Information

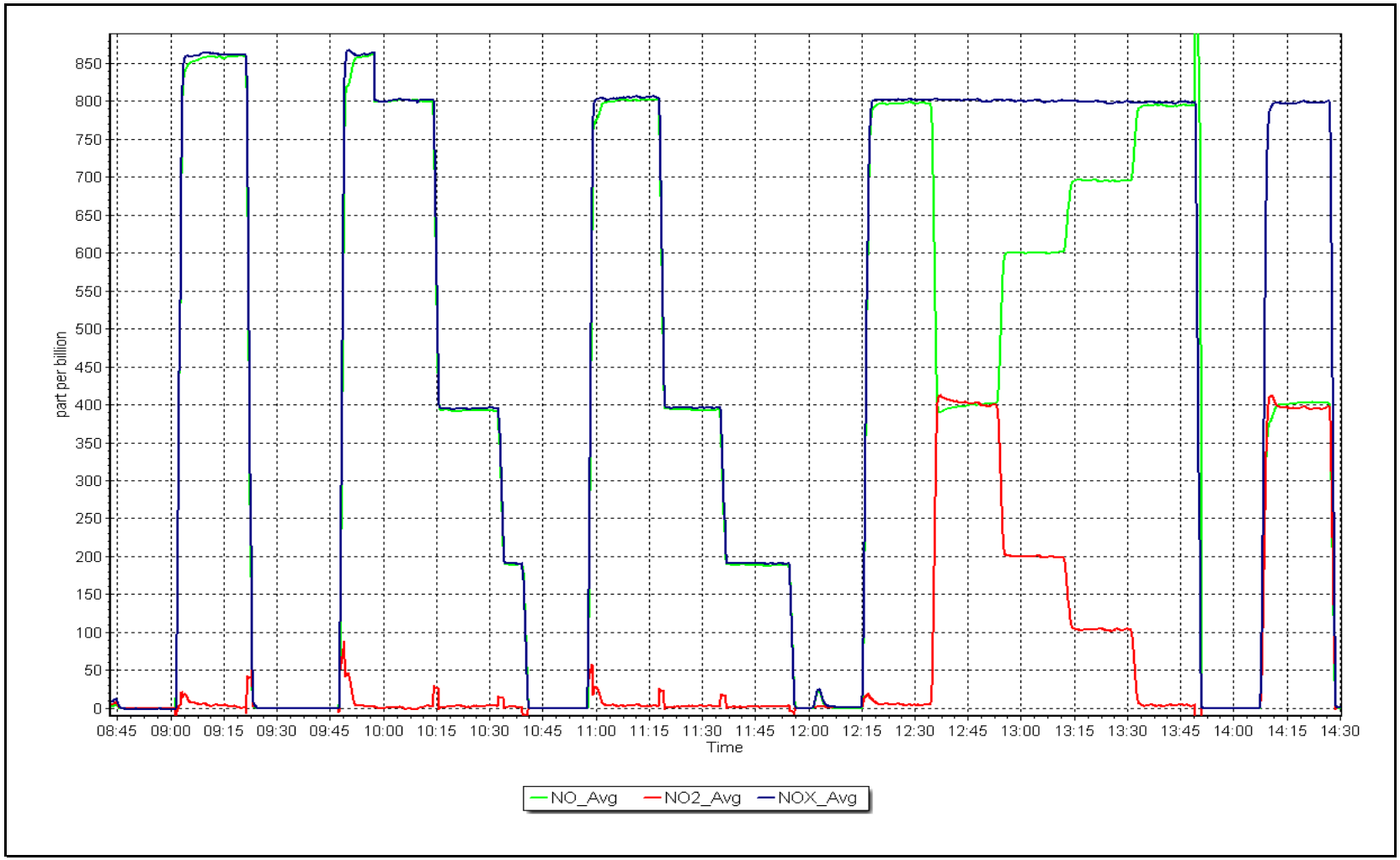
Calibration Date:	October 26, 2023	Previous Calibration:	September 14, 2023
Station Name:	Leismer	Station Number:	AMS501
Start Time (MST):	8:43	End Time (MST):	14:30
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999985	≥0.995
398.7	400.7	0.9950			
198.7	199.7	0.9949	Slope	1.006440	0.90 - 1.10
104.1	103.2	1.0085			
			Intercept	-0.613191	+/-20



NO_X Calibration Plot Date: October 26, 2023 Location: Leismer



Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Leismer	Station Number:	AMS 501
Calibration Date:	September 11, 2023	Prev Cal Date:	N/A
Start Time (MST):	11:45	End Time (MST):	12:45
Tower Height (m):	9.8	Reason:	Install

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	Y18362
WS Calibrator:	MetOne 053	Serial Number:	CA 03845

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

	Start	***Finish***	*Limits*
Correl Coeff (r^2)		0.999999	*≥0.9995*
Calculated slope		0.998949	*0.90 - 1.10*
Calculated intercept		-0.013169	*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	R14654
As Found Declination (deg east of True North):		As Left Declination (deg east of True North):	14
Solar noon time (MST):	13:22	Calc Declination*:	13.38 Degrees
Deadband calc:	1.0 degrees (*Limit 4 deg*)		* - calculated declination as per NOAA website

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	% Error (based on 357° FS) *Limit = +/- 1.0%*
0	0.3	---
90	88.8	-0.3%
180	182.4	0.7%
270	271.5	0.4%
357	356.3	-0.2%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)		0.999944	*≥0.9995*
Calculated slope		0.999058	*0.90 - 1.10*
Calculated intercept		-0.290512	*+/- 4*

Notes: Install calibrations. Bearings are in good condition, used compass to line up the crossarm.

Calibration Performed By: Sean Bala

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS505
SAWBONES BAY
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Sawbones Bay	Station number:	AMS505
Calibration Date:	October 6, 2023	Last Cal Date:	September 22, 2023
Start time (MST):	8:27	End time (MST):	11:21
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:	1.000437	1.001967	Backgd or Offset:	19.3	20.3
Calibration intercept:	-0.691921	-1.152684	Coeff or Slope:	0.995	0.995

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.2	----
as found span	4922	77.8	799.8	803.9	0.995
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.5	----
high point	4922	77.8	799.8	800.4	0.999
second point	4961	38.9	399.9	399.7	1.001
third point	4981	19.5	200.4	198.7	1.009
as left zero	5000	0.0	0.0	-0.4	----
as left span	4922	77.8	799.8	801.4	0.998
				Average Correction Factor	1.003

Baseline Corr As found:	803.70	Previous response	799.47	*% 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 inlet filter. Adjusted zero.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

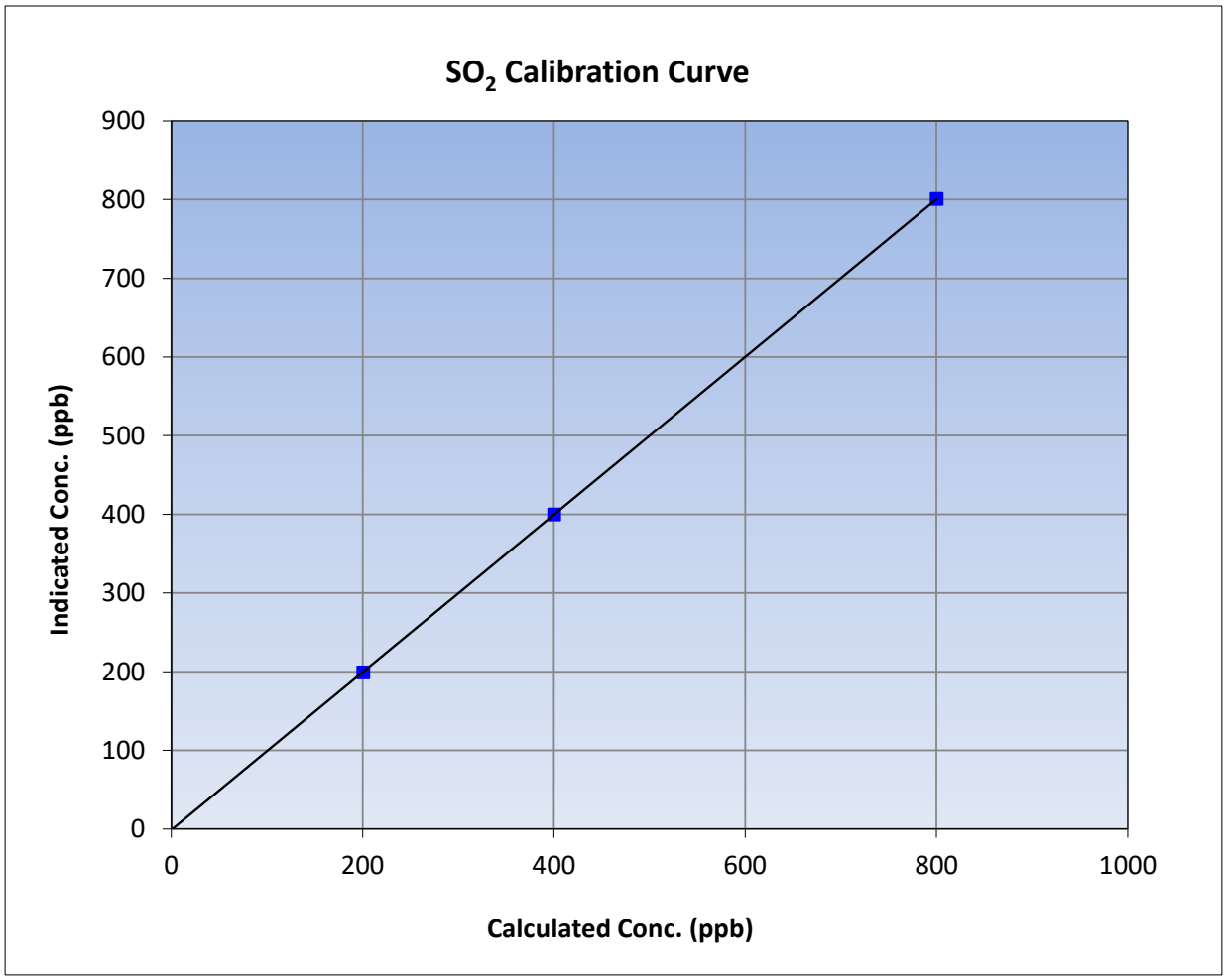
Station Information

Calibration Date:	October 6, 2023	Previous Calibration:	September 22, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:27	End Time (MST):	11:21
Analyzer make:	Thermo 43i	Analyzer serial #:	0710321323

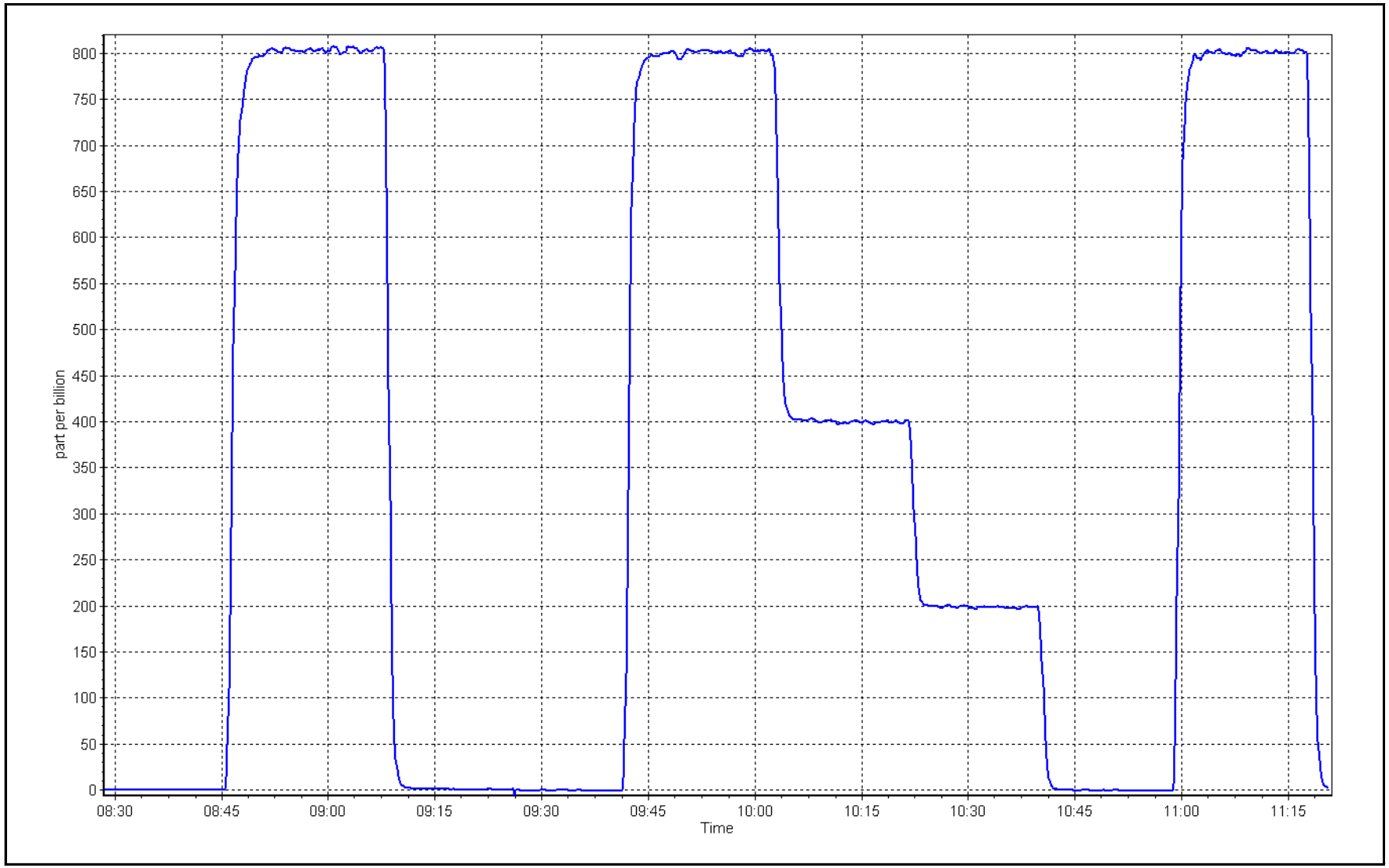
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.5	----
799.8	800.4	0.9993
399.9	399.7	1.0005
200.4	198.7	1.0088

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	1.001967	*0.90 - 1.10*
Intercept	-1.152684	*+/-30*



SO2 Calibration Plot Date: October 6, 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:	October 5, 2023	Last Cal Date:	September 21, 2023
Start time (MST):	8:25	End time (MST):	12:33
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:	1.003503	1.008501	Backgd or Offset:	2.21	2.21
Calibration intercept:	0.081954	0.082063	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	0.0	----
as found span	4922	77.7	80.0	81.6	0.981
as found 2nd point	4961	38.8	40.0	40.2	0.994
as found 3rd point	4981	19.4	20.0	20.1	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	0.1	----
high point	4922	77.7	80.0	80.8	0.991
second point	4961	38.8	40.0	40.4	0.989
third point	4981	19.4	20.0	20.2	0.989
as left zero	5000	0.0	0.0	0.3	----
as left span	4922	77.7	80.0	80.3	0.997
SO2 Scrubber Check	4922	77.8	778.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.990
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.6	Prev response:	80.40	*% change:	1.5%
Baseline Corr 2nd AF pt:	40.2	AF Slope:	1.019929	AF Intercept:	-0.217881
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999944		

* = > +/-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

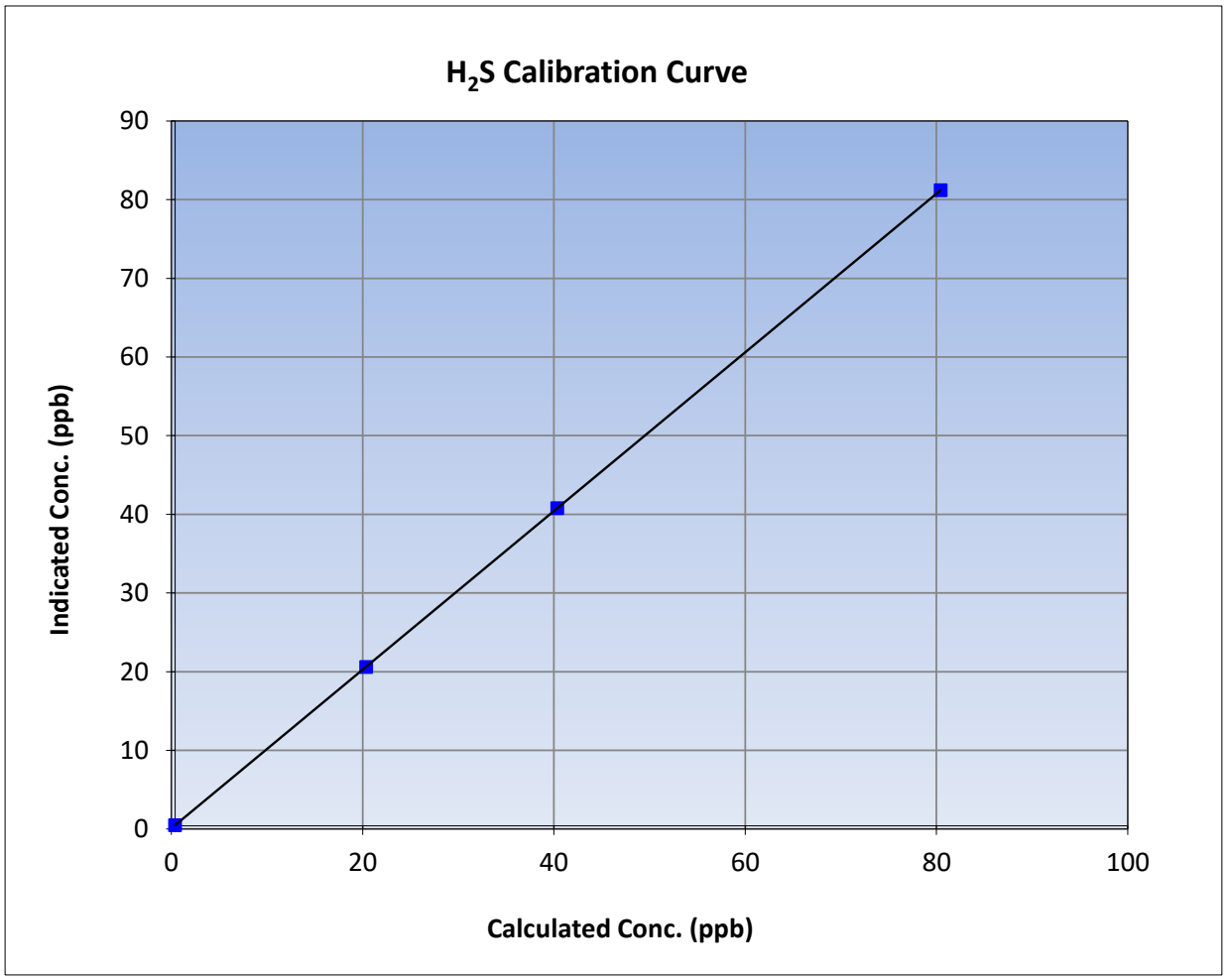
Station Information

Calibration Date:	October 5, 2023	Previous Calibration:	September 21, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:25	End Time (MST):	12:33
Analyzer make:	Thermo 43iQ	Analyzer serial #:	1228021057

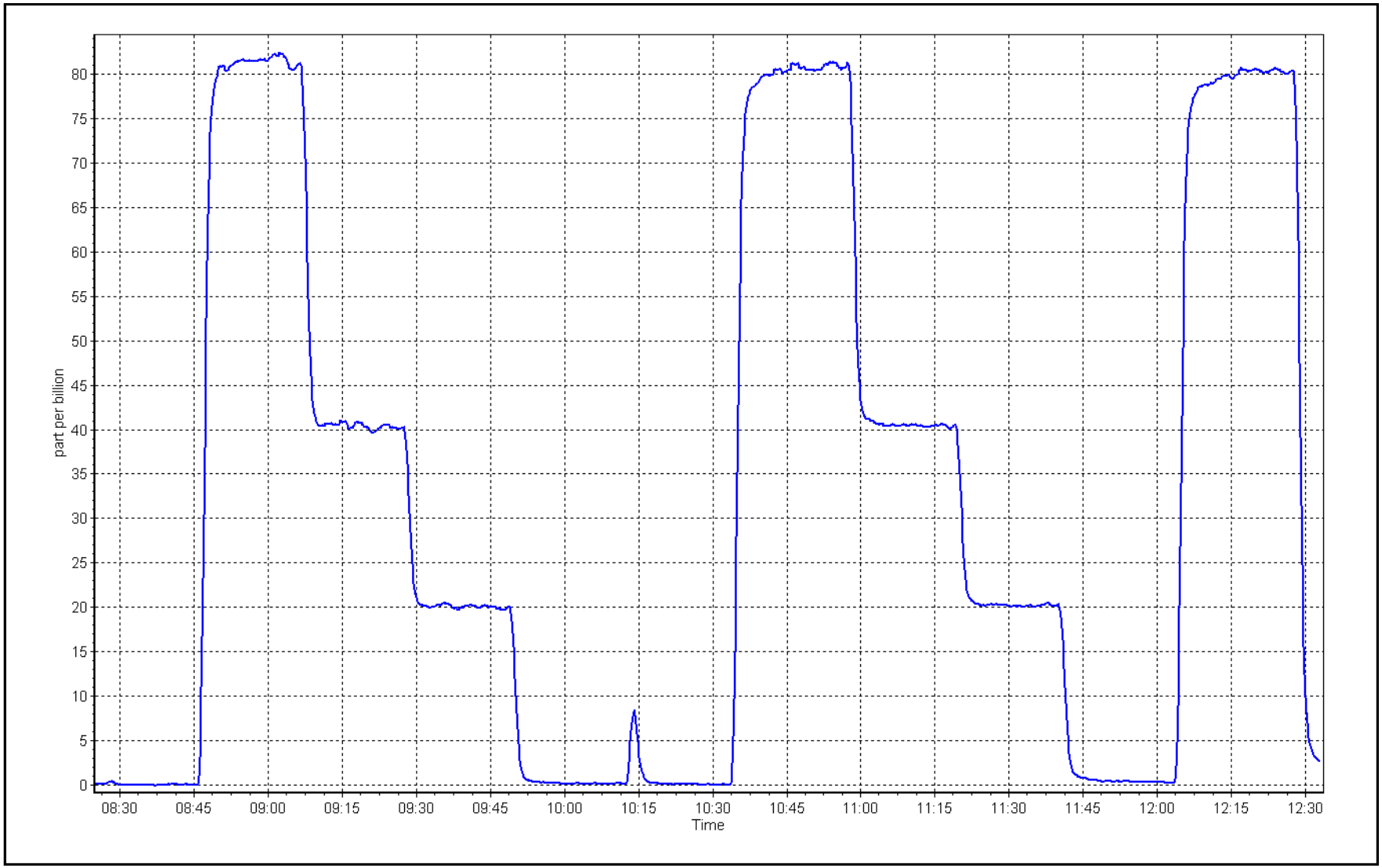
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.8	0.9905
40.0	40.4	0.9892
20.0	20.2	0.9891

Statistical Evaluation		Limits
Correlation Coefficient	1.000000	≥0.995
Slope	1.008501	0.90 - 1.10
Intercept	0.082063	+/-3



H_2S Calibration Plot Date: October 5, 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:	October 4, 2023	Last Cal Date:	September 20, 2023
Start time (MST):	8:35	End time (MST):	12:41
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:	1.055	1.074	NO bkgnd or offset:	0.4	0.4
NOX coeff or slope:	1.052	1.066	NOX bkgnd or offset:	1.3	1.3
NO2 coeff or slope:	NA	NA	Reaction cell Press:	7.8	7.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001507	1.002452
NO_X Cal Offset:	-1.530484	-0.711135
NO Cal Slope:	1.001793	1.005224
NO Cal Offset:	-1.830393	-1.131231
NO_2 Cal Slope:	0.999010	0.995052
NO_2 Cal Offset:	0.464663	-1.022252

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	1.1	-0.3	1.5	----	----
as found span	4917	83.4	799.6	799.6	0.0	786.2	781.5	4.6	1.0170	1.0231
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1	----	----
high point	4917	83.4	799.6	799.6	0.0	801.0	802.8	-1.7	0.9982	0.9960
second point	4958	41.7	399.8	399.8	0.0	400.1	401.3	-1.1	0.9994	0.9964
third point	4979	20.9	200.4	200.4	0.0	199.5	198.6	0.8	1.0045	1.0090
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	352.0	447.7	800.8	358.9	441.8	0.9987	0.9809
								Average Correction Factor	1.0007	1.0005

Corrected As found	NO_X = 785.1 ppb	NO = 781.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -1.8%		
Previous Response	NO_X = 799.2 ppb	NO = 799.2 ppb		*Percent Change	NO = -2.2%		
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	804.3	356.6	447.7	445.0	1.0061	99.4%
2nd GPT point (200 ppb O3)	804.3	549.9	254.4	251.9	1.0099	99.0%
3rd GPT point (100 ppb O3)	804.3	655.3	149.0	146.0	1.0205	98.0%
				Average Correction Factor	1.0122	98.8%

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

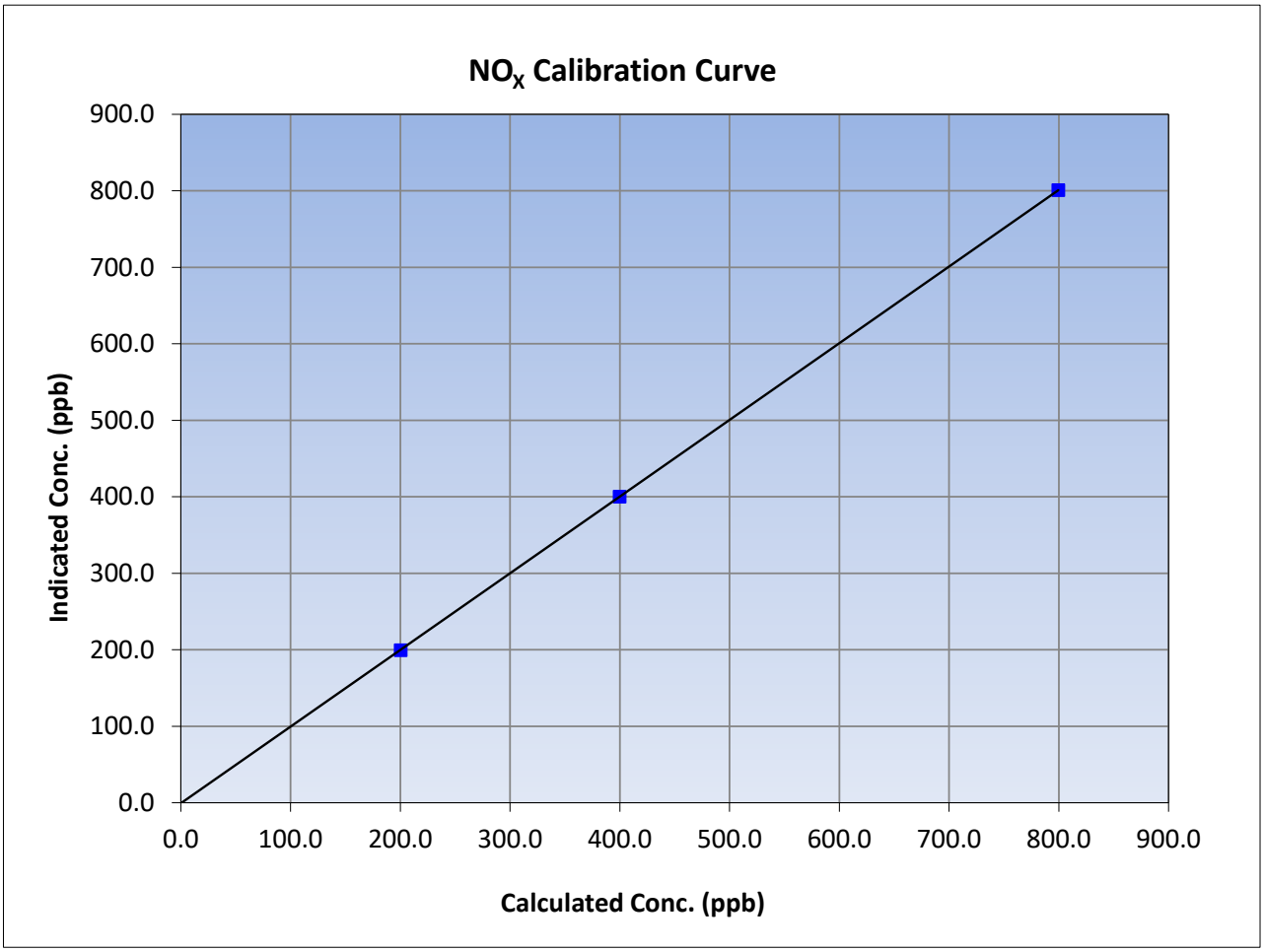
Version-04-2020

Station Information

Calibration Date:	October 4, 2023	Previous Calibration:	September 20, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:35	End Time (MST):	12:41
Analyzer make:	API T200	Analyzer serial #:	4260

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999998	≥0.995
799.6	801.0	0.9982			
399.8	400.1	0.9994	Slope	1.002452	0.90 - 1.10
200.4	199.5	1.0045			
			Intercept	-0.711135	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

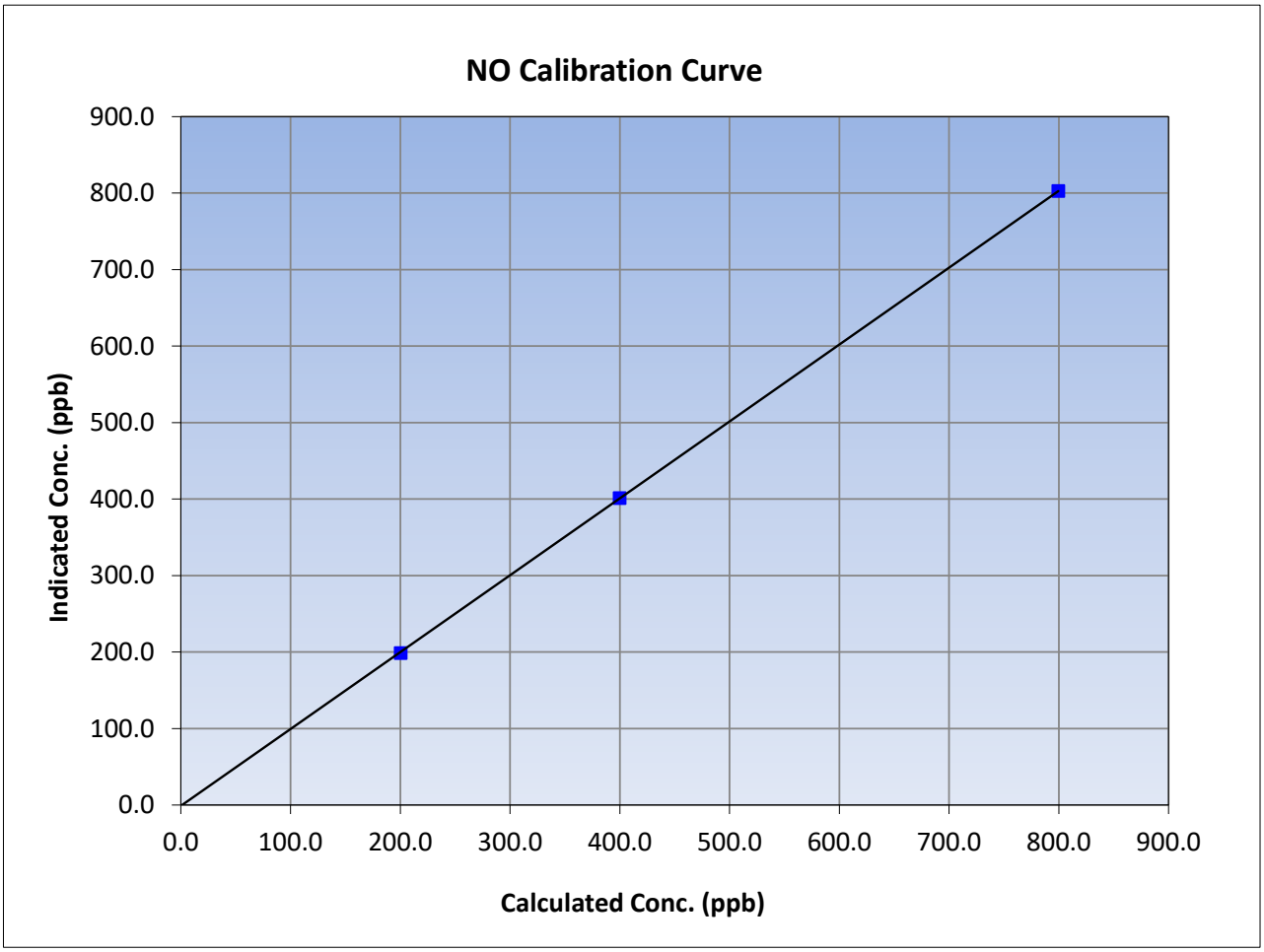
Version-04-2020

Station Information

Calibration Date:	October 4, 2023	Previous Calibration:	September 20, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:35	End Time (MST):	12:41
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	0.999988	≥0.995
799.6	802.8	0.9960			
399.8	401.3	0.9964	Slope	1.005224	0.90 - 1.10
200.4	198.6	1.0090			
			Intercept	-1.131231	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

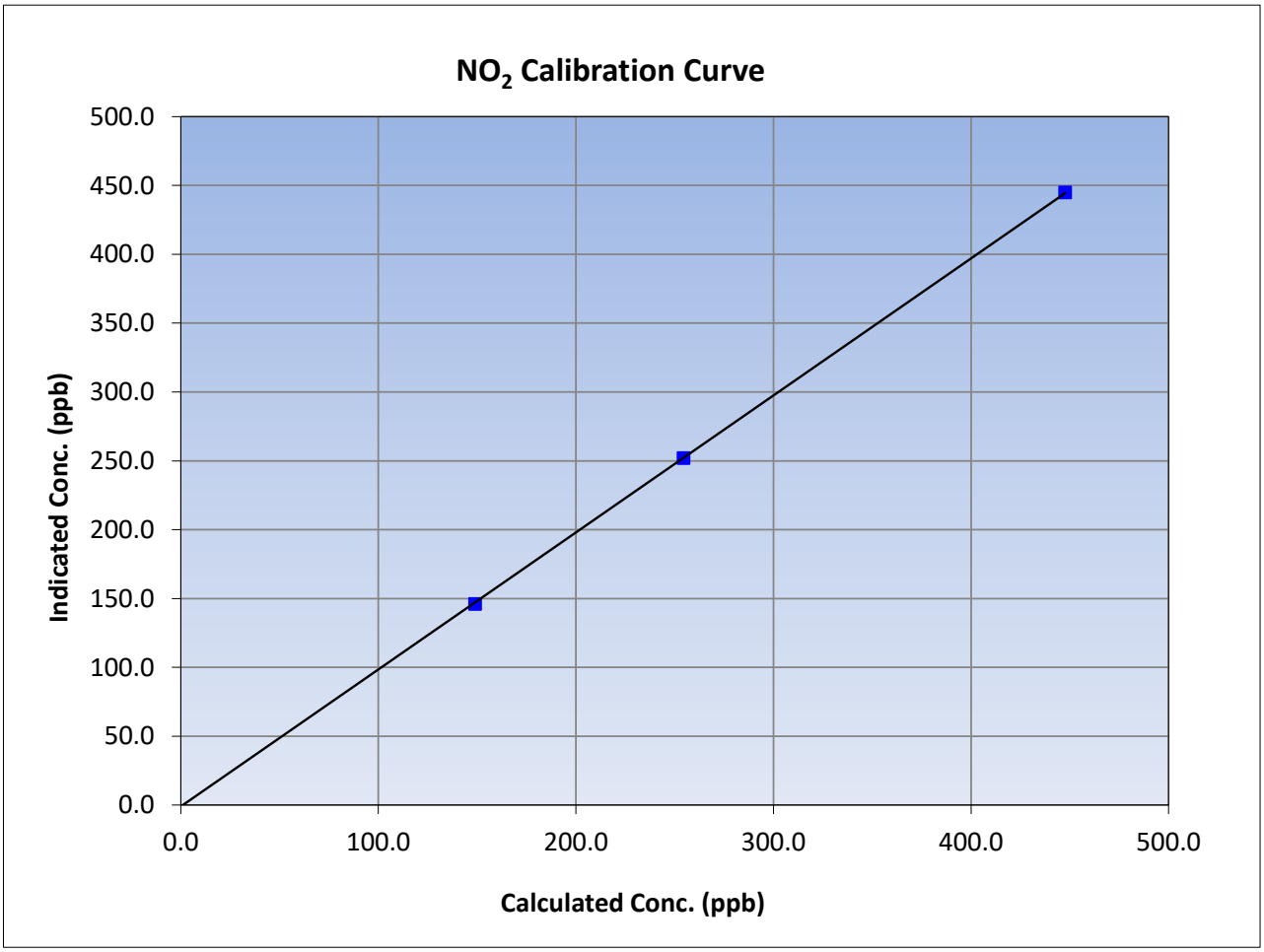
Version-04-2020

Station Information

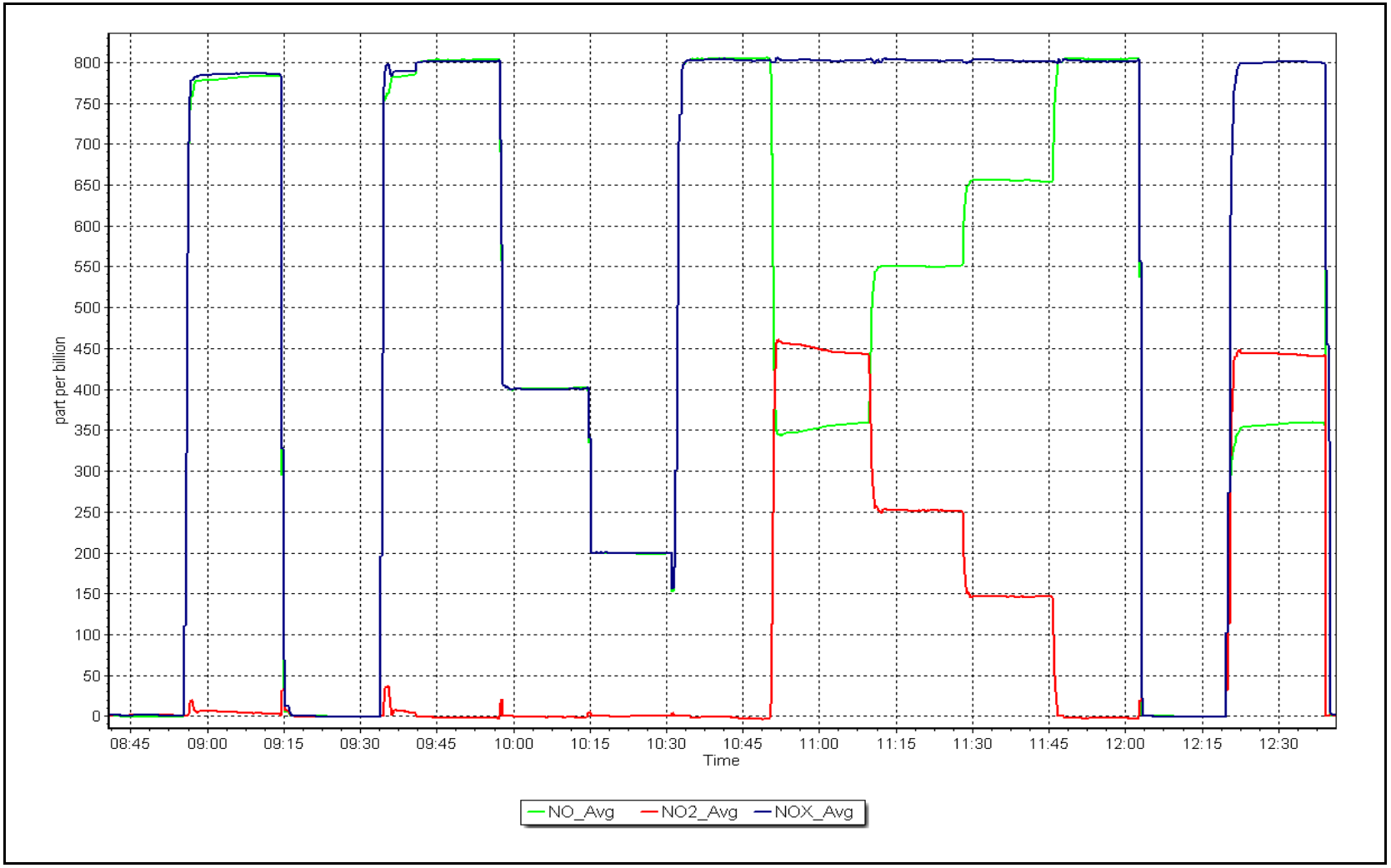
Calibration Date:	October 4, 2023	Previous Calibration:	September 20, 2023
Station Name:	Sawbones Bay	Station Number:	AMS505
Start Time (MST):	8:35	End Time (MST):	12:41
Analyzer make:	API T200	Analyzer serial #:	4260

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999974	≥0.995
447.7	445.0	1.0061			
254.4	251.9	1.0099	Slope	0.995052	0.90 - 1.10
149.0	146.0	1.0205			
			Intercept	-1.022252	+/-20



NO_X Calibration Plot Date: October 4, 2023 Location: Sawbones Bay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS507
KIRBY SOUTH
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Kirby South	Station number:	AMS 507
Calibration Date:	October 4, 2023	Last Cal Date:	September 14, 2023
Start time (MST):	14:20	End time (MST):	18:17
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:	1.004608	1.004435	Backgd or Offset:	20.1	20.0
Calibration intercept:	-0.669160	-1.308487	Coeff or Slope:	1.135	1.135

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4919	81.3	799.6	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	799.6	803.0	0.996
second point	4959	40.7	400.3	398.6	1.004
third point	4980	20.3	199.7	199.1	1.003
as left zero	5000	0.0	0.0	-0.1	----
as left span	4919	81.3	799.6	798.9	1.001
				Average Correction Factor	1.001

Baseline Corr As found:	803.10	Previous response	802.63	*% 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

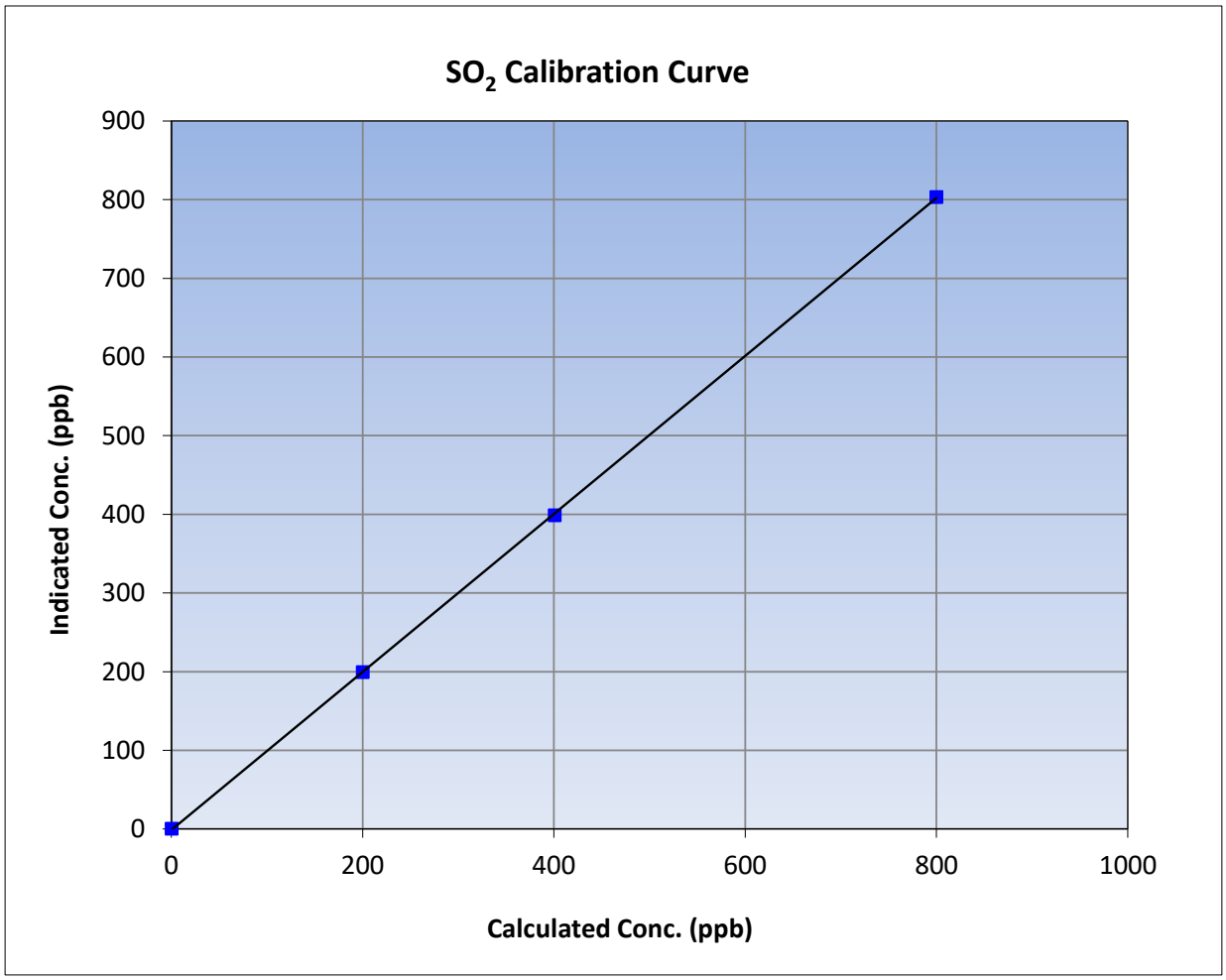
Station Information

Calibration Date:	October 4, 2023	Previous Calibration:	September 14, 2023
Station Name:	Kirby South	Station Number:	AMS 507
Start Time (MST):	14:20	End Time (MST):	18:17
Analyzer make:	Thermo 43iQ	Analyzer serial #:	1182340007

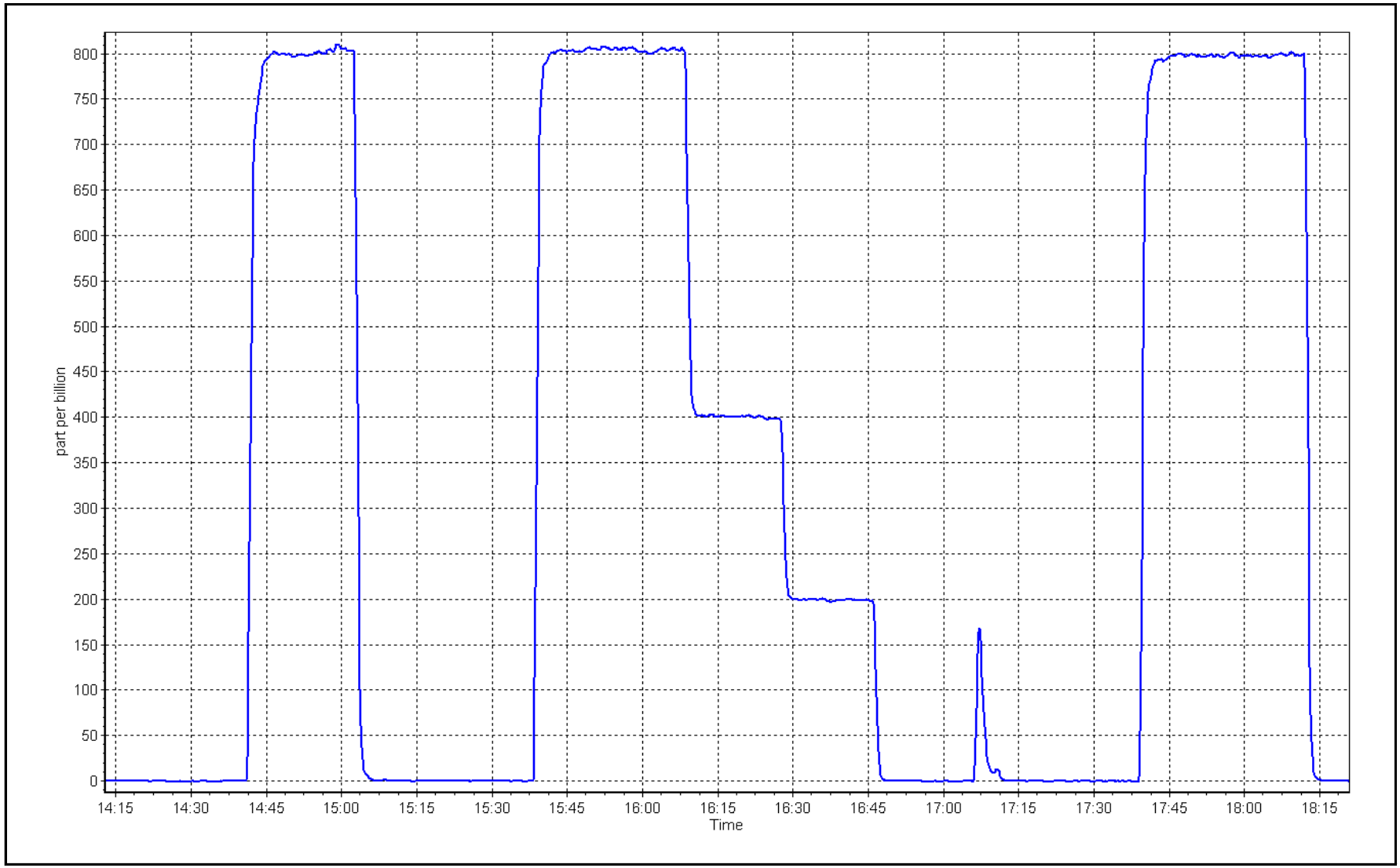
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
799.6	803.0	0.9958
400.3	398.6	1.0044
199.7	199.1	1.0028

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999978	*≥0.995*
Slope	1.004435	*0.90 - 1.10*
Intercept	-1.308487	*+/-30*



SO2 Calibration Plot Date: October 4, 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:	October 4, 2023	Last Cal Date:	September 14, 2023
Start time (MST):	9:44	End time (MST):	14:34
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.167	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517378			
Removed Cal Gas Conc:	5.167	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3804
ZAG Make/Model:	API T701H		Serial Number:	880

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1150840012	
Converter make:	Global		Converter serial #:	2022-197	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.992888	1.003178	Backgd or Offset:	1.54	1.75
Calibration intercept:	0.019018	-0.041177	Coeff or Slope:	1.048	1.068

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4923	77.4	80.0	79.1	1.012
as found 2nd point	4961	38.8	40.1	39.4	1.020
as found 3rd point	4981	19.3	19.9	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	0.0	----
high point	4923	77.4	80.0	80.2	0.997
second point	4961	38.8	40.1	40.2	0.997
third point	4981	19.3	19.9	19.9	1.002
as left zero	5000	0.0	0.0	0.1	----
as left span	4923	77.4	80.0	80.4	0.995
SO2 Scrubber Check	4919	80.0	800.2	0.0	----
Date of last scrubber change:		25-Jul-23		Ave Corr Factor	0.999
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.0	Prev response:	79.43	*% change:	-0.5%
Baseline Corr 2nd AF pt:	39.3	AF Slope:	0.988174	AF Intercept:	-0.040945
Baseline Corr 3rd AF pt:	19.5	AF Correlation:	0.999980		

* = > +/-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

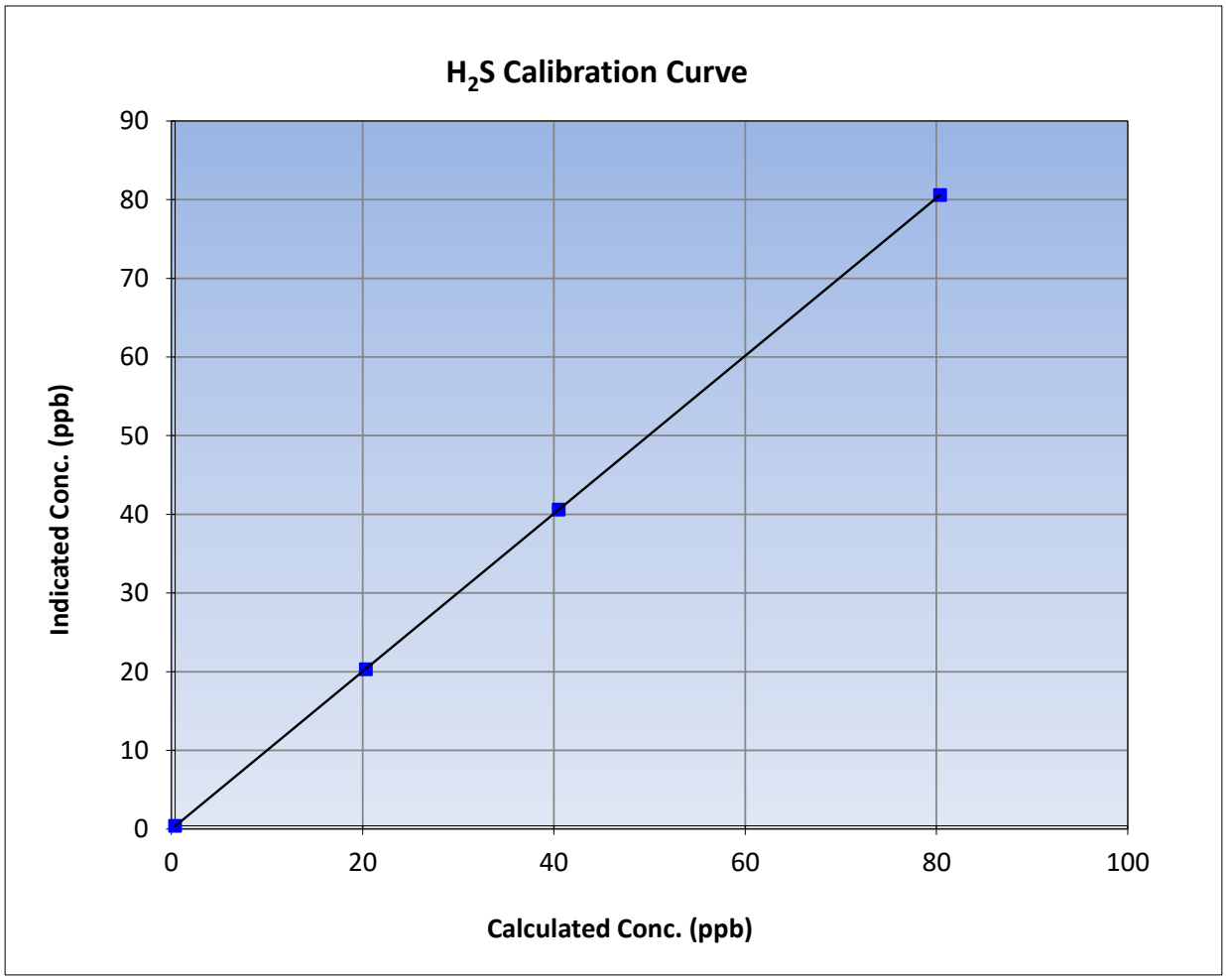
Station Information

Calibration Date:	October 4, 2023	Previous Calibration:	September 14, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	9:44	End Time (MST):	14:34
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1150840012

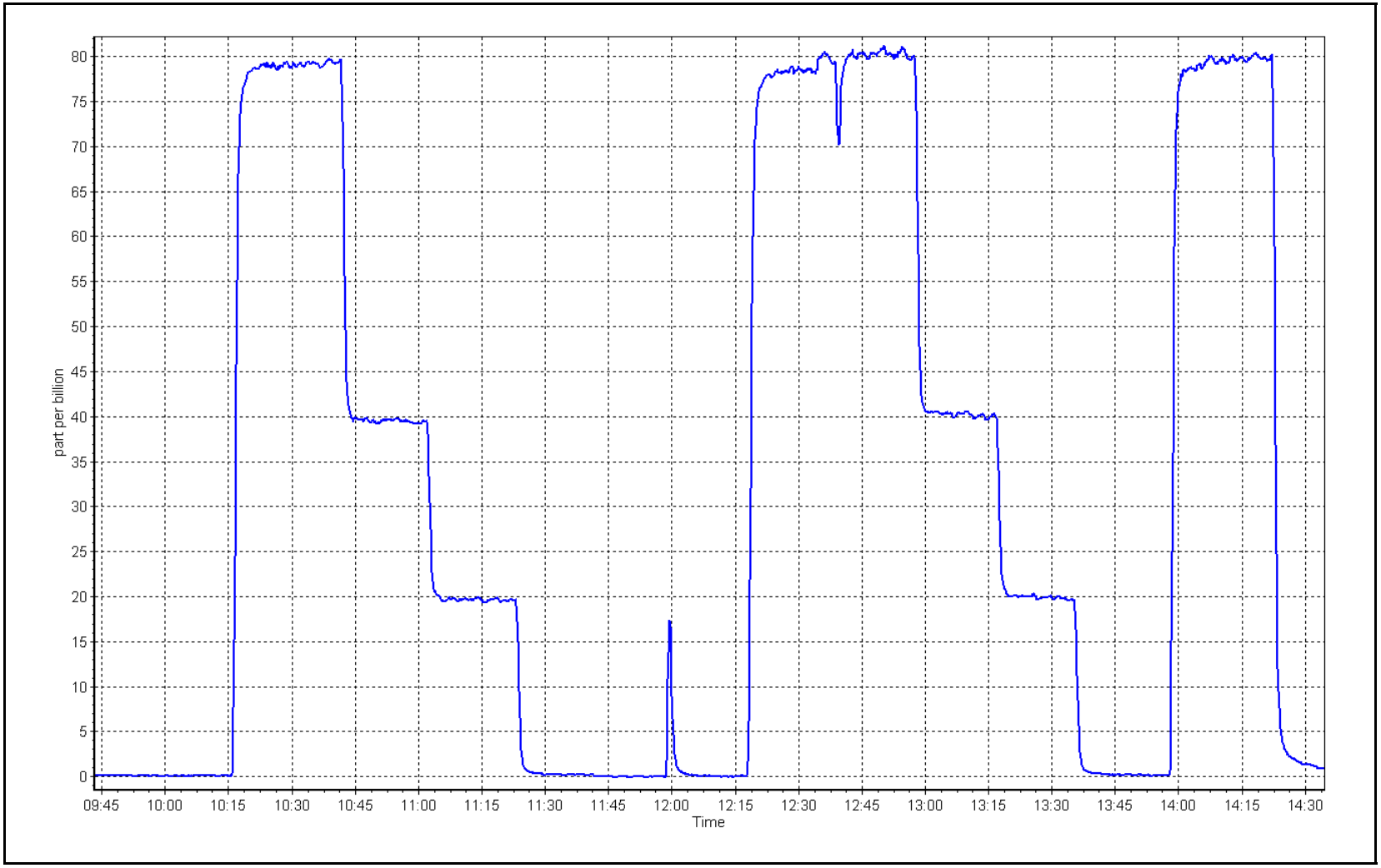
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.2	0.9972
40.1	40.2	0.9975
19.9	19.9	1.0022

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.003178	*0.90 - 1.10*
Intercept	-0.041177	*+/-3*



H_2S Calibration Plot Date: October 4, 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:	October 4, 2023	Last Cal Date:	September 14, 2023
Start time (MST):	14:20	End time (MST):	18:17
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:	0.999942	1.002940	Background:	2.83	3.12
Calibration intercept:	0.005209	-0.087189	Coefficient:	3.975	4.286

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	0.06	----
as found span	4919	81.3	17.26	16.02	1.078
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.08	----
high point	4919	81.3	17.26	17.24	1.001
second point	4959	40.7	8.64	8.55	1.011
third point	4980	20.3	4.31	4.24	1.016
as left zero	5000	0.0	0.00	-0.04	----
as left span	4919	81.3	17.26	17.30	0.998
				Average Correction Factor	1.009

Baseline Corr As found:	15.96	Previous response	17.27	*% change	-8.2%
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 zero and span. Pump will be changed out later in the month.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

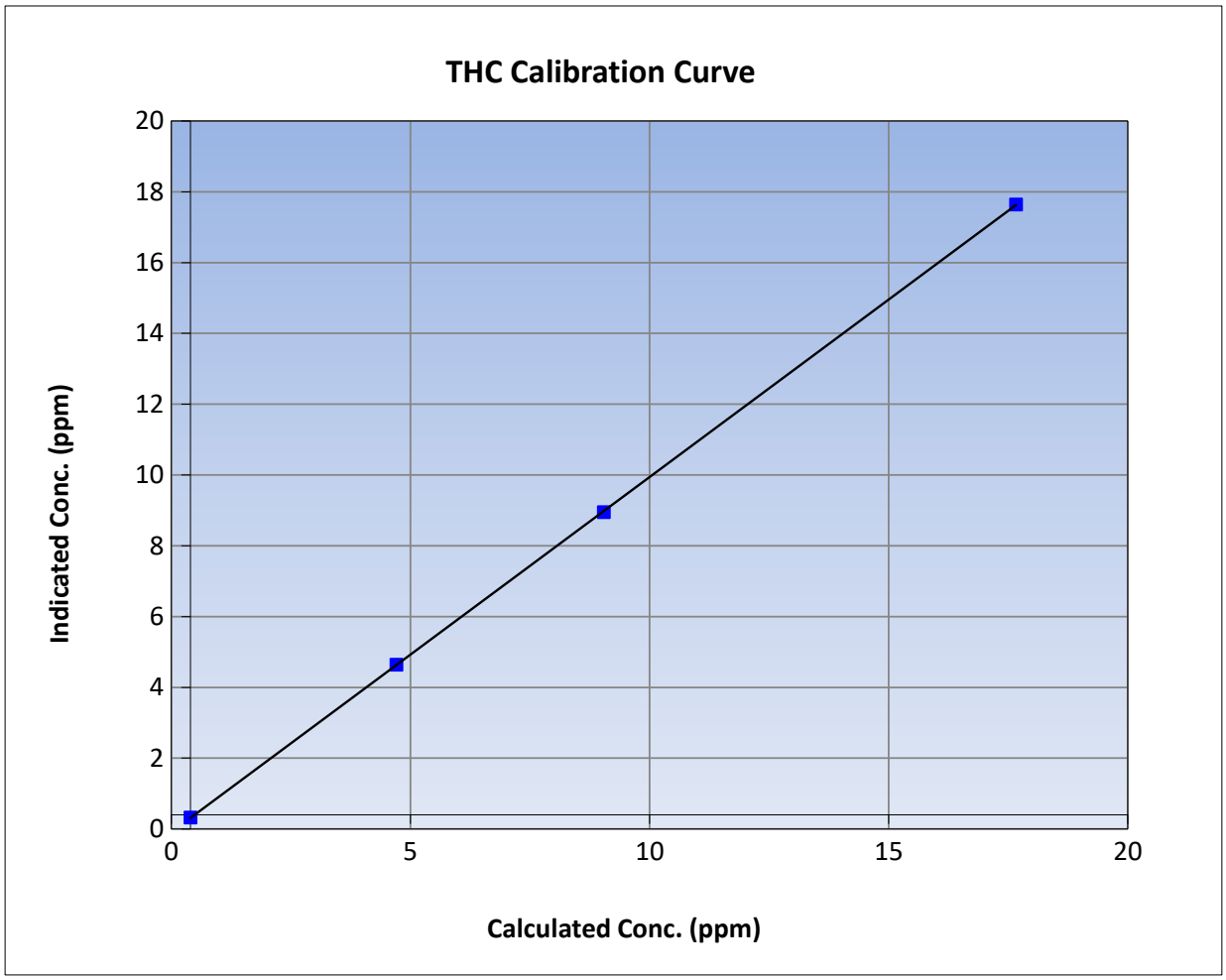
Station Information

Calibration Date:	October 4, 2023	Previous Calibration:	September 14, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	14:20	End Time (MST):	18:17
Analyzer make:	Thermo 51i	Analyzer serial #:	1182340005

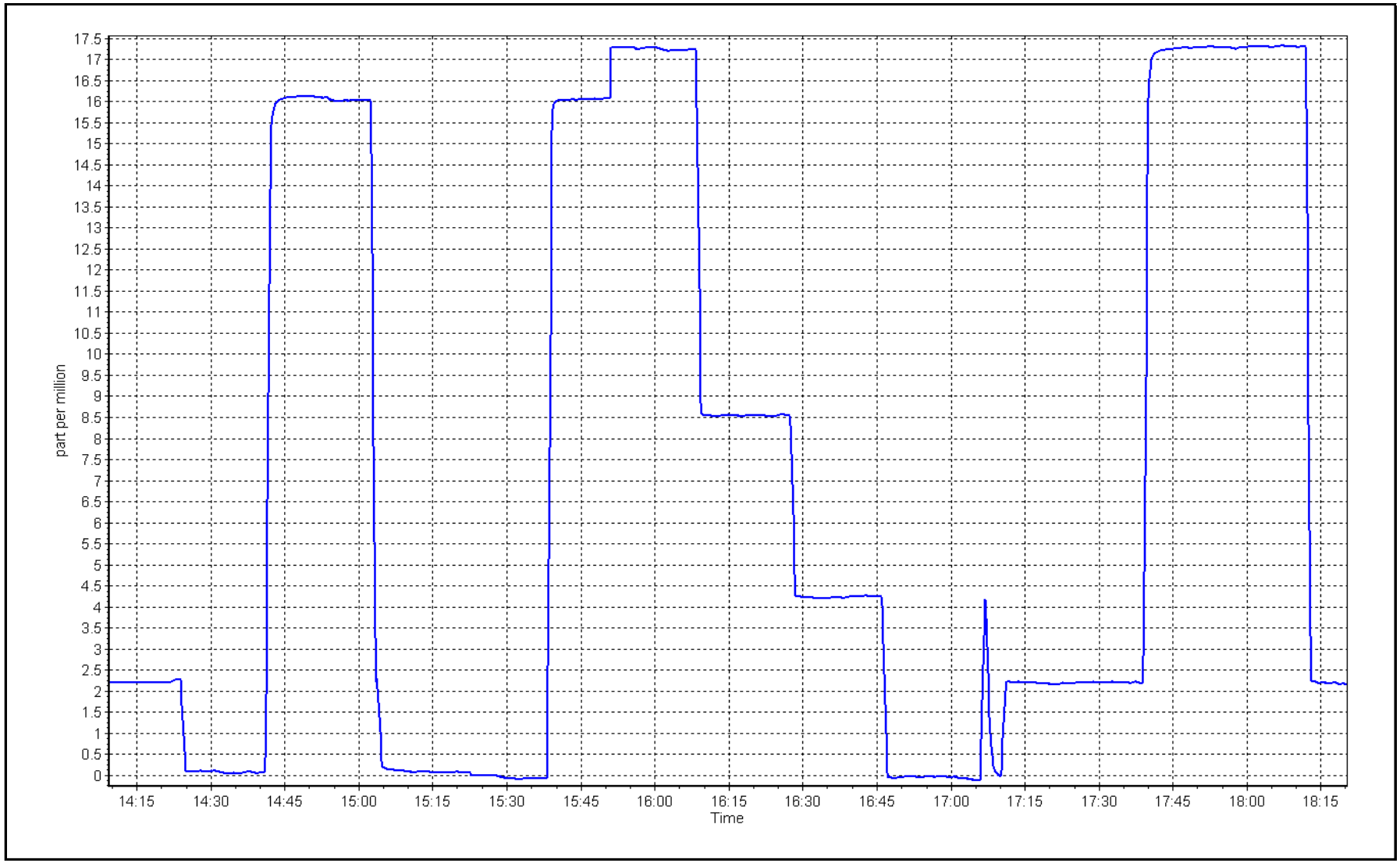
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.08	----
17.26	17.24	1.0013
8.64	8.55	1.0109
4.31	4.24	1.0159

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	1.002940	*0.90 - 1.10*
Intercept	-0.087189	*+/-1.5*



THC Calibration Plot Date: October 4, 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:	October 19, 2023	Last Cal Date:	October 4, 2023
Start time (MST):	10:50	End time (MST):	15:05
Reason:	Maintenance		

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:	1.002940	0.997581	Background:	3.12	3.12
Calibration intercept:	-0.087189	-0.000204	Coefficient:	4.286	3.720

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	0.23	----
as found span	4919	81.3	17.26	17.01	1.015
as found 2nd point	4959	40.7	8.64	8.53	1.013
as found 3rd point	4980	20.3	4.31	4.34	0.994
new cylinder response					
calibrator zero	5000	0.0	0.00	0.02	----
high point	4919	81.3	17.26	17.23	1.002
second point	4959	40.7	8.64	8.61	1.004
third point	4980	20.3	4.31	4.29	1.006
as left zero	5000	0.0	0.00	0.05	----
as left span	4919	81.3	17.26	17.30	0.998
				Average Correction Factor	1.004

Baseline Corr As found:	16.78	Previous response	17.23	*% change	-2.7%
Baseline Corr 2nd AF pt:	8.30	AF Slope:	0.972988	AF Intercept:	0.176820
Baseline Corr 3rd AF pt:	4.11	AF Correlation:	0.999944		

* = > +/-5% change initiates investigation

Notes: Swapped the internal pump. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

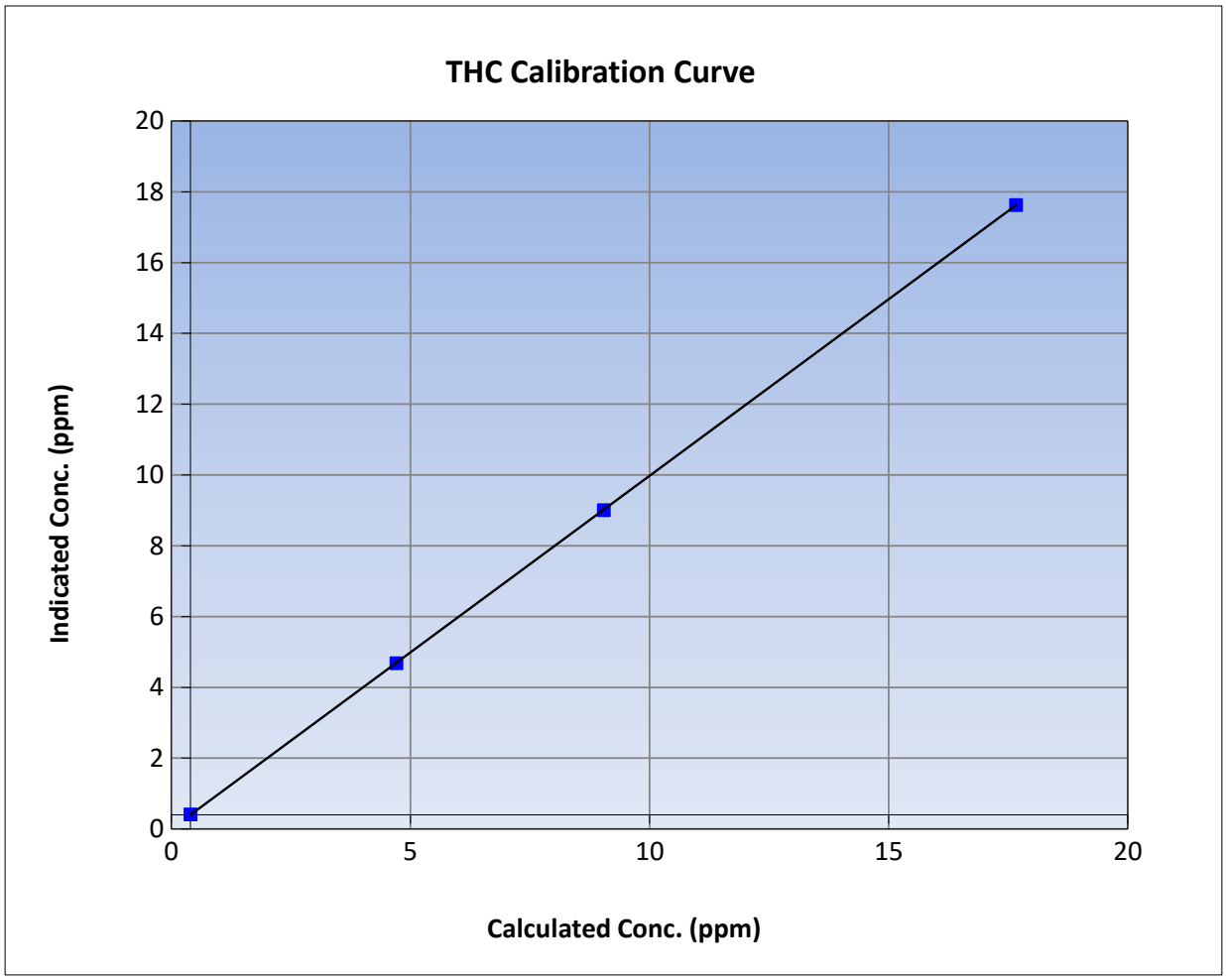
Station Information

Calibration Date:	October 19, 2023	Previous Calibration:	October 4, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	10:50	End Time (MST):	15:05
Analyzer make:	Thermo 51i	Analyzer serial #:	1182340005

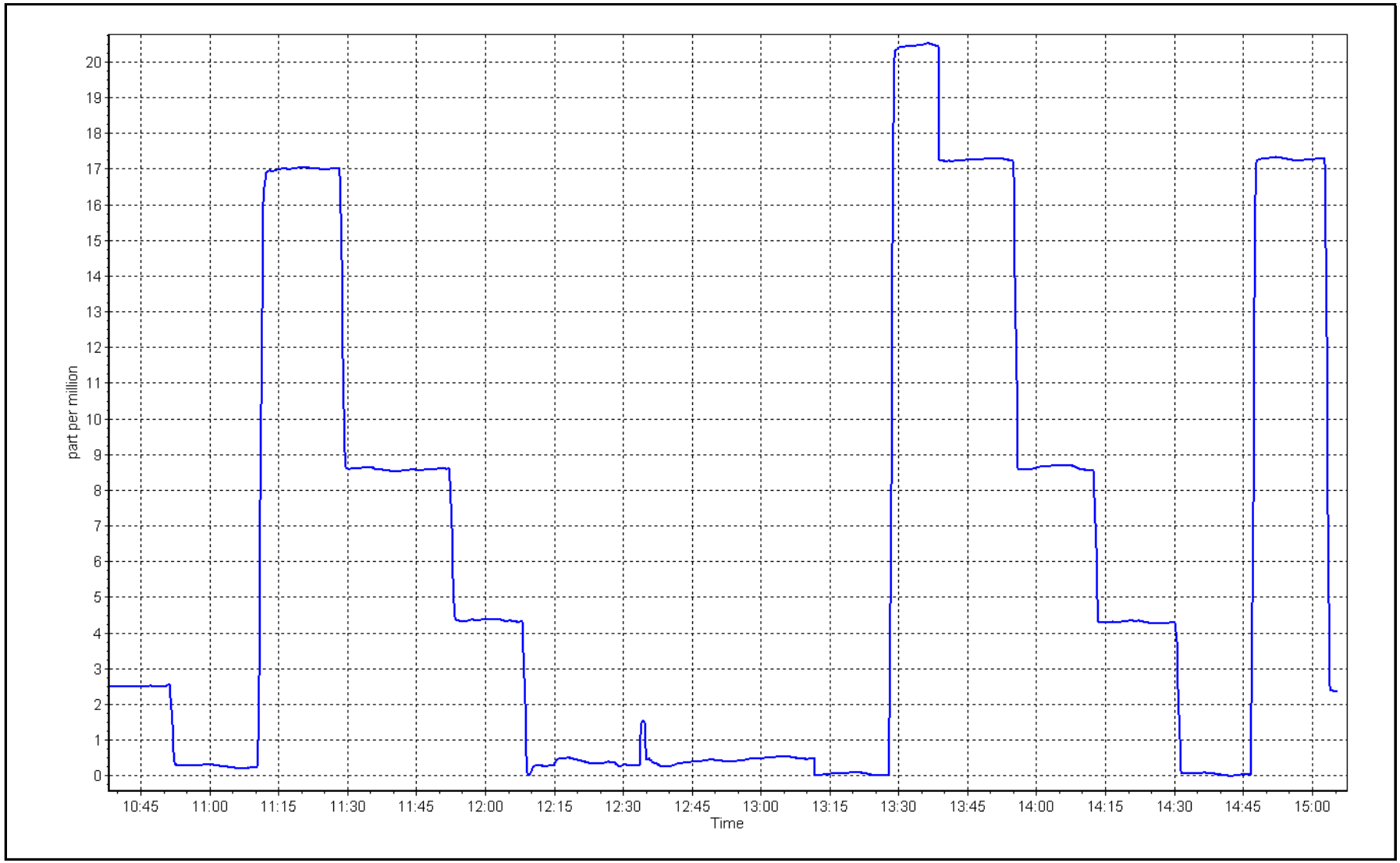
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.02	----
17.26	17.23	1.0019
8.64	8.61	1.0038
4.31	4.29	1.0057

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	0.997581	*0.90 - 1.10*
Intercept	-0.000204	*+/-1.5*



THC Calibration Plot Date: October 19, 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:	October 4, 2023	Last Cal Date:	September 15, 2023
Start time (MST):	10:00	End time (MST):	17:50
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 T750		Serial Number:	282	
ZAG make/model:	API 751H		Serial Number:	321	

Analyzer Information

Analyzer make:	Thermo 42iQ	Analyzer serial #:	1182340006
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.485	1.424	NO bkgnd or offset:	1.5	1.5
NOX coeff or slope:	0.994	0.997	NOX bkgnd or offset:	1.6	1.6
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	167.97	168.83

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.009702	1.001586
NO_X Cal Offset:	-4.611056	-1.471182
NO Cal Slope:	1.011497	1.001191
NO Cal Offset:	-5.412656	-1.933293
NO_2 Cal Slope:	1.004706	0.995145
NO_2 Cal Offset:	1.319502	0.363035

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	4919	81.0	800.1	794.1	6.0	835.0	830.0	4.8	0.9582	0.9568
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	----	----
high point	4919	81.0	800.1	794.1	6.0	801.0	794.2	6.4	0.9989	0.9999
second point	4960	40.5	400.0	397.0	3.0	397.2	394.1	3.1	1.0071	1.0074
third point	4980	20.2	199.5	198.0	1.5	198.0	195.0	3.0	1.0077	1.0156
as left zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.3	0.0	----	----
as left span	4919	81.0	800.1	389.6	410.5	782.5	363.9	418.7	1.0225	1.0707
								Average Correction Factor	1.0046	1.0076

Corrected As found	NO_X = 835.2 ppb	NO = 830.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	3.8%
Previous Response	NO_X = 803.3 ppb	NO = 797.8 ppb		*Percent Change	NO =	3.9%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found NO r^2:	NO Sl:	NO Int:	
			As found NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	794.8	390.3	410.5	409.5	1.0024	99.8%
2nd GPT point (200 ppb O3)	794.8	590.2	210.6	207.7	1.0139	98.6%
3rd GPT point (100 ppb O3)	794.8	694.0	106.8	108.6	0.9834	101.7%
				Average Correction Factor	0.9999	100.0%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

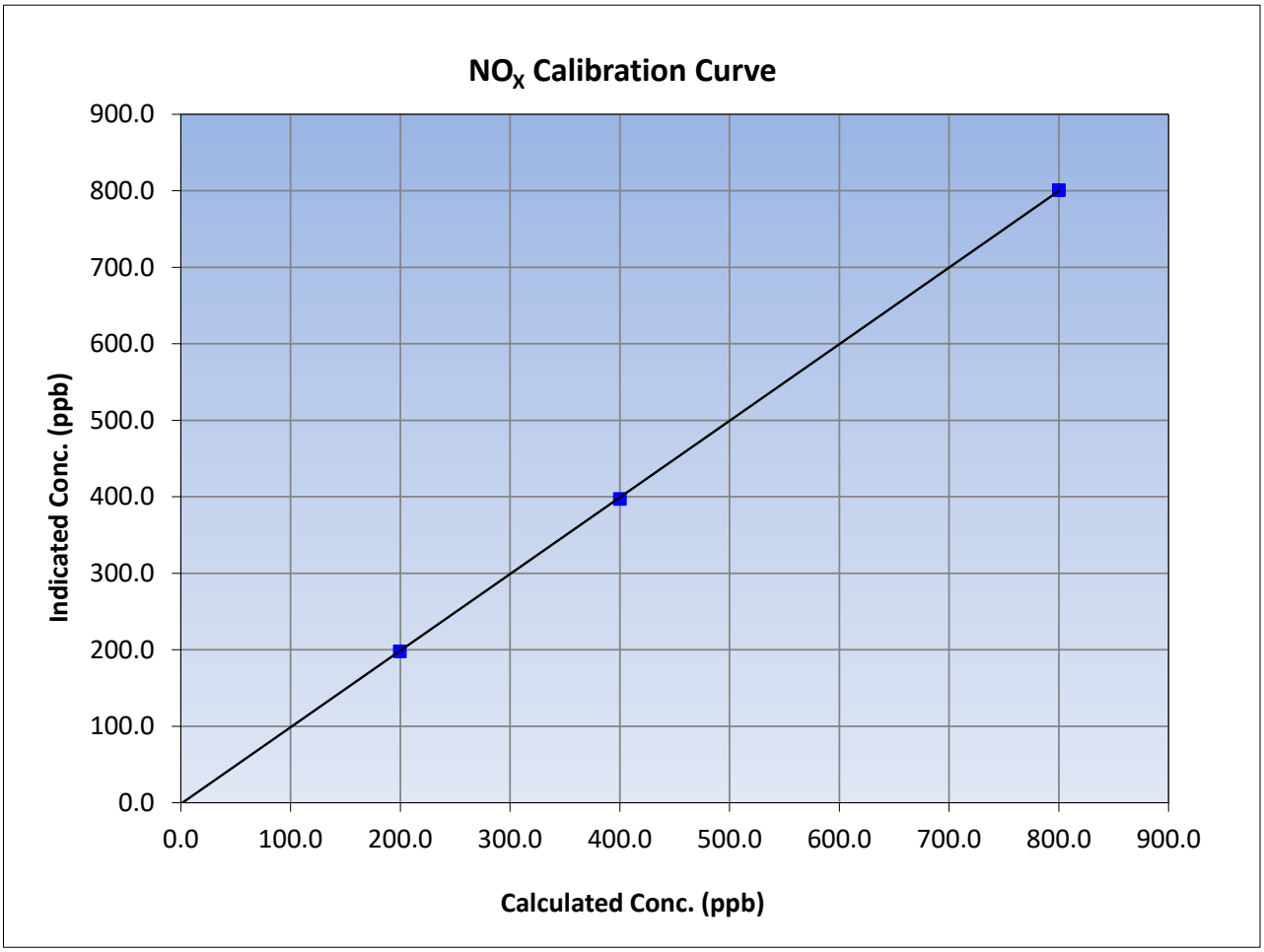
Version-04-2020

Station Information

Calibration Date:	October 4, 2023	Previous Calibration:	September 15, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	10:00	End Time (MST):	17:50
Analyzer make:	Thermo 42iQ	Analyzer serial #:	1182340006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999980	≥0.995
800.1	801.0	0.9989			
400.0	397.2	1.0071	Slope	1.001586	0.90 - 1.10
199.5	198.0	1.0077			
			Intercept	-1.471182	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

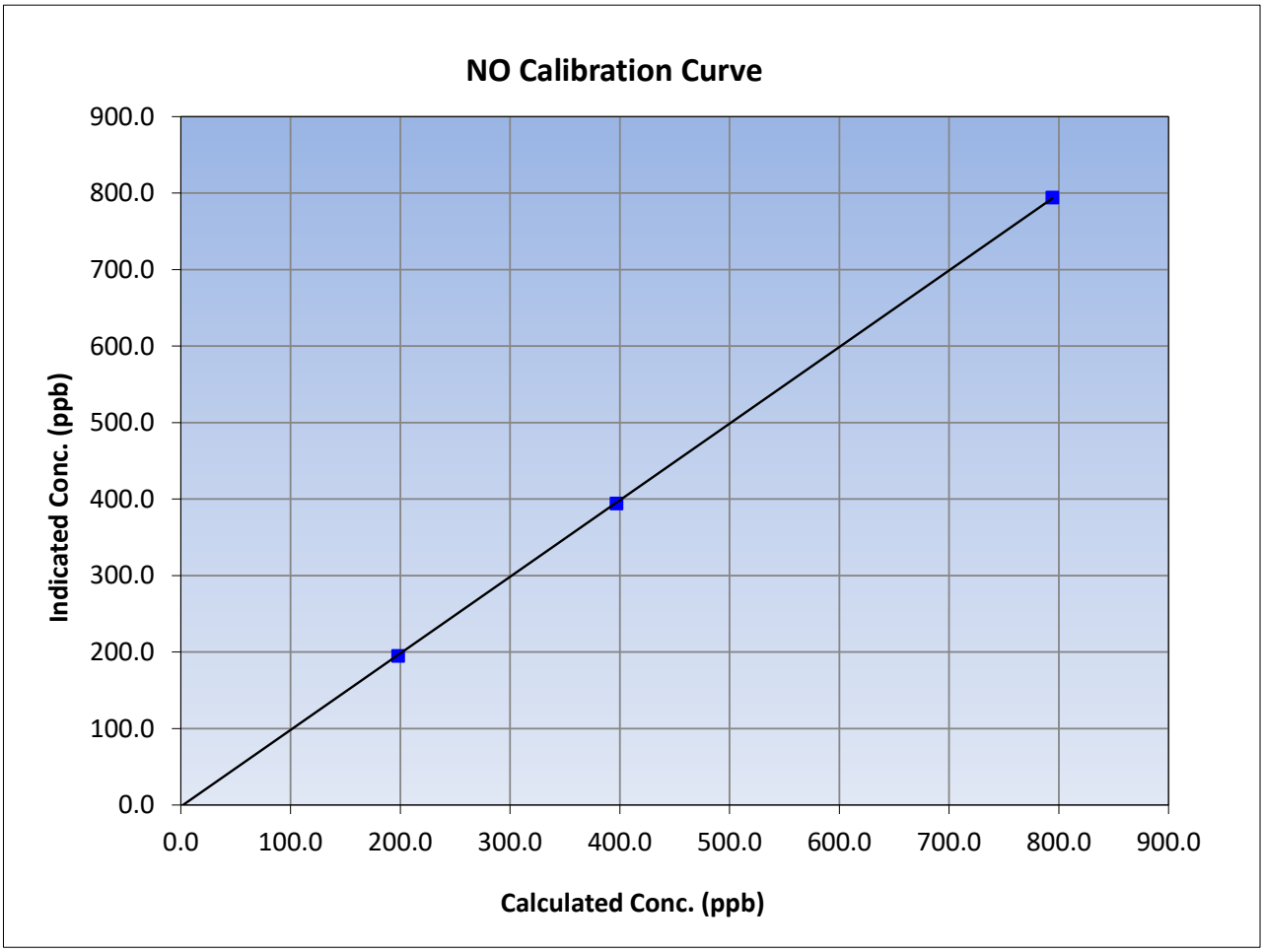
Version-04-2020

Station Information

Calibration Date:	October 4, 2023	Previous Calibration:	September 15, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	10:00	End Time (MST):	17:50
Analyzer make:	Thermo 42iQ	Analyzer serial #:	1182340006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999977	≥0.995
794.1	794.2	0.9999			
397.0	394.1	1.0074	Slope	1.001191	0.90 - 1.10
198.0	195.0	1.0156			
			Intercept	-1.933293	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

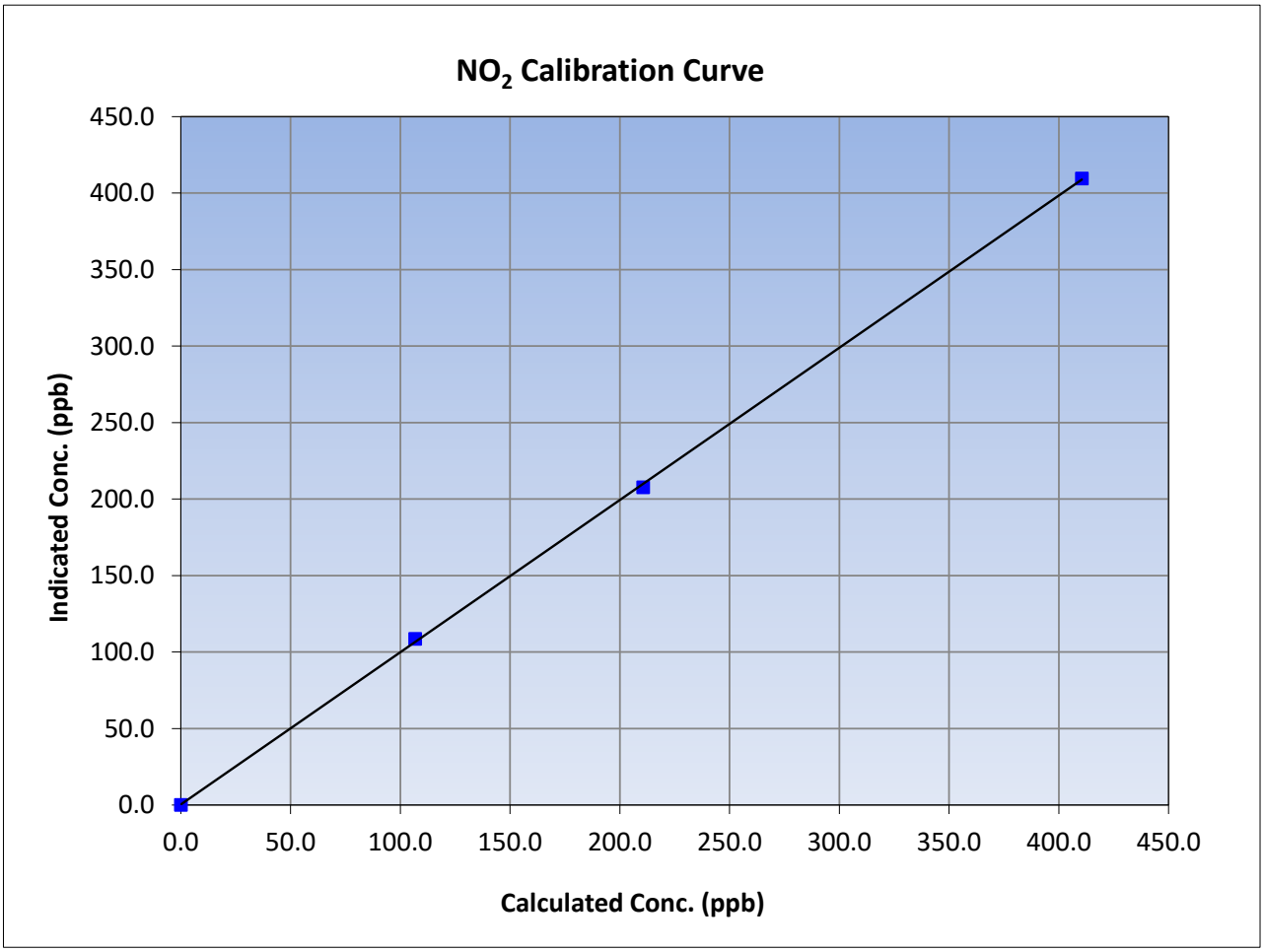
Version-04-2020

Station Information

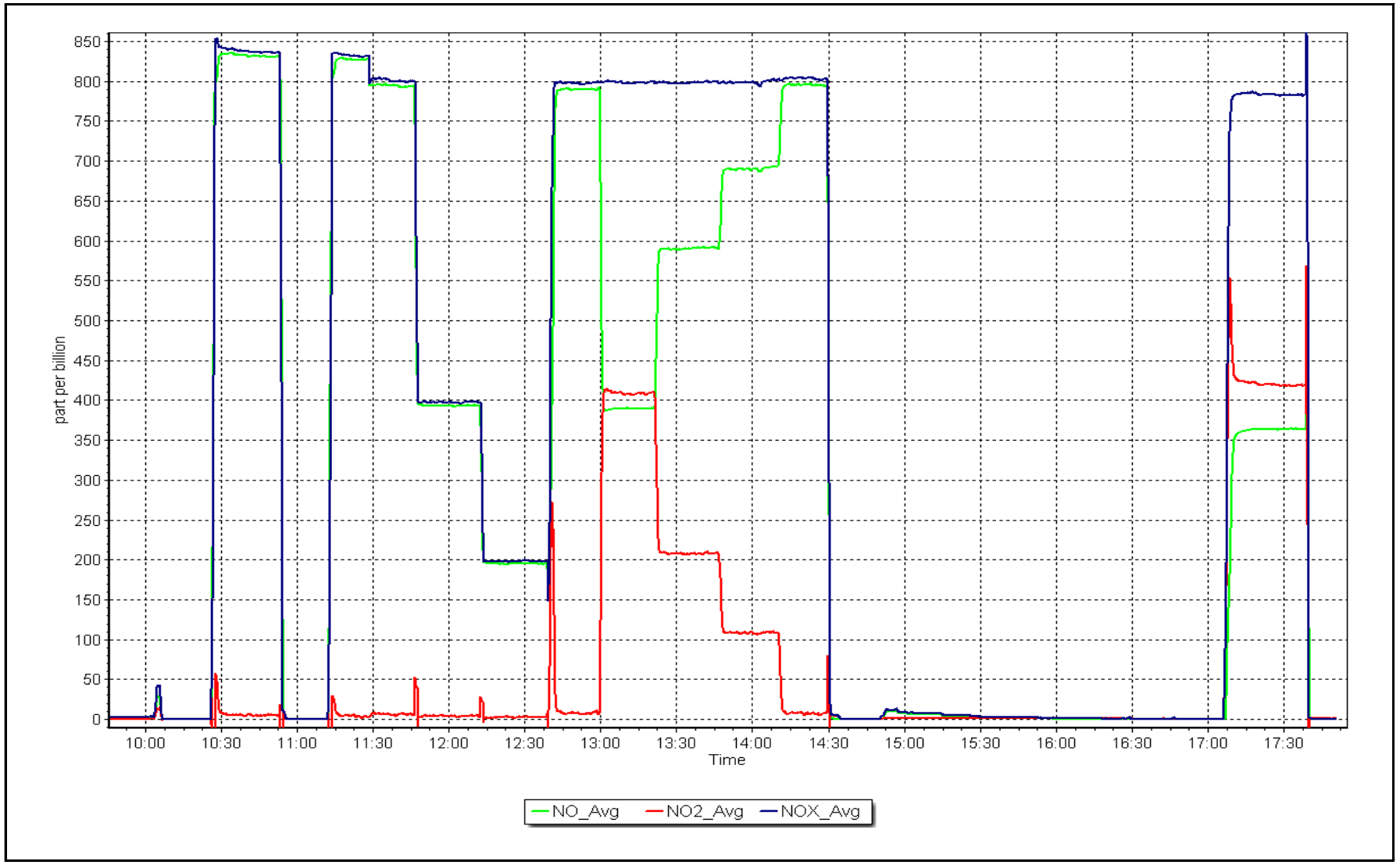
Calibration Date:	October 4, 2023	Previous Calibration:	September 15, 2023
Station Name:	Kirby South	Station Number:	AMS507
Start Time (MST):	10:00	End Time (MST):	17:50
Analyzer make:	Thermo 42iQ	Analyzer serial #:	1182340006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999897	≥0.995
410.5	409.5	1.0024			
210.6	207.7	1.0139	Slope	0.995145	0.90 - 1.10
106.8	108.6	0.9834			
			Intercept	0.363035	+/-20



NO_X Calibration Plot Date: October 4, 2023 Location: Kirby South



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS511
BLACKGOLD
OCTOBER 2023

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

November 29, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Blackgold	Station number:	AMS511
Calibration Date:	September 26, 2023	Last Cal Date:	NA
Start time (MST):	14:55	End time (MST):	17:35
Reason:	Install		

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:	API T700		Serial Number:	5258
ZAG Make/Model:	T701		Serial Number:	138

Analyzer Information

Analyzer make: Thermo scientific — Analyzer serial #: 1160290014

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	NA	1.009285	Backgd or Offset:	NA	31.2
Calibration intercept:	NA	-1.252082	Coeff or Slope:	NA	1.097

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	4926	80.0	800.0	806.5	0.992
second point	4968	40.1	400.8	403.7	0.993
third point	4987	20.2	202.0	200.5	1.007
as left zero	5000	0.0	0.0	0.5	----
as left span	4926	80.0	800.0	811.9	0.985
				Average Correction Factor	0.997

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. Changed sample inlet filter before calibrator zero. Adjusted span only.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

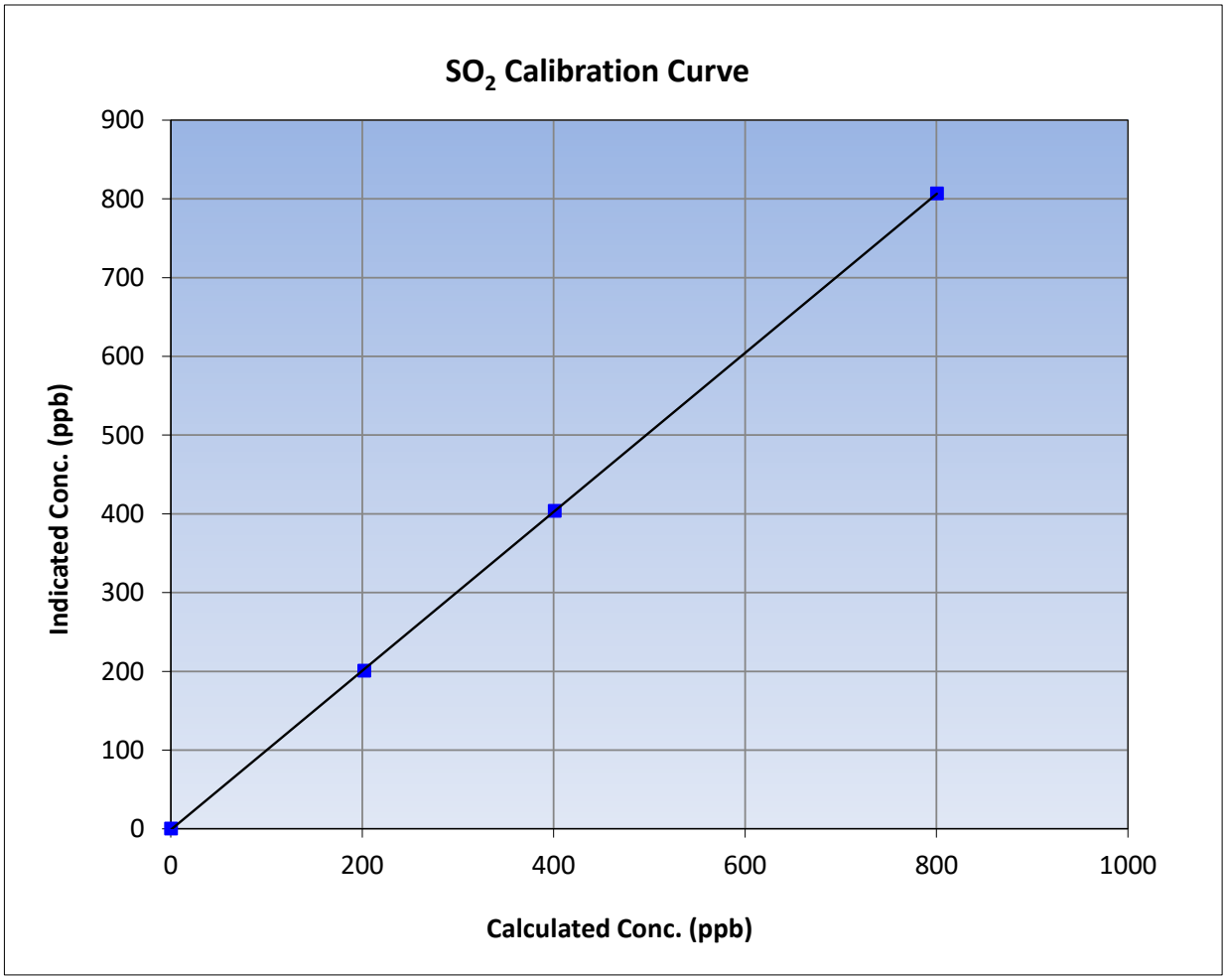
Station Information

Calibration Date:	September 26, 2023	Previous Calibration:	NA
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	14:55	End Time (MST):	17:35
Analyzer make:	Thermo scientific	Analyzer serial #:	1160290014

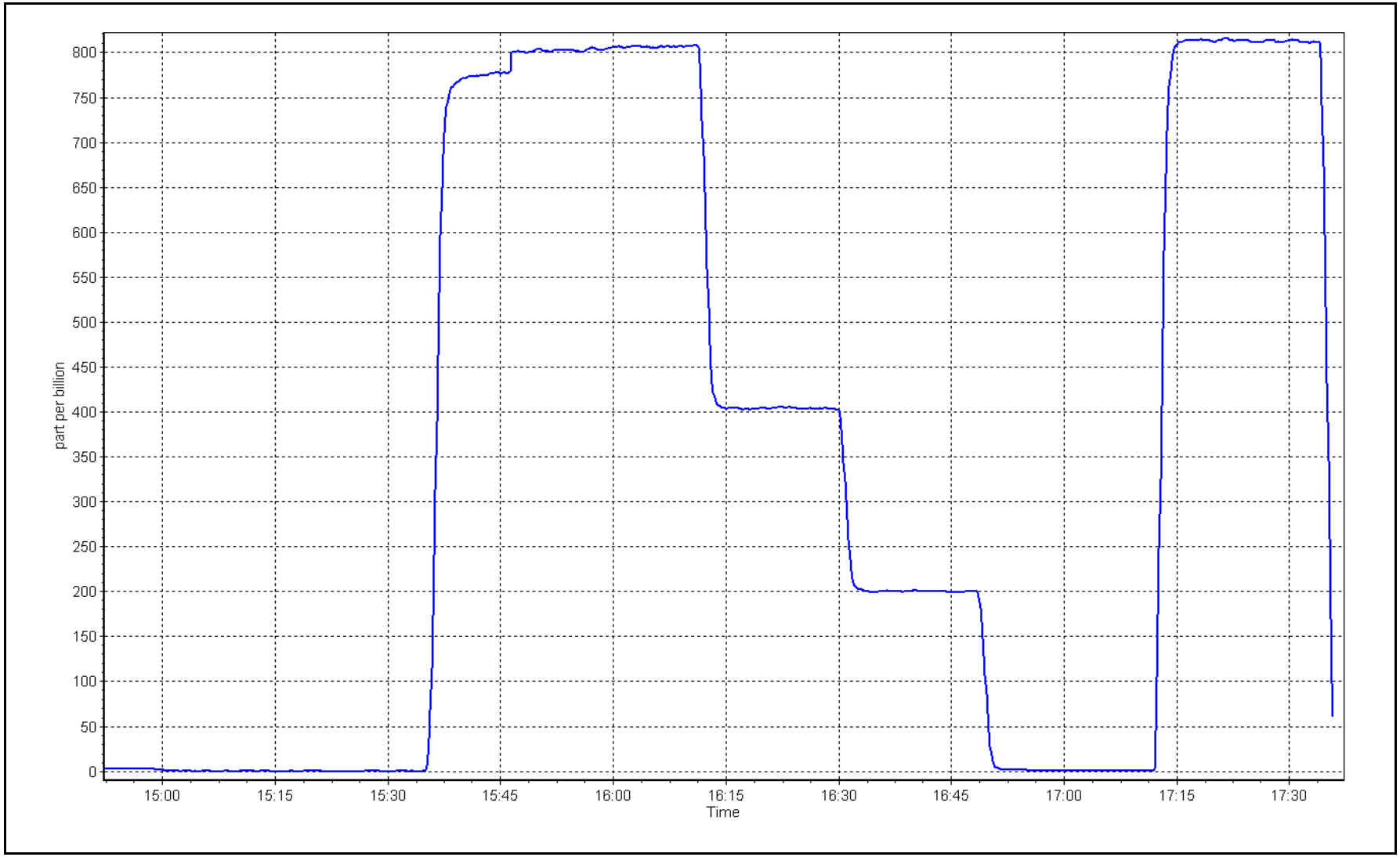
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
800.0	806.5	0.9919
400.8	403.7	0.9929
202.0	200.5	1.0072

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999982	*≥0.995*
Slope	1.009285	*0.90 - 1.10*
Intercept	-1.252082	*+/-30*



SO2 Calibration Plot Date: September 26, 2023 Location: Blackgold



Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Blackgold	Station number:	AMS511
Calibration Date:	October 5, 2023	Last Cal Date:	September 26, 2023
Start time (MST):	11:30	End time (MST):	16:20
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:	1.009285	1.001162	Backgd or Offset:	31.2	31.8
Calibration intercept:	-1.252082	-1.503208	Coeff or Slope:	1.097	1.107

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	4926	80.0	800.0	791.0	1.011
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4926	80.0	800.0	799.9	1.000
second point	4968	40.1	400.8	400.2	1.002
third point	4987	20.2	202.0	198.0	1.020
as left zero	5000	0.0	0.0	0.0	----
as left span	4926	80.0	800.0	798.3	1.002
				Average Correction Factor	1.007

Baseline Corr As found:	790.00	Previous response	806.18	*% change	-2.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

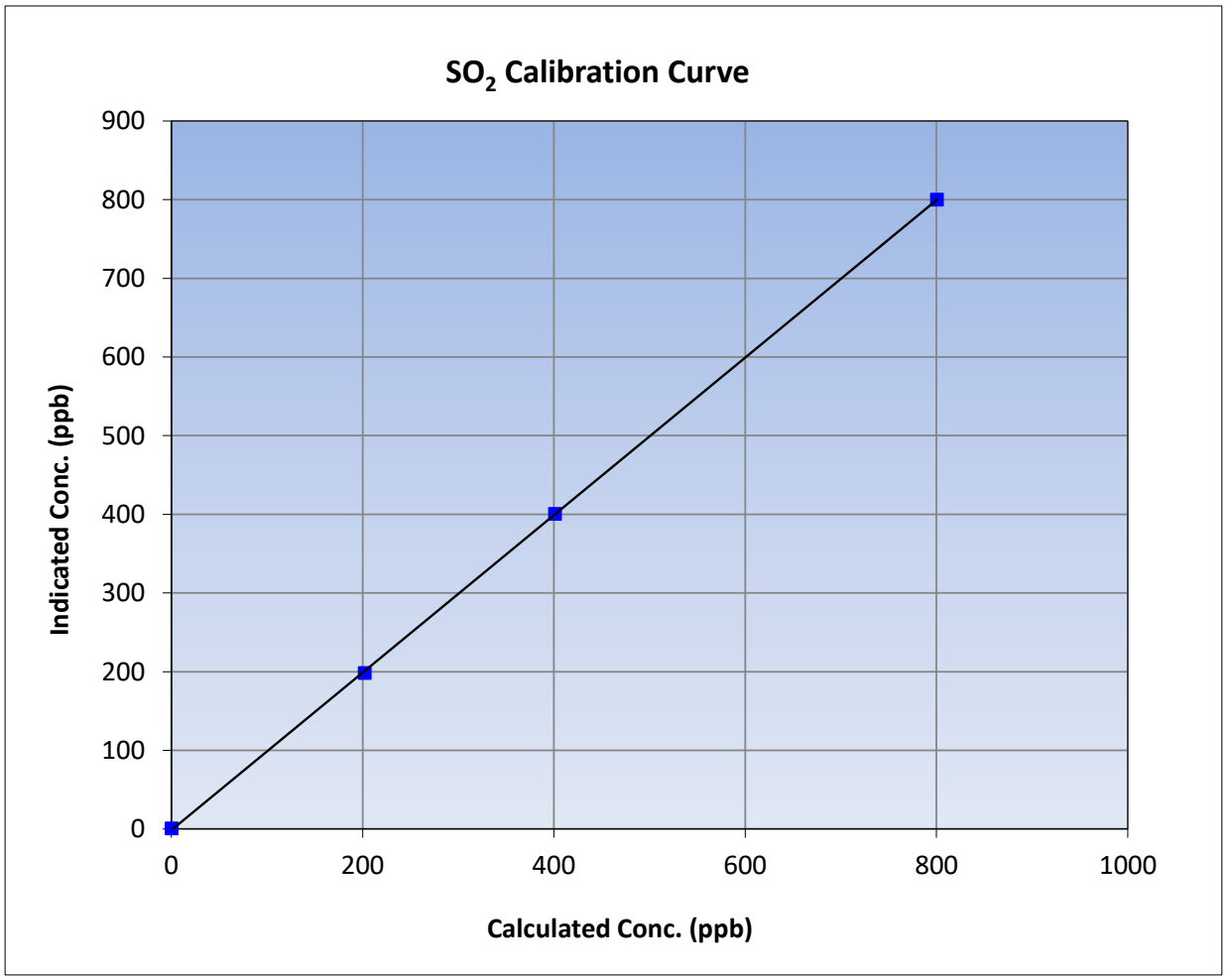
Station Information

Calibration Date:	October 5, 2023	Previous Calibration:	September 26, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	11:30	End Time (MST):	16:20
Analyzer make:	Thermo scientific	Analyzer serial #:	1160290014

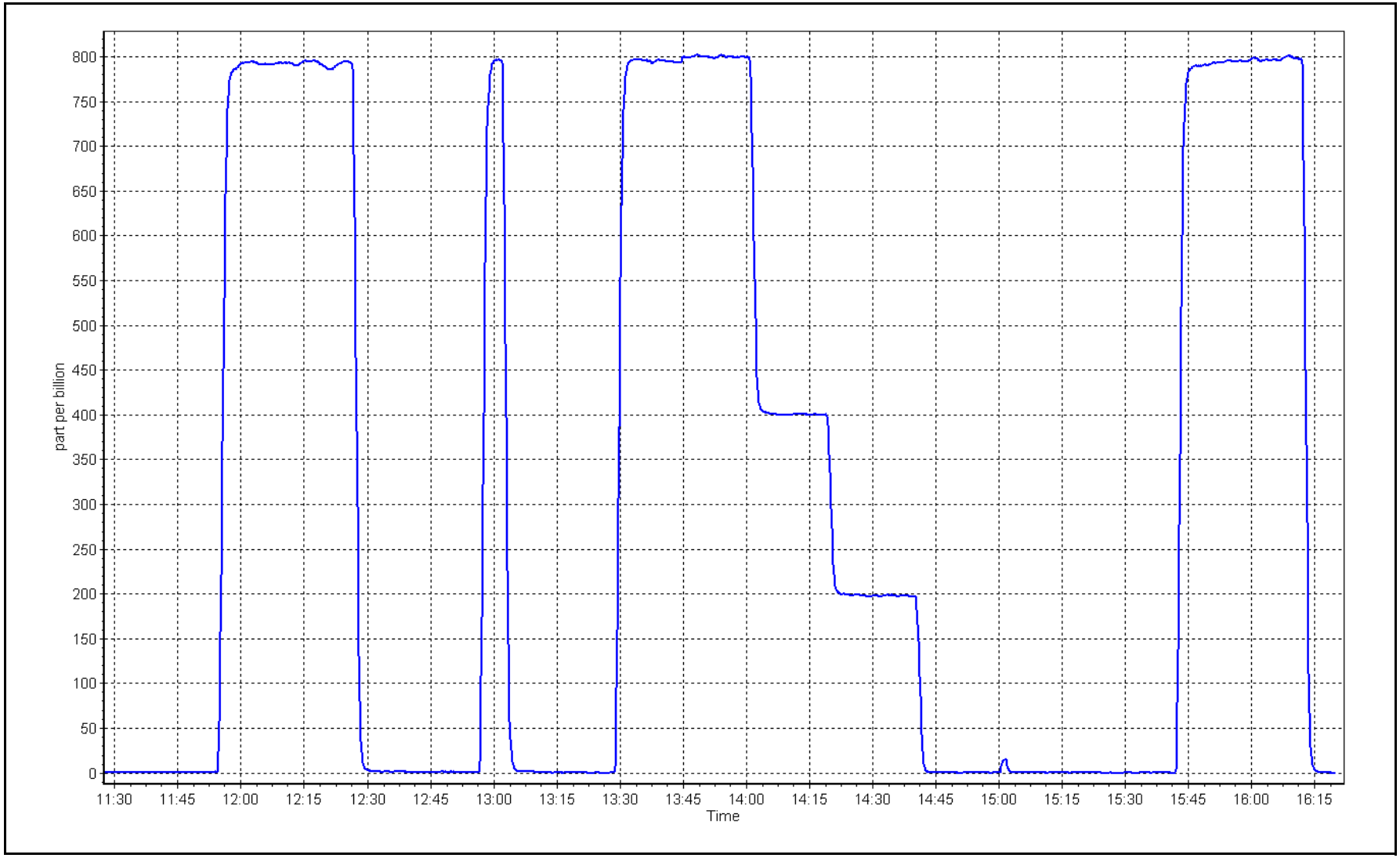
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
800.0	799.9	1.0001
400.8	400.2	1.0016
202.0	198.0	1.0200

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999969	*≥0.995*
Slope	1.001162	*0.90 - 1.10*
Intercept	-1.503208	*+/-30*



SO2 Calibration Plot Date: October 5, 2023 Location: Blackgold



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Blackgold	Station number:	AMS511
Calibration Date:	September 28, 2023	Last Cal Date:	NA
Start time (MST):	12:05	End time (MST):	14:20
Reason:	Install		

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 T700		Serial Number:	5258
ZAG Make/Model:	API T701		Serial Number:	60

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:	NA	1.003061	Backgd or Offset:	NA	3.11
Calibration intercept:	NA	-0.179226	Coeff or Slope:	NA	1.137

H_2S As Found Data

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

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4922	77.8	80.0	80.1	0.998
second point	4961	38.9	40.0	39.9	1.002
third point	4981	19.5	20.0	19.7	1.017
as left zero	5000	0.0	0.0	0.1	----
as left span	4922	77.9	80.0	80.3	0.997
SO2 Scrubber Check	4920	80.0	800.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.006
Date of last converter efficiency test:					efficiency

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

* = > +/-5% change initiates investigation

Notes: Installation calibration, no issues. SOX scrubber tested post calibration but before as left zero/span.

Calibration Performed By: Kelly Baragar

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

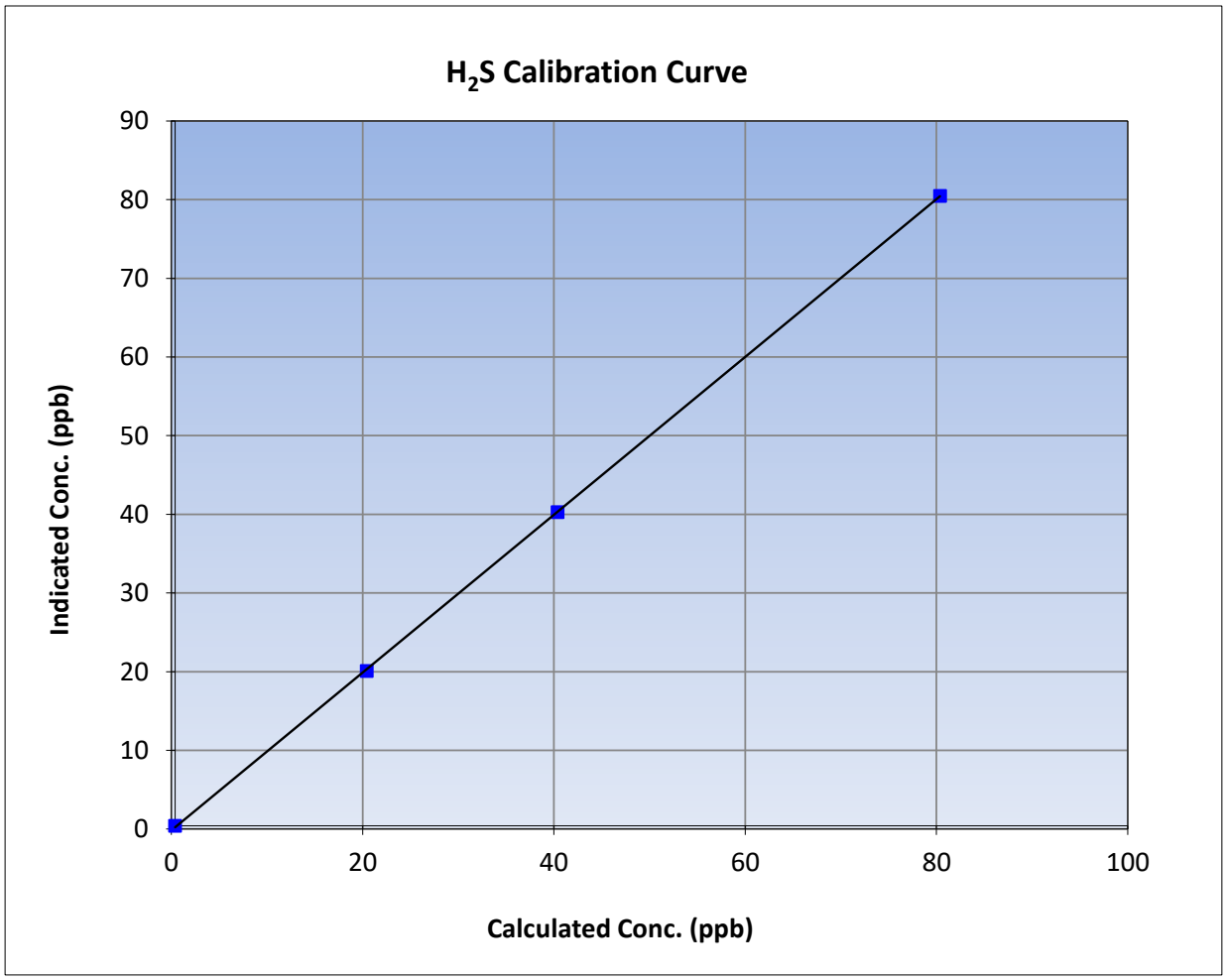
Station Information

Calibration Date:	September 28, 2023	Previous Calibration:	NA
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	12:05	End Time (MST):	14:20
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1336160090

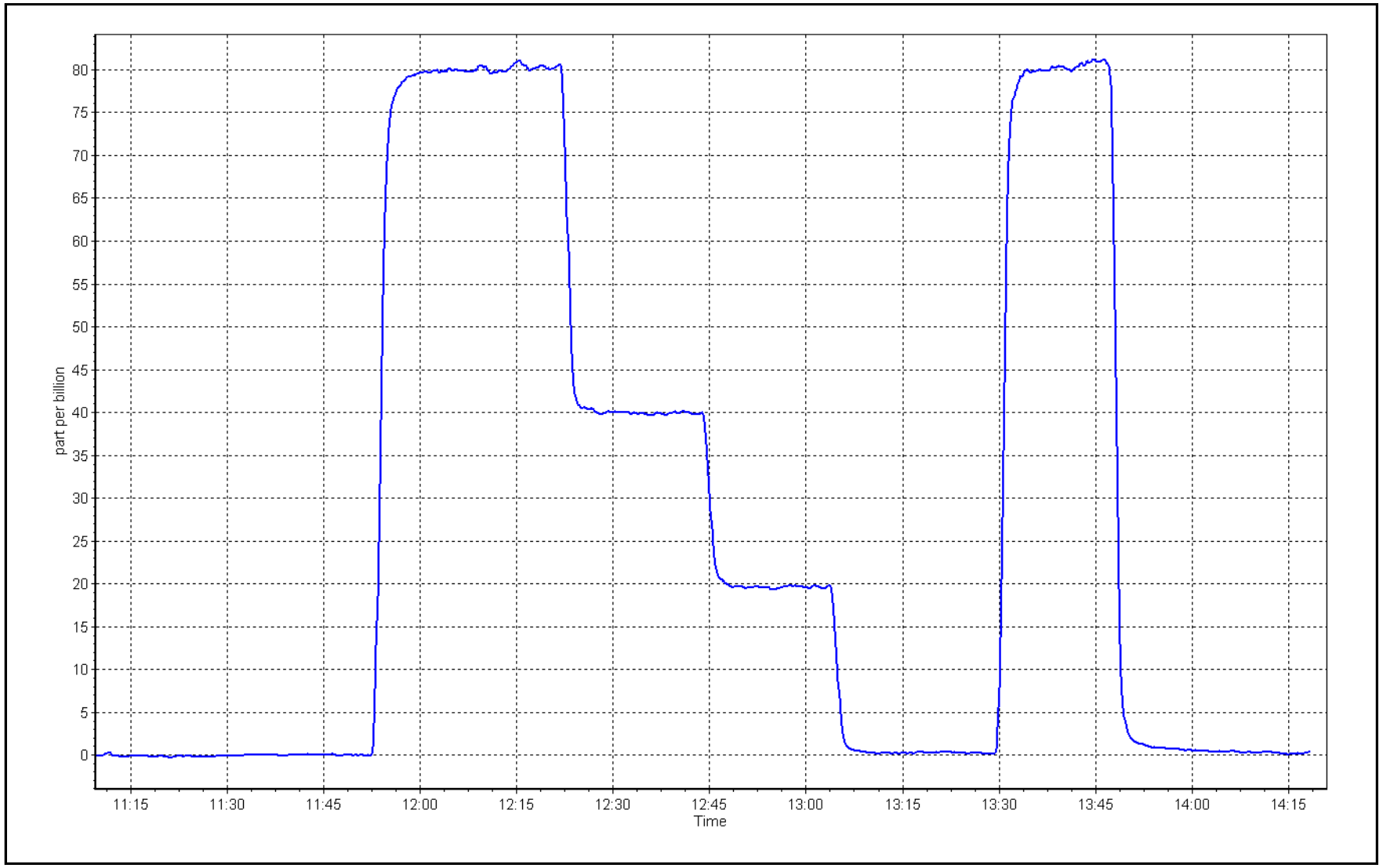
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.1	0.9983
40.0	39.9	1.0021
20.0	19.7	1.0173

Statistical Evaluation		Limits
Correlation Coefficient	0.999975	≥0.995
Slope	1.003061	0.90 - 1.10
Intercept	-0.179226	+/-3



H_2S Calibration Plot Date: September 28, 2023 Location: Blackgold



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Blackgold	Station number:	AMS511
Calibration Date:	October 5, 2023	Last Cal Date:	September 28, 2023
Start time (MST):	6:57	End time (MST):	11:50
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 T700		Serial Number:	5258
ZAG Make/Model:	API T701		Serial Number:	138

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:	1.003061	0.999059	Backgd or Offset:	3.11	3.08
Calibration intercept:	-0.179226	-0.039168	Coeff or Slope:	1.137	1.137

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	77.8	80.0	80.0	1.000
as found 2nd point	4961	38.9	40.0	40.0	1.000
as found 3rd point	4981	19.5	20.0	19.6	1.022
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	79.9	1.001
second point	4961	38.9	40.0	39.9	1.002
third point	4981	19.5	20.0	19.8	1.012
as left zero	5000	0.0	0.0	0.3	----
as left span	4922	77.9	80.0	79.8	1.003
SO2 Scrubber Check	4920	80.0	800.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.005
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.0	Prev response:	80.03	*% change:	0.0%
Baseline Corr 2nd AF pt:	40.0	AF Slope:	1.002345	AF Intercept:	-0.179169
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999961		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter after as founds. Scrubber check done after cal zero. No adjustments made.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

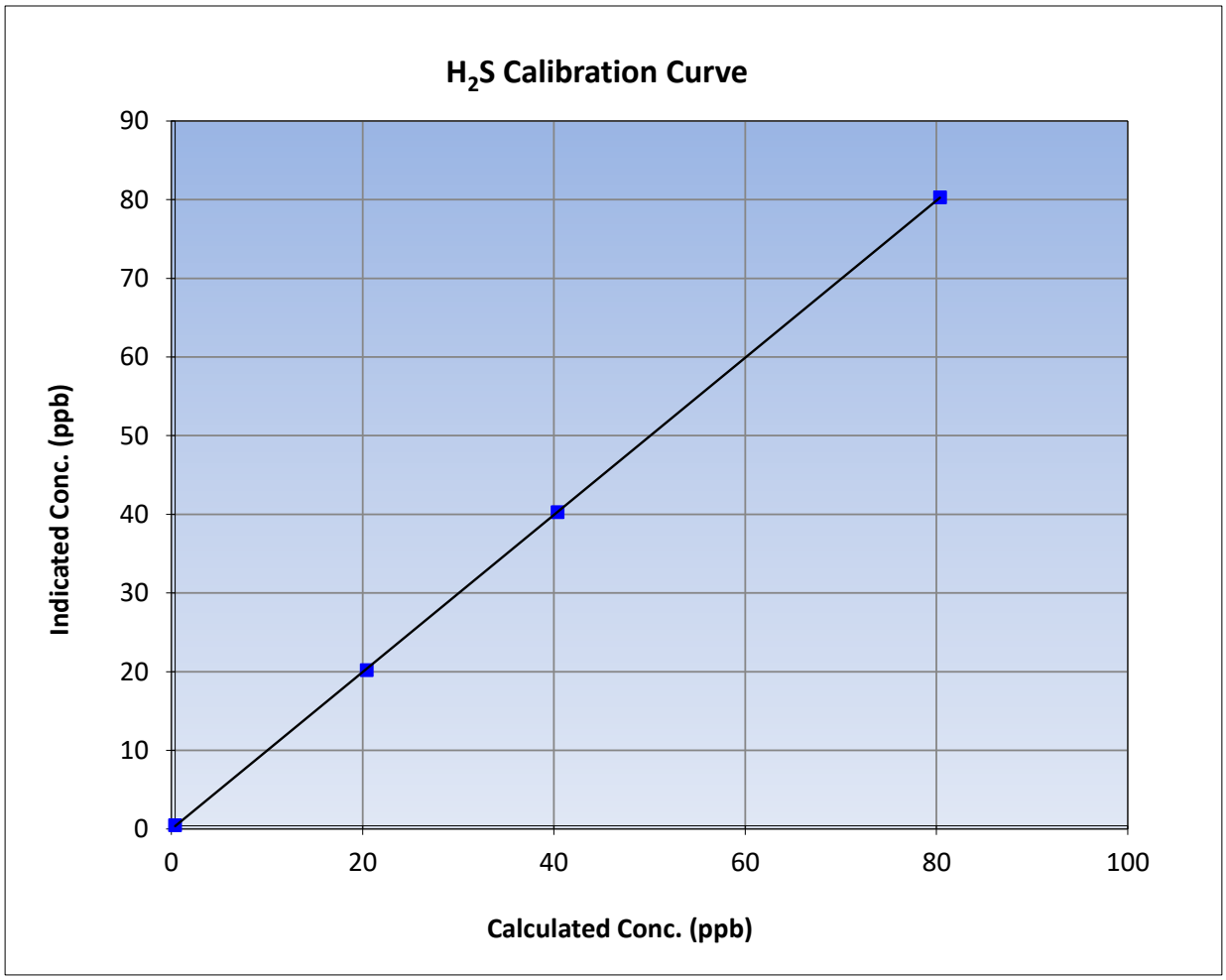
Station Information

Calibration Date:	October 5, 2023	Previous Calibration:	September 28, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	6:57	End Time (MST):	11:50
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1336160090

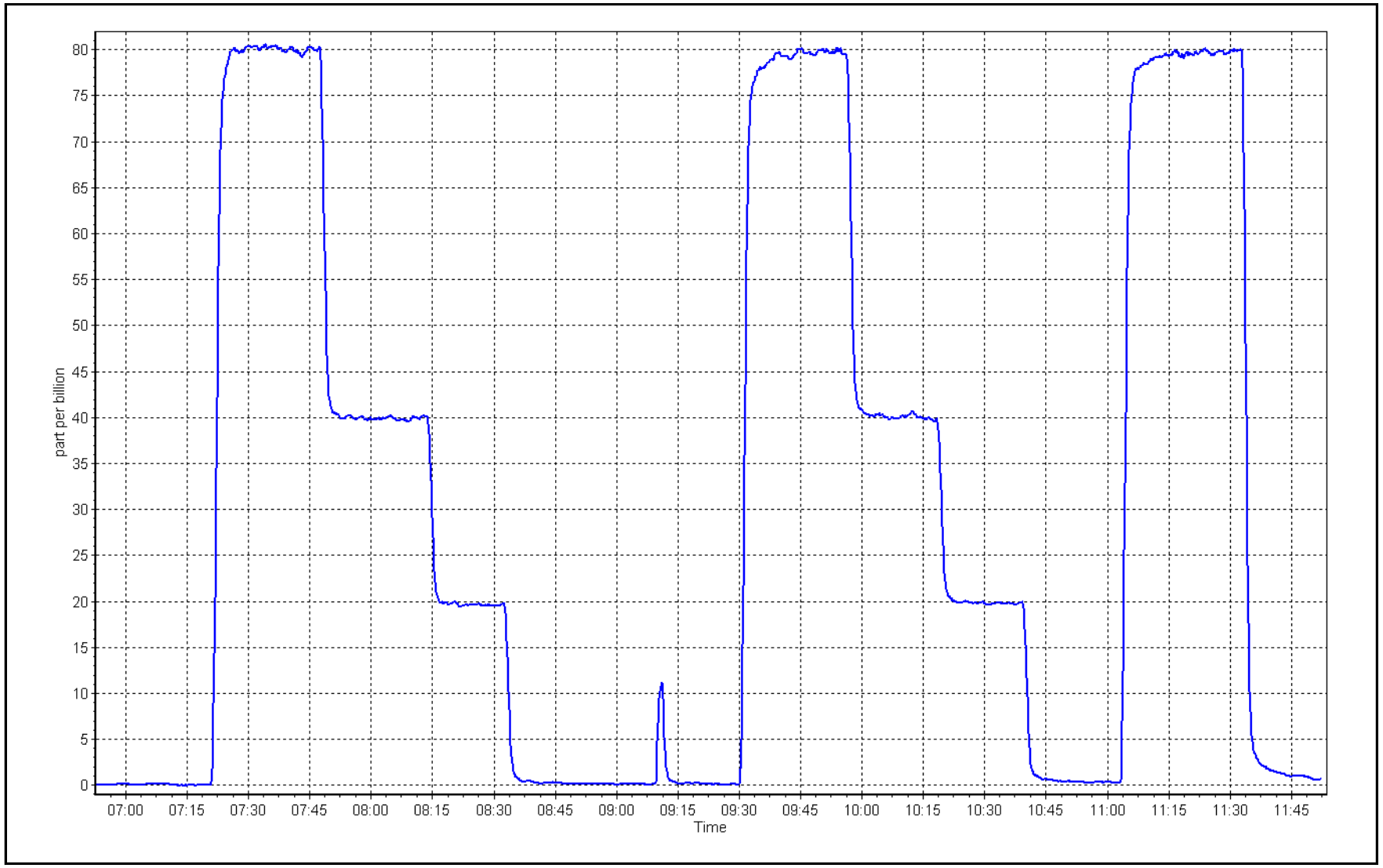
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	79.9	1.0008
40.0	39.9	1.0021
20.0	19.8	1.0121

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999984	*≥0.995*
Slope	0.999059	*0.90 - 1.10*
Intercept	-0.039168	*+/-3*



H_2S Calibration Plot Date: October 5, 2023 Location: Blackgold



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Harvest Blackgold	Station number:	AMS511
Calibration Date:	September 30, 2023	Last Cal Date:	NA
Start time (MST):	10:13	End time (MST):	13:40
Reason:	Install		

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:	NA	1.000628	Background:	NA	0.960
Calibration intercept:	NA	-0.054987	Coefficient:	NA	0.562

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	79.9	17.11	17.10	1.001
second point	4960	40.0	8.57	8.48	1.010
third point	4980	20.0	4.28	4.18	1.026
as left zero	5000	0.0	0.00	-0.02	----
as left span	4926	80.0	17.11	17.17	0.997
				Average Correction Factor	1.012

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. New sample inlet filter and ne pump installed. Adjusted span only.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

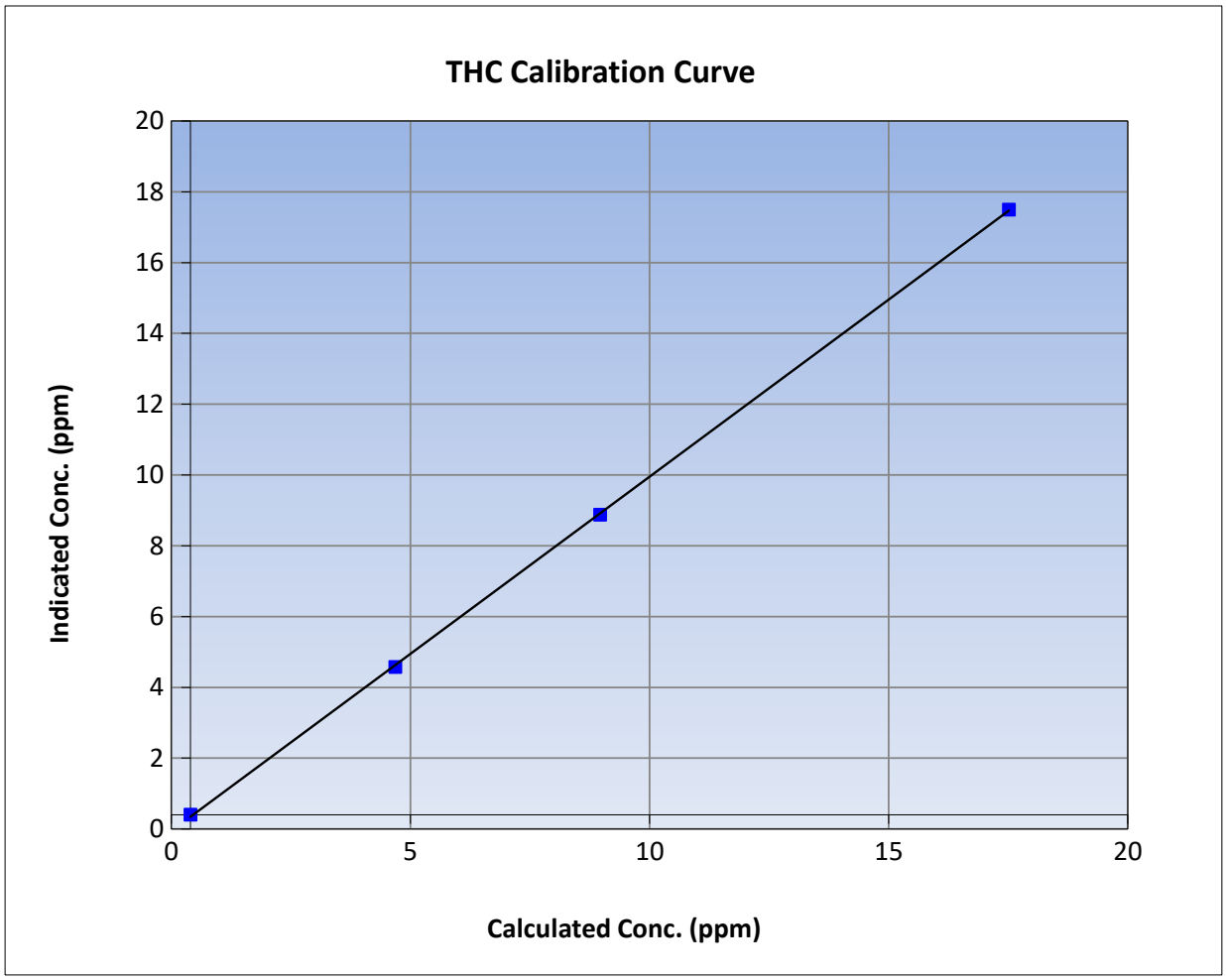
Station Information

Calibration Date:	September 30, 2023	Previous Calibration:	NA
Station Name:	Harvest Blackgold	Station Number:	AMS511
Start Time (MST):	10:13	End Time (MST):	13:40
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1317958295

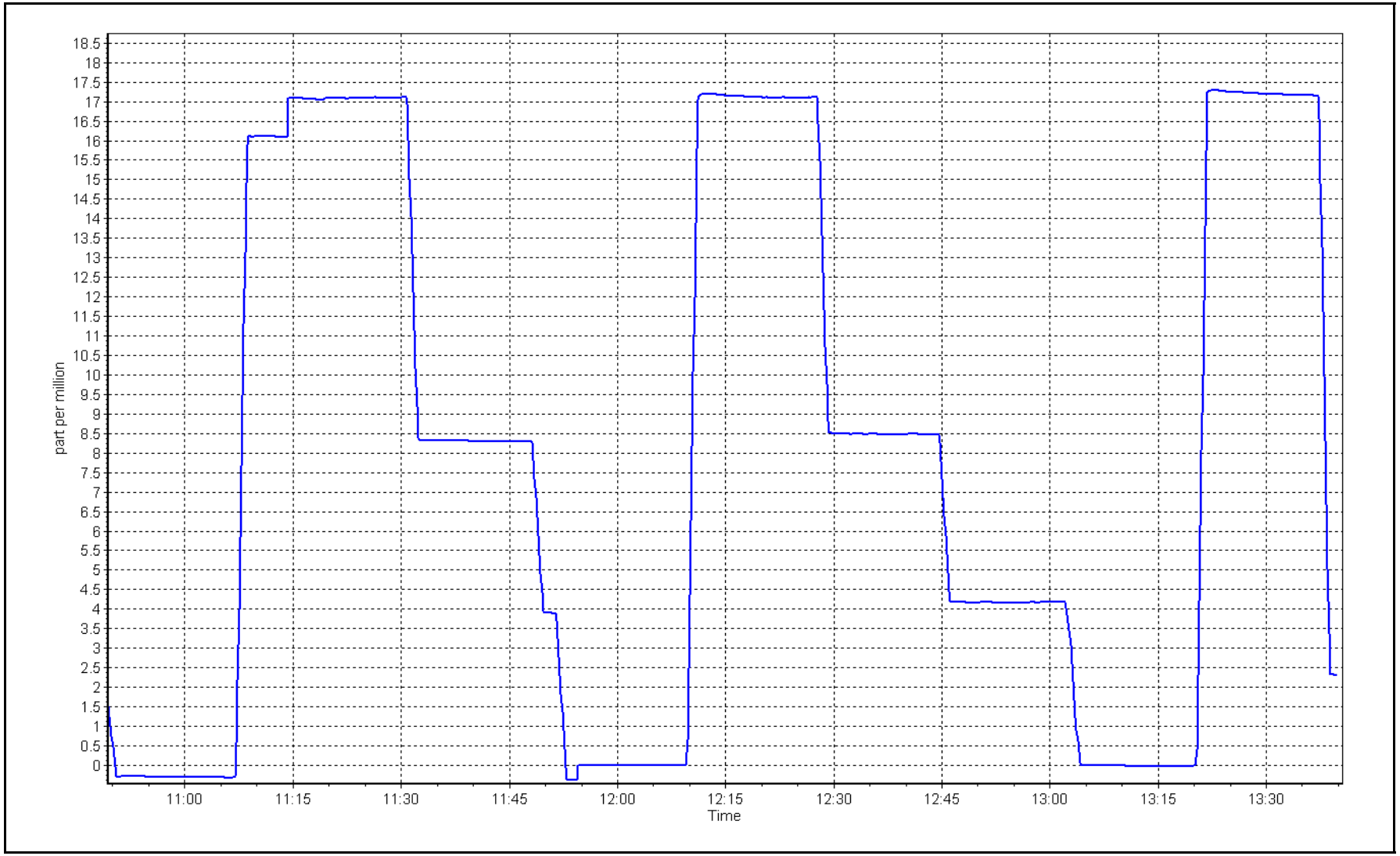
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.00	----
17.11	17.10	1.0008
8.57	8.48	1.0099
4.28	4.18	1.0255

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999947	*≥0.995*
Slope	1.000628	*0.90 - 1.10*
Intercept	-0.054987	*+/-1.5*



THC Calibration Plot Date: September 30, 2023 Location: Harvest Blackgold



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Blackgold	Station number:	AMS511
Calibration Date:	October 5, 2023	Last Cal Date:	September 30, 2023
Start time (MST):	11:30	End time (MST):	16:20
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:	1.000628	0.997401	Background:	0.96	0.94
Calibration intercept:	-0.054987	-0.038565	Coefficient:	0.562	0.550

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	0.04	----
as found span	4920	79.9	17.11	17.43	0.982
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.03	----
high point	4920	79.9	17.11	17.07	1.003
second point	4960	40.0	8.57	8.46	1.013
third point	4980	20.0	4.28	4.17	1.028
as left zero	5000	0.0	0.00	0.01	----
as left span	4926	80.0	17.11	17.13	0.999
				Average Correction Factor	1.014

Baseline Corr As found:	17.39	Previous response	17.07	*% change	1.9%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

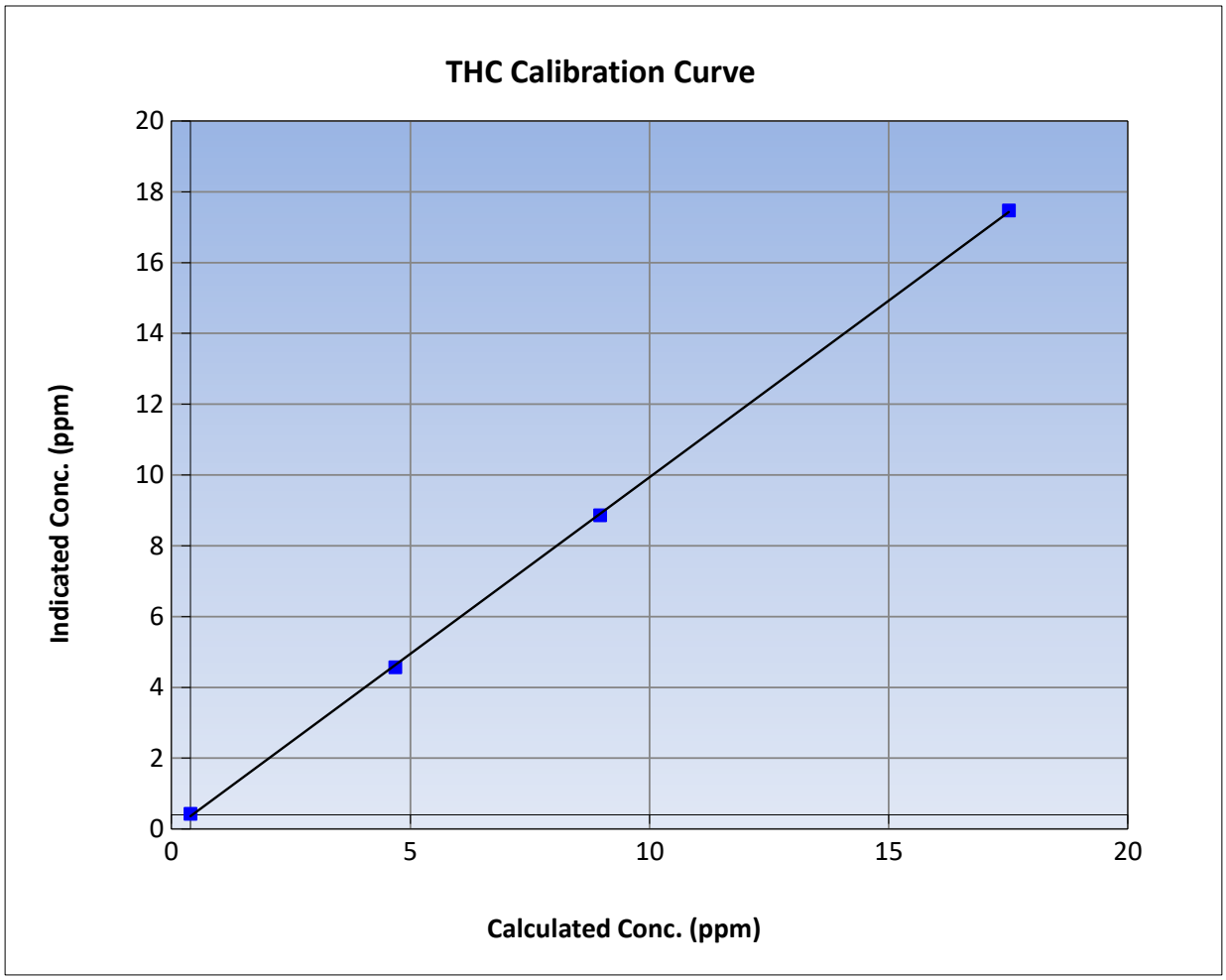
Station Information

Calibration Date:	October 5, 2023	Previous Calibration:	September 30, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	11:30	End Time (MST):	16:20
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1317958295

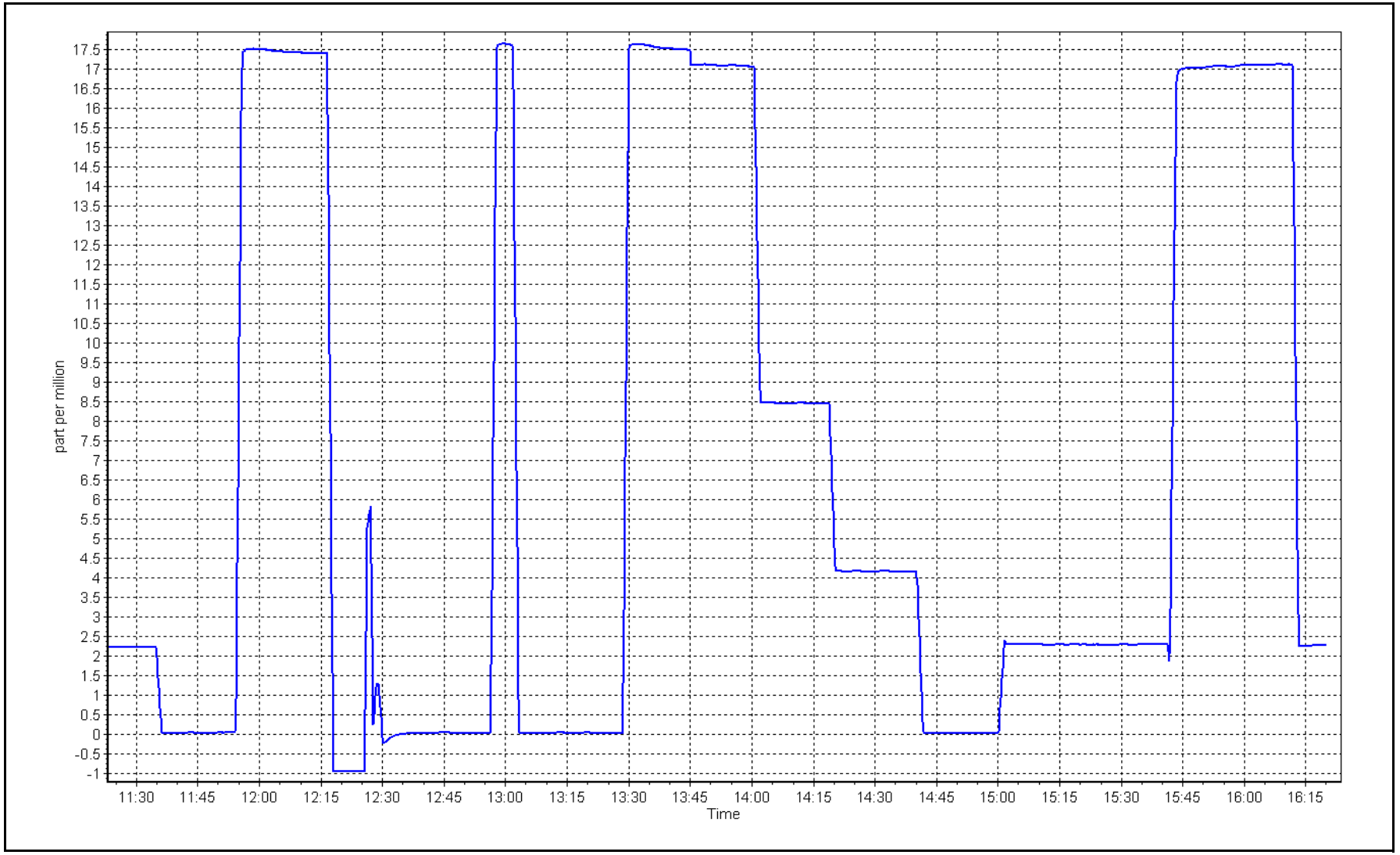
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.03	----
17.11	17.07	1.0025
8.57	8.46	1.0127
4.28	4.17	1.0277

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999916	*≥0.995*
Slope	0.997401	*0.90 - 1.10*
Intercept	-0.038565	*+/-1.5*



THC Calibration Plot Date: October 5, 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:	September 26, 2023	Last Cal Date:	NA
Start time (MST):	10:26	End time (MST):	14:57
Reason:	Install		

Calibration Standards

NO Gas Cylinder #:	T2XX7A5		Cal Gas Expiry Date:	January 14, 2024	
NOX Cal Gas Conc:	51.0	ppm	NO Cal Gas Conc:	49.1	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	51.0	ppm	Removed Gas NO Conc:	49.1	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	5258	
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:	NA	1.024	NO bkgnd or offset:	NA	-0.2
NOX coeff or slope:	NA	1.019	NOX bkgnd or offset:	NA	2.5
NO2 coeff or slope:	NA	1.000	Reaction cell Press:	NA	4.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	NA	1.001353
NO_X Cal Offset:	NA	-2.877465
NO Cal Slope:	NA	1.001728
NO Cal Offset:	NA	-2.897845
NO_2 Cal Slope:	NA	0.999779
NO_2 Cal Offset:	NA	-1.154126

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero										
as found span										
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-1.2	-0.1	-1.1	----	----
high point	4924	81.6	831.4	799.9	31.5	830.2	799.4	30.7	1.0014	1.0007
second point	4966	40.9	416.6	400.8	15.8	414.3	398.5	15.8	1.0056	1.0059
third point	4986	20.6	209.8	201.9	7.9	205.0	195.7	9.3	1.0236	1.0317
as left zero	5000	0.0	0.0	0.0	0.0	-0.8	0.4	-1.1	----	----
as left span	4924	81.6	831.4	405.2	426.2	818.5	394.8	423.6	1.0157	1.0264
								Average Correction Factor	1.0102	1.0127

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)	787.4	392.7	426.2	424.7	1.0034	99.7%
2nd GPT point (200 ppb O3)	787.4	598.3	220.6	220.1	1.0021	99.8%
3rd GPT point (100 ppb O3)	787.4	694.6	124.3	122.5	1.0144	98.6%
				Average Correction Factor	1.0066	99.3%

Notes: Install calibration. Changed sample inlet filter before calibrator zero. Adjusted span only.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

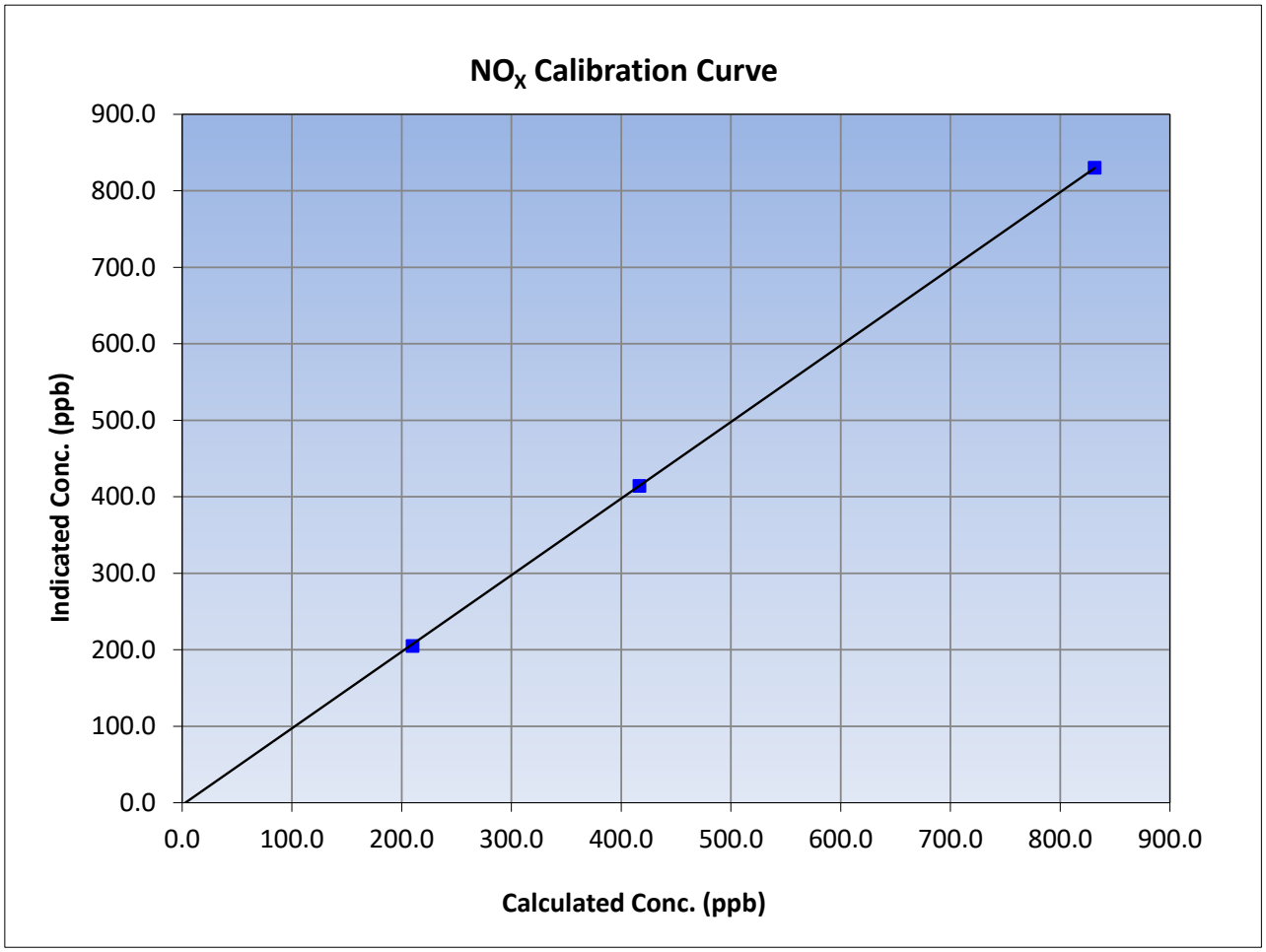
Version-04-2020

Station Information

Calibration Date:	September 26, 2023	Previous Calibration:	NA
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	10:26	End Time (MST):	14:57
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	-1.2	----	Correlation Coefficient	0.999978	*≥0.995*
831.4	830.2	1.0014			
416.6	414.3	1.0056	Slope	1.001353	*0.90 - 1.10*
209.8	205.0	1.0236			
			Intercept	-2.877465	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

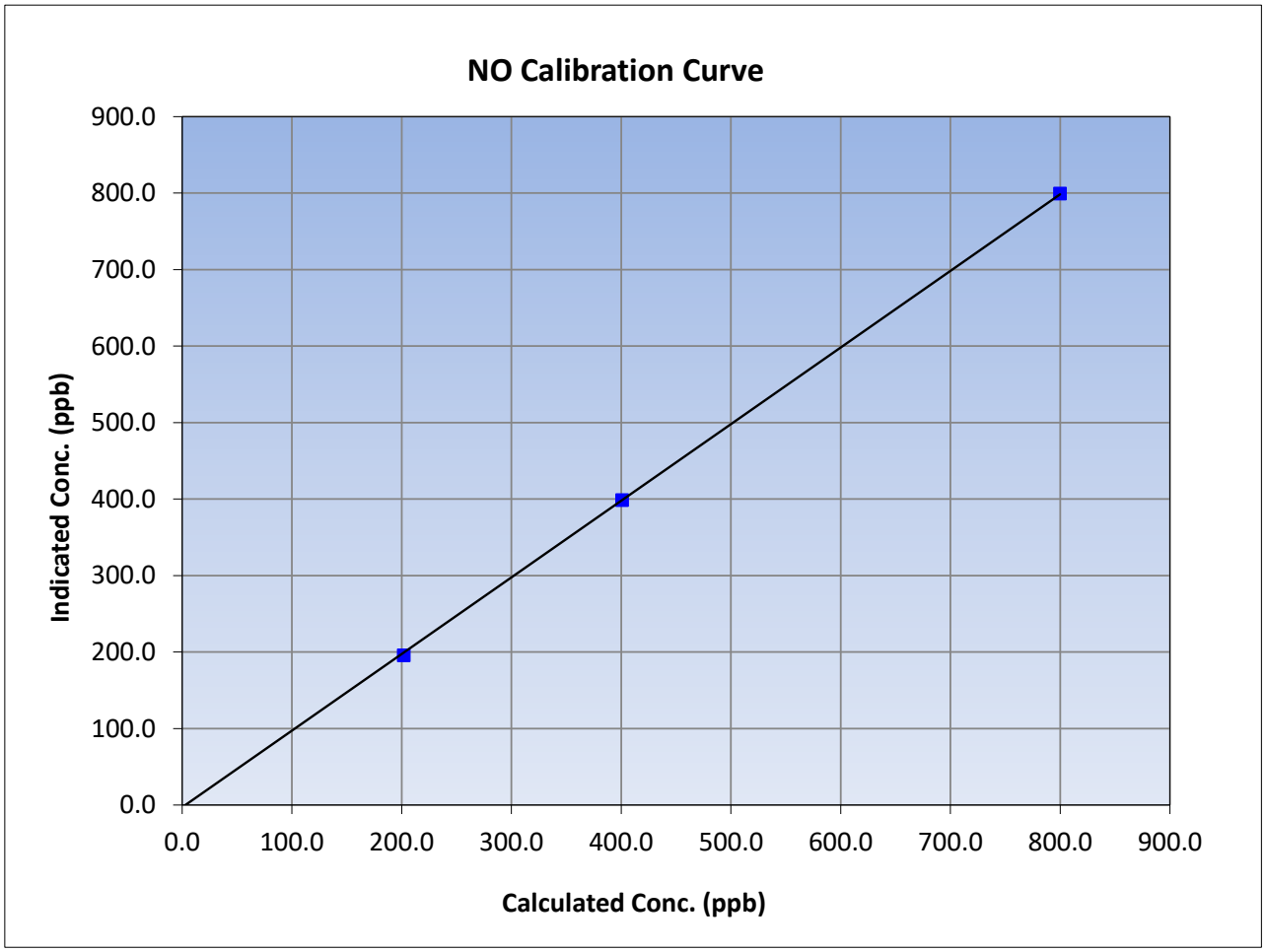
Version-04-2020

Station Information

Calibration Date:	September 26, 2023	Previous Calibration:	NA
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	10:26	End Time (MST):	14:57
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	0.999937	≥0.995
799.9	799.4	1.0007			
400.8	398.5	1.0059	Slope	1.001728	0.90 - 1.10
201.9	195.7	1.0317			
			Intercept	-2.897845	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

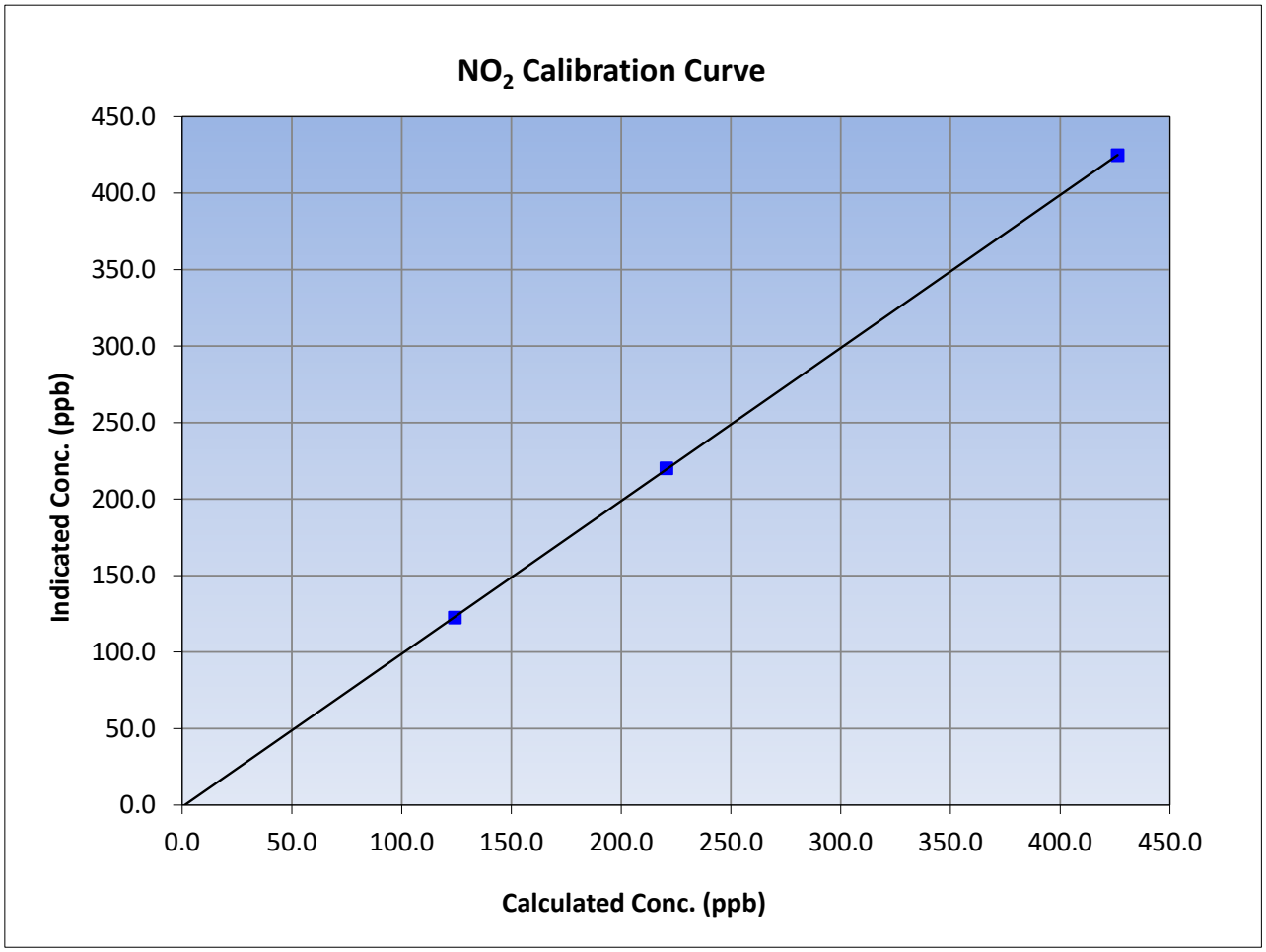
Version-04-2020

Station Information

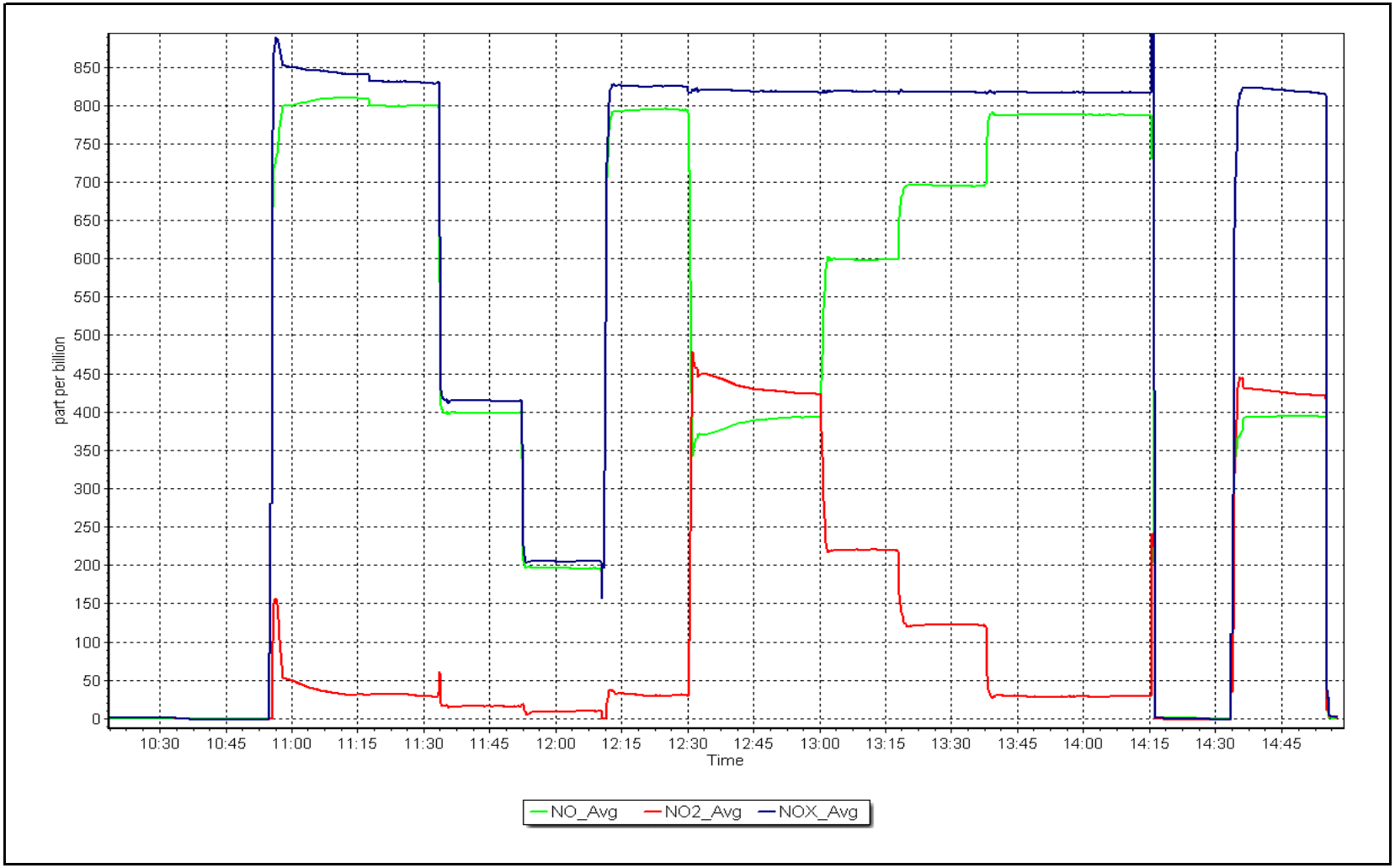
Calibration Date:	September 26, 2023	Previous Calibration:	NA
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	10:26	End Time (MST):	14:57
Analyzer make:	Teledyne API T200	Analyzer serial #:	7029

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-1.1	----	Correlation Coefficient	0.999990	*≥0.995*
426.2	424.7	1.0034			
220.6	220.1	1.0021	Slope	0.999779	*0.90 - 1.10*
124.3	122.5	1.0144			
			Intercept	-1.154126	*+/-20*



NO_X Calibration Plot Date: September 26, 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:	October 5, 2023	Last Cal Date:	September 26, 2023
Start time (MST):	7:06	End time (MST):	16:02
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2XX7A5		Cal Gas Expiry Date:	January 14, 2024	
NOX Cal Gas Conc:	51.0	ppm	NO Cal Gas Conc:	49.1	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	51.0	ppm	Removed Gas NO Conc:	49.1	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T750		Serial Number:	282	
ZAG make/model:	Teledyne API T751H		Serial Number:	321	

Analyzer Information

Analyzer make:	Teledyne API T200	Analyzer serial #:	7029
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.024	1.029	NO bkgnd or offset:	-0.2	0.2
NOX coeff or slope:	1.019	1.029	NOX bkgnd or offset:	2.5	1.1
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	4.2	4.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001353	0.994686
NO_X Cal Offset:	-2.877465	1.102483
NO Cal Slope:	1.001728	0.983189
NO Cal Offset:	-2.897845	2.228032
NO_2 Cal Slope:	0.999779	1.005880
NO_2 Cal Offset:	-1.154126	0.450694

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	0.4	-0.5	----	----
as found span	4924	81.6	831.4	799.9	31.5	819.0	789.9	28.8	1.0151	1.0127
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.3	0.2	----	----
high point	4924	81.6	831.4	799.9	31.5	827.0	786.2	40.7	1.0053	1.0175
second point	4966	40.9	416.6	400.8	15.8	417.5	401.3	16.3	0.9979	0.9989
third point	4986	20.6	209.8	201.9	7.9	210.1	200.8	9.3	0.9988	1.0055
as left zero	5000	0.0	0.0	0.0	0.0	0.0	-0.2	0.2	----	----
as left span	4924	81.6	831.4	404.4	427.0	826.0	81.4	744.6	1.0065	4.9684
								Average Correction Factor	1.0006	1.0073

Corrected As found	NO_X = 819.1 ppb	NO = 789.5 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-1.3%
Previous Response	NO_X = 829.6 ppb	NO = 798.4 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)	795.9	400.4	427.0	429.6	0.9939	100.6%
2nd GPT point (200 ppb O3)	795.9	599.0	228.4	230.8	0.9894	101.1%
3rd GPT point (100 ppb O3)	795.9	698.6	128.8	129.9	0.9912	100.9%
				Average Correction Factor	0.9915	100.9%

Notes: Portable setup used for calibration. Adjusted zero and span. As left span was out, the current calibrator is outputting inconsistent GPT points, will look to replace the calibrator this month.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

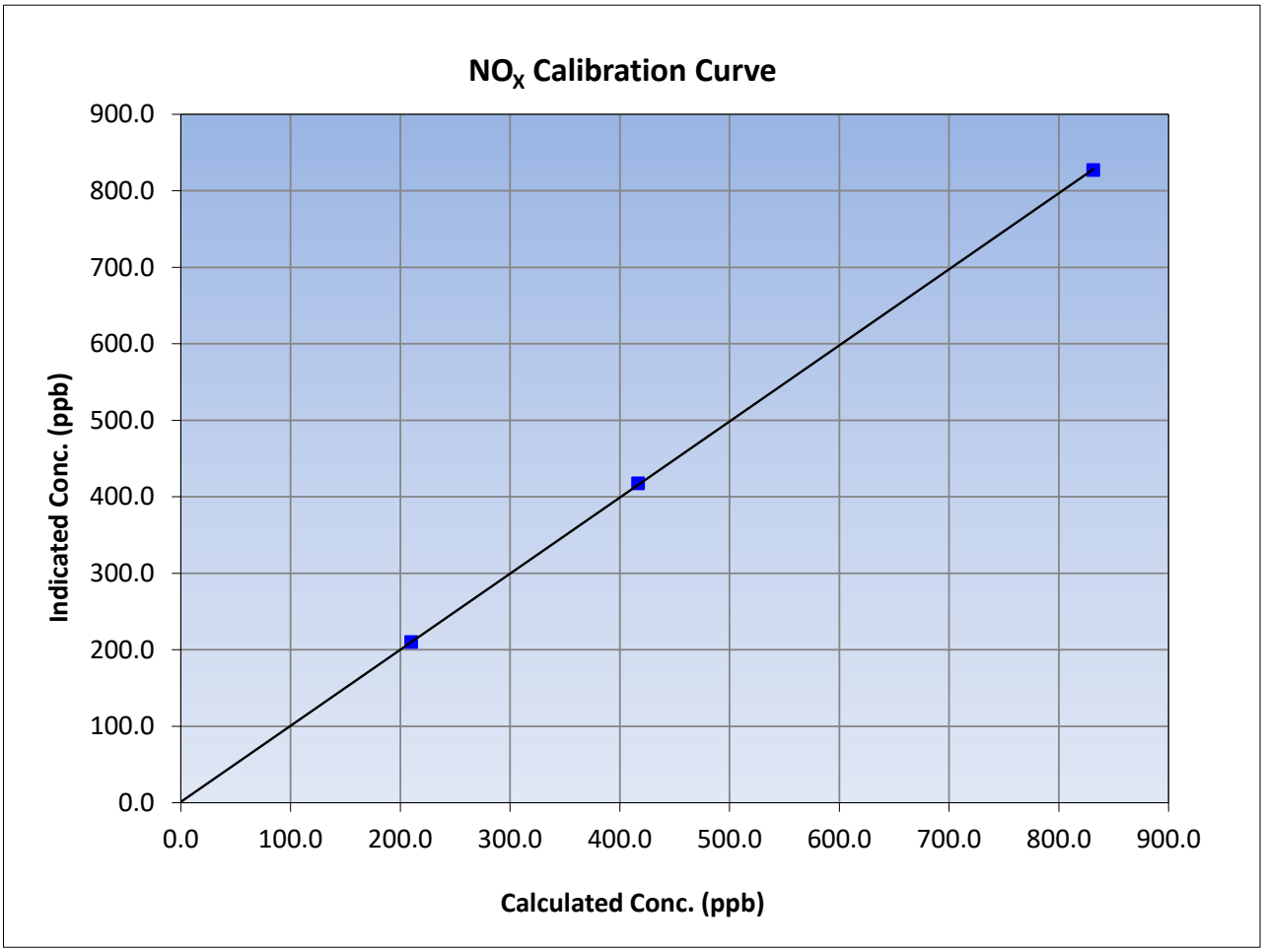
Version-04-2020

Station Information

Calibration Date:	October 5, 2023	Previous Calibration:	September 26, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	7:06	End Time (MST):	16:02
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	0.999982	≥0.995
831.4	827.0	1.0053			
416.6	417.5	0.9979	Slope	0.994686	0.90 - 1.10
209.8	210.1	0.9988			
			Intercept	1.102483	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

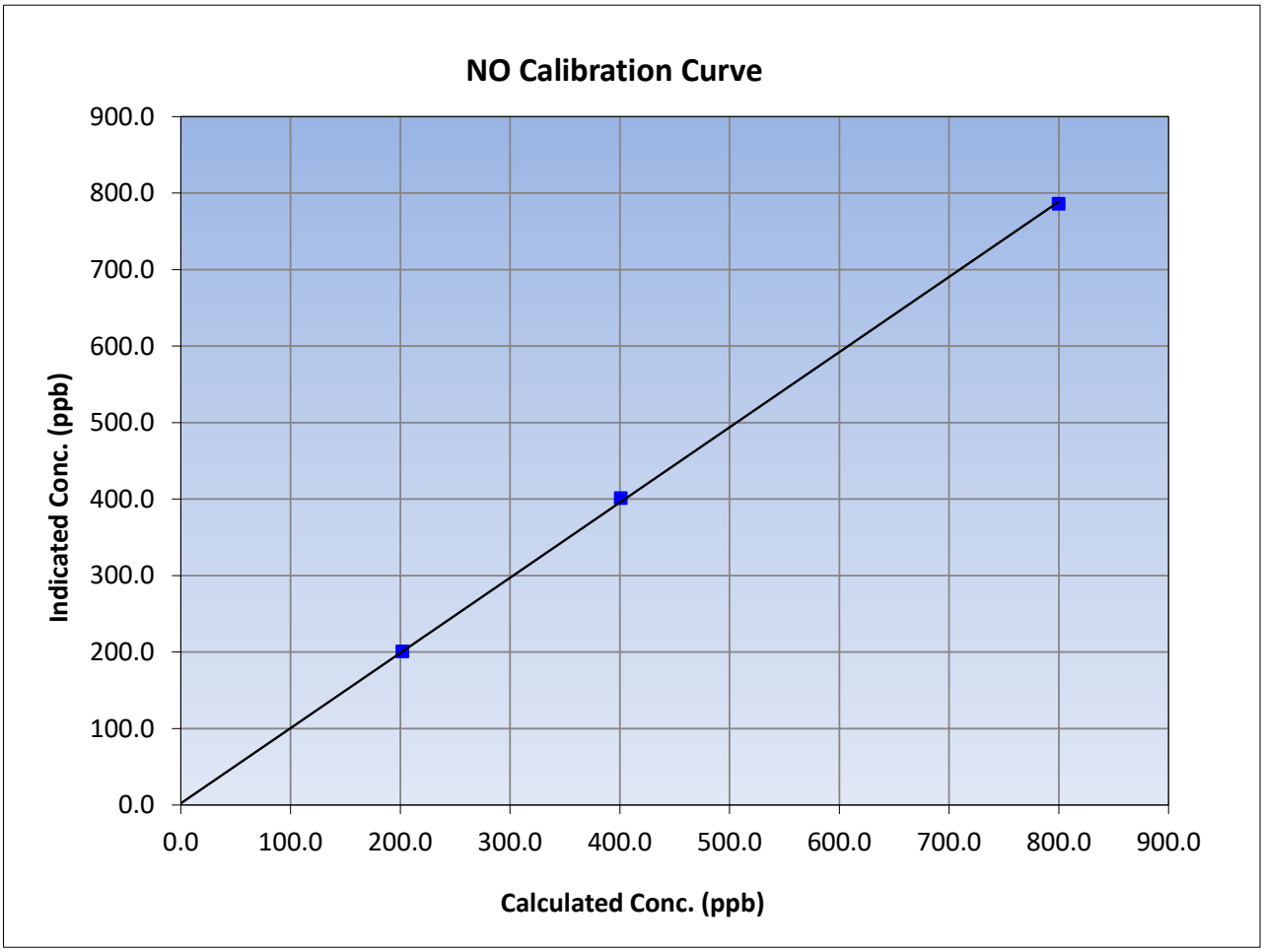
Version-04-2020

Station Information

Calibration Date:	October 5, 2023	Previous Calibration:	September 26, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	7:06	End Time (MST):	16:02
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	-0.3	----	Correlation Coefficient	0.999889	≥0.995
799.9	786.2	1.0175			
400.8	401.3	0.9989	Slope	0.983189	0.90 - 1.10
201.9	200.8	1.0055			
			Intercept	2.228032	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

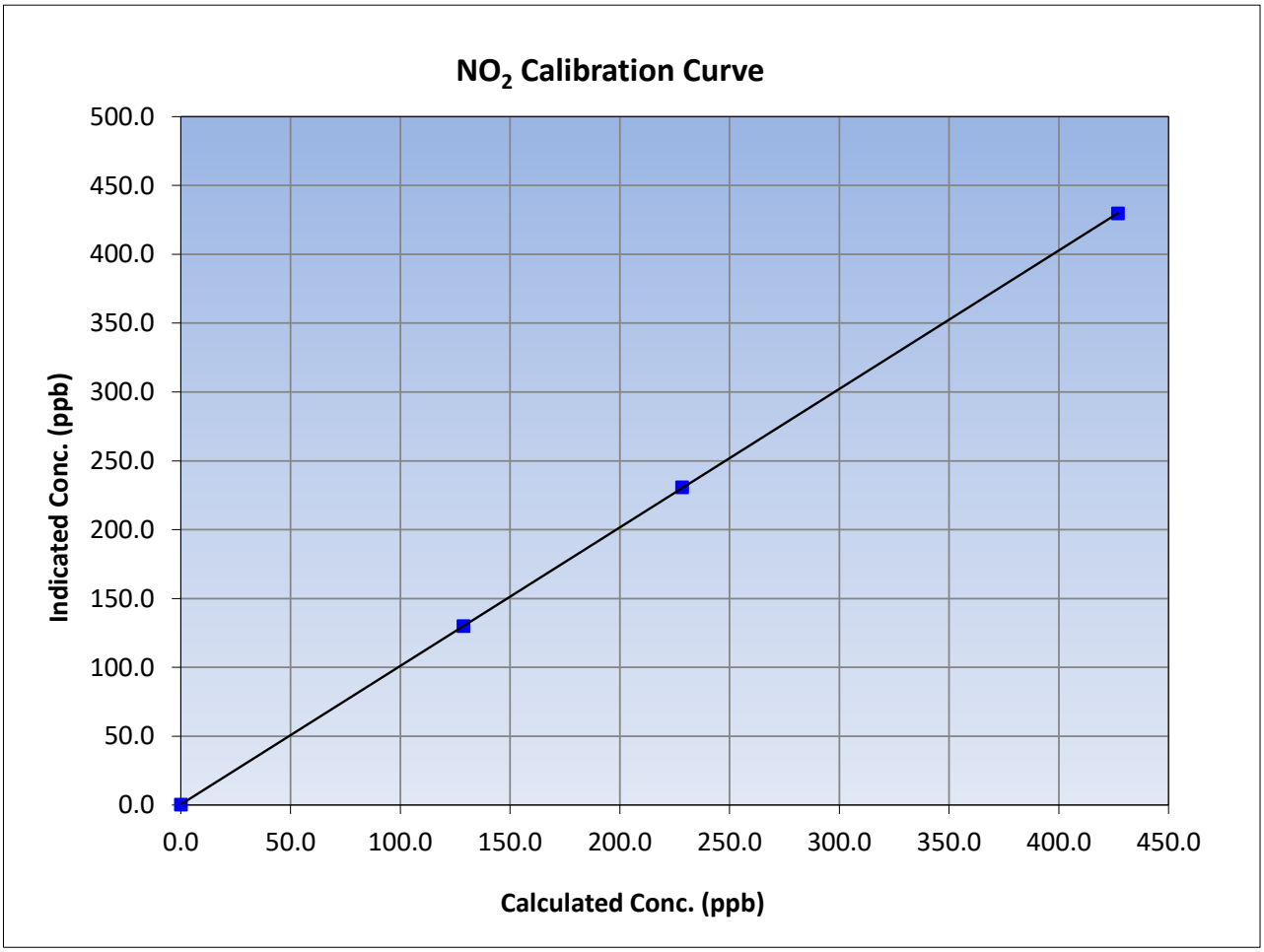
Version-04-2020

Station Information

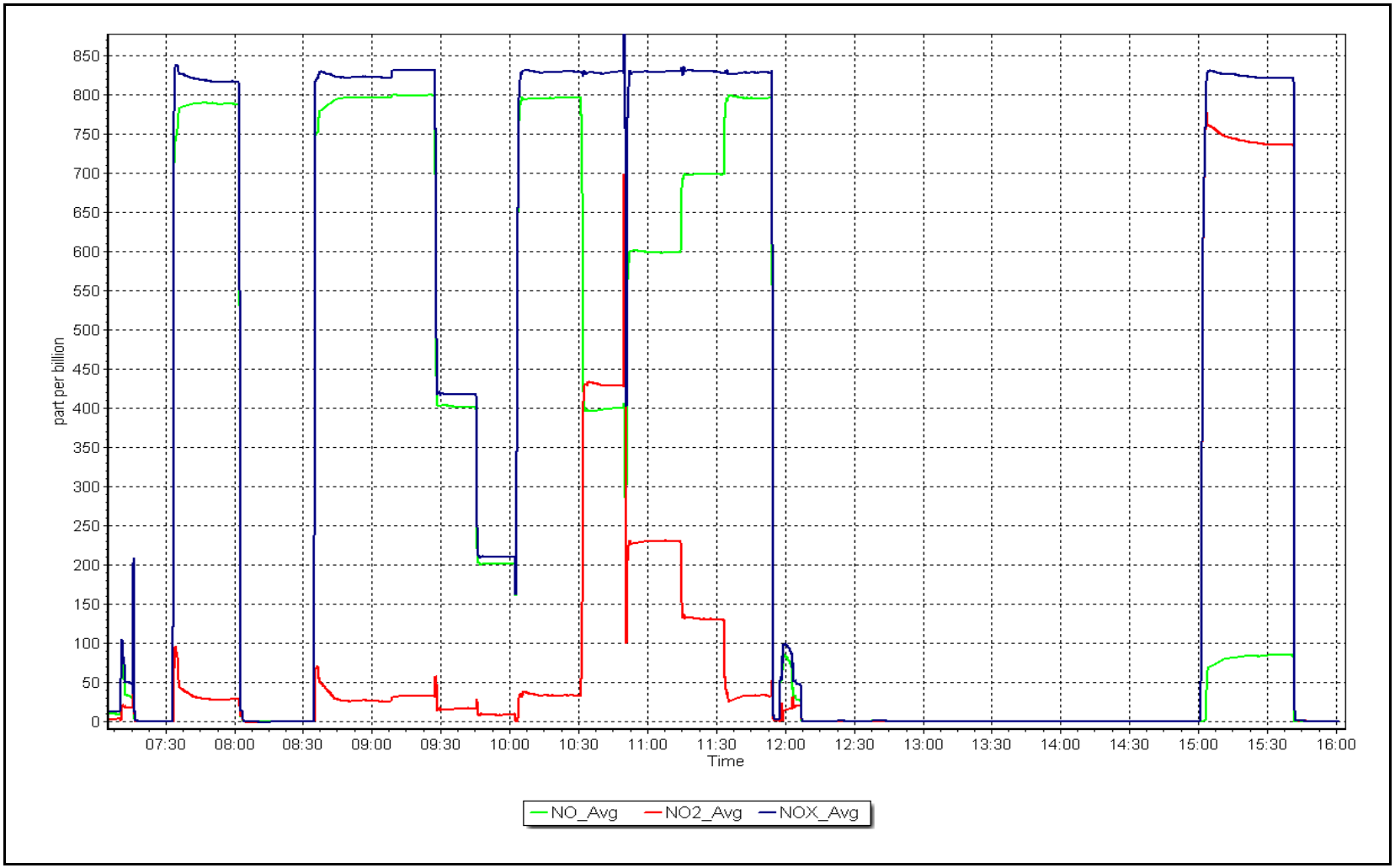
Calibration Date:	October 5, 2023	Previous Calibration:	September 26, 2023
Station Name:	Blackgold	Station Number:	AMS511
Start Time (MST):	7:06	End Time (MST):	16:02
Analyzer make:	Teledyne API T200	Analyzer serial #:	7029

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999994	≥0.995
427.0	429.6	0.9939			
228.4	230.8	0.9894	Slope	1.005880	0.90 - 1.10
128.8	129.9	0.9912			
			Intercept	0.450694	+/-20



NO_X Calibration Plot Date: October 5, 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:	October 5, 2023	Last Cal Date:	September 26, 2023
Start time (MST):	7:06	End time (MST):	9:25
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 #:	T2XX7A5		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	51.0	ppm	Removed Gas NO Conc:	49.1	ppm
NOX gas Diff:	2.5%		NO gas Diff:	2.5%	
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:	1.024	1.029	NO bkgnd or offset:	-0.2	0.2
NOX coeff or slope:	1.019	1.029	NOX bkgnd or offset:	2.5	1.1
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	4.2	4.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.994686	
NO_X Cal Offset:	1.102483	
NO Cal Slope:	0.983189	
NO Cal Offset:	2.228032	
NO_2 Cal Slope:	1.005880	
NO_2 Cal Offset:	0.450694	

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	4924	81.6	831.4	799.9	31.5	803.0	769.2	34.1	1.0354	1.0399
as found 2nd										
as found 3rd										
new cyl resp	4916	84.4	800.6	800.6	0.0	792.4	788.4	4.0	1.0103	1.0154
calibrator zero										
high point										
second point										
third point										
as left zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.2	-0.3	----	----
as left span	4916	84.4	800.6			785.3	396.1	389.2	1.0194	
								Average Correction Factor		

Corrected As found	NO_X = NA ppb	NO = NA ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	NA
Previous Response	NO_X = 828.1 ppb	NO = 788.7 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:		

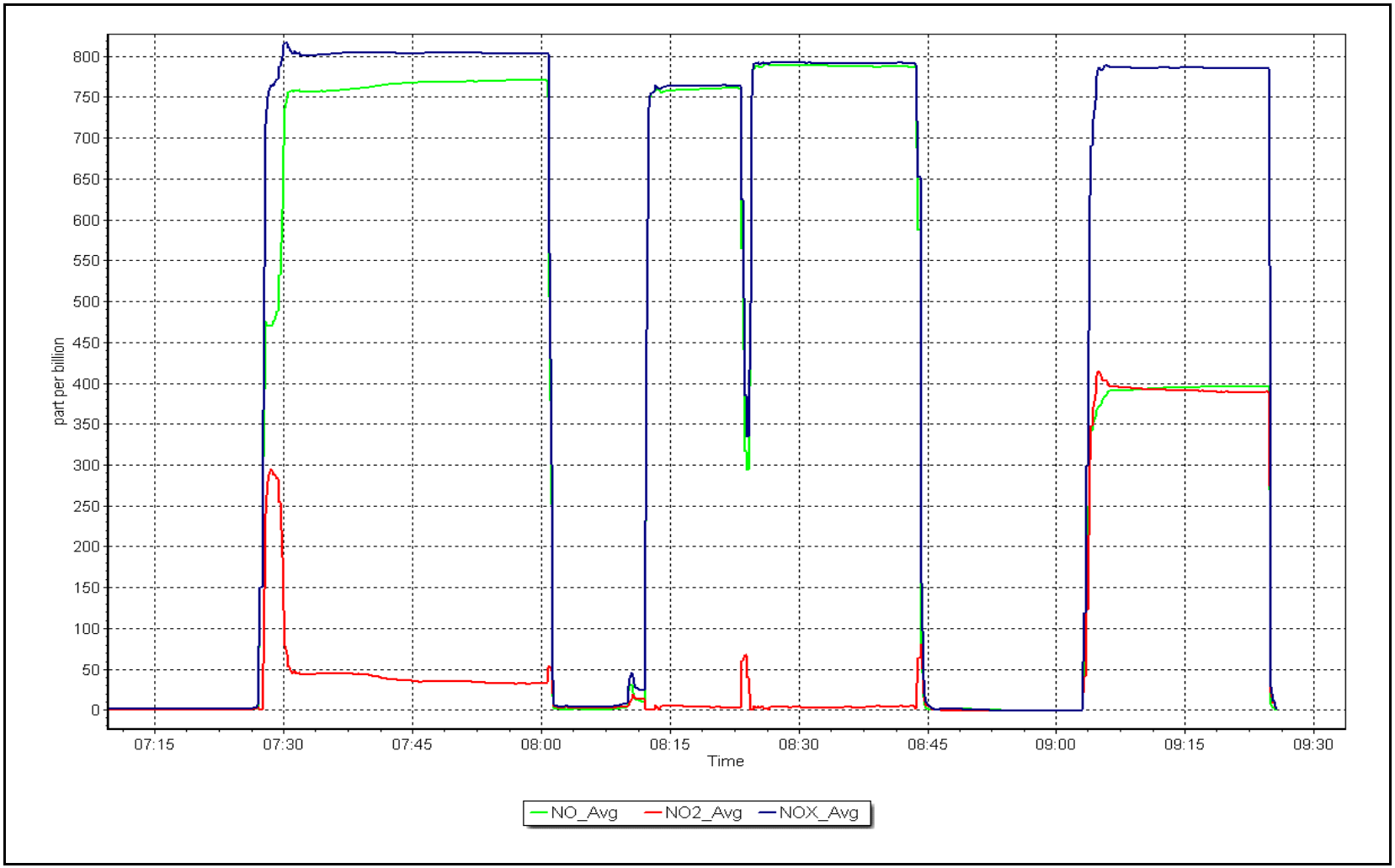
GPT Calibration Data

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

Notes: Changed NO cylinder, cylinder#: T2XX7A5 does not meet internal audit standards. Replaced with cylinder#: T0F8P52.

Calibration Performed By: Braiden Boutilier

NO_X Calibration Plot Date: October 5, 2023 Location: Blackgold



Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Blackgold	Station Number:	AMS 511
Calibration Date:	September 26 & 28th, 2023	Prev Cal Date:	NA
Start Time (MST):	11:52	End Time (MST):	13:58
Tower Height (m):	10.0	Reason:	Install

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	B10017
WS Calibrator:	MetOne 053	Serial Number:	P15103

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

	Start	***Finish***	*Limits*
Correl Coeff (r^2)		0.999999	*≥0.9995*
Calculated slope		0.998909	*0.90 - 1.10*
Calculated intercept		0.030357	*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	D13603
As Found Declination (deg east of True North):	NA	As Left Declination (deg east of True North):	13
Solar noon time (MST):	13:18	Calc Declination*:	13.08 Degrees
Deadband calc:	1.1 degrees (*Limit 4 deg*)		* - calculated declination as per NOAA website

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	% Error (based on 357° FS) *Limit = +/- 1.0%*
0	0.6	---
90	91.2	0.3%
180	181.9	0.5%
270	271.7	0.5%
357	356.5	-0.1%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)		0.999978	*≥0.9995*
Calculated slope		1.001818	*0.90 - 1.10*
Calculated intercept		-1.308016	*+/- 4*

Notes: Install calibration, WS completed Sep 26th and WD was done on Sep 28th. Set to true North as measured by solar noon and compass.

Calibration Performed By: Kelly Baragar/Devin Russell

End of Report