WOOD BUFFALO
ENVIRONMENTAL ASSOCIATION

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Wood Buffalo Environmental Association

JUNE 2023

MONTHLY CALIBRATION REPORT

CONTINUOUS MONITORING

July 31, 2023

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS01
BERTHA GANTER - FORT MCKAY
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	June 1, 2023	Last Cal Date:	May 1, 2023
Start time (MST):	10:00	End time (MST):	13:46
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.19	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC486642			
Removed Cal Gas Conc:	49.19	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3565
ZAG Make/Model:	Teledyne API T701		Serial Number:	5609

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000343	0.999958	Backgd or Offset:	19.4	19.1
Calibration intercept:	0.027099	0.086959	Coeff or Slope:	0.893	0.883

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.2	----
as found span	4918	81.3	799.9	806.9	0.991
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.5	----
high point	4918	81.3	799.9	800.5	0.999
second point	4959	40.7	400.4	399.4	1.003
third point	4979	20.3	199.7	200.0	0.999
as left zero	5000	0.0	0.0	0.3	----
as left span	4918	81.3	799.9	800.2	1.000
				Average Correction Factor	1.000

Baseline Corr As found:	806.70	Previous response	800.24	*% change	0.8%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

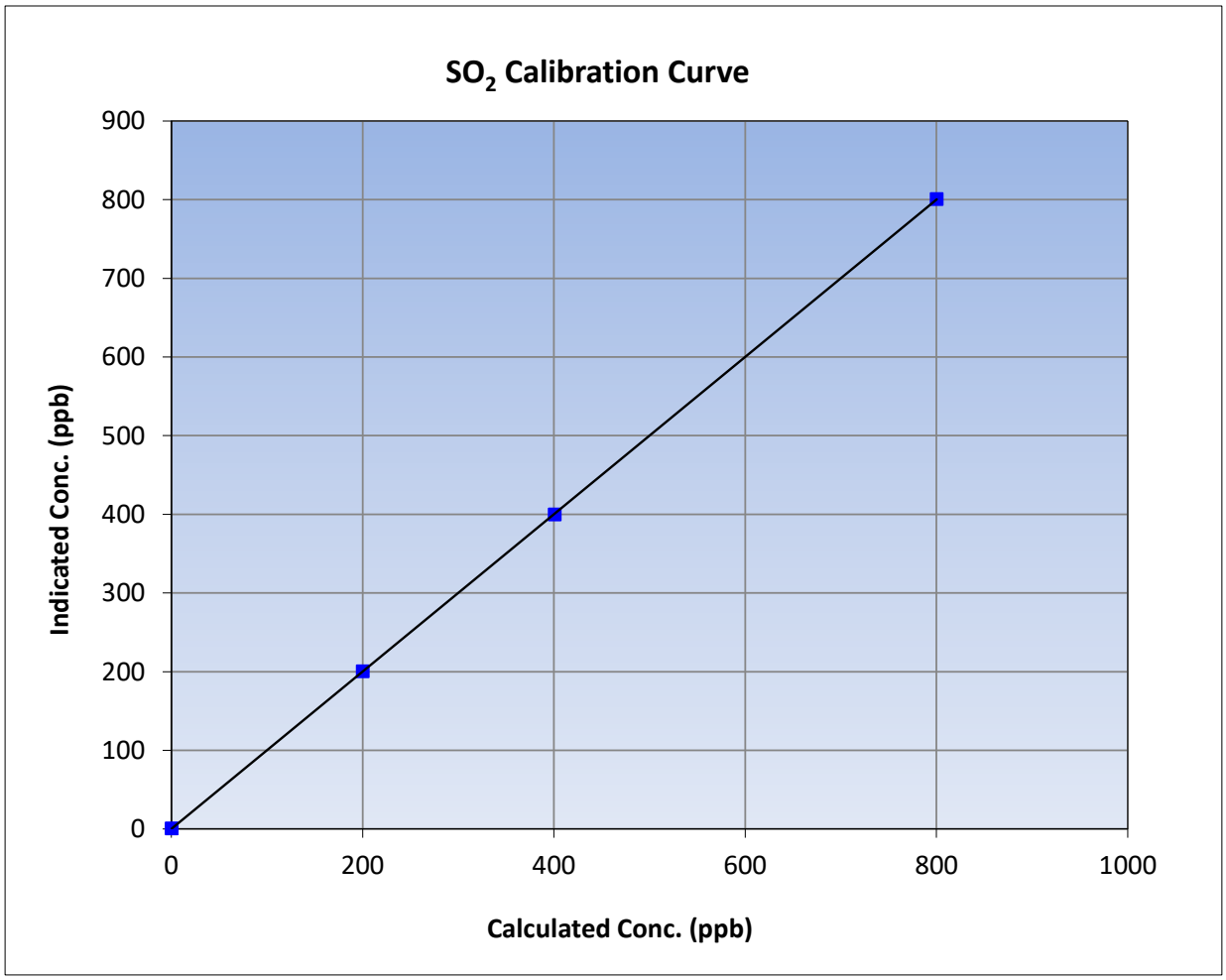
Station Information

Calibration Date:	June 1, 2023	Previous Calibration:	May 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:00	End Time (MST):	13:46
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301448

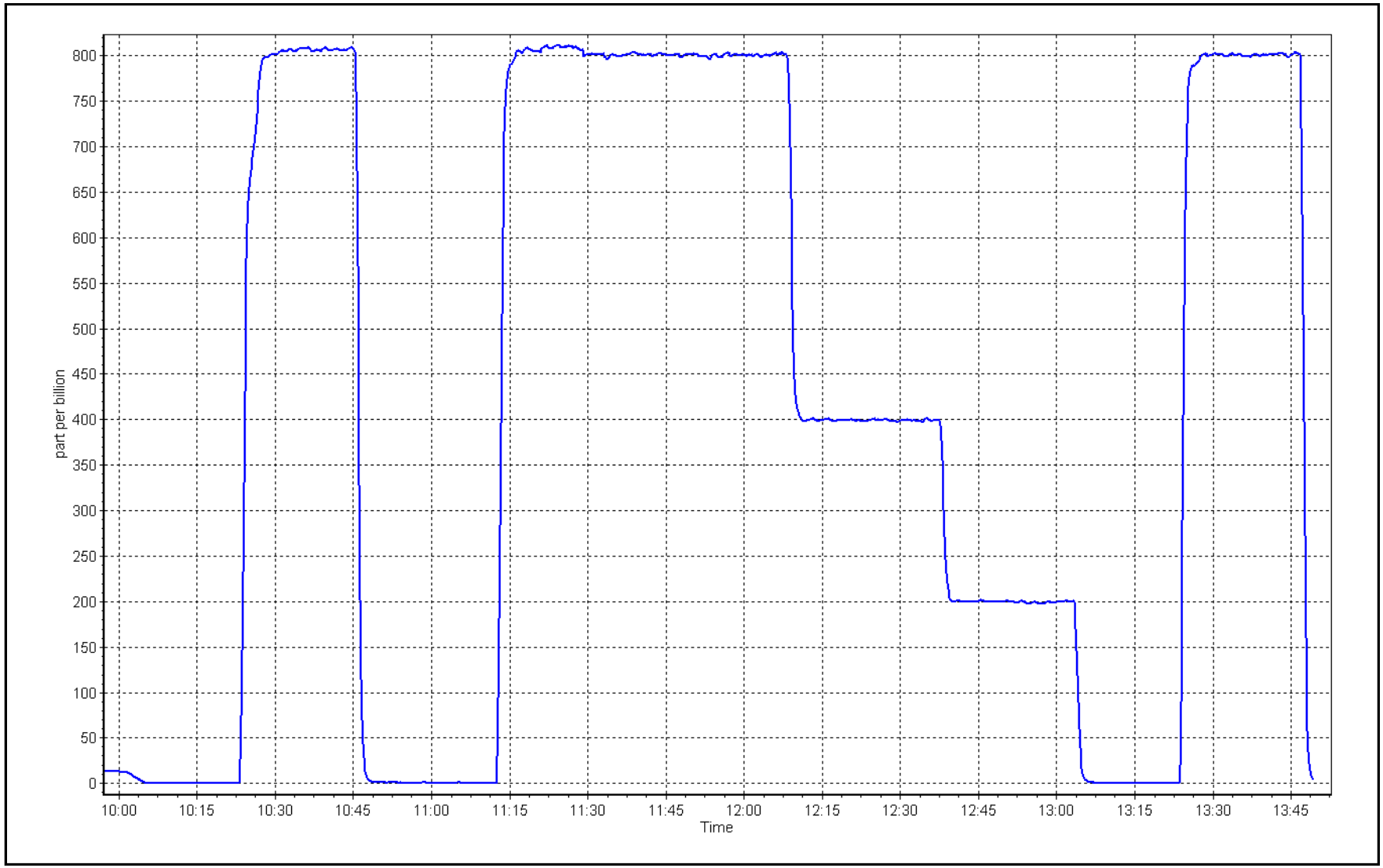
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
799.9	800.5	0.9993
400.4	399.4	1.0026
199.7	200.0	0.9987

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	0.999958	*0.90 - 1.10*
Intercept	0.086959	*+/-30*



SO2 Calibration Plot Date: June 1, 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:	June 27, 2023	Last Cal Date:	May 16, 2023
Start time (MST):	8:59	End time (MST):	13:45
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:	0.993792	1.002650	Backgd or Offset:	2.27	2.30
Calibration intercept:	0.220000	0.159995	Coeff or Slope:	0.919	0.919

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4921	78.4	80.0	79.4	1.009
as found 2nd point	4960	39.2	40.0	40.0	1.002
as found 3rd point	4980	19.6	20.0	20.0	1.005
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4921	78.4	80.0	80.3	0.996
second point	4960	39.2	40.0	40.5	0.988
third point	4980	19.6	20.0	20.0	1.000
as left zero	5000	0.0	0.0	0.4	----
as left span	4921	78.4	80.0	79.9	1.001
SO2 Scrubber Check	4919	81.3	813.0	0.0	----
Date of last scrubber change:		December 17, 2021		Ave Corr Factor	0.995
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.3	Prev response:	79.72	*% change:	-0.5%
Baseline Corr 2nd AF pt:	39.9	AF Slope:	0.991363	AF Intercept:	0.179997
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999988		

* = > +/-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

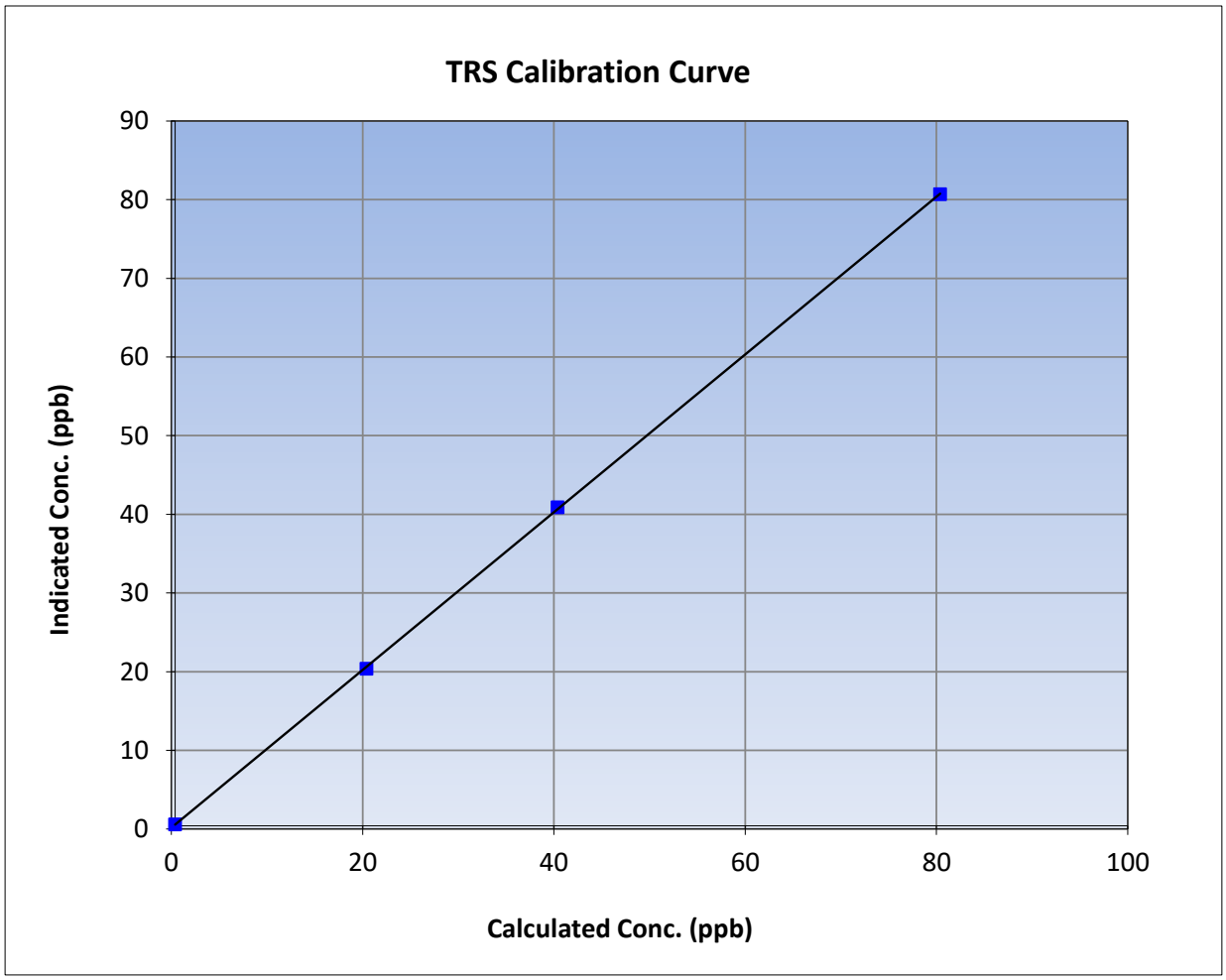
Station Information

Calibration Date:	June 27, 2023	Previous Calibration:	May 16, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	8:59	End Time (MST):	13:45
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153461

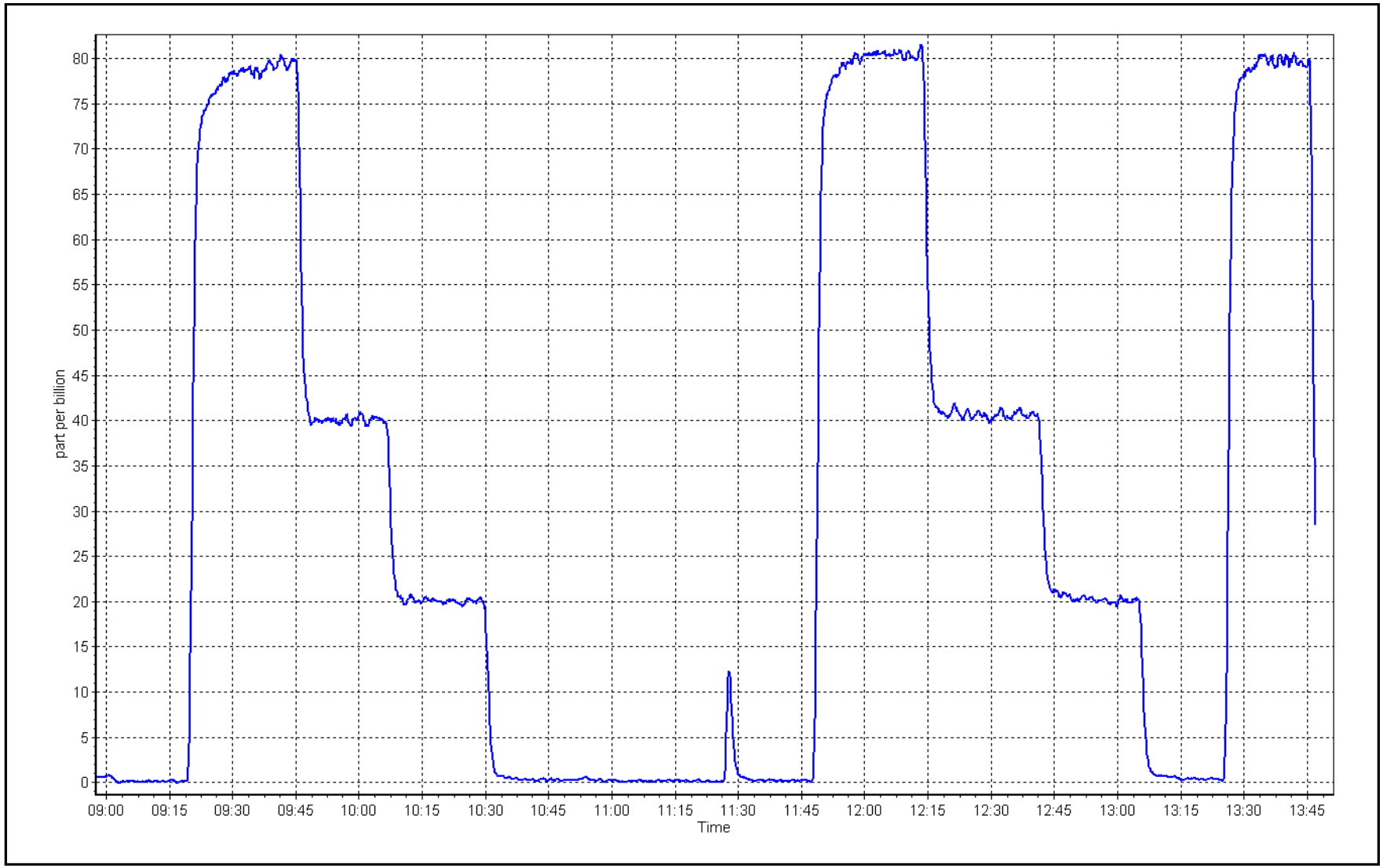
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	80.3	0.9962
40.0	40.5	0.9876
20.0	20.0	0.9999

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999970	*≥0.995*
Slope	1.002650	*0.90 - 1.10*
Intercept	0.159995	*+/-3*



TRS Calibration Plot Date: June 27, 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:	June 27, 2023	Last Cal Date:	May 16, 2023
Start time (MST):	8:59	End time (MST):	11:00
Reason:	As Found		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43iQTL		Analyzer serial #:	1200326167	
Converter make:	Thermo Converter		Converter serial #:	N/A	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001375		Backgd or Offset:	1.92	
Calibration intercept:	0.081613		Coeff or Slope:	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	-0.2	----
as found span	4921	78.4	80.0	81.4	0.980
as found 2nd point	4960	39.2	40.0	40.6	0.980
as found 3rd point	4980	19.6	20.0	20.0	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					
high point					
second point					
third point					
as left zero					
as left span					

SO2 Scrubber Check

Date of last scrubber change:	March 21, 2022	Ave Corr Factor	
Date of last converter efficiency test:			efficiency

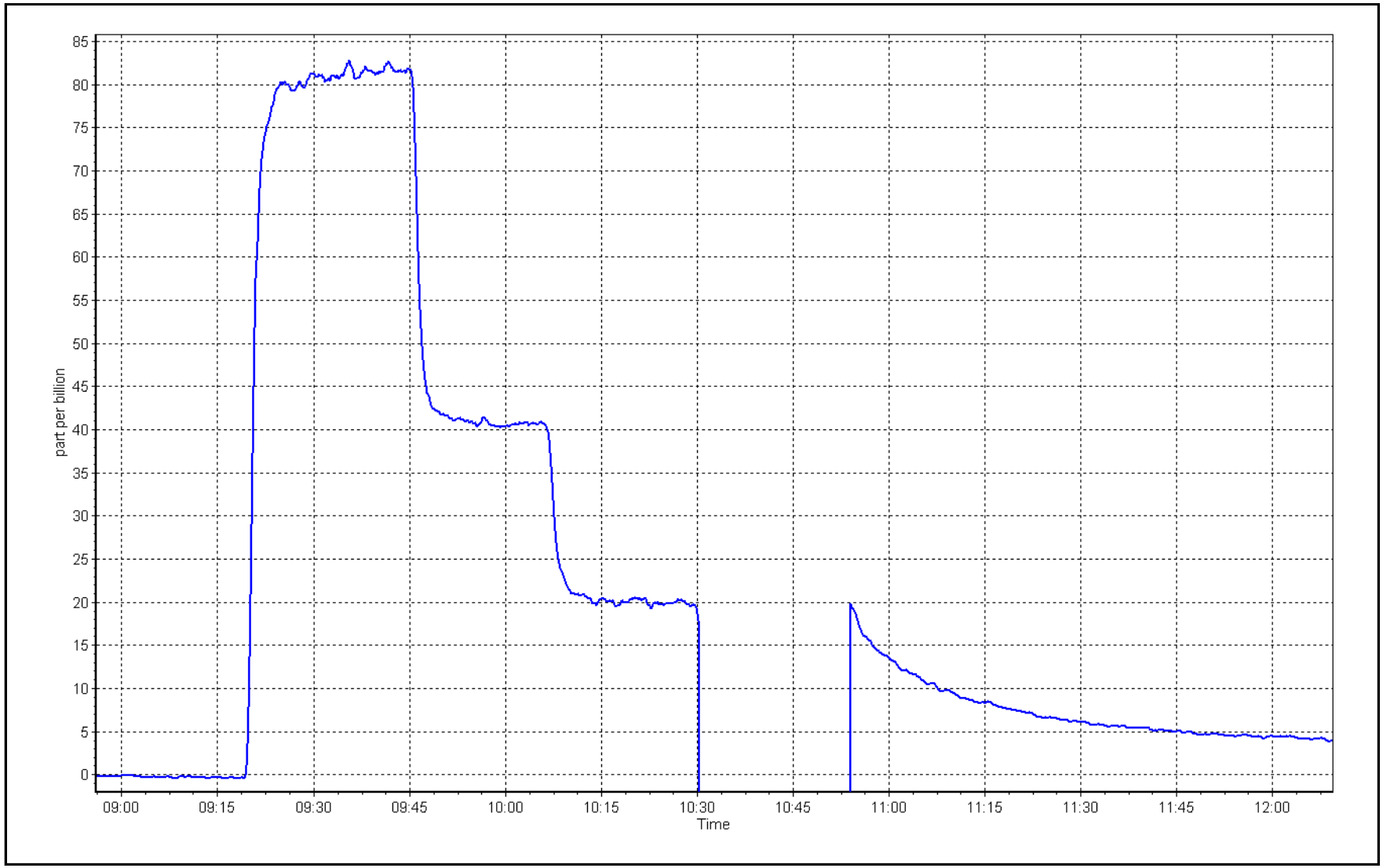
Baseline Corr As found:	81.6	Prev response:	80.17	*% change:	1.8%
Baseline Corr 2nd AF pt:	40.8	AF Slope:	1.021137	AF Intercept:	-0.280002
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999993		

* = > +/-5% change initiates investigation

Notes: Inlet filter change completed after as founds. Replaced the kicker assembly.

Calibration Performed By: Rene Chamberland

H_2S Calibration Plot Date: June 27, 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:	June 28, 2023	Last Cal Date:	May 16, 2023
Start time (MST):	9:10	End time (MST):	13:06
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43iQTL		Analyzer serial #:	1200326167	
Converter make:	Thermo Converter		Converter serial #:	N/A	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001375	0.997140	Backgd or Offset:	1.92	1.91
Calibration intercept:	0.081613	0.156826	Coeff or Slope:	1.001	0.992

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	0.3	----
high point	4922	78.4	80.0	80.0	1.000
second point	4960	39.2	40.0	39.9	1.002
third point	4980	19.6	20.0	20.0	1.000
as left zero	5000	0.0	0.0	0.5	----
as left span	4922	78.4	80.0	78.3	1.021
SO2 Scrubber Check	4919	81.3	813.0		----
Date of last scrubber change:		March 21, 2022		Ave Corr Factor	1.001
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: Kicker assembly was replaced yesterday. Scrubber check completed after zero. Adjusted span only.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

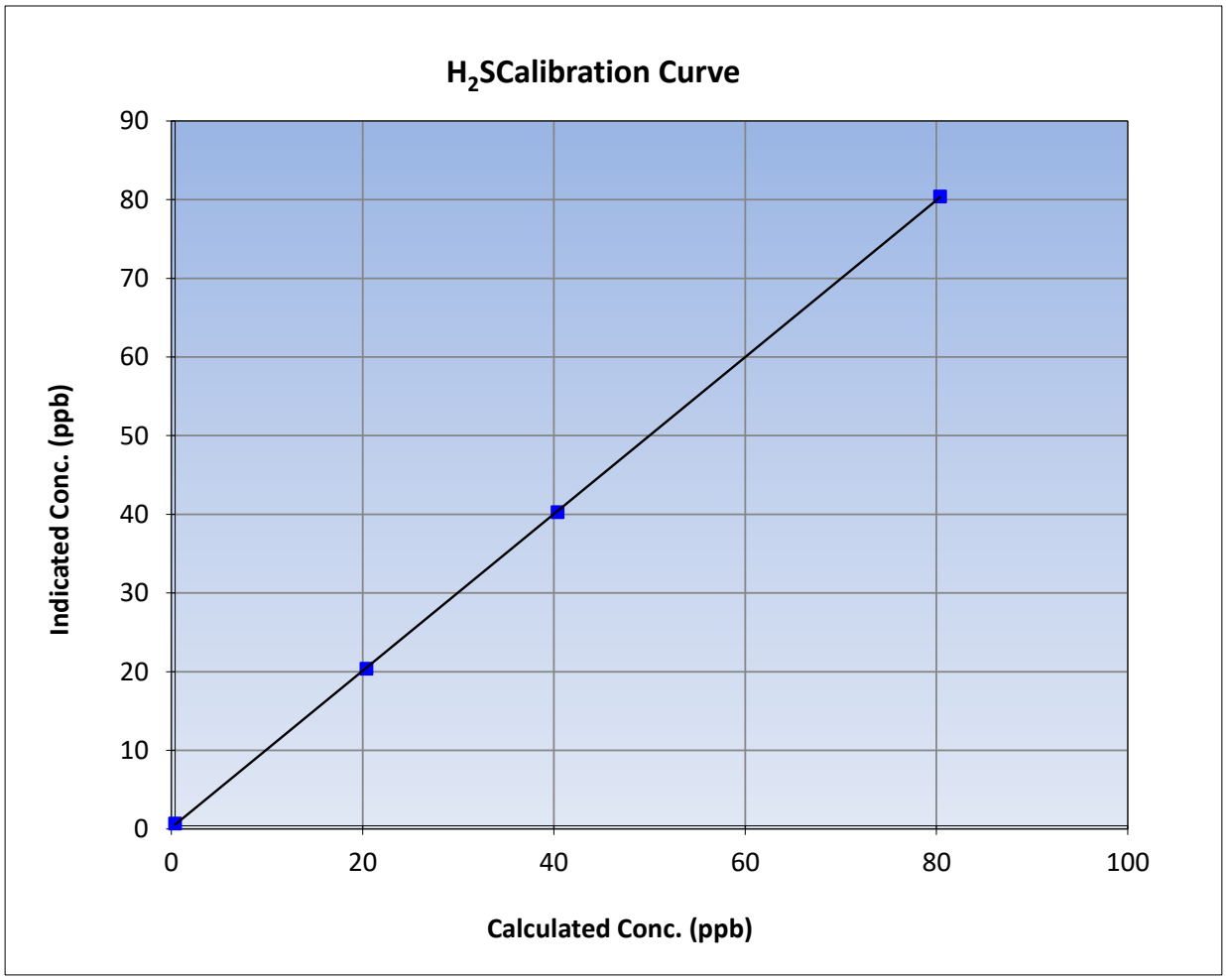
Station Information

Calibration Date:	June 28, 2023	Previous Calibration:	May 16, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:10	End Time (MST):	13:06
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1200326167

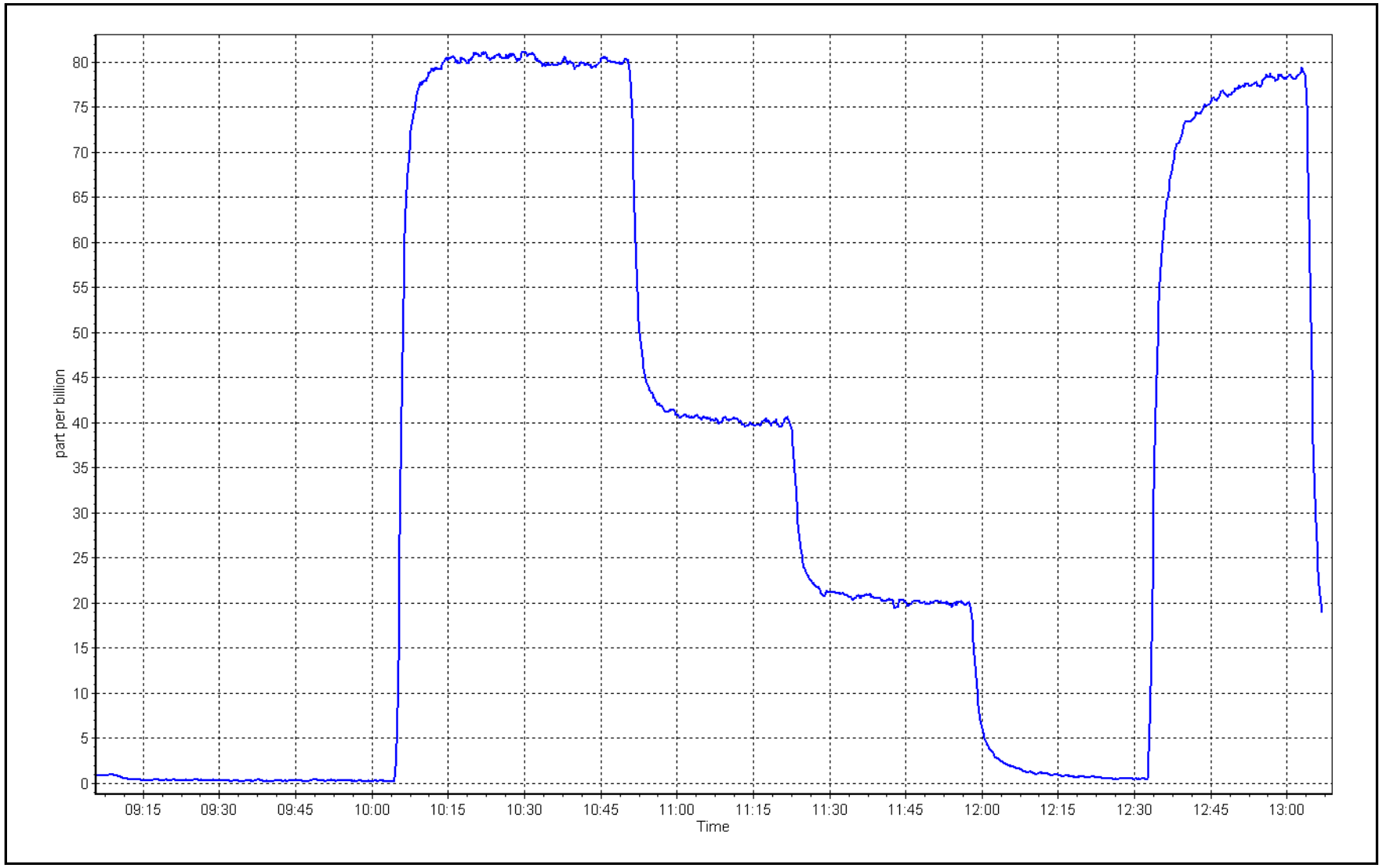
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
80.0	80.0	0.9997
40.0	39.9	1.0025
20.0	20.0	0.9999

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999983	*≥0.995*
Slope	0.997140	*0.90 - 1.10*
Intercept	0.156826	*+/-3*



H_2S Calibration Plot Date: June 28, 2023 Location: Bertha Ganter-Fort McKay



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Bertha Ganter-Fort McKay	Station number:	AMS01
Calibration Date:	June 1, 2023	Last Cal Date:	May 1, 2023
Start time (MST):	10:00	End time (MST):	13:46
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC486642	Cal Gas Expiry Date:	February 23, 2025	
CH4 Cal Gas Conc.	497.7	ppm	CH4 Equiv Conc.	1063.1	ppm
C3H8 Cal Gas Conc.	205.6	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.7	ppm	CH4 Equiv Conc.	1063.1	ppm
Removed C3H8 Conc.	205.6	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T700		Serial Number:	3565	
ZAG make/model:	Teledyne API T701		Serial Number:	5609	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320040	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.00E-04	2.89E-04	NMHC SP Ratio:	6.36E-05	6.23E-05
CH4 Retention time:	14.6	14.6	NMHC Peak Area:	144534	147590

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4918	81.3	17.29	17.88	0.967
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4918	81.3	17.29	17.25	1.002
second point	4959	40.7	8.65	8.56	1.011
third point	4980	20.3	4.32	4.26	1.013
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	17.29	17.36	0.996
				Average Correction Factor	1.009

Baseline Corr AF:	17.88	Prev response	17.28	*% change	3.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4918	81.3	9.19	9.42	0.976
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4918	81.3	9.19	9.17	1.002
second point	4959	40.7	4.60	4.59	1.003
third point	4980	20.3	2.30	2.29	1.001
as left zero	5000	0	0.00	0.00	----
as left span	4918	81.3	9.19	9.25	0.994
				Average Correction Factor	1.002
Baseline Corr AF:	9.42	Prev response	9.20	*% change	2.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4918	81.3	8.09	8.46	0.957
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4918	81.3	8.09	8.08	1.002
second point	4959	40.7	4.05	3.97	1.019
third point	4980	20.3	2.02	1.97	1.027
as left zero	5000	0.0	0.00	0.00	----
as left span	4918	81.3	8.09	8.11	0.999
				Average Correction Factor	1.016
Baseline Corr AF:	8.46	Prev response	8.08	*% change	4.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.998379	0.998392
THC Cal Offset:	0.020702	-0.033901
CH4 Cal Slope:	0.999517	0.999433
CH4 Cal Offset:	-0.010960	-0.034161
NMHC Cal Slope:	0.997203	0.997502
NMHC Cal Offset:	0.031861	0.000659

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

THC Calibration Summary

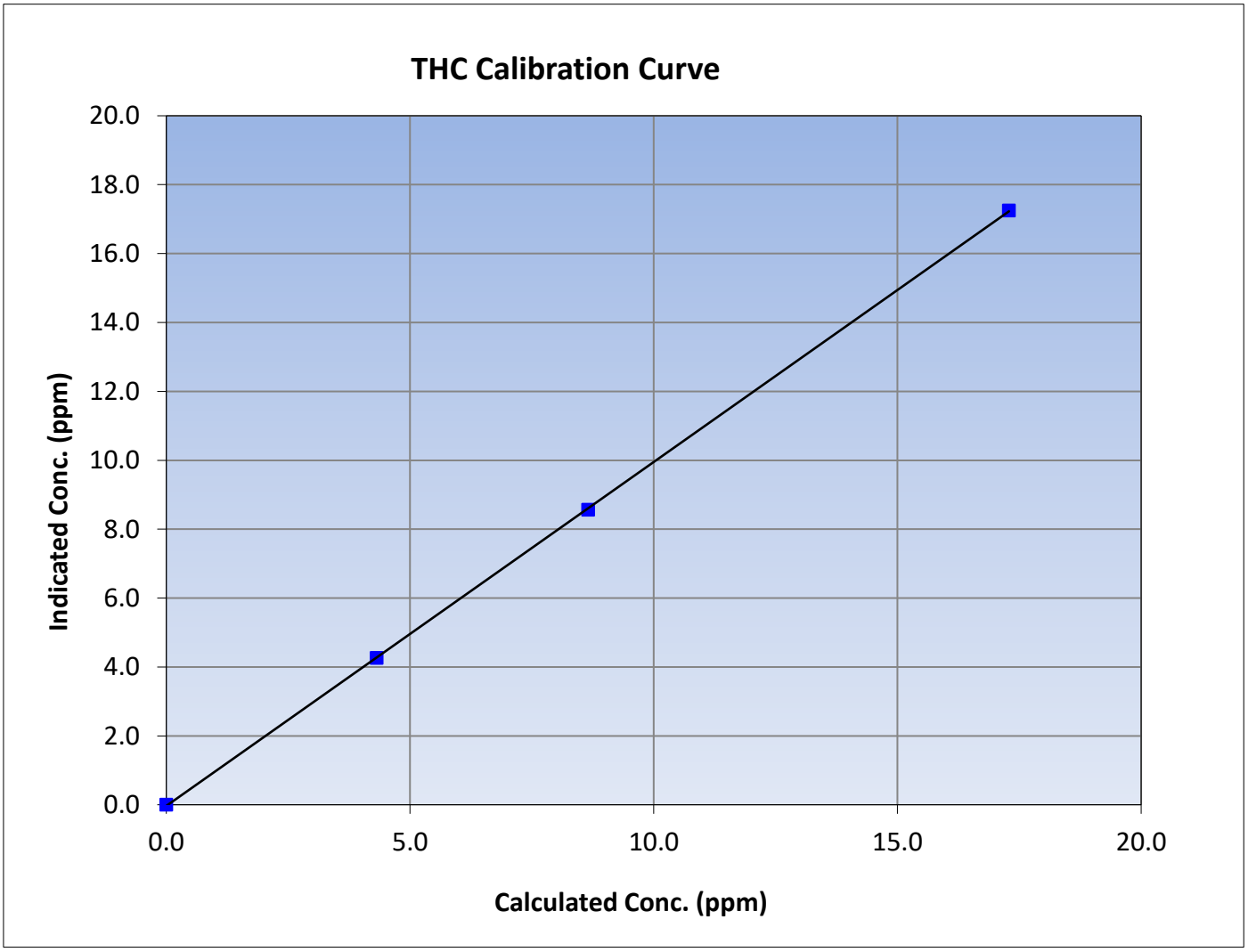
Version-01-2020

Station Information

Calibration Date:	June 1, 2023	Previous Calibration:	May 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:00	End Time (MST):	13:46
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	0.999975	≥0.995
17.29	17.25	1.0021			
8.65	8.56	1.0108	Slope	0.998392	0.90 - 1.10
4.32	4.26	1.0132			
			Intercept	-0.033901	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

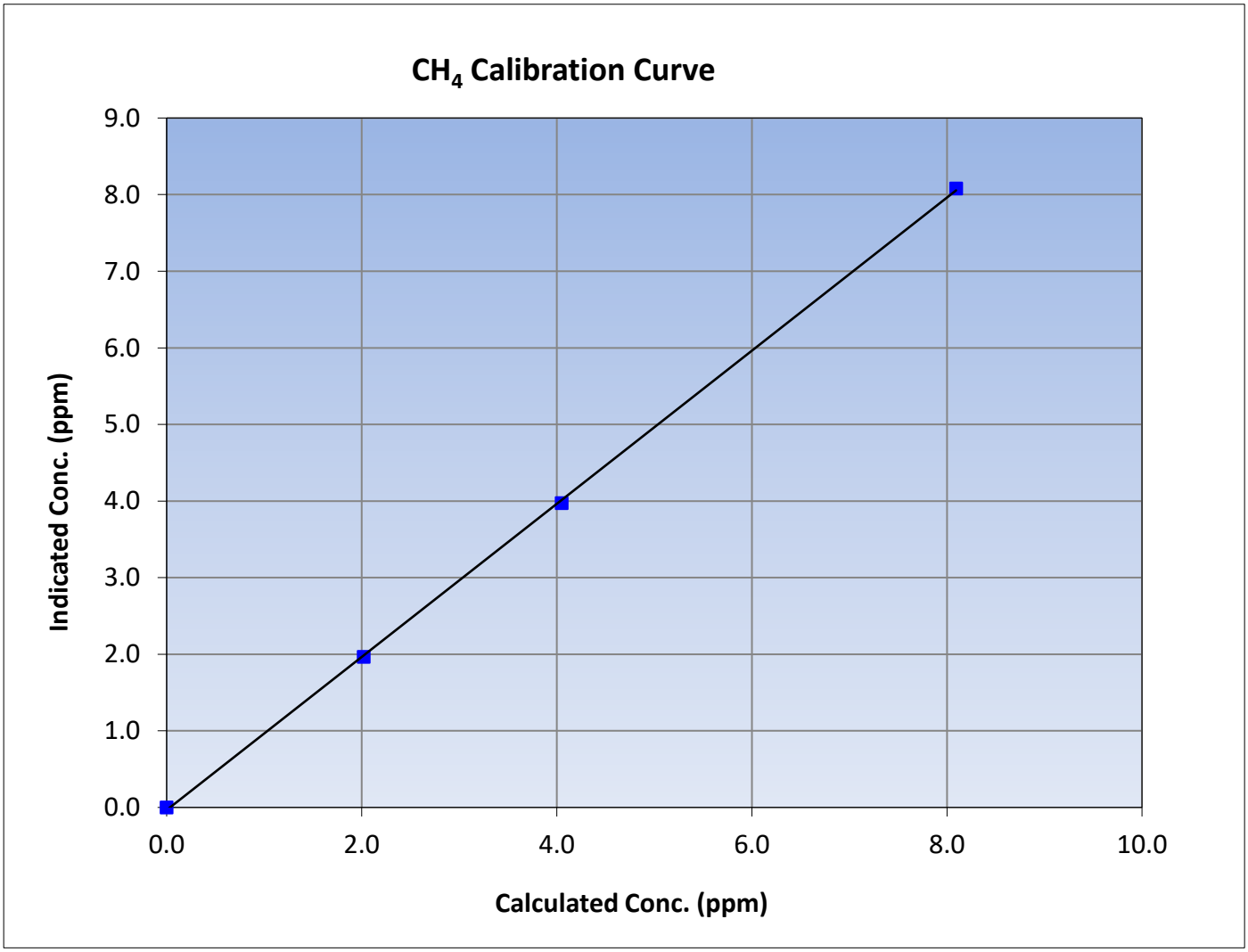
Version-01-2020

Station Information

Calibration Date:	June 1, 2023	Previous Calibration:	May 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:00	End Time (MST):	13:46
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	0.999894	*≥0.995*
8.09	8.08	1.0017			
4.05	3.97	1.0194	Slope	0.999433	*0.90 - 1.10*
2.02	1.97	1.0273			
			Intercept	-0.034161	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

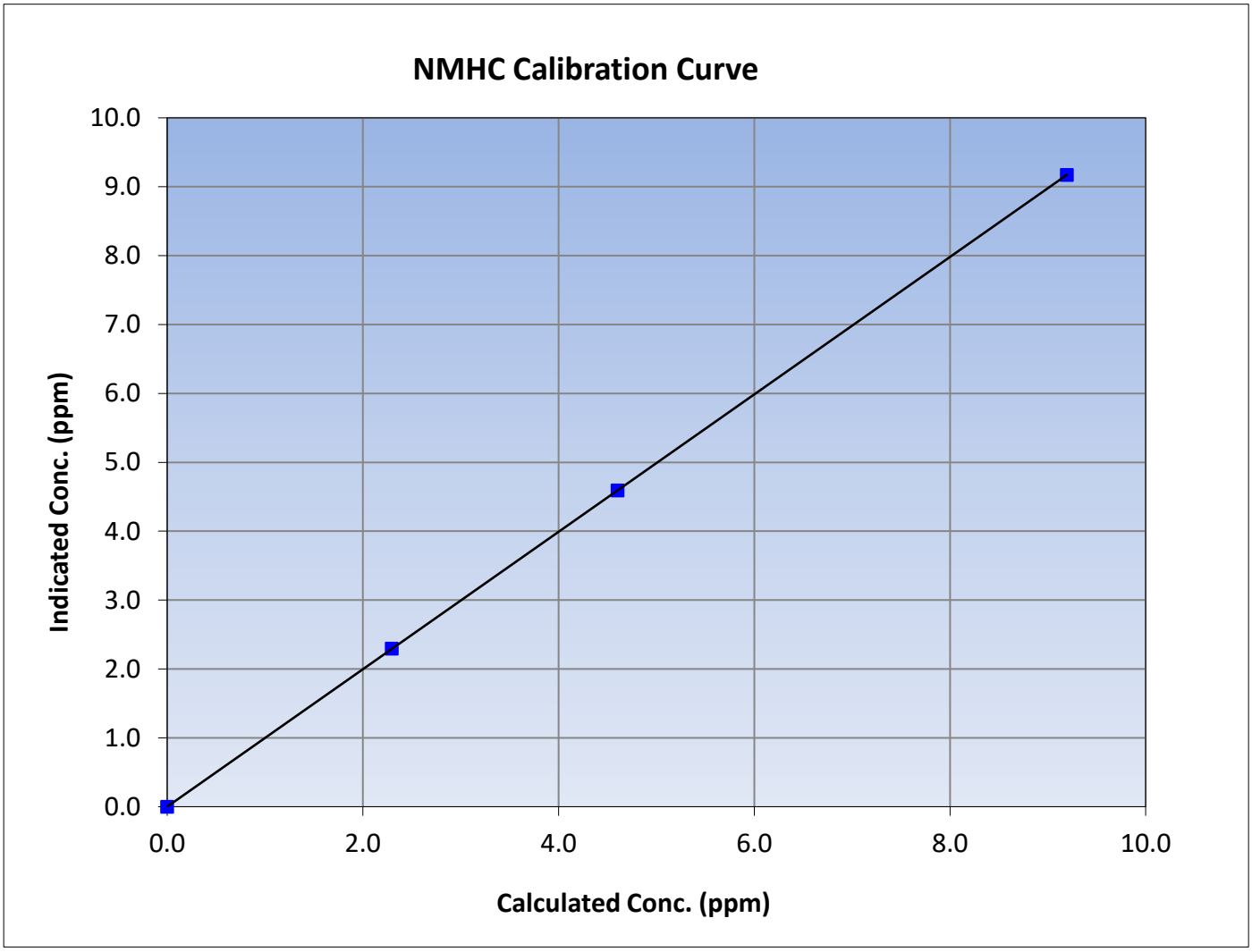
Version-01-2020

Station Information

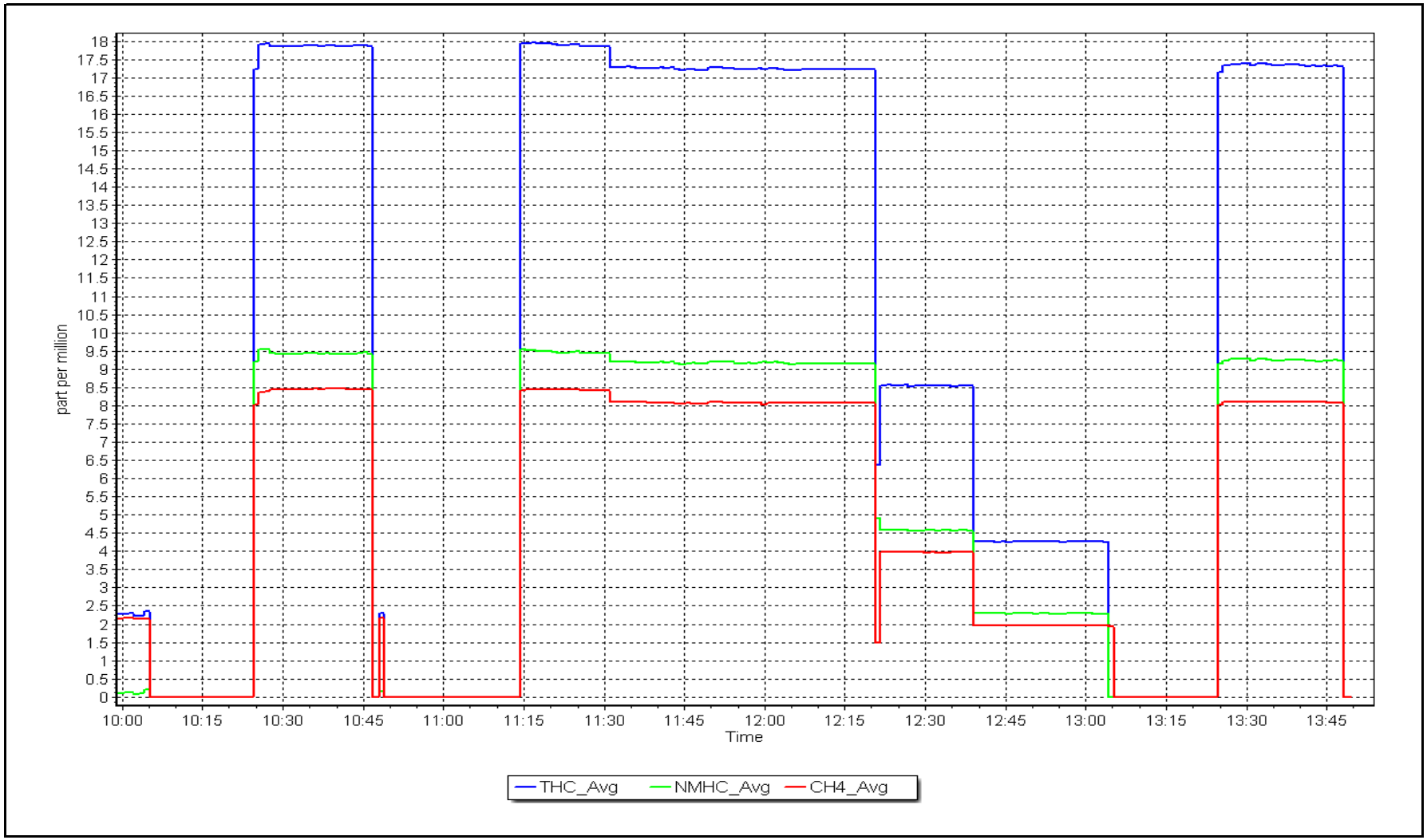
Calibration Date:	June 1, 2023	Previous Calibration:	May 1, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:00	End Time (MST):	13:46
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320040

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	1.000000	*≥0.995*
9.19	9.17	1.0024			
4.60	4.59	1.0029	Slope	0.997502	*0.90 - 1.10*
2.30	2.29	1.0011			
			Intercept	0.000659	*+/-0.5*



NMHC Calibration Plot Date: June 1, 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:	June 15, 2023	Last Cal Date:	May 18, 2023
Start time (MST):	9:03	End time (MST):	13:39
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:	1.465	1.474	NO bkgnd or offset:	7.4	7.5
NOX coeff or slope:	0.991	0.990	NOX bkgnd or offset:	7.6	7.7
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	198.1	198.4

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999073	0.999157
NO_X Cal Offset:	0.200000	0.120000
NO Cal Slope:	0.999971	1.001013
NO Cal Offset:	-0.620000	-1.060000
NO_2 Cal Slope:	1.001305	1.000108
NO_2 Cal Offset:	0.605886	0.179968

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	0.1	----	----
as found span	4920	80.0	813.4	800.6	12.8	809.2	793.0	16.1	1.0052	1.0096
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.2	----	----
high point	4920	80.0	813.4	800.6	12.8	812.8	800.8	12.0	1.0008	0.9998
second point	4960	40.0	406.7	400.3	6.4	406.8	399.5	7.3	0.9998	1.0021
third point	4980	20.0	203.4	200.2	3.2	203.0	198.0	5.0	1.0018	1.0109
as left zero	5000	0.0	0.0	0.0	0.0	0.2	-0.1	0.3	----	----
as left span	4920	80.0	813.4	397.7	415.7	813.6	398.5	415.1	0.9998	0.9981
								Average Correction Factor	1.0008	1.0043

Corrected As found	NO_X = 809.2 ppb	NO = 793.0 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.5%
Previous Response	NO_X = 812.9 ppb	NO = 800.0 ppb		*Percent Change	NO =	-0.9%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	798.8	395.9	415.7	415.9	0.9995	100.0%
2nd GPT point (200 ppb O3)	798.8	598.6	213.0	213.3	0.9986	100.1%
3rd GPT point (100 ppb O3)	798.8	699.9	111.7	111.8	0.9991	100.1%
				Average Correction Factor	0.9991	100.1%

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

NO_X Calibration Summary

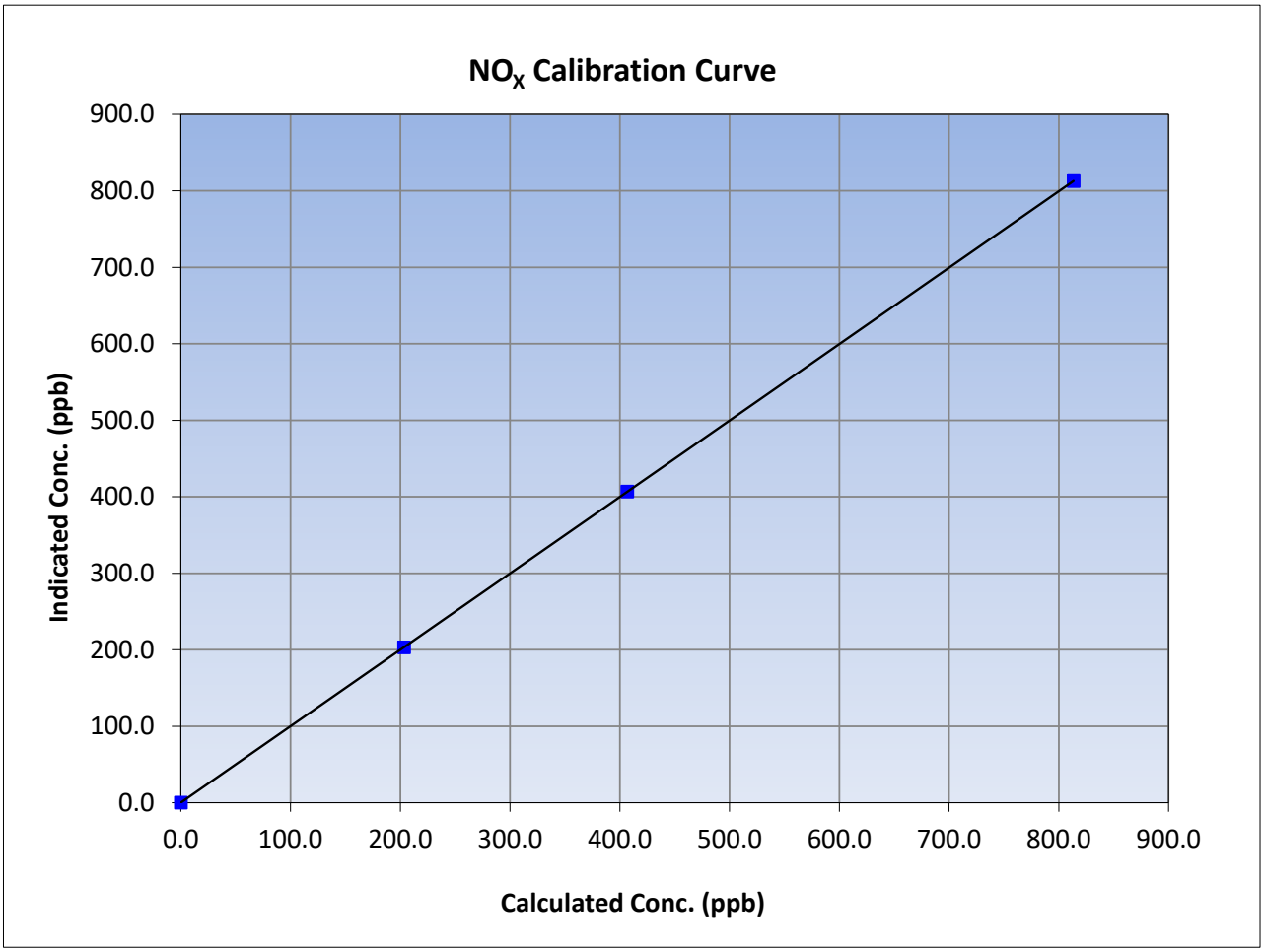
Version-04-2020

Station Information

Calibration Date:	June 15, 2023	Previous Calibration:	May 18, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:03	End Time (MST):	13:39
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	0.999999	*≥0.995*
813.4	812.8	1.0008			
406.7	406.8	0.9998	Slope	0.999157	*0.90 - 1.10*
203.4	203.0	1.0018			
			Intercept	0.120000	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

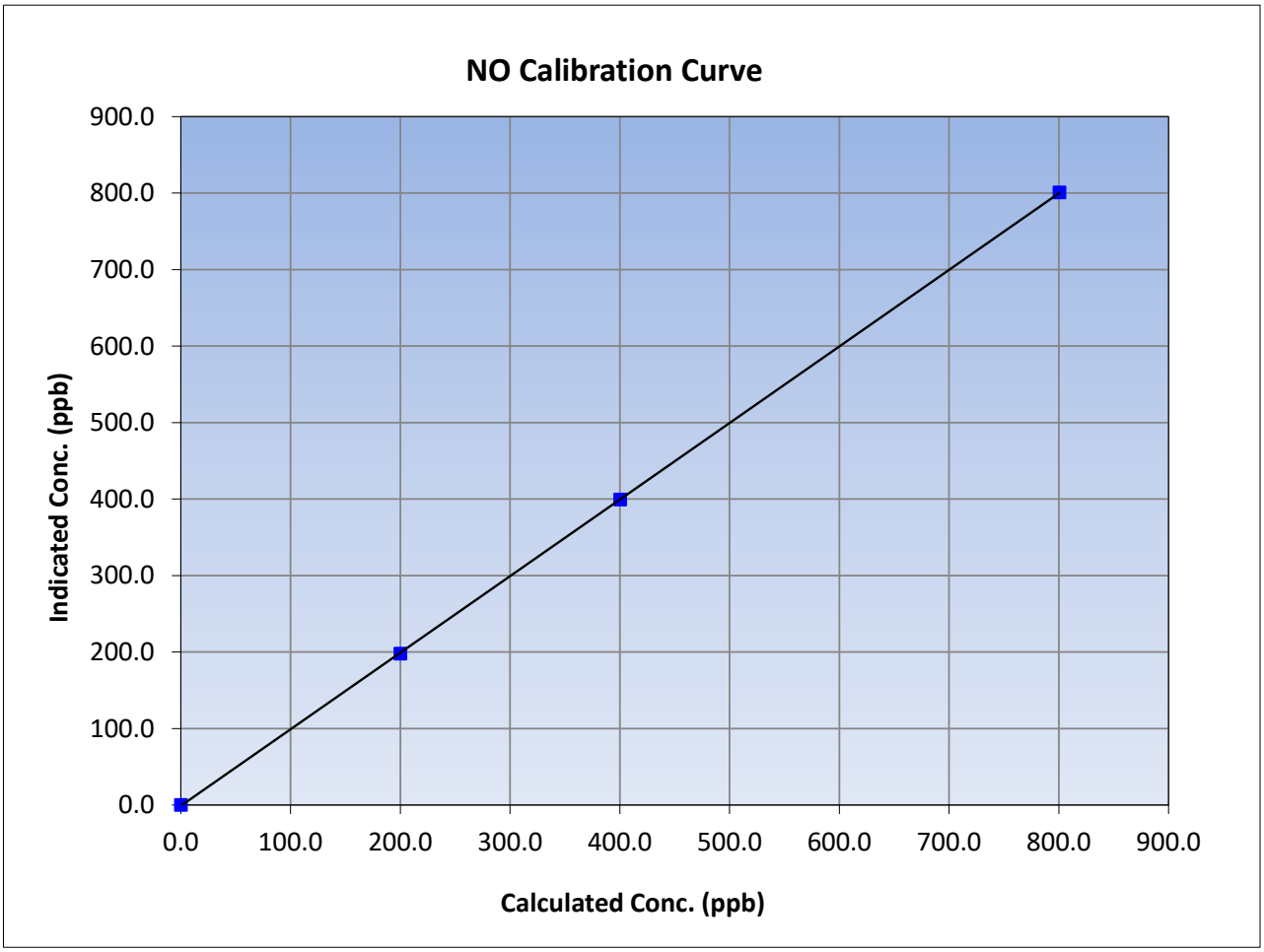
Version-04-2020

Station Information

Calibration Date:	June 15, 2023	Previous Calibration:	May 18, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:03	End Time (MST):	13:39
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999991	≥0.995
800.6	800.8	0.9998			
400.3	399.5	1.0021	Slope	1.001013	0.90 - 1.10
200.2	198.0	1.0109			
			Intercept	-1.060000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

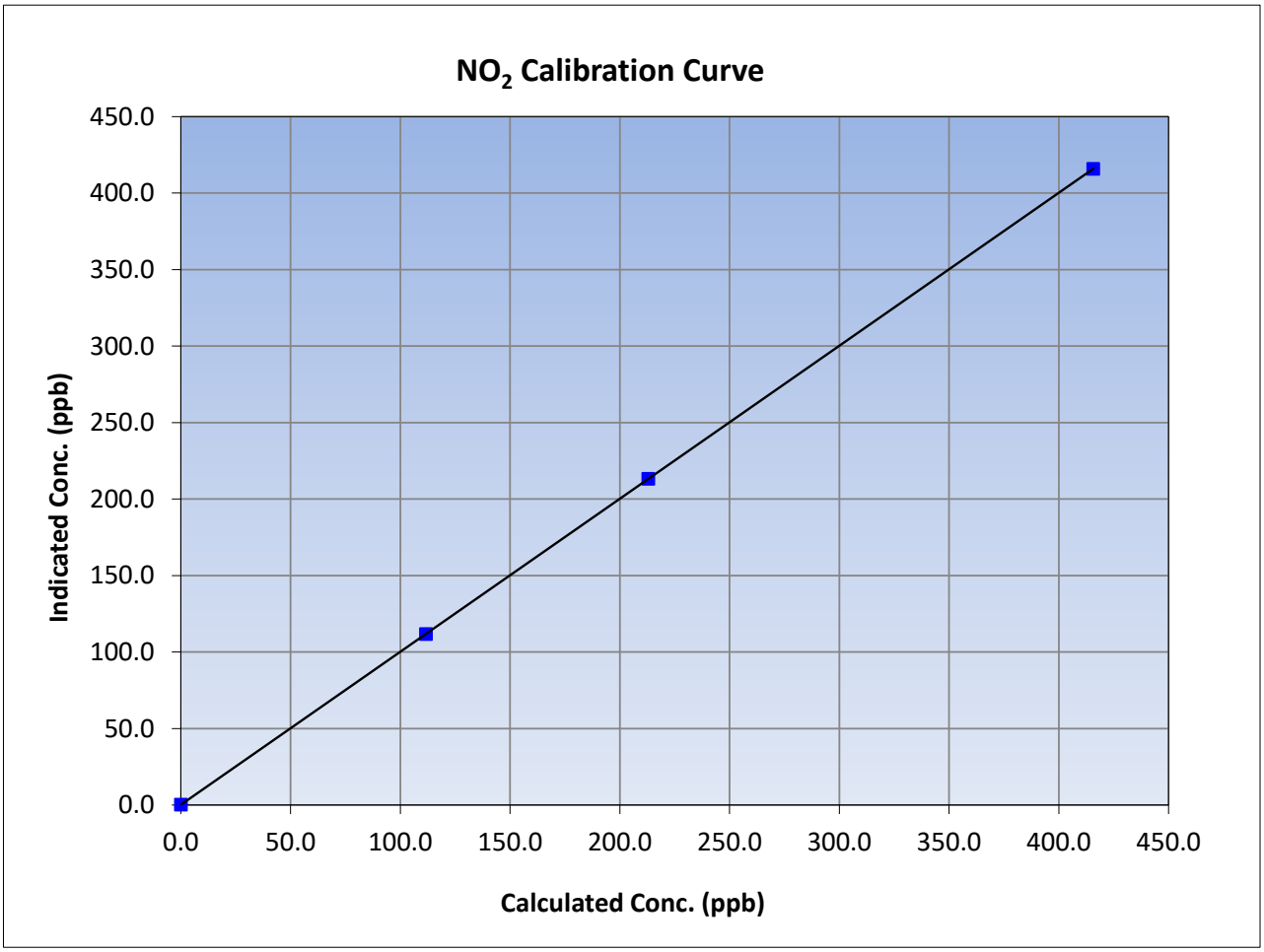
Version-04-2020

Station Information

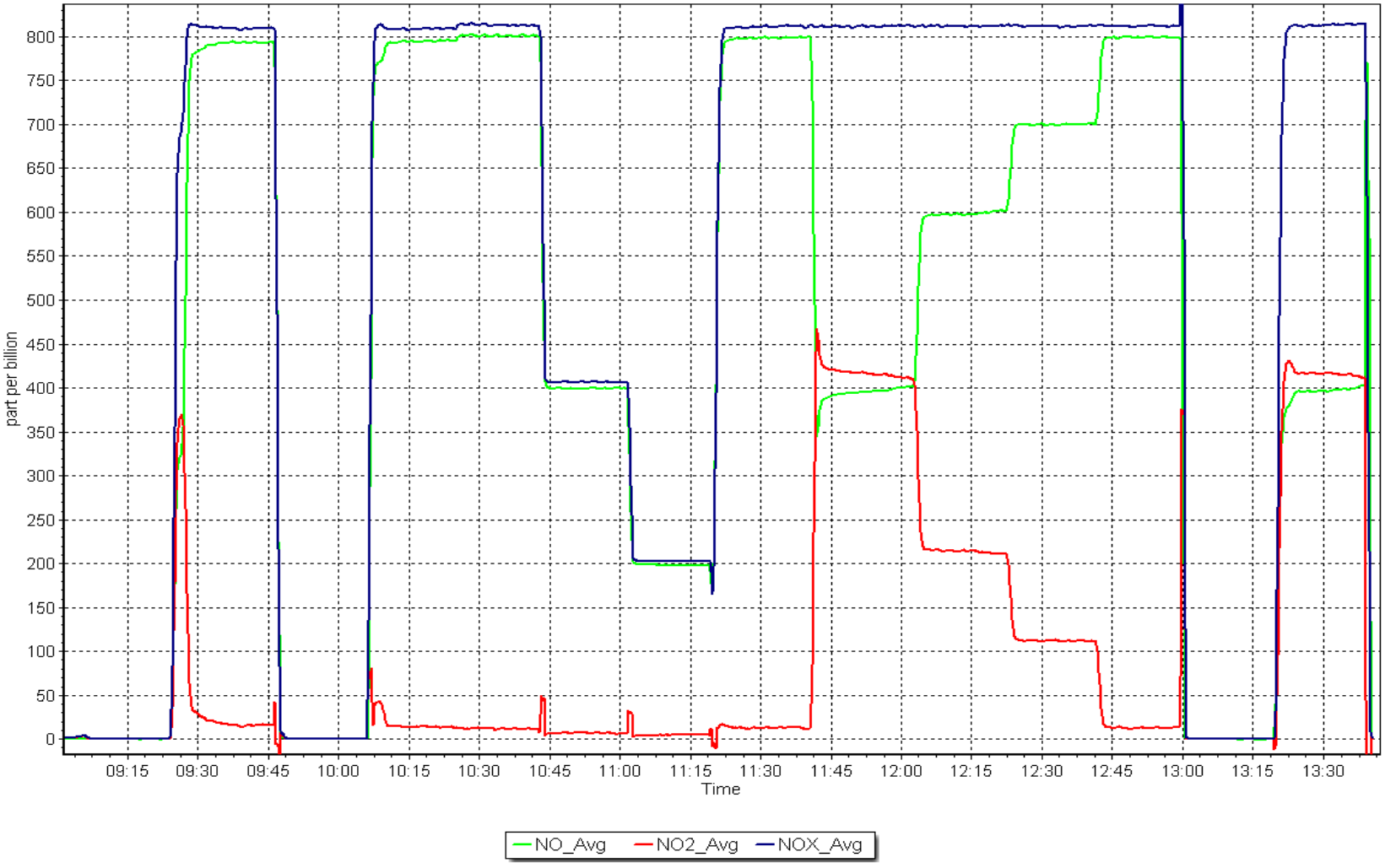
Calibration Date:	June 15, 2023	Previous Calibration:	May 18, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:03	End Time (MST):	13:39
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	1.000000	≥0.995
415.7	415.9	0.9995			
213.0	213.3	0.9986	Slope	1.000108	0.90 - 1.10
111.7	111.8	0.9991			
			Intercept	0.179968	+/-20



NO_X Calibration Plot Date: June 15, 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:	June 19, 2023	Last Cal Date:	June 15, 2023
Start time (MST):	9:42	End time (MST):	12:45
Reason:	As Found		

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:	1.474	1.474	NO bkgnd or offset:	7.5	7.5
NOX coeff or slope:	0.990	0.990	NOX bkgnd or offset:	7.7	7.7
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	215.5	185.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999157	
NO_X Cal Offset:	0.120000	
NO Cal Slope:	1.001013	
NO Cal Offset:	-1.060000	
NO_2 Cal Slope:	1.000108	
NO_2 Cal Offset:	0.179968	

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
as found span	4920	80.0	813.4	800.6	12.8	719.2	705.5	13.7	1.1310	1.1349
as found 2nd	4960	40.0	406.7	400.3	6.4	358.9	351.3	7.6	1.1332	1.1395
as found 3rd	4980	20.0	203.4	200.2	3.2	179.0	174.3	4.7	1.1361	1.1484
new cyl resp										
calibrator zero										
high point										
second point										
third point										
as left zero										
as left span										
								Average Correction Factor		

Corrected As found	NO_X = 719.5 ppb	NO = 705.7 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -13.0%
Previous Response	NO_X = 812.9 ppb	NO = 800.4 ppb		*Percent Change	NO = -13.4%
Baseline Corr 2nd pt	NO_X = 359.2 ppb	NO = 351.5 ppb	As found	NO_X r^2: 0.999999	Nx Sl: 0.884680	Nx Int: -0.640
Baseline Corr 3rd pt	NO_X = 179.3 ppb	NO = 174.5 ppb	As found	NO r^2: 0.999990	NO Sl: 0.882052	NO Int: -1.240
			As found	NO_2 r^2: 0.999996	NO2 Sl: 0.998547	NO_2 Int: -0.386

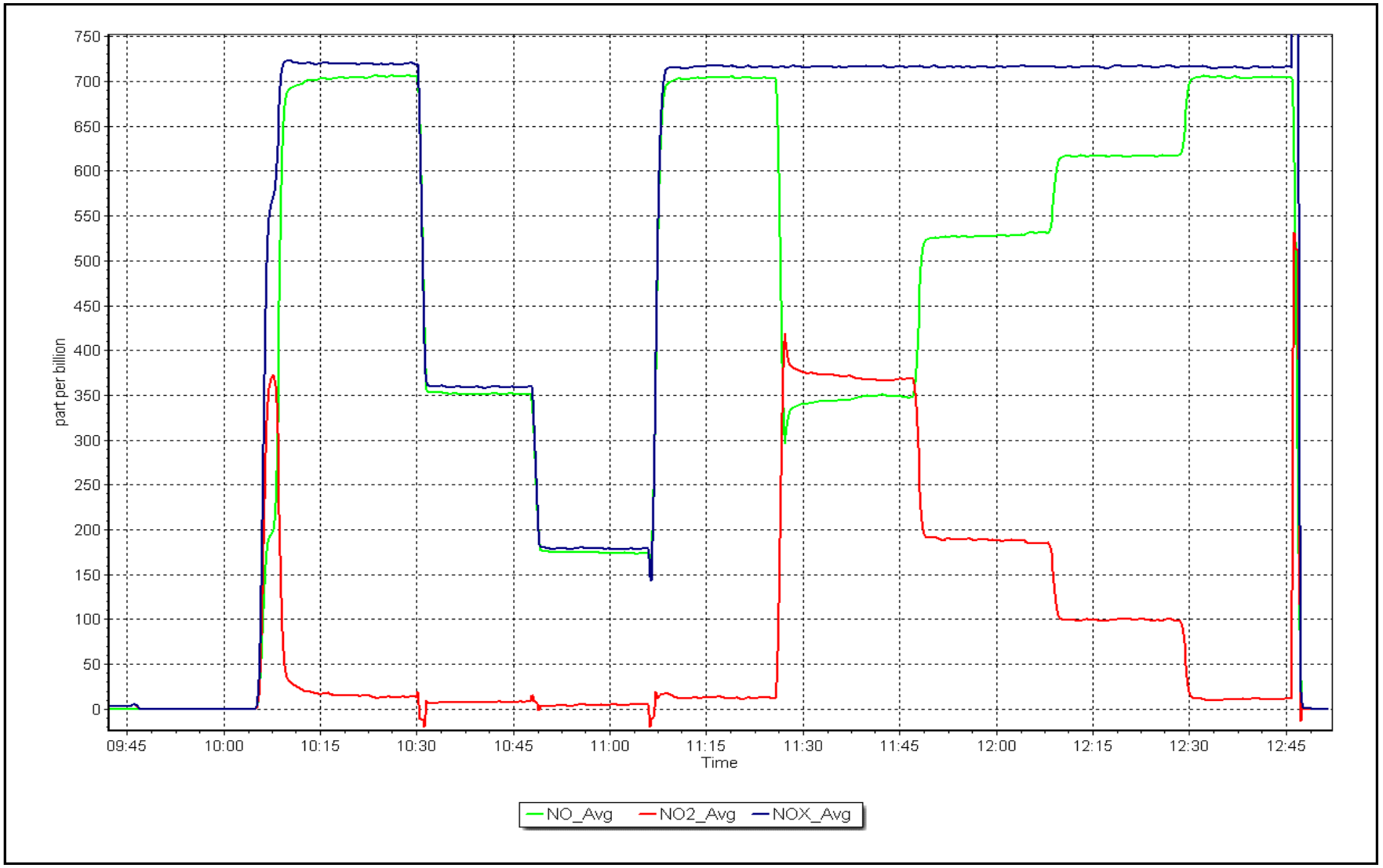
GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero	----	----	0.0	-0.1	----	----
as found GPT point (400 ppb NO2)	704.2	349.4	367.6	366.9	1.0019	99.8%
as found GPT point (200 ppb NO2)	704.2	527.6	189.4	188.4	1.0053	99.5%
as found GPT point (100 ppb NO2)	704.2	616.6	100.4	99.7	1.0070	99.3%
1st GPT point (400 ppb O3)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
				Average Correction Factor		

Notes: Performing multi point as founds. Replacing the sample pump.

Calibration Performed By: Rene Chamberland

NO_X Calibration Plot Date: June 19, 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:	June 20, 2023	Last Cal Date:	June 15, 2023
Start time (MST):	9:34	End time (MST):	13:44
Reason:	Maintenance		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:		1.334	NO bkgnd or offset:		6.6
NOX coeff or slope:		0.988	NOX bkgnd or offset:		6.8
NO2 coeff or slope:		1.000	Reaction cell Press:		186.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:		1.000702
NO_X Cal Offset:		-0.180000
NO Cal Slope:		1.001256
NO Cal Offset:		-0.920000
NO_2 Cal Slope:		0.998452
NO_2 Cal Offset:		0.436719

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero										
as found span										
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
high point	4920	80.0	813.4	800.6	12.8	814.0	801.1	12.9	0.9993	0.9994
second point	4960	40.0	406.7	400.3	6.4	406.5	399.7	6.8	1.0005	1.0016
third point	4980	20.0	203.4	200.2	3.2	203.3	198.4	5.0	1.0003	1.0089
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.1	----	----
as left span	4920	80.0	813.4	398.6	414.8	813.5	398.1	415.4	0.9999	1.0014
								Average Correction Factor	1.0000	1.0033

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)	799.2	397.2	414.8	414.3	1.0012	99.9%
2nd GPT point (200 ppb O3)	799.2	597.9	214.1	214.6	0.9977	100.2%
3rd GPT point (100 ppb O3)	799.2	699.9	112.1	112.7	0.9947	100.5%
				Average Correction Factor	0.9979	100.2%

Notes: Performing maintenance calibration after pump swap. Adjusted both zero and span.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

NO_X Calibration Summary

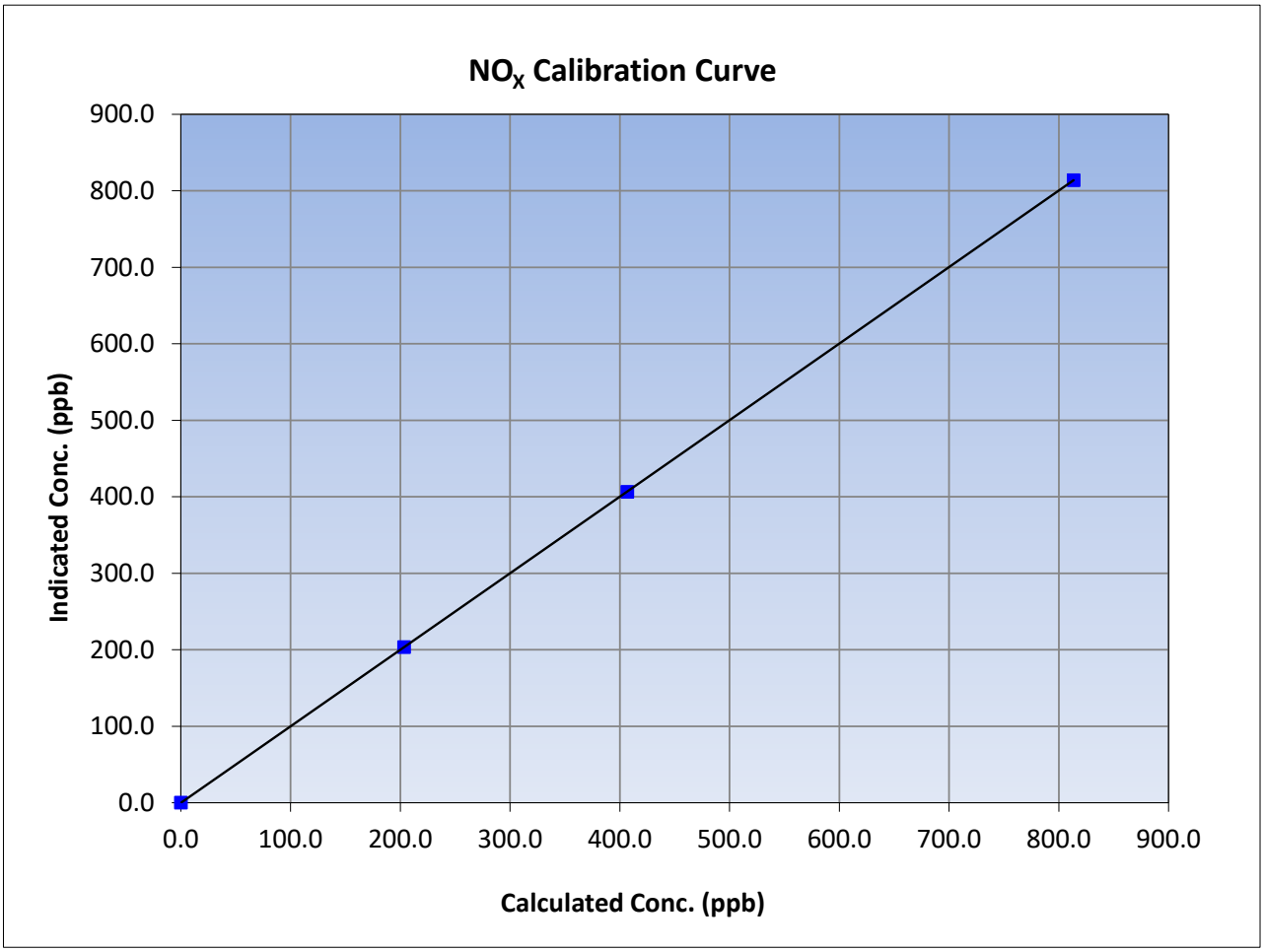
Version-04-2020

Station Information

Calibration Date:	June 20, 2023	Previous Calibration:	June 15, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:34	End Time (MST):	13:44
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.0	----	Correlation Coefficient	1.000000	*≥0.995*
813.4	814.0	0.9993			
406.7	406.5	1.0005	Slope	1.000702	*0.90 - 1.10*
203.4	203.3	1.0003			
			Intercept	-0.180000	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

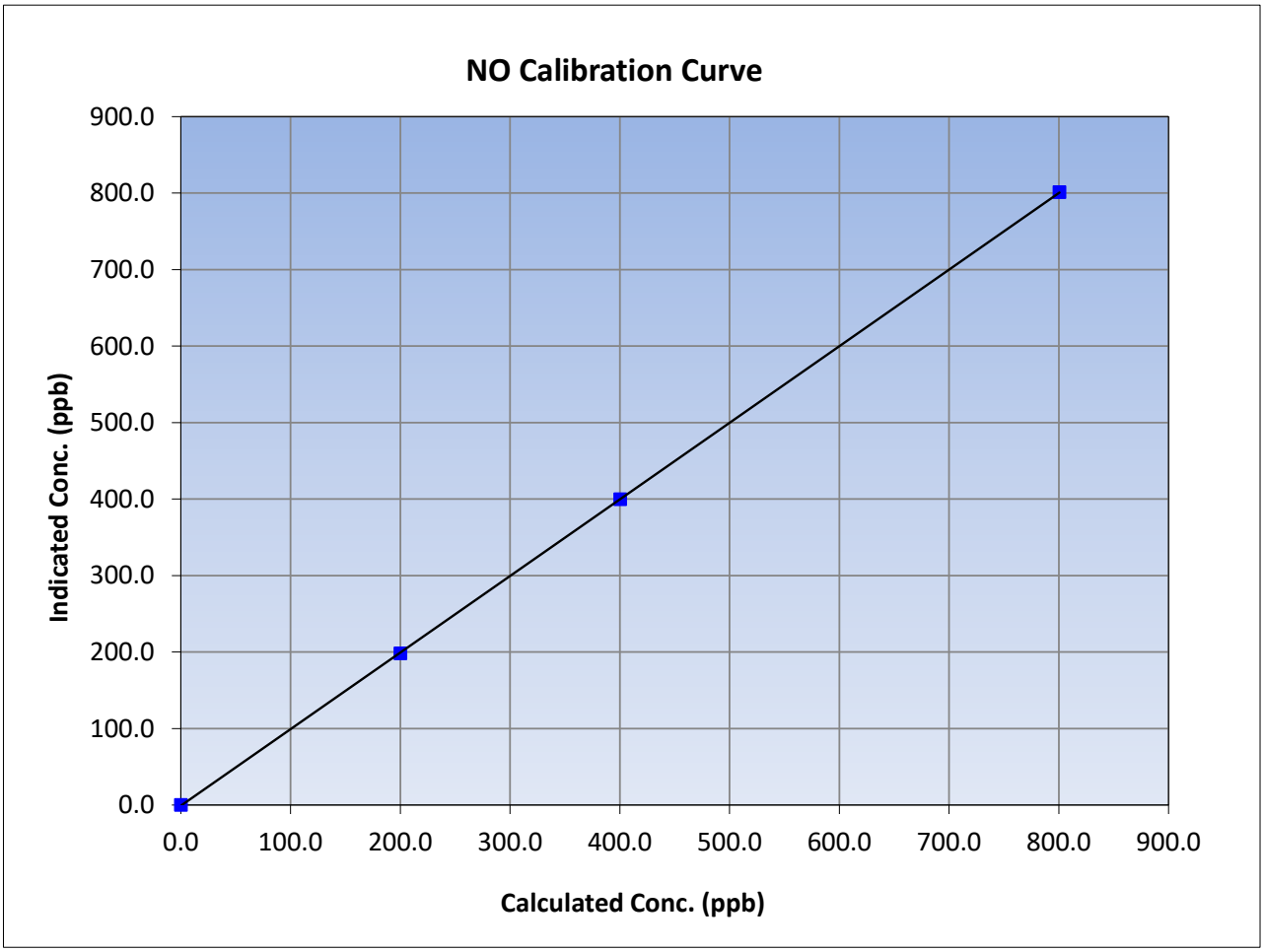
Version-04-2020

Station Information

Calibration Date:	June 20, 2023	Previous Calibration:	June 15, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:34	End Time (MST):	13:44
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999994	≥0.995
800.6	801.1	0.9994			
400.3	399.7	1.0016	Slope	1.001256	0.90 - 1.10
200.2	198.4	1.0089			
			Intercept	-0.920000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

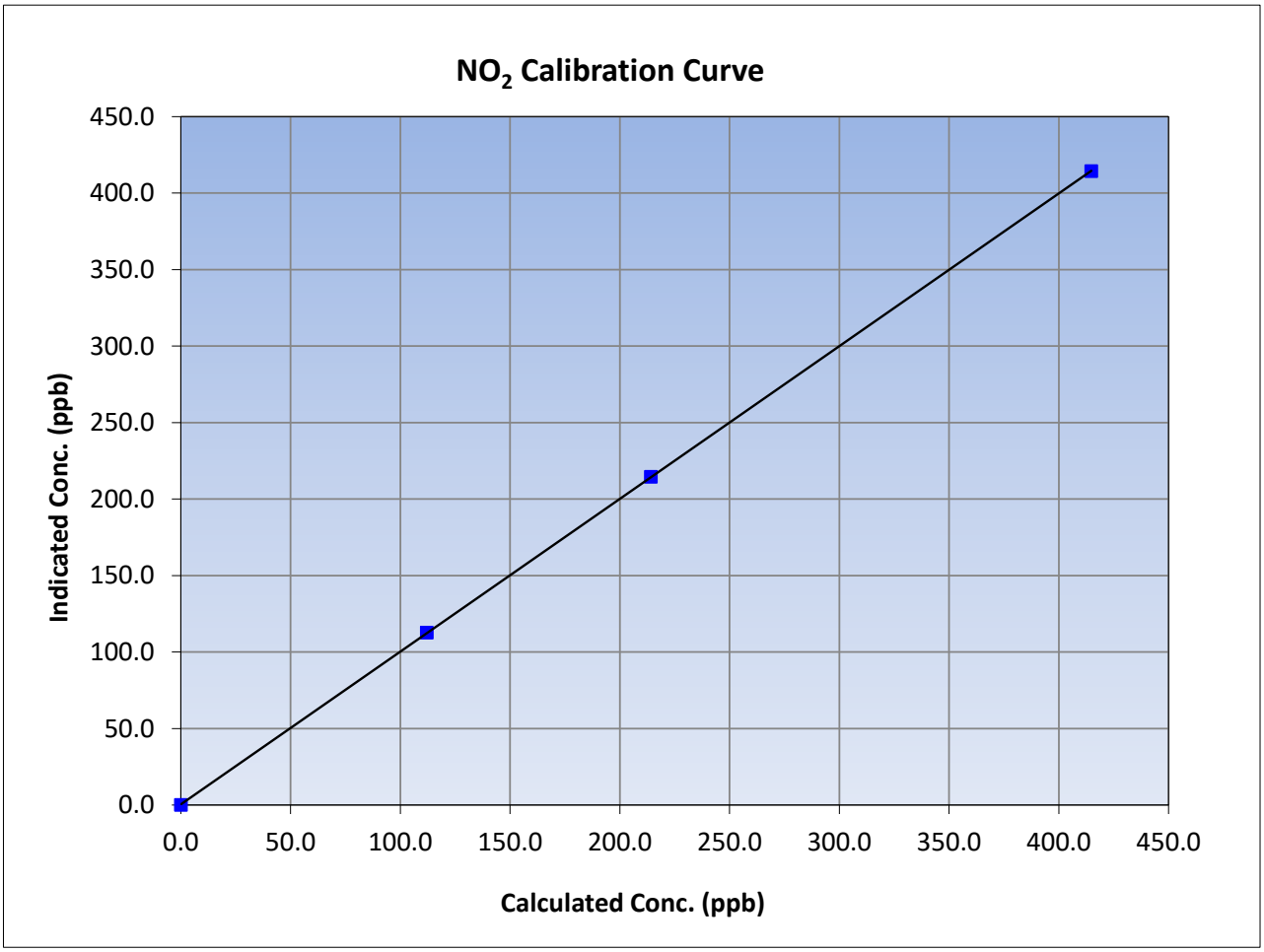
Version-04-2020

Station Information

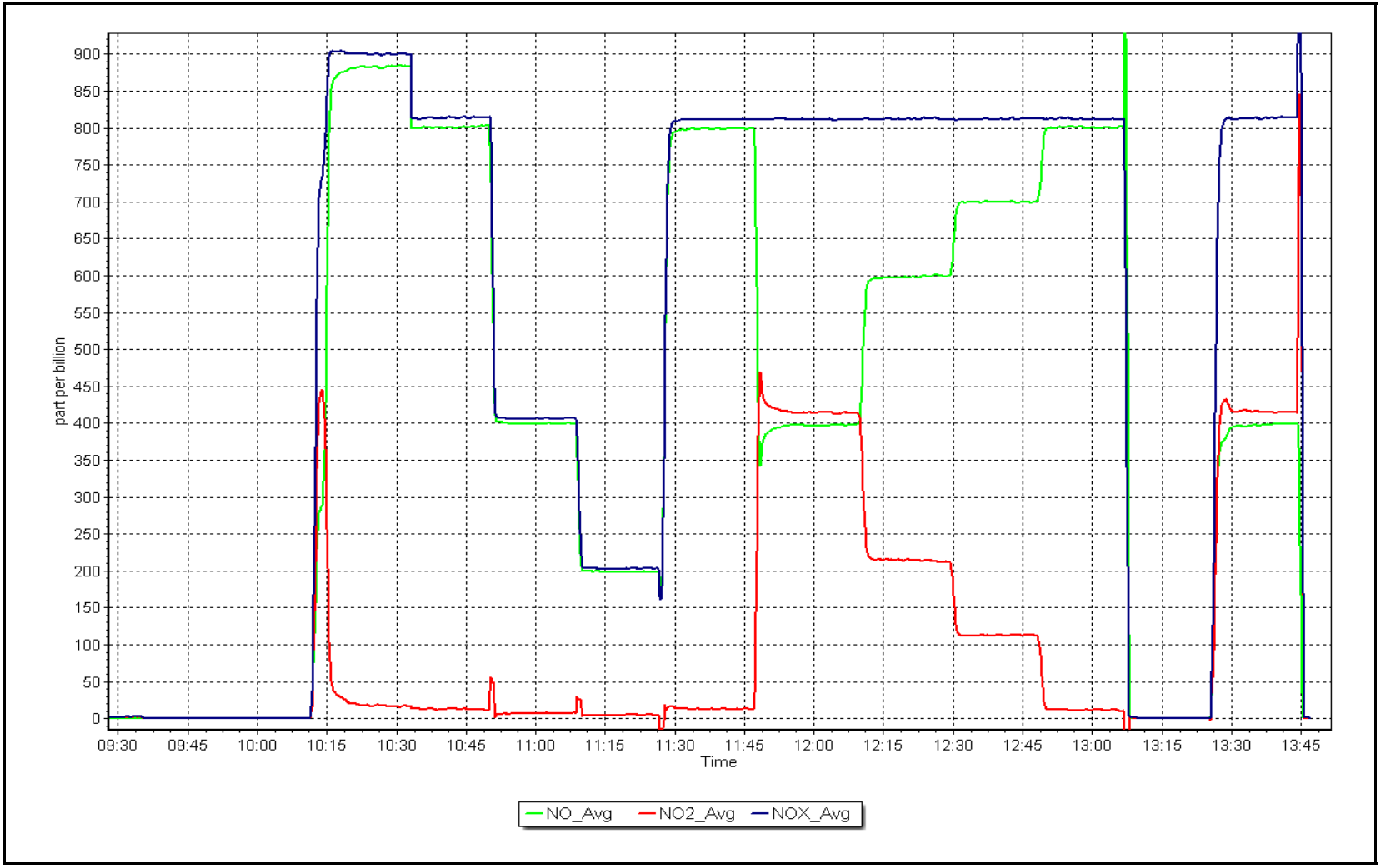
Calibration Date:	June 20, 2023	Previous Calibration:	June 15, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:34	End Time (MST):	13:44
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999994	≥0.995
414.8	414.3	1.0012			
214.1	214.6	0.9977	Slope	0.998452	0.90 - 1.10
112.1	112.7	0.9947			
			Intercept	0.436719	+/-20



NO_X Calibration Plot Date: June 20, 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:	June 2, 2023	Last Cal Date:	May 4, 2023
Start time (MST):	9:37	End time (MST):	12:36
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:	0.999429	1.001229	Backgd or Offset:	3.2	3.2
Calibration intercept:	0.500000	0.260000	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	855.5	400.0	400.3	0.999
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	858.8	400.0	400.6	0.999
second point	5000	743.1	200.0	200.8	0.996
third point	5000	653.5	100.0	100.4	0.996
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	858.8	400.0	404.8	0.988
				Average Correction Factor	0.997

Baseline Corr As found:	400.2	Previous response	400.3	*% 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 founds. No adjustments made.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

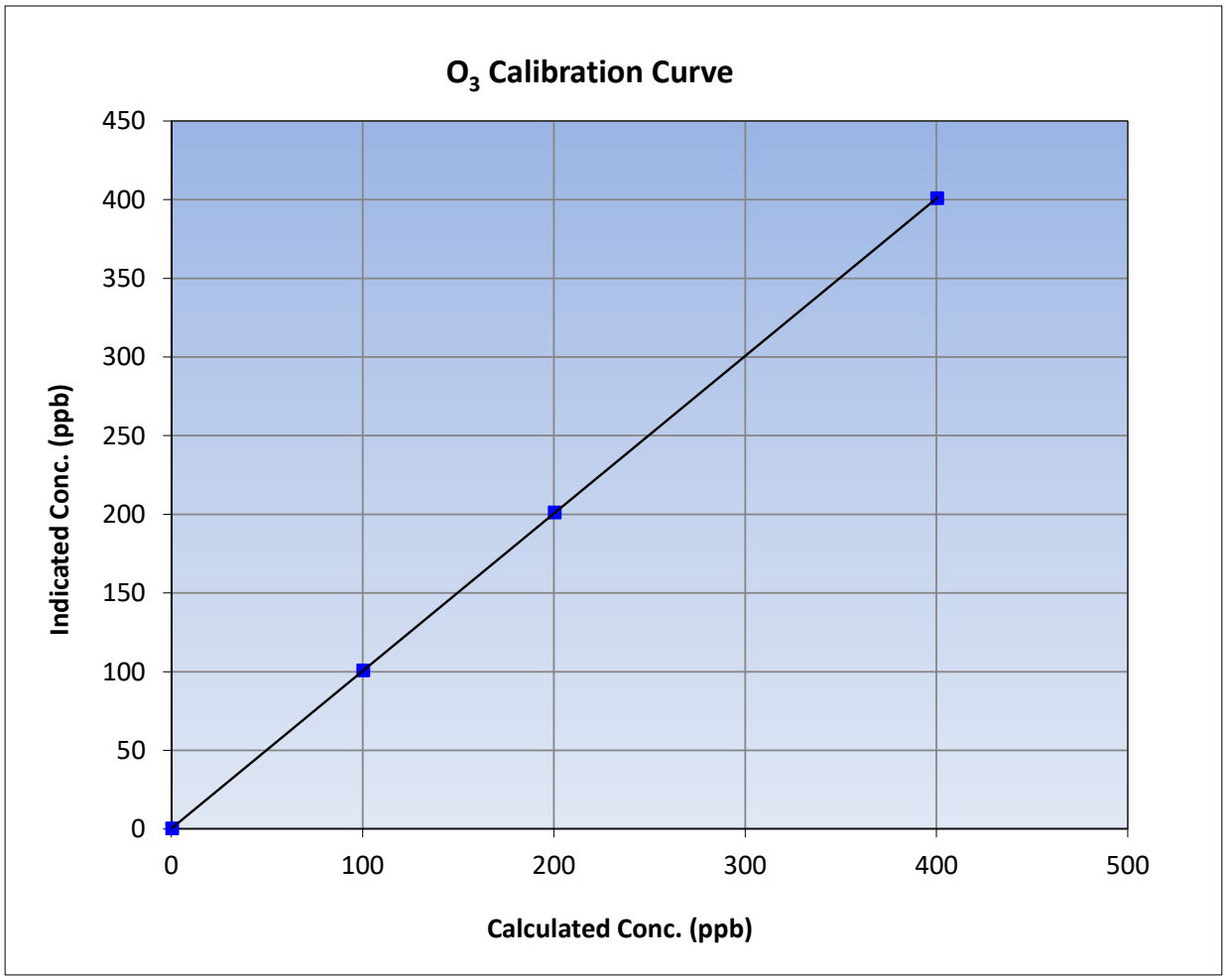
Station Information

Calibration Date:	June 2, 2023	Previous Calibration:	May 4, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:37	End Time (MST):	12:36
Analyzer make:	Teledyne API T400	Analyzer serial #:	1107

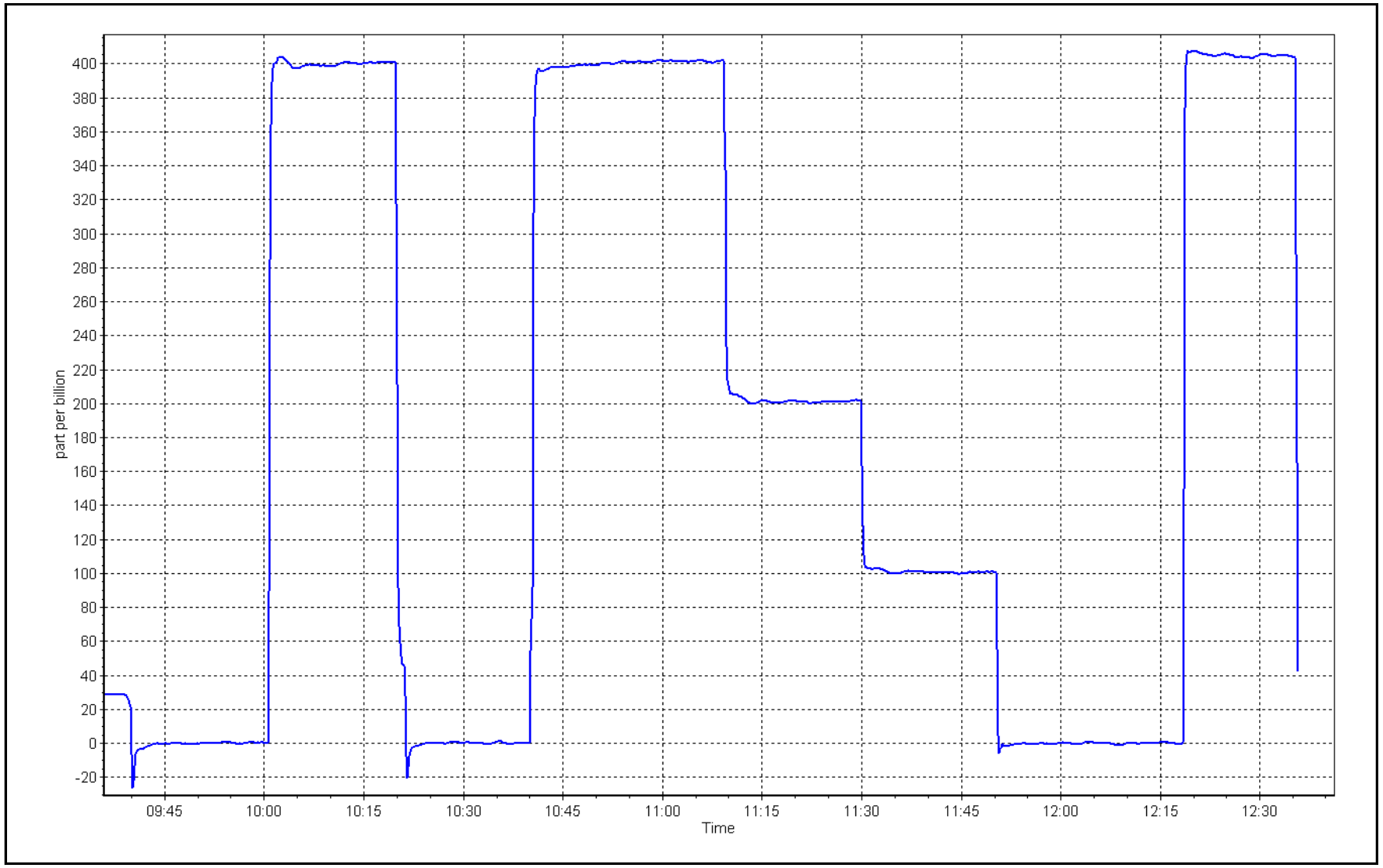
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
400.0	400.6	0.9985
200.0	200.8	0.9960
100.0	100.4	0.9960

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.001229	*0.90 - 1.10*
Intercept	0.260000	*+/- 5*



O_3 Calibration Plot Date: June 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:	June 2, 2023	Last Cal Date:	May 15, 2023
Start time (MST):	11:38	End time (MST):	12:07
Analyzer Make:	API T640	S/N:	326
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 (^{o}C)	24.6	23.5	24.6	☐	+/- 2 ^{o}C
P (mmHg)	736.1	738	736.1	☐	+/- 10 mmHg
flow (LPM)	4.99	5.09	4.99	☐	+/- 0.25 LPM

Leak Test: Date of check: June 2, 2023 Last Cal Date: May 15, 2023

PM w/o HEPA: 13.6 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: _____

Disposable Filter Changed: _____

Annual Maintenance

Date Sample Tube Cleaned: _____

Date RH/T Sensor Cleaned: _____

Notes: Removing the T640 instrument. Flow, temperature, and pressure all within limits. Leak check passed. PMT peak test did not display any results.

Calibration by: Rene Chamberland

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:	June 2, 2023	Last Cal Date:	May 15, 2023
Start time (MST):	12:47	End time (MST):	13:29
Analyzer Make:	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 (^{o}C)	25.8	24.7	25.8	☐	+/- 2 ^{o}C
P (mmHg)	738.8	738	738.8	☐	+/- 10 mmHg
flow (LPM)	5.01	5.01	5.01	☐	+/- 0.25 LPM

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

PM w/o HEPA: 206 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 +/- 0.5

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

Date Optical Chamber Cleaned: _____

Disposable Filter Changed: _____

Annual Maintenance

Date Sample Tube Cleaned: _____

Date RH/T Sensor Cleaned: _____

Notes: Installing a new T640 instrument. Flow, temperature, and pressure all within limits. Leak check passed. PMT peak test within limits. Inlet head 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:	June 26, 2023	Last Cal Date:	May 11, 2023
Start time (MST):	10:29	End time (MST):	13:41
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:	0.999480	1.001481	Backgd or Offset:	-0.012	-0.012
Calibration intercept:	0.161861	0.163854	Coeff or Slope:	0.992	0.992

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4933	66.7	40.6	40.8	0.995
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4933	66.7	40.6	40.6	0.998
second point	4966	33.3	20.2	20.8	0.976
third point	4983	16.7	10.2	10.3	0.984
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	0.986

Baseline Corr As found:	40.70	Prev response:	40.70	*% change:	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

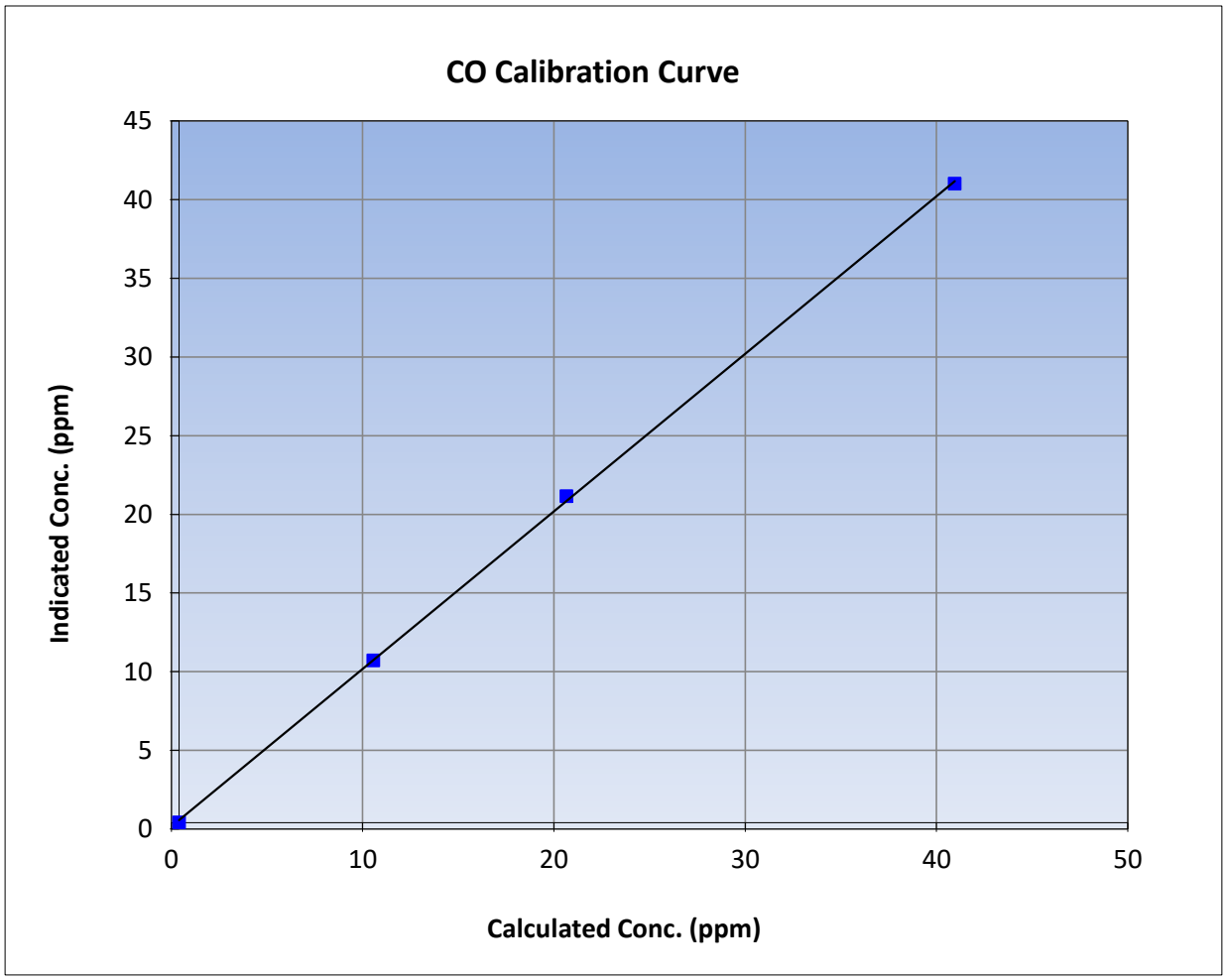
Station Information

Calibration Date:	June 26, 2023	Previous Calibration:	May 11, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	10:29	End Time (MST):	13:41
Analyzer make:	Teledyne API T300	Analyzer serial #:	3520

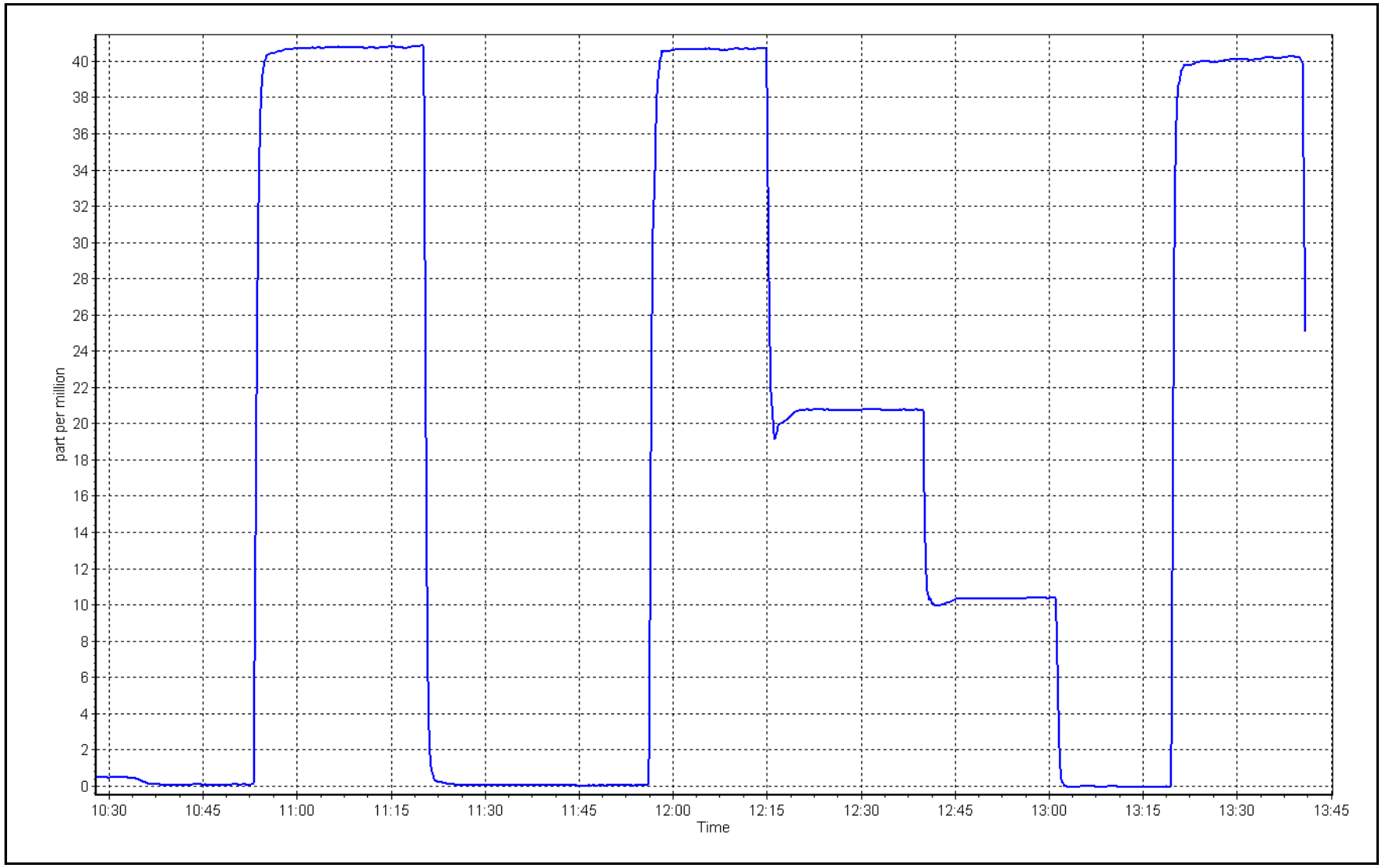
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.6	40.6	0.9982
20.2	20.8	0.9759
10.2	10.3	0.9839

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999847	*≥0.995*
Slope	1.001481	*0.90 - 1.10*
Intercept	0.163854	*+/-1.5*



CO Calibration Plot Date: June 26, 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:	June 12, 2023	Last Cal Date:	May 12, 2023
Start time (MST):	9:43	End time (MST):	13:22
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:	1.002095	1.001960	Backgd or Offset:	0.037	0.045
Calibration intercept:	-6.580000	-4.460000	Coeff or Slope:	0.880	0.874

CO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	3000	0.0	0.0	-0.8	----
as found span	2920	80.0	1605.3	1604.6	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	-0.1	----
high point	2920	80.0	1605.3	1606.1	1.000
second point	2960	40.0	802.7	797.9	1.006
third point	2980	20.0	401.3	393.1	1.021
as left zero	3000	0.0	0.0	-0.1	----
as left span	2960	40.0	802.7	784.7	1.023
				Average Correction Factor	1.009

Baseline Corr As found:	1605.40	Prev response:	1602.12	*% 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 the inlet filter after as founds. Adjusted both zero and span.

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

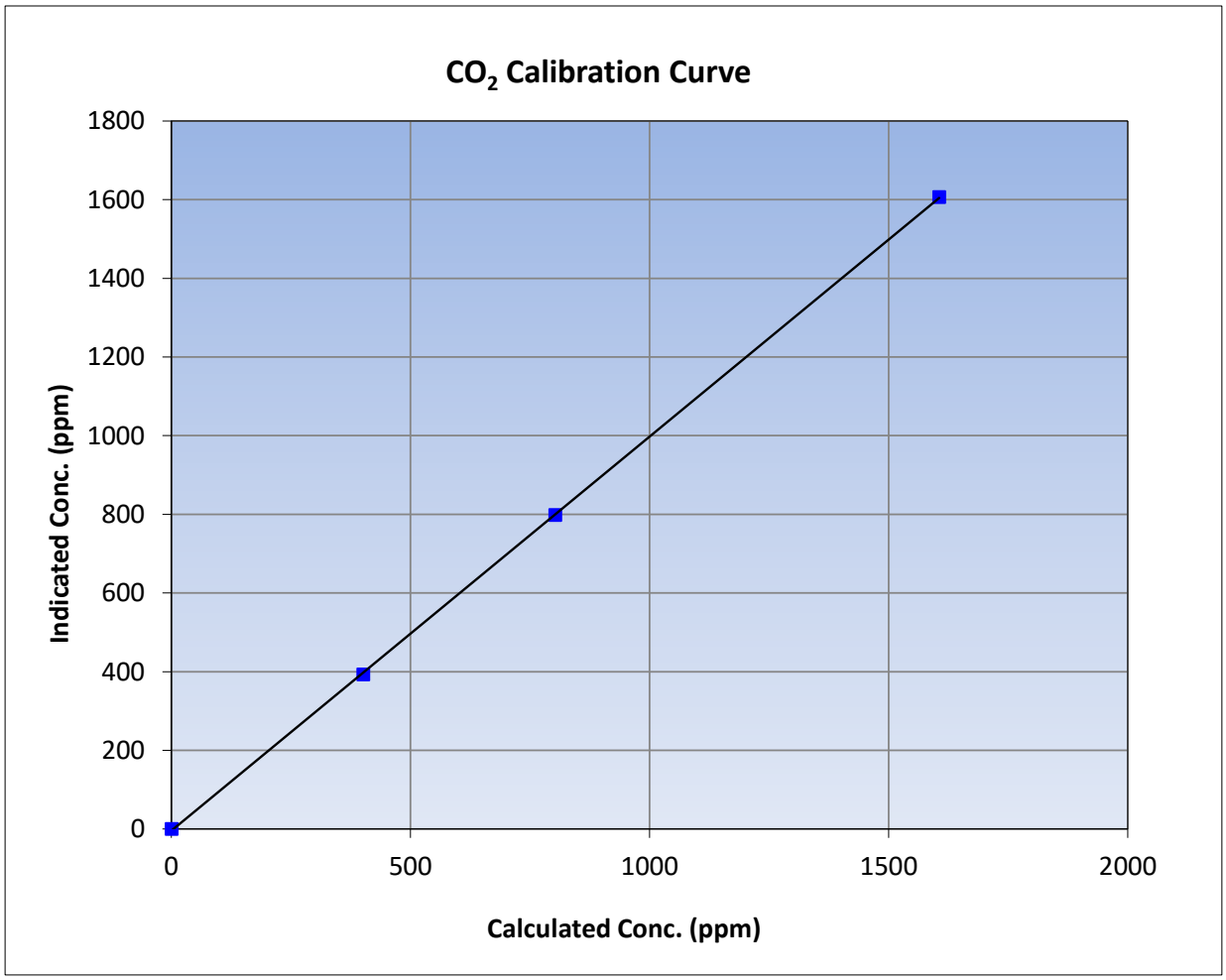
Station Information

Calibration Date	June 12, 2023	Previous Calibration	May 12, 2023
Station Name	Bertha Ganter-Fort McKay	Station Number	AMS01
Start Time (MST)	9:43	End Time (MST)	13:22
Analyzer make	Teledyne API 360	Analyzer serial #	442

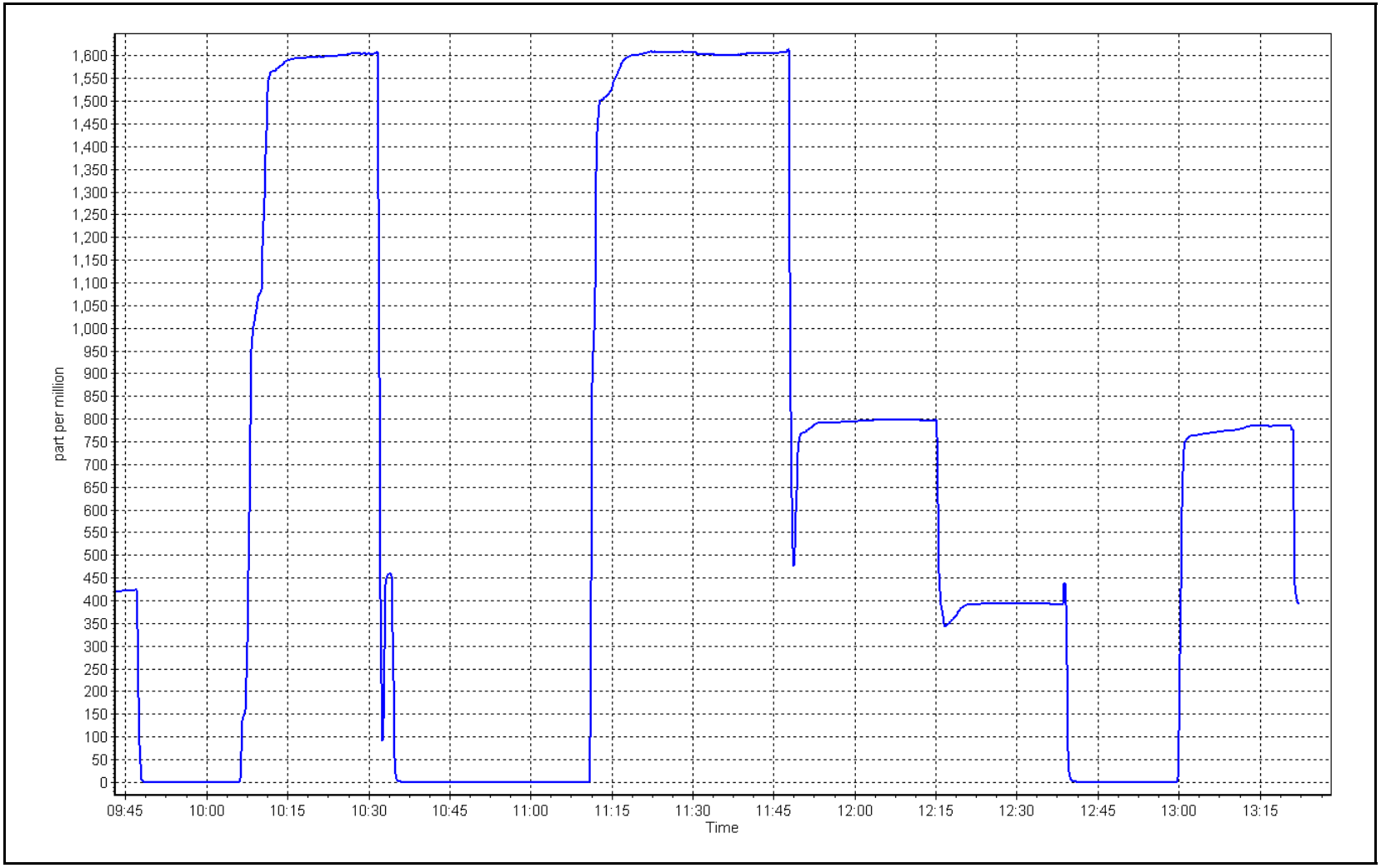
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
1605.3	1606.1	0.9995
802.7	797.9	1.0060
401.3	393.1	1.0209

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999966	*≥0.995*
Slope	1.001960	*0.90 - 1.10*
Intercept	-4.460000	*+/-10*



CO_2 Calibration Plot Date: June 12, 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:	June 21, 2023	Last Cal Date:	May 30, 2023
Start time (MST):	9:10	End time (MST):	14:30
NH3 Cal Date:	June 22, 2023	Last Cal Date:	May 30, 2023
Start time (MST):	9:15	End time (MST):	12:59
Reason:	Routine		

Calibration Standards

NOX Cal Gas Conc:	50.84	ppm	NO Gas Cylinder #:	T2Y1P9L
NO Cal Gas Conc:	50.04	ppm	NO Cal Gas Expiry:	March 3, 2028
Removed NOX Conc:	50.84	ppm	Removed Cylinder #:	NA
Removed NO Conc:	50.04	ppm	Removed cyl Expiry:	NA
NOX gas Diff:			NO gas Diff:	
NH3 Cal Gas Conc:	72.93	ppm	NH3 Gas Cylinder #:	CC281298
			NH3 Cal Gas Expiry:	February 28, 2023
Removed NH3 Conc:	72.93	ppm	Removed Cylinder #:	NA
NH3 gas Diff:			Removed cyl Expiry:	NA
Calibrator Model:	Teledyne API T700		Serial Number:	3565
ZAG make/model:	Teledyne API T701		Serial Number:	5609

Analyzer Information

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

	Start	*Finish*		*Start*	*Finish*
NO coefficient:	0.986	0.989	TN coefficient:	0.984	0.995
NOX coefficient:	0.986	0.991	NO bkgrnd:	-3.0	-0.5
NO2 coefficient:	1.000	1.000	NOX bkgrnd:	-2.5	-0.3
NH3 coefficient:	0.941	0.941	TN bkgrnd:	1.4	0.5

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	0.998848	0.998174
NO_X Cal Offset:	-0.520000	-1.280000
NO Cal Slope:	0.998730	0.999572
NO Cal Offset:	-1.160000	-2.180000
NO_2 Cal Slope:	0.999748	1.004664
NO_2 Cal Offset:	0.471532	0.067495
NH3 Cal Slope:	0.998065	0.998759
NH3 Cal Offset:	-0.656397	1.195770
TN Cal Slope:	1.001095	1.001474
TN Cal Offset:	-0.131851	1.255511

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	-0.7	-0.7	0.0	----	----
as found NO	4920	80.0	813.4	813.4	----	814.0	813.8	0.3	0.999	----
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high NO point	4920	80.0	813.4	813.4	----	812.0	811.3	0.4	1.002	----
NO/O3 point	4920	80.0	813.4	813.4	----	813.0	812.0	0.8	1.001	----
as found NH3	3413	86.4	1800.6	----	1800.6	1806.3	----	1801.5	0.997	1.000
new NH3 cyl rp							----			
first NH3	3413	86.4	1800.6	----	1800.6	1806.3	----	1801.5	0.997	1.000
second NH3	3452	48.0	1000.2	----	1000.2	997.0	----	994.0	1.003	1.006
third NH3	3476	24.0	500.1	----	500.1	507.6	----	506.1	0.985	0.988
								Average Correction Factor	1.0012	0.9980

Corrected As found TN = 814.7 ppb NO_X = 814.5 ppb NH3 = 1801.5 ppb *Percent Change TN = 0.1%

Previous Response TN = 814.2 ppb NO_X = 812.0 ppb NH3 = 1796.5 ppb *Percent Change NO_X = 0.3%

*Percent Change NH3 = 0.3%

* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 94.1%

NH3 Current Converter Efficiency = 94.1%

Wood Buffalo Environmental Association

NO_X - NO - NO_2 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.7	0.8	-0.4	----	----
as found span	4920	80.0	813.4	800.6	813.4	812.0	796.1	804.9	1.0018	1.0057
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	----	----
high point	4920	80.0	813.4	800.6	813.4	811.3	799.4	812.0	1.0026	1.0016
second point	4960	40.0	406.7	400.3	406.7	404.0	396.2	404.8	1.0067	1.0104
third point	4980	20.0	203.4	200.2	203.4	200.6	196.3	201.3	1.0138	1.0197
								Average Correction Factor	1.0077	1.0105

Baseline Corr As fnd	TN =	805.3 ppb	NO_X =	811.3 ppb	NO =	795.3 ppb	*Percent Change	TN = -1.1%
Previous Response	TN =	814.2 ppb	NO_X =	812.0 ppb	NO =	798.5 ppb	*Percent Change	NO_X = -0.1%
							*Percent Change	NO = -0.4%

* = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found zero	----	----	0.0	0.0	----	----
calibration zero	----	----	0.0	0.0	----	----
1st GPT point (400 ppb O3)	794.9	398.9	408.8	410.6	0.9956	100.4%
2nd GPT point (200 ppb O3)	794.9	594.0	213.7	215.2	0.9930	100.7%
3rd GPT point (100 ppb O3)	794.9	694.8	112.9	113.3	0.9965	100.4%
				Average Correction Factor	0.9950	100.5%

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

Calibration Performed By: Rene Chamberland

Wood Buffalo Environmental Association

TN Calibration Summary

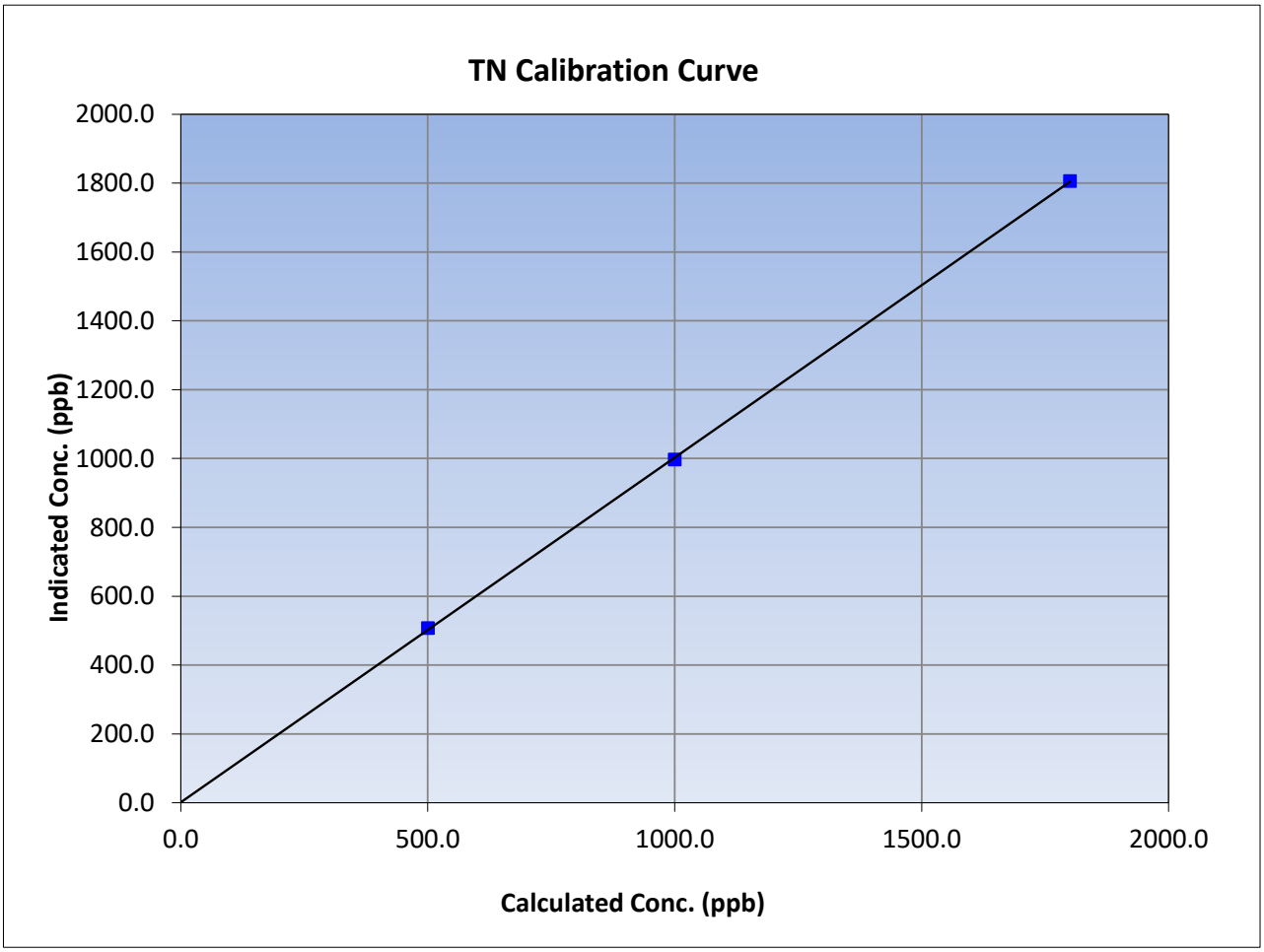
Version-05-2023

Station Information

Calibration Date:	June 22, 2023	Previous Calibration:	May 30, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:10	End Time (MST):	14:30
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	0.999960	≥0.995
1800.6	1806.3	0.9969			
1000.2	997.0	1.0032	Slope	1.001474	0.90 - 1.10
500.1	507.6	0.9852			
			Intercept	1.255511	+/-20



Wood Buffalo Environmental Association

NH_3 Calibration Summary

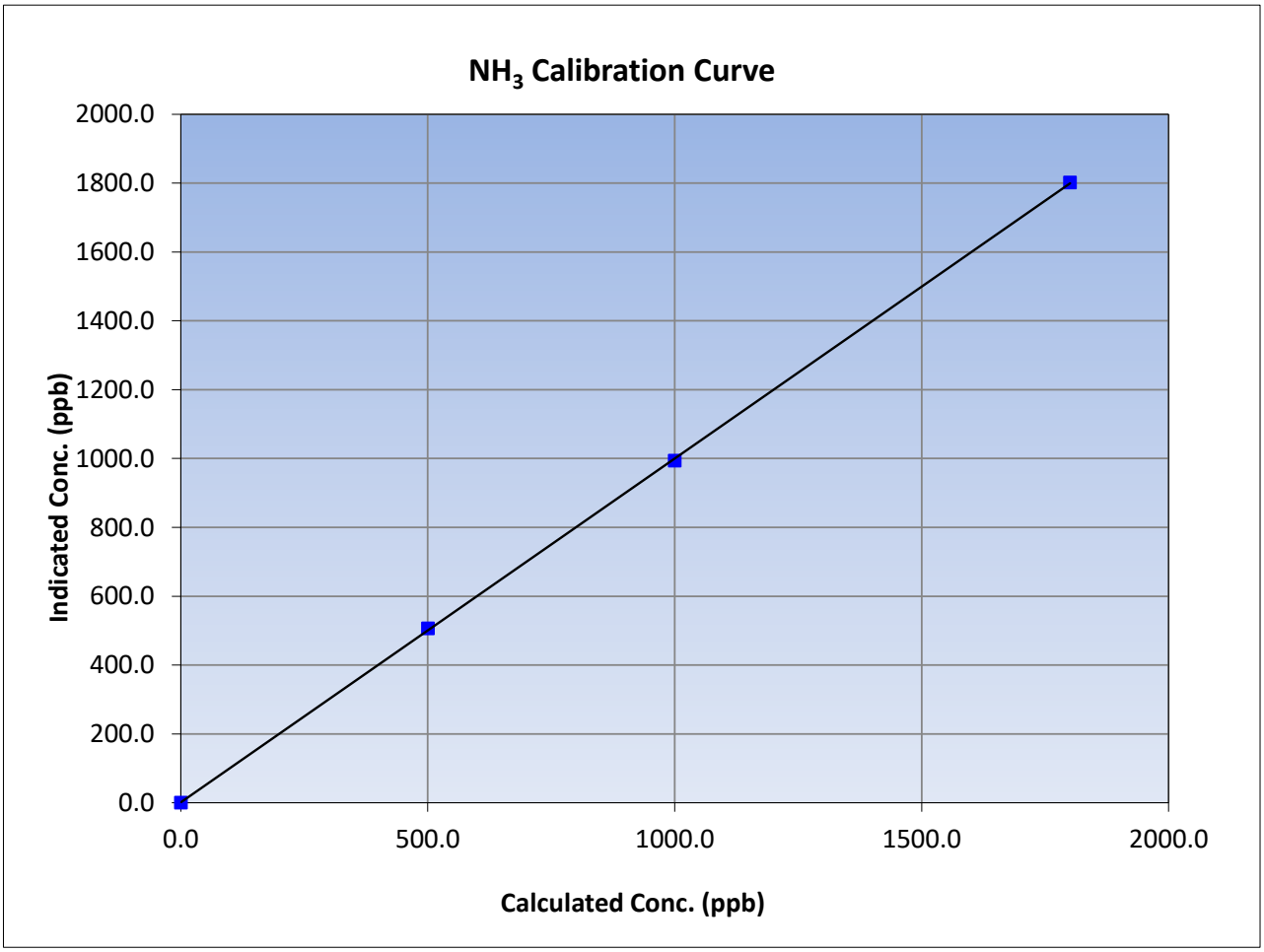
Version-05-2023

Station Information

Calibration Date:	June 22, 2023	Previous Calibration:	May 30, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:10	End Time (MST):	14:30
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999959	≥0.995
1800.6	1801.5	0.9995			
1000.2	994.0	1.0062	Slope	0.998759	0.90 - 1.10
500.1	506.1	0.9881			
			Intercept	1.195770	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

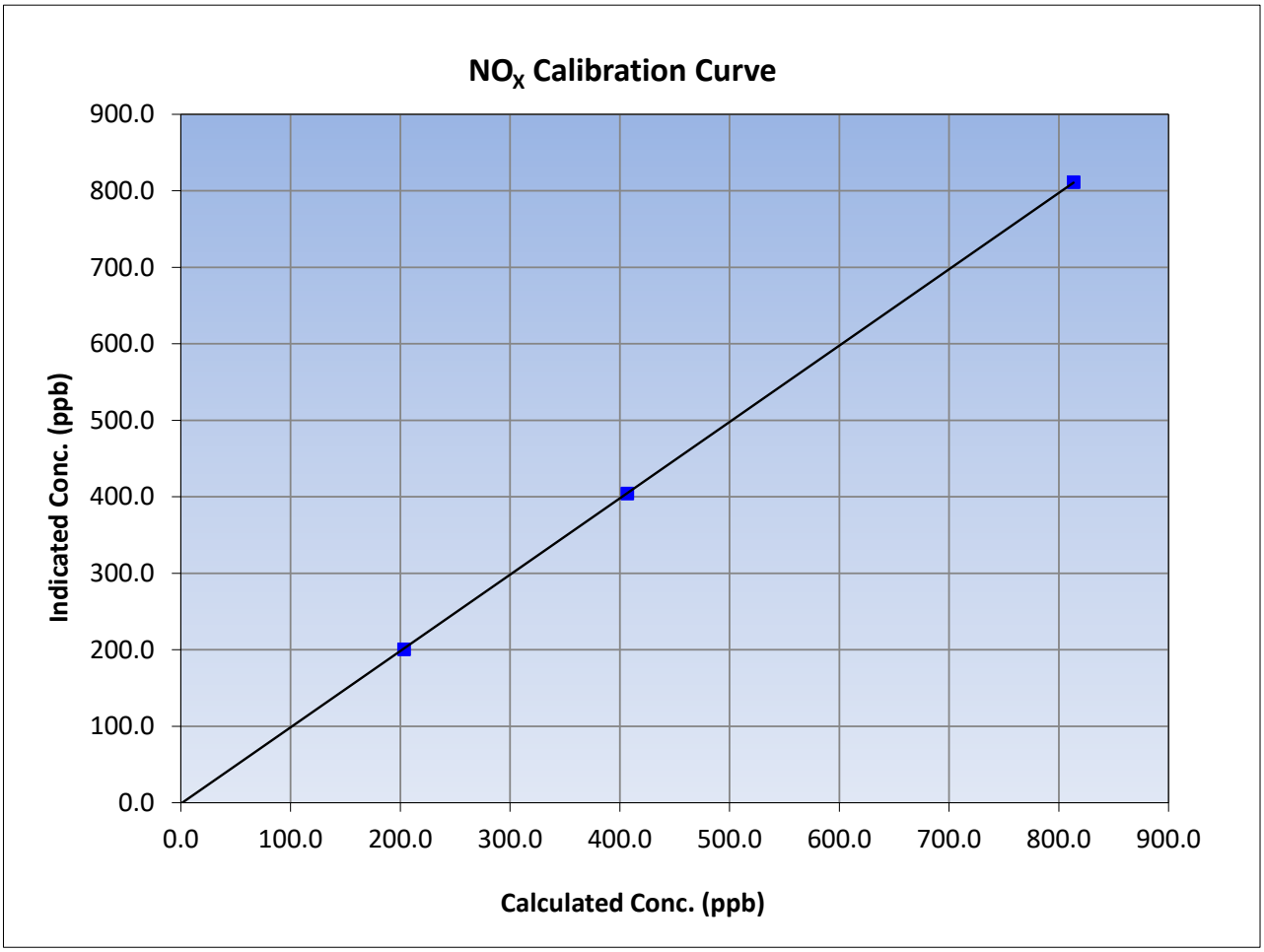
Version-05-2023

Station Information

Calibration Date:	June 21, 2023	Previous Calibration:	May 30, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:10	End Time (MST):	14:30
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	0.999990	≥0.995
813.4	811.3	1.0026			
406.7	404.0	1.0067	Slope	0.998174	0.90 - 1.10
203.4	200.6	1.0138			
			Intercept	-1.280000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

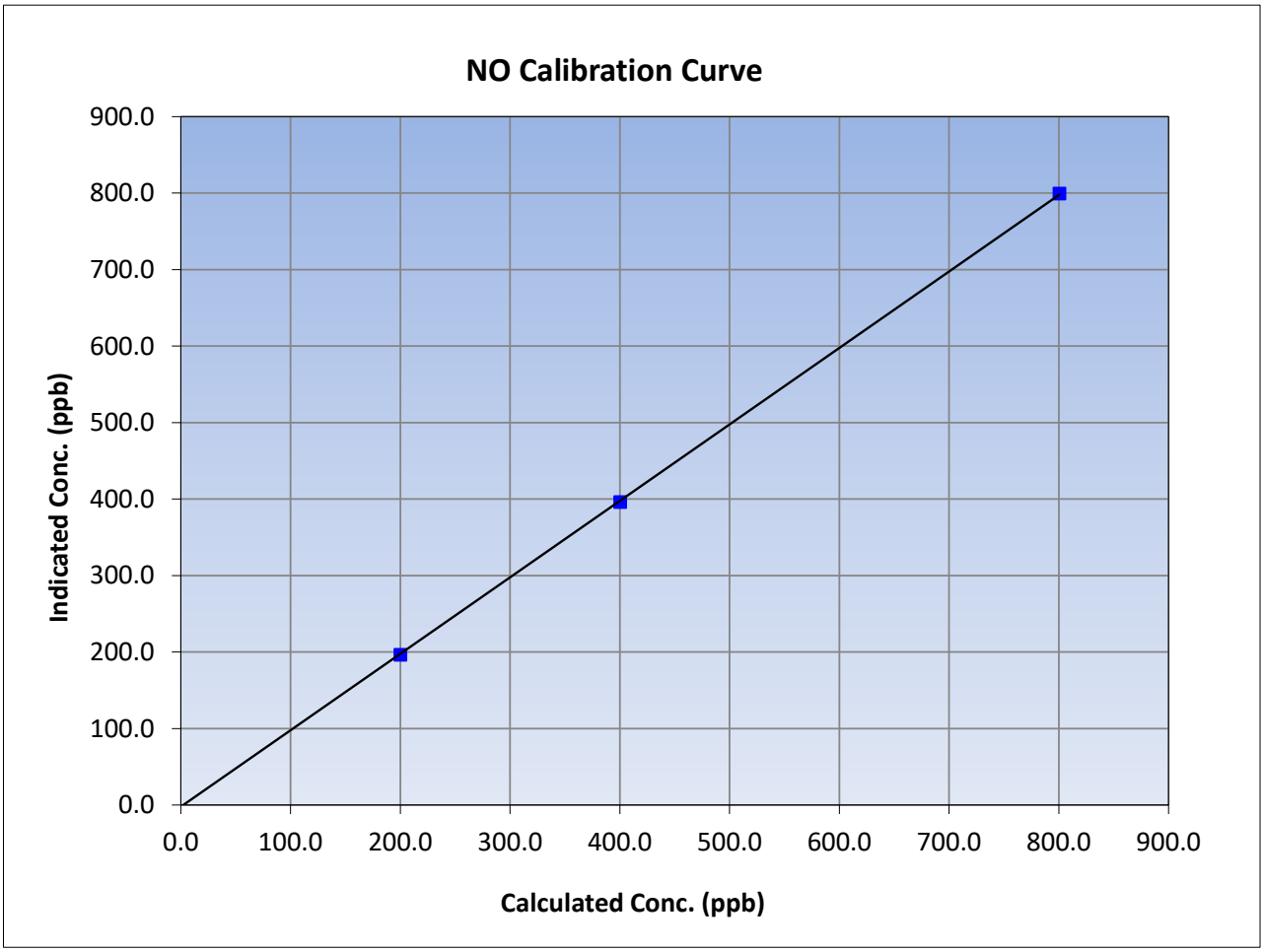
Version-05-2023

Station Information

Calibration Date:	June 21, 2023	Previous Calibration:	May 30, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:10	End Time (MST):	14:30
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	0.999967	≥0.995
800.6	799.4	1.0016			
400.3	396.2	1.0104	Slope	0.999572	0.90 - 1.10
200.2	196.3	1.0197			
			Intercept	-2.180000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

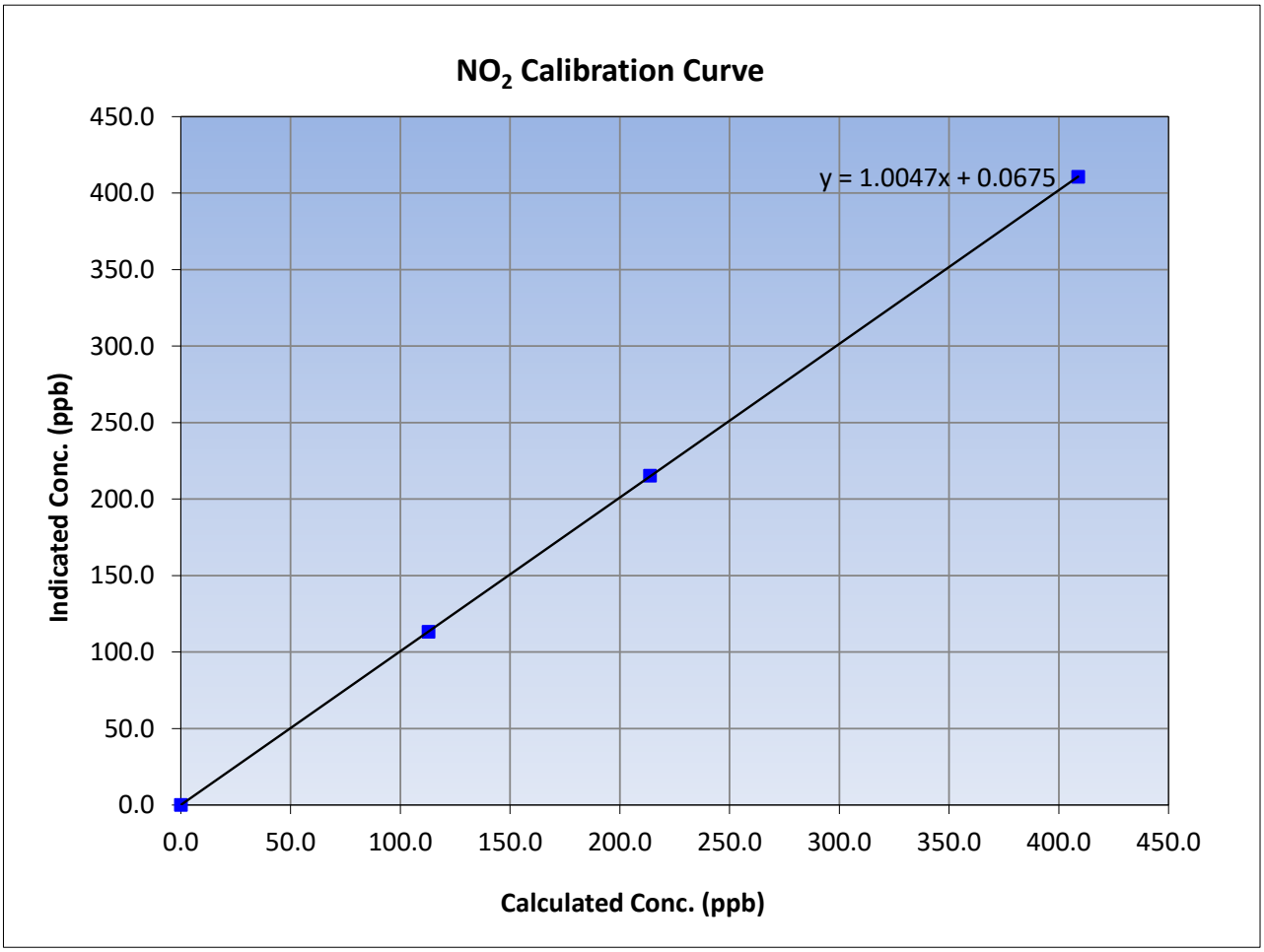
Version-05-2023

Station Information

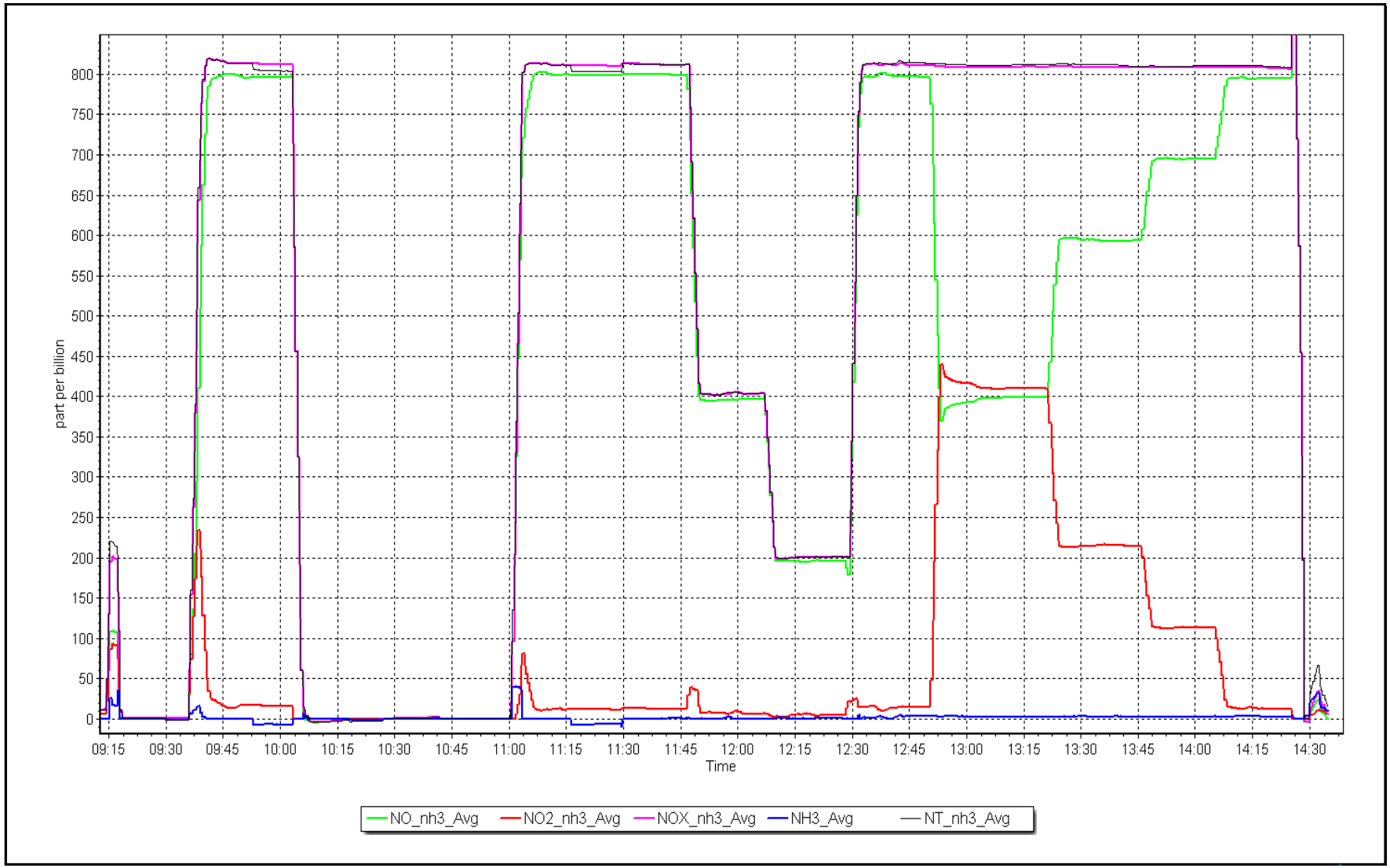
Calibration Date:	June 21, 2023	Previous Calibration:	May 30, 2023
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01
Start Time (MST):	9:10	End Time (MST):	14:30
Analyzer make:	Teledyne API T201	Analyzer serial #:	475

Calibration Data

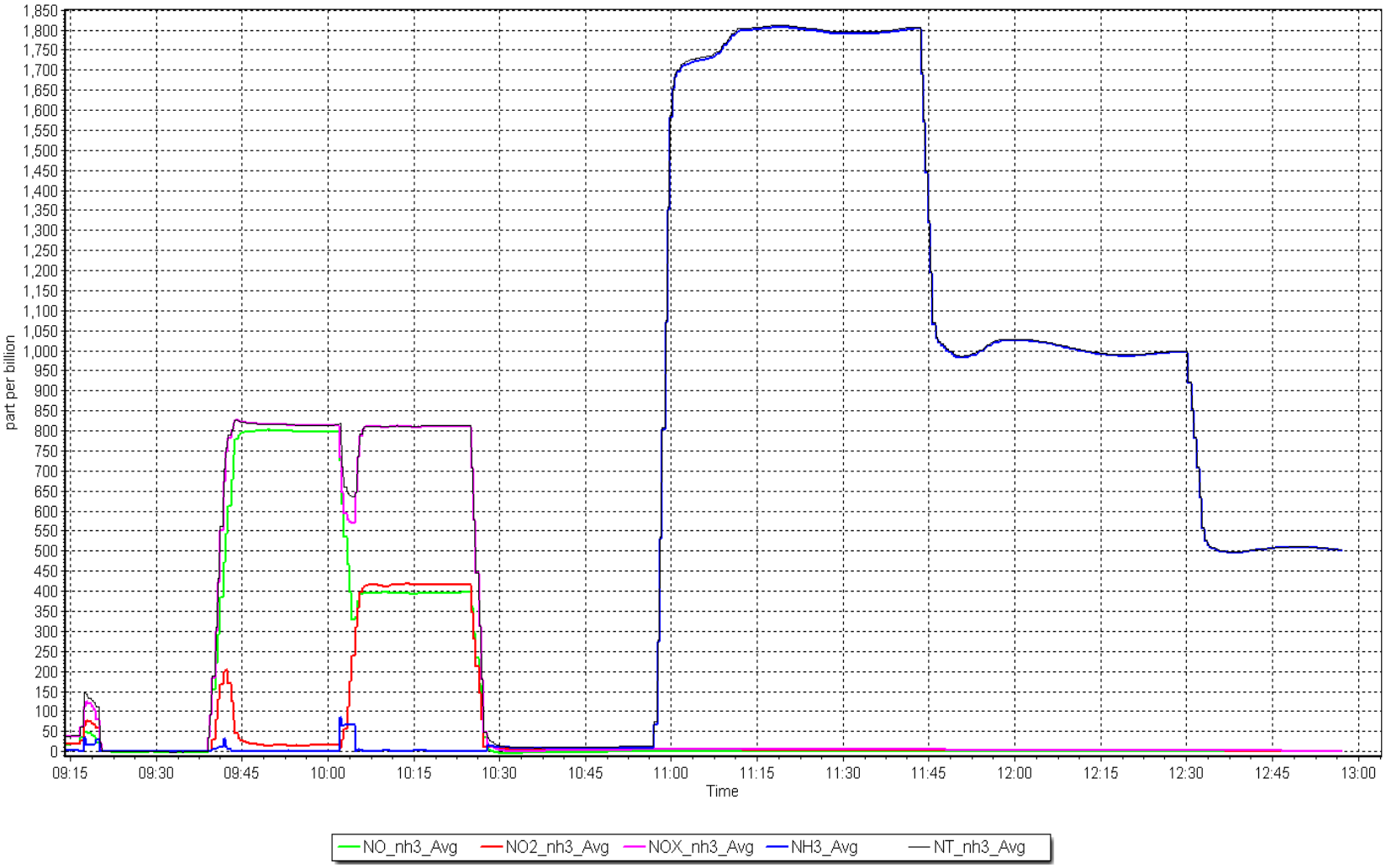
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999997	≥0.995
408.8	410.6	0.9956			
213.7	215.2	0.9930	Slope	1.004664	0.90 - 1.10
112.9	113.3	0.9965			
			Intercept	0.067495	+/-20



NO_X Calibration Plot Date: June 21, 2023 Location: Bertha Ganter-Fort McKay



NH_3 Calibration Plot Date: June 22, 2023 Location: Bertha Ganter-Fort McKay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS02
MILDRED LAKE
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Mildred Lake	Station number:	AMS02
Calibration Date:	June 29, 2023	Last Cal Date:	May 11, 2023
Start time (MST):	10:38	End time (MST):	16:04
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 T750		Serial Number:	282
ZAG Make/Model:	API T751		Serial Number:	321

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000972	0.999231	Backgd or Offset:	17.9	17.8
Calibration intercept:	-1.065310	-0.605160	Coeff or Slope:	0.793	0.783

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	----
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	0.1	----
high point	4920	80.2	801.6	801.0	1.001
second point	4960	40.1	400.8	398.9	1.005
third point	4980	20.0	199.9	198.9	1.005
as left zero	5000	0.0	0.0	-0.2	----
as left span	4920	80.2	801.6	785.0	1.021
				Average Correction Factor	1.004

Baseline Corr As found:	813.00	Previous response	801.36	*% change	1.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

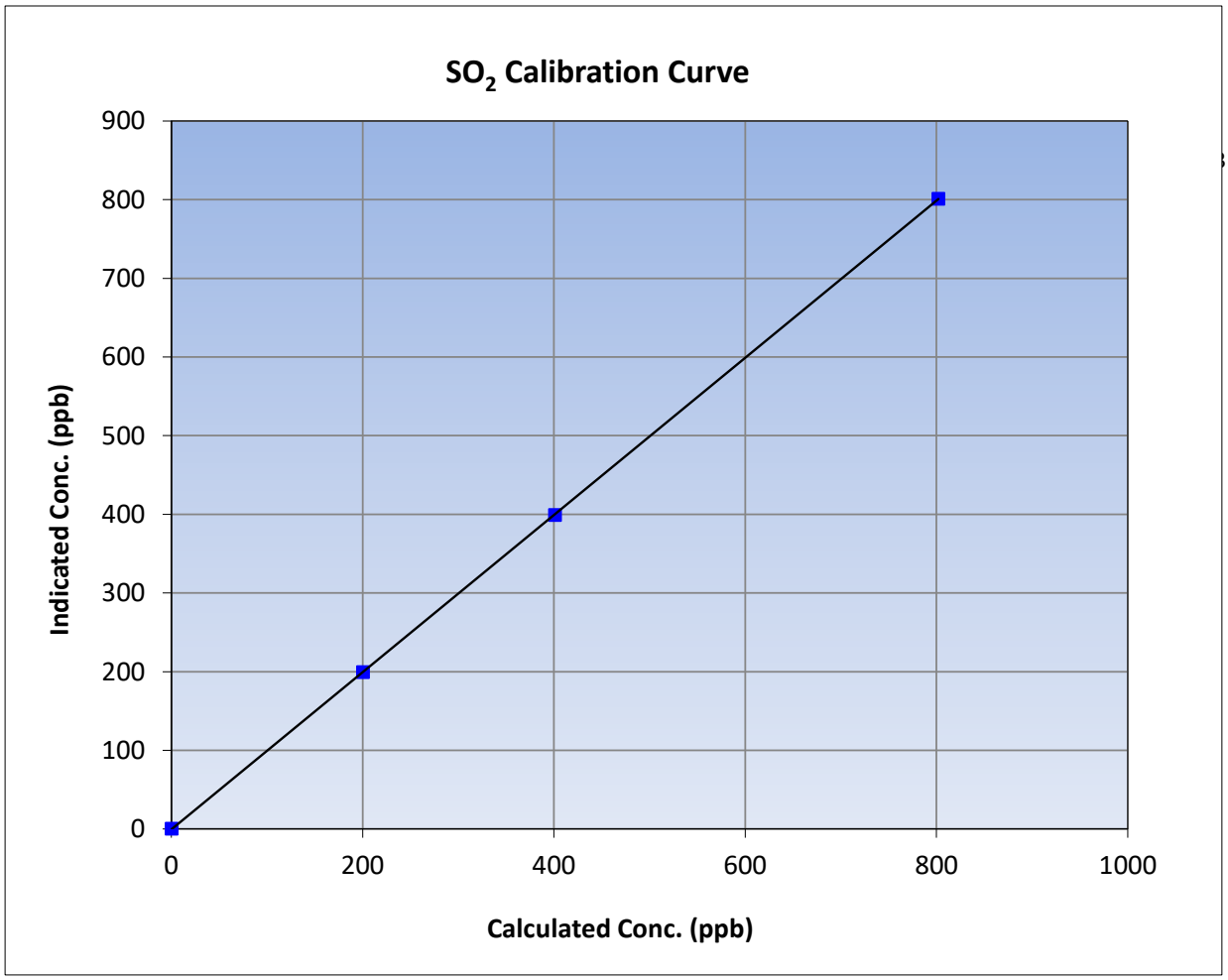
Station Information

Calibration Date:	June 29, 2023	Previous Calibration:	May 11, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:38	End Time (MST):	16:04
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1404901075

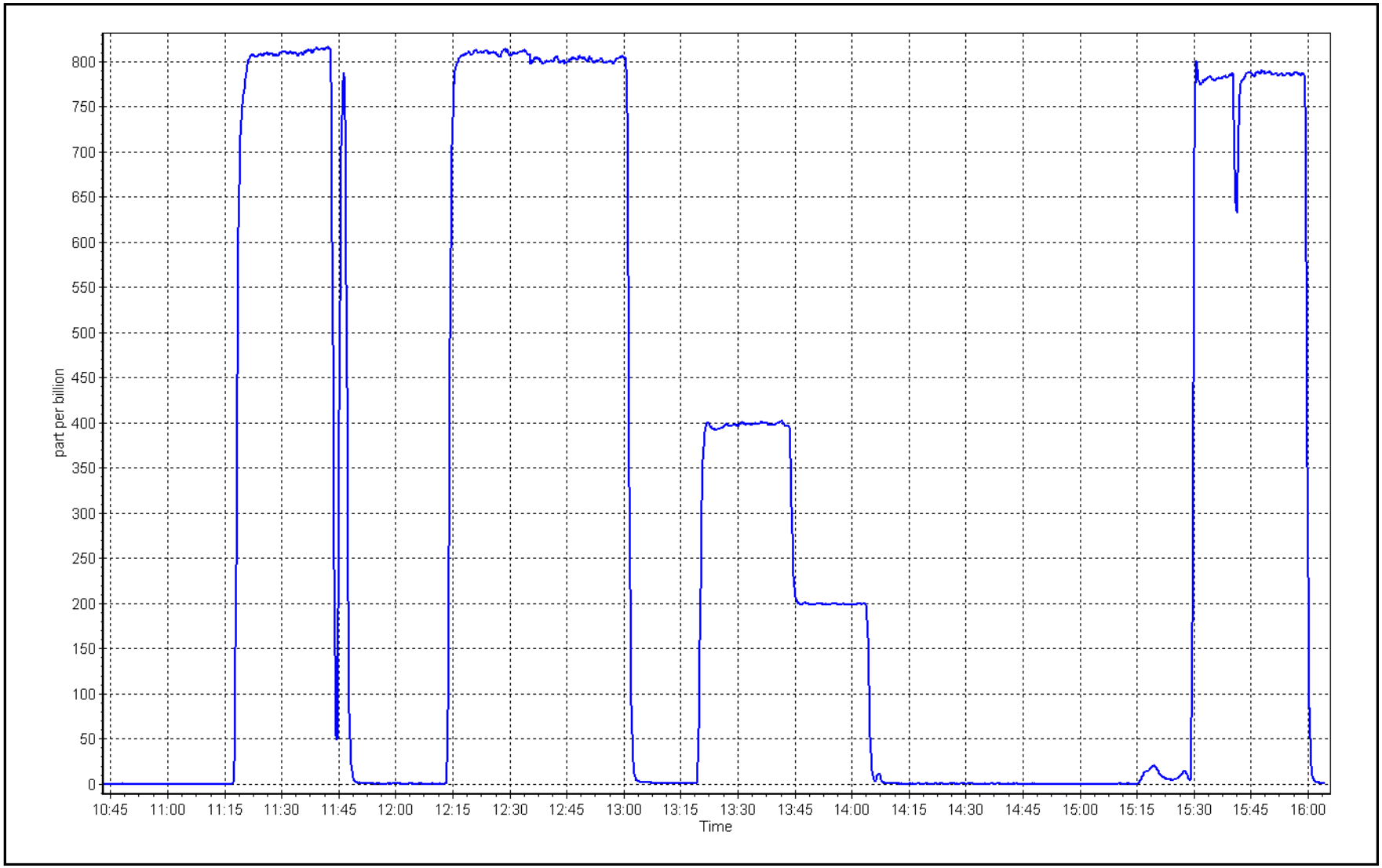
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
801.6	801.0	1.0008
400.8	398.9	1.0048
199.9	198.9	1.0051

Statistical Evaluation		Limits
Correlation Coefficient	0.999994	≥0.995
Slope	0.999231	0.90 - 1.10
Intercept	-0.605160	+/-30



SO2 Calibration Plot Date: June 29, 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:	June 29, 2023	Last Cal Date:	May 3, 2023
Start time (MST):	10:00	End time (MST):	15:39
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:	1.006965	1.006394	Backgd or Offset:	1.80	1.72
Calibration intercept:	-0.239199	-0.119196	Coeff or Slope:	0.833	0.797

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	83.4	0.959
as found 2nd point	4962	37.8	40.0	41.7	0.959
as found 3rd point	4981	18.9	20.0	20.4	0.980
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4924	75.6	80.0	80.4	0.995
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	0.0	----
as left span	4924	75.6	80.0	80.6	0.992
SO2 Scrubber Check	4920	80.2	802.0	0.0	----
Date of last scrubber change:		12-Sep-22		Ave Corr Factor	1.000
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	83.4	Prev response:	80.31	*% change:	3.7%
Baseline Corr 2nd AF pt:	41.7	AF Slope:	1.044541	AF Intercept:	-0.179166
Baseline Corr 3rd AF pt:	20.4	AF Correlation:	0.999964		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

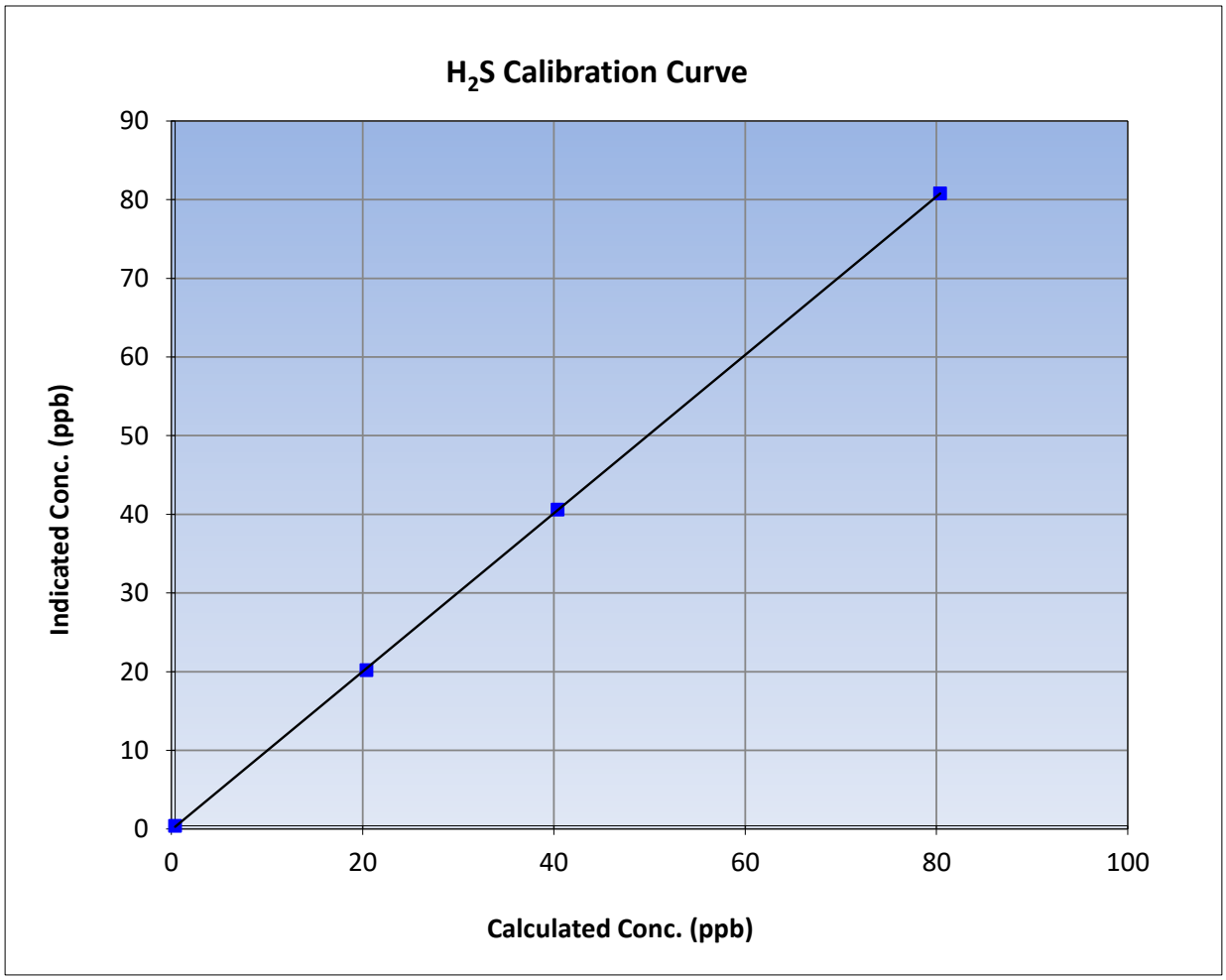
Station Information

Calibration Date:	June 29, 2023	Previous Calibration:	May 3, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:00	End Time (MST):	15:39
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	12113311966

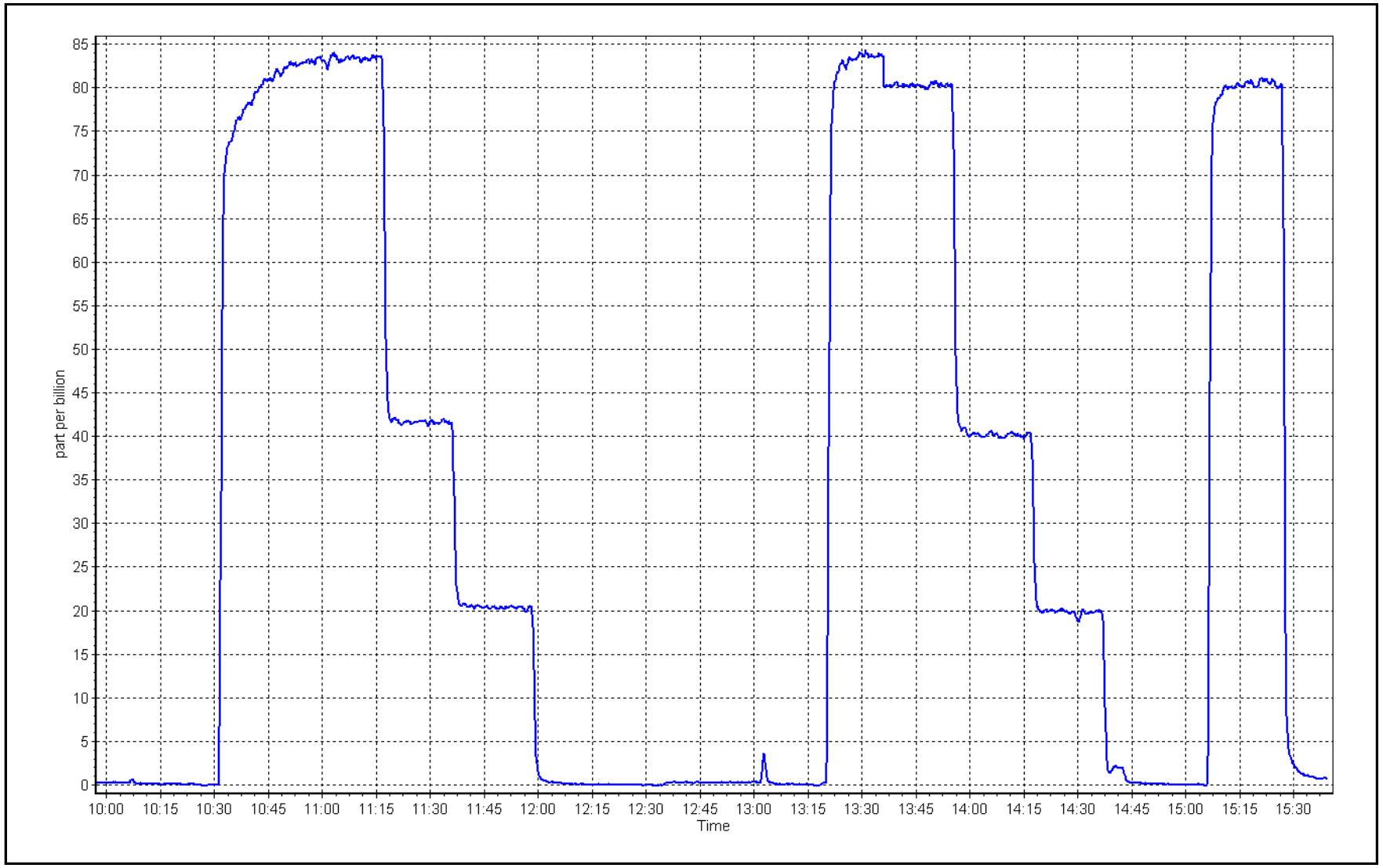
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.4	0.9949
40.0	40.2	0.9949
20.0	19.8	1.0099

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999983	*≥0.995*
Slope	1.006394	*0.90 - 1.10*
Intercept	-0.119196	*+/-3*



H_2S Calibration Plot Date: June 29, 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:	June 29, 2023	Last Cal Date:	May 30, 2023
Start time (MST):	10:38	End time (MST):	16:04
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 T750		Serial Number:	282	
ZAG make/model:	Teledyne API T751		Serial Number:	321	

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:	2.90E-04	2.88E-04	NMHC SP Ratio:	4.54E-04	4.52E-05
CH4 Retention time:	14.6	14.6	NMHC Peak Area:	194026	194709
Zero Chromatogram:	ON	ON	Flat Baseline:	OFF	OFF

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	16.82	17.28	0.973
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	16.82	16.85	0.998
second point	4960	40.1	8.41	8.40	1.001
third point	4980	20.0	4.19	4.22	0.994
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	16.82	16.48	1.021
				Average Correction Factor	0.998
Baseline Corr AF:	17.28	Prev response	16.82	*% change	2.7%
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	9.06	0.971
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	8.83	0.996
second point	4960	40.1	4.40	4.43	0.993
third point	4980	20.0	2.19	2.24	0.981
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.80	8.70	1.011
				Average Correction Factor	0.990
Baseline Corr AF:	9.06	Prev response	8.81	*% change	2.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	8.02	8.22	0.976
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	8.02	8.02	1.000
second point	4960	40.1	4.01	3.98	1.009
third point	4980	20.0	2.00	1.98	1.009
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	8.02	7.78	1.031
				Average Correction Factor	1.006
Baseline Corr AF:	8.22	Prev response	8.01	*% change	2.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000855	1.001404
THC Cal Offset:	-0.012905	0.001307
CH4 Cal Slope:	1.001225	0.999914
CH4 Cal Offset:	-0.018850	-0.014249
NMHC Cal Slope:	1.000634	1.002789
NMHC Cal Offset:	0.005745	0.015957

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

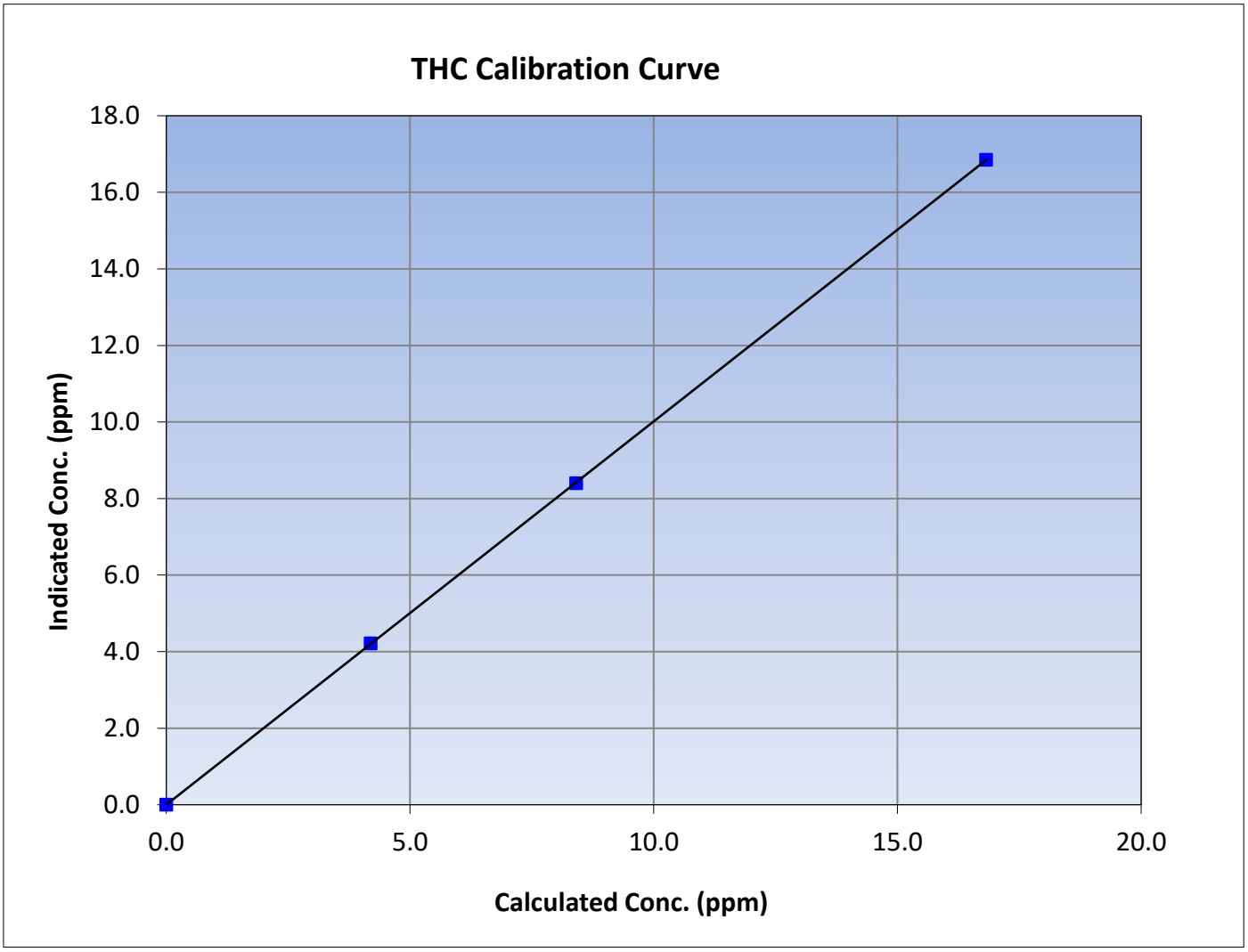
Version-06-2022

Station Information

Calibration Date:	June 29, 2023	Previous Calibration:	May 30, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:38	End Time (MST):	16:04
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	0.999995	*≥0.995*
16.82	16.85	0.9981			
8.41	8.40	1.0011	Slope	1.001404	*0.90 - 1.10*
4.19	4.22	0.9944			
			Intercept	0.001307	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

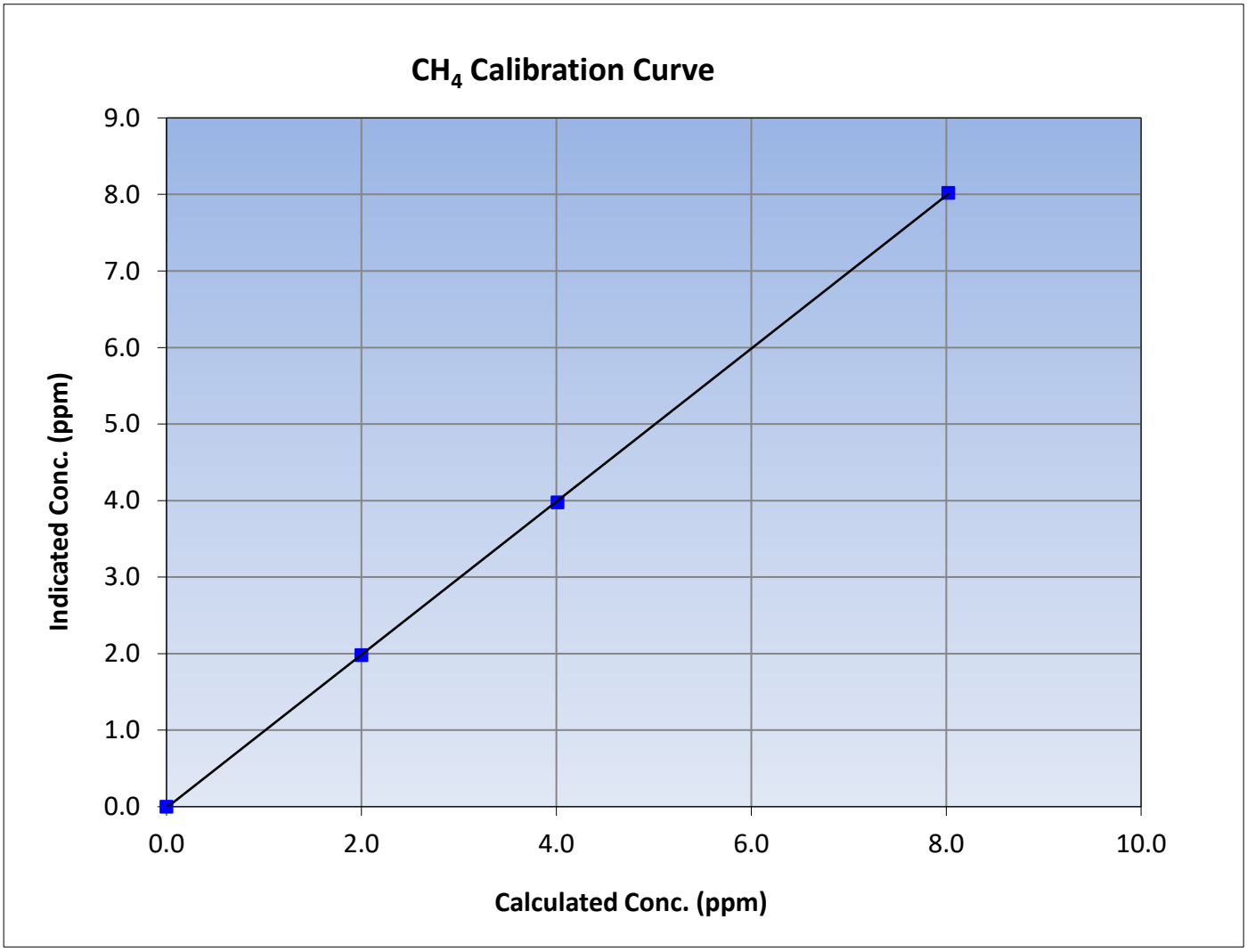
Version-06-2022

Station Information

Calibration Date:	June 29, 2023	Previous Calibration:	May 30, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:38	End Time (MST):	16:04
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	0.999976	*≥0.995*
8.02	8.02	1.0004			
4.01	3.98	1.0092	Slope	0.999914	*0.90 - 1.10*
2.00	1.98	1.0095			
			Intercept	-0.014249	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

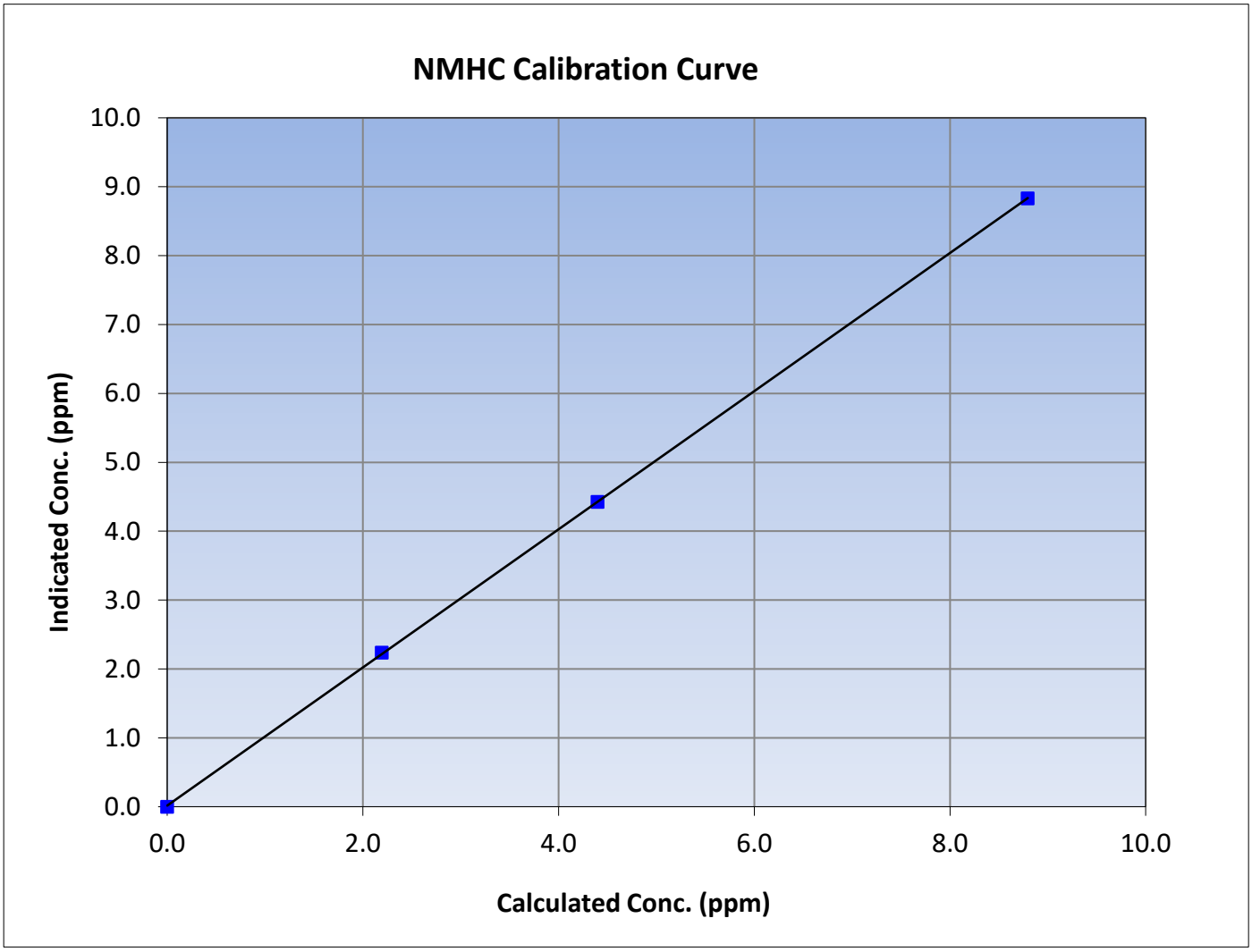
Version-06-2022

Station Information

Calibration Date:	June 29, 2023	Previous Calibration:	May 30, 2023
Station Name:	Mildred Lake	Station Number:	AMS02
Start Time (MST):	10:38	End Time (MST):	16:04
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	0.999983	≥0.995
8.80	8.83	0.9961			
4.40	4.43	0.9934	Slope	1.002789	0.90 - 1.10
2.19	2.24	0.9809			
			Intercept	0.015957	+/-0.5



NMHC Calibration Plot Date: June 29, 2023 Location: Mildred Lake

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS04
BUFFALO VIEWPOINT
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	June 9, 2023	Last Cal Date:	May 4, 2023
Start time (MST):	6:27	End time (MST):	9:13
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.02	ppm	Cal Gas Exp Date:	September 9, 2028
Cal Gas Cylinder #:	CC470284			
Removed Cal Gas Conc:	50.02	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3808
ZAG Make/Model:	API T701		Serial Number:	362

Analyzer Information

Analyzer make: Thermo 43i Analyzer serial #: JC1327300932

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003456	1.001756	Backgd or Offset:	22.1	22.1
Calibration intercept:	0.000000	0.520000	Coeff or Slope:	0.869	0.860

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4920	80.0	800.3	810.7	0.987
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4920	80.0	800.3	801.4	0.999
second point	4960	40.0	400.2	403.3	0.992
third point	4980	20.0	200.1	200.5	0.998
as left zero	5000	0.0	0.0	0.2	----
as left span	4920	80.0	800.3	800.4	1.000
				Average Correction Factor	0.996

Baseline Corr As found:	810.80	Previous response	803.09	*% 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: No Maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

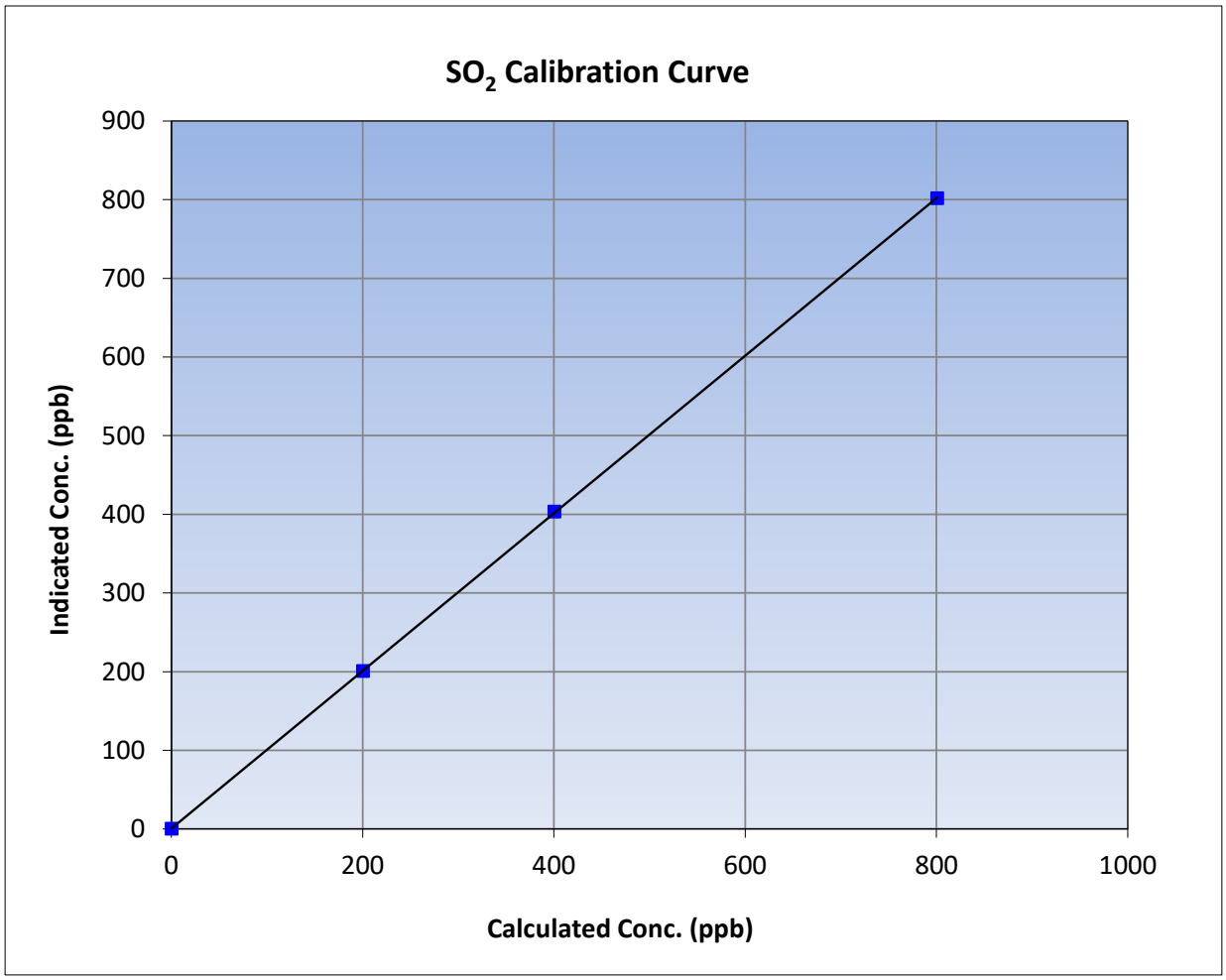
Station Information

Calibration Date:	June 9, 2023	Previous Calibration:	May 4, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:27	End Time (MST):	9:13
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1327300932

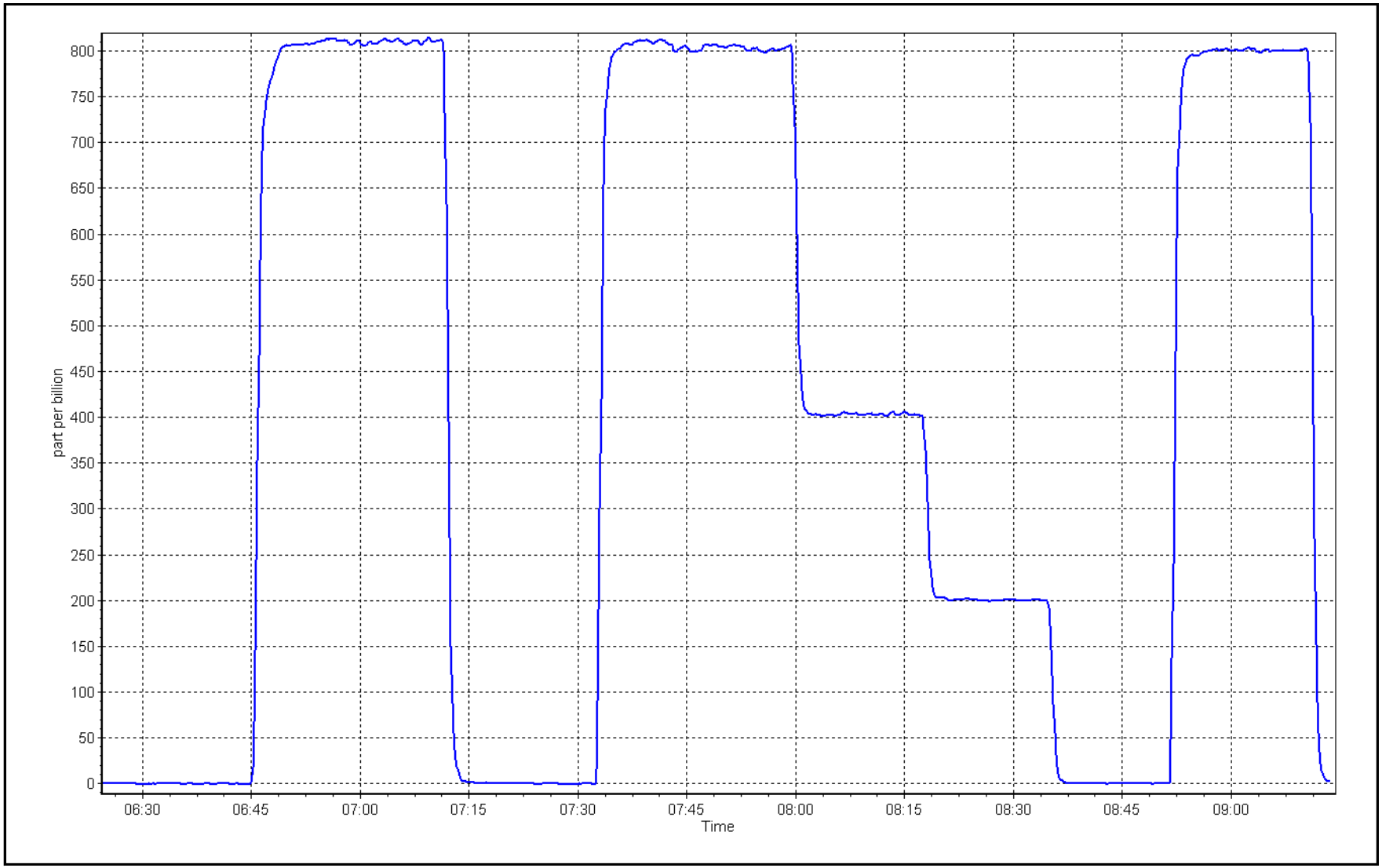
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
800.3	801.4	0.9987
400.2	403.3	0.9922
200.1	200.5	0.9979

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999986	*≥0.995*
Slope	1.001756	*0.90 - 1.10*
Intercept	0.520000	*+/-30*



SO2 Calibration Plot Date: June 9, 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:	June 22, 2023	Last Cal Date:	May 16, 2023
Start time (MST):	6:05	End time (MST):	10:35
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:	1.003759	1.001341	Backgd or Offset:	2.0	1.8
Calibration intercept:	-0.177711	-0.017797	Coeff or Slope:	1.067	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	-0.3	----
as found span	4926	74.1	80.3	78.6	1.018
as found 2nd point	4963	37.0	40.1	39.4	1.010
as found 3rd point	4982	18.5	20.1	19.4	1.018
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4926	74.1	80.3	80.4	0.999
second point	4963	37.0	40.1	40.2	0.998
third point	4982	18.5	20.1	20.0	1.003
as left zero	5000	0.0	0.0	0.0	----
as left span	4926	74.1	80.3	80.0	1.004
SO2 Scrubber Check	4920	80.0	800.0	0.0	----
Date of last scrubber change:		16-May-23		Ave Corr Factor	1.000
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.9	Prev response:	80.45	*% change:	-2.0%
Baseline Corr 2nd AF pt:	39.7	AF Slope:	0.982700	AF Intercept:	-0.238123
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999980		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

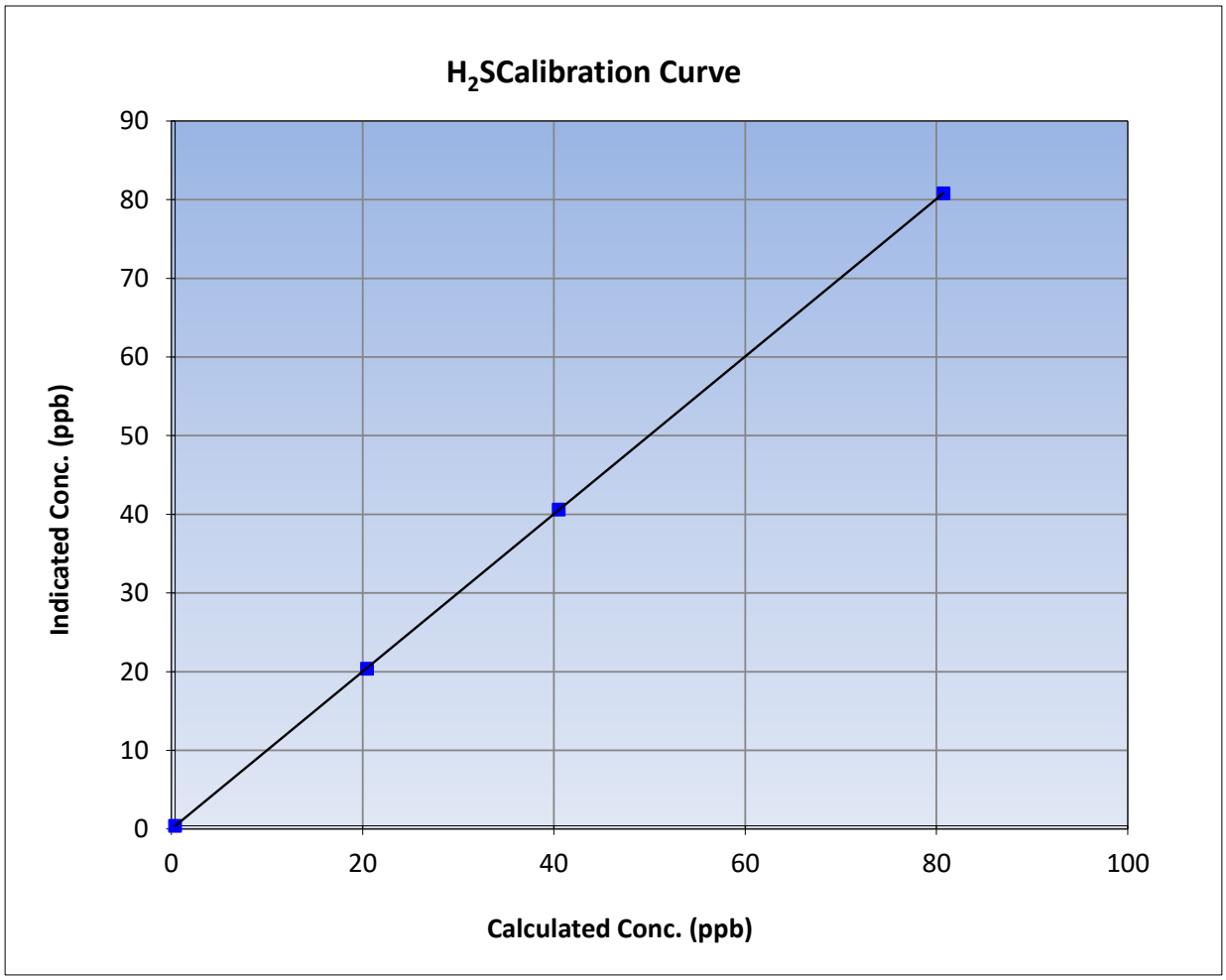
Station Information

Calibration Date:	June 22, 2023	Previous Calibration:	May 16, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:05	End Time (MST):	10:35
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1008841400

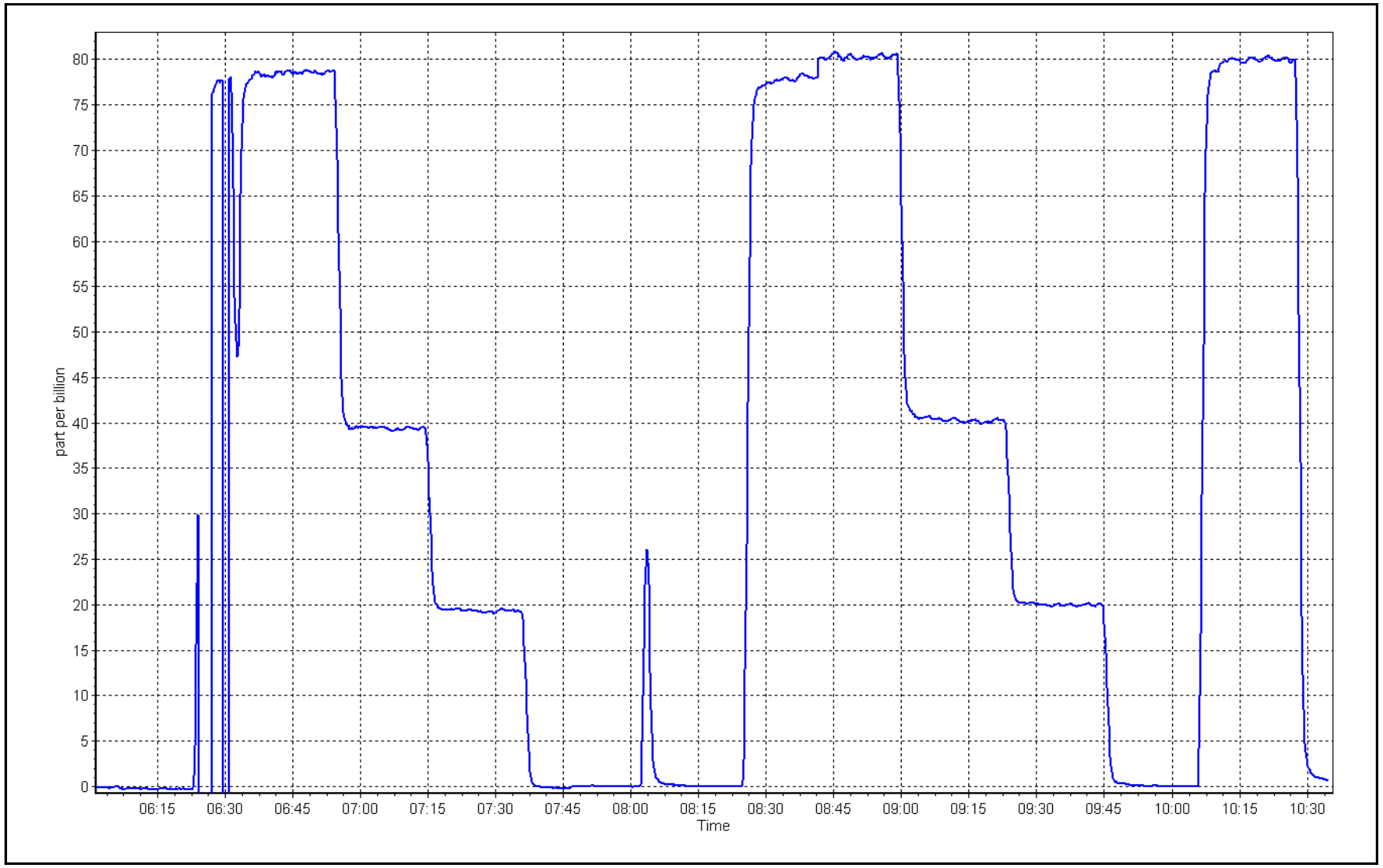
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.3	80.4	0.9990
40.1	40.2	0.9977
20.1	20.0	1.0026

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.001341	*0.90 - 1.10*
Intercept	-0.017797	*+/-3*



H_2S Calibration Plot Date: June 22, 2023 Location: Buffalo Viewpoint



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS04
Calibration Date:	June 9, 2023	Last Cal Date:	May 4, 2023
Start time (MST):	6:27	End time (MST):	9:12
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	17.01	17.08	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	17.01	17.10	0.995
second point	4960	40.0	8.50	8.53	0.997
third point	4980	20.0	4.25	4.25	1.000
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	17.01	17.12	0.993
				Average Correction Factor	0.997

Baseline Corr AF:	17.08	Prev response	16.97	*% change	0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.0	9.04	9.04	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	9.04	9.05	0.999
second point	4960	40.0	4.52	4.51	1.002
third point	4980	20.0	2.26	2.24	1.009
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	9.04	9.06	0.998
				Average Correction Factor	1.004
Baseline Corr AF:	9.04	Prev response	9.04	*% change	0.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	7.96	8.05	0.989
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	7.96	8.05	0.989
second point	4960	40.0	3.98	4.02	0.991
third point	4980	20.0	1.99	2.01	0.991
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	7.96	8.07	0.987
				Average Correction Factor	0.990
Baseline Corr AF:	8.05	Prev response	7.94	*% 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:	0.999063	1.005850
THC Cal Offset:	-0.016000	-0.014000
CH4 Cal Slope:	0.997102	1.010733
CH4 Cal Offset:	-0.002000	-0.002000
NMHC Cal Slope:	1.000411	1.001548
NMHC Cal Offset:	-0.010000	-0.012000

Notes: Hydrogen and Nitrogen changed out. No adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

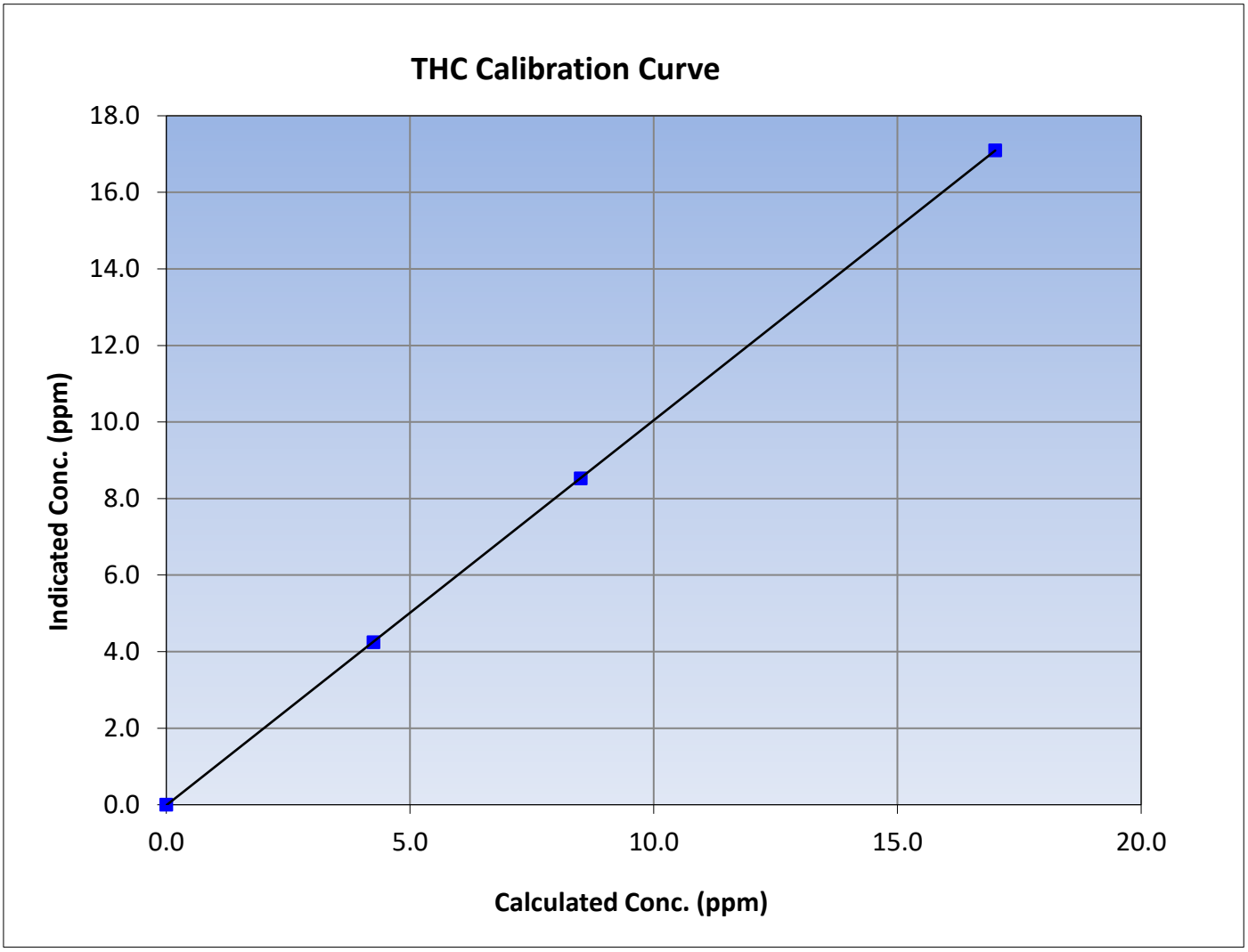
Version-01-2020

Station Information

Calibration Date:	June 9, 2023	Previous Calibration:	May 4, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:27	End Time (MST):	9:12
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
17.01	17.10	0.9945			
8.50	8.53	0.9969	Slope	1.005850	0.90 - 1.10
4.25	4.25	1.0004			
			Intercept	-0.014000	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

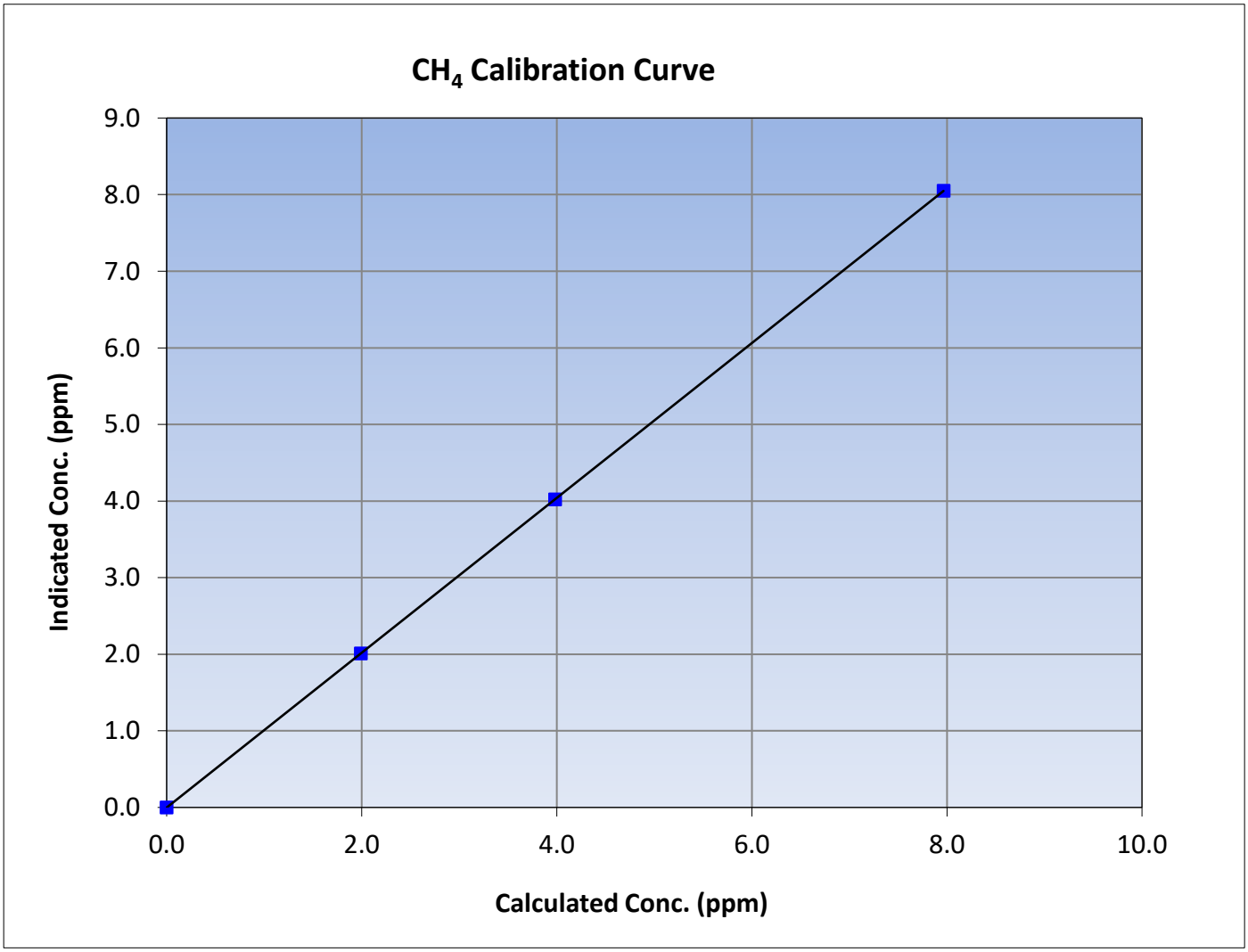
Version-01-2020

Station Information

Calibration Date:	June 9, 2023	Previous Calibration:	May 4, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:27	End Time (MST):	9:12
Analyzer make:	Thermo 55i	Analyzer serial #:	1222762077

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	1.000000	≥0.995
7.96	8.05	0.9894			
3.98	4.02	0.9906	Slope	1.010733	0.90 - 1.10
1.99	2.01	0.9906			
			Intercept	-0.002000	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

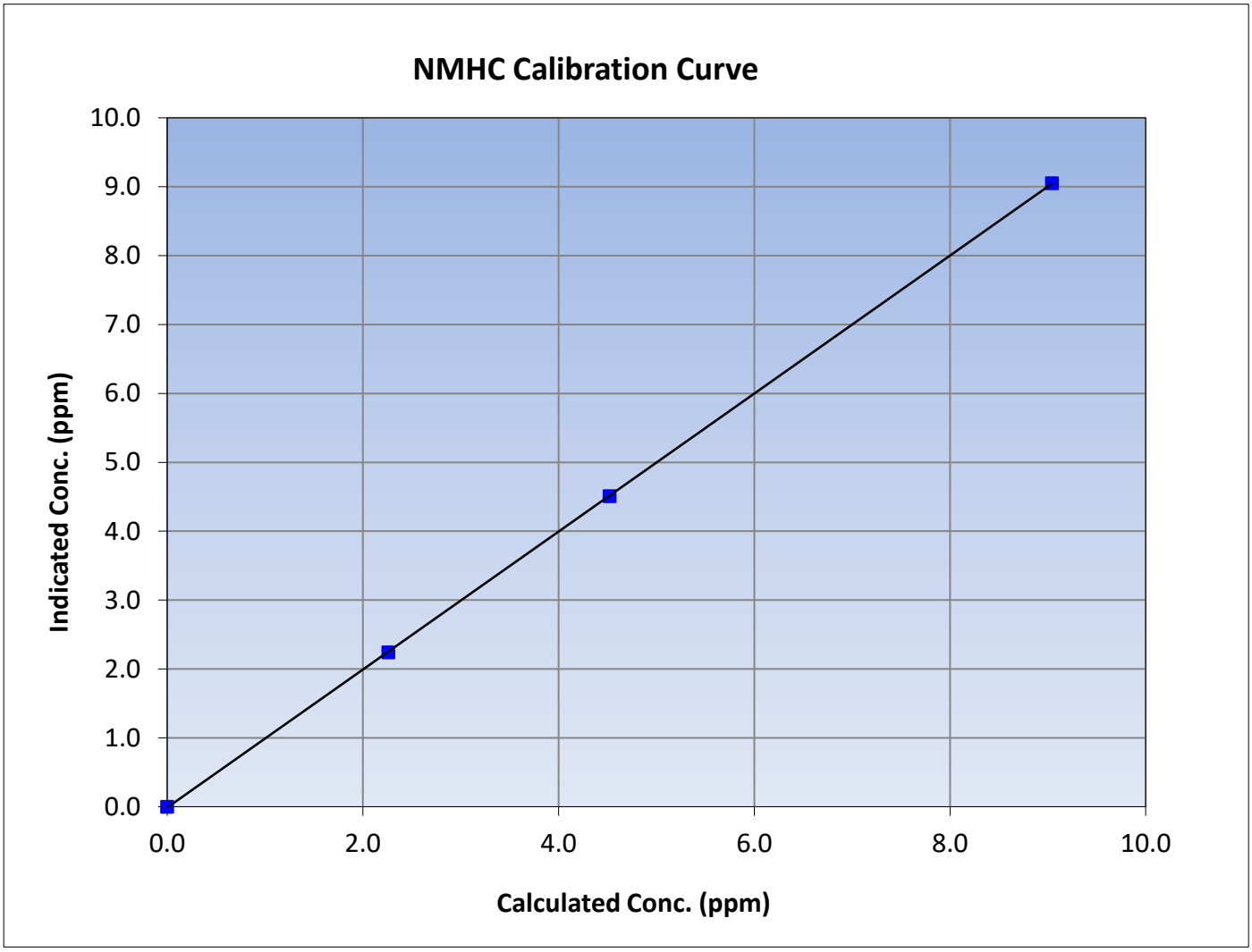
Version-01-2020

Station Information

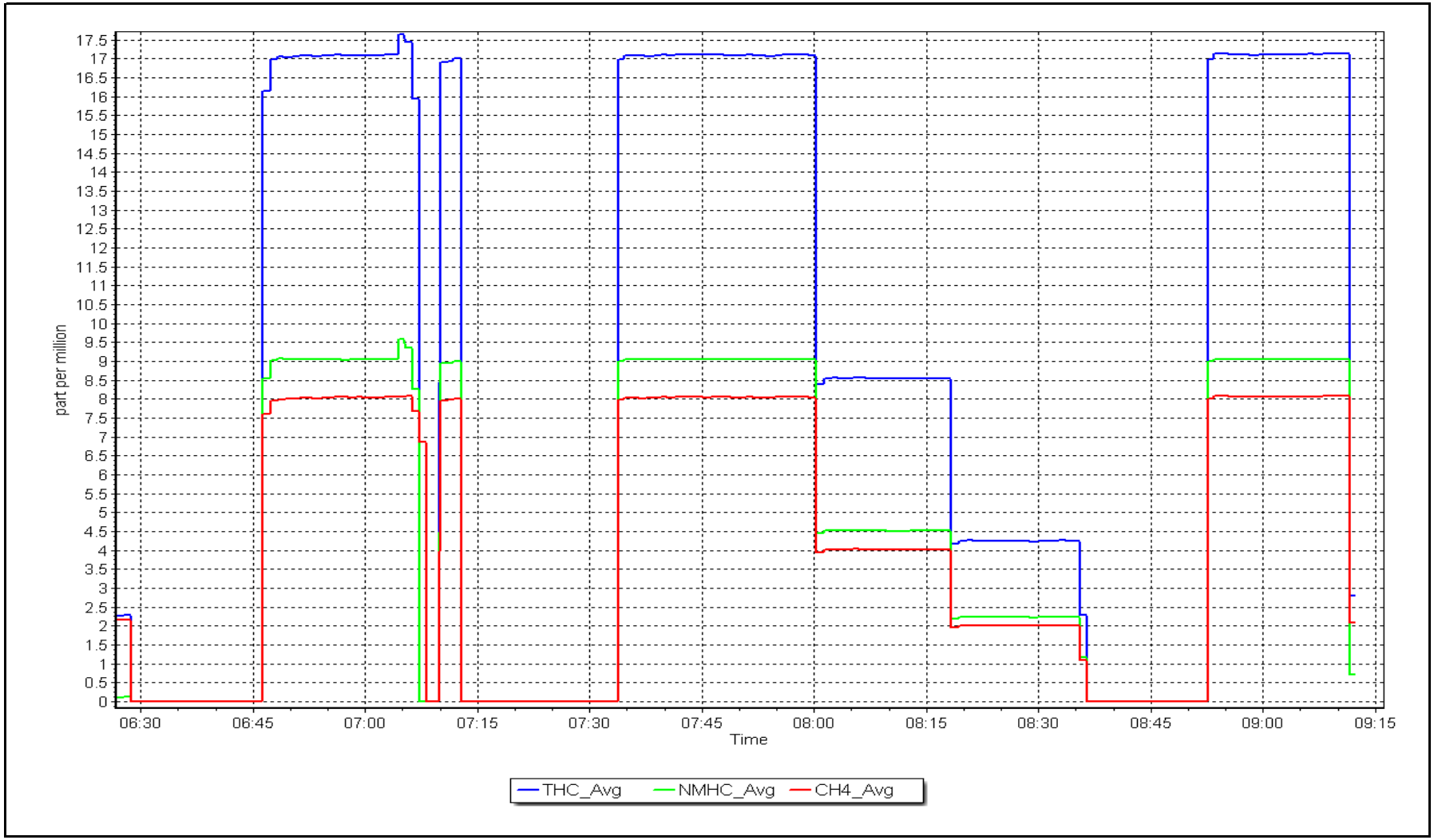
Calibration Date:	June 9, 2023	Previous Calibration:	May 4, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:27	End Time (MST):	9:12
Analyzer make:	Thermo 55i	Analyzer serial #:	1222762077

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999992	≥0.995
9.04	9.05	0.9991			
4.52	4.51	1.0024	Slope	1.001548	0.90 - 1.10
2.26	2.24	1.0092			
			Intercept	-0.012000	+/-0.5



NMHC Calibration Plot Date: June 9, 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:	June 5, 2023	Last Cal Date:	May 19, 2023
Start time (MST):	6:45	End time (MST):	11:56
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.055	1.146	NO bkgnd or offset:	-1.2	-2.6
NOX coeff or slope:	1.056	1.149	NOX bkgnd or offset:	2.7	2.7
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	7.6	7.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999316	1.001047
NO_X Cal Offset:	-0.653591	1.266147
NO Cal Slope:	1.001680	0.997960
NO Cal Offset:	-1.693638	0.425945
NO_2 Cal Slope:	1.001373	1.007354
NO_2 Cal Offset:	-0.003271	1.181889

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	-2.5	-1.1	-1.3	----	----
as found span	4922	78.1	799.1	795.2	3.9	733.9	729.4	4.6	1.0888	1.0902
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.5	0.6	-0.1	----	----
high point	4922	78.1	799.1	795.2	3.9	800.7	793.9	7.0	0.9980	1.0016
second point	4961	39.1	400.1	398.1	2.0	402.5	398.2	4.3	0.9939	0.9998
third point	4981	19.5	199.5	198.5	1.0	201.5	198.0	3.5	0.9901	1.0027
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.8	-0.5	----	----
as left span	4922	78.1	799.1	381.4	417.7	798.2	378.2	419.9	1.0011	1.0085
								Average Correction Factor	0.9940	1.0014

Corrected As found	NO_X = 736.4 ppb	NO = 730.5 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-8.4%
Previous Response	NO_X = 797.9 ppb	NO = 794.8 ppb			*Percent Change	NO =	-8.8%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	791.8	378.0	417.7	421.4	0.9912	100.9%
2nd GPT point (200 ppb O3)	791.8	589.8	205.9	209.0	0.9852	101.5%
3rd GPT point (100 ppb O3)	791.8	690.8	104.9	108.3	0.9687	103.2%
				Average Correction Factor	0.9817	101.9%

Notes: Zero and Span adjusted. Diagonstics similar to last month. Moly converter was replaced last month.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

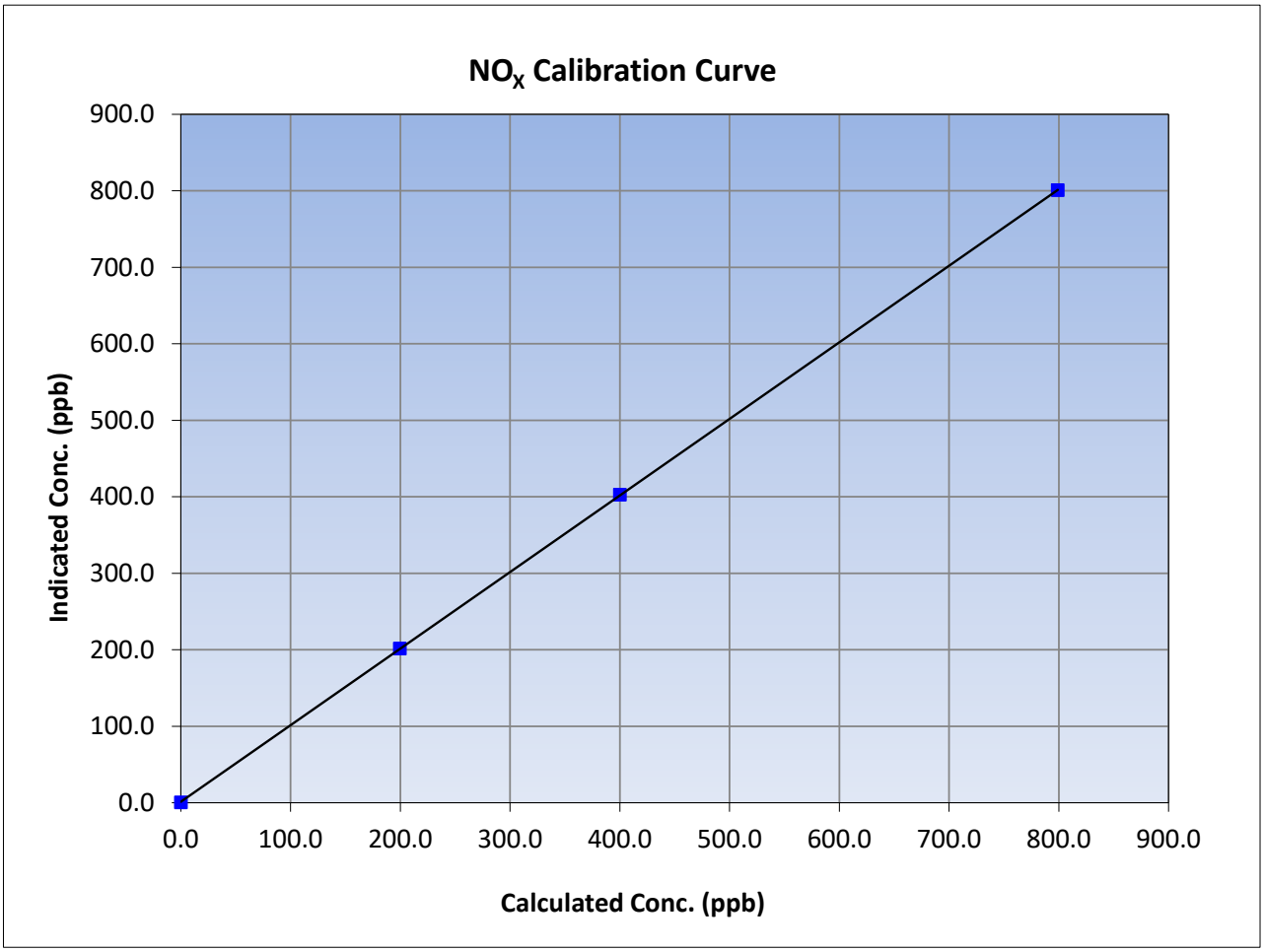
Version-04-2020

Station Information

Calibration Date:	June 5, 2023	Previous Calibration:	May 19, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:45	End Time (MST):	11:56
Analyzer make:	API T200	Analyzer serial #:	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.5	----	Correlation Coefficient	0.999995	≥0.995
799.1	800.7	0.9980			
400.1	402.5	0.9939	Slope	1.001047	0.90 - 1.10
199.5	201.5	0.9901			
			Intercept	1.266147	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

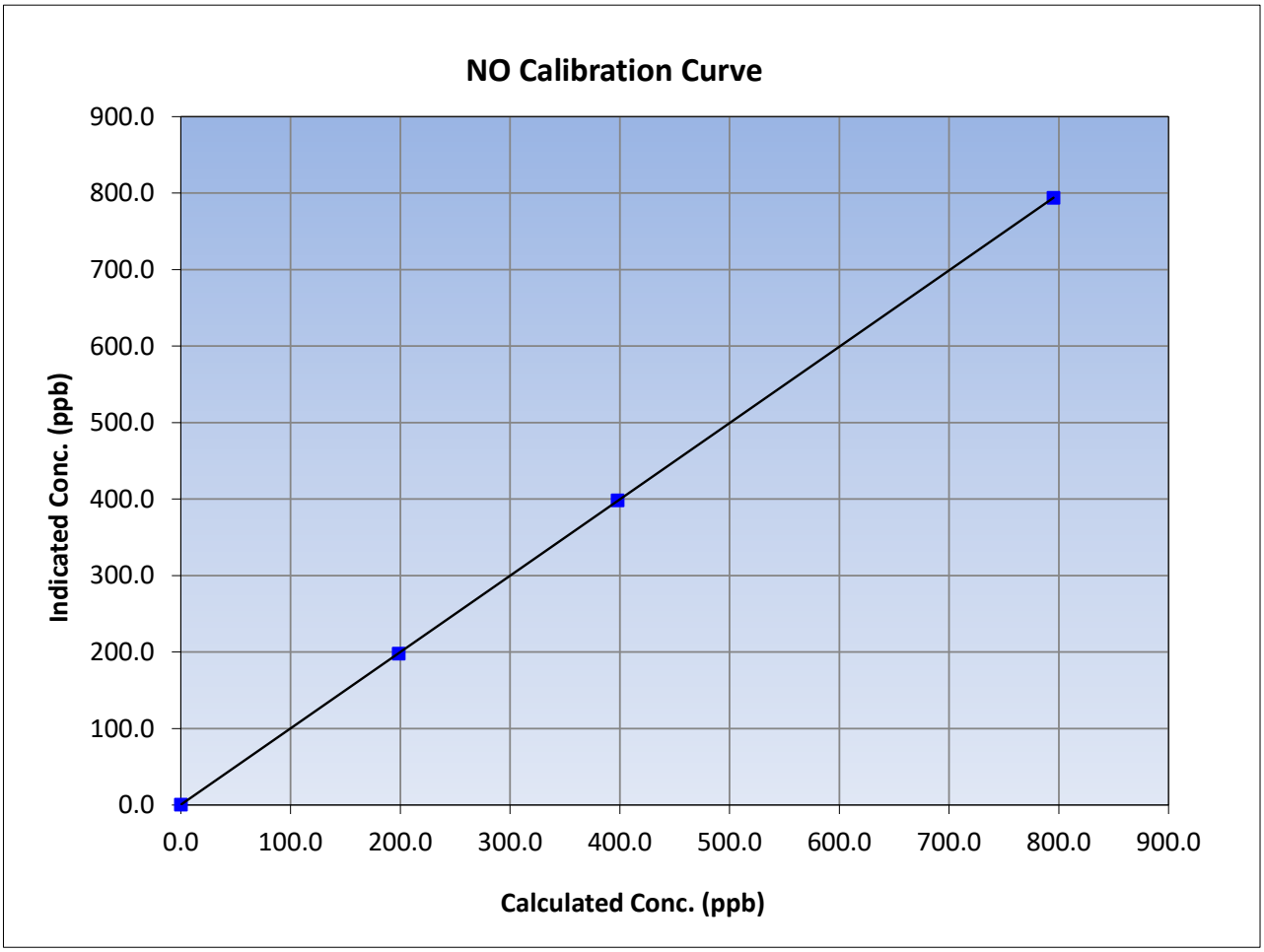
Version-04-2020

Station Information

Calibration Date:	June 5, 2023	Previous Calibration:	May 19, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:45	End Time (MST):	11:56
Analyzer make:	API T200	Analyzer serial #:	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.6	----	Correlation Coefficient	0.999998	≥0.995
795.2	793.9	1.0016			
398.1	398.2	0.9998	Slope	0.997960	0.90 - 1.10
198.5	198.0	1.0027			
			Intercept	0.425945	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

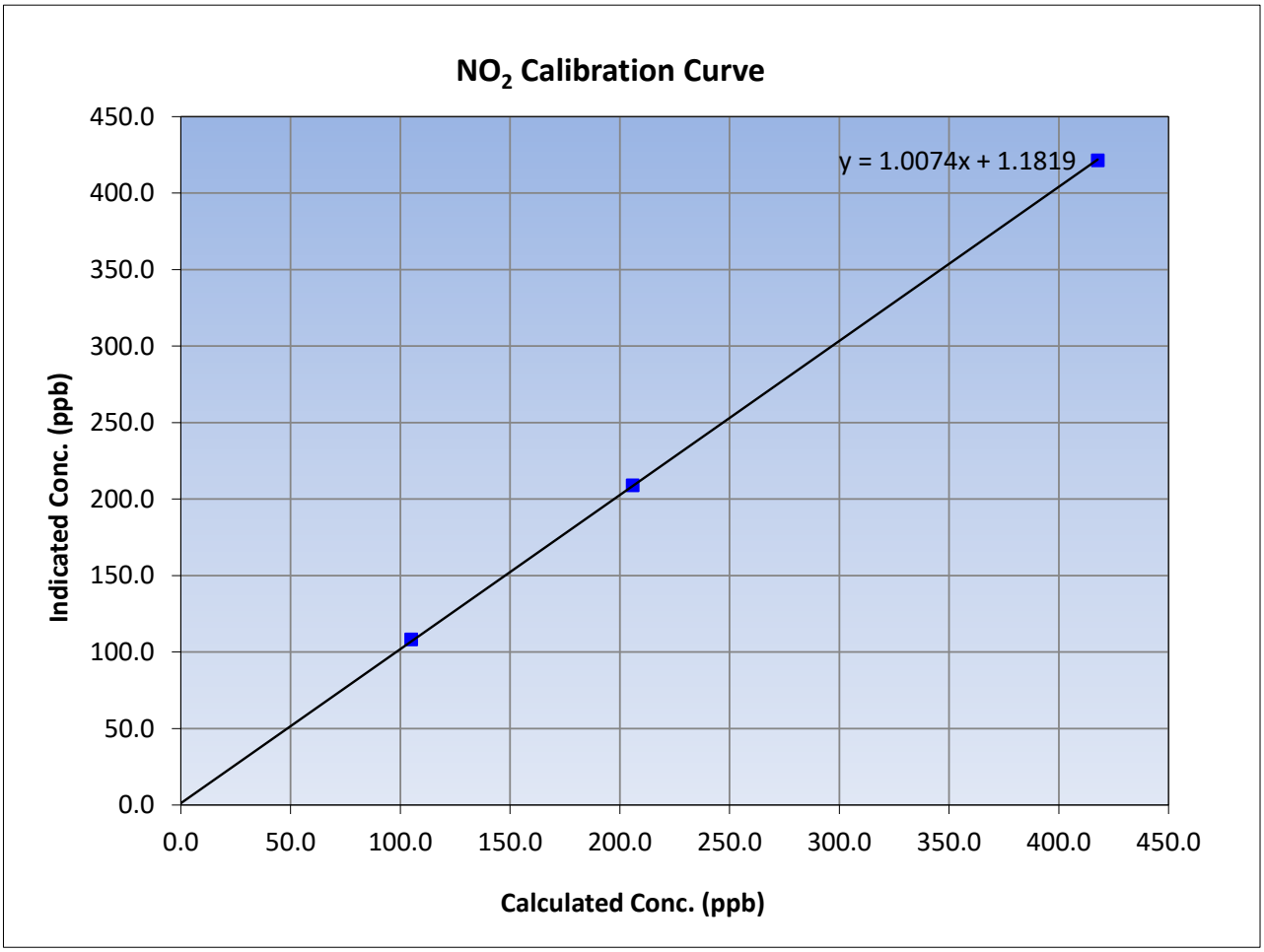
Version-04-2020

Station Information

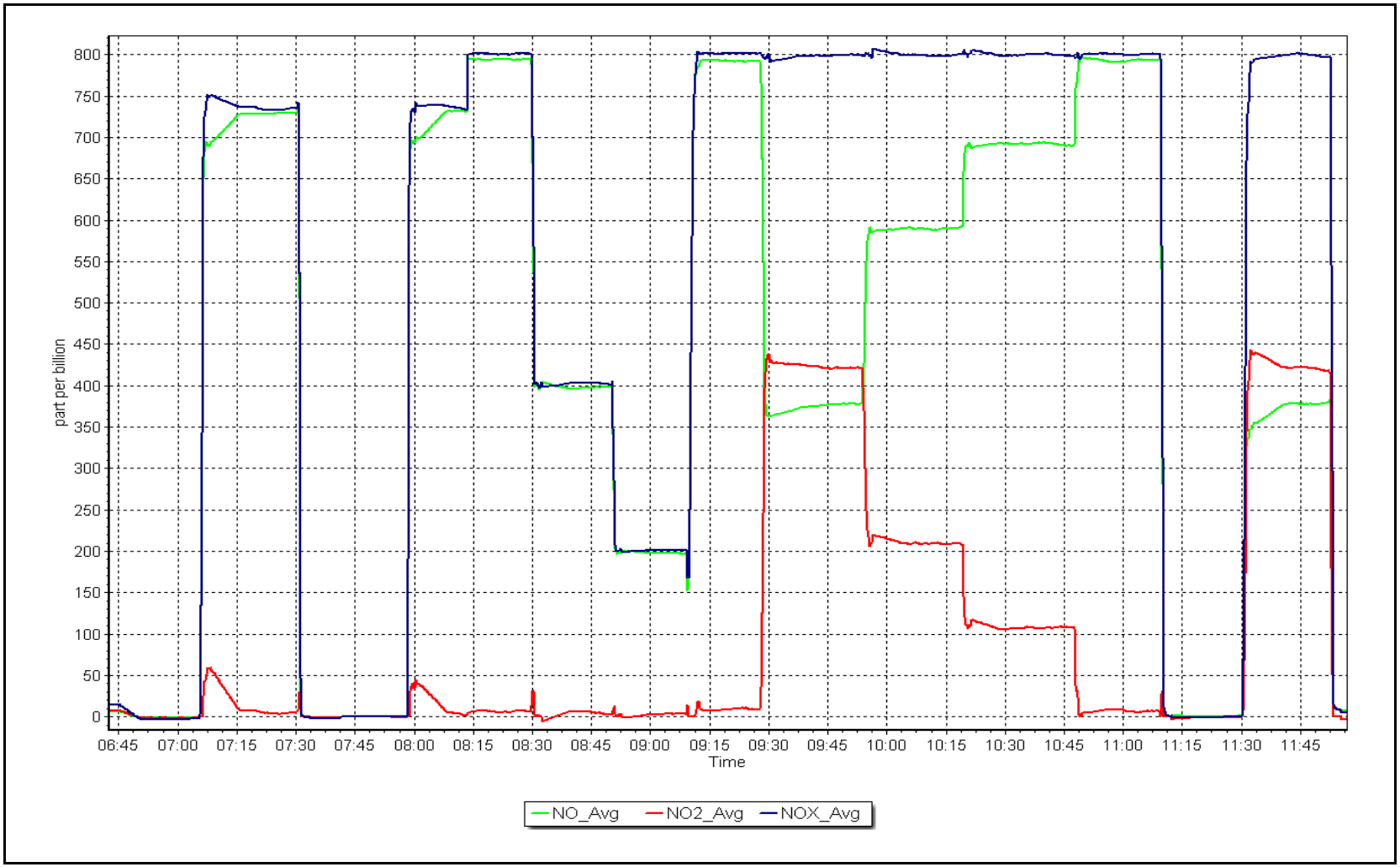
Calibration Date:	June 5, 2023	Previous Calibration:	May 19, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:45	End Time (MST):	11:56
Analyzer make:	API T200	Analyzer serial #:	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999957	≥0.995
417.7	421.4	0.9912			
205.9	209.0	0.9852	Slope	1.007354	0.90 - 1.10
104.9	108.3	0.9687			
			Intercept	1.181889	+/-20



NO_X Calibration Plot Date: June 5, 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:	June 23, 2023	Last Cal Date:	May 4, 2023
Start time (MST):	6:56	End time (MST):	9:28
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:	0.998743	1.000343	Backgd or Offset:	-2.6	-2.6
Calibration intercept:	1.020000	-0.060000	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	-0.5	----
as found span	5000	984.4	400.0	398.2	1.005
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	986.2	400.0	400.0	1.000
second point	5000	817.2	200.0	200.1	1.000
third point	5000	707.8	100.0	100.1	0.999
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	986.3	400.0	399.7	1.001
				Average Correction Factor	1.000

Baseline Corr As found:	398.7	Previous response	400.5	*% change	-0.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No Maintenance or adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

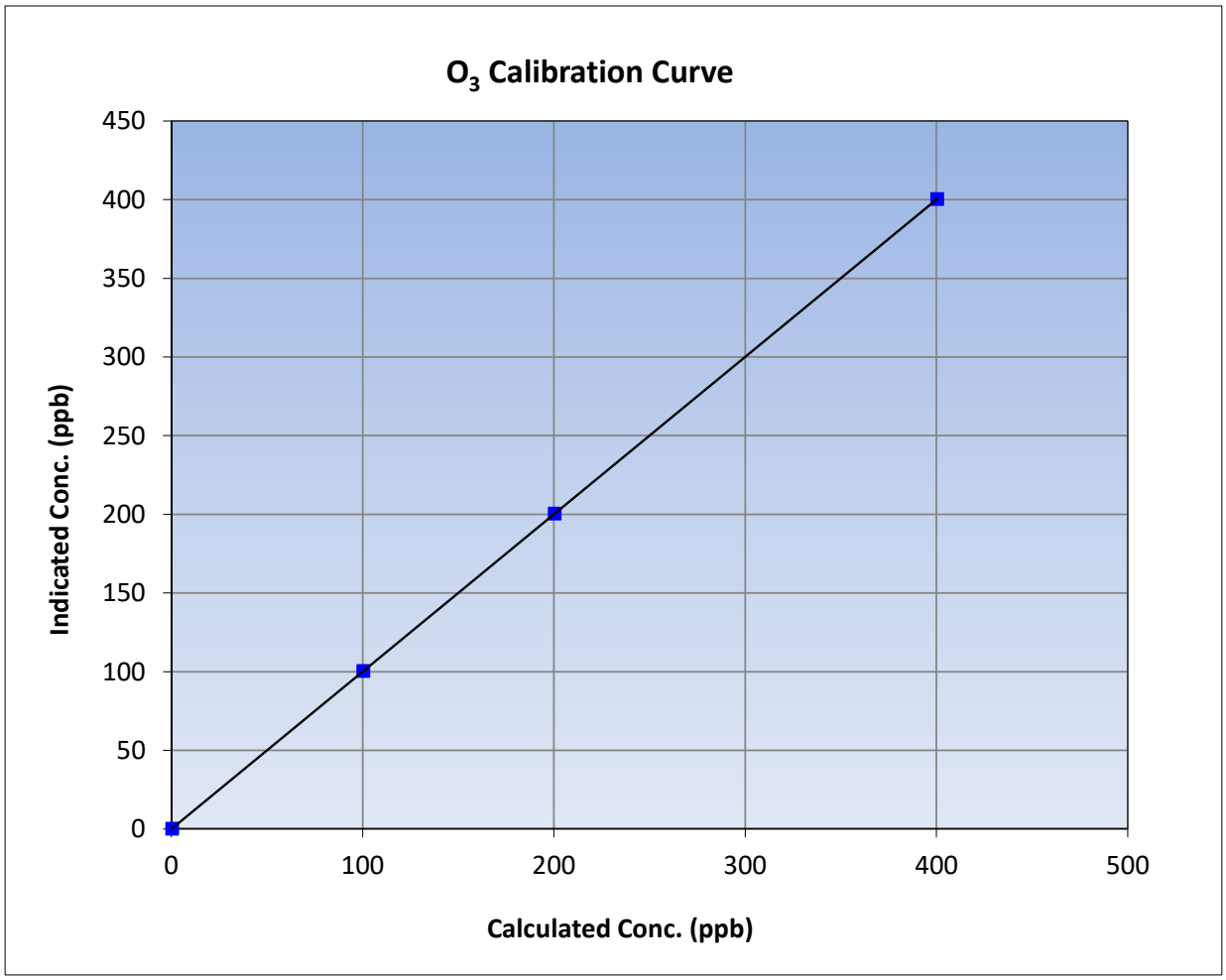
Station Information

Calibration Date:	June 23, 2023	Previous Calibration:	May 4, 2023
Station Name:	Buffalo Viewpoint	Station Number:	AMS04
Start Time (MST):	6:56	End Time (MST):	9:28
Analyzer make:	API T400	Analyzer serial #:	2961

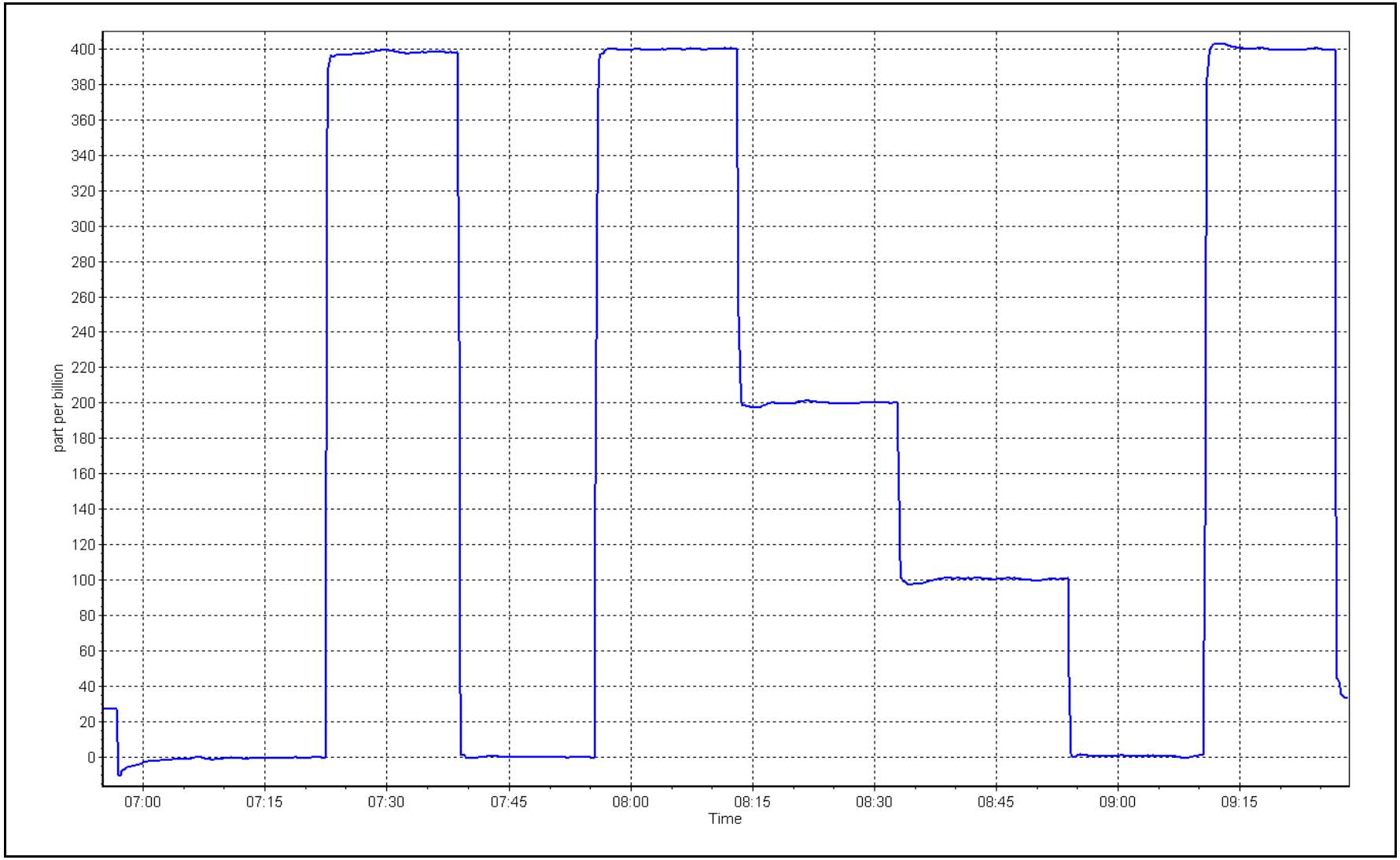
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
400.0	400.0	1.0000
200.0	200.1	0.9995
100.0	100.1	0.9990

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	1.000343	*0.90 - 1.10*
Intercept	-0.060000	*+/- 5*



O_3 Calibration Plot Date: June 23, 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:	June 23, 2023	Last Cal Date:	May 23, 2023
Start time (MST):	6:04	End time (MST):	6:26
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)	16.3	16.8	16.3	☐	+/- 2 °C
P (mmHg)	728.1	729.3	728.1	☐	+/- 10 mmHg
flow (LPM)	5.00	4.70	5.00	☑	+/- 0.25 LPM

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

PM w/o HEPA: 14.9 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

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

Disposable Filter Changed: May 23, 2023

Annual Maintenance

Date Sample Tube Cleaned: May 23, 2023

Date RH/T Sensor Cleaned: May 23, 2023

Notes: Flow adjusted. Head cleaned.

Calibration by: Melissa Lemay

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS05
MANNIX
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	June 15, 2023	Last Cal Date:	May 5, 2023
Start time (MST):	8:50	End time (MST):	12:20
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:	0.990561	1.000214	Backgd or Offset:	8.8	8.9
Calibration intercept:	0.040000	-0.540000	Coeff or Slope:	0.920	0.908

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.3	----
as found span	4920	80.0	800.3	810.3	0.988
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	----
high point	4920	80.0	800.3	800.3	1.000
second point	4960	40.0	400.2	399.6	1.001
third point	4980	20.0	200.1	198.4	1.008
as left zero	5000	0.0	0.0	0.8	----
as left span	4920	80.0	800.3	799.4	1.001
				Average Correction Factor	1.003

Baseline Corr As found:	810.00	Previous response	792.81	*% change	2.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

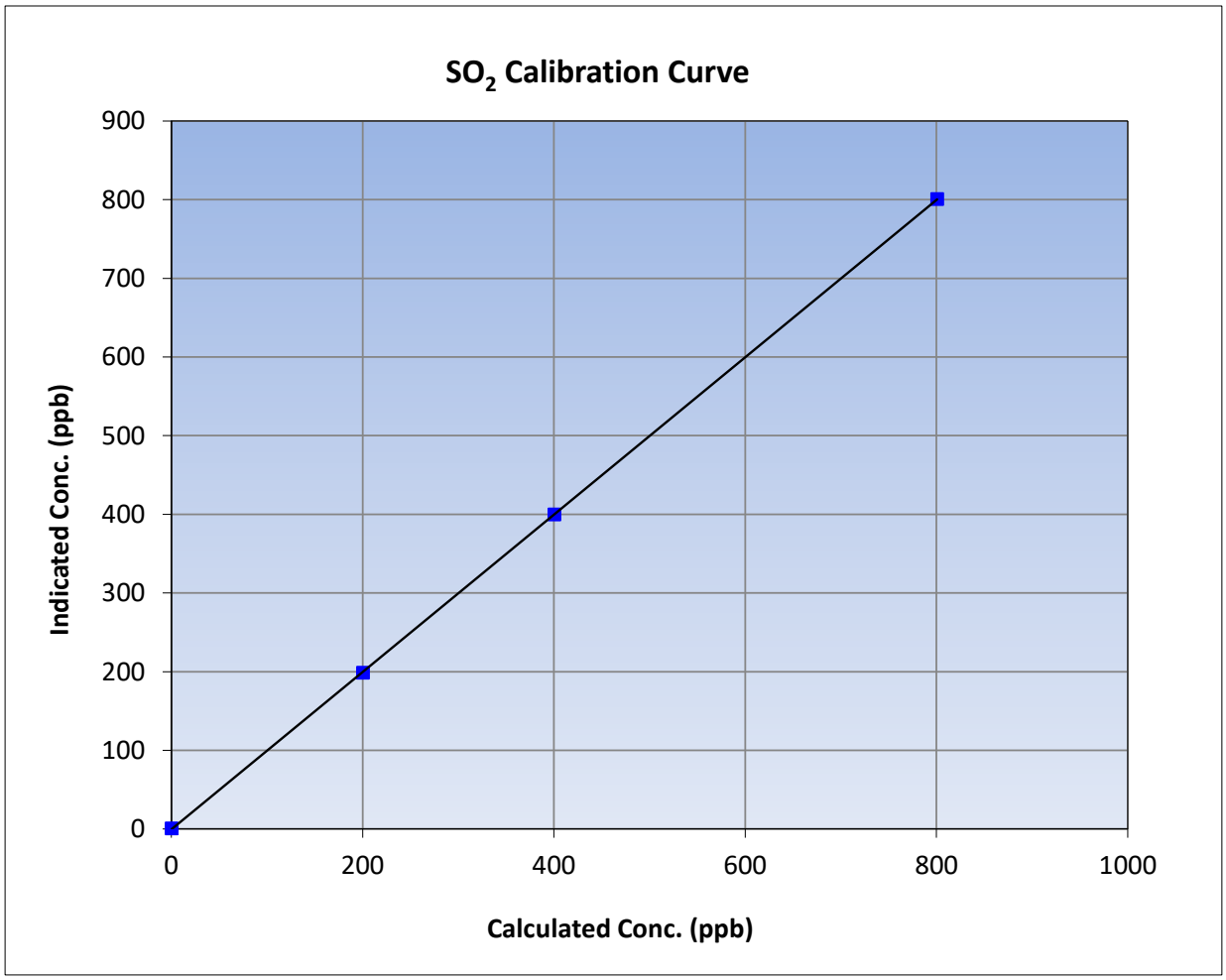
Station Information

Calibration Date:	June 15, 2023	Previous Calibration:	May 5, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	8:50	End Time (MST):	12:20
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841399

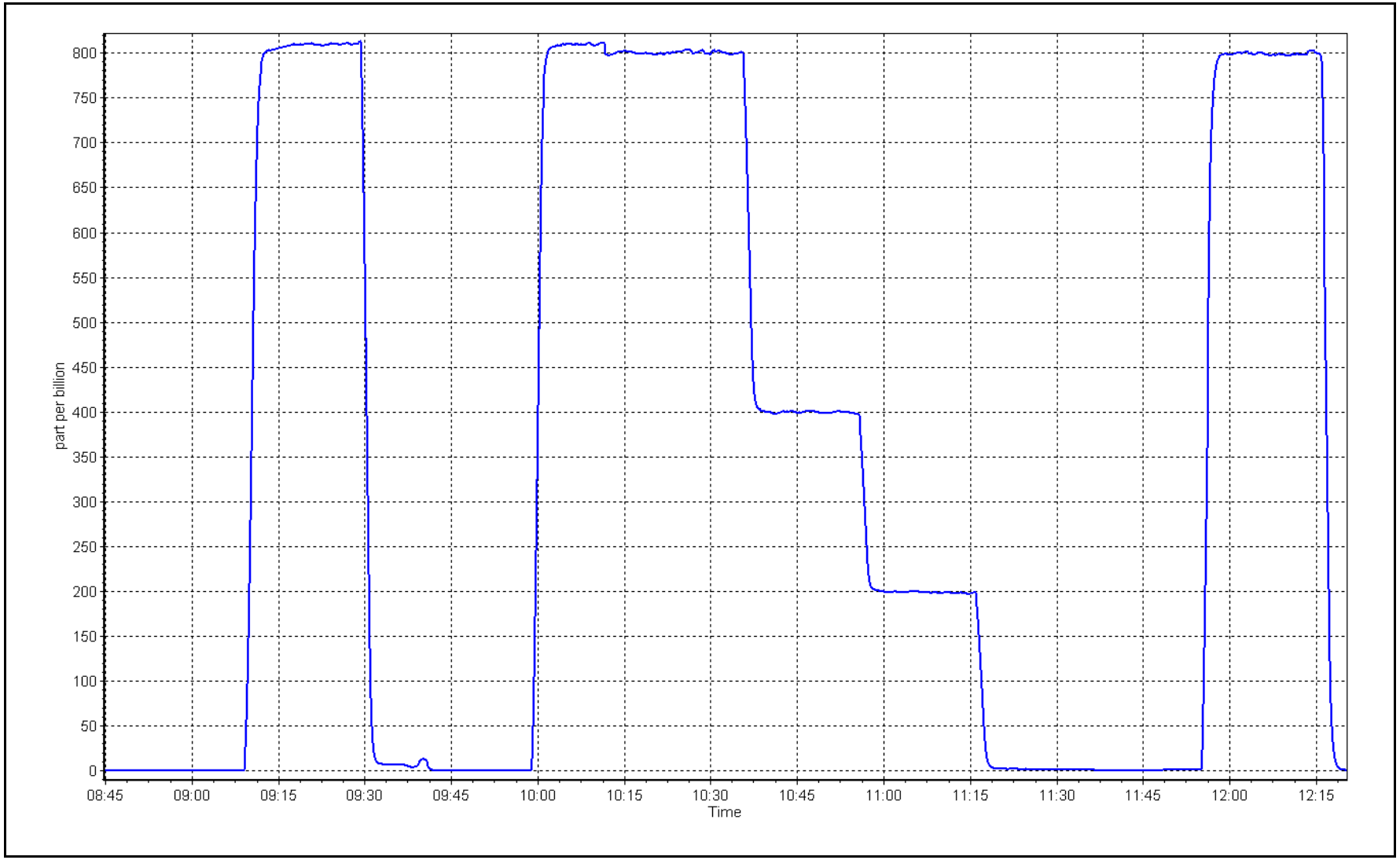
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
800.3	800.3	1.0000
400.2	399.6	1.0014
200.1	198.4	1.0085

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999993	*≥0.995*
Slope	1.000214	*0.90 - 1.10*
Intercept	-0.540000	*+/-30*



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



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	June 9, 2023	Last Cal Date:	May 18, 2023
Start time (MST):	8:39	End time (MST):	12:28
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43iQTL		Analyzer serial #:	1203169745
Converter make:	Global		Converter serial #:	2022-196
Analyzer Range	0 - 100 ppb			

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005754	1.003756	Backgd or Offset:	2.25	2.07
Calibration intercept:	0.020710	0.040615	Coeff or Slope:	0.893	0.821

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4919	81.3	80.0	89.2	0.897
as found 2nd point	4960	40.7	40.0	44.5	0.900
as found 3rd point	4980	20.3	20.0	22.1	0.904
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	4919	81.3	80.0	80.3	0.996
second point	4960	40.7	40.0	40.3	0.994
third point	4980	20.3	20.0	20.1	0.994
as left zero	5000	0.0	0.0	0.2	----
as left span	4919	81.3	80.0	79.1	1.011
SO2 Scrubber Check	4920	80.0	800.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.995
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	89.2	Prev response:	80.48	*% change:	9.8%
Baseline Corr 2nd AF pt:	44.5	AF Slope:	1.115601	AF Intercept:	-0.099272
Baseline Corr 3rd AF pt:	22.1	AF Correlation:	0.999994		

* = > +/-5% change initiates investigation

Notes: As found span is 10% high, suspecting the change in humidity has caused this as the instrument diagnostics are all good. Changed the inlet filter after as founds. Ran a SO2 scrubber test after calibrator zero. Adjusted the span only.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

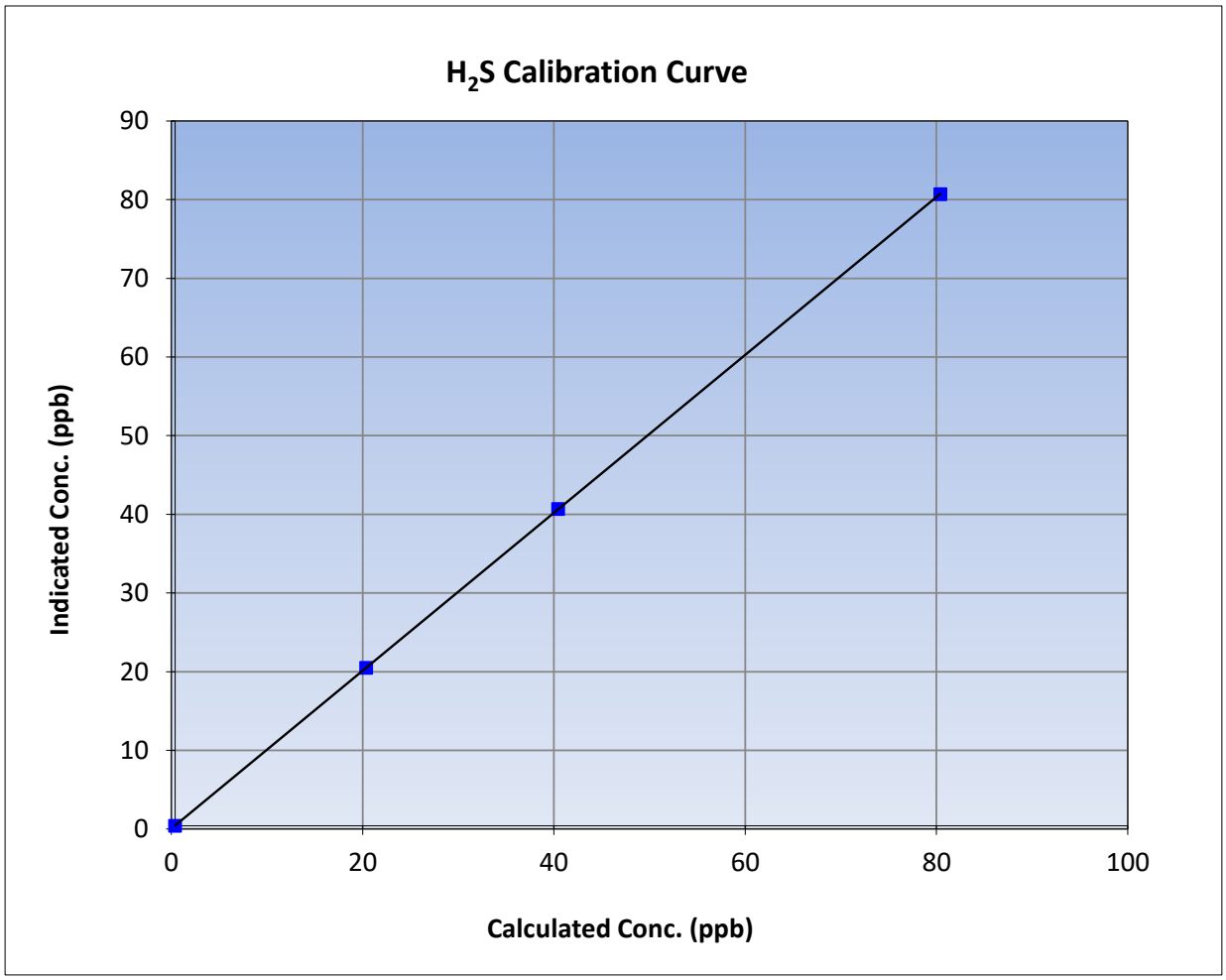
Station Information

Calibration Date:	June 9, 2023	Previous Calibration:	May 18, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	8:39	End Time (MST):	12:28
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1203169745

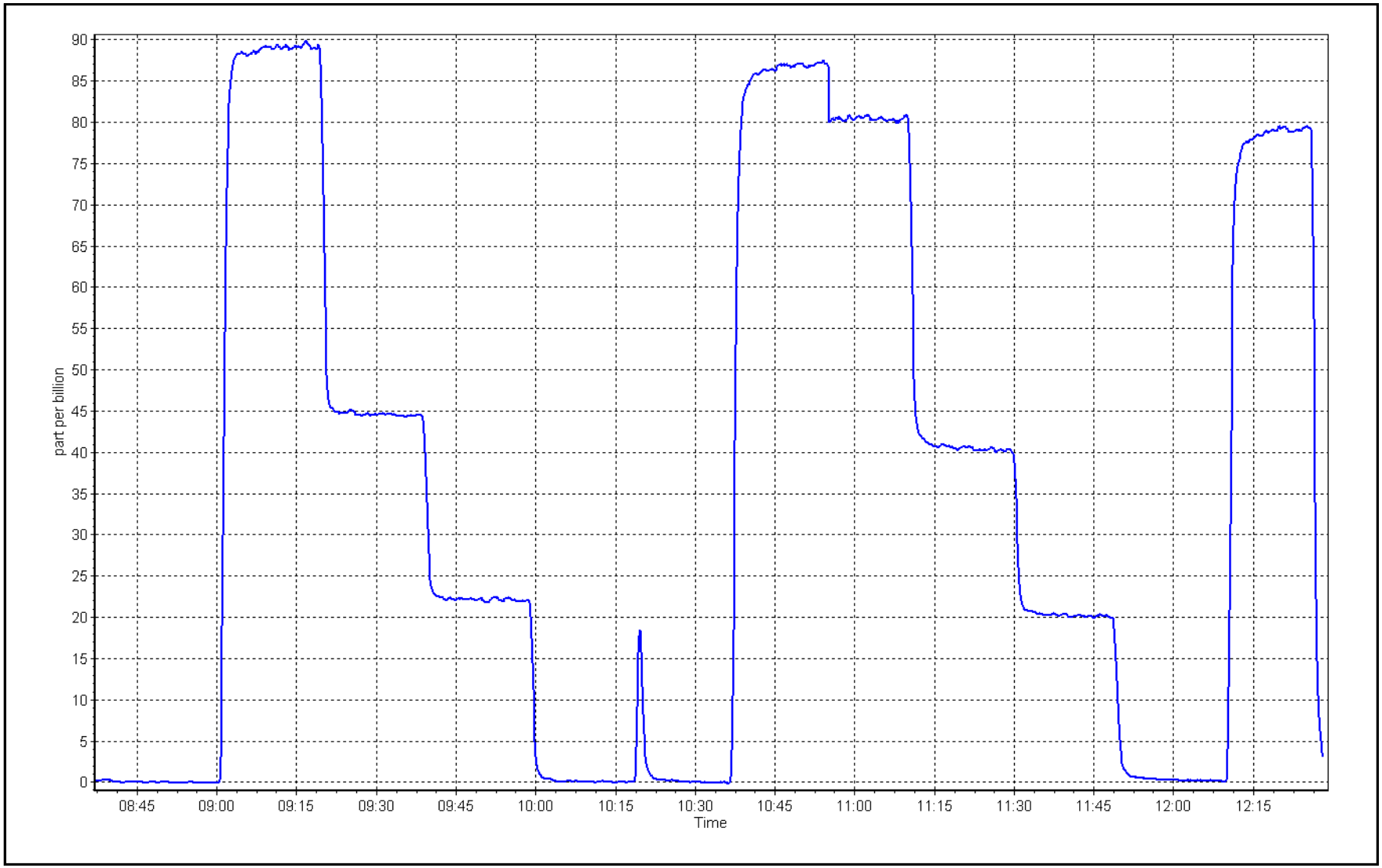
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.3	0.9962
40.0	40.3	0.9936
20.0	20.1	0.9937

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.003756	*0.90 - 1.10*
Intercept	0.040615	*+/-3*



H_2S Calibration Plot Date: June 9, 2023 Location: Mannix



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Mannix	Station number:	AMS05
Calibration Date:	June 15, 2023	Last Cal Date:	May 8, 2023
Start time (MST):	8:49	End time (MST):	12:20
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1152430011	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.66E-04	2.66E-04	NMHC SP Ratio:	4.41E-05	4.43E-05
CH4 Retention time:	15.20	15.20	NMHC Peak Area:	207349	206739

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	17.03	1.012
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	17.23	17.25	0.998
second point	4960	40.0	8.61	8.63	0.998
third point	4980	20.0	4.31	4.33	0.995
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	17.23	17.32	0.995
				Average Correction Factor	0.997
Baseline Corr AF:	17.03	Prev response	17.25	*% change	-1.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4920	80	9.15	9.12	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4920	80	9.15	9.16	0.999
second point	4960	40	4.57	4.60	0.995
third point	4980	20	2.29	2.31	0.988
as left zero	5000	0	0.00	0.00	----
as left span	4920	80	9.15	9.21	0.994
				Average Correction Factor	0.994
Baseline Corr AF:	9.12	Prev response	9.18	*% change	-0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.0	8.08	7.91	1.022
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.0	8.08	8.09	0.998
second point	4960	40.0	4.04	4.03	1.002
third point	4980	20.0	2.02	2.01	1.003
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.0	8.08	8.11	0.996
				Average Correction Factor	1.001
Baseline Corr AF:	7.91	Prev response	8.08	*% change	-2.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.001881	1.001244
THC Cal Offset:	-0.005800	0.006000
CH4 Cal Slope:	1.000679	1.001712
CH4 Cal Offset:	-0.008200	-0.006600
NMHC Cal Slope:	1.002855	1.000793
NMHC Cal Offset:	0.003000	0.013000

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

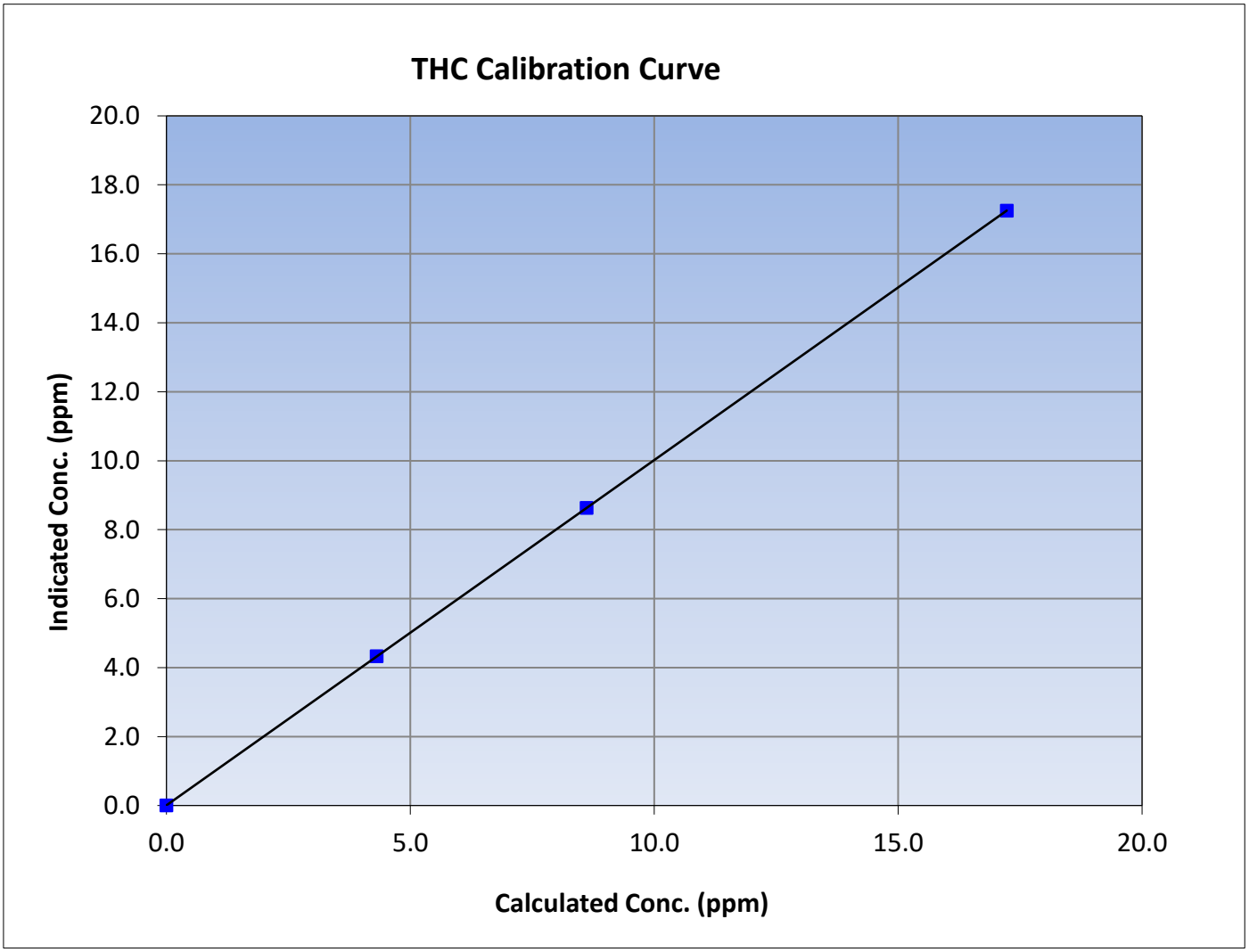
Version-01-2020

Station Information

Calibration Date:	June 15, 2023	Previous Calibration:	May 8, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	8:49	End Time (MST):	12:20
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999999	*≥0.995*
17.23	17.25	0.9985			
8.61	8.63	0.9983	Slope	1.001244	*0.90 - 1.10*
4.31	4.33	0.9953			
			Intercept	0.006000	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

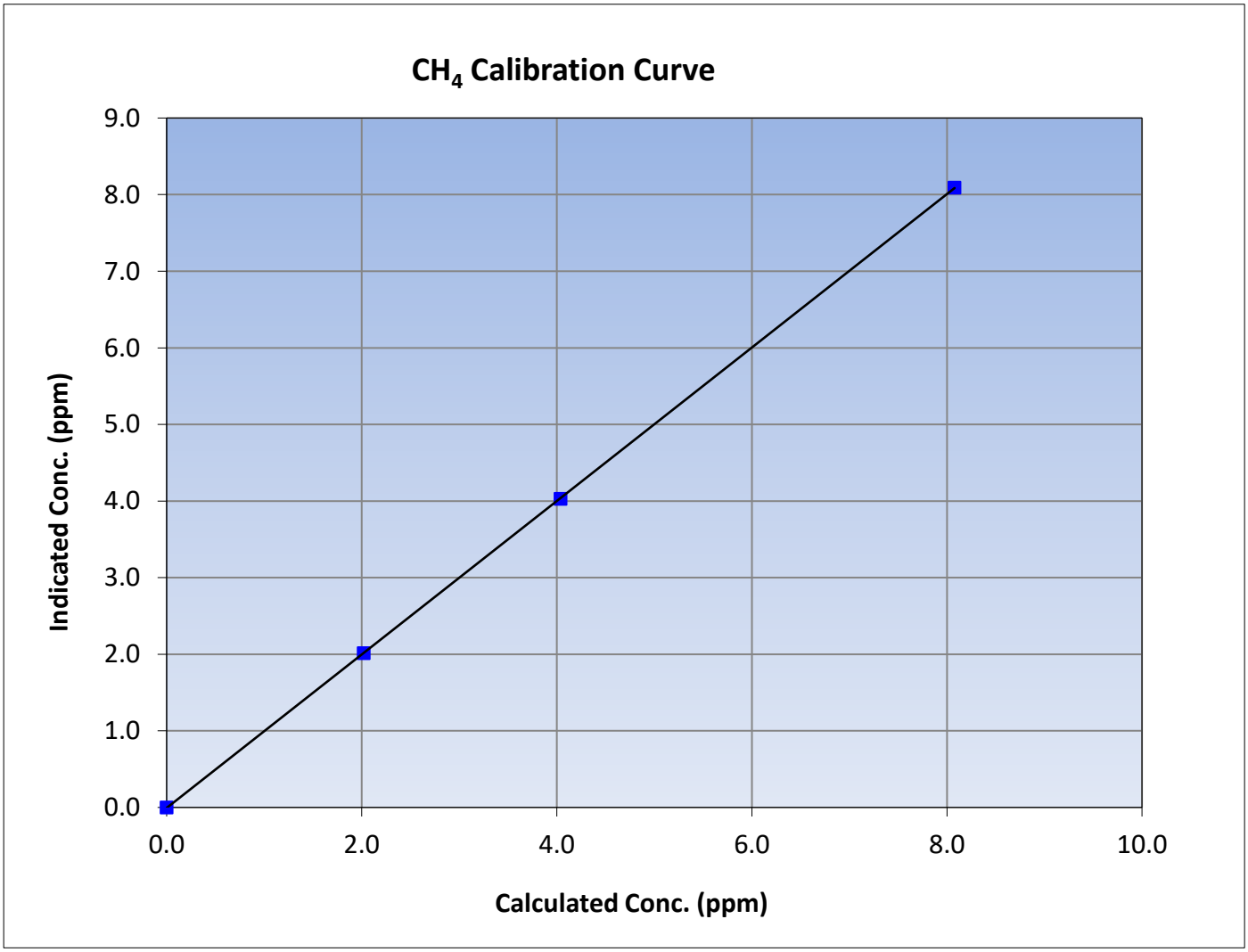
Version-01-2020

Station Information

Calibration Date:	June 15, 2023	Previous Calibration:	May 8, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	8:49	End Time (MST):	12:20
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	0.999995	*≥0.995*
8.08	8.09	0.9984			
4.04	4.03	1.0023	Slope	1.001712	*0.90 - 1.10*
2.02	2.01	1.0028			
			Intercept	-0.006600	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

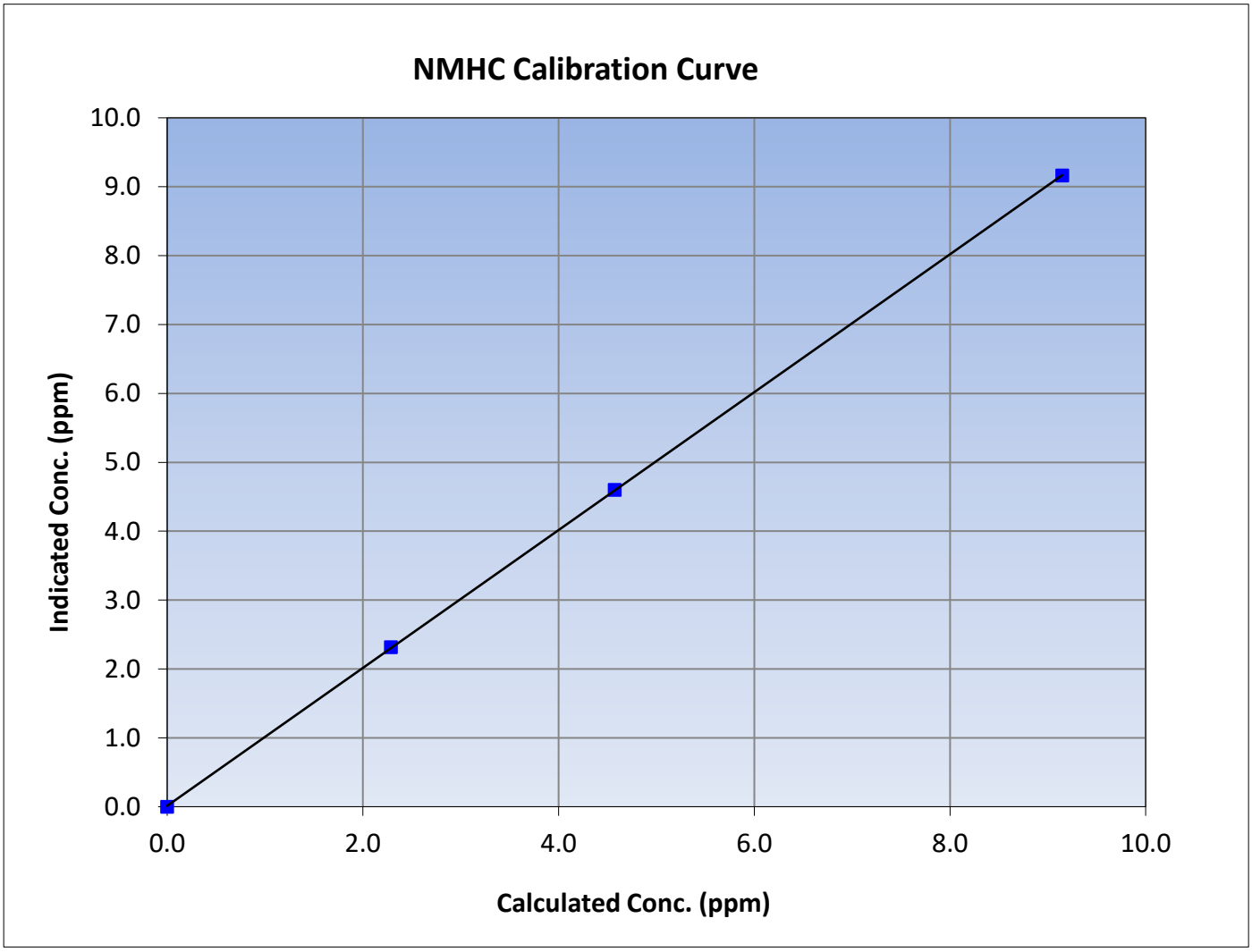
Version-01-2020

Station Information

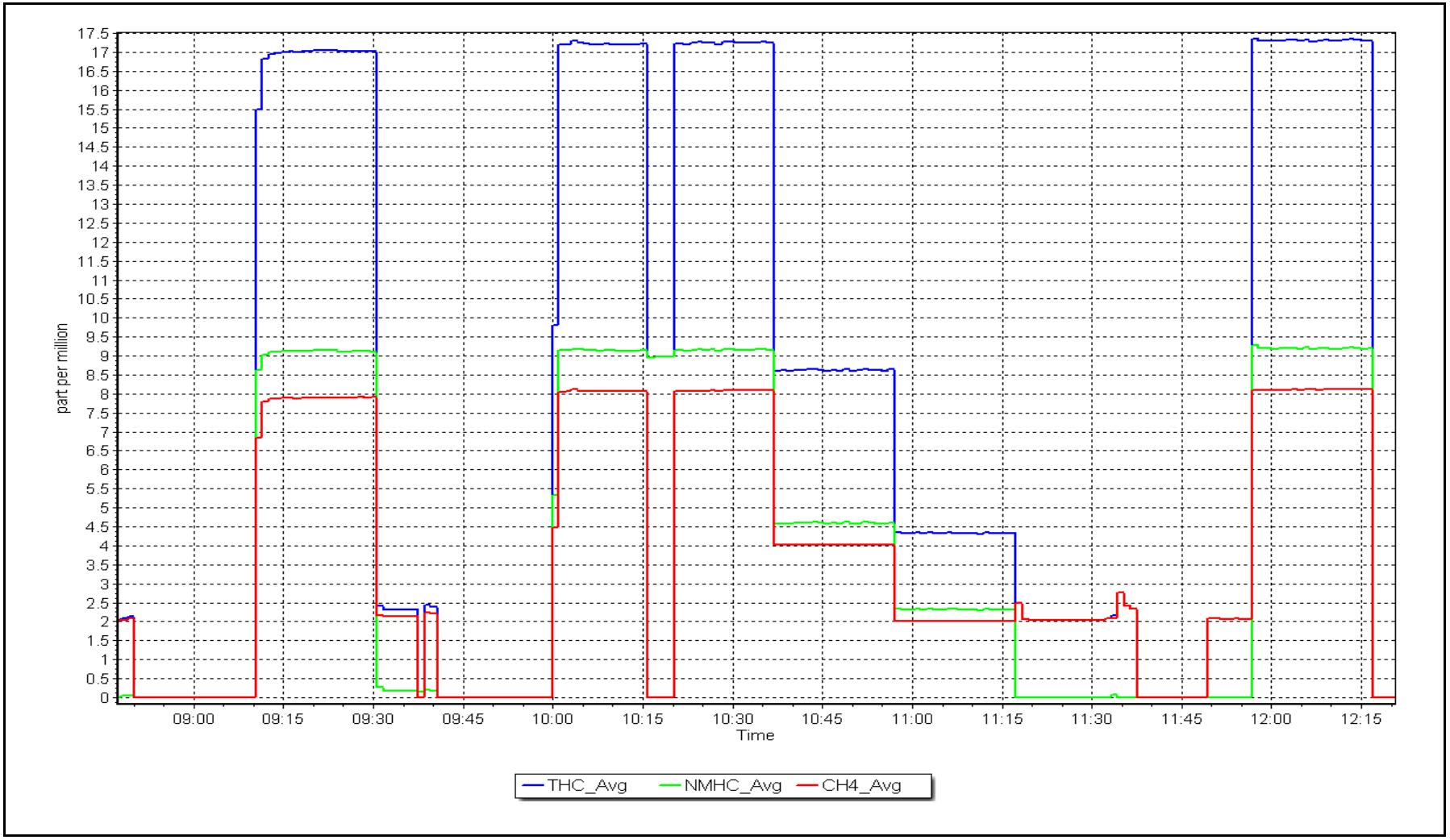
Calibration Date:	June 15, 2023	Previous Calibration:	May 8, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	8:49	End Time (MST):	12:20
Analyzer make:	Thermo 55i	Analyzer serial #:	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999991	≥0.995
9.15	9.16	0.9985			
4.57	4.60	0.9947	Slope	1.000793	0.90 - 1.10
2.29	2.31	0.9883			
			Intercept	0.013000	+/-0.5



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



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS06
PATRICIA MCINNES
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	June 5, 2023	Last Cal Date:	May 17, 2023
Start time (MST):	9:05	End time (MST):	12:41
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998732	1.003750	Backgd or Offset:	17.2	17.2
Calibration intercept:	1.940243	1.159413	Coeff or Slope:	0.901	0.901

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.2	----
as found span	4920	80.3	799.5	801.3	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4920	80.3	799.5	802.9	0.996
second point	4960	40.2	400.2	403.9	0.991
third point	4980	20.1	200.1	202.9	0.986
as left zero	5000	0.0	0.0	0.1	----
as left span	4920	80.3	799.5	804.4	0.994
				Average Correction Factor	0.991

Baseline Corr As found:	801.50	Previous response	800.39	*% change	0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

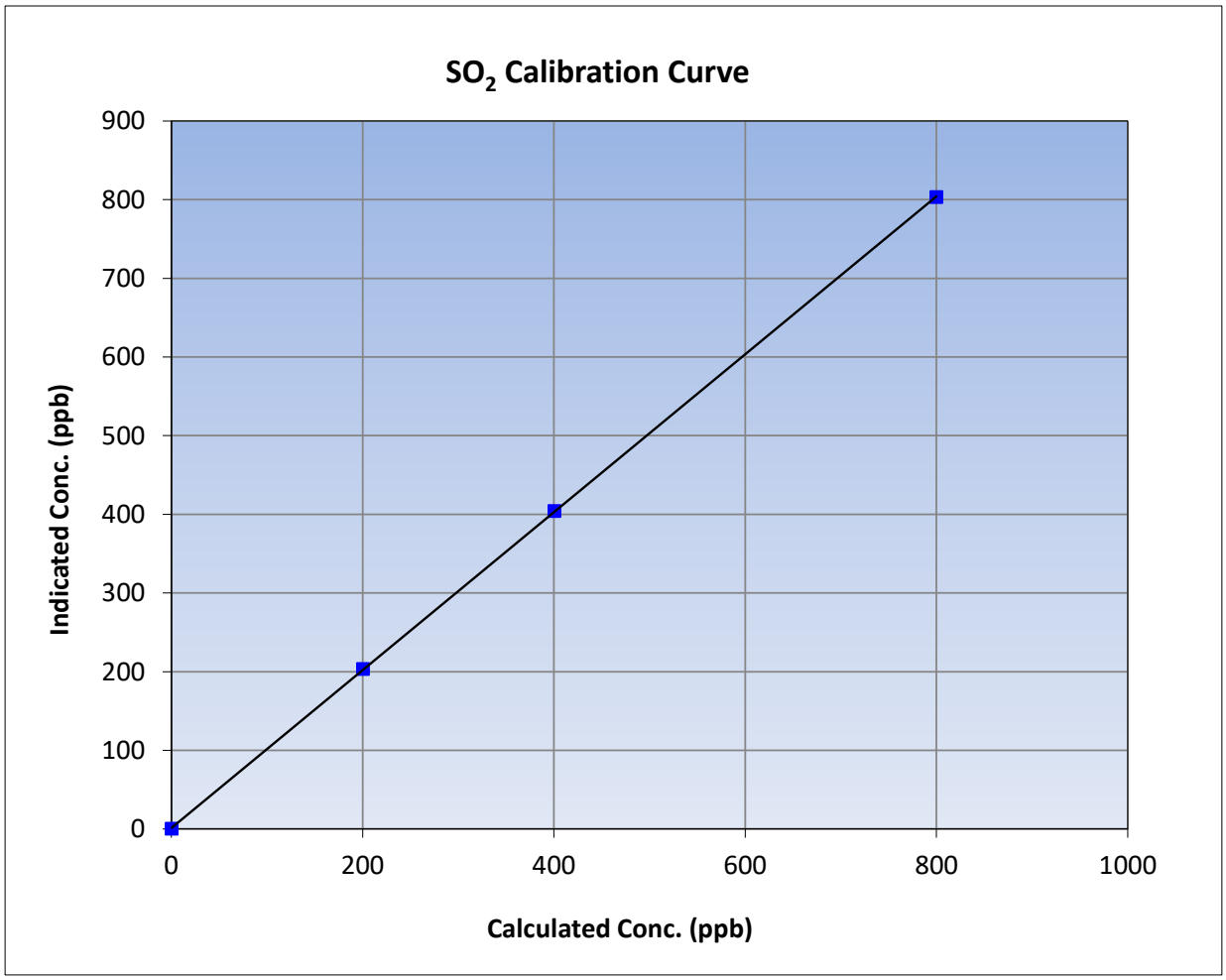
Station Information

Calibration Date:	June 5, 2023	Previous Calibration:	May 17, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:05	End Time (MST):	12:41
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290013

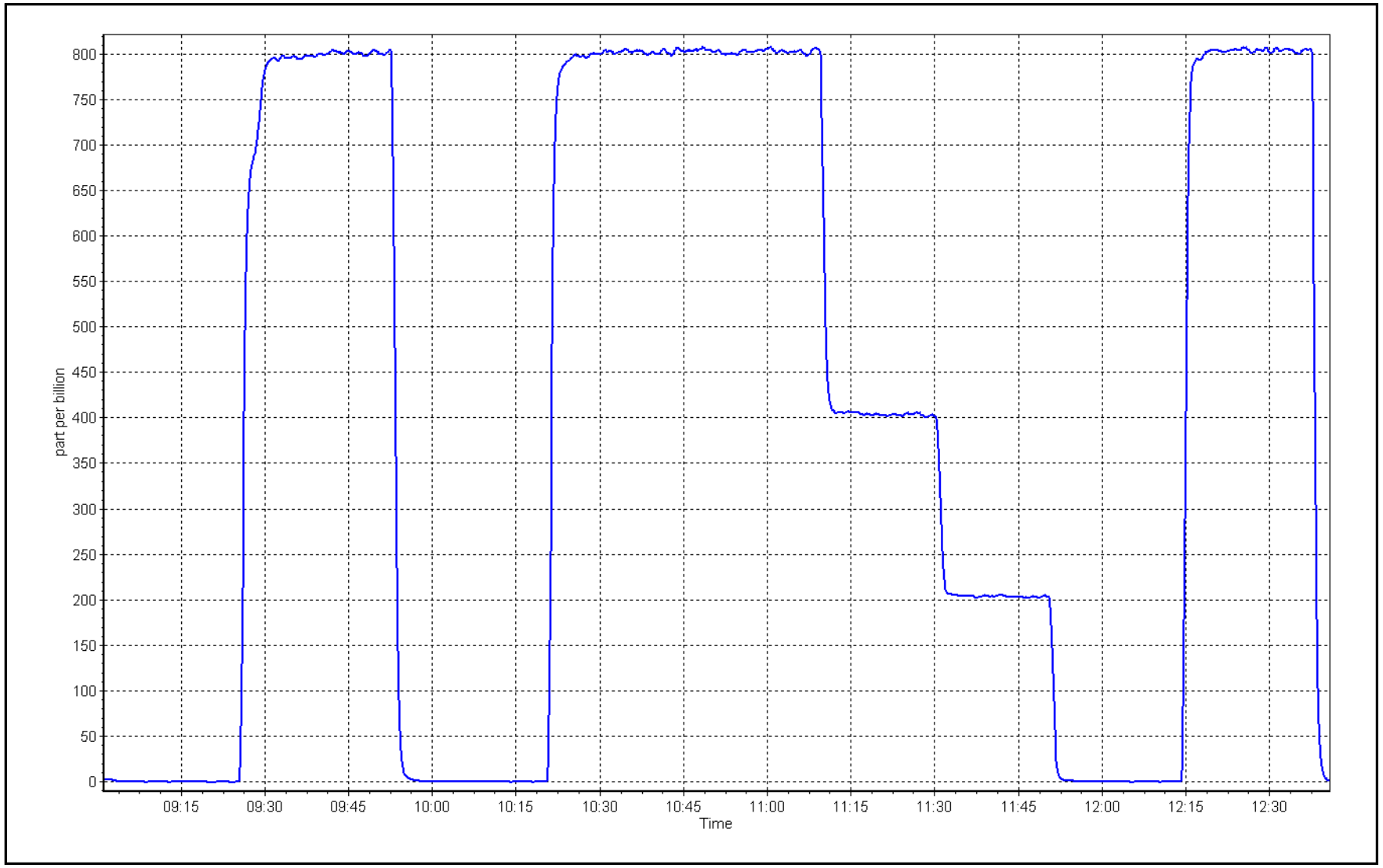
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
799.5	802.9	0.9957
400.2	403.9	0.9909
200.1	202.9	0.9863

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999990	*≥0.995*
Slope	1.003750	*0.90 - 1.10*
Intercept	1.159413	*+/-30*



SO2 Calibration Plot Date: June 5, 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:	June 12, 2023	Last Cal Date:	May 12, 2023
Start time (MST):	8:53	End time (MST):	13:15
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.38	ppm	Cal Gas Exp Date:	March 2, 2023
Cal Gas Cylinder #:	EY0000809			
Removed Cal Gas Conc:	5.38	ppm	Rem Gas Exp Date:	N/A
Removed Gas Cyl #:	N/A		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3566
ZAG Make/Model:	API T701 H		Serial Number:	689

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1218153358	
Converter make:	CDN-101		Converter serial #:	517	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.996460	0.994772	Backgd or Offset:	1.91	1.92
Calibration intercept:	0.320162	0.337244	Coeff or Slope:	1.107	1.116

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4926	74.3	79.9	79.2	1.009
as found 2nd point	4963	37.2	40.0	40.0	1.001
as found 3rd point	4981	18.6	20.0	20.2	0.991
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	40.1	0.998
third point	4981	18.6	20.0	20.6	0.972
as left zero	5000	0.0	0.0	0.5	----
as left span	4926	74.3	79.9	79.0	1.012
SO2 Scrubber Check	4920	80.3	803.0	0.2	----
Date of last scrubber change:		December 20, 2021		Ave Corr Factor	0.991
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.2	Prev response:	79.98	*% change:	-1.0%
Baseline Corr 2nd AF pt:	40.0	AF Slope:	0.989628	AF Intercept:	0.217291
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999964		

* = > +/-5% change initiates investigation

Notes: Changed the inlet filter and the converter after multi point as founds. Had the converter from global installed previously, swapped it out with a CD-NOVA converter. Ran a SO2 scrubber check after calibrator zero. Adjusted the span.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

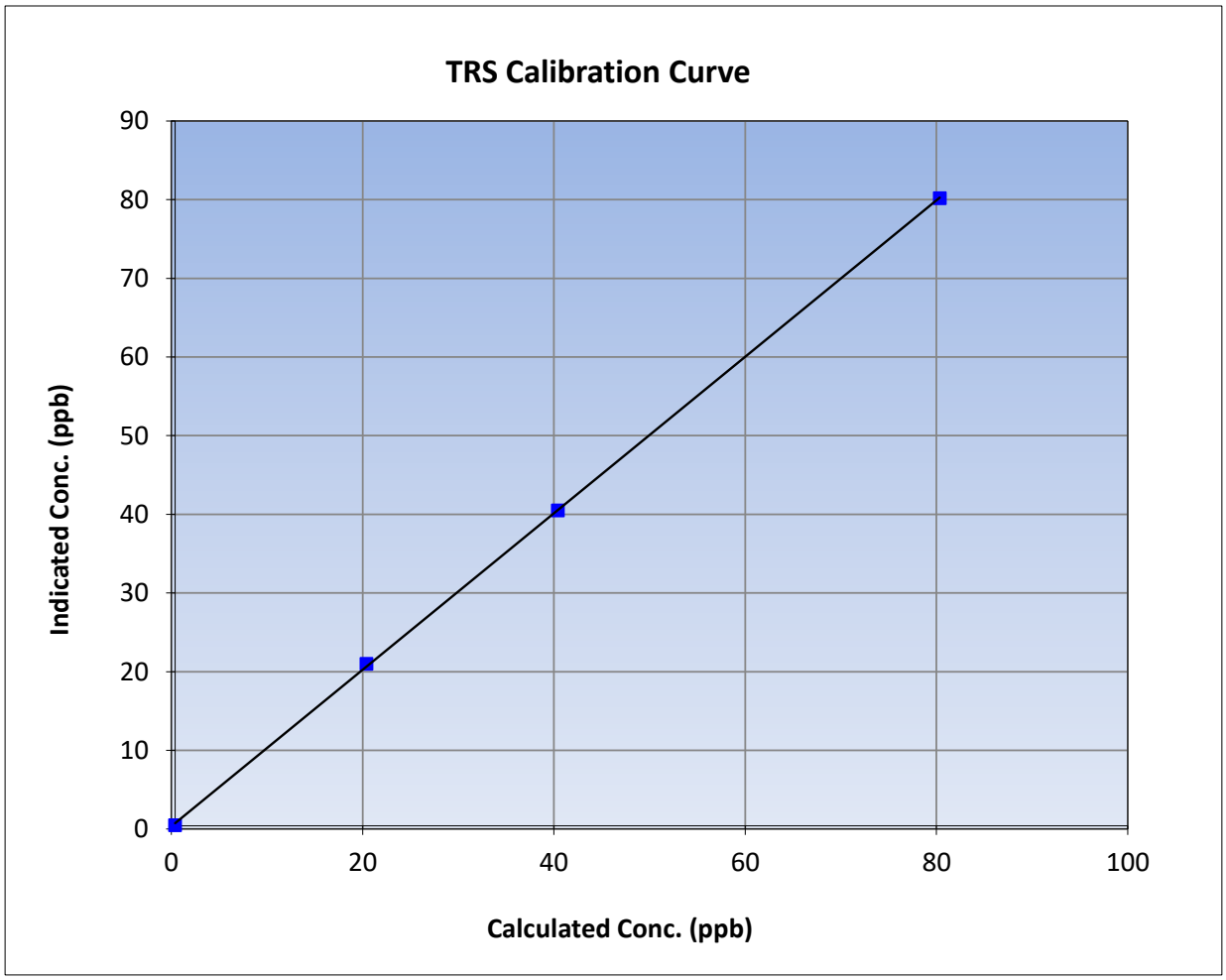
Station Information

Calibration Date:	June 12, 2023	Previous Calibration:	May 12, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:53	End Time (MST):	13:15
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1218153358

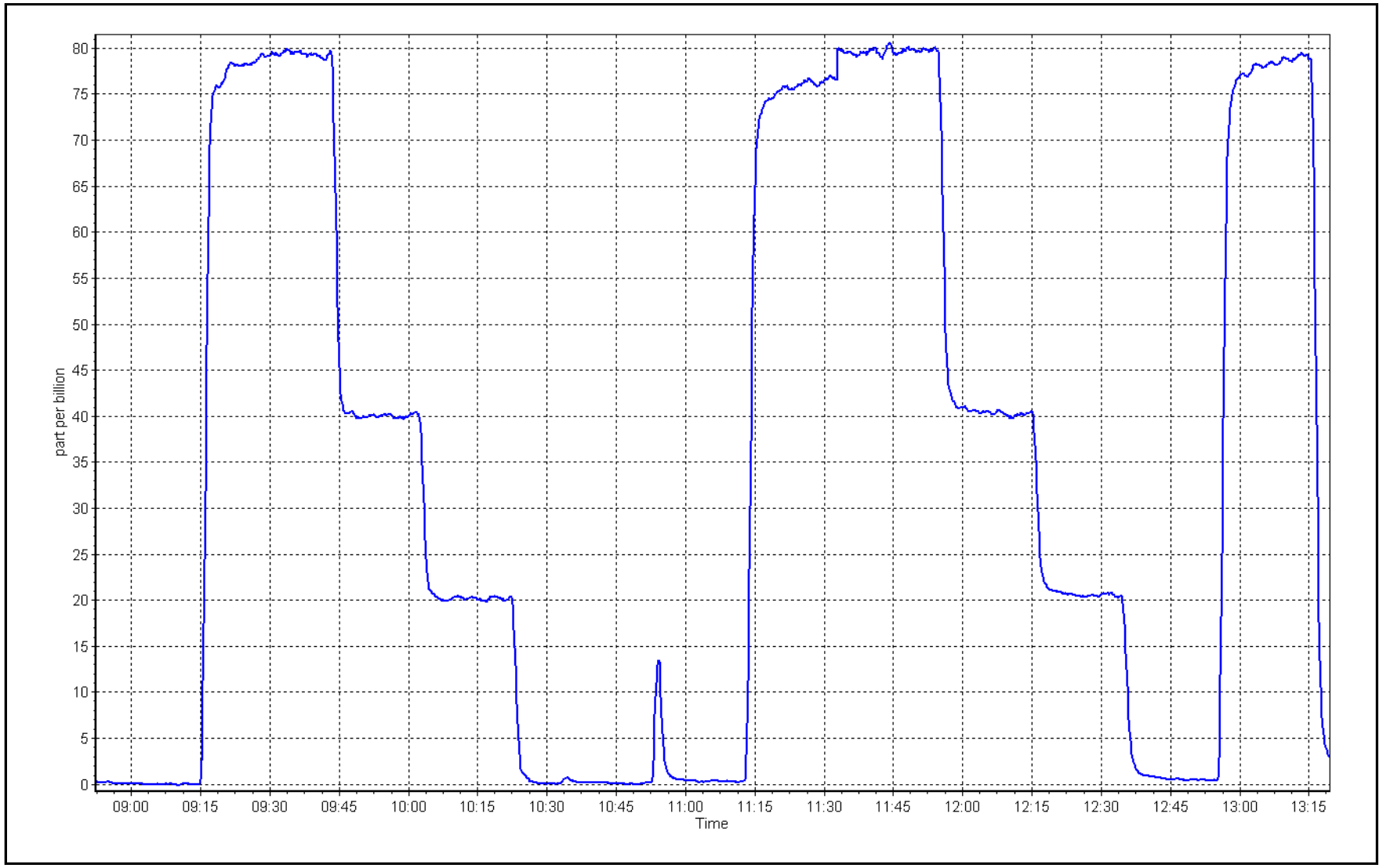
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
79.9	79.8	1.0018
40.0	40.1	0.9981
20.0	20.6	0.9716

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999946	*≥0.995*
Slope	0.994772	*0.90 - 1.10*
Intercept	0.337244	*+/-3*



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



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	June 5, 2023	Last Cal Date:	May 17, 2023
Start time (MST):	9:05	End time (MST):	12:40
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320037	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.57E-04	3.85E-04	NMHC SP Ratio:	5.96E-05	6.02E-05
CH4 Retention time:	14.6	14.8	NMHC Peak Area:	152338	150828

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	17.12	16.55	1.035
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	17.12	17.13	1.000
second point	4960	40.2	8.57	8.54	1.003
third point	4980	20.1	4.29	4.30	0.997
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.12	17.16	0.998
				Average Correction Factor	1.000
Baseline Corr AF:	16.55	Prev response	17.16	*% change	-3.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4920	80.3	9.07	9.01	1.006
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4920	80.3	9.07	9.05	1.002
second point	4960	40.2	4.54	4.54	1.000
third point	4980	20.1	2.27	2.29	0.991
as left zero	5000	0	0.00	0.00	----
as left span	4920	80.3	9.07	9.07	1.000
				Average Correction Factor	0.998
Baseline Corr AF:	9.01	Prev response	9.10	*% change	-1.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	8.06	7.55	1.067
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	8.06	8.08	0.997
second point	4960	40.2	4.03	4.01	1.007
third point	4980	20.1	2.02	2.01	1.004
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	8.06	8.09	0.996
				Average Correction Factor	1.002
Baseline Corr AF:	7.55	Prev response	8.06	*% change	-6.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.002022	0.999886
THC Cal Offset:	0.005131	-0.000855
CH4 Cal Slope:	1.001093	1.003290
CH4 Cal Offset:	-0.003602	-0.013600
NMHC Cal Slope:	1.003075	0.996899
NMHC Cal Offset:	0.008332	0.012344

Notes: As found CH4 is 6.7% low, checked all the diagnostics and chromatograms and couldn't find any issues. Will monitor the daily zero spans and complete maintenance if the CH4 continues dropping. Changed the inlet filter after as founds and adjusted the span.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

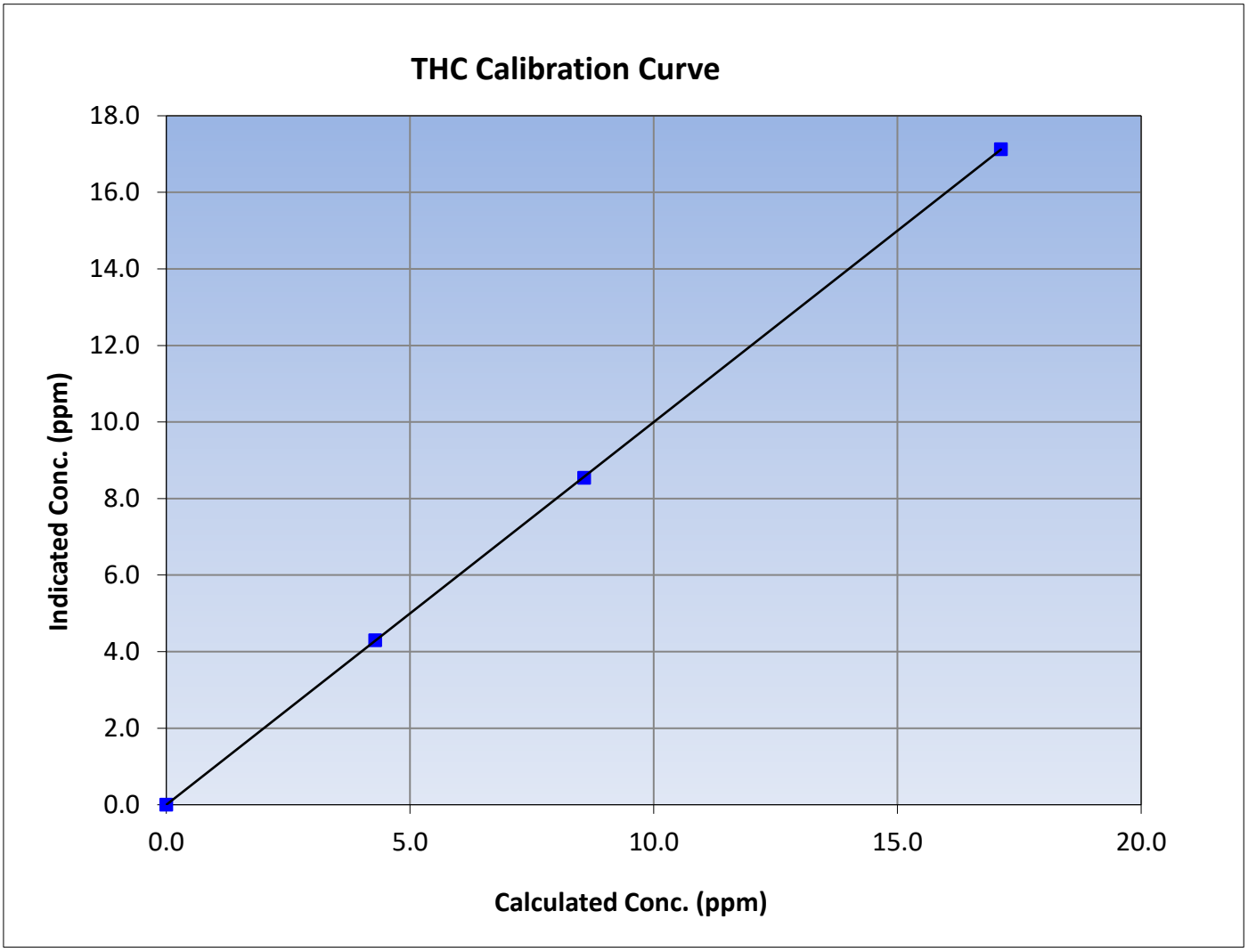
Version-01-2020

Station Information

Calibration Date:	June 5, 2023	Previous Calibration:	May 17, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:05	End Time (MST):	12:40
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	0.999994	≥0.995
17.12	17.13	0.9996			
8.57	8.54	1.0033	Slope	0.999886	0.90 - 1.10
4.29	4.30	0.9965			
			Intercept	-0.000855	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

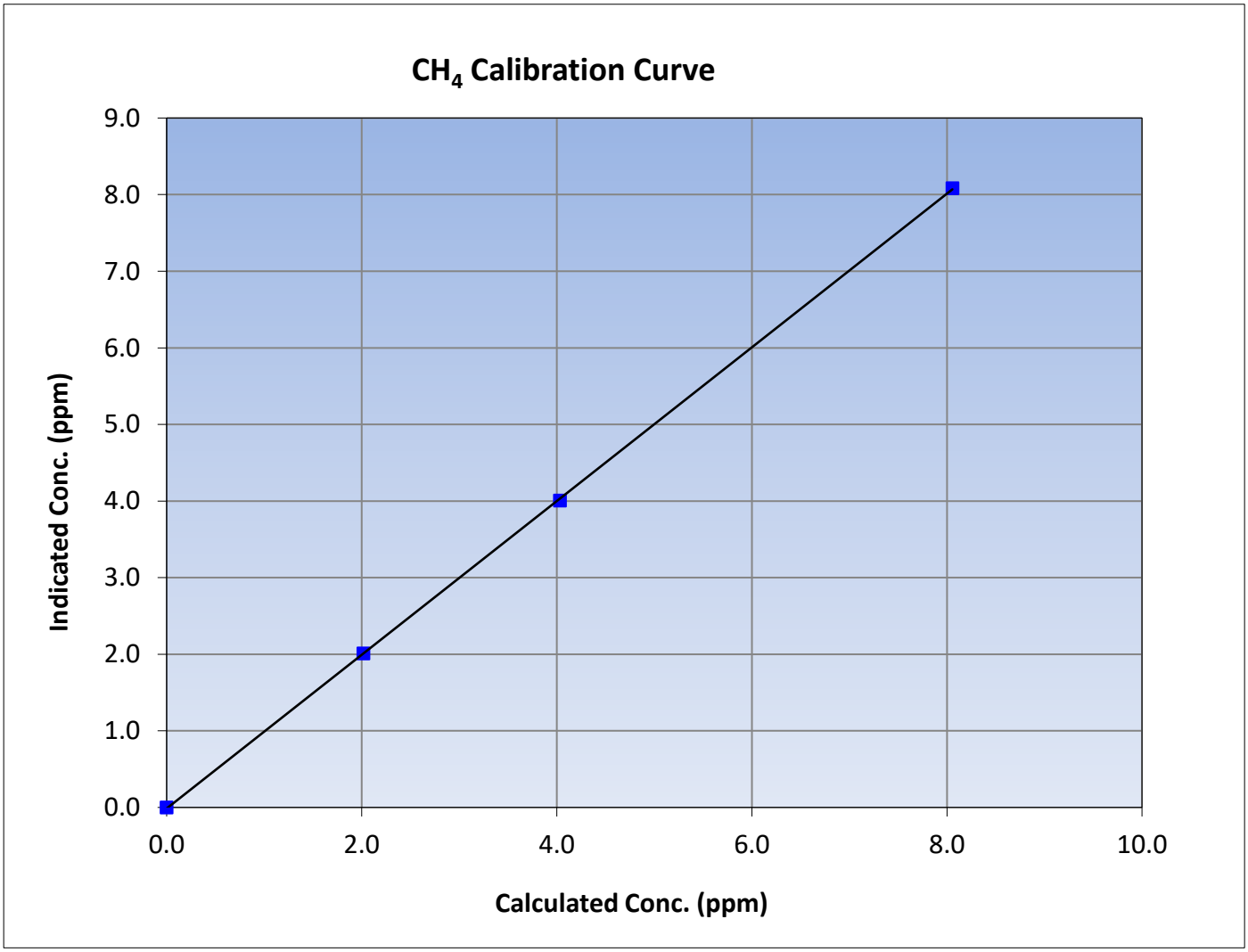
Version-01-2020

Station Information

Calibration Date:	June 5, 2023	Previous Calibration:	May 17, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:05	End Time (MST):	12:40
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	0.999970	≥0.995
8.06	8.08	0.9967			
4.03	4.01	1.0067	Slope	1.003290	0.90 - 1.10
2.02	2.01	1.0037			
			Intercept	-0.013600	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

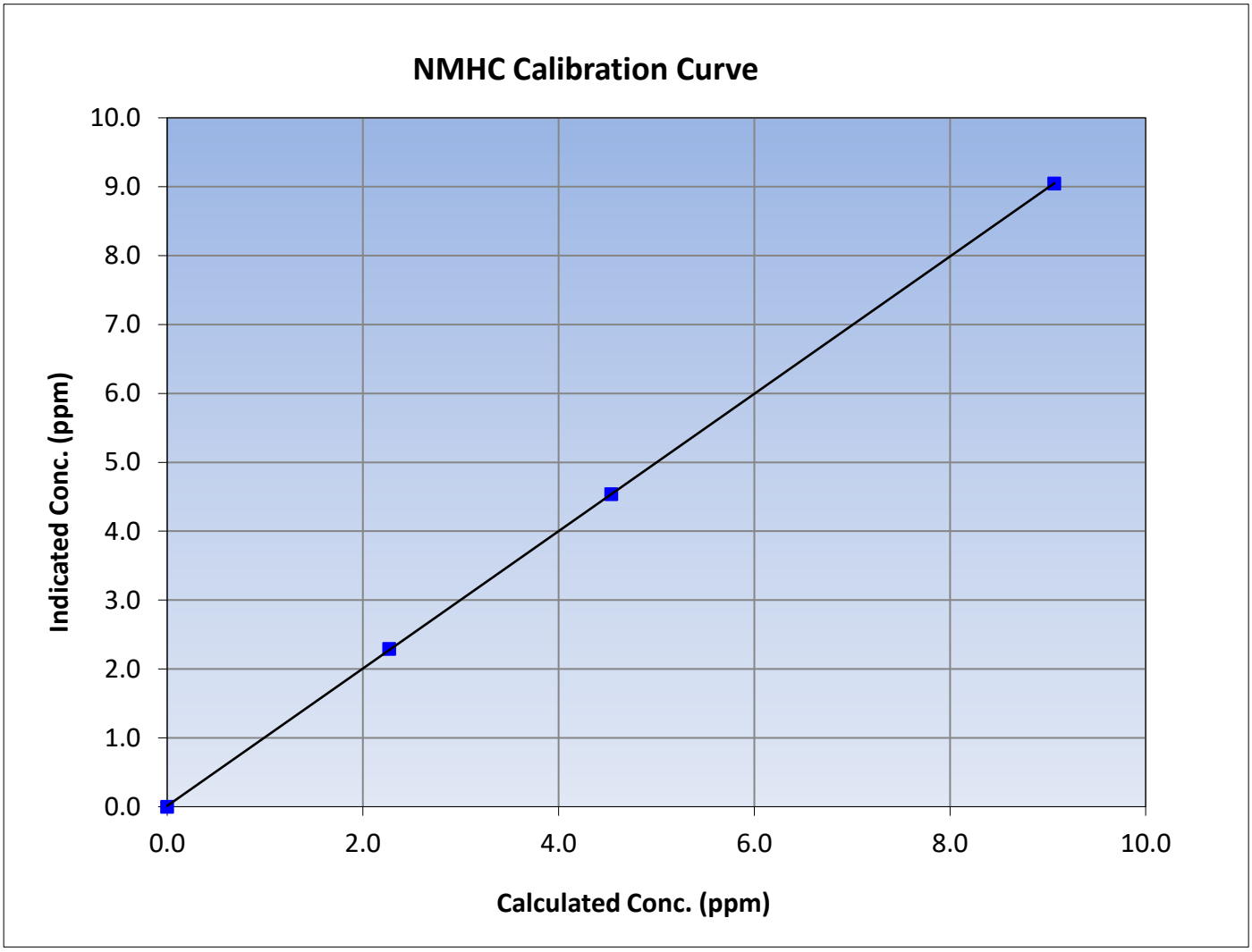
Version-01-2020

Station Information

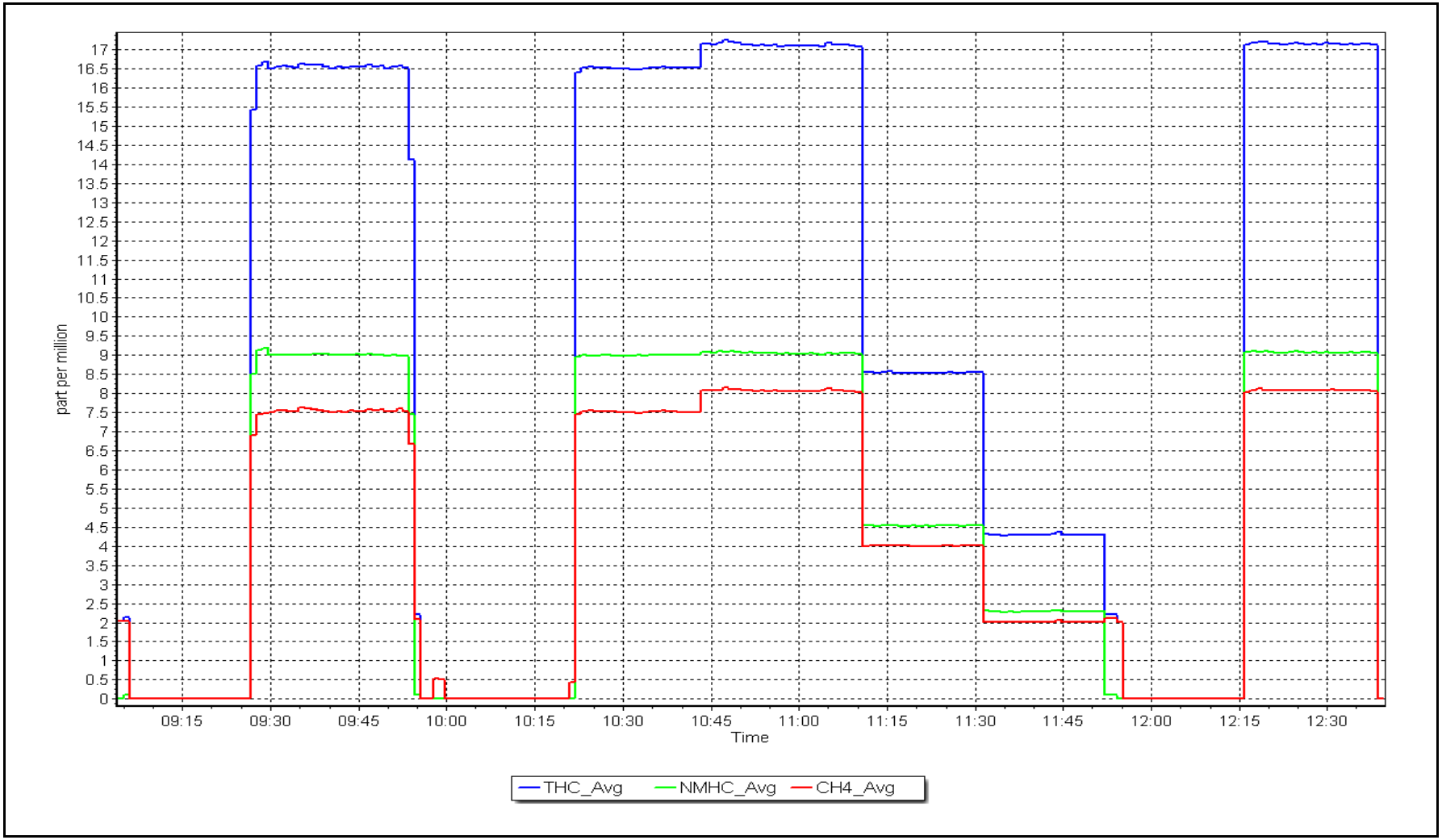
Calibration Date:	June 5, 2023	Previous Calibration:	May 17, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:05	End Time (MST):	12:40
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320037

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
9.07	9.05	1.0022			
4.54	4.54	1.0003	Slope	0.996899	0.90 - 1.10
2.27	2.29	0.9907			
			Intercept	0.012344	+/-0.5



NMHC Calibration Plot Date: June 5, 2023 Location: Patricia McInnes



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Patricia McInnes	Station number:	AMS06
Calibration Date:	June 19, 2023	Last Cal Date:	June 5, 2023
Start time (MST):	9:17	End time (MST):	14:23
Reason:	Maintenance		

Calibration Standards

Gas Cert Reference:		AAL070632	Cal Gas Expiry Date:	September 9, 2024	
CH4 Cal Gas Conc.	501.6	ppm	CH4 Equiv Conc.	1066.2	ppm
C3H8 Cal Gas Conc.	205.3	ppm			
Removed Gas Ref.		N/A	Removed Gas Expiry:	N/A	
Removed CH4 Conc.	501.6	ppm	CH4 Equiv Conc.	1066.2	ppm
Removed C3H8 Conc.	205.3	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3566	
ZAG make/model:	API T701		Serial Number:	5608	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320037	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.85E-04	2.54E-04	NMHC SP Ratio:	6.02E-05	7.86E-05
CH4 Retention time:	14.8	12.1	NMHC Peak Area:	150828	115463

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	17.12	16.63	1.030
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	17.12	17.23	0.994
second point	4960	40.2	8.57	8.44	1.016
third point	4980	20.1	4.29	4.19	1.023
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.12	17.17	0.998
				Average Correction Factor	1.011

Baseline Corr AF:	16.63	Prev response	17.12	*% change	-2.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4920	80.3	9.07	8.97	1.011
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4920	80.3	9.07	9.13	0.993
second point	4960	40.2	4.54	4.52	1.004
third point	4980	20.1	2.27	2.25	1.008
as left zero	5000	0	0.00	0.00	----
as left span	4920	80.3	9.07	9.14	0.992
				Average Correction Factor	1.002
Baseline Corr AF:	8.97	Prev response	9.05	*% change	-0.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	8.06	7.66	1.052
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	8.06	8.10	0.995
second point	4960	40.2	4.03	3.92	1.029
third point	4980	20.1	2.02	1.94	1.041
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	8.06	8.02	1.004
				Average Correction Factor	1.022
Baseline Corr AF:	7.66	Prev response	8.07	*% change	-5.3%
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:	0.999886	1.007754
THC Cal Offset:	-0.000855	-0.087832
CH4 Cal Slope:	1.003290	1.007409
CH4 Cal Offset:	-0.013600	-0.063374
NMHC Cal Slope:	0.996899	1.007709
NMHC Cal Offset:	0.012344	-0.024058

Notes: CH4 channel started dips yesterday. Optimized gas flows. Found ZAG leaking. Changed around 11:00 MST and left to warm up before calibrating. Use zero chrome and use flat baseline options removed.

Calibration Performed By: Ryan Power

Wood Buffalo Environmental Association

THC Calibration Summary

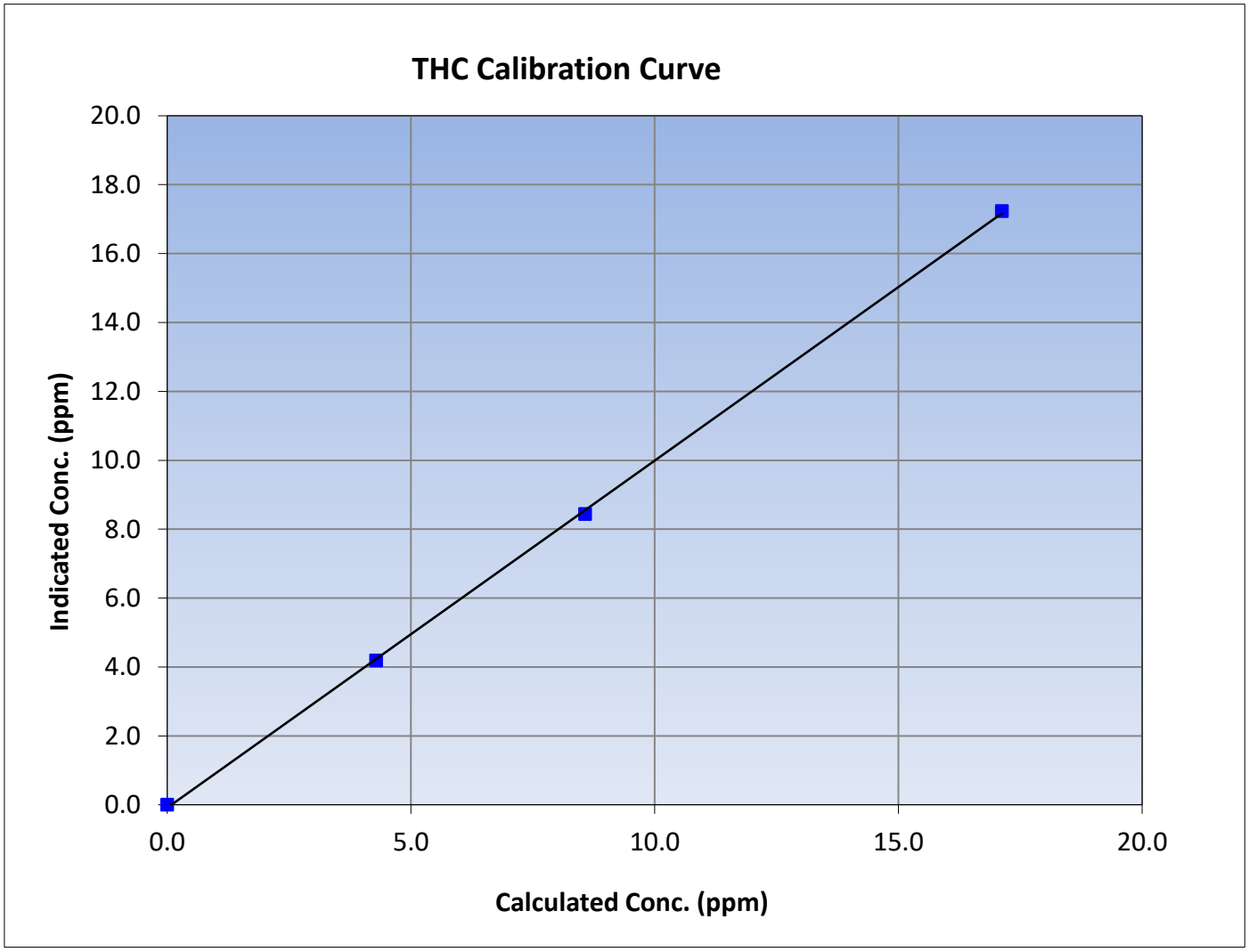
Version-01-2020

Station Information

Calibration Date:	June 19, 2023	Previous Calibration:	June 5, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:17	End Time (MST):	14:23
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	0.999839	≥0.995
17.12	17.23	0.9935			
8.57	8.44	1.0156	Slope	1.007754	0.90 - 1.10
4.29	4.19	1.0234			
			Intercept	-0.087832	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

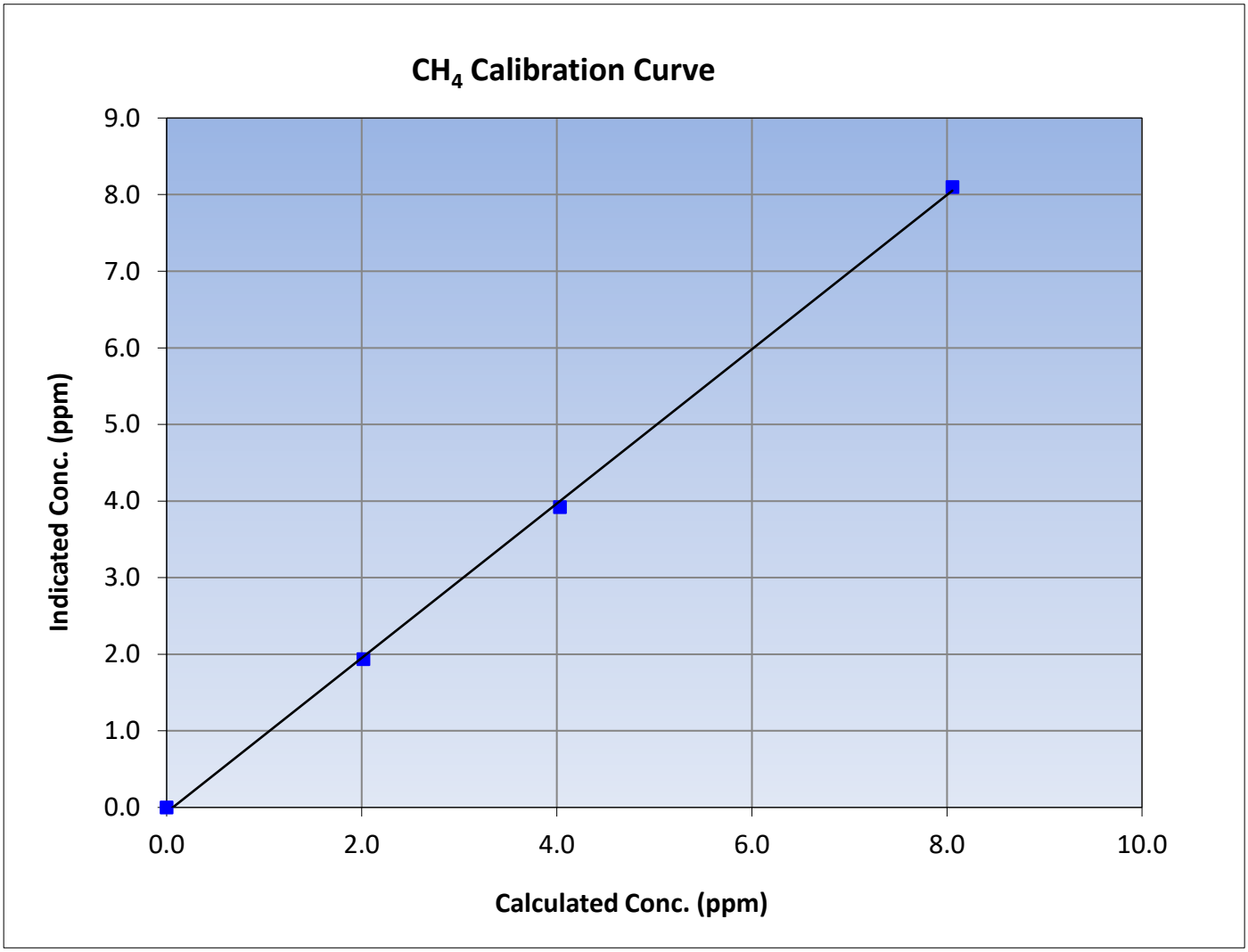
Version-01-2020

Station Information

Calibration Date:	June 19, 2023	Previous Calibration:	June 5, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:17	End Time (MST):	14:23
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	0.999619	≥0.995
8.06	8.10	0.9945			
4.03	3.92	1.0291	Slope	1.007409	0.90 - 1.10
2.02	1.94	1.0410			
			Intercept	-0.063374	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

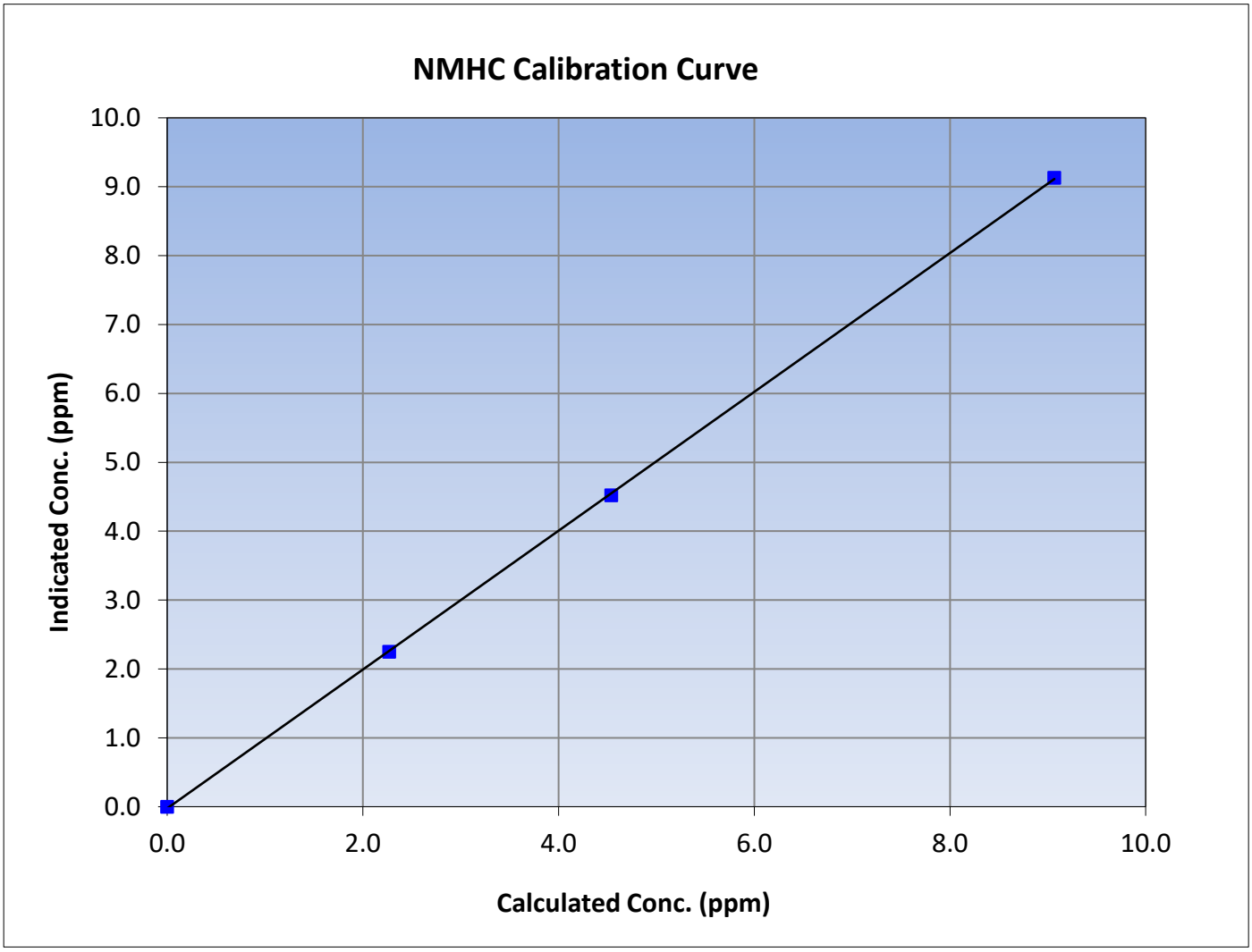
Version-01-2020

Station Information

Calibration Date:	June 19, 2023	Previous Calibration:	June 5, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:17	End Time (MST):	14:23
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	0.999957	*≥0.995*
9.07	9.13	0.9930			
4.54	4.52	1.0042	Slope	1.007709	*0.90 - 1.10*
2.27	2.25	1.0083			
			Intercept	-0.024058	*+/-0.5*



NMHC Calibration Plot Date: June 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:	June 26, 2023	Last Cal Date:	May 1, 2023
Start time (MST):	9:10	End time (MST):	13:39
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:	689	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1172750022	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	0.835	0.815	NO bkgnd or offset:	3.2	3.2
NOX coeff or slope:	0.996	0.986	NOX bkgnd or offset:	3.9	3.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	156.0	156.0

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001069	0.996744
NO_X Cal Offset:	1.979986	2.176487
NO Cal Slope:	0.998555	1.000845
NO Cal Offset:	1.080026	1.122676
NO_2 Cal Slope:	1.005730	1.000605
NO_2 Cal Offset:	0.795849	-0.357261

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	-0.2	----	----
as found span	4914	86.2	826.5	799.7	26.7	857.4	820.6	37.0	0.9639	0.9746
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	4914	86.2	826.5	799.7	26.7	825.0	801.2	23.9	1.0018	0.9982
second point	4957	43.1	413.2	399.9	13.4	415.1	401.6	13.5	0.9955	0.9957
third point	4978	21.6	207.1	200.4	6.7	210.3	202.5	7.7	0.9849	0.9897
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.2	-0.1	----	----
as left span	4923	76.9	737.3	313.7	423.6	824.6	402.4	422.1	0.8942	0.7796
								Average Correction Factor	0.9940	0.9945

Corrected As found	NO_X = 857.3 ppb	NO = 820.4 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	3.3%
Previous Response	NO_X = 829.3 ppb	NO = 799.7 ppb		*Percent Change	NO =	2.5%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	799.1	402.2	423.6	423.6	1.0000	100.0%
2nd GPT point (200 ppb O3)	799.1	602.1	223.7	223.7	1.0001	100.0%
3rd GPT point (100 ppb O3)	799.1	702.2	123.6	122.7	1.0075	99.3%
				Average Correction Factor	1.0025	99.7%

Notes: Span adjusted. No maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

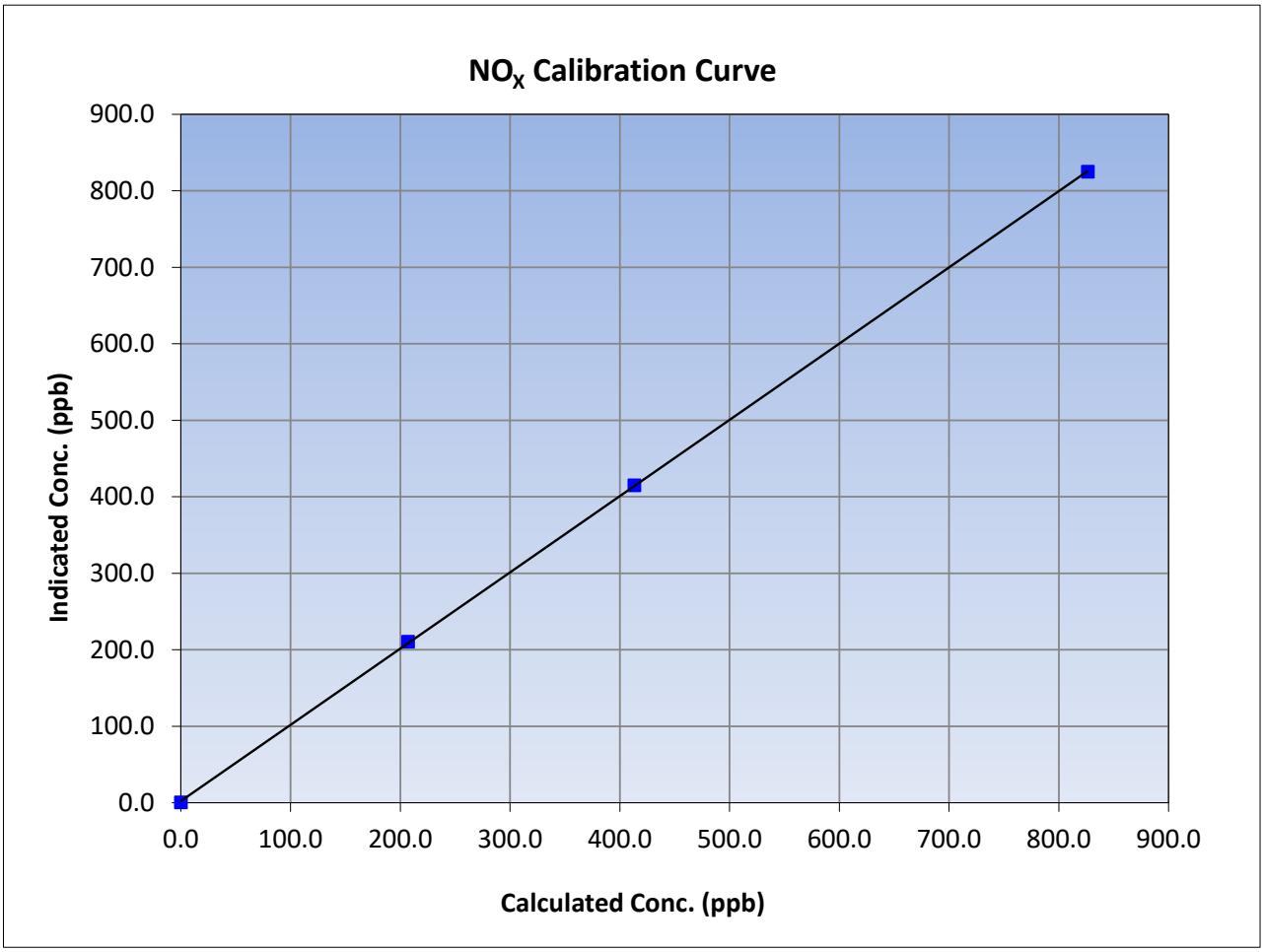
Version-04-2020

Station Information

Calibration Date:	June 26, 2023	Previous Calibration:	May 1, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:10	End Time (MST):	13:39
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	0.999979	≥0.995
826.5	825.0	1.0018			
413.2	415.1	0.9955	Slope	0.996744	0.90 - 1.10
207.1	210.3	0.9849			
			Intercept	2.176487	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

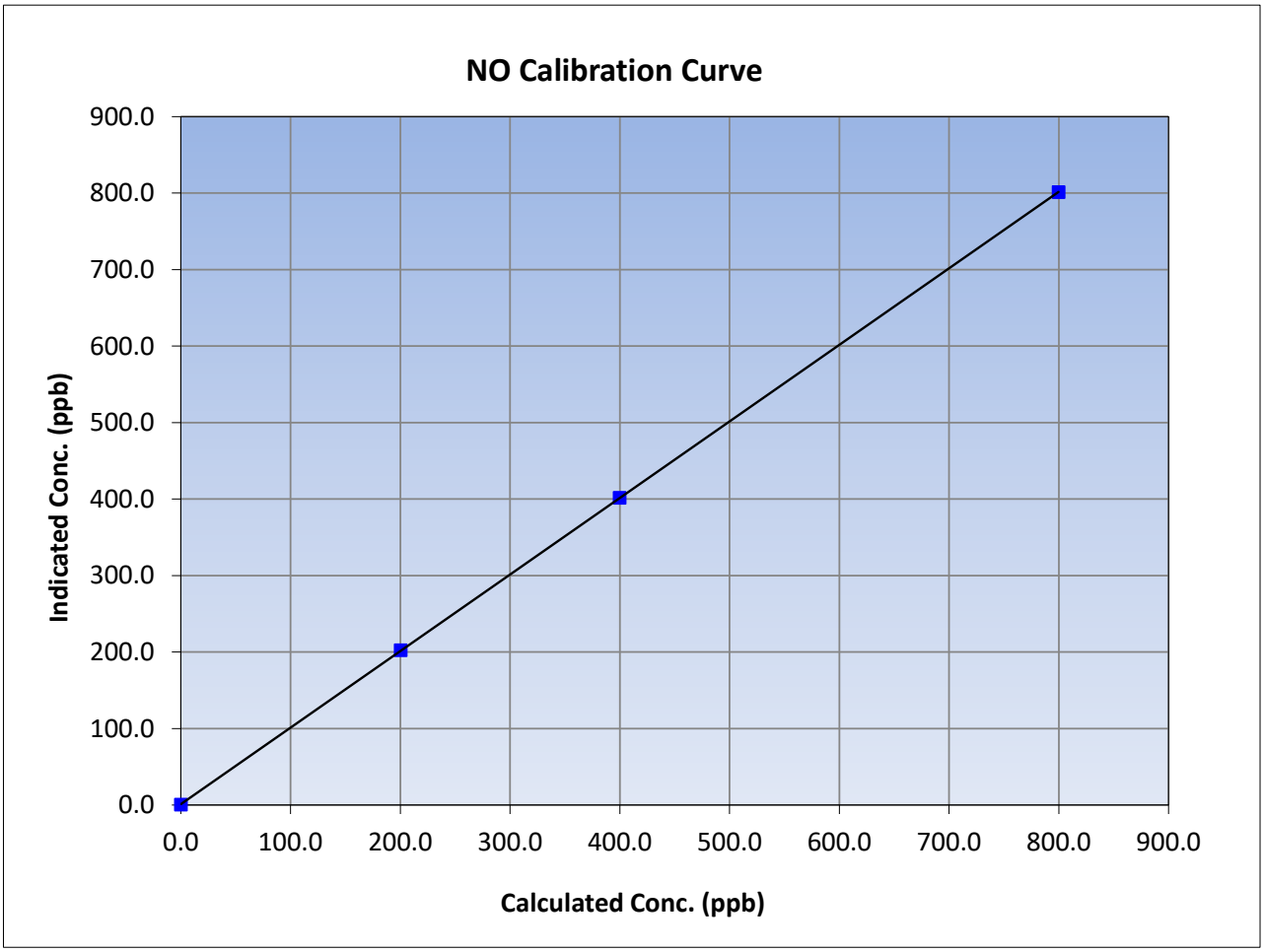
Version-04-2020

Station Information

Calibration Date:	June 26, 2023	Previous Calibration:	May 1, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:10	End Time (MST):	13:39
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	0.999996	*≥0.995*
799.7	801.2	0.9982			
399.9	401.6	0.9957	Slope	1.000845	*0.90 - 1.10*
200.4	202.5	0.9897			
			Intercept	1.122676	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

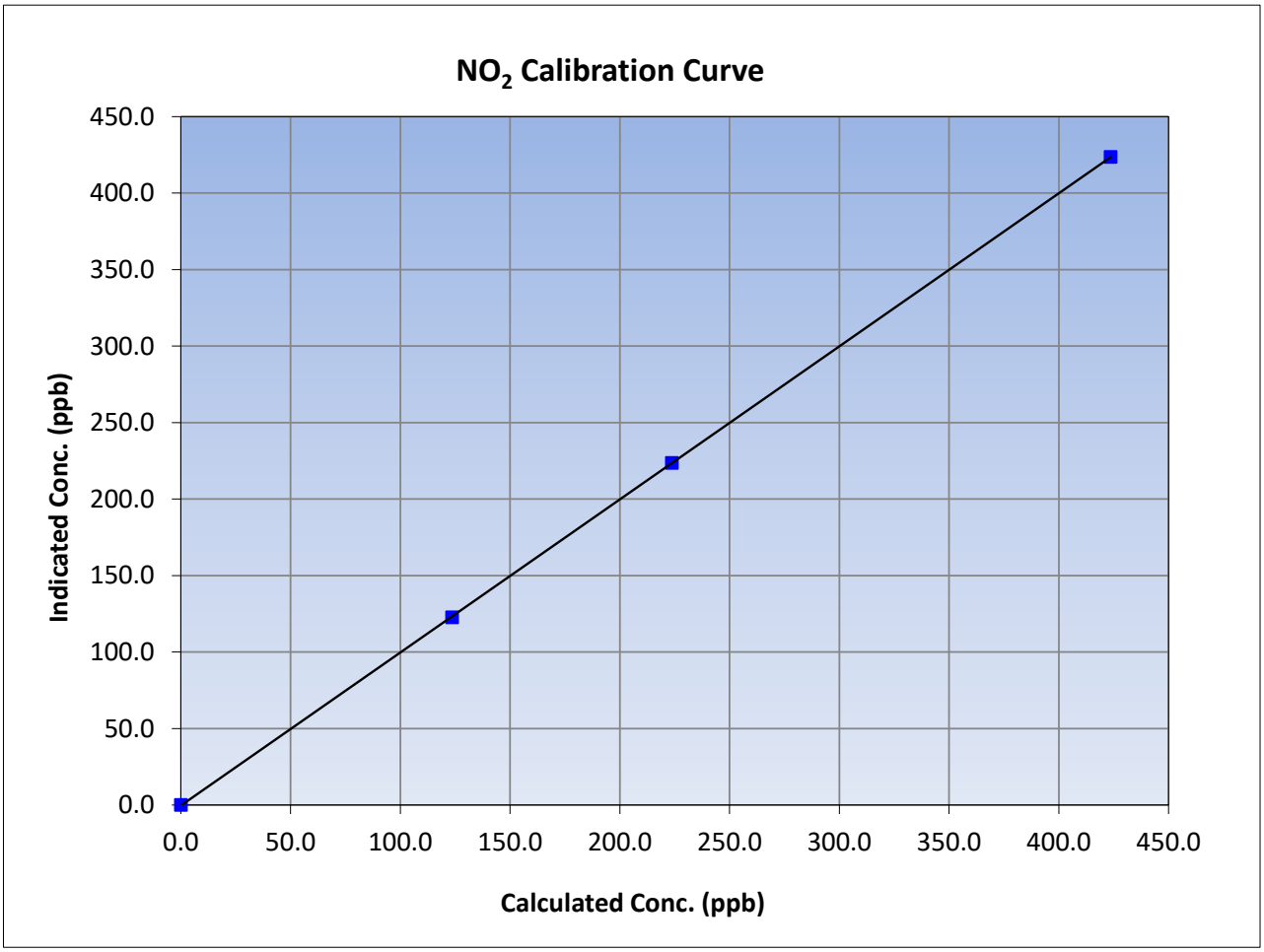
Version-04-2020

Station Information

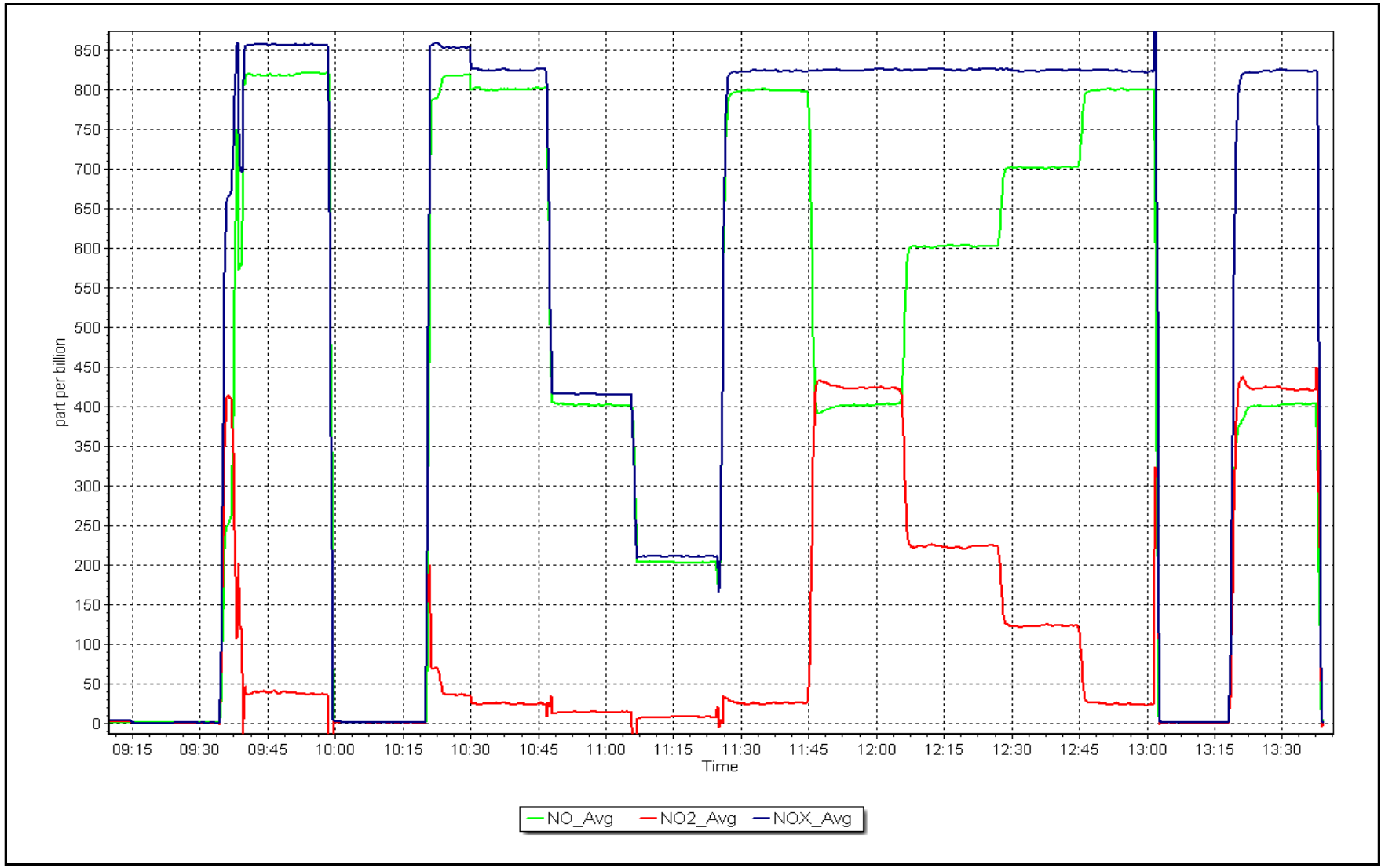
Calibration Date:	June 26, 2023	Previous Calibration:	May 1, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	9:10	End Time (MST):	13:39
Analyzer make:	Thermo 42i	Analyzer serial #:	1172750022

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999994	≥0.995
423.6	423.6	1.0000			
223.7	223.7	1.0001	Slope	1.000605	0.90 - 1.10
123.6	122.7	1.0075			
			Intercept	-0.357261	+/-20



NO_X Calibration Plot Date: June 26, 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:	June 13, 2023	Last Cal Date:	May 15, 2023
Start time (MST):	10:04	End time (MST):	13:15
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	API T700	Serial Number:	3566
ZAG Make/Model:	API T701H	Serial Number:	689

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001971	1.002286	Backgd or Offset:	-0.2	-0.2
Calibration intercept:	0.480000	0.600000	Coeff or Slope:	1.019	1.019

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	800.0	0.0	-0.9	----
as found span	5000	1303.0	400.0	400.3	0.999
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	-0.6	----
high point	5000	1303.0	400.0	400.6	0.999
second point	5000	966.5	200.0	202.6	0.987
third point	5000	794.3	100.0	101.4	0.986
as left zero	5000	800.0	0.0	0.6	----
as left span	5000	1303.0	400.0	402.9	0.993
				Average Correction Factor	0.991

Baseline Corr As found:	401.2	Previous response	401.3	*% change	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

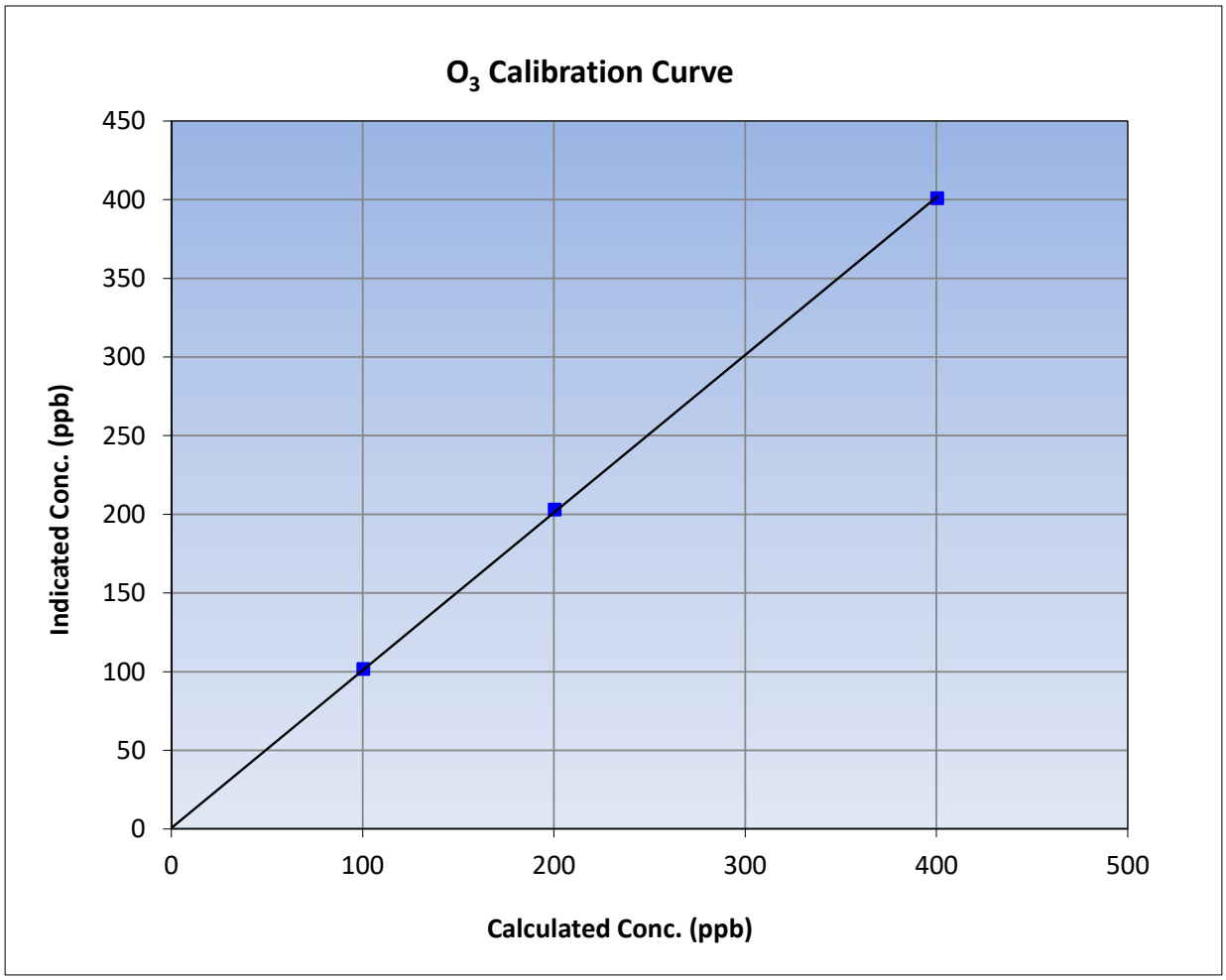
Station Information

Calibration Date:	June 13, 2023	Previous Calibration:	May 15, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	10:04	End Time (MST):	13:15
Analyzer make:	Thermo 49i	Analyzer serial #:	1300156234

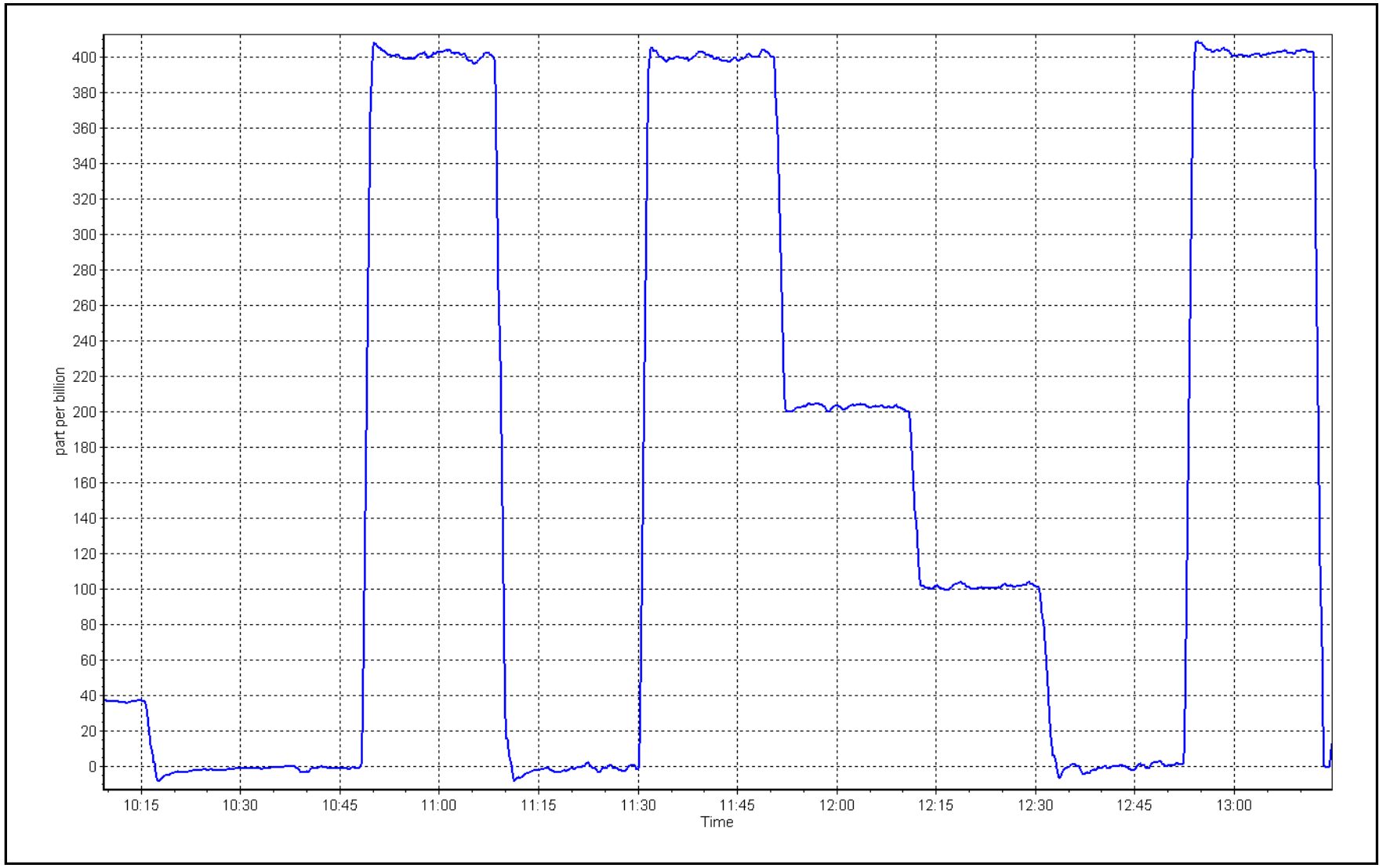
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.6	----
400.0	400.6	0.9985
200.0	202.6	0.9872
100.0	101.4	0.9862

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999943	*≥0.995*
Slope	1.002286	*0.90 - 1.10*
Intercept	0.600000	*+/- 5*



O_3 Calibration Plot Date: June 13, 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:	June 5, 2023	Last Cal Date:	May 17, 2023
Start time (MST):	12:53	End time (MST):	13:56
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)	22.4	22.0	22.4	☐	+/- 2 °C
P (mmHg)	725.5	726.2	725.5	☐	+/- 10 mmHg
flow (LPM)	5.01	5.16	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: June 5, 2023 Last Cal Date: May 17, 2023

PM w/o HEPA: 12.9 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	13	13	10.8	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 9.4 w/ HEPA: 0

Date Optical Chamber Cleaned: June 5, 2023 <0.2 ug/m3

Disposable Filter Changed: June 5, 2023

Annual Maintenance

Date Sample Tube Cleaned: April 13, 2023

Date RH/T Sensor Cleaned: April 13, 2023

Notes: "Perform span dust check" alarm was on upon arrival. Was unable to complete PMT Peak test as no readings were showing with the span dust. Cleaned the chamber and adjusted the PMT peak. Leak check passed, no other adjustments made.

Calibration by: Max Farrell

Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
Calibration Date:	June 28, 2023	Last Cal Date:	June 5, 2023
Start time (MST):	8:50	End time (MST):	12:00
Analyzer Make:	API T640	S/N:	766
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	ALICAT FP-25	S/N:	388744
Temp/RH standard:	ALICAT FP-25	S/N:	388744

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	27.3	26.6	27.3	☐	+/- 2 °C
P (mmHg)	723.2	724.6	723.2	☐	+/- 10 mmHg
flow (LPM)	0.32	0.32	5.00	☑	+/- 0.25 LPM

Leak Test: Date of check: June 28, 2023 Last Cal Date: June 5, 2023

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

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: June 5, 2023 <0.2 ug/m3

Disposable Filter Changed: June 5, 2023

Annual Maintenance

Date Sample Tube Cleaned: April 13, 2023

Date RH/T Sensor Cleaned: April 13, 2023

Notes: As found flow was low at 0.3 LPM, pump power output at 100%. Replaced pump but only half flow restored, troubleshooting revealed internal DFU filter was plugged, replaced filter.

Calibration by: Kelly Baragar

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:	June 26, 2023	Last Cal Date:	May 24, 2023
Start time (MST):	9:10	End time (MST):	13:08
NH3 Cal Date:	June 27, 2023	Last Cal Date:	May 24, 2023
Start time (MST):	8:30	End time (MST):	15:58
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:	689

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:	25.3

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

Calibration Statistics

	Start	*Finish*
NO_X Cal Slope:	0.995223	1.005776
NO_X Cal Offset:	1.876743	1.234716
NO Cal Slope:	0.994331	0.998846
NO Cal Offset:	1.802690	1.222396
NO_2 Cal Slope:	1.004951	1.005535
NO_2 Cal Offset:	1.630262	0.912555
NH3 Cal Slope:	1.008694	1.017396
NH3 Cal Offset:	6.507686	0.876681
TN Cal Slope:	1.013896	1.023007
TN Cal Offset:	6.739810	0.746567

Wood Buffalo Environmental Association

TN - NOX - NH_3 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated TN concentration (ppb) (Cc)	Calculated NOX concentration (ppb) (Cc)	Calculated NH3 concentration (ppb) (Cc)	Indicated TN concentration (ppb) (Ic)	Indicated NOX concentration (ppb) (Ic)	Indicated NH3 concentration (ppb) (Ic)	TN Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NH3 Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1	----	----
as found NO	4914	86.2	826.5	826.5	----	822.8	824.0	-1.3	1.004	----
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1	----	----
high NO point	4914	86.2	826.5	826.5	----	822.8	824.0	-1.3	1.004	----
GPT point	4914	86.2	826.5	826.5	----	827.0	825.1	1.7	0.999	----
as found NH3	3419	81.0	1800.5	----	1800.5	1843.3	----	1833.4	0.977	0.982
new NH3 cyl rp							----			
first NH3	3419	81.0	1800.5	----	1800.5	1843.3	----	1833.4	0.977	0.982
second NH3	3455	45.0	1000.3	----	1000.3	1021.5	----	1015.8	0.979	0.985
third NH3	3478	22.5	500.1	----	500.1	515.2	----	512.7	0.971	0.975
								Average Correction Factor	1.0019	0.9807

Corrected As found TN = 823 ppb NO_X = 824.1 ppb NH3 = 1833.5 ppb *Percent Change TN = -2.6%

Previous Response TN = 844.7 ppb NO_X = 824.4 ppb NH3 = 1822.7 ppb *Percent Change NO_X = 0.0%

*Percent Change NH3 = 0.6%

* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 90.8%

NH3 Current Converter Efficiency = 90.8%

Wood Buffalo Environmental Association

NO_X - NO - NO_2 Calibration Report

Version-05-2023

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.1	0.8	0.7	----	----
as found span	4914	86.2	826.5	799.7	826.5	829.7	796.0	824.9	0.9961	1.0047
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	0.1	0.2	----	----
high point	4914	86.2	826.5	799.7	826.5	831.7	800.0	828.4	0.9937	0.9997
second point	4957	43.1	413.2	399.9	413.2	417.6	399.6	417.7	0.9895	1.0007
third point	4978	21.6	207.1	200.4	207.1	211.1	203.6	211.4	0.9811	0.9844
								Average Correction Factor	0.9881	0.9949

Baseline Corr As fnd	TN =	824.2 ppb	NO_X =	829.6 ppb	NO =	795.2 ppb	*Percent Change TN = -2.5%
Previous Response	TN =	844.7 ppb	NO_X =	824.4 ppb	NO =	797.0 ppb	*Percent Change NO_X = 0.6%
							*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	-0.7	----	----
calibration zero	----	----	0.0	-0.3	----	----
1st GPT point (400 ppb O3)	799.6	399.0	427.3	429.7	0.9945	100.6%
2nd GPT point (200 ppb O3)	799.6	603.3	223.0	226.4	0.9851	101.5%
3rd GPT point (100 ppb O3)	799.6	702.1	124.2	126.7	0.9804	102.0%
				Average Correction Factor	0.9867	101.4%

Notes: Nox portition of the calibration done today. No adjustments done.

Calibration Performed By: Maddison Baragar

Wood Buffalo Environmental Association

TN Calibration Summary

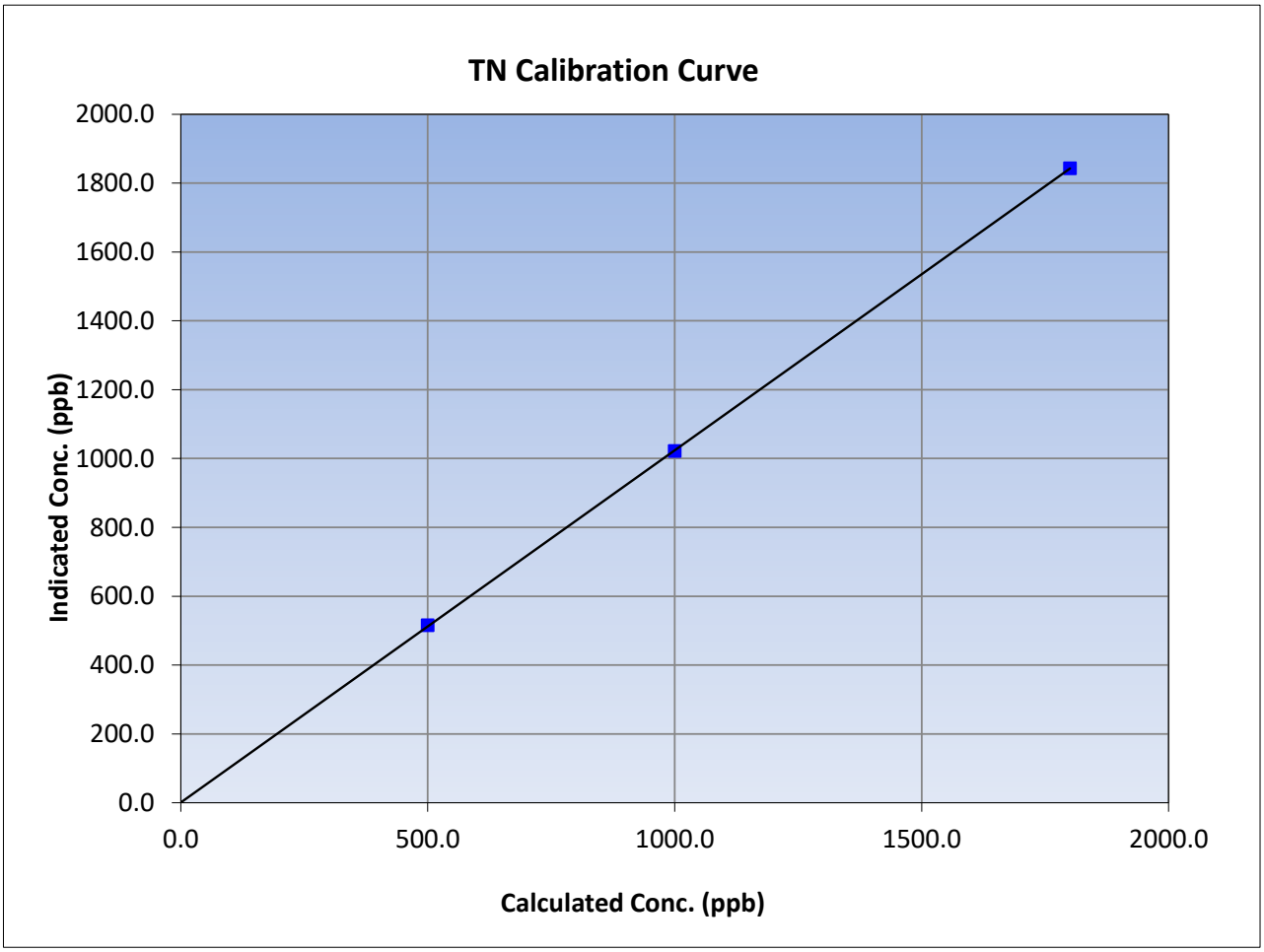
Version-05-2023

Station Information

Calibration Date:	June 27, 2023	Previous Calibration:	May 24, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:30	End Time (MST):	15:58
Analyzer make:	Teledyne API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.2	----	Correlation Coefficient	0.999991	*≥0.995*
1800.5	1843.3	0.9768			
1000.3	1021.5	0.9792	Slope	1.023007	*0.90 - 1.10*
500.1	515.2	0.9706			
			Intercept	0.746567	*+/-20*



Wood Buffalo Environmental Association

NH_3 Calibration Summary

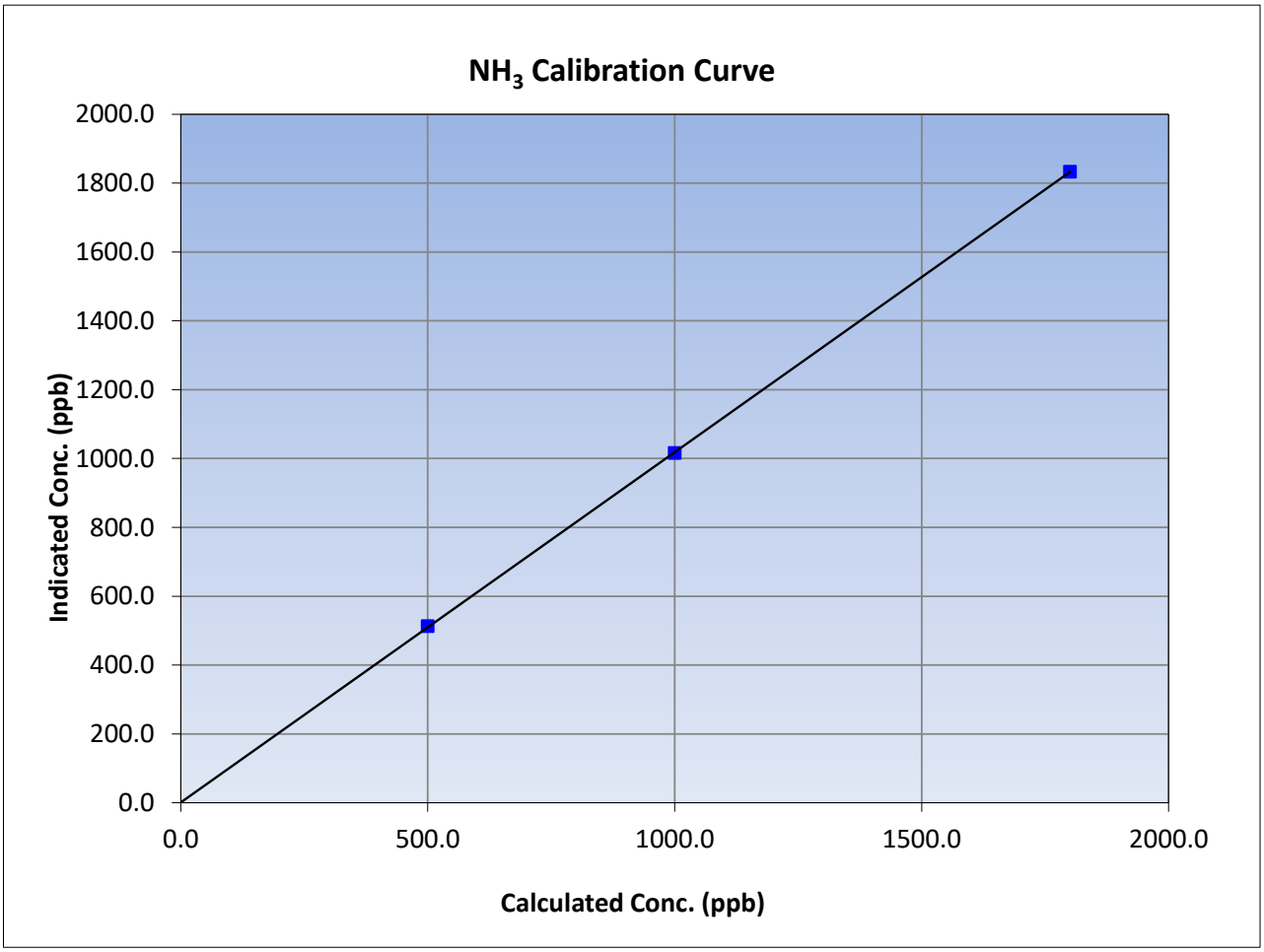
Version-05-2023

Station Information

Calibration Date:	June 27, 2023	Previous Calibration:	May 24, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	8:30	End Time (MST):	15:58
Analyzer make:	Teledyne API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999990	≥0.995
1800.5	1833.4	0.9821			
1000.3	1015.8	0.9847	Slope	1.017396	0.90 - 1.10
500.1	512.7	0.9754			
			Intercept	0.876681	+/-20



Wood Buffalo Environmental Association

NO_X Calibration Summary

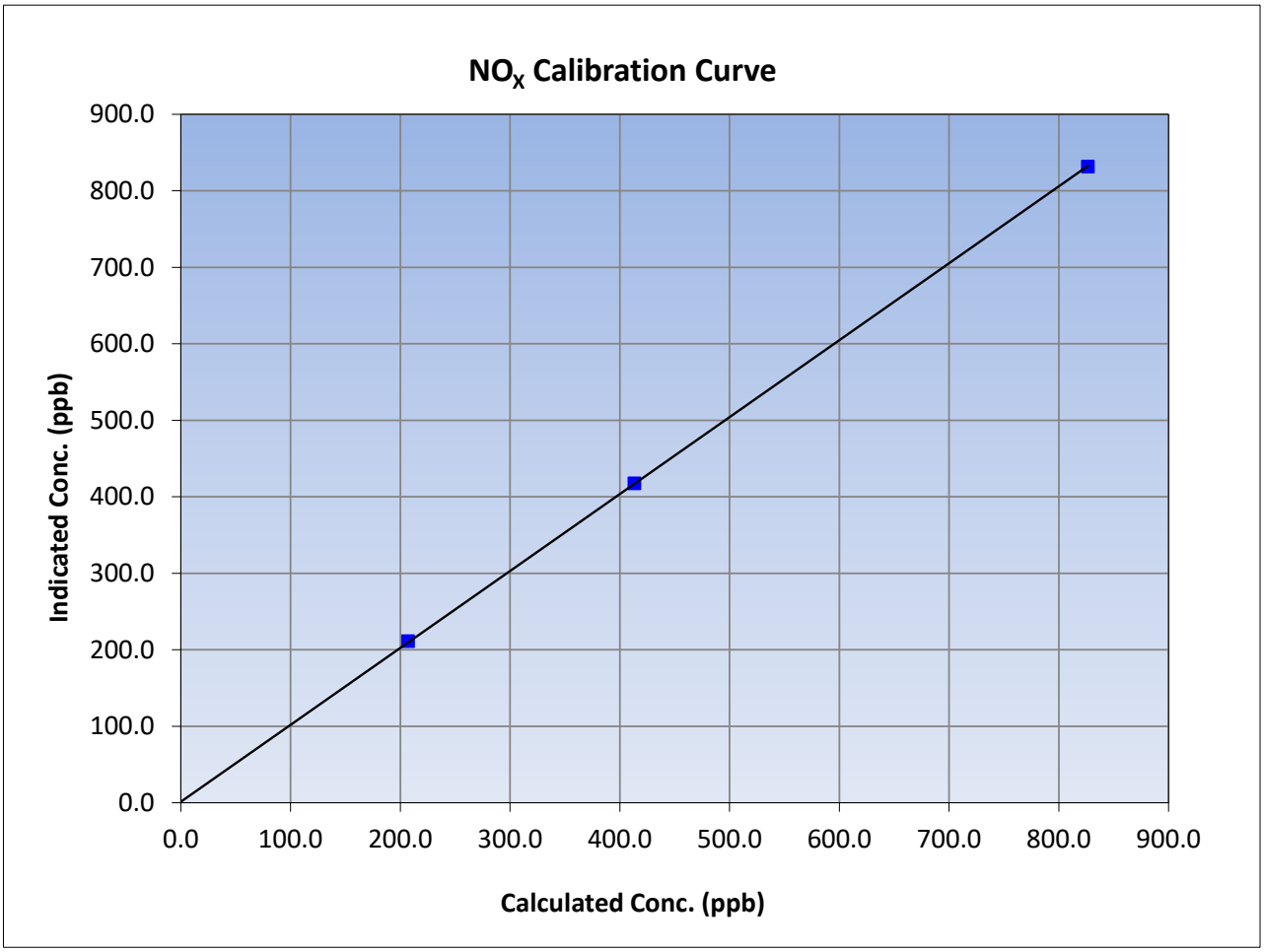
Version-05-2023

Station Information

Calibration Date:	June 26, 2023	Previous Calibration:	May 24, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:10	End Time (MST):	13:08
Analyzer make:	Teledyne API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.3	----	Correlation Coefficient	0.999984	≥0.995
826.5	831.7	0.9937			
413.2	417.6	0.9895	Slope	1.005776	0.90 - 1.10
207.1	211.1	0.9811			
			Intercept	1.234716	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

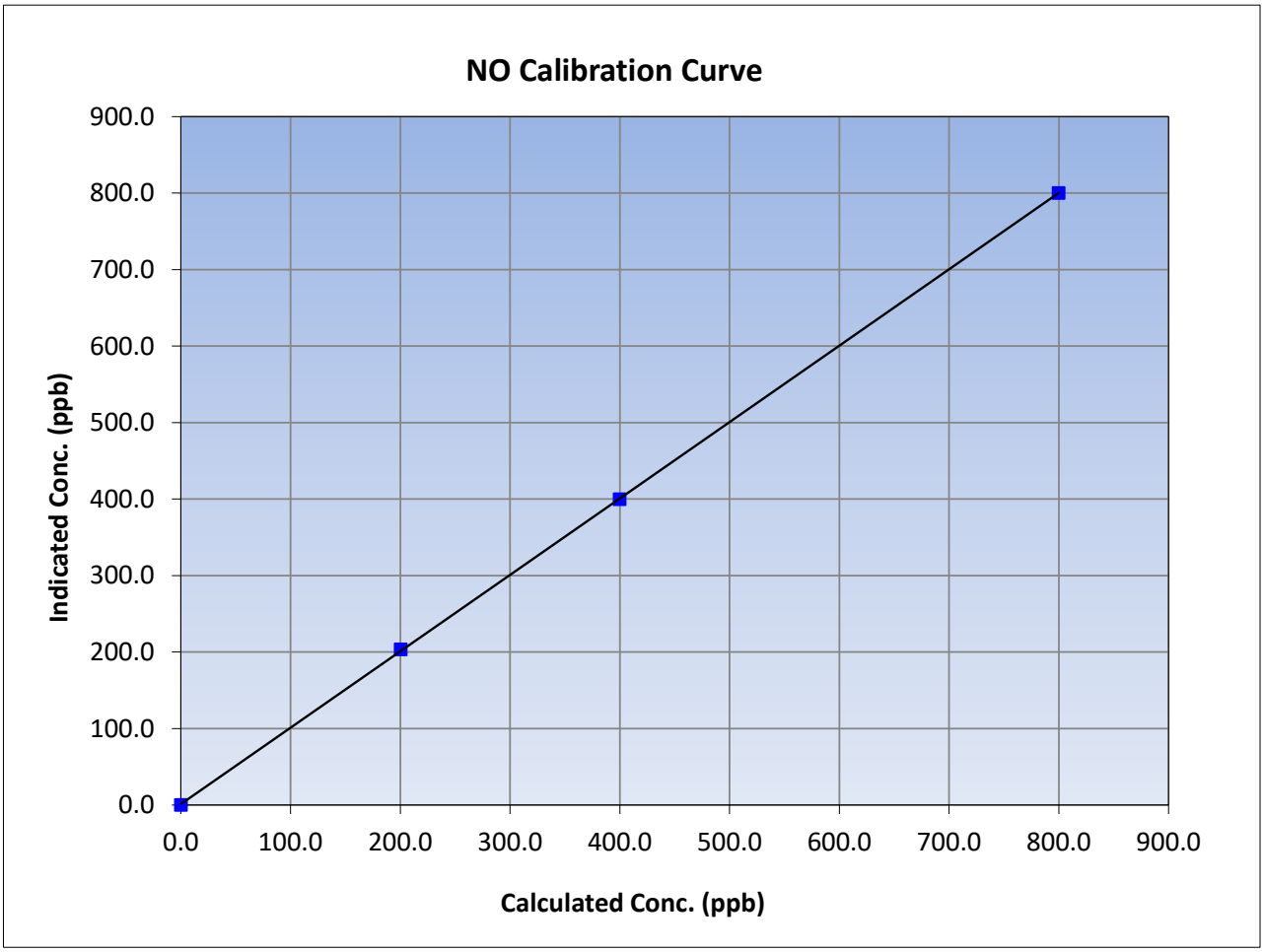
Version-05-2023

Station Information

Calibration Date:	June 26, 2023	Previous Calibration:	May 24, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:10	End Time (MST):	13:08
Analyzer make:	Teledyne API T201	Analyzer serial #:	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999980	≥0.995
799.7	800.0	0.9997			
399.9	399.6	1.0007	Slope	0.998846	0.90 - 1.10
200.4	203.6	0.9844			
			Intercept	1.222396	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

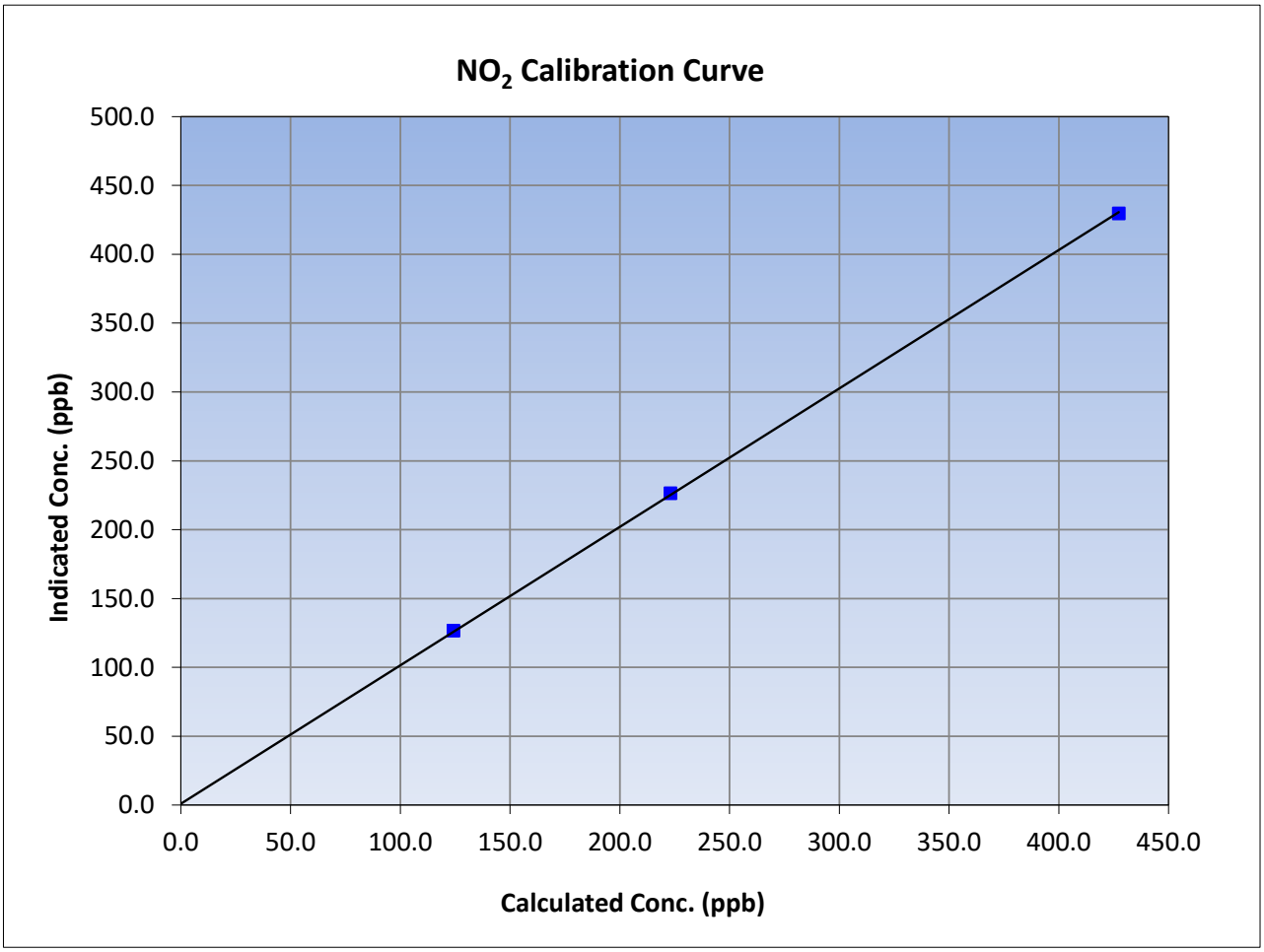
Version-05-2023

Station Information

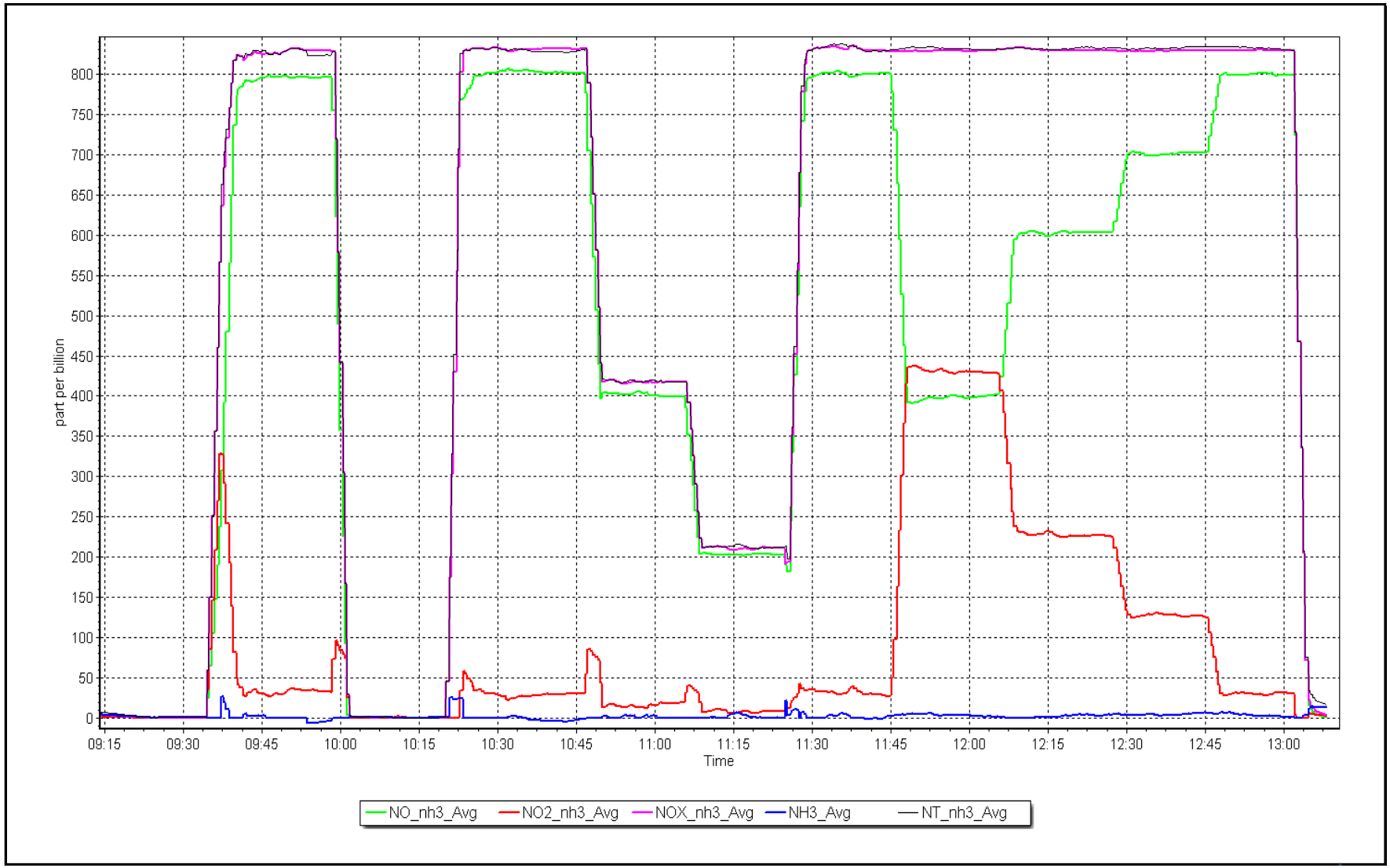
Calibration Date:	June 26, 2023	Previous Calibration:	May 24, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	9:10	End Time (MST):	13:08
Analyzer make:	Teledyne API T201	Analyzer serial #:	152

Calibration Data

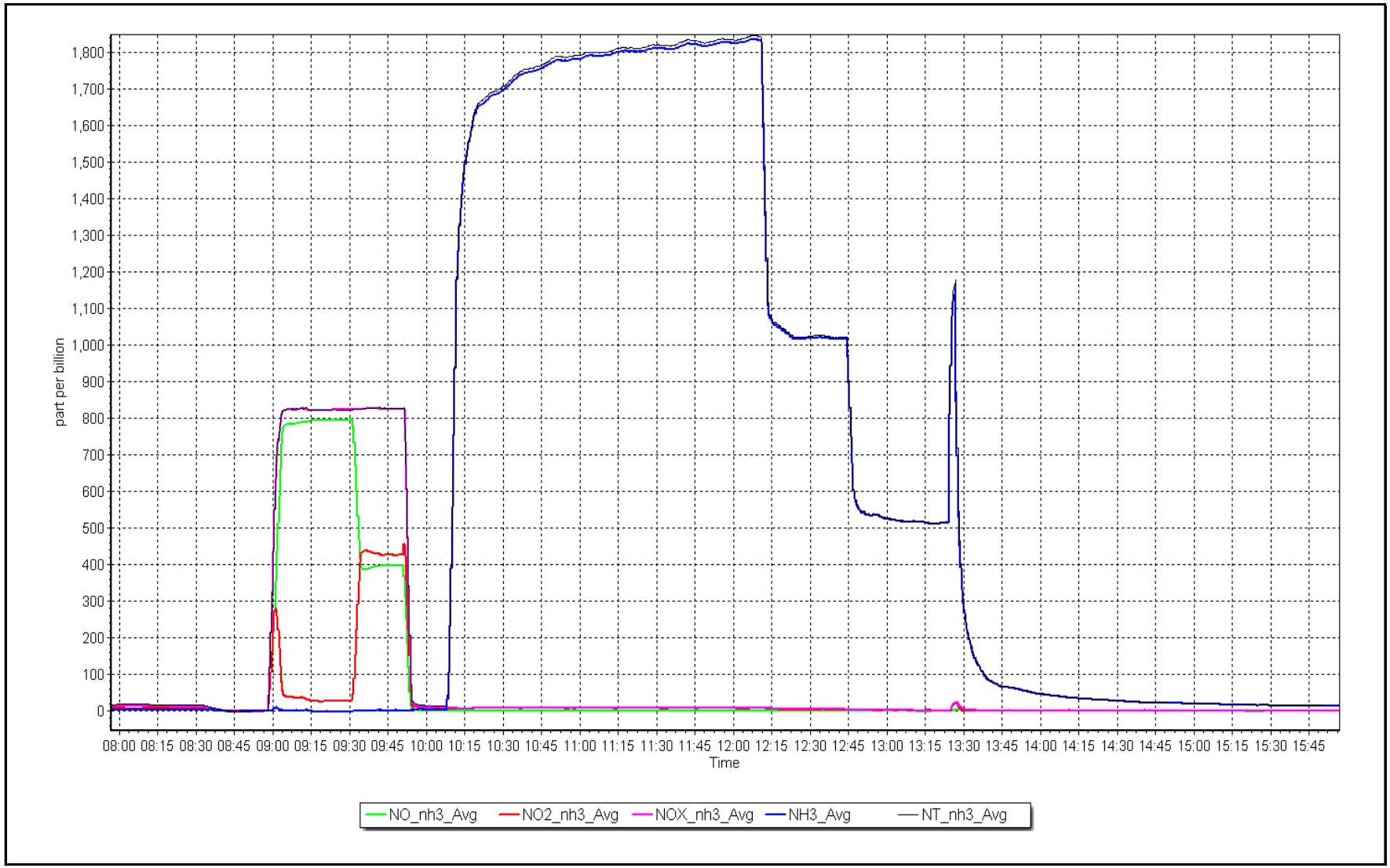
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.3	----	Correlation Coefficient	0.999954	*≥0.995*
427.3	429.7	0.9945			
223.0	226.4	0.9851	Slope	1.005535	*0.90 - 1.10*
124.2	126.7	0.9804			
			Intercept	0.912555	*+/-20*



NO_X Calibration Plot Date: June 26, 2023 Location: Patricia McInnes



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



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS07
ATHABASCA VALLEY
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	June 16, 2023	Last Cal Date:	May 15, 2023
Start time (MST):	9:05	End time (MST):	12:38
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.004627	1.003815	Backgd or Offset:	2.70	2.70
Calibration intercept:	1.624552	1.384231	Coeff or Slope:	0.845	0.840

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	803.9	0.997
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	804.9	0.995
second point	4960	39.6	400.2	404.1	0.990
third point	4980	19.8	200.1	203.1	0.985
as left zero	5000	0.0	0.0	0.0	----
as left span	4921	79.2	800.2	804.1	0.995
				Average Correction Factor	0.990

Baseline Corr As found:	804.00	Previous response	806.53	*% 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: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

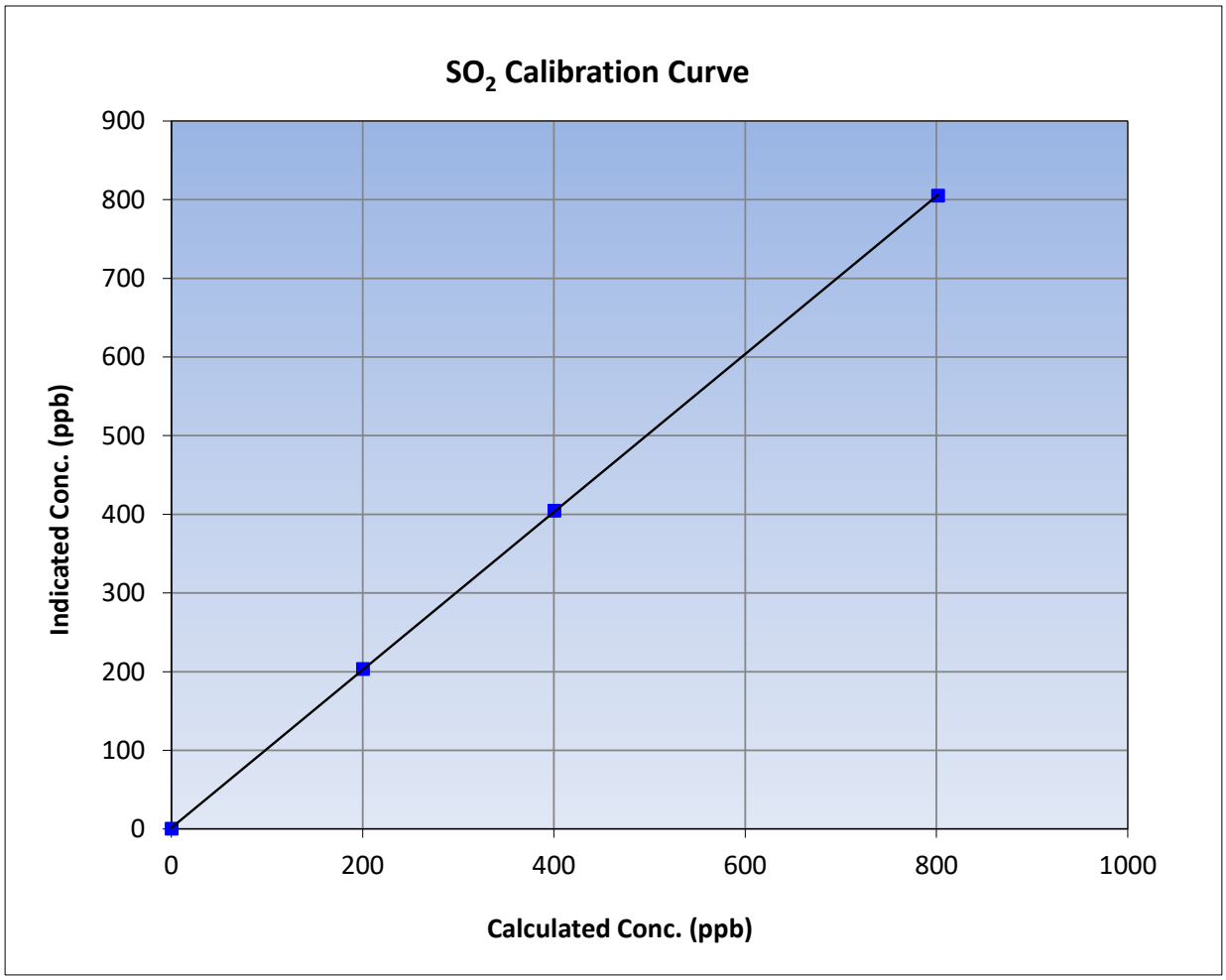
Station Information

Calibration Date:	June 16, 2023	Previous Calibration:	May 15, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:05	End Time (MST):	12:38
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1507864683

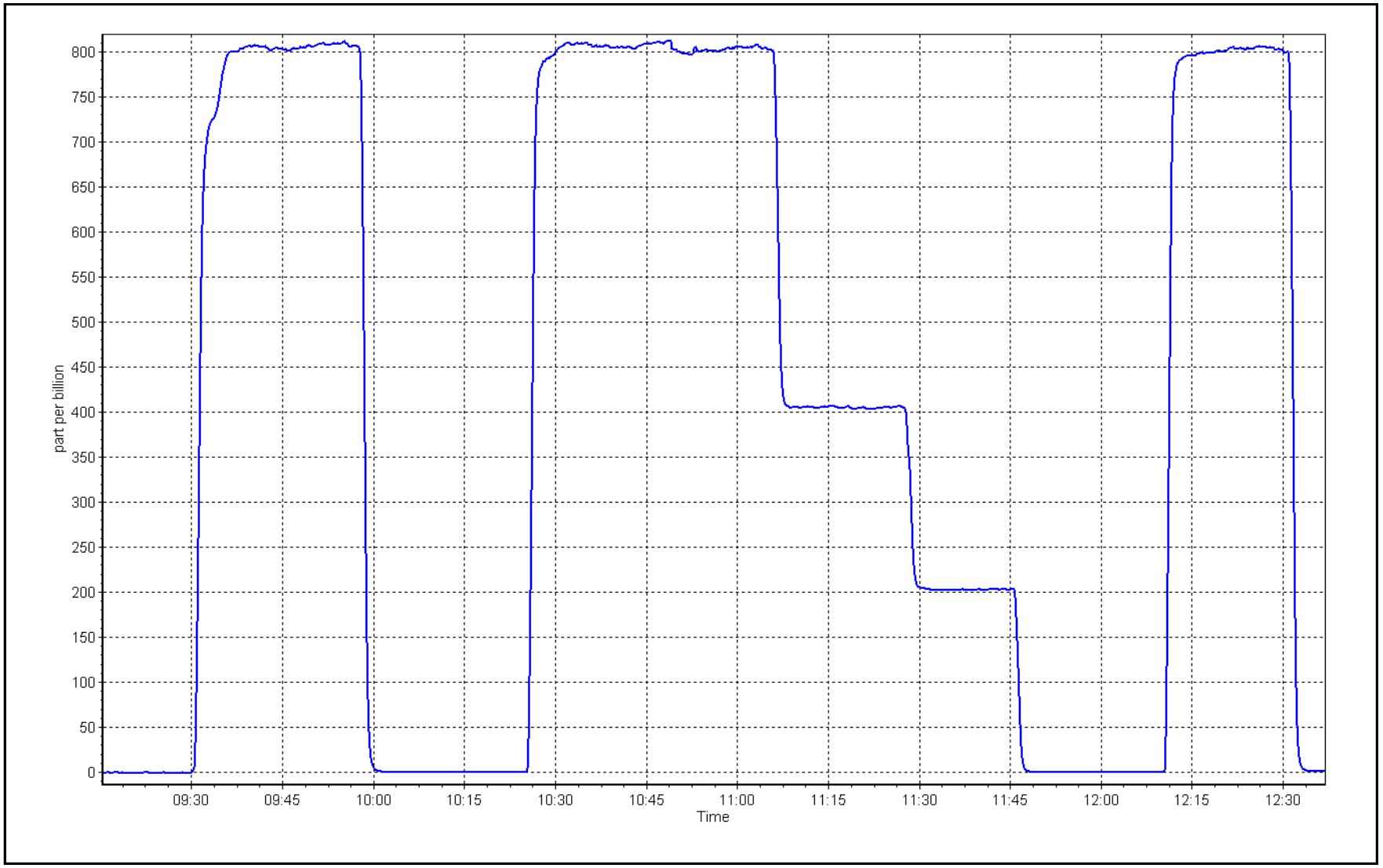
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
801.2	804.9	0.9954
400.2	404.1	0.9902
200.1	203.1	0.9851

Statistical Evaluation		Limits
Correlation Coefficient	0.999989	≥0.995
Slope	1.003815	0.90 - 1.10
Intercept	1.384231	+/-30



SO2 Calibration Plot Date: June 16, 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:	June 26, 2023	Last Cal Date:	May 10, 2023
Start time (MST):	9:55	End time (MST):	14:55
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:	1.002951	1.003525	Backgd or Offset:	2.29	2.33
Calibration intercept:	-0.222144	-0.042085	Coeff or Slope:	0.876	0.885

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4925	75.5	79.3	79.6	0.995
as found 2nd point	4962	37.7	39.6	39.4	1.002
as found 3rd point	4981	18.9	19.8	19.5	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	4925	75.5	79.3	79.5	0.998
second point	4962	37.7	39.6	39.9	0.993
third point	4981	18.9	19.9	19.7	1.008
as left zero	5000	0.0	0.0	0.1	----
as left span	4925	75.5	79.3	79.3	1.000
SO2 Scrubber Check	4921	79.2	800.2	0.0	----
Date of last scrubber change:		25-Feb-22		Ave Corr Factor	0.999
Date of last converter efficiency test:		April 22, 2022		92.6%	efficiency

Baseline Corr As found:	79.7	Prev response:	79.28	*% change:	0.5%
Baseline Corr 2nd AF pt:	39.5	AF Slope:	1.006555	AF Intercept:	-0.302251
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999970		

* = > +/-5% change initiates investigation

Notes: Scrubber check passed. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

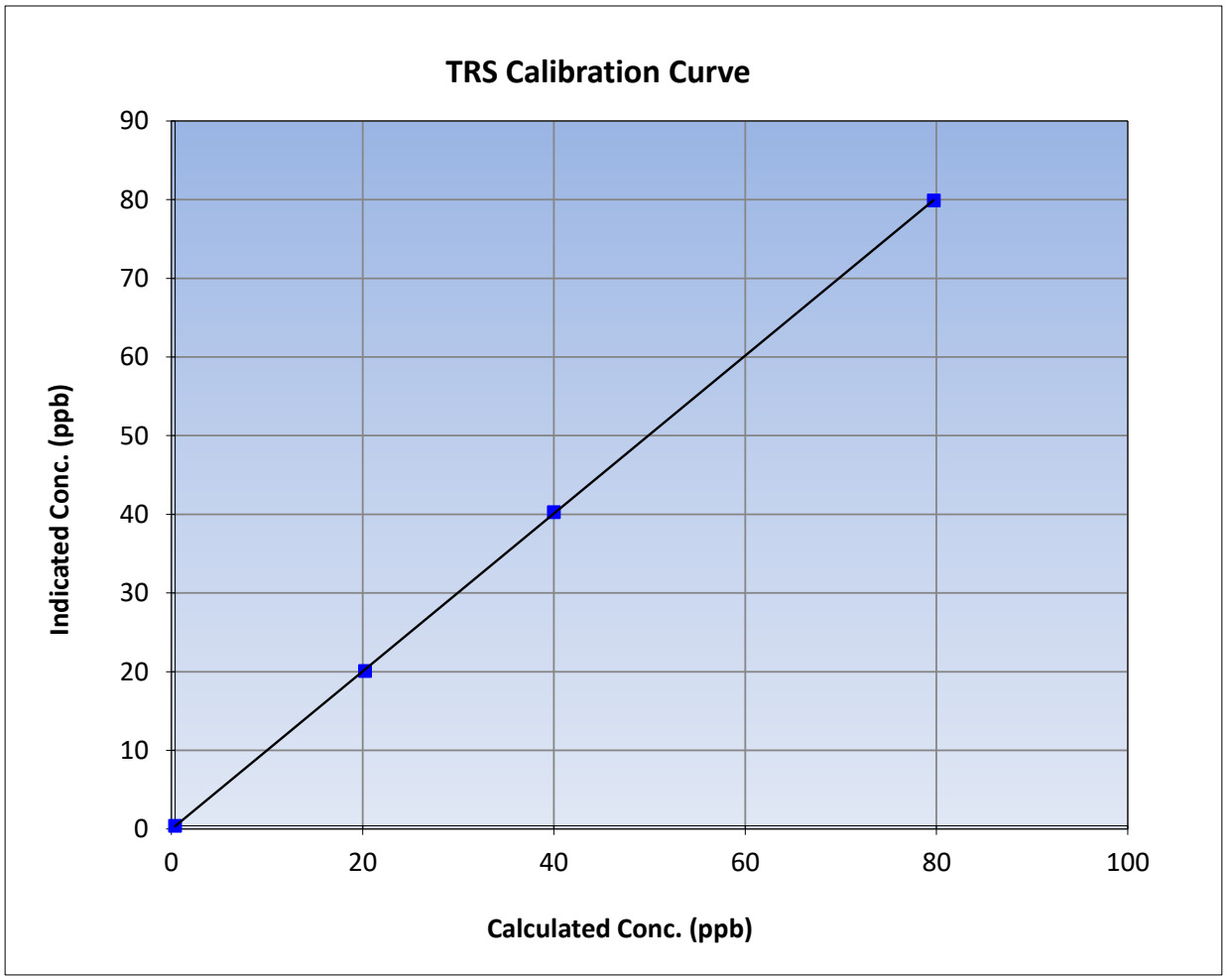
Station Information

Calibration Date:	June 26, 2023	Previous Calibration:	May 10, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:55	End Time (MST):	14:55
Analyzer make:	CDN-101	Analyzer serial #:	551

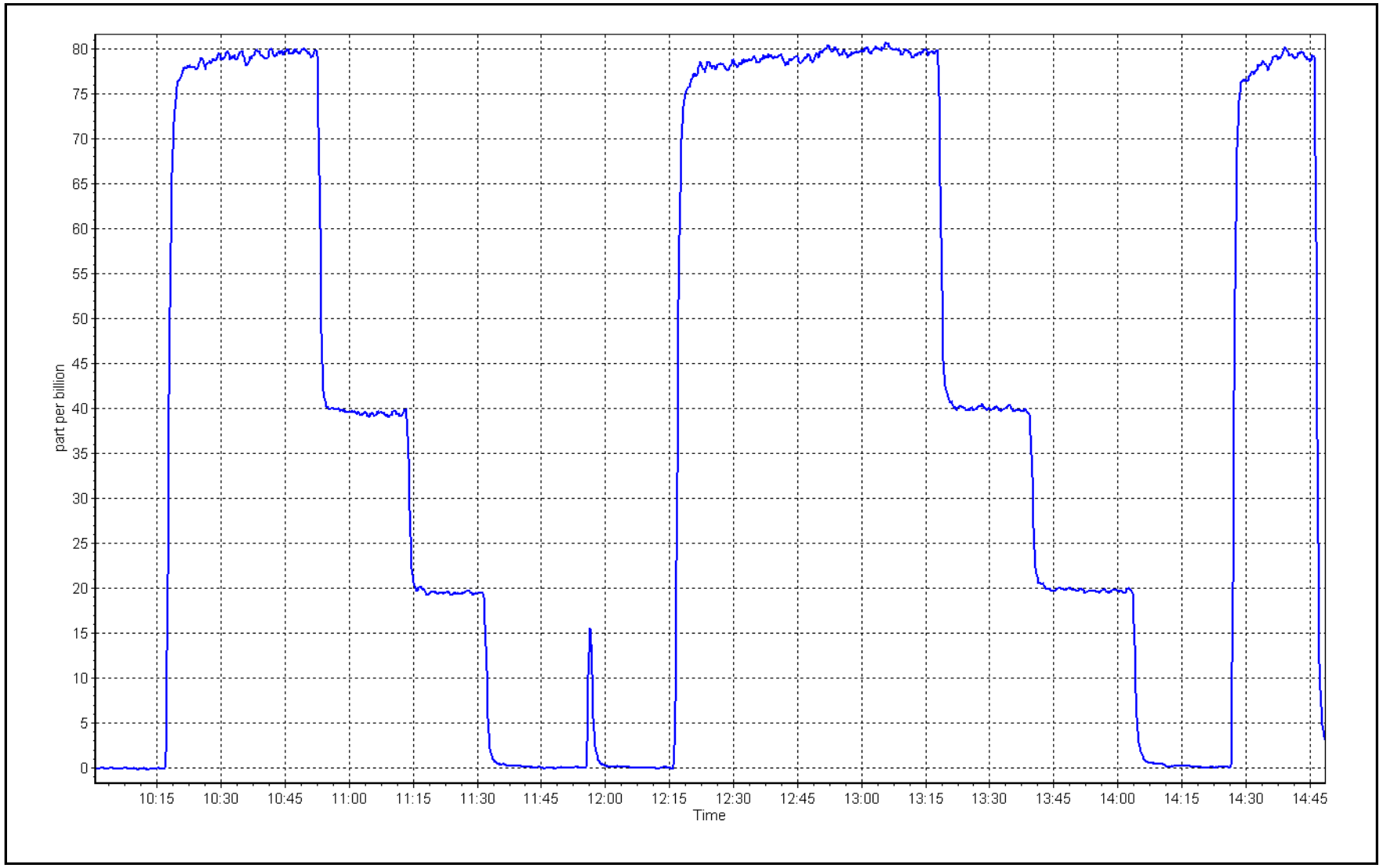
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
79.3	79.5	0.9976
39.6	39.9	0.9927
19.9	19.7	1.0080

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999978	*≥0.995*
Slope	1.003525	*0.90 - 1.10*
Intercept	-0.042085	*+/-3*



TRS Calibration Plot Date: June 26, 2023 Location: Athabasca Valley



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	June 16, 2023	Last Cal Date:	May 15, 2023
Start time (MST):	9:05	End time (MST):	12:38
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1317958219	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	0.000280	0.000288	NMHC SP Ratio:	4.75E-05	5.28E-05
CH4 Retention time:	13.8	14.0	NMHC Peak Area:	191368	172128

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.3	17.05	16.00	1.066
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.3	17.05	17.12	0.996
second point	4960	39.6	8.52	8.53	0.998
third point	4980	19.8	4.26	4.33	0.983
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	17.12	0.995
				Average Correction Factor	0.992
Baseline Corr AF:	16.00	Prev response	17.05	*% change	-6.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4921	79.3	9.10	8.25	1.103
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.3	9.10	9.18	0.991
second point	4960	39.6	4.55	4.55	0.999
third point	4980	19.8	2.27	2.34	0.972
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	9.09	9.14	0.994
				Average Correction Factor	0.987
Baseline Corr AF:	8.25	Prev response	9.12	*% change	-10.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.3	7.95	7.75	1.026
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.3	7.95	7.94	1.001
second point	4960	39.6	3.97	3.98	0.998
third point	4980	19.8	1.98	1.99	0.995
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.94	7.97	0.996
				Average Correction Factor	0.998
Baseline Corr AF:	7.75	Prev response	7.93	*% change	-2.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999351	1.002897
THC Cal Offset:	0.013892	0.018700
CH4 Cal Slope:	0.998818	0.998369
CH4 Cal Offset:	-0.004193	0.007616
NMHC Cal Slope:	1.000193	1.006726
NMHC Cal Offset:	0.014085	0.011084

Notes: NM channel was 11% low. No maintenance done today, adjusted span. Will monitor.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

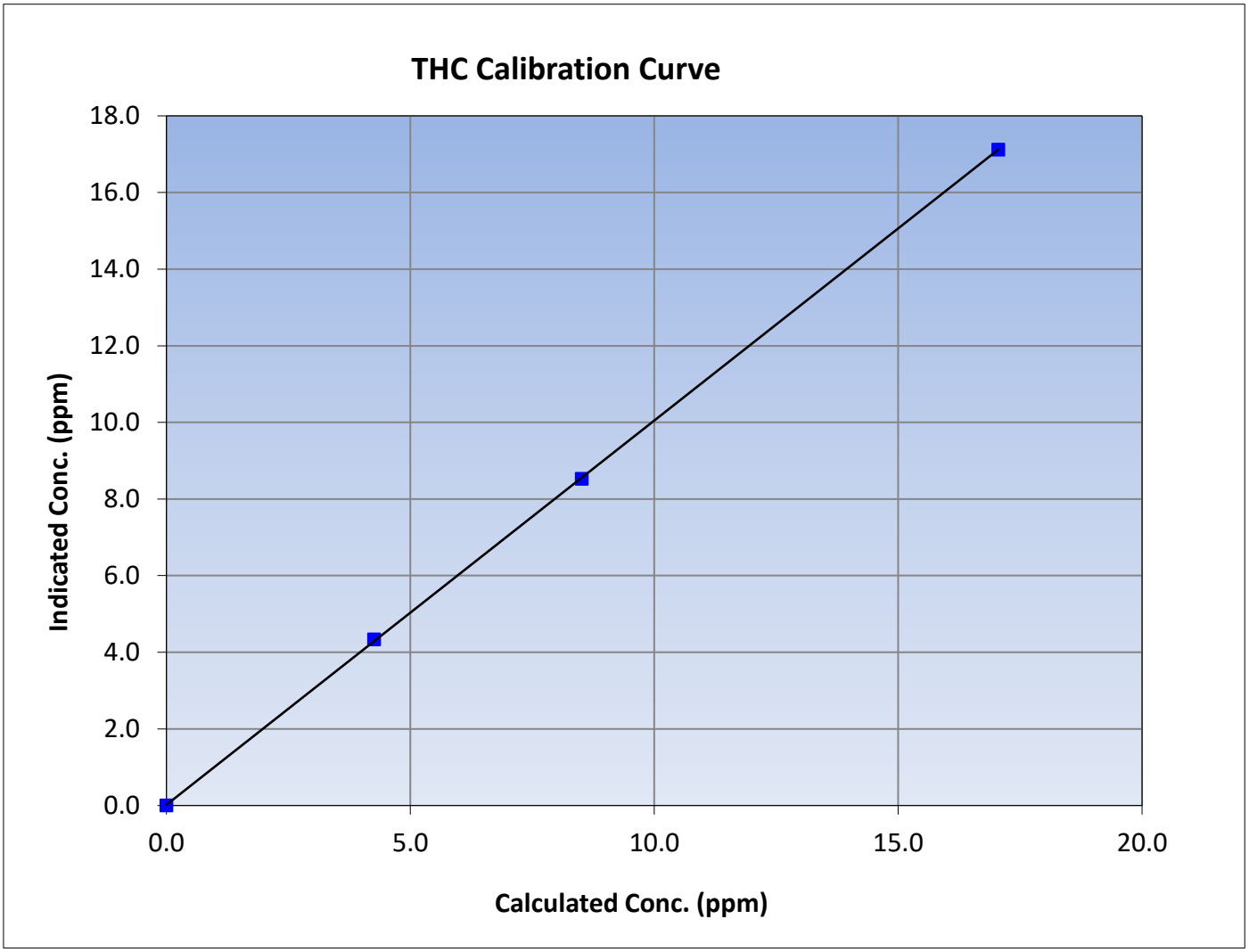
Version-01-2020

Station Information

Calibration Date:	June 16, 2023	Previous Calibration:	May 15, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:05	End Time (MST):	12:38
Analyzer make:	Thermo 55i	Analyzer serial #:	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999980	≥0.995
17.05	17.12	0.9958			
8.52	8.53	0.9983	Slope	1.002897	0.90 - 1.10
4.26	4.33	0.9826			
			Intercept	0.018700	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

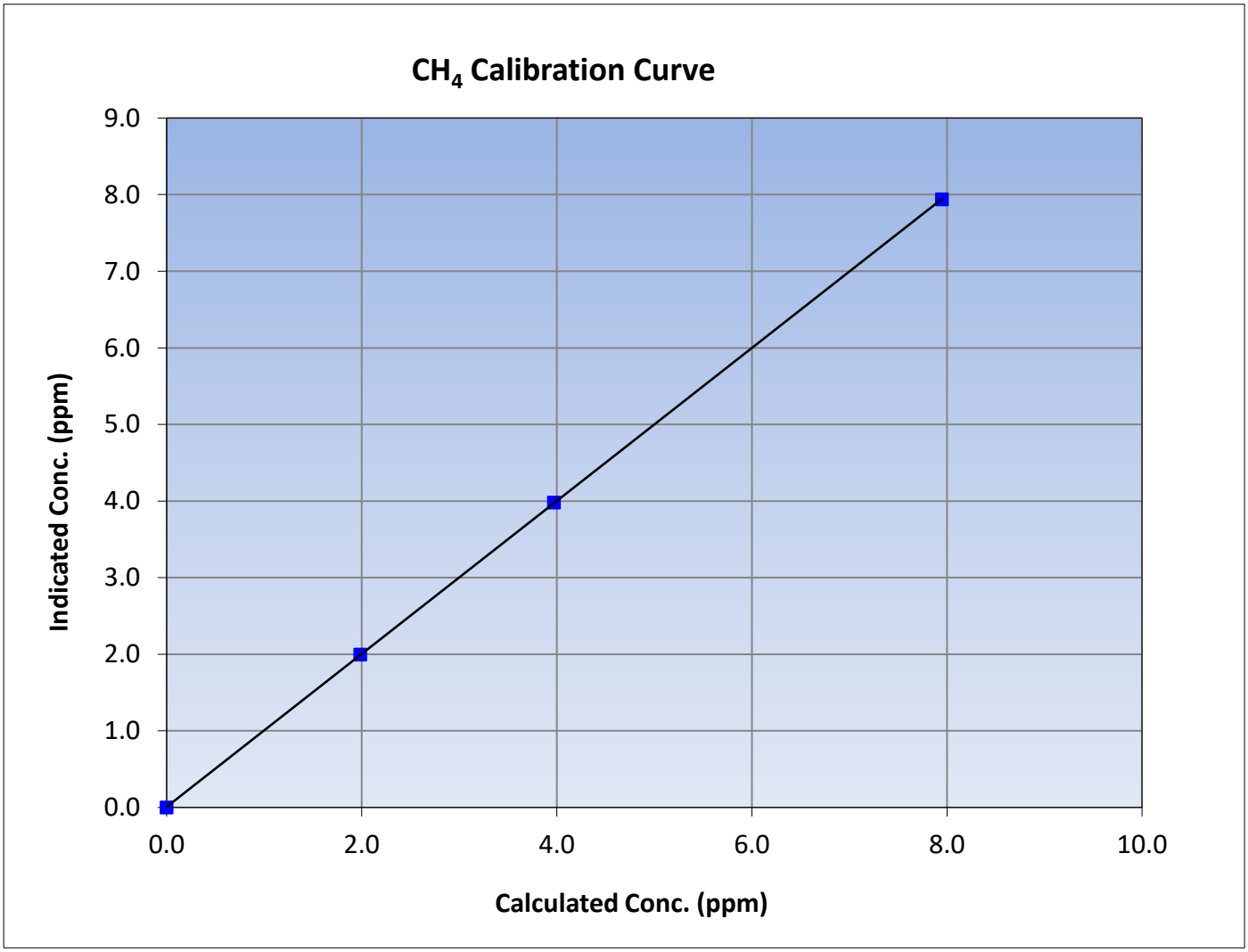
Version-01-2020

Station Information

Calibration Date:	June 16, 2023	Previous Calibration:	May 15, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:05	End Time (MST):	12:38
Analyzer make:	Thermo 55i	Analyzer serial #:	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999995	*≥0.995*
7.95	7.94	1.0013			
3.97	3.98	0.9977	Slope	0.998369	*0.90 - 1.10*
1.98	1.99	0.9954			
			Intercept	0.007616	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

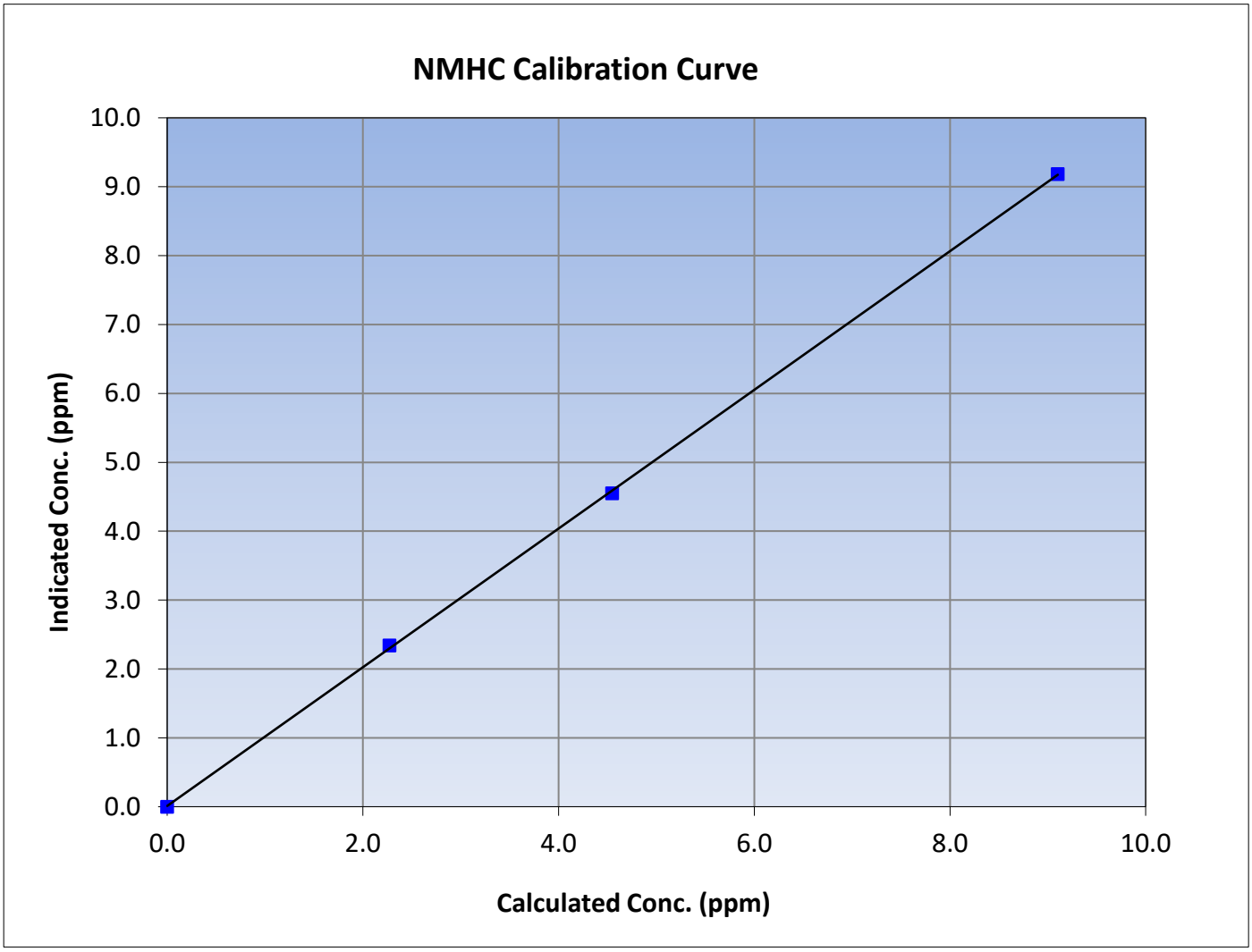
Version-01-2020

Station Information

Calibration Date:	June 16, 2023	Previous Calibration:	May 15, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:05	End Time (MST):	12:38
Analyzer make:	Thermo 55i	Analyzer serial #:	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999931	*≥0.995*
9.10	9.18	0.9912			
4.55	4.55	0.9991	Slope	1.006726	*0.90 - 1.10*
2.27	2.34	0.9717			
			Intercept	0.011084	*+/-0.5*



NMHC Calibration Plot Date: June 16, 2023 Location: Athabasca Valley

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Athabasca Valley	Station number:	AMS07
Calibration Date:	June 28, 2023	Last Cal Date:	June 16, 2023
Start time (MST):	10:48	End time (MST):	16:13
Reason:	Maintenance	Investigation to NM sensitivity drop observed in daily spans	

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1317958219	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	0.000280	0.000288	NMHC SP Ratio:	4.75E-05	5.28E-05
CH4 Retention time:	13.8	14.0	NMHC Peak Area:	191368	172128

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	16.21	1.051
as found 2nd point	4960	39.6	8.52	8.19	1.040
as found 3rd point	4980	19.8	4.26	4.03	1.056
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	17.03	16.93	1.006
second point	4960	39.6	8.52	8.45	1.008
third point	4980	19.8	4.26	4.23	1.008
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	16.88	1.009
				Average Correction Factor	1.007
Baseline Corr AF:	16.21	Prev response	17.10	*% change	-5.5%
Baseline Corr 2nd AF:	8.2	AF Slope:	0.952684	AF Intercept:	0.008873
Baseline Corr 3rd AF:	4.0	AF Correlation:	0.999956	* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4921	79.2	9.09	8.41	1.081
as found 2nd point	4960	39.6	4.55	4.29	1.060
as found 3rd point	4980	19.8	2.27	2.07	1.097
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	9.09	8.98	1.012
second point	4960	39.6	4.55	4.47	1.017
third point	4980	19.8	2.27	2.24	1.016
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	9.09	8.91	1.020
				Average Correction Factor	1.015
Baseline Corr AF:	8.41	Prev response	9.16	*% change	-9.0%
Baseline Corr 2nd AF:	4.3	AF Slope:	0.927375	AF Intercept:	0.004029
Baseline Corr 3rd AF:	2.1	AF Correlation:	0.999818	* = > +/-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	7.80	1.018
as found 2nd point	4960	39.6	3.97	3.90	1.018
as found 3rd point	4980	19.8	1.98	1.96	1.013
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	3.98	0.998
third point	4980	19.8	1.98	1.99	0.998
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.94	7.96	0.997
				Average Correction Factor	0.999
Baseline Corr AF:	7.80	Prev response	7.93	*% change	-1.7%
Baseline Corr 2nd AF:	3.90	AF Slope:	0.981968	AF Intercept:	0.004044
Baseline Corr 3rd AF:	1.96	AF Correlation:	0.999998	* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.002897	0.993911
THC Cal Offset:	0.018700	-0.005538
CH4 Cal Slope:	0.998369	1.000237
CH4 Cal Offset:	0.007616	0.002841
NMHC Cal Slope:	1.006726	0.988285
NMHC Cal Offset:	0.011084	-0.007979

Notes: Steady decline in sensitivity noted in daily spans, replaced pump. Also found the sample line worn through by vibration, replaced sample line.

Calibration Performed By: Kelly Baragar

Wood Buffalo Environmental Association

THC Calibration Summary

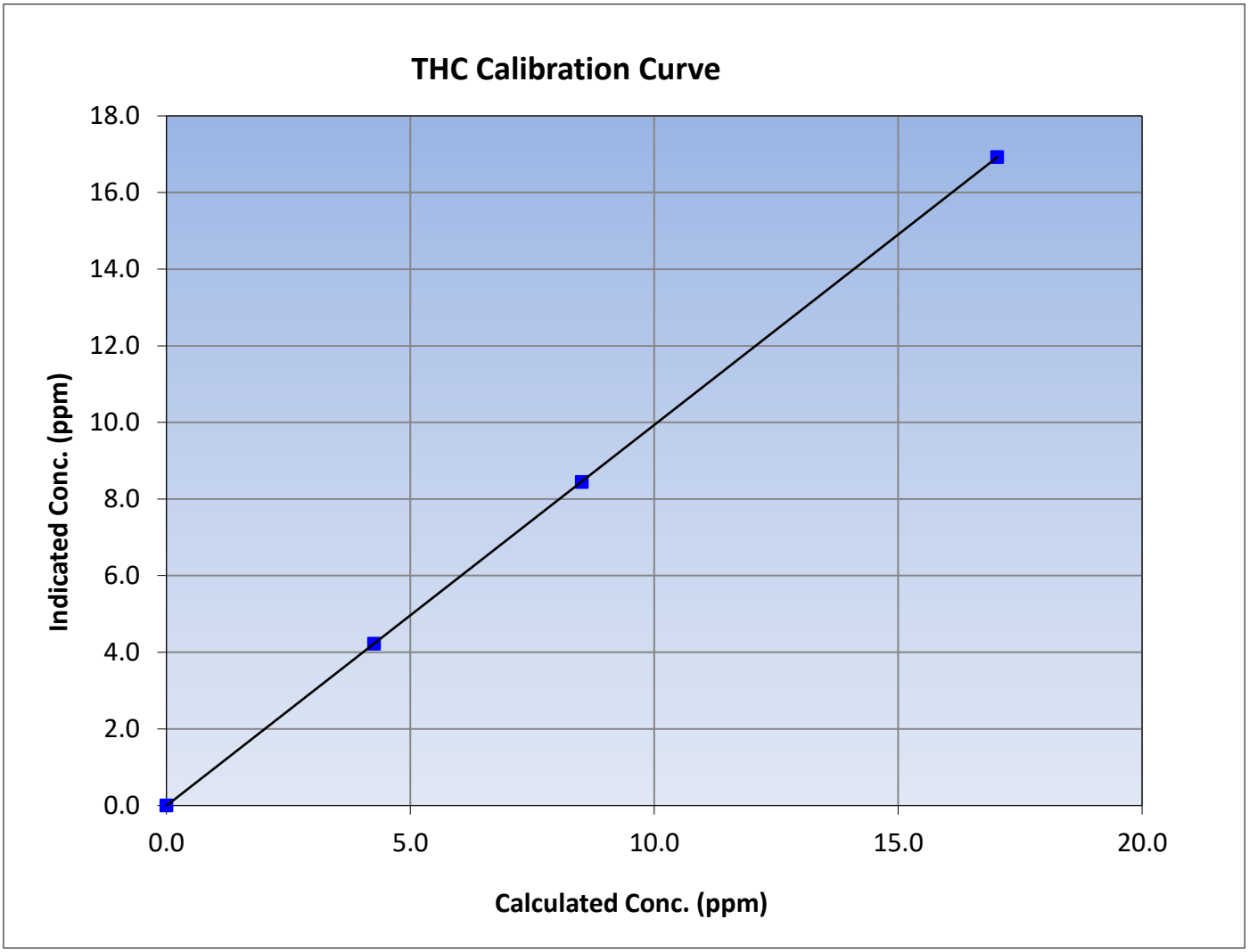
Version-01-2020

Station Information

Calibration Date:	June 28, 2023	Previous Calibration:	June 16, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:48	End Time (MST):	16:13
Analyzer make:	Thermo 55i	Analyzer serial #:	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999999	≥0.995
17.03	16.93	1.0062			
8.52	8.45	1.0079	Slope	0.993911	0.90 - 1.10
4.26	4.23	1.0077			
			Intercept	-0.005538	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

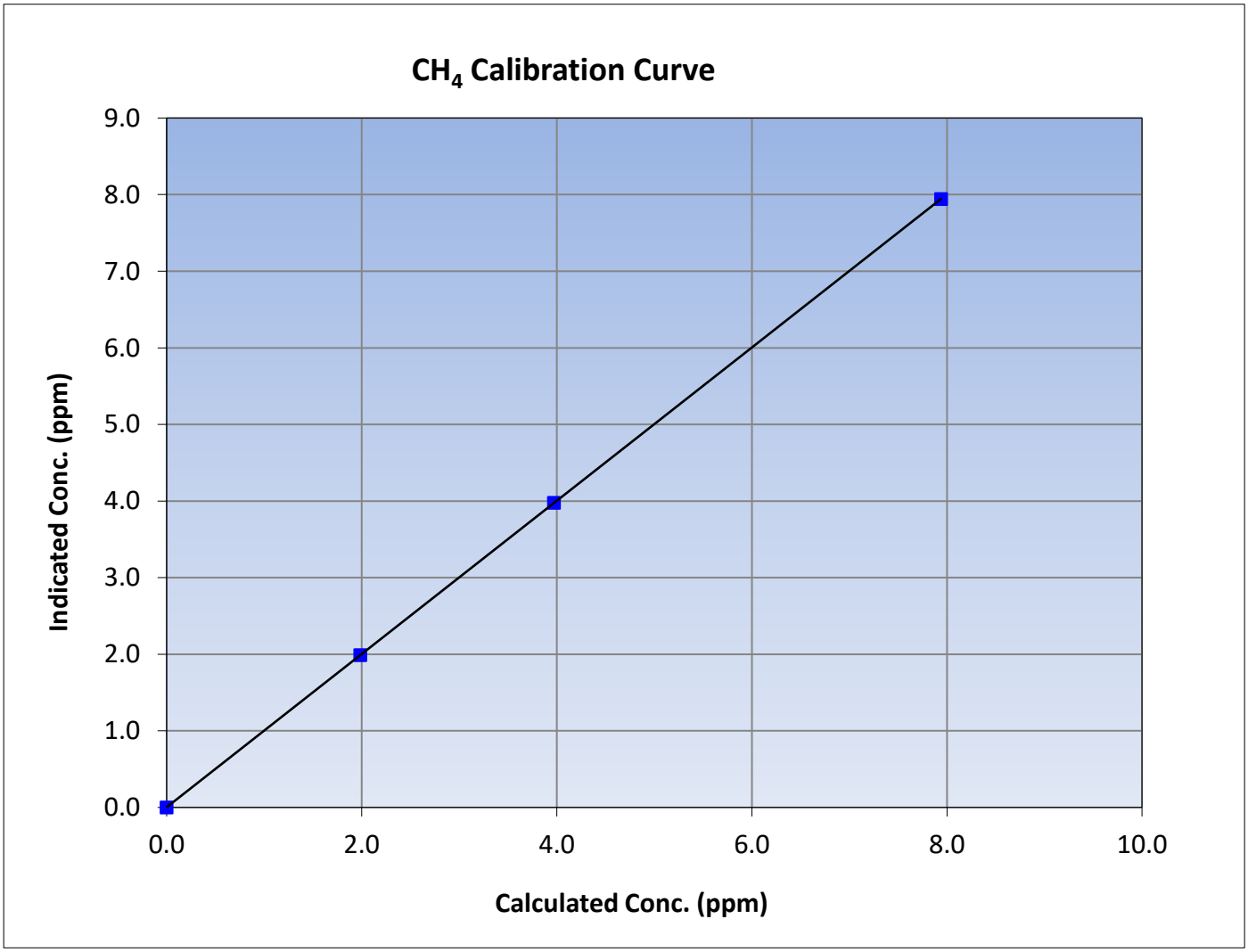
Version-01-2020

Station Information

Calibration Date:	June 28, 2023	Previous Calibration:	June 16, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:48	End Time (MST):	16:13
Analyzer make:	Thermo 55i	Analyzer serial #:	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999999	≥0.995
7.94	7.94	0.9997			
3.97	3.98	0.9979	Slope	1.000237	0.90 - 1.10
1.98	1.99	0.9979			
			Intercept	0.002841	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

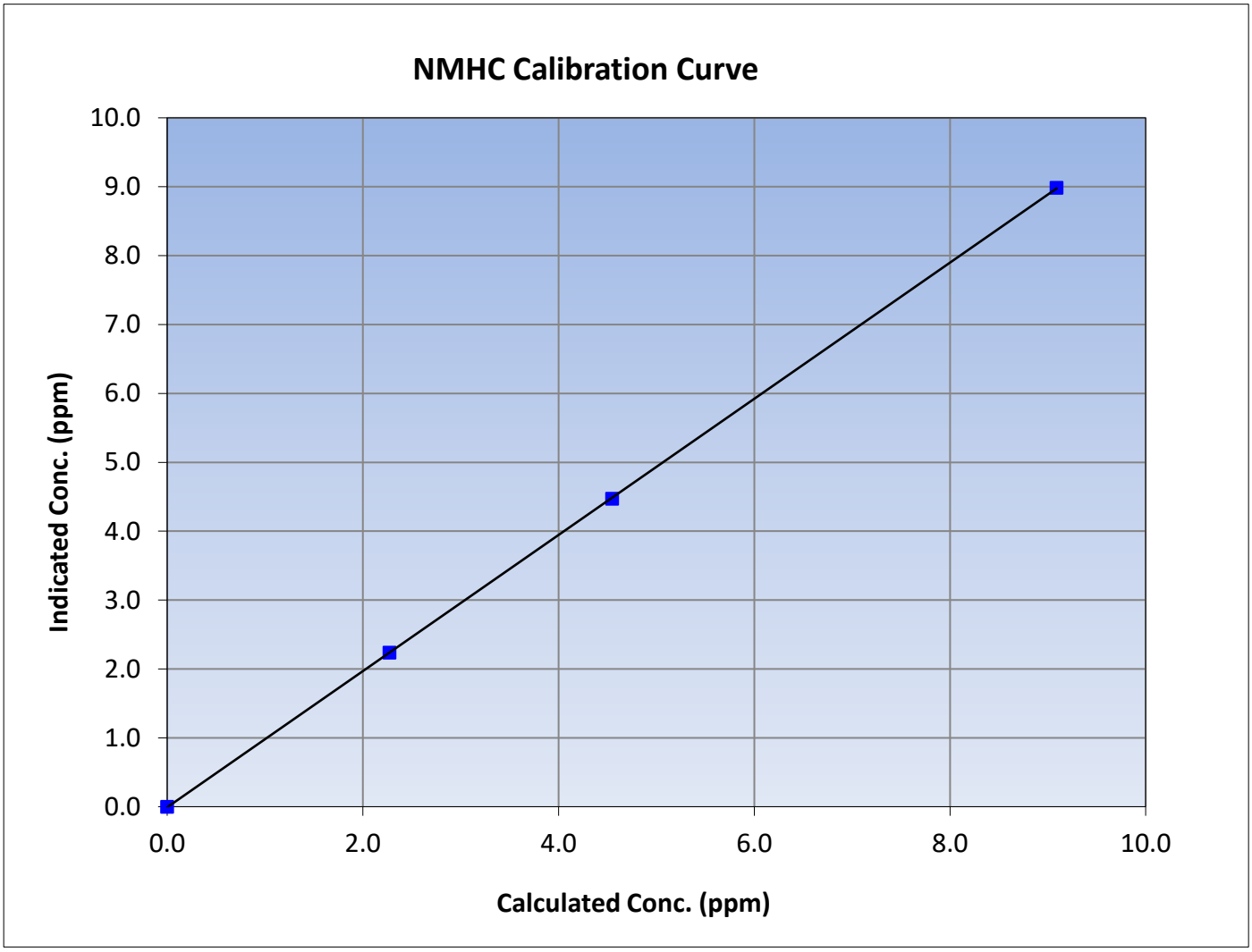
Version-01-2020

Station Information

Calibration Date:	June 28, 2023	Previous Calibration:	June 16, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	10:48	End Time (MST):	16:13
Analyzer make:	Thermo 55i	Analyzer serial #:	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999994	*≥0.995*
9.09	8.98	1.0120			
4.55	4.47	1.0165	Slope	0.988285	*0.90 - 1.10*
2.27	2.24	1.0165			
			Intercept	-0.007979	*+/-0.5*



NMHC Calibration Plot Date: June 28, 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:	June 12, 2023	Last Cal Date:	May 8, 2023
Start time (MST):	9:13	End time (MST):	14:18
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2Y1KA4		Cal Gas Expiry Date:	November 30, 2023	
NOX Cal Gas Conc:	50.92	ppm	NO Cal Gas Conc:	49.92	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	50.92	ppm	Removed Gas NO Conc:	49.92	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3805	
ZAG make/model:	API T701H		Serial Number:	198	

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.048	1.048	NO bkgnd or offset:	7.3	7.3
NOX coeff or slope:	0.995	0.995	NOX bkgnd or offset:	7.5	7.5
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	201.6	201.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.991417	0.997768
NO_X Cal Offset:	1.497144	1.378516
NO Cal Slope:	0.991499	0.998277
NO Cal Offset:	0.973228	0.974621
NO_2 Cal Slope:	1.004055	1.001546
NO_2 Cal Offset:	0.235209	0.752238

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.3	0.1	0.2	----	----
as found span	4920	80.2	816.7	800.7	16.0	818.6	800.3	18.2	0.9977	1.0005
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.1	----	----
high point	4920	80.2	816.7	800.7	16.0	815.3	799.5	15.8	1.0017	1.0015
second point	4960	40.1	408.4	400.4	8.0	410.6	402.1	8.6	0.9946	0.9956
third point	4980	20.0	203.7	199.7	4.0	205.0	200.5	4.4	0.9936	0.9959
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.1	----	----
as left span	4920	80.2	816.7	395.1	421.6	821.0	395.9	424.7	0.9948	0.9979
								Average Correction Factor	0.9966	0.9977

Corrected As found	NO_X = 818.3 ppb	NO = 800.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	0.9%
Previous Response	NO_X = 811.2 ppb	NO = 794.9 ppb		*Percent Change	NO =	0.7%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found NO r^2:	NO Sl:	NO Int:	
			As found NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.6	392.0	421.6	422.6	0.9977	100.2%
2nd GPT point (200 ppb O3)	797.6	594.7	218.9	220.6	0.9925	100.8%
3rd GPT point (100 ppb O3)	797.6	695.4	118.2	119.7	0.9878	101.2%
				Average Correction Factor	0.9927	100.7%

Notes: No maintenance or adjustments done.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

NO_X Calibration Summary

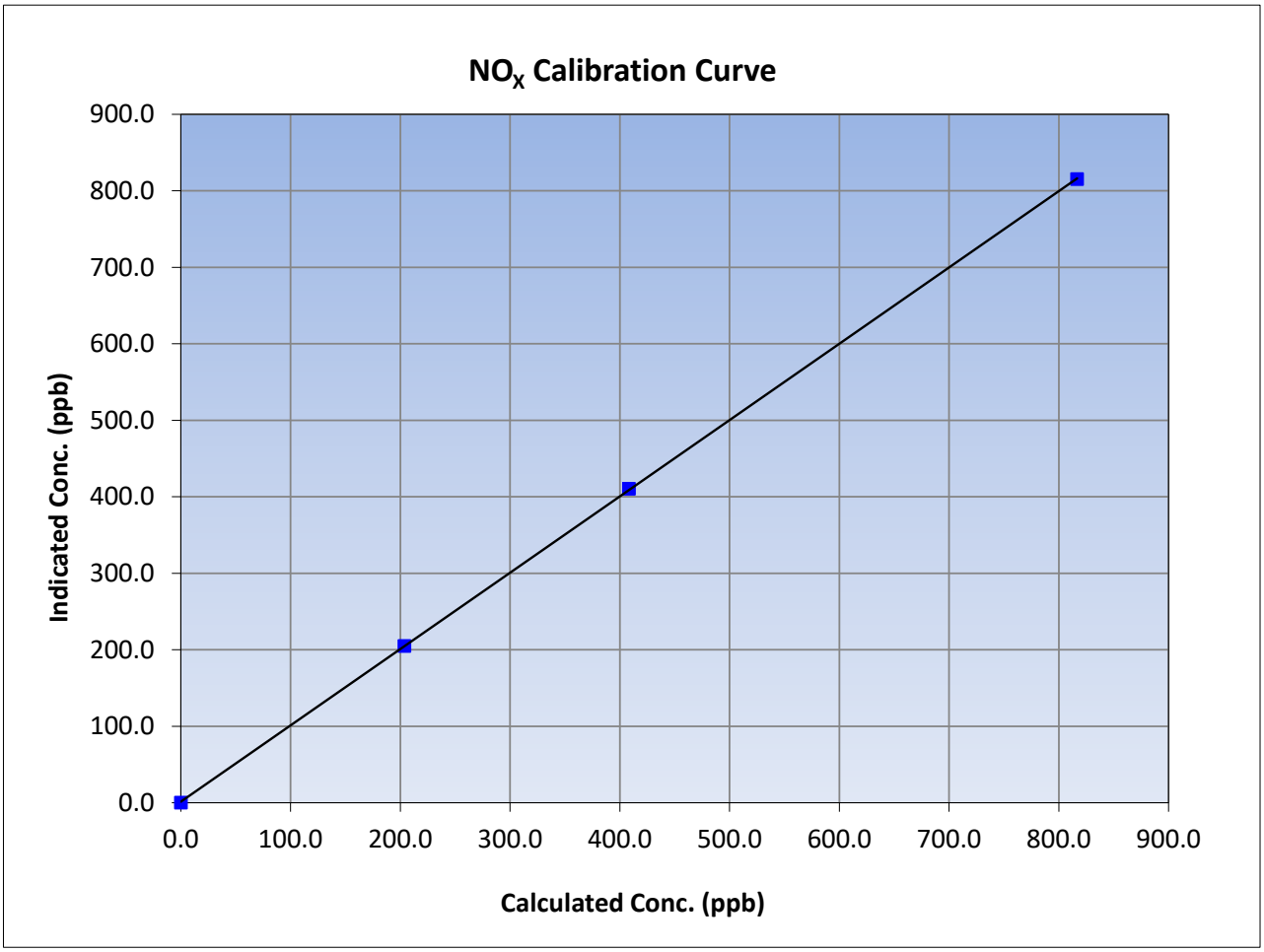
Version-04-2020

Station Information

Calibration Date:	June 12, 2023	Previous Calibration:	May 8, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:13	End Time (MST):	14:18
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.2	----	Correlation Coefficient	0.999985	*≥0.995*
816.7	815.3	1.0017			
408.4	410.6	0.9946	Slope	0.997768	*0.90 - 1.10*
203.7	205.0	0.9936			
			Intercept	1.378516	*+/-20*



Wood Buffalo Environmental Association

NO Calibration Summary

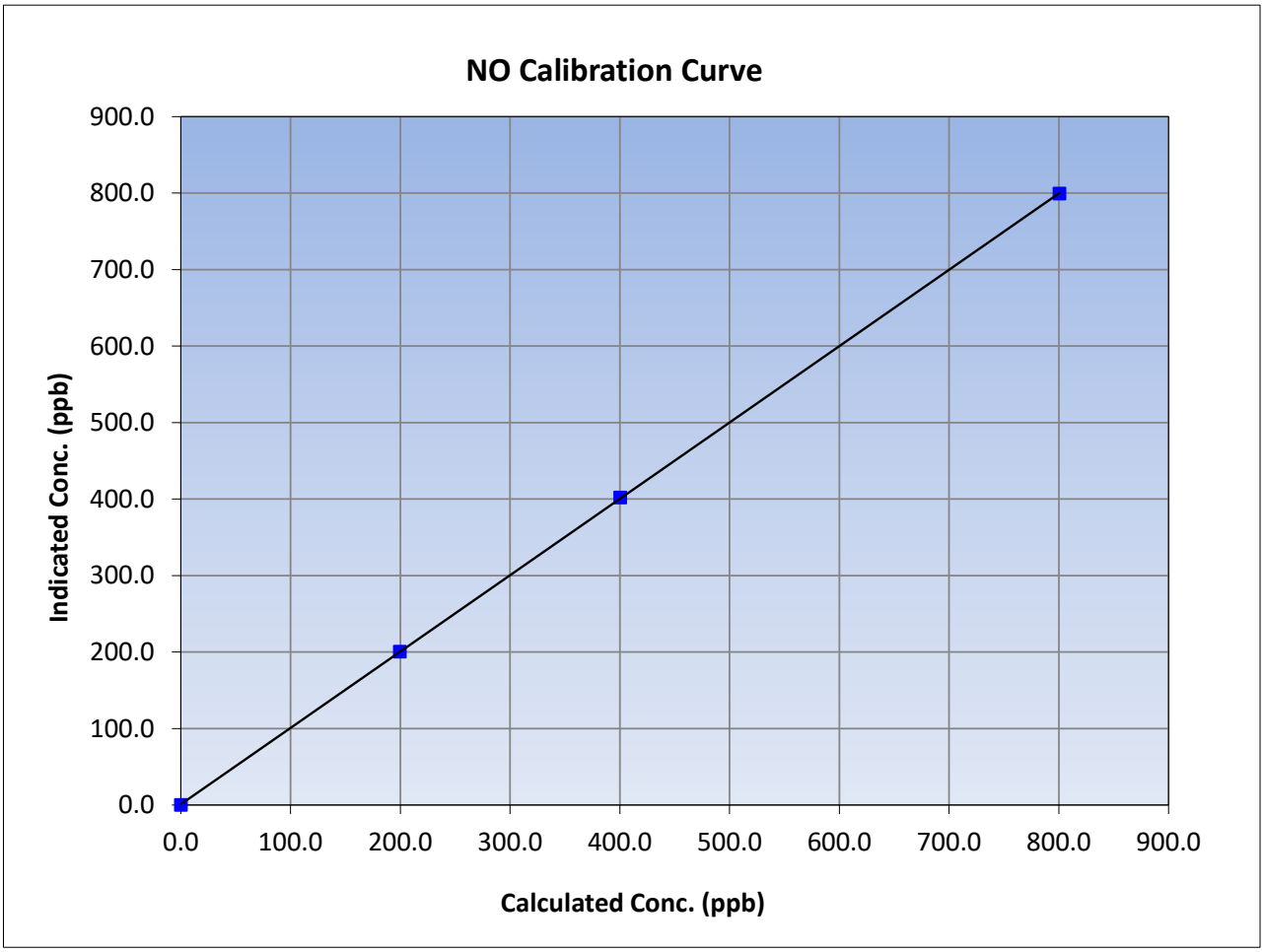
Version-04-2020

Station Information

Calibration Date:	June 12, 2023	Previous Calibration:	May 8, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:13	End Time (MST):	14:18
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999990	≥0.995
800.7	799.5	1.0015			
400.4	402.1	0.9956	Slope	0.998277	0.90 - 1.10
199.7	200.5	0.9959			
			Intercept	0.974621	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

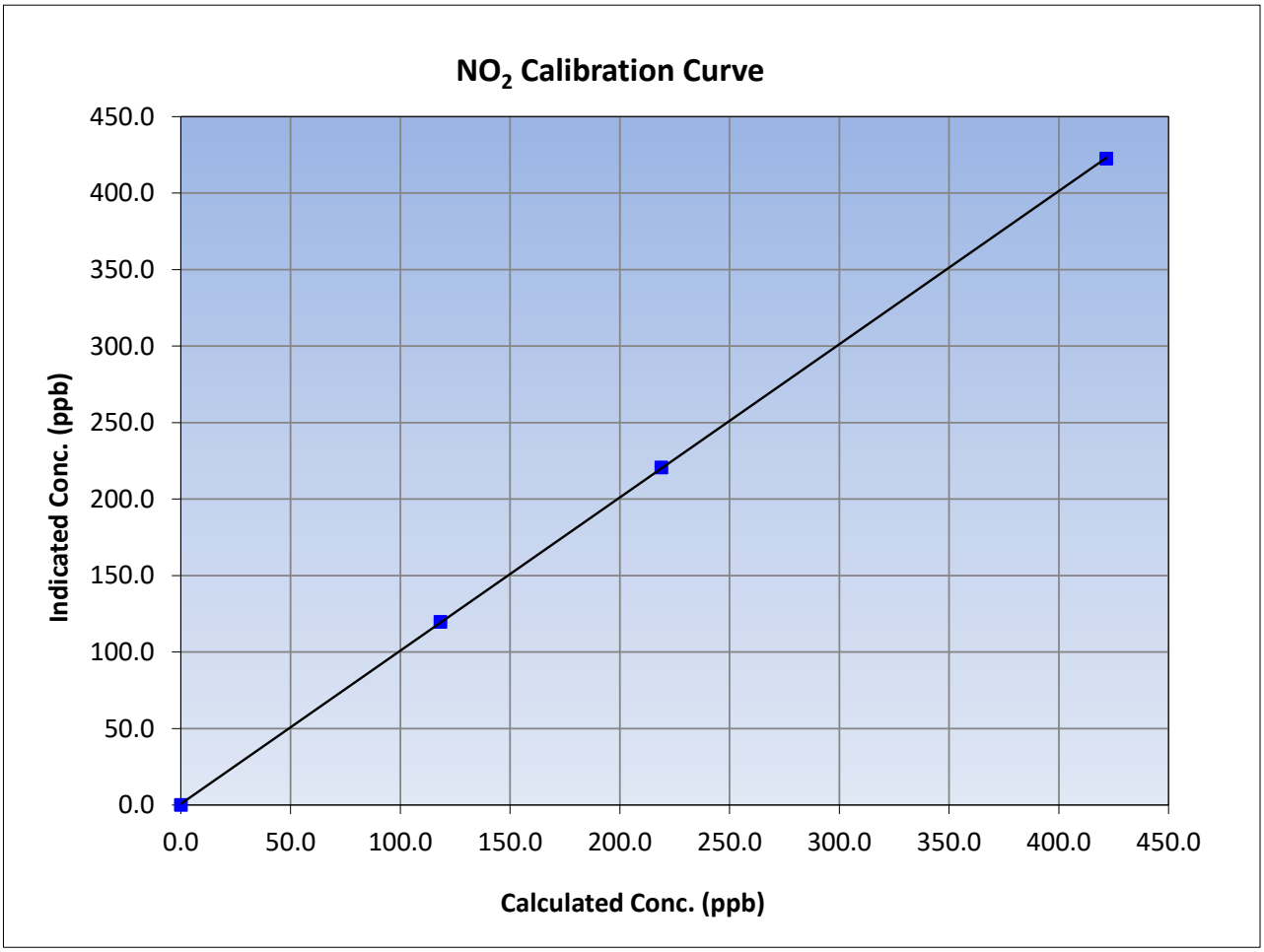
Version-04-2020

Station Information

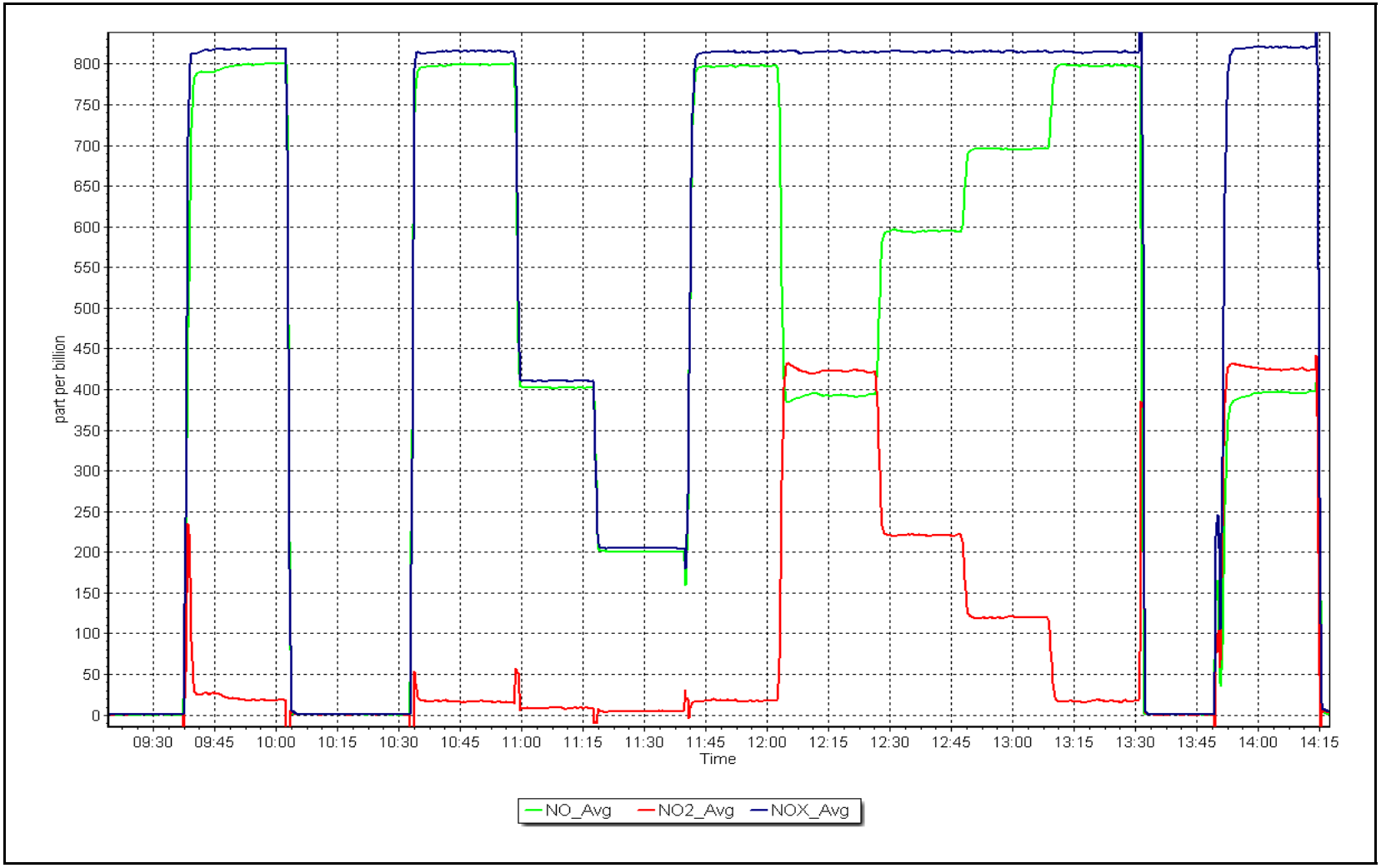
Calibration Date:	June 12, 2023	Previous Calibration:	May 8, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:13	End Time (MST):	14:18
Analyzer make:	Thermo 42i	Analyzer serial #:	1160120024

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999987	≥0.995
421.6	422.6	0.9977			
218.9	220.6	0.9925	Slope	1.001546	0.90 - 1.10
118.2	119.7	0.9878			
			Intercept	0.752238	+/-20



NO_X Calibration Plot Date: June 12, 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:	June 6, 2023	Last Cal Date:	May 3, 2023
Start time (MST):	7:48	End time (MST):	12:17
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000257	0.999971	Backgd or Offset:	-1.3	-3.5
Calibration intercept:	1.380000	0.480000	Coeff or Slope:	1.502	1.504

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	-3.0	----
as found span	5000	1414.8	400.0	393.3	1.017
as found 2nd point	5000	1038.6	200.0	197.0	1.015
as found 3rd point	5000	855.5	100.0	98.4	1.016
calibrator zero	5000	0.0	0.0	0.5	----
high point	5000	1415.7	400.0	400.9	0.998
second point	5000	1039.9	200.0	199.2	1.004
third point	5000	856.2	100.0	101.3	0.987
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	1416.0	400.0	401.0	0.998
				Average Correction Factor	0.996

Baseline Corr As found:	396.3	Previous response	401.5	*% change	-1.3%
Baseline Corr 2nd AF pt:	-196.3	AF Slope:	0.989286	AF Intercept:	-1.700000
Baseline Corr 3rd AF pt:	-98.6	AF Correlation:	0.999950		

* = > +/-5% change initiates investigation

Notes: Big rain storms past 2 days. No water present in the trap of the manifold. Multi point as found was stable and linear. Filter was very dirty. Zero and Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

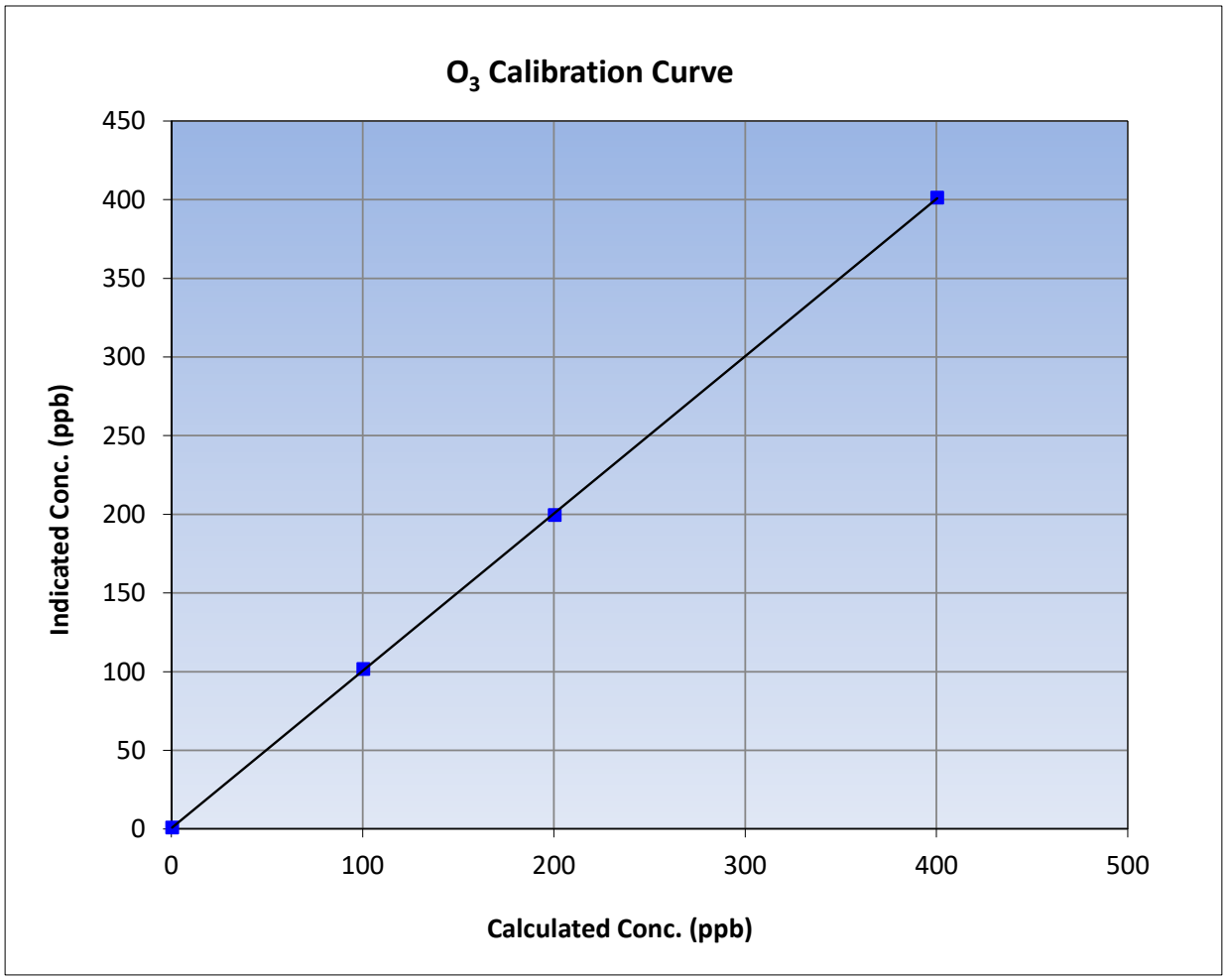
Station Information

Calibration Date:	June 6, 2023	Previous Calibration:	May 3, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:48	End Time (MST):	12:17
Analyzer make:	Thermo 49i	Analyzer serial #:	1152220023

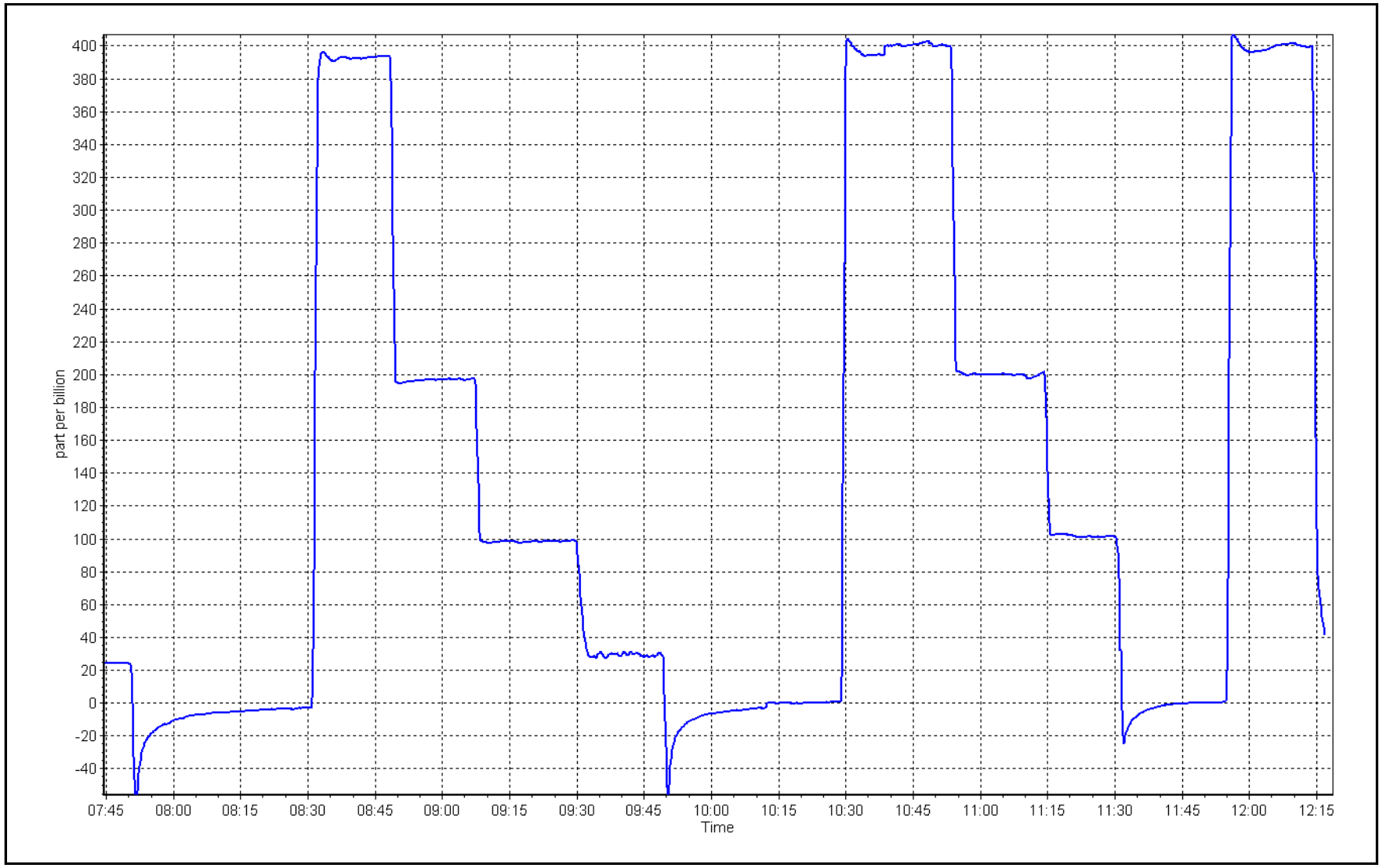
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.5	----
400.0	400.9	0.9978
200.0	199.2	1.0040
100.0	101.3	0.9872

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999972	*≥0.995*
Slope	0.999971	*0.90 - 1.10*
Intercept	0.480000	*+/- 5*



O_3 Calibration Plot Date: June 6, 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:	June 29, 2023	Last Cal Date:	May 23, 2023
Start time (MST):	11:53	End time (MST):	13:11
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)	31.6	31.3	31.6	☐	+/- 2 °C
P (mmHg)	729.5	732.43	729.5	☐	+/- 10 mmHg
flow (LPM)	4.93	4.86	4.93	☐	+/- 0.25 LPM

Leak Test: Date of check: June 29, 2023 Last Cal Date: May 23, 2023

PM w/o HEPA: 2.5 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	10.2	10.2	11	☑	10.9 +/- 0.5

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

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

Disposable Filter Changed: May 23, 2023

Annual Maintenance

Date Sample Tube Cleaned: 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:	June 29, 2023	Last Cal Date:	May 15, 2023
Start time (MST):	9:44	End time (MST):	13:04
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	0.991945	0.999915	Backgd or Offset:	3.910	4.147
Calibration intercept:	0.060555	0.018540	Coeff or Slope:	1.079	1.086

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.2	----
as found span	4933	66.7	40.0	40.2	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	0.995
third point	4983	16.7	10.0	10.0	1.000
as left zero	5000	0.0	0.0	0.0	----
as left span	4933	66.7	40.0	40.0	1.001
				Average Correction Factor	0.999

Baseline Corr As found:	40.01	Prev response:	39.76	*% change:	0.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: No Maintenance done. Zero and span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

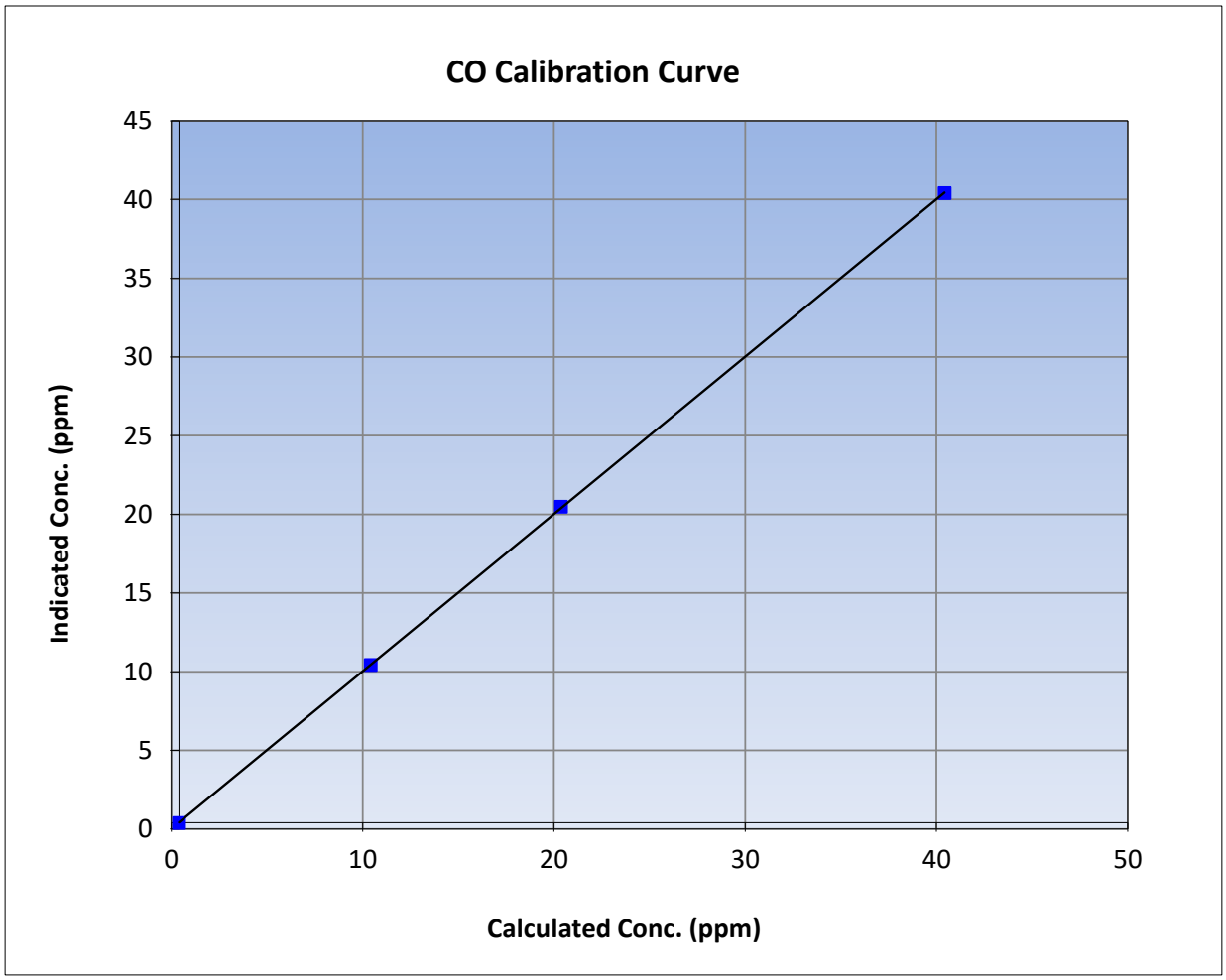
Station Information

Calibration Date:	June 29, 2023	Previous Calibration:	May 15, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	9:44	End Time (MST):	13:04
Analyzer make:	Thermo 48i-LTE	Analyzer serial #:	1408761381

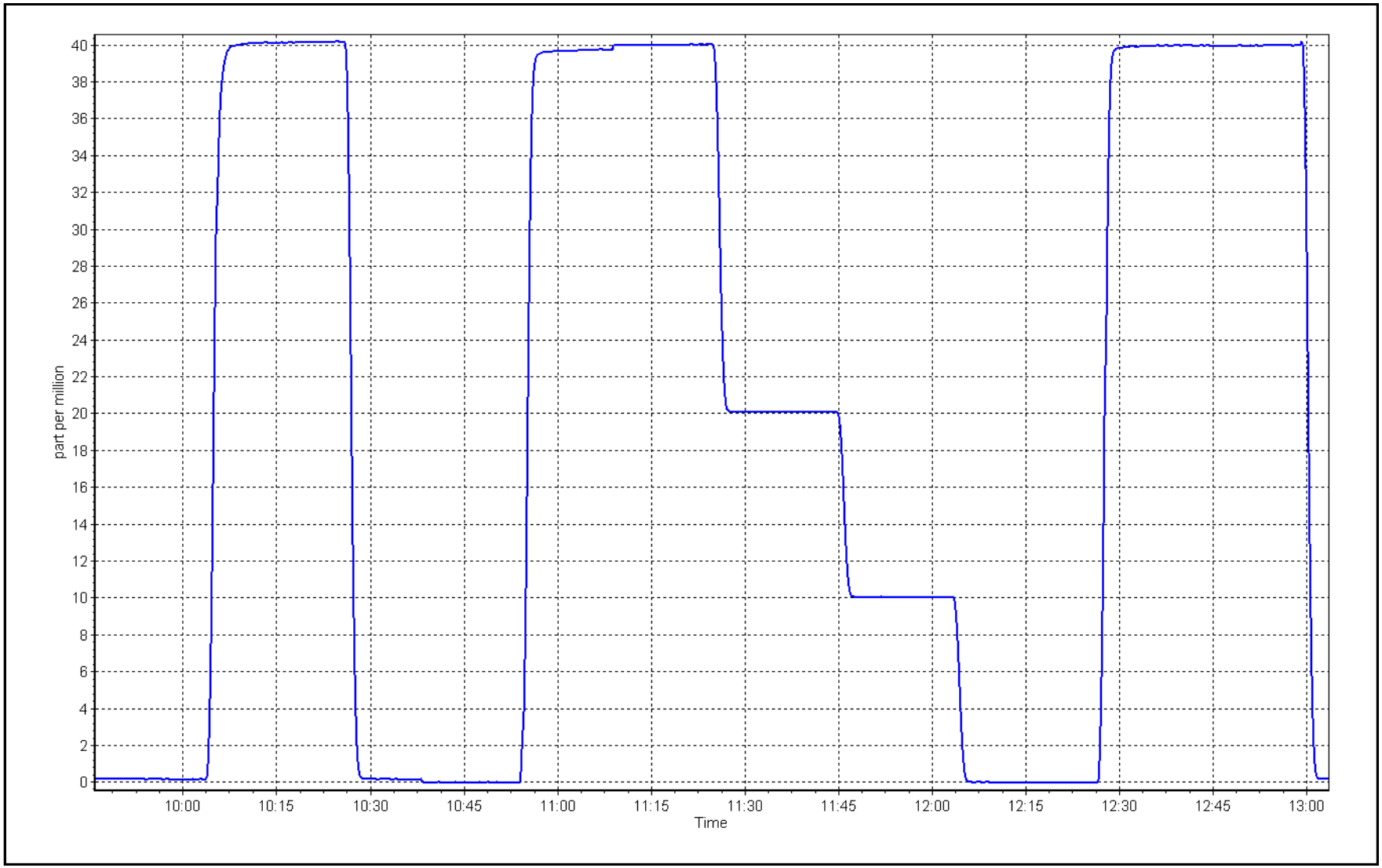
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.0	40.0	1.0006
20.0	20.1	0.9950
10.0	10.0	1.0001

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999989	*≥0.995*
Slope	0.999915	*0.90 - 1.10*
Intercept	0.018540	*+/-1.5*



CO Calibration Plot Date: June 29, 2023 Location: Athabasca Valley



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS08
FORT CHIPEWYAN
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	June 28, 2023	Last Cal Date:	May 8, 2023
Start time (MST):	5:55	End time (MST):	8:22
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999415	0.996931	Backgd or Offset:	1.50	1.60
Calibration intercept:	-1.203236	-0.082970	Coeff or Slope:	0.877	0.915

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4920	80.3	800.4	765.1	1.046
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	800.4	798.4	1.002
second point	4960	40.2	400.7	397.9	1.007
third point	4980	20.1	200.4	200.4	1.000
as left zero	5000	0.0	0.0	0.0	----
as left span	4920	80.3	800.4	803.9	0.996
				Average Correction Factor	1.003

Baseline Corr As found: 765.20 Previous response 798.71 *% change -4.4%

* = > +/-5% change initiates investigation

Notes: Remote calibration done. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

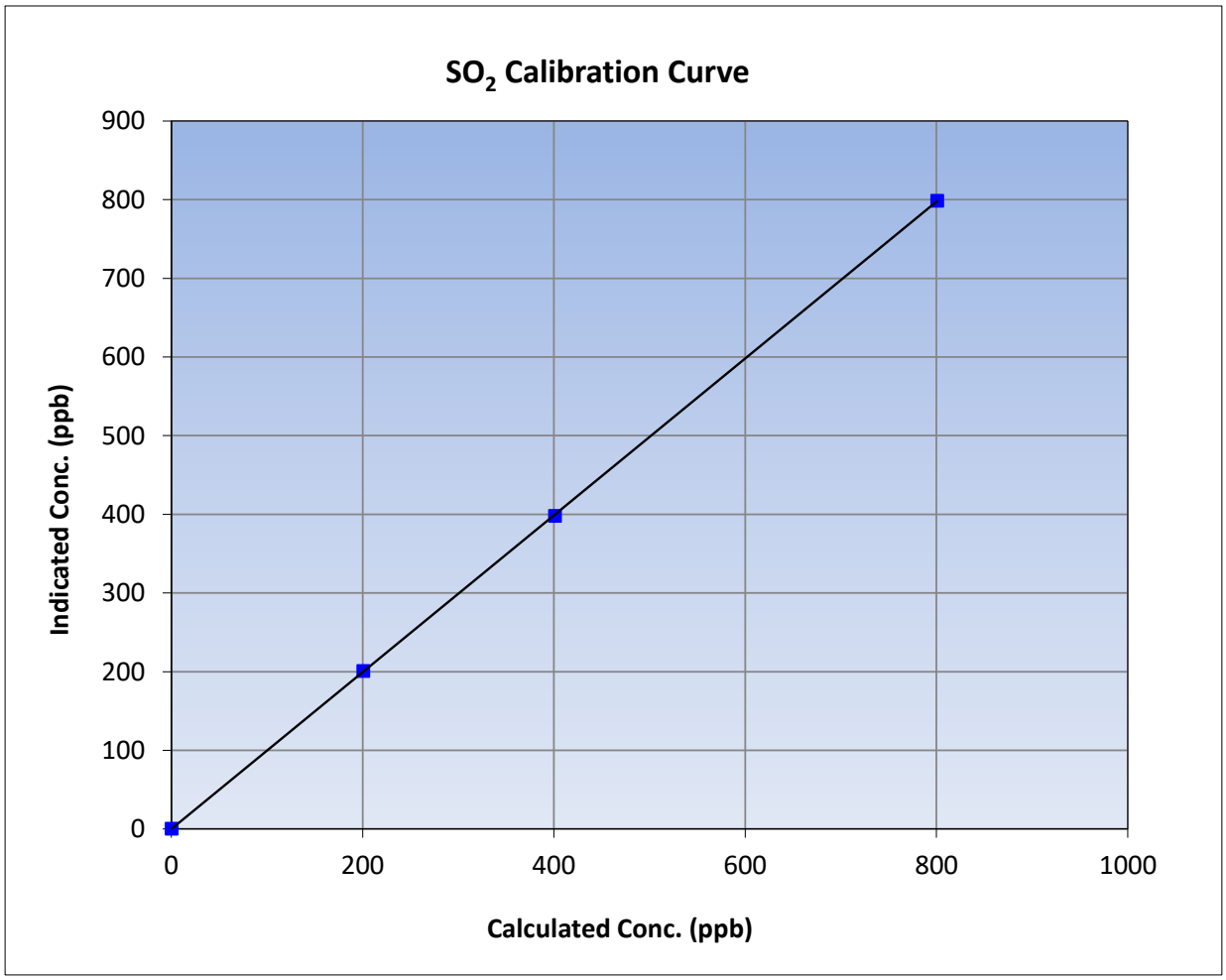
Station Information

Calibration Date:	June 28, 2023	Previous Calibration:	May 8, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	5:55	End Time (MST):	8:22
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1136451241

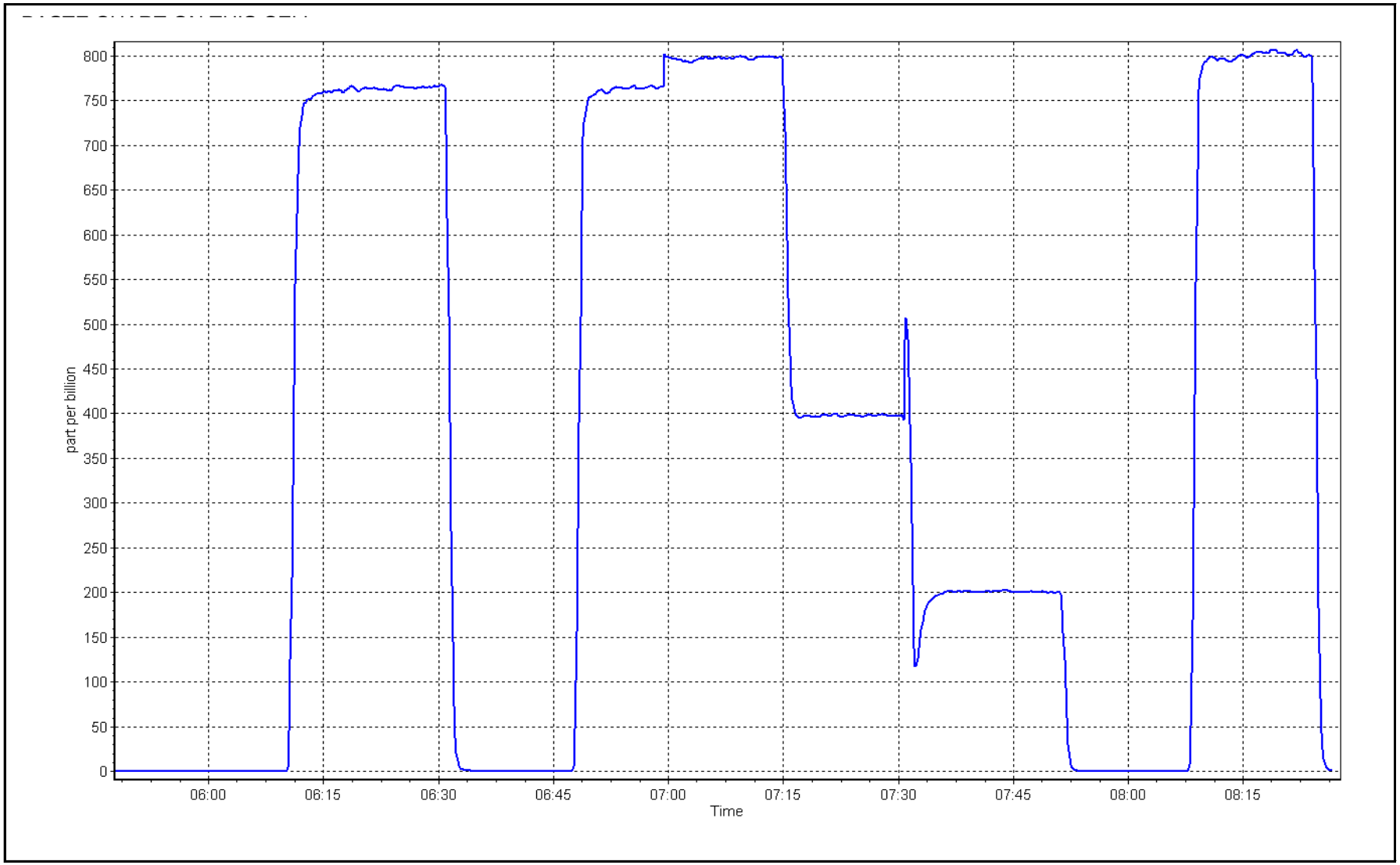
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
800.4	798.4	1.0025
400.7	397.9	1.0070
200.4	200.4	0.9998

Statistical Evaluation		Limits
Correlation Coefficient	0.999991	≥0.995
Slope	0.996931	0.90 - 1.10
Intercept	-0.082970	+/-30



SO2 Calibration Plot Date: June 28, 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:	June 29, 2023	Last Cal Date:	May 29, 2023
Start time (MST):	8:15	End time (MST):	12:25
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43iQ-TL		Analyzer serial #:	1203169744	
Converter make:	CDN-101		Converter serial #:	14639	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.976855	1.005570	Backgd or Offset:	0.93	0.94
Calibration intercept:	0.498472	0.218839	Coeff or Slope:	0.694	0.707

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.3	----
as found span	4920	80.5	80.0	78.3	1.026
as found 2nd point	4960	40.2	40.0	39.3	1.025
as found 3rd point	4980	20.1	20.0	19.6	1.035
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.3	----
high point	4920	80.5	80.0	80.7	0.991
second point	4960	40.2	40.0	40.4	0.989
third point	4980	20.1	20.0	20.2	0.989
as left zero	5000	0.0	0.0	0.4	----
as left span	4920	80.5	80.0	79.9	1.001
SO2 Scrubber Check	4919.7	80.3	803.0	0.1	----

Date of last scrubber change:	March 7, 2022	Ave Corr Factor	0.990
Date of last converter efficiency test:	March 15, 2022	100.7%	efficiency

Baseline Corr As found:	78.0	Prev response:	78.66	*% change:	-0.8%
Baseline Corr 2nd AF pt:	39.0	AF Slope:	0.975716	AF Intercept:	0.238308
Baseline Corr 3rd AF pt:	19.3	AF Correlation:	0.999992		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

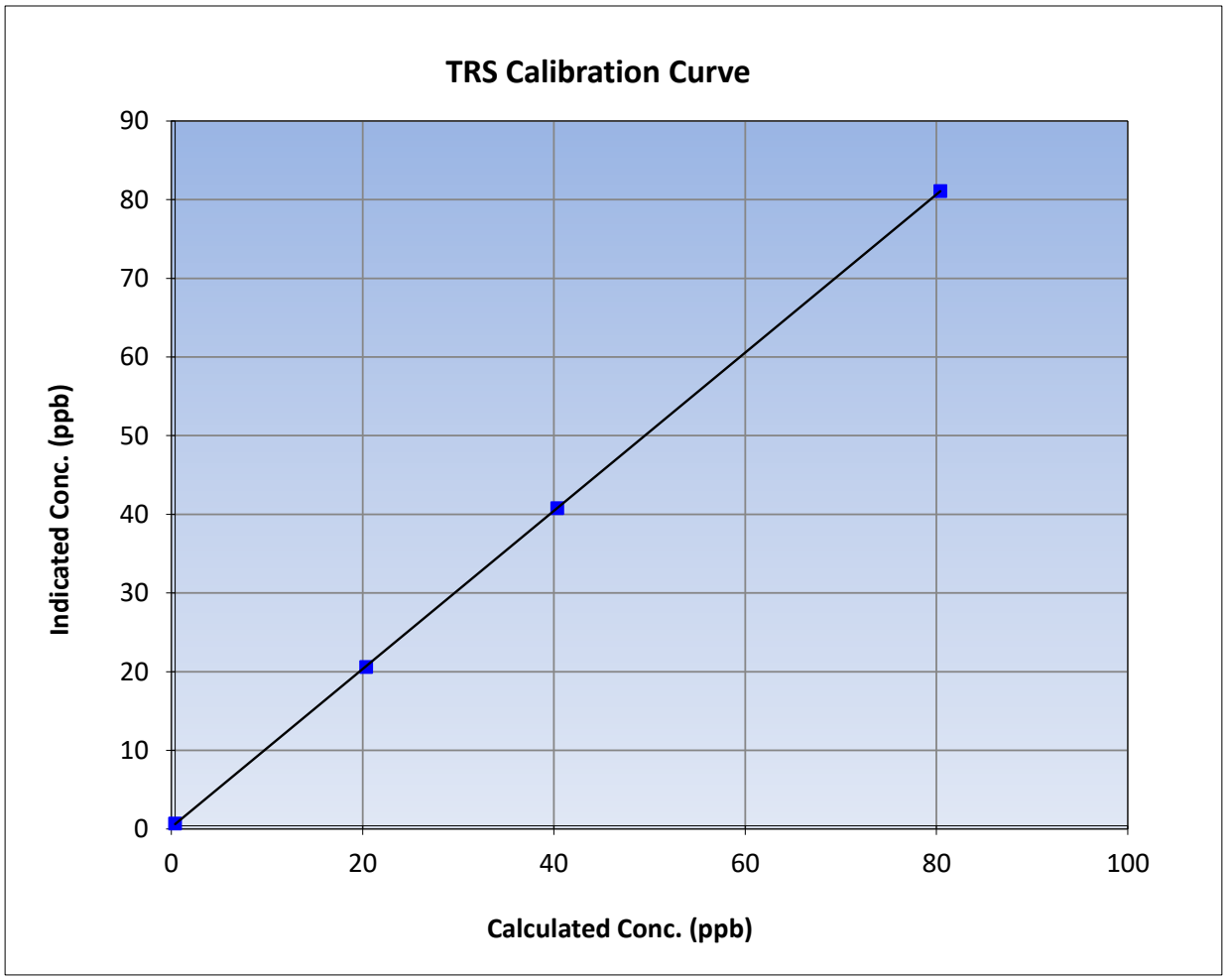
Station Information

Calibration Date:	June 29, 2023	Previous Calibration:	May 29, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:15	End Time (MST):	12:25
Analyzer make:	Thermo 43iQ-TL	Analyzer serial #:	1203169744

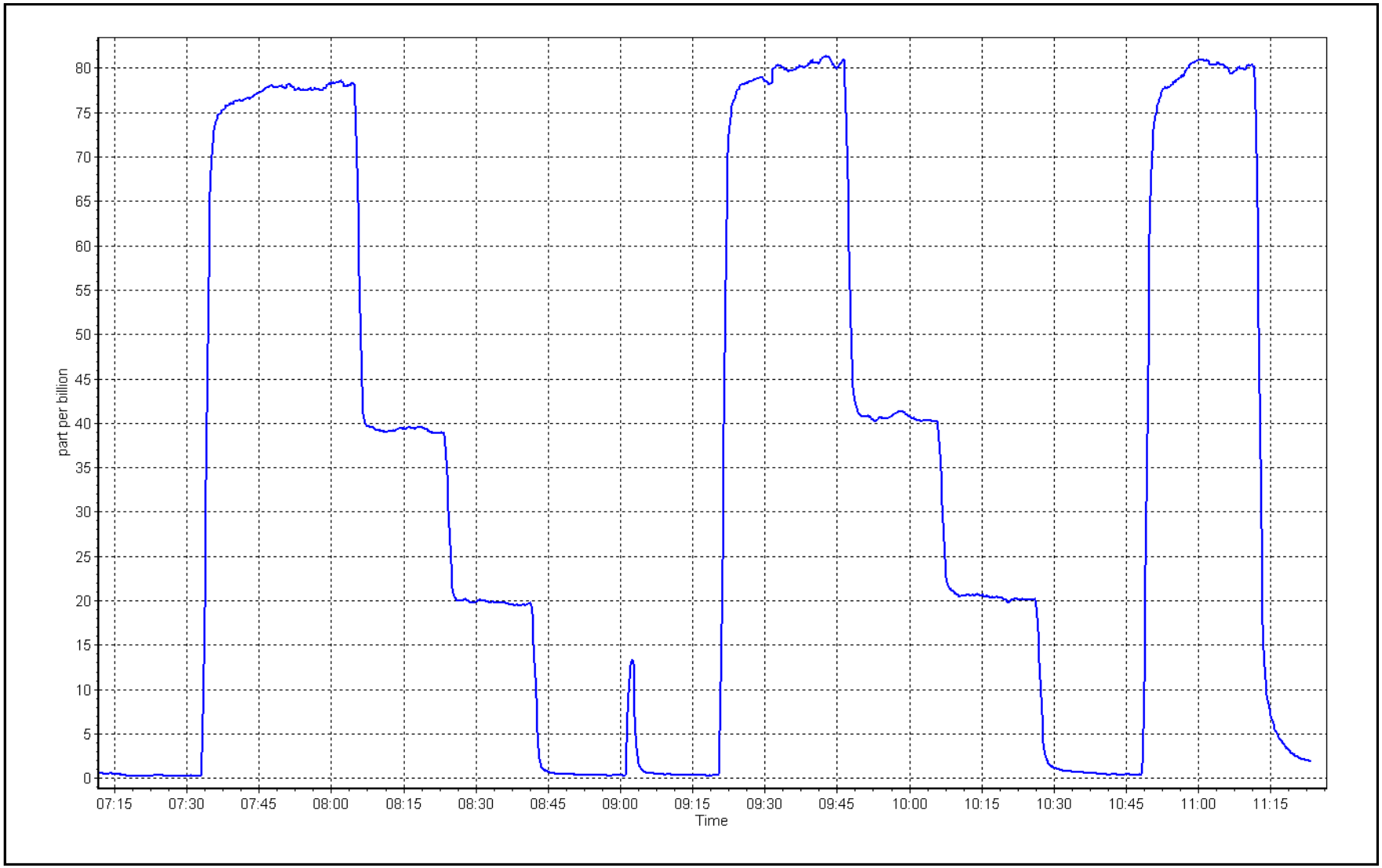
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
80.0	80.7	0.9914
40.0	40.4	0.9890
20.0	20.2	0.9891

Statistical Evaluation		Limits
Correlation Coefficient	0.999995	≥0.995
Slope	1.005570	0.90 - 1.10
Intercept	0.218839	+/-3



TRS Calibration Plot Date: June 29, 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:	June 27, 2023	Last Cal Date:	May 15, 2023
Start time (MST):	8:15	End time (MST):	11:34
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:	1.813	1.933	NO bkgnd or offset:	7.6	8.1
NOX coeff or slope:	0.993	0.993	NOX bkgnd or offset:	7.7	8.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	268.4	268.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.995016	0.999486
NO_X Cal Offset:	-0.320000	-0.060000
NO Cal Slope:	0.998443	1.002670
NO Cal Offset:	-0.920000	-1.000000
NO_2 Cal Slope:	0.994665	0.991397
NO_2 Cal Offset:	-1.310360	0.179814

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
as found span	4918	82.0	800.3	800.3	0.0	751.4	749.5	1.9	1.0651	1.0678
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
high point	4918	82.0	800.3	800.3	0.0	800.0	802.2	-2.2	1.0004	0.9977
second point	4959	41.0	400.2	400.2	0.0	399.5	399.1	0.3	1.0017	1.0027
third point	4980	20.5	200.1	200.1	0.0	200.1	198.9	1.1	0.9999	1.0059
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
as left span	4918	82.0	800.3	419.6	380.7	799.5	422.3	377.4	1.0010	0.9937
								Average Correction Factor	1.0007	1.0021

Corrected As found	NO_X = 751.5 ppb	NO = 749.5 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-5.9%
Previous Response	NO_X = 796.0 ppb	NO = 798.2 ppb			*Percent Change	NO =	-6.5%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	801.2	420.5	380.7	376.8	1.0104	99.0%
2nd GPT point (200 ppb O3)	801.2	617.2	184.0	184.8	0.9957	100.4%
3rd GPT point (100 ppb O3)	801.2	712.7	88.5	86.8	1.0196	98.1%
				Average Correction Factor	1.0085	99.2%

Notes: Remote Calibration done after filter changed. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

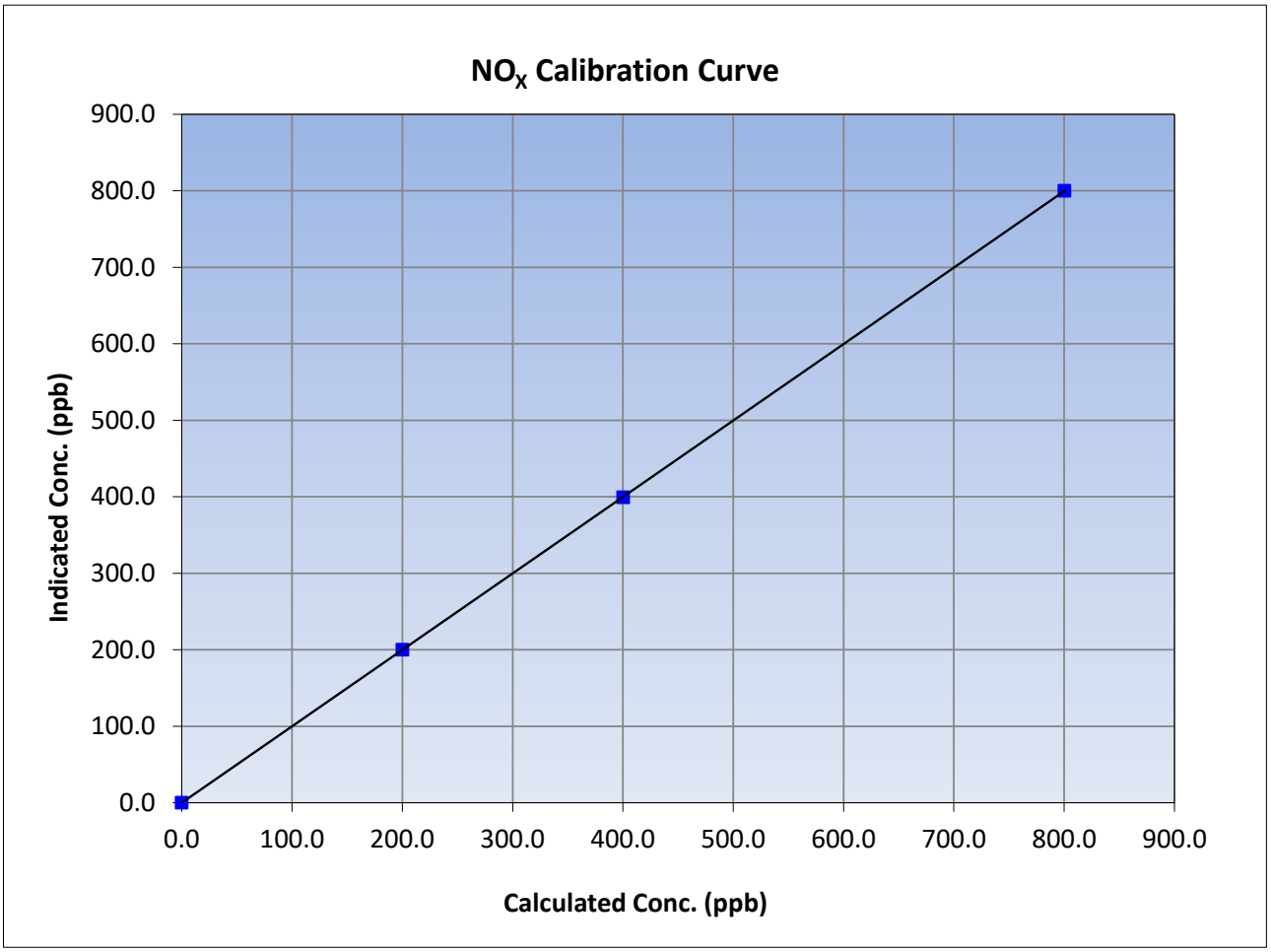
Version-04-2020

Station Information

Calibration Date:	June 27, 2023	Previous Calibration:	May 15, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:15	End Time (MST):	11:34
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	0.999999	≥0.995
800.3	800.0	1.0004			
400.2	399.5	1.0017	Slope	0.999486	0.90 - 1.10
200.1	200.1	0.9999			
			Intercept	-0.060000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

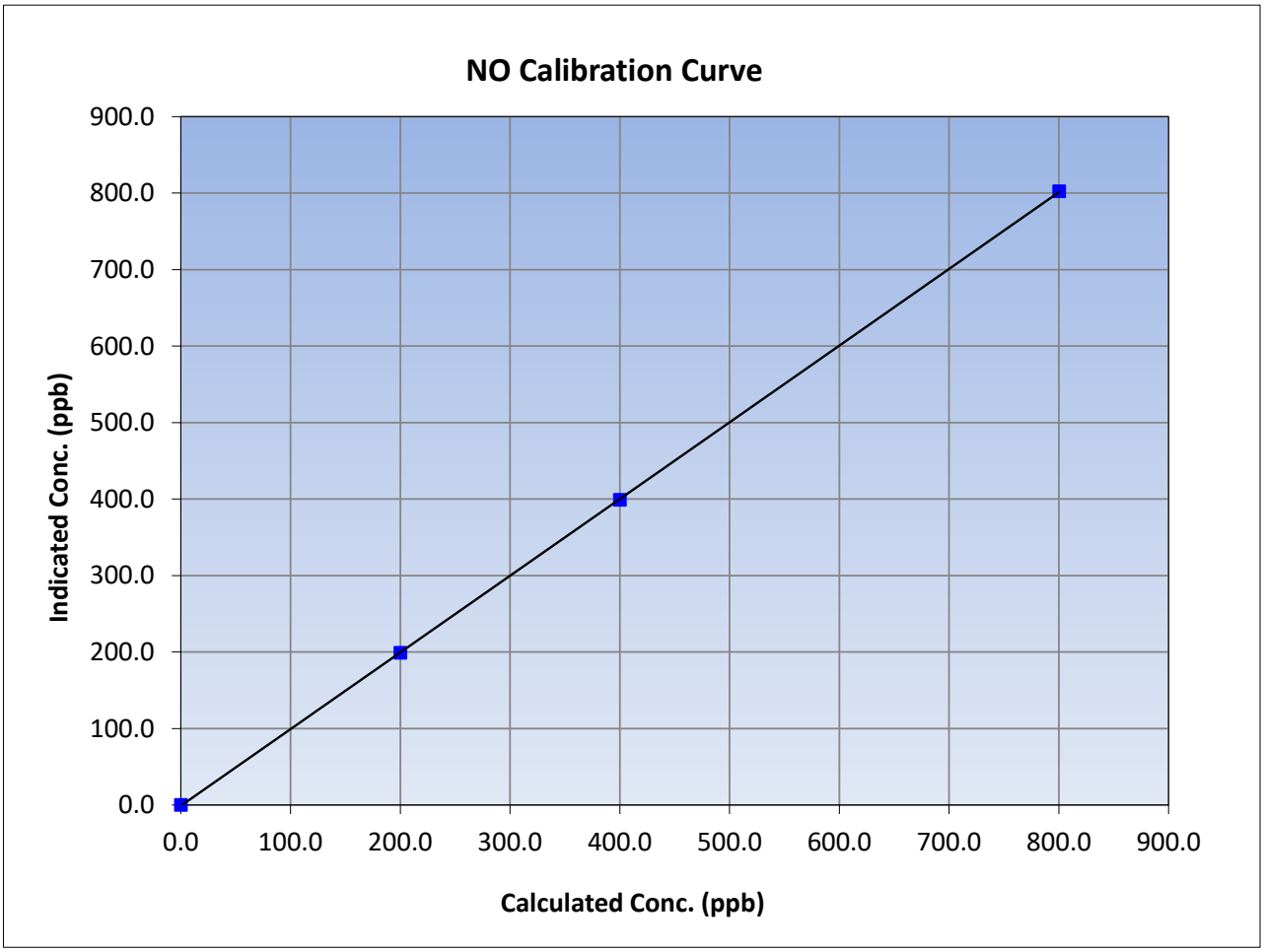
Version-04-2020

Station Information

Calibration Date:	June 27, 2023	Previous Calibration:	May 15, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:15	End Time (MST):	11:34
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999990	≥0.995
800.3	802.2	0.9977			
400.2	399.1	1.0027	Slope	1.002670	0.90 - 1.10
200.1	198.9	1.0059			
			Intercept	-1.000000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

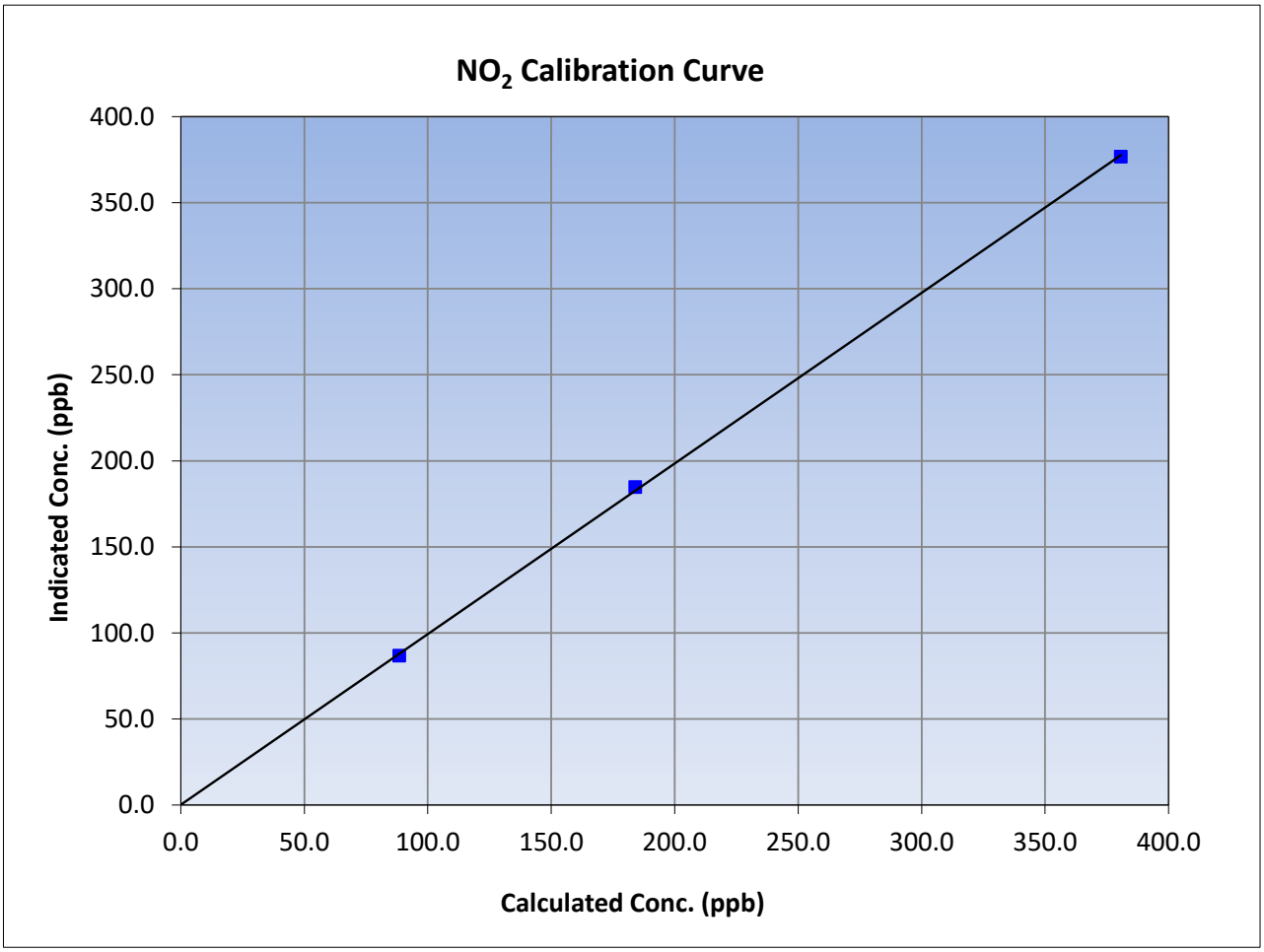
Version-04-2020

Station Information

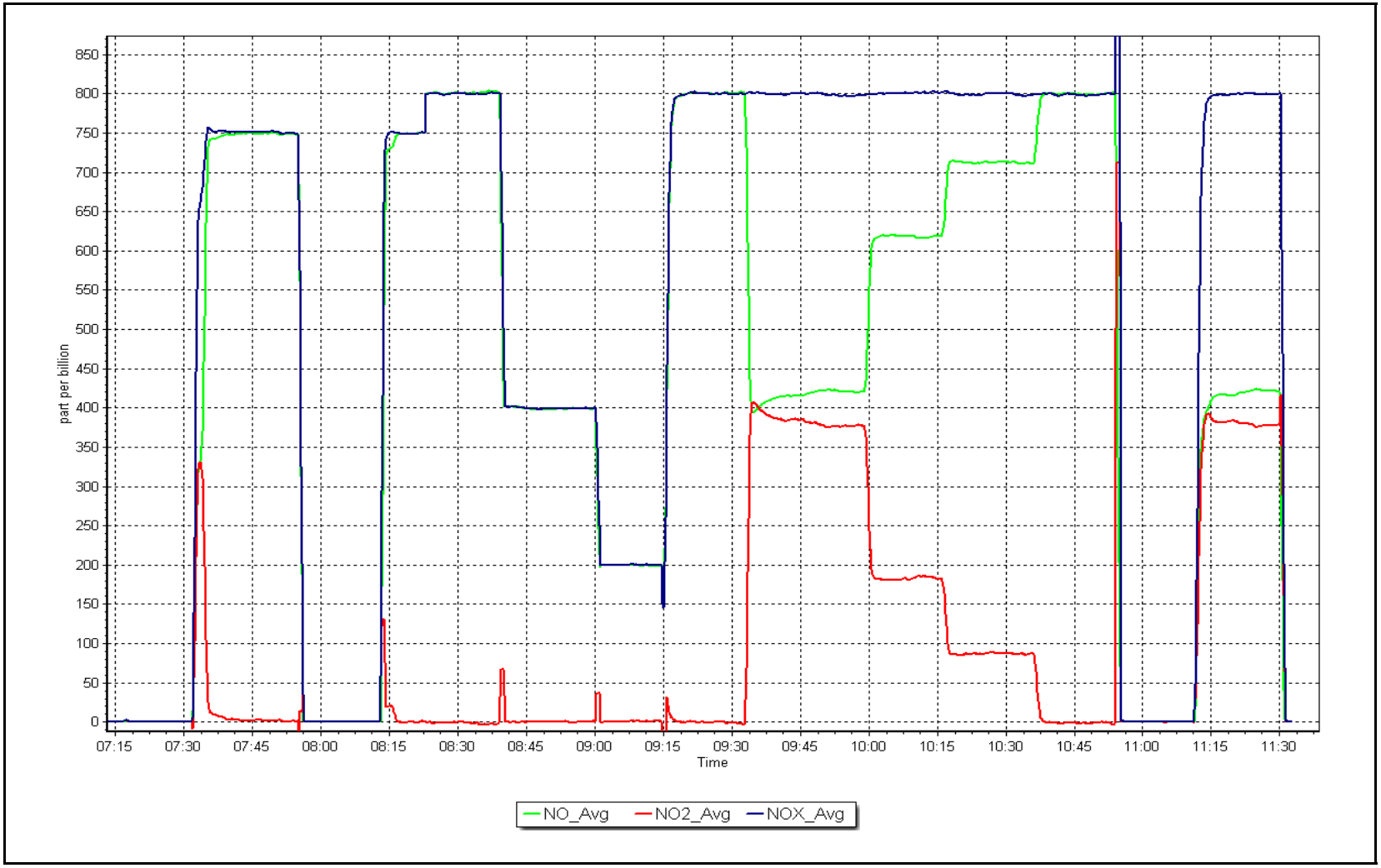
Calibration Date:	June 27, 2023	Previous Calibration:	May 15, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	8:15	End Time (MST):	11:34
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999913	≥0.995
380.7	376.8	1.0104			
184.0	184.8	0.9957	Slope	0.991397	0.90 - 1.10
88.5	86.8	1.0196			
			Intercept	0.179814	+/-20



NO_X Calibration Plot Date: June 27, 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:	June 28, 2023	Last Cal Date:	May 10, 2023
Start time (MST):	13:50	End time (MST):	16:07
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:	1.007686	1.012486	Backgd or Offset:	-2.0	-2.0
Calibration intercept:	-2.020000	-1.460000	Coeff or Slope:	1.036	1.036

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	5000	913.0	400.0	404.4	0.989
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.6	----
high point	5000	914.7	400.0	404.6	0.989
second point	5000	786.4	200.0	199.9	1.001
third point	5000	701.3	100.0	97.8	1.022
as left zero	5000	0.0	0.0	0.7	----
as left span	5000	963.3	400.0	404.9	0.988
				Average Correction Factor	1.004

Baseline Corr As found:	404.3	Previous response	401.1	*% 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: remote calibration done. No adjustments

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

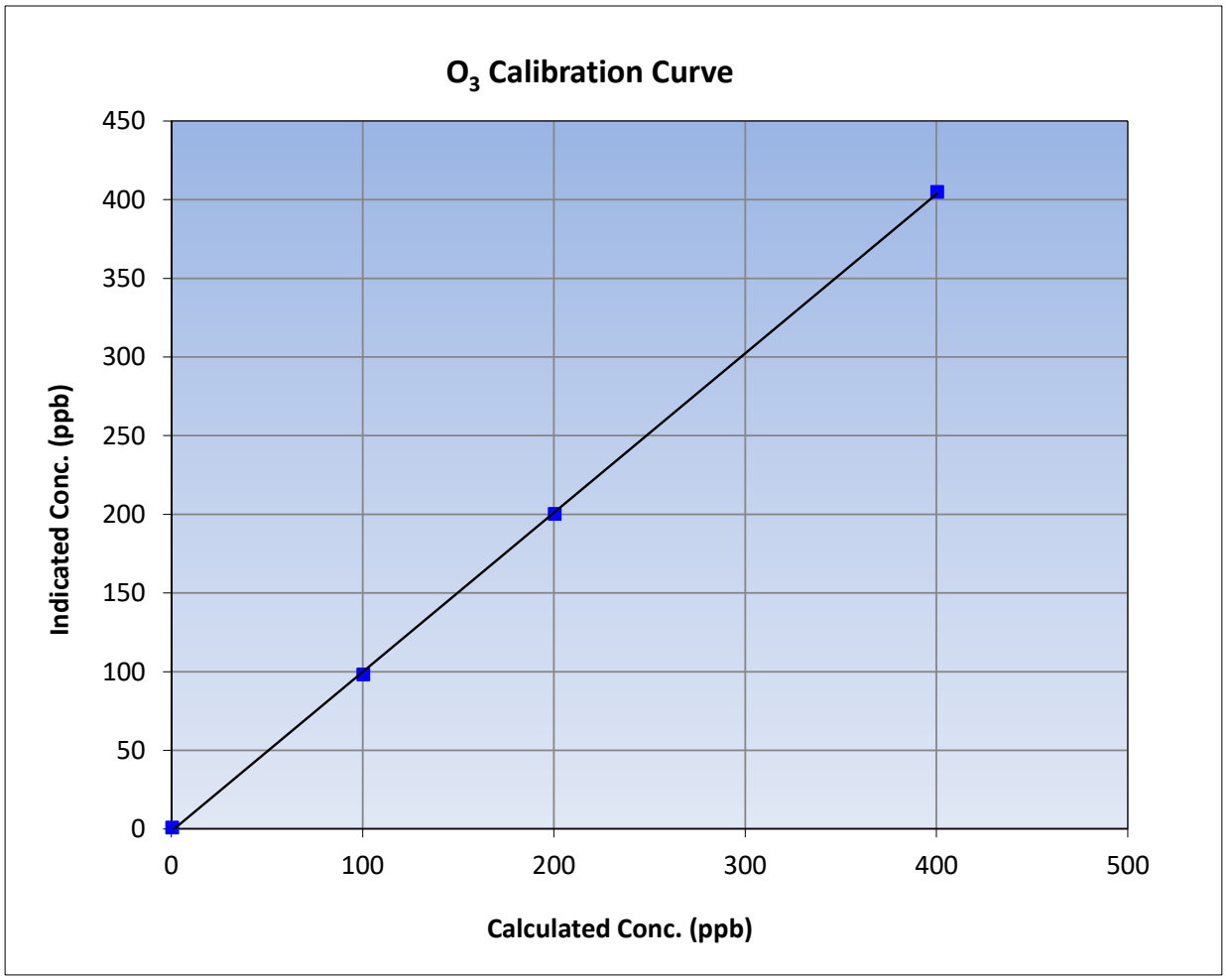
Station Information

Calibration Date:	June 28, 2023	Previous Calibration:	May 10, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	13:50	End Time (MST):	16:07
Analyzer make:	Teledyne API T400	Analyzer serial #:	3872

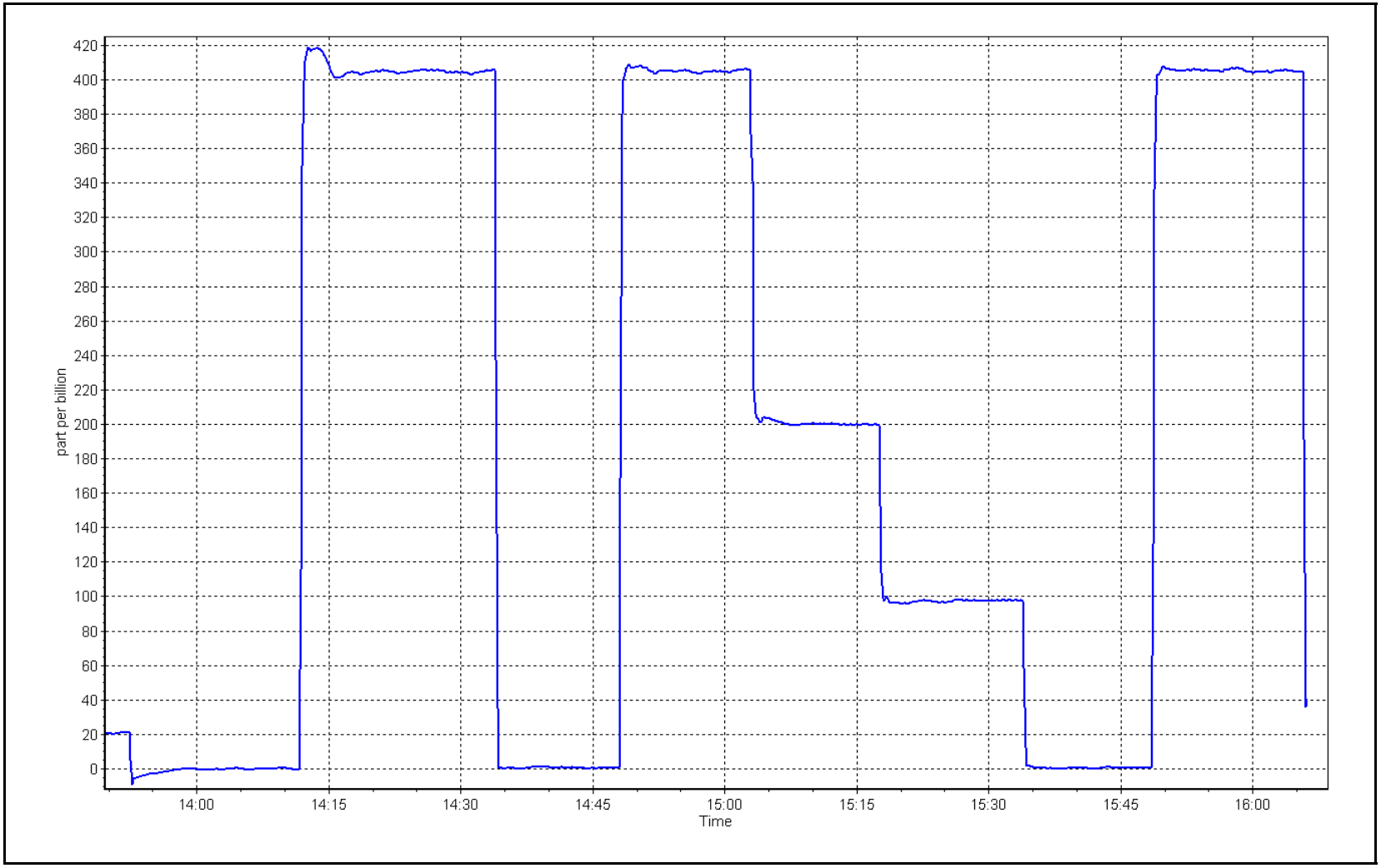
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.6	----
400.0	404.6	0.9886
200.0	199.9	1.0005
100.0	97.8	1.0225

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999882	*≥0.995*
Slope	1.012486	*0.90 - 1.10*
Intercept	-1.460000	*+/- 5*



O_3 Calibration Plot Date: June 28, 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:	June 29, 2023	Last Cal Date:	May 29,2023
Start time (MST):	14:20	End time (MST):	14:59
Analyzer Make:	API	S/N:	216
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	1212
Temp/RH standard:	Delta Cal	S/N:	1212

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	30.0	30.0	30.0	☐	+/- 2 °C
P (mmHg)	729.6	721.3	729.6	☐	+/- 10 mmHg
flow (LPM)	5.00	4.94	5.00	☐	+/- 0.25 LPM

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

PM w/o HEPA: 0 PM w/ HEPA: 0.1 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

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

Post-maintenance leak check: PM w/o HEPA: 8.4 w/ HEPA: 0.0

Date Optical Chamber Cleaned: March 13, 2023 <0.2 ug/m3

Disposable Filter Changed: March 13, 2023

Annual Maintenance

Date Sample Tube Cleaned: July 14, 2022

Date RH/T Sensor Cleaned: July 14, 2022

Notes: No adjustments made.

Calibration by: Matthew Courtoreille,

Wood Buffalo Environmental Association

CO Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS08
Calibration Date:	June 30, 2023	Last Cal Date:	May 17, 2023
Start time (MST):	10:32	End time (MST):	13:34
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999682	0.988086	Backgd or Offset:	-0.014	-0.014
Calibration intercept:	0.126989	0.136987	Coeff or Slope:	0.968	0.968

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.15	----
as found span	4933	66.7	40.4	40.0	1.011
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	----
high point	4934	66.7	40.4	40.0	1.010
second point	4967	33.3	20.2	20.2	0.998
third point	4983	16.7	10.1	10.1	1.005
as left zero	5000	0.0	0.0	-0.1	----
as left span	2960	40.0	40.4	40.1	1.009
				Average Correction Factor	1.004

Baseline Corr As found:	40.15	Prev response:	40.54	*% 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: Remote calibration, sample inlet filter changed out before calibration. No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

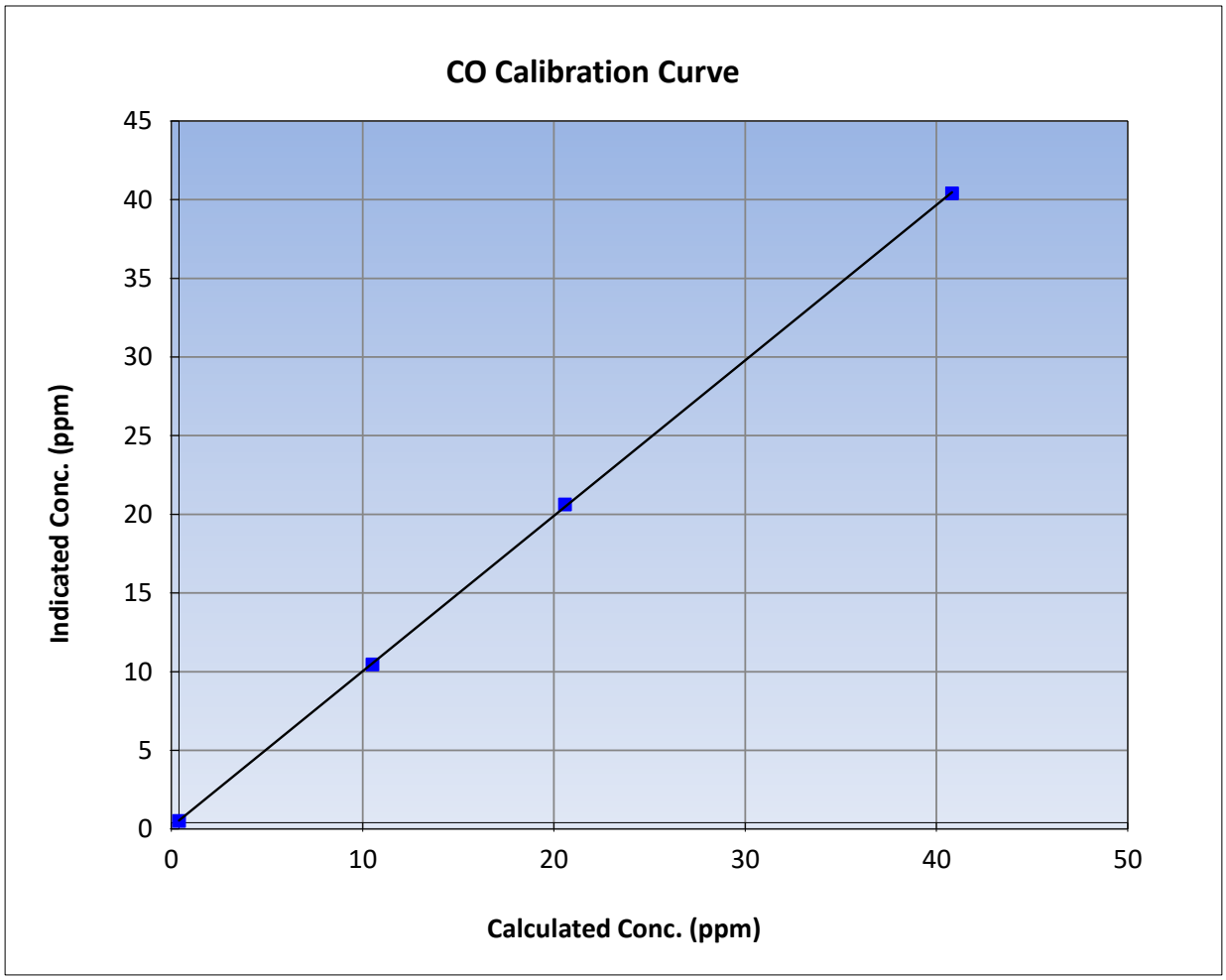
Station Information

Calibration Date:	June 30, 2023	Previous Calibration:	May 17, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	10:32	End Time (MST):	13:34
Analyzer make:	API T300	Analyzer serial #:	3505

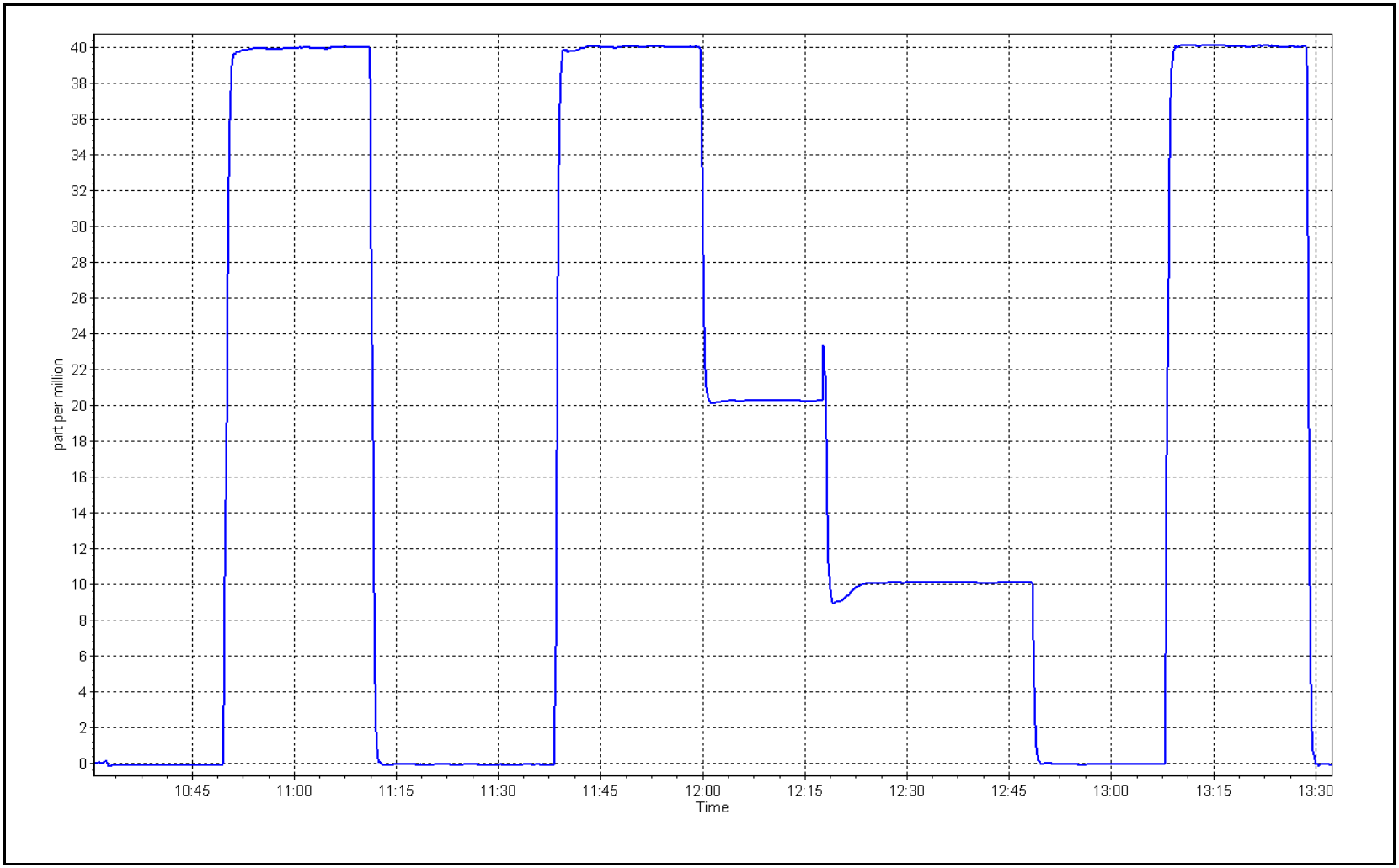
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
40.4	40.0	1.0101
20.2	20.2	0.9975
10.1	10.1	1.0050

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999963	*≥0.995*
Slope	0.988086	*0.90 - 1.10*
Intercept	0.136987	*+/-1.5*



CO Calibration Plot Date: June 30, 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:	June 28, 2023	Last Cal Date:	May 17, 2023
Start time (MST):	11:32	End time (MST):	13:51
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:	3060
N2 Gen Make/Model:	NG 5000		Serial Number:	771048318

Analyzer Information

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

Analyzer Range 0 - 2,000 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.996425	0.986205	Backgd or Offset:	-0.010	0.008
Calibration intercept:	-0.680000	-4.300000	Coeff or Slope:	1.018	1.002

CO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	3000	0.0	0.0	-1.8	----
as found span	2920	80.0	1605.9	1583.0	1.014
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	-0.1	----
high point	2920	80.0	1605.9	1585.0	1.013
second point	2960	40.0	802.9	775.0	1.036
third point	2980	20.0	401.5	394.4	1.018
as left zero	3000	0.0	0.0	0.3	----
as left span					
				Average Correction Factor	1.022

Baseline Corr As found:	1584.80	Prev response:	1599.45	*% 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: Remote calibration done. Zero adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

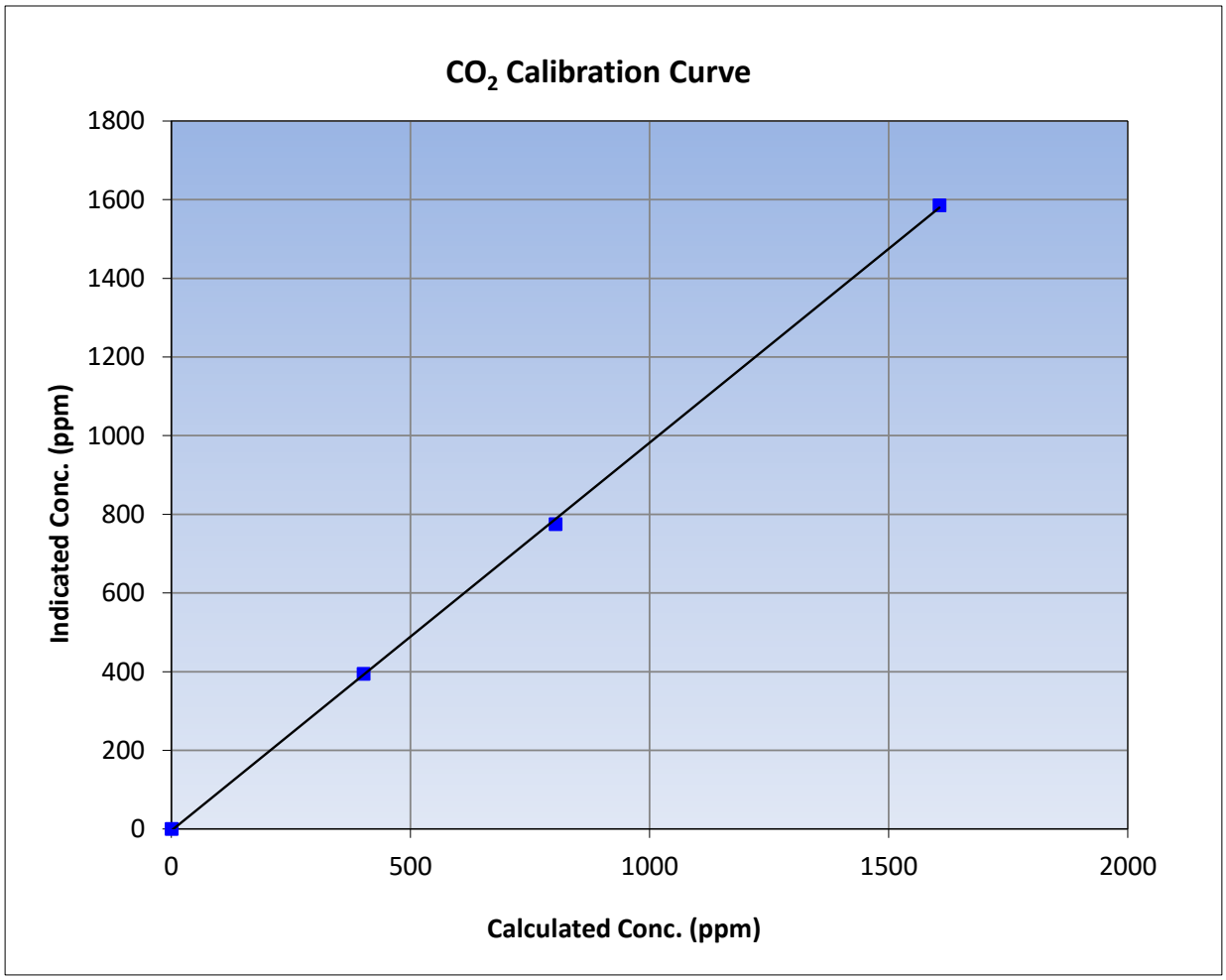
Station Information

Calibration Date	June 28, 2023	Previous Calibration	May 17, 2023
Station Name	Fort Chipewyan	Station Number	AMS08
Start Time (MST)	11:32	End Time (MST)	13:51
Analyzer make	Teledyne API T360	Analyzer serial #	289

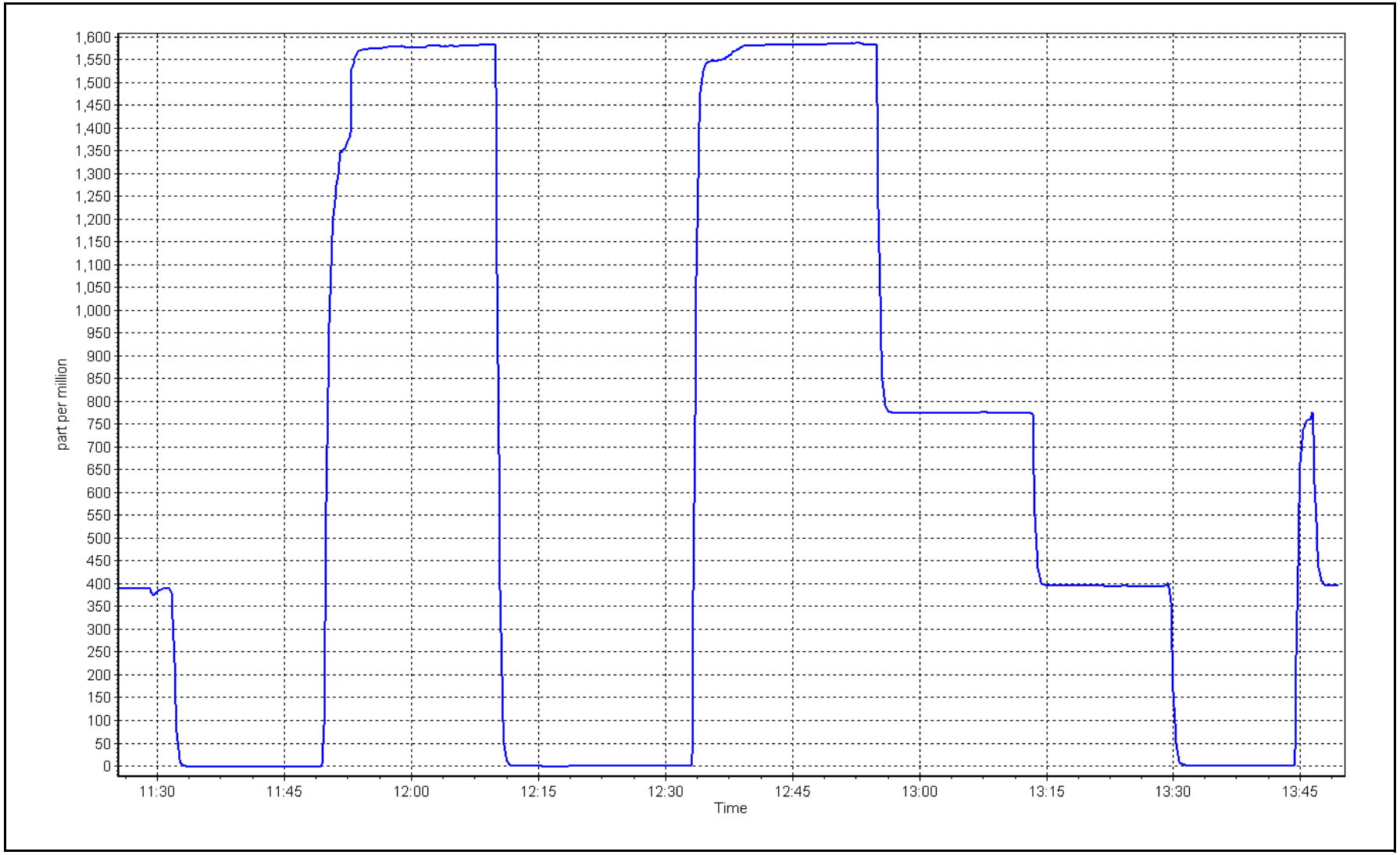
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
1605.9	1585.0	1.0132
802.9	775.0	1.0360
401.5	394.4	1.0179

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999844	*≥0.995*
Slope	0.986205	*0.90 - 1.10*
Intercept	-4.300000	*+/-20*



CO_2 Calibration Plot Date: June 28, 2023 Location: Fort Chipewyan



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS09
BARGE LANDING
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	June 8, 2023	Last Cal Date:	May 8, 2023
Start time (MST):	8:43	End time (MST):	11:50
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999100	0.995921	Backgd or Offset:	9.9	9.6
Calibration intercept:	-0.528972	0.510287	Coeff or Slope:	0.986	0.972

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.2	----
as found span	4919	80.2	801.5	809.6	0.990
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	----
high point	4919	80.2	801.5	798.7	1.003
second point	4959	40.1	400.8	399.6	1.003
third point	4980	20.0	199.8	199.7	1.001
as left zero	5000	0.0	0.0	0.3	----
as left span	4919	80.2	801.5	799.6	1.002
				Average Correction Factor	1.002

Baseline Corr As found:	809.40	Previous response	800.24	*% change	1.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Changed 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

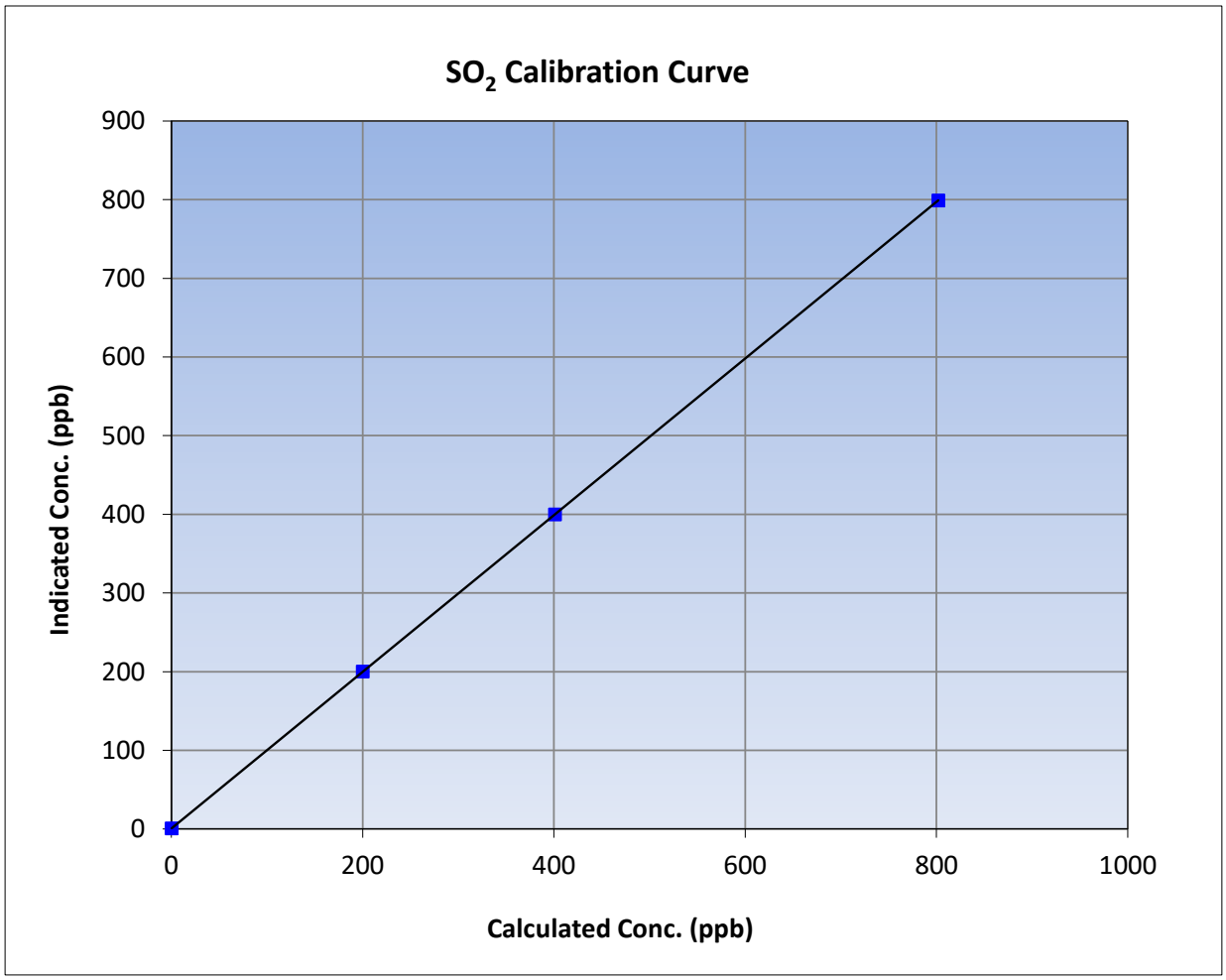
Station Information

Calibration Date:	June 8, 2023	Previous Calibration:	May 8, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	8:43	End Time (MST):	11:50
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148498

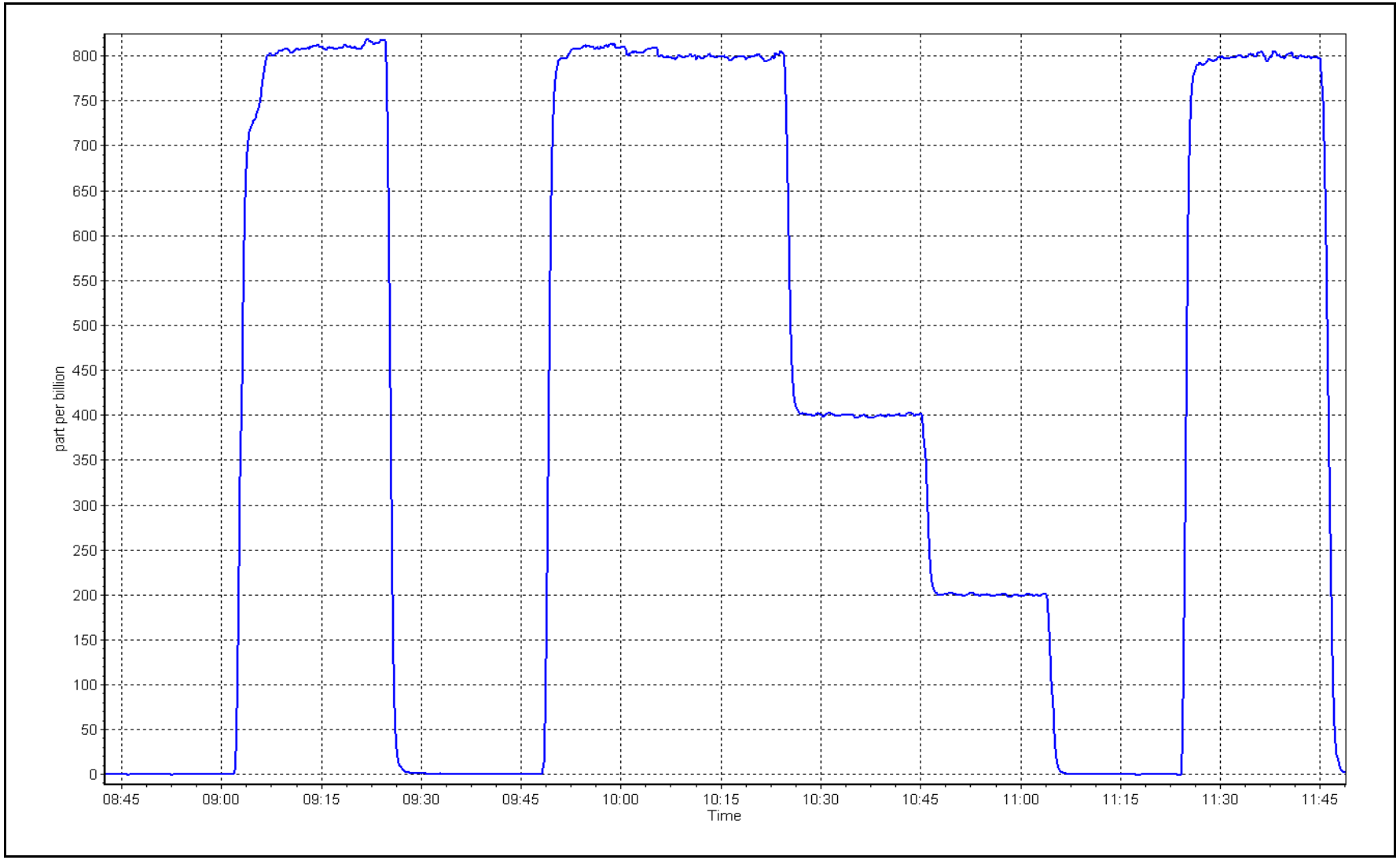
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
801.5	798.7	1.0035
400.8	399.6	1.0029
199.8	199.7	1.0007

Statistical Evaluation		*Limits*
Correlation Coefficient	1.000000	*≥0.995*
Slope	0.995921	*0.90 - 1.10*
Intercept	0.510287	*+/-30*



SO2 Calibration Plot Date: June 8, 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:	June 7, 2023	Last Cal Date:	May 3, 2023
Start time (MST):	8:05	End time (MST):	12:09
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	4.87	ppm	Cal Gas Exp Date:	September 2, 2024
Cal Gas Cylinder #:	EY0002346			
Removed Cal Gas Conc:	4.87	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3812
ZAG Make/Model:	API T701		Serial Number:	4888

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1331259320	
Converter make:	CDN-101		Converter serial #:	519	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005434	1.007720	Backgd or Offset:	2.82	2.77
Calibration intercept:	0.019021	-0.060968	Coeff or Slope:	1.147	1.134

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4918	82.1	80.0	79.2	1.008
as found 2nd point	4959	41.1	40.0	39.3	1.016
as found 3rd point	4979	20.5	20.0	19.7	1.009
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4918	82.1	80.0	80.5	0.993
second point	4959	41.1	40.0	40.3	0.993
third point	4979	20.5	20.0	20.1	0.993
as left zero	5000	0.0	0.0	-0.1	----
as left span	4918	82.1	80.0	81.8	0.978
SO2 Scrubber Check	4920	80.2	802.0	0.0	----
Date of last scrubber change:		28-Feb-23		Ave Corr Factor	0.993
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.3	Prev response:	80.42	*% change:	-1.4%
Baseline Corr 2nd AF pt:	39.4	AF Slope:	0.991283	AF Intercept:	-0.160828
Baseline Corr 3rd AF pt:	19.8	AF Correlation:	0.999981		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

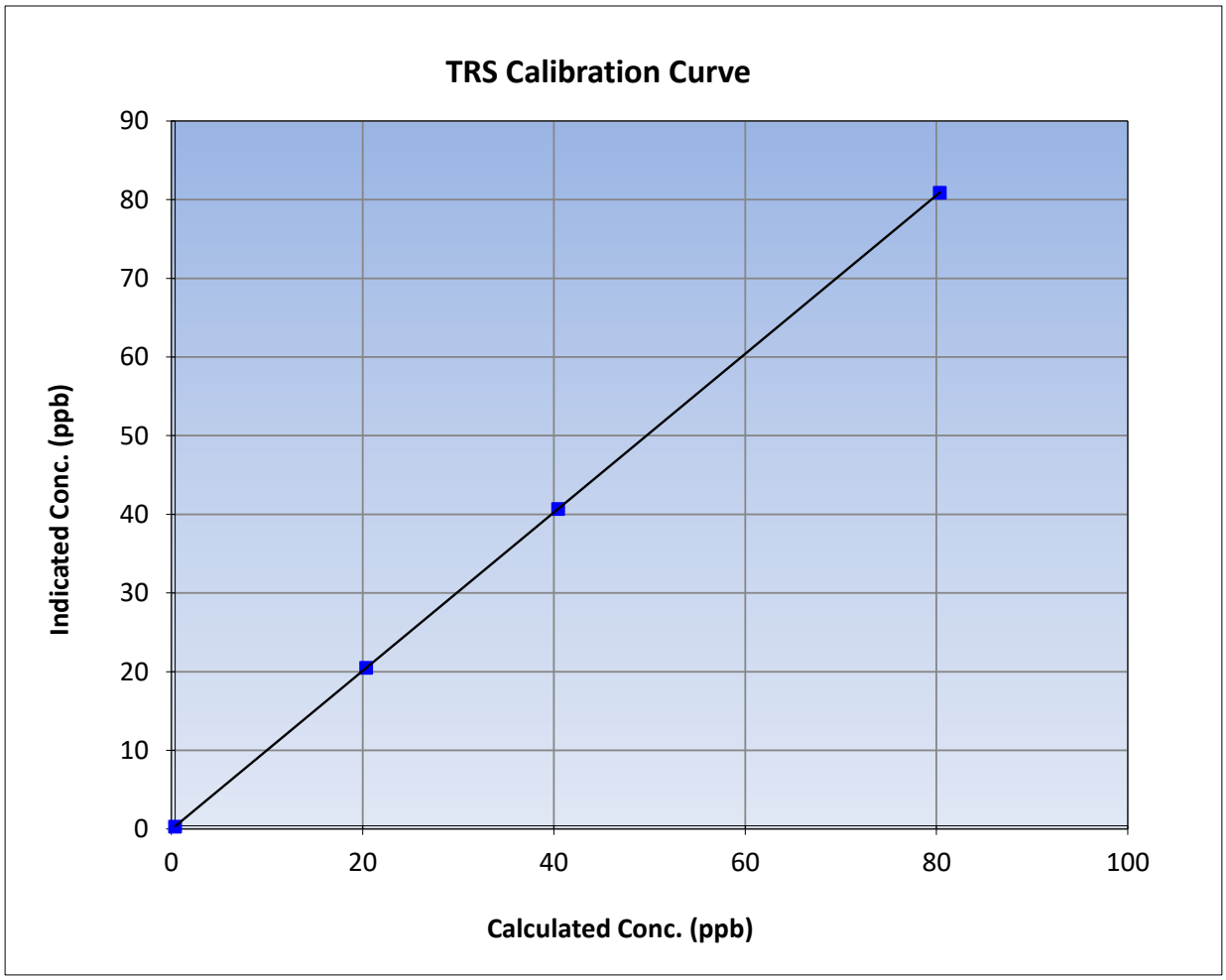
Station Information

Calibration Date:	June 7, 2023	Previous Calibration:	May 3, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	8:05	End Time (MST):	12:09
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1331259320

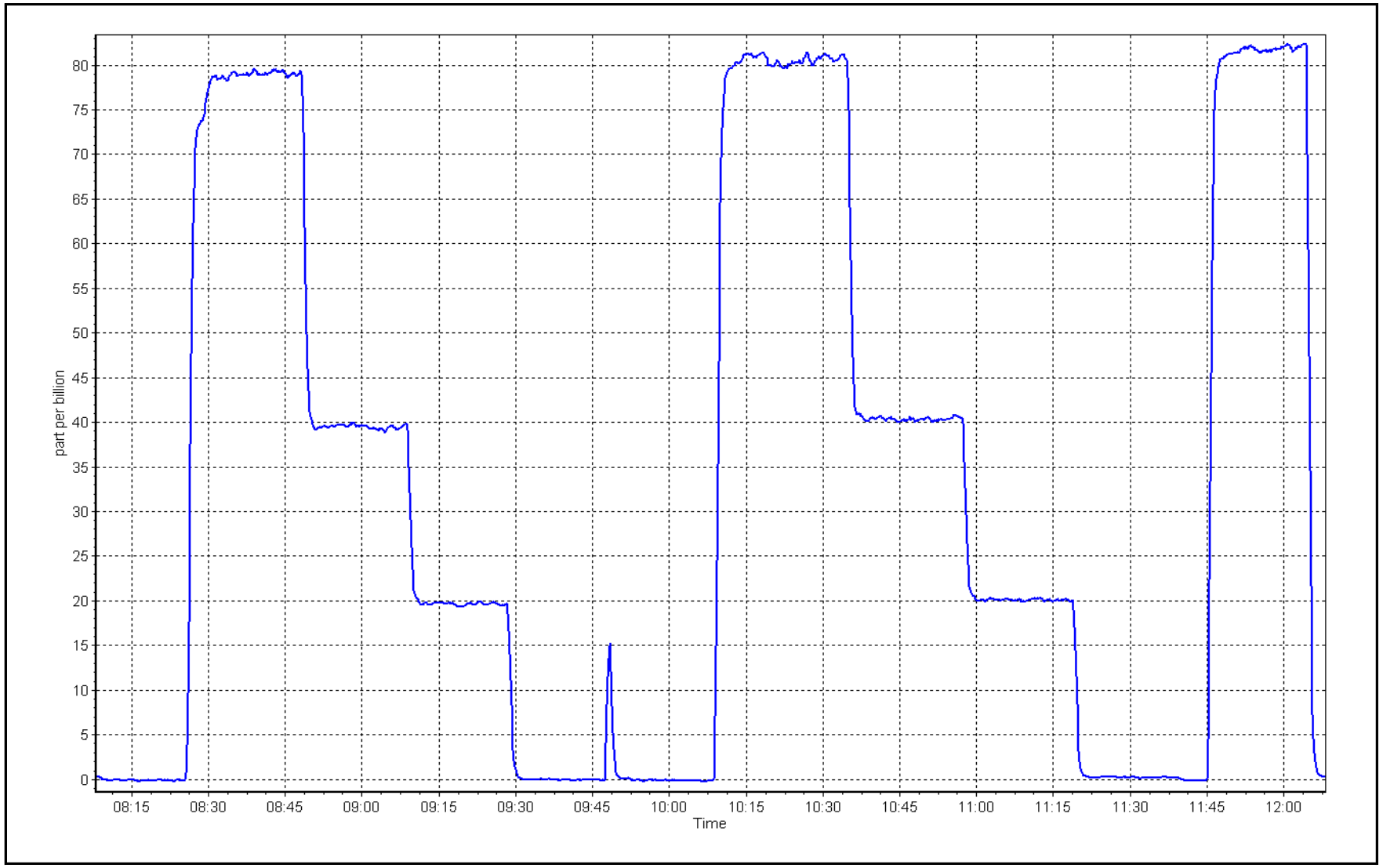
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.5	0.9933
40.0	40.3	0.9933
20.0	20.1	0.9935

Statistical Evaluation		Limits
Correlation Coefficient	0.999999	≥0.995
Slope	1.007720	0.90 - 1.10
Intercept	-0.060968	+/-3



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



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Barge Landing	Station number:	AMS09
Calibration Date:	June 8, 2023	Last Cal Date:	May 8, 2023
Start time (MST):	8:43	End time (MST):	11:50
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC151285	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	497.6	ppm	CH4 Equiv Conc.	1067.1	ppm
C3H8 Cal Gas Conc.	207.1	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.6	ppm	CH4 Equiv Conc.	1067.1	ppm
Removed C3H8 Conc.	207.1	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3812	
ZAG make/model:	API T701		Serial Number:	4888	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1193585649	
THC Range (ppm):	0 - 100 ppm				
NMHC Range (ppm):	0 - 50 ppm		CH4 Range (ppm):	0 - 50 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.50E-04	2.49E-04	NMHC SP Ratio:	4.87E-05	4.85E-05
CH4 Retention time:	15.2	15.2	NMHC Peak Area:	187500	188395

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	17.23	0.994
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	17.12	17.16	0.998
second point	4960	40.1	8.56	8.58	0.997
third point	4980	20.0	4.27	4.30	0.994
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	17.12	17.22	0.994
				Average Correction Factor	0.996

Baseline Corr AF:	17.23	Prev response	17.17	*% change	0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.0	----
as found span	4919	80.2	9.14	9.20	0.993
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	9.16	0.998
second point	4960	40.1	4.57	4.59	0.995
third point	4980	20	2.28	2.30	0.991
as left zero	5000	0	0.00	0.00	----
as left span	4919	80.2	9.14	9.20	0.994
				Average Correction Factor	0.995
Baseline Corr AF:	9.20	Prev response	9.18	*% 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	80.2	7.98	8.03	0.995
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	80.2	7.98	8.00	0.997
second point	4960	40.1	3.99	3.99	0.999
third point	4980	20.0	1.99	2.00	0.997
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	80.2	7.98	8.02	0.995
				Average Correction Factor	0.998
Baseline Corr AF:	8.03	Prev response	7.99	*% 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:	1.003421	1.002132
THC Cal Offset:	-0.007132	0.007266
CH4 Cal Slope:	1.001195	1.002397
CH4 Cal Offset:	-0.006136	-0.001332
NMHC Cal Slope:	1.004627	1.001775
NMHC Cal Offset:	0.001202	0.008598

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

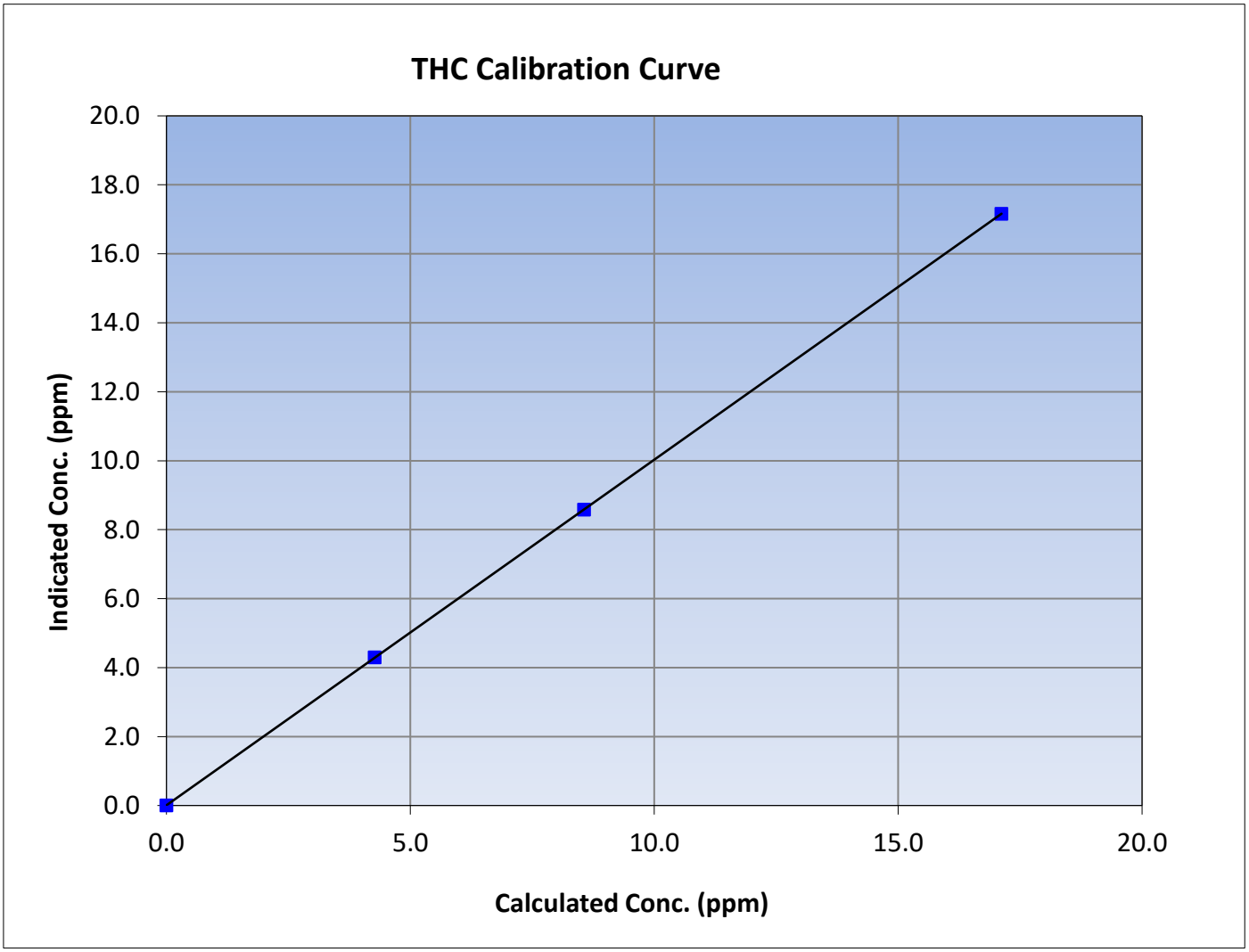
Version-01-2020

Station Information

Calibration Date:	June 8, 2023	Previous Calibration:	May 8, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	8:43	End Time (MST):	11:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999999	≥0.995
17.12	17.16	0.9976			
8.56	8.58	0.9971	Slope	1.002132	0.90 - 1.10
4.27	4.30	0.9938			
			Intercept	0.007266	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

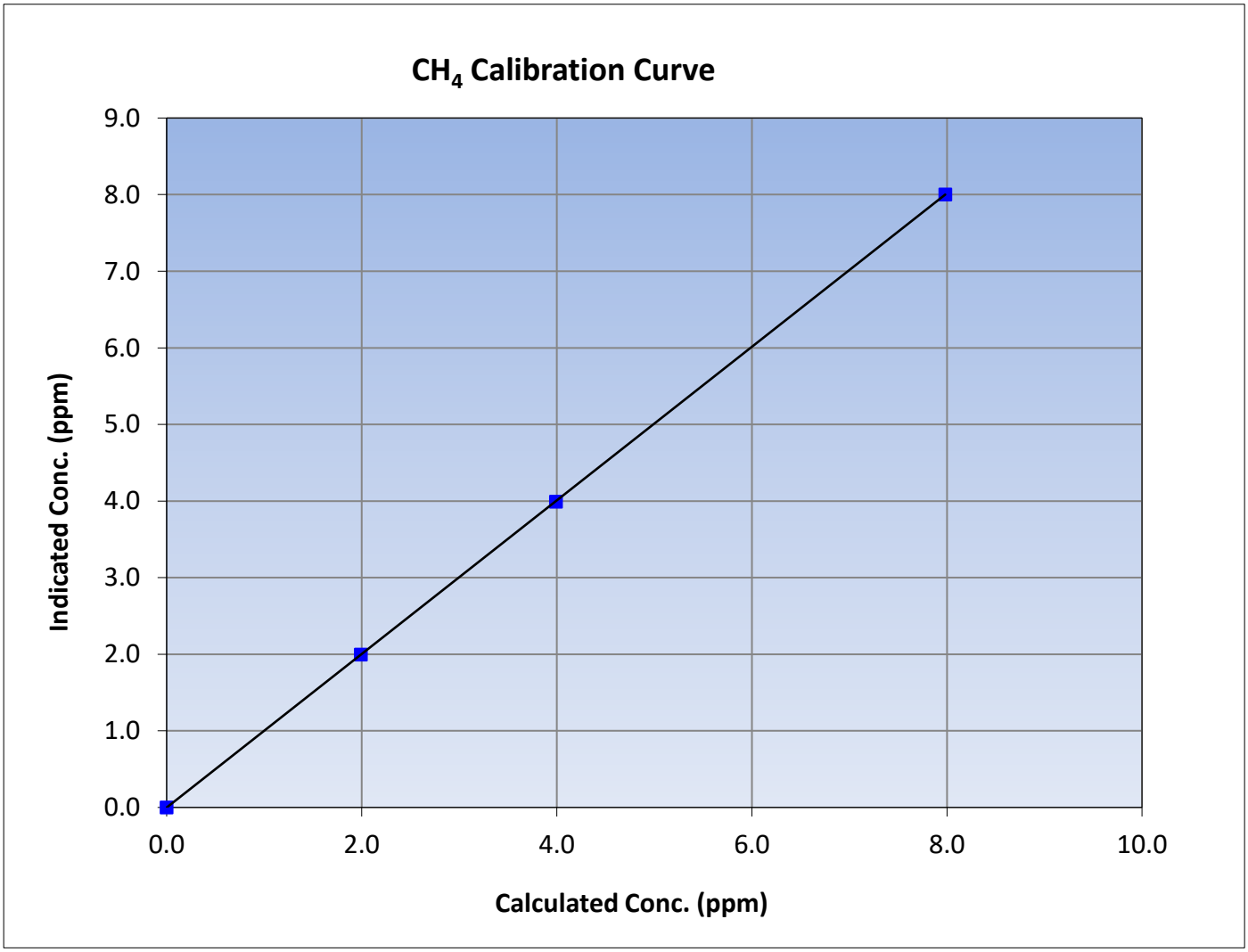
Version-01-2020

Station Information

Calibration Date:	June 8, 2023	Previous Calibration:	May 8, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	8:43	End Time (MST):	11:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999999	*≥0.995*
7.98	8.00	0.9975			
3.99	3.99	0.9994	Slope	1.002397	*0.90 - 1.10*
1.99	2.00	0.9972			
			Intercept	-0.001332	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

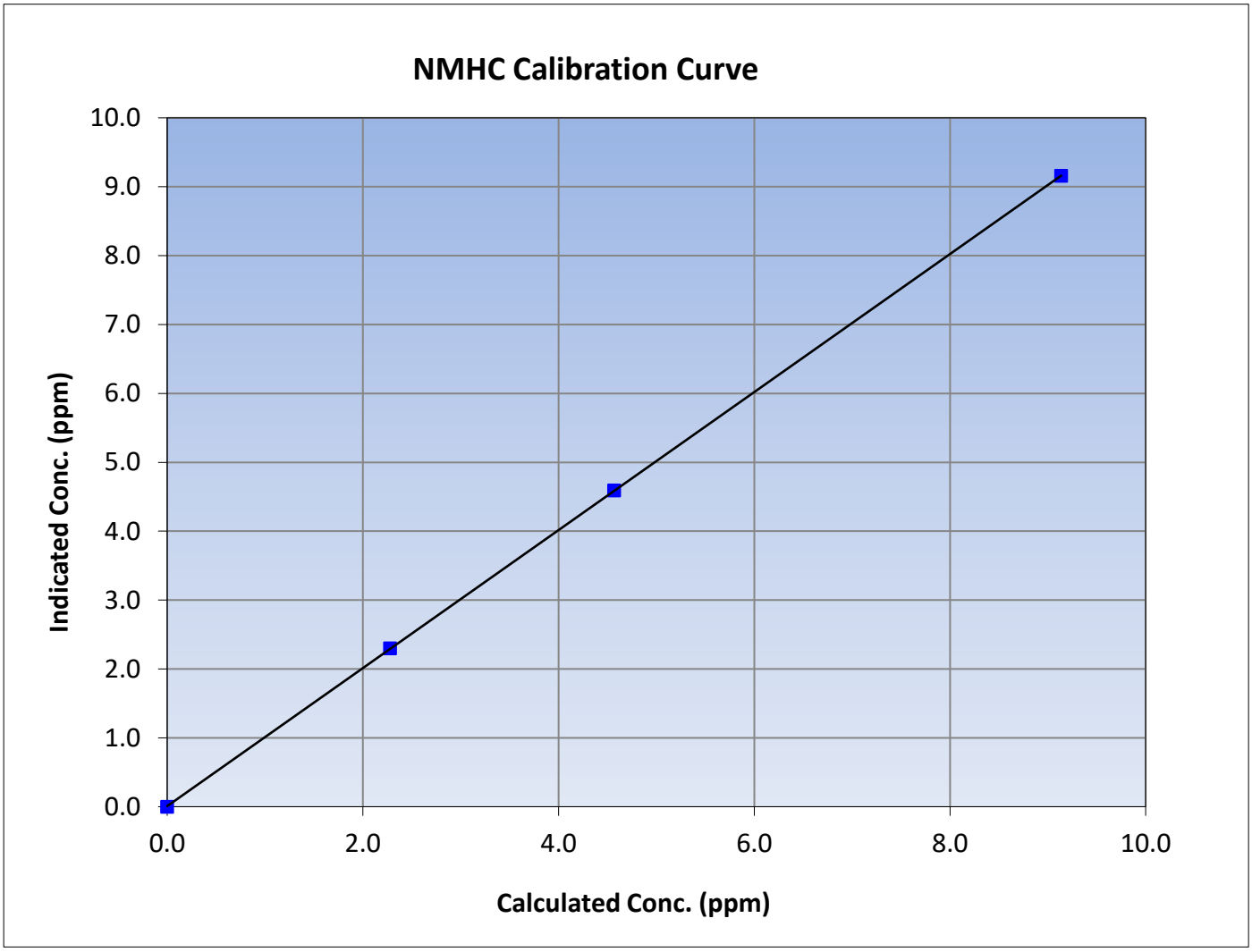
Version-01-2020

Station Information

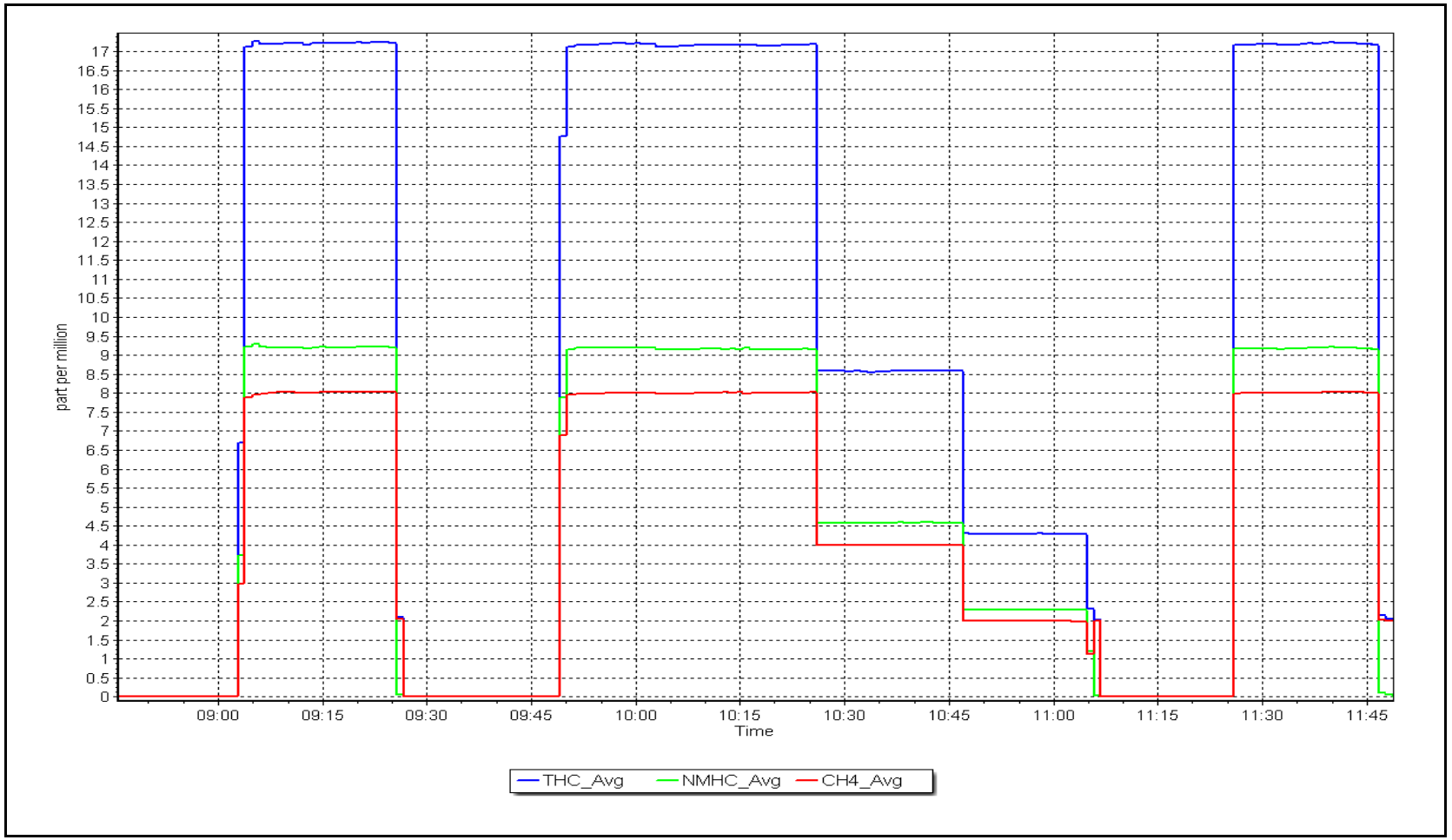
Calibration Date:	June 8, 2023	Previous Calibration:	May 8, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	8:43	End Time (MST):	11:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585649

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999996	≥0.995
9.14	9.16	0.9978			
4.57	4.59	0.9953	Slope	1.001775	0.90 - 1.10
2.28	2.30	0.9909			
			Intercept	0.008598	+/-0.5



NMHC Calibration Plot Date: June 8, 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:	June 6, 2023	Last Cal Date:	May 23, 2023
Start time (MST):	8:21	End time (MST):	12:50
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	DT0036634		Cal Gas Expiry Date:	January 28, 2024	
NOX Cal Gas Conc:	50.00	ppm	NO Cal Gas Conc:	49.70	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	50.00	ppm	Removed Gas NO Conc:	49.70	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3812	
ZAG make/model:	API T701		Serial Number:	4888	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1426262593	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.175	1.181	NO bkgnd or offset:	10.7	10.8
NOX coeff or slope:	0.995	0.994	NOX bkgnd or offset:	11.0	11.0
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	174.6	172.2

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.003622	0.998838
NO_X Cal Offset:	0.329752	0.888950
NO Cal Slope:	1.005383	1.001441
NO Cal Offset:	-0.991769	-0.512202
NO_2 Cal Slope:	0.999175	0.999242
NO_2 Cal Offset:	0.249142	0.437176

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	4919	80.5	805.1	800.3	4.8	804.3	795.5	8.7	1.001	1.006
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	-0.1	0.3	----	----
high point	4919	80.5	805.1	800.3	4.8	804.6	801.0	3.7	1.001	0.999
second point	4959	40.2	402.1	399.7	2.4	403.1	399.8	3.3	0.997	1.000
third point	4979	20.1	201.0	199.8	1.2	202.2	199.0	3.2	0.994	1.004
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as left span	4919	80.5	805.1	439.8	365.3	805.2	439.7	365.5	1.000	1.000
								Average Correction Factor	0.997	1.001

Corrected As found	NO_X = 804.2 ppb	NO = 795.7 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-0.5%
Previous Response	NO_X = 808.3 ppb	NO = 803.6 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)	797.3	436.8	365.3	365.4	1.000	100.0%
2nd GPT point (200 ppb O3)	797.3	660.1	142.0	142.6	0.996	100.4%
3rd GPT point (100 ppb O3)	797.3	728.5	73.6	74.0	0.995	100.5%
				Average Correction Factor	0.997	100.3%

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

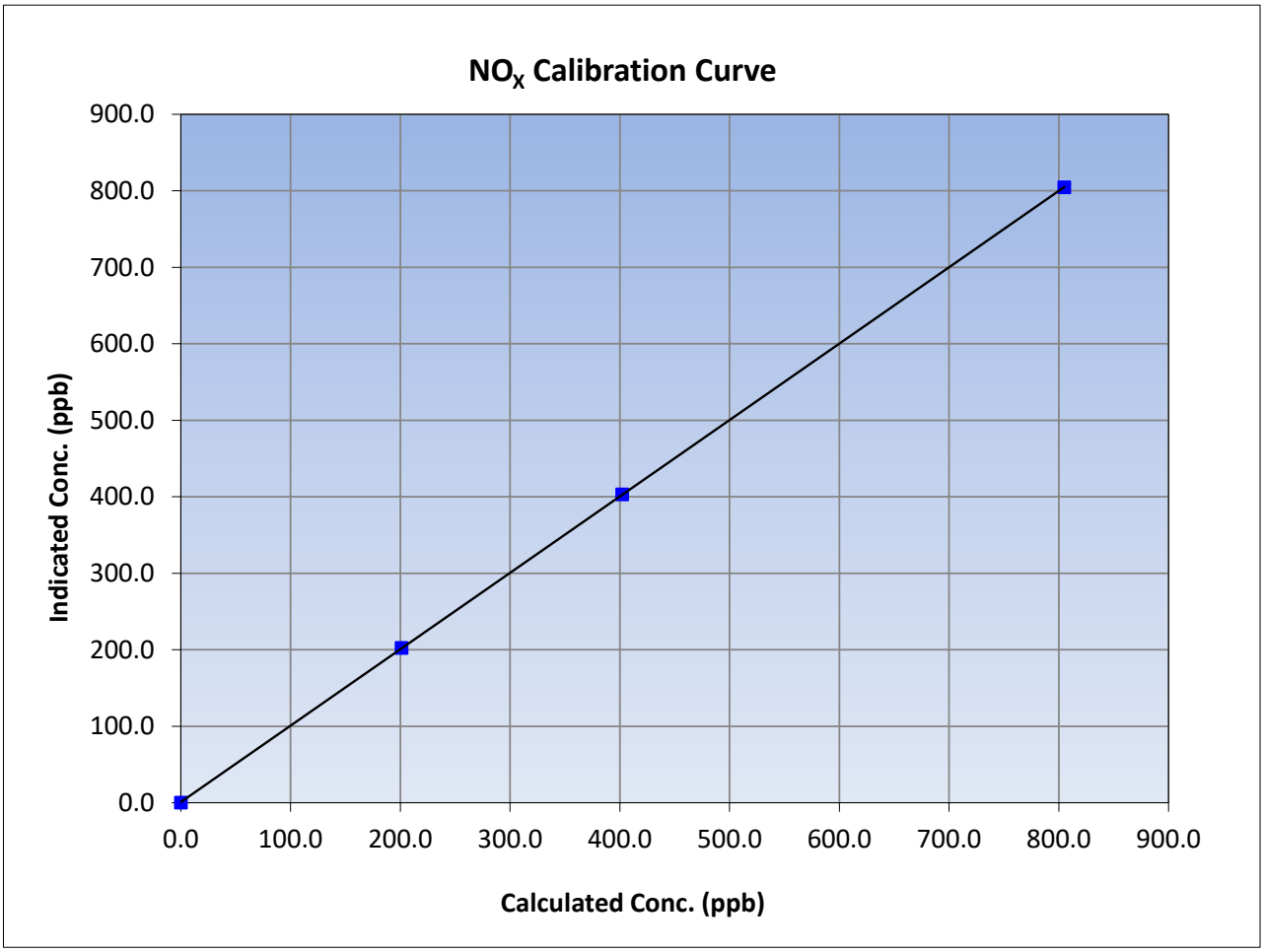
Version-04-2020

Station Information

Calibration Date:	June 6, 2023	Previous Calibration:	May 23, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	8:21	End Time (MST):	12:50
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999996	≥0.995
805.1	804.6	1.0006			
402.1	403.1	0.9974	Slope	0.998838	0.90 - 1.10
201.0	202.2	0.9942			
			Intercept	0.888950	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

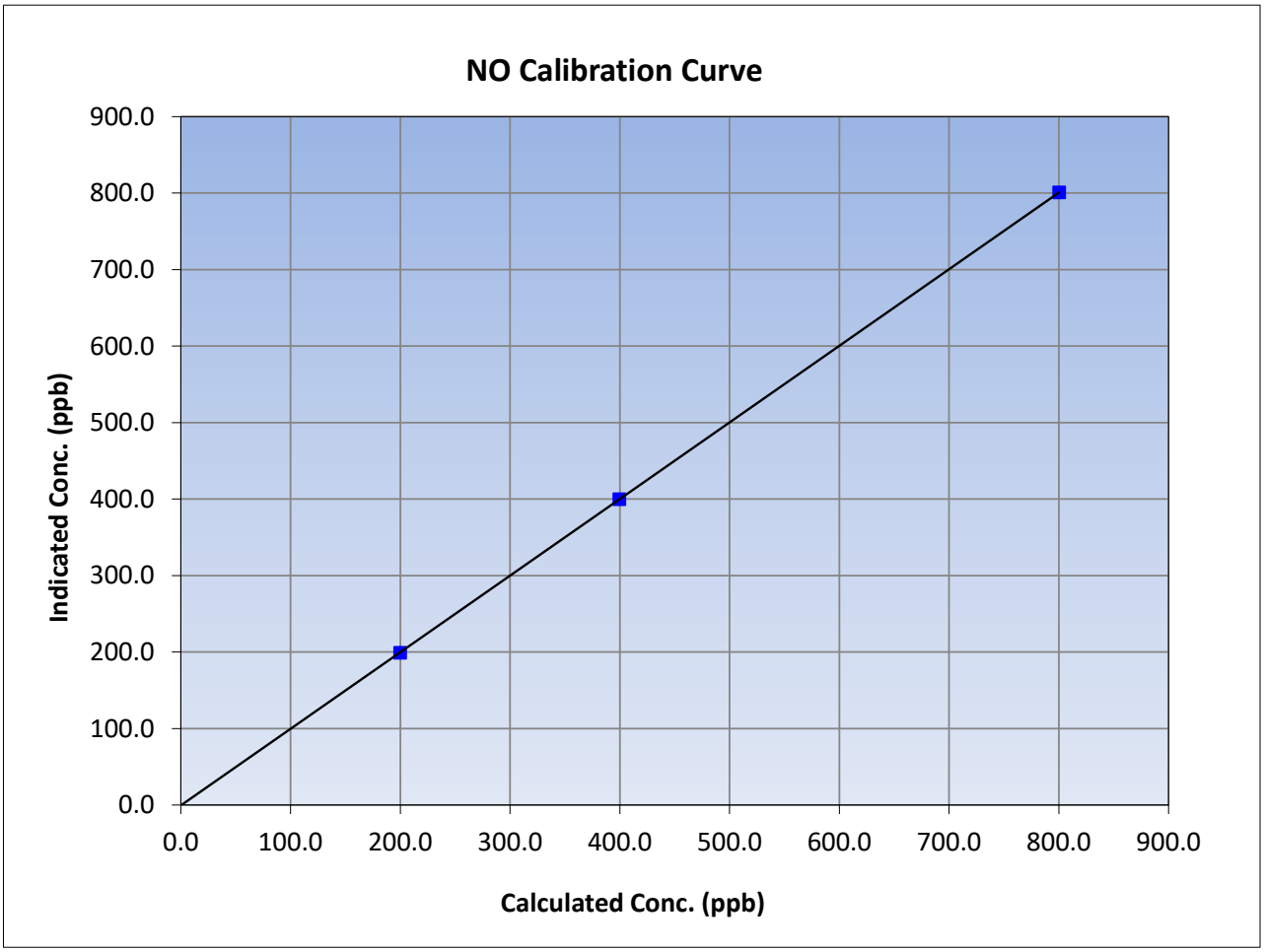
Version-04-2020

Station Information

Calibration Date:	June 6, 2023	Previous Calibration:	May 23, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	8:21	End Time (MST):	12:50
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999998	≥0.995
800.3	801.0	0.9991			
399.7	399.8	0.9996	Slope	1.001441	0.90 - 1.10
199.8	199.0	1.0042			
			Intercept	-0.512202	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

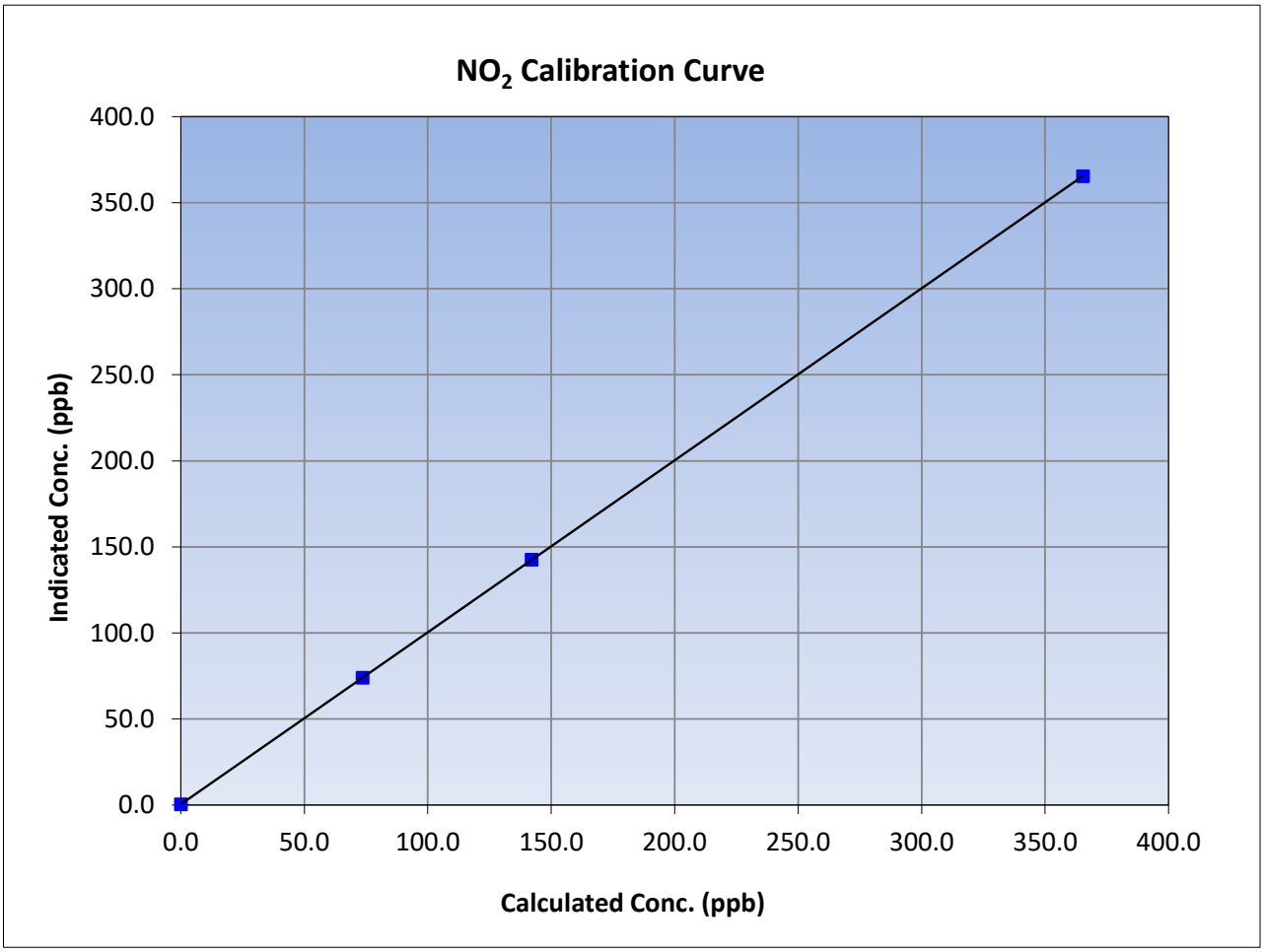
Version-04-2020

Station Information

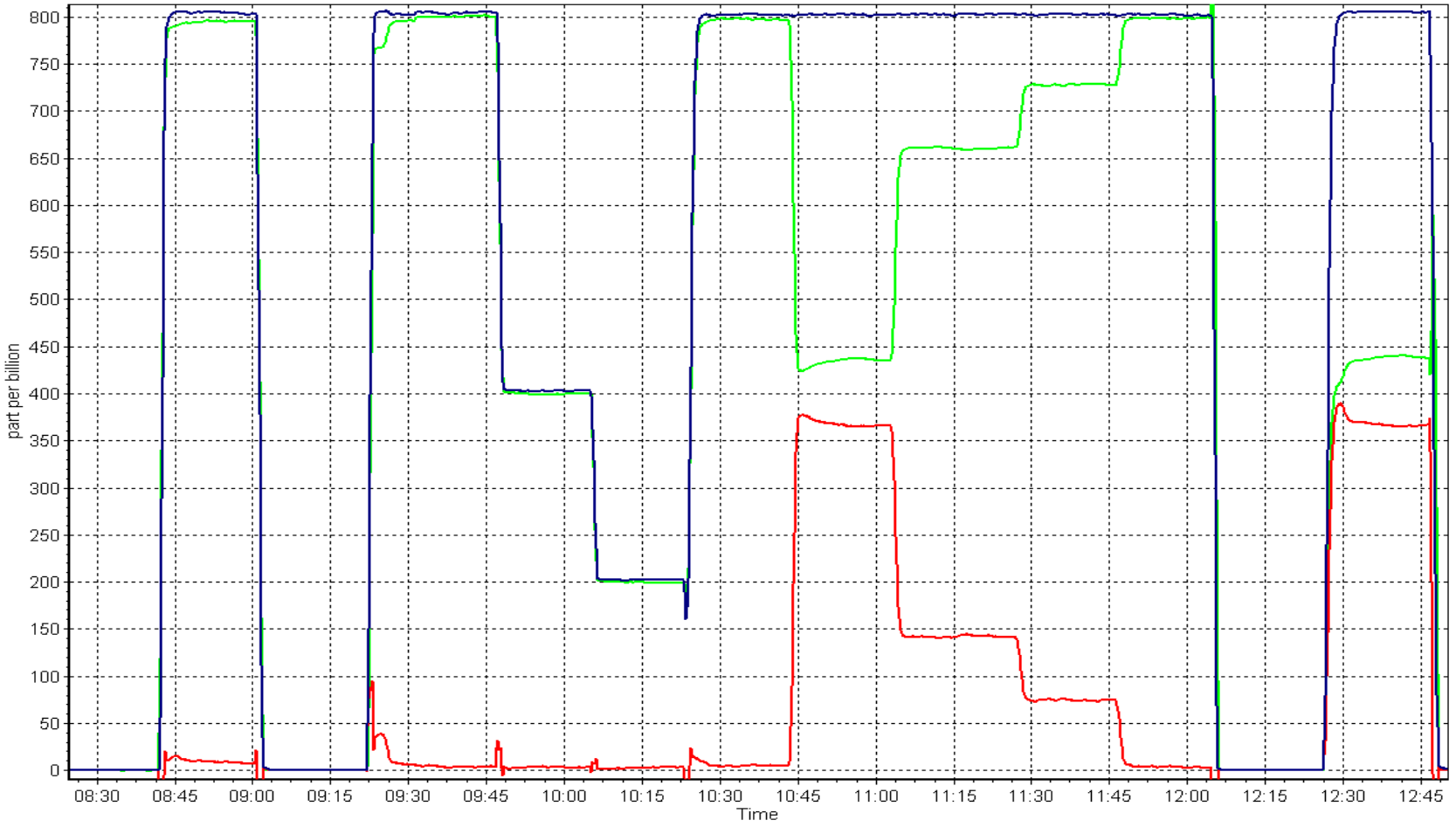
Calibration Date:	June 6, 2023	Previous Calibration:	May 23, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	8:21	End Time (MST):	12:50
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.3	----	Correlation Coefficient	0.999999	≥0.995
365.3	365.4	0.9998			
142.0	142.6	0.9960	Slope	0.999242	0.90 - 1.10
73.6	74.0	0.9950			
			Intercept	0.437176	+/-20



NO_X Calibration Plot Date: June 6, 2023 Location: Barge Landing



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Barge Landing	Station number:	AMS 09
Calibration Date:	June 7, 2023	Last Cal Date:	May 23, 2023
Start time (MST):	9:10	End time (MST):	9:39
Analyzer Make:	API T640	S/N:	321
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	DeltaCal	S/N:	1451
Temp/RH standard:	DeltaCal	S/N:	1451

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	21.1	22.30	21.1	☐	+/- 2 °C
P (mmHg)	728.1	729	728.1	☐	+/- 10 mmHg
flow (LPM)	5.04	5.06	5.04	☐	+/- 0.25 LPM

Leak Test: Date of check: June 7, 2023 Last Cal Date: May 23, 2023

PM w/o HEPA: 28.0 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				☐	11.3 +/- 0.5

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

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

Disposable Filter Changed: May 23, 2023

Annual Maintenance

Date Sample Tube Cleaned: November 15, 2022

Date RH/T Sensor Cleaned: November 15, 2022

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

Calibration by: Sean Bala

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS11
LOWER CAMP
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Lower Camp	Station number:	AMS11
Calibration Date:	June 27, 2023	Last Cal Date:	May 15, 2023
Start time (MST):	9:08	End time (MST):	11:51
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.25	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC2216			
Removed Cal Gas Conc:	49.25	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3807
ZAG Make/Model:	Teledyne API T701		Serial Number:	196

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 100841398

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997114	1.004834	Backgd or Offset:	14.6	14.7
Calibration intercept:	-0.568654	-0.648706	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	0.1	----
as found span	4919	81.3	800.8	802.6	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4919	81.3	800.8	804.9	0.995
second point	4959	40.7	400.9	400.4	1.001
third point	4980	20.3	199.9	200.2	0.999
as left zero	5000	0.0	0.0	0.4	----
as left span	4919	81.3	800.8	805.9	0.994
				Average Correction Factor	0.998

Baseline Corr As found:	802.50	Previous response	797.88	*% change	0.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

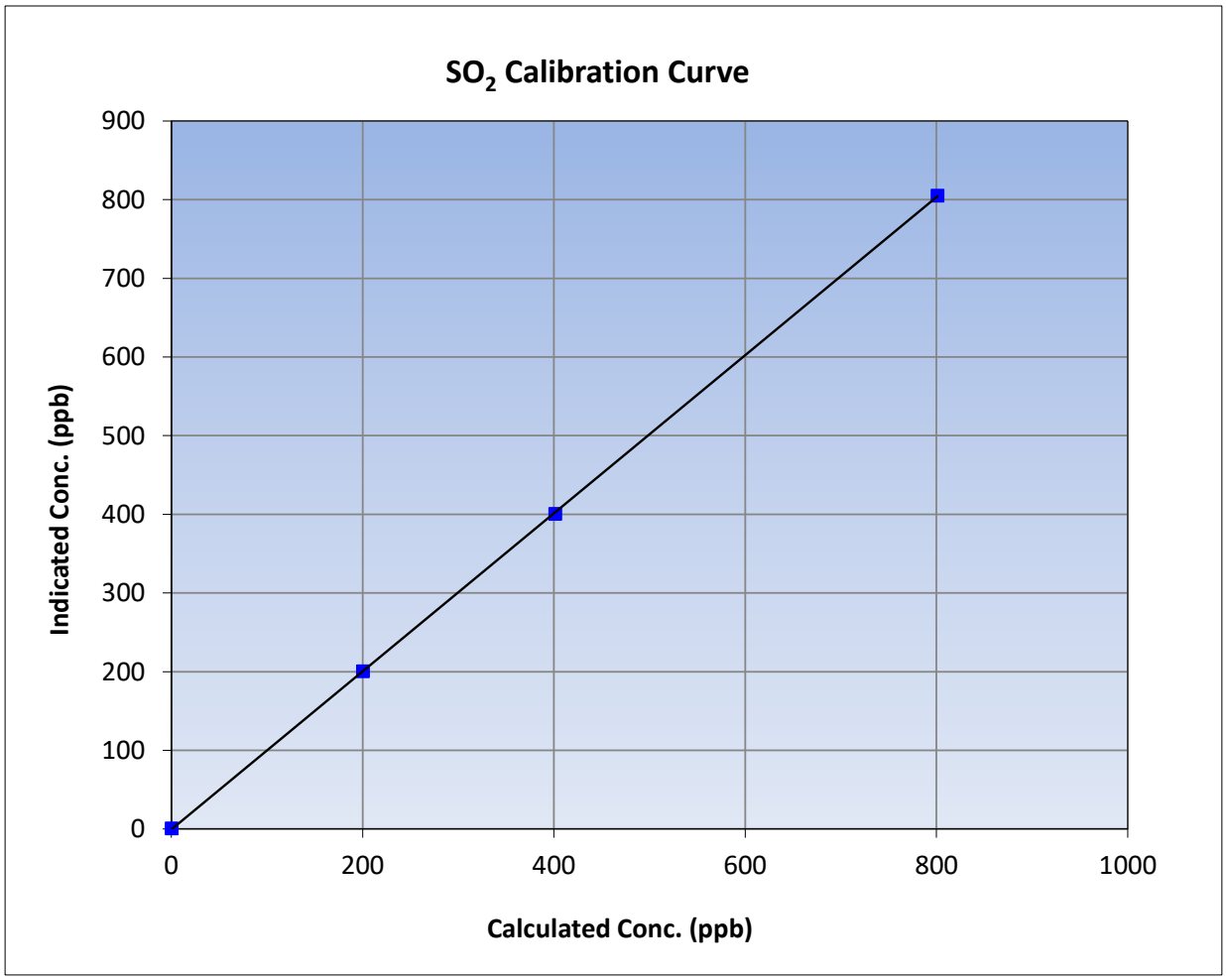
Station Information

Calibration Date:	June 27, 2023	Previous Calibration:	May 15, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:08	End Time (MST):	11:51
Analyzer make:	Thermo 43i	Analyzer serial #:	100841398

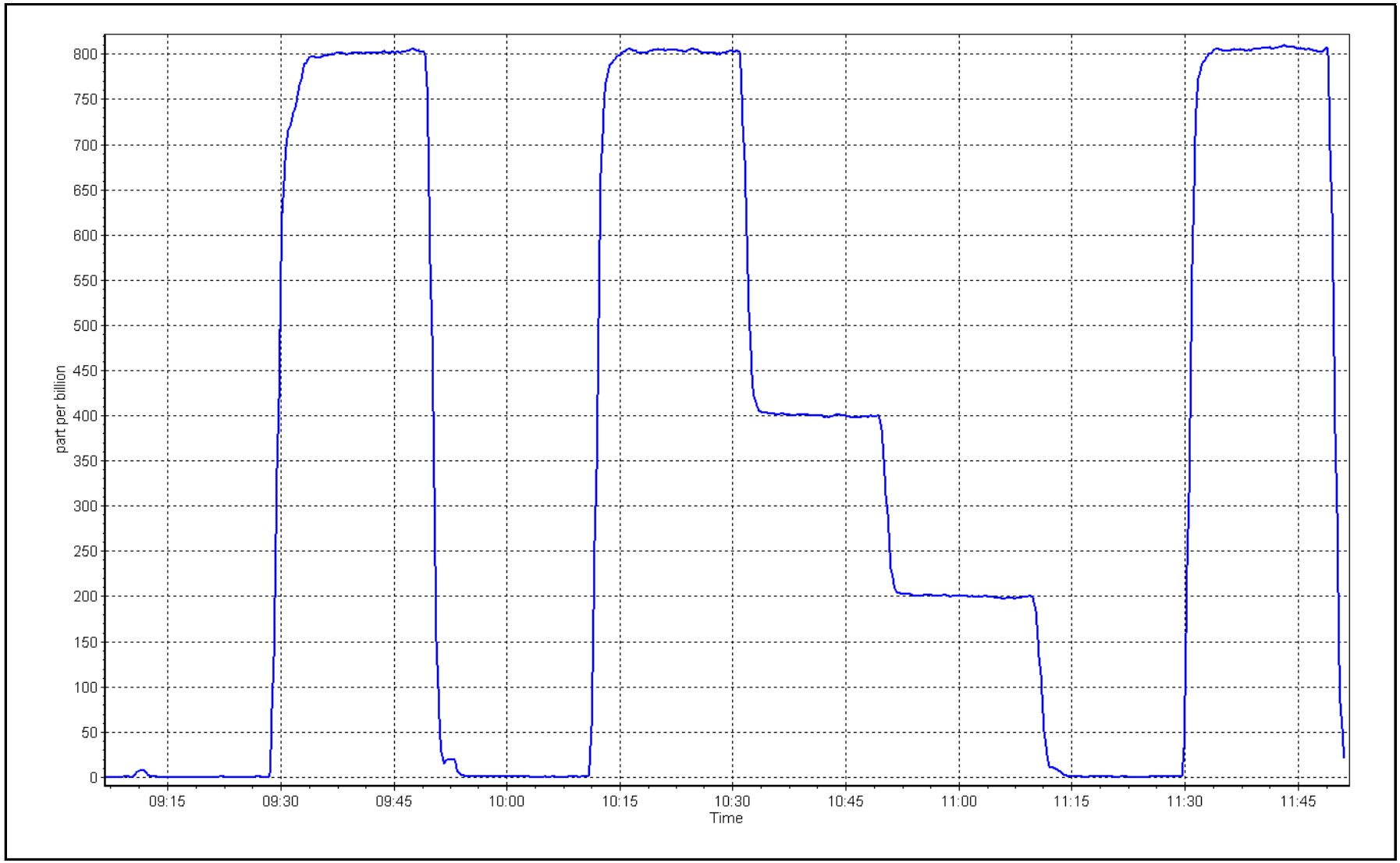
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
800.8	804.9	0.9949
400.9	400.4	1.0013
199.9	200.2	0.9987

Statistical Evaluation		Limits
Correlation Coefficient	0.999986	≥0.995
Slope	1.004834	0.90 - 1.10
Intercept	-0.648706	+/-30



SO2 Calibration Plot Date: June 27, 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:	June 28, 2023	Last Cal Date:	May 16, 2023
Start time (MST):	10:30	End time (MST):	13:59
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:	1.004895	1.012197	Backgd or Offset:	13.3	13.6
Calibration intercept:	0.035134	0.054446	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	-0.2	----
as found span	4926	73.6	79.9	81.5	0.978
as found 2nd point	4963	36.8	40.0	40.8	0.975
as found 3rd point	4982	18.6	20.2	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	0.1	----
high point	4926	73.6	79.9	80.9	0.988
second point	4963	36.8	40.0	40.7	0.982
third point	4982	18.6	20.2	20.3	0.995
as left zero	5000	0.0	0.0	0.2	----
as left span	4926	73.6	79.9	81.4	0.982
SO2 Scrubber Check	4919	81.1	811.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.988
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	81.7	Prev response:	80.35	*% change:	1.7%
Baseline Corr 2nd AF pt:	41.0	AF Slope:	1.023929	AF Intercept:	-0.306388
Baseline Corr 3rd AF pt:	20.3	AF Correlation:	0.999967		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

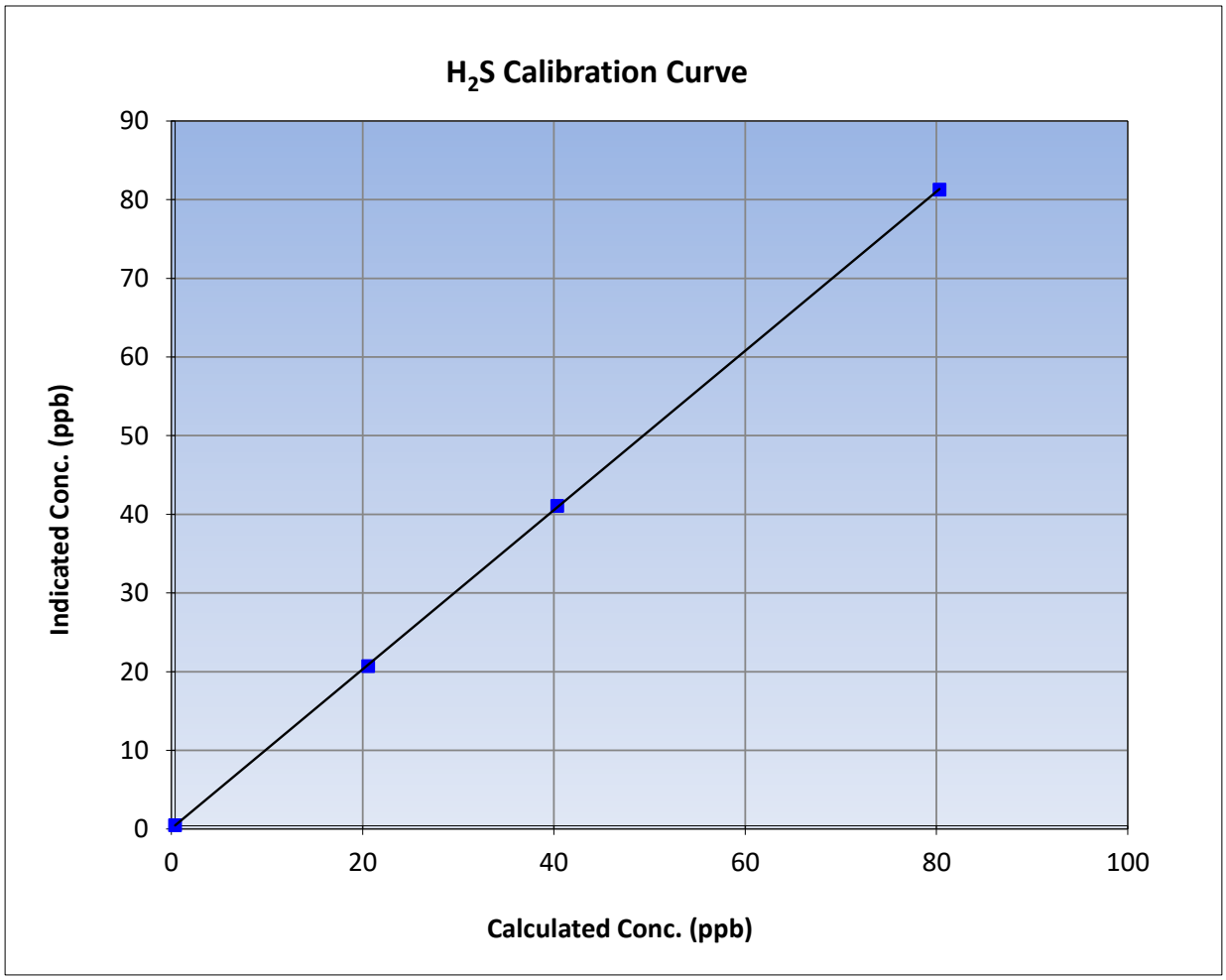
Station Information

Calibration Date:	June 28, 2023	Previous Calibration:	May 16, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	10:30	End Time (MST):	13:59
Analyzer make:	Thermo 450iQ	Analyzer serial #:	CM20080003

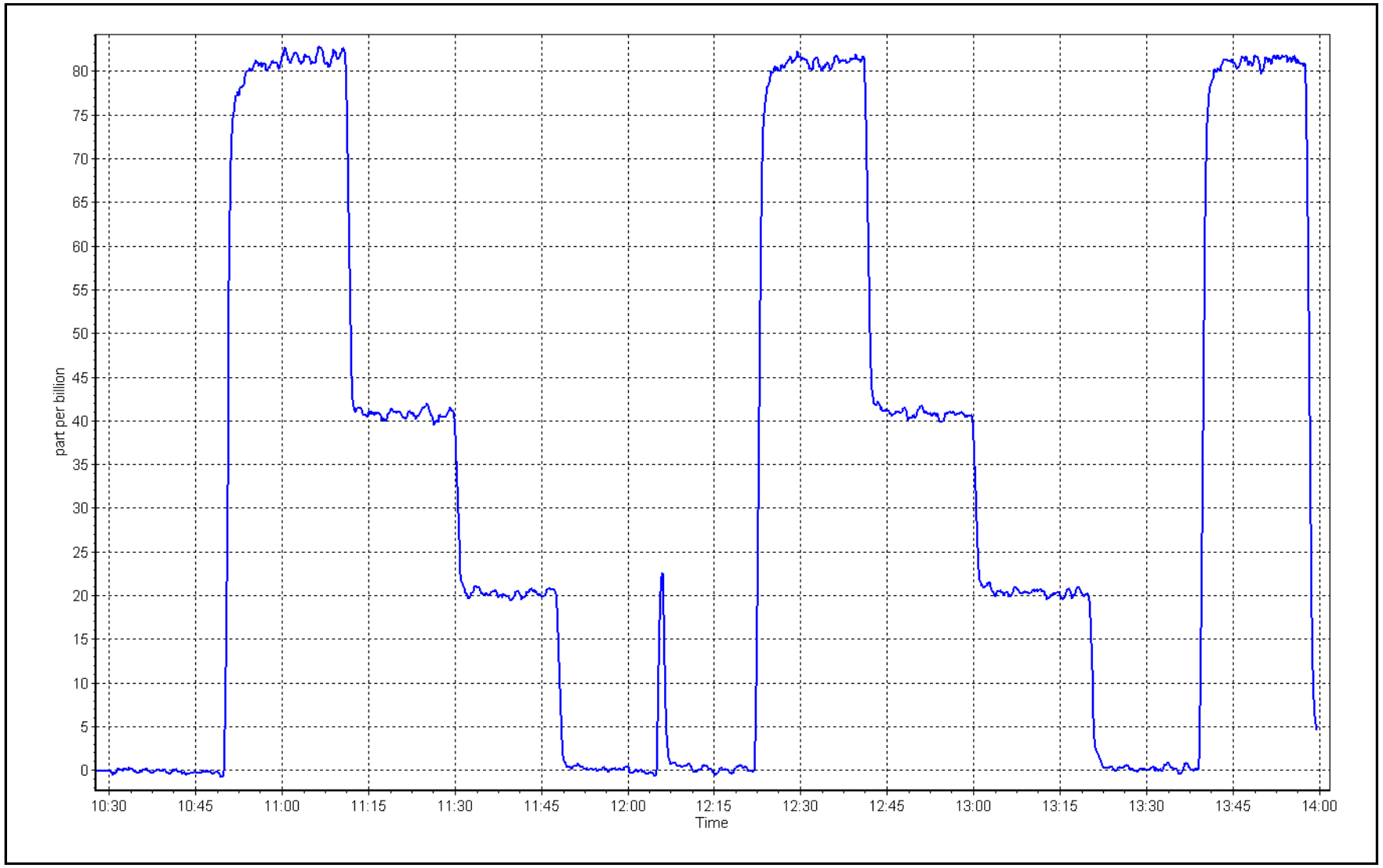
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
79.9	80.9	0.9879
40.0	40.7	0.9818
20.2	20.3	0.9948

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999977	*≥0.995*
Slope	1.012197	*0.90 - 1.10*
Intercept	0.054446	*+/-3*



H_2S Calibration Plot Date: June 28, 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:	June 27, 2023	Last Cal Date:	May 15, 2023
Start time (MST):	9:08	End time (MST):	11:51
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	17.33	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.3	17.35	17.30	1.003
second point	4959	40.7	8.69	8.60	1.010
third point	4980	20.3	4.33	4.30	1.008
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	17.35	17.43	0.995
				Average Correction Factor	1.007
Baseline Corr AF:	17.33	Prev response	17.29	*% change	0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	9.19	9.18	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.3	9.19	9.17	1.002
second point	4959	40.7	4.60	4.57	1.008
third point	4980	20.3	2.29	2.29	1.004
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	9.19	9.24	0.994
				Average Correction Factor	1.004
Baseline Corr AF:	9.18	Prev response	9.16	*% change	0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.3	8.16	8.14	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4919	81.3	8.16	8.13	1.004
second point	4959	40.7	4.09	4.04	1.012
third point	4980	20.3	2.04	2.01	1.012
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.3	8.16	8.19	0.996
				Average Correction Factor	1.009
Baseline Corr AF:	8.14	Prev response	8.12	*% change	0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.996470	0.997114
THC Cal Offset:	-0.001598	-0.018987
CH4 Cal Slope:	0.994977	0.996346
CH4 Cal Offset:	-0.000697	-0.012088
NMHC Cal Slope:	0.997386	0.997920
NMHC Cal Offset:	-0.000502	-0.006899

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

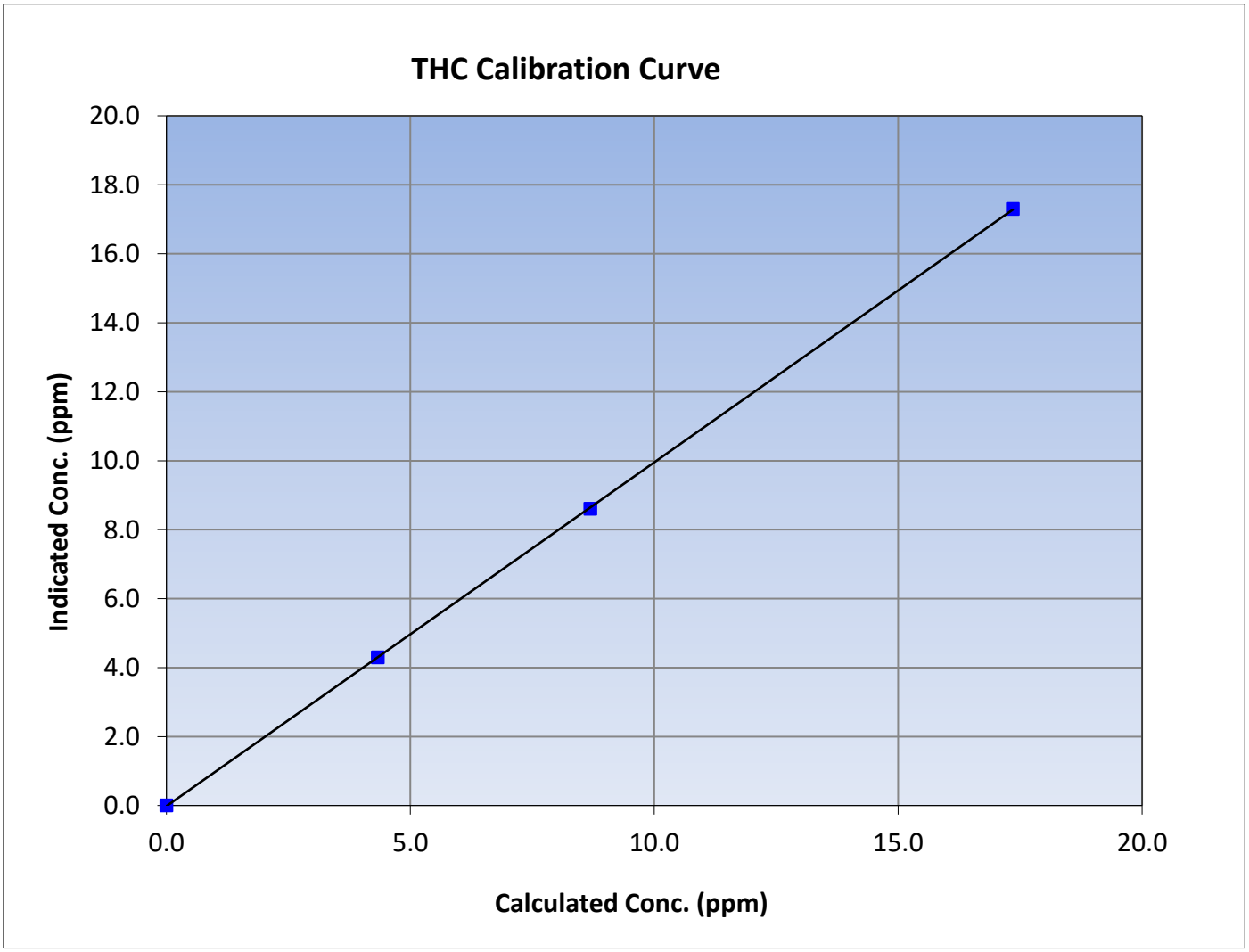
Version-01-2020

Station Information

Calibration Date:	June 27, 2023	Previous Calibration:	May 15, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:08	End Time (MST):	11:51
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	0.999986	*≥0.995*
17.35	17.30	1.0029			
8.69	8.60	1.0096	Slope	0.997114	*0.90 - 1.10*
4.33	4.30	1.0075			
			Intercept	-0.018987	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

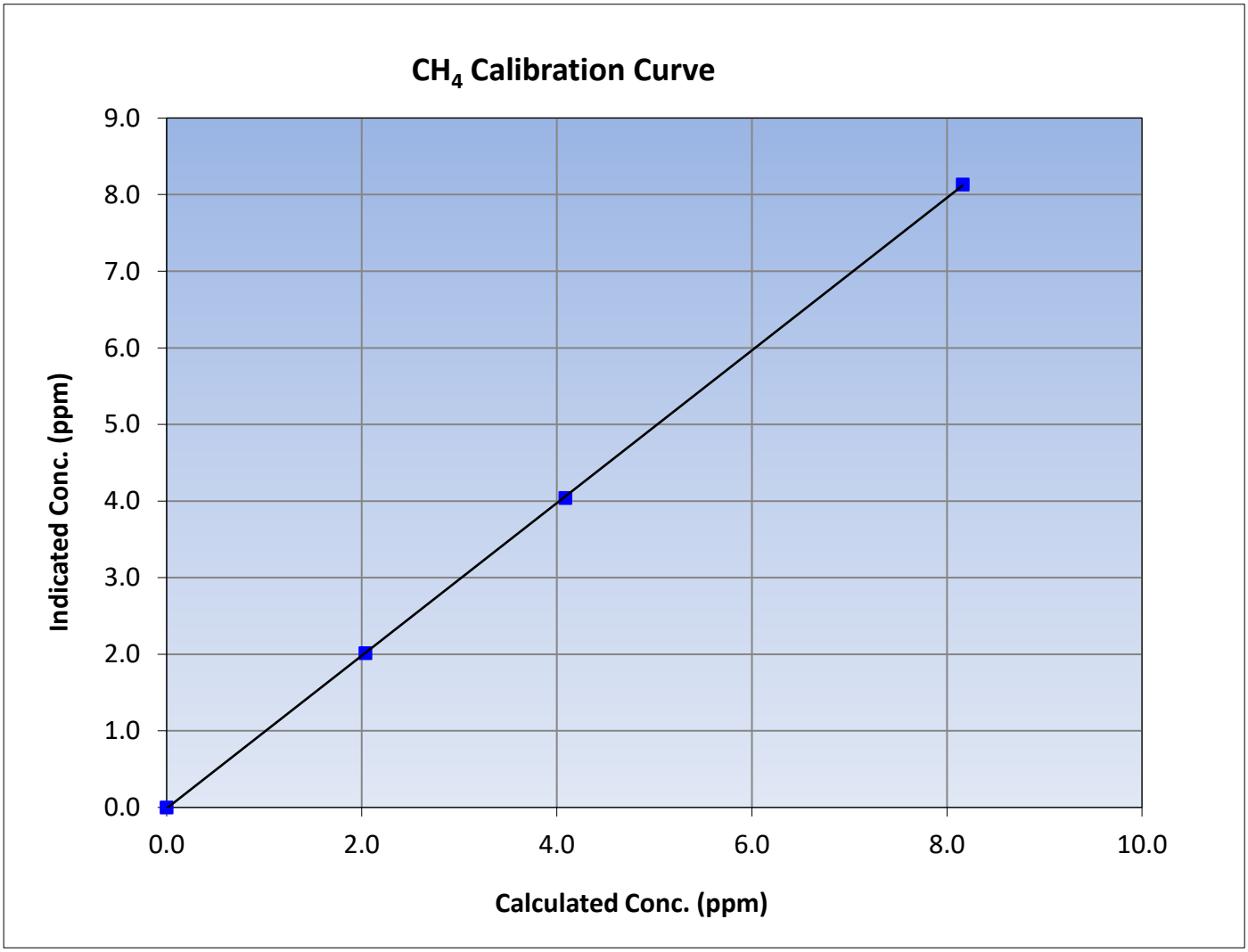
Version-01-2020

Station Information

Calibration Date:	June 27, 2023	Previous Calibration:	May 15, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:08	End Time (MST):	11:51
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	0.999981	*≥0.995*
8.16	8.13	1.0038			
4.09	4.04	1.0115	Slope	0.996346	*0.90 - 1.10*
2.04	2.01	1.0119			
			Intercept	-0.012088	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

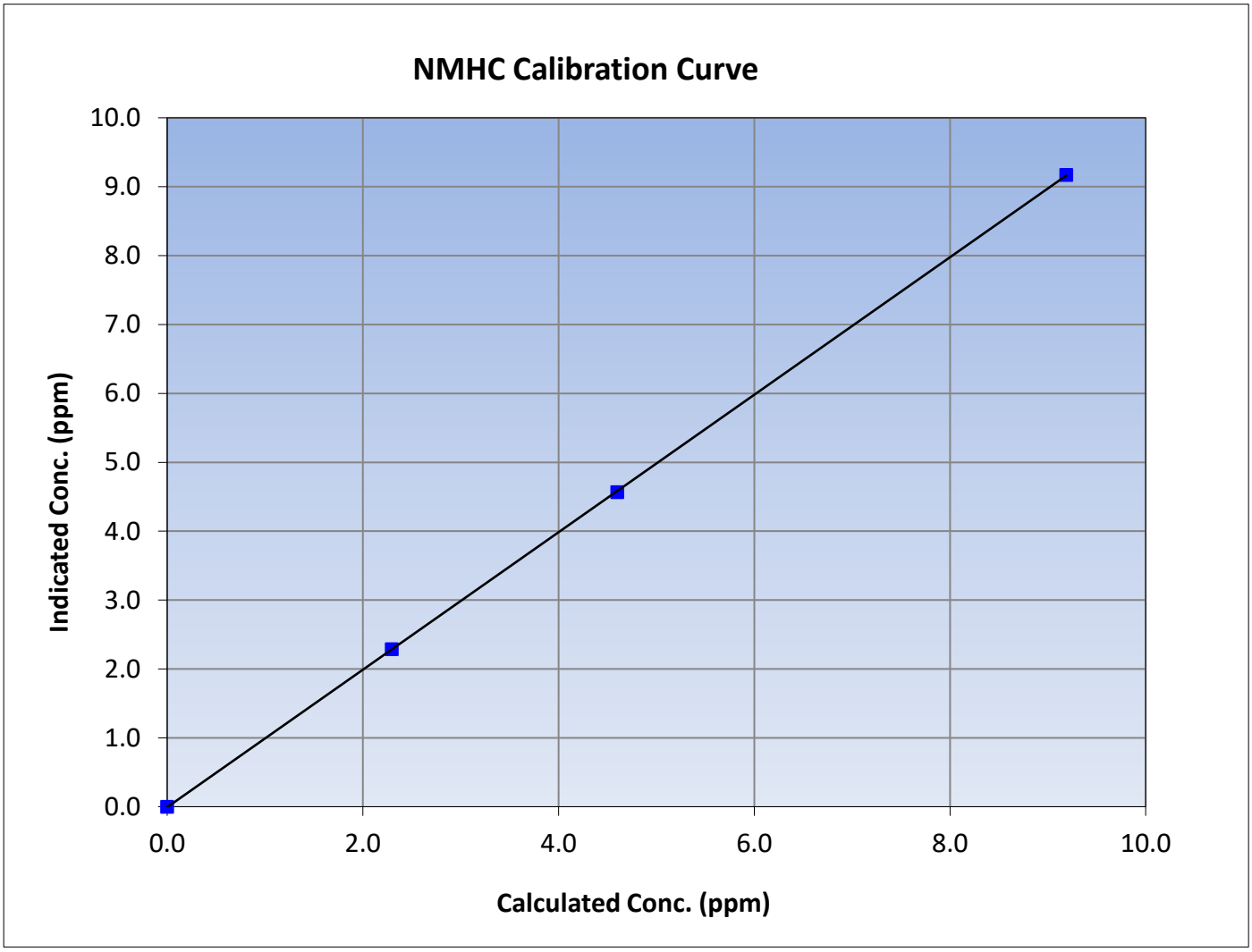
Version-01-2020

Station Information

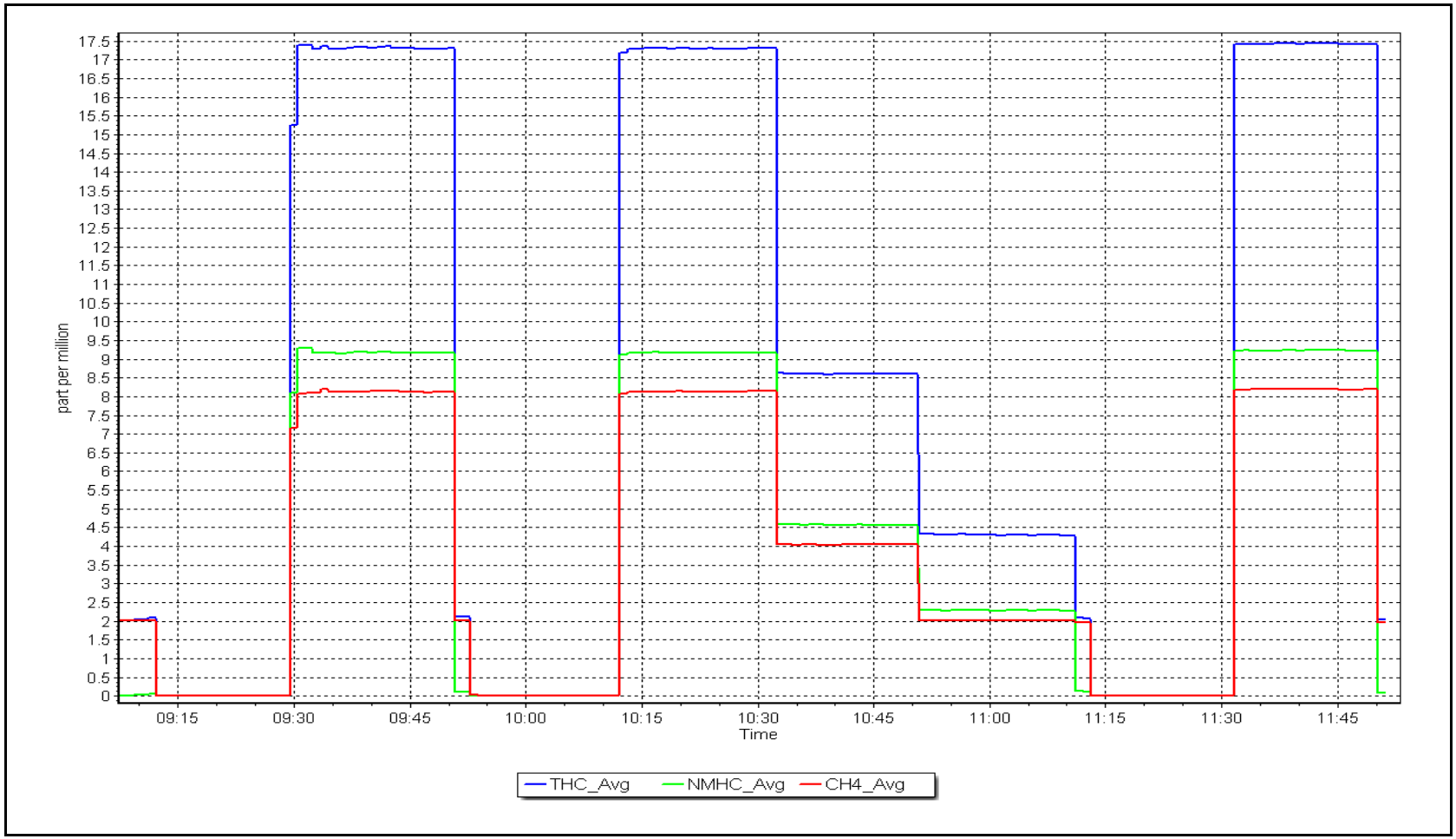
Calibration Date:	June 27, 2023	Previous Calibration:	May 15, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:08	End Time (MST):	11:51
Analyzer make:	Thermo 55i	Analyzer serial #:	1505164381

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999989	≥0.995
9.19	9.17	1.0019			
4.60	4.57	1.0078	Slope	0.997920	0.90 - 1.10
2.29	2.29	1.0036			
			Intercept	-0.006899	+/-0.5



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



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS13
FORT MCKAY SOUTH
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	June 26, 2023	Last Cal Date:	May 17, 2023
Start time (MST):	9:42	End time (MST):	12:35
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make: API T100 Analyzer serial #: 599

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001326	1.001127	Backgd or Offset:	80.5	86.3
Calibration intercept:	-1.757849	-2.638171	Coeff or Slope:	0.725	0.714

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	1.6	----
as found span	4921	79.1	799.7	812.0	0.985
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.3	----
high point	4921	79.1	799.7	799.0	1.001
second point	4961	39.5	399.3	396.3	1.008
third point	4980	19.8	200.2	195.2	1.026
as left zero	5000	0.0	0.0	-0.2	----
as left span	4921	79.1	799.7	798.8	1.001
				Average Correction Factor	1.011

Baseline Corr As found:	810.40	Previous response	798.99	*% change	1.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

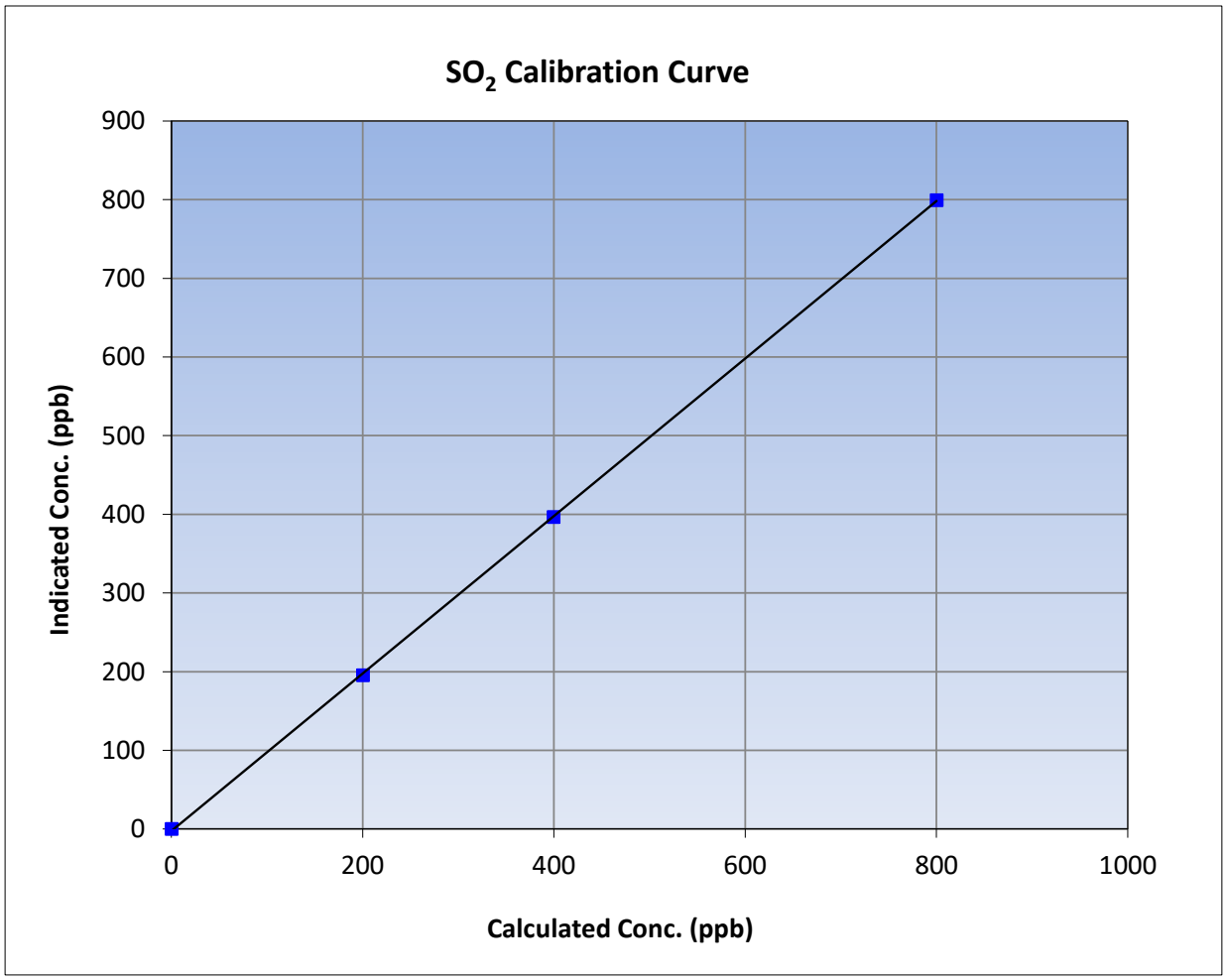
Station Information

Calibration Date:	June 26, 2023	Previous Calibration:	May 17, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	9:42	End Time (MST):	12:35
Analyzer make:	API T100	Analyzer serial #:	599

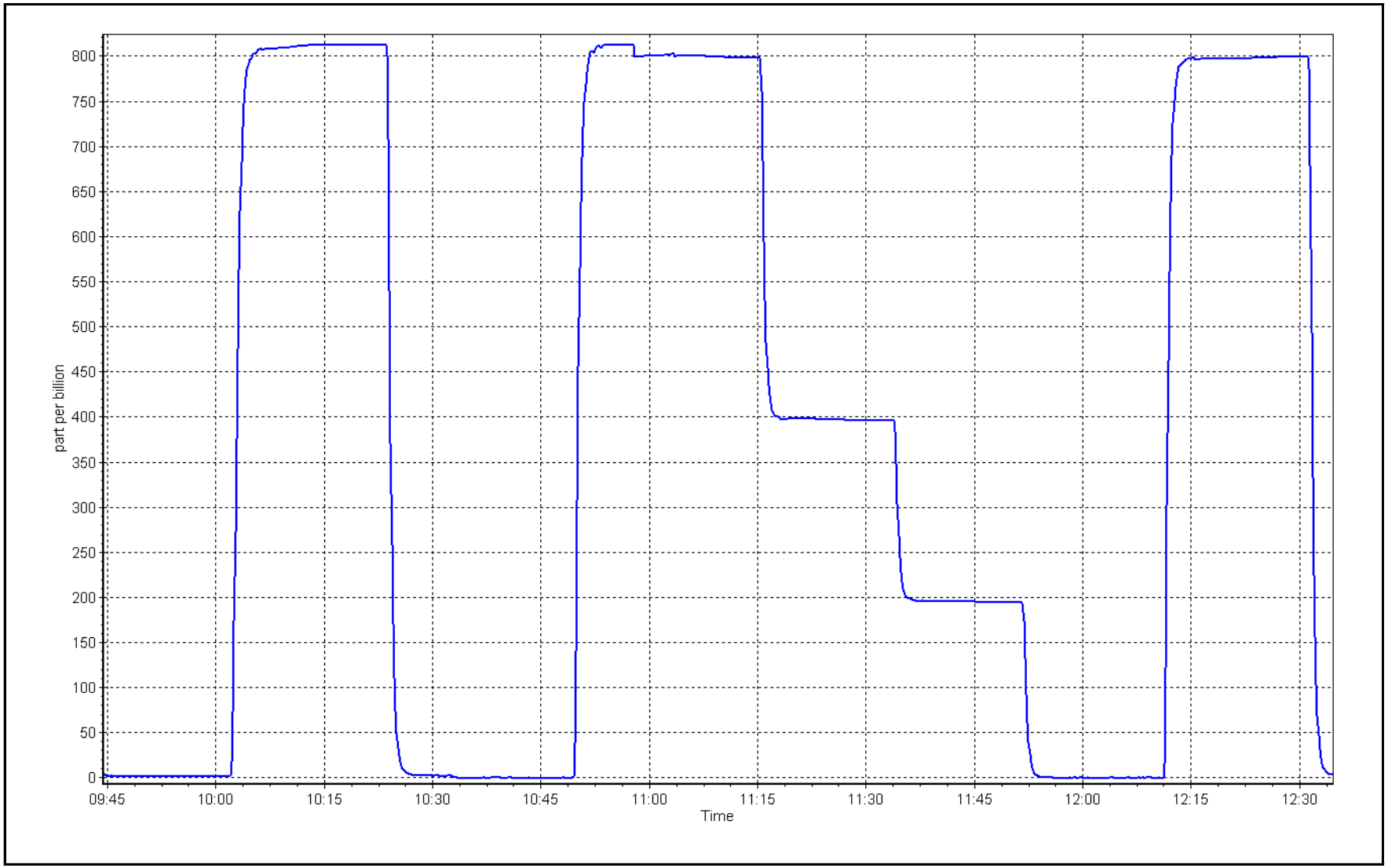
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
799.7	799.0	1.0009
399.3	396.3	1.0076
200.2	195.2	1.0255

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999960	*≥0.995*
Slope	1.001127	*0.90 - 1.10*
Intercept	-2.638171	*+/-30*



SO2 Calibration Plot Date: June 26, 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:	June 29, 2023	Last Cal Date:	May 2, 2023
Start time (MST):	7:09	End time (MST):	11:08
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1180540017	
Converter make:	CDN-101		Converter serial #:	521	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005466	1.004617	Backgd or Offset:	3.68	3.54
Calibration intercept:	-0.262184	-0.182243	Coeff or Slope:	1.116	1.066

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4925	75.5	80.6	80.7	0.998
as found 2nd point	4962	37.7	40.3	40.2	0.999
as found 3rd point	4981	18.9	20.2	20.1	0.999
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4925	75.5	80.6	80.9	0.997
second point	4962	37.7	40.3	40.2	1.002
third point	4981	18.9	20.2	19.9	1.014
as left zero	5000	0.0	0.0	0.2	----
as left span	4925	75.5	80.6	80.7	0.999
SO2 Scrubber Check	4921	79.1	791.0	0.0	----
Date of last scrubber change:		20-Mar-20		Ave Corr Factor	1.004
Date of last converter efficiency test:		NA			efficiency

Baseline Corr As found:	80.8	Prev response:	80.80	*% change:	0.0%
Baseline Corr 2nd AF pt:	40.3	AF Slope:	1.002208	AF Intercept:	-0.122275
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999999		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

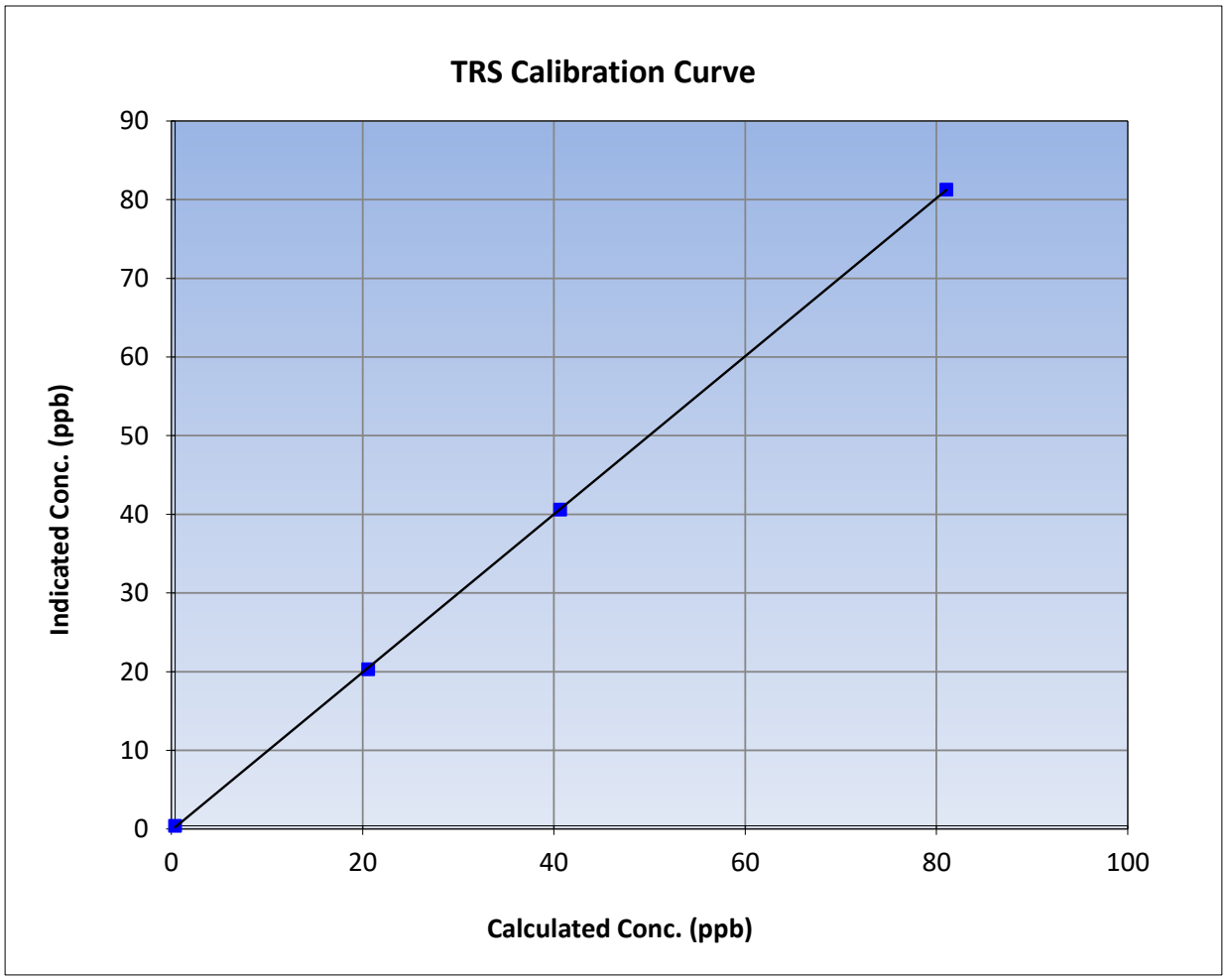
Station Information

Calibration Date:	June 29, 2023	Previous Calibration:	May 2, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	7:09	End Time (MST):	13:36
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1180540017

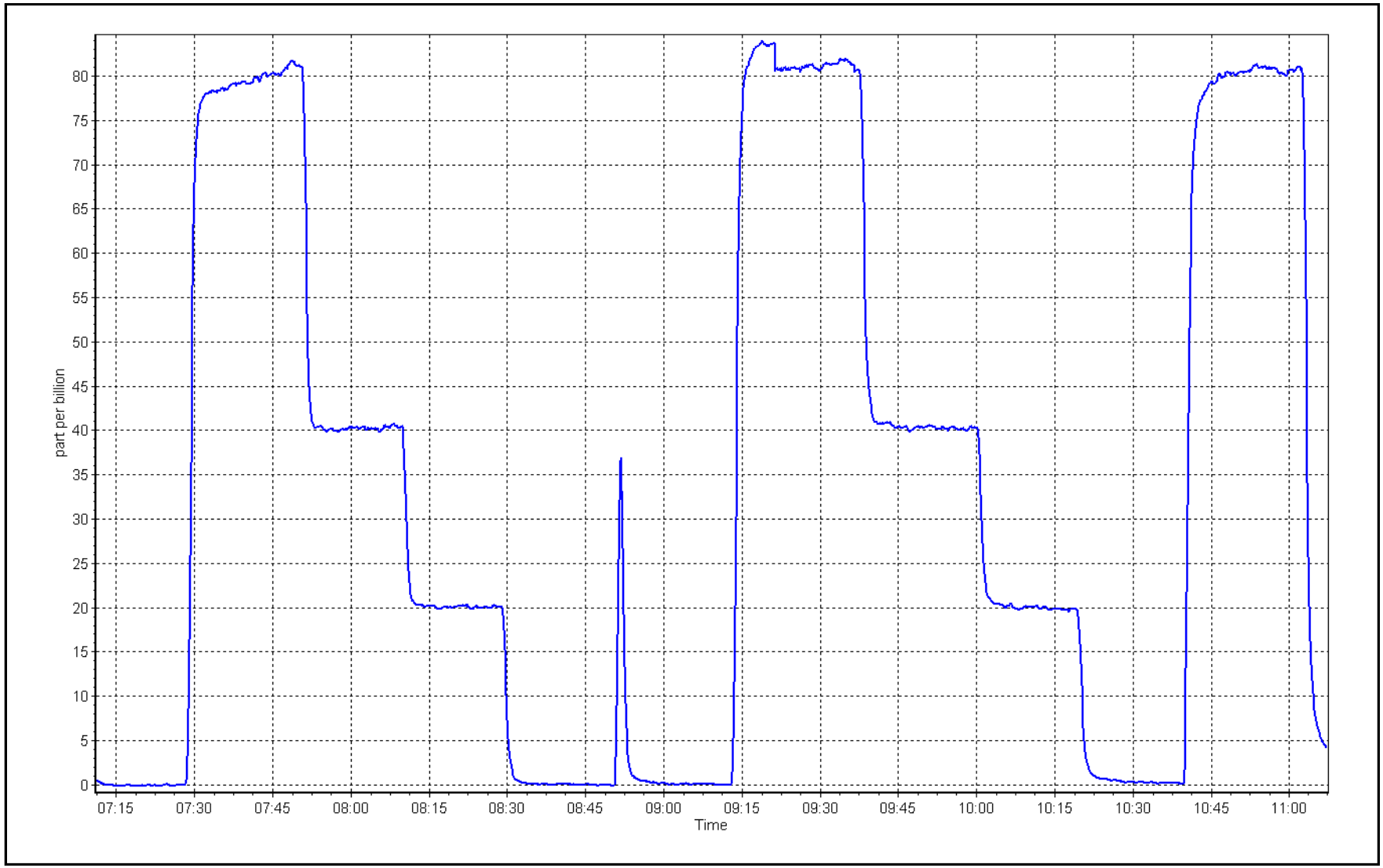
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.6	80.9	0.9966
40.3	40.2	1.0016
20.2	19.9	1.0144

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999977	*≥0.995*
Slope	1.004617	*0.90 - 1.10*
Intercept	-0.182243	*+/-3*



TRS Calibration Plot Date: June 29, 2023 Location: Fort McKay South



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	June 23, 2023	Last Cal Date:	May 17, 2023
Start time (MST):	8:30	End time (MST):	9:58
Reason:	Cylinder Change		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1170050130	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.21E-04	2.21E-04	NMHC SP Ratio:	5.06E-04	5.06E-04
CH4 Retention time:	12.8	12.8	NMHC Peak Area:	179419	179419

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	16.95	1.006
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	16.90	1.009
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.009

Baseline Corr AF:	16.95	Prev response	16.98	*% change	-0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4921	79.1	9.08	9.04	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4921	79.1	9.08	9.00	1.009
second point	4960				
third point					
as left zero					
as left span	4921	79.1	9.08		
				Average Correction Factor	1.009
Baseline Corr AF:	9.04	Prev response	9.04	*% 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	4921	79.1	7.97	7.91	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	79.1	7.97	7.90	1.008
second point	4960				
third point					
as left zero					
as left span	4921	79.1	7.97		
				Average Correction Factor	1.008
Baseline Corr AF:	7.91	Prev response	7.94	*% change	-0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

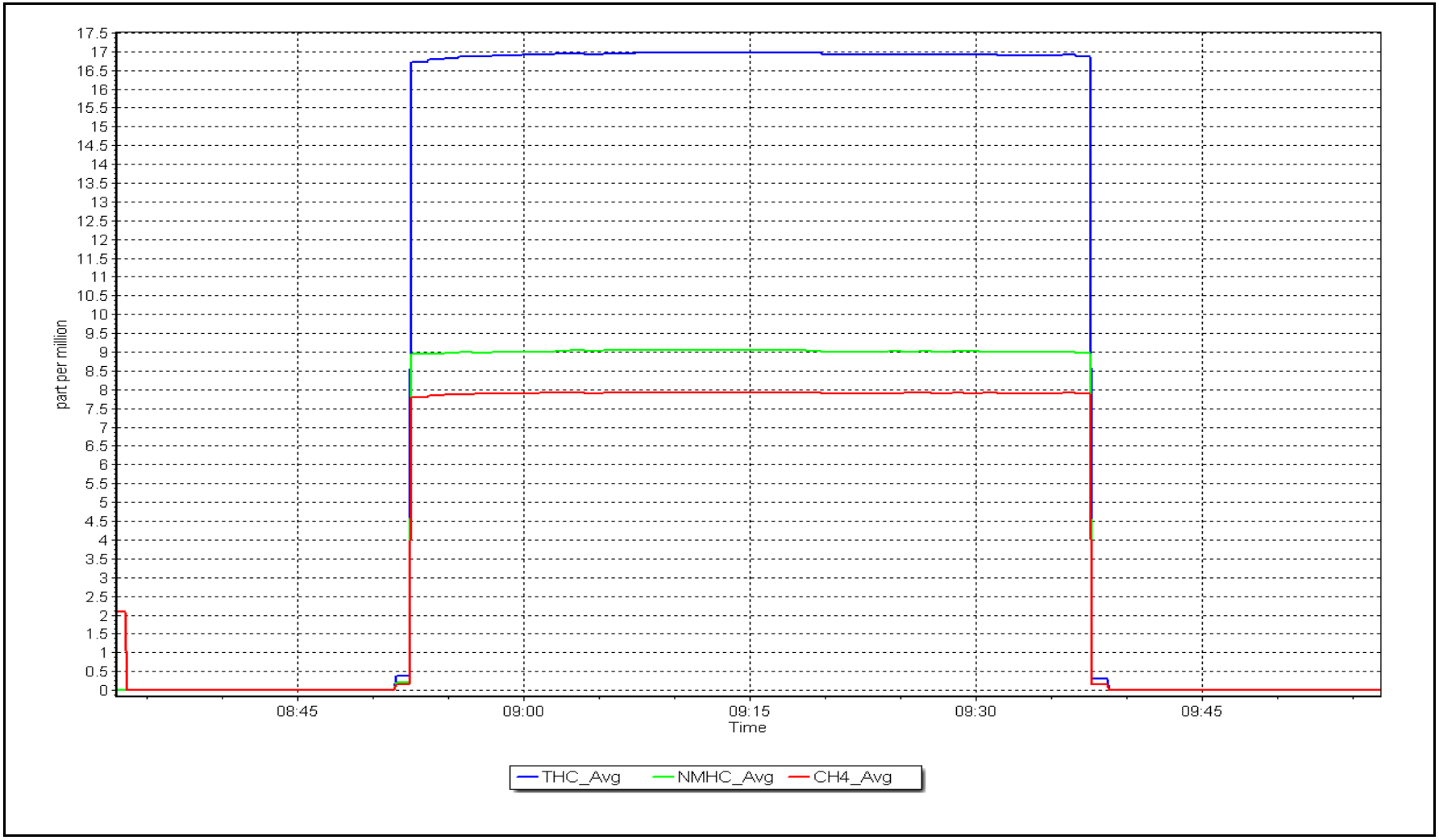
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000879	0.991488
THC Cal Offset:	-0.078771	0.000000
CH4 Cal Slope:	1.001767	0.992118
CH4 Cal Offset:	-0.042148	0.000000
NMHC Cal Slope:	0.999952	0.991044
NMHC Cal Offset:	-0.036961	0.000000

Notes: Changed cylinder after as founds.

Calibration Performed By: Sean Bala

NMHC Calibration Plot Date: June 23, 2023 Location: Fort McKay South



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Fort McKay South	Station number:	AMS13
Calibration Date:	June 26, 2023	Last Cal Date:	May 17, 2023
Start time (MST):	9:42	End time (MST):	12:35
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1170050130	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.21E-04	2.22E-04	NMHC SP Ratio:	5.06E-04	5.10E-04
CH4 Retention time:	12.8	13.0	NMHC Peak Area:	179419	177982

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	16.95	1.006
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	17.02	1.001
second point	4961	39.5	8.51	8.38	1.016
third point	4980	19.8	4.27	4.12	1.037
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	17.05	17.04	1.000
				Average Correction Factor	1.018
Baseline Corr AF:	16.95	Prev response	16.98	*% change	-0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4921	79.1	9.08	9.04	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4921	79.1	9.08	9.06	1.002
second point	4960	39.5	4.53	4.49	1.011
third point	4980	19.8	2.27	2.20	1.032
as left zero	5000	0	0.00	0.00	----
as left span	4921	79.1	9.08	9.08	0.999
				Average Correction Factor	1.015
Baseline Corr AF:	9.04	Prev response	9.04	*% change	0.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.1	7.97	7.90	1.008
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	7.96	1.001
second point	4960	39.5	3.98	3.89	1.022
third point	4980	19.8	1.99	1.91	1.043
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.1	7.97	7.96	1.001
				Average Correction Factor	1.022
Baseline Corr AF:	7.90	Prev response	7.94	*% 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:	1.000879	1.000853
THC Cal Offset:	-0.078771	-0.082577
CH4 Cal Slope:	1.001767	1.001309
CH4 Cal Offset:	-0.042148	-0.048553
NMHC Cal Slope:	0.999952	1.000342
NMHC Cal Offset:	-0.036961	-0.034760

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

THC Calibration Summary

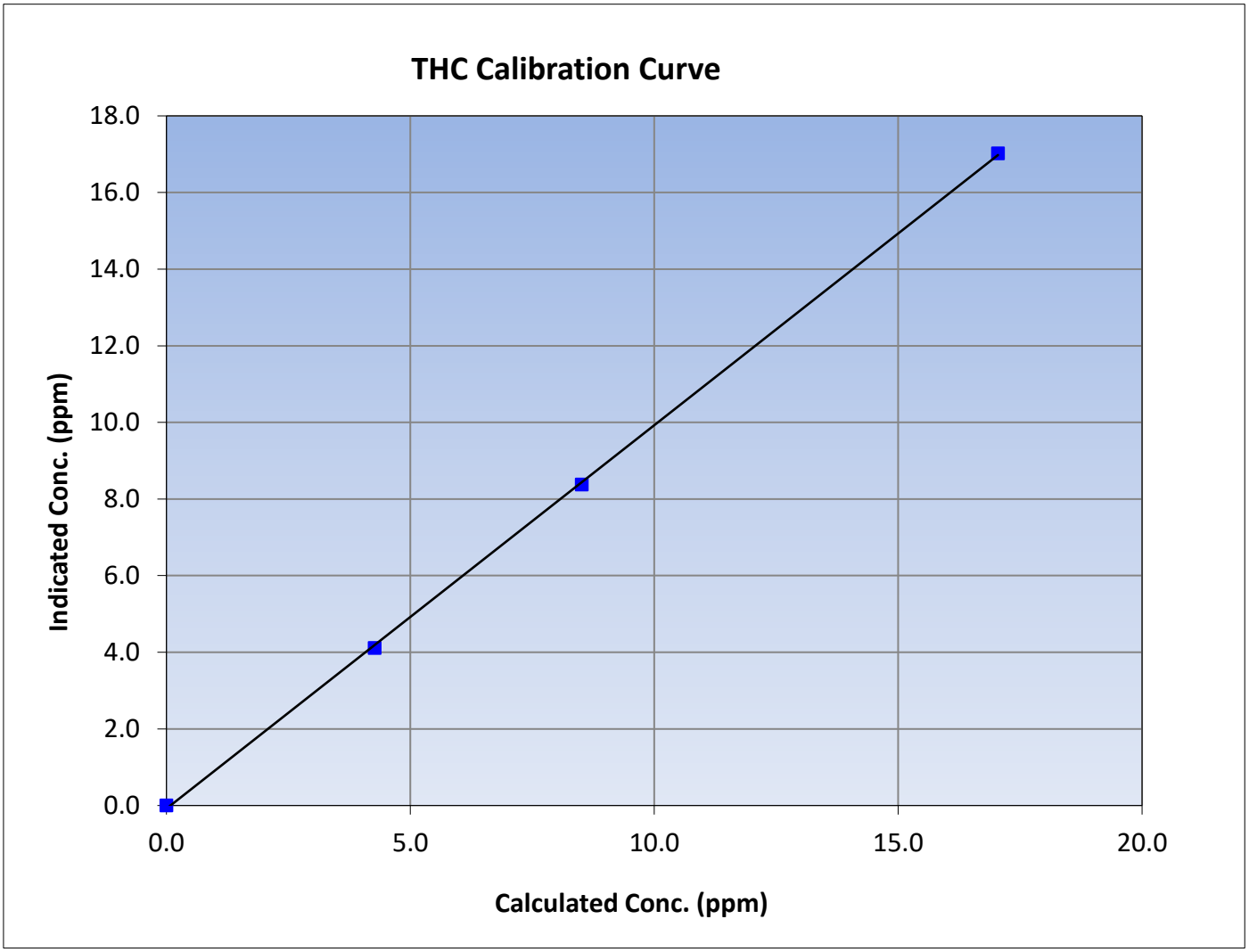
Version-01-2020

Station Information

Calibration Date:	June 26, 2023	Previous Calibration:	May 17, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	9:42	End Time (MST):	12:35
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050130

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999891	≥0.995
17.05	17.02	1.0013			
8.51	8.38	1.0156	Slope	1.000853	0.90 - 1.10
4.27	4.12	1.0370			
			Intercept	-0.082577	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

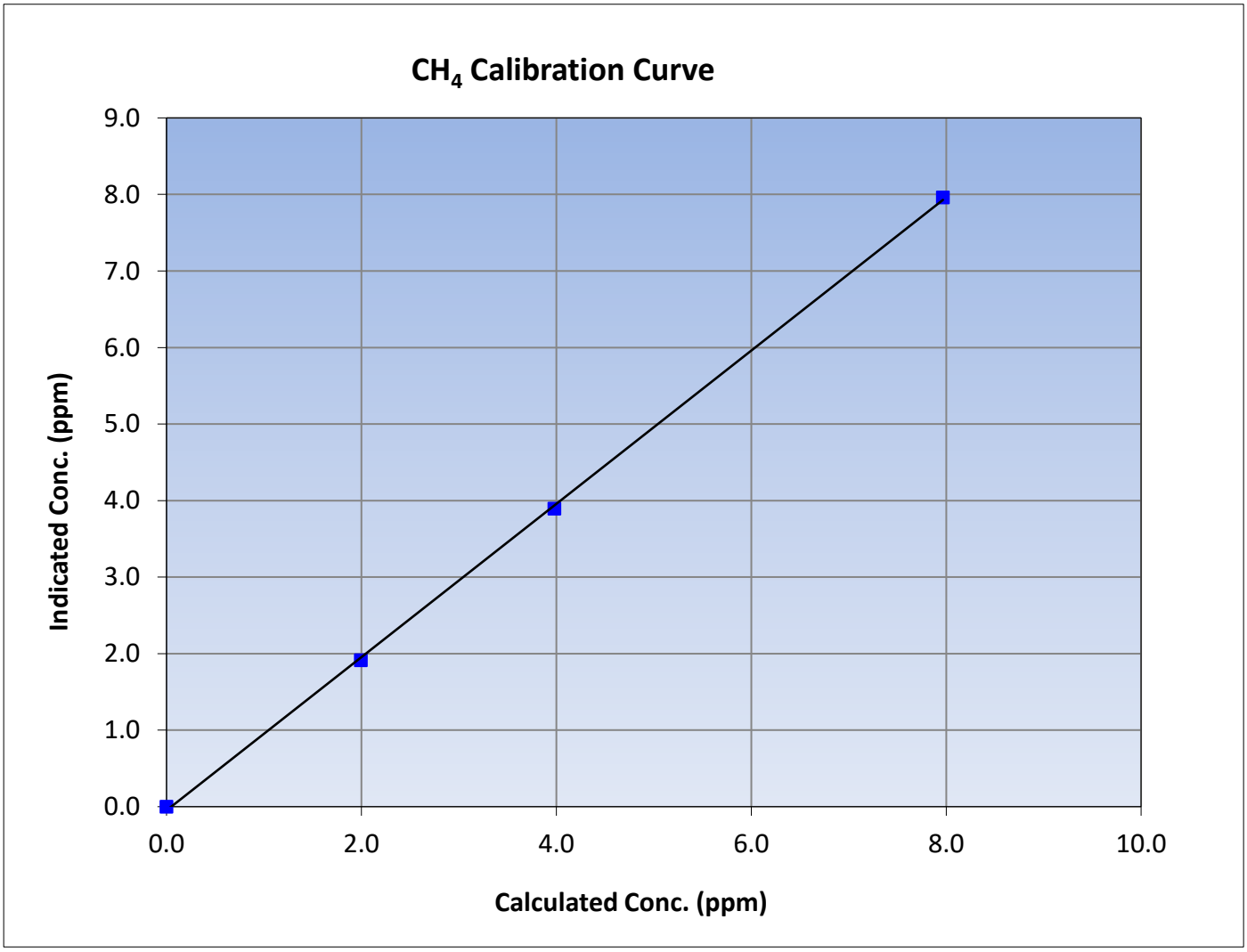
Version-01-2020

Station Information

Calibration Date:	June 26, 2023	Previous Calibration:	May 17, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	9:42	End Time (MST):	12:35
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050130

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999816	*≥0.995*
7.97	7.96	1.0010			
3.98	3.89	1.0220	Slope	1.001309	*0.90 - 1.10*
1.99	1.91	1.0431			
			Intercept	-0.048553	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

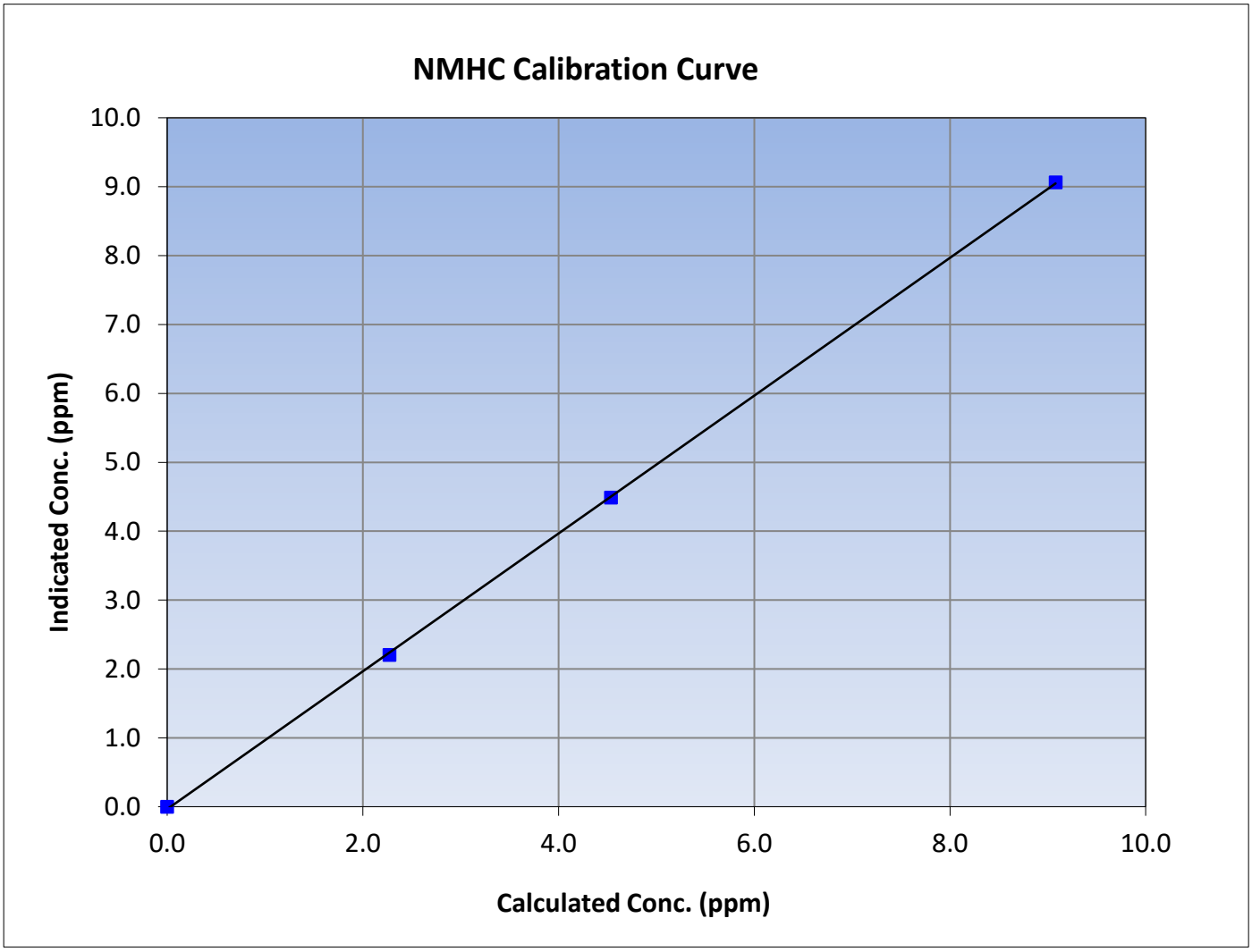
Version-01-2020

Station Information

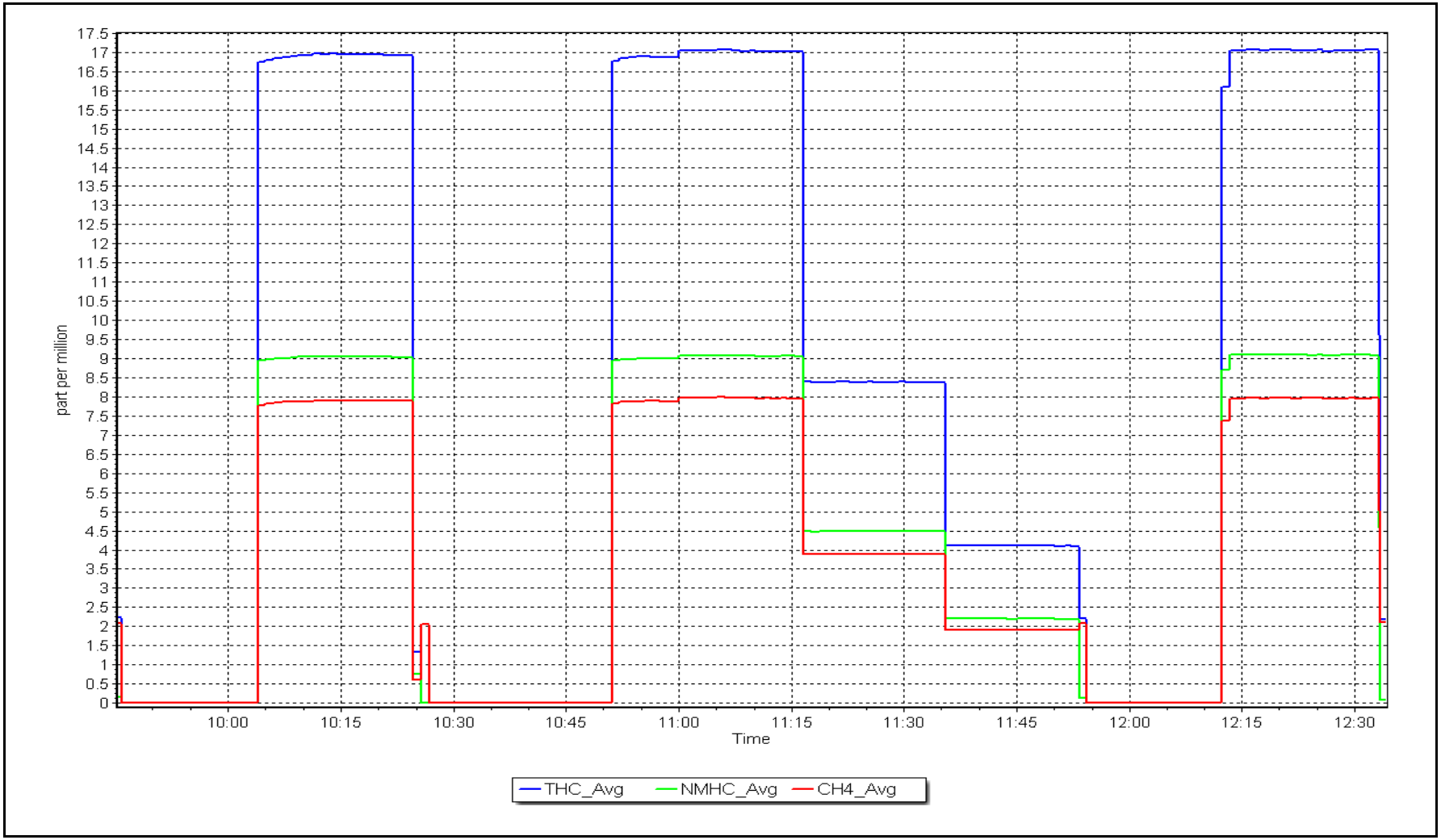
Calibration Date:	June 26, 2023	Previous Calibration:	May 17, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	9:42	End Time (MST):	12:35
Analyzer make:	Thermo 55i	Analyzer serial #:	1170050130

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999933	≥0.995
9.08	9.06	1.0017			
4.53	4.49	1.0106	Slope	1.000342	0.90 - 1.10
2.27	2.20	1.0322			
			Intercept	-0.034760	+/-0.5



NMHC Calibration Plot Date: June 26, 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:	June 5, 2023	Last Cal Date:	May 30, 2023
Start time (MST):	9:14	End time (MST):	13:39
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:	1.168	1.095	NO bkgnd or offset:	9.2	8.9
NOX coeff or slope:	0.988	0.991	NOX bkgnd or offset:	9.6	10.3
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	130.9	158.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.998875	0.997811
NO_X Cal Offset:	-1.831289	-1.870975
NO Cal Slope:	1.003248	1.002005
NO Cal Offset:	-2.765445	-2.905185
NO_2 Cal Slope:	0.991692	0.997514
NO_2 Cal Offset:	-1.272971	0.257066

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	0.1	1.1	----	----
as found span	4919	81.1	826.9	800.0	26.9	881.2	854.6	26.3	0.9384	0.9361
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	-0.2	0.3	----	----
high point	4919	81.1	826.9	800.0	26.9	824.2	800.0	24.1	1.0033	0.9999
second point	4960	40.6	413.9	400.4	13.5	410.1	397.0	13.0	1.0093	1.0086
third point	4980	20.3	207.0	200.2	6.7	202.7	195.0	7.7	1.0210	1.0268
as left zero	5000	0.0	0.0	0.0	0.0	-1.0	-0.2	-0.8	----	----
as left span	4919	80.1	816.8	374.0	442.8	830.8	384.4	446.4	0.9832	0.9730
								Average Correction Factor	1.0112	1.0118

Corrected As found	NO_X = 880.1 ppb	NO = 854.5 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	6.4%
Previous Response	NO_X = 824.1 ppb	NO = 799.8 ppb		*Percent Change	NO =	6.4%
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)	796.5	380.6	442.8	441.8	1.0023	99.8%
2nd GPT point (200 ppb O3)	796.5	590.2	233.2	233.5	0.9988	100.1%
3rd GPT point (100 ppb O3)	796.5	694.2	129.2	128.7	1.0041	99.6%
				Average Correction Factor	1.0017	99.8%

Notes: 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

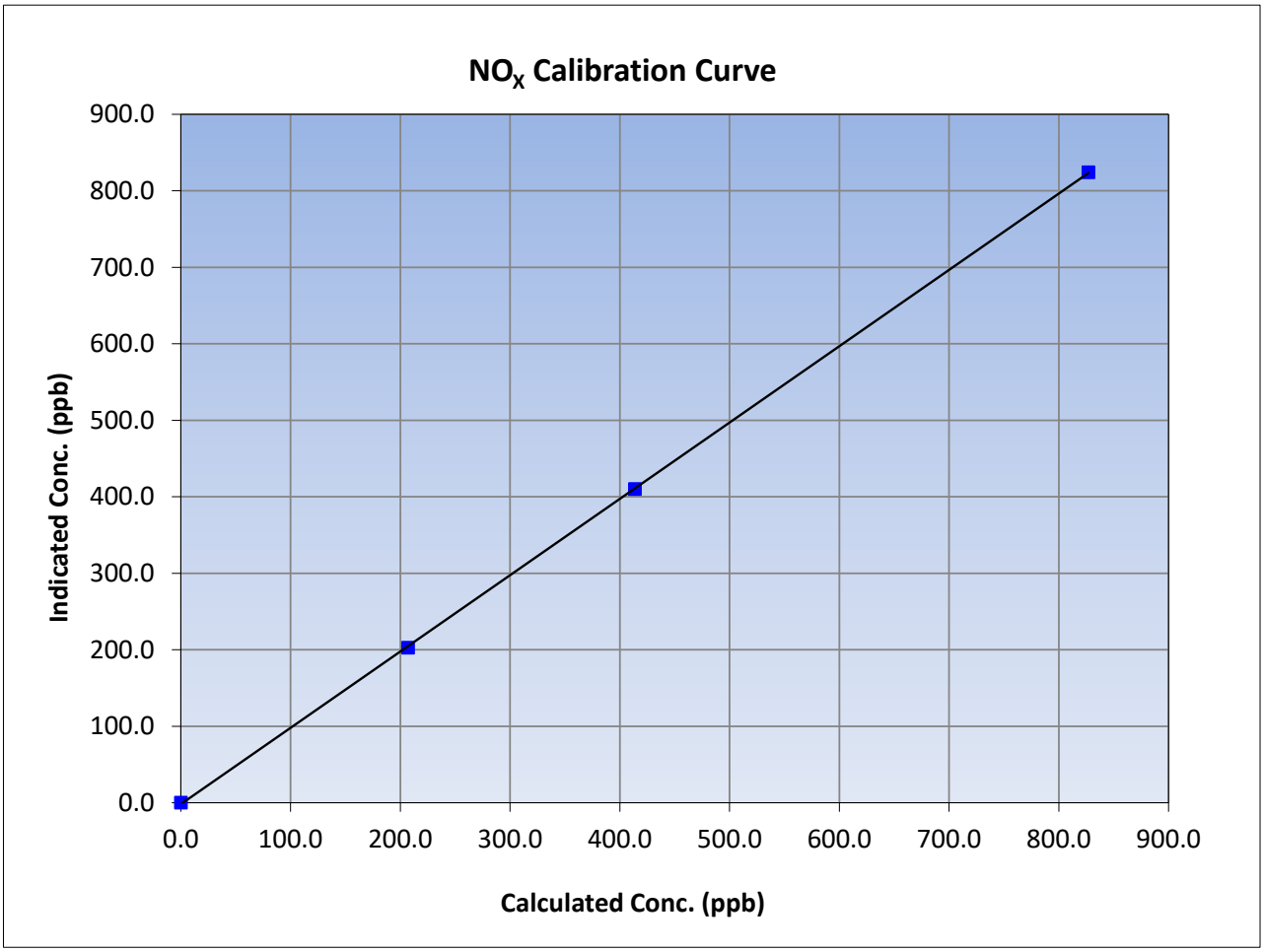
Version-04-2020

Station Information

Calibration Date:	June 5, 2023	Previous Calibration:	May 30, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	9:14	End Time (MST):	13:39
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	824.2	1.0033			
413.9	410.1	1.0093	Slope	0.997811	0.90 - 1.10
207.0	202.7	1.0210			
			Intercept	-1.870975	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

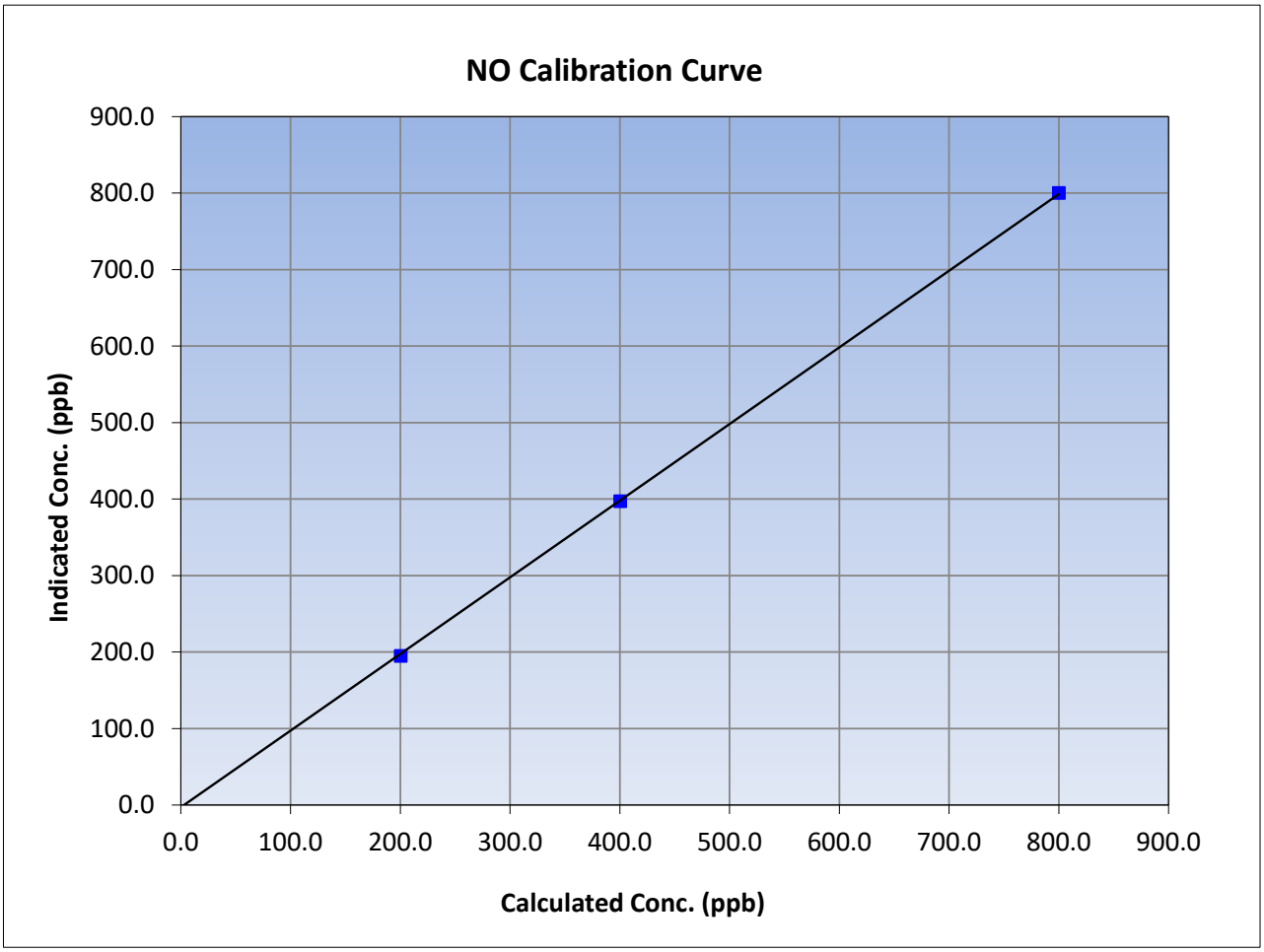
Version-04-2020

Station Information

Calibration Date:	June 5, 2023	Previous Calibration:	May 30, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	9:14	End Time (MST):	13:39
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999948	≥0.995
800.0	800.0	0.9999			
400.4	397.0	1.0086	Slope	1.002005	0.90 - 1.10
200.2	195.0	1.0268			
			Intercept	-2.905185	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

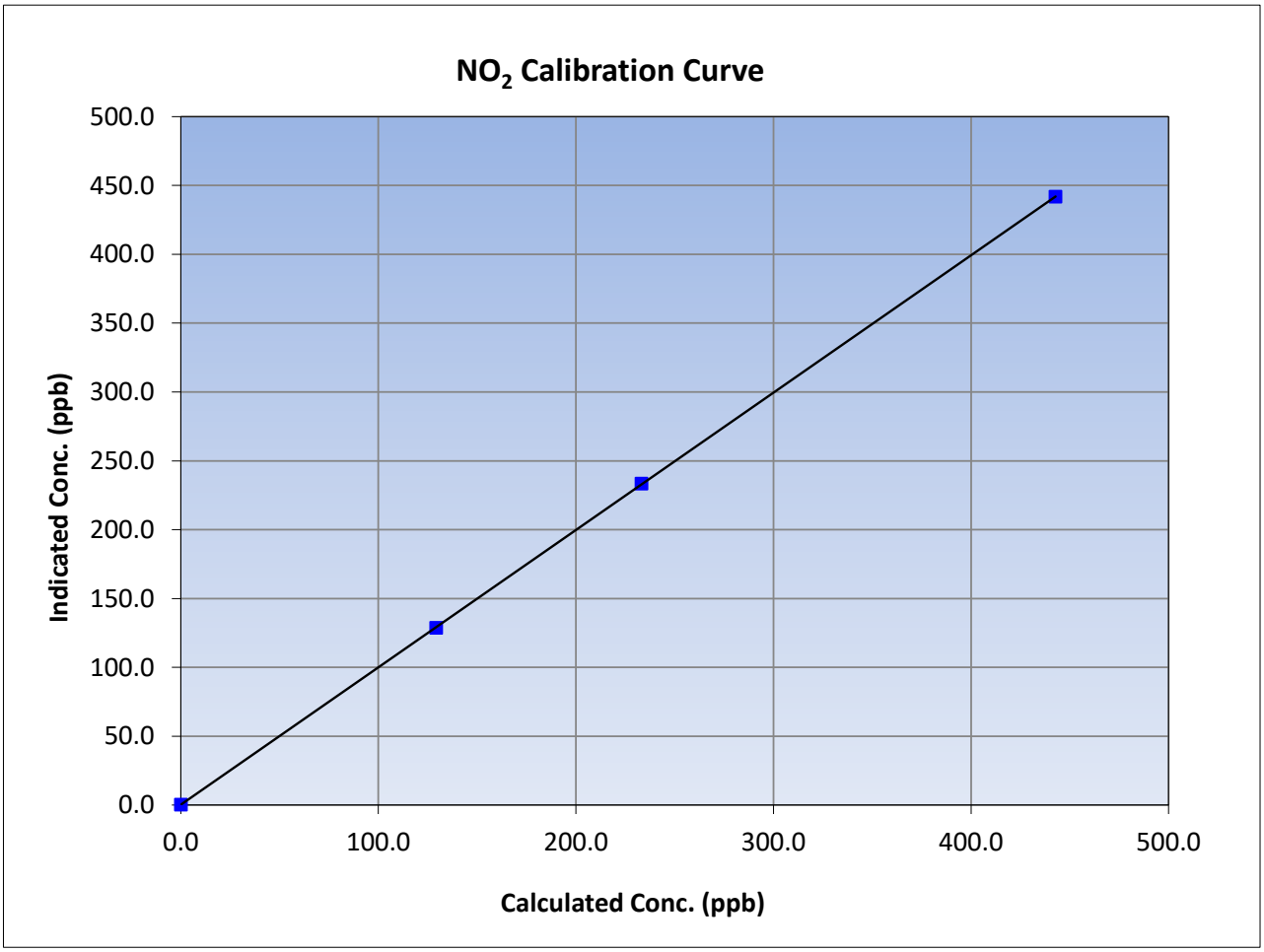
Version-04-2020

Station Information

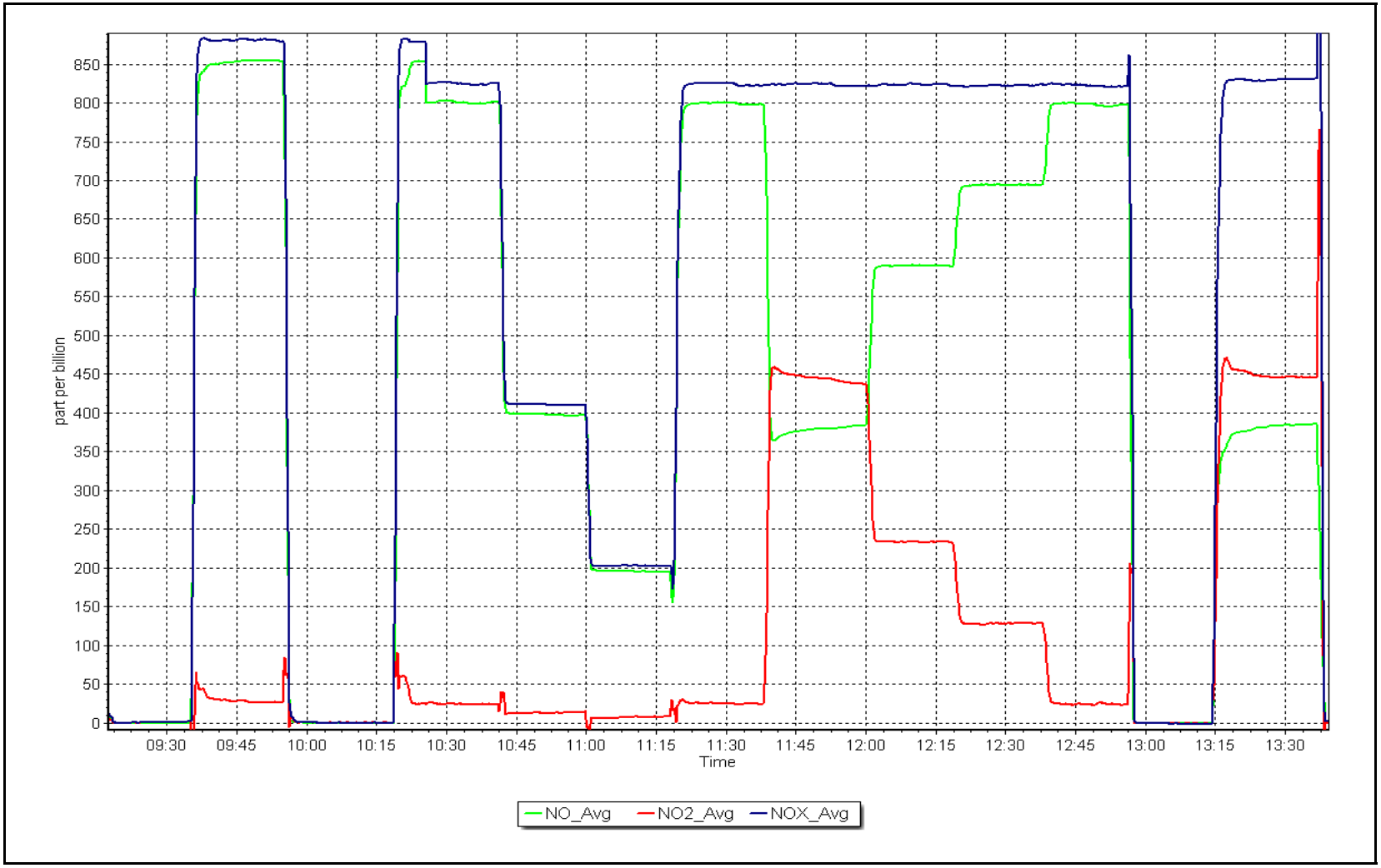
Calibration Date:	June 5, 2023	Previous Calibration:	May 30, 2023
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	9:14	End Time (MST):	13:39
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.3	----	Correlation Coefficient	0.999994	≥0.995
442.8	441.8	1.0023			
233.2	233.5	0.9988	Slope	0.997514	0.90 - 1.10
129.2	128.7	1.0041			
			Intercept	0.257066	+/-20



NO_X Calibration Plot Date: June 5, 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:	June 2, 2023	Last Cal Date:	May 8, 2023
Start time (MST):	8:53	End time (MST):	11:52
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:	1.003343	0.997857	Backgd or Offset:	3.4	2.4
Calibration intercept:	0.440000	1.000000	Coeff or Slope:	0.966	0.963

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-1.2	----
as found span	5000	969.9	400.0	397.9	1.005
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.4	----
high point	5000	980.6	400.0	399.8	1.001
second point	5000	838.0	200.0	201.0	0.995
third point	5000	735.3	100.0	101.3	0.987
as left zero	5000	0.0	0.0	-0.1	----
as left span	5000	979.1	400.0	401.6	0.996
				Average Correction Factor	0.994

Baseline Corr As found:	399.1	Previous response	401.8	*% 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 only.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

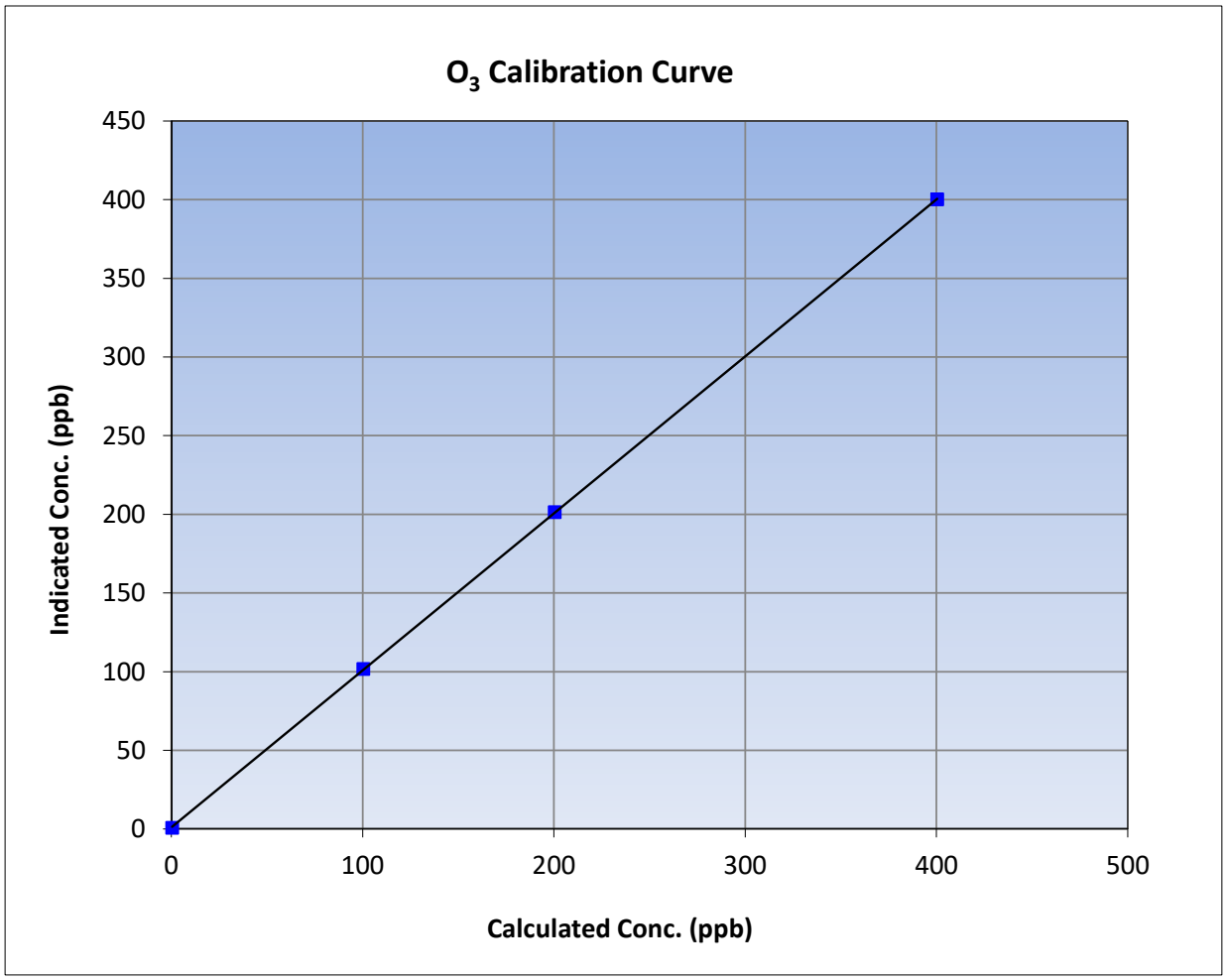
Station Information

Calibration Date:	June 2, 2023	Previous Calibration:	May 8, 2023
Station Name:	Fort McKay South	Station Number:	AMS13
Start Time (MST):	8:53	End Time (MST):	11:52
Analyzer make:	Teledyne API T400	Analyzer serial #:	3871

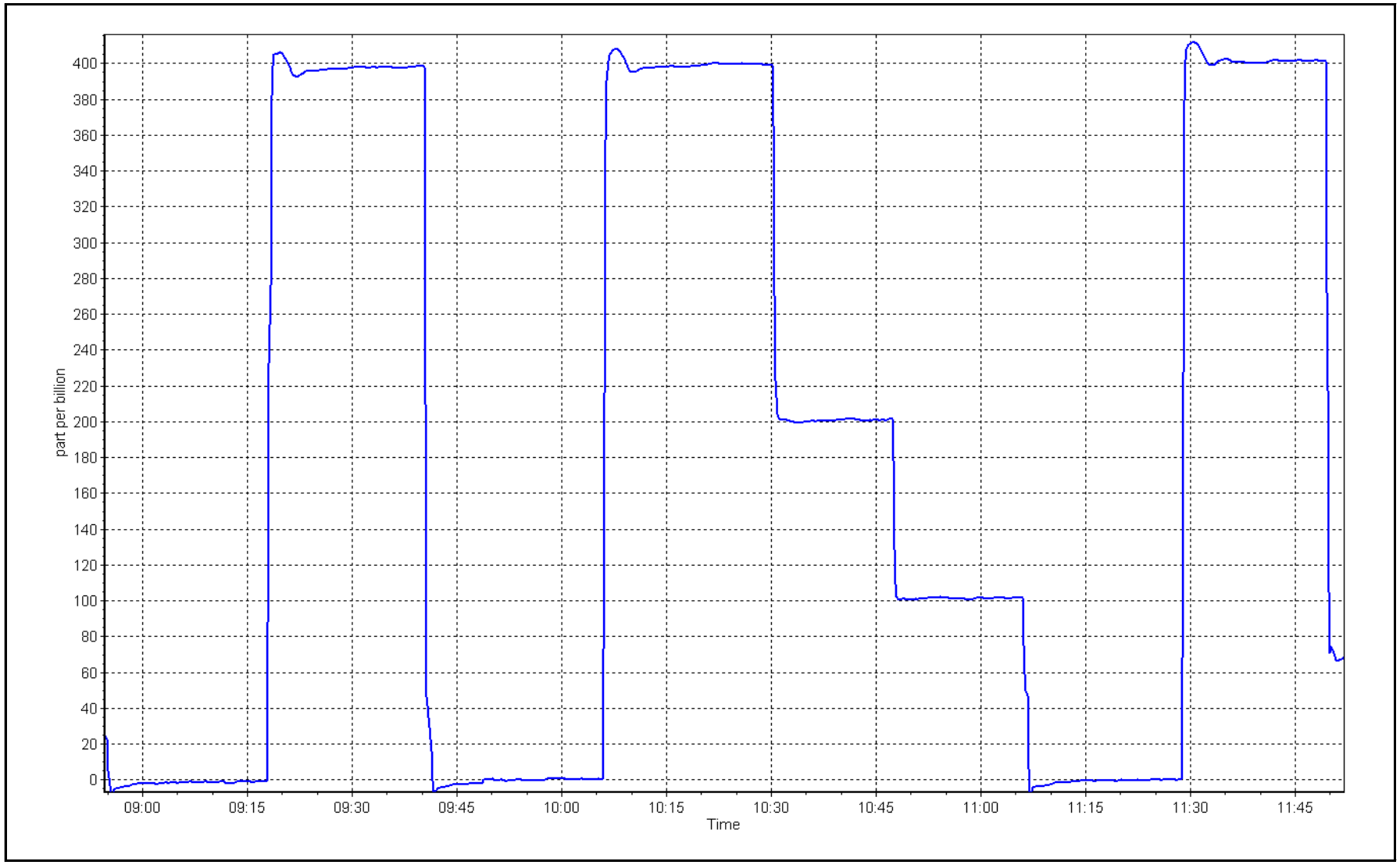
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
400.0	399.8	1.0005
200.0	201.0	0.9950
100.0	101.3	0.9872

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999989	*≥0.995*
Slope	0.997857	*0.90 - 1.10*
Intercept	1.000000	*+/- 5*



O_3 Calibration Plot Date: June 2, 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:	June 29, 2023	Last Cal Date:	May 9, 2023
Start time (MST):	9:31	End time (MST):	10:31
Analyzer Make:	API T640	S/N:	319
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	141229
Temp/RH standard:	Delta Cal	S/N:	141229

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	25.0	25.8	25.0	☐	+/- 2 °C
P (mmHg)	730.1	731.0	730.1	☐	+/- 10 mmHg
flow (LPM)	4.98	4.90	4.98	☐	+/- 0.25 LPM

Leak Test: Date of check: June 29, 2023 Last Cal Date: May 9, 2023

PM w/o HEPA: 47.6 PM w/ HEPA: 0.1 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	9.0	10.9	10.9	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 4.4 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: June 29, 2023

Disposable Filter Changed: June 29, 2023

Annual Maintenance

Date Sample Tube Cleaned: June 29, 2023

Date RH/T Sensor Cleaned: June 29, 2023

Notes: Inlet head clean and inspected. PMT peak test was adjusted.

Calibration by: Sean Bala

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS14
ANZAC
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	June 5, 2023	Last Cal Date:	May 2, 2023
Start time (MST):	9:50	End time (MST):	13:01
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.95	ppm	Cal Gas Exp Date:	January 5, 2025
Cal Gas Cylinder #:	CC279389			
Removed Cal Gas Conc:	49.95	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	5239
ZAG Make/Model:	API T701H		Serial Number:	357

Analyzer Information

Analyzer make: Thermo 43i Analyzer serial #: 0710321322

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.999181	1.016533	Backgd or Offset:	25.2	25.0
Calibration intercept:	-0.684110	-0.680611	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	0.2	----
as found span	4920	80.1	800.2	809.4	0.989
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	----
high point	4920	80.1	800.2	813.2	0.984
second point	4960	40.0	399.6	405.1	0.986
third point	4980	20.0	199.8	201.4	0.992
as left zero	5000	0.0	0.0	0.5	----
as left span	4920	80.1	800.2	815.3	0.981
				Average Correction Factor	0.987

Baseline Corr As found:	809.20	Previous response	798.84	*% 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: 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

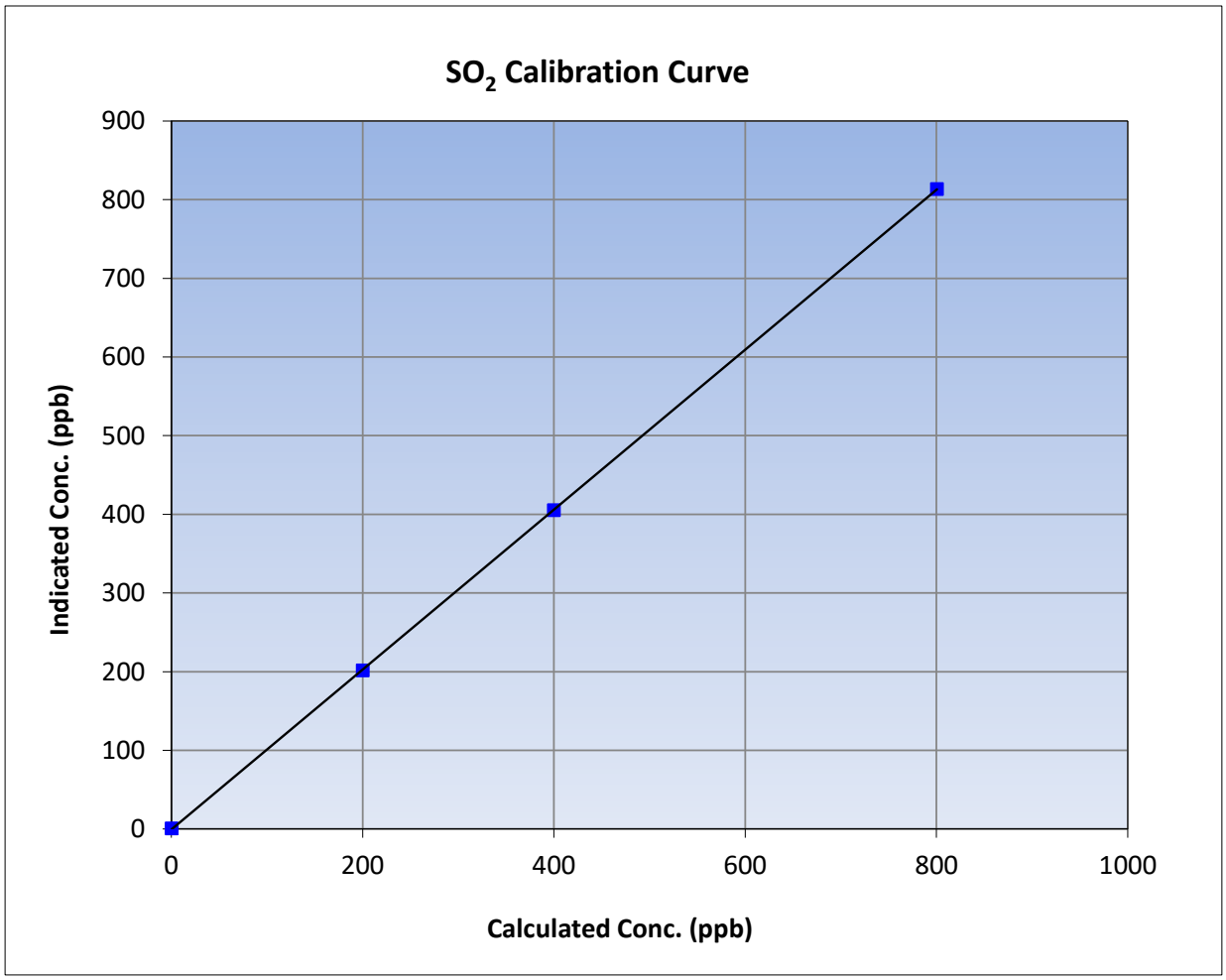
Station Information

Calibration Date:	June 5, 2023	Previous Calibration:	May 2, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:50	End Time (MST):	13:01
Analyzer make:	Thermo 43i	Analyzer serial #:	0710321322

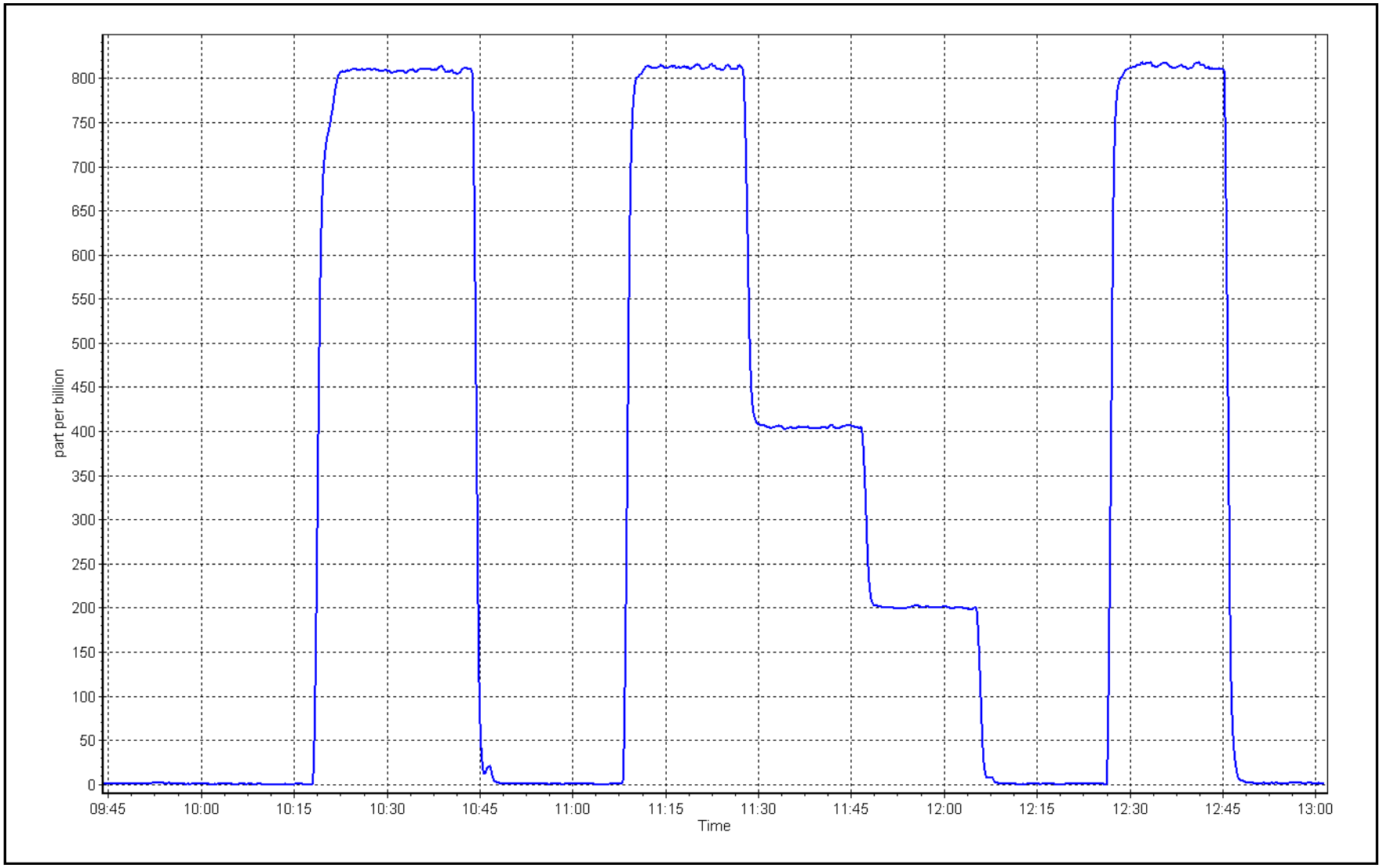
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
800.2	813.2	0.9840
399.6	405.1	0.9864
199.8	201.4	0.9921

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999993	*≥0.995*
Slope	1.016533	*0.90 - 1.10*
Intercept	-0.680611	*+/-30*



SO2 Calibration Plot Date: June 5, 2023 Location: Anzac



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	June 12, 2023	Last Cal Date:	May 11, 2023
Start time (MST):	9:47	End time (MST):	14:17
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1180540019
Converter make:	CD Nova CDN-101		Converter serial #:	503
Analyzer Range	0 - 100 ppb			

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997841	0.989547	Backgd or Offset:	5.36	5.39
Calibration intercept:	0.098854	0.039166	Coeff or Slope:	0.972	0.972

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4925	74.3	80.0	79.7	1.004
as found 2nd point	4962	37.2	40.0	39.5	1.016
as found 3rd point	4981	18.6	20.0	19.5	1.032
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.3	----
high point	4925	74.3	80.0	79.3	1.008
second point	4962	37.2	40.0	39.5	1.014
third point	4981	18.6	20.0	19.6	1.021
as left zero	5000	0.0	0.0	0.3	----
as left span	4925	74.3	80.0	79.6	1.004
SO2 Scrubber Check	4920	80.0	800.0	-0.1	----
Date of last scrubber change:				Ave Corr Factor	1.014
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.6	Prev response:	79.88	*% change:	-0.4%
Baseline Corr 2nd AF pt:	39.4	AF Slope:	0.997122	AF Intercept:	-0.200957
Baseline Corr 3rd AF pt:	19.4	AF Correlation:	0.999933		

* = > +/-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

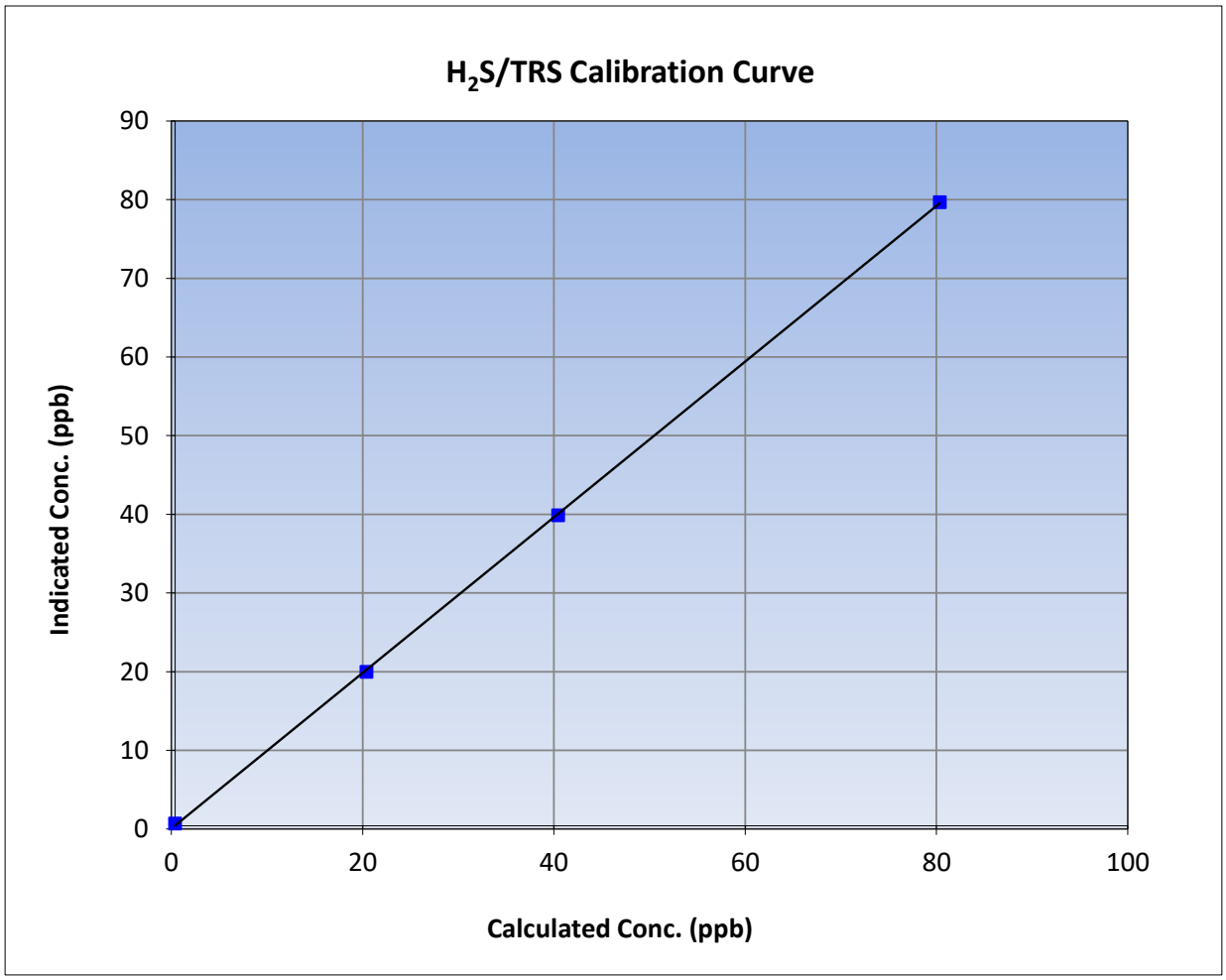
Station Information

Calibration Date:	June 12, 2023	Previous Calibration:	May 11, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	9:47	End Time (MST):	14:17
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1180540019

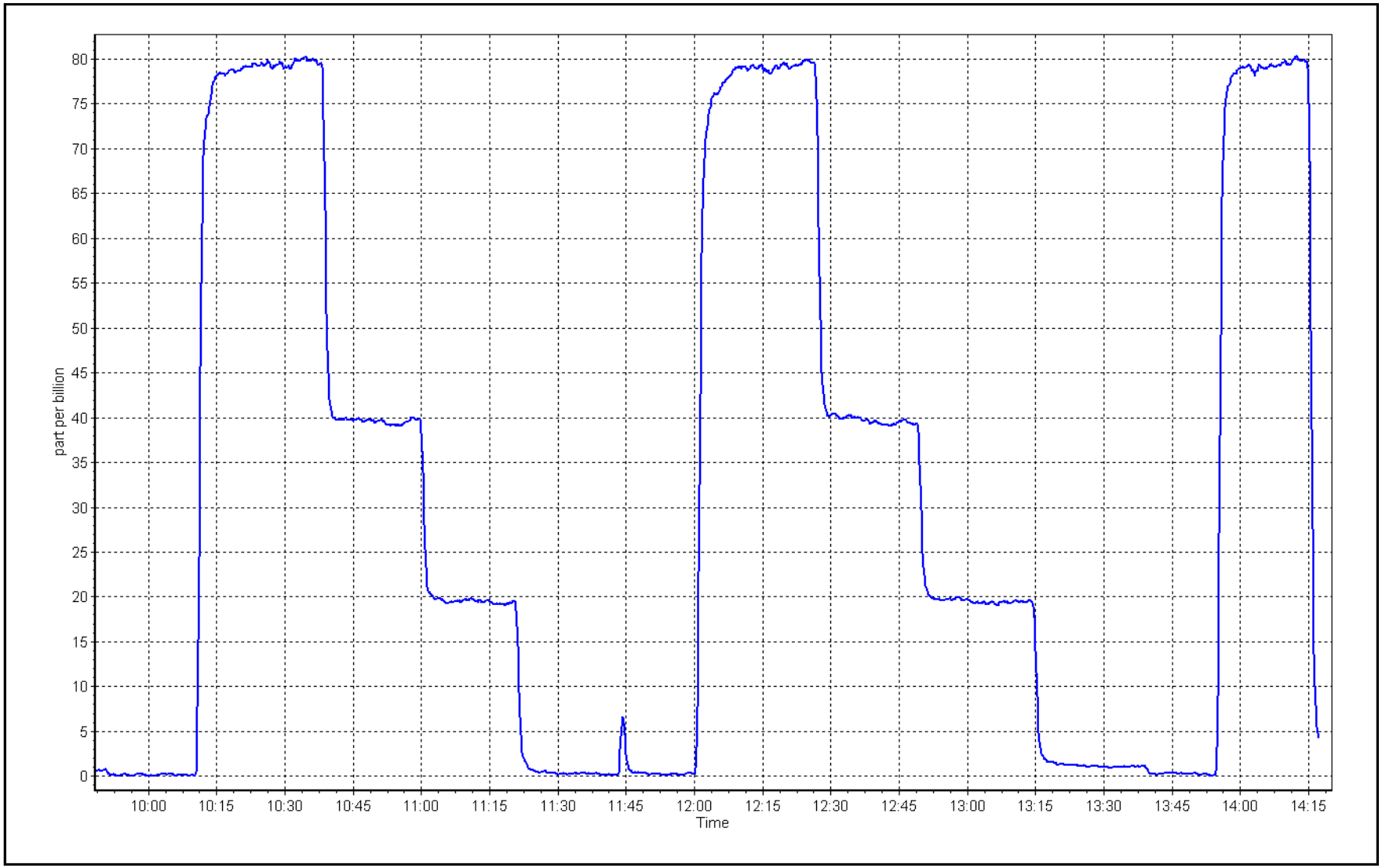
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.3	----
80.0	79.3	1.0083
40.0	39.5	1.0135
20.0	19.6	1.0212

Statistical Evaluation		Limits
Correlation Coefficient	0.999950	≥0.995
Slope	0.989547	0.90 - 1.10
Intercept	0.039166	+/-3



TRS Calibration Plot Date: June 12, 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:	June 5, 2023	Last Cal Date:	May 2, 2023
Start time (MST):	9:50	End time (MST):	13:01
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC279389	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
C3H8 Cal Gas Conc.	207.1	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:		NA
Removed CH4 Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
Removed C3H8 Conc.	207.1	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	5239	
ZAG make/model:	API 701H		Serial Number:	357	

Analyzer Information

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

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	17.12	17.09	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	80.1	17.12	17.05	1.004
second point	4960	40.0	8.55	8.57	0.998
third point	4980	20.0	4.28	4.26	1.003
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.1	17.12	17.18	0.997
				Average Correction Factor	1.002

Baseline Corr AF:	17.09	Prev response	17.05	*% change	0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	9.12	9.08	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	80.1	9.12	9.08	1.005
second point	4960	40.0	4.56	4.56	1.000
third point	4980	20.0	2.28	2.26	1.007
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.1	9.12	9.12	1.001
				Average Correction Factor	1.004
Baseline Corr AF:	9.08	Prev response	9.08	*% change	0.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	8.00	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	4920	80.1	8.00	7.97	1.004
second point	4960	40.0	3.99	4.01	0.996
third point	4980	20.0	2.00	2.00	0.999
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.1	8.00	8.06	0.992
				Average Correction Factor	0.999
Baseline Corr AF:	8.01	Prev response	7.97	*% change	0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.996430	0.996014
THC Cal Offset:	-0.007805	0.012807
CH4 Cal Slope:	0.996993	0.996447
CH4 Cal Offset:	-0.002038	0.010369
NMHC Cal Slope:	0.995937	0.995647
NMHC Cal Offset:	-0.005767	0.002638

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

THC Calibration Summary

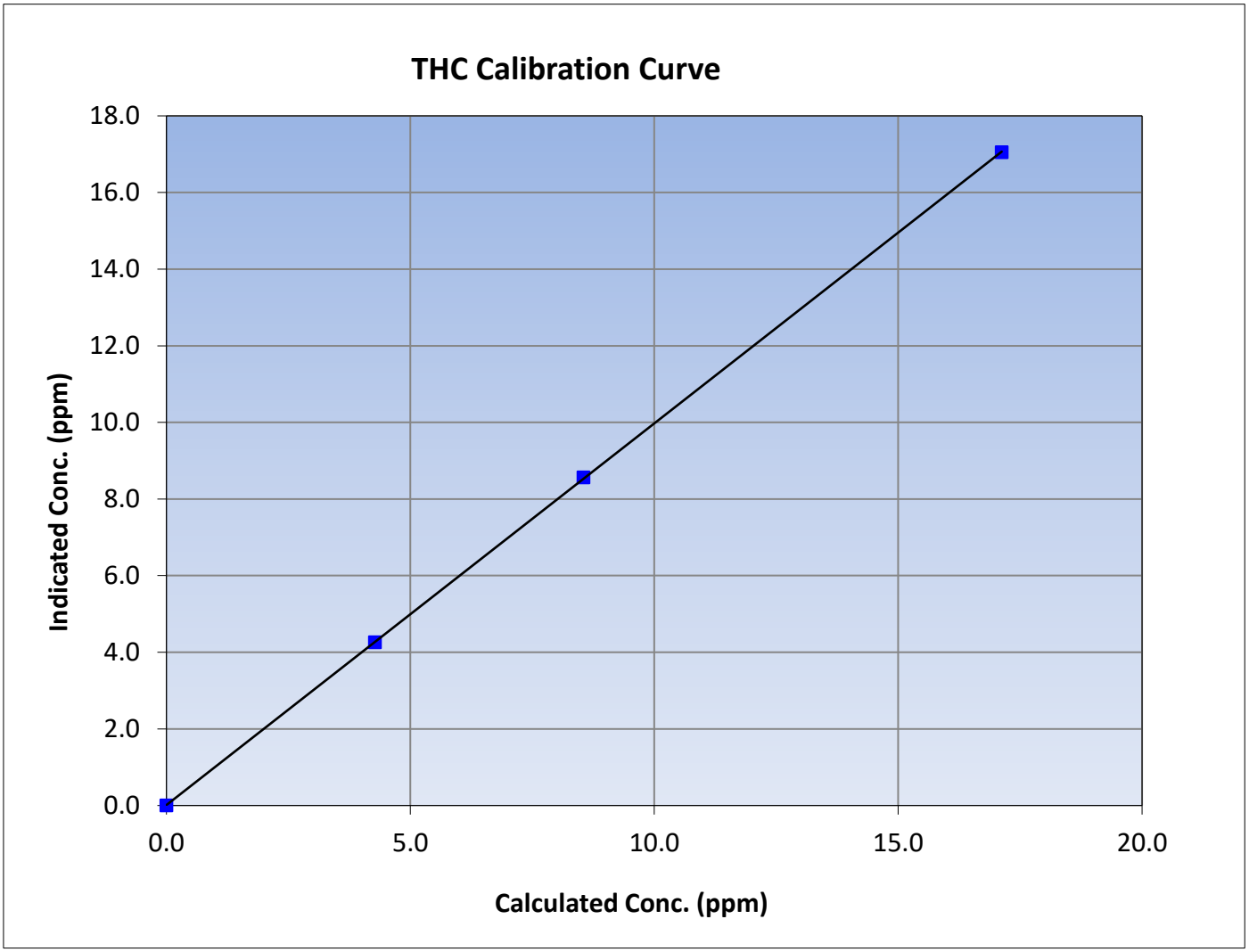
Version-01-2020

Station Information

Calibration Date:	June 5, 2023	Previous Calibration:	May 2, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:50	End Time (MST):	13:01
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	0.999988	*≥0.995*
17.12	17.05	1.0042			
8.55	8.57	0.9981	Slope	0.996014	*0.90 - 1.10*
4.28	4.26	1.0029			
			Intercept	0.012807	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

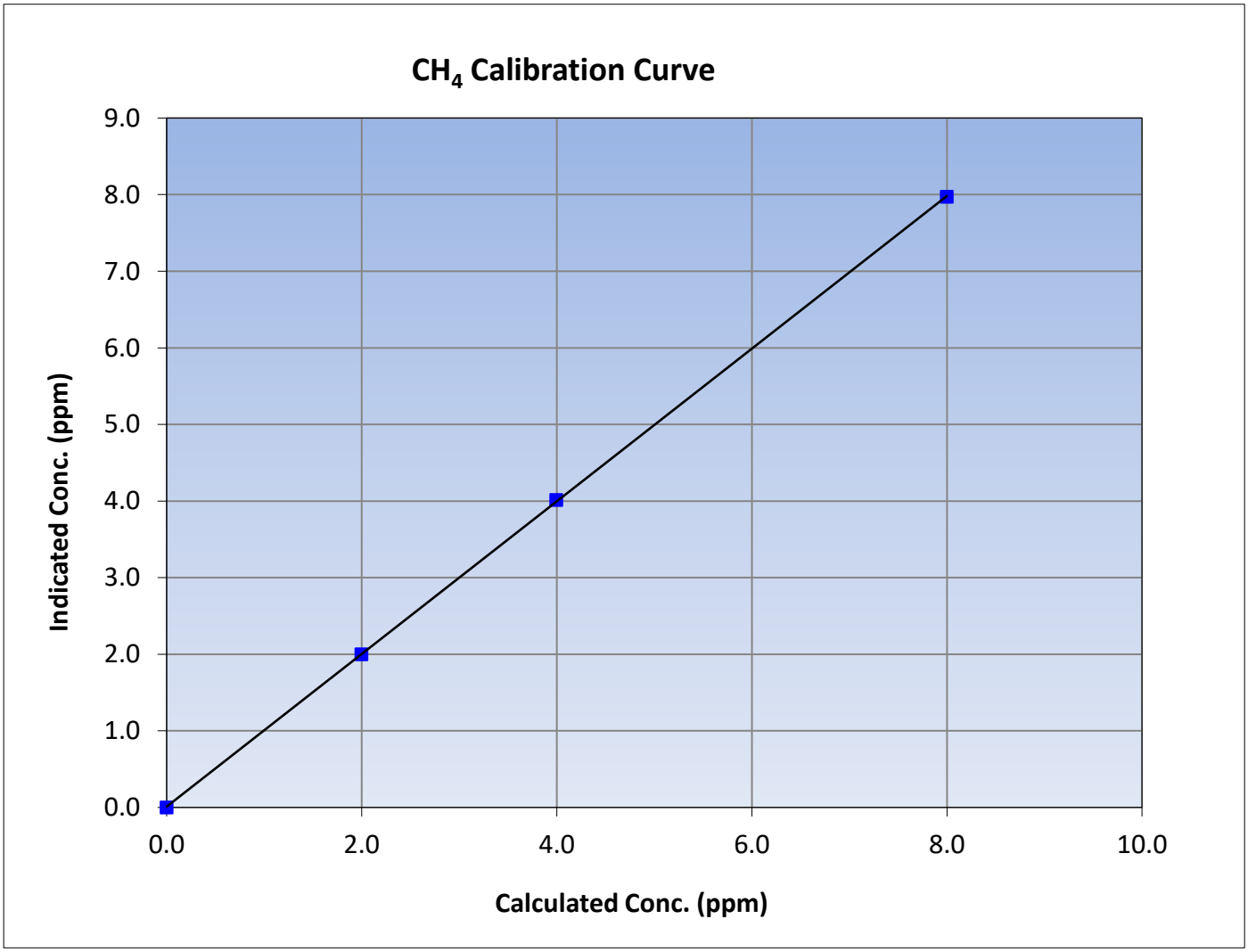
Version-01-2020

Station Information

Calibration Date:	June 5, 2023	Previous Calibration:	May 2, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:50	End Time (MST):	13:01
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999980	≥0.995
8.00	7.97	1.0036			
3.99	4.01	0.9956	Slope	0.996447	0.90 - 1.10
2.00	2.00	0.9986			
			Intercept	0.010369	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

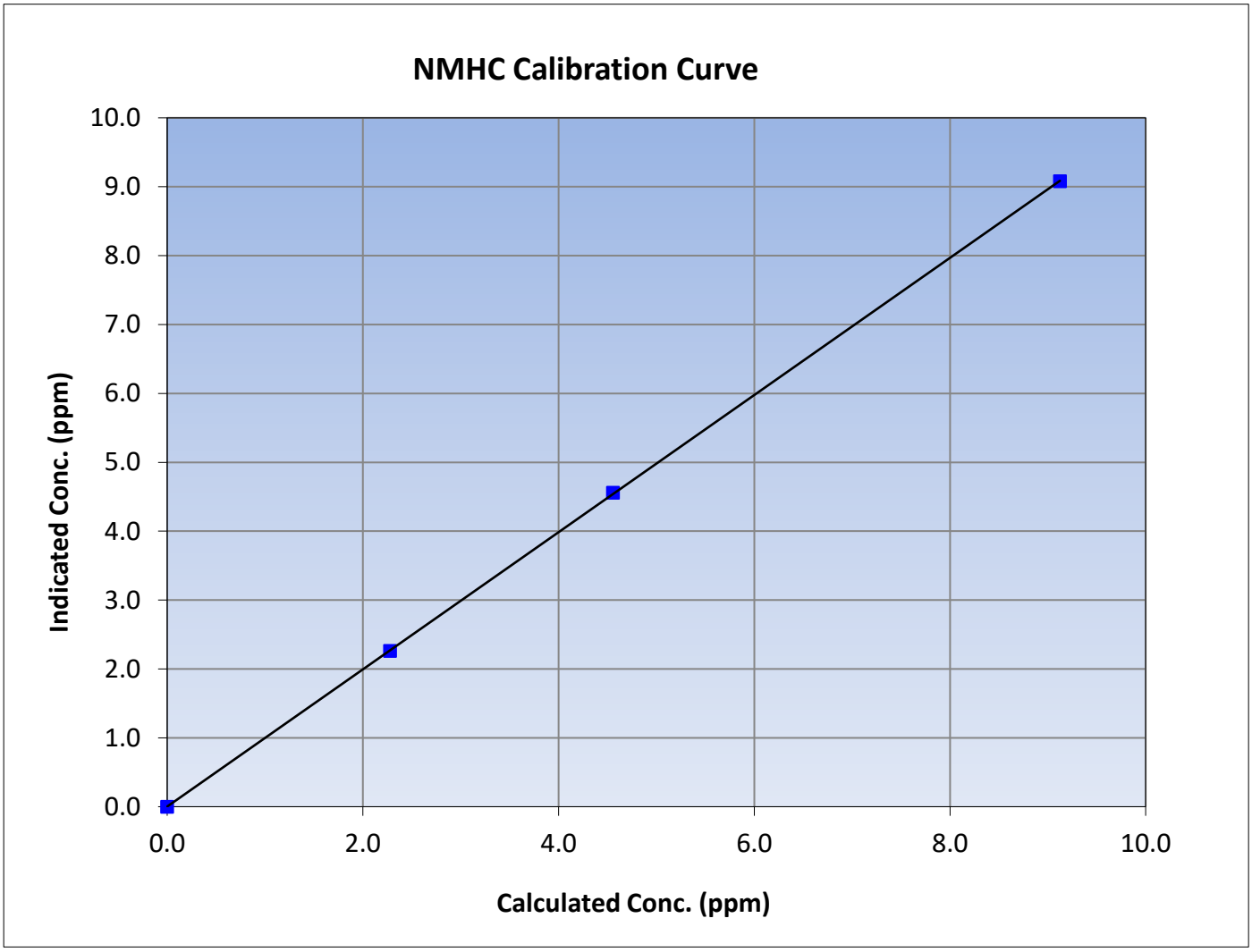
Version-01-2020

Station Information

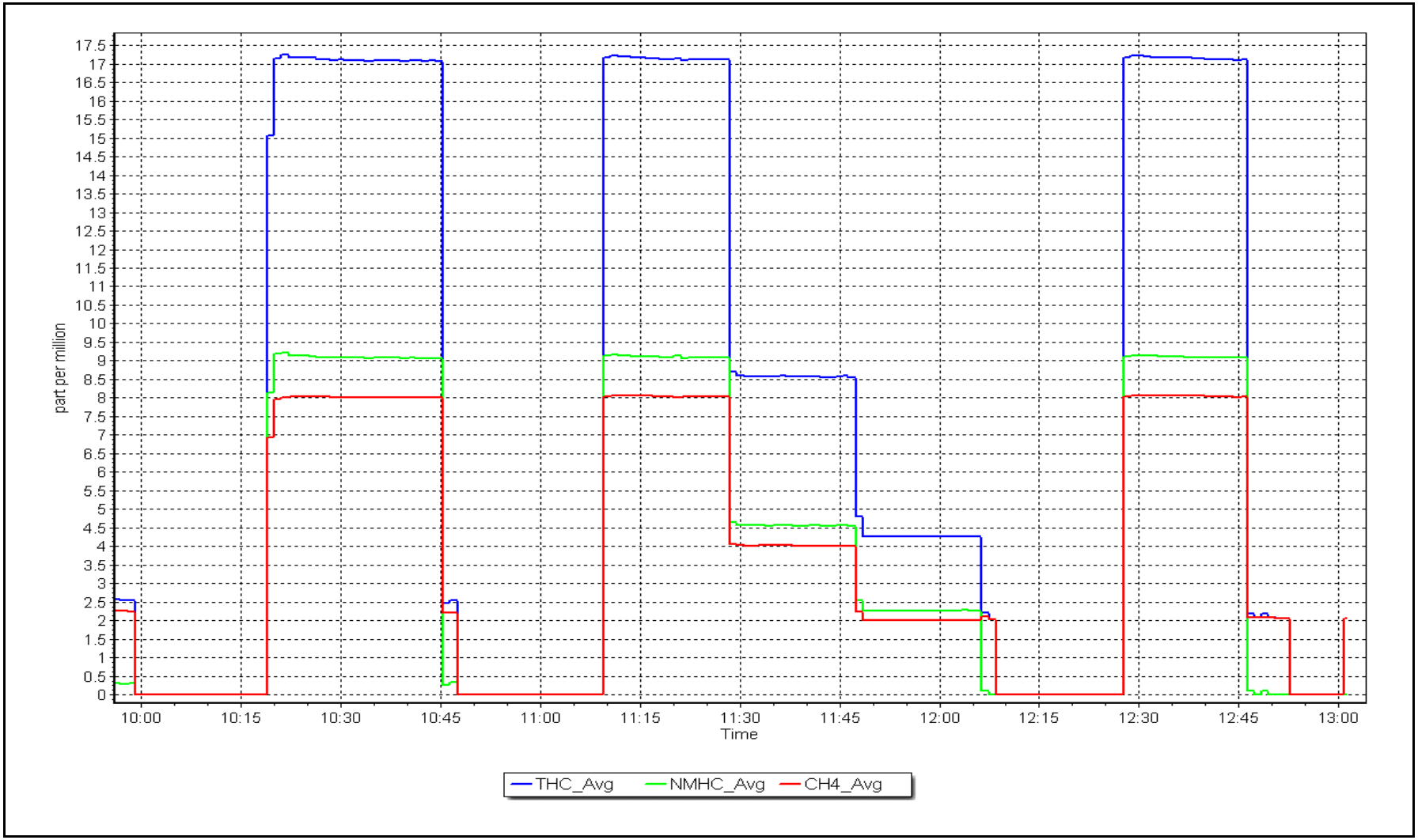
Calibration Date:	June 5, 2023	Previous Calibration:	May 2, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:50	End Time (MST):	13:01
Analyzer make:	Thermo 55i	Analyzer serial #:	1118148494

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999991	≥0.995
9.12	9.08	1.0048			
4.56	4.56	1.0000	Slope	0.995647	0.90 - 1.10
2.28	2.26	1.0067			
			Intercept	0.002638	+/-0.5



NMHC Calibration Plot Date: June 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:	June 19, 2023	Last Cal Date:	June 5, 2023
Start time (MST):	11:04	End time (MST):	13:33
Reason:	Cylinder Change	Support gas cylinder change out.	

Calibration Standards

Gas Cert Reference:		CC279389	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
C3H8 Cal Gas Conc.	207.1	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:		NA
Removed CH4 Conc.	499.3	ppm	CH4 Equiv Conc.	1068.8	ppm
Removed C3H8 Conc.	207.1	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	5239	
ZAG make/model:	API 701H		Serial Number:	357	

Analyzer Information

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

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	17.12	17.24	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	17.12	17.15	0.999
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.999

Baseline Corr AF:	17.24	Prev response	17.07	*% change	1.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	9.12	9.11	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.1	9.12	9.06	1.007
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.007
Baseline Corr AF:	9.11	Prev response	9.09	*% change	0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.1	8.00	8.13	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	80.1	8.00	8.09	0.989
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.989
Baseline Corr AF:	8.13	Prev response	7.98	*% change	1.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

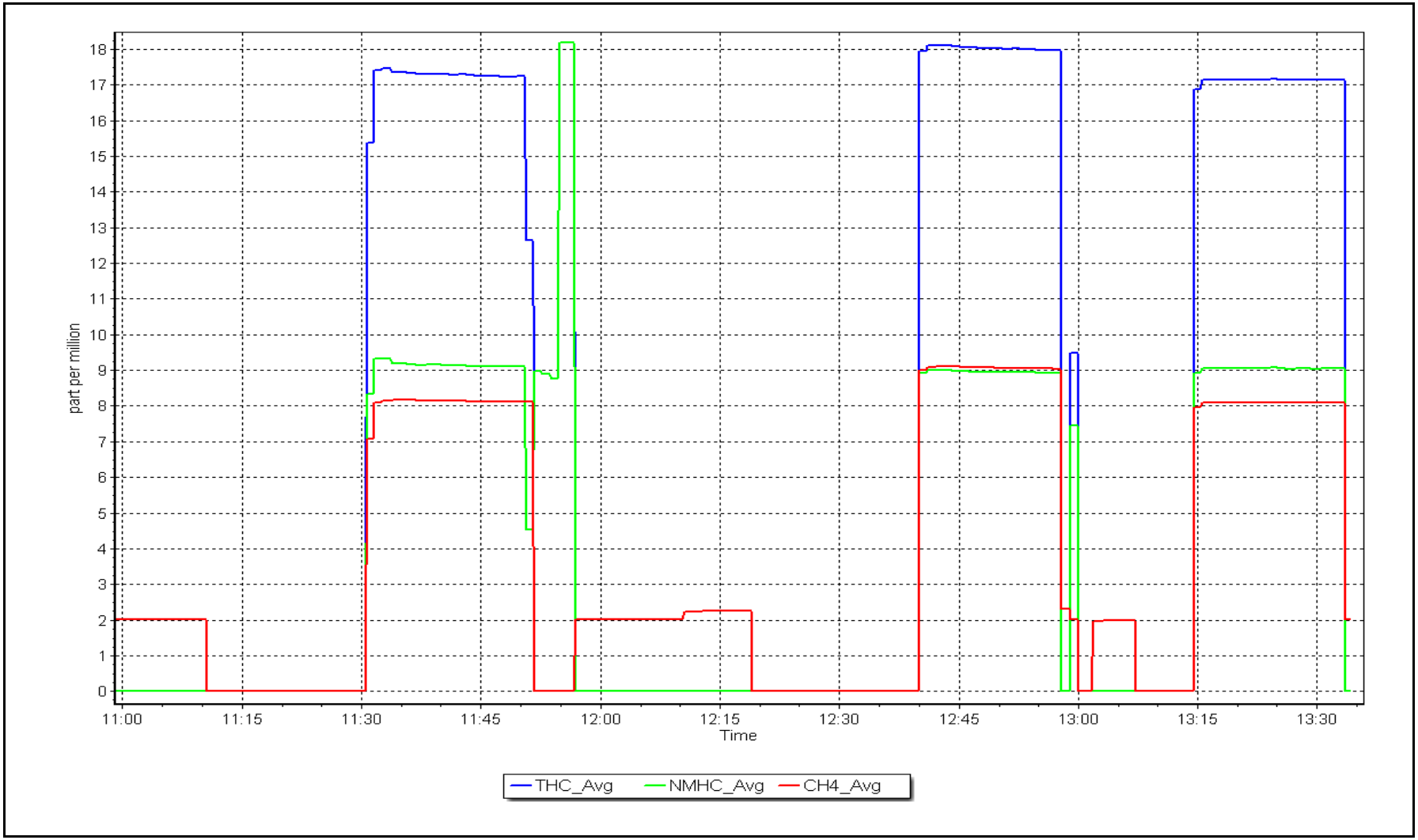
Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.996014	1.001446
THC Cal Offset:	0.012807	0.000000
CH4 Cal Slope:	0.996447	1.011299
CH4 Cal Offset:	0.010369	0.000000
NMHC Cal Slope:	0.995647	0.992809
NMHC Cal Offset:	0.002638	0.000000

Notes: Changed out the Hydrogen and Nitrogen cylinders after as founds. Second span run was comparable to the as found points. No changes were made onto the analyzer.

Calibration Performed By: Mohammed Kashif

NMHC Calibration Plot Date: June 19, 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:	June 8, 2023	Last Cal Date:	May 1, 2023
Start time (MST):	9:34	End time (MST):	14:41
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2Y1P8D		Cal Gas Expiry Date:	December 11, 2023	
NOX Cal Gas Conc:	50.92	ppm	NO Cal Gas Conc:	50.05	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	50.92	ppm	Removed Gas NO Conc:	50.05	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	5239	
ZAG make/model:	Teledyne API 701H		Serial Number:	357	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1426262592	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.361	1.375	NO bkgnd or offset:	3.7	3.7
NOX coeff or slope:	0.996	0.996	NOX bkgnd or offset:	3.7	3.7
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	162.7	162.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.995080	1.000547
NO_X Cal Offset:	-0.466631	-0.105430
NO Cal Slope:	0.996609	1.001604
NO Cal Offset:	-1.790505	-1.609467
NO_2 Cal Slope:	1.001233	1.002084
NO_2 Cal Offset:	0.590521	1.232321

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	0.3	----	----
as found span	4921	78.6	800.5	786.8	13.7	792.9	776.1	16.8	1.0096	1.0138
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.4	0.0	0.4	----	----
high point	4921	78.6	800.5	786.8	13.7	800.9	787.1	13.9	0.9995	0.9997
second point	4961	39.3	400.2	393.4	6.8	400.7	392.2	8.5	0.9988	1.0030
third point	4980	19.6	199.6	196.2	3.4	198.7	192.9	5.8	1.0046	1.0172
as left zero	5000	0.0	0.0	0.0	0.0	0.4	0.0	0.3	----	----
as left span	4921	78.6	800.5	389.5	411.0	800.6	389.6	411.0	0.9999	0.9999
								Average Correction Factor	1.0010	1.0066

Corrected As found	NO_X = 792.8 ppb	NO = 776.2 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -0.4%		
Previous Response	NO_X = 796.1 ppb	NO = 782.4 ppb		*Percent Change	NO = -0.8%		
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	782.6	385.3	411.0	412.6	0.9961	100.4%
2nd GPT point (200 ppb O3)	782.6	582.3	214.0	216.1	0.9902	101.0%
3rd GPT point (100 ppb O3)	782.6	683.2	113.1	115.4	0.9799	102.1%
				Average Correction Factor	0.9887	101.1%

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

Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

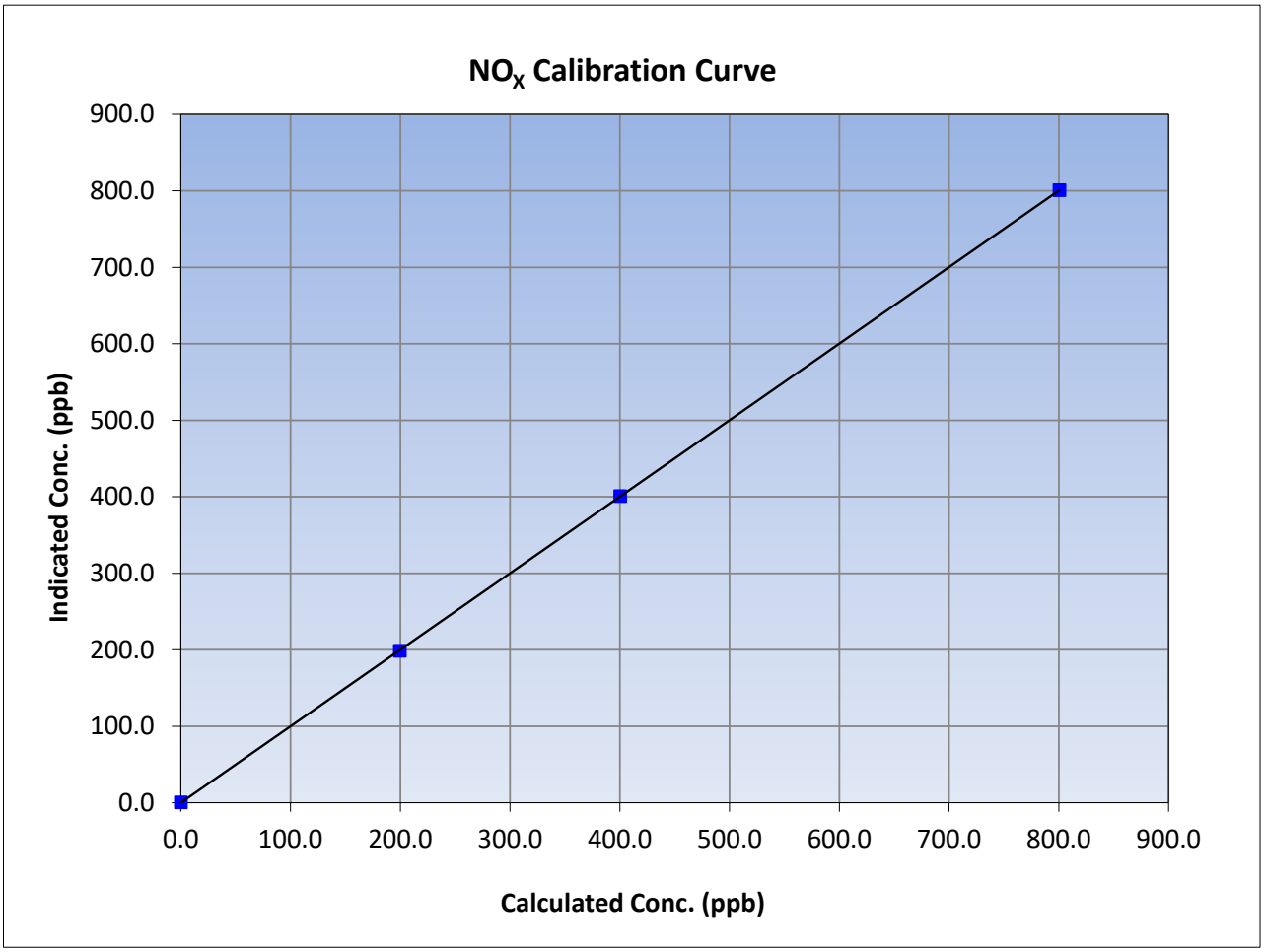
Version-04-2020

Station Information

Calibration Date:	June 8, 2023	Previous Calibration:	May 1, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:34	End Time (MST):	14:41
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.4	----	Correlation Coefficient	0.999996	≥0.995
800.5	800.9	0.9995			
400.2	400.7	0.9988	Slope	1.000547	0.90 - 1.10
199.6	198.7	1.0046			
			Intercept	-0.105430	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

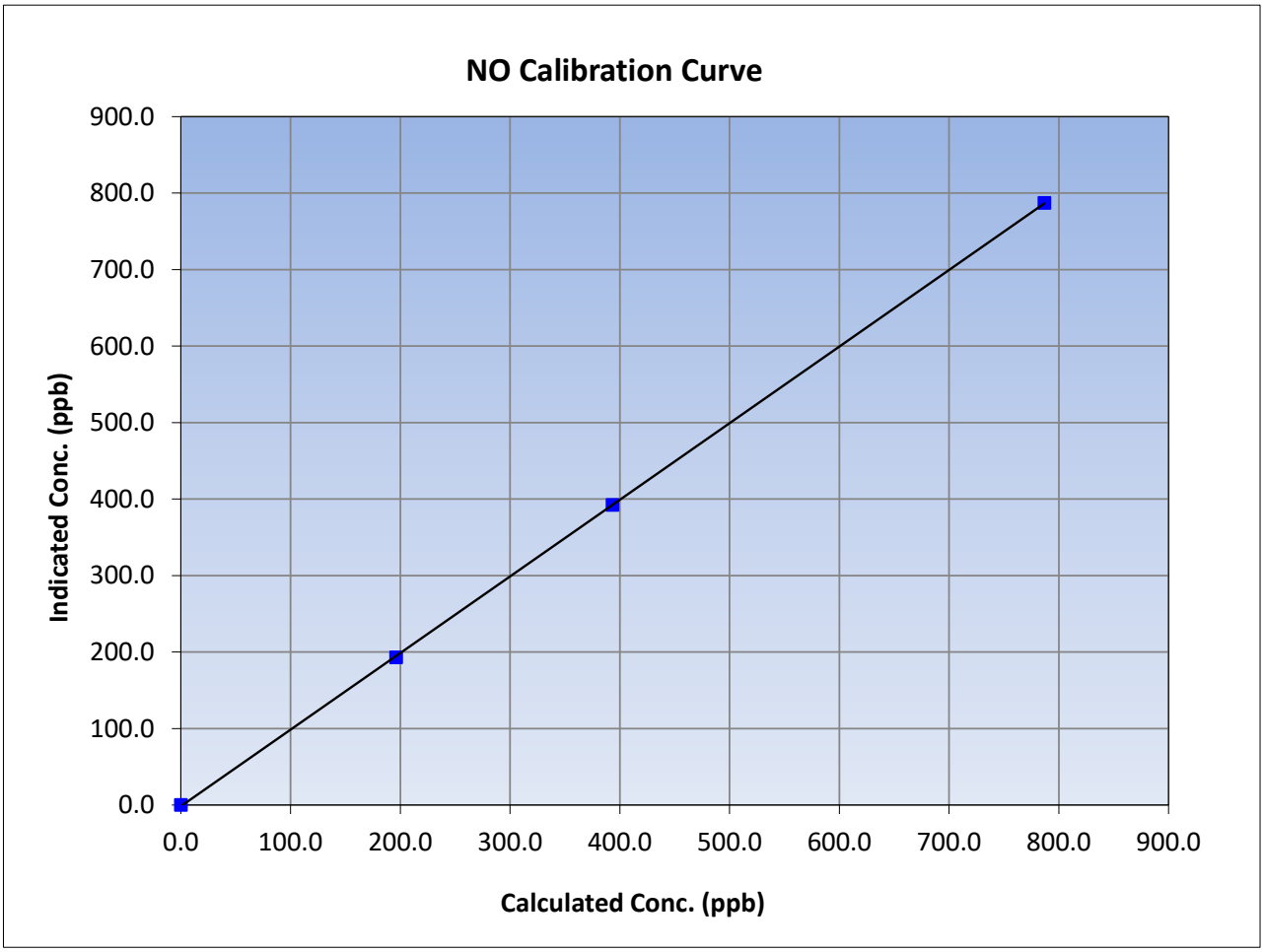
Version-04-2020

Station Information

Calibration Date:	June 8, 2023	Previous Calibration:	May 1, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:34	End Time (MST):	14:41
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999979	≥0.995
786.8	787.1	0.9997			
393.4	392.2	1.0030	Slope	1.001604	0.90 - 1.10
196.2	192.9	1.0172			
			Intercept	-1.609467	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

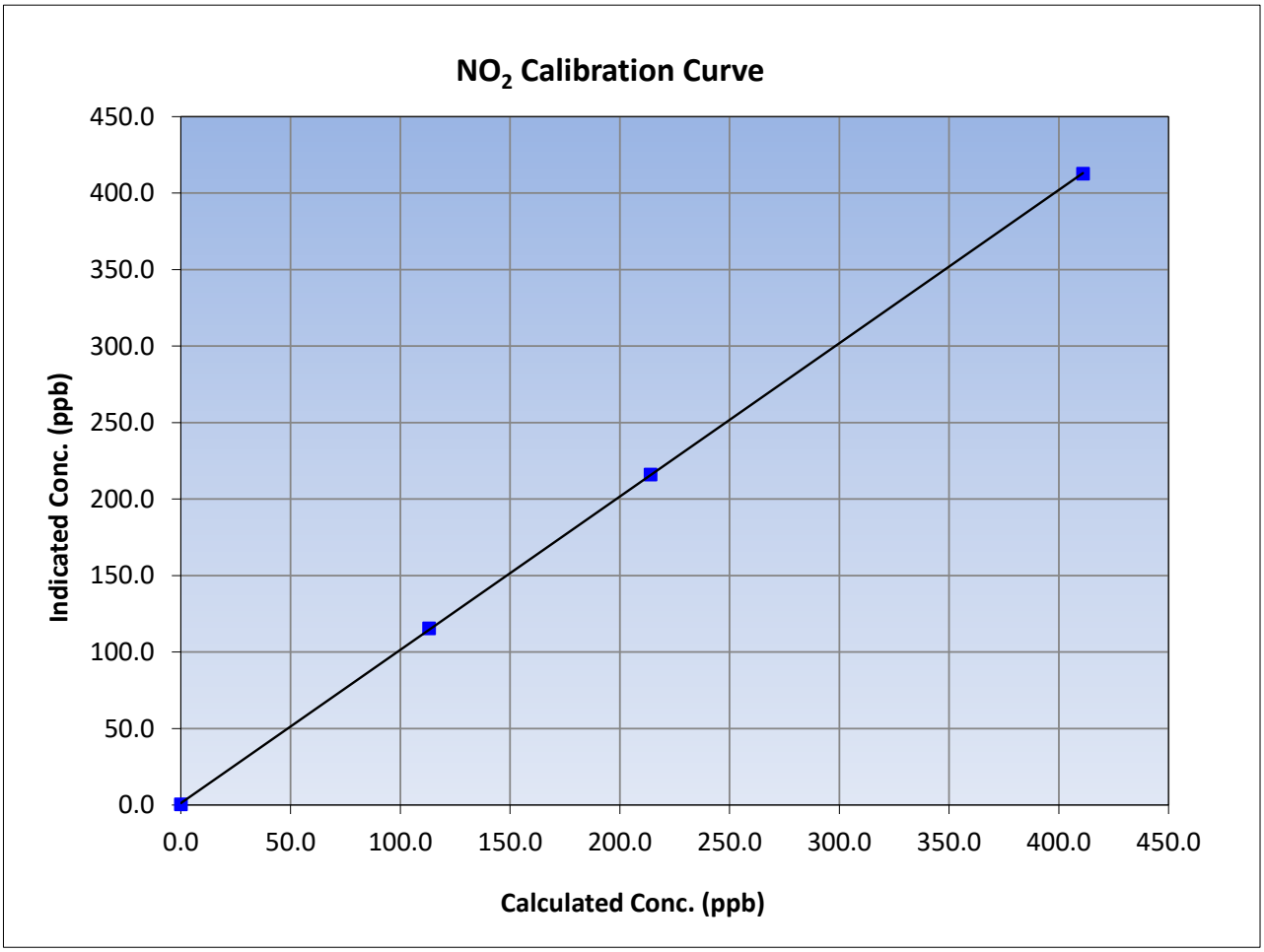
Version-04-2020

Station Information

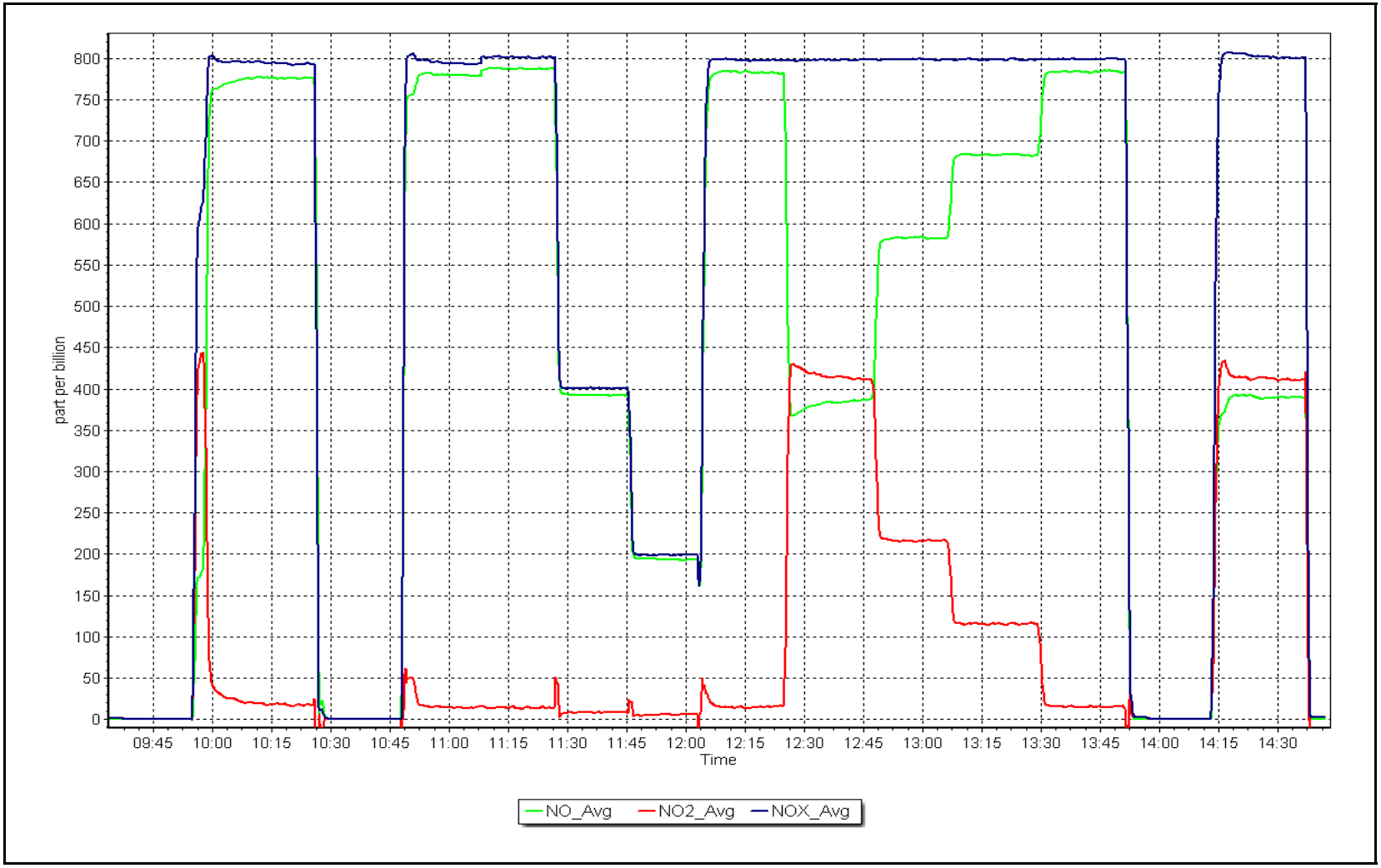
Calibration Date:	June 8, 2023	Previous Calibration:	May 1, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	9:34	End Time (MST):	14:41
Analyzer make:	Thermo 42i	Analyzer serial #:	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.4	----	Correlation Coefficient	0.999980	≥0.995
411.0	412.6	0.9961			
214.0	216.1	0.9902	Slope	1.002084	0.90 - 1.10
113.1	115.4	0.9799			
			Intercept	1.232321	+/-20



NO_X Calibration Plot Date: June 8, 2023 Location: Anzac



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Anzac	Station number:	AMS14
Calibration Date:	June 7, 2023	Last Cal Date:	May 2, 2023
Start time (MST):	9:59	End time (MST):	12:47
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.007857	0.993171	Backgd or Offset:	1.3	1.3
Calibration intercept:	-0.500000	1.020000	Coeff or Slope:	1.516	1.516

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.4	----
as found span	5000	884.2	400.0	398.2	1.005
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.4	----
high point	5000	884.9	400.0	397.9	1.005
second point	5000	769.3	200.0	200.2	0.999
third point	5000	669.8	100.0	100.8	0.992
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	883.1	400.0	401.8	0.996
				Average Correction Factor	0.999

Baseline Corr As found:	397.8	Previous response	402.6	*% change	-1.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

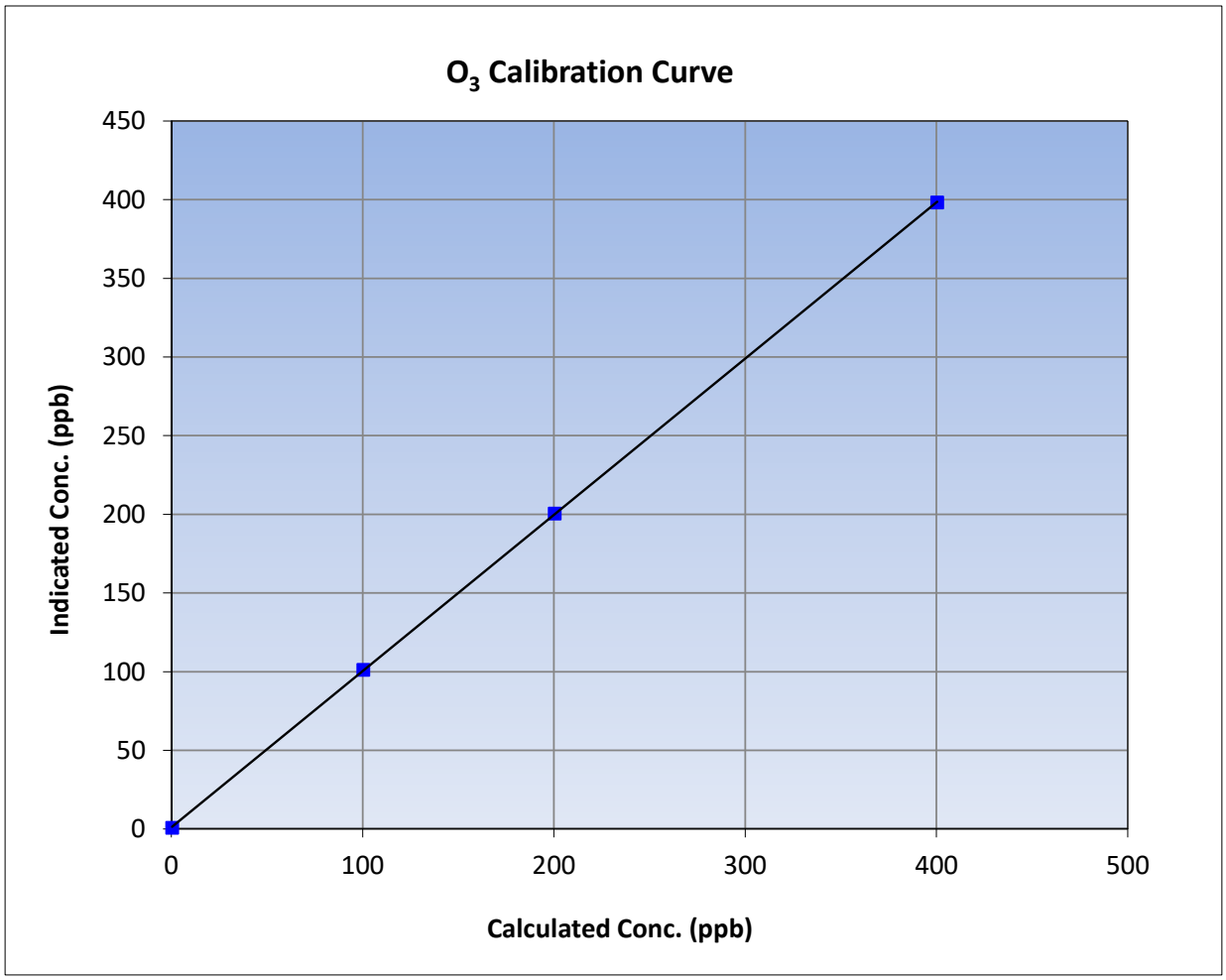
Station Information

Calibration Date:	June 7, 2023	Previous Calibration:	May 2, 2023
Station Name:	Anzac	Station Number:	AMS14
Start Time (MST):	9:59	End Time (MST):	12:47
Analyzer make:	Thermo 49i	Analyzer serial #:	1426262595

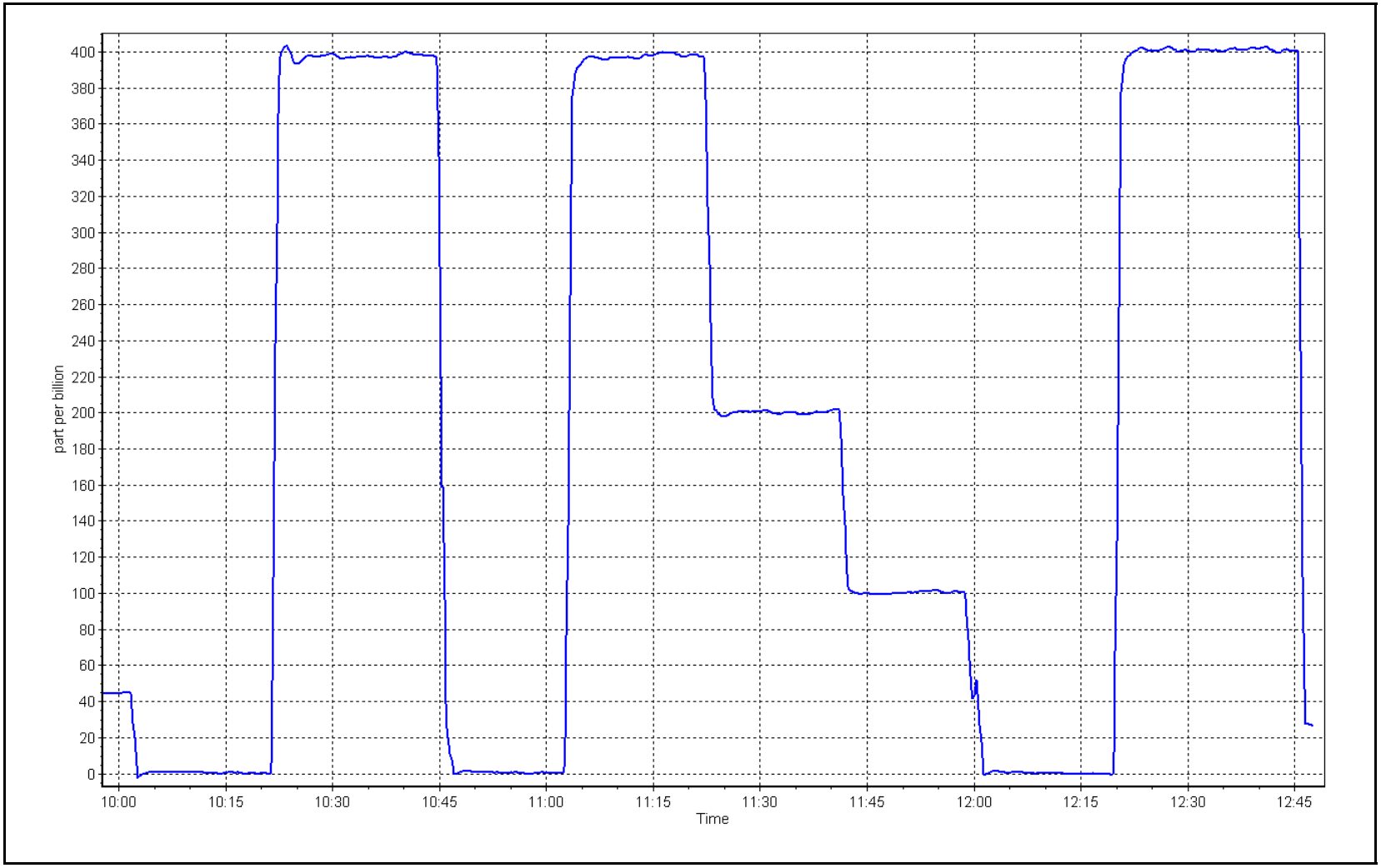
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
400.0	397.9	1.0053
200.0	200.2	0.9990
100.0	100.8	0.9921

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999988	*≥0.995*
Slope	0.993171	*0.90 - 1.10*
Intercept	1.020000	*+/- 5*



O_3 Calibration Plot Date: June 7, 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:	June 14, 2023	Last Cal Date:	May 30, 2023
Start time (MST):	11:10	End time (MST):	14:35
Analyzer Make:	API T640	S/N:	825
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25	S/N:	388744
Temp/RH standard:	Alicat FP-25	S/N:	388744

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	-62.6	10.9	11.6	☐	+/- 2 °C
P (mmHg)	706.3	707.0	706.3	☐	+/- 10 mmHg
flow (LPM)	4.32	6.23	5.00	☑	+/- 0.25 LPM

Leak Test: Date of check: June 14, 2023 Last Cal Date: May 30, 2023

PM w/o HEPA: 9.0 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

Date Optical Chamber Cleaned: March 30, 2023 <0.2 ug/m3

Disposable Filter Changed: March 30, 2023

Annual Maintenance

Date Sample Tube Cleaned: June 21, 2022

Date RH/T Sensor Cleaned: June 21, 2022

Notes: As found pump operating at 100% capacity affected by ambient temperature readings that were significantly out, repaired temperature sensor and calibrated flow. Cleaned optics and performed dust test, no adjustments required. Did not do final leak check due to rain.

Calibration by: Kelly Baragar

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS17
WAPASU
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	June 5, 2023	Last Cal Date:	May 15, 2023
Start time (MST):	10:35	End time (MST):	13:36
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998882	0.998368	Backgd or Offset:	12.4	12.4
Calibration intercept:	-2.039793	-2.660243	Coeff or Slope:	1.099	1.099

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.3	----
as found span	4921	79.4	800.0	793.4	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4921	79.4	800.0	797.8	1.003
second point	4960	39.7	400.0	394.0	1.015
third point	4980	19.8	199.5	194.8	1.024
as left zero	5000	0.0	0.0	-0.2	----
as left span	4920	79.4	800.1	797.1	1.004
				Average Correction Factor	1.014

Baseline Corr As found:	793.70	Previous response	797.04	*% change	-0.4%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

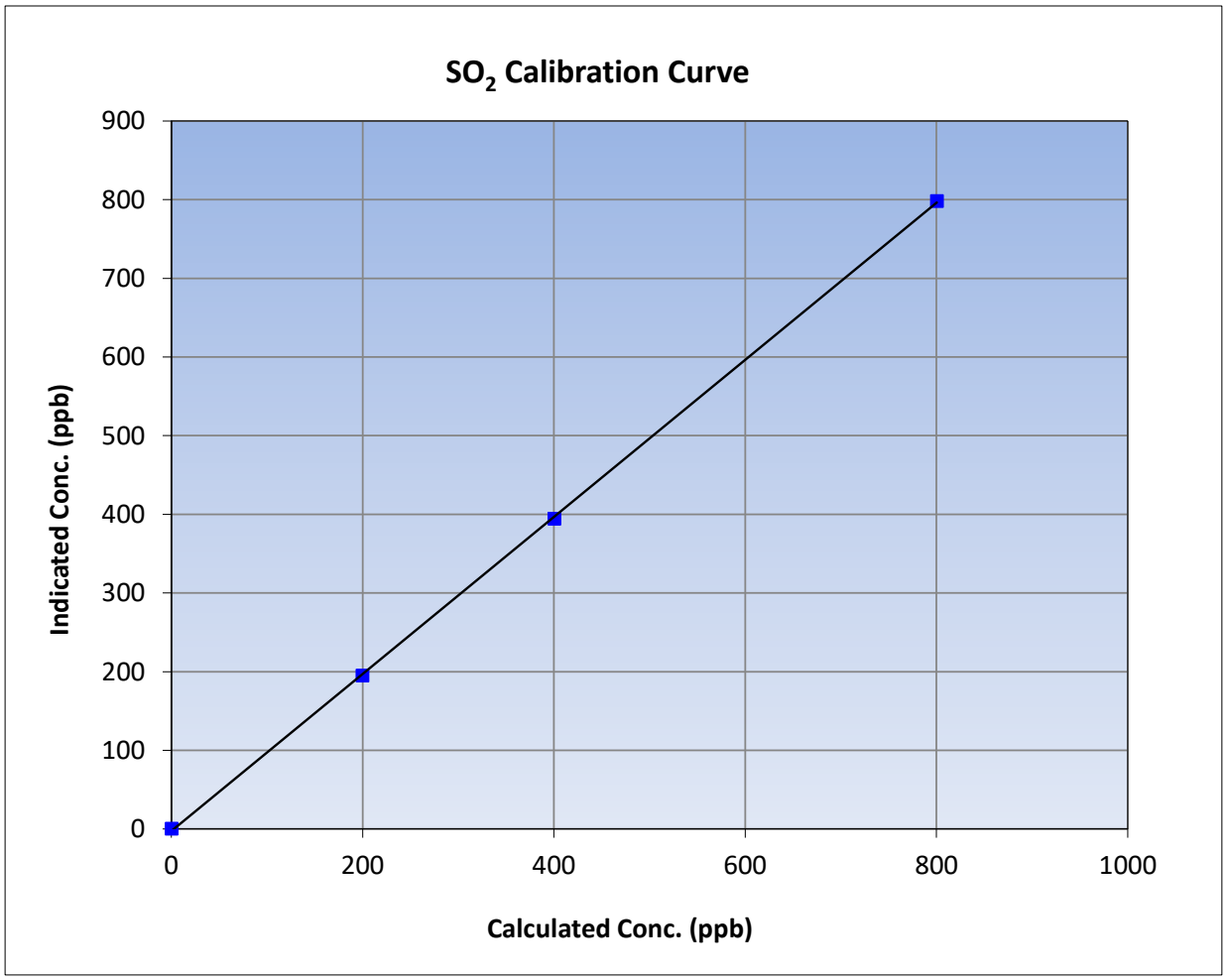
Station Information

Calibration Date:	June 5, 2023	Previous Calibration:	May 15, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:35	End Time (MST):	13:36
Analyzer make:	Thermo 43i	Analyzer serial #:	1218153459

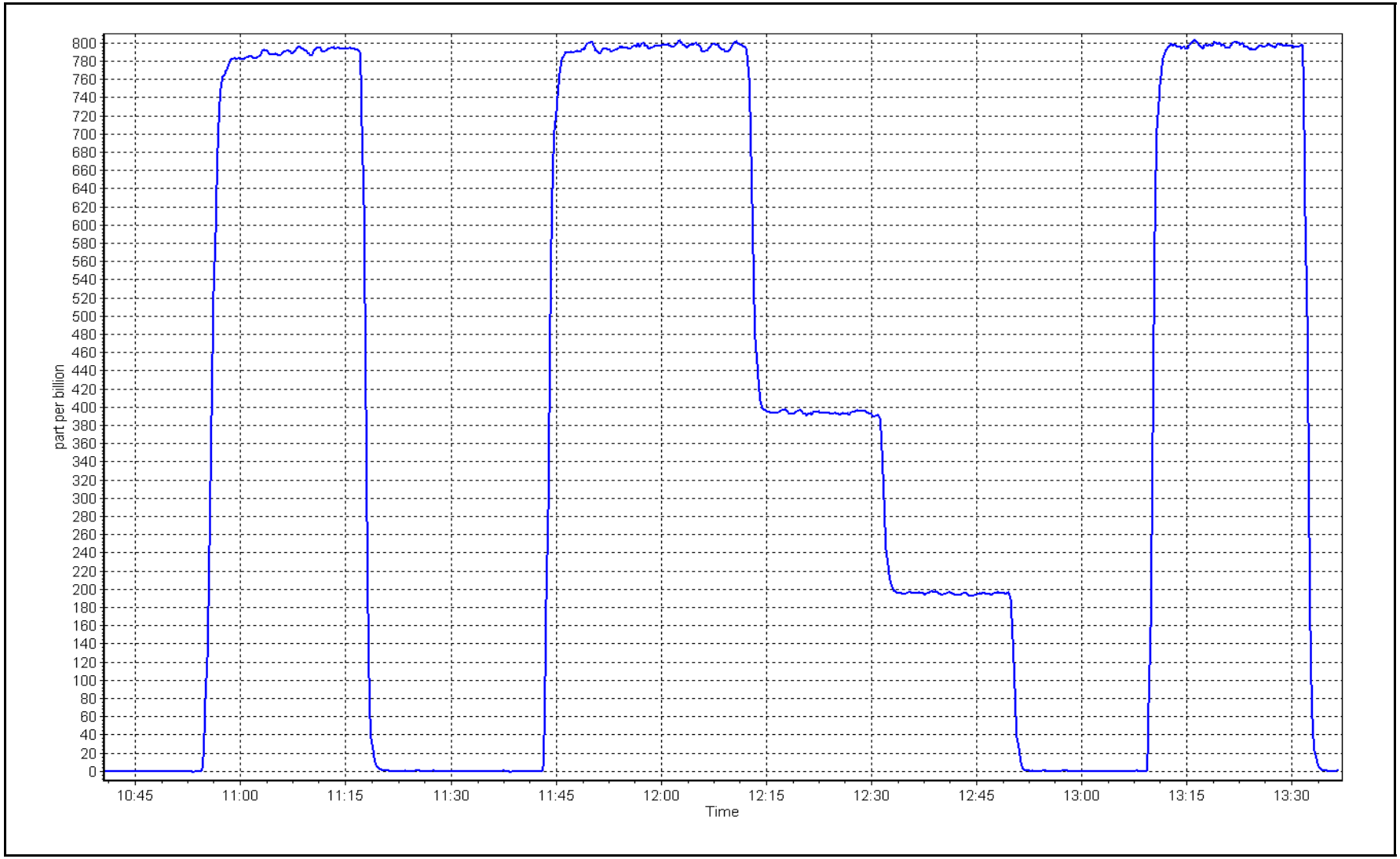
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
800.0	797.8	1.0027
400.0	394.0	1.0153
199.5	194.8	1.0242

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999941	*≥0.995*
Slope	0.998368	*0.90 - 1.10*
Intercept	-2.660243	*+/-30*



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



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	June 21, 2023	Last Cal Date:	May 23, 2023
Start time (MST):	9:45	End time (MST):	14:47
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:	0.987854	0.997854	Backgd or Offset:	12.7	13.2
Calibration intercept:	0.100766	-0.199211	Coeff or Slope:	1.085	1.115

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4921	78.8	80.0	79.5	1.008
as found 2nd point	4961	39.4	40.0	40.0	1.002
as found 3rd point	4980	19.7	20.0	19.8	1.015
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4921	78.8	80.0	79.8	1.003
second point	4961	39.4	40.0	39.5	1.013
third point	4980	19.7	20.0	19.5	1.026
as left zero	5000	0.0	0.0	0.4	----
as left span	4921	78.8	80.0	77.7	1.030
SO2 Scrubber Check	4921	79.4	800.0	0.3	----
Date of last scrubber change:		n/a		Ave Corr Factor	1.014
Date of last converter efficiency test:		n/a			efficiency

Baseline Corr As found:	79.4	Prev response:	79.13	*% change:	0.3%
Baseline Corr 2nd AF pt:	39.9	AF Slope:	0.993425	AF Intercept:	0.080804
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999982		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

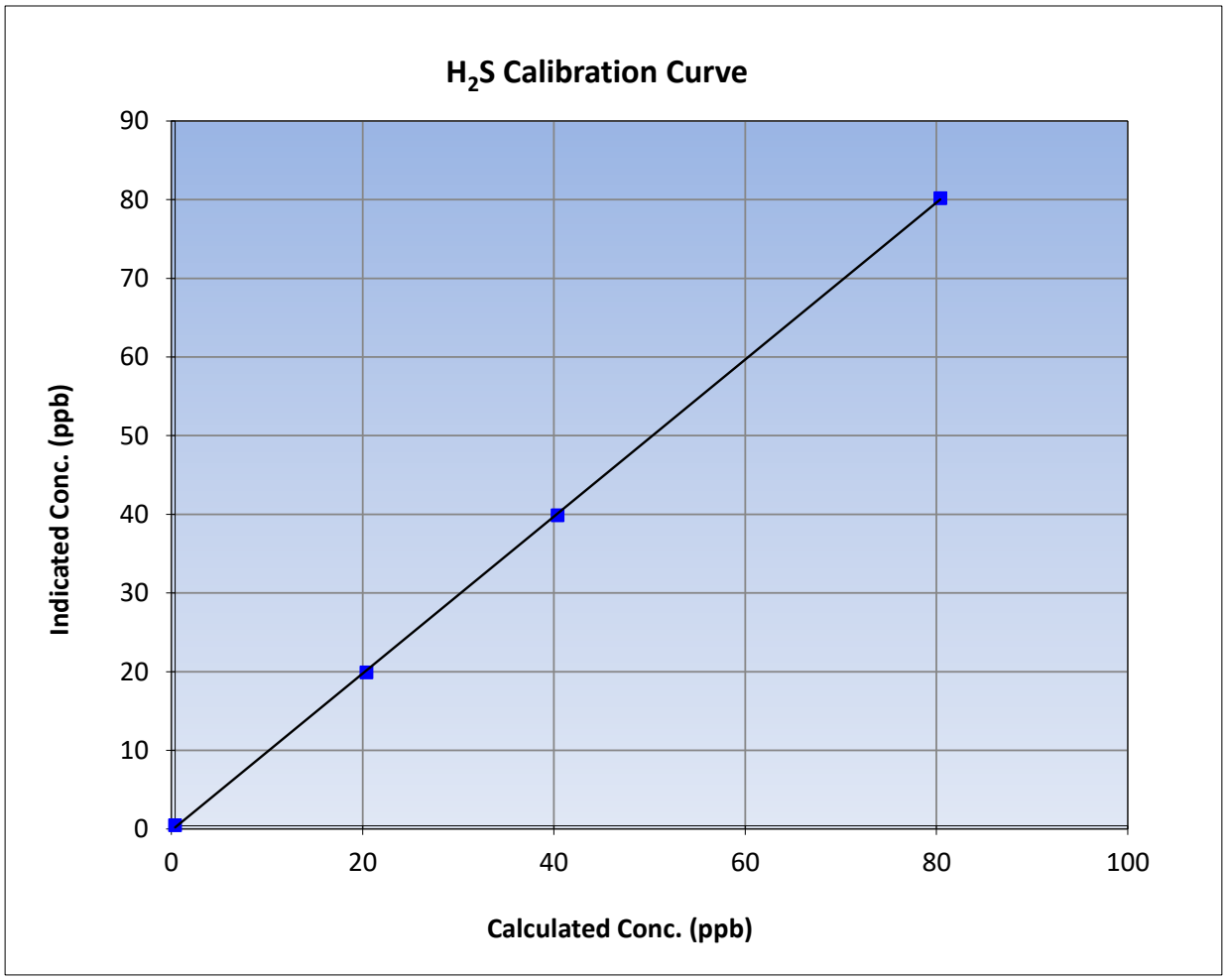
Station Information

Calibration Date:	June 21, 2023	Previous Calibration:	May 23, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	9:45	End Time (MST):	14:47
Analyzer make:	Thermo 450i	Analyzer serial #:	1218153583

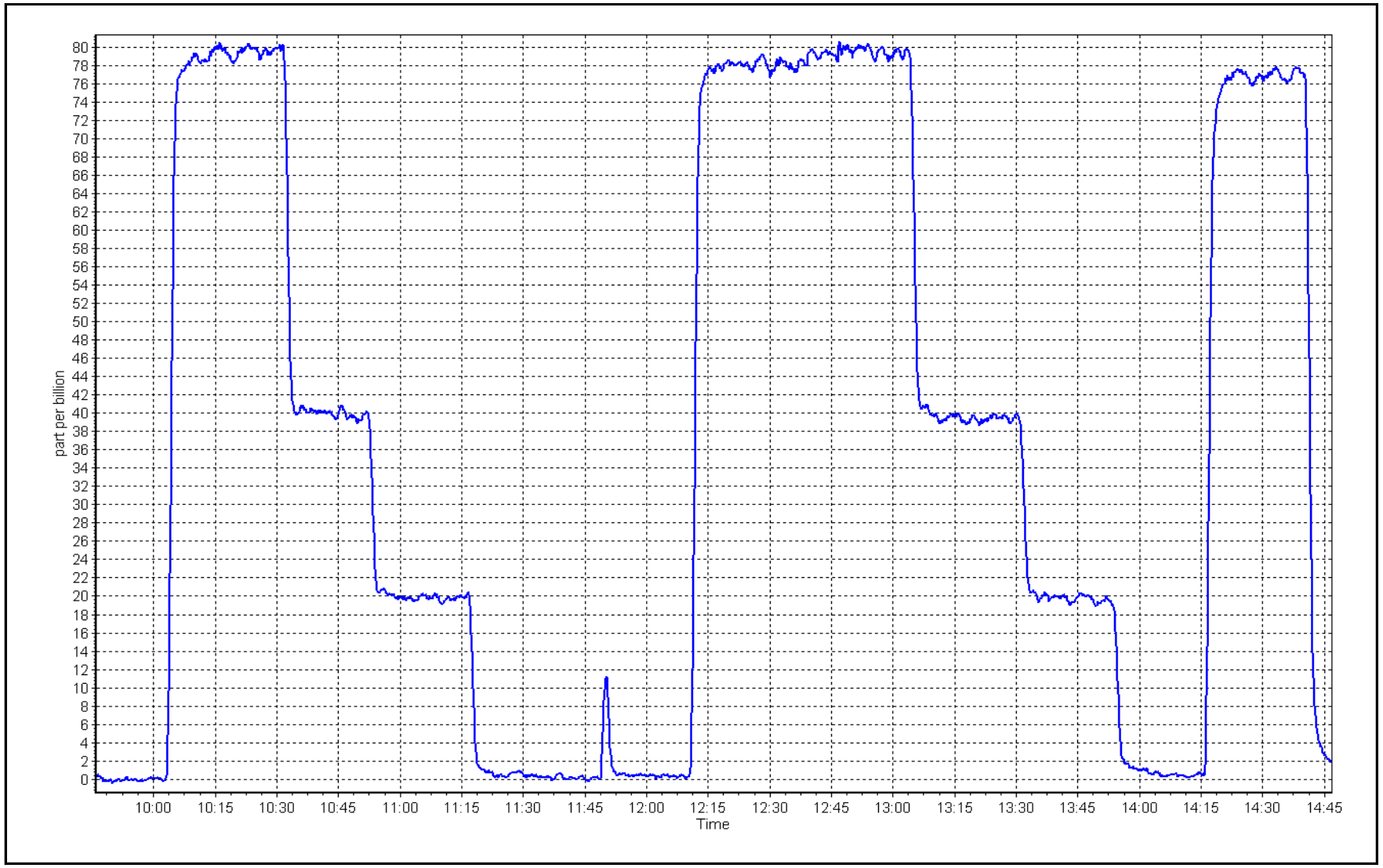
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	79.8	1.0025
40.0	39.5	1.0125
20.0	19.5	1.0257

Statistical Evaluation		Limits
Correlation Coefficient	0.999934	≥0.995
Slope	0.997854	0.90 - 1.10
Intercept	-0.199211	+/-3



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



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	June 5, 2023	Last Cal Date:	May 15, 2023
Start time (MST):	10:35	End time (MST):	13:36
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:	1.004482	0.998402	Background:	3.070	3.210
Calibration intercept:	-0.015906	-0.031959	Coefficient:	4.296	4.483

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.00	-0.02	----
as found span	4921	79.4	17.09	16.31	1.048
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.03	----
high point	4921	79.4	17.09	17.07	1.001
second point	4960	39.7	8.55	8.44	1.013
third point	4980	19.8	4.26	4.19	1.018
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.4	17.09	17.01	1.005
				Average Correction Factor	1.011

Baseline Corr As found:	16.33	Previous response	17.15	*% change	-5.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

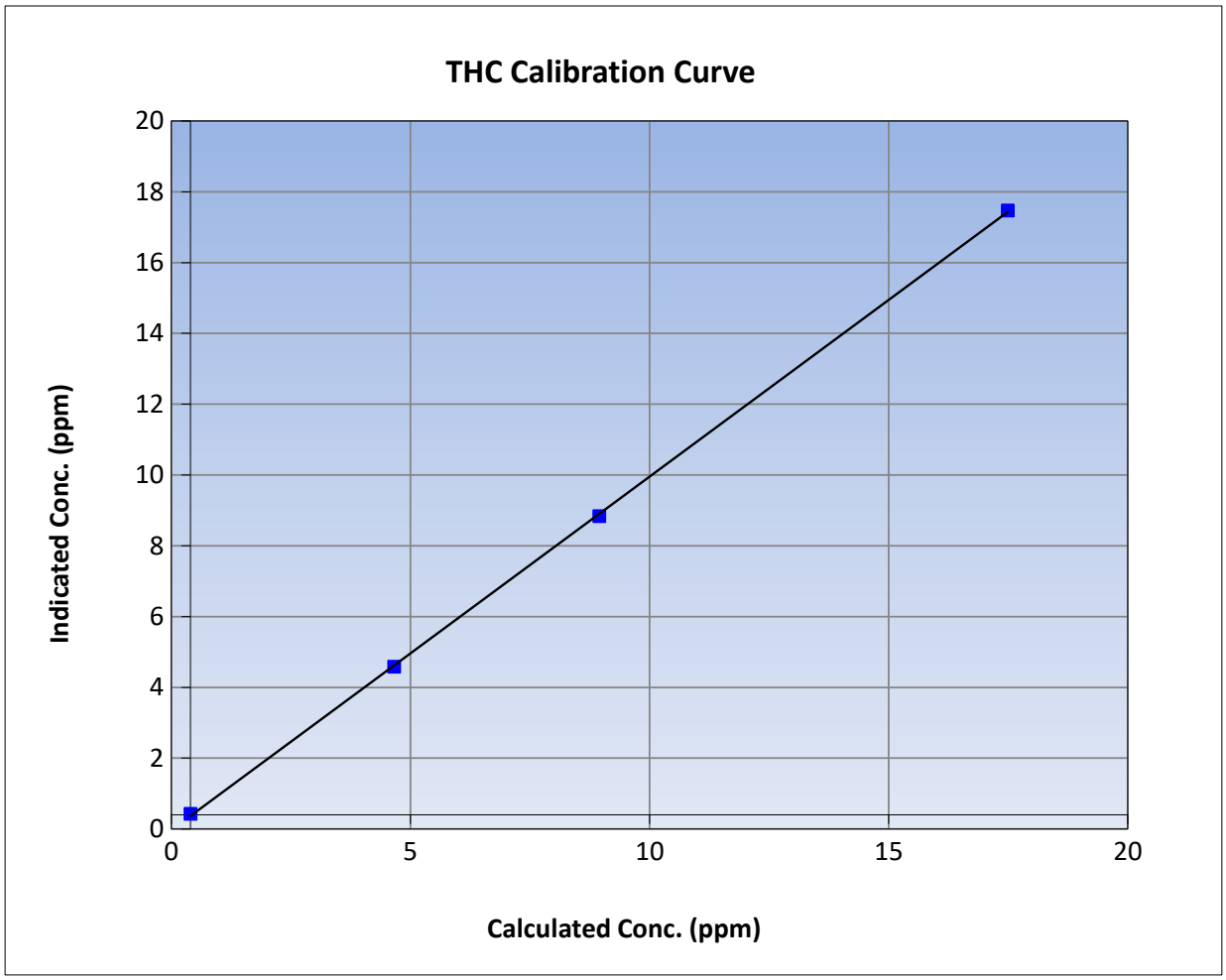
Station Information

Calibration Date:	June 5, 2023	Previous Calibration:	May 15, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:35	End Time (MST):	13:36
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1218153352

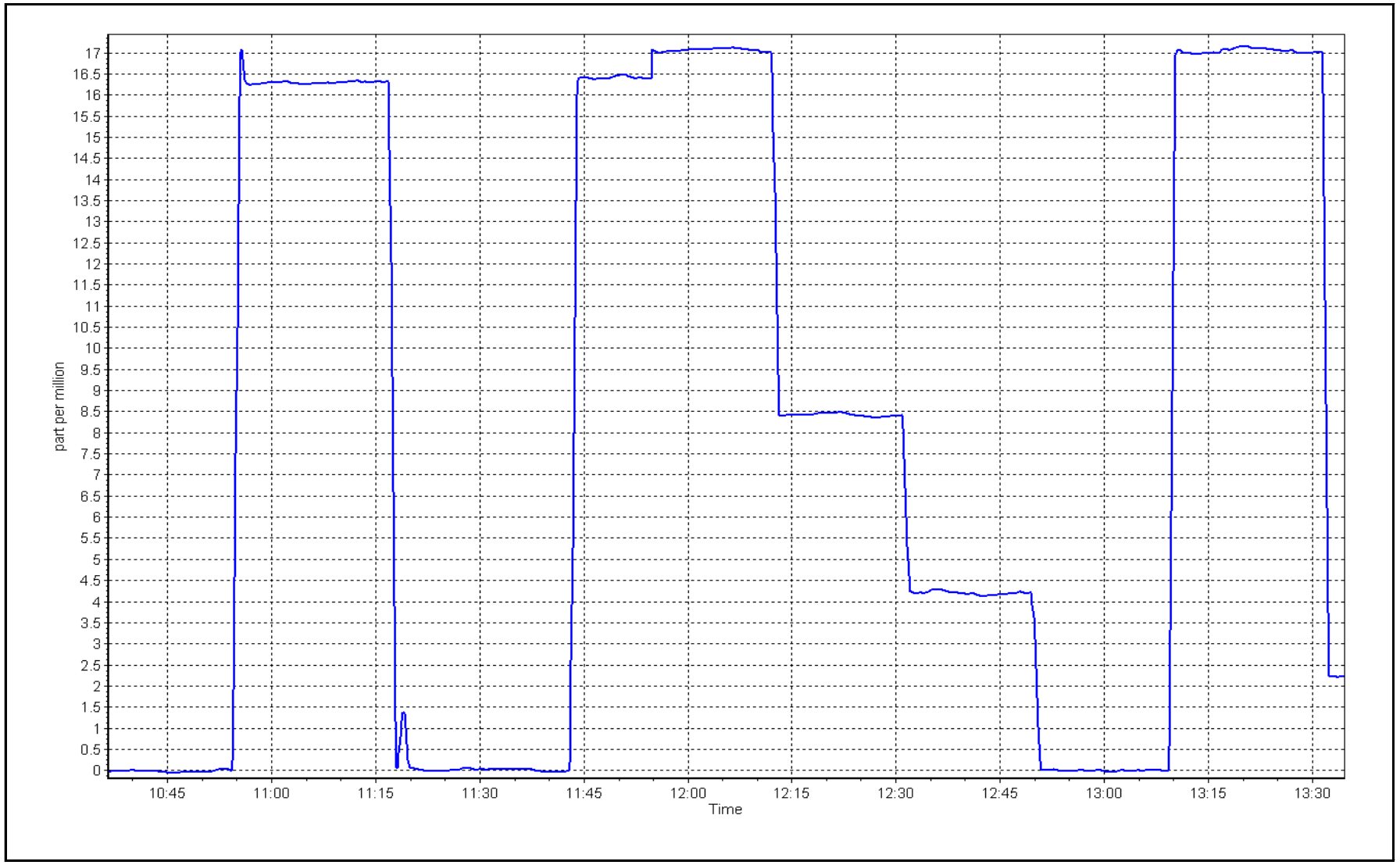
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.03	----
17.09	17.07	1.0011
8.55	8.44	1.0129
4.26	4.19	1.0180

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999935	*≥0.995*
Slope	0.998402	*0.90 - 1.10*
Intercept	-0.031959	*+/-1.5*



THC Calibration Plot Date: June 5, 2023 Location: Wapasu



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	June 6, 2023	Last Cal Date:	May 18, 2023
Start time (MST):	9:55	End time (MST):	12:54
Reason:	Removal		

Calibration Standards

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

Analyzer Information

Analyzer make:	Teledyne API T200		Analyzer serial #:	833	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	0.836	N/A	NO bkgnd or offset:	0.1	N/A
NOX coeff or slope:	0.828	N/A	NOX bkgnd or offset:	-0.4	N/A
NO2 coeff or slope:	1.000	N/A	Reaction cell Press:	4.4	N/A

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000389	
NO_X Cal Offset:	-0.960000	
NO Cal Slope:	1.000187	
NO Cal Offset:	-1.540000	
NO_2 Cal Slope:	0.997323	
NO_2 Cal Offset:	-0.628631	

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	3.6	-0.4	4.0	----	----
as found span	4917	83.2	817.2	799.9	17.3	816.8	798.8	18.0	1.0005	1.0014
as found 2nd	4958	41.6	408.6	399.9	8.7	407.3	397.5	9.9	1.0032	1.0061
as found 3rd	4979	20.8	204.3	200.0	4.3	202.4	196.2	6.2	1.0094	1.0192
new cyl resp										
calibrator zero										
high point										
second point										
third point										
as left zero										
as left span										
								Average Correction Factor		

Corrected As found	NO_X = 813.2 ppb	NO = 799.2 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-0.4%
Previous Response	NO_X = 816.5 ppb	NO = 798.5 ppb			*Percent Change	NO =	0.1%
Baseline Corr 2nd pt	NO_X = 403.7 ppb	NO = 397.9 ppb	As found	NO_X r^2: 0.999961	Nx Sl: 0.996599	Nx Int:	1.220
Baseline Corr 3rd pt	NO_X = 198.8 ppb	NO = 196.6 ppb	As found	NO r^2: 0.999981	NO Sl: 1.000273	NO Int:	-2.020
			As found	NO_2 r^2: 0.999945	NO2 Sl: 0.992145	NO_2 Int:	3.495

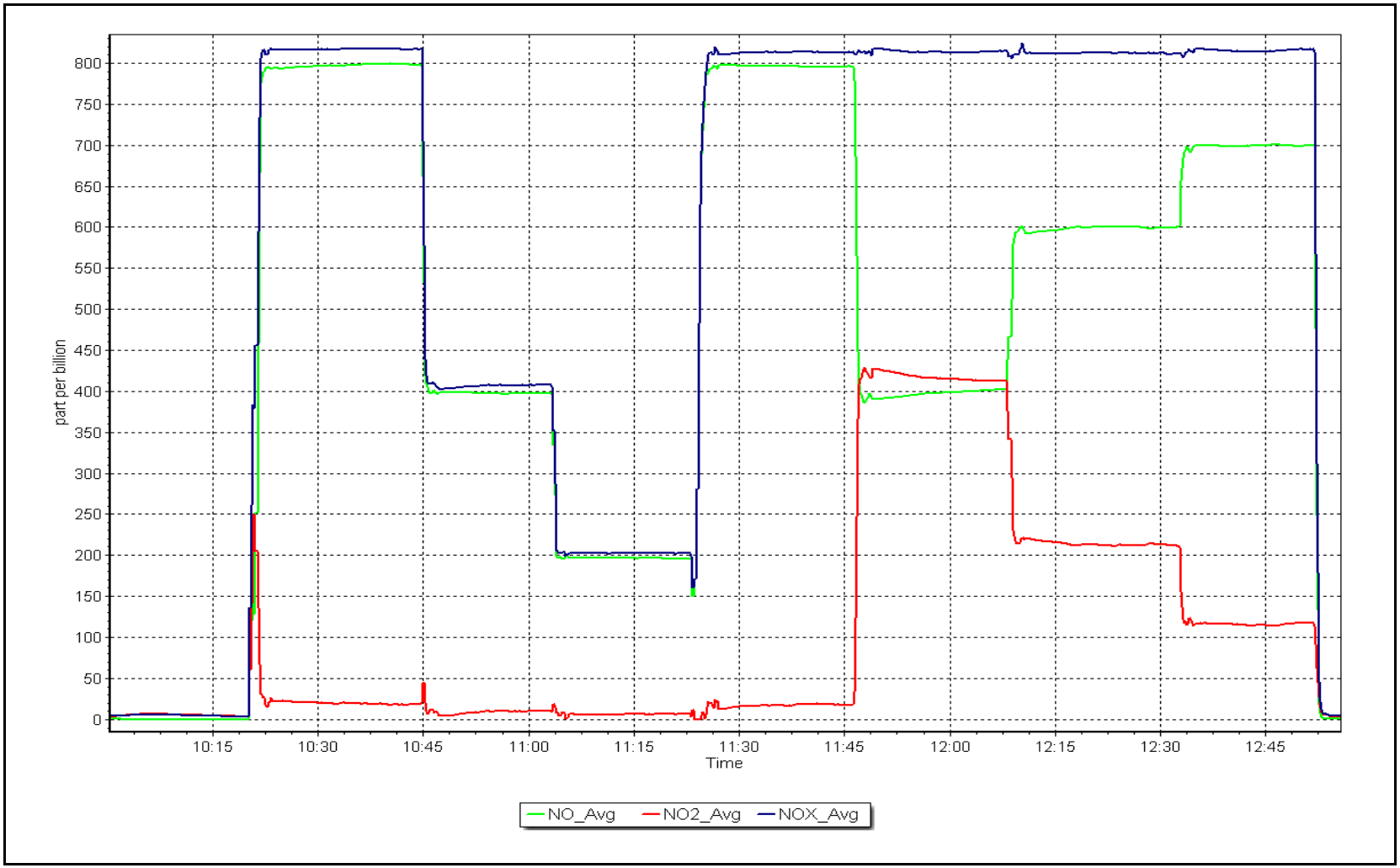
GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero	----	----	0.0	4.0	----	----
as found GPT point (400 ppb NO2)	795.2	400.5	412.0	413.1	0.9974	100.3%
as found GPT point (200 ppb NO2)	795.2	599.5	213.0	212.9	1.0005	100.0%
as found GPT point (100 ppb NO2)	795.2	699.7	112.8	116.0	0.9725	102.8%
1st GPT point (400 ppb O3)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
				Average Correction Factor		

Notes: Removal calibration performed due to elevated zero baseline, the instrument needs further investigation and maintenance.

Calibration Performed By: Aswin Sasi Kumar

NO_X Calibration Plot Date: June 6, 2023 Location: Wapasu



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	June 7, 2023	Last Cal Date:	N/A
Start time (MST):	10:08	End time (MST):	15:04
Reason:	Install		

Calibration Standards

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

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	N/A	0.932	NO bkgnd or offset:	N/A	2.4
NOX coeff or slope:	N/A	0.984	NOX bkgnd or offset:	N/A	2.4
NO2 coeff or slope:	N/A	1.000	Reaction cell Press:	N/A	141.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	N/A	1.003075
NO_X Cal Offset:	N/A	-4.520000
NO Cal Slope:	N/A	1.003530
NO Cal Offset:	N/A	-5.460000
NO_2 Cal Slope:	N/A	1.006000
NO_2 Cal Offset:	N/A	-0.618680

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero										
as found span										
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.0	----	----
high point	4917	83.2	817.2	799.9	17.3	818.0	800.5	17.5	0.9990	0.9992
second point	4958	41.6	408.6	399.9	8.7	401.5	391.6	9.9	1.0177	1.0213
third point	4979	20.8	204.3	200.0	4.3	196.8	190.8	6.0	1.0381	1.0481
as left zero	5000	0.0	0.0	0.0	0.0	0.4	0.3	0.1	----	----
as left span	4917	83.2	817.2	392.7	424.5	812.0	385.2	427.0	1.0064	1.0193
								Average Correction Factor	1.0183	1.0229

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)	797.4	390.2	424.5	426.1	0.9963	100.4%
2nd GPT point (200 ppb O3)	797.4	609.2	205.5	208.0	0.9880	101.2%
3rd GPT point (100 ppb O3)	797.4	701.7	113.0	110.9	1.0190	98.1%
				Average Correction Factor	1.0011	99.9%

Notes: Install calibration, zero and span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

NO_X Calibration Summary

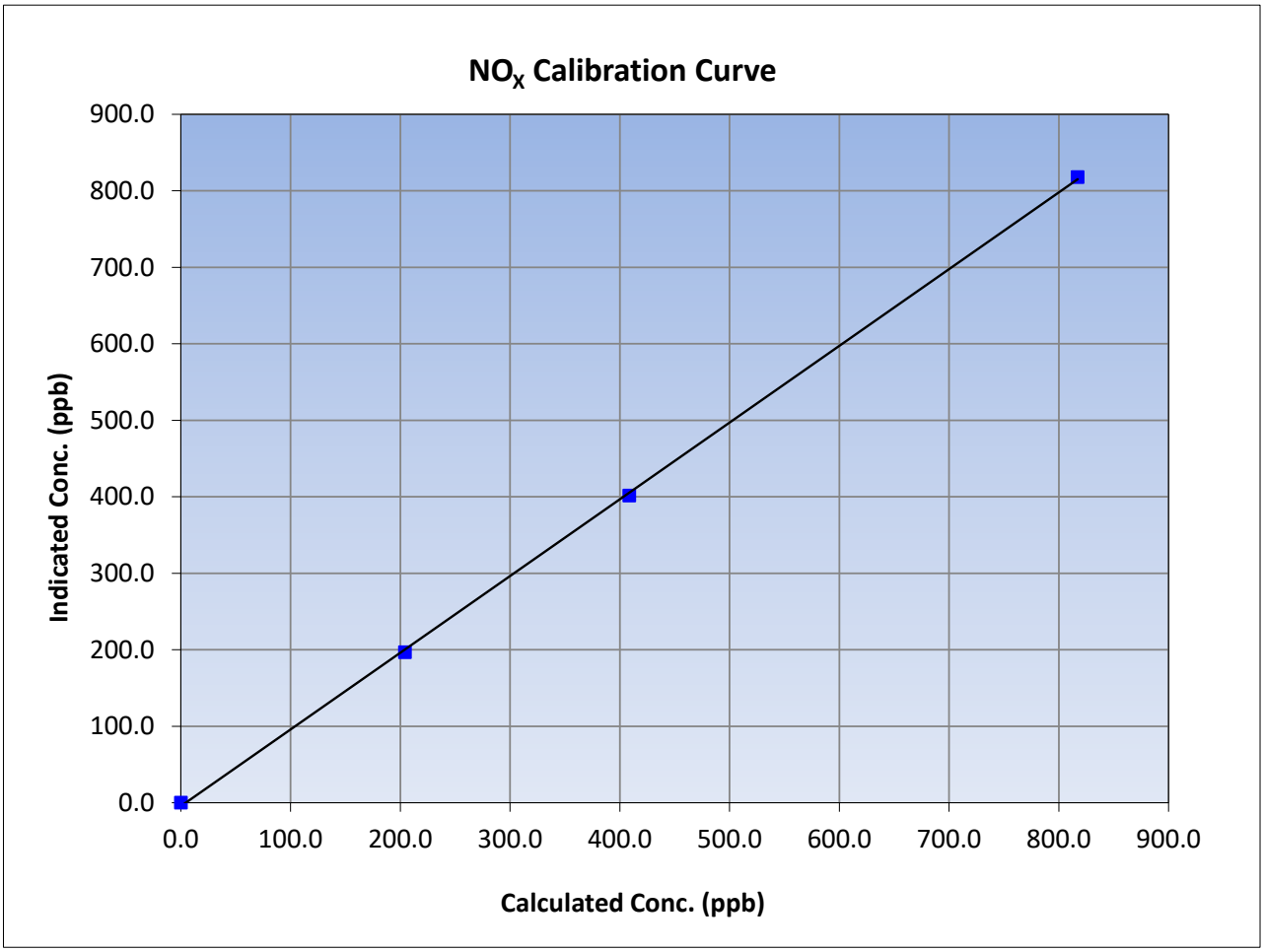
Version-04-2020

Station Information

Calibration Date:	June 7, 2023	Previous Calibration:	N/A
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:08	End Time (MST):	15:04
Analyzer make:	Thermo Scientific 42iQ	Analyzer serial #:	12300522720

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999845	≥0.995
817.2	818.0	0.9990			
408.6	401.5	1.0177	Slope	1.003075	0.90 - 1.10
204.3	196.8	1.0381			
			Intercept	-4.520000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

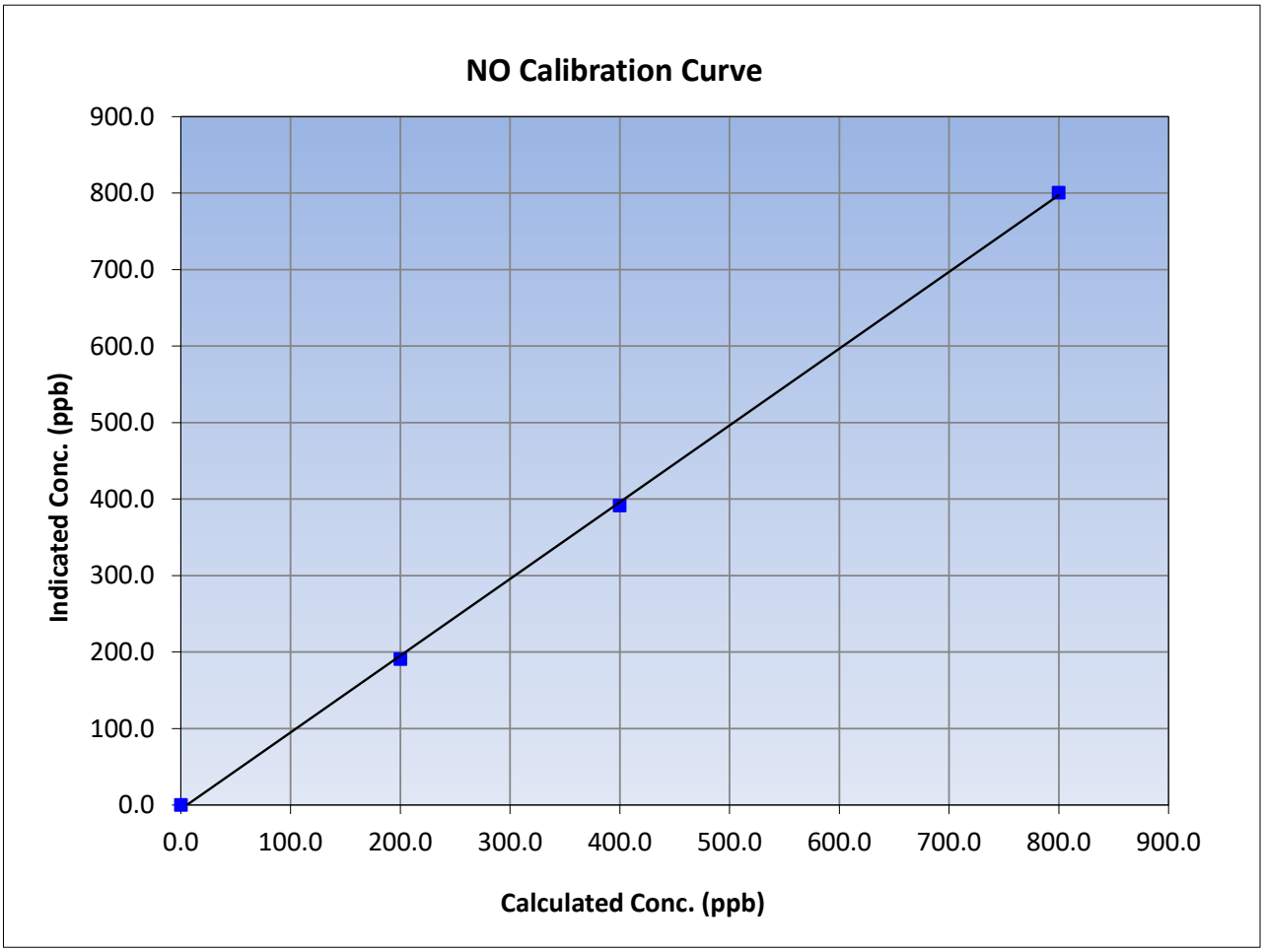
Version-04-2020

Station Information

Calibration Date:	June 7, 2023	Previous Calibration:	N/A
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:08	End Time (MST):	15:04
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	0.999778	≥0.995
799.9	800.5	0.9992			
399.9	391.6	1.0213	Slope	1.003530	0.90 - 1.10
200.0	190.8	1.0481			
			Intercept	-5.460000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

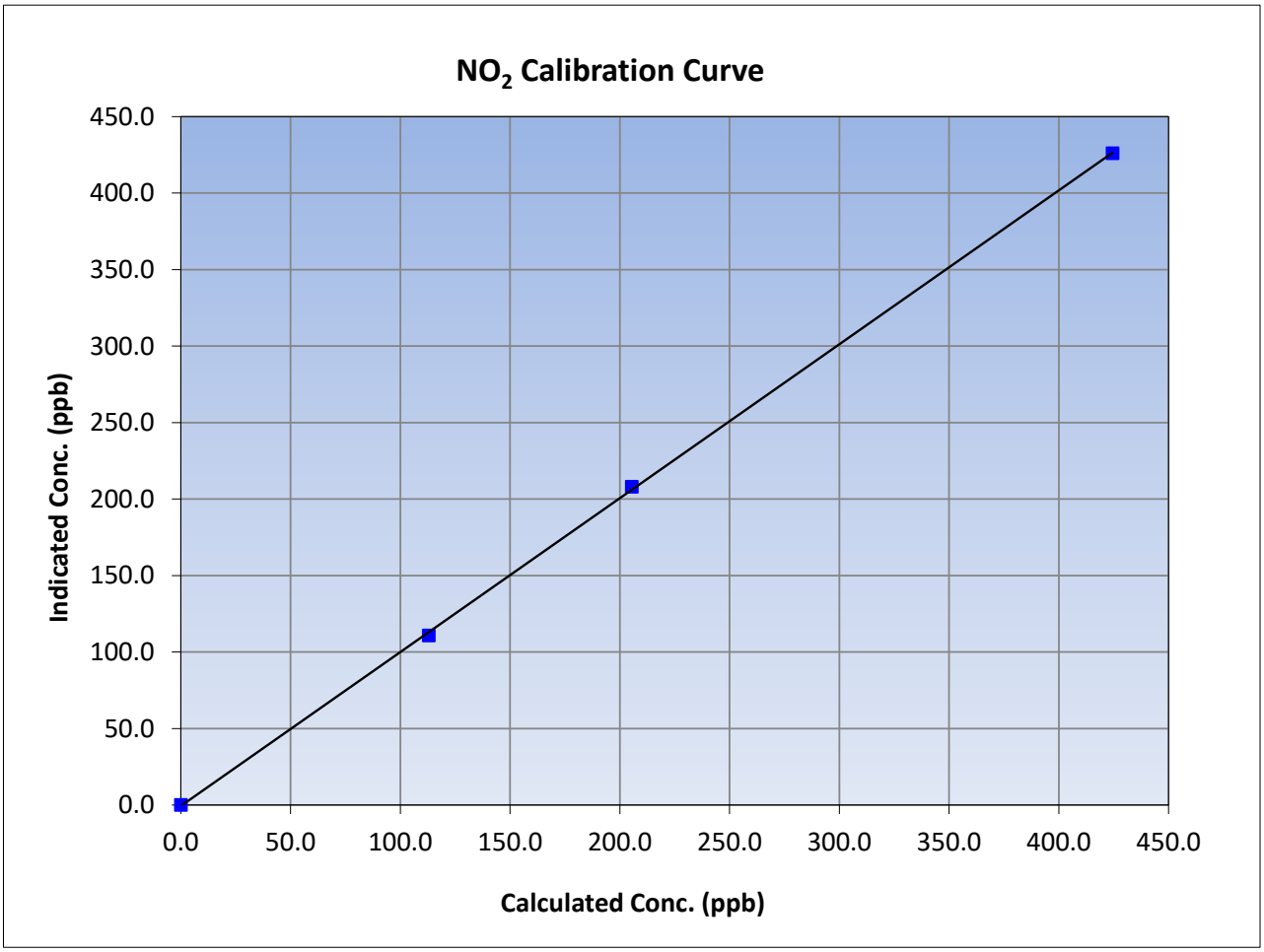
Version-04-2020

Station Information

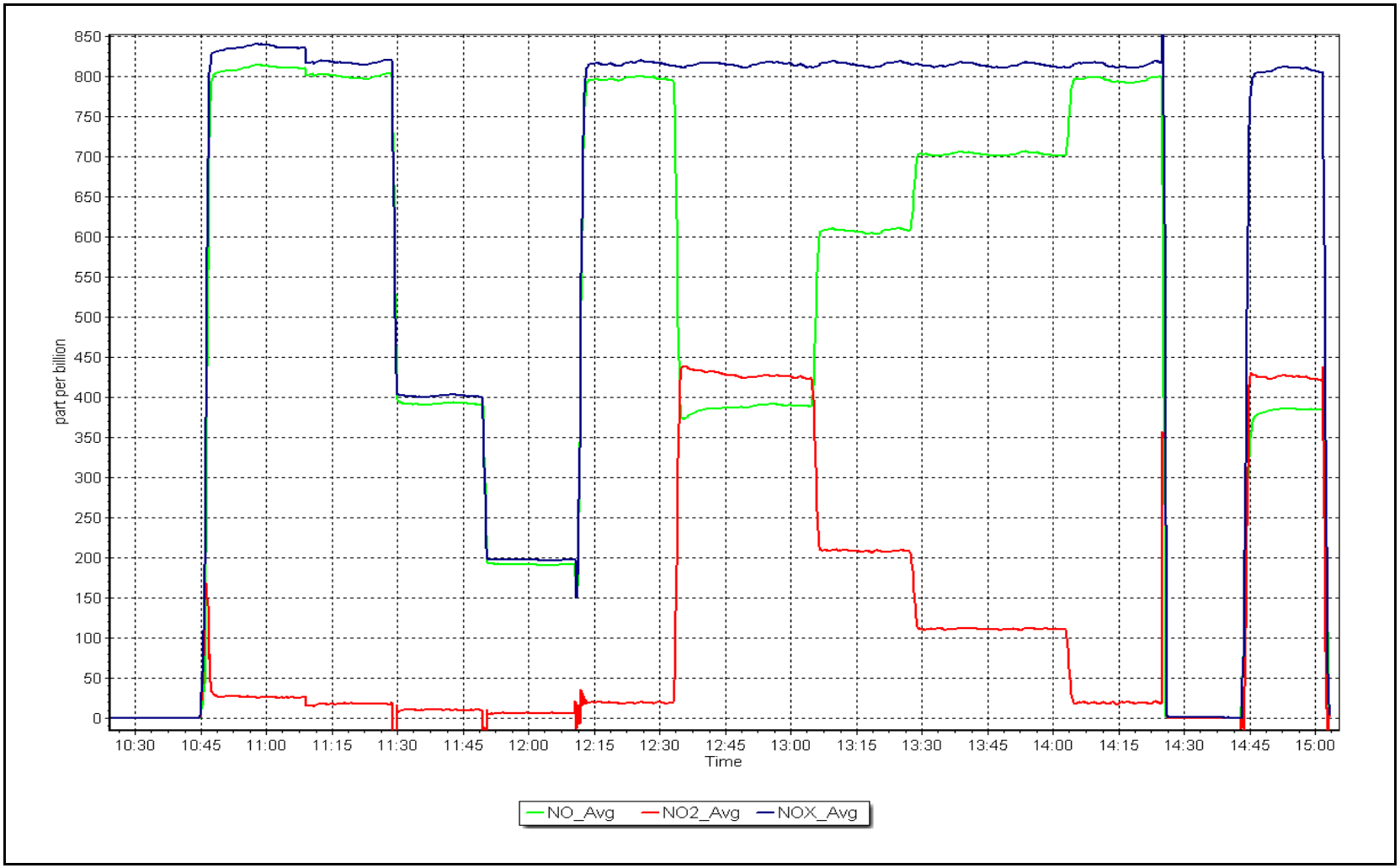
Calibration Date:	June 7, 2023	Previous Calibration:	N/A
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:08	End Time (MST):	15:04
Analyzer make:	Thermo Scientific 42iQ	Analyzer serial #:	12300522720

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999911	≥0.995
424.5	426.1	0.9963			
205.5	208.0	0.9880	Slope	1.006000	0.90 - 1.10
113.0	110.9	1.0190			
			Intercept	-0.618680	+/-20



NO_X Calibration Plot Date: June 7, 2023 Location: Wapasu



Wood Buffalo Environmental Association

O_3 Calibration Report

Version-01-2020

Station Information

Station Name:	Wapasu	Station number:	AMS17
Calibration Date:	June 1, 2023	Last Cal Date:	May 5, 2023
Start time (MST):	10:15	End time (MST):	13:18
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:	1.008857	1.004914	Backgd or Offset:	-1.8	-1.8
Calibration intercept:	-0.600000	-0.460000	Coeff or Slope:	1.020	1.020

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	----
as found span	5000	1077.3	400.0	401.0	0.998
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.4	----
high point	5000	1077.3	400.0	401.9	0.995
second point	5000	900.3	200.0	200.2	0.999
third point	5000	789.5	100.0	99.1	1.009
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	1077.3	400.0	406.4	0.984
				Average Correction Factor	1.001

Baseline Corr As found:	401.0	Previous response	402.9	*% 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: Aswin Sasi Kumar

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

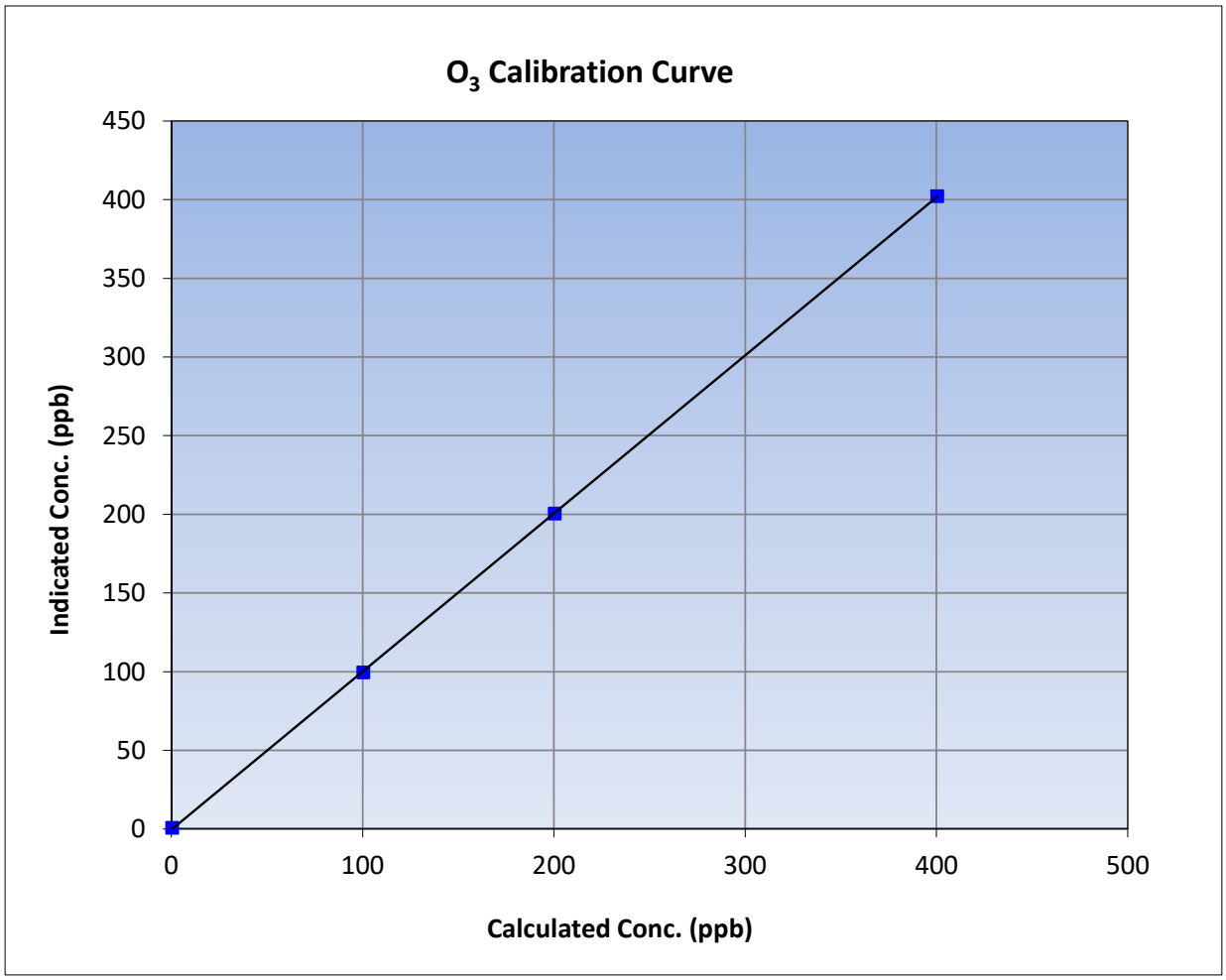
Station Information

Calibration Date:	June 1, 2023	Previous Calibration:	May 5, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	10:15	End Time (MST):	13:18
Analyzer make:	API T400	Analyzer serial #:	3870

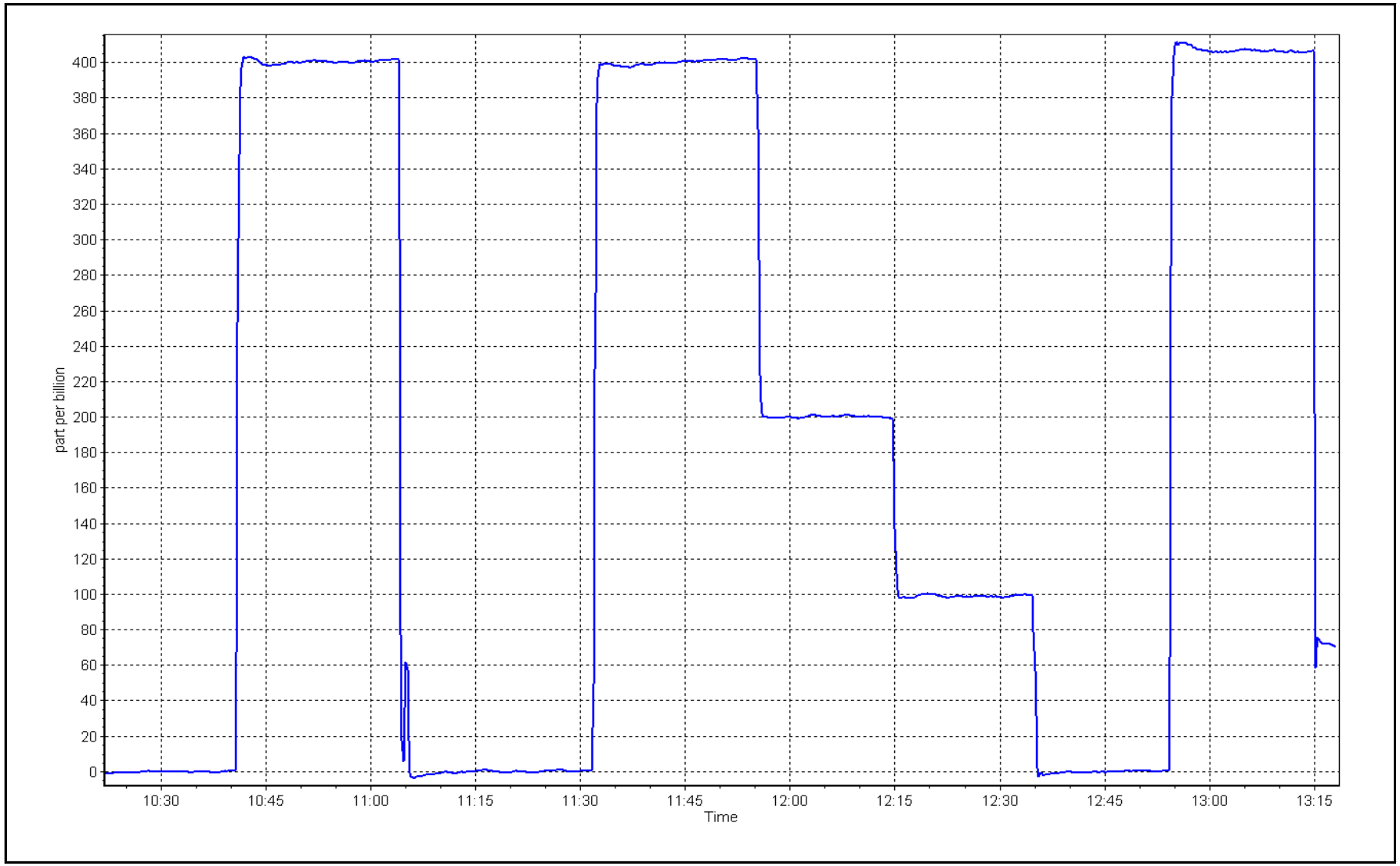
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
400.0	401.9	0.9953
200.0	200.2	0.9990
100.0	99.1	1.0091

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999979	*≥0.995*
Slope	1.004914	*0.90 - 1.10*
Intercept	-0.460000	*+/- 5*



O_3 Calibration Plot Date: June 1, 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:	June 21, 2023	Last Cal Date:	May 23, 2023
Start time (MST):	13:31	End time (MST):	14:09
Analyzer Make:	API T640	S/N:	1183
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388748
Temp/RH standard:	Alicat FP-25BT	S/N:	388748

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	15.5	15.1	15.5	☐	+/- 2 °C
P (mmHg)	712.8	715.8	712.8	☐	+/- 10 mmHg
flow (LPM)	5.01	5	5.01	☐	+/- 0.25 LPM

Leak Test: Date of check: June 21, 2023 Last Cal Date: May 23, 2023

PM w/o HEPA: 2.9 PM w/ HEPA: 0.0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

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

Disposable Filter Changed: March 23, 2023

Annual Maintenance

Date Sample Tube Cleaned: _____

Date RH/T Sensor Cleaned: _____

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

Calibration by: Aswin Sasi Kumar

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS18
STONY MOUNTAIN
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	June 15, 2023	Last Cal Date:	May 8, 2023
Start time (MST):	10:37	End time (MST):	13:48
Reason:	Routine		

Calibration Standards

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

Analyzer Information

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

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000576	1.002775	Backgd or Offset:	22.6	22.6
Calibration intercept:	-1.343541	-1.563172	Coeff or Slope:	0.808	0.808

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5009	0.0	0.0	-0.2	----
as found span	4919	81.0	800.3	800.2	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4919	81.0	800.3	802.1	0.998
second point	4959	40.5	400.2	398.0	1.005
third point	4979	20.2	199.6	197.4	1.011
as left zero	5000	0.0	0.0	-0.2	----
as left span	4919	81.0	800.3	799.1	1.001
				Average Correction Factor	1.005

Baseline Corr As found:	800.40	Previous response	799.40	*% 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: Sample inlet filter changed after as founds. No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

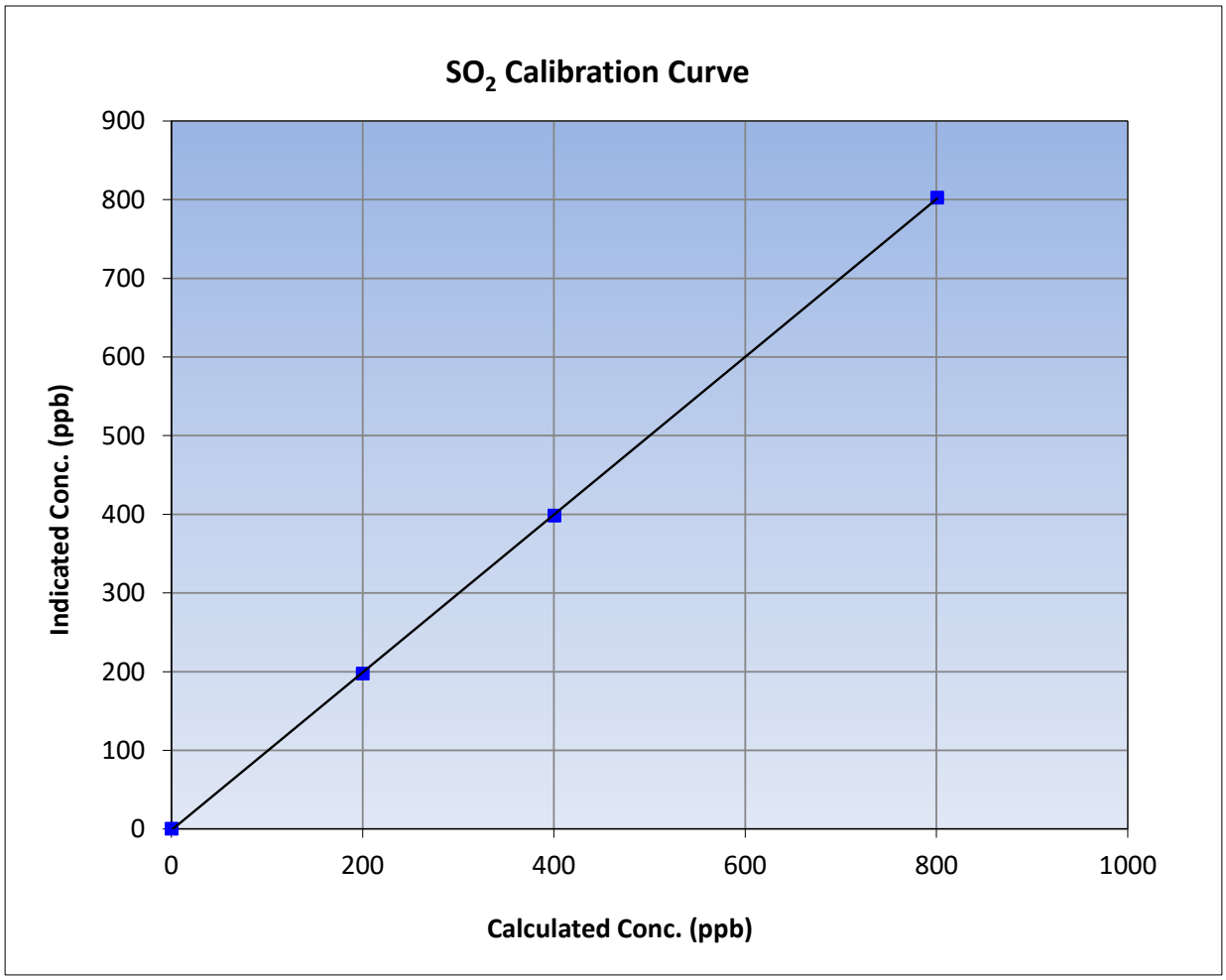
Station Information

Calibration Date:	June 15, 2023	Previous Calibration:	May 8, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:37	End Time (MST):	13:48
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1501301453

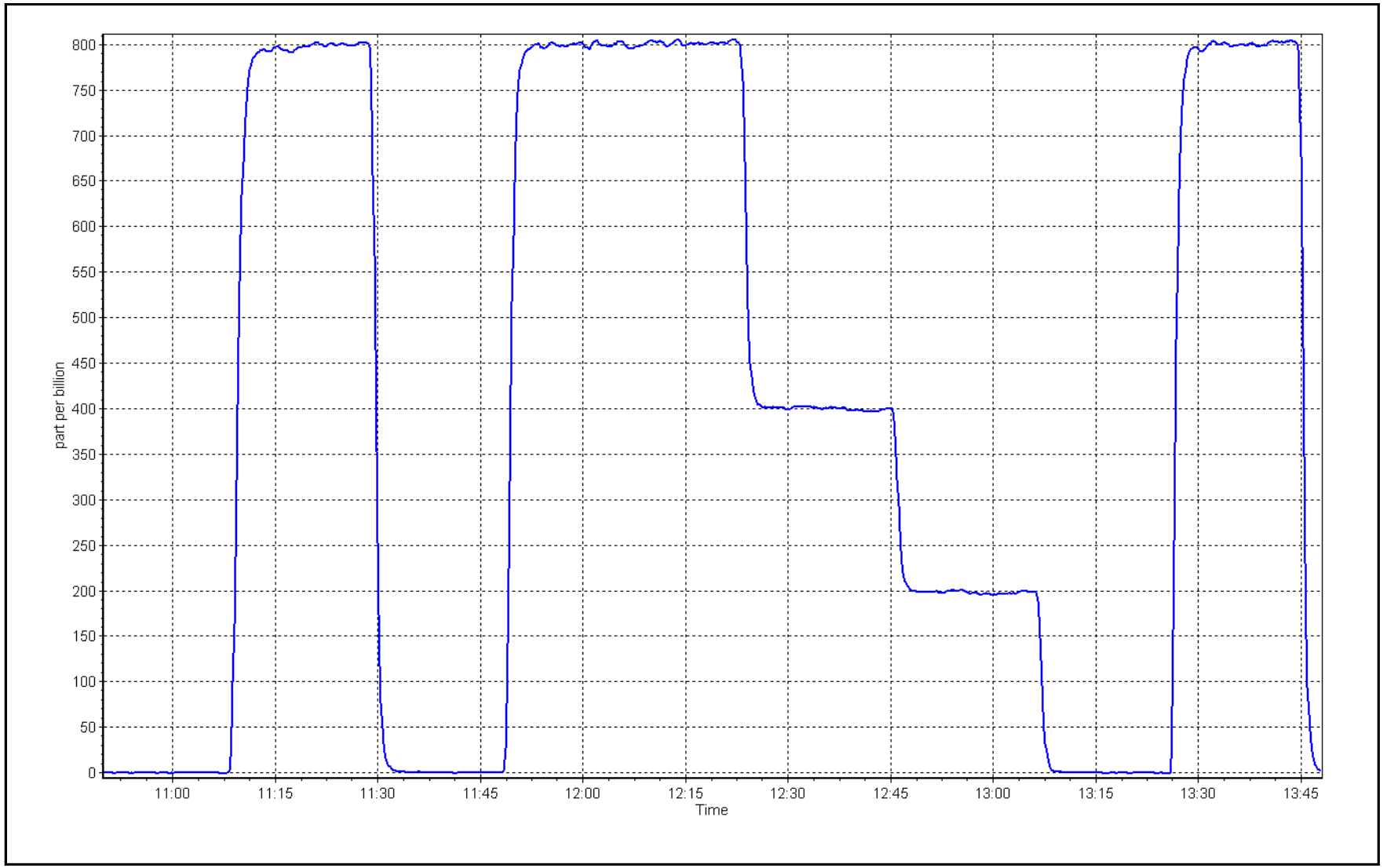
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
800.3	802.1	0.9977
400.2	398.0	1.0055
199.6	197.4	1.0112

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999975	*≥0.995*
Slope	1.002775	*0.90 - 1.10*
Intercept	-1.563172	*+/-30*



SO2 Calibration Plot Date: June 15, 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:	June 27, 2023	Last Cal Date:	May 16, 2023
Start time (MST):	10:00	End time (MST):	14:55
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:	1.001444	1.003297	Backgd or Offset:	2.59	2.70
Calibration intercept:	0.240955	0.101073	Coeff or Slope:	1.159	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	0.1	----
as found span	4927	73.0	80.0	78.1	1.026
as found 2nd point	4964	36.5	40.0	38.3	1.047
as found 3rd point	4983	18.3	20.0	18.6	1.084
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.2	----
high point	4927	73.0	80.0	80.3	0.996
second point	4964	36.5	40.0	40.5	0.987
third point	4983	18.3	20.0	19.9	1.007
as left zero	5000	0.0	0.0	0.3	----
as left span	4927	73.0	80.0	80.5	0.994
SO2 Scrubber Check	4923	77.1	771.0	0.0	----
Date of last scrubber change:		17-Dec-21		Ave Corr Factor	0.997
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.0	Prev response:	80.35	*% change:	-3.0%
Baseline Corr 2nd AF pt:	38.2	AF Slope:	0.978430	AF Intercept:	-0.478368
Baseline Corr 3rd AF pt:	18.5	AF Correlation:	0.999748		

* = > +/-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

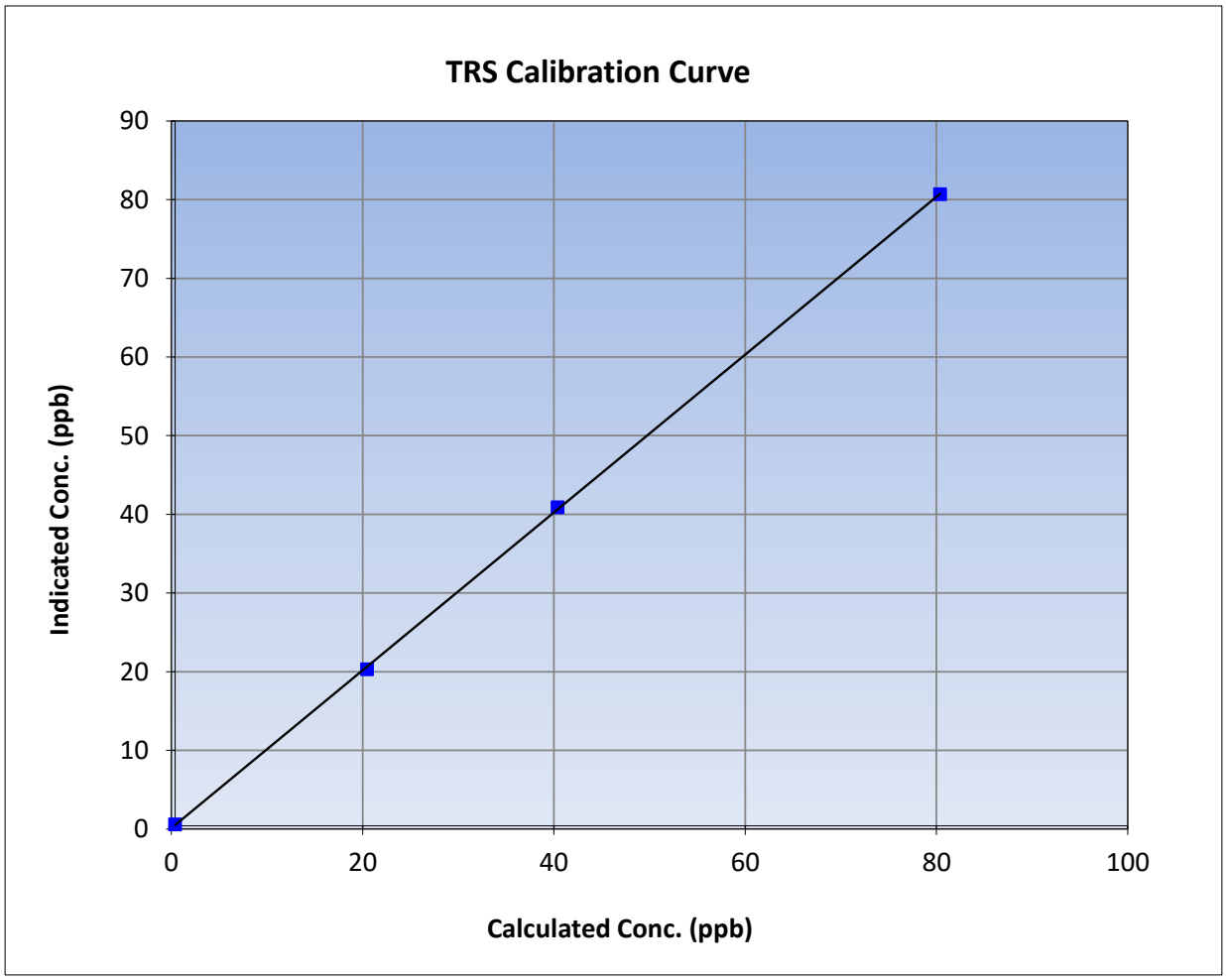
Station Information

Calibration Date:	June 27, 2023	Previous Calibration:	May 16, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	10:00	End Time (MST):	14:55
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153359

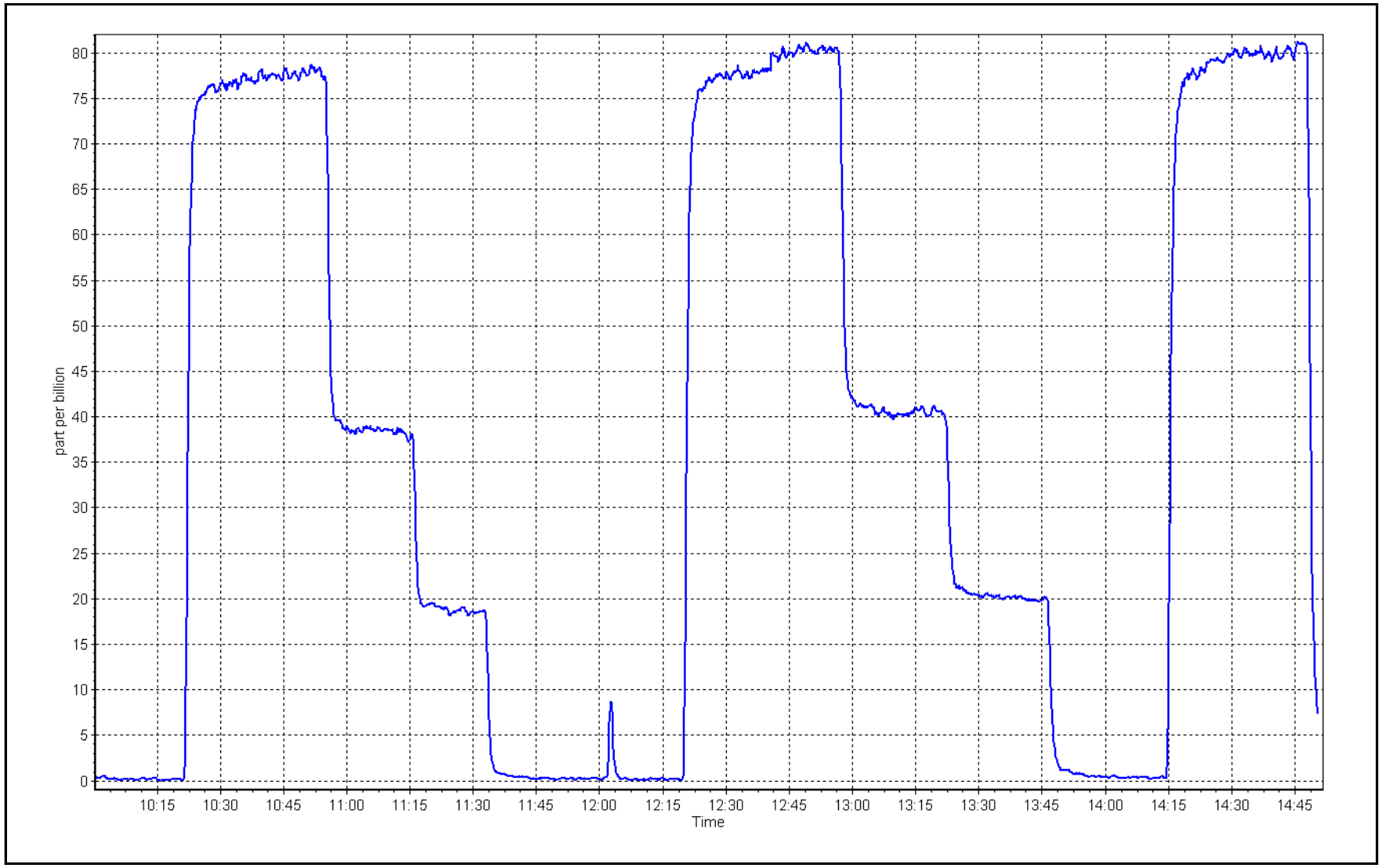
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
80.0	80.3	0.9962
40.0	40.5	0.9875
20.0	19.9	1.0074

Statistical Evaluation		Limits
Correlation Coefficient	0.999947	≥0.995
Slope	1.003297	0.90 - 1.10
Intercept	0.101073	+/-3



TRS Calibration Plot Date: June 27, 2023 Location: Stony Mountain



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	June 15, 2023	Last Cal Date:	May 13, 2023
Start time (MST):	10:37	End time (MST):	13:48
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1180320039	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	3.15E-04	3.17E-04	NMHC SP Ratio:	5.66E-05	5.97E-05
CH4 Retention time:	15.20	15.20	NMHC Peak Area:	161883	153659

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	4919	81.0	17.28	16.80	1.029
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.01	----
high point	4919	81.0	17.28	17.30	0.999
second point	4959	40.5	8.64	8.63	1.001
third point	4979	20.2	4.31	4.32	0.998
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	17.28	17.27	1.000
				Average Correction Factor	1.000
Baseline Corr AF:	16.79	Prev response	17.27	*% change	-2.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4919	81.0	9.17	8.74	1.049
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	9.18	0.999
second point	4959	40.5	4.58	4.59	0.999
third point	4979	20.2	2.29	2.31	0.991
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81	9.17	9.14	1.004
				Average Correction Factor	0.996
Baseline Corr AF:	8.74	Prev response	9.16	*% change	-4.9%
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	0.01	----
as found span	4919	81.0	8.11	8.06	1.006
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.01	----
high point	4919	81.0	8.11	8.12	0.999
second point	4959	40.5	4.06	4.04	1.005
third point	4979	20.2	2.02	2.01	1.006
as left zero	5000	0.0	0.00	0.00	----
as left span	4919	81.0	8.11	8.13	0.998
				Average Correction Factor	1.003
Baseline Corr AF:	8.05	Prev response	8.11	*% change	-0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999792	1.000273
THC Cal Offset:	-0.006990	0.004621
CH4 Cal Slope:	1.000313	0.999876
CH4 Cal Offset:	-0.010212	-0.002412
NMHC Cal Slope:	0.998770	1.000625
NMHC Cal Offset:	0.004221	0.007033

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

THC Calibration Summary

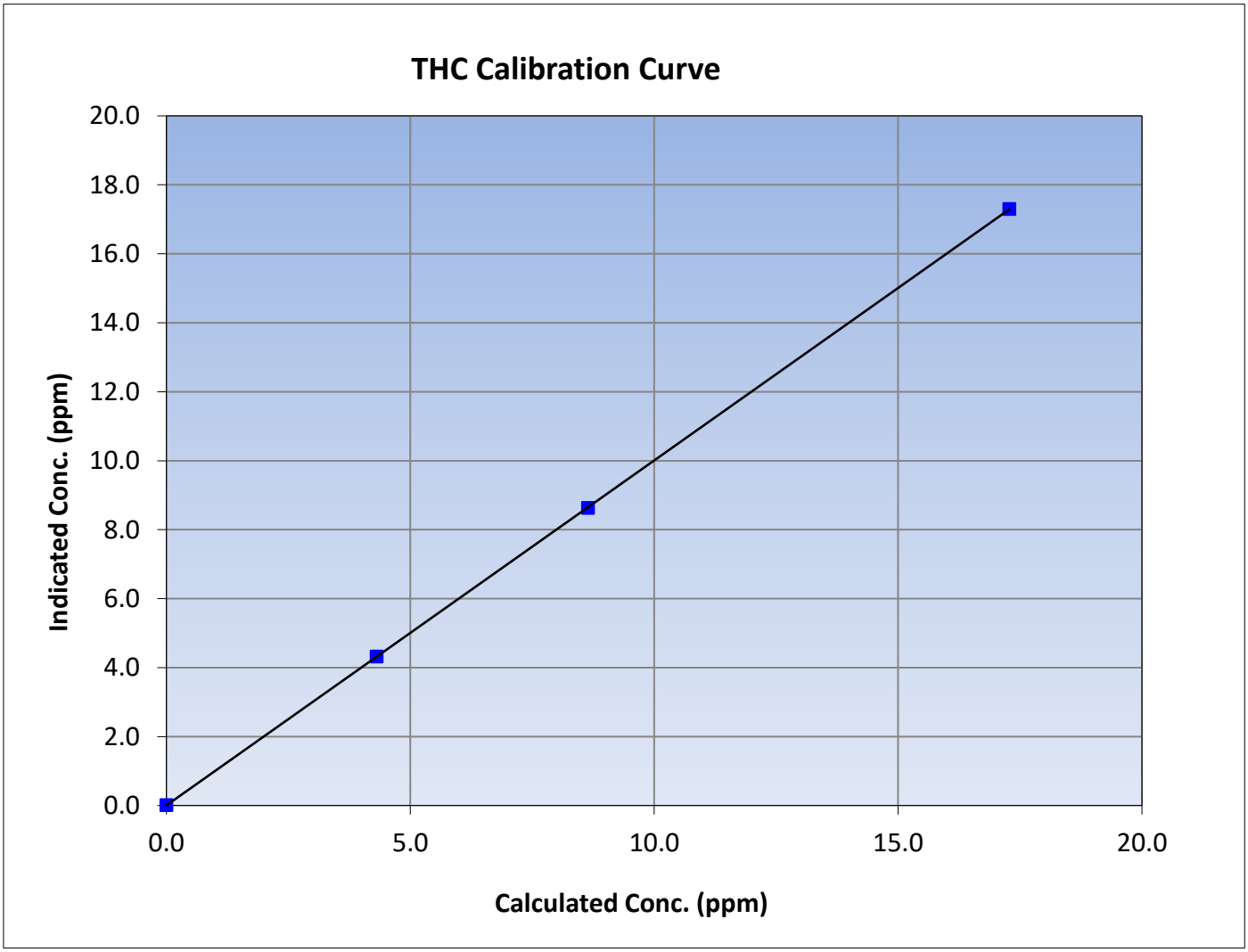
Version-01-2020

Station Information

Calibration Date:	June 15, 2023	Previous Calibration:	May 13, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:37	End Time (MST):	13:48
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.01	----	Correlation Coefficient	0.999997	*≥0.995*
17.28	17.30	0.9989			
8.64	8.63	1.0015	Slope	1.000273	*0.90 - 1.10*
4.31	4.32	0.9982			
			Intercept	0.004621	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

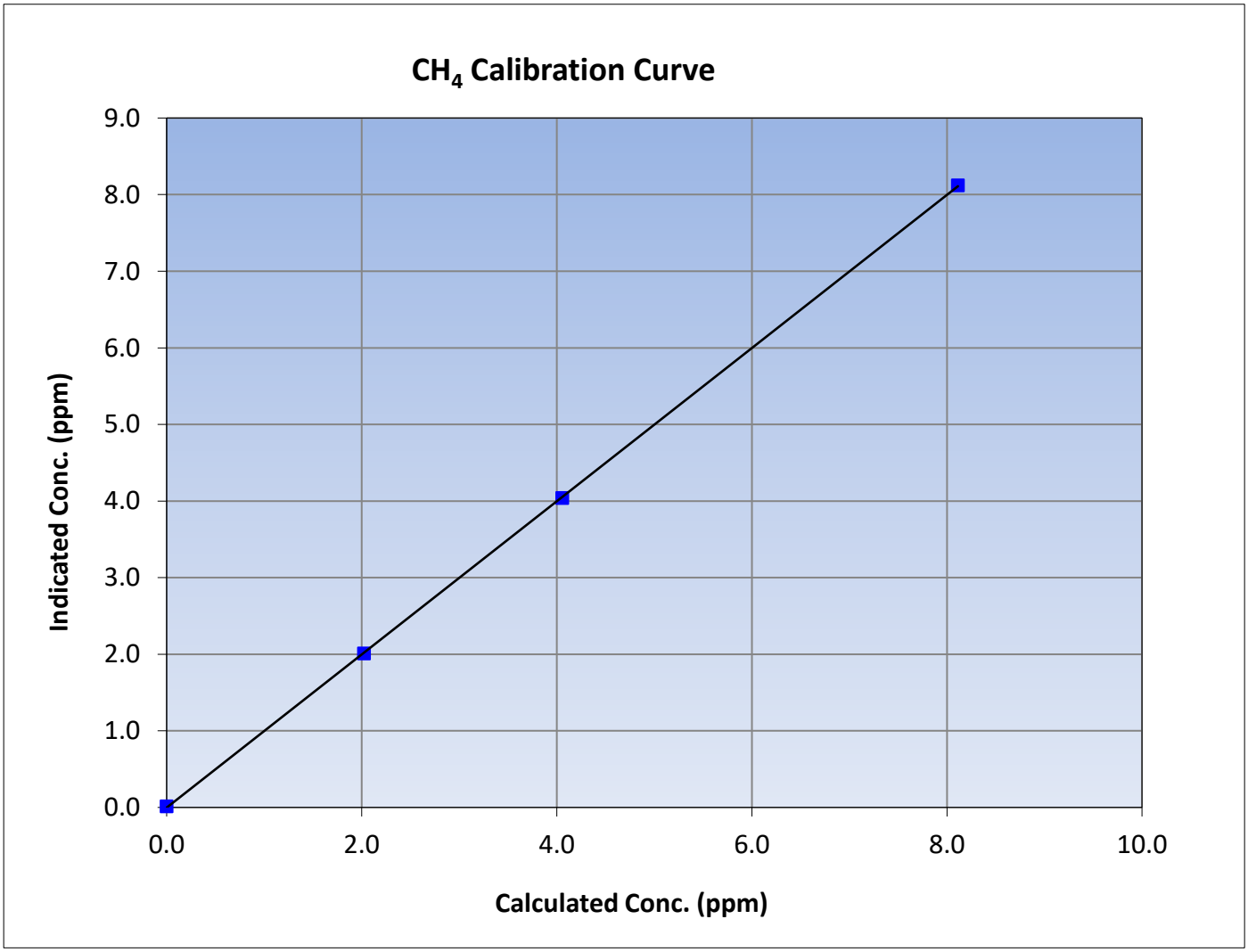
Version-01-2020

Station Information

Calibration Date:	June 15, 2023	Previous Calibration:	May 13, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:37	End Time (MST):	13:48
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.01	----	Correlation Coefficient	0.999981	≥0.995
8.11	8.12	0.9991			
4.06	4.04	1.0047	Slope	0.999876	0.90 - 1.10
2.02	2.01	1.0062			
			Intercept	-0.002412	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

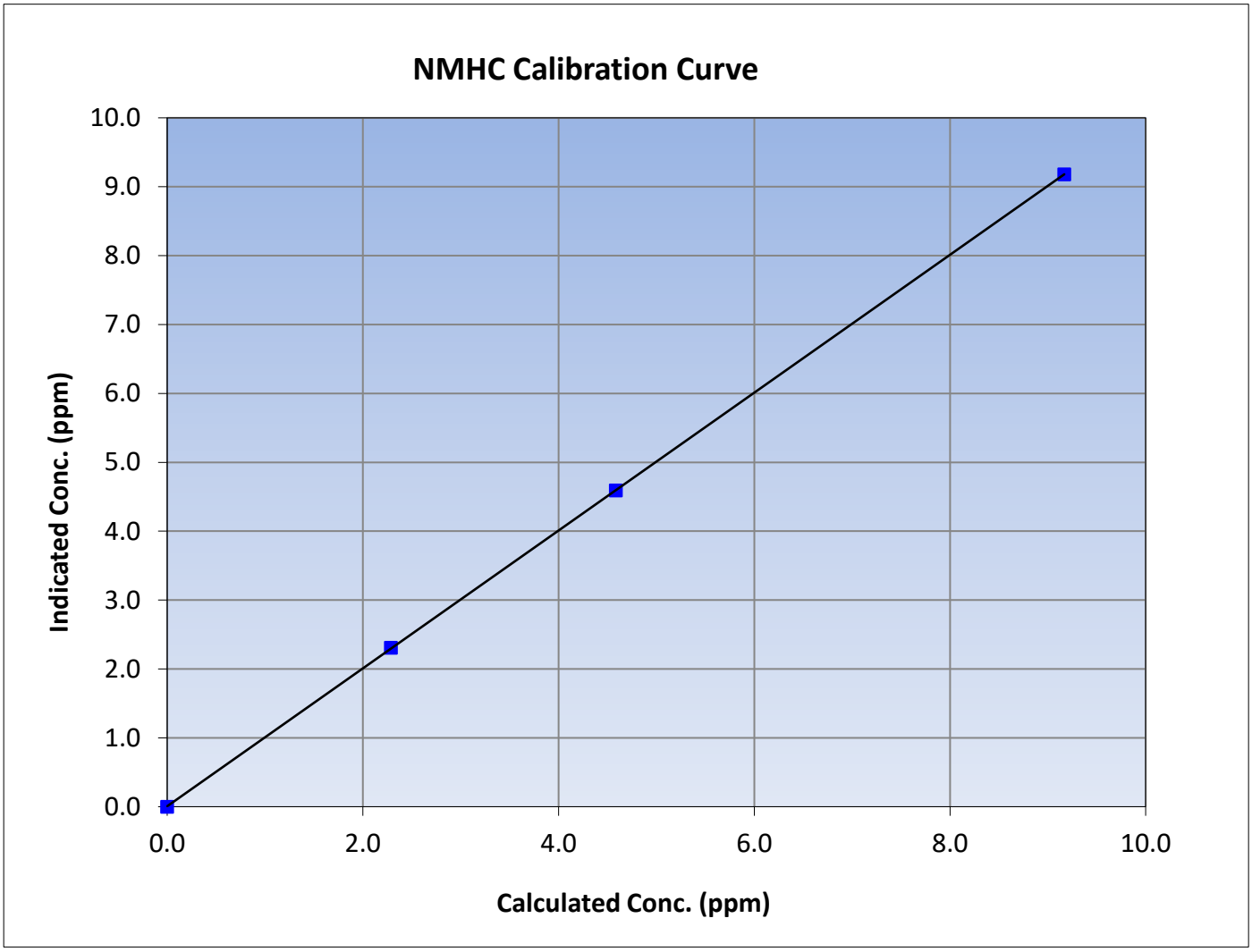
Version-01-2020

Station Information

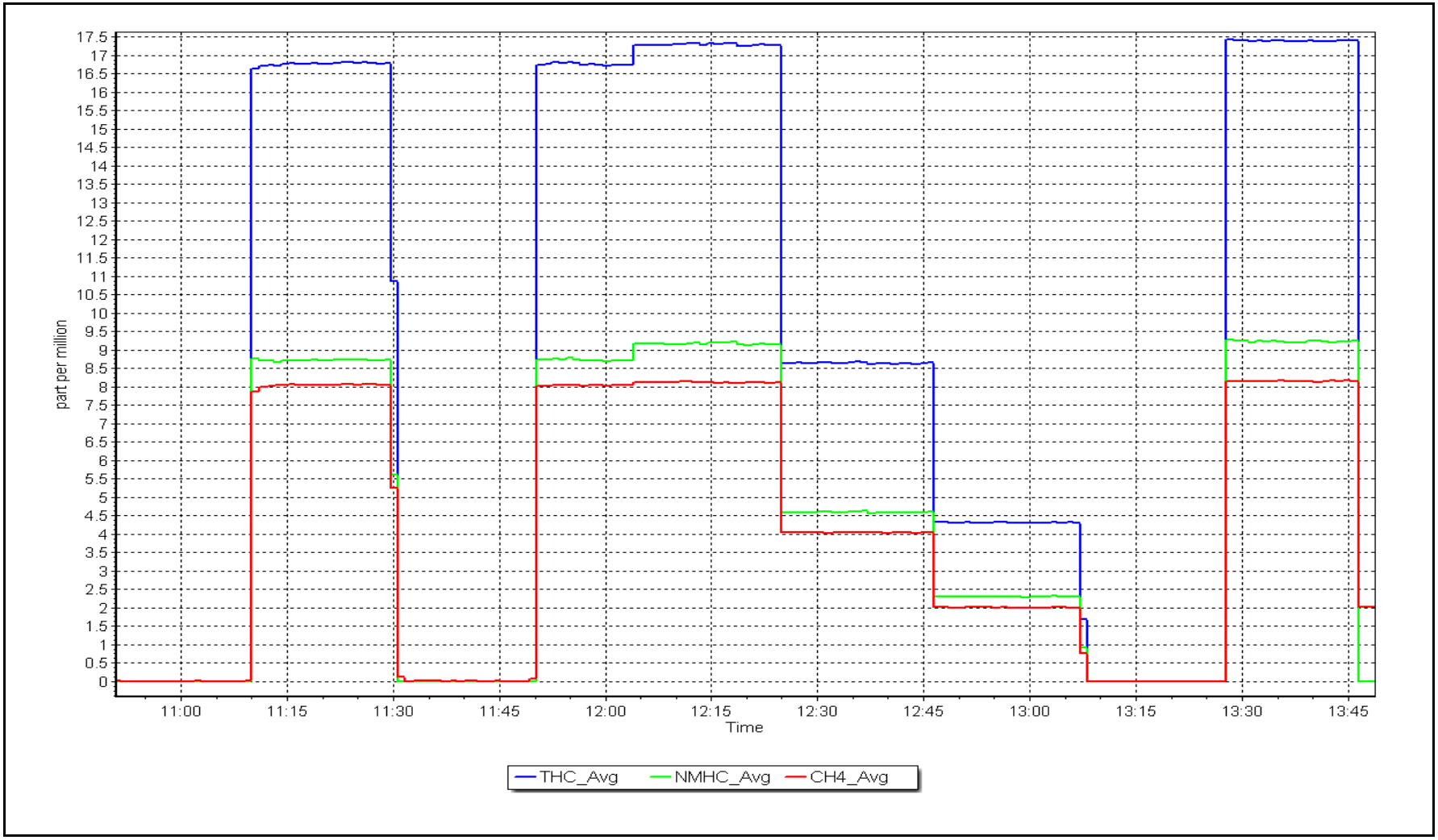
Calibration Date:	June 15, 2023	Previous Calibration:	May 13, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:37	End Time (MST):	13:48
Analyzer make:	Thermo 55i	Analyzer serial #:	1180320039

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999996	≥0.995
9.17	9.18	0.9987			
4.58	4.59	0.9986	Slope	1.000625	0.90 - 1.10
2.29	2.31	0.9912			
			Intercept	0.007033	+/-0.5



NMHC Calibration Plot Date: June 15, 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:	June 28, 2023	Last Cal Date:	May 10, 2023
Start time (MST):	10:55	End time (MST):	16:13
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:	1.035	0.964	NO bkgnd or offset:	2.9	2.7
NOX coeff or slope:	0.986	0.987	NOX bkgnd or offset:	2.9	2.7
NO2 coeff or slope:	0.999	0.999	Reaction cell Press:	220.1	225.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000165	1.001389
NO_X Cal Offset:	0.109832	0.070063
NO Cal Slope:	0.999810	1.001010
NO Cal Offset:	-1.249778	-1.269997
NO_2 Cal Slope:	0.999469	1.004754
NO_2 Cal Offset:	1.142324	0.176637

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as found span	4919	81.3	820.8	800.3	20.5	883.5	858.8	24.7	0.9290	0.9318
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	822.0	800.3	21.6	0.9985	1.0000
second point	4959	40.7	410.9	400.7	10.3	411.6	399.7	11.9	0.9984	1.0024
third point	4980	20.3	204.9	199.8	5.1	205.1	197.0	8.1	0.9992	1.0143
as left zero	5000	0.0	0.0	0.0	0.0	0.4	0.1	0.3	----	----
as left span	4919	81.3	820.8	381.6	439.2	823.9	382.1	441.8	0.9962	0.9986
								Average Correction Factor	0.9987	1.0056

Corrected As found NO_X = 883.4 ppb NO = 858.8 ppb

Previous Response NO_X = 821.0 ppb NO = 798.9 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 = 7.1%

*Percent Change NO = 7.0%

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)	799.2	380.5	439.2	441.4	0.9950	100.5%
2nd GPT point (200 ppb O3)	799.2	594.6	225.1	226.4	0.9942	100.6%
3rd GPT point (100 ppb O3)	799.2	698.5	121.2	122.0	0.9933	100.7%
				Average Correction Factor	0.9942	100.6%

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

NO_X Calibration Summary

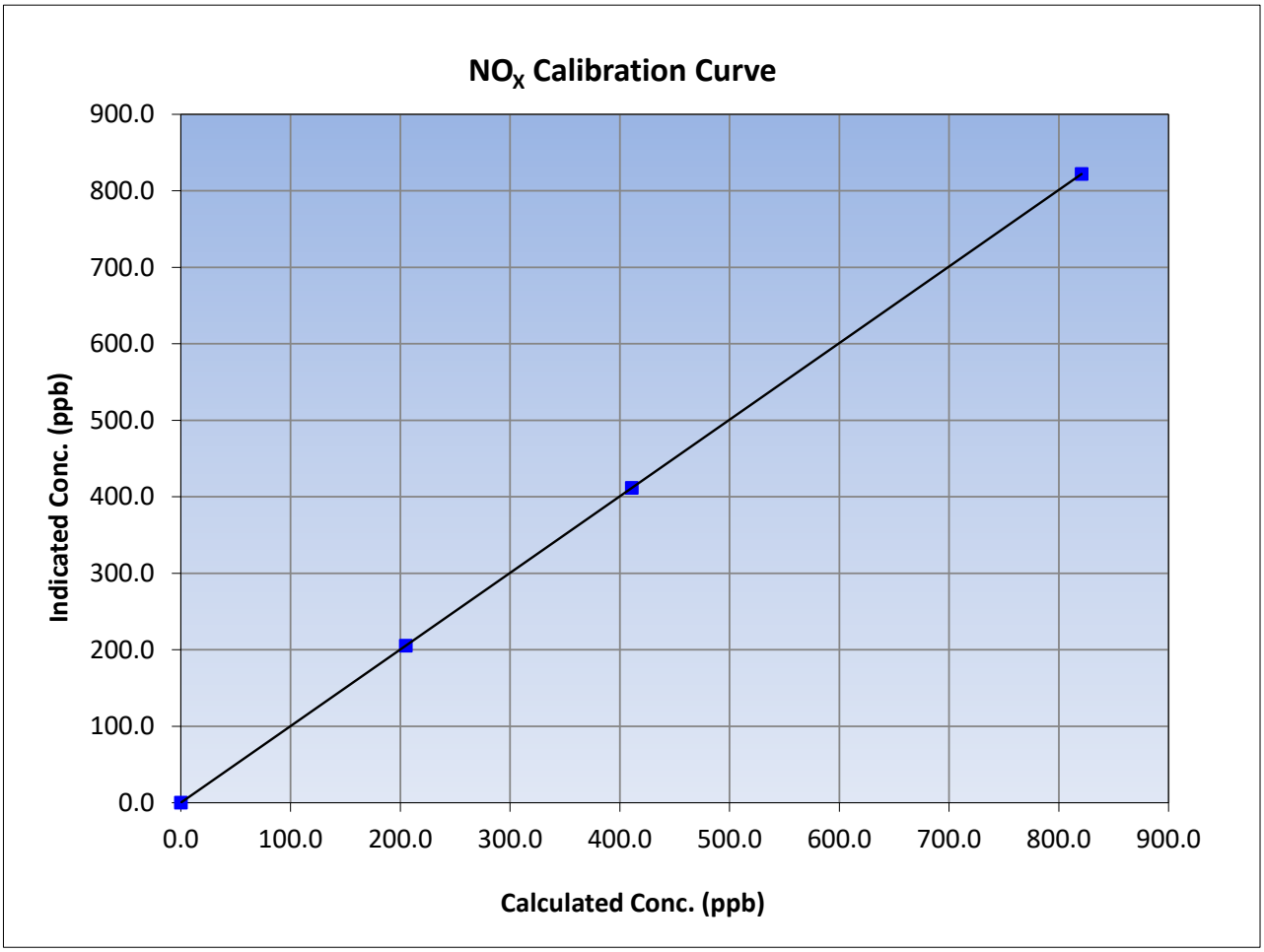
Version-04-2020

Station Information

Calibration Date:	June 28, 2023	Previous Calibration:	May 10, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:55	End Time (MST):	16:13
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	1.000000	≥0.995
820.8	822.0	0.9985			
410.9	411.6	0.9984	Slope	1.001389	0.90 - 1.10
204.9	205.1	0.9992			
			Intercept	0.070063	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

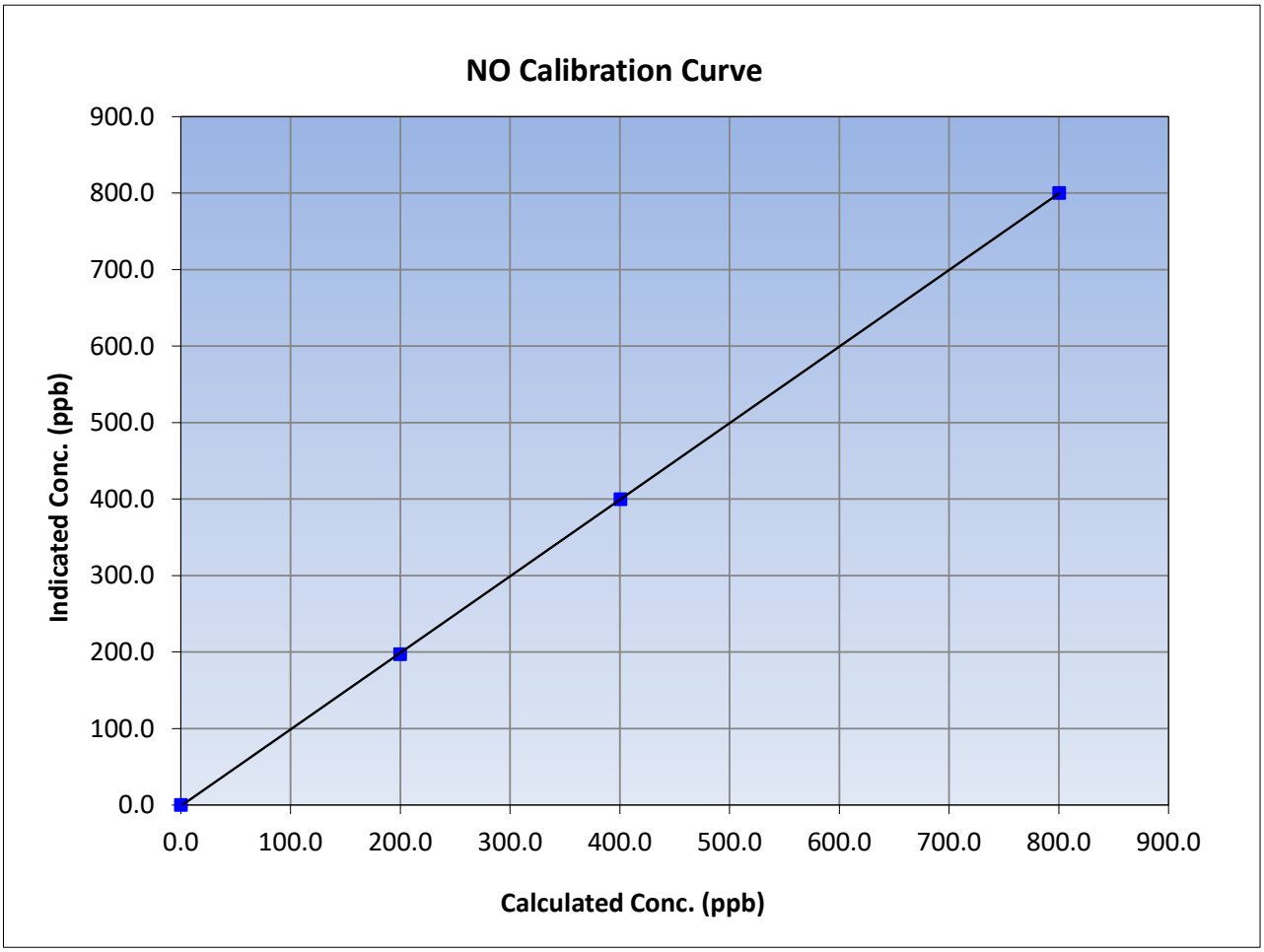
Version-04-2020

Station Information

Calibration Date:	June 28, 2023	Previous Calibration:	May 10, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:55	End Time (MST):	16:13
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	0.999985	≥0.995
800.3	800.3	1.0000			
400.7	399.7	1.0024	Slope	1.001010	0.90 - 1.10
199.8	197.0	1.0143			
			Intercept	-1.269997	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

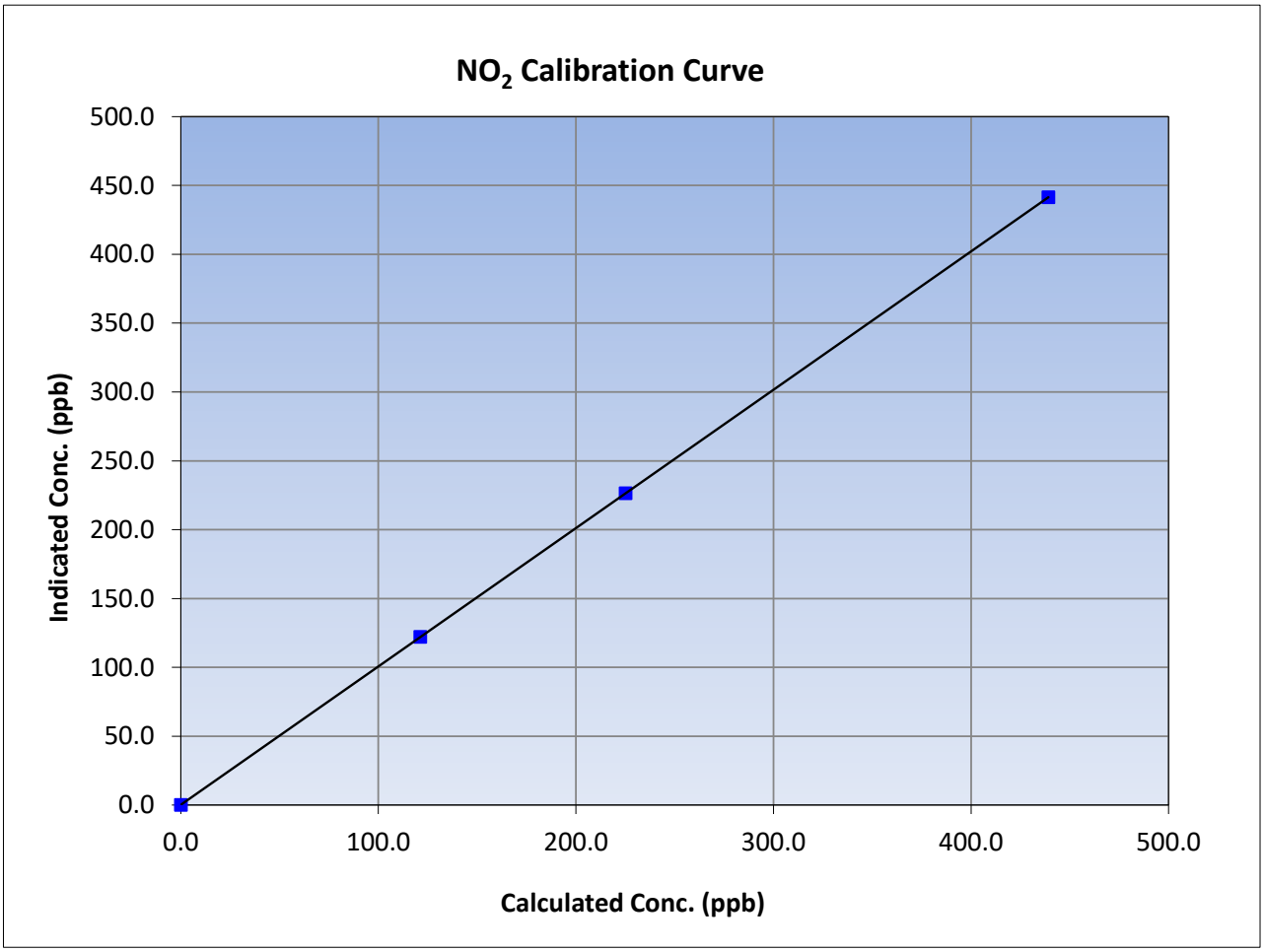
Version-04-2020

Station Information

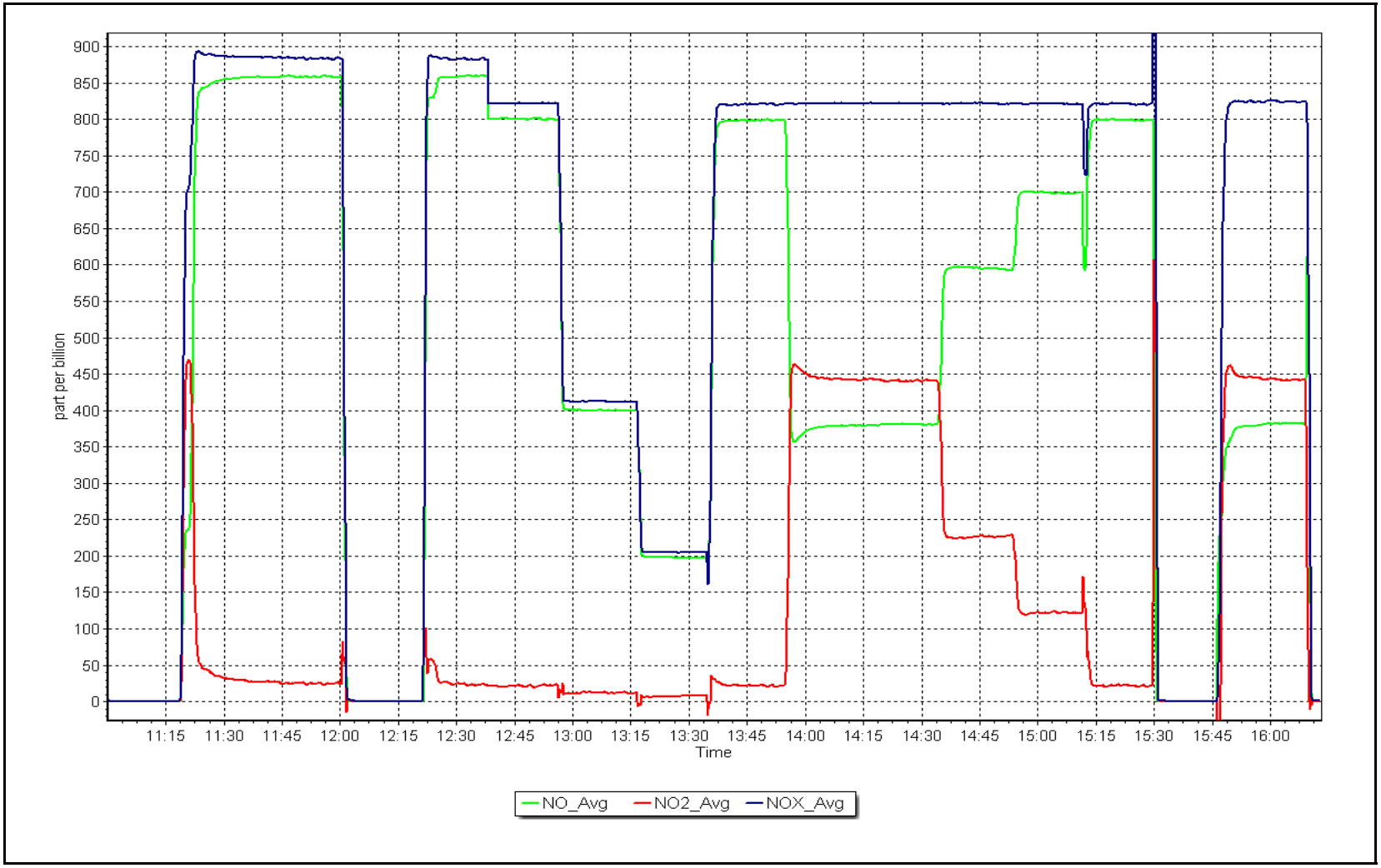
Calibration Date:	June 28, 2023	Previous Calibration:	May 10, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:55	End Time (MST):	16:13
Analyzer make:	Thermo 42i	Analyzer serial #:	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	1.000000	≥0.995
439.2	441.4	0.9950			
225.1	226.4	0.9942	Slope	1.004754	0.90 - 1.10
121.2	122.0	0.9933			
			Intercept	0.176637	+/-20



NO_X Calibration Plot Date: June 28, 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:	June 28, 2023	Last Cal Date:	May 4, 2023
Start time (MST):	11:15	End time (MST):	16:29
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	Teledyne API T750	Serial Number:	282
ZAG Make/Model:	Teledyne API T751H	Serial Number:	321

Analyzer Information

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

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.998229	1.005457	Backgd or Offset:	1.000	1.000
Calibration intercept:	-0.340000	-0.380000	Coeff or Slope:	0.987	0.995

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	800.0	0.0	1.2	----
as found span	4888	1096.9	400.0	399.9	1.000
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	-0.1	----
high point	4888	1101.7	400.0	402.0	0.995
second point	4888	863.9	200.0	200.4	0.998
third point	4888	741.4	100.0	100.0	1.000
as left zero	5000	800.0	0.0	-0.7	----
as left span	4812	1097.9	400.0	407.9	0.981
				Average Correction Factor	0.998

Baseline Corr As found:	398.7	Previous response	399.0	*% change	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

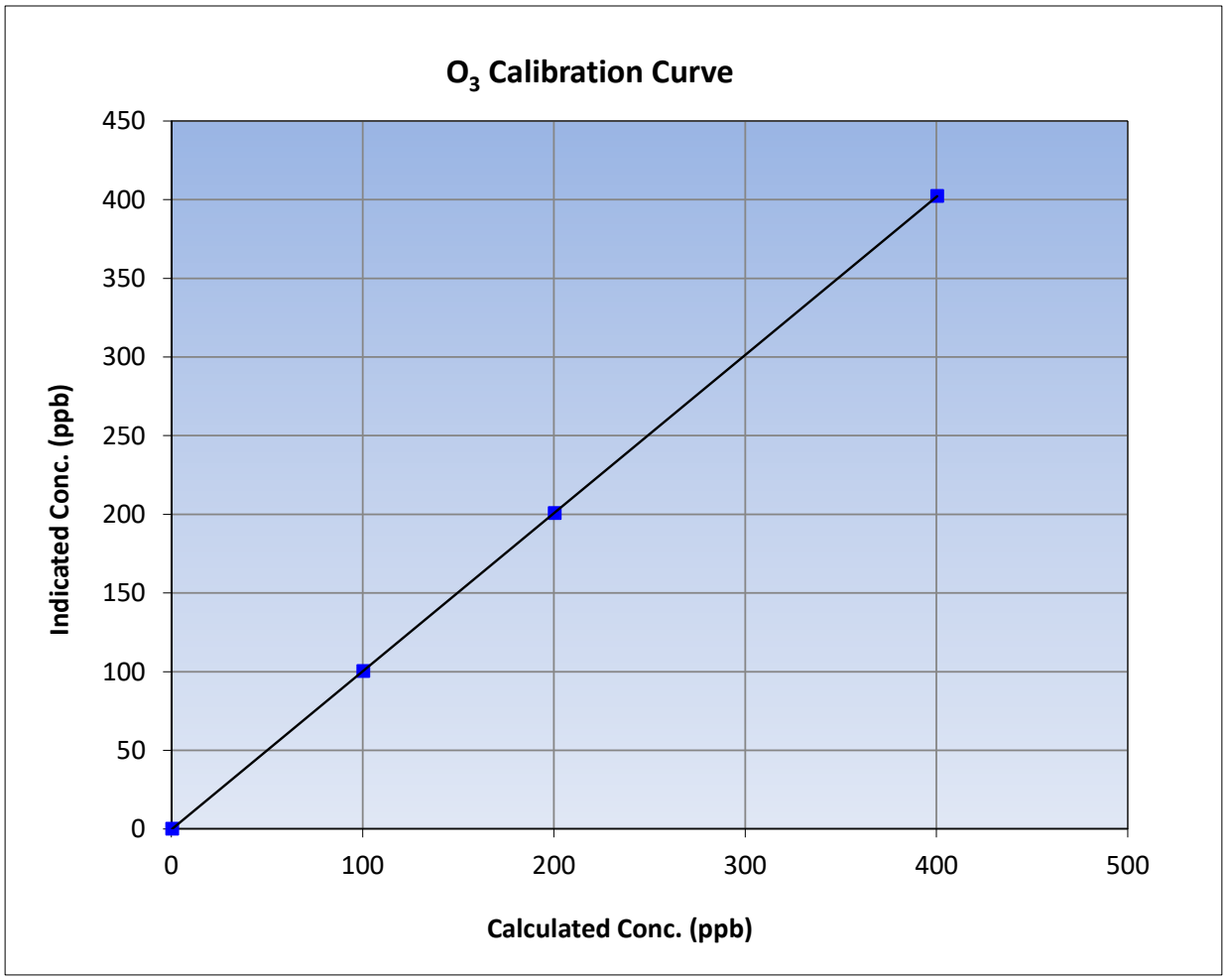
Station Information

Calibration Date:	June 28, 2023	Previous Calibration:	May 4, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	11:15	End Time (MST):	16:29
Analyzer make:	API T400	Analyzer serial #:	825

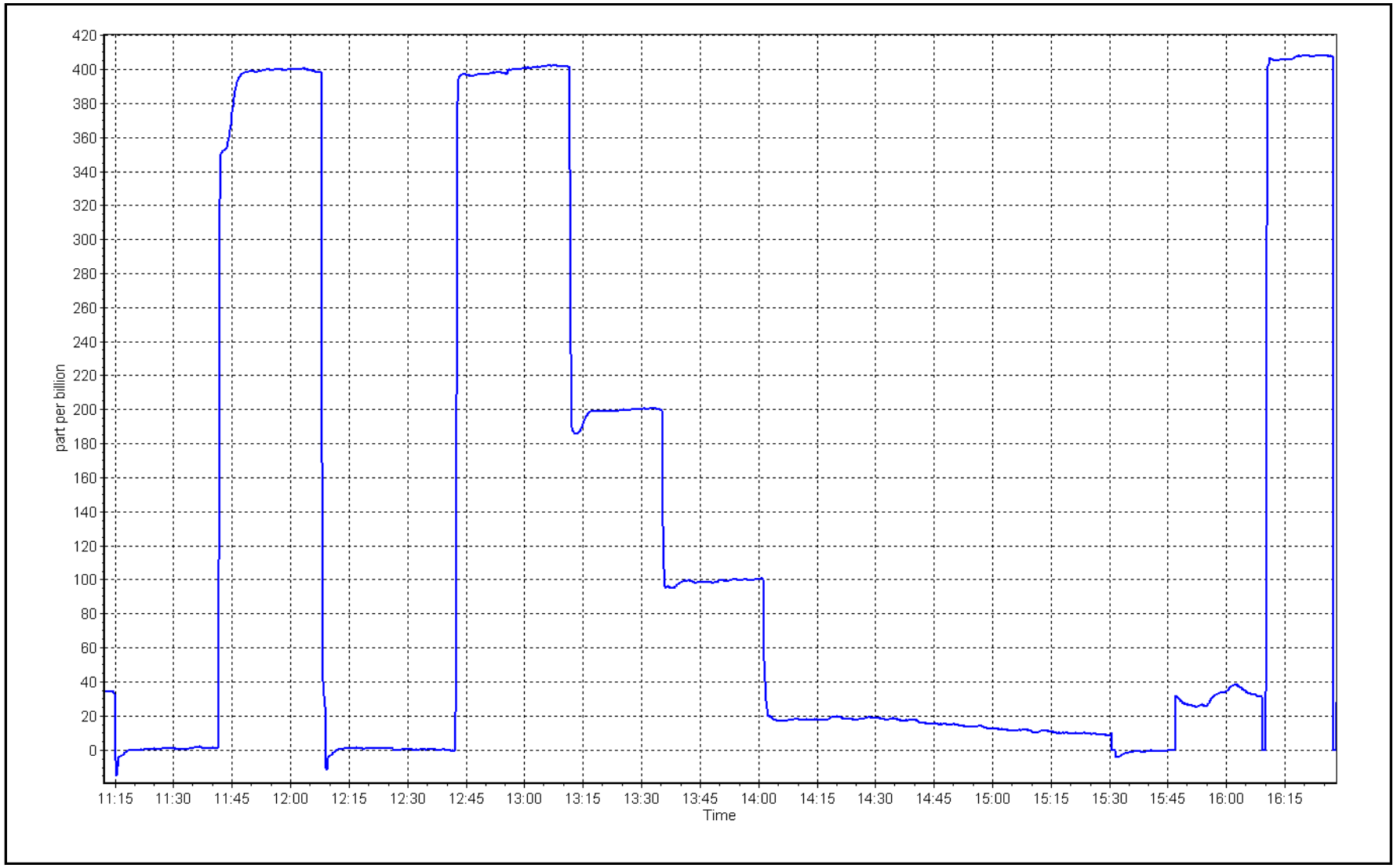
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
400.0	402.0	0.9950
200.0	200.4	0.9980
100.0	100.0	1.0000

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999997	*≥0.995*
Slope	1.005457	*0.90 - 1.10*
Intercept	-0.380000	*+/- 5*



O_3 Calibration Plot Date: June 28, 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:	June 28, 2023	Last Cal Date:	May 16, 2023
Start time (MST):	15:27	End time (MST):	16:08
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)	18.8	19.2	18.8	☐	+/- 2 °C
P (mmHg)	700.0	705	700.0	☐	+/- 10 mmHg
flow (LPM)	4.98	5.07	4.98	☐	+/- 0.25 LPM

Leak Test: Date of check: _____ Last Cal Date: May 16, 2023

PM w/o HEPA: _____ PM w/ HEPA: _____ <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	N/A		N/A	☐	10.9 +/- 0.5

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

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

Disposable Filter Changed: March 22, 2023

Annual Maintenance

Date Sample Tube Cleaned: August 30, 2022

Date RH/T Sensor Cleaned: August 30, 2022

Notes: No adjustments needed. Leak check not performed since there was no HEPA filter on-site.

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:	June 8, 2023	Last Cal Date:	May 9, 2023
Start time (MST):	10:55	End time (MST):	13:47
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	3,050	ppm	Cal Gas Exp Date:	December 1, 2028
Cal Gas Cylinder #:	ALM063503			
Removed Cal Gas Conc:	3,050	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	2658
ZAG Make/Model:	Teledyne API T701		Serial Number:	360

Analyzer Information

Analyzer make: API T300 — Analyzer serial #: 3504

Analyzer Range: 0 - 50 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000645	0.999102	Backgd or Offset:	-0.009	-0.010
Calibration intercept:	0.127800	0.057760	Coeff or Slope:	0.905	0.906

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.1	----
as found span	4933	66.7	40.7	40.8	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	40.7	40.7	1.001
second point	4966	33.3	20.3	20.5	0.992
third point	4983	16.7	10.2	10.2	0.998
as left zero	3000	0.0	0.0	0.0	----
as left span	2960	40.0	40.7	40.7	0.999
				Average Correction Factor	0.997

Baseline Corr As found:	40.72	Prev response:	40.84	*% change:	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO Calibration Summary

Version-01-2020

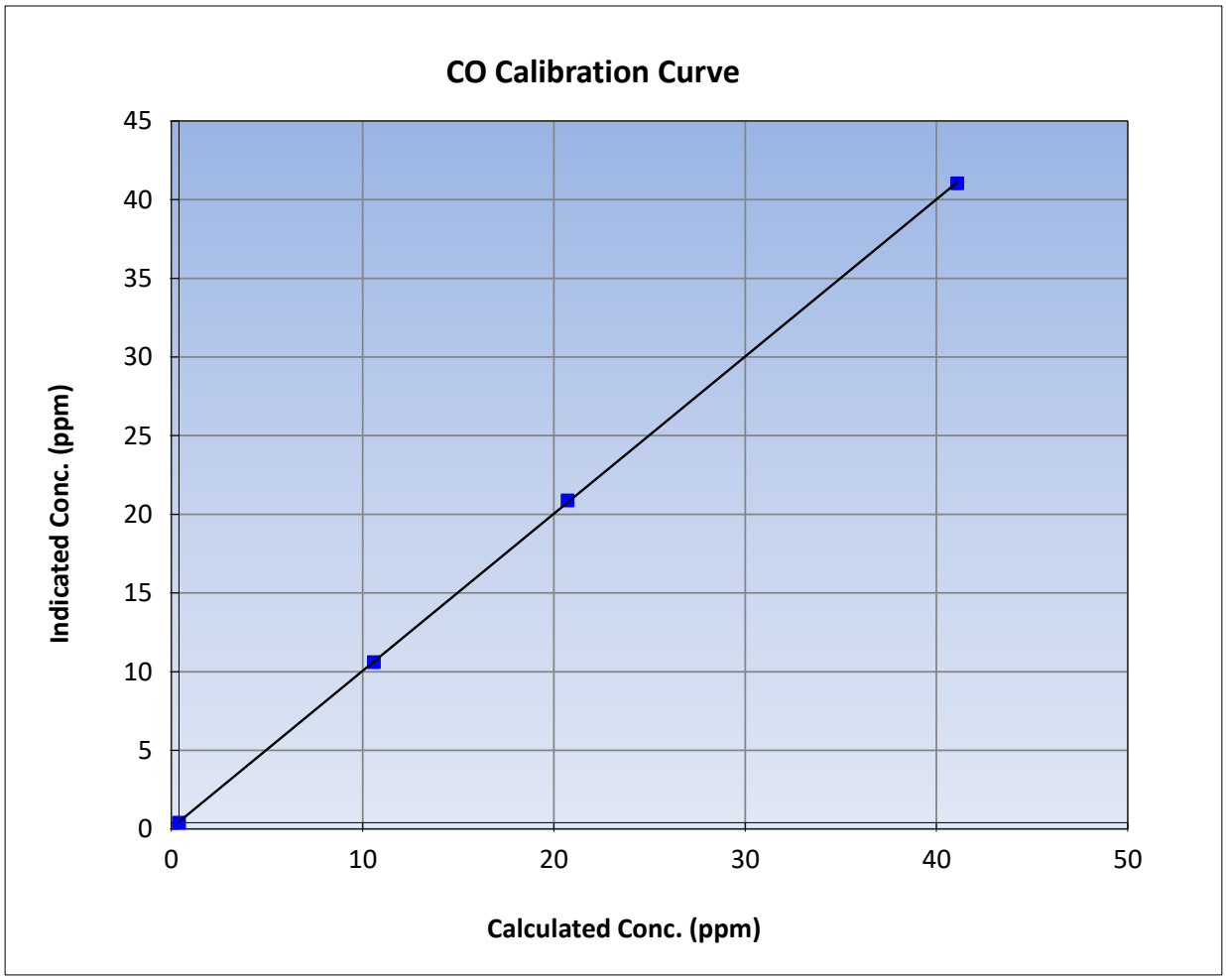
Station Information

Calibration Date:	June 8, 2023	Previous Calibration:	May 9, 2023
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	10:55	End Time (MST):	13:47
Analyzer make:	API T300	Analyzer serial #:	3504

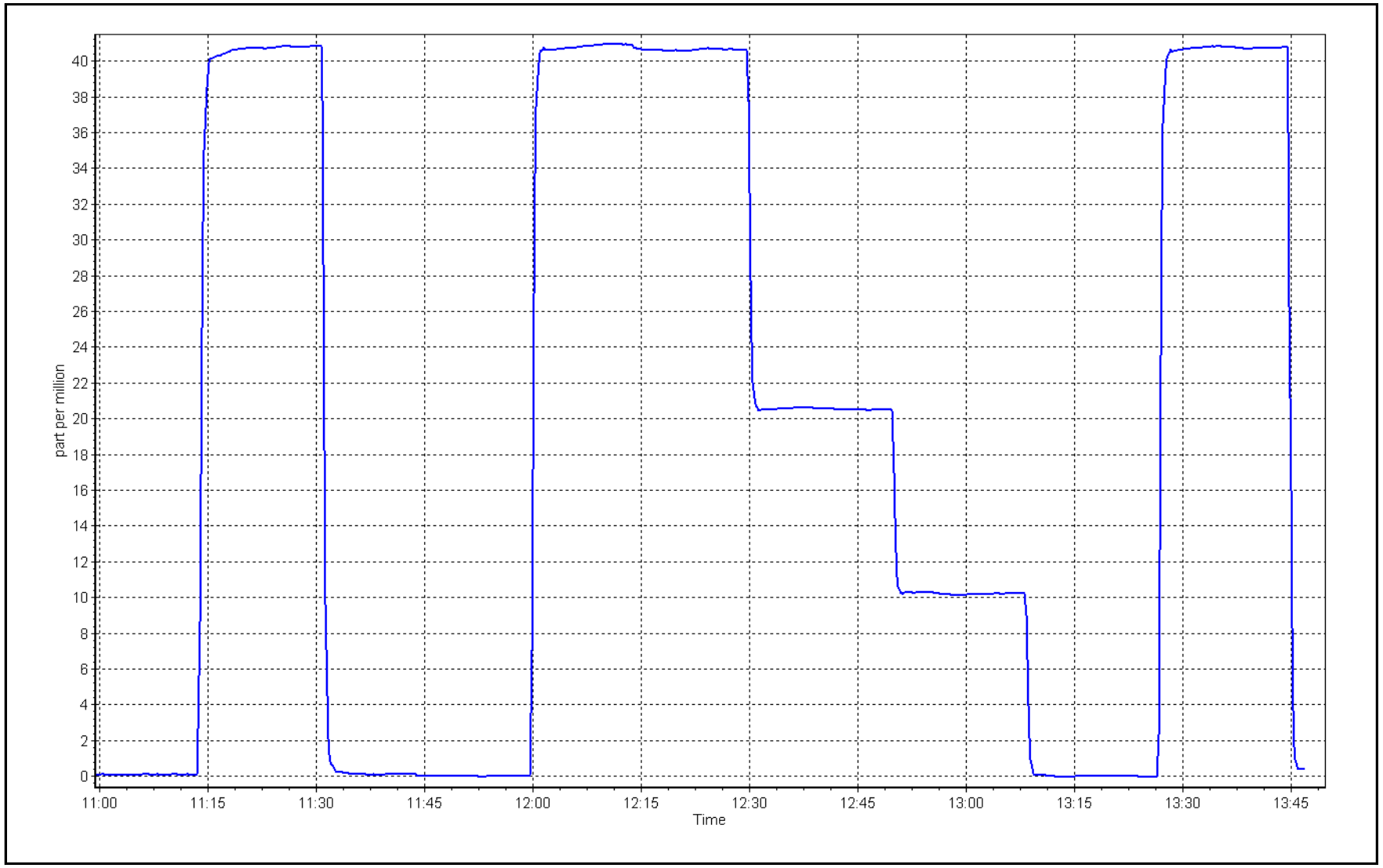
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
40.7	40.7	1.0010
20.3	20.5	0.9915
10.2	10.2	0.9978

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999973	*≥0.995*
Slope	0.999102	*0.90 - 1.10*
Intercept	0.057760	*+/-1.5*



CO Calibration Plot Date: June 8, 2023 Location: Stony Mountain



Wood Buffalo Environmental Association

CO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	June 14, 2023	Last Cal Date:	May 12, 2023
Start time (MST):	10:24	End time (MST):	13:46
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make: API T360 — Analyzer serial #: 283

Analyzer Range 0 - 2,000 ppm

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997386	0.997863	Backgd or Offset:	-0.081	-0.081
Calibration intercept:	-0.780000	-0.740000	Coeff or Slope:	1.085	1.091

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	-0.8	----
as found span	2920	80.0	1605.9	1564.8	1.026
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	-0.1	----
high point	2920	80.0	1605.9	1600.0	1.004
second point	2960	40.0	802.9	806.2	0.996
third point	2980	20.0	401.5	395.2	1.016
as left zero	3000	0.0	0.0	0.6	----
as left span	2930	80.0	1600.5	1608.2	0.995
				Average Correction Factor	1.005

Baseline Corr As found:	1565.60	Prev response:	1600.89	*% change:	-2.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Aswin Sasi Kumar

Wood Buffalo Environmental Association

CO_2 Calibration Summary

Version-01-2020

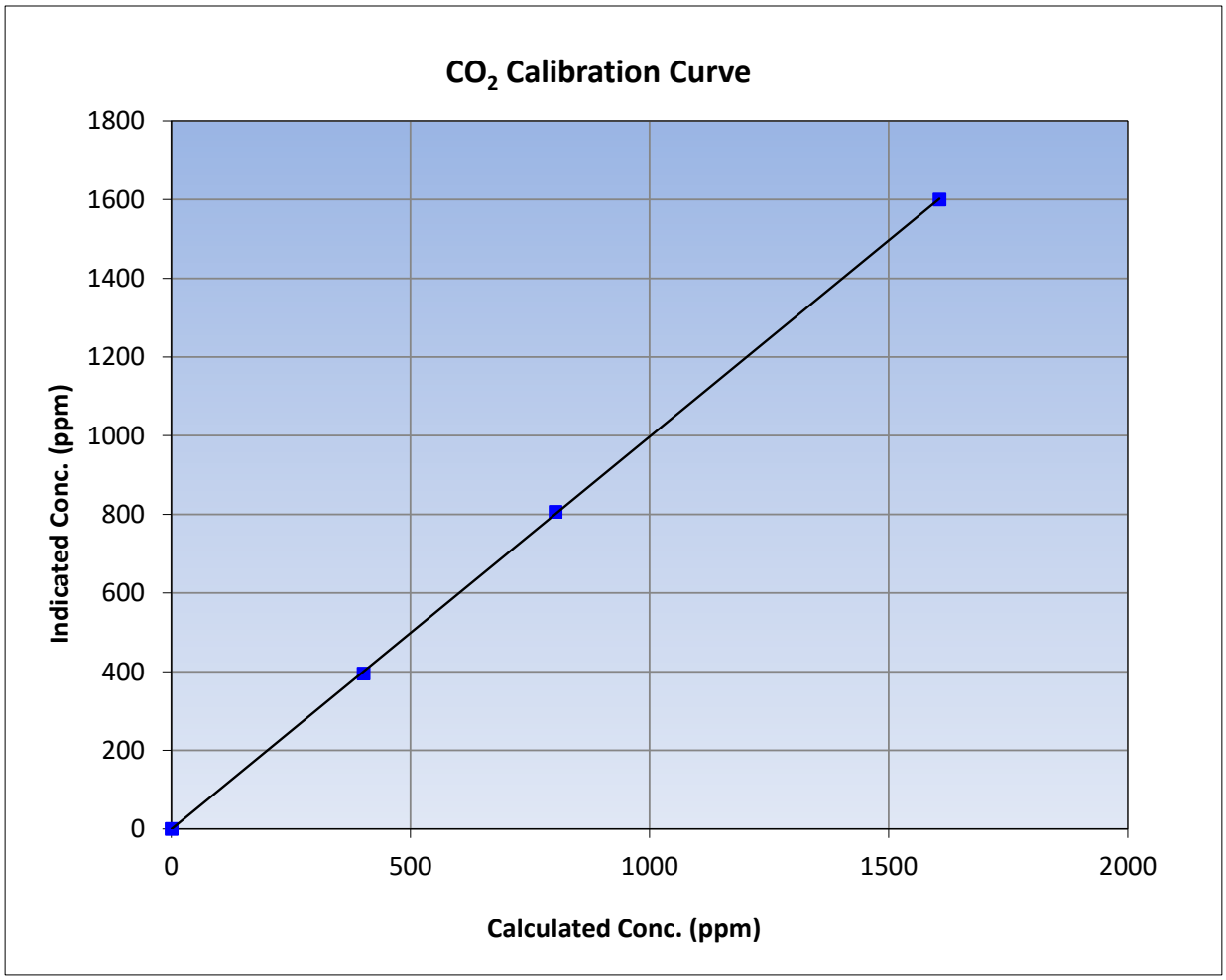
Station Information

Calibration Date	June 14, 2023	Previous Calibration	May 12, 2023
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:24	End Time (MST)	13:46
Analyzer make	API T360	Analyzer serial #	283

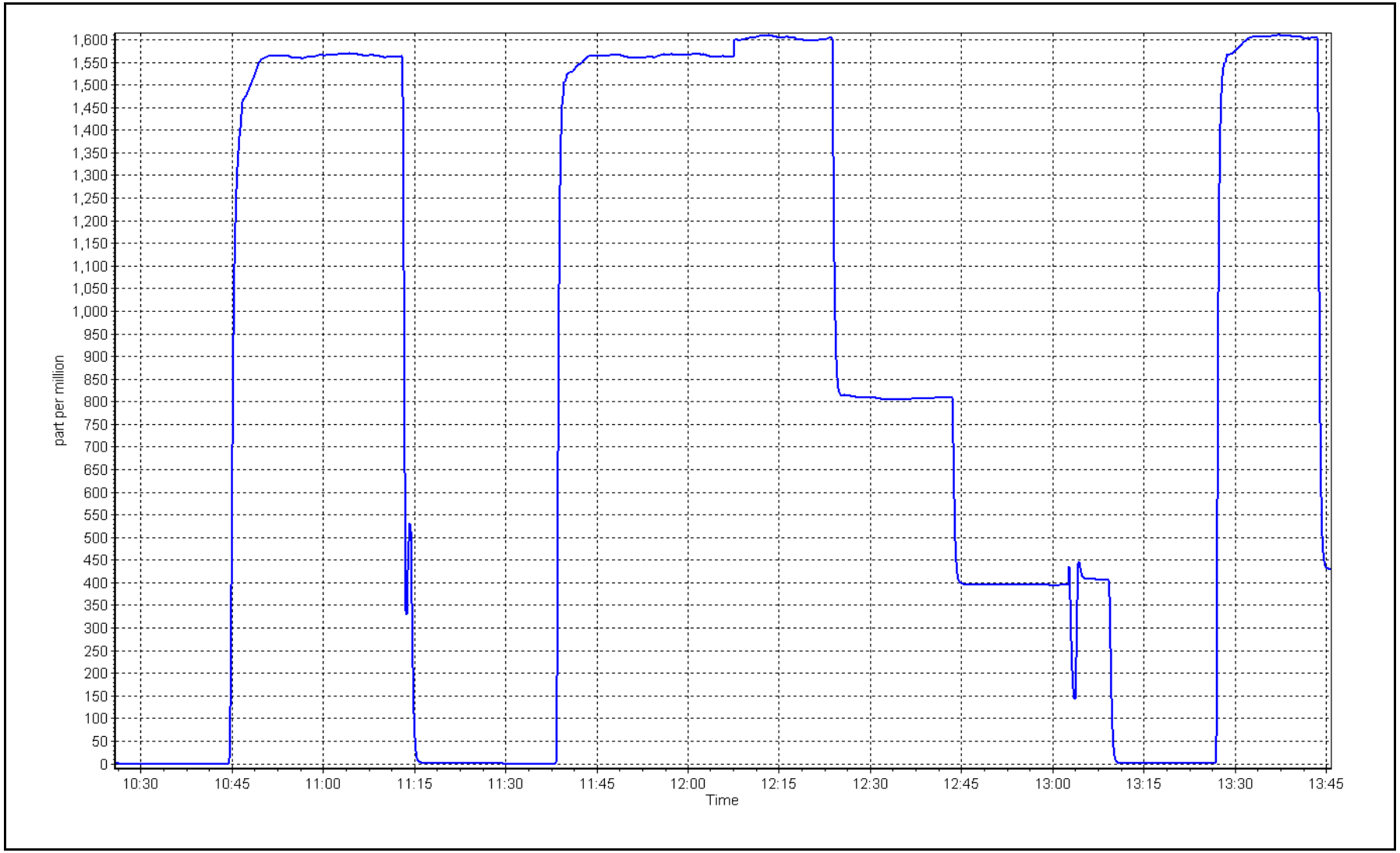
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
1605.9	1600.0	1.0037
802.9	806.2	0.9959
401.5	395.2	1.0159

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999959	*≥0.995*
Slope	0.997863	*0.90 - 1.10*
Intercept	-0.740000	*+/-10*



CO_2 Calibration Plot Date: June 14, 2023 Location: Stony Mountain



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS19
FIREBAG
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	June 20, 2023	Last Cal Date:	May 1, 2023
Start time (MST):	10:35	End time (MST):	13:43
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:	0.994974	0.998790	Backgd or Offset:	10.2	10.3
Calibration intercept:	0.198788	-0.461656	Coeff or Slope:	0.992	0.992

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	4999	0.0	0.0	-0.3	----
as found span	4919	81.1	799.5	798.1	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	4999	0.0	0.0	-0.3	----
high point	4919	81.1	799.5	798.1	1.002
second point	4959	40.6	400.3	399.3	1.002
third point	4980	20.3	200.1	199.2	1.005
as left zero	4999	0.0	0.0	-0.2	----
as left span	4919	81.1	799.5	799.6	1.000
				Average Correction Factor	1.003

Baseline Corr As found:	798.40	Previous response	795.65	*% 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. No adjustments made.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

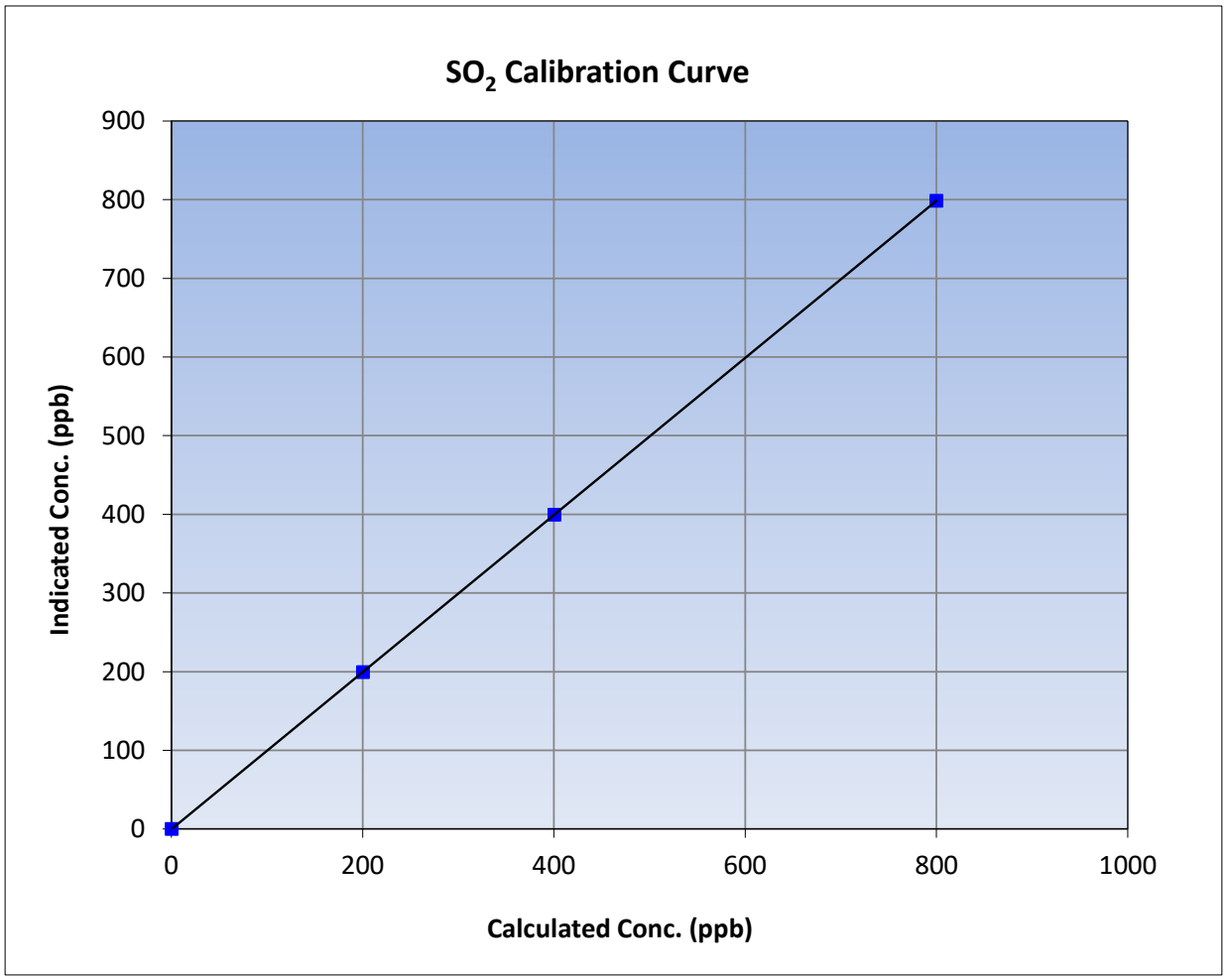
Station Information

Calibration Date:	June 20, 2023	Previous Calibration:	May 1, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:35	End Time (MST):	13:43
Analyzer make:	Thermo 43i	Analyzer serial #:	1410661308

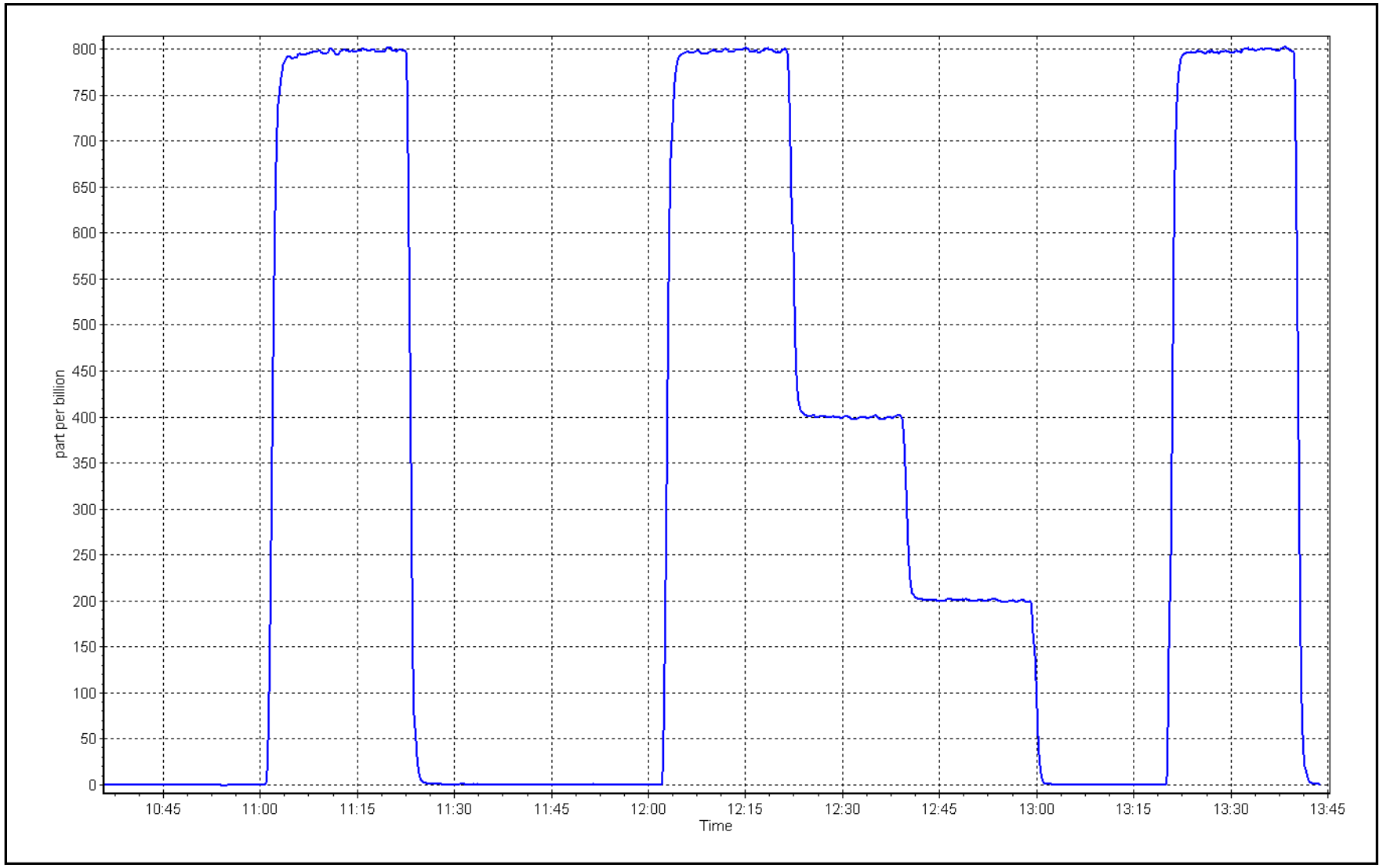
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
799.5	798.1	1.0017
400.3	399.3	1.0024
200.1	199.2	1.0045

Statistical Evaluation		Limits
Correlation Coefficient	1.000000	≥0.995
Slope	0.998790	0.90 - 1.10
Intercept	-0.461656	+/-30



SO2 Calibration Plot Date: June 20, 2023 Location: Firebag



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Firebag	Station number:	AMS19
Calibration Date:	June 12, 2023	Last Cal Date:	May 2, 2023
Start time (MST):	10:13	End time (MST):	13:43
Reason:	As Found		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1336160090	
Converter make:	Global		Converter serial #:	2022-222	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.008056		Backgd or Offset:	3.11	NA
Calibration intercept:	-0.061725		Coeff or Slope:	0.983	NA

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	1.4	----
as found span	4922	78.2	80.0	77.5	1.051
as found 2nd point	4961	39.1	40.0	39.5	1.050
as found 3rd point	4980	19.6	20.0	20.4	1.055
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	4922	78.3	800.2		----
Date of last scrubber change:		January 18, 2023		Ave Corr Factor	
Date of last converter efficiency test:		n/a			efficiency

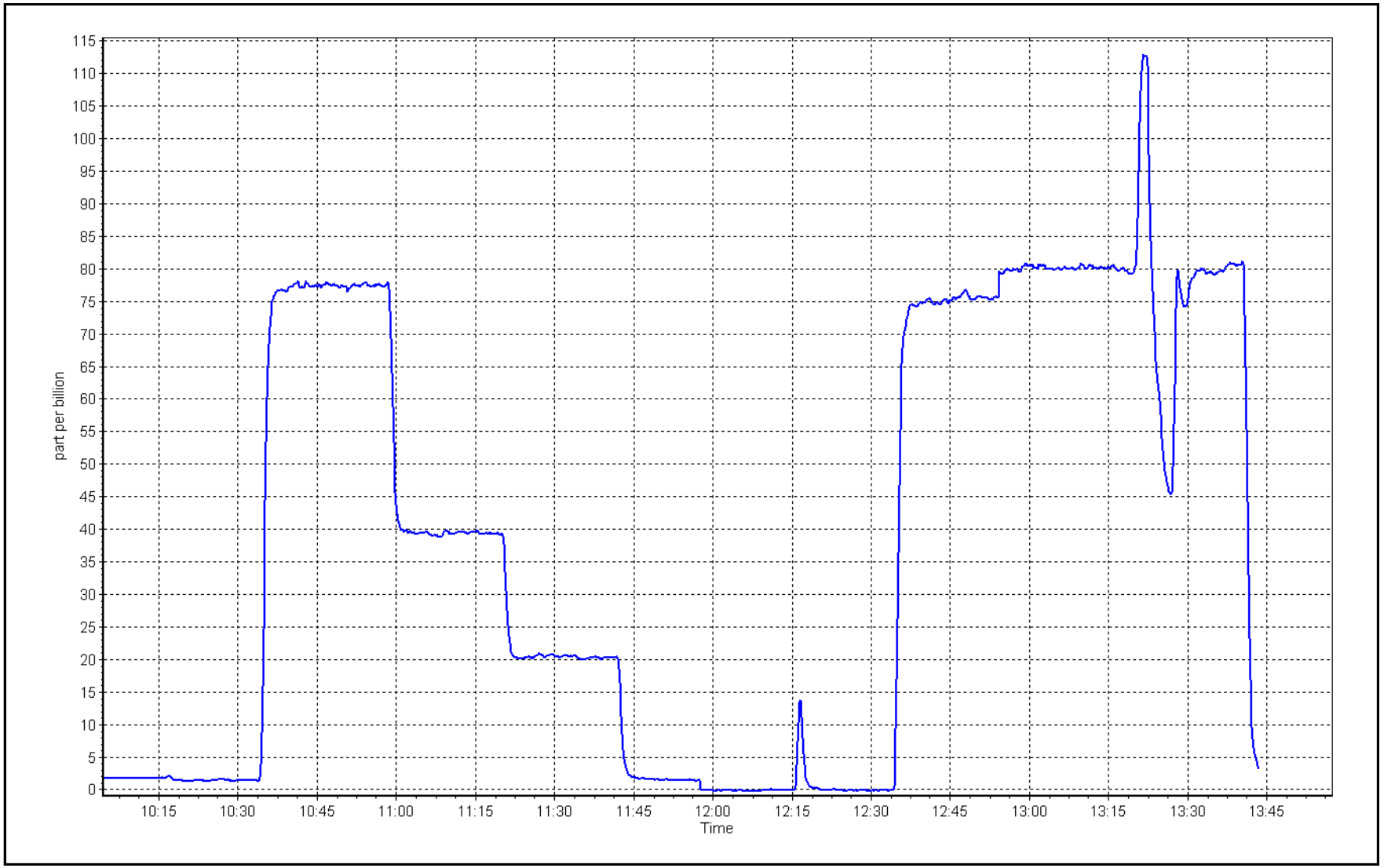
Baseline Corr As found:	76.1	Prev response:	80.56	*% change:	-5.9%
Baseline Corr 2nd AF pt:	38.1	AF Slope:	0.951886	AF Intercept:	1.379494
Baseline Corr 3rd AF pt:	19.0	AF Correlation:	0.999998		

* = > +/-5% change initiates investigation

Notes: As founds completed. Scrubber check passed. Lamp voltage above upper alarm limit, will replace the lamp June 13.

Calibration Performed By: Braiden Boutilier

H_2S Calibration Plot Date: June 12, 2023 Location: Firebag



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Firebag	Station number:	AMS19
Calibration Date:	June 13, 2023	Last Cal Date:	June 12, 2023
Start time (MST):	10:15	End time (MST):	15:17
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1336160090	
Converter make:	Global		Converter serial #:	2022-222	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.007755	1.009200	Backgd or Offset:	4.94	4.21
Calibration intercept:	0.000000	-0.001760	Coeff or Slope:	1.040	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					
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	78.2	80.0	80.7	0.991
second point	4961	39.1	40.0	40.4	0.990
third point	4980	19.6	20.0	20.2	0.992
as left zero	5000	0.0	0.0	0.1	----
as left span	4922	78.2	80.0	80.8	0.990

SO2 Scrubber Check

Date of last scrubber change:	January 18, 2023	Ave Corr Factor	0.991
Date of last converter efficiency test:	n/a		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 lamp. Adjusted lamp voltage and PMT voltage. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

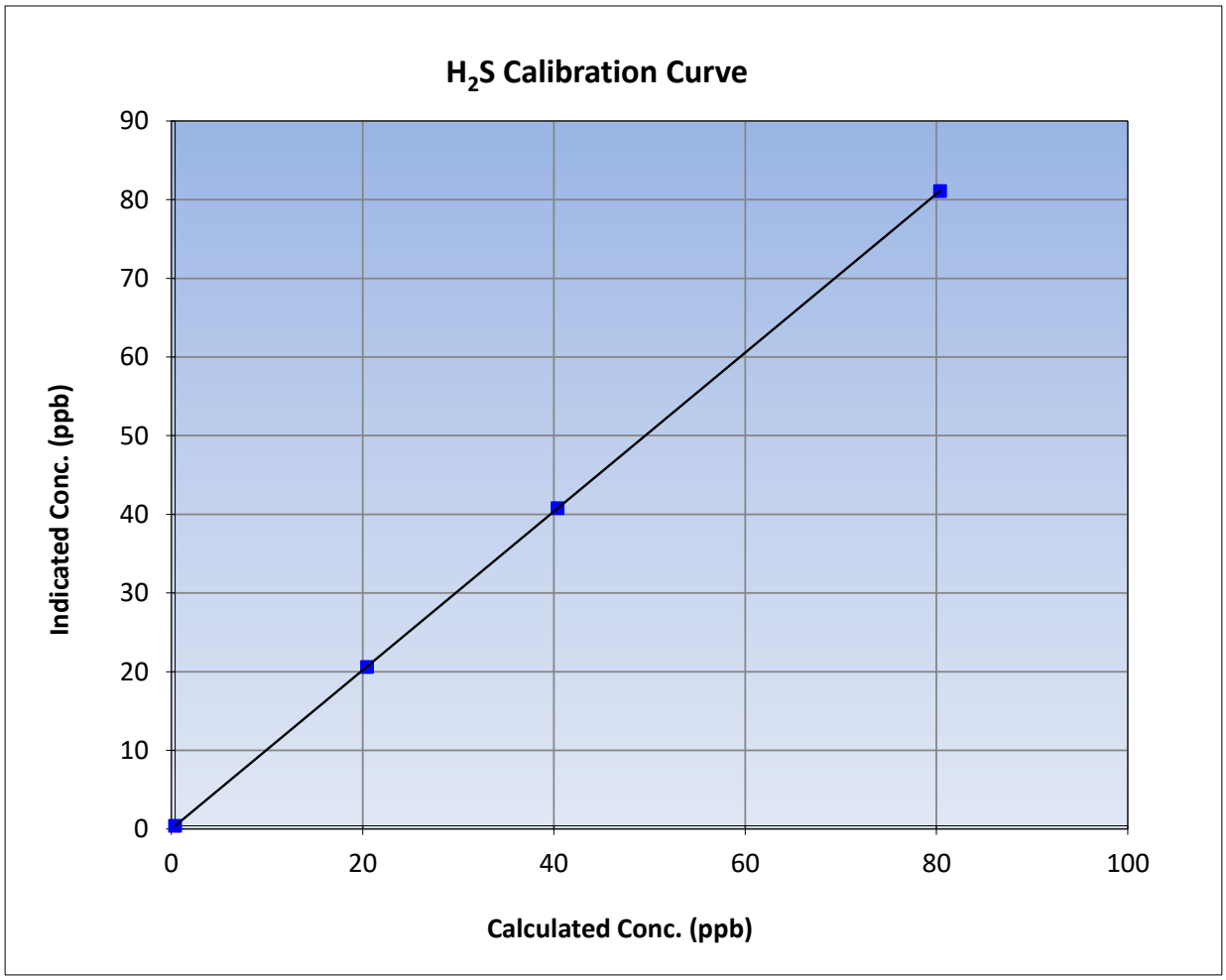
Station Information

Calibration Date:	June 13, 2023	Previous Calibration:	June 12, 2023
Station Name:	Firebag	Station Number:	AMS19
Start Time (MST):	10:15	End Time (MST):	15:17
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1336160090

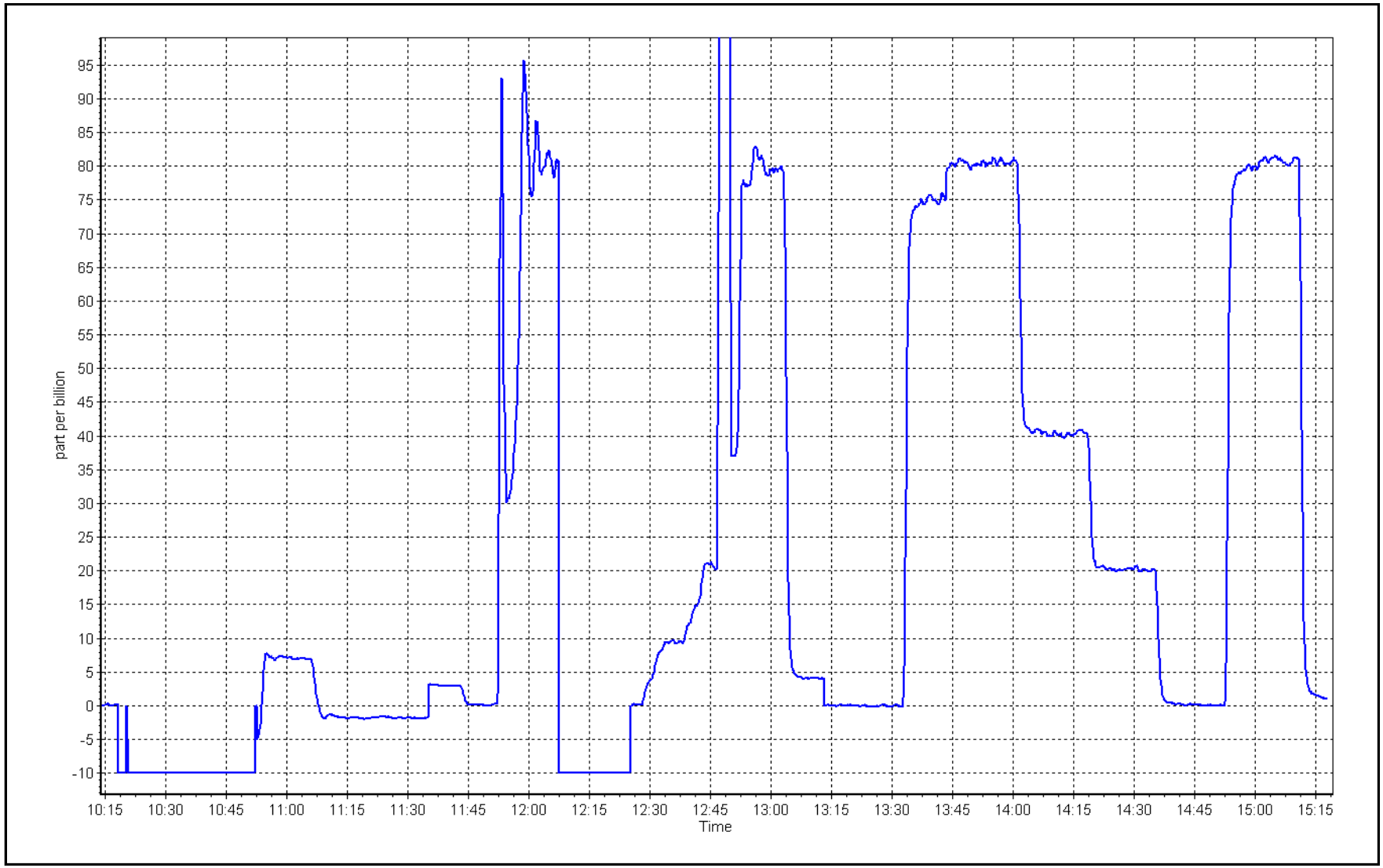
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.7	0.9911
40.0	40.4	0.9899
20.0	20.2	0.9925

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	1.009200	*0.90 - 1.10*
Intercept	-0.001760	*+/-3*



H_2S Calibration Plot Date: June 13, 2023 Location: Firebag



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Firebag	Station number:	AMS19
Calibration Date:	June 27, 2023	Last Cal Date:	June 13, 2023
Start time (MST):	9:36	End time (MST):	13:28
Reason:	Maintenance		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1336160090	
Converter make:	Global		Converter serial #:	2022-222	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.009200	1.007771	Backgd or Offset:	4.21	6.34
Calibration intercept:	-0.001760	-0.101745	Coeff or Slope:	1.068	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	1.7	----
as found span	4922	78.2	80.0	78.0	1.048
as found 2nd point	4961	39.1	40.0	39.6	1.055
as found 3rd point	4980	19.6	20.0	20.4	1.072
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4922	78.2	80.0	80.4	0.995
second point	4961	39.1	40.0	40.4	0.990
third point	4980	19.6	20.0	20.1	0.997
as left zero	5000	0.0	0.0	0.1	----
as left span	4922	78.2	80.0	80.3	0.996

SO2 Scrubber Check

Date of last scrubber change:	January 18, 2023	Ave Corr Factor	0.994
Date of last converter efficiency test:	n/a		efficiency

Baseline Corr As found:	76.3	Prev response:	80.71	*% change:	-5.8%
Baseline Corr 2nd AF pt:	37.9	AF Slope:	0.955456	AF Intercept:	1.479510
Baseline Corr 3rd AF pt:	18.7	AF Correlation:	0.999962		

* = > +/-5% change initiates investigation

Notes: Calibrated due to baseline shift. Adjusted zero and span. No investigation needed as the baseline shift is most likely due to high humidity.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

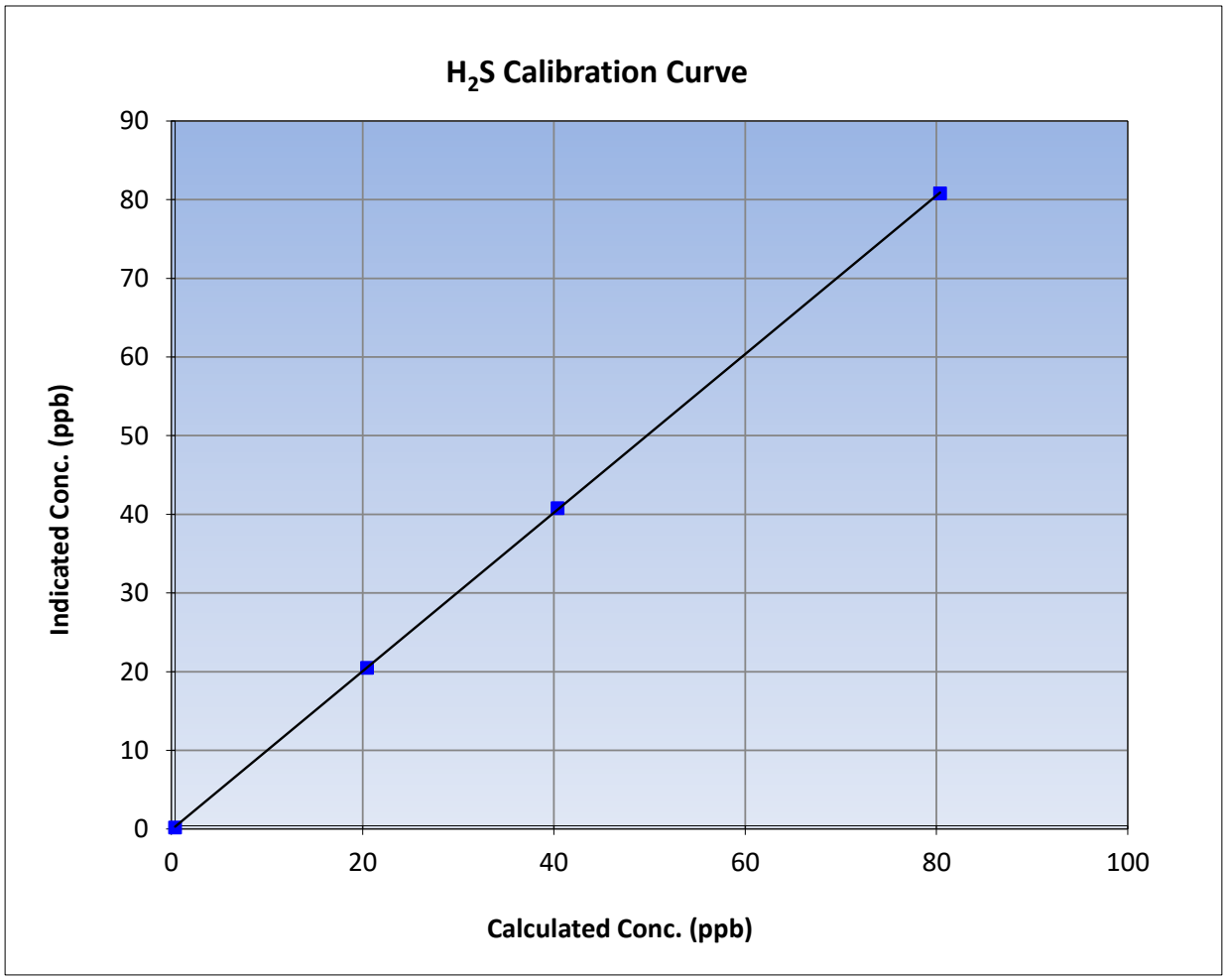
Station Information

Calibration Date:	June 27, 2023	Previous Calibration:	June 13, 2023
Station Name:	Firebag	Station Number:	AMS19
Start Time (MST):	9:36	End Time (MST):	13:28
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1336160090

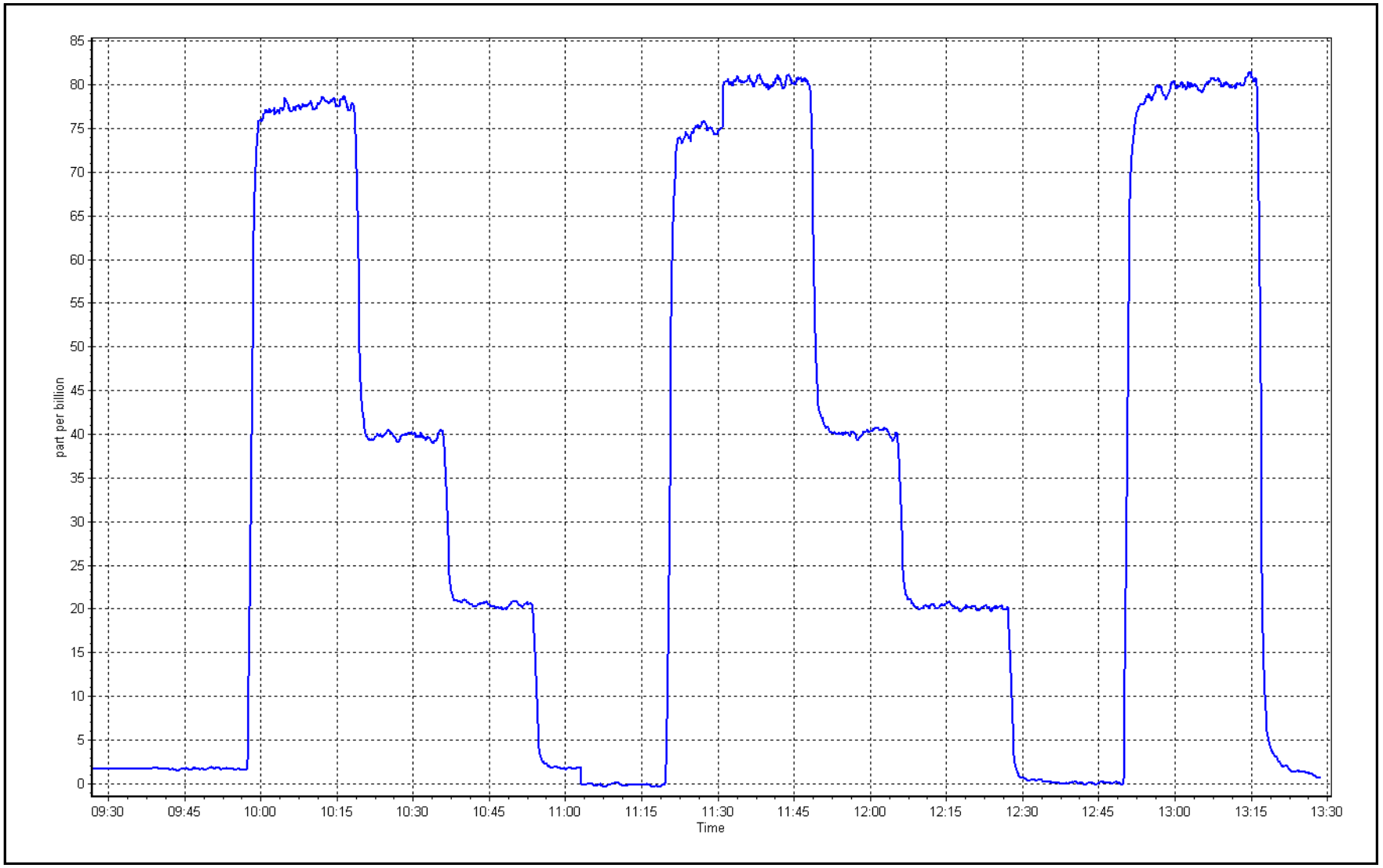
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.2	----
80.0	80.4	0.9948
40.0	40.4	0.9899
20.0	20.1	0.9974

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999983	*≥0.995*
Slope	1.007771	*0.90 - 1.10*
Intercept	-0.101745	*+/-3*



H_2S Calibration Plot Date: June 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:	June 30, 2023	Last Cal Date:	June 27, 2023
Start time (MST):	10:17	End time (MST):	10:55
Reason:	Removal	problems with lamp caused baseline and sensitivity drift	

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1336160090	
Converter make:	Global		Converter serial #:	2022-222	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.009200		Backgd or Offset:	6.34	N/A
Calibration intercept:	-0.001760		Coeff or Slope:	1.137	N/A

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	9.4	----
as found span	4922	78.2	80.0	45.0	2.247
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					
high point					
second point					
third point					
as left zero					
as left span					

SO2 Scrubber Check

Date of last scrubber change:	January 18, 2023	Ave Corr Factor	
Date of last converter efficiency test:	n/a		efficiency

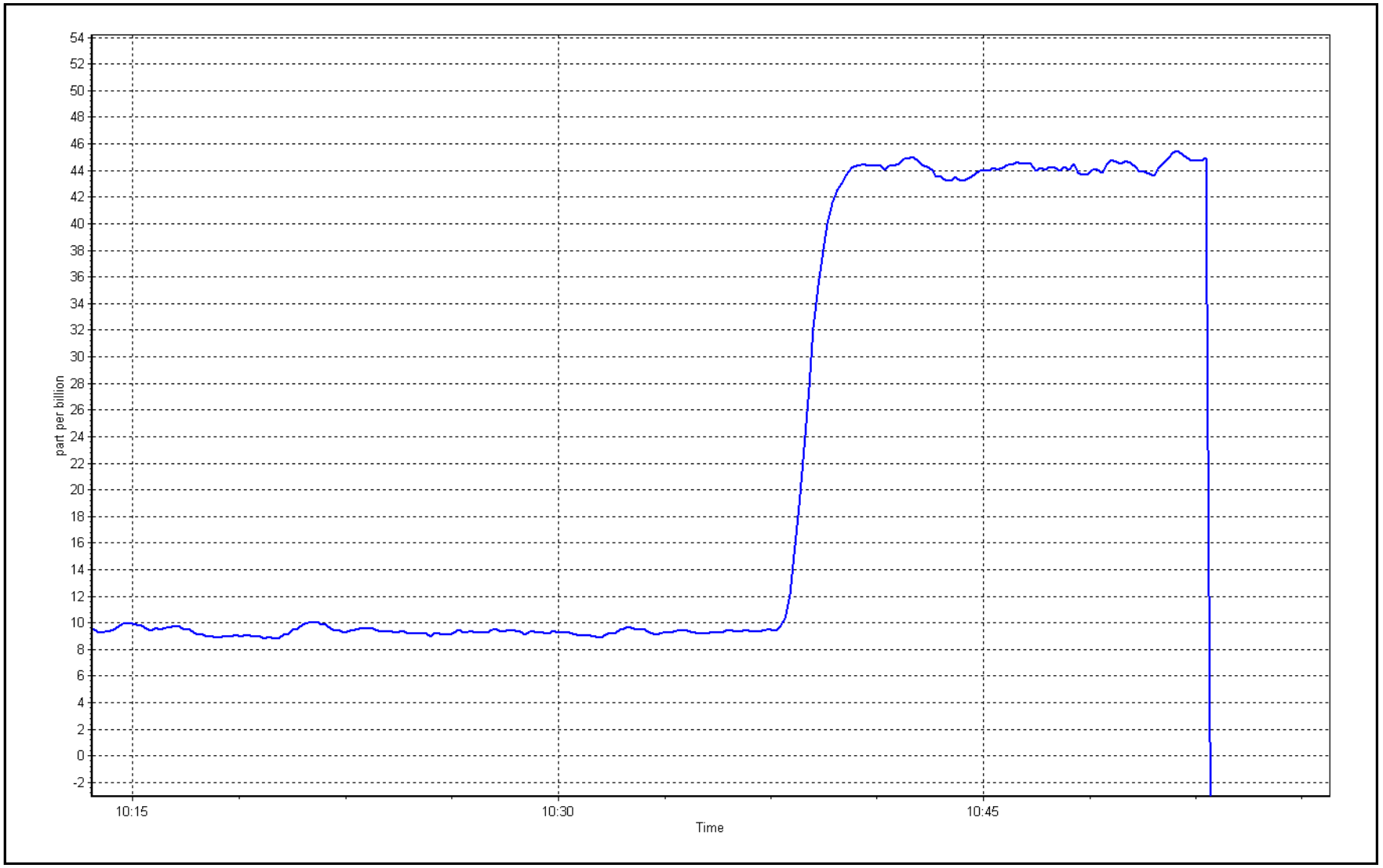
Baseline Corr As found:	35.6	Prev response:	80.71	*% change:	-126.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:	NA	AF Intercept:	NA
Baseline Corr 3rd AF pt:	NA	AF Correlation:	NA		

* = > +/-5% change initiates investigation

Notes: Lamp decayed to the point where readings and baseline were largely out of compliance. Replacing with green tagged 43i-TLE.

Calibration Performed By: Braiden Boutilier

H_2S Calibration Plot Date: June 30, 2023 Location: Firebag



CALS_352

Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Firebag	Station number:	AMS19
Calibration Date:	June 30, 2023	Last Cal Date:	June 27, 2023
Start time (MST):	11:01	End time (MST):	13:54
Reason:	Install		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1151680032	
Converter make:	Global		Converter serial #:	2022-222	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.009200	1.002911	Backgd or Offset:	NA	2.54
Calibration intercept:	-0.001760	-0.281624	Coeff or Slope:	NA	1.122

H_2S As Found Data

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

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4922	78.2	80.0	80.1	0.998
second point	4961	39.1	40.0	39.5	1.012
third point	4980	19.6	20.0	19.8	1.013
as left zero	5000	0.0	0.0	-0.1	----
as left span	4922	78.2	80.0	79.9	1.001

SO2 Scrubber Check

Date of last scrubber change:	January 18, 2023	Ave Corr Factor	1.008
Date of last converter efficiency test:	n/a		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: Installed 43i-TLE (1151680032). Removed 43i-TLE (1336160090) due to increased lamp voltage overnight leading to shifted baseline. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

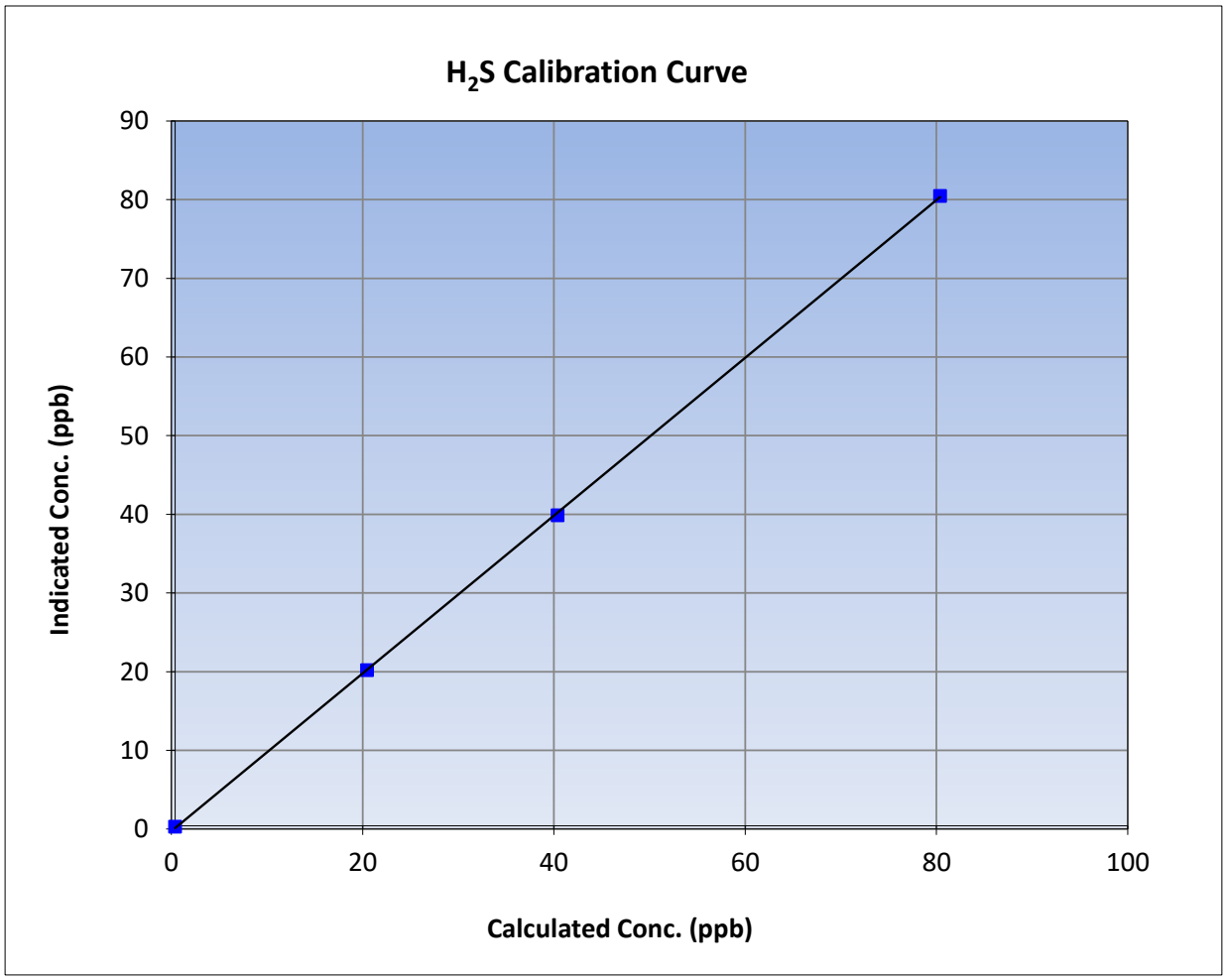
Station Information

Calibration Date:	June 30, 2023	Previous Calibration:	June 27, 2023
Station Name:	Firebag	Station Number:	AMS19
Start Time (MST):	11:01	End Time (MST):	13:54
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1151680032

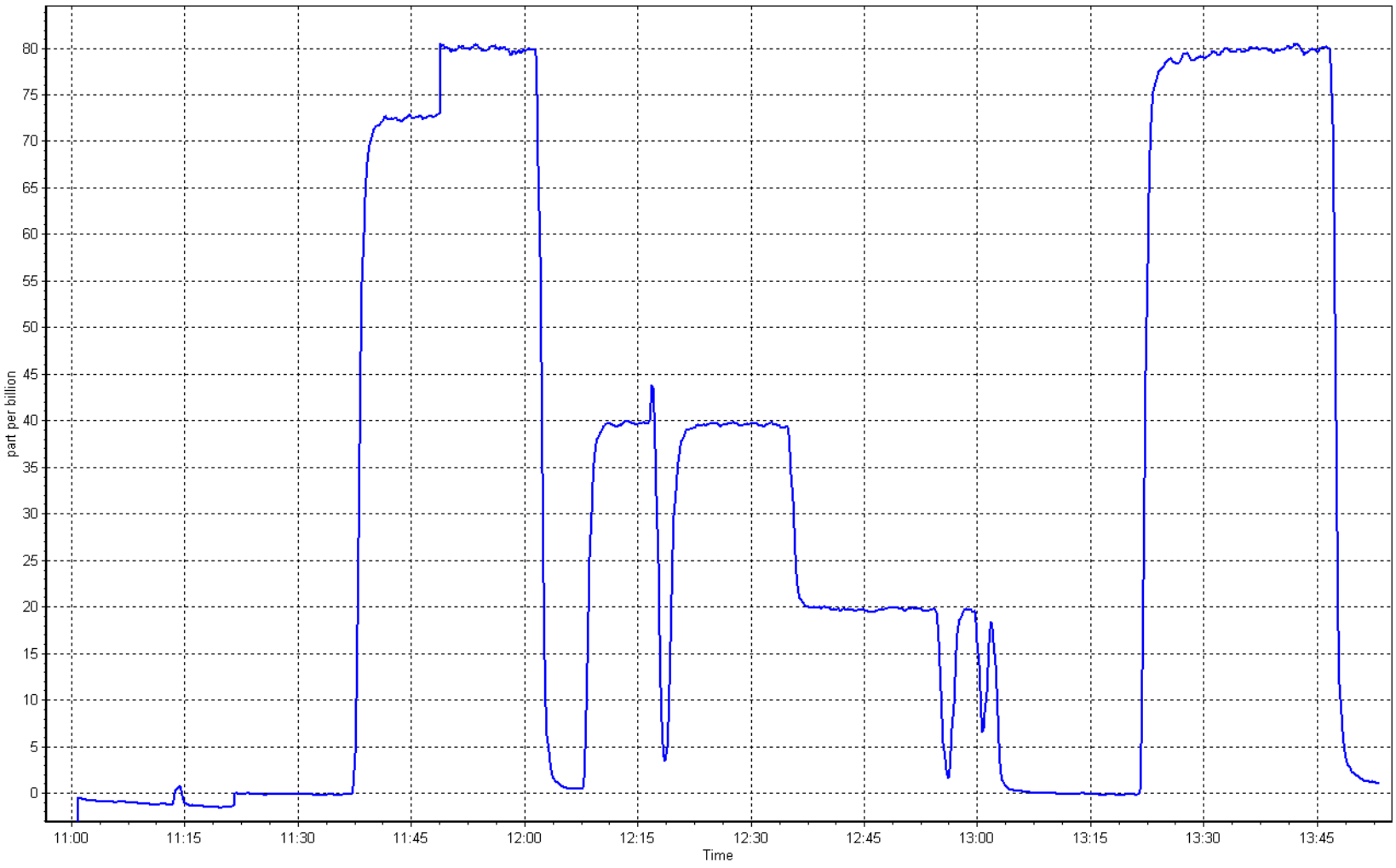
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.1	0.9985
40.0	39.5	1.0124
20.0	19.8	1.0125

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999952	*≥0.995*
Slope	1.002911	*0.90 - 1.10*
Intercept	-0.281624	*+/-3*



H_2S Calibration Plot Date: June 30, 2023 Location: Firebag



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	June 20, 2023	Last Cal Date:	May 24, 2023
Start time (MST):	10:35	End time (MST):	13:43
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:	0.994758	1.003320	Background:	2.37	2.69
Calibration intercept:	0.018270	-0.013586	Coefficient:	3.846	3.908

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	0.21	----
as found span	4919	81.1	17.31	17.31	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	4999	0.0	0.00	0.00	----
high point	4919	81.1	17.31	17.35	0.997
second point	4959	40.6	8.66	8.69	0.997
third point	4980	20.3	4.33	4.31	1.006
as left zero	5000	0.0	0.00	0.05	----
as left span	4919	81.1	17.31	17.49	0.989
				Average Correction Factor	1.000

Baseline Corr As found:	17.10	Previous response	17.23	*% change	-0.8%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

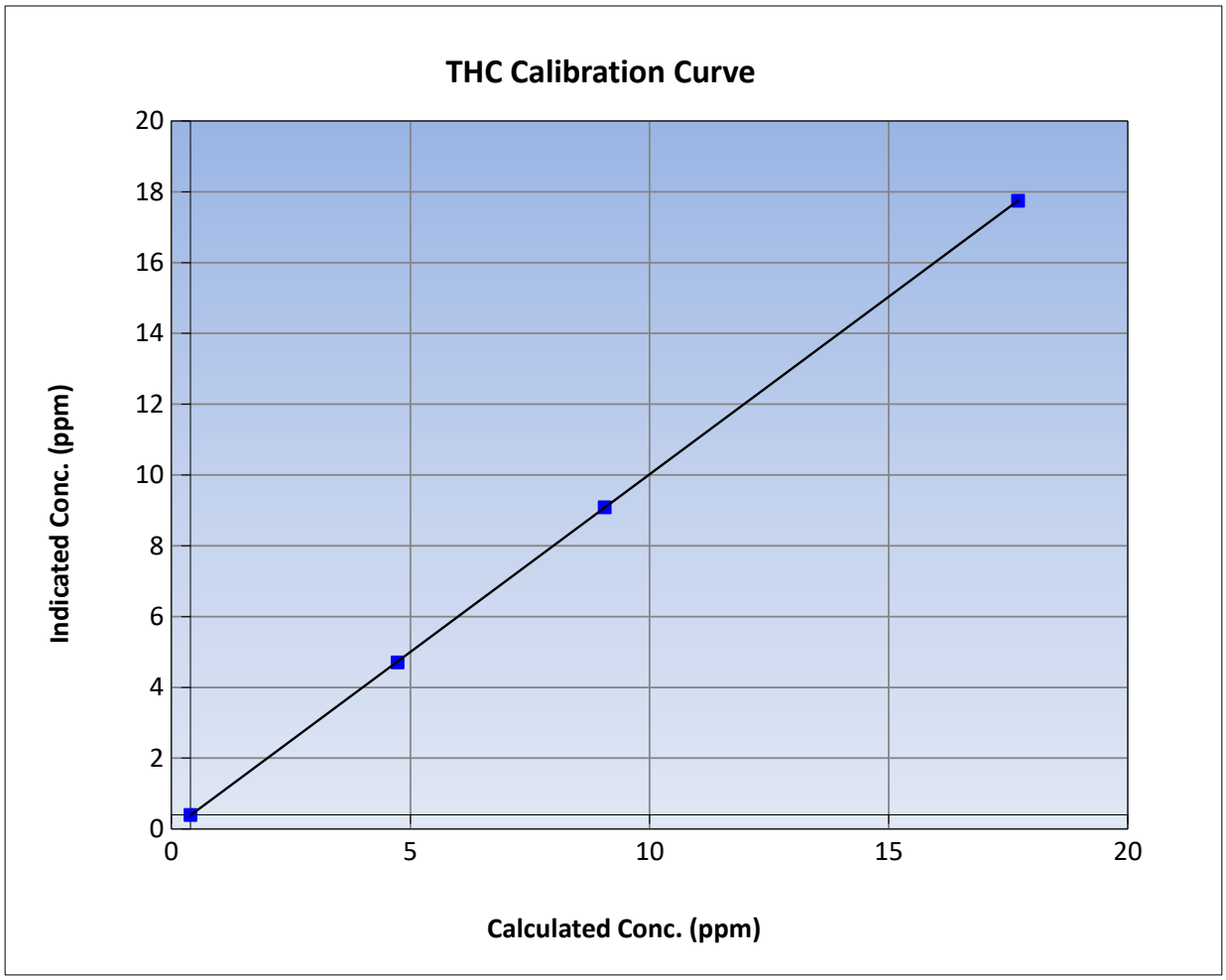
Station Information

Calibration Date:	June 20, 2023	Previous Calibration:	May 24, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:35	End Time (MST):	13:43
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1336160089

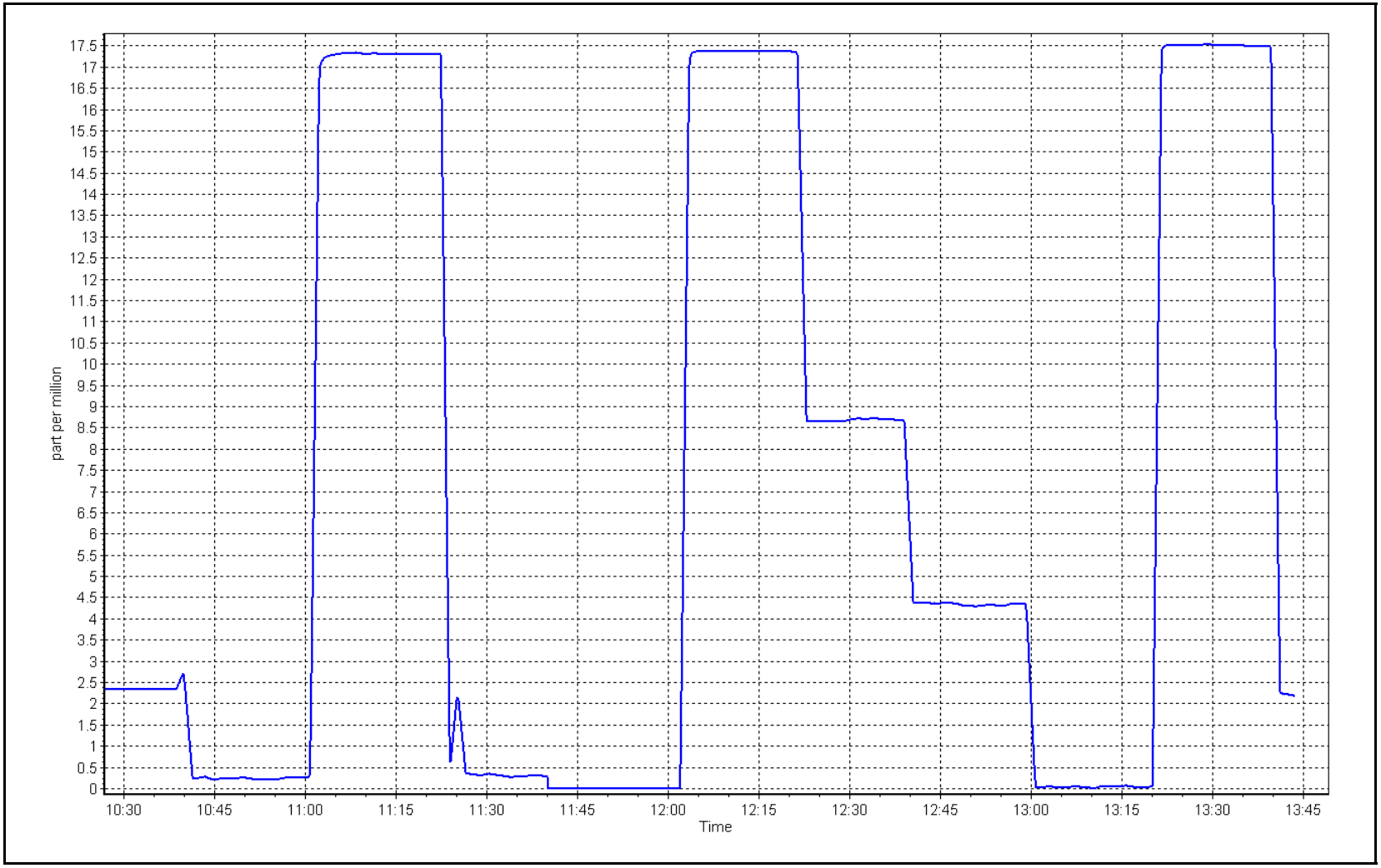
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.00	----
17.31	17.35	0.9974
8.66	8.69	0.9970
4.33	4.31	1.0057

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999994	*≥0.995*
Slope	1.003320	*0.90 - 1.10*
Intercept	-0.013586	*+/-1.5*



THC Calibration Plot Date: June 20, 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:	June 22, 2023	Last Cal Date:	May 4, 2023
Start time (MST):	10:07	End time (MST):	14:50
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1410661309	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.078	1.094	NO bkgnd or offset:	7.5	7.6
NOX coeff or slope:	0.995	0.994	NOX bkgnd or offset:	7.5	7.6
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	210.3	211.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999367	0.998084
NO_X Cal Offset:	0.856331	1.096129
NO Cal Slope:	1.001140	0.999369
NO Cal Offset:	-0.011041	0.508726
NO_2 Cal Slope:	0.998524	1.001853
NO_2 Cal Offset:	-0.233199	-0.516592

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	4999	0.0	0.0	0.0	0.0	0.0	-0.2	0.2	----	----
as found span	4919	81.0	828.1	800.3	27.9	819.0	789.8	29.1	1.0112	1.0133
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	4999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
high point	4919	81.0	828.1	800.3	27.9	827.0	799.8	27.6	1.0014	1.0006
second point	4960	40.5	414.0	400.1	13.9	415.2	401.3	13.9	0.9972	0.9970
third point	4980	20.2	206.5	199.6	6.9	208.1	200.0	8.1	0.9924	0.9978
as left zero	4999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as left span	4919	81.0	828.1	362.4	465.8	828.0	363.5	465.0	1.0002	0.9969
								Average Correction Factor	0.9970	0.9985

Corrected As found	NO_X = 819.0 ppb	NO = 790.0 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-1.2%
Previous Response	NO_X = 828.5 ppb	NO = 801.2 ppb		*Percent Change	NO =	-1.4%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	799.5	361.6	465.8	466.9	0.9976	100.2%
2nd GPT point (200 ppb O3)	799.5	579.9	247.5	245.7	1.0072	99.3%
3rd GPT point (100 ppb O3)	799.5	691.1	136.3	136.4	0.9990	100.1%
				Average Correction Factor	1.0012	99.9%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

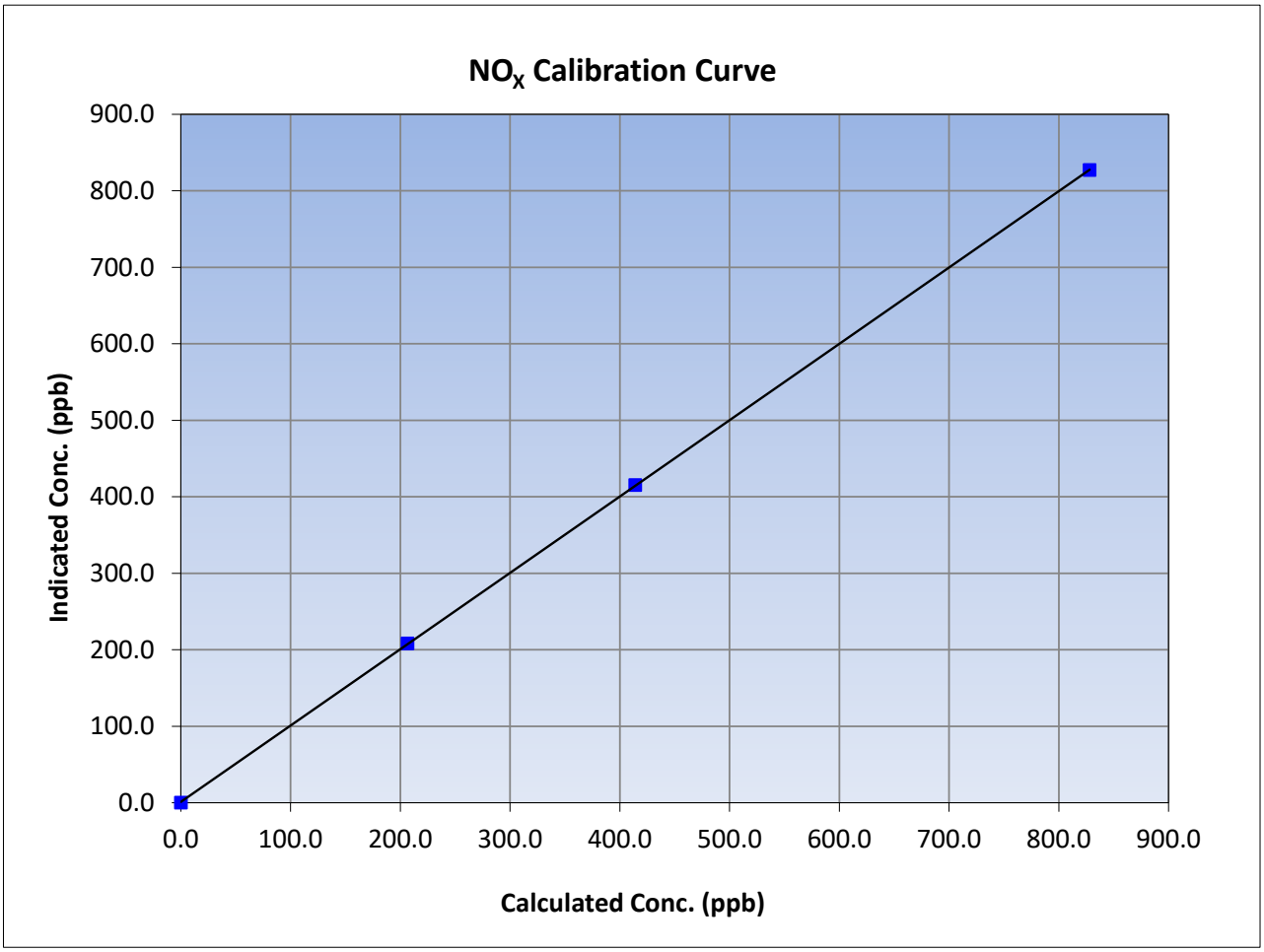
Version-04-2020

Station Information

Calibration Date:	June 22, 2023	Previous Calibration:	May 4, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:07	End Time (MST):	14:50
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999992	≥0.995
828.1	827.0	1.0014			
414.0	415.2	0.9972	Slope	0.998084	0.90 - 1.10
206.5	208.1	0.9924			
			Intercept	1.096129	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

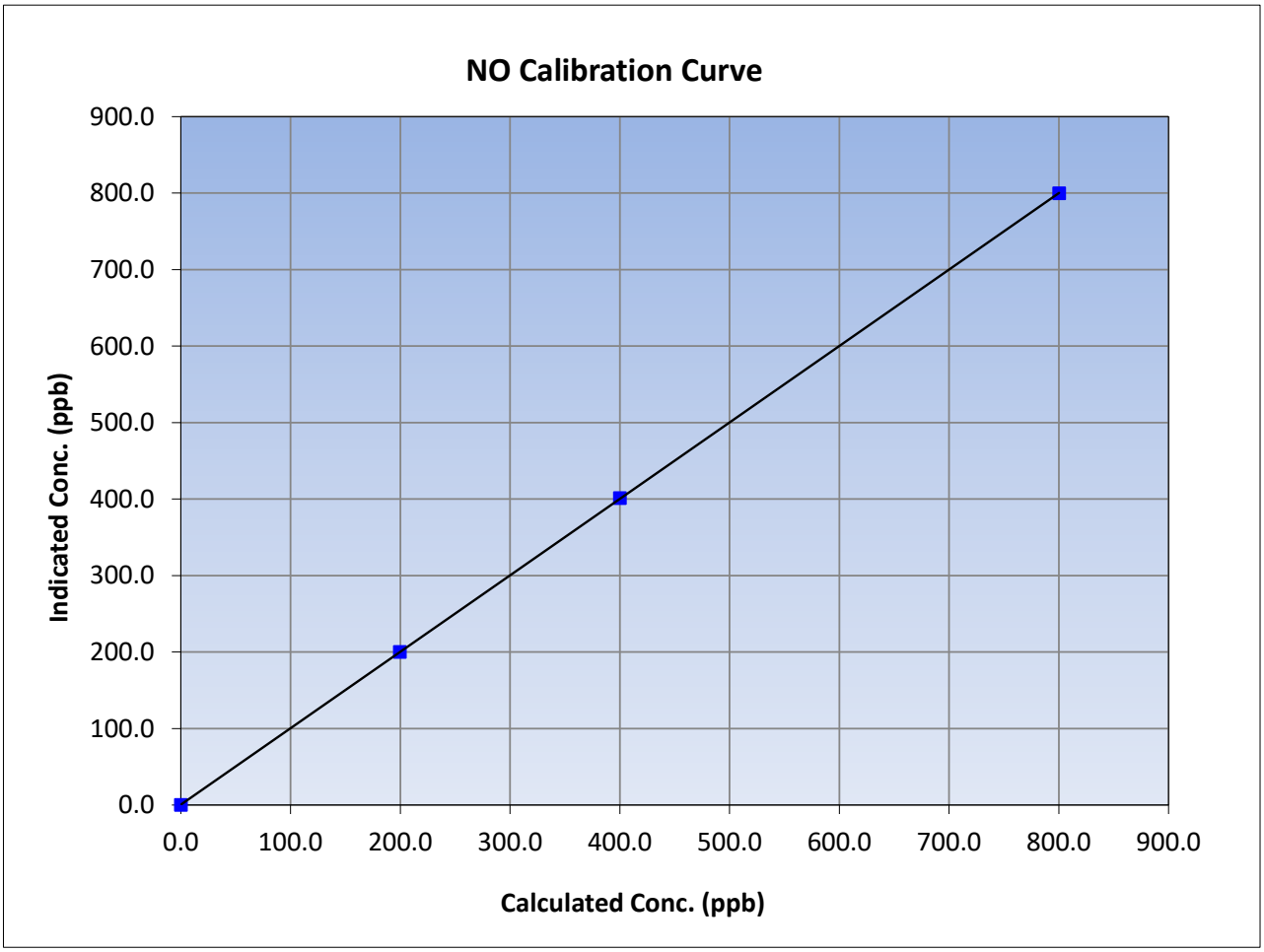
Version-04-2020

Station Information

Calibration Date:	June 22, 2023	Previous Calibration:	May 4, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:07	End Time (MST):	14:50
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999996	≥0.995
800.3	799.8	1.0006			
400.1	401.3	0.9970	Slope	0.999369	0.90 - 1.10
199.6	200.0	0.9978			
			Intercept	0.508726	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

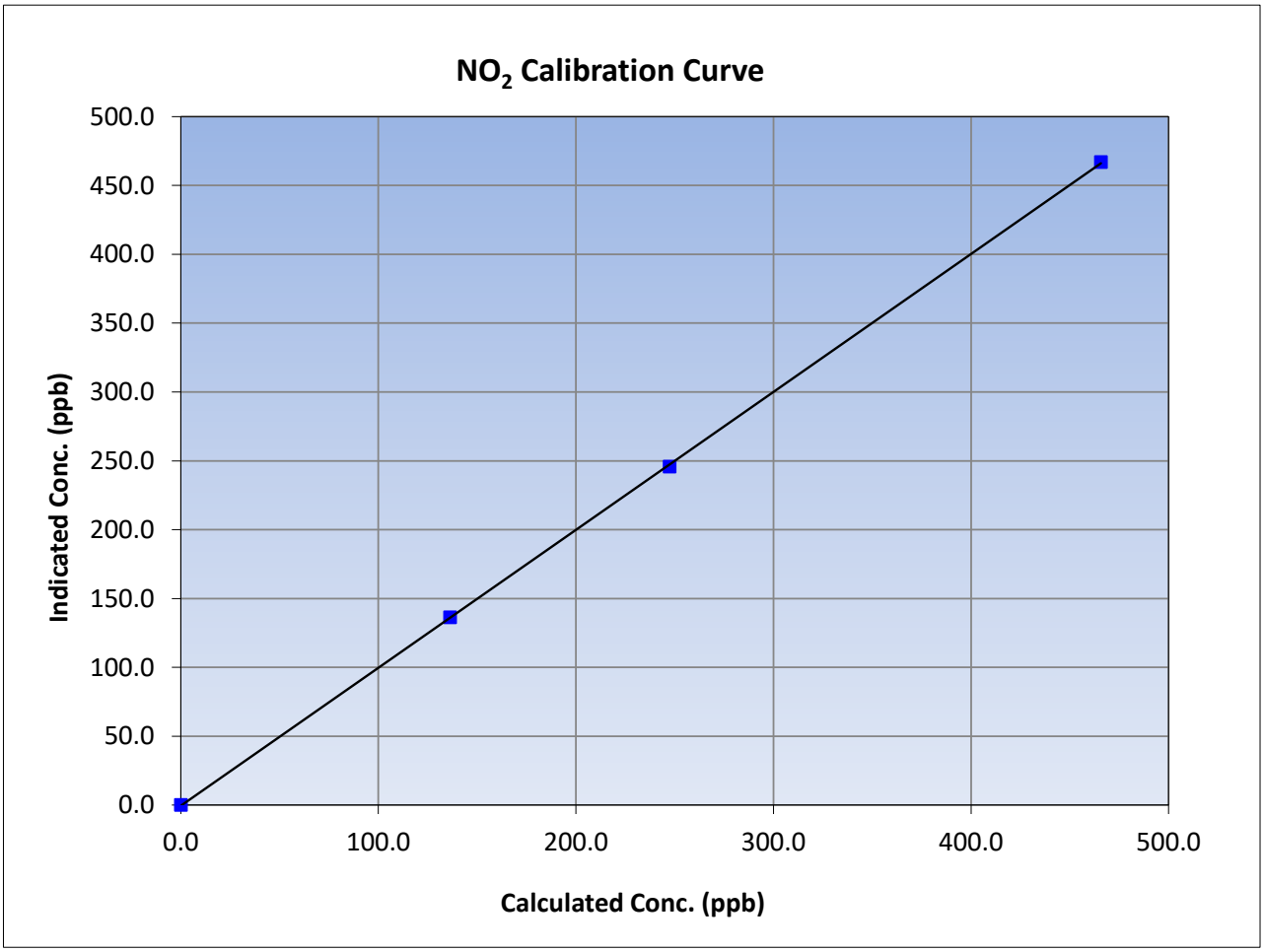
Version-04-2020

Station Information

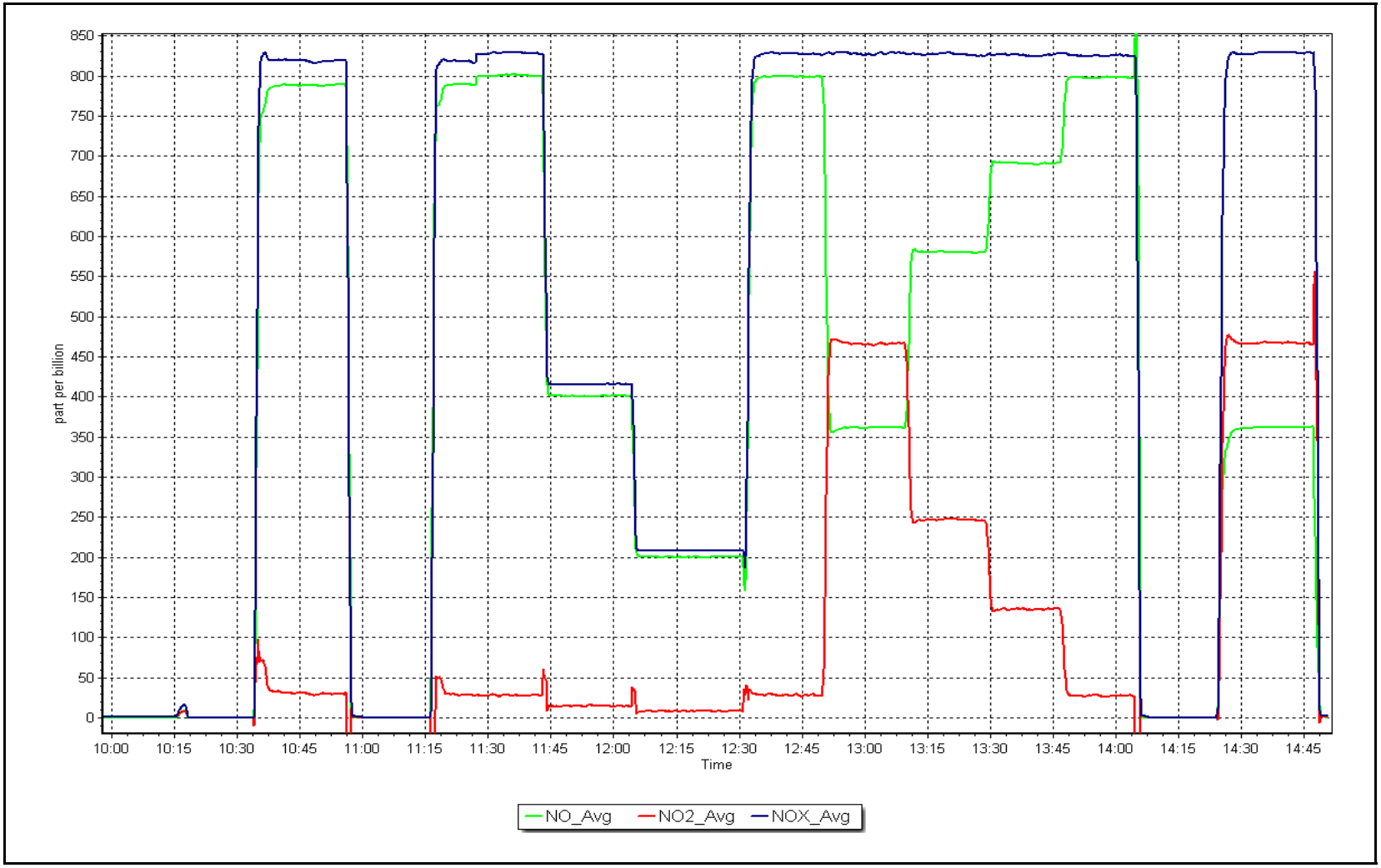
Calibration Date:	June 22, 2023	Previous Calibration:	May 4, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	10:07	End Time (MST):	14:50
Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999966	≥0.995
465.8	466.9	0.9976			
247.5	245.7	1.0072	Slope	1.001853	0.90 - 1.10
136.3	136.4	0.9990			
			Intercept	-0.516592	+/-20



NO_X Calibration Plot Date: June 22, 2023 Location: Firebag



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS20
MACKAY RIVER
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	June 8, 2023	Last Cal Date:	May 2, 2023
Start time (MST):	7:15	End time (MST):	9:59
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make: Thermo 43i Analyzer serial #: 1501301450

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.007790	0.995624	Backgd or Offset:	18.8	18.2
Calibration intercept:	2.430853	0.891225	Coeff or Slope:	0.974	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	0.0	----
as found span	4919	81.3	800.3	819.2	0.977
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4919	81.3	800.3	797.7	1.003
second point	4959	40.7	400.7	399.0	1.004
third point	4980	20.3	199.8	201.3	0.993
as left zero	5000	0.0	0.0	0.3	----
as left span	4919	81.3	800.3	799.5	1.001
				Average Correction Factor	1.000

Baseline Corr As found:	819.20	Previous response	808.93	*% 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

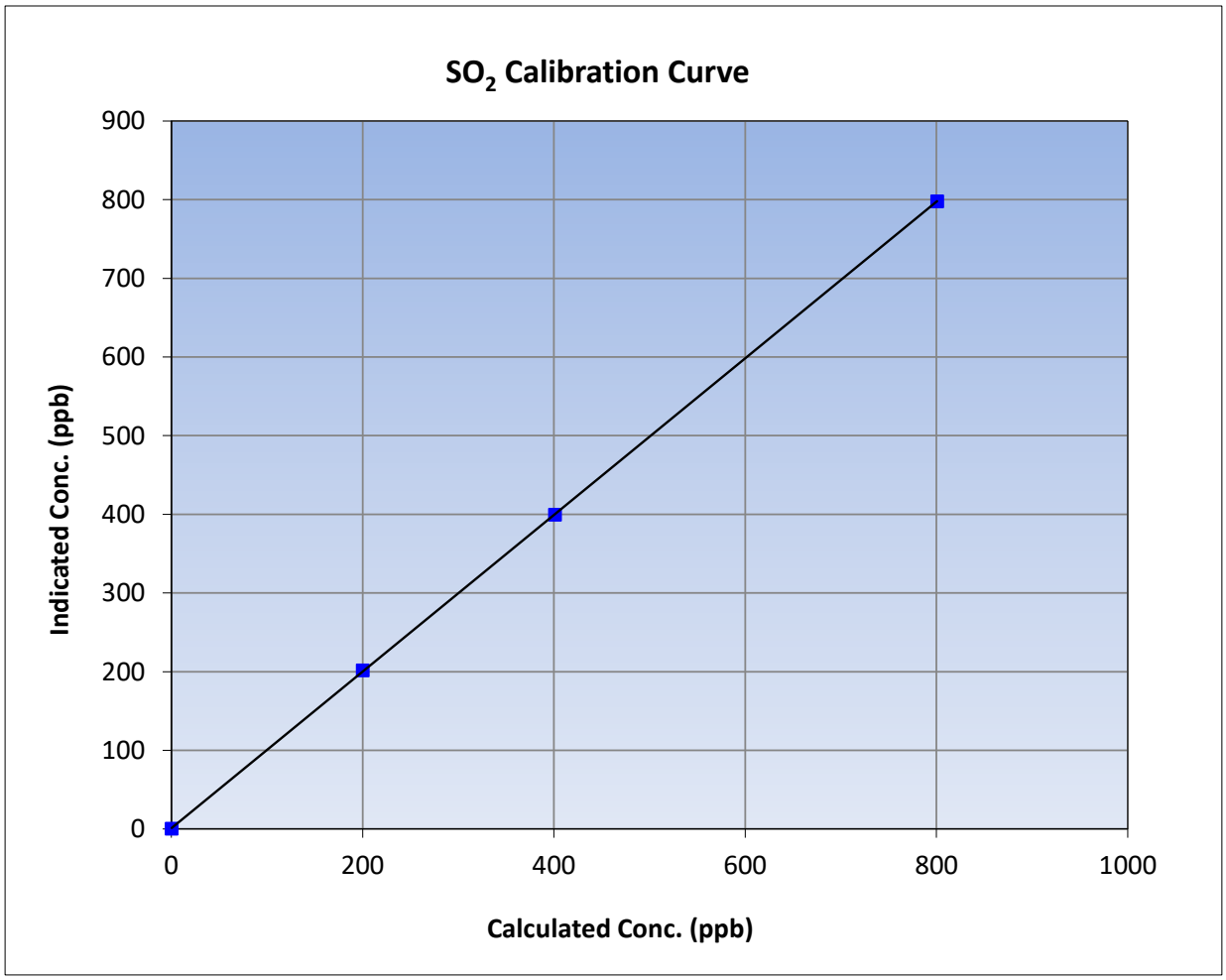
Station Information

Calibration Date:	June 8, 2023	Previous Calibration:	May 2, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	7:15	End Time (MST):	9:59
Analyzer make:	Thermo 43i	Analyzer serial #:	1501301450

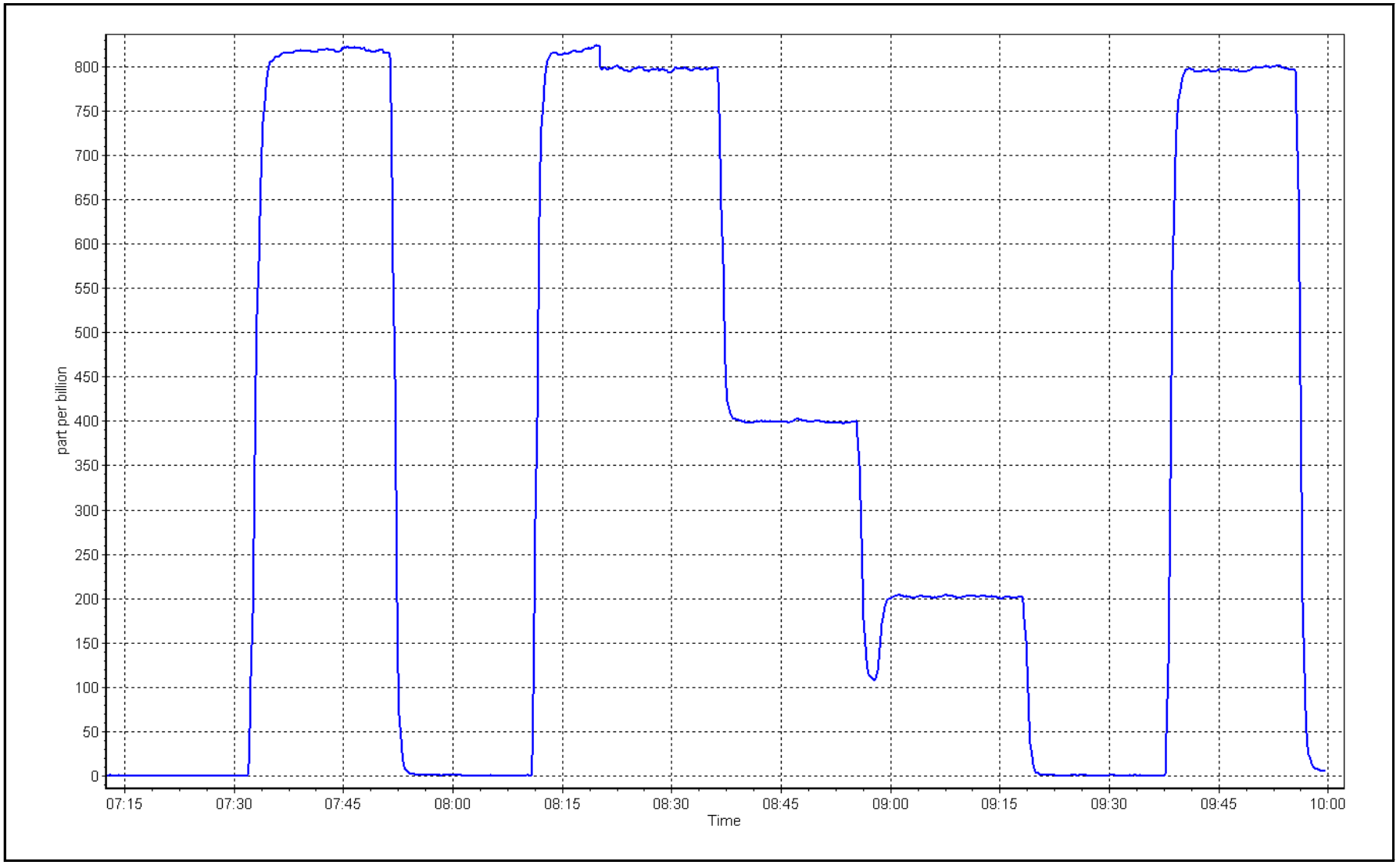
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
800.3	797.7	1.0032
400.7	399.0	1.0042
199.8	201.3	0.9927

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999991	*≥0.995*
Slope	0.995624	*0.90 - 1.10*
Intercept	0.891225	*+/-30*



SO2 Calibration Plot Date: June 8, 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:	June 7, 2023	Last Cal Date:	May 25, 2023
Start time (MST):	7:24	End time (MST):	11:18
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.12	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC515997			
Removed Cal Gas Conc:	5.12	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	1220
ZAG Make/Model:	Teledyne API 701		Serial Number:	4522

Analyzer Information

Analyzer make:	Thermo 43iQ TLE		Analyzer serial #:	12124313139	
Converter make:	Global		Converter serial #:	2022-226	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.006091	1.002952	Backgd or Offset:	1.9	1.10
Calibration intercept:	-0.292887	-0.033000	Coeff or Slope:	0.619	0.605

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.7	----
as found span	4922	78.1	80.0	81.8	0.969
as found 2nd point	4961	39.0	39.9	40.6	0.967
as found 3rd point	4980	19.5	20.0	20.2	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	-0.1	----
high point	4922	78.1	80.0	80.3	0.997
second point	4961	39.0	40.0	39.8	1.004
third point	4980	19.5	20.0	20.3	0.986
as left zero	5000	0.0	0.0	0.0	----
as left span	4922	78.1	80.0	80.1	0.999
SO2 Scrubber Check	4919	80.0	800.2	0.0	----
Date of last scrubber change:		May 25, 2023		Ave Corr Factor	0.996
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	82.5	Prev response:	80.17	*% change:	2.8%
Baseline Corr 2nd AF pt:	41.3	AF Slope:	1.030464	AF Intercept:	-0.560003
Baseline Corr 3rd AF pt:	20.9	AF Correlation:	0.999985		

* = > +/-5% change initiates investigation

Notes: Scrubber check completed after calibrator zero. Adjusted zero and span.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

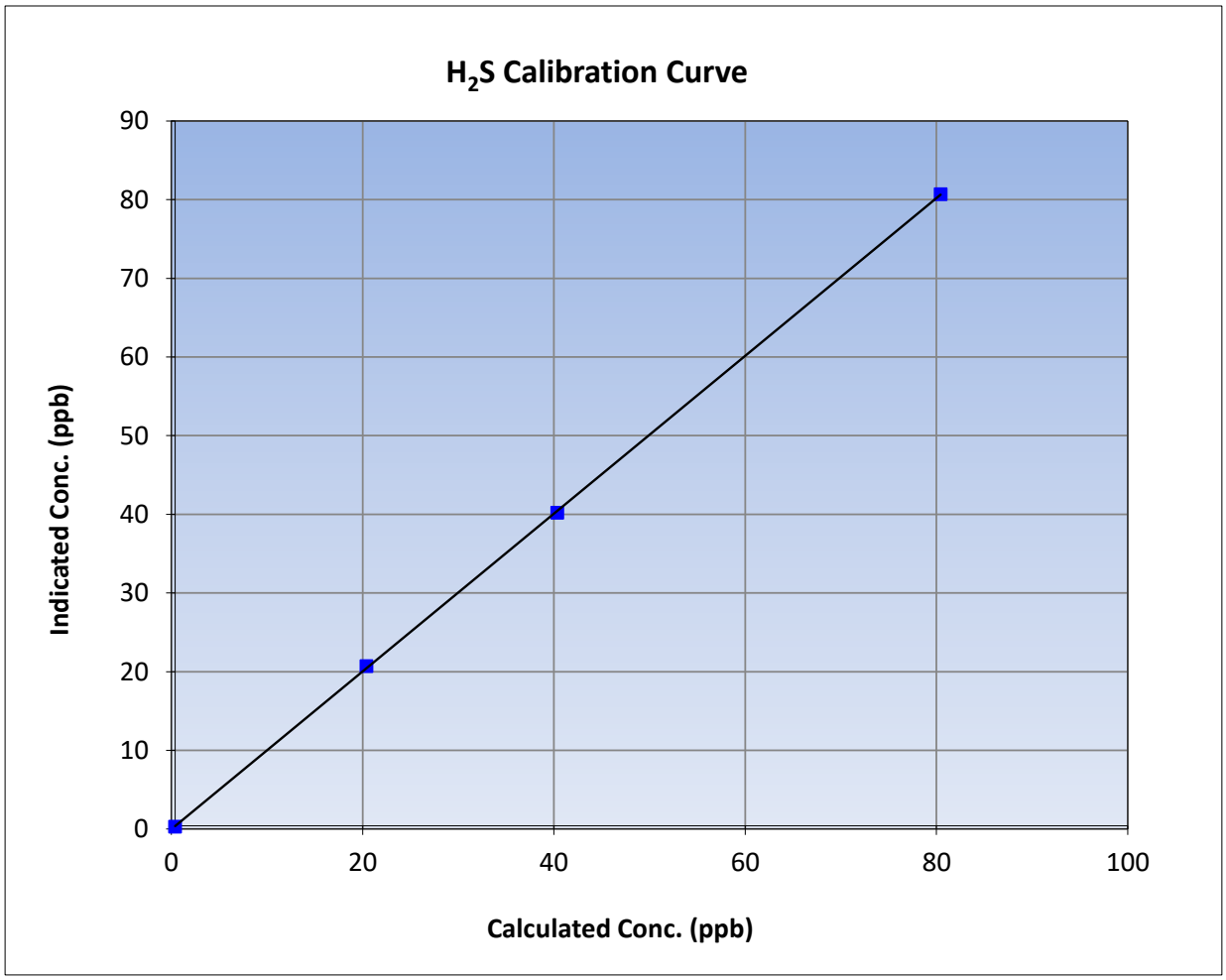
Station Information

Calibration Date:	June 7, 2023	Previous Calibration:	May 25, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	7:24	End Time (MST):	11:18
Analyzer make:	Thermo 43iQ TLE	Analyzer serial #:	12124313139

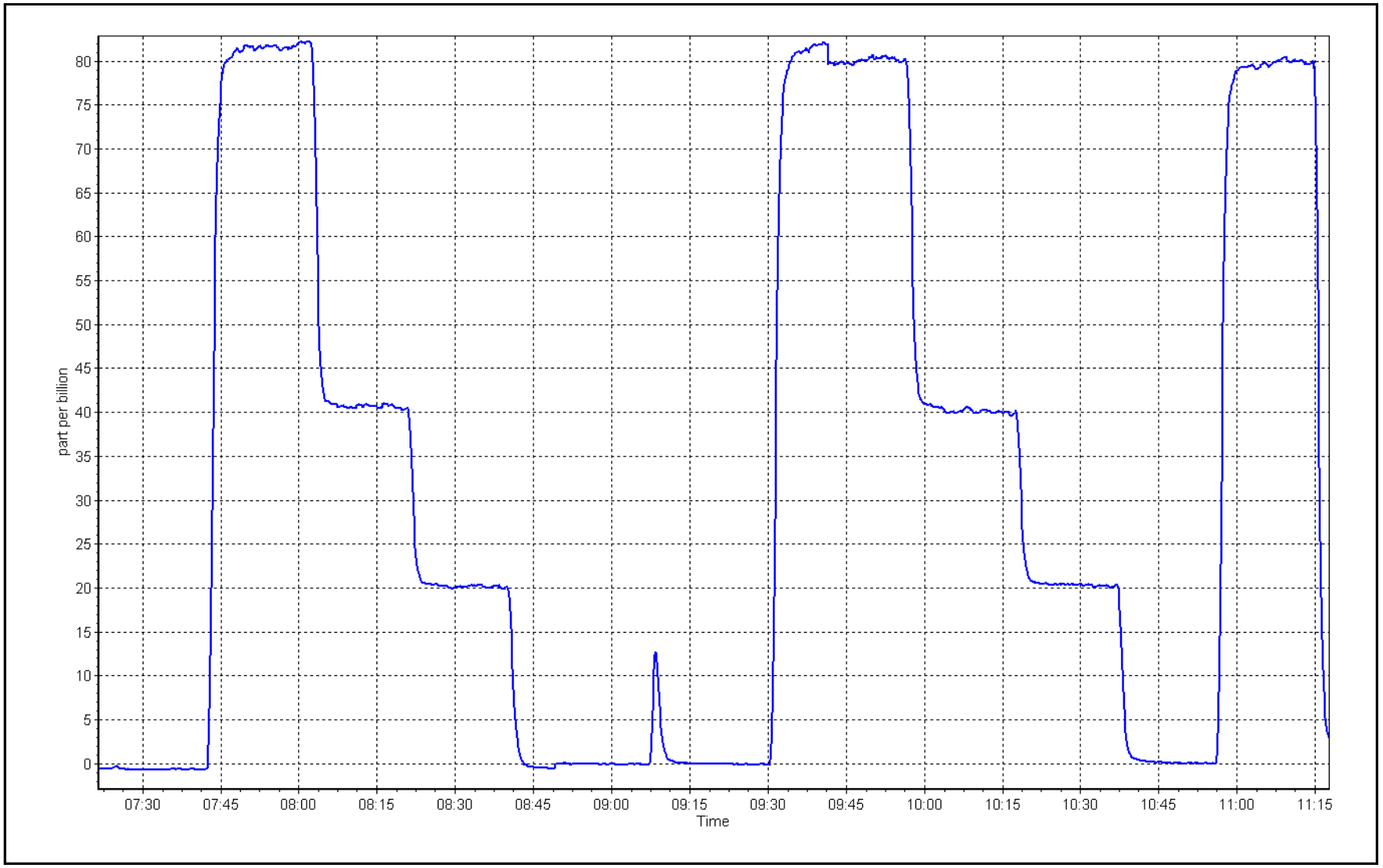
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.3	0.9967
40.0	39.8	1.0042
20.0	20.3	0.9860

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999961	*≥0.995*
Slope	1.002952	*0.90 - 1.10*
Intercept	-0.033000	*+/-3*



H_2S Calibration Plot Date: June 7, 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:	June 8, 2023	Last Cal Date:	May 2, 2023
Start time (MST):	7:15	End time (MST):	9:58
Reason:	Routine		

Calibration Standards

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

Analyzer Information

Analyzer make:	Thermo 51i-LT		Analyzer serial #:	1501663727	
Analyzer Range:	0 - 20 ppm				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.004428	1.002852	Background:	3.250	3.220
Calibration intercept:	-0.093194	-0.024234	Coefficient:	5.488	5.430

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	-0.03	----
as found span	4919	81.3	17.34	17.55	0.988
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.05	----
high point	4919	81.3	17.34	17.34	1.000
second point	4959	40.7	8.68	8.73	0.994
third point	4980	20.3	4.33	4.32	1.002
as left zero	5000	0.0	0.00	-0.06	----
as left span	4919	81.3	17.34	17.28	1.003
				Average Correction Factor	0.999

Baseline Corr As found:	17.58	Previous response	17.32	*% 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: Hydrogen cylinder changed. Span adjusted.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

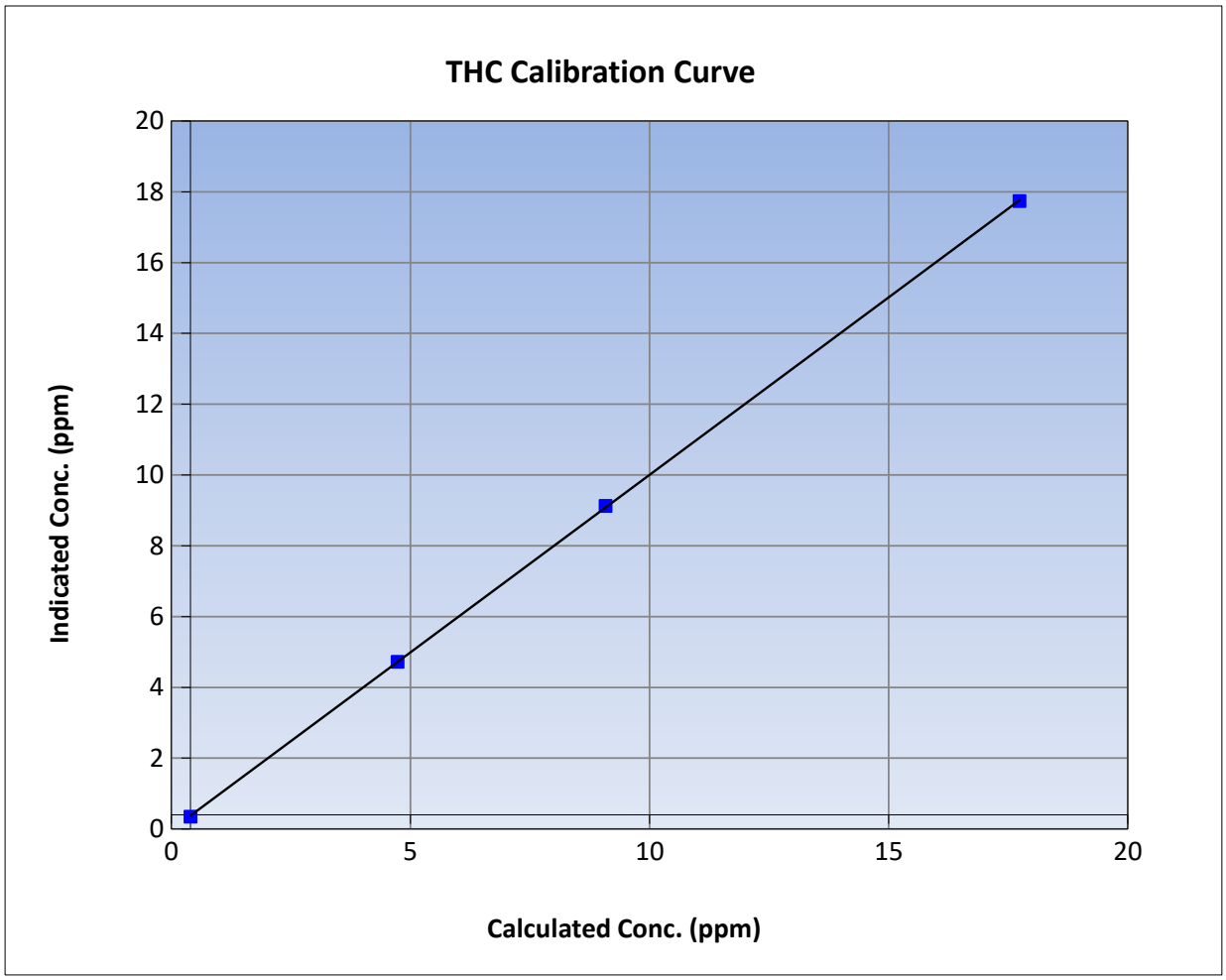
Station Information

Calibration Date:	June 8, 2023	Previous Calibration:	May 2, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	7:15	End Time (MST):	9:58
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1501663727

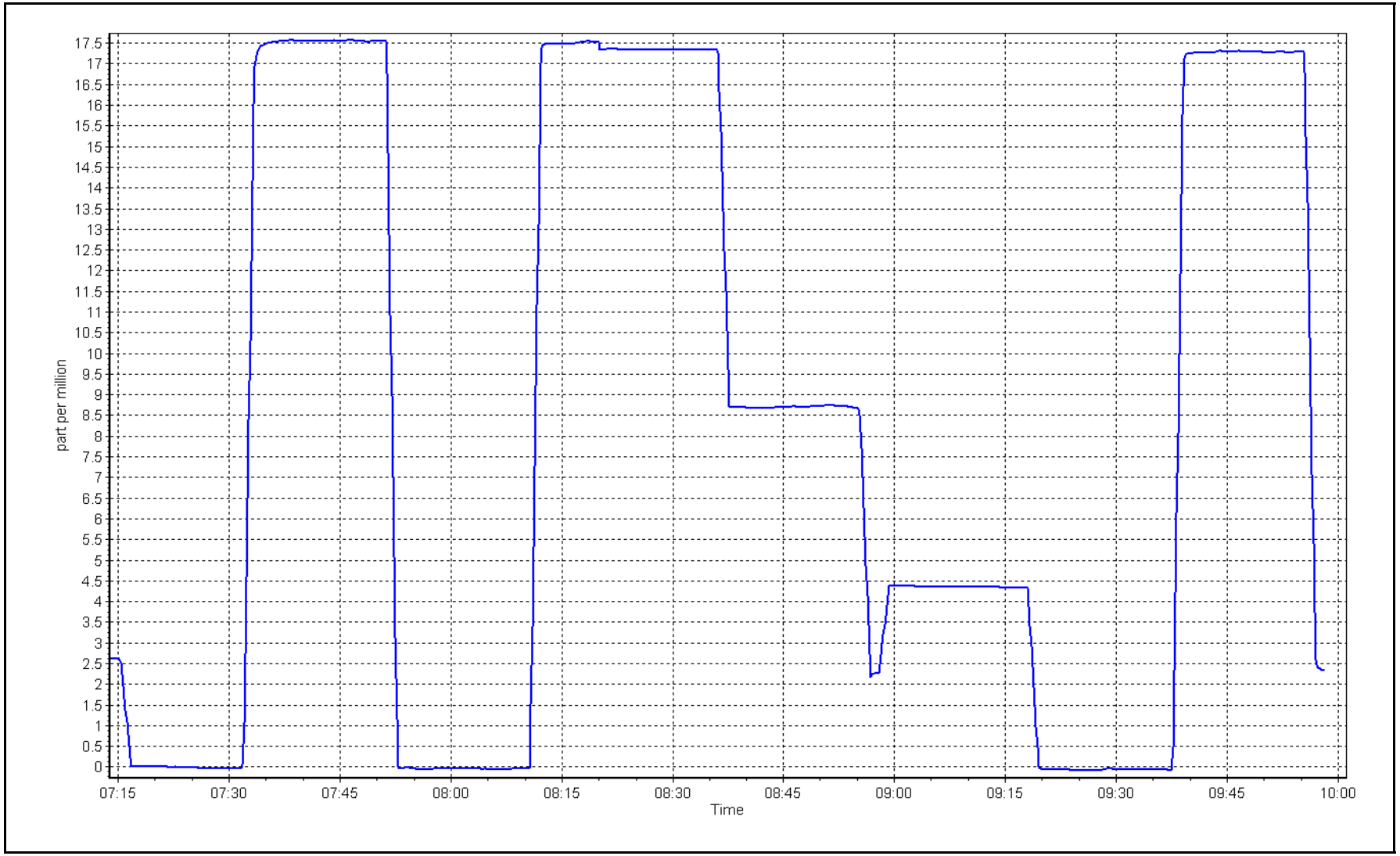
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	-0.05	----
17.34	17.34	1.0000
8.68	8.73	0.9944
4.33	4.32	1.0022

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999978	*≥0.995*
Slope	1.002852	*0.90 - 1.10*
Intercept	-0.024234	*+/-1.5*



THC Calibration Plot Date: June 8, 2023 Location: MacKay River



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	MacKay River	Station number:	AMS20
Calibration Date:	June 19, 2023	Last Cal Date:	May 11, 2023
Start time (MST):	7:00	End time (MST):	11:16
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:	1.459	1.503	NO bkgnd or offset:	4.0	4.2
NOX coeff or slope:	0.990	0.992	NOX bkgnd or offset:	4.0	4.2
NO2 coeff or slope:	0.995	0.995	Reaction cell Press:	178.6	178.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.981506	0.997289
NO_X Cal Offset:	1.850414	2.290060
NO Cal Slope:	0.983542	0.998247
NO Cal Offset:	0.691620	1.091419
NO_2 Cal Slope:	1.000887	1.002522
NO_2 Cal Offset:	-0.270425	-0.129742

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
as found span	4917	83.3	819.5	800.3	19.2	795.9	777.7	18.4	1.0296	1.0291
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.2	----	----
high point	4917	83.3	819.5	800.3	19.2	818.9	799.9	19.0	1.0007	1.0005
second point	4956	41.7	410.4	400.8	9.6	411.4	400.4	11.0	0.9977	1.0011
third point	4979	20.8	204.6	199.9	4.8	209.3	202.6	6.7	0.9777	0.9864
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.1	----	----
as left span	4917	83.3	819.5	444.4	375.1	816.4	440.0	376.4	1.0037	1.0100
								Average Correction Factor	0.9920	0.9960

Corrected As found	NO_X = 795.9 ppb	NO = 777.8 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-1.3%
Previous Response	NO_X = 806.2 ppb	NO = 787.8 ppb			*Percent Change	NO =	-1.3%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	796.3	440.4	375.1	376.1	0.9972	100.3%
2nd GPT point (200 ppb O3)	796.3	612.3	203.2	203.3	0.9993	100.1%
3rd GPT point (100 ppb O3)	796.3	701.7	113.8	113.6	1.0014	99.9%
				Average Correction Factor	0.9993	100.1%

Notes: Span adjusted. No Maintenance done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

NO_X Calibration Summary

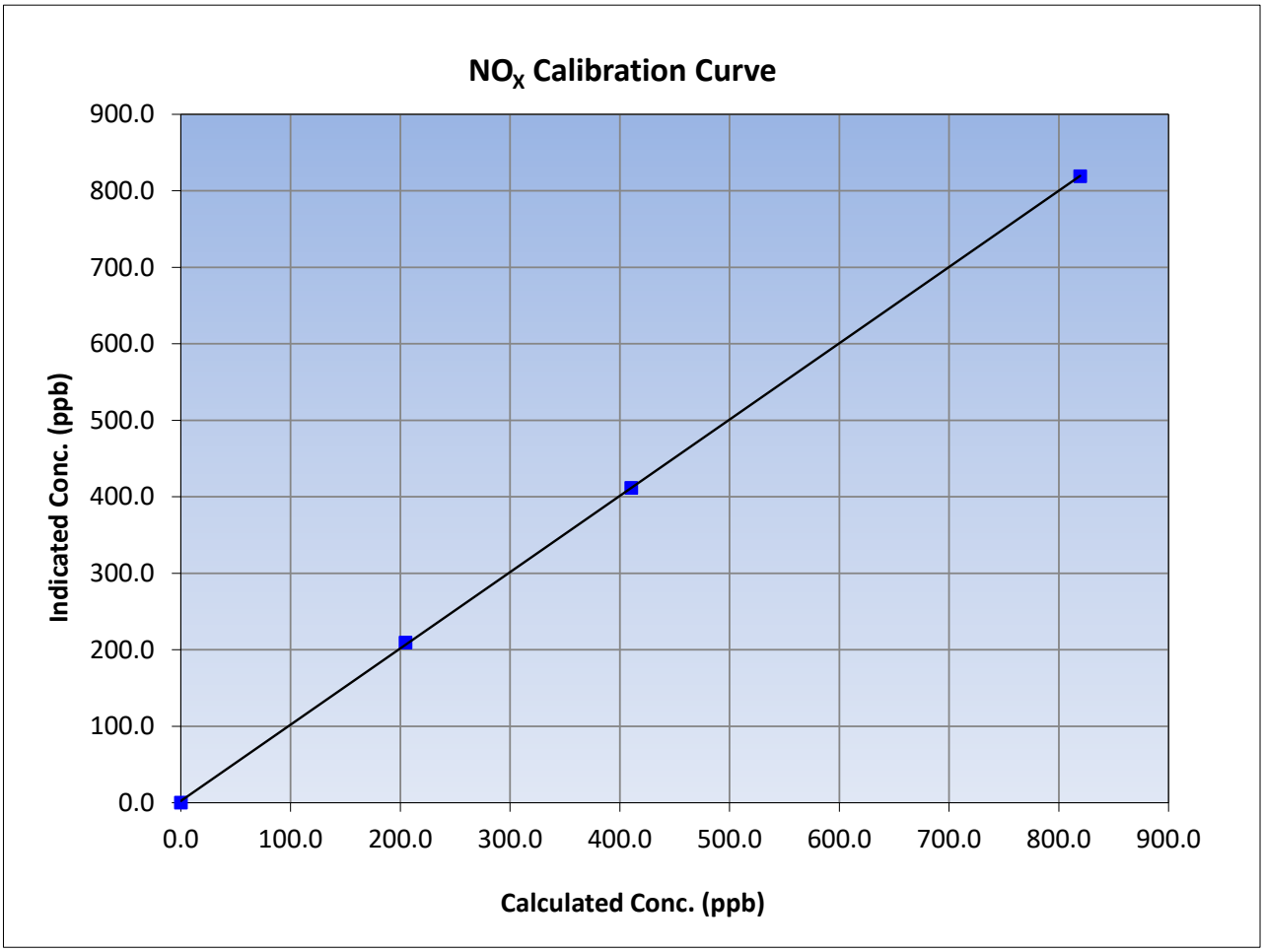
Version-04-2020

Station Information

Calibration Date:	June 19, 2023	Previous Calibration:	May 11, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	7:00	End Time (MST):	11:16
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	0.999963	≥0.995
819.5	818.9	1.0007			
410.4	411.4	0.9977	Slope	0.997289	0.90 - 1.10
204.6	209.3	0.9777			
			Intercept	2.290060	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

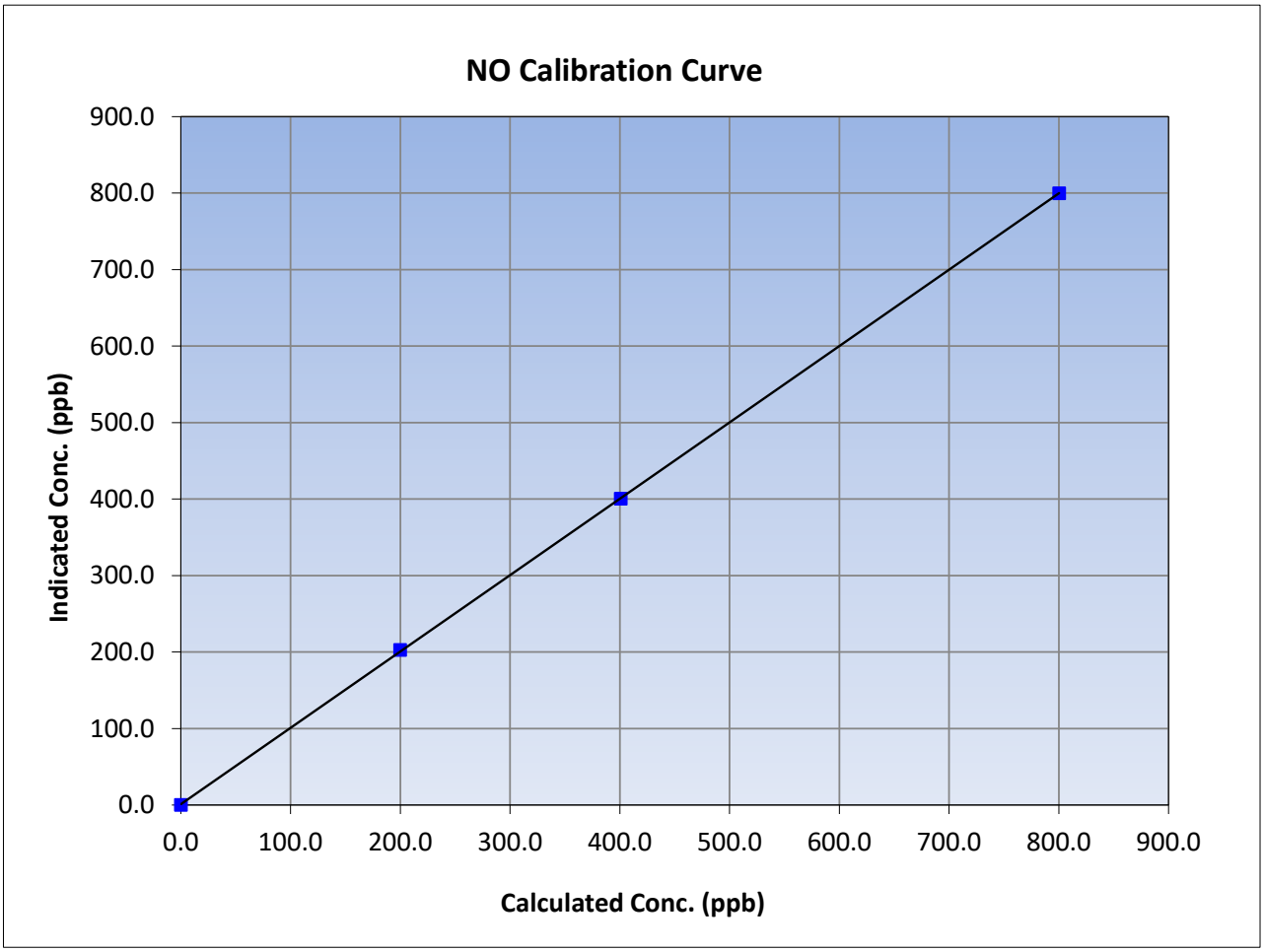
Version-04-2020

Station Information

Calibration Date:	June 19, 2023	Previous Calibration:	May 11, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	7:00	End Time (MST):	11:16
Analyzer make:	Thermo 42i	Analyzer serial #:	1505164379

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999983	≥0.995
800.3	799.9	1.0005			
400.8	400.4	1.0011	Slope	0.998247	0.90 - 1.10
199.9	202.6	0.9864			
			Intercept	1.091419	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

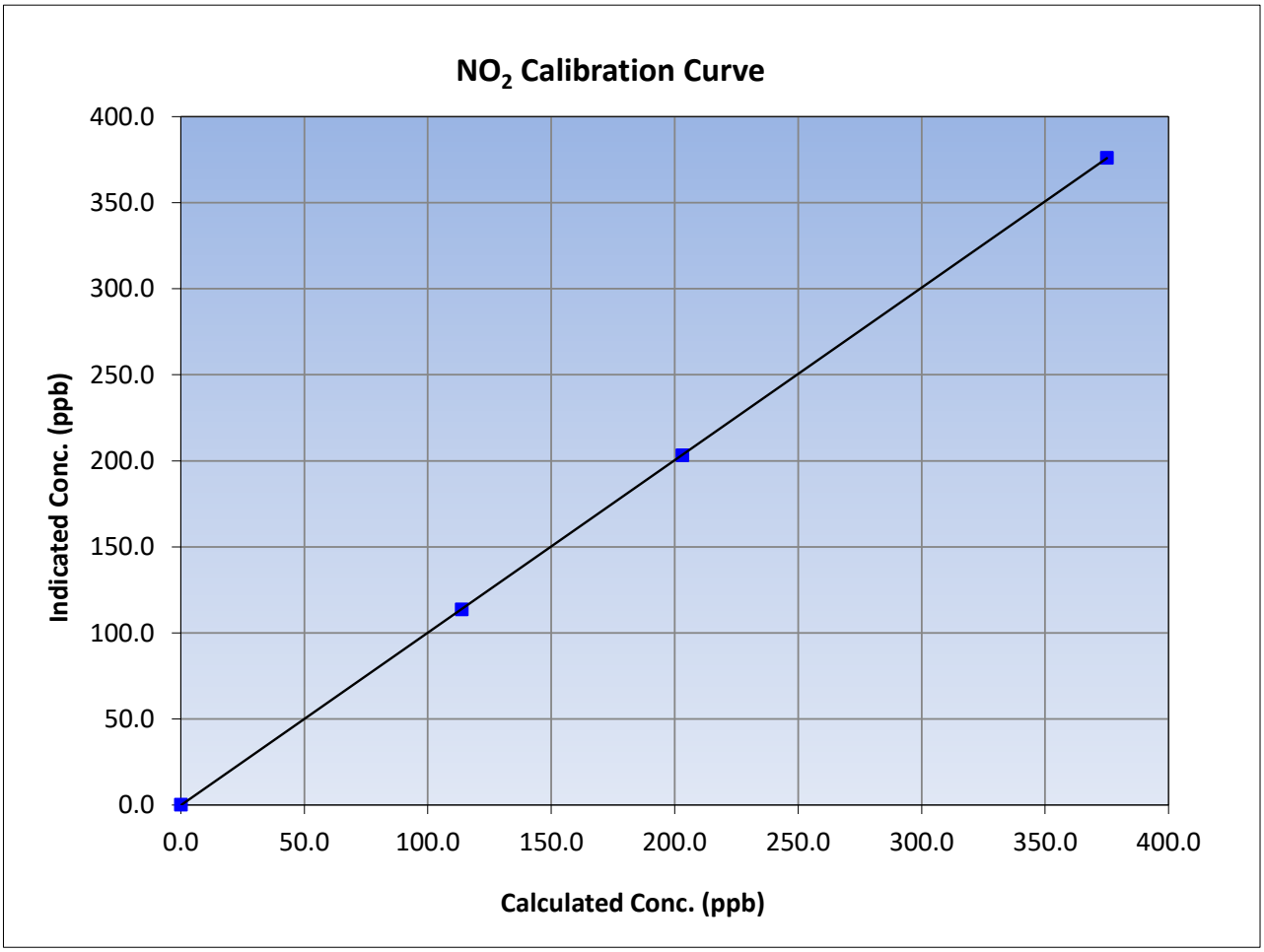
Version-04-2020

Station Information

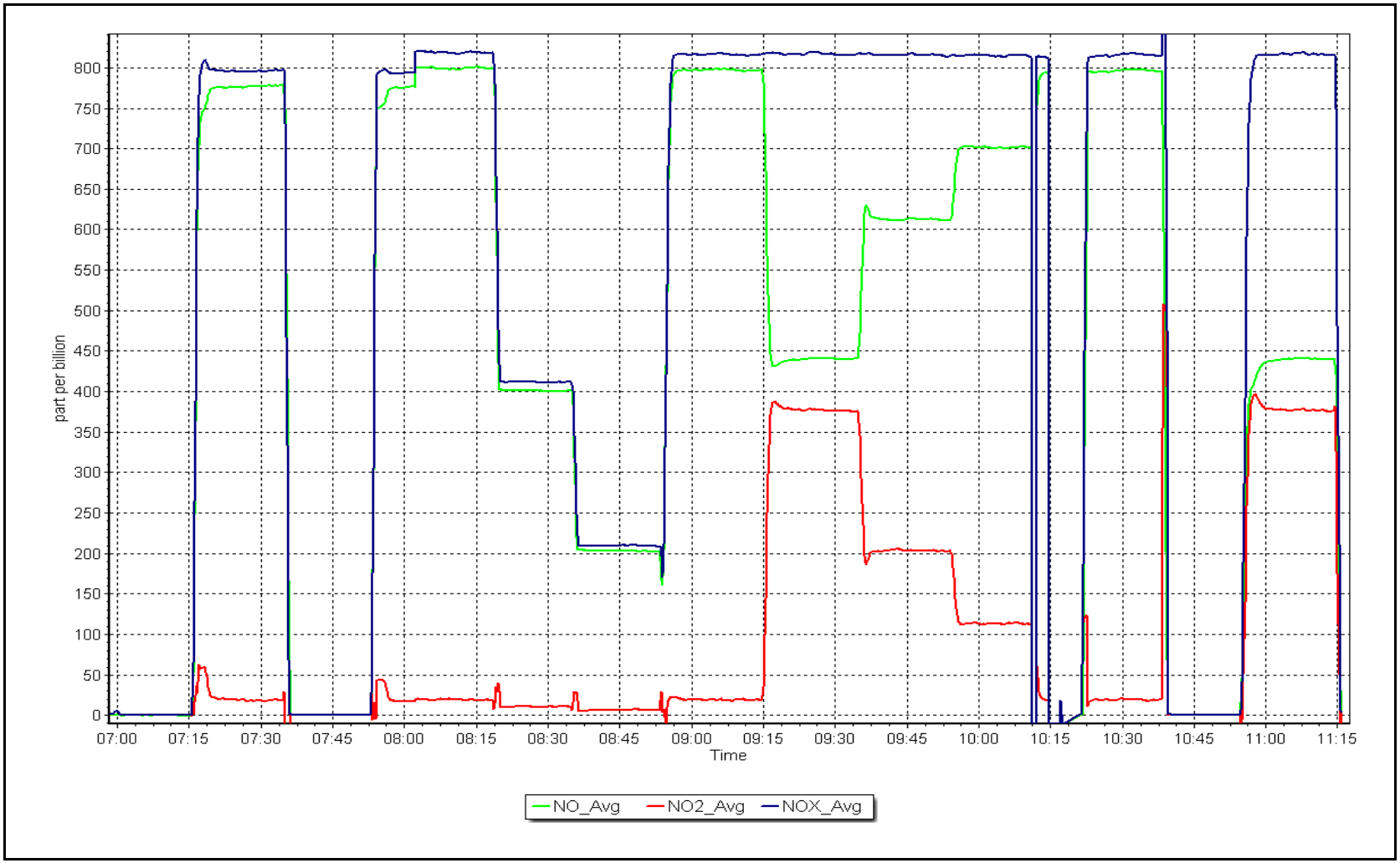
Calibration Date:	June 19, 2023	Previous Calibration:	May 11, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	7:00	End Time (MST):	11:16
Analyzer make:	Thermo 42i	Analyzer serial #:	1505164379

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.2	----	Correlation Coefficient	0.999996	*≥0.995*
375.1	376.1	0.9972			
203.2	203.3	0.9993	Slope	1.002522	*0.90 - 1.10*
113.8	113.6	1.0014			
			Intercept	-0.129742	*+/-20*



NO_X Calibration Plot Date: June 19, 2023 Location: MacKay River



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS21
CONKLIN
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	June 5, 2023	Last Cal Date:	May 3, 2023
Start time (MST):	10:25	End time (MST):	13:12
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.93	ppm	Cal Gas Exp Date:	January 5, 2025
Cal Gas Cylinder #:	CC259455			
Removed Cal Gas Conc:	49.93	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:			Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3810
ZAG Make/Model:	Teledyne API 701		Serial Number:	691

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1428701363

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.015485	0.999546	Backgd or Offset:	28.4	27.3
Calibration intercept:	1.176454	0.235763	Coeff or Slope:	0.914	0.883

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5005	0.0	0.0	-0.2	----
as found span	4920	80.2	800.8	825.7	0.970
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5005	0.0	0.0	0.0	----
high point	4920	80.2	800.8	800.5	1.000
second point	4960	40.1	400.4	400.9	0.999
third point	4980	20.0	200.1	200.3	0.999
as left zero	5005	0.0	0.0	0.0	----
as left span	4920	80.2	800.8	800.0	1.001
				Average Correction Factor	0.999

Baseline Corr As found:	825.90	Previous response	814.42	*% 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: Adjusted the span only.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

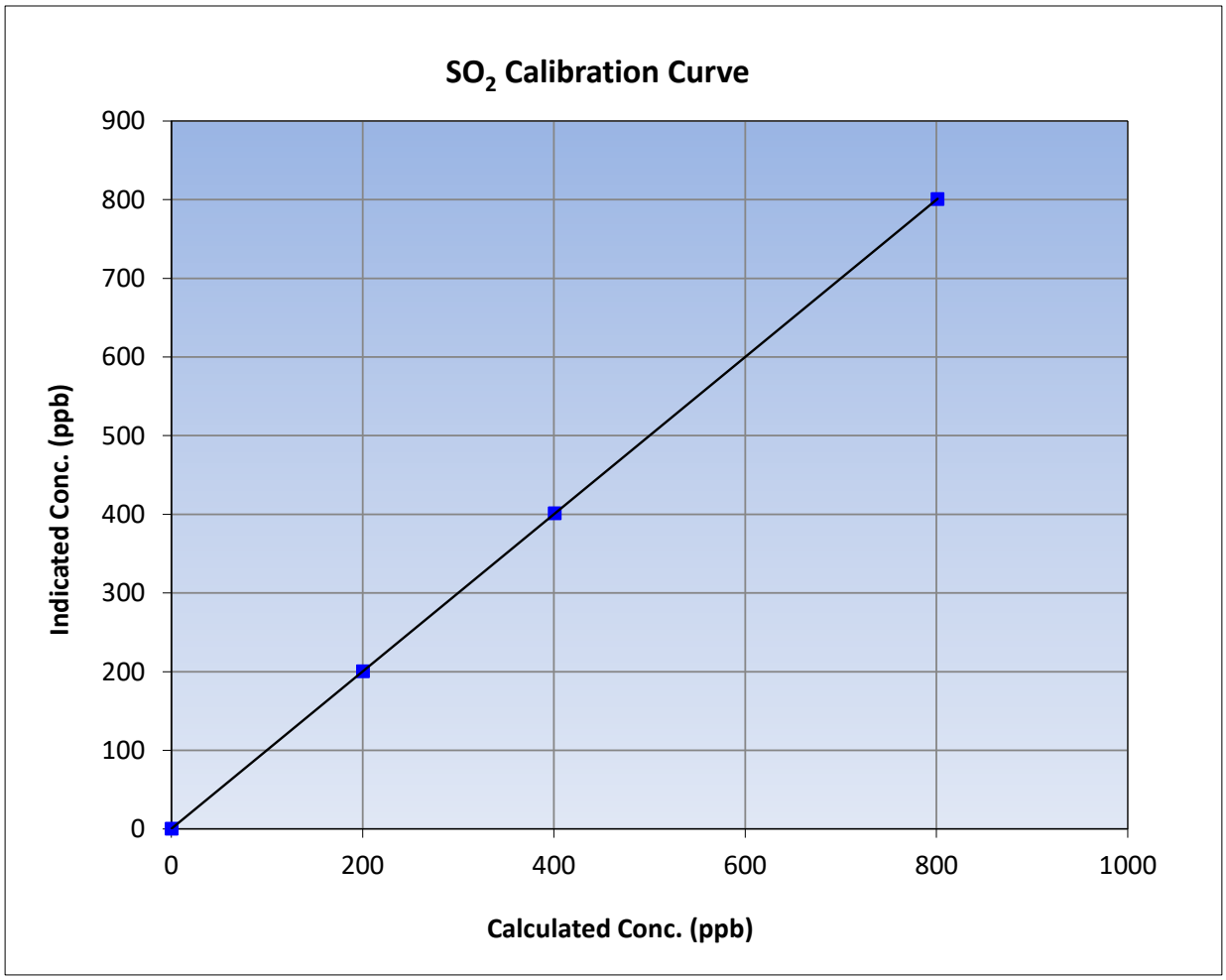
Station Information

Calibration Date:	June 5, 2023	Previous Calibration:	May 3, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:25	End Time (MST):	13:12
Analyzer make:	Thermo 43i	Analyzer serial #:	1428701363

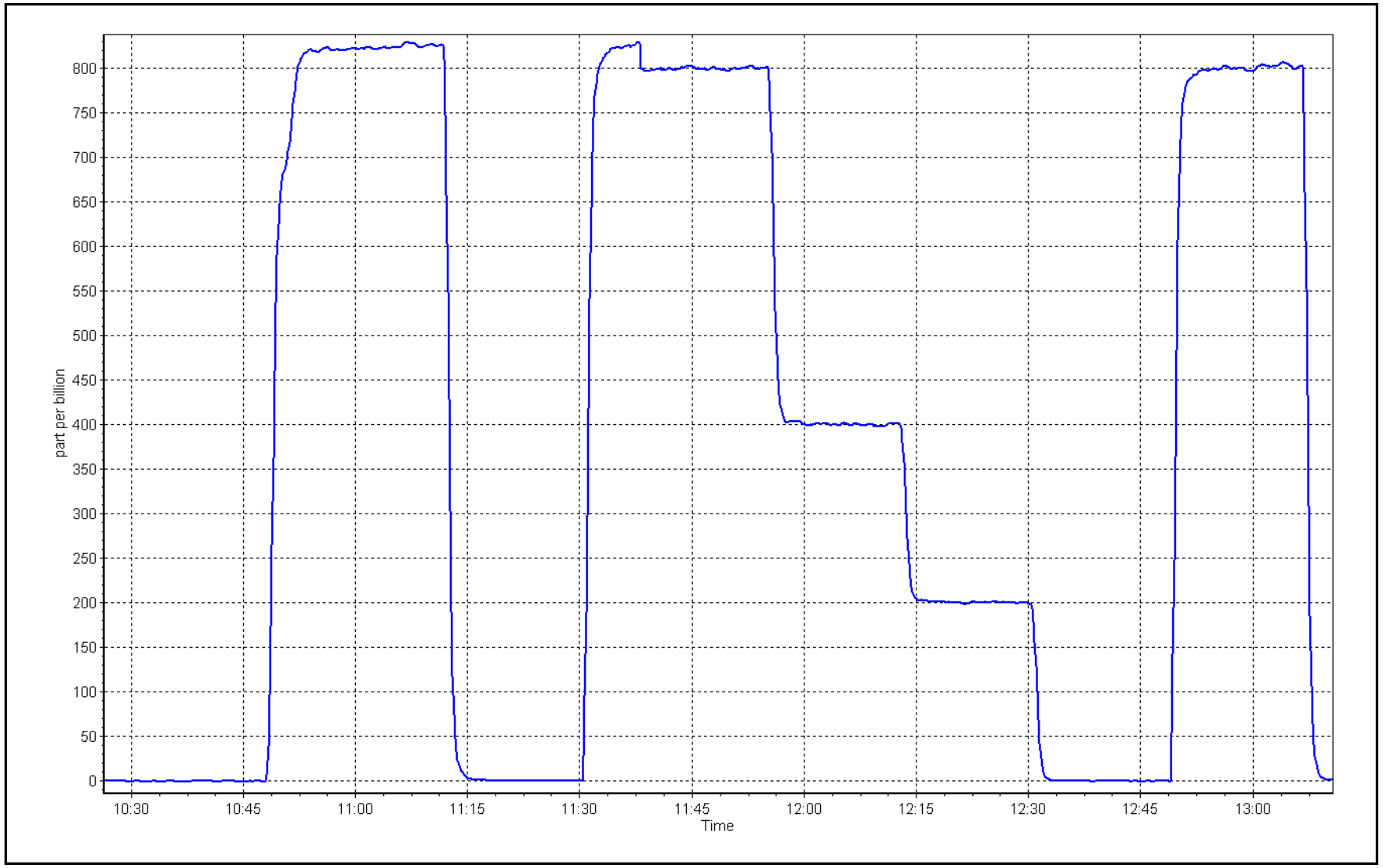
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
800.8	800.5	1.0004
400.4	400.9	0.9988
200.1	200.3	0.9991

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999999	*≥0.995*
Slope	0.999546	*0.90 - 1.10*
Intercept	0.235763	*+/-30*



SO2 Calibration Plot Date: June 5, 2023 Location: Conklin



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	June 28, 2023	Last Cal Date:	May 30, 2023
Start time (MST):	8:31	End time (MST):	12:03
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.00	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC501204			
Removed Cal Gas Conc:	5.03	ppm	Rem Gas Exp Date:	April 16, 2022
Removed Gas Cyl #:	CC505493		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3810
ZAG Make/Model:	API 701H		Serial Number:	691

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1236656116	
Converter make:	CD-Nova 101		Converter serial #:	NA	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000000	1.001571	Backgd or Offset:	2.9	2.4
Calibration intercept:	0.000000	0.320000	Coeff or Slope:	0.974	0.974

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.4	----
as found span	4921	79.5	80.0	80.0	0.995
as found 2nd point	4960	39.8	40.0	40.0	0.991
as found 3rd point	4980	19.9	20.0	19.9	0.986
new cylinder response	4920	80.0	80.0		

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4920	80.0	80.0	80.3	0.996
second point	4960	40.0	40.0	40.6	0.985
third point	4980	20.0	20.0	20.5	0.976
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	80.0	80.0	80.1	0.999
SO2 Scrubber Check	4920	80.2	802.0	-0.1	----
Date of last scrubber change:				Ave Corr Factor	0.986
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	80.4	Prev response:	79.97	*% change:	0.5%
Baseline Corr 2nd AF pt:	40.4	AF Slope:	1.004858	AF Intercept:	-0.302369
Baseline Corr 3rd AF pt:	20.3	AF Correlation:	0.999993		

* = > +/-5% change initiates investigation

Notes: Adjusted the zero only.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

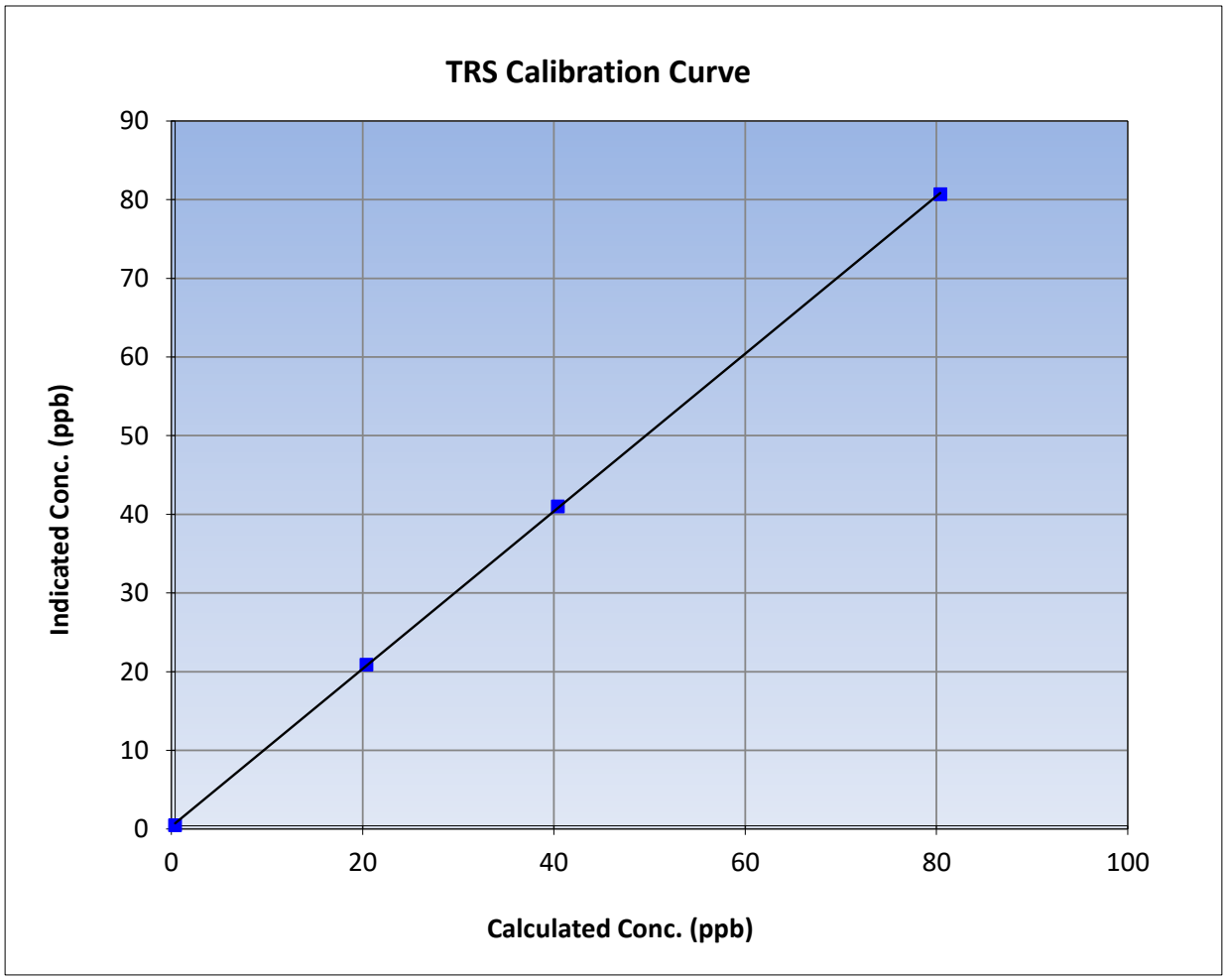
Station Information

Calibration Date:	June 28, 2023	Previous Calibration:	May 30, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	8:31	End Time (MST):	12:03
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1236656116

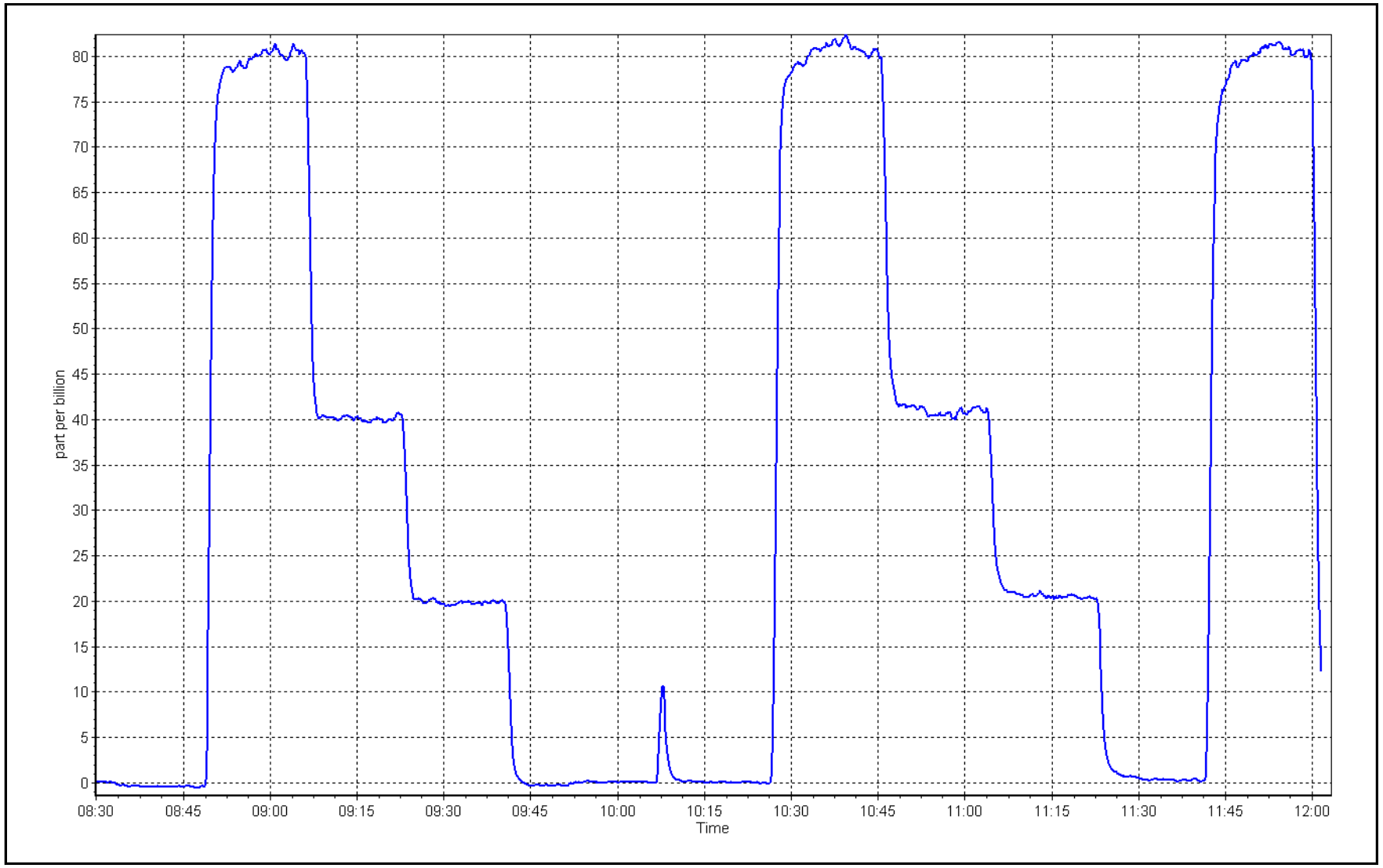
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.3	0.9963
40.0	40.6	0.9852
20.0	20.5	0.9756

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999960	*≥0.995*
Slope	1.001571	*0.90 - 1.10*
Intercept	0.320000	*+/-3*



TRS Calibration Plot Date: June 28, 2023 Location: Conklin



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

Station Information

Station Name:	Conklin	Station number:	AMS21
Calibration Date:	June 5, 2023	Last Cal Date:	May 24, 2023
Start time (MST):	10:25	End time (MST):	13:12
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:	2.22E-04	2.26E-04	NMHC SP Ratio:	4.83E-05	4.95E-05
CH4 Retention time:	12.00	12.00	NMHC Peak Area:	189107	184655

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	16.83	1.017
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	17.13	17.14	0.999
second point	4960	40.1	8.56	8.57	0.999
third point	4980	20.0	4.27	4.30	0.993
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	17.13	17.16	0.998
				Average Correction Factor	0.997
Baseline Corr AF:	16.83	Prev response	17.14	*% change	-1.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	9.14	8.95	1.021
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	9.14	9.14	1.000
second point	4960	40.1	4.57	4.58	0.998
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	9.15	0.999
				Average Correction Factor	0.996
Baseline Corr AF:	8.95	Prev response	9.15	*% change	-2.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	7.99	7.88	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	80.2	7.99	7.99	0.999
second point	4960	40.1	3.99	3.99	1.001
third point	4980	20.0	1.99	2.00	0.996
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	7.99	8.01	0.997
				Average Correction Factor	0.998
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:	0.999175	1.000150
THC Cal Offset:	0.027981	0.011178
CH4 Cal Slope:	0.999308	1.000639
CH4 Cal Offset:	0.008750	0.001348
NMHC Cal Slope:	0.998771	0.999397
NMHC Cal Offset:	0.019631	0.010629

Notes: Adjusted the span only.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

THC Calibration Summary

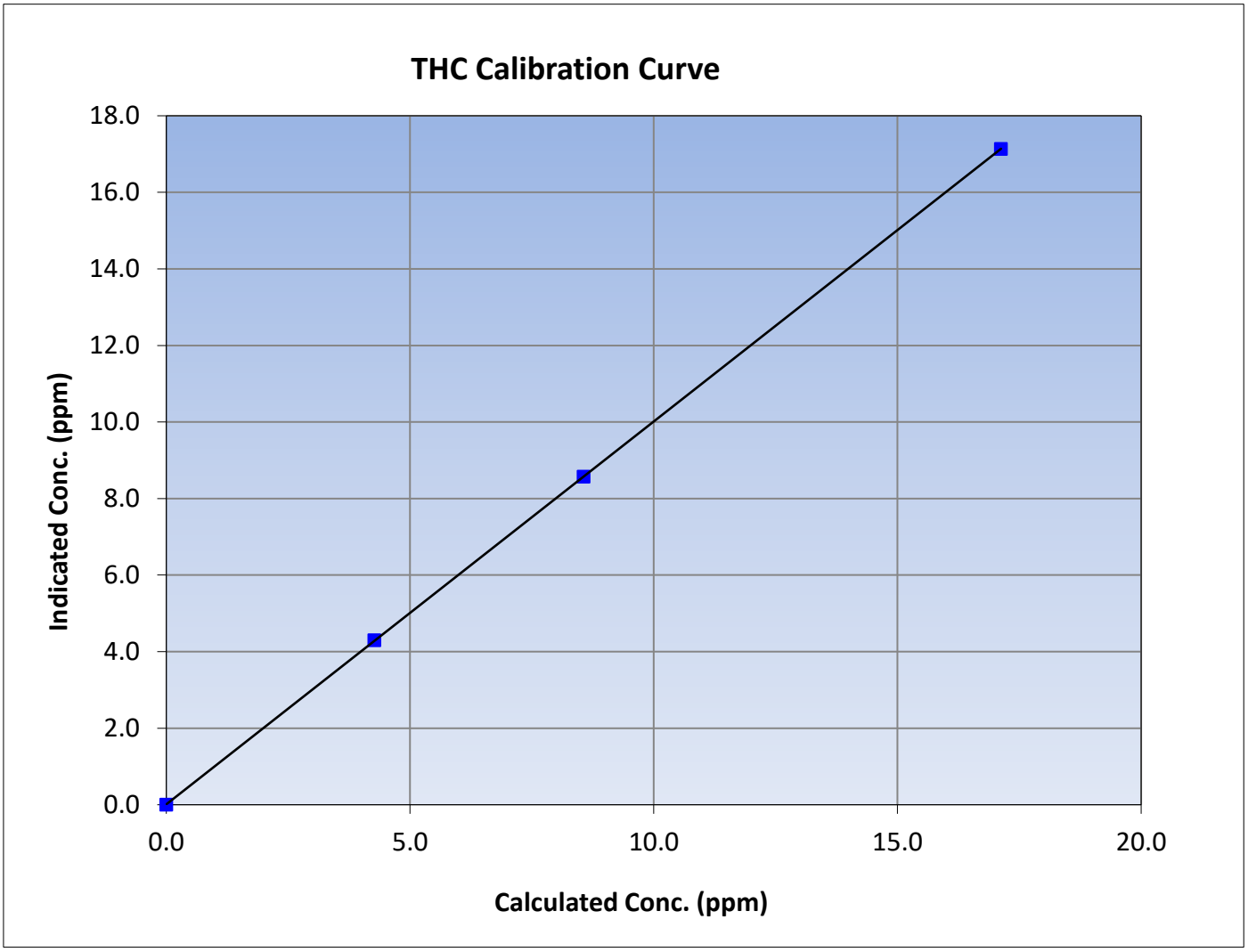
Version-06-2022

Station Information

Calibration Date:	June 5, 2023	Previous Calibration:	May 24, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:25	End Time (MST):	13:12
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	0.999997	*≥0.995*
17.13	17.14	0.9993			
8.56	8.57	0.9992	Slope	1.000150	*0.90 - 1.10*
4.27	4.30	0.9930			
			Intercept	0.011178	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

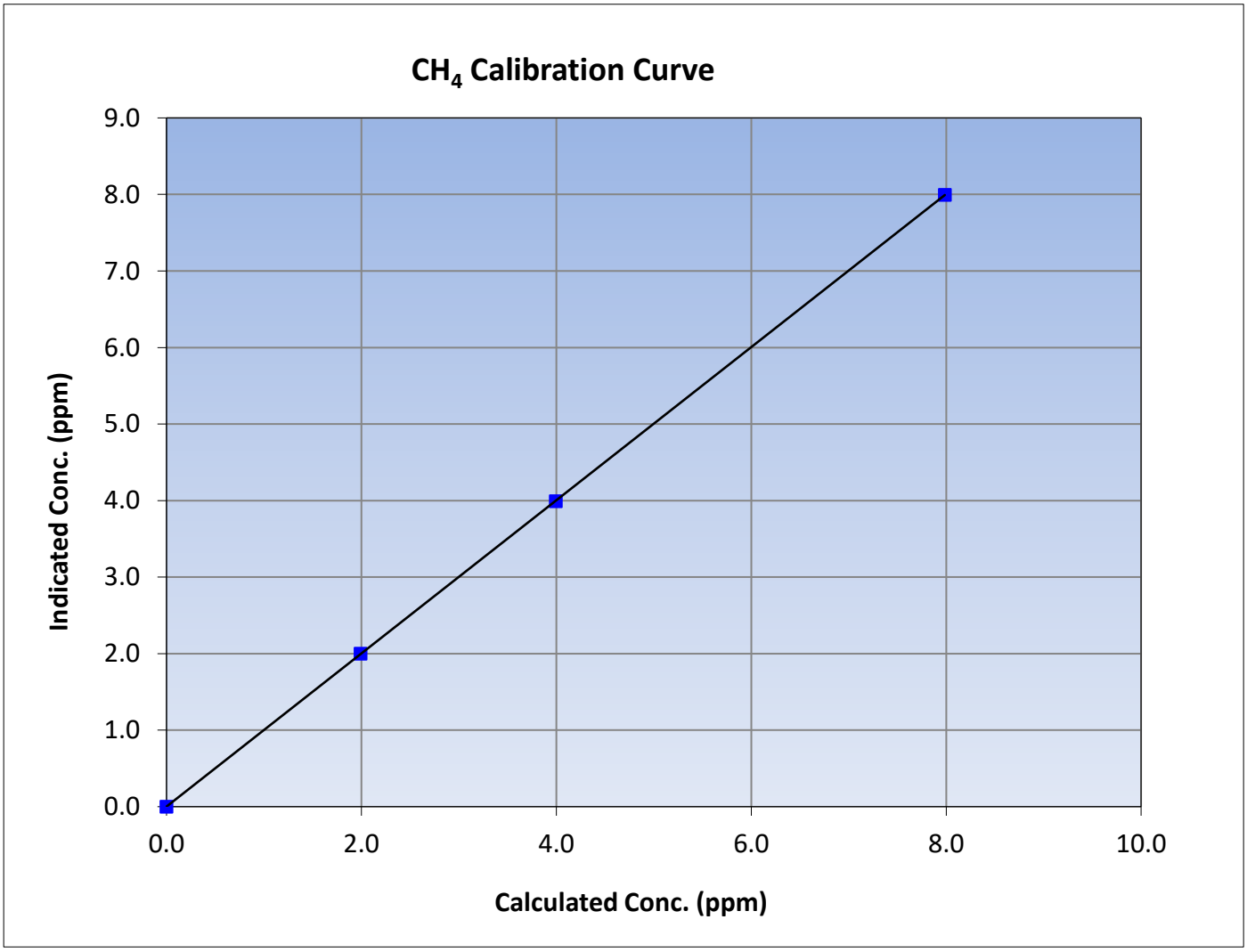
Version-06-2022

Station Information

Calibration Date:	June 5, 2023	Previous Calibration:	May 24, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:25	End Time (MST):	13:12
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999998	*≥0.995*
7.99	7.99	0.9990			
3.99	3.99	1.0005	Slope	1.000639	*0.90 - 1.10*
1.99	2.00	0.9958			
			Intercept	0.001348	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

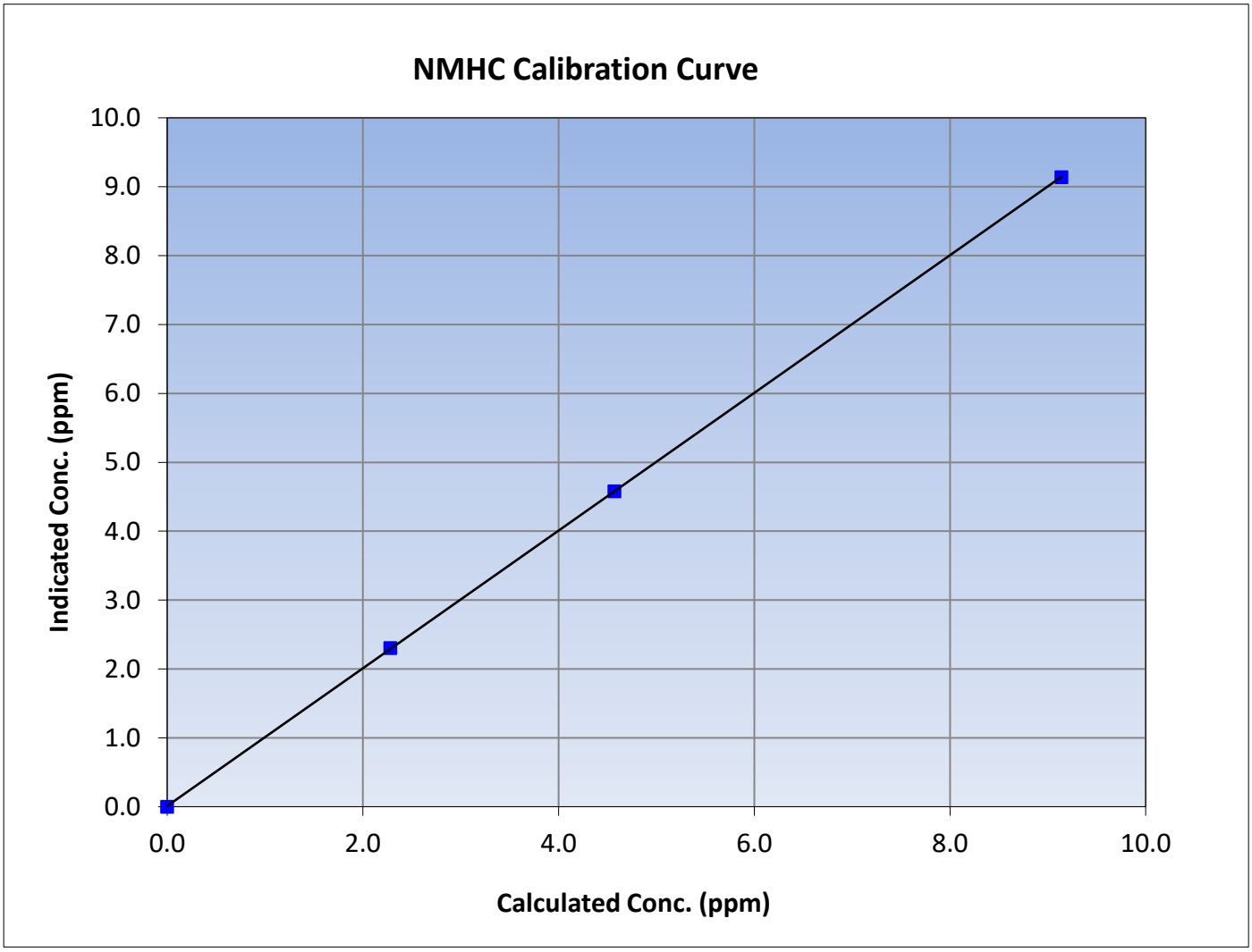
Version-06-2022

Station Information

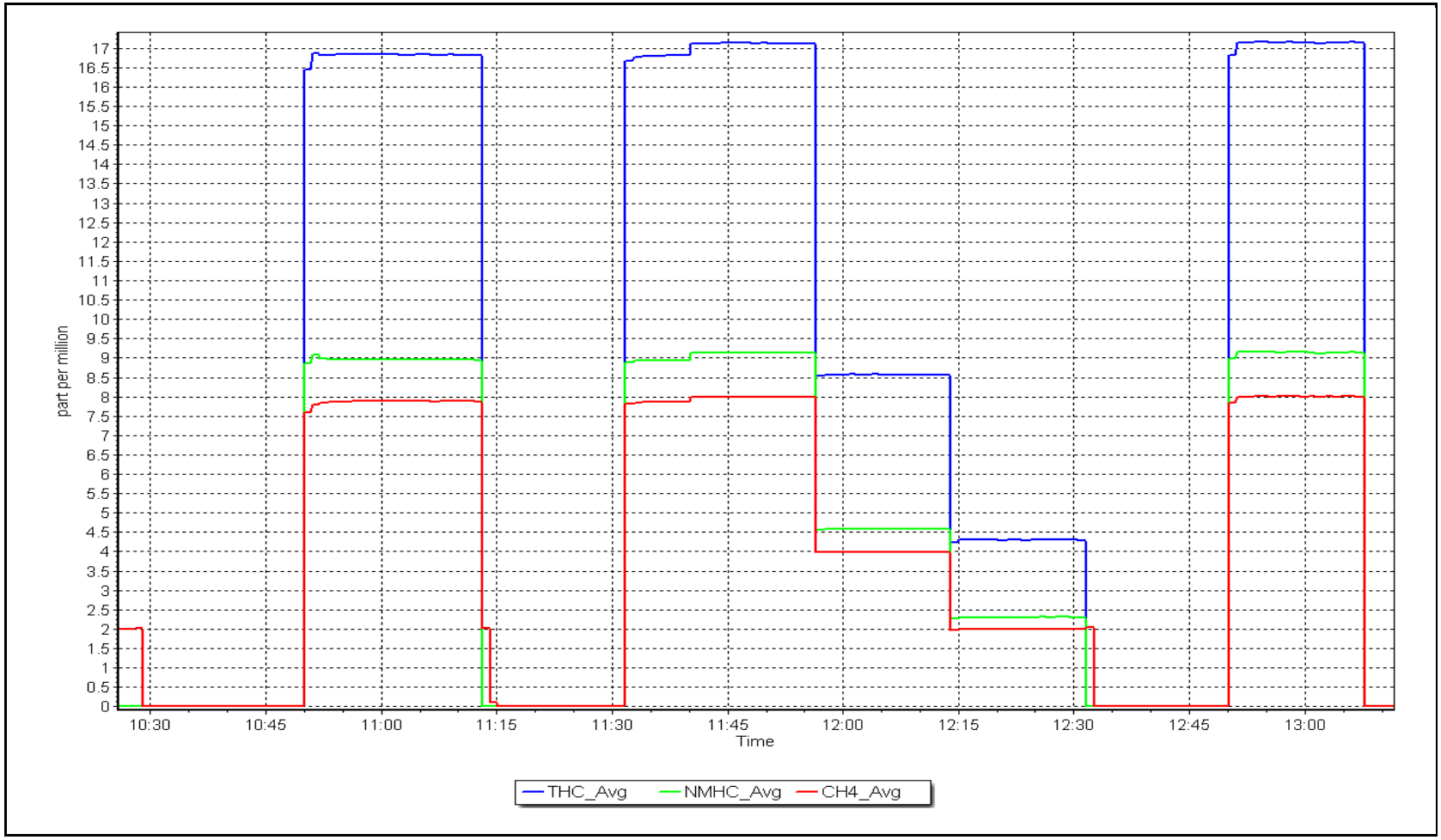
Calibration Date:	June 5, 2023	Previous Calibration:	May 24, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:25	End Time (MST):	13:12
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999994	≥0.995
9.14	9.14	0.9999			
4.57	4.58	0.9978	Slope	0.999397	0.90 - 1.10
2.28	2.30	0.9905			
			Intercept	0.010629	+/-0.5



NMHC Calibration Plot Date: June 5, 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:	June 21, 2023	Last Cal Date:	June 5, 2023
Start time (MST):	10:00	End time (MST):	12:35
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 #:	1331259521	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.26E-04	2.26E-04	NMHC SP Ratio:	4.95E-05	4.99E-05
CH4 Retention time:	12.00	12.00	NMHC Peak Area:	184655	183139

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	17.06	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	17.13	17.12	1.000
second point	4960	40.1	8.56	8.53	1.004
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	17.13	1.000
				Average Correction Factor	1.000
Baseline Corr AF:	17.06	Prev response	17.14	*% change	-0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	9.14	9.07	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	9.14	9.13	1.001
second point	4960	40.1	4.57	4.57	1.001
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	9.14	1.000
				Average Correction Factor	0.997
Baseline Corr AF:	9.07	Prev response	9.14	*% change	-0.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.2	7.99	7.99	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.2	7.99	7.99	1.000
second point	4960	40.1	3.99	3.96	1.008
third point	4980	20.0	1.99	1.99	1.001
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.2	7.99	7.99	0.999
				Average Correction Factor	1.003
Baseline Corr AF:	7.99	Prev response	7.99	*% change	0.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000150	0.999095
THC Cal Offset:	0.011178	0.002575
CH4 Cal Slope:	1.000639	0.999624
CH4 Cal Offset:	0.001348	-0.006854
NMHC Cal Slope:	0.999397	0.998558
NMHC Cal Offset:	0.010629	0.009229

Notes: No maintenance done just recalibration; due to dips. Adjusted the span.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

THC Calibration Summary

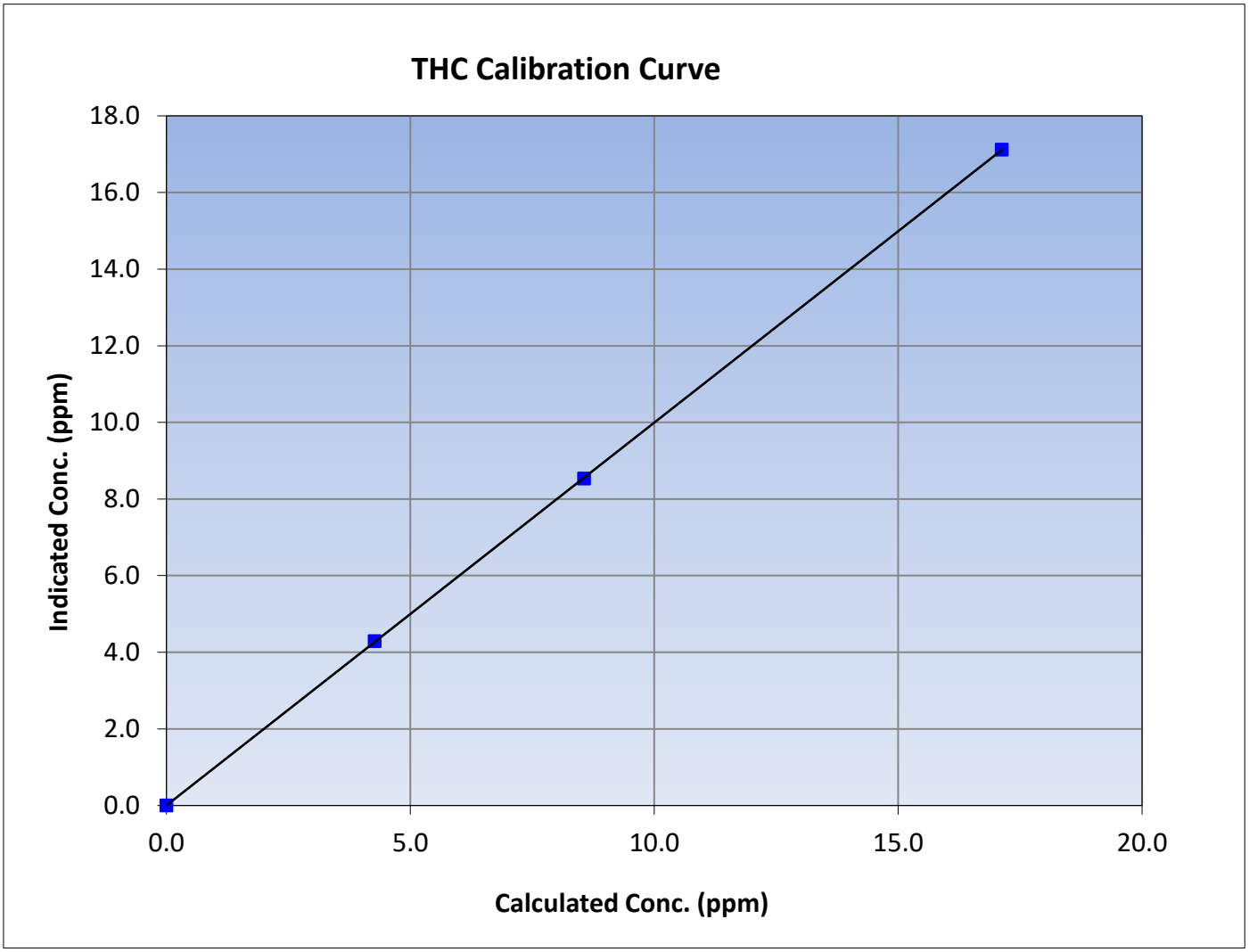
Version-06-2022

Station Information

Calibration Date:	June 21, 2023	Previous Calibration:	June 5, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:00	End Time (MST):	12:35
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	0.999993	*≥0.995*
17.13	17.12	1.0003			
8.56	8.53	1.0036	Slope	0.999095	*0.90 - 1.10*
4.27	4.29	0.9955			
			Intercept	0.002575	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

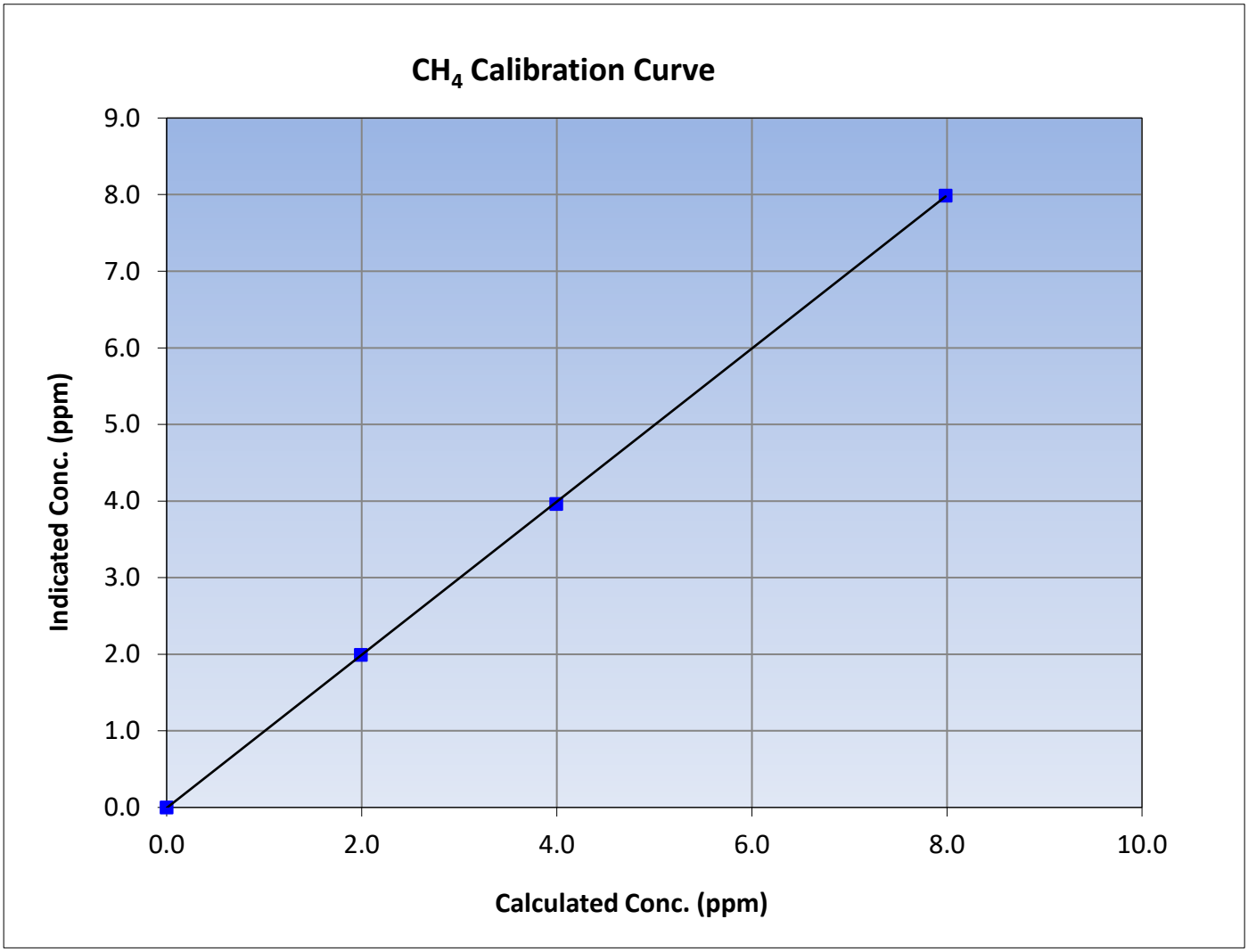
Version-06-2022

Station Information

Calibration Date:	June 21, 2023	Previous Calibration:	June 5, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:00	End Time (MST):	12:35
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	0.999980	*≥0.995*
7.99	7.99	1.0000			
3.99	3.96	1.0078	Slope	0.999624	*0.90 - 1.10*
1.99	1.99	1.0008			
			Intercept	-0.006854	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

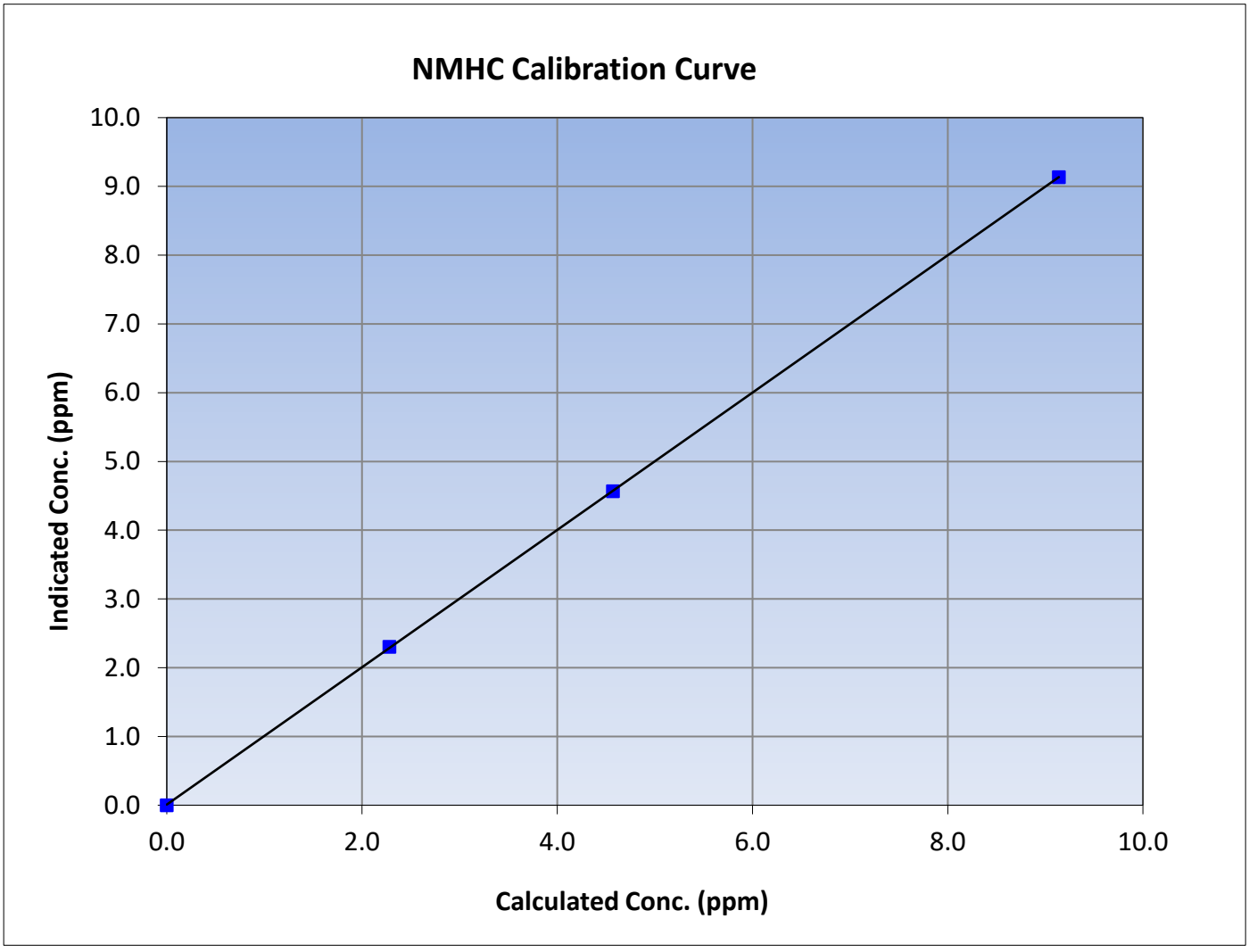
Version-06-2022

Station Information

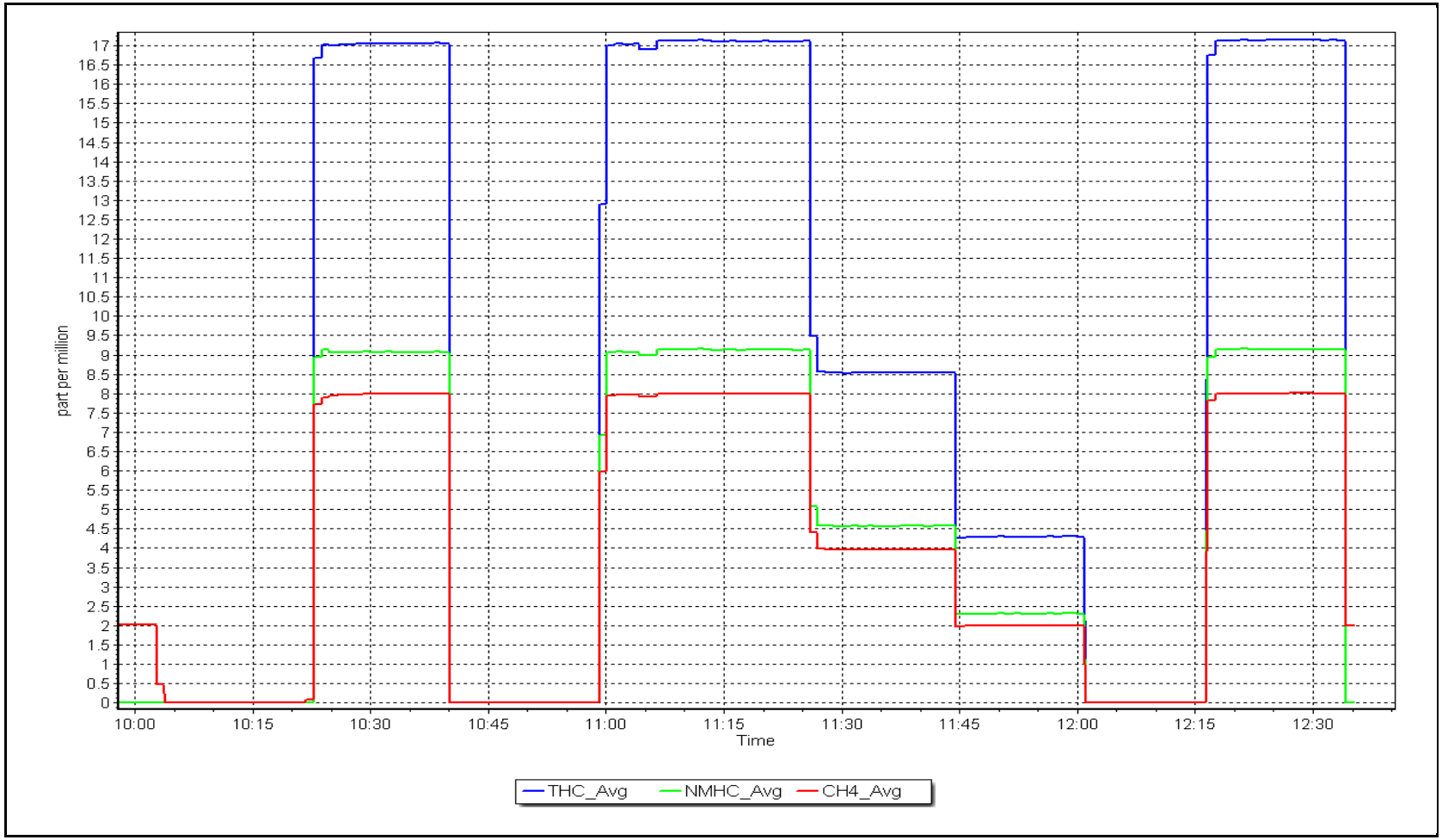
Calibration Date:	June 21, 2023	Previous Calibration:	June 5, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:00	End Time (MST):	12:35
Analyzer make:	Thermo 55i	Analyzer serial #:	1331259521

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*
9.14	9.13	1.0006			
4.57	4.57	1.0006	Slope	0.998558	*0.90 - 1.10*
2.28	2.30	0.9905			
			Intercept	0.009229	*+/-0.5*



NMHC Calibration Plot Date: June 21, 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:	June 27, 2023	Last Cal Date:	May 16, 2023
Start time (MST):	9:12	End time (MST):	13:20
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2Y1P1H		Cal Gas Expiry Date:	December 11, 2023	
NOX Cal Gas Conc:	51.09	ppm	NO Cal Gas Conc:	50.39	ppm
Removed Cylinder #:	n/a		Removed Gas Exp Date:	n/a	
Removed Gas NOX Conc:	51.09	ppm	Removed Gas NO Conc:	50.39	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	3810	
ZAG make/model:	Teledyne API T701H		Serial Number:	691	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1501663731	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.144	1.112	NO bkgnd or offset:	11.6	11.1
NOX coeff or slope:	1.001	0.999	NOX bkgnd or offset:	11.8	11.3
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	220.7	201.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001335	0.998659
NO_X Cal Offset:	2.164394	1.463814
NO Cal Slope:	1.000766	1.000266
NO Cal Offset:	1.181398	0.781352
NO_2 Cal Slope:	1.002657	0.995256
NO_2 Cal Offset:	-0.146701	0.164082

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	0.0	-0.2	----	----
as found span	4921	79.4	811.2	800.1	11.1	835.6	821.8	13.8	0.9709	0.9736
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
high point	4921	79.4	811.2	800.1	11.1	811.0	800.9	10.0	1.0003	0.9990
second point	4960	39.7	405.7	400.1	5.6	407.0	400.9	6.1	0.9968	0.9981
third point	4980	19.8	202.3	199.6	2.8	205.2	201.5	3.7	0.9860	0.9903
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as left span	4921	79.4	811.2	382.0	429.2	810.6	383.7	426.8	1.0008	0.9956
								Average Correction Factor	0.9943	0.9958

Corrected As found	NO_X = 835.8 ppb	NO = 821.8 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	2.5%
Previous Response	NO_X = 814.5 ppb	NO = 801.9 ppb		*Percent Change	NO =	2.4%
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)	797.1	379.0	429.2	427.4	1.0042	99.6%
2nd GPT point (200 ppb O3)	797.1	590.5	217.7	216.5	1.0056	99.4%
3rd GPT point (100 ppb O3)	797.1	696.0	112.2	112.3	0.9992	100.1%
				Average Correction Factor	1.0030	99.7%

Notes: Adjusted the span only.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

NO_X Calibration Summary

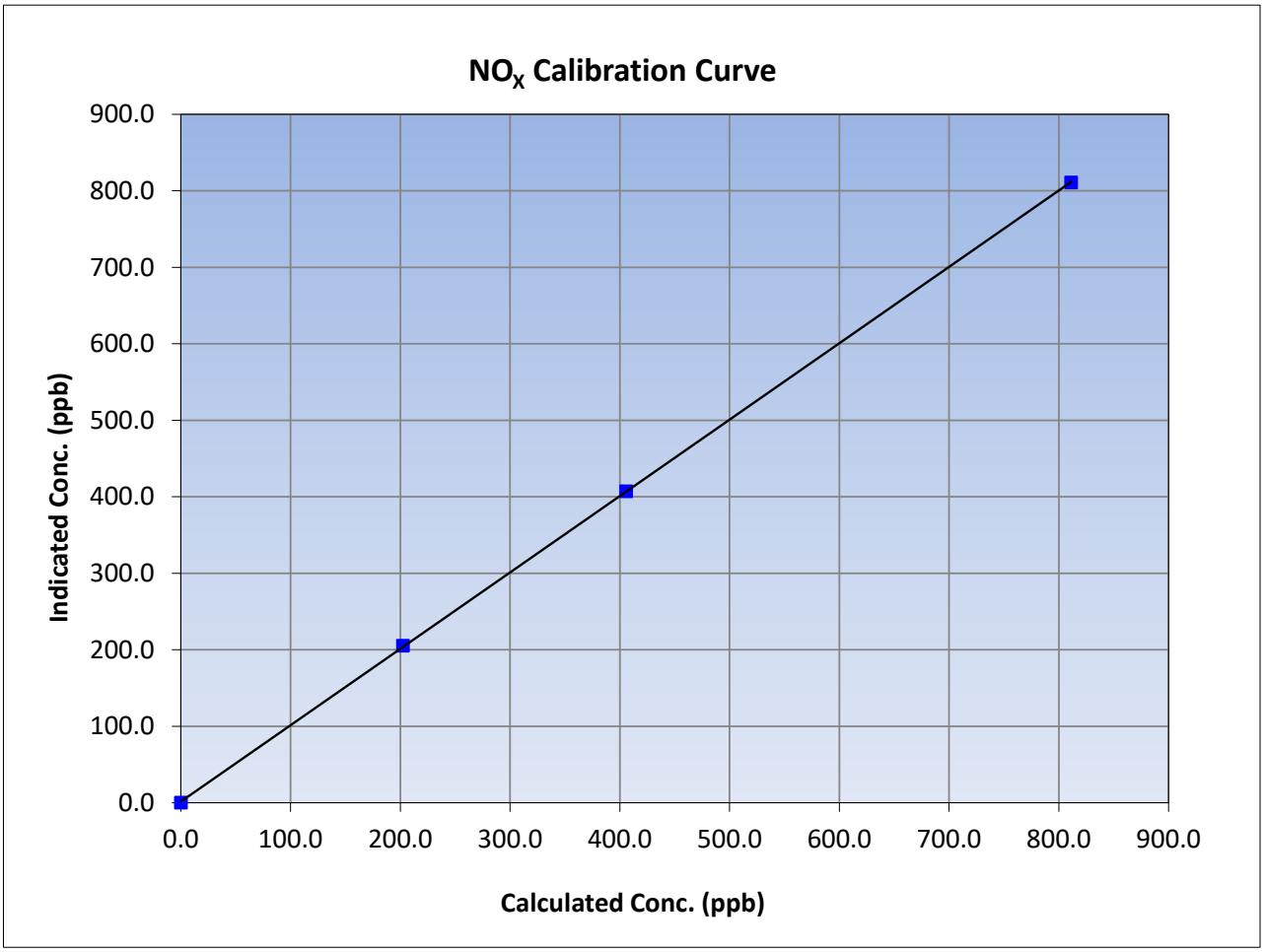
Version-04-2020

Station Information

Calibration Date:	June 27, 2023	Previous Calibration:	May 16, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:12	End Time (MST):	13:20
Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999985	≥0.995
811.2	811.0	1.0003			
405.7	407.0	0.9968	Slope	0.998659	0.90 - 1.10
202.3	205.2	0.9860			
			Intercept	1.463814	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

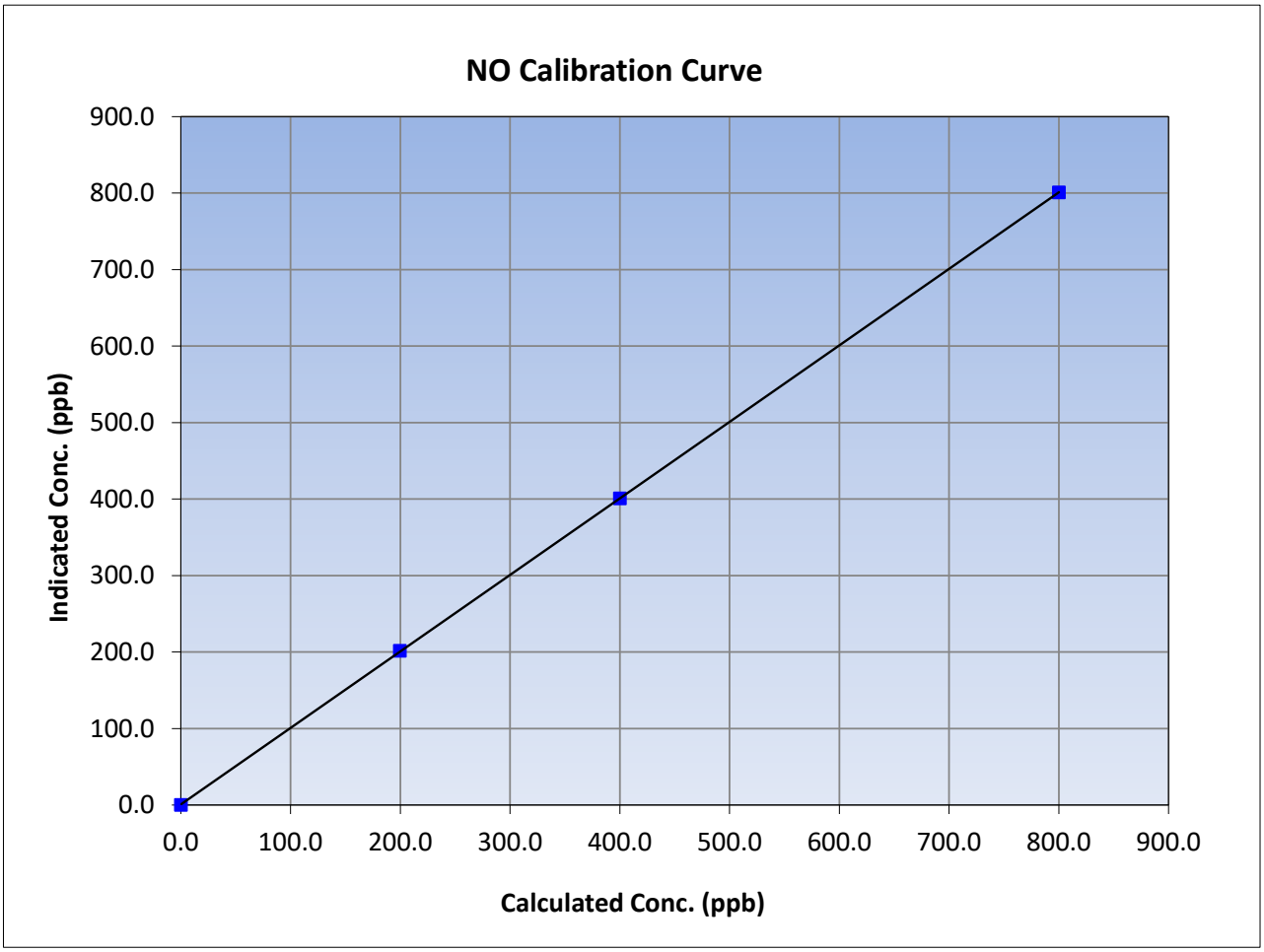
Version-04-2020

Station Information

Calibration Date:	June 27, 2023	Previous Calibration:	May 16, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:12	End Time (MST):	13:20
Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999995	≥0.995
800.1	800.9	0.9990			
400.1	400.9	0.9981	Slope	1.000266	0.90 - 1.10
199.6	201.5	0.9903			
			Intercept	0.781352	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

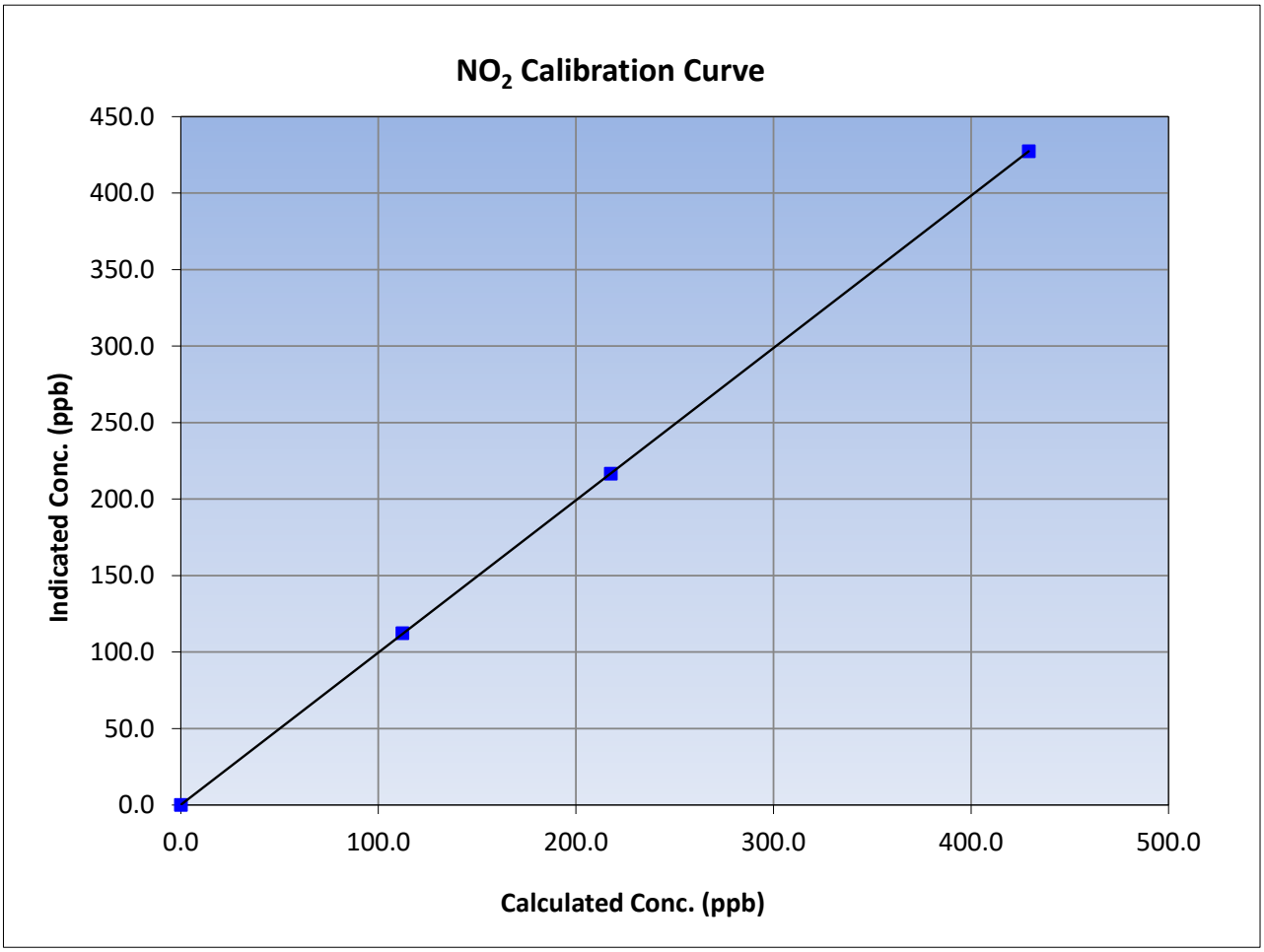
Version-04-2020

Station Information

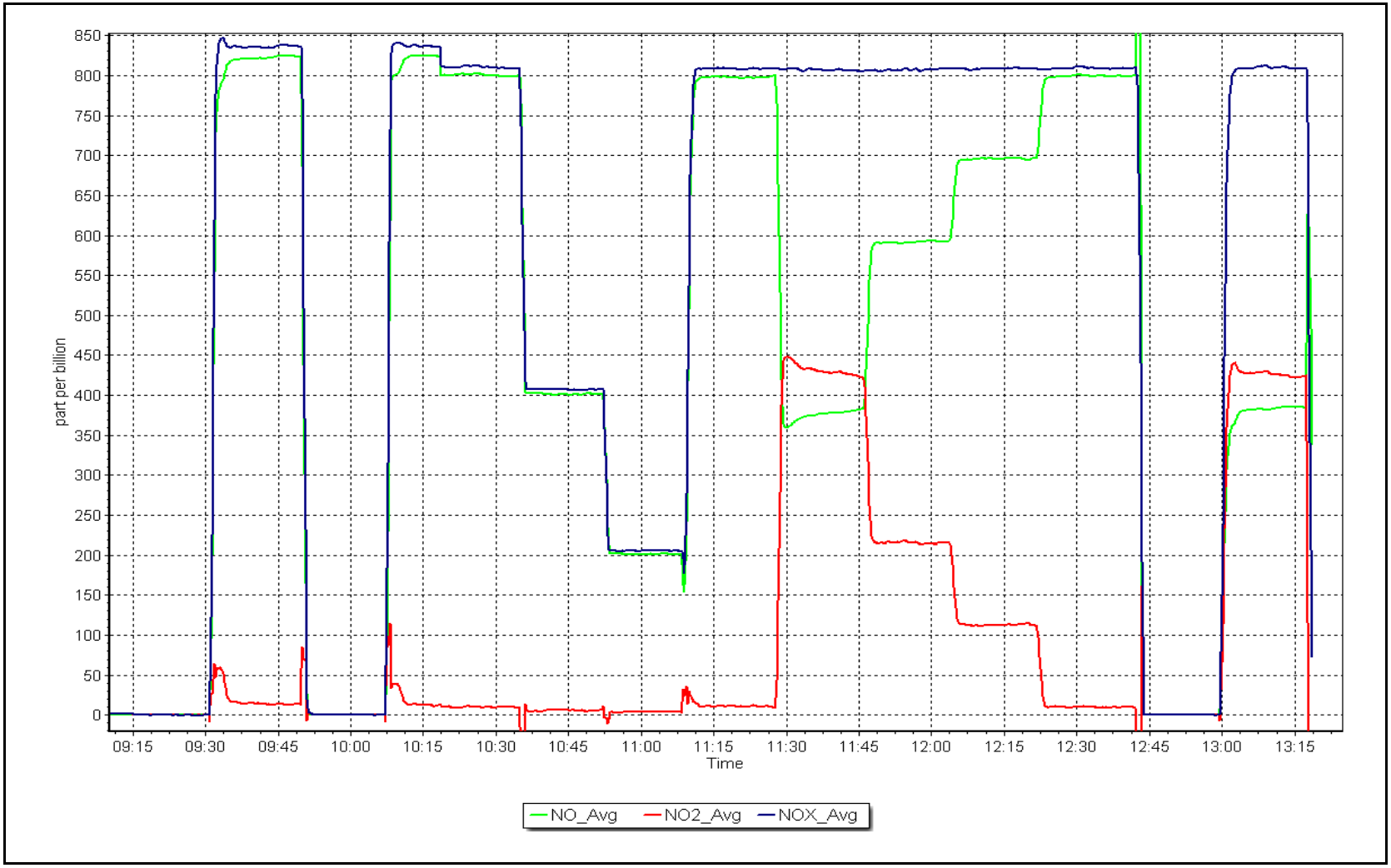
Calibration Date:	June 27, 2023	Previous Calibration:	May 16, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:12	End Time (MST):	13:20
Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999996	≥0.995
429.2	427.4	1.0042			
217.7	216.5	1.0056	Slope	0.995256	0.90 - 1.10
112.2	112.3	0.9992			
			Intercept	0.164082	+/-20



NO_X Calibration Plot Date: June 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:	June 7, 2023	Last Cal Date:	May 9, 2023
Start time (MST):	9:16	End time (MST):	12:13
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	Teledyne API T700	Serial Number:	3810
ZAG Make/Model:	Teledyne API 701H	Serial Number:	691

Analyzer Information

Analyzer make:	Thermo 49i	Analyzer serial #:	1501663734
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.002194	0.997914	Backgd or Offset:	-1.2	-2.0
Calibration intercept:	0.656000	1.340000	Coeff or Slope:	1.002	1.002

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-1.5	----
as found span	5000	941.5	400.0	397.0	1.008
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.4	----
high point	5000	941.5	400.0	400.0	1.000
second point	5000	804.0	200.0	201.5	0.993
third point	5000	703.6	100.0	102.0	0.980
as left zero	5000	0.0	0.0	-0.1	----
as left span	5000	936.0	400.0	402.0	0.995
				Average Correction Factor	0.991

Baseline Corr As found:	398.5	Previous response	401.5	*% change	-0.8%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Adjusted the zero only.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

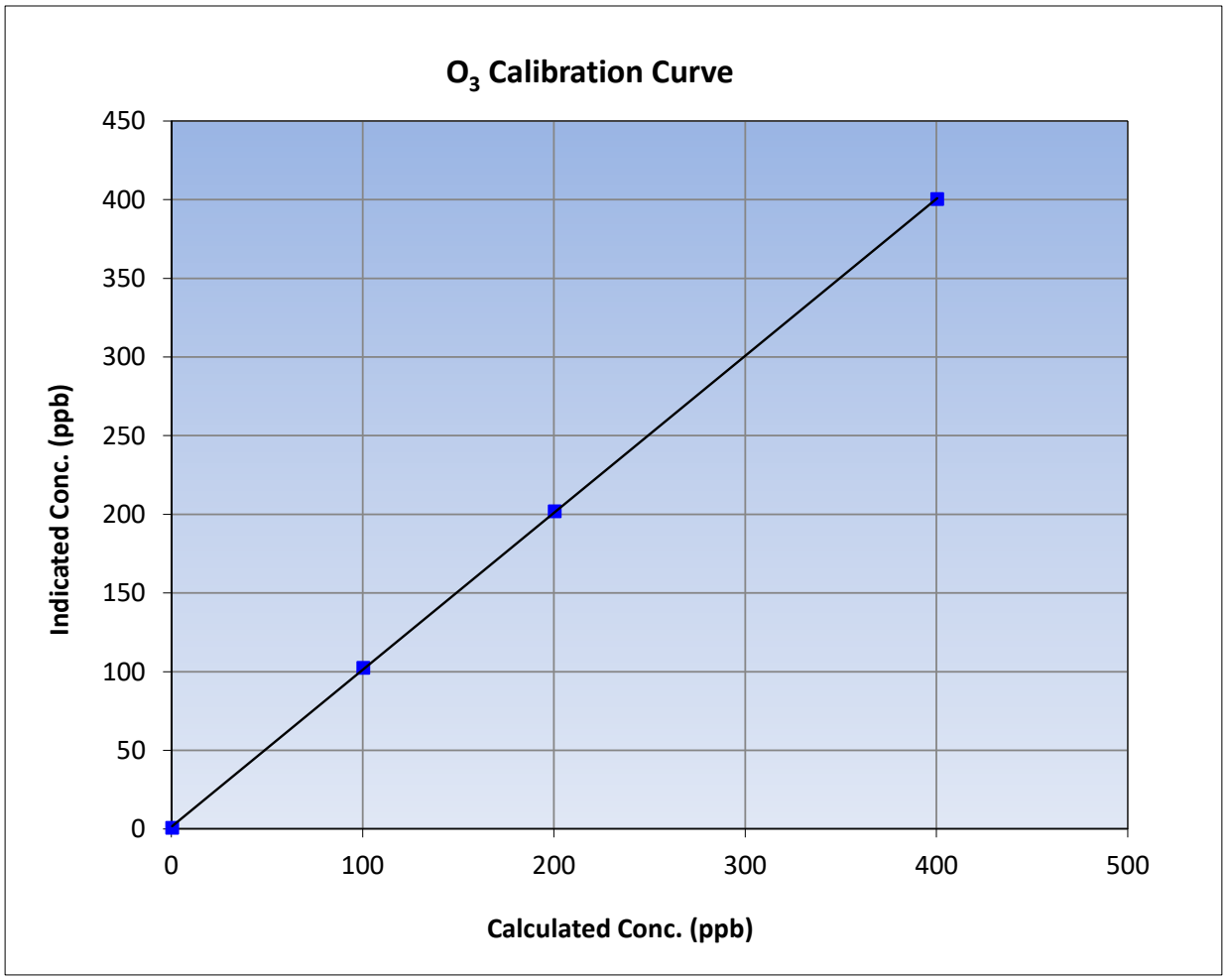
Station Information

Calibration Date:	June 7, 2023	Previous Calibration:	May 9, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:16	End Time (MST):	12:13
Analyzer make:	Thermo 49i	Analyzer serial #:	1501663734

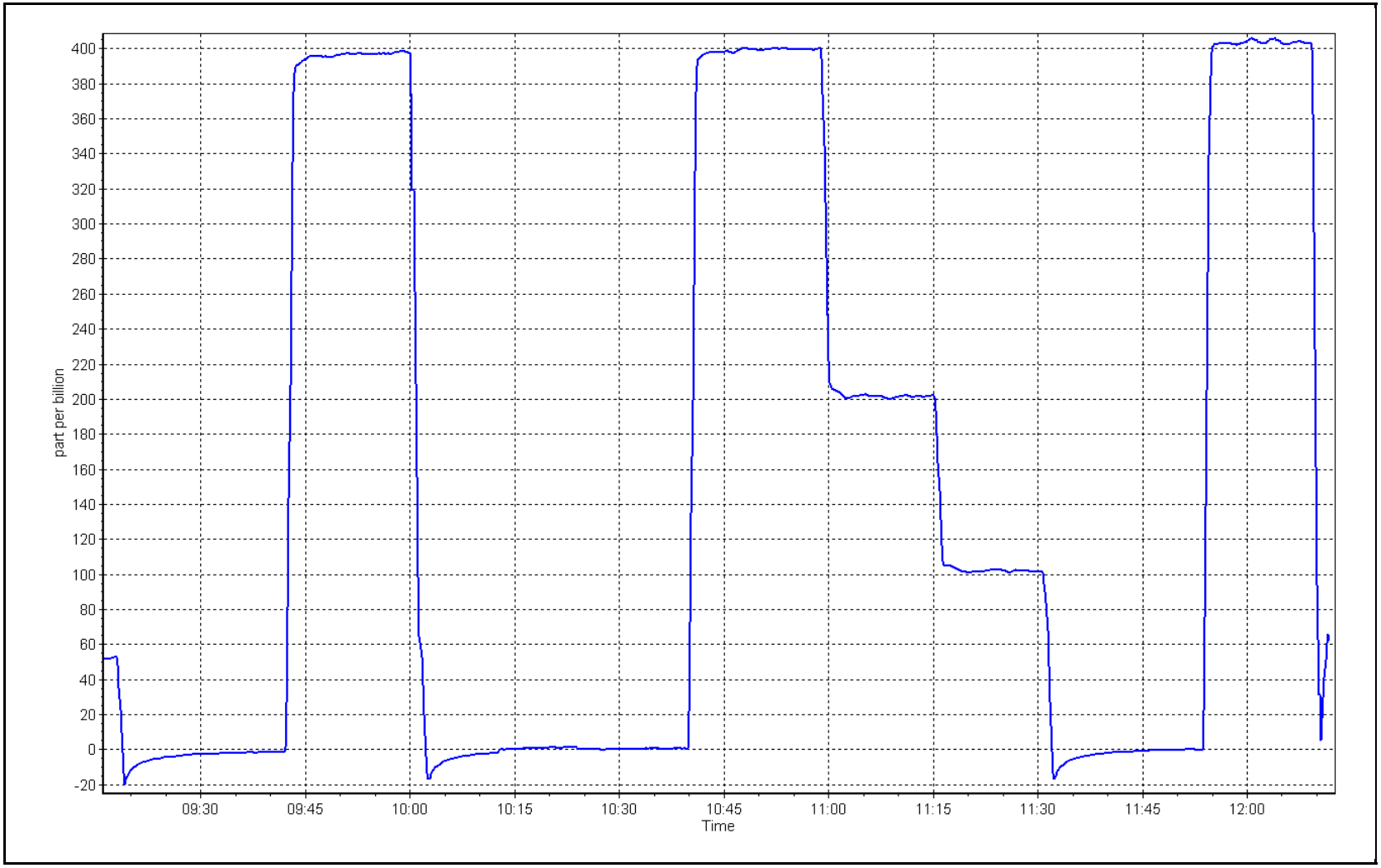
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
400.0	400.0	1.0000
200.0	201.5	0.9926
100.0	102.0	0.9804

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999974	*≥0.995*
Slope	0.997914	*0.90 - 1.10*
Intercept	1.340000	*+/- 5*



O_3 Calibration Plot Date: June 7, 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:	June 27, 2023	Last Cal Date:	May 24, 2023
Start time (MST):	9:30	End time (MST):	10:34
Analyzer Make:	API T640X	S/N:	1597
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat	S/N:	388751
Temp/RH standard:	Alicat	S/N:	388751

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	21.6	21.01	21.6	☐	+/- 2 °C
P (mmHg)	704.7	706.83	704.7	☐	+/- 10 mmHg
flow (LPM)	5.09	5.17	5.09	☐	+/- 0.25 LPM

Leak Test: Date of check: June 27, 2023 Last Cal Date: May 24, 2023

PM w/o HEPA: 21.4 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	11.8	12	11	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 13.1 w/ HEPA: 0 <0.2 ug/m3

Date Optical Chamber Cleaned: June 27, 2023

Disposable Filter Changed: June 27, 2023

Annual Maintenance

Date Sample Tube Cleaned: June 27, 2023

Date RH/T Sensor Cleaned: June 27, 2023

Notes: No adjustments made for the monthly test. Adjusted PMT Peak Test. Inspected inlet head; relatively clean.

Calibration by: Denny Ray Estador

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS22
JANVIER
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	June 14, 2023	Last Cal Date:	May 17, 2023
Start time (MST):	9:44	End time (MST):	12:50
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.11	ppm	Cal Gas Exp Date:	January 18, 2029
Cal Gas Cylinder #:	CC281519			
Removed Cal Gas Conc:	50.11	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3806
ZAG Make/Model:	Teledyne API T701		Serial Number:	4890

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1152430006

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000578	1.007567	Backgd or Offset:	21.3	21.3
Calibration intercept:	0.744403	1.922834	Coeff or Slope:	0.998	0.998

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.9	----
as found span	4920	79.8	799.8	806.0	0.992
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.9	----
high point	4920	79.8	799.8	806.8	0.991
second point	4960	39.9	399.9	406.7	0.983
third point	4980	20.0	200.4	204.0	0.983
as left zero	5000	0.0	0.0	0.9	----
as left span	4920	79.8	799.8	808.8	0.989
				Average Correction Factor	0.986

Baseline Corr As found:	805.10	Previous response	800.99	*% change	0.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

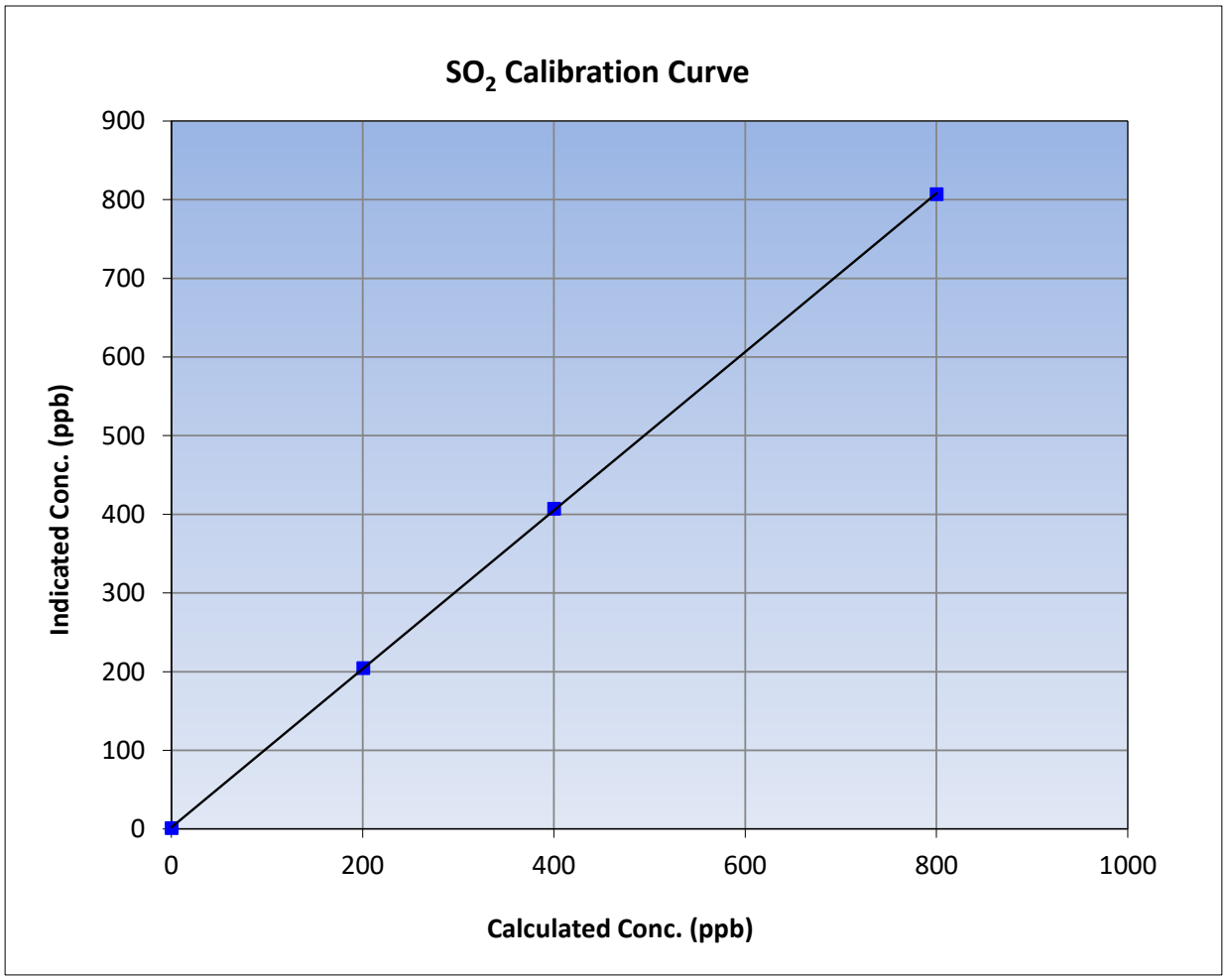
Station Information

Calibration Date:	June 14, 2023	Previous Calibration:	May 17, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:44	End Time (MST):	12:50
Analyzer make:	Thermo 43i	Analyzer serial #:	1152430006

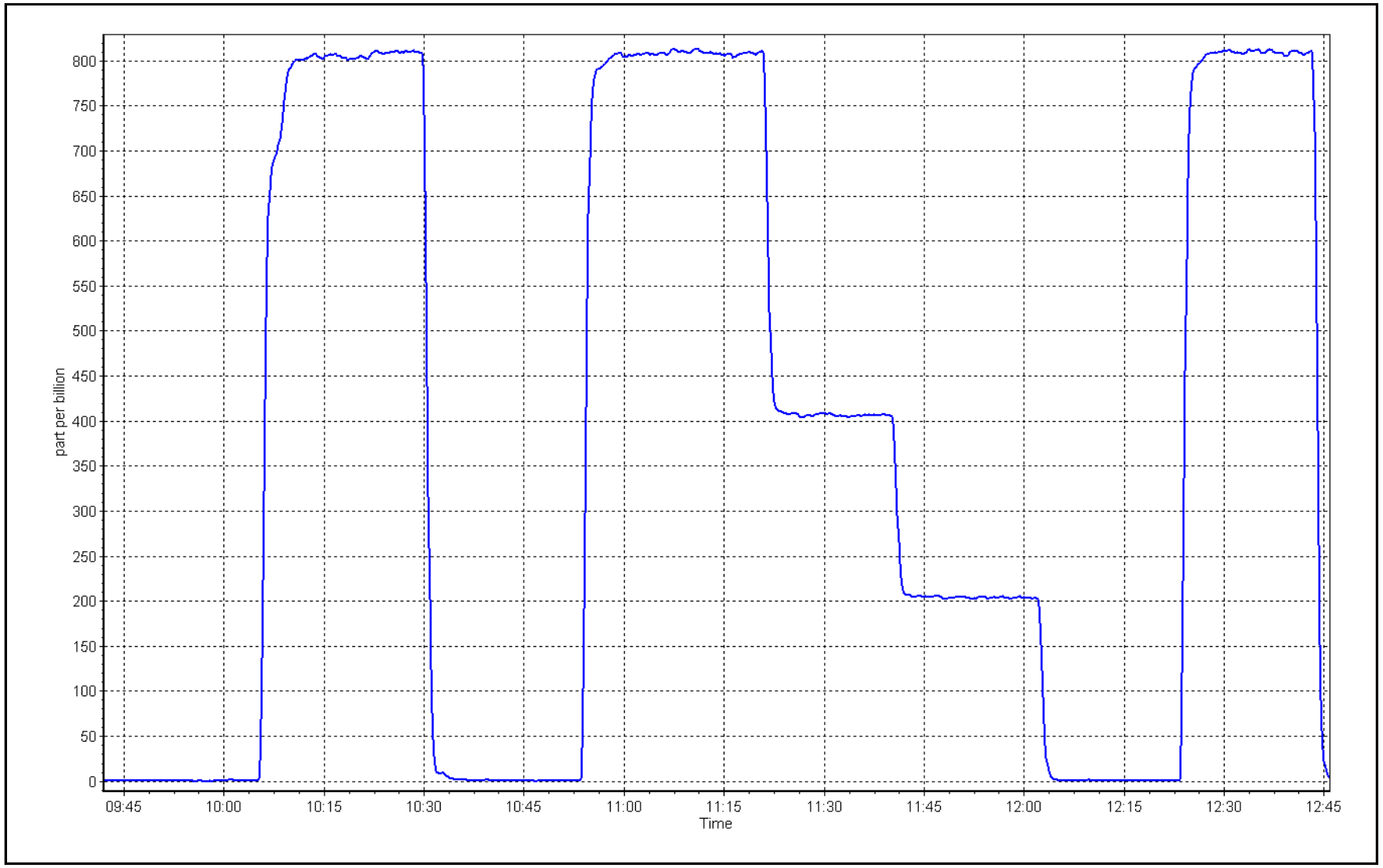
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.9	----
799.8	806.8	0.9913
399.9	406.7	0.9832
200.4	204.0	0.9825

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999985	*≥0.995*
Slope	1.007567	*0.90 - 1.10*
Intercept	1.922834	*+/-30*



SO2 Calibration Plot Date: June 14, 2023 Location: Janvier



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Janvier	Station number:	AMS22
Calibration Date:	June 13, 2023	Last Cal Date:	May 24, 2023
Start time (MST):	10:20	End time (MST):	14:45
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.03	ppm	Cal Gas Exp Date:	April 16, 2022
Cal Gas Cylinder #:	DT0018680			
Removed Cal Gas Conc:	5.03	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3806
ZAG Make/Model:	Teledyne API T701		Serial Number:	4890

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1151680031	
Converter make:	CDN-101		Converter serial #:	587	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	0.997220	1.000081	Backgd or Offset:	6.33	9.13
Calibration intercept:	0.161030	0.260853	Coeff or Slope:	1.022	0.973

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	3.1	----
as found span	4920	79.5	80.0	86.0	0.965
as found 2nd point	4960	39.8	40.0	44.8	0.960
as found 3rd point	4980	19.9	20.0	24.4	0.940
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4920	79.5	80.0	80.1	0.999
second point	4960	39.8	40.0	40.5	0.989
third point	4980	19.9	20.0	20.5	0.977
as left zero	5000	0.0	0.0	0.3	----
as left span	4920	79.5	80.0	80.2	0.997
SO2 Scrubber Check	4920	79.8	798.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.988
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	82.9	Prev response:	79.92	*% change:	3.6%
Baseline Corr 2nd AF pt:	41.7	AF Slope:	1.034373	AF Intercept:	3.360257
Baseline Corr 3rd AF pt:	21.3	AF Correlation:	0.999950		

* = > +/-5% change initiates investigation

Notes: Inlet filter changed after as founds. Scrubber check passed. Adjusted zero and span.

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

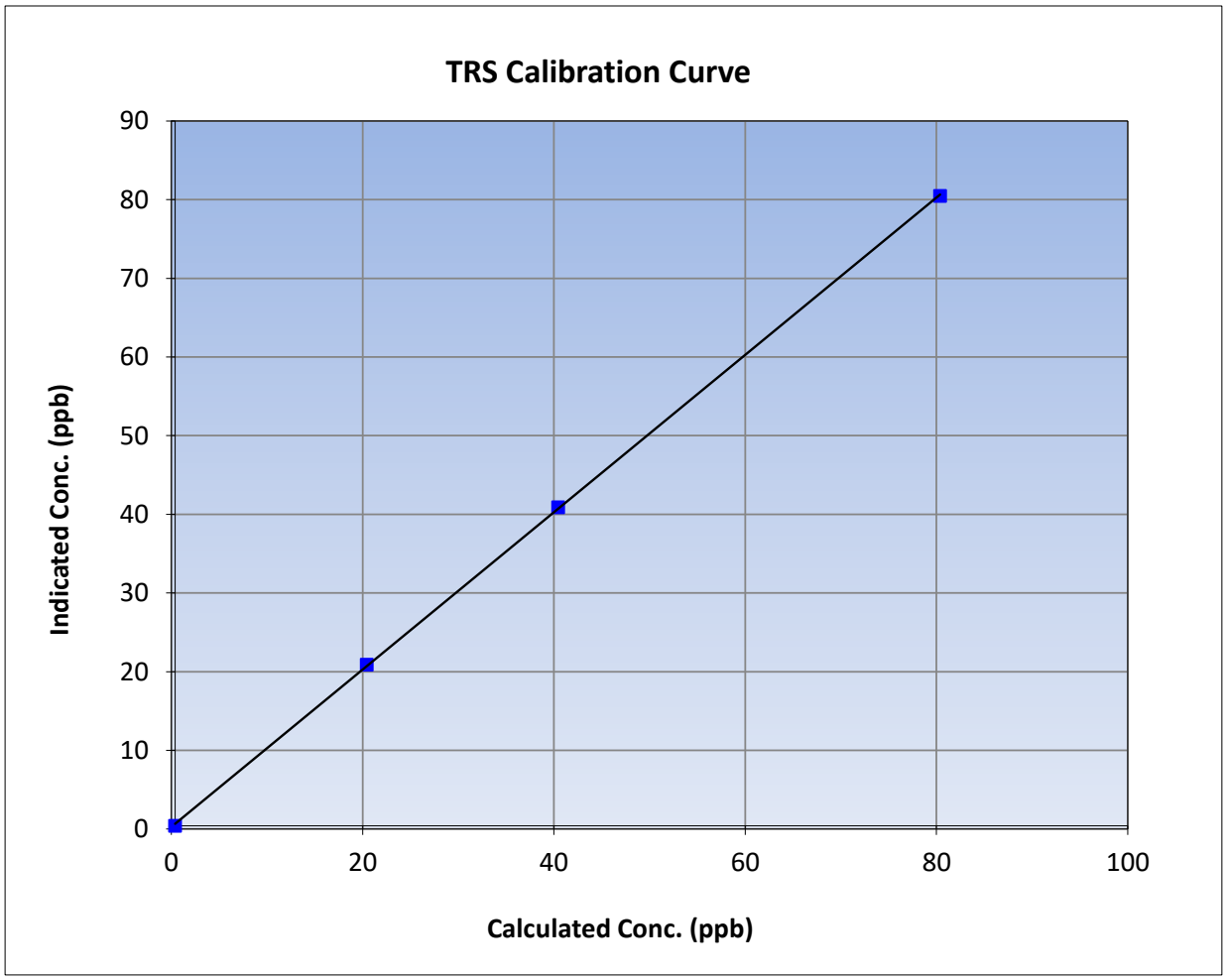
Station Information

Calibration Date:	June 13, 2023	Previous Calibration:	May 24, 2023
Station Name:	Janvier	Station Number:	AMS22
Start Time (MST):	10:20	End Time (MST):	14:45
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1151680031

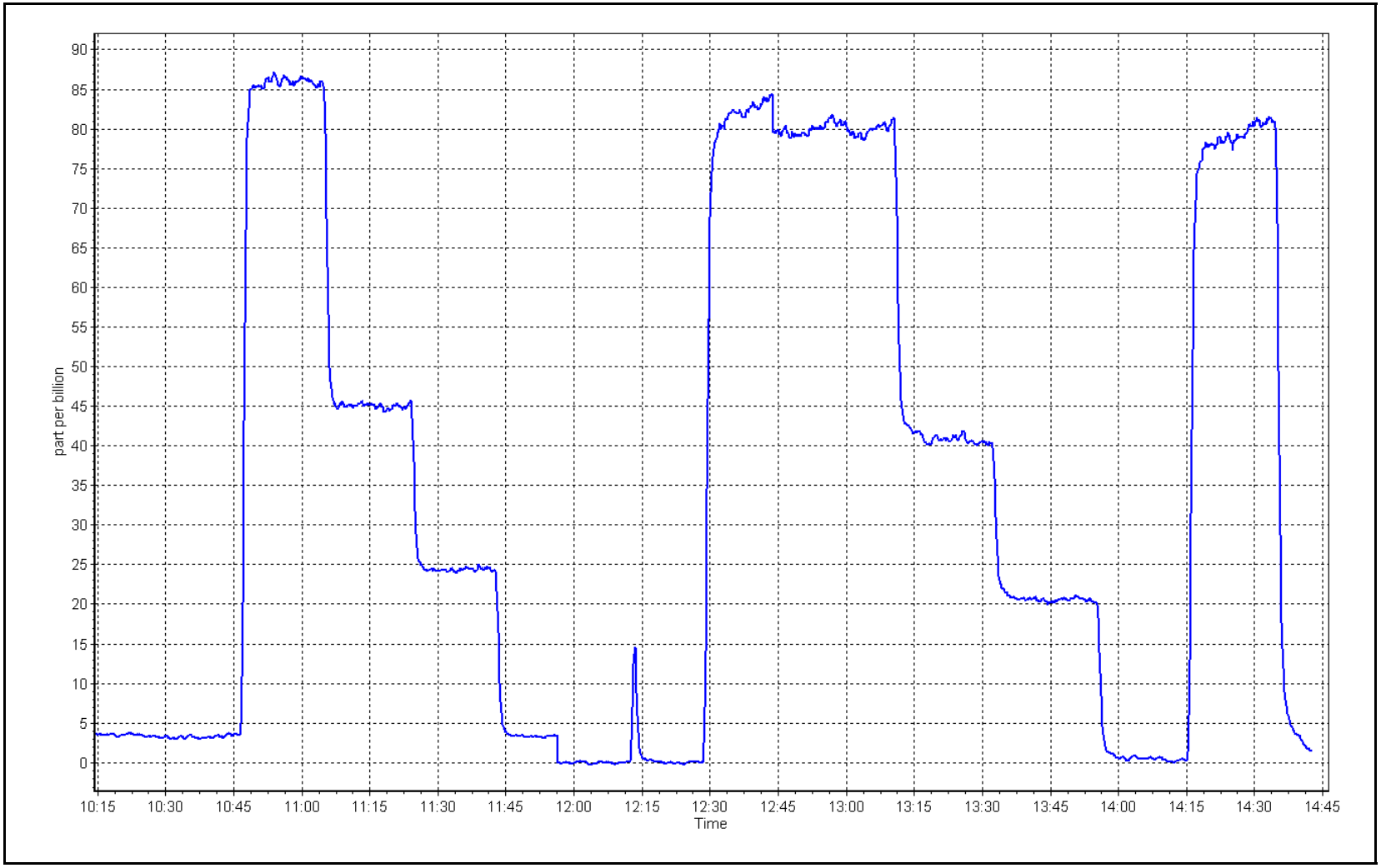
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.0	80.1	0.9986
40.0	40.5	0.9887
20.0	20.5	0.9766

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999949	*≥0.995*
Slope	1.000081	*0.90 - 1.10*
Intercept	0.260853	*+/-3*



TRS Calibration Plot Date: June 13, 2023 Location: Janvier



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Janvier	Station number:	AMS22
Calibration Date:	June 19, 2023	Last Cal Date:	June 13, 2023
Start time (MST):	11:30	End time (MST):	N/A
Reason:	Removal		

Calibration Standards

Cal Gas Concentration:	5.03	ppm	Cal Gas Exp Date:	April 16, 2022
Cal Gas Cylinder #:	DT0018680			
Removed Cal Gas Conc:	5.03	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3806
ZAG Make/Model:	Teledyne API T701		Serial Number:	4890

Analyzer Information

Analyzer make:	Thermo 43i-TLE		Analyzer serial #:	1151680031
Converter make:	CDN-101		Converter serial #:	587
Analyzer Range	0 - 100 ppb			

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.000081		Backgd or Offset:	9.13	N/A
Calibration intercept:	0.260853		Coeff or Slope:	0.973	N/A

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	3.4	----
as found span	4920	79.5	80.0	83.2	1.002
as found 2nd point	4960	39.8	40.0	44.0	0.986
as found 3rd point	4980	19.9	20.0	23.3	1.006
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
SO2 Scrubber Check					

Date of last scrubber change:		Ave Corr Factor	
Date of last converter efficiency test:			efficiency

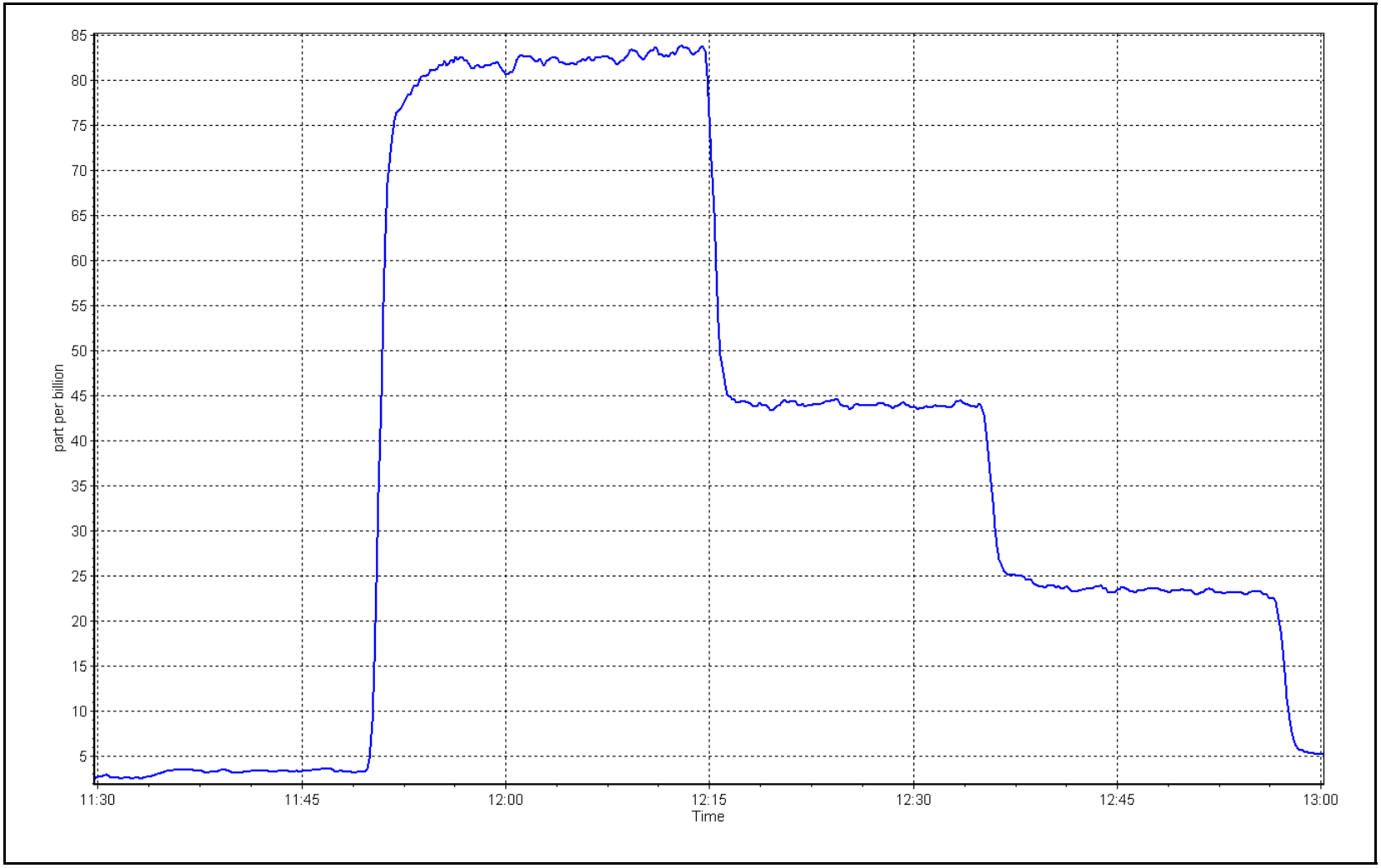
Baseline Corr As found:	79.8	Prev response:	80.25	*% change:	-0.6%
Baseline Corr 2nd AF pt:	40.6	AF Slope:	0.998940	AF Intercept:	3.500826
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999902		

* = > +/-5% change initiates investigation

Notes: Removing instrument due to elevated zeroes.

Calibration Performed By: Aswin Sasi Kumar

TRS Calibration Plot Date: June 19, 2023 Location: Janvier



Wood Buffalo Environmental Association

TRS Calibration Report

Version-11-2021

Station Information

Station Name:	Janvier	Station number:	AMS22
Calibration Date:	June 20, 2023	Last Cal Date:	N/A
Start time (MST):	10:33	End time (MST):	13:02
Reason:	Install		

Calibration Standards

Cal Gas Concentration:	5.03	ppm	Cal Gas Exp Date:	April 16, 2022
Cal Gas Cylinder #:	DT0018680			
Removed Cal Gas Conc:	5.03	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3806
ZAG Make/Model:	Teledyne API T701		Serial Number:	4890

Analyzer Information

Analyzer make:	Thermo 43iQ-TLE		Analyzer serial #:	1200326169	
Converter make:	CDN-101		Converter serial #:	587	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	N/A	1.004939	Backgd or Offset:	N/A	1.05
Calibration intercept:	N/A	0.140790	Coeff or Slope:	N/A	0.954

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	0.0	----
high point	4920	79.5	80.0	80.4	0.995
second point	4960	39.8	40.0	40.6	0.986
third point	4980	19.9	20.0	20.3	0.986
as left zero	5000	0.0	0.0	0.1	----
as left span	4920	79.5	80.0	80.5	0.994
SO2 Scrubber Check	4920	79.8	798.0		----
Date of last scrubber change:				Ave Corr Factor	0.989
Date of last converter efficiency test:					efficiency

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

* = > +/-5% change initiates investigation

Notes: Adjusted the span only.

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

TRS Calibration Summary

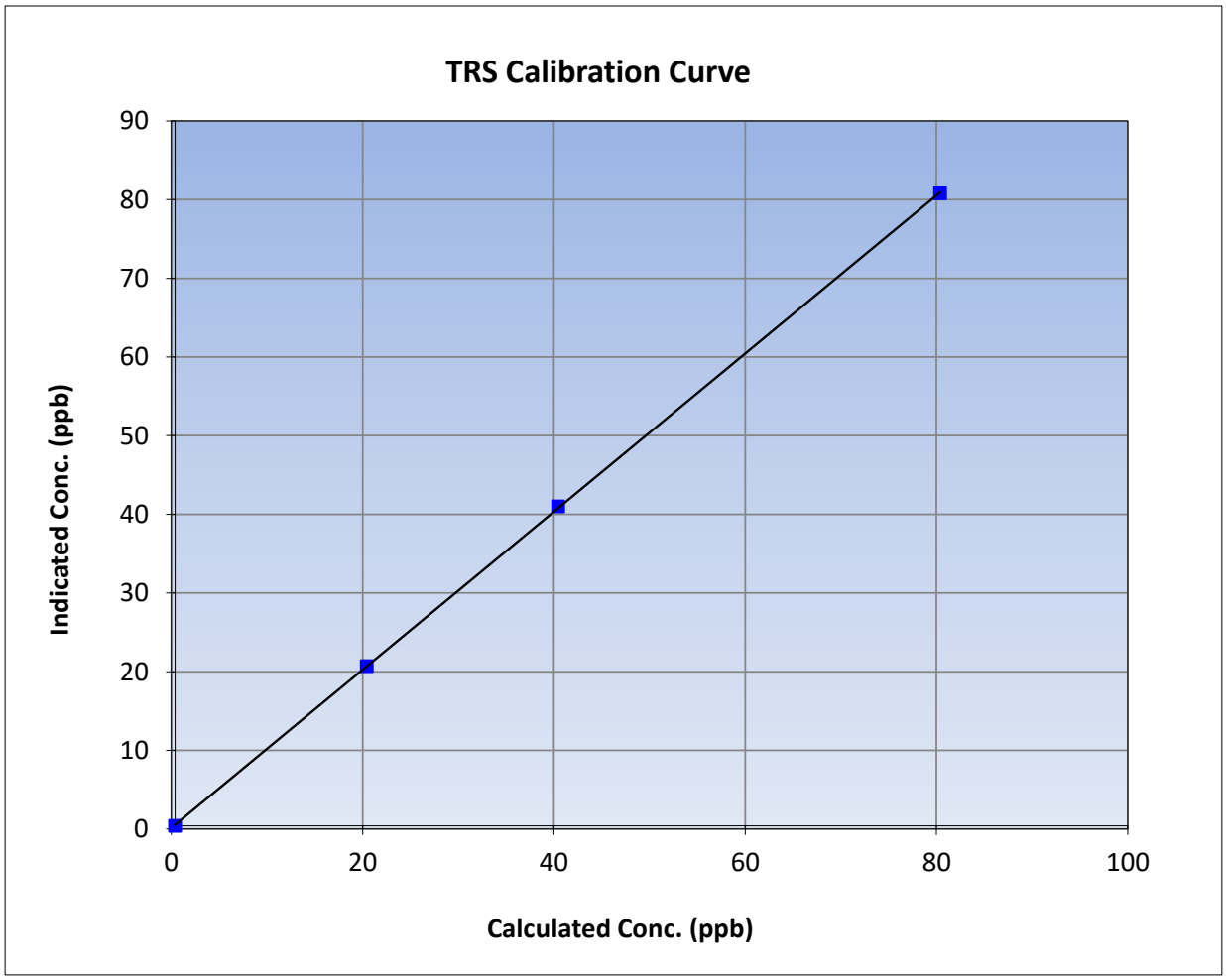
Version-11-2021

Station Information

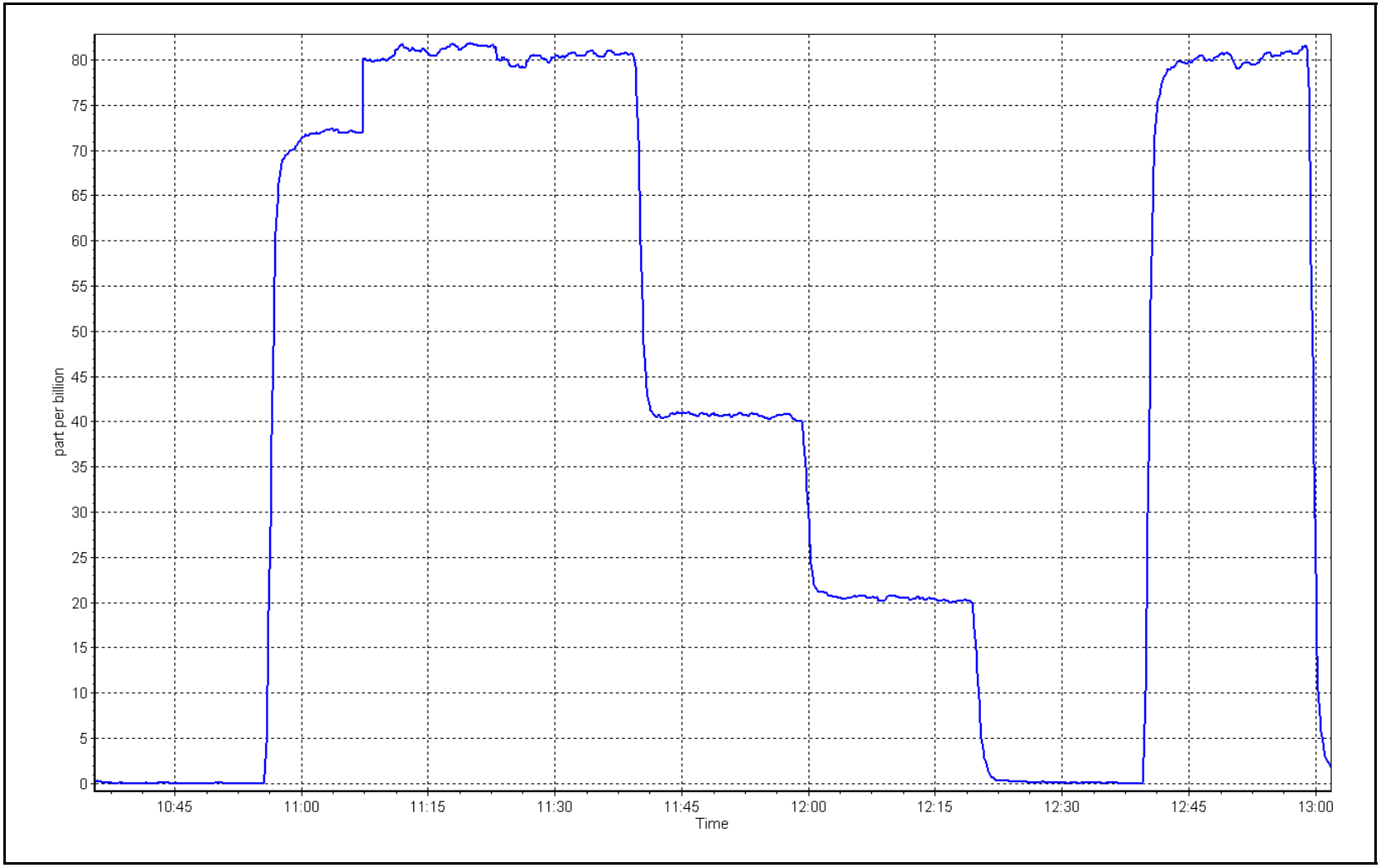
Calibration Date:	June 20, 2023	Previous Calibration:	N/A
Station Name:	Janvier	Station Number:	AMS22
Start Time (MST):	10:33	End Time (MST):	13:02
Analyzer make:	Thermo 43iQ-TLE	Analyzer serial #:	1200326169

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*
80.0	80.4	0.9948			
40.0	40.6	0.9862	Slope	1.004939	*0.90 - 1.10*
20.0	20.3	0.9862			
			Intercept	0.140790	*+/-3*



TRS Calibration Plot Date: June 20, 2023 Location: Janvier



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	June 14, 2023	Last Cal Date:	May 17, 2023
Start time (MST):	9:45	End time (MST):	12:50
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC281519	Cal Gas Expiry Date:	January 18, 2029	
CH4 Cal Gas Conc.	502.8	ppm	CH4 Equiv Conc.	1075.9	ppm
C3H8 Cal Gas Conc.	208.4	ppm			
Removed Gas Cert:		N/A	Removed Gas Expiry:	N/A	
Removed CH4 Conc.	502.8	ppm	CH4 Equiv Conc.	1075.9	ppm
Removed C3H8 Conc.	208.4	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API 700		Serial Number:	3806	
ZAG make/model:	Teledyne API 701		Serial Number:	4890	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1172750023	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.160E-04	2.150E-04	NMHC SP Ratio:	4.48E-05	4.55E-05
CH4 Retention time:	13.40	13.40	NMHC Peak Area:	204301	201202

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	17.10	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	79.8	17.17	17.19	0.999
second point	4960	39.9	8.59	8.64	0.994
third point	4980	20.0	4.30	4.31	1.000
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	17.17	17.14	1.002
				Average Correction Factor	0.998

Baseline Corr AF:	17.10	Prev response	17.19	*% change	-0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4920	79.8	9.15	9.00	1.017
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	----
high point	4920	79.8	9.15	9.13	1.002
second point	4960	39.9	4.57	4.57	1.001
third point	4980	20.0	2.29	2.28	1.008
as left zero	5000	0	0.00	0.00	----
as left span	4920	79.8	9.15	9.09	1.006
				Average Correction Factor	1.003
Baseline Corr AF:	9.00	Prev response	9.13	*% change	-1.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	79.8	8.03	8.10	0.991
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	8.06	0.996
second point	4960	39.9	4.01	4.07	0.987
third point	4980	20.0	2.01	2.03	0.991
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	79.8	8.03	8.05	0.997
				Average Correction Factor	0.991
Baseline Corr AF:	8.10	Prev response	8.06	*% 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:	1.001793	1.001387
THC Cal Offset:	-0.014598	0.007200
CH4 Cal Slope:	1.004345	1.004460
CH4 Cal Offset:	-0.005170	0.011429
NMHC Cal Slope:	0.999528	0.998704
NMHC Cal Offset:	-0.009829	-0.004029

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

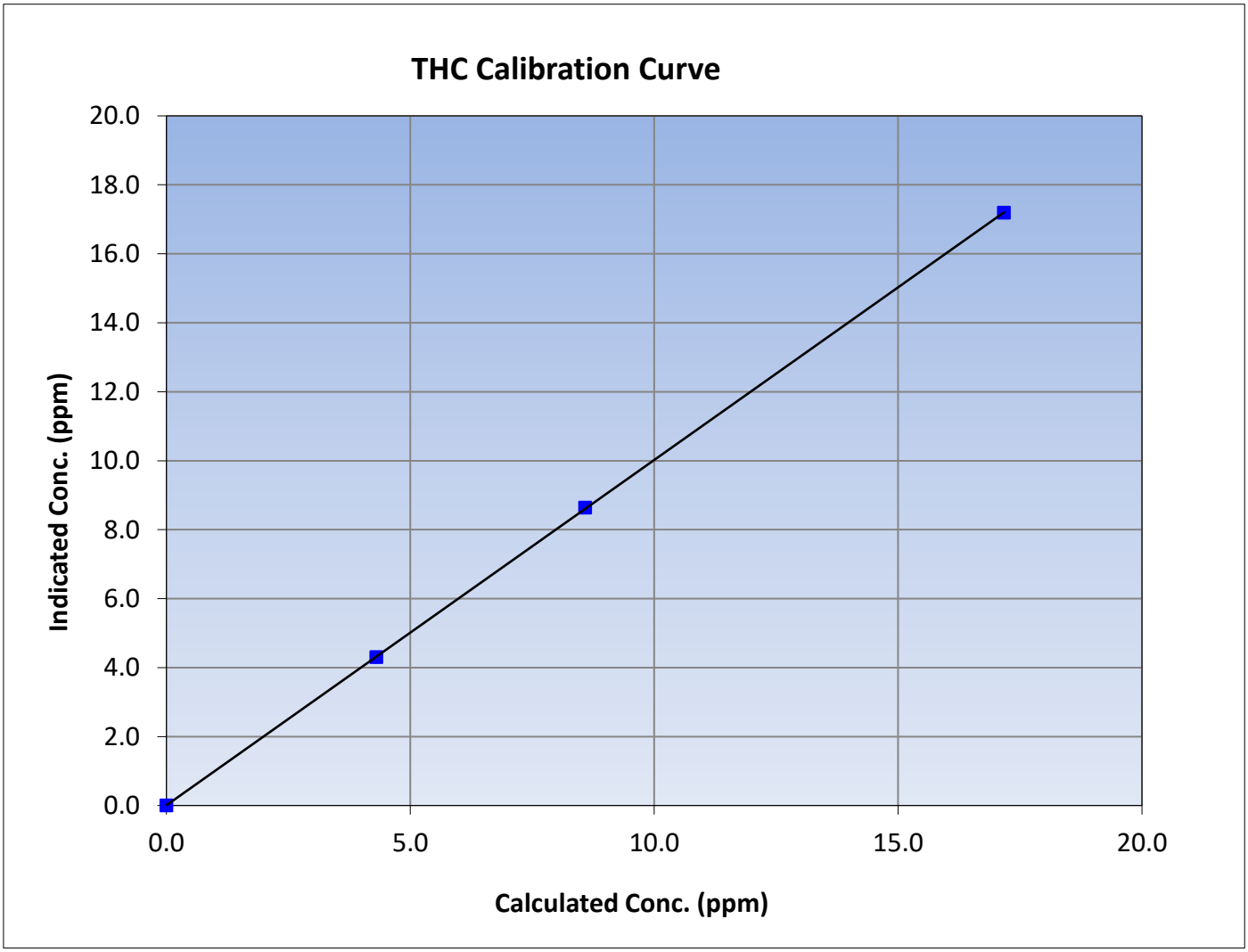
Version-01-2020

Station Information

Calibration Date:	June 14, 2023	Previous Calibration:	May 17, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:45	End Time (MST):	12:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750023

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999991	*≥0.995*
17.17	17.19	0.9990			
8.59	8.64	0.9941	Slope	1.001387	*0.90 - 1.10*
4.30	4.31	0.9997			
			Intercept	0.007200	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

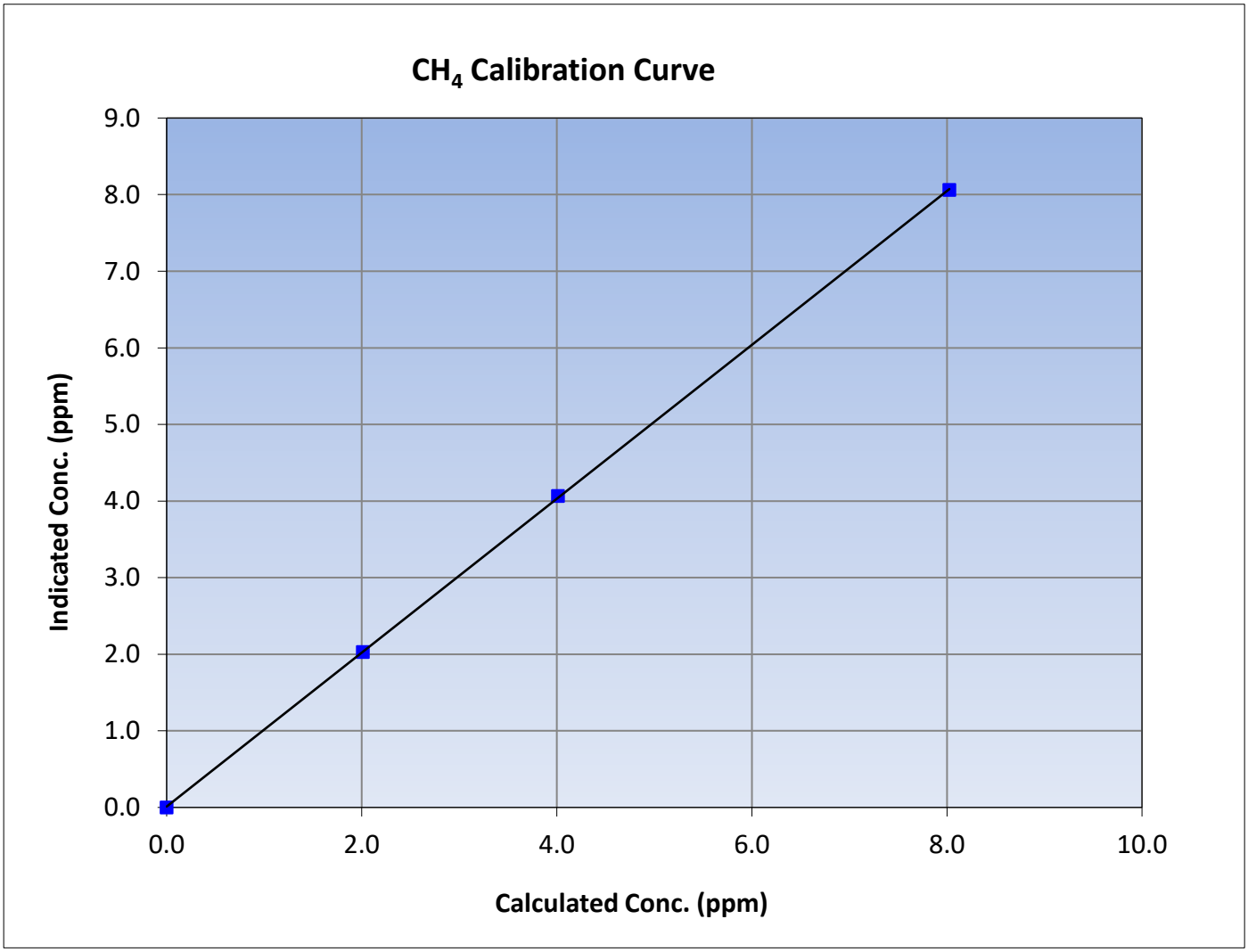
Version-01-2020

Station Information

Calibration Date:	June 14, 2023	Previous Calibration:	May 17, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:45	End Time (MST):	12:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750023

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999974	*≥0.995*
8.03	8.06	0.9957			
4.01	4.07	0.9866	Slope	1.004460	*0.90 - 1.10*
2.01	2.03	0.9907			
			Intercept	0.011429	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

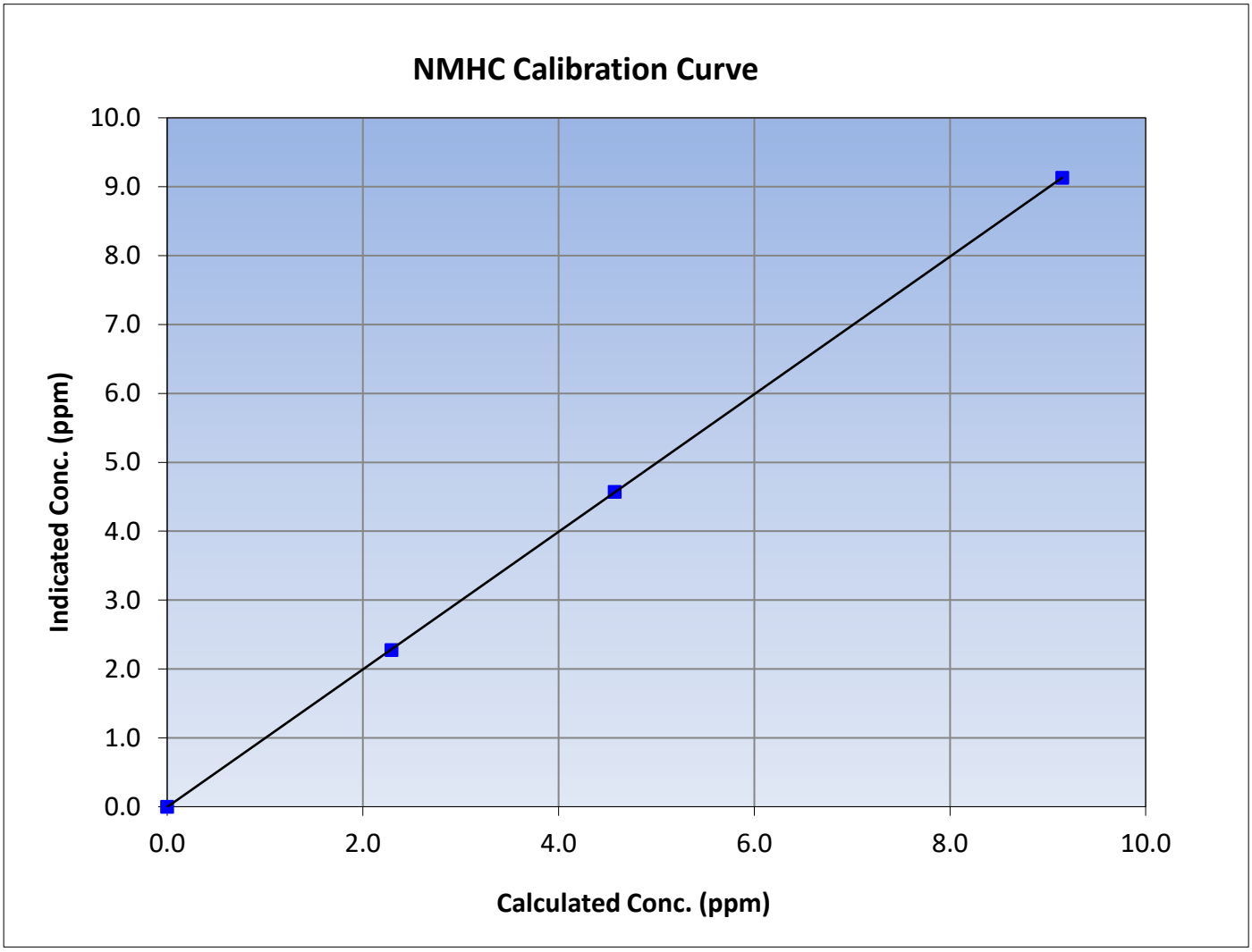
Version-01-2020

Station Information

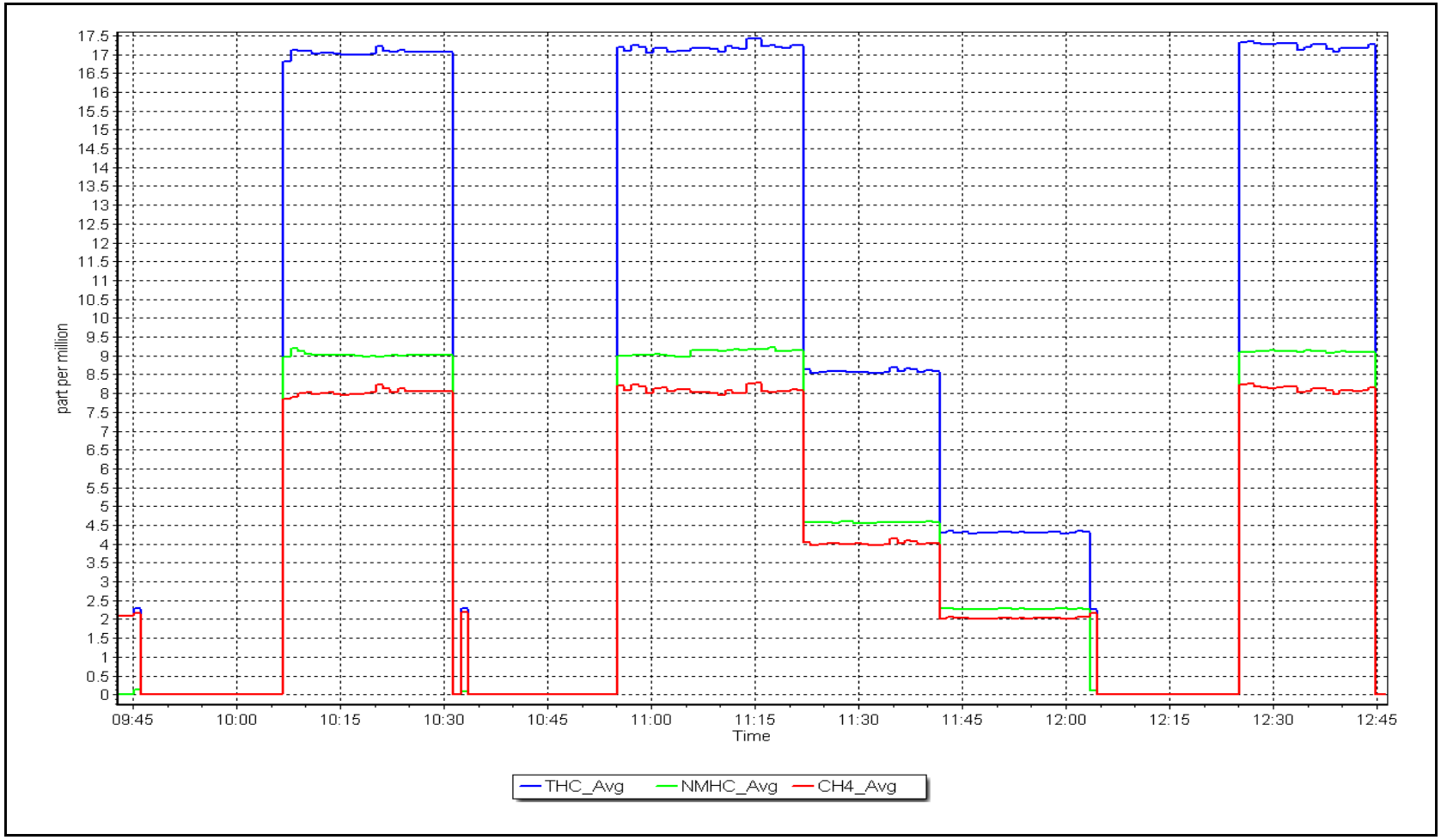
Calibration Date:	June 14, 2023	Previous Calibration:	May 17, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	9:45	End Time (MST):	12:50
Analyzer make:	Thermo 55i	Analyzer serial #:	1172750023

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999996	*≥0.995*
9.15	9.13	1.0019			
4.57	4.57	1.0005	Slope	0.998704	*0.90 - 1.10*
2.29	2.28	1.0076			
			Intercept	-0.004029	*+/-0.5*



NMHC Calibration Plot Date: June 14, 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:	June 16, 2023	Last Cal Date:	May 3, 2023
Start time (MST):	8:29	End time (MST):	15:39
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:	4890	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1218153460	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.303	1.338	NO bkgnd or offset:	3.4	3.5
NOX coeff or slope:	0.988	0.988	NOX bkgnd or offset:	4.3	4.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	189.8	189.5

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999560	0.999180
NO_X Cal Offset:	1.487988	-2.628921
NO Cal Slope:	0.999544	1.003252
NO Cal Offset:	0.468701	-4.029566
NO_2 Cal Slope:	0.998379	0.994339
NO_2 Cal Offset:	0.058523	0.394612

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	-0.3	-0.6	----	----
as found span	4918	82.3	799.9	799.9	0.0	775.1	774.0	1.1	1.0320	1.0335
as found 2nd	4959	41.2	400.4	400.4	0.0	383.8	382.6	1.2	1.0434	1.0466
as found 3rd	4980	20.6	200.2	200.2	0.0	189.8	188.5	1.3	1.0548	1.0621
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.8	-0.2	1.1	----	----
high point	4918	82.3	799.9	799.9	0.0	798.8	800.8	-1.9	1.0014	0.9989
second point	4959	41.2	400.4	400.4	0.0	394.4	394.6	-0.2	1.0153	1.0148
third point	4980	20.6	200.2	200.2	0.0	194.9	193.8	1.0	1.0272	1.0331
as left zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
as left span	4918	82.3	799.9	386.3	413.6	802.2	389.2	413.0	0.9971	0.9926
								Average Correction Factor	1.0147	1.0156

Corrected As found	NO_X = 776.0 ppb	NO = 774.3 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-3.2%
Previous Response	NO_X = 801.0 ppb	NO = 800.0 ppb		*Percent Change	NO =	-3.3%
Baseline Corr 2nd pt	NO_X = 384.7 ppb	NO = 382.9 ppb	As found	NO_X r^2: 0.999960	Nx Sl: 0.971078	Nx Int: -3.064
Baseline Corr 3rd pt	NO_X = 190.7 ppb	NO = 188.8 ppb	As found	NO r^2: 0.999930	NO Sl: 0.969448	NO Int: -3.244
			As found	NO_2 r^2: 0.999994	NO2 Sl: 1.002022	NO_2 Int: -0.301

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero	----	----	0.0	-0.6	----	----
as found GPT point (400 ppb NO2)	772.7	373.2	399.5	400.0	0.9988	100.1%
as found GPT point (200 ppb NO2)	772.7	578.4	194.3	194.1	1.0010	99.9%
as found GPT point (100 ppb NO2)	772.7	673.0	99.7	100.2	0.9950	100.5%
1st GPT point (400 ppb O3)	797.0	383.4	413.6	412.0	1.0039	99.6%
2nd GPT point (200 ppb O3)	797.0	594.0	203.0	201.9	1.0054	99.5%
3rd GPT point (100 ppb O3)	797.0	693.2	103.8	102.9	1.0087	99.1%
				Average Correction Factor	1.0060	99.4%

Notes: Changed sample inlet filter and zero/span valve after multi point as founds. Adjusted span only.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

NO_X Calibration Summary

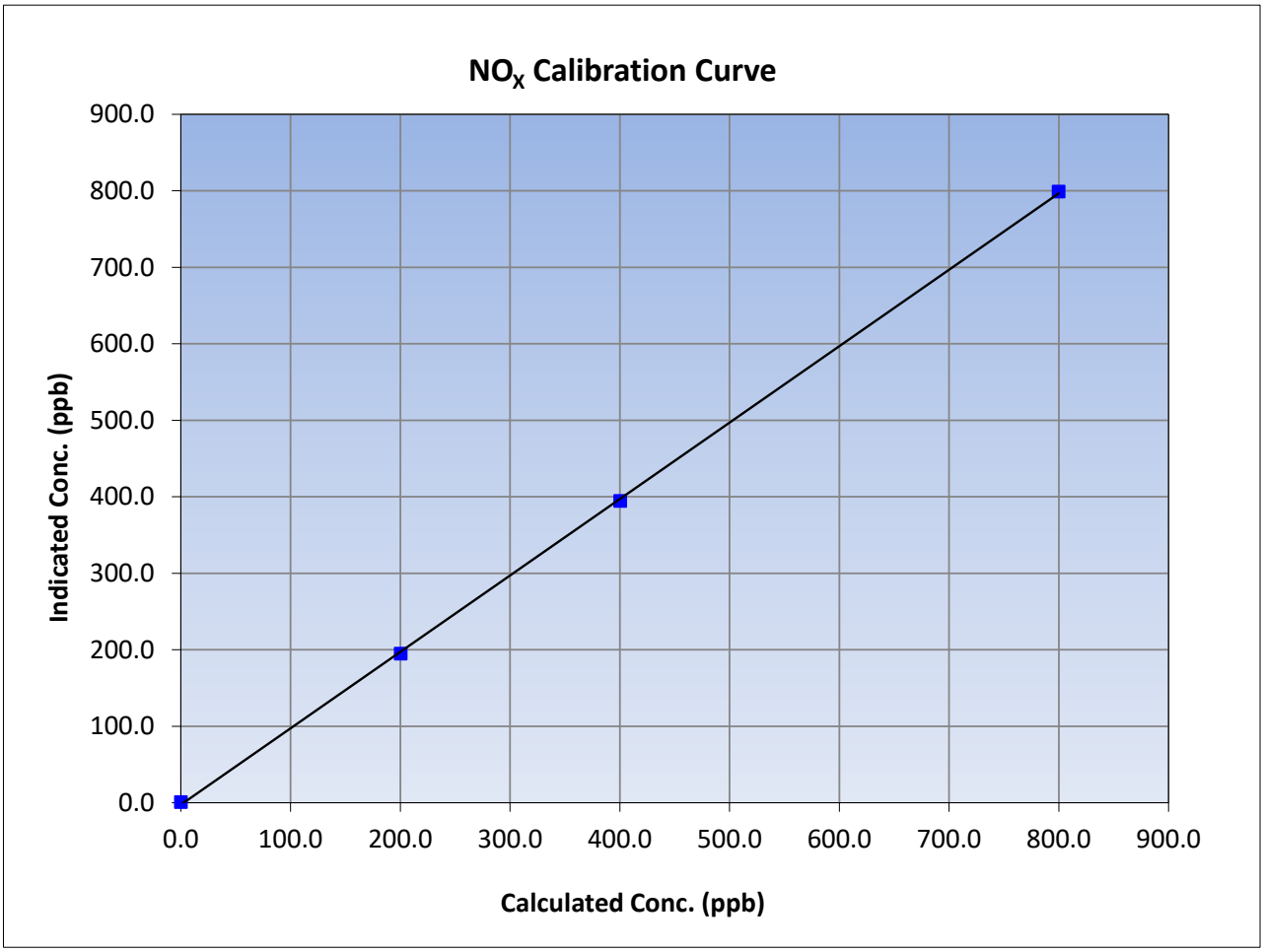
Version-04-2020

Station Information

Calibration Date:	June 16, 2023	Previous Calibration:	May 3, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	8:29	End Time (MST):	15:39
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153460

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.8	----	Correlation Coefficient	0.999907	≥0.995
799.9	798.8	1.0014			
400.4	394.4	1.0153	Slope	0.999180	0.90 - 1.10
200.2	194.9	1.0272			
			Intercept	-2.628921	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

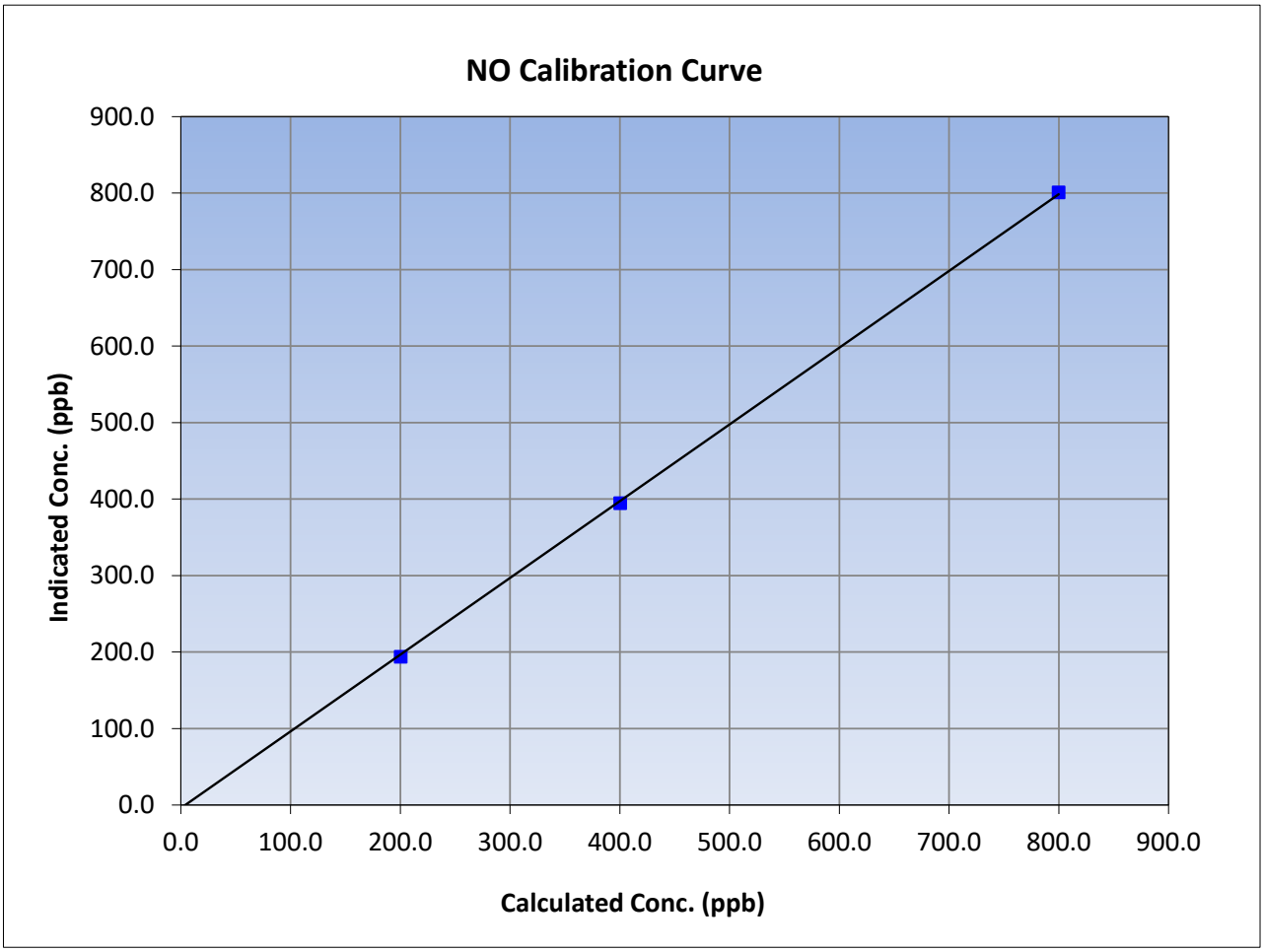
Version-04-2020

Station Information

Calibration Date:	June 16, 2023	Previous Calibration:	May 3, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	8:29	End Time (MST):	15:39
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153460

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999889	≥0.995
799.9	800.8	0.9989			
400.4	394.6	1.0148	Slope	1.003252	0.90 - 1.10
200.2	193.8	1.0331			
			Intercept	-4.029566	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

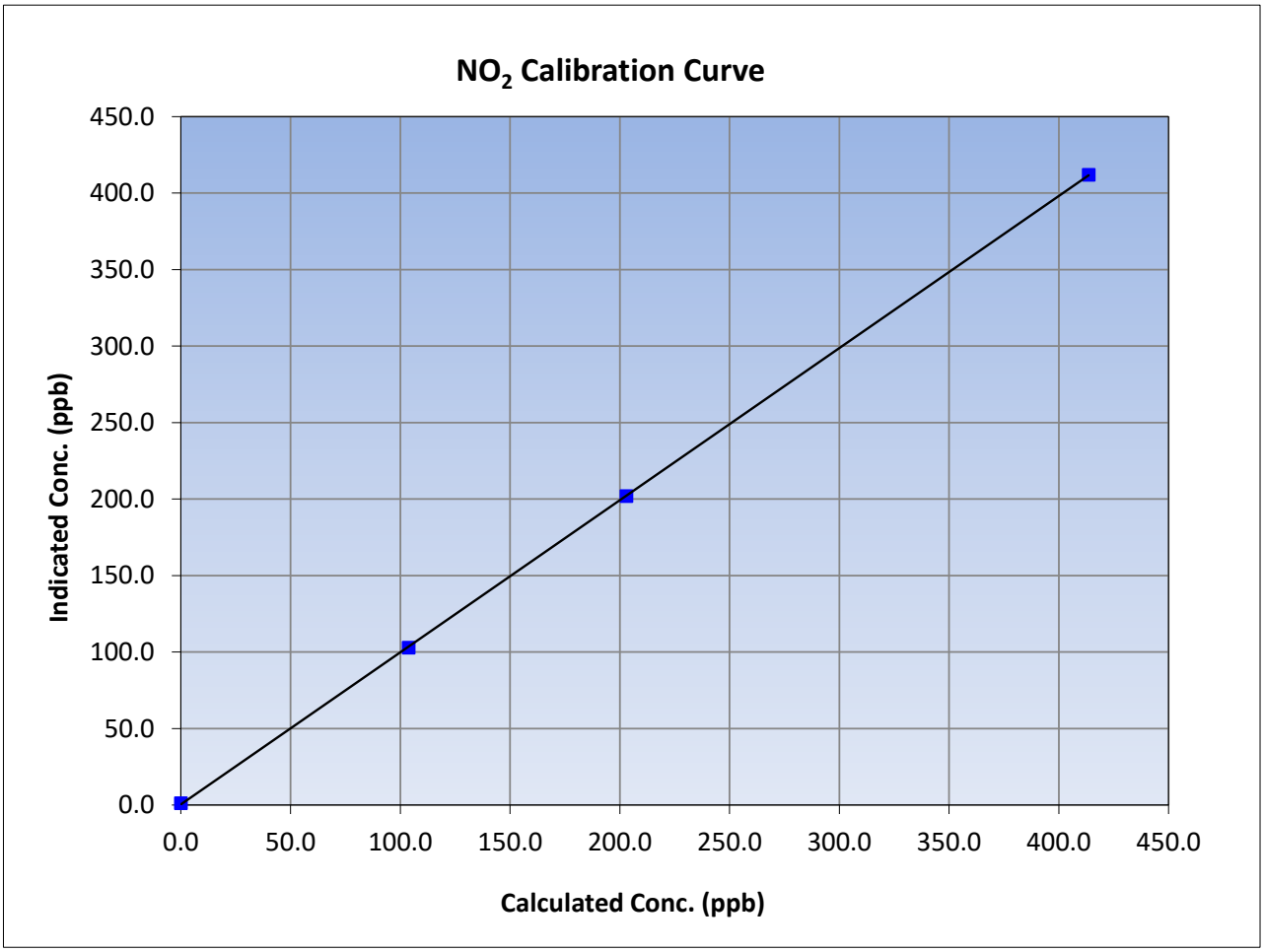
Version-04-2020

Station Information

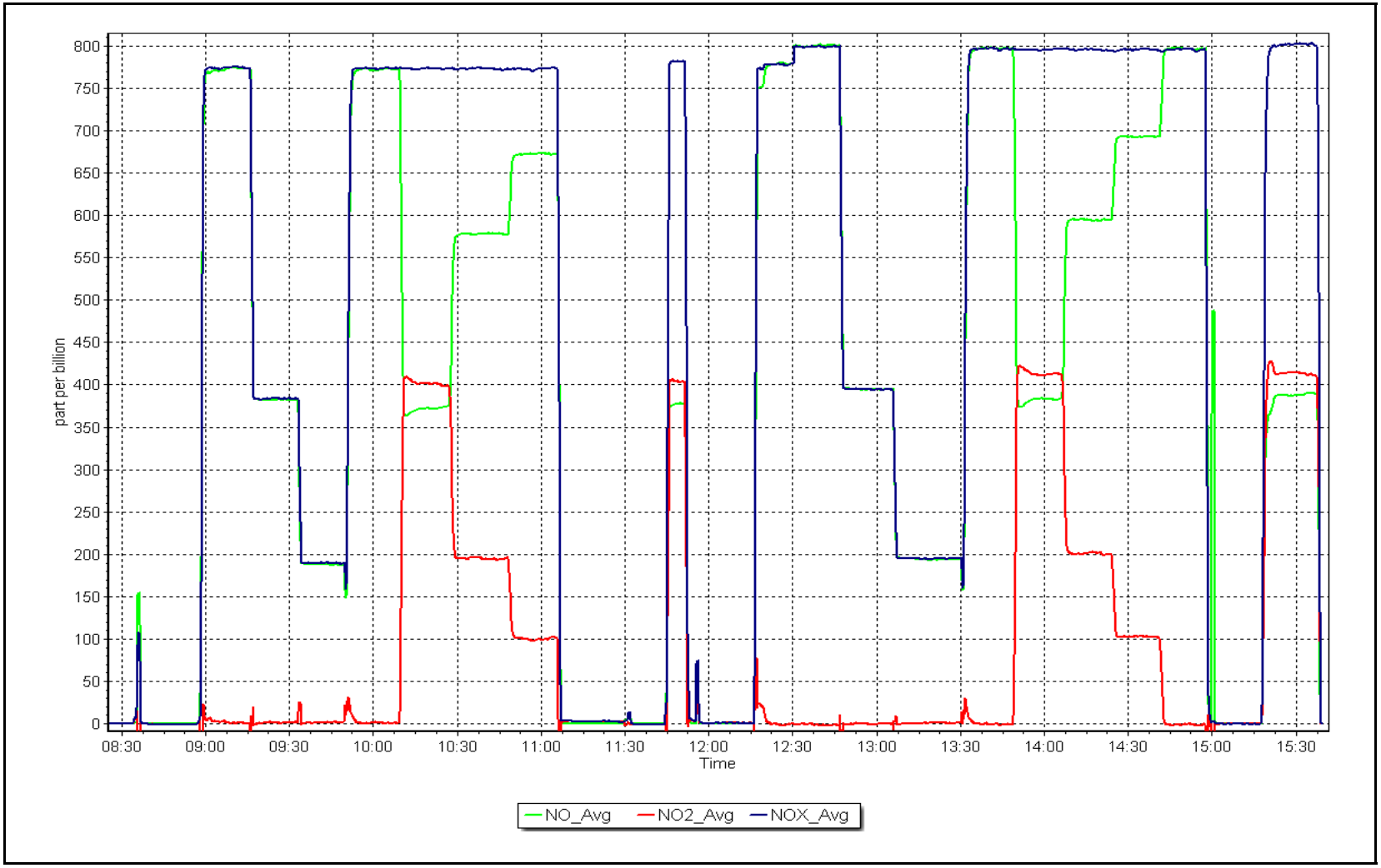
Calibration Date:	June 16, 2023	Previous Calibration:	May 3, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	8:29	End Time (MST):	15:39
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153460

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	1.1	----	Correlation Coefficient	0.999987	≥0.995
413.6	412.0	1.0039			
203.0	201.9	1.0054	Slope	0.994339	0.90 - 1.10
103.8	102.9	1.0087			
			Intercept	0.394612	+/-20



NO_X Calibration Plot Date: June 16, 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:	June 22, 2023	Last Cal Date:	May 30, 2023
Start time (MST):	9:25	End time (MST):	10:50
Reason:	Removal		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	Teledyne API T700	Serial Number:	3806
ZAG Make/Model:	Teledyne API T701	Serial Number:	201

Analyzer Information

Analyzer make:	Teledyne API T400	Analyzer serial #:	3869
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.006657		Backgd or Offset:	-2.0	
Calibration intercept:	0.560000		Coeff or Slope:	1.011	

O_3 Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	800.0	0.0	-32.4	----
as found span	4895	909.7	400.0	405.0	0.988
as found 2nd point	4895	757.2	200.0	204.0	0.980
as found 3rd point	4895	656.9	100.0	102.5	0.976
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	

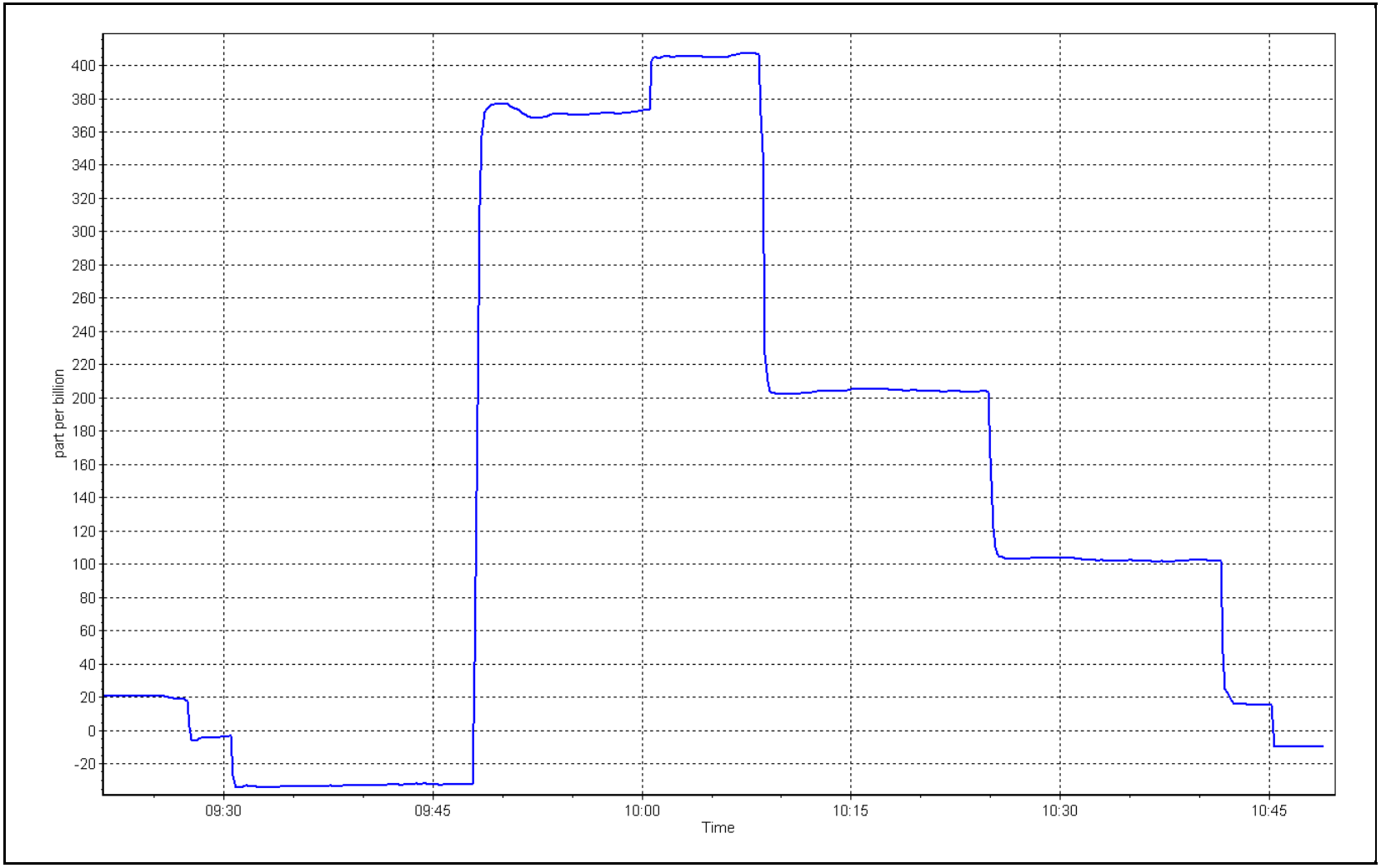
Baseline Corr As found:	437.4	Previous response	403.2	*% change	7.8%
Baseline Corr 2nd AF pt:	236.4	AF Slope:	1.076657	AF Intercept:	-18.640000
Baseline Corr 3rd AF pt:	134.9	AF Correlation:	0.995352		

* = > +/-5% change initiates investigation

Notes: Removal calibration, will replace intrument due to poor perfomence.

Calibration Performed By: Denny Ray Estador

O_3 Calibration Plot Date: June 22, 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:	June 22, 2023	Last Cal Date:	May 30, 2023
Start time (MST):	10:50	End time (MST):	13:05
Reason:	Install		

Calibration Standards

O3 generation mode:	Photometer		
Calibrator Make/Model:	Teledyne API T700	Serial Number:	3806
ZAG Make/Model:	Teledyne API T701H	Serial Number:	201

Analyzer Information

Analyzer make:	Teledyne API T400	Analyzer serial #:	7046
Analyzer Range	0 - 500 ppb		

	Start	***Finish***		***Start***	***Finish***
Calibration slope:		1.000371	Backgd or Offset:		-0.2
Calibration intercept:		1.760000	Coeff or Slope:		1.018

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	800.0	0.0	0.2	----
high point	4895	904.3	400.0	401.0	0.998
second point	4895	756.7	200.0	203.0	0.985
third point	4895	656.1	100.0	103.1	0.970
as left zero	5000	800.0	0.0	0.0	----
as left span	4895	904.3	400.0	405.5	0.986
				Average Correction Factor	0.984

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

* = > +/-5% change initiates investigation

Notes: Install calibration. Adjusted both zero and span.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

O_3 Calibration Summary

Version-01-2020

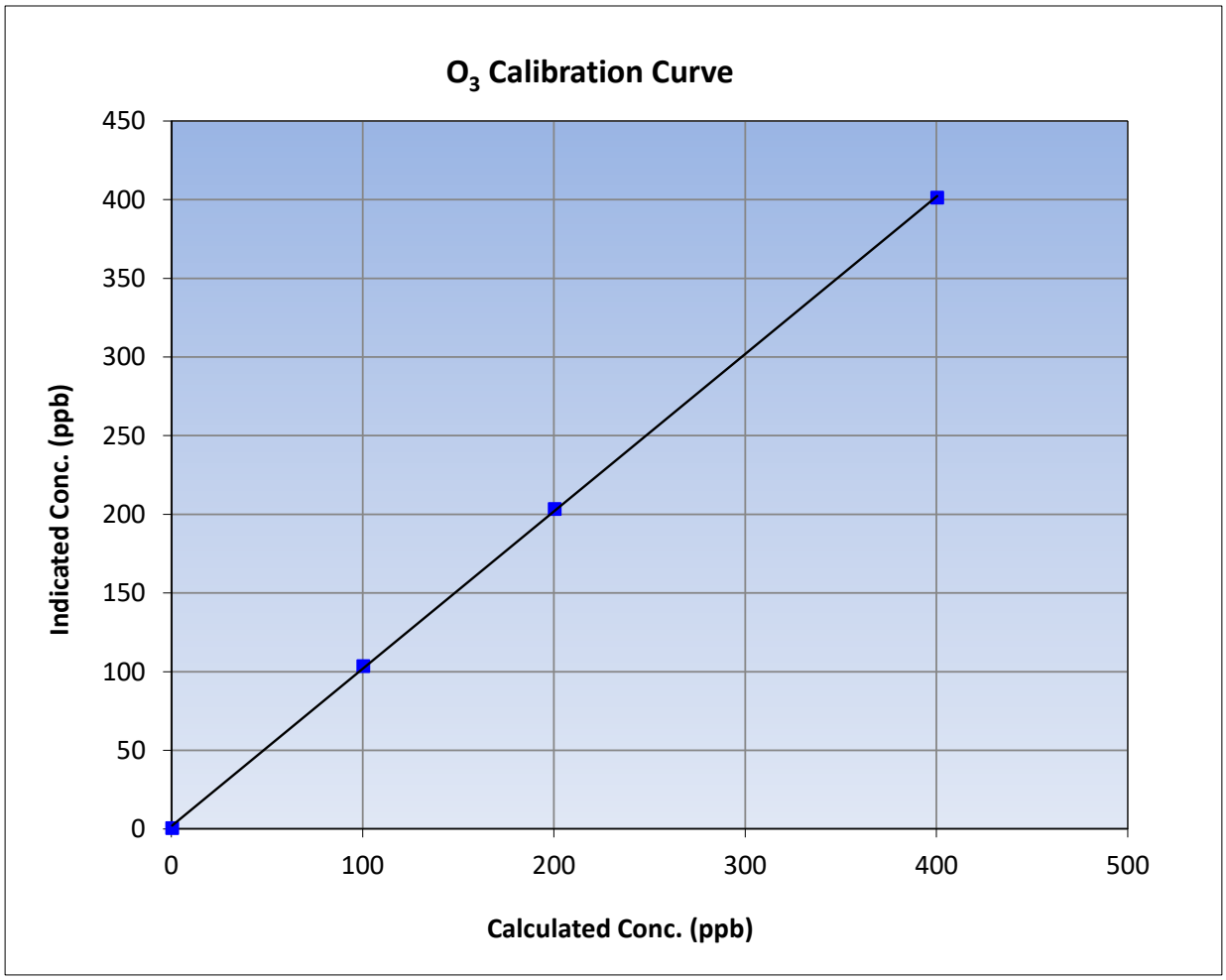
Station Information

Calibration Date:	June 22, 2023	Previous Calibration:	May 30, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	10:50	End Time (MST):	13:05
Analyzer make:	Teledyne API T400	Analyzer serial #:	7046

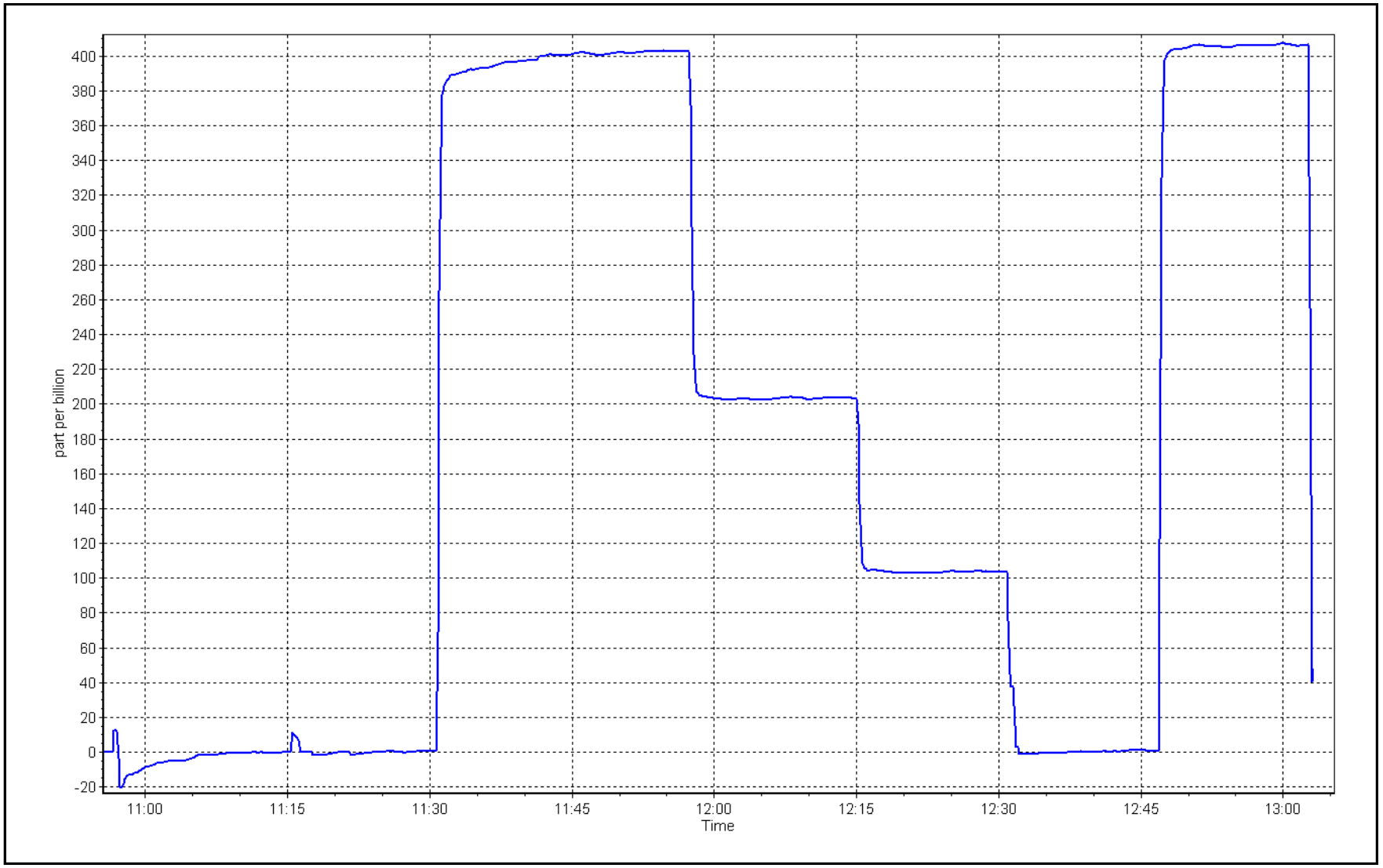
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
400.0	401.0	0.9975
200.0	203.0	0.9852
100.0	103.1	0.9699

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999928	*≥0.995*
Slope	1.000371	*0.90 - 1.10*
Intercept	1.760000	*+/- 5*



O_3 Calibration Plot Date: June 22, 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:	June 13, 2023	Last Cal Date:	May 30, 2023
Start time (MST):	10:45	End time (MST):	11:35
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)	22.9	23.2	22.9	☐	+/- 2 °C
P (mmHg)	711.5	711.80	711.5	☐	+/- 10 mmHg
flow (LPM)	5.04	5.030	5.04	☐	+/- 0.25 LPM

Leak Test: Date of check: June 13, 2023 Last Cal Date: May 30, 2023

PM w/o HEPA: 110 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☑

Quarterly Calibration Test

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

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

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

Disposable Filter Changed: April 27, 2023

Annual Maintenance

Date Sample Tube Cleaned: October 6, 2022

Date RH/T Sensor Cleaned: October 6, 2022

Notes: Verified flow, temperature, and pressure. No adjustments made. Leak test passed.

Calibration by: Devin Russell

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS23
FORT HILLS
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	June 6, 2023	Last Cal Date:	May 10, 2023
Start time (MST):	9:10	End time (MST):	12:00
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.76	ppm	Cal Gas Exp Date:	January 5, 2025
Cal Gas Cylinder #:	CC281425			
Removed Cal Gas Conc:	49.76	ppm	Rem Gas Exp Date:	N/A
Removed Gas Cyl #:	N/A		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	451
ZAG Make/Model:	API T701		Serial Number:	5611

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1160290012

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.001510	1.004713	Backgd or Offset:	17.8	17.8
Calibration intercept:	-0.523913	-0.844401	Coeff or Slope:	1.040	1.040

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.3	----
as found span	4920	80.3	799.1	797.5	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4920	80.3	799.1	802.4	0.996
second point	4960	40.2	400.1	400.8	0.998
third point	4980	20.1	200.0	199.2	1.004
as left zero	5000	0.0	0.0	-0.3	----
as left span	4920	80.3	799.1	803.6	0.994
				Average Correction Factor	0.999

Baseline Corr As found:	797.80	Previous response	799.78	*% 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

SO_2 Calibration Summary

Version-01-2020

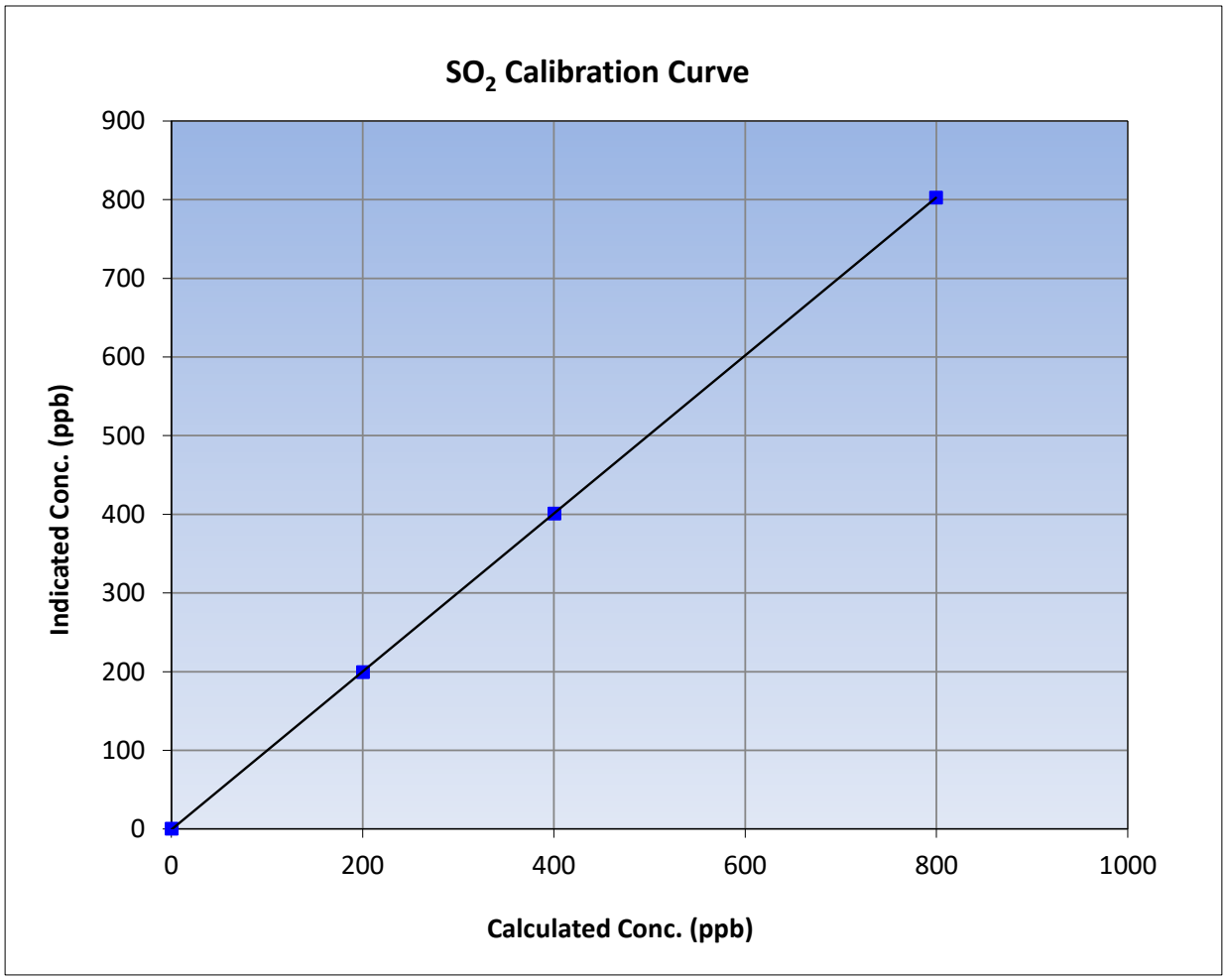
Station Information

Calibration Date:	June 6, 2023	Previous Calibration:	May 10, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:10	End Time (MST):	12:00
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290012

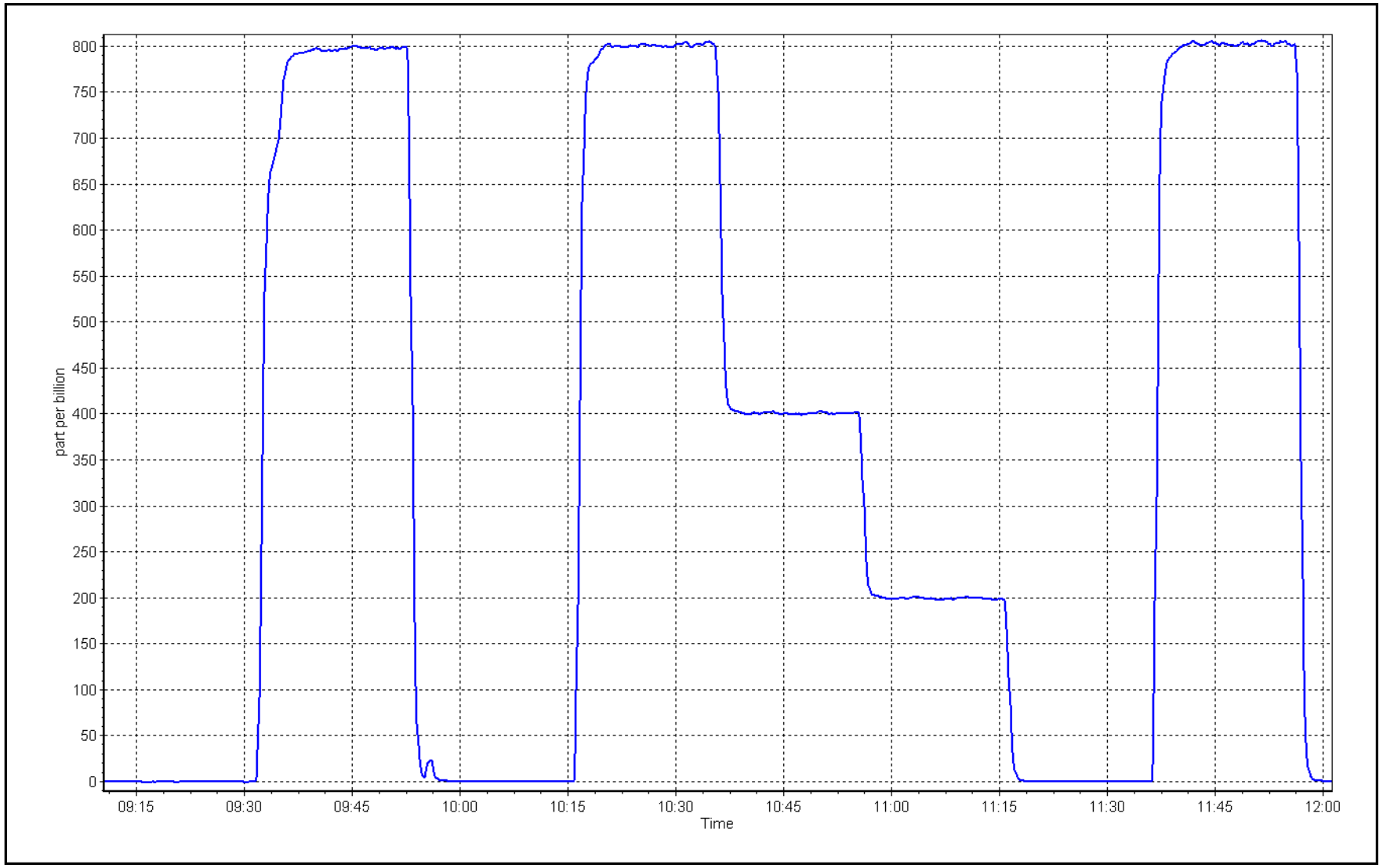
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
799.1	802.4	0.9959
400.1	400.8	0.9981
200.0	199.2	1.0042

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.004713	*0.90 - 1.10*
Intercept	-0.844401	*+/-30*



SO2 Calibration Plot Date: June 6, 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:	June 29, 2023	Last Cal Date:	May 25, 2023
Start time (MST):	9:56	End time (MST):	14:00
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.20	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517372			
Removed Cal Gas Conc:	5.20	ppm	Rem Gas Exp Date:	N/A
Removed Gas Cyl #:	N/A		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	451
ZAG Make/Model:	API T701		Serial Number:	5611

Analyzer Information

Analyzer make:	Thermo 43iQ TLE		Analyzer serial #:	1300156232	
Converter make:	CDN-101		Converter serial #:	594	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005029	1.006026	Backgd or Offset:	1.92	1.93
Calibration intercept:	-0.038092	0.002053	Coeff or Slope:	1.132	1.132

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4923	77.0	80.0	77.3	1.034
as found 2nd point	4962	38.5	40.0	39.7	1.005
as found 3rd point	4981	19.2	19.9	19.6	1.013
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4923	77.0	80.0	80.4	0.995
second point	4962	38.5	40.0	40.4	0.990
third point	4981	19.2	19.9	20.1	0.992
as left zero	5000	0.0	0.0	0.0	----
as left span	4923	77.0	80.0	81.3	0.984
SO2 Scrubber Check	4920	80.3	803.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.993
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	77.4	Prev response:	80.37	*% change:	-3.8%
Baseline Corr 2nd AF pt:	39.8	AF Slope:	0.967321	AF Intercept:	0.281225
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999752		

* = > +/-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: Rene Chamberland

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

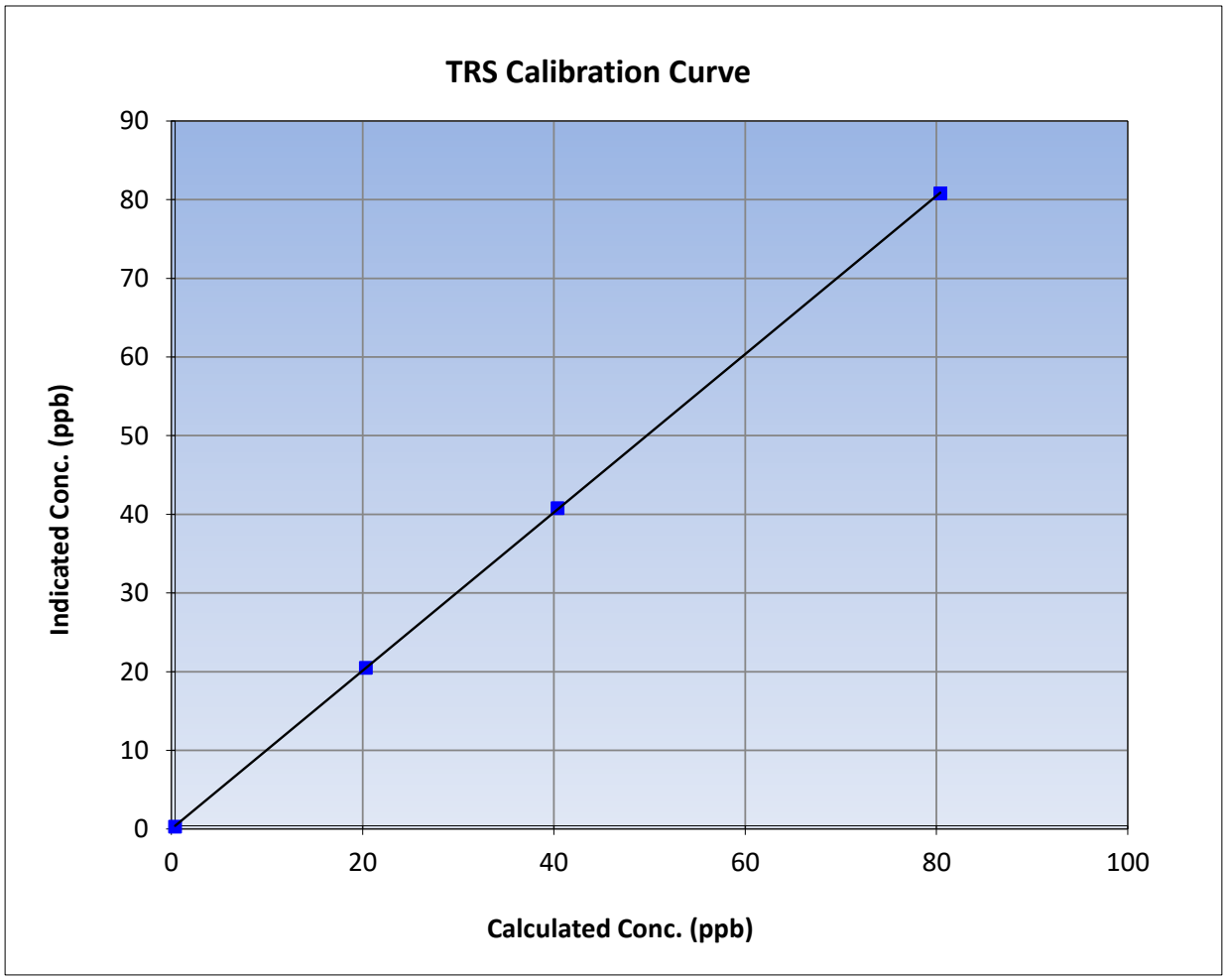
Station Information

Calibration Date:	June 29, 2023	Previous Calibration:	May 25, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:56	End Time (MST):	14:00
Analyzer make:	Thermo 43iQ TLE	Analyzer serial #:	1300156232

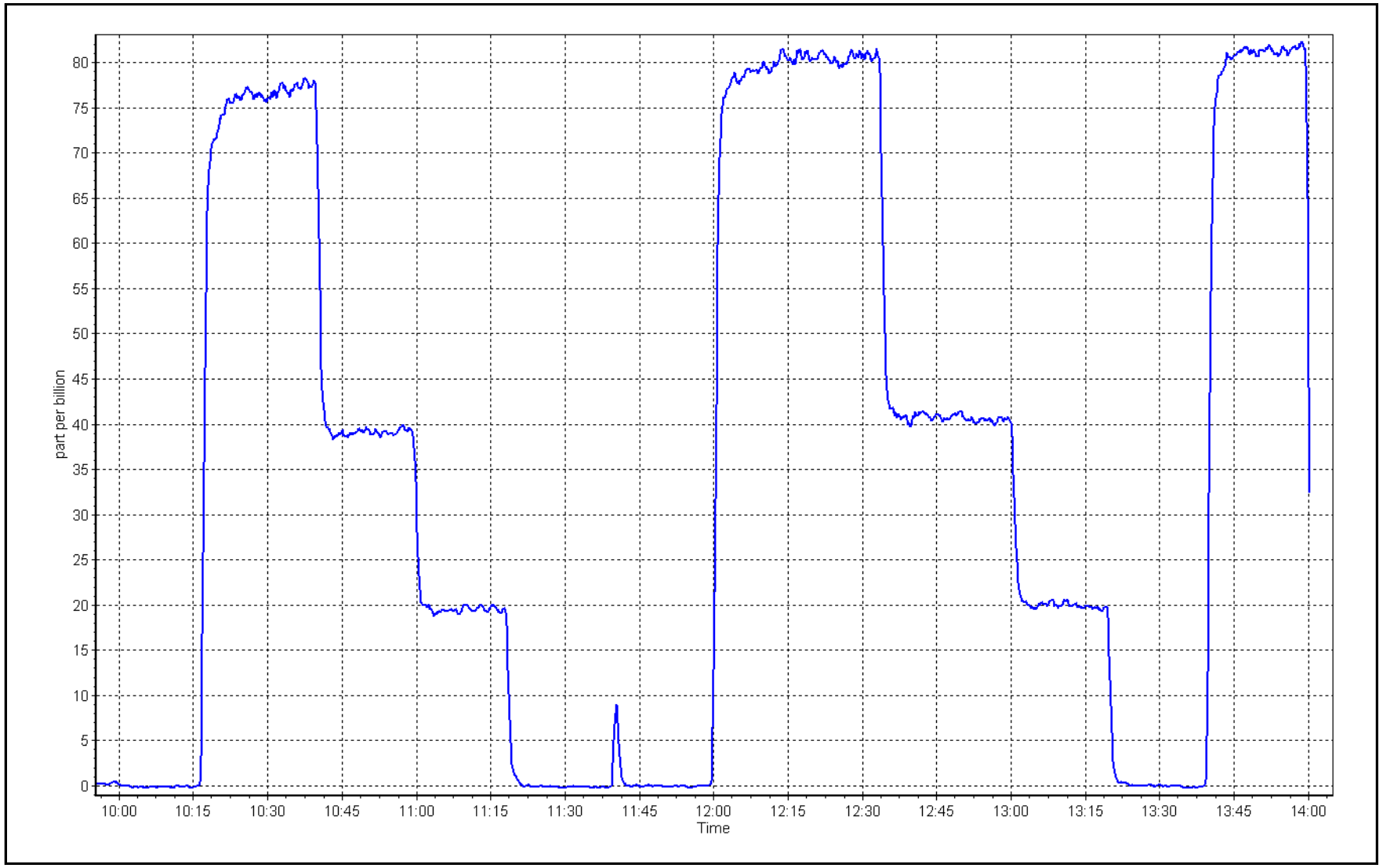
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.4	0.9951
40.0	40.4	0.9900
19.9	20.1	0.9924

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999987	*≥0.995*
Slope	1.006026	*0.90 - 1.10*
Intercept	0.002053	*+/-3*



TRS Calibration Plot Date: June 29, 2023 Location: Fort Hills



Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Information

Station Name:	Fort Hills	Station number:	AMS23
Calibration Date:	June 6, 2023	Last Cal Date:	May 10, 2023
Start time (MST):	9:10	End time (MST):	12:00
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC281425	Cal Gas Expiry Date:	January 5, 2025	
CH4 Cal Gas Conc.	500.2	ppm	CH4 Equiv Conc.	1070.6	ppm
C3H8 Cal Gas Conc.	207.4	ppm			
Removed Gas Cert:		N/A	Removed Gas Expiry:	N/A	
Removed CH4 Conc.	500.2	ppm	CH4 Equiv Conc.	1070.6	ppm
Removed C3H8 Conc.	207.4	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	451	
ZAG make/model:	API T701		Serial Number:	5611	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1193585648	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	2.32E-04	2.32E-04	NMHC SP Ratio:	5.06E-05	5.06E-05
CH4 Retention time:	13.0	13.0	NMHC Peak Area:	181940	181940

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	17.19	17.09	1.006
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	17.19	17.12	1.004
second point	4960	40.2	8.61	8.52	1.010
third point	4980	20.1	4.30	4.25	1.013
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	17.19	17.10	1.005
				Average Correction Factor	1.009
Baseline Corr AF:	17.09	Prev response	17.18	*% change	-0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	9.16	9.10	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	9.16	9.11	1.006
second point	4960	40.2	4.59	4.58	1.001
third point	4980	20.1	2.29	2.29	0.999
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	9.16	9.09	1.008
				Average Correction Factor	1.002
Baseline Corr AF:	9.10	Prev response	9.15	*% change	-0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4920	80.3	8.03	8.00	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4920	80.3	8.03	8.01	1.003
second point	4960	40.2	4.02	3.94	1.021
third point	4980	20.1	2.01	1.96	1.029
as left zero	5000	0.0	0.00	0.00	----
as left span	4920	80.3	8.03	8.02	1.002
				Average Correction Factor	1.017
Baseline Corr AF:	8.00	Prev response	8.03	*% change	-0.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	0.999810	0.995947
THC Cal Offset:	-0.013170	-0.024349
CH4 Cal Slope:	1.003198	0.998403
CH4 Cal Offset:	-0.029231	-0.034620
NMHC Cal Slope:	0.996713	0.993893
NMHC Cal Offset:	0.016062	0.009871

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

Calibration Performed By: Max Farrell

Wood Buffalo Environmental Association

THC Calibration Summary

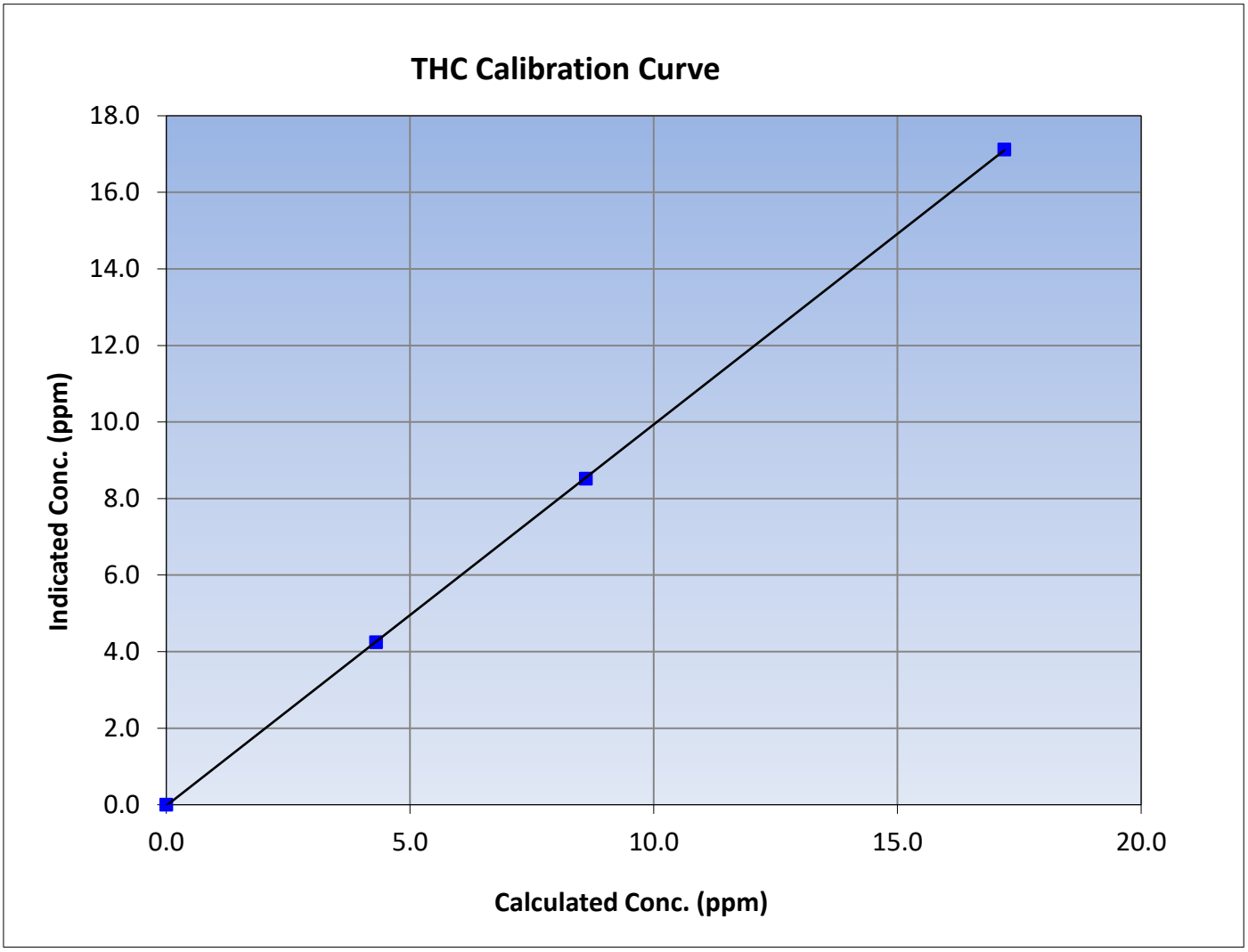
Version-01-2020

Station Information

Calibration Date:	June 6, 2023	Previous Calibration:	May 10, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:10	End Time (MST):	12:00
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585648

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999988	≥0.995
17.19	17.12	1.0044			
8.61	8.52	1.0104	Slope	0.995947	0.90 - 1.10
4.30	4.25	1.0128			
			Intercept	-0.024349	+/-0.5



Wood Buffalo Environmental Association

CH_4 Calibration Summary

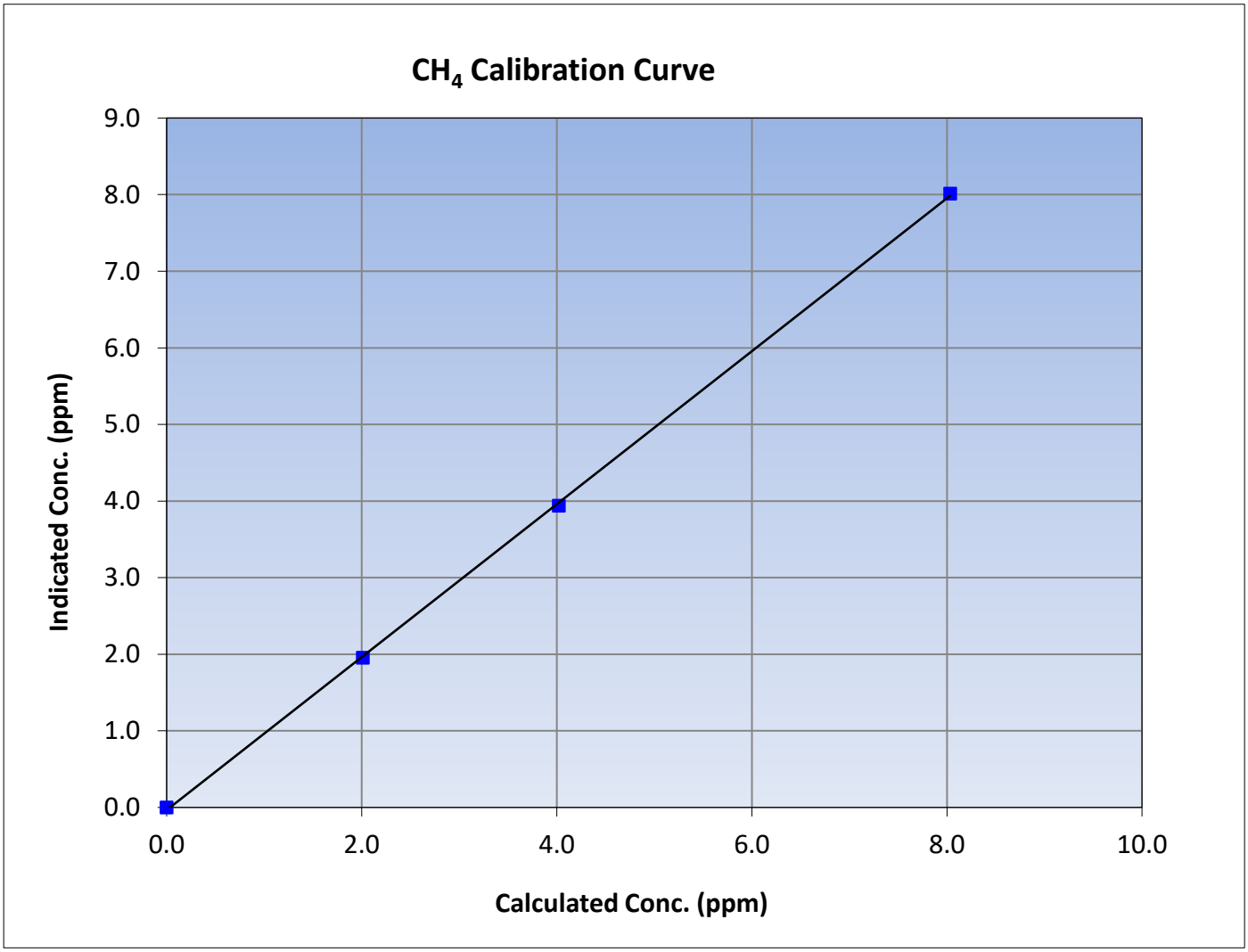
Version-01-2020

Station Information

Calibration Date:	June 6, 2023	Previous Calibration:	May 10, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:10	End Time (MST):	12:00
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585648

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999887	*≥0.995*
8.03	8.01	1.0027			
4.02	3.94	1.0212	Slope	0.998403	*0.90 - 1.10*
2.01	1.96	1.0285			
			Intercept	-0.034620	*+/-0.5*



Wood Buffalo Environmental Association

NMHC Calibration Summary

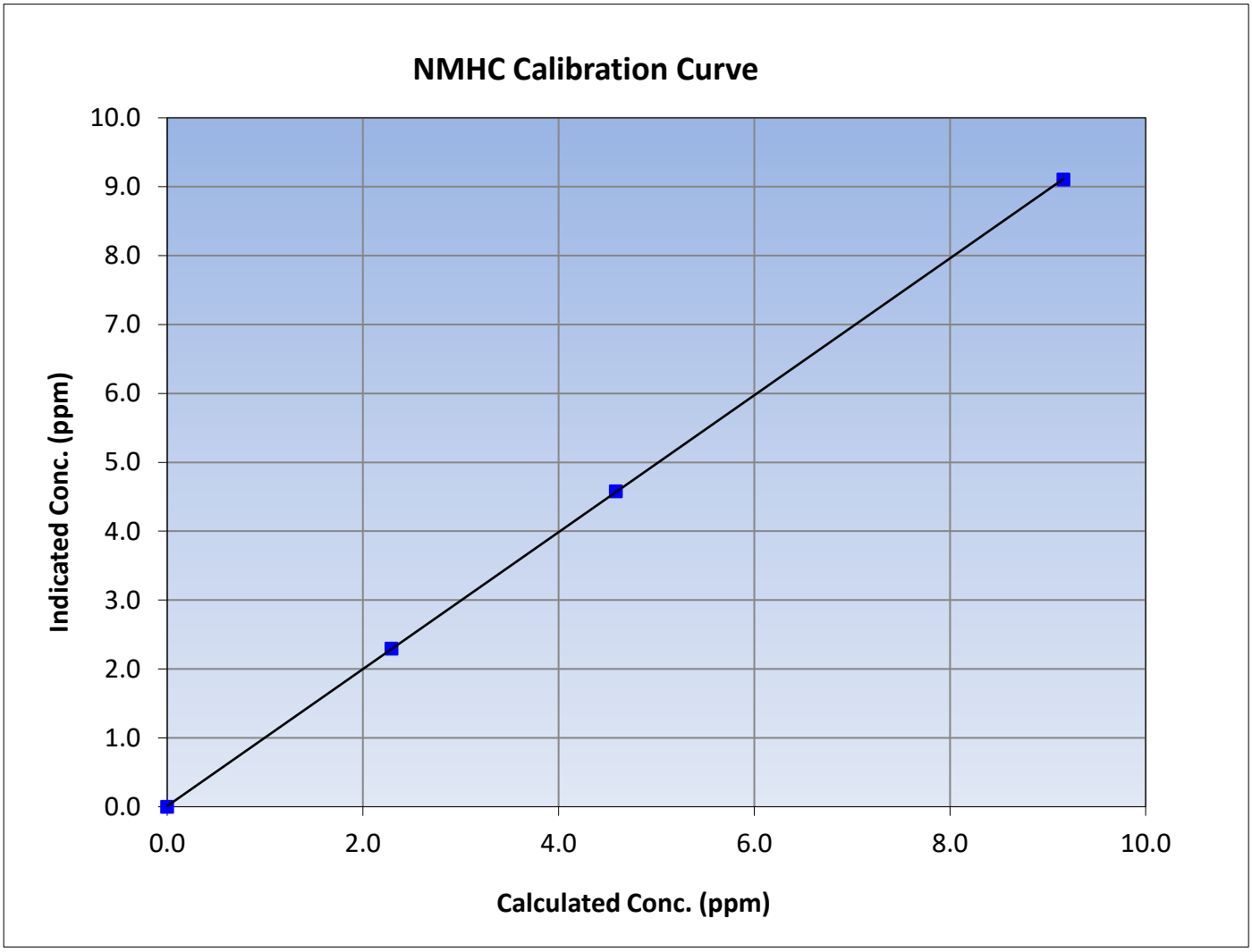
Version-01-2020

Station Information

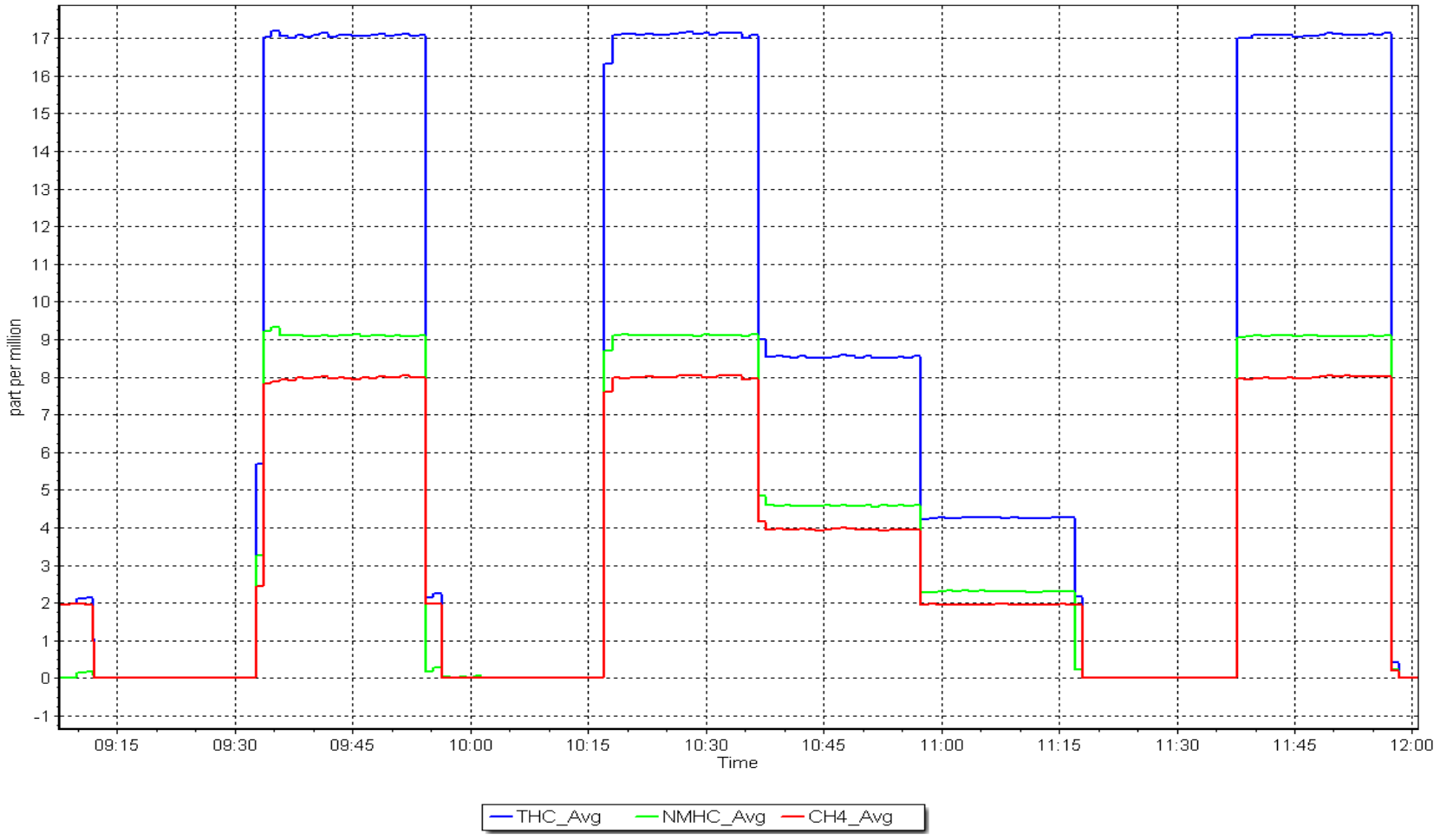
Calibration Date:	June 6, 2023	Previous Calibration:	May 10, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:10	End Time (MST):	12:00
Analyzer make:	Thermo 55i	Analyzer serial #:	1193585648

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.00	0.00	----	Correlation Coefficient	0.999993	*≥0.995*
9.16	9.11	1.0059			
4.59	4.58	1.0014	Slope	0.993893	*0.90 - 1.10*
2.29	2.29	0.9995			
			Intercept	0.009871	*+/-0.5*



NMHC Calibration Plot Date: June 6, 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:	June 1, 2023	Last Cal Date:	May 16, 2023
Start time (MST):	9:09	End time (MST):	13:39
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	CC332703		Cal Gas Expiry Date:	January 28, 2024	
NOX Cal Gas Conc:	49.7	ppm	NO Cal Gas Conc:	49.7	ppm
Removed Cylinder #:	N/A		Removed Gas Exp Date:	N/A	
Removed Gas NOX Conc:	49.7	ppm	Removed Gas NO Conc:	49.7	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T750		Serial Number:	275	
ZAG make/model:	Teledyne API T751H		Serial Number:	307	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1152430007	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.049	1.072	NO bkgnd or offset:	2.9	3
NOX coeff or slope:	0.995	0.995	NOX bkgnd or offset:	3.1	3.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	160.7	162.3

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	0.999094	0.998879
NO_X Cal Offset:	1.084161	1.384352
NO Cal Slope:	1.000637	0.999937
NO Cal Offset:	-0.356041	-0.035916
NO_2 Cal Slope:	1.001549	1.003749
NO_2 Cal Offset:	-0.718730	0.418698

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.8	0.1	0.7	----	----
as found span	4920	80.5	800.2	800.2	0.0	785.4	780.4	5.1	1.019	1.025
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.7	0.1	0.6	----	----
high point	4920	80.5	800.2	800.2	0.0	799.7	799.6	0.1	1.001	1.001
second point	4960	40.2	399.6	399.6	0.0	402.7	401.1	1.6	0.992	0.996
third point	4980	20.1	199.8	199.8	0.0	200.4	198.5	1.9	0.997	1.006
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.1	----	----
as left span	4920	80.5	800.2	444.7	355.5	801.1	442.6	358.4	0.999	1.005
								Average Correction Factor	0.997	1.001

Corrected As found	NO_X = 784.6 ppb	NO = 780.3 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-2.0%
Previous Response	NO_X = 800.5 ppb	NO = 800.3 ppb		*Percent Change	NO =	-2.6%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	798.5	443.0	355.5	357.5	0.994	100.6%
2nd GPT point (200 ppb O3)	798.5	622.7	175.8	176.3	0.997	100.3%
3rd GPT point (100 ppb O3)	798.5	709.5	89.0	89.9	0.990	101.0%
				Average Correction Factor	0.994	100.6%

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

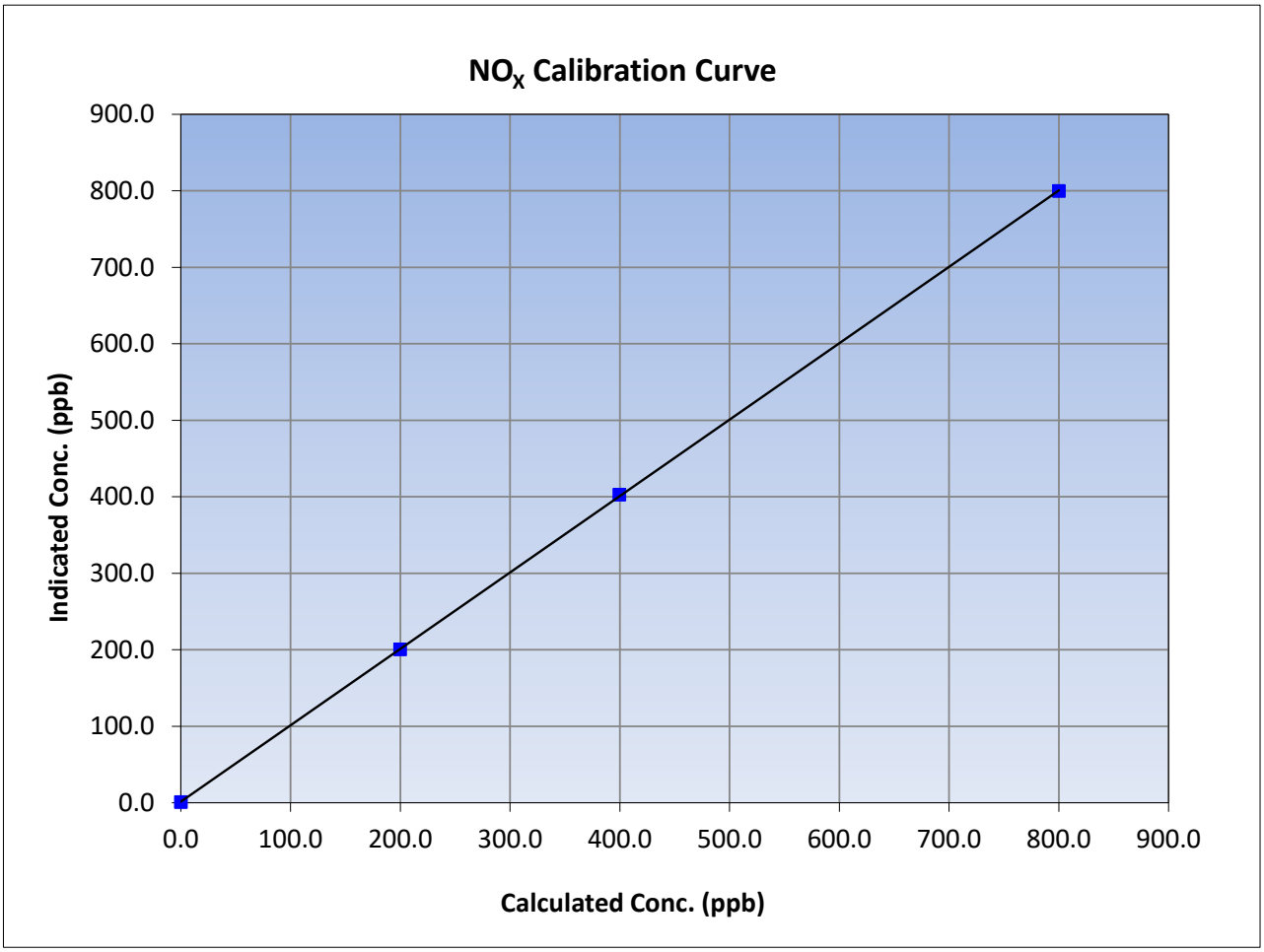
Version-04-2020

Station Information

Calibration Date:	June 1, 2023	Previous Calibration:	May 16, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:09	End Time (MST):	13:39
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	0.7	----	Correlation Coefficient	0.999981	≥0.995
800.2	799.7	1.0006			
399.6	402.7	0.9922	Slope	0.998879	0.90 - 1.10
199.8	200.4	0.9970			
			Intercept	1.384352	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

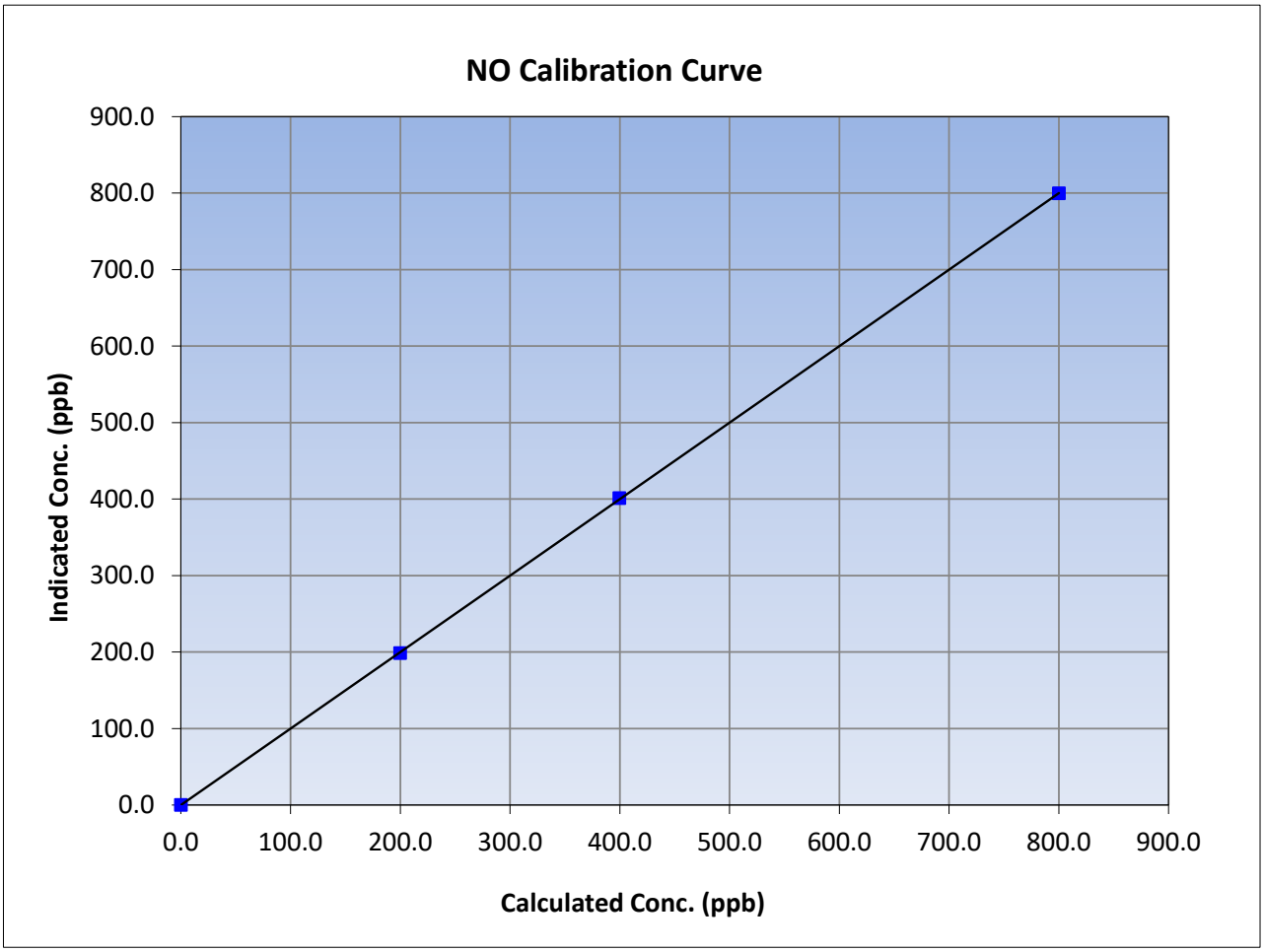
Version-04-2020

Station Information

Calibration Date:	June 1, 2023	Previous Calibration:	May 16, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:09	End Time (MST):	13:39
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	0.1	----	Correlation Coefficient	0.999988	*≥0.995*
800.2	799.6	1.0007			
399.6	401.1	0.9962	Slope	0.999937	*0.90 - 1.10*
199.8	198.5	1.0065			
			Intercept	-0.035916	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

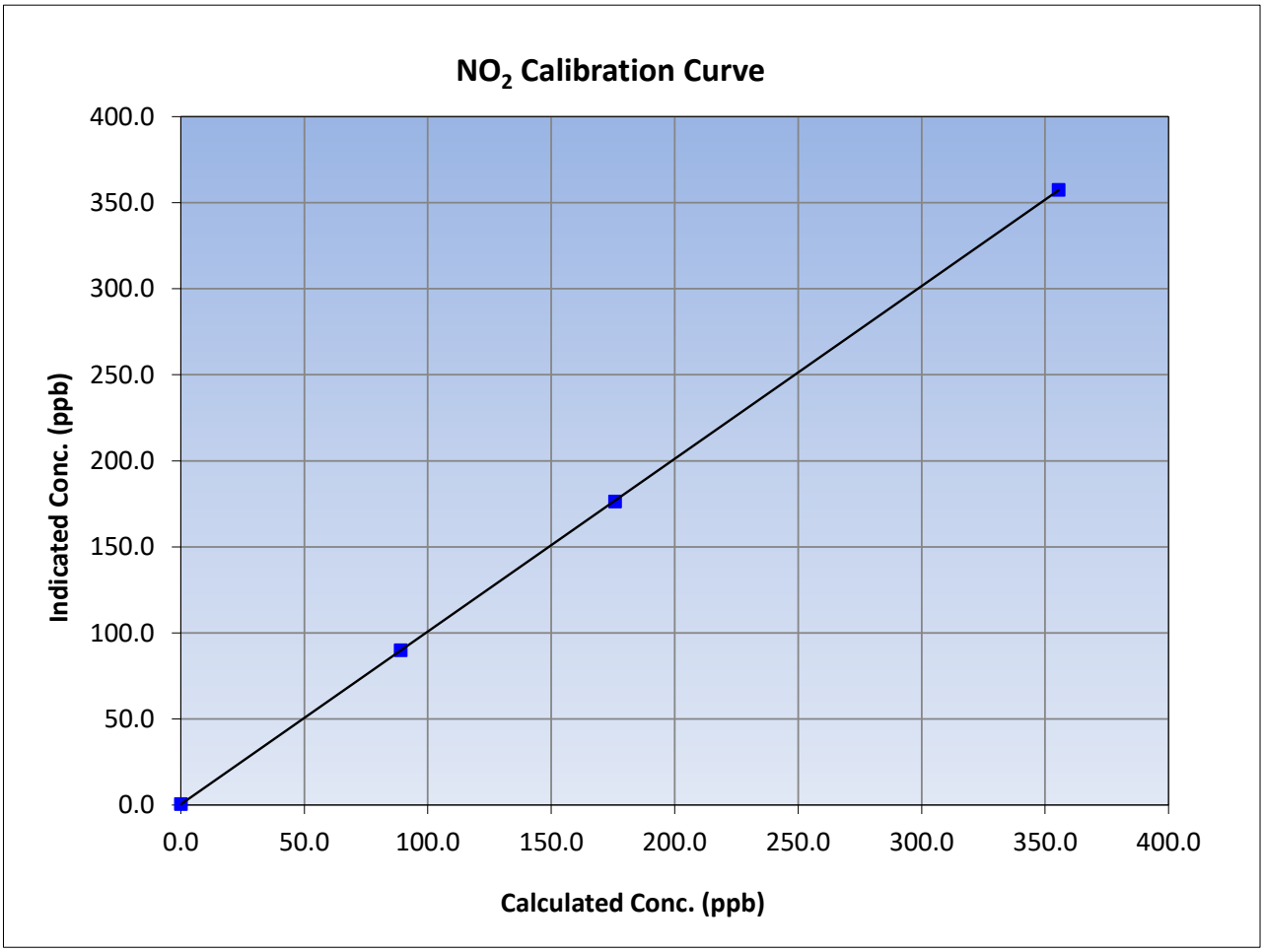
Version-04-2020

Station Information

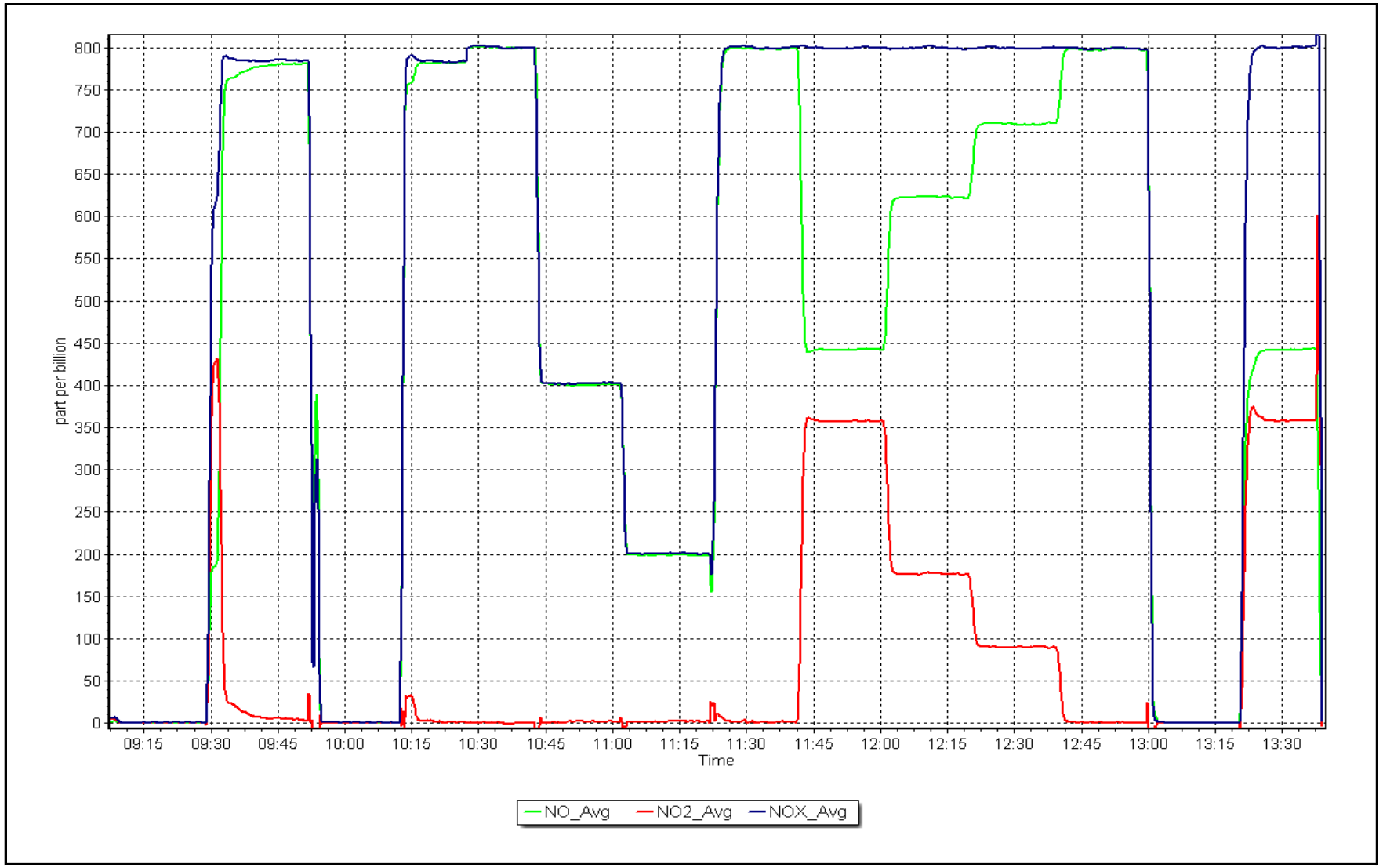
Calibration Date:	June 1, 2023	Previous Calibration:	May 16, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	9:09	End Time (MST):	13:39
Analyzer make:	Thermo 42i	Analyzer serial #:	1152430007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.6	----	Correlation Coefficient	0.999994	≥0.995
355.5	357.5	0.9944			
175.8	176.3	0.9972	Slope	1.003749	0.90 - 1.10
89.0	89.9	0.9900			
			Intercept	0.418698	+/-20



NO_X Calibration Plot Date: June 1, 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:	June 6, 2023	Last Cal Date:	May 10, 2023
Start time (MST):	12:26	End time (MST):	13:06
Analyzer Make:	API T640	S/N:	1546
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat FP-25BT	S/N:	388755
Temp/RH standard:	Alicat FP-25BT	S/N:	388755

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (^{o}C)	18.5	18.2	18.5	☐	+/- 2 ^{o}C
P (mmHg)	733.6	732.5	733.6	☐	+/- 10 mmHg
flow (LPM)	5.02	5.08	5.02	☐	+/- 0.25 LPM

Leak Test: Date of check: June 6, 2023 Last Cal Date: May 10, 2023

PM w/o HEPA: 105 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	12	12	10.8	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 117 w/ HEPA: 0.0

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

Disposable Filter Changed: June 6, 2023

Annual Maintenance

Date Sample Tube Cleaned: May 10, 2023

Date RH/T Sensor Cleaned: May 10, 2023

Notes: Leak check passed, adjusted the PMT. Instrument is very dirty due to a lot of site activity, completed the quarterly and annual maintenance.

Calibration by: Max Farrell

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS25
WASKŌW OHCI PIMÂTISIWIN
JUNE 2023

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

July 31, 2023

CALS_460

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Waskow ohci Pimatisiwin	Station number:	AMS25
Calibration Date:	June 15, 2023	Last Cal Date:	May 10, 2023
Start time (MST):	9:35	End time (MST):	13:06
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:	50.5	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:	1.000277	0.999805	Backgd or Offset:	9.7	9.7
Calibration intercept:	0.283925	0.523945	Coeff or Slope:	0.983	0.974

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	----
as found span	4921	79.2	800.5	807.0	0.992
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	----
high point	4921	79.2	800.5	800.4	1.000
second point	4960	39.6	400.3	401.7	0.997
third point	4980	19.8	200.1	200.7	0.997
as left zero	5000	0.0	0.0	0.0	----
as left span	4921	79.2	800.5	801.8	0.998
				Average Correction Factor	0.998

Baseline Corr As found:	807.00	Previous response	801.03	*% 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: Minor adjustment to span, filter changed after As Founds.

Calibration Performed By: Ryan Power

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

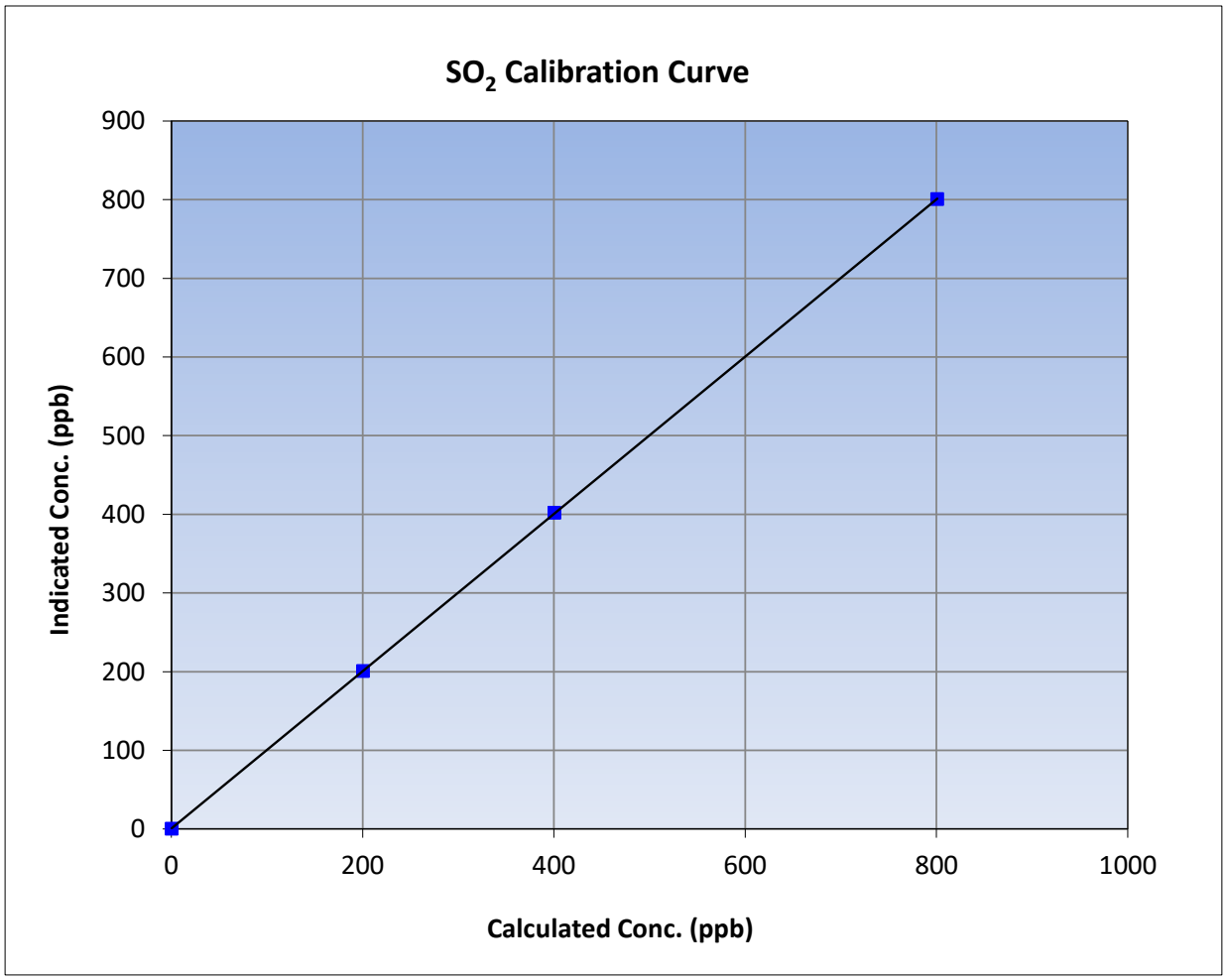
Station Information

Calibration Date:	June 15, 2023	Previous Calibration:	May 10, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	9:35	End Time (MST):	13:06
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148497

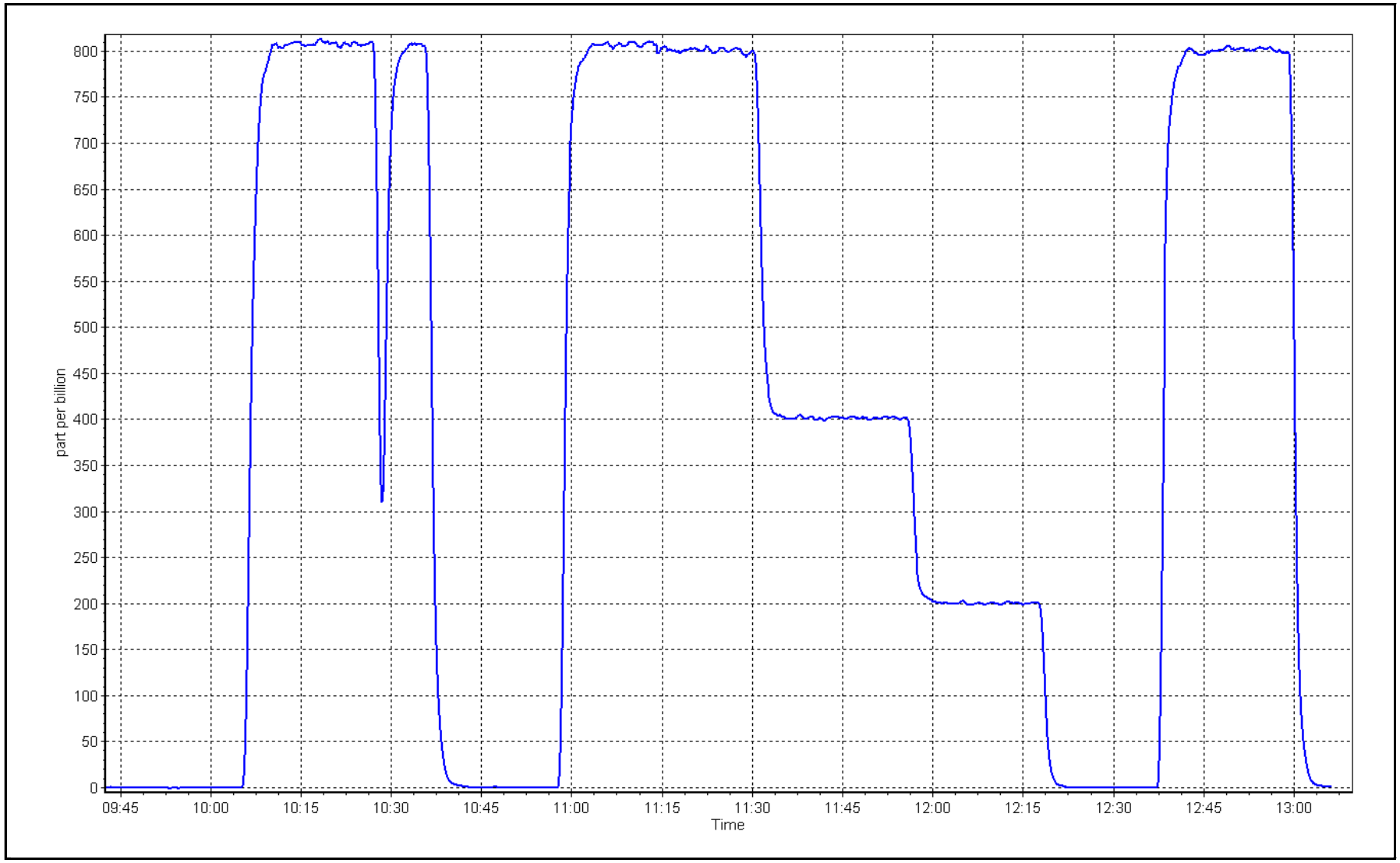
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
800.5	800.4	1.0002
400.3	401.7	0.9965
200.1	200.7	0.9972

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999996	*≥0.995*
Slope	0.999805	*0.90 - 1.10*
Intercept	0.523945	*+/-30*



SO2 Calibration Plot Date: June 15, 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:	June 20, 2023	Last Cal Date:	May 26, 2023
Start time (MST):	6:48	End time (MST):	8:05
Reason:	Removal	External Converter swap	

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:	Thermo 43C		Converter serial #:	328702539
Analyzer Range	0 - 100 ppb			

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005984		Backgd or Offset:	3.3	3.3
Calibration intercept:	0.180000		Coeff or Slope:	1.079	1.079

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4920	80.0	79.5	79.1	1.006
as found 2nd point	4960	40.0	39.7	39.9	0.998
as found 3rd point	4980	20.0	19.9	20.1	0.993
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
SO2 Scrubber Check					

Date of last scrubber change:		Ave Corr Factor	
Date of last converter efficiency test:			efficiency

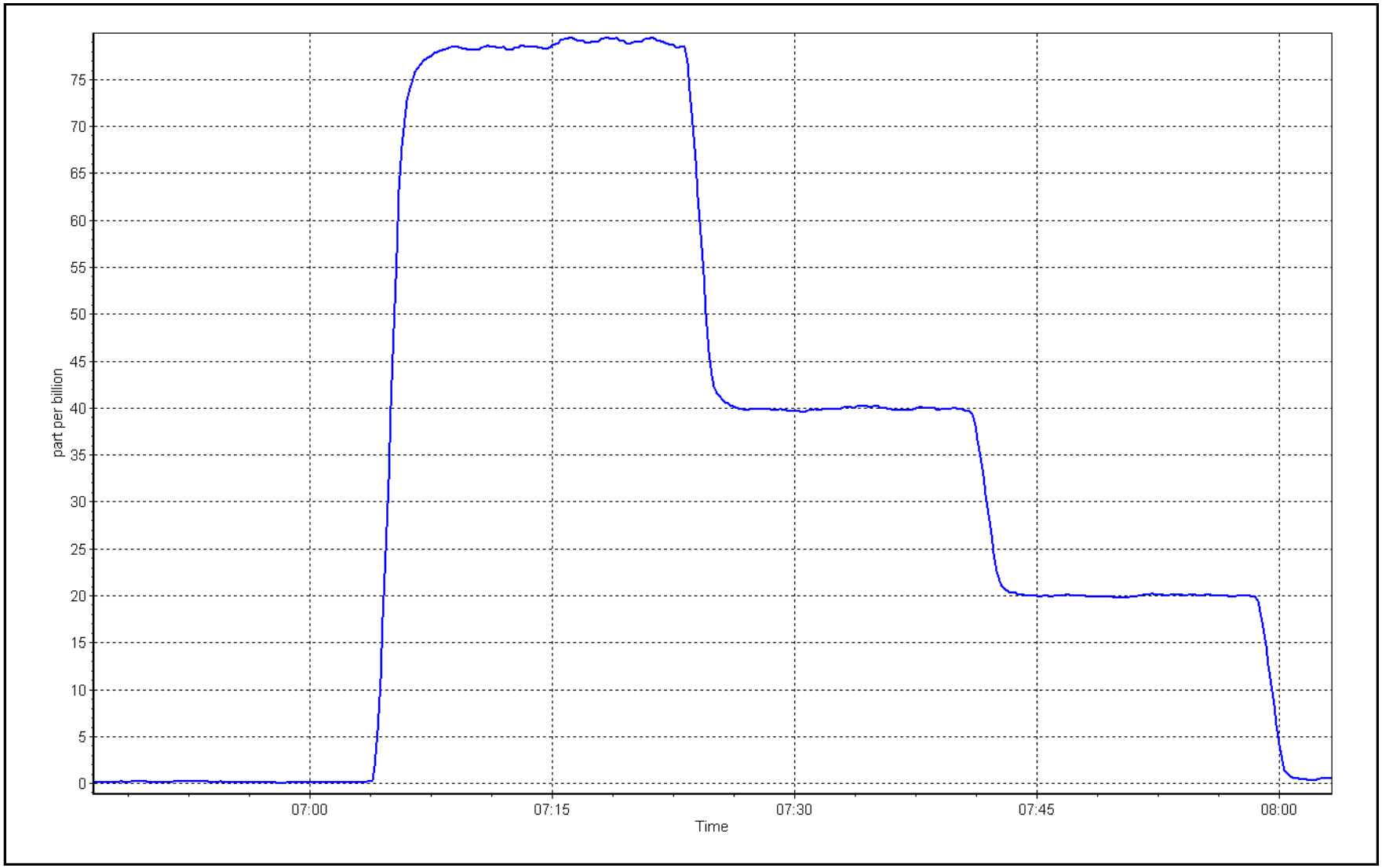
Baseline Corr As found:	79.0	Prev response:	80.11	*% change:	-1.4%
Baseline Corr 2nd AF pt:	39.8	AF Slope:	0.993614	AF Intercept:	0.260000
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999978		

* = > +/-5% change initiates investigation

Notes: External Converter swap for Sulphur Study.

Calibration Performed By: Melissa Lemay

H_2S Calibration Plot Date: June 20, 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:	June 20, 2023	Last Cal Date:	May 26, 2023
Start time (MST):	8:45	End time (MST):	11:35
Reason:	Install	External Converter swap	

Calibration Standards

Cal Gas Concentration:	4.97	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC517099			
Removed Cal Gas Conc:	4.97	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	747
ZAG Make/Model:	API T701		Serial Number:	261

Analyzer Information

Analyzer make:	Thermo 43i-LTE		Analyzer serial #:	1170050146	
Converter make:	Global G-150		Converter serial #:	2022-219	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.005984	1.012312	Backgd or Offset:	3.3	3.25
Calibration intercept:	0.180000	0.360000	Coeff or Slope:	1.079	1.079

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero					
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	0.4	----
high point	4920	80.0	79.5	80.8	0.983
second point	4960	40.0	39.7	40.6	0.979
third point	4980	20.0	19.9	20.4	0.974
as left zero	5000	0.0	0.0	0.2	----
as left span	4920	80.0	800.0	823.8	0.971
SO2 Scrubber Check	4921	79.2	800.0	0.0	----
Date of last scrubber change:		20-Jun-23		Ave Corr Factor	0.979
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: External Converter swap for Sulphur Study. Zero adjusted. SOx scrubber checked after the calibrator zero.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

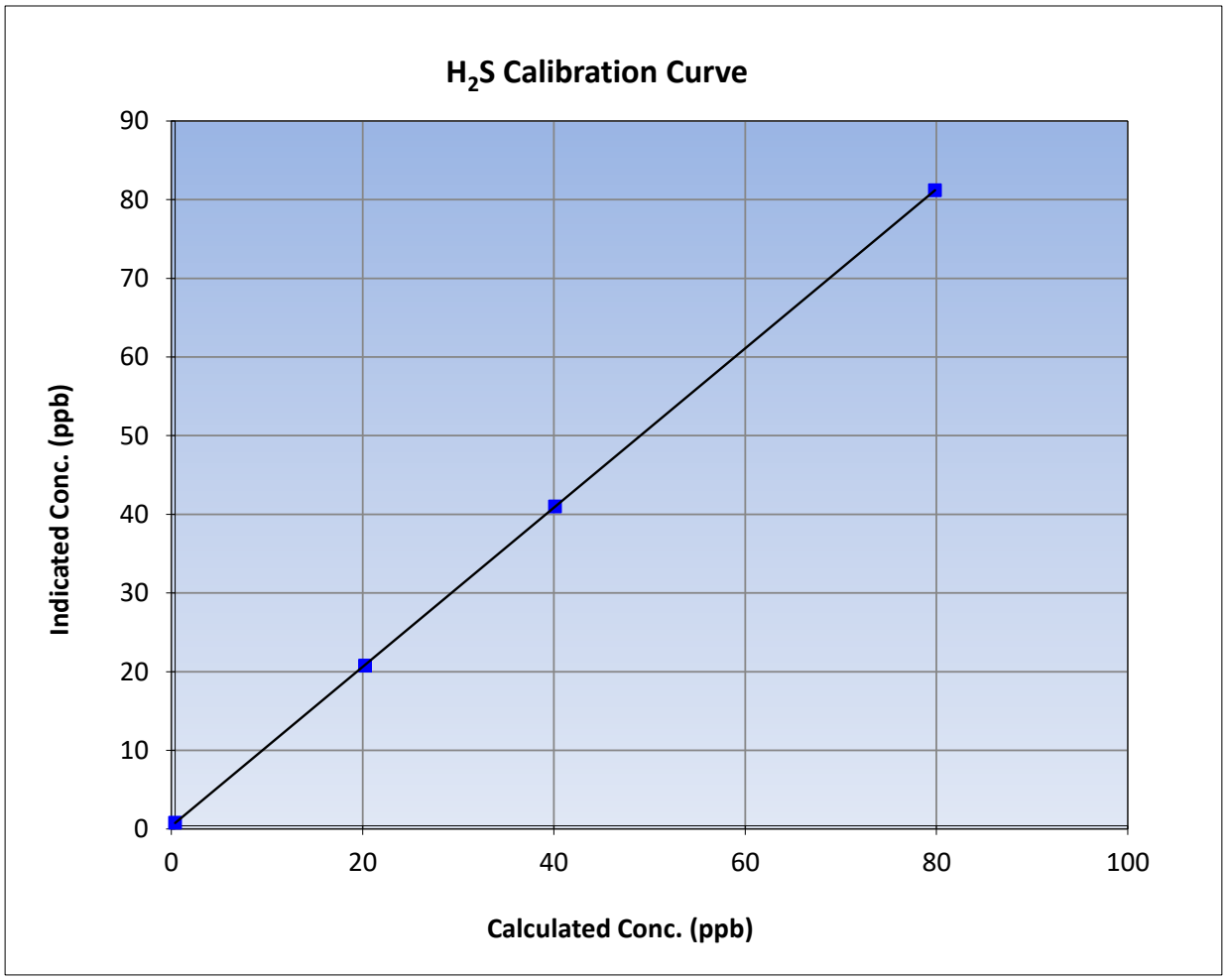
Station Information

Calibration Date:	June 20, 2023	Previous Calibration:	May 26, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	8:45	End Time (MST):	11:35
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1170050146

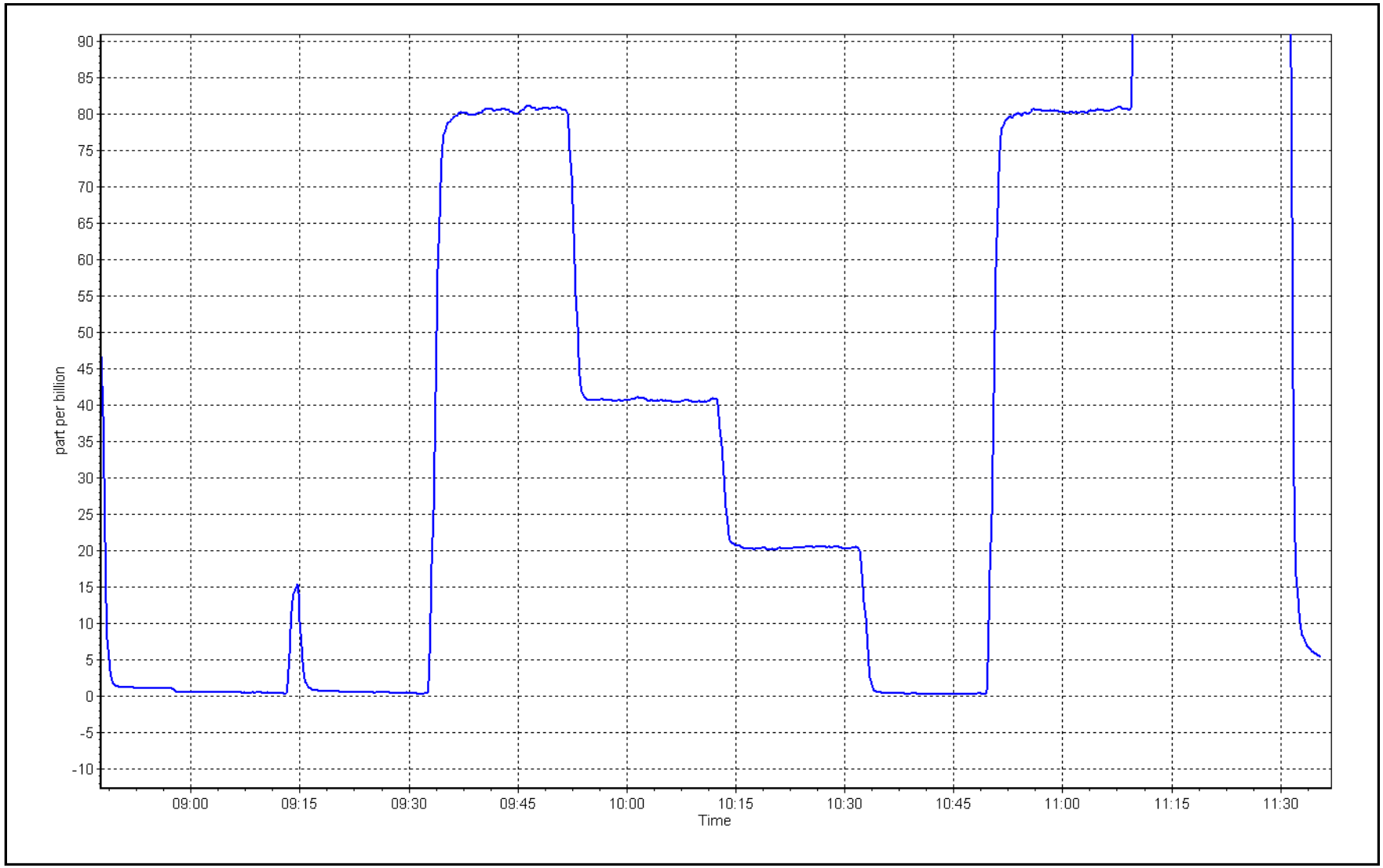
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
79.5	80.8	0.9834
39.7	40.6	0.9785
19.9	20.4	0.9737

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999998	*≥0.995*
Slope	1.012312	*0.90 - 1.10*
Intercept	0.360000	*+/-3*



H_2S Calibration Plot Date: June 20, 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:	June 30, 2023	Last Cal Date:	June 20, 2023
Start time (MST):	5:35	End time (MST):	9:23
Reason:	Maintenance	Calibration after Sulphur Study	

Calibration Standards

Cal Gas Concentration:	4.97	ppm	Cal Gas Exp Date:	January 3, 2026
Cal Gas Cylinder #:	CC517099			
Removed Cal Gas Conc:	4.97	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	747
ZAG Make/Model:	API T701		Serial Number:	261

Analyzer Information

Analyzer make:	Thermo 43i-LTE		Analyzer serial #:	1170050146	
Converter make:	Global G-150		Converter serial #:	2022-219	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.012312	0.996347	Backgd or Offset:	3.25	3.25
Calibration intercept:	0.360000	0.040000	Coeff or Slope:	1.079	1.079

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4920	80.0	79.5	78.7	1.008
as found 2nd point	4960	40.0	39.7	39.8	0.996
as found 3rd point	4980	20.0	19.9	19.7	1.003
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4920	80.0	79.5	79.1	1.005
second point	4960	40.0	39.7	39.8	0.998
third point	4980	20.0	19.9	19.9	0.998
as left zero	5000	0.0	0.0	0.0	----
as left span	4920	80.0	800.0	799.3	1.001
SO2 Scrubber Check	4921	79.2	800.0	0.0	----
Date of last scrubber change:		20-Jun-23		Ave Corr Factor	1.000
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	78.8	Prev response:	80.79	*% change:	-2.5%
Baseline Corr 2nd AF pt:	39.9	AF Slope:	0.992032	AF Intercept:	0.040000
Baseline Corr 3rd AF pt:	19.8	AF Correlation:	0.999950		

* = > +/-5% change initiates investigation

Notes: Calibration after the Sulphur Study. SOx scrubber checked after the calibrator zero. No adjustments done.

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

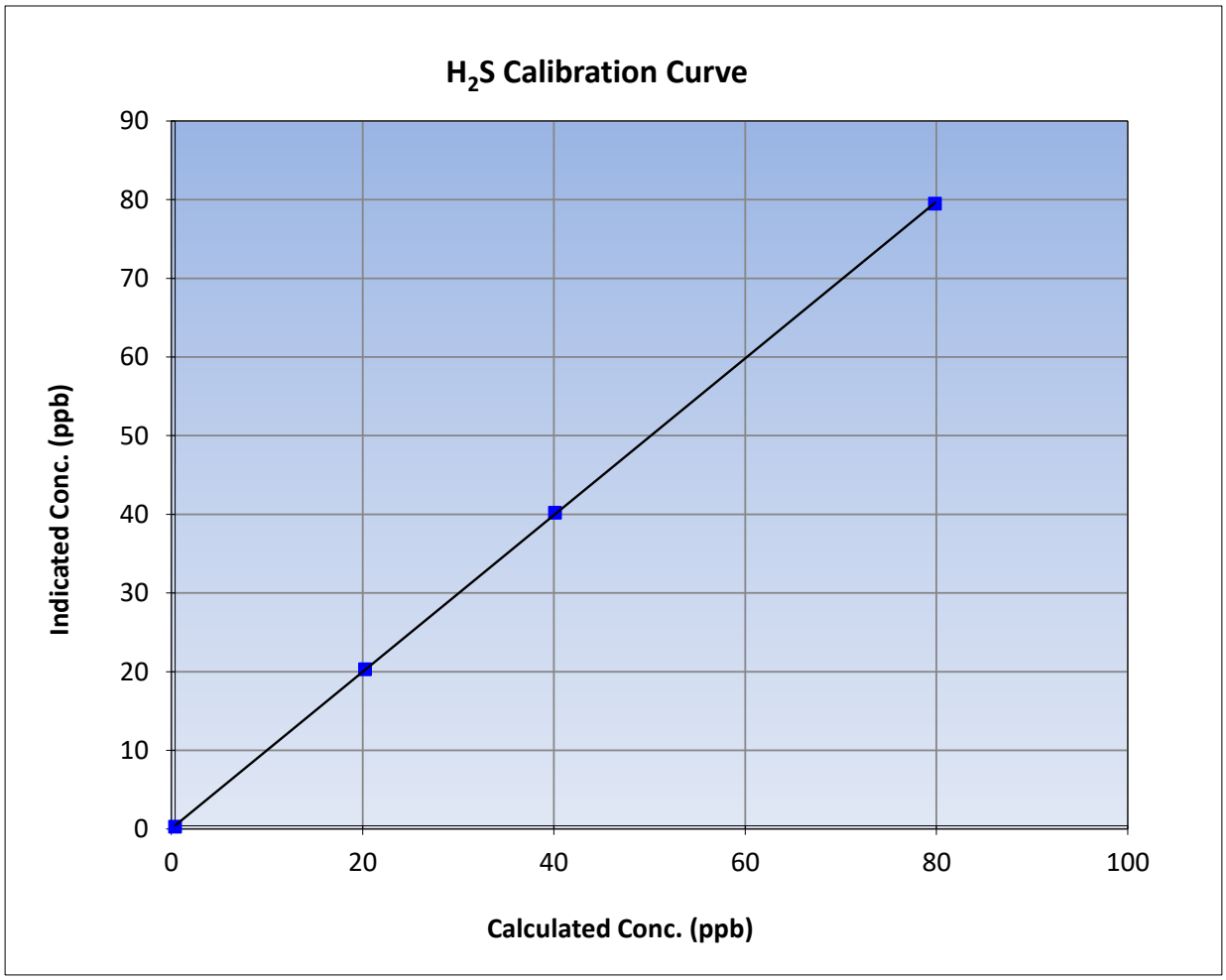
Station Information

Calibration Date:	June 30, 2023	Previous Calibration:	June 20, 2023
Station Name:	Waskow ohci Pimatisiwin	Station Number:	AMS25
Start Time (MST):	5:35	End Time (MST):	9:23
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1170050146

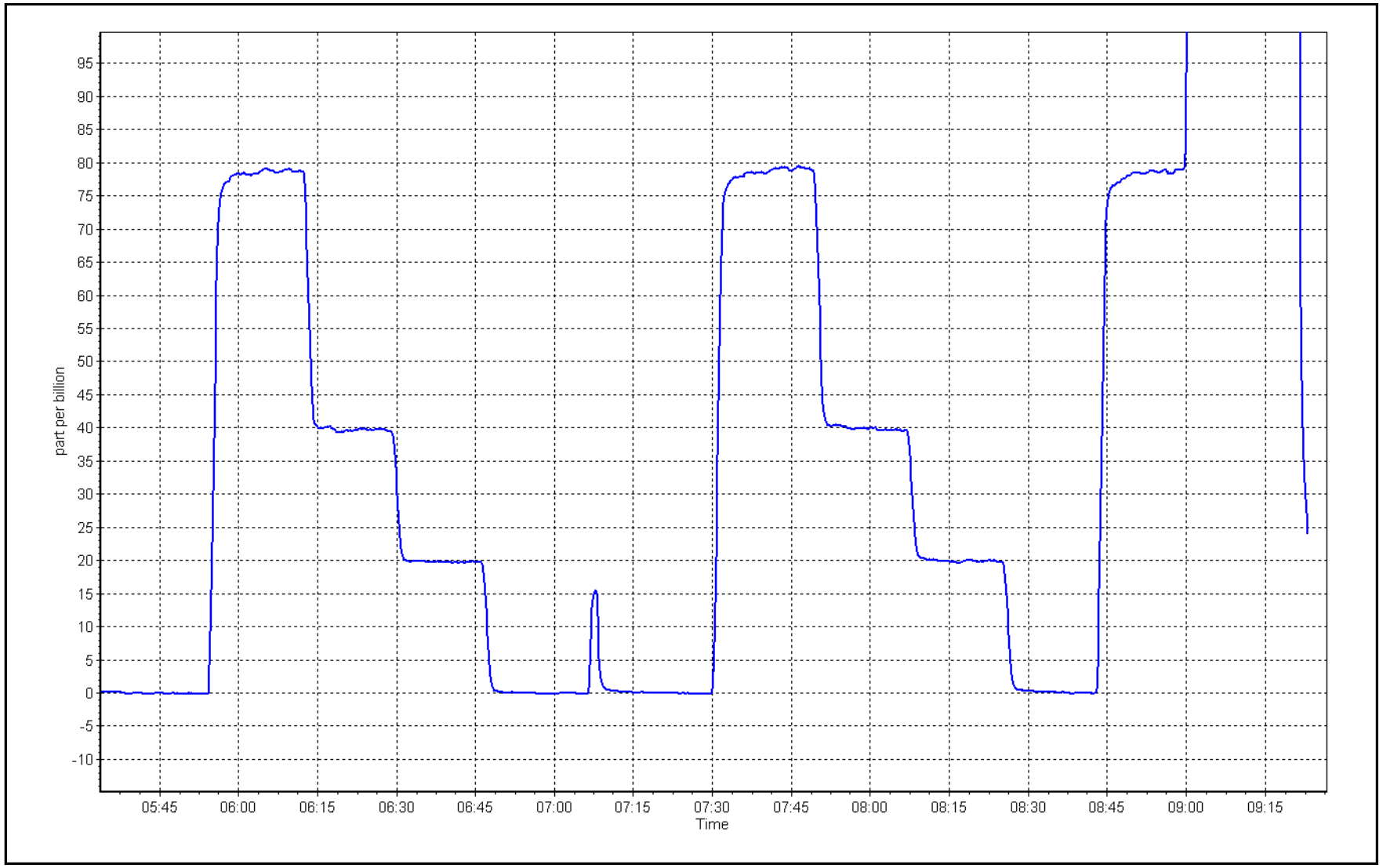
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
79.5	79.1	1.0045
39.7	39.8	0.9982
19.9	19.9	0.9982

Statistical Evaluation		Limits
Correlation Coefficient	0.999980	≥0.995
Slope	0.996347	0.90 - 1.10
Intercept	0.040000	+/-3



H_2S Calibration Plot Date: June 30, 2023 Location: Waskow ohci Pimatisiwin



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS26
CHRISTINA LAKE
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Christina Lake	Station number:	AMS 26
Calibration Date:	June 1, 2023	Last Cal Date:	May 9, 2023
Start time (MST):	11:35	End time (MST):	17:14
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	49.56	ppm	Cal Gas Exp Date:	February 23, 2025
Cal Gas Cylinder #:	CC362134			
Removed Cal Gas Conc:	49.56	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	2447
ZAG Make/Model:	API T701H		Serial Number:	832

Analyzer Information

Analyzer make: Thermo 43i — Analyzer serial #: 1173410001

Analyzer Range 0 - 1000 ppb

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.017133	1.001939	Backgd or Offset:	16.6	16.1
Calibration intercept:	-1.819322	-2.456875	Coeff or Slope:	0.929	0.900

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.5	----
as found span	4919	80.6	799.0	823.9	0.970
as found 2nd point	4960	40.3	399.4	408.4	0.978
as found 3rd point	4980	20.2	200.2	200.4	0.999
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	----
high point	4919	80.6	799.0	799.8	0.999
second point	4960	40.3	399.4	395.4	1.010
third point	4980	20.2	200.2	195.9	1.022
as left zero	5000	0.0	0.0	0.3	----
as left span	4919	80.6	799.0	807.7	0.989
				Average Correction Factor	1.010

Baseline Corr As found:	823.40	Previous response	810.84	*% change	1.5%
Baseline Corr 2nd AF pt:	407.90	AF Slope:	1.032798	AF Intercept:	-2.821673
Baseline Corr 3rd AF pt:	199.90	AF Correlation:	0.999925		

* = > +/-5% change initiates investigation

Notes: Changed sample inlet filter and zero/span valve after multi point as founds. Adjusted span only.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

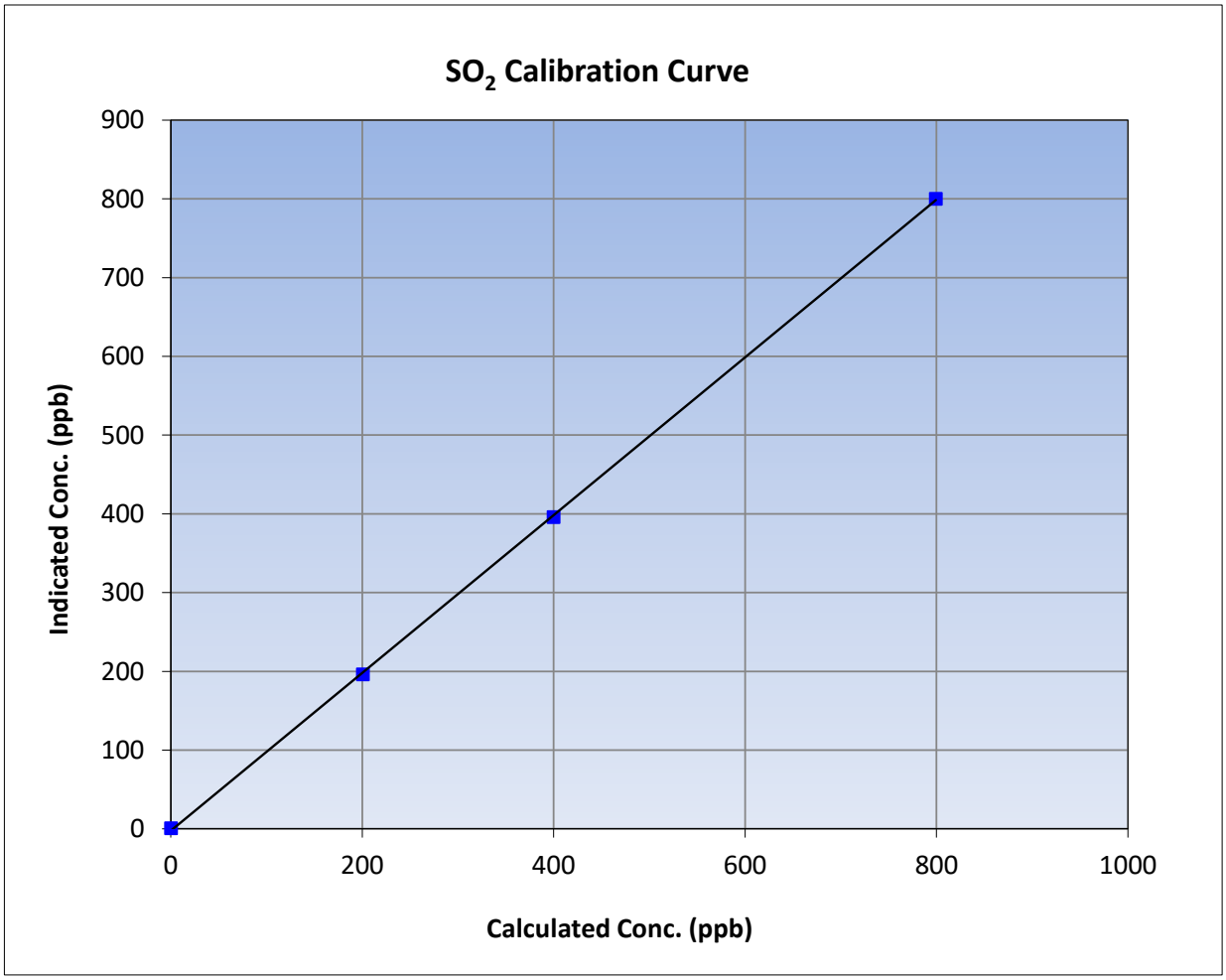
Station Information

Calibration Date:	June 1, 2023	Previous Calibration:	May 9, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	11:35	End Time (MST):	17:14
Analyzer make:	Thermo 43i	Analyzer serial #:	1173410001

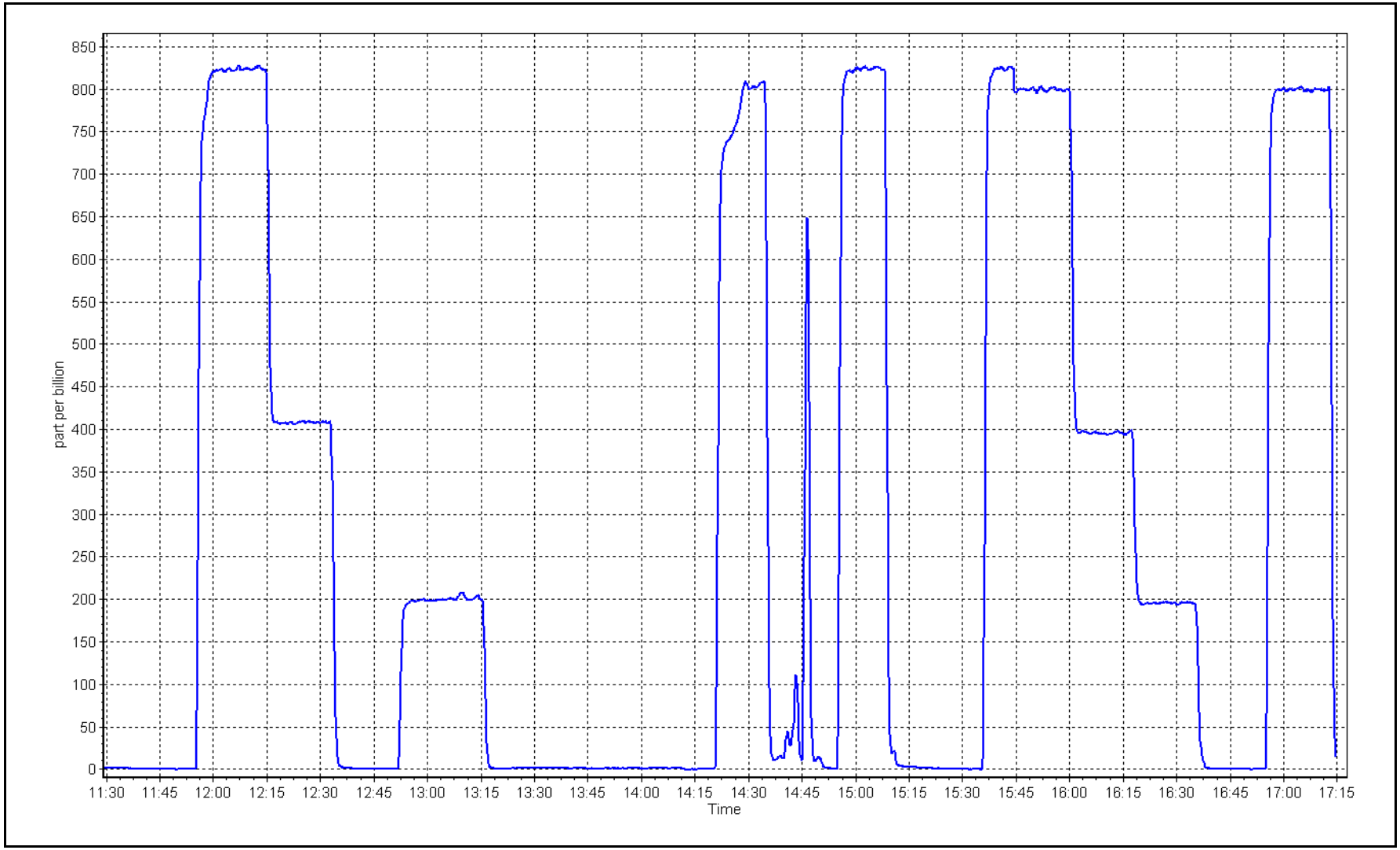
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.4	----
799.0	799.8	0.9990
399.4	395.4	1.0102
200.2	195.9	1.0220

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999938	*≥0.995*
Slope	1.001939	*0.90 - 1.10*
Intercept	-2.456875	*+/-30*



SO2 Calibration Plot Date: June 1, 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:	June 14, 2023	Last Cal Date:	May 30, 2023
Start time (MST):	11:17	End time (MST):	15:09
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	4.89	ppm	Cal Gas Exp Date:	February 9, 2024
Cal Gas Cylinder #:	EY0002466			
Removed Cal Gas Conc:	4.89	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	2447
ZAG Make/Model:	API T701H		Serial Number:	832

Analyzer Information

Analyzer make:	Thermo 450i		Analyzer serial #:	1180030032	
Converter make:	NA		Converter serial #:	NA	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.035031	1.010753	Backgd or Offset:	35.4	35.0
Calibration intercept:	-0.240256	-0.140775	Coeff or Slope:	1.125	1.093

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.1	----
as found span	4918	81.8	80.0	83.0	0.965
as found 2nd point	4959	40.9	40.0	41.2	0.973
as found 3rd point	4979	20.4	20.0	20.4	0.983
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4918	81.8	80.0	80.9	0.989
second point	4959	40.9	40.0	40.0	1.000
third point	4979	20.4	20.0	19.9	1.003
as left zero	5000	0.0	0.0	0.3	----
as left span	4918	81.8	80.0	80.6	0.993
SO2 Scrubber Check	4919	80.6	806.1	0.0	----
Date of last scrubber change:		27-Feb-19		Ave Corr Factor	0.997
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	82.9	Prev response:	82.57	*% change:	0.4%
Baseline Corr 2nd AF pt:	41.1	AF Slope:	1.037318	AF Intercept:	-0.120291
Baseline Corr 3rd AF pt:	20.3	AF Correlation:	0.999966		

* = > +/-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

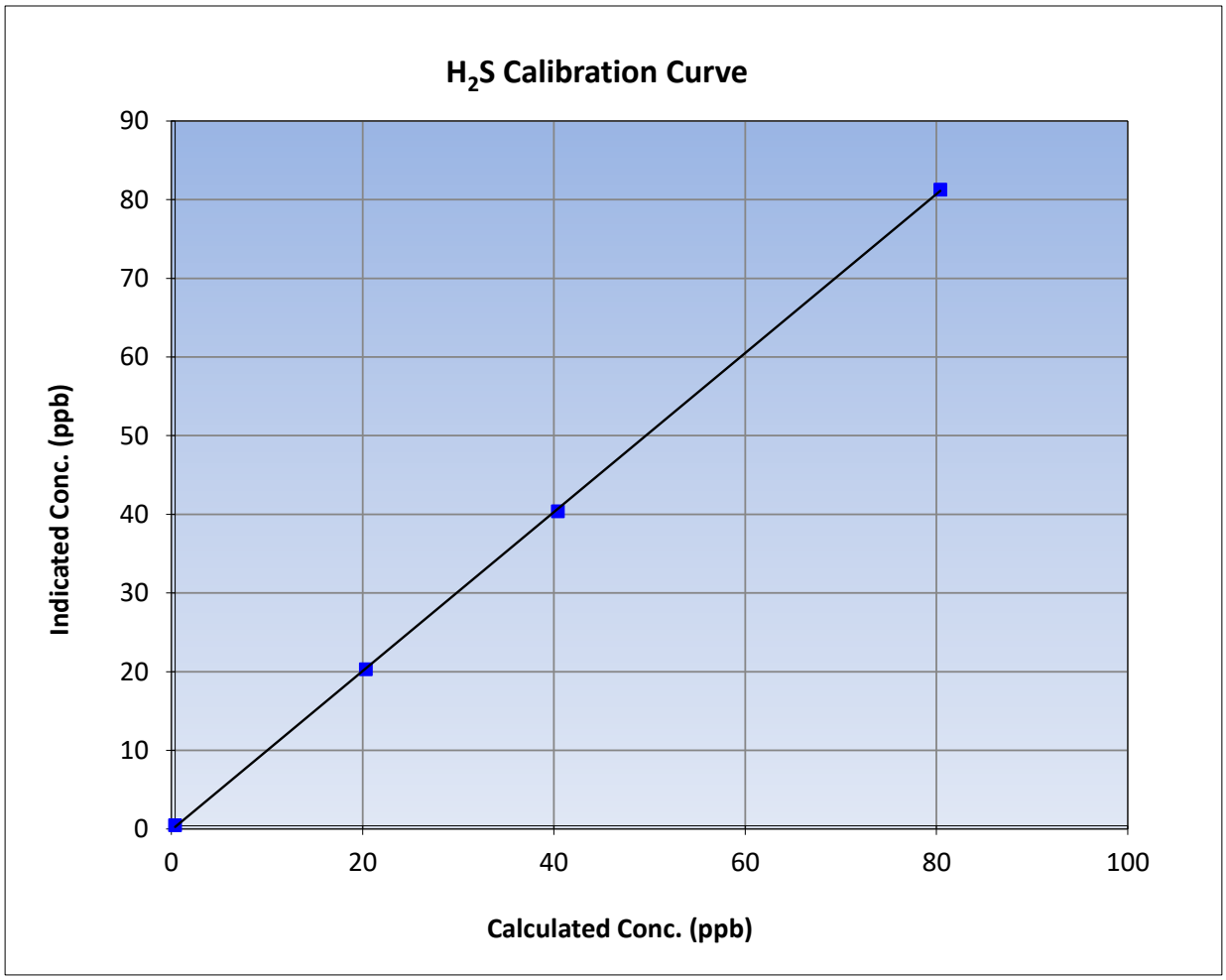
Station Information

Calibration Date:	June 14, 2023	Previous Calibration:	May 30, 2023
Station Name:	Christina Lake	Station Number:	AMS26
Start Time (MST):	11:17	End Time (MST):	15:09
Analyzer make:	Thermo 450i	Analyzer serial #:	1180030032

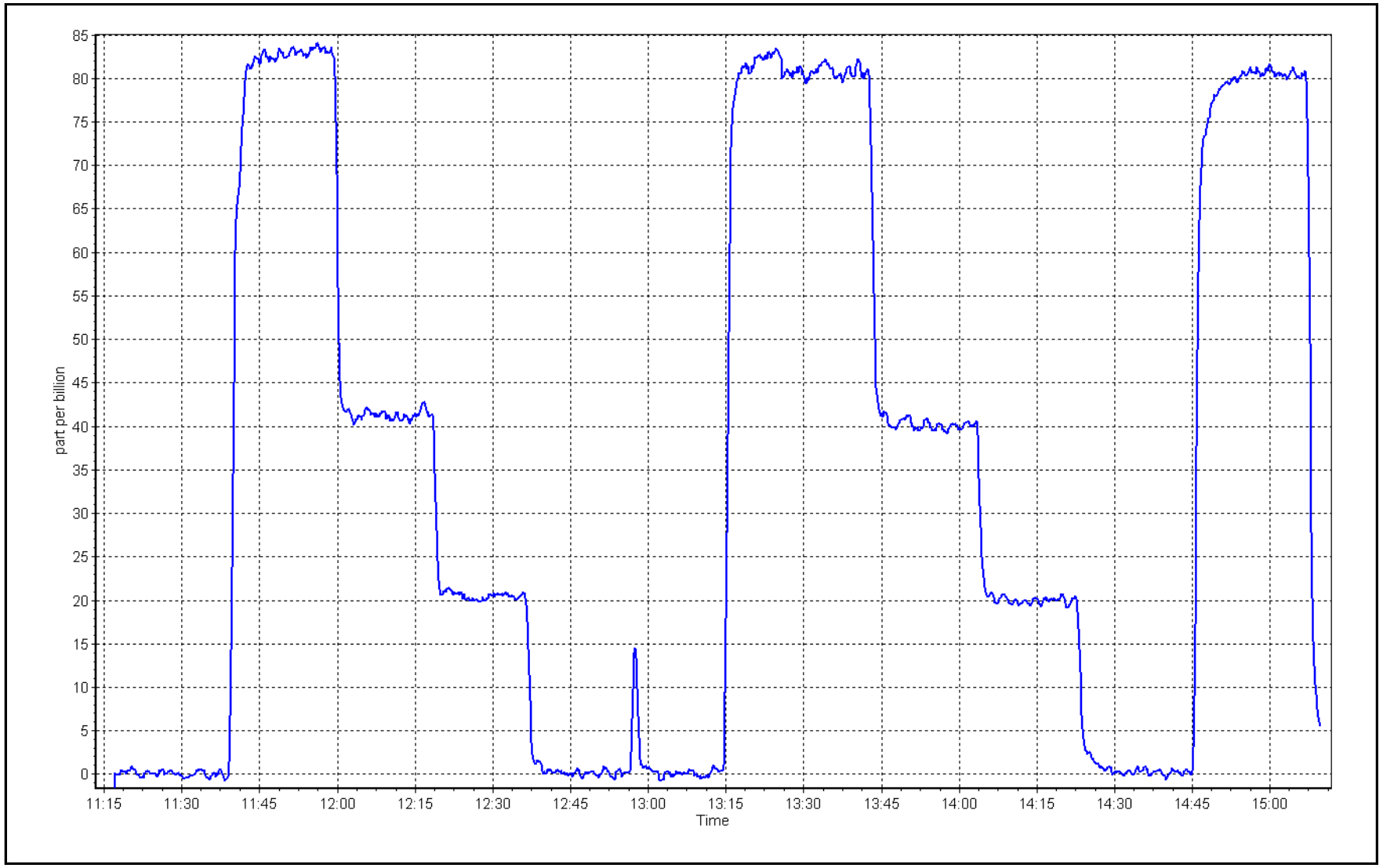
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.9	0.9889
40.0	40.0	1.0000
20.0	19.9	1.0027

Statistical Evaluation		Limits
Correlation Coefficient	0.999947	≥0.995
Slope	1.010753	0.90 - 1.10
Intercept	-0.140775	+/-3



H_2S Calibration Plot Date: June 14, 2023 Location: Christina Lake



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Christina Lake	Station number:	AMS 26
Calibration Date:	June 15, 2023	Last Cal Date:	May 31, 2023
Start time (MST):	14:53	End time (MST):	19:44
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:	T2Y1P4C		Cal Gas Expiry Date:	November 12, 2023	
NOX Cal Gas Conc:	50.82	ppm	NO Cal Gas Conc:	50.02	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	50.82	ppm	Removed Gas NO Conc:	50.02	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	2447	
ZAG make/model:	API T701H		Serial Number:	832	

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.795	1.887	NO bkgnd or offset:	3.4	3.6
NOX coeff or slope:	0.997	0.995	NOX bkgnd or offset:	4.0	4.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	202.8	212.8

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.003078	1.003570
NO_X Cal Offset:	-1.760000	-1.960000
NO Cal Slope:	1.002199	1.003127
NO Cal Offset:	-2.660000	-3.060000
NO_2 Cal Slope:	1.007991	1.001715
NO_2 Cal Offset:	0.778153	-0.246575

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.1	-0.4	----	----
as found span	4920	80.0	813.1	800.3	12.8	776.4	759.2	17.3	1.0473	1.0542
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	4920	80.0	813.1	800.3	12.8	814.9	801.3	13.7	0.9978	0.9988
second point	4960	40.0	406.6	400.2	6.4	405.2	396.8	8.4	1.0034	1.0085
third point	4980	20.0	203.3	200.1	3.2	200.4	194.6	5.8	1.0144	1.0282
as left zero	5000	0.0	0.0	0.0	0.0	-0.3	0.0	-0.4	----	----
as left span	4920	80.0	813.1	394.4	418.7	814.8	394.3	420.5	0.9979	1.0003
								Average Correction Factor	1.0052	1.0118

Corrected As found	NO_X = 776.9 ppb	NO = 759.3 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-4.8%
Previous Response	NO_X = 813.9 ppb	NO = 799.4 ppb		*Percent Change	NO =	-5.3%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.6	391.7	418.7	419.3	0.9986	100.1%
2nd GPT point (200 ppb O3)	797.6	591.9	218.5	218.2	1.0014	99.9%
3rd GPT point (100 ppb O3)	797.6	697.7	112.7	113.0	0.9973	100.3%
				Average Correction Factor	0.9991	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

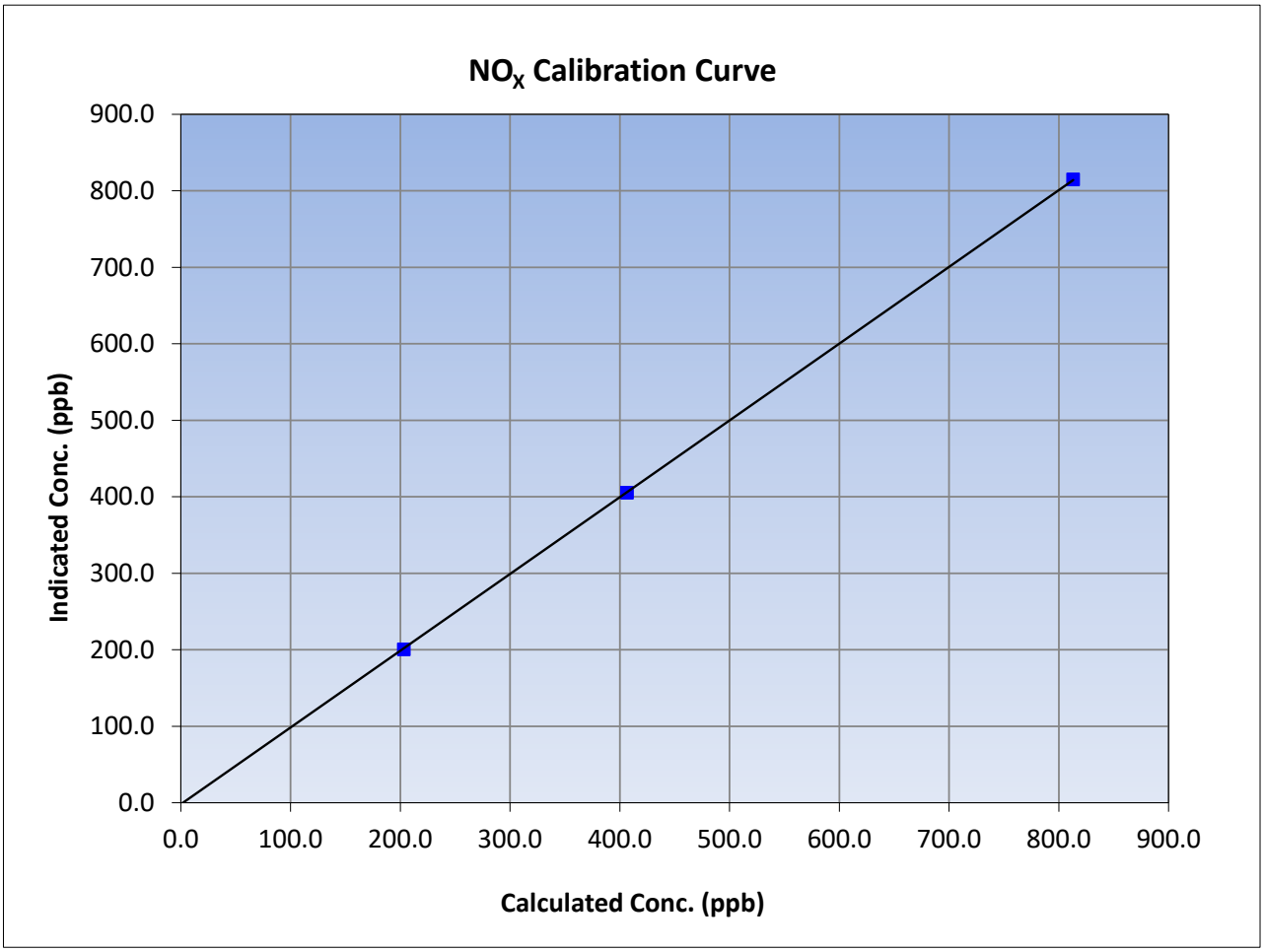
Version-04-2020

Station Information

Calibration Date:	June 15, 2023	Previous Calibration:	May 31, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	14:53	End Time (MST):	19:44
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	-0.3	----	Correlation Coefficient	0.999981	≥0.995
813.1	814.9	0.9978			
406.6	405.2	1.0034	Slope	1.003570	0.90 - 1.10
203.3	200.4	1.0144			
			Intercept	-1.960000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

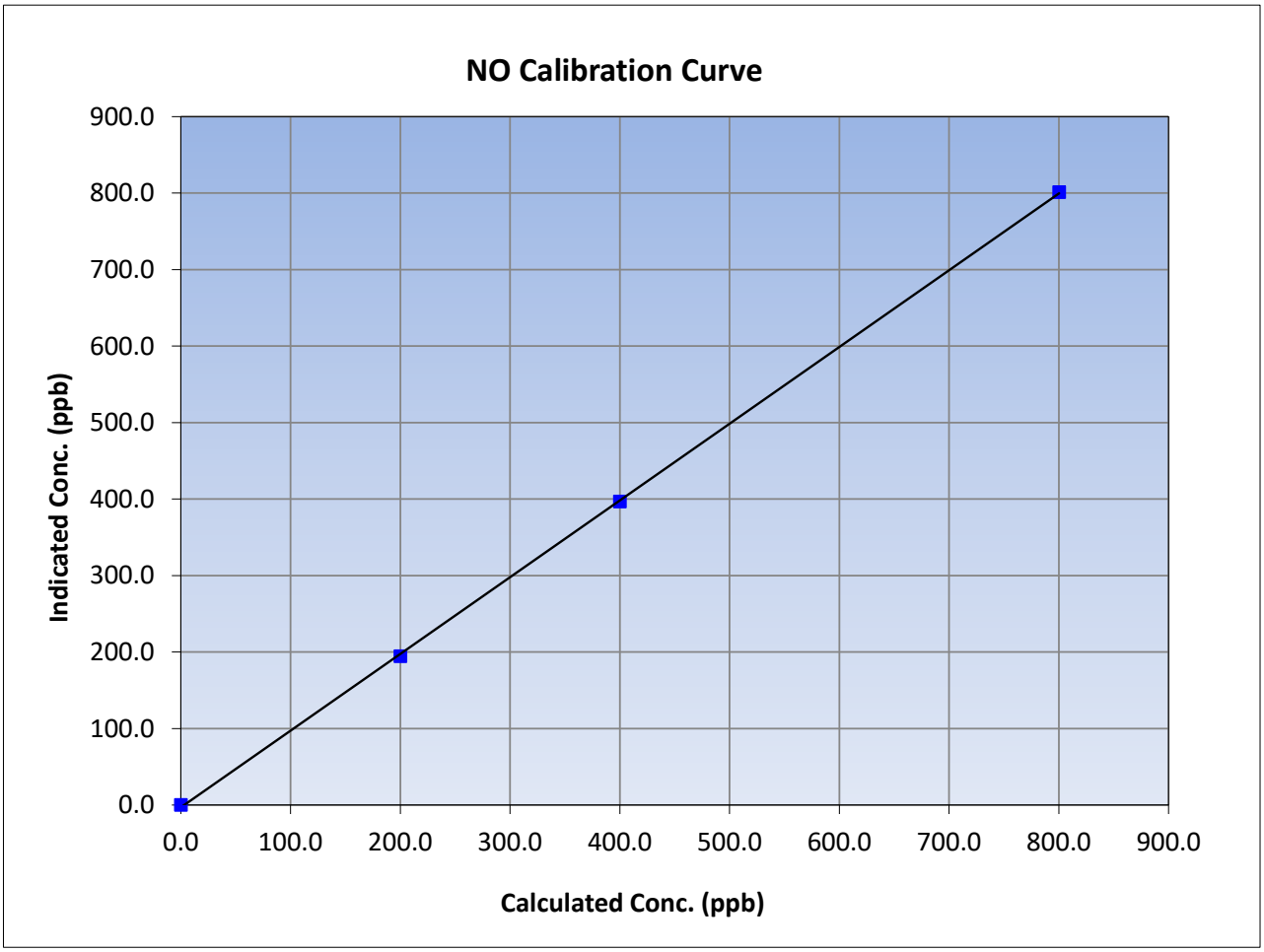
Version-04-2020

Station Information

Calibration Date:	June 15, 2023	Previous Calibration:	May 31, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	14:53	End Time (MST):	19:44
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	0.999934	≥0.995
800.3	801.3	0.9988			
400.2	396.8	1.0085	Slope	1.003127	0.90 - 1.10
200.1	194.6	1.0282			
			Intercept	-3.060000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

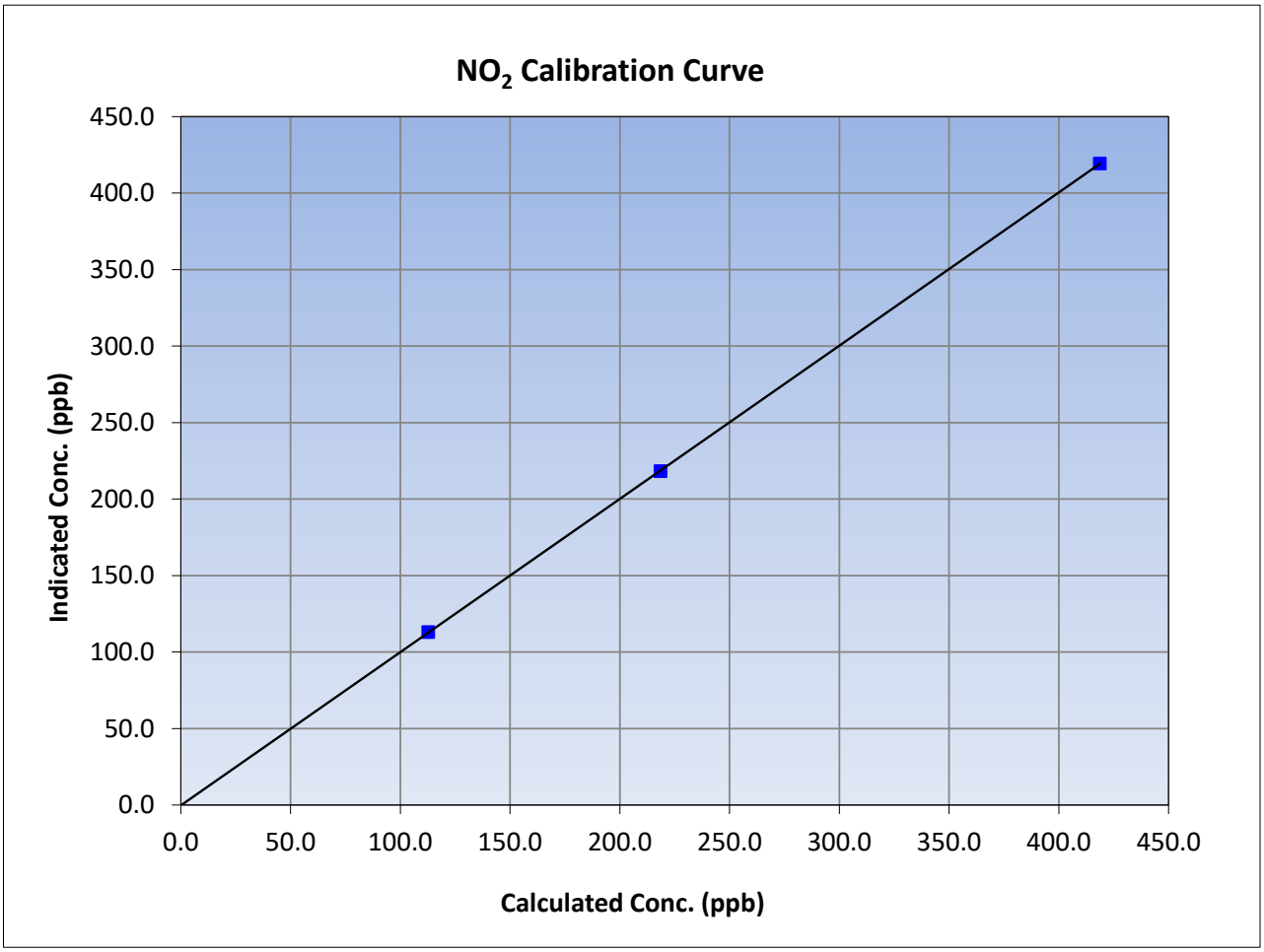
Version-04-2020

Station Information

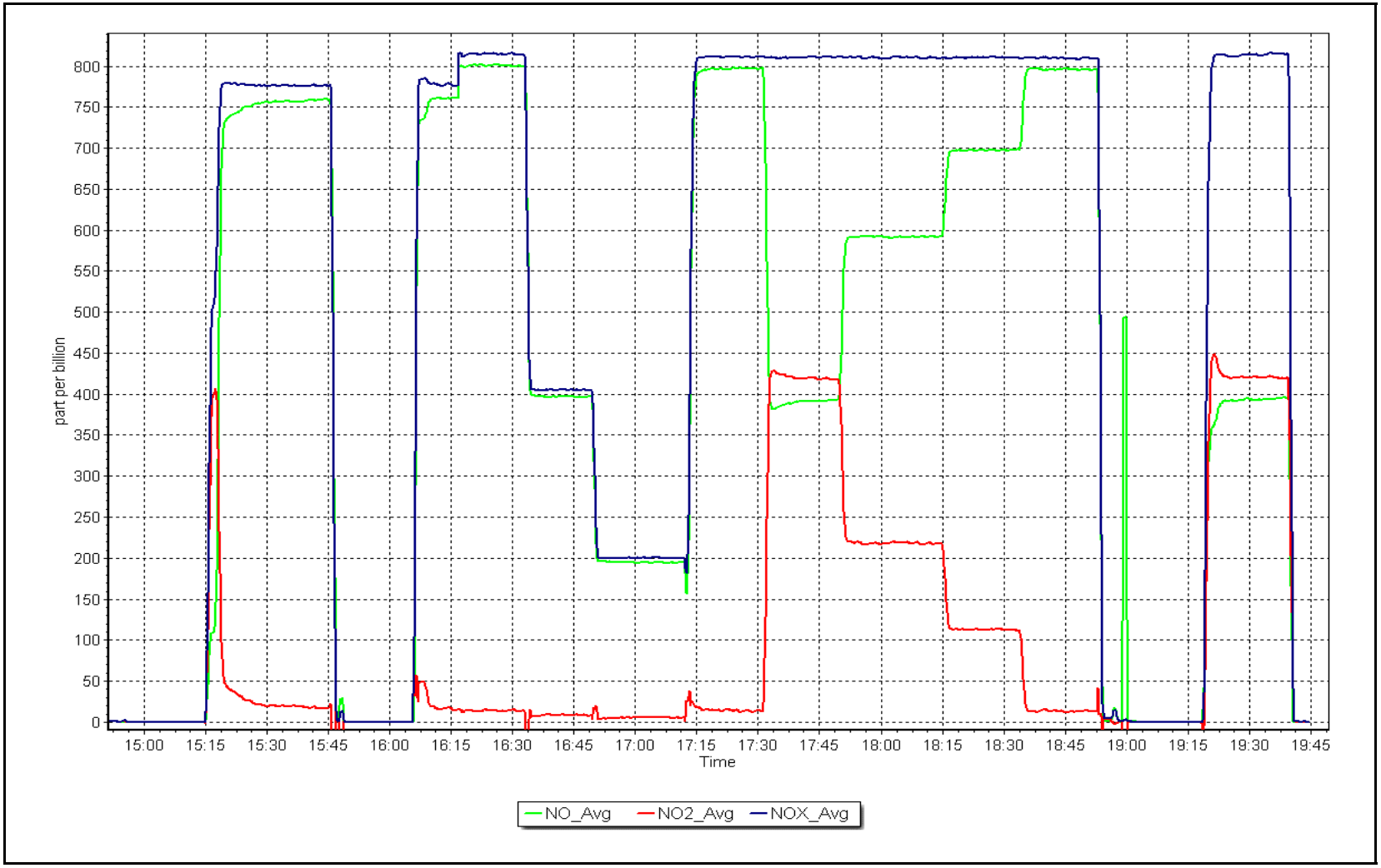
Calibration Date:	June 15, 2023	Previous Calibration:	May 31, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	14:53	End Time (MST):	19:44
Analyzer make:	Thermo 42i	Analyzer serial #:	1173480006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.3	----	Correlation Coefficient	0.999997	≥0.995
418.7	419.3	0.9986			
218.5	218.2	1.0014	Slope	1.001715	0.90 - 1.10
112.7	113.0	0.9973			
			Intercept	-0.246575	+/-20



NO_X Calibration Plot Date: June 15, 2023 Location: Christina Lake



Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Christina Lake	Station Number:	AMS 26
Calibration Date:	June 15, 2023	Prev Cal Date:	August 24, 2022
Start Time (MST):	14:10	End Time (MST):	15:10
Tower Height (m):	10.0	Reason:	Removal

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	Y18361
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	0.0	-100.0%
400	39.4	0.0	-100.0%
600	58.6	0.0	-100.0%
800	77.8	0.0	-100.0%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)		#DIV/0!	*≥0.9995*
Calculated slope		#DIV/0!	*0.90 - 1.10*
Calculated intercept		#DIV/0!	*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	W23733
As Found Declination (deg east of True North):	13.3	As Left Declination (deg east of True North):	13.3
Solar noon time (MST):	12:23	Calc Declination*:	13.3 Degrees
Deadband calc:	333.0 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	16.8	---
90	20.4	-19.5%
180	29.7	-42.1%
270	36.2	-65.5%
356	40.8	-88.3%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)			*≥0.9995*
Calculated slope		13.770550	*0.90 - 1.10*
Calculated intercept		-217.254137	*+/- 4*

Notes: As founds before removal.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Christina Lake	Station Number:	AMS 26
Calibration Date:	June 15, 2023	Prev Cal Date:	NA
Start Time (MST):	15:20	End Time (MST):	17:59
Tower Height (m):	10.0	Reason:	Install

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	P22395
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	20.1	-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		0.998858	*0.90 - 1.10*
Calculated intercept		0.034341	*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	N13744
As Found Declination (deg east of True North):	13.3	As Left Declination (deg east of True North):	13.3
Solar noon time (MST):	12:23	Calc Declination*:	13.3 Degrees
Deadband calc:	1.9 degrees (*Limit 4 deg*)		* - calculated declination as per NOAA website

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	% Error (based on 357° FS) *Limit = +/- 1.0%*
0	1.8	---
90	89.9	0.0%
180	179.4	-0.2%
270	268.6	-0.4%
354	356.9	0.8%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)			*≥0.9995*
Calculated slope		0.999057	*0.90 - 1.10*
Calculated intercept		-0.353341	*+/- 4*

Notes: WS and WD install. Bearings good. No issues to note. Realigned tower using solar noon.

Calibration Performed By: Mohammed Kashif

Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Christina Lake	Station Number:	AMS 26	
Calibration Date:	June 30, 2023	Prev Cal Date:	June 15, 2023	
Start Time (MST):	13:03	End Time (MST):	13:55	
Tower Height (m):	10.0	Reason:	As Found	To test the sensor

Wind Speed Information

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

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

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

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	N13744	
As Found Declination (deg east of True North):	13.3	As Left Declination (deg east of True North):	13.3	
Solar noon time (MST):	13:27	Calc Declination*:	13.3	Degrees
Deadband calc:	5.1 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	2.8	---
90	90.9	0.3%
180	179.7	-0.1%
270	269.1	-0.3%
355	354.7	-0.1%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)			*≥0.9995*
Calculated slope		1.009074	*0.90 - 1.10*
Calculated intercept		-2.058121	*+/- 4*

Notes: Perfomed WD as founds only since it was not trending similar to nearby stations.

Calibration Performed By: Mohammed Kashif

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS27
JACKFISH 2/3
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Jackfish 2/3	Station number:	AMS 27
Calibration Date:	June 1, 2023	Last Cal Date:	May 1, 2023
Start time (MST):	9:33	End time (MST):	12:18
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	50.58	ppm	Cal Gas Exp Date:	December 29, 2028
Cal Gas Cylinder #:	SG9133974BAL			
Removed Cal Gas Conc:	50.58	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3811
ZAG Make/Model:	API 701		Serial Number:	135

Analyzer Information

Analyzer make: Thermo 43iQ — Analyzer serial #: 12124313138

Analyzer Range 0 - 1000 ppb

	Start	*Finish*		*Start*	*Finish*
Calibration slope:	1.022106	1.006390	Backgd or Offset:	7.9	7.5
Calibration intercept:	-1.838756	-1.738080	Coeff or Slope:	0.990	0.942

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.5	----
as found span	4921	79.1	800.2	843.0	0.949
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.3	----
high point	4921	79.1	800.2	804.1	0.995
second point	4961	39.5	399.5	400.1	0.999
third point	4980	19.8	200.3	198.1	1.011
as left zero	5000	0.0	0.0	-0.4	----
as left span	4921	79.1	800.2	804.0	0.995
				Average Correction Factor	1.002

Baseline Corr As found:	843.50	Previous response	816.01	*% change	3.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Adjusted the span only.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

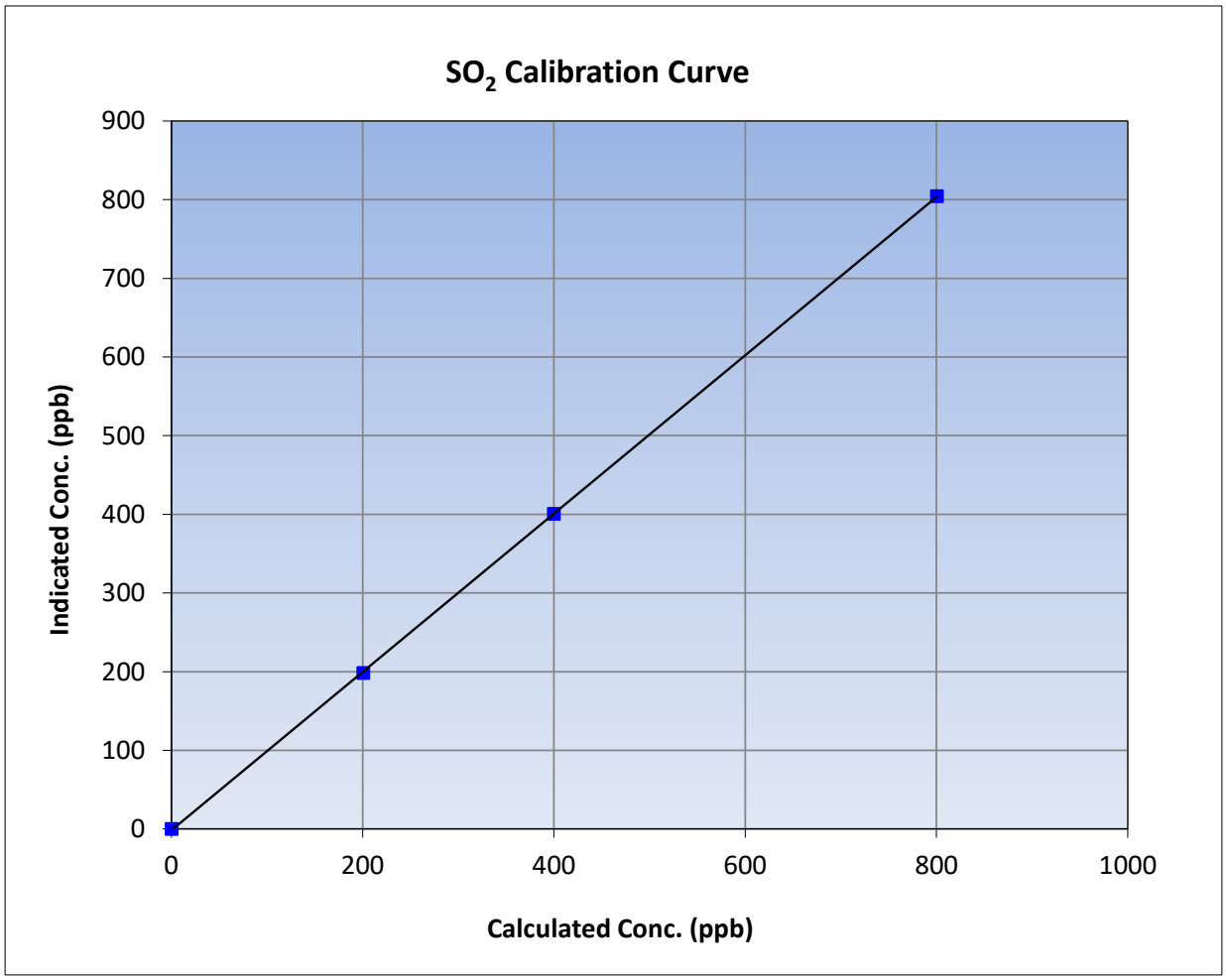
Station Information

Calibration Date:	June 1, 2023	Previous Calibration:	May 1, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS 27
Start Time (MST):	9:33	End Time (MST):	12:18
Analyzer make:	Thermo 43iQ	Analyzer serial #:	12124313138

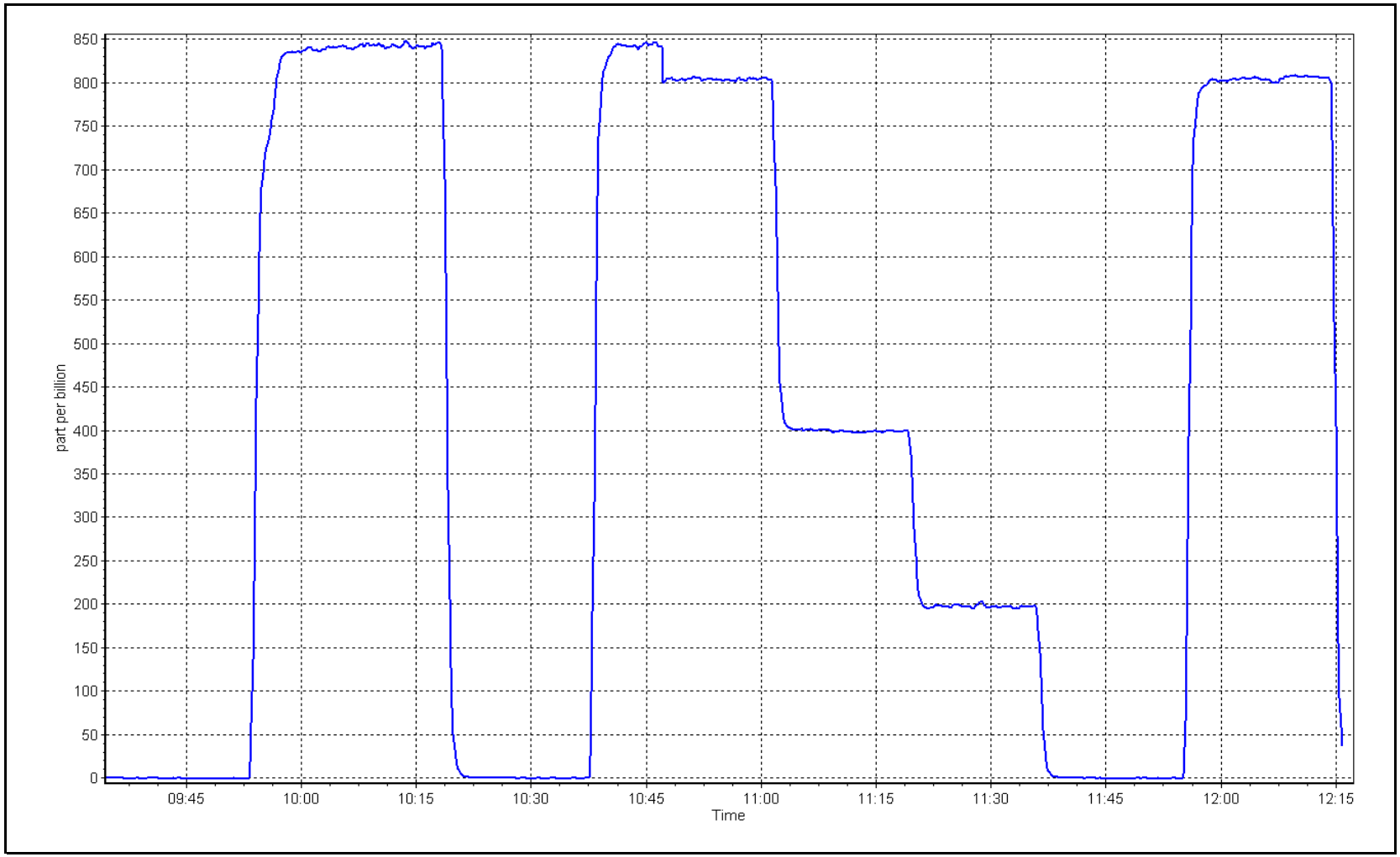
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
800.2	804.1	0.9951
399.5	400.1	0.9986
200.3	198.1	1.0111

Statistical Evaluation		Limits
Correlation Coefficient	0.999984	≥0.995
Slope	1.006390	0.90 - 1.10
Intercept	-1.738080	+/-30



SO2 Calibration Plot Date: June 1, 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:	June 13, 2023	Last Cal Date:	May 18, 2023
Start time (MST):	9:42	End time (MST):	13:25
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:	1.000198	1.003478	Backgd or Offset:	25.7	27.3
Calibration intercept:	-0.137827	-0.077831	Coeff or Slope:	0.970	0.961

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.6	----
as found span	4926	74.1	80.2	83.0	0.973
as found 2nd point	4963	37.0	40.0	41.7	0.974
as found 3rd point	4982	18.5	20.0	21.0	0.981
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.0	----
high point	4926	74.1	80.2	80.4	0.997
second point	4963	37.0	40.0	40.1	0.998
third point	4982	18.5	20.0	19.9	1.006
as left zero	5000	0.0	0.0	0.0	----
as left span	4926	74.1	80.2	80.1	1.001
SO2 Scrubber Check	4921	79.1	791.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	1.000
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	82.4	Prev response:	80.05	*% change:	2.8%
Baseline Corr 2nd AF pt:	41.1	AF Slope:	1.028423	AF Intercept:	0.522721
Baseline Corr 3rd AF pt:	20.4	AF Correlation:	0.999995		

* = > +/-5% change initiates investigation

Notes: Adjusted both zero and span.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

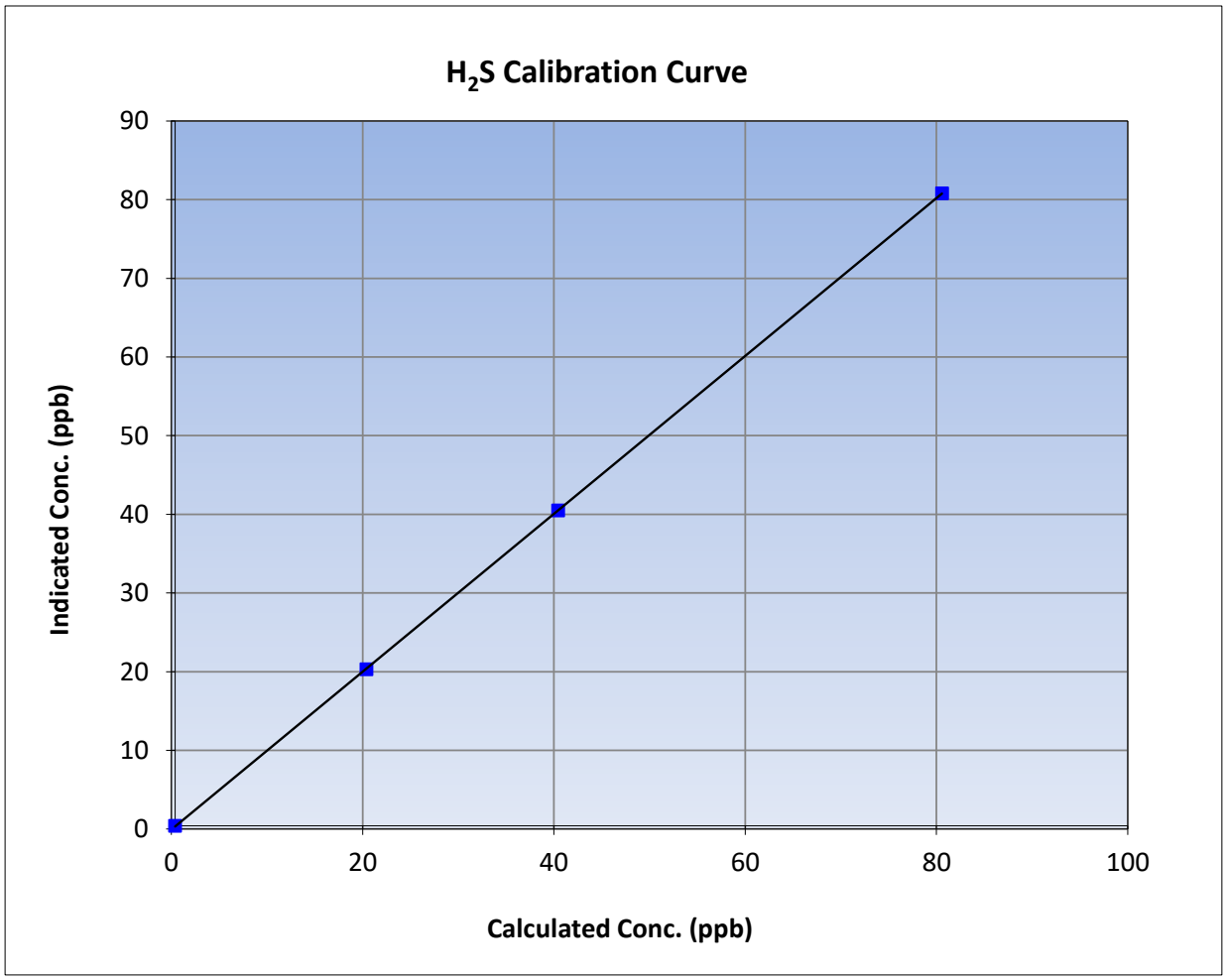
Station Information

Calibration Date:	June 13, 2023	Previous Calibration:	May 18, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:42	End Time (MST):	13:25
Analyzer make:	API T101	Analyzer serial #:	621

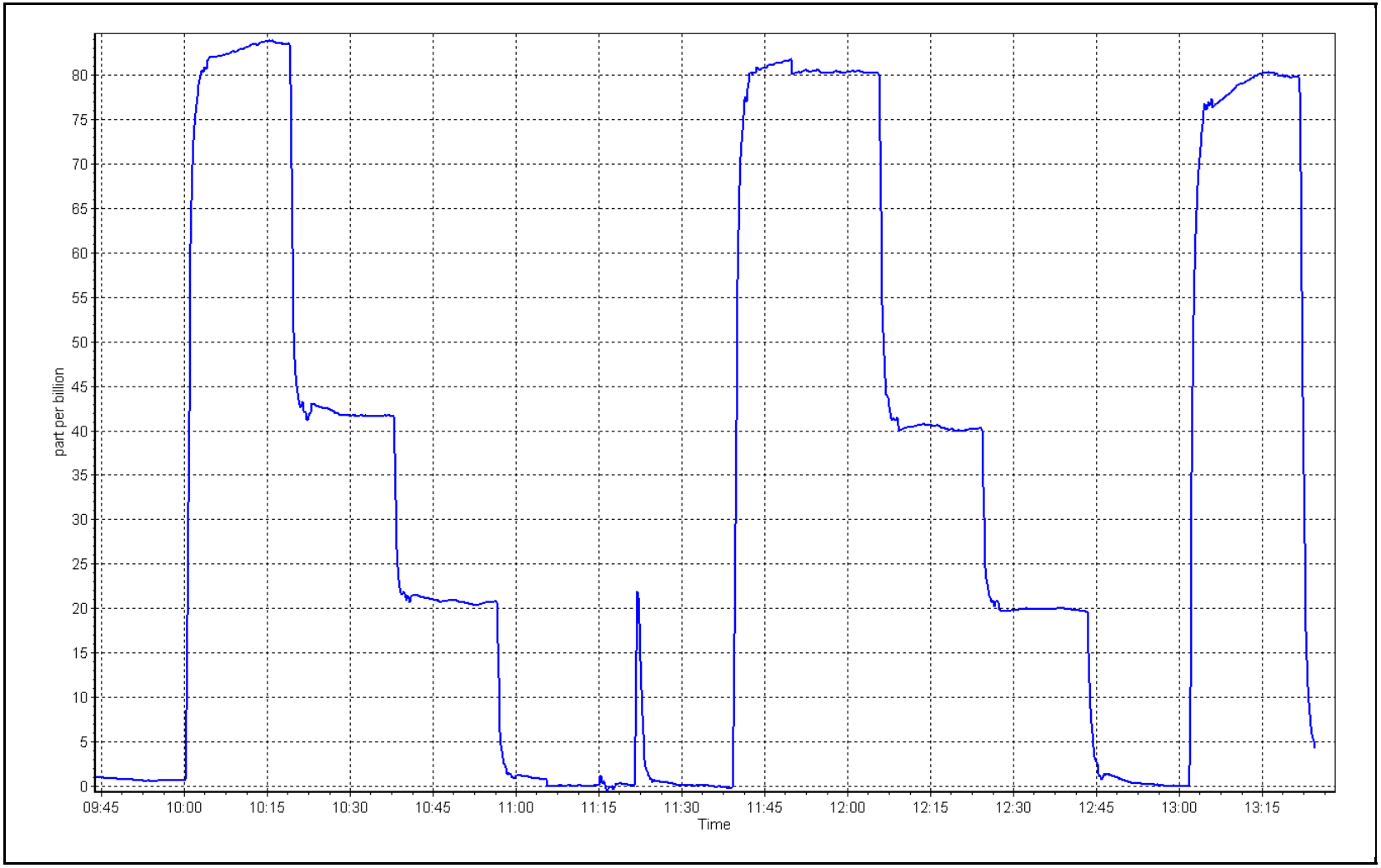
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.0	----
80.2	80.4	0.9972
40.0	40.1	0.9984
20.0	19.9	1.0058

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.003478	*0.90 - 1.10*
Intercept	-0.077831	*+/-3*



H_2S Calibration Plot Date: June 13, 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:	June 14, 2023	Last Cal Date:	May 25, 2023
Start time (MST):	9:56	End time (MST):	12:47
Reason:	Maintenance		

Calibration Standards

NO Gas Cylinder #:	T2Y1P35		Cal Gas Expiry Date:	December 11, 2023	
NOX Cal Gas Conc:	51.44	ppm	NO Cal Gas Conc:	50.40	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	51.44	ppm	Removed Gas NO Conc:	50.40	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3811	
ZAG make/model:	API T701		Serial Number:	135	

Analyzer Information

Analyzer make:	API T200		Analyzer serial #:	722	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.080	1.080	NO bkgnd or offset:	0.2	0.2
NOX coeff or slope:	1.072	1.072	NOX bkgnd or offset:	0.7	0.7
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	4.3	3.9

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.004933	
NO_X Cal Offset:	-2.155062	
NO Cal Slope:	1.007298	
NO Cal Offset:	-2.599343	
NO_2 Cal Slope:	0.999563	
NO_2 Cal Offset:	0.617993	

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	0.4	----	----
as found span	4921	79.4	816.8	800.3	16.5	817.9	798.6	19.3	0.9987	1.0021
as found 2nd	4921	39.7	411.7	403.3	8.3	409.1	398.7	10.3	1.0063	1.0117
as found 3rd	4980	19.8	203.7	199.6	4.1	200.8	195.8	5.0	1.0145	1.0194
new cyl resp										
calibrator zero										
high point										
second point										
third point										
as left zero										
as left span										
								Average Correction Factor		

Corrected As found	NO_X = 817.8 ppb	NO = 798.9 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-0.1%
Previous Response	NO_X = 818.7 ppb	NO = 803.5 ppb			*Percent Change	NO =	-0.6%
Baseline Corr 2nd pt	NO_X = 409.0 ppb	NO = 399.0 ppb	As found	NO_X r^2: 0.999973	Nx Sl: 1.002133	Nx Int:	-1.834
Baseline Corr 3rd pt	NO_X = 200.7 ppb	NO = 196.1 ppb	As found	NO r^2: 0.999967	NO Sl: 0.999076	NO Int:	-2.282
			As found	NO_2 r^2: 0.999936	NO2 Sl: 0.996666	NO_2 Int:	1.545

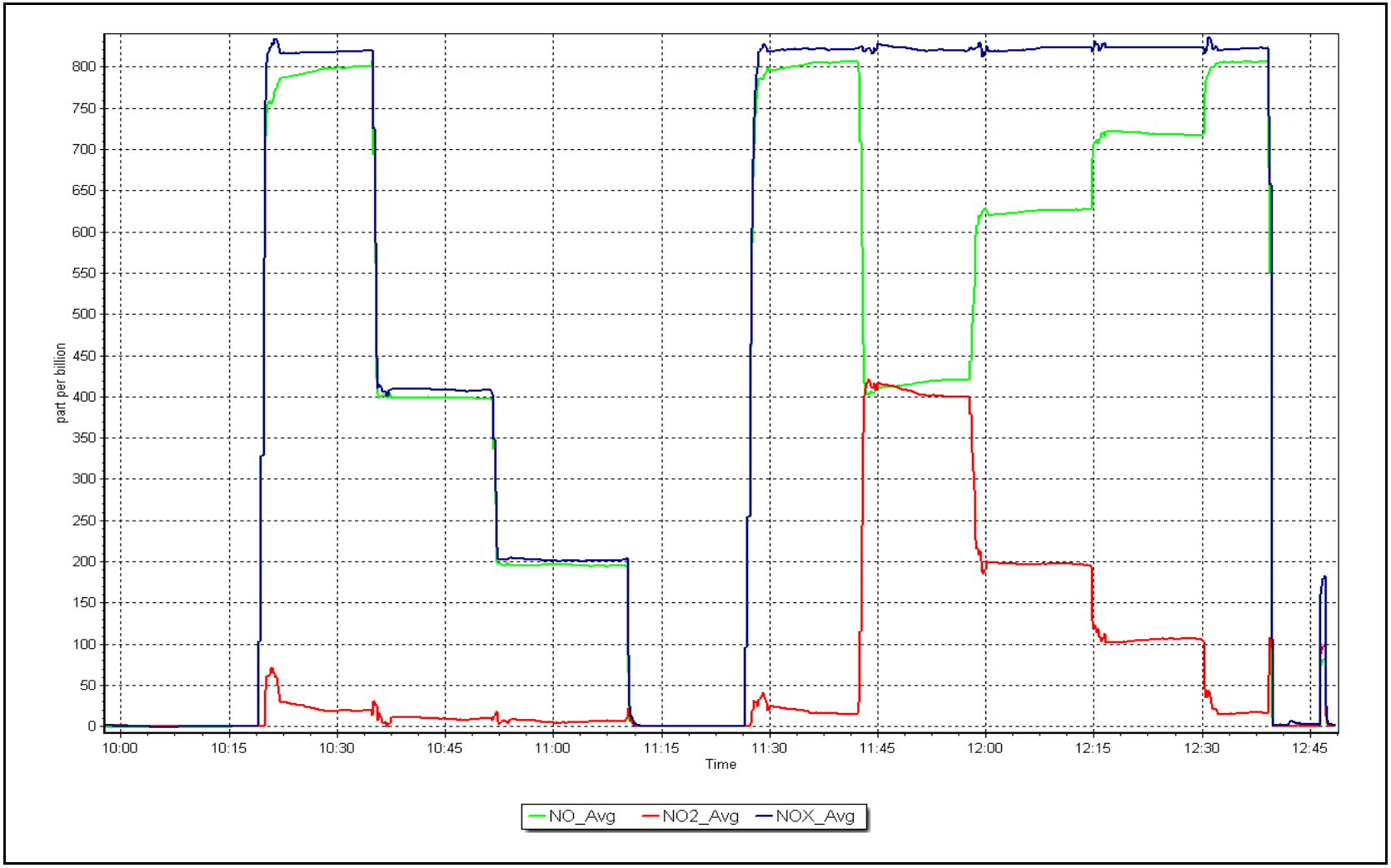
GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero	----	----	0.0	0.4	----	----
as found GPT point (400 ppb NO2)	804.6	416.5	404.6	404.4	1.0005	99.9%
as found GPT point (200 ppb NO2)	804.6	624.9	196.2	196.7	0.9975	100.2%
as found GPT point (100 ppb NO2)	804.6	696.0	125.1	128.2	0.9759	102.5%
1st GPT point (400 ppb O3)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
				Average Correction Factor		

Notes: Conducted MPAFs for pump replacement.

Calibration Performed By: Denny Ray Estador

NO_X Calibration Plot Date: June 14, 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:	June 15, 2023	Last Cal Date:	June 14, 2023
Start time (MST):	9:56	End time (MST):	13:05
Reason:	Maintenance		

Calibration Standards

NO Gas Cylinder #:	T2Y1P35		Cal Gas Expiry Date:	December 11, 2023	
NOX Cal Gas Conc:	51.44	ppm	NO Cal Gas Conc:	50.40	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	51.44	ppm	Removed Gas NO Conc:	50.40	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3811	
ZAG make/model:	API T701		Serial Number:	135	

Analyzer Information

Analyzer make:	API T200		Analyzer serial #:	722	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.080	1.099	NO bkgnd or offset:	0.2	-0.9
NOX coeff or slope:	1.072	1.082	NOX bkgnd or offset:	0.7	-0.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	3.9	4.9

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:		1.000905
NO_X Cal Offset:		-1.315764
NO Cal Slope:		1.008010
NO Cal Offset:		-1.998764
NO_2 Cal Slope:		0.996976
NO_2 Cal Offset:		0.633893

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero										
as found span										
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
high point	4921	79.4	816.8	800.3	16.5	817.0	805.6	11.5	0.9998	0.9934
second point	4960	39.7	408.5	400.2	8.3	406.5	400.7	5.9	1.0048	0.9988
third point	4980	19.8	203.7	199.6	4.1	201.5	197.0	4.5	1.0110	1.0132
as left zero	5000	0.0	0.0	0.0	0.0	0.7	1.1	-0.4	----	----
as left span	4921	79.4	816.8	417.2	413.4	816.0	416.5	399.6	1.0010	1.0017
								Average Correction Factor	1.0052	1.0018

Corrected As found NO_X = NA ppb NO = NA ppb

Previous Response NO_X = NA ppb NO = NA ppb

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

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

* = > +/-5% change initiates investigation

*Percent Change NO_X = NA

*Percent Change NO = NA

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

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

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

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	801.1	404.2	413.4	412.5	1.0022	99.8%
2nd GPT point (200 ppb O3)	801.1	615.6	202.0	202.3	0.9986	100.1%
3rd GPT point (100 ppb O3)	801.1	713.0	104.6	105.6	0.9907	100.9%
				Average Correction Factor	0.9972	100.3%

Notes: Adjusted both zero and span. Pump was replaced.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

NO_X Calibration Summary

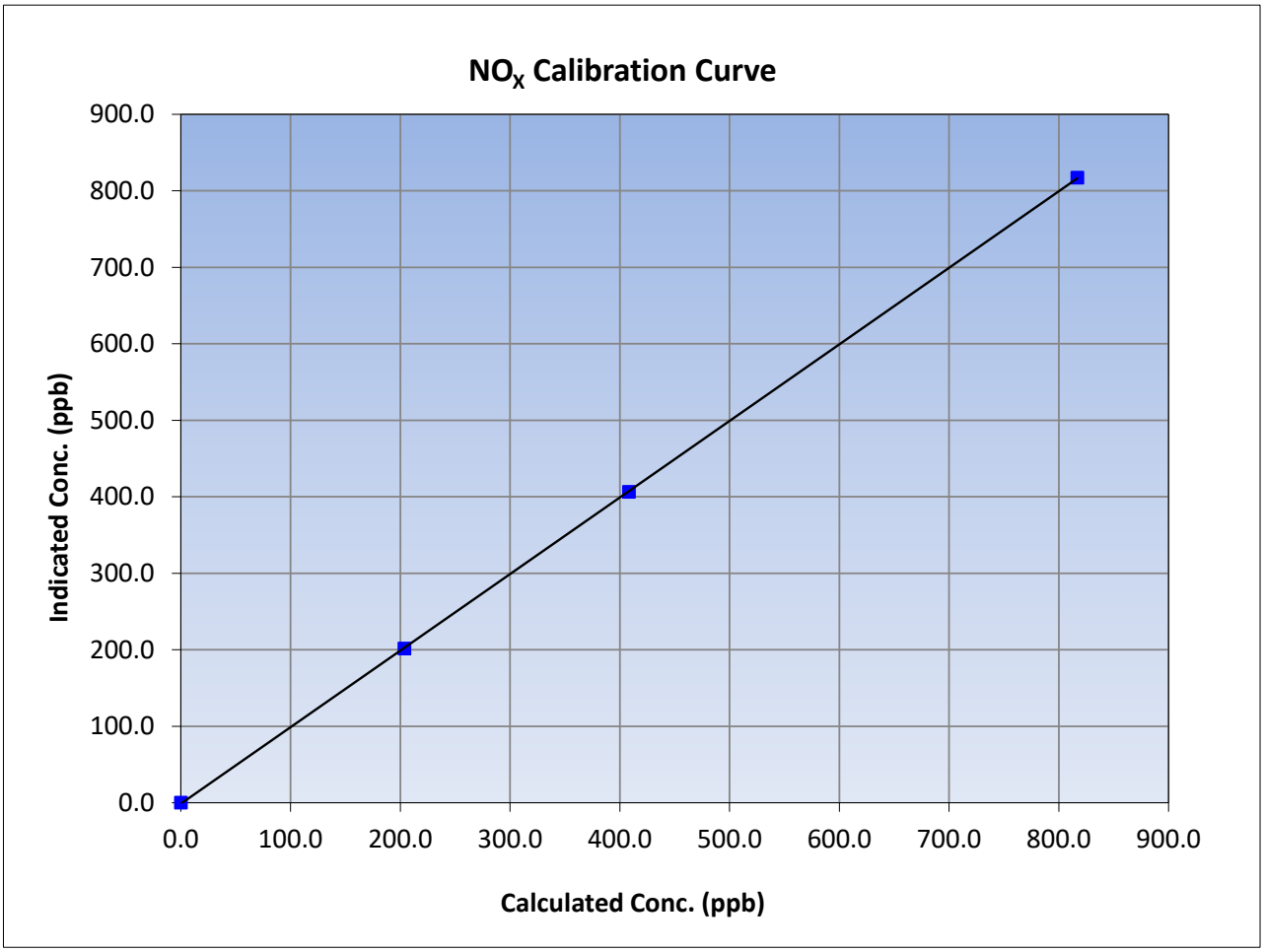
Version-04-2020

Station Information

Calibration Date:	June 15, 2023	Previous Calibration:	June 14, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:56	End Time (MST):	13:05
Analyzer make:	API T200	Analyzer serial #:	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999988	≥0.995
816.8	817.0	0.9998			
408.5	406.5	1.0048	Slope	1.000905	0.90 - 1.10
203.7	201.5	1.0110			
			Intercept	-1.315764	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

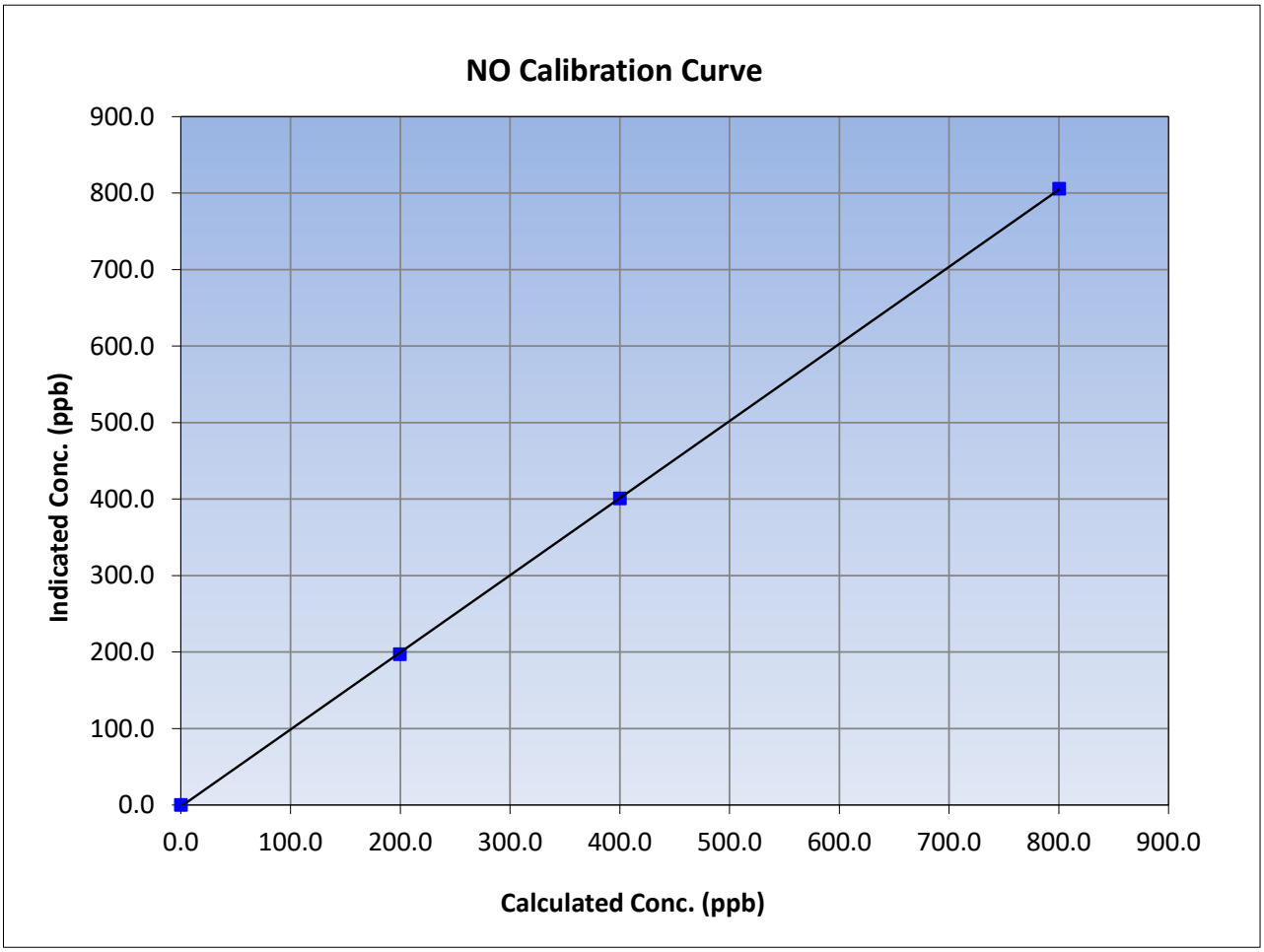
Version-04-2020

Station Information

Calibration Date:	June 15, 2023	Previous Calibration:	June 14, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:56	End Time (MST):	13:05
Analyzer make:	API T200	Analyzer serial #:	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999972	≥0.995
800.3	805.6	0.9934			
400.2	400.7	0.9988	Slope	1.008010	0.90 - 1.10
199.6	197.0	1.0132			
			Intercept	-1.998764	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

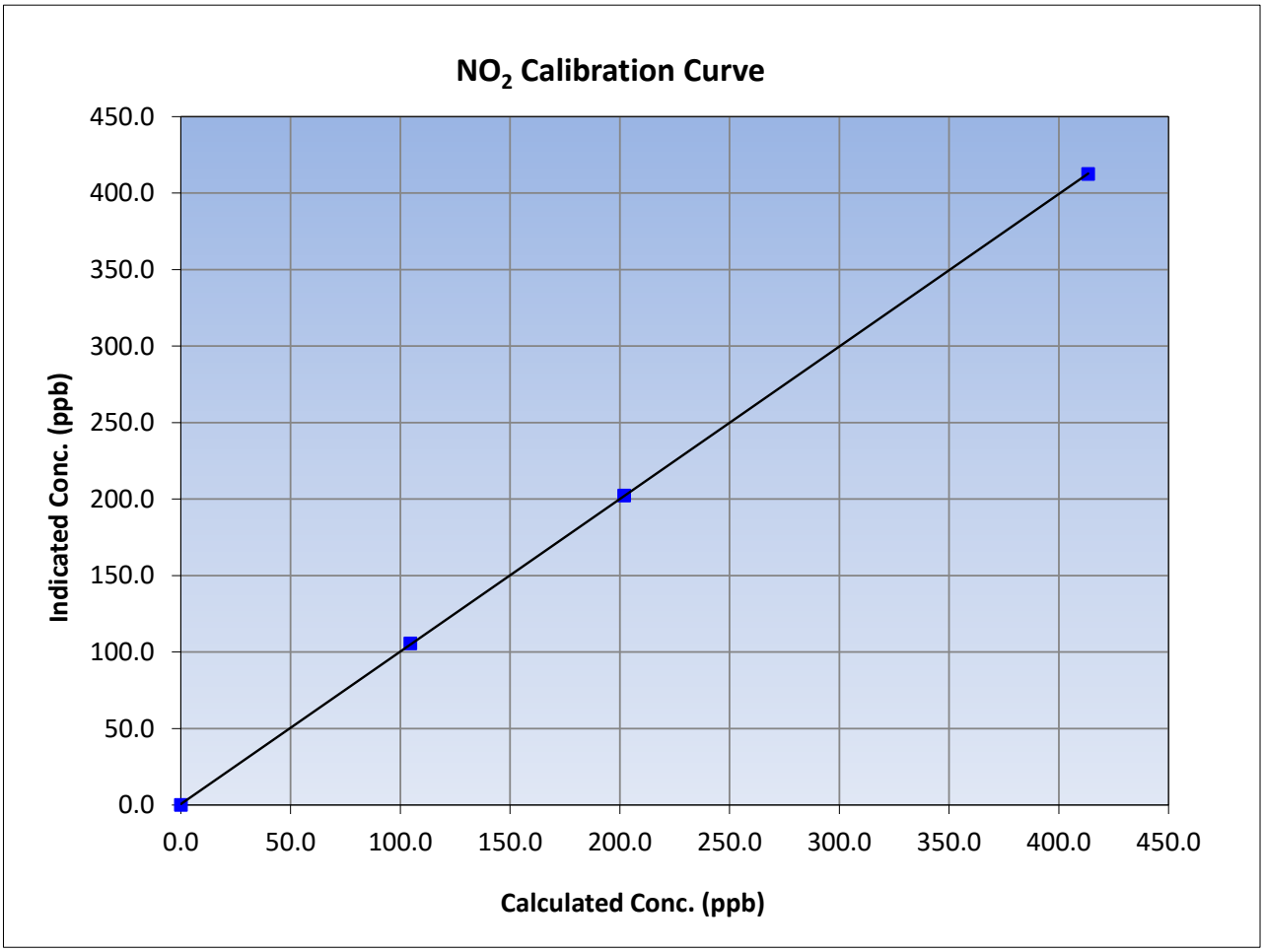
Version-04-2020

Station Information

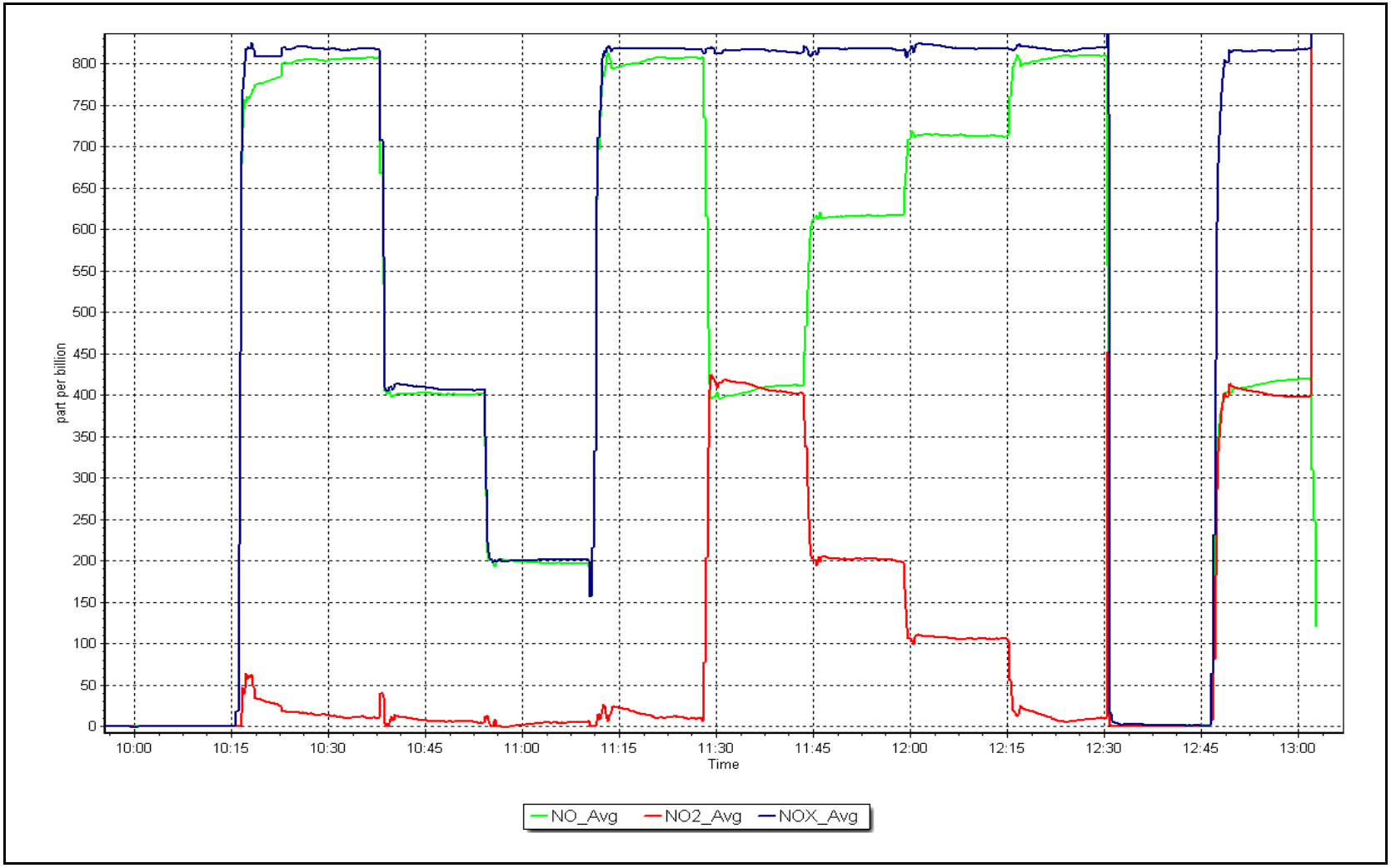
Calibration Date:	June 15, 2023	Previous Calibration:	June 14, 2023
Station Name:	Jackfish 2/3	Station Number:	AMS27
Start Time (MST):	9:56	End Time (MST):	13:05
Analyzer make:	API T200	Analyzer serial #:	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999989	≥0.995
413.4	412.5	1.0022			
202.0	202.3	0.9986	Slope	0.996976	0.90 - 1.10
104.6	105.6	0.9907			
			Intercept	0.633893	+/-20



NO_X Calibration Plot Date: June 15, 2023 Location: Jackfish 2/3



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS29
SURMONT 2
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	June 1, 2023	Last Cal Date:	May 10, 2023
Start time (MST):	10:06	End time (MST):	11:45
Reason:	As Found		

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:	1.002228		Backgd or Offset:	12.1	12.1
Calibration intercept:	-1.885142		Coeff or Slope:	0.916	0.916

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.3	----
as found span	4919	81.3	800.1	787.1	1.017
as found 2nd point	4959	40.7	400.6	392.3	1.021
as found 3rd point	4979	20.3	199.8	194.7	1.026
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	

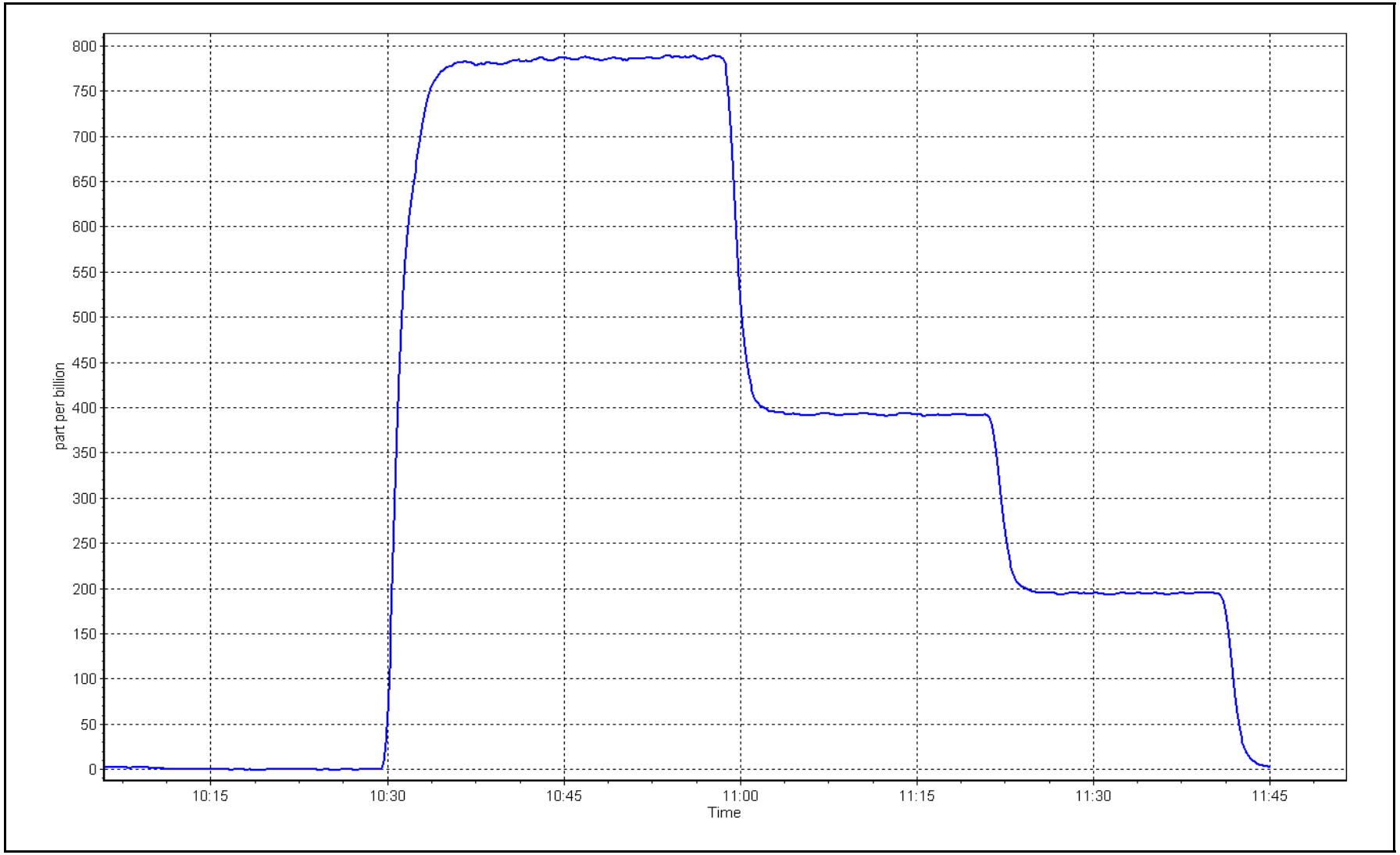
Baseline Corr As found:	787.40	Previous response	800.00	*% change	-1.6%
Baseline Corr 2nd AF pt:	392.60	AF Slope:	0.984591	AF Intercept:	-1.284908
Baseline Corr 3rd AF pt:	195.00	AF Correlation:	0.999992		

* = > +/-5% change initiates investigation

Notes: MPAF's completed for pump changeout tomorrow.

Calibration Performed By: Braiden Boutilier

SO2 Calibration Plot Date: June 1, 2023 Location: Surmont 2



Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Surmont 2	Station number:	AMS29
Calibration Date:	June 6, 2023	Last Cal Date:	June 1, 2023
Start time (MST):	10:00	End time (MST):	13:48
Reason:	Maintenance	Replaced external pump	

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:	1.002228	1.001929	Backgd or Offset:	12.1	12.4
Calibration intercept:	-1.885142	-1.605425	Coeff or Slope:	0.916	0.942

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.2	----
as found span	4919	81.3	800.1	787.5	1.016
as found 2nd point	4959	40.7	400.6	391.4	1.023
as found 3rd point	4979	20.3	199.8	193.8	1.031
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	----
high point	4919	81.3	800.1	801.0	0.999
second point	4959	40.7	400.6	398.7	1.005
third point	4979	20.3	199.8	196.9	1.015
as left zero	5000	0.0	0.0	0.1	----
as left span	4919	81.3	800.1	801.0	0.999
				Average Correction Factor	1.006

Baseline Corr As found:	787.70	Previous response	800.00	*% change	-1.6%
Baseline Corr 2nd AF pt:	391.60	AF Slope:	0.985261	AF Intercept:	-1.844695
Baseline Corr 3rd AF pt:	194.00	AF Correlation:	0.999978		

* = > +/-5% change initiates investigation

Notes: Replaced external pump. Adjusted span. Changed sample inlet filter after MPAF's.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

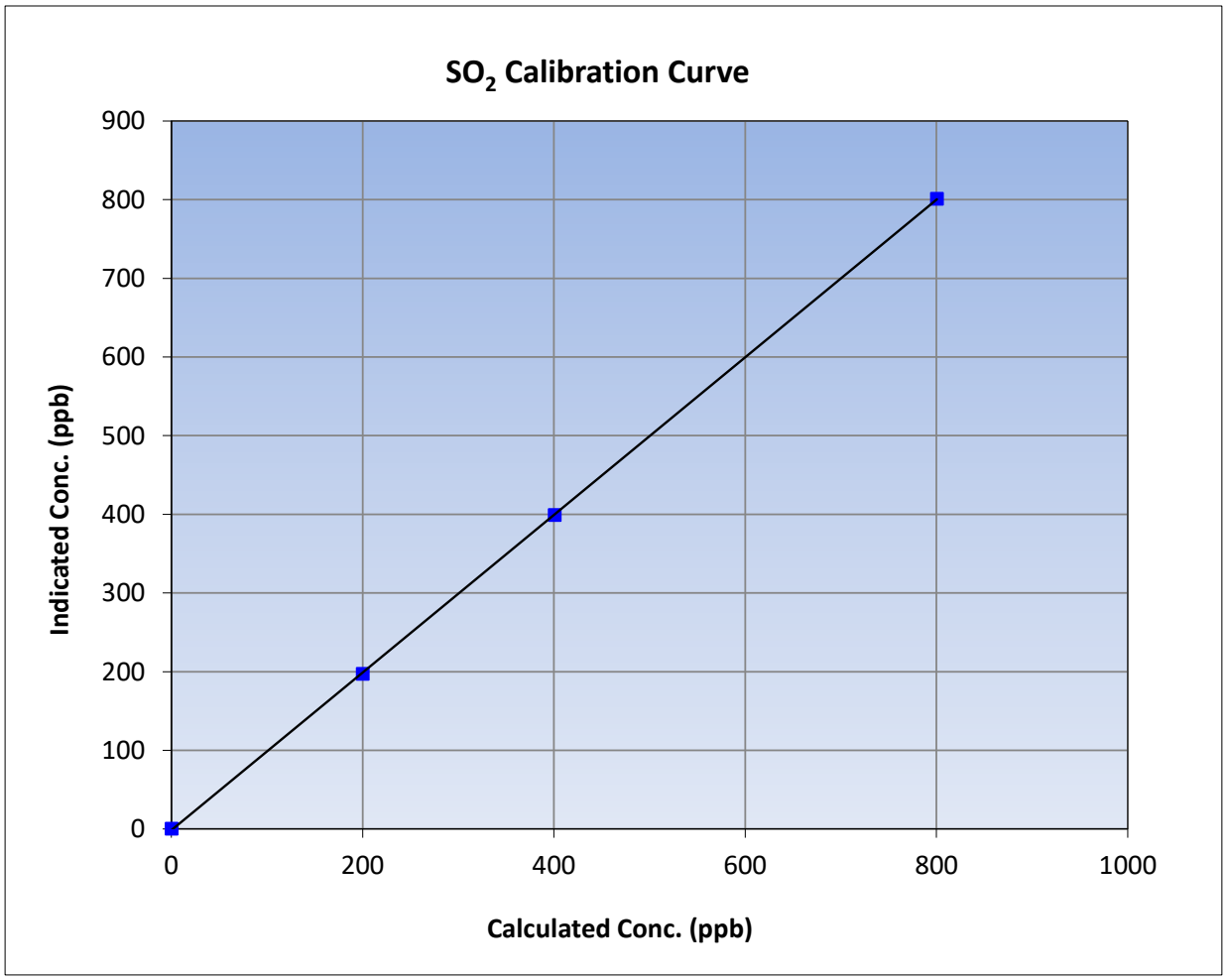
Station Information

Calibration Date:	June 6, 2023	Previous Calibration:	June 1, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:00	End Time (MST):	13:48
Analyzer make:	Thermo 43i	Analyzer serial #:	1170050150

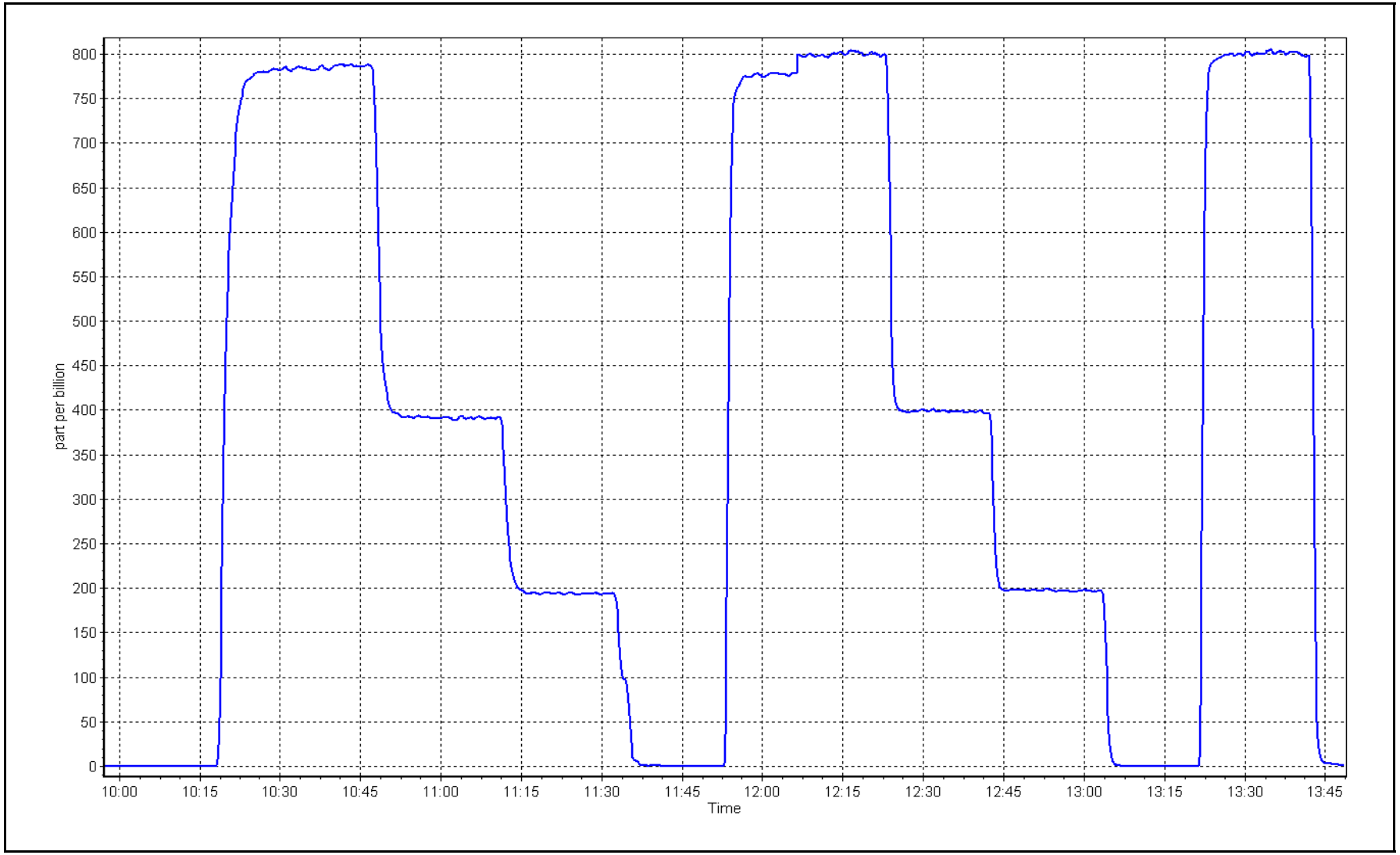
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.2	----
800.1	801.0	0.9989
400.6	398.7	1.0047
199.8	196.9	1.0148

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999977	*≥0.995*
Slope	1.001929	*0.90 - 1.10*
Intercept	-1.605425	*+/-30*



SO2 Calibration Plot Date: June 6, 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:	June 7, 2023	Last Cal Date:	May 9, 2023
Start time (MST):	10:19	End time (MST):	15:15
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.391	ppm	Cal Gas Exp Date:	January 4, 2025
Cal Gas Cylinder #:	CC508338			
Removed Cal Gas Conc:	5.391	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	CC508338		Diff between cyl:	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5472
ZAG Make/Model:	Teledyne API T701		Serial Number:	4297

Analyzer Information

Analyzer make:	Thermo 43iQ-TLE		Analyzer serial #:	1200326170	
Converter make:	Global		Converter serial #:	2022-223	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.008319	0.999622	Backgd or Offset:	0.82	0.82
Calibration intercept:	-0.382705	-0.002939	Coeff or Slope:	1.034	1.046

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.1	----
as found span	4926	74.2	80.0	79.2	1.009
as found 2nd point	4963	37.2	40.1	39.4	1.015
as found 3rd point	4982	18.6	20.1	19.6	1.018
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4926	74.2	80.0	79.9	1.001
second point	4963	37.2	40.1	40.2	0.998
third point	4982	18.6	20.1	20.1	0.998
as left zero	5000	0.0	0.0	0.0	----
as left span	4926	74.2	80.0	79.7	1.004
SO2 Scrubber Check	4919	81.3	813.0	0.0	----
Date of last scrubber change:				Ave Corr Factor	0.999
Date of last converter efficiency test:					efficiency

Baseline Corr As found:	79.3	Prev response:	80.29	*% change:	-1.2%
Baseline Corr 2nd AF pt:	39.5	AF Slope:	0.991611	AF Intercept:	-0.222254
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999986		

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

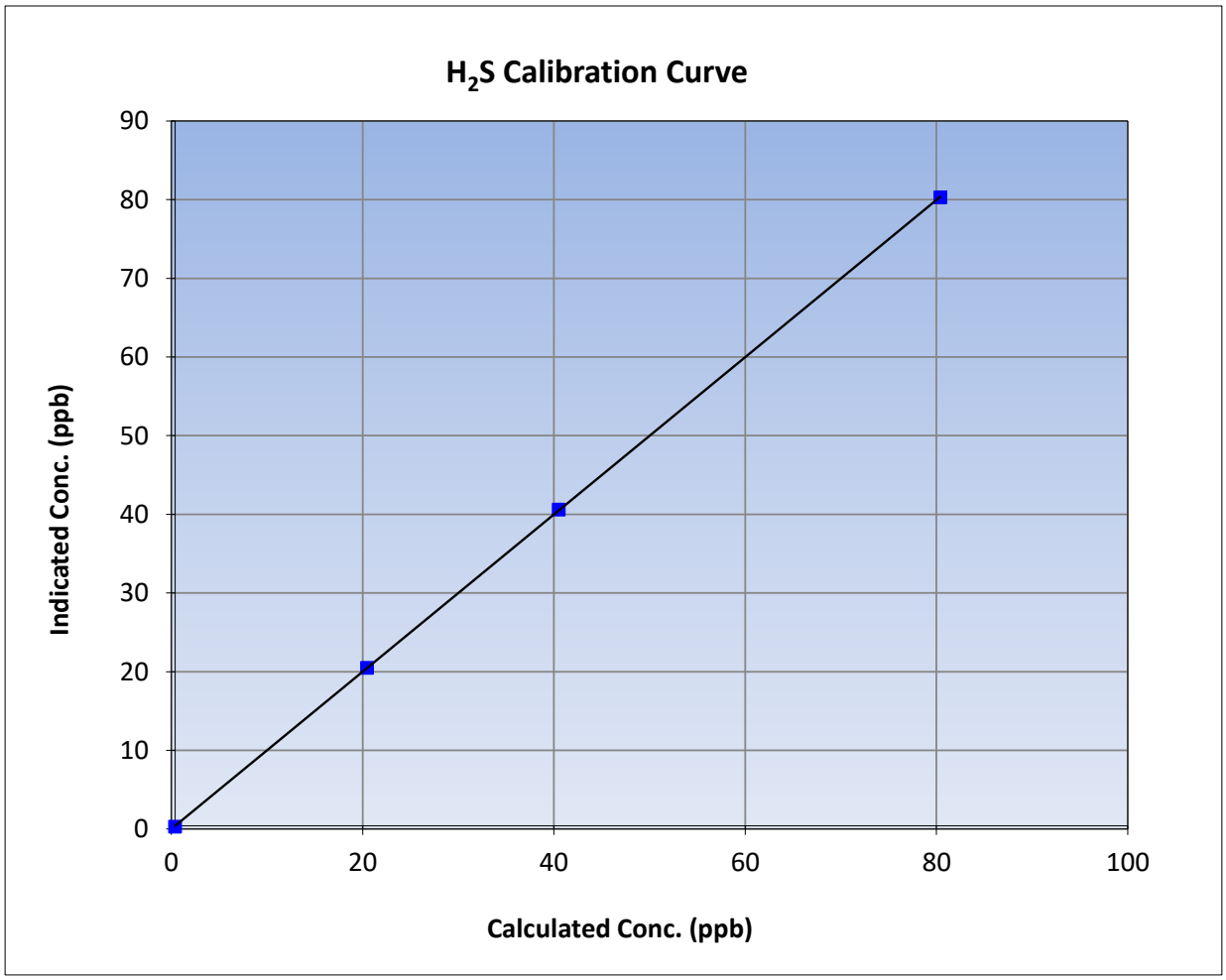
Station Information

Calibration Date:	June 7, 2023	Previous Calibration:	May 9, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	10:19	End Time (MST):	15:15
Analyzer make:	Thermo 43iQ-TLE	Analyzer serial #:	1200326170

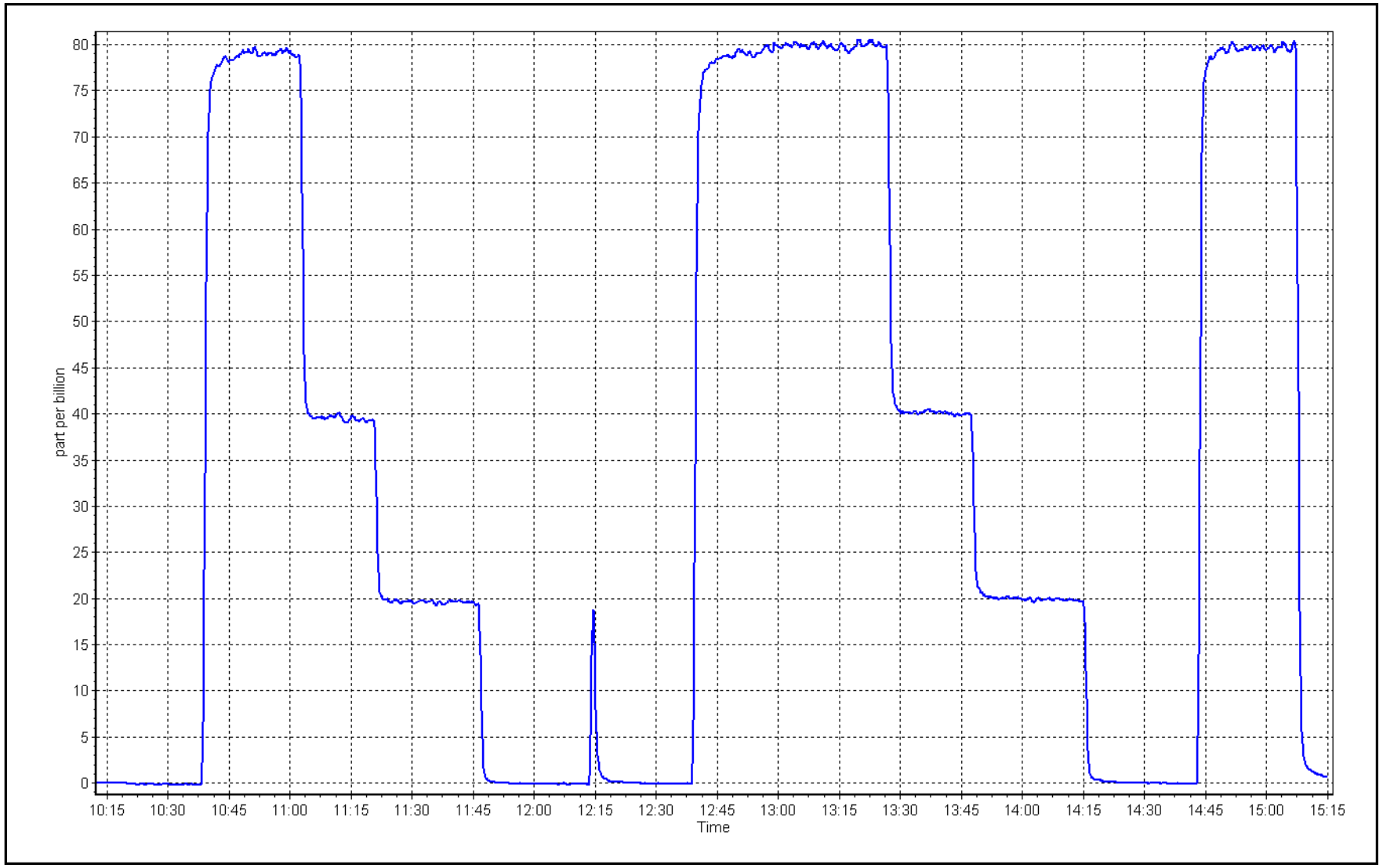
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	79.9	1.0013
40.1	40.2	0.9977
20.1	20.1	0.9977

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999992	*≥0.995*
Slope	0.999622	*0.90 - 1.10*
Intercept	-0.002939	*+/-3*



H_2S Calibration Plot Date: June 7, 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:	June 1, 2023	Last Cal Date:	May 10, 2023
Start time (MST):	10:06	End time (MST):	11:45
Reason:	As Found		

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:	1.002670		Background:	4.88	4.88
Calibration intercept:	-0.072027		Coefficient:	5.485	5.485

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	15.83	1.094
as found 2nd point	4959	40.7	8.67	7.92	1.095
as found 3rd point	4979	20.3	4.32	3.83	1.128
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	

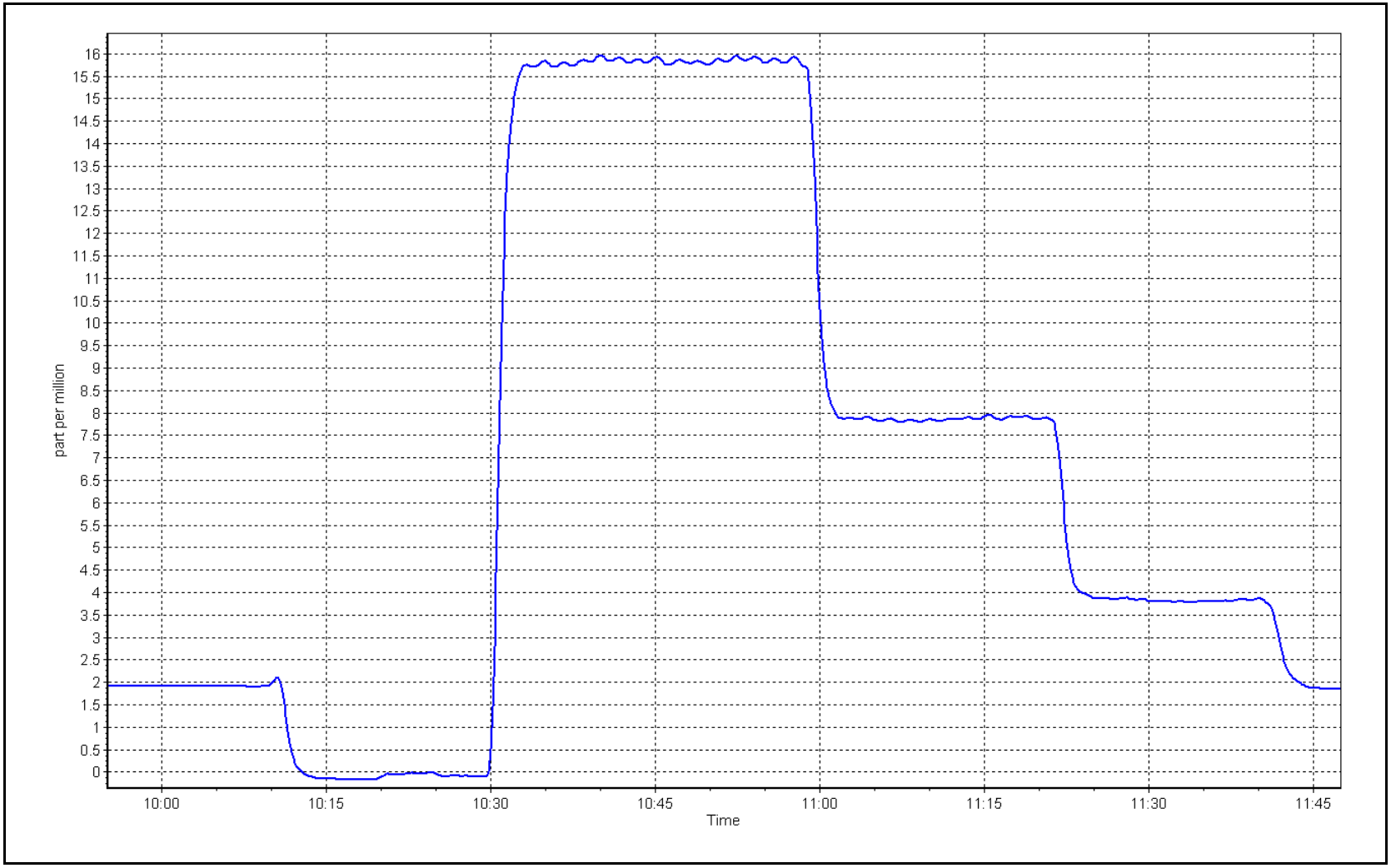
Baseline Corr As found:	15.92	Previous response	17.29	*% change	-8.6%
Baseline Corr 2nd AF pt:	8.00	AF Slope:	0.920632	AF Intercept:	-0.101503
Baseline Corr 3rd AF pt:	3.92	AF Correlation:	0.999970		

* = > +/-5% change initiates investigation

Notes: MPAF's done for pump change tomorrow.

Calibration Performed By: Braiden Boutilier

THC Calibration Plot Date: June 1, 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:	June 21, 2023	Last Cal Date:	May 11, 2023
Start time (MST):	9:25	End time (MST):	14:22
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:		T12YYFE	Cal Gas Expiry Date:	October 30, 2024	
NOX Cal Gas Conc:	47.46	ppm	NO Cal Gas Conc:	47.46	ppm
Removed Cylinder #:		NA	Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	47.46	ppm	Removed Gas NO Conc:	47.46	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T700		Serial Number:	5472	
ZAG make/model:	Teledyne API T701		Serial Number:	4297	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1170050148	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.370	1.370	NO bkgnd or offset:	1.3	1.3
NOX coeff or slope:	0.995	0.995	NOX bkgnd or offset:	1.4	1.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	173.2	171.7

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.002627	1.008735
NO_X Cal Offset:	-0.313069	0.025730
NO Cal Slope:	1.004857	1.008047
NO Cal Offset:	-1.492939	-0.733798
NO_2 Cal Slope:	0.995411	0.995558
NO_2 Cal Offset:	-0.294557	-0.127452

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.1	----	----
as found span	4916	84.2	799.2	799.2	0.0	805.0	804.0	0.9	0.9928	0.9940
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.3	0.2	0.2	----	----
high point	4916	84.2	799.2	799.2	0.0	806.0	805.0	0.7	0.9916	0.9928
second point	4958	42.1	399.6	399.6	0.0	404.0	402.7	1.4	0.9891	0.9923
third point	4979	21.1	200.3	200.3	0.0	201.1	199.5	1.7	0.9959	1.0039
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.1	----	----
as left span	4916	84.2	799.2	404.0	395.2	804.0	406.2	398.1	0.9940	0.9946
								Average Correction Factor	0.9922	0.9963

Corrected As found NO_X = 804.9 ppb NO = 803.9 ppb

Previous Response NO_X = 801.0 ppb NO = 801.6 ppb

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

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

* = > +/-5% change initiates investigation

*Percent Change NO_X = 0.5%

*Percent Change NO = 0.3%

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

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

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

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	801.0	405.8	395.2	393.8	1.0036	99.6%
2nd GPT point (200 ppb O3)	801.0	615.7	185.3	183.1	1.0120	98.8%
3rd GPT point (100 ppb O3)	801.0	708.3	92.7	92.6	1.0011	99.9%
				Average Correction Factor	1.0056	99.5%

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

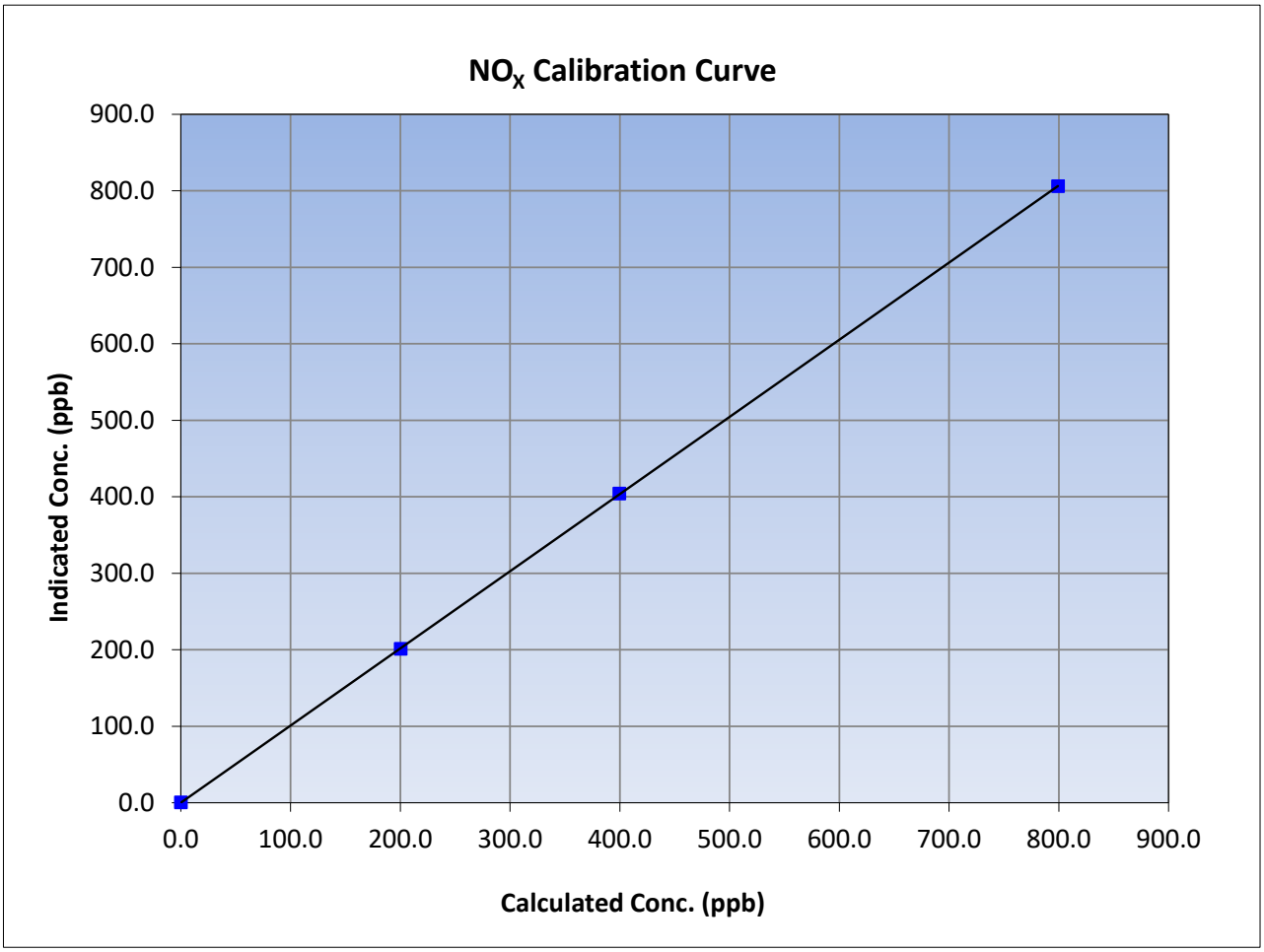
Version-04-2020

Station Information

Calibration Date:	June 21, 2023	Previous Calibration:	May 11, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:25	End Time (MST):	14:22
Analyzer make:	Thermo 42i	Analyzer serial #:	1170050148

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.3	----	Correlation Coefficient	0.999995	≥0.995
799.2	806.0	0.9916			
399.6	404.0	0.9891	Slope	1.008735	0.90 - 1.10
200.3	201.1	0.9959			
			Intercept	0.025730	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

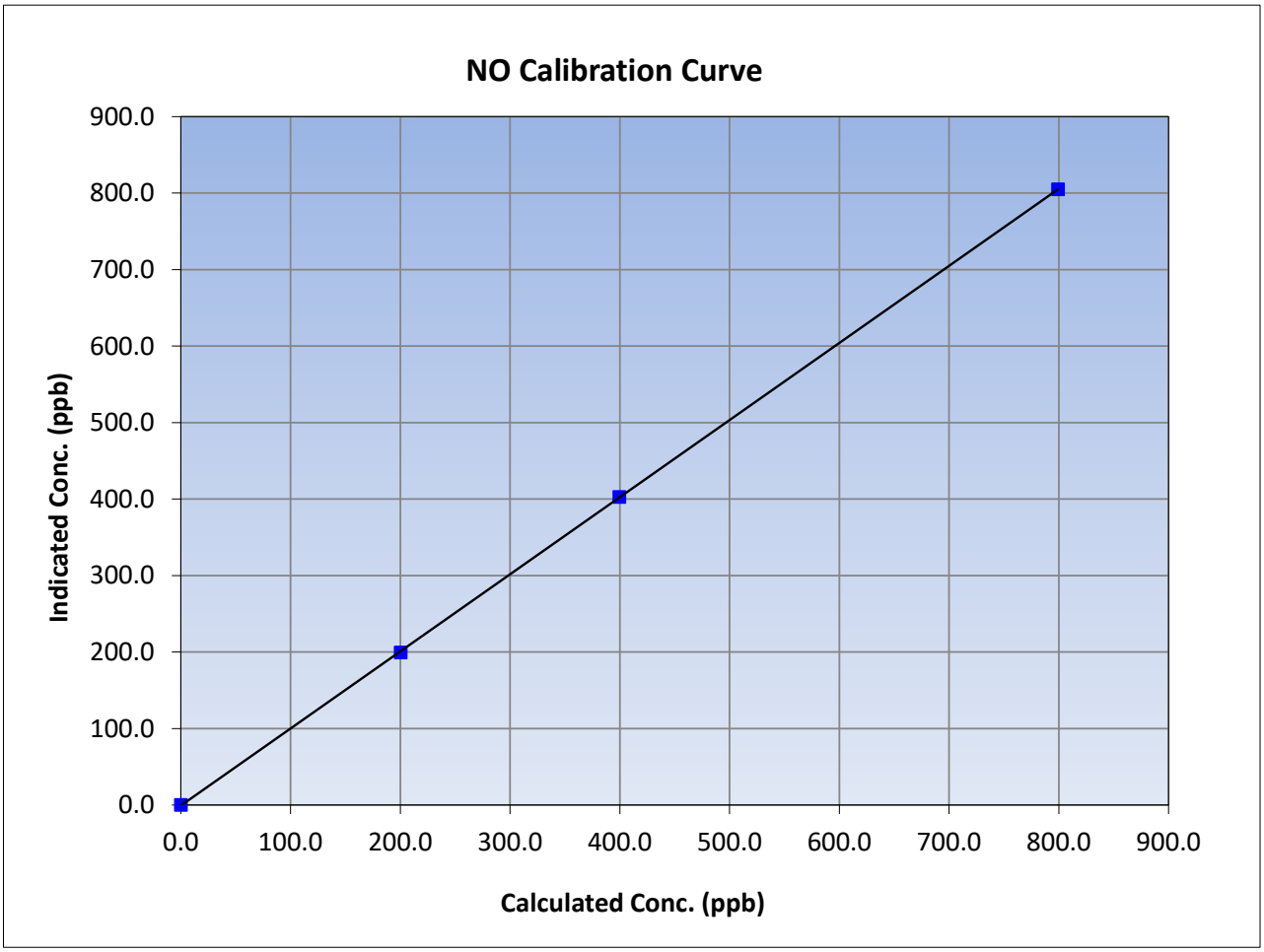
Version-04-2020

Station Information

Calibration Date:	June 21, 2023	Previous Calibration:	May 11, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:25	End Time (MST):	14:22
Analyzer make:	Thermo 42i	Analyzer serial #:	1170050148

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999989	≥0.995
799.2	805.0	0.9928			
399.6	402.7	0.9923	Slope	1.008047	0.90 - 1.10
200.3	199.5	1.0039			
			Intercept	-0.733798	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

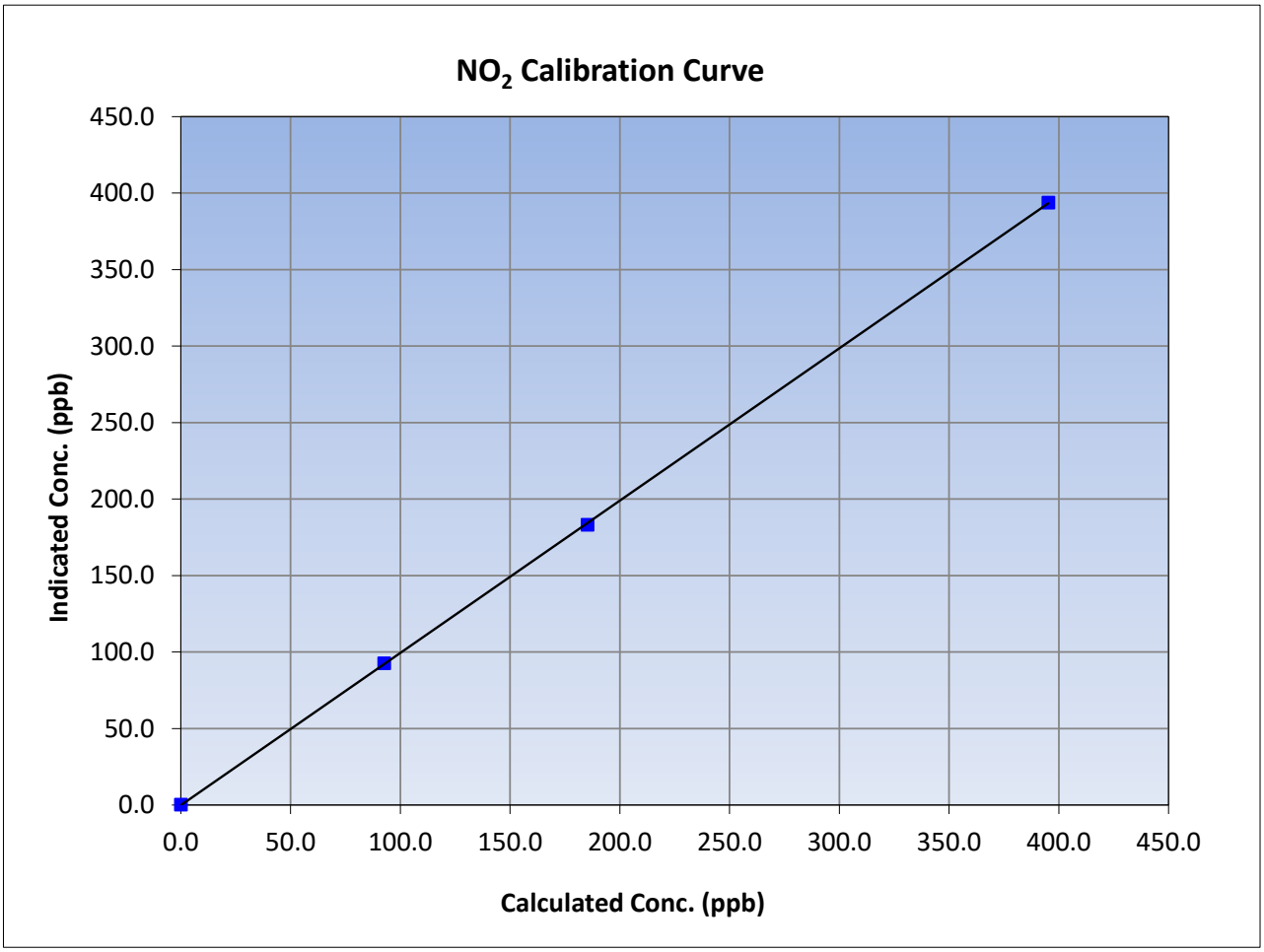
Version-04-2020

Station Information

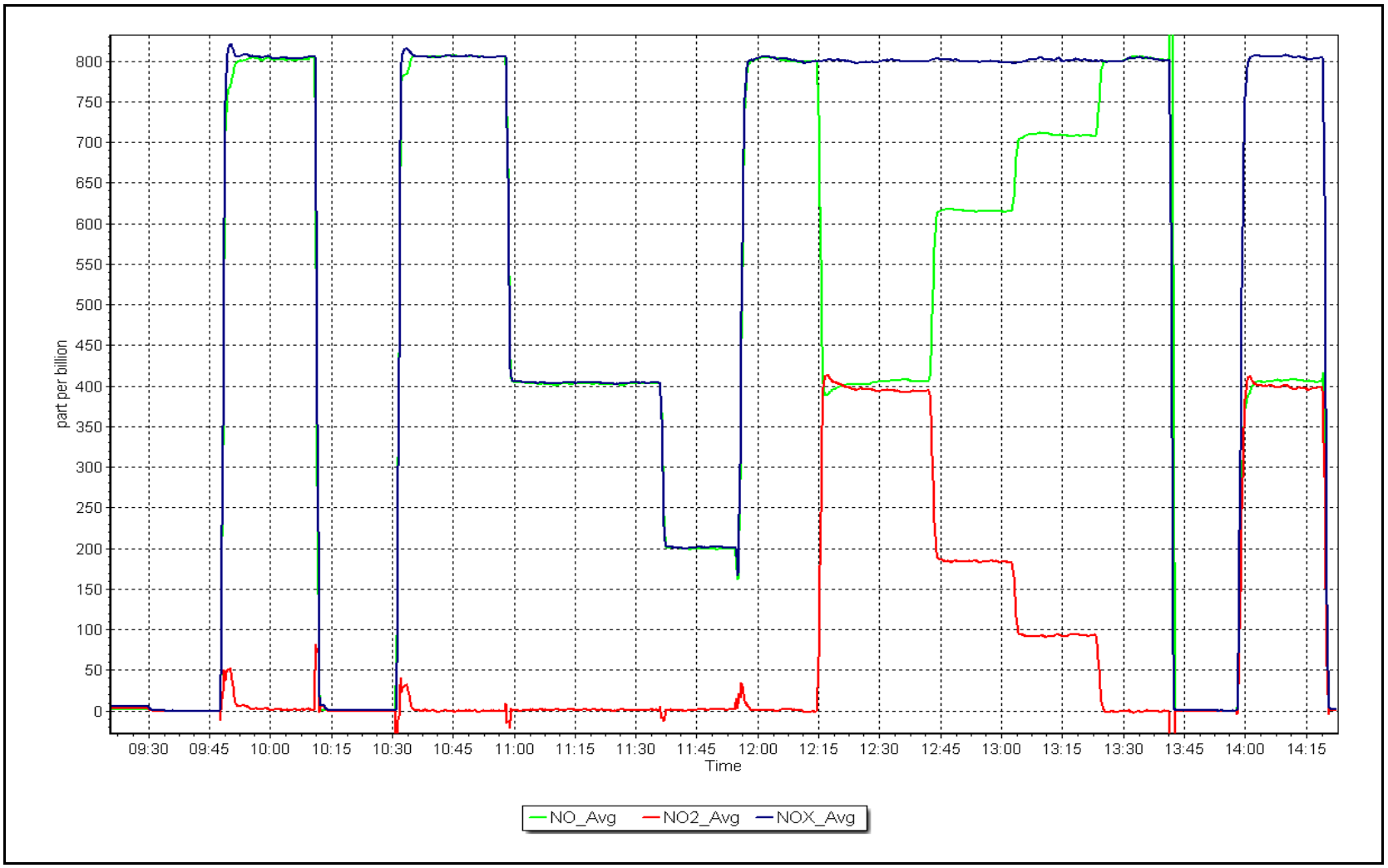
Calibration Date:	June 21, 2023	Previous Calibration:	May 11, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	9:25	End Time (MST):	14:22
Analyzer make:	Thermo 42i	Analyzer serial #:	1170050148

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.2	----	Correlation Coefficient	0.999975	≥0.995
395.2	393.8	1.0036			
185.3	183.1	1.0120	Slope	0.995558	0.90 - 1.10
92.7	92.6	1.0011			
			Intercept	-0.127452	+/-20



NO_X Calibration Plot Date: June 21, 2023 Location: Surmont 2



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Surmont 2	Station number:	AMS 29
Calibration Date:	June 21, 2023	Last Cal Date:	April 26, 2023
Start time (MST):	10:13	End time (MST):	11:56
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)	12.0	11.36	12.0	☐	+/- 2 °C
P (mmHg)	709.1	710.47	709.1	☐	+/- 10 mmHg
flow (LPM)	5.00	5.005	5.00	☐	+/- 0.25 LPM

Leak Test: Date of check: June 21, 2023 Last Cal Date: April 26, 2023

PM w/o HEPA: 2.5 PM w/ HEPA: 0 <0.2 ug/m3

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

Inlet cleaning : Inlet Head ☐

Quarterly Calibration Test

Parameter	As found	Post maintenance	As left	Adjusted	*(Limits)*
PMT Peak Test	11.9	12.0	11.0	☑	11.3 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 2.5 w/ HEPA: 0.0 <0.2 ug/m3

Date Optical Chamber Cleaned: June 21, 2023

Disposable Filter Changed: June 21, 2023

Annual Maintenance

Date Sample Tube Cleaned: September 30, 2022

Date RH/T Sensor Cleaned: October 6, 2022

Notes: Adjusted PMT peak, both leak checks passed.

Calibration by: Braiden Boutilier

Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Surmont 2	Station Number:	AMS 29
Calibration Date:	June 7, 2023	Prev Cal Date:	December 16, 2022
Start Time (MST):	12:22	End Time (MST):	14:20
Tower Height (m):	10.0	Reason:	Routine

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	N10022
WS Calibrator:	MetOne 053	Serial Number:	CA 03988

Shaft RPM	Calculated Speed (K/hr) (Cv)	Indicated Speed (K/hr) (Iv)	% Error *Limit = +/- 1.5%*
0	0.0	0.0	---
200	20.2	20.1	-0.2%
400	39.4	39.5	0.5%
600	58.6	58.5	0.0%
800	77.8	77.8	0.1%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)		0.999996	*≥0.9995*
Calculated slope		0.998856	*0.90 - 1.10*
Calculated intercept		0.000701	*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	P22885	
As Found Declination (deg east of True North):	13.2	As Left Declination (deg east of True North):	13.2	
Solar noon time (MST):	12:22	Calc Declination*:	13.2	Degrees
Deadband calc:	-4.7 degrees (*Limit 4 deg*)			* - calculated declination as per NOAA website

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	% Error (based on 357° FS) *Limit = +/- 1.0%*
0	-0.2	---
90	84.8	-1.5%
180	178.6	-0.4%
270	274.9	1.4%
357	361.5	1.3%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)			*≥0.9995*
Calculated slope		0.978289	*0.90 - 1.10*
Calculated intercept		3.412775	*+/- 4*

Notes: WD sensor out of compliance. Will replace sensor on June 8. Tower verified and aligned with solar noon.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Surmont 2	Station Number:	AMS 29
Calibration Date:	June 8, 2023	Prev Cal Date:	June 7, 2023
Start Time (MST):	11:06	End Time (MST):	11:18
Tower Height (m):	10.0	Reason:	Removal

Wind Speed Information

Sensor make/model: Serial Number:

WS Calibrator: Serial Number:

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

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

Wind Direction Information

Sensor make/model: Met One 020C-1 Serial Number: P22885

As Found Declination (deg east of True North): 13.2 As Left Declination (deg east of True North): 13.2

Solar noon time (MST): 12:22 Calc Declination*: 13.2 Degrees

Deadband calc: -5.4 degrees (*Limit 4 deg*)

* - calculated declination as per NOAA website

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	% Error (based on 357° FS) *Limit = +/- 1.0%*
0	-0.4	---
90	85.8	-1.2%
180	179.6	-0.1%
270	275.4	1.5%
357	362.0	1.4%

	Start	*Finish*	*Limits*
Correl Coeff (r^2)			*≥0.9995*
Calculated slope		0.977306	*0.90 - 1.10*
Calculated intercept		3.015779	*+/- 4*

Notes: As founds before removal.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Surmont 2	Station Number:	AMS 29
Calibration Date:	June 8, 2023	Prev Cal Date:	June 7, 2023
Start Time (MST):	11:18	End Time (MST):	12:10
Tower Height (m):	10.0	Reason:	Install

Wind Speed Information

Sensor make/model: Serial Number:

WS Calibrator: Serial Number:

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

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

Wind Direction Information

Sensor make/model: Met One 020C-1 Serial Number: A2005

As Found Declination (deg east of True North): 13.2 As Left Declination (deg east of True North): 13.2

Solar noon time (MST): 12:22 Calc Declination*: 13.2 Degrees

Deadband calc: 0.7 degrees (*Limit 4 deg*)

* - calculated declination as per NOAA website

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	% Error (based on 357° FS) *Limit = +/- 1.0%*
0	-0.2	---
90	88.6	-0.4%
180	179.6	-0.1%
270	270.0	0.0%
357	356.1	-0.3%

	Start	*Finish*	*Limits*
Correl Coeff (r^2)			*≥0.9995*
Calculated slope		0.999883	*0.90 - 1.10*
Calculated intercept		0.604273	*+/- 4*

Notes: WD install. No issues to note. Realigned tower using solar noon.

Calibration Performed By: Braiden Boutilier

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS30
ELLS RIVER
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Ells River	Station number:	AMS 30
Calibration Date:	June 2, 2023	Last Cal Date:	May 5, 2023
Start time (MST):	9:16	End time (MST):	12:16
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:	1.008699	1.010127	Backgd or Offset:	8.9	9.5
Calibration intercept:	-2.796032	-2.796062	Coeff or Slope:	0.988	0.988

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	----
as found span	4921	79.2	800.4	805.0	0.994
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	800.4	807.0	0.992
second point	4960	39.6	400.2	400.0	1.001
third point	4980	19.8	200.1	197.0	1.016
as left zero	5000	0.0	0.0	-0.3	----
as left span	4921	79.2	800.4	812.0	0.986
				Average Correction Factor	1.003

Baseline Corr As found:	805.00	Previous response	804.53	*% change	0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

Notes: Adjusted the zero only.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

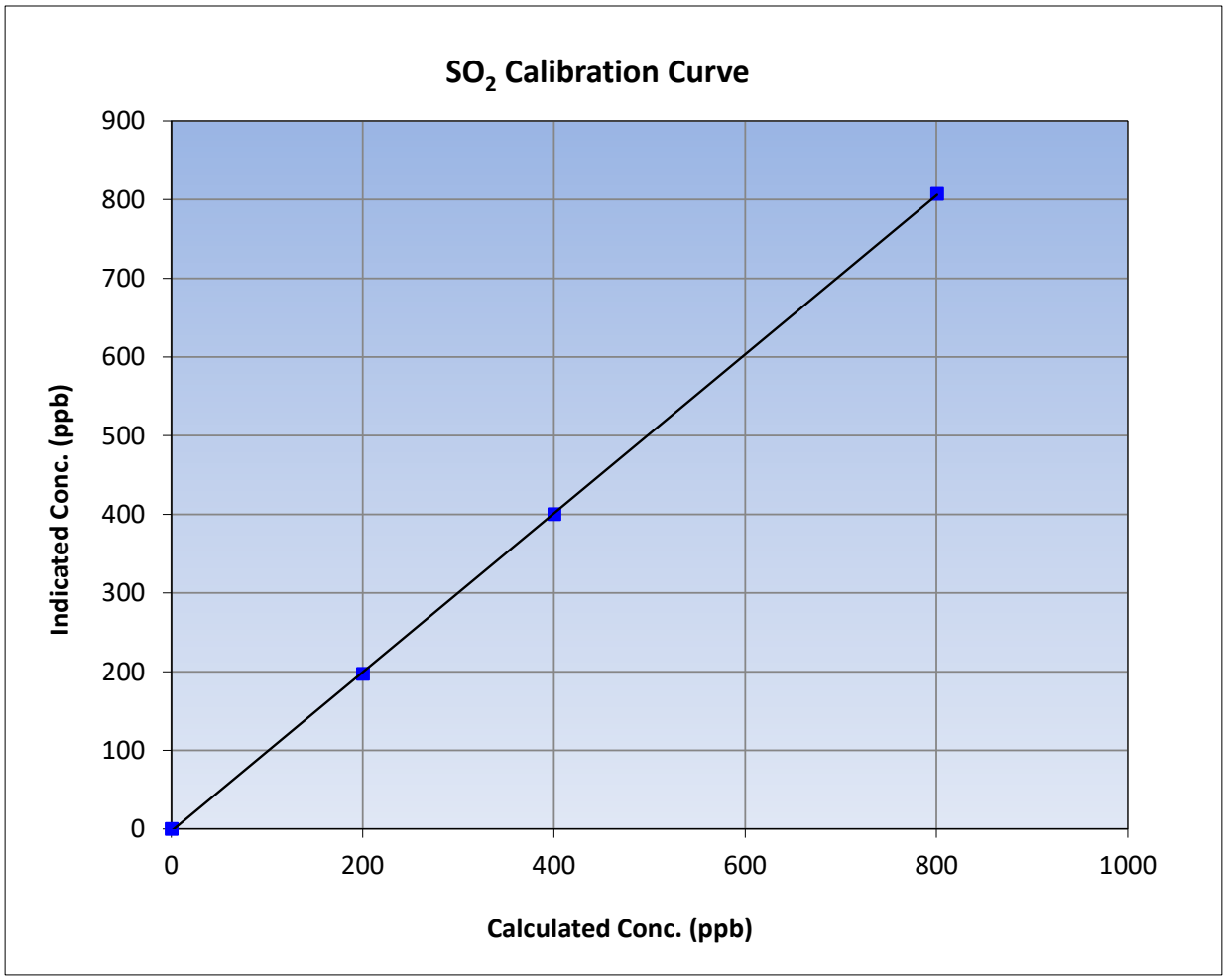
Station Information

Calibration Date:	June 2, 2023	Previous Calibration:	May 5, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:16	End Time (MST):	12:16
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841397

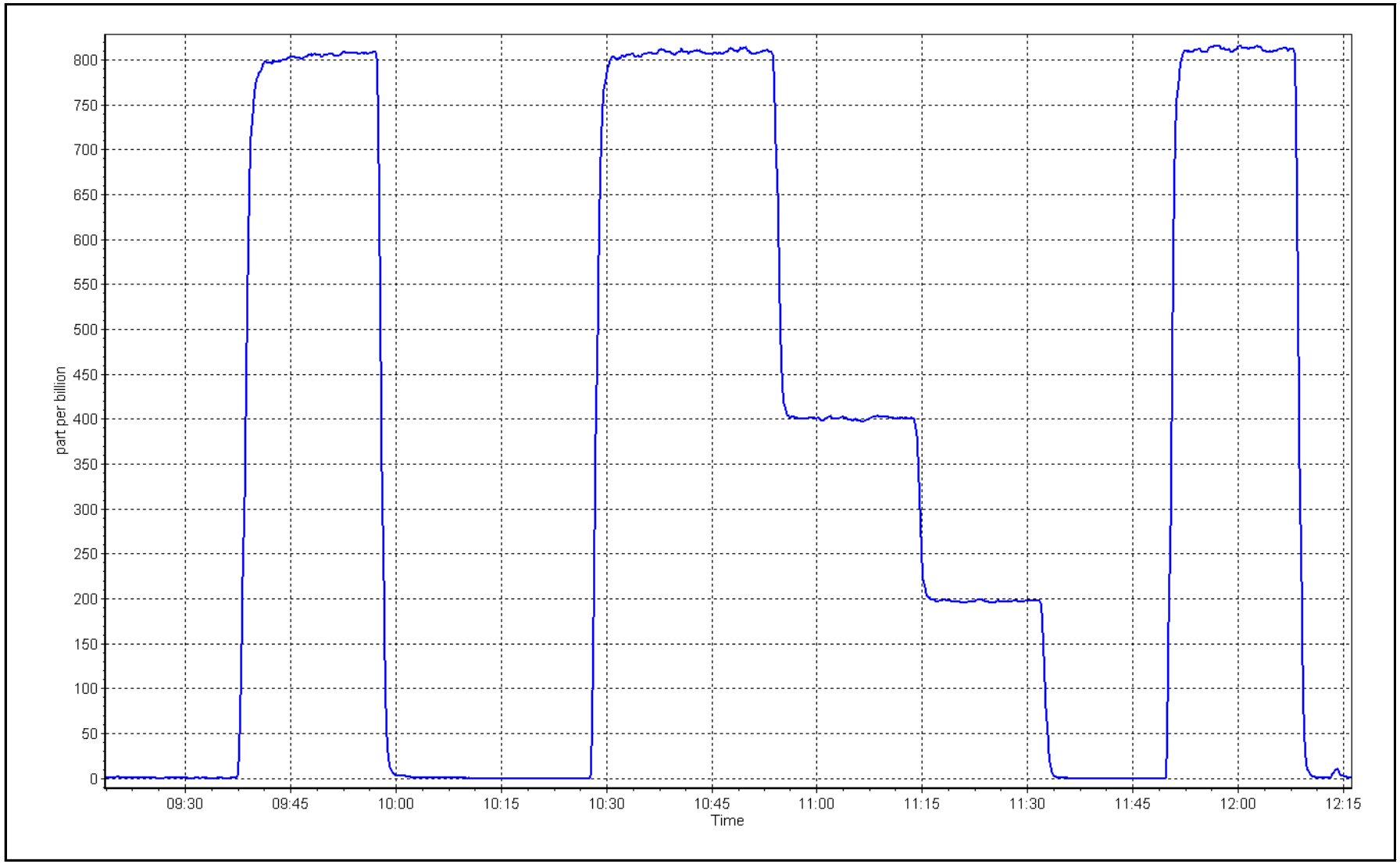
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
800.4	807.0	0.9918
400.2	400.0	1.0006
200.1	197.0	1.0158

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999956	*≥0.995*
Slope	1.010127	*0.90 - 1.10*
Intercept	-2.796062	*+/-30*



SO2 Calibration Plot Date: June 2, 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:	June 12, 2023	Last Cal Date:	May 10, 2023
Start time (MST):	9:16	End time (MST):	13:16
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:	1.007352	1.003207	Backgd or Offset:	1.58	1.59
Calibration intercept:	-0.159242	-0.139148	Coeff or Slope:	1.107	1.136

TRS As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.0	----
as found span	4921	78.7	80.0	78.0	1.025
as found 2nd point	4961	39.4	40.0	39.1	1.024
as found 3rd point	4980	19.7	20.0	19.3	1.037
new cylinder response					

TRS Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	0.1	----
high point	4921	78.7	80.0	80.2	0.997
second point	4961	39.4	40.0	39.9	1.003
third point	4980	19.7	20.0	19.7	1.016
as left zero	5000	0.0	0.0	0.1	----
as left span	4921	78.7	80.0	80.0	1.000
SO2 Scrubber Check	4921	79.2	800.4	0.0	----
Date of last scrubber change:		N/A		Ave Corr Factor	1.005
Date of last converter efficiency test:		N/A		95.1%	efficiency

Baseline Corr As found:	78.0	Prev response:	80.39	*% change:	-3.1%
Baseline Corr 2nd AF pt:	39.1	AF Slope:	0.976483	AF Intercept:	-0.078748
Baseline Corr 3rd AF pt:	19.3	AF Correlation:	0.999987		

* = > +/-5% change initiates investigation

Notes: Adjusted the span only.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

TRS Calibration Summary

Version-11-2021

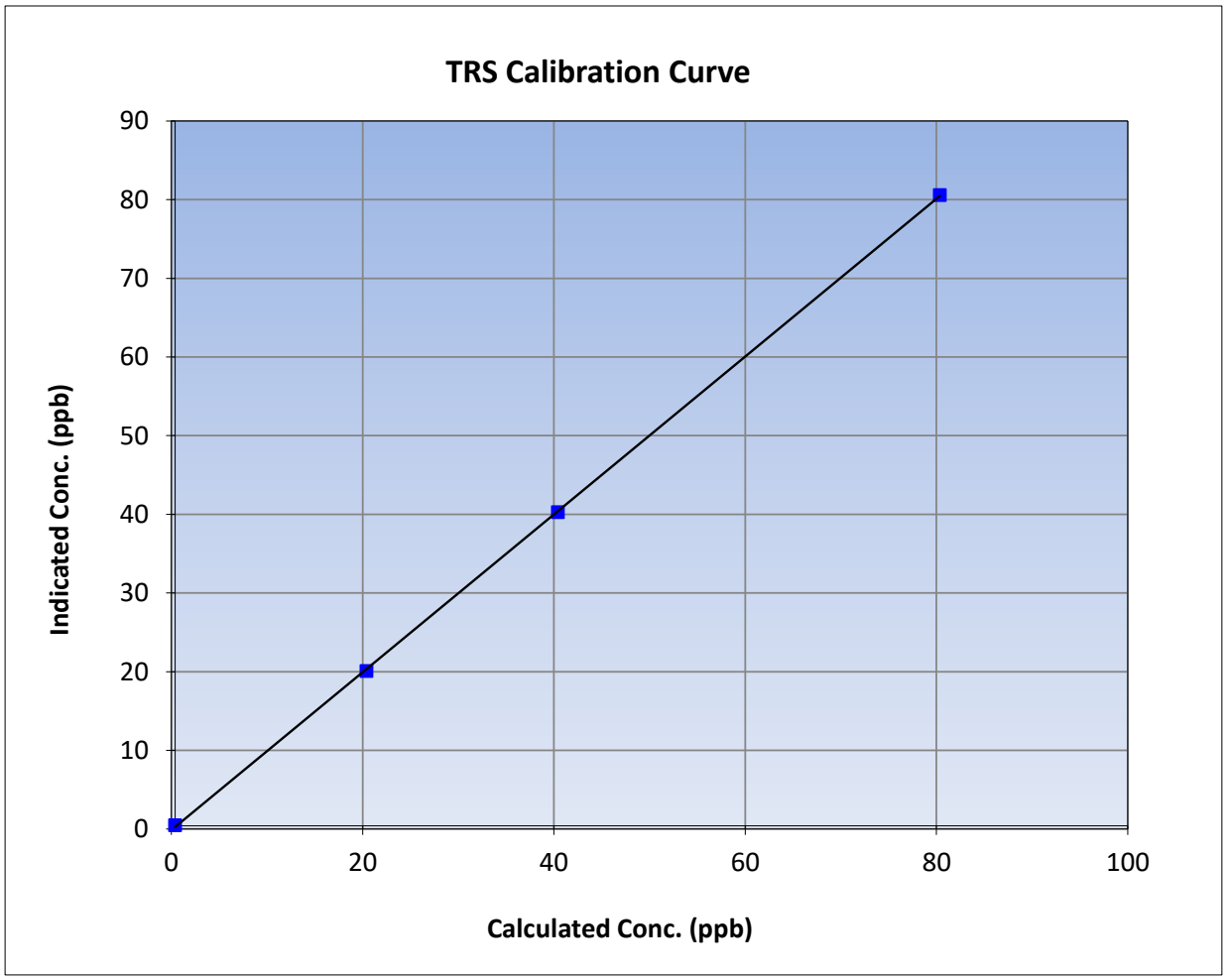
Station Information

Calibration Date:	June 12, 2023	Previous Calibration:	May 10, 2023
Station Name:	Ells River	Station Number:	AMS30
Start Time (MST):	9:16	End Time (MST):	13:16
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1410661331

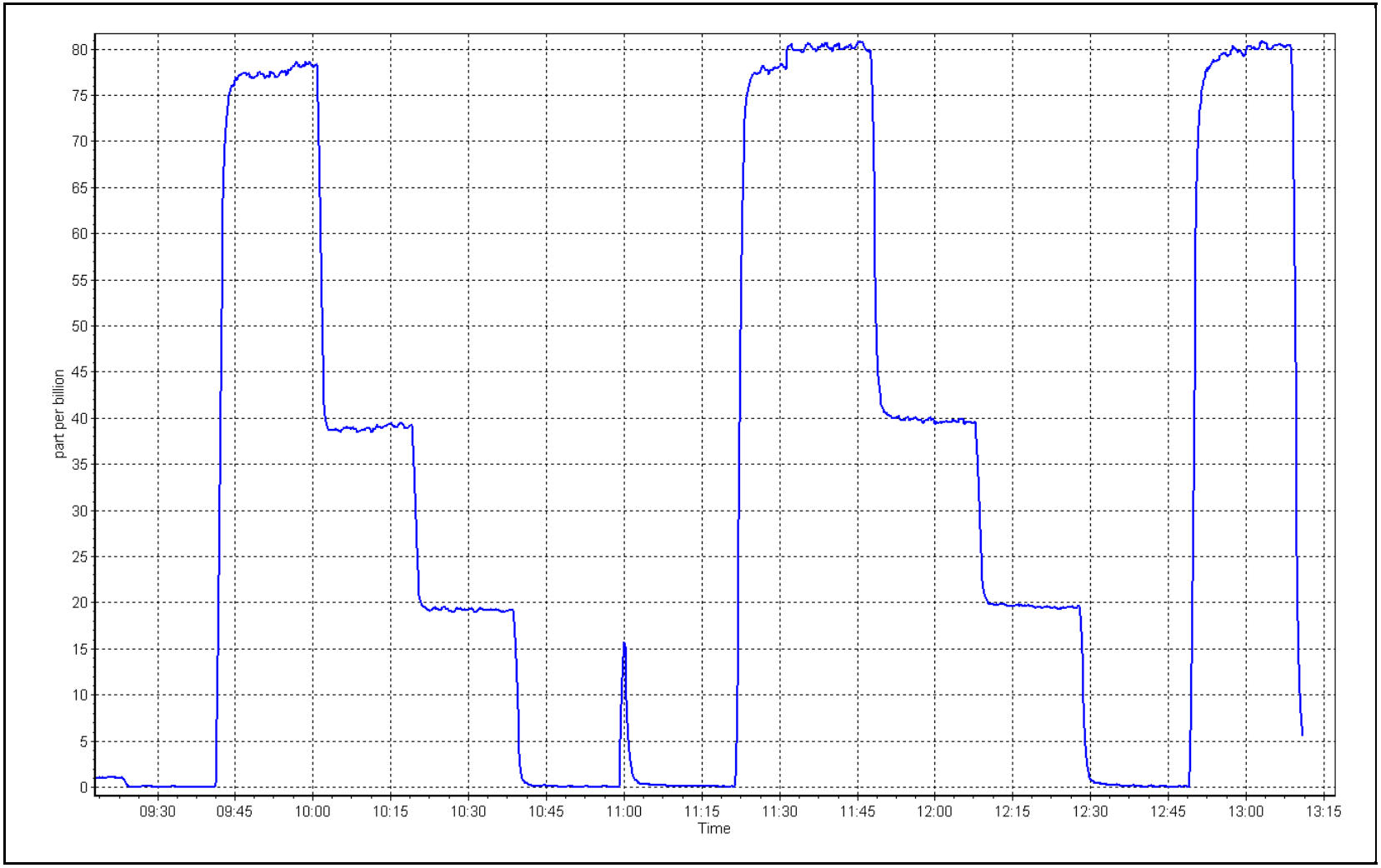
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	0.1	----
80.0	80.2	0.9971
40.0	39.9	1.0032
20.0	19.7	1.0161

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999959	*≥0.995*
Slope	1.003207	*0.90 - 1.10*
Intercept	-0.139148	*+/-3*



TRS Calibration Plot Date: June 12, 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:	June 2, 2023	Last Cal Date:	May 26, 2023
Start time (MST):	9:16	End time (MST):	12:16
Reason:	Routine		

Calibration Standards

Gas Cert Reference:		CC494126	Cal Gas Expiry Date:	December 29, 2028	
CH4 Cal Gas Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm
C3H8 Cal Gas Conc.	209.2	ppm			
Removed Gas Cert:			Removed Gas Expiry:		
Removed CH4 Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm
Removed C3H8 Conc.	209.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH_4):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	3061	
ZAG make/model:	API T701H		Serial Number:	358	

Analyzer Information

Analyzer make:	Thermo 55i		Analyzer serial #:	1181490018	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	Start	***Finish***		***Start***	***Finish***
CH4 SP Ratio:	0.000238	0.000241	NMHC SP Ratio:	4.39E-05	4.51E-05
CH4 Retention time:	14.2	14.2	NMHC Peak Area:	207620	202169

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	17.03	16.66	1.022
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	17.03	17.04	0.999
second point	4960	39.6	8.51	8.41	1.013
third point	4980	19.8	4.26	4.13	1.031
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	17.03	17.06	0.998
				Average Correction Factor	1.014

Baseline Corr AF:	16.66	Prev response	17.00	*% change	-2.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0	0.00	0.00	----
as found span	4921	79.2	9.11	8.87	1.028
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	9.11	1.000
second point	4960	39.6	4.56	4.50	1.012
third point	4980	19.8	2.28	2.20	1.036
as left zero	5000	0	0.00	0.00	----
as left span	4921	79.2	9.11	9.12	0.999
				Average Correction Factor	1.016
Baseline Corr AF:	8.87	Prev response	9.14	*% change	-3.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

CH4 Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF *Limit= 0.95-1.05*
as found zero	5000	0.0	0.00	0.00	----
as found span	4921	79.2	7.91	7.79	1.016
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4921	79.2	7.91	7.93	0.998
second point	4960	39.6	3.96	3.91	1.013
third point	4980	19.8	1.98	1.93	1.026
as left zero	5000	0.0	0.00	0.00	----
as left span	4921	79.2	7.91	7.94	0.997
				Average Correction Factor	1.012
Baseline Corr AF:	7.79	Prev response	7.86	*% change	-0.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation	

Calibration Statistics

	Start	***Finish***
THC Cal Slope:	1.000973	1.002469
THC Cal Offset:	-0.047539	-0.074938
CH4 Cal Slope:	0.995687	1.003253
CH4 Cal Offset:	-0.021757	-0.032957
NMHC Cal Slope:	1.005200	1.001801
NMHC Cal Offset:	-0.024582	-0.041781

Notes: Adjusted the span only.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

THC Calibration Summary

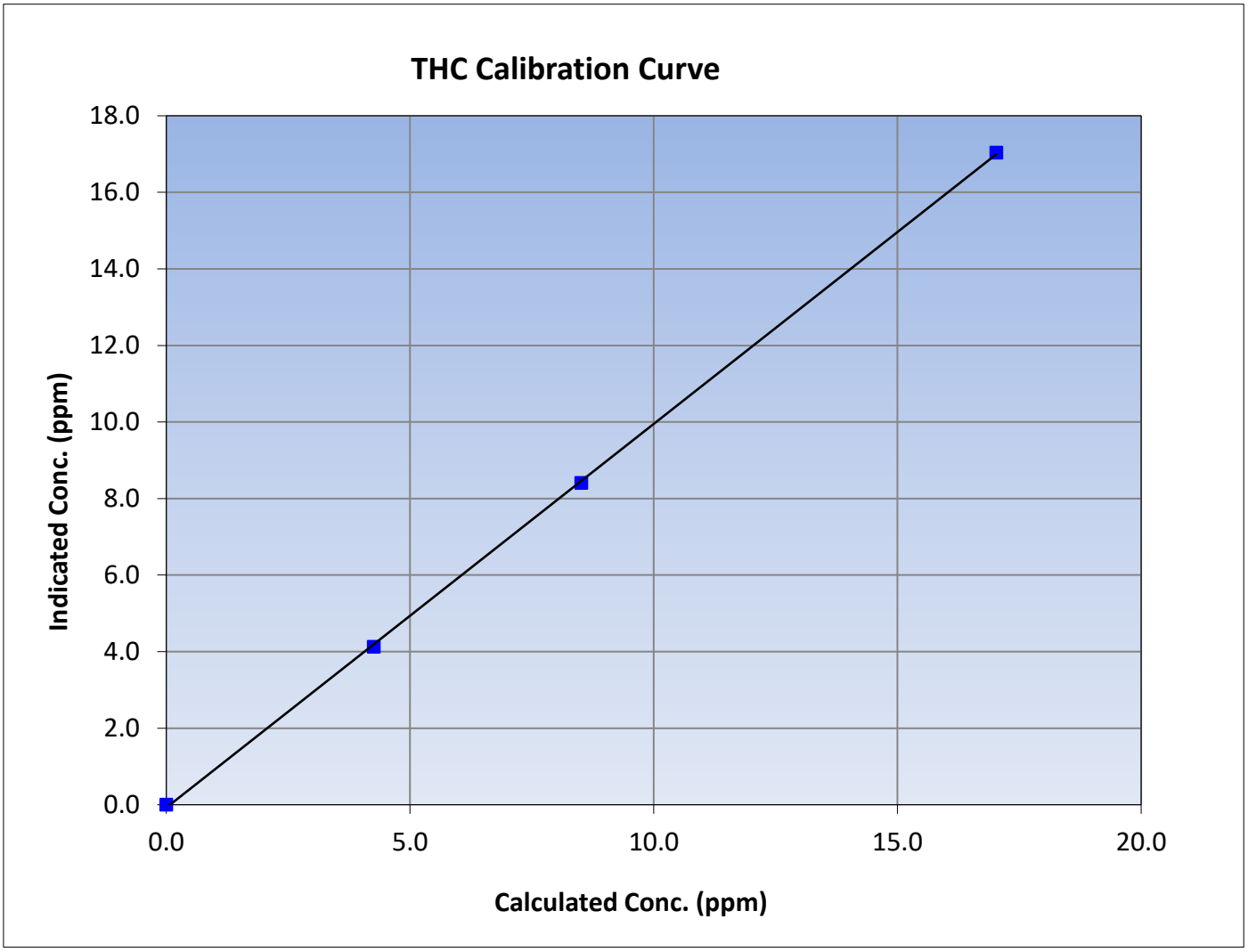
Version-01-2020

Station Information

Calibration Date:	June 2, 2023	Previous Calibration:	May 26, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:16	End Time (MST):	12:16
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	0.999910	*≥0.995*
17.03	17.04	0.9994			
8.51	8.41	1.0127	Slope	1.002469	*0.90 - 1.10*
4.26	4.13	1.0313			
			Intercept	-0.074938	*+/-0.5*



Wood Buffalo Environmental Association

CH_4 Calibration Summary

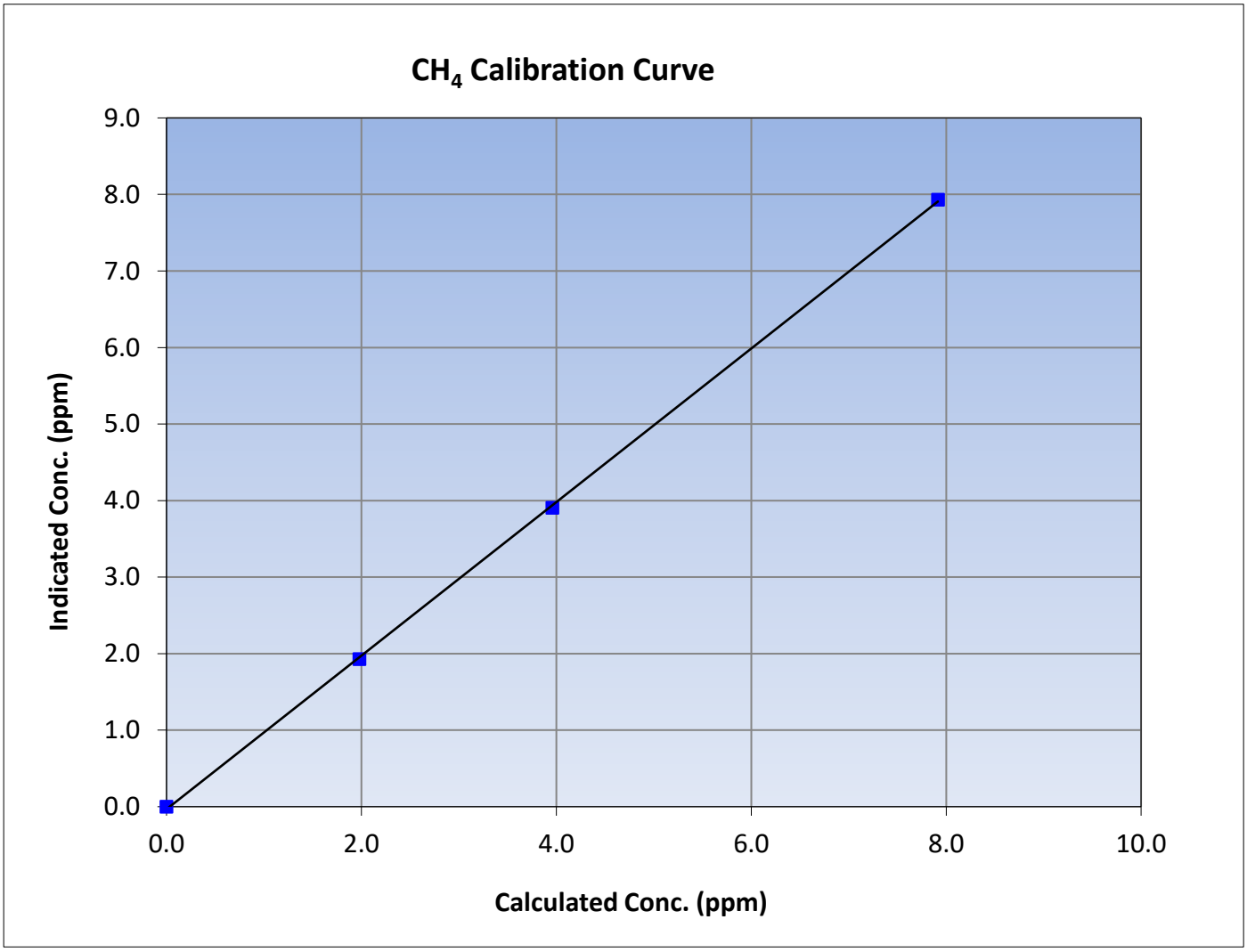
Version-01-2020

Station Information

Calibration Date:	June 2, 2023	Previous Calibration:	May 26, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:16	End Time (MST):	12:16
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	0.999912	≥0.995
7.91	7.93	0.9982			
3.96	3.91	1.0130	Slope	1.003253	0.90 - 1.10
1.98	1.93	1.0259			
			Intercept	-0.032957	+/-0.5



Wood Buffalo Environmental Association

NMHC Calibration Summary

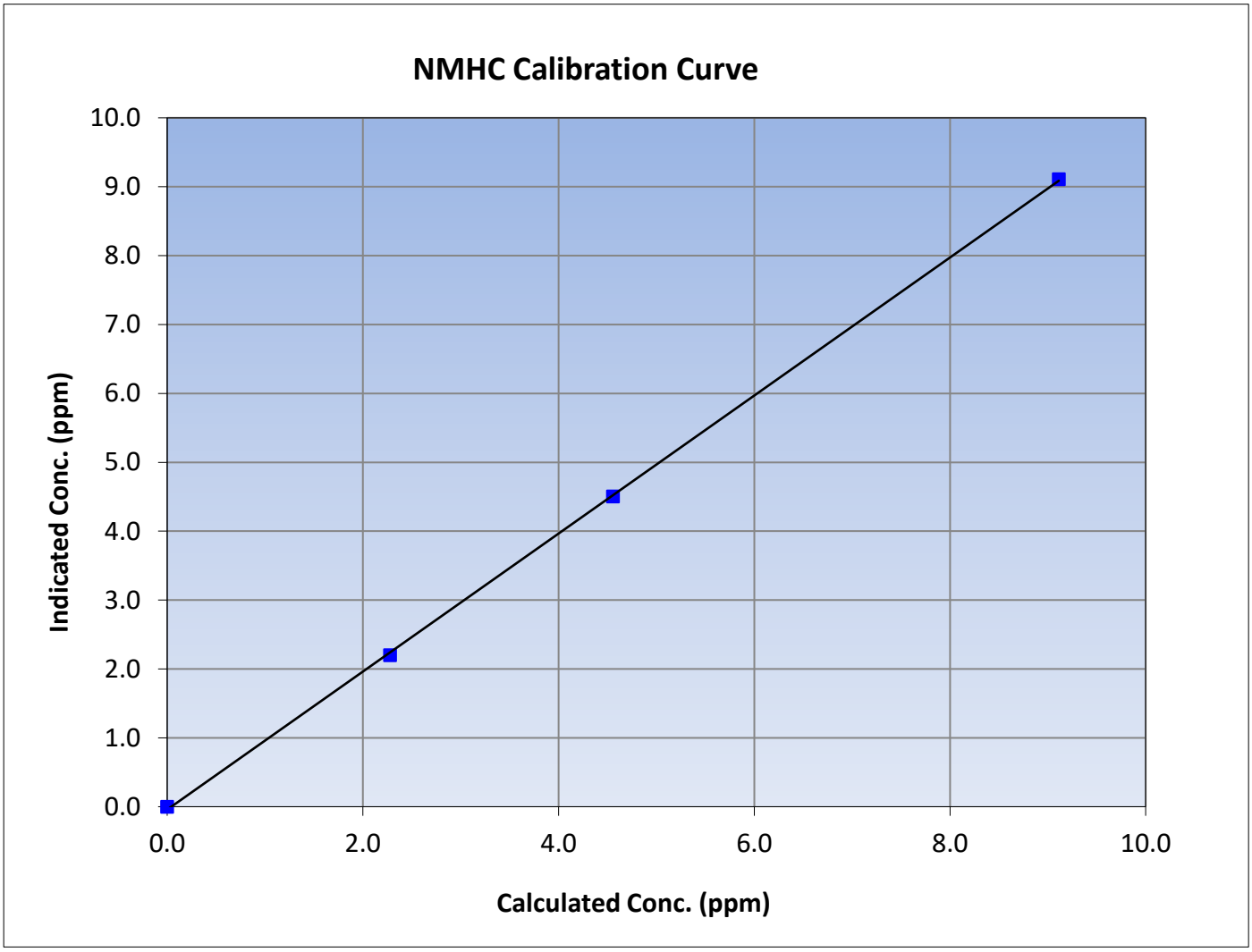
Version-01-2020

Station Information

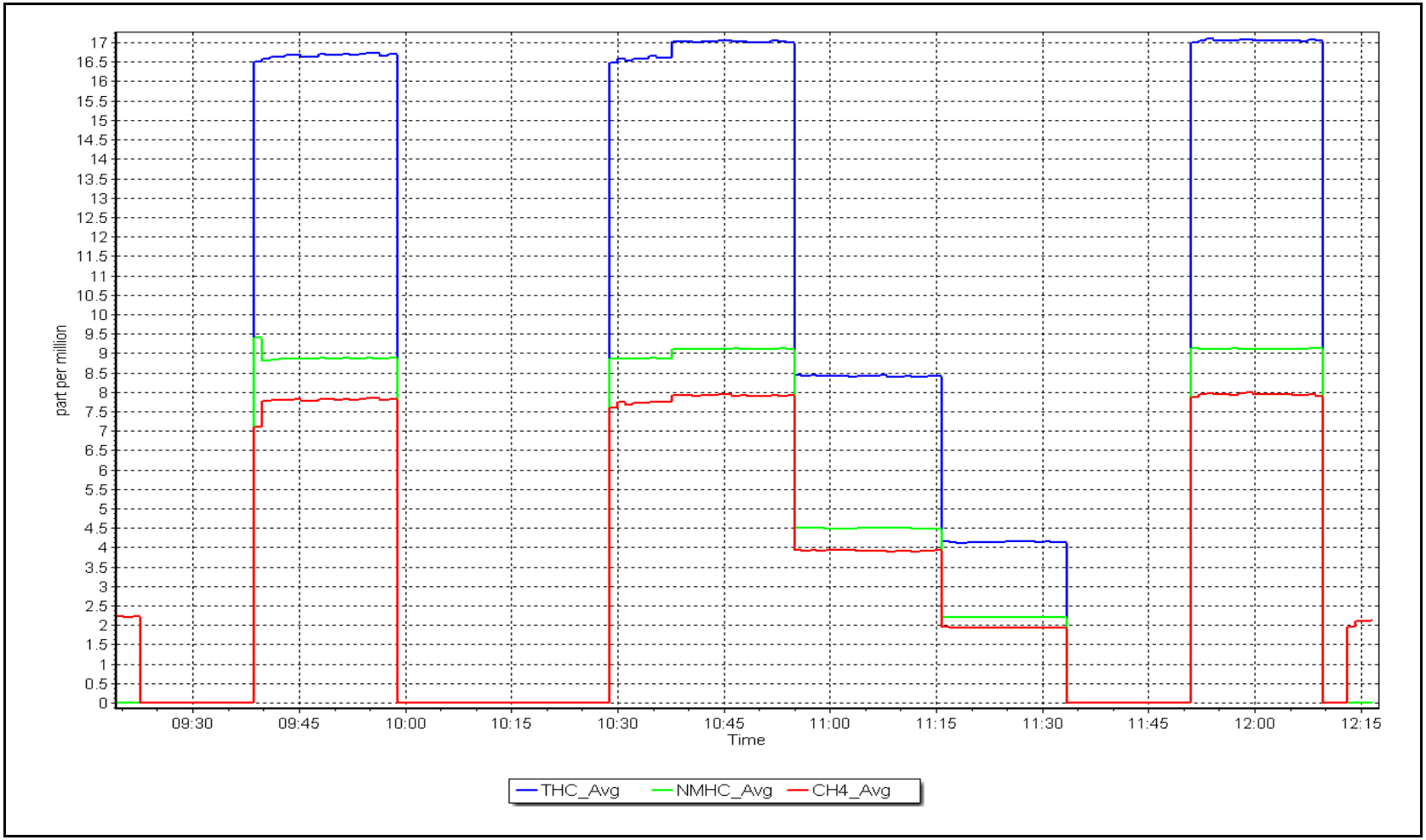
Calibration Date:	June 2, 2023	Previous Calibration:	May 26, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	9:16	End Time (MST):	12:16
Analyzer make:	Thermo 55i	Analyzer serial #:	1181490018

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.00	0.00	----	Correlation Coefficient	0.999904	≥0.995
9.11	9.11	1.0005			
4.56	4.50	1.0122	Slope	1.001801	0.90 - 1.10
2.28	2.20	1.0361			
			Intercept	-0.041781	+/-0.5



NMHC Calibration Plot Date: June 2, 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:	June 6, 2023	Last Cal Date:	May 11, 2023
Start time (MST):	8:49	End time (MST):	13:20
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:		T2Y1P2R	Cal Gas Expiry Date:	December 11, 2023	
NOX Cal Gas Conc:	50.83	ppm	NO Cal Gas Conc:	49.97	ppm
Removed Cylinder #:			Removed Gas Exp Date:		
Removed Gas NOX Conc:	50.83	ppm	Removed Gas NO Conc:	49.97	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3061	
ZAG make/model:	API T701H		Serial Number:	358	

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	710321429
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.051	1.051	NO bkgnd or offset:	12.7	12.7
NOX coeff or slope:	0.990	0.990	NOX bkgnd or offset:	12.9	12.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	181.2	180.6

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000351	0.996431
NO_X Cal Offset:	-1.160000	-1.740000
NO Cal Slope:	1.001858	0.993668
NO Cal Offset:	-2.240000	-2.100000
NO_2 Cal Slope:	0.998225	1.000832
NO_2 Cal Offset:	0.085999	0.789762

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	4920	80.0	813.3	799.5	13.8	809.5	794.3	15.2	1.0047	1.0066
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	80.0	813.3	799.5	13.8	809.8	793.7	16.2	1.0043	1.0073
second point	4960	40.0	406.6	399.8	6.9	401.8	393.3	8.5	1.0120	1.0164
third point	4980	20.0	203.3	199.9	3.4	199.5	194.8	4.7	1.0191	1.0261
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.2	-0.1	----	----
as left span	4920	80.0	813.3	435.5	377.8	810.0	425.0	384.9	1.0040	1.0248
								Average Correction Factor	1.0118	1.0166

Corrected As found	NO_X = 809.5 ppb	NO = 794.4 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X =	-0.4%
Previous Response	NO_X = 812.4 ppb	NO = 798.8 ppb		*Percent Change	NO =	-0.5%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	788.0	424.0	377.8	378.5	0.9980	100.2%
2nd GPT point (200 ppb O3)	788.0	609.8	192.0	193.1	0.9941	100.6%
3rd GPT point (100 ppb O3)	788.0	697.0	104.8	106.6	0.9827	101.8%
				Average Correction Factor	0.9916	100.8%

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

Wood Buffalo Environmental Association

NO_X Calibration Summary

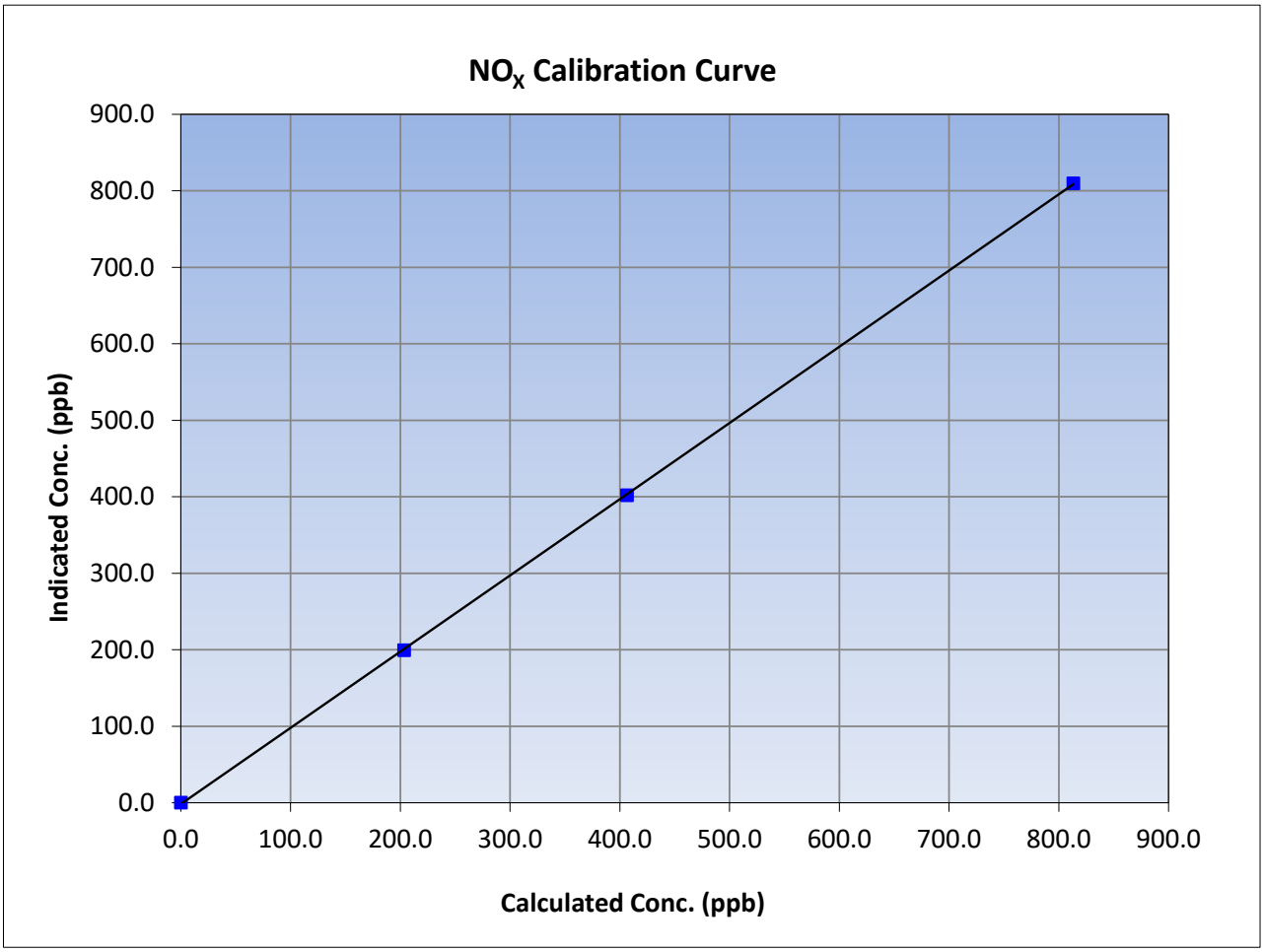
Version-04-2020

Station Information

Calibration Date:	June 6, 2023	Previous Calibration:	May 11, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	8:49	End Time (MST):	13:20
Analyzer make:	Thermo 42i	Analyzer serial #:	710321429

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999974	≥0.995
813.3	809.8	1.0043			
406.6	401.8	1.0120	Slope	0.996431	0.90 - 1.10
203.3	199.5	1.0191			
			Intercept	-1.740000	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

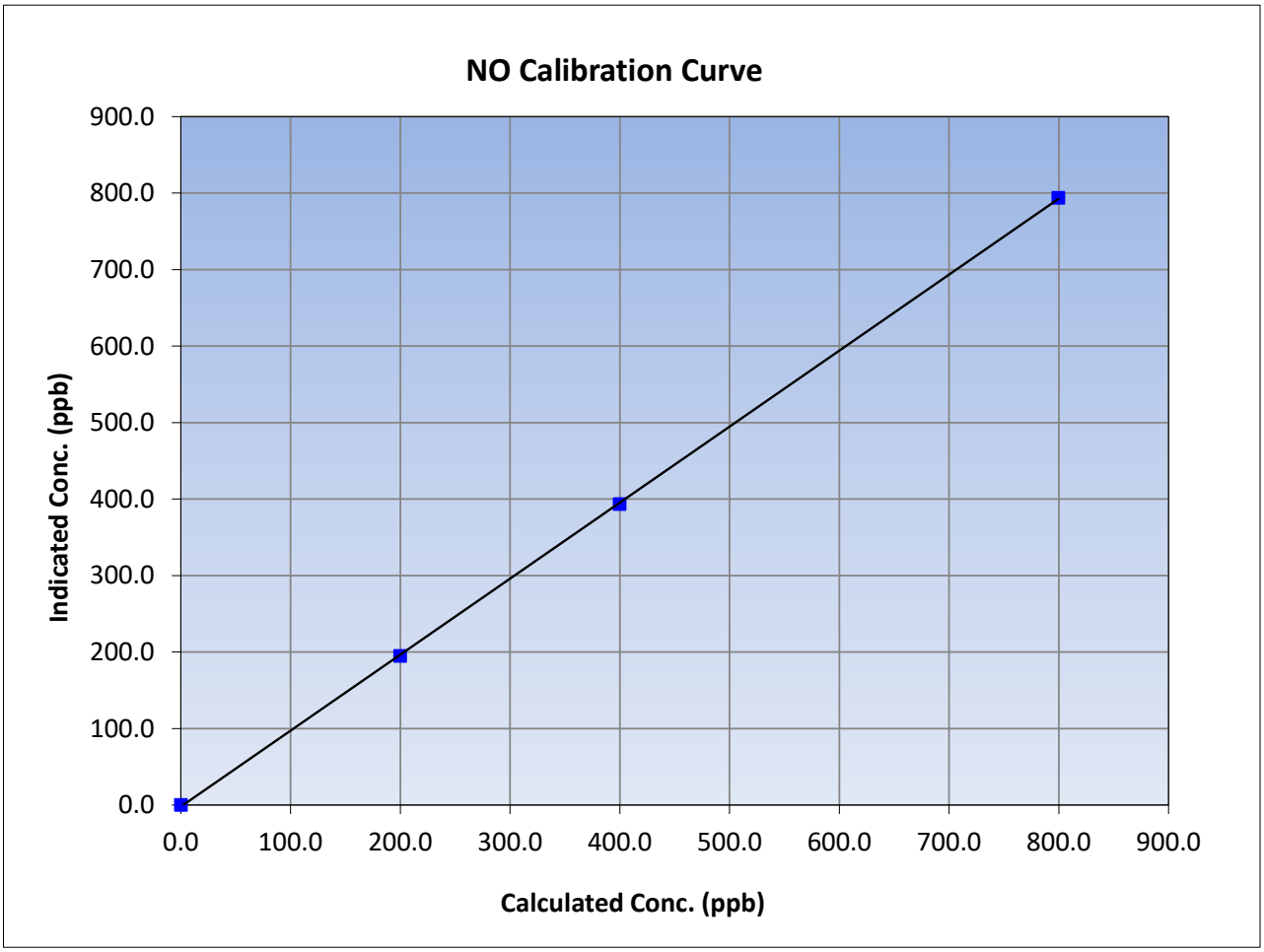
Version-04-2020

Station Information

Calibration Date:	June 6, 2023	Previous Calibration:	May 11, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	8:49	End Time (MST):	13:20
Analyzer make:	Thermo 42i	Analyzer serial #:	710321429

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.1	----	Correlation Coefficient	0.999963	≥0.995
799.5	793.7	1.0073			
399.8	393.3	1.0164	Slope	0.993668	0.90 - 1.10
199.9	194.8	1.0261			
			Intercept	-2.100000	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

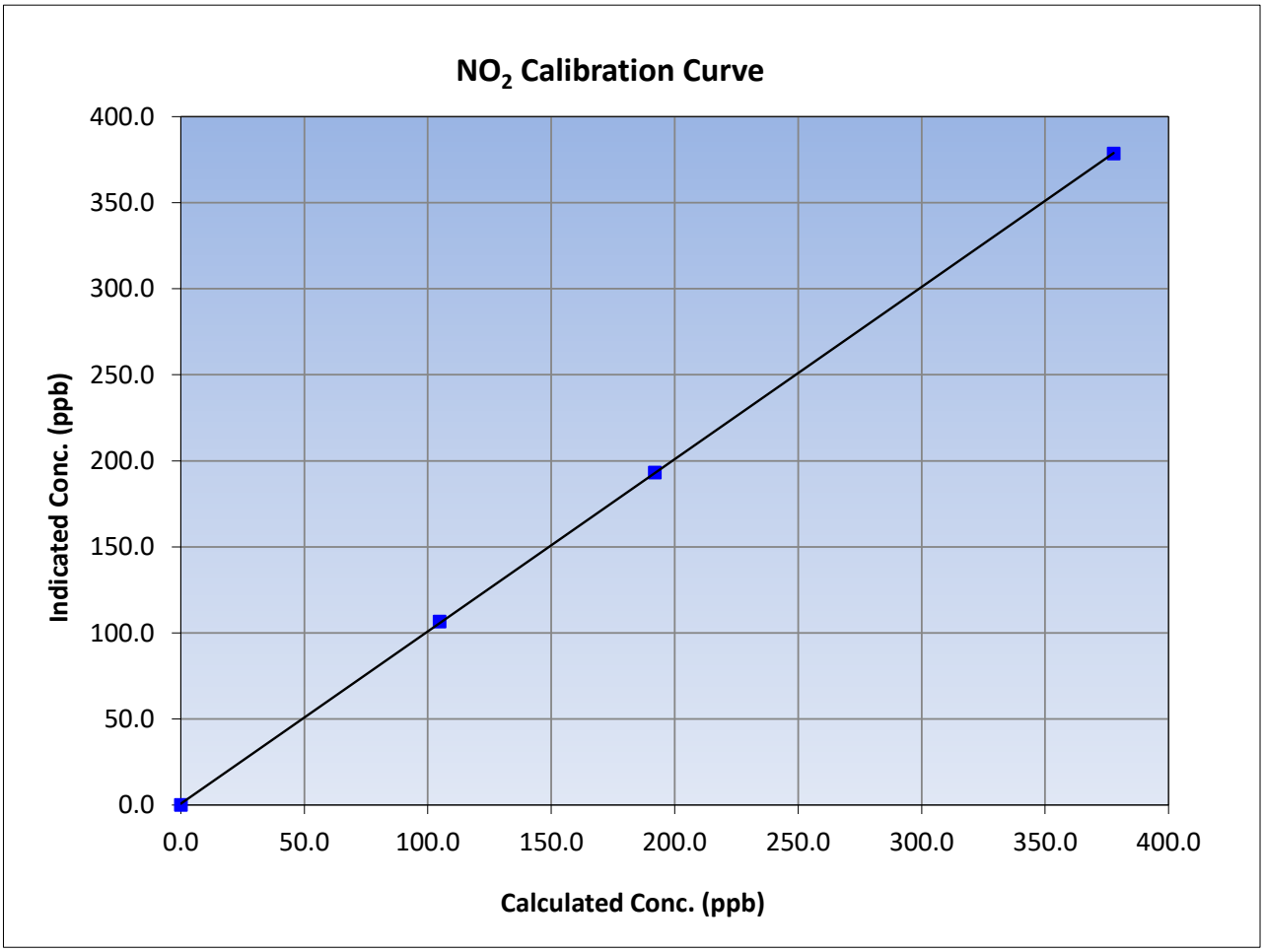
Version-04-2020

Station Information

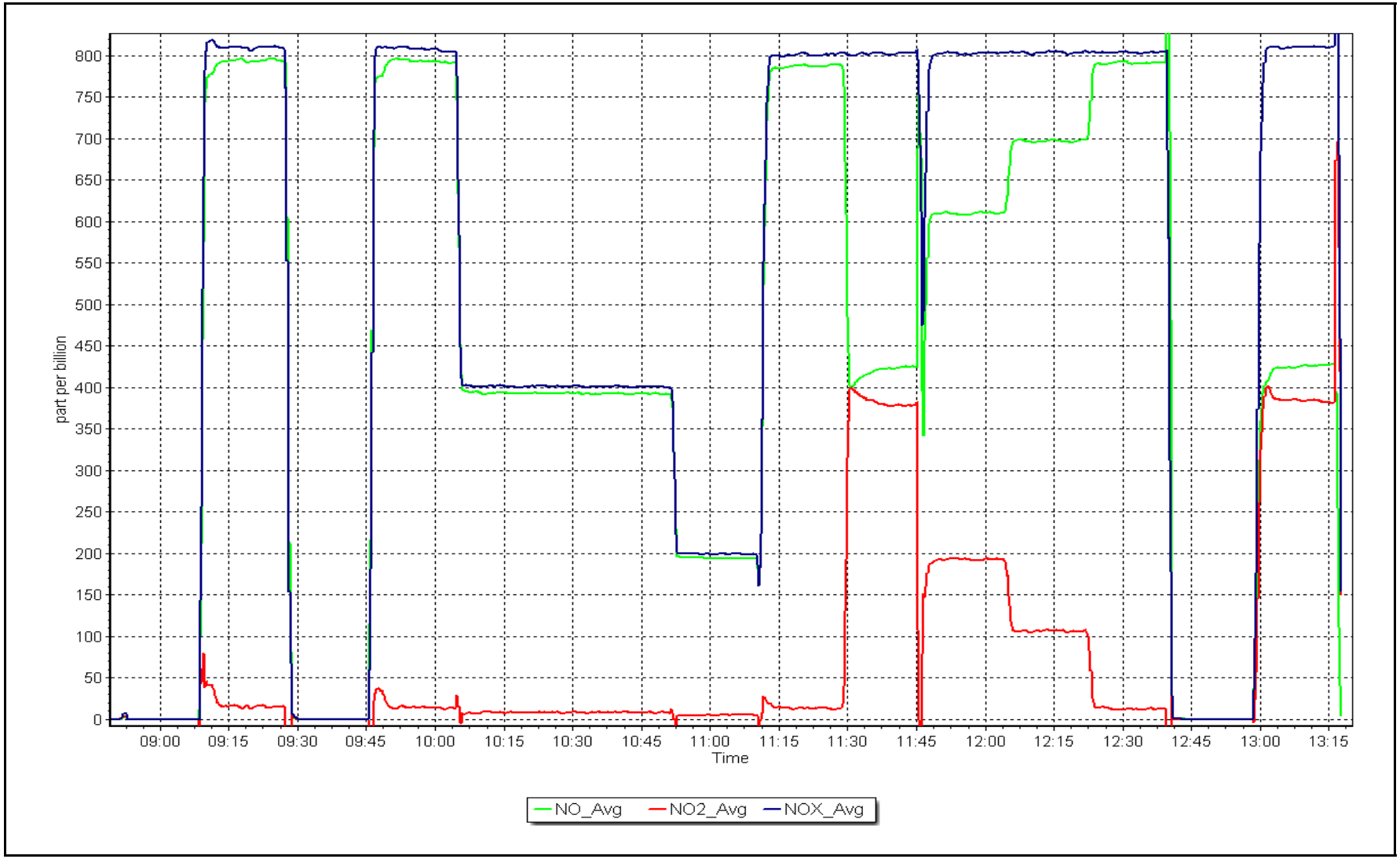
Calibration Date:	June 6, 2023	Previous Calibration:	May 11, 2023
Station Name:	Ells River	Station Number:	AMS 30
Start Time (MST):	8:49	End Time (MST):	13:20
Analyzer make:	Thermo 42i	Analyzer serial #:	710321429

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	0.0	----	Correlation Coefficient	0.999978	≥0.995
377.8	378.5	0.9980			
192.0	193.1	0.9941	Slope	1.000832	0.90 - 1.10
104.8	106.6	0.9827			
			Intercept	0.789762	+/-20



NO_X Calibration Plot Date: June 6, 2023 Location: Ells River



Wood Buffalo Environmental Association

T640 $PM_{2.5}$ CALIBRATION

Version-01-2023

Station Information

Station Name:	Ells River	Station number:	AMS 30
Calibration Date:	June 29, 2023	Last Cal Date:	June 16, 2023
Start time (MST):	8:49	End time (MST):	9:45
Analyzer Make:	API T640	S/N:	875
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Alicat	S/N:	388751
Temp/RH standard:	Alicat	S/N:	388751

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	*(Limits)*
T (°C)	23.6	23.32	23.6	☐	+/- 2 °C
P (mmHg)	727.1	729.1	727.1	☐	+/- 10 mmHg
flow (LPM)	5.05	5.13	5.05	☐	+/- 0.25 LPM

Leak Test: Date of check: June 29, 2023 Last Cal Date: May 10, 2023

PM w/o HEPA: 18.8 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	7.2	11.2	11	☑	10.9 +/- 0.5

Post-maintenance leak check: PM w/o HEPA: 54.7 w/ HEPA: 0 <0.2 ug/m3

Date Optical Chamber Cleaned: June 29, 2023

Disposable Filter Changed: June 29, 2023

Annual Maintenance

Date Sample Tube Cleaned: June 29, 2023

Date RH/T Sensor Cleaned: June 29, 2023

Notes: Adjusted PMT Peak Test. Inlet head still clean.

Calibration by: Denny Ray Estador

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS506
JACKFISH 1
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Jackfish 1	Station number:	AMS 506
Calibration Date:	June 28, 2023	Last Cal Date:	May 18, 2023
Start time (MST):	8:09	End time (MST):	10:49
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:	1.003957	1.001415	Backgd or Offset:	18.7	18.6
Calibration intercept:	-1.916022	-2.176005	Coeff or Slope:	0.946	0.941

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.8	----
as found span	4921	79.2	800.2	799.6	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.5	----
high point	4921	79.2	800.2	799.6	1.001
second point	4960	39.6	400.2	398.9	1.003
third point	4980	19.8	200.1	195.7	1.022
as left zero	5000	0.0	0.0	-0.7	----
as left span	4921	79.2	800.2	800.3	1.000
				Average Correction Factor	1.009

Baseline Corr As found:	800.40	Previous response	801.46	*% change	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

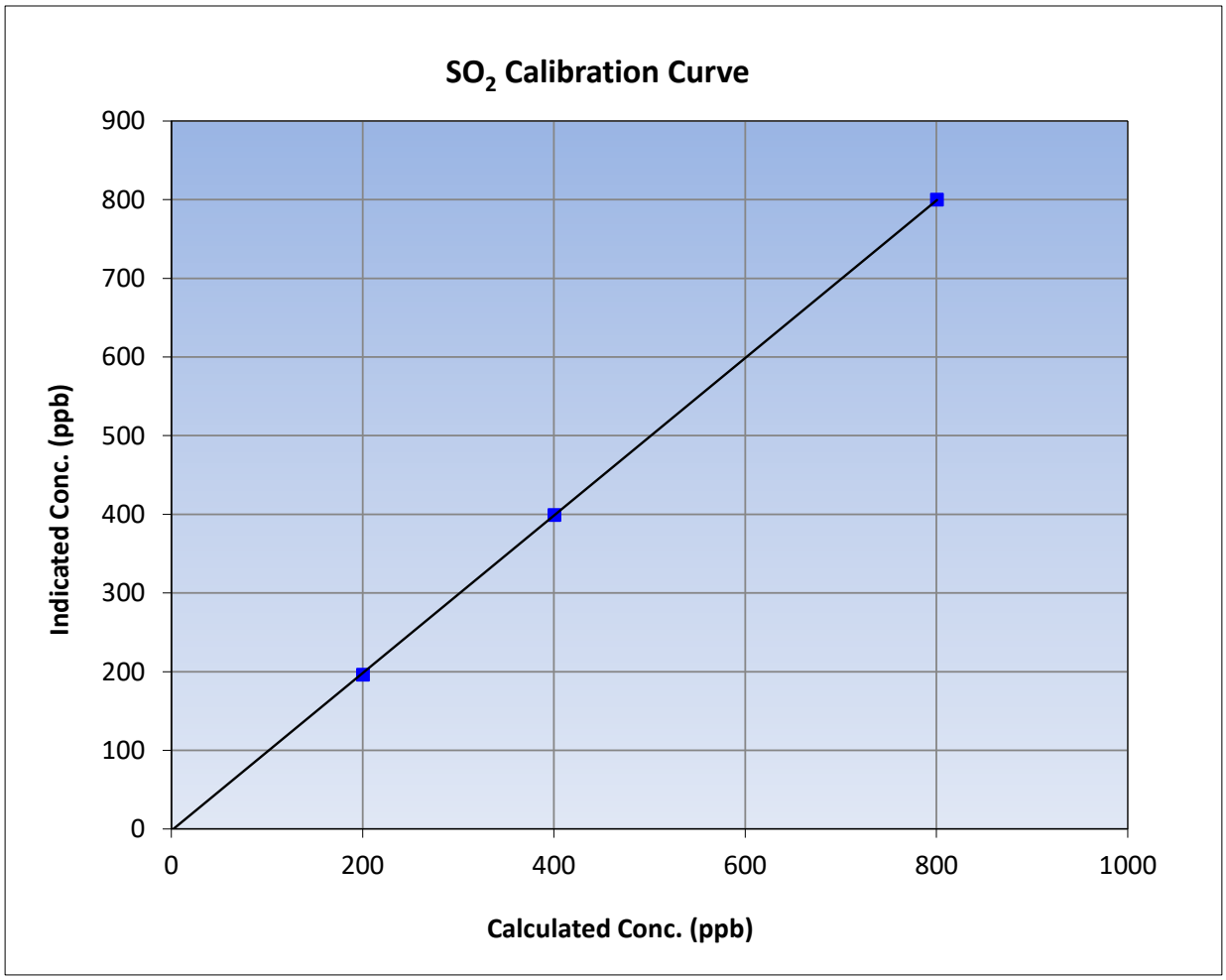
Station Information

Calibration Date:	June 28, 2023	Previous Calibration:	May 18, 2023
Station Name:	Jackfish 1	Station Number:	AMS 506
Start Time (MST):	8:09	End Time (MST):	10:49
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290011

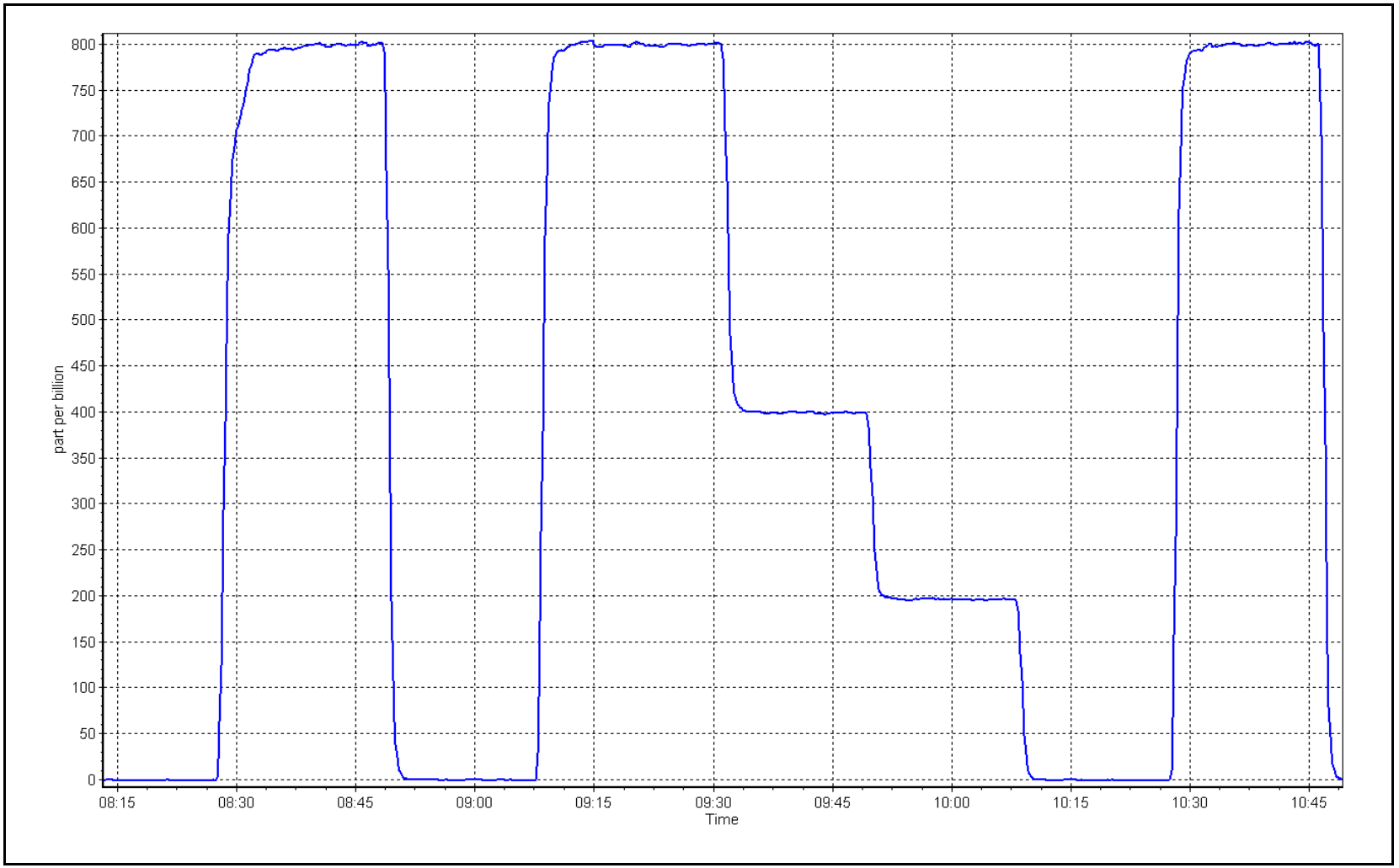
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.5	----
800.2	799.6	1.0008
400.2	398.9	1.0031
200.1	195.7	1.0223

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999974	*≥0.995*
Slope	1.001415	*0.90 - 1.10*
Intercept	-2.176005	*+/-30*



SO2 Calibration Plot Date: June 28, 2023 Location: Jackfish 1



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Jackfish 1	Station number:	AMS506
Calibration Date:	June 22, 2023	Last Cal Date:	May 25, 2023
Start time (MST):	8:39	End time (MST):	12:24
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:	1.015003	1.015290	Backgd or Offset:	3.33	3.35
Calibration intercept:	-0.378084	-0.438102	Coeff or Slope:	1.066	1.066

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-0.3	----
as found span	4922	77.8	80.0	79.5	1.002
as found 2nd point	4961	38.9	40.0	39.7	1.000
as found 3rd point	4981	19.4	19.9	19.4	1.012
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.3	----
high point	4922	77.8	80.0	80.8	0.990
second point	4961	38.9	40.0	40.2	0.995
third point	4981	19.4	19.9	19.6	1.017
as left zero	5000	0.0	0.0	-0.3	----
as left span	4922	77.8	80.0	80.6	0.992
SO2 Scrubber Check	4921	79.2	792.0	0.0	----
Date of last scrubber change:		24-Feb-23		Ave Corr Factor	1.001
Date of last converter efficiency test:		December 1, 2022			efficiency

Baseline Corr As found:	79.8	Prev response:	80.80	*% change:	-1.3%
Baseline Corr 2nd AF pt:	40.0	AF Slope:	0.998717	AF Intercept:	-0.358434
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999988		

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after multi-point as founds. Scrubber test done and passed after calibrator zero. No adjustment made.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

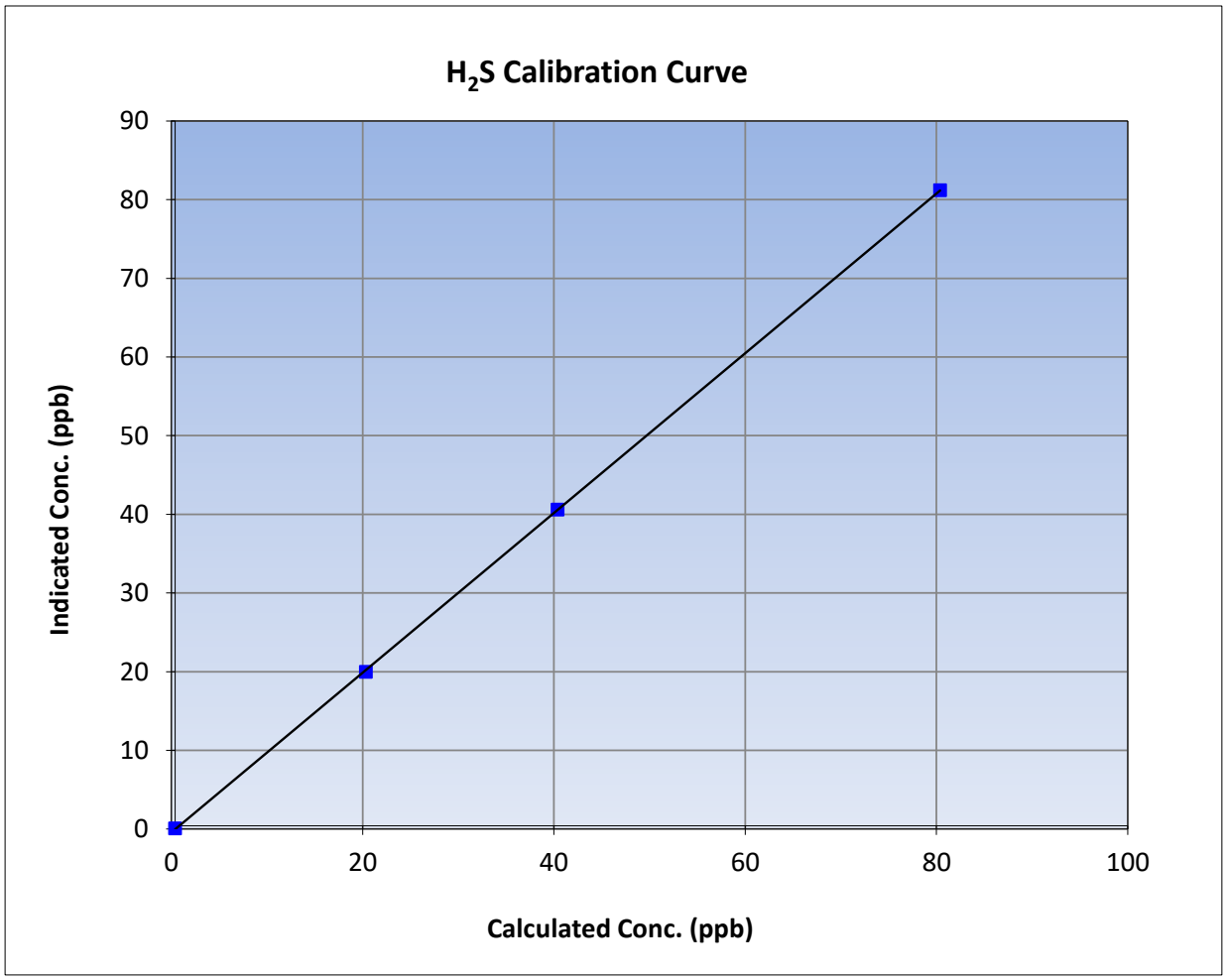
Station Information

Calibration Date:	June 22, 2023	Previous Calibration:	May 25, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	8:39	End Time (MST):	12:24
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1180540020

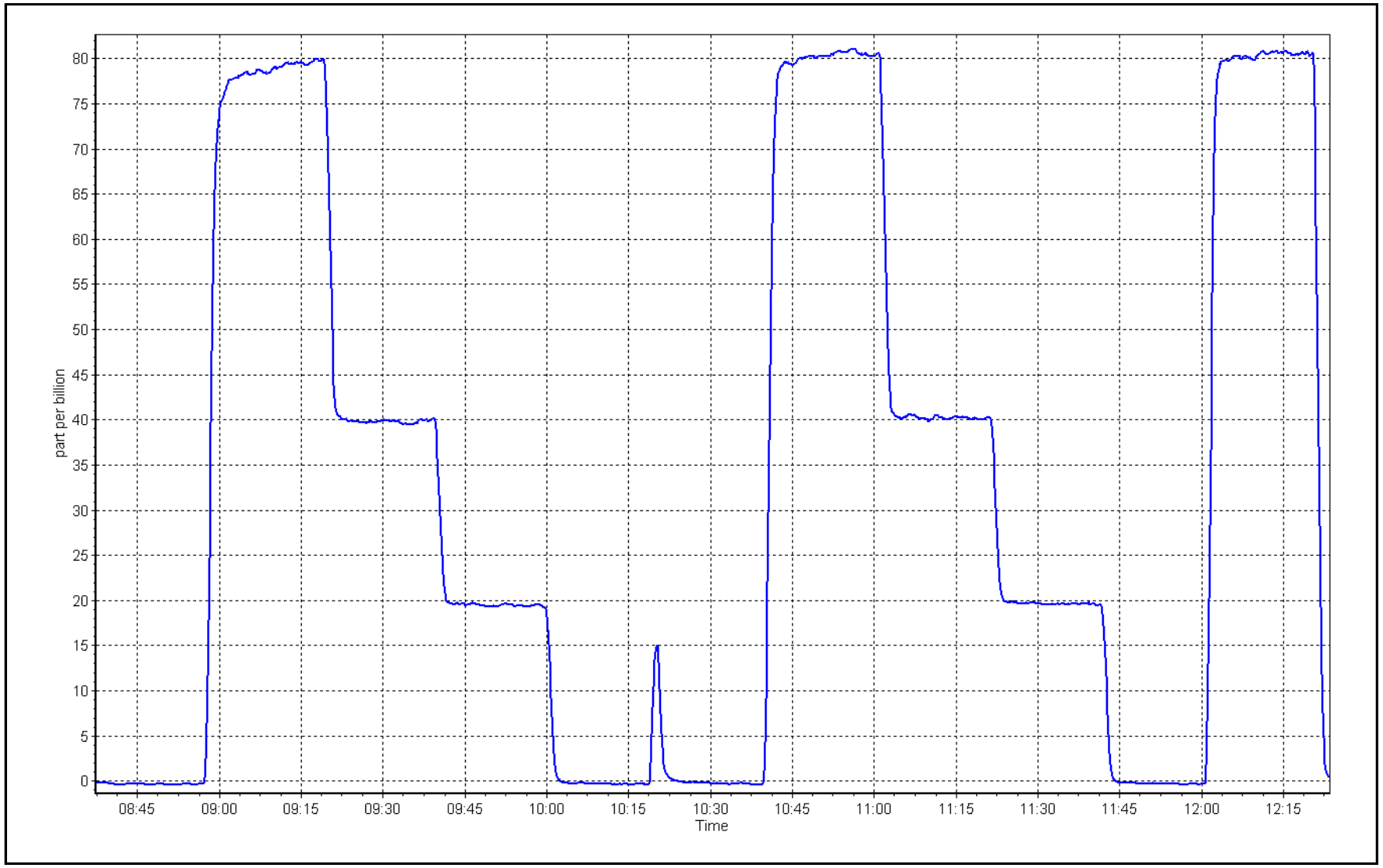
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.3	----
80.0	80.8	0.9899
40.0	40.2	0.9948
19.9	19.6	1.0174

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999982	*≥0.995*
Slope	1.015290	*0.90 - 1.10*
Intercept	-0.438102	*+/-3*



H_2S Calibration Plot Date: June 22, 2023 Location: Jackfish 1



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Jackfish 1	Station number:	AMS506
Calibration Date:	June 27, 2023	Last Cal Date:	May 26, 2023
Start time (MST):	8:21	End time (MST):	12:36
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #:		T26811M	Cal Gas Expiry Date:	October 30, 2024	
NOX Cal Gas Conc:	47.46	ppm	NO Cal Gas Conc:	47.39	ppm
Removed Cylinder #:		NA	Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	47.46	ppm	Removed Gas NO Conc:	47.39	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	2659	
ZAG make/model:	API 701		Serial Number:	4427	

Analyzer Information

Analyzer make:	Thermo 42i		Analyzer serial #:	1218153356	
NOX Range (ppb):	0 - 1000 ppb				
	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.142	1.150	NO bkgnd or offset:	3.7	3.8
NOX coeff or slope:	0.991	0.989	NOX bkgnd or offset:	3.9	4.0
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	173.7	173.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.000448	1.001347
NO_X Cal Offset:	-1.727986	-1.568006
NO Cal Slope:	1.001597	1.002797
NO Cal Offset:	-2.987959	-2.507983
NO_2 Cal Slope:	1.000773	1.006674
NO_2 Cal Offset:	-1.046494	-0.458123

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.3	-0.1	----	----
as found span	4916	84.4	801.1	799.9	1.2	798.8	794.0	4.9	1.0028	1.0074
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.1	-0.2	----	----
high point	4916	84.4	801.1	799.9	1.2	800.8	800.4	0.3	1.0003	0.9993
second point	4958	42.2	400.5	400.0	0.6	400.1	398.6	1.5	1.0011	1.0034
third point	4979	21.1	200.3	200.0	0.3	196.9	194.8	2.1	1.0172	1.0266
as left zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
as left span	4916	84.4	801.1	407.3	393.8	790.8	399.9	390.9	1.0130	1.0185
								Average Correction Factor	1.0062	1.0098

Corrected As found	NO_X = 799.2 ppb	NO = 794.3 ppb	* = > +/-5% change initiates investigation		*Percent Change	NO_X =	-0.1%
Previous Response	NO_X = 799.7 ppb	NO = 798.2 ppb			*Percent Change	NO =	-0.5%
Baseline Corr 2nd pt	NO_X = NA ppb	NO = NA ppb	As found	NO_X r^2:	Nx Sl:	Nx Int:	
Baseline Corr 3rd pt	NO_X = NA ppb	NO = NA ppb	As found	NO r^2:	NO Sl:	NO Int:	
			As found	NO_2 r^2:	NO2 Sl:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	791.1	398.5	393.8	396.2	0.9939	100.6%
2nd GPT point (200 ppb O3)	791.1	599.6	192.7	193.0	0.9983	100.2%
3rd GPT point (100 ppb O3)	791.1	691.3	101.0	101.2	0.9978	100.2%
				Average Correction Factor	0.9967	100.3%

Notes: Changed inlet filter after as founds. Adjusted and span only. Used 2nd NO reference point due to drift.

Calibration Performed By: Sean Bala

Wood Buffalo Environmental Association

NO_X Calibration Summary

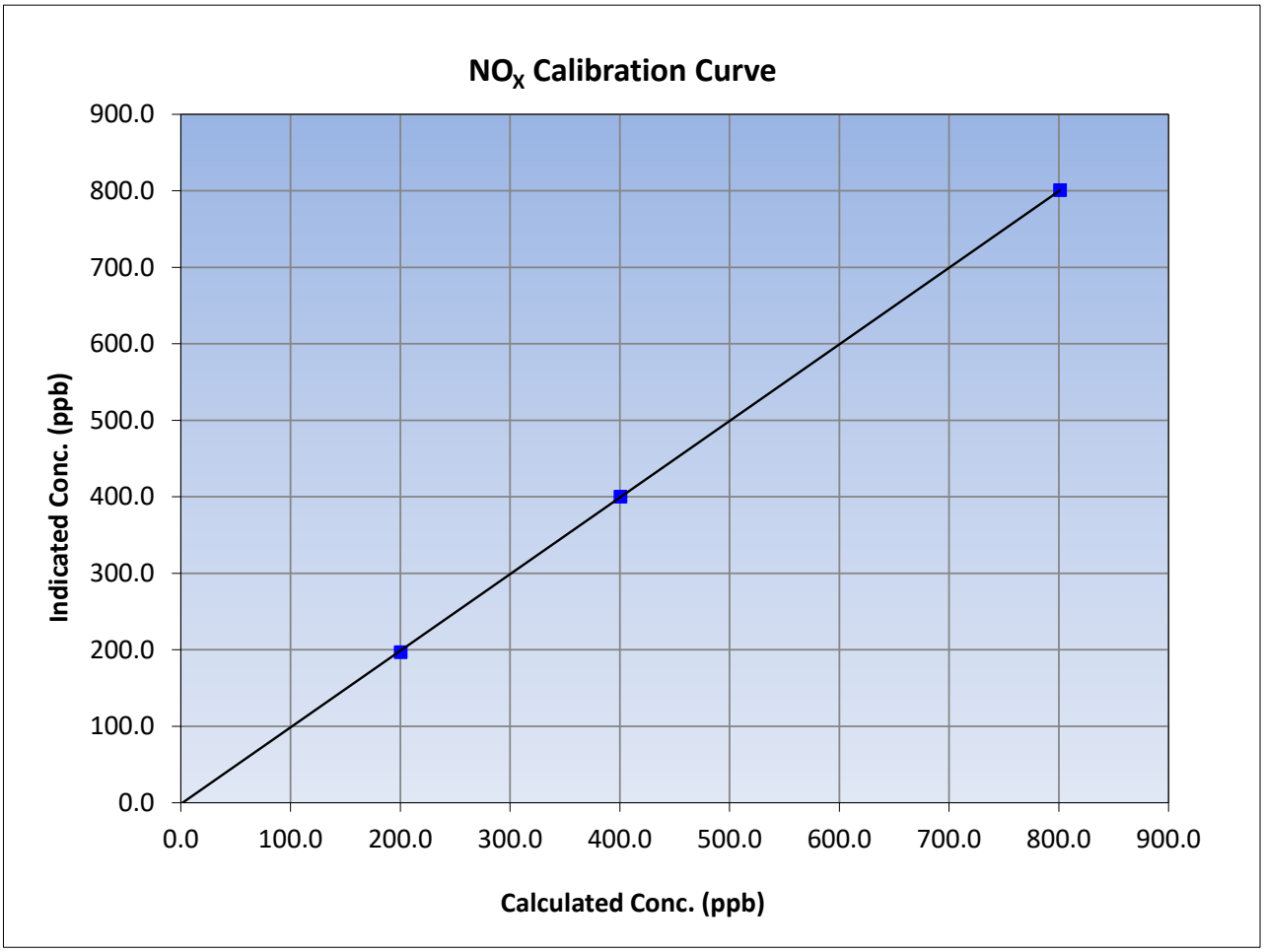
Version-04-2020

Station Information

Calibration Date:	June 27, 2023	Previous Calibration:	May 26, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	8:21	End Time (MST):	12:36
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.3	----	Correlation Coefficient	0.999982	≥0.995
801.1	800.8	1.0003			
400.5	400.1	1.0011	Slope	1.001347	0.90 - 1.10
200.3	196.9	1.0172			
			Intercept	-1.568006	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

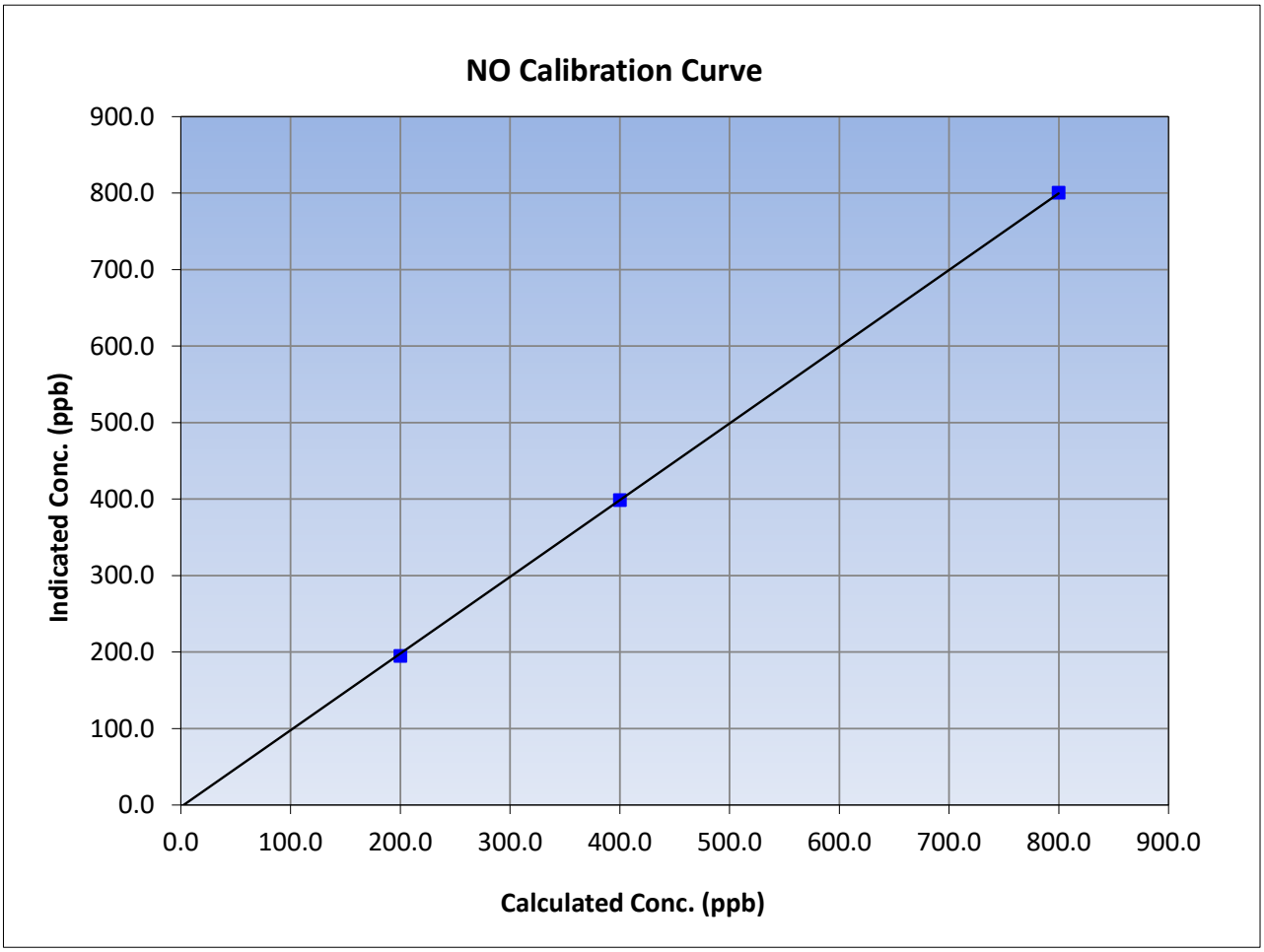
Version-04-2020

Station Information

Calibration Date:	June 27, 2023	Previous Calibration:	May 26, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	8:21	End Time (MST):	12:36
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	0.999952	≥0.995
799.9	800.4	0.9993			
400.0	398.6	1.0034	Slope	1.002797	0.90 - 1.10
200.0	194.8	1.0266			
			Intercept	-2.507983	+/-20



Wood Buffalo Environmental Association

NO_2 Calibration Summary

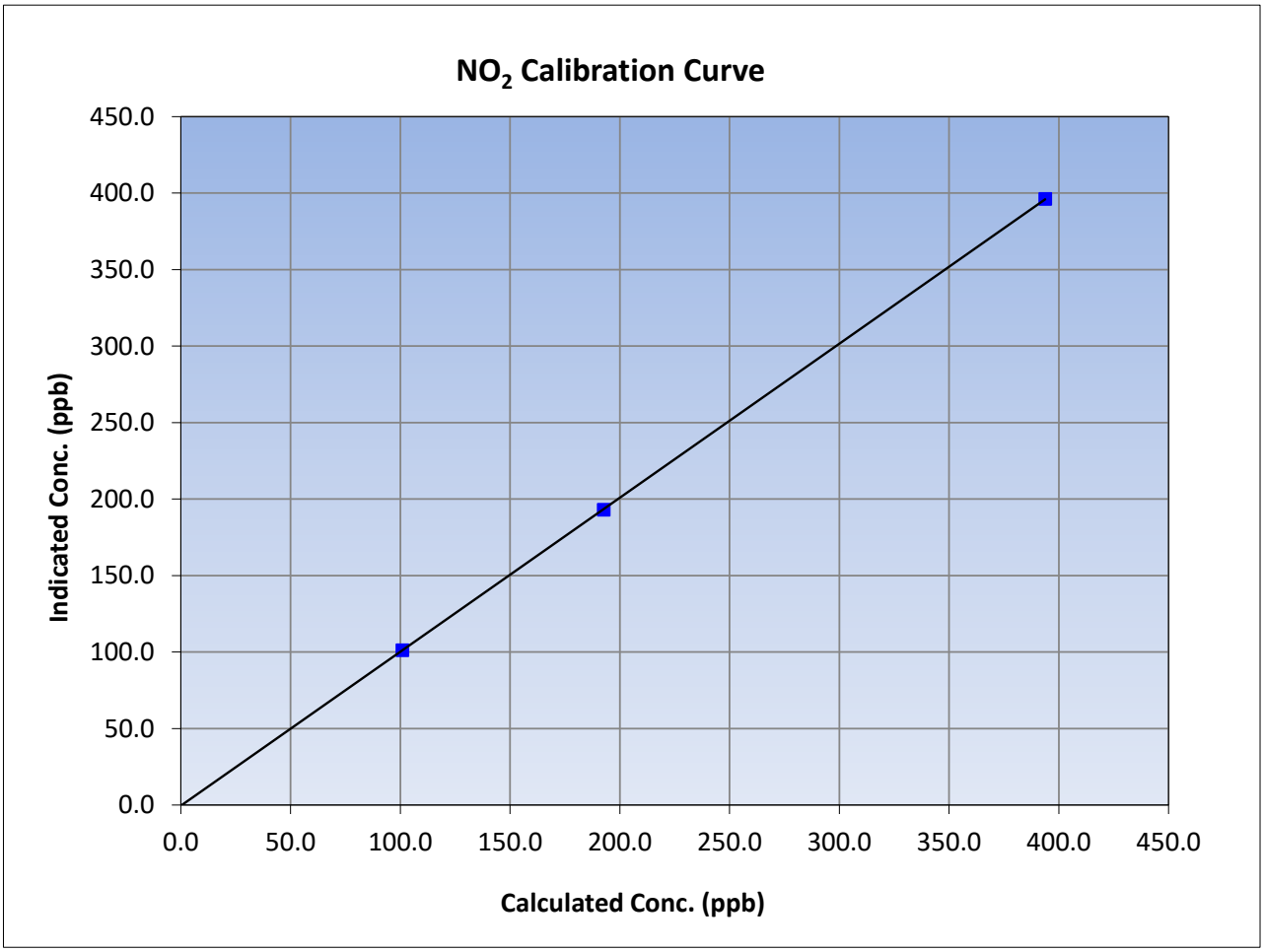
Version-04-2020

Station Information

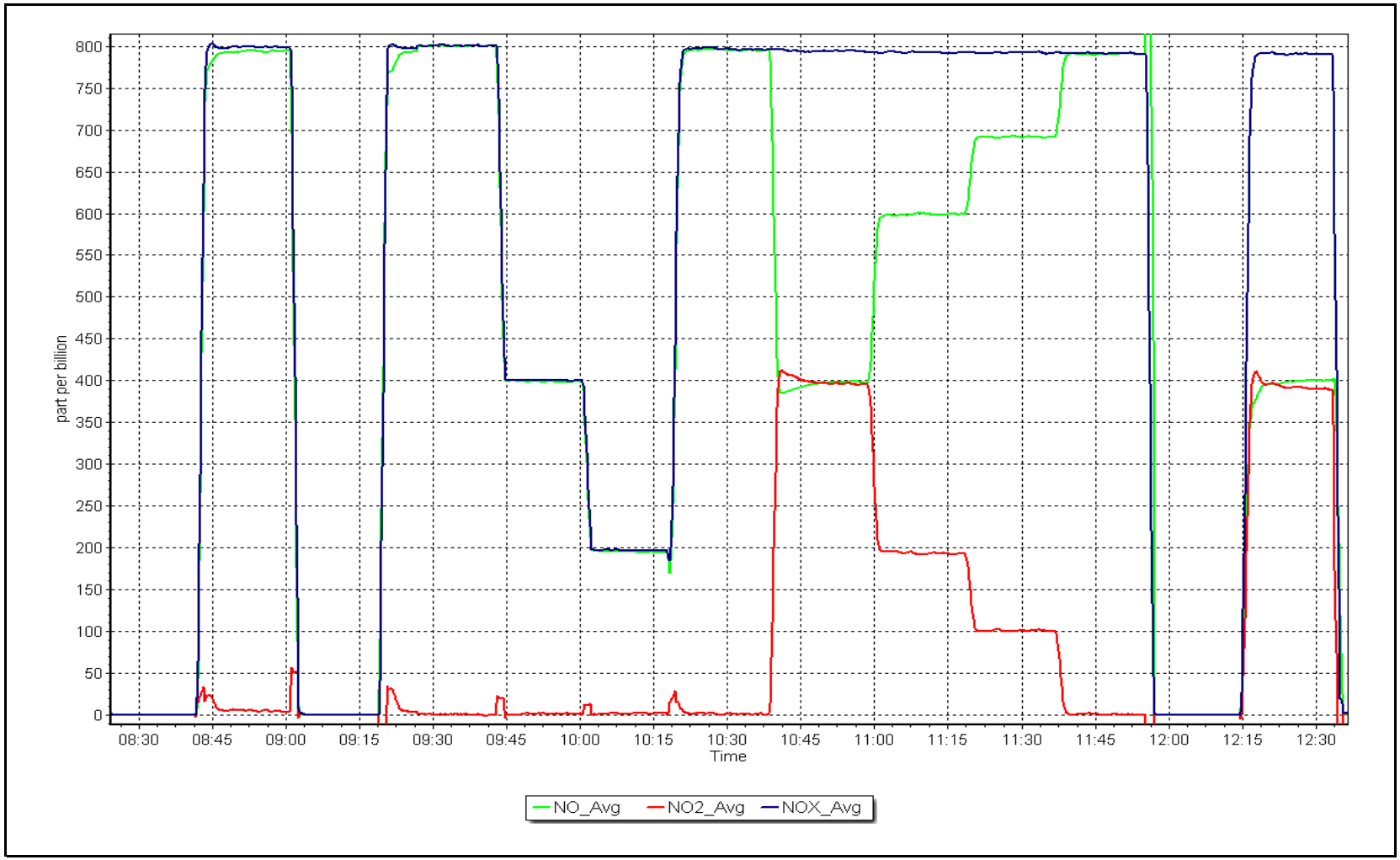
Calibration Date:	June 27, 2023	Previous Calibration:	May 26, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	8:21	End Time (MST):	12:36
Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.2	----	Correlation Coefficient	0.999995	≥0.995
393.8	396.2	0.9939			
192.7	193.0	0.9983	Slope	1.006674	0.90 - 1.10
101.0	101.2	0.9978			
			Intercept	-0.458123	+/-20



NO_X Calibration Plot Date: June 27, 2023 Location: Jackfish 1



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
CALIBRATION REPORT

AMS508
KIRBY NORTH
JUNE 2023

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

July 31, 2023

Wood Buffalo Environmental Association

SO_2 Calibration Report

Version-01-2020

Station Information

Station Name:	Kirby North	Station number:	AMS508
Calibration Date:	June 18, 2023	Last Cal Date:	May 18, 2023
Start time (MST):	13:45	End time (MST):	19:17
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:	1.006620	1.005551	Backgd or Offset:	19.1	19.3
Calibration intercept:	-0.948262	-0.648981	Coeff or Slope:	1.151	1.151

SO_2 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	-0.2	----
as found span	4919	81.3	799.6	802.0	0.997
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4919	81.3	799.6	804.0	0.995
second point	4959	40.7	400.3	400.7	0.999
third point	4980	20.3	199.7	200.2	0.997
as left zero	5000	0.0	0.0	-0.1	----
as left span	4919	81.3	799.6	804.0	0.995
				Average Correction Factor	0.997

Baseline Corr As found:	802.20	Previous response	803.96	*% change	-0.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

SO_2 Calibration Summary

Version-01-2020

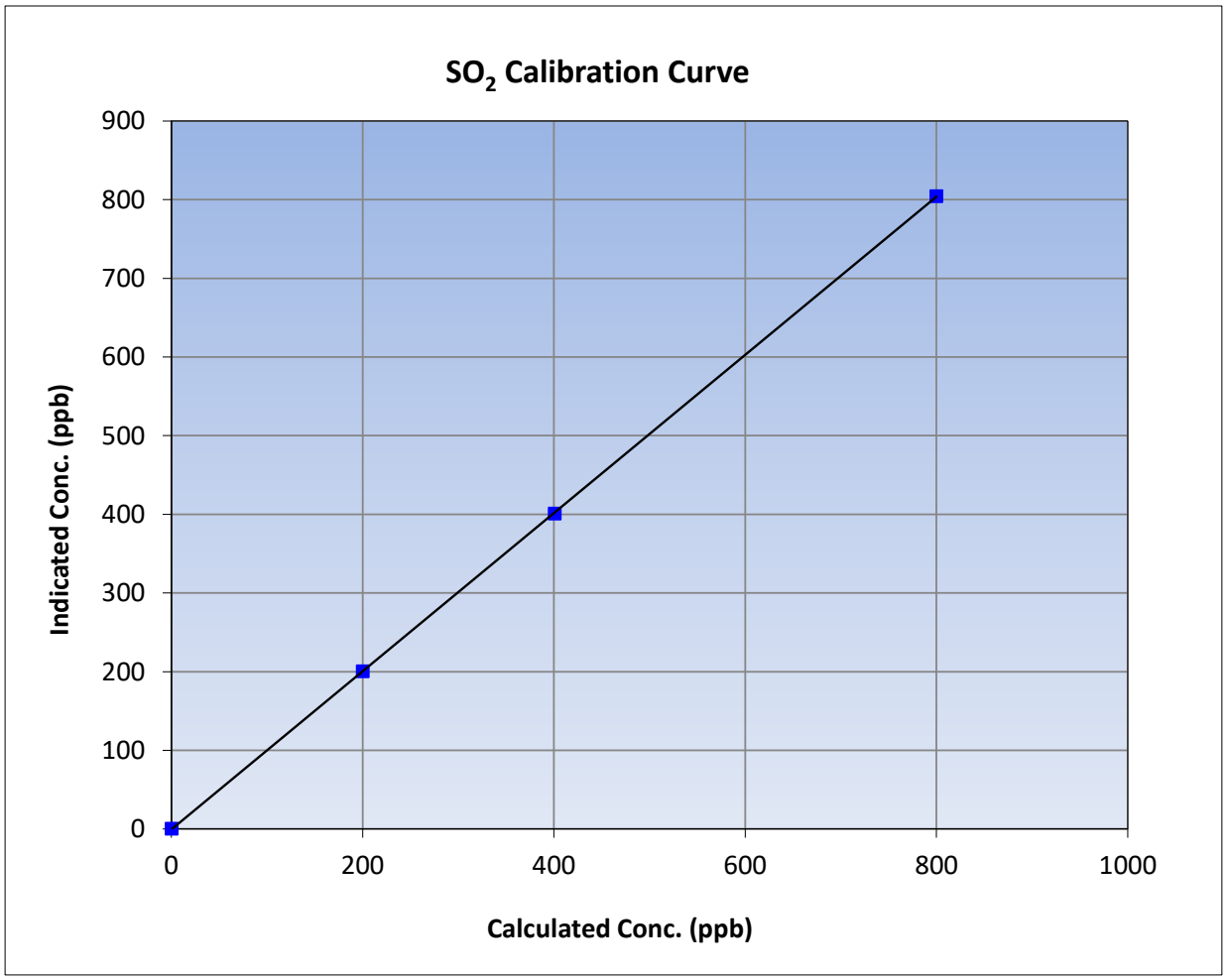
Station Information

Calibration Date:	June 18, 2023	Previous Calibration:	May 18, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	13:45	End Time (MST):	19:17
Analyzer make:	Thermo 43iQ	Analyzer serial #:	1182340007

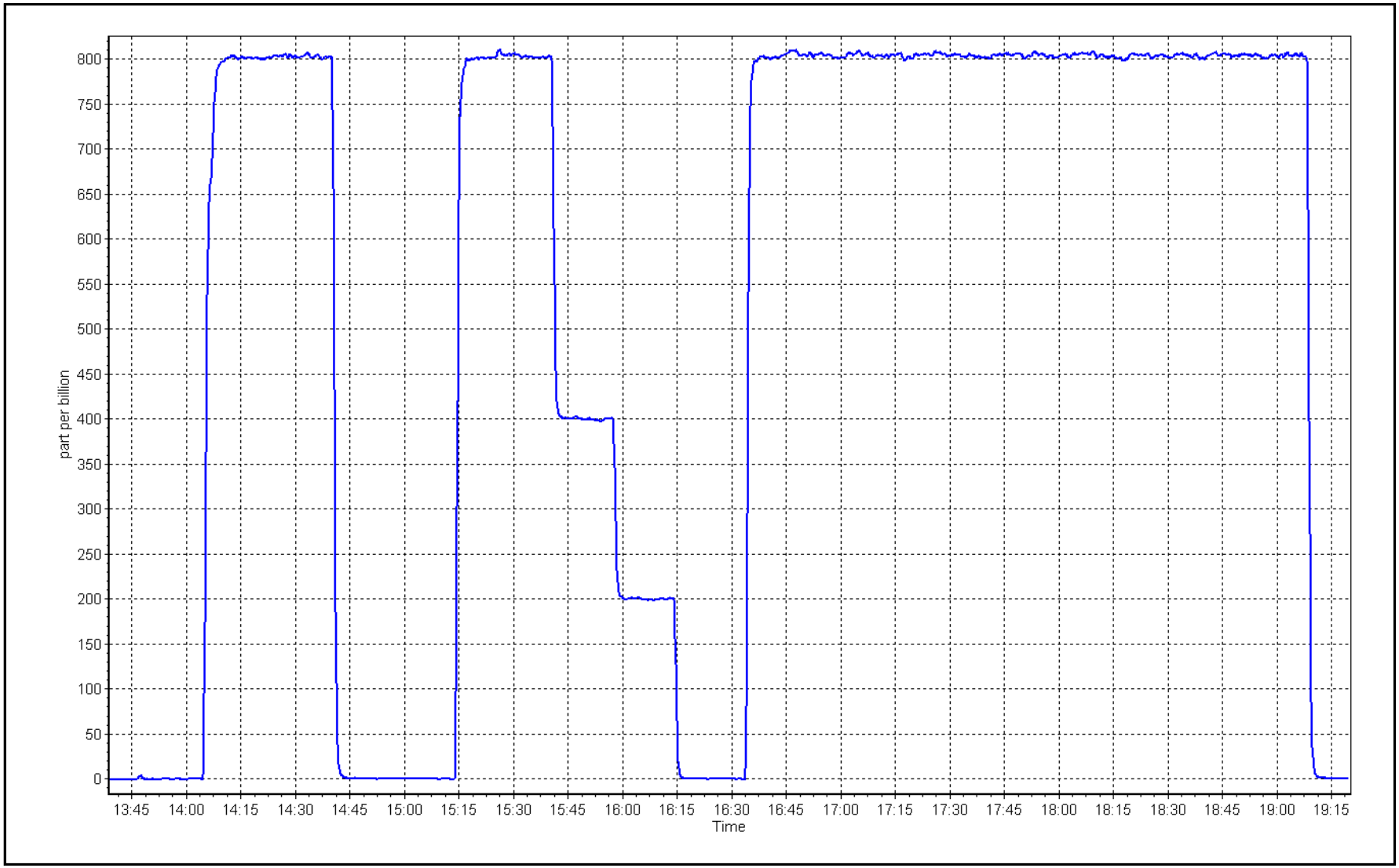
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
799.6	804.0	0.9946
400.3	400.7	0.9991
199.7	200.2	0.9973

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999994	*≥0.995*
Slope	1.005551	*0.90 - 1.10*
Intercept	-0.648981	*+/-30*



SO2 Calibration Plot Date: June 18, 2023 Location: Kirby North



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Kirby North	Station number:	AMS508
Calibration Date:	June 14, 2023	Last Cal Date:	May 17, 2023
Start time (MST):	10:44	End time (MST):	15:45
Reason:	As Found		

Calibration Standards

Cal Gas Concentration:	5.167	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517378			
Removed Cal Gas Conc:	5.167	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3804
ZAG Make/Model:	API T701H		Serial Number:	880

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1150840012
Converter make:	Global		Converter serial #:	2022-197
Analyzer Range	0 - 100 ppb			

	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003026		Backgd or Offset:	1.58	
Calibration intercept:	-0.160868		Coeff or Slope:	1.027	

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	0.2	----
as found span	4923	77.4	80.0	78.9	1.016
as found 2nd point	4961	38.8	40.1	39.5	1.020
as found 3rd point	4981	19.3	19.9	19.5	1.033
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:	14-Jun-23	Ave Corr Factor	
Date of last converter efficiency test:			efficiency

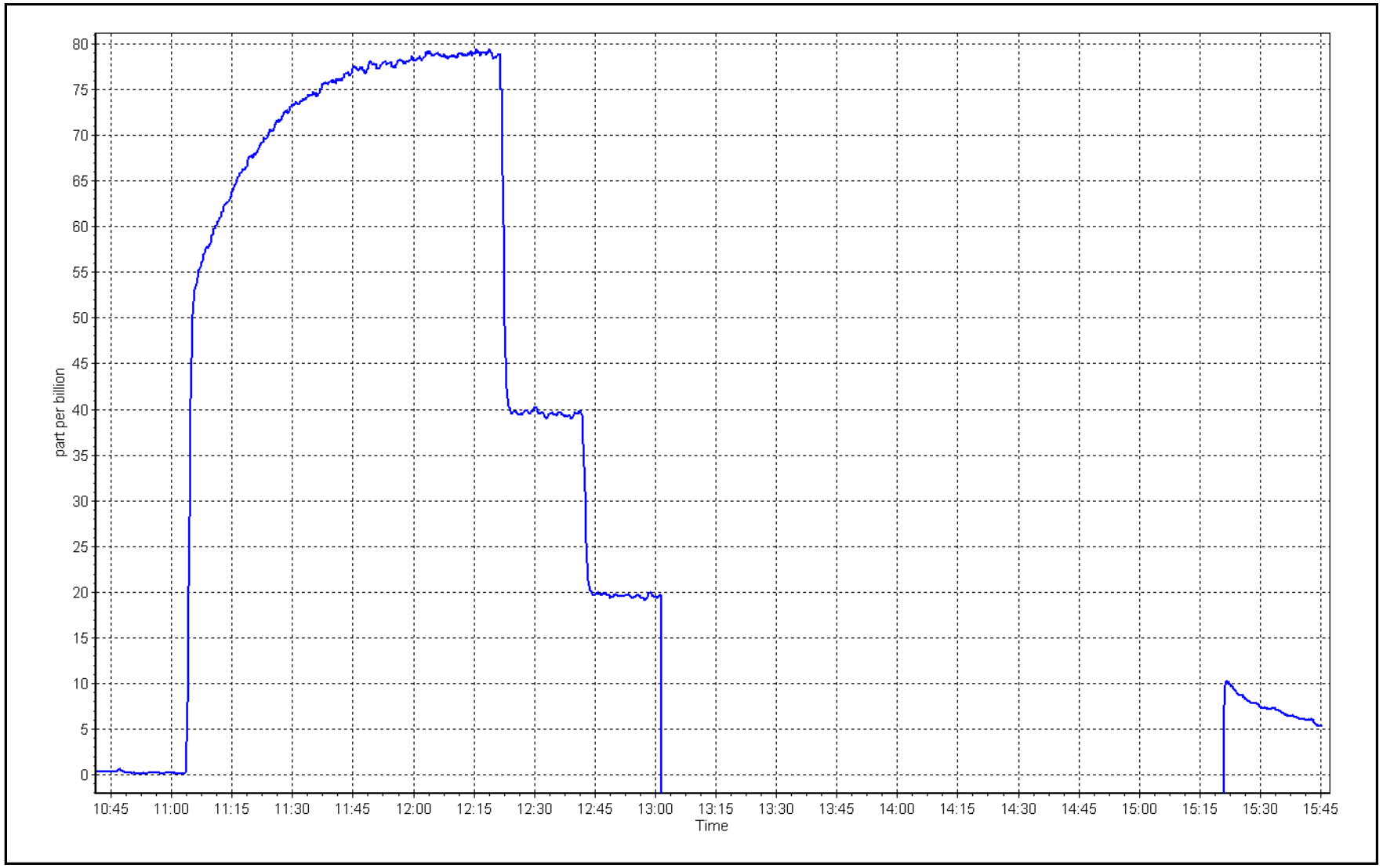
Baseline Corr As found:	78.7	Prev response:	80.06	*% change:	-1.7%
Baseline Corr 2nd AF pt:	39.3	AF Slope:	0.985180	AF Intercept:	0.038845
Baseline Corr 3rd AF pt:	19.3	AF Correlation:	0.999980		

* = > +/-5% change initiates investigation

Notes: Completed as founds. Troubleshooting slow response during high humidity. Changed the hydrocarbon kicker. Changed scrubber beads.

Calibration Performed By: Braiden Boutilier

H_2S Calibration Plot Date: June 14, 2023 Location: Kirby North



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Kirby North	Station number:	AMS508
Calibration Date:	June 15, 2023	Last Cal Date:	June 14, 2023
Start time (MST):	8:20	End time (MST):	11:37
Reason:	Routine		

Calibration Standards

Cal Gas Concentration:	5.167	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517378			
Removed Cal Gas Conc:	5.167	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3804
ZAG Make/Model:	API T701H		Serial Number:	880

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1150840012	
Converter make:	Global		Converter serial #:	2022-197	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003026	1.003887	Backgd or Offset:	1.62	3.65
Calibration intercept:	-0.160868	-0.140994	Coeff or Slope:	1.027	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	-0.1	----
high point	4923	77.4	80.0	80.2	0.997
second point	4961	38.8	40.1	40.0	1.002
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	79.8	1.002
SO2 Scrubber Check				0.1	
Date of last scrubber change:		14-Jun-23		Ave Corr Factor	1.001
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: As founds completed June 14. Scrubber check passed. Adjusted zero and span.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

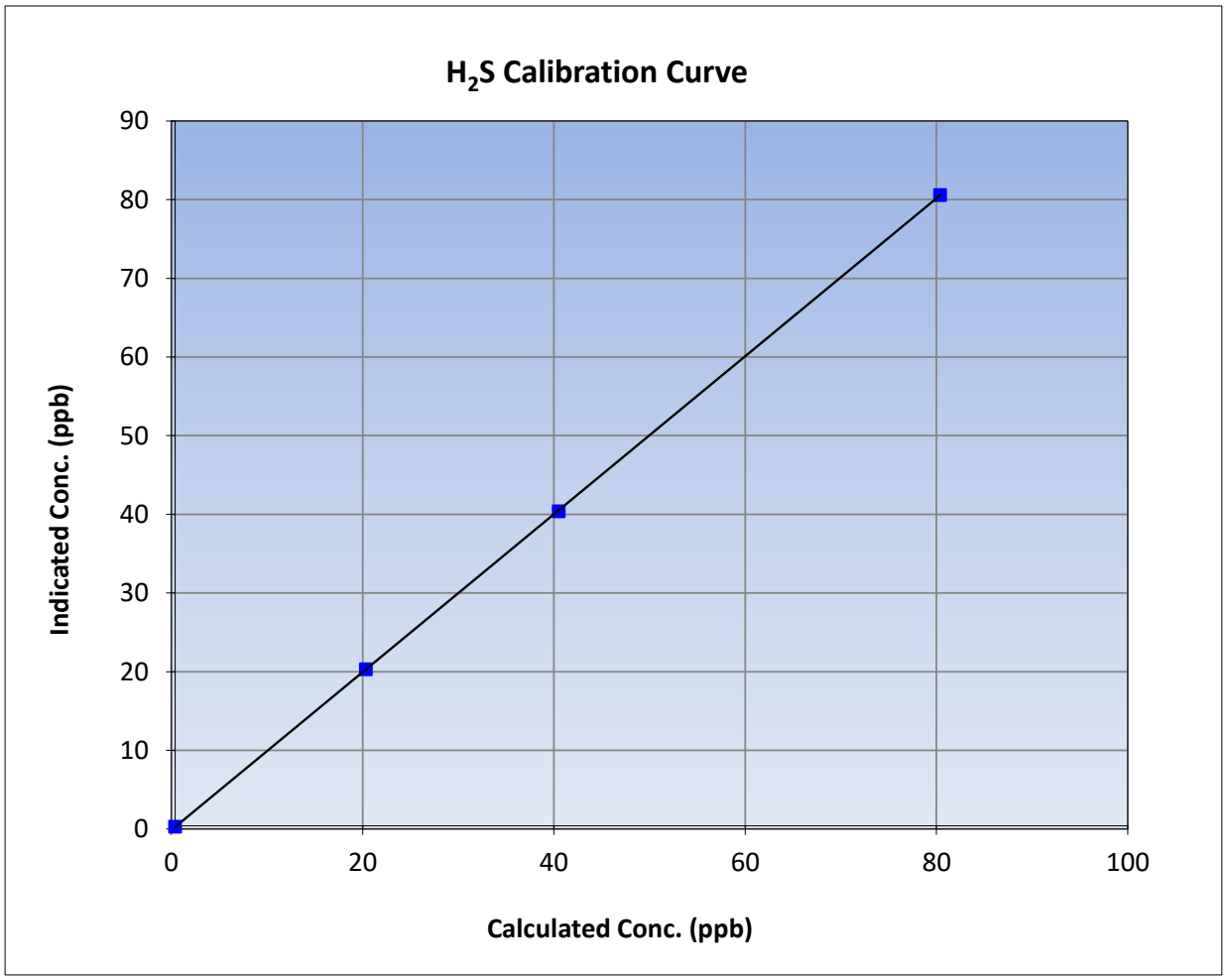
Station Information

Calibration Date:	June 15, 2023	Previous Calibration:	June 14, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	8:20	End Time (MST):	11:37
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1150840012

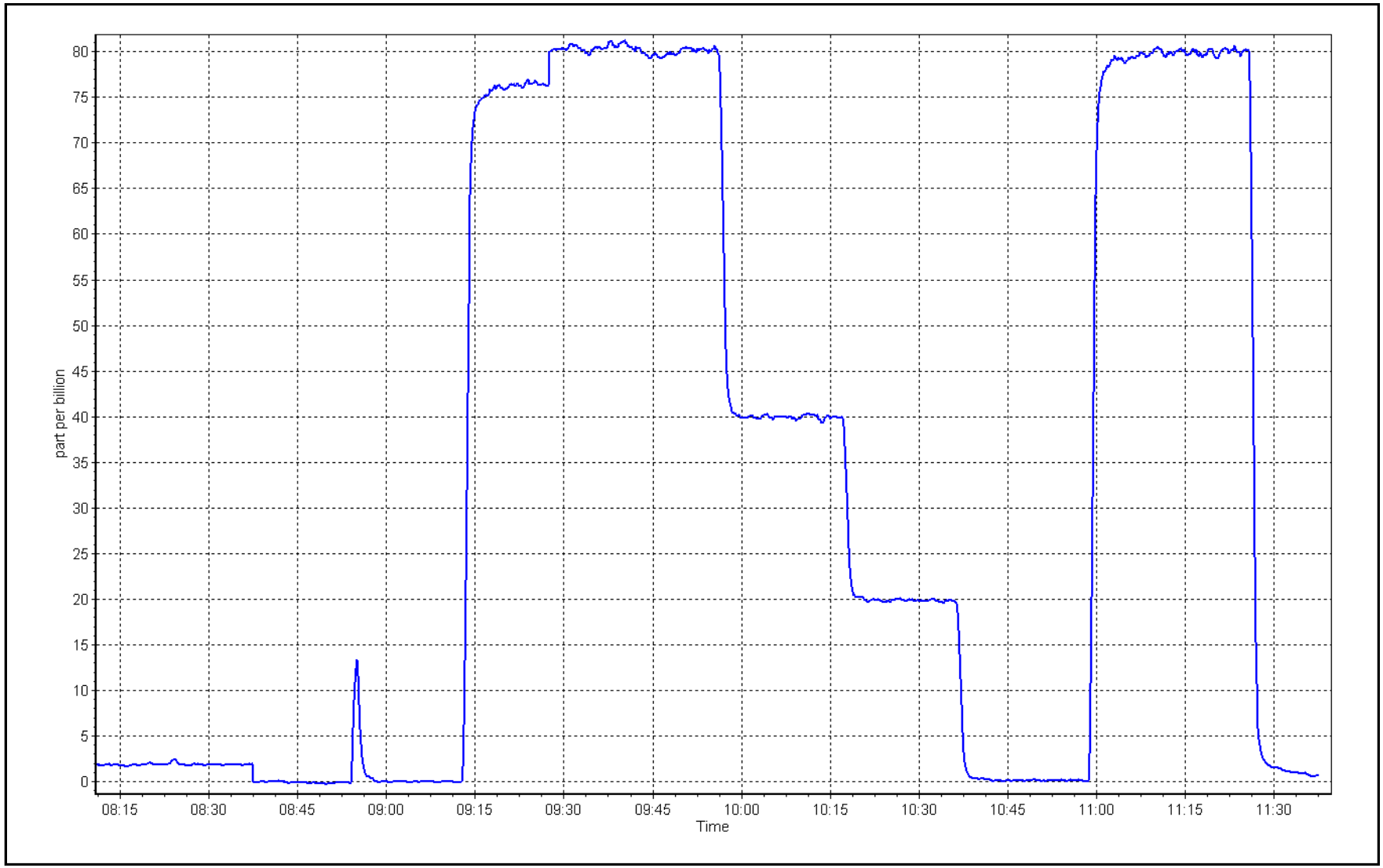
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.2	0.9972
40.1	40.0	1.0024
19.9	19.9	1.0022

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999995	*≥0.995*
Slope	1.003887	*0.90 - 1.10*
Intercept	-0.140994	*+/-3*



H_2S Calibration Plot Date: June 15, 2023 Location: Kirby North



Wood Buffalo Environmental Association

H_2S Calibration Report

Version-11-2021

Station Information

Station Name:	Kirby North	Station number:	AMS508
Calibration Date:	June 28, 2023	Last Cal Date:	June 15, 2023
Start time (MST):	10:39	End time (MST):	14:58
Reason:	Maintenance		

Calibration Standards

Cal Gas Concentration:	5.167	ppm	Cal Gas Exp Date:	February 5, 2024
Cal Gas Cylinder #:	CC517378			
Removed Cal Gas Conc:	5.167	ppm	Rem Gas Exp Date:	NA
Removed Gas Cyl #:	NA		Diff between cyl:	
Calibrator Make/Model:	API T700		Serial Number:	3804
ZAG Make/Model:	API T701H		Serial Number:	880

Analyzer Information

Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1150840012	
Converter make:	Global		Converter serial #:	2022-197	
Analyzer Range	0 - 100 ppb				
	Start	***Finish***		***Start***	***Finish***
Calibration slope:	1.003887	1.002027	Backgd or Offset:	3.65	2.62
Calibration intercept:	-0.140994	-0.100872	Coeff or Slope:	1.066	1.066

H_2S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) *Limit = 0.90-1.10*
as found zero	5000	0.0	0.0	-1.3	----
as found span	4923	77.4	80.0	78.6	1.001
as found 2nd point	4961	38.8	40.1	38.8	1.000
as found 3rd point	4981	19.3	19.9	18.4	1.012
new cylinder response					

H_2S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) *Limit = 0.95-1.05*
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4923	77.4	80.0	80.1	0.998
second point	4961	38.8	40.1	39.9	1.005
third point	4981	19.3	19.9	20.0	0.997
as left zero	5000	0.0	0.0	0.1	----
as left span	4923	77.4	80.0	80.0	1.000

SO2 Scrubber Check

Date of last scrubber change:	14-Jun-23	Ave Corr Factor	1.000
Date of last converter efficiency test:			efficiency

Baseline Corr As found:	79.9	Prev response:	80.15	*% change:	-0.3%
Baseline Corr 2nd AF pt:	40.1	AF Slope:	1.000039	AF Intercept:	-1.381294
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999989		

* = > +/-5% change initiates investigation

Notes: Calibrated due to baseline drift. Adjusted zero only. Changed sample inlet filter after MPAF's.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

H_2S Calibration Summary

Version-11-2021

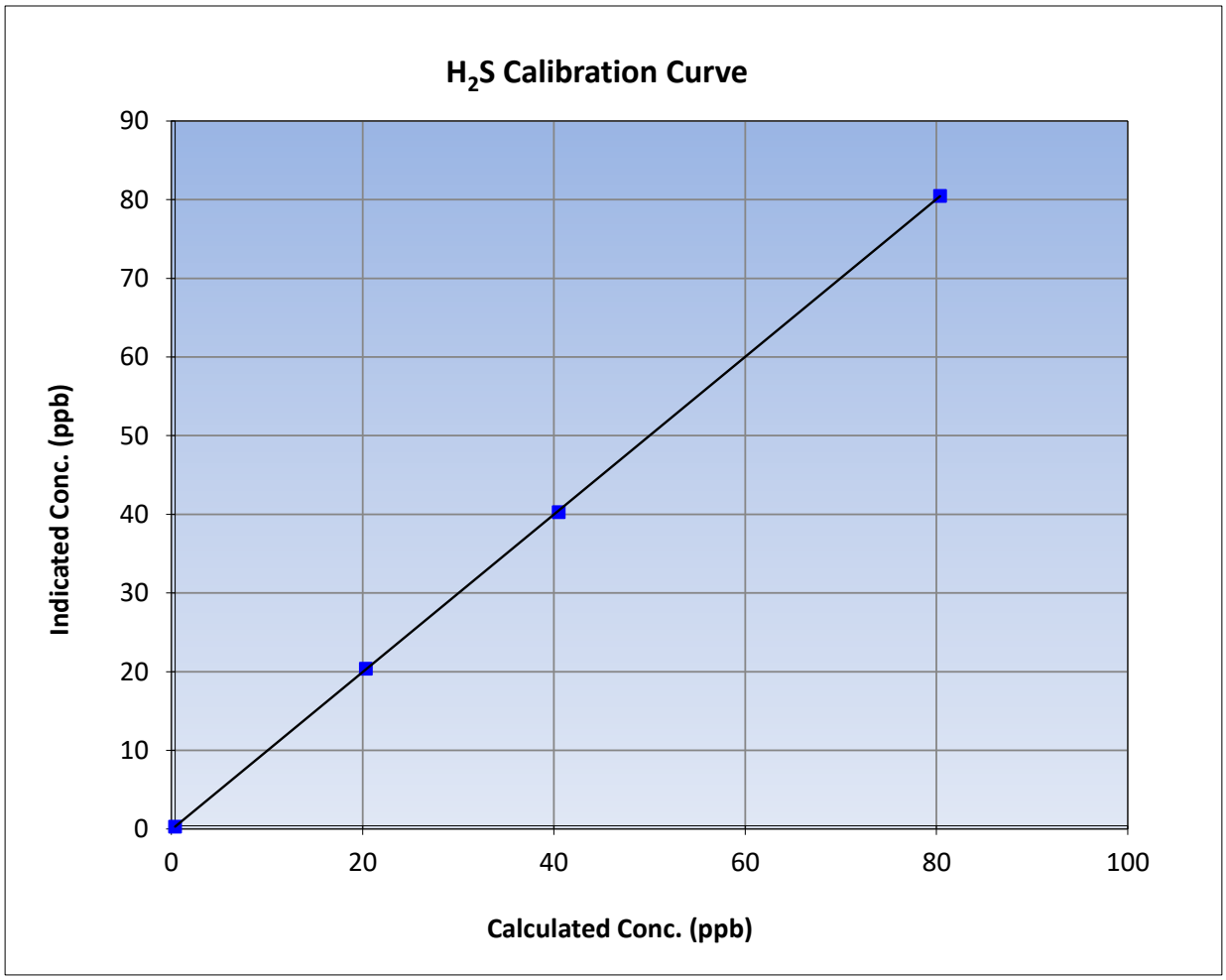
Station Information

Calibration Date:	June 28, 2023	Previous Calibration:	June 15, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	10:39	End Time (MST):	14:58
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1150840012

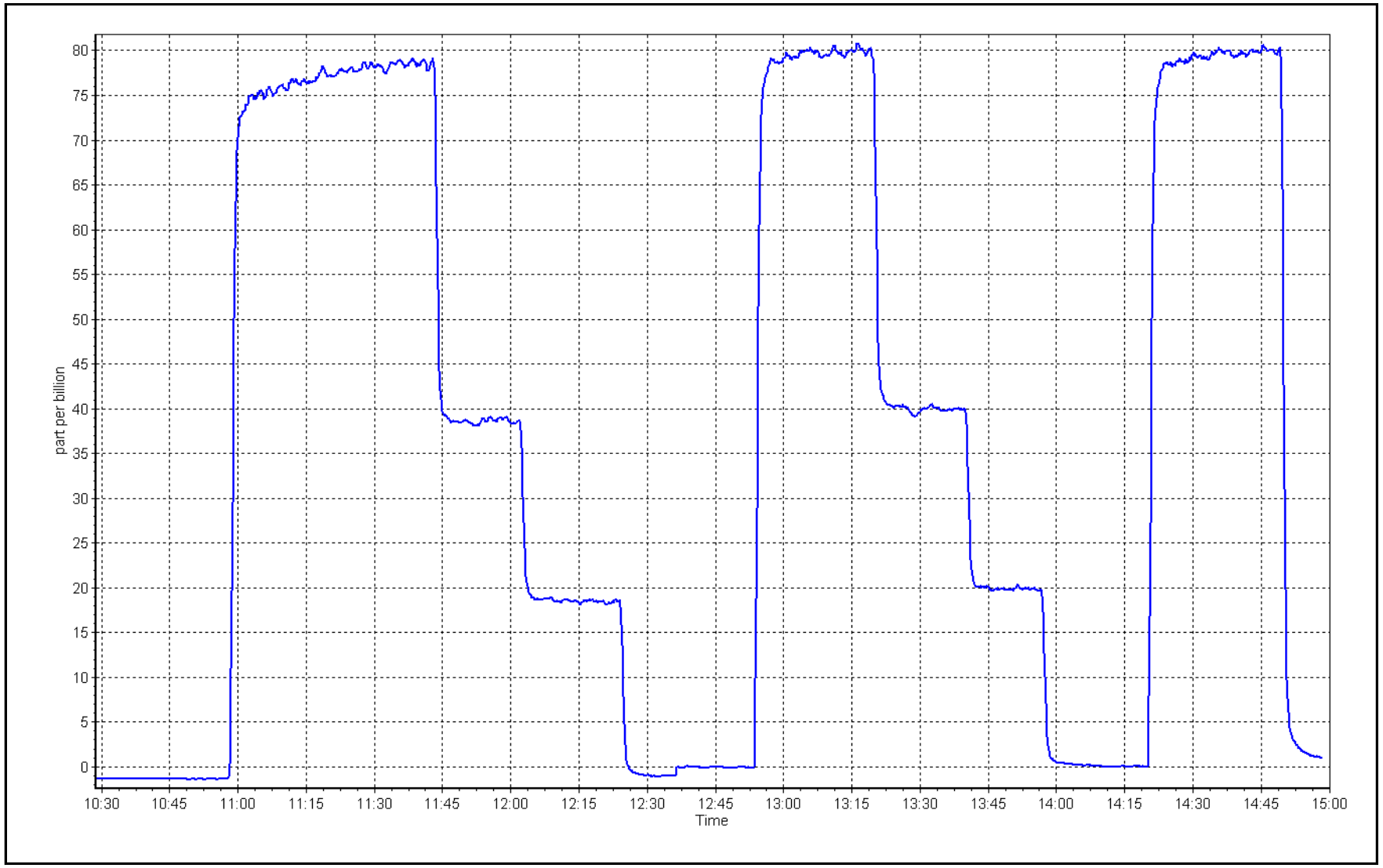
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
0.0	-0.1	----
80.0	80.1	0.9985
40.1	39.9	1.0050
19.9	20.0	0.9972

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999986	*≥0.995*
Slope	1.002027	*0.90 - 1.10*
Intercept	-0.100872	*+/-3*



H_2S Calibration Plot Date: June 28, 2023 Location: Kirby North



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Kirby North	Station number:	AMS508
Calibration Date:	June 18, 2023	Last Cal Date:	May 16, 2023
Start time (MST):	10:40	End time (MST):	13:50
Reason:	Removal		

Calibration Standards

NO Gas Cylinder #:		T34ULGL	Cal Gas Expiry Date:	March 8, 2025	
NOX Cal Gas Conc:	49.39	ppm	NO Cal Gas Conc:	49.02	ppm
Removed Cylinder #:		NA	Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	49.39	ppm	Removed Gas NO Conc:	49.02	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3804	
ZAG make/model:	API 701H		Serial Number:	880	

Analyzer Information

Analyzer make:	API T200	Analyzer serial #:	7029
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.038	1.038	NO bkgnd or offset:	-0.1	-0.1
NOX coeff or slope:	1.034	1.034	NOX bkgnd or offset:	3.6	3.6
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	5.1	5.1

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001459	
NO_X Cal Offset:	-2.051855	
NO Cal Slope:	1.000875	
NO Cal Offset:	-1.873766	
NO_2 Cal Slope:	0.995418	
NO_2 Cal Offset:	-0.467650	

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero	5000	0.0	0.0	0.0	0.0	-1.2	-0.1	-1.1	----	----
as found span	4919	81.0	800.1	794.1	6.0	781.1	776.5	4.6	1.0243	1.0227
as found 2nd	4960	40.5	400.0	397.0	3.0	388.4	384.7	3.7	1.0299	1.0320
as found 3rd	4980	20.2	199.5	198.0	1.5	190.9	188.9	1.9	1.0452	1.0483
new cyl resp										
calibrator zero										
high point										
second point										
third point										
as left zero										
as left span										
								Average Correction Factor		

Corrected As found	NO_X = 782.3 ppb	NO = 776.6 ppb	* = > +/-5% change initiates investigation	*Percent Change	NO_X = -2.2%
Previous Response	NO_X = 799.2 ppb	NO = 792.9 ppb		*Percent Change	NO = -2.1%
Baseline Corr 2nd pt	NO_X = 389.6 ppb	NO = 384.8 ppb	As found	NO_X r^2: 0.999983	Nx Sl: 0.978796	Nx Int: -2.697
Baseline Corr 3rd pt	NO_X = 192.1 ppb	NO = 189.0 ppb	As found	NO r^2: 0.999950	NO Sl: 0.979451	NO Int: -2.658
			As found	NO_2 r^2: 0.999998	NO2 Sl: 0.998293	NO_2 Int: -1.384

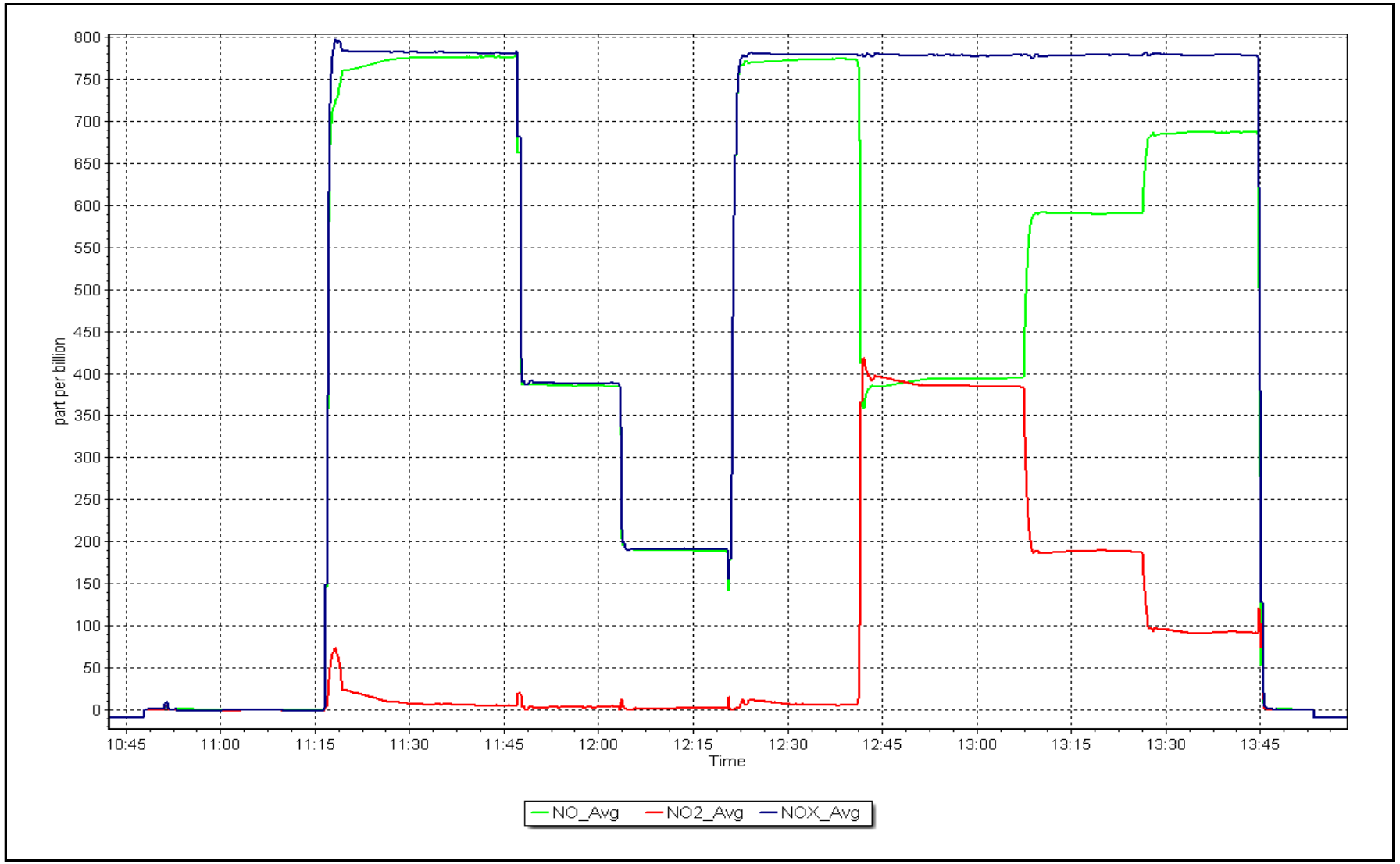
GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) *Calibration Limit = 0.95-1.05* *As Found Limit = 0.90-1.10*	Converter Efficiency *Calibration Limit = 96-104%*
as found GPT zero	----	----	0.0	-1.1	----	----
as found GPT point (400 ppb NO2)	774.5	393.3	387.2	385.3	1.0049	99.5%
as found GPT point (200 ppb NO2)	774.5	590.6	189.9	188.0	1.0101	99.0%
as found GPT point (100 ppb NO2)	774.5	687.0	93.5	91.7	1.0196	98.1%
1st GPT point (400 ppb O3)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
				Average Correction Factor		

Notes: RAM issues causing analyzer to crash frequently. Replaced this T200 with a 42iQ.

Calibration Performed By: Braiden Boutilier

NO_X Calibration Plot Date: June 18, 2023 Location: Kirby North



Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Station Information

Station Name:	Kirby North	Station number:	AMS508
Calibration Date:	June 19, 2023	Last Cal Date:	June 18, 2023
Start time (MST):	7:50	End time (MST):	12:49
Reason:	Install		

Calibration Standards

NO Gas Cylinder #:		T34ULGL	Cal Gas Expiry Date:	March 8, 2025	
NOX Cal Gas Conc:	49.39	ppm	NO Cal Gas Conc:	49.02	ppm
Removed Cylinder #:		NA	Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	49.39	ppm	Removed Gas NO Conc:	49.02	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3804	
ZAG make/model:	API 701H		Serial Number:	880	

Analyzer Information

Analyzer make:	Thermo 42iQ	Analyzer serial #:	1182340006
NOX Range (ppb):	0 - 1000 ppb		

	Start	***Finish***		***Start***	***Finish***
NO coeff or slope:	1.553	1.553	NO bkgnd or offset:	3.2	3.2
NOX coeff or slope:	1.001	1.001	NOX bkgnd or offset:	3.3	3.3
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	422.94	422.94

Calibration Statistics

	Start	***Finish***
NO_X Cal Slope:	1.001459	1.002974
NO_X Cal Offset:	-2.051855	-3.331924
NO Cal Slope:	1.000875	1.003524
NO Cal Offset:	-1.873766	-4.693702
NO_2 Cal Slope:	0.995418	1.000557
NO_2 Cal Offset:	-0.467650	0.483574

Wood Buffalo Environmental Association

NO_X \ NO \ NO_2 Calibration Report

Version-04-2020

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) *Limit = 0.95-1.05*	NO Correction factor (Cc/Ic) *Limit = 0.95-1.05*
as found zero										
as found span										
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.1	-0.1	----	----
high point	4919	81.0	800.1	794.1	6.0	801.0	795.4	5.8	0.9989	0.9984
second point	4960	40.5	400.0	397.0	3.0	395.4	388.8	6.6	1.0117	1.0211
third point	4980	20.2	199.5	198.0	1.5	194.4	191.2	3.2	1.0264	1.0357
as left zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.1	-0.4	----	----
as left span	4919	81.0	800.1	402.3	397.8	794.3	397.9	396.4	1.0073	1.0111
								Average Correction Factor	1.0123	1.0184

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)	790.3	398.5	397.8	398.6	0.9980	100.2%
2nd GPT point (200 ppb O3)	790.3	601.6	194.7	194.4	1.0015	99.8%
3rd GPT point (100 ppb O3)	790.3	699.6	96.7	98.6	0.9807	102.0%
				Average Correction Factor	0.9934	100.7%

Notes: 42iQ installation. Adjusted zero and span. No other maintenance done.

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

NO_X Calibration Summary

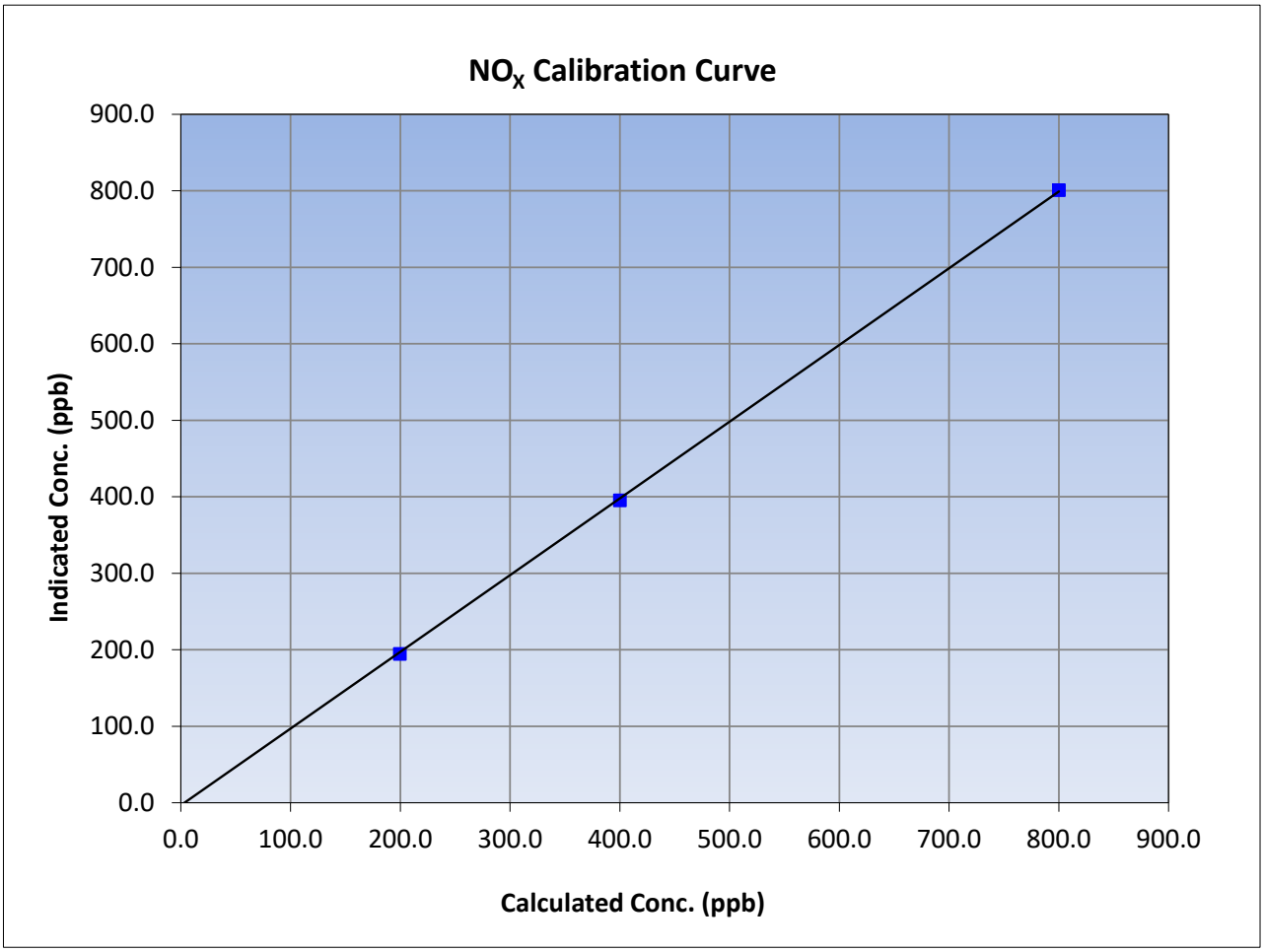
Version-04-2020

Station Information

Calibration Date:	June 19, 2023	Previous Calibration:	June 18, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	7:50	End Time (MST):	12:49
Analyzer make:	Thermo 42iQ	Analyzer serial #:	1182340006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.3	----	Correlation Coefficient	0.999931	≥0.995
800.1	801.0	0.9989			
400.0	395.4	1.0117	Slope	1.002974	0.90 - 1.10
199.5	194.4	1.0264			
			Intercept	-3.331924	+/-20



Wood Buffalo Environmental Association

NO Calibration Summary

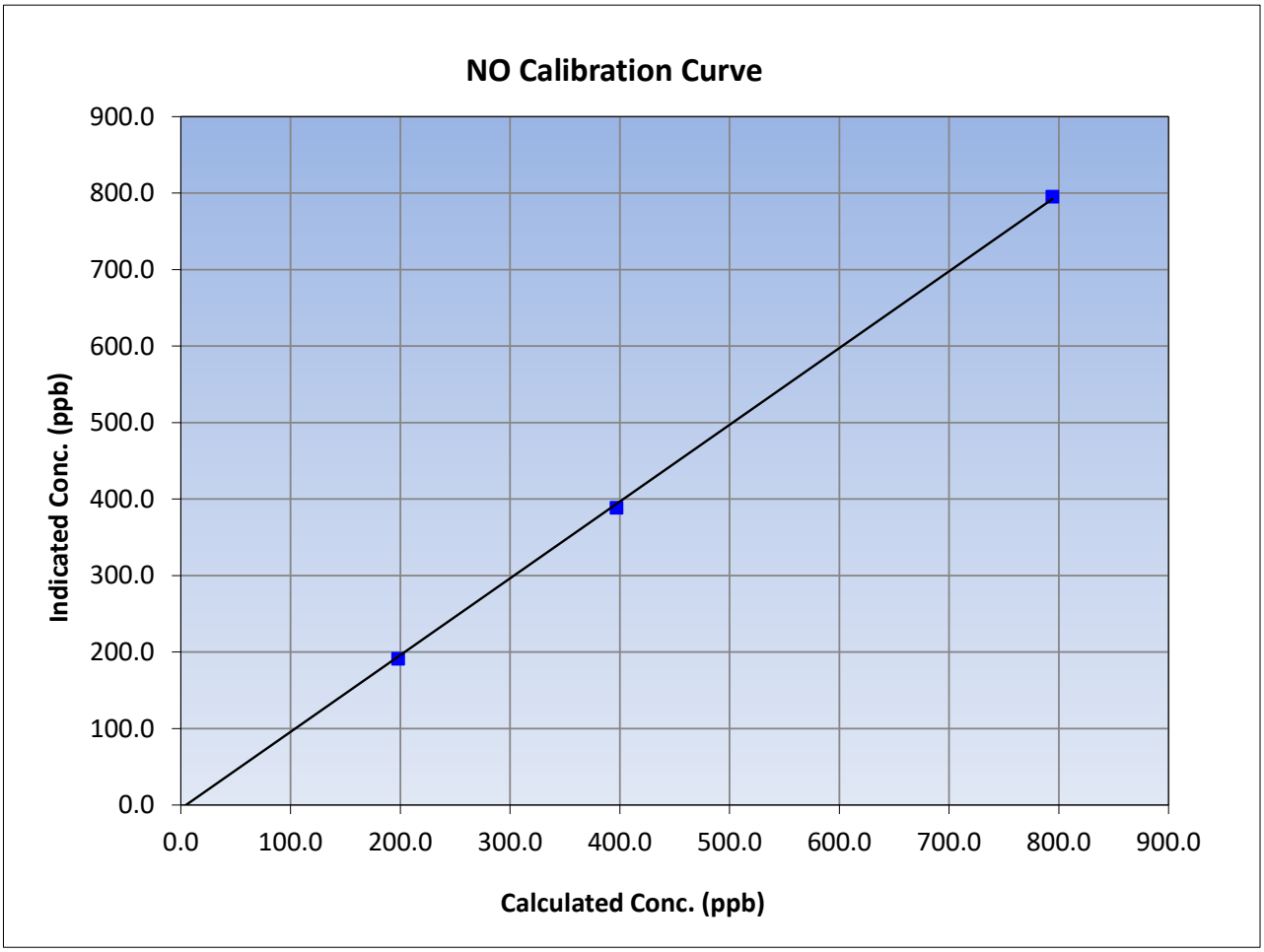
Version-04-2020

Station Information

Calibration Date:	June 19, 2023	Previous Calibration:	June 18, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	7:50	End Time (MST):	12:49
Analyzer make:	Thermo 42iQ	Analyzer serial #:	1182340006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		*Limits*
0.0	-0.1	----	Correlation Coefficient	0.999817	*≥0.995*
794.1	795.4	0.9984			
397.0	388.8	1.0211	Slope	1.003524	*0.90 - 1.10*
198.0	191.2	1.0357			
			Intercept	-4.693702	*+/-20*



Wood Buffalo Environmental Association

NO_2 Calibration Summary

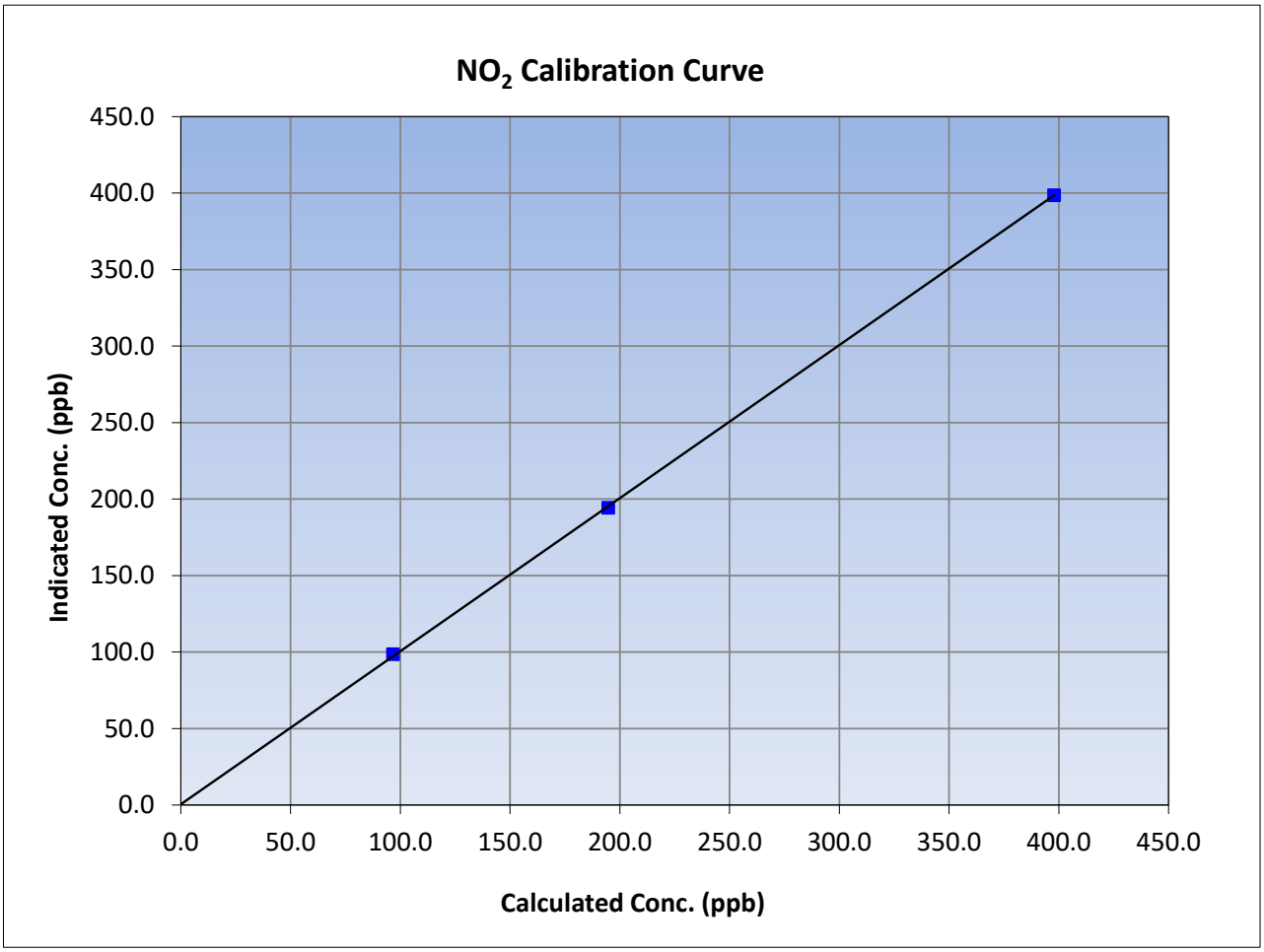
Version-04-2020

Station Information

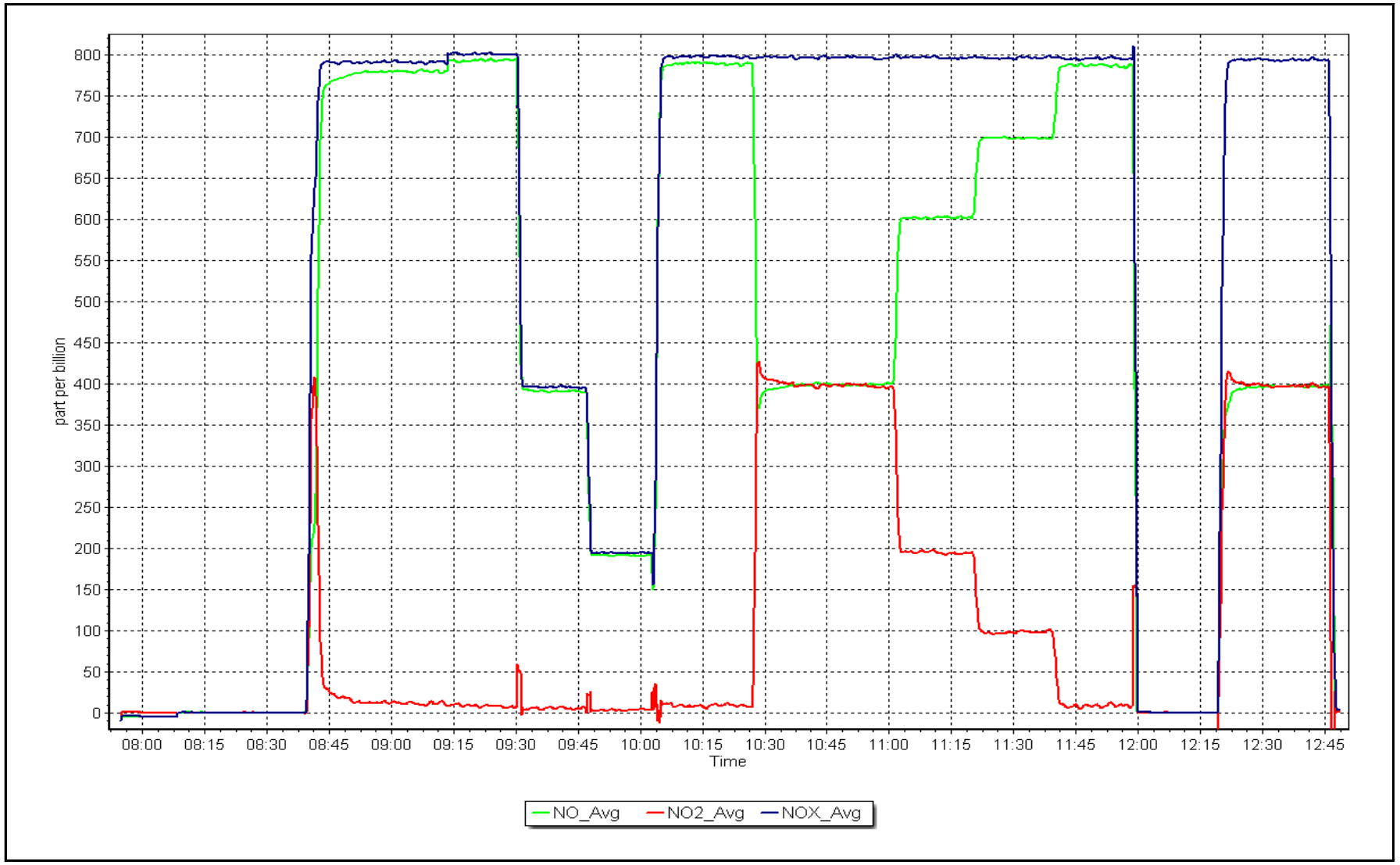
Calibration Date:	June 19, 2023	Previous Calibration:	June 18, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	7:50	End Time (MST):	12:49
Analyzer make:	Thermo 42iQ	Analyzer serial #:	1182340006

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		Limits
0.0	-0.1	----	Correlation Coefficient	0.999965	≥0.995
397.8	398.6	0.9980			
194.7	194.4	1.0015	Slope	1.000557	0.90 - 1.10
96.7	98.6	0.9807			
			Intercept	0.483574	+/-20



NO_X Calibration Plot Date: June 19, 2023 Location: Kirby North



Wood Buffalo Environmental Association

THC Calibration Report

Version-01-2020

Station Information

Station Name:	Kirby North	Station number:	AMS508
Calibration Date:	June 18, 2023	Last Cal Date:	May 18, 2023
Start time (MST):	13:45	End time (MST):	19:17
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:	1.009048	1.003015	Background:	2.66	2.56
Calibration intercept:	-0.160831	-0.057756	Coefficient:	3.753	3.789

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	16.91	1.021
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	17.26	17.31	0.997
second point	4959	40.7	8.64	8.51	1.016
third point	4980	20.3	4.31	4.26	1.013
as left zero	5000	0.0	0.00	-0.01	----
as left span	4919	81.3	17.26	17.42	0.991
				Average Correction Factor	1.009

Baseline Corr As found:	16.97	Previous response	17.26	*% change	-1.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

* = > +/-5% change initiates investigation

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

Calibration Performed By: Braiden Boutilier

Wood Buffalo Environmental Association

THC Calibration Summary

Version-01-2020

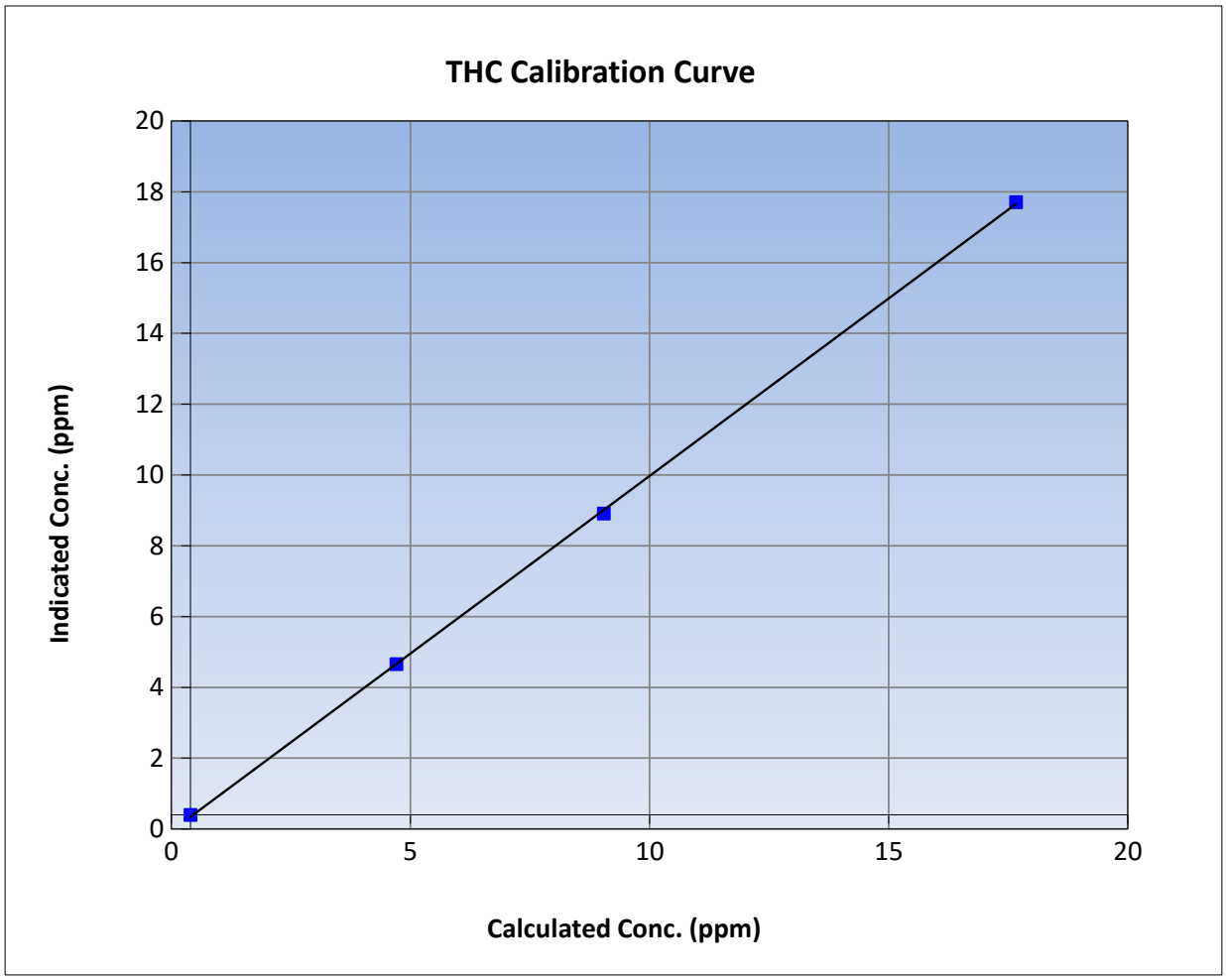
Station Information

Calibration Date:	June 18, 2023	Previous Calibration:	May 18, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	13:45	End Time (MST):	19:17
Analyzer make:	Thermo 51i	Analyzer serial #:	1182340005

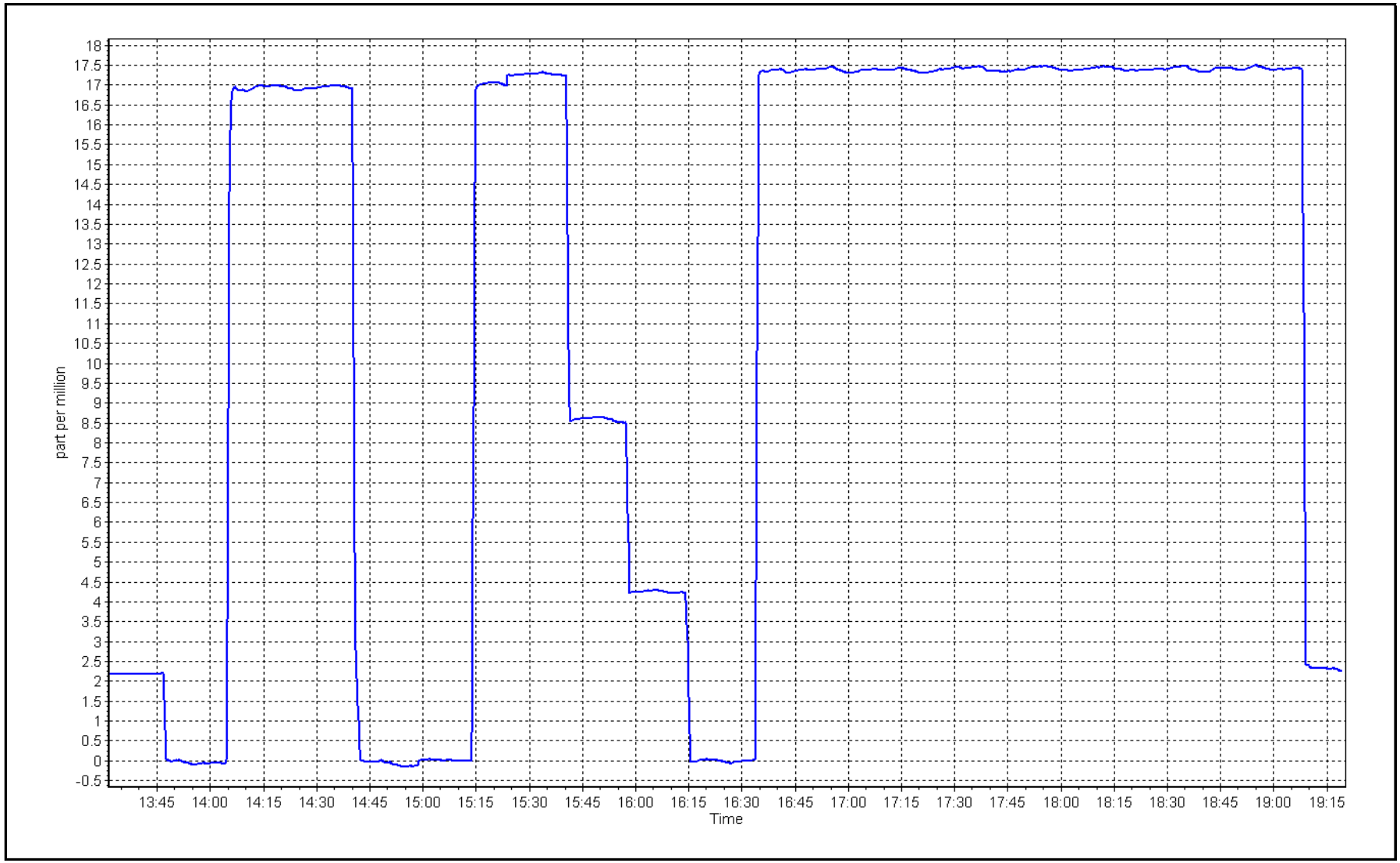
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)
0.00	0.00	----
17.26	17.31	0.9973
8.64	8.51	1.0156
4.31	4.26	1.0128

Statistical Evaluation		*Limits*
Correlation Coefficient	0.999899	*≥0.995*
Slope	1.003015	*0.90 - 1.10*
Intercept	-0.057756	*+/-1.5*



THC Calibration Plot Date: June 18, 2023 Location: Kirby North



Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-10-2022

Station Information

Station Name:	Kirby North	Station Number:	AMS 508
Calibration Date:	July 4, 2023	Prev Cal Date:	June 29, 2022
Start Time (MST):	14:00	End Time (MST):	14:47
Tower Height (m):	10.0	Reason:	Removal

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	X16479
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		0.998908	*0.90 - 1.10*
Calculated intercept		0.028386	*+/- 2*

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	X16495
As Found Declination (deg east of True North):	14	As Left Declination (deg east of True North):	NA
Solar noon time (MST):	12:28	Calc Declination*:	14 Degrees
Deadband calc:	-1.5 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	0.8	---
90	91.6	0.5%
180	182.4	0.7%
270	272.4	0.7%
357	359.4	0.7%

	Start	***Finish***	*Limits*
Correl Coeff (r^2)		0.999997	*≥0.9995*
Calculated slope		0.995847	*0.90 - 1.10*
Calculated intercept		-1.173951	*+/- 4*

Notes: Removals completed for the station move to Kirby South.

Calibration Performed By: Braiden Boutilier

End of Report