# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION MONTHLY AMBIENT AIR QUALITY MONITORING REPORT MAY 2023 REPORT HISTORY

Original report release data: June 30, 2023

Revised report release date: August 30, 2023

### Revision 1 - Submission of H2S data and Revision of TRS data at Patricia McInnes.

The Patricia McInnes air monitoring station (AMS06) collected  $H_2S$  data from January 3, 2023, to June 12, 2023, but it was reported as TRS. On August 30, 2023, the data was resubmitted as  $H_2S$  to the Electronic Transfer System (ETS) and the TRS data was revised. The monthly report cover letter, station summary, network summary, and calibration report contained within have been revised to reflect the change.



Unit 3 - 805 Memorial Drive Fort McMurray, AB T9K 0K4 P: 780,799,4420 E: info@wbea,org wbea.org

# Wood Buffalo Environmental Association

# MAY 2023 MONTHLY CALIBRATION REPORT

CONTINUOUS MONITORING
August 30, 2023
Revision 01

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 MAY 2023

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

June 30, 2023



# **SO<sub>2</sub> Calibration Report**

Version-01-2020

### **Station Information**

Station Name:Bertha Ganter-Fort McKayStation number:AMS01Calibration Date:May 1, 2023Last Cal Date:April 24, 2023Start time (MST):10:14End time (MST):16:22

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

**Finish Finish** Start Start Calibration slope: 0.998615 1.000343 Backgd or Offset: 19.2 19.4 0.893 Calibration intercept: 0.106886 0.027099 Coeff or Slope: 0.889

### SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow 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	796.9	1.004
as found 2nd point	4959	40.7	400.4	398.2	1.006
as found 3rd point	4979	20.3	199.7	198.0	1.009
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	
high point	4918	81.3	799.9	800.7	0.999
second point	4959	40.7	400.4	399.4	1.003
third point	4979	20.3	199.7	200.4	0.997
as left zero	5000	0.0	0.0	0.4	
as left span	4918	81.3	799.9	799.9	1.000
			Averag	ge Correction Factor	0.999
Baseline Corr As found:	796.70	Previous response	798.94	*% change	-0.3%
Baseline Corr 2nd AF pt:	398.00	AF Slope	: 0.996317	AF Intercept:	-0.413604
Baseline Corr 3rd AF pt:	197.80	AF Correlation	: 0.999997		

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

Calibration Performed By: Rene Chamberland

\* = > +/-5% change initiates investigation



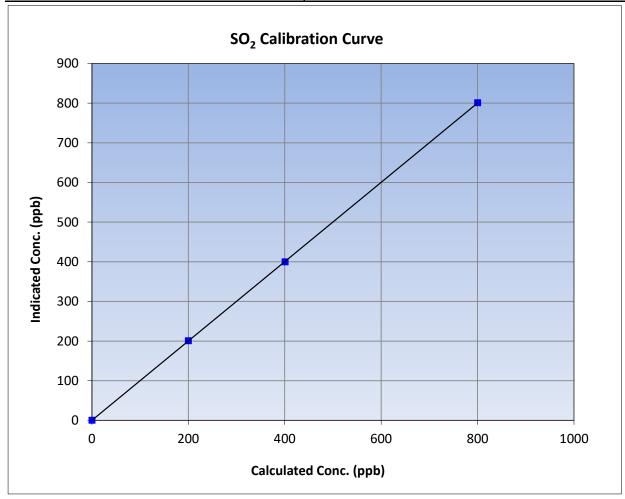
# **SO<sub>2</sub> Calibration Summary**

Version-01-2020

### **Station Information**

Calibration Date: May 1, 2023 **Previous Calibration:** April 24, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 10:14 End Time (MST): 16:22 Analyzer make: Thermo 43i Analyzer serial #: JC1501301448

	Calibration Data								
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>				
0.0	0.2		Correlation Coefficient	0.999994	≥0.995				
799.9	800.7	0.9991	Correlation coefficient	0.333334	20.333				
400.4	399.4	1.0026	Slope	1.000343	0.90 - 1.10				
199.7	200.4	0.9967	Slope	1.000343	0.30 - 1.10				
			- Intercept	0.027099	+/-30				



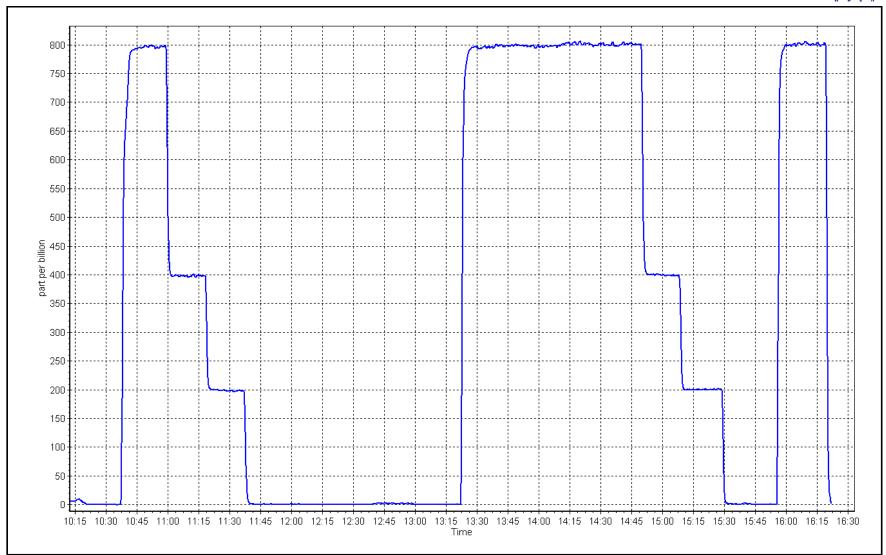
**SO2 Calibration Plot** 

Date:

May 1, 2023

Location: Bertha Ganter-Fort McKay







### **TRS Calibration Report**

Version-11-2021

**Station Information** 

Station Name:Bertha Ganter-Fort McKayStation number:AMS01Calibration Date:May 16, 2023Last Cal Date:April 21, 2023Start time (MST):8:59End time (MST):14:26

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

Notes:

<u>Start</u> **Finish Start** <u>Finish</u> 0.999078 0.993792 Backgd or Offset: 2.26 2.27 Calibration slope: 0.220000 Calibration intercept: 0.160000 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	77.6	1.032
as found 2nd point	4960	39.2	40.0	39.4	1.018
as found 3rd point	4980	19.6	20.0	19.9	1.010
new cylinder response					

### **TRS Calibration Data**

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	0.2	
high point	4921	78.4	80.0	79.7	1.004
second point	4960	39.2	40.0	40.0	1.000
third point	4980	19.6	20.0	20.1	0.995
as left zero	5000	0.0	0.0	0.3	
as left span	4921	78.4	80.0	79.2	1.010
SO2 Scrubber Check	4919	81.3	813.0	0.0	
Date of last scrubber chang	ge:	December 17, 2021		Ave Corr Factor	1.000
D . C1				,	

Date of last scrubber change:	December 17, 2021	Ave Corr Factor	1.000
Date of last converter efficiency test:			efficiency

Baseline Corr As found: 77.5 80.08 Prev response: \*% change: -3.3% Baseline Corr 2nd AF pt: 0.379996 39.3 AF Slope: 0.967790 AF Intercept: Baseline Corr 3rd AF pt: AF Correlation: 0.999926 19.8

\* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland



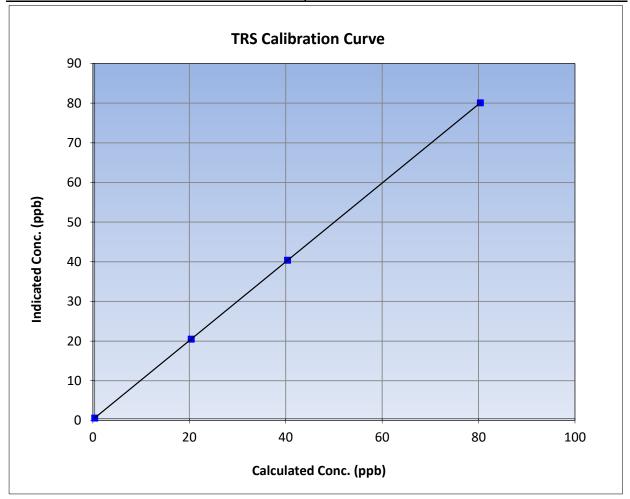
# **TRS Calibration Summary**

Version-11-2021

### **Station Information**

Calibration Date: May 16, 2023 **Previous Calibration:** April 21, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 8:59 End Time (MST): 14:26 Analyzer make: Thermo 43i-TLE Analyzer serial #: 1218153461

	Calibration Data								
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>				
0.0	0.2		Correlation Coefficient	1.000000	≥0.995				
80.0	79.7	1.0037	Correlation Coefficient	1.000000	20.993				
40.0	40.0	1.0000	Slope	0.993792	0.90 - 1.10				
20.0	20.1	0.9949	Slope	0.333732	0.90 - 1.10				
			- Intercept	0.220000	+/-3				

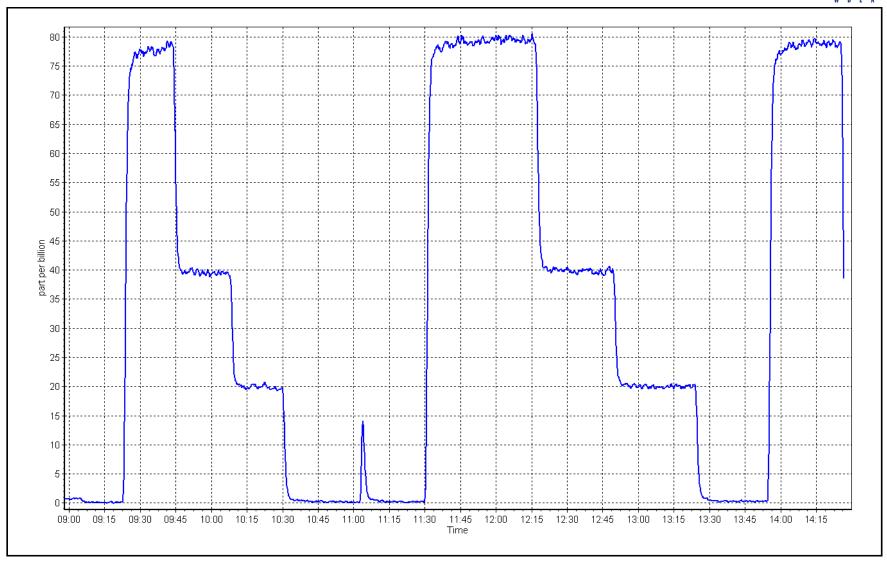




Date: May 16, 2023

Location: Bertha Ganter-Fort McKay







## H<sub>2</sub>S Calibration Report

Version-11-2021

**Station Information** 

Station Name:Bertha Ganter-Fort McKayStation number:AMS01Calibration Date:May 16, 2023Last Cal Date:April 21, 2023Start time (MST):8:59End time (MST):14:26

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

<u>Start</u> **Finish** <u>Finish</u> <u>Start</u> 1.001375 Backgd or Offset: Calibration slope: 0.993089 1.90 1.92 Calibration intercept: 0.521594 0.081613 Coeff or Slope: 1.001 1.001

H<sub>2</sub>S 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	80.7	0.989
as found 2nd point	4960	39.2	40.0	40.3	0.987
as found 3rd point	4980	19.6	20.0	20.1	0.985
new cylinder response					

### H<sub>2</sub>S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	0.0	
high point	4921	78.4	80.0	80.1	0.999
second point	4961	39.2	40.0	40.3	0.992
third point	4980	19.6	20.0	20.1	0.995
as left zero	5000	0.0	0.0	0.6	
as left span	4921	78.4	80.0	78.7	1.016
SO2 Scrubber Check	4919	81.3	813.0	0.1	
Date of last scrubber cha	ange:	March 21, 2022		Ave Corr Factor	0.995
Date of last converter efficiency test: effici					
Pacolina Corr As found:	90.0	Drov rosponso:	70.05	*% change:	1 20/

Baseline Corr As found: 80.9 Prev response: 79.95 \*% change: 1.2% Baseline Corr 2nd AF pt: 40.5 AF Slope: 1.011277 AF Intercept: -0.160000 Baseline Corr 3rd AF pt: 20.3 0.999999 AF Correlation: \* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

Notes:



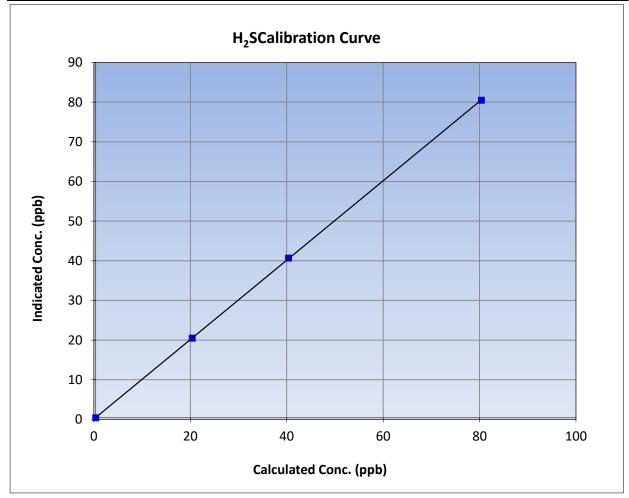
# H<sub>2</sub>S Calibration Summary

Version-11-2021

### **Station Information**

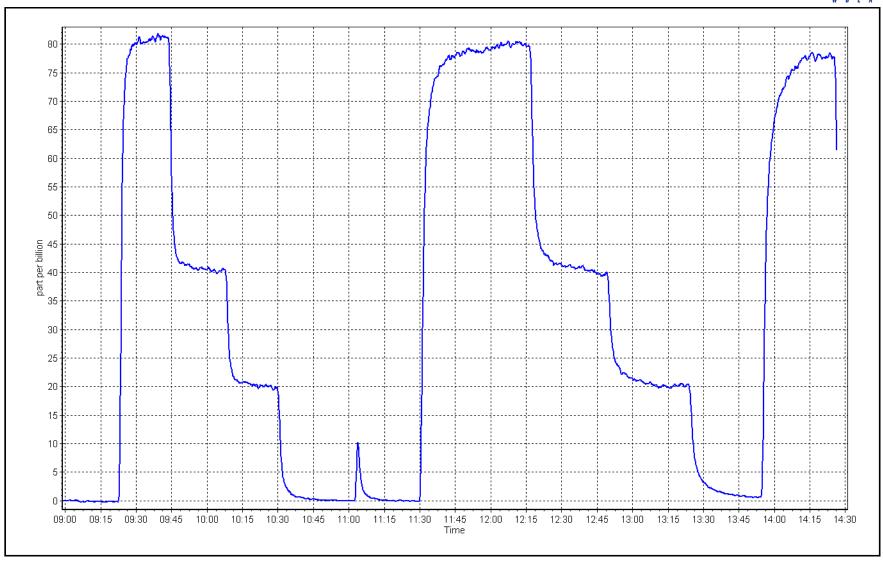
Calibration Date: May 16, 2023 **Previous Calibration:** April 21, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 8:59 End Time (MST): 14:26 Analyzer make: Thermo 43iQTL Analyzer serial #: 1200326167

Calibration Data								
Calculated concentration Indicated concentration Correction factor (ppb) (Cc) (ppb) (Ic) (Cc/Ic)			Statistical Evalua	ation	<u>Limits</u>			
0.0	0.0		Correlation Coefficient	0.999987	≥0.995			
80.0	80.1	0.9987	Correlation Coefficient	0.555567	20.993			
40.0	40.3	0.9923	Slope	1.001375	0.90 - 1.10			
20.0	20.1	0.9949	Siope	1.001575	0.90 - 1.10			
			- Intercept	0.081613	+/-3			



Location: Bertha Ganter-Fort McKay





Date: May 16, 2023



CH4 Cal Gas Conc.

# **Wood Buffalo Environmental Association**

# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

### **Station Information**

Station Name: Bertha Ganter-Fort McKay

Calibration Date: May 1, 2023 Start time (MST): 10:14

Reason: Routine

Station number: AMS01

Last Cal Date: April 26, 2023

End time (MST): 16:22

### **Calibration Standards**

Gas Cert Reference: CC486642 Cal Gas Expiry Date: February 23, 2025

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<sub>4</sub>): 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

n CH4 Range (ppm): 0 - 10 ppm

Start Finish **Start** Finish CH4 SP Ratio: 2.82E-04 3.00E-04 NMHC SP Ratio: 6.36E-05 6.11E-05 CH4 Retention time: 14.6 14.6 NMHC Peak Area: 150450 144534

### **THC Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc	) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4918	81.3	17.29	17.04	1.015
as found 2nd point	4959	40.7	8.65	8.42	1.027
as found 3rd point	4980	20.3	4.32	4.19	1.029
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4918	81.3	17.29	17.28	1.000
second point	4959	40.7	8.65	8.64	1.001
third point	4980	20.3	4.32	4.37	0.988
as left zero	5000	0.0	0.00	0.00	
as left span	4918	81.3	17.29	17.91	0.966
			Av	verage Correction Factor	0.997
Baseline Corr AF:	17.04	Prev response	17.27	*% change	-1.3%
Baseline Corr 2nd AF:	8.4	AF Slope:	0.986010	AF Intercept:	-0.045298
Baseline Corr 3rd AF:	4.2	AF Correlation:	0.999950	* = > +/-5% change initiates investigation	



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

NMF	10	Cali	hra	tion	Data
		Cuii	DI U	LIOII	Dutu

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (C	Cc) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>	
as found zero	5000	0	0.00	0.00		
as found span	4918	81.3	9.19	9.08	1.013	
as found 2nd point	4959	40.7	4.60	4.53	1.016	
as found 3rd point	4980	20.3	2.30	2.28	1.008	
new cylinder response						
calibrator zero	5000	0	0.00	0.00		
high point	4918	81.3	9.19	9.19	1.001	
second point	4959	40.7	4.60	4.63	0.993	
third point	4980	20.3	2.30	2.36	0.975	
as left zero	5000	0	0.00	0.00		
as left span	4918	81.3	9.19	9.60	0.957	
			А	verage Correction Factor	0.990	
Baseline Corr AF:	9.08	Prev response	9.21	*% change	-1.5%	
Baseline Corr 2nd AF:	4.5	AF Slope:	0.986667	AF Intercept:	AF Intercept: 0.001464	
Baseline Corr 3rd AF:	2.3	AF Correlation:	0.999992	* = > +/-5% change initiat	* = > +/-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 <i>Limit= 0.95-1.05</i>		
as found zero	5000	0.0	0.00	0.00			
as found span	4918	81.3	8.09	7.96	1.017		
as found 2nd point	4959	40.7	4.05	3.89	1.041		
as found 3rd point	4980	20.3	2.02	1.92	1.055		
new cylinder response							
calibrator zero	5000	0.0	0.00	0.00			
high point	4918	81.3	8.09	8.09	1.000		
second point	4959	40.7	4.05	4.01	1.010		
third point	4980	20.3	2.02	2.01	1.004		
as left zero	5000	0.0	0.00	0.00			
as left span	4918	81.3	8.09	8.30	0.975		
			Aver	age Correction Factor	1.005		
Baseline Corr AF:	7.96	Prev response	8.06	*% change	-1.2%		
Baseline Corr 2nd AF:	3.89	AF Slope:	0.985108	AF Intercept:	-0.046961		
Baseline Corr 3rd AF:	1.92	AF Correlation:	0.999807	* = > +/-5% change initiat	es investigation		
		Calibration	Statistics				
		<u>Start</u>		<u>Finish</u>			
THC Cal Slope:		1.000528		0.998379			
THC Cal Offset:		-0.030303	0.020702				
CH4 Cal Slope:		0.999037	0.999517				
CH4 Cal Offset:		-0.028760	-0.010960				
NMHC Cal Slope:		1.001827		0.997203			
NMHC Cal Offset:		-0.001743		0.031861			

Changed the inlet filter and H2/N2 cylinders after as founds. Performed an input board calibration.

Adjusted H2, N2, and air flow rates. Captured a new zero chromatogram. Adjusted span.

Calibration Performed By: Rene Chamberland

Notes:



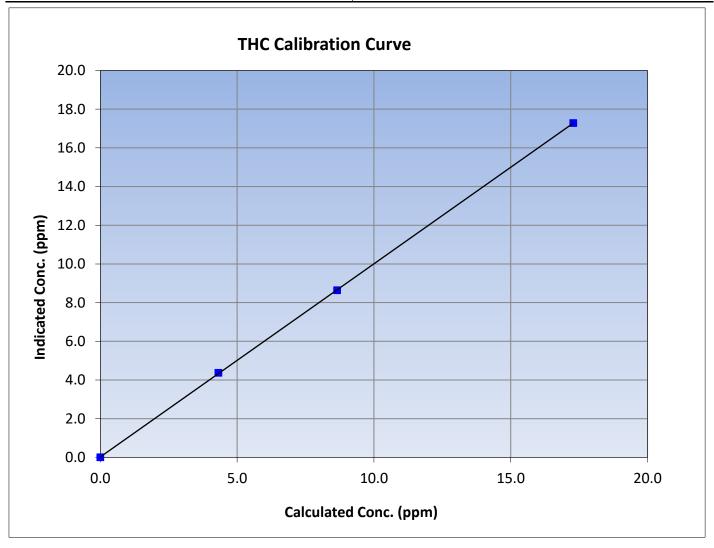
# **THC Calibration Summary**

Version-01-2020

### **Station Information**

Calibration Date: May 1, 2023 **Previous Calibration:** April 26, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 10:14 End Time (MST): 16:22 Analyzer make: Thermo 55i Analyzer serial #: 1180320040

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999986	≥0.995
17.29	17.28	1.0005	Correlation Coemicient	0.333360	20.333
8.65	8.64	1.0012	Slope	0.998379	0.90 - 1.10
4.32	4.37	0.9879	Slope	0.996379	0.90 - 1.10
			Intercept	0.020702	+/-0.5





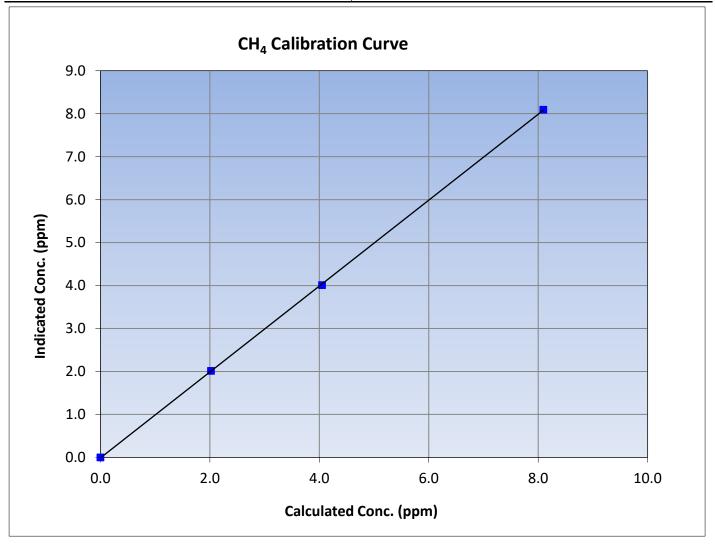
# **CH<sub>4</sub> Calibration Summary**

Version-01-2020

### **Station Information**

Calibration Date: May 1, 2023 **Previous Calibration:** April 26, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 10:14 End Time (MST): 16:22 Analyzer make: Analyzer serial #: 1180320040 Thermo 55i

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999969	≥0.995
8.09	8.09	1.0002	Correlation Coefficient	0.555505	20.999
4.05	4.01	1.0103	Slope	0.999517	0.90 - 1.10
2.02	2.01	1.0038	Slope	0.555517	0.90 - 1.10
			Intercept	-0.010960	+/-0.5





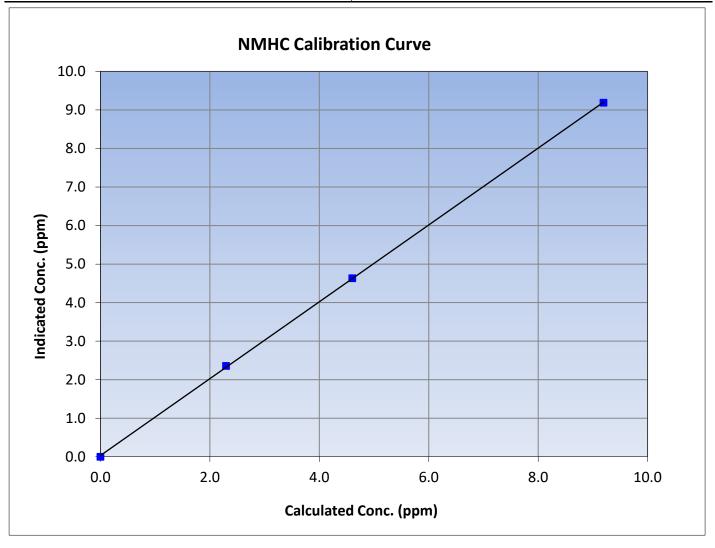
# **NMHC Calibration Summary**

Version-01-2020

### **Station Information**

Calibration Date: May 1, 2023 **Previous Calibration:** April 26, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 10:14 End Time (MST): 16:22 Analyzer make: Thermo 55i Analyzer serial #: 1180320040

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999944	≥0.995
9.19	9.19	1.0009	Correlation Coemicient	0.333344	20.333
4.60	4.63	0.9932	Slope	0.997203	0.90 - 1.10
2.30	2.36	0.9747	Slope	0.997203	0.90 - 1.10
			Intercept	0.031861	+/-0.5

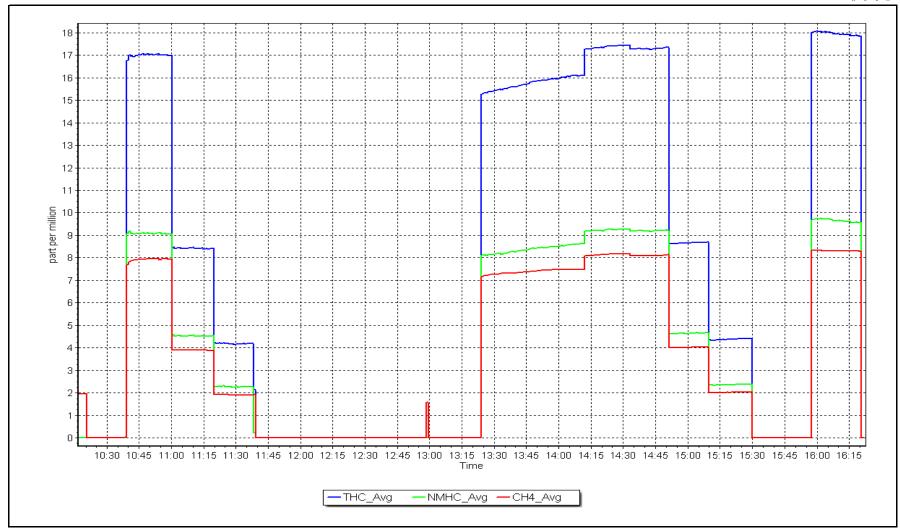


**NMHC Calibration Plot** 

May 1, 2023 Date:

Location: Bertha Ganter-Fort McKay







# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

### **Station Information**

Station Name: Bertha Ganter-Fort McKay

Calibration Date: May 18, 2023

Start time (MST): 8:33

Reason: Routine

Station number: AMS01

Last Cal Date: April 18, 2023

End time (MST): 13:28

### **Calibration Standards**

T2Y1P9L NO Gas Cylinder #: Cal Gas Expiry Date: December 11, 2023 NOX Cal Gas Conc: 50.84 NO Cal Gas Conc: 50.04 ppm ppm Removed Cylinder #: NA Removed Gas Exp Date: NA Removed Gas NO Conc: Removed Gas NOX Conc: 50.84 ppm 50.04 ppm

NOX gas Diff:

Calibrator Model: Teledyne API T700
ZAG make/model: Teledyne API T701

NO gas Diff:

Serial Number: 3565 Serial Number: 5609

### **Analyzer Information**

Analyzer make: Thermo 42i Analyzer serial #: 1218153357

NOX Range (ppb): 0 - 1000 ppb

<u>Start</u> **Finish** <u>Start</u> **Finish** NO coeff or slope: 1.498 1.465 NO bkgnd or offset: 7.1 7.4 NOX coeff or slope: 0.990 0.991 NOX bkgnd or offset: 7.2 7.6 NO2 coeff or slope: 1.000 1.000 Reaction cell Press: 201.6 201.9

### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	0.999185	0.999073
NO <sub>x</sub> Cal Offset:	0.160000	0.200000
NO Cal Slope:	0.999572	0.999971
NO Cal Offset:	-0.480000	-0.620000
NO <sub>2</sub> Cal Slope:	0.999865	1.001305
NO <sub>2</sub> Cal Offset:	-0.124708	0.605886



# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

				Dilı	ution Calibratio	n Data				
Set Point	Dilution flow rate (sccm)	Source gas flow	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) Limit = 0.95-1.05	NO Correction factor (Cc/Ic) Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.0	0.0	0.5	0.4	0.1		
as found span	4920	80.0	813.4	800.6	12.8	834.3	819.2	15.1	0.9750	0.9773
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.6	0.4	0.2		
high point	4920	80.0	813.4	800.6	12.8	813.0	800.3	12.8	1.0005	1.0004
second point	4960	40.0	406.7	400.3	6.4	406.6	399.8	6.8	1.0003	1.0013
third point	4980	20.0	203.4	200.2	3.2	202.8	198.1	4.7	1.0028	1.0104
as left zero	5000	0.0	0.0	0.0	0.0	0.1	-0.1	0.2		
as left span	4920	80.0	813.4	396.0	417.4	811.5	395.7	415.7	1.0024	1.0009
							Average C	Correction Factor	1.0012	1.0040
Corrected As fo	ound NO <sub>X</sub> =	833.8 ppb	NO =	818.8 ppb	* = > +/-5	5% change initiates i	investigation	*Percent Chang	ge NO <sub>X</sub> =	2.5%
Previous Respo	nse NO <sub>X</sub> =	812.9 ppb	NO =	799.8 ppb				*Percent Chang	ge NO =	2.3%
Baseline Corr 2	nd pt NO <sub>X</sub> =	NA ppb	NO =	NA ppb	As found	$NO_X r^2$ :		Nx SI:	Nx Int:	
Baseline Corr 3	rd pt NO <sub>X</sub> =	NA ppb	NO =	NA ppb	As found	$NO r^2$ :		NO SI:	NO Int:	
					As found	$NO_2 r^2$ :		NO2 SI:	NO <sub>2</sub> Int:	
				e	GPT Calibration	Data				
O3 Setpo	int (ppb)	Indicated NO Refere concentration (ppl		icated NO Drop centration (ppb)	Calculated NC concentration (pp		ndicated NO2 ntration (ppb) (Ic)	NO2 Correction fac Calibration Limit = 0 As Found Limit = 0	0.95-1.05	erter Efficiency on Limit = 96-104%
as found	GPT zero			-						
as found GPT poir	nt (400 ppb NO2)									
as found GPT poir	nt (200 ppb NO2)									
as found GPT poir	nt (100 ppb NO2)									
							410 5	0.9974	4	100.3%
1st GPT point	(400 ppb O3)	796.5		391.9	417.4		418.5	0.997	+ .	100.570
· · · · · · · · · · · · · · · · · · ·	,	796.5 796.5		391.9 591.2	417.4 218.1		218.7	0.9974		100.3%
1st GPT point	(200 ppb O3)								3 1	

Notes:

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

Calibration Performed By:

Rene Chamberland



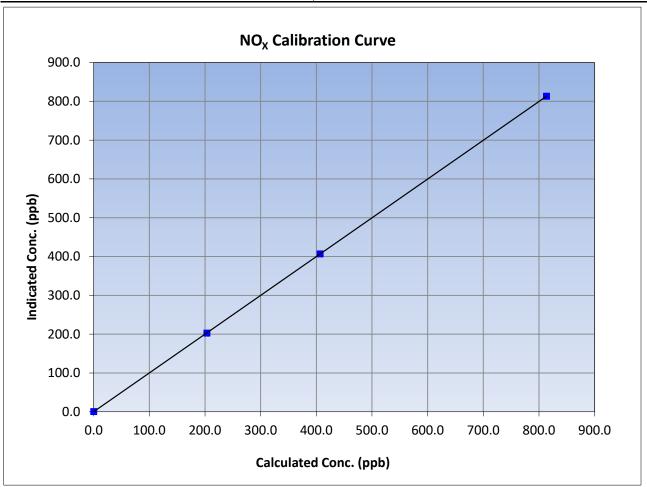
# NO<sub>x</sub> Calibration Summary

Version-04-2020

### **Station Information**

Calibration Date: May 18, 2023 Previous Calibration: April 18, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 8:33 End Time (MST): 13:28 Analyzer serial #: Analyzer make: Thermo 42i 1218153357

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.6		Correlation Coefficient	0.999999	≥0.995
813.4	813.0	1.0005	Correlation Coefficient	0.333333	20.333
406.7	406.6	1.0003	Slope	0.999073	0.90 - 1.10
203.4	202.8	1.0028	Slope	0.999075	0.90 - 1.10
			Intercept	0.200000	+/-20





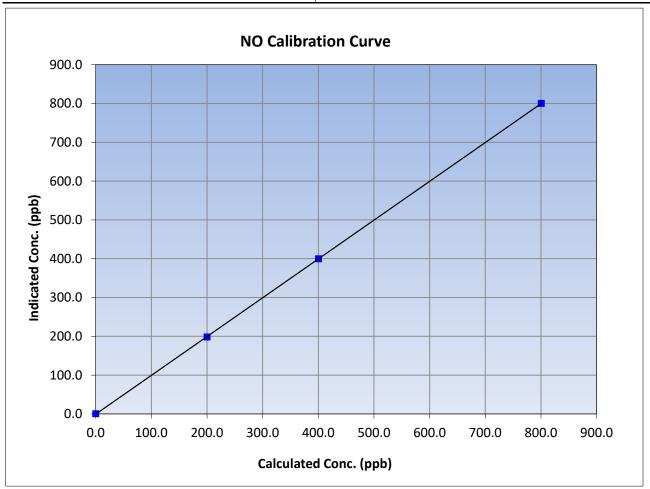
# **NO Calibration Summary**

Version-04-2020

### **Station Information**

Calibration Date: May 18, 2023 Previous Calibration: April 18, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 8:33 End Time (MST): 13:28 Analyzer make: Thermo 42i Analyzer serial #: 1218153357

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	0.4		Correlation Coefficient	0.999991	≥0.995	
800.6	800.3	1.0004	Correlation Coefficient	0.555551	20.333	
400.3	399.8	1.0013	Slope	0.999971	0.90 - 1.10	
200.2	198.1	1.0104	Slope	0.999971	0.90 - 1.10	
			Intercept	-0.620000	+/-20	





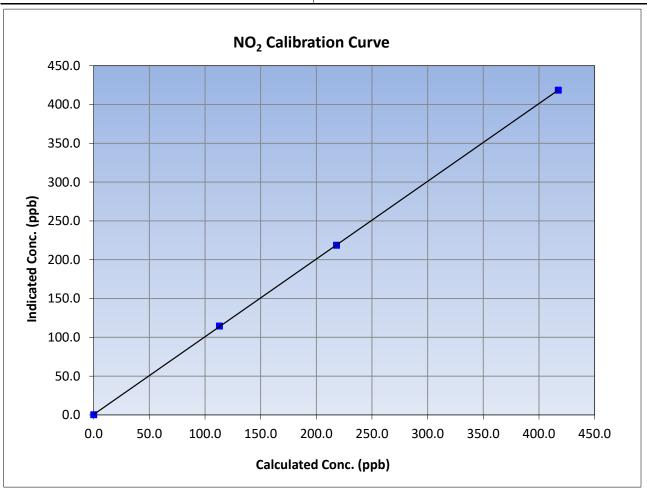
# NO<sub>2</sub> Calibration Summary

Version-04-2020

### **Station Information**

Calibration Date: May 18, 2023 Previous Calibration: April 18, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 8:33 End Time (MST): 13:28 Analyzer serial #: Analyzer make: Thermo 42i 1218153357

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.2		Correlation Coefficient	0.999991	≥0.995
417.4	418.5	0.9974	correlation coemicient	0.555551	20.993
218.1	218.7	0.9973	Slope	1.001305	0.90 - 1.10
113.0	114.5	0.9869	Slope	1.001303	0.30 - 1.10
	<u> </u>		Intercept	0.605886	+/-20

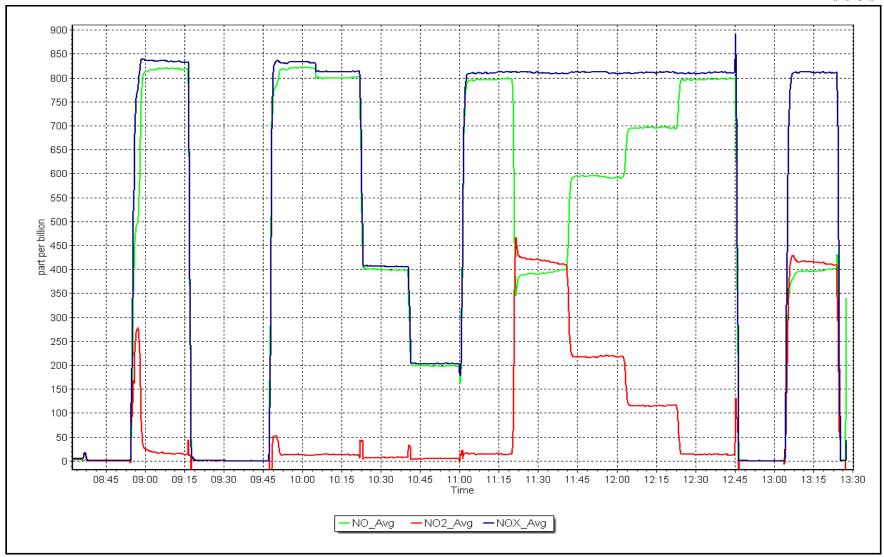


NO<sub>x</sub> Calibration Plot

Date: May 18, 2023

Location: Bertha Ganter-Fort McKay







# O<sub>3</sub> Calibration Report

Version-01-2020

Finish

### **Station Information**

Station Name: Bertha Ganter-Fort McKay

Calibration Date: May 4, 2023

Start time (MST): 9:36

Reason: Routine

Station number: AMS01

Last Cal Date: April 5, 2023

End time (MST): 13:02

### **Calibration Standards**

O3 generation mode: Photometer

Baseline Corr 3rd AF pt:

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 Range 0 - 500 ppb

Analyzer serial #: 1107

<u>Start</u> <u>Finish</u>

<u>Start</u> 2.5

 Calibration slope:
 1.001057
 0.999429
 Backgd or Offset:
 2.5
 3.2

 Calibration intercept:
 0.440000
 0.500000
 Coeff or Slope:
 1.040
 1.010

### O<sub>3</sub> Calibration Data

Set Point	Total air flow rate	Calibrator Lamp	Calculated	Indicated concentration (	Correction factor (Cc/Ic)
Set Point	(sccm)	Voltage Drive	concentration (ppb) (Cc)	(ppm) (Ic)	Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.6	
as found span	5000	855.5	400.0	414.8	0.964
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.5	
high point	5000	858.8	400.0	400.2	1.000
second point	5000	743.1	200.0	200.6	0.997
third point	5000	653.5	100.0	100.3	0.997
as left zero	5000	0.0	0.0	-0.2	
as left span	5000	858.8	400.0	402.0	0.995
			Averag	ge Correction Factor	0.998
	44.4.2	<b>.</b>	400.0	<b>*</b> 0/ I	2.20/

Baseline Corr As found: 414.2 Previous response 400.9 \*% change 3.2%

AF Correlation:

Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept:

\* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland

NA



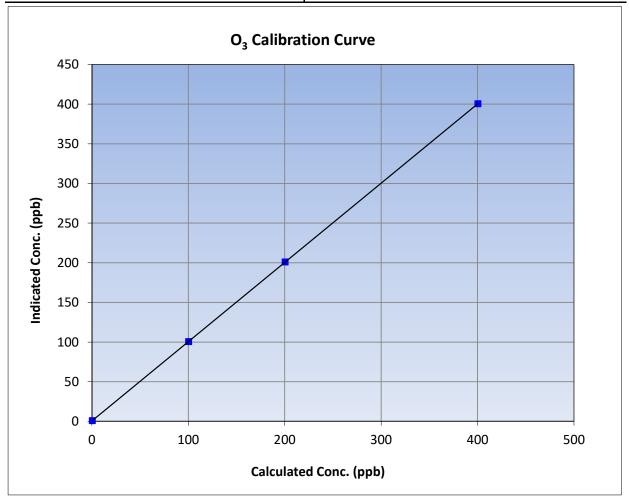
# O<sub>3</sub> Calibration Summary

Version-01-2020

### **Station Information**

Calibration Date: May 4, 2023 **Previous Calibration:** April 5, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 9:36 End Time (MST): 13:02 Analyzer make: Teledyne API T400 Analyzer serial #: 1107

	Calibration Data								
Calculated concentration Indicated concentration Correction factor (ppb) (Cc) (ppb) (Ic) (Cc/Ic)			Statistical Evalua	ation	<u>Limits</u>				
0.0	0.5		Correlation Coefficient	0.999999	≥0.995				
400.0	400.2	0.9995	Correlation Coefficient	0.555555	20.333				
200.0	200.6	0.9970	Slope	0.999429	0.90 - 1.10				
100.0	100.3	0.9970	Slope	0.333423	0.90 - 1.10				
			Intercept	0.500000	+/- 5				

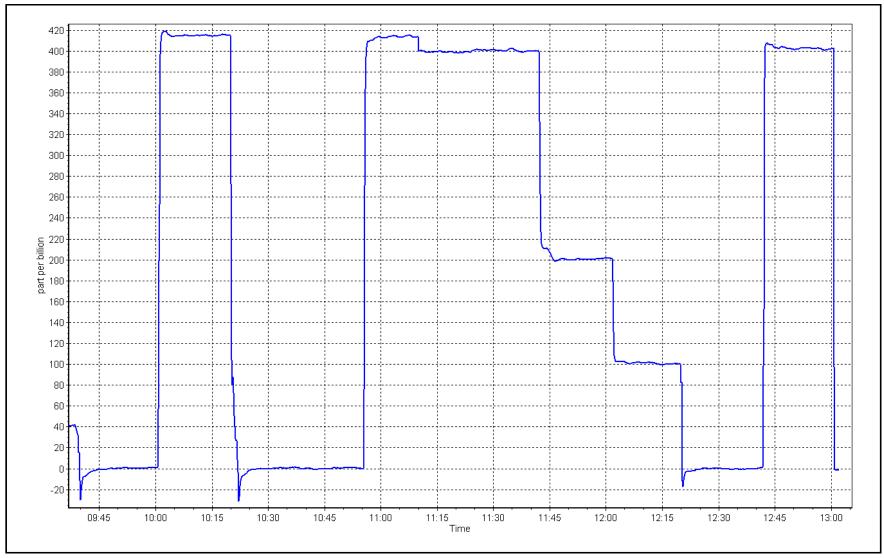


O<sub>3</sub> Calibration Plot

Date: May 4, 2023

Location: Bertha Ganter-Fort McKay







Calibration by:

Rene Chamberland

# **Wood Buffalo Environmental Association**

# **T640 PM<sub>2.5</sub> CALIBRATION**

Version-01-2023

		Station Informatio	n			
Station Name: Calibration Date: Start time (MST):	Fort McKay - Bertha C May 15, 2023 9:50	Ganter	Station number: Last Cal Date: End time (MST):	April 20, 20	23	
Analyzer Make: Particulate Fraction:	API T640 PM2.5		S/N:	306		
Flow Meter Make/Model: Temp/RH standard:	Delta Cal Delta Cal		S/N: S/N:			
		Monthly Calibration 1	lest est			
<u>Parameter</u> T (°C)	<u>As found</u> 24.7	Measured 24.4	<u>As left</u> 24.7		Adjusted	( <i>Limits</i> ) +/- 2 °C
P (mmHg) flow (LPM)	735.9 5.02	739 4.98	735.9 5.02			+/- 10 mmHg +/- 0.25 LPM
Leak Test: Note: this leak check will be	Date of check:  PM w/o HEPA:	May 15, 2023 3.2	Last Cal Date: PM w/ HEPA:	April 20		<0.2 ug/m3
Inlet cleaning :	Inlet Head					
		Quarterly Calibration				44 4 1
<u>Parameter</u> PMT Peak Test	<u>As found</u> 6	Post maintenance -60	<u>As left</u> 10.9		Adjusted  ✓	(Limits) 10.9 +/- 0.5
Post-maintenance Date Optical Cham Disposable Filte	ber Cleaned:	PM w/o HEPA: May 15, May 15,		w/ HEPA:		0 <0.2 ug/m3
		Annual Maintenand	ce			
Date Sample Tuk Date RH/T Senso	=	August 31 May 15,				
Notes:	· · · · · · · · · · · · · · · · · · ·	ure, and pressure. Leak checle disposable filter. Inlet head Remo			•	



# **T640 PM<sub>2.5</sub> CALIBRATION**

Version-01-2023

_		Station Informatio	n		
Station Name:	Fort McKay - Bertha (	Ganter	Station number:		
Calibration Date:	May 15, 2023		Last Cal Date:		
Start time (MST):	12:00		End time (MST):	13:15	
Analyzer Make:	API T640		S/N:	328	
Particulate Fraction:	PM2.5				
Flow Meter Make/Model:	Delta Cal		S/N:	1450	
Temp/RH standard:	Delta Cal		S/N:	1450	
		Monthly Calibration 1	Test Test		
<u>Parameter</u>	As found	Measured	<u>As left</u>	<u>Adjusted</u>	(Limits)
T (°C)	26.5	25.7	26.5		+/- 2 °C
P (mmHg)	736.1	738	736.1		+/- 10 mmHg
flow (LPM)	5.00	5.02	5.00		+/- 0.25 LPM
Leak Test:	Date of check:	May 15, 2023	Last Cal Date:	NA	
Note: this leak check will be	PM w/o HEPA:	60.2	PM w/ HEPA:	0	<0.2 ug/m3
		Quarterly Calibration	Test		
<u>Parameter</u>	As found	Post maintenance	<u>As left</u>	<u>Adjusted</u>	(Limits)
PMT Peak Test	10.9		10.9		10.9 +/- 0.5
Post-maintenance	e leak check:	PM w/o HEPA:		w/ HEPA:	
Date Optical Cham Disposable Filte	-				<0.2 ug/m3
		Annual Maintenand	ce		
Date Sample Tub	oe Cleaned:				
Date RH/T Sensor Cleaned:					
Notes:	Installing a new T640 i	nstrument. Flow, tempera	ature, and pressure al test within limits.	l within limits. Leak check	passed. PMT
Calibration by:	Rene Chamberland				



# TN - NO<sub>x</sub> - NH<sub>3</sub> Calibration Report

Version-11-2021

### **Station Information**

Station Name: Bertha Ganter-Fort McKay

NOX Cal Date: May 23, 2023

10:10 Start time (MST):

NH3 Cal Date: May 23, 2023

Start time (MST): 14:55

Routine Reason:

Station number: AMS01

Last Cal Date: April 27, 2023

14:30 End time (MST):

Last Cal Date: April 28, 2023

February 28, 2023

18:40 End time (MST):

NH3 Cal Gas Expiry:

### **Calibration Standards**

NOX Cal Gas Conc: 50.84 NO Gas Cylinder #: T2Y1P9L ppm NO Cal Gas Conc: 50.04 NO Cal Gas Expiry: March 3, 2028 ppm

Removed NOX Conc: 50.84 Removed Cylinder #: ppm NA 50.04 Removed cyl Expiry: NA Removed NO Conc: ppm

NOX gas Diff: NO gas Diff:

NH3 Cal Gas Conc: 72.93 NH3 Gas Cylinder #: CC281298 ppm

Removed NH3 Conc: 72.93 Removed Cylinder #: ppm

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 #: 808 Converter model: Teledyne API T501 Converter serial #: 824 NH3 Range (ppb): 0 - 2000 ppb Reaction cell Press: 5.20 NOX Range (ppb): 0 - 1000 ppb Sample Flow: 472

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient:	0.834	0.834	TN coefficient:	0.836	0.836
NOX coefficient:	0.839	0.839	NO bkgrnd:	-0.626	-0.626
NO2 coefficient:	1.000	1.000	NOX bkgrnd:	-0.402	-0.402
NH3 coefficient:	0.937	0.937	TN bkgrnd:	1.871	1.871

### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	1.005241	1.000126
NO <sub>x</sub> Cal Offset:	-0.420000	-0.900000
NO Cal Slope:	1.000685	1.000043
NO Cal Offset:	-2.020000	-1.820000
NO <sub>2</sub> Cal Slope:	1.007356	1.005118
NO <sub>2</sub> Cal Offset:	1.516016	-0.102116
NH3 Cal Slope:	1.005229	1.002401
NH3 Cal Offset:	-3.943276	-1.184396
TN Cal Slope:	1.009496	1.006409
TN Cal Offset:	-3.914715	-1.167305



# **TN - NOX - NH<sub>3</sub> Calibration Report**

Version-11-2021

### **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	-0.1	-0.1	-0.1		
as found NO	4920	80.0	813.4	813.4		812.7	812.7	0.0	1.001	
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.1		
high NO point	4920	80.0	813.4	813.4		813.9	813.3	0.6	0.999	
NO/O3 point	4920	80.0	813.4	813.4		812.1	811.0	1.2	1.002	
as found NH3	3413	86.4	1800.6		1800.6	1817.2		1810.0	0.991	0.995
new NH3 cyl rp										
first NH3	3413	86.4	1800.6		1800.6	1817.2		1810.0	0.991	0.995
second NH3	3452	48.0	1000.2		1000.2	990.5		986.5	1.010	1.014
third NH3	3476	24.0	500.1		500.1	509.7		507.5	0.981	0.985
							Average Co	rrection Factor	1.0005	0.9980

Corrected As found TN = 812.8 ppb NO<sub>X</sub> = 812.8 ppb NH3 = 1810.1 ppb Previous Response TN = 817.3 ppb NO<sub>X</sub> = 817.3 ppb NH3 = 1806.1 ppb

\*Percent Change TN = -0.5%\*Percent Change  $NO_x = -0.6\%$ 

\*Percent Change  $\frac{NO_X}{} = 0.0\%$ 

NH3 Previous Converter Efficiency = 93.7% \*=>+/-5% change initiates investigation

NH3 Current Converter Efficiency = 93.7%



# NO<sub>X</sub> - NO - NO<sub>2</sub> Calibration Report

Version-11-2021

### **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	-0.2	-0.1		
as found span	4920	80.0	813.4	800.6	813.4	812.7	792.6	812.7	1.0009	1.0101
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	0.0		
high point	4920	80.0	813.4	800.6	813.4	813.3	800.0	813.9	1.0002	1.0008
second point	4960	40.0	406.7	400.3	406.7	404.8	397.0	404.3	1.0047	1.0084
third point	4980	20.0	203.4	200.2	203.4	202.0	196.8	202.4	1.0067	1.0171
							Average C	Correction Factor	1.0039	1.0087
Baseline Corr A	s fnd TN =	812.8 ppb	NO <sub>X</sub> = 812.8	ppb NO =	792.8 ppb			*Percent Chang	e TN=	-0.5%
Previous Respo	nse TN =	817.3 ppb	NO <sub>x</sub> = 817.3	ppb NO =	799.2 ppb			*Percent Chang	e NO <sub>x</sub> =	-0.6%
								*Percent Chang	e NO =	-0.8%
								* = > +/-5% change	initiates investigati	on

### **GPT Calibration Data**

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) Calibration Limit = 0.95-1.05 As Found Limit = 0.90-1.10	Converter Efficiency Calibration Limit = 96-104%
as found zero			0.0	0.2		
calibration zero			0.0	-0.2		
1st GPT point (400 ppb O3)	796.1	397.3	411.6	413.8	0.9947	100.5%
2nd GPT point (200 ppb O3)	796.1	593.4	215.5	215.8	0.9986	100.1%
3rd GPT point (100 ppb O3)	796.1	691.9	117.0	118.1	0.9907	100.9%
			Δ	verage Correction Factor	0.9947	100.5%

Notes:

Changed the inlet filter. No adjustments made.

Calibration Performed By:

Rene Chamberland



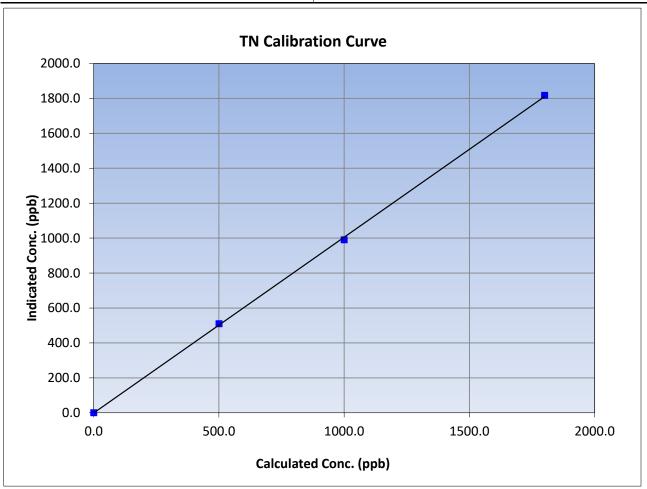
# **TN Calibration Summary**

Version-11-2021

### **Station Information**

Calibration Date: May 23, 2023 Previous Calibration: April 27, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 10:10 End Time (MST): 14:30 Analyzer make: Teledyne API T201 Analyzer serial #: 808

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999822	≥0.995
1800.6	1817.2	0.9909	Correlation Coefficient	0.333622	20.993
1000.2	990.5	1.0098	Slope	1.006409	0.90 - 1.10
500.1	509.7	0.9811	Slope	1.000409	0.90 - 1.10
			Intercept	-1.167305	+/-20





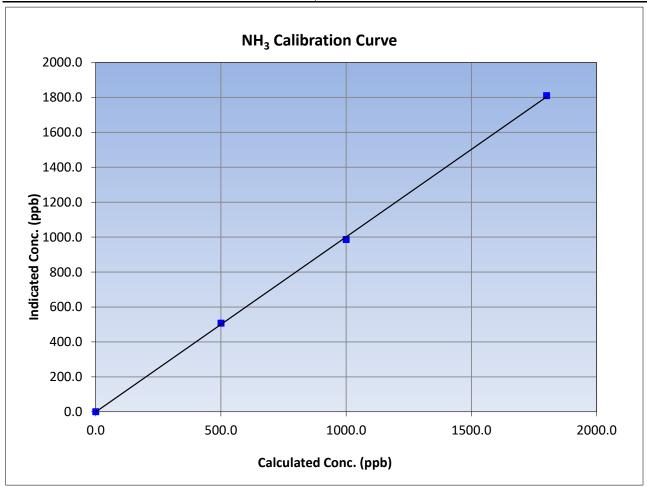
# NH<sub>3</sub> Calibration Summary

Version-11-2021

### **Station Information**

Calibration Date: May 23, 2023 Previous Calibration: April 27, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 10:10 End Time (MST): 14:30 Analyzer serial #: Analyzer make: Teledyne API T201 808

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999822	≥0.995
1800.6	1810.0	0.9948	Correlation Coefficient	0.555622	20.993
1000.2	986.5	1.0139	Slope	1.002401	0.90 - 1.10
500.1	507.5	0.9854	Slope	1.002401	0.30 - 1.10
			Intercept	-1.184396	+/-20





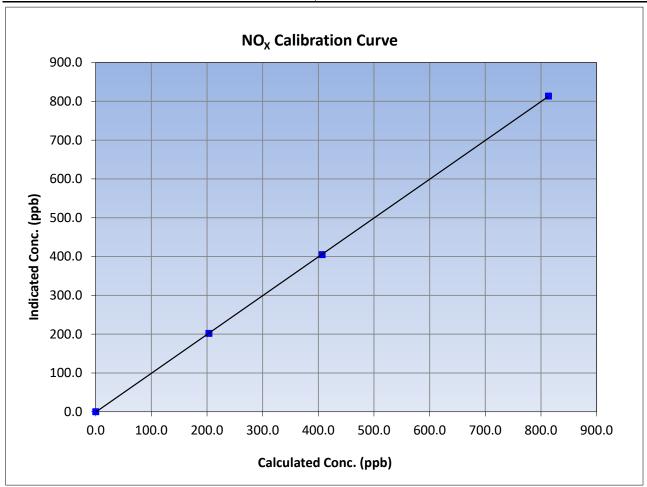
# NO<sub>X</sub> Calibration Summary

Version-11-2021

### **Station Information**

Calibration Date: May 23, 2023 Previous Calibration: April 27, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 10:10 End Time (MST): 14:30 Analyzer serial #: Analyzer make: Teledyne API T201 808

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999993	≥0.995
813.4	813.3	1.0002	Correlation Coefficient	0.555555	20.993
406.7	404.8	1.0047	Slope	1.000126	0.90 - 1.10
203.4	202.0	1.0067	Slope	1.000120	0.90 - 1.10
			Intercept	-0.900000	+/-20





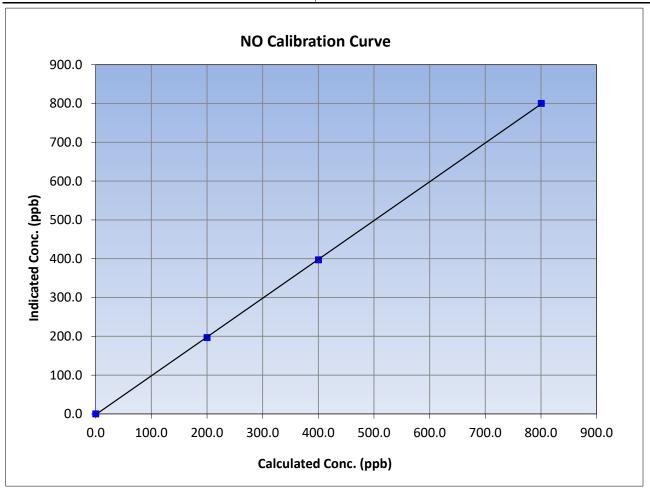
# **NO Calibration Summary**

Version-11-2021

### **Station Information**

Calibration Date: May 23, 2023 Previous Calibration: April 27, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 10:10 End Time (MST): 14:30 Analyzer make: Teledyne API T201 Analyzer serial #: 808

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999972	≥0.995
800.6	800.0	1.0008	Correlation Coefficient	0.333372	20.993
400.3	397.0	1.0084	Slope	1.000043	0.90 - 1.10
200.2	196.8	1.0171	Slope	1.000043	0.30 - 1.10
			Intercept	-1.820000	+/-20





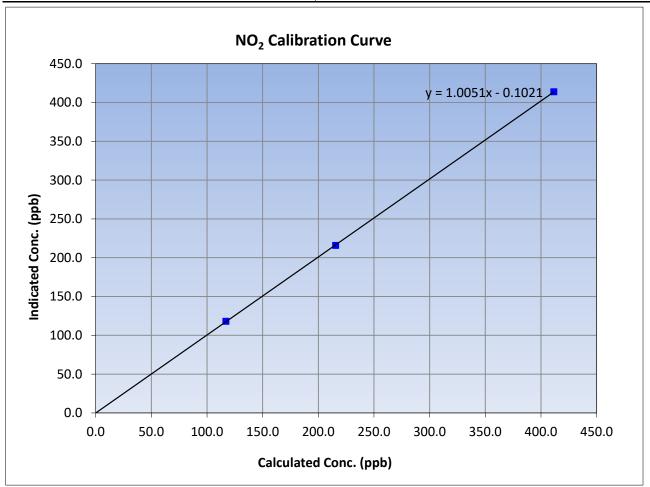
# NO<sub>2</sub> Calibration Summary

Version-11-2021

#### **Station Information**

Calibration Date: May 23, 2023 Previous Calibration: April 27, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 10:10 End Time (MST): 14:30 Analyzer serial #: Analyzer make: Teledyne API T201 808

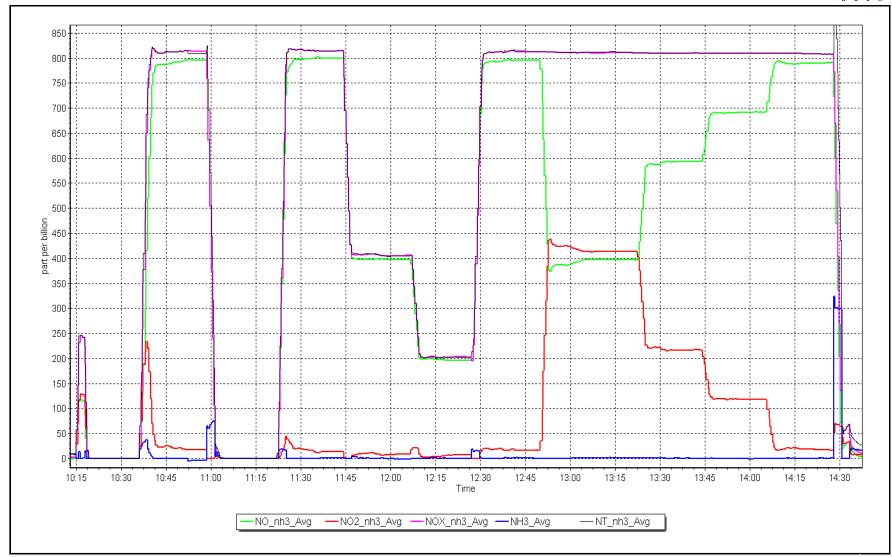
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	-0.2		Correlation Coefficient	0.999990	≥0.995
411.6	413.8	0.9947	Correlation Coefficient	0.999990	20.993
215.5	215.8	0.9986	Slope	1.005118	0.90 - 1.10
117.0	118.1	0.9907	Slope	1.005116	0.90 - 1.10
			Intercept	-0.102116	+/-20



NO<sub>x</sub> Calibration Plot

Date: May 23, 2023

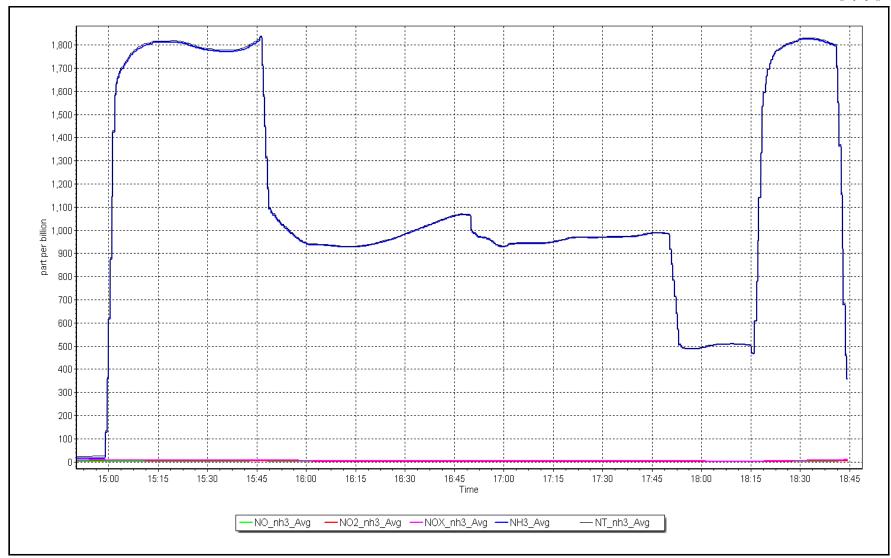




NH<sub>3</sub> Calibration Plot

Date: May 23, 2023







# TN - NO<sub>x</sub> - NH<sub>3</sub> Calibration Report

Version-05-2023

#### Station Information

Station Name: Bertha Ganter-Fort McKay

NOX Cal Date: May 29, 2023

8:39 Start time (MST):

NH3 Cal Date: May 29, 2023

12:23 Start time (MST):

Removal Reason:

Station number: AMS01

Last Cal Date: May 23, 2023

12:00 End time (MST):

Last Cal Date: May 23, 2023

14:01 End time (MST):

#### **Calibration Standards**

NOX Cal Gas Conc: T2Y1P9L 50.84 NO Gas Cylinder #: ppm NO Cal Gas Conc: 50.04 NO Cal Gas Expiry: March 3, 2028 ppm

Removed NOX Conc: 50.84 Removed Cylinder #: ppm NA 50.04 NA Removed NO Conc: ppm Removed cyl Expiry:

NOX gas Diff: NO gas Diff:

NH3 Cal Gas Conc: 72.93 NH3 Gas Cylinder #: CC281298 ppm

> NH3 Cal Gas Expiry: February 28, 2023

Removed NH3 Conc: 72.93 Removed Cylinder #: ppm

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 #: 808 Converter model: Teledyne API T501 Converter serial #: 824 Reaction cell Press: 5.20 NH3 Range (ppb): 0 - 2000 ppb

NOX Range (ppb): 0 - 1000 ppb Sample Flow: 486

Start **Finish Start Finish** 

NO coefficient: 0.834 TN coefficient: 0.836 NOX coefficient: NO bkgrnd: 0.839 -0.626 NO2 coefficient: 1.000 NOX bkgrnd: -0.402 NH3 coefficient: 0.937 TN bkgrnd: 1.871

#### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	1.000126	1.003836
NO <sub>X</sub> Cal Offset:	-0.900000	-1.320000
NO Cal Slope:	1.000043	0.997074
NO Cal Offset:	-1.820000	-1.380000
NO <sub>2</sub> Cal Slope:	1.005118	1.006204
NO <sub>2</sub> Cal Offset:	-0.102116	0.774028
NH3 Cal Slope:	1.002401	1.000316
NH3 Cal Offset:	-1.184396	7.361047
TN Cal Slope:	1.006409	1.004132
TN Cal Offset:	-1.167305	7.636840



# **TN - NOX - NH<sub>3</sub> 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	-0.1	-0.1	-0.1		
as found NO	4920	80.0	813.4	813.4		816.1	816.1	0.0	0.997	
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1		
high NO point	4920	80.0	813.4	813.4		816.1	816.1	0.0	0.997	
NO/O3 point	4920	80.0	813.4	813.4		812.5	811.2	1.1	1.001	
as found NH3	3413	86.4	1800.6		1800.6	1809.8		1802.8	0.995	0.999
new NH3 cyl rp										
first NH3	3413	86.4	1800.6		1800.6	1809.8		1802.8	0.995	0.999
second NH3	3452	48.0	1000.2		1000.2	1019.6		1015.4	0.981	0.985
third NH3	3476	24.0	500.1		500.1	515.8		513.3	0.970	0.974
							Average Co	rrection Factor	0.9989	0.9860

Corrected As found TN = 816.2 ppb NO<sub>X</sub> = 816.2 ppb NH3 = 1802.9 ppb Previous Response TN = 817.5 ppb NO<sub>X</sub> = 812.6 ppb NH3 = 1803.8 ppb

\*Percent Change TN = -0.2%

\*Percent Change  $NO_X = 0.4\%$ 

\*Percent Change NH3 = 0.0%

\* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 93.7%

NH3 Current Converter Efficiency =



# NO<sub>X</sub> - NO - NO<sub>2</sub> 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	-0.2	-0.1		
as found span	4920	80.0	813.4	800.6	813.4	816.1	797.3	816.1	0.9967	1.0042
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.1		
high point	4920	80.0	813.4	800.6	813.4	816.1	797.3	816.1	0.9967	1.0042
second point	4960	40.0	406.7	400.3	406.7	405.6	397.8	408.3	1.0028	1.0063
third point	4980	20.0	203.4	200.2	203.4	202.1	196.6	201.5	1.0062	1.0181
							Average C	Correction Factor	1.0019	1.0095
Baseline Corr A	s fnd TN =	816.2 ppb	NO <sub>X</sub> = 816.2	ppb NO =	797.5 ppb			*Percent Chang	e TN=	-0.2%
Previous Respo	nse TN =	817.5 ppb	$NO_X = 812.6$	ppb NO =	798.9 ppb			*Percent Chang	e NO <sub>x</sub> =	0.4%
								*Percent Chang	e NO =	-0.2%
								* = > +/-5% change	initiates investigati	ion

<sup>\* = &</sup>gt; +/-5% change initiates investigation

#### **GPT Calibration Data**

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) Calibration Limit = 0.95-1.05 As Found Limit = 0.90-1.10	Converter Efficiency Calibration Limit = 96-104%
as found zero			0.0	0.2		
calibration zero			0.0	0.2		
1st GPT point (400 ppb O3)	795.5	393.0	415.3	418.3	0.9928	100.7%
2nd GPT point (200 ppb O3)	795.5	595.6	212.7	215.2	0.9884	101.2%
3rd GPT point (100 ppb O3)	795.5	694.2	114.1	116.1	0.9828	101.8%
			ı	Average Correction Factor	0.9880	101.2%

Notes:

Removing the analyzer due to memory issues.

Calibration Performed By:

Rene Chamberland



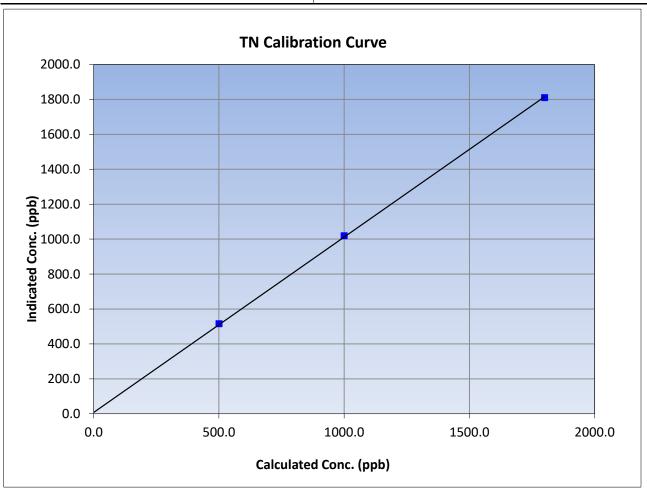
## **TN Calibration Summary**

Version-05-2023

#### **Station Information**

Calibration Date: May 29, 2023 Previous Calibration: May 23, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 8:39 End Time (MST): 12:00 Analyzer make: Teledyne API T201 Analyzer serial #: 808

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>	
0.0	-0.1		Correlation Coefficient	0.999894	≥0.995	
1800.6	1809.8	0.9949	Correlation Coefficient	0.555654	E0.333	
1000.2	1019.6	0.9810	Slope	1.004132	0.90 - 1.10	
500.1	515.8	0.9695	Slope	1.004132	0.30 - 1.10	
			Intercept	7.636840	+/-20	





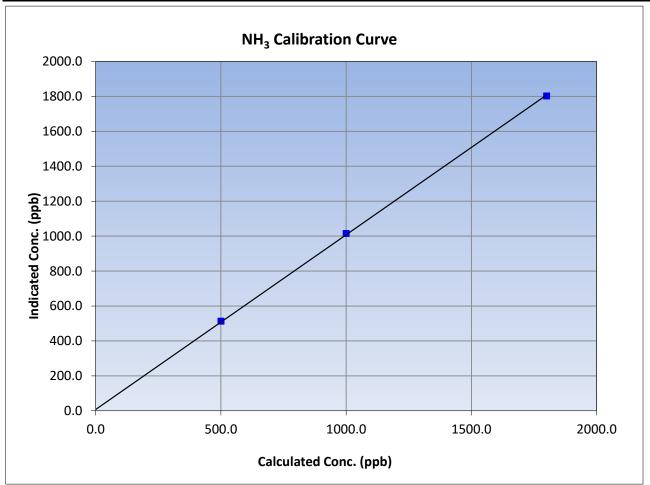
# NH<sub>3</sub> Calibration Summary

Version-05-2023

#### **Station Information**

Calibration Date: May 29, 2023 Previous Calibration: May 23, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 8:39 End Time (MST): 12:00 Analyzer serial #: Analyzer make: Teledyne API T201 808

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	-0.1		Correlation Coefficient	0.999899	≥0.995
1800.6	1802.8	0.9988	Correlation Coefficient	0.555655	20.333
1000.2	1015.4	0.9850	Slope	1.000316	0.90 - 1.10
500.1	513.3	0.9743	Зюре	1.000310	0.90 - 1.10
			Intercept	7.361047	+/-20





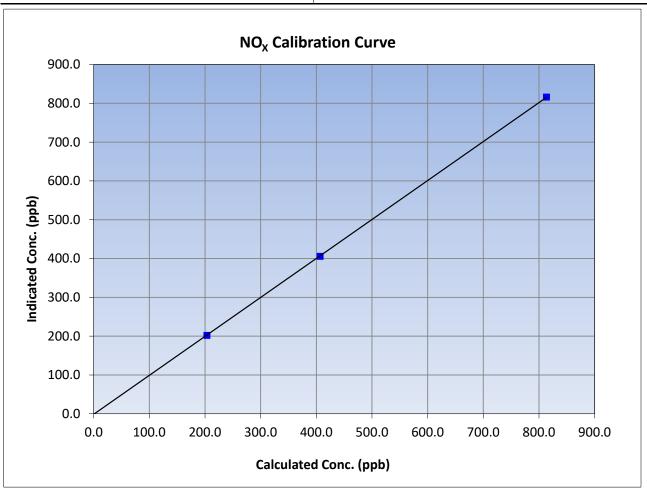
# NO<sub>x</sub> Calibration Summary

Version-05-2023

#### **Station Information**

Calibration Date: May 29, 2023 Previous Calibration: May 23, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 8:39 End Time (MST): 12:00 Analyzer serial #: Analyzer make: Teledyne API T201 808

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	-0.1		Correlation Coefficient	0.999987	≥0.995
813.4	816.1	0.9967	Correlation Coefficient	0.555507	20.555
406.7	405.6	1.0028	Slope	1.003836	0.90 - 1.10
203.4	202.1	1.0062	Slope	1.005650	0.90 - 1.10
			Intercept	-1.320000	+/-20





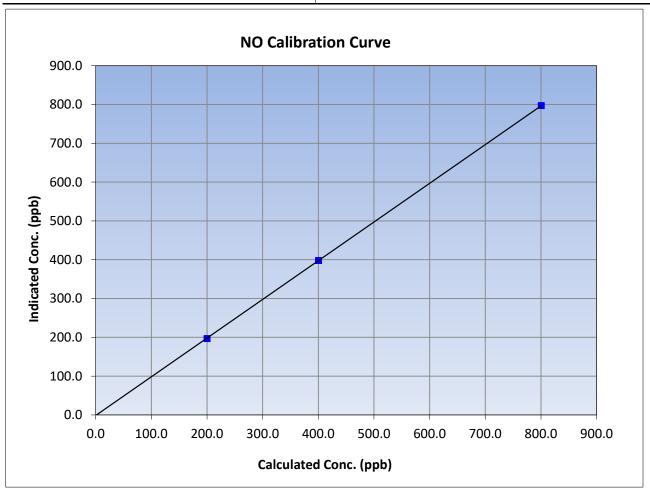
### **NO Calibration Summary**

Version-05-2023

#### **Station Information**

Calibration Date: May 29, 2023 Previous Calibration: May 23, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 8:39 End Time (MST): 12:00 Analyzer make: Teledyne API T201 Analyzer serial #: 808

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>	
0.0	-0.2		Correlation Coefficient	0.999988	≥0.995	
800.6	797.3	1.0042	Correlation Coefficient	0.555500	20.555	
400.3	397.8	1.0063	Slope	0.997074	0.90 - 1.10	
200.2	196.6	1.0181	Slope	0.997074	0.90 - 1.10	
			Intercept	-1.380000	+/-20	





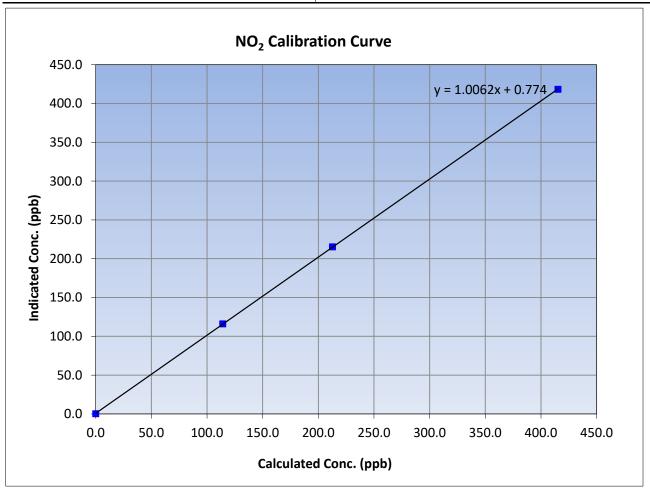
# NO<sub>2</sub> Calibration Summary

Version-05-2023

#### **Station Information**

Calibration Date: May 29, 2023 Previous Calibration: May 23, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 8:39 End Time (MST): 12:00 Analyzer serial #: Analyzer make: Teledyne API T201 808

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>	
0.0	0.2		Correlation Coefficient	0.999991	≥0.995	
415.3	418.3	0.9928	Correlation Coefficient	0.555551	20.595	
212.7	215.2	0.9884	Slope	1.006204	0.90 - 1.10	
114.1	116.1	0.9828	Siope	1.000204	0.90 - 1.10	
		_	Intercept	0.774028	+/-20	

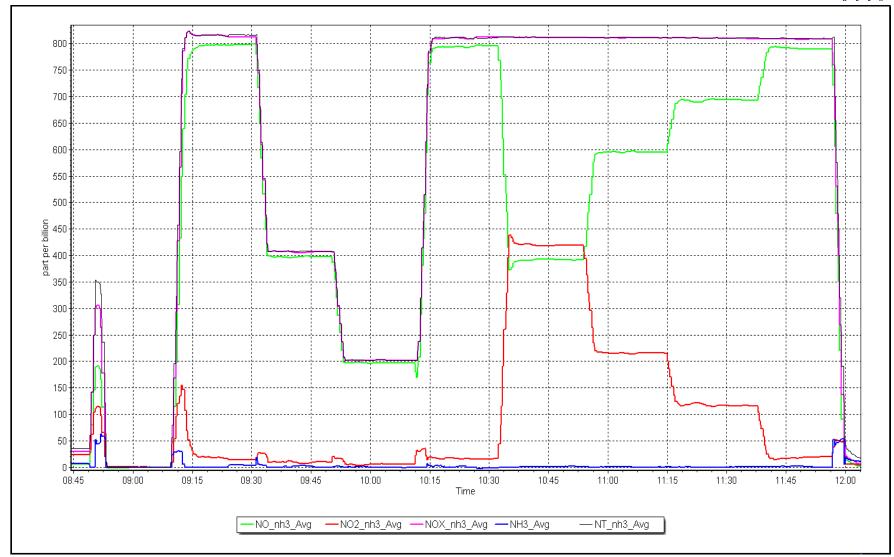


NO<sub>x</sub> Calibration Plot

Date:

May 29, 2023

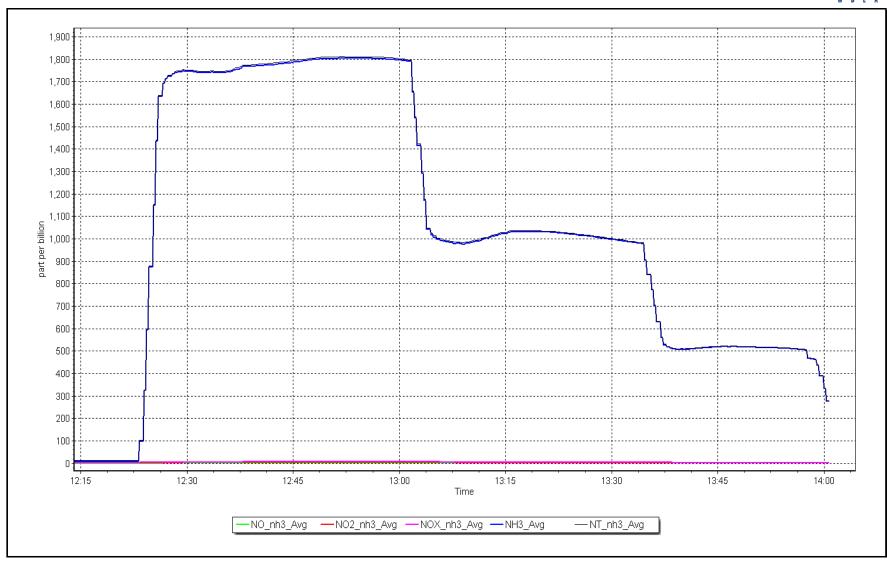




NH<sub>3</sub> Calibration Plot

Date: May 29, 2023







# TN - NO<sub>x</sub> - NH<sub>3</sub> Calibration Report

Version-05-2023

#### Station Information

Station Name: Bertha Ganter-Fort McKay Station number: May 30, 2023 NOX Cal Date: Last Cal Date:

10:03 Start time (MST):

NH3 Cal Date: May 30, 2023

14:45 Start time (MST):

AMS01 May 23, 2023

14:20 End time (MST):

Last Cal Date: May 23, 2023

18:14 End time (MST):

Reason: Install

#### **Calibration Standards**

NOX Cal Gas Conc: T2Y1P9L 50.84 NO Gas Cylinder #: ppm NO Cal Gas Conc: 50.04 NO Cal Gas Expiry: March 3, 2028 ppm

Removed NOX Conc: 50.84 Removed Cylinder #: ppm NA 50.04 NA Removed NO Conc: ppm Removed cyl Expiry:

NOX gas Diff: NO gas Diff:

NH3 Cal Gas Conc: 72.93 NH3 Gas Cylinder #: CC281298 ppm

NH3 Cal Gas Expiry: February 28, 2023

Removed NH3 Conc: 72.93 Removed Cylinder #: ppm Removed cyl Expiry: NA

NH3 gas Diff:

Calibrator Model: Teledyne API T700 ZAG make/model:

Serial Number: 3565 Teledyne API T701 Serial Number: 5609

#### **Analyzer Information**

Analyzer model: Teledyne API T201 Analyzer serial #: 475 Converter model: Teledyne API T501 Converter serial #: 824 Reaction cell Press: 5.00 NH3 Range (ppb): 0 - 2000 ppb NOX Range (ppb): 0 - 1000 ppb Sample Flow: 511

**Start Finish Start Finish** NO coefficient: 0.986 TN coefficient: 0.984 NOX coefficient: 0.986 NO bkgrnd: -3.0 NO2 coefficient: 1.000 NOX bkgrnd: -2.5 NH3 coefficient: 0.941 TN bkgrnd: 1.4

#### **Calibration Statistics**

Start **Finish** NO<sub>x</sub> Cal Slope: 0.998848 NO<sub>x</sub> Cal Offset: -0.520000 NO Cal Slope: 0.998730 NO Cal Offset: -1.160000 NO<sub>2</sub> Cal Slope: 0.999748 NO<sub>2</sub> Cal Offset: 0.471532 NH3 Cal Slope: 0.998065 NH3 Cal Offset: -0.656397 TN Cal Slope: 1.001095 TN Cal Offset: -0.131851



# **TN - NOX - NH<sub>3</sub> Calibration Report**

Version-05-2023

#### **Dilution Calibration Data**

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated TN concentration (ppb) (Cc)	Calculated NOX concentration (ppb) (Cc)	Calculated NH3 concentration (ppb) (Cc)	Indicated TN concentration (ppb) (Ic)	Indicated NOX concentration (ppb) (Ic)	Indicated NH3 concentration (ppb) (Ic)	TN Correction factor (Cc/Ic) Limit = 0.95-1.05	NH3 Correction factor (Cc/Ic) Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.0	0.0	0.2	0.3	-0.1		
as found NO	4920	80.0	813.4	813.4		812.3	812.4	-0.2	1.001	
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.3	-0.1		
high NO point	4920	80.0	813.4	813.4		812.3	812.4	-0.2	1.001	
NO/O3 point	4920	80.0	813.4	813.4		808.0	808.0	-0.5	1.007	
as found NH3	3413	86.4	1800.6		1800.6	1804.7		1798.9	0.998	1.001
new NH3 cyl rp										
first NH3	3413	86.4	1800.6		1800.6	1804.7		1798.9	0.998	1.001
second NH3	3452	48.0	1000.2		1000.2	995.7		991.9	1.005	1.008
third NH3	3476	24.0	500.1		500.1	503.4		501.2	0.993	0.998
	•	•	•		•		Average Co	rrection Factor	1.0041	1.0024

Corrected As found TN = 812.1 ppb NO<sub>X</sub> = 812.1 ppb NH3 = 1799.0 ppb Previous Response TN = NA ppb NO<sub>X</sub> = NA ppb NH3 = NA ppb

\*Percent Change

TN = NA

\*Percent Change

 $NO_X = NA$ 

\*Percent Change

NH3 = NA

\* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency =

NH3 Current Converter Efficiency = 94.1%



# NO<sub>X</sub> - NO - NO<sub>2</sub> Calibration Report

Version-05-2023

D:	1	Cali	bration	Data
IJ	lution	can	pration	Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) Limit = 0.95-1.05	NO Correction factor (Cc/Ic) Limit = 0.95-1.05
as found zero										
as found span										
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.3	0.3	0.2		
high point	4920	80.0	813.4	800.6	813.4	812.4	799.5	812.3	1.0013	1.0014
second point	4960	40.0	406.7	400.3	406.7	405.3	397.0	404.8	1.0035	1.0084
third point	4980	20.0	203.4	200.2	203.4	201.8	197.9	201.7	1.0077	1.0114
							Average C	Correction Factor	1.0042	1.0071
Baseline Corr As	s fnd TN =	NA ppb	NO <sub>X</sub> = NA	ppb NO =	NA ppb			*Percent Change	e TN=	NA
Previous Respo	nse TN =	NA ppb	$NO_X = NA$	ppb NO =	NA ppb			*Percent Change	e NO <sub>x</sub> =	NA
								*Percent Change	e NO =	NA
								* = > +/-5% change i	nitiates investigati	on

#### **GPT Calibration Data**

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) Calibration Limit = 0.95-1.05 As Found Limit = 0.90-1.10	Converter Efficiency Calibration Limit = 96-104%
as found zero						
calibration zero			0.0	0.1		
1st GPT point (400 ppb O3)	795.3	395.2	412.9	413.0	0.9998	100.0%
2nd GPT point (200 ppb O3)	795.3	595.7	212.4	213.2	0.9962	100.4%
3rd GPT point (100 ppb O3)	795.3	693.9	114.2	114.9	0.9939	100.6%
				Average Correction Factor	0.9966	100.3%

Installing a new NH3 analyzer. Adjusted both zero and span. Used the 2nd GPT reference point due to drift. Adjusted the NH3 span. Notes:

Calibration Performed By: Rene Chamberland



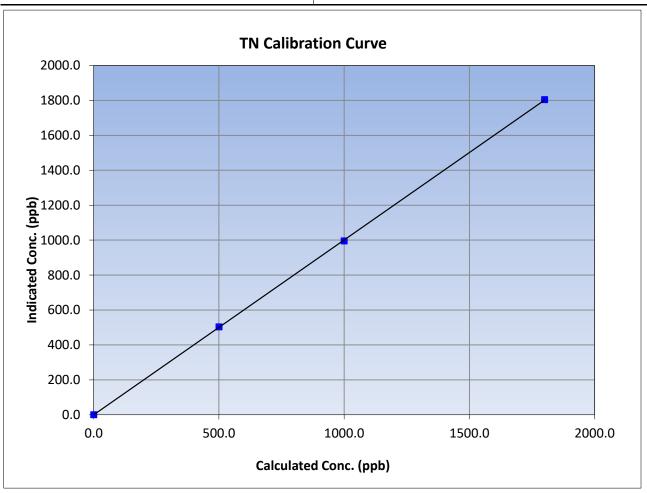
# **TN Calibration Summary**

Version-05-2023

#### **Station Information**

Calibration Date: May 30, 2023 Previous Calibration: May 23, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 10:03 End Time (MST): 14:20 Analyzer make: Teledyne API T201 Analyzer serial #: 475

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>	
0.0	0.2		Correlation Coefficient	0.999976	≥0.995	
1800.6	1804.7	0.9977	Correlation Coefficient	0.999970	20.555	
1000.2	995.7	1.0045	Slope	1.001095	0.90 - 1.10	
500.1	503.4	0.9934	Slope	1.001095	0.90 - 1.10	
			Intercept	-0.131851	+/-20	





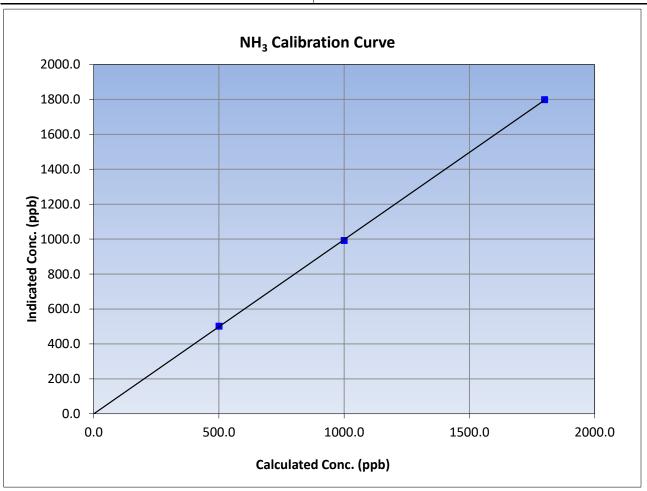
## NH<sub>3</sub> Calibration Summary

Version-05-2023

#### **Station Information**

Calibration Date: May 30, 2023 Previous Calibration: May 23, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 10:03 End Time (MST): 14:20 Analyzer serial #: Analyzer make: Teledyne API T201 475

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>	
0.0	-0.1		Correlation Coefficient	0.999974	≥0.995	
1800.6	1798.9	1.0010	Correlation Coefficient	0.55574	20.555	
1000.2	991.9	1.0084	Slope	0.998065	0.90 - 1.10	
500.1	501.2	0.9978	Slope	0.996005	0.90 - 1.10	
			Intercept	-0.656397	+/-20	





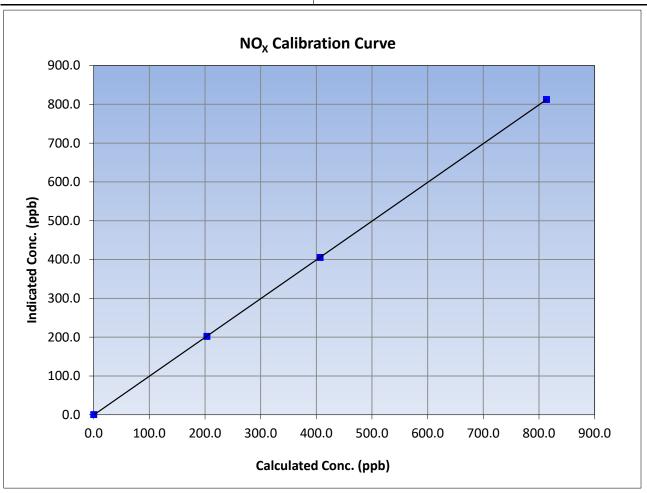
# NO<sub>x</sub> Calibration Summary

Version-05-2023

#### **Station Information**

Calibration Date: May 30, 2023 Previous Calibration: May 23, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 10:03 End Time (MST): 14:20 Analyzer serial #: Analyzer make: Teledyne API T201 475

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.3		Correlation Coefficient	0.999995	≥0.995
813.4	812.4	1.0013	Correlation Coefficient	0.99999	20.333
406.7	405.3	1.0035	Slope	0.998848	0.90 - 1.10
203.4	201.8	1.0077	Slope	0.336646	0.90 - 1.10
			Intercept	-0.520000	+/-20





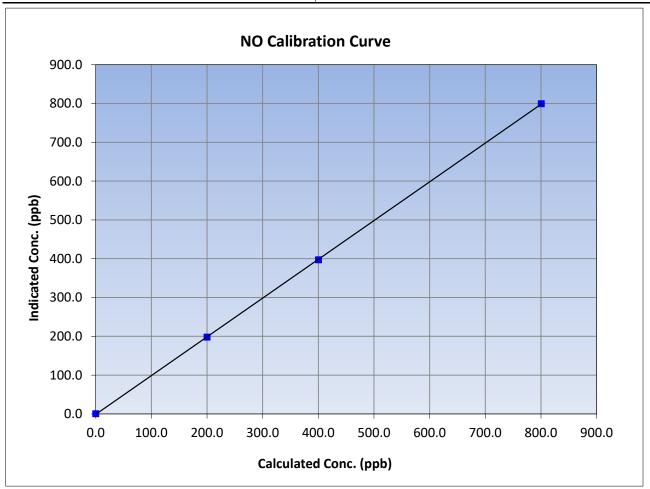
### **NO Calibration Summary**

Version-05-2023

#### **Station Information**

Calibration Date: May 30, 2023 Previous Calibration: May 23, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 10:03 End Time (MST): 14:20 Analyzer make: Teledyne API T201 Analyzer serial #: 475

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	tion factor (Cc/Ic) Statistical Evaluation		<u>Limits</u>	
0.0	0.3		Correlation Coefficient	0.999981	≥0.995	
800.6	799.5	1.0014	Correlation Coefficient	0.555501	20.555	
400.3	397.0	1.0084	Slope	0.998730	0.90 - 1.10	
200.2	197.9	1.0114	Slope	0.996730	0.90 - 1.10	
			Intercept	-1.160000	+/-20	





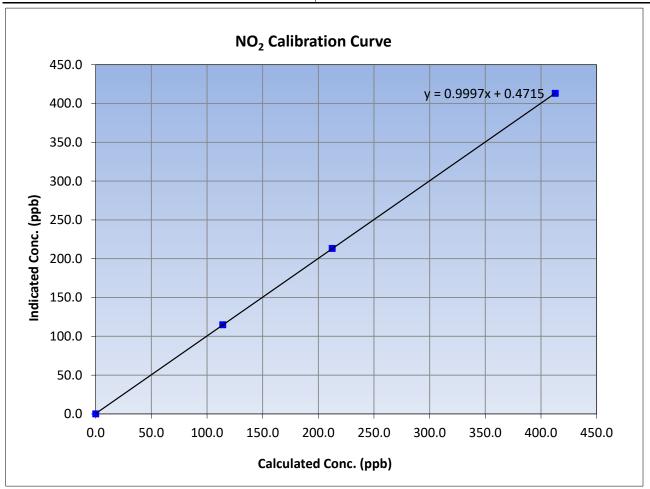
## NO<sub>2</sub> Calibration Summary

Version-05-2023

#### **Station Information**

Calibration Date: May 30, 2023 Previous Calibration: May 23, 2023 Station Name: Bertha Ganter-Fort McKay Station Number: AMS01 Start Time (MST): 10:03 End Time (MST): 14:20 Analyzer serial #: Analyzer make: Teledyne API T201 475

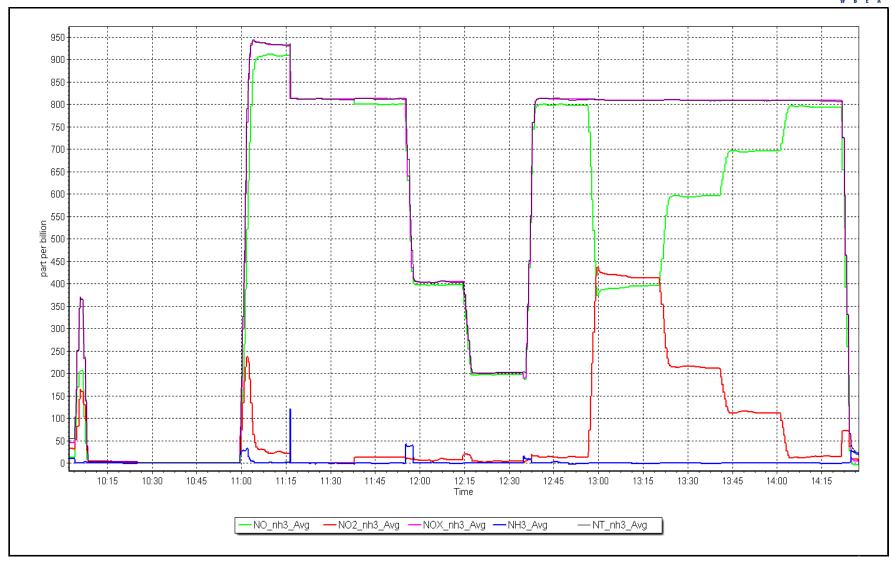
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999995	≥0.995
412.9	413.0	0.9998	Correlation Coefficient	0.99999	20.333
212.4	213.2	0.9962	Slope	0.999748	0.90 - 1.10
114.2	114.9	0.9939	Slope	0.999746	0.90 - 1.10
	114.2		Intercept	0.471532	+/-20



NO<sub>X</sub> Calibration Plot

Date: May 30, 2023

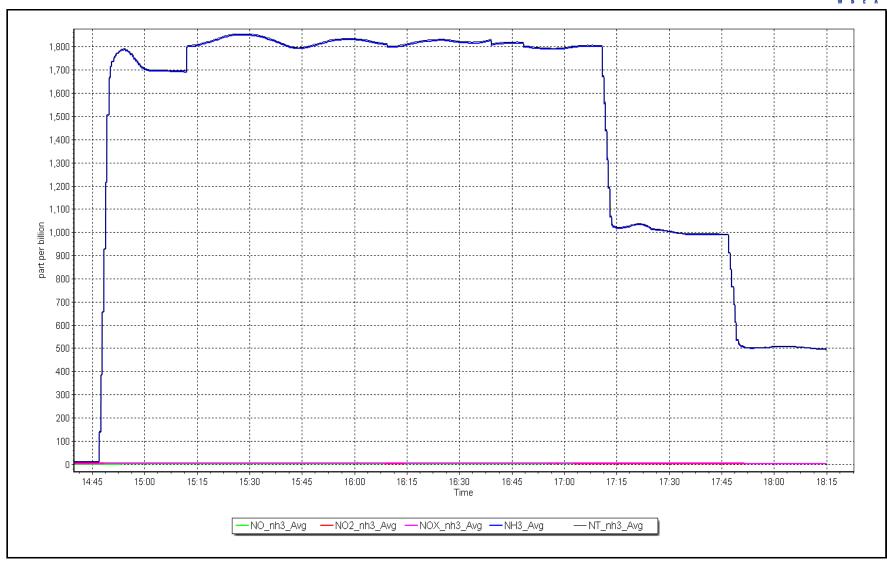




NH<sub>3</sub> Calibration Plot

Date: May 30, 2023







# **CO Calibration Report**

Version-01-2020

#### **Station Information**

Station Name: Bertha Ganter-Fort McKay Station number: AMS01
Calibration Date: May 11, 2023 Last Cal Date: April 20, 2023

Start time (MST): 9:51 End time (MST): 13:19

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 #: 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 Finish Start Calibration slope: 1.001765 0.999480 Backgd or Offset: -0.012 -0.012 Calibration intercept: Coeff or Slope: 0.992 0.992 0.123811 0.161861

#### **CO Calibration Data** Calculated Correction factor Dilution air flow rate Source gas flow rate Indicated concentration Set Point concentration (ppm) (Cc/Ic) (sccm) (sccm) (ppm) (Ic) (Cc) Limit = 0.95-1.050.0 as found zero 5000 0.0 0.1 4933 66.7 40.6 41.2 0.983 as found span as found 2nd point as found 3rd point new cylinder response calibrator zero 0.0 5000 0.0 0.0 ---high point 4933 66.7 40.6 40.5 1.000 second point 4966 33.3 20.2 20.7 0.977 third point 4983 16.7 10.2 10.3 0.986 0.0 0.0 0.0 as left zero 5000 ---as left span 2960 40.0 40.5 40.3 1.007 Average Correction Factor 0.988 Baseline Corr As found: 41.12 Prev response: 40.75 \*% change: 0.9% Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept: Baseline Corr 3rd AF pt: AF Correlation: NA

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

Calibration Performed By: Rene Chamberland

\* = > +/-5% change initiates investigation



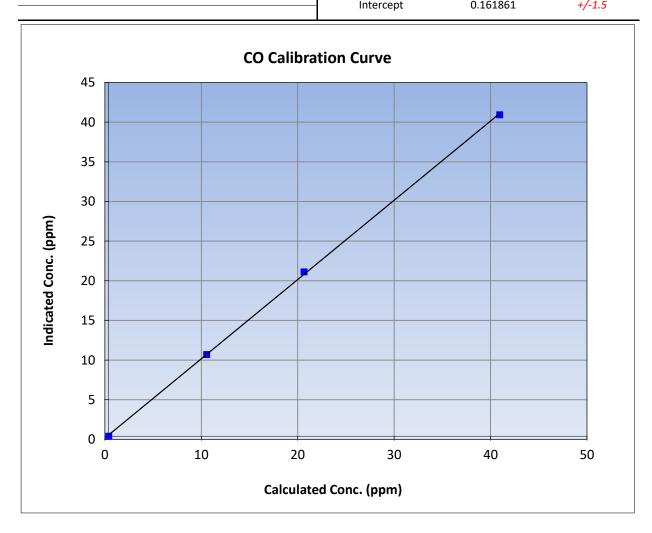
# **CO Calibration Summary**

Version-01-2020

#### **Station Information**

Calibration Date: May 11, 2023 **Previous Calibration:** April 20, 2023 Station Name: Station Number: AMS01 Bertha Ganter-Fort McKay Start Time (MST): 9:51 End Time (MST): 13:19 Analyzer make: Teledyne API T300 Analyzer serial #: 3520

	Calibration Data									
Calculated concentration Indicated concentration (ppm) (Ic) (Cc/Ic) Statistical Evaluation Limits										
0.0	0.0		Correlation Coefficient	0.999833	≥0.995					
40.6	40.5	1.0004	Correlation Coefficient	0.999633	20.993					
20.2	20.7	0.9773	Slone	0.999480	0.90 - 1.10					
10.2	10.3	0.9858	Slope	0.555480	0.90 - 1.10					
			Intercent	0 161961	<b>4/15</b>					

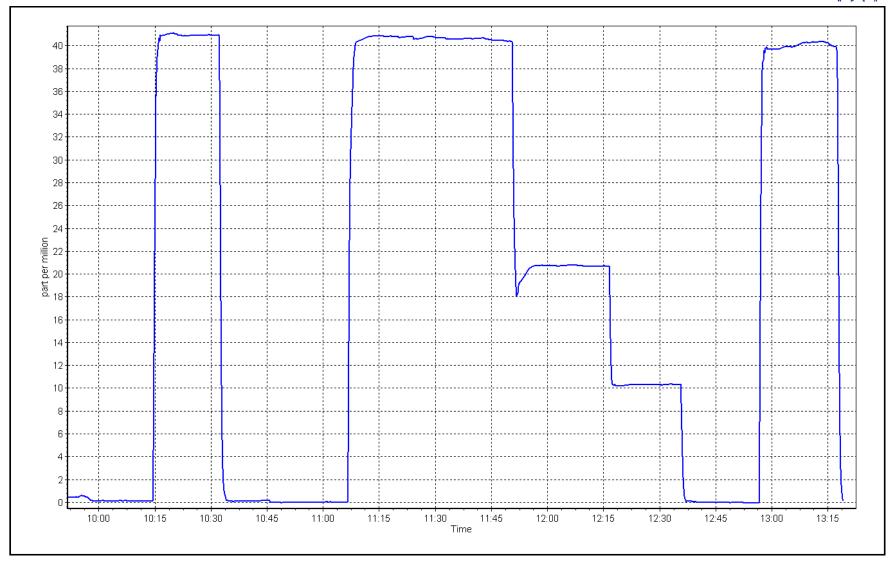


**CO Calibration Plot** 

Date:

May 11, 2023







# CO<sub>2</sub> Calibration Report

Version-01-2020

#### **Station Information**

Station Name: Bertha Ganter-Fort McKay

Calibration Date:

Start time (MST): Reason:

May 12, 2023

9:39 Routine Station number: AMS01

April 19, 2023 Last Cal Date:

End time (MST): 12:40

#### **Calibration Standards**

Cal Gas Concentration: December 1, 2028 60,200 ppm Cal Gas Exp Date:

Cal Gas Cylinder #: ALM042207

Removed Cal Gas Conc: 60,200 Rem Gas Exp Date: NA ppm Removed Gas Cyl #: Diff between cyl: <u>NA</u>

Teledyne API T700 Calibrator Make/Model: 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: 1.000116 1.002095 Backgd or Offset: 0.037 0.037 Calibration intercept: -5.740000 -6.580000 Coeff or Slope: 0.880 0.880

#### CO<sub>2</sub> Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)  Limit = 0.95-1.05
as found zero	3000	0.0	0.0	-0.7	
as found span	2920	80.0	1605.3	1597.0	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	-0.3	
high point	2920	80.0	1605.3	1604.5	1.001
second point	2960	40.0	802.7	796.9	1.007
third point	2980	20.0	401.3	387.8	1.035
as left zero	3000	0.0	0.0	-0.5	
as left span	2960	40.0	802.7	780.8	1.028
		_	Avera	ge Correction Factor	1.014

Baseline Corr As found: 1597.70 Prev response: 1599.78 \*% change: -0.1%

Baseline Corr 2nd AF pt: AF Slope: NA AF Intercept:

Baseline Corr 3rd AF pt: AF Correlation: NA \* = > +/-5% change initiates investigation

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

Calibration Performed By: Rene Chamberland



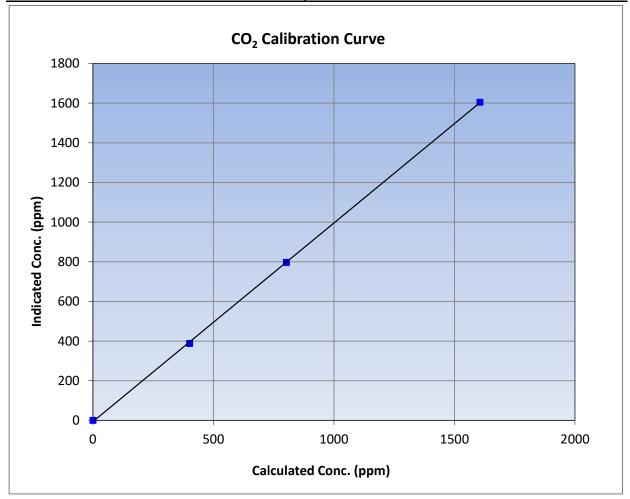
# CO<sub>2</sub> Calibration Summary

Version-01-2020

#### **Station Information**

Calibration Date	May 12, 2023	Previous Calibration	April 19, 2023
Station Name	Bertha Ganter-Fort McKay	Station Number	AMS01
Start Time (MST)	9:39	End Time (MST)	12:40
Analyzer make	Teledyne API 360	Analyzer serial #	442

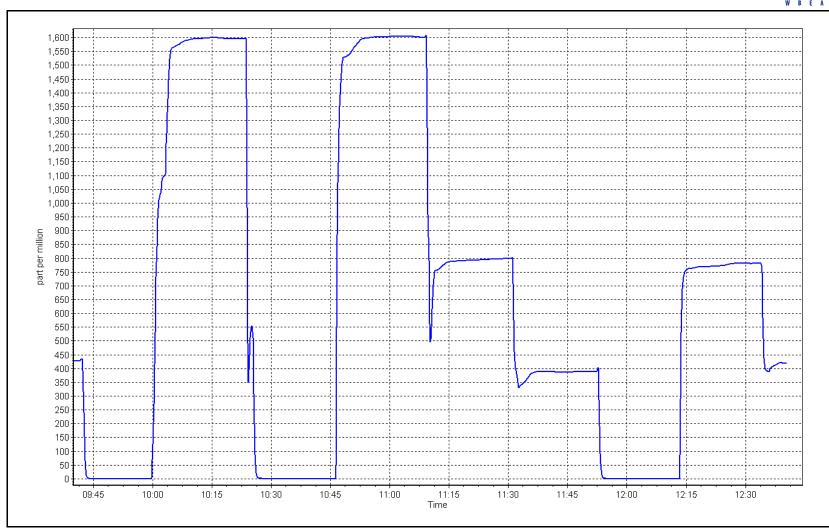
	Calibration Data								
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>				
0.0	-0.3		Correlation Coefficient	0.999925	≥0.995				
1605.3	1604.5	1.0005	Correlation Coefficient	0.555525	20.333				
802.7	796.9	1.0072	Slope	1.002095	0.90 - 1.10				
401.3	387.8	1.0349	Siope	1.002093	0.90 - 1.10				
			Intercept	-6.580000	+/-10				



CO<sub>2</sub> Calibration Plot

Date: May 12, 2023







### WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

### AMS02 MILDRED LAKE MAY 2023

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

June 30, 2023



# **SO<sub>2</sub> Calibration Report**

Version-01-2020

#### **Station Information**

Station Name: Mildred Lake Calibration Date: May 11, 2023 Start time (MST): 9:11 AM Routine Reason:

Station number: AMS02 April 13, 2023

Last Cal Date: End time (MST): 12:31

**Calibration Standards** 

Cal Gas Concentration: 49.98

Cal Gas Cylinder #: CC501209

Removed Cal Gas Conc: 49.98 Removed Gas Cyl #: NA

Calibrator Make/Model: **API T700** ZAG Make/Model: **API T701**  ppm Cal Gas Exp Date: August 12, 2024

Rem Gas Exp Date: NA

Diff between cyl:

Serial Number: 1185 Serial Number: 5608

**Analyzer Information** 

Analyzer make: Thermo 43i Analyzer serial #: JC1404901075

ppm

Analyzer Range 0 - 1000 ppb

**Finish** Start Calibration slope: 0.999874 1.000972 Backgd or Offset: Calibration intercept: -0.805548 -1.065310 Coeff or Slope:

Start 18.3 0.805 **Finish** 17.9 0.793

#### SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow rate	Source gas flow rate	Calculated	Indicated concentration (	Correction factor (Cc/Ic)
Set Point	(sccm)	(sccm)	concentration (ppb) (Cc)	(ppb) (Ic)	<i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	-0.2	
as found span	4920	80.2	801.6	813.6	0.985
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	801.9	1.000
second point	4960	40.1	400.8	399.7	1.003
third point	4980	20.0	199.9	197.8	1.011
as left zero	5000	0.0	0.0	0.0	
as left span	4920	80.2	801.6	801.6	1.000
			Averag	ge Correction Factor	1.004
			_	•	

Baseline Corr As found: 813.80 Previous response 800.74 1.6% \*% change Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept: NA AF Correlation: Baseline Corr 3rd AF pt:

\* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala



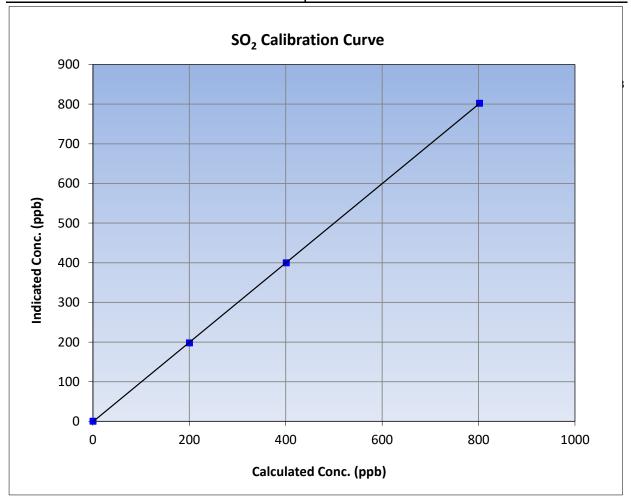
# **SO<sub>2</sub> Calibration Summary**

Version-01-2020

#### **Station Information**

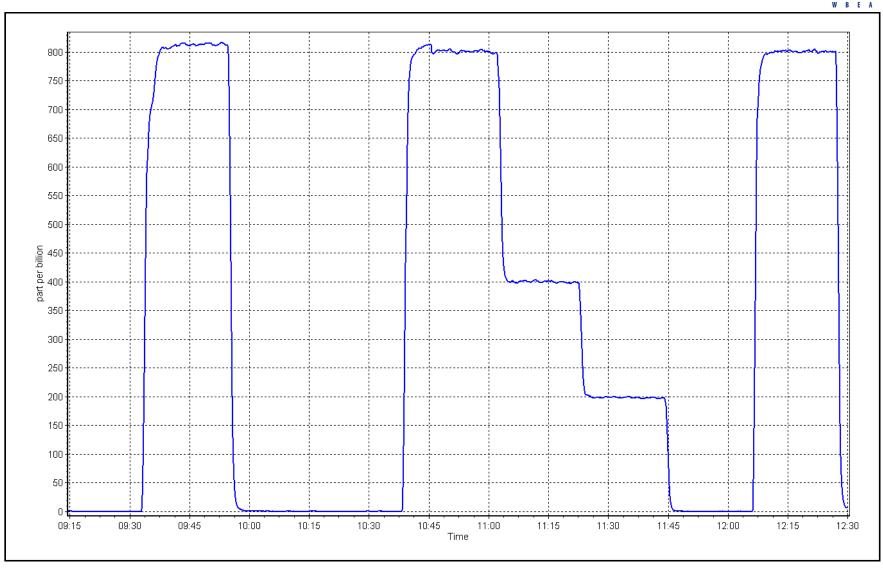
Calibration Date: May 11, 2023 **Previous Calibration:** April 13, 2023 Station Name: Mildred Lake Station Number: AMS02 Start Time (MST): 9:11 End Time (MST): 12:31 Analyzer make: Thermo 43i Analyzer serial #: JC1404901075

Calibration Data					
Calculated concentration Indicated concentration (ppb) (Cc) (ppb) (Ic)		Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999990	≥0.995
801.6	801.9	0.9997	Correlation coefficient		
400.8	399.7	1.0028	Clans	1.000972	0.90 - 1.10
199.9	197.8	1.0107	Slope	1.000972	0.90 - 1.10
			Intercept	-1.065310	+/-30



SO2 Calibration Plot Date: May 11, 2023 Location: Mildred Lake







### H<sub>2</sub>S Calibration Report

Version-11-2021

**Station Information** 

Station Name: Mildred Lake
Calibration Date: May 3, 2023
Start time (MST): 8:51
Reason: Routine

Station number: AMS02 Last Cal Date: April 5, 2023 End time (MST): 13:08

**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

**Finish Start** <u>Finish</u> <u>Start</u> 1.006965 Backgd or Offset: Calibration slope: 1.015395 1.75 1.80 Calibration intercept: -0.059190 -0.239199 Coeff or Slope: 0.833 0.823

H<sub>2</sub>S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) Limit = 0.90-1.10
as found zero	5000	0.0	0.0	0.1	
as found span	4924	75.6	80.0	80.0	1.001
as found 2nd point	4962	37.8	40.0	39.9	1.005
as found 3rd point	4981	18.9	20.0	19.6	1.025
new cylinder response					

#### H<sub>2</sub>S Calibration Data

Set Point	Dilution air flow 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	40.0	1.000
third point	4981	18.9	20.0	19.6	1.020
as left zero	5000	0.0	0.0	0.0	
as left span	4924	75.6	80.0	80.0	1.000
SO2 Scrubber Check				0.0	
Date of last scrubber chang	ge:	12-Sep-22		Ave Corr Factor	1.005

	Date of last scrubber change:	12-Sep-22	Ave Corr Factor	1.005
Date of last converter efficiency test:				efficiency

Baseline Corr As found: 79.9 Prev response: 81.16 \*% change: -1.6% Baseline Corr 2nd AF pt: 39.8 AF Slope: 1.000679 AF Intercept: -0.119203 Baseline Corr 3rd AF pt: 0.999961 19.5 AF Correlation: \* = > +/-5% change initiates investigation

Notes: Changed the inlet filter after MPAF's. Ran a SO2 scrubber check after calibrator zero and passed.

Adjusted span only.

Calibration Performed By: Sean Bala



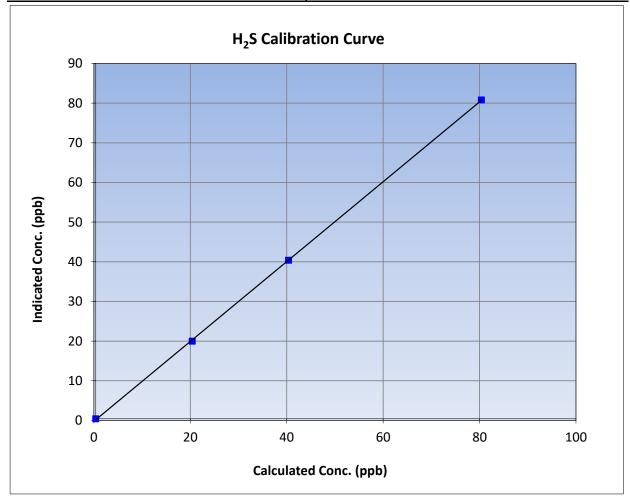
# H<sub>2</sub>S Calibration Summary

Version-11-2021

#### **Station Information**

Calibration Date: May 3, 2023 **Previous Calibration:** April 5, 2023 Station Name: Mildred Lake Station Number: AMS02 Start Time (MST): 8:51 End Time (MST): 13:08 Analyzer make: Thermo 43iQTL Analyzer serial #: 12113311966

Calibration Data						
Calculated concentration Indicated concentration (ppb) (Cc) (ppb) (Ic)		Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>	
0.0	0.0		Correlation Coefficient	0.999956	≥0.995	
80.0	80.4	0.9949	Correlation coefficient	0.555550	20.993	
40.0	40.0	0.9998	Slope	1.006965	0.90 - 1.10	
20.0	19.6	1.0202	Slope	1.000903	0.90 - 1.10	
			- Intercept	-0.239199	+/-3	

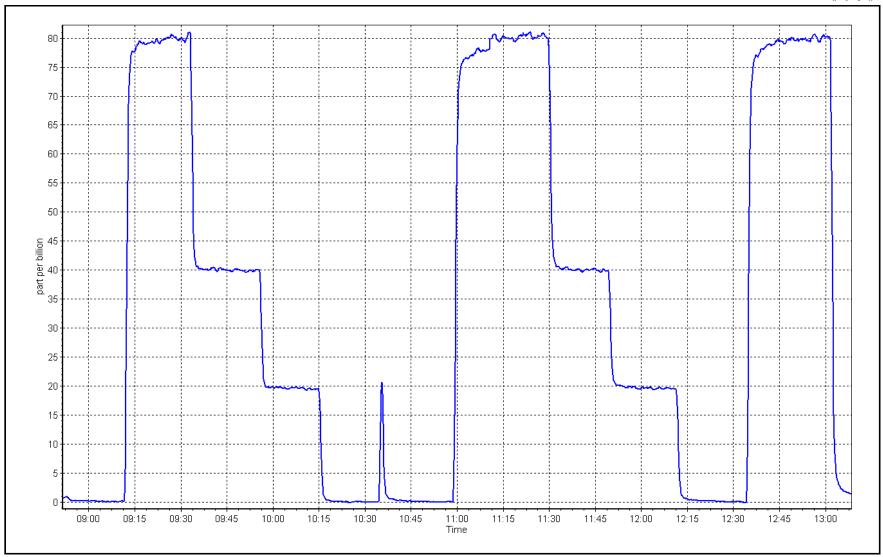


H<sub>2</sub>S Calibration Plot

Date: May 3, 2023

Location: Mildred Lake







## THC / CH<sub>4</sub> / NMHC Calibration Report

Removed Gas Expiry:

Version-06-2022

### **Station Information**

Station Name: Mildred Lake
Calibration Date: May 11, 2023
Statt time (MST)

Start time (MST): 9:11
Reason: Routine

Station number: AMS02 Last Cal Date: April 13, 2023

End time (MST): 12:31

**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 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<sub>4</sub>): Diff between cyl (NM):

Calibrator Model: Teledyne API T700 Serial Number: 1185 ZAG make/model: Teledyne API T701 Serial Number: 5608

### **Analyzer Information**

Analyzer make: Thermo 55i

THC Range (ppm): 0 - 20 ppm NMHC Range (ppm): 0 - 10 ppm

CH4 Range (ppm): 0 - 10 ppm

Analyzer serial #: 1180320038

Finish Finish Start Start CH4 SP Ratio: 2.86E-04 2.90E-04 NMHC SP Ratio: 4.49E-04 4.54E-04 CH4 Retention time: 14.6 14.6 NMHC Peak Area: 195861 194026 Zero Chromatogram: ON ON Flat Baseline: OFF OFF

### **THC Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (0	Cc) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.2	16.82	16.60	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	16.82	16.82	1.000
second point	4960	40.1	8.41	8.38	1.003
third point	4980	20.0	4.19	4.17	1.005
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.2	16.82	16.83	0.999
			A	Average Correction Factor	1.003
Baseline Corr AF:	16.60	Prev response	16.81	*% change	-1.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	tes investigation



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-06-2022

					10.5.000 2
		NMHC Calibr	ration Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.2	8.80	8.72	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	8.80	8.80	1.000
second point	4960	40.1	4.40	4.40	0.999
third point	4980	20.0	2.19	2.20	0.995
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.2	8.80	8.83	0.996
				rage Correction Factor	0.998
Baseline Corr AF:	8.72	Prev response	8.80	*% change	-0.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
as found zero	5000	Source gas flow rate 0.0	Calc conc (ppm) (Cc) 0.00	Ind conc (ppm) (Ic) 0.00	
as found span	4920	80.2	8.02	7.88	1.018
as found 2nd point	.525		0.02		
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	1.007
third point	4980	20.0	2.00	1.97	1.016
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.2	8.02	8.01	1.002
			Ave	rage Correction Factor	1.008
Baseline Corr AF:	7.88	Prev response	8.01	*% change	-1.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
		Calibration	Statistics		
		<u>Start</u>		<u>Finish</u>	
THC Cal Slope:		1.000482		1.000257	
THC Cal Offset:		-0.015912		-0.013510	

1.001482

-0.021253

0.999608

0.004941

Notes:

CH4 Cal Slope:

CH4 Cal Offset:

NMHC Cal Slope:

NMHC Cal Offset:

Changed inlet filter after as founds. Adjusted span.

1.000527

-0.017653

1.000102

0.004544

Calibration Performed By: Sean Bala



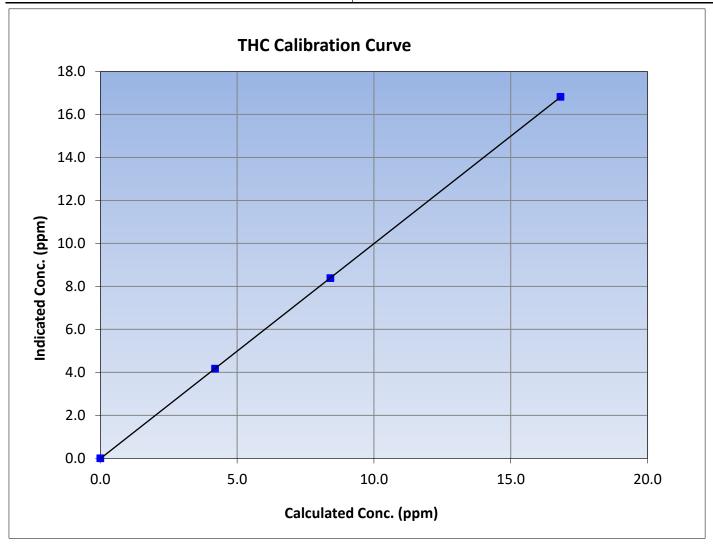
## **THC Calibration Summary**

Version-06-2022

### **Station Information**

**Previous Calibration:** Calibration Date: May 11, 2023 April 13, 2023 Station Name: Mildred Lake Station Number: AMS02 Start Time (MST): 9:11 End Time (MST): 12:31 Analyzer make: Thermo 55i Analyzer serial #: 1180320038

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999997	≥0.995
16.82	16.82	1.0000	Correlation Coefficient		20.993
8.41	8.38	1.0030	Slope	1.000257	0.90 - 1.10
4.19	4.17	1.0051	Slope	1.000237	0.90 - 1.10
			Intercept	-0.013510	+/-0.5





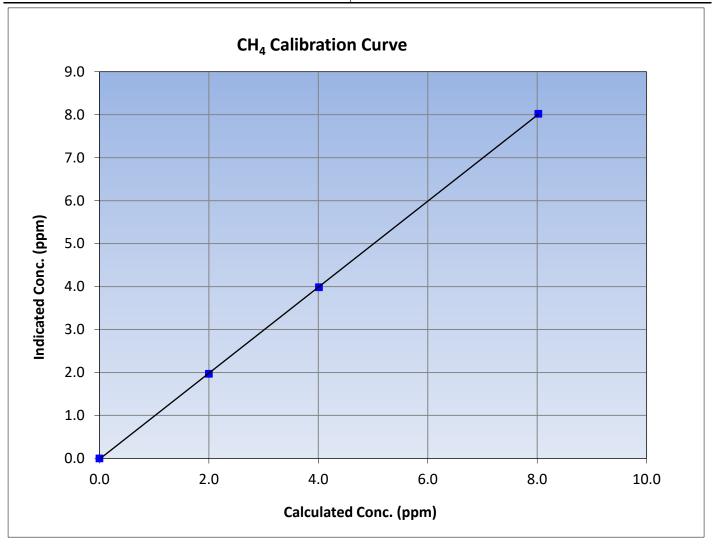
# **CH<sub>4</sub> Calibration Summary**

Version-06-2022

### **Station Information**

Calibration Date: May 11, 2023 **Previous Calibration:** April 13, 2023 Station Name: Mildred Lake Station Number: AMS02 Start Time (MST): 9:11 End Time (MST): 12:31 Analyzer make: Thermo 55i Analyzer serial #: 1180320038

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999977	≥0.995
8.02	8.02	1.0004	Correlation Coefficient		20.999
4.01	3.98	1.0074	Slope	1.000527	0.90 - 1.10
2.00	1.97	1.0156	Slope		0.90 - 1.10
			Intercept	-0.017653	+/-0.5





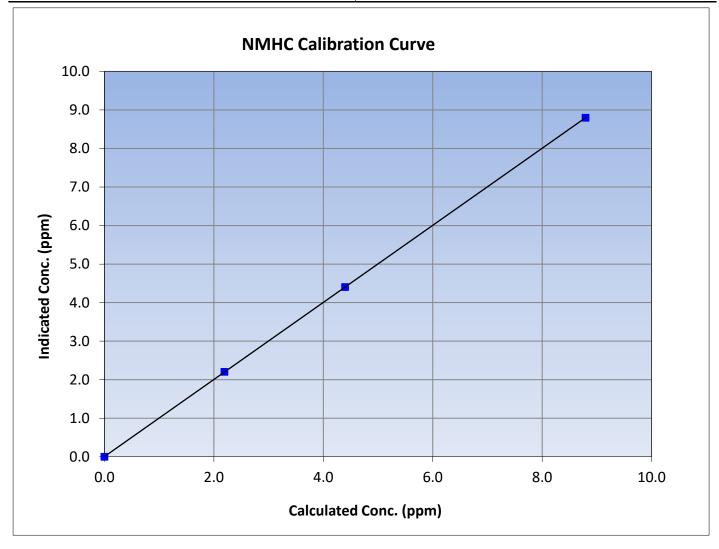
## **NMHC Calibration Summary**

Version-06-2022

### **Station Information**

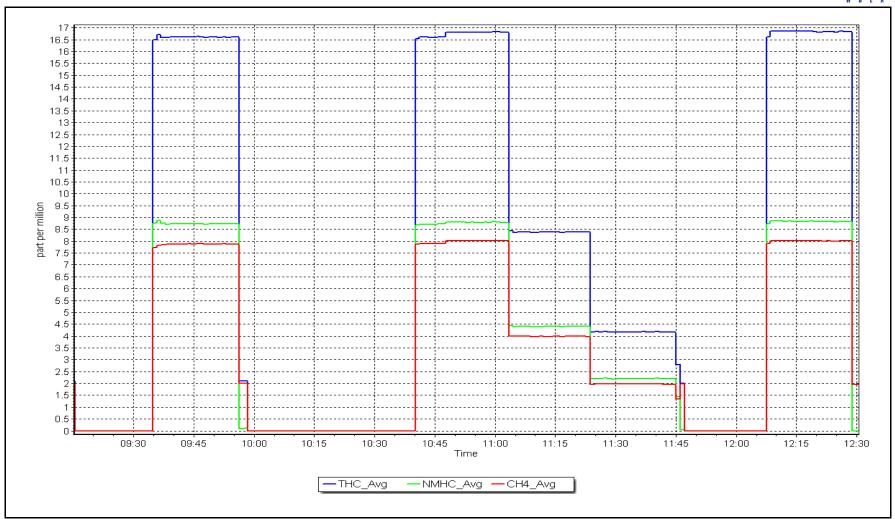
Calibration Date: May 11, 2023 **Previous Calibration:** April 13, 2023 Station Name: Mildred Lake Station Number: AMS02 Start Time (MST): 9:11 End Time (MST): 12:31 Analyzer make: Thermo 55i Analyzer serial #: 1180320038

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999999	≥0.995
8.80	8.80	0.9996	Correlation Coefficient		20.993
4.40	4.40	0.9988	Slope	1.000102	0.90 - 1.10
2.19	2.20	0.9952	Slope		0.30 - 1.10
			Intercept	0.004544	+/-0.5



NMHC Calibration Plot Date: May 11, 2023 Location: Mildred Lake







## THC / CH<sub>4</sub> / NMHC Calibration Report

Version-06-2022

### **Station Information**

Station Name: Mildred Lake Station number: AMS02
Calibration Date: May 30, 2023 Last Cal Date: May 11, 2023
Start time (MST): 10:00 End time (MST): 14:12

Reason: Maintenance troubleshoot elevated daily zero response

**Calibration Standards** 

Gas Cert Reference: CC501209 Cal Gas Expiry Date: August 12, 2024

CH4 Cal Gas Conc. 500.2 ppm CH4 Equiv Conc. 1048.6 ppm

C3H8 Cal Gas Conc. 199.4 ppm

Removed Gas Cert: NA Removed Gas Expiry:

Removed CH4 Conc. 500.2 ppm CH4 Equiv Conc. 1048.6 ppm

Removed C3H8 Conc. 199.4 ppm Diff between cyl (THC): Diff between cyl (CH $_4$ ): Diff between cyl (NM):

Calibrator Model: Teledyne API T700 Serial Number: 1185

ZAG make/model: Teledyne API 1700 Serial Number: 1185
Serial Number: 5608

### **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

Finish Finish Start Start CH4 SP Ratio: 2.86E-04 2.90E-04 NMHC SP Ratio: 4.49E-04 4.54E-04 CH4 Retention time: 14.6 14.6 NMHC Peak Area: 195861 194026 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.20	
as found span	4920	80.2	16.82	16.70	1.007
as found 2nd point	4960	40.1	8.41	8.44	0.996
as found 3rd point	4980	20.0	4.19	4.34	0.967
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4920	80.2	16.82	16.83	0.999
second point	4960	40.1	8.41	8.39	1.003
third point	4980	20.0	4.19	4.18	1.003
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.2	16.82	16.99	0.990
			Av	verage Correction Factor	1.002
Baseline Corr AF:	16.50	Prev response	16.81	*% change	-1.9%
Baseline Corr 2nd AF:	8.2	AF Slope:	0.980546	AF Intercept:	0.205223
Baseline Corr 3rd AF:	4.1	AF Correlation:	0.999997	* = > +/-5% change initiat	es investigation



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data							
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Co	c) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>		
as found zero	5000	0.0	0.00	0.00			
as found span	4920	80.2	8.80	8.62	1.020		
as found 2nd point	4960	40.1	4.40	4.32	1.019		
as found 3rd point	4980	20.0	2.19	2.16	1.015		
new cylinder response							
calibrator zero	5000	0.0	0.00	0.00			
high point	4920	80.2	8.80	8.80	0.999		
second point	4960	40.1	4.40	4.41	0.998		
third point	4980	20.0	2.19	2.21	0.994		
as left zero	5000	0.0	0.00	0.00			
as left span	4920	80.2	8.80	8.92	0.986		
			Αν	verage Correction Factor	0.997		
Baseline Corr AF:	8.62	Prev response	8.80	*% change	-2.1%		
Baseline Corr 2nd AF:	4.3	AF Slope:	0.979653	AF Intercept:	0.005700		
Baseline Corr 3rd AF:	2.2	AF Correlation:	0.999998	* = > +/-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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.20	
as found span	4920	80.2	8.02	8.08	0.993
as found 2nd point	4960	40.1	4.01	4.13	0.971
as found 3rd point	4980	20.0	2.00	2.18	0.919
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4920	80.2	8.02	8.03	0.999
second point	4960	40.1	4.01	3.98	1.009
third point	4980	20.0	2.00	1.97	1.014
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.2	8.02	8.07	0.994
			Aver	age Correction Factor	1.007
Baseline Corr AF:	7.88	Prev response	8.01	*% change	-1.6%
Baseline Corr 2nd AF:	3.94	AF Slope:	0.981781	AF Intercept:	0.200123
Baseline Corr 3rd AF:	1.98	AF Correlation:	0.999992	* = > +/-5% change initiat	es investigation
		Calibration	Statistics		_
		<u>Start</u>		<u>Finish</u>	
THC Cal Slope:		1.000257		1.000855	
THC Cal Offset:		-0.013510		-0.012905	
CH4 Cal Slope:		1.000527		1.001225	
CH4 Cal Offset:		-0.017653		-0.018850	
NMHC Cal Slope:		1.000102		1.000634	
NMHC Cal Offset:		0.004544		0.005745	

Notes: Changed zero air generator after as founds to improve daily zero's, span adjustment performed.

Calibration Performed By: Kelly Baragar



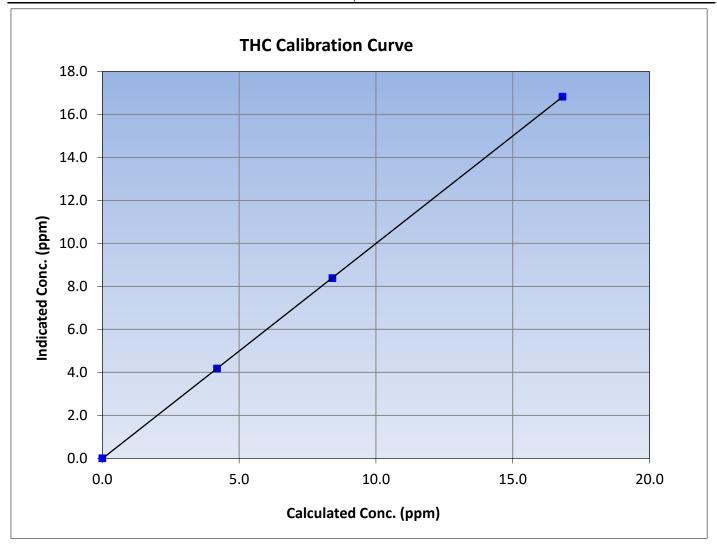
## **THC Calibration Summary**

Version-06-2022

### **Station Information**

May 30, 2023 **Previous Calibration:** Calibration Date: May 11, 2023 Station Name: Mildred Lake Station Number: AMS02 Start Time (MST): 10:00 End Time (MST): 14:12 Analyzer make: Thermo 55i Analyzer serial #: 1180320038

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999996	≥0.995
16.82	16.83	0.9993	Correlation Coemicient		20.333
8.41	8.39	1.0029	Slope	1.000855	0.90 - 1.10
4.19	4.18	1.0034	Slope	1.000655	0.90 - 1.10
			Intercept	-0.012905	+/-0.5





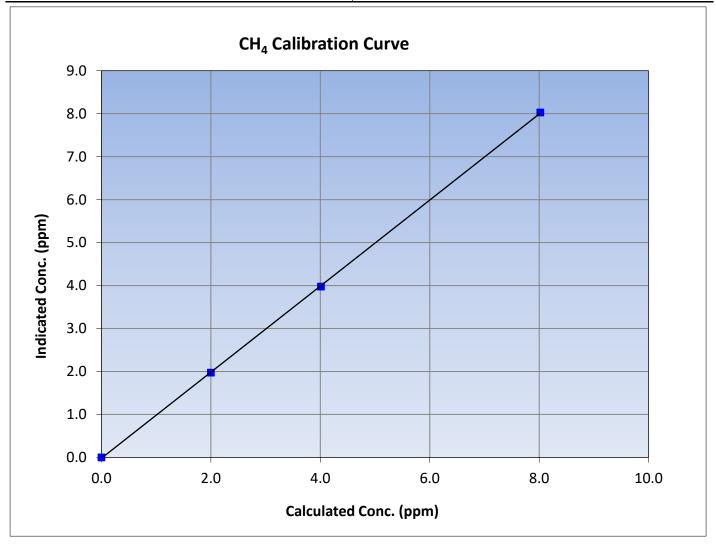
# **CH<sub>4</sub> Calibration Summary**

Version-06-2022

### **Station Information**

Calibration Date: May 30, 2023 **Previous Calibration:** May 11, 2023 Station Name: Mildred Lake Station Number: AMS02 Start Time (MST): 10:00 End Time (MST): 14:12 Analyzer make: Analyzer serial #: 1180320038 Thermo 55i

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999969	≥0.995
8.02	8.03	0.9995	Correlation Coefficient		20.993
4.01	3.98	1.0087	Slope	1.001225	0.90 - 1.10
2.00	1.97	1.0141	Slope		0.50 - 1.10
			Intercept	-0.018850	+/-0.5





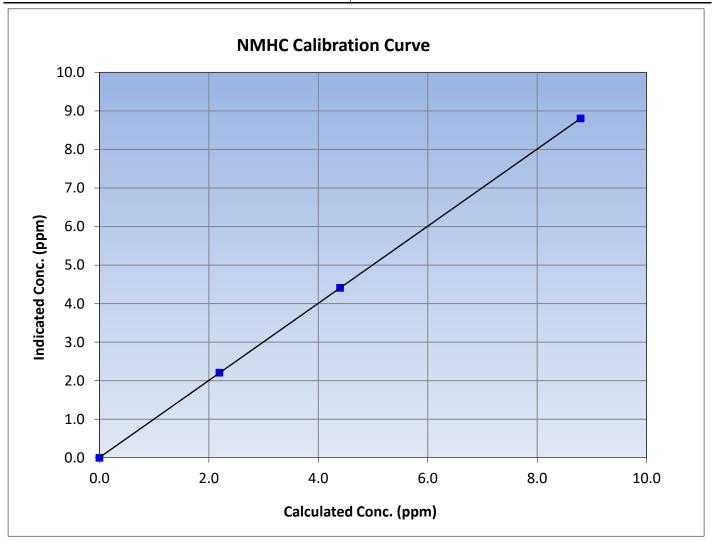
## **NMHC Calibration Summary**

Version-06-2022

### **Station Information**

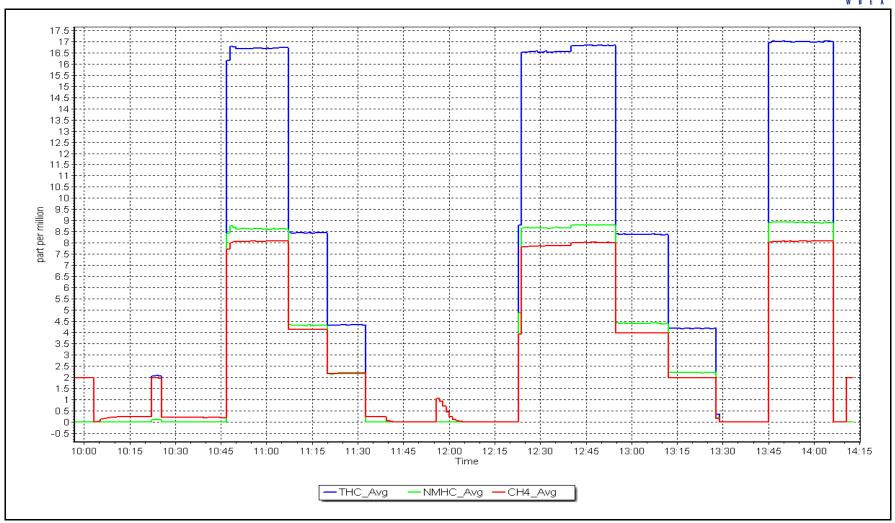
May 30, 2023 Calibration Date: **Previous Calibration:** May 11, 2023 Station Name: Mildred Lake Station Number: AMS02 Start Time (MST): 10:00 End Time (MST): 14:12 Analyzer make: Thermo 55i Analyzer serial #: 1180320038

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999998	≥0.995
8.80	8.80	0.9990	Correlation Coemicient	0.555556	20.333
4.40	4.41	0.9977	Slope	1.000634	0.90 - 1.10
2.19	2.21	0.9938	Slope	1.000034	0.90 - 1.10
			Intercept	0.005745	+/-0.5



NMHC Calibration Plot Date: May 30, 2023 Location: Mildred Lake







### WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

### AMS04 BUFFALO VIEWPOINT MAY 2023

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

June 30, 2023







## **SO<sub>2</sub> Calibration Report**

Version-01-2020

**Finish** 

22.1

#### **Station Information**

Station Name: **Buffalo Viewpoint** Calibration Date: May 4, 2023

8:35 Start time (MST): Routine Reason:

Station number: AMS04 April 13, 2023 Last Cal Date:

End time (MST): 11:18

**Calibration Standards** 

Cal Gas Concentration: 50.02

Cal Gas Cylinder #: CC470284

Removed Cal Gas Conc: 50.02 Removed Gas Cyl #: NA

Calibrator Make/Model: **API T700** ZAG Make/Model: **API T701**  ppm Cal Gas Exp Date: September 9, 2028

Rem Gas Exp Date: NA ppm

Diff between cyl:

Serial Number: 3808 Serial Number: 362

**Analyzer Information** 

Analyzer make: Thermo 43i Analyzer serial #: JC1327300932

Analyzer Range 0 - 1000 ppb

**Finish** Start Calibration slope: 1.003456 1.001885

Calibration intercept: -0.100000 0.000000 Start

Backgd or Offset: 22.1 0.869 Coeff or Slope: 0.869

### SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)		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	803.5	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.5	
high point	4920	80.0	800.3	802.9	0.997
second point	4960	40.0	400.2	402.6	0.994
third point	4980	20.0	200.1	199.4	1.003
as left zero	5000	0.0	0.0	0.2	
as left span	4920	80.0	800.3	803.8	0.996
			Averag	ge Correction Factor	0.998

Baseline Corr As found: 803.40 Previous response 801.73 \*% change 0.2% Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept:

NA AF Correlation: Baseline Corr 3rd AF pt:

Notes: no maintenance or adjustments done.

Calibration Performed By: Melissa Lemay \* = > +/-5% change initiates investigation



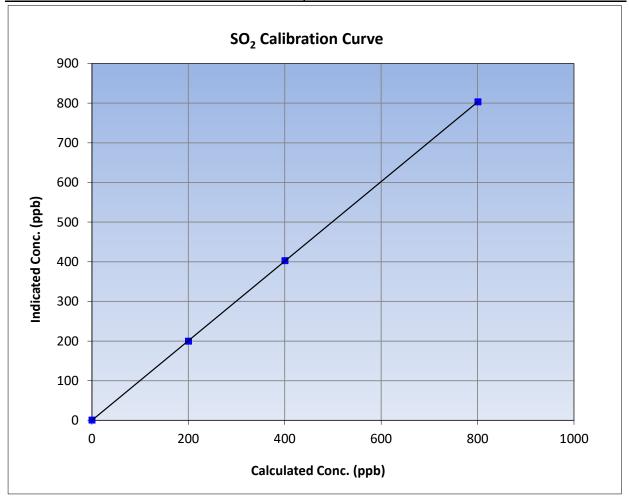
## **SO<sub>2</sub> Calibration Summary**

Version-01-2020

### **Station Information**

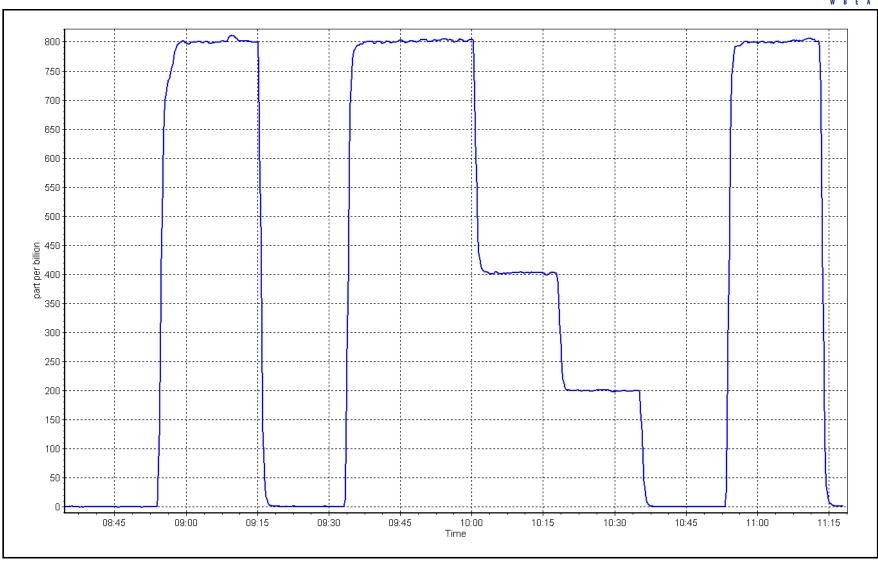
Calibration Date: May 4, 2023 **Previous Calibration:** April 13, 2023 Station Name: **Buffalo Viewpoint** Station Number: AMS04 Start Time (MST): 8:35 End Time (MST): 11:18 Analyzer make: Thermo 43i Analyzer serial #: JC1327300932

Calibration Data							
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>		
0.0	0.5		Correlation Coefficient	0.999991	≥0.995		
800.3	802.9	0.9968	Correlation Coefficient	0.555551	20.333		
400.2	402.6	0.9939	Slope	1.003456	0.90 - 1.10		
200.1	199.4	1.0034	Slope	1.003430	0.90 - 1.10		
			- Intercept	0.000000	+/-30		



SO2 Calibration Plot Date: May 4, 2023 Location: Buffalo Viewpoint







### H<sub>2</sub>S Calibration Report

Version-11-2021

<u>Finish</u>

**Station Information** 

Station Name: Buffalo Viewpoint
Calibration Date: May 16, 2023
Start time (MST): 6:03

Reason: Removal

Station number: AMS04 Last Cal Date: April 27, 2023

End time (MST): 7:30

Diff between cyl:

**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: January 4, 2025

Removed Gas Cyl #: CC345266

Calibrator Make/Model: API T700 Serial Number: 3808 ZAG Make/Model: API T701H Serial Number: 362

**Analyzer Information** 

Analyzer make: Thermo 450i Analyzer serial #: 1336160094

Converter make: NA Converter serial #: NA

Analyzer Range 0 - 100 ppb

<u>Start</u> <u>Finish</u> <u>Start</u>

Calibration slope:0.996073Backgd or Offset:19.019.0Calibration intercept:0.142229Coeff or Slope:1.0701.070

H<sub>2</sub>S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) Limit = 0.90-1.10
as found zero	5000	0.0	0.0	0.1	
as found span	4926	74.1	80.3	80.4	1.000
as found 2nd point	4963	37.0	40.1	40.5	0.993
as found 3rd point	4982	18.5	20.1	20.0	1.008
new cylinder response					

### H<sub>2</sub>S Calibration Data

Set Point	Dilution air flow 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: Baseline Corr 2nd AF pt:	80.3 40.4	Prev response: AF Slope:	80.15 1.000770	*% change: AF Intercept:	0.2% 0.102267
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999971	Ar intercept.	0.102267
•				* = > +/-5% change initiates	investigation

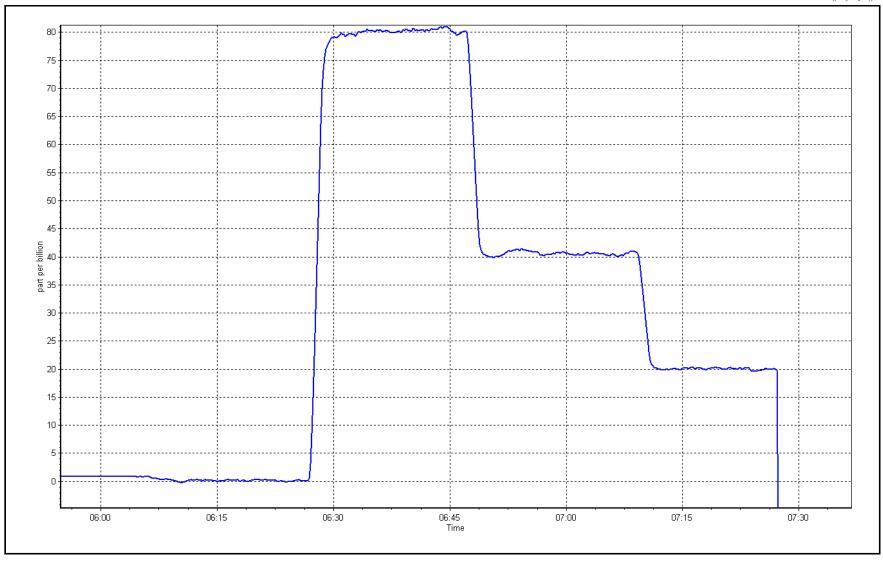
Notes: Removed Due to putting in a H2S external converter and trace level SO2 instead.

Calibration Performed By: Melissa Lemay

Date: May 16, 2023

Location: Buffalo Viewpoint







### H<sub>2</sub>S Calibration Report

Version-11-2021

**Station Information** 

Station Name: **Buffalo Viewpoint** 

Calibration Date: May 16, 2023

Start time (MST): 8:45 Reason: Install Station number: AMS04

Last Cal Date:

End time (MST): 11:25

**Calibration Standards** 

Cal Gas Exp Date: January 4, 2025 Cal Gas Concentration: 5.42 ppm

Cal Gas Cylinder #: CC345266

Removed Cal Gas Conc: Rem Gas Exp Date: January 4, 2025 5.42 ppm

CC345266 Removed Gas Cyl #: Diff between cyl:

Calibrator Make/Model: API T700 3808 Serial Number: ZAG Make/Model: **API T701H** Serial Number: 362

**Analyzer Information** 

Analyzer make: Thermo 43i-LTE Analyzer serial #: 1008841400

Global Converter serial #: 2022-200 Converter make:

Analyzer Range 0 - 100 ppb

> <u>Start</u> **Finish**

**Start** <u>Finish</u> 1.003759 Backgd or Offset: Calibration slope: 2.0 -0.177711 Coeff or Slope: 1.067 Calibration intercept:

H<sub>2</sub>S As Found Data

Baseline Adjusted Calculated Dilution air flow rate Source gas flow rate Indicated Correction factor concentration (ppb) Set Point (Cc/(Ic-AFzero)) (sccm) (sccm) concentration (ppb) (Ic) (Cc) Limit = 0.90-1.10as found zero

as found span as found 2nd point

as found 3rd point new cylinder response

H<sub>2</sub>S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	-0.1	
high point	4926	74.1	80.3	80.4	0.999
second point	4963	37.0	40.1	40.3	0.995
third point	4982	18.5	20.1	19.7	1.018
as left zero	5000	0.0	0.0	-0.2	
as left span	4926	74.1	80.3	79.9	1.005
SO2 Scrubber Check	4920	80.0	800.0	0.0	
Date of last scrubber change	e:	16-May-23		Ave Corr Factor	1.004

Date of last converter efficiency test: efficiency

Baseline Corr As found: NA Prev response: \*% change: NA 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

Install Due to going to external H2S converters. Sox scrubber checked after the calibrator zero.

Notes: Zero and Span adjusted.

Calibration Performed By: Melissa Lemay



## H<sub>2</sub>S Calibration Summary

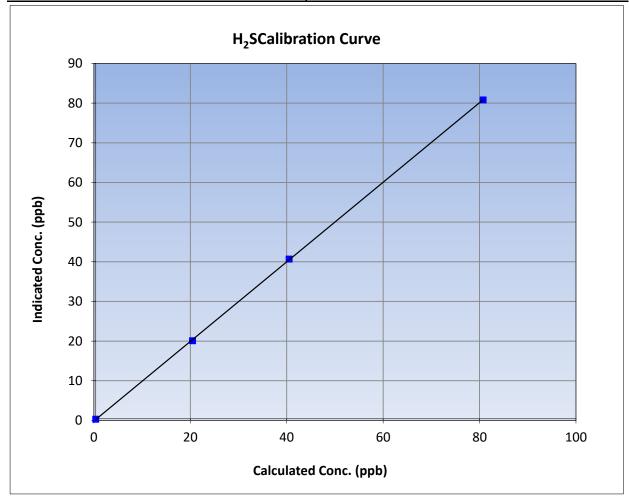
Version-11-2021

### **Station Information**

Calibration Date: May 16, 2023 Previous Calibration:

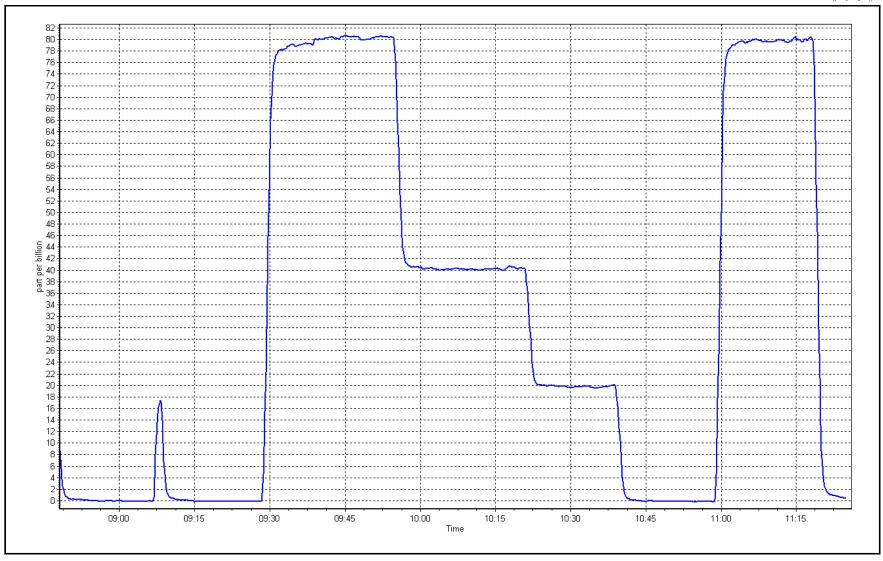
Station Name:Buffalo ViewpointStation Number:AMS04Start Time (MST):8:45End Time (MST):11:25Analyzer make:Thermo 43i-LTEAnalyzer serial #:1008841400

Calibration Data						
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>	
0.0	-0.1		Correlation Coefficient	0.999967	≥0.995	
80.3	80.4	0.9990	Correlation Coefficient	0.555507	20.993	
40.1	40.3	0.9952	Slope	1.003759	0.90 - 1.10	
20.1	19.7	1.0179	Slope			
			- Intercept	-0.177711	+/-3	



Location: Buffalo Viewpoint





Date: May 16, 2023



## THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

ppm

### **Station Information**

Station Name: **Buffalo Viewpoint** Calibration Date: May 4, 2023 Start time (MST): 8:35

Reason: Routine Station number: AMS04 Last Cal Date: April 6, 2023

End time (MST): 11:17

### **Calibration Standards**

Gas Cert Reference: Cal Gas Expiry Date: September 9, 2028 CC470284 CH4 Equiv Conc. 1062.9 ppm

11.8

CH4 Cal Gas Conc. 497.8 ppm C3H8 Cal Gas Conc. 205.5 ppm

NA

Removed Gas Cert: Removed CH4 Conc. 497.8

ppm Removed C3H8 Conc. 205.5 ppm

Diff between cyl ( $CH_4$ ):

Calibrator Model: **API T700** ZAG make/model: **API T701** 

CH4 Equiv Conc. 1062.9

Diff between cyl (THC):

Diff between cyl (NM):

Removed Gas Expiry: NA

Serial Number: 3808 Serial Number: 362

### **Analyzer Information**

Analyzer make: Thermo 55i

THC Range (ppm): 0 - 20 ppm

NMHC Range (ppm): 0 - 10 ppm

Analyzer serial #: 1222762077

236377

CH4 Range (ppm): 0 - 10 ppm

NMHC Peak Area:

Start Finish **Start** Finish CH4 SP Ratio: 1.840E-04 1.860E-04 NMHC SP Ratio: 3.870E-05 3.820E-05 CH4 Retention time:

11.8

### **THC Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (0	Cc) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.0	17.01	16.76	1.015
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4920	80.0	17.01	16.98	1.002
second point	4960	40.0	8.50	8.48	1.003
third point	4980	20.0	4.25	4.21	1.010
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.0	17.01	16.96	1.003
			ļ	Average Correction Factor	1.005
Baseline Corr AF:	16.76	Prev response	17.00	*% change	-1.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	

\* = > +/-5% change initiates investigation AF Correlation: Baseline Corr 3rd AF: NA

233712



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

		NMHC Calibra	ation Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.0	9.04	8.94	1.011
as found 2nd point					
as found 3rd point					
new cylinder response					
alibrator zero	5000	0.0	0.00	0.00	
nigh point	4920	80.0	9.04	9.04	1.000
second point	4960	40.0	4.52	4.51	1.002
hird 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	9.04	1.000
			Avera	ge Correction Factor	1.004
Baseline Corr AF:	8.94	Prev response	9.02	*% change	-0.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
Set Point	Dil air flow rate	CH4 Calibra	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.0	7.96	7.83	1.017
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
nigh point	4920	80.0	7.96	7.94	1.003
second point	4960	40.0	3.98	3.97	1.003
hird point	4980	20.0	1.99	1.98	1.006
s left zero	5000	0.0	0.00	0.00	
as left span	4920	80.0	7.96	7.92	1.006
				ge Correction Factor	1.004
Baseline Corr AF:	7.83	Prev response	7.96	*% change	-1.7%
				Λ Γ Ι.α. L.α. L.α. L.α. L.α. L.α. L.α. L.α.	
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
	NA NA	AF Slope: AF Correlation:		* = > +/-5% change initiat	es investigation
		•	Statistics	•	es investigation
Baseline Corr 2nd AF: Baseline Corr 3rd AF:		AF Correlation:	Statistics	•	es investigation
		AF Correlation:  Calibration	Statistics	* = > +/-5% change initiat	es investigation
Baseline Corr 3rd AF:		AF Correlation:  Calibration  Start	Statistics	* = > +/-5% change initiat	es investigation
Baseline Corr 3rd AF: THC Cal Slope:		AF Correlation:  Calibration:  Start  1.001213	Statistics	* = > +/-5% change initiat  Finish  0.999063	es investigation

0.999779

-0.020000

Notes:

NMHC Cal Slope:

NMHC Cal Offset:

Span adjusted. No maintenance done.

1.000411

-0.010000

Calibration Performed By: Melissa Lemay



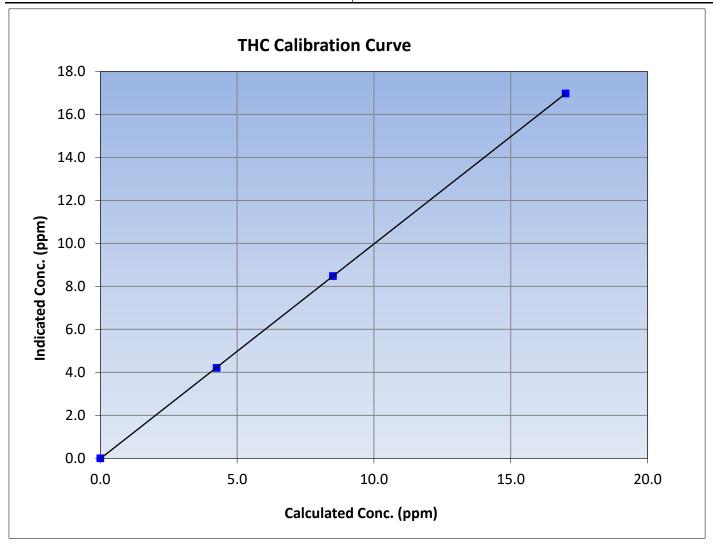
## **THC Calibration Summary**

Version-01-2020

### **Station Information**

May 4, 2023 **Previous Calibration:** Calibration Date: April 6, 2023 Station Name: **Buffalo Viewpoint** Station Number: AMS04 Start Time (MST): 8:35 End Time (MST): 11:17 Analyzer make: Thermo 55i Analyzer serial #: 1222762077

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999995	≥0.995
17.01	16.98	1.0016	Correlation Coemicient	0.999995	20.999
8.50	8.48	1.0028	Slope	0.999063	0.90 - 1.10
4.25	4.21	1.0099	Slope	0.555005	0.90 - 1.10
			Intercept	-0.016000	+/-0.5





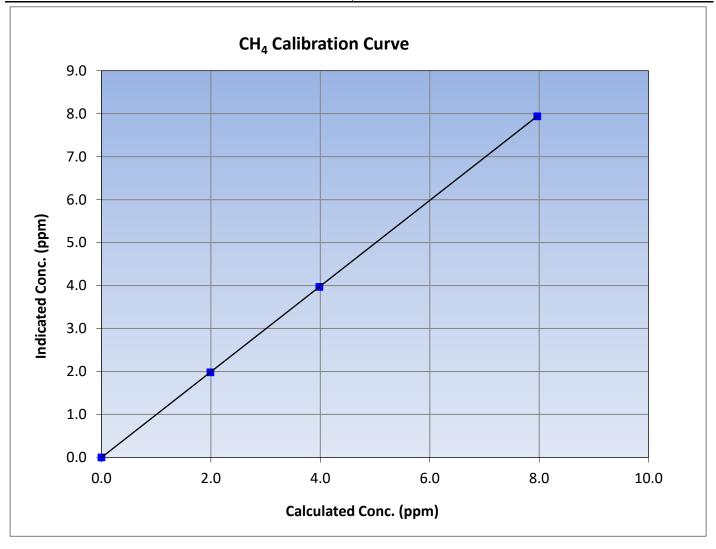
# **CH<sub>4</sub> Calibration Summary**

Version-01-2020

### **Station Information**

May 4, 2023 Calibration Date: **Previous Calibration:** April 6, 2023 Station Name: **Buffalo Viewpoint** Station Number: AMS04 Start Time (MST): 8:35 End Time (MST): 11:17 Analyzer make: Thermo 55i Analyzer serial #: 1222762077

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	1.000000	≥0.995
7.96	7.94	1.0031	Correlation Coemicient	1.000000	20.933
3.98	3.97	1.0031	Slope	0.997102	0.90 - 1.10
1.99	1.98	1.0057	Зюре	0.997102	
			Intercept	-0.002000	+/-0.5





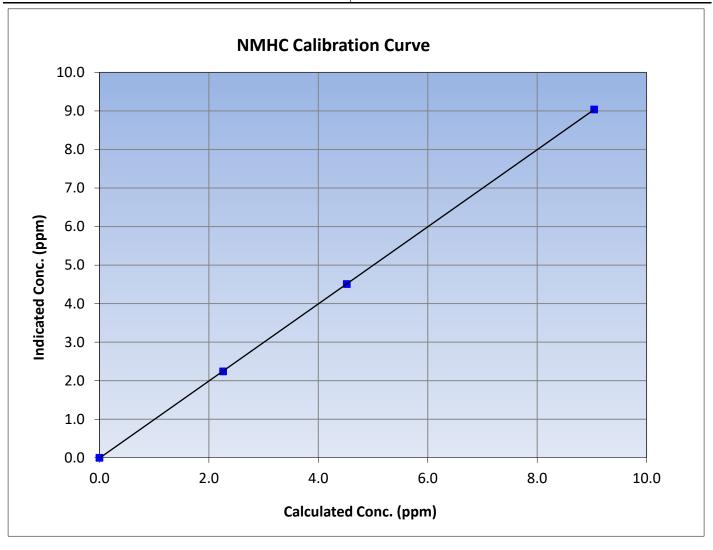
## **NMHC Calibration Summary**

Version-01-2020

### **Station Information**

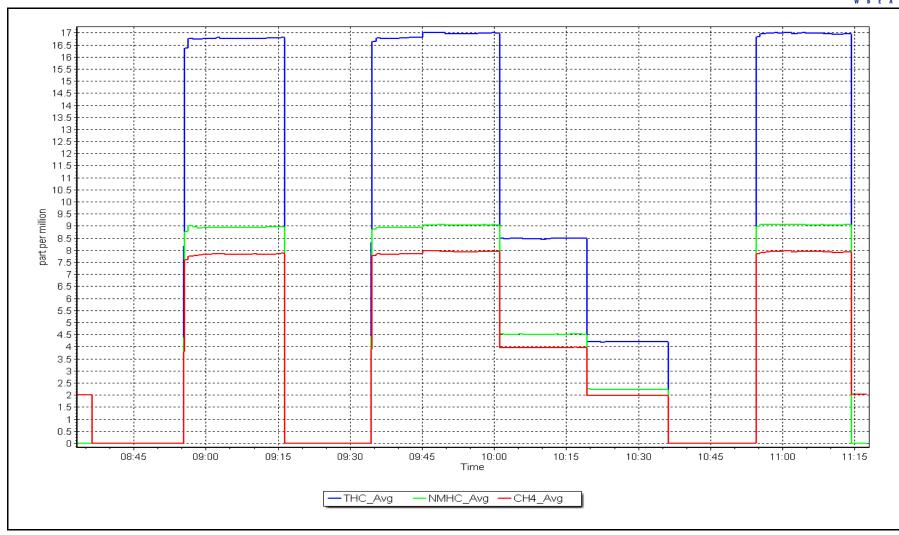
May 4, 2023 **Previous Calibration:** Calibration Date: April 6, 2023 Station Name: **Buffalo Viewpoint** Station Number: AMS04 Start Time (MST): 8:35 End Time (MST): 11:17 Analyzer make: Thermo 55i Analyzer serial #: 1222762077

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999994	≥0.995
9.04	9.04	1.0002	Correlation Coefficient	0.555554	20.333
4.52	4.51	1.0024	Slope	1.000411	0.90 - 1.10
2.26	2.24	1.0092	Slope	1.000411	0.90 - 1.10
			Intercept	-0.010000	+/-0.5



NMHC Calibration Plot Date: May 4, 2023 Location: Buffalo Viewpoint







## NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

#### **Station Information**

Station Name: Buffalo Viewpoint Calibration Date: May 5, 2023

Start time (MST): 6:48
Reason: Routine

Station number: AMS04 Last Cal Date: April 4, 2023 End time (MST): 11:30

### **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** <u>Start</u> **Finish** NO coeff or slope: 1.014 1.032 NO bkgnd or offset: -2.1 -0.3 NOX coeff or slope: 1.032 NOX bkgnd or offset: -1.7 1.8 1.013 NO2 coeff or slope: 1.000 1.000 Reaction cell Press: 7.6 7.6

### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	0.999617	0.998201
NO <sub>x</sub> Cal Offset:	-0.133690	-0.313645
NO Cal Slope:	0.998232	1.000170
NO Cal Offset:	-0.993777	-1.493235
NO <sub>2</sub> Cal Slope:	0.984274	0.998883
NO <sub>2</sub> Cal Offset:	-0.102857	1.152412



## NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

				Dile	ution Calibratio	n 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	3.0	1.0	1.9		
as found span	4922	78.1	799.1	795.2	3.9	785.1	779.8	5.4	1.0178	1.0197
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.4	0.4	-0.8		
high point	4922	78.1	799.1	795.2	3.9	797.3	795.0	2.3	1.0023	1.0002
second point	4961	39.1	400.1	398.1	2.0	399.1	395.1	4.0	1.0024	1.0076
third point	4981	19.5	199.5	198.5	1.0	198.9	195.6	3.3	1.0030	1.0150
as left zero	5000	0.0	0.0	0.0	0.0	-0.7	0.1	-0.8		
as left span	4922	78.1	799.1	382.7	416.4	801.2	399.3	401.9	0.9974	0.9584
							Average C	Correction Factor	1.0026	1.0076
Corrected As fo	ound NO <sub>X</sub> =	782.1 ppb	NO =	778.8 ppb	* = > +/-5%	6 change initiates i	nvestigation	*Percent Chang	ge NO <sub>x</sub> =	-2.1%
Previous Respo	onse NO <sub>X</sub> =	798.7 ppb	NO =	792.8 ppb				*Percent Chang	ge NO =	-1.8%
Baseline Corr 2	and pt $NO_X =$	NA ppb	NO =	NA ppb	As found	$I \qquad NO_X r^2$ :		Nx SI:	Nx Int:	
Baseline Corr 3	ord pt NO <sub>X</sub> =	NA ppb	NO =	NA ppb	As found	$I NO r^2$ :		NO SI:	NO Int:	
					As found	$I \qquad NO_2 r^2$ :		NO2 SI:	NO <sub>2</sub> Int:	
				G	GPT Calibration I	Data				
O3 Setpo	pint (ppb)	Indicated NO Ref		cated NO Drop entration (ppb)	Calculated NC concentration (ppl		dicated NO2 tration (ppb) (Ic)	NO2 Correction fac Calibration Limit = 0 As Found Limit = 0	0.95-1.05	erter Efficiency on Limit = 96-104%
as found	GPT zero									
as found GPT po	int (400 ppb NO2)									
as found GPT poi	int (200 ppb NO2)									
as found GPT po	int (100 ppb NO2)									
1st GPT point	(400 ppb O3)	792.4		379.9	416.4		415.8	1.0015		99.9%
2nd GPT poin	t (200 ppb O3)	792.4		583.2	213.1		215.8	0.9875	;	101.3%

Notes:

3rd GPT point (100 ppb O3)

Zero and Span adjusted. No maintenance done.

110.8

Average Correction Factor

108.3

Calibration Performed By: Melissa Lemay

792.4

688.0

102.3%

101.1%

0.9775

0.9888



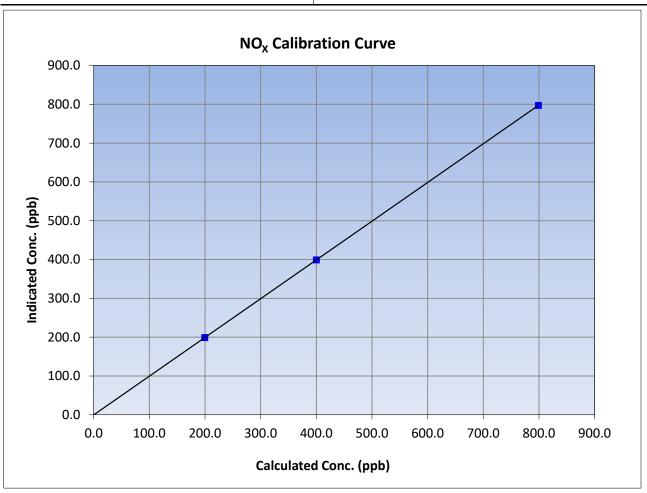
## NO<sub>x</sub> Calibration Summary

Version-04-2020

### **Station Information**

Calibration Date: May 5, 2023 Previous Calibration: April 4, 2023 Station Name: **Buffalo Viewpoint** Station Number: AMS04 Start Time (MST): 6:48 End Time (MST): 11:30 Analyzer serial #: Analyzer make: **API T200** 723

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	-0.4		Correlation Coefficient		≥0.995
799.1	797.3	1.0023	Correlation Coefficient	1.000000	20.333
400.1	399.1	1.0024	Slope	0.998201	0.90 - 1.10
199.5	198.9	1.0030	Slope	0.996201	0.90 - 1.10
			Intercept	-0.313645	+/-20





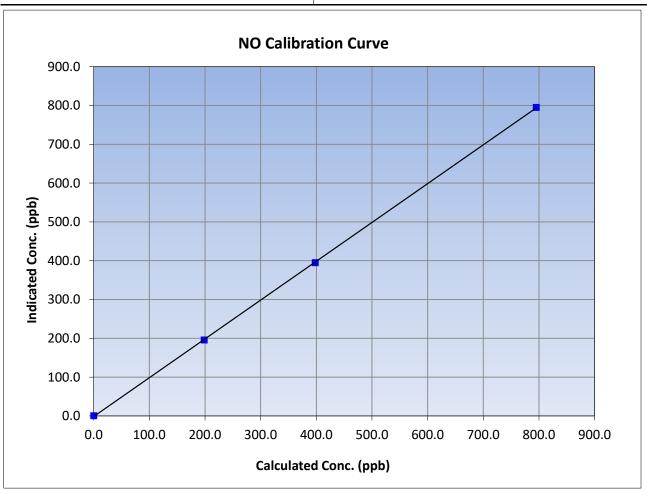
### **NO Calibration Summary**

Version-04-2020

### **Station Information**

Calibration Date: May 5, 2023 Previous Calibration: April 4, 2023 Station Name: **Buffalo Viewpoint** Station Number: AMS04 Start Time (MST): 6:48 End Time (MST): 11:30 Analyzer make: **API T200** Analyzer serial #: 723

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.4	Correlation Coefficient		0.999972	≥0.995
795.2	795.0	1.0002	Correlation Coefficient	0.333372	20.333
398.1	395.1	1.0076	Slope	1.000170	0.90 - 1.10
198.5	195.6	1.0150	Slope	1.000170	0.90 - 1.10
			Intercept	-1.493235	+/-20





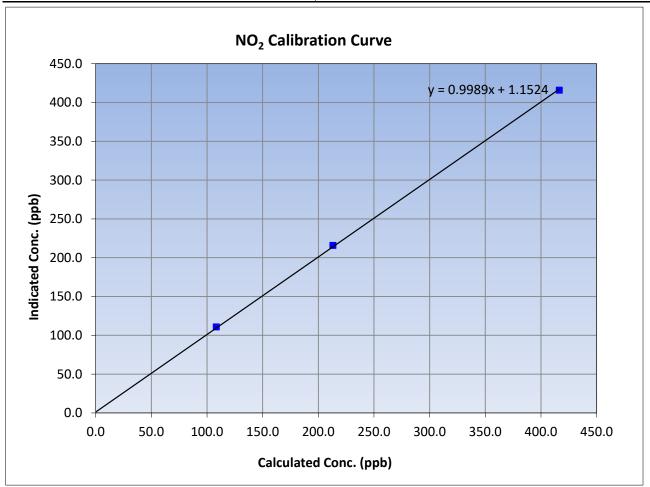
## NO<sub>2</sub> Calibration Summary

Version-04-2020

### **Station Information**

Calibration Date: May 5, 2023 Previous Calibration: April 4, 2023 Station Name: **Buffalo Viewpoint** Station Number: AMS04 Start Time (MST): 6:48 End Time (MST): 11:30 Analyzer make: **API T200** Analyzer serial #: 723

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	-0.8		Correlation Coefficient	0.999885	≥0.995
416.4	415.8	1.0015	Correlation Coefficient	0.555005	20.333
213.1	215.8	0.9875	Slope	0.998883	0.90 - 1.10
108.3	110.8	0.9775	Slope	0.550005	0.90 - 1.10
			Intercept	1.152412	+/-20



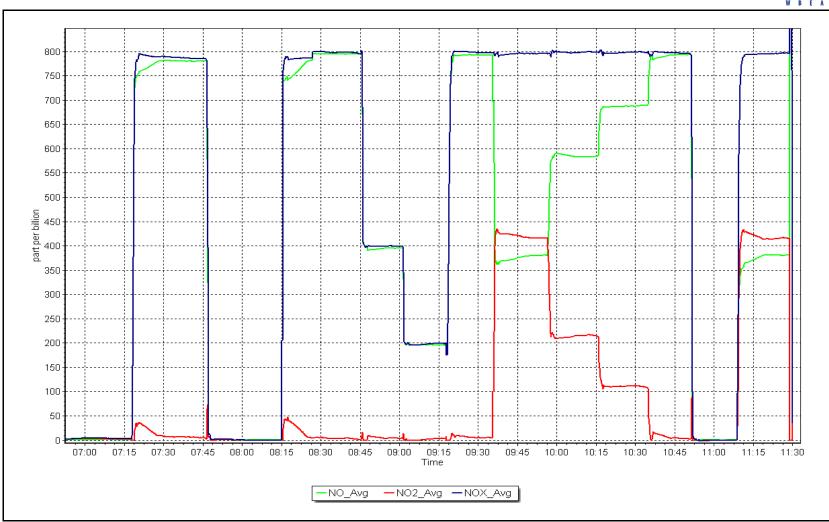
NO<sub>x</sub> Calibration Plot

Date:

May 5, 2023

Location: Buffalo Viewpoint







## NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

#### **Station Information**

Station Name: Buffalo Viewpoint Station number: AMS04
Calibration Date: May 18, 2023 Last Cal Date: May 5, 2023

Start time (MST): 5:50 End time (MST): 9:30

Reason: As Found Moly converter changed

### **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** <u>Start</u> **Finish** NO coeff or slope: 1.032 1.032 NO bkgnd or offset: -0.3 -0.3 NOX coeff or slope: NOX bkgnd or offset: 1.032 1.032 1.8 1.8 NO2 coeff or slope: 1.000 1.000 Reaction cell Press: 7.7 7.7

#### **Calibration Statistics**

<u>Start</u> <u>Finish</u>



# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

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1 )11	IITIAN	( alii	bration	I 12T2

				Dire	acion canbracic	ni Bata				
Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) Limit = 0.95-1.05	NO Correction factor (Cc/Ic) Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.0	0.0	0.4	-0.1	0.4		
as found span	4922	78.1	799.1	795.2	3.9	784.1	779.3	4.8	1.0191	1.0204
as found 2nd	4961	39.1	400.1	398.1	2.0	391.6	387.3	4.2	1.0216	1.0279
as found 3rd	4981	19.5	199.5	198.5	1.0	195.0	192.0	3.0	1.0231	1.0340
new cyl resp										
calibrator zero										
high point										
second point										
third point										
as left zero										
as left span										
							Average C	Correction Factor	-	
Corrected As fo	und NO <sub>X</sub> =	783.7 ppb	NO =	779.4 ppb	* = > +/-5	% change initiates	investigation	*Percent Chan	ge NO <sub>x</sub> =	-1.7%
Previous Respo	nse NO <sub>x</sub> =	797.4 ppb	NO =	793.8 ppb				*Percent Chan	ge NO =	-1.9%
Baseline Corr 2	nd pt $NO_X =$	391.2 ppb	NO =	387.4 ppb	As foun	d $NO_X r^2$ :	0.999996	Nx SI: 0.9810	Nx Int:	-0.254
Baseline Corr 3	rd pt $NO_X =$	194.6 ppb	NO =	192.1 ppb	As foun	d NO r <sup>2</sup> :	0.999979	NO SI: 0.9808	NO Int:	-1.653
					As foun	d $NO_2 r^2$ :	0.999914	NO2 SI: 0.9927	749 NO <sub>2</sub> Int:	2.088

### **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)	780.8	377.5	407.2	405.3	1.0047	99.5%
as found GPT point (200 ppb NO2)	780.8	571.5	213.2	215.0	0.9917	100.8%
as found GPT point (100 ppb NO2)	780.8	678.6	106.1	108.9	0.9743	102.6%
1st GPT point (400 ppb O3)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
			Ave	erage Correction Factor		

Notes:

As founds to change the Moly converter. Due to drifting during the GPT the 2nd NO ref point used.

Calibration Performed By:

Melissa Lemay

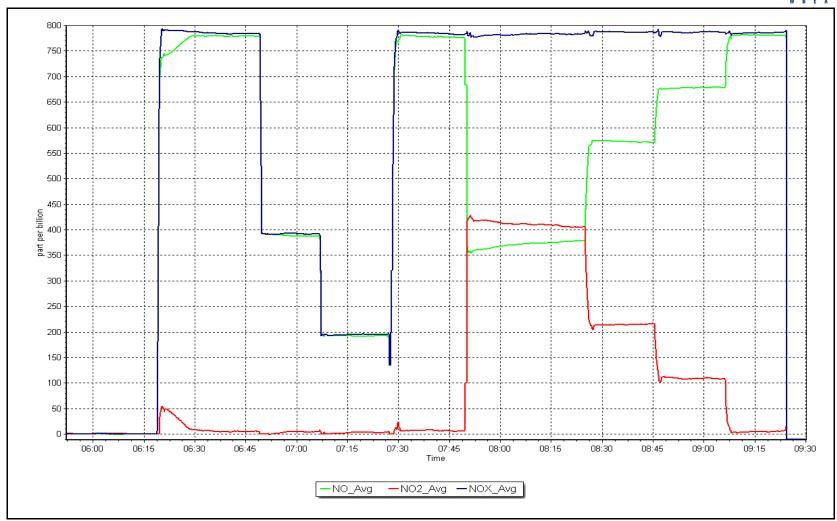
NO<sub>x</sub> Calibration Plot

Date:

May 18, 2023

Location: Buffalo Viewpoint







### NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

#### **Station Information**

Station Name: Buffalo Viewpoint Calibration Date: May 19, 2023

Start time (MST): 5:15
Reason: Routine

Station number: AMS04 Last Cal Date: May 18, 2023 End time (MST): 9:38

### **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

<u>Start</u> **Finish** <u>Start</u> **Finish** NO coeff or slope: 1.032 1.055 NO bkgnd or offset: -0.3 -0.5 NOX coeff or slope: 1.032 1.056 NOX bkgnd or offset: 2.7 1.8 NO2 coeff or slope: 1.000 1.000 Reaction cell Press: 7.7 7.6

#### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	0.998201	0.999316
NO <sub>x</sub> Cal Offset:	-0.313645	-0.653591
NO Cal Slope:	1.000170	1.001680
NO Cal Offset:	-1.493235	-1.693638
NO <sub>2</sub> Cal Slope:	0.998883	1.001373
NO <sub>2</sub> Cal Offset:	1.152412	-0.003271



# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

				Dile	ution Calibration	n Data				
Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)		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	0.1		
high point	4922	78.1	799.1	795.2	3.9	798.3	795.7	2.5	1.0010	0.9994
second point	4961	39.1	400.1	398.1	2.0	398.7	396.2	2.5	1.0034	1.0048
third point	4981	19.5	199.5	198.5	1.0	198.0	195.5	2.6	1.0076	1.0155
as left zero	5000	0.0	0.0	0.0	0.0	-0.9	0.3	-1.2		
as left span	4922	78.1	799.1	387.4	411.7	793.8	382.4	411.4	1.0067	1.0131
							Average C	orrection Factor	1.0040	1.0066
Corrected As fo	ound NO <sub>x</sub> =	NA ppb	NO = N	A ppb	* = > +/-5%	6 change initiates i	investigation	*Percent Chan	ge NO <sub>x</sub> =	NA
Previous Respo	onse NO <sub>X</sub> =	NA ppb	NO = N	A ppb				*Percent Chan	ge NO =	NA
Baseline Corr 2	nd pt NO <sub>X</sub> =	NA ppb	NO = N	A ppb	As found	$NO_X r^2$ :		Nx SI:	Nx Int:	
Baseline Corr 3	rd pt NO <sub>X</sub> =	NA ppb	NO = N	A ppb	As found	$NO r^2$ :		NO SI:	NO Int:	
					As found	$NO_2 r^2$ :		NO2 SI:	NO <sub>2</sub> Int:	
				e	GPT Calibration I	Data				
O3 Setpo	int (ppb)	Indicated NO Refer concentration (p		ed NO Drop tration (ppb)	Calculated NC concentration (ppl		dicated NO2 ntration (ppb) (Ic)	NO2 Correction fa Calibration Limit = As Found Limit =	0.95-1.05	erter Efficiency on Limit = 96-104%
as found	GPT zero									
as found GPT poir	nt (400 ppb NO2)									
as found GPT poir	nt (200 ppb NO2)									
as found GPT poir	nt (100 ppb NO2)									
1st GPT point	(400 ppb O3)	791.4	3	883.6	411.7		412.4	0.998	3	100.2%
2nd GPT point	(200 ppb O3)	791.4	5	86.1	209.2		209.2	1.000	)	100.0%
3rd GPT point	(100 ppb O3)	791.4	6	588.9	106.4		106.6	0.998	2	100.2%
						Average Co	rrection Factor	0.998	3	100.1%

Notes:

Calibration after moly converter change. Zero air scrubbers changed.

Calibration Performed By:

Melissa Lemay



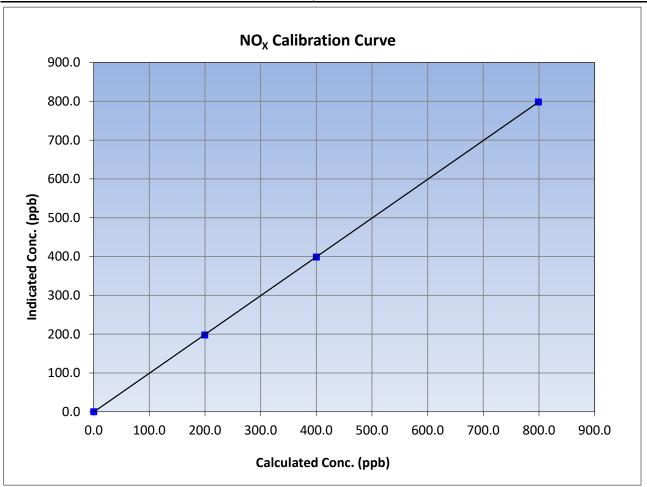
### NO<sub>x</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 19, 2023 Previous Calibration: May 18, 2023 Station Name: **Buffalo Viewpoint** Station Number: AMS04 Start Time (MST): 5:15 End Time (MST): 9:38 Analyzer make: **API T200** Analyzer serial #: 723

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999996	≥0.995
799.1	798.3	1.0010	Correlation Coefficient	0.555550	20.993
400.1	398.7	1.0034	Slope	0.999316	0.90 - 1.10
199.5	198.0	1.0076	Slope	0.555510	0.50 - 1.10
			Intercept	-0.653591	+/-20





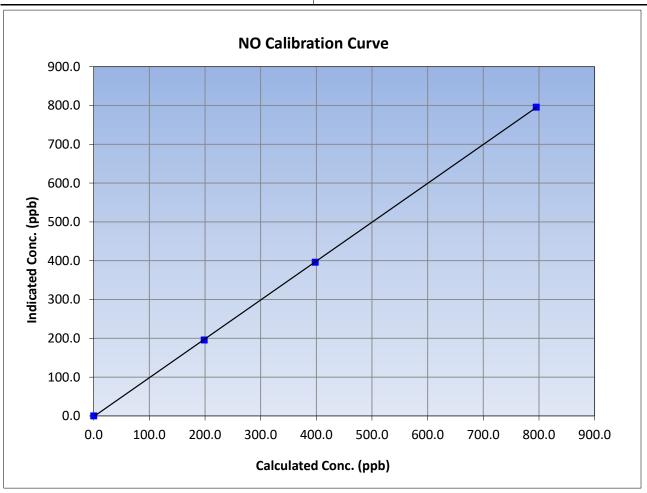
### **NO Calibration Summary**

Version-04-2020

#### **Station Information**

Calibration Date: May 19, 2023 Previous Calibration: May 18, 2023 Station Name: **Buffalo Viewpoint** Station Number: AMS04 Start Time (MST): 5:15 End Time (MST): 9:38 Analyzer make: **API T200** Analyzer serial #: 723

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	0.0		Correlation Coefficient	0.999979	≥0.995	
795.2	795.7	0.9994	Correlation Coefficient	0.555575	≥0.333	
398.1	396.2	1.0048	Slope	1.001680	0.90 - 1.10	
198.5	195.5	1.0155	Slope	1.001000	0.90 - 1.10	
			Intercept	-1.693638	+/-20	





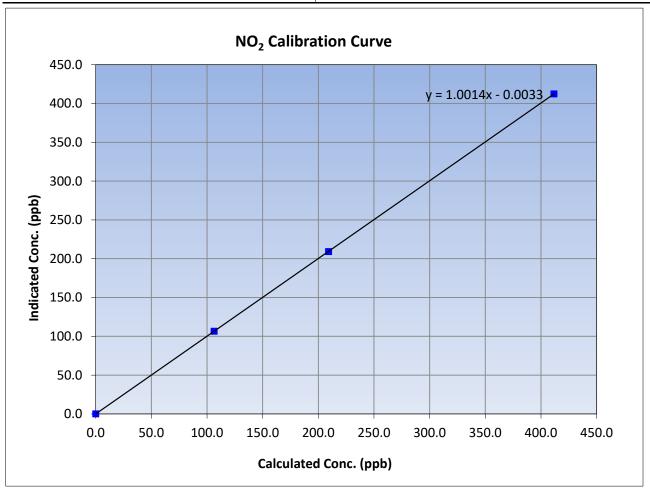
### NO<sub>2</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 19, 2023 Previous Calibration: May 18, 2023 Station Name: **Buffalo Viewpoint** Station Number: AMS04 Start Time (MST): 5:15 End Time (MST): 9:38 Analyzer make: **API T200** Analyzer serial #: 723

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999999	≥0.995
411.7	412.4	0.9983	Correlation Coefficient	0.99999	20.333
209.2	209.2	1.0000	Slope	1.001373	0.90 - 1.10
106.4	106.6	0.9982	Slope	1.001373	0.90 - 1.10
			Intercept	-0.003271	+/-20

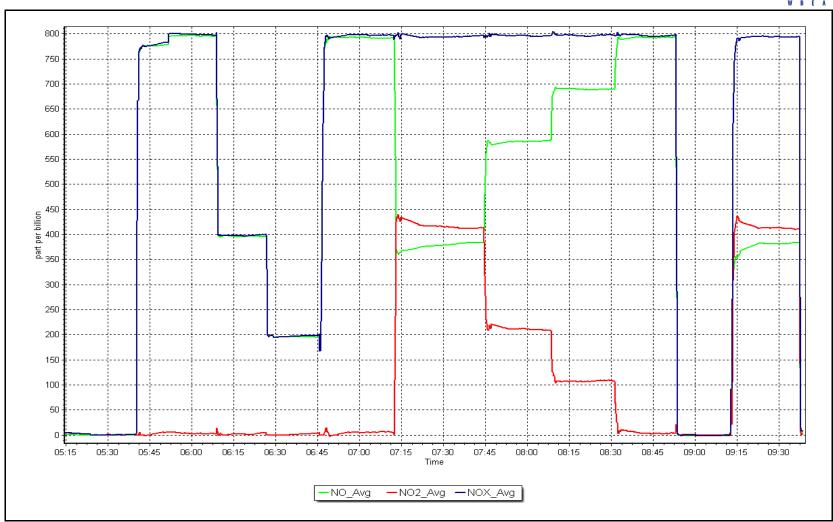


NO<sub>x</sub> Calibration Plot

Date: May 19, 2023

Location: Buffalo Viewpoint







## O<sub>3</sub> Calibration Report

Version-01-2020

**Station Information** 

Station Name: Buffalo Viewpoint Calibration Date: May 4, 2023

Start time (MST): 5:58
Reason: Routine

Station number: AMS04 Last Cal Date: April 3, 2023

End time (MST): 8:37

Serial Number: 3808

Serial Number: 362

**Calibration Standards** 

O3 generation mode: Photometer

Calibrator Make/Model: API T700
ZAG Make/Model: API T701

**Analyzer Information** 

Analyzer make: API T400 Analyzer serial #: 2961

Analyzer Range 0 - 500 ppb

Start Finish Start Finish 0.998743 Backgd or Offset: -2.6 Calibration slope: 1.000143 -2.7 1.020000 Coeff or Slope: 1.008 Calibration intercept: -0.100000 1.035

#### O<sub>3</sub> Calibration Data

Set Point	Total air flow rate	Calibrator Lamp	Calculated	Indicated concentration	Correction factor (Cc/Ic)
Set i onit	(sccm)	Voltage Drive	concentration (ppb) (Cc)	(ppm) (Ic)	<i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.1	
as found span	5000	978.9	400.0	410.7	0.974
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.8	
high point	5000	981.1	400.0	400.4	0.999
second point	5000	813.4	200.0	200.9	0.996
third point	5000	704.3	100.0	101.1	0.989
as left zero	5000	0.0	0.0	1.1	
as left span	5000	981.8	400.0	400.8	0.998
			Avera	ge Correction Factor	0.995
Baseline Corr As found:	410.6	Previous response	e 400.0	*% change	2.6%

Baseline Corr As found: 410.6 Previous response 400.0 \*% change 2.6%
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. Span adjusted.

Calibration Performed By: Melissa Lemay



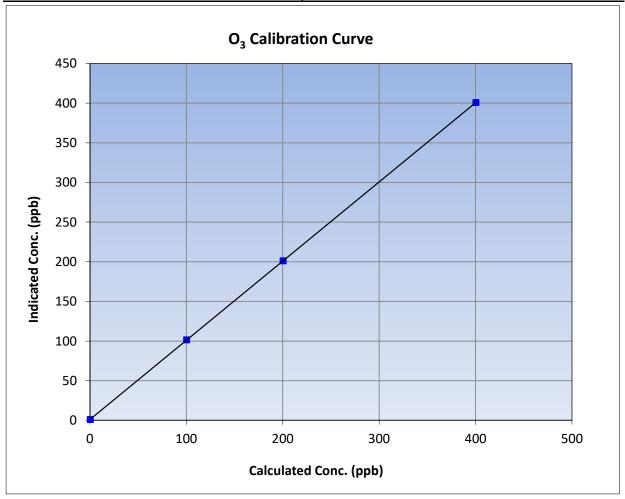
### O<sub>3</sub> Calibration Summary

Version-01-2020

### **Station Information**

Calibration Date: May 4, 2023 **Previous Calibration:** April 3, 2023 Station Name: **Buffalo Viewpoint** Station Number: AMS04 Start Time (MST): 5:58 End Time (MST): 8:37 Analyzer make: **API T400** Analyzer serial #: 2961

	Calibration Data								
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>				
0.0	0.8		Correlation Coefficient	0.999999	≥0.995				
400.0	400.4	0.9990	correlation coefficient	0.55555	20.555				
200.0	200.9	0.9955	Slope	0.998743	0.90 - 1.10				
100.0	101.1	0.9891	- Slope	0.996745	0.90 - 1.10				
			- Intercept	1.020000	+/- 5				



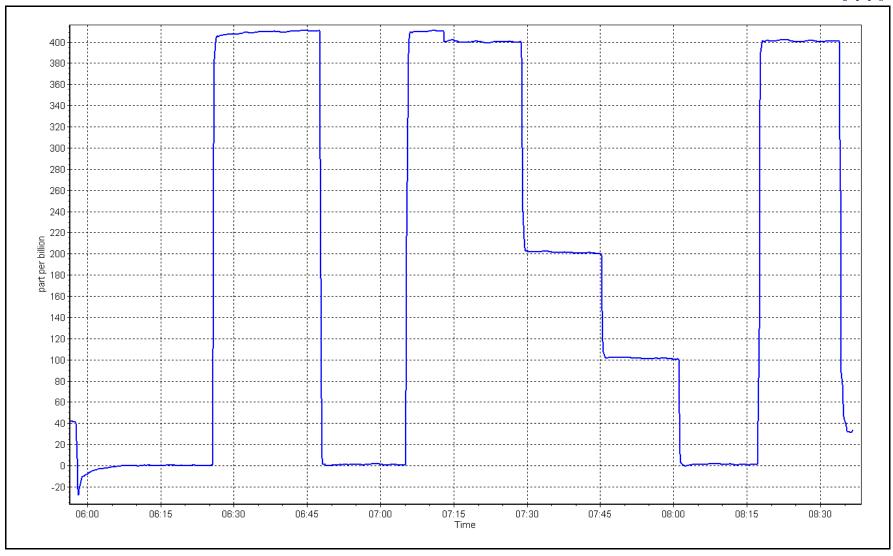
O<sub>3</sub> Calibration Plot

Date:

May 4, 2023

Location: Buffalo Viewpoint







# **T640 PM<sub>2.5</sub> CALIBRATION**

Version-01-2023

		Station Information	1		
Station Name: Calibration Date: Start time (MST):	Buffalo Viewpoint May 16, 2023 7:16		Station number: Last Cal Date: End time (MST):	April 27, 2023	
Analyzer Make: Particulate Fraction:	API T640 PM2.5		S/N:	322	
Flow Meter Make/Model: Temp/RH standard:	AliCat AliCat		·	228085 228085	
		Monthly Calibration T	est		
Parameter T (°C) P (mmHg)	<u>As found</u> 12.9 731.1	<u>Measured</u> 12.6 732.8	As left 12.9 731.1	Adjusted	(Limits) +/- 2 °C +/- 10 mmHg
flow (LPM) Leak Test:	5  Date of check: PM w/o HEPA:	4.7 May 16, 2023 58	5 Last Cal Date: PM w/ HEPA:	April 27, 2023	+/- 0.25 LPM <0.2 ug/m3
Note: this leak check will be Inlet cleaning:	Inlet Head		·		
		Quarterly Calibration	Гest		
<u>Parameter</u> PMT Peak Test	<u>As found</u>	Post maintenance	<u>As left</u>	Adjusted	(Limits) 10.9 +/- 0.5
Post-maintenance	e leak check:	PM w/o HEPA:		w/ HEPA:	
Date Optical Cham		March 28,	2023		<0.2 ug/m3
Disposable Filte	r Changed:	March 28,	2023		
		Annual Maintenanc	e		
Date Sample Tub	oe Cleaned:	September 1	5, 2022		
Date RH/T Senso	•	September 1			
		Flow adjusted. Hea	nd cleaned. Leak che	ck passed.	
Notes:					
Calibration by:	Melissa Lemay				



# **T640 PM<sub>2.5</sub> CALIBRATION**

Version-01-2023

		Station Information			
Station Name:	Buffalo Viewpoint		Station number:		
Calibration Date:	May 23, 2023 9:17		Last Cal Date: End time (MST):	• •	
Start time (MST):	9.17		End time (IVIST):	10:41	
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 Te	est		
<u>Parameter</u>	As found	Measured	<u>As left</u>	<u>Adjusted</u>	(Limits)
T (°C)	10.5	10.8	10.5		+/- 2 °C
P (mmHg)	732.4	733	732.4		+/- 10 mmHg
flow (LPM)	5.03	5.24	5.03		+/- 0.25 LPM
Leak Test:	Date of check:	May 23, 2023	Last Cal Date:	May 16, 2023	
	PM w/o HEPA:	24.3	PM w/ HEPA:	24.3	<0.2 ug/m3
Inlet cleaning :	Inlet Head	Quarterly Calibration T	rest		
Parameter	As found	Post maintenance	As left	Adjusted	(Limits)
PMT Peak Test	5.2	10.8	10.8	<u></u>	10.9 +/- 0.5
Post-maintenance	e leak check:	PM w/o HEPA:	95.4	w/ HEPA:	0
Date Optical Cham	nber Cleaned:	May 23, 2	023		<0.2 ug/m3
Disposable Filte	r Changed:	May 23, 2	023		
		Annual Maintenance	2		
Date Sample Tul	pe Cleaned:	May 23, 2	023		
Date RH/T Senso		May 23, 2			
Notes:	Initial leak check is	not passing, will proceed w	rith the maintenance		ısted. Post-
	Casa Bala				
Calibration by:	Sean Bala				



### WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

> AMS05 MANNIX MAY 2023

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

June 30, 2023



### SO<sub>2</sub> Calibration Report

Version-01-2020

#### **Station Information**

Station Name: Mannix Calibration Date: May 5, 2023 Start time (MST): 12:28

Routine Reason:

Station number: AMS05 April 25, 2023 Last Cal Date:

End time (MST):

15:16

**Calibration Standards** 

Cal Gas Concentration: 50.02

Cal Gas Cylinder #: XC026809B

Removed Cal Gas Conc: 50.02

Calibrator Make/Model: **API T700** ZAG Make/Model: **API T701H** 

Removed Gas Cyl #:

Baseline Corr As found:

ppm Cal Gas Exp Date: January 12, 2029

Rem Gas Exp Date: NA ppm

Diff between cyl:

Serial Number: 621 Serial Number: 832

### **Analyzer Information**

Analyzer make: Thermo 43i Analyzer serial #: 1008841399

0.040000

Analyzer Range 0 - 1000 ppb

**Finish Start** 0.990561

NA

Calibration slope: 1.003342 Calibration intercept: 0.240000

Backgd or Offset: Coeff or Slope:

803.23

**Finish** 8.8

**Start** 

9.0

0.920

0.920

### SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)		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	790.6	1.012
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	
high point	4920	80.0	800.3	792.8	1.009
second point	4960	40.0	400.2	396.7	1.009
third point	4980	20.0	200.1	197.7	1.012
as left zero	5000	0.0	0.0	0.4	
as left span	4920	80.0	800.3	798.5	1.002
			Avera	ge Correction Factor	1.010

790.50 Baseline Corr 2nd AF pt: NA AF Slope: NA AF Correlation: Baseline Corr 3rd AF pt:

\* = > +/-5% change initiates investigation

\*% change

AF Intercept:

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

Previous response

Calibration Performed By: Mohammed Kashif -1.6%



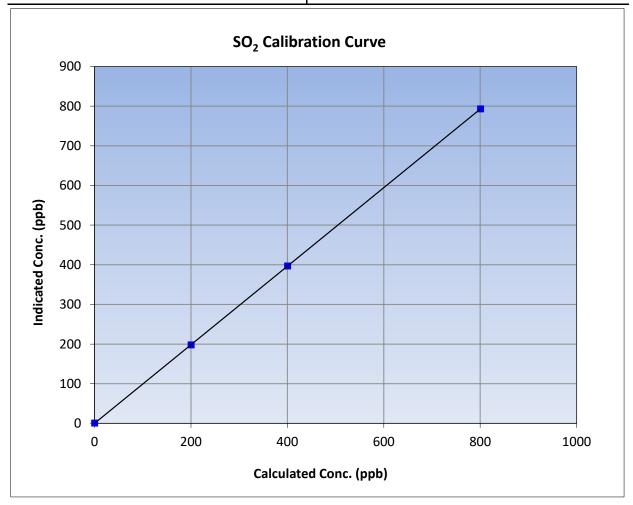
### **SO<sub>2</sub> Calibration Summary**

Version-01-2020

### **Station Information**

Calibration Date: May 5, 2023 **Previous Calibration:** April 25, 2023 Station Name: Mannix Station Number: AMS05 Start Time (MST): 12:28 End Time (MST): 15:16 Analyzer make: Thermo 43i Analyzer serial #: 1008841399

	Calibration Data									
Calculated concentration (ppb) (Cc)	n Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>					
0.0	0.3		Correlation Coefficient	0.999999	≥0.995					
800.3	792.8	1.0095	correlation coefficient	0.55555	20.555					
400.2	396.7	1.0087	Slope	0.990561	0.90 - 1.10					
200.1	197.7	1.0120	Slope	0.990301	0.90 - 1.10					
			Intercept	0.040000	+/-30					



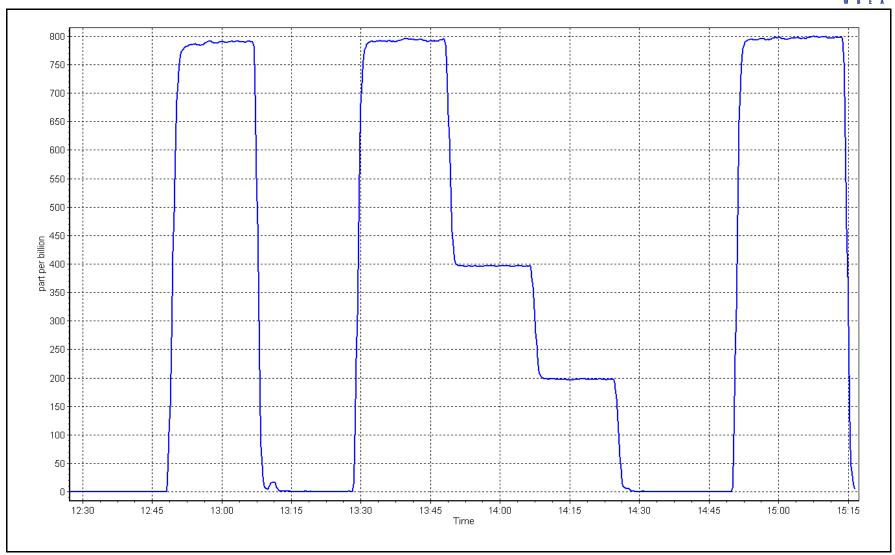
**SO2 Calibration Plot** 

Date:

May 5, 2023

Location: Mannix







### H<sub>2</sub>S Calibration Report

Version-11-2021

**Station Information** 

Station Name: Mannix Calibration Date: May 18, 2023 Start time (MST): 10:00

Reason: Routine Station number: AMS05 Last Cal Date: April 17, 2023

End time (MST): 14:51

**Calibration Standards** 

Cal Gas Exp Date: February 9, 2024 Cal Gas Concentration: 4.92 ppm

ppm

Cal Gas Cylinder #: EY0002433

Removed Cal Gas Conc: 4.92 Removed Gas Cyl #: NA Calibrator Make/Model: API T700

ZAG Make/Model: **API T701H**  Rem Gas Exp Date: NA

Diff between cyl: Serial Number: 1845

Serial Number: 832

**Analyzer Information** 

Analyzer make: Thermo 43iQTL Analyzer serial #: 1203169745 Global Converter serial #: 2022-196 Converter make:

0 - 100 ppb Analyzer Range

> **Finish** <u>Start</u>

<u>Start</u> **Finish** 1.005327 1.005754 Backgd or Offset: 2.25 Calibration slope: 2.17 0.020710 Calibration intercept: 0.060642 Coeff or Slope: 0.893 0.849

H<sub>2</sub>S 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	80.1	0.999
as found 2nd point	4960	40.7	40.0	39.5	1.014
as found 3rd point	4980	20.3	20.0	19.5	1.024
new cylinder response					_

#### H<sub>2</sub>S Calibration Data

Set Point	Dilution air flow 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	80.5	0.994
second point	4960	40.7	40.0	40.2	0.996
third point	4980	20.3	20.0	20.2	0.989
as left zero	5000	0.0	0.0	0.3	
as left span	4919	81.3	80.0	79.7	1.004
SO2 Scrubber Check	4920	80.0	800.0	0.1	
Date of last scrubber chan	ge:			Ave Corr Factor	0.993

Date of last scrubber change	2:			Ave Corr Factor	0.993
Date of last converter efficie	ency test:			ef	ficiency
Baseline Corr As found:	80.1	Prev response:	80.48	*% change:	-0.5%

Baseline Corr 2nd AF pt: 39.5 AF Slope: 1.002610 Baseline Corr 3rd AF pt: 0.999915 19.5 AF Correlation:

\* = > +/-5% change initiates investigation

-0.319257

AF Intercept:

Sample inlet filter changed after as founds. Scrubber check completed after calibrator zero. Notes: Adjusted the span only.

Calibration Performed By: Mohammed Kashif



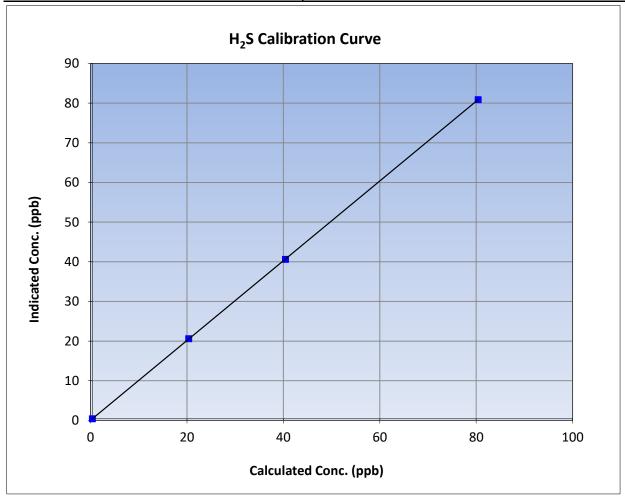
### H<sub>2</sub>S Calibration Summary

Version-11-2021

### **Station Information**

Calibration Date: May 18, 2023 **Previous Calibration:** April 17, 2023 Station Name: Station Number: AMS05 Mannix Start Time (MST): 10:00 End Time (MST): 14:51 Analyzer make: Thermo 43iQTL Analyzer serial #: 1203169745

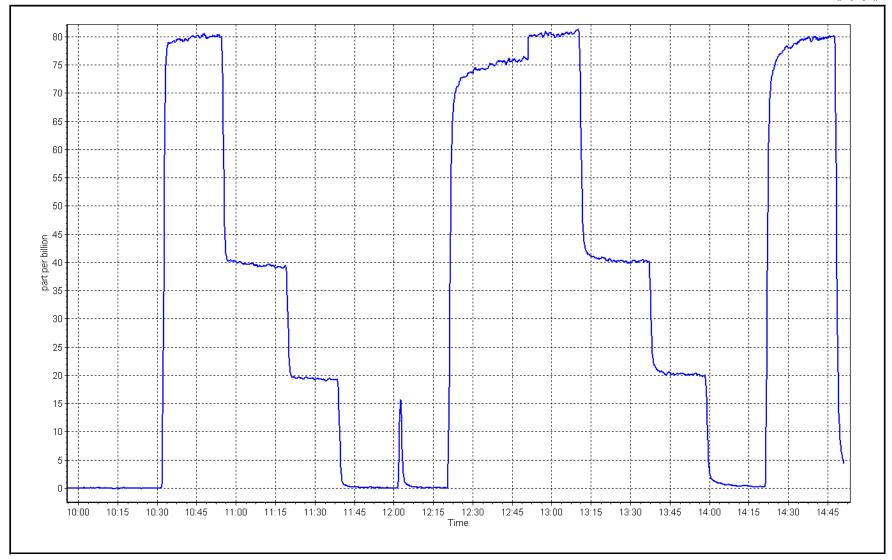
Calibration Data								
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Statistical Evalua	ation	<u>Limits</u>				
0.0	0.0		Correlation Coefficient	0.999995	≥0.995			
80.0	80.5	0.9937	Correlation Coefficient	0.99999	20.993			
40.0	40.2	0.9961	Slope	1.005754	0.90 - 1.10			
20.0	20.2	0.9888	Slope	1.003734	0.90 - 1.10			
			- Intercept	0.020710	+/-3			



Date: May 18, 2023

Location: Mannix







### THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

#### **Station Information**

Station Name: Mannix Station number: AMS05
Calibration Date: May 4, 2023 Last Cal Date: April 25, 2023
Start time (MST): 9:20 End time (MST): 11:03

Reason: Cylinder Change Support gas cylinder change out.

**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 T701H Serial Number: 832

#### **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

<u>Start</u> <u>Finish</u> <u>Start</u> <u>Finish</u>

CH4 SP Ratio: 2.65E-04 NA NMHC SP Ratio: 4.42E-05 NA CH4 Retention time: 15.00 NA NMHC Peak Area: 206898 NA

### **THC Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.0	17.23	17.41	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	17.23	17.42	0.989
second point					
third point					
as left zero					
as left span					

			Ave	rage Correction Factor	0.989
Baseline Corr AF:	17.41	Prev response	17.24	*% change	1.0%
Baseline Corr 2nd AF:	NA	AF Slope:	AF Intercept:		
Baseline Corr 3rd AF:	NA	AF Correlation:	* = > +/-5% change initiates investigation		



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

			- A ! D - A		
0.10.1.1	50 . 0	NMHC Calibr			
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i>
as found zero	5000	0	0.00	0.00	
as found span	4920	80	9.15	9.22	0.992
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	9.19	0.995
second point					
third point					
as left zero					
as left span					
				age Correction Factor	0.995
Baseline Corr AF:	9.22	Prev response	9.17	*% change	0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
		CH4 Calibra	tion Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.0	8.08	8.19	0.987
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4920	80.0	8.08	8.23	0.982
second point					
third point					
as left zero					
as left span					
			Avera	age Correction Factor	0.982
Baseline Corr AF:	8.19	Prev response	8.07	*% change	1.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
		Calibration	Statistics		
		<u>Start</u>		<u>Finish</u>	
THC Cal Slope:		1.000899		1.011204	
THC Cal Offset:		-0.002400		0.000000	
CH4 Cal Slope:		1.000594		1.018642	
				0.000000	
CH4 Cal Offset:		-0.009400		() ()()()()()()	

Notes: Changed out the Hydrogen cylinder after as founds.

0.007000

Calibration Performed By: Mohammed Kashif

NMHC Cal Offset:

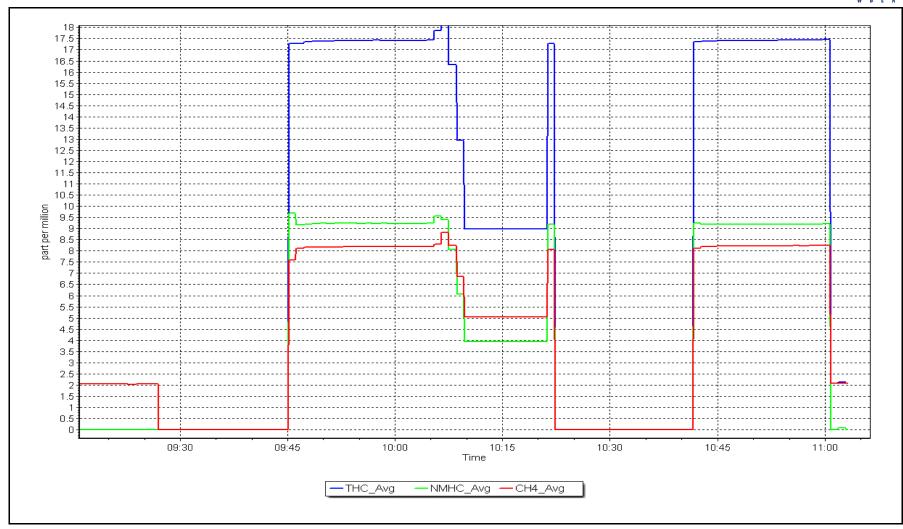
0.000000

NMHC Calibration Plot

Date: May 4, 2023

Location: Mannix







### THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

#### **Station Information**

Station Name: Mannix
Calibration Date: May 5, 2023
Start time (MST): 12:28
Reason: Routine

Station number: AMS05 Last Cal Date: April 25, 2023

End time (MST): 15:16

### **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<sub>4</sub>):

Callbrate Market ABLT700

Calibrator Model: API T700 Serial Number: 621 ZAG make/model: API T701H Serial Number: 832

#### **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: 2.65E-04 2.65E-04 NMHC SP Ratio: 4.42E-05 4.42E-05 CH4 Retention time: 15.00 15.00 NMHC Peak Area: 206898 206898

### **THC Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (C	Cc) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.0	17.23	17.38	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	80.0	17.23	17.24	0.999
second point	4960	40.0	8.61	8.69	0.991
third point	4980	20.0	4.31	4.34	0.993
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.0	17.23	17.38	0.991
			Д	Average Correction Factor	0.994
Baseline Corr AF:	17.38	Prev response	17.24	*% change	0.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

					VEISION OF E
		NMHC Calibr	ation Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i>
as found zero	5000	0	0.00	0.00	
as found span	4920	80	9.15	9.20	0.994
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	
nigh point	4920	80	9.15	9.16	0.998
second point	4960	40	4.57	4.61	0.992
third point	4980	20	2.29	2.31	0.989
as left zero	5000	0	0.00	0.00	
as left span	4920	80	9.15	9.21	0.993
as iere spari	4320			erage Correction Factor	0.993
Baseline Corr AF:	9.20	Prev response	9.17	*% change	0.4%
Baseline Corr 2nd AF:	NA	AF Slope:	3.17	AF Intercept:	0.470
Baseline Corr 3rd AF:	NA NA	AF Correlation:		* = > +/-5% change initiat	es investigation
baseline con sia Ai .	14/1	Ai correlation.		7	
		CH4 Calibra	tion Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc	) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.0	8.08	8.19	0.987
as found 2nd point					
as found 3rd point					-
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
nigh point	4920	80.0	8.08	8.08	1.000
second point	4960	40.0	4.04	4.08	0.991
third point	4980	20.0	2.02	2.03	0.997
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.0	8.08	8.17	0.989
				erage Correction Factor	0.996
Baseline Corr AF:	8.19	Prev response	8.07	*% change	1.4%
Baseline Corr 2nd AF:	NA	AF Slope:	0.07	AF Intercept:	,
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
baseline con Sta At.	11/7	Calibration	Statistics	,	
			Janshies	Finish	
THE C   C		<u>Start</u>		<u>Finish</u>	
THC Cal Slope:		1.000899		1.000806	
THC Cal Offset:		-0.002400		0.024800	
CH4 Cal Slope:		1.000594		1.000481	
CH4 Cal Offset:		-0.009400		0.009000	
		4 004460		1 001101	

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

1.001168

0.007000

Calibration Performed By: Mohammed Kashif

NMHC Cal Slope:

NMHC Cal Offset:

1.001131

0.015400



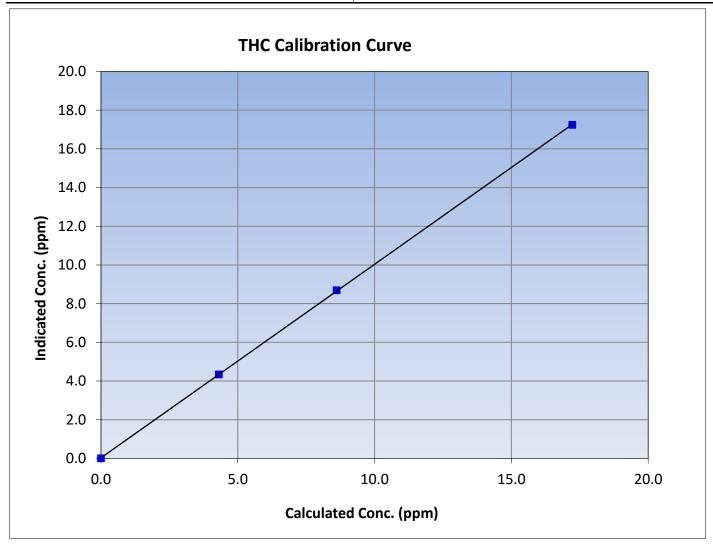
### **THC Calibration Summary**

Version-01-2020

### **Station Information**

Calibration Date: May 5, 2023 **Previous Calibration:** April 25, 2023 Station Name: Mannix Station Number: AMS05 Start Time (MST): 12:28 End Time (MST): 15:16 Analyzer make: Thermo 55i Analyzer serial #: 1152430011

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999981	≥0.995
17.23	17.24	0.9991	Correlation Coemicient	0.555561	20.555
8.61	8.69	0.9914	Slope	1.000806	0.90 - 1.10
4.31	4.34	0.9925	Slope	1.000800	0.90 - 1.10
			Intercept	0.024800	+/-0.5





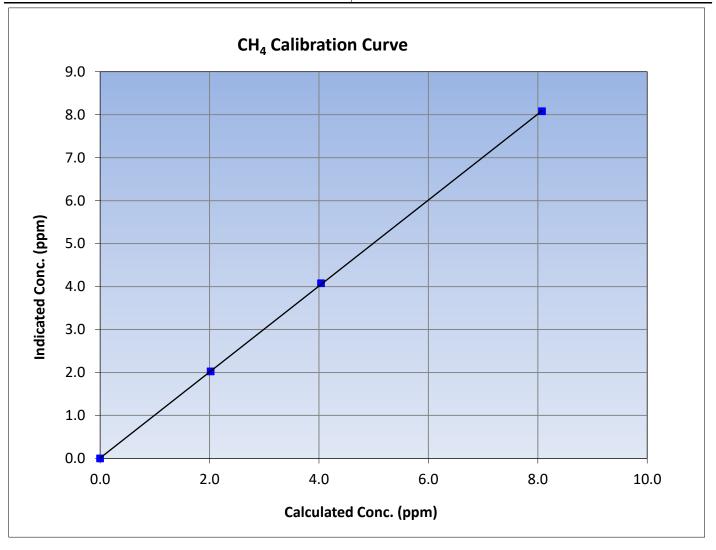
# **CH<sub>4</sub> Calibration Summary**

Version-01-2020

### **Station Information**

Calibration Date: May 5, 2023 **Previous Calibration:** April 25, 2023 Station Name: Mannix Station Number: AMS05 Start Time (MST): 12:28 End Time (MST): 15:16 Analyzer make: Thermo 55i Analyzer serial #: 1152430011

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999976	≥0.995
8.08	8.08	0.9998	Correlation Coemicient	0.333370	20.333
4.04	4.08	0.9912	Slope	1.000481	0.90 - 1.10
2.02	2.03	0.9973	Slope	1.000461	0.90 - 1.10
			Intercept	0.009000	+/-0.5





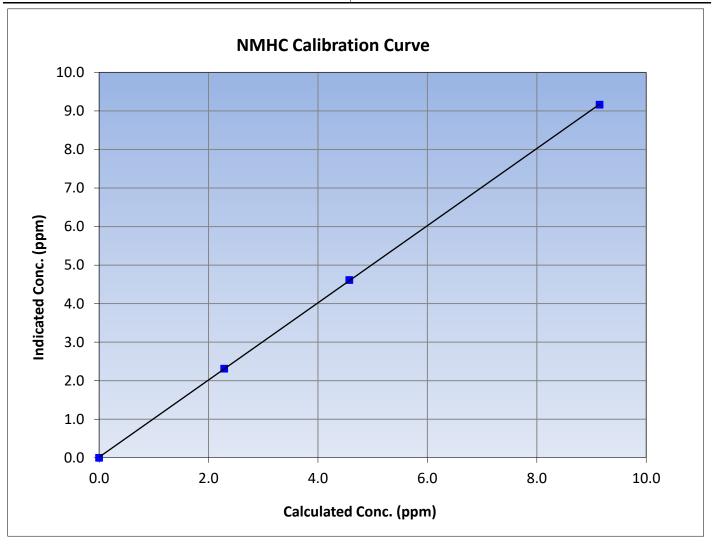
### **NMHC Calibration Summary**

Version-01-2020

### **Station Information**

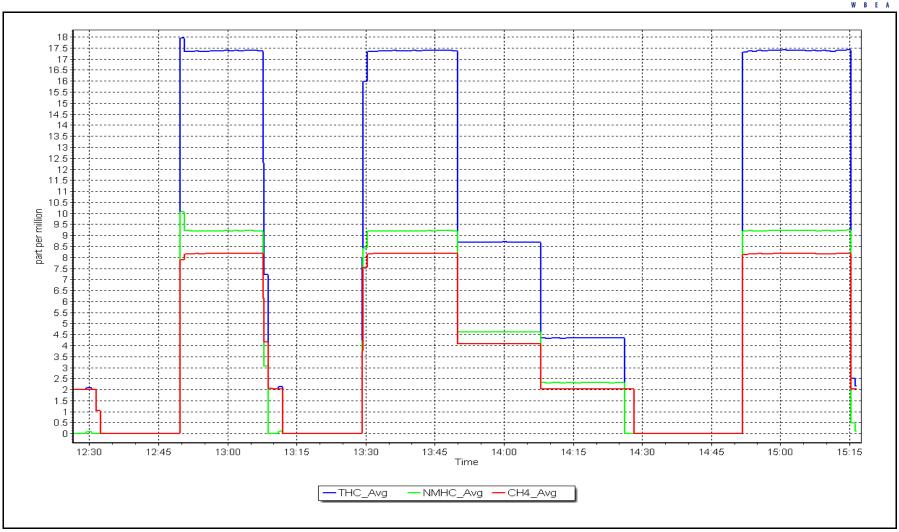
Calibration Date: May 5, 2023 **Previous Calibration:** April 25, 2023 Station Name: Mannix Station Number: AMS05 Start Time (MST): 12:28 End Time (MST): 15:16 Analyzer make: Thermo 55i Analyzer serial #: 1152430011

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999983	≥0.995
9.15	9.16	0.9984	Correlation Coemicient	0.999965	20.555
4.57	4.61	0.9915	Slope	1.001131	0.90 - 1.10
2.29	2.31	0.9887	Slope	1.001131	0.90 - 1.10
			Intercept	0.015400	+/-0.5



**NMHC Calibration Plot** Date: May 5, 2023 Location: Mannix







### THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

#### **Station Information**

Station Name: Mannix
Calibration Date: May 8, 2023
Start time (MST): 9:09

Reason: Maintenance

Station number: AMS05 Last Cal Date: May 5, 2023

End time (MST): 11:50

#### **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<sub>4</sub>):

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: 2.65E-04 2.66E-04 NMHC SP Ratio: 4.42E-05 4.41E-05 CH4 Retention time: 15.00 NMHC Peak Area: 15.20 206898 207349

### **THC Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (	Cc) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.0	17.23	17.26	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	80.0	17.23	17.26	0.998
second point	4960	40.0	8.61	8.61	1.000
third point	4980	20.0	4.31	4.31	0.999
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.0	17.23	17.25	0.998
				Average Correction Factor	0.999
Baseline Corr AF:	17.26	Prev response	17.26	*% change	0.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	

Baseline Corr 3rd AF:

NA

AF Correlation:

\* =>+/-5% change initiates investigation



NMHC Cal Slope:

NMHC Cal Offset:

# **Wood Buffalo Environmental Association**

# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

WDEA					Version-01-2
		NMHC Calibr	ation Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (0	Cc) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i>
as found zero	5000	0	0.00	0.00	
as found span	4920	80	9.15	9.20	0.995
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	9.18	0.997
second point	4960	40	4.57	4.59	0.997
third point	4980	20	2.29	2.30	0.994
as left zero	5000	0	0.00	0.00	
as left span	4920	80	9.15	9.16	0.998
			P	verage Correction Factor	0.996
Baseline Corr AF:	9.20	Prev response	9.17	*% change	0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (0	,	CF <i>Limit=</i> 0.95-1.0
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.0	8.08	8.07	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4920	80.0	8.08	8.08	1.000
second point	4960	40.0	4.04	4.02	1.004
third point	4980	20.0	2.02	2.01	1.005
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.0	8.08	8.09	0.998
				verage Correction Factor	1.003
Baseline Corr AF:	8.07	Prev response	8.09	*% change	-0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
		Calibration	Statistics		
		<u>Start</u>		<u>Finish</u>	
THC Cal Slope:		1.000806		1.001881	
THC Cal Offset:		0.024800		-0.005800	
CH4 Cal Slope:		1.000481		1.000679	
CH4 Cal Offset:		0.009000		-0.008200	

Notes: Maintenance. Adjusted span only to fix the dipping issue.

1.001131

0.015400

Calibration Performed By: Denny Ray estador and Mohammed Kashif

1.002855

0.003000



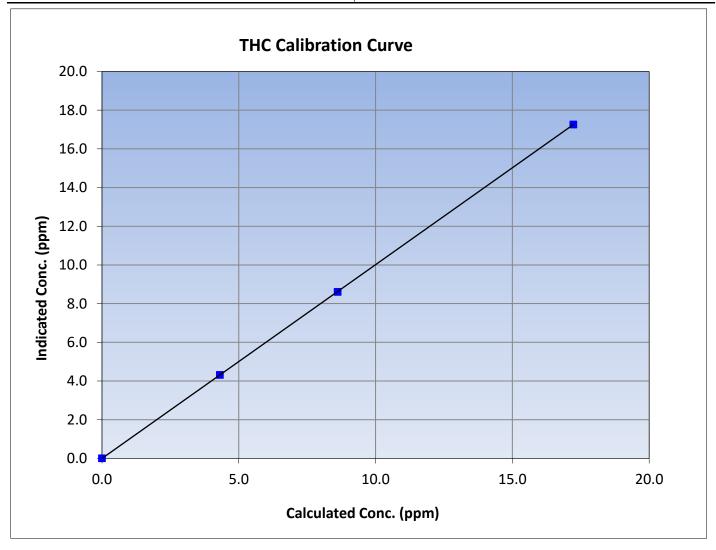
### **THC Calibration Summary**

Version-01-2020

### **Station Information**

**Previous Calibration:** Calibration Date: May 8, 2023 May 5, 2023 Station Name: Mannix Station Number: AMS05 9:09 Start Time (MST): End Time (MST): 11:50 Analyzer make: Thermo 55i Analyzer serial #: 1152430011

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999998	≥0.995
17.23	17.26	0.9981	Correlation Coefficient	0.555556	20.535
8.61	8.61	1.0003	Slope	1.001881	0.90 - 1.10
4.31	4.31	0.9992	Slope	1.001001	0.90 - 1.10
			Intercept	-0.005800	+/-0.5





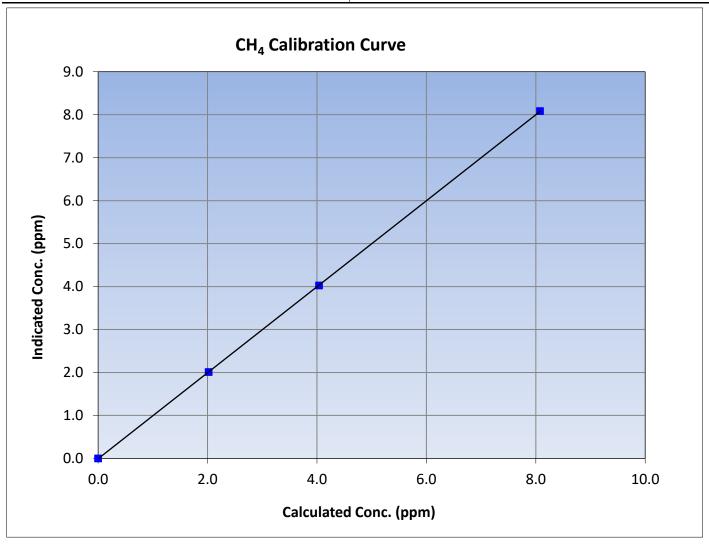
# **CH<sub>4</sub> Calibration Summary**

Version-01-2020

### **Station Information**

Calibration Date: May 8, 2023 **Previous Calibration:** May 5, 2023 Station Name: Mannix Station Number: AMS05 Start Time (MST): 9:09 End Time (MST): 11:50 Analyzer make: Thermo 55i Analyzer serial #: 1152430011

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999993	≥0.995
8.08	8.08	0.9996	Correlation Coefficient	0.555555	20.333
4.04	4.02	1.0040	Slope	1.000679	0.90 - 1.10
2.02	2.01	1.0053	Slope	1.000079	0.90 - 1.10
			Intercept	-0.008200	+/-0.5





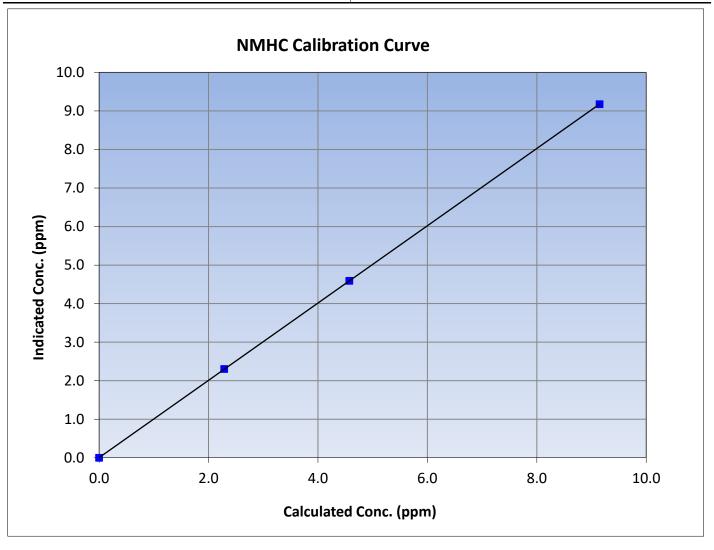
### **NMHC Calibration Summary**

Version-01-2020

### **Station Information**

Calibration Date: May 8, 2023 **Previous Calibration:** May 5, 2023 Station Name: Mannix Station Number: AMS05 9:09 Start Time (MST): End Time (MST): 11:50 Analyzer make: Thermo 55i Analyzer serial #: 1152430011

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.99999	≥0.995
9.15	9.18	0.9969	Correlation Coefficient	0.55555	20.333
4.57	4.59	0.9967	Slope	1.002855	0.90 - 1.10
2.29	2.30	0.9939	Slope	1.002833	0.90 - 1.10
			Intercept	0.003000	+/-0.5

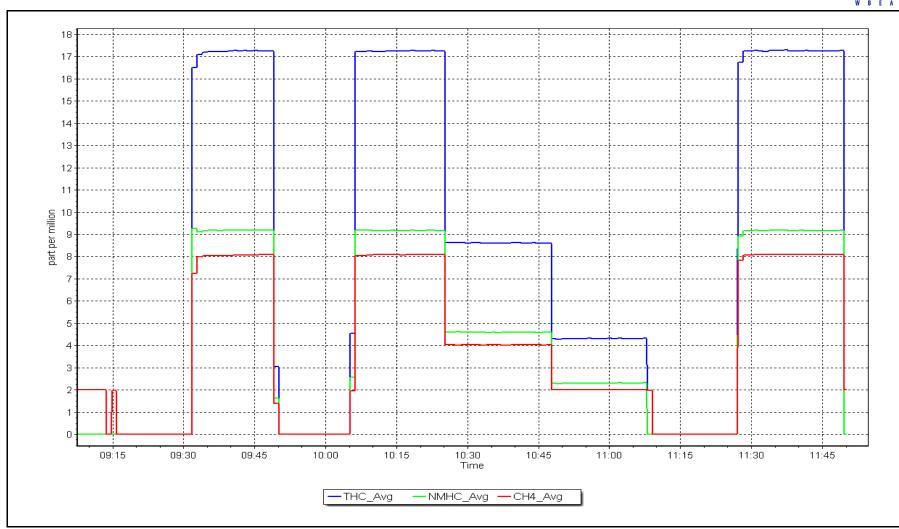


**NMHC Calibration Plot** 

Date: May 8, 2023

Location: Mannix







### WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

# AMS06 PATRICIA MCINNES MAY 2023

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

August 30, 2023

Revision 01



### **SO<sub>2</sub> Calibration Report**

Version-01-2020

#### **Station Information**

Station Name: Patricia McInnes
Calibration Date: May 17, 2023

Start time (MST): 8:19
Reason: Routine

Station number: AMS06
Last Cal Date: April 13, 2023

End time (MST): 12:26

**Calibration Standards** 

Cal Gas Concentration: 49.78

Cal Gas Cylinder #: AAL070632

Removed Cal Gas Conc: 49.78
Removed Gas Cyl #: N/A

Calibrator Make/Model: API T700
ZAG Make/Model: API T701

Notes:

Calibration Performed By:

ppm Cal Gas Exp Date: September 9, 2024

Rem Gas Exp Date: N/A

Diff between cyl: Serial Number: 689

Serial Number: 3566

**Analyzer Information** 

Analyzer make: Thermo 43i Analyzer serial #: 1160290013

Analyzer Range 0 - 1000 ppb

<u>Start</u> <u>Finish</u>

ppm

Calibration slope: 1.001234 0.998732 Backgd or Offset: Calibration intercept: 1.539845 1.940243 Coeff or Slope:

Ct. d

 Start
 Finish

 17.2
 17.2

 0.907
 0.901

\* = > +/-5% change initiates investigation

### SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)  Limit = 0.95-1.05
as found zero	5000	0.0	0.0	-0.1	
as found span	4920	80.3	799.5	801.5	0.997
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	
high point	4920	80.3	799.5	799.5	1.000
second point	4960	40.2	400.2	402.5	0.994
third point	4980	20.1	200.1	203.7	0.982
as left zero	5000	0.0	0.0	-0.2	
as left span	4920	80.3	799.5	800.3	0.999
			Averag	ge Correction Factor	0.992

Baseline Corr As found: 801.60 Previous response 801.99 \*% change 0.0% Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept:

Baseline Corr 3rd AF pt: NA AF Correlation:

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

Max Farrell



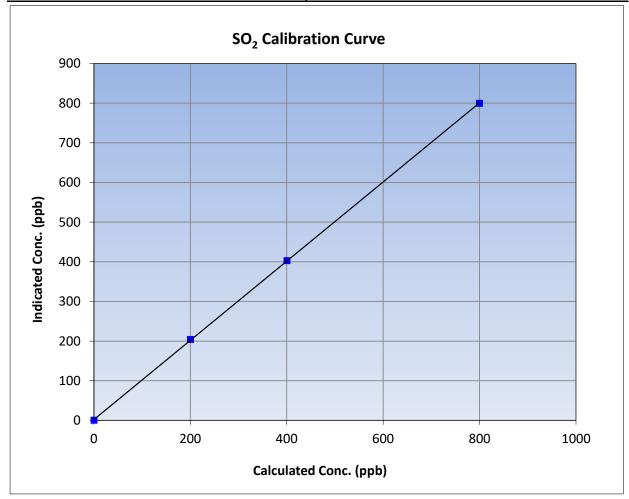
## **SO<sub>2</sub> Calibration Summary**

Version-01-2020

#### **Station Information**

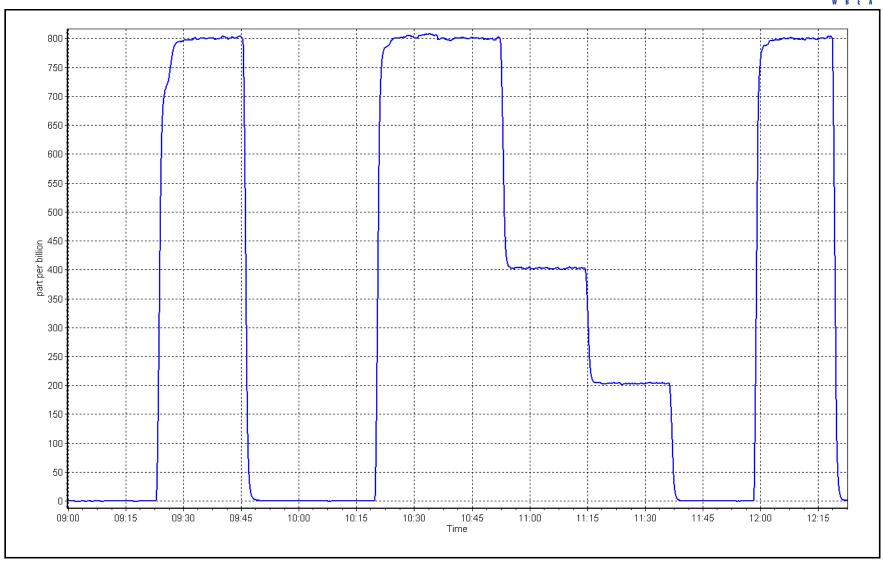
Calibration Date: May 17, 2023 **Previous Calibration:** April 13, 2023 Station Name: Patricia McInnes Station Number: AMS06 Start Time (MST): 8:19 End Time (MST): 12:26 Analyzer make: Thermo 43i Analyzer serial #: 1160290013

Calibration Data								
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.0	0.1		Correlation Coefficient	0.999976	≥0.995			
799.5	799.5	1.0000	Correlation Coefficient	0.333370	20.993			
400.2	402.5	0.9944	Slope	0.998732	0.90 - 1.10			
200.1	203.7	0.9824	Slope	0.996732	0.90 - 1.10			
			- Intercept	1.940243	+/-30			



SO2 Calibration Plot Date: May 17, 2023 Location: Patricia McInnes







### **H2S Calibration Report**

Version-11-2021

**Station Information** 

Station Name: Patricia McInnes
Calibration Date: May 3, 2023
Start time (MST): 8:14
Reason: Routine

Station number: AMS 06 Last Cal Date: April 5, 2023 End time (MST): 14:10

**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: Global G150 Converter serial #: 2022-195

Analyzer Range 0 - 100 ppb

**Finish** <u>Start</u> <u>Finish</u> <u>Start</u> 0.998919 Backgd or Offset: Calibration slope: 0.992200 1.84 1.91 Calibration intercept: 0.277270 0.217144 Coeff or Slope: 1.070 1.107

**H2S 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	75.8	1.055
as found 2nd point	4963	37.2	40.0	38.2	1.048
as found 3rd point	4981	18.6	20.0	19.2	1.042
new cylinder response					

#### **H2S Calibration Data**

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	0.1	
high point	4926	74.3	79.9	80.0	0.999
second point	4963	37.2	40.0	40.3	0.993
third point	4981	18.6	20.0	20.3	0.986
as left zero	5000	0.0	0.0	0.1	
as left span	4926	74.3	79.9	80.6	0.992
SO2 Scrubber Check	4920	80.3	803.0	0.1	
Date of last scrubber chang	ge:	December 20, 2021		Ave Corr Factor	0.993

Date of last scrubber change:	December 20, 2021	Ave Corr Factor	0.993
Date of last converter efficiency test:			efficiency

Baseline Corr As found: 75.8 -5.0% Prev response: 79.60 \*% change: Baseline Corr 2nd AF pt: 0.138294 38.2 AF Slope: 0.947594 AF Intercept: Baseline Corr 3rd AF pt: 0.999983 19.2 AF Correlation:

\* = > +/-5% change initiates investigation

As found span is 5.5% low, suspecting the dry ambient air has caused this change. Changed the Notes: inlet filter after as founds and hydrated the scrubber beads for 45 minutes. Ran a SO2 scrubber

check after the calibrator zero. Adjusted the span only.

Calibration Performed By: Max Farrell



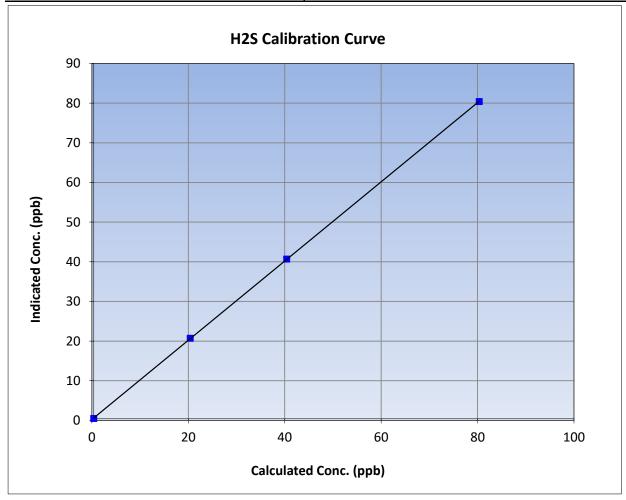
## **H2S Calibration Summary**

Version-11-2021

#### **Station Information**

**Previous Calibration:** Calibration Date: May 3, 2023 April 5, 2023 Station Name: Patricia McInnes Station Number: AMS 06 Start Time (MST): 8:14 End Time (MST): 14:10 Analyzer make: Thermo 43i TLE Analyzer serial #: 1218153358

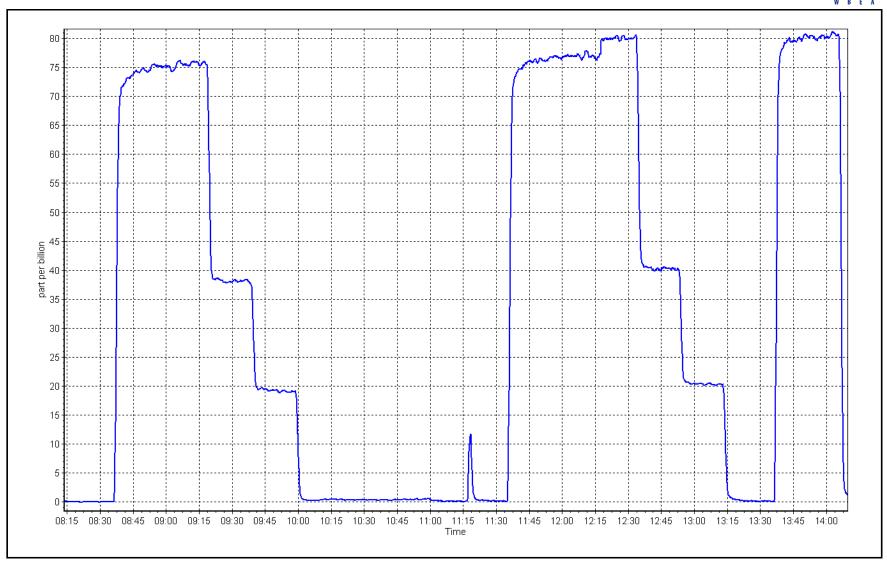
Calibration Data								
Calculated concentration Indicated concentration Correction factoring (ppb) (Cc) (ppb) (Ic) (Cc/Ic)			Statistical Evalua	ation	<u>Limits</u>			
0.0	0.1		Correlation Coefficient	0.999989	≥0.995			
79.9	80.0	0.9993	Correlation Coefficient	0.333363	20.333			
40.0	40.3	0.9932	Slope	0.998919	0.90 - 1.10			
20.0	20.3	0.9860	Slope	0.556515	0.90 - 1.10			
			- Intercept	0.217144	+/-3			



**H2S Calibration Plot** Date: May 3, 2023

Location: Patricia McInnes







### **H2S Calibration Report**

Version-11-2021

<u>Finish</u>

1.91

1.107

**Station Information** 

Station Name: Patricia McInnes
Calibration Date: May 8, 2023
Start time (MST): 12:13

Reason: Cylinder Change

Station number: AMS 06 Last Cal Date: May 3, 2023 End time (MST): 14:10

**Calibration Standards** 

Cal Gas Concentration: 5.33 ppm Cal Gas Exp Date: February 14, 2025

ppm

Cal Gas Cylinder #: CC506659

Removed Cal Gas Conc: 5.38

Removed Gas Cyl #: EY0000809
Calibrator Make/Model: API T700
ZAG Make/Model: API T701 H

Cal Gas Exp Date: February 14, 2025

Analyzer serial #: 1218153358

Converter serial #: 2022-195

Rem Gas Exp Date: March 2, 2023
Diff between cyl: -2.3%
Serial Number: 3566
Serial Number: 689

**Analyzer Information** 

Analyzer make: Thermo 43i TLE
Converter make: Global G150

Analyzer Range 0 - 100 ppb

<u>Start</u> <u>Finish</u>

Calibration slope: 0.998919 Calibration intercept: 0.217144 <u>Start</u>

Backgd or Offset: 1.91 Coeff or Slope: 1.107

#### **H2S As Found Data**

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) Limit = 0.90-1.10
as found zero	5000	0.0	0.0	0.0	
as found span	4926	74.3	79.9	76.9	1.040
as found 2nd point					
as found 3rd point					
new cylinder response	4925	75.1	80.0	75.3	1.063

#### **H2S Calibration Data**

Set Point	Dilution air flow 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	:	December 20, 2021		Ave Corr Factor	
Date of last converter efficiency test:				е	efficiency
Baseline Corr As found: Baseline Corr 2nd AF pt:	76.9 NA	Prev response: AF Slope:	80.07 NA	*% change: AF Intercept:	-4.1% NA
Baseline Corr 3rd AF pt:	NA NA	AF Correlation:	NA NA	Ar intercept.	IVA
baseline con siu Ai pt.	IVA	Ai Correlation.	IVA	* = > +/-5% change initiates	investigation

Notes: Changed the H2S cylinder after as founds. As found is low, suspecting the scrubber beads are

starting to go bad, will be back tomorrow to change the beads.

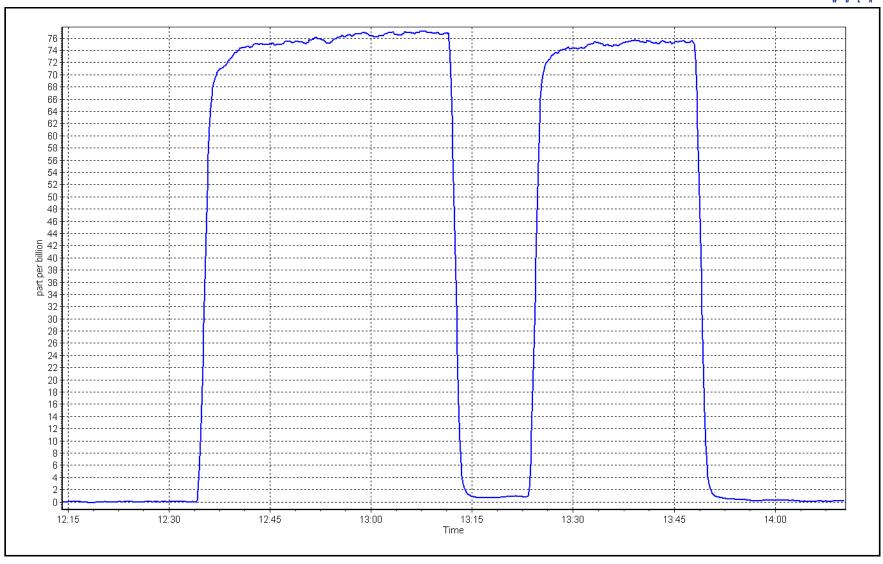
Calibration Performed By: Max Farrell

**H2S Calibration Plot** 

Date: May 8, 2023

Location: Patricia McInnes







### **H2S Calibration Report**

Version-11-2021

**Station Information** 

Station Name: Patricia McInnes
Calibration Date: May 9, 2023

Start time (MST): 8:21

Reason: Maintenance

Station number: AMS 06 Last Cal Date: May 3, 2

Last Cal Date: May 3, 2023 End time (MST): 13:52

**Calibration Standards** 

Cal Gas Concentration: 5.33 ppm Cal Gas Exp Date: February 14, 2025

Cal Gas Cylinder #: CC506659

Removed Cal Gas Conc: 5.33 ppm Rem Gas Exp Date: February 14, 2025

Removed Gas Cyl #: 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: Global G150 Converter serial #: 2022-195

Analyzer Range 0 - 100 ppb

**Finish** <u>Finish</u> <u>Start</u> <u>Start</u> 1.001170 Backgd or Offset: Calibration slope: 0.992200 1.91 2.03 0.480293 Calibration intercept: 0.277270 Coeff or Slope: 1.186 1.107

**H2S As Found Data** 

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) Limit = 0.90-1.10
as found zero	5000	0.0	0.0	0.0	
as found span	4925	75.1	80.0	76.7	1.043
as found 2nd point	4963	37.5	40.0	38.5	1.038
as found 3rd point	4981	18.8	20.0	19.3	1.038
new cylinder response					

#### **H2S Calibration Data**

Set Point	Dilution air flow 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	75.1	80.0	80.3	0.997
second point	4963	37.5	40.0	40.9	0.977
third point	4981	18.8	20.0	20.9	0.959
as left zero	5000	0.0	0.0	0.7	
as left span	4925	75.1	80.0	80.3	0.997
SO2 Scrubber Check	4920	80.3	803.0	0.1	
Date of last scrubber chang	ge:	December 20, 2021		Ave Corr Factor	0.977
D . C1					CC1 .

Date of last scrubber change:	December 20, 2021	Ave Corr Factor	0.977
Date of last converter efficiency test:			efficiency

Baseline Corr As found: 76.7 79.68 -3.9% Prev response: \*% change: Baseline Corr 2nd AF pt: 38.5 AF Slope: 0.958319 AF Intercept: 0.080219 Baseline Corr 3rd AF pt: AF Correlation: 0.999991 19.3

\* = > +/-5% change initiates investigation

The span has drifted down since the last calibration. Completed multipoint as founds and changed the SO2 scrubber beads. Adjusted the span only.

Calibration Performed By: Max Farrell

Notes:



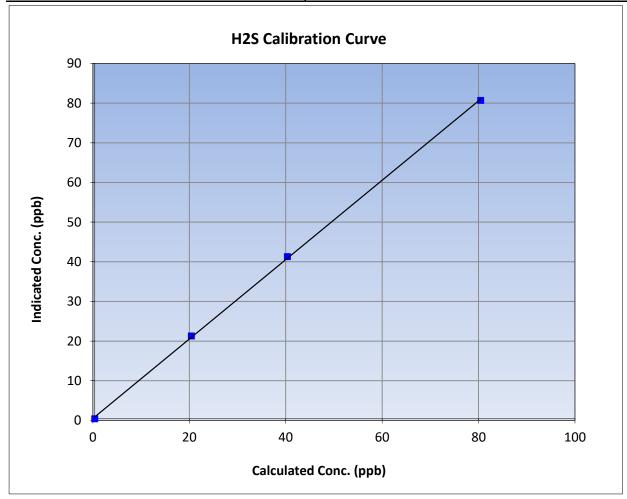
## **H2S Calibration Summary**

Version-11-2021

#### **Station Information**

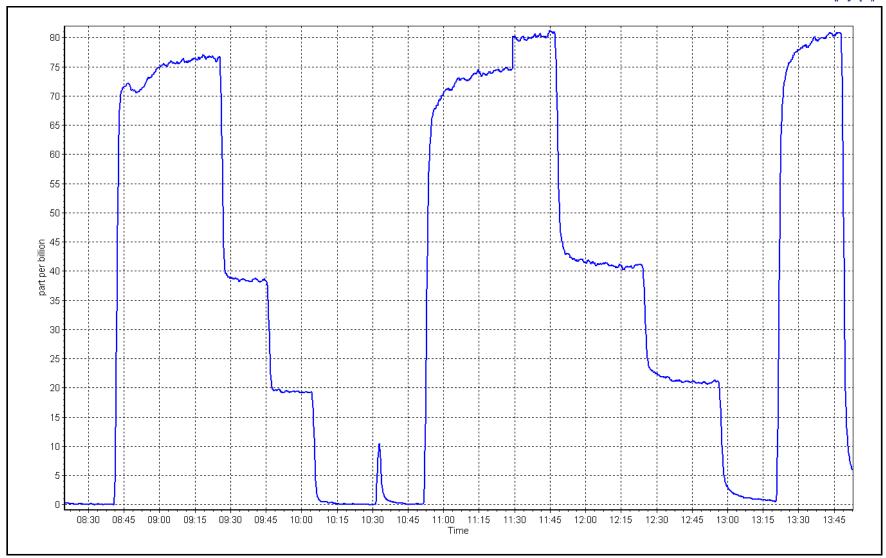
**Previous Calibration:** Calibration Date: May 9, 2023 May 3, 2023 Station Name: Patricia McInnes Station Number: AMS 06 Start Time (MST): 8:21 End Time (MST): 13:52 Analyzer make: Thermo 43i TLE Analyzer serial #: 1218153358

Calibration Data								
Calculated concentration Indicated concentration (ppb) (Cc) (ppb) (Ic)		Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.0	0.0		Correlation Coefficient	0.999822	≥0.995			
80.0	80.3	0.9966	Correlation Coefficient	0.999022	20.993			
40.0	40.9	0.9769	Slope	1.001170	0.90 - 1.10			
20.0	20.9	0.9586	Siope	1.001170	0.90 - 1.10			
			- Intercept	0.480293	+/-3			



**H2S Calibration Plot** Date: May 9, 2023 Location: Patricia McInnes







### **H2S Calibration Report**

Version-11-2021

**Station Information** 

Station Name: Patricia McInnes Calibration Date: May 12, 2023

Start time (MST): 9:12

Reason: Maintenance Station number: AMS 06 Last Cal Date:

May 9, 2023 End time (MST): 12:29

**Calibration Standards** 

Cal Gas Concentration: 5.33 ppm Cal Gas Exp Date: February 14, 2025

Cal Gas Cylinder #: CC506659

Removed Cal Gas Conc: Rem Gas Exp Date: February 14, 2025 5.33 ppm

Diff between cyl: Removed Gas Cyl #:

Calibrator Make/Model: API T700 3566 Serial Number: ZAG Make/Model: API T701 H Serial Number: 689

**Analyzer Information** 

Analyzer make: Thermo 43i TLE Analyzer serial #: 1218153358 Converter serial #: 2022-195 Converter make: Global G150

Analyzer Range 0 - 100 ppb

**Finish** <u>Start</u>

<u>Finish</u> <u>Start</u> 1.001170 Backgd or Offset: Calibration slope: 0.996460 2.03 1.82 0.480293 0.320162 Coeff or Slope: 1.069 Calibration intercept: 1.186

**H2S As Found Data** 

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) Limit = 0.90-1.10
as found zero	5000	0.0	0.0	0.0	
as found span	4925	75.1	80.0	88.8	0.901
as found 2nd point					
as found 3rd point					
new cylinder response					

#### **H2S Calibration Data**

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	0.2	
high point	4925	75.1	80.0	80.0	1.000
second point	4963	37.5	40.0	40.2	0.994
third point	4981	18.8	20.0	20.4	0.982
as left zero	5000	0.0	0.0	0.1	
as left span	4925	75.1	80.0	79.8	1.003

SO2 Scrubber Check

Date of last scrubber change	December 20, 2021		Ave Corr Factor	0.992	
Date of last converter efficiency test: efficiency					
Baseline Corr As found:	88.8	Prev response:	80.60	*% change:	9.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:	NA	AF Intercept:	NA

Baseline Corr 2nd AF pt: AF Slope: Baseline Corr 3rd AF pt: NA AF Correlation: NA

\* = > +/-5% change initiates investigation

The span has drifted up by 9% since the last calibration, it seems that maybe the smoky weather Notes: might have caused the drift instead of the scrubber beads. Adjusted the span only.

Calibration Performed By: Max Farrell



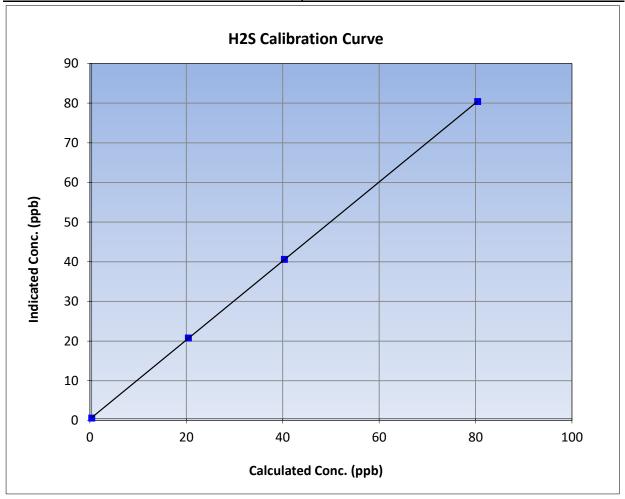
## **H2S Calibration Summary**

Version-11-2021

#### **Station Information**

**Previous Calibration:** Calibration Date: May 12, 2023 May 9, 2023 Station Name: Patricia McInnes Station Number: AMS 06 Start Time (MST): 9:12 End Time (MST): 12:29 Analyzer make: Thermo 43i TLE Analyzer serial #: 1218153358

Calibration Data								
Calculated concentration Indicated concentration (ppb) (Cc) (ppb) (Ic)		Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.0	0.2		Correlation Coefficient	0.999990	≥0.995			
80.0	80.0	1.0003	Correlation coefficient	0.555550	20.993			
40.0	40.2	0.9939	Slope	0.996460	0.90 - 1.10			
20.0	20.4	0.9821	Slope	0.990400	0.90 - 1.10			
			- Intercept	0.320162	+/-3			

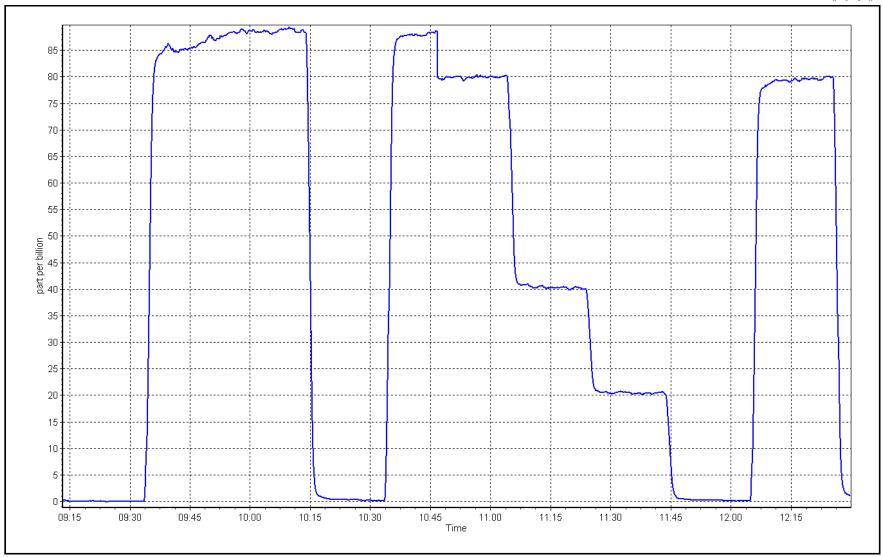


H2S Calibration Plot

Date: May 12, 2023

Location: Patricia McInnes







## THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

#### **Station Information**

Station Name: Patricia McInnes
Calibration Date: May 17, 2023

Start time (MST): 8:18
Reason: Routine

Station number: AMS06

Last Cal Date: April 13, 2023

End time (MST): 12:26

### **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<sub>4</sub>): 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** 3.57E-04 CH4 SP Ratio: 3.33E-04 NMHC SP Ratio: 5.96E-05 5.86E-05 CH4 Retention time: 14 14.6 NMHC Peak Area: 154840 152338

### **THC Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Co	c) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>	
as found zero	5000	0.0	0.00	0.00		
as found span	4920	80.3	17.12	16.58	1.033	
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	17.17	0.997	
second point	4960	40.2	8.57	8.58	1.000	
third point	4980	20.1	4.29	4.32	0.992	
as left zero	5000	0.0	0.00	0.00		
as left span	4920	80.3	17.12	17.03	1.006	
			A۱	verage Correction Factor	0.996	
Baseline Corr AF:	16.58	Prev response	17.02	*% change	-2.7%	
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:		
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation		



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

NΝ	ΛН	C	Cal	ibra	ition	Data
1411	/	•	Lai	IDIG	ILIUI	ı Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (	Cc) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>	
as found zero	5000	0	0.00	0.00		
as found span	4920	80.3	9.07	8.76	1.035	
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	9.10	0.996	
second point	4960	40.2	4.54	4.56	0.995	
third point	4980	20.1	2.27	2.30	0.988	
as left zero	5000	0	0.00	0.00		
as left span	4920	80.3	9.07	9.04	1.003	
			Į.	Average Correction Factor	0.993	
Baseline Corr AF:	8.76	Prev response	9.05	*% change	-3.3%	
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 <i>Limit= 0.95-1.05</i>	
as found zero	5000	0.0	0.00	0.00		
as found span	4920	80.3	8.06	7.82	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	8.06	8.07	0.998	
second point	4960	40.2	4.03	4.02	1.004	
third point	4980	20.1	2.02	2.02	0.997	
as left zero	5000	0.0	0.00	0.00		
as left span	4920	80.3	8.06	7.99	1.009	
			Į.	Average Correction Factor	1.000	
Baseline Corr AF:	7.82	Prev response	7.98	*% change	-2.0%	
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:		
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation		

### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
THC Cal Slope:	0.993826	1.002022
THC Cal Offset:	0.007564	0.005131
CH4 Cal Slope:	0.990693	1.001093
CH4 Cal Offset:	-0.004180	-0.003602
NMHC Cal Slope:	0.996672	1.003075
NMHC Cal Offset:	0.010746	0.008332

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

Calibration Performed By: Max Farrell



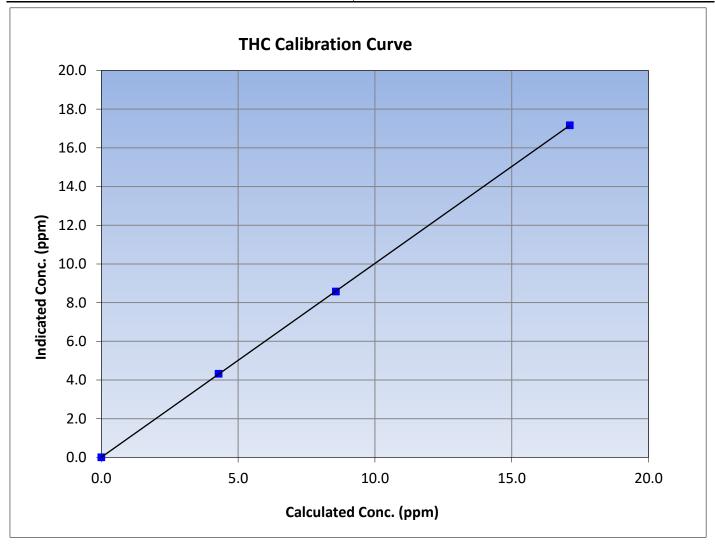
## **THC Calibration Summary**

Version-01-2020

#### **Station Information**

May 17, 2023 Calibration Date: **Previous Calibration:** April 13, 2023 Station Name: Patricia McInnes Station Number: AMS06 Start Time (MST): 8:18 End Time (MST): 12:26 Analyzer make: Thermo 55i Analyzer serial #: 1180320037

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999995	≥0.995
17.12	17.17	0.9974	Correlation Coefficient	0.555555	20.333
8.57	8.58	0.9995	Slope	1.002022	0.90 - 1.10
4.29	4.32	0.9924	Slope		0.90 - 1.10
			Intercept	0.005131	+/-0.5





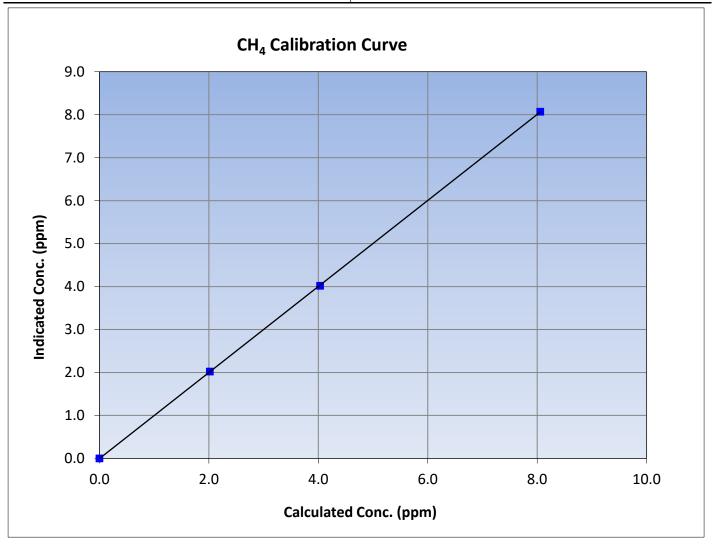
# **CH<sub>4</sub> Calibration Summary**

Version-01-2020

#### **Station Information**

May 17, 2023 Calibration Date: **Previous Calibration:** April 13, 2023 Station Name: Patricia McInnes Station Number: AMS06 Start Time (MST): 8:18 End Time (MST): 12:26 Analyzer make: Thermo 55i Analyzer serial #: 1180320037

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999988	≥0.995
8.06	8.07	0.9985	Correlation Coemicient		20.333
4.03	4.02	1.0042	Slope	1.001093	0.90 - 1.10
2.02	2.02	0.9972	Slope	1.001093	0.90 - 1.10
			Intercept	-0.003602	+/-0.5





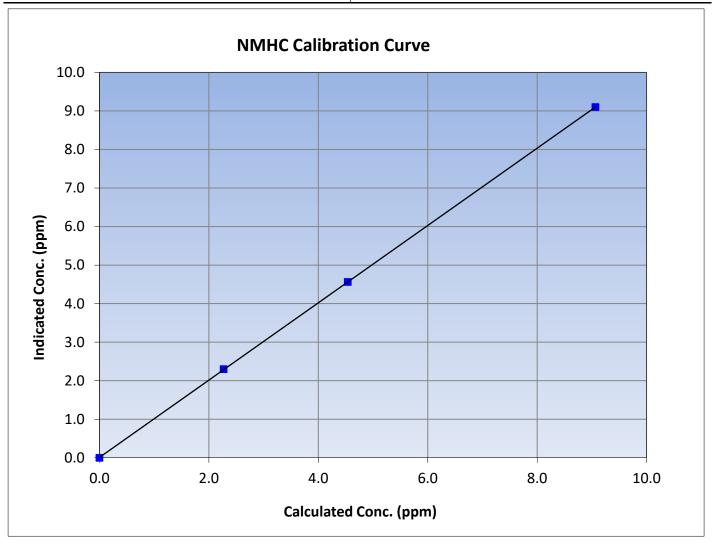
## **NMHC Calibration Summary**

Version-01-2020

### **Station Information**

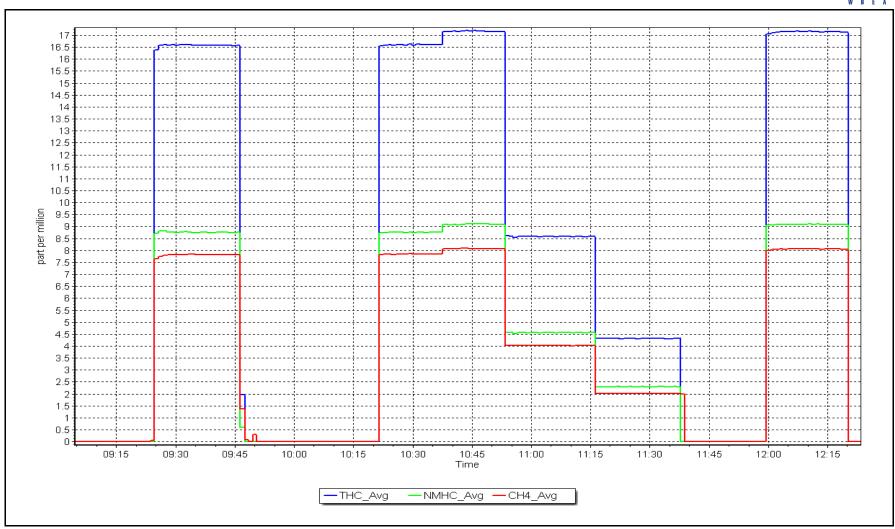
May 17, 2023 Calibration Date: **Previous Calibration:** April 13, 2023 Station Name: Patricia McInnes Station Number: AMS06 Start Time (MST): 8:18 End Time (MST): 12:26 Analyzer make: Thermo 55i Analyzer serial #: 1180320037

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999995	≥0.995
9.07	9.10	0.9963	Correlation Coemicient		20.333
4.54	4.56	0.9954	Clara	1.003075	0.90 - 1.10
2.27	2.30	0.9881	Slope	1.003073	0.90 - 1.10
			Intercept	0.008332	+/-0.5



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







## NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

#### **Station Information**

Station Name: Patricia McInnes Calibration Date: May 1, 2023

Reason: Routine

Start time (MST): 9:03 Station number: AMS06

Last Cal Date: April 4, 2023

End time (MST): 13:47

#### **Calibration Standards**

NO Gas Cylinder #: T26D9MR Cal Gas Expiry Date: August 18, 2023

NOX Cal Gas Conc: NO Cal Gas Conc: 52.51 51.98 ppm ppm

Removed Cylinder #: N/A Removed Gas Exp Date: N/A

52.51 Removed Gas NO Conc: Removed Gas NOX Conc: ppm 51.98 ppm

NOX gas Diff: NO gas Diff:

Teledyne API T700 Serial Number: Calibrator Model: 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

<u>Start</u> **Finish** <u>Start</u> **Finish** NO coeff or slope: 0.835 0.835 NO bkgnd or offset: 3.2 3.2 NOX coeff or slope: 0.996 0.996 NOX bkgnd or offset: 3.9 3.9 NO2 coeff or slope: 1.000 1.000 Reaction cell Press: 155.1 154.2

#### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	1.001408	1.001069
NO <sub>x</sub> Cal Offset:	2.760164	1.979986
NO Cal Slope:	0.998955	0.998555
NO Cal Offset:	1.840130	1.080026
NO <sub>2</sub> Cal Slope:	1.006294	1.005730
NO <sub>2</sub> Cal Offset:	1.349835	0.795849



# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

				Dilı	ution Calibration	n Data				
Set Point	Dilution flow rate (sccm)	Source gas flow co	alculated 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	4923	76.9	807.6	799.5	8.2	810.9	797.9	13.0	0.9959	1.0019
as found 2nd		-								
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0		
high point	4923	76.9	807.6	799.5	8.2	809.5	798.9	10.6	0.9977	1.0007
second point	4962	38.5	404.3	400.2	4.1	407.7	401.2	6.5	0.9917	0.9976
third point	4981	19.2	201.6	199.6	2.0	205.7	201.4	4.3	0.9803	0.9911
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.2	-0.1		
as left span	4923	76.9	807.6	387.2	420.5	806.0	386.4	419.6	1.0020	1.0019
							Average C	Correction Factor	r 0.9899	0.9965
Corrected As fo	ound NO <sub>X</sub> =	= 811.0 ppb	NO =	797.9 ppb	* = > +/-5%	% change initiates i	investigation	*Percent Chang	ge NO <sub>x</sub> =	-0.1%
Previous Respo	onse NO <sub>X</sub> =	= 811.5 ppb	NO =	800.5 ppb				*Percent Chang	ge NO =	-0.3%
Baseline Corr 2	2nd pt NO <sub>x</sub> =	NA ppb	NO =	NA ppb	As found	d $NO_X r^2$ :		Nx SI:	Nx Int:	•
Baseline Corr 3	$3rd pt NO_X =$	NA ppb	NO =	NA ppb	As found	d NO $r^2$ :		NO SI:	NO Int:	
					As found	d $NO_2 r^2$ :		NO2 SI:	NO <sub>2</sub> Int:	
				e	GPT Calibration I	Data	-			
O3 Setpo	oint (ppb)	Indicated NO Referen concentration (ppb		cated NO Drop centration (ppb)	Calculated NC concentration (ppl		ndicated NO2 ntration (ppb) (Ic)	NO2 Correction fac Calibration Limit = As Found Limit = 0	= 0.95-1.05 Calibratio	erter Efficiency on Limit = 96-104%
as found	d GPT zero									
as found GPT po	oint (400 ppb NO2)									
as found GPT po	oint (200 ppb NO2)									
as found GPT po	oint (100 ppb NO2)									
1st GPT point	it (400 ppb O3)	796.7		384.4	420.5		422.9	0.9942	2	100.6%
	nt (200 pph O3)	796.7	·	592.2	212.7		216.1	0.9840	0	101.6%
2nd GPT poin	it (200 ppb 03)									
•	nt (100 ppb O3)	796.7		694.1	110.8		112.3	0.9862	2	101.4%

Notes:

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

Calibration Performed By:

Max Farrell



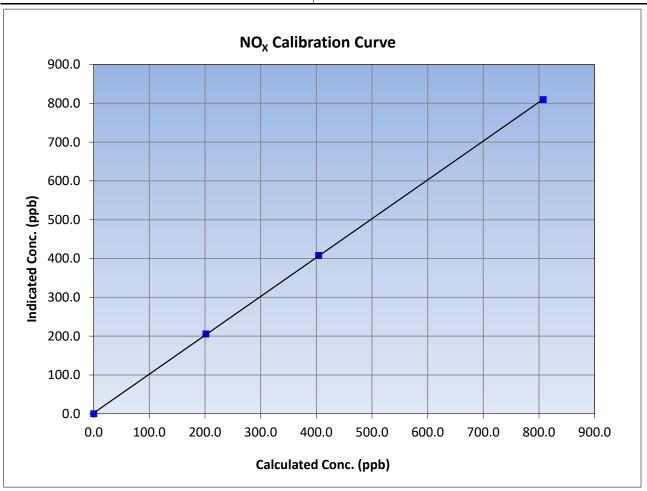
## NO<sub>x</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 1, 2023 **Previous Calibration:** April 4, 2023 Station Name: Patricia McInnes Station Number: AMS06 Start Time (MST): 9:03 End Time (MST): 13:47 Analyzer serial #: Analyzer make: Thermo 42i 1172750022

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	0.1		Correlation Coefficient	0.999975	≥0.995	
807.6	809.5	0.9977	Correlation Coefficient	0.333373	20.555	
404.3	407.7	0.9917	Slope	1.001069	0.90 - 1.10	
201.6	205.7	0.9803	Slope	1.001009	0.90 - 1.10	
			Intercept	1.979986	+/-20	





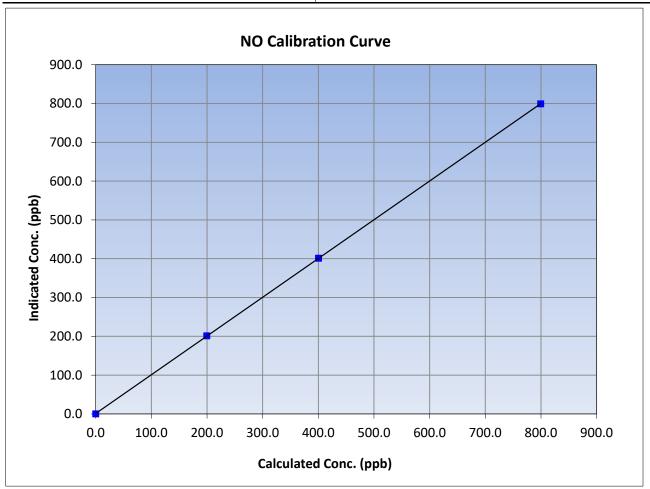
### **NO Calibration Summary**

Version-04-2020

#### **Station Information**

Calibration Date: May 1, 2023 **Previous Calibration:** April 4, 2023 Station Name: Patricia McInnes Station Number: AMS06 Start Time (MST): 9:03 End Time (MST): 13:47 Analyzer make: Thermo 42i Analyzer serial #: 1172750022

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999993	≥0.995
799.5	798.9	1.0007	Correlation Coefficient	0.555555	≥0.993
400.2	401.2	0.9976	Slope	0.998555	0.90 - 1.10
199.6	201.4	0.9911	Slope	0.996555	0.90 - 1.10
			Intercept	1.080026	+/-20





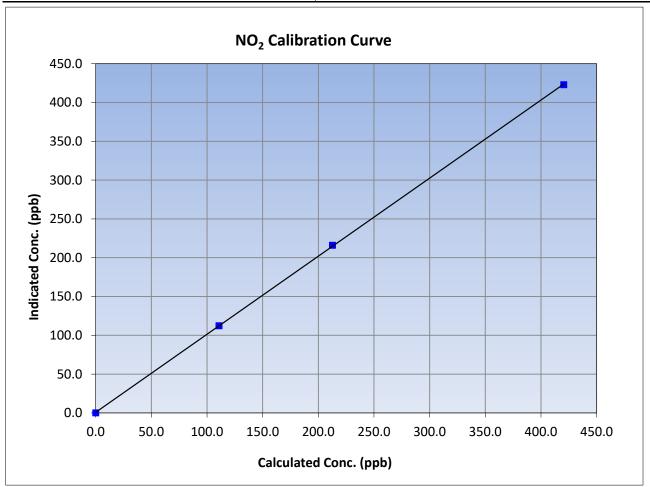
## NO<sub>2</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 1, 2023 **Previous Calibration:** April 4, 2023 Station Name: Patricia McInnes Station Number: AMS06 Start Time (MST): 9:03 End Time (MST): 13:47 Analyzer make: Thermo 42i Analyzer serial #: 1172750022

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	0.0		Correlation Coefficient	0.999966	≥0.995	
420.5	422.9	0.9942	Correlation Coefficient	0.555500	20.555	
212.7	216.1	0.9840	Slope	1.005730	0.90 - 1.10	
110.8	112.3	0.9862	Slope	1.005750	0.90 - 1.10	
			Intercept	0.795849	+/-20	



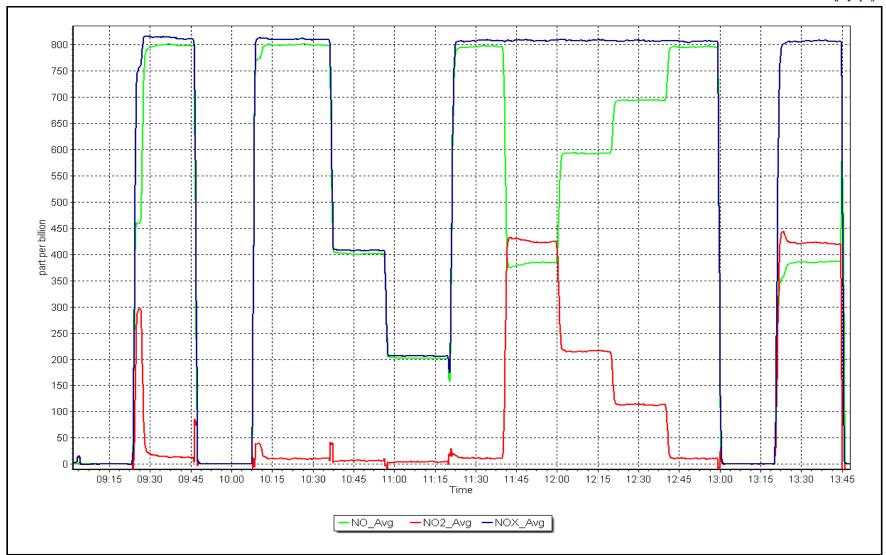
NO<sub>x</sub> Calibration Plot

Date: May 1, 2023

Location

Location: Patricia McInnes







## NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

#### **Station Information**

Station Name: Patricia McInnes
Calibration Date: January 0, 1900

Start time (MST): 10:12

Reason: Cylinder Change

Station number: AMS06

Last Cal Date: May 1, 2023 End time (MST): 12:04

#### **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 #: T26D9MR Removed Gas Exp Date: August 18, 2023

Removed Gas NOX Conc: 52.51 ppm Removed Gas NO Conc: 51.98 ppm

NOX gas Diff:3.5%NO gas Diff:3.6%Calibrator Model:Teledyne API T700Serial Number:3566ZAG make/model:Teledyne API T701Serial Number:689

### **Analyzer Information**

Analyzer make: Thermo 42i Analyzer serial #: 1172750022

NOX Range (ppb): 0 - 1000 ppb

**Start Finish** <u>Start</u> **Finish** NO coeff or slope: 0.835 0.835 NO bkgnd or offset: 3.2 3.2 NOX coeff or slope: 0.996 0.996 NOX bkgnd or offset: 3.9 3.9 NO2 coeff or slope: 1.000 1.000 Reaction cell Press: 154.2 154.2

#### **Calibration Statistics**

<u>Start</u> <u>Finish</u>

 $NO_{X}$  Cal Slope: 1.001069  $NO_{X}$  Cal Offset: 1.979986 NO Cal Slope: 0.998555 NO Cal Offset: 1.080026  $NO_{2}$  Cal Slope: 1.005730  $NO_{2}$  Cal Offset: 0.795849



# $NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

				Dilu	ution Calibration	n Data				
Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) Limit = 0.95-1.05	NO Correction factor (Cc/Ic) Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.0	0.0	0.2	0.2	0.1		
as found span	4923	76.9	807.6	799.5	8.2	810.4	797.4	12.9	0.9965	1.0026
as found 2nd										
as found 3rd										
new cyl resp	4914	86.2	826.5	799.7	26.7	859.9	827.0	32.9	0.9611	0.9670
calibrator zero										
high point										
second point										
third point										
as left zero										
as left span										
							Average C	orrection Factor	•	
Corrected As for	und NO <sub>x</sub> =	810.2 ppb	NO =	797.2 ppb	* = > +/-5%	6 change initiates	sinvestigation	*Percent Chan	ge NO <sub>x</sub> =	0.0%
Previous Respor	nse NO <sub>x</sub> =	810.4 ppb	NO =	799.4 ppb				*Percent Chan	ge NO =	-0.3%
Baseline Corr 2r	nd pt NO <sub>x</sub> =	NA ppb	NO =		As found	d NO <sub>X</sub> r <sup>2</sup>	:	Nx SI:	Nx Int:	
Baseline Corr 3r			NO =	NA ppb	As found	2		NO SI:	NO Int:	
	χ	pp-2		pp2	As found			NO2 SI:	NO <sub>2</sub> Int:	
				G	PT Calibration I	Data				
O3 Setpoi	nt (ppb)	Indicated NO Refe concentration (p		rated NO Drop entration (ppb)	Calculated NC concentration (ppl		ndicated NO2 entration (ppb) (Ic)	NO2 Correction fa Calibration Limit = As Found Limit =	0.95-1.05 Calibratio	rter Efficiency n Limit = 96-104%
as found 0	GPT zero									
as found GPT poin	t (400 ppb NO2)									
as found GPT poin	t (200 ppb NO2)									
as found GPT poin	t (100 ppb NO2)									
1st GPT point (	400 ppb O3)									
2nd GPT point	(200 ppb O3)									
3rd GPT point (	(100 ppb O3)									
						Average C	orrection Factor	-		

Notes:

Changed the NO cylinder after as founds.

Calibration Performed By:

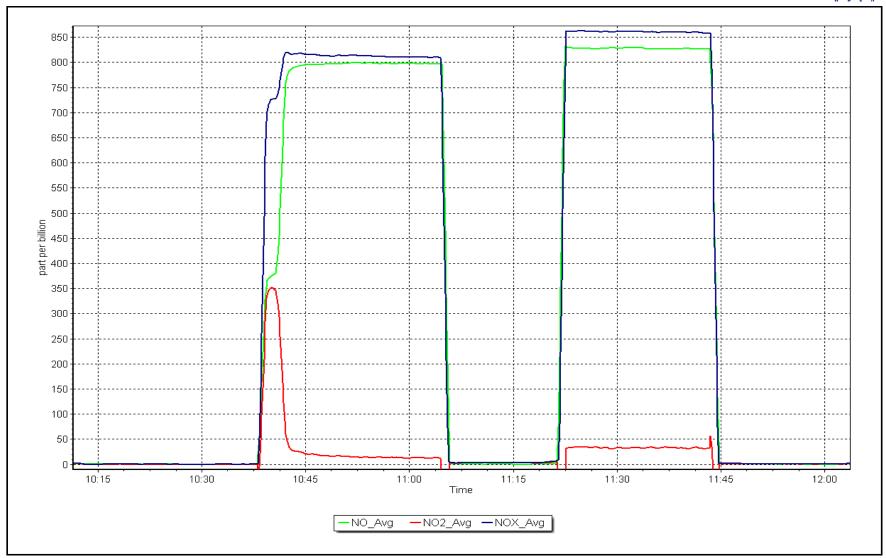
Max Farrell

NO<sub>x</sub> Calibration Plot

Date: January 0, 1900

Location: Patricia McInnes







## TN - NO<sub>x</sub> - NH<sub>3</sub> Calibration Report

Version-05-2023

#### Station Information

Station Name: Patricia McInnes Station number: AMS 06 May 8, 2023 April 27, 2023 NOX Cal Date: Last Cal Date:

10:12 Start time (MST): End time (MST): 12:03

NH3 Cal Date: April 20, 2023 Last Cal Date: March 8, 2023 13:00 14:48 Start time (MST): End time (MST):

NO cylinder change Reason: Cylinder Change

#### **Calibration Standards**

NOX Cal Gas Conc: 47.94 T30YCWN NO Gas Cylinder #: ppm NO Cal Gas Conc: 46.39 NO Cal Gas Expiry: April 11, 2025 ppm Removed NOX Conc: 52.5 Removed Cylinder #: T26D9MR ppm August 18, 2023 Removed NO Conc: 52.0 ppm Removed cyl Expiry: NOX gas Diff: 3.2% NO gas Diff: 3.7% NH3 Cal Gas Conc: 77.8 NH3 Gas Cylinder #: CC710812 ppm NH3 Cal Gas Expiry: March 30, 2023 Removed NH3 Conc: 77.8 Removed Cylinder #: ppm NH3 gas Diff: Removed cyl Expiry:

Calibrator Model:

**API T700 API T701** ZAG make/model:

## **Analyzer Information**

Serial Number:

Serial Number:

3566

**Finish** 

689

Analyzer model: API T201 Analyzer serial #: 152 Converter model: API T501 Converter serial #: 147 Reaction cell Press: 5.70 NH3 Range (ppb): 0 - 2000 ppb NOX Range (ppb): 0 - 1000 ppb Sample Flow:

Start **Finish Start Finish** NO coefficient: 0.833 0.833 TN coefficient: 0.837 0.837 NOX coefficient: 0.839 NO bkgrnd: -0.1 0.839 -0.100 NO2 coefficient: 1.000 1.000 NOX bkgrnd: 0.000 0.0 NH3 coefficient: 0.951 0.951 TN bkgrnd: 0.000 0.0

#### **Calibration Statistics**

Start NO<sub>x</sub> Cal Slope: 1.004262 NO<sub>x</sub> Cal Offset: 2.034812 NO Cal Slope: 1.000294 NO Cal Offset: 0.654848 NO<sub>2</sub> Cal Slope: 1.003690 NO<sub>2</sub> Cal Offset: 0.714817 NH3 Cal Slope: 1.003144 NH3 Cal Offset: 4.931327 TN Cal Slope: 1.008443 TN Cal Offset: 5.257930



# TN - NOX - NH<sub>3</sub> Calibration Report

Version-05-2023

							Dilutio	on Cal	ibratior	Data				
Set Point	Dilution flow rate (sccm)		e gas flow (sccm)	Calculate concenti (ppb)	ration	conce	nted NOX ntration o) (Cc)	conce	ted NH3 ntration o) (Cc)	Indicated TN concentration (ppb) (Ic)	Indicated NOX concentration (ppb) (Ic)	Indicated NH3 concentration (ppb) (Ic)	TN Correction factor (Cc/Ic) Limit = 0.95-1.05	NH3 Correction factor (Cc/Ic) Limit = 0.95-1.05
as found zero														
as found NO														
calibrator zero														
high NO point														
NO/O3 point														
as found NH3														
new NH3 cyl rp														
first NH3														
second NH3														
third NH3														
											Average (	Correction Factor		
Corrected As fo	und TN =	NA	ppb	NO <sub>X</sub> =	NA	ppb	NH3 =	NA	ppb			*Percent Chang	ge TN =	NA
Previous Respo	nse TN =	NA	ppb	NO <sub>X</sub> =	NA	ppb	NH3 =	NA	ppb			*Percent Chang	ge NO <sub>x</sub> =	NA
												*Percent Chang	ge NH3 =	NA
NH3 Previous C	onverter Efficie	ncy =	95.1%									* = > +/-5% change	initiates investigat	ion
NH3 Current Co	nverter Efficien	ncy =	95.1%											



# NO<sub>X</sub> - NO - NO<sub>2</sub> Calibration Report

Version-05-2023

-				-
1)1	liiti∩n	Calı	bration	I)ata

Set Point	Dilution flow rate	Source gas flow	Calculated NOx concentration	Calculated NO concentration	Calculated TN concentration	Indicated NOx concentration	Indicated NO concentration	Indicated TN concentration	NOx Correction factor (Cc/Ic)	NO Correction factor (Cc/Ic)
	(sccm)	(sccm) rate (sccm)		(ppb) (Cc)	(ppb) (Cc)	(ppb) (Ic)	(ppb) (Ic)	(ppb) (Ic)	<i>Limit = 0.95-1.05</i>	<i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	0.2	0.4	1.0		
as found span	4923	76.9	807.6	799.5	807.6	811.2	794.6	811.0	0.9956	1.0061
new NO cyl rp	4914	86.2	826.5	799.7	826.5	857.9	825.0	857.7	0.9633	0.9694
calibrator zero										
high point										
second point										
third point										

				Average Correction Factor	
Baseline Corr As fnd	TN = 810 ppb	NO <sub>X</sub> = 811.0 ppb	NO = 794.2 ppb	*Percent Change	TN = -1.2%
Previous Response	TN = 819.7 ppb	$NO_X = 813.1 ppb$	NO = 800.4 ppb	*Percent Change	$NO_X = -0.3\%$
				*Percent Change	NO = -0.8%
				* = > +/-5% change initiate	es investigation

### **GPT Calibration Data**

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) Calibration Limit = 0.95-1.05 As Found Limit = 0.90-1.10	Converter Efficiency Calibration Limit = 96-104%
as found zero			0.0	-0.2		
calibration zero						
1st GPT point (400 ppb O3)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
		•	Ave	erage Correction Factor		

Notes: Changed the NO cylinder after as founds.

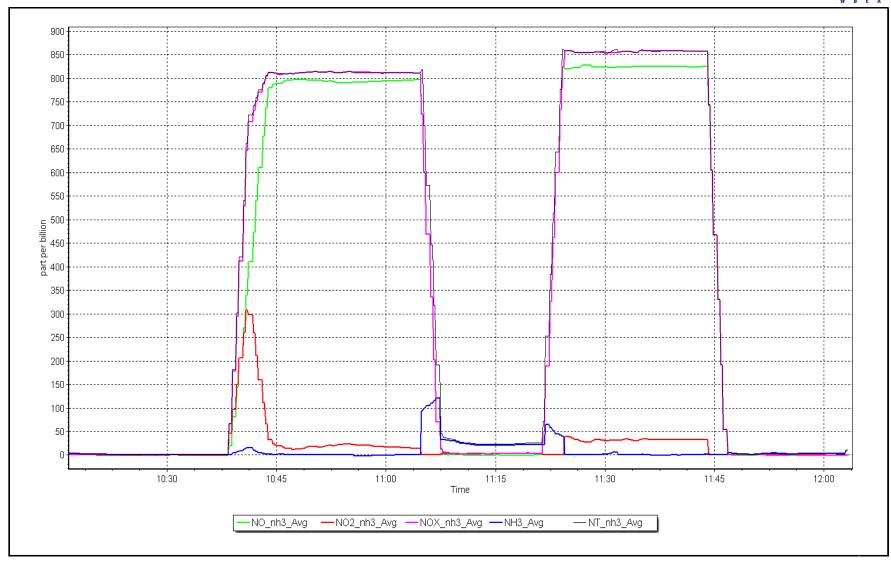
Calibration Performed By: Max Farrell

NO<sub>x</sub> Calibration Plot

Date: May 8, 2023

Location: Patricia McInnes



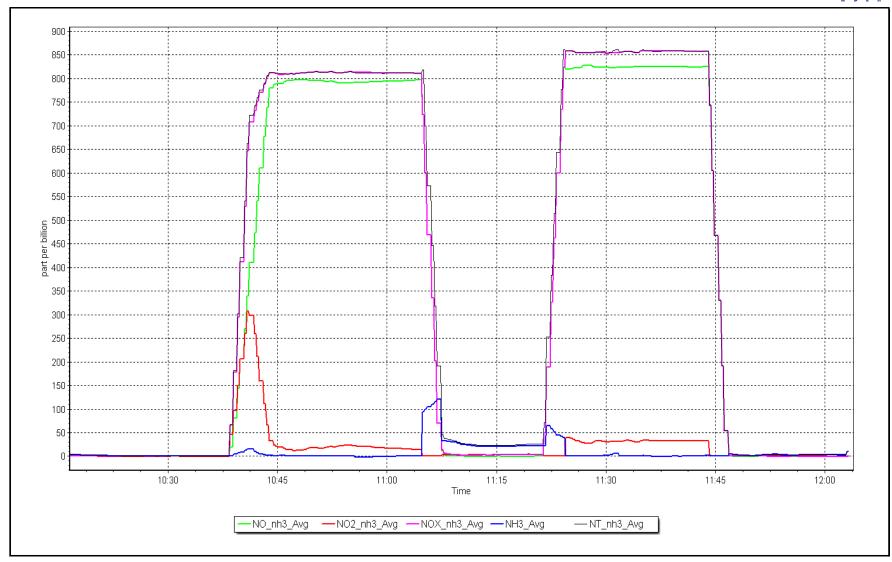


NH<sub>3</sub> Calibration Plot

Date: April 20, 2023

Location: Patricia McInnes







## TN - NO<sub>X</sub> - NH<sub>3</sub> Calibration Report

Station number:

Last Cal Date:

Version-05-2023

Station	Intorm	ation

Station Name: Patricia McInnes NOX Cal Date: May 24, 2023

Start time (MST): 7:26

NH3 Cal Date: May 24, 2023 Start time (MST): 12:00

Start time (MST): 12:00 Reason: Routine

7·26

, 2023 Last Cal Date: End time (MS

End time (MST): 11:40

Removed cyl Expiry:

April 27, 2023

April 27, 2023

AMS 06

End time (MST): 14:20

**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 #: Removed NO Conc: 46.39 ppm Removed cyl Expiry:

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 #:

NH3 gas Diff:

Calibrator Model: API T700 Serial Number: 3566 ZAG make/model: API T701 Serial Number: 689

#### **Analyzer Information**

Analyzer model: API T201 Analyzer serial #: 152
Converter model: 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

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient:	0.833	0.794	TN coefficient:	0.837	0.794
NOX coefficient:	0.839	0.796	NO bkgrnd:	-0.1	-0.1
NO2 coefficient:	1.000	1.000	NOX bkgrnd:	0.0	0.0
NH3 coefficient:	0.951	0.908	TN bkgrnd:	0.0	0.0

### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	1.004262	0.995223
NO <sub>X</sub> Cal Offset:	2.034812	1.876743
NO Cal Slope:	1.000294	0.994331
NO Cal Offset:	0.654848	1.802690
NO <sub>2</sub> Cal Slope:	1.003690	1.004951
NO <sub>2</sub> Cal Offset:	0.714817	1.630262
NH3 Cal Slope:	1.003144	1.008694
NH3 Cal Offset:	4.931327	6.507686
TN Cal Slope:	1.008443	1.013896
TN Cal Offset:	5.257930	6.739810



# **TN - NOX - NH<sub>3</sub> 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	0.9	-0.6	1.5		
as found NO	4914	86.2	826.5	826.5		869.3	870.8	-1.4	0.951	
calibrator zero	5000	0.0	0.0	0.0	0.0	1.6	0.2	1.5		
high NO point	4914	86.2	826.5	826.5		827.4	823.6	3.8	0.999	
NO/O3 point	4914	86.2	826.5	826.5		828.5	824.7	3.8	0.998	
as found NH3	3419	81.0	1800.5		1800.5	1730.5		1720.5	1.040	1.047
new NH3 cyl rp										
first NH3	3419	81.0	1800.5		1800.5	1830.5		1820.9	0.984	0.989
second NH3	3455	45.0	1000.3		1000.3	1020.4		1015.1	0.980	0.985
third NH3	3478	22.5	500.1		500.1	521.2		518.1	0.959	0.965
							Average Co	rrection Factor	0.9982	0.9798

Corrected As found TN = 868.4 ppb NO<sub>x</sub> = 871.4 ppb NH3 = 1719.0 ppb Previous Response TN = 838.7 ppb NO<sub>x</sub> = 832.0 ppb NH3 = 1811.1 ppb

\*Percent Change TN = 3.4%

\*Percent Change NO<sub>X</sub> = 4.5%

\*Percent Change NH3 = -5.4%

\* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 95.1%

NH3 Current Converter Efficiency = 90.8%



# NO<sub>X</sub> - NO - NO<sub>2</sub> Calibration Report

Version-05-2023

### **Dilution Calibration Data**

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) Limit = 0.95-1.05	NO Correction factor (Cc/Ic) Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.0	0.0	-0.6	-0.2	0.9		
as found span	4914	86.2	826.5	799.7	826.5	870.8	838.2	869.3	0.9491	0.9541
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	1.6		
high point	4914	86.2	826.5	799.7	826.5	823.6	796.9	827.4	1.0035	1.0036
second point	4957	43.1	413.2	399.9	413.2	413.8	397.9	416.9	0.9986	1.0050
third point	4978	21.6	207.1	200.4	207.1	209.8	204.5	210.4	0.9872	0.9801
							Average C	Correction Factor	0.9964	0.9962
Baseline Corr A	s fnd TN =	868.4 ppb	NO <sub>X</sub> = 871.4	ppb NO =	838.4 ppb			*Percent Chang	e TN=	3.4%
Previous Respo	nse TN =	838.7 ppb	$NO_X = 832.0$	ppb NO =	800.6 ppb			*Percent Chang	e NO <sub>x</sub> =	4.5%
								*Percent Chang	e NO =	4.5%
								* = > +/-5% change	initiates investigati	on

### **GPT Calibration Data**

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) Calibration Limit = 0.95-1.05 As Found Limit = 0.90-1.10	Converter Efficiency Calibration Limit = 96-104%
as found zero			0.0	-0.5		
calibration zero			0.0	0.2		
1st GPT point (400 ppb O3)	795.4	399.6	422.5	425.1	0.9939	100.6%
2nd GPT point (200 ppb O3)	795.4	600.2	221.9	226.3	0.9806	102.0%
3rd GPT point (100 ppb O3)	795.4	695.7	126.4	129.6	0.9755	102.5%
			ı	Average Correction Factor	0.9834	101.7%

Changed the inlet filter after as founds. Adjusted both NOX and NH3 span. As found span is close to 5% high due to the recent NO cylinder change. Notes:

Calibration Performed By: Max Farrell



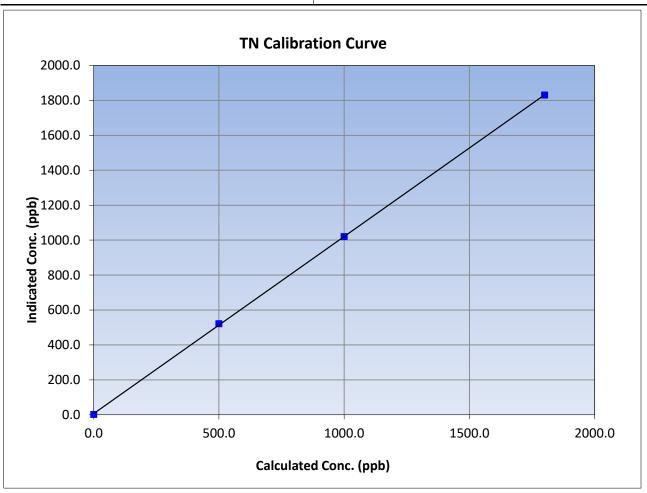
## **TN Calibration Summary**

Version-05-2023

#### **Station Information**

Calibration Date: May 24, 2023 **Previous Calibration:** April 27, 2023 Station Name: Patricia McInnes Station Number: AMS 06 Start Time (MST): 7:26 End Time (MST): 11:40 Analyzer make: **API T201** Analyzer serial #: 152

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	1.6		Correlation Coefficient	0.999953	≥0.995
1800.5	1830.5	0.9836	Correlation Coefficient	0.999933	20.993
1000.3	1020.4	0.9803	Slope	1.013896	0.90 - 1.10
500.1	521.2	0.9595	Slope	1.015690	0.90 - 1.10
			Intercept	6.739810	+/-20





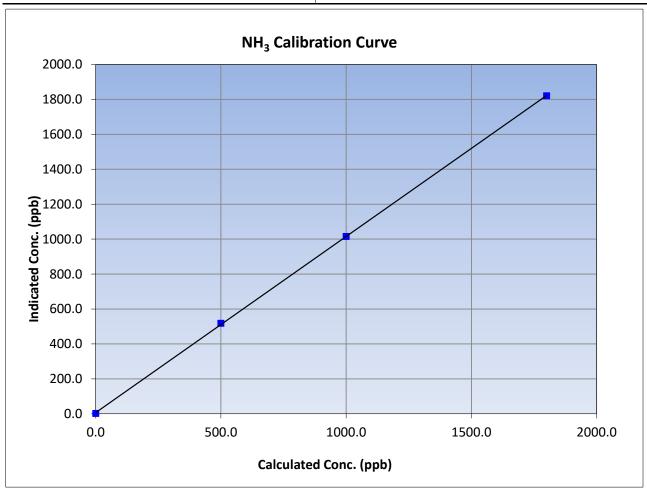
## NH<sub>3</sub> Calibration Summary

Version-05-2023

#### **Station Information**

Calibration Date: May 24, 2023 **Previous Calibration:** April 27, 2023 Station Name: Patricia McInnes Station Number: AMS 06 Start Time (MST): 7:26 End Time (MST): 11:40 Analyzer make: **API T201** Analyzer serial #: 152

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	1.5		Correlation Coefficient	0.999956	≥0.995
1800.5	1820.9	0.9888	Correlation Coefficient	0.55550	20.993
1000.3	1015.1	0.9854	Slope	1.008694	0.90 - 1.10
500.1	518.1	0.9652	Slope	1.000094	0.90 - 1.10
			Intercept	6.507686	+/-20





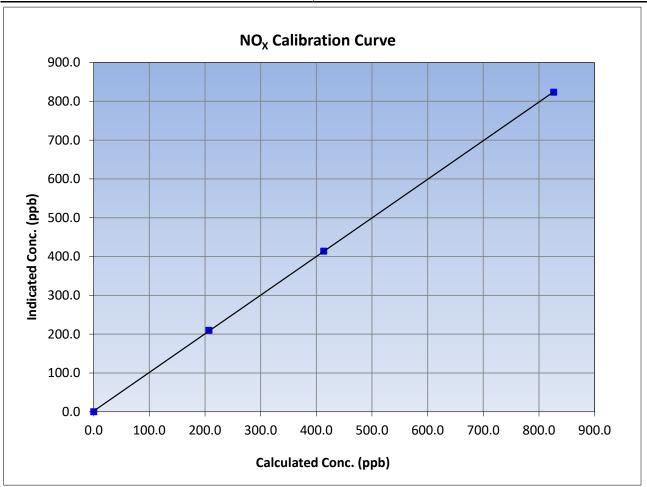
## NO<sub>x</sub> Calibration Summary

Version-05-2023

#### **Station Information**

Calibration Date: May 24, 2023 **Previous Calibration:** April 27, 2023 Station Name: Patricia McInnes Station Number: AMS 06 Start Time (MST): 7:26 End Time (MST): 11:40 Analyzer serial #: Analyzer make: **API T201** 152

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>	
0.0	0.2		Correlation Coefficient	0.999981	≥0.995	
826.5	823.6	1.0035	correlation coemicient	0.555501	20.993	
413.2	413.8	0.9986	Slope	0.995223	0.90 - 1.10	
207.1	209.8	0.9872	Slope	0.995225	0.90 - 1.10	
			Intercept	1.876743	+/-20	





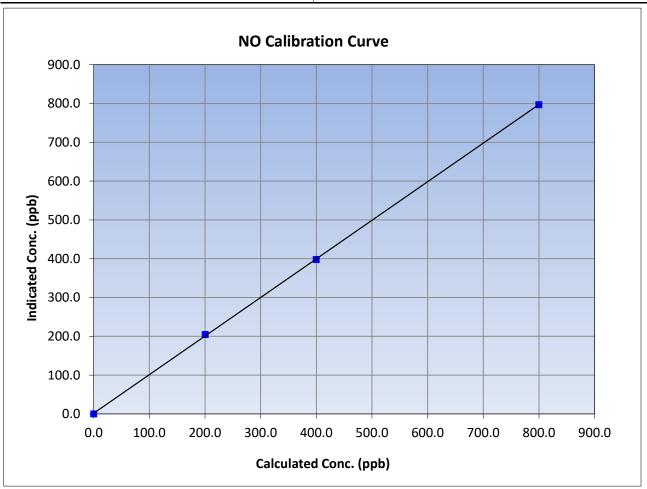
## **NO Calibration Summary**

Version-05-2023

#### **Station Information**

Calibration Date: May 24, 2023 **Previous Calibration:** April 27, 2023 Station Name: Patricia McInnes Station Number: AMS 06 Start Time (MST): 7:26 End Time (MST): 11:40 Analyzer make: **API T201** Analyzer serial #: 152

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>	
0.0	0.0		Correlation Coefficient	0.999950	≥0.995	
799.7	796.9	1.0036	Correlation Coefficient	0.555550	20.595	
399.9	397.9	1.0050	Slope	0.994331	0.90 - 1.10	
200.4	204.5	0.9801	Siope	0.554551		
			Intercept	1.802690	+/-20	





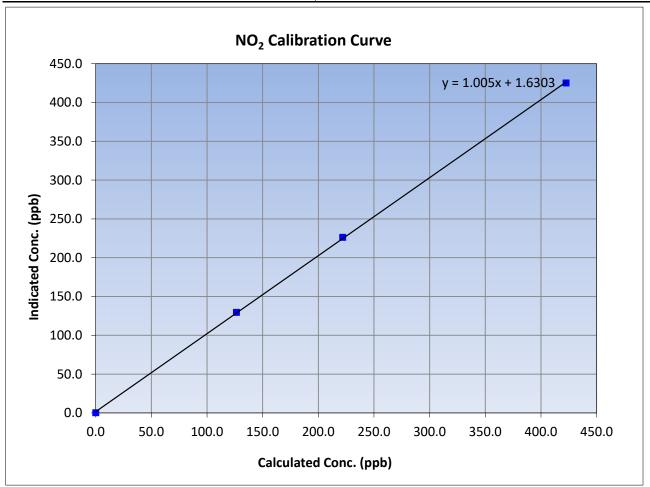
## NO<sub>2</sub> Calibration Summary

Version-05-2023

#### **Station Information**

Calibration Date: May 24, 2023 Previous Calibration: April 27, 2023 Station Name: Patricia McInnes Station Number: AMS 06 Start Time (MST): 7:26 End Time (MST): 11:40 Analyzer serial #: Analyzer make: **API T201** 152

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.2		Correlation Coefficient	0.999928	≥0.995
422.5	425.1	0.9939	Correlation Coefficient	0.333328	20.333
221.9	226.3	0.9806	Slope	1.004951	0.90 - 1.10
126.4	129.6	0.9755	Slope	1.004931	0.90 - 1.10
			Intercept	1.630262	+/-20

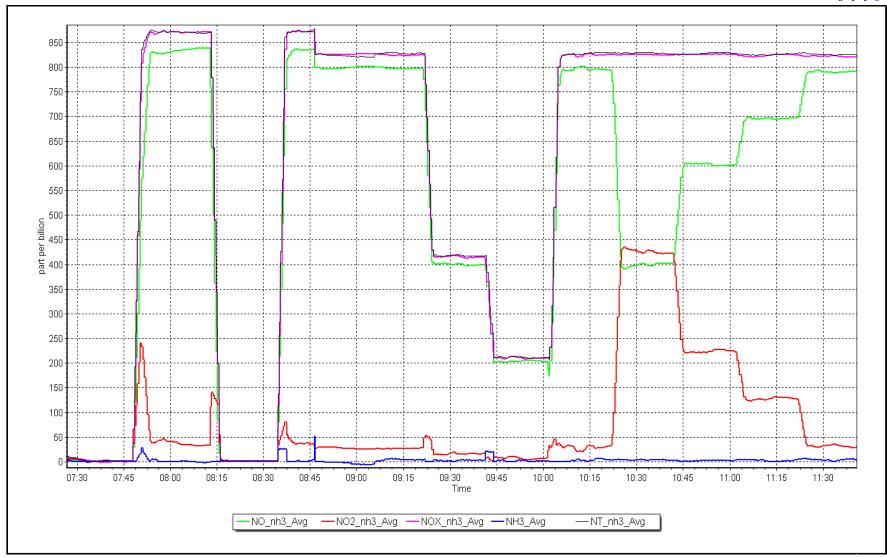


NO<sub>x</sub> Calibration Plot

Date: May 24, 2023

Location: Patricia McInnes





NH<sub>3</sub> Calibration Plot

Date: May 24, 2023

Location: Patricia McInnes







# O<sub>3</sub> Calibration Report

Version-01-2020

**Station Information** 

Station Name: Patricia McInnes
Calibration Date: May 15, 2023

Start time (MST): 9:23
Reason: Routine

Station number: AMS06

Last Cal Date: April 3, 2023 End time (MST): 12:35

**Calibration Standards** 

O3 generation mode: Photometer

Calibrator Make/Model: API T700 ZAG Make/Model: API T701H Serial Number: 3566 Serial Number: 689

Analyzer serial #: 1300156234

**Analyzer Information** 

Analyzer make: Thermo 49i

Analyzer Range 0 - 500 ppb

Finish

Start

<u>Finish</u>

Calibration slope: Calibration intercept: <u>Start</u> 1.006429 0.300000

1.001971 0.480000

Backgd or Offset: Coeff or Slope: -0.2 1.019 -0.2 1.019

O<sub>3</sub> 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	-1.1	
as found span	5000	1303.0	400.0	401.4	0.997
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	-0.6	
high point	5000	1303.0	400.0	400.7	0.998
second point	5000	966.5	200.0	201.5	0.993
third point	5000	794.3	100.0	101.7	0.983
as left zero	5000	800.0	0.0	-0.8	
as left span	5000	1303.0	400.0	403.6	0.991
			Averag	ge Correction Factor	0.991
Baseline Corr As found:	402.5	Previous response	402.9	*% change	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope	:	AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation	:		
				* = > +/-5% change initia	tes investigation

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

Calibration Performed By: Aswin Sasi Kumar



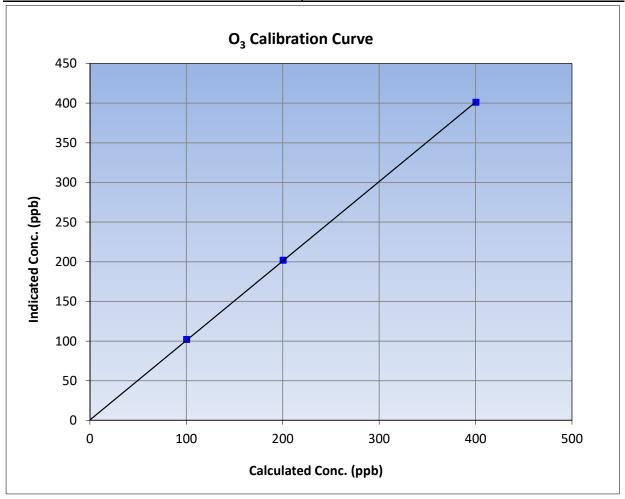
## O<sub>3</sub> Calibration Summary

Version-01-2020

#### **Station Information**

Calibration Date: May 15, 2023 **Previous Calibration:** April 3, 2023 Station Name: Patricia McInnes Station Number: AMS06 Start Time (MST): 9:23 End Time (MST): 12:35 Analyzer make: Thermo 49i Analyzer serial #: 1300156234

Calibration Data								
Calculated concentration Indicated concentration (ppb) (Cc) (ppb) (Ic)		Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>			
0.0	-0.6		Correlation Coefficient	0.999967	≥0.995			
400.0	400.7	0.9983	Correlation Coefficient	0.555507	20.993			
200.0	201.5	0.9926	Slope	1.001971	0.90 - 1.10			
100.0	101.7	0.9833	Slope	1.001971	0.90 - 1.10			
			- Intercept	0.480000	+/- 5			

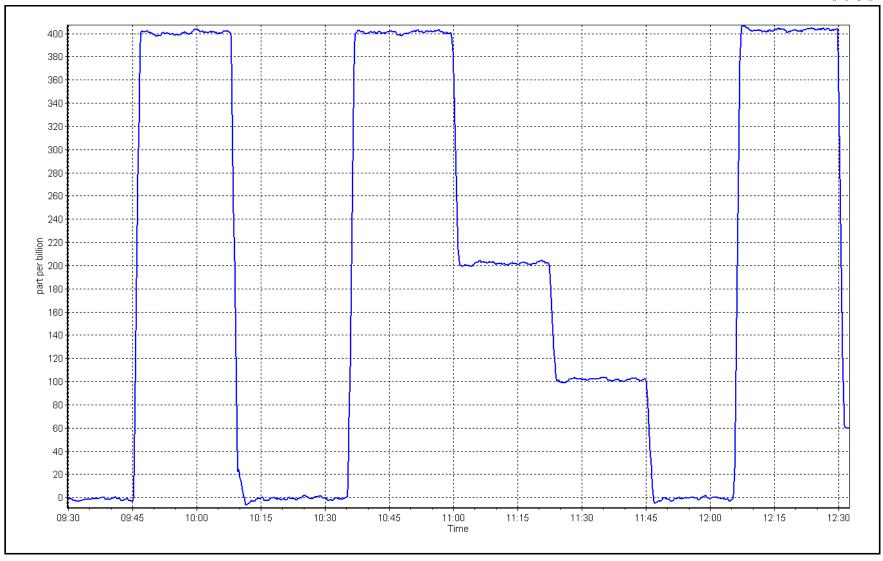


O<sub>3</sub> Calibration Plot

Date: May 15, 2023

Location: Patricia McInnes







# **T640 PM<sub>2.5</sub> CALIBRATION**

Version-01-2023

		Station Information	n		
Station Name: Calibration Date:	Patricia McInnes		Station number:	AMS 06 April 13, 2023	
Start time (MST):	May 17, 2023 12:42		End time (MST):	•	
Analyzer Make: Particulate Fraction:	API T640 PM2.5		S/N:	766	
Flow Meter Make/Model:	ALICAT FP-25		S/N:	388755	
Temp/RH standard:	ALICAT FP-25		S/N:	388755	
		Monthly Calibration T	est		
<u>Parameter</u>	As found	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	(Limits)
T (°C)	8.9	8.66	8.9		+/- 2 °C
P (mmHg)	732.9	733.5	732.9		+/- 10 mmHg
flow (LPM)	4.99	5.11	4.99		+/- 0.25 LPM
Leak Test:	Date of check:	May 17, 2023	Last Cal Date:	April 13, 2023	
	PM w/o HEPA:	16.8	PM w/ HEPA:	0	<0.2 ug/m3
		Quarterly Calibration	Test		
Parameter	As found	Post maintenance	As left	Adjusted	(Limits)
PMT Peak Test	10	10	11.1	<u></u>	10.9 +/- 0.5
Post-maintenance	e leak check:	PM w/o HEPA:		w/ HEPA:	
Date Optical Cham	-	April 13,		-	<0.2 ug/m3
Disposable Filter	r Changed:	April 13,	2023	-	
		Annual Maintenand	ce		
Date Sample Tub	oe Cleaned:	April 13, i	2023		
Date RH/T Sensor Cleaned:		April 13,	2023	<del>-</del> -	
Notes:	"Perform span dust o	check" alarm was on up	on arrival, complete	ed PMT Peak adjustme	nt. Leak check
Calibration by:	Max Farrell				



## TN - NO<sub>x</sub> - NH<sub>3</sub> Calibration Report

Version-05-2023

C		
Station	Intorm	<b>ation</b>
Jialion		ativi

Station Name: Patricia McInnes NOX Cal Date: May 24, 2023

Start time (MST): 7:26

NH3 Cal Date: May 24, 2023 Start time (MST): 12:00

Routine Reason:

Station number: AMS 06

Last Cal Date: April 27, 2023

11:40 End time (MST):

Last Cal Date: April 27, 2023

End time (MST): 14:20

Removed cyl Expiry:

#### **Calibration Standards**

NOX Cal Gas Conc: 47.94 NO Gas Cylinder #: T30YCWN ppm NO Cal Gas Conc: 46.39 NO Cal Gas Expiry: April 11, 2025 ppm

Removed NOX Conc: 47.94 Removed Cylinder #: ppm Removed NO Conc: 46.39 Removed cyl Expiry: ppm

NOX gas Diff: NO gas Diff:

NH3 Cal Gas Conc: 77.8 NH3 Gas Cylinder #: CC710812 ppm

NH3 Cal Gas Expiry: March 30, 2023 Removed NH3 Conc: 77.8 Removed Cylinder #: ppm

NH3 gas Diff:

Calibrator Model: **API T700** Serial Number: 3566 ZAG make/model: **API T701** Serial Number: 689

#### **Analyzer Information**

Analyzer model: API T201 Analyzer serial #: 152 Converter model: 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

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient:	0.833	0.794	TN coefficient:	0.837	0.794
NOX coefficient:	0.839	0.796	NO bkgrnd:	-0.1	-0.1
NO2 coefficient:	1.000	1.000	NOX bkgrnd:	0.0	0.0
NH3 coefficient:	0.951	0.908	TN bkgrnd:	0.0	0.0

#### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	1.004262	0.995223
NO <sub>x</sub> Cal Offset:	2.034812	1.876743
NO Cal Slope:	1.000294	0.994331
NO Cal Offset:	0.654848	1.802690
NO <sub>2</sub> Cal Slope:	1.003690	1.004951
NO <sub>2</sub> Cal Offset:	0.714817	1.630262
NH3 Cal Slope:	1.003144	1.008694
NH3 Cal Offset:	4.931327	6.507686
TN Cal Slope:	1.008443	1.013896
TN Cal Offset:	5.257930	6.739810



# **TN - NOX - NH<sub>3</sub> 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	0.9	-0.6	1.5		
as found NO	4914	86.2	826.5	826.5		869.3	870.8	-1.4	0.951	
calibrator zero	5000	0.0	0.0	0.0	0.0	1.6	0.2	1.5		
high NO point	4914	86.2	826.5	826.5		827.4	823.6	3.8	0.999	
NO/O3 point	4914	86.2	826.5	826.5		828.5	824.7	3.8	0.998	
as found NH3	3419	81.0	1800.5		1800.5	1730.5		1720.5	1.040	1.047
new NH3 cyl rp										
first NH3	3419	81.0	1800.5		1800.5	1830.5		1820.9	0.984	0.989
second NH3	3455	45.0	1000.3		1000.3	1020.4		1015.1	0.980	0.985
third NH3	3478	22.5	500.1		500.1	521.2		518.1	0.959	0.965
	•		•		•	•	Average Co	rrection Factor	0.9982	0.9798

Corrected As found TN = 868.4 ppb NO<sub>x</sub> = 871.4 ppb NH3 = 1719.0 ppb Previous Response TN = 838.7 ppb NO<sub>x</sub> = 832.0 ppb NH3 = 1811.1 ppb

\*Percent Change TN = 3.4%

\*Percent Change NO<sub>x</sub> = 4.5%

\*Percent Change NH3 = -5.4%

\* = > +/-5% change initiates investigation

NH3 Previous Converter Efficiency = 95.1%

NH3 Current Converter Efficiency = 90.8%



# NO<sub>X</sub> - NO - NO<sub>2</sub> Calibration Report

Version-05-2023

#### **Dilution Calibration Data**

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) Limit = 0.95-1.05	NO Correction factor (Cc/Ic) Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.0	0.0	-0.6	-0.2	0.9		
as found span	4914	86.2	826.5	799.7	826.5	870.8	838.2	869.3	0.9491	0.9541
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	1.6		
high point	4914	86.2	826.5	799.7	826.5	823.6	796.9	827.4	1.0035	1.0036
second point	4957	43.1	413.2	399.9	413.2	413.8	397.9	416.9	0.9986	1.0050
third point	4978	21.6	207.1	200.4	207.1	209.8	204.5	210.4	0.9872	0.9801
							Average C	Correction Factor	0.9964	0.9962
Baseline Corr A	s fnd TN =	868.4 ppb	NO <sub>X</sub> = 871.4	ppb NO =	838.4 ppb			*Percent Change	e TN=	3.4%
Previous Respo	nse TN =	838.7 ppb	$NO_X = 832.0$	ppb NO =	800.6 ppb			*Percent Change	e NO <sub>x</sub> =	4.5%
								*Percent Change	e NO =	4.5%
								* = > +/-5% change i	nitiates investigati	ion

#### **GPT Calibration Data**

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) Calibration Limit = 0.95-1.05 As Found Limit = 0.90-1.10	Converter Efficiency Calibration Limit = 96-104%
as found zero			0.0	-0.5		
calibration zero			0.0	0.2		
1st GPT point (400 ppb O3)	795.4	399.6	422.5	425.1	0.9939	100.6%
2nd GPT point (200 ppb O3)	795.4	600.2	221.9	226.3	0.9806	102.0%
3rd GPT point (100 ppb O3)	795.4	695.7	126.4	129.6	0.9755	102.5%
			A	Average Correction Factor	0.9834	101.7%

Changed the inlet filter after as founds. Adjusted both NOX and NH3 span. As found span is close to 5% high due to the recent NO cylinder change. Notes:

Calibration Performed By: Max Farrell



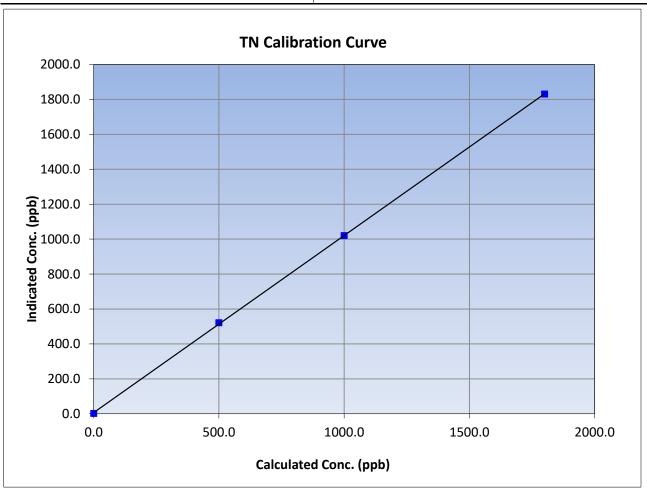
## **TN Calibration Summary**

Version-05-2023

#### **Station Information**

Calibration Date: May 24, 2023 **Previous Calibration:** April 27, 2023 Station Name: Patricia McInnes Station Number: AMS 06 Start Time (MST): 7:26 End Time (MST): 11:40 Analyzer make: **API T201** Analyzer serial #: 152

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	1.6		Correlation Coefficient	0.999953	≥0.995
1800.5	1830.5	0.9836	Correlation Coefficient	0.999933	20.555
1000.3	1020.4	0.9803	Slope	1.013896	0.90 - 1.10
500.1	521.2	0.9595	Slope	1.015690	0.90 - 1.10
			Intercept	6.739810	+/-20





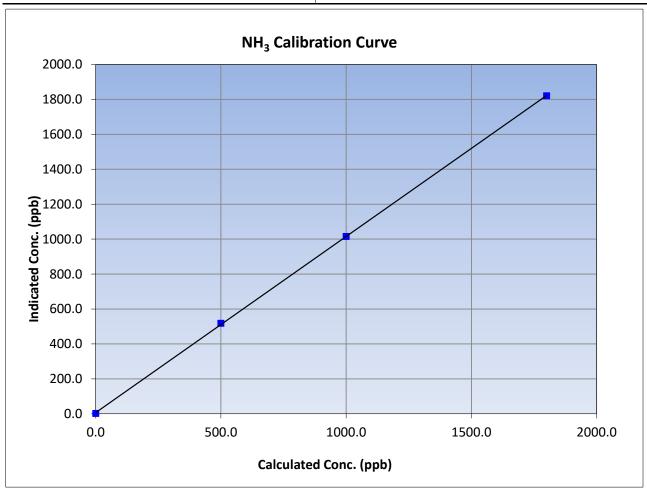
## NH<sub>3</sub> Calibration Summary

Version-05-2023

#### **Station Information**

Calibration Date: May 24, 2023 **Previous Calibration:** April 27, 2023 Station Name: Patricia McInnes Station Number: AMS 06 Start Time (MST): 7:26 End Time (MST): 11:40 Analyzer make: **API T201** Analyzer serial #: 152

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	1.5		Correlation Coefficient	0.999956	≥0.995
1800.5	1820.9	0.9888	Correlation Coefficient	0.55550	20.555
1000.3	1015.1	0.9854	Slope	1.008694	0.90 - 1.10
500.1	518.1	0.9652	Slope	1.000034	0.90 - 1.10
	<u> </u>		Intercept	6.507686	+/-20





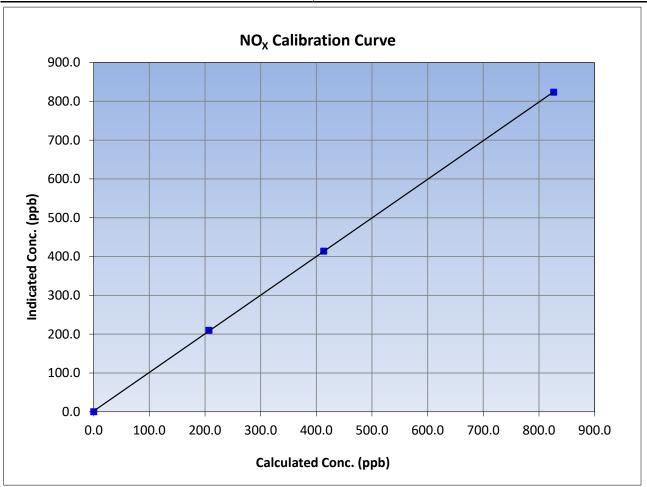
## NO<sub>x</sub> Calibration Summary

Version-05-2023

#### **Station Information**

Calibration Date: May 24, 2023 **Previous Calibration:** April 27, 2023 Station Name: Patricia McInnes Station Number: AMS 06 Start Time (MST): 7:26 End Time (MST): 11:40 Analyzer serial #: Analyzer make: **API T201** 152

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.2		Correlation Coefficient	0.999981	≥0.995
826.5	823.6	1.0035	correlation coemicient	0.555501	20.555
413.2	413.8	0.9986	Slope	0.995223	0.90 - 1.10
207.1	209.8	0.9872	Slope	0.995225	0.90 - 1.10
			Intercept	1.876743	+/-20





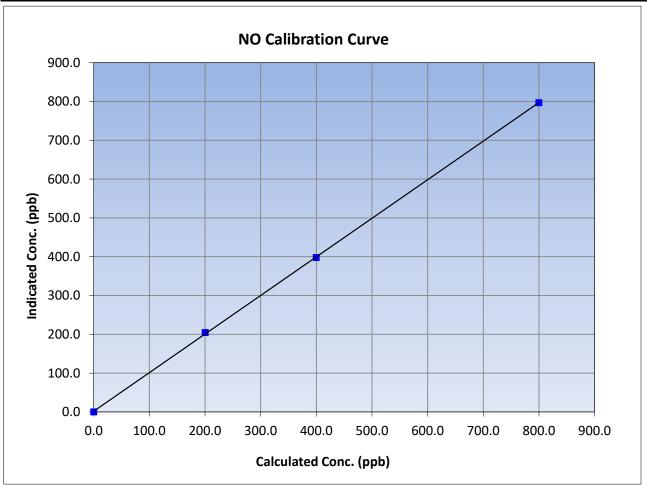
## **NO Calibration Summary**

Version-05-2023

#### **Station Information**

Calibration Date: May 24, 2023 **Previous Calibration:** April 27, 2023 Station Name: Patricia McInnes Station Number: AMS 06 Start Time (MST): 7:26 End Time (MST): 11:40 Analyzer make: **API T201** Analyzer serial #: 152

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999950	≥0.995
799.7	796.9	1.0036	Correlation Coefficient	0.99990	20.333
399.9	397.9	1.0050	Slope	0.994331	0.90 - 1.10
200.4	204.5	0.9801	Slope	0.994551	0.90 - 1.10
			Intercept	1.802690	+/-20





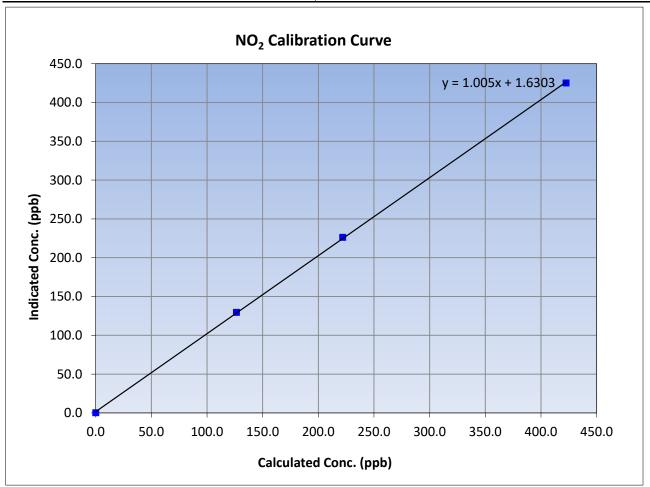
## NO<sub>2</sub> Calibration Summary

Version-05-2023

#### **Station Information**

Calibration Date: May 24, 2023 Previous Calibration: April 27, 2023 Station Name: Patricia McInnes Station Number: AMS 06 Start Time (MST): 7:26 End Time (MST): 11:40 Analyzer make: **API T201** Analyzer serial #: 152

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	0.2		Correlation Coefficient	0.999928	≥0.995	
422.5	425.1	0.9939	Correlation Coefficient	0.333328	20.555	
221.9	226.3	0.9806	Slope	1.004951	0.90 - 1.10	
126.4	129.6	0.9755	Slope	1.004931	0.30 - 1.10	
			Intercept	1.630262	+/-20	

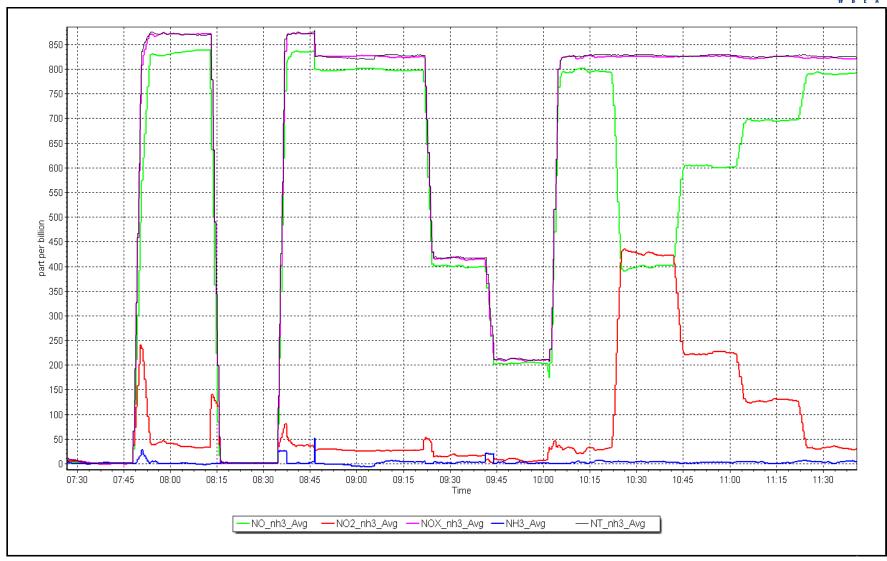


NO<sub>x</sub> Calibration Plot

Date: May 24, 2023

Location: Patricia McInnes





NH<sub>3</sub> Calibration Plot

Date: May 24, 2023

Location: Patricia McInnes







## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

> AMS07 ATHABASCA VALLEY MAY 2023

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

June 30, 2023



## **SO<sub>2</sub> Calibration Report**

Version-01-2020

#### **Station Information**

Station Name: Athabasca Valley Calibration Date: May 15, 2023

8:36 Start time (MST): Reason:

Routine

Station number: AMS07

April 19, 2023 Last Cal Date:

End time (MST): 11:19

#### **Calibration Standards**

Cal Gas Concentration: 50.52

Cal Gas Cylinder #: CC282115

Removed Cal Gas Conc: 50.52 Removed Gas Cyl #: NA

Calibrator Make/Model: **API T700** ZAG Make/Model: **API 701H** 

Calibration slope:

Calibration intercept:

ppm Cal Gas Exp Date: December 29, 2028

Rem Gas Exp Date: NA ppm

Diff between cyl:

Serial Number: 3805 Serial Number: 198

#### **Analyzer Information**

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

Analyzer Range 0 - 1000 ppb

**Finish** Start 1.004627 1.003328

2.004886

Backgd or Offset: 1.624552 Coeff or Slope: Start 2.70 0.857 **Finish** 2.70 0.845

#### SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)		Correction factor (Cc/lc)  Limit = 0.95-1.05
as found zero	5000	0.0	0.0	-0.1	
as found span	4921	79.3	801.2	813.5	0.985
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	805.6	0.995
second point	4960	39.6	400.2	405.0	0.988
third point	4980	19.8	200.1	203.6	0.983
as left zero	5000	0.0	0.0	0.1	
as left span	4921	79.2	800.2	803.7	0.996
			Averag	ge Correction Factor	0.988

Baseline Corr As found: 813.60 Previous response 805.87 \*% change Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept: NA AF Correlation: Baseline Corr 3rd AF pt:

\* = > +/-5% change initiates investigation

Notes: No adjustments or maintenance done.

Calibration Performed By: Melissa Lemay 1.0%



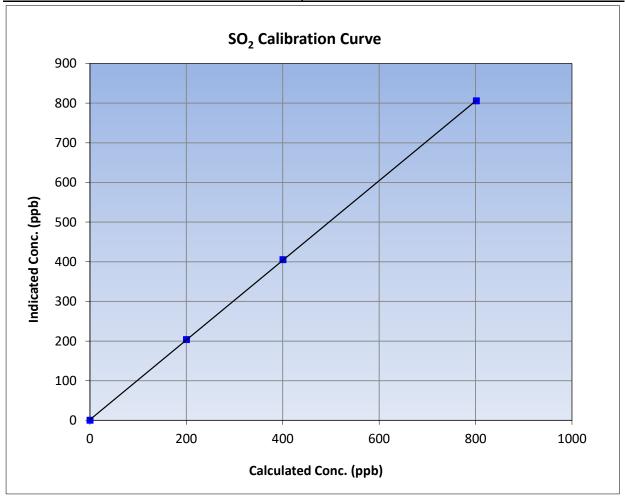
## **SO<sub>2</sub> Calibration Summary**

Version-01-2020

#### **Station Information**

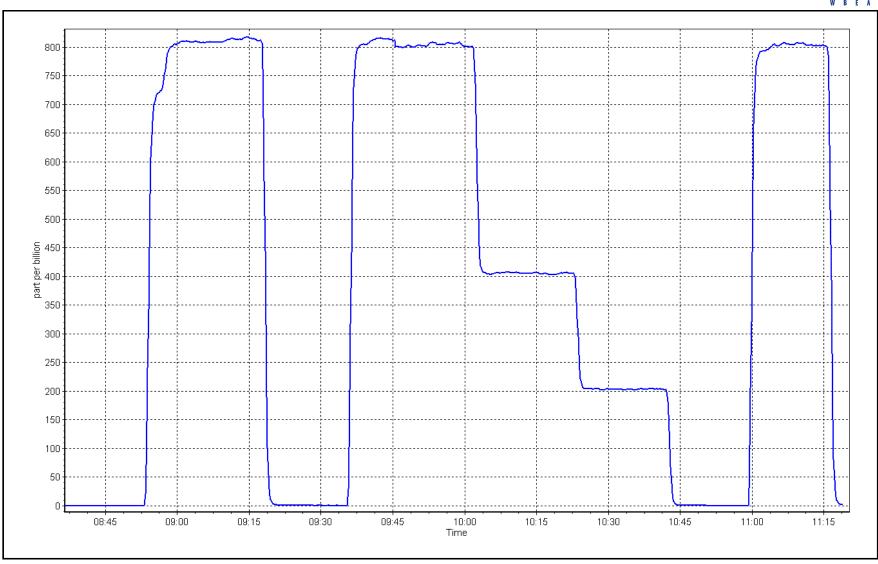
Calibration Date: May 15, 2023 **Previous Calibration:** April 19, 2023 Station Name: Athabasca Valley Station Number: AMS07 Start Time (MST): 8:36 End Time (MST): 11:19 Analyzer make: Thermo 43i-LTE Analyzer serial #: 1507864683

Calibration Data							
Calculated concentration Indicated concentration (ppb) (Cc) (ppb) (Ic) (Cc/Ic) Statistical Evaluation							
0.0	0.2		Correlation Coefficient	0.999984	≥0.995		
801.2	805.6	0.9945	Correlation Coefficient	0.333304	20.993		
400.2	405.0	0.9880	Slope	1.004627	0.90 - 1.10		
200.1	203.6	0.9826	Slope	1.004027	0.90 - 1.10		
			- Intercept	1.624552	+/-30		



SO2 Calibration Plot Date: May 15, 2023 Location: Athabasca Valley





# W B E A

## **Wood Buffalo Environmental Association**

## **TRS Calibration Report**

Version-11-2021

**Station Information** 

Station Name: Athabasca Valley
Calibration Date: May 10, 2023
Start time (MST): 8:30
Reason: Routine

Station number: AMS07 Last Cal Date: April 26, 2023 End time (MST): 13:05

**Calibration Standards** 

Cal Gas Concentration: 5.25 ppm Cal Gas Exp Date: January 3, 2026

Cal Gas Cylinder #: CC504080

Removed Cal Gas Conc: 4.94 ppm Rem Gas Exp Date: February 9, 2024

Removed Gas Cyl #: EY0002277 Diff between cyl: -5.8% 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** <u>Finish</u> <u>Start</u> 0.993201 Calibration slope: 1.002951 Backgd or Offset: 2.29 2.17 -0.222144 0.876 Calibration intercept: 0.141603 Coeff or Slope: 0.829

**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	81.6	80.6	80.1	1.005
as found 2nd point	4959	40.8	40.3	39.8	1.010
as found 3rd point	4980	20.4	20.2	19.6	1.023
new cylinder response	4925	75.5	79.3	74.5	1.065

#### **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	79.4	0.999
second point	4962	37.7	39.6	39.5	1.003
third point	4981	18.9	19.9	19.4	1.024
as left zero	5000	0.0	0.0	0.1	
as left span	4925	75.5	79.3	78.9	1.005
SO2 Scrubber Check	4921	79.2	800.2	0.0	
Date of last scrubber cha	nge:	25-Feb-22		Ave Corr Factor	1.008
Date of last converter eff	iciency test:	April 22, 2022		92.6%	efficiency
Baseline Corr As found:	80.2	Prev response:	80.22	*% change:	0.0%
Baseline Corr 2nd AF pt:	39.9	AF Slope:	0.995895	AF Intercept:	-0.278401
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999977		

Notes: Sox scrubber checked after calibrator zero. Span adjusted. Cal gas cylinder repalced after MPAFS.

Calibration Performed By: Karina Fenwick

\* = > +/-5% change initiates investigation



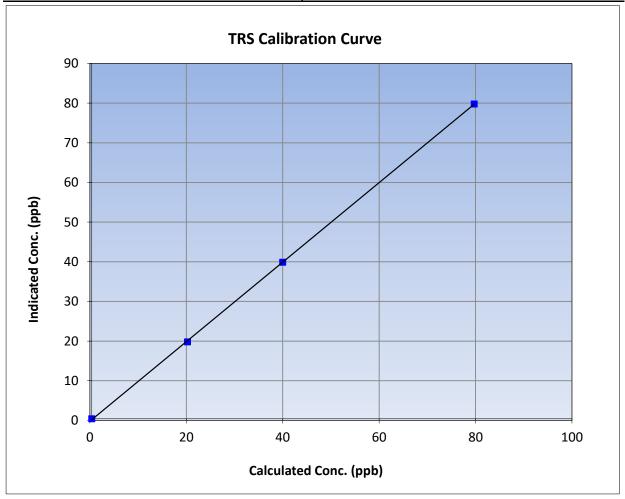
## **TRS Calibration Summary**

Version-11-2021

#### **Station Information**

**Previous Calibration:** Calibration Date: May 10, 2023 April 26, 2023 Station Name: Athabasca Valley Station Number: AMS07 Start Time (MST): 8:30 End Time (MST): 13:05 Analyzer make: CDN-101 Analyzer serial #: 551

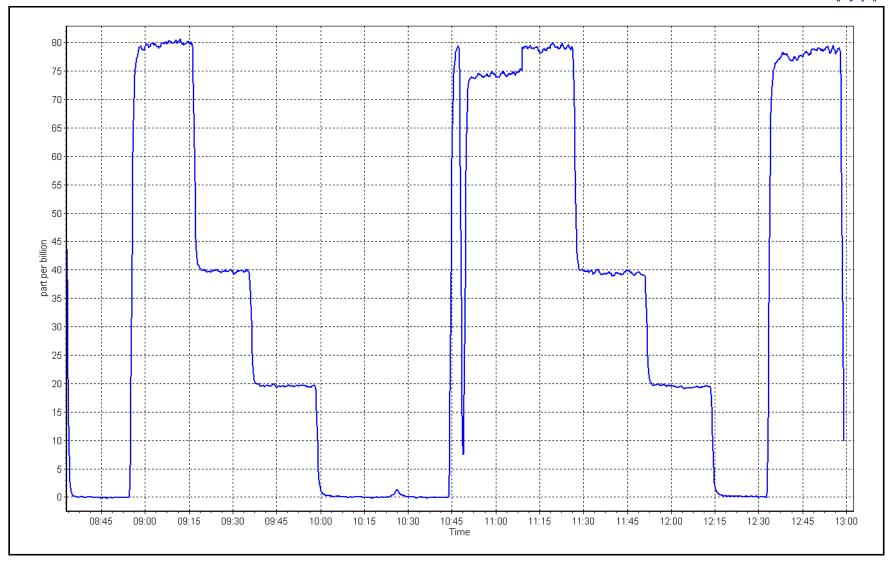
Calibration Data							
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>		
0.0	0.0		Correlation Coefficient	0.999959	≥0.995		
79.3	79.4	0.9989	Correlation Coefficient	0.55555	20.993		
39.6	39.5	1.0028	Slope	1.002951	0.90 - 1.10		
19.9	19.4	1.0235	Siope	1.002931	0.90 - 1.10		
			Intercept	-0.222144	+/-3		



TRS Calibration Plot Date: May 10, 2023

Location: Athabasca Valley







## THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

#### **Station Information**

Station Name: Athabasca Valley Station number: AMS07
Calibration Date: May 8, 2023 Last Cal Date: April 19, 2023

Start time (MST): 6:08 End time (MST): 7:18

Reason: Cylinder Change Nitrogen Cylincer change

#### **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<sub>4</sub>): 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

<u>Start</u> <u>Finish</u> <u>Start</u> <u>Finish</u>

 CH4 SP Ratio:
 0.000278
 0.000278
 NMHC SP Ratio:
 4.49E-05
 4.49E-05

 CH4 Retention time:
 13.8
 13.8
 NMHC Peak Area:
 202584
 202584

#### **THC Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4921	79.3	17.05	16.60	1.027
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4921	79.3	17.05	16.61	1.027
second point					
third point					
as left zero					
as left snan					

			Aver	age Correction Factor	1.027
Baseline Corr AF:	16.60	Prev response	17.04	*% change	-2.7%
Baseline Corr 2nd AF:	NA	AF Slope:	AF Intercept:		
Baseline Corr 3rd AF:	NA	AF Correlation:	* = > +/-5% change initiates investigation		



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

W B E A					Version-01-2
		NMHC Calibr	ation Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i>
as found zero	5000	0	0.00	0.00	
is found span	4921	79.3	9.10	8.72	1.044
s found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
nigh point	4921	79.3	9.10	8.74	1.041
second point					
hird point					
as left zero					
as left span					
•			Aver	age Correction Factor	1.041
Baseline Corr AF:	8.72	Prev response	9.11	*% change	-4.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
Set Point	Dil air flow rate	CH4 Calibra Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4921	79.3	7.95	7.88	1.009
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
nigh point	4921	79.3	7.95	7.87	1.010
second point					
hird point					
as left zero					
as left span					
			Aver	age Correction Factor	1.010
Baseline Corr AF:	7.88	Prev response	7.94	*% change	-0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
		Calibration	Statistics		
		Start		Finish	
THC Cal Slope:		0.999083		0.974167	
THC Cal Offset:		0.005889		0.000000	
CH4 Cal Slope:		0.998961		0.990117	
CH4 Cal Offset:		-0.002189		0.000000	
NMHC Cal Slope:		0.999315		0.960239	
		0.0000		0.00000	

Notes: Nitrogen Cylinder Change.

0.010081

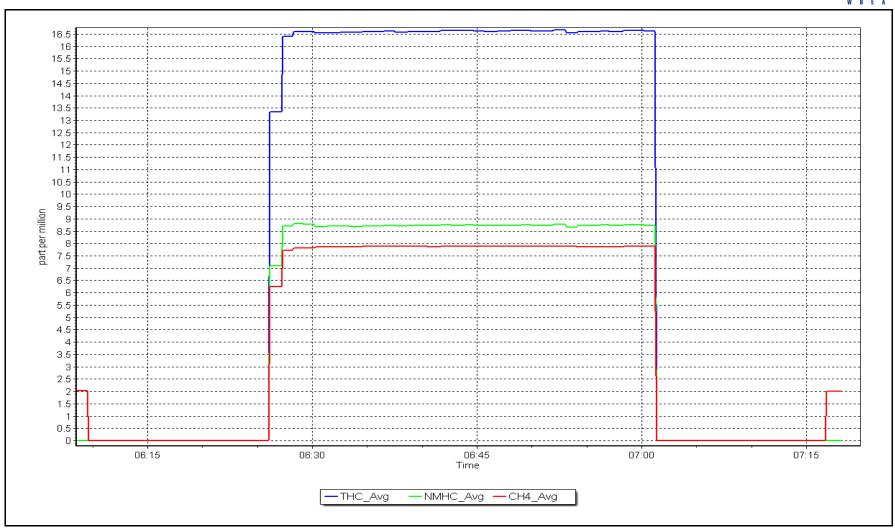
Calibration Performed By: Melissa Lemay

NMHC Cal Offset:

0.000000

NMHC Calibration Plot Date: May 8, 2023 Location: Athabasca Valley







## THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

#### **Station Information**

Athabasca Valley Station Name: Calibration Date: May 15, 2023

8:36 Start time (MST): Reason: Routine Station number: AMS07 Last Cal Date: April 19, 2023

End time (MST): 11:18

#### **Calibration Standards**

Gas Cert Reference: Cal Gas Expiry Date: December 29, 2028 CC282115 CH4 Cal Gas Conc. 501.2 CH4 Equiv Conc. 1075.1 ppm ppm

C3H8 Cal Gas Conc. 208.7 ppm

Removed Gas Cert: NA

Removed CH4 Conc. 501.2 ppm CH4 Equiv Conc. 1075.1

ppm Removed C3H8 Conc. 208.7 Diff between cyl (THC): ppm

Diff between cyl ( $CH_4$ ):

Calibrator Model: **API T700** ZAG make/model: **API 701H**  Diff between cyl (NM):

Removed Gas Expiry: NA

Serial Number: 3805 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: 0.000278 0.000280 NMHC SP Ratio: 4.49E-05 4.75E-05 CH4 Retention time: NMHC Peak Area: 13.8 13.8 202584 191368

#### **THC Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (C	Cc) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4921	79.3	17.05	16.40	1.040
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	17.05	1.000
second point	4960	39.6	8.52	8.52	0.999
third point	4980	19.8	4.26	4.29	0.992
as left zero	5000	0.0	0.00	0.00	
as left span	4921	79.2	17.03	17.00	1.002
			Α	Average Correction Factor	0.997
Baseline Corr AE:	16.40	Drey response	17.04	*% change	-3 Q%

Baseline Corr AF: Prev response 16.40 17.04 % change -3.9%

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



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

		NMHC Calibr	ation Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0	0.00	0.00	
as found span	4921	79.3	9.10	8.52	1.068
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	9.11	0.999
second point	4960	39.6	4.55	4.57	0.995
third point	4980	19.8	2.27	2.30	0.988
as left zero	5000	0.0	0.00	0.00	
as left span	4921	79.2	9.09	9.08	1.001
			Ave	rage Correction Factor	0.994
Baseline Corr AF:	8.52	Prev response	9.11	*% change	-6.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
			Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	
Set Point	Dil air flow rate	CH4 Calibra Source gas flow rate		1.1	CF <i>Limit= 0.95-1.0</i> 5
as found zero	5000	0.0	0.00	0.00	
as found span	4921	79.3	7.95	7.88	1.009
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4921	79.3	7.95	7.94	1.001
second point	4960	39.6	3.97	3.95	1.005
third point	4980	19.8	1.98	1.98	1.002
as left zero	5000	0.0	0.00	0.00	
as left span	4921	79.2	7.94	7.93	1.001
				rage Correction Factor	1.003
Baseline Corr AF:	7.88	Prev response	7.94	*% change	-0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
		Calibration	Statistics		
		<u>Start</u>		<u>Finish</u>	
THC Cal Slope:		0.999083		0.999351	
THC Cal Offset:		0.005889	0.013892		
THE Cal Offset.		0.003883		0.013692	

Notes: NM channel moved a bit since last month, will adjust span and monitor.

0.998961

-0.002189

0.999315

0.010081

Calibration Performed By: Melissa Lemay

CH4 Cal Slope:

CH4 Cal Offset:

NMHC Cal Slope:

NMHC Cal Offset:

0.998818

-0.004193

1.000193

0.014085



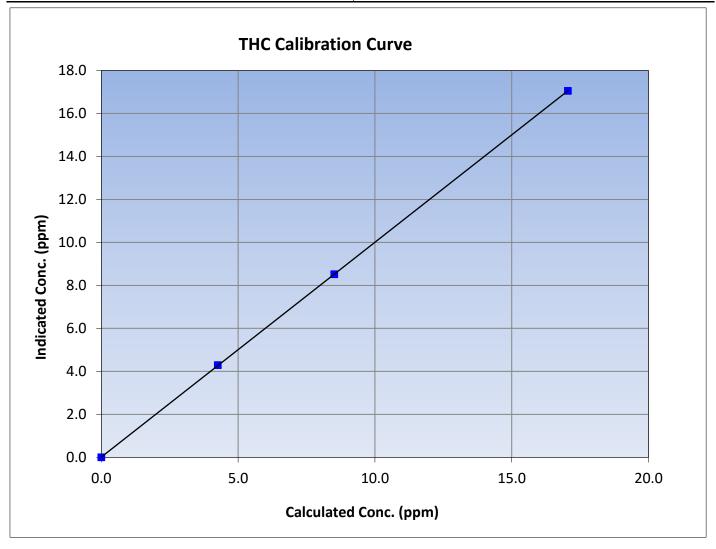
## **THC Calibration Summary**

Version-01-2020

#### **Station Information**

May 15, 2023 **Previous Calibration:** Calibration Date: April 19, 2023 Station Name: Athabasca Valley Station Number: AMS07 Start Time (MST): 8:36 End Time (MST): 11:18 Analyzer make: Thermo 55i Analyzer serial #: 1317958219

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999996	≥0.995
17.05	17.05	1.0000			20.333
8.52	8.52	0.9995	Slope	0.999351	0.90 - 1.10
4.26	4.29	0.9925			0.90 - 1.10
			Intercept	0.013892	+/-0.5





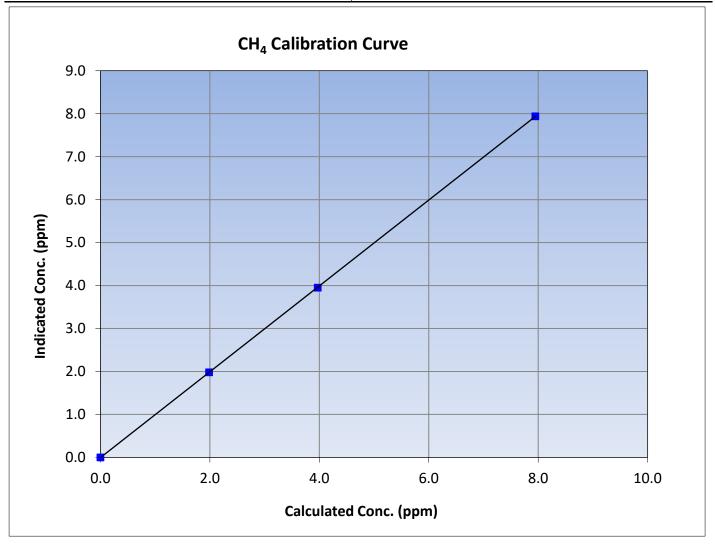
# **CH<sub>4</sub> Calibration Summary**

Version-01-2020

#### **Station Information**

Calibration Date: May 15, 2023 **Previous Calibration:** April 19, 2023 Station Name: Athabasca Valley Station Number: AMS07 Start Time (MST): 8:36 End Time (MST): 11:18 Analyzer make: Thermo 55i Analyzer serial #: 1317958219

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999995	≥0.995
7.95	7.94	1.0011			20.333
3.97	3.95	1.0050	Slope	0.998818	0.90 - 1.10
1.98	1.98	1.0024			0.90 - 1.10
			Intercept	-0.004193	+/-0.5





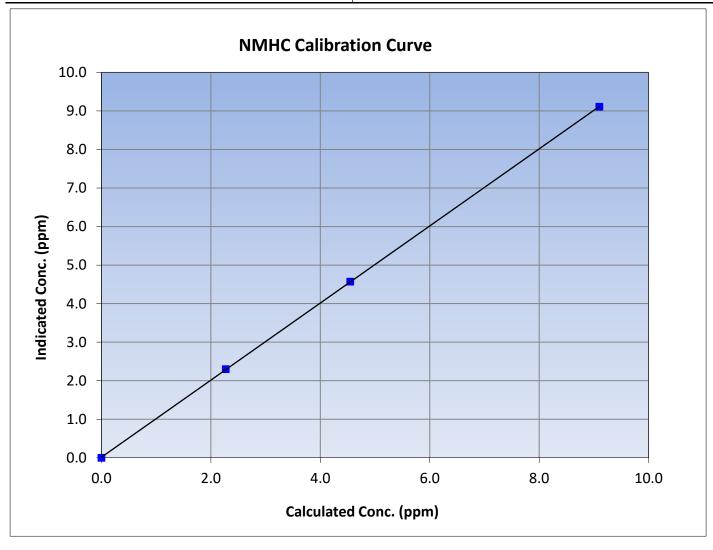
## **NMHC Calibration Summary**

Version-01-2020

#### **Station Information**

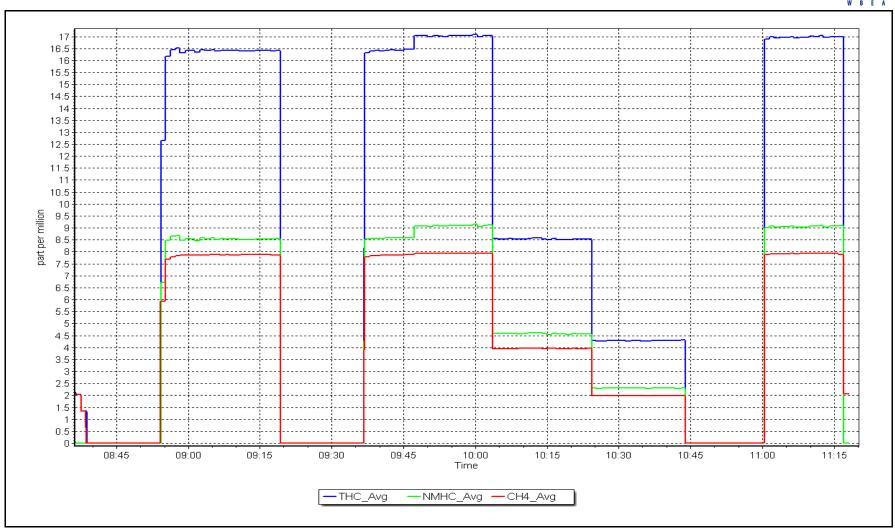
May 15, 2023 Calibration Date: **Previous Calibration:** April 19, 2023 Station Name: Athabasca Valley Station Number: AMS07 Start Time (MST): 8:36 End Time (MST): 11:18 Analyzer make: Thermo 55i Analyzer serial #: 1317958219

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999989	≥0.995
9.10	9.11	0.9991			20.333
4.55	4.57	0.9947	Slope	1.000193	0.90 - 1.10
2.27	2.30	0.9882			0.90 - 1.10
		·	Intercept	0.014085	+/-0.5



NMHC Calibration Plot Date: May 15, 2023 Location: Athabasca Valley







# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

ppm

#### **Station Information**

Station Name: Athabasca Valley
Calibration Date: May 8, 2023
Start time (MST): 7:15

Start time (MST): 7:15
Reason: Routine

Station number: AMS07 Last Cal Date: April 21, 2023 End time (MST): 11:26

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

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** <u>Start</u> **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<sub>x</sub> Cal Slope: 1.001148 0.991417 NO<sub>x</sub> Cal Offset: 1.279327 1.497144 NO Cal Slope: 1.000931 0.991499 NO Cal Offset: 1.195212 0.973228 NO<sub>2</sub> Cal Slope: 1.007625 1.004055 NO<sub>2</sub> Cal Offset: 1.013573 0.235209



# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

				Dil	ution Calibratio	n Data				
Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NC 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 = 0.95-1.0
as found zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.2		
as found span	4920	80.2	816.7	800.7	16.0	810.7	793.7	17.1	1.0074	1.0088
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.5	0.1	0.3		
high point	4920	80.2	816.7	800.7	16.0	810.3	794.0	16.4	1.0079	1.0084
second point	4960	40.1	408.4	400.4	8.0	408.1	399.6	8.6	1.0007	1.0019
third point	4980	20.0	203.7	199.7	4.0	203.6	199.0	4.6	1.0004	1.0034
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	401.9	414.8	811.9	392.5	419.3	1.0059	1.0239
							Average C	orrection Factor	1.0030	1.0046
Corrected As fo	und NO <sub>X</sub> =	810.6 ppb	NC	) = 793.7 ppb	* = > +/-5%	6 change initiates	investigation	*Percent Chang	ge NO <sub>x</sub> =	-1.0%
Previous Respor	nse NO <sub>X</sub> =	818.9 ppb	NC	) = 802.6 ppb				*Percent Chang	ge NO =	-1.1%
Baseline Corr 2r	nd pt NO <sub>X</sub> =	NA ppb	NC	) = NA ppb	As found	I NO <sub>x</sub> r <sup>2</sup> :	:	Nx SI:	Nx Int:	
Baseline Corr 3r	d pt NO <sub>x</sub> =	NA ppb	NC	) = NA ppb	As found	l NO r <sup>2</sup> :	:	NO SI:	NO Int:	
					As found	$I \qquad NO_2 r^2$	:	NO2 SI:	NO <sub>2</sub> Int:	
				(	GPT Calibration	Data				
O3 Setpoi	int (ppb)	Indicated NO Ref		ndicated NO Drop oncentration (ppb)	Calculated NC concentration (ppl		ndicated NO2 ntration (ppb) (Ic)	NO2 Correction fac Calibration Limit = 0	0.95-1.05	rter Efficiency n Limit = 96-104%
as found (	GPT zero									
as found GPT poin	nt (400 ppb NO2)									

Notes:

as found GPT point (200 ppb NO2) as found GPT point (100 ppb NO2)

1st GPT point (400 ppb O3)

2nd GPT point (200 ppb O3)

3rd GPT point (100 ppb O3)

No maintenance or adjustments done.

416.9

217.6

119.2

Average Correction Factor

0.9951

0.9965

0.9928

0.9948

414.8

216.8

118.3

Calibration Performed By:

Melissa Lemay

392.0

590.0

688.5

790.8

790.8

790.8

100.5%

100.4%

100.7%

100.5%



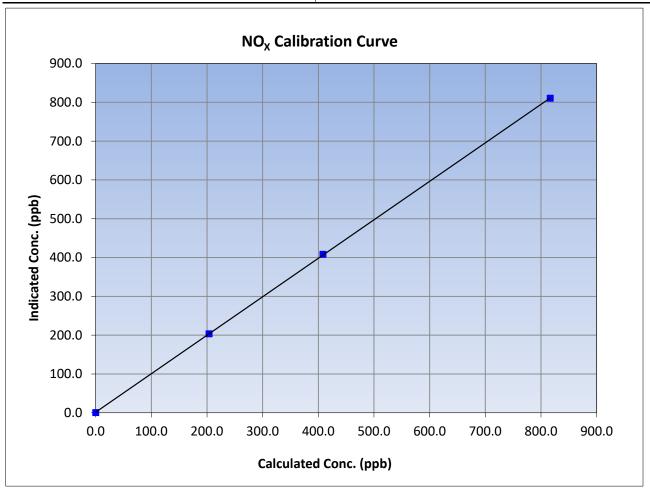
### NO<sub>x</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 8, 2023 Previous Calibration: April 21, 2023 Station Name: Athabasca Valley Station Number: AMS07 Start Time (MST): 7:15 End Time (MST): 11:26 Analyzer serial #: Analyzer make: Thermo 42i 1160120024

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.5		Correlation Coefficient	0.999986	≥0.995
816.7	810.3	1.0079	Correlation Coefficient	0.333360	20.555
408.4	408.1	1.0007	Slope	0.991417	0.90 - 1.10
203.7	203.6	1.0004	Slope	0.991417	0.30 - 1.10
			Intercept	1.497144	+/-20





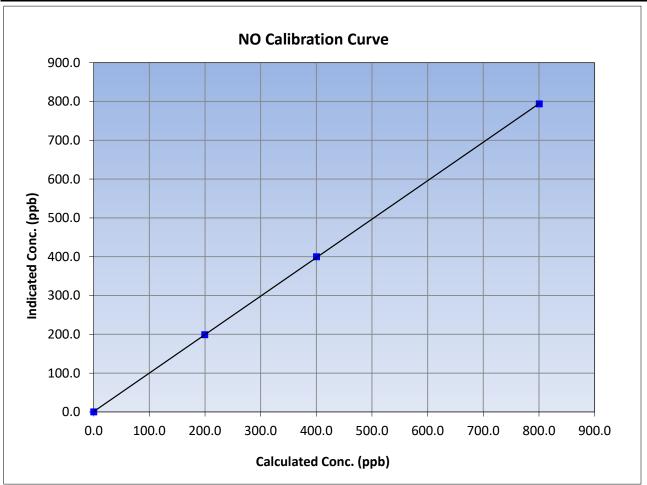
### **NO Calibration Summary**

Version-04-2020

#### **Station Information**

Calibration Date: May 8, 2023 Previous Calibration: April 21, 2023 Station Name: Athabasca Valley Station Number: AMS07 Start Time (MST): 7:15 End Time (MST): 11:26 Analyzer make: Thermo 42i Analyzer serial #: 1160120024

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999987	≥0.995
800.7	794.0	1.0084	Correlation Coefficient	0.555567	20.555
400.4	399.6	1.0019	Slope	0.991499	0.90 - 1.10
199.7	199.0	1.0034	Slope	0.551455	0.90 - 1.10
			Intercept	0.973228	+/-20





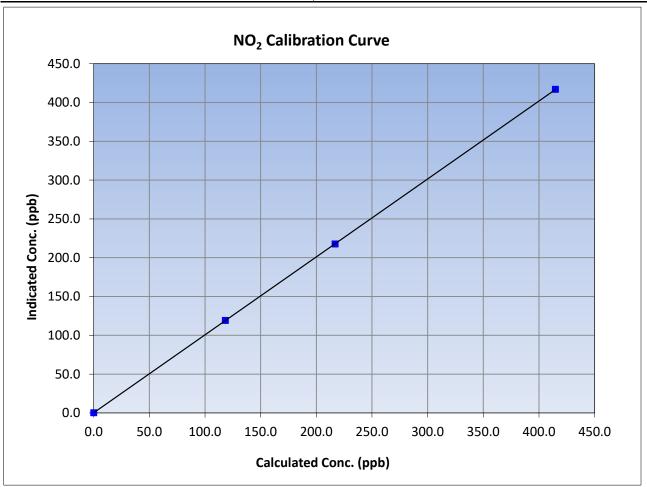
### NO<sub>2</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 8, 2023 Previous Calibration: April 21, 2023 Station Name: Athabasca Valley Station Number: AMS07 Start Time (MST): 7:15 End Time (MST): 11:26 Analyzer make: Thermo 42i Analyzer serial #: 1160120024

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.3		Correlation Coefficient	0.999998	≥0.995
414.8	416.9	0.9951	Correlation Coefficient	0.333336	20.555
216.8	217.6	0.9965	Slope	1.004055	0.90 - 1.10
118.3	119.2	0.9928	Slope	1.004055	0.90 - 1.10
			Intercept	0.235209	+/-20

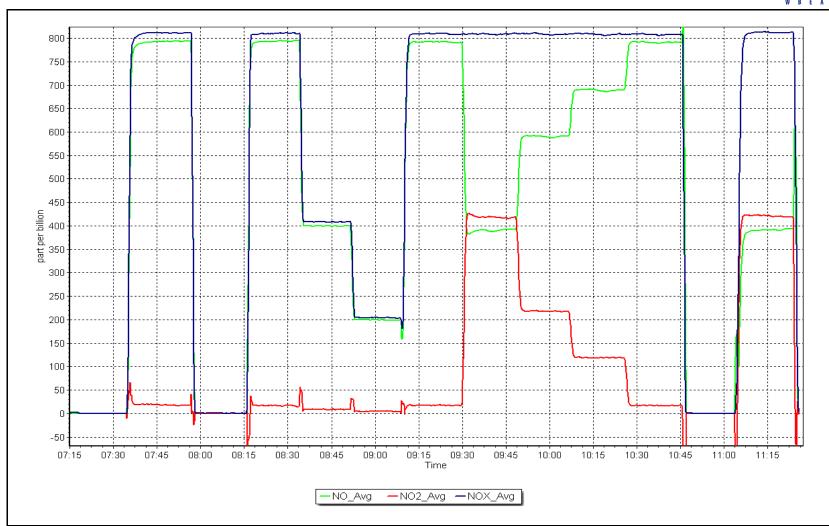


NO<sub>x</sub> Calibration Plot

Date: May 8, 2023

Location: Athabasca Valley







# O<sub>3</sub> Calibration Report

Version-01-2020

**Station Information** 

Station Name: Athabasca Valley

Calibration Date: May 3, 2023

Start time (MST): 9:28
Reason: Routine

Station number: AMS07

Last Cal Date: April 20, 2023

End time (MST): 12:38

**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 Backgd or Offset: Calibration slope: 0.998171 1.000257 -2.8 -1.3 Coeff or Slope: Calibration intercept: 0.120000 1.380000 1.435 1.502

#### O<sub>3</sub> Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)		Correction factor (Cc/Ic)  Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.8	
as found span	5000	1403.4	400.0	381.4	1.049
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.1	
high point	5000	1415.0	400.0	400.7	0.998
second point	5000	1035.1	200.0	202.5	0.988
third point	5000	852.2	100.0	102.4	0.977
as left zero	5000	0.0	0.0	-1.3	
as left span	5000	1406.5	400.0	398.6	1.004
			Averag	ge Correction Factor	0.987
Baseline Corr As found:	380.6	Previous response	e 399.4	*% change	-4.9%
Baseline Corr 2nd AF pt:	NA	AF Slope	2:	AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation	ı:		

Notes: Installed last month. Zero and Span adjusted.

Calibration Performed By: Melissa Lemay

\* = > +/-5% change initiates investigation



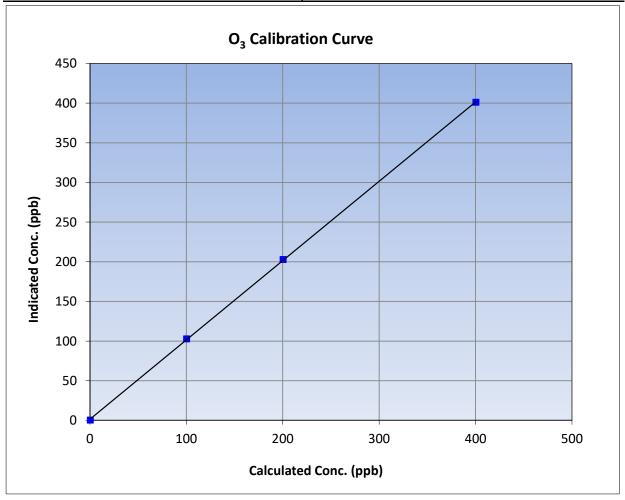
## O<sub>3</sub> Calibration Summary

Version-01-2020

#### **Station Information**

Calibration Date: May 3, 2023 **Previous Calibration:** April 20, 2023 Station Name: Athabasca Valley Station Number: AMS07 Start Time (MST): 9:28 End Time (MST): 12:38 Analyzer make: Thermo 49i Analyzer serial #: 1152220023

Calibration Data							
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>		
0.0	0.1		Correlation Coefficient	0.999950	≥0.995		
400.0	400.7	0.9983	Correlation Coefficient	0.555550	20.333		
200.0	202.5	0.9877	Slope	1.000257	0.90 - 1.10		
100.0	102.4	0.9766	Slope	1.000237	0.90 - 1.10		
			- Intercept	1.380000	+/- 5		

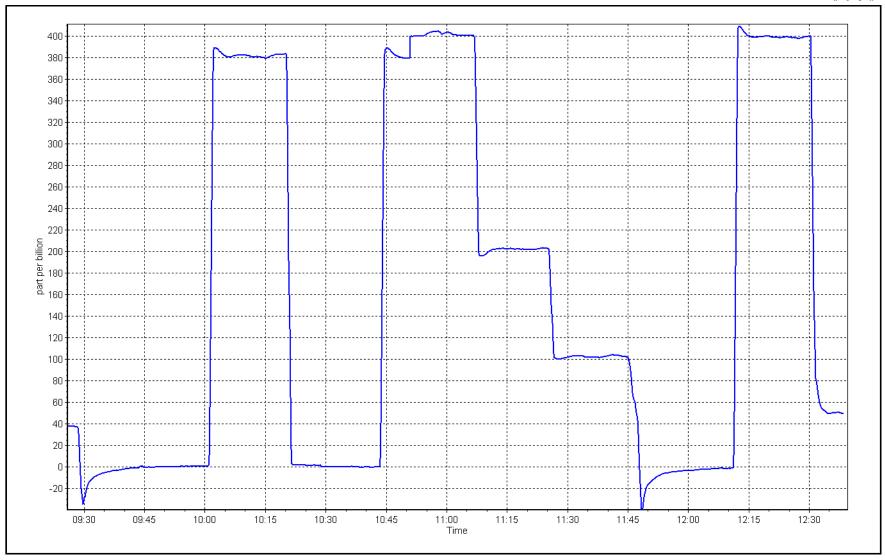


O<sub>3</sub> Calibration Plot

Date: May 3, 2023

Location: Athabasca Valley







# **T640 PM<sub>2.5</sub> CALIBRATION**

Version-01-2023

		Station Information	n			
Station Name:	Athabasca Valley		Station number:	AMS 07		
Calibration Date:	May 23, 2023		Last Cal Date:			
Start time (MST):	7:20		End time (MST):	7:52		
Analyzer Make:	API T640		S/N:	871		
Particulate Fraction:	PM2.5					
Flow Meter Make/Model:	Alicat FP-25BT		S/N:	388753		
Temp/RH standard:	Alicat FP-25BT		S/N:	388753		
		Monthly Calibration T	est			
<u>Parameter</u>	As found	Measured	<u>As left</u>		<u>Adjusted</u>	(Limits)
T (°C)	10.9	10.7	10.9			+/- 2 °C
P (mmHg)	737.5	740.2	737.5			+/- 10 mmHg
flow (LPM)	5	5.11	5			+/- 0.25 LPM
Leak Test:	Date of check:	May 23, 2023	Last Cal Date:			
	PM w/o HEPA:	101	PM w/ HEPA:		)	<0.2 ug/m3
Note: this leak check will be			serve as the pre ma	intenance le	eak check	
Inlet cleaning:	Inlet Head	<b>✓</b>				
		Quarterly Calibration	Tost			
Parameter	As found	Post maintenance			Adjusted	(Limits)
PMT Peak Test	10.2	10.2	As left 11		<u>Aujusteu</u> ✓	10.9 +/- 0.5
PIVIT PEAK TEST	10.2	10.2	11			10.9 +/- 0.5
Post-maintenance	e leak check:	PM w/o HEPA:		w/ HEPA:		
Date Optical Cham	-	May 23, 2				<0.2 ug/m3
Disposable Filter	r Changed:	May 23, 2	2023			
		Annual Maintenand	e			
Date Sample Tub Date RH/T Senso	-	December 5				
Date Kily i Selisc	or cleaned.	December	5, 2022			
	Install Due to news	r issue with removed T6	MO PMT adjusted	No other a	diustmonts	done Look
Notes:	nistan Due to powe		heck passed.	NO OTHER d	ajustilielits	GOIIE. LEAK
Calibration by:	Melissa Lemay					



### **CO Calibration Report**

Version-01-2020

**Station Information** 

Station Name: Athabasca Valley
Calibration Date: May 15, 2023

Start time (MST): 5:55

Reason: Routine

Station number: AMS07

Last Cal Date: April 25, 2023

End time (MST): 8:39

**Calibration Standards** 

Cal Gas Concentration: 3,000 ppm Cal Gas Exp Date: December 12, 2026

Cal Gas Cylinder #: LL66942

Removed Cal Gas Conc: 3,000 ppm Rem Gas Exp Date: NA Removed Gas Cyl #: NA Diff between cyl:

Calibrator Make/Model: API T700 Serial Number: 3805
ZAG Make/Model: API 700H Serial Number: 198

**Analyzer Information** 

Analyzer make: Thermo 48i-LTE Analyzer serial #: 1408761381

Analyzer Range: 0 - 50 ppm

<u>Finis</u>h Start **Finish** <u>Start</u> Calibration slope: 0.994802 0.991945 Backgd or Offset: 3.896 3.910 Coeff or Slope: Calibration intercept: 0.030541 0.060555 1.079 1.079

CO Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.1	
as found span	4933	66.7	40.0	39.8	1.006
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	39.7	1.008
second point	4967	33.3	20.0	20.0	0.999
third point	4983	16.7	10.0	10.0	1.002
as left zero	5000	0.0	0.0	0.0	
as left span	4933	66.7	40.0	39.7	1.008
			Avera	ge Correction Factor	1.003

Baseline Corr As found: 39.74 Prev response: 39.84 \*% change: -0.3% Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept:

Baseline Corr 3rd AF pt: NA AF Correlation:

Notes: No Maintenance done. Zero adjusted.

Calibration Performed By: Melissa Lemay

\* = > +/-5% change initiates investigation



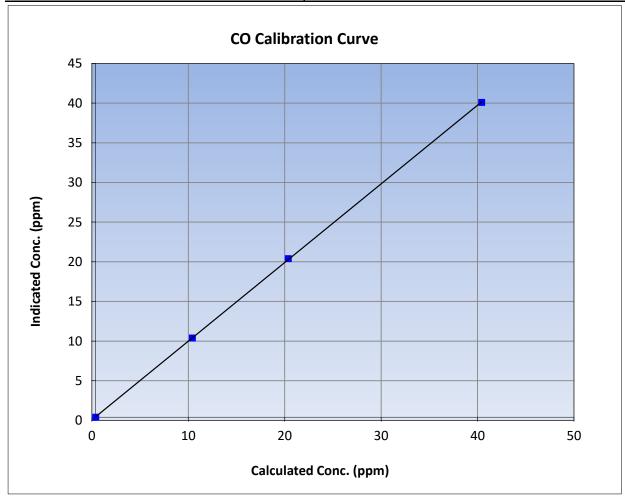
### **CO Calibration Summary**

Version-01-2020

#### **Station Information**

Calibration Date: May 15, 2023 **Previous Calibration:** April 25, 2023 Station Name: Athabasca Valley Station Number: AMS07 Start Time (MST): 5:55 End Time (MST): 8:39 Analyzer make: Thermo 48i-LTE Analyzer serial #: 1408761381

Calibration Data							
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>		
0.0	0.0		Correlation Coefficient	0.999974	≥0.995		
40.0	39.7	1.0081	Correlation Coefficient	0.333374	20.993		
20.0	20.0	0.9989	Slope	0.991945	0.90 - 1.10		
10.0	10.0	1.0021	Slope	0.551545	0.90 - 1.10		
			- Intercept	0.060555	+/-1.5		

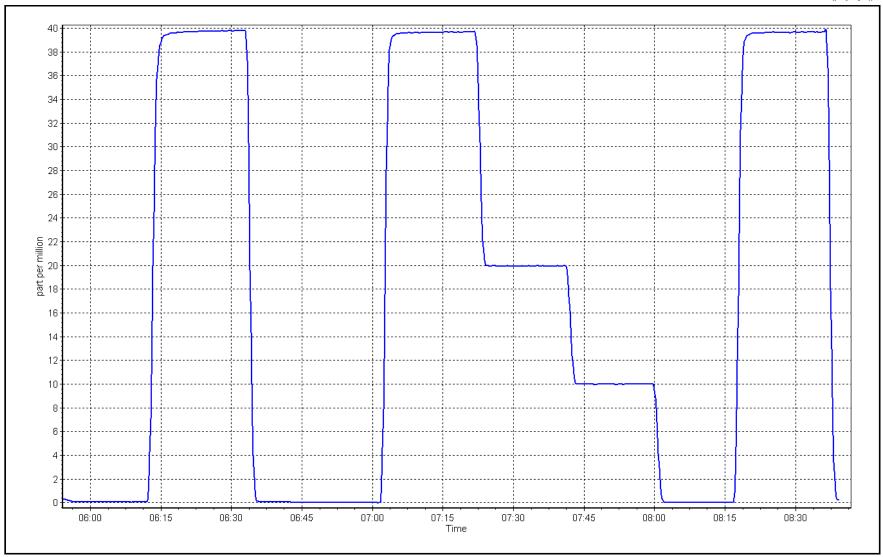


**CO Calibration Plot** 

Date: May 15, 2023

Location: Athabasca Valley







### WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

> AMS08 FORT CHIPEWYAN MAY 2023

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

June 30, 2023



### SO<sub>2</sub> Calibration Report

Version-01-2020

**Station Information** 

Station Name: Fort Chipewyan
Calibration Date: May 8, 2023
Start time (MST): 11:11

Reason: Routine

Station number: AMS08

Last Cal Date: April 12, 2023

End time (MST): 15:22

**Calibration Standards** 

Cal Gas Concentration: 49.84 ppm

Cal Gas Cylinder #: CC196697

Removed Cal Gas Conc: 49.84
Removed Gas Cyl #: NA

Calibrator Make/Model: Teledyne API T700 ZAG Make/Model: Teledyne API T701

Cal Gas Exp Date: January 6, 2030

Rem Gas Exp Date: NA Diff between cyl:

Serial Number:

Serial Number: 3060

260

Analyzer serial #: 1136451241

Analyzer Information

Analyzer make: Thermo 43i-TLE

Analyzer Range 0 - 1000 ppb

opb

ppm

**Finish** Start Finish Start Backgd or Offset: Calibration slope: 1.003016 0.999415 1.29 1.50 Calibration intercept: -1.203236 Coeff or Slope: 1.010 0.877 1.535287

SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)		Correction factor (Cc/lc)  Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.3	
as found span	4920	80.3	800.4	922.0	0.868
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	799.5	1.001
second point	4960	40.2	400.7	398.0	1.007
third point	4980	20.1	200.4	198.4	1.010
as left zero	5000	0.0	0.0	-0.1	
as left span	4920	80.3	800.4	797.3	1.004
			Averag	ge Correction Factor	1.006

Baseline Corr As found: 921.70 Previous response 804.33 \*% change 12.7% \* = > +/-5% change initiates investigation

Notes: Sample inlet filter changed after as founds. Adjusted the coefficient on analyzer. Adjustments

made to zero and span. Changed the calbrator serial # on cal sheet.

Calibration Performed By: Morgan Voyageur, Matthew C



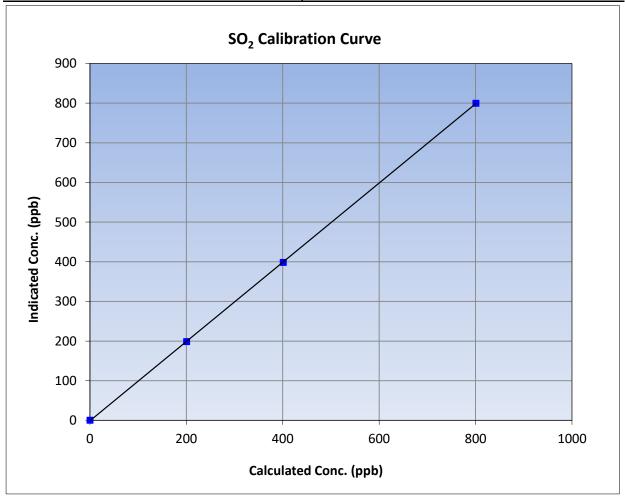
## **SO<sub>2</sub> Calibration Summary**

Version-01-2020

#### **Station Information**

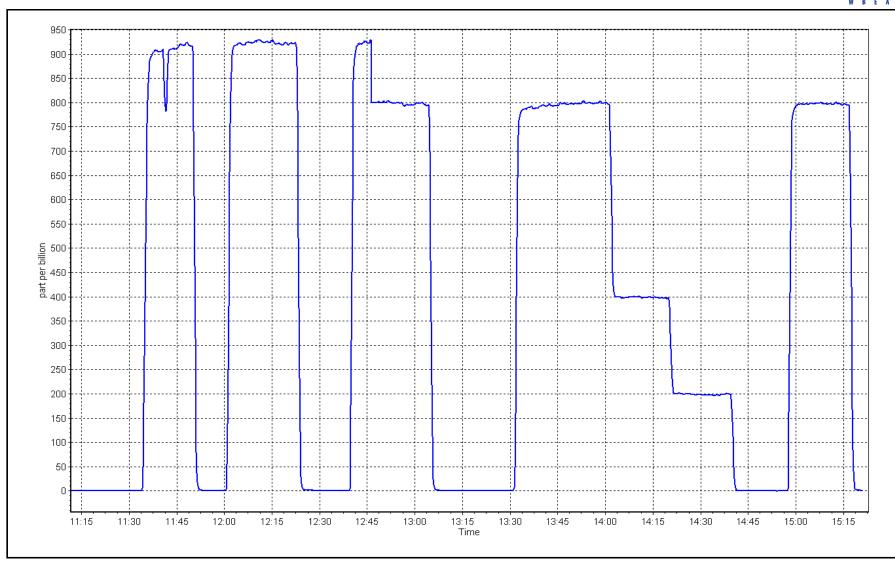
Calibration Date: May 8, 2023 **Previous Calibration:** April 12, 2023 Station Name: Fort Chipewyan Station Number: AMS08 Start Time (MST): 11:11 End Time (MST): 15:22 Analyzer make: Thermo 43i-TLE Analyzer serial #: 1136451241

	Calibration Data							
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>			
0.0	-0.1		Correlation Coefficient	0.999989	≥0.995			
800.4	799.5	1.0011	Correlation coefficient	0.555565	20.333			
400.7	398.0	1.0068	Slope	0.999415	0.90 - 1.10			
200.4	198.4	1.0098	Slope	0.555415	0.90 - 1.10			
			- Intercept	-1.203236	+/-30			



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





### **TRS Calibration Report**

Version-11-2021

**Station Information** 

Station Name: Fort Chipewyan Calibration Date: May 29, 2023 Start time (MST): 9:45 Reason: Routine

Station number: AMS08 Last Cal Date: April 26, 2023 13:41

End time (MST):

**Calibration Standards** 

Cal Gas Concentration: Cal Gas Exp Date: February 9, 2024 4.97 ppm

Cal Gas Cylinder #: EY0002276

Removed Cal Gas Conc: Rem Gas Exp Date: NA 4.97 ppm Removed Gas Cyl #: Diff between cyl: NA

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

CDN-101 Converter serial #: 14639 Converter make:

0 - 100 ppb Analyzer Range

Start **Finish Start** <u>Finish</u> 0.994424 0.976855 Backgd or Offset: 0.93 Calibration slope: 0.92 Calibration intercept: 0.158770 0.498472 Coeff or Slope: 0.694 0.694

**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	79.1	1.015
as found 2nd point	4960	40.2	40.0	39.4	1.022
as found 3rd point	4980	20.1	20.0	19.9	1.019
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	78.5	1.019
second point	4960	40.2	40.0	39.8	1.004
third point	4980	20.1	20.0	20.1	0.994
as left zero	5000	0.0	0.0	0.4	
as left span	4920	80.5	80.0	79.1	1.011
SO2 Scrubber Check	4919.7	80.3	803.0	0.1	
Date of last scrubber cha	ange:	March 7, 2022		Ave Corr Factor	1.006
Date of last converter ef	ficiency test:	March 15, 2022		100.7%	efficiency
Dosalina Carr As found	70.0	Draw rasmanasa.	70.72	*0/ ahanaa.	1 20/

Baseline Corr As found: Prev response: \*% change: 78.8 79.72 -1.2% Baseline Corr 2nd AF pt: 39.1 AF Slope: 0.984860 AF Intercept: 0.218396 Baseline Corr 3rd AF pt: AF Correlation: 0.999987 19.6 \* = > +/-5% change initiates investigation

Sample inlet filter changed after as founds. No adjustment made.

Calibration Performed By: Morgan Voyageur

Notes:



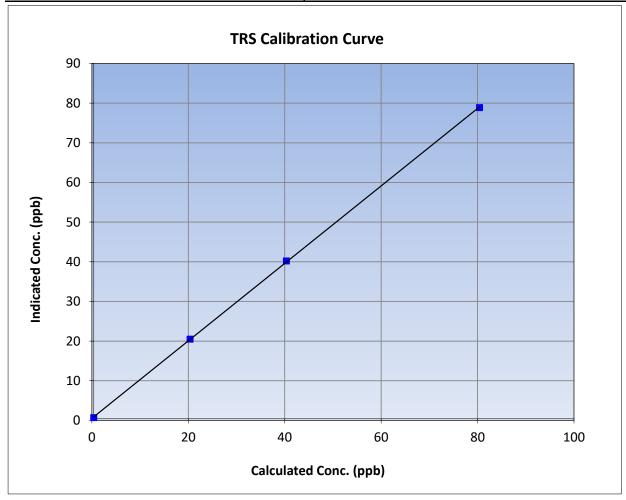
### **TRS Calibration Summary**

Version-11-2021

#### **Station Information**

**Previous Calibration:** Calibration Date: May 29, 2023 April 26, 2023 Station Name: Fort Chipewyan Station Number: AMS08 Start Time (MST): 9:45 End Time (MST): 13:41 Analyzer make: Thermo 43iQ-TL Analyzer serial #: 1203169744

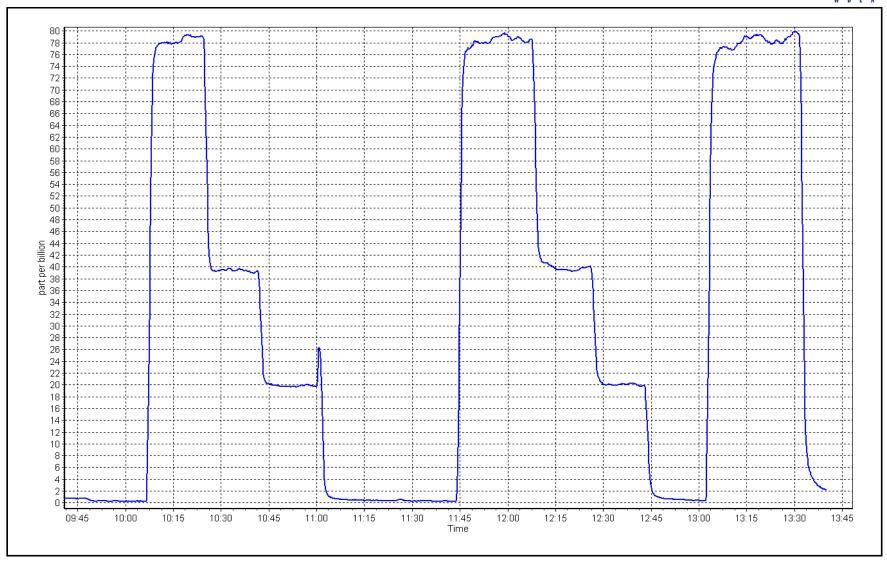
Calibration Data								
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>			
0.0	0.3		Correlation Coefficient	0.999957	≥0.995			
80.0	78.5	1.0192	Correlation Coefficient	0.55557	20.993			
40.0	39.8	1.0039	Slope	0.976855	0.90 - 1.10			
20.0	20.1	0.9940	Slope	0.970633	0.90 - 1.10			
			- Intercept	0.498472	+/-3			



TRS Calibration Plot Date: May 29, 2023

Location: Fort Chipewyan







# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

#### **Station Information**

Station Name: Fort Chipewyan Calibration Date: May 15, 2023

Start time (MST): 8:28
Reason: Routine

Station number: AMS08 Last Cal Date: April 13, 2023

End time (MST): 12:54

#### **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

<u>Start</u> **Finish** <u>Start</u> **Finish** NO coeff or slope: 1.882 1.813 NO bkgnd or offset: 7.9 7.6 NOX coeff or slope: 1.000 0.993 NOX bkgnd or offset: 7.7 8.1 NO2 coeff or slope: 0.995 1.000 Reaction cell Press: 241.1 241.1

#### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	0.996544	0.995016
NO <sub>x</sub> Cal Offset:	1.320000	-0.320000
NO Cal Slope:	0.995845	0.998443
NO Cal Offset:	0.740000	-0.920000
NO <sub>2</sub> Cal Slope:	1.003157	0.994665
NO <sub>2</sub> Cal Offset:	0.613431	-1.310360



# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

				Dilu	ution Calibration	า Data				
Set Point	Dilution flow rate (sccm)	Source gas flow co	oncentration (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	829.1	826.7	2.4	0.9653	0.9681
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	4918	82.0	800.3	800.3	0.0	796.3	798.7	-2.4	1.0050	1.0020
second point	4959	41.0	400.2	400.2	0.0	397.4	398.0	-0.6	1.0069	1.0054
third point	4980	20.5	200.1	200.1	0.0	198.5	197.9	0.6	1.0080	1.0110
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1		
as left span	4918	82.0	800.3	432.4	367.9	796.3	437.5	358.7	1.0050	0.9884
							Average Co	orrection Factor	1.0067	1.0062
Corrected As fo	ound NO <sub>X</sub> =	829.2 ppb	NO =	826.7 ppb	* = > +/-5%	6 change initiates i	investigation	*Percent Chang	ge NO <sub>x</sub> =	3.7%
Previous Respo	onse NO <sub>X</sub> =	798.9 ppb	NO =	797.7 ppb				*Percent Chang	ge NO =	3.5%
Baseline Corr 2	and pt NO <sub>X</sub> =	NA ppb	NO =	NA ppb	As found	$I NO_X r^2$ :		Nx SI:	Nx Int:	
Baseline Corr 3	$Srd pt NO_X =$	NA ppb	NO =	NA ppb	As found	$1   NO r^2$ :		NO SI:	NO Int:	
					As found	$I \qquad NO_2 r^2$ :		NO2 SI:	NO <sub>2</sub> Int:	
				G	PT Calibration [	) Data				
O3 Setpo	pint (ppb)	Indicated NO Referer concentration (ppb		cated NO Drop entration (ppb)	Calculated NO concentration (ppb		dicated NO2 ntration (ppb) (Ic)	NO2 Correction fac Calibration Limit = As Found Limit = C	0.95-1.05 Calibratio	erter Efficiency on Limit = 96-104%
as found	GPT zero									
as found GPT poi	int (400 ppb NO2)									
as found GPT poi	int (200 ppb NO2)									
as found GPT poi	int (100 ppb NO2)									
1st GPT point	t (400 ppb O3)	795.1		427.2	367.9		365.2	1.0074	1	99.3%
2nd GPT poin	t (200 ppb O3)	795.1		619.0	176.1		173.3	1.0162	<u>)</u>	98.4%
		705.1		700.6	85.5		82.4	1.0376	•	96.4%
3rd GPT point	t (100 ppb O3)	795.1		709.6			82.4	1.0370		90.4%

Notes:

Sample inlet filter changed after as founds. Adjustment made to span high point.

Calibration Performed By: Morgan Voyageur, Matthew C



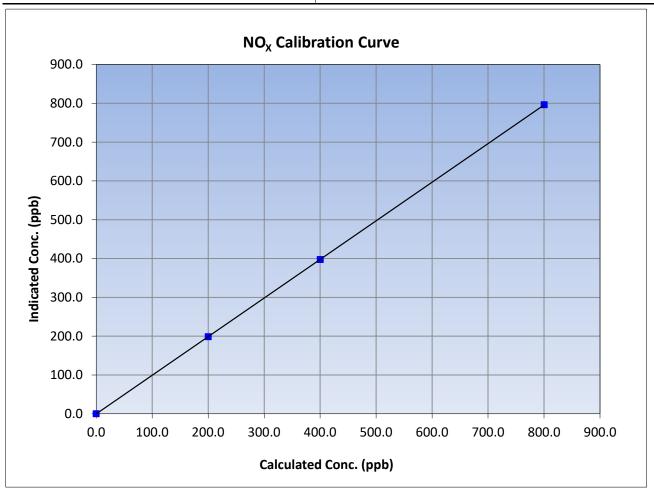
### NO<sub>x</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 15, 2023 Previous Calibration: April 13, 2023 Station Name: Fort Chipewyan Station Number: AMS08 Start Time (MST): 8:28 End Time (MST): 12:54 Analyzer serial #: Analyzer make: Thermo 42i 1426262592

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999998	≥0.995
800.3	796.3	1.0050	Correlation Coefficient	0.55555	20.333
400.2	397.4	1.0069	Slope	0.995016	0.90 - 1.10
200.1	198.5	1.0080	Slope	0.993010	0.90 - 1.10
			Intercept	-0.320000	+/-20





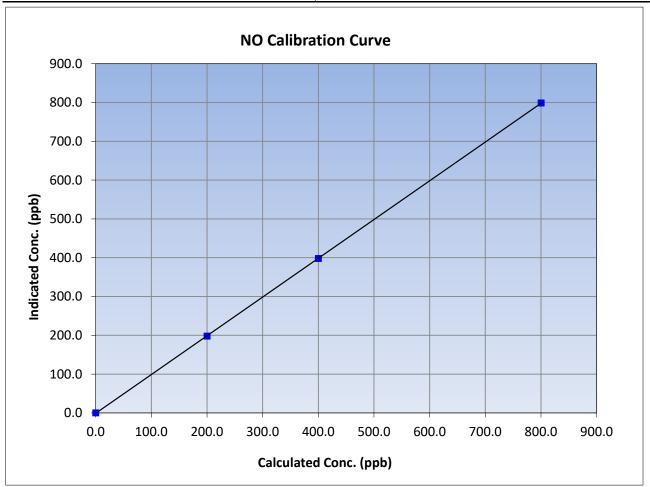
### **NO Calibration Summary**

Version-04-2020

#### **Station Information**

Calibration Date: May 15, 2023 Previous Calibration: April 13, 2023 Station Name: Fort Chipewyan Station Number: AMS08 Start Time (MST): 8:28 End Time (MST): 12:54 Analyzer make: Thermo 42i Analyzer serial #: 1426262592

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999993	≥0.995
800.3	798.7	1.0020	Correlation Coefficient	0.999993	20.333
400.2	398.0	1.0054	Slope	0.998443	0.90 - 1.10
200.1	197.9	1.0110	Slope	0.556445	0.90 - 1.10
			Intercept	-0.920000	+/-20





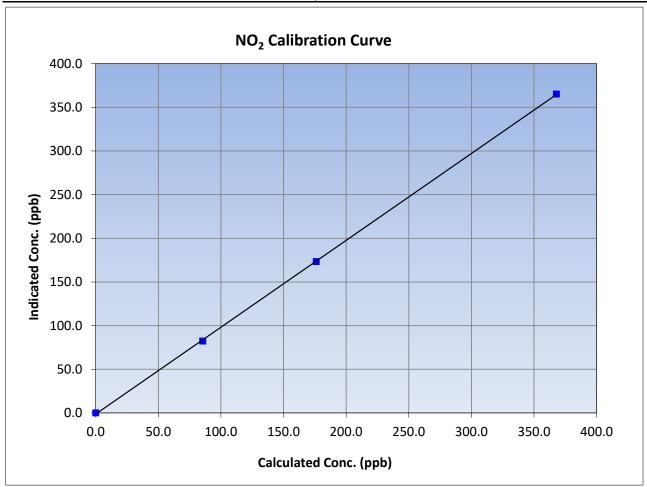
# NO<sub>2</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 15, 2023 Previous Calibration: April 13, 2023 Station Name: Fort Chipewyan Station Number: AMS08 Start Time (MST): 8:28 End Time (MST): 12:54 Analyzer make: Thermo 42i Analyzer serial #: 1426262592

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999944	≥0.995
367.9	365.2	1.0074	Correlation Coefficient	0.555544	20.333
176.1	173.3	1.0162	Slope	0.994665	0.90 - 1.10
85.5	82.4	1.0376	Slope	0.554005	0.90 - 1.10
			Intercept	-1.310360	+/-20

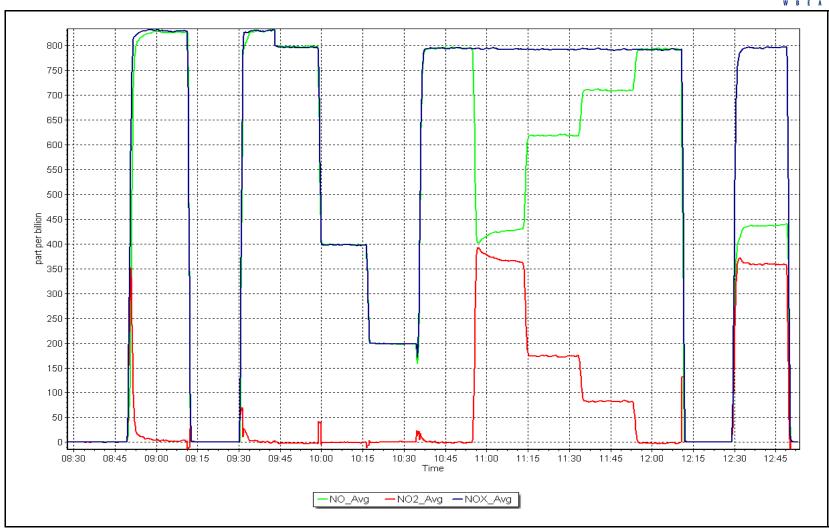


NO<sub>x</sub> Calibration Plot

Date: May 15, 2023

Location: Fort Chipewyan







## O<sub>3</sub> Calibration Report

Version-01-2020

Finish

-2.0

1.036

Station Information

Station Name: Fort Chipewyan Calibration Date: May 10, 2023

Start time (MST): 7:39

Reason: Routine Station number: AMS08

Last Cal Date: April 12, 2023

End time (MST): 10:33

**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 Range 0 - 500 ppb

Analyzer serial #: 3872

Finish Start Start Backgd or Offset: Calibration slope: 1.013200 1.007686 -2.0 Coeff or Slope: Calibration intercept: -0.960000 -2.020000 1.036

O<sub>3</sub> Calibration Data

Set Point	Total air flow rate	Calibrator Lamp	Calculated	Indicated concentration (	Correction factor (Cc/Ic)
Set Point	(sccm)	Voltage Drive	concentration (ppb) (Cc)	(ppm) (Ic)	<i>Limit = 0.95-1.05</i>
as found zero	5000	NA	0.0	-0.3	
as found span	5000	963.6	400.0	399.8	1.001
as found 2nd point					
as found 3rd point					
calibrator zero	5000	NA	0.0	0.4	
high point	5000	961.7	400.0	402.4	0.994
second point	5000	810.3	200.0	197.9	1.011
third point	5000	701.3	100.0	96.6	1.035
as left zero	5000	NA	0.0	0.3	
as left span	5000	963.3	400.0	405.2	0.987
			Averag	ge Correction Factor	1.013

Baseline Corr As found: 400.1 Previous response 404.3 \*% change -1.1% Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept:

Baseline Corr 3rd AF pt: NA AF Correlation:

\* = > +/-5% change initiates investigation

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

Calibration Performed By: Morgan Voyageur



# **T640 PM<sub>2.5</sub> CALIBRATION**

Version-01-2023

		Station Information	1			
Station Name:	Fort Chipewyan		Station number:	AMS 08		
Calibration Date:	May 29, 2023		Last Cal Date:	April 26, 20	23	
Start time (MST):	13:33		End time (MST):	15:21		
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 T	est			
<u>Parameter</u>	As found	Measured	As left		<u>Adjusted</u>	(Limits)
T (°C)	18.8	18.5	18.8			+/- 2 °C
P (mmHg)	726.1	717.3	726.1			+/- 10 mmHg
flow (LPM)	5.02	4.49	5.02			+/- 0.25 LPM
Leak Test:	Date of check:	May 29, 2023	Last Cal Date:			
	PM w/o HEPA:	0.1	PM w/ HEPA:	0.	0	<0.2 ug/m3
Note: this leak check will be	completed before the	quarterly work and will s	serve as the pre ma	intenance le	eak check	
Inlet cleaning :	Inlet Head					
		Quarterly Calibration	Гest			
<u>Parameter</u>	As found	Post maintenance	<u>As left</u>		<u>Adjusted</u>	(Limits)
PMT Peak Test						11.3 +/- 0.5
Post-maintenance	e leak check:	PM w/o HEPA:	8.4	w/ HEPA:		0.0
Date Optical Cham		March 13, 2023				<0.2 ug/m3
Disposable Filte	r Changed:	March 13,	2023			
		Annual Maintenanc	e			
Date Sample Tuk	•	July 14, 2				
Date RH/T Senso	or Cleaned:	July 14, 2	022			
Notes:		No ad	justments made.			
Calibration by:	Morgan Voyageur					



### **CO Calibration Report**

Version-01-2020

#### **Station Information**

Station Name: Fort Chipewyan
Calibration Date: May 17, 2023
Start time (MST): 7:41

Reason: Routine

Station number: AMS08

Last Cal Date: April 21, 2023

End time (MST): 10:25

#### **Calibration Standards**

Cal Gas Concentration: 3,030

Cal Gas Cylinder #: ALM014846

Removed Cal Gas Conc: 3,030 Removed Gas Cyl #: NA

Calibrator Make/Model: API T700 ZAG Make/Model: API T701H Cal Gas Exp Date: December 1, 2028

Rem Gas Exp Date: NA

Diff between cyl: Serial Number: 3060

Serial Number: 260

#### **Analyzer Information**

Analyzer make: API T300 Analyzer serial #: 3505

ppm

ppm

Analyzer Range: 0 - 50 ppm

Start Finish Finish Start Calibration slope: 0.997452 0.999682 Backgd or Offset: -0.014 -0.014 Calibration intercept: 0.126989 Coeff or Slope: 1.005 0.968 0.118914

#### **CO Calibration Data** Calculated Correction factor Indicated concentration Dilution air flow rate Source gas flow rate Set Point concentration (ppm) (Cc/Ic) (sccm) (sccm) (ppm) (Ic) (Cc) Limit = 0.95-1.050.0 as found zero 5000 0.0 0.00 4933 66.7 40.4 43.0 0.940 as found span as found 2nd point as found 3rd point new cylinder response calibrator zero 0.0 5000 0.0 0.0 ---high point 4934 66.7 40.4 40.4 1.000 second point 4967 33.3 20.2 20.5 0.983 third point 4983 16.7 10.1 10.2 0.988 0.0 0.0 0.0 as left zero 5000 ---as left span 2960 40.0 40.4 40.3 1.001 Average Correction Factor 0.991 Baseline Corr As found: 42.99 Prev response: 40.44 \*% change: 5.9% Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept: Baseline Corr 3rd AF pt: AF Correlation: NA

Notes: Changed inlet filter after as founds. Adjusted span.installed new calibrator prior.

Calibration Performed By: Morgan Voyageur, Matthew Courtoreille

\* = > +/-5% change initiates investigation



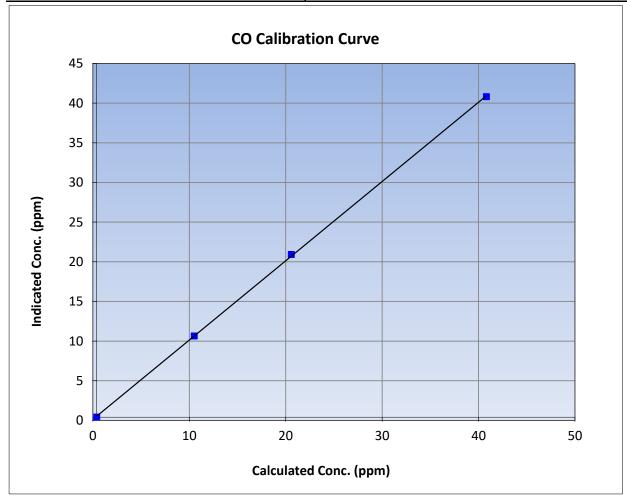
### **CO Calibration Summary**

Version-01-2020

#### **Station Information**

**Previous Calibration:** Calibration Date: May 17, 2023 April 21, 2023 Station Name: Fort Chipewyan Station Number: AMS08 Start Time (MST): 7:41 End Time (MST): 10:25 Analyzer make: **API T300** Analyzer serial #: 3505

Calibration Data								
Calculated concentration Indicated concentration Correction factor (ppm) (Cc) (ppm) (Ic) (Cc/Ic)			Statistical Evalua	ation	<u>Limits</u>			
0.0	0.0		Correlation Coefficient	0.999920	≥0.995			
40.4	40.4	0.9999	Correlation Coefficient	0.333320	20.993			
20.2	20.5	0.9834	Slope	0.999682	0.90 - 1.10			
10.1	10.2	0.9883	Slope	0.999062	0.90 - 1.10			
			- Intercept	0.126989	+/-1.5			

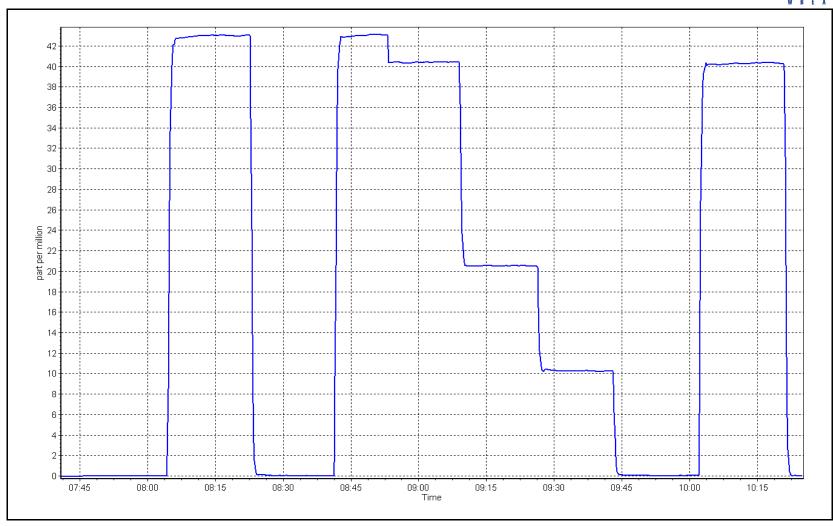


**CO Calibration Plot** 

Date: May 17, 2023

Location: Fort Chipewyan







### CO<sub>2</sub> Calibration Report

Version-01-2020

**Station Information** 

Station Name: Fort Chipewyan
Calibration Date: May 17, 2023
Start time (MST): 11:14

Reason: Routine

Station number: AMS08

Last Cal Date: April 21, 2023

End time (MST): 16:54

**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: 0.992226 0.996425 Backgd or Offset: 0.006 -0.01 Calibration intercept: -4.080000 -0.680000 Coeff or Slope: 1.018 1.018

CO<sub>2</sub> 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/lc)  Limit = 0.95-1.05
as found zero	3000	0.0	0.0	0.6	
as found span	2920	80.0	1605.9	1713.7	0.937
as found 2nd point					
as found 3rd point					
new cylinder response					_
calibrator zero	3000	0.0	0.0	0.2	
high point	2920	80.0	1605.9	1604.4	1.001
second point	2960	40.0	802.9	785.4	1.022
third point	2980	20.0	401.5	407.5	0.985
as left zero	3000	0.0	0.0	26.0	
as left span					

Average Correction Factor 1.003

Baseline Corr As found: 1713.10 Prev response: 1589.30 \*% change: 7.2%

Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept:

Baseline Corr 3rd AF pt: NA AF Correlation:

Notes: Sample inlet filter changed after as founds. As found points are high due to changing calibrator.

Slighty adjusted as found and span points.

Calibration Performed By: Morgan Voyageur, Matthew C

\* = > +/-5% change initiates investigation



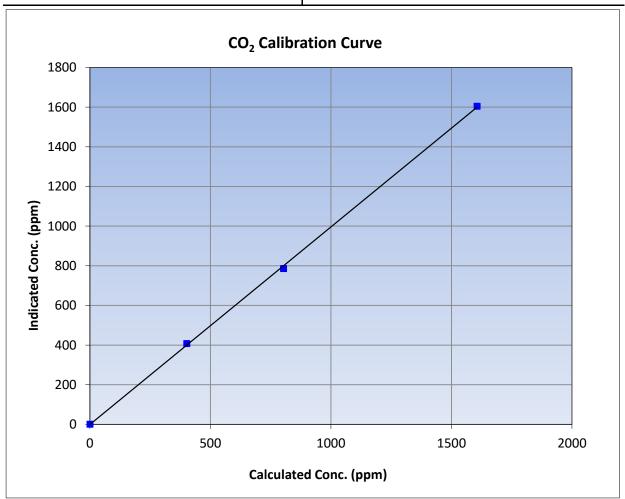
# **CO<sub>2</sub> Calibration Summary**

Version-01-2020

O		
Station	Intorm	STICE
Station		ativi

Calibration Date	May 17, 2023	Previous Calibration	April 21, 2023
Station Name	Fort Chipewyan	Station Number	AMS08
Start Time (MST)	11:14	End Time (MST)	16:54
Analyzer make	Teledyne API T360	Analyzer serial #	289

Calculated concentration Indicated concentration (ppm) (Cc) (ppm) (Ic)		Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.2		Correlation Coefficient	0.999795	≥0.995
1605.9	1604.4	1.0009			
802.9	785.4	1.0223	Slope	0.996425	0.90 - 1.10
401.5	407.5	0.9852			
			- Intercept	-0.680000	+/-20



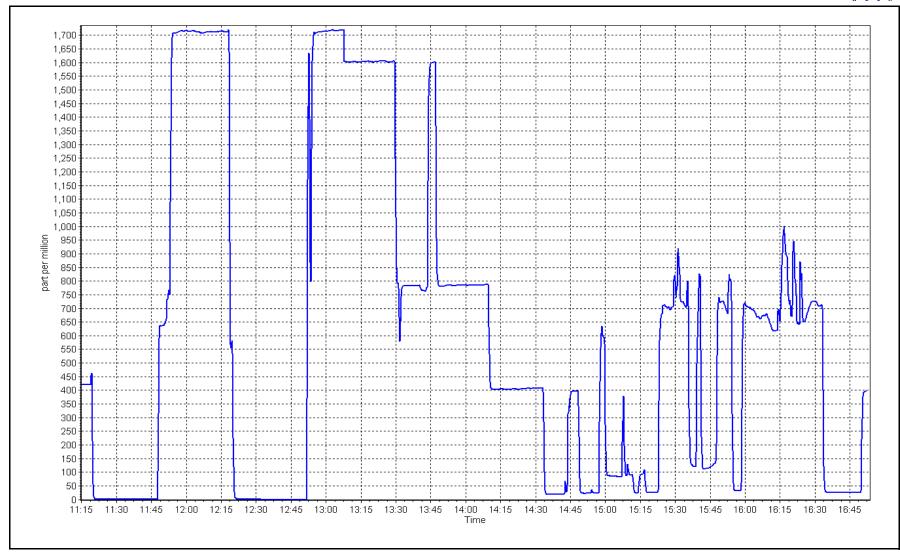
CO<sub>2</sub> Calibration Plot

Date:

May 17, 2023

Location: Fort Chipewyan







### WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

> AMS09 BARGE LANDING MAY 2023

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

June 30, 2023



### **SO<sub>2</sub> Calibration Report**

Version-01-2020

#### **Station Information**

Station Name: Barge Landing
Calibration Date: May 8, 2023
Start time (MST): 10:36
Reason: Routine

Station number: AMS09 Last Cal Date: April 11, 2023

End time (MST): 13:51

#### **Calibration Standards**

Cal Gas Concentration: 49.96

Cal Gas Cylinder #: CC151285

Removed Cal Gas Conc: 49.96 Removed Gas Cyl #: NA

Calibrator Make/Model: API T700 ZAG Make/Model: API T701 ppm Cal Gas Exp Date: January 5, 2025

ppm Rem Gas Exp Date: NA

Diff between cyl:

Serial Number: 3812 Serial Number: 4888

#### **Analyzer Information**

Analyzer make: Thermo 43i Analyzer serial #: 1118148498

Analyzer Range 0 - 1000 ppb

**Finish Finish** Start Start Calibration slope: 0.998843 0.999100 Backgd or Offset: 9.7 9.9 -0.089025 0.986 Calibration intercept: -0.528972 Coeff or Slope: 0.986

#### SO<sub>2</sub> Calibration Data

6 ( 8 ) (	Dilution air flow rate	Source gas flow rate	Calculated	Indicated concentration (	Correction factor (Cc/Ic)
Set Point	(sccm)	(sccm)	concentration (ppb) (Cc)	(ppb) (Ic)	<i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.1	
as found span	4919	80.2	801.5	797.5	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	
high point	4919	80.2	801.5	801.1	1.000
second point	4959	40.1	400.8	398.0	1.007
third point	4980	20.0	199.8	199.4	1.002
as left zero	5000	0.0	0.0	0.2	
as left span	4919	80.2	801.5	802.0	0.999
			Averag	ge Correction Factor	1.003
Baseline Corr As found:	797.40	Previous response	800.47	*% change	-0.4%

Baseline Corr As found: 797.40 Previous response 800.47 \*% change -0.4% Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept:

Baseline Corr 3rd AF pt: NA AF Slope: AF Intercept:

NA AF Slope: AF Intercept:

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

\* = > +/-5% change initiates investigation

Calibration Performed By: Braiden Boutilier

Notes:



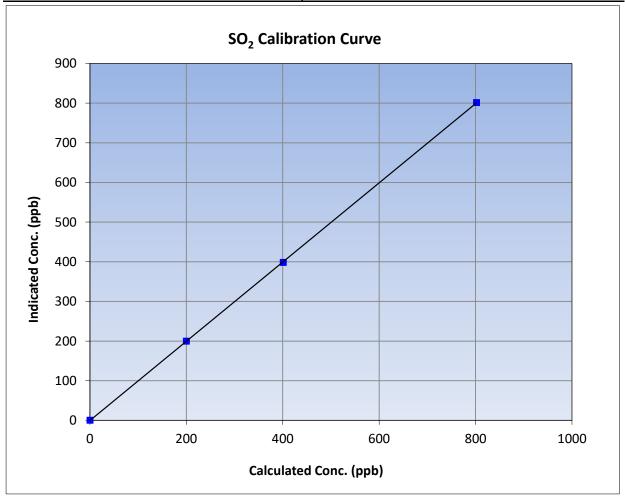
## **SO<sub>2</sub> Calibration Summary**

Version-01-2020

#### **Station Information**

Calibration Date: May 8, 2023 **Previous Calibration:** April 11, 2023 Station Name: Barge Landing Station Number: AMS09 Start Time (MST): 10:36 End Time (MST): 13:51 Analyzer make: Thermo 43i Analyzer serial #: 1118148498

Calibration Data							
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>		
0.0	0.2		Correlation Coefficient	0.999986	≥0.995		
801.5	801.1	1.0005	Correlation Coefficient	0.55550	20.993		
400.8	398.0	1.0069	Slone	0.999100	0.90 - 1.10		
199.8	199.4	1.0022	Slope		0.90 - 1.10		
			- Intercept	-0.528972	+/-30		



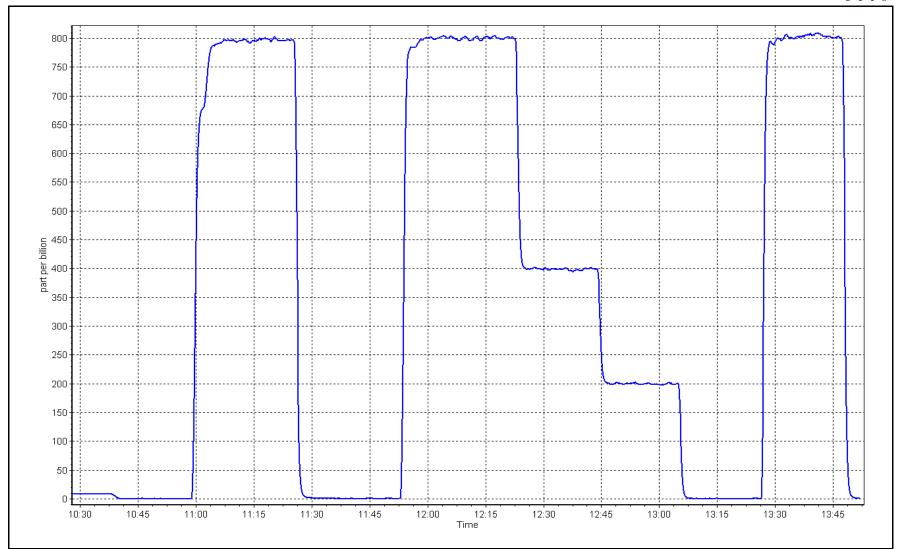
**SO2 Calibration Plot** 

Date:

May 8, 2023

Location: Barge Landing







### **TRS Calibration Report**

Version-11-2021

**Station Information** 

Station Name: Barge Landing
Calibration Date: May 3, 2023
Start time (MST): 9:47
Reason: Routine

Station number: AMS09 Last Cal Date: April 17, 2023 End time (MST): 14:57

**Calibration Standards** 

Cal Gas Concentration: 4.87 ppm

Cal Gas Cylinder #: EY0002346

Removed Cal Gas Conc: 4.87
Removed Gas Cyl #: NA
Calibrator Make/Model: API T700

ZAG Make/Model: API T701

Cal Gas Exp Date: September 2, 2024

Rem Gas Exp Date: NA
Diff between cyl:

Serial Number: 3812 Serial Number: 4888

Analyzer serial #: 1331259320

**Analyzer Information** 

Analyzer make: Thermo 43i-TLE

Converter make: CDN-101

Analyzer Range 0 - 100 ppb

0 - 100 ppb

Start

Calibration slope: 1.008720 Calibration intercept: 0.079030 <u>Finish</u>

1.005434 0.019021

ppm

Backgd or Offset: Coeff or Slope:

Converter serial #: 519

<u>Start</u> 2.78 1.137 <u>Finish</u> 2.82 1.147

**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	4918	82.1	80.0	77.8	1.028
as found 2nd point	4959	41.1	40.0	39.2	1.021
as found 3rd point	4979	20.5	20.0	19.6	1.019
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	4918	82.1	80.0	80.4	0.995
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	0.0	
as left span	4918	82.1	80.0	81.1	0.986
SO2 Scrubber Check	4920	80.2	802.0	-0.1	
Date of last scrubber chang	ge:	28-Feb-23		Ave Corr Factor	0.994
Date of last converter effic	·	efficiency			

	- /				<u> </u>	
Baseline Corr As found:	77.8	Prev response:	80.74	*% change:	-3.8%	
Baseline Corr 2nd AF pt:	39.2	AF Slope:	0.972568	AF Intercept:	0.119009	
Baseline Corr 3rd AF pt:	19.6	AF Correlation:	0.999986			

Notes:

Changed sample inlet filter after as founds. SOx scrubber check done after calibrator zero.

Adjusted span.

Calibration Performed By:

Braiden Boutilier

\* = > +/-5% change initiates investigation



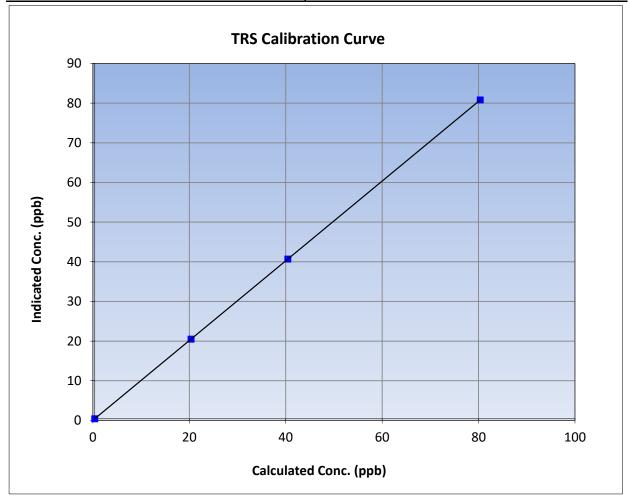
### **TRS Calibration Summary**

Version-11-2021

#### **Station Information**

**Previous Calibration:** Calibration Date: May 3, 2023 April 17, 2023 Station Name: Barge Landing Station Number: AMS09 Start Time (MST): 9:47 End Time (MST): 14:57 Analyzer make: Thermo 43i-TLE Analyzer serial #: 1331259320

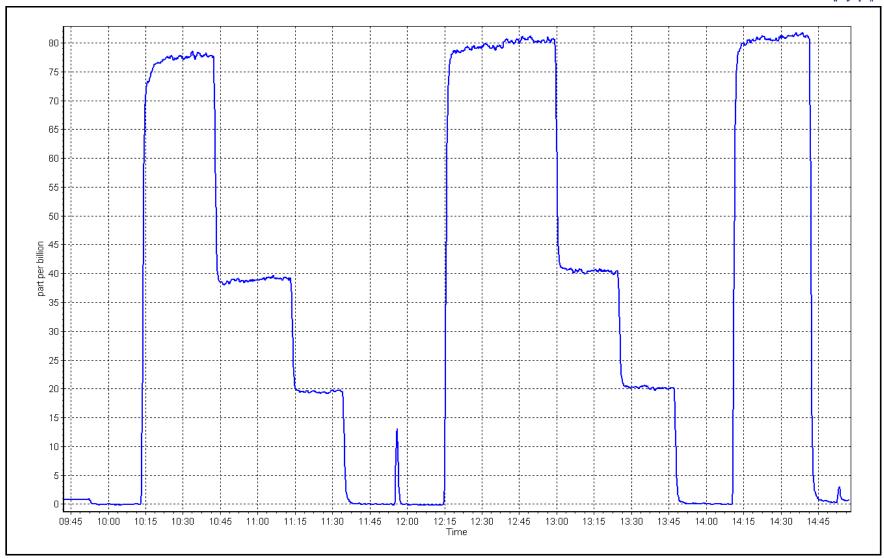
Calibration Data							
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>		
0.0	0.0		Correlation Coefficient	1.000000	≥0.995		
80.0	80.4	0.9946	Correlation Coefficient	1.000000	20.333		
40.0	40.3	0.9933	Slope	1.005434	0.90 - 1.10		
20.0	20.1	0.9935	Siope	1.005454	0.90 - 1.10		
			- Intercept	0.019021	+/-3		



TRS Calibration Plot

Date: May 3, 2023 Location: Barge Landing







### THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

#### **Station Information**

Station Name: Barge Landing Calibration Date: May 8, 2023 Start time (MST): 10:36 Reason:

Routine

Station number: AMS09

Last Cal Date: April 11, 2023

End time (MST): 13:51

#### **Calibration Standards**

Gas Cert Reference: Cal Gas Expiry Date: January 5, 2025 CC151285

CH4 Cal Gas Conc. 497.6 CH4 Equiv Conc. 1067.1 ppm ppm

C3H8 Cal Gas Conc. 207.1 ppm

Removed Gas Expiry: NA Removed Gas Cert: NA

Removed CH4 Conc. 497.6 ppm CH4 Equiv Conc. 1067.1 ppm

Removed C3H8 Conc. 207.1 ppm Diff between cyl (THC): Diff between cyl ( $CH_4$ ): Diff between cyl (NM):

Calibrator Model: **API T700** Serial Number: 3812 ZAG make/model: **API T701** Serial Number: 4888

#### **Analyzer Information**

Analyzer make: Thermo 55i Analyzer serial #: 1193585649

THC Range (ppm): 0 - 100 ppm

NMHC Range (ppm): 0 - 50 ppm CH4 Range (ppm): 0 - 50 ppm

Start Finish Start Finish CH4 SP Ratio: 2.49E-04 2.50E-04 NMHC SP Ratio: 4.79E-05 4.87E-05 CH4 Retention time: 15.2 NMHC Peak Area: 15.2 190949 187500

#### **THC Calibration Data**

0.0 80.2	0.00	0.00	
80 2		0.00	
00.2	17.12	16.99	1.008
0.0	0.00	0.00	
80.2	17.12	17.18	0.996
40.1	8.56	8.56	1.000
20.0	4.27	4.28	0.997
0.0	0.00	0.00	
80.2	17.12	17.15	0.998
	Į.	Average Correction Factor	0.998
Prev response	17.07	*% change	-0.4%
AF Slope:		AF Intercept:	
	0.0 80.2 Prev response	0.0 0.00 80.2 17.12 Prev response 17.07	0.0         0.00         0.00           80.2         17.12         17.15           Average Correction Factor           Prev response         17.07         *% change

\* = > +/-5% change initiates investigation Baseline Corr 3rd AF: NA AF Correlation:



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

					VC151011 01 2
		NINALIC Colibra	estion Data		
Set Point	Dil air flow rate	NMHC Calibr Source gas flow rate	Calc conc (ppm) (Co	c) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i>
as found zero	5000	0.0	0.00	0.0	
is found span	4919	80.2	9.14	9.03	1.012
s found 2nd point					
s found 3rd point					
new cylinder response					
alibrator zero	5000	0.0	0.00	0.00	
nigh point	4919	80.2	9.14	9.18	0.995
second point	4960	40.1	4.57	4.59	0.995
hird point	4980	20	2.28	2.29	0.994
as left zero	5000	0	0.00	0.00	
is left span	4919	80.2	9.14	9.17	0.996
is rere spari	1323	30.2		verage Correction Factor	0.995
Baseline Corr AF:	9.03	Prev response	9.07	*% change	-0.5%
Baseline Corr 2nd AF:	NA	AF Slope:	3.07	AF Intercept:	0.570
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
Justinie Con Gru / II .		7ti concideroni			
		CH4 Calibra	tion Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Co	c) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i>
is found zero	5000	0.0	0.00	0.00	
is found span	4919	80.2	7.98	7.96	1.003
s found 2nd point					
s found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
nigh point	4919	80.2	7.98	7.99	0.999
econd point	4960	40.1	3.99	3.98	1.004
hird point	4980	20.0	1.99	1.99	1.001
is left zero	5000	0.0	0.00	0.00	
is left span	4919	80.2	7.98	7.98	1.000
·			A۱	verage Correction Factor	1.001
Baseline Corr AF:	7.96	Prev response	8.00	*% change	-0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
		Calibration	Statistics		
		<u>Start</u>		<u>Finish</u>	
THC Cal Slope:		0.995837		1.003421	
THC Cal Offset:		0.017643		-0.007132	
CH4 Cal Slope:		1.000907		1.001195	
CH4 Cal Offset:		0.007869		-0.006136	
Cri- Cui Oriset.		0.007005		0.000130	

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

0.991957

0.009575

Calibration Performed By: Braiden Boutilier

NMHC Cal Slope:

NMHC Cal Offset:

1.004627

0.001202



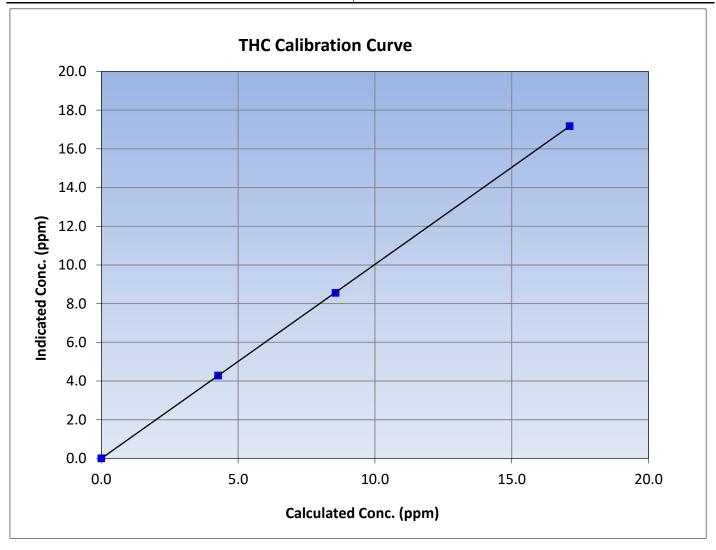
## **THC Calibration Summary**

Version-01-2020

#### **Station Information**

Calibration Date: May 8, 2023 **Previous Calibration:** April 11, 2023 Station Name: Barge Landing Station Number: AMS09 Start Time (MST): 10:36 End Time (MST): 13:51 Analyzer make: Thermo 55i Analyzer serial #: 1193585649

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Eval	uation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999997	≥0.995
17.12	17.18	0.9965	Correlation Coefficient	0.555557	20.333
8.56	8.56	0.9998	Slope	1.003421	0.90 - 1.10
4.27	4.28	0.9973	Slope	1.003421	0.90 - 1.10
			Intercept	-0.007132	+/-0.5





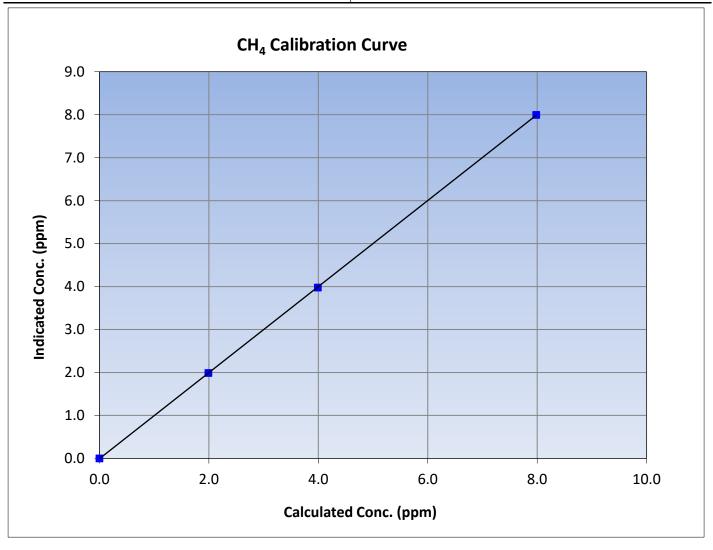
# **CH<sub>4</sub> Calibration Summary**

Version-01-2020

#### **Station Information**

Calibration Date: May 8, 2023 **Previous Calibration:** April 11, 2023 Station Name: **Barge Landing** Station Number: AMS09 Start Time (MST): 10:36 End Time (MST): 13:51 Analyzer make: Thermo 55i Analyzer serial #: 1193585649

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999992	≥0.995
7.98	7.99	0.9987	Correlation Coemicient	0.333332	20.333
3.99	3.98	1.0039	Clara	1.001195	0.90 - 1.10
1.99	1.99	1.0012	Slope		0.90 - 1.10
			Intercept	-0.006136	+/-0.5





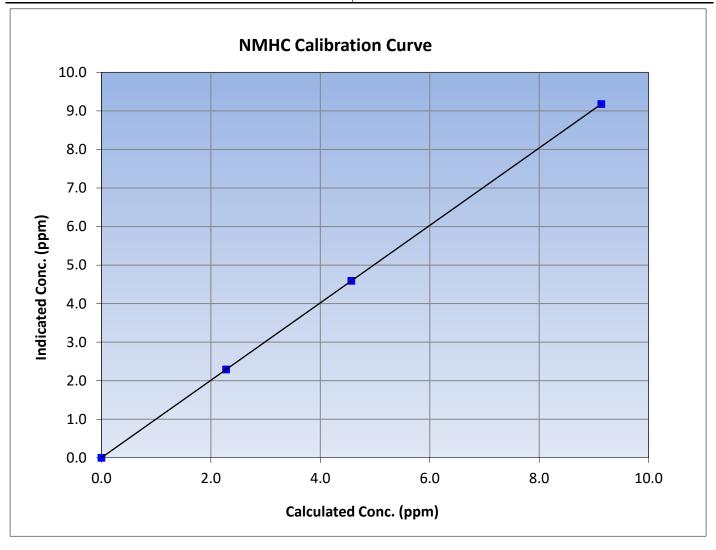
## **NMHC Calibration Summary**

Version-01-2020

#### **Station Information**

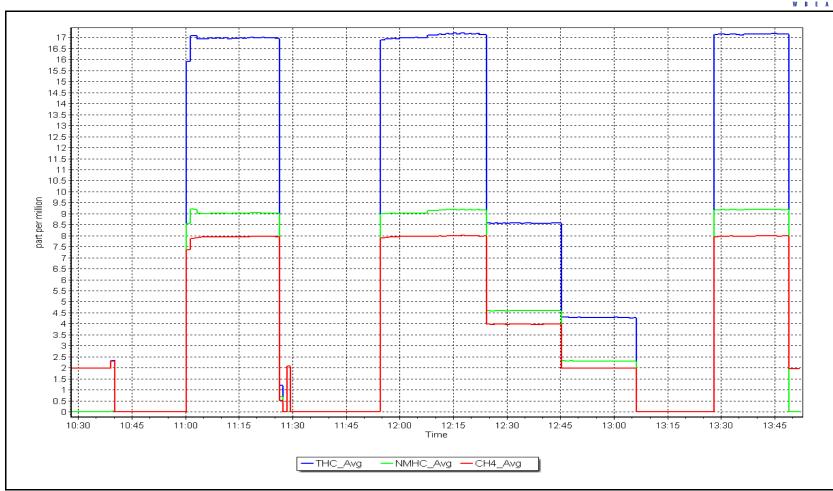
Calibration Date: May 8, 2023 **Previous Calibration:** April 11, 2023 Station Name: **Barge Landing** Station Number: AMS09 Start Time (MST): 10:36 End Time (MST): 13:51 Analyzer make: Thermo 55i Analyzer serial #: 1193585649

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	1.000000	≥0.995
9.14	9.18	0.9953	Correlation Coefficient	1.000000	20.333
4.57	4.59	0.9953	Slope	1.004627	0.90 - 1.10
2.28	2.29	0.9939	Slope	1.004027	0.90 - 1.10
		·	Intercept	0.001202	+/-0.5



NMHC Calibration Plot Date: May 8, 2023 Location: Barge Landing







## NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

#### **Station Information**

Station Name: Barge Landing
Calibration Date: May 23, 2023
Start time (MST): 9:39

Reason: 9.59

Station number: AMS09 Last Cal Date: April 28, 2023 End time (MST): 14:54

NO gas Diff:

#### **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:

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** <u>Start</u> **Finish** NO coeff or slope: 1.175 1.175 NO bkgnd or offset: 10.5 10.7 NOX coeff or slope: 0.995 0.995 NOX bkgnd or offset: 10.5 11.0 Reaction cell Press: NO2 coeff or slope: 1.000 1.000 174.9 174.6

#### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	0.997105	1.003622
NO <sub>x</sub> Cal Offset:	0.848780	0.329752
NO Cal Slope:	0.996586	1.005383
NO Cal Offset:	-0.413290	-0.991769
NO <sub>2</sub> Cal Slope:	1.003813	0.999175
NO <sub>2</sub> Cal Offset:	0.518213	0.249142



# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

				Dilı	ution Calibratio	n Data				
Set Point	Dilution flow rate (sccm)	Source gas flow	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 = 0.95-1.0
as found zero	5000	0.0	0.0	0.0	0.0	0.4	-0.1	0.5		
as found span	4919	80.5	805.1	800.3	4.8	811.0	804.0	7.3	0.993	0.995
as found 2nd										
as found 3rd										
new cyl resp										·
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0		
high point	4919	80.5	805.1	800.3	4.8	808.0	804.0	4.5	0.996	0.995
second point	4959	40.2	402.1	399.7	2.4	404.3	400.3	4.0	0.994	0.998
third point	4979	20.1	201.0	199.8	1.2	202.5	199.2	3.3	0.993	1.003
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1		
as left span	4919	80.5	805.1	435.7	369.4	804.0	437.2	367.1	1.001	0.996
							Average C	Correction Factor	0.995	0.999
Corrected As fou	und NO <sub>X</sub> =	810.6 ppb	NO =	804.1 ppb	* = > +/-5	% change initiates i	investigation	*Percent Chang	ge NO <sub>x</sub> =	0.9%
Previous Respon	nse NO <sub>X</sub> =	803.6 ppb	NO =	797.1 ppb				*Percent Chang	ge NO =	0.9%
Baseline Corr 2n	nd pt $NO_X =$	NA ppb	NO =	NA ppb	As found	$NO_X r^2$ :		Nx SI:	Nx Int:	
Baseline Corr 3rd	rd pt $NO_X =$	NA ppb	NO =	NA ppb	As found	d NO r <sup>2</sup> :		NO SI:	NO Int:	
					As found	$NO_2 r^2$ :		NO2 SI:	NO <sub>2</sub> Int:	
				e	GPT Calibration	Data				
O3 Setpoir	nt (ppb)	Indicated NO Refere concentration (pp		icated NO Drop centration (ppb)	Calculated NO concentration (pp		ndicated NO2 ntration (ppb) (Ic)	NO2 Correction fac Calibration Limit = 0 As Found Limit = 0	0.95-1.05 Calibratio	erter Efficiency on Limit = 96-104%
as found G	GPT zero									
as found GPT point	it (400 ppb NO2)									
as found GPT point	it (200 ppb NO2)									
as found GPT point	it (100 ppb NO2)									
1st GPT point (	(400 ppb O3)	799.1		434.5	369.4		369.3	1.000		100.0%
2nd GPT point (	(200 ppb O3)	799.1		658.9	145.0		145.2	0.999		100.1%
3rd GPT point (	(100 ppb O3)	799.1		727.2	76.7		77.2	0.994		100.6%
								r 0.998		100.2%

Notes:

Changed sample inlet filter after as founds. Adjusted zero.

Calibration Performed By:

Braiden Boutilier



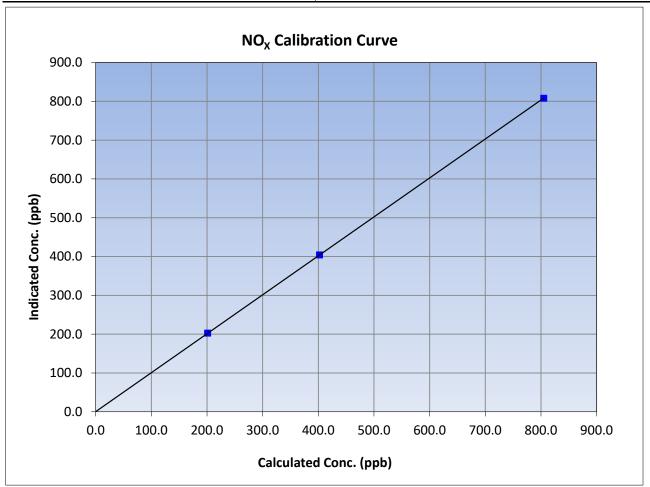
### NO<sub>x</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 23, 2023 **Previous Calibration:** April 28, 2023 Station Name: Barge Landing Station Number: AMS09 Start Time (MST): 9:39 End Time (MST): 14:54 Analyzer serial #: Analyzer make: Thermo 42i 1426262593

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	-0.2		Correlation Coefficient	0.999998	≥0.995
805.1	808.0	0.9964	Correlation Coefficient	0.55555	20.333
402.1	404.3	0.9945	Slope	1.003622	0.90 - 1.10
201.0	202.5	0.9928	Slope	1.005022	0.90 - 1.10
			Intercept	0.329752	+/-20





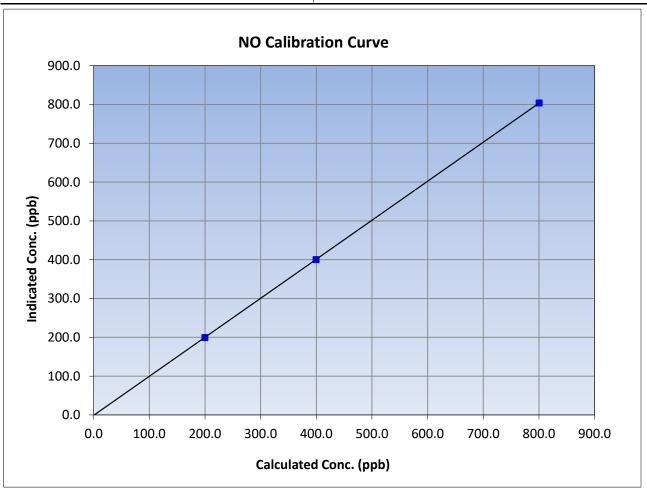
### **NO Calibration Summary**

Version-04-2020

#### **Station Information**

Calibration Date: May 23, 2023 **Previous Calibration:** April 28, 2023 Station Name: Barge Landing Station Number: AMS09 Start Time (MST): 9:39 End Time (MST): 14:54 Analyzer make: Thermo 42i Analyzer serial #: 1426262593

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	-0.2		Correlation Coefficient	0.999996	≥0.995
800.3	804.0	0.9953	Correlation Coefficient	0.555550	20.333
399.7	400.3	0.9984	Slope	1.005383	0.90 - 1.10
199.8	199.2	1.0032	Slope	1.005565	0.90 - 1.10
			Intercept	-0.991769	+/-20





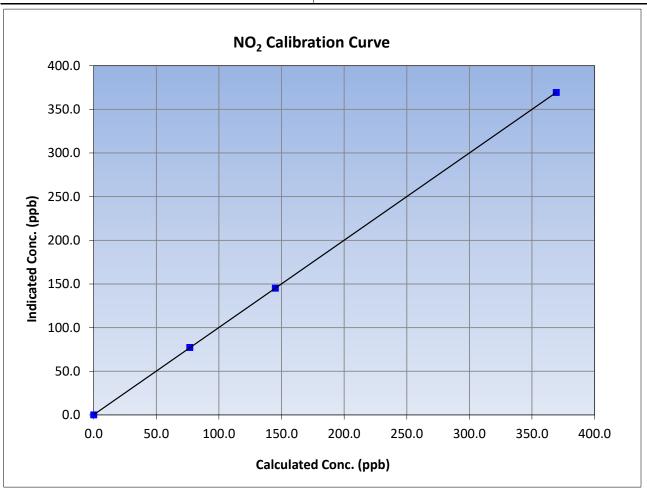
# NO<sub>2</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 23, 2023 **Previous Calibration:** April 28, 2023 Station Name: Barge Landing Station Number: AMS09 Start Time (MST): 9:39 End Time (MST): 14:54 Analyzer serial #: Analyzer make: Thermo 42i 1426262593

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999998	≥0.995
369.4	369.3	1.0004	Correlation Coefficient	0.55555	20.993
145.0	145.2	0.9988	Slope	0.999175	0.90 - 1.10
76.7	77.2	0.9939	Slope	0.999175	0.90 - 1.10
			Intercept	0.249142	+/-20

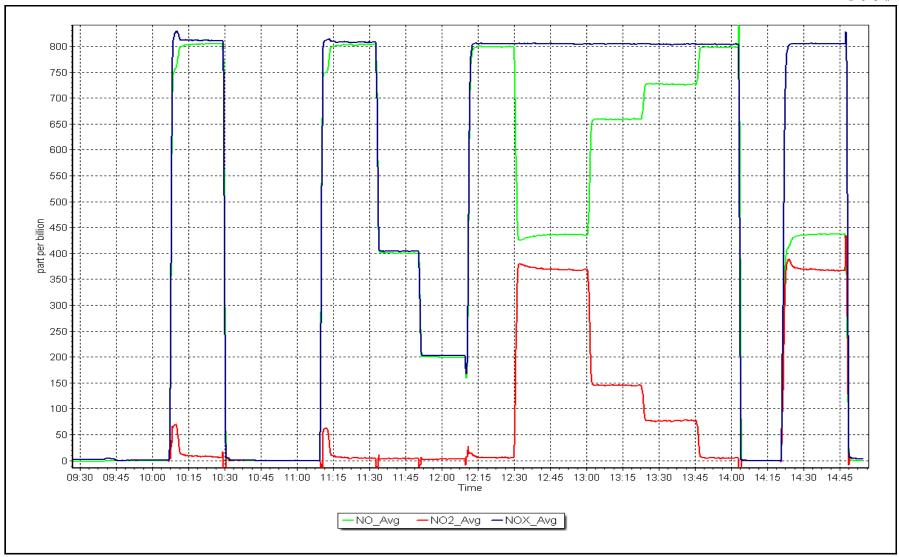


NO<sub>x</sub> Calibration Plot

Date: May 23, 2023

Location: Barge Landing







# **T640 PM<sub>2.5</sub> CALIBRATION**

Version-01-2023

		Station Information	ı			
Station Name:	Barge Landing		Station number:	AMS 09		
Calibration Date:	May 23, 2023		Last Cal Date:		23	
Start time (MST):	11:43		End time (MST):	13:17		
Analyzer Make:	API T640		S/N:	321		
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 To	est			
<u>Parameter</u>	As found	<u>Measured</u>	<u>As left</u>		<u>Adjusted</u>	(Limits)
T (°C)	11.0	10.20	11.0			+/- 2 °C
P (mmHg)	736.9	738.99	736.9			+/- 10 mmHg
flow (LPM)	5.00	5.036	5.00			+/- 0.25 LPM
Leak Test:	Date of check:	May 23, 2023	Last Cal Date:	April 28	3, 2023	
	PM w/o HEPA:	102	PM w/ HEPA:	0.		<0.2 ug/m3
Note: this leak check will be	completed before the	quarterly work and will s	erve as the pre mai	ntenance l	eak check	
Inlet cleaning:	Inlet Head					
		Quarterly Calibration T	est			
<u>Parameter</u>	As found	Post maintenance	As left		Adjusted	(Limits)
PMT Peak Test	10.7	10.8	10.8		<u>/tajusteu</u>	11.3 +/- 0.5
					<del>_</del>	
Post-maintenance	e leak check:	PM w/o HEPA:	121.3	w/ HEPA:	(	0.0
Date Optical Cham	-	May 23, 2				<0.2 ug/m3
Disposable Filter	r Changed:	May 23, 2	023			
		Annual Maintenance	9			
Date Sample Tub	e Cleaned:	November 15	5, 2022			
Date RH/T Senso	or Cleaned:	November 15	5, 2022			
Notes:	No adjustments mad	le (Dust standard for PM	•	Both leak	checks passe	ed. Quarterly
		maintei	nance completed.			
Calibration by:	Braiden Boutilier					



### WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

> AMS11 LOWER CAMP MAY 2023

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

June 30, 2023



Calibration slope:

Calibration intercept:

### **Wood Buffalo Environmental Association**

### **SO<sub>2</sub> Calibration Report**

Version-01-2020

#### **Station Information**

Station Name: Lower Camp
Calibration Date: May 15, 2023
Start time (MST): 10:13

Reason: Routine

Station number: AMS11 Last Cal Date: April 11, 2023

End time (MST): 13:42

Calibration Standards

Cal Gas Concentration: 49.25 ppm

Cal Gas Cylinder #: CC2216

Removed Cal Gas Conc: 49.25 Removed Gas Cyl #: NA

Calibrator Make/Model: Teledyne API T700 ZAG Make/Model: Teledyne API T701

Cal Gas Exp Date: February 23, 2025

Rem Gas Exp Date: NA

Diff between cyl:

Serial Number: 3807 Serial Number: 196

Backgd or Offset:

Coeff or Slope:

**Analyzer Information** 

Analyzer make: Thermo 43i Analyzer serial #: 100841398

ppm

Analyzer Range 0 - 1000 ppb

<u>Start</u> <u>Finish</u> 0.995416 0.99711

0.995416 0.997114 -0.748519 -0.568654 <u>Start</u>

14.3 1.051 14.6 1.034

SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)		Correction factor (Cc/Ic)  Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.5	
as found span	4919	81.3	8.008	809.0	0.990
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	8.008	798.7	1.003
second point	4959	40.7	400.9	397.5	1.009
third point	4980	20.3	199.9	198.9	1.005
as left zero	5000	0.0	0.0	0.2	
as left span	4919	81.3	8.008	800.9	1.000
			Averag	ge Correction Factor	1.005

Baseline Corr As found: 808.50 Previous response 796.34 \*% change 1.5% Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept:

Baseline Corr 3rd AF pt: NA AF Correlation:

\* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif



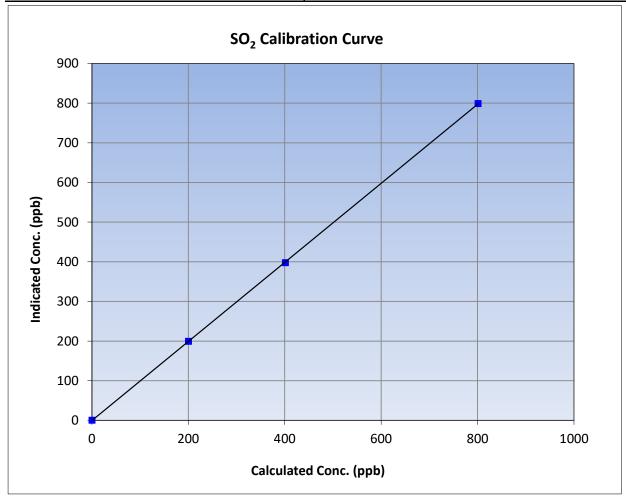
## **SO<sub>2</sub> Calibration Summary**

Version-01-2020

#### **Station Information**

Calibration Date: May 15, 2023 **Previous Calibration:** April 11, 2023 Station Name: **Lower Camp** Station Number: AMS11 Start Time (MST): 10:13 End Time (MST): 13:42 Analyzer make: Thermo 43i Analyzer serial #: 100841398

	Calibration Data								
Calculated concentration Indicated concentration (ppb) (Cc) (ppb) (lc) (Cc/lc) Statistical Evaluation									
0.0	0.2	Correlation Coefficient		0.999988 ≥0	≥0.995				
800.8	798.7	1.0026	Correlation Coefficient	0.333366	20.993				
400.9	397.5	1.0086	Slope	0.997114	0.90 - 1.10				
199.9	198.9	1.0052	Slope	0.557114	0.90 - 1.10				
			Intercept	-0.568654	+/-30				



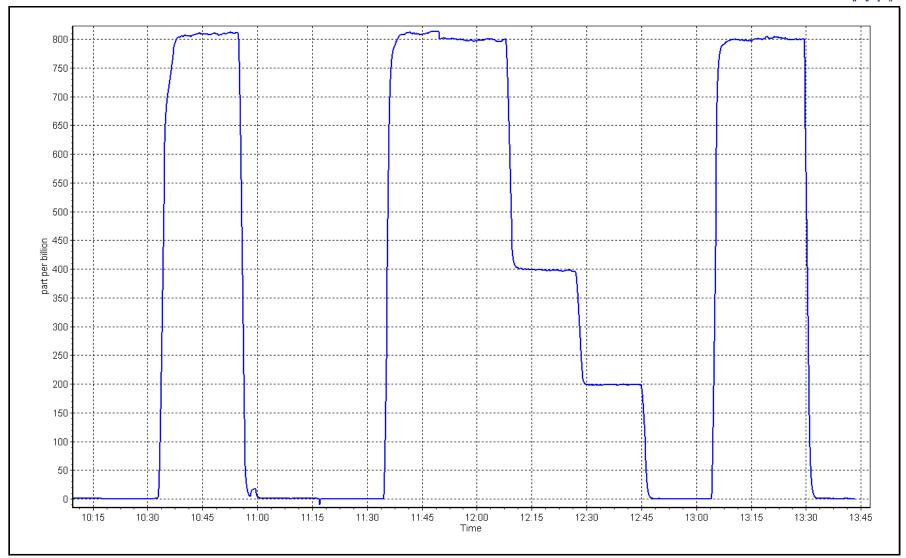
**SO2 Calibration Plot** 

Date:

May 15, 2023

Location: Lower Camp







### H<sub>2</sub>S Calibration Report

Version-11-2021

**Station Information** 

Station Name: Lower Camp
Calibration Date: May 16, 2023
Start time (MST): 9:15

Reason: Routine

Station number: AMS11 Last Cal Date: April 13, 2023 End time (MST): 13:04

**Calibration Standards** 

Cal Gas Concentration: 5.429 ppm Cal Gas Exp Date: January 4, 2025

ppm

Cal Gas Cylinder #: CC501097

Removed Cal Gas Conc: 5.429
Removed Gas Cyl #: NA
Calibrator Make/Model: APLT700

Calibrator Make/Model: API T700 ZAG Make/Model: API T701H ,

Rem Gas Exp Date: NA Diff between cyl:

Serial Number: 3807 Serial Number: 196

**Analyzer Information** 

Analyzer make: Thermo 450iQ Analyzer serial #: CM20080003

Converter make: NA Converter serial #: NA

Analyzer Range 0 - 100 ppb

**Finish** <u>Finish</u> <u>Start</u> <u>Start</u> 1.015352 1.004895 Backgd or Offset: 13.3 Calibration slope: 14.0 Calibration intercept: 0.293967 0.035134 Coeff or Slope: 1.043 1.001

H<sub>2</sub>S 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	83.2	0.963
as found 2nd point	4963	36.8	40.0	41.7	0.963
as found 3rd point	4982	18.6	20.2	20.8	0.980
new cylinder response					

#### H<sub>2</sub>S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)  Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	0.2	
high point	4926	73.6	79.9	80.4	0.994
second point	4963	36.8	40.0	40.2	0.994
third point	4982	18.6	20.2	20.1	1.005
as left zero	5000	0.0	0.0	-0.1	
as left span	4926	73.6	79.9	79.6	1.004
SO2 Scrubber Check	4919	81.1	811.0	0.0	
Date of last scrubber chang	ge:	_	_	Ave Corr Factor	0.998
				· · · · · · · · · · · · · · · · · · ·	

Date of last scrubber change:	Ave Corr Factor	0.998
Date of last converter efficiency test:		efficiency

Baseline Corr As found:83.0Prev response:81.44Baseline Corr 2nd AF pt:41.5AF Slope:1.040103Baseline Corr 3rd AF pt:20.6AF Correlation:0.999975

\* = > +/-5% change initiates investigation

\*% change:

AF Intercept:

1.9%

0.052205

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

Adjusted span only.

Calibration Performed By: Mohammed Kashif



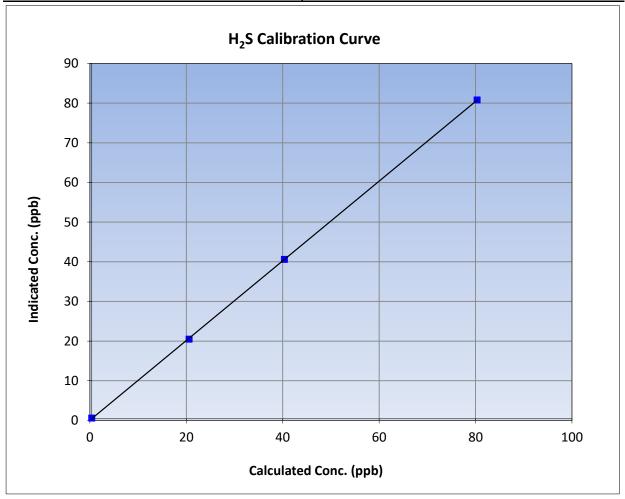
## H<sub>2</sub>S Calibration Summary

Version-11-2021

#### **Station Information**

Calibration Date: May 16, 2023 **Previous Calibration:** April 13, 2023 Station Name: Lower Camp Station Number: AMS11 Start Time (MST): 9:15 End Time (MST): 13:04 Analyzer make: Thermo 450iQ Analyzer serial #: CM20080003

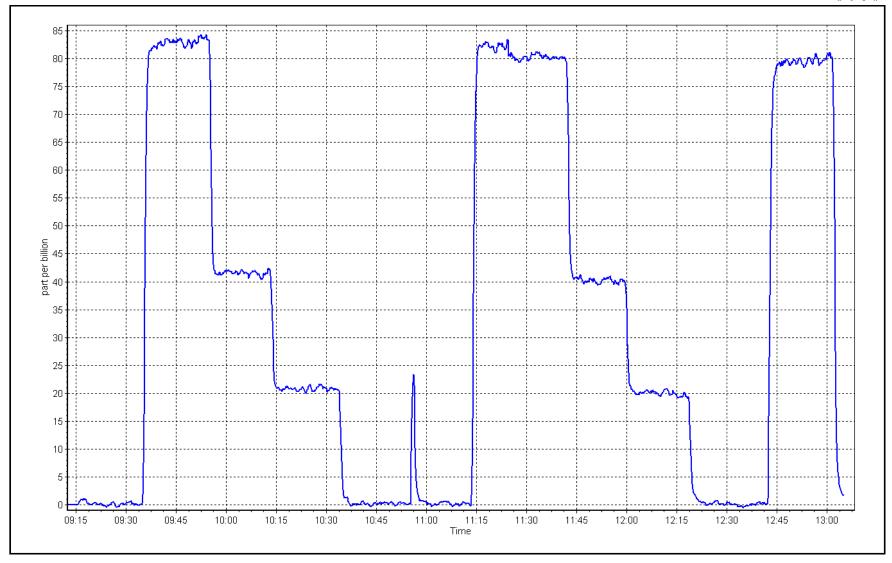
	Calibration Data								
Calculated concentration Indicated concentration Correction factor (ppb) (Cc) (ppb) (Ic) (Cc/Ic) Statistical Evaluation									
0.0	0.2	0.2 Correlation Coefficient		0.999977	≥0.995				
79.9	80.4	0.9940	Correlation Coefficient	0.555511	20.993				
40.0	40.2	0.9940	Slope	1.004895	0.90 - 1.10				
20.2	20.1	1.0046	Slope	1.004655	0.90 - 1.10				
			- Intercept	0.035134	+/-3				



Date: May 16, 2023

Location: Lower Camp







### THC / CH<sub>4</sub> / NMHC Calibration Report

Removed Gas Expiry:

Version-01-2020

#### **Station Information**

Station Name: Lower Camp
Calibration Date: May 15, 2023
Start time (MST): 10:13

Station number: AMS11 Last Cal Date: April 11, 2023 End time (MST): 13:42

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:

Nemoved das cert.

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 2.99E-04 CH4 SP Ratio: 3.02E-04 NMHC SP Ratio: 5.86E-05 5.79E-05 CH4 Retention time: 14.0 NMHC Peak Area: 13.8 156599 158468

#### **THC Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (0	Cc) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4919	81.3	17.35	17.44	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	81.3	17.35	17.29	1.003
second point	4959	40.7	8.69	8.64	1.005
third point	4980	20.3	4.33	4.32	1.002
as left zero	5000	0.0	0.00	0.00	
as left span	4919	81.3	17.35	17.41	0.997
			A	Average Correction Factor	1.004
Baseline Corr AF:	17.44	Prev response	17.29	*% change	0.9%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	tes investigation



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

					VE151011 01 20
		NINALIC Callibra	ation Data		
Set Point	Dil air flow rate	NMHC Calibr Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i> .
as found zero	5000	0.0	0.00	0.00	
	4919	81.3	9.19	9.27	0.991
as found span	4919	01.5	9.19	9.27	0.991
as found 2nd point					
as found 3rd point					
new cylinder response	5000	0.0	0.00	2.22	
calibrator zero	5000	0.0	0.00	0.00	4.002
nigh point	4919	81.3	9.19	9.17	1.002
second point	4959	40.7	4.60	4.58	1.005
hird point	4980	20.3	2.29	2.30	1.000
as left zero	5000	0.0	0.00	0.00	
as left span	4919	81.3	9.19	9.22	0.996
			Ave	rage Correction Factor	1.002
Baseline Corr AF:	9.27	Prev response	9.14	*% change	1.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
Set Point	Dil air flow rate	CH4 Calibra Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4919	81.3	8.16	8.17	0.999
as found 2nd point	1323	01.0	0.10	0.17	0.333
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
nigh point	4919	81.3	8.16	8.12	1.005
second point	4959	40.7	4.09	4.06	1.006
chird point	4980	20.3	2.04	2.03	1.005
as left zero	5000	0.0	0.00	0.00	
as left span	4919	81.3	8.16	8.19	0.997
25 Tere 5pari	4313	01.3		rage Correction Factor	1.005
Baseline Corr AF:	8.17	Prev response	8.15	*% change	0.3%
Baseline Corr 2nd AF:	NA	AF Slope:	0.13	AF Intercept:	0.570
Baseline Corr 3rd AF:	NA NA	AF Correlation:		* = > +/-5% change initiat	es investigation
Saseille Coll Stu Ar.	IVA		Ct-ti-ti	7 17 370 change initiae	es investigation
		Calibration	Statistics		
T110 5 1 51		<u>Start</u>		<u>Finish</u>	
THC Cal Slope:		0.998101		0.996470	
THC Cal Offset:		-0.029983		-0.001598	
CH4 Cal Slope:		1.000279		0.994977	
CH4 Cal Offset:		-0.017886		-0.000697	
NMHC Cal Slope:		0.996415		0.997386	
				0.000=00	

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

-0.012098

Calibration Performed By: Mohammed Kashif

NMHC Cal Offset:

-0.000502



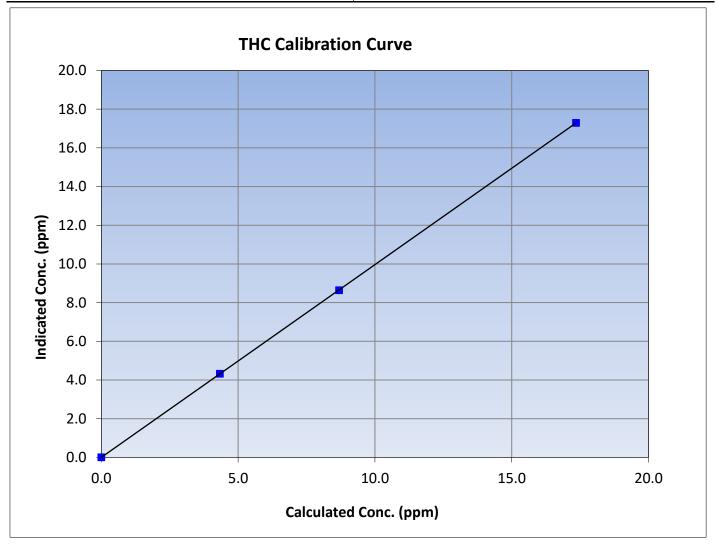
## **THC Calibration Summary**

Version-01-2020

#### **Station Information**

Calibration Date: May 15, 2023 **Previous Calibration:** April 11, 2023 Station Name: **Lower Camp** Station Number: AMS11 Start Time (MST): 10:13 End Time (MST): 13:42 Analyzer make: Thermo 55i Analyzer serial #: 1505164381

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999998	≥0.995
17.35	17.29	1.0033	Correlation Coefficient	0.555556	20.333
8.69	8.64	1.0054	Slope	0.996470	0.90 - 1.10
4.33	4.32	1.0021			0.90 - 1.10
			Intercept	-0.001598	+/-0.5





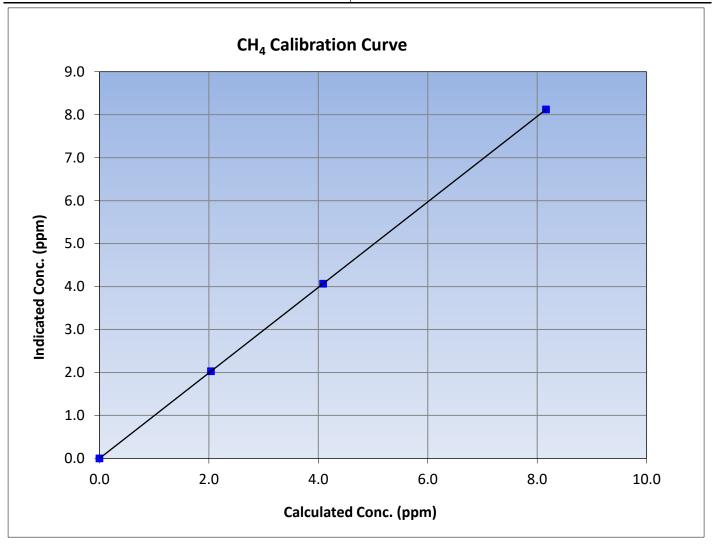
# **CH<sub>4</sub> Calibration Summary**

Version-01-2020

#### **Station Information**

Calibration Date: May 15, 2023 **Previous Calibration:** April 11, 2023 Station Name: **Lower Camp** Station Number: AMS11 Start Time (MST): 10:13 End Time (MST): 13:42 Analyzer make: Thermo 55i Analyzer serial #: 1505164381

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	1.000000	≥0.995
8.16	8.12	1.0051		1.000000	20.535
4.09	4.06	1.0055	Slope	0.994977	0.90 - 1.10
2.04	2.03	1.0054		0.334377	0.90 - 1.10
			Intercept	-0.000697	+/-0.5





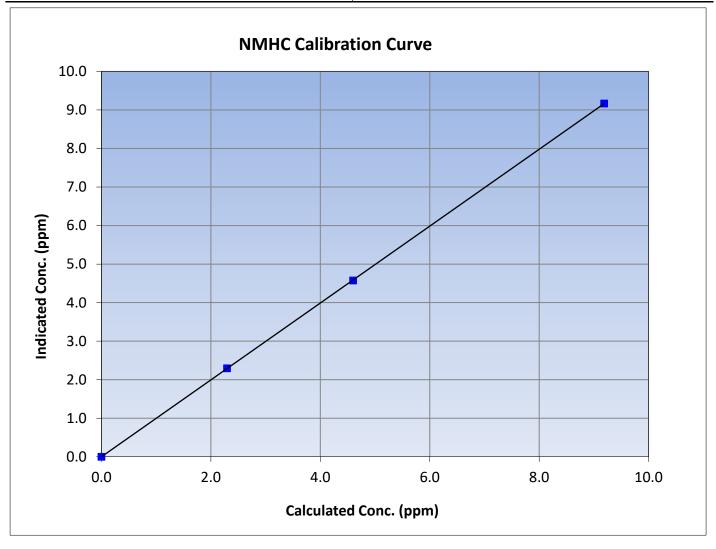
## **NMHC Calibration Summary**

Version-01-2020

#### **Station Information**

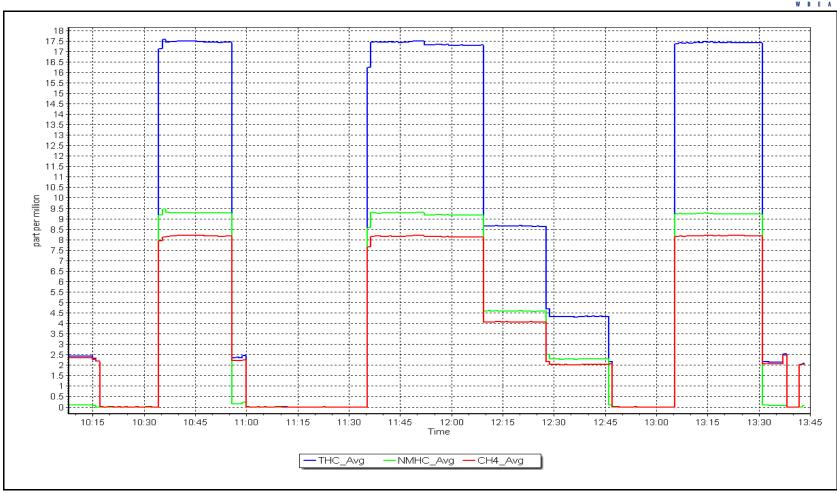
Calibration Date: May 15, 2023 **Previous Calibration:** April 11, 2023 Station Name: **Lower Camp** Station Number: AMS11 Start Time (MST): 10:13 End Time (MST): 13:42 Analyzer make: Thermo 55i Analyzer serial #: 1505164381

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999995	≥0.995
9.19	9.17	1.0022		0.555555	20.333
4.60	4.58	1.0053	Slope	0.997386	0.90 - 1.10
2.29	2.30	0.9997			0.90 - 1.10
			Intercept	-0.000502	+/-0.5



NMHC Calibration Plot Date: May 15, 2023 Location: Lower Camp







### WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

> AMS13 FORT MCKAY SOUTH MAY 2023

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

June 30, 2023



### **SO<sub>2</sub> Calibration Report**

Version-01-2020

#### **Station Information**

Station Name: Fort McKay South May 17, 2023 Calibration Date:

Start time (MST): 8:37 Routine Reason:

Station number: AMS13 April 19, 2023 Last Cal Date:

End time (MST): 11:36

**Calibration Standards** 

Cal Gas Concentration: 50.55

Cal Gas Cylinder #: CC260812 Removed Cal Gas Conc: 50.55

Removed Gas Cyl #: N/A

Calibrator Make/Model: **API T700** ZAG Make/Model: API 701

ppm Cal Gas Exp Date: December 29, 2028

Diff between cyl:

Serial Number: 2448 Serial Number: 1117

Rem Gas Exp Date: N/A

**Analyzer Information** 

Analyzer make: API T100 Analyzer serial #: 599

ppm

Analyzer Range 0 - 1000 ppb

**Finish** Start

Start 80.5

**Finish** 

Calibration slope: 1.001326 Backgd or Offset: 80.5 1.002614 0.725 Calibration intercept: -2.958216 -1.757849 Coeff or Slope: 0.731

#### SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)  Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.3	
as found span	4921	79.1	799.7	805.0	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	
high point	4921	79.1	799.7	799.8	1.000
second point	4961	39.5	399.3	397.8	1.004
third point	4980	19.8	200.2	196.0	1.021
as left zero	5000	0.0	0.0	0.5	
as left span	4921	79.1	799.7	800.6	0.999
			Averag	ge Correction Factor	1.008

Baseline Corr As found: 804.70 Previous response 798.82 \*% change 0.7% Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept:

NA AF Correlation: Baseline Corr 3rd AF pt:

\* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala



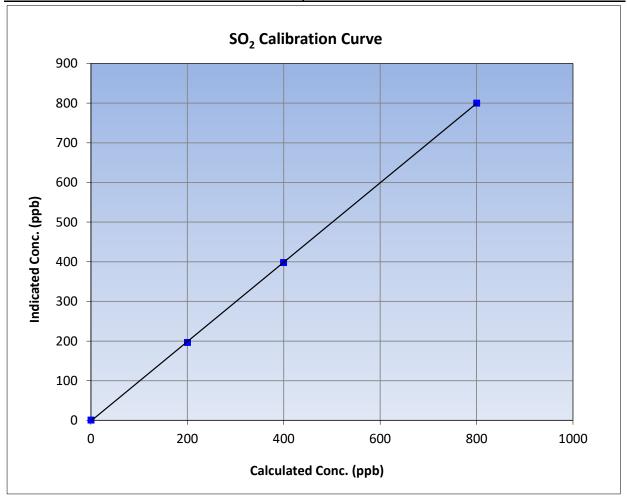
## **SO<sub>2</sub> Calibration Summary**

Version-01-2020

#### **Station Information**

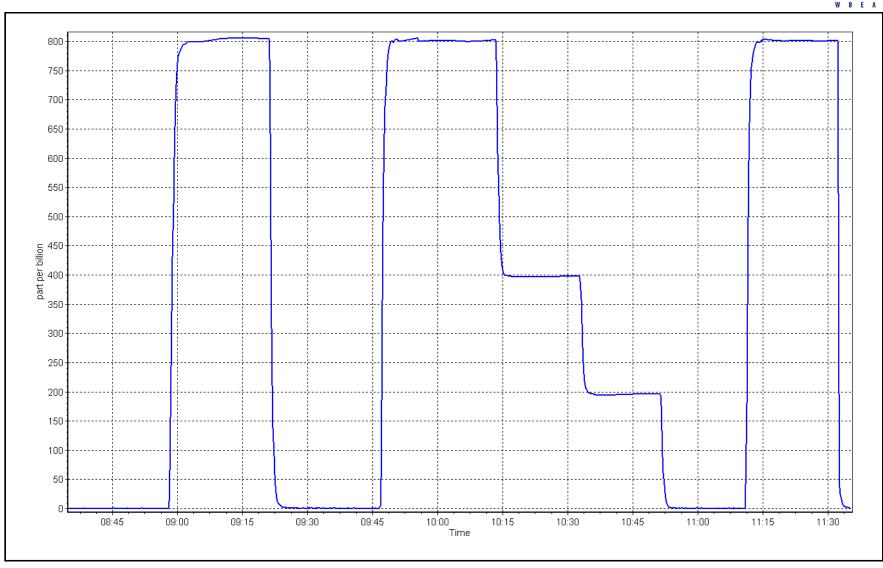
Calibration Date: May 17, 2023 **Previous Calibration:** April 19, 2023 Station Name: Fort McKay South Station Number: AMS13 Start Time (MST): 8:37 End Time (MST): 11:36 Analyzer make: **API T100** Analyzer serial #: 599

Calibration Data						
Calculated concentration Indicated concentration (ppb) (Cc) (ppb) (Ic)		Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>	
0.0	0.4		Correlation Coefficient	0.999964	≥0.995	
799.7	799.8	0.9999	Correlation Coefficient	0.333304	20.333	
399.3	397.8	1.0038	Slope	1.001326	0.90 - 1.10	
200.2	196.0	1.0214	Slope		0.90 - 1.10	
			- Intercept	-1.757849	+/-30	



SO2 Calibration Plot Date: May 17, 2023 Location: Fort McKay South







## **TRS Calibration Report**

Version-11-2021

**Station Information** 

Station Name: Fort McKay South Calibration Date: May 2, 2023 Start time (MST): 8:38 Reason: Routine

Station number: AMS13 Last Cal Date: April 3, 2023 End time (MST): 12:35

**Calibration Standards** 

Cal Gas Concentration: Cal Gas Exp Date: January 4, 2025 5.34 ppm

Cal Gas Cylinder #: CC500241

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

**Analyzer Information** 

Analyzer make: Thermo 43i TLE Analyzer serial #: 1180540017

CDN-101 Converter serial #: 521 Converter make:

0 - 100 ppb Analyzer Range

<u>Start</u> <u>Finish</u> **Finish** <u>Start</u> 1.003341 1.005466 Backgd or Offset: Calibration slope: 3.71 3.68 Calibration intercept: -0.062227 -0.262184 Coeff or Slope: 1.120 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	-0.1	
as found span	4925	75.5	80.6	80.8	0.997
as found 2nd point	4962	37.7	40.3	40.2	0.999
as found 3rd point	4981	18.9	20.2	19.6	1.025
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	19.7	1.025
as left zero	5000	0.0	0.0	0.1	
as left span	4925	75.5	80.6	81.0	0.995
SO2 Scrubber Check	4921	79.1	791.0	0.0	
Date of last scrubber chang	e:	20-Mar-20		Ave Corr Factor	1.008
	•	<u> </u>	<u> </u>	•	

Date of last scrubber change:	20-Mar-20	Ave Corr Factor	1.008
Date of last converter efficiency test:	NA		efficiency

Baseline Corr As found: 80.9 80.83 Prev response: \*% change: 0.1% Baseline Corr 2nd AF pt: 40.3 AF Slope: 1.005607 AF Intercept: -0.342143 AF Correlation: Baseline Corr 3rd AF pt: 19.7 0.999946 \* = > +/-5% change initiates investigation

Changed the inlet filter after as founds. Completed a SO2 scrubber check after calibrator zero.

Notes: Adjusted span.

Calibration Performed By: Sean Bala



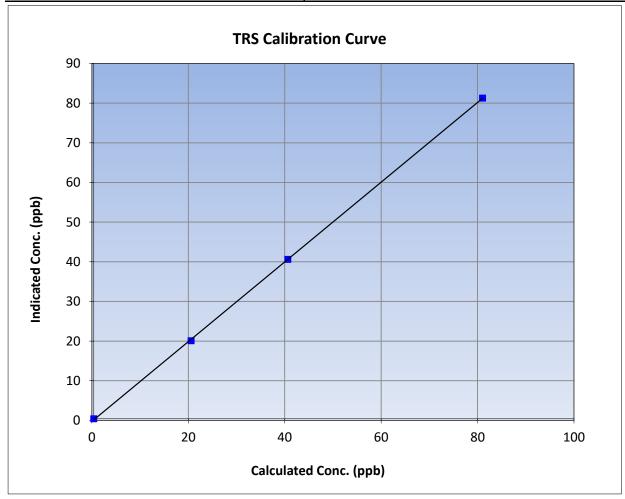
## **TRS Calibration Summary**

Version-11-2021

#### **Station Information**

**Previous Calibration:** Calibration Date: May 2, 2023 April 3, 2023 Station Name: Fort McKay South Station Number: AMS13 Start Time (MST): 8:38 End Time (MST): 13:36 Analyzer make: Thermo 43i TLE Analyzer serial #: 1180540017

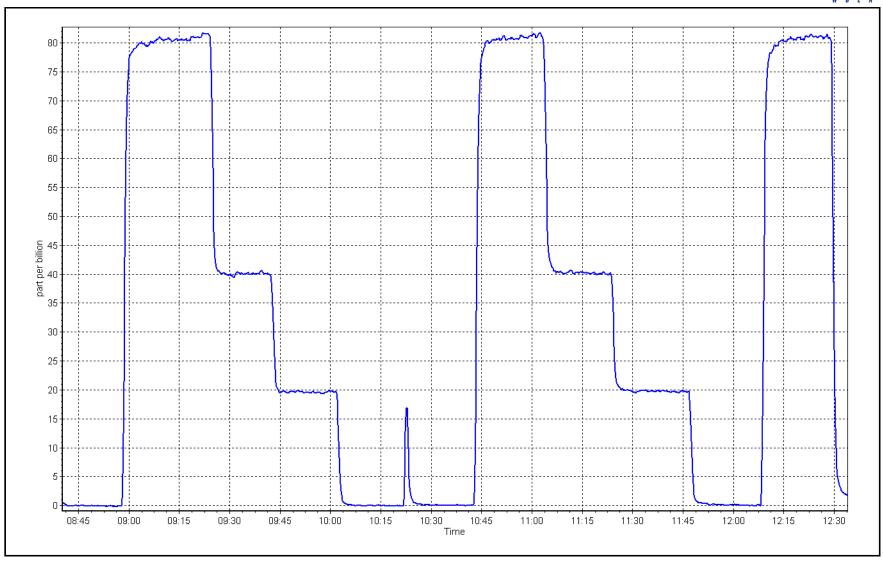
Calibration Data						
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>	
0.0	0.0		Correlation Coefficient	0.999947	≥0.995	
80.6	80.9	0.9966	Correlation Coefficient	0.555547	20.993	
40.3	40.2	1.0016	Slope	1.005466	0.90 - 1.10	
20.2	19.7	1.0246	Slope	1.003400	0.90 - 1.10	
			- Intercept	-0.262184	+/-3	



**TRS Calibration Plot** Date: May 2, 2023

Location: Fort McKay South







# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

#### **Station Information**

Station Name: Fort McKay South Calibration Date: May 17, 2023

Start time (MST): 8:37
Reason: Routine

Station number: AMS13 Last Cal Date: April 19, 2023

End time (MST): 11:36

Removed Gas Expiry: NA

#### **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 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 ( $CH_4$ ):

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: 2.19E-04 2.21E-04 NMHC SP Ratio: 5.04E-04 5.06E-04 CH4 Retention time: NMHC Peak Area: 12.8 12.8 179990 179419

#### **THC Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (C	c) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>	
as found zero	5000	0.0	0.00	0.00		
as found span	4921	79.1	17.05	16.97	1.005	
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	8.39	1.014	
third point	4980	19.8	4.27	4.12	1.036	
as left zero	5000	0.0	0.00	0.00		
as left span	4921	79.1	17.05	17.08	0.998	
			A	verage Correction Factor	1.017	
Baseline Corr AF:	16.97	Prev response	16.99	*% change	-0.2%	
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:		
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation		



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

NMHC Calibration	Data
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Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (	(Cc) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>	
as found zero	5000	0	0.00	0.00		
as found span	4921	79.1	9.08	9.03	1.006	
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	4.48	1.012	
third point	4980	19.8	2.27	2.20	1.034	
as left zero	5000	0	0.00	0.00		
as left span	4921	79.1	9.08	9.07	1.001	
			,	Average Correction Factor	1.016	
Baseline Corr AF:	9.03	Prev response	9.05	*% 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 <i>Limit= 0.95-1.05</i>	
as found zero	5000	0.0	0.00	0.00		
as found span	4921	79.1	7.97	7.94	1.003	
as found 2nd point						
as found 3rd point						
new cylinder response						
calibrator zero	5000	0.0	0.00	0.00		
high point	4921	79.1	7.97	7.96	1.000	
second point	4960	39.5	3.98	3.91	1.017	
third point	4980	19.8	1.99	1.92	1.039	
as left zero	5000	0.0	0.00	0.00		
as left span	4921	79.1	7.97	8.01	0.995	
			P	Average Correction Factor	1.019	
Baseline Corr AF:	7.94	Prev response	7.94	*% 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**

	<u>Start</u>	<u>Finish</u>
THC Cal Slope:	1.002569	1.000879
THC Cal Offset:	-0.096376	-0.078771
CH4 Cal Slope:	1.003704	1.001767
CH4 Cal Offset:	-0.056151	-0.042148
NMHC Cal Slope:	1.001425	0.999952
NMHC Cal Offset:	-0.040562	-0.036961

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

Calibration Performed By: Sean Bala



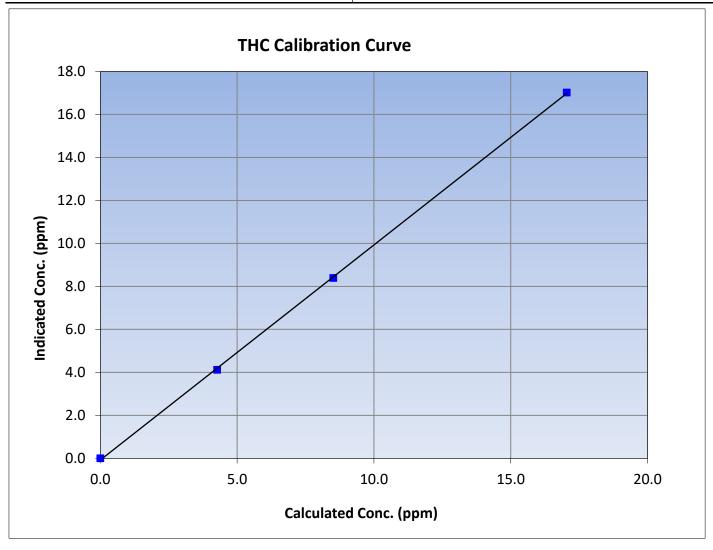
# **THC Calibration Summary**

Version-01-2020

#### **Station Information**

May 17, 2023 **Previous Calibration:** Calibration Date: April 19, 2023 Station Name: Fort McKay South Station Number: AMS13 Start Time (MST): 8:37 End Time (MST): 11:36 Analyzer make: Thermo 55i Analyzer serial #: 1170050130

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999902	≥0.995
17.05	17.02	1.0013	Correlation Coemicient		20.555
8.51	8.39	1.0140	Slope	1.000879	0.90 - 1.10
4.27	4.12	1.0362			0.90 - 1.10
			Intercept	-0.078771	+/-0.5





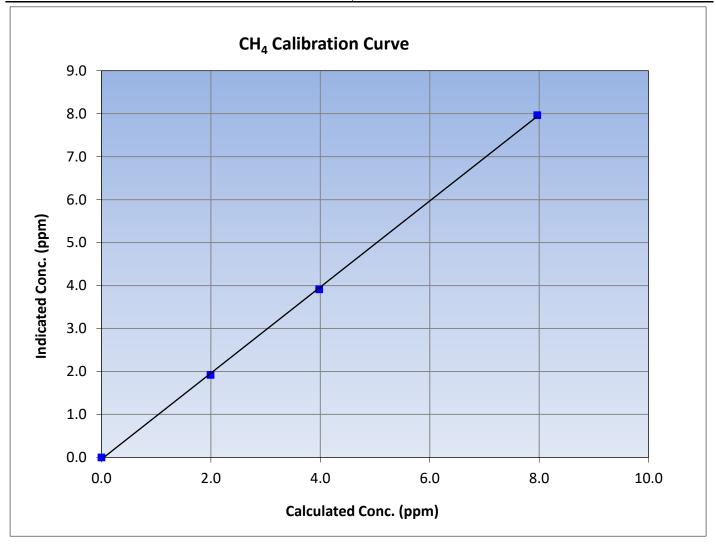
# **CH<sub>4</sub> Calibration Summary**

Version-01-2020

#### **Station Information**

Calibration Date: May 17, 2023 **Previous Calibration:** April 19, 2023 Station Name: Fort McKay South Station Number: AMS13 Start Time (MST): 8:37 End Time (MST): 11:36 Analyzer make: Thermo 55i Analyzer serial #: 1170050130

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999868	≥0.995
7.97	7.96	1.0005	Correlation Coemicient		20.333
3.98	3.91	1.0168	Slope	1.001767	0.90 - 1.10
1.99	1.92	1.0387			0.30 - 1.10
			Intercept	-0.042148	+/-0.5





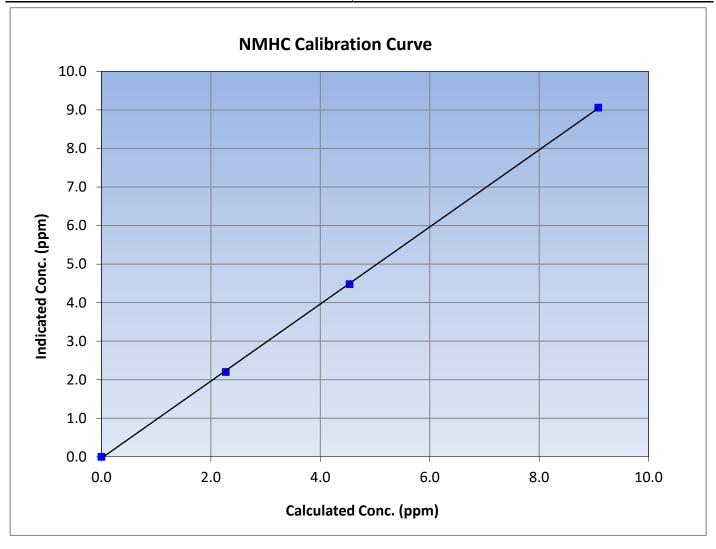
# **NMHC Calibration Summary**

Version-01-2020

#### **Station Information**

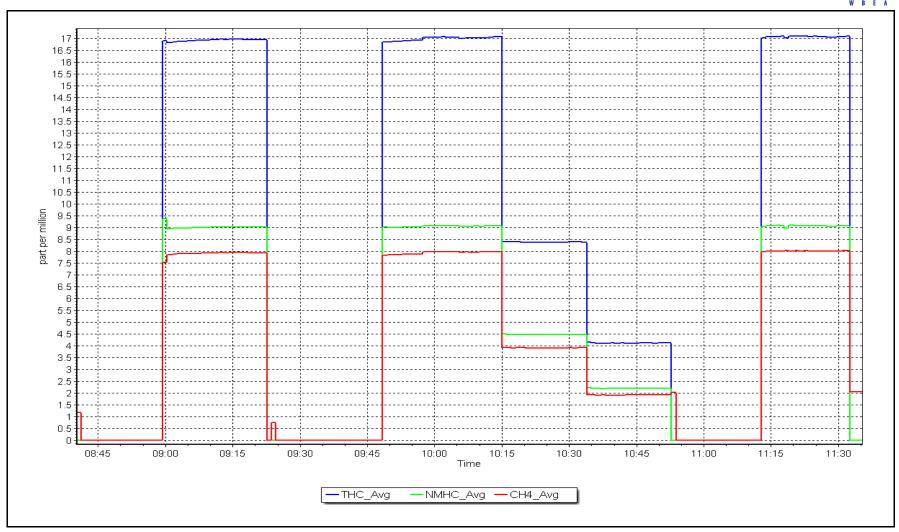
**Previous Calibration:** Calibration Date: May 17, 2023 April 19, 2023 Station Name: Fort McKay South Station Number: AMS13 Start Time (MST): 8:37 End Time (MST): 11:36 Analyzer make: Thermo 55i Analyzer serial #: 1170050130

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999924	≥0.995
9.08	9.06	1.0021	Correlation Coefficient		20.333
4.53	4.48	1.0122	Slope	0.999952	0.90 - 1.10
2.27	2.20	1.0340			0.90 - 1.10
			Intercept	-0.036961	+/-0.5



NMHC Calibration Plot Date: May 17, 2023 Location: Fort McKay South







# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

#### **Station Information**

Station Name: Fort McKay South Calibration Date: May 9, 2023

Start time (MST): 8:41
Reason: Routine

Station number: AMS 13 Last Cal Date: April 12, 2023 End time (MST): 13:15

` '

NO gas Diff:

#### **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:

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** <u>Start</u> **Finish** NO coeff or slope: 1.213 1.203 NO bkgnd or offset: 9.6 9.5 NOX coeff or slope: 0.992 0.992 NOX bkgnd or offset: 9.5 9.7 NO2 coeff or slope: 1.000 1.000 Reaction cell Press: 195.9 195.9

#### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	1.001266	0.997742
NO <sub>x</sub> Cal Offset:	-2.371415	-1.871090
NO Cal Slope:	1.003448	1.001205
NO Cal Offset:	-3.285243	-2.924978
NO <sub>2</sub> Cal Slope:	0.998635	0.997870
NO <sub>2</sub> Cal Offset:	-0.712517	-1.056811



# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

				Dilı	ution Calibratior	ก Data				
Set Point	Dilution flow rate (sccm)	Source gas flow co	alculated NOx oncentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) Limit = 0.95-1.05	NO Correction factor (Cc/Ic) Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
as found span	4919	81.1	826.9	800.0	26.9	834.1	805.3	28.8	0.9913	0.9934
as found 2nd		-								
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.1		
high point	4919	81.1	826.9	800.0	26.9	824.0	799.4	24.7	1.0035	1.0007
second point	4960	40.6	413.9	400.4	13.5	410.4	396.7	13.7	1.0085	1.0094
third point	4980	20.3	207.0	200.2	6.7	202.6	194.5	8.1	1.0216	1.0294
as left zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1		
as left span	4919	81.1	826.9	375.2	451.7	835.6	381.0	454.5	0.9896	0.9847
							Average C	Correction Factor	1.0112	1.0132
Corrected As fo	ound NO <sub>X</sub> =	834.1 ppb	NO =	805.3 ppb	* = > +/-5%	% change initiates in	investigation	*Percent Chang	ge NO <sub>X</sub> =	: 1.0%
Previous Respo	onse NO <sub>X</sub> =	825.6 ppb	NO =	799.4 ppb				*Percent Chang	ge NO =	0.7%
Baseline Corr 2	2nd pt $NO_X =$	NA ppb	NO =	NA ppb	As found	d $NO_X r^2$ :		Nx SI:	Nx Int:	
Baseline Corr 3	Brd pt $NO_X =$	NA ppb	NO =	NA ppb	As found	d NO r <sup>2</sup> :		NO SI:	NO Int:	
					As found	d $NO_2 r^2$ :		NO2 SI:	NO <sub>2</sub> Int:	
				e	GPT Calibration [	Data	-			
O3 Setpc	oint (ppb)	Indicated NO Referen concentration (ppb)		cated NO Drop entration (ppb)	Calculated NO concentration (ppb		dicated NO2 ntration (ppb) (Ic)	NO2 Correction fac Calibration Limit = 0 As Found Limit = 0	0.95-1.05 Calibratio	erter Efficiency on Limit = 96-104%
as found	l GPT zero									
as found GPT poi	int (400 ppb NO2)									
as found GPT poi	int (200 ppb NO2)									
as found GPT poi	int (100 ppb NO2)									
4-t-CDT	t (400 ppb O3)	797.8		373.0	451.7		450.4	1.0029	}	99.7%
1st GPT point				588.1	236.6		234.4	1.0095	5	99.1%
	t (200 ppb O3)	797.8		200.1	230.0			1.005.	, <u> </u>	
2nd GPT point	t (200 ppb O3) t (100 ppb O3)	797.8 797.8		692.9	131.8		129.3	1.0195		98.1%

Notes:

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

Calibration Performed By:

Sean Bala



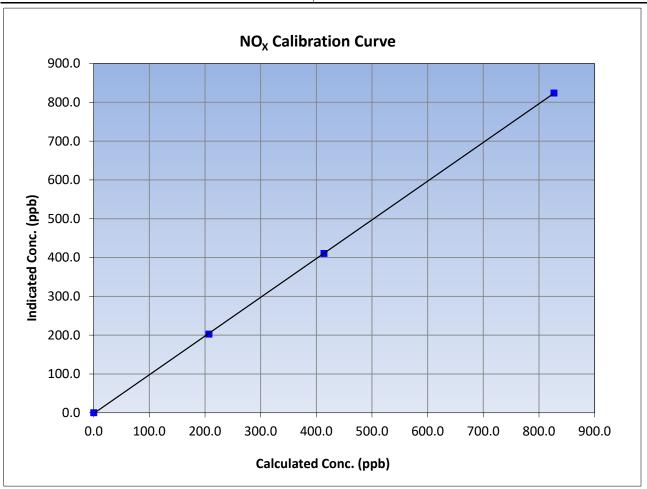
## NO<sub>x</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 9, 2023 Previous Calibration: April 12, 2023 Station Name: Fort McKay South Station Number: **AMS 13** Start Time (MST): 8:41 End Time (MST): 13:15 Analyzer serial #: Analyzer make: Thermo 42i 1410661329

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	0.0		Correlation Coefficient	0.999976	≥0.995	
826.9	824.0	1.0035	correlation coefficient	0.333370	20.333	
413.9	410.4	1.0085	Slope	0.997742	0.90 - 1.10	
207.0	202.6	1.0216	Slope	0.997742	0.90 - 1.10	
			Intercept	-1.871090	+/-20	





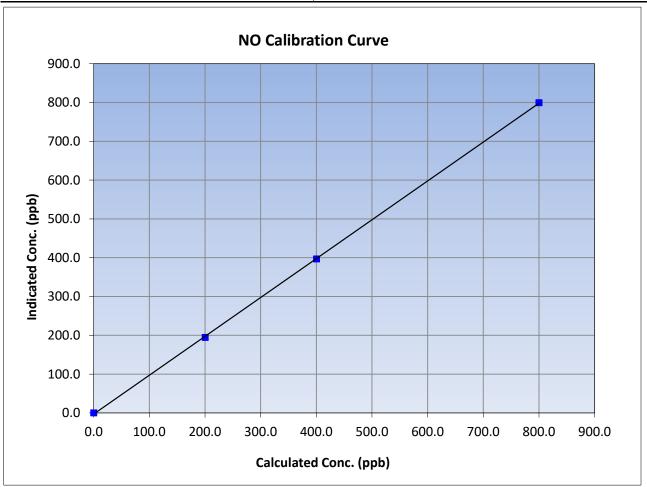
## **NO Calibration Summary**

Version-04-2020

#### **Station Information**

Calibration Date: May 9, 2023 Previous Calibration: April 12, 2023 Station Name: Fort McKay South Station Number: AMS 13 Start Time (MST): 8:41 End Time (MST): 13:15 Analyzer make: Thermo 42i Analyzer serial #: 1410661329

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>	
0.0	0.0		Correlation Coefficient	0.999939	≥0.995	
800.0	799.4	1.0007	Correlation Coefficient	0.55555	20.555	
400.4	396.7	1.0094	Slope	1.001205	0.90 - 1.10	
200.2	194.5	1.0294	Slope	1.001205	0.90 - 1.10	
			Intercept	-2.924978	+/-20	





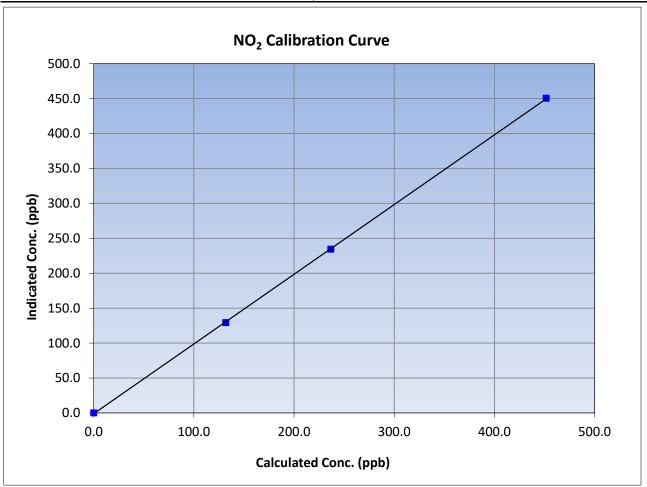
## NO<sub>2</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 9, 2023 Previous Calibration: April 12, 2023 Station Name: Fort McKay South Station Number: AMS 13 Start Time (MST): 8:41 End Time (MST): 13:15 Analyzer make: Thermo 42i Analyzer serial #: 1410661329

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>	
0.0	0.1		Correlation Coefficient	0.999966	≥0.995	
451.7	450.4	1.0029	Correlation Coefficient	0.555500	20.999	
236.6	234.4	1.0095	Slope	0.997870	0.90 - 1.10	
131.8	129.3	1.0195	Slope	0.997670	0.90 - 1.10	
			Intercept	-1.056811	+/-20	



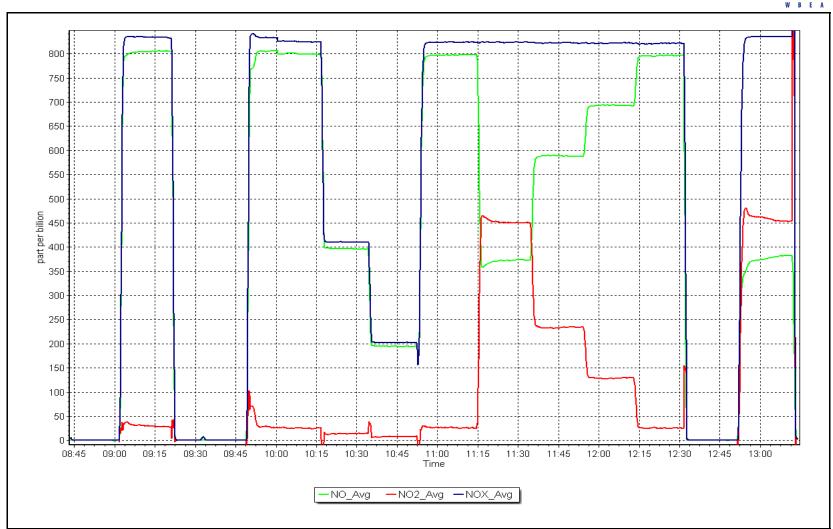
NO<sub>x</sub> Calibration Plot

Date:

May 9, 2023

Location: Fort McKay South







# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

#### **Station Information**

Station Name: Fort McKay South May 29, 2023 Calibration Date:

10:13

Start time (MST): Reason:

Maintenance

Station number: AMS 13

Last Cal Date: May 9, 2023

End time (MST): 15:52

**Calibration Standards** 

NO Gas Cylinder #: T2Y1P76 Cal Gas Expiry Date: December 11, 2023

Changing pump

NOX Cal Gas Conc: 50.98 NO Cal Gas Conc: 49.32 ppm 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:

Serial Number: Calibrator Model: **API T700** 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** <u>Start</u> **Finish** NO coeff or slope: 1.203 1.203 NO bkgnd or offset: 9.5 9.5 NOX coeff or slope: 0.992 0.992 NOX bkgnd or offset: 9.5 9.5 NO2 coeff or slope: 1.000 1.000 Reaction cell Press: 195.9 195.9

**Calibration Statistics** 

Start **Finish** 

NO<sub>x</sub> Cal Slope: 0.997742 NO<sub>x</sub> Cal Offset: -1.871090 NO Cal Slope: 1.001205 NO Cal Offset: -2.924978 NO<sub>2</sub> Cal Slope: 0.997870 NO<sub>2</sub> Cal Offset: -1.056811



# $NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

Dilution	Cali	brati	ion [	Data
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Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) Limit = 0.95-1.05	NO Correction factor (Cc/Ic)  Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.0	0.0	0.2	-0.1	0.2		
as found span	4919	81.1	826.9	800.0	26.9	716.8	690.9	25.9	1.1536	1.1578
as found 2nd	4960	40.6	413.9	400.4	13.5	356.6	342.6	14.0	1.1607	1.1688
as found 3rd	4980	20.3	207.0	200.2	6.7	176.1	168.1	8.1	1.1753	1.1911
new cyl resp										
calibrator zero										
high point										
second point										
third point										
as left zero										
as left span										
							Average (	Correction Factor	r	
Corrected As fo	und NO <sub>X</sub> =	716.6 ppb	NO =	691.0 ppb	* = > +/-5	% change initiates	investigation	*Percent Chan	ge NO <sub>X</sub> =	-14.9%
								* 5		

			Average	Correction Factor	
NO <sub>x</sub> = 716.6 ppb	NO = 691.0 ppb	* = > +/-5% cha	nge initiates investigation	*Percent Change	$NO_X = -14.9\%$
$NO_X = 823.1 \text{ ppb}$	NO = 798.0 ppb			*Percent Change	NO = -15.5%
$NO_X = 356.4$ ppb	NO = 342.7 ppb	As found	NO <sub>x</sub> r <sup>2</sup> : 0.999970	Nx SI: 0.867747	Nx Int: -1.646
$NO_X = 175.9$ ppb	NO = 168.2 ppb	As found	NO r <sup>2</sup> : 0.999938	NO SI: 0.865378	NO Int: -2.640
		As found	NO <sub>2</sub> r <sup>2</sup> : 0.999978	NO2 SI: 0.989898	NO <sub>2</sub> Int: -0.586
	$NO_X = 823.1 \text{ ppb}$ $NO_X = 356.4 \text{ ppb}$	NO <sub>X</sub> = 823.1 ppb NO = 798.0 ppb NO <sub>X</sub> = 356.4 ppb NO = 342.7 ppb	$NO_X = 823.1 \text{ ppb}$ $NO = 798.0 \text{ ppb}$ $NO_X = 356.4 \text{ ppb}$ $NO = 342.7 \text{ ppb}$ As found $NO_X = 175.9 \text{ ppb}$ $NO = 168.2 \text{ ppb}$ As found	$NO_X = 716.6 \text{ ppb}$ $NO = 691.0 \text{ ppb}$ * = > +/-5% change initiates investigation} $NO_X = 823.1 \text{ ppb}$ $NO = 798.0 \text{ ppb}$ $NO_X = 356.4 \text{ ppb}$ $NO = 342.7 \text{ ppb}$ As found $NO_X r^2$ : 0.9999970 $NO_X = 175.9 \text{ ppb}$ $NO = 168.2 \text{ ppb}$ As found $NO r^2$ : 0.999938	$NO_X = 823.1 \text{ ppb}$ $NO = 798.0 \text{ ppb}$ *Percent Change $NO_X = 356.4 \text{ ppb}$ $NO = 342.7 \text{ ppb}$ As found $NO_X = 72.0.999970$ No SI: 0.867747 $NO_X = 175.9 \text{ ppb}$ $NO = 168.2 \text{ ppb}$ As found $NO_X = 175.9 \text{ ppb}$ No SI: 0.865378

#### **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/lc) 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	0.2		
as found GPT point (400 ppb NO2)	690.1	322.1	394.9	390.6	1.0111	98.9%
as found GPT point (200 ppb NO2)	690.1	322.1	394.9	390.6	1.0111	98.9%
as found GPT point (100 ppb NO2)	690.1	563.3	153.7	150.3	1.0228	97.8%
1st GPT point (400 ppb O3)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
			Ave	rage Correction Factor		

Notes: Here to address the low spans. Changed inlet filter and pump after multi-poins as founds. Will let it settle overnight and continue the calibration tomorrow.

Calibration Performed By: Sean Bala

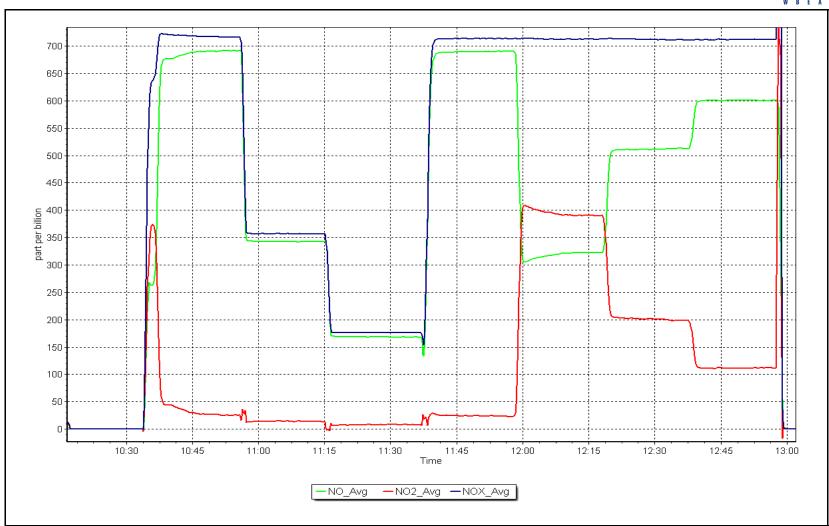
NO<sub>x</sub> Calibration Plot

Date:

May 29, 2023

Location: Fort McKay South







# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

#### **Station Information**

Station Name: Fort McKay South Station number: AMS 13
Calibration Date: May 30, 2023 Last Cal Date: May 29, 2023

Start time (MST): 8:27 End time (MST): 12:24

Reason: Maintenance Continuing calibration after pump change

#### **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** <u>Start</u> **Finish** NO coeff or slope: 1.203 1.168 NO bkgnd or offset: 9.5 9.2 NOX coeff or slope: 0.992 0.988 NOX bkgnd or offset: 9.6 9.5 NO2 coeff or slope: 1.000 1.000 Reaction cell Press: 195.9 130.9

#### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	0.997742	0.998875
NO <sub>x</sub> Cal Offset:	-1.871090	-1.831289
NO Cal Slope:	1.001205	1.003248
NO Cal Offset:	-2.924978	-2.765445
NO <sub>2</sub> Cal Slope:	0.997870	0.991692
NO <sub>2</sub> Cal Offset:	-1.056811	-1.272971



# $NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

				D	ilution Calibration	on Data				
Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)		Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/lc) 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	4919	81.1	826.9	800.0	26.9	825.0	801.1	23.8	1.0023	0.9986
second point	4960	40.6	413.9	400.4	13.5	410.8	397.8	13.0	1.0076	1.0066
third point	4980	20.3	207.0	200.2	6.7	203.0	195.2	7.7	1.0195	1.0258
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1		
as left span	4919	80.1	816.8	364.5	452.3	834.7	380.4	454.3	0.9786	0.9583
							Average C	Correction Factor	1.0098	1.0103
Corrected As fo	ound NO <sub>X</sub> =	NA ppb	NO =	NA ppb	* = > +/-5	5% change initiates	investigation	*Percent Chang	ge NO <sub>x</sub> =	NA
Previous Respo	onse NO <sub>X</sub> =	NA ppb	NO =	NA ppb				*Percent Chang	ge NO =	NA
Baseline Corr 2	nd pt NO <sub>X</sub> =	NA ppb	NO =	NA ppb	As foun	$NO_X r^2$ :	:	Nx SI:	Nx Int:	
Baseline Corr 3	rd pt NO <sub>X</sub> =	NA ppb	NO =	NA ppb	As foun	nd NO r <sup>2</sup> :	:	NO SI:	NO Int:	
	·				As found	$NO_2 r^2$ :	:	NO2 SI:	NO <sub>2</sub> Int:	
				-	GPT Calibration	n Data				
O3 Setpo	int (ppb)	Indicated NO Refo		icated NO Drop centration (ppb)	Calculated No concentration (pp		ndicated NO2 entration (ppb) (Ic)	NO2 Correction fac Calibration Limit = 0 As Found Limit = 0	0.95-1.05 Calibrati	erter Efficiency ion Limit = 96-104%
as found	GPT zero									
as found GPT poir	nt (400 ppb NO2)									
as found GPT poir	nt (200 ppb NO2)									
as found GPT poir	nt (100 ppb NO2)									
1st GPT point	(400 ppb O3)	801.1		375.7	452.3		448.1	1.0094	1	99.1%
2nd GPT point	(200 ppb O3)	801.1		593.9	234.1		230.0	1.0179	<del></del>	98.2%
3rd GPT point	(100 ppb O3)	801.1		698.1	129.9		126.4	1.0279	)	97.3%
						Average Co	orrection Factor	r 1.0184	1	98.2%

Notes:

Adjusted zero and span.

Calibration Performed By:

Sean Bala



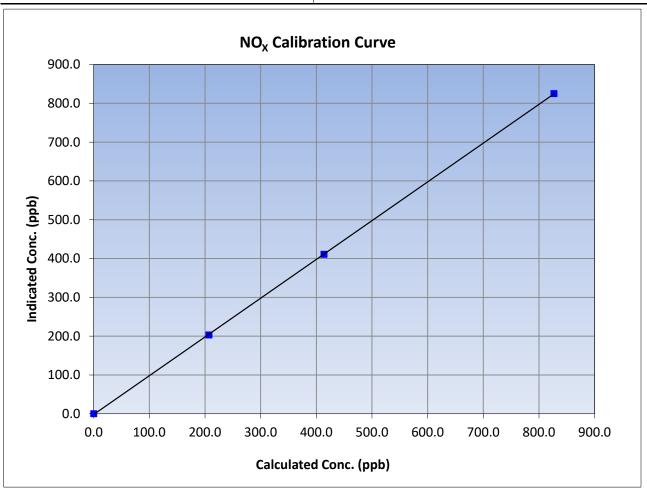
## NO<sub>x</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 30, 2023 Previous Calibration: May 29, 2023 Station Name: Fort McKay South Station Number: AMS 13 Start Time (MST): 8:27 End Time (MST): 12:24 Analyzer serial #: Analyzer make: Thermo 42i 1410661329

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	0.0		Correlation Coefficient	0.999977	≥0.995	
826.9	825.0	1.0023	Correlation Coefficient	0.333377	20.555	
413.9	410.8	1.0076	Slope	0.998875	0.90 - 1.10	
207.0	203.0	1.0195	Slope	0.996673	0.90 - 1.10	
			Intercept	-1.831289	+/-20	





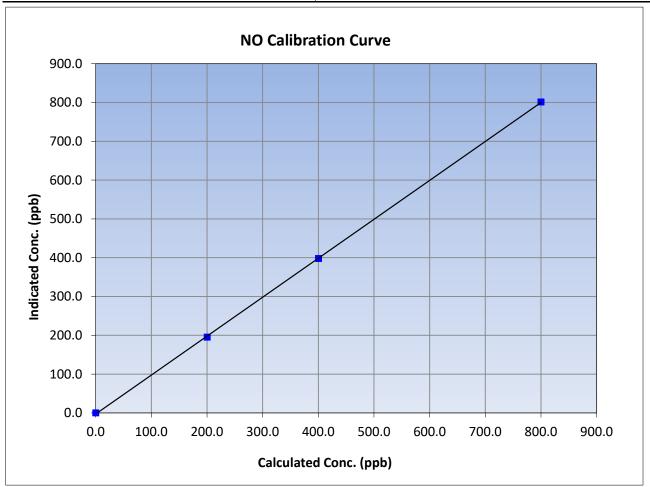
## **NO Calibration Summary**

Version-04-2020

#### **Station Information**

Calibration Date: May 30, 2023 Previous Calibration: May 29, 2023 Station Name: Fort McKay South Station Number: AMS 13 Start Time (MST): 8:27 End Time (MST): 12:24 Analyzer make: Thermo 42i Analyzer serial #: 1410661329

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999945	≥0.995
800.0	801.1	0.9986	Correlation Coefficient	0.555545	20.333
400.4	397.8	1.0066	Slope	1.003248	0.90 - 1.10
200.2	195.2	1.0258	Slope	1.003246	0.90 - 1.10
			Intercept	-2.765445	+/-20





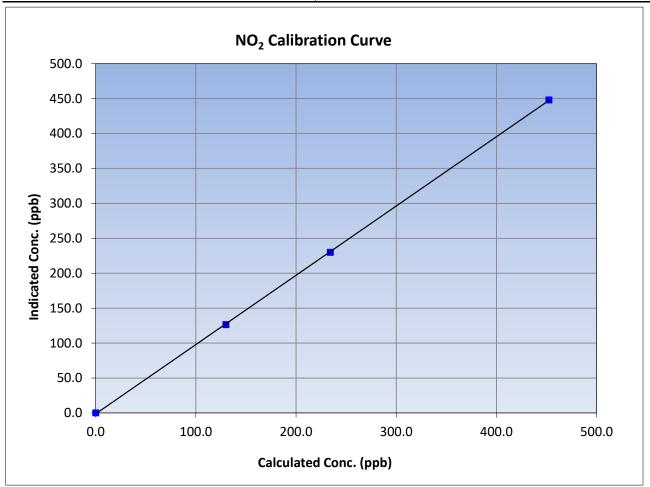
## NO<sub>2</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 30, 2023 Previous Calibration: May 29, 2023 Station Name: Fort McKay South Station Number: AMS 13 Start Time (MST): 8:27 End Time (MST): 12:24 Analyzer make: Thermo 42i Analyzer serial #: 1410661329

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999959	≥0.995
452.3	448.1	1.0094	Correlation Coefficient	0.999939	20.333
234.1	230.0	1.0179	Slope	0.991692	0.90 - 1.10
129.9	126.4	1.0279	Siope	0.991092	0.90 - 1.10
			Intercept	-1.272971	+/-20

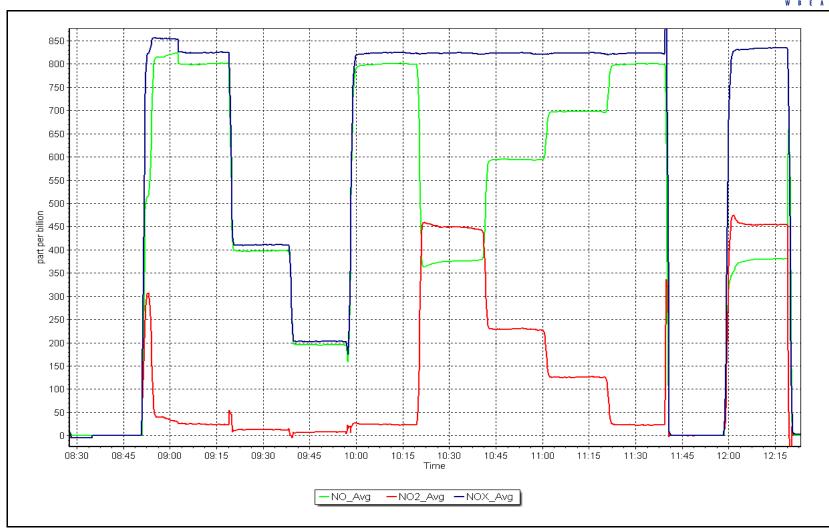


NO<sub>x</sub> Calibration Plot

Date: May 30, 2023

Location: Fort McKay South







## O<sub>3</sub> Calibration Report

Version-01-2020

Station Information

Station Name: Fort McKay South

Calibration Date: May 8, 2023 Start time (MST): 9:46

Reason: Routine Station number: AMS13

Last Cal Date: April 11, 2023

End time (MST): 13:05

**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 Range 0 - 500 ppb

Analyzer serial #: 3871

Start Finish

0.997171 1.003343

Start Backgd or Offset: 3.4

Finish 3.4 0.966

Calibration slope: 0.440000 Coeff or Slope: Calibration intercept: 0.620000 0.963

#### O<sub>3</sub> Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)  Limit = 0.95-1.05
as found zero	5000	0.0	0.0	-0.6	
as found span	5000	969.9	400.0	398.7	1.003
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.3	
high point	5000	980.6	400.0	401.5	0.996
second point	5000	838.0	200.0	201.2	0.994
third point	5000	735.3	100.0	101.7	0.983
as left zero	5000	0.0	0.0	-0.4	
as left span	5000	979.1	400.0	401.8	0.996
			Averag	ge Correction Factor	0.991

Baseline Corr As found: 0.0% 399.3 Previous response 399.5 \*% change

AF Correlation:

Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept:

\* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala

NA

Baseline Corr 3rd AF pt:



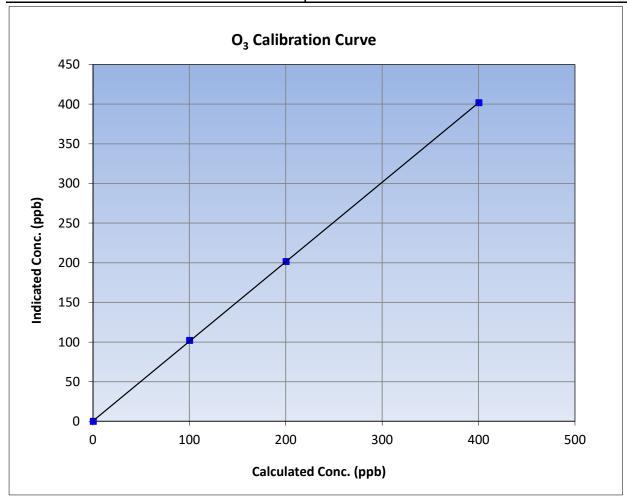
# O<sub>3</sub> Calibration Summary

Version-01-2020

#### **Station Information**

Calibration Date: May 8, 2023 **Previous Calibration:** April 11, 2023 Station Name: Fort McKay South Station Number: AMS13 Start Time (MST): 9:46 End Time (MST): 13:05 Analyzer make: Teledyne API T400 Analyzer serial #: 3871

Calibration Data							
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>		
0.0	-0.3		Correlation Coefficient	0.999983	≥0.995		
400.0	401.5	0.9963	Correlation coefficient	0.999983	20.993		
200.0	201.2	0.9940	Slope	1.003343	0.90 - 1.10		
100.0	101.7	0.9833	Slope	1.005545	0.90 - 1.10		
			- Intercept	0.440000	+/- 5		



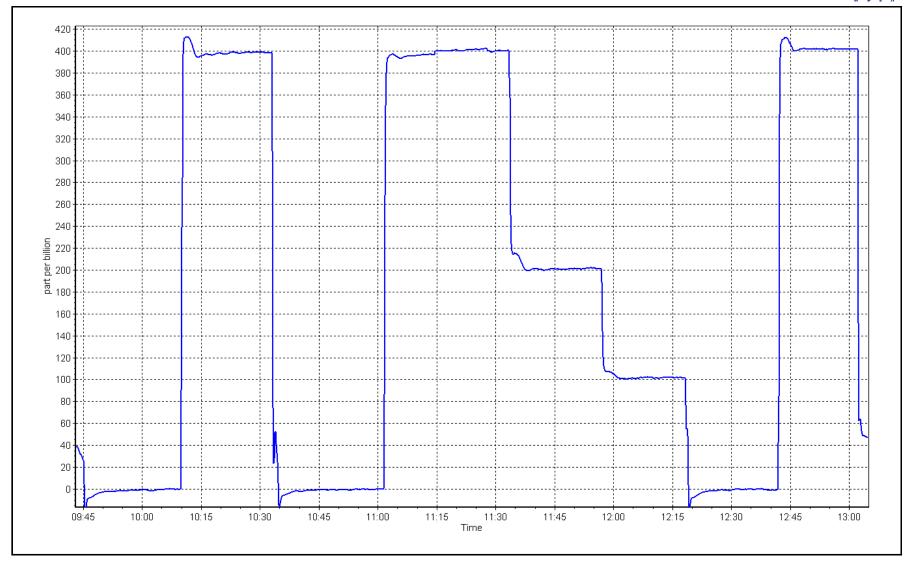
O<sub>3</sub> Calibration Plot

Date:

May 8, 2023

Location: Fort McKay South







# T640 PM<sub>2.5</sub> CALIBRATION

Version-01-2023

Station Name: Fort McKay South Calibration Date: May 9, 2023			Station Information			
Start time (MST): 10:52   End time (MST): 11:08	Station Name:	Fort McKay South		Station number:	AMS 13	
Analyzer Make: API T640		•			•	
Particulate Fraction:   PM2.5	Start time (MST):	10:52		End time (MST):	11:08	
Flow Meter Make/Model: Delta Cal S/N: 141229  Temp/RH standard: Delta Cal S/N: 141229    Parameter	Analyzer Make:	API T640		S/N:	319	
Temp/RH standard:   Delta Cal   Delta Ca	Particulate Fraction:	PM2.5				
Monthly Calibration Test	Flow Meter Make/Model:	Delta Cal		S/N:	141229	
Parameter As found Measured As left Adjusted (Limits) T (°C) 20.3 21.7 20.3	Temp/RH standard:	Delta Cal		S/N:	141229	
T (°C) 20.3 21.7 20.3			Monthly Calibration Te	est		
P (mmHg) 734.1 735.0 734.1	<u>Parameter</u>	As found	Measured	<u>As left</u>	<u>Adjusted</u>	(Limits)
flow (LPM) 4.91 5.16 5.16	T (°C)	20.3	21.7	20.3		+/- 2 °C
Leak Test: Date of check: May 9, 2023 Last Cal Date: April 12, 2023 PM w/o HEPA: 17.9 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	P (mmHg)	734.1	735.0	734.1		+/- 10 mmHg
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	flow (LPM)	4.91	5.16	5.16	<b>✓</b>	+/- 0.25 LPM
Note: this leak check will be completed before the quarterly work and will serve as the pre maintenance leak check Inlet cleaning:    Parameter	Leak Test:	Date of check:	May 9, 2023	Last Cal Date:	April 12, 2023	
Parameter As found Post maintenance As left Adjusted (Limits)  PMT Peak Test Post-maintenance leak check: PM w/o HEPA: w/ HEPA:  Date Optical Chamber Cleaned: April 12, 2023  Disposable Filter Changed: March 22, 2023  Annual Maintenance  Date Sample Tube Cleaned: Date RH/T Sensor Cleaned:  Date Sample Tube Cleaned: Inlet head clean and inspected. Flow adjusted.  Notes:		PM w/o HEPA:	17.9	PM w/ HEPA:	0.0	<0.2 ug/m3
Parameter As found Post maintenance As left Adjusted (Limits)  PMT Peak Test	Note: this leak check will be	completed before the	quarterly work and will s	erve as the pre ma	aintenance leak check	
Parameter As found Post maintenance As left	Inlet cleaning:	Inlet Head	✓			
Parameter As found Post maintenance As left   Adjusted (Limits)    PMT Peak Test						
Parameter As found Post maintenance As left			Quarterly Calibration T	ost		
PMT Peak Test	Parameter	As found	•		Adjusted	(Limite)
Post-maintenance leak check: Date Optical Chamber Cleaned: Disposable Filter Changed:  April 12, 2023  March 22, 2023  Annual Maintenance  Date Sample Tube Cleaned: Date RH/T Sensor Cleaned:  Inlet head clean and inspected. Flow adjusted.  Notes:	<u></u>	<u>AS TOUTIU</u>	rost maintenance	ASTEIL	Aujusteu	•
Date Optical Chamber Cleaned: Disposable Filter Changed:  April 12, 2023  March 22, 2023  Annual Maintenance  Date Sample Tube Cleaned: Date RH/T Sensor Cleaned:  Inlet head clean and inspected. Flow adjusted.  Notes:	FIVIT FEAR TEST					10.9 +/- 0.5
Disposable Filter Changed:  March 22, 2023  Annual Maintenance  Date Sample Tube Cleaned: Date RH/T Sensor Cleaned:  Inlet head clean and inspected. Flow adjusted.  Notes:	Post-maintenance	e leak check:	PM w/o HEPA:		w/ HEPA:	
Date Sample Tube Cleaned: Date RH/T Sensor Cleaned:  Inlet head clean and inspected. Flow adjusted.  Notes:	Date Optical Cham	ber Cleaned:				<0.2 ug/m3
Date Sample Tube Cleaned:  Date RH/T Sensor Cleaned:  Inlet head clean and inspected. Flow adjusted.  Notes:	Disposable Filter	r Changed:	March 22, 2	2023		
Date Sample Tube Cleaned:  Date RH/T Sensor Cleaned:  Inlet head clean and inspected. Flow adjusted.  Notes:						
Date Sample Tube Cleaned:  Date RH/T Sensor Cleaned:  Inlet head clean and inspected. Flow adjusted.  Notes:			Annual Maintanana			
Date RH/T Sensor Cleaned:  Inlet head clean and inspected. Flow adjusted.  Notes:			Annual Maintenance	:		
Inlet head clean and inspected. Flow adjusted.  Notes:	Date Sample Tub	e Cleaned:				
Notes:	Date RH/T Senso	or Cleaned:				
Notes:						
Notes:						
			Inlet head clean ar	id inspected. Flow	adjusted.	
Calibration by: Sean Bala	Notes:					
Calibration by: Sean Bala						
	Calibration by:	Sean Bala				



## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

> AMS14 ANZAC MAY 2023

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

June 30, 2023

## **SO<sub>2</sub> Calibration Report**

Version-01-2020

#### **Station Information**

Station number: Station Name: Anzac **AMS 14** April 18, 2023 Calibration Date: May 2, 2023 Last Cal Date: End time (MST): 9:17

Start time (MST): 6:40

Routine Reason:

**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 Diff between cyl: Removed Gas Cyl #: NA

Calibrator Make/Model: **API T700** Serial Number: 5239 API T701H ZAG Make/Model: Serial Number: 357

#### **Analyzer Information**

Analyzer make: Thermo 43i Analyzer serial #: 0710321322

Analyzer Range 0 - 1000 ppb

**Finish Finish** Start Start Calibration slope: 0.997195 0.999181 Backgd or Offset: 25.2 25.2 0.798 Calibration intercept: -0.864371 -0.684110 Coeff or Slope: 0.798

#### SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow 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	80.1	800.2	795.7	1.006
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.6	
high point	4920	80.1	800.2	799.4	1.001
second point	4960	40.0	399.6	398.2	1.004
third point	4980	20.0	199.8	197.5	1.012
as left zero	5000	0.0	0.0	0.6	
as left span	4920	80.1	800.2	799.4	1.001
			Averag	ge Correction Factor	1.005
Pacalina Carr As found:	70E 40	Provious rospons	207.07	*0/ change	0.29/

Baseline Corr As found: Previous response \*% change 795.40 797.07 -0.2% Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept:

NA AF Correlation: Baseline Corr 3rd AF pt:

Notes: No maintenance or adjustments done.

Calibration Performed By: Melissa Lemay \* = > +/-5% change initiates investigation



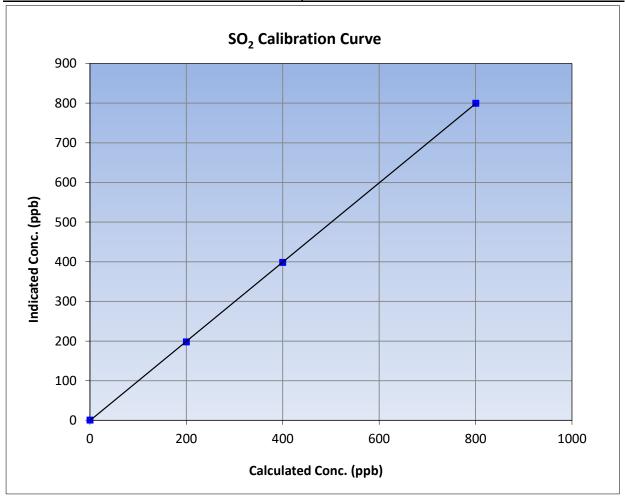
# **SO<sub>2</sub> Calibration Summary**

Version-01-2020

#### **Station Information**

Calibration Date: May 2, 2023 **Previous Calibration:** April 18, 2023 Station Name: Anzac Station Number: **AMS 14** Start Time (MST): 6:40 End Time (MST): 9:17 Analyzer make: Thermo 43i Analyzer serial #: 0710321322

Calibration Data							
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>		
0.0	0.6		Correlation Coefficient	0.999988	≥0.995		
800.2	799.4	1.0010	Correlation Coefficient	0.333366	20.333		
399.6	398.2	1.0035	Slope	0.999181	0.90 - 1.10		
199.8	197.5	1.0116	Slope	0.555161	0.90 - 1.10		
			- Intercept	-0.684110	+/-30		



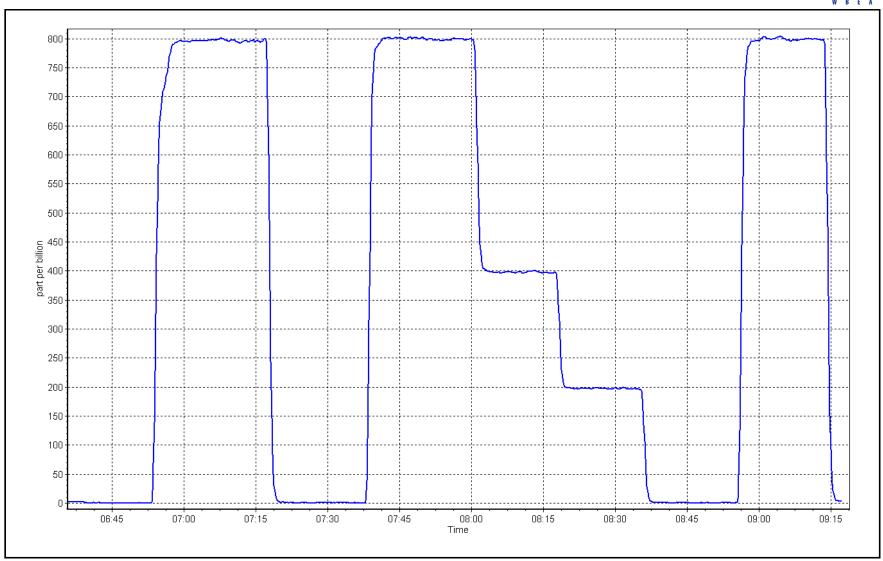
**SO2 Calibration Plot** 

Date:

May 2, 2023

Location: Anzac





# W B E A

#### **Wood Buffalo Environmental Association**

## **TRS Calibration Report**

Version-11-2021

**Station Information** 

Station Name: Anzac
Calibration Date: May 11, 2023
Start time (MST): 7:00
Reason: Routine

Station number: AMS14 Last Cal Date: April 5, 2023 End time (MST): 10:47

**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
Removed Gas Cyl #: NA
Calibrator Make/Model: API T700
ZAG Make/Model: API 701H

ppm Rem Gas Exp Date: NA
Diff between cyl:

Serial Number: 5239 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

<u>Start</u> **Finish** <u>Finish</u> <u>Start</u> 1.002553 0.997841 Backgd or Offset: Calibration slope: 5.51 5.36 0.098854 0.972 Calibration intercept: -0.041067 Coeff or Slope: 0.993

**TRS As Found Data** 

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) Limit = 0.90-1.10
as found zero	5000	0.0	0.0	0.2	
as found span	4925	74.3	80.0	83.1	0.965
as found 2nd point	4962	37.2	40.0	41.3	0.974
as found 3rd point	4981	18.6	20.0	20.4	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	0.3	
high point	4925	74.3	80.0	79.9	1.001
second point	4962	37.2	40.0	40.2	0.996
third point	4981	18.6	20.0	19.7	1.016
as left zero	5000	0.0	0.0	0.4	
as left span	4925	74.3	80.0	79.4	1.007
SO2 Scrubber Check	4920	80.0	0.008	0.0	
Date of last scrubber cha	ange:	Ave Corr Factor	1.004		
Date of last converter ef	fficiency test:		efficiency		

Baseline Corr As found: 82.9 80.12 3.4% Prev response: \*% change: Baseline Corr 2nd AF pt: -0.101851 41.1 AF Slope: 1.038574 AF Intercept: Baseline Corr 3rd AF pt: 20.2 0.999939 AF Correlation: \* = > +/-5% change initiates investigation

Notes: Scrubber checked after the calibrator zero. No maintenance done. Span adjusted.

Calibration Performed By: Melissa Lemay



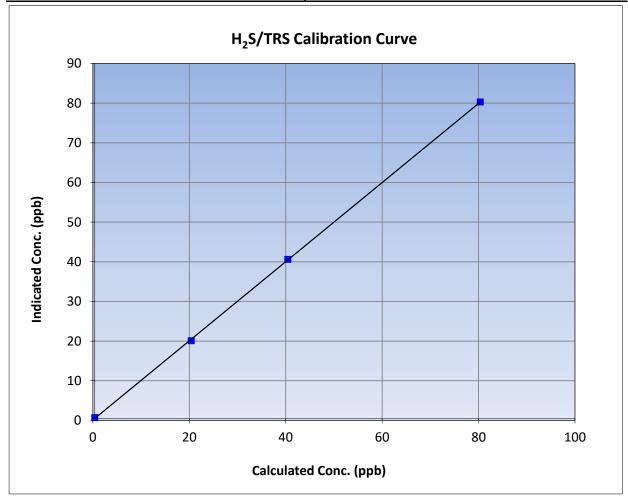
## **TRS Calibration Summary**

Version-11-2021

#### **Station Information**

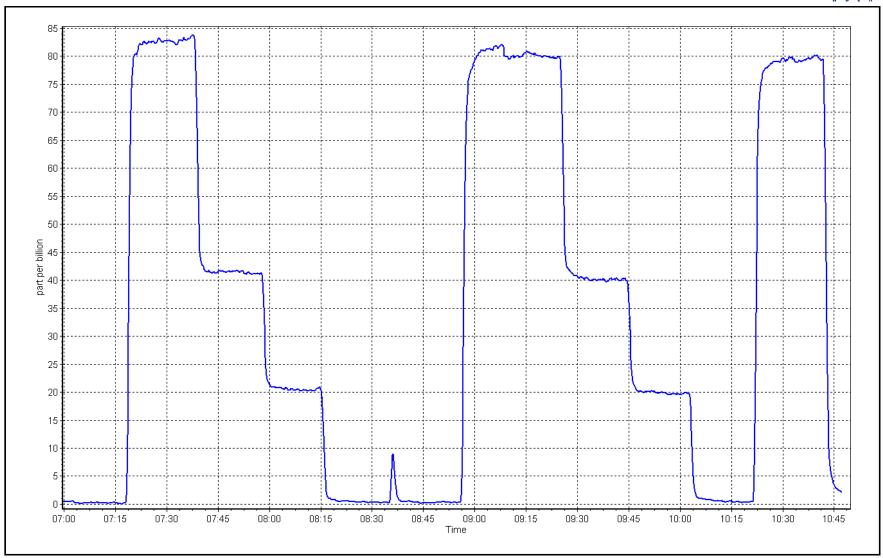
Calibration Date: May 11, 2023 **Previous Calibration:** April 5, 2023 Station Name: Station Number: AMS14 Anzac Start Time (MST): 7:00 End Time (MST): 10:47 Analyzer make: Thermo 43i-TLE Analyzer serial #: 1180540019

Calibration Data							
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>		
0.0	0.3		Correlation Coefficient	0.999942	≥0.995		
80.0	79.9	1.0007	Correlation Coefficient	0.333342	20.333		
40.0	40.2	0.9959	Slope	0.997841	0.90 - 1.10		
20.0	19.7	1.0160	Slope	0.557641	0.30 - 1.10		
			- Intercept	0.098854	+/-3		



Date: May 11, 2023 Location: Anzac







# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

#### **Station Information**

Station Name: Anzac Calibration Date: May 2, 2023 Start time (MST): 6:40

Reason: Routine Station number: AMS 14 Last Cal Date: April 18, 2023

End time (MST): 9:18

#### **Calibration Standards**

Gas Cert Reference: Cal Gas Expiry Date: January 5, 2025 CC279389

CH4 Cal Gas Conc. 499.3 ppm C3H8 Cal Gas Conc. 207.1

ppm

Removed Gas Cert: NA Removed CH4 Conc.

499.3 ppm

Removed C3H8 Conc. 207.1 ppm

Diff between cyl ( $CH_4$ ):

Calibrator Model: **API T700** ZAG make/model: **API 701H** 

CH4 Equiv Conc. 1068.8 ppm

NA

Removed Gas Expiry: CH4 Equiv Conc. 1068.8 ppm

Diff between cyl (THC):

Diff between cyl (NM): Serial Number: 5252

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 CH4 SP Ratio: 3.90E-04 3.90E-04

NMHC SP Ratio:

Start 4.53E-05 Finish

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)	c) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.1	17.12	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	80.1	17.12	17.05	1.004
second point	4960	40.0	8.55	8.53	1.002
third point	4980	20.0	4.28	4.23	1.011
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.1	17.12	17.03	1.005
			Av	verage Correction Factor	1.006

Baseline Corr AF: 17.06 Prev response 17.03 0.2% \*% change Baseline Corr 2nd AF: NA AF Slope: AF Intercept:

\* = > +/-5% change initiates investigation Baseline Corr 3rd AF: NA AF Correlation:



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

					VE151011 01 20
		NMHC Calibr	ation Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit=</i> 0.95-1.0
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.1	9.12	9.09	1.004
as found 2nd point	4320	80.1	9.12	9.09	1.004
as found 3rd point					
new cylinder response					
calibrator zero	F000	0.0	0.00	0.00	
	5000 4920	0.0 80.1	0.00 9.12	0.00	
high point	4960	40.0		9.08	1.005
second point			4.56	4.54	1.004
third point	4980	20.0	2.28	2.25	1.012
as left zero	5000	0.0	0.00	0.00	4.006
as left span	4920	80.1	9.12	9.07	1.006
	2.00			rage Correction Factor	1.007
Baseline Corr AF:	9.09	Prev response	9.11	*% change	-0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
		CH4 Calibra			
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i> .
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.1	8.00	7.97	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
nigh point	4920	80.1	8.00	7.97	1.004
second point	4960	40.0	3.99	3.99	1.001
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	80.1	8.00	7.96	1.005
				rage Correction Factor	1.004
Baseline Corr AF:	7.97	Prev response	7.99	*% change	-0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
		Calibration	Statistics		
		<u>Start</u>		<u>Finish</u>	
THC Cal Slope:		0.994025		0.996430	
THC Cal Offset:		0.010201		-0.007805	
CH4 Cal Slope:		0.999707		0.996993	
CH4 Cal Offset:		-0.004033		-0.002038	
NMHC Cal Slope:		0.999569		0.995937	
				0.00=====	

Notes: Hydrogen cylinder changed. No adjustments done.

-0.007757

Calibration Performed By: Melissa Lemay

NMHC Cal Offset:

-0.005767



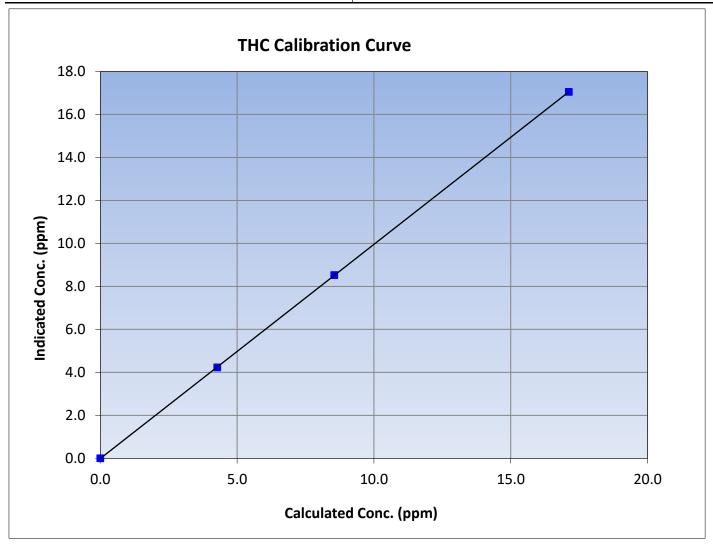
# **THC Calibration Summary**

Version-01-2020

#### **Station Information**

**Previous Calibration:** Calibration Date: May 2, 2023 April 18, 2023 Station Name: Anzac Station Number: **AMS 14** Start Time (MST): 6:40 End Time (MST): 9:18 Analyzer make: Thermo 55i Analyzer serial #: 1118148494

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999994	≥0.995
17.12	17.05	1.0042	Correlation Coemicient	0.999994	20.993
8.55	8.53	1.0024	Slope	0.996430	0.90 - 1.10
4.28	4.23	1.0107	Slope	0.550450	0.90 - 1.10
			Intercept	-0.007805	+/-0.5





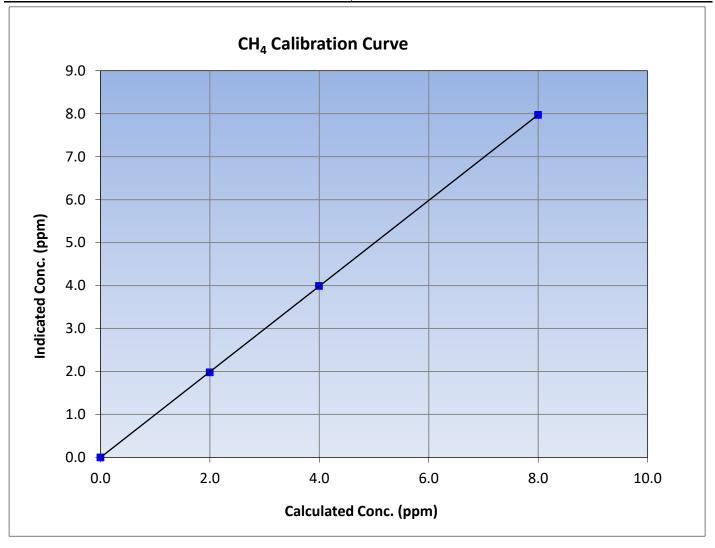
# **CH<sub>4</sub> Calibration Summary**

Version-01-2020

#### **Station Information**

Calibration Date: May 2, 2023 **Previous Calibration:** April 18, 2023 Station Name: Anzac Station Number: **AMS 14** Start Time (MST): 6:40 End Time (MST): 9:18 Analyzer make: Analyzer serial #: Thermo 55i 1118148494

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999995	≥0.995
8.00	7.97	1.0036	Correlation Coefficient	0.555555	20.333
3.99	3.99	1.0011	Slope	0.996993	0.90 - 1.10
2.00	1.98	1.0087	Зюре	0.990993	0.90 - 1.10
			Intercept	-0.002038	+/-0.5





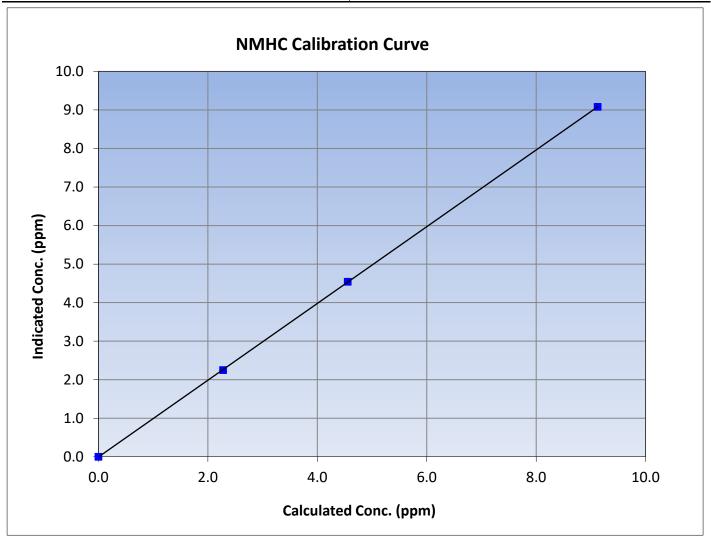
## **NMHC Calibration Summary**

Version-01-2020

#### **Station Information**

Calibration Date: May 2, 2023 **Previous Calibration:** April 18, 2023 Station Name: Anzac Station Number: **AMS 14** Start Time (MST): 6:40 End Time (MST): 9:18 Analyzer make: Thermo 55i Analyzer serial #: 1118148494

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>	
0.00	0.00		Correlation Coefficient	0.999994	≥0.995	
9.12	9.08	1.0048	Correlation Coefficient	0.999994	20.333	
4.56	4.54	1.0036	Slope	0.995937	0.90 - 1.10	
2.28	2.25	1.0125	Slope	0.555557	0.90 - 1.10	
			Intercept	-0.005767	+/-0.5	

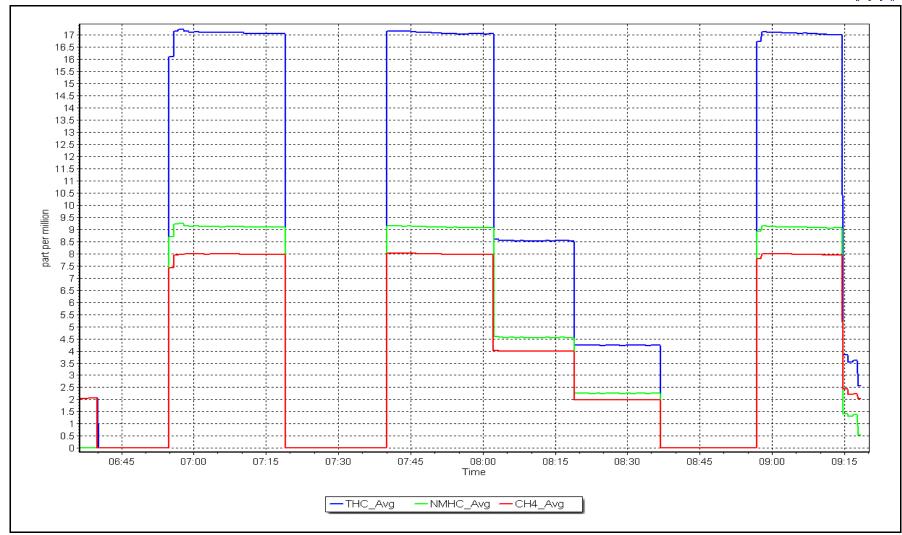


**NMHC Calibration Plot** 

Date: May 2, 2023

Location: Anzac







## THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

#### **Station Information**

Station Name:AnzacStation number: AMS 14Calibration Date:May 11, 2023Last Cal Date: May 2, 2023Start time (MST):5:56End time (MST): 7:02

Reason: Cylinder Change Nitrogen Cylinder change

**Calibration Standards** 

Gas Cert Reference: CC279389 Cal Gas Expiry Date: January 5, 2025

CH4 Cal Gas Conc. 499.3 ppm CH4 Equiv Conc. 1068.8 ppm

C3H8 Cal Gas Conc. 207.1 ppm

Removed Gas Cert: NA Removed Gas Expiry: NA

Removed CH4 Conc. 499.3 ppm CH4 Equiv Conc. 1068.8 ppm

Removed C3H8 Conc. 207.1 ppm Diff between cyl (THC): Diff between cyl (CH<sub>4</sub>): 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

<u>Start</u> <u>Finish</u> <u>Start</u> <u>Finish</u>

CH4 SP Ratio: 3.90E-04 3.90E-04 NMHC SP Ratio: 4.53E-05 4.53E-05 CH4 Retention time: 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.1	17.12	17.15	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4920	80.1	17.12	17.13	1.000
second point					
third point					
as left zero					
as left span					

			Ave	erage Correction Factor	1.000
Baseline Corr AF:	17.15	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates i	nvestigation



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

					VEISIOII-01-20
		NMHC Calibr	ation Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.1	9.12	9.15	0.997
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
nigh point	4920	80.1	9.12	9.13	0.999
second point					
third point					
as left zero					
as left span					
·			Avera	ge Correction Factor	0.999
Baseline Corr AF:	9.15	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation: * = > +/-5% change initiat			
		CH4 Calibra	tion Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.1	8.00	8.00	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
nigh point	4920	80.1	8.00	8.00	1.000
second point					
third point					
as left zero					
as left span					
			Avera	ge Correction Factor	1.000
Baseline Corr AF:	8.00	Prev response	NA	*% change	NA
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
		Calibration	Statistics	_	
			Statistics	<u>Finish</u>	
THC Cal Slana		<u>Start</u> 1.000454		<u>FIIIISII</u>	
THC Cal Slope: THC Cal Offset:		0.00000			
CH4 Cal Offsate		1.000172			
CH4 Cal Offset:		0.000000			
NMHC Cal Slope:		1.000701			

Notes: Nitrogen cylinder change.

0.000000

Calibration Performed By: Melissa Lemay

NMHC Cal Offset:

**NMHC Calibration Plot** 

Date: May 11, 2023

Location: Anzac







## NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

#### **Station Information**

Station Name: Anzac
Calibration Date: May 1, 2023

Start time (MST): 6:45
Reason: Routine

Station number: AMS 14 Last Cal Date: April 14, 2023

End time (MST): 11:31

NO gas Diff:

#### **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:

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 <u>Finish</u> <u>Start</u> <u>Finish</u> NO coeff or slope: 1.361 1.361 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: 162.7 162.7

#### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	1.002446	0.995080
NO <sub>x</sub> Cal Offset:	-0.745161	-0.466631
NO Cal Slope:	1.004625	0.996609
NO Cal Offset:	-2.149028	-1.790505
NO <sub>2</sub> Cal Slope:	1.000896	1.001233
NO <sub>2</sub> Cal Offset:	0.328255	0.590521



# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

				Dila	ution Calibratio	n 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	4921	78.6	800.5	786.8	13.7	798.0	784.0	14.0	1.0032	1.0036
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	-0.1	0.2		
high point	4921	78.6	800.5	786.8	13.7	796.2	783.1	13.1	1.0054	1.0048
second point	4961	39.3	400.2	393.4	6.8	398.1	389.8	8.3	1.0053	1.0092
third point	4980	19.6	199.6	196.2	3.4	197.2	191.8	5.4	1.0123	1.0230
as left zero	5000	0.0	0.0	0.0	0.0	0.2	-0.1	0.2		
as left span	4921	78.6	800.5	392.1	408.4	794.8	387.9	406.9	1.0072	1.0110
							Average C	Correction Factor	1.0077	1.0123
Corrected As fo	ound NO <sub>X</sub> =	797.9 ppb	NO	= 784.2 ppb	* = > +/-5%	% change initiates	investigation	*Percent Chang	ge NO <sub>x</sub> =	-0.5%
Previous Respo	nse NO <sub>x</sub> =	801.7 ppb	NO	= 788.3 ppb				*Percent Chang	ge NO =	-0.5%
Baseline Corr 2	nd pt NO <sub>X</sub> =	NA ppb	NO	= NA ppb	As found	- ^		Nx SI:	Nx Int:	
Baseline Corr 3	rd pt NO <sub>X</sub> =	NA ppb	NO	= NA ppb	As found	d NO r <sup>2</sup> :		NO SI:	NO Int:	
	·				As found	d $NO_2 r^2$ :		NO2 SI:	NO <sub>2</sub> Int:	
				G	GPT Calibration	Data				
O3 Setpo	int (ppb)	Indicated NO Ref concentration (		dicated NO Drop ncentration (ppb)	Calculated NC concentration (pp		dicated NO2 atration (ppb) (Ic)	NO2 Correction fa Calibration Limit = As Found Limit = 0	0.95-1.05 Calibratio	rter Efficiency n Limit = 96-104%
as found	GPT zero									
as found GPT poir	nt (400 ppb NO2)									
as found GPT poir	nt (200 ppb NO2)									
as found GPT poir	nt (100 ppb NO2)									
1st GPT point	(400 ppb O3)	777.7		383.0	408.4		409.3	0.9977		100.2%
2nd GPT point	(200 ppb O3)	777.7		577.7	213.7		214.6	0.9957		100.4%
3rd GPT point	(100 ppb O3)	777.7		679.1	112.3		113.5	0.9892	2	101.1%

Notes:

No maintenance or adjustments done.

Average Correction Factor

0.9942

100.6%



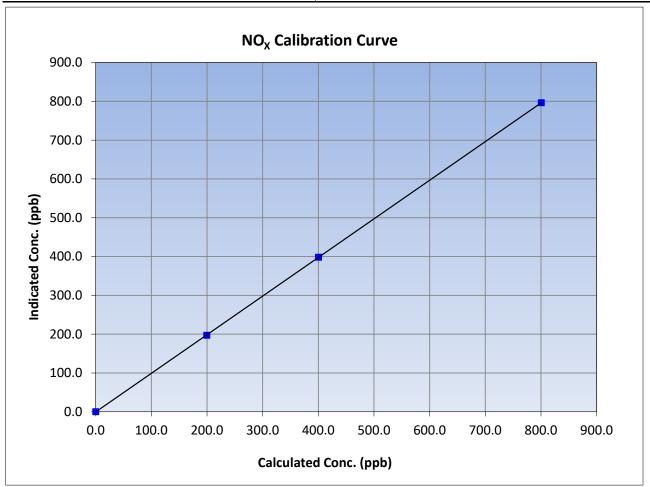
## NO<sub>x</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 1, 2023 Previous Calibration: April 14, 2023 Station Name: Station Number: AMS 14 Anzac Start Time (MST): 6:45 End Time (MST): 11:31 Analyzer serial #: Analyzer make: Thermo 42i 1426262592

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999996	≥0.995
800.5	796.2	1.0054	Correlation Coefficient	0.555550	20.993
400.2	398.1	1.0053	Slope	0.995080	0.90 - 1.10
199.6	197.2	1.0123	Slope	0.995060	0.90 - 1.10
			Intercept	-0.466631	+/-20





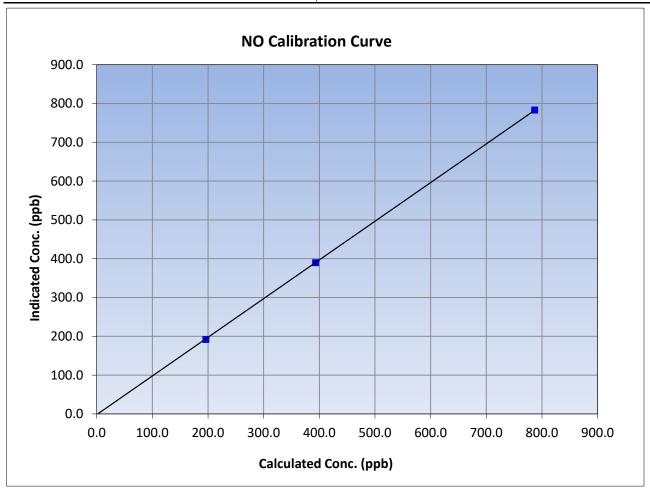
## **NO Calibration Summary**

Version-04-2020

#### **Station Information**

Calibration Date: May 1, 2023 Previous Calibration: April 14, 2023 Station Name: Station Number: AMS 14 Anzac Start Time (MST): 6:45 End Time (MST): 11:31 Analyzer make: Thermo 42i Analyzer serial #: 1426262592

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	-0.1		Correlation Coefficient	0.999978	≥0.995
786.8	783.1	1.0048	Correlation Coefficient	0.333376	20.993
393.4	389.8	1.0092	Slope	0.996609	0.90 - 1.10
196.2	191.8	1.0230	Slope	0.990009	0.90 - 1.10
			Intercept	-1.790505	+/-20





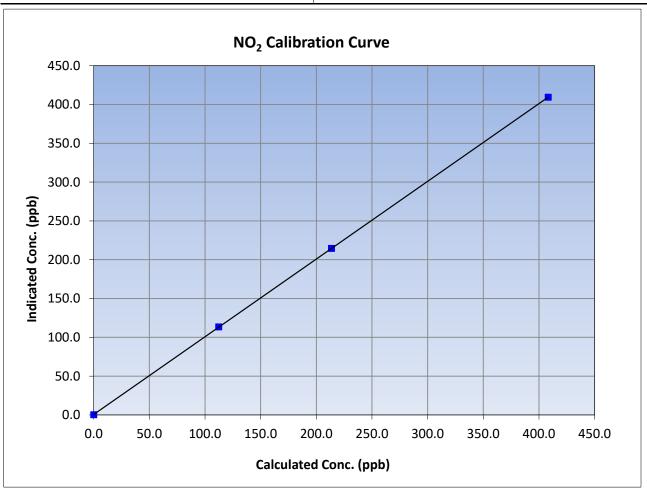
## NO<sub>2</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 1, 2023 Previous Calibration: April 14, 2023 Station Name: Station Number: AMS 14 Anzac Start Time (MST): 6:45 End Time (MST): 11:31 Analyzer serial #: Analyzer make: Thermo 42i 1426262592

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.2		Correlation Coefficient	0.999995	≥0.995
408.4	409.3	0.9977	Correlation Coefficient	0.555555	20.333
213.7	214.6	0.9957	Slope	1.001233	0.90 - 1.10
112.3	113.5	0.9892	Slope	1.001255	0.90 - 1.10
			Intercept	0.590521	+/-20

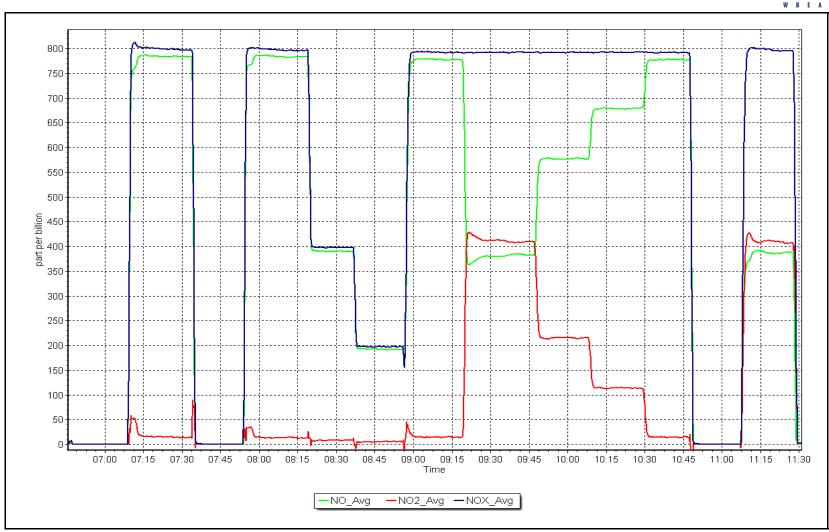


NO<sub>x</sub> Calibration Plot

Date: May 1, 2023

Location: Anzac







## O<sub>3</sub> Calibration Report

Version-01-2020

Station Information

Station Name: Anzac Station number: AMS14

Calibration Date: Last Cal Date: April 18, 2023 May 2, 2023 End time (MST): 11:38

Start time (MST): 9:15 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 Backgd or Offset: Calibration slope: 1.000057 1.007857 1.3 1.3 Coeff or Slope: Calibration intercept: 0.140000 -0.500000 1.516 1.516

#### O<sub>3</sub> Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)		Correction factor (Cc/Ic)  Limit = 0.95-1.05
as found zero	5000	0.0	0.0	-0.2	
as found span	5000	884.2	400.0	402.9	0.993
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.8	
high point	5000	884.9	400.0	402.4	0.994
second point	5000	769.3	200.0	201.5	0.993
third point	5000	669.8	100.0	100.4	0.996
as left zero	5000	0.0	0.0	-0.6	
as left span	5000	883.1	400.0	405.1	0.987
			Avera	ge Correction Factor	0.994
Baseline Corr As found:	403.1	Previous respons		*% change	0.7%
Baseline Corr 2nd AF nt	NA	AF Slone	7.	AF Intercent:	

Baseline Corr 2nd AF pt: AF Slope: AF Intercept: NA AF Correlation:

Baseline Corr 3rd AF pt: \* = > +/-5% change initiates investigation

Notes: No maintenance or adjustments done.

Calibration Performed By: Melissa Lemay



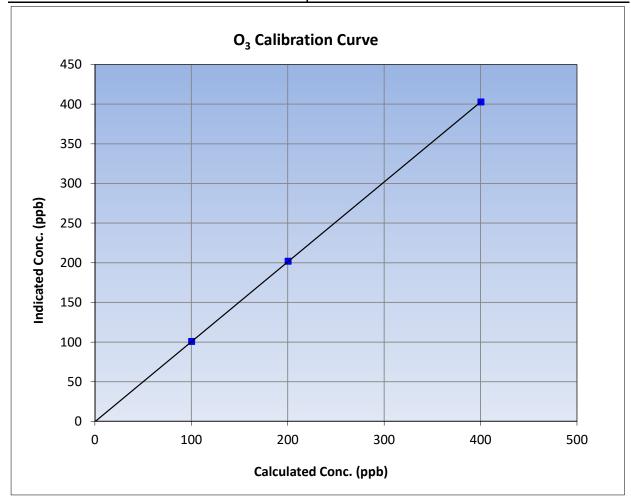
## O<sub>3</sub> Calibration Summary

Version-01-2020

#### **Station Information**

Calibration Date: May 2, 2023 **Previous Calibration:** April 18, 2023 Station Name: Anzac Station Number: AMS14 Start Time (MST): 9:15 End Time (MST): 11:38 Analyzer make: Thermo 49i Analyzer serial #: 1426262595

Calibration Data						
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>	
0.0	-0.8		Correlation Coefficient	0.999996	≥0.995	
400.0	402.4	0.9940	Correlation Coefficient	0.999990	20.995	
200.0	201.5	0.9926	Slope	1.007857	0.90 - 1.10	
100.0	100.4	0.9960	Slope	1.007657	0.90 - 1.10	
			Intercept	-0.500000	+/- 5	



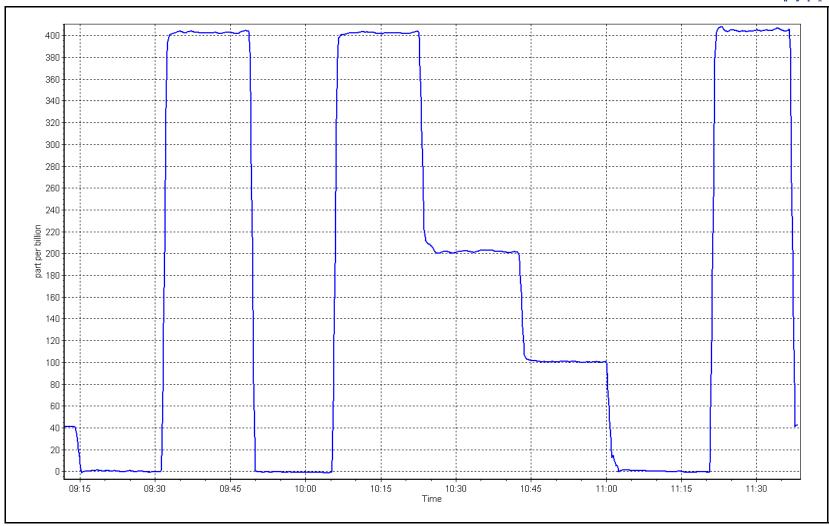
O<sub>3</sub> Calibration Plot

Date:

May 2, 2023

Location: Anzac







# **T640 PM<sub>2.5</sub> CALIBRATION**

Version-01-2023

		Station Information			
Station Name: Calibration Date: Start time (MST):	Anzac May 30, 2023 8:26		Station number: Last Cal Date: End time (MST):	April 18, 2023	
Analyzer Make: Particulate Fraction:	API T640 PM2.5		S/N:	825	
Flow Meter Make/Model:	Alicat FP-25		S/N:	388753	
Temp/RH standard:	Alicat FP-25		S/N:	388753	
		Monthly Calibration Te	est		
<u>Parameter</u>	As found	Measured	<u>As left</u>	<u>Adjust</u>	<u>ted</u> (Limits)
T (°C)	19.9	20.4	19.9		+/- 2 °C
P (mmHg)	711.4	712.7	711.4		+/- 10 mmHg
flow (LPM)	5	5.05	5		+/- 0.25 LPM
Leak Test:	Date of check:	May 30, 2023	Last Cal Date:	April 18, 2023	
Note: this leak check will be	PM w/o HEPA:	44	PM w/ HEPA:	0	<0.2 ug/m3
Inlet cleaning :	Inlet Head	Quarterly Calibration T	rost		
Daramotor	As found	Post maintenance	As left	Adjust	ed (Limits)
<u>Parameter</u> PMT Peak Test	AS TOUTIU	<u>FOST Maintenance</u>	<u>AS IEIL</u>	Aujust	10.9 +/- 0.5
Post-maintenance	e leak check:	PM w/o HEPA:		w/ HEPA:	
Date Optical Cham	nber Cleaned:	March 30,			<0.2 ug/m3
Disposable Filte	r Changed:	March 30,	2023		
		Annual Maintenance	2		
Date Sample Tul	oe Cleaned:	June 21, 2	022		
Date RH/T Senso	-	June 21, 2			
Notes:		No adjustmen	ts done. Head Clea	ned.	
Calibration by:	Melissa Lemay				



## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

> AMS17 WAPASU MAY 2023

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

June 30, 2023

## **SO<sub>2</sub> Calibration Report**

Version-01-2020

#### **Station Information**

Station number: Station Name: Wapasu AMS17 May 15, 2023 April 13, 2023 Calibration Date: Last Cal Date: Start time (MST): 9:58 End time (MST): 13:00

Routine Reason:

#### **Calibration Standards**

Cal Gas Concentration: 50.38 ppm Cal Gas Exp Date: January 12, 2029

Cal Gas Cylinder #: ALM066507

<u>50.38</u> ppm Removed Cal Gas Conc: Rem Gas Exp Date: n/a

Diff between cyl: Removed Gas Cyl #: n/a

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

**Finish Finish** Start Start Calibration slope: 0.999723 0.998882 Backgd or Offset: 12.4 12.4 1.099 Calibration intercept: -1.559214 -2.039793 Coeff or Slope: 1.099

#### SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow 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	796.6	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.1	
high point	4921	79.4	800.0	798.5	1.002
second point	4960	39.7	400.0	395.1	1.013
third point	4980	19.8	199.5	196.3	1.016
as left zero	5000	0.0	0.0	0.0	
as left span	4920	79.4	800.1	801.1	0.999
			Averag	ge Correction Factor	1.010
Baseline Corr As found:	796.90	Previous response	798.19	*% change	-0.2%

Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept:

Baseline Corr 3rd AF pt: NA AF Correlation:

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

Calibration Performed By: Max Farrell \* = > +/-5% change initiates investigation



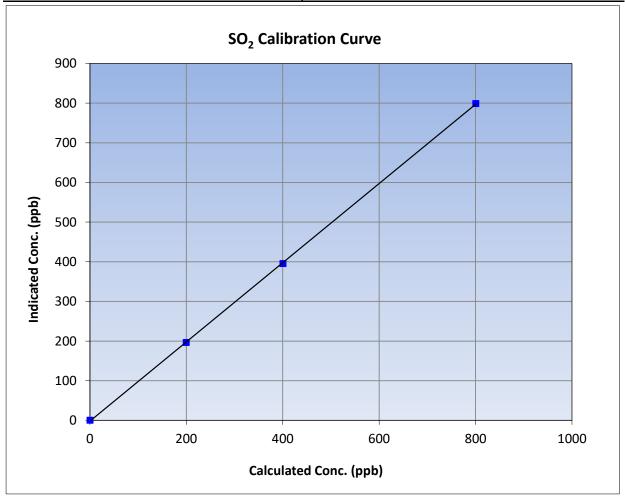
## **SO<sub>2</sub> Calibration Summary**

Version-01-2020

#### **Station Information**

Calibration Date: May 15, 2023 **Previous Calibration:** April 13, 2023 Station Name: Station Number: AMS17 Wapasu Start Time (MST): 9:58 End Time (MST): 13:00 Analyzer make: Thermo 43i Analyzer serial #: 1218153459

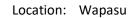
Calibration Data						
		Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>	
0.0	-0.1		Correlation Coefficient	0.999963	≥0.995	
800.0	798.5	1.0018	Correlation Coefficient	0.555505	20.993	
400.0	395.1	1.0125	Slope	0.998882	0.90 - 1.10	
199.5	196.3	1.0164	Slope	0.990002	0.90 - 1.10	
			- Intercept	-2.039793	+/-30	



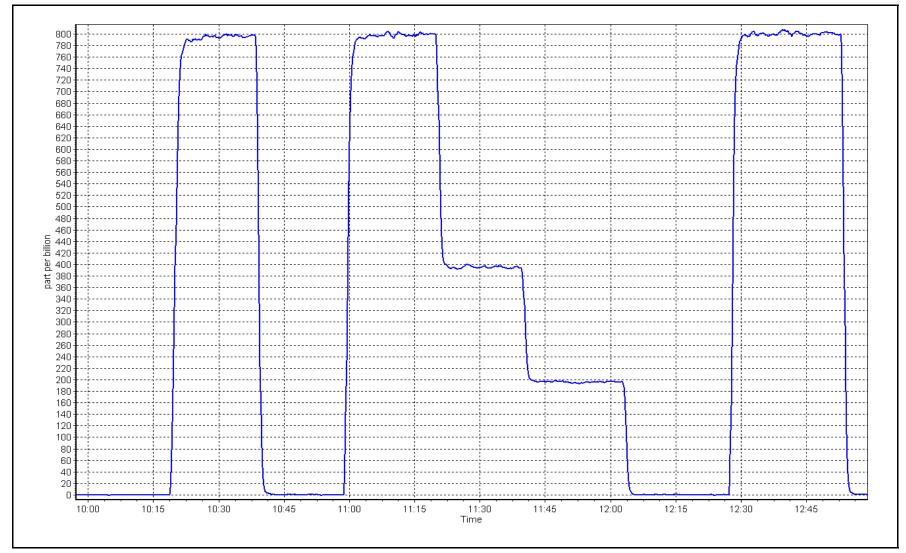
**SO2 Calibration Plot** 

Date: Ma

May 15, 2023







# W B E A

## **Wood Buffalo Environmental Association**

## H<sub>2</sub>S Calibration Report

Version-11-2021

**Station Information** 

Station Name: Wapasu
Calibration Date: May 23, 2023
Start time (MST): 10:19
Reason: Routine

Station number: AMS17 Last Cal Date: April 21, 2023 End time (MST): 14:09

**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

<u>Start</u> **Finish** <u>Finish</u> <u>Start</u> 0.990854 0.987854 Backgd or Offset: 12.7 Calibration slope: 12.7 0.100766 Calibration intercept: 0.220786 Coeff or Slope: 1.085 1.085

H<sub>2</sub>S 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	79.8	1.004
as found 2nd point	4961	39.4	40.0	39.4	1.018
as found 3rd point	4980	19.7	20.0	19.8	1.015
new cylinder response					

#### H<sub>2</sub>S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	0.4	
high point	4921	78.8	80.0	79.4	1.008
second point	4961	39.4	40.0	39.1	1.023
third point	4980	19.7	20.0	19.8	1.010
as left zero	5000	0.0	0.0	0.4	
as left span	4921	78.8	80.0	78.6	1.018
SO2 Scrubber Check	4921	79.4	0.008	-0.2	
Date of last scrubber cha	nge:	n/a		Ave Corr Factor	1.014
Date of last converter eff	iciency test:	n/a			efficiency

Baseline Corr As found: 79.7 79.49 0.3% Prev response: \*% change: 0.996426 -0.099220 Baseline Corr 2nd AF pt: 39.3 AF Slope: AF Intercept: Baseline Corr 3rd AF pt: AF Correlation: 0.999943 19.7

\* = > +/-5% change initiates investigation

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

Calibration Performed By: Max Farrell



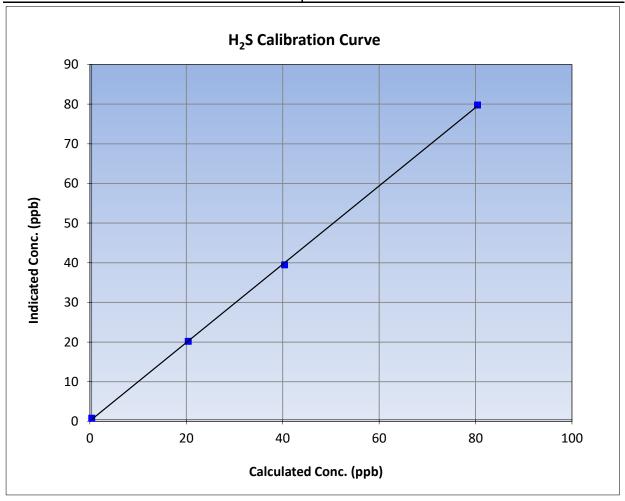
## H<sub>2</sub>S Calibration Summary

Version-11-2021

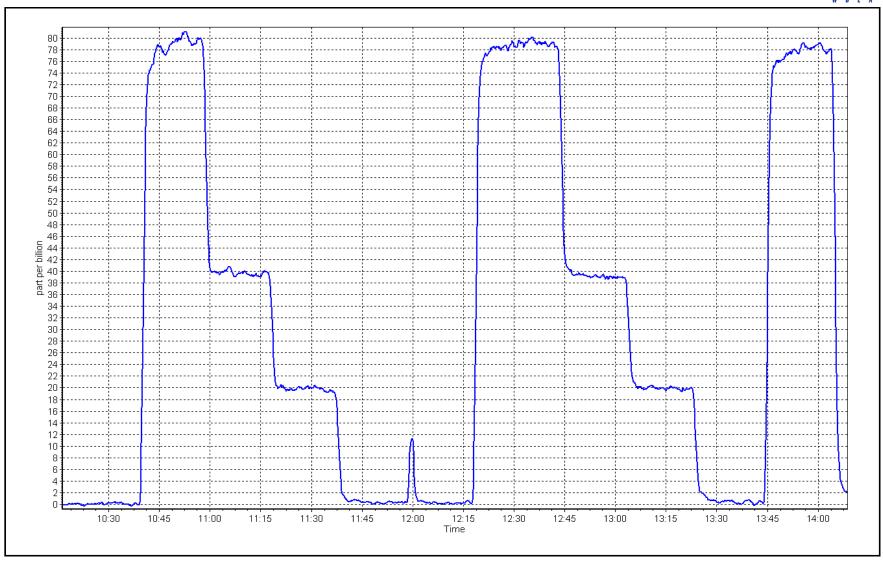
#### **Station Information**

Calibration Date: May 23, 2023 **Previous Calibration:** April 21, 2023 Station Name: Station Number: AMS17 Wapasu Start Time (MST): 10:19 End Time (MST): 14:09 Analyzer make: Thermo 450i Analyzer serial #: 1218153583

Calibration Data						
		Correction factor (Cc/Ic)	Statistical Evaluation <u>Li</u>		<u>Limits</u>	
0.0	0.4		Correlation Coefficient	0.999875	≥0.995	
80.0	79.4	1.0076	Correlation Coefficient	0.999873	20.995	
40.0	39.1	1.0229	Slope	0.987854	0.90 - 1.10	
20.0	19.8	1.0101	Slope	0.367634	0.90 - 1.10	
			- Intercept	0.100766	+/-3	







Date: May 23, 2023



## **THC Calibration Report**

Version-01-2020

#### **Station Information**

Station Name: Wapasu May 15, 2023 Calibration Date: Start time (MST): 9:58 Routine Reason:

Station number: Last Cal Date:

AMS17 April 13, 2023

End time (MST):

13:00

**Calibration Standards** 

ALM066507 Gas Cert Reference: Cal Gas Expiry Date:

CH4 Cal Gas Conc. 503.5 ppm C3H8 Cal Gas Conc. 208.3 ppm

n/a

Removed Gas Expiry: n/a

CH4 Equiv Conc.

1076.3

January 12, 2029

1076.3

ppm

Removed CH4 Conc. Removed C3H8 Conc.

Removed Gas Cert:

503.5 208.3 ppm ppm

Diff between cyl:

CH4 Equiv Conc.

ppm

Calibrator Make/Model:

**API T700** 

Serial Number: Serial Number: 2449 359

ZAG Make/Model: **API 701H** 

**Analyzer Information** 

Analyzer make: Thermo 51i-LT

Analyzer Range: 0 - 20 ppm

Start

Finish

Analyzer serial #:

Start

1218153352

Finish

Calibration slope:

1.001474 -0.066926 1.004482

Background:

3.070

3.070

Calibration intercept:

-0.015906

Coefficient:

4.296

4.296

#### **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	4921	79.4	17.09	17.21	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.01	
high point	4921	79.4	17.09	17.19	0.994
second point	4960	39.7	8.55	8.48	1.008
third point	4980	19.8	4.26	4.29	0.994
as left zero	5000	0.0	0.00	0.01	
as left span	4920	79.4	17.09	17.14	0.997
			Aver	age Correction Factor	0.999
Baseline Corr As found:	17.18	Previous response	17.05	*% change	0.8%

AF Slope:

Baseline Corr 3rd AF pt: NA AF Correlation:

NA

\* = > +/-5% change initiates investigation

AF Intercept:

Notes:

Baseline Corr 2nd AF pt:

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

Calibration Performed By:

Max Farrell



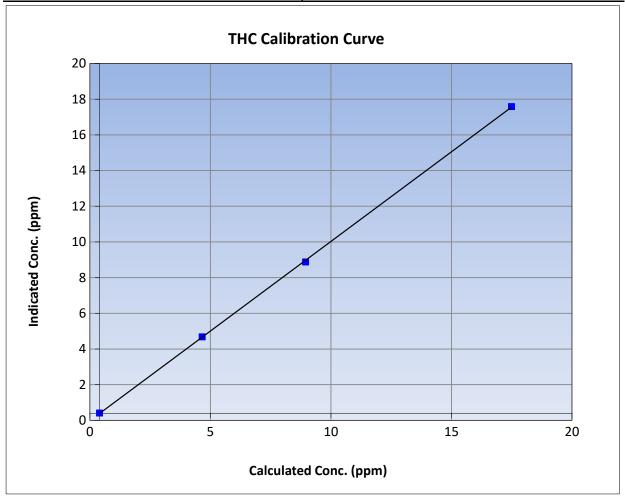
## **THC Calibration Summary**

Version-01-2020

#### **Station Information**

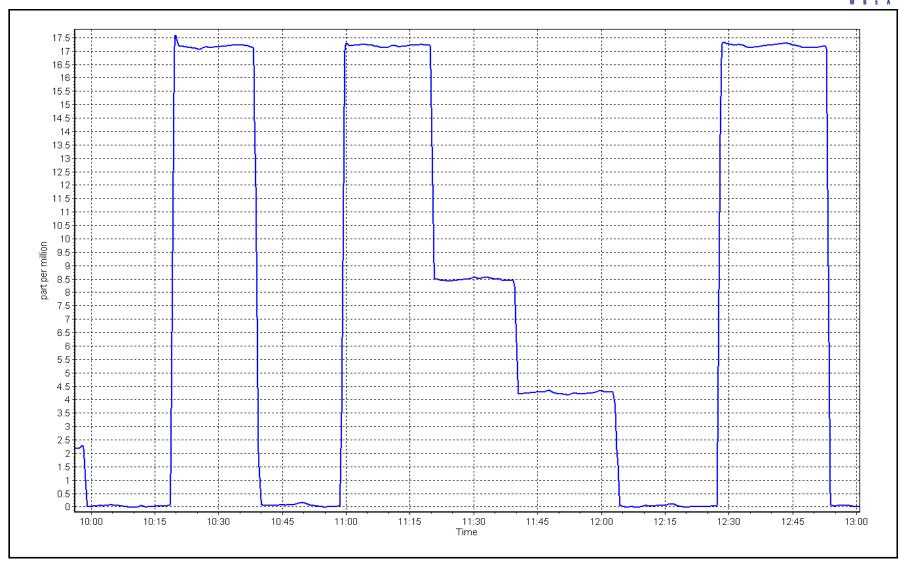
**Previous Calibration:** Calibration Date: May 15, 2023 April 13, 2023 Station Name: Station Number: AMS17 Wapasu Start Time (MST): End Time (MST): 9:58 13:00 Analyzer make: Thermo 51i-LT Analyzer serial #: 1218153352

Calibration Data						
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>	
0.00	0.01		Correlation Coefficient	0.999932	≥0.995	
17.09	17.19	0.9942	Correlation Coefficient	0.333332	20.333	
8.55	8.48	1.0080	Slope	1.004482	0.90 - 1.10	
4.26	4.29	0.9943	Slope	1.004462	0.90 - 1.10	
			- Intercept	-0.015906	+/-1.5	



THC Calibration Plot Date: May 15, 2023 Location: Wapasu







# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

#### **Station Information**

Station Name: Wapasu Calibration Date: May 18, 2023

Start time (MST): 9:22 Reason: Routine Station number: AMS17

Last Cal Date: April 25, 2023

End time (MST): 13:46

#### **Calibration Standards**

T375YK8 NO Gas Cylinder #: Cal Gas Expiry Date: April 13, 2025

NOX Cal Gas Conc: NO Cal Gas Conc: 49.11 ppm ppm

Removed Cylinder #: Removed Gas Exp Date:

Removed Gas NOX Conc: Removed Gas NO Conc: 49.11 ppm 48.07 ppm NO gas Diff:

NOX 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

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	0.836	0.836	NO bkgnd or offset:	0.1	0.1
NOX coeff or slope:	0.828	0.828	NOX bkgnd or offset:	-0.4	-0.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	4.4	4.4

#### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	1.001718	1.000389
NO <sub>x</sub> Cal Offset:	-1.660000	-0.960000
NO Cal Slope:	1.001759	1.000187
NO Cal Offset:	-1.940000	-1.540000
NO <sub>2</sub> Cal Slope:	0.991719	0.997323
NO <sub>2</sub> Cal Offset:	-0.351144	-0.628631



# $NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

Dilution Calibration Data										
Set Point	Dilution flow rate (sccm)	Source gas flow	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/lc) 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	2.3	-0.2	2.5		
as found span	4917	83.2	817.2	799.9	17.3	815.7	799.2	16.7	1.0018	1.0009
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	4917	83.2	817.2	799.9	17.3	817.2	799.2	17.9	1.0000	1.0009
second point	4958	41.6	408.6	399.9	8.7	407.5	398.0	9.5	1.0027	1.0049
third point	4979	20.8	204.3	200.0	4.3	201.4	196.6	4.8	1.0144	1.0171
as left zero	5000	0.0	0.0	0.0	0.0	0.4	0.0	0.4		
as left span	4917	83.2	817.2	400.5	416.7	811.6	397.8	413.7	1.0069	1.0067
							Average C	Correction Factor	1.0057	1.0076
Corrected As fo	ound NO <sub>X</sub> =	813.4 ppb	NO =	799.4 ppb	* = > +/-5%	% change initiates i	investigation	*Percent Chang	ge NO <sub>x</sub> =	-0.4%
Previous Respo	nse NO <sub>X</sub> =	816.9 ppb	NO =	799.4 ppb				*Percent Chang	ge NO =	0.0%
Baseline Corr 2	nd pt NO <sub>X</sub> =	NA ppb	NO =	NA ppb	As found	d $NO_X r^2$ :		Nx SI:	Nx Int:	
Baseline Corr 3	rd pt NO <sub>X</sub> =	NA ppb	NO =	NA ppb	As found	d $NO r^2$ :		NO SI:	NO Int:	
					As found	d $NO_2 r^2$ :		NO2 SI:	NO <sub>2</sub> Int:	
				e	GPT Calibration I	Data				
O3 Setpo	int (ppb)	Indicated NO Reference concentration (ppt		cated NO Drop centration (ppb)	Calculated NC concentration (ppl		dicated NO2 ntration (ppb) (Ic)	NO2 Correction fac Calibration Limit = As Found Limit = C	0.95-1.05 Calibratio	erter Efficiency on Limit = 96-104%
as found	GPT zero									
as found GPT poi	nt (400 ppb NO2)									
as found GPT poi	nt (200 ppb NO2)									
as found GPT poi	nt (100 ppb NO2)									
1st GPT point	(400 ppb O3)	797.6		398.2	416.7		416.0	1.0017	7	99.8%
2nd GPT point	(200 ppb O3)	797.6		598.6	216.3		213.4	1.0136	ĵ	98.7%
3rd GPT point	(100 ppb O3)	797.6		699.9	115.0		113.5	1.0133	3	98.7%
						Average Cc	orrection Factor	r 1.0095	5	99.1%

Notes:

Changed the inlet fitler after as founds. No adjustments made.

Calibration Performed By:

Max Farrell



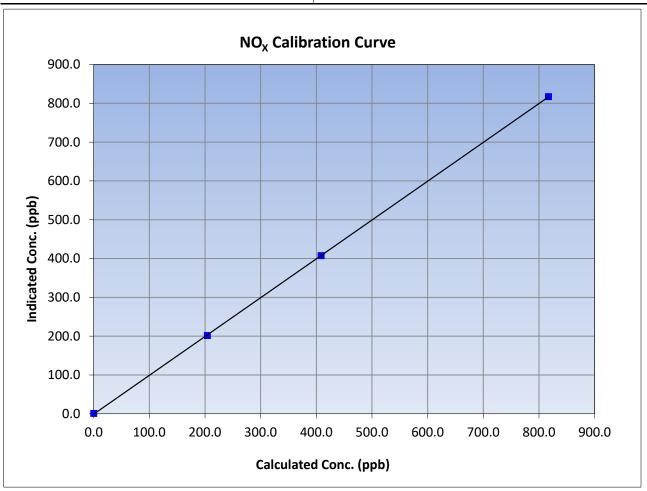
## NO<sub>x</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 18, 2023 Previous Calibration: April 25, 2023 Station Name: Station Number: AMS17 Wapasu Start Time (MST): 9:22 End Time (MST): 13:46 Analyzer serial #: Analyzer make: Teledyne API T200 833

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.7		Correlation Coefficient	0.999980	≥0.995
817.2	817.2	1.0000	Correlation Coefficient	0.999980	
408.6	407.5	1.0027	Slope	1.000389	0.90 - 1.10
204.3	201.4	1.0144	Slope	1.000569	
			Intercept	-0.960000	+/-20





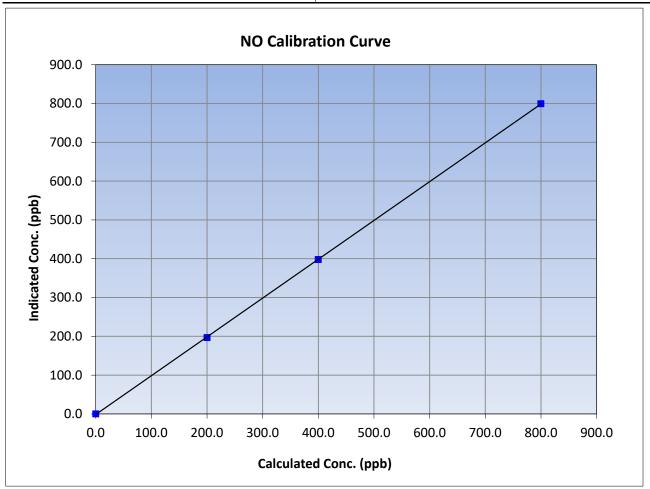
## **NO Calibration Summary**

Version-04-2020

#### **Station Information**

Calibration Date: May 18, 2023 Previous Calibration: April 25, 2023 Station Name: Wapasu Station Number: AMS17 Start Time (MST): 9:22 End Time (MST): 13:46 Analyzer make: Teledyne API T200 Analyzer serial #: 833

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999980	≥0.995
799.9	799.2	1.0009	Correlation Coefficient		
399.9	398.0	1.0049	Slope	1.000187	0.90 - 1.10
200.0	196.6	1.0171	Siope	1.000167	0.30 - 1.10
			Intercept	-1.540000	+/-20





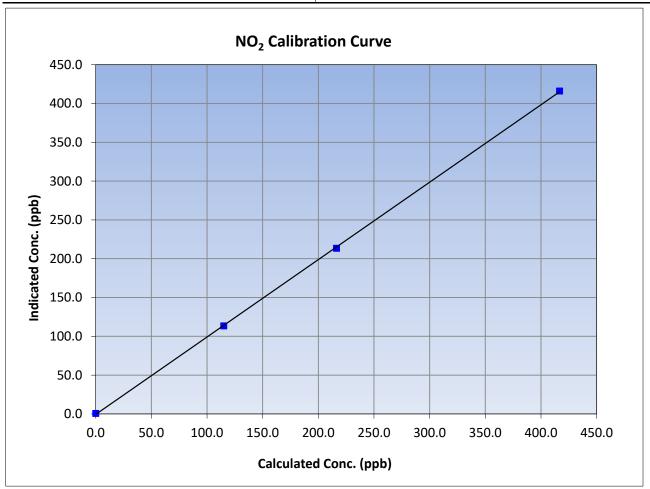
## NO<sub>2</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 18, 2023 Previous Calibration: April 25, 2023 Station Name: Wapasu Station Number: AMS17 Start Time (MST): 9:22 End Time (MST): 13:46 Analyzer serial #: Analyzer make: Teledyne API T200 833

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.6		Correlation Coefficient	0.999938	≥0.995
416.7	416.0	1.0017	Correlation Coefficient		
216.3	213.4	1.0136	Slope	0.997323	0.90 - 1.10
115.0	113.5	1.0133	Slope	0.997323	0.90 - 1.10
			Intercept	-0.628631	+/-20

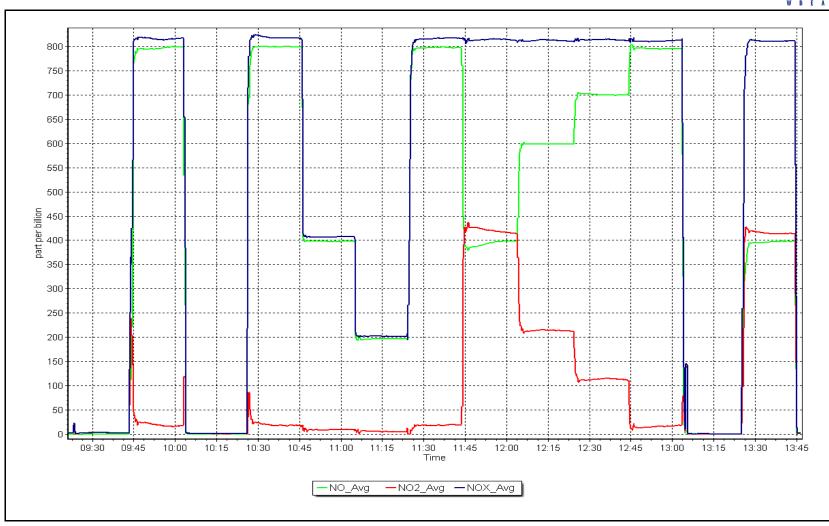


NO<sub>x</sub> Calibration Plot

Date: May 18, 2023

Location: Wapasu







## O<sub>3</sub> Calibration Report

End time (MST): 12:38

Version-01-2020

Station Information

Station Name: Wapasu Station number: AMS17

Calibration Date: May 5, 2023 Last Cal Date: April 11, 2023

Start time (MST): 9:55

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 Backgd or Offset: 1.008600 1.008857 -1.8 -1.8

Calibration slope: Coeff or Slope: Calibration intercept: -0.380000 -0.600000 1.020 1.020

#### O<sub>3</sub> Calibration Data

Set Point	Total air flow rate	Calibrator Lamp	Calculated	Indicated concentration	Correction factor (Cc/Ic)
Set Point	(sccm)	Voltage Drive	concentration (ppb) (Cc)	(ppm) (Ic)	Limit = 0.95-1.05
as found zero	5000	0.0	0.0	-0.1	
as found span	5000	1077.3	400.0	403.9	0.990
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.1	
high point	5000	1077.3	400.0	403.1	0.992
second point	5000	900.3	200.0	201.2	0.994
third point	5000	789.5	100.0	99.6	1.004
as left zero	5000	0.0	0.0	0.0	
as left span	5000	1077.3	400.0	405.6	0.986
			Averag	ge Correction Factor	0.997

Baseline Corr As found: 403.1 0.2% 404.0 Previous response \*% change

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



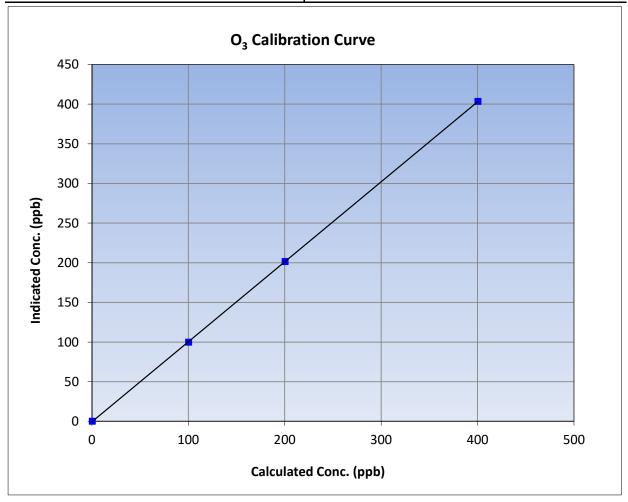
## O<sub>3</sub> Calibration Summary

Version-01-2020

#### **Station Information**

Calibration Date: May 5, 2023 **Previous Calibration:** April 11, 2023 Station Name: Station Number: AMS17 Wapasu Start Time (MST): 9:55 End Time (MST): 12:38 Analyzer make: **API T400** Analyzer serial #: 3870

Calibration Data								
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	<u>Limits</u>				
0.0	-0.1		Correlation Coefficient	0.999992	≥0.995			
400.0	403.1	0.9923	Correlation Coefficient	0.333332	20.333			
200.0	201.2	0.9940	Slope	1.008857	0.90 - 1.10			
100.0	99.6	1.0040	Slope	1.008637	0.90 - 1.10			
			Intercept	-0.600000	+/- 5			



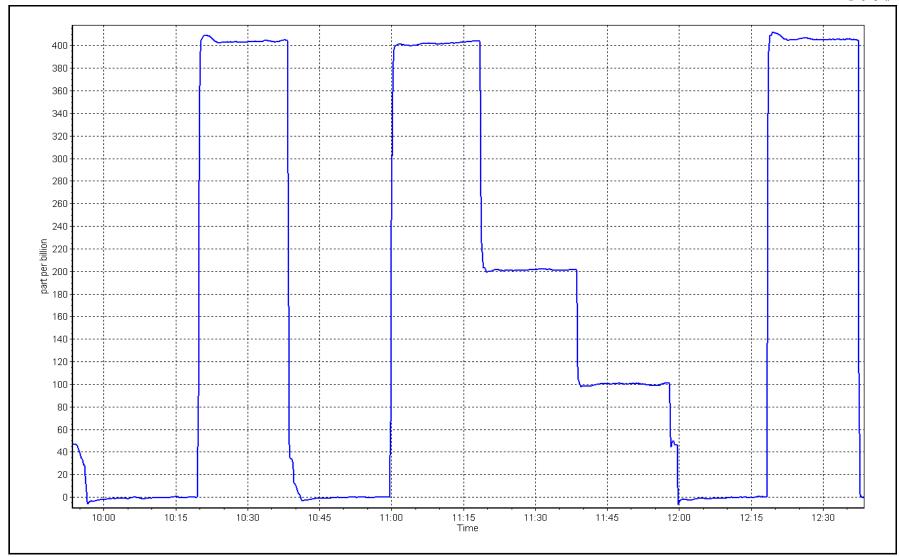
O<sub>3</sub> Calibration Plot

Date:

May 5, 2023

Location: Wapasu







# **T640 PM<sub>2.5</sub> CALIBRATION**

Version-01-2023

		Station Information	1		
Station Name:	Wapasu		Station number:	AMS 17	
Calibration Date:	May 23, 2023		Last Cal Date: /	•	
Start time (MST):	13:27		End time (MST):	13:57	
Analyzer Make:	API T640		S/N: :	1183	
Particulate Fraction:	PM2.5				
Flow Meter Make/Model:	Alicat FP-25BT		S/N: 3	388755	
Temp/RH standard:	Alicat FP-25BT		S/N: 3	388755	
		Monthly Calibration T	est		
<u>Parameter</u>	As found	Measured	<u>As left</u>	<u>Adjusted</u>	(Limits)
T (°C)	6.8	6.3	6.8		+/- 2 °C
P (mmHg)	717.1	719.7	717.1		+/- 10 mmHg
flow (LPM)	5.01	5.15	5.01		+/- 0.25 LPM
Leak Test:	Date of check:	May 23, 2023	Last Cal Date:	April 25, 2023	
	PM w/o HEPA:	81.8	PM w/ HEPA:	0.0	<0.2 ug/m3
Note: this leak check will be	·	· <u> </u>	serve as the pre mai	ntenance leak check	
Inlet cleaning:	Inlet Head	<b>✓</b>			
		Quarterly Calibration	Test .		
Parameter	As found	Post maintenance	As left	Adjusted	(Limits)
PMT Peak Test	10.0	10	11.1	<u>/\djustea</u>	10.9 +/- 0.5
TWITT CORTES	10.0	10	11.1		20.5 ., 0.5
Post-maintenance	e leak check:	PM w/o HEPA:		w/ HEPA:	
Date Optical Cham	-	March 23,			<0.2 ug/m3
Disposable Filte	r Changed:	March 23,	2023		
		Annual Maintenanc	ρ		
			-		
Date Sample Tub	e Cleaned:				
Date RH/T Senso	or Cleaned:				
Notes:		Adjusted the PM	T peak. Leak check	passed.	
Calibration by:	Max Farrell				



### WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

### AMS18 STONY MOUNTAIN MAY 2023

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

June 30, 2023



### **SO<sub>2</sub> Calibration Report**

Station number:

Cal Gas Exp Date:

**AMS 18** 

13:38

April 27, 2023

February 23, 2025

Version-01-2020

#### **Station Information**

Station Name: Stony Mountain
Calibration Date: May 8, 2023
Start time (MST): 9:55

2023 Last Cal Date: End time (MST):

Reason: Routine

**Calibration Standards** 

Cal Gas Concentration: 49.40 ppm

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 7700 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

**Finish Finish** Start Start Calibration slope: 0.997063 1.000576 Backgd or Offset: 22.6 22.6 0.808 Calibration intercept: 0.035860 -1.343541 Coeff or Slope: 0.808

### SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow rate	Source gas flow rate	Calculated	Indicated concentration	Correction factor (Cc/Ic)
Set Follit	(sccm)	(sccm)	concentration (ppb) (Cc)	(ppb) (Ic)	<i>Limit = 0.95-1.05</i>
as found zero	5009	0.0	0.0	-0.1	
as found span	4919	81.0	800.3	796.1	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.1	
high point	4919	81.0	800.3	800.1	1.000
second point	4959	40.5	400.2	398.2	1.005
third point	4979	20.2	199.6	197.3	1.012
as left zero	5000	0.0	0.0	-0.2	
as left span	4919	81.0	800.3	799.1	1.001
			Averag	ge Correction Factor	1.006
Baseline Corr As found:	796.20	Previous response	e 797.97	*% change	-0.2%

Baseline Corr As found: 796.20 Previous response 797.97 \*% change -0.2% Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept:

Baseline Corr 3rd AF pt: NA AF Slope: AF Intercept:

NA AF Slope: AF Intercept:

Sample inlet filter changed after as founds. No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar

Notes:

\* = > +/-5% change initiates investigation



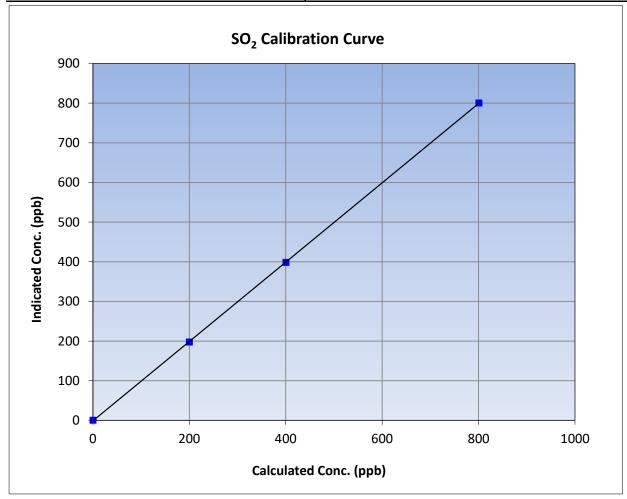
## **SO<sub>2</sub> Calibration Summary**

Version-01-2020

### **Station Information**

Calibration Date: May 8, 2023 **Previous Calibration:** April 27, 2023 Station Name: Stony Mountain Station Number: **AMS 18** Start Time (MST): 9:55 End Time (MST): 13:38 Analyzer make: Thermo 43i Analyzer serial #: JC1501301453

Calibration Data								
Calculated concentration Indicated concentration Correction facto (ppb) (Cc) (ppb) (Ic) (Cc/Ic)			Statistical Evalua	ation	<u>Limits</u>			
0.0	-0.1		Correlation Coefficient	0.999989	≥0.995			
800.3	800.1	1.0002	Correlation coefficient	0.555565	20.993			
400.2	398.2	1.0050	Slope	1.000576	0.90 - 1.10			
199.6	197.3	1.0117	Slope	1.000370	0.90 - 1.10			
			- Intercept	-1.343541	+/-30			



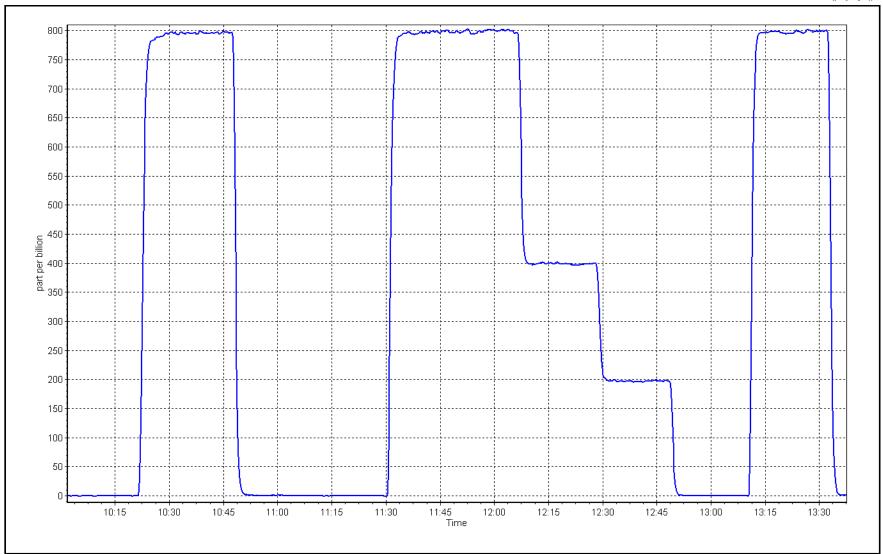
SO2 Calibration Plot

Date:

May 8, 2023

Location: Stony Mountain







### **TRS Calibration Report**

Version-11-2021

**Station Information** 

Station Name: Stony Mountain
Calibration Date: May 16, 2023
Start time (MST): 10:22
Reason: Routine

Station number: AMS18 Last Cal Date: April 26, 2023 End time (MST): 15:30

**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: 265

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** <u>Finish</u> <u>Start</u> Calibration slope: 0.994871 1.001444 Backgd or Offset: 2.59 2.60 0.240955 Calibration intercept: 0.321057 Coeff or Slope: 1.159 1.151

**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	77.7	1.031
as found 2nd point	4964	36.5	40.0	38.9	1.031
as found 3rd point	4983	18.3	20.0	19.0	1.061
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	40.4	0.990
third point	4983	18.3	20.0	20.3	0.988
as left zero	5000	0.0	0.0	0.4	
as left span	4927	73.0	80.0	80.3	0.996
SO2 Scrubber Check	4923	77.1	771.0	0.0	
Date of last scrubber chang	ge:	17-Dec-21		Ave Corr Factor	0.991
Date of last converter efficiency test: efficiency					

Baseline Corr As found: 77.6 79.90 -3.0% Prev response: \*% change: Baseline Corr 2nd AF pt: -0.118314 38.8 AF Slope: 0.972430 AF Intercept: Baseline Corr 3rd AF pt: AF Correlation: 0.999937 18.9 \* = > +/-5% change initiates investigation

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

adjusted.

Calibration Performed By: Aswin Sasi Kumar



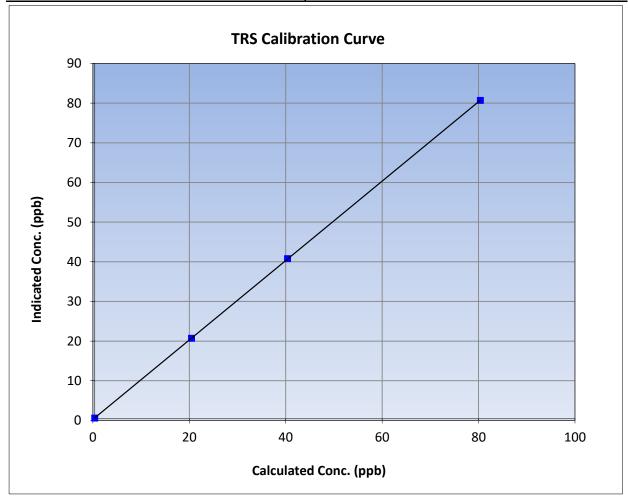
### **TRS Calibration Summary**

Version-11-2021

### **Station Information**

May 16, 2023 **Previous Calibration:** Calibration Date: April 26, 2023 Station Name: Stony Mountain Station Number: AMS18 Start Time (MST): 10:22 End Time (MST): 15:30 Analyzer make: Thermo 43i-TLE Analyzer serial #: 1218153359

Calibration Data								
Calculated concentration Indicated concentration Correction factor (ppb) (Cc) (ppb) (Ic) (Cc/Ic)			Statistical Evalua	ation	<u>Limits</u>			
0.0	0.2		Correlation Coefficient	0.999995	≥0.995			
80.0	80.3	0.9962	Correlation Coefficient	0.555555	20.333			
40.0	40.4	0.9899	Slope	1.001444	0.90 - 1.10			
20.0	20.3	0.9876	Slope	1.001444	0.90 - 1.10			
			- Intercept	0.240955	+/-3			

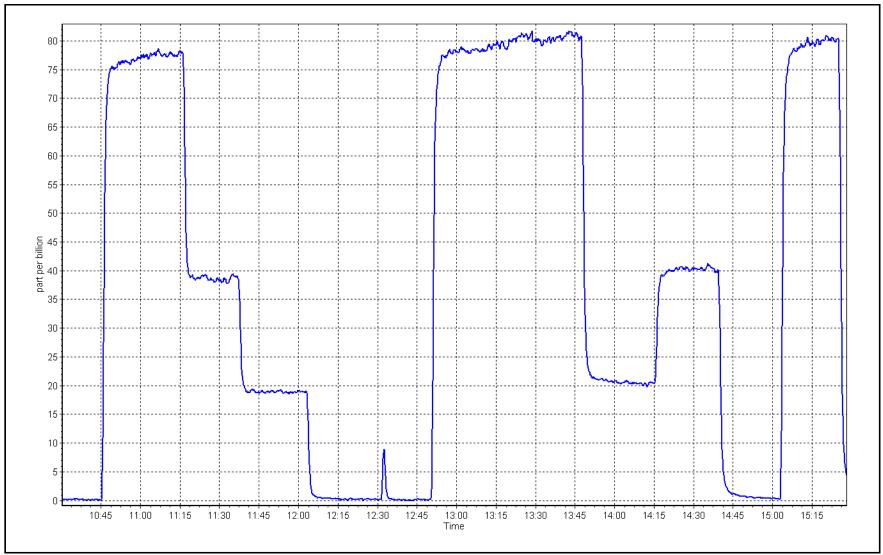




Date: May 16, 2023

Location: Stony Mountain







### THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

#### **Station Information**

Station Name: Stony Mountain
Calibration Date: May 8, 2023
Start time (MST): 9:55

Reason: Routine

Station number: AMS 18 Last Cal Date: April 27, 2023

End time (MST): 13:38

Removed Gas Expiry: NA

### **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 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<sub>4</sub>): 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: 3.06E-04 3.10E-04 NMHC SP Ratio: 5.89E-05 5.73E-05 CH4 Retention time: 14.60 14.60 NMHC Peak Area: 159925 155690

### **THC Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (C	c) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>		
as found zero	5000	0.0	0.00	0.00			
as found span	4919	81.0	17.28	17.02	1.016		
as found 2nd point							
as found 3rd point							
new cylinder response							
calibrator zero	5000	0.0	0.00	0.00			
high point	4919	81.0	17.28	17.27	1.001		
second point	4959	40.5	8.64	8.61	1.003		
third point	4979	20.2	4.31	4.28	1.006		
as left zero	5000	0.0	0.00	0.00			
as left span	4919	81.0	17.28	17.32	0.998		
			А	verage Correction Factor	1.003		
Baseline Corr AF:	17.02	Prev response	17.27	*% change	-1.5%		
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:			
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation			

**CALS 368** 



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

					VEISION OF E
		NMHC Calibr	ration Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i> .
as found zero	5000	0.0	0.00	0.00	
as found span	4919	81.0	9.17	8.96	1.023
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
nigh point	4919	81.0	9.17	9.16	1.001
second point	4959	40.5	4.58	4.57	1.002
hird point	4979	20.2	2.29	2.28	1.002
ns left zero	5000	0.0	0.00	0.00	
is left span	4919	81	9.17	9.19	0.998
,			Aver	age Correction Factor	1.002
Baseline Corr AF:	8.96	Prev response	9.17	*% change	-2.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
as found zero	5000	0.0	0.00	0.00	
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i> 5
as found span	4919	81.0	8.11	8.06	1.007
s found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	4.000
nigh point	4919	81.0	8.11	8.11	1.000
econd point	4959	40.5	4.06	4.04	1.004
hird point	4979	20.2	2.02	2.00	1.011
is left zero	5000	0.0	0.00	0.00	
s left span	4919	81.0	8.11	8.14	0.997
Baseline Corr AF:	0.06	D		age Correction Factor	1.005
	8.06	Prev response	8.10	*% change	-0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:  * = > +/-5% change initiat	es investigation
Baseline Corr 3rd AF:	NA	AF Correlation:		= > +/-5% change initiat	es investigation
		Calibration	Statistics		
		<u>Start</u>		<u>Finish</u>	
THC Cal Slope:		0.999520		0.999626	
THC Cal Offset:		-0.003183		-0.013988	
CH4 Cal Slope:		0.999834		1.000468	

Sample inlet filter changed after as founds. N2 cylinder changed after as founds. Adjusted the span only.

-0.012012

0.998732

-0.001376

Calibration Performed By: Aswin Sasi Kumar

-0.012012

0.999279

0.008428

CH4 Cal Offset:

NMHC Cal Slope:

NMHC Cal Offset:

Notes:



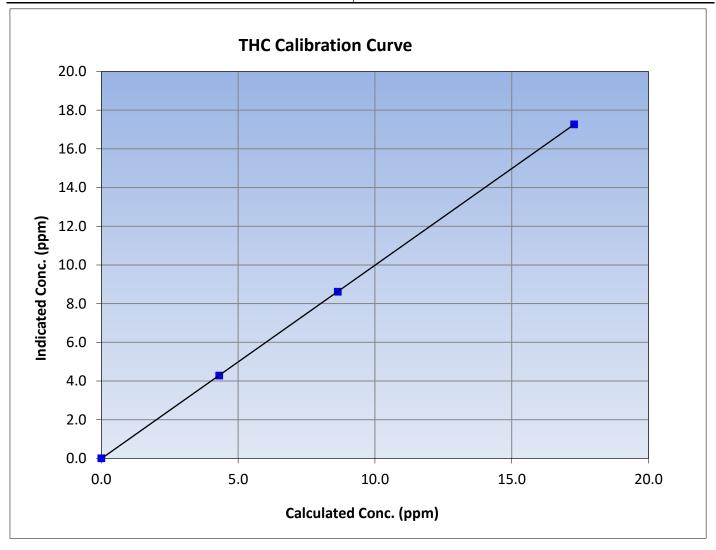
## **THC Calibration Summary**

Version-01-2020

### **Station Information**

May 8, 2023 Calibration Date: **Previous Calibration:** April 27, 2023 Station Name: Stony Mountain Station Number: **AMS 18** Start Time (MST): 9:55 End Time (MST): 13:38 Analyzer make: Thermo 55i Analyzer serial #: 1180320039

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999997	≥0.995
17.28	17.27	1.0007	Correlation Coemicient	0.555557	20.333
8.64	8.61	1.0032	Slope	0.999626	0.90 - 1.10
4.31	4.28	1.0064	Slope	0.999020	0.90 - 1.10
		·	Intercept	-0.013988	+/-0.5





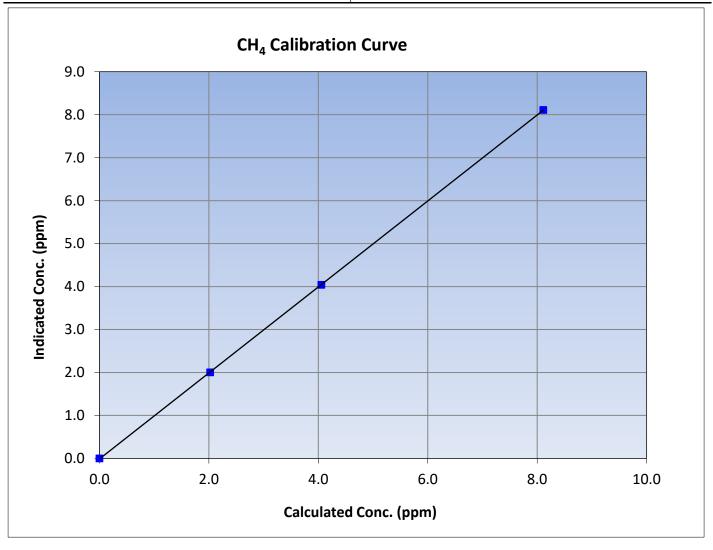
# **CH<sub>4</sub> Calibration Summary**

Version-01-2020

### **Station Information**

Calibration Date: May 8, 2023 **Previous Calibration:** April 27, 2023 Station Name: Stony Mountain Station Number: **AMS 18** Start Time (MST): 9:55 End Time (MST): 13:38 Analyzer make: Analyzer serial #: 1180320039 Thermo 55i

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999990	≥0.995
8.11	8.11	1.0002	Correlation Coemicient	0.999990	20.333
4.06	4.04	1.0042	Slope	1.000468	0.90 - 1.10
2.02	2.00	1.0113	Slope	1.000408	0.90 - 1.10
			Intercept	-0.012012	+/-0.5





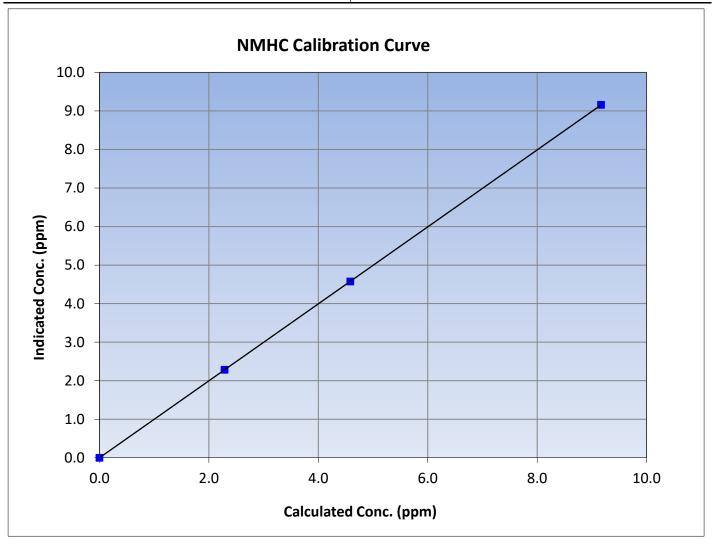
## **NMHC Calibration Summary**

Version-01-2020

### **Station Information**

May 8, 2023 Calibration Date: **Previous Calibration:** April 27, 2023 Station Name: Stony Mountain Station Number: **AMS 18** Start Time (MST): 9:55 End Time (MST): 13:38 Analyzer make: Thermo 55i Analyzer serial #: 1180320039

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	ient 1.000000 ≥0.	≥0.995
9.17	9.16	1.0012	Correlation Coemicient	1.000000	20.555
4.58	4.57	1.0023	Slope	0.998732	0.90 - 1.10
2.29	2.28	1.0017	Slope	0.556752	0.90 - 1.10
			Intercept	-0.001376	+/-0.5

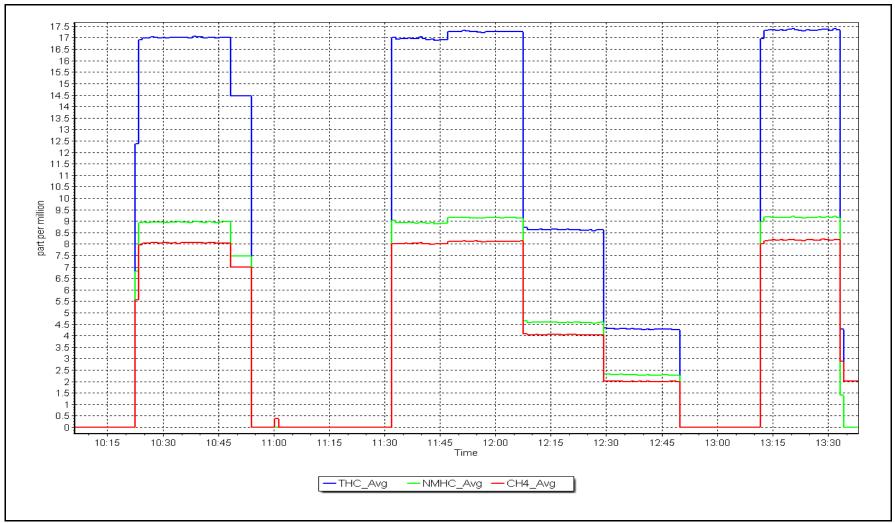


NMHC Calibration Plot

Date: May 8, 2023

Location: Stony Mountain







CH4 Cal Gas Conc.

Baseline Corr 3rd AF:

## **Wood Buffalo Environmental Association**

## THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

#### **Station Information**

Station Name: Stony Mountain Calibration Date: May 13, 2023

Start time (MST): 11:03

Reason: Maintenance

Station number: AMS 18

Last Cal Date: May 8, 2023 End time (MST): 14:21

**Calibration Standards** 

Gas Cert Reference: CC463851 Cal Gas Expiry Date: February 23, 2025

500.8 ppm CH4 Equiv Conc. 1066.8 ppm

C3H8 Cal Gas Conc. 205.8 ppm

Removed Gas Cert: NA Removed Gas Expiry: NA

4.3

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<sub>4</sub>): 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:
 3.10E-04
 3.15E-04
 NMHC SP Ratio:
 5.89E-05
 5.66E-05

CH4 Retention time: 14.60 15.20 NMHC Peak Area: 155690 161883

### **THC Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (	Cc) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4919	81.0	17.28	17.18	1.006
as found 2nd point	4959	40.5	8.64	8.56	1.010
as found 3rd point	4979	20.2	4.31	4.26	1.012
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4919	81.0	17.28	17.27	1.001
second point	4959	40.5	8.64	8.64	1.000
third point	4979	20.2	4.31	4.29	1.005
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	1.002
Baseline Corr AF:	17.18	Prev response	17.26	*% change	-0.4%
Baseline Corr 2nd AF:	8.6	AF Slope:	0.994661	AF Intercept:	-0.018206

0.999993

AF Correlation:

\* = > +/-5% change initiates investigation



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

NMHC	Cali	hrai	tion	Data
IAIAIIIC	Can	Dia		Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4919	81.0	9.17	9.25	0.992
as found 2nd point	4959	40.5	4.58	4.62	0.993
as found 3rd point	4979	20.2	2.29	2.31	0.992
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4919	81.0	9.17	9.16	1.001
second point	4959	40.5	4.58	4.60	0.997
third point	4979	20.2	2.29	2.28	1.001
as left zero	5000	0.0	0.00	0.00	
as left span	4919	81	9.17	9.14	1.004
			Aver	rage Correction Factor	1.000
Baseline Corr AF:	9.25	Prev response	9.16	*% change	1.0%
Baseline Corr 2nd AF:	4.6	AF Slope:	1.008316	AF Intercept:	-0.001557
Baseline Corr 3rd AF:	2.3	AF Correlation:	0.999999	* = > +/-5% change initiat	es investigation

### **CH4 Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4919	81.0	8.11	7.94	1.022
as found 2nd point	4959	40.5	4.06	3.94	1.030
as found 3rd point	4979	20.2	2.02	1.95	1.036
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4919	81.0	8.11	8.11	1.000
second point	4959	40.5	4.06	4.04	1.003
third point	4979	20.2	2.02	2.00	1.010
as left zero	5000	0.0	0.00	0.00	
as left span	4919	81.0	8.11	8.13	0.998
			Aver	age Correction Factor	1.005
Baseline Corr AF:	7.94	Prev response	8.10	*% change	-2.1%
Baseline Corr 2nd AF:	3.94	AF Slope:	0.978891	AF Intercept:	-0.016450
Baseline Corr 3rd AF:	1.95	AF Correlation:	0.999978	* = > +/-5% change initiate	es investigation
		Calibration	Statistics		
		<u>Start</u>		<u>Finish</u>	
THC Cal Slope:		0.999626		0.999792	
THC Cal Offset:		-0.013988		-0.006990	
CH4 Cal Slope:		1.000468		1.000313	
CH4 Cal Offset:		-0.012012		-0.010212	
NMHC Cal Slope:		0.998732		0.998770	
NMHC Cal Offset:		-0.001376		0.004221	

Notes: Instrument started dipping this morning. After as founds checked the operation of the actuator. It was a little sticky so replaced it. Adjusted the span.

Calibration Performed By: Max Farrell



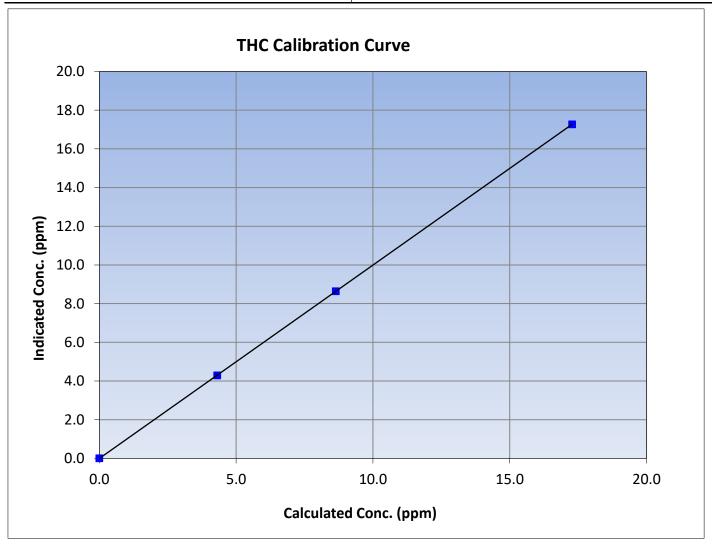
## **THC Calibration Summary**

Version-01-2020

### **Station Information**

Calibration Date: May 13, 2023 **Previous Calibration:** May 8, 2023 Station Name: Stony Mountain Station Number: **AMS 18** Start Time (MST): 11:03 End Time (MST): 14:21 Analyzer make: Thermo 55i Analyzer serial #: 1180320039

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999998	≥0.995
17.28	17.27	1.0007	Correlation Coefficient	0.333336	20.333
8.64	8.64	0.9999	Slope	0.999792	0.90 - 1.10
4.31	4.29	1.0054	Slope	0.999792	0.90 - 1.10
			Intercept	-0.006990	+/-0.5





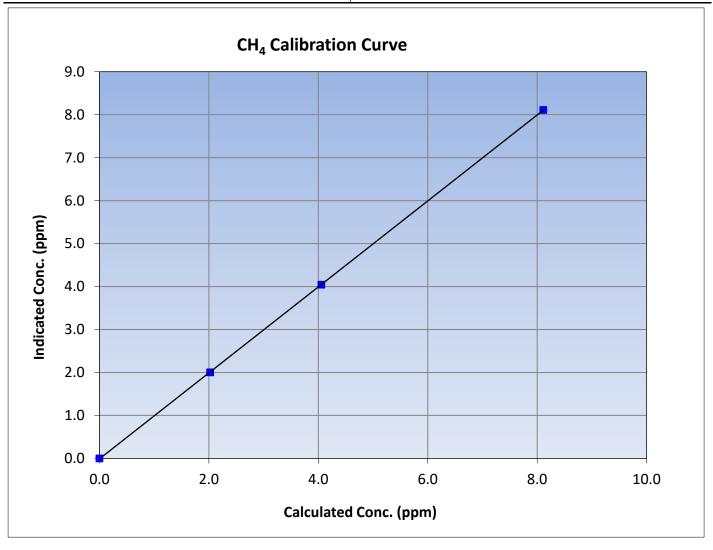
# **CH<sub>4</sub> Calibration Summary**

Version-01-2020

### **Station Information**

Calibration Date: May 13, 2023 **Previous Calibration:** May 8, 2023 Station Name: Stony Mountain Station Number: **AMS 18** Start Time (MST): 11:03 End Time (MST): 14:21 Analyzer make: Thermo 55i Analyzer serial #: 1180320039

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999993	≥0.995
8.11	8.11	1.0004	Correlation Coemicient	0.555555	20.333
4.06	4.04	1.0032	Slope	1.000313	0.90 - 1.10
2.02	2.00	1.0103	Slope	1.000313	0.90 - 1.10
			Intercept	-0.010212	+/-0.5





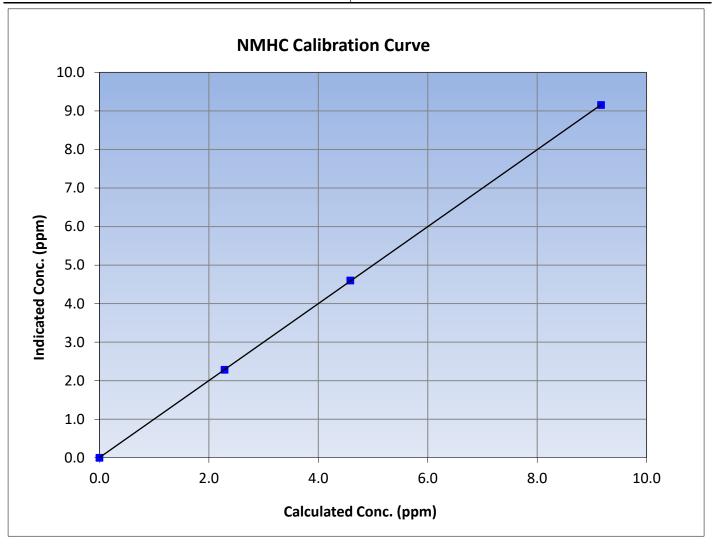
## **NMHC Calibration Summary**

Version-01-2020

### **Station Information**

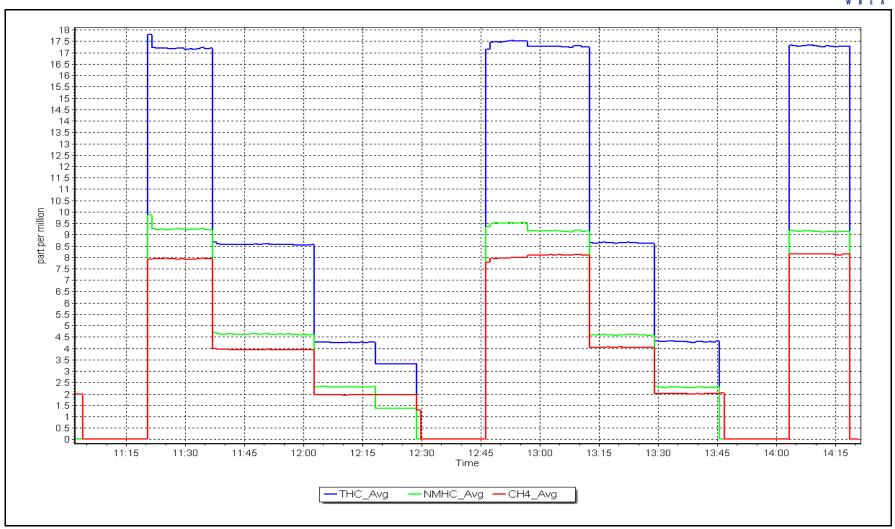
**Previous Calibration:** Calibration Date: May 13, 2023 May 8, 2023 Station Name: Stony Mountain Station Number: **AMS 18** Start Time (MST): 11:03 End Time (MST): 14:21 Analyzer make: Thermo 55i Analyzer serial #: 1180320039

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999994	≥0.995
9.17	9.16	1.0015	Correlation Coemicient	0.333334	20.333
4.58	4.60	0.9971	Slope	0.998770	0.90 - 1.10
2.29	2.28	1.0012	Slope	0.996770	0.90 - 1.10
			Intercept	0.004221	+/-0.5



NMHC Calibration Plot Date: May 13, 2023 Location: Stony Mountain







## THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

#### **Station Information**

Station Name: **Stony Mountain** Calibration Date: May 25, 2023

10:05 Start time (MST):

Reason: Cylinder Change Station number: AMS 18 Last Cal Date: May 13, 2023

End time (MST): 11:18

Removed Gas Expiry: NA

**Calibration Standards** 

Gas Cert Reference: Cal Gas Expiry Date: February 23, 2025 CC463851

CH4 Cal Gas Conc. 500.8 CH4 Equiv Conc. 1066.8 ppm ppm

C3H8 Cal Gas Conc. 205.8 ppm

Removed Gas Cert: NA

Removed CH4 Conc. 500.8 ppm CH4 Equiv Conc. 1066.8 ppm

Removed C3H8 Conc. 205.8 Diff between cyl (THC): ppm Diff between cyl (NM):

Diff between cyl (CH<sub>4</sub>):

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 3.15E-04 NMHC SP Ratio: 5.66E-05 5.66E-05

CH4 Retention time: 15.20 15.20 NMHC Peak Area: 161883 161883

### **THC Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.01	
as found span	4919	81.0	17.28	17.11	1.010
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	17.10	1.011
second point					
third point					
as left zero					
as left span					

			Ave	erage Correction Factor	1.011
Baseline Corr AF:	17.10	Prev response	17.27	*% change	-1.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates	investigation



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

WBEA					Version-01-2
		NMHC Calibr	ation Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4919	81.0	9.17	8.94	1.026
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4919	81.0	9.17	8.91	1.029
second point					
third point					
as left zero					
as left span					
			Aver	age Correction Factor	1.029
Baseline Corr AF:	8.94	Prev response	9.16	*% change	-2.5%
Baseline Corr 2nd AF:	NA	AF Slope:	3.20	AF Intercept:	2.075
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
		CH4 Calibra			
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i>
as found zero	5000	0.0	0.00	0.01	
as found span	4919	81.0	8.11	8.17	0.993
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	8.19	0.991
second point					
third point					
as left zero					
as left span					
				age Correction Factor	0.991
Baseline Corr AF:	8.17	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 initiat	es investigation
		Calibration	Statistics		
		<u>Start</u>		<u>Finish</u>	
THC Cal Slope:		0.999792		0.988812	
THC Cal Offset:		-0.006990		0.008000	
CH4 Cal Slope:		1.000313		1.008017	
CH4 Cal Offset:		-0.010212		0.008000	
NMHC Cal Slope:		0.998770		0.971926	
				0.000000	

Notes:

NMHC Cal Offset:

N2 cylinder change. No change in response.

0.000000

Calibration Performed By: Aswin Sasi Kumar

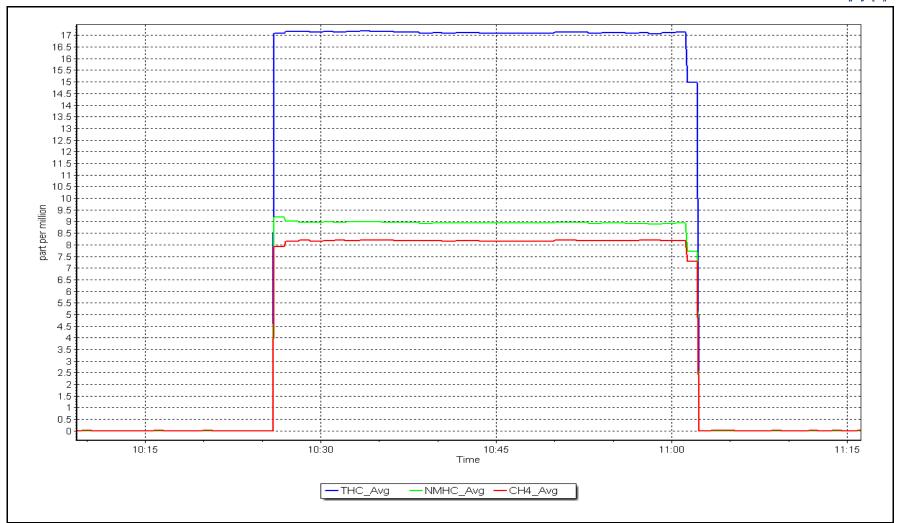
0.004221

**NMHC Calibration Plot** 

Date: May 25, 2023

Location: Stony Mountain







Reason:

## **Wood Buffalo Environmental Association**

## THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

#### **Station Information**

Station Name: **Stony Mountain** Calibration Date: May 31, 2023

Start time (MST): 10:43

Cylinder Change H2 Cylinder change Station number: AMS 18

Last Cal Date: May 25, 2023 End time (MST): 12:06

### **Calibration Standards**

Gas Cert Reference: Cal Gas Expiry Date: February 23, 2025 CC463851 CH4 Equiv Conc. 1066.8

CH4 Cal Gas Conc. 500.8 ppm C3H8 Cal Gas Conc. 205.8 ppm

NA

Removed Gas Expiry: NA

CH4 Equiv Conc.

1066.8

ppm

ppm

Removed C3H8 Conc.

Removed Gas Cert:

Removed CH4 Conc.

500.8 205.8 ppm ppm

Diff between cyl (THC):

Diff between cyl (NM):

Serial Number: 2658

Serial Number: 360

Diff between cyl ( $CH_4$ ):

Calibrator Model: Teledyne API T700 ZAG make/model: Teledyne API T701H

### **Analyzer Information**

Analyzer make: Thermo 55i

THC Range (ppm): 0 - 20 ppm

NMHC Range (ppm): 0 - 10 ppm

Analyzer serial #: 1180320039

CH4 Range (ppm): 0 - 10 ppm

Start

Finish

**Start** 

Finish

CH4 SP Ratio:

3.15E-04

3.15E-04

NMHC SP Ratio:

5.66E-05

5.66E-05

CH4 Retention time:

15.20

15.20

NMHC Peak Area:

161883

161883

### **THC Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4919	81.0	17.28	16.89	1.023
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	16.82	1.027
second point					
third point					
as left zero					
as left span					

			Ave	rage Correction Factor	1.027
Baseline Corr AF:	16.89	Prev response	17.27	*% change	-2.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates i	nvestigation



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

					V C151011 01 20
		NIMALIC Calibr	ation Data		
Set Point	Dil air flow rate	NMHC Calibr Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i> :
as found zero	5000	0.0	0.00	0.00	
as found span	4919	81.0	9.17	8.76	1.047
as found 2nd point	4313	01.0	3.17	0.70	1.047
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4919	81.0	9.17	8.74	1.049
second point	4313	01.0	3.17	0.74	1.0-15
third point					
as left zero					
as left span					
as tere span			Aver	age Correction Factor	1.049
Baseline Corr AF:	8.76	Prev response	9.16	*% change	-4.6%
Baseline Corr 2nd AF:	NA	AF Slope:	3.10	AF Intercept:	1.070
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
		CH4 Calibra	tion Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i> :
as found zero	5000	0.0	0.00	0.00	
as found span	4919	81.0	8.11	8.13	0.998
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	8.09	1.003
second point					
third point					
as left zero					
as left span					
·			Aver	age Correction Factor	1.003
Baseline Corr AF:	8.13	Prev response	8.11	*% change	0.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
		Calibration	Statistics		
		<u>Start</u>		<u>Finish</u>	
THC Cal Slope:		0.999792		0.972841	
THC Cal Offset:		-0.006990		0.008000	
CH4 Cal Slope:		1.000313		0.996184	
CH4 Cal Offset:		-0.010212		0.008000	
NMHC Cal Slope:		0.998770		0.953275	
MINITE Cal Slope:		0.330//0		0.333273	

Notes: H2 Cylinder change.

0.004221

Calibration Performed By: Max Farrell

NMHC Cal Offset:

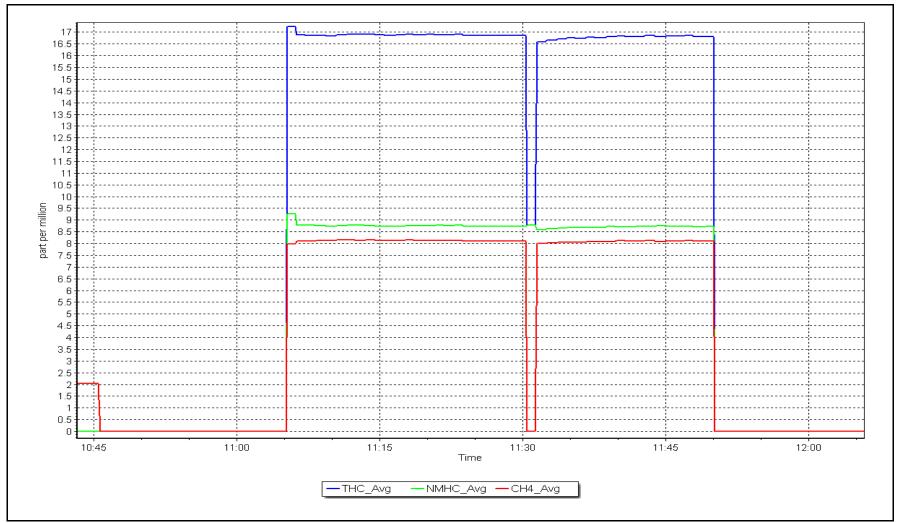
0.000000

**NMHC Calibration Plot** 

Date: May 31, 2023

Location: Stony Mountain







## NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

#### **Station Information**

Station Name: Stony Mountain
Calibration Date: May 10, 2023
Start time (MST): 10:16

Reason: 10:16

Station number: AMS 18 Last Cal Date: April 20, 2023

End time (MST): 15:21

### **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

<u>Start</u> **Finish** <u>Start</u> **Finish** NO coeff or slope: 1.062 1.035 NO bkgnd or offset: 3.0 2.9 NOX coeff or slope: 0.984 0.986 NOX bkgnd or offset: 2.9 3.0 NO2 coeff or slope: 0.999 0.999 Reaction cell Press: 230.2 220.1

#### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	0.993566	1.000165
NO <sub>x</sub> Cal Offset:	0.129802	0.109832
NO Cal Slope:	0.995555	0.999810
NO Cal Offset:	-1.209770	-1.249778
NO <sub>2</sub> Cal Slope:	0.999137	0.999469
NO <sub>2</sub> Cal Offset:	0.306137	1.142324



# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

				Dile	ution Calibratio	n 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	4919	81.3	820.8	800.3	20.5	841.0	818.1	23.1	0.9759	0.9782
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.1		
high point	4919	81.3	820.8	800.3	20.5	820.9	799.4	21.5	0.9998	1.0011
second point	4959	40.7	410.9	400.7	10.3	411.5	399.0	12.5	0.9986	1.0042
third point	4980	20.3	204.9	199.8	5.1	204.7	197.1	7.6	1.0012	1.0138
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.2		
as left span	4919	81.3	820.8	357.7	463.1	825.4	360.5	465.0	0.9944	0.9921
							Average C	orrection Factor	0.9999	1.0064
Corrected As fo	ound NO <sub>X</sub> =	841.0 ppb	NO =	818.2 ppb	* = > +/-5	% change initiates i	investigation	*Percent Chan	ge NO <sub>x</sub> =	3.0%
Previous Respo	onse NO <sub>X</sub> =	815.6 ppb	NO =	795.5 ppb				*Percent Chan	ge NO =	2.8%
Baseline Corr 2	nd pt NO <sub>X</sub> =	NA ppb	NO =	NA ppb	As found	d $NO_X r^2$ :		Nx SI:	Nx Int:	
Baseline Corr 3	rd pt NO <sub>x</sub> =	NA ppb	NO =	NA ppb	As foun	d $NO r^2$ :		NO SI:	NO Int:	
					As found	d $NO_2 r^2$ :		NO2 SI:	NO <sub>2</sub> Int:	
				(	PT Calibration	Data				
O3 Setpo	pint (ppb)	Indicated NO Ref		icated NO Drop centration (ppb)	Calculated No concentration (pp		dicated NO2 stration (ppb) (Ic)	NO2 Correction fa Calibration Limit = As Found Limit =	0.95-1.05 Calibratio	erter Efficiency on Limit = 96-104%
as found	GPT zero									
as found GPT poi	nt (400 ppb NO2)									
as found GPT poi	nt (200 ppb NO2)									
as found GPT poi	nt (100 ppb NO2)									
1st GPT point	(400 ppb O3)	799.0		356.4	463.1		463.5	0.999	1 :	100.1%
2nd GPT poin	t (200 ppb O3)	799.0		595.1	224.4		225.8	0.993	7	100.6%
3rd GPT point	t (100 ppb O3)	799.0		699.6	119.9		122.1	0.981	9	101.8%

Notes:

Sample inlet filter changed after as founds. Span adjusted.

Average Correction Factor

Calibration Performed By:

Aswin Sasi Kumar

100.9%

0.9916



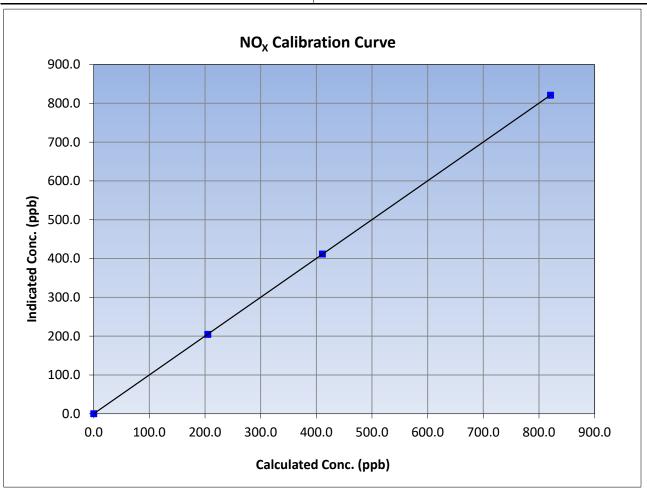
### NO<sub>x</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 10, 2023 Previous Calibration: April 20, 2023 Station Name: Stony Mountain Station Number: **AMS 18** Start Time (MST): 10:16 End Time (MST): 15:21 Analyzer serial #: Analyzer make: Thermo 42i 1336160088

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.2		Correlation Coefficient	0.999999	≥0.995
820.8	820.9	0.9998	Correlation Coefficient	0.333333	20.333
410.9	411.5	0.9986	Slope	1.000165	0.90 - 1.10
204.9	204.7	1.0012	Slope	1.000165	0.30 - 1.10
			Intercept	0.109832	+/-20





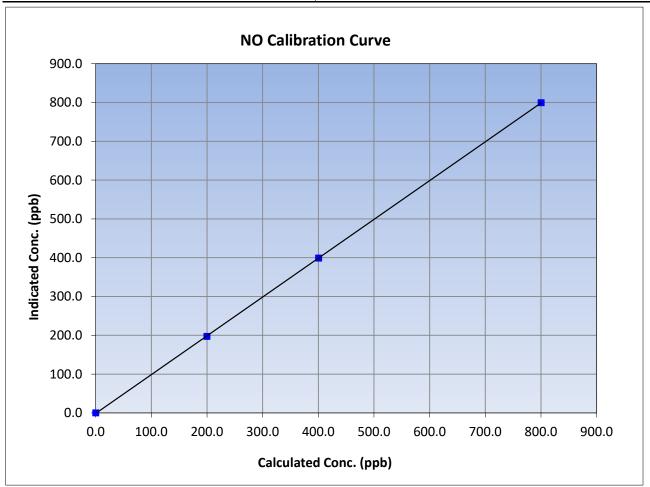
### **NO Calibration Summary**

Version-04-2020

#### **Station Information**

Calibration Date: May 10, 2023 Previous Calibration: April 20, 2023 Station Name: Stony Mountain Station Number: **AMS 18** Start Time (MST): 10:16 End Time (MST): 15:21 Analyzer make: Thermo 42i Analyzer serial #: 1336160088

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999989	≥0.995
800.3	799.4	1.0011	Correlation Coefficient	0.333363	20.333
400.7	399.0	1.0042	Slope	0.999810	0.90 - 1.10
199.8	197.1	1.0138	Slope	0.999610	0.90 - 1.10
			Intercept	-1.249778	+/-20





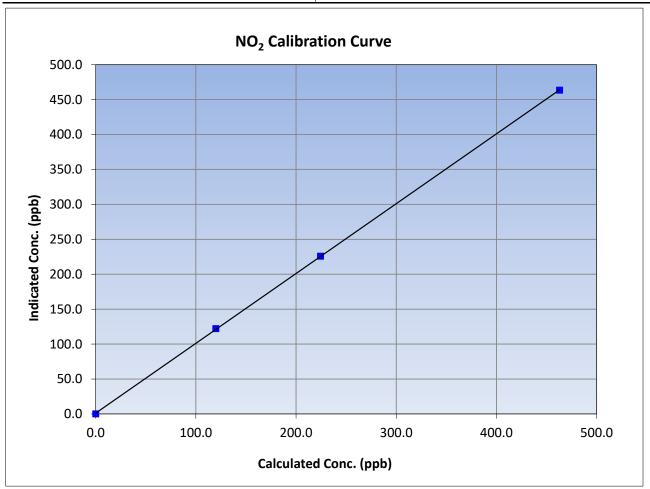
### NO<sub>2</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 10, 2023 Previous Calibration: April 20, 2023 Station Name: Stony Mountain Station Number: **AMS 18** Start Time (MST): 10:16 End Time (MST): 15:21 Analyzer make: Thermo 42i Analyzer serial #: 1336160088

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999976	≥0.995
463.1	463.5	0.9991	Correlation Coefficient	0.555570	20.333
224.4	225.8	0.9937	Slope	0.999469	0.90 - 1.10
119.9	122.1	0.9819	Slope	0.999409	0.90 - 1.10
			Intercept	1.142324	+/-20

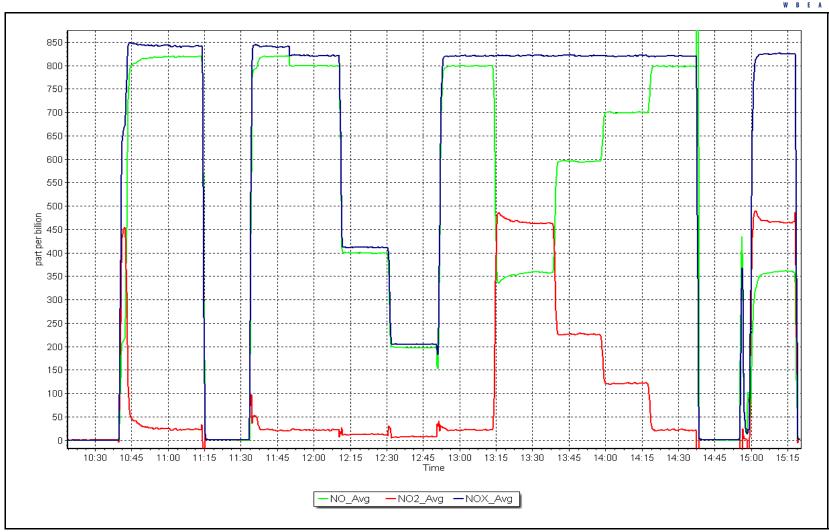


NO<sub>x</sub> Calibration Plot

Date: May 10, 2023

Location: Stony Mountain







## O<sub>3</sub> Calibration Report

Version-01-2020

Station Information

Station Name: **Stony Mountain** Calibration Date: May 4, 2023 Start time (MST): 9:50

Reason: Routine Station number: AMS18 Last Cal Date: April 4, 2023

End time (MST): 13:29

**Calibration Standards** 

O3 generation mode: Photometer

Calibrator Make/Model: Teledyne API T700 Serial Number: 2658 ZAG Make/Model: Teledyne API T701H Serial Number: 360

**Analyzer Information** 

Analyzer make: API T400

Analyzer Range 0 - 500 ppb

Analyzer serial #: 825

Start Finish Start Finish Backgd or Offset: Calibration slope: 0.999114 0.998229 1.000 1.000 Coeff or Slope: Calibration intercept: -0.420000 -0.340000 0.993 0.987

#### O<sub>3</sub> Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)		Correction factor (Cc/Ic)  Limit = 0.95-1.05
as found zero	5000	800.0	0.0	0.2	
as found span	4888	1096.9	400.0	405.5	0.986
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	0.1	
high point	4888	1101.7	400.0	399.3	1.002
second point	4888	863.9	200.0	198.7	1.007
third point	4888	741.4	100.0	99.3	1.007
as left zero	5000	800.0	0.0	0.4	
as left span	4812	1097.9	400.0	404.0	0.990
			Avera	ge Correction Factor	1.005
Baseline Corr As found:	405.3	Previous respons	se 399.2	*% change	1.5%
Baseline Corr 2nd AF pt:	NA	AF Slope	e:	AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation	n:		

Sample inlet filter changed after as founds. Zero and span adjusted.

Calibration Performed By: Aswin Sasi Kumar

Notes:

\* = > +/-5% change initiates investigation



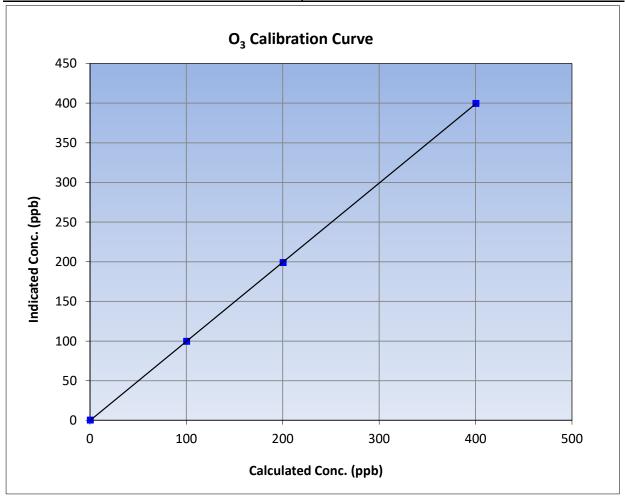
## O<sub>3</sub> Calibration Summary

Version-01-2020

### **Station Information**

Calibration Date: May 4, 2023 **Previous Calibration:** April 4, 2023 Station Name: Stony Mountain Station Number: AMS18 Start Time (MST): 9:50 End Time (MST): 13:29 Analyzer make: **API T400** Analyzer serial #: 825

Calibration Data							
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>		
0.0	0.1		Correlation Coefficient	0.999992	≥0.995		
400.0	399.3	1.0018	Correlation Coefficient	0.555552	20.333		
200.0	198.7	1.0065	Slope	0.998229	0.90 - 1.10		
100.0	99.3	1.0070	Slope	0.556225	0.90 - 1.10		
			- Intercept	-0.340000	+/- 5		



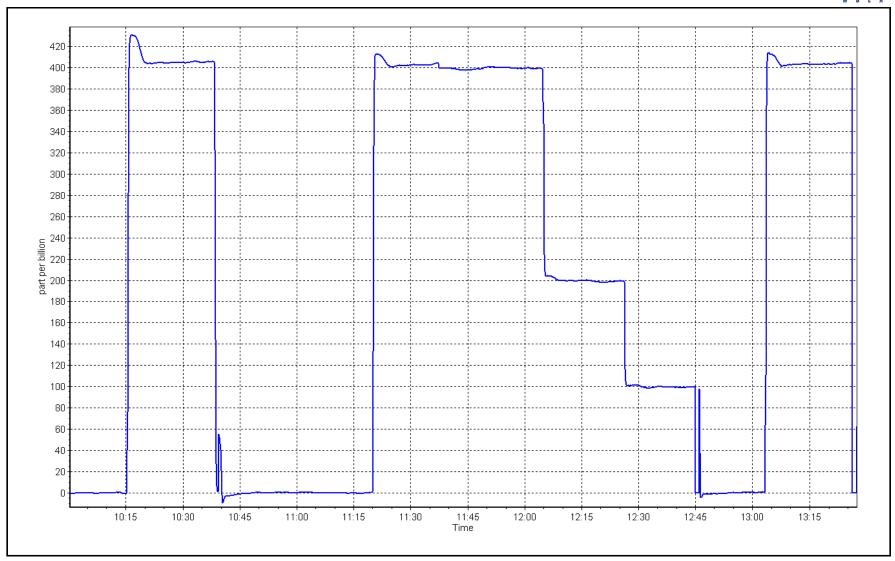
O<sub>3</sub> Calibration Plot

Date:

May 4, 2023

Location: Stony Mountain







## **T640 PM<sub>2.5</sub> CALIBRATION**

Version-01-2023

		Station Information	1			
Station Name:	Stony Mountain		Station number:	AMS 18		
Calibration Date:	May 16, 2023		Last Cal Date:	April 19, 20	123	
Start time (MST):	13:55		End time (MST):	14:24		
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 T	est			
<u>Parameter</u>	As found	Measured	<u>As left</u>		<u>Adjusted</u>	(Limits)
T (°C)	13.8	13.65	13.8			+/- 2 °C
P (mmHg)	704.8	704.54	704.8			+/- 10 mmHg
flow (LPM)	5	5.016	5			+/- 0.25 LPM
Leak Test:	Date of check:	May 16, 2023	Last Cal Date:	April 19	9, 2023	
	PM w/o HEPA:	29.4	PM w/ HEPA:	0.		<0.2 ug/m3
Note: this leak check will be		<u> </u>	serve as the pre ma	intenance l	eak check	
Inlet cleaning:	Inlet Head					
		Quarterly Calibration 1	Test .			
Parameter	As found	Post maintenance	As left		Adjusted	(Limits)
PMT Peak Test	N/A	1 OSt Maintenance	N/A			10.9 +/- 0.5
Tivit i cak icst	NA		N/A			10.5 +/- 0.5
Post-maintenance	e leak check:	PM w/o HEPA:	N/A	w/ HEPA:	1	N/A
Date Optical Cham	ber Cleaned:	March 22,	2023			<0.2 ug/m3
Disposable Filte	r Changed:	March 22,	2023			
		Annual Maintenanc	P			
		Amadi Waliteriane	-			
Date Sample Tub	oe Cleaned:	August 30,	2022			
Date RH/T Senso	or Cleaned:	August 30,	2022			
Notes:		No adjustments	needed. Leak check p	assed.		
Calibration by:	Aswin Sasi Kumar					



## **CO Calibration Report**

Cal Gas Exp Date:

Version-01-2020

**Station Information** 

Station Name: Stony Mountain
Calibration Date: May 9, 2023
Start time (MST): 10:05

Reason: Routine

Station number: AMS 18
Last Cal Date: April 12, 2023

December 1, 2028

End time (MST): 13:03

**Calibration Standards** 

Cal Gas Concentration: 3,050 ppm

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

Baseline Corr 3rd AF pt:

Start Finish Finish Start Calibration slope: 1.011069 1.000645 Backgd or Offset: -0.012 -0.009 Calibration intercept: 0.019763 0.127800 Coeff or Slope: 0.905 0.912

**CO Calibration Data** Calculated Correction factor Indicated concentration Dilution air flow rate Source gas flow rate Set Point concentration (ppm) (Cc/Ic) (sccm) (sccm) (ppm) (Ic) (Cc) Limit = 0.95-1.050.0 as found zero 5000 0.0 0.1 4933 66.7 40.7 41.4 0.984 as found span as found 2nd point as found 3rd point new cylinder response calibrator zero 0.0 5000 0.0 0.1 ---high point 4933 66.7 40.7 40.8 0.998 second point 4966 33.3 20.3 20.7 0.984 third point 4983 16.7 10.2 10.3 0.992 3000 0.0 0.0 0.1 as left zero ---as left span 2920 0.08 81.3 80.6 1.009 Average Correction Factor 0.991 Baseline Corr As found: 41.30 Prev response: 41.16 \*% change: 0.3% Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept:

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

AF Correlation:

Calibration Performed By: Aswin Sasi Kumar

NA

\* = > +/-5% change initiates investigation



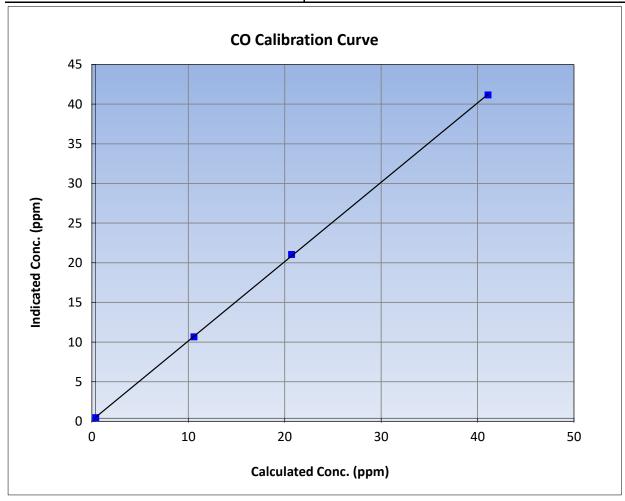
## **CO Calibration Summary**

Version-01-2020

#### **Station Information**

**Previous Calibration:** Calibration Date: May 9, 2023 April 12, 2023 Station Name: Stony Mountain Station Number: **AMS 18** Start Time (MST): 10:05 End Time (MST): 13:03 Analyzer make: **API T300** Analyzer serial #: 3504

Calibration Data									
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>				
0.0	0.1		Correlation Coefficient	0.999944	≥0.995				
40.7	40.8	0.9983	Correlation Coefficient	0.555544	20.995				
20.3	20.7	0.9838	Slope	1.000645	0.90 - 1.10				
10.2	10.3	0.9920	Siope	1.000045	0.90 - 1.10				
			- Intercept	0.127800	+/-1.5				



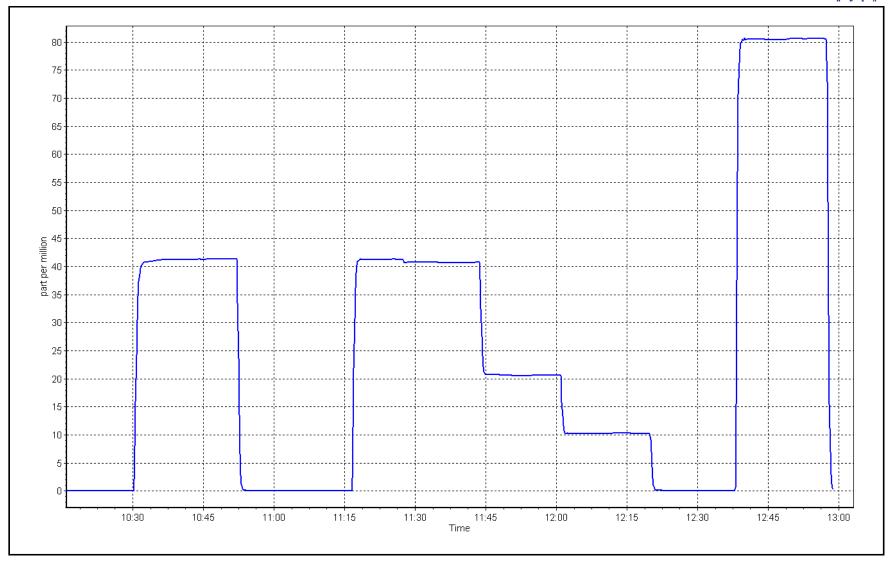
**CO Calibration Plot** 

Date:

May 9, 2023

Location: Stony Mountain







## **CO<sub>2</sub> Calibration Report**

Version-01-2020

#### **Station Information**

Station Name: Stony Mountain
Calibration Date: May 12, 2023
Start time (MST): 10:12

Reason: Routine

Station number: AMS 18

Last Cal Date: April 19, 2023

End time (MST): 13:35

#### **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 0.997386 Backgd or Offset: Calibration slope: 1.012352 -0.069 -0.081 Calibration intercept: 0.980000 -0.780000 Coeff or Slope: 1.076 1.085

#### CO<sub>2</sub> 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/lc)  Limit = 0.95-1.05
as found zero	3000	0.0	0.0	0.7	
as found span	2920	80.0	1605.9	1625.0	0.988
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	1599.1	1.004
second point	2960	40.0	802.9	806.1	0.996
third point	2980	20.0	401.5	394.7	1.017
as left zero	3000	0.0	0.0	0.4	
as left span	2930	80.0	1600.5	1599.0	1.001
			Avera	ge Correction Factor	1.006

Baseline Corr As found: 1624.30 Prev response: 1626.68 \*% 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. Zero and span adjusted.

Calibration Performed By: Aswin Sasi Kumar



401.5

## **Wood Buffalo Environmental Association**

## **CO<sub>2</sub> Calibration Summary**

Version-01-2020

+/-10

<b>~</b> :				•			
Sta	1	nn	ın	TO	rm	21	IOP
JLC		UII		ш		aı	w

Calibration Date	May 12, 2023	<b>Previous Calibration</b>	April 19, 2023
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:12	End Time (MST)	13:35
Analyzer make	API T360	Analyzer serial #	283

1.0171

394.7

Calibration Data									
Calculated concentration Indicated concentration (ppm) (Ic) (Cc/Ic) Statistical Evaluation Limits									
0.0	-0.1		Correlation Coefficient	0.999954	≥0.995				
1605.9	1599.1	1.0042	Correlation coefficient	0.555554	20.333				
802.9	806.1	0.9961	Slope	0.997386	0.90 - 1.10				
401 F	204.7	1 0171	Johe	0.33/300	0.30 - 1.10				

-0.780000

Intercept

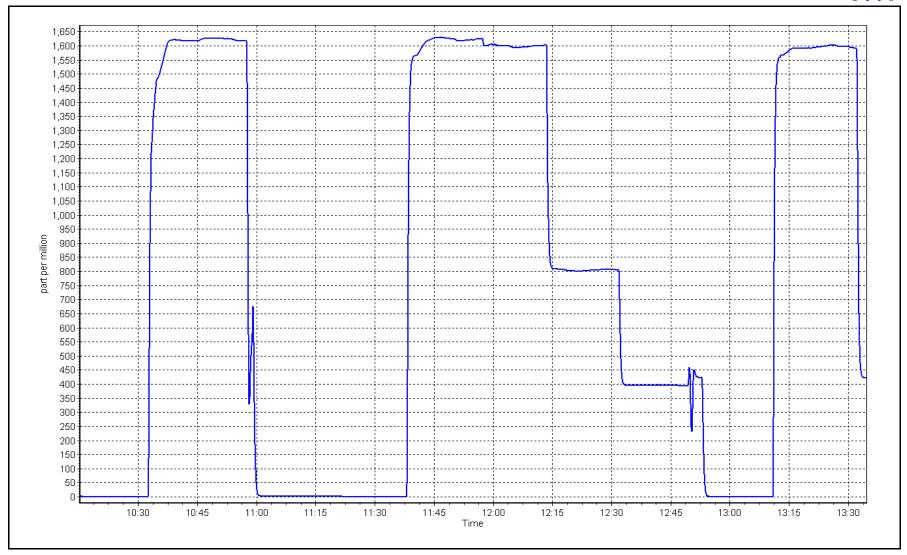
CO<sub>2</sub> Calibration Curve 1800 1600 1400 1200 Indicated Conc. (ppm) 1000 800 600 400 200 500 1000 1500 2000 0 Calculated Conc. (ppm)

CO<sub>2</sub> Calibration Plot

Date: May 12, 2023

Location: Stony Mountain







### WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

> AMS19 FIREBAG MAY 2023

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

June 30, 2023







## **SO<sub>2</sub> Calibration Report**

Station number:

Version-01-2020

#### **Station Information**

Station Name: **Firebag** May 1, 2023 Calibration Date: Start time (MST): 10:20

Routine Reason:

April 14, 2023 Last Cal Date:

End time (MST): 13:51

February 23, 2025

**AMS 19** 

#### **Calibration Standards**

Cal Gas Concentration: 49.29

Cal Gas Cylinder #: CC716618

Removed Cal Gas Conc: 49.29

Removed Gas Cyl #: Calibrator Make/Model:

**API T700** ZAG Make/Model: **API T701**  ppm Cal Gas Exp Date:

Rem Gas Exp Date: Diff between cyl:

Serial Number: 1607 Serial Number: 1118

#### **Analyzer Information**

Analyzer make: Thermo 43i Analyzer serial #: 1410661308

Analyzer Range 0 - 1000 ppb

Start **Finish** 

ppm

Start

**Finish** 

Calibration slope: 1.000391 0.994974 Backgd or Offset: 10.2 10.2 0.992 Calibration intercept: -0.421893 0.198788 Coeff or Slope: 0.992

#### SO<sub>2</sub> Calibration Data

Cat Paint	Dilution air flow rate	Source gas flow rate	Calculated	Indicated concentration	Correction factor (Cc/Ic)
Set Point	(sccm)	(sccm)	concentration (ppb) (Cc)	(ppb) (Ic)	<i>Limit = 0.95-1.05</i>
as found zero	4999	0.0	0.0	-0.3	
as found span	4919	81.1	799.5	795.1	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	4999	0.0	0.0	0.0	
high point	4919	81.1	799.5	795.4	1.005
second point	4959	40.6	400.3	399.0	1.003
third point	4980	20.3	200.1	199.2	1.005
as left zero	4999	0.0	0.0	0.0	
as left span	4919	81.1	799.5	792.4	1.009
•			Averag	ge Correction Factor	1.004
Pacalina Carr Ac founds	70F 26	Dravious raspans	700.26	*0/ change	O E0/

Baseline Corr As found: Previous response \*% change 795.36 799.36 -0.5% Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept:

NA AF Correlation: Baseline Corr 3rd AF pt:

\* = > +/-5% change initiates investigation

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



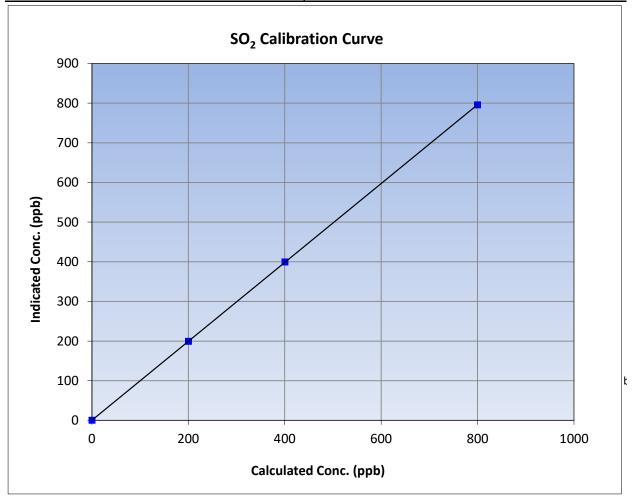
## **SO<sub>2</sub> Calibration Summary**

Version-01-2020

#### **Station Information**

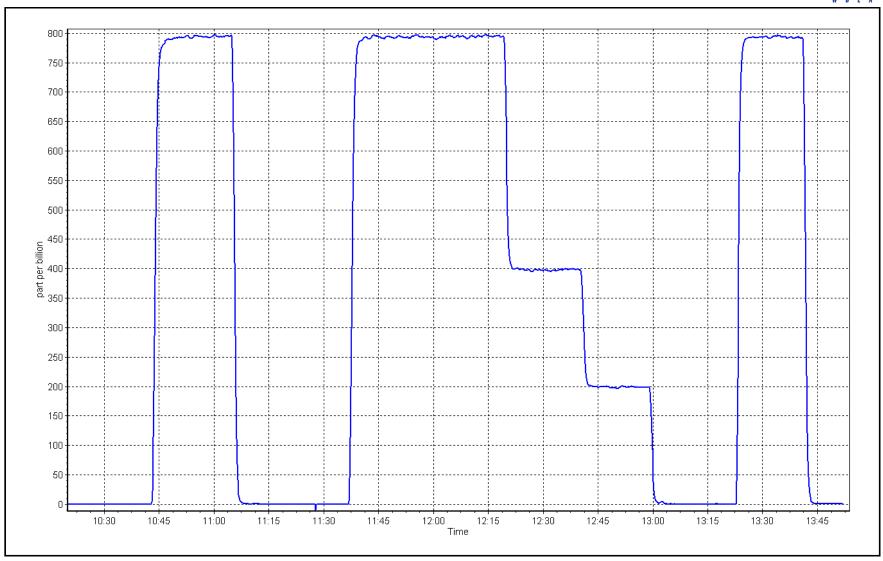
Calibration Date: May 1, 2023 **Previous Calibration:** April 14, 2023 Station Name: Firebag Station Number: **AMS 19** Start Time (MST): 10:20 End Time (MST): 13:51 Analyzer make: Thermo 43i Analyzer serial #: 1410661308

Calibration Data									
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>				
0.0	0.0		Correlation Coefficient	0.999999	≥0.995				
799.5	795.4	1.0051	Correlation Coefficient	0.555555	20.993				
400.3	399.0	1.0032	Slope	0.994974	0.90 - 1.10				
200.1	199.2	1.0045	Slope	0.554574	0.90 - 1.10				
			- Intercept	0.198788	+/-30				



SO2 Calibration Plot Date: May 1, 2023 Location: Firebag







## H<sub>2</sub>S Calibration Report

Version-11-2021

**Station Information** 

Station Name: Firebag
Calibration Date: May 2, 2023
Start time (MST): 10:04
Reason: Routine

Station number: AMS19
Last Cal Date: April 3, 2023

End time (MST): 14:42

**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

**Finish Start** <u>Finish</u> <u>Start</u> 1.003054 1.008056 Backgd or Offset: Calibration slope: 3.12 3.11 Calibration intercept: 0.038381 -0.061725 Coeff or Slope: 0.990 0.983

H<sub>2</sub>S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) Limit = 0.90-1.10
as found zero	5000	0.0	0.0	-0.1	
as found span	4922	78.2	80.0	81.0	0.986
as found 2nd point	4961	39.1	40.0	40.5	0.985
as found 3rd point	4980	19.6	20.0	20.2	0.988
new cylinder response					

#### H<sub>2</sub>S Calibration Data

Set Point	Dilution air flow 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	80.6	0.992
second point	4961	39.1	40.0	40.2	0.995
third point	4980	19.6	20.0	20.1	0.997
as left zero	5000	0.0	0.0	0.0	
as left span	4922	78.2	80.0	80.4	0.995
SO2 Scrubber Check	4922	78.3	800.2	0.0	
Date of last scrubber cha	nge:	January 18, 2023		Ave Corr Factor	0.995
Date of last converter eff	iciency test:	n/a			efficiency

Baseline Corr As found: 81.1 80.26 1.0% Prev response: \*% change: -0.101867 Baseline Corr 2nd AF pt: 40.6 AF Slope: 1.014202 AF Intercept: Baseline Corr 3rd AF pt: 20.3 AF Correlation: 0.999999

\* = > +/-5% change initiates investigation

Notes: SOx scrubber check done after calibrator zero. Adjusted span. Changed sample inlet filter after MPAF's.



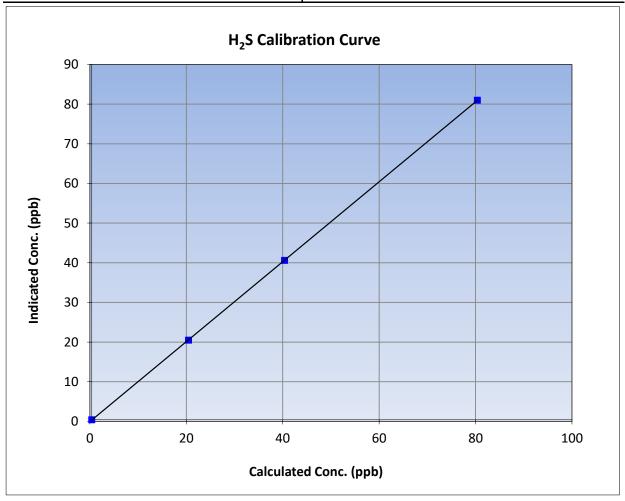
## H<sub>2</sub>S Calibration Summary

Version-11-2021

#### **Station Information**

Calibration Date: May 2, 2023 **Previous Calibration:** April 3, 2023 Station Name: Firebag Station Number: AMS19 Start Time (MST): 10:04 End Time (MST): 14:42 Analyzer make: Thermo 43i-TLE Analyzer serial #: 1336160090

Calibration Data									
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>				
0.0	0.0		Correlation Coefficient	0.999997	≥0.995				
80.0	80.6	0.9923	Correlation Coefficient	0.555557	20.333				
40.0	40.2	0.9948	Slope	1.008056	0.90 - 1.10				
20.0	20.1	0.9974	Siope	1.008030	0.90 - 1.10				
			Intercept	-0.061725	+/-3				

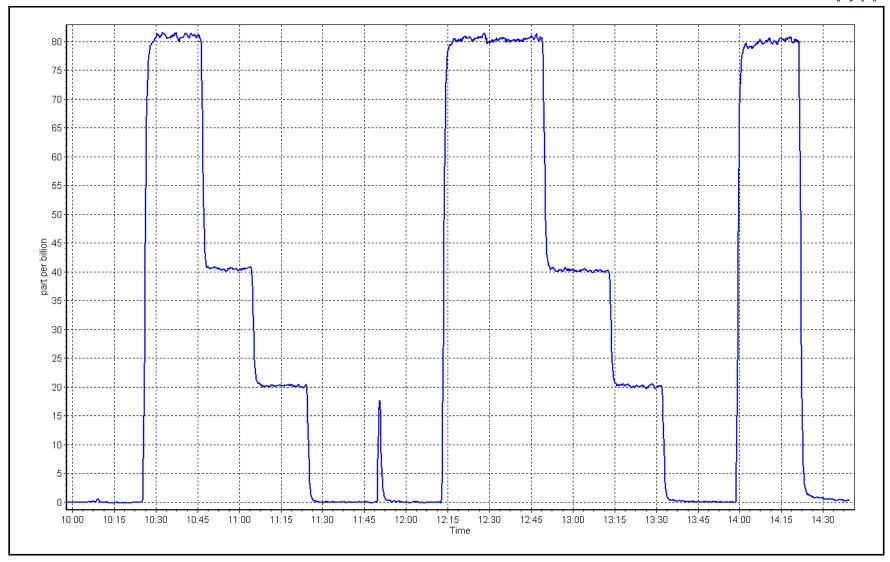


H<sub>2</sub>S Calibration Plot

Date: May 2, 2023

Location: Firebag







## **THC Calibration Report**

Version-01-2020

ppm

ppm

1066.9

#### **Station Information**

Station Name: Firebag May 1, 2023 Calibration Date: Start time (MST): 10:20 Routine Reason:

Station number: **AMS 19** April 14, 2023 Last Cal Date:

End time (MST): 13:51

**Calibration Standards** 

CC716618 Gas Cert Reference: Cal Gas Expiry Date: February 23, 2025 1066.9

CH4 Cal Gas Conc. 500.7 ppm CH4 Equiv Conc.

C3H8 Cal Gas Conc. 205.9 ppm Removed Gas Cert:

Removed Gas Expiry: Removed CH4 Conc. 500.7 ppm CH4 Equiv Conc.

Removed C3H8 Conc. 205.9 Diff between cyl: ppm 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 **Finish** Start Calibration slope: Background: 0.997928 0.994758 2.62 2.37 0.018270 Coefficient: Calibration intercept: -0.020741 3.815 3.846

**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	-0.26	
as found span	4919	81.1	17.31	16.88	1.025
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	4999	0.0	0.00	0.02	
high point	4919	81.1	17.31	17.25	1.003
second point	4959	40.6	8.66	8.59	1.009
third point	4980	20.3	4.33	4.35	0.995
as left zero	5000	0.0	0.00	0.04	
as left span	4919	81.1	17.31	17.40	0.995
			Ave	rage Correction Factor	1.002
Baseline Corr As found:	17.14	Previous response	17.25	*% change	-0.6%

Baseline Corr 2nd AF pt: AF Slope: AF Intercept: NA

Baseline Corr 3rd AF pt: NA AF Correlation:

\* = > +/-5% change initiates investigation

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



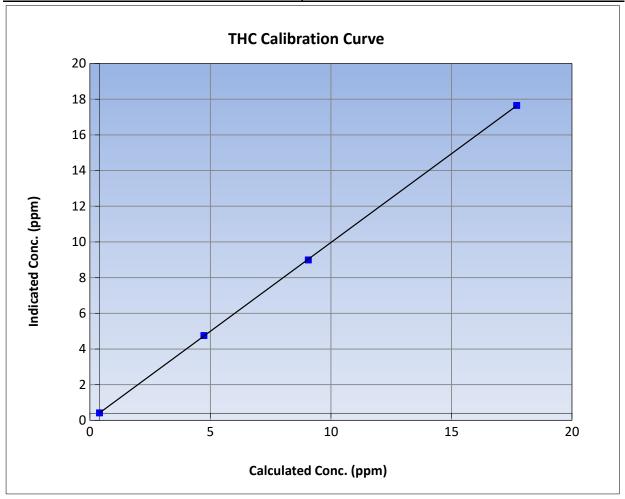
## **THC Calibration Summary**

Version-01-2020

#### **Station Information**

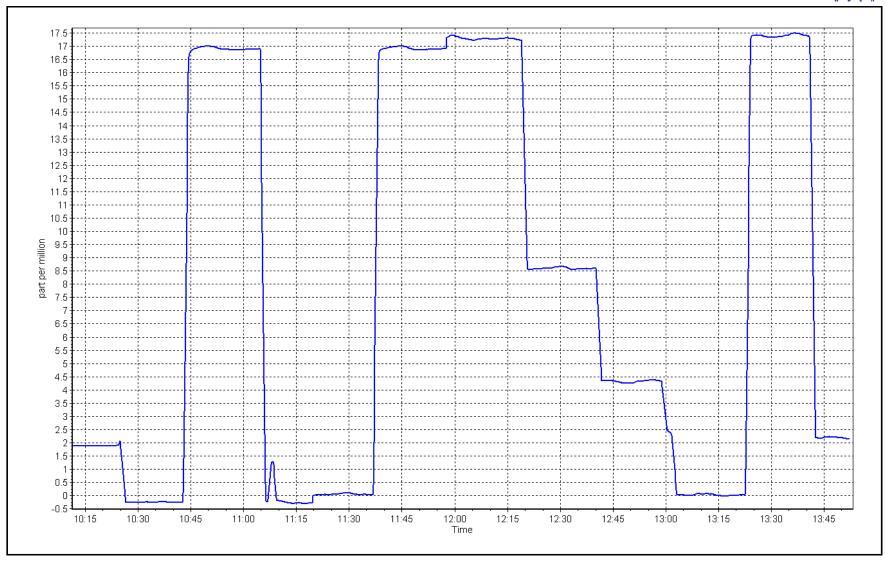
**Previous Calibration:** Calibration Date: May 1, 2023 April 14, 2023 Station Name: Firebag Station Number: **AMS 19** Start Time (MST): End Time (MST): 10:20 13:51 Analyzer make: Thermo 51i-LT Analyzer serial #: 1336160089

Calibration Data						
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>	
0.00	0.02		Correlation Coefficient	0.999981	≥0.995	
17.31	17.25	1.0032	Correlation Coefficient	0.999901	20.993	
8.66	8.59	1.0086	Slope	0.994758	0.90 - 1.10	
4.33	4.35	0.9953	Slope	0.334736	0.90 - 1.10	
			- Intercept	0.018270	+/-1.5	



THC Calibration Plot Date: May 1, 2023 Location: Firebag







## **THC Calibration Report**

Version-01-2020

**Station Information** 

Station Name: **Firebag** May 24, 2023 Calibration Date: Start time (MST): 10:05

Cylinder Change Reason:

Station number: **AMS 19** 

Last Cal Date: May 1, 2023 End time (MST):

12:40

**Calibration Standards** 

CC716618 Gas Cert Reference: Cal Gas Expiry Date: February 23, 2025

ppm

CH4 Cal Gas Conc. 500.7 ppm C3H8 Cal Gas Conc. 205.9 ppm

Removed Gas Cert:

Removed CH4 Conc. 500.7 ppm

Removed C3H8 Conc. 205.9 Calibrator Make/Model: **API T700** 

ZAG Make/Model: **API T701** 

Calibration slope:

Calibration intercept:

CH4 Equiv Conc. 1066.9 ppm

Removed Gas Expiry: CH4 Equiv Conc.

Analyzer serial #:

Diff between cyl:

Serial Number: 1607 1066.9 ppm

Serial Number: 1118

**Analyzer Information** 

Finish

Analyzer make: Thermo 51i-LT

Analyzer Range: 0 - 20 ppm

Start

0.994758

0.018270

Start 2.37

Finish

Background: 2.37 Coefficient: 3.846 3.846

1336160089

**THC Calibration Data** 

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentrate (ppm) (Cc)	tion Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)  Limit = 0.95-1.05
as found zero	5000	0.0	0.00	-0.32	
as found span	4919	81.1	17.31	16.91	1.023
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	4999	0.0	0.00	0.06	
high point	4919	81.1	17.31	17.31	1.000
second point					
third point					
as left zero	5000	0.0	0.00	0.14	
as left span	4919	81.1	17.31	17.37	0.996
			Av	verage Correction Factor	1.000
Baseline Corr As found:	17.23	Previous response	17.23	*% change	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	

Baseline Corr 2nd AF pt: NΑ AF Slope: Baseline Corr 3rd AF pt: AF Correlation: NA

\* = > +/-5% change initiates investigation

Notes:

Changed hydrogen cylinder. Checked zero and span response after the cylinder was swapped. No

adjustment needed.

Calibration Performed By:

**Braiden Boutilier** 

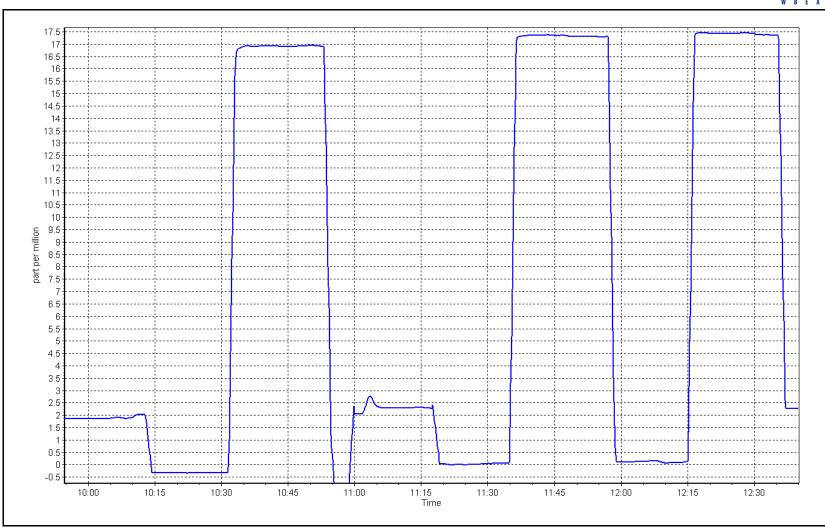
**THC Calibration Plot** 

Date: N

May 24, 2023

Location: Firebag







## NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

#### **Station Information**

Station Name: **Firebag** Calibration Date: May 4, 2023 10:14 Start time (MST): Reason: Routine

Station number: AMS 19 Last Cal Date: April 4, 2023 End time (MST): 14:59

#### **Calibration Standards**

NO Gas Cylinder #: T2Y1K63 Cal Gas Expiry Date: November 30, 2023 NOX Cal Gas Conc: NO Cal Gas Conc: 49.40 51.12 ppm ppm Removed Cylinder #: Removed Gas Exp Date: n/a n/a Removed Gas NOX Conc: Removed Gas NO Conc: 51.12 ppm 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

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.041	1.078	NO bkgnd or offset:	7.3	7.5
NOX coeff or slope:	0.996	0.995	NOX bkgnd or offset:	7.3	7.5
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	210.9	210.3

#### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	0.991227	0.999367
NO <sub>x</sub> Cal Offset:	0.554416	0.856331
NO Cal Slope:	0.991132	1.001140
NO Cal Offset:	-0.133220	-0.011041
NO <sub>2</sub> Cal Slope:	0.999545	0.998524
NO <sub>2</sub> Cal Offset:	-0.476369	-0.233199



## NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

				Dil	ution Calibratio	n 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 = 0.95-1.0
as found zero	4999	0.0	0.0	0.0	0.0	-0.1	-0.2	0.0		
as found span	4919	81.0	828.1	800.3	27.9	802.0	772.9	29.4	1.0326	1.0354
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	4999	0.0	0.0	0.0	0.0	0.0	-0.1	0.1		
high point	4919	81.0	828.1	800.3	27.9	828.0	801.0	26.6	1.0002	0.9991
second point	4960	40.5	414.0	400.1	13.9	415.2	401.0	14.2	0.9972	0.9978
third point	4980	20.2	206.5	199.6	6.9	208.0	199.6	8.4	0.9929	0.9998
as left zero	4999	0.0	0.0	0.0	0.0	-0.1	-0.2	0.1		
as left span	4919	81.0	828.1	359.9	468.3	831.0	360.5	470.8	0.9966	0.9983
							Average C	Correction Factor	0.9967	0.9989
Corrected As fou	ınd NO <sub>x</sub> =	802.1 ppb	NO =	773.1 ppb	* = > +/-59	% change initiates	investigation	*Percent Chan	ge NO <sub>X</sub> =	-2.4%
Previous Respon	se NO <sub>x</sub> =	821.4 ppb	NO =	793.0 ppb				*Percent Chan	ge NO =	-2.6%
Baseline Corr 2n	d pt NO <sub>X</sub> =	NA ppb	NO =	NA ppb	As found	$NO_X r^2$ :		Nx SI:	Nx Int:	
Baseline Corr 3rd	d pt NO <sub>X</sub> =	NA ppb	NO =	NA ppb	As found	$1   NO r^2$ :		NO SI:	NO Int:	
	,				As found	d $NO_2 r^2$ :		NO2 SI:	NO <sub>2</sub> Int:	
				(	GPT Calibration	Data				
O3 Setpoin	nt (ppb)	Indicated NO Ref		cated NO Drop centration (ppb)	Calculated NC concentration (pp		dicated NO2 stration (ppb) (Ic)	NO2 Correction fa Calibration Limit = As Found Limit = 0	0.95-1.05	rter Efficiency n Limit = 96-104%
as found G	iPT zero									
as found GPT point	t (400 ppb NO2)									
as found GPT point	t (200 ppb NO2)									
as found GPT point	t (100 ppb NO2)									
1st GPT point (4	400 ppb O3)	801.0		360.6	468.3		467.6	1.0014	1	99.9%
2nd GPT point (	200 ppb O3)	801.0		580.7	248.2		247.2	1.0039	9	99.6%
3rd GPT point (	100 ppb O3)	801.0	·	691.9	137.0		136.3	1.0049	)	99.5%

Notes:

Changed sample inlet filter after as founds. Adjusted span.

Average Correction Factor

Calibration Performed By:

Braiden Boutilier

99.7%

1.0034



## NO<sub>x</sub> Calibration Summary

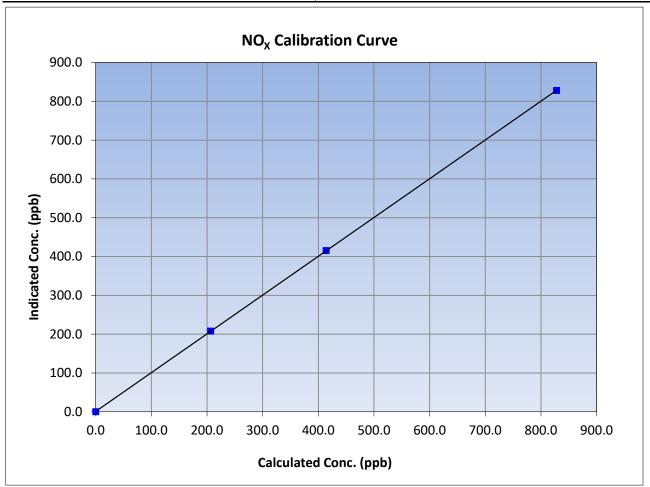
Version-04-2020

#### **Station Information**

Calibration Date: May 4, 2023 Previous Calibration: April 4, 2023 Station Name: Station Number: **AMS 19** Firebag Start Time (MST): 10:14 End Time (MST): 14:59 Analyzer make: Thermo 42i Analyzer serial #: 1410661309

#### **Calibration Data**

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999995	≥0.995
828.1	828.0	1.0002	Correlation Coefficient	0.999995	20.993
414.0	415.2	0.9972	Slope	0.999367	0.90 - 1.10
206.5	208.0	0.9929	Зюре	0.555507	0.90 - 1.10
			Intercept	0.856331	+/-20





## **NO Calibration Summary**

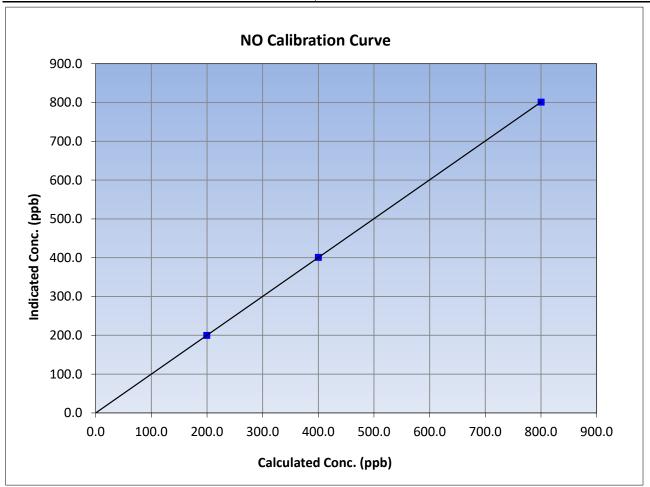
Version-04-2020

#### **Station Information**

Calibration Date: May 4, 2023 Previous Calibration: April 4, 2023 Station Name: Station Number: **AMS 19** Firebag Start Time (MST): 10:14 End Time (MST): 14:59 Analyzer make: Thermo 42i Analyzer serial #: 1410661309

#### **Calibration Data**

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	-0.1		Correlation Coefficient	0.999999	≥0.995
800.3	801.0	0.9991	Correlation Coefficient	0.999999	20.333
400.1	401.0	0.9978	Slope	1.001140	0.90 - 1.10
199.6	199.6	0.9998	Slope	1.001140	0.90 - 1.10
			Intercept	-0.011041	+/-20





## NO<sub>2</sub> Calibration Summary

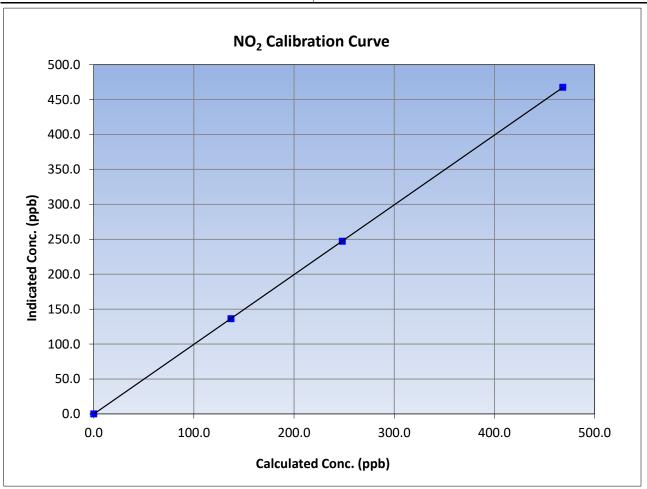
Version-04-2020

#### **Station Information**

Calibration Date: May 4, 2023 Previous Calibration: April 4, 2023 Station Name: Station Number: **AMS 19** Firebag Start Time (MST): 10:14 End Time (MST): 14:59 Analyzer make: Thermo 42i Analyzer serial #: 1410661309

#### **Calibration Data**

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999997	≥0.995
468.3	467.6	1.0014	Correlation Coefficient	0.55557	20.993
248.2	247.2	1.0039	Slope	0.998524	0.90 - 1.10
137.0	136.3	1.0049	Slope	0.996524	0.90 - 1.10
			Intercept	-0.233199	+/-20

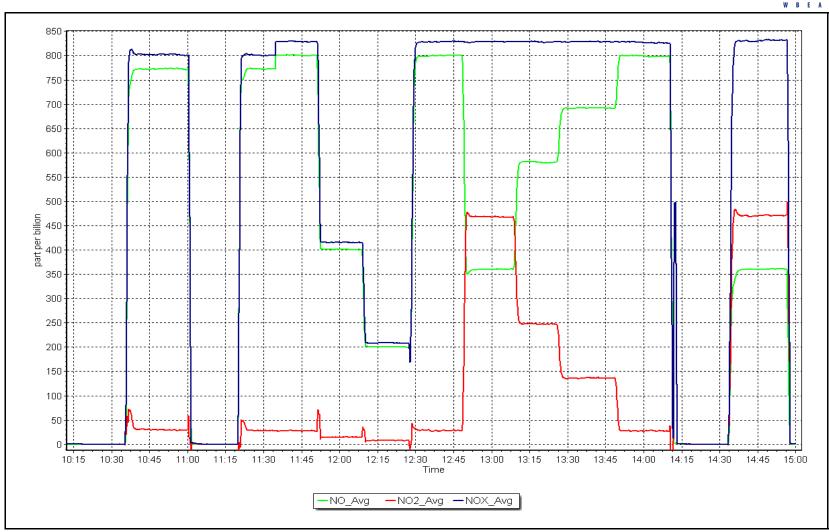


NO<sub>x</sub> Calibration Plot

Date: May 4, 2023

Location: Firebag





# W R F A

## **Wood Buffalo Environmental Association**

## **Wind Speed/Direction Calibration Report**

Version-10-2022

**Station Information** 

Station Name: Firebag Station Number: **AMS 19** Prev Cal Date: Calibration Date: May 1, 2023 July 4, 2022 Start Time (MST): 13:40 End Time (MST): 15:12 Tower Height (m): Reason: Routine 10.0

**Wind Speed Information** 

Sensor make/model: Met One 010C-1 Serial Number: W15276
WS Calibrator: MetOne 053 Serial Number: CA 03845

% Error Shaft RPM Calculated Speed (K/hr) (Cv) Indicated Speed (K/hr) (Iv) *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 58.6 0.0% 800 77.8 77.7 -0.1%

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r <sup>2</sup> )		0.999999	≥0.9995
Calculated slope		1.000283	0.90 - 1.10
Calculated intercept		0.005312	+/- 2

#### **Wind Direction Information**

Sensor make/model: Met One 020C-1 Serial Number: U11347

As Found Declination (deg east of True North): 28 As Left Declination (deg east of True North): 15
Solar noon time (MST): 12:20 Calc Declination\*: 15.44 Degrees

Deadband calc: 4.4 degrees (Limit 4 deg ) \*- calculated declination as per NOAA website

% Error (based on 357° FS)

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	Limit = +/- 1.0%
2	3.4	
90	89.2	-0.2%
180	178.4	-0.4%
270	267.6	-0.7%
357	356.0	-0.3%

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r <sup>2</sup> )			≥0.9995
Calculated slope		1.007234	0.90 - 1.10
Calculated intercept		-0.418403	+/- 4

Notes:

Adjusted tower crossarm to proper orientation. Adjusted using a compass. Deadband out of compliance limits, will return with a replacement sensor.

# W B E A

## **Wood Buffalo Environmental Association**

## **Wind Speed/Direction Calibration Report**

Version-10-2022

**Station Information** 

Station Name: Firebag Station Number: **AMS 19** Prev Cal Date: Calibration Date: May 4, 2023 May 1, 2023 Start Time (MST): 13:22 14:40 End Time (MST): Tower Height (m): Reason: Removal 10.0

**Wind Speed Information** 

Sensor make/model: Met One 010C-1 Serial Number: W15276
WS Calibrator: MetOne 053 Serial Number: CA 03845

 Shaft RPM
 Calculated Speed (K/hr) (Cv)
 Indicated Speed (K/hr) (Iv)
 Limit = +/- 1.5%

 0
 0.0
 -- 

 200
 20.2
 -- 

 400
 39.4
 -- 

 600
 58.6
 -- 

 800
 77.8
 --

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r <sup>2</sup> )			≥0.9995
Calculated slope			0.90 - 1.10
Calculated intercept			+/- 2

#### **Wind Direction Information**

Sensor make/model: Met One 020C-1 Serial Number: U11347

As Found Declination (deg east of True North): 14 As Left Declination (deg east of True North): 15
Solar noon time (MST): 12:20 Calc Declination\*: 15.44 Degrees

Deadband calc: 5.2 degrees (Limit 4 deg) \*- calculated declination as per NOAA website

% Error (based on 357 $^{\circ}$  FS)

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	Limit = +/- 1.0%
2	3.2	
90	89.3	-0.2%
180	178.3	-0.5%
270	267.5	-0.7%
357	355.0	-0.6%

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r <sup>2</sup> )			≥0.9995
Calculated slope		1.009250	0.90 - 1.10
Calculated intercept		-0.503217	+/- 4

Notes:

Deadband out of compliance from the calibration done on May 1, 2023. As founds done before removing the WD sensor.

## W R E A

## **Wood Buffalo Environmental Association**

## **Wind Speed/Direction Calibration Report**

Version-10-2022

#### **Station Information**

Station Name: Firebag Station Number: **AMS 19** Prev Cal Date: Calibration Date: May 4, 2023 May 1, 2023 Start Time (MST): 13:40 End Time (MST): 15:12 Tower Height (m): Reason: Install 10.0

#### **Wind Speed Information**

Sensor make/model: Met One 010C-1 Serial Number: W15276
WS Calibrator: MetOne 053 Serial Number: CA 03845

 Shaft RPM
 Calculated Speed (K/hr) (Cv)
 Indicated Speed (K/hr) (Iv)
 Limit = +/- 1.5%

 0
 0.0
 -- 

 200
 20.2
 -- 

 400
 39.4
 -- 

 600
 58.6
 -- 

 800
 77.8
 --

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r <sup>2</sup> )			≥0.9995
Calculated slope			0.90 - 1.10
Calculated intercept			+/- 2

#### **Wind Direction Information**

Sensor make/model: Met One 020C-1 Serial Number: A23968

As Found Declination (deg east of True North): 14 As Left Declination (deg east of True North): 15
Solar noon time (MST): 12:20 Calc Declination\*: 15.44 Degrees

Deadband calc: 1.6 degrees (Limit 4 deg) \*- calculated declination as per NOAA website

% Error (based on 357° FS)

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	Limit = +/- 1.0%
2	4.0	
90	88.8	-0.3%
180	181.7	0.5%
270	272.1	0.6%
357	359.4	0.7%

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r <sup>2</sup> )			≥0.9995
Calculated slope		0.995367	0.90 - 1.10
Calculated intercept		-0.576136	+/- 4

Notes:

Deadband out of compliance from the calibration done on May 1, 2023. New WD sensor installed. Aligned tower using solar noon.



### WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

> AMS20 MACKAY RIVER MAY 2023

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

June 30, 2023

## **SO<sub>2</sub> Calibration Report**

Version-01-2020

#### **Station Information**

Station Name: MacKay River Calibration Date: May 2, 2023 Start time (MST): 9:55 Routine Reason:

Station number: AMS20 Last Cal Date: April 3, 2023

End time (MST): 12:35

**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 #: <u>NA</u> 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

Baseline Corr 3rd AF pt:

**Finish Finish** Start Start Calibration slope: 1.007790 Backgd or Offset: 18.9 18.8 1.005548 Calibration intercept: 0.790939 2.430853 Coeff or Slope: 0.974 0.974

#### SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow 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	800.3	805.6	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	
high point	4919	81.3	800.3	808.2	0.990
second point	4959	40.7	400.7	406.4	0.986
third point	4980	20.3	199.8	206.4	0.968
as left zero	5000	0.0	0.0	0.3	
as left span	4919	81.3	800.3	814.5	0.983
·			Averag	ge Correction Factor	0.981
Baseline Corr As found:	805.50	Previous response	805.50	*% change	0.0%
Baseline Corr 2nd AF pt:	NA	AF Slope	:	AF Intercept:	

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

AF Correlation:

Calibration Performed By: Mohammed Kashif

NA

\* = > +/-5% change initiates investigation



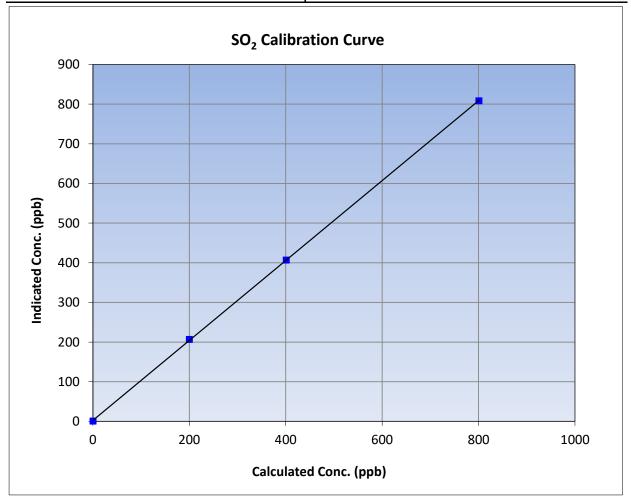
## **SO<sub>2</sub> Calibration Summary**

Version-01-2020

#### **Station Information**

Calibration Date: May 2, 2023 **Previous Calibration:** April 3, 2023 Station Name: MacKay River Station Number: AMS20 Start Time (MST): 9:55 End Time (MST): 12:35 Analyzer make: Thermo 43i Analyzer serial #: 1501301450

Calibration Data					
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>
0.0	0.4		Correlation Coefficient	0.999968	≥0.995
800.3	808.2	0.9902	- Correlation Coefficient	0.999900	20.995
400.7	406.4	0.9859	Slope	1.007790	0.90 - 1.10
199.8	206.4	0.9681	Slope	1.007790	0.90 - 1.10
			Intercept	2.430853	+/-30



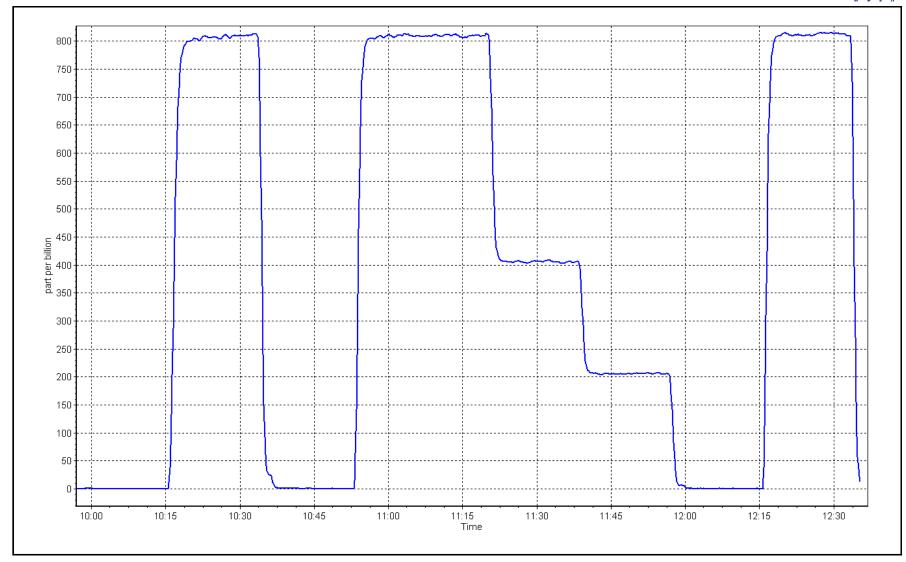
**SO2 Calibration Plot** 

Date:

May 2, 2023

Location: MacKay River







## H<sub>2</sub>S Calibration Report

Version-11-2021

**Station Information** 

Station Name:MacKay RiverStation number:AMS20Calibration Date:May 24, 2023Last Cal Date:April 4, 2023Start time (MST):9:56End time (MST):13:27

Reason: Removal and cal gas cylinder change

**Calibration Standards** 

Cal Gas Concentration: 5.12 ppm Cal Gas Exp Date: January 3, 2026

Cal Gas Cylinder #: CC515997

Removed Cal Gas Conc: 4.87 ppm Rem Gas Exp Date: May 5, 2023
Removed Gas Cyl #: EY0001922 Diff between cyl: -2.5%
Calibrator Make/Model: Teledyne API T700 Serial Number: 1220

ZAG Make/Model: Teledyne API 701 Serial Number: 4522

**Analyzer Information** 

Analyzer make: Teledyne API T101 Analyzer serial #: 196
Converter make: Internal Converter serial #: NA

Analyzer Range 0 - 100 ppb

<u>Finish</u> <u>Finish</u> <u>Start</u> <u>Start</u> Backgd or Offset: Calibration slope: 1.003004 NA 46.3 NA Calibration intercept: 0.079047 Coeff or Slope: NA 0.987 NA

H<sub>2</sub>S 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	4918	82.1	80.0	82.1	0.981
as found 2nd point	4959	41.1	40.0	41.5	0.979
as found 3rd point	4979	20.5	20.0	21.1	0.974
new cylinder response	4922	78.1	80.0	80.1	0.999

#### H<sub>2</sub>S Calibration Data

Set Point	Dilution air flow 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	4919	80.0	800.2		

Date of last scrubber change:		December 15, 2020		Ave Corr Factor	
Date of last converter efficien	cy test:			(	efficiency
Baseline Corr As found:	81.5	Prev response:	80.28	*% change:	1.5%
Baseline Corr 2nd AF pt:	40.9	AF Slope:	1.018723	AF Intercept:	0.679021
Baseline Corr 3rd AF pt:	20.5	AF Correlation:	0.999996	* = > +/-5% change initiates	

Notes: Removal calibration for instrument change out. Scrubber check completed after third point, it

passed; and then changed calibration gas cylinder

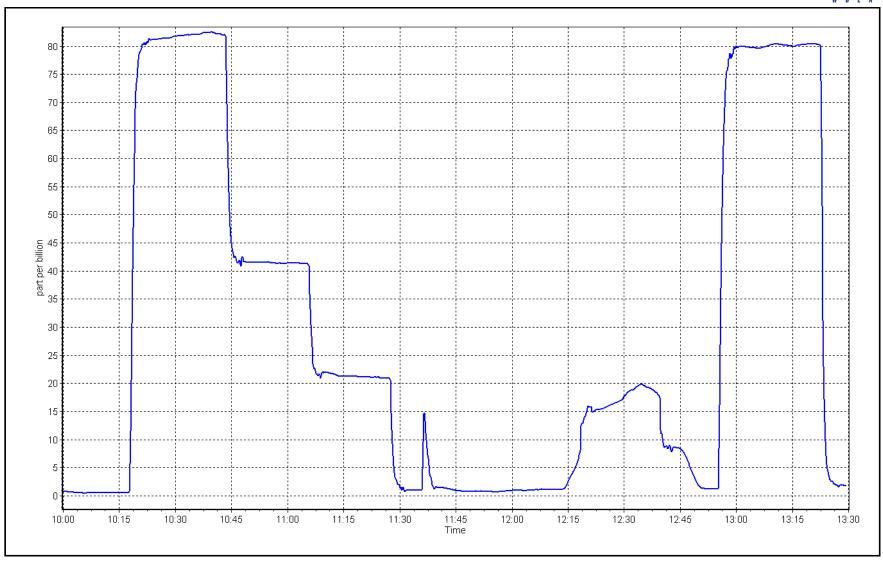
Calibration Performed By: Mohammed Kashif

H<sub>2</sub>S Calibration Plot

Date: May 24, 2023

Location: MacKay River





## H<sub>2</sub>S Calibration Report

Version-11-2021

**Station Information** 

Station Name: MacKay River Calibration Date: May 25, 2023 Start time (MST): 10:33 Reason:

Install

Station number: AMS20 Last Cal Date: NA End time (MST): 13:25

**Calibration Standards** 

Cal Gas Exp Date: January 3, 2026 Cal Gas Concentration: 5.12 ppm

Cal Gas Cylinder #: CC515997

Removed Cal Gas Conc: 5.12

Removed Gas Cyl #: NA Calibrator Make/Model: Teledyne API T700 ZAG Make/Model: Teledyne API 701

ppm

Diff between cyl: 1220 Serial Number: Serial Number: 4522

Rem Gas Exp Date: NA

**Analyzer Information** 

Analyzer make: Thermo 43iQ TLE

Global Converter make:

Analyzer serial #: Converter serial #: 2022-226

Analyzer Range 0 - 100 ppb

<u>Start</u> **Finish** Calibration slope: NA Calibration intercept:

NA

1.006091 -0.292887 Backgd or Offset: Coeff or Slope:

<u>Start</u> NA NA

12124313139

<u>Finish</u> 1.92 0.619

H<sub>2</sub>S As Found Data

Baseline Adjusted Calculated Dilution air flow rate Source gas flow rate Indicated Correction factor concentration (ppb) Set Point (Cc/(Ic-AFzero)) (sccm) (sccm) concentration (ppb) (Ic) (Cc) Limit = 0.90-1.10as found zero

as found span as found 2nd point

as found 3rd point new cylinder response

Notes:

#### H<sub>2</sub>S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	-0.2	
high point	4922	78.1	80.0	80.3	0.997
second point	4961	39.0	40.0	39.8	1.004
third point	4980	19.5	20.0	19.8	1.011
as left zero	5000	0.0	0.0	-0.5	
as left span	4922	78.1	80.0	79.9	1.002
SO2 Scrubber Check	4919	80.0	800.2	-0.1	
Date of last scrubber change	re:	May 25, 2023		Ave Corr Factor	1.004

Date of last scrubber change:	May 25, 2023	Ave Corr Factor	1.004
Date of last converter efficiency test:			efficiency

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

Install calibration. Scrubber check completed after calibrator zero. Adjusted zero and span.

Calibration Performed By: Mohammed Kashif NA

NA



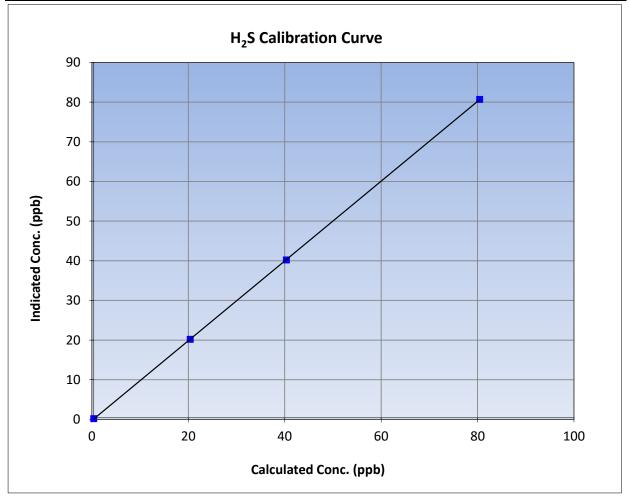
# H<sub>2</sub>S Calibration Summary

Version-11-2021

### **Station Information**

Calibration Date: May 25, 2023 **Previous Calibration:** NA Station Name: MacKay River Station Number: AMS20 Start Time (MST): 10:33 End Time (MST): 13:25 Analyzer make: Thermo 43iQ TLE Analyzer serial #: 12124313139

Calibration Data								
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>			
0.0	-0.2		Correlation Coefficient	0.999992	≥0.995			
80.0	80.3	0.9967	Correlation Coefficient	0.555552	20.995			
40.0	39.8	1.0042	Slope	1.006091	0.90 - 1.10			
20.0	19.8	1.0109	Slope	1.000091	0.90 - 1.10			
			- Intercept	-0.292887	+/-3			

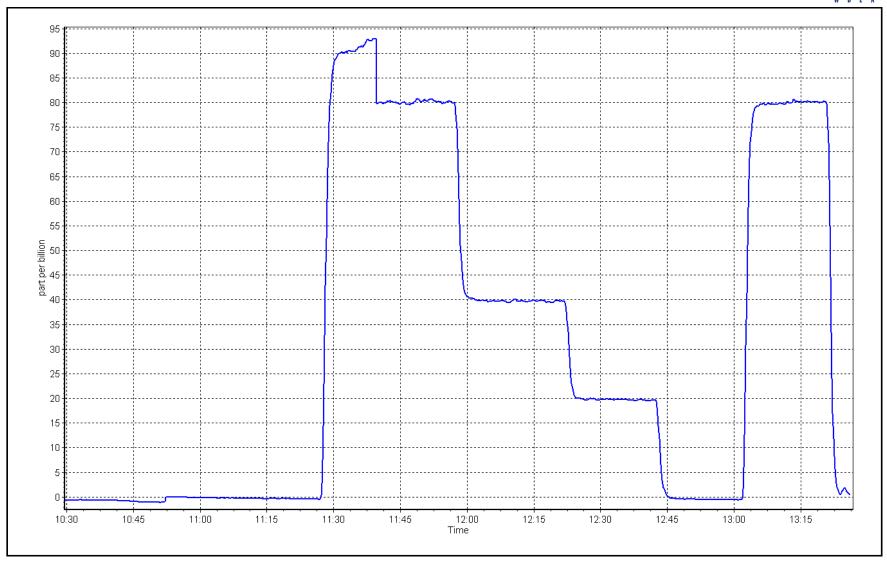


H<sub>2</sub>S Calibration Plot

Date: May 25, 2023

Location: MacKay River







# **THC Calibration Report**

Version-01-2020

#### **Station Information**

Station Name: MacKay River May 2, 2023 Calibration Date: Start time (MST): 9:55 Routine Reason:

Station number: AMS20 April 3, 2023 Last Cal Date:

End time (MST): 12:35

**Calibration Standards** 

CC306868 Gas Cert Reference: Cal Gas Expiry Date: February 23, 2025

CH4 Cal Gas Conc. 499.40 CH4 Equiv Conc. 1066.45 ppm ppm

C3H8 Cal Gas Conc. 206.20 ppm

Removed Gas Cert: NA Removed Gas Expiry: NA

Removed CH4 Conc. 499.40 CH4 Equiv Conc. 1066.45 ppm ppm

Removed C3H8 Conc. Diff between cyl: 206.20 ppm

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

Baseline Corr 3rd AF pt:

Start Finish Finish Start Background: Calibration slope: 0.995858 1.004428 3.160 3.250 -0.093194 Coefficient: Calibration intercept: -0.025166 5.328 5.488

### **THC Calibration Data**

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentrati (ppm) (Cc)	ion Indicated Concentration (ppm) (Ic)	Correction factor (Cc/lc)  Limit = 0.95-1.05
as found zero	5000	0.0	0.00	-0.13	
as found span	4919	81.3	17.34	16.89	1.027
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.14	
high point	4919	81.3	17.34	17.31	1.002
second point	4959	40.7	8.68	8.63	1.006
third point	4980	20.3	4.33	4.32	1.003
as left zero	5000	0.0	0.00	-0.10	
as left span	4919	81.3	17.34	17.43	0.995
			А	Average Correction Factor	1.004
Baseline Corr As found:	17.02	Previous response	17.24	*% change	-1.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	

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

AF Correlation:

Mohammed Kashif Calibration Performed By:

NA

\* = > +/-5% change initiates investigation



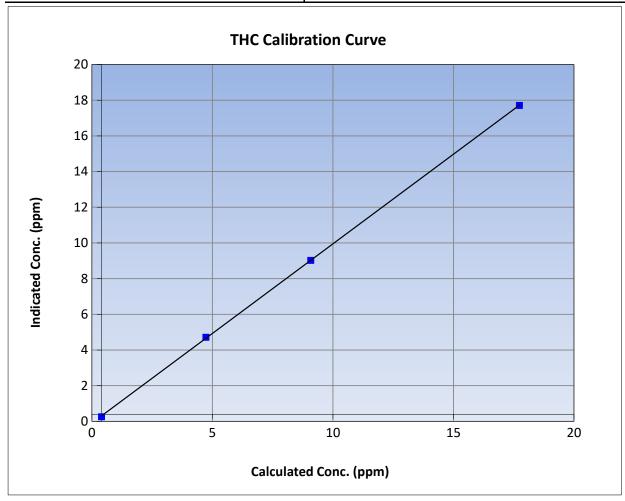
# **THC Calibration Summary**

Version-01-2020

### **Station Information**

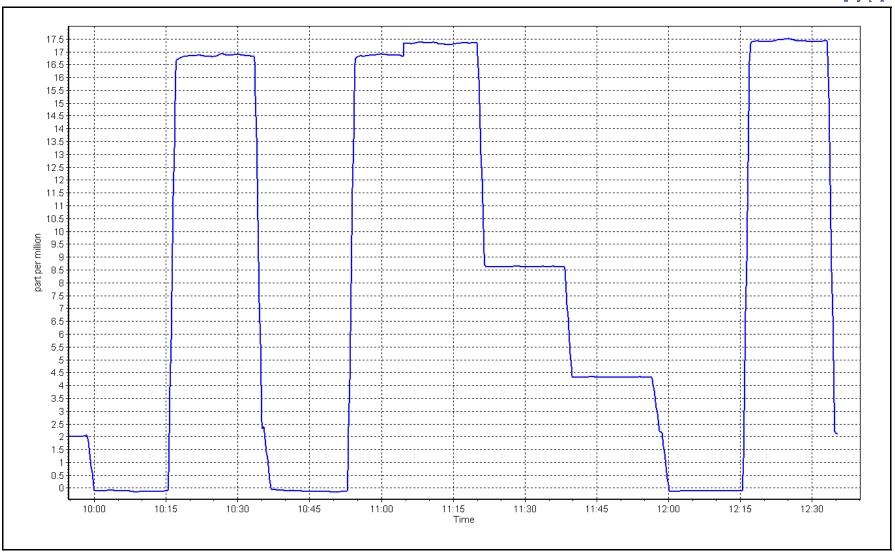
**Previous Calibration:** Calibration Date: May 2, 2023 April 3, 2023 Station Name: MacKay River Station Number: AMS20 Start Time (MST): 9:55 End Time (MST): 12:35 Analyzer make: Thermo 51i-LT Analyzer serial #: 1501663727

Calibration Data								
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>			
0.00	-0.14		Correlation Coefficient	0.999963	≥0.995			
17.34	17.31	1.0018	Correlation Coefficient	0.555505	20.333			
8.68	8.63	1.0064	Slope	1.004428	0.90 - 1.10			
4.33	4.32	1.0029	Slope	1.004426	0.90 - 1.10			
			Intercept	-0.093194	+/-1.5			



THC Calibration Plot Date: May 2, 2023 Location: MacKay River







# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

#### **Station Information**

Station Name: MacKay River Calibration Date: May 11, 2023 9:15

Start time (MST): Reason: Routine Station number: AMS20 Last Cal Date: April 19, 2023

End time (MST): 13:21

### **Calibration Standards**

T376265 NO Gas Cylinder #: Cal Gas Expiry Date: April 13, 2025

NOX Cal Gas Conc: NO Cal Gas Conc: 49.19 48.04 ppm ppm

Removed Cylinder #: NA Removed Gas Exp Date: NA

Removed Gas NO Conc: Removed Gas NOX Conc: 49.19 ppm 48.04 ppm NO gas Diff:

NOX gas Diff:

Teledyne API T700 Serial Number: 1220 Calibrator Model: 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** <u>Start</u> **Finish** NO coeff or slope: 1.459 1.459 NO bkgnd or offset: 4.0 4.0 NOX coeff or slope: 0.990 0.990 NOX bkgnd or offset: 4.0 4.0 NO2 coeff or slope: 0.995 0.995 Reaction cell Press: 181.9 180.7

### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	0.996899	0.981506
NO <sub>x</sub> Cal Offset:	1.929986	1.850414
NO Cal Slope:	0.999776	0.983542
NO Cal Offset:	0.730780	0.691620
NO <sub>2</sub> Cal Slope:	0.995110	1.000887
NO <sub>2</sub> Cal Offset:	-1.870675	-0.270425



# $NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

										10.5.0 0 . 20.
				Dilu	ution Calibration	n 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 = 0.95-1.0
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.1		
as found span	4917	83.3	819.5	800.3	19.2	807.7	788.3	19.4	1.0146	1.0152
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1		
high point	4917	83.3	819.5	800.3	19.2	805.5	787.7	17.9	1.0173	1.0160
second point	4956	41.7	410.4	400.8	9.6	404.9	394.6	10.3	1.0137	1.0158
third point	4979	20.8	204.6	199.9	4.8	204.9	198.4	6.5	0.9987	1.0073
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1		
as left span	4917	83.3	819.5	447.1	372.4	809.1	434.1	375.0	1.0128	1.0299
							Average C	Correction Factor	1.0099	1.0130
Corrected As fo	ound NO <sub>X</sub> =	807.8 ppb	NO =	788.4 ppb	* = > +/-5%	change initiates	investigation	*Percent Chang	ge NO <sub>x</sub> =	-1.4%
Previous Respo	onse NO <sub>X</sub> =	818.8 ppb	NO =	800.8 ppb				*Percent Chang	ge NO =	-1.6%
Baseline Corr 2	2nd pt $NO_X =$	NA ppb	NO =	NA ppb	As found	$NO_X r^2$ :		Nx SI:	Nx Int:	
Baseline Corr 3	Brd pt $NO_X =$	NA ppb	NO =	NA ppb	As found	NO r <sup>2</sup> :		NO SI:	NO Int:	
					As found	$NO_2 r^2$ :		NO2 SI:	NO <sub>2</sub> Int:	
				G	iPT Calibration D	Data				
O3 Setpo	oint (ppb)	Indicated NO Refe concentration (		ated NO Drop entration (ppb)	Calculated NO: concentration (ppb		dicated NO2 ntration (ppb) (Ic)	NO2 Correction fac Calibration Limit = 0 As Found Limit = 0	0.95-1.05	erter Efficiency on Limit = 96-104%
as found	l GPT zero									

O3 Setpoint (ppb)	concentration (ppb)	concentration (ppb)	concentration (ppb) (Cc	) concentration (ppb) (Ic)	Calibration Limit = 0.95-1.05 As Found Limit = 0.90-1.10	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)	785.6	432.4	372.4	372.6	0.9994	100.1%
2nd GPT point (200 ppb O3)	785.6	603.4	201.4	201.2	1.0008	99.9%
3rd GPT point (100 ppb O3)	785.6	692.5	112.3	111.6	1.0059	99.4%
			A	verage Correction Factor	1.0020	99.8%

Notes:

No adjustments made.

Calibration Performed By:

Mohammed Kashif



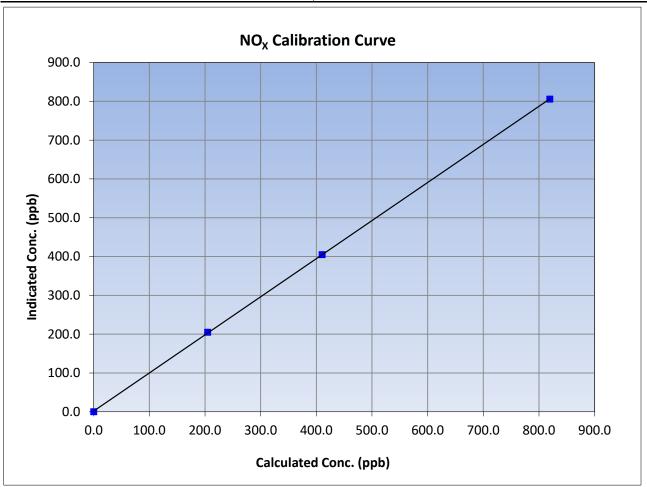
# NO<sub>X</sub> Calibration Summary

Version-04-2020

### **Station Information**

Calibration Date: May 11, 2023 Previous Calibration: April 19, 2023 Station Name: MacKay River Station Number: AMS20 Start Time (MST): 9:15 End Time (MST): 13:21 Analyzer serial #: Analyzer make: Thermo 42i 1505164379

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999976	≥0.995
819.5	805.5	1.0173	Correlation Coefficient	0.333370	20.993
410.4	404.9	1.0137	Slope	0.981506	0.90 - 1.10
204.6	204.9	0.9987	Slope	0.961300	0.30 - 1.10
			Intercept	1.850414	+/-20





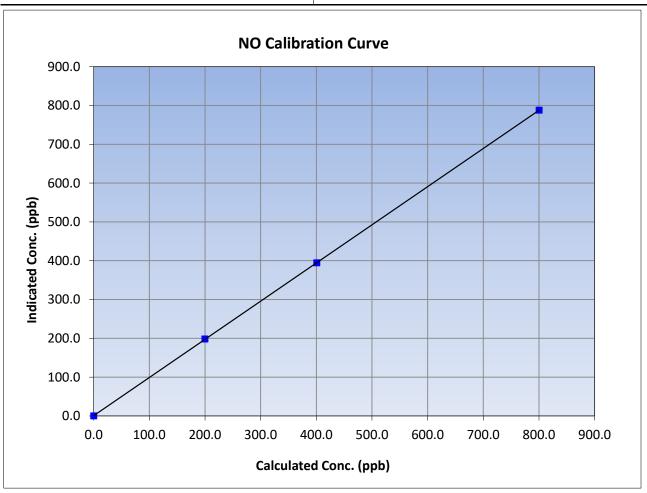
### **NO Calibration Summary**

Version-04-2020

### **Station Information**

Calibration Date: May 11, 2023 Previous Calibration: April 19, 2023 Station Name: MacKay River Station Number: AMS20 Start Time (MST): 9:15 End Time (MST): 13:21 Analyzer make: Thermo 42i Analyzer serial #: 1505164379

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	0.0		Correlation Coefficient	0.999994	≥0.995	
800.3	787.7	1.0160	correlation coemicient	0.555554	20.555	
400.8	394.6	1.0158	Slope	0.983542	0.90 - 1.10	
199.9	198.4	1.0073	Slope	0.965542	0.90 - 1.10	
			Intercept	0.691620	+/-20	





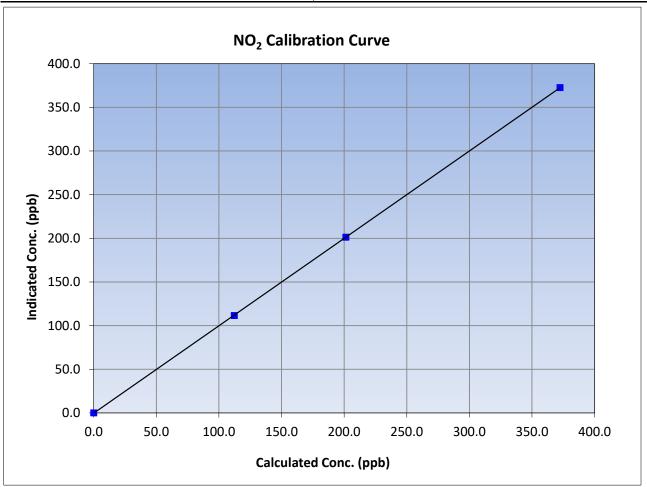
# NO<sub>2</sub> Calibration Summary

Version-04-2020

### **Station Information**

Calibration Date: May 11, 2023 Previous Calibration: April 19, 2023 Station Name: MacKay River Station Number: AMS20 Start Time (MST): 9:15 End Time (MST): 13:21 Analyzer make: Thermo 42i Analyzer serial #: 1505164379

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999994	≥0.995
372.4	372.6	0.9994	Correlation Coefficient	0.55554	20.333
201.4	201.2	1.0008	Slope	1.000887	0.90 - 1.10
112.3	111.6	1.0059	Slope	1.000887	0.90 - 1.10
			Intercept	-0.270425	+/-20



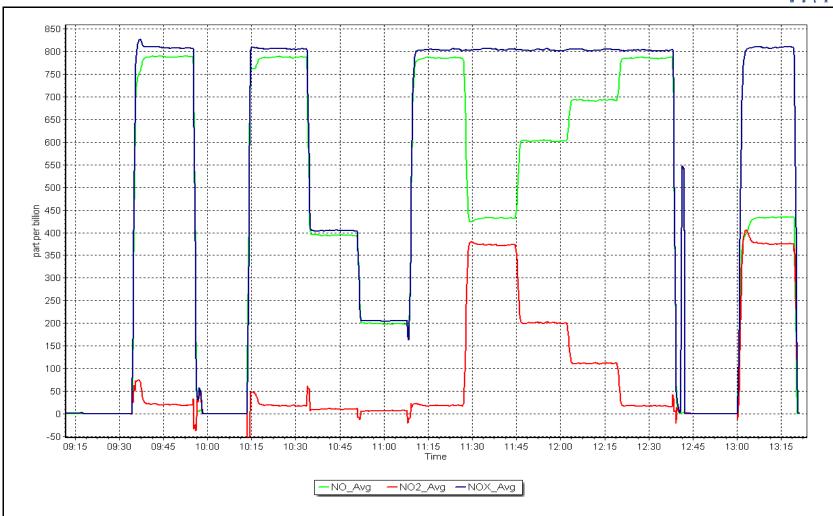
NO<sub>x</sub> Calibration Plot

Date:

May 11, 2023

Location: MacKay River







### WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

> AMS21 CONKLIN MAY 2023

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

June 30, 2023

# **SO<sub>2</sub> Calibration Report**

Version-01-2020

#### **Station Information**

Station number: Station Name: Conklin AMS21 April 13, 2023 Calibration Date: May 3, 2023 Last Cal Date: Start time (MST): 9:41 End time (MST): 12:41

Routine Reason:

#### **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 Rem Gas Exp Date: NA ppm 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

**Finish Finish** Start Start Calibration slope: 1.015485 Backgd or Offset: 28.4 28.4 1.015856 0.914 Calibration intercept: 0.896430 1.176454 Coeff or Slope: 0.914

### SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow 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	0.1	
as found span	4920	80.2	8.008	812.9	0.985
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5005	0.0	0.0	0.1	
high point	4920	80.2	8.008	814.0	0.984
second point	4960	40.1	400.4	408.0	0.981
third point	4980	20.0	200.1	205.7	0.973
as left zero	5005	0.0	0.0	0.1	
as left span	4920	80.2	8.008	817.0	0.980
·			Averag	ge Correction Factor	0.979
Baseline Corr As found:	812.80	Previous response	814.44	*% change	-0.2%

Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept:

NA Baseline Corr 3rd AF pt: AF Correlation:

Notes: No adjustments have been made.

Calibration Performed By: **Denny Ray Estador**  \* = > +/-5% change initiates investigation



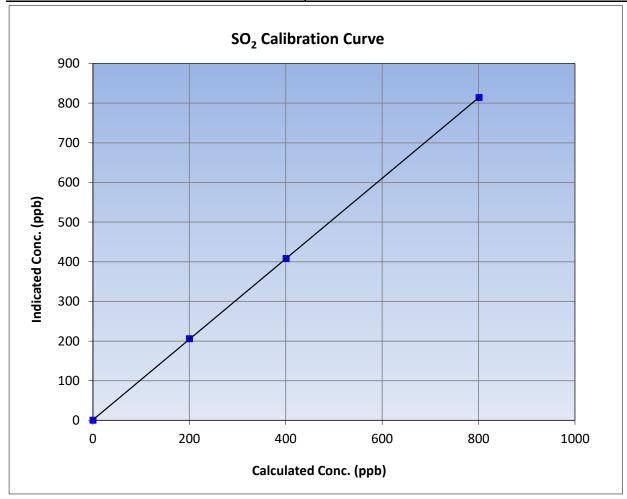
# **SO<sub>2</sub> Calibration Summary**

Version-01-2020

### **Station Information**

Calibration Date: May 3, 2023 **Previous Calibration:** April 13, 2023 Station Name: Conklin Station Number: AMS21 Start Time (MST): 9:41 End Time (MST): 12:41 Analyzer make: Thermo 43i Analyzer serial #: 1428701363

	Calibration Data									
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Statistical Evalua	ation	<u>Limits</u>						
0.0	0.1		Correlation Coefficient	0.999991	≥0.995					
800.8	814.0	0.9838	Correlation Coefficient	0.555551	20.333					
400.4	408.0	0.9814	Slope	1.015485	0.90 - 1.10					
200.1	205.7	0.9729	Slope	1.015465	0.90 - 1.10					
			- Intercept	1.176454	+/-30					



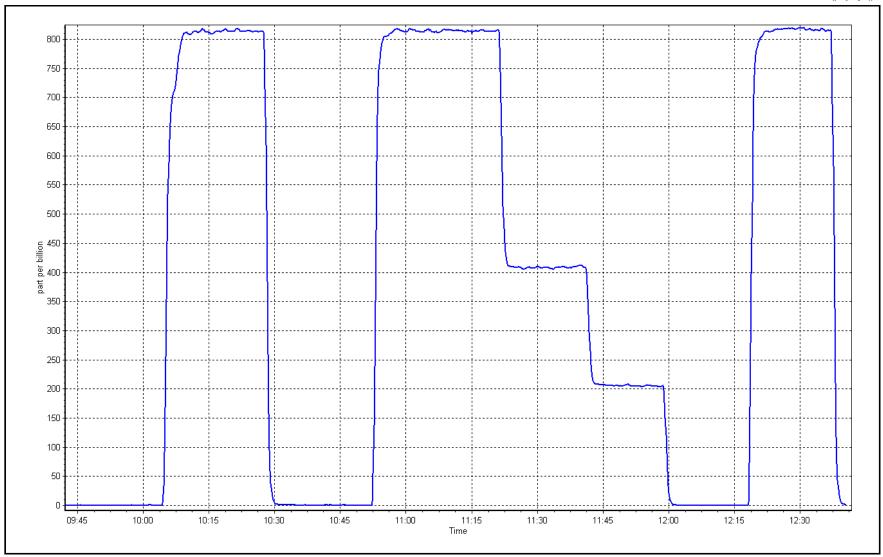
**SO2 Calibration Plot** 

Date:

May 3, 2023

Location: Conklin





# W B E A

### **Wood Buffalo Environmental Association**

### **TRS Calibration Report**

Version-11-2021

**Station Information** 

Station Name: Conklin
Calibration Date: May 30, 2023
Start time (MST): 9:32
Reason: Routine

Station number: AMS21 Last Cal Date: April 26, 2023 End time (MST): 14:00

**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

emoved Cal Gas Conc: 5.03 ppm Rem Gas Exp Date: April 16, 2022

Removed Gas Cyl #:CC505493Diff between cyl:-0.8%Calibrator Make/Model:API 7700Serial Number:3810ZAG Make/Model:API 701HSerial 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** <u>Finish</u> Calibration slope: 1.009291 1.000000 Backgd or Offset: 2.8 2.9 0.000000 0.974 Calibration intercept: -0.082550 Coeff or Slope: 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	81.3	0.978
as found 2nd point	4960	39.8	40.0	41.0	0.966
as found 3rd point	4980	19.9	20.0	20.2	0.970
new cylinder response	4920	80.0	80.0	80.7	0.991

### **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	80.0	80.0	80.0	1.000
second point	4960	40.0	40.0	40.0	1.000
third point	4980	20.0	20.0	20.0	1.000
as left zero	5000	0.0	0.0	0.0	
as left span	4920	80.0	80.0	79.9	1.001
SO2 Scrubber Check	4920	80.2	802.0	-0.3	
Date of last scrubber cha	inge:		•	Ave Corr Factor	1.000
Date of last converter eff	Date of last converter efficiency test:				

Date of last scrubber change	2:			Ave Corr Factor	1.000
Date of last converter efficie	ncy test:			ef	ficiency
Baseline Corr As found:	81.7	Prev response:	80.63	*% change:	1.3%

Baseline Corr 2nd AF pt: 41.4 AF Slope: 1.022026 AF Intercept: Baseline Corr 3rd AF pt: 20.6 AF Correlation: 0.999953

\* = > +/-5% change initiates investigation

Notes: No adjustments made. Replaced H2S gas.

Calibration Performed By: Denny Ray Estador

-0.260878



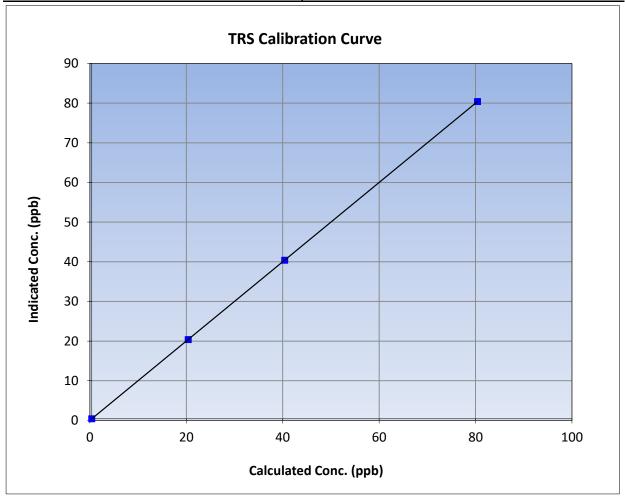
# **TRS Calibration Summary**

Version-11-2021

### **Station Information**

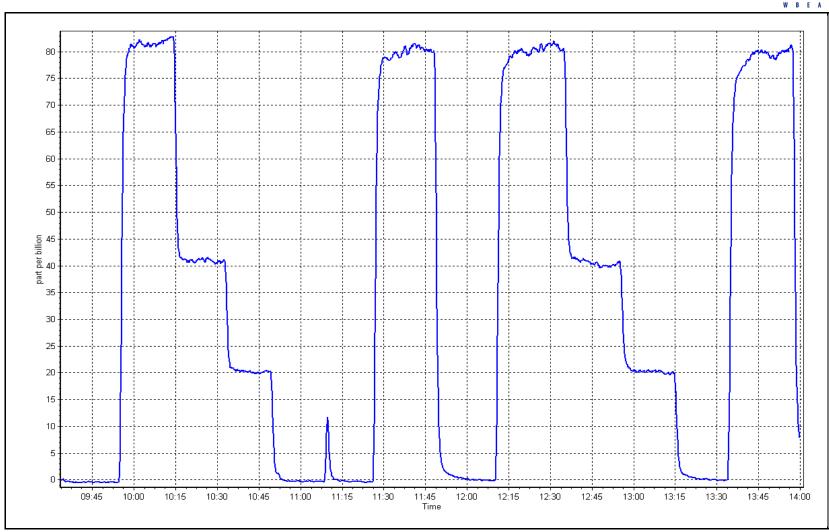
**Previous Calibration:** Calibration Date: May 30, 2023 April 26, 2023 Station Name: Conklin Station Number: AMS21 Start Time (MST): 9:32 End Time (MST): 14:00 Analyzer make: Thermo 43i-TLE Analyzer serial #: 1236656116

Calibration Data							
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>		
0.0	0.0		Correlation Coefficient	1.000000	≥0.995		
80.0	80.0	1.0000	Correlation Coefficient	1.000000	20.333		
40.0	40.0	1.0000	Slope	1.000000	0.90 - 1.10		
20.0	20.0	1.0000	Slope	1.000000	0.90 - 1.10		
			- Intercept	0.000000	+/-3		



TRS Calibration Plot Date: May 30, 2023 Location: Conklin







# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-06-2022

### **Station Information**

Station Name: Conklin
Calibration Date: May 3, 2023
Start time (MST): 9:41
Reason: Routine

Station number: AMS21 Last Cal Date: April 18, 2023

End time (MST): 12:41

Removed Gas Expiry: NA

**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 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 701 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: 2.16E-04 2.22E-04 NMHC SP Ratio: 4.66E-05 4.83E-05 CH4 Retention time: 12.00 12.00 NMHC Peak Area: 196084 189107

#### **THC Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (	(Cc) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.2	17.13	16.59	1.033
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	17.13	1.000
second point	4960	40.1	8.56	8.59	0.997
third point	4980	20.0	4.27	4.33	0.987
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.2	17.13	17.15	0.999
				Average Correction Factor	0.994
Baseline Corr AF:	16.59	Prev response	17.16	*% change	-3.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	tes investigation



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-06-2022

II V L K					Version-00-2
		NMHC Calibr	ation Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (C	Cc) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.2	9.14	8.82	1.036
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	4.59	0.995
:hird point	4980	20.0	2.28	2.32	0.984
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.2	9.14	9.15	0.999
•			А	verage Correction Factor	0.993
Baseline Corr AF:	8.82	Prev response	9.16	*% change	-3.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
		CH4 Calibra	tion Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (C	Cc) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.2	7.99	7.77	1.028
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
nigh point	4920	80.2	7.99	7.99	1.000
second point	4960	40.1	3.99	3.99	1.000
hird point	4980	20.0	1.99	2.01	0.989
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.2	7.99	7.99	0.999
				verage Correction Factor	0.996
Baseline Corr AF:	7.77	Prev response	8.00	*% change	-3.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
		Calibration	Statistics		
		<u>Start</u>		<u>Finish</u>	
THC Cal Slope:		0.999574		0.999175	
THC Cal Offset:		0.045989		0.027981	
CH4 Cal Slope:		0.999808		0.999308	
CH4 Cal Offset:		0.019754		0.008750	

Notes: Replaced N2 cylinder after the as founds. Adjusted the span only.

0.999495

0.026235

Calibration Performed By: Denny Ray Estador

NMHC Cal Slope:

NMHC Cal Offset:

0.998771

0.019631



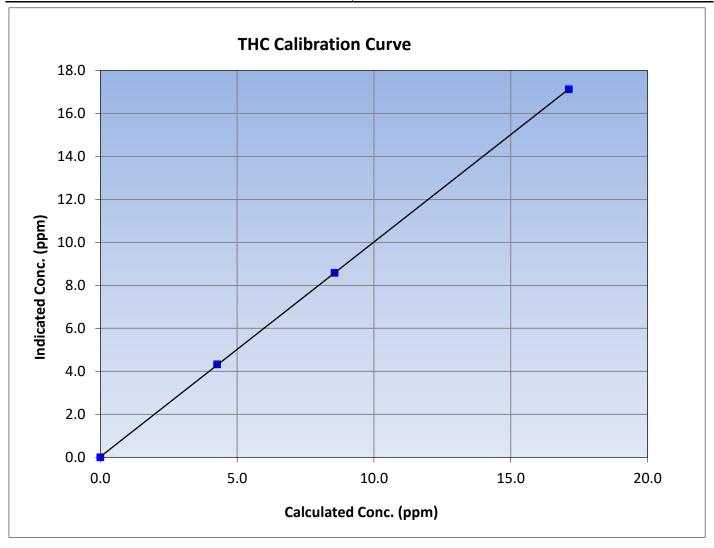
# **THC Calibration Summary**

Version-06-2022

### **Station Information**

**Previous Calibration:** Calibration Date: May 3, 2023 April 18, 2023 Station Name: Conklin Station Number: AMS21 Start Time (MST): 9:41 End Time (MST): 12:41 Analyzer make: Thermo 55i Analyzer serial #: 1331259521

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999987	≥0.995
17.13	17.13	0.9998	Correlation Coemicient	0.333367	20.333
8.56	8.59	0.9969	Slope	0.999175	0.90 - 1.10
4.27	4.33	0.9866	Slope	0.555175	0.90 - 1.10
			Intercept	0.027981	+/-0.5





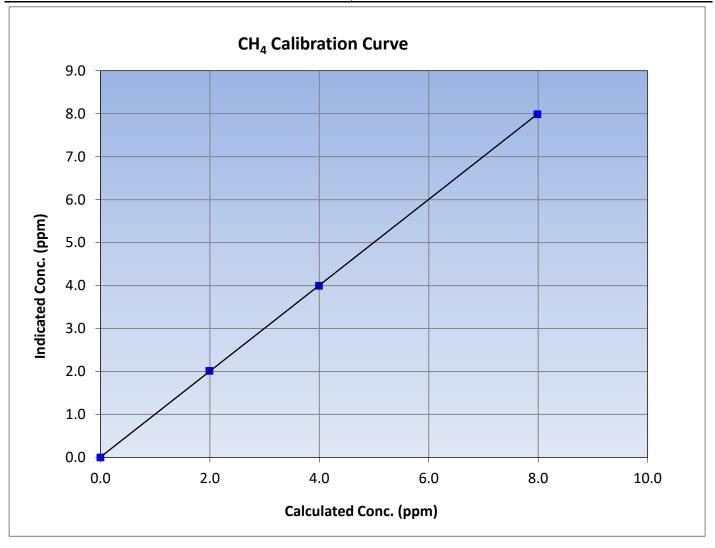
# **CH<sub>4</sub> Calibration Summary**

Version-06-2022

### **Station Information**

Calibration Date: May 3, 2023 **Previous Calibration:** April 18, 2023 Station Name: Conklin Station Number: AMS21 Start Time (MST): 9:41 End Time (MST): 12:41 Analyzer make: Analyzer serial #: 1331259521 Thermo 55i

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999991	≥0.995
7.99	7.99	0.9997	Correlation Coemicient	0.555551	20.333
3.99	3.99	0.9998	Slope	0.999308	0.90 - 1.10
1.99	2.01	0.9889	Slope	0.333308	0.90 - 1.10
			Intercept	0.008750	+/-0.5





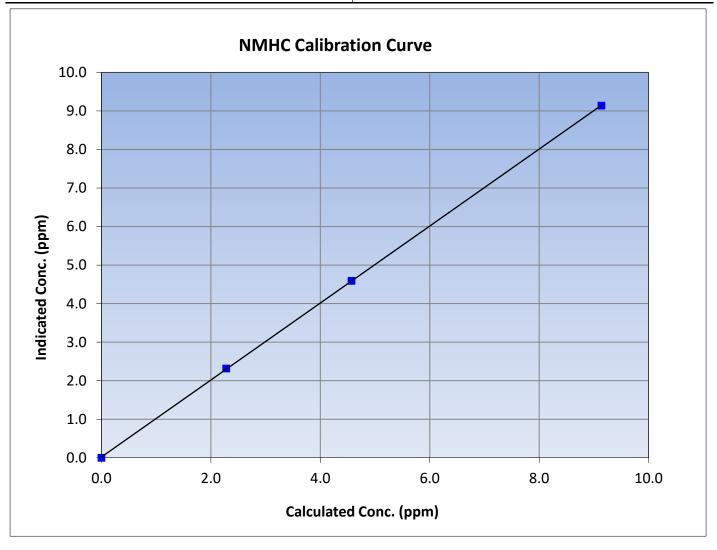
# **NMHC Calibration Summary**

Version-06-2022

### **Station Information**

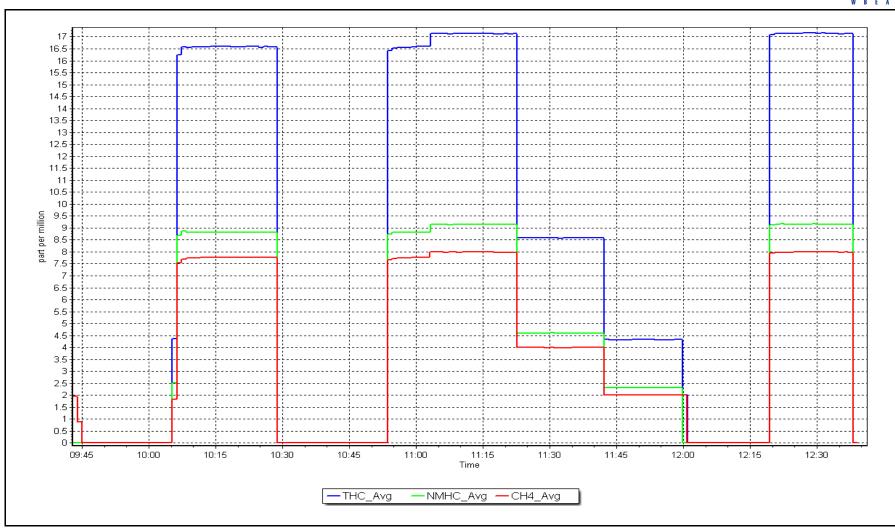
Calibration Date: May 3, 2023 **Previous Calibration:** April 18, 2023 Station Name: Conklin Station Number: AMS21 Start Time (MST): 9:41 End Time (MST): 12:41 Analyzer make: Analyzer serial #: 1331259521 Thermo 55i

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999979	≥0.995
9.14	9.14	1.0001	Correlation Coefficient		20.993
4.57	4.59	0.9949	Slope	0.998771	0.90 - 1.10
2.28	2.32	0.9841	Slope	0.556771	0.90 - 1.10
			Intercept	0.019631	+/-0.5



NMHC Calibration Plot Date: May 3, 2023 Location: Conklin







# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-06-2022

### **Station Information**

Conklin Station Name: Calibration Date: May 24, 2023 Start time (MST): 10:17

Cylinder Change Reason:

Station number: AMS21 Last Cal Date: May 3, 2023

End time (MST): 11:55

Removed Gas Expiry: NA

### **Calibration Standards**

Gas Cert Reference: CC259455 Cal Gas Expiry Date: January 5, 2025

CH4 Cal Gas Conc. 497.9 CH4 Equiv Conc. 1067.7 ppm ppm

C3H8 Cal Gas Conc. 207.2 ppm

Removed Gas Cert: NΑ

Removed CH4 Conc. 497.9 CH4 Equiv Conc. 1067.7 ppm ppm

Removed C3H8 Conc. Diff between cyl (THC): 207.2 ppm

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

> **Finish Finish Start Start**

CH4 SP Ratio: 2.22E-04 2.22E-04 NMHC SP Ratio: 4.83E-05 4.83E-05 12.00 12.00 NMHC Peak Area: CH4 Retention time: 189107 189107

#### **THC Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.2	17.13	16.91	1.013
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.2	17.13	16.85	1.016
			Ave	rage Correction Factor	
Baseline Corr AF:	16.91	Prev response	17.14	*% change	-1.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initia	tes investigation



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-06-2022

NMHC	Cali	bration	Data
------	------	---------	------

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.2	9.14	8.99	1.017
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.2	9.14	8.94	1.022
			Aver	age Correction Factor	
Baseline Corr AF:	8.99	Prev response	9.15	*% change	-1.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	tes investigation

### **CH4 Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.2	7.99	7.92	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.2	7.99	7.91	1.009
			Ave	rage Correction Factor	
Baseline Corr AF:	7.92	Prev response	7.99	*% change	-0.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
		Calibration	Statistics		
		Start		Finish	
THC Cal Slope:		0.999175			
THC Cal Offset:		0.027981			
CH4 Cal Slope:		0.999308			
CH4 Cal Offset:		0.008750			
NMHC Cal Slope:		0.998771			
NMHC Cal Offset:		0.019631			

Notes: Changed H2 cylinder.

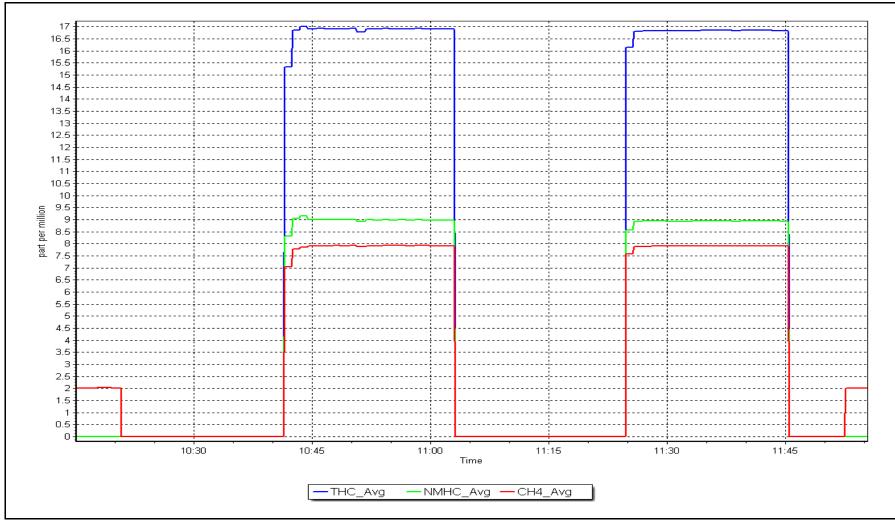
Calibration Performed By: Denny Ray Estador

**NMHC Calibration Plot** 

Date: May 24, 2023

Location: Conklin







# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

### **Station Information**

Station Name: Conklin Calibration Date: May 16, 2023

Start time (MST): 9:41 Reason: Routine Station number: AMS21 Last Cal Date: April 28, 2023

End time (MST): 13:35

### **Calibration Standards**

NO Gas Cylinder #: T2Y1P1H Cal Gas Expiry Date: December 11, 2023 ppm

NOX Cal Gas Conc: NO Cal Gas Conc: 51.09 50.39 ppm

Removed Cylinder #: n/a Removed Gas Exp Date: n/a

Removed Gas NO Conc: Removed Gas NOX Conc: 51.09 ppm 50.39 ppm

NOX gas Diff: NO gas Diff:

Teledyne API T700 Serial Number: Calibrator Model: 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** <u>Start</u> **Finish** NO coeff or slope: 1.144 1.144 NO bkgnd or offset: 11.6 11.6 NOX coeff or slope: 1.001 1.001 NOX bkgnd or offset: 11.8 11.8 NO2 coeff or slope: 1.000 1.000 Reaction cell Press: 219.5 220.7

### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	1.010616	1.001335
NO <sub>x</sub> Cal Offset:	2.246244	2.164394
NO Cal Slope:	1.008763	1.000766
NO Cal Offset:	1.982980	1.181398
NO <sub>2</sub> Cal Slope:	1.003351	1.002657
NO <sub>2</sub> Cal Offset:	-0.204066	-0.146701



# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

					ition Calibratio					
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 = 0.95-1.0
as found zero	5000	0.0	0.0	0.0	0.0	0.0	-0.2	0.1		
as found span	4921	79.4	811.2	800.1	11.1	813.3	800.0	13.4	0.9975	1.0001
as found 2nd	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	4921	79.4	811.2	800.1	11.1	813.5	801.3	12.1	0.9972	0.9985
second point	4960	39.7	405.7	400.1	5.6	409.4	402.3	7.1	0.9909	0.9946
third point	4980	19.8	202.3	199.6	2.8	206.7	202.0	4.7	0.9788	0.9879
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1		
as left span	4921	79.4	811.2	379.2	432.0	814.0	385.2	428.9	0.9966	0.9845
							Average C	orrection Factor	0.9890	0.9937
Corrected As fo	ound NO <sub>X</sub> =	813.3 ppb	NO =	800.2 ppb	* = > +/-59	6 change initiates i	nvestigation	*Percent Chang	ge NO <sub>x</sub> =	-1.1%
Previous Respo	onse NO <sub>X</sub> =	822.1 ppb	NO =	809.1 ppb				*Percent Chang	ge NO =	-1.1%
Baseline Corr 2	2nd pt $NO_X =$	NA ppb	NO =	NA ppb	As found	$NO_X r^2$ :		Nx SI:	Nx Int:	
Baseline Corr 3	Brd pt $NO_X =$	NA ppb	NO =	NA ppb	As found	$1   NO r^2$ :		NO SI:	NO Int:	
					As found	$NO_2 r^2$ :		NO2 SI: ;	NO <sub>2</sub> Int:	

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (C	Indicated NO2 c) concentration (ppb) (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	378.6	432.0	432.9	0.9980	100.2%
2nd GPT point (200 ppb O3)	799.5	590.9	219.7	220.9	0.9946	100.5%
3rd GPT point (100 ppb O3)	799.5	694.0	116.6	115.8	1.0070	99.3%
				Average Correction Factor	0.9999	100.0%

Notes:

No adjustments required.

Calibration Performed By:

Denny Ray Estador



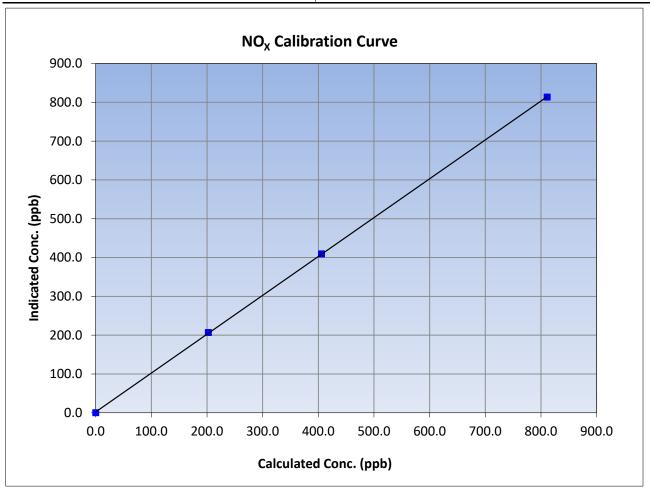
# NO<sub>x</sub> Calibration Summary

Version-04-2020

### **Station Information**

Calibration Date: May 16, 2023 Previous Calibration: April 28, 2023 Station Name: Conklin Station Number: AMS21 Start Time (MST): 9:41 End Time (MST): 13:35 Analyzer serial #: Analyzer make: Thermo 42i 1501663731

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.2		Correlation Coefficient	0.999973	≥0.995
811.2	813.5	0.9972	Correlation Coefficient	0.999973	20.333
405.7	409.4	0.9909	Slope	1.001335	0.90 - 1.10
202.3	206.7	0.9788	Slope	1.001555	0.90 - 1.10
			Intercept	2.164394	+/-20





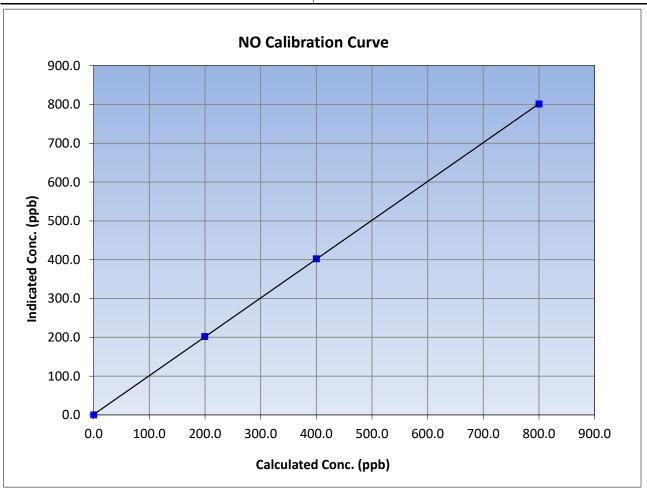
### **NO Calibration Summary**

Version-04-2020

### **Station Information**

Calibration Date: May 16, 2023 Previous Calibration: April 28, 2023 Station Name: Conklin Station Number: AMS21 Start Time (MST): 9:41 End Time (MST): 13:35 Analyzer make: Thermo 42i Analyzer serial #: 1501663731

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999990	≥0.995
800.1	801.3	0.9985	Correlation Coefficient	0.999990	20.333
400.1	402.3	0.9946	Slope	1.000766	0.90 - 1.10
199.6	202.0	0.9879	Slope	1.000700	0.30 - 1.10
			Intercept	1.181398	+/-20





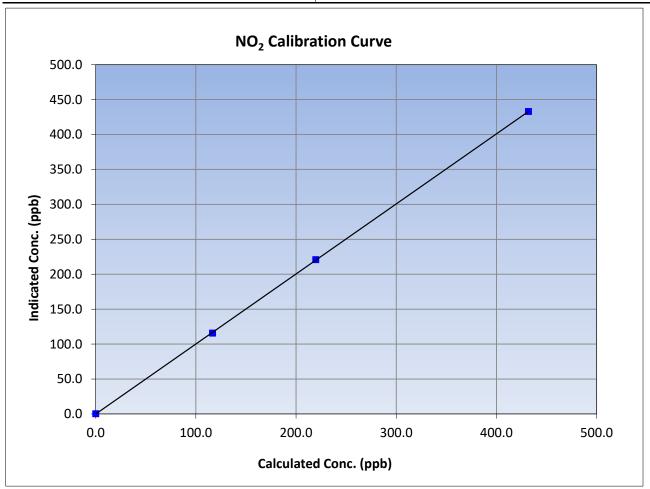
# NO<sub>2</sub> Calibration Summary

Version-04-2020

### **Station Information**

Calibration Date: May 16, 2023 Previous Calibration: April 28, 2023 Station Name: Conklin Station Number: AMS21 Start Time (MST): 9:41 End Time (MST): 13:35 Analyzer serial #: Analyzer make: Thermo 42i 1501663731

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.2		Correlation Coefficient	0.999984	≥0.995
432.0	432.9	0.9980	Correlation Coefficient	0.555504	20.999
219.7	220.9	0.9946	Slope	1.002657	0.90 - 1.10
116.6	115.8	1.0070	Зюре	1.002037	0.90 - 1.10
	<u> </u>		Intercept	-0.146701	+/-20

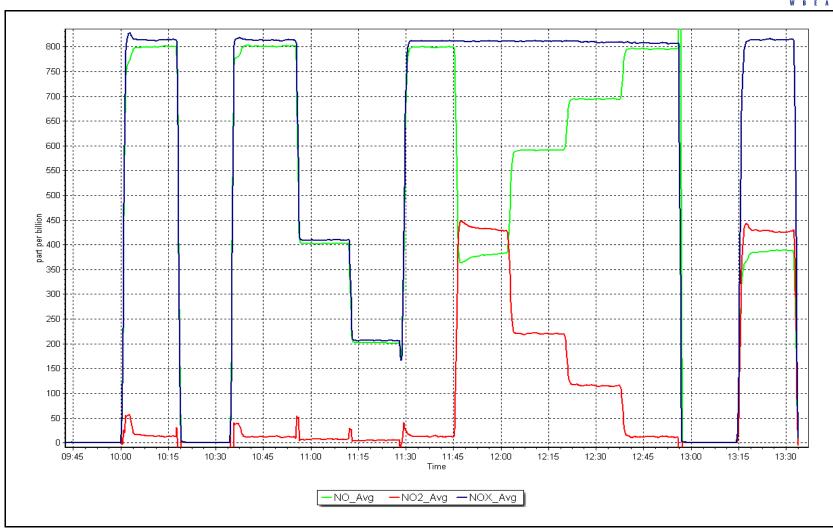


NO<sub>x</sub> Calibration Plot

Date: May 16, 2023

Location: Conklin







# O<sub>3</sub> Calibration Report

Station number: AMS21

Version-01-2020

**Station Information** 

Station Name: Conklin

Calibration Date: May 9, 2023 Last Cal Date: April 14, 2023 Start time (MST): 9:02 End time (MST): 12:05

Start time (MST): 9:02 Reason: Routine

**Calibration Standards** 

O3 generation mode: Photometer

Baseline Corr 3rd AF pt:

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 1.002194 Backgd or Offset: Calibration slope: 0.999857 -1.2 -1.2 Coeff or Slope: 1.002 Calibration intercept: 0.700000 0.656000 1.002

### O<sub>3</sub> 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	944.3	400.0	400.1	1.000
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.1	
high point	5000	946.2	400.0	401.0	0.998
second point	5000	803.2	200.0	201.9	0.991
third point	5000	705.0	100.0	101.4	0.986
as left zero	5000	0.0	0.0	-0.3	
as left span	5000	936.0	400.0	401.0	0.998
			Averag	ge Correction Factor	0.991
Baseline Corr As found:	400.2	Previous respons	e 400.6	*% change	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope	<u>;</u> :	AF Intercept:	

AF Correlation:

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

NA

\* = > +/-5% change initiates investigation



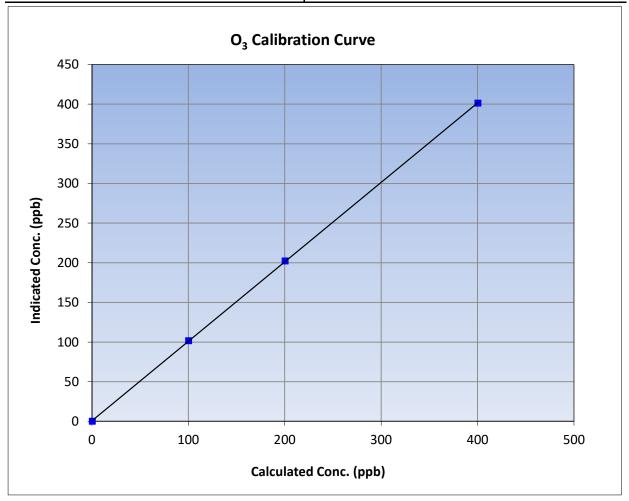
# O<sub>3</sub> Calibration Summary

Version-01-2020

### **Station Information**

Calibration Date: May 9, 2023 **Previous Calibration:** April 14, 2023 Station Name: Conklin Station Number: AMS21 Start Time (MST): 9:02 End Time (MST): 12:05 Analyzer make: Thermo 49i Analyzer serial #: 1501663734

Calibration Data						
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>	
0.0	-0.1		Correlation Coefficient	0.999979	≥0.995	
400.0	401.0	0.9975	Correlation Coefficient	0.333373	20.993	
200.0	201.9	0.9906	Slope	1.002194	0.90 - 1.10	
100.0	101.4	0.9862	Siope	1.002194	0.90 - 1.10	
			Intercept	0.656000	+/- 5	

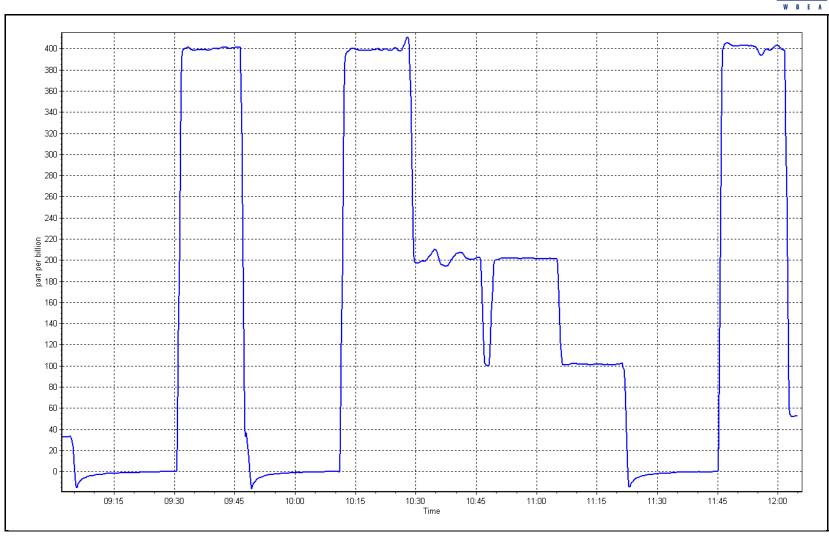


O<sub>3</sub> Calibration Plot

Date: May 9, 2023

Location: Conklin







# **T640 PM<sub>2.5</sub> CALIBRATION**

Version-01-2023

		Station Information	1		
Station Name:	Conklin		Station number:	AMS 21	
Calibration Date:	May 23, 2023		Last Cal Date:	April 28, 2023	
Start time (MST):	12:00		End time (MST):	12:25	
Analyzer Make:	API T640X		S/N:	1597	
Particulate Fraction:	PM2.5				
Flow Meter Make/Model:	DeltaCal		S/N:	954	
Temp/RH standard:	DeltaCal		S/N:	954	
		Monthly Calibration To	est		
<u>Parameter</u>	As found	Measured	<u>As left</u>	<u>Adjusted</u>	(Limits)
T (°C)	8.4	8.1	8.4		+/- 2 °C
P (mmHg)	710.1	710.5	710.1		+/- 10 mmHg
flow (LPM)	5.03	5.08	5.03		+/- 0.25 LPM
Leak Test:	Date of check:	May 23, 2023	Last Cal Date:	May 23, 2023	_
	PM w/o HEPA:	23.1	PM w/ HEPA:	0	<0.2 ug/m3
Note: this leak check will be			erve as the pre ma	intenance leak check	
Inlet cleaning:	Inlet Head	4			
		Quarterly Calibration T	est		
<u>Parameter</u>	As found	Post maintenance	As left	<u>Adjusted</u>	(Limits)
PMT Peak Test					10.9 +/- 0.5
Post-maintenance Date Optical Cham		PM w/o HEPA:		w/ HEPA:	40.2/2
Date Optical Chair Disposable Filte	•				<0.2 ug/m3
Disposable Filte	r changea.				
		Annual Maintenance	e		
Date Sample Tul	,				
Date RH/T Senso	or Cleaned:				
Notes:	Install Cali	bration. No adjustments	made. Inspected ir	nlet head; relatively cl	ean.
Calibration by:	Denny Ray Estador				



# **T640 PM<sub>2.5</sub> CALIBRATION**

Version-01-2023

		Station Information				
Station Name:	Conklin		Station number:	AMS 21		
Calibration Date:	May 24, 2023		Last Cal Date:		23	
Start time (MST):	11:25		End time (MST):	11:40		
Analyzer Make:	API T640X		S/N:	1597		
Particulate Fraction:	PM2.5					
Flow Meter Make/Model:	DeltaCal		S/N:	954		
Temp/RH standard:	DeltaCal		S/N:	954		
		Monthly Calibration Te	est			
<u>Parameter</u>	As found	Measured	<u>As left</u>		<u>Adjusted</u>	(Limits)
T (°C)	15.9	15.8	15.9			+/- 2 °C
P (mmHg)	707.4	708	707.4			+/- 10 mmHg
flow (LPM)	5	5.03	5			+/- 0.25 LPM
Leak Test:	Date of check:	May 24, 2023	Last Cal Date:	May 23	3, 2023	
	PM w/o HEPA:	20.1	PM w/ HEPA:	(		<0.2 ug/m3
Note: this leak check will be			erve as the pre mai	ntenance l	eak check	
Inlet cleaning:	Inlet Head	<b>✓</b>				
		Quarterly Calibration T	est			
<u>Parameter</u>	As found	Post maintenance	As left		Adjusted	(Limits)
PMT Peak Test	10.9	NA	10.9			10.9 +/- 0.5
Post-maintenance	leak check:	PM w/o HEPA:	20.1	w/ HEPA:		0
Date Optical Chamb		NA	20.1	W/ IILI A.		<0.2 ug/m3
Disposable Filter		NA	_			<b>.</b>
		Annual Maintenance	2			
Date Sample Tub	e Cleaned:					
Date RH/T Senso						
NI - 1		No adjustments made las	nacted inlat has de	rolatival	loon	
Notes:	!	No adjustments made. Ins	spected inlet head;	relatively o	lean.	



## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

> AMS22 JANVIER MAY 2023

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

June 30, 2023

# W B F A

# **Wood Buffalo Environmental Association**

## **SO<sub>2</sub> Calibration Report**

Version-01-2020

#### **Station Information**

Station Name:JanvierStation number:AMS 22Calibration Date:May 17, 2023Last Cal Date:April 26, 2023Start time (MST):10:24End time (MST):13:45

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

**Finish Finish** Start Start Calibration slope: 0.998121 1.000578 Backgd or Offset: 21.8 21.3 0.998 Calibration intercept: 0.804418 0.744403 Coeff or Slope: 1.003

## SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow 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	79.8	799.8	801.1	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	
high point	4920	79.8	799.8	800.5	0.999
second point	4960	39.9	399.9	402.0	0.995
third point	4980	20.0	200.4	201.0	0.997
as left zero	5000	0.0	0.0	0.5	
as left span	4920	79.8	799.8	803.4	0.996
·			Averag	ge Correction Factor	0.997
Baseline Corr As found:	800.90	Previous response	799.09	*% change	0.2%

Baseline Corr As found: 800.90 Previous response 799.09 \*% change 0.2%
Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept:
Baseline Corr 3rd AF pt: NA AF Correlation:

\* = > +/-5% change initiates investigation

Notes: Inlet filter changed after as founds. Adjusted span only.

Calibration Performed By: Rene Chamberland



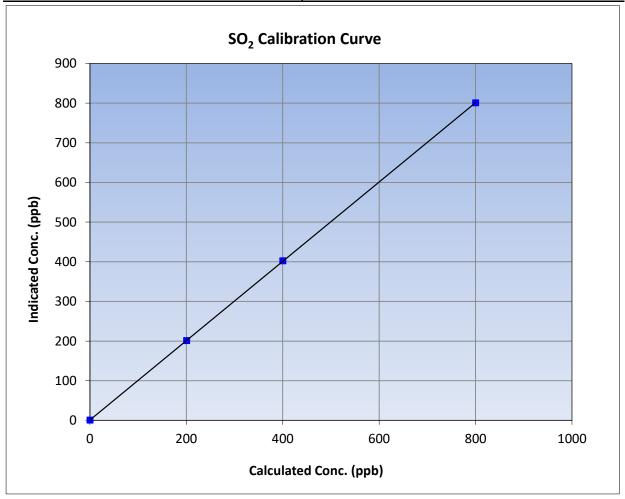
# **SO<sub>2</sub> Calibration Summary**

Version-01-2020

## **Station Information**

Calibration Date: May 17, 2023 **Previous Calibration:** April 26, 2023 Station Name: Janvier Station Number: AMS 22 Start Time (MST): 10:24 End Time (MST): 13:45 Analyzer make: Thermo 43i Analyzer serial #: 1152430006

Calibration Data									
Calculated concentration Indicated concentration (ppb) (Cc) (ppb) (Ic)		Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>				
0.0	0.4		Correlation Coefficient	0.999995	≥0.995				
799.8	800.5	0.9991	Correlation Coefficient	0.55555	20.995				
399.9	402.0	0.9947	Slope	1.000578	0.90 - 1.10				
200.4	201.0	0.9972	Siope	1.000576	0.90 - 1.10				
			Intercept	0.744403	+/-30				



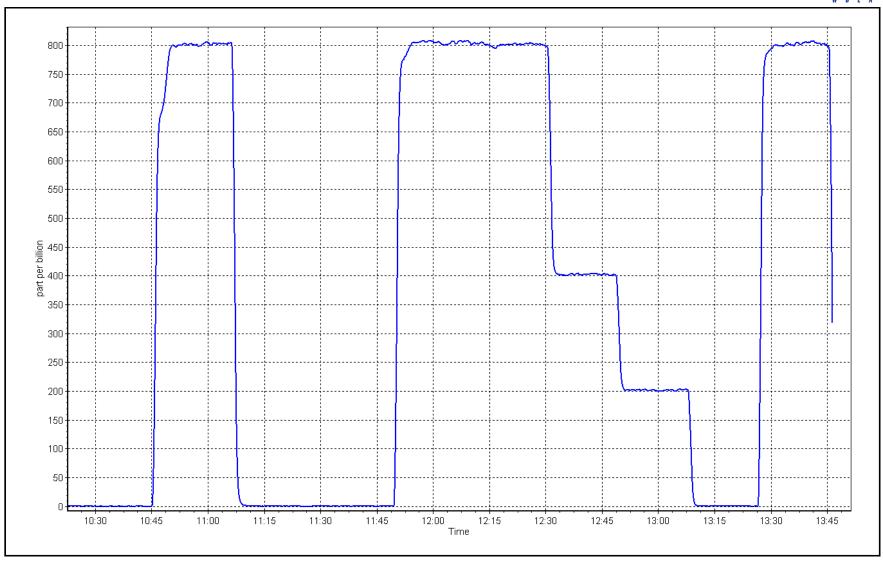
**SO2 Calibration Plot** 

Date:

May 17, 2023

Location: Janvier





## **TRS Calibration Report**

Version-11-2021

**Station Information** 

Station Name: Janvier Calibration Date: May 24, 2023 Start time (MST): 10:30 Reason: Routine

Station number: AMS22 Last Cal Date: April 25, 2023 End time (MST): 15:18

**Calibration Standards** 

Cal Gas Concentration: Cal Gas Exp Date: April 16, 2022 5.03 ppm

Cal Gas Cylinder #: DT0018680

Removed Cal Gas Conc: 5.03 Rem Gas Exp Date: NA ppm Removed Gas Cyl #: Diff between cyl: NA

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 serial #: 587 Converter make: CDN-101

Analyzer Range 0 - 100 ppb

<u>Start</u> **Finish** <u>Finish</u> <u>Start</u> 0.999363 0.997220 Backgd or Offset: Calibration slope: 5.95 6.33 Calibration intercept: -0.038984 0.161030 Coeff or Slope: 1.022 1.071

**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	0.7	
as found span	4920	79.5	80.0	84.1	0.959
as found 2nd point	4960	39.8	40.0	42.9	0.949
as found 3rd point	4980	19.9	20.0	21.8	0.949
new cylinder response					

#### **TRS Calibration Data**

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)  Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	0.1	
high point	4920	79.5	80.0	79.9	1.001
second point	4960	39.8	40.0	40.1	0.999
third point	4980	19.9	20.0	20.2	0.991
as left zero	5000	0.0	0.0	0.2	
as left span	4920	79.5	80.0	79.8	1.002
SO2 Scrubber Check	4920	79.8	798.0	0.0	
Date of last scrubber ch	ange:	_	_	Ave Corr Factor	0.997
Date of last converter e	fficiency test:				efficiency

Date of last scrubber change:	Ave Corr Factor	0.997	
Date of last converter efficiency test:		efficiency	

Baseline Corr As found: 83.4 79.90 Prev response: \*% change: 4.2% Baseline Corr 2nd AF pt: 42.2 AF Slope: 1.042376 AF Intercept: 0.880046 Baseline Corr 3rd AF pt: 21.1 AF Correlation: 0.999963 \* = > +/-5% change initiates investigation

Changed out the inlet filter after as founds. Scrubber check passed. Adjusted both zero and span. Notes:

Calibration Performed By: Rene Chamberland



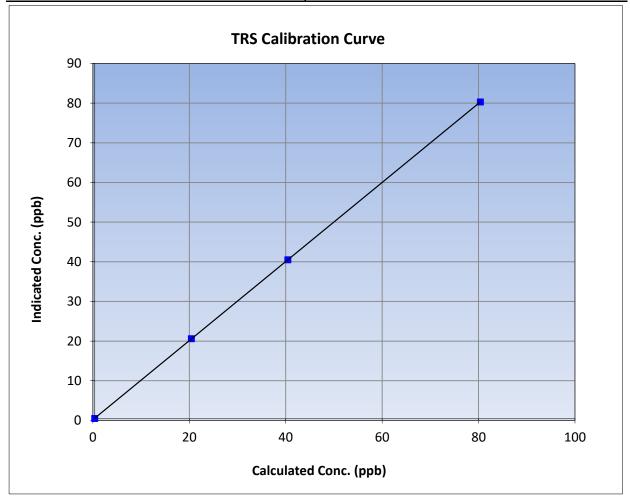
## **TRS Calibration Summary**

Version-11-2021

## **Station Information**

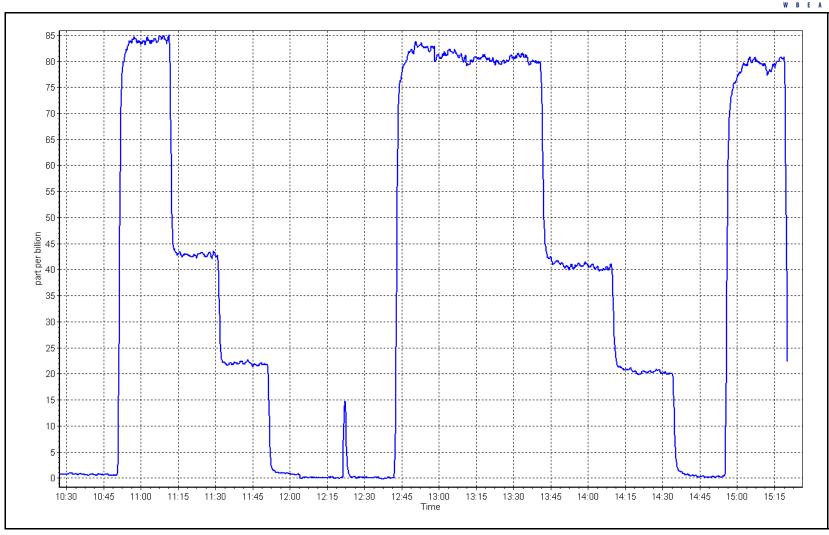
**Previous Calibration:** Calibration Date: May 24, 2023 April 25, 2023 Station Name: Station Number: AMS22 Janvier Start Time (MST): 10:30 End Time (MST): 15:18 Analyzer make: Thermo 43i-TLE Analyzer serial #: 1151680031

Calibration Data									
Calculated concentration Indicated concentration (ppb) (Cc) (ppb) (Ic)		Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>				
0.0	0.1		Correlation Coefficient	0.999997	≥0.995				
80.0	79.9	1.0011	Correlation coefficient	0.555557	20.993				
40.0	40.1	0.9985	Slope	0.997220	0.90 - 1.10				
20.0	20.2	0.9911	Slope	0.997220	0.90 - 1.10				
			- Intercept	0.161030	+/-3				



Date: May 24, 2023 Location: Janvier







## THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

#### **Station Information**

Station Name: Janvier
Calibration Date: May 17, 2023
Start time (MST): 10:24

Reason: Routine

Station number: AMS 22 Last Cal Date: April 26, 2023

End time (MST): 13:45

Removed Gas Expiry: N/A

## **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 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<sub>4</sub>): 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

<u>Start</u> <u>Finish</u> <u>Start</u> <u>Finish</u>

CH4 SP Ratio: 2.150E-04 2.160E-04 NMHC SP Ratio: 4.45E-05 4.48E-05 CH4 Retention time: 13.20 13.40 NMHC Peak Area: 205602 204301

## **THC Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (C	Cc) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	79.8	17.17	17.38	0.988
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4920	79.8	17.17	17.19	0.999
second point	4960	39.9	8.59	8.59	1.000
third point	4980	20.0	4.30	4.28	1.006
as left zero	5000	0.0	0.00	0.00	
as left span	4920	79.8	17.17	17.19	0.999
			А	Average Correction Factor	1.002
Baseline Corr AF:	17.38	Prev response	17.19	*% change	1.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

		NMHC Calibr			
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i> .
as found zero	5000	0	0.00	0.00	
as found span	4920	79.8	9.15	9.20	0.995
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	9.14	1.001
second point	4960	39.9	4.57	4.57	1.002
third point	4980	20.0	2.29	2.27	1.012
as left zero	5000	0	0.00	0.00	
as left span	4920	79.8	9.15	9.09	1.007
			Avera	age Correction Factor	1.005
Baseline Corr AF:	9.20	Prev response	9.15	*% change	0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiate	es investigation
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i>
		CH4 Calibra			
		Source gas flow rate	Calc conc (ppm) (Cc)		CF <i>Limit= 0.95-1.0</i> 5
as found zero	5000	Source gas flow rate 0.0	Calc conc (ppm) (Cc) 0.00	0.00	
as found zero as found span		Source gas flow rate	Calc conc (ppm) (Cc)		
as found zero as found span as found 2nd point	5000	Source gas flow rate 0.0	Calc conc (ppm) (Cc) 0.00	0.00	
as found zero as found span as found 2nd point as found 3rd point	5000	Source gas flow rate 0.0	Calc conc (ppm) (Cc) 0.00	0.00	
as found zero as found span as found 2nd point as found 3rd point new cylinder response	5000 4920	Source gas flow rate 0.0 79.8	Calc conc (ppm) (Cc) 0.00 8.03	0.00 8.18	0.982
as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero	5000 4920 5000	Source gas flow rate 0.0 79.8	Calc conc (ppm) (Cc) 0.00 8.03	0.00 8.18	0.982
as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero nigh point	5000 4920 5000 4920	0.0 79.8 0.0 79.8	Calc conc (ppm) (Cc) 0.00 8.03  0.00 8.03	0.00 8.18 0.00 8.06	0.982  0.996
as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero nigh point second point	5000 4920 5000 4920 4960	0.0 79.8 0.0 79.8 0.0 79.8 39.9	Calc conc (ppm) (Cc) 0.00 8.03  0.00 8.03 4.01	0.00 8.18 0.00 8.06 4.02	0.982  0.996 0.998
as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero high point second point third point	5000 4920 5000 4920 4960 4980	0.0 79.8 0.0 79.8 0.0 79.8 39.9 20.0	0.00 8.03 0.00 8.03 0.00 8.03 4.01 2.01	0.00 8.18 0.00 8.06 4.02 2.01	0.982  0.996 0.998 1.000
as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero high point second point third point as left zero	5000 4920 5000 4920 4960 4980 5000	0.0 79.8 0.0 79.8 0.0 79.8 39.9 20.0 0.0	0.00 8.03 0.00 8.03 0.00 8.03 4.01 2.01 0.00	0.00 8.18 0.00 8.06 4.02 2.01 0.00	0.982  0.996 0.998 1.000
as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero high point second point third point as left zero	5000 4920 5000 4920 4960 4980	0.0 79.8 0.0 79.8 0.0 79.8 39.9 20.0	0.00 8.03  0.00 8.03  0.00 8.03 4.01 2.01 0.00 8.03	0.00 8.18 0.00 8.06 4.02 2.01 0.00 8.10	0.982  0.996 0.998 1.000  0.991
as found zero as found span as found 2nd point as found 3rd point as left zero as left span	5000 4920 5000 4920 4960 4980 5000 4920	0.0 79.8 0.0 79.8 0.0 79.8 39.9 20.0 0.0 79.8	Calc conc (ppm) (Cc) 0.00 8.03  0.00 8.03 4.01 2.01 0.00 8.03 Avera	0.00 8.18 0.00 8.06 4.02 2.01 0.00 8.10 age Correction Factor	0.982  0.996 0.998 1.000  0.991 0.998
as found zero as found span as found 2nd point as found 3rd point as left zero as left zero as left span Baseline Corr AF:	5000 4920 5000 4920 4960 4980 5000 4920 8.18	0.0 79.8  0.0 79.8  0.0 79.8  39.9 20.0 0.0 79.8  Prev response	0.00 8.03  0.00 8.03  0.00 8.03 4.01 2.01 0.00 8.03	0.00 8.18 0.00 8.06 4.02 2.01 0.00 8.10 age Correction Factor	0.982  0.996 0.998 1.000  0.991
as found zero as found span as found 2nd point as found 3rd point as found point as calibrator zero as left zero as left span  Baseline Corr AF: Baseline Corr 2nd AF:	5000 4920 5000 4920 4960 4980 5000 4920 8.18 NA	0.0 79.8  0.0 79.8  0.0 79.8  39.9 20.0 0.0 79.8  Prev response AF Slope:	Calc conc (ppm) (Cc) 0.00 8.03  0.00 8.03 4.01 2.01 0.00 8.03 Avera	0.00 8.18  0.00 8.06 4.02 2.01 0.00 8.10 age Correction Factor *% change AF Intercept:	0.982  0.996 0.998 1.000  0.991 0.998 1.6%
as found zero as found span as found 2nd point as found 3rd point as found point as left zero as left span Baseline Corr AF: Baseline Corr 2nd AF:	5000 4920 5000 4920 4960 4980 5000 4920 8.18	O.0 79.8  O.0 79.8  O.0 79.8  39.9 20.0 0.0 79.8  Prev response AF Slope: AF Correlation:	0.00 8.03  0.00 8.03  0.00 8.03 4.01 2.01 0.00 8.03 Avera	0.00 8.18 0.00 8.06 4.02 2.01 0.00 8.10 age Correction Factor	0.982  0.996 0.998 1.000  0.991 0.998 1.6%
as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero high point second point third point as left zero as left span  Baseline Corr AF: Baseline Corr 2nd AF:	5000 4920 5000 4920 4960 4980 5000 4920 8.18 NA	0.0 79.8  0.0 79.8  0.0 79.8  39.9 20.0 0.0 79.8  Prev response AF Slope:	0.00 8.03  0.00 8.03  0.00 8.03 4.01 2.01 0.00 8.03 Avera	0.00 8.18  0.00 8.06 4.02 2.01 0.00 8.10 age Correction Factor *% change AF Intercept:	0.982  0.996 0.998 1.000  0.991 0.998 1.6%
as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero high point second point third point as left zero as left span  Baseline Corr AF: Baseline Corr 2nd AF:	5000 4920 5000 4920 4960 4980 5000 4920 8.18 NA	O.0 79.8  O.0 79.8  O.0 79.8  39.9 20.0 0.0 79.8  Prev response AF Slope: AF Correlation:	0.00 8.03  0.00 8.03  0.00 8.03 4.01 2.01 0.00 8.03 Avera	0.00 8.18  0.00 8.06 4.02 2.01 0.00 8.10 age Correction Factor *% change AF Intercept:	0.982  0.996 0.998 1.000  0.991 0.998 1.6%
as found zero as found span as found 2nd point as found 3rd point as found point as calibrator zero as left zero as left span  Baseline Corr AF: Baseline Corr 2nd AF:	5000 4920 5000 4920 4960 4980 5000 4920 8.18 NA	O.0 79.8  O.0 79.8  O.0 79.8  39.9 20.0 0.0 79.8  Prev response AF Slope: AF Correlation: Calibration	0.00 8.03  0.00 8.03  0.00 8.03 4.01 2.01 0.00 8.03 Avera	0.00 8.18  0.00 8.06 4.02 2.01 0.00 8.10 age Correction Factor *% change AF Intercept: * = > +/-5% change initiate	0.982  0.996 0.998 1.000  0.991 0.998 1.6%
as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero high point second point third point as left zero as left span  Baseline Corr AF: Baseline Corr 2nd AF: Baseline Corr 3rd AF:	5000 4920 5000 4920 4960 4980 5000 4920 8.18 NA	O.0 79.8  O.0 79.8  O.0 79.8  39.9 20.0 0.0 79.8  Prev response AF Slope: AF Correlation: Calibration Start	0.00 8.03  0.00 8.03  0.00 8.03 4.01 2.01 0.00 8.03 Avera	0.00 8.18  0.00 8.06 4.02 2.01 0.00 8.10 age Correction Factor *% change AF Intercept: * = > +/-5% change initiate	0.982  0.996 0.998 1.000  0.991 0.998 1.6%

Notes: Changed the inlet filter and N2/H2 cylinders after as founds. Adjusted span only.

-0.017966

1.001328

-0.014032

Calibration Performed By: Rene Chamberland

CH4 Cal Offset:

NMHC Cal Slope:

NMHC Cal Offset:

-0.005170

0.999528

-0.009829



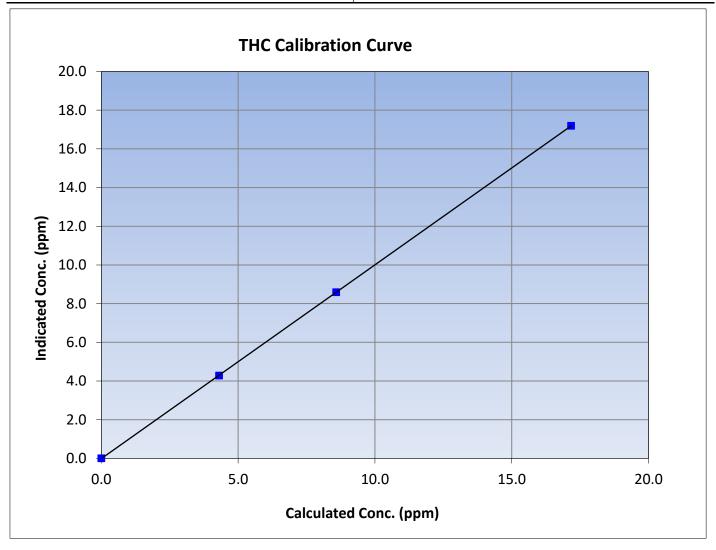
# **THC Calibration Summary**

Version-01-2020

## **Station Information**

Calibration Date: May 17, 2023 **Previous Calibration:** April 26, 2023 Station Name: Janvier Station Number: AMS 22 Start Time (MST): 10:24 End Time (MST): 13:45 Analyzer make: Thermo 55i Analyzer serial #: 1172750023

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999996	≥0.995
17.17	17.19	0.9988	Correlation Coefficient	0.555550	20.333
8.59	8.59	0.9999	Slope	1.001793	0.90 - 1.10
4.30	4.28	1.0062	Slope	1.001793	0.90 - 1.10
			Intercept	-0.014598	+/-0.5





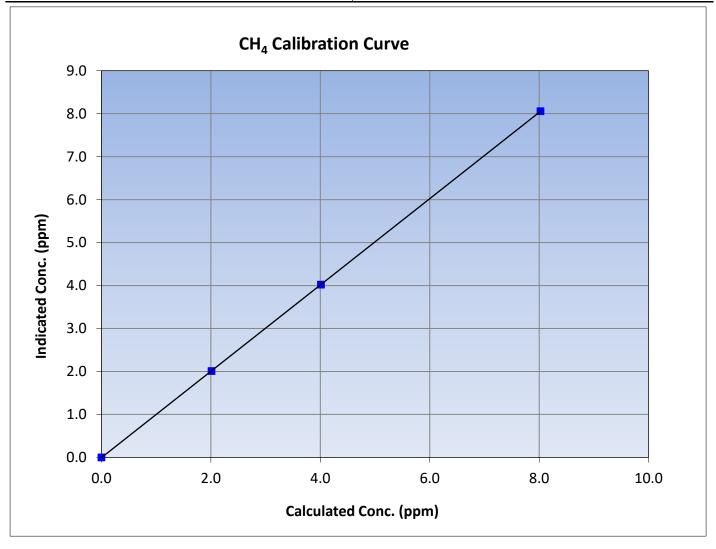
# **CH<sub>4</sub> Calibration Summary**

Version-01-2020

## **Station Information**

Calibration Date: May 17, 2023 **Previous Calibration:** April 26, 2023 Station Name: Janvier Station Number: AMS 22 Start Time (MST): 10:24 End Time (MST): 13:45 Analyzer make: Thermo 55i Analyzer serial #: 1172750023

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999998	≥0.995
8.03	8.06	0.9959	Correlation Coemicient	0.999996	20.993
4.01	4.02	0.9981	Slope	1.004345	0.90 - 1.10
2.01	2.01	1.0001	Slope	1.004343	0.90 - 1.10
			Intercept	-0.005170	+/-0.5





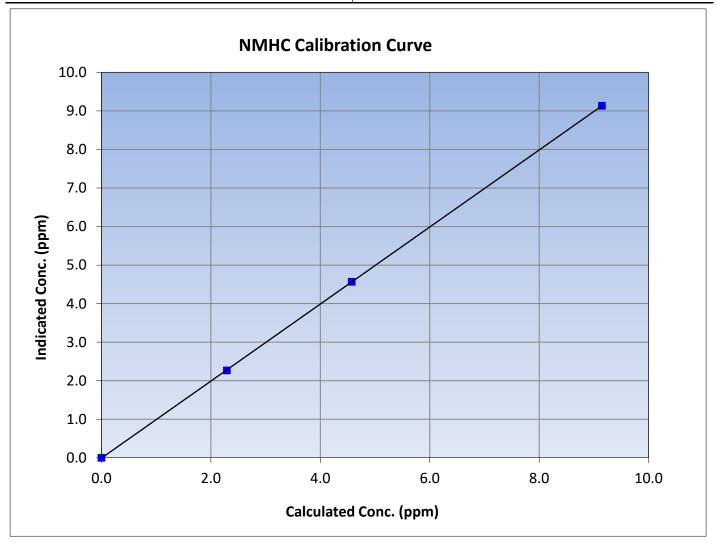
# **NMHC Calibration Summary**

Version-01-2020

## **Station Information**

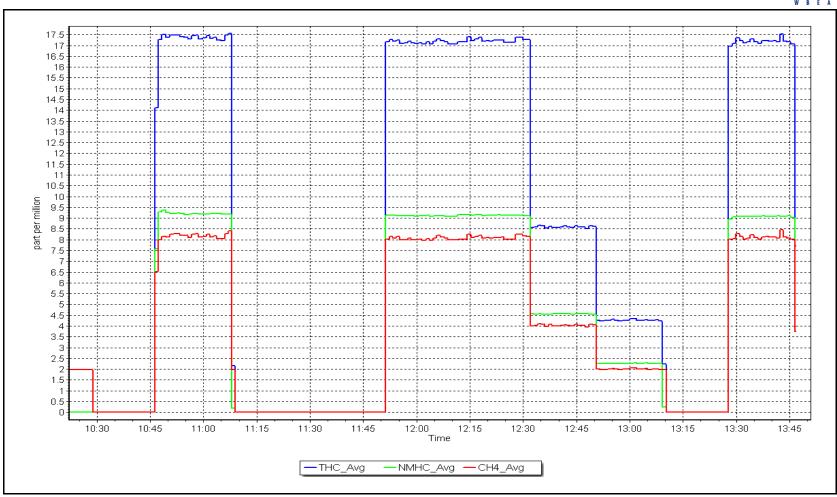
Calibration Date: May 17, 2023 **Previous Calibration:** April 26, 2023 Station Name: Janvier Station Number: AMS 22 Start Time (MST): 10:24 End Time (MST): 13:45 Analyzer make: Thermo 55i Analyzer serial #: 1172750023

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999992	≥0.995
9.15	9.14	1.0013	Correlation Coefficient	0.999992	20.555
4.57	4.57	1.0018	Slope	0.999528	0.90 - 1.10
2.29	2.27	1.0117	Slope	0.333326	0.90 - 1.10
			Intercept	-0.009829	+/-0.5



NMHC Calibration Plot Date: May 17, 2023 Location: Janvier







# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

#### **Station Information**

Station Name: Janvier
Calibration Date: May 2, 2023
Start time (MST): 10:28
Reason: Routine

Station number: AMS 22 Last Cal Date: April 27, 2023 End time (MST): 16:02

#### **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: Teledyne API T200 Analyzer serial #: 7117

NOX Range (ppb): 0 - 1000 ppb

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.012	1.013	NO bkgnd or offset:	4.8	0.6
NOX coeff or slope:	1.002	1.002	NOX bkgnd or offset:	5.9	2.2
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	5.1	5.1

#### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	0.999487	0.999801
NO <sub>x</sub> Cal Offset:	0.688544	0.228682
NO Cal Slope:	0.999800	0.999815
NO Cal Offset:	-0.271133	-0.151058
NO <sub>2</sub> Cal Slope:	1.003470	1.001797
NO <sub>2</sub> Cal Offset:	0.116060	0.161197



# $NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

				Dile	ution Calibratio	n Data				
Set Point	Dilution flow rate (sccm)	Source gas flow	alculated 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	2.3	-2.4	4.7		
as found span	4918	82.3	799.9	799.9	0.0	799.9	794.1	5.9	1.0000	1.0073
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	4918	82.3	799.9	799.9	0.0	799.8	799.7	0.1	1.0001	1.0003
second point	4959	41.2	400.4	400.4	0.0	400.8	400.0	0.8	0.9991	1.0011
third point	4980	20.6	200.2	200.2	0.0	200.7	200.1	0.7	0.9975	1.0005
as left zero	5000	0.0	0.0	0.0	0.0	0.0	-0.2	0.2		
as left span	4918	82.3	799.9	399.8	400.1	797.4	397.7	399.7	1.0031	1.0053
							Average C	Correction Factor	r 0.9989	1.0006
Corrected As fo	ound NO <sub>X</sub> =	797.6 ppb	NO =	796.5 ppb	* = > +/-5	% change initiates	investigation	*Percent Chan	ge NO <sub>X</sub> =	-0.3%
Previous Respo	onse NO <sub>X</sub> =	800.2 ppb	NO =	799.5 ppb				*Percent Chan	ge NO =	-0.4%
Baseline Corr 2	2nd pt $NO_X =$	NA ppb	NO =	NA ppb	As found	d $NO_X r^2$ :		Nx SI:	Nx Int:	•
Baseline Corr 3	Brd pt $NO_X =$	NA ppb	NO =	NA ppb	As found	d NO r <sup>2</sup> :		NO SI:	NO Int:	,
					As found	d $NO_2 r^2$ :		NO2 SI:	NO <sub>2</sub> Int:	
				e	GPT Calibration	Data				
O3 Setpo	oint (ppb)	Indicated NO Referer concentration (ppb		cated NO Drop entration (ppb)	Calculated NC concentration (pp		ndicated NO2 ntration (ppb) (Ic)	NO2 Correction fa Calibration Limit = As Found Limit = 0	= 0.95-1.05	erter Efficiency on Limit = 96-104%
as found	l GPT zero							·		
as found GPT po	int (400 ppb NO2)									
as found GPT po	int (200 ppb NO2)									
as found GPT po	int (100 ppb NO2)									
1st GPT poin	t (400 ppb O3)	796.2		396.1	400.1		400.9	0.9980	0	100.2%
2nd GPT poin	nt (200 ppb O3)	796.2		597.2	199.0		199.6	0.9970	0	100.3%
3rd GPT poin	t (100 ppb O3)	796.2		696.8	99.4		99.9	0.9950	0	100.5%
						Average Co	orrection Factor	r 0.9967	7	100.3%

Notes:

Changed the inlet filter after as founds. Changed out the ZAG charcoal and purafil scrubbers. Adjusted both zero and span.

Calibration Performed By:

Rene Chamberland



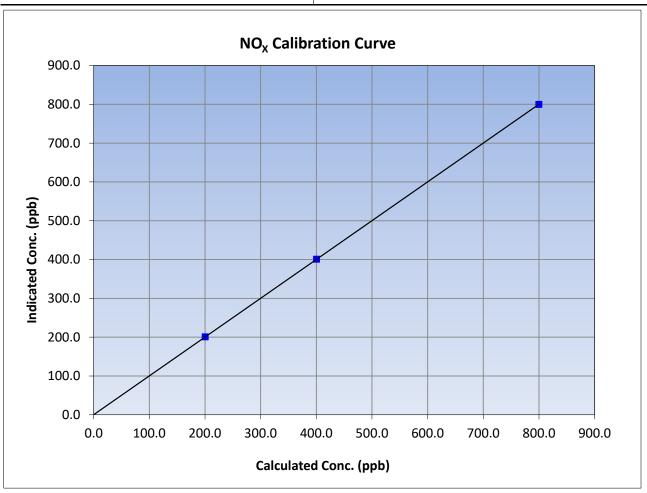
## NO<sub>x</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 2, 2023 Previous Calibration: April 27, 2023 Station Name: Janvier Station Number: AMS 22 Start Time (MST): 10:28 End Time (MST): 16:02 Analyzer serial #: Analyzer make: Teledyne API T200 7117

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	-0.1		Correlation Coefficient	0.999999	≥0.995
799.9	799.8	1.0001	Correlation Coefficient	0.555555	20.555
400.4	400.8	0.9991	Slope	0.999801	0.90 - 1.10
200.2	200.7	0.9975	Slope	0.999601	0.90 - 1.10
			Intercept	0.228682	+/-20





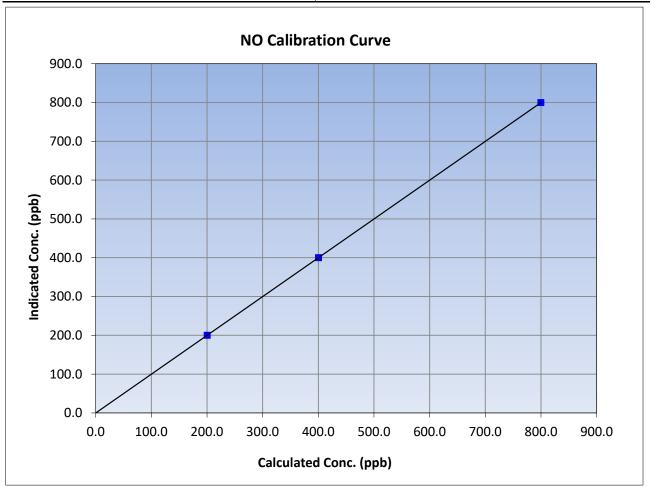
## **NO Calibration Summary**

Version-04-2020

#### **Station Information**

Calibration Date: May 2, 2023 Previous Calibration: April 27, 2023 Station Name: Janvier Station Number: AMS 22 Start Time (MST): 10:28 End Time (MST): 16:02 Analyzer make: Teledyne API T200 Analyzer serial #: 7117

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	-0.1		Correlation Coefficient	1.000000	≥0.995
799.9	799.7	1.0003	Correlation Coefficient	1.000000	20.333
400.4	400.0	1.0011	Slope	0.999815	0.90 - 1.10
200.2	200.1	1.0005	Зюре	0.555615	0.90 - 1.10
			Intercept	-0.151058	+/-20





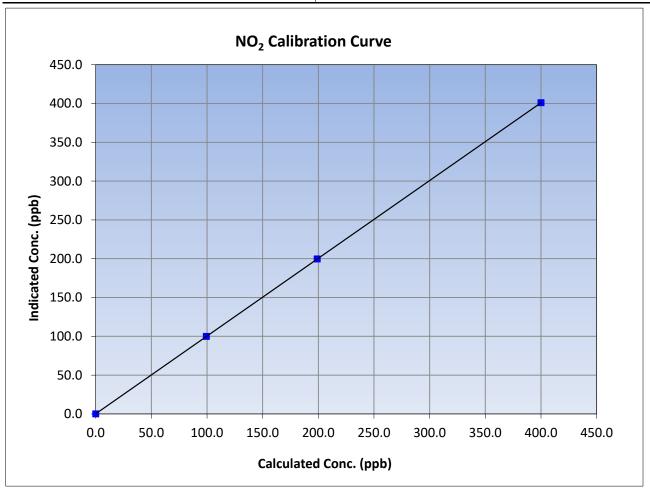
## NO<sub>2</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 2, 2023 Previous Calibration: April 27, 2023 Station Name: Janvier Station Number: AMS 22 Start Time (MST): 10:28 End Time (MST): 16:02 Analyzer serial #: Analyzer make: Teledyne API T200 7117

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999999	≥0.995
400.1	400.9	0.9980	Correlation Coefficient	0.555555	20.555
199.0	199.6	0.9970	Slope	1.001797	0.90 - 1.10
99.4	99.9	0.9950	Slope	1.001797	
			Intercept	0.161197	+/-20

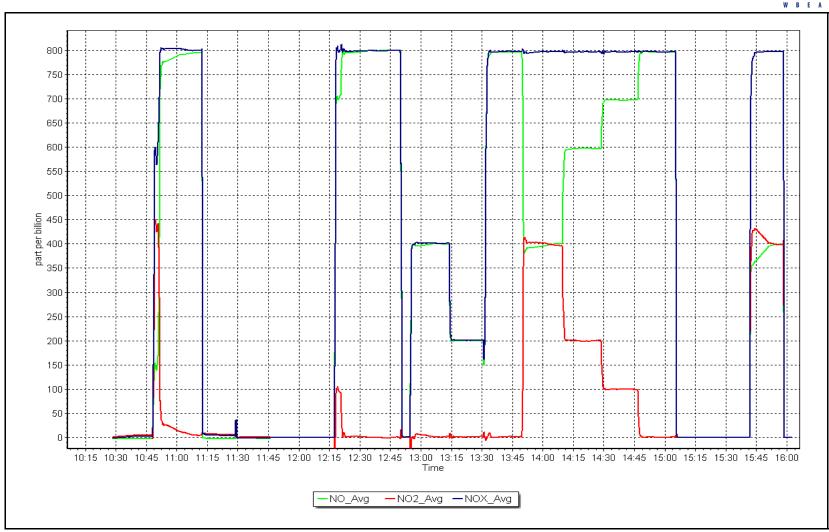


NO<sub>x</sub> Calibration Plot

Date: May 2, 2023

Location: Janvier







# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

#### **Station Information**

Station Name: Janvier
Calibration Date: May 3, 2023
Start time (MST): 10:09
Reason: Install

Station number: AMS 22 Last Cal Date: NA End time (MST): 15:42

#### **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

<u>Start</u> **Finish Finish Start** NO coeff or slope: 1.303 NO bkgnd or offset: 3.4 NOX coeff or slope: 0.988 NOX bkgnd or offset: 4.3 NO2 coeff or slope: 1.000 Reaction cell Press: 189.8

#### **Calibration Statistics**

 Start
 Finish

 NO<sub>X</sub> Cal Slope:
 0.999560

 NO<sub>X</sub> Cal Offset:
 1.487988

 NO Cal Slope:
 0.999544

 NO Cal Offset:
 0.468701

 NO<sub>2</sub> Cal Slope:
 0.998379

 NO<sub>2</sub> Cal Offset:
 0.058523



# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

				Dil	ution Calibratio	n Data				
Set Point	Dilution flow rate (sccm)	Source gas flow		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/lc) 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					·			<u> </u>		
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1		
high point	4918	82.3	799.9	799.9	0.0	800.1	799.8	0.2	0.9998	1.0001
second point	4959	41.2	400.4	400.4	0.0	403.0	400.9	2.1	0.9937	0.9989
third point	4980	20.6	200.2	200.2	0.0	202.9	201.1	1.8	0.9867	0.9956
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1		
as left span	4918	82.3	799.9	397.1	402.8	803.0	399.0	404.1	0.9961	0.9953
							Average C	Correction Factor	r 0.9934	0.9982
Corrected As fo	ound NO <sub>X</sub> =	NA ppb	NO = NA	A ppb	* = > +/-5°	% change initiates i	investigation	*Percent Chang	ige NO <sub>X</sub> =	NA
Previous Respo	onse NO <sub>x</sub> =	NA ppb	NO = NA	A ppb				*Percent Chang	ige NO =	NA
Baseline Corr 2	and pt NO <sub>X</sub> =	NA ppb	NO = NA	A ppb	As found	d $NO_X r^2$ :		Nx SI:	Nx Int:	
Baseline Corr 3		NA ppb	NO = NA	A ppb	As found	d NO r <sup>2</sup> :		NO SI:	NO Int:	
					As found	d $NO_2 r^2$ :		NO2 SI:	NO <sub>2</sub> Int:	
				•	GPT Calibration I	Data				
O3 Setpo	int (ppb)	Indicated NO Referer concentration (ppb		ed NO Drop ration (ppb)	Calculated NC concentration (ppl		ndicated NO2 ntration (ppb) (Ic)	NO2 Correction fa Calibration Limit = As Found Limit = 0	= 0.95-1.05 Calibratio	erter Efficiency on Limit = 96-104%
as found	GPT zero									
as found GPT poir	nt (400 ppb NO2)									
as found GPT poir	nt (200 ppb NO2)									
as found GPT poir	nt (100 ppb NO2)									
1st GPT point	(400 ppb O3)	799.3	30	96.5	402.8		402.2	1.0015	5	99.9%
2nd GPT point	(200 ppb O3)	799.3	60	00.1	199.2		198.8	1.0020	0	99.8%
	(400  - 02)	799.3	7′	01.8	97.5		97.7	0.9980	0 ,	100.2%
3rd GPT point	(100 ppb O3)	799.3		01.0	57.5		37.7	0.550	<u> </u>	100.270

Notes:

Installing a new NOx analyzer due to unstable zeros. Inlet filter was changed yesterday. Adjusted both zero and span.

Calibration Performed By:

Rene Chamberland



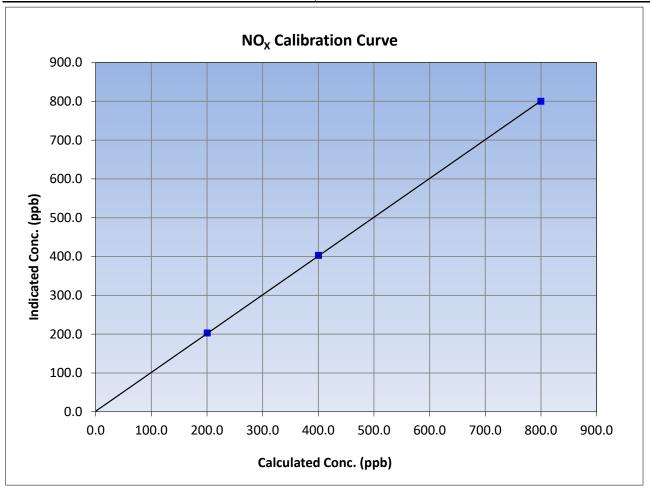
## NO<sub>x</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 3, 2023 Previous Calibration: NA Station Name: Janvier Station Number: AMS 22 Start Time (MST): 10:09 End Time (MST): 15:42 Analyzer serial #: Analyzer make: Thermo 42i 1218153460

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	-0.1		Correlation Coefficient	0.999981	≥0.995
799.9	800.1	0.9998	Correlation Coefficient	0.555561	20.993
400.4	403.0	0.9937	Slope	0.999560	0.90 - 1.10
200.2	202.9	0.9867	Slope	0.999500	
			Intercept	1.487988	+/-20





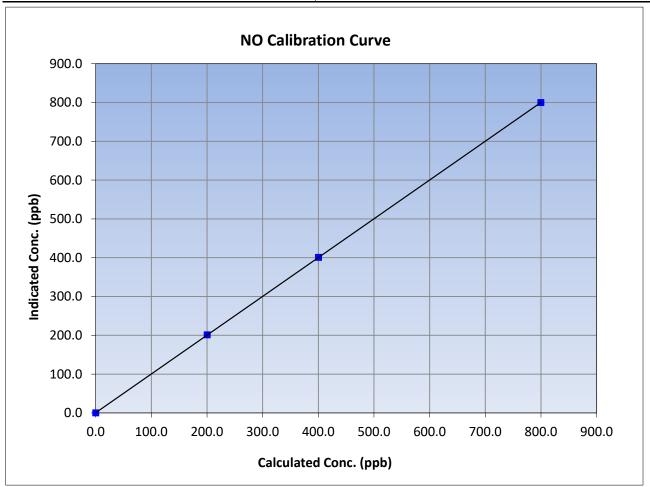
## **NO Calibration Summary**

Version-04-2020

#### **Station Information**

Calibration Date: May 3, 2023 Previous Calibration: NA Station Name: Janvier Station Number: AMS 22 Start Time (MST): 10:09 End Time (MST): 15:42 Analyzer make: Thermo 42i Analyzer serial #: 1218153460

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999998	≥0.995
799.9	799.8	1.0001	Correlation Coefficient	0.555556	20.993
400.4	400.9	0.9989	Slope	0.999544	0.90 - 1.10
200.2	201.1	0.9956	Slope	0.999544	0.90 - 1.10
			Intercept	0.468701	+/-20





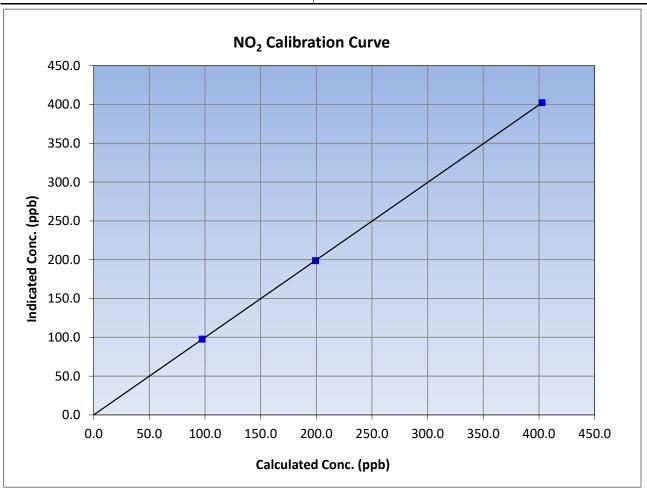
## NO<sub>2</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 3, 2023 Previous Calibration: NA Station Name: Janvier Station Number: AMS 22 Start Time (MST): 10:09 End Time (MST): 15:42 Analyzer make: Thermo 42i Analyzer serial #: 1218153460

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	-0.1		Correlation Coefficient	0.999998	≥0.995
402.8	402.2	1.0015	Correlation Coefficient	0.55555	20.555
199.2	198.8	1.0020	Slope	0.998379	0.90 - 1.10
97.5	97.7	0.9980	Slope	0.996579	0.90 - 1.10
			Intercept	0.058523	+/-20

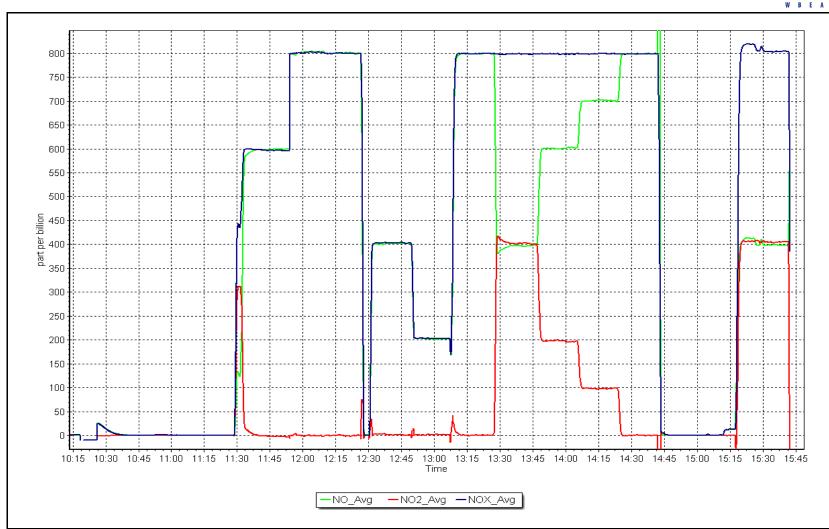


NO<sub>x</sub> Calibration Plot

Date: May 3, 2023

Location: Janvier







## O<sub>3</sub> Calibration Report

Version-01-2020

Station Information

Station Name: Janvier Calibration Date: May 30, 2023

Start time (MST): 10:08 Reason: Routine Station number: AMS 22 Last Cal Date: April 26, 2023

End time (MST): 13:23

**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 Range 0 - 500 ppb

Analyzer serial #: 3869

Start Finish

Start Finish Backgd or Offset: -2.0 Calibration slope: 1.007857 1.006657 -2.0 Coeff or Slope: Calibration intercept: 0.800000 0.560000 1.011 1.011

#### O<sub>3</sub> Calibration Data

Set Point	Total air flow rate	Calibrator Lamp	Calculated	Indicated concentration	Correction factor (Cc/Ic)
Set Foint	(sccm)	Voltage Drive	concentration (ppb) (Cc)	(ppm) (Ic)	Limit = 0.95-1.05
as found zero	5000	800.0	0.0	-0.1	
as found span	4893	899.1	400.0	402.9	0.993
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	-0.1	
high point	4893	899.1	400.0	402.8	0.993
second point	4893	753.4	200.0	202.5	0.988
third point	4893	655.7	100.0	101.7	0.983
as left zero	5000	800.0	0.0	0.2	
as left span	4816	899.1	400.0	406.9	0.983
			Avera	ge Correction Factor	0.988
Baseline Corr As found:	403.0	Previous response	e 403.9	*% change	-0.2%

Baseline Corr 2nd AF pt: AF Slope: AF Intercept: NA

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: **Braiden Boutilier** 



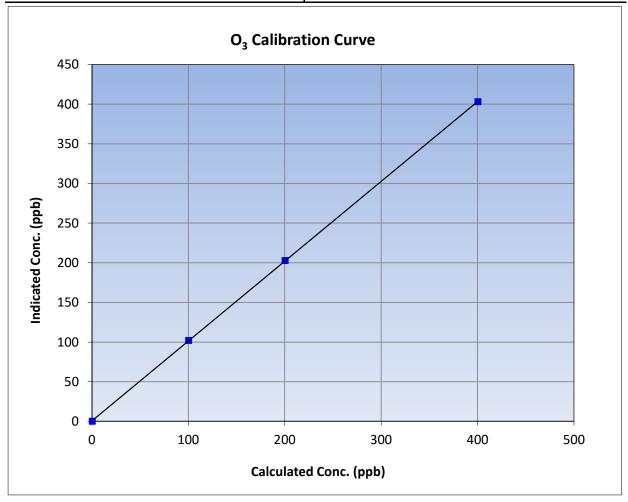
# O<sub>3</sub> Calibration Summary

Version-01-2020

## **Station Information**

Calibration Date: May 30, 2023 **Previous Calibration:** April 26, 2023 Station Name: Station Number: AMS 22 Janvier Start Time (MST): 10:08 End Time (MST): 13:23 Analyzer make: Teledyne API T400 Analyzer serial #: 3869

Calibration Data							
Calculated concentration Indicated concentration (ppb) (Cc) (ppb) (Ic)		Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>		
0.0	-0.1		Correlation Coefficient	0.999986	≥0.995		
400.0	402.8	0.9930	Correlation Coefficient	0.555500	20.333		
200.0	202.5	0.9877	Slope	1.006657	0.90 - 1.10		
100.0	101.7	0.9833	Slope	1.000037	0.90 - 1.10		
			Intercept	0.560000	+/- 5		

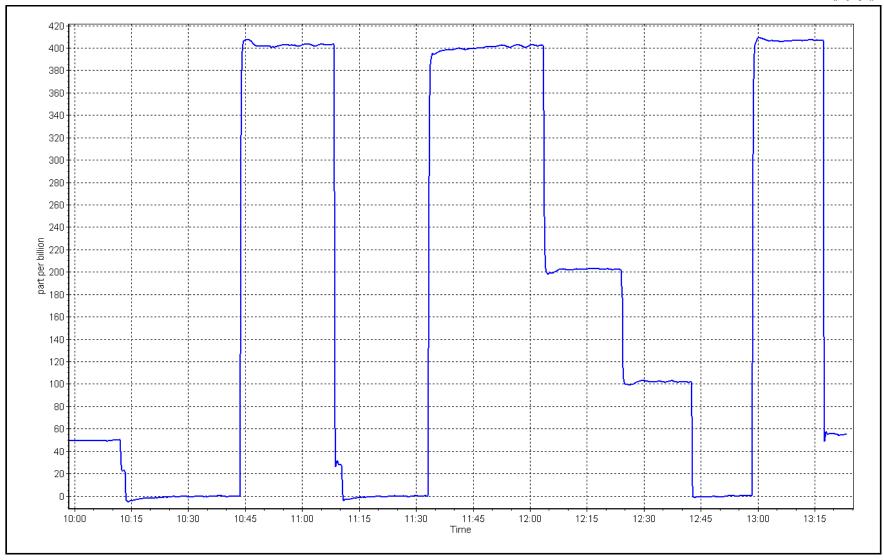


O<sub>3</sub> Calibration Plot

Date: May 30, 2023

Location: Janvier







# **T640 PM<sub>2.5</sub> CALIBRATION**

Version-01-2023

		Station Information	n			
Station Name:	Janvier		Station number:	AMS 22		
Calibration Date:	May 30, 2023		Last Cal Date:	April 27, 20	123	
Start time (MST):	11:15		End time (MST):	13:28		
Analyzer Make:	Teledyne API T640		S/N:	325		
Particulate Fraction:	PM2.5					
Flow Meter Make/Model:	Alicat FP-25		S/N:	388750		
Temp/RH standard:	Alicat FP-25		S/N:	388750		
		Monthly Calibration T	est			
<u>Parameter</u>	As found	Measured	As left		<u>Adjusted</u>	(Limits)
T (°C)	23.8	23.62	23.8			+/- 2 °C
P (mmHg)	712.5	713.29	712.5			+/- 10 mmHg
flow (LPM)	5.02	5.080	5.02			+/- 0.25 LPM
Leak Test:	Date of check:	May 30, 2023	Last Cal Date:	April 27	7, 2023	
	PM w/o HEPA:	12.6	PM w/ HEPA:	C		<0.2 ug/m3
Note: this leak check will be			serve as the pre mai	ntenance le	eak check	
Inlet cleaning:	Inlet Head					
		Quarterly Calibration	Fost			
Darameter	As found	•			Adjusted	(Limits)
<u>Parameter</u>	<u>AS TOUTIU</u>	Post maintenance	<u>As left</u>		<u>Adjusted</u>	
PMT Peak Test						11.3 +/- 0.5
Post-maintenance	e leak check:	PM w/o HEPA:		w/ HEPA:		
Date Optical Cham	nber Cleaned:	April 27, 2	2023	•		<0.2 ug/m3
Disposable Filte	r Changed:	April 27, 2	2023			
		Annual Maintenanc	e			
Date Sample Tube Cleaned:		October 6, 2022				
Date RH/T Senso	or Cleaned:	October 6,	2022			
Notes:	Verif	ied flow, temperature, and pro	essure. No adjustments	made. Leak te	est passed.	
Calibration by:	Braiden Boutilier					



## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

> AMS23 FORT HILLS MAY 2023

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

June 30, 2023



## **SO<sub>2</sub> Calibration Report**

Version-01-2020

**Finish** 

Start

#### **Station Information**

Station Name: Fort Hills Station numb
Calibration Date: May 10, 2023 Last Cal Date:
Start time (MST): 9:24 End time (MST)

Reason: Routine

Station number: AMS23 Last Cal Date: April 14, 2023

End time (MST): 12:35

**Calibration Standards** 

Cal Gas Concentration: 49.76

Cal Gas Cylinder #: CC281425

Removed Cal Gas Conc: 49.76

Removed Gas Cyl #: N/A

Calibrator Make/Model: API T700 ZAG Make/Model: API T701 ppm Cal Gas Exp Date: January 5, 2025

Rem Gas Exp Date: N/A

Diff between cyl: Serial Number: 451

Serial Number: 5611

**Analyzer Information** 

Analyzer make: Thermo 43i Analyzer serial #: 1160290012

Analyzer Range 0 - 1000 ppb

Start Finish

ppm

 Calibration slope:
 1.007702
 1.001510
 Backgd or Offset:
 18.5
 17.8

 Calibration intercept:
 -1.064774
 -0.523913
 Coeff or Slope:
 1.053
 1.040

SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow rate	Source gas flow rate	Calculated	Indicated concentration	Correction factor (Cc/Ic)
Sectionic	(sccm)	(sccm)	concentration (ppb) (Cc)	(ppb) (Ic)	Limit = 0.95-1.05
as found zero	5000	0.0	0.0	-0.3	
as found span	4920	80.3	799.1	808.4	0.988
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.2	
high point	4920	80.3	799.1	800.0	0.999
second point	4960	40.2	400.1	399.8	1.001
third point	4980	20.1	200.0	199.6	1.002
as left zero	5000	0.0	0.0	0.0	
as left span	4920	80.3	799.1	802.0	0.996
·			Averag	ge Correction Factor	1.001
Baseline Corr As found:	808 70	Previous response	2 804 19	*% change	0.6%

Baseline Corr As found: 808.70 Previous response 804.19 \*% change 0.6% Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept:

Baseline Corr 3rd AF pt: NA AF Correlation:

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

Calibration Performed By: Max Farrell

\* = > +/-5% change initiates investigation



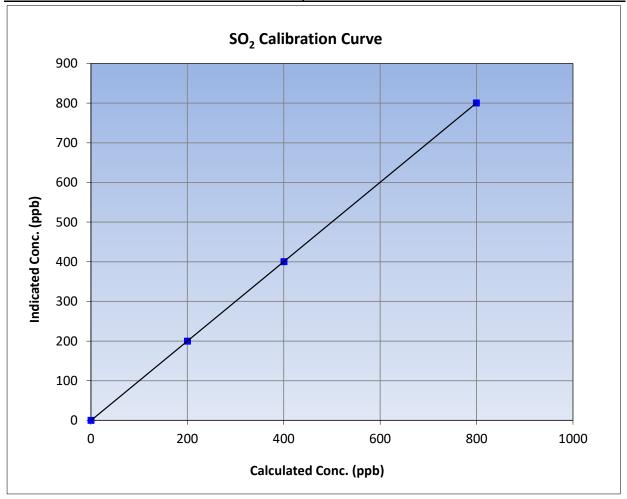
# **SO<sub>2</sub> Calibration Summary**

Version-01-2020

## **Station Information**

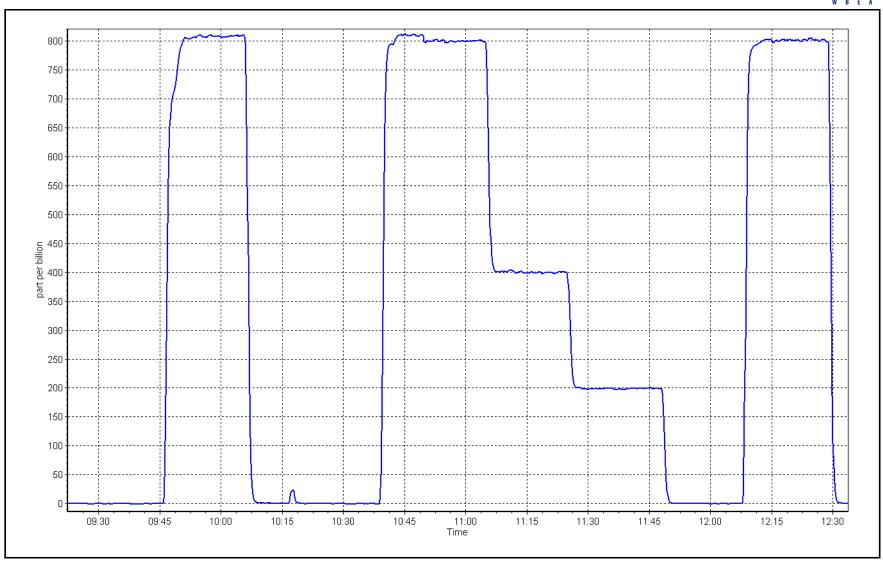
Calibration Date: May 10, 2023 **Previous Calibration:** April 14, 2023 Station Name: Fort Hills Station Number: AMS23 Start Time (MST): 9:24 End Time (MST): 12:35 Analyzer make: Thermo 43i Analyzer serial #: 1160290012

Calibration Data							
Calculated concentration Indicated concentration (ppb) (Cc) (ppb) (Ic)		Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>		
0.0	-0.2		Correlation Coefficient	0.999999	≥0.995		
799.1	800.0	0.9989	Correlation coefficient	0.555555	20.333		
400.1	399.8	1.0006	Slope	1.001510	0.90 - 1.10		
200.0	199.6	1.0022	Slope	1.001310	0.30 - 1.10		
			- Intercept	-0.523913	+/-30		



SO2 Calibration Plot Date: May 10, 2023 Location: Fort Hills







## **TRS Calibration Report**

Version-11-2021

**Station Information** 

Station Name: Fort Hills Calibration Date: May 25, 2023 Start time (MST): 9:24 Reason: Routine

Station number: AMS23 Last Cal Date: April 5, 2023 End time (MST): 13:29

**Calibration Standards** 

Cal Gas Concentration: February 5, 2024 5.20 ppm Cal Gas Exp Date:

Cal Gas Cylinder #: CC517372

Removed Cal Gas Conc: Rem Gas Exp Date: N/A 5.20 ppm Removed Gas Cyl #: Diff between cyl: N/A Calibrator Make/Model: API T700

451 Serial Number: ZAG Make/Model: **API T701** Serial Number: 5611

**Analyzer Information** 

Analyzer make: Thermo 43iQ TLE Analyzer serial #: 1300156232

Converter serial #: 594 Converter make: CDN-101

Analyzer Range 0 - 100 ppb

**Finish** <u>Finish</u> <u>Start</u> <u>Start</u> 1.005029 Backgd or Offset: Calibration slope: 1.003023 1.92 1.92 -0.038092 Calibration intercept: 0.182125 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	79.3	1.008
as found 2nd point	4962	38.5	40.0	39.7	1.005
as found 3rd point	4981	19.2	19.9	19.7	1.007
new cylinder response					

#### **TRS Calibration Data**

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	0.0	
high point	4923	77.0	80.0	80.3	0.996
second point	4962	38.5	40.0	40.4	0.990
third point	4981	19.2	19.9	19.8	1.007
as left zero	5000	0.0	0.0	0.7	
as left span	4923	77.0	80.0	80.4	0.995
SO2 Scrubber Check	4920	80.3	803.0	-0.1	
Date of last scrubber chang	ge:			Ave Corr Factor	0.998
- 41				•	

Date of last scrubber change	er change: Ave Corr Factor				
Date of last converter efficie	ency test:			ef	ficiency
Baseline Corr As found:	79.4	Prev response:	80.43	*% change:	-1.3%

Baseline Corr 2nd AF pt: 39.8 AF Slope: 0.992601 AF Intercept: Baseline Corr 3rd AF pt: AF Correlation: 0.999998 19.8

\* = > +/-5% change initiates investigation

-0.078272

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

Calibration Performed By: Max Farrell



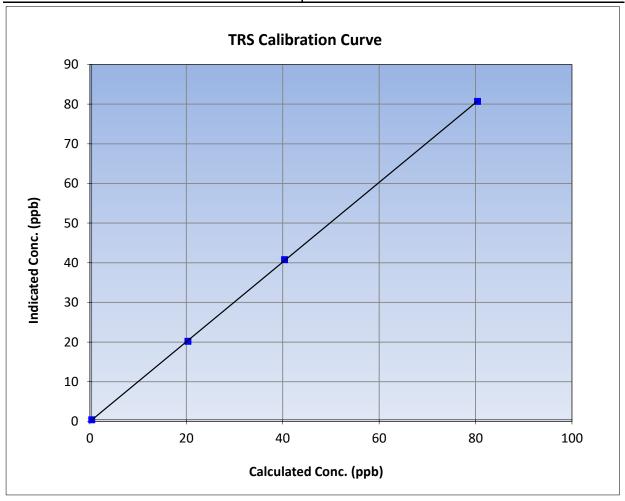
## **TRS Calibration Summary**

Version-11-2021

### **Station Information**

**Previous Calibration:** Calibration Date: May 25, 2023 April 5, 2023 Station Name: Fort Hills Station Number: AMS23 Start Time (MST): 9:24 End Time (MST): 13:29 Analyzer make: Thermo 43iQ TLE Analyzer serial #: 1300156232

Calibration Data									
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>				
0.0	0.0		Correlation Coefficient	0.999970	≥0.995				
80.0	80.3	0.9963	Correlation Coefficient	0.999970	20.993				
40.0	40.4	0.9900	Slope	1.005029	0.90 - 1.10				
19.9	19.8	1.0075	Зюре	1.003029	0.90 - 1.10				
			- Intercept	-0.038092	+/-3				

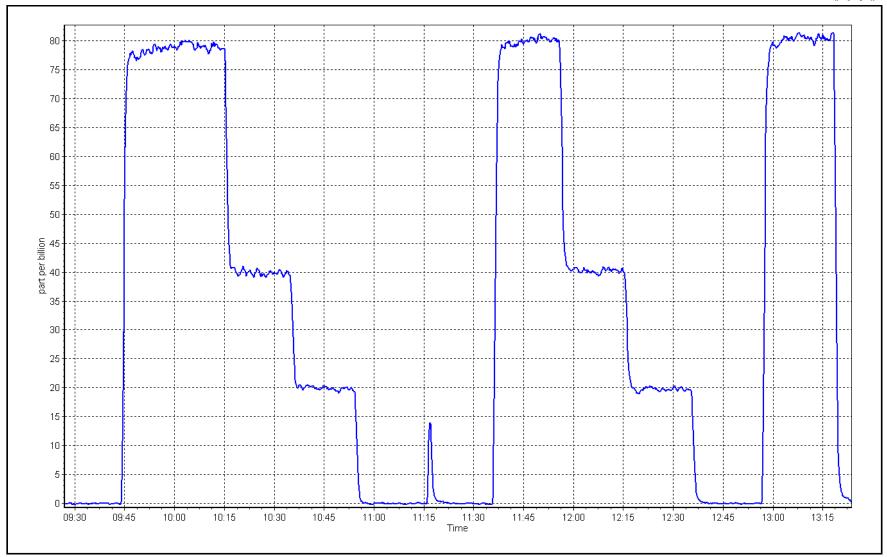


**TRS Calibration Plot** 

Date: May 25, 2023

Location: Fort Hills







CH4 Cal Gas Conc.

## **Wood Buffalo Environmental Association**

## THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

### **Station Information**

Station Name: Fort Hills
Calibration Date: May 10, 2023

Start time (MST): 9:24
Reason: Routine

Station number: AMS23 Last Cal Date: April 14, 2023

End time (MST): 12:35

**Calibration Standards** 

Gas Cert Reference: CC281425 Cal Gas Expiry Date: January 5, 2025

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<sub>4</sub>): 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: NMHC Peak Area: 13.0 13.0 181940 181940

### **THC Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (0	Cc) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>		
as found zero	5000	0.0	0.00	0.00			
as found span	4920	80.3	17.19	17.21	0.999		
as found 2nd point							
as found 3rd point							
new cylinder response							
calibrator zero	5000	0.0	0.00	0.00			
high point	4920	80.3	17.19	17.19	1.000		
second point	4960	40.2	8.61	8.56	1.005		
third point	4980	20.1	4.30	4.29	1.003		
as left zero	5000	0.0	0.00	0.00			
as left span	4920	80.3	17.19	17.15	1.003		
			,	Average Correction Factor	1.003		
Baseline Corr AF:	17.21	Prev response	17.26	*% change	-0.3%		
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:			
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation			



## THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

					VE151011 01 20
		NMHC Calibr	ation Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.3	9.16	9.15	1.001
as found 2nd point	4320	80.3	9.10	9.13	1.001
as found 3rd point					
new cylinder response					
calibrator zero	F000	0.0	0.00	0.00	
	5000 4920	0.0 80.3	0.00 9.16	0.00	
high point	4920 4960	40.2		9.14	1.003 0.997
second point			4.59	4.60	
third point	4980	20.1	2.29	2.32	0.990
as left zero	5000	0.0	0.00	0.00	4.004
as left span	4920	80.3	9.16	9.12	1.004
	0.15			rage Correction Factor	0.997
Baseline Corr AF:	9.15	Prev response	9.20	*% change	-0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
		CH4 Calibra			05.11 11 0.05.40
Set Point as found zero	Dil air flow rate	Source gas flow rate 0.0	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i>
	4920		0.00	0.00 8.07	0.000
as found span	4920	80.3	8.03	8.07	0.996
as found 2nd point					
as found 3rd point					
new cylinder response	F000	0.0	0.00	0.00	
calibrator zero	5000 4920	0.0 80.3	0.00	0.00	
nigh point			8.03	8.05	0.997
second point	4960	40.2	4.02	3.96	1.015
chird point as left zero	4980	20.1	2.01	1.98	1.017
	5000	0.0	0.00	0.00	
as left span	4920	80.3	8.03	8.02	1.001
Danalina Cama A.F.	0.07	Duo		rage Correction Factor	1.010
Baseline Corr AF:	8.07	Prev response	8.06	*% change	0.1%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:  * = > +/-5% change initiat	oo inwestigation
Baseline Corr 3rd AF:	NA	AF Correlation:		= > +/-5% change initiat	es investigation
		Calibration	Statistics		
		<u>Start</u>		<u>Finish</u>	
THC Cal Slope:		1.002839		0.999810	
THC Cal Offset:		0.020787		-0.013170	
CH4 Cal Slope:		1.005380		1.003198	
CH4 Cal Offset:		-0.017654		-0.029231	
NMHC Cal Slope:		1.000647		0.996713	
				0.046060	

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

0.038041

Calibration Performed By: Max Farrell

NMHC Cal Offset:

0.016062



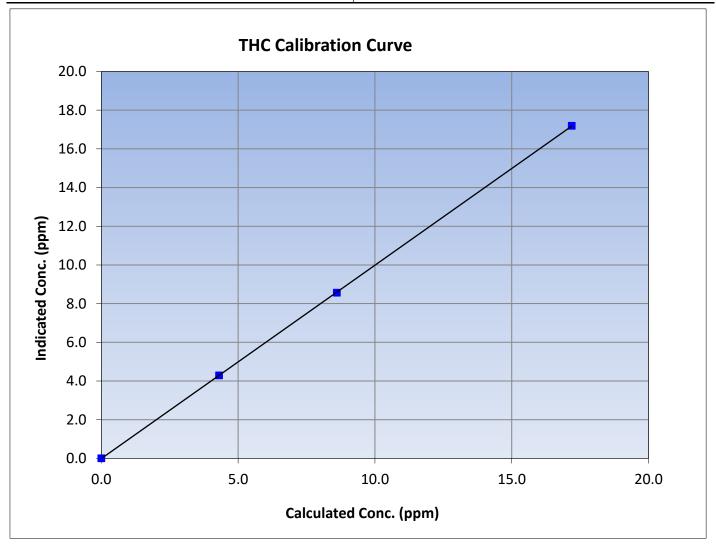
## **THC Calibration Summary**

Version-01-2020

### **Station Information**

Calibration Date: May 10, 2023 **Previous Calibration:** April 14, 2023 Station Name: Fort Hills Station Number: AMS23 Start Time (MST): 9:24 End Time (MST): 12:35 Analyzer make: Thermo 55i Analyzer serial #: 1193585648

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999992	≥0.995
17.19	17.19	1.0001	Correlation Coefficient	0.333332	20.333
8.61	8.56	1.0052	Slope	0.999810	0.90 - 1.10
4.30	4.29	1.0027	Slope	0.999610	0.90 - 1.10
		·	Intercept	-0.013170	+/-0.5





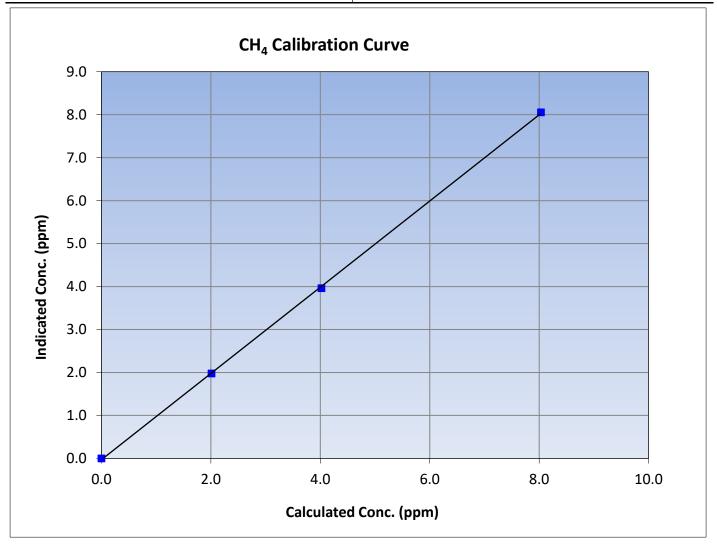
## **CH<sub>4</sub> Calibration Summary**

Version-01-2020

### **Station Information**

Calibration Date: May 10, 2023 **Previous Calibration:** April 14, 2023 Station Name: Fort Hills Station Number: AMS23 Start Time (MST): 9:24 End Time (MST): 12:35 Analyzer make: Analyzer serial #: Thermo 55i 1193585648

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999907	≥0.995
8.03	8.05	0.9975	Correlation Coemicient	0.999907	20.993
4.02	3.96	1.0147	Slope	1.003198	0.90 - 1.10
2.01	1.98	1.0171	Slope	1.003196	0.90 - 1.10
			Intercept	-0.029231	+/-0.5





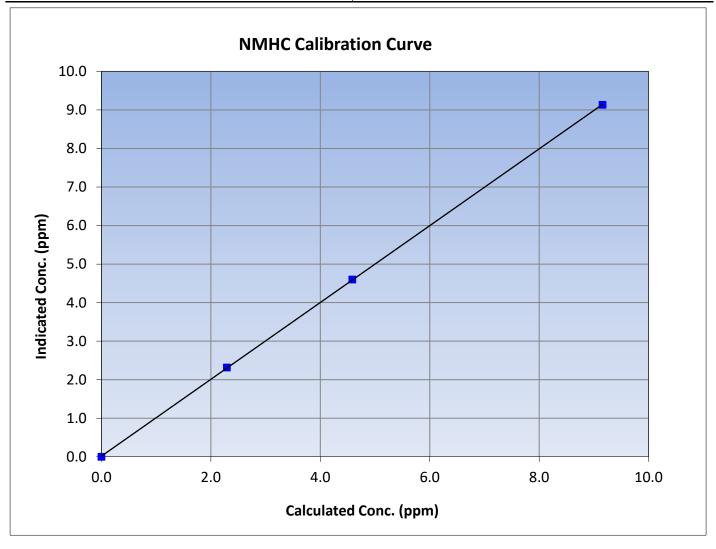
## **NMHC Calibration Summary**

Version-01-2020

### **Station Information**

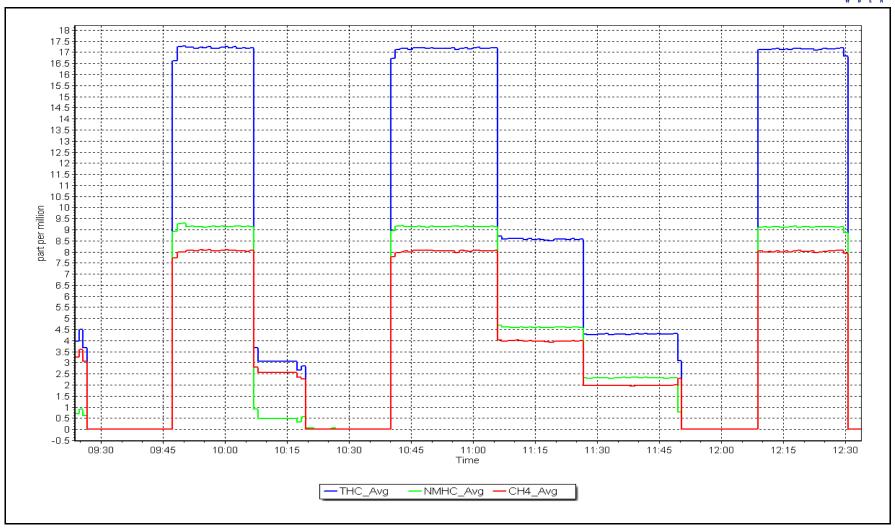
Calibration Date: May 10, 2023 **Previous Calibration:** April 14, 2023 Station Name: Fort Hills Station Number: AMS23 Start Time (MST): 9:24 End Time (MST): 12:35 Analyzer make: Thermo 55i Analyzer serial #: 1193585648

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999985	≥0.995
9.16	9.14	1.0025	Correlation Coemicient	0.999965	20.993
4.59	4.60	0.9973	Slope	0.996713	0.90 - 1.10
2.29	2.32	0.9904	Slope	0.990713	0.90 - 1.10
			Intercept	0.016062	+/-0.5



NMHC Calibration Plot Date: May 10, 2023 Location: Fort Hills







## NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

### **Station Information**

Station Name: Fort Hills
Calibration Date: May 16, 2023

Start time (MST): 9:08
Reason: Routine

Station number: AMS23 Last Cal Date: April 21, 2023

End time (MST): 13:55

### **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

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.065	1.049	NO bkgnd or offset:	2.9	2.9
NOX coeff or slope:	0.995	0.995	NOX bkgnd or offset:	3.2	3.1
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	158.3	160.7

### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	1.003237	0.999094
NO <sub>x</sub> Cal Offset:	0.084507	1.084161
NO Cal Slope:	1.004153	1.000637
NO Cal Offset:	-1.236008	-0.356041
NO <sub>2</sub> Cal Slope:	1.006445	1.001549
NO <sub>2</sub> Cal Offset:	0.589439	-0.718730



## NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

				Dil	ution Calibration	n 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/local Limit = 0.95-1.
as found zero	5000	0.0	0.0	0.0	0.0	0.7	-0.1	0.8		
as found span	4920	80.5	800.2	800.2	0.0	813.3	810.3	3.0	0.984	0.987
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.6	0.0	0.5		
high point	4920	80.5	800.2	800.2	0.0	799.8	800.1	-0.3	1.000	1.000
second point	4960	40.2	399.6	399.6	0.0	402.0	400.5	1.5	0.994	0.998
third point	4980	20.1	199.8	199.8	0.0	200.2	198.4	1.8	0.998	1.007
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1		
as left span	4920	80.5	800.2	441.3	358.9	797.1	439.2	357.9	1.004	1.005
							Average C	Correction Factor	0.997	1.002
Corrected As fo	ound NO <sub>X</sub> =	812.6 ppb	NO =	810.4 ppb	* = > +/-5%	6 change initiates	investigation	*Percent Chang	ge NO <sub>x</sub> =	1.2%
revious Respo	nse NO <sub>x</sub> =	802.8 ppb	NO =	802.3 ppb				*Percent Chang	ge NO =	1.0%
Baseline Corr 2	nd pt NO <sub>X</sub> =	NA ppb	NO =	NA ppb	As found	$I NO_X r^2$ :		Nx SI:	Nx Int:	
Baseline Corr 3	rd pt NO <sub>X</sub> =	NA ppb	NO =	NA ppb	As found	l NO r <sup>2</sup> :		NO SI:	NO Int:	
					As found	$I \qquad NO_2 r^2$ :		NO2 SI:	NO <sub>2</sub> Int:	
				(	iPT Calibration I	Data				
O3 Setpo	int (ppb)	Indicated NO Ref		cated NO Drop entration (ppb)	Calculated NC concentration (ppl		dicated NO2 ntration (ppb) (Ic)	NO2 Correction fac Calibration Limit = As Found Limit = 0	0.95-1.05	rter Efficiency n Limit = 96-104%
as found	GPT zero									
as found GPT poi	nt (400 ppb NO2)									
as found GPT poi	nt (200 ppb NO2)									
as found GPT poi	nt (100 ppb NO2)									
1st GPT point	(400 ppb O3)	799.6		440.7	358.9		359.5	0.998		100.2%

Notes:

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

176.9

90.6

Average Correction Factor

1.008

1.017

1.008

178.4

92.1

Calibration Performed By:

2nd GPT point (200 ppb O3)

3rd GPT point (100 ppb O3)

Max Farrell

621.2

707.5

799.6

799.6

99.2%

98.4%

99.2%



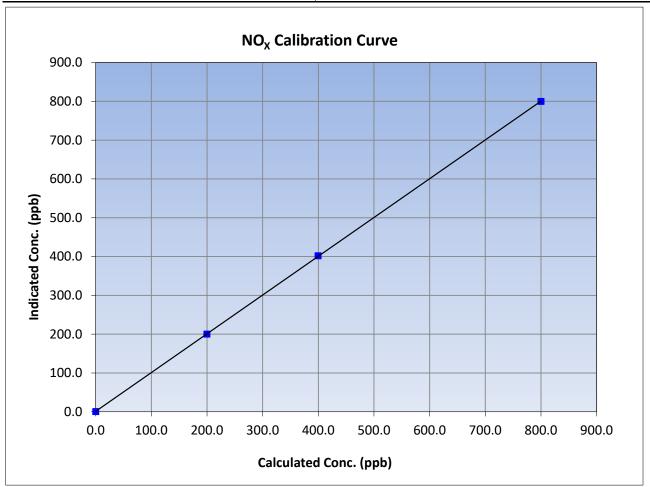
## NO<sub>x</sub> Calibration Summary

Version-04-2020

### **Station Information**

Calibration Date: May 16, 2023 Previous Calibration: April 21, 2023 Station Name: Fort Hills Station Number: AMS23 Start Time (MST): 9:08 End Time (MST): 13:55 Analyzer serial #: Analyzer make: Thermo 42i 1152430007

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.6		Correlation Coefficient	0.999989	≥0.995
800.2	799.8	1.0005	Correlation Coefficient	0.999909	20.555
399.6	402.0	0.9940	Slope	0.999094	0.90 - 1.10
199.8	200.2	0.9980	Slope	0.999094	0.90 - 1.10
			Intercept	1.084161	+/-20





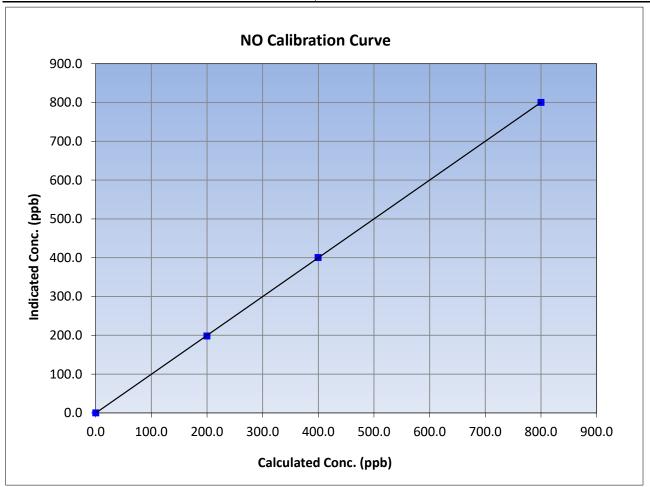
### **NO Calibration Summary**

Version-04-2020

### **Station Information**

Calibration Date: May 16, 2023 Previous Calibration: April 21, 2023 Station Name: Fort Hills Station Number: AMS23 Start Time (MST): 9:08 End Time (MST): 13:55 Analyzer make: Thermo 42i Analyzer serial #: 1152430007

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999993	≥0.995
800.2	800.1	1.0001	Correlation Coefficient	0.555555	20.555
399.6	400.5	0.9977	Slope	1.000637	0.90 - 1.10
199.8	198.4	1.0070	Slope	1.000657	0.90 - 1.10
			Intercept	-0.356041	+/-20





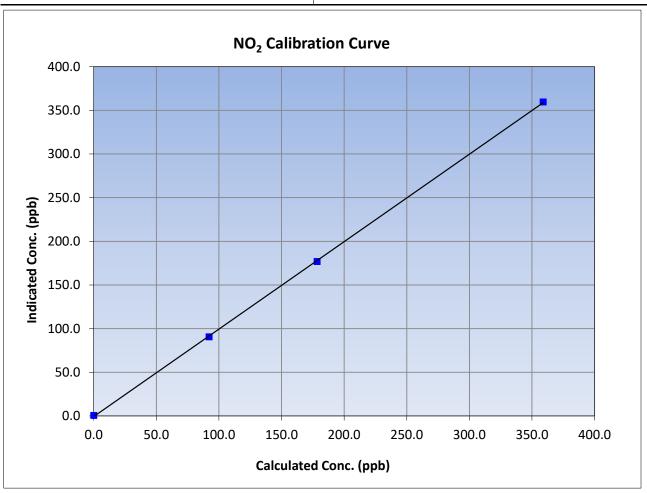
## NO<sub>2</sub> Calibration Summary

Version-04-2020

### **Station Information**

Calibration Date: May 16, 2023 Previous Calibration: April 21, 2023 Station Name: Fort Hills Station Number: AMS23 Start Time (MST): 9:08 End Time (MST): 13:55 Analyzer make: Thermo 42i Analyzer serial #: 1152430007

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.5		Correlation Coefficient	0.999943	≥0.995
358.9	359.5	0.9983	Correlation Coefficient	0.555545	20.555
178.4	176.9	1.0085	Slope	1.001549	0.90 - 1.10
92.1	90.6	1.0166	Slope	1.001549	0.90 - 1.10
			Intercept	-0.718730	+/-20



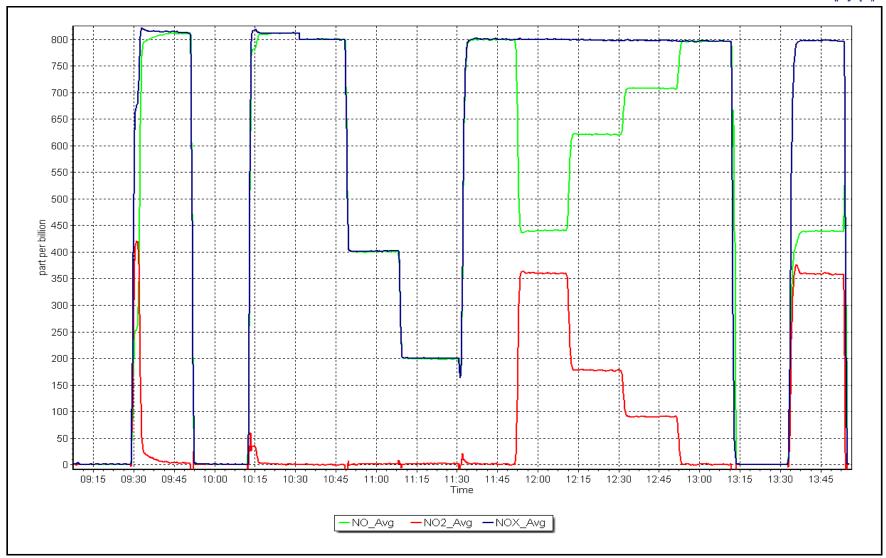
NO<sub>x</sub> Calibration Plot

Date: N

May 16, 2023

Location: Fort Hills







## **T640 PM<sub>2.5</sub> CALIBRATION**

Version-01-2023

		Station Information	l			
Station Name:	Fort Hills		Station number:	AMS 23		
Calibration Date:	May 10, 2023		Last Cal Date:	•	23	
Start time (MST):	12:41		End time (MST):	14:00		
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 To	est			
<u>Parameter</u>	As found	Measured	<u>As left</u>		Adjusted	(Limits)
T (°C)	24.2	23.27	24.2			+/- 2 °C
P (mmHg)	735.06	733.4	735.06			+/- 10 mmHg
flow (LPM)	5.07	5.14	5.07			+/- 0.25 LPM
Leak Test:	Date of check:	May 10, 2023	Last Cal Date:	April 2:	1, 2023	
	PM w/o HEPA:	90.1	PM w/ HEPA:	(		<0.2 ug/m3
Note: this leak check will be			erve as the pre mai	ntenance le	eak check	
Inlet cleaning:	Inlet Head	<b>✓</b>				
		Quarterly Calibration 1	oct			
Parameter	As found				Adjusted	(Limite)
<u>Parameter</u> PMT Peak Test	As found 10.8	Post maintenance 11	<u>As left</u> 11		<u>Adjusted</u>	(Limits) 10.9 +/- 0.5
PIVIT PEAK TEST	10.8	11	11			10.9 +/- 0.5
Post-maintenance	e leak check:	PM w/o HEPA:	80.7	w/ HEPA:		0.0
Date Optical Cham	ber Cleaned:	May 10, 2	023			<0.2 ug/m3
Disposable Filter	Changed:	May 10, 2	023			
		Annual Maintenanc	е			
Date Sample Tub	e Cleaned:	May 10, 2	023			
Date RH/T Senso	or Cleaned:	May 10, 2	023			
Net	Look shock pass	ed, no adjustments need	lad Campleted ave	rtorly and	annual main	onanco
Notes:	Leak Check pass	eu, no aujustments neet	ieu. Compieted qua	irteriy and i	amudi mam	enance.
6 HI						
Calibration by:	Max Farrell					



### WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

## AMS25 WASKŌW OHCI PIMÂTISIWIN MAY 2023

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

June 30, 2023



## **SO<sub>2</sub> Calibration Report**

Version-01-2020

### **Station Information**

Station number: Station Name: Waskow ohci Pimatisiwin AMS25 April 11, 2023 Calibration Date: May 10, 2023 Last Cal Date: Start time (MST): 9:44 End time (MST): 12:20

Routine Reason:

**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 Rem Gas Exp Date: NA ppm Diff between cyl: Removed Gas Cyl #: NA

Calibrator Make/Model: **API T700** Serial Number: 747 ZAG Make/Model: **API T701** Serial Number: 261

### **Analyzer Information**

Analyzer make: Thermo 43i Analyzer serial #: 1118148497

Analyzer Range 0 - 1000 ppb

**Finish Finish** Start Start Calibration slope: 1.000277 Backgd or Offset: 10.0 9.7 0.998563 0.983

Calibration intercept: 0.983970 0.283925

### SO<sub>2</sub> Calibration Data

Coeff or Slope:

1.008

Set Point	Dilution air flow rate	Source gas flow rate	Calculated	Indicated concentration	Correction factor (Cc/Ic
Set Pollit	(sccm)	(sccm)	concentration (ppb) (Cc)	(ppb) (Ic)	<i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	
as found span	4921	79.2	800.5	819.1	0.977
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	800.5	800.5	1.000
second point	4960	39.6	400.3	402.3	0.995
third point	4980	19.8	200.1	199.4	1.004
as left zero	5000	0.0	0.0	0.2	
as left span	4921	79.2	800.5	802.8	0.997
			Averag	ge Correction Factor	1.000
	212.12		222.22	<b>*</b> 0.4 1	2.22/

Baseline Corr As found: 819.10 Previous response 800.36 \*% change 2.3% Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept:

NA AF Correlation: Baseline Corr 3rd AF pt:

Notes: Calibration Gas Changed. Span adjusted.

Calibration Performed By: Melissa Lemay \* = > +/-5% change initiates investigation



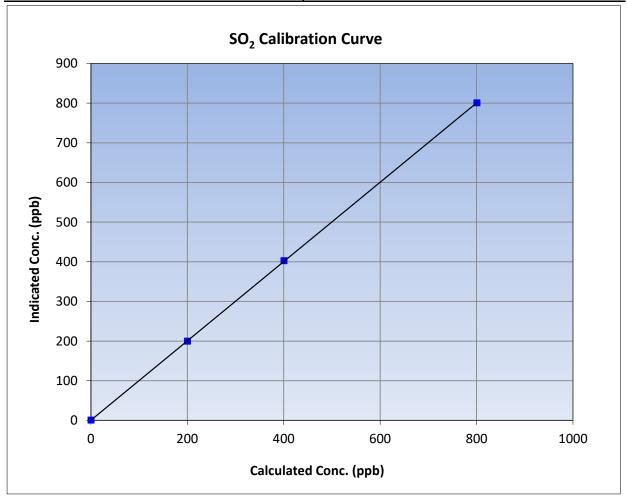
## **SO<sub>2</sub> Calibration Summary**

Version-01-2020

### **Station Information**

Calibration Date: May 10, 2023 **Previous Calibration:** April 11, 2023 Station Name: Waskow ohci Pimatisiwin Station Number: AMS25 Start Time (MST): 9:44 End Time (MST): 12:20 Analyzer make: Thermo 43i Analyzer serial #: 1118148497

Calibration Data									
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>				
0.0	0.3		Correlation Coefficient	0.999989	≥0.995				
800.5	800.5	1.0000	Correlation Coefficient	0.555565	20.993				
400.3	402.3	0.9951	Slope	1.000277	0.90 - 1.10				
200.1	199.4	1.0037	Slope	1.000277	0.90 - 1.10				
			- Intercept	0.283925	+/-30				

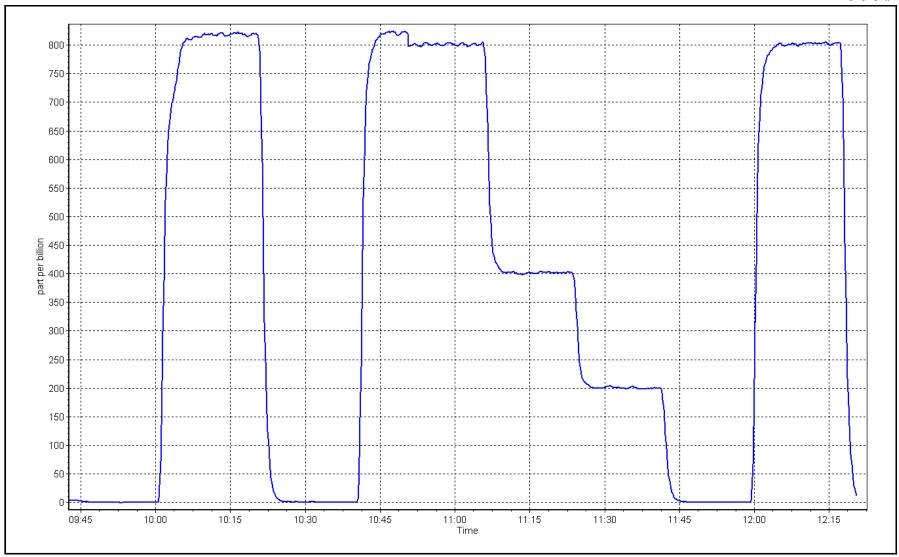


**SO2 Calibration Plot** 

Date: May 10, 2023

Location: Waskow ohci Pimatisiwin





# W B E A

### **Wood Buffalo Environmental Association**

### H<sub>2</sub>S Calibration Report

Version-11-2021

**Station Information** 

Station Name:Waskow ohci PimatisiwinStation number:AMS25Calibration Date:May 17, 2023Last Cal Date:April 12, 2023Start time (MST):6:05End time (MST):10:24

Reason: Routine

**Calibration Standards** 

Cal Gas Concentration: 4.97 ppm Cal Gas Exp Date: January 3, 2026

Cal Gas Cylinder #: CC517099

Removed Cal Gas Conc: 4.97 ppm Rem Gas Exp Date: NA
Removed Gas Cyl #: NA
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

<u>Finish</u> <u>Start</u> **Finish Start** 1.014757 1.021518 Backgd or Offset: Calibration slope: 3.4 3.4 0.200000 0.240000 Calibration intercept: Coeff or Slope: 1.108 1.108

H<sub>2</sub>S 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	81.6	81.1	81.2	0.999
as found 2nd point	4959	40.8	40.5	40.7	0.997
as found 3rd point	4980	20.4	20.3	20.5	0.993
new cylinder response					

### H<sub>2</sub>S Calibration Data

Set Point	Dilution air flow 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	4920	80.0	79.5	81.4	0.976
second point	4960	40.0	39.7	40.8	0.974
third point	4980	20.0	19.9	20.6	0.964
as left zero	5000	0.0	0.0	0.2	
as left span	4912	88.3	800.0	826.0	0.969
SO2 Scrubber Check	4924	76.3	800.0	0.0	
Date of last scrubber chang	ge:	19-Jul-10		Ave Corr Factor	0.971
Date of last converter effic	iency test:				efficiency

Baseline Corr As found: 81.1 82.45 -1.7% Prev response: \*% change: 0.167624 Baseline Corr 2nd AF pt: 40.6 AF Slope: 1.000170 AF Intercept: Baseline Corr 3rd AF pt: 20.4 0.999997 AF Correlation: \* = > +/-5% change initiates investigation

- x y 550 change initiates investigate

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

Calibration Performed By: Melissa Lemay

Notes:



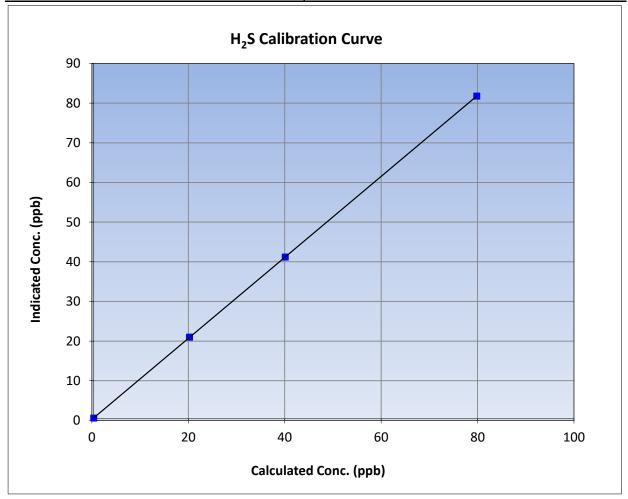
## H<sub>2</sub>S Calibration Summary

Version-11-2021

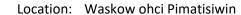
### **Station Information**

Calibration Date: May 17, 2023 **Previous Calibration:** April 12, 2023 Station Name: Waskow ohci Pimatisiwin Station Number: AMS25 Start Time (MST): 6:05 End Time (MST): 10:24 Analyzer make: Thermo 43i-LTE Analyzer serial #: 1170050146

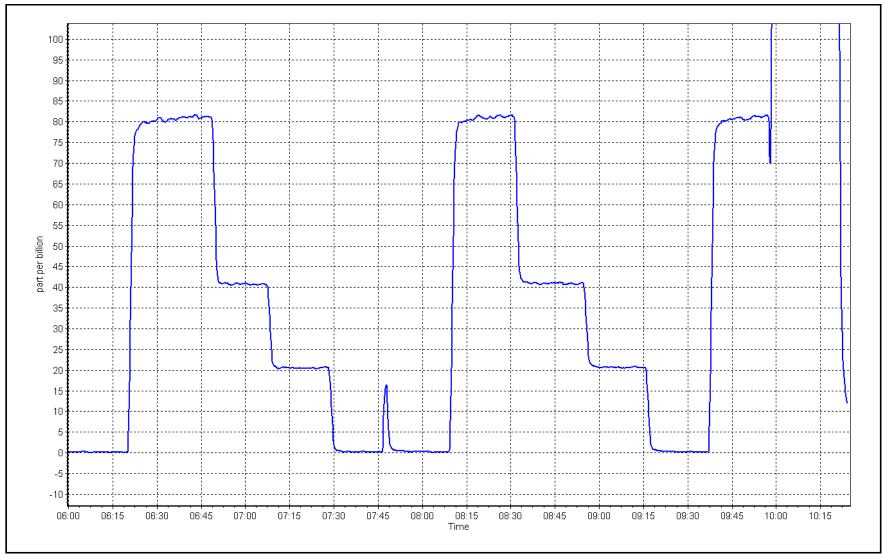
Calibration Data								
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>			
0.0	0.2		Correlation Coefficient	0.999998	≥0.995			
79.5	81.4	0.9761	Correlation Coefficient	0.555556	20.993			
39.7	40.8	0.9737	Slope	1.021518	0.90 - 1.10			
19.9	20.6	0.9643	Slope	1.021316	0.90 - 1.10			
			- Intercept	0.240000	+/-3			



Date: May 17, 2023









### H<sub>2</sub>S Calibration Report

Version-11-2021

### **Station Information**

Station Name:Waskow ohci PimatisiwinStation number:AMS25Calibration Date:May 26, 2023Last Cal Date:May 17, 2023Start time (MST):5:50End time (MST):9:52

Reason: Maintenance Calibration and SOx scrubber check 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
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

<u>Start</u> **Finish Start** <u>Finish</u> 1.021518 1.005984 Backgd or Offset: Calibration slope: 3.4 3.3 0.180000 Calibration intercept: 0.240000 Coeff or Slope: 1.079 1.108

### H<sub>2</sub>S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) Limit = 0.90-1.10
as found zero	5000	0.0	0.0	0.2	
as found span	4920	80.0	79.5	81.6	0.976
as found 2nd point	4960	40.0	39.7	41.0	0.974
as found 3rd point	4980	20.0	19.9	20.6	0.974
new cylinder response					

### H<sub>2</sub>S Calibration Data

Set Point	Dilution air flow 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	4920	80.0	79.5	80.1	0.992
second point	4960	40.0	39.7	40.2	0.988
third point	4980	20.0	19.9	20.1	0.988
as left zero	5000	0.0	0.0	0.2	
as left span	4912	88.3	0.008	808.9	0.989
SO2 Scrubber Check	4924	76.3	0.008	0.0	
Date of last scrubber chang	ge:	19-Jul-10		Ave Corr Factor	0.989
Date of last converter efficiency test:					efficiency

Baseline Corr As found: 81.4 0.0% Prev response: 81.41 \*% change: 0.240000 Baseline Corr 2nd AF pt: 40.8 AF Slope: 1.024394 AF Intercept: Baseline Corr 3rd AF pt: 20.4 AF Correlation: 0.999998 \* = > +/-5% change initiates investigation

Calibration and SOx scrubber check after the Sulphur Study test. Sox scrubber checked after the

calibrator zero. Span adjusted.

Calibration Performed By: Melissa Lemay

Notes:



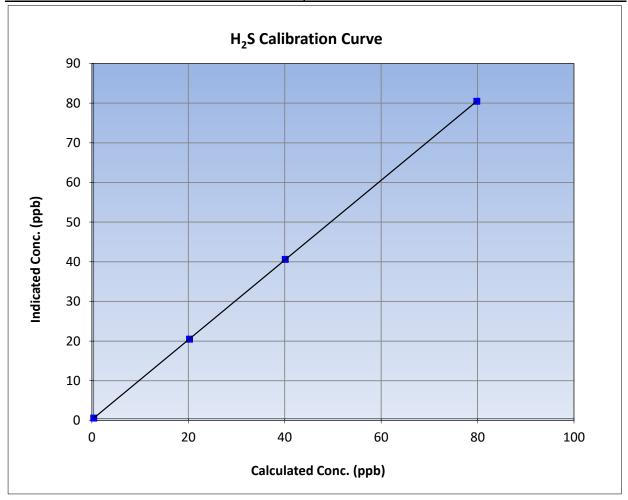
## H<sub>2</sub>S Calibration Summary

Version-11-2021

### **Station Information**

Calibration Date: May 26, 2023 **Previous Calibration:** May 17, 2023 Station Name: Waskow ohci Pimatisiwin Station Number: AMS25 Start Time (MST): 5:50 End Time (MST): 9:52 Analyzer make: Thermo 43i-LTE Analyzer serial #: 1170050146

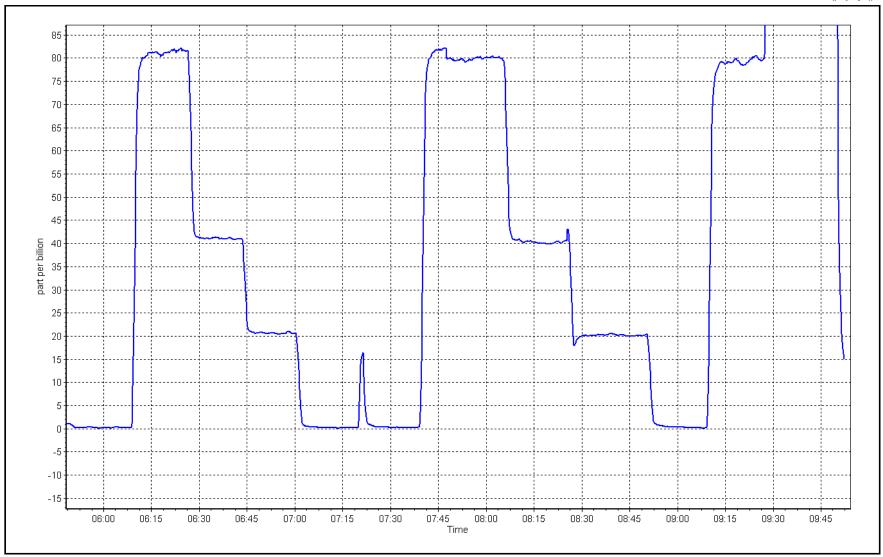
Calibration Data									
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>				
0.0	0.2		Correlation Coefficient	0.999998	≥0.995				
79.5	80.1	0.9920	Correlation Coefficient	0.555550	20.333				
39.7	40.2	0.9883	Slope	1.005984	0.90 - 1.10				
19.9	20.1	0.9883	Slope	1.005364	0.90 - 1.10				
			- Intercept	0.180000	+/-3				



Date: May 26, 2023

Location: Waskow ohci Pimatisiwin







### WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

## AMS26 CHRISTINA LAKE MAY 2023

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

June 30, 2023



## **SO<sub>2</sub> Calibration Report**

Version-01-2020

### **Station Information**

Station Name: Christina Lake Calibration Date: May 9, 2023 10:11 Start time (MST): Routine Reason:

Station number: **AMS 26** Last Cal Date: April 27, 2023

End time (MST): 12:54

**Calibration Standards** 

Cal Gas Concentration: 49.56

Cal Gas Cylinder #: Removed Cal Gas Conc:

Removed Gas Cyl #:

ZAG Make/Model:

Calibrator Make/Model:

CC362134

49.56

ppm Rem Gas Exp Date: NA

Diff between cyl:

Cal Gas Exp Date:

<u>NA</u> **API T700 API T701** 

Serial Number: 2447 Serial Number: 953

**Analyzer Information** 

Analyzer make: Thermo 43i Analyzer serial #: 1173410001

Analyzer Range 0 - 1000 ppb

**Finish** Start

ppm

Calibration slope: 1.010951 Calibration intercept: -2.757950

1.017133 -1.819322

Backgd or Offset: Coeff or Slope: Start 16.5 0.929

February 23, 2025

**Finish** 16.6 0.929

SO<sub>2</sub> Calibration Data

Cat Daint	Dilution air flow rate	Source gas flow rate	Calculated	Indicated concentration	Correction factor (Cc/Ic
Set Point	(sccm)	(sccm)	concentration (ppb) (Cc)	(ppb) (Ic)	Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.2	
as found span	4919	80.6	799.0	810.7	0.986
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	
high point	4919	80.6	799.0	811.6	0.984
second point	4960	40.3	399.4	404.2	0.988
third point	4980	20.2	200.2	199.3	1.005
as left zero	5000	0.0	0.0	0.3	
as left span	4919	80.6	799.0	807.7	0.989
			Avera	ge Correction Factor	0.992

Baseline Corr As found: 810.50 Previous response 804.96 \*% change 0.7% Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept:

NA AF Correlation: Baseline Corr 3rd AF pt:

\* = > +/-5% change initiates investigation

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

Calibration Performed By: Mohammed Kashif



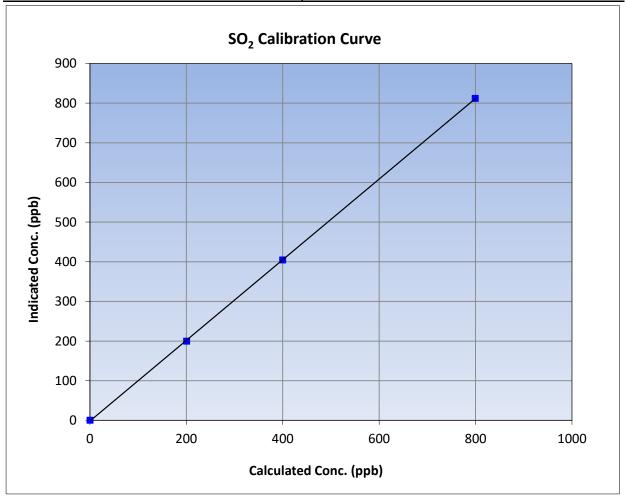
## **SO<sub>2</sub> Calibration Summary**

Version-01-2020

### **Station Information**

Calibration Date: May 9, 2023 **Previous Calibration:** April 27, 2023 Station Name: Christina Lake Station Number: AMS 26 Start Time (MST): 10:11 End Time (MST): 12:54 Analyzer make: Thermo 43i Analyzer serial #: 1173410001

	Calibration Data								
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>				
0.0	0.2		Correlation Coefficient	0.999969	≥0.995				
799.0	811.6	0.9844	Correlation Coefficient	0.555505	20.333				
399.4	404.2	0.9882	Slope	1.017133	0.90 - 1.10				
200.2	199.3	1.0046	- Slope	1.01/155	0.90 - 1.10				
			- Intercept	-1.819322	+/-30				



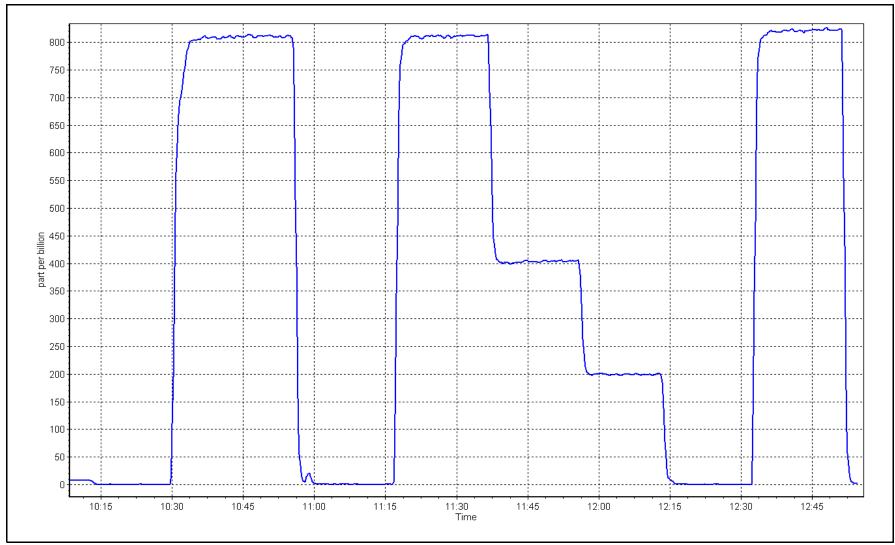
**SO2 Calibration Plot** 

Date:

May 9, 2023

Location: Christina Lake







### H<sub>2</sub>S Calibration Report

Version-11-2021

**Station Information** 

Station Name: Christina Lake Calibration Date: May 30, 2023 Start time (MST): 16:15

Routine Reason:

Station number: AMS26 Last Cal Date: April 25, 2023

End time (MST): 20:04

**Calibration Standards** 

Cal Gas Exp Date: February 9, 2024 Cal Gas Concentration: 4.89 ppm

Cal Gas Cylinder #: EY0002466

Removed Cal Gas Conc: Rem Gas Exp Date: NA 4.89 ppm Removed Gas Cyl #: Diff between cyl: NA

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 serial #: NA Converter make:

0 - 100 ppb Analyzer Range

**Finish** <u>Start</u> **Finish** <u>Start</u> 1.035031 Backgd or Offset: 35.4 Calibration slope: 1.005611 35.4 -0.240256 Calibration intercept: -0.360862 Coeff or Slope: 1.125 1.125

H<sub>2</sub>S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) Limit = 0.90-1.10
as found zero	5000	0.0	0.0	-0.3	
as found span	4918	81.8	80.0	82.7	0.964
as found 2nd point	4959	40.9	40.0	41.0	0.969
as found 3rd point	4979	20.4	20.0	20.1	0.978
new cylinder response					

### H<sub>2</sub>S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	-0.2	
high point	4918	81.8	80.0	82.6	0.969
second point	4959	40.9	40.0	41.1	0.973
third point	4979	20.4	20.0	20.4	0.978
as left zero	5000	0.0	0.0	-0.1	
as left span	4918	81.8	80.0	82.5	0.970
SO2 Scrubber Check	4919	80.6	806.1	-0.1	
Date of last scrubber chang	ge:	27-Feb-19		Ave Corr Factor	0.973
Date of last converter effic	iencv test:			·	efficiency

Date of last scrubber change:	27-Feb-19	Ave Corr Factor	0.973
Date of last converter efficiency test:			efficiency

Baseline Corr As found: 83.0 80.09 Prev response: \*% change: 3.5% -0.460261 Baseline Corr 2nd AF pt: 41.3 AF Slope: 1.038460 AF Intercept: Baseline Corr 3rd AF pt: 20.4 0.999983 AF Correlation:

\* = > +/-5% change initiates investigation

Installed new zero air generator. Changed sample inlet filter after MAF's. Ran scrubber check after calibrator zero. No adjustments made.

Calibration Performed By: Mohammed Kashif

Notes:



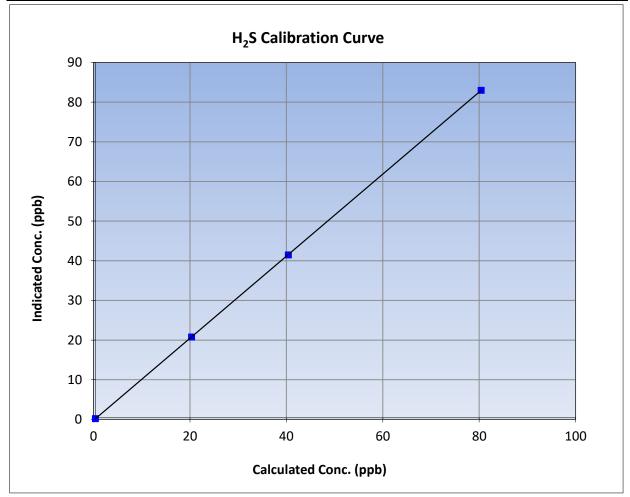
## H<sub>2</sub>S Calibration Summary

Version-11-2021

### **Station Information**

Calibration Date: May 30, 2023 **Previous Calibration:** April 25, 2023 Station Name: Christina Lake Station Number: AMS26 Start Time (MST): 16:15 End Time (MST): 20:04 Analyzer make: Thermo 450i Analyzer serial #: 1180030032

Calibration Data							
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>		
0.0	-0.2		Correlation Coefficient	0.999998	≥0.995		
80.0	82.6	0.9686	Correlation Coefficient	0.555556	20.333		
40.0	41.1	0.9733	Slope	1.035031	0.90 - 1.10		
20.0	20.4	0.9781	Siope	1.033031	0.90 - 1.10		
			Intercept	-0.240256	+/-3		

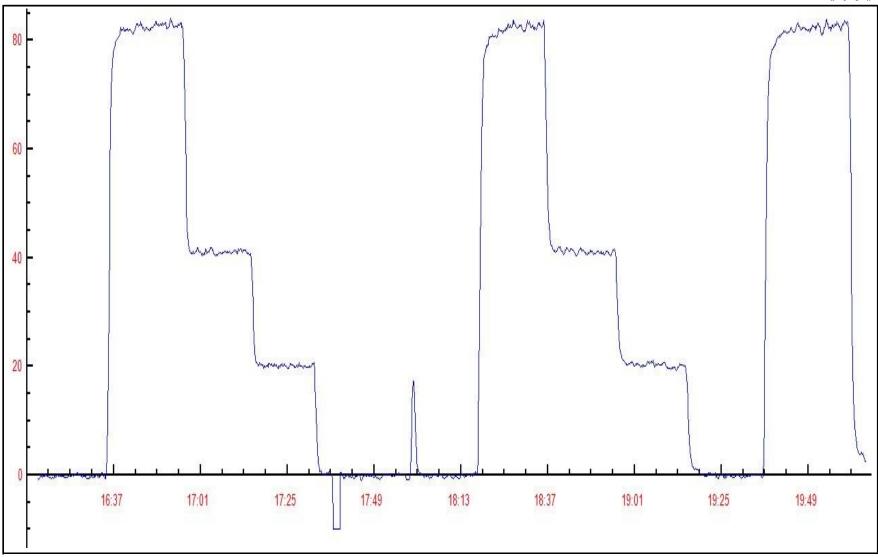


H<sub>2</sub>S Calibration Plot

Date: May 30, 2023

Location: Christina Lake







## NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

ppm

### **Station Information**

Station Name: Christina Lake
Calibration Date: May 31, 2023

Start time (MST): 8:11 Reason: Routine Station number: AMS 26 Last Cal Date: April 26, 2023 End time (MST): 13:18

### **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

Removed Gas NOX Conc: NOX gas Diff:

Calibrator Model: API T700 ZAG make/model: API T701H NO gas Diff: Serial Number: 2447

Serial Number: 832

### **Analyzer Information**

Analyzer make: Thermo 42i Analyzer serial #: 1173480006

NOX Range (ppb): 0 - 1000 ppb

**Start** <u>Finish</u> <u>Start</u> **Finish** NO coeff or slope: 1.762 1.795 NO bkgnd or offset: 2.9 3.4 NOX coeff or slope: 0.997 0.997 NOX bkgnd or offset: 4.0 3.0 Reaction cell Press: NO2 coeff or slope: 1.000 1.000 198.6 202.8

### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	0.999958	1.003078
NO <sub>x</sub> Cal Offset:	-1.700000	-1.760000
NO Cal Slope:	0.999786	1.002199
NO Cal Offset:	-2.340000	-2.660000
NO <sub>2</sub> Cal Slope:	1.003094	1.007991
NO <sub>2</sub> Cal Offset:	0.778854	0.778153



 $NO_X \setminus NO \setminus NO_2$  Calibration Report

Version-04-2020

				Dilı	lution Calibration	ı Data				
Set Point	Dilution flow rate (sccm)	Source gas flow	Calculated NOx concentration (ppb) (Cc)	Calculated NO 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	0.3	0.5		
as found span	4920	80.0	813.1	800.3	12.8	801.4	784.6	16.9	1.0146	1.0200
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	813.1	800.3	12.8	814.7	8.008	13.9	0.9981	0.9994
second point	4960	40.0	406.6	400.2	6.4	405.3	396.9	8.4	1.0031	1.0082
third point	4980	20.0	203.3	200.1	3.2	200.3	195.3	5.1	1.0149	1.0245
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	0.1	-0.2		
as left span	4920	80.0	813.1	395.5	417.6	817.9	399.3	418.7	0.9942	0.9905
							Average C	Correction Factor	1.0053	1.0107
Corrected As fo	ound NO <sub>X</sub> =	800.6 ppb	NO =	784.3 ppb	* = > +/-5%	6 change initiates i	investigation	*Percent Chang	ge NO <sub>X</sub> =	-1.3%
Previous Respo	onse NO <sub>X</sub> =	811.4 ppb		797.8 ppb				*Percent Chang	ge NO =	-1.7%
Baseline Corr 2			NO =		As found	$NO_X r^2$ :	•	Nx SI:	Nx Int:	:
Baseline Corr 3			NO =	• • • • • • • • • • • • • • • • • • • •	As found			NO SI:	NO Int:	•
	•				As found	3		NO2 SI:	NO <sub>2</sub> Int:	
				•	GPT Calibration D	) Jata				
O3 Setpo	int (ppb)	Indicated NO Refere concentration (pp		cated NO Drop centration (ppb)	Calculated NO2 concentration (ppb)		ndicated NO2 ntration (ppb) (Ic)	NO2 Correction fac Calibration Limit = 0. As Found Limit = 0.	0.95-1.05 Calibratic	erter Efficiency ion Limit = 96-104%
as found	GPT zero									
as found GPT poi	int (400 ppb NO2)									
as found GPT poin	int (200 ppb NO2)									
as found GPT poin	int (100 ppb NO2)									
1st GPT point	(400 ppb O3)	799.6		394.8	417.6		421.4	0.9910	)	100.9%
2nd GPT point	t (200 ppb O3)	799.6		593.8	218.6		221.2	0.9882	2	101.2%
3rd GPT point	(100 ppb O3)	799.6		699.3	113.1		115.8	0.9767	/	102.4%
						Average Co	orrection Factor	r 0.9853	3	101.5%

Notes:

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

Calibration Performed By:

Mohammed Kashif



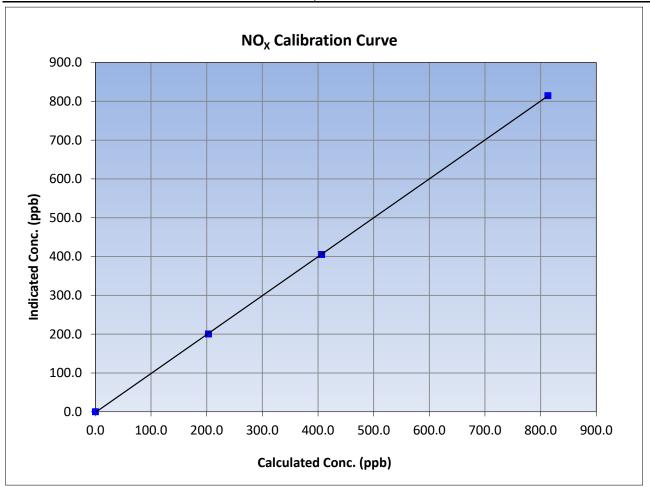
## **NO<sub>X</sub> Calibration Summary**

Version-04-2020

### **Station Information**

Calibration Date: May 31, 2023 Previous Calibration: April 26, 2023 Station Name: Christina Lake Station Number: AMS 26 Start Time (MST): 8:11 End Time (MST): 13:18 Analyzer make: Thermo 42i Analyzer serial #: 1173480006

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999979	≥0.995
813.1	814.7	0.9981	Correlation Coefficient		20.993
406.6	405.3	1.0031	Slope	1.003078	0.90 - 1.10
203.3	200.3	1.0149	Slope	1.003078	0.30 - 1.10
			Intercept	-1.760000	+/-20





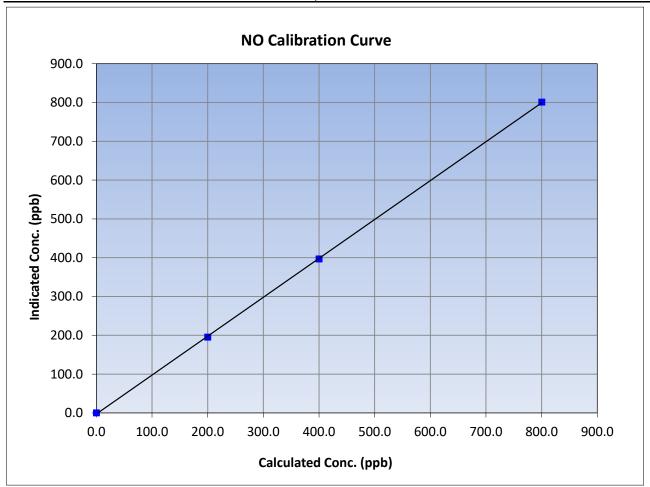
## **NO Calibration Summary**

Version-04-2020

### **Station Information**

Calibration Date: May 31, 2023 Previous Calibration: April 26, 2023 Station Name: Christina Lake Station Number: AMS 26 Start Time (MST): 8:11 End Time (MST): 13:18 Analyzer make: Thermo 42i Analyzer serial #: 1173480006

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999950	≥0.995
800.3	8.008	0.9994	Correlation Coefficient		20.993
400.2	396.9	1.0082	Slope	1.002199	0.90 - 1.10
200.1	195.3	1.0245	Slope	1.002199	0.90 - 1.10
			Intercept	-2.660000	+/-20





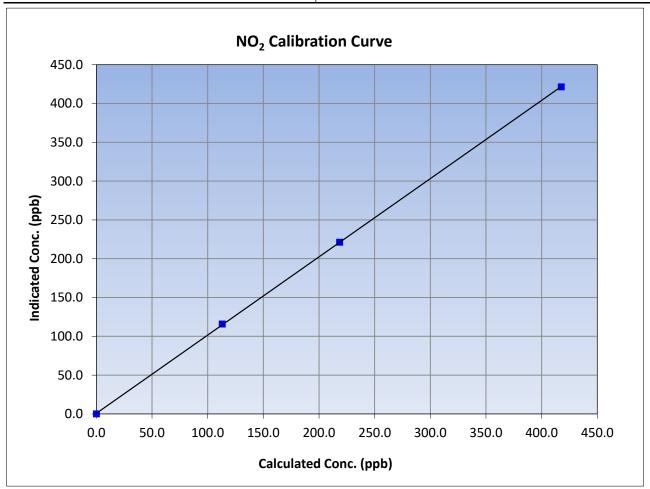
# NO<sub>2</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 31, 2023 Previous Calibration: April 26, 2023 Station Name: Christina Lake Station Number: AMS 26 Start Time (MST): 8:11 End Time (MST): 13:18 Analyzer make: Thermo 42i Analyzer serial #: 1173480006

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999982	≥0.995
417.6	421.4	0.9910	correlation coefficient	0.999982	20.555
218.6	221.2	0.9882	Slope	1.007991	0.90 - 1.10
113.1	115.8	0.9767	Slope	1.007991	0.90 - 1.10
			Intercept	0.778153	+/-20

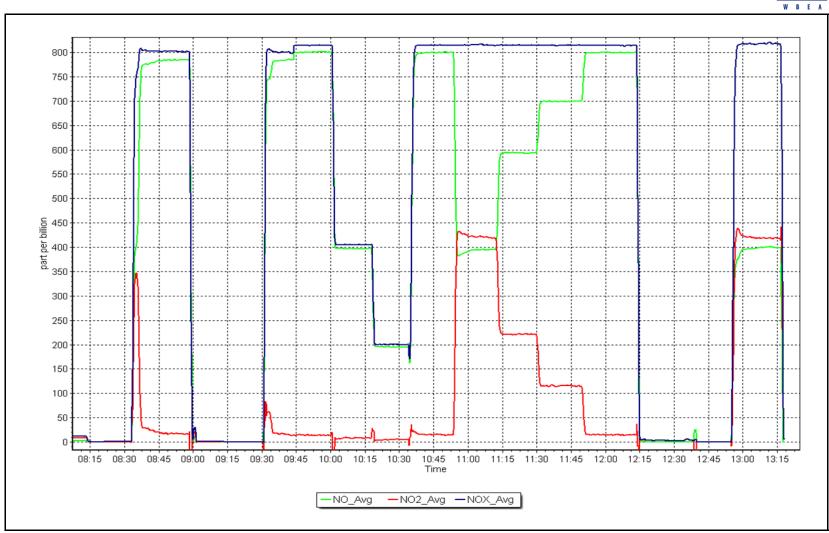


NO<sub>x</sub> Calibration Plot

Date: May 31, 2023

Location: Christina Lake







### WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

> AMS27 JACKFISH 2/3 MAY 2023

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

June 30, 2023

## **SO<sub>2</sub> Calibration Report**

Version-01-2020

#### **Station Information**

Station Name: Jackfish 2/3 Calibration Date: May 1, 2023 Start time (MST): 10:41 Routine Reason:

Station number: **AMS 27** April 4, 2023 Last Cal Date:

End time (MST): 13:12

#### **Calibration Standards**

Cal Gas Concentration: 50.58

Cal Gas Cylinder #: SG9133974BAL 50.58

Removed Cal Gas Conc: Removed Gas Cyl #: <u>NA</u>

Calibrator Make/Model: **API T700** ZAG Make/Model: **API 701** 

Baseline Corr 3rd AF pt:

ppm Cal Gas Exp Date: December 29, 2028

Rem Gas Exp Date: NA ppm

Diff between cyl:

Serial Number: 3811 Serial Number: 135

#### **Analyzer Information**

Analyzer make: Thero 43iQ Analyzer serial #: 12124313138

Analyzer Range 0 - 1000 ppb

**Start Finish Start Finish** Calibration slope: 1.022106 Backgd or Offset: 7.9 7.9 1.012431 Coeff or Slope: Calibration intercept: -1.377395 -1.838756 0.990 0.990

### SO<sub>2</sub> Calibration Data

Cat Daint	Dilution air flow rate	Source gas flow rate	Calculated	Indicated concentration	Correction factor (Cc/Ic)
Set Point	(sccm)	(sccm)	concentration (ppb) (Cc)	(ppb) (Ic)	<i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	
as found span	4921	79.1	800.2	813.0	0.984
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	
high point	4921	79.1	800.2	817.1	0.979
second point	4961	39.5	399.5	405.1	0.986
third point	4980	19.8	200.3	201.4	0.995
as left zero	5000	0.0	0.0	0.0	
as left span	4921	79.1	800.2	817.1	0.979
			Averag	ge Correction Factor	0.987
Baseline Corr As found:	813.00	Previous response	808.73	*% change	0.5%
Baseline Corr 2nd AF pt:	NA	AF Slope	•	AF Intercept:	

AF Correlation:

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

NA

\* = > +/-5% change initiates investigation



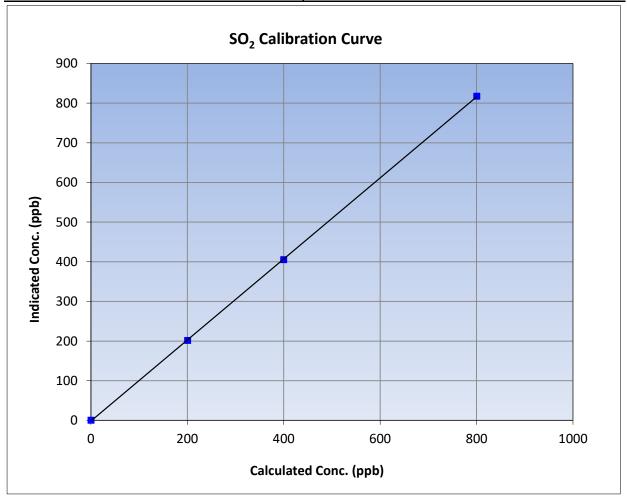
# **SO<sub>2</sub> Calibration Summary**

Version-01-2020

#### **Station Information**

Calibration Date: May 1, 2023 **Previous Calibration:** April 4, 2023 Station Name: Jackfish 2/3 Station Number: **AMS 27** Start Time (MST): 10:41 End Time (MST): 13:12 Analyzer make: Thero 43iQ Analyzer serial #: 12124313138

Calibration Data									
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>				
0.0	0.0		Correlation Coefficient	0.999976	≥0.995				
800.2	817.1	0.9793	Correlation Coefficient	0.555570	20.333				
399.5	405.1	0.9863	Slope	1.022106	0.90 - 1.10				
200.3	201.4	0.9946	Siope	1.022106	0.90 - 1.10				
			- Intercept	-1.838756	+/-30				



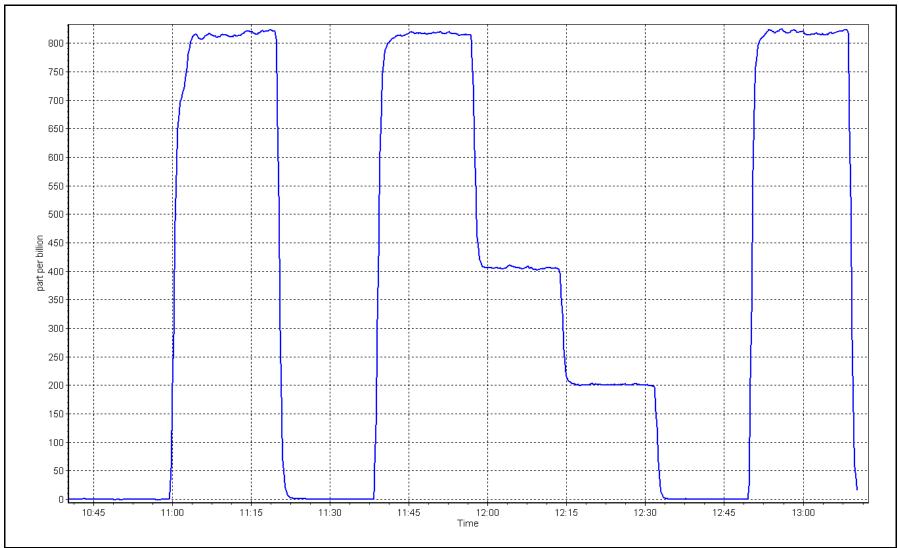
**SO2 Calibration Plot** 

Date:

May 1, 2023

Location: Jackfish 2/3





### H<sub>2</sub>S Calibration Report

Version-11-2021

**Station Information** 

Station Name: Jackfish 2/3 Calibration Date: May 18, 2023 Start time (MST): 6:53

Reason: Routine Station number: AMS27 Last Cal Date: April 27, 2023

End time (MST): 10:25

**Calibration Standards** 

Cal Gas Concentration: Cal Gas Exp Date: January 4, 2025 5.41 ppm

ppm

Cal Gas Cylinder #: CC345023

Removed Cal Gas Conc: 5.41 Removed Gas Cyl #: NA

Calibrator Make/Model: API T700 ZAG Make/Model: **API 701** 

Rem Gas Exp Date: NA

Diff between cyl:

Serial Number: 3811 Serial Number: 135

**Analyzer Information** 

Analyzer make: **API T101** Analyzer serial #: 621 Converter serial #:

Converter make:

0 - 100 ppb Analyzer Range

> <u>Start</u> **Finish**

Calibration slope: 1.000342 Calibration intercept: -0.217897

<u>Start</u> 1.000198 Backgd or Offset: 25.7

Coeff or Slope: 0.970

<u>Finish</u> 25.7 0.970

H<sub>2</sub>S As Found Data

-0.137827

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) Limit = 0.90-1.10
as found zero	5000	0.0	0.0	0.0	
as found span	4926	74.1	80.2	81.0	0.990
as found 2nd point	4963	37.0	40.0	40.3	0.993
as found 3rd point	4982	18.5	20.0	19.6	1.021
new cylinder response					

#### H<sub>2</sub>S Calibration Data

Set Point	Dilution air flow 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	80.0	1.002
second point	4963	37.0	40.0	40.2	0.996
third point	4982	18.5	20.0	19.5	1.026
as left zero	5000	0.0	0.0	0.1	
as left span	4926	74.1	80.2	79.7	1.006
SO2 Scrubber Check	4921	79.1	791.0	0.1	
Date of last scrubber cha	inge:			Ave Corr Factor	1.008

Date of last scrubber change:				Ave Corr Factor	1.008
Date of last converter efficien	ncy test:			eff	ficiency
Baseline Corr As found:	81.0	Prev response:	79.98	*% change:	1.3%

Baseline Corr 2nd AF pt: 40.3 AF Slope: 1.012745 Baseline Corr 3rd AF pt: 19.6 AF Correlation: 0.999934

\* = > +/-5% change initiates investigation

-0.277693

AF Intercept:

No adjustments made. Notes:

Calibration Performed By: Denny Ray Estador



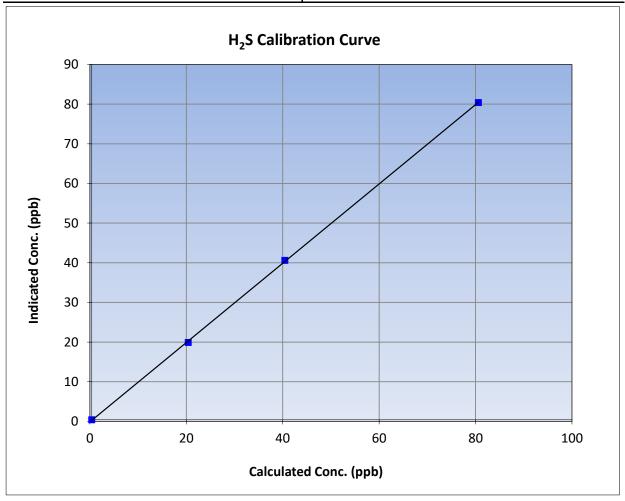
# H<sub>2</sub>S Calibration Summary

Version-11-2021

#### **Station Information**

Calibration Date: May 18, 2023 **Previous Calibration:** April 27, 2023 Station Name: Jackfish 2/3 Station Number: AMS27 Start Time (MST): 6:53 End Time (MST): 10:25 Analyzer make: **API T101** Analyzer serial #: 621

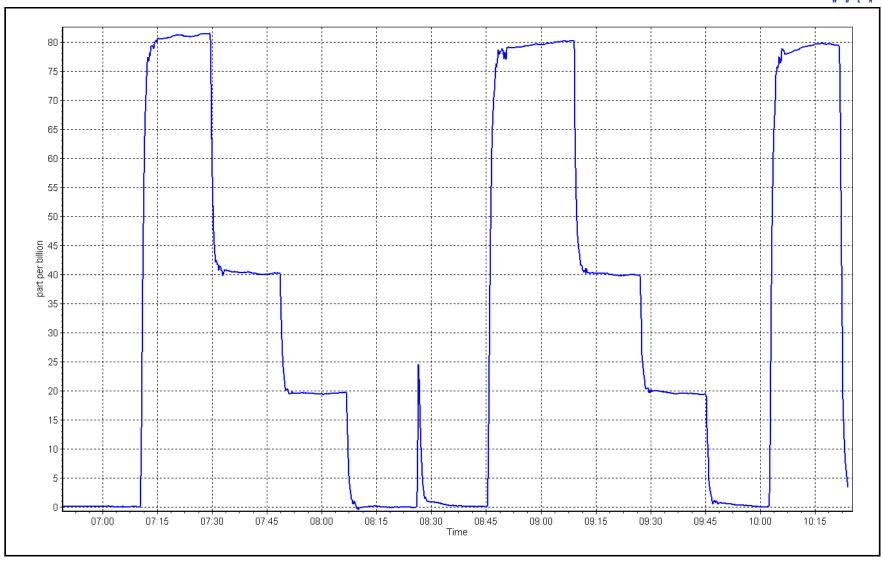
Calibration Data									
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>				
0.0	0.0		Correlation Coefficient	0.999928	≥0.995				
80.2	80.0	1.0022	Correlation Coefficient	0.333320	20.333				
40.0	40.2	0.9959	Slope	1.000198	0.90 - 1.10				
20.0	19.5	1.0264	- Slope	1.000196	0.90 - 1.10				
			- Intercept	-0.137827	+/-3				



H<sub>2</sub>S Calibration Plot

Date: May 18, 2023 Location: Jackfish 2/3







# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

#### **Station Information**

Station Name: Jackfish 2/3
Calibration Date: May 25, 2023

Start time (MST): 9:40
Reason: Routine

Station number: AMS27 Last Cal Date: April 20, 2023 End time (MST): 14:18

#### **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

<u>Start</u> **Finish** <u>Start</u> **Finish** NO coeff or slope: 1.003 1.080 NO bkgnd or offset: -3.0 0.7 NOX coeff or slope: 1.005 1.072 NOX bkgnd or offset: -2.6 0.2 NO2 coeff or slope: 1.000 1.000 Reaction cell Press: 4.4 4.3

#### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	1.005888	1.004933
NO <sub>x</sub> Cal Offset:	-2.995962	-2.155062
NO Cal Slope:	1.002272	1.007298
NO Cal Offset:	-2.840268	-2.599343
NO <sub>2</sub> Cal Slope:	0.996178	0.999563
NO <sub>2</sub> Cal Offset:	1.252891	0.617993



# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

				Dilı	ution Calibration	л Data				
Set Point	Dilution flow rate (sccm)	Source gas flow co	alculated 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	1.0	0.7	0.3		
as found span	4921	79.4	816.8	800.3	16.5	767.2	744.3	22.9	1.0647	1.0752
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.3	0.0		
high point	4921	79.4	816.8	800.3	16.5	819.9	804.3	15.5	0.9962	0.9950
second point	4960	39.7	408.5	400.2	8.3	406.5	400.5	6.0	1.0048	0.9993
third point	4980	19.8	203.7	199.6	4.1	201.3	195.4	5.9	1.0120	1.0215
as left zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1		
as left span	4921	79.4	816.8	415.1	413.0	819.0	417.2	401.7	0.9973	0.9950
		<u> </u>					Average C	Correction Factor	1.0043	1.0052
Corrected As fo	ound NO <sub>X</sub> =	766.2 ppb	NO =	743.6 ppb	* = > +/-5%	% change initiates i	investigation	*Percent Chang	ge NO <sub>X</sub> =	-6.8%
Previous Respo	onse NO <sub>X</sub> =	818.6 ppb	NO =	799.3 ppb				*Percent Chang	ge NO =	-7.5%
Baseline Corr 2	2nd pt NO <sub>X</sub> =	NA ppb	NO =	NA ppb	As found	d $NO_X r^2$ :		Nx SI:	Nx Int:	
Baseline Corr 3	3rd pt NO <sub>x</sub> =	· NA ppb	NO =	NA ppb	As found	d NO $r^2$ :		NO SI:	NO Int:	
					As found	d $NO_2 r^2$ :		NO2 SI:	NO <sub>2</sub> Int:	
				e	GPT Calibration [	Data				
O3 Setpo	oint (ppb)	Indicated NO Referen concentration (ppb		cated NO Drop centration (ppb)	Calculated NO concentration (ppt		dicated NO2 ntration (ppb) (Ic)	NO2 Correction fac Calibration Limit = As Found Limit = C	0.95-1.05 Calibratio	erter Efficiency on Limit = 96-104%
as found	d GPT zero									
as found GPT poi	oint (400 ppb NO2)									
as found GPT poi	oint (200 ppb NO2)									
as found GPT poi	oint (100 ppb NO2)									
1st GPT point	t (400 ppb O3)	803.2		406.7	413.0		413.1	0.9998	8	100.0%
2nd GPT noin	nt (200 ppb O3)	803.2		619.9	199.8		200.8	0.9951	1	100.5%
Zilu di i polit	· (   -   /									
•	nt (100 ppb O3)	803.2		714.3	105.4	<u></u>	106.5	0.9898	3	101.0%

Notes:

Adjusted both zero and span. As founds are 7% low; due to low pump issue.

Calibration Performed By:

**Denny Ray Estador** 



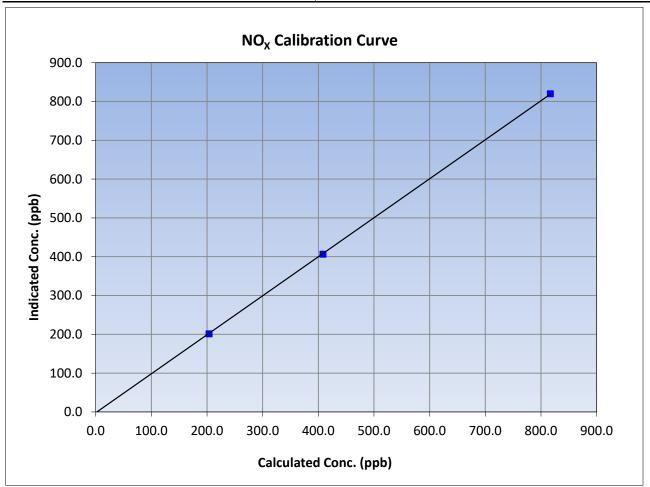
## NO<sub>x</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 25, 2023 Previous Calibration: April 20, 2023 Jackfish 2/3 AMS27 Station Name: Station Number: Start Time (MST): 9:40 End Time (MST): 14:18 **API T200** Analyzer make: Analyzer serial #: 722

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	-0.3		Correlation Coefficient	0.999973	≥0.995
816.8	819.9	0.9962	Correlation Coefficient	0.333373	20.555
408.5	406.5	1.0048	Slope	1.004933	0.90 - 1.10
203.7	201.3	1.0120	Slope	1.004933	0.30 - 1.10
			Intercept	-2.155062	+/-20





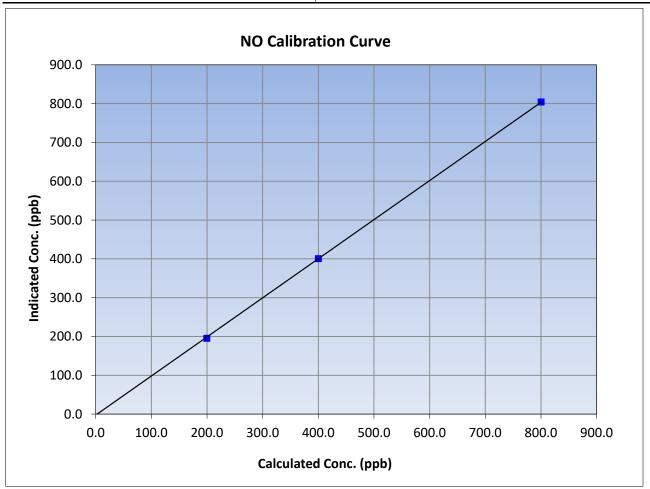
### **NO Calibration Summary**

Version-04-2020

#### **Station Information**

Calibration Date: May 25, 2023 Previous Calibration: April 20, 2023 Jackfish 2/3 AMS27 Station Name: Station Number: Start Time (MST): 9:40 End Time (MST): 14:18 **API T200** 722 Analyzer make: Analyzer serial #:

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	-0.3		Correlation Coefficient	0.999957	≥0.995
800.3	804.3	0.9950	Correlation Coefficient	0.55557	<u> </u>
400.2	400.5	0.9993	Slope	1.007298	0.90 - 1.10
199.6	195.4	1.0215	Slope	1.007298	0.90 - 1.10
			Intercept	-2.599343	+/-20





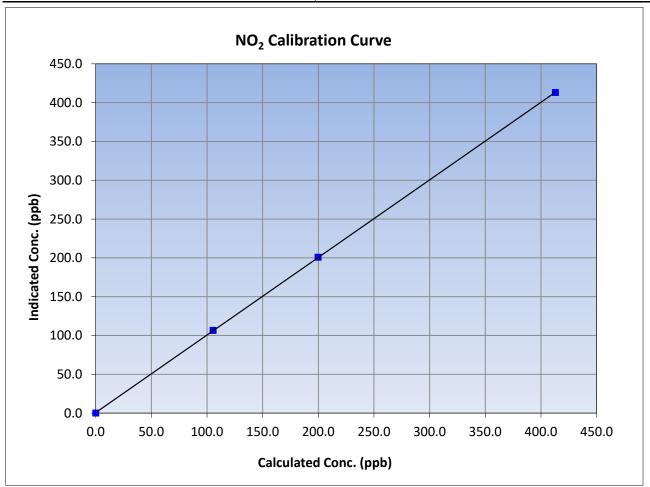
## NO<sub>2</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 25, 2023 Previous Calibration: April 20, 2023 Jackfish 2/3 AMS27 Station Name: Station Number: Start Time (MST): 9:40 End Time (MST): 14:18 **API T200** Analyzer make: Analyzer serial #: 722

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999989	≥0.995
413.0	413.1	0.9998	Correlation Coefficient	0.555565	20.555
199.8	200.8	0.9951	Slope	0.999563	0.90 - 1.10
105.4	106.5	0.9898	Slope	0.999303	0.90 - 1.10
			Intercept	0.617993	+/-20

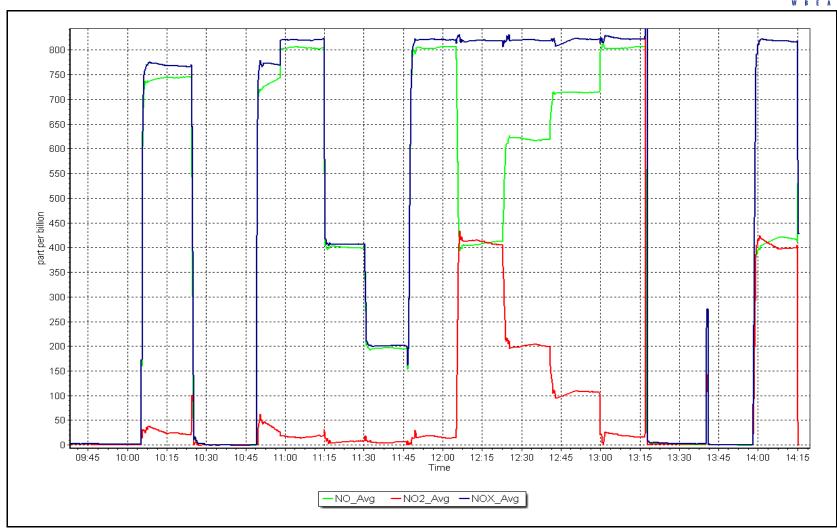


NO<sub>x</sub> Calibration Plot

Date: May 25, 2023

Location: Jackfish 2/3







### WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

> AMS29 SURMONT 2 MAY 2023

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

June 30, 2023

## **SO<sub>2</sub> Calibration Report**

Version-01-2020

#### **Station Information**

Station Name: Surmont 2 Calibration Date: May 9, 2023 Start time (MST): 9:51

As Found Reason:

Station number: AMS29

April 13, 2023 Last Cal Date:

End time (MST): 11:31

### **Calibration Standards**

Cal Gas Concentration: 49.21

Cal Gas Cylinder #: CC356008

Removed Cal Gas Conc: 49.21 Removed Gas Cyl #: <u>NA</u>

Calibrator Make/Model: Teledyne API T700 ZAG Make/Model: Teledyne API T701 Cal Gas Exp Date: February 23, 2025

> Rem Gas Exp Date: NA Diff between cyl:

Serial Number: 5258

Serial Number: 4297

#### **Analyzer Information**

Analyzer make: Thermo 43i Analyzer serial #: 1170050150

ppm

ppm

Analyzer Range 0 - 1000 ppb

**Finish** Start

Calibration slope: 0.998958 Calibration intercept: -0.765478

**Finish** Start Backgd or Offset: 12.3 12.2 0.922

Coeff or Slope: 0.922

#### SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow 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	799.0	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.0	-0.1	
as left span	4919	81.3	800.1	801.0	0.999
			Averag	ge Correction Factor	
Baseline Corr As found:	799.30	Previous response	98.51	*% change	0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope	:	AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation	:		

Notes: As founds completed. THC maintenance required and will be done May 10.

Calibration Performed By: **Braiden Boutilier**  \* = > +/-5% change initiates investigation

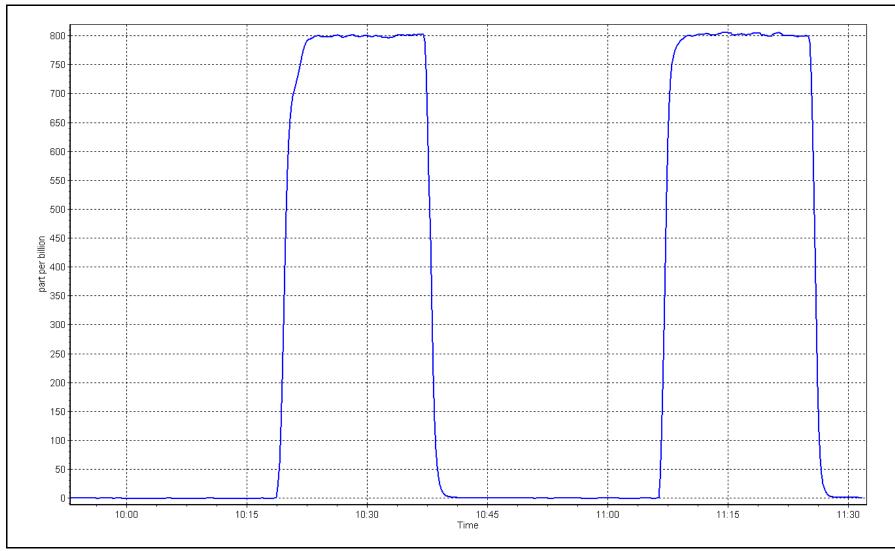
**SO2 Calibration Plot** 

Date:

May 9, 2023

Location: Surmont 2





## **SO<sub>2</sub> Calibration Report**

Version-01-2020

#### **Station Information**

Station Name: Surmont 2 Calibration Date: May 10, 2023 Start time (MST): 10:15

Routine Reason:

Station number: AMS29

Last Cal Date: May 9, 2023 End time (MST): 15:20

**Calibration Standards** 

Cal Gas Concentration: 49.21 ppm Cal Gas Exp Date:

ppm

Cal Gas Cylinder #: CC356008

Removed Cal Gas Conc: 49.21 Removed Gas Cyl #: <u>NA</u>

Calibrator Make/Model: Teledyne API T700 ZAG Make/Model: Teledyne API T701 February 23, 2025

Rem Gas Exp Date: NA Diff between cyl:

Serial Number: 5258 Serial Number: 4297

#### **Analyzer Information**

Analyzer make: Thermo 43i Analyzer serial #: 1170050150

Analyzer Range 0 - 1000 ppb

**Finish Finish** Start Start Calibration slope: 0.998958 1.002228 Backgd or Offset: 12.2 12.1 Calibration intercept: -0.765478 -1.885142 Coeff or Slope: 0.922 0.916

### SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow rate	Source gas flow rate	Calculated	Indicated concentration	Correction factor (Cc/Ic)
Set Point	(sccm)	(sccm)	concentration (ppb) (Cc)	(ppb) (Ic)	<i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	-0.3	
as found span	4919	81.3	800.1	803.0	0.996
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.3	
high point	4919	81.3	800.1	801.0	0.999
second point	4959	40.7	400.6	398.2	1.006
third point	4979	20.3	199.8	197.2	1.013
as left zero	5000	0.0	0.0	0.0	
as left span	4919	81.3	800.1	801.0	0.999
			Averag	ge Correction Factor	1.006
Baseline Corr As found:	803.30	Previous response	2 798.51	*% change	0.6%

% change Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept:

Baseline Corr 3rd AF pt: NA AF Correlation:

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

Calibration Performed By: **Braiden Boutilier**  \* = > +/-5% change initiates investigation



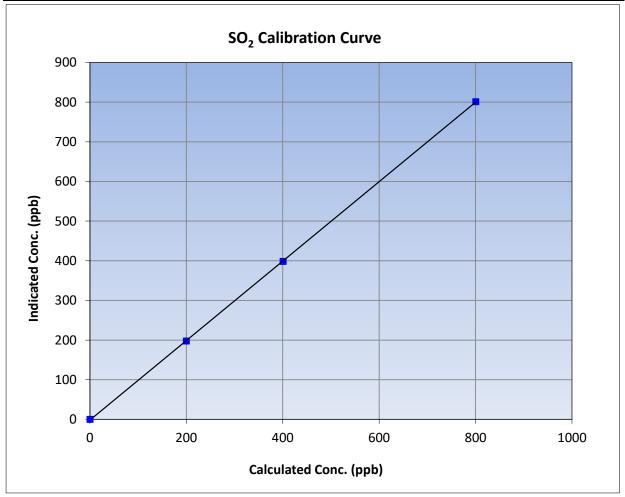
# **SO<sub>2</sub> Calibration Summary**

Version-01-2020

#### **Station Information**

Calibration Date: May 10, 2023 **Previous Calibration:** May 9, 2023 Station Name: Surmont 2 Station Number: AMS29 Start Time (MST): 10:15 End Time (MST): 15:20 Analyzer make: Thermo 43i Analyzer serial #: 1170050150

	Calibration Data										
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>						
0.0	-0.3		Correlation Coefficient	0.999980	≥0.995						
800.1	801.0	0.9989	Correlation Coefficient	0.999980	20.333						
400.6	398.2	1.0060	Slope	1.002228	0.90 - 1.10						
199.8	197.2	1.0133	Зюре	1.002228	0.90 - 1.10						
			- Intercept	-1.885142	+/-30						



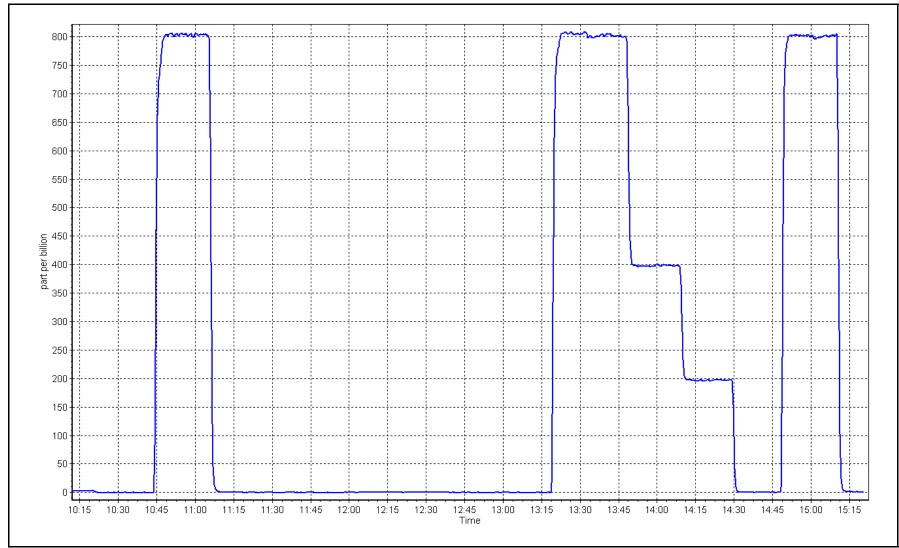
**SO2 Calibration Plot** 

Date:

May 10, 2023

Location: Surmont 2







### H<sub>2</sub>S Calibration Report

Version-11-2021

**Station Information** 

Station Name: Surmont 2
Calibration Date: May 9, 2023
Start time (MST): 11:15
Reason: Routine

Station number: AMS29 Last Cal Date: April 12, 2023 End time (MST): 15:52

**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: 5258 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

**Finish Start** <u>Finish</u> <u>Start</u> 1.008319 Backgd or Offset: Calibration slope: 0.999326 0.82 0.82 Calibration intercept: -0.142577 -0.382705 Coeff or Slope: 1.034 1.043

H<sub>2</sub>S 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	80.1	0.998
as found 2nd point	4963	37.2	40.1	39.8	1.005
as found 3rd point	4982	18.6	20.1	19.8	1.008
new cylinder response					

#### H<sub>2</sub>S Calibration Data

Set Point	Set Point Dilution air flow rate Source gas (sccm) (scc		Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	-0.1	
high point	4926	74.2	80.0	80.5	0.994
second point	4963	37.2	37.2 40.1 39.7		1.010
third point	4982	18.6	20.1	19.7	1.018
as left zero	5000	0.0	0.0	0.0	
as left span	4926	74.2	80.0	79.3	1.009
SO2 Scrubber Check	4919	81.3	813.0	0.0	
Date of last scrubber ch	nange:	_		Ave Corr Factor	1.007
Date of last converter e	fficiency test:			·	efficiency

Date of last converter efficiency test:							
Baseline Corr As found:	80.2	Prev response:	79.81	*% change:	0.5%		
Baseline Corr 2nd AF pt:	39.9	AF Slope:	1.002897	AF Intercept:	-0.242699		

Baseline Corr 3rd AF pt: 19.9 AF Correlation: 0.999980

\* = > +/-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



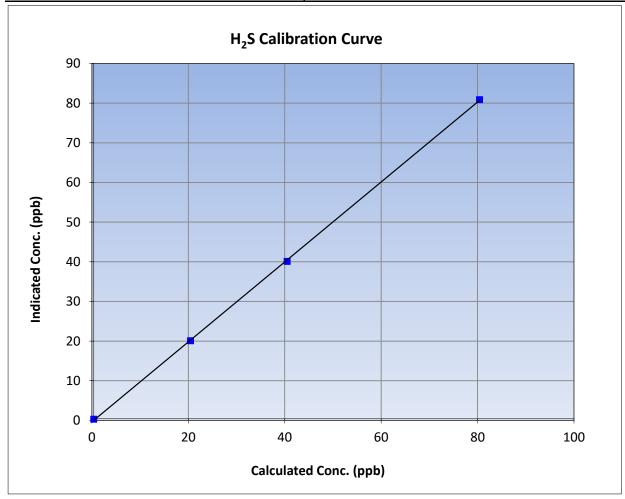
# H<sub>2</sub>S Calibration Summary

Version-11-2021

#### **Station Information**

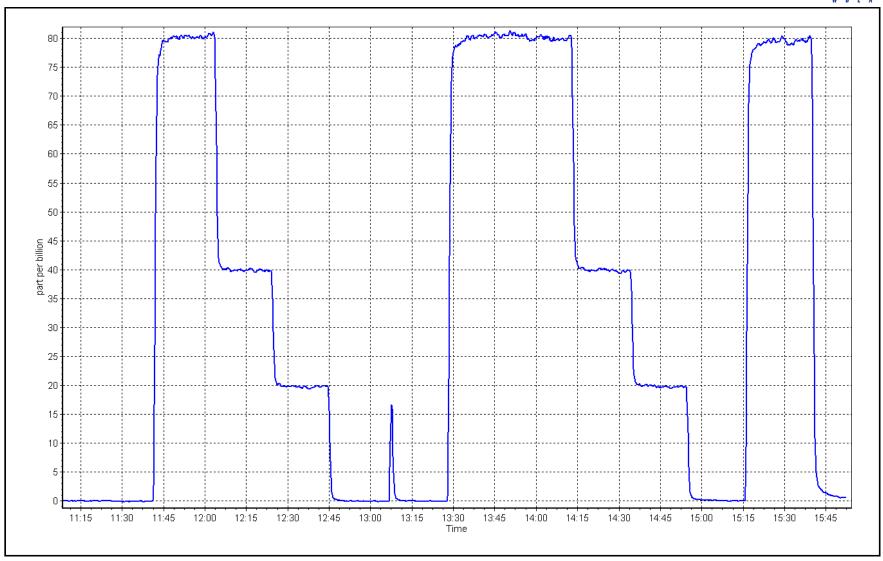
Calibration Date: May 9, 2023 **Previous Calibration:** April 12, 2023 Station Name: Surmont 2 Station Number: AMS29 Start Time (MST): 11:15 End Time (MST): 15:52 Analyzer make: Thermo 43iQ-TLE Analyzer serial #: 1200326170

	Calibration Data										
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>						
0.0	-0.1		Correlation Coefficient	0.999923	≥0.995						
80.0	80.5	0.9938	Correlation coefficient	0.333323	20.993						
40.1	39.7	1.0103	Slope	1.008319	0.90 - 1.10						
20.1	19.7	1.0180	Slope	1.008319	0.90 - 1.10						
			- Intercept	-0.382705	+/-3						



Date: May 9, 2023 Location: Surmont 2







### **THC Calibration Report**

Version-01-2020

#### **Station Information**

Station Name: Surmont 2 Calibration Date: May 9, 2023 Start time (MST): 9:51 As Found Reason:

Station number: AMS29 Last Cal Date: April 13, 2023

End time (MST):

11:31

**Calibration Standards** 

CC356008 Gas Cert Reference: CH4 Cal Gas Conc.

Cal Gas Expiry Date: February 23, 2025 CH4 Equiv Conc.

1064.7 ppm

C3H8 Cal Gas Conc.

499.0 ppm 205.7 ppm

Removed Gas Expiry: NA

Removed Gas Cert:

NA

CH4 Equiv Conc.

1064.7

Removed CH4 Conc.

499.0

ppm ppm Diff between cyl:

ppm

Removed C3H8 Conc.

205.7

Serial Number:

5258

Calibrator Make/Model: ZAG Make/Model:

Teledyne API T700 Teledyne API T701

Serial Number:

4297

**Analyzer Information** 

Analyzer make: Thermo 51i-LT

Analyzer serial #:

1170050149

Analyzer Range: 0 - 20 ppm

Finish

Start

**Finish** 

Calibration slope:

1.000707

Background:

4.62

4.62

Calibration intercept:

-0.035654

Start

Coefficient: 5.286 5.286

#### **THC Calibration Data**

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)  Limit = 0.95-1.05
as found zero	5000	0.0	0.00	0.01	
as found span	4918	81.3	17.31	16.32	1.061
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	-0.01	
as left span	4918	81.3	17.31	16.36	1.058
			Averag	ge Correction Factor	
Baseline Corr As found:	16.31	Previous response	17.29	*% change	-6.0%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	

AF Correlation:

Notes:

Baseline Corr 3rd AF pt:

As founds completed. A large adjustment was needed, potential reasons: the pump needs a changeout, or the hydrogen cylinder level is too low. Both will be tested May 10.

Braiden Boutilier Calibration Performed By:

NA

\* = > +/-5% change initiates investigation

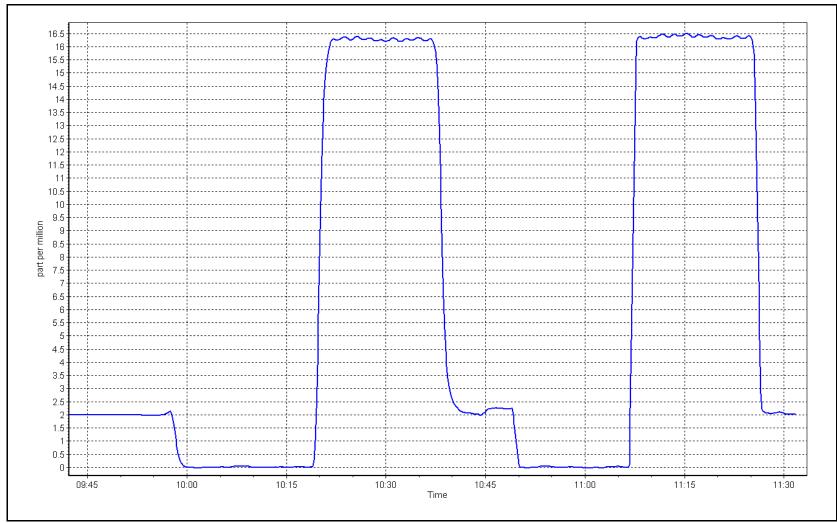
**THC Calibration Plot** 

Date:

May 9, 2023

Location: Surmont 2





## **THC Calibration Report**

Version-01-2020

ppm

#### **Station Information**

Station Name: Surmont 2 Calibration Date: May 10, 2023 Start time (MST): 10:15 Routine Reason:

Station number: AMS29 Last Cal Date: May 9, 2023 15:20

End time (MST):

**Calibration Standards** 

CC356008 Gas Cert Reference: Cal Gas Expiry Date: February 23, 2025 1064.7

CH4 Cal Gas Conc. <u>499.0</u> ppm CH4 Equiv Conc. C3H8 Cal Gas Conc. 205.7 ppm

Removed Gas Cert: NA Removed Gas Expiry: NA

Removed CH4 Conc. 499.0 CH4 Equiv Conc. 1064.7 ppm ppm

205.7 Diff between cyl: Removed C3H8 Conc. ppm

5258 Calibrator Make/Model: Teledyne API T700 Serial Number: ZAG Make/Model: Teledyne API T701 Serial Number: 4297

**Analyzer Information** 

Analyzer make: Thermo 51i-LT Analyzer serial #: 1170050149

Analyzer Range: 0 - 20 ppm

Baseline Corr 3rd AF pt:

Start Finish **Finish** Start Calibration slope: Background: 1.000707 1.002670 4.62 4.88 -0.072027 Coefficient: Calibration intercept: -0.035654 5.286 5.485

#### **THC Calibration Data**

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	on Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)  Limit = 0.95-1.05
as found zero	5000	0.0	0.00	0.04	
as found span	4918	81.3	17.31	16.33	1.060
as found 2nd point					
as found 3rd point					
new cylinder response					_
calibrator zero	5000	0.0	0.00	-0.05	
high point	4918	81.3	17.31	17.32	1.000
second point	4959	40.7	8.67	8.55	1.014
third point	4979	20.3	4.32	4.27	1.012
as left zero	5000	0.0	0.00	-0.15	
as left span	4918	81.3	17.31	17.43	0.993
			Ave	erage Correction Factor	1.008
Baseline Corr As found:	16.29	Previous response	17.29	*% change	-6.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	

AF Correlation:

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

Calibration Performed By: **Braiden Boutilier** 

NA

\* = > +/-5% change initiates investigation



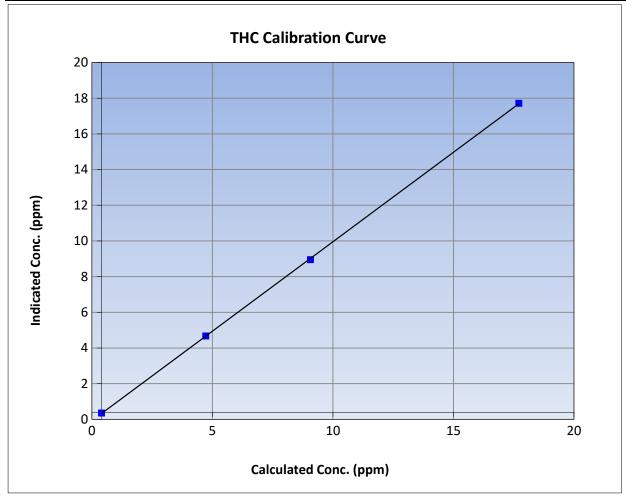
## **THC Calibration Summary**

Version-01-2020

#### **Station Information**

**Previous Calibration:** Calibration Date: May 10, 2023 May 9, 2023 Station Name: Surmont 2 Station Number: AMS29 Start Time (MST): 10:15 End Time (MST): 15:20 Analyzer make: Thermo 51i-LT Analyzer serial #: 1170050149

	Calibration Data										
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>						
0.00	-0.05		Correlation Coefficient	0.999961	≥0.995						
17.31	17.32	0.9997	Correlation Coefficient	0.555501	20.995						
8.67	8.55	1.0137	Slope	1.002670	0.90 - 1.10						
4.32	4.27	1.0120	Slope	1.002070	0.90 - 1.10						
			- Intercept	-0.072027	+/-1.5						

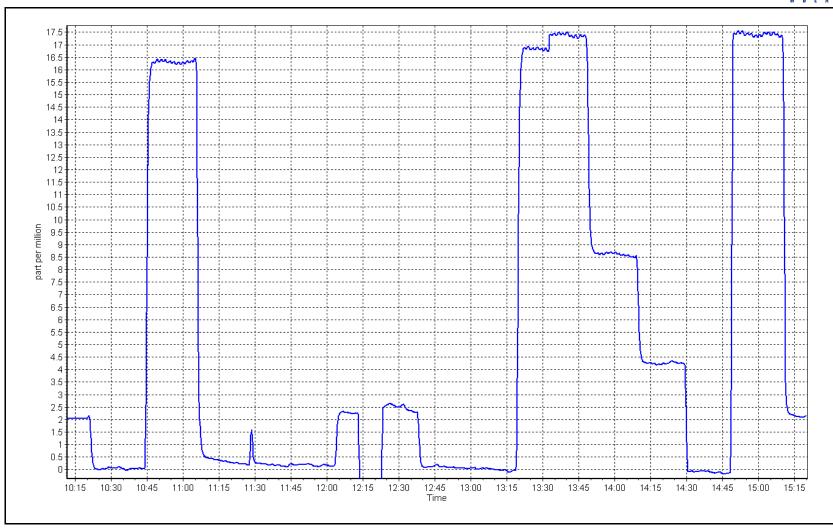


**THC Calibration Plot** 

Date: May 10, 2023

Location: Surmont 2







# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

#### **Station Information**

Station Name: Surmont 2
Calibration Date: May 11, 2023

Start time (MST): 9:25 Reason: Routine Station number: AMS29 Last Cal Date: April 26, 2023 End time (MST): 15:02

NO gas Diff:

Serial Number: 5258

Serial Number: 4297

#### **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:

Calibrator Model: Teledyne API T700
ZAG make/model: Teledyne API T701

Analyzer make: Thermo 42i Analyzer serial #: 1170050148

NOX Range (ppb): 0 - 1000 ppb

<u>Start</u> **Finish** <u>Start</u> **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: 173.2 173.2

**Analyzer Information** 

#### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	1.000252	1.002627
NO <sub>x</sub> Cal Offset:	-0.432516	-0.313069
NO Cal Slope:	0.999765	1.004857
NO Cal Offset:	-1.012030	-1.492939
NO <sub>2</sub> Cal Slope:	0.997717	0.995411
NO <sub>2</sub> Cal Offset:	0.172614	-0.294557



# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

				Dilı	ution Calibratior	n Data				
Set Point	Dilution flow rate (sccm)	Source gas flow co	alculated 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	4916	84.2	799.2	799.2	0.0	803.0	804.0	-1.0	0.9953	0.9940
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.2		
high point	4916	84.2	799.2	799.2	0.0	801.0	802.0	-0.4	0.9977	0.9965
second point	4958	42.1	399.6	399.6	0.0	400.8	400.3	0.6	0.9970	0.9983
third point	4979	21.1	200.3	200.3	0.0	199.5	197.6	1.9	1.0039	1.0135
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.2		
as left span	4916	84.2	799.2	388.2	411.0	797.8	383.4	414.4	1.0017	1.0125
							Average C	Correction Factor	0.9996	1.0028
Corrected As fo	ound NO <sub>X</sub> =	803.0 ppb	NO =	804.1 ppb	* = > +/-5%	% change initiates in	investigation	*Percent Chang	ge NO <sub>X</sub> =	0.5%
Previous Respo	onse NO <sub>X</sub> =	799.0 ppb	NO =	798.0 ppb				*Percent Chang	ge NO =	0.8%
Baseline Corr 2	2nd pt NO <sub>X</sub> =	NA ppb	NO =	NA ppb	As found	d $NO_X r^2$ :		Nx SI:	Nx Int:	
Baseline Corr 3	3rd pt NO <sub>X</sub> =	· NA ppb	NO =	NA ppb	As found	d NO $r^2$ :		NO SI:	NO Int:	
					As found	d $NO_2 r^2$ :		NO2 SI:	NO <sub>2</sub> Int:	
		-		e	GPT Calibration [	Data				
O3 Setpo	oint (ppb)	Indicated NO Referen concentration (ppb		cated NO Drop entration (ppb)	Calculated NO concentration (ppb		dicated NO2 ntration (ppb) (Ic)	NO2 Correction fac Calibration Limit = 0 As Found Limit = 0	0.95-1.05 Calibratio	erter Efficiency on Limit = 96-104%
as found	d GPT zero									
as found GPT poi	oint (400 ppb NO2)									
as found GPT poi	oint (200 ppb NO2)									
as found GPT poi	oint (100 ppb NO2)									
1st GPT point	nt (400 ppb O3)	795.9		384.9	411.0		408.8	1.0054	1	99.5%
2 - 1 CDT '-	nt (200 ppb O3)	795.9		592.1	203.8		203.2	1.0030	J	99.7%
Zna GPT poin	.t ( <u>200 pp2 00)</u>									
•	nt (100 ppb O3)	795.9		686.9	109.0	<u>-</u> -	107.1	1.0177	7	98.3%

Notes:

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

Calibration Performed By:

Braiden Boutilier



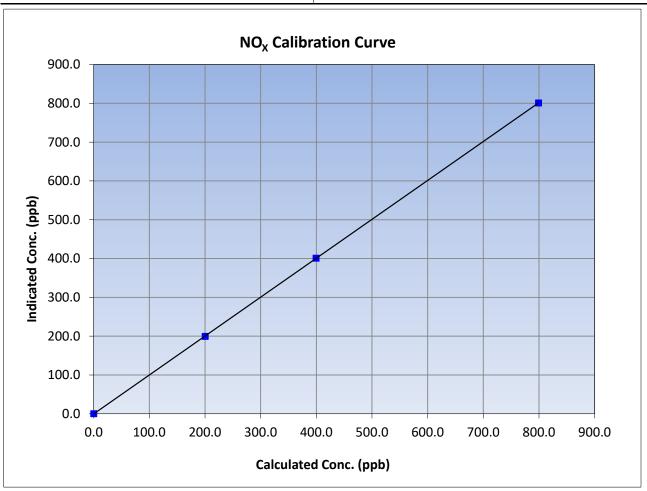
## NO<sub>x</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 11, 2023 Previous Calibration: April 26, 2023 Station Name: Surmont 2 Station Number: AMS29 Start Time (MST): 9:25 End Time (MST): 15:02 Analyzer serial #: Analyzer make: Thermo 42i 1170050148

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>	
0.0	0.2		Correlation Coefficient	0.999996	≥0.995	
799.2	801.0	0.9977	Correlation Coefficient	0.999990	20.333	
399.6	400.8	0.9970	Slope	1.002627	0.90 - 1.10	
200.3	199.5	1.0039	Slope	1.002027	0.90 - 1.10	
			Intercept	-0.313069	+/-20	





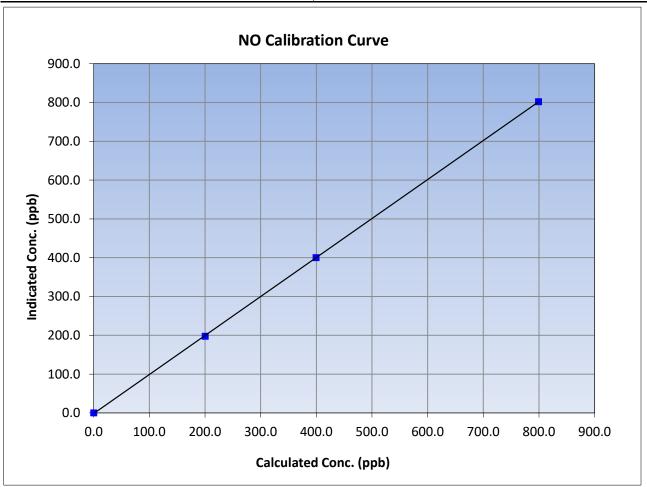
## **NO Calibration Summary**

Version-04-2020

#### **Station Information**

Calibration Date: May 11, 2023 Previous Calibration: April 26, 2023 Station Name: Surmont 2 Station Number: AMS29 Start Time (MST): 9:25 End Time (MST): 15:02 Analyzer make: Thermo 42i Analyzer serial #: 1170050148

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999980	≥0.995
799.2	802.0	0.9965	Correlation Coefficient	0.555500	20.993
399.6	400.3	0.9983	Slope	1.004857	0.90 - 1.10
200.3	197.6	1.0135	Slope	1.004657	
			Intercept	-1.492939	+/-20





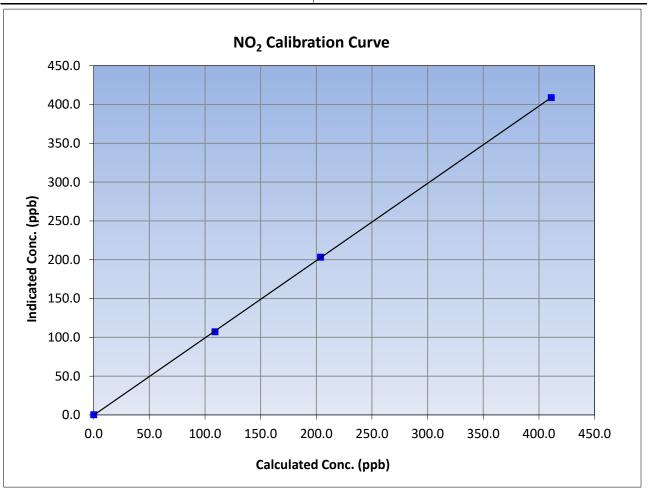
## NO<sub>2</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 11, 2023 Previous Calibration: April 26, 2023 Station Name: Surmont 2 Station Number: AMS29 Start Time (MST): 9:25 End Time (MST): 15:02 Analyzer make: Thermo 42i Analyzer serial #: 1170050148

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>	
0.0	0.2		Correlation Coefficient	0.999979	≥0.995	
411.0	408.8	1.0054	Correlation Coefficient		20.333	
203.8	203.2	1.0030	Slope	0.995411	0.90 - 1.10	
109.0	107.1	1.0177	Slope	0.995411	0.30 - 1.10	
			Intercept	-0.294557	+/-20	

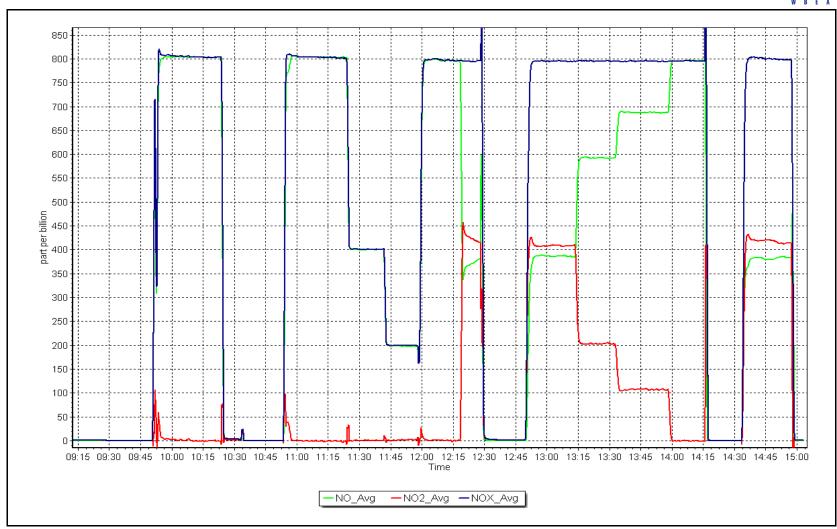


NO<sub>x</sub> Calibration Plot

Date: May 11, 2023

Location: Surmont 2







# **T640 PM<sub>2.5</sub> CALIBRATION**

Version-01-2023

		Station Information	1			
Station Name:	Surmont 2		Station number:	AMS 29		
Calibration Date:	May 11, 2023		Last Cal Date:	April 26, 20	23	
Start time (MST):	12:21		End time (MST):	14:17		
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 T	est			
<u>Parameter</u>	As found	<u>Measured</u>	<u>As left</u>		<u>Adjusted</u>	(Limits)
T (°C)	18.1	18.38	18.1			+/- 2 °C
P (mmHg)	714.5	715.93	714.5			+/- 10 mmHg
flow (LPM)	5.00	4.899	5.00			+/- 0.25 LPM
Leak Test:	Date of check:	May 11, 2023	Last Cal Date:	April 26	5, 2023	
Note: this leak check will be	PM w/o HEPA:	13.1	PM w/ HEPA:	C		<0.2 ug/m3
Inlet cleaning :	Inlet Head	Quarterly Calibration 1	<b>Test</b>			
<u>Parameter</u>	As found	Post maintenance	As left		Adjusted	(Limits)
PMT Peak Test	11.0	11.0	11.0			11.3 +/- 0.5
Post-maintenance	a leak check:	PM w/o HEPA:	8.9	w/ HEPA:		0.0
Date Optical Cham		May 11, 2		W/ IILI A.		<0.2 ug/m3
Disposable Filte		May 11, 2023				
		Annual Maintenanc	e			
Date Sample Tube Cleaned:		September 30, 2022				
Date RH/T Sensor Cleaned:		October 6, 2022				
Notes:		Quarterly maintenance	completed. No adju	stments ma	ade.	
Calibration by:	Braiden Boutilier					



## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

> AMS30 ELLS RIVER MAY 2023

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

June 30, 2023



## **SO<sub>2</sub> Calibration Report**

Version-01-2020

#### **Station Information**

Station Name:Ells RiverStation number:AMS 30Calibration Date:May 5, 2023Last Cal Date:April 11, 2023Start time (MST):9:53End time (MST):12:35

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

<u>Start</u> **Start Finish Finish** Calibration slope: 1.003073 1.008699 Backgd or Offset: 8.9 9.0 0.988 Calibration intercept: -2.075962 -2.796032 Coeff or Slope: 0.988

SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow 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	803.1	0.997
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	806.0	0.993
second point	4960	39.6	400.2	399.6	1.002
third point	4980	19.8	200.1	195.8	1.022
as left zero	5000	0.0	0.0	0.0	
as left span	4921	79.2	800.4	806.0	0.993
			Averag	ge Correction Factor	1.006
Baseline Corr As found:	803.10	Previous response	800.75	*% change	0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope	:	AF Intercept:	

\* = > +/-5% change initiates investigation

AF Correlation:

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador

NA

Baseline Corr 3rd AF pt:



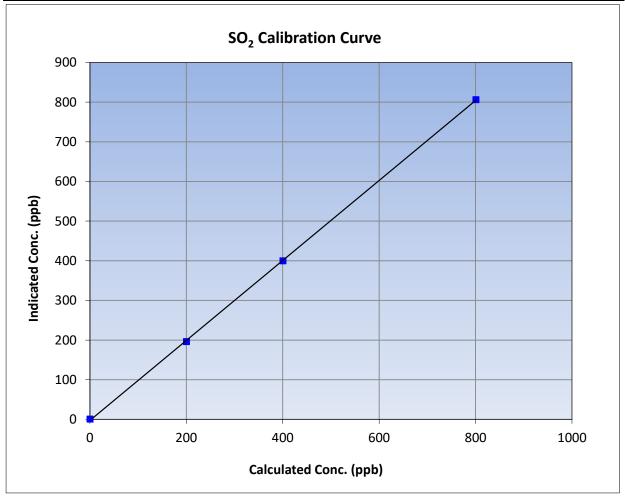
# **SO<sub>2</sub> Calibration Summary**

Version-01-2020

## **Station Information**

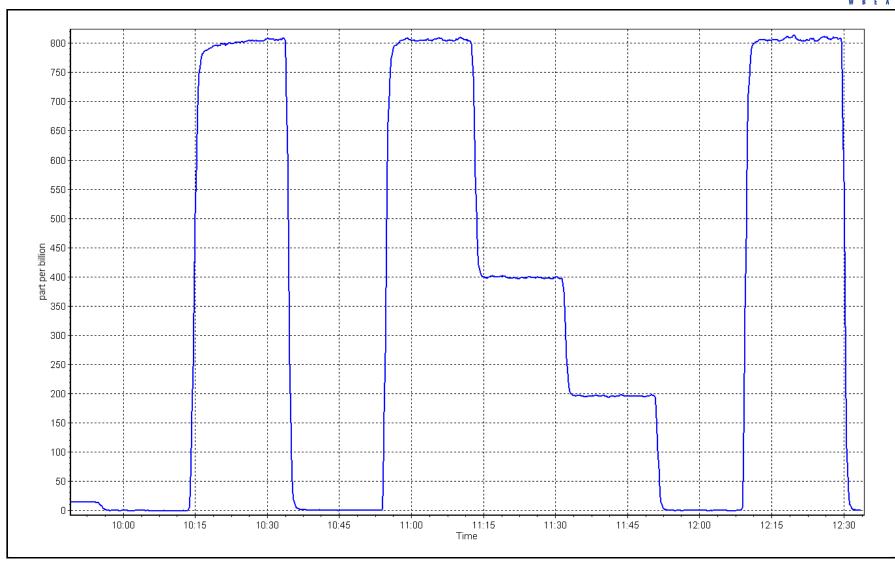
Calibration Date: May 5, 2023 **Previous Calibration:** April 11, 2023 Station Name: Ells River Station Number: AMS 30 Start Time (MST): 9:53 End Time (MST): 12:35 Analyzer make: Thermo 43i Analyzer serial #: 1008841397

Calibration Data									
Calculated concentration Indicated concentration (ppb) (Ic) (ppb) (Ic) (Cc/			Statistical Evalua	ation	<u>Limits</u>				
0.0	0.3		Correlation Coefficient	0.999933	≥0.995				
800.4	806.0	0.9930	Correlation Coefficient	0.999933	20.995				
400.2	399.6	1.0016	Slope	1.008699	0.90 - 1.10				
200.1	195.8	1.0220	Slope	1.008033	0.90 - 1.10				
			- Intercept	-2.796032	+/-30				



SO2 Calibration Plot Date: May 5, 2023 Location: Ells River





# W R F A

## **Wood Buffalo Environmental Association**

## **TRS Calibration Report**

Version-11-2021

**Station Information** 

Station Name: Ells River
Calibration Date: May 10, 2023
Start time (MST): 9:00
Reason: Routine

Station number: AMS30 Last Cal Date: April 3, 2023 End time (MST): 13:00

**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** <u>Finish</u> 1.000494 Calibration slope: 1.007352 Backgd or Offset: 1.58 1.55 -0.159242 Coeff or Slope: Calibration intercept: -0.019196 1.092 1.107

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	78.3	1.021
as found 2nd point	4961	39.4	40.0	38.9	1.029
as found 3rd point	4980	19.7	20.0	19.4	1.032
new cylinder response					

#### **TRS Calibration Data**

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	0.0	
high point	4921	78.7	80.0	80.5	0.993
second point	4961	39.4	40.0	40.0	1.001
third point	4980	19.7	20.0	19.9	1.006
as left zero	5000	0.0	0.0	0.1	
as left span	4921	78.7	80.0	80.0	1.000
SO2 Scrubber Check	4921	79.2	800.4	0.1	
Date of last scrubber char	ige:	N/A		Ave Corr Factor	1.000
Date of last converter effi	ciency test:	N/A		95.1%	efficiency

Baseline Corr As found: 78.3 79.98 -2.2% Prev response: \*% change: Baseline Corr 2nd AF pt: -0.138713 38.9 AF Slope: 0.979624 AF Intercept: Baseline Corr 3rd AF pt: AF Correlation: 0.999981 19.4

\* = > +/-5% change initiates investigation

Notes: Adjusted the span only.

Calibration Performed By: Denny Ray Estador



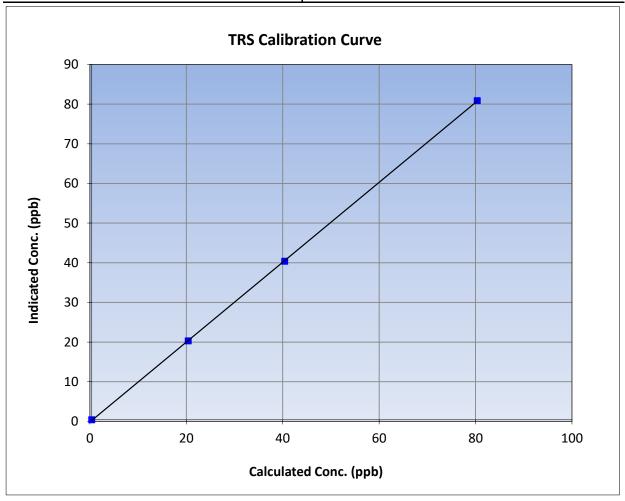
## **TRS Calibration Summary**

Version-11-2021

## **Station Information**

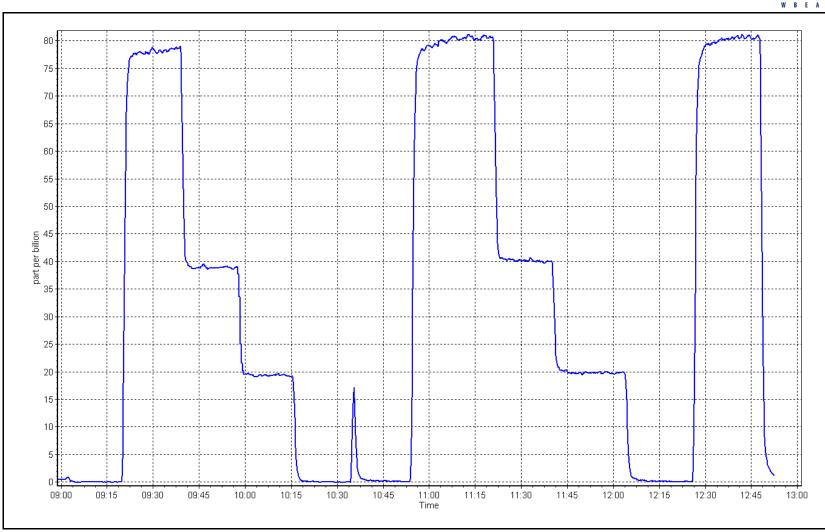
**Previous Calibration:** Calibration Date: May 10, 2023 April 3, 2023 Station Name: Ells River Station Number: AMS30 Start Time (MST): 9:00 End Time (MST): 13:00 Analyzer make: Thermo 43i TLE Analyzer serial #: 1410661331

Calibration Data								
Calculated concentration Indicated concentration Cor (ppb) (Cc) (ppb) (Ic)		Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.0	0.0		Correlation Coefficient	0.999979	≥0.995			
80.0	80.5	0.9933	Correlation Coefficient	0.333373	20.995			
40.0	40.0	1.0007	Slope	1.007352	0.90 - 1.10			
20.0	19.9	1.0058	Зюре	1.00/332	0.90 - 1.10			
			- Intercept	-0.159242	+/-3			



**TRS Calibration Plot** Date: May 10, 2023 Location: Ells River







# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

#### **Station Information**

Ells River Station Name: Calibration Date: May 5, 2023 Start time (MST): 9:53

Routine Reason:

Station number: AMS 30 Last Cal Date: April 11, 2023

End time (MST): 12:35

## **Calibration Standards**

Gas Cert Reference: Cal Gas Expiry Date: December 29, 2028 CC494126 CH4 Cal Gas Conc. 499.7 ppm

C3H8 Cal Gas Conc. 209.2 ppm

Removed Gas Cert:

Removed CH4 Conc. 499.7 ppm

Removed C3H8 Conc. 209.2 ppm

Diff between cyl ( $CH_4$ ):

Calibrator Model: **API T700** ZAG make/model: **API T701H**  CH4 Equiv Conc. 1075.0 ppm

Removed Gas Expiry:

CH4 Equiv Conc. 1075.0 ppm

Diff between cyl (THC):

Diff between cyl (NM):

Serial Number: 3061 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 0.000238 NMHC SP Ratio: 4.39E-05 4.39E-05

CH4 Retention time: 14.2 14.2 NMHC Peak Area: 207620 207620

## **THC Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (C	Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05
			,	, , , , ,	CI EIIIII 0.55 1.05
as found zero	5000	0.0	0.00	0.00	
as found span	4921	79.2	17.03	17.02	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4921	79.2	17.03	17.02	1.000
second point	4960	39.6	8.51	8.45	1.008
third point	4980	19.8	4.26	4.17	1.021
as left zero	5000	0.0	0.00	0.00	
as left span	4921	79.2	17.03	17.10	0.996
			Α	Average Correction Factor	1.010
Baseline Corr AF:	17.02	Prev response	16.95	*% change	0.4%

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



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (	Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05
as found zero	5000	0	0.00	0.00	
as found span	4921	79.2	9.11	9.15	0.996
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	9.15	0.996
second point	4960	39.6	4.56	4.55	1.002
third point	4980	19.8	2.28	2.24	1.018
as left zero	5000	0	0.00	0.00	
as left span	4921	79.2	9.11	9.20	0.991
			A	Average Correction Factor	1.005
Baseline Corr AF:	9.15	Prev response	9.09	*% change	0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc	r) Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4921	79.2	7.91	7.87	1.005
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	7.87	1.005
second point	4960	39.6	3.96	3.90	1.014
third point	4980	19.8	1.98	1.93	1.025
as left zero	5000	0.0	0.00	0.00	
as left span	4921	79.2	7.91	7.90	1.002
			Av	verage Correction Factor	1.015
Baseline Corr AF:	7.87	Prev response	7.86	*% change	0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
		Calibration	Statistics		_
		<u>Start</u>		<u>Finish</u>	
THC Cal Slope:		0.998335		1.000973	
THC Cal Offset:		-0.048138		-0.047539	
CH4 Cal Slope:		0.996510	0.995687		
CH4 Cal Offset:		-0.029356		-0.021757	
NMHC Cal Slope:		0.999568		1.005200	
NMHC Cal Offset:		-0.018381		-0.024582	

Notes: No adjustments made.

Calibration Performed By: Denny Ray Estador



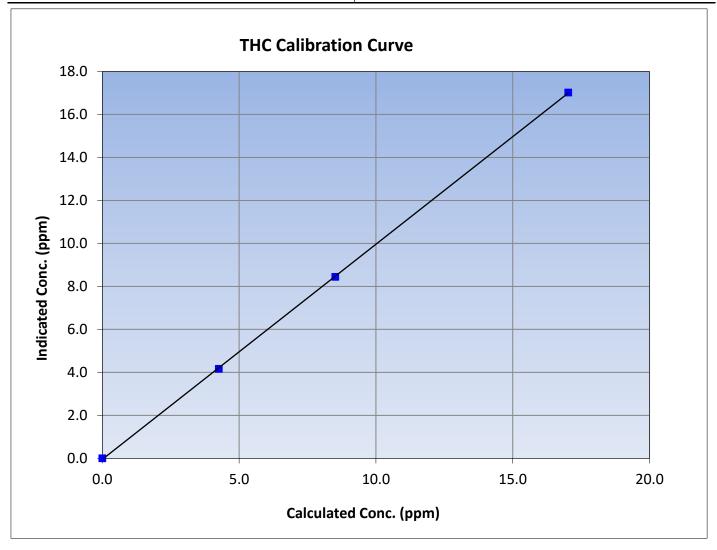
# **THC Calibration Summary**

Version-01-2020

## **Station Information**

**Previous Calibration:** Calibration Date: May 5, 2023 April 11, 2023 Station Name: Ells River Station Number: **AMS 30** 9:53 Start Time (MST): End Time (MST): 12:35 Analyzer make: Analyzer serial #: 1181490018 Thermo 55i

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999964	≥0.995
17.03	17.02	1.0004	Correlation Coemicient	0.555504	20.333
8.51	8.45	1.0078	Slope	1.000973	0.90 - 1.10
4.26	4.17	1.0214	Slope		0.90 - 1.10
			Intercept	-0.047539	+/-0.5





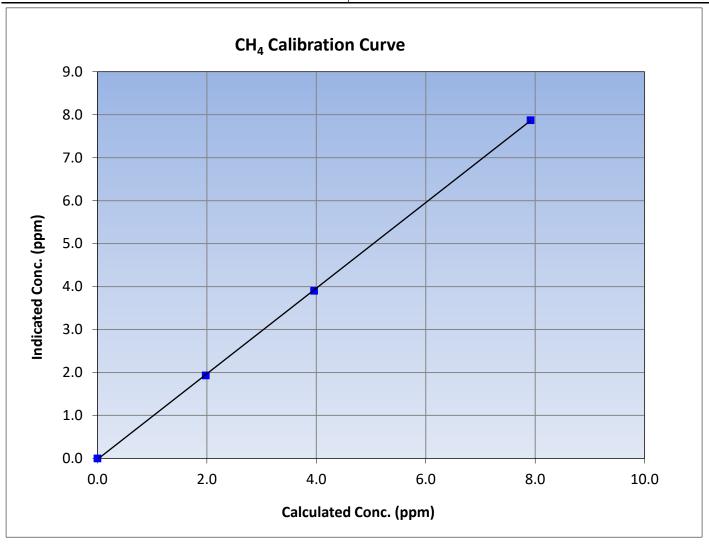
# **CH<sub>4</sub> Calibration Summary**

Version-01-2020

## **Station Information**

Calibration Date: May 5, 2023 **Previous Calibration:** April 11, 2023 Station Name: Ells River Station Number: **AMS 30** Start Time (MST): 9:53 End Time (MST): 12:35 Analyzer make: Analyzer serial #: Thermo 55i 1181490018

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999963	≥0.995
7.91	7.87	1.0055			20.999
3.96	3.90	1.0143	Slope	0.995687	0.90 - 1.10
1.98	1.93	1.0248	Slope		0.90 - 1.10
			Intercept	-0.021757	+/-0.5





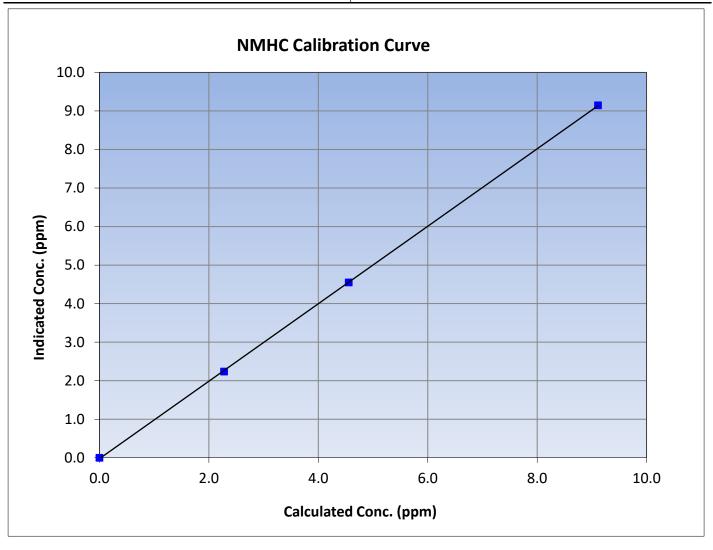
# **NMHC Calibration Summary**

Version-01-2020

## **Station Information**

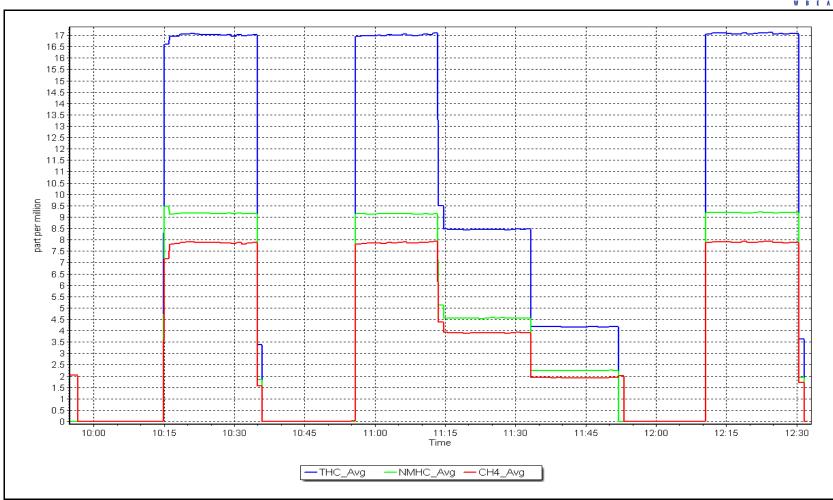
Calibration Date: May 5, 2023 **Previous Calibration:** April 11, 2023 Station Name: Ells River Station Number: **AMS 30** 9:53 Start Time (MST): End Time (MST): 12:35 Analyzer make: Analyzer serial #: 1181490018 Thermo 55i

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999966	≥0.995
9.11	9.15	0.9963	Correlation Coemicient	0.999900	20.333
4.56	4.55	1.0019	Slope	1.005200	0.90 - 1.10
2.28	2.24	1.0180	Slope		0.90 - 1.10
			Intercept	-0.024582	+/-0.5



NMHC Calibration Plot Date: May 5, 2023 Location: Ells River







## THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

#### **Station Information**

Ells River Station Name: Calibration Date: May 26, 2023 11:54

Start time (MST):

Reason: Cylinder Change Station number: AMS 30 Last Cal Date: May 5, 2023

End time (MST): 13:07

**Calibration Standards** 

Gas Cert Reference: Cal Gas Expiry Date: December 29, 2028 CC494126

CH4 Cal Gas Conc. 499.7 ppm C3H8 Cal Gas Conc. 209.2 ppm

Removed Gas Cert:

499.7 ppm

Removed CH4 Conc. Removed C3H8 Conc. 209.2 ppm

Diff between cyl ( $CH_4$ ):

Calibrator Model: **API T700** ZAG make/model: **API T701H** 

CH4 Equiv Conc. 1075.0 ppm

Removed Gas Expiry:

CH4 Equiv Conc. 1075.0 ppm

Diff between cyl (THC): Diff between cyl (NM):

> Serial Number: 3061 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

0.000238

NMHC SP Ratio:

Start

Finish

CH4 SP Ratio:

0.000238

4.39E-05

CH4 Retention time:

14.2

207620

4.39E-05

14.2

NMHC Peak Area:

207620

## **THC Calibration Data**

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4921	79.2	17.03	16.83	1.012
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	
as left span	4921	79.2	17.03	16.86	1.010
	Average Correction Fact				

Baseline Corr AF: 16.83 Prev response 17.00 -1.0% \*% change Baseline Corr 2nd AF: NA AF Slope: AF Intercept:

\* = > +/-5% change initiates investigation Baseline Corr 3rd AF: NA AF Correlation:



# THC / CH<sub>4</sub> / NMHC Calibration Report

Version-01-2020

NMHC Ca	alibra	ation	Data
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Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>		
as found zero	5000	0	0.00	0.00			
as found span	4921	79.2	9.11	9.09	1.002		
as found 2nd point							
as found 3rd point							
new cylinder response							
calibrator zero							
high point							
second point							
third point							
as left zero	5000	0	0.00	0.00			
as left span	4921	79.2	9.11	9.07	1.005		
			Aver	rage Correction Factor			
Baseline Corr AF:	9.09	Prev response	9.14	*% 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 <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4921	79.2	7.91	7.74	1.023
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	
as left span	4921	79.2	7.91	7.79	1.016
			Ave	rage Correction Factor	
Baseline Corr AF:	7.74	Prev response	7.86	*% change	-1.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
		Calibration	Statistics		_
		<u>Start</u>		<u>Finish</u>	
THC Cal Slope:		1.000973			
THC Cal Offset:		-0.047539			
CH4 Cal Slope:		0.995687			
CH4 Cal Offset:		-0.021757			
NMHC Cal Slope:		1.005200			
NMHC Cal Offset:		-0.024582			

Notes: Replaced N2 cylinder.

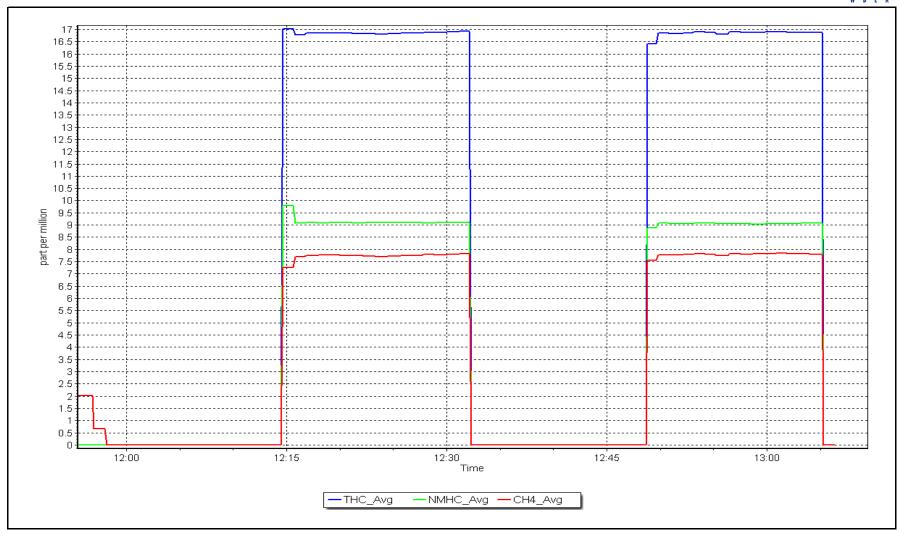
Calibration Performed By: Denny Ray Estador

**NMHC Calibration Plot** 

Date: May 26, 2023

Location: Ells River







# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

#### **Station Information**

Station Name: Ells River Calibration Date: May 11, 2023 8:51

Start time (MST): Routine Reason:

Station number: AMS 30 Last Cal Date: April 5, 2023

End time (MST): 13:43

#### **Calibration Standards**

T2Y1P2R NO Gas Cylinder #: Cal Gas Expiry Date: December 11, 2023 NOX Cal Gas Conc: NO Cal Gas Conc: 49.97 50.83 ppm ppm

Removed Cylinder #: Removed Gas Exp Date:

Removed Gas NO Conc: Removed Gas NOX Conc: 50.83 ppm 49.97 ppm

NOX gas Diff:

NO gas Diff: **API T700** Serial Number: 3061 Calibrator Model: ZAG make/model: **API T701H** Serial Number: 358

## **Analyzer Information**

Analyzer make: Thermo 42i Analyzer serial #: 710321429

NOX Range (ppb): 0 - 1000 ppb

<u>Start</u> **Finish** <u>Start</u> **Finish** NO coeff or slope: 1.029 1.051 NO bkgnd or offset: 12.5 12.7 NOX coeff or slope: 0.992 0.990 NOX bkgnd or offset: 12.9 12.5 NO2 coeff or slope: 1.000 1.000 Reaction cell Press: 183.6 181.2

#### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	1.000576	1.000351
NO <sub>x</sub> Cal Offset:	-1.140000	-1.160000
NO Cal Slope:	0.998571	1.001858
NO Cal Offset:	-1.840000	-2.240000
NO <sub>2</sub> Cal Slope:	1.002663	0.998225
NO <sub>2</sub> Cal Offset:	0.679699	0.085999



# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

				5"	6.111	5.				
Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) Limit = 0.95-1.05	NO Correction factor (Cc/Ic)  Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.0	0.0	0.1	-0.1	0.2		
as found span	4920	80.0	813.3	799.5	13.8	803.0	786.9	16.1	1.0128	1.0160
as found 2nd	4320	00.0	013.3	755.5	15.0	003.0	700.5	10.1	1.0120	1.0100
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
high point	4920	80.0	813.3	799.5	13.8	813.0	799.9	13.2	1.0003	0.9995
second point	4960	40.0	406.6	399.8	6.9	405.0	397.1	7.9	1.0040	1.0067
third point	4980	20.0	203.3	199.9	3.4	201.1	195.8	5.2	1.0110	1.0208
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1		
as left span	4920	80.0	813.3	427.5	385.8	816.7	428.4	388.2	0.9958	0.9979
							Average C	orrection Factor	1.0051	1.0090
Corrected As fo	ound NO <sub>x</sub> =	802.9 ppb	NO =	787.0 ppb	* = > +/-5%	change initiates i	nvestigation	*Percent Chang	ge NO <sub>x</sub> =	-1.2%
Previous Respo	onse NO <sub>x</sub> =	812.6 ppb	NO =	796.5 ppb				*Percent Chang	ge NO =	-1.2%
Baseline Corr 2			NO =		As found	$NO_{x} r^{2}$ :		Nx SI:	Nx Int:	
Baseline Corr 3			NO =	• • •	As found			NO SI:	NO Int:	
buseline con a	na pt No <sub>χ</sub> –	тит ррб	140 -	ил ррь	As found	2		NO2 SI:		
					AS TOUTIO	$1  NO_2 I$		NO2 31.	NO <sub>2</sub> Int:	
				(	GPT Calibration I	Data				
O3 Setpo	oint (ppb)	Indicated NO Ref		cated NO Drop entration (ppb)	Calculated NO concentration (ppt		dicated NO2 tration (ppb) (Ic)	NO2 Correction far Calibration Limit = As Found Limit = 0	0.95-1.05 Calibratio	rter Efficiency n Limit = 96-104%
as found	l GPT zero									
as found GPT po	int (400 ppb NO2)									
as found GPT po	int (200 ppb NO2)									
as found GPT po	int (100 ppb NO2)									
1st GPT point	t (400 ppb O3)	797.5		425.5	385.8		385.0	1.0020	)	99.8%

Notes:

2nd GPT point (200 ppb O3)

3rd GPT point (100 ppb O3)

Both zero and span was adjusted.

196.3

107.4

Average Correction Factor

0.9993

1.0024

1.0012

196.2

107.7

Calibration Performed By: Denny Ray Estador

797.5

797.5

615.1

703.6

100.1%

99.8%

99.9%



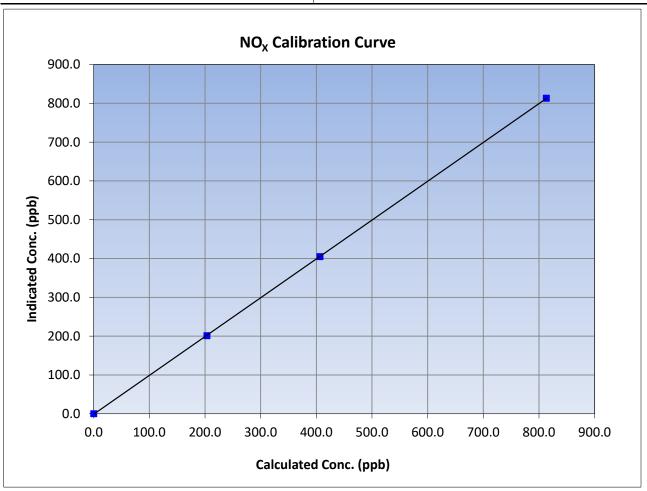
## NO<sub>x</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 11, 2023 Previous Calibration: April 5, 2023 Station Name: Ells River Station Number: AMS 30 Start Time (MST): 8:51 End Time (MST): 13:43 Analyzer serial #: Analyzer make: Thermo 42i 710321429

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999991	≥0.995
813.3	813.0	1.0003	Correlation Coefficient	0.555551	20.333
406.6	405.0	1.0040	Slope	1.000351	0.90 - 1.10
203.3	201.1	1.0110	Slope	1.000551	0.90 - 1.10
			Intercept	-1.160000	+/-20





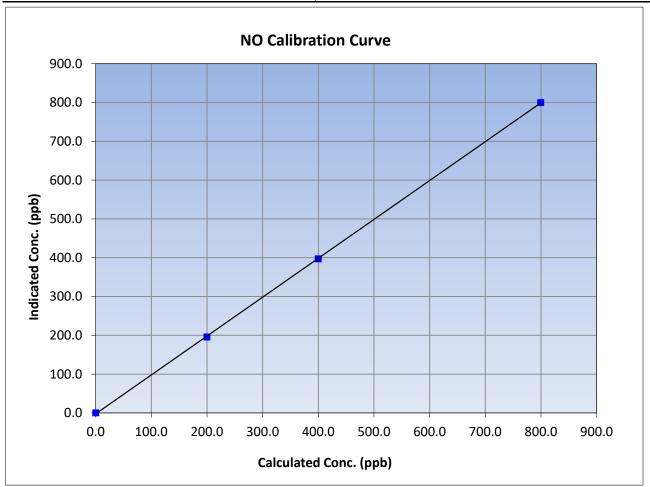
## **NO Calibration Summary**

Version-04-2020

#### **Station Information**

Calibration Date: May 11, 2023 Previous Calibration: April 5, 2023 Station Name: Ells River Station Number: AMS 30 Start Time (MST): 8:51 End Time (MST): 13:43 Analyzer make: Thermo 42i Analyzer serial #: 710321429

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999964	≥0.995
799.5	799.9	0.9995	Correlation Coefficient	0.555504	20.993
399.8	397.1	1.0067	Slope	1.001858	0.90 - 1.10
199.9	195.8	1.0208	Slope	1.001656	0.30 - 1.10
			Intercept	-2.240000	+/-20





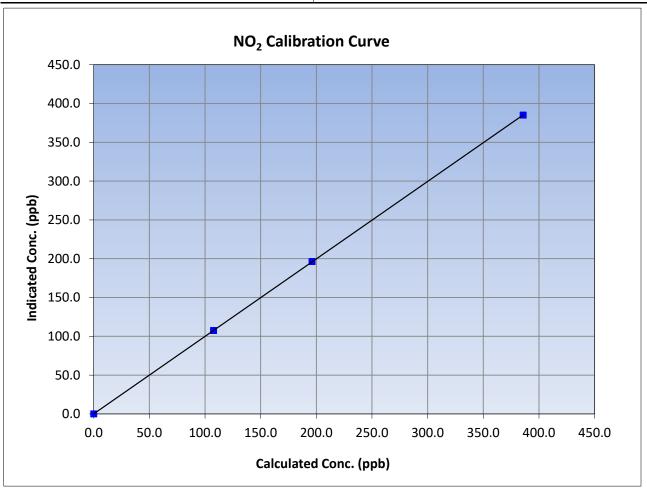
## NO<sub>2</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 11, 2023 Previous Calibration: April 5, 2023 Station Name: Ells River Station Number: AMS 30 Start Time (MST): 8:51 End Time (MST): 13:43 Analyzer make: Thermo 42i Analyzer serial #: 710321429

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>	
0.0	0.0		Correlation Coefficient	0.999997	≥0.995	
385.8	385.0	1.0020	correlation coefficient	0.555557	≥0.333	
196.2	196.3	0.9993	Slope	0.998225	0.90 - 1.10	
107.7	107.4	1.0024	Siope	0.996223	0.30 - 1.10	
			Intercept	0.085999	+/-20	



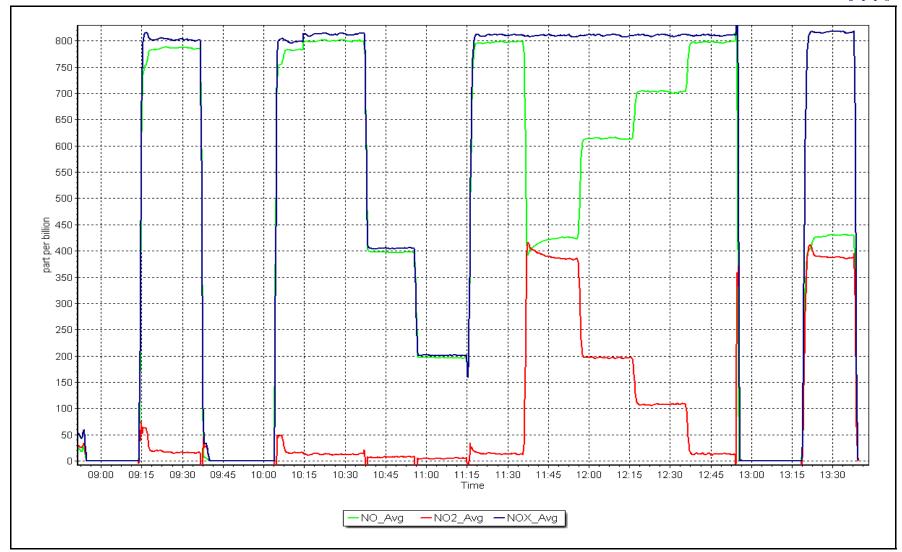
NO<sub>X</sub> Calibration Plot

Date:

May 11, 2023

Location: Ells River







# **T640 PM<sub>2.5</sub> CALIBRATION**

Version-01-2023

		Station Information	1					
Station Name:	Ells River	Station number: AMS 30						
Calibration Date:	May 10, 2023		Last Cal Date:	•	)23			
Start time (MST):	9:26		End time (MST):	9:48				
Analyzer Make:	API T640		S/N:	875				
Particulate Fraction:	PM2.5							
Flow Meter Make/Model:	Delta Cal		S/N:	954				
Temp/RH standard:	Delta Cal		S/N:	954				
		Monthly Calibration To	est					
<u>Parameter</u>	As found	Measured	As left		<u>Adjusted</u>	(Limits)		
T (°C)	18.2	17.5	18.2			+/- 2 °C		
P (mmHg)	732.4	732.5	732.4			+/- 10 mmHg		
flow (LPM)	5.01	5	5.01			+/- 0.25 LPM		
Leak Test:	Date of check:	May 10, 2023	Last Cal Date:	April 1	1, 2023			
	PM w/o HEPA:	9.9	PM w/ HEPA:		)	<0.2 ug/m3		
Note: this leak check will be	·	•	erve as the pre mai	ntenance l	eak check			
Inlet cleaning:	Inlet Head	<b>✓</b>						
		Quarterly Calibration 1	rest rest					
<u>Parameter</u>	As found	Post maintenance	As left		Adjusted	(Limits)		
PMT Peak Test						10.9 +/- 0.5		
Post-maintenance		PM w/o HEPA:		w/ HEPA:				
Date Optical Cham Disposable Filter						<0.2 ug/m3		
Disposable Filter	Changeu.							
		Annual Maintenanc	•					
		Allitual Maintenant	•					
Date Sample Tub	e Cleaned:							
Date RH/T Senso	r Cleaned:							
Notes:		No adjustments	made. Inlet head sti	II clean				
NOLES.		no adjustinents		5164111				
Calibration by:	Denny Ray Estador							



## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

> AMS506 JACKFISH 1 MAY 2023

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

June 30, 2023



## **SO<sub>2</sub> Calibration Report**

Version-01-2020

#### **Station Information**

Station Name: Jackfish 1 Calibration Date: May 18, 2023 Start time (MST): 9:06

Routine Reason:

Station number: **AMS 506** Last Cal Date: April 20, 2023

End time (MST): 11:54

#### **Calibration Standards**

Cal Gas Concentration: 50.52 ppm Cal Gas Exp Date: December 29, 2028

Cal Gas Cylinder #: CC274266

Calibrator Make/Model:

ZAG Make/Model:

Removed Cal Gas Conc: <u>50.52</u> ppm Removed Gas Cyl #: <u>NA</u>

**API T700** 

API 701

Rem Gas Exp Date: NA Diff between cyl:

Serial Number: 2659 Serial Number: 4427

## **Analyzer Information**

Analyzer make: Thermo 43i Analyzer serial #: 1160290011

Analyzer Range 0 - 1000 ppb

**Finish Finish** Start <u>Start</u> 1.003957 Backgd or Offset: 18.7 1.003357 18.7

Calibration slope: 0.946 Calibration intercept: -1.656062 -1.916022 Coeff or Slope: 0.949

## SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow rate	Source gas flow rate	Calculated	Indicated concentration	Correction factor (Cc/Ic)
Set Polit	(sccm)	(sccm)	concentration (ppb) (Cc)	(ppb) (Ic)	<i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	-0.7	
as found span	4921	79.2	800.2	802.7	0.997
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.3	
high point	4921	79.2	800.2	802.1	0.998
second point	4960	39.6	400.2	399.5	1.002
third point	4980	19.8	200.1	197.0	1.016
as left zero	5000	0.0	0.0	-0.5	
as left span	4921	79.2	800.2	801.9	0.998
			Averag	ge Correction Factor	1.005
Baseline Corr As found:	803.40	Previous response	801.24	*% change	0.3%

Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept: Baseline Corr 3rd AF pt: NA AF Correlation:

\* = > +/-5% change initiates investigation

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

Calibration Performed By: Sean Bala



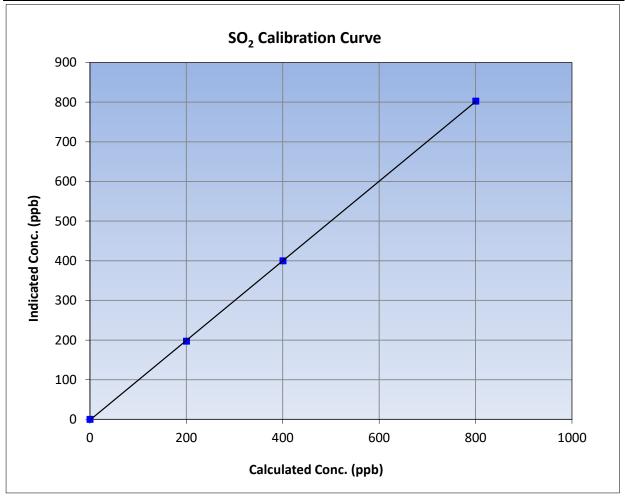
# **SO<sub>2</sub> Calibration Summary**

Version-01-2020

## **Station Information**

Calibration Date: May 18, 2023 **Previous Calibration:** April 20, 2023 Station Name: Jackfish 1 Station Number: AMS 506 Start Time (MST): 9:06 End Time (MST): 11:54 Analyzer make: Thermo 43i Analyzer serial #: 1160290011

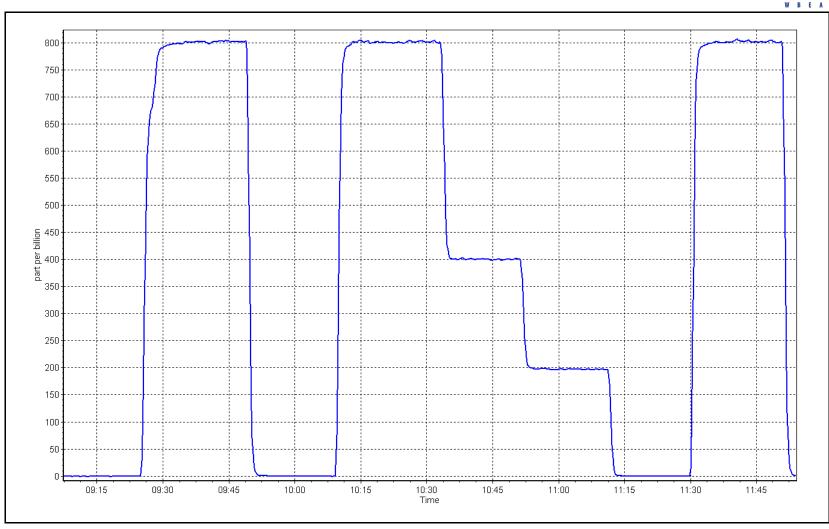
Calibration Data									
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>				
0.0	-0.3		Correlation Coefficient	0.999980	≥0.995				
800.2	802.1	0.9976	Correlation Coefficient	0.999980	20.333				
400.2	399.5	1.0016	Slope	1.003957	0.90 - 1.10				
200.1	197.0	1.0156	Siope	1.003937	0.90 - 1.10				
			Intercept	-1.916022	+/-30				



**SO2 Calibration Plot** Date: May 18, 2023

Location: Jackfish 1







## H<sub>2</sub>S Calibration Report

Version-11-2021

<u>Finish</u>

3.33

1.066

**Station Information** 

Station Name: Jackfish 1 Calibration Date: May 25, 2023 Start time (MST): 8:16

Reason: Routine Station number: AMS506 Last Cal Date: April 25, 2023

End time (MST): 12:03

**Calibration Standards** 

Cal Gas Exp Date: September 16, 2024 Cal Gas Concentration: 5.14 ppm

ppm

Cal Gas Cylinder #: CC511843

Removed Cal Gas Conc: 5.14 Removed Gas Cyl #: NA

Calibrator Make/Model: API T700 ZAG Make/Model: **API 701** 

<u>Start</u>

3.37

1.066

Rem Gas Exp Date: NA Diff between cyl:

2659 Serial Number: Serial Number: 4427

**Analyzer Information** 

Analyzer make: Thermo 43i-TLE Analyzer serial #: 1180540020 Global G150 Converter serial #: 2022-218 Converter make:

0 - 100 ppb Analyzer Range

Calibration slope:

Calibration intercept:

**Finish** <u>Start</u> 0.999860

-0.298400

1.015003 Backgd or Offset: -0.378084 Coeff or Slope:

H<sub>2</sub>S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) Limit = 0.90-1.10
as found zero	5000	0.0	0.0	-0.3	
as found span	4922	77.8	80.0	80.3	0.992
as found 2nd point	4961	38.9	40.0	39.9	0.995
as found 3rd point	4981	19.4	19.9	19.4	1.012
new cylinder response					

#### H<sub>2</sub>S Calibration Data

Set Point	Dilution air flow 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	40.3	0.992
third point	4981	19.4	19.9	19.7	1.012
as left zero	5000	0.0	0.0	-0.3	
as left span	4922	77.8	80.0	79.9	1.001
SO2 Scrubber Check	4921	79.2	792.0	0.0	
Date of last scrubber char	nge:	24-Feb-23		Ave Corr Factor	0.998
Date of last converter eff	iciency test:	December 1, 2022	_	_	efficiency

Date of last scrubber change	2:	24-Feb-23		Ave Corr Factor	0.998	
Date of last converter efficie	ncy test:	December 1, 2022			efficiency	
Baseline Corr As found:	80.6	Prev response:	79.67	*% change:	1.2%	

1.009290 Baseline Corr 2nd AF pt: 40.2 AF Slope: Baseline Corr 3rd AF pt: 0.999973 19.7 AF Correlation:

\* = > +/-5% change initiates investigation

-0.478254

AF Intercept:

Changed inlet filter after multi-point as founds. Scrubber test done and passed after calibrator Notes: zero. No adjustment made.

Calibration Performed By: Sean Bala



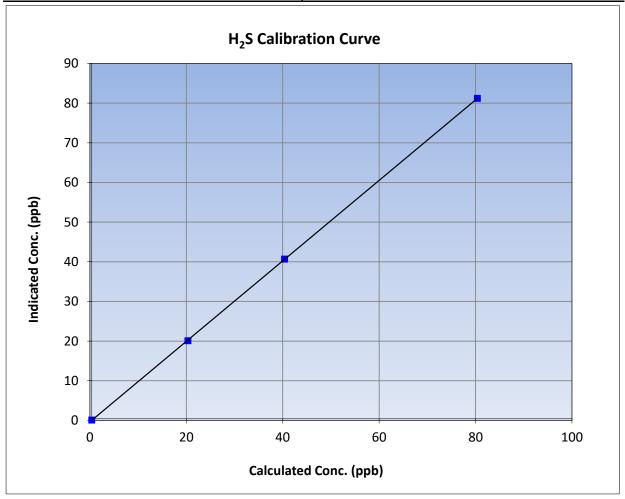
# H<sub>2</sub>S Calibration Summary

Version-11-2021

## **Station Information**

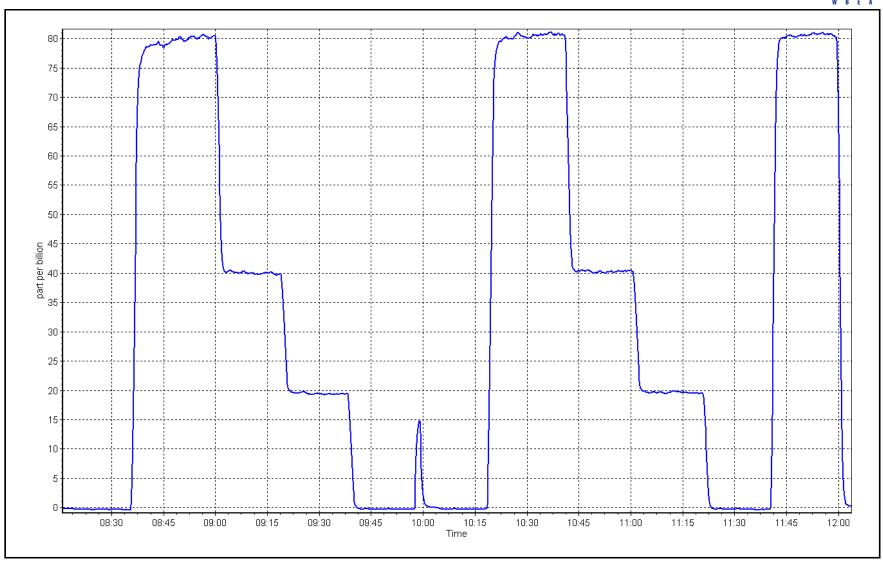
Calibration Date: May 25, 2023 **Previous Calibration:** April 25, 2023 Station Name: Jackfish 1 Station Number: AMS506 Start Time (MST): 8:16 End Time (MST): 12:03 Analyzer make: Thermo 43i-TLE Analyzer serial #: 1180540020

Calibration Data							
Calculated concentration Indicated concentration (ppb) (Cc) (ppb) (Ic) (Cc/Ic)			Statistical Evalua	ation	<u>Limits</u>		
0.0	-0.3		Correlation Coefficient	0.999989	≥0.995		
80.0	80.8	0.9899	Correlation Coefficient	0.555565	20.333		
40.0	40.3	0.9923	Slope	1.015003	0.90 - 1.10		
19.9	19.7	1.0123	Зюре	1.013003	0.90 - 1.10		
			- Intercept	-0.378084	+/-3		



Location: Jackfish 1





Date: May 25, 2023



# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

#### **Station Information**

Station Name: Jackfish 1
Calibration Date: May 26, 2023
Start time (MST): 8:06

Start time (MST): 8:06
Reason: Routine

Station number: AMS506 Last Cal Date: April 26, 2023

End time (MST): 12:25

#### **Calibration Standards**

October 30, 2024 NO Gas Cylinder #: T26811M Cal Gas Expiry Date: NOX Cal Gas Conc: NO Cal Gas Conc: 47.46 ppm ppm 47.39 Removed Cylinder #: NA Removed Gas Exp Date: NA Removed Gas NO Conc: Removed Gas NOX Conc: 47.46 ppm 47.39 ppm

NOX gas Diff:

Calibrator Model: API T700 ZAG make/model: API 701

NO gas Diff:

Serial Number: 2659 Serial Number: 4427

## **Analyzer Information**

Analyzer make: Thermo 42i Analyzer serial #: 1218153356

NOX Range (ppb): 0 - 1000 ppb

**Start Finish** <u>Start</u> **Finish** NO coeff or slope: 1.143 1.142 NO bkgnd or offset: 3.3 3.7 NOX coeff or slope: 0.993 0.991 NOX bkgnd or offset: 3.4 3.9 NO2 coeff or slope: 1.000 1.000 Reaction cell Press: 172.5 173.7

#### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	1.001147	1.000448
NO <sub>x</sub> Cal Offset:	-0.448022	-1.727986
NO Cal Slope:	0.999625	1.001597
NO Cal Offset:	-1.447978	-2.987959
NO <sub>2</sub> Cal Slope:	1.006063	1.000773
NO <sub>2</sub> Cal Offset:	0.960980	-1.046494



# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

				Dilu	ution Calibratio	n Data				
Set Point	Dilution flow rate (sccm)	Source gas flow	alculated NOx oncentration (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	806.6	800.4	6.1	0.9931	0.9993
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0		
high point	4916	84.4	801.1	799.9	1.2	800.3	799.4	0.8	1.0010	1.0006
second point	4958	42.2	400.5	400.0	0.6	398.8	396.8	2.0	1.0044	1.0080
third point	4979	21.1	200.3	200.0	0.3	196.6	194.0	2.6	1.0187	1.0308
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1		
as left span	4916	84.4	801.1	405.9	395.2	788.3	402.3	386.0	1.0162	1.0089
							Average Co	orrection Factor	1.0080	1.0131
Corrected As fo	ound NO <sub>X</sub> =	806.2 ppb	NO =	800.1 ppb	* = > +/-5%	6 change initiate	s investigation	*Percent Chang	ge NO <sub>x</sub> =	0.6%
Previous Respo	onse NO <sub>X</sub> =	801.5 ppb	NO =	798.1 ppb				*Percent Chang	ge NO =	0.2%
Baseline Corr 2	nd pt NO <sub>x</sub> =	NA ppb	NO =	NA ppb	As found	d NO <sub>x</sub> r <sup>2</sup>	<sup>2</sup> :	Nx SI:	Nx Int:	
Baseline Corr 3	ord pt NO <sub>x</sub> =	NA ppb	NO =	NA ppb	As found	d NO r <sup>2</sup>	·:	NO SI:	NO Int:	
	, ,				As found	d NO <sub>2</sub> r <sup>2</sup>	2:	NO2 SI:	NO <sub>2</sub> Int:	
				G	PT Calibration	Data				
O3 Setpo	pint (ppb)	Indicated NO Refere concentration (ppl		rated NO Drop entration (ppb)	Calculated NC concentration (pp		Indicated NO2 entration (ppb) (Ic)	NO2 Correction fac Calibration Limit = As Found Limit = 0	0.95-1.05	erter Efficiency on Limit = 96-104%
as found	GPT zero									
as found GPT poi	int (400 ppb NO2)									
as found GPT po	int (200 ppb NO2)									
as found GPT poi	int (100 ppb NO2)									
1st GPT point	t (400 ppb O3)	791.6		397.6	395.2		394.7	1.0012	<u> </u>	99.9%
2nd GPT poin	t (200 ppb O3)	791.6		594.4	198.4		197.9	1.0024	1	99.8%
3rd GPT poin	t (100 ppb O3)	791.6		685.5	107.3		104.6	1.0256	5	97.5%
						Avorago (	Correction Factor	1.0098	2	99.0%

Notes:

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

Calibration Performed By:

Sean Bala



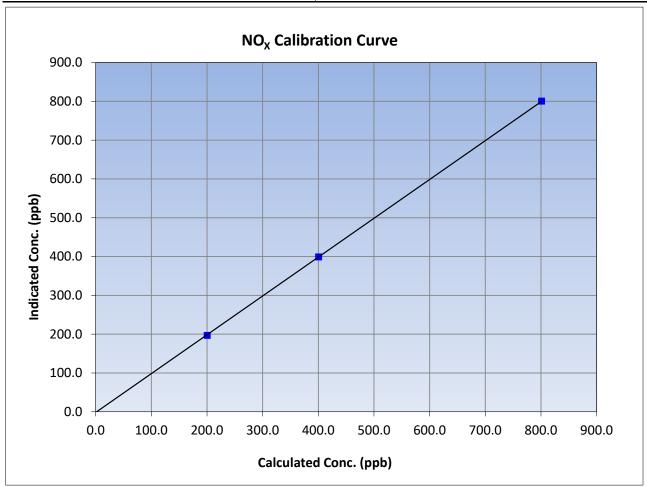
## NO<sub>x</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 26, 2023 Previous Calibration: April 26, 2023 Station Name: Jackfish 1 Station Number: AMS506 Start Time (MST): 8:06 End Time (MST): 12:25 Analyzer serial #: Analyzer make: Thermo 42i 1218153356

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	-0.1		Correlation Coefficient	0.999979	≥0.995
801.1	800.3	1.0010	Correlation Coefficient	0.333373	20.333
400.5	398.8	1.0044	Slope	1.000448	0.90 - 1.10
200.3	196.6	1.0187	Slope	1.000446	0.90 - 1.10
			Intercept	-1.727986	+/-20





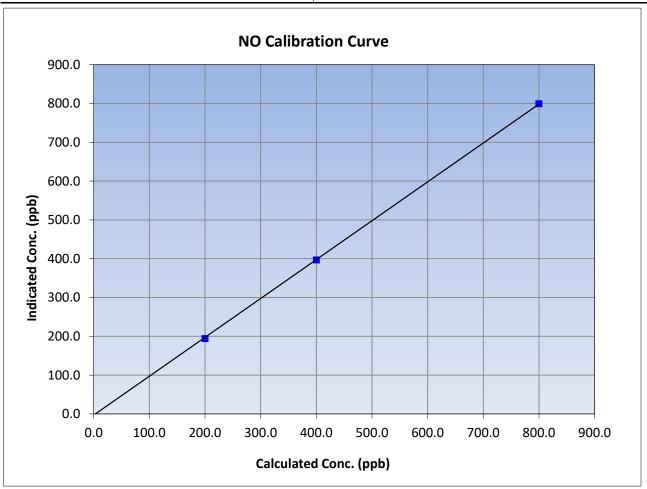
## **NO Calibration Summary**

Version-04-2020

#### **Station Information**

Calibration Date: May 26, 2023 Previous Calibration: April 26, 2023 Station Name: Jackfish 1 Station Number: AMS506 Start Time (MST): 8:06 End Time (MST): 12:25 Analyzer make: Thermo 42i Analyzer serial #: 1218153356

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	-0.1		Correlation Coefficient	0.999939	≥0.995
799.9	799.4	1.0006	Correlation Coefficient		20.555
400.0	396.8	1.0080	Slope	1.001597	0.90 - 1.10
200.0	194.0	1.0308	Slope	1.001597	0.90 - 1.10
			Intercept	-2.987959	+/-20





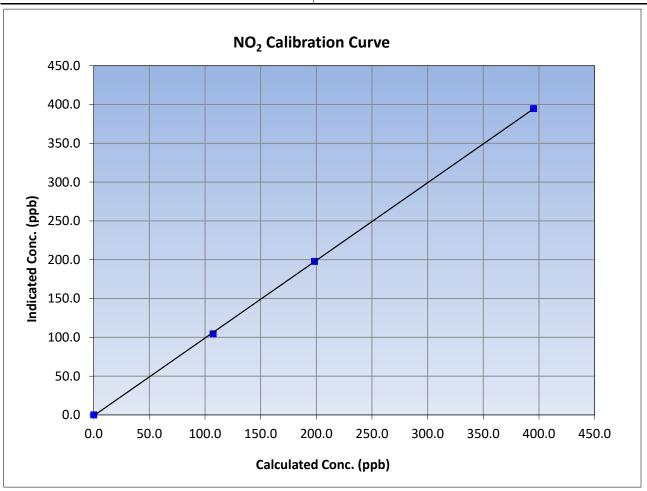
## NO<sub>2</sub> Calibration Summary

Version-04-2020

#### **Station Information**

Calibration Date: May 26, 2023 Previous Calibration: April 26, 2023 Station Name: Jackfish 1 Station Number: AMS506 Start Time (MST): 8:06 End Time (MST): 12:25 Analyzer serial #: Analyzer make: Thermo 42i 1218153356

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999949 ≥	≥0.995
395.2	394.7	1.0012	Correlation Coefficient		20.333
198.4	197.9	1.0024	Slope	1.000773	0.90 - 1.10
107.3	104.6	1.0256	Зюре	1.000773	0.90 - 1.10
			Intercept	-1.046494	+/-20



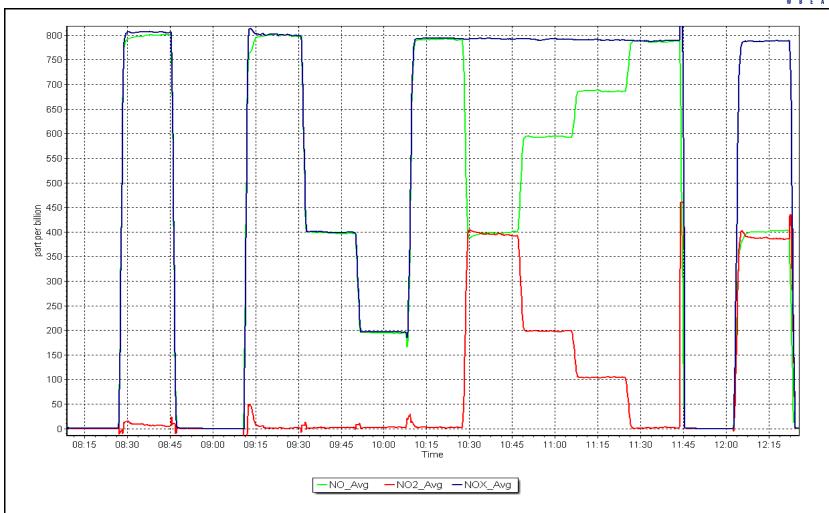
NO<sub>x</sub> Calibration Plot

Date:

May 26, 2023

Location: Jackfish 1







## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

> AMS508 KIRBY NORTH MAY 2023

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

June 30, 2023



# **SO<sub>2</sub> Calibration Report**

Version-01-2020

#### **Station Information**

Station Name: Kirby North
Calibration Date: May 18, 2023
Start time (MST): 7:42

Start time (MST): 7:42 Reason: Routine Station number: AMS508
Last Cal Date: April 21, 2023

End time (MST): 11:39

**Calibration Standards** 

Cal Gas Concentration: 49.18

Cal Gas Cylinder #: CC303554
Removed Cal Gas Conc: 49.18

Removed Gas Cyl #: NA
Calibrator Make/Model: API T700

Calibrator Make/Model: API T700 ZAG Make/Model: API T701H ppm Cal Gas Exp Date: February 23, 2025

Rem Gas Exp Date: NA Diff between cyl:

Serial Number: 3804 Serial Number: 880

**Analyzer Information** 

Analyzer make: Thermo 43iQ Analyzer serial #: 1182340007

ppm

Analyzer Range 0 - 1000 ppb

<u>Start</u> <u>Finish</u>

Calibration slope: 0.997420 1.006620 Backgd or Offset: Calibration intercept: -0.728926 -0.948262 Coeff or Slope:

<u>Start</u> 19.5

1.151

<u>Finish</u> 19.1 1.151

SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)		Correction factor (Cc/Ic)  Limit = 0.95-1.05
as found zero	5000	0.0	0.0	-0.6	
as found span	4919	81.3	799.6	801.0	0.998
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	799.6	805.0	0.993
second point	4959	40.7	400.3	399.7	1.002
third point	4980	20.3	199.7	200.6	0.995
as left zero	5000	0.0	0.0	0.0	
as left span	4919	81.3	799.6	805.0	0.993
			Avera	ge Correction Factor	0.997

Baseline Corr As found: 801.60 Previous response 796.83 \*% change 0.6% Baseline Corr 2nd AF pt: NA AF Slope: AF Intercept:

Baseline Corr 3rd AF pt: NA AF Correlation:

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

Calibration Performed By: Braiden Boutilier

\* = > +/-5% change initiates investigation



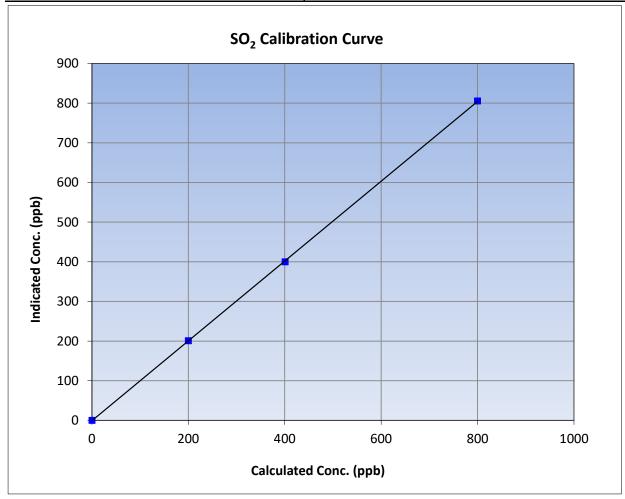
# **SO<sub>2</sub> Calibration Summary**

Version-01-2020

## **Station Information**

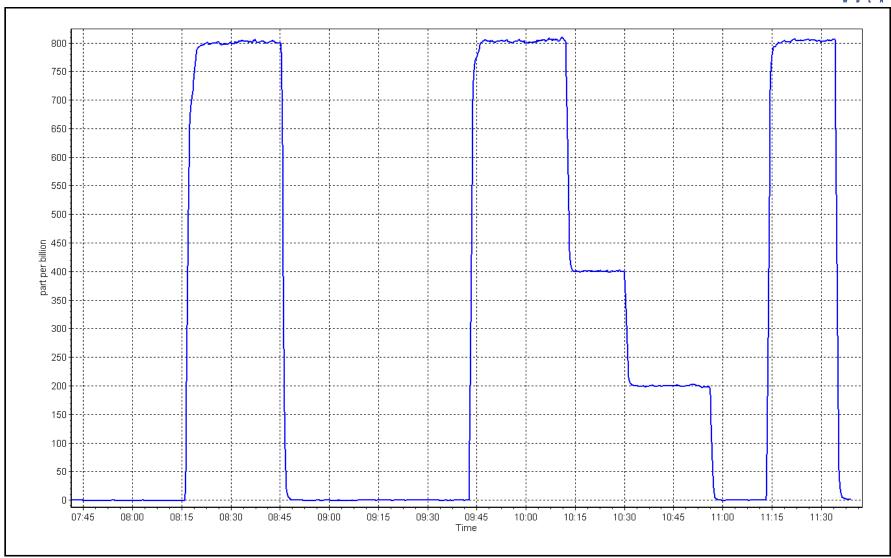
Calibration Date: May 18, 2023 **Previous Calibration:** April 21, 2023 Station Name: Kirby North Station Number: AMS508 Start Time (MST): 7:42 End Time (MST): 11:39 Analyzer make: Thermo 43iQ Analyzer serial #: 1182340007

	Calibration Data									
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>					
0.0	-0.2		Correlation Coefficient	0.999979	≥0.995					
799.6	805.0	0.9933	Correlation coefficient	0.555575	20.993					
400.3	399.7	1.0016	Slope	1.006620	0.90 - 1.10					
199.7	200.6	0.9953	Slope	1.000020	0.90 - 1.10					
			- Intercept	-0.948262	+/-30					



SO2 Calibration Plot Date: May 18, 2023 Location: Kirby North





# W B E A

## **Wood Buffalo Environmental Association**

## H<sub>2</sub>S Calibration Report

Version-11-2021

<u>Finish</u>

1.58

1.027

**Station Information** 

Station Name: Kirby North
Calibration Date: May 17, 2023
Start time (MST): 10:58
Reason: Routine

Station number: AMS508 Last Cal Date: April 20, 2023 End time (MST): 17:13

February 5, 2024

**Calibration Standards** 

Cal Gas Concentration: 5.167 ppm

Cal Gas Cylinder #: CC517378
Removed Cal Gas Conc: 5.167

Removed Gas Cyl #: NA
Calibrator Make/Model: API T700
ZAG Make/Model: API T701H

ppm Rem Gas Exp Date: NA

Diff between cyl:
Serial Number: 3804
Serial Number: 880

Cal Gas Exp Date:

**Analyzer Information** 

Analyzer make: Thermo 43i TLE

Converter make: Global
Analyzer Range 0 - 100 ppb

Analyzer serial #: 1150840012 Converter serial #: 2022-197

Allaryzer Range 0 100 ppb

StartFinishStartCalibration slope:1.0013121.003026Backgd or Offset:1.60Calibration intercept:-0.100838-0.160868Coeff or Slope:1.046

H<sub>2</sub>S As Found Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) Limit = 0.90-1.10
as found zero	5000	0.0	0.0	-0.1	
as found span	4923	77.4	80.0	79.8	1.001
as found 2nd point	4961	38.8	40.1	39.7	1.007
as found 3rd point	4981	19.3	19.9	19.6	1.012
new cylinder response					

## H<sub>2</sub>S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	0.0	
high point	4923	77.4	80.0	80.2	0.997
second point	4961	38.8	40.1	39.8	1.007
third point	4981	19.3	19.9	19.8	1.007
as left zero	5000	0.0	0.0	0.1	
as left span	4923	77.4	80.0	79.9	1.001
SO2 Scrubber Check				0.0	
Date of last scrubber change	ze:	19-Apr-23		Ave Corr Factor	1.004

Date of last scrubber change:	19-Apr-23	Ave Corr Factor	1.004
Date of last converter efficiency test:			efficiency

Baseline Corr As found: 79.9 79.98 Prev response: \*% change: -0.1% Baseline Corr 2nd AF pt: 39.8 AF Slope: 0.999603 AF Intercept: -0.241018 Baseline Corr 3rd AF pt: 0.999984 19.7 AF Correlation: \* = > +/-5% change initiates investigation

Notes: Adjusted span. Moved scrubber outside of the Global Converter after MPAF's.

Calibration Performed By: Braiden Boutilier



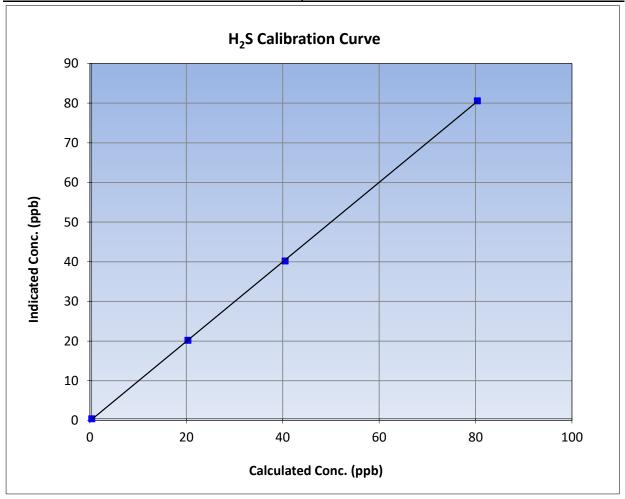
# H<sub>2</sub>S Calibration Summary

Version-11-2021

## **Station Information**

**Previous Calibration:** Calibration Date: May 17, 2023 April 20, 2023 Station Name: Kirby North Station Number: AMS508 Start Time (MST): 10:58 End Time (MST): 17:13 Thermo 43i-TLE Analyzer make: Analyzer serial #: 1150840012

	Calibration Data										
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>						
0.0	0.0		Correlation Coefficient	0.999968	≥0.995						
80.0	80.2	0.9972	Correlation Coefficient	0.555500	20.993						
40.1	39.8	1.0075	Slope	1.003026	0.90 - 1.10						
19.9	19.8	1.0072	Slope	1.003020	0.90 - 1.10						
			Intercept	-0.160868	+/-3						

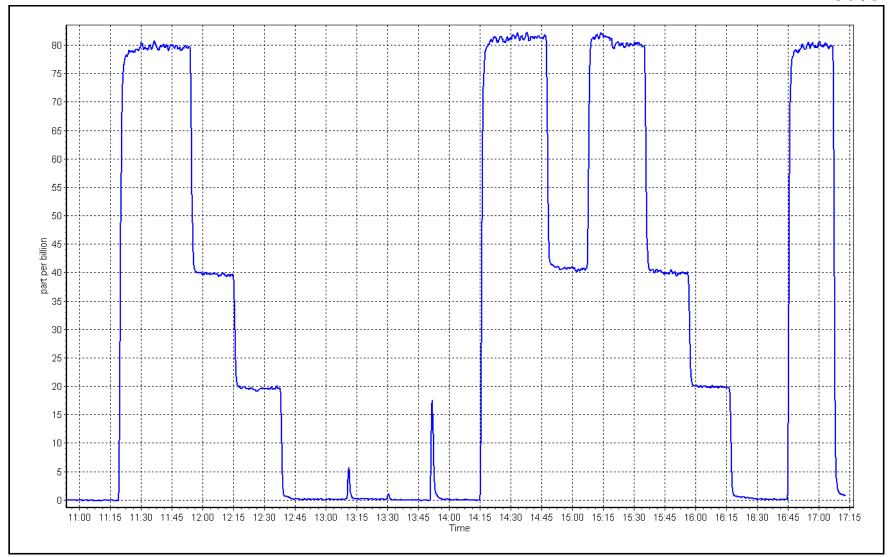


H<sub>2</sub>S Calibration Plot

Date: May 17, 2023

Location: Kirby North







# **THC Calibration Report**

Version-01-2020

ppm

#### **Station Information**

Station Name: Kirby North
Calibration Date: May 18, 2023
Start time (MST): 7:42
Reason: Routine

Station number: AMS508 Last Cal Date: April 21, 2023

End time (MST): 11:39

**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 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

Baseline Corr 3rd AF pt:

Start Finish Finish Start Calibration slope: Background: 0.994800 1.009048 2.62 2.66 -0.160831 Coefficient: Calibration intercept: 0.044805 3.695 3.753

**THC Calibration Data** 

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentra (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)  Limit = 0.95-1.05
as found zero	5000	0.0	0.00	-0.05	
as found span	4919	81.3	17.26	17.14	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	-0.12	
high point	4919	81.3	17.26	17.27	1.000
second point	4959	40.7	8.64	8.57	1.009
third point	4980	20.3	4.31	4.12	1.046
as left zero	5000	0.0	0.00	-0.12	
as left span	4919	81.3	17.26	17.30	0.998
			A۱	verage Correction Factor	1.018
Baseline Corr As found:	17.19	Previous response	17.22	*% change	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	

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

AF Correlation:

Calibration Performed By: Braiden Boutilier

NA

\* = > +/-5% change initiates investigation



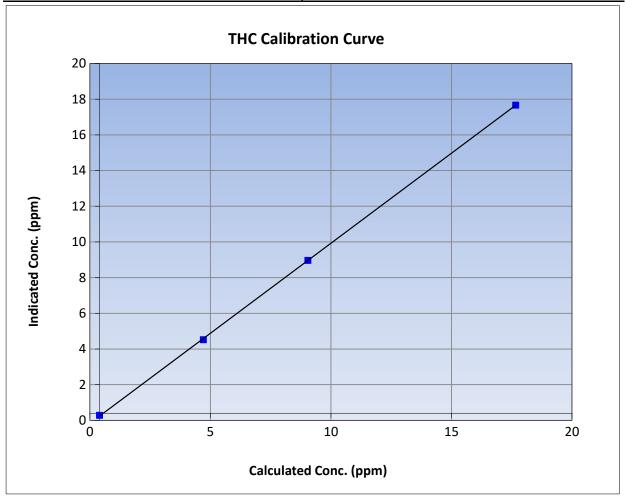
# **THC Calibration Summary**

Version-01-2020

## **Station Information**

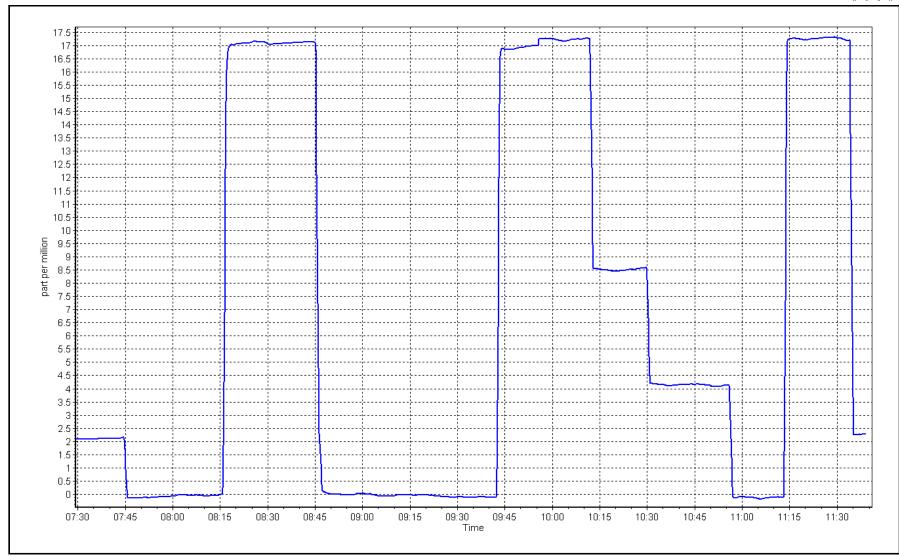
**Previous Calibration:** Calibration Date: May 18, 2023 April 21, 2023 Station Name: Kirby North Station Number: AMS508 Start Time (MST): 7:42 End Time (MST): 11:39 Analyzer make: Thermo 51i Analyzer serial #: 1182340005

Calibration Data									
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>				
0.00	-0.12		Correlation Coefficient	0.999958	≥0.995				
17.26	17.27	0.9996	Correlation Coefficient	0.999936	20.993				
8.64	8.57	1.0085	Slope	1.009048	0.90 - 1.10				
4.31	4.12	1.0459	Slope	1.003048	0.90 - 1.10				
			- Intercept	-0.160831	+/-1.5				



THC Calibration Plot Date: May 18, 2023 Location: Kirby North







# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

ppm

ppm

## **Station Information**

Station Name: Kirby North Calibration Date: May 15, 2023 Start time (MST): 10:11 Reason:

As Found

NA

ppm

Station number: AMS508 Last Cal Date: April 20, 2023

End time (MST): 15:07

### **Calibration Standards**

T34ULGL NO Gas Cylinder #:

NOX Cal Gas Conc: 49.39 ppm

Removed Cylinder #:

Removed Gas NOX Conc: 49.39

NOX gas Diff:

**API T700** Calibrator Model: ZAG make/model: **API 701H**  Cal Gas Expiry Date: March 8, 2025

NO Cal Gas Conc: 49.02

Removed Gas Exp Date: NA

Removed Gas NO Conc: 49.02

NO gas Diff:

Serial Number: 3804 Serial Number: 880

## **Analyzer Information**

Analyzer make: API T200

NOX Range (ppb): 0 - 1000 ppb

Analyzer serial #: 7029

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.026	1.026	NO bkgnd or offset:	0.1	0.1
NOX coeff or slope:	1.023	1.023	NOX bkgnd or offset:	0.3	0.3
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	5.0	5.1

## **Calibration Statistics**

Start **Finish** 

NO<sub>x</sub> Cal Slope: 0.999458 NO<sub>x</sub> Cal Offset: -0.151623 NO Cal Slope: 1.001479 NO Cal Offset: -1.633427 NO<sub>2</sub> Cal Slope: 1.001970 NO<sub>2</sub> Cal Offset: 1.001988



# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

D	ilod	tion	Cal	ih	ratio	nn [	Data
v	IIU	LIOH	Lai	IU	ıalıc	JII L	Jala

Calculated NOx concentration (ppb) (Cc)  0.0  800.1  400.0  199.5	Calculated NO concentration (ppb) (Cc)  0.0  794.1  397.0  198.0	Calculated NO2 concentration (ppb) (Cc)  0.0  6.0  3.0  1.5	Indicated NOx concentration (ppb) (Ic)  0.5  798.2  397.0  197.0	Indicated NO concentration (ppb) (Ic)  0.0  788.3  392.3  192.7	Indicated NO2 concentration (ppb) (Ic)  0.5  9.9  4.7  4.3	NOx Correction factor (Cc/Ic) Limit = 0.95-1.05 1.0024 1.0076 1.0128	NO Correction factor (Cc/Ic) Limit = 0.95-1.05 1.0074 1.0120 1.0277
800.1 400.0	794.1 397.0	6.0 3.0	798.2 397.0	788.3 392.3	9.9 4.7	1.0024 1.0076	1.0074 1.0120
400.0	397.0	3.0	397.0	392.3	4.7	1.0076	1.0120
199.5	198.0	1.5	197.0	192.7	4.3	1.0128	1.0277
				Average C	orrection Factor		
b NO	= 788.3 ppb	* = > +/-5	% change initiates	investigation	*Percent Chang	ge NO <sub>x</sub> =	-0.2%
b NO	= 793.7 ppb				*Percent Chang	ge NO =	-0.7%
b NO	= 392.3 ppb	As foun	d $NO_X r^2$ :	0.999984	Nx SI: 0.9976	89 Nx Int:	-0.932
b NO	= 192.7 ppb	As foun	d NO r <sup>2</sup> :	0.999972	NO SI: 0.9940	84 NO Int:	-1.915
		As foun	d NO. r <sup>2</sup> ·	ი 999985	NO2 SI: 1 0033	03 NO Into	1 154
	ob NO	NO = 793.7 ppb NO = 392.3 ppb	bb NO = 793.7 ppb bb NO = 392.3 ppb As foun bb NO = 192.7 ppb As foun	NO = 793.7 ppb NO = 392.3 ppb As found NO <sub>X</sub> $r^2$ : NO = 192.7 ppb As found NO $r^2$ :	NO = 793.7 ppb NO = 392.3 ppb As found NO <sub>X</sub> $r^2$ : 0.999984 NO = 192.7 ppb As found NO $r^2$ : 0.999972	$ NO = 793.7 \text{ ppb} $ $ NO = 392.3 \text{ ppb} $ $ NO = 392.3 \text{ ppb} $ $ NO = 192.7 \text{ ppb} $ $ As found $ $ NO_x r^2: 0.999984 $ $ NO = 192.7 \text{ ppb} $ $ As found $ $ NO r^2: 0.999972 $ $ NO SI: 0.99400 $	$NO = 793.7 \text{ ppb}$ NO = 793.7 ppb  *Percent Change NO = NO = 392.3 ppb  As found $NO_X r^2$ : 0.999984  Nx SI: 0.997689  Nx 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/lc) Calibration Limit = 0.95-1.05 As Found Limit = 0.90-1.10	Converter Efficiency Calibration Limit = 96-104%
as found GPT zero			0.0	0.5		
as found GPT point (400 ppb NO2)	785.8	402.2	389.6	391.6	0.9949	100.5%
as found GPT point (200 ppb NO2)	785.8	604.4	187.4	189.9	0.9868	101.3%
as found GPT point (100 ppb NO2)	785.8	701.9	89.9	91.7	0.9803	102.0%
1st GPT point (400 ppb O3)						
2nd GPT point (200 ppb O3)						
3rd GPT point (100 ppb O3)						
			A۱	erage Correction Factor		

Notes: Planned to change the analyzer due to a memory error. Could not complete as communication issues occurred with the new analyzer. Deleted datalog on the DAS (potential fix for memory issue). Will finish the work May 16.

Calibration Performed By: Braiden Boutilier

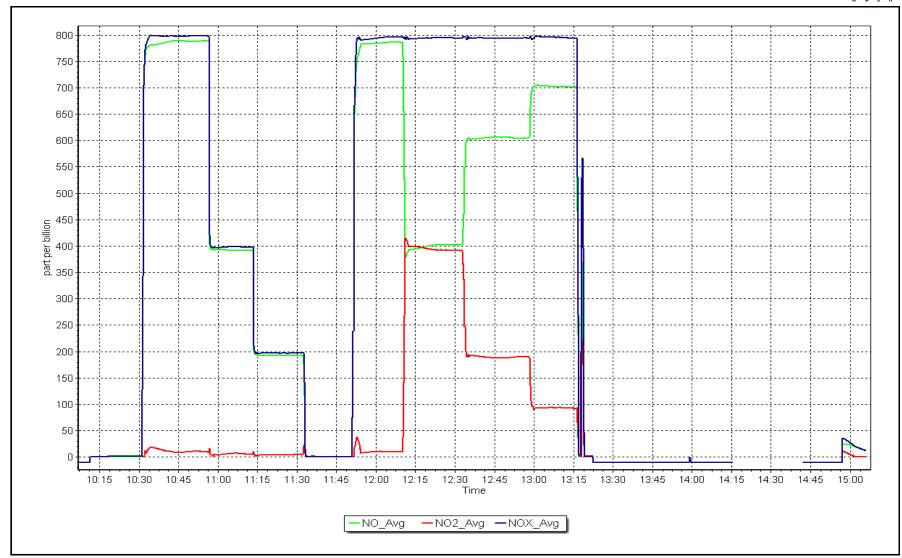
NO<sub>x</sub> Calibration Plot

Date:

May 15, 2023

Location: Kirby North







# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

#### **Station Information**

Station Name: Kirby North
Calibration Date: May 16, 2023
Start time (MST): 9:58

Reason: Routine

Station number: AMS508
Last Cal Date: May 15, 2023

End time (MST): 14:18

## **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:

Calibrator Model: API T700 ZAG make/model: API 701H

NO gas Diff: Serial Number: 3804 Serial Number: 880

## **Analyzer Information**

Analyzer make: API T200 Analyzer serial #: 7029

NOX Range (ppb): 0 - 1000 ppb

**Start Finish** <u>Start</u> **Finish** NO coeff or slope: 1.026 1.038 NO bkgnd or offset: 0.1 -0.1 NOX coeff or slope: NOX bkgnd or offset: 3.6 1.023 1.034 0.3 NO2 coeff or slope: 1.000 1.000 Reaction cell Press: 5.1 5.1

### **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope:	0.999458	1.001459
NO <sub>x</sub> Cal Offset:	-0.151623	-2.051855
NO Cal Slope:	1.001479	1.000875
NO Cal Offset:	-1.633427	-1.873766
NO <sub>2</sub> Cal Slope:	1.001970	0.995418
NO <sub>2</sub> Cal Offset:	1.001988	-0.467650



# NO<sub>X</sub> \ NO \ NO<sub>2</sub> Calibration Report

Version-04-2020

				Dil	ution Calibratio	n Data				
Set Point	Dilution flow rate (sccm)	Source gas flow		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	r 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					<u> </u>					
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.4	0.0	-0.4		
high point	4919	81.0	800.1	794.1	6.0	800.0	793.7	6.7	1.0001	1.0005
second point	4960	40.5	400.0	397.0	3.0	397.9	395.1	2.8	1.0053	1.0049
third point	4980	20.2	199.5	198.0	1.5	196.0	194.1	1.9	1.0180	1.0203
as left zero	5000	0.0	0.0	0.0	0.0	-1.5	0.2	-1.6		
as left span	4919	81.0	800.1	406.1	394.0	793.6	404.9	388.7	1.0082	1.0030
							Average C	Correction Factor	r 1.0078	1.0086
Corrected As fo	ound NO <sub>X</sub> =	NA ppb	NO = NA	A ppb	* = > +/-5	5% change initiates i	investigation	*Percent Chang	nge NO <sub>x</sub> =	= NA
Previous Respo	nse NO <sub>X</sub> =	NA ppb	NO = NA	A ppb				*Percent Chang	nge NO =	= NA
Baseline Corr 2	nd pt NO <sub>X</sub> =	NA ppb	NO = NA	A ppb	As found	$NO_X r^2$ :		Nx SI:	Nx Int:	:
Baseline Corr 3	rd pt NO <sub>X</sub> =	NA ppb	NO = NA	A ppb	As found	$100 \text{ NO } \text{r}^2$ :		NO SI:	NO Int:	:
	•	-		-	As found	$NO_2 r^2$ :		NO2 SI:	NO <sub>2</sub> Int:	
				•	GPT Calibration	Data				
O3 Setpo	int (ppb)	Indicated NO Refere concentration (pp		ed NO Drop ration (ppb)	Calculated NC concentration (pp		ndicated NO2 ntration (ppb) (Ic)	NO2 Correction factorial Calibration Limit = Case Found Limit = Case No.	= 0.95-1.05 Calibratio	erter Efficiency ion Limit = 96-104%
as found	GPT zero									
as found GPT poir	nt (400 ppb NO2)									
as found GPT poin	nt (200 ppb NO2)									
as found GPT poir	nt (100 ppb NO2)									
1st GPT point	(400 ppb O3)	791.9	4/	03.9	394.0		392.1	1.0048	8	99.5%
2nd GPT point	(200 ppb O3)	791.9	6	20.6	177.3		174.8	1.0143	3	98.6%
3rd GPT point	(100 ppb O3)	791.9	7	'11.9	86.0		85.9	1.0011	.1	99.9%
						Average Co	orrection Factor	r 1.0067	7	99.3%

Notes:

Calibration completed after as founds and maintenance done yesterday. Adjusted zero and span.

Calibration Performed By:

Braiden Boutilier



# NO<sub>x</sub> Calibration Summary

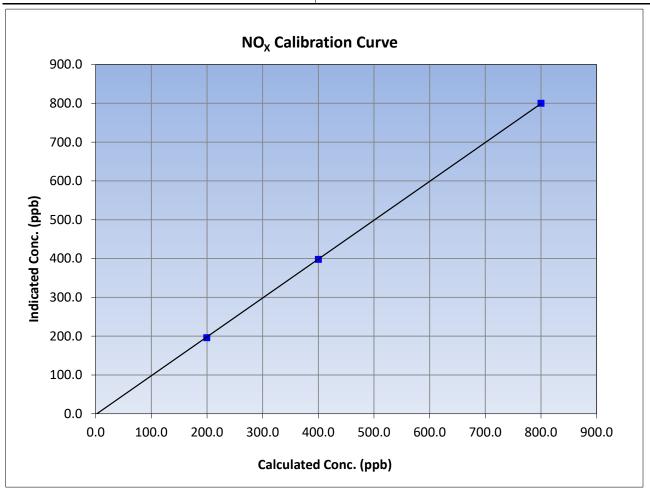
Version-04-2020

### **Station Information**

Calibration Date: May 16, 2023 Previous Calibration: May 15, 2023 Station Name: Kirby North Station Number: AMS508 Start Time (MST): 9:58 End Time (MST): 14:18 Analyzer serial #: Analyzer make: **API T200** 7029

## **Calibration Data**

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	-0.4		Correlation Coefficient	0.999980	≥0.995
800.1	800.0	1.0001	Correlation Coefficient	0.333360	
400.0	397.9	1.0053	Slope	1.001459	0.90 - 1.10
199.5	196.0	1.0180	Siope		
			Intercept	-2.051855	+/-20





## **NO Calibration Summary**

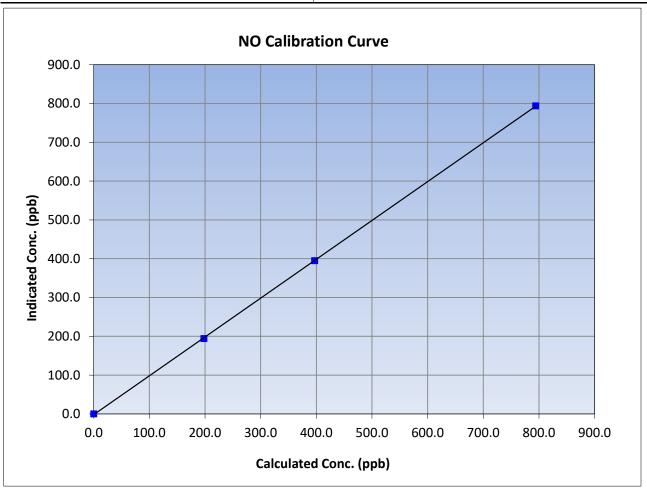
Version-04-2020

### **Station Information**

Calibration Date: May 16, 2023 Previous Calibration: May 15, 2023 Station Name: Kirby North Station Number: AMS508 Start Time (MST): 9:58 End Time (MST): 14:18 Analyzer make: **API T200** Analyzer serial #: 7029

## **Calibration Data**

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999973	≥0.995
794.1	793.7	1.0005	Correlation Coefficient	0.333373	20.333
397.0	395.1	1.0049	Slope	1.000875	0.90 - 1.10
198.0	194.1	1.0203	Slope		
			Intercept	-1.873766	+/-20





# NO<sub>2</sub> Calibration Summary

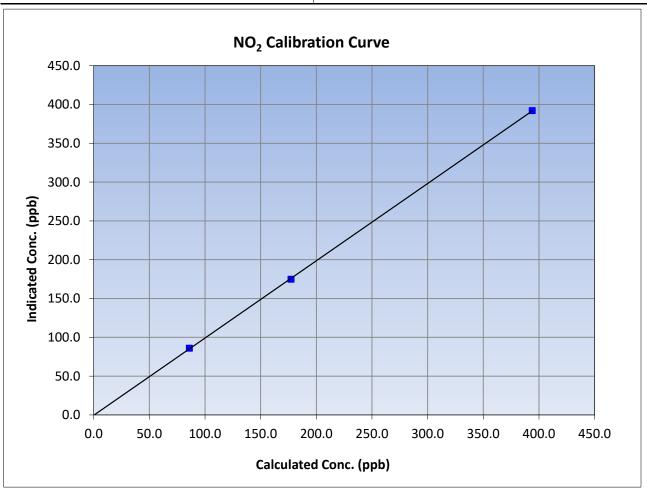
Version-04-2020

### **Station Information**

Calibration Date: May 16, 2023 Previous Calibration: May 15, 2023 Station Name: Kirby North Station Number: AMS508 Start Time (MST): 9:58 End Time (MST): 14:18 Analyzer make: **API T200** Analyzer serial #: 7029

## **Calibration Data**

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	-0.4		Correlation Coefficient	0.999974	≥0.995
394.0	392.1	1.0048	Correlation Coefficient	0.333374	
177.3	174.8	1.0143	Slope	0.995418	0.90 - 1.10
86.0	85.9	1.0011	Siope		
			Intercept	-0.467650	+/-20

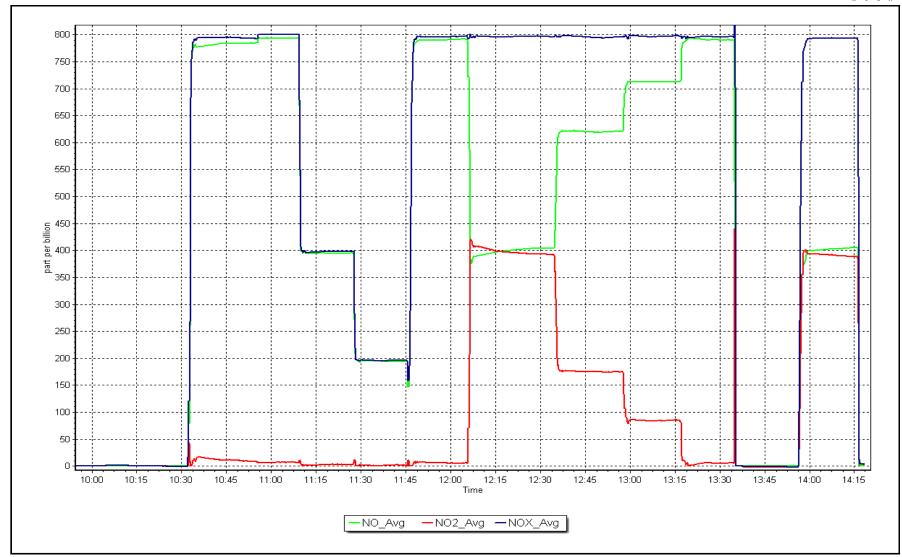


NO<sub>x</sub> Calibration Plot

Date: May 16, 2023

Location: Kirby North







# End of Report