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Wood Buffalo Environmental Association

FEBRUARY 2023

MONTHLY CALIBRATION REPORT

CONTINUOUS MONITORING March 31, 2023

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



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS01 BERTHA GANTER - FORT MCKAY FEBRUARY 2023

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

March 31, 2023



SO₂ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Bertha Ganter-Fort February 1, 2023 10:45 Routine	МсКау	Station number: Last Cal Date: End time (MST):	AMS01 January 5, 2023 14:21	
		Calibration St	andards		
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 Info	rmation		
Analyzer make:	Thermo 43i		Analyzer serial #:	IC1501301448	
Analyzer Range			Analyzer serial #.	301301301440	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.998187	0.998801	Backgd or Offset:	19.1	19.0
Calibration intercept:	-0.293417	-0.333078	Coeff or Slope:	0.891	0.891
		SO ₂ Calibratio	on Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration ((ppb) (Ic)	Correction factor (Cc/lc Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.1	
as found span	4918	81.3	799.9	797.8	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	
high point	4918	81.3	799.9	799.2	1.001
second point	4959	40.7	400.4	398.5	1.005
third point	4979	20.3	199.7	199.2	1.003
as left zero	5000	0.0	0.0	0.3	
as left span	4918	81.3	799.9	799.6	1.000
			Averag	ge Correction Factor	1.003
Baseline Corr As found:	797.70	Previous response	798.20	*% change	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
PL		/ ii 0.0pc.		intercepti	

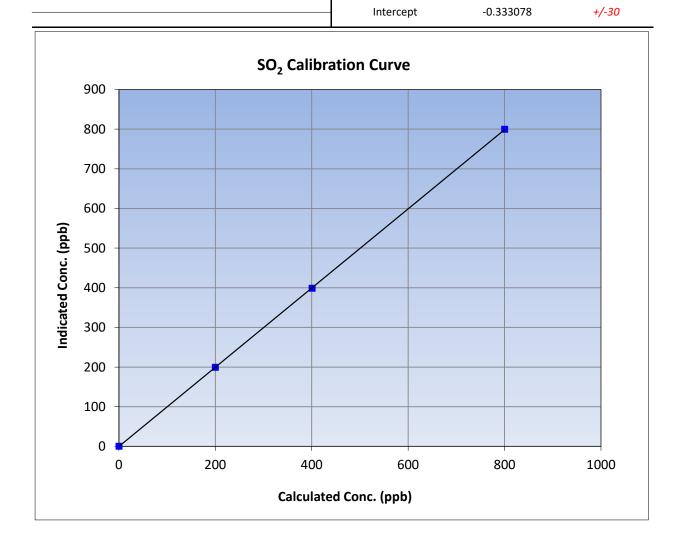
Changed the inlet filter after as founds. No adjustments made.

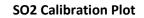
Calibration Performed By:



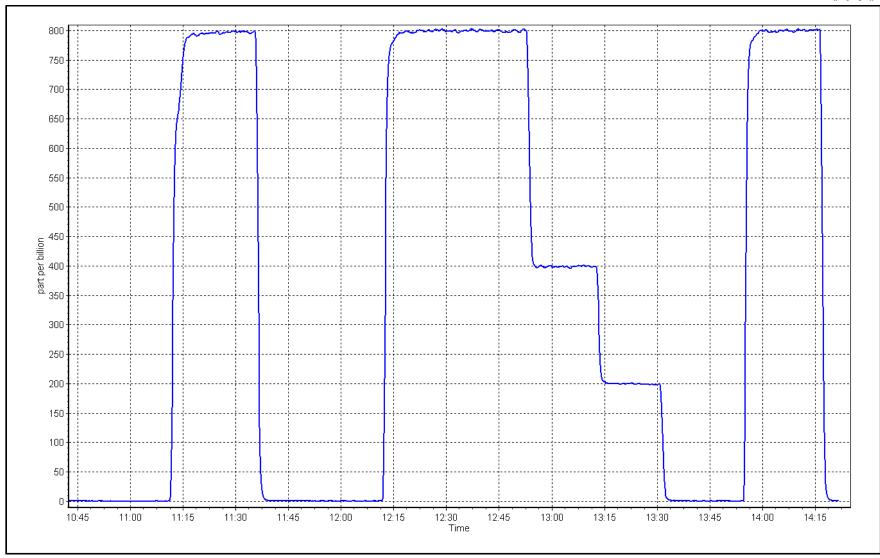
SO₂ Calibration Summary

WBEA					Version-01-2020
		Station	Information		
Calibration Date:	February	1, 2023	Previous Calibration:	January	/ 5, 2023
Station Name:	Bertha Ganter	-Fort McKay	Station Number:	AM	1501
Start Time (MST):	tart Time (MST): 10:45		End Time (MST):	14	:21
Analyzer make:	Analyzer make: Thermo 43i		Analyzer serial #:	JC1501	301448
		Calib	ration 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	0.999995	≥0.995
799.9	799.2	1.0009	correlation coemclefit	0.5555555	20.995
400.4	398.5	1.0048	- Slope	0.998801	0.90 - 1.10
199.7	199.2	1.0027	Siope	0.55801	0.50 - 1.10











TRS Calibration Report

				Version-11-2
	Station Info	ormation		
Bertha Ganter-Fort February 13, 2023 11:12 Routine	МсКау	Station number: Last Cal Date: End time (MST):	AMS01 January 10, 2023 17:19	
	Calibration	Standards		
5.10	ppm	Cal Gas Exp Date:	September 16, 2024	
<u>CC511749</u> 5.10 <u>N/A</u>	ppm	Rem Gas Exp Date: Diff between cyl:	N/A	
Teledyne API T700 Teledyne API T701		Serial Number: Serial Number:	3565 5609	
	Analyzer Inf	ormation		
Thermo 43i-TLE CD Nova 0 - 100 ppb		Analyzer serial #: Converter serial #:	1218153461 470	
<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
0.998364	0.995507	Backgd or Offset:	2.29	2.30
0.059997	0.059999	Coeff or Slope:	0.919	0.919
	TRS As Fou	ind Data		
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
5000	0.0	0.0	0.1	
4921	78.4	80.0	79.6	1.006
4960	39.2	40.0	39.8	1.008
4980	19.6	20.0	20.2	0.995
		-		
	TRS Calibra	tion Data		
Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05
5000	0.0	0.0	0.1	
4921	78.4	80.0	79.7	1.004
4960	39.2	40.0	39.9	1.002
4980	19.6	20.0	19.9	1.005
	0.0	0.0	0.1	
5000				
4921	78.4	80.0	79.6	1.005
4921 4919	78.4 81.3	813.0	0.0	
4921 4919 nge:	78.4	813.0	0.0 Ave Corr Factor	 1.004
4921 4919	78.4 81.3	813.0	0.0 Ave Corr Factor	
4921 4919 nge:	78.4 81.3	813.0 1	0.0 Ave Corr Factor	 1.004
4921 4919 nge: ficiency test:	78.4 81.3 December 17, 202	813.0 1 : 79.92	0.0 Ave Corr Factor	 1.004 efficiency
	February 13, 2023 11:12 Routine 5.10 <u>CC511749</u> 5.10 <u>N/A</u> Teledyne API T700 Teledyne API T701 Thermo 43i-TLE CD Nova 0 - 100 ppb <u>Start</u> 0.998364 0.059997 Dilution air flow rate (sccm) 4960 4980 Dilution air flow rate (sccm) Dilution air flow rate 0.059997	Bertha Ganter-Fort McKay February 13, 2023 11:12 Routine Calibration S 5.10 ppm <u>CC511749</u> 5.10 ppm <u>N/A</u> Teledyne API T700 Teledyne API T701 Thermo 43i-TLE CD Nova 0 - 100 ppb Start Finish 0.998364 0.995507 0.059997 0.059999 Dilution air flow rate Source gas flow rate (sccm) 0.0 4960 39.2 4980 19.6 Dilution air flow rate Source gas flow rate (sccm) Calibrat Dilution air flow rate Source gas flow rate (sccm) 0.0 4980 19.6	February 13, 2023 Last Cal Date: End time (MST): Routime Routine Calibration Standards 5.10 ppm Cal Gas Exp Date: <u>CC511749</u> Diff between cyl: 5.10 ppm Rem Gas Exp Date: <u>M/A</u> Diff between cyl: Teledyne API T700 Serial Number: Teledyne API T701 Serial Number: Teledyne API T701 Serial Number: Thermo 43i-TLE Analyzer serial #: Converter serial #: Converter serial #: Converter serial #: Converter serial #: Coeff or Slope: Start Finish 0.998364 Backgd or Offset: Coeff or Slope: 0-100 ppb TRS As Foundated (scem) Calculated concentration (ppb) (Cc) Dilution air flow rate (scem) Source gas flow rate (scem) Calculated concentration (ppb) (Cc) Dilution air flow rate (scem) Source gas flow rate (scem) Calculated concentration (ppb) (Cc) Dilution air flow rate (scem) Source gas flow rate (scem) Calculated concentration (ppb) (Cc) Dilution air flow rate (scem) Source gas flow rate (scem) Calculated concentration (ppb) (Cc) Dilution air flow rate (scem) Source gas flow rate 	Bertha Ganter-Fort McKay February 13, 2023 11:12 RoutineStation number: Last Cal Date: End time (MST):AMS01 January 10, 2023 17:19BoutineCallobration Standards End time (MST):September 16, 2024CC511749 S.10 S.10 PpmRem Gas Exp Date: Diff between cyl: Serial Number:N/A 3565Teledyne API T700 Teledyne API T701Serial Number: Serial Number:3565 509Analyzer Information Converter serial #: 470Thermo 43i-TLE CD Nova 0 - 100 ppbAnalyzer serial #: 4701218153461 2.29 0.059997Start 0.998364 0.995507 0.059999Esckgd or Offset: 2.29 Coeff or Slope:Start 0.919Dilution air flow rate (sccm)Source gas flow rate (sccm)Calculated concentration (ppb) (cc)Indicated concentration (ppb) (cc)Dilution air flow rate (sccm)Source gas flow rate (sccm)Calculated concentration (ppb) (cc)Indicated concentration (ppb) (ic)Dilution air flow rate (sccm)Source gas flow rate (sccm)Calculated concentration (ppb) (ic)Dilution air flow rate (sccm)Source gas flow rate (sccm)Calculated concentration (ppb) (ic)Dilution air flow rate (sccm)Source gas flow rate (sccm)Calculated concentration (ppb) (cc)Indicated concentration (ppb) (ic)Dilution air flow rate (sccm)Source gas flow rate (sccm)Calculated concentration (ppb) (cc)Indicated concentration (ppb) (cc)Dilution air flow rate (sccm)Source gas flow rate (

Notes:

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

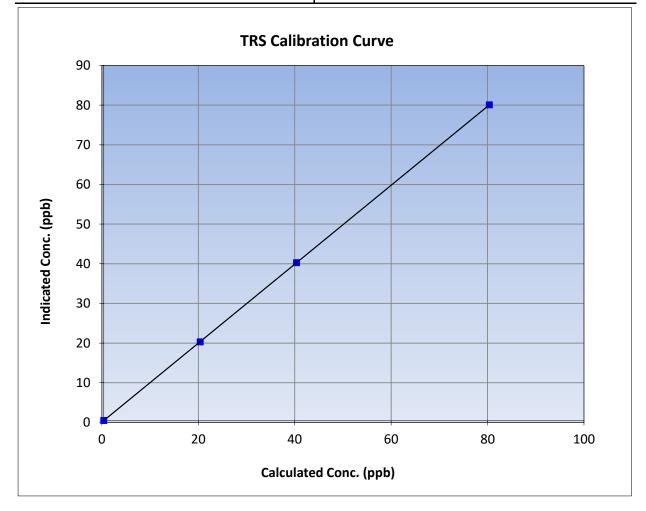


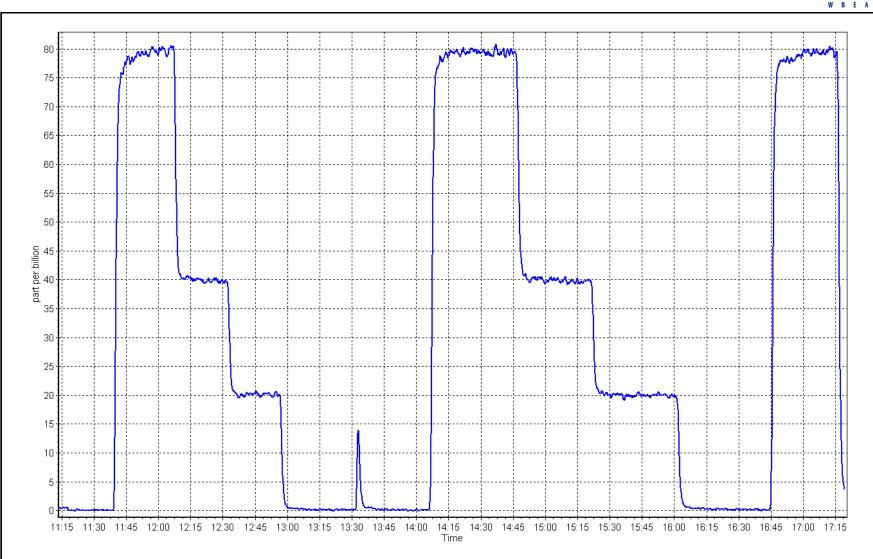
TRS Calibration Summary

WBEA			Version-11-2021				
Station Information							
Calibration Date:	February 13, 2023	Previous Calibration:	January 10, 2023				
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01				
Start Time (MST):	11:12	End Time (MST):	17:19				
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	0.1		Correlation Coefficient	0.999998	≥0.995	
80.0	79.7	1.0037	correlation coefficient	0.999996	20.335	
40.0	39.9	1.0025	Slope	0.995507	0.90 - 1.10	
20.0	19.9	1.0049	Slope	0.995507	0.30 - 1.10	
			- Intercept	0.059999	+/-3	





TRS Calibration Plot

Date: February 13, 2023

Location: Bertha Ganter-Fort McKay





H₂S Calibration Report

WBEA		-			Version-11-20
		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Bertha Ganter-Fort February 13, 2023 11:12 Routine	МсКау	Station number: Last Cal Date: End time (MST):	AMS01 January 10, 2023 17:19	
		Calibration S	tandards		
Cal Gas Concentration:	5.10	ppm	Cal Gas Exp Date:	September 16, 2024	
Cal Gas Cylinder #: Removed Cal Gas Conc: Removed Gas Cyl #:	<u>CC511749</u> 5.10 N/A	ppm	Rem Gas Exp Date: Diff between cyl:	N/A	
Calibrator Make/Model: ZAG Make/Model:			Serial Number: Serial Number:	3565 5609	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	Thermo 43iQTL Thermo Converter 0 - 100 ppb		Analyzer serial #: Converter serial #:	1200326167 N/A	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.996946	0.996946	Backgd or Offset:	1.94	1.95
Calibration intercept:	0.161599	0.361624	Coeff or Slope:	1.014	1.014
		H ₂ S As Fou	nd 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	80.0	0.998
as found 2nd point	4960	39.2	40.0	40.3	0.990
as found 3rd point	4980	19.6	20.0	20.2	0.985
new cylinder response					
		H ₂ S Calibrat	ion Data		
Set Point	Dilution air flow 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	79.9	1.001
second point	4961	39.2	40.0	40.7	0.983
third point	4980	19.6	20.0	20.2	0.990
as left zero	5000	0.0	0.0	0.4	
as left span	4921	78.4	80.0	78.7	1.016
O2 Scrubber Check	4919	81.3	813.0	0.0	
Date of last scrubber cha		March 21, 2022		Ave Corr Factor	0.991
Date of last converter eff	ficiency test:				efficiency
Baseline Corr As found:	80.1	Prev response:	79.89	*% change:	0.3%
Baseline Corr 2nd AF pt:	40.4	AF Slope:		AF Intercept:	0.079998
Baseline Corr 3rd AF pt:	20.3	AF Correlation:			

Notes:

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

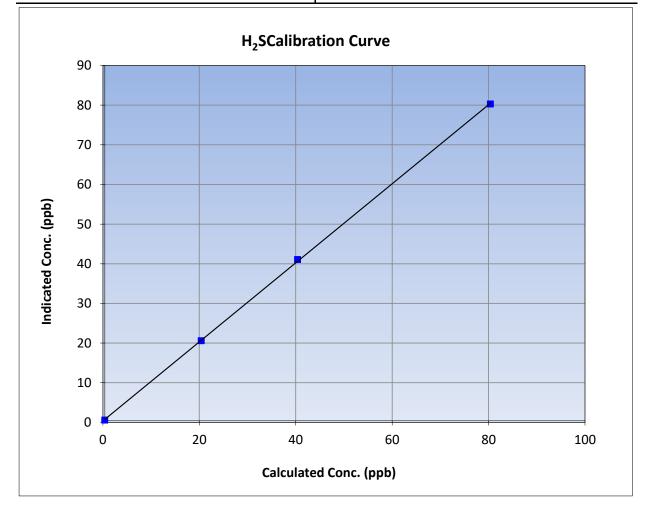


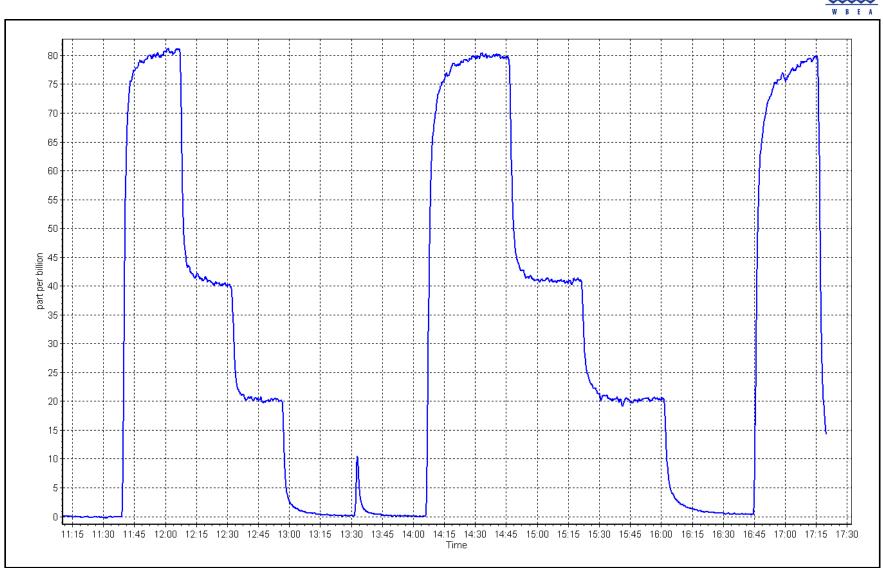
H₂S Calibration Summary

WBEA			Version-11-2021				
Station Information							
Calibration Date:	February 13, 2023	Previous Calibration:	January 10, 2023				
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01				
Start Time (MST):	11:12	End Time (MST):	17:19				
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1200326167				

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	0.999913	≥0.995
80.0	79.9	1.0012	correlation coefficient	0.999913	20.333
40.0	40.7	0.9826	Slope	0.996946	0.90 - 1.10
20.0	20.2	0.9900	Slope	0.990940	0.30 - 1.10
			Intercept	0.361624	+/-3





H₂S Calibration Plot

Location: Bertha Ganter-Fort McKay



THC / CH_4 / NMHC Calibration Report

		Statio	n Information		
Station Name: Calibration Date: Start time (MST): Reason:	Bertha Ganter-Fo February 1, 2023 10:45 Routine	•	Station number: AMS01 Last Cal Date: January 24, 2023 End time (MST): 14:21		
		Calibra	tion Standards		
Gas Cert Reference:	СС	486642	Cal Gas Expiry Date: Fe	bruary 23, 202	5
CH4 Cal Gas Conc.	497.7	ppm	CH4 Equiv Conc.	1063.1	ppm
C3H8 Cal Gas Conc.	205.6	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry: N	4	
Removed CH4 Conc.	497.7	ppm	CH4 Equiv Conc.	1063.1	ppm
Removed C3H8 Conc.	205.6	ppm	Diff between cyl (THC):		
Diff between cyl (CH ₄)	:		Diff between cyl (NM):		
Calibrator Model:	Teledyne API T70	0	Serial Number: 3565		
ZAG make/model:	Teledyne API T70	1	Serial Number: 56	509	
		Analyz	er Information		
Analyzer make THC Range (ppm)			Analyzer serial #: 11	80320040	
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	: 2.54E-04	2.52E-04	NMHC SP Ratio:	5.11E-05	5.06E-05
CH4 Retention time	: 14.4	14.4	NMHC Peak Area:	179761	181561

		THC Calibra	ation 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
as found zero	5000	0.0	0.00	0.00	
as found span	4918	81.3	17.29	17.25	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4918	81.3	17.29	17.21	1.004
second point	4959	40.7	8.65	8.56	1.011
third point	4980	20.3	4.32	4.27	1.011
as left zero	5000	0.0	0.00	0.00	
as left span	4918	81.3	17.29	17.10	1.011
			A	verage Correction Factor	1.009
Baseline Corr AF:	17.25	Prev response	17.28	*% change	-0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation



THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data					
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05
as found zero	5000	0	0.00	0.00	
as found span	4918	81.3	9.19	9.22	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	
high point	4918	81.3	9.19	9.15	1.005
second point	4959	40.7	4.60	4.56	1.010
third point	4980	20.3	2.30	2.28	1.009
as left zero	5000	0	0.00	0.00	
as left span	4918	81.3	9.19	9.07	1.014
			ŀ	Average Correction Factor	1.008
Baseline Corr AF:	9.22	Prev response	9.20	*% 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	Cal	ibration	Data
CIT	Cu	is a cion	Dutu

		CH4 Calibra	lion Dala		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (C	c) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05
as found zero	5000	0.0	0.00	0.00	
as found span	4918	81.3	8.09	8.03	1.008
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4918	81.3	8.09	8.06	1.004
second point	4959	40.7	4.05	4.00	1.012
third point	4980	20.3	2.02	1.99	1.014
as left zero	5000	0.0	0.00	0.00	
as left span	4918	81.3	8.09	8.03	1.007
			A	verage Correction Factor	1.010
Baseline Corr AF:	8.03	Prev response	8.09	*% change	-0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
		Calibration	Statistics		
		<u>Start</u>		<u>Finish</u>	
THC Cal Slope:		0.999160		0.995861	
THC Cal Offset:		0.008295		-0.022506	
CH4 Cal Slope:		0.998842		0.996625	
CH4 Cal Offset:		0.003433		-0.014967	
NMHC Cal Slope:		0.999663		0.994978	
NMHC Cal Offset:		0.004462		-0.007938	

Notes:

Changed out the inlet filter and N2 cylinder after as founds. Adjused span only.

Calibration Performed By:



THC Calibration Summary

Calibration Date: Station Name: Start Time (MST): Analyzer make: Calculated concentration (ppm) (Cc) 0.00 17.29 8.65 4.32	February Bertha Gante 10: Thern Indicated concentration (ppm) (Ic) 0.00 17.21 8.56 4.27	/ 1, 2023 rr-Fort McKay :45 no 55i	nformation Previous Calibration: Station Number: End Time (MST): Analyzer serial #: tion Data Statistical Evalu Correlation Coefficient Slope	January 2 AM 14: 118032	501 21
Station Name: Start Time (MST): Analyzer make: Calculated concentration (ppm) (Cc) 0.00 17.29 8.65	Bertha Gante 10: Thern Indicated concentration (ppm) (Ic) 0.00 17.21 8.56	er-Fort McKay :45 no 55i Calibra Correction factor (Cc/lc) 1.0044 1.0107	Station Number: End Time (MST): Analyzer serial #: tion Data Statistical Evalu	AM 14: 11803	501 21 20040 <u>Limits</u>
Start Time (MST): Analyzer make: Calculated concentration (ppm) (Cc) 0.00 17.29 8.65	10: Thern Indicated concentration (ppm) (Ic) 0.00 17.21 8.56	:45 no 55i Calibra Correction factor (Cc/Ic) 1.0044 1.0107	End Time (MST): Analyzer serial #: tion Data Statistical Evalu Correlation Coefficient	14: 11803. nation	21 20040 <u>Limits</u>
Analyzer make: Calculated concentration (ppm) (Cc) 0.00 17.29 8.65	Thern Indicated concentration (ppm) (Ic) 0.00 17.21 8.56	no 55i Calibra Correction factor (Cc/lc) 1.0044 1.0107	Analyzer serial #: tion Data Statistical Evalu Correlation Coefficient	11803	20040 <u>Limits</u>
Calculated concentration (ppm) (Cc) 0.00 17.29 8.65	Indicated concentration (ppm) (Ic) 0.00 17.21 8.56	Calibra Correction factor (Cc/lc) 1.0044 1.0107	tion Data Statistical Evalu Correlation Coefficient	ation	<u>Limits</u>
(ppm) (Cc) 0.00 17.29 8.65	(ppm) (Ic) 0.00 17.21 8.56	Correction factor (Cc/Ic) 1.0044 1.0107	Statistical Evalu		
(ppm) (Cc) 0.00 17.29 8.65	(ppm) (Ic) 0.00 17.21 8.56	 1.0044 1.0107	Correlation Coefficient		
17.29 8.65	17.21 8.56	1.0044 1.0107		0.999988	≥0.995
8.65	8.56	1.0107			_0.000
			Slope		
4.32	4.27	1.0113		0.995861	0.90 - 1.10
			Intercent	0.0225.05	
			Intercept	-0.022506	+/-0.5
20.0		THC Calibratio	n Curve		
18.0					
16.0					
14.0					
u 12.0					
j 10.0					
0.0 bm 10.0 bm 0.0 bm					
ip 6.0					
4.0					
2.0					
0.0	F	0	10.0	15.0	20.0
0.0	5.		10.0 Conc. (ppm)	15.0	20.0



CH₄ Calibration Summary

		Station I	nformation			
alibration Date:		y 1, 2023	Previous Calibration:		January 24, 2023 AMS01	
tation Name:		er-Fort McKay	Station Number:			
tart Time (MST):		:45	End Time (MST):	14:		
nalyzer make:	Therr	no 55i	Analyzer serial #:	118032	20040	
		Calibra	tion Data			
alculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Eva	luation	<u>Limits</u>	
0.00	0.00		Correlation Coefficient	0.999978	≥0.995	
8.09	8.06	1.0038				
4.05 2.02	4.00 1.99	1.0121 1.0144	Slope	0.996625	0.90 - 1.10	
			Intercept	-0.014967	+/-0.5	
8.0 7.0 6.0						
da 5.0 –						
O 4.0						
Indicated Conc. (ppm) 0.4 0.5 3.0						
2.0						
1.0						
0.0	2.0	4.0	6.0	8.0	10.0	
0.0	2.0	4.0	0.0	0.0	10.0	

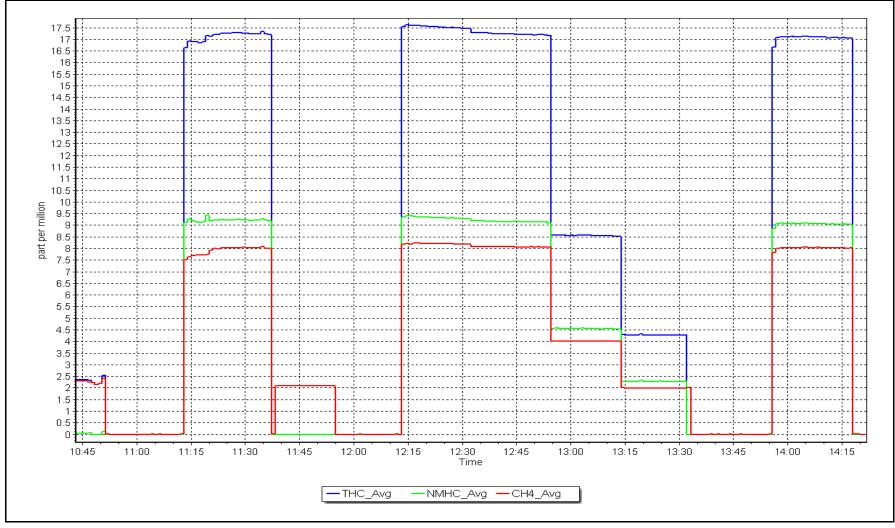


NMHC Calibration Summary

			Station I	nformation		
Calibration	Date:	Februar	ry 1, 2023	Previous Calibration:	January 2	24, 2023
Station Nar			er-Fort McKay	Station Number:	AM	501
Start Time):45	End Time (MST):	14:	
Analyzer m	nake:	Ther	mo 55i	Analyzer serial #:	11803	20040
			Calibra	tion Data		
Calculated co (ppm)		Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Eval	uation	<u>Limits</u>
0.0 9.1		0.00 9.15	1.0051	Correlation Coefficient	0.999993	≥0.995
4.6	50	4.56	1.0100	Slope	0.994978	0.90 - 1.10
2.3	30	2.28	1.0090		0.001070	
				Intercept	-0.007938	+/-0.5
:	9.0					•
	7.0 <u> </u>					
Conc. (ppm)	5.0					
d Cor	4.0					
cate						
Indicated	3.0					
	2.0					
	1.0					
(0.0					
	0.0	2.0	4.0	6.0	8.0	10.0









CH4 SP Ratio:

CH4 Retention time:

Set Point

as found zero

as found span

as left zero

as left span

Baseline Corr AF:

Baseline Corr 2nd AF:

Baseline Corr 3rd AF:

as found 2nd point as found 3rd point new cylinder response calibrator zero high point second point third point 2.52E-04

14.4

Dil air flow rate

5000

4918

5000

4918

17.09

NA

NA

Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

NMHC SP Ratio:

NMHC Peak Area:

Calc conc (ppm) (Cc)

0.00

17.29

0.00

17.29

17.19

5.06E-05

181561

Ind conc (ppm) (Ic)

0.00

17.09

0.01

16.93

*% change

AF Intercept: * = > +/-5% change initiates investigation

Average Correction Factor

Version-01-2020

			Station	Information		
Station Name: Calibration Date: Start time (MST): Reason:	Bertha Ganter- February 21, 20 11:32 Cylinder Chang	23 Last Cal Date: Febru End time (MST): 14:31			oruary 1, 2023	3
			Calibrat	ion Standards		
Gas Cert Reference:	(CC486642		Cal Gas Expiry Date: Feb	oruary 23, 202	25
CH4 Cal Gas Conc.	497.7	ppm		CH4 Equiv Conc.	1063.1	ppm
C3H8 Cal Gas Conc.	205.6	ppm				
Removed Gas Cert:		NA		Removed Gas Expiry: NA		
Removed CH4 Conc.	497.7	ppm		CH4 Equiv Conc.	1063.1	ppm
Removed C3H8 Conc.	205.6	ppm		Diff between cyl (THC):		
Diff between cyl (CH ₄)):			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T	700		Serial Number: 356	55	
ZAG make/model:	Teledyne API T	701		Serial Number: 560)9	
			Analyze	r Information		
Analyzer make THC Range (ppm)				Analyzer serial #: 118	80320040	
NMHC Range (ppm)				CH4 Range (ppm): 0 -	10 ppm	
	<u>Start</u>		<u>Finish</u>		<u>Start</u>	<u>Finish</u>

THC Calibration Data

2.52E-04

14.4

Source gas flow rate

0.0

81.3

0.0

81.3

Prev response

AF Correlation:

AF Slope:

5.06E-05

181561

CF Limit= 0.95-1.05

1.011

1.021

-0.6%



THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data								
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit=</i> 0.95-1.05			
as found zero	5000	0	0.00	0.00				
as found span	4918	81.3	9.19	9.05	1.016			
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	4918	81.3	9.19	8.95	1.028			
			Avera	ge Correction Factor				
Baseline Corr AF:	9.05	Prev response	9.14	*% change	-1.0%			
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:				
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initia	tes investigation			

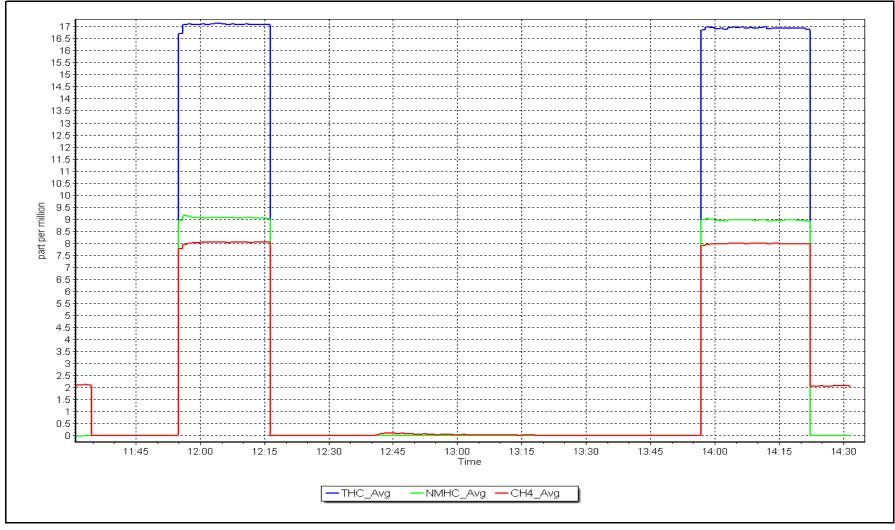
		CH4 Calibra	tion Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05
as found zero	5000	0.0	0.00	0.00	
as found span	4918	81.3	8.09	8.04	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.01	
as left span	4918	81.3	8.09	7.98	1.014
			Avera	age Correction Factor	
Baseline Corr AF:	8.04	Prev response	8.05	*% 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>		Finish	
THC Cal Slope:		0.995861			
THC Cal Offset:		-0.022506			
CH4 Cal Slope:		0.996625			
CH4 Cal Offset:		-0.014967			
NMHC Cal Slope:		0.994978			
NMHC Cal Offset:		-0.007938			

Changed out the H2 cylinder.

Calibration Performed By:

NMHC Calibration Plot







$NO_X \setminus NO \setminus NO_2$ Calibration Report

Station number: AMS01

End time (MST): 16:07

Last Cal Date: January 6, 2023

Version-04-2020

Station Information

Station Name:	Be
Calibration Date:	Fe
Start time (MST):	1
Reason:	R

Bertha Ganter-Fort McKay Gebruary 2, 2023 1:23 Routine

Calibration Standards

NO Gas Cylinder #:	T2Y1P9L		Cal Gas Expiry Date: December 11, 2023			
NOX Cal Gas Conc:	50.84	ppm	NO Cal Gas Conc:	50.04	ppm	
Removed Cylinder #:		NA	Removed Gas Exp Date:		NA	
Removed Gas NOX Conc:	50.84	ppm	Removed Gas NO Conc:	50.04	ppm	
NOX gas Diff:			NO gas Diff:			
Calibrator Model:	Teledyne API T	700	Serial Number:	3565		
ZAG make/model:	Teledyne API T	701	Serial Number:	5609		

Analyzer Information

Analyzer make: Th NOX Range (ppb): 0 -			Analyzer serial #: 12	18153357	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.453	1.440	NO bkgnd or offset:	6.9	6.8
NOX coeff or slope:	0.990	0.990	NOX bkgnd or offset:	7.0	6.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	199.5	198.9

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.999269	0.997218
NO _x Cal Offset:	-0.220000	0.060000
NO Cal Slope:	1.000842	0.998701
NO Cal Offset:	-0.900000	-0.400000
NO ₂ Cal Slope:	0.996966	0.997388
NO ₂ Cal Offset:	-0.078101	-0.442888



$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

				Dilu	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	0.2	0.2	0.0		
as found span	4920	80.0	813.4	800.6	12.8	821.9	806.2	15.7	0.9897	0.9931
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	4920	80.0	813.4	800.6	12.8	811.3	799.5	11.7	1.0026	1.0014
second point	4960	40.0	406.7	400.3	6.4	405.7	399.2	6.5	1.0025	1.0028
third point	4980	20.0	203.4	200.2	3.2	202.5	198.7	3.9	1.0042	1.0073
as left zero	5000	0.0	0.0	0.0	0.0	0.4	0.2	0.2		
as left span	4920	80.0	813.4	413.7	399.7	805.5	408.0	397.5	1.0099	1.0141
							Average C	orrection Factor	1.0031	1.0039
Corrected As fo	ound NO _x =	821.7 ppb	NO =	806.0 ppb	* = > +/-59	% change initiates i	nvestigation	*Percent Chang	ge NO _x =	1.1%
Previous Respo	onse NO _x =	812.6 ppb	NO =	800.4 ppb				*Percent Chang	ge NO =	0.7%
Baseline Corr 2	and pt NO _x =	NA ppb	NO =	NA ppb	As found	d $NO_X r^2$:		Nx SI:	Nx Int:	
Baseline Corr 3	rd pt NO _x =	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 ₂ Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Co	Indicated NO2 c) concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) Calibration Limit = 0.95-1.05 As Found Limit = 0.90-1.10	Converter Efficiency Calibration Limit = 96-104%
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	793.8	406.9	399.7	398.5	1.0030	99.7%
2nd GPT point (200 ppb O3)	793.8	585.2	221.4	220.1	1.0059	99.4%
3rd GPT point (100 ppb O3)	793.8	689.3	117.3	116.1	1.0103	99.0%
				Average Correction Factor	1.0064	99.4%

Notes:

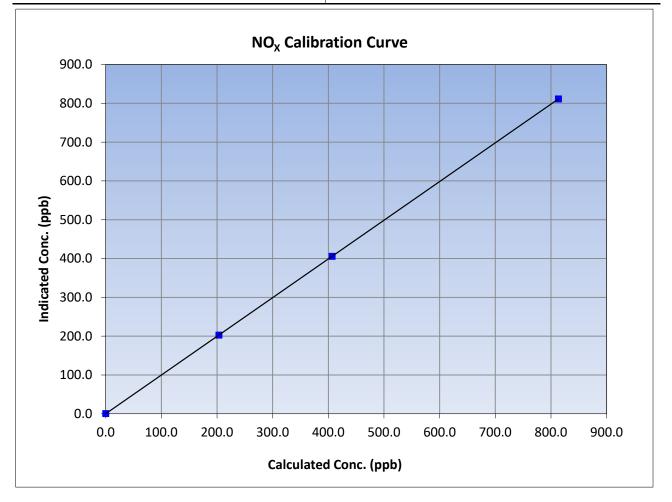
Changed the inlet filter after as founds. Adjusted span only.

Calibration Performed By:



NO_x Calibration Summary

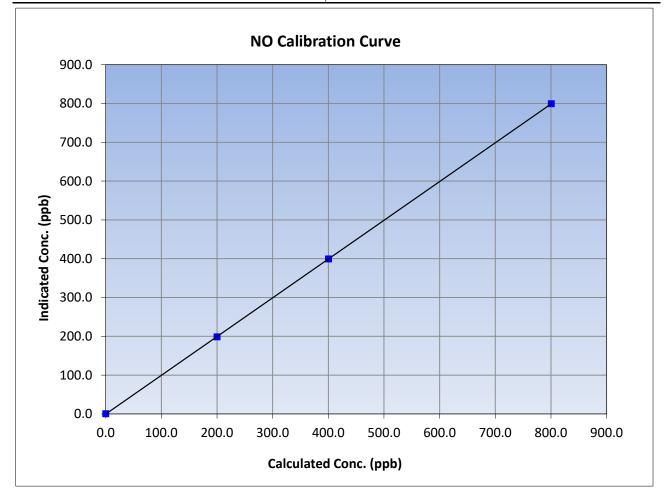
WBEA					Version-04-20	
		Station	Information			
Calibration Date:	Februar	y 2, 2023	Previous Calibration:	January	6, 2023	
Station Name:	Bertha Gante	er-Fort McKay	Station Number:	AM	S01	
Start Time (MST):	11	:23	End Time (MST):	16	:07	
Analyzer make:	Therr	mo 42i	Analyzer serial #:	nalyzer serial #: 1218153357		
		Calibra	ation Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	0.3		Correlation Coefficient	0.999999	≥0.995	
813.4	811.3	1.0026	correlation coefficient	0.5555555	20.995	
406.7	405.7	1.0025	Clana	0.997218	0.00 1.10	
203.4	202.5	1.0042	Slope	0.997218	0.90 - 1.10	
			Intercept	0.060000	+/-20	





NO Calibration Summary

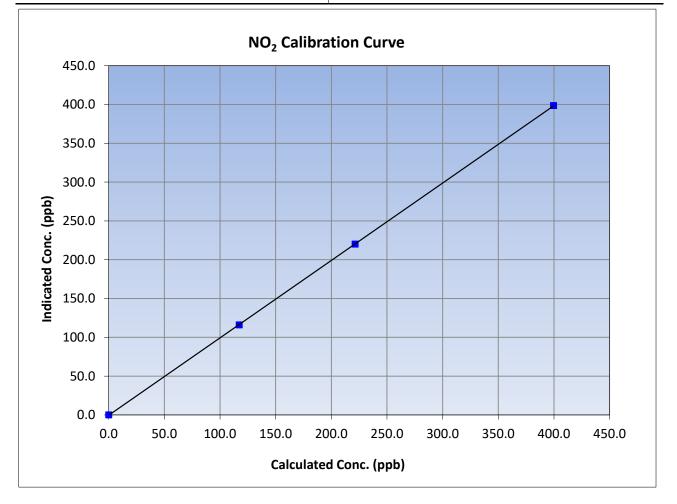
WBEA					Version-04-20	
		Station	Information			
Calibration Date:	Februar	y 2, 2023	Previous Calibration:	January	6, 2023	
Station Name:	Bertha Ganter-Fort McKay		Station Number:	AM	S01	
Start Time (MST):	11:23		End Time (MST):	16	:07	
nalyzer make: Thermo 42i			Analyzer serial #:	1218153357		
		Calibra	ation Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	0.3		Correlation Coefficient	0.999996	≥0.995	
800.6	799.5	1.0014	correlation coefficient	0.555550	20.995	
400.3	399.2	1.0028	Clana	0.998701	0.00 1.10	
200.2	198.7	1.0073	Slope	0.998701	0.90 - 1.10	
			Intercept	-0.400000	+/-20	





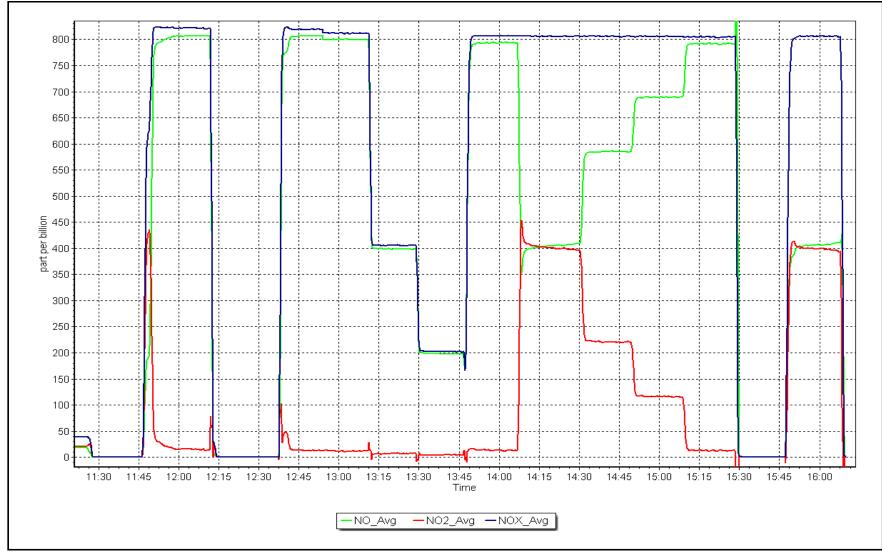
NO₂ Calibration Summary

WBEA					Version-04-202
		Station	Information		
Calibration Date:	Februar	y 2, 2023	Previous Calibration:	January	6, 2023
Station Name:	Bertha Gante	er-Fort McKay	Station Number:	AM	S01
Start Time (MST):	11	:23	End Time (MST):	16	:07
Analyzer make:	Therr	no 42i	Analyzer serial #:	53357	
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999993	≥0.995
399.7	398.5	1.0030	correlation coefficient	0.999995	20.999
221.4	220.1	1.0059	Clana	0.007200	0.00 1.10
117.3	116.1	1.0103	Slope	0.997388	0.90 - 1.10
			Intercept	-0.442888	+/-20











O₃ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Bertha Ganter-Fort February 8, 2023 11:06 Routine	МсКау	Station number: Last Cal Date: End time (MST):	January 4, 2023	
		Calibration St	andards		
O3 generation mode: Calibrator Make/Model: ZAG Make/Model:	Photometer Teledyne API T700 Teledyne API T701		Serial Number: Serial Number:		
		Analyzer Info	rmation		
Analyzer make: Analyzer Range	: Teledyne API T400 e 0 - 500 ppb		Analyzer serial #:	1107	
Calibration slope: Calibration intercept:	<u>Start</u> 1.001400 0.480000	<u>Finish</u> 1.000086 0.760000	Backgd or Offset: Coeff or Slope:		<u>Finish</u> 2.4 1.016
		O ₃ Calibratio	on Data		
Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration C (ppm) (Ic)	Correction factor (Cc/I Limit = 0.95-1.05
as found zero	5000	0.0	0.0	-0.4	
as found span	5000	855.5	400.0	399.3	1.002
as found 2nd point as found 3rd point					
calibrator zero	5000	0.0	0.0	0.5	
high point	5000	855.5	400.0	400.6	0.999
second point	5000	738.6	200.0	201.1	0.995
third point	5000	649.2	100.0	100.9	0.991
as left zero	5000	0.0	0.0	0.3	
as left span	5000	855.5	400.0	402.8	0.993
			Avera	ge Correction Factor	0.995
Baseline Corr As found:	399.7	Previous response	401.0	*% change	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:		* = > +/-5% change initiate	es investigation

Notes:

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

Calibration Performed By:

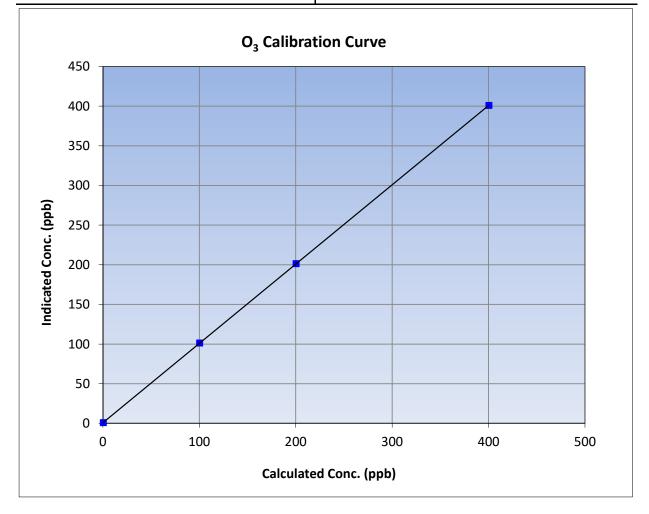


O₃ Calibration Summary

WBEA			Version-01-2020						
Station Information									
Calibration Date:	February 8, 2023	Previous Calibration:	January 4, 2023						
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01						
Start Time (MST):	11:06	End Time (MST):	14:30						
Analyzer make:	Teledyne API T400	Analyzer serial #:	1107						

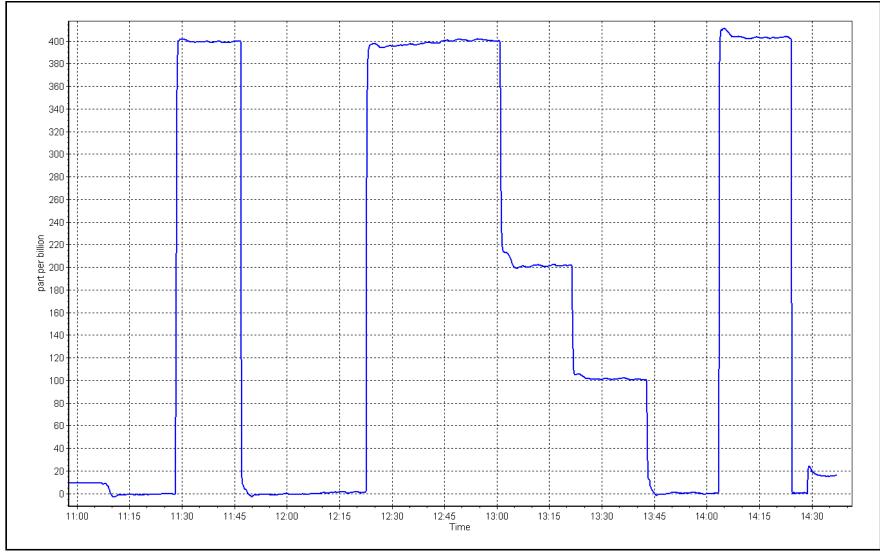
Calibration Data

Calculated concentration (ppb) (Cc)	Calculated concentration Indicated concentration (ppb) (Cc) (ppb) (Ic)		Statistical Evalua	<u>Limits</u>	
0.0	0.5		Correlation Coefficient	0.999997	≥0.995
400.0	400.6	0.9985	correlation coefficient	0.999997	20.335
200.0	201.1	0.9945	Slope	1.000086	0.90 - 1.10
100.0	100.9	0.9911	Slope	1.000080	0.90 - 1.10
			Intercept	0.760000	+/- 5











T640 PM_{2.5} CALIBRATION

WDEA					Version-01-2023
		Station Informatio	n		
Station Name:	Fort McKay - Bertha	Ganter Station number: AMS 01			
Calibration Date:	February 16, 2023		January 23, 2023		
Start time (MST):	12:45		End time (MST):	13:46	
			- 4.		
Analyzer Make:	API T640		S/N:	306	
Particulate Fraction:	PM2.5				
Flow Meter Make/Model:	Delta Cal		S/N:	1450	
Temp/RH standard:	Delta Cal		S/N:	1450	
		Monthly Calibration 1	ſest		
<u>Parameter</u>	<u>As found</u>	Measured	<u>As left</u>	Adjusted	(Limits)
T (°C)	-7.6	-8.2	-7.6		+/- 2 °C
P (mmHg)	724.1	723.2	724.1		+/- 10 mmHg
flow (LPM)	5.00	5.03	5.00		+/- 0.25 LPM
				L	17- 0.25 EI WI
Leak Test:	PM w/o HEPA:	February 16, 2023 7.5	Last Cal Date: PM w/ HEPA:	January 24, 2023 0	<0.2 ug/m3
Note: this leak check will be	-	-			<0.2 ug/m5
Inlet cleaning :	Inlet Head				
		_			
		Quarterly Calibration	Test		
Parameter_	<u>As found</u>	Post maintenance	As left	Adjusted	(Limits)
PMT Peak Test	<u></u>	<u></u>	<u></u>		11.3 +/- 0.5
					11.5 +/- 0.5
Post-maintenance	e leak check:	PM w/o HEPA:		w/ HEPA:	
Date Optical Cham	ber Cleaned:	December 1	.9, 2022		<0.2 ug/m3
Disposable Filte	r Changed:	December 1	9, 2022		
		Annual Maintenand	re internet		
Date Sample Tub	pe Cleaned:	August 31	, 2022		
Date RH/T Sense	or Cleaned:	December 1	.9, 2022		
Notes:		Flow, temperature and	pressure verified. Lea	k check passed.	
Calibration by:	Rene Chamberland				



TN - NO_X - NH_3 Calibration Report

W B E A			X 5	•	Version-11-2
		Station	Information		VC151011 11 2
tation Name:	Bertha Ganter-F		Station number:	AMS01	
NOX Cal Date:	February 16, 20		Last Cal Date:	January 26, 2023	
Start time (MST):	11:12		End time (MST):	15:18	
NH3 Cal Date:	February 16, 2023		Last Cal Date:	January 26, 2023	
Start time (MST):	15:50		End time (MST):	18:20	
Reason:	Removal				
		Calibrati	on Standards		
NOX Cal Gas Conc:	50.84	ppm	NO Gas Cylinder #:	T2Y1P9L	
NO Cal Gas Conc:	50.04	ppm	NO Cal Gas Expiry:	March 3, 2028	
Removed NOX Conc:	50.84	ppm	Removed Cylinder #:	NA	
Removed NO Conc:	50.04	ppm	Removed cyl Expiry:	NA	
NOX gas Diff:			NO gas Diff:		
NH3 Cal Gas Conc:	72.93	ppm	NH3 Gas Cylinder #:	CC281298	
			, NH3 Cal Gas Expiry:	February 28, 2023	
Removed NH3 Conc:	72.93	ppm	Removed Cylinder #:	NA	
NH3 gas Diff:			Removed cyl Expiry:	NA	
Calibrator Model:		yne API T700	Serial Number:	3565	
ZAG make/model:	Teled	yne API T701	Serial Number:	5609	
		-	r Information		
	: Teledyne API T2		Analyzer serial #		
Converter model:	-	01	Converter serial #		
NH3 Range (ppb):			Reaction cell Press		
NOX Range (ppb):	: 0 - 1000 ppb		Sample Flow		
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	Finish
NO coefficient:	: 0.793		TN coefficient	t: 0.806	
NOX coefficient:	: 0.804		NO bkgrnd		
NO2 coefficient:			NOX bkgrnd		
NH3 coefficient:	: 0.919		TN bkgrnd	l: 3.100	
		Calibrat	ion Statistics		
		<u>Start</u>		<u>Finish</u>	
NO _x Cal Slope:	:	1.001644		0.986302	
NO _x Cal Offset:		-0.440000		-0.180000	
NO Cal Slope:		1.001856		0.988309	
NO Cal Offset:		-1.080000		-0.560000	
NO ₂ Cal Slope:		0.999297		0.982947	
NO ₂ Cal Offset:		0.756159		-0.400969	
NH3 Cal Slope:		0.988888		1.009740	
NH3 Cal Offset:		14.116543		1.383893	
TN Cal Slope:		0.996806		1.017473	
TN Cal Offset:	:	16.482567		1.877552	



TN - NOX - NH₃ 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) <i>Limit = 0.95-1.05</i>
as found zero										
as found NO										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.8	-0.8		
high NO point	4920	80.0	813.4	813.4		802.5	802.8	-0.2	1.014	
NO/O3 point										
as found NH3										
new NH3 cyl rp										
first NH3	3413	86.4	1800.6		1800.6	1839.0		1824.3	0.979	0.987
second NH3	3452	48.0	1000.2		1000.2	1004.7		996.8	0.996	1.003
third NH3	3476	24.0	500.1		500.1	522.3		518.3	0.957	0.965
							Average C	Correction Factor	1.0136	0.9851
Corrected As fo	ound TN =	NA ppb	NO _X = NA	ppb NH3 =	NA ppb			*Percent Change	e TN =	NA
Previous Respo	nse TN =	NA ppb	NO _X = NA	ppb NH3 =	NA ppb			*Percent Change	e NO _x =	NA
								*Percent Change	e NH3 =	NA
NH2 Provious C	onvortor Efficio	$n_{01} = 01.0\%$						* - > +/-5% chango i	nitiatos invostigati	on

NH3 Previous Converter Efficiency = 91.9%

NH3 Current Converter Efficiency =

* = > +/-5% change initiates investigation



NO_x - NO - NO₂ 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	0.8	1.0	0.1		
as found span	4920	80.0	813.4	800.6	813.4	802.8	791.0	802.5	1.0133	1.0122
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.8	1.0	0.1		
high point	4920	80.0	813.4	800.6	813.4	802.8	791.0	802.5	1.0133	1.0122
second point	4960	40.0	406.7	400.3	406.7	399.9	395.8	397.9	1.0171	1.0114
third point	4980	20.0	203.4	200.2	203.4	199.8	194.7	199.8	1.0178	1.0280
							Average C	Correction Factor	1.0160	1.0172
Baseline Corr A	s fnd TN =	802.4 ppb	NO _x = 802.0	ppb NO =	790.0 ppb			*Percent Chang	e TN =	-3.1%
Previous Respo	nse TN =	827.3 ppb	NO _x = 814.3	ppb NO =	801.0 ppb			*Percent Chang	e NO _x =	-1.5%
								*Percent Chang	e NO =	-1.4%
								* = > +/-5% change	initiates investigat	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)	784.3	392.6	404.5	398.6	1.0148	98.5%				
2nd GPT point (200 ppb O3)	784.3	583.3	213.8	205.9	1.0384	96.3%				
3rd GPT point (100 ppb O3)	784.3	682.6	114.5	114.4	1.0009	99.9%				
				Average Correction Factor	1.0180	98.3%				

Notes:

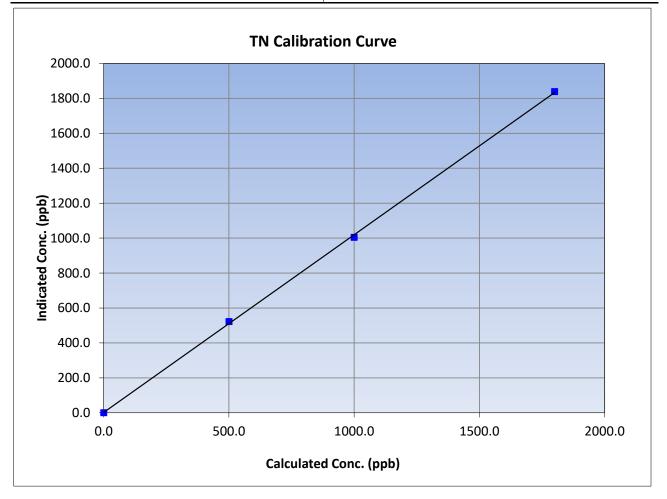
Completing multi point as founds. Removing the analyzer/converter.

Calibration Performed By:



TN Calibration Summary

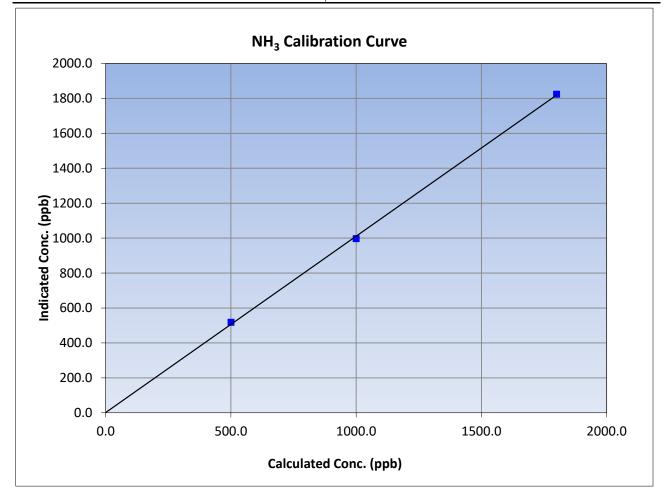
WBEA					Version-11-202	
		Station	Information			
Calibration Date:	February 16, 2023		Previous Calibration:		January 26, 2023	
Station Name:	Bertha Ganter-Fort McKay		Station Number:	AMS01		
Start Time (MST):	11:12		End Time (MST):	15:18		
Analyzer make:	Teledyne API T201E		Analyzer serial #:	56		
		Calibra	ation Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>	
0.0	0.1		Correlation Coefficient	0.999791	≥0.995	
1800.6	1839.0	0.9791		0.999791	20.333	
1000.2	1004.7	0.9955	Slope	1.017473	0.90 - 1.10	
500.1	522.3	0.9575			0.90 - 1.10	
			Intercept	1.877552	+/-20	





NH₃ Calibration Summary

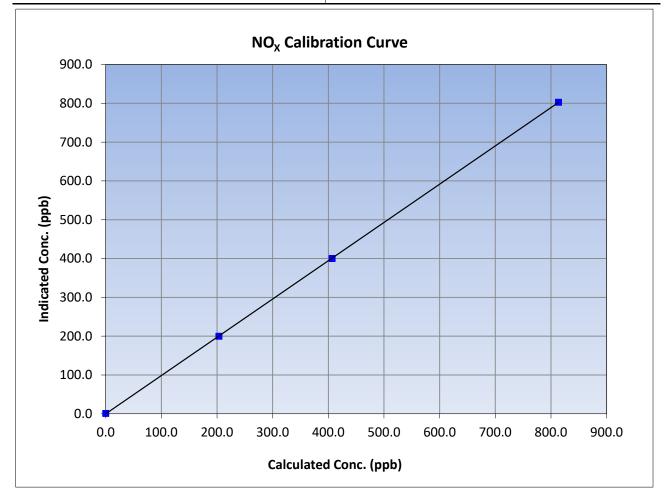
WBEA		o			Version-11-202
		Station	Information		
Calibration Date:	February 16, 2023		Previous Calibration:	Januar	ry 26, 2023
Station Name:	Bertha Ganter-Fort McKay		Station Number:	AMS01	
Start Time (MST):	11:12		End Time (MST):	15:18	
Analyzer make:	Teledyne API T201E		Analyzer serial #:	56	
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	-0.8		Correlation Coefficient	0.999789	≥0.995
1800.6	1824.3	0.9870		0.999789	20.395
1000.2	996.8	1.0034	Slope	1.009740	0.90 - 1.10
500.1	518.3	0.9649		1.009740	0.90 - 1.10
			Intercept	1.383893	+/-20





NO_x Calibration Summary

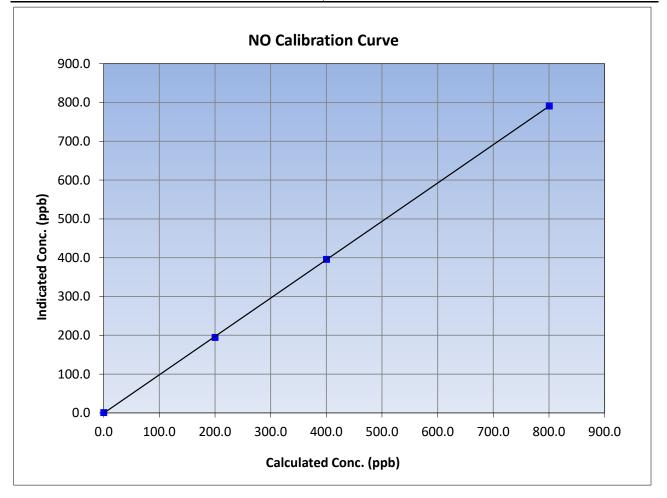
WBEA		Station	Information		Version-11-2
Calibration Date: Station Name: Start Time (MST):	February 16, 2023 Bertha Ganter-Fort McKay 11:12		Previous Calibration: Station Number: End Time (MST):	January 26, 2023 AMS01 15:18	
Analyzer make:	Teledyne	API T201E	Analyzer serial #:		56
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.8		Correlation Coefficient	0.999992	≥0.995
813.4	802.8	1.0133		0.00002	20.000
406.7	399.9	1.0171	Slope	0.986302 0.90	0.90 - 1.10
203.4	199.8	1.0178			0.90 - 1.10
			Intercept	-0.180000	+/-20





NO Calibration Summary

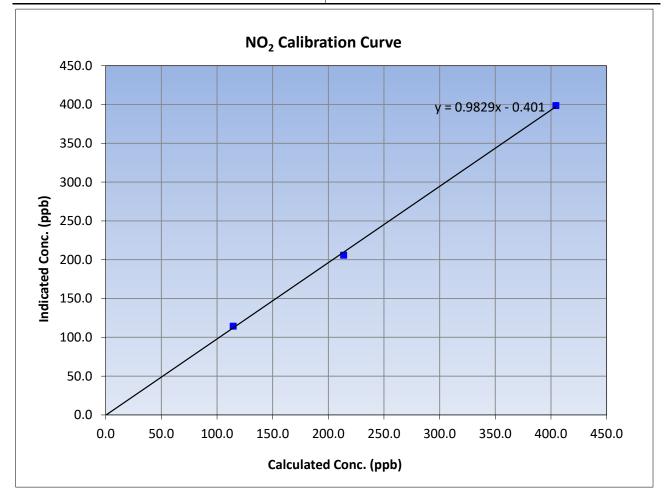
		Station I	nformation		Version-11-2
Calibration Date: Station Name: Start Time (MST): Analyzer make:	Bertha Gante 11	16, 2023 er-Fort McKay :12 API T201E	Previous Calibration: Station Number: End Time (MST): Analyzer serial #:	AN 15	26, 2023 4501 5:18 56
Calculated concentration	Indicated concentration		tion Data Statistical Evalua	ation	
(ppb) (Cc)	(ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua		<u>Limits</u>
(ppb) (Cc) 0.0 800.6 400.3	(ppb) (Ic) <u>1.0</u> <u>791.0</u> <u>395.8</u>	 1.0122 1.0114	Correlation Coefficient	0.999972	<u>Limits</u> ≥0.995

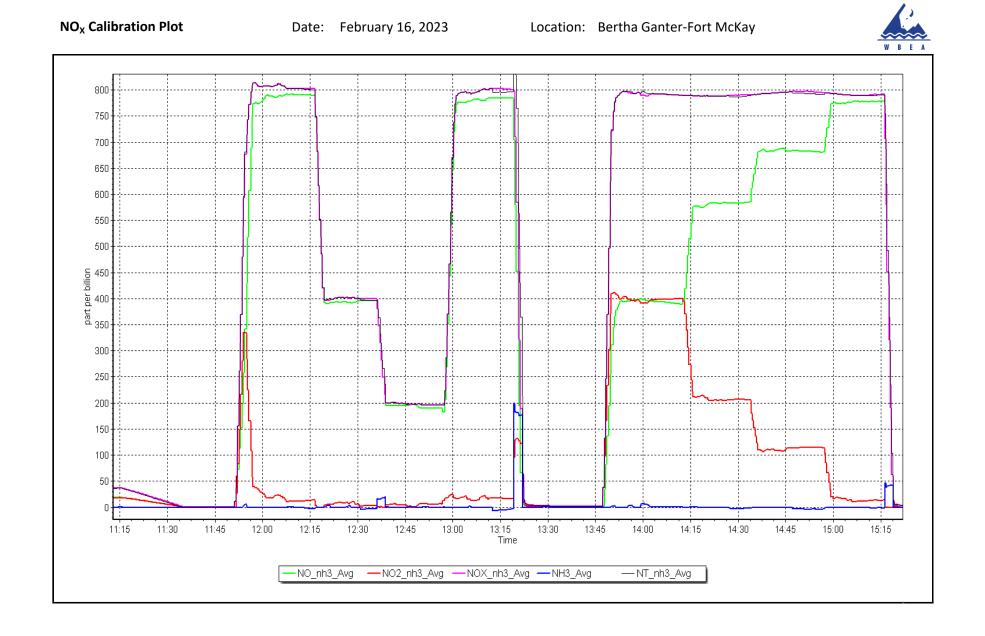




NO₂ Calibration Summary

WBEA					Version-11-2
		Station	Information		
Calibration Date:	February	16, 2023	Previous Calibration: Jar		y 26, 2023
Station Name:	Bertha Ganter-Fort McKay		Station Number:	AN	MS01
Start Time (MST):	t Time (MST): 11:12		End Time (MST):	1	5:18
Analyzer make:	Teledyne	API T201E	Analyzer serial #:	56	
		Calibra	ation 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	0.999743	≥0.995
404.5	398.6	1.0148	correlation coefficient	0.555745	20.995
213.8	205.9	1.0384	Slope	0.982947	0.90 - 1.10
114.5	114.4	1.0009	Slope	0.962947	0.90 - 1.10
			Intercept	-0.400969	+/-20













TN - NO_X - NH_3 Calibration Report

W B E A					Version-11-202	
		Statio	n Information			
Station Name:	Bertha Ganter-For	t McKay	Station number:	AMS01		
NOX Cal Date:	February 17, 2023		Last Cal Date:	NA		
Start time (MST):	11:32		End time (MST):	15:30		
NH3 Cal Date:	February 17, 2023		Last Cal Date:	NA		
Start time (MST):	15:50		End time (MST):	18:15		
Reason:	Install					
		Calibra	tion Standards			
NOX Cal Gas Conc:	50.84	ppm	NO Gas Cylinder #:	T2Y1P9L		
NO Cal Gas Conc:	50.04	ppm	NO Cal Gas Expiry:	March 3, 2028		
Removed NOX Conc:	50.84	ppm	Removed Cylinder #:	NA		
Removed NO Conc:	50.04	ppm	Removed cyl Expiry:	NA		
NOX gas Diff:			NO gas Diff:			
NH3 Cal Gas Conc:	72.93	ppm	NH3 Gas Cylinder #:	CC281298		
			NH3 Cal Gas Expiry:	February 28, 2023		
Removed NH3 Conc:	72.93	ppm	Removed Cylinder #:	NA		
NH3 gas Diff:			Removed cyl Expiry:	NA		
Calibrator Model:	Teledyr	e API T700	Serial Number:	3565		
ZAG make/model:	Teledyr	e API T701	Serial Number:	5609		
		Analyz	er Information			
	: Teledyne API T201		Analyzer serial #	‡: 808		
Converter model	: Teledyne API T501	L	Converter serial #	t: 824		
NH3 Range (ppb):	: 0 - 2000 ppb		Reaction cell Press	s: 5.10		
NOX Range (ppb):	: 0 - 1000 ppb		Sample Flow: 470			
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	Finish	
NO coefficient		0.833	TN coefficien	t:	0.828	
NOX coefficient		0.834	NO bkgrnd		-11.017	
NO2 coefficient		1.000	NOX bkgrnd	1:	-10.278	
NH3 coefficient	:	0.854	TN bkgrnd	1:	-4.631	
		Calibra	ation Statistics			
		<u>Start</u>		<u>Finish</u>		
NO _x Cal Slope:	:			1.000885		
NO _x Cal Offset:				0.380000		
NO Cal Slope:				0.999215		
NO Cal Offset				-0.780000		
NO ₂ Cal Slope	:			0.999881		
NO ₂ Cal Offset	:			0.372129		
NH3 Cal Slope	:			1.010718		
NH3 Cal Offset	:			-8.022555		
TN Cal Slope	:			1.015098		
TN Cal Offset	:			-7.787324		



TN - NOX - NH₃ Calibration Report

Version-11-2021

				Diluti	on 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) .imit = 0.95-1.05	NH3 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero										
as found NO										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1		
high NO point	4920	80.0	813.4	813.4		812.9	814.6	-1.9	1.001	
NO/O3 point										
as found NH3										
new NH3 cyl rp										
first NH3	3413	86.4	1800.6		1800.6	1817.8		1809.8	0.991	0.995
second NH3	3452	48.0	1000.2		1000.2	1021.0		1016.3	0.980	0.984
third NH3	3476	24.0	500.1		500.1	480.9		478.2	1.040	1.046
							Average C	Correction Factor	1.0007	1.0083
Corrected As fo	und TN =	NA ppb	NO _X = NA	ppb NH3 =	NA ppb			*Percent Change	e TN =	NA
Previous Respon	nse TN =	NA ppb	NO _x = NA	ppb NH3 =	NA ppb			*Percent Change	e NO _X =	NA
								*Percent Change	e NH3 =	NA

NH3 Previous Converter Efficiency =

NH3 Current Converter Efficiency = 85.4%

* = > +/-5% change initiates investigation



NO_x - NO - NO₂ Calibration Report

Version-11-2021

				Dilutio	on 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) <i>Limit = 0.95-1.05</i>
as found zero										
as found span										
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1		
high point	4920	80.0	813.4	800.6	813.4	814.6	799.8	812.9	0.9986	1.0011
second point	4960	40.0	406.7	400.3	406.7	406.9	398.2	406.9	0.9996	1.0053
third point	4980	20.0	203.4	200.2	203.4	204.8	199.0	204.0	0.9930	1.0058
							Average C	Correction Factor	0.9970	1.0041
Baseline Corr A	s fnd TN =	NA ppb	NO _x = NA	ppb NO =	NA ppb			*Percent Chang	e TN =	NA
Previous Respo	nse TN =	NA ppb	NO _x = NA	ppb NO =	NA ppb			*Percent Chang	e NO _x =	NA
								*Percent Chang	e NO =	NA
								* = > +/-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									
calibration zero			0.0	0.1					
1st GPT point (400 ppb O3)	795.6	393.9	414.5	414.9	0.9990	100.1%			
2nd GPT point (200 ppb O3)	795.6	594.5	213.9	213.7	1.0009	99.9%			
3rd GPT point (100 ppb O3)	795.6	693.9	114.5	115.6	0.9905	101.0%			
			ŀ	Average Correction Factor	0.9968	100.3%			

Notes: Installing a new NH3 analyzer/converter. Changed the inlet filter. Adjusted both zero and span. Used the 2nd GPT point. Adjusted the NH3 span.

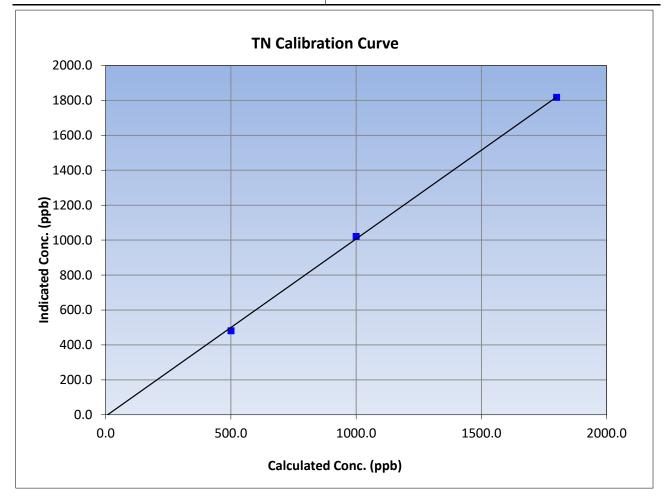
Calibration Performed By:

Rene Chamberland



TN Calibration Summary

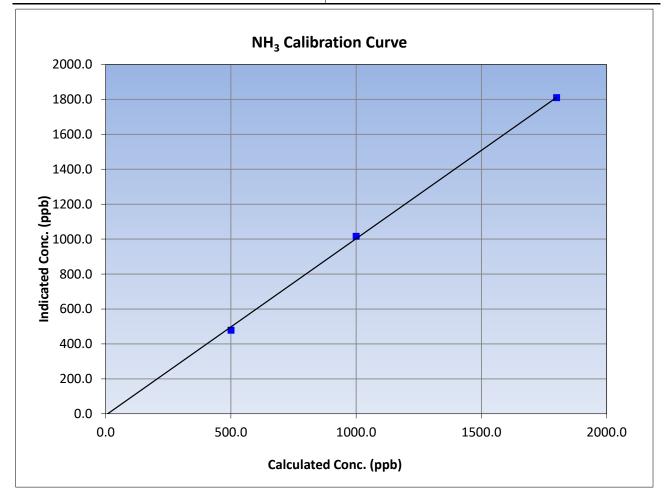
WDEA					Version-11-202	
		Station	Information			
Calibration Date:	February	17, 2023	Previous Calibration:		NA	
Station Name:	Bertha Ganter-Fort McKay		Station Number:		AMS01	
Start Time (MST):	11:32		End Time (MST):		15:30	
Analyzer make:	Teledyne	e API T201	Analyzer serial #:		808	
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Calibra Correction factor (Cc/Ic)	ation Data Statistical Evalu	ation	<u>Limits</u>	
0.0	-0.1		Correlation Coofficient	0.000000	× 0.005	
1800.6	1817.8	0.9906	Correlation Coefficient	0.999668	≥0.995	
1000.2	1021.0	0.9796	Slope	1.015098	0.90 - 1.10	
500.1	480.9	1.0399	Slope	1.015098	0.90 - 1.10	
			Intercept	-7.787324	+/-20	





NH₃ Calibration Summary

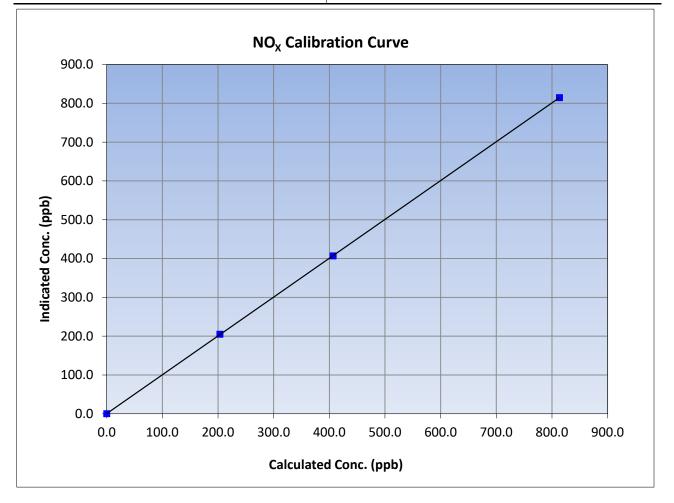
WBEA					Version-11-202
		Station	Information		
Calibration Date:	February	17, 2023	Previous Calibration:		NA
Station Name:	Bertha Ganter-Fort McKay		Station Number:		AMS01
Start Time (MST):	MST): 11:32		End Time (MST):		15:30
Analyzer make:	Teledyne	API T201	Analyzer serial #:	808	
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	-0.1		Correlation Coefficient	0.999659	≥0.995
1800.6	1809.8	0.9949	correlation coefficient	0.999039	20.333
1000.2	1016.3	0.9841	Slopp	1.010718	0.90 - 1.10
500.1	478.2	1.0458	– Slope 1.01		0.90 - 1.10
			Intercept	-8.022555	+/-20





NO_x Calibration Summary

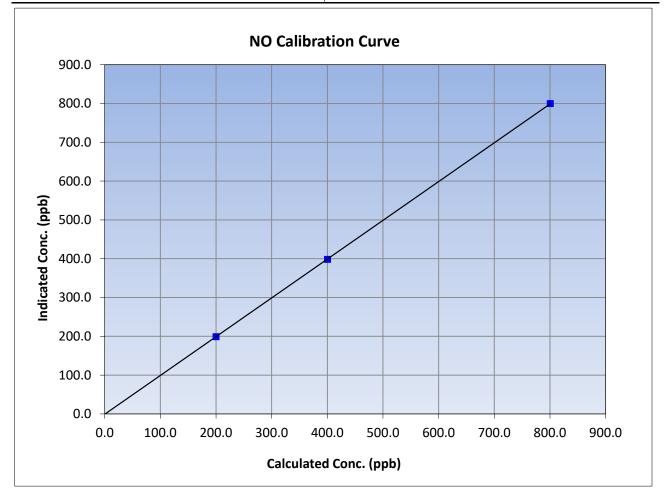
WBEA					Version-11-202
		Station	Information		
Calibration Date:	February	17, 2023	Previous Calibration:		NA
Station Name:	Bertha Ganter-Fort McKay		Station Number:		AMS01
Start Time (MST):	11:32		End Time (MST):		15:30
Analyzer make:	Teledyne	e API T201	Analyzer serial #:	808	
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999997	≥0.995
813.4	814.6	0.9986	correlation coernelent	0.555557	20.333
406.7	406.9	0.9996	Slope	1.000885	0.90 - 1.10
203.4	204.8	0.9930	Slope	1.000865	0.90 - 1.10
			Intercept	0.380000	+/-20





NO Calibration Summary

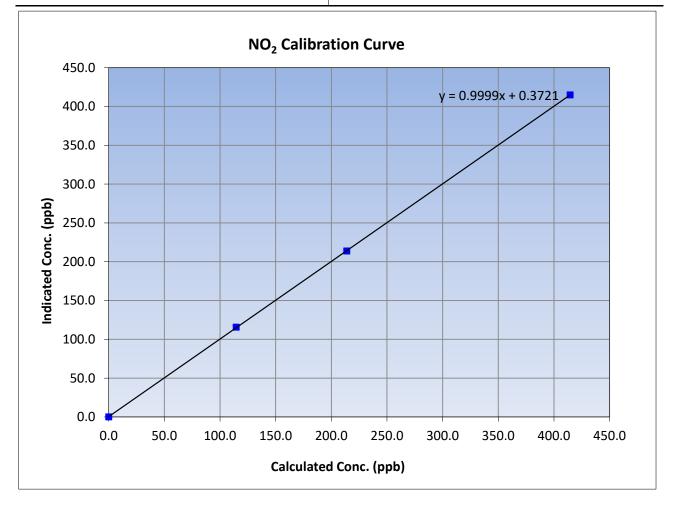
					Version-11-2	
		Station	Information			
Calibration Date:	February	17, 2023	Previous Calibration:		NA	
Station Name:	Bertha Ganter-Fort McKay		Station Number:		AMS01	
Start Time (MST):	11:32		End Time (MST):		15:30	
nalyzer make: Teledyne API T201			Analyzer serial #:		808	
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	-0.1		Correlation Coefficient	0.000005	≥0.995	
800.6	799.8	1.0011	Correlation Coefficient	0.999995		
400.3	398.2	1.0053	Slope	0.999215	0.90 - 1.10	
200.2	199.0	1.0058	зюре	0.999215		
			Intercept	-0.780000	+/-20	

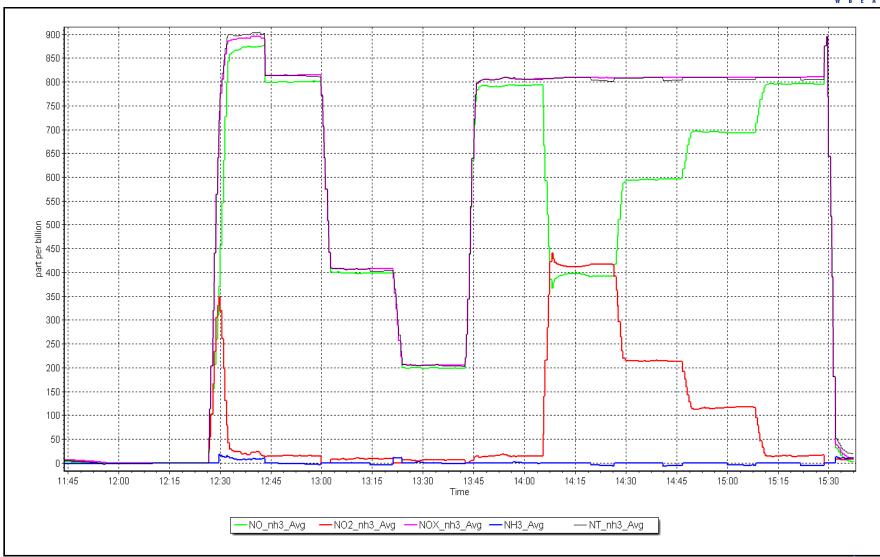




NO₂ Calibration Summary

W B E A					Version-11-202
		Station	Information		
Calibration Date:	February	17, 2023	Previous Calibration:		NA
Station Name:	Bertha Ganter-Fort McKay		Station Number:		AMS01
Start Time (MST):	Time (MST): 11:32		End Time (MST):		15:30
Analyzer make:	Teledyne	API T201	Analyzer serial #:	808	
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999990	>0.005
414.5	414.9	0.9990	correlation coefficient	0.9999990	≥0.995
213.9	213.7	1.0009	Clana	0.000891	0.90 - 1.10
114.5	115.6	0.9905	– Slope 0.999881		0.90 - 1.10
			Intercept	0.372129	+/-20





NO_x Calibration Plot

Date: February 17, 2023 Location: Bertha Ganter-Fort McKay











CO Calibration Report

Version-01-2020

WBEA					Version-01-2020
		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Bertha Ganter-Fort February 15, 2023 11:15 Maintenance	МсКау	Station number: Last Cal Date: End time (MST):	AMS01 January 11, 2023 15:35	
		Calibration St	andards		
Cal Gas Concentration: Cal Gas Cylinder #: Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model: ZAG Make/Model:	<u>3040</u> <u>ALM042207</u> <u>3040</u> <u>NA</u> Teledyne API T700 Teledyne API T701	ppm ppm	Cal Gas Exp Date: Rem Gas Exp Date: Diff between cyl: Serial Number: Serial Number:	December 1, 2028 NA 3565 5609	
		Analyzer Info	rmation		
Analyzer make: Analyzer Range:	Teledyne API T300 : 0 - 50 ppm		Analyzer serial #:	3520	
Calibration slope: Calibration intercept:	<u>Start</u> 0.999735 0.169836	<u>Finish</u> 1.001201 0.093816	Backgd or Offset: Coeff or Slope:		<u>Finish</u> -0.012 0.991
		CO Calibratio	on 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	-0.1	
as found span	4933	66.7	40.6	40.2	1.008
as found 2nd point	4966	33.3	20.2	20.4	0.991
as found 3rd point	4983	16.7	10.2	10.1	1.010
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	
high point	4933	66.7	40.6	40.6	0.999
second point	4966	33.3	20.2	20.6	0.982
third point	4983	16.7	10.2	10.3	0.991
as left zero	5000	0.0	0.0	0.0	
as left span	2960	40.0	40.5	40.2	1.010
			Averag	ge Correction Factor	0.991
Baseline Corr As found:	40.36	Prev response:	40.72	*% change:	-0.9%
Baseline Corr 2nd AF pt:	20.6	AF Slope:		AF Intercept:	-0.022146
Baseline Corr 3rd AF pt:	10.2	AF Correlation:		* = > +/-5% change initiate	

Notes:

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

Calibration Performed By:

Rene Chamberland

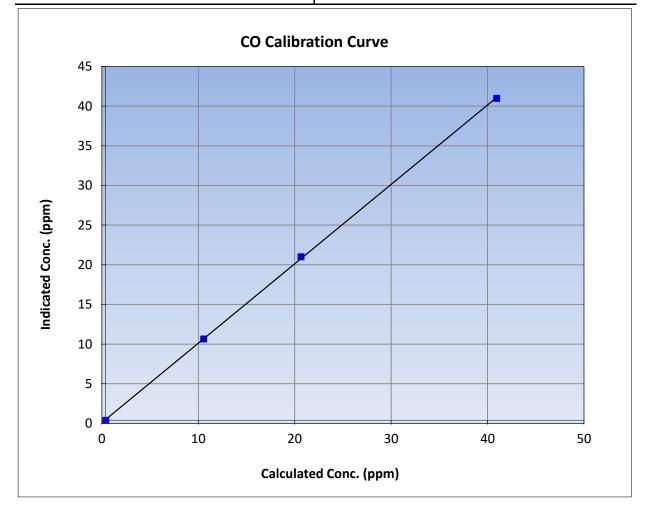


CO Calibration Summary

WBEA			Version-01-2020					
Station Information								
Calibration Date:	February 15, 2023	Previous Calibration:	January 11, 2023					
Station Name:	Bertha Ganter-Fort McKay	Station Number:	AMS01					
Start Time (MST):	11:15	End Time (MST):	15:35					
Analyzer make:	Teledyne API T300	Analyzer serial #:	3520					

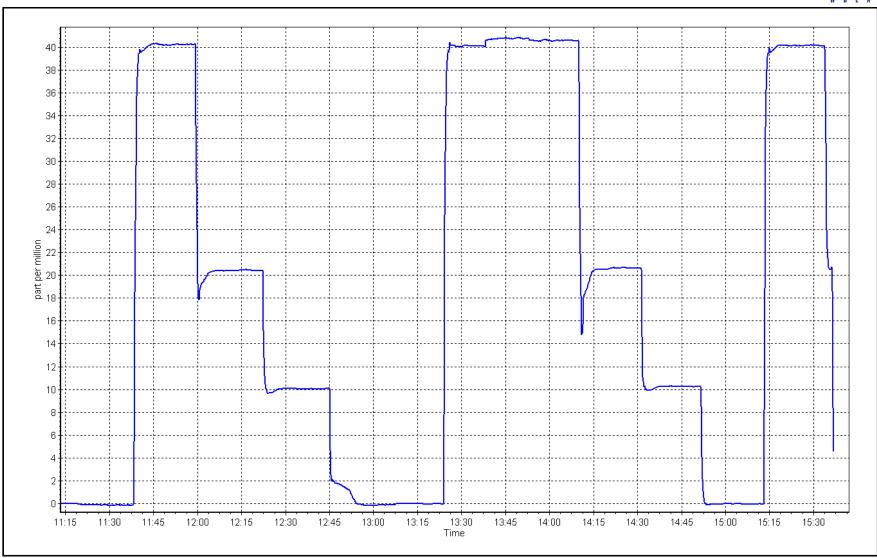
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999905	≥0.995
40.6	40.6	0.9994	correlation coefficient	0.999900	20.333
20.2	20.6	0.9825	Slope	1.001201	0.90 - 1.10
10.2	10.3	0.9907	Slope	1.001201	0.30 - 1.10
			Intercept	0.093816	+/-1.5











CO₂ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Bertha Ganter-Fort February 7, 2023 10:46 Routine	МсКау	Station number: Last Cal Date: End time (MST):	AMS01 January 16, 2023 14:02	
		Calibration St	andards		
Cal Gas Concentration:	60,200	ppm	Cal Gas Exp Date:	December 1, 2028	
Cal Gas Cylinder #:	ALM042207				
Removed Cal Gas Conc:	<u>60,200</u>	ppm	Rem Gas Exp Date:	NA	
Removed Gas Cyl #:	<u>NA</u>		Diff between cyl:		
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3565	
N2 Gen Make/Model:	Peak Sci NG5000		Serial Number:	7220900034	
		Analyzer Info	rmation		
,	: Teledyne API 360 e 0 - 2,000 ppm		Analyzer serial #:	442	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.002131	0.999874	Backgd or Offset:	0.037	0.037
Calibration intercept:	-6.480000	-5.820000	Coeff or Slope:	0.883	0.883
		CO ₂ Calibratio	on 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	-0.4	
as found span	2920	80.0	1605.3	1601.0	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	-0.1	
high point	2920	80.0	1605.3	1602.5	1.002
second point	2960	40.0	802.7	792.9	1.012
third point	2980	20.0	401.3	390.4	1.028
as left zero	3000	0.0	0.0	-0.4	
as left span	2960	40.0	802.7	780.8	1.028
			Averag	e Correction Factor	1.014
Baseline Corr As found:	1601.40	Prev response:	1602.27	*% change:	-0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

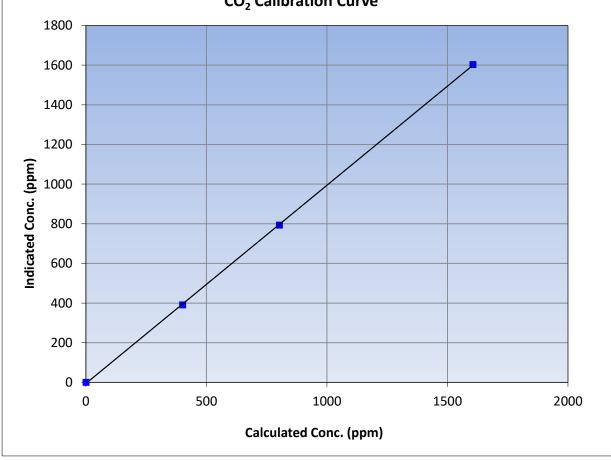
Changed the inlet filter after as founds. No adjustments made.

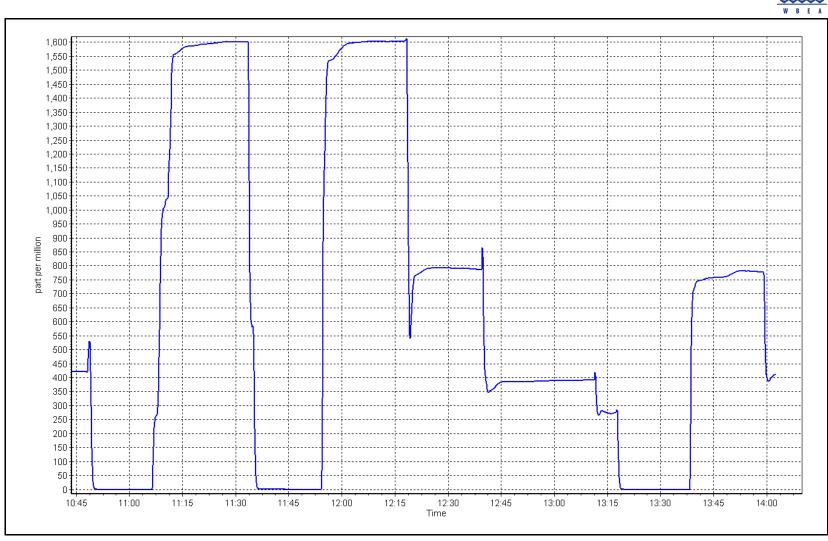
Calibration Performed By:



CO₂ Calibration Summary

		Statio	n Information		
Calibration Date	February	7, 2023	Previous Calibration	January	16, 2023
Station Name	Bertha Ganter	-Fort McKay	Station Number	AM	IS01
Start Time (MST)	10:4	46	End Time (MST)	14	:02
Analyzer make	Teledyne API 360		Analyzer serial #	442	
		Calil	pration Data		
lculated concentration Ir (ppm) (Cc)	ndicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0 1605.3	-0.1 1602.5	1.0018	 Correlation Coefficient 	0.999941	≥0.995
802.7 401.3	792.9 390.4	1.0123 1.0280	Slope	0.999874	0.90 - 1.10
			Intercept	-5.820000	+/-10
		CO Calib	ration Curve		





Date: February 7, 2023

Location: Bertha Ganter-Fort McKay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS02 MILDRED LAKE FEBRUARY 2023

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

March 31, 2023



SO₂ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Mildred Lake February 8, 2023 9:57 AM Routine		Station number: Last Cal Date: End time (MST):	AMS02 January 3, 2023 13:07	
		Calibration St	andards		
Cal Gas Concentration:	49.98	ppm	Cal Gas Exp Date:	August 12, 2024	
Cal Gas Cylinder #:	CC501209				
Removed Cal Gas Conc:	49.98	ppm	Rem Gas Exp Date:	NA	
Removed Gas Cyl #:			Diff between cyl:	1105	
Calibrator Make/Model: ZAG Make/Model:	API T700 API T701		Serial Number: Serial Number:	1185 5608	
	AFITIOI		Senai Number.	5008	
		Analyzer Info	rmation		
Analyzer make Analyzer Range			Analyzer serial #:	JC1404901075	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.996082	1.002695	Backgd or Offset:	17.8	17.9
Calibration intercept:	-0.526045	-0.144667	Coeff or Slope:	0.816	0.827
		SO ₂ Calibratio	on Data		
	Dilution air flow rate	Source gas flow rate	Calculated	Indicated concentration C	orrection factor (Cc/Ic
Set Point	(sccm)	(sccm)	concentration (ppb) (Cc)		<i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	
as found span	4920	80.2	801.6	793.0	1.011
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	
high point	4920	80.2	801.6	803.7	0.997
second point	4960	40.1	400.8	402.0	0.997
third point	4980	20.0	199.9	199.7	1.001
as left zero	5000	0.0	0.0	0.3	
as left span	4920	80.2	801.6	807.8	0.992
			Averag	ge Correction Factor	0.999
Baseline Corr As found:	793.00	Previous response	797.98	*% change	-0.6%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:		* = > +/-5% change initiate	

Changed inlet filter after as founds. Adjusted span.

Calibration Performed By:

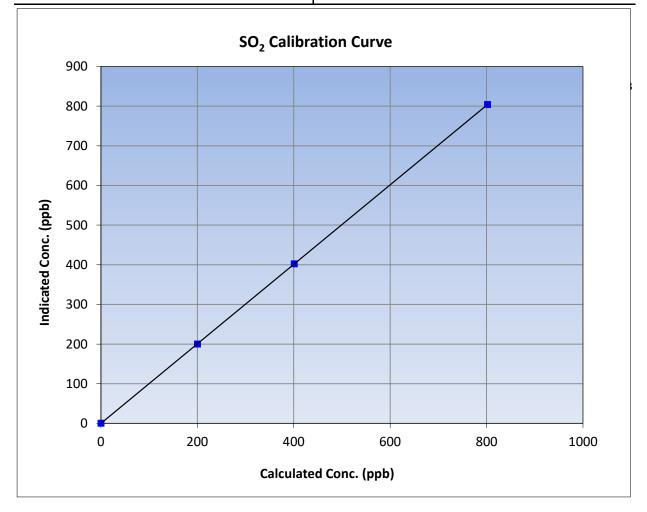


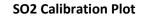
SO₂ Calibration Summary

WBEA			Version-01-2020					
Station Information								
Calibration Date:	February 8, 2023	Previous Calibration:	January 3, 2023					
Station Name:	Mildred Lake	Station Number:	AMS02					
Start Time (MST):	9:57	End Time (MST):	13:07					
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1404901075					

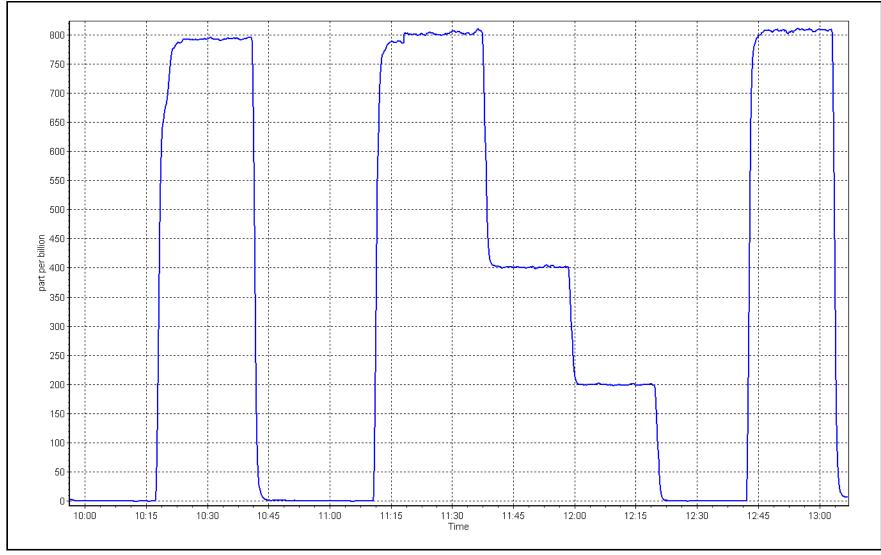
Calibration Data

Calculated concentration (ppb) (Cc)					Statistical Eva		Statistical Evalua	ation	<u>Limits</u>
0.0	0.2		Correlation Coefficient	0.999998	≥0.995				
801.6	803.7	0.9974	correlation coefficient	0.999998	20.333				
400.8	402.0	0.9971	Slope	1.002695	0.90 - 1.10				
199.9	199.7	1.0011	Slope	1.002095	0.90 - 1.10				
			Intercept	-0.144667	+/-30				











H₂S Calibration Report

WBEA					Version-11-2
		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Mildred Lake February 6, 2023 10:07 Routine		Station number: Last Cal Date: End time (MST):	AMS02 January 17, 2023 14:25	
		Calibration S	tandards		
Cal Gas Concentration:	5.29	ppm	Cal Gas Exp Date:	January 4, 2025	
Cal Gas Cylinder #: Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model: ZAG Make/Model:	CC345191 5.29 NA API T700 API T701	ppm	Rem Gas Exp Date: Diff between cyl: Serial Number: Serial Number:	NA 1185 5608	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	Thermo 43iQTL Global G150 0 - 100 ppb		Analyzer serial #: Converter serial #:	12113311966 2022-198	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope: Calibration intercept:	1.010965 -0.179192	0.993964 -0.059204	Backgd or Offset: Coeff or Slope:		1.83 0.844
		H ₂ S As Four	nd 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	79.7	1.002
as found 2nd point	4962	37.8	40.0	40.1	0.995
as found 3rd point	4981	18.9	20.0	19.8	1.005
new cylinder response					
		H ₂ S Calibrat	ion Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction facto (Cc/Ic) Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	0.0	
high point	4924	75.6	80.0	79.4	1.007
second point	4962	37.8	40.0	39.9	1.002
third point	4981	18.9	20.0	19.6	1.020
as left zero	5000	0.0	0.0	0.1	
as left span	4924	75.6	80.0	79.9	1.001
O2 Scrubber Check	4920	80.2	802.0	0.0	
Date of last scrubber cha		12-Sep-22		Ave Corr Factor	1.010
Date of last converter eff	iciency test:				efficiency
Baseline Corr As found:	79.8	Prev response:		*% change:	-1.1%
Baseline Corr 2nd AF pt:	40.2	AF Slope: AF Correlation:		AF Intercept:	-0.059199

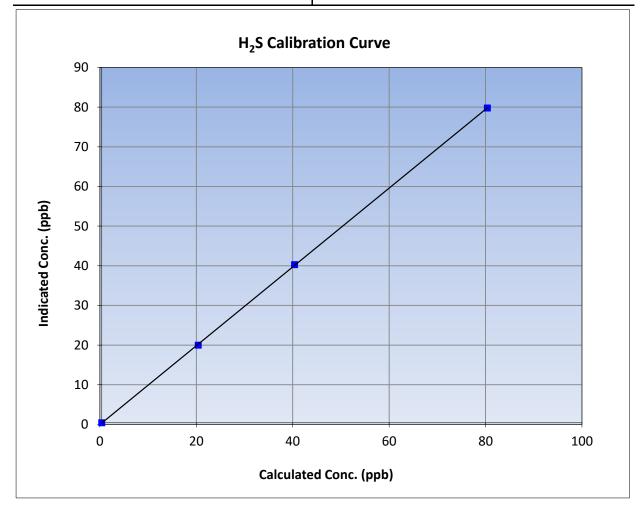
Notes:

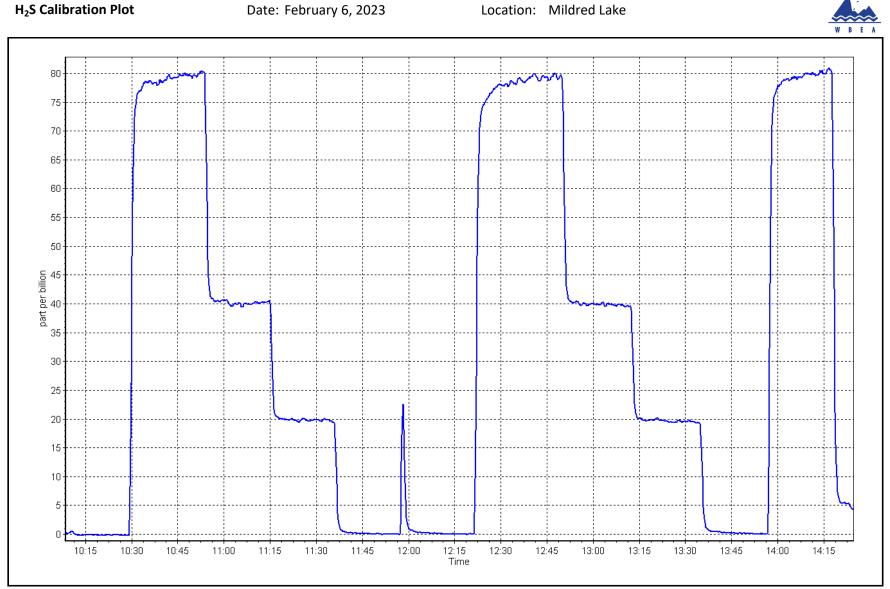
Changed the inlet filter after as founds. Ran a SO2 scrubber check after calibrator zero. No adjustment made.



H₂S Calibration Summary

		Station	Information		Version-11-2
Calibration Date:	February		Previous Calibration:	lanuar	/ 17, 2023
Station Name:	Mildred		Station Number:		VS02
Start Time (MST):	10:0		End Time (MST):		4:25
Analyzer make:			Analyzer serial #:		185
		Caliba	untion Data		
		Calibr	ration Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999972	≥0.995
80.0	79.4	1.0074		0.999972	20.995
40.0	39.9	1.0024	Slope	0.993964	0.90 - 1.10
20.0	19.6	1.0202	51000	0.00004	0.00 1.10
			Intercept	-0.059204	+/-3





Location: Mildred Lake



THC / CH_4 / NMHC Calibration Report

		Statio	n Information			
Station Name:	Mildred Lake		Station number: AMS02			
Calibration Date:	February 8, 2023	5	Last Cal Date: Ja	nuary 3, 2023		
Start time (MST):	9:57		End time (MST): 13	3:07		
Reason:	Routine					
		Calibra	tion Standards			
Gas Cert Reference:	C	501209	Cal Gas Expiry Date: Au	ugust 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 T70	00	Serial Number: 11	.85		
ZAG make/model:	Teledyne API T70	01	Serial Number: 56	508		
		Analyz	er Information			
Analyzer make:	Thermo 55i		Analyzer serial #: 11	80320038		
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:	2.87E-04	2.80E-04	NMHC SP Ratio:	4.52E-04	4.43E-04	
CH4 Retention time:	14.6	14.4	NMHC Peak Area:	194883	198634	
Zero Chromatogram:	ON	ON	Flat Baseline:	OFF	OFF	

THC Calibration Data							
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05		
as found zero	5000	0.0	0.00	0.00			
as found span	4920	80.2	16.82	17.13	0.982		
as found 2nd point							
as found 3rd point							
new cylinder response							
calibrator zero	5000	0.0	0.00	0.00			
high point	4920	80.2	16.82	16.80	1.001		
second point	4960	40.1	8.41	8.36	1.005		
third point	4980	20.0	4.19	4.15	1.011		
as left zero	5000	0.0	0.00	0.00			
as left span	4920	80.2	16.82	16.81	1.000		
				Average Correction Factor	1.006		
Baseline Corr AF:	17.13	Prev response	16.85	*% change	1.6%		
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:			
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation			



THC / CH_4 / NMHC Calibration Report

Version-06-2022

		NMHC Calib	ration Data			
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05	
as found zero	5000	0.0	0.00	0.00		
as found span	4920	80.2	8.80	8.98	0.979	
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	1.000	
third point	4980	20.0	2.19	2.19	1.001	
as left zero	5000	0.0	0.00	0.00		
as left span	4920	80.2	8.80	8.84	0.995	
			ŀ	Average Correction Factor	1.000	
Baseline Corr AF:	8.98	Prev response	8.79	*% change	2.1%	
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:		
Baseline Corr 3rd AF:	NA	AF Correlation:		<pre>* = > +/-5% change initiates investigation</pre>		

CH4 Calibration Data	CH4	Calibration	Data
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Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (C	c) Ind conc (ppm) (Ic)	CF <i>Limit=</i> 0.95-1.05	
as found zero	5000	0.0	0.00	0.00		
as found span	4920	80.2	8.02	8.15	0.985	
as found 2nd point						
as found 3rd point						
new cylinder response						
calibrator zero	5000	0.0	0.00	0.00		
high point	4920	80.2	8.02	8.01	1.002	
second point	4960	40.1	4.01	3.97	1.012	
third point	4980	20.0	2.00	1.96	1.021	
as left zero	5000	0.0	0.00	0.00		
as left span	4920	80.2	8.02	7.97	1.007	
			A	verage Correction Factor	1.011	
Baseline Corr AF:	8.15	Prev response	8.06	*% change	1.1%	
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:		
Baseline Corr 3rd AF:	NA	AF Correlation:		<pre>* = > +/-5% change initiates investigation</pre>		
		Calibration	Statistics			
		<u>Start</u>		<u>Finish</u>		
THC Cal Slope:		1.003029		0.999735		
THC Cal Offset:		-0.014898		-0.023917		
CH4 Cal Slope:		1.006623		0.999431		
CH4 Cal Offset:		-0.017040		-0.023056		
NMHC Cal Slope:		0.999387		1.000064		
NMHC Cal Offset:		0.002541		-0.001060		

Notes:

Changed inlet filter and N2 cylinder after as founds. Adjusted span.

Calibration Performed By:

Sean Bala



THC Calibration Summary

		Station In	nformation			
Calibration Date:	: February 8, 2023		Previous Calibration:	January	January 3, 2023	
station Name:	Mildre	ed Lake	Station Number:	AM	502	
start Time (MST):	9:	57	End Time (MST):	13:	07	
analyzer make:	Thern	no 55i	Analyzer serial #:	11803	20038	
		Calibra	tion Data			
alculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.00	0.00		Correlation Coefficient	0.999990	≥0.995	
16.82	16.80	1.0008				
8.41 4.19	8.36 4.15	1.0054 1.0107	Slope	0.999735	0.90 - 1.10	
		1.0107	Intercept	-0.023917	+/-0.5	
16.0						
18.0				_		
14.0						
12.0						
Ed 10.0						
10.0 (bbm) 0.8 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0						
8.0 –						
0.0 q						
— 0.6 cate						
4.0						
2.0						
0.0						
	E	.0	10.0	15.0	20.0	
0.0	5	.0	10.0	15.0	20.0	



CH₄ Calibration Summary

						Version-06-20
				nformation		
Calibration Da				Previous Calibration:	January	
Station Name			ed Lake	Station Number:	AMS	
Start Time (M	ST):	9	:57	End Time (MST):	13:	07
Analyzer mak	e:	Ther	mo 55i	Analyzer serial #:	11803	20038
			Calibra	tion Data		
Calculated conce (ppm) (Cc		Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Eva	luation	<u>Limits</u>
0.00 8.02		0.00 8.01	1.0016	Correlation Coefficient	0.999958	≥0.995
4.01 2.00		3.97 1.96	1.0117 1.0208	Slope	0.999431	0.90 - 1.10
				Intercept	-0.023056	+/-0.5
9.(8.(
7.() —					
6.0 ٦) —					
idd 5.0) 					
uoj 4.()					
Indicated Conc. (ppm) 3.0) -					
– 2.0) —					
1.0						
0.0	0.0	2.0	4.0	6.0	8.0	10.0
	0.0	2.0			0.0	10.0
			Calculated	l Conc. (ppm)		

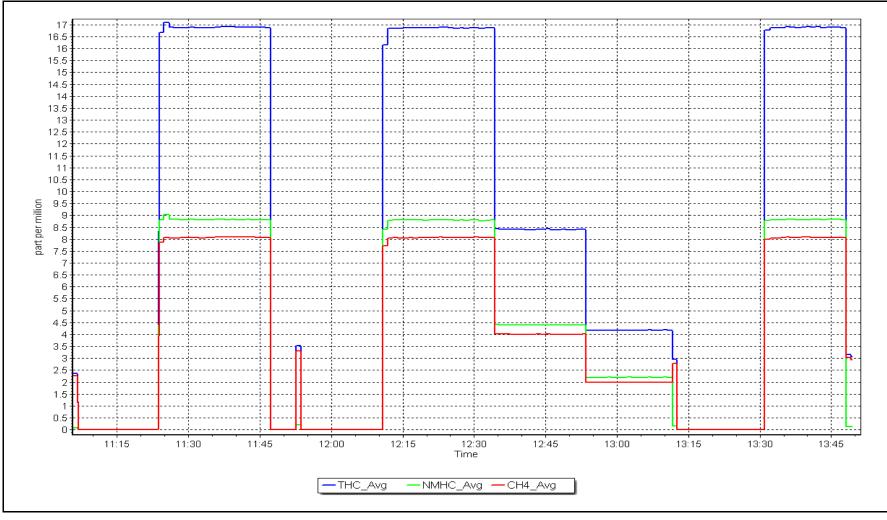


NMHC Calibration Summary

		Station I	nformation		
libration Date: February 8, 2023		Previous Calibration: Jan		inuary 3, 2023	
Station Name:	Name: Mildred Lake		Station Number:	AMS	502
Start Time (MST):	9	:57	End Time (MST):	13:	07
Analyzer make:			Analyzer serial #:	118032	20038
		Calibra	tion Data		
Calculated concentration Indicated concentration (ppm) (Cc) (ppm) (IC) Correction factor (Cc/Ic)			Statistical Eval	uation	<u>Limits</u>
0.00	0.00 8.80		Correlation Coefficient	1.000000	≥0.995
8.80	4.40	1.0000 1.0002			
2.19	2.19	1.0011	Slope	1.000064	0.90 - 1.10
			Intercept	-0.001060	+/-0.5
9.0 8.0 7.0 6.0					
(m 6.0 bbm) 5.0					
Undicated 10 10 10 10 10 10 10 10 10 10 10 10 10					
2.0					
1.0					
0.0	2.0	4.0	6.0	8.0	10.0
0.0	2.0		l Conc. (ppm)	0.0	10.0

NMHC Calibration Plot







WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS04 BUFFALO VIEWPOINT FEBRUARY 2023

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

March 31, 2023







SO₂ Calibration Report

Version-01-2020

		Station Infor	mation				
Calibration Date: F Start time (MST): 7	Buffalo Viewpoint February 10, 2023 7:18 Routine		Station number: Last Cal Date: End time (MST):	AMS04 January 12, 2023 10:59			
		Calibration St	andards				
Cal Gas Concentration: Cal Gas Cylinder #:	50.02 CC470284	ppm	Cal Gas Exp Date:	September 9, 2028			
Removed Cal Gas Conc: Removed Gas Cyl #:	50.02 NA	ppm	Rem Gas Exp Date: Diff between cyl:	NA			
· · · · · · · · · · · · · · · · · · ·	API T700 API T701		Serial Number: Serial Number:	2445 5611			
		Analyzer Info	rmation				
Analyzer make: 1 Analyzer Range (Analyzer serial #:	JC1327300932			
Calibration slope: Calibration intercept:	<u>Start</u> 0.998800 0.680000	<u>Finish</u> 0.998701 1.140000	Backgd or Offset: Coeff or Slope:	<u>Start</u> 21.5 0.869	<u>Finish</u> 21.5 0.869		
SO ₂ Calibration Data							
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration ((ppb) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05		
as found zero	5000	0.0	0.0	0.7			
as found span	4920	80.0	800.3	763.8	1.048		
as found 2nd point	4960	40.0	400.2	374.0	1.070		
as found 3rd point	4980	20.0	200.1	188.0	1.064		
new cylinder response							
calibrator zero	5000	0.0	0.0	0.9			
high point	4920	80.0	800.3	800.2	1.000		
second point	4960	40.0	400.2	401.2	0.997		
third point as left zero	4980 5000	20.0	200.1	201.0 0.8	0.995		
as left span	4920	80.0	800.3	798.5	1.002		
	7320	00.0		ge Correction Factor	0.998		
Baseline Corr As found:	763.10	Previous response	800.04	*% change	-4.8%		
Baseline Corr 2nd AF pt: Baseline Corr 3rd AF pt:	373.30 187.30	AF Slope: AF Correlation:		AF Intercept: * = > +/-5% change initiat	-2.340000 es investigation		

Notes:

As found Span is low, nightly spans around 800ppb. After filter change spans around 800ppb. No Maintenance or adjustments done.

Calibration Performed By:

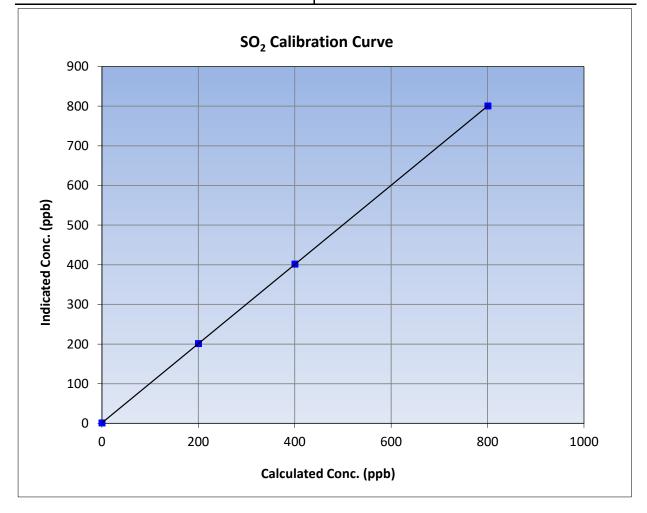


SO₂ Calibration Summary

WBEA			Version-01-2020			
Station Information						
Calibration Date:	February 10, 2023	Previous Calibration:	January 12, 2023			
Station Name:	Buffalo Viewpoint	Station Number:	AMS04			
Start Time (MST):	7:45	End Time (MST):	10:59			
Analyzer make:	Thermo 43i	Analyzer serial #:	JC1327300932			
		·				

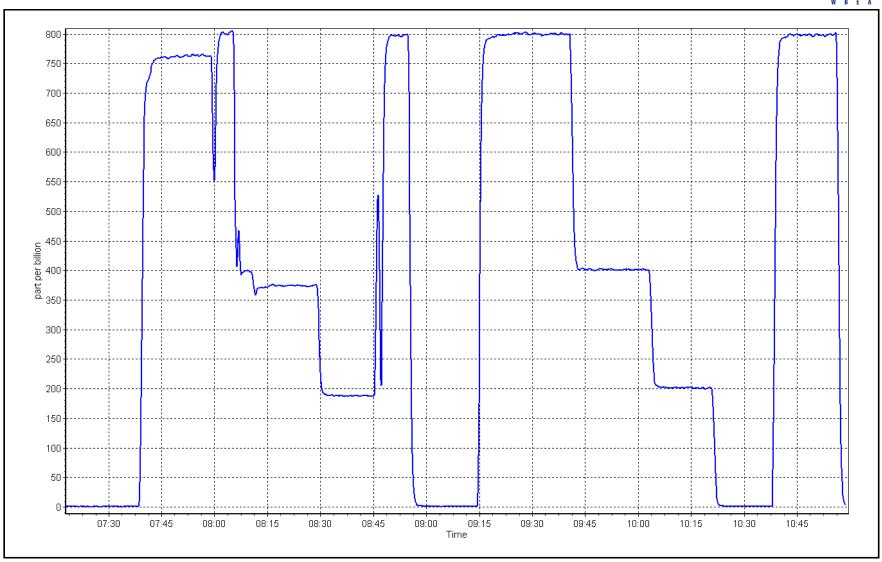
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.9		Correlation Coefficient	0.999999	≥0.995
800.3	800.2	1.0001	correlation coefficient	0.9999999	20.995
400.2	401.2	0.9974	Slope	0.998701	0.90 - 1.10
200.1	201.0	0.9954	Slope	0.998701	0.30 - 1.10
			Intercept	1.140000	+/-30











H₂S Calibration Report

WBEA		-		-	
WDEA		Chatlen Info			Version-11-20
Station Name:	Buffalo Viewpoint	Station Info	Station number:	AMS04	
Calibration Date:	February 15, 2023		Last Cal Date:	January 16, 2023	
Start time (MST):	7:20		End time (MST):	11:19	
Reason:	Routine			11.15	
	Routine				
		Calibration S	tandards		
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		Diff between cyl:		
Calibrator Make/Model:	API T700		Serial Number:	3060	
ZAG Make/Model:	API T701H		Serial Number:	362	
		Analyzer Info	ormation		
Analyzer make:	Thermo 450i		Analyzer serial #:	1336160094	
Converter make:	NA		Converter serial #:	NA	
Analyzer Range	0 - 100 ppb				
	Start	Finish		Start	Finish
Calibration clone:	<u>Start</u> 1.000770	1.001200	Packed or Officat:	<u>Start</u> 20.1	<u>Finish</u> 18.7
Calibration slope:	0.002271		Backgd or Offset: Coeff or Slope:		
Calibration intercept:	0.002271	0.162167	coen or slope.	1.119	1.080
		H ₂ S As Four	nd Data		
			Calculated		Baseline Adjusted
Set Point	Dilution air flow rate	Source gas flow rate	concentration (ppb)	Indicated	Correction factor
	(sccm)	(sccm)	(Cc)	concentration (ppb) (Ic)	(Cc/(Ic-AFzero))
as found zoro	5000	0.0	0.0	-0.4	Limit = 0.90-1.10
as found zero	4926	74.1	80.3	82.9	
as found span as found 2nd point	4928	37.0	40.1	41.5	0.964
	4982	18.5	20.1	20.6	0.957
as found 3rd point new cylinder response	4962	10.5	20.1	20.0	0.955
		H ₂ S Calibrat	ion Data		
		-	Calculated		Correction factor
Set Point	Dilution air flow rate	Source gas flow rate	concentration (ppb)	Indicated	(Cc/Ic)
	(sccm)	(sccm)	(Cc)	concentration (ppb) (Ic)	<i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.2	
high point	4926	74.1	80.3	80.6	0.997
second point	4963	37.0	40.1	40.3	0.995
third point	4982	18.5	20.1	20.2	0.993
as left zero	5000	0.0	0.0	0.3	
as left span	4926	74.1	80.3	80.6	0.997
SO2 Scrubber Check	4920	80.0	800.0	-0.2	
Date of last scrubber cha	inge:			Ave Corr Factor	0.995
Date of last converter eff	ficiency test:				efficiency
Baseline Corr As found:	83.3	Prev response:	80.39	*% change:	3.5%
Baseline Corr 2nd AF pt:	41.9	AF Slope:		AF Intercept:	-0.256912
Baseline Corr 3rd AF pt:	21.0	AF Correlation:			
•				* = > +/-5% change initiat	or investigation

Notes:

Sox scrubber checked after the calibrator zero. Zero and span adjusted.

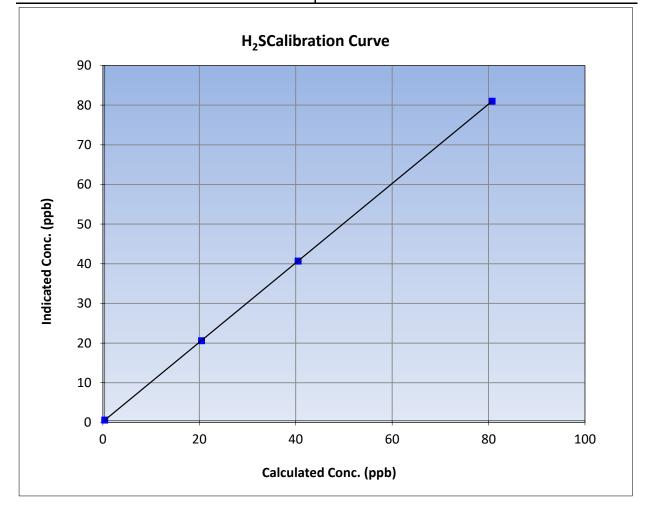


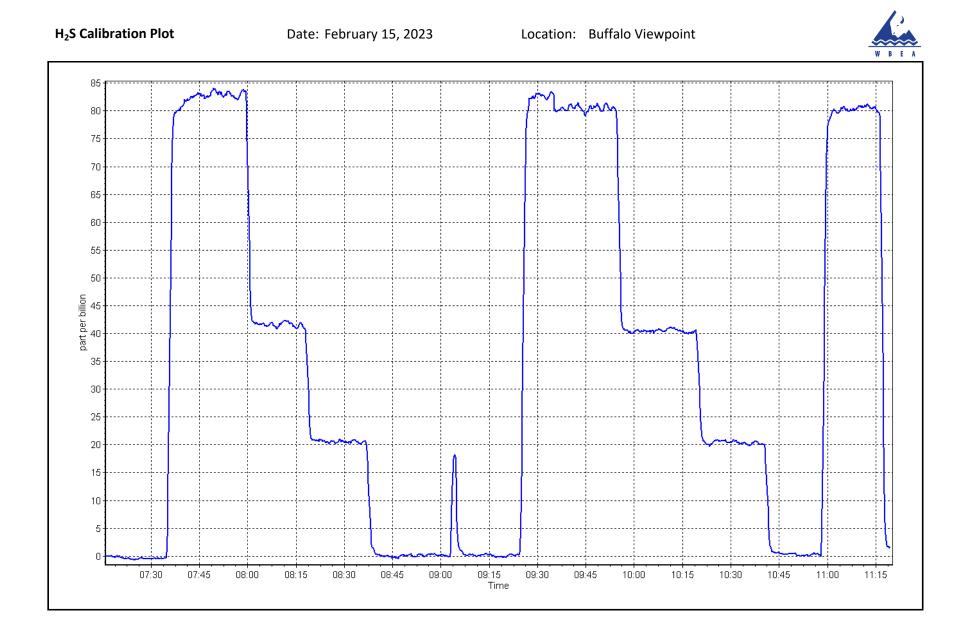
H₂S Calibration Summary

Version-11-2021 Station Information						
Calibration Date:	February 15, 2023	Previous Calibration:	January 16, 2023			
Station Name:	Buffalo Viewpoint	Station Number:	AMS04			
Start Time (MST):	7:20	End Time (MST):	11:19			
Analyzer make:	Thermo 450i	Analyzer serial #:	1336160094			

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	0.999999	≥0.995
80.3	80.6	0.9966	correlation coefficient	0.9999999	20.335
40.1	40.3	0.9952	Slope	1.001200	0.90 - 1.10
20.1	20.2	0.9927	Slope	1.001200	0.90 - 1.10
			Intercept	0.162167	+/-3







THC / CH_4 / NMHC Calibration Report

W B E A					Version-01-2020
		Station	Information		
Station Name:	Buffalo Viewpo	oint	Station number: AMS04		
Calibration Date:	February 10, 20	023	Last Cal Date: Ja	nuary 12, 2023	3
Start time (MST):	7:18		End time (MST): 10	0:58	
Reason:	Routine				
		Calibrat	ion Standards		
Gas Cert Reference:		CC470284	Cal Gas Expiry Date: Se	eptember 9, 20	28
CH4 Cal Gas Conc.	497.8	ppm	CH4 Equiv Conc.	1062.9	ppm
C3H8 Cal Gas Conc.	205.5	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry: N	A	
Removed CH4 Conc.	497.8	ppm	CH4 Equiv Conc.	1062.9	ppm
Removed C3H8 Conc.	205.5	ppm	Diff between cyl (THC):		
Diff between cyl (CH ₄)	:		Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number: 24	145	
ZAG make/model:	API T701		Serial Number: 36	52	
		Analyze	er Information		
Analyzer make			Analyzer serial #: 14	126262594	
THC Range (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	: 3.070E-04	3.070E-04	NMHC SP Ratio:	6.120E-05	6.120E-05
CH4 Retention time	: 13.6	13.6	NMHC Peak Area:	147690	147690

THC Calibration Data					
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (0	Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.0	17.01	16.86	1.009
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4920	80.0	17.01	17.07	0.996
second point	4960	40.0	8.50	8.35	1.018
third point	4980	20.0	4.25	4.16	1.022
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.0	17.01	17.06	0.997
			ŀ	Average Correction Factor	1.012
Baseline Corr AF:	16.86	Prev response	17.03	*% change	-1.0%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initial	tes investigation



THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data						
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05	
as found zero	5000	0.0	0.00	0.00		
as found span	4920	80.0	9.04	8.87	1.019	
as found 2nd point						
as found 3rd point						
new cylinder response						
calibrator zero	5000	0.0	0.00	0.00		
high point	4920	80.0	9.04	9.04	1.000	
second point	4960	40.0	4.52	4.49	1.007	
third point	4980	20.0	2.26	2.26	1.000	
as left zero	5000	0.0	0.00	0.00		
as left span	4920	80.0	9.04	9.03	1.001	
			ŀ	Average Correction Factor	1.002	
Baseline Corr AF:	8.87	Prev response	9.05	*% change	-2.0%	
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:		
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation	

			tion Data			
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (C	c) Ind conc (ppm) (Ic)	CF <i>Limit=</i> 0.95-1.05	
as found zero	5000	0.0	0.00	0.00		
as found span	4920	80.0	7.96	7.99	0.997	
as found 2nd point						
as found 3rd point						
new cylinder response						
calibrator zero	5000	0.0	0.00	0.00		
high point	4920	80.0	7.96	8.04	0.991	
second point	4960	40.0	3.98	3.87	1.029	
third point	4980	20.0	1.99	1.91	1.043	
as left zero	5000	0.0	0.00	0.00		
as left span	4920	80.0	7.96	8.03	0.992	
			A	verage Correction Factor	1.021	
Baseline Corr AF:	7.99	Prev response	7.99	*% change	-0.1%	
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:		1.005648		1.004640		
THC Cal Offset:		-0.070000		-0.080000		
CH4 Cal Slope:		1.011450 1.011594				
CH4 Cal Offset:		-0.062000		-0.070000		
NMHC Cal Slope:		1.001675		0.999400		
NMHC Cal Offset:		-0.010000		-0.006000		

Notes:

No maintenance or adjustments done.

Calibration Performed By:

Melissa Lemay



THC Calibration Summary

Version-01-2020

		Station	nformation		Version-01-20	
Calibration Date:	Eabrara		Previous Calibration:	lanuary	12 2022	
Station Name:		[,] 10, 2023 /iewpoint			ary 12, 2023 AMS04	
		18				
Start Time (MST):			End Time (MST):	10:		
Analyzer make:	Iherr	no 55i	Analyzer serial #: 1		62594	
		Calibra	tion Data			
Calculated concentrat (ppm) (Cc)	ion Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>	
0.00	0.00		Correlation Coefficient	0.999848	≥0.995	
17.01	17.07	0.9963				
8.50 4.25	8.35 4.16	1.0184 1.0220	Slope	1.004640	0.90 - 1.10	
4.23	4.10	1.0220	Intercept	-0.080000	+/-0.5	
18.0 - 16.0 -						
14.0 -						
1.10						
12.0 -						
נו מ 10.0 –						
d) 10.0						
Indicated Conc. (ppm)						
- 0.6 cate						
4.0 -						
2.0 -						
2.0						
0.0						
0.	0 5	.0	10.0	15.0	20.0	
		Calculated	Conc. (ppm)			
		Calculated				



CH₄ Calibration Summary

Version-01-2020

						Version-01-2
			Station I	nformation		
Calibration Da	te:	Febru	ary 10, 2023	Previous Calibration	1: January	12, 2023
Station Name:	:	Buffal	o Viewpoint	Station Number	r: AM	504
Start Time (MS	ST):		7:18	End Time (MST): 10:	58
Analyzer make	e:	Th	ermo 55i	Analyzer serial #	#: 14262	62594
			Calibra	ation Data		
Calculated concer (ppm) (Cc)		Indicated concentration (ppm) (Ic)	ON Correction factor (Cc/Ic)	Statistical	Evaluation	<u>Limits</u>
0.00		0.00		Correlation Coefficien	nt 0.999529	≥0.995
7.96		8.04	0.9906			
3.98 1.99		3.87 1.91	1.0290 1.0425	- Slope	1.011594	0.90 - 1.10
1.55		1.51	1.0425	- Intercept	-0.070000	+/-0.5
9.0 8.0 7.0)					
6.0)					
udd 5.0)					
о чо 4.0)					
Indicated Conc. (ppm) 3.0 3.0)					
<u>드</u> 2.0)					
1.0)					
0.0			4.0		8.0	10.0
	0.0	2.0		6.0	8.0	10.0
			Calaulata	d Conc. (ppm)		



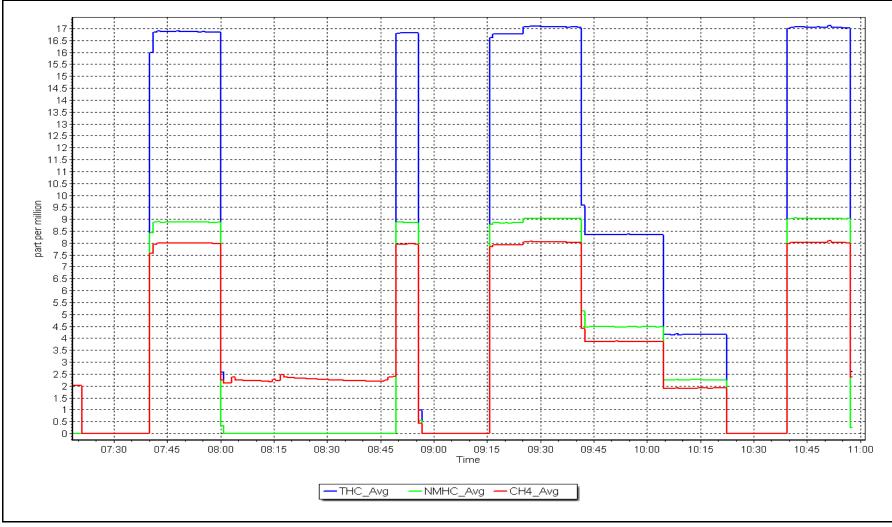
NMHC Calibration Summary

Version-01-2020

		Station In	nformation		
Calibration Date:	February	10, 2023	Previous Calibration:	January 1	2, 2023
Station Name:	Buffalo \	/iewpoint	Station Number:	AMS	504
Start Time (MST):	7:	18	End Time (MST): 10:58		
Analyzer make:	Therr	no 55i	Analyzer serial #:	142620	52594
		Calibra	tion Data		
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999985	≥0.995
9.04 4.52	9.04 4.49	1.0002 1.0069			
2.26	2.26	1.0009	Slope	0.999400	0.90 - 1.10
	-		Intercept	-0.006000	+/-0.5
9.0 8.0 7.0					
(m. 6.0 bbm 5.0					
· •					
0.4 undicated					
4.0 3.0 2.0	2.0	4.0	6.0	8.0	10.0









as left zero

Wood Buffalo Environmental Association

THC / CH_4 / NMHC Calibration Report

W B E A					Version-01-20
		Station Ir	nformation		
Station Name: Calibration Date: Start time (MST): Reason:	Buffalo Viewpoint February 16, 2023 11:25 Cylinder Change		Station number: AMS04 Last Cal Date: February 10, 2023 End time (MST): 12:44 /linder Change		
		Calibratio	n Standards		
Gas Cert Reference:	CC4	70284	Cal Gas Expiry Date:	September 9, 2028	3
CH4 Cal Gas Conc.	497.8	ppm	CH4 Equiv Conc.	1062.9	ppm
C3H8 Cal Gas Conc.	205.5	ppm	•		
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	497.8	ppm	CH4 Equiv Conc.	1062.9	ppm
Removed C3H8 Conc.	205.5	ppm	Diff between cyl (THC):		
Diff between cyl (CH ₄):			Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	2445	
ZAG make/model:	API T701		Serial Number:	362	
		Analyzer I	nformation		
Analyzer make:	Thermo 55i		Analyzer serial #:	1426262594	
THC Range (ppm):	0 - 20 ppm				
NMHC Range (ppm):	0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	<u>Start</u>	Finish		Start	Finish
CH4 SP Ratio:		3.070E-04	NMHC SP Ratio:	6.120E-05	6.120E-05
CH4 Retention time:		13.6	NMHC Peak Area:	147690	147690
		THC Calib	ration 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	80.0	17.01	17.11	0.994
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4920	80.0	17.01	17.03	0.999
second point					
third point					

as left span					
				Average Correction Factor	0.999
Baseline Corr AF:	17.11	Prev response	17.01	*% change	0.6%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates in the second s	nvestigation



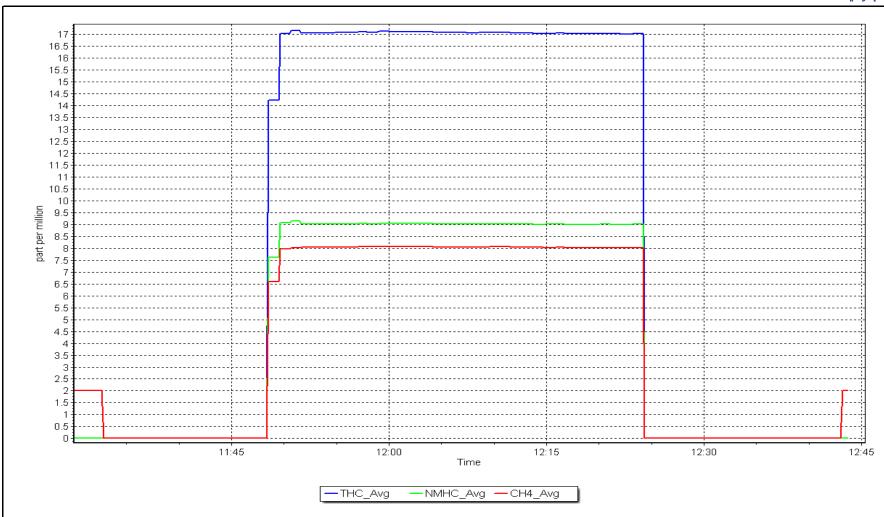
THC / CH_4 / NMHC Calibration Report

Version-01-2020

Dil air flow rate 5000 4920 5000 4920	Source gas flow rate 0.0 80.0 0.0 80.0 80.0	Calc conc (ppm) (Cc) 0.00 9.04 0.00	Ind conc (ppm) (Ic) 0.00 9.04	CF <i>Limit=</i> 0.95-1.05	
4920 5000	80.0	9.04		1.000	
5000	0.0		9.04	1.000	
		0.00			
		0.00			
		0.00			
		0.00			
4920	80.0		0.00		
		9.04	9.00	1.005	
		Avera	ge Correction Factor	1.005	
9.04	Prev response	9.03	*% change	0.1%	
NA	AF Slope:		AF Intercept:		
NA	AF Correlation:		* = > +/-5% change initiate	es investigation	
	CH4 Calibrat	tion Data			
Dil air flow rate			Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>	
				0.988	
4520	00.0	7.50	0.00	0.500	
5000	0.0	0.00	0.00		
				0.992	
4520	00.0	7.50	0.00	0.552	
		Avera	ge Correction Eactor	0.992	
8.06	Drey response			0.9%	
		1.55	-	0.978	
				es investigation	
INA		Ctatistics		25 Investigation	
		Statistics			
	-0.006000		0.000000		
	NA	NA AF Slope: AF Correlation: CH4 Calibra Dil air flow rate Source gas flow rate 5000 0.0 4920 80.0 5000 0.0 4920 80.0 5000 0.0 4920 80.0 5000 0.0 4920 80.0 8.06 Prev response NA AF Slope: NA AF Correlation: Calibration Start 1.004640 -0.080000 1.011594 -0.070000 0.999400 -0.006000	9.04 Prev response 9.03 NA AF Slope: NA NA AF Correlation: CH4 Calibration Data Dil air flow rate Source gas flow rate Calc conc (ppm) (Cc) 5000 0.0 0.00 4920 80.0 7.96 5000 0.0 0.00 4920 80.0 7.96 5000 0.0 0.00 4920 80.0 7.96 5000 0.0 0.00 4920 80.0 7.96 Avera 8.06 Prev response 7.99 NA AF Slope: AF Slope: NA AF Correlation: Avera Calibration Statistics Start 1.004640 -0.080000 1.011594 -0.070000 0.999400 -0.006000	NA AF Slope: AF Intercept: NA AF Correlation: * = > +/-5% change initiate CH4 Calibration Data Dil air flow rate Source gas flow rate Calc conc (ppm) (Cc) Ind conc (ppm) (lc) 5000 0.0 0.00 0.00 4920 4920 80.0 7.96 8.06 5000 0.0 0.00 0.00 4920 80.0 7.96 8.03 5000 0.0 0.00 0.00 4920 80.0 7.96 8.03 5000 0.0 0.00 0.00 4920 80.0 7.96 8.03 5000 0.0 7.96 8.03 5000 0.0 7.96 8.03 5000 0.0 7.96 8.03 5000 0.0 7.99 *% change NA AF Slope: AF Intercept: NA AF Correlation: * => +/-5% change initiate <th cols<="" td=""></th>	

Calibration Performed By:

Melissa Lemay



NMHC Calibration Plot

Location: Buffalo Viewpoint





$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

Station Name: Buffalo Viewpoint Station number: AMS04 Calibration Date: February 13, 2023 Last Cal Date: January 13, 2023 Start time (MST): 8:00 End time (MST): 11:00 Reason: As Found 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 Gas NOX Conc: 51.16 ppm Removed Gas NO Conc: 50.91 ppm NOX gas Diff: NO gas Diff: NO gas Diff: NO gas Diff: NO gas Diff: Station NO gas Diff: Calibrator Model: API T700 Serial Number: 2445
NO Gas Cylinder #:T36RH1FCal Gas Expiry Date:August 18, 2023NOX Cal Gas Conc:51.16ppmNO Cal Gas Conc:50.91ppmRemoved Cylinder #:NARemoved Gas Exp Date:NARemoved Gas NOX Conc:51.16ppmRemoved Gas NO Conc:50.91ppmNOX gas Diff:NO gas Diff:Calibrator Model:API T700Serial Number:2445
NOX Cal Gas Conc:51.16ppmNO Cal Gas Conc:50.91ppmRemoved Cylinder #:NARemoved Gas Exp Date:NARemoved Gas NOX Conc:51.16ppmRemoved Gas NO Conc:50.91ppmNOX gas Diff:NO gas Diff:Calibrator Model:API T700Serial Number:2445
NOX Cal Gas Conc:51.16ppmNO Cal Gas Conc:50.91ppmRemoved Cylinder #:NARemoved Gas Exp Date:NARemoved Gas NOX Conc:51.16ppmRemoved Gas NO Conc:50.91ppmNOX gas Diff:NO gas Diff:Calibrator Model:API T700Serial Number:2445
Removed Cylinder #:NARemoved Gas Exp Date:NARemoved Gas NOX Conc:51.16ppmRemoved Gas NO Conc:50.91ppmNOX gas Diff:NO gas Diff:NO gas Diff:100Serial Number:2445
NOX gas Diff:NO gas Diff:Calibrator Model:API T700Serial Number:2445
Calibrator Model: API T700 Serial Number: 2445
ZAG make/model:API T701Serial Number:362
Analyzer InformationAnalyzer make: API T200 NOX Range (ppb): 0 - 1000 ppbAnalyzer serial #: 723NOX Range (ppb): 0 - 1000 ppbStartFinishStartFinishNO coeff or slope:1.204NOX coeff or slope:1.2031.203NOX bkgnd or offset:-0.1-0.1NO2 coeff or slope:1.000Reaction cell Press:6.4
Calibration Statistics
<u>Start</u> <u>Finish</u>
NO _x Cal Slope: 1.000402
NO _x Cal Offset: 0.466890
NO Cal Slope: 1.001422
NO Cal Offset: -0.653871
NO ₂ Cal Slope: 1.000220
NO ₂ Cal Offset: 1.229528



$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

				Dilu	ution Calibratio	on 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/lc) Limit = 0.95-1.05	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	0.9	0.4	0.6		
as found span	4922	78.1	799.1	795.2	3.9	772.1	767.9	4.2	1.0350	1.0355
as found 2nd	4961	39.1	400.1	398.1	2.0	385.8	382.6	3.2	1.0370	1.0405
as found 3rd	4981	19.5	199.5	198.5	1.0	193.9	189.5	4.4	1.0289	1.0476
new cyl resp										
calibrator zero										
high point										
second point										
third point										
as left zero										
as left span										
							Average C	orrection Factor	-	
Corrected As for	und NO _X =	771.2 ppb	NO =	767.5 ppb	* = > +/-5	% change initiates	investigation	*Percent Chan	ge NO _x =	-3.7%
Previous Respor	nse NO _X =	799.9 ppb	NO =	795.7 ppb				*Percent Chan	ge NO =	-3.7%
Baseline Corr 2r	nd pt NO _x =	384.9 ppb	NO =	382.2 ppb	As foun	d $NO_{X} r^{2}$:	0.999996	Nx SI: 0.9647	/11 Nx Int:	0.847
Baseline Corr 3r	rd pt NO _x =	193.0 ppb	NO =	189.1 ppb	As foun	d NO r ² :	0.999984	NO SI: 0.9659	NO Int:	-1.014
	Ň				As foun	d $NO_2 r^2$:	0.999972	NO2 SI: 0.9948	NO ₂ Int:	1.558

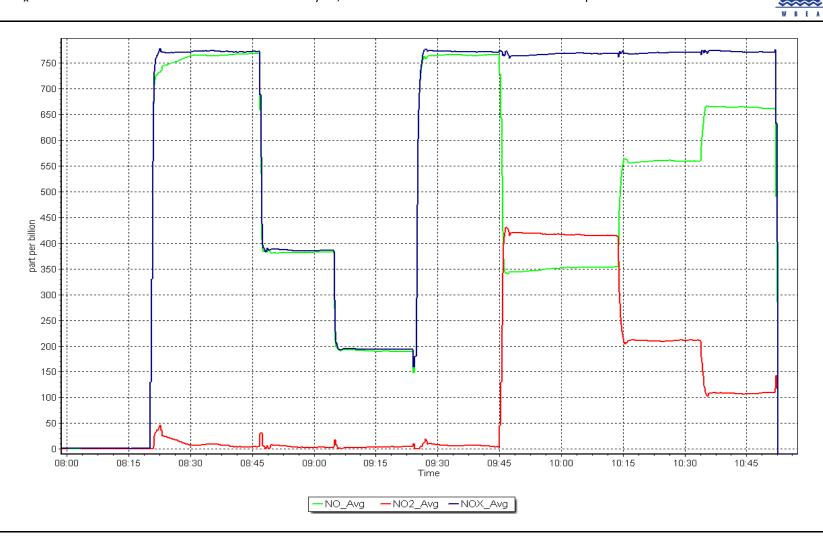
GPT Calibration Data

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	0.6		
as found GPT point (400 ppb NO2)	765.7	353.5	416.1	414.9	1.0029	99.7%
as found GPT point (200 ppb NO2)	765.7	559.6	210.0	211.4	0.9934	100.7%
as found GPT point (100 ppb NO2)	765.7	663.2	106.4	108.1	0.9843	101.6%
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 for Cleaning Reaction Cell and replacing critical flow orifices.

Calibration Performed By:



Location: Buffalo Viewpoint





NO₂ Cal Offset:

Wood Buffalo Environmental Association

$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

		Station	nformation		
Station Name: Calibration Date: Start time (MST): Reason:	Buffalo Viewpoint February 14, 2023 7:40 Routine		Station number: Last Cal Date: End time (MST):	February 13, 2023	
		Calibratio	on 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: NOX gas Diff:	51.16	ppm	Removed Gas NO Conc: NO gas Diff:	50.91	ppm
Calibrator Model:	API T700		Serial Number:	2445	
ZAG make/model:	API T701		Serial Number:	362	
		Analyzer	Information		
Analyzer make: NOX Range (ppb):			Analyzer serial #:	723	
	0 - 1000 ppb				
	0 - 1000 ppb <u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope	<u>Start</u>	<u>Finish</u> 0.993	NO bkgnd or offset:	<u>Start</u> -0.3	<u>Finish</u> -9.0
	<u>Start</u> : 1.204		NO bkgnd or offset: NOX bkgnd or offset:		
NO coeff or slope	<u>Start</u> : 1.204 : 1.203	0.993	-	-0.3	-9.0
NO coeff or slope NOX coeff or slope	<u>Start</u> : 1.204 : 1.203	0.993 0.988 1.000	NOX bkgnd or offset:	-0.3 -0.1	-9.0 -9.0
NO coeff or slope NOX coeff or slope	<u>Start</u> : 1.204 : 1.203	0.993 0.988 1.000	NOX bkgnd or offset: Reaction cell Press:	-0.3 -0.1	-9.0 -9.0
NO coeff or slope NOX coeff or slope	Start : 1.204 : 1.203 : 1.000	0.993 0.988 1.000 Calibrati	NOX bkgnd or offset: Reaction cell Press:	-0.3 -0.1 7.6	-9.0 -9.0
NO coeff or slope NOX coeff or slope NO2 coeff or slope	Start 1.204 1.203 1.000	0.993 0.988 1.000 Calibrati <u>Start</u>	NOX bkgnd or offset: Reaction cell Press:	-0.3 -0.1 7.6	-9.0 -9.0
NO coeff or slope NOX coeff or slope NO2 coeff or slope NO2 coeff or slope	Start 1.204 1.203 1.000	0.993 0.988 1.000 Calibrati <u>Start</u> 1.000402	NOX bkgnd or offset: Reaction cell Press:	-0.3 -0.1 7.6 <u><i>Finish</i></u> 1.000759	-9.0 -9.0
NO coeff or slope NOX coeff or slope NO2 coeff or slope NO _x Cal Slope NO _x Cal Slope	Start 1.204 1.203 1.000	0.993 0.988 1.000 Calibrati <u>Start</u> 1.000402 0.466890	NOX bkgnd or offset: Reaction cell Press:	-0.3 -0.1 7.6 <u><i>Finish</i></u> 1.000759 0.966826	-9.0 -9.0

1.229528

-0.612933



$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

				Dilu	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) <i>Limit = 0.95-1.05</i>
as found zero										
as found span										
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.4	0.4	0.1		
high point	4922	78.1	799.1	795.2	3.9	800.6	798.9	1.7	0.9981	0.9954
second point	4961	39.1	400.1	398.1	2.0	401.0	398.8	2.2	0.9977	0.9983
third point	4981	19.5	199.5	198.5	1.0	201.6	199.3	2.3	0.9896	0.9961
as left zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.3	0.0		
as left span	4922	78.1	799.1	358.0	441.1	795.5	357.8	437.8	1.0045	1.0006
							Average C	orrection Factor	0.9951	0.9966
Corrected As fo	ound NO _x =	NA ppb	NO =	NA ppb	* = > +/-59	% change initiates	investigation	*Percent Chan	ge NO _x =	NA
Previous Respo	onse NO _X =	NA ppb	NO =	NA ppb				*Percent Chan	ge NO =	NA
Baseline Corr 2	nd pt NO _X =	NA ppb	NO =	NA ppb	As found	d $NO_X r^2$:		Nx SI:	Nx Int:	
Baseline Corr 3	rd 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 ₂ Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Co	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						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	796.0	358.8	441.1	438.1	1.0069	99.3%
2nd GPT point (200 ppb O3)	796.0	574.5	225.4	224.1	1.0058	99.4%
3rd GPT point (100 ppb O3)	796.0	683.5	116.4	113.8	1.0229	97.8%
			ŀ	Average Correction Factor	1.0119	98.8%

Notes:

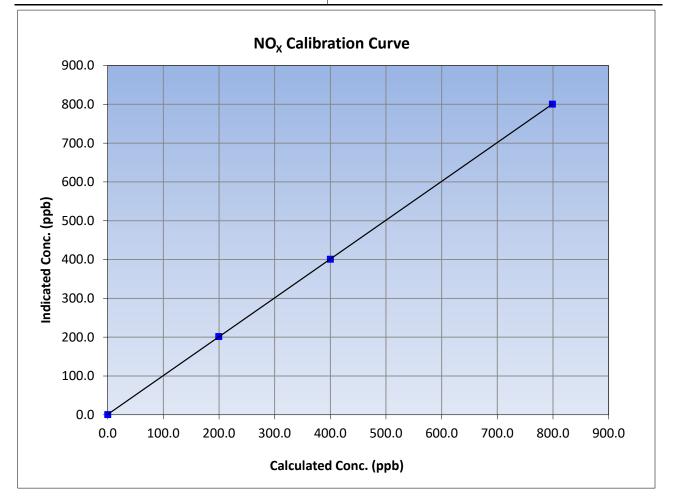
Calibration after Cleaning Reaction Cell and replacing critical flow orifices. Zero and Span adjusted.

Calibration Performed By:



$NO_{\rm X}$ Calibration Summary

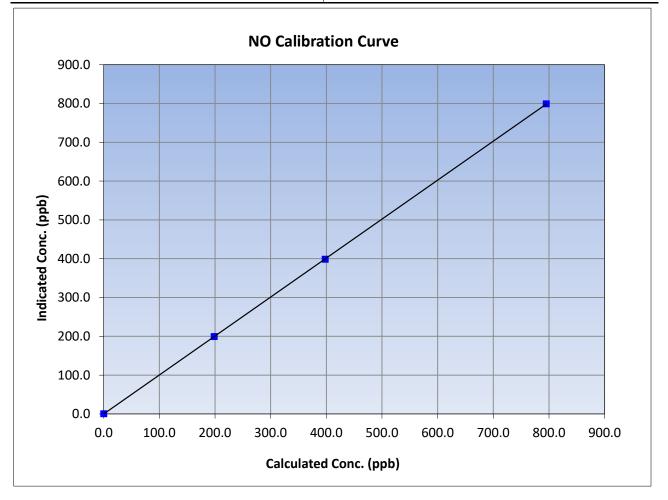
WBEA					Version-04-2
		Station	Information		
Calibration Date:	February	14, 2023	Previous Calibration:	February 13, 2023	
Station Name:	Buffalo V	/iewpoint	Station Number:	AN	1SO4
Start Time (MST):	7:	40	End Time (MST):	11	:16
Analyzer make:	API	T200	Analyzer serial #:	7	23
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Calibra Correction factor (Cc/Ic)	ation Data Statistical Evalu	ation	<u>Limits</u>
0.0	0.4				
799.1	800.6	0.9981	Correlation Coefficient	0.999996	≥0.995
400.1	401.0	0.9977	Slope	1.000759	0.90 - 1.10
199.5	201.6	0.9896	Siope	1.000759	0.90 - 1.10
			Intercept	0.966826	+/-20





NO Calibration Summary

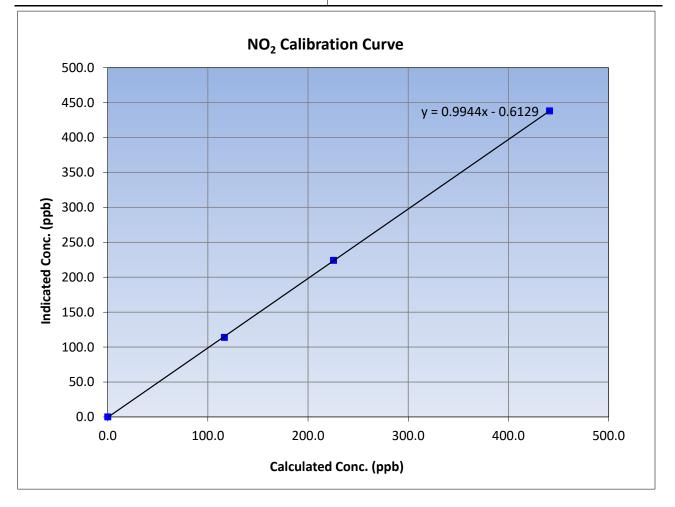
WBEA					Version-04-202	
		Station	Information			
Calibration Date:	February	14, 2023	Previous Calibration: Feb		uary 13, 2023	
Station Name:	Buffalo Viewpoint		Station Number: A		MS04	
Start Time (MST):	7:40		End Time (MST):	1	1:16	
Analyzer make:	API	T200	Analyzer serial #:		723	
		Calibra	ation Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	0.4		Correlation Coefficient	0.999996	≥0.995	
795.2	798.9	0.9954	correlation coefficient	0.999990	20.995	
398.1	398.8	0.9983	Slopp	1.004151	0.90 - 1.10	
198.5	199.3	0.9961	Slope	1.004151	0.90 - 1.10	
			Intercept	-0.053156	+/-20	

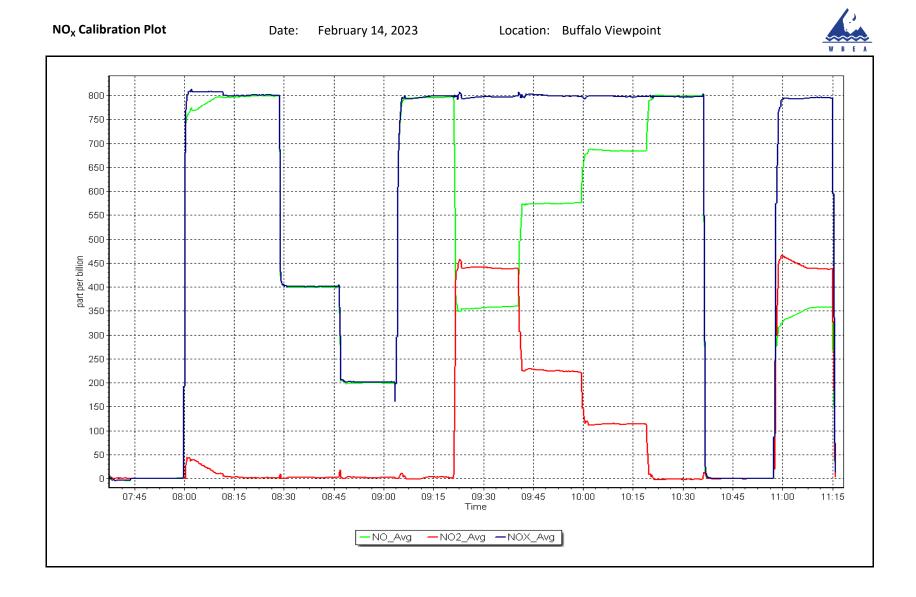




NO₂ Calibration Summary

WBEA					Version-04-2
		Station	Information		
Calibration Date:	February	14, 2023	Previous Calibration:	Februar	y 13, 2023
Station Name:	Buffalo V	'iewpoint	Station Number:	AN	v1S04
Start Time (MST):	7:40		End Time (MST):	1	1:16
Analyzer make:	API T200		Analyzer serial #:		723
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999975	≥0.995
441.1	438.1	1.0069	correlation coefficient	0.555575	20.333
225.4	224.1	1.0058	Slope	0.994427	0.90 - 1.10
116.4	113.8	1.0229	Siope	0.334427	0.90 - 1.10
			Intercept	-0.612933	+/-20







O₃ Calibration Report

Version-01-2020

					version-01-20		
		Station Infor	mation				
Station Name:	Buffalo Viewpoint	nt Station number: AMS04					
Calibration Date:	February 10, 2023		Last Cal Date:	January 12, 2023			
Start time (MST):	10:55		End time (MST):	13:26			
Reason:	Routine						
		Calibration St	andards				
O3 generation mode:	Photometer						
Calibrator Make/Model:	API T700		Serial Number:	2445			
ZAG Make/Model:	API T701		Serial Number:	362			
		Analyzer Info	rmation				
Analyzer make	: API T400		Analyzer serial #:	2961			
Analyzer Range							
	Start	Finish		Start	Finish		
Calibration slope:	0.992571	0.988657	Backgd or Offset:	-3.3	-3.3		
Calibration intercept:	2.700000	3.560000	Coeff or Slope:	1.065	1.065		
		O ₃ Calibratio	on Data				
		J					
Set Point	Total air flow rate	Calibrator Lamp	Calculated	Indicated concentration C	•		
	(sccm)	Voltage Drive	concentration (ppb) (Cc)	(ppm) (Ic)	<i>Limit = 0.95-1.05</i>		
as found zero	5000	0.0	0.0	0.5			
as found span	5000	1160.2	400.0	398.3	1.004		
as found 2nd point							
as found 3rd point							
calibrator zero	5000	0.0	0.0	1.2			
high point	5000	1161.4	400.0	397.8	1.006		
second point	5000	919.0	200.0	202.6	0.987		
third point	5000	788.4	100.0	104.7	0.955		
as left zero	5000	0.0	0.0	1.1			
as left span	5000	1159.5	400.0	397.2	1.007		
			Averag	ge Correction Factor	0.983		
Baseline Corr As found:	397.8	Previous response	399.7	*% change	-0.5%		
	NA	AF Slope:		AF Intercept:			
Baseline Corr 2nd AF pt:	INA	AI JIUDE.					
Baseline Corr 2nd AF pt: Baseline Corr 3rd AF pt:	NA	AF Correlation:		i intercepti			

Notes:

No maintenance or adjustments done.

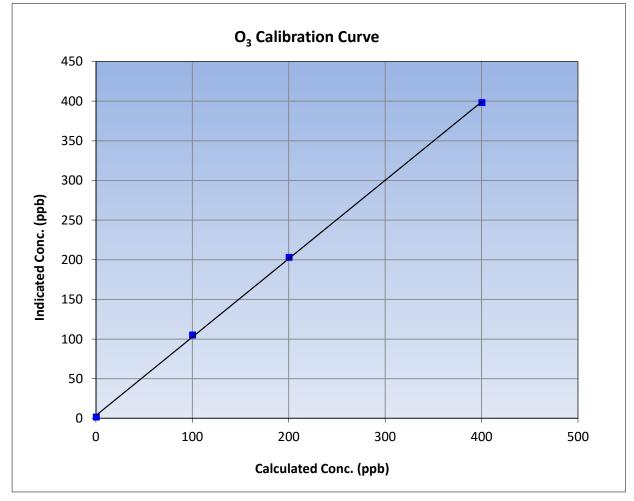
Calibration Performed By:

Melissa Lemay



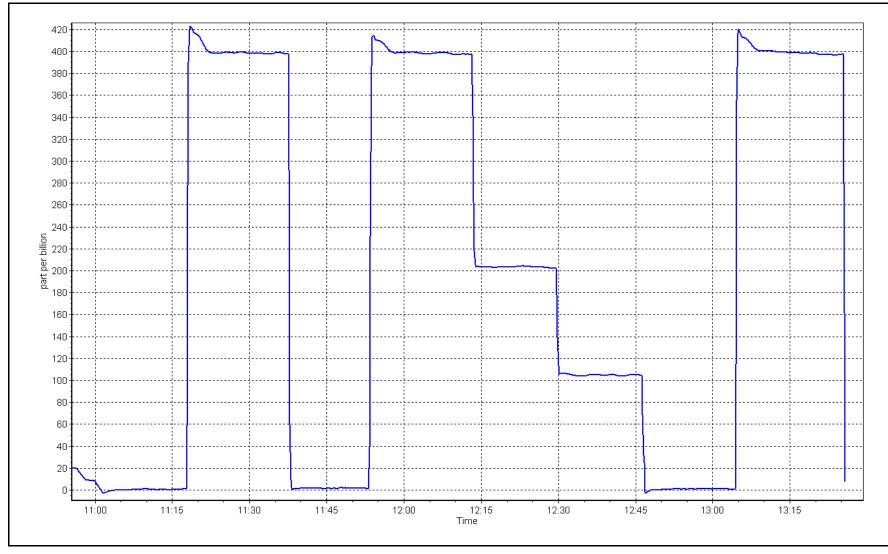
O₃ Calibration Summary

		Station	Information		Version-01-2
		Station	information		
Calibration Date:	February 1	.0, 2023	Previous Calibration:	January	12, 2023
Station Name:	Buffalo Vie	ewpoint	Station Number:	AM	1SO4
Start Time (MST):	10:5	5	End Time (MST):	13:26	
Analyzer make:	API T4	100	Analyzer serial #:	29	961
		Calibr	ation Data		
Calculated concentration (ppb) (Cc)		Correction factor	Statistical Evalua	tion	<u>Limits</u>
(ppb) (Cc)	(ppb) (Ic)	(Cc/Ic)	Statistical Evalua	tion	<u>Limits</u>
(ppb) (Cc) 0.0	(ppb) (lc) 1.2	(Cc/Ic)	Statistical Evalua	tion 0.999837	<u>Limits</u> ≥0.995
(ppb) (Cc)	(ppb) (Ic) 1.2 397.8	(Cc/Ic)	Correlation Coefficient	0.999837	≥ <i>0.995</i>
(ppb) (Cc) 0.0 400.0	(ppb) (lc) 1.2	(Cc/lc) 1.0055			











T640 PM_{2.5} CALIBRATION

W B E A					Version-09-2020
		Station Information	on		
Station Name: Calibration Date: Start time (MST):	Buffalo Viewpoint February 15, 2023 9:46		Station number: AM Last Cal Date: Janu End time (MST): 10:1	uary 16, 2023	
Analyzer Make: Particulate Fraction:	API T640 PM2.5		S/N: 844		
Flow Meter Make/Model:	AliCat		S/N: 228	085	
Temp/RH standard:	AliCat		S/N: 228	085	
		Monthly Calibration	Test		
<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	(Limits)
T (°C)	-19.1	-18.8	-19.1		+/- 2 °C
P (mmHg)	734.8	736.6	734.8		+/- 10 mmHg
flow (LPM)	5	4.80	5	\checkmark	+/- 0.25 LPM
Leak Test:	Date of check: PM w/o HEPA:	February 15, 2023 5.1	Last Cal Date: PM w/ HEPA:	anuary 16, 2023 0	
Inlet cleaning :	Inlet Head	 Image: A start of the start of			
		Quarterly Calibration	Test		
<u>Parameter</u> PMT Peak Test	<u>As found</u>	Measured	<u>As left</u>	Adjusted	(Limits) 10.9 +/- 0.5
Date Optical Cham	nber Cleaned:	December 1	3, 2022		
Disposable Filte	r Changed:	December 1	3, 2022		
		Annual Maintenan	ice		
Date Sample Tul	be Cleaned:	September 1			
Date RH/T Sense	or Cleaned:	September 1	.5, 2022		
Notes:		No adjustments	done. Inlet head cleane	ed.	
Calibration by:	Melissa Lemay				



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS05 MANNIX FEBRUARY 2023

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

March 31, 2023



SO₂ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Mannix February 21, 2023 10:52 Routine		Station number: Last Cal Date: End time (MST):	AMS05 January 20, 2023 13:57	
		Calibration St	andards		
Cal Gas Concentration: Cal Gas Cylinder #:	50.02 XC026809B	ppm	Cal Gas Exp Date:	January 12, 2029	
Removed Cal Gas Conc: Removed Gas Cyl #:	50.02 NA	ppm	Rem Gas Exp Date: Diff between cyl:	NA	
Calibrator Make/Model:	API T700		Serial Number:	621	
ZAG Make/Model:	API T701H		Serial Number:	832	
		Analyzer Info	rmation		
Analyzer make Analyzer Range			Analyzer serial #:	1008841399	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.996673	0.996758	Backgd or Offset:	8.9	8.8
Calibration intercept:	0.800000	-0.080000	Coeff or Slope:	0.914	0.914
		SO ₂ Calibratio	on Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.1	
as found span	4920	80.0	800.3	796.2	1.005
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	
high point	4920	80.0	800.3	797.5	1.004
second point	4960	40.0	400.2	399.5	1.002
third point	4980	20.0	200.1	198.5	1.008
as left zero	5000	0.0	0.0	0.1	
as left span	4920	80.0	800.3	800.6	1.000
			Averag	ge Correction Factor	1.004
Baseline Corr As found:	796.10	Previous response	798.46	*% change	-0.3%
	NIA	AF Slope:		AF Intercept:	
Baseline Corr 2nd AF pt:	NA	Al Slope.		/ a meereepe	

Notes:

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

Calibration Performed By:

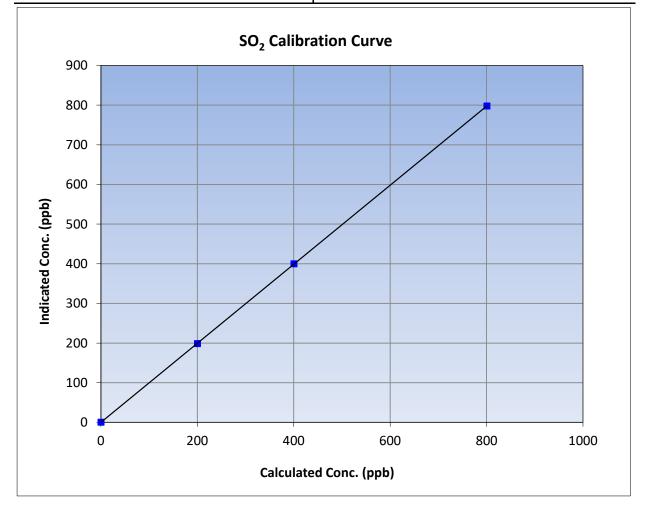


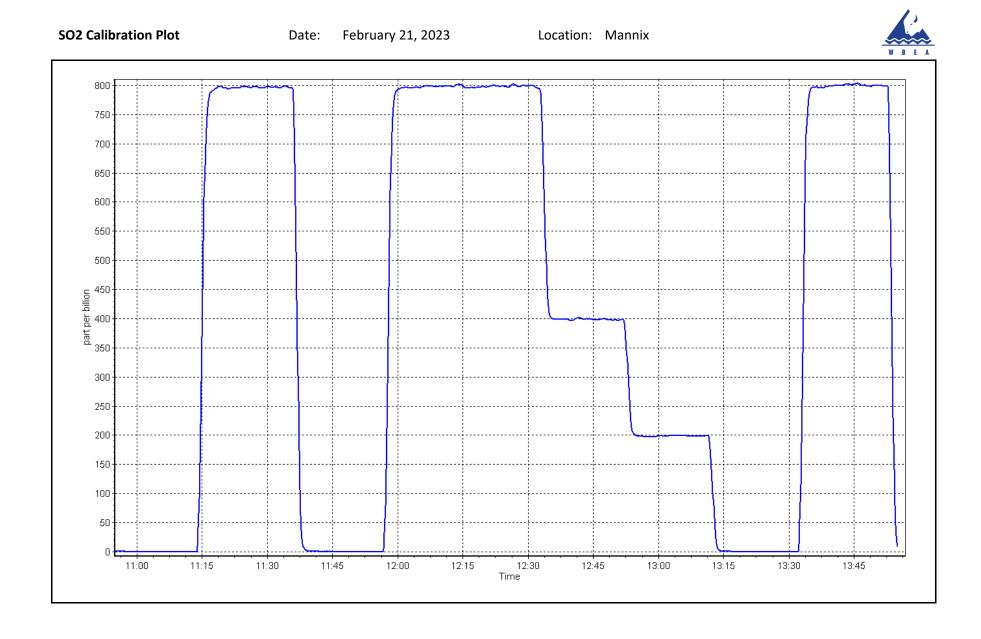
SO₂ Calibration Summary

	Statio	on Information	
Calibration Date:	February 21, 2023	Previous Calibration:	January 20, 2023
Station Name:	Mannix	Station Number:	AMS05
Start Time (MST):	10:52	End Time (MST):	13:57
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841399

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	0.999996	≥0.995
800.3	797.5	1.0035	correlation coefficient	0.555550	20.995
400.2	399.5	1.0017	Slope	0.996758	0.90 - 1.10
200.1	198.5	1.0080	Siope	0.990738	0.90 - 1.10
			Intercept	-0.080000	+/-30







H₂S Calibration Report

WBEA					Version-11-2
		Station Info	rmation		
itation Name: Calibration Date: tart time (MST): Reason:	Mannix February 7, 2023 10:35 Routine		Station number: Last Cal Date: End time (MST):	AMS05 January 3, 2023 15:10	
		Calibration S	tandards		
Cal Gas Concentration:	4.92	ppm	Cal Gas Exp Date:	February 9, 2024	
Cal Gas Cylinder #: Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model: ZAG Make/Model:	EY0002433 4.92 NA API T700 API T701H	ppm	Rem Gas Exp Date: Diff between cyl: Serial Number: Serial Number:	NA 1845 832	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	Thermo 43iQTL Global 0 - 100 ppb		Analyzer serial #: Converter serial #:	1203169745 2022-196	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope: Calibration intercept:	0.998045 0.340531	0.998613 0.220652	Backgd or Offset: Coeff or Slope:		2.09 0.822
		H ₂ S As Four	nd Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjuster Correction facto (Cc/(Ic-AFzero)) Limit = 0.90-1.10
as found zero	5000	0.0	0.0	0.2	
as found span	4919	81.3	80.0	80.7	0.994
as found 2nd point	4960	40.7	40.0	40.8	0.986
as found 3rd point	4980	20.3	20.0	20.4	0.989
new cylinder response					
		H ₂ S Calibrati	ion Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction facto (Cc/Ic) Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	0.2	
high point	4919	81.3	80.0	80.1	0.999
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	0.5	
as left span	4919	81.3	80.0	78.8	1.015
O2 Scrubber Check	4920	80.0	800.0	0.0	
Date of last scrubber cha				Ave Corr Factor	0.995
Date of last converter eff	ficiency test:				efficiency
Baseline Corr As found:	80.5	Prev response:	80.18	*% change:	0.4%
Baseline Corr 2nd AF pt:	40.6	AF Slope:		AF Intercept:	0.300551
Baseline Corr 3rd AF pt:	20.2	AF Correlation:			

Notes:

Sample inlet filter changed after as founds. Scrubber check completed after calibrator zero. No adjustments made.

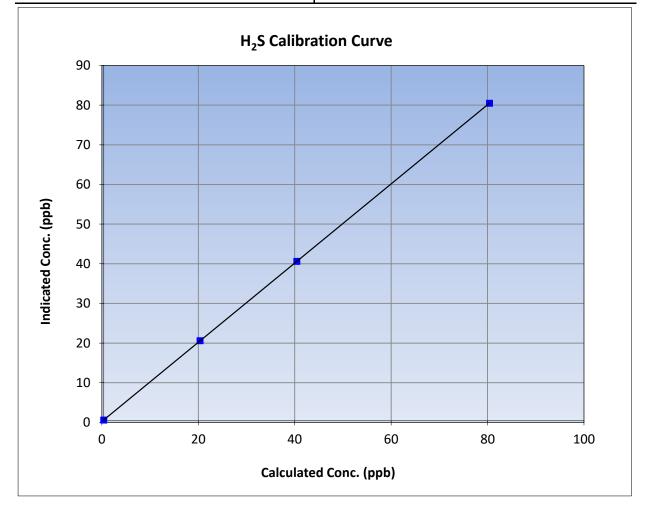


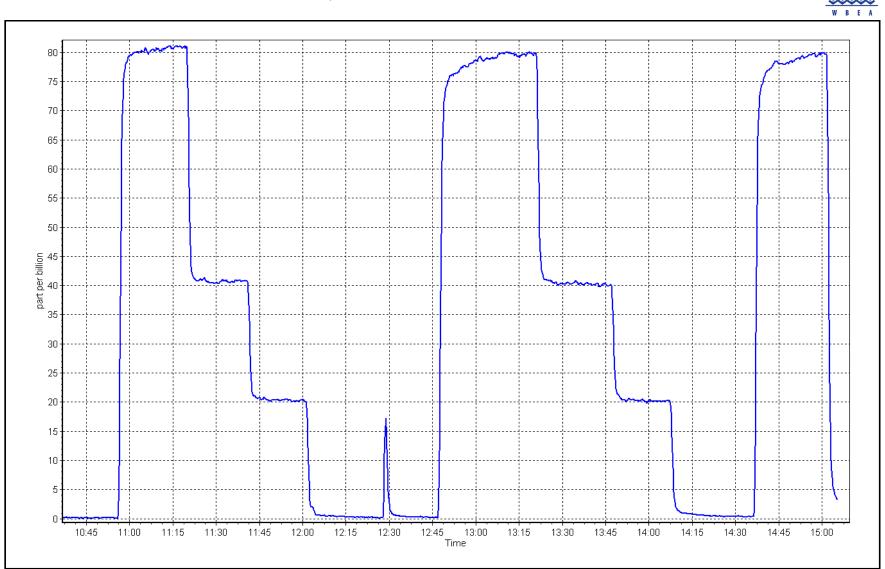
H₂S Calibration Summary

WBEA			Version-11-2021				
Station Information							
Calibration Date:	February 7, 2023	Previous Calibration:	January 3, 2023				
Station Name:	Mannix	Station Number:	AMS05				
Start Time (MST):	10:35	End Time (MST):	15:10				
Analyzer make:	Thermo 43iQTL	Analyzer serial #:	1203169745				

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	80.1	0.9987	correlation coefficient	1.000000	20.995
40.0	40.2	0.9961	Slope	0.998613	0.90 - 1.10
20.0	20.2	0.9888	Slope	0.998013	0.90 - 1.10
			Intercept	0.220652	+/-3





H₂S Calibration Plot

Location: Mannix



THC / CH_4 / NMHC Calibration Report

Version-01-2020

Station Name: Calibration Date: Start time (MST): Reason:	Mannix February 21, 202 10:52 Routine	23	Station number: AN Last Cal Date: Ja End time (MST): 13	nuary 20, 2023	
		Calibra	tion Standards		
Gas Cert Reference:	XC	0268098	Cal Gas Expiry Date: Ja	nuary 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: 62	1	
ZAG make/model:	API T701H		Serial Number: 83	2	
		Analyz	er Information		
Analyzer make	e: Thermo 55i		Analyzer serial #: 11	52430011	
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	o: 2.57E-04	2.56E-04	NMHC SP Ratio:	4.41E-05	4.36E-05
CH4 Retention time	e: 15.00	15.00	NMHC Peak Area:	207495	209913

Station Information

THC Calibration Data							
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05		
as found zero	5000	0.0	0.00	0.00			
as found span	4920	80.0	17.23	17.56	0.981		
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	17.18	1.003		
second point	4960	40.0	8.61	8.58	1.004		
third point	4980	20.0	4.31	4.27	1.008		
as left zero	5000	0.0	0.00	0.00			
as left span	4920	80.0	17.23	17.27	0.998		
				Average Correction Factor	1.005		
Baseline Corr AF:	17.56	Prev response	17.27	*% change	1.7%		
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:			
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	tes investigation		



THC / CH_4 / NMHC Calibration Report

Version-01-2020

		NMHC Calib	ration Data			
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05	
as found zero	5000	0	0.00	0.00		
as found span	4920	80	9.15	9.34	0.979	
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	9.12	1.003	
second point	4960	40	4.57	4.57	1.002	
third point	4980	20	2.29	2.28	1.004	
as left zero	5000	0	0.00	0.00		
as left span	4920	80	9.15	9.18	0.996	
			ŀ	Average Correction Factor	1.003	
Baseline Corr AF:	9.34	Prev response	9.17	*% change	1.9%	
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:		
Baseline Corr 3rd AF:	NA	AF Correlation:		<pre>* = > +/-5% change initiates investigation</pre>		

CH4 Calibration Data	CH4	Calibration	Data
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			lion Data				
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (C	c) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05		
as found zero	5000	0.0	0.00	0.00			
as found span	4920	80.0	8.08	8.23	0.982		
as found 2nd point							
as found 3rd point							
new cylinder response							
calibrator zero	5000	0.0	0.00	0.00			
high point	4920	80.0	8.08	8.06	1.003		
second point	4960	40.0	4.04	4.01 1.008			
third point	4980	20.0	2.02	2.00	1.012		
as left zero	5000	0.0	0.00	0.00			
as left span	4920	80.0	8.08	8.09	0.999		
			A	verage Correction Factor	1.008		
Baseline Corr AF:	8.23	Prev response	8.10	*% change	1.5%		
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:			
Baseline Corr 3rd AF:	NA	AF Correlation:		<pre>* = > +/-5% change initiates investigation</pre>			
		Calibration	Statistics				
		<u>Start</u>		<u>Finish</u>			
THC Cal Slope:		1.004873		0.997356			
THC Cal Offset:		-0.040600		-0.010200			
CH4 Cal Slope:		1.006140		0.997864			
CH4 Cal Offset:		-0.026000		-0.012000			
NMHC Cal Slope:		1.003542		0.997020			
NMHC Cal Offset:		-0.015000		0.000600			

Notes:

Sample inlet filter changed after as founds. Adjusted the span only.

Calibration Performed By:

Karan Pandit



THC Calibration Summary

		Station I	nformation		
Calibration Date:	February	21, 2023	Previous Calibration:	January 2	20, 2023
Station Name:	Ma	nnix	Station Number:	AM	S05
Start Time (MST):	10	:52	End Time (MST):	13:	57
Analyzer make:	Therr	no 55i	Analyzer serial #:	11524	30011
		Calibra	tion Data		
Calculated concentratio (ppm) (Cc)	n Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.00 17.23	0.00 17.18	1.0030	Correlation Coefficient	0.999998	≥0.995
8.61 4.31	8.58 4.27	1.0043 1.0076	Slope	0.997356	0.90 - 1.10
			Intercept	-0.010200	+/-0.5
20.0		THC Calibratio			
18.0					
16.0					
14.0 —					
E 12.0					
(md 12.0					
— 0.8 d					
0.8 Indicated					
4.0					
2.0					
0.0					
0.0	5	.0	10.0	15.0	20.0



CH₄ Calibration Summary

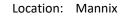
		Station I	nformation		
Calibration Date:	February	21, 2023	Previous Calibration:	January 2	20, 2023
Station Name:	Mar	nnix	Station Number:	AM	505
Start Time (MST):	10:	52	End Time (MST):	13:	57
Analyzer make:	Thern	no 55i	Analyzer serial #:	115243	30011
		Calibra	tion Data		
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Eval	uation	<u>Limits</u>
0.00 8.08	0.00 8.06	1.0027	Correlation Coefficient	0.999989	≥0.995
4.04	4.01 2.00	1.0080 1.0123	Slope	0.997864	0.90 - 1.10
2.02	2.00	1.0123	Intercept	-0.012000	+/-0.5
8.0 7.0 6.0					
100 5.0 (bbm) 4.0 (bbm) 3.0 (bbm)					
4.0					
0.6 udicate					
2.0					
1.0					
0.0	2.0	4.0	6.0	8.0	10.0
		Calculated	l Conc. (ppm)		



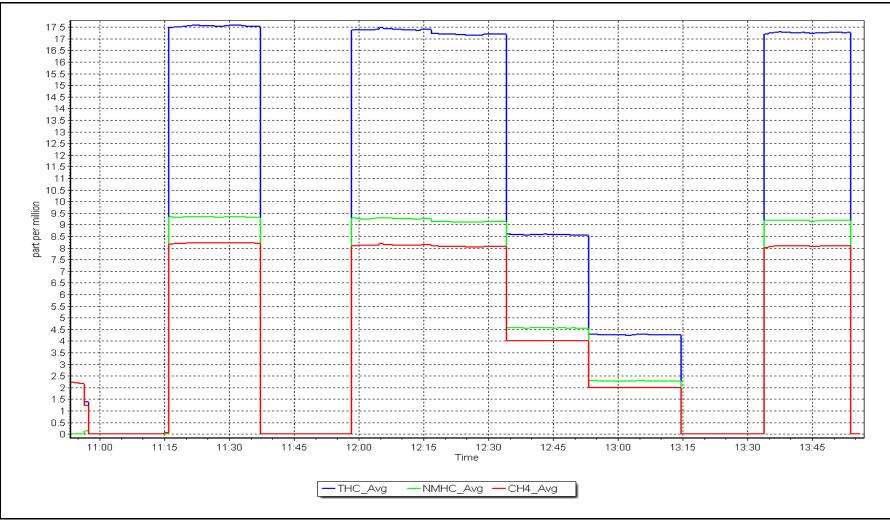
NMHC Calibration Summary

			Station I	nformation		
Calibration Da	ate:	February	/ 21, 2023	Previous Calibration:	January 2	20, 2023
tation Name	9:	Ma	nnix	Station Number:	AM	505
itart Time (M	1ST):	10):52	End Time (MST):	13:	57
nalyzer mak	ke:	Ther	mo 55i	Analyzer serial #:	11524	30011
			Calibra	tion Data		
alculated conce (ppm) (Ce		Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>
0.00		0.00		Correlation Coefficient	0.999999	≥0.995
9.15 4.57		9.12 4.57	1.0031 1.0017			
2.29		2.28	1.0039	Slope	0.997020	0.90 - 1.10
				Intercept	0.000600	+/-0.5
9.1 8.1 7.1	0 —					
6.0 Conc. (bbm)	0					
 5.0	0 +					
	o —					
1.4 Indicated	o —					
2.	0					
1.	0					
0	0					
0.		2.0	4.0	6.0	8.0	10.0
0.	0.0	2.0	4.0	0.0	0.0	10.0

NMHC Calibration Plot









WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS06 PATRICIA MCINNES FEBRUARY 2023

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

March 31, 2023



SO₂ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Patricia McInnes February 16, 2023 10:16 Routine		Station number: Last Cal Date: End time (MST):	AMS06 January 9, 2023 13:48	
		Calibration St	andards		
Cal Gas Concentration: Cal Gas Cylinder #:	49.78 AAL070632	ppm	Cal Gas Exp Date:	September 9, 2024	
Removed Cal Gas Conc:	49.78	ppm	Rem Gas Exp Date:	N/A	
Removed Gas Cyl #:	N/A	P	Diff between cyl:		
Calibrator Make/Model:	API T700		Serial Number:	689	
ZAG Make/Model:	API T701		Serial Number:	3566	
		Analyzer Info	rmation		
Analyzer make	• Thermo 43i	,,	Analyzer serial #:	1160290013	
Analyzer Range			Allalyzer serial #.	1100290013	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.992084	0.993085	Backgd or Offset:	17.2	17.2
Calibration intercept:	1.741680	1.541481	Coeff or Slope:	0.907	0.907
		SO ₂ Calibratio	on Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic Limit = 0.95-1.05
as found zero	5000	0.0	0.0	-0.3	
as found span	4920	80.3	799.5	794.3	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.0	
high point	4920	80.3	799.5	794.7	1.006
second point	4960	40.2	400.2	399.8	1.001
third point	4980	20.1	200.1	201.8	0.992
as left zero	5000	0.0	0.0	-0.1	
as left span	4920	80.3	799.5	795.6	1.005
			Averag	ge Correction Factor	1.000
Baseline Corr As found:	794.60	Previous response	794.88	*% change	0.0%
	NA	AF Slope:		AF Intercept:	
Baseline Corr 2nd AF pt:	NA	/ a biopei			

Notes:

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

Calibration Performed By:

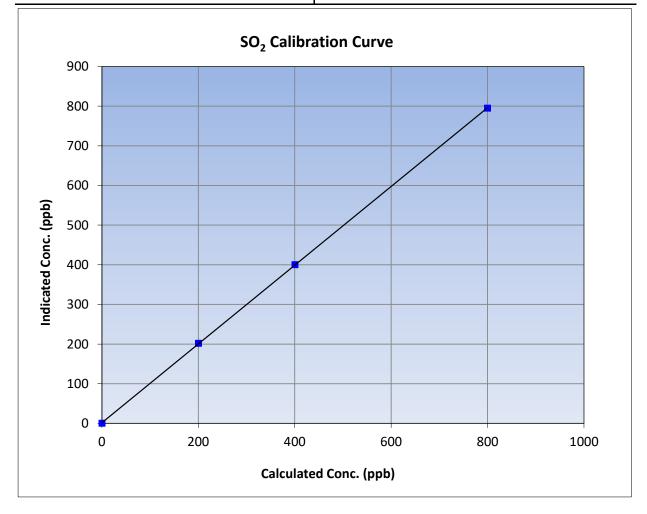


SO₂ Calibration Summary

Station Information								
Calibration Date:	February 16, 2023	Previous Calibration:	January 9, 2023					
Station Name:	Patricia McInnes	Station Number:	AMS06					
Start Time (MST):	10:16	End Time (MST):	13:48					
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290013					

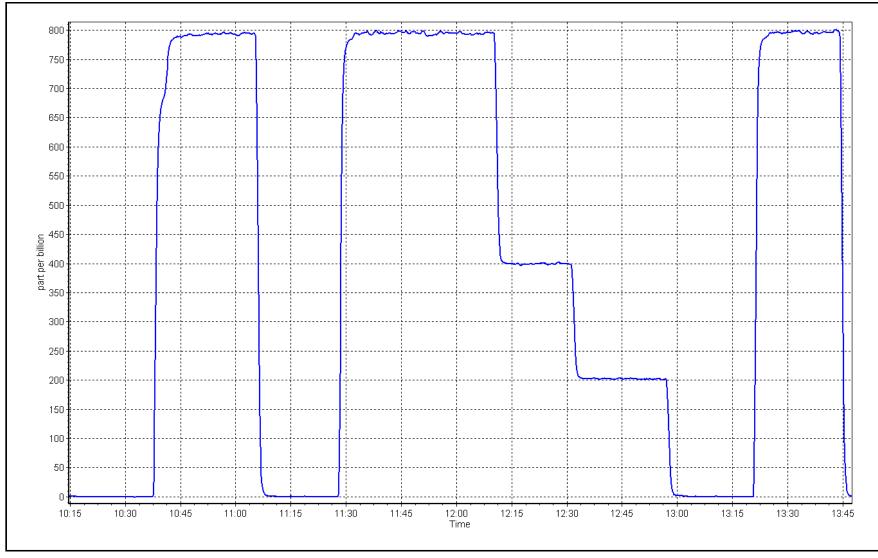
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999983	≥0.995
799.5	794.7	1.0060	correlation coefficient	0.999985	20.333
400.2	399.8	1.0011	Slope	0.993085	0.90 - 1.10
200.1	201.8	0.9917	Slope	0.993085	0.90 - 1.10
			- Intercept	1.541481	+/-30











TRS Calibration Report

WBEA					Version-11-2021
		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Patricia McInnes February 6, 2023 10:23 Routine		Station number: Last Cal Date: End time (MST):	AMS 06 January 3, 2023 14:43	
		Calibration St	andards		
Cal Gas Concentration: Cal Gas Cylinder #: Removed Cal Gas Conc:	5.38 EY0000809 5.38	ppm	Cal Gas Exp Date: Rem Gas Exp Date:	March 2, 2023	
Removed Gas Cyl #: Calibrator Make/Model: ZAG Make/Model:	N/A	ppm	Diff between cyl: Serial Number: Serial Number:	3566 689	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	Thermo 43i TLE Global G150 0 - 100 ppb		Analyzer serial #: Converter serial #:	1218153358 2022-195	
Calibration slope: Calibration intercept:	<u>Start</u> 0.997488 0.117191	<u>Finish</u> 0.990341 0.217319	Backgd or Offset: Coeff or Slope:		<u>Finish</u> 1.82 1.049
		TRS As Four	nd Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) Limit = 0.90-1.10
as found zero	5000	0.0	0.0	-0.6	
as found span	4926	74.3	79.9	78.5	1.011
as found 2nd point	4963	37.2	40.0	39.4	1.001
as found 3rd point	4981	18.6	20.0	19.5	0.996
new cylinder response					
		TRS Calibrati	on Data		
Set Point	Dilution air flow 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	74.3	79.9	79.3	1.008
second point	4963	37.2	40.0	39.9	1.003
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	79.4	1.007
SO2 Scrubber Check	4920	80.3	803.0	0.1	
Date of last scrubber cha		December 20, 2021		Ave Corr Factor	0.999
Date of last converter ef	ficiency test:				efficiency
Baseline Corr As found: Baseline Corr 2nd AF pt:	79.1 40.0	Prev response: AF Slope:	79.86 0.988770	*% change: AF Intercept:	-1.0% -0.402701
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999964	* = > +/-5% change initiat	
				, shange initiat	

Notes:

Changed the inlet filter after as founds. Ran a SO2 scrubber check after the calibrator zero. Adjusted the zero only.

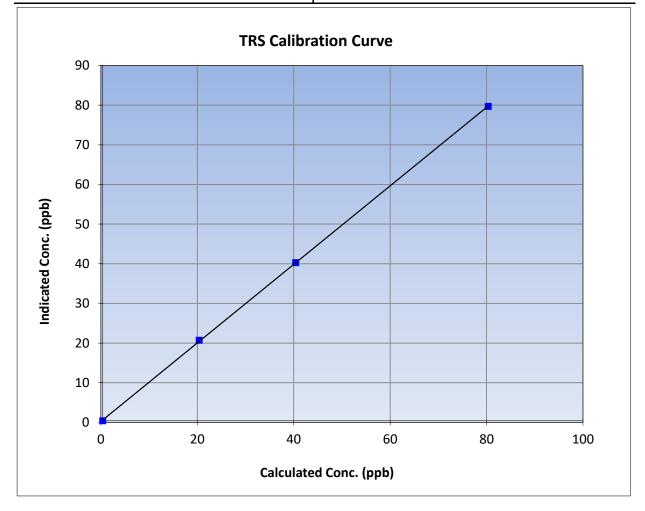


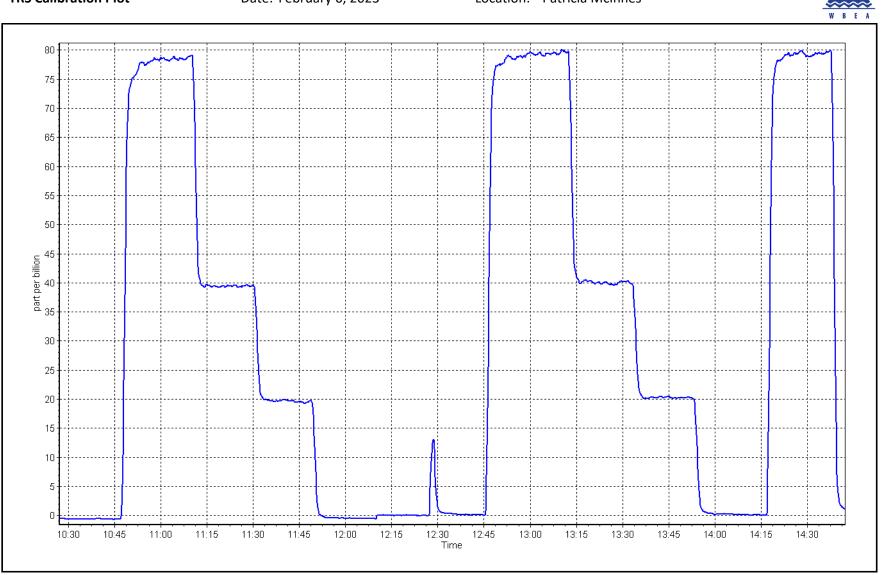
TRS Calibration Summary

WBEA			Version-11-2021
	Stati	on Information	
Calibration Date:	February 6, 2023	Previous Calibration:	January 3, 2023
Station Name:	Patricia McInnes	Station Number:	AMS 06
Start Time (MST):	10:23	End Time (MST):	14:43
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1218153358

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	0.999964	≥0.995
79.9	79.3	1.0081	correlation coefficient	0.999904	20.333
40.0	39.9	1.0031	Slope	0.990341	0.90 - 1.10
20.0	20.3	0.9860	Siope		
			Intercept	0.217319	+/-3





TRS Calibration Plot

Location: Patricia McInnes



THC / CH₄ / NMHC Calibration Report

					10:0:01 01 202		
		Stati	on Information				
Station Name: Calibration Date: Start time (MST): Reason:	Patricia McInne February 16, 20 10:17 Routine	-	Station number: AMS06 Last Cal Date: January 9, 2023 End time (MST): 13:49				
		Calibr	ation Standards				
Gas Cert Reference:	Δ	AL070632	Cal Gas Expiry Date: Se	ptember 9, 20)24		
CH4 Cal Gas Conc.	501.6	ppm	CH4 Equiv Conc.	1066.2	ppm		
C3H8 Cal Gas Conc.	205.3	ppm					
Removed Gas Ref.		N/A	Removed Gas Expiry: N/	A			
Removed CH4 Conc.	501.6	ppm	CH4 Equiv Conc.	1066.2	ppm		
Removed C3H8 Conc.	205.3	ppm	Diff between cyl (THC):				
Diff between cyl (CH ₄):		Diff between cyl (NM):				
Calibrator Model:	API T700		Serial Number: 68	9			
ZAG make/model:	API T701		Serial Number: 35	66			
		Analy	zer Information				
Analyzer make THC Range (ppm			Analyzer serial #: 11	80320037			
NMHC Range (ppm			CH4 Range (ppm): 0 -	10 ppm			
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>		

CH4 SP Ratio:	3.19E-04	3.19E-04	NMHC SP Ratio:	5.63E-05	5.63E-05
CH4 Retention time:	13.8	13.8	NMHC Peak Area:	161210	161210

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	
as found zero	5000	0.0	0.00	0.00		
as found span	4920	80.3	17.12	16.74	1.023	
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	17.14	0.999	
second point	4960	40.2	8.57	8.56	1.001	
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	17.14	0.999	
			A	verage Correction Factor	0.997	
Baseline Corr AF:	16.74	Prev response	17.12	*% change	-2.3%	
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:		
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	tes investigation	



THC / CH₄ / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05
as found zero	5000	0	0.00	0.00	
as found span	4920	80.3	9.07	8.85	1.025
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	9.08	0.999
second point	4960	40.2	4.54	4.55	0.999
third point	4980	20.1	2.27	2.29	0.989
as left zero	5000	0	0.00	0.00	
as left span	4920	80.3	9.07	9.09	0.998
			ŀ	Average Correction Factor	0.995
Baseline Corr AF:	8.85	Prev response	9.06	*% change	-2.4%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	tes investigation

CH4 Calibration Data

			luon 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
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.3	8.06	7.89	1.021
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4920	80.3	8.06	8.06	1.000
second point	4960	40.2	4.03	4.02	1.004
third point	4980	20.1	2.02	2.03	0.994
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.3	8.06	8.06	1.000
			A	verage Correction Factor	1.000
Baseline Corr AF:	7.89	Prev response	8.06	*% change	-2.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation

	<u>Start</u>	<u>Finish</u>	
THC Cal Slope:	1.000499	1.000113	
THC Cal Offset:	-0.007453	0.008939	
CH4 Cal Slope:	1.001107	0.999419	
CH4 Cal Offset:	-0.004401	0.000800	
NMHC Cal Slope:	1.000174	1.000630	
NMHC Cal Offset:	-0.003652	0.008539	

Notes:

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

Calibration Performed By:

Max Farrell



THC Calibration Summary

		Station I	nformation		
Calibration Date:	February	16, 2023	Previous Calibration:	January	9, 2023
tation Name:	Patricia	McInnes	Station Number:	AM	S06
itart Time (MST):	10	:17	End Time (MST):	13:	49
Analyzer make:	Therr	no 55i	Analyzer serial #: 1180320037		20037
		Calibra	tion Data		
alculated concentrati (ppm) (Cc)	on Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999992	≥0.995
17.12	17.14	0.9991		0.00000	
8.57 4.29	<u>8.56</u> 4.32	1.0014 0.9917	Slope	1.000113	0.90 - 1.10
4.29	4.52	0.9917	Intercept	0.008939	+/-0.5
				_	
18.0				_	
16.0 -					
14.0 -					
12.0					
udd 10.0					
- 0.8 Conc					
ndicated Conc. (ppm) - 0.8 - - 0.9 -					
<u>ة</u> 4.0 –					
2.0 -					
0.0 🖛	/				
0.0) 5	.0	10.0	15.0	20.0



CH₄ Calibration Summary

		Station I	nformation		
Calibration Date:	February	16, 2023	Previous Calibration:	January	9, 2023
Station Name:		McInnes	Station Number:	AM	
Start Time (MST):	10	:17	End Time (MST):	13:	49
Analyzer make:	Therr	no 55i	Analyzer serial #:	11803	20037
		Calibra	tion Data		
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Eval	uation	<u>Limits</u>
0.00 8.06	0.00 8.06	 0.9998	Correlation Coefficient	0.999988	≥0.995
4.03	4.02 2.03	1.0044 0.9943	Slope	0.999419	0.90 - 1.10
			Intercept	0.000800	+/-0.5
8.0 7.0 6.0					
(mdd 5.0 					
4.0					
Indicated 0					
2.0					
1.0					
0.0	2.0	4.0	6.0	8.0	10.0
0.0	2.0			0.0	10.0
		Calculated	l Conc. (ppm)		

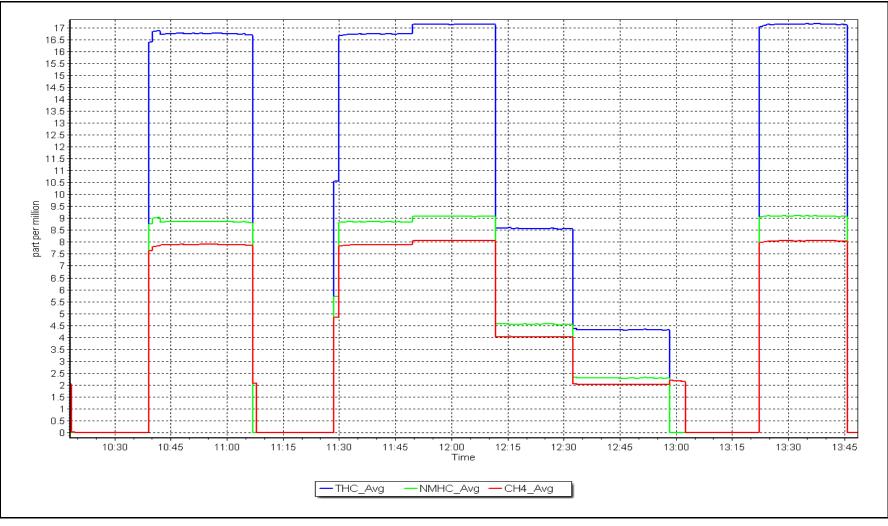


NMHC Calibration Summary

		Station I	nformation		
Calibration Date:	February	16, 2023	Previous Calibration:	January	9, 2023
Station Name:	Patricia	McInnes	Station Number:	AM	S06
Start Time (MST):	10	:17	End Time (MST):	13:	49
Analyzer make:	Thern	no 55i	Analyzer serial #: 1180320037		20037
		Calibra	tion Data		
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999993	≥0.995
9.07 4.54	9.08 4.55	0.9986			
2.27	2.29	0.9985	Slope	1.000630	0.90 - 1.10
			Intercept	0.008539	+/-0.5
8.0					
(m 6.0 5.0 Couc					
5.0					
4.0 3.0					
2.0					
1.0					
0.0	2.0	4.0	6.0	8.0	10.0
0.0	2.0			2.0	

NMHC Calibration Plot







THC / CH₄ / NMHC Calibration Report

Station Information

Version-01-2020

Station Name:	Pati
Calibration Date:	Feb
Start time (MST):	10:5
Reason:	Mai

atricia McInnes ebruary 25, 2023 0:52 Aaintenance Station number: AMS06 Last Cal Date: February 16, 2023 End time (MST): 17:04

2024

ppm

ppm

			Calibration Standards
Gas Cert Reference:		AAL070632	Cal Gas Expiry Date: September 9,
CH4 Cal Gas Conc.	501.6	ppm	CH4 Equiv Conc. 1066.2
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
Removed C3H8 Conc.	205.3	ppm	Diff between cyl (THC):
Diff between cyl (CH ₄):			Diff between cyl (NM):
Calibrator Model:	API T700		Serial Number: 3566

ZAG make/model: A	PI T701		Serial Number: 261				
		Analyzer Ir	nformation				
Analyzer make: T			Analyzer serial #: 11	180320037			
THC Range (ppm): 0 NMHC Range (ppm): 0			CH4 Range (ppm): 0 - 10 ppm				
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>		
CH4 SP Ratio:	3.19E-04	3.26E-04	NMHC SP Ratio:	5.63E-05	5.79E-05		
CH4 Retention time:	13.8	14.0	NMHC Peak Area:	161210	156880		

THC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.0</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.3	17.12	14.77	1.159
as found 2nd point	4960	40.2	8.57	7.37	1.163
as found 3rd point	4980	20.1	4.29	3.70	1.158
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4920	80.3	17.12	17.14	0.999
second point	4960	40.2	8.57	8.54	1.004
third point	4980	20.1	4.29	4.29	0.999
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.3	17.12	17.09	1.002
			Aver	age Correction Factor	1.000
Baseline Corr AF:	14.77	Prev response	17.13	*% change	-16.0%
Baseline Corr 2nd AF:	7.4	AF Slope:	0.862320	AF Intercept:	-0.003271
Baseline Corr 3rd AF:	3.7	AF Correlation:	0.999996	* = > +/-5% change initia	tes investigation



THC / CH₄ / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF <i>Limit= 0.95-1.05</i>
as found zero	5000	0	0.00	0.00	
as found span	4920	80.3	9.07	7.58	1.196
as found 2nd point	4960	40.2	4.54	3.79	1.199
as found 3rd point	4980	20.1	2.27	1.90	1.196
new cylinder response					
calibrator zero	5000	0	0.00	0.00	
high point	4920	80.3	9.07	9.08	0.999
second point	4960	40.2	4.54	4.54	1.001
third point	4980	20.1	2.27	2.28	0.996
as left zero	5000	0	0.00	0.00	
as left span	4920	80.3	9.07	9.06	1.001
			Ave	rage Correction Factor	0.998
Baseline Corr AF:	7.58	Prev response	9.08	*% change	-19.8%
Baseline Corr 2nd AF:	3.8	AF Slope:	0.836122	AF Intercept:	-0.002285
Baseline Corr 3rd AF:	1.9	AF Correlation:	0.999998	* = > +/-5% change initiat	es investigation

CH4 Calibration Data

			liun Dala		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.3	8.06	7.19	1.121
as found 2nd point	4960	40.2	4.03	3.59	1.125
as found 3rd point	4980	20.1	2.02	1.80	1.118
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4920	80.3	8.06	8.06	0.999
second point	4960	40.2	4.03	4.00	1.007
third point	4980	20.1	2.02	2.01	1.002
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.3	8.06	8.03	1.003
			Aver	age Correction Factor	1.003
Baseline Corr AF:	7.19	Prev response	8.05	*% change	-12.0%
Baseline Corr 2nd AF:	3.59	AF Slope:	0.891680	AF Intercept:	-0.000785
Baseline Corr 3rd AF:	1.80	AF Correlation:	0.999995	* = > +/-5% change initiat	es investigation

Calibration Statistics

	<u>Start</u>	<u>Finish</u>	
THC Cal Slope:	1.000113	1.000813	
THC Cal Offset:	0.008939	-0.008055	
CH4 Cal Slope:	0.999419	1.000524	
CH4 Cal Offset:	0.000800	-0.008597	
NMHC Cal Slope:	1.000630	1.001070	
NMHC Cal Offset:	0.008539	0.000542	

Notes:

Changed pump after MAF's. Adjusted span only.

Calibration Performed By:

Mohammed Kashif



THC Calibration Summary

		Station I	nformation			
Calibration Date:	February	25, 2023	Previous Calibration:	February	16, 2023	
Station Name:		McInnes	Station Number:	-	AMS06	
Start Time (MST):	10:52		End Time (MST):	17:		
Analyzer make:		no 55i	Analyzer serial #:	11803		
-						
		Calibra	tion Data			
Calculated concentration (ppm) (Cc)	n Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>	
0.00	0.00		Correlation Coefficient	0.999991	≥0.995	
17.12	17.14	0.9989				
8.57 4.29	<u>8.54</u> 4.29	1.0039 0.9986	Slope	1.000813	0.90 - 1.10	
4.25	4.23	0.5580	Intercept	-0.008055	+/-0.5	
18.0				·		
18.0						
16.0 —						
14.0 —						
12.0 —						
(u d 10.0 –						
(bbm) 10.0						
0.6 C						
0.6 undicated						
- 4.0 +						
2.0 —						
0.0	-	0	10.0	15.0	20.0	
0.0	5	.0		15.0	20.0	
		Calculated	Conc. (ppm)			



CH₄ Calibration Summary

Calibration E Station Nam Start Time (N Analyzer ma Calculated cond (ppm) (0 0.00 8.06	ne: MST):	Patricia	/ 25, 2023 McInnes):52	nformation Previous Calibratio Station Numbe		v 16, 2023 ISO6
Station Nam Start Time (N Analyzer ma Calculated cond (ppm) (0 0.00	ne: MST):	Patricia 10	McInnes I:52			
Start Time (N Analyzer ma Calculated cond (ppm) (0 0.00	MST):	10	:52			1500
Analyzer ma Calculated cond (ppm) (0 0.00				End Time (MS		:04
(ppm) (0 0.00			no 55i	Analyzer serial		320037
(ppm) (0 0.00						
(ppm) (0 0.00			Calibra	ition Data		
		Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistica	I Evaluation	<u>Limits</u>
		0.00 8.06	0.9992	Correlation Coefficie	nt 0.999979	≥0.995
4.03		4.00	1.0075	Slope	1.000524	0.90 - 1.10
2.02	2	2.01	1.0017	Slope	1.000324	0.90 - 1.10
				Intercept	-0.008597	+/-0.5
	0.0		CH₄ Calibratio			
	3.0					
/	.0					
6	5.0					
(mdd) 2 2000: 4	5.0 —					
4 Conc.	I.0					
Indicated 9	8.0					
	2.0					
1	0					
0	0.0	2.0	4.0	6.0	8.0	10.0
			Calculated	d Conc. (ppm)		

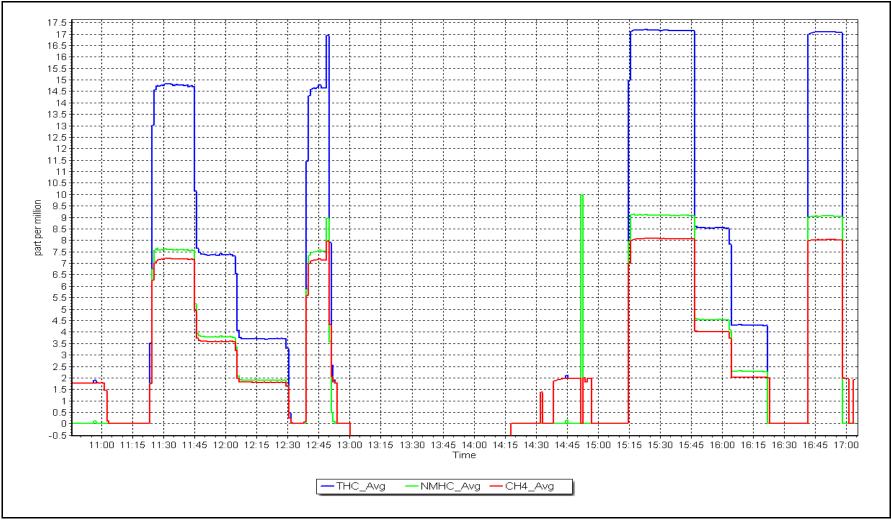


NMHC Calibration Summary

		Station I	nformation		
Calibration Date:	Februar	y 25, 2023	Previous Calibration:	February 16, 2023	
Station Name:	Patricia	McInnes	Station Number:	AM	S06
Start Time (MST):	10):52	End Time (MST):	17:	04
Analyzer make:	Ther	mo 55i	Analyzer serial #:	11803	20037
		Calibra	ition Data		
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999997	≥0.995
9.07	9.08	0.9986			
4.54	4.54	<u>1.0007</u> 0.9959	Slope	1.001070	0.90 - 1.10
	0		Intercept	0.000542	+/-0.5
9.0 8.0 7.0					
6.0 (bbm)					
5.0					
0.4 de					
3.0 –					
2.0					
1.0					
0.0	2.0	4.0	6.0	8.0	10.0
0.0	2.0		d Conc. (ppm)	0.0	10.0

NMHC Calibration Plot







$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

			Station Inform	mation			
Station Name: Calibration Date: Start time (MST): Reason:							
			Calibration Sta	andards			
NO Gas Cylinder #:	T26D9MR			Cal Gas Expiry Date:	August 18, 2023		
NOX Cal Gas Conc:	52.51	ppm		NO Cal Gas Conc:	51.98	ppm	
Removed Cylinder #:	N/A		Re	moved Gas Exp Date:	N/A		
Removed Gas NOX Conc:	52.51	ppm	Re	moved Gas NO Conc:		ppm	
NOX gas Diff:				NO gas Diff:			
Calibrator Model:	Teledyne API T700			Serial Number:			
ZAG make/model:	Teledyne API T701			Serial Number:	689		
			Analyzer Infor	mation			
Analyzer make:	Thermo 42i			Analyzer serial #:	1172750022		
NOX Range (ppb):				.,			
	<u>Start</u>		<u>Finish</u>		<u>Start</u>		<u>Finish</u>
NO coeff or slope:			<u>Finish</u> 0.818	NO bkgnd or offset:	<u>Start</u> 3.2		<u>Finish</u> 3.2
NO coeff or slope: NOX coeff or slope:	0.818			NO bkgnd or offset: NOX bkgnd or offset:			

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	1.000715	1.004307
NO _x Cal Offset:	2.680164	2.260596
NO Cal Slope:	0.999284	1.003971
NO Cal Offset:	1.700041	1.260503
NO ₂ Cal Slope:	1.007019	1.009891
NO ₂ Cal Offset:	0.124373	0.497022



$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

				Dilu	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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	0.1	-0.3		
as found span	4923	76.9	807.6	799.5	8.2	815.2	802.4	12.8	0.9907	0.9963
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.2	-0.2		
high point	4923	76.9	807.6	799.5	8.2	812.5	803.6	8.9	0.9940	0.9948
second point	4962	38.5	404.3	400.2	4.1	408.6	402.9	5.7	0.9895	0.9934
third point	4981	19.2	201.6	199.6	2.0	207.6	203.2	4.4	0.9713	0.9823
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	0.2	-0.3		
as left span	4923	76.9	807.6	388.2	419.5	810.2	389.2	421.0	0.9968	0.9973
							Average C	orrection Factor	0.9849	0.9902
Corrected As fo	ound NO _x =	815.5 ppb	NO =	802.3 ppb	* = > +/-5%	6 change initiates i	nvestigation	*Percent Chang	ge NO _x =	0.6%
Previous Respo	onse NO _x =	810.9 ppb	NO =	800.6 ppb				*Percent Chang	ge NO =	0.2%
Baseline Corr 2	nd pt NO _X =	NA ppb	NO =	NA ppb	As found	$I NO_{\chi} r^2$:		Nx SI:	Nx Int:	
Baseline Corr 3	rd pt NO _x =	NA ppb	NO =	NA ppb	As found	NO r^2 :		NO SI:	NO Int:	
					As found	$I NO_2 r^2$:		NO2 SI:	NO_2 Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Co	Indicated NO2 c) 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						
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)	799.4	388.1	419.5	423.7	0.9900	101.0%
2nd GPT point (200 ppb O3)	799.4	594.2	213.4	216.4	0.9859	101.4%
3rd GPT point (100 ppb O3)	799.4	696.5	111.1	113.3	0.9802	102.0%
				Average Correction Factor	0.9853	101.5%

Notes:

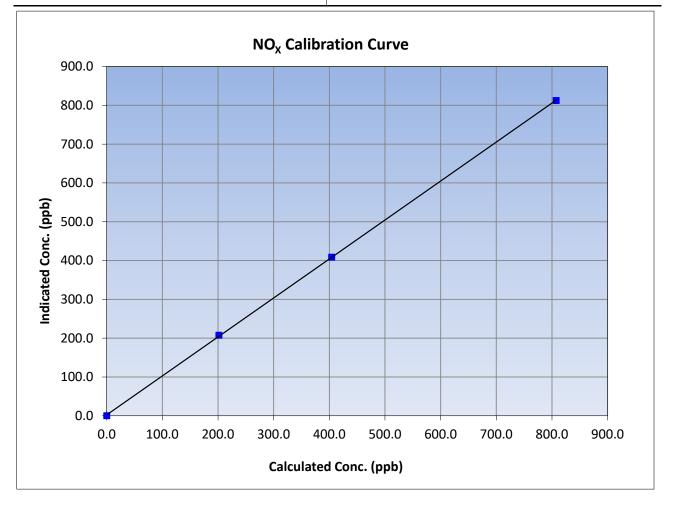
Changed the inlet filter after as founds. No adjustments made.

Calibration Performed By:



$NO_{\rm X}$ Calibration Summary

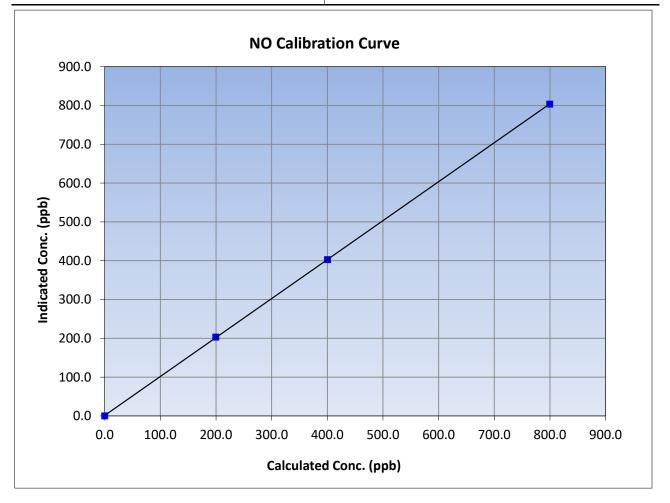
WBEA					Version-04-202
		Station	Information		
Calibration Date:	Februar	y 2, 2023	Previous Calibration:	January	5, 2023
Station Name:	Patricia	McInnes	Station Number:	AM	S06
Start Time (MST):	9:	:39	End Time (MST):	14	:14
Analyzer make:	Therr	mo 42i	Analyzer serial #: 1172750022		
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999961	≥0.995
807.6	812.5	0.9940	correlation coefficient	0.333301	20.995
404.3	408.6	0.9895	Slope	1.004307	0.90 - 1.10
201.6	207.6	0.9713	Siope	1.004507	0.90 - 1.10
			Intercept	2.260596	+/-20





NO Calibration Summary

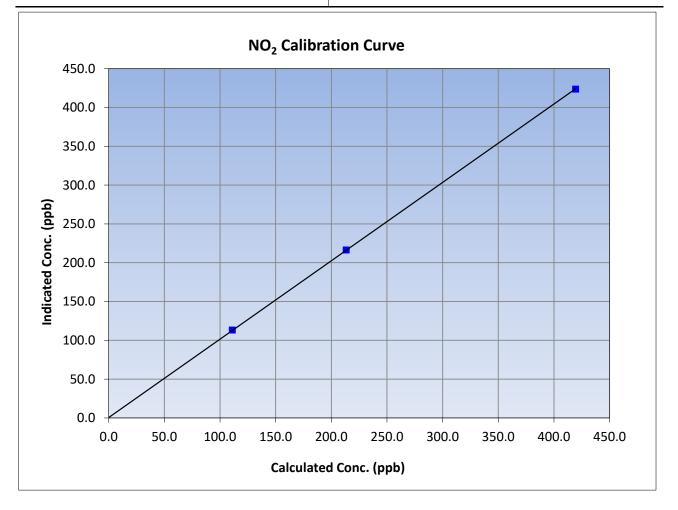
WBEA					Version-04-2	
		Station	Information			
Calibration Date:	Februar	y 2, 2023	Previous Calibration:	January	5, 2023	
Station Name:	n Name: Patricia McInnes		Station Number:		S06	
Start Time (MST):	9:	9:39 End Time (MST): 14		14	4:14	
Analyzer make:	Therr	no 42i	Analyzer serial #: 1172750022			
		Calibra	ation 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	0.999990	≥0.995	
799.5	803.6	0.9948	correlation coefficient	0.999990	20.995	
400.2	402.9	0.9934	Slope	1.003971	0.90 - 1.10	
199.6	203.2	0.9823	Siope	1.003971	0.90 - 1.10	
			Intercept	1.260503	+/-20	

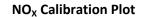




NO₂ Calibration Summary

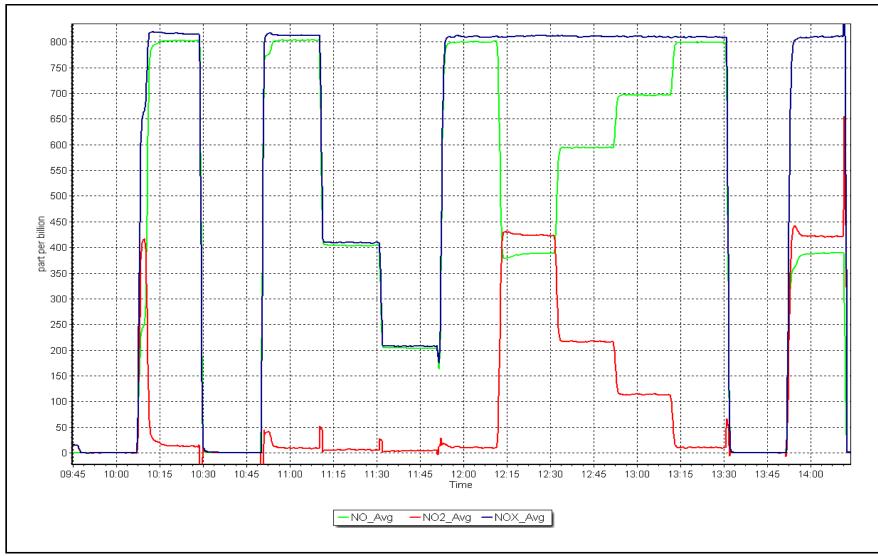
WBEA					Version-04-202	
		Station	Information			
Calibration Date:	Februar	y 2, 2023	Previous Calibration:	January	5, 2023	
Station Name:	e: Patricia McInnes		Station Number:	AM	S06	
Start Time (MST):	-): 9:39 End Time (MST):		9:39 End Time (MST):		:14	
Analyzer make:	Therr	no 42i	Analyzer serial #:	1172750022		
		Calibra	ation Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	-0.2		Correlation Coefficient	0.999987	≥0.995	
419.5	423.7	0.9900	correlation coefficient	0.555567	20.333	
213.4	216.4	0.9859	Slope	1.009891	0.90 - 1.10	
111.1	113.3	0.9802	Slope	1.009691	0.90 - 1.10	
			Intercept	0.497022	+/-20	













O₃ Calibration Report

Version-01-2020

		Station Infor	mation				
		Station infor					
Station Name:	Patricia McInnes		Station number:				
Calibration Date:	February 8, 2023			January 12, 2023			
Start time (MST):	10:19		End time (MST):	13:52			
Reason:	Routine						
		Calibration St	andards				
O3 generation mode:	Photometer						
Calibrator Make/Model:	API T700		Serial Number:	3566			
ZAG Make/Model:	API T701H	Serial Number: 689					
		Analyzer Info	rmation				
Analyzer make:	: Thermo 49i		Analyzer serial #:	1300156234			
Analyzer Range	e 0 - 500 ppb						
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	Finish		
Calibration slope:	1.004914	1.005057	Backgd or Offset:	-1.2	-1.2		
Calibration intercept:	1.440000	1.240000	Coeff or Slope:	1.019	1.019		
		O ₃ Calibratio	on Data				
	Total air flow rate	Calibrator Lamp	Calculated	Indicated concentration C	Correction factor (Cc/		
Set Point	(sccm)	Voltage Drive	concentration (ppb) (Cc)	(ppm) (Ic)	<i>Limit = 0.95-1.05</i>		
as found zero	5000	800.0	0.0	0.4			
as found span	5000	1303.0	400.0	403.3	0.992		
as found 2nd point							
as found 3rd point							
calibrator zero	5000	800.0	0.0	0.6			
high point	5000	1303.0	400.0	402.8	0.993		
second point	5000	966.5	200.0	203.0	0.985		
third point	5000	794.3	100.0	102.1	0.979		
as left zero	5000	800.0	0.0	0.9			
	5000	1303.0	400.0	405.4	0.987		
as left span				e Correction Factor	0.986		
as left span			Averag		0.500		
	402.9	Previous response		*% change	-0.1%		
Baseline Corr As found:	402.9 NA	Previous response AF Slope:	403.4	· · ·			
as left span Baseline Corr As found: Baseline Corr 2nd AF pt: Baseline Corr 3rd AF pt:			403.4	*% change			

Notes:

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

Calibration Performed By:

Max Farrell

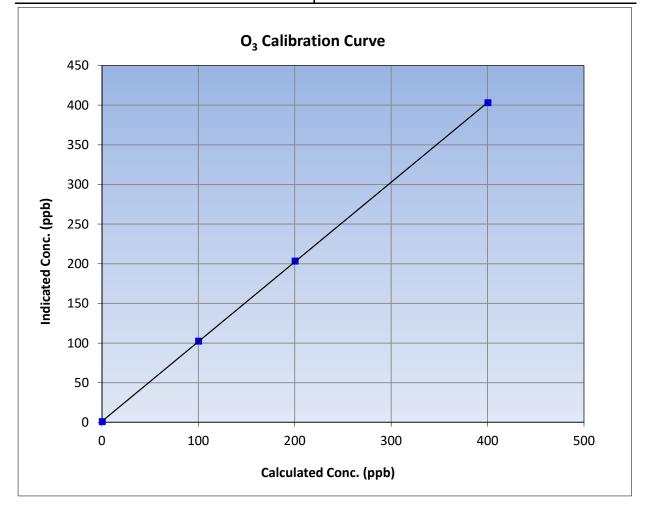


O₃ Calibration Summary

	Stati	on Information	Version-01-20
Calibration Date:	February 8, 2023	Previous Calibration:	January 12, 2023
Station Name:	Patricia McInnes	Station Number:	AMS06
Start Time (MST):	10:19	End Time (MST):	13:52
Analyzer make:	Thermo 49i	Analyzer serial #:	1300156234

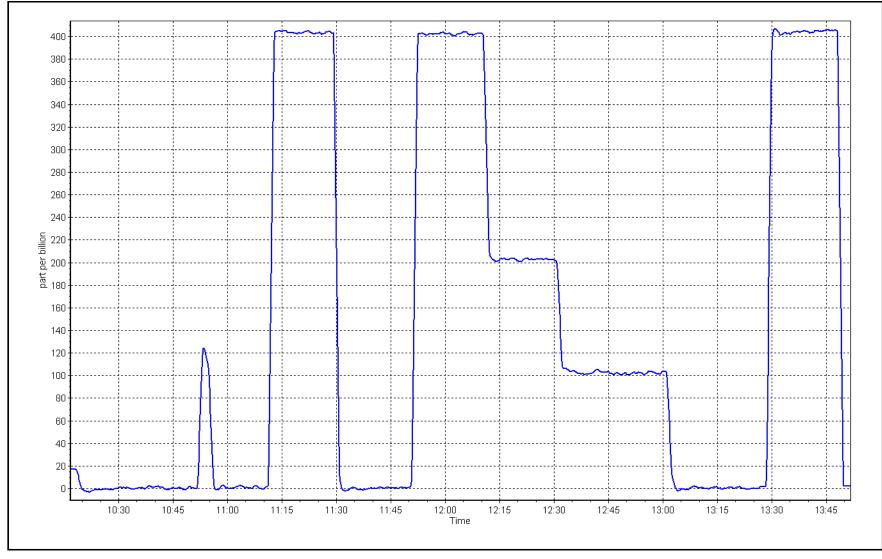
Calibration Data

Calculated concentration Indicated concentration (ppb) (Cc) (ppb) (Ic)		Correction factor (Cc/Ic)	Statistical Evalua	<u>Limits</u>	
0.0	0.6		Correlation Coefficient	0.999985	≥0.995
400.0	402.8	0.9930	correlation coefficient	0.999965	20.995
200.0	203.0	0.9852	Slope	1.005057	0.90 - 1.10
100.0	102.1	0.9794	Slope	1.005057	0.90 - 1.10
			Intercept	1.240000	+/- 5











T640 PM_{2.5} CALIBRATION

W D L A					Version-01-2023
		Station Information	n		
Station Name:	Patricia McInnes				
Calibration Date:	February 16, 2023				
Start time (MST):	14:29		End time (MST):	15:08	
			o (b)		
Analyzer Make: Particulate Fraction:	API T640		S/N:	/66	
Particulate Fraction:	PM2.5				
Flow Meter Make/Model:	Delta Cal		S/N:	628	
Temp/RH standard:	Delta Cal		628		
		Monthly Calibration T	est		
<u>Parameter</u>	<u>As found</u>	Measured	<u>As left</u>	Adjusted	(Limits)
T (°C)	-6.5	-7.2	-6.5		+/- 2 °C
P (mmHg)	715.9	713.3	715.9		+/- 10 mmHg
flow (LPM)	5.02	5.1	5.02		+/- 0.25 LPM
Leak Test:		February 16, 2023	Last Cal Date:	January 9, 2023	
Leak rest.	PM w/o HEPA:	9.1	PM w/ HEPA:	0	<0.2 ug/m3
Note: this leak check will be		-	· · · · · ·	-	
Inlet cleaning :	Inlet Head				
		Quarterly Calibration	Test		
Parameter	<u>As found</u>	Post maintenance	As left	Adjusted	(Limits)
PMT Peak Test					11.3 +/- 0.5
					,
Post-maintenance	e leak check:	PM w/o HEPA:		w/ HEPA:	
Date Optical Charr		January 9,	2023		<0.2 ug/m3
Disposable Filte	r Changed:	January 9,	2023		
		Annual Maintenand	ce		
Date Sample Tub	pe Cleaned:	August 28,	, 2020		
Date RH/T Sense	or Cleaned:	August 28,	, 2020		
Notes:	PMT Peak	test completed last mon	th. Leak check pass	ed. No adjustments ma	ade.
Calibration by:	Max Farrell				



TN - NO_X - NH_3 Calibration Report

WBEA					Version-11-2021
		Statio	n Information		
Station Name:	Patricia McInnes		Station number:	AMS 06	
NOX Cal Date:	February 7, 2023		Last Cal Date: January 11, 2023		
Start time (MST):	9:09		End time (MST):	13:20	
NH3 Cal Date:	February 7, 2023		Last Cal Date:	January 11, 2023	
Start time (MST):	13:21		End time (MST):	15:25	
Reason:	Routine				
		Calibra	tion Standards		
NOX Cal Gas Conc:	52.51	ppm	NO Gas Cylinder #:	T26D9MR	
NO Cal Gas Conc:	51.98	ppm	NO Cal Gas Expiry:	August 18, 2023	
Removed NOX Conc:	52.51	ppm	Removed Cylinder #:	N/A	
Removed NO Conc:	51.98	ppm	Removed cyl Expiry:	N/A	
NOX gas Diff:			NO gas Diff:		
NH3 Cal Gas Conc:	73.9	ppm	NH3 Gas Cylinder #:	CC430800	
			, NH3 Cal Gas Expiry:	January 7, 2023	
Removed NH3 Conc:	73.9	ppm	Removed Cylinder #:		
NH3 gas Diff:			Removed cyl Expiry:		
Calibrator Model:	AP	I T700	Serial Number:	3566	
ZAG make/model:	AP	I T701	Serial Number:	689	
		Analyz	er Information		
Analyzer model			Analyzer serial #		
Converter model			Converter serial #		
NH3 Range (ppb)			Reaction cell Press:	: 5.70	
NOX Range (ppb)	: 0 - 1000 ppb		Sample Flow:	: 531	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient		0.853	TN coefficient:		0.851
NOX coefficient		0.855	NO bkgrnd:		-0.1
NO2 coefficient		1.000	NOX bkgrnd:		0.0
NH3 coefficient	: 0.951	0.951	TN bkgrnd:	0.0	0.0
		Calibra	ation Statistics		
		<u>Start</u>		<u>Finish</u>	
NO _x Cal Slope	:	0.996497		0.994899	
NO _x Cal Offset		1.220653		2.960281	
NO Cal Slope		1.002531		0.994939	
NO Cal Offset		-0.260924		1.319966	
NO ₂ Cal Slope		1.003819		0.993439	
NO ₂ Cal Offset	:	1.157200		1.205483	
NH3 Cal Slope	:	0.998364		0.998917	
NH3 Cal Offset	:	7.107284		8.375709	
TN Cal Slope	:	1.003901		1.004451	
TN Cal Offset	:	5.611013		8.831802	



TN - NOX - NH₃ Calibration Report

Version-11-2021

				Dilut	ion 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	0.4	-0.3	0.7		
as found NO	4923	76.9	807.6	807.6		796.1	790.1	5.9	1.014	
calibrator zero	5000	0.0	0.0	0.0	0.0	0.6	0.4	0.2		
high NO point	4923	76.9	807.6	807.6		802.1	805.3	-3.2	1.007	
NO/O3 point	4923	76.9	807.6	807.6		803.5	802.8	0.7	1.005	
as found NH3	3415	85.3	1801.0		1801.0	1813.5		1803.1	0.993	0.999
new NH3 cyl rp										
first NH3	3415	85.3	1801.0		1801.0	1813.5		1803.1	0.993	0.999
second NH3	3453	47.4	1000.8		1000.8	1017.3		1011.3	0.984	0.990
third NH3	3476	23.7	500.4		500.4	520.9		517.6	0.961	0.967
							Average C	orrection Factor	1.0060	0.9851
Corrected As fo	ound TN =	795.7 ppb	NO _x = 790.4	ppb NH3 =	1802.4 ppb			*Percent Chang	e TN =	-2.6%
Previous Respo	nse TN =	816.4 ppb	NO _x = 806.0	ppb NH3 =	1805.2 ppb			*Percent Chang	e NO _x =	-2.0%
NH3 Previous C	onverter Efficie	ncy = 95.1%						*Percent Chang * = > +/-5% change		-0.2% on

Dilution Calibration Data

NH3 Current Converter Efficiency = 95.1%



NO_x - NO - NO₂ Calibration Report

Version-11-2021

				Diluti	on 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 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	0.4	0.4		
as found span	4923	76.9	807.6	799.5	807.6	790.1	782.9	796.1	1.0222	1.0211
new NO cyl rp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.4	0.3	0.6		
high point	4923	76.9	807.6	799.5	807.6	805.3	796.2	802.1	1.0029	1.0041
second point	4962	38.5	404.3	400.2	404.3	406.1	400.1	405.0	0.9956	1.0004
third point	4981	19.2	201.6	199.6	201.6	206.4	200.9	205.1	0.9769	0.9935
							Average C	Correction Factor	0.9918	0.9993
Baseline Corr A	s fnd TN =	795.7 ppb	NO _x = 790.4	ppb NO =	782.5 ppb			*Percent Chang	e TN =	-2.6%
Previous Respo	onse TN =	816.4 ppb	NO _x = 806.0	ppb NO =	801.2 ppb			*Percent Chang	e NO _x =	-2.0%
								*Percent Chang	e NO =	-2.4%
								* = > +/-5% change	initiates investigati	on

		GF	PT Calibration Data			
O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) Calibration Limit = 0.95-1.05 As Found Limit = 0.90-1.10	Converter Efficiency Calibration Limit = 96-104%
as found zero			0.0	-0.7		
calibration zero			0.0	0.1		
1st GPT point (400 ppb O3)	796.9	385.8	419.3	416.9	1.0056	99.4%
2nd GPT point (200 ppb O3)	796.9	592.6	212.5	213.5	0.9951	100.5%
3rd GPT point (100 ppb O3)	796.9	693.5	111.6	112.7	0.9898	101.0%
				Average Correction Factor	0.9968	100.3%

Notes:

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

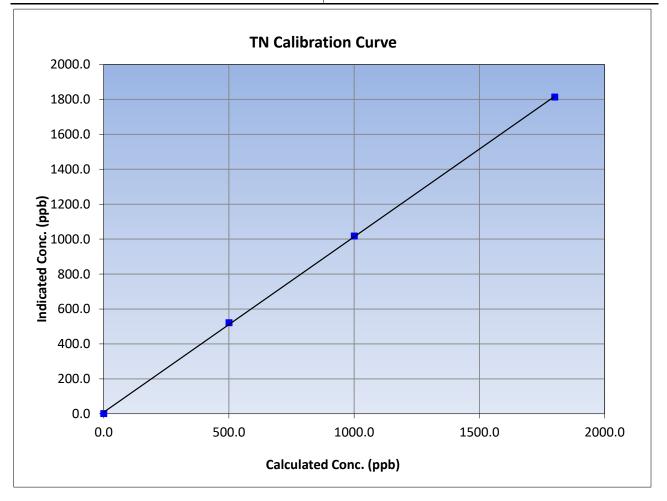
Calibration Performed By:

Max Farrell



TN Calibration Summary

		Station	Information		
Calibration Date:	February	y 7, 2023	Previous Calibration:	January	y 11, 2023
Station Name:	Patricia	McInnes	Station Number:	AN	AS 06
Start Time (MST):	9:	9:09		1	3:20
Analyzer make:	API T201		Analyzer serial #:	:	152
		Cullore	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
			Statistical Evalu		
(ppb) (Cc)	(ppb) (Ic)	Correction factor (Cc/lc)		ation 0.999896	<u>Limits</u> ≥0.995
(ppb) (Cc) 0.0	(ppb) (Ic) 0.6	Correction factor (Cc/Ic)	Statistical Evalua	0.999896	≥0 <i>.9</i> 95
(ppb) (Cc) 0.0 1801.0	(ppb) (Ic) 0.6 1813.5	Correction factor (Cc/Ic) 0.9931	Statistical Evalu		

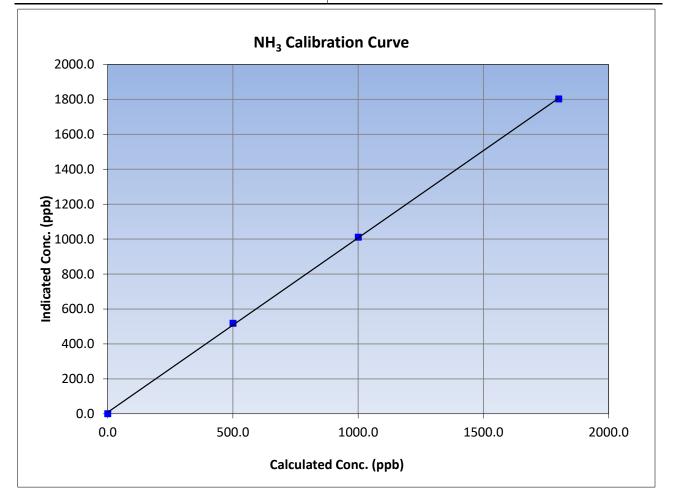


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NH₃ Calibration Summary

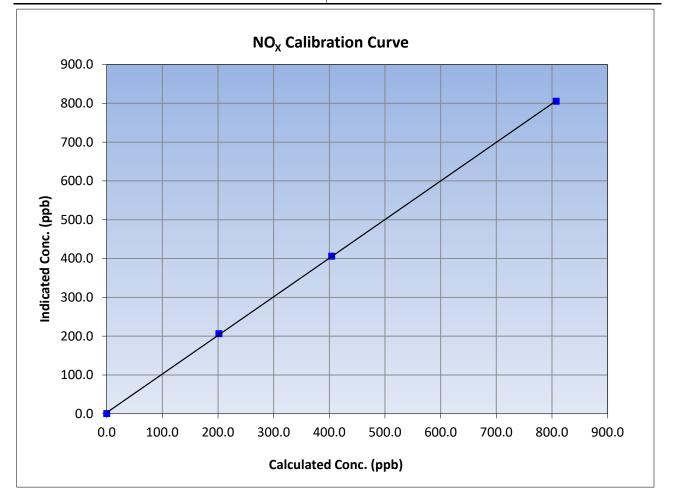
WBEA		Station	Information		Version-11-
Calibration Date:	Februar	y 7, 2023	Previous Calibration:	January	11, 2023
Station Name:	Patricia	McInnes	Station Number:	AN	1S 06
Start Time (MST):	9:09		End Time (MST):	13	3:20
Analyzer make:	API T201		Analyzer serial #:	152	
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Calibra Correction factor (Cc/lc)	ation Data Statistical Evalu	ation	<u>Limits</u>
0.0	0.2		Correlation Coefficient	0.999896	≥0.995
1801.0	1803.1	0.9989	correlation coernelent	0.555050	20.000
1000.8	1011.3	0.9896	Slope	0.998917	0.90 - 1.10
500.4	517.6	0.9668	Jope	0.550917	0.50 1.10
			Intercept	8.375709	+/-20





NO_x Calibration Summary

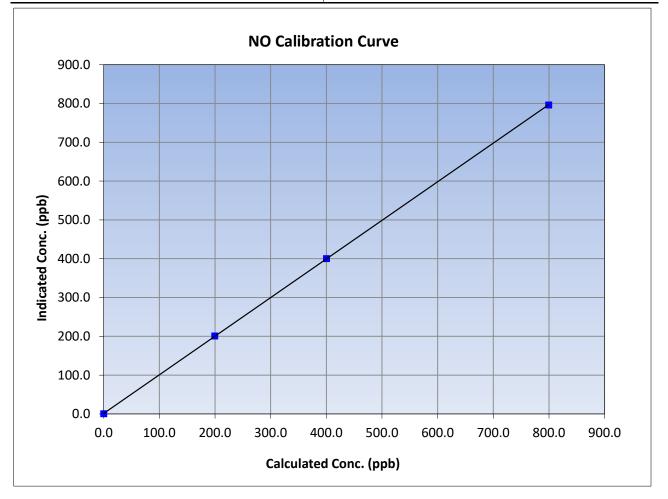
WBEA		Station	Information		Version-11-2
Calibration Date:	Fobruar		Previous Calibration:	lanuar	,11 2022
		y 7, 2023			y 11, 2023
Station Name:	Patricia	McInnes	Station Number:	AN	AS 06
Start Time (MST):	9:	9:09		1	3:20
Analyzer make:	API	T201	Analyzer serial #:		152
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/lc)	ation Data Statistical Evalu	ation	<u>Limits</u>
0.0	0.4		Correlation Coefficient	0.999953	≥0.995
807.6	805.3	1.0029	correlation coefficient	0.999955	20.333
404.3	406.1	0.9956	Slope	0.994899	0.90 - 1.10
201.6	206.4	0.9769	Siope	0.334833	0.50 1.10
			Intercept	2.960281	+/-20





NO Calibration Summary

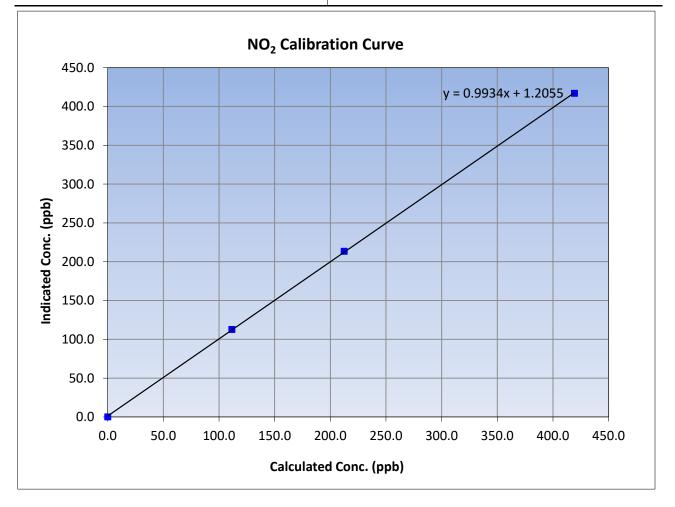
WBEA		<u></u>			Version-11-20
		Station	Information		
Calibration Date:	Februar	y 7, 2023	Previous Calibration:	Janua	ry 11, 2023
Station Name:	Patricia	McInnes	Station Number:	А	MS 06
Start Time (MST):	9:09		End Time (MST):		13:20
Analyzer make:	API T201		Analyzer serial #:	152	
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>
0.0	0.3		Correlation Coefficient	0.999992	≥0.995
799.5	796.2	1.0041	correlation coernicient	0.999992	20.995
400.2	400.1	1.0004	Slope	0.994939	0.90 - 1.10
199.6	200.9	0.9935	Siope	0.334959	0.90 - 1.10
			Intercept	1.319966	+/-20

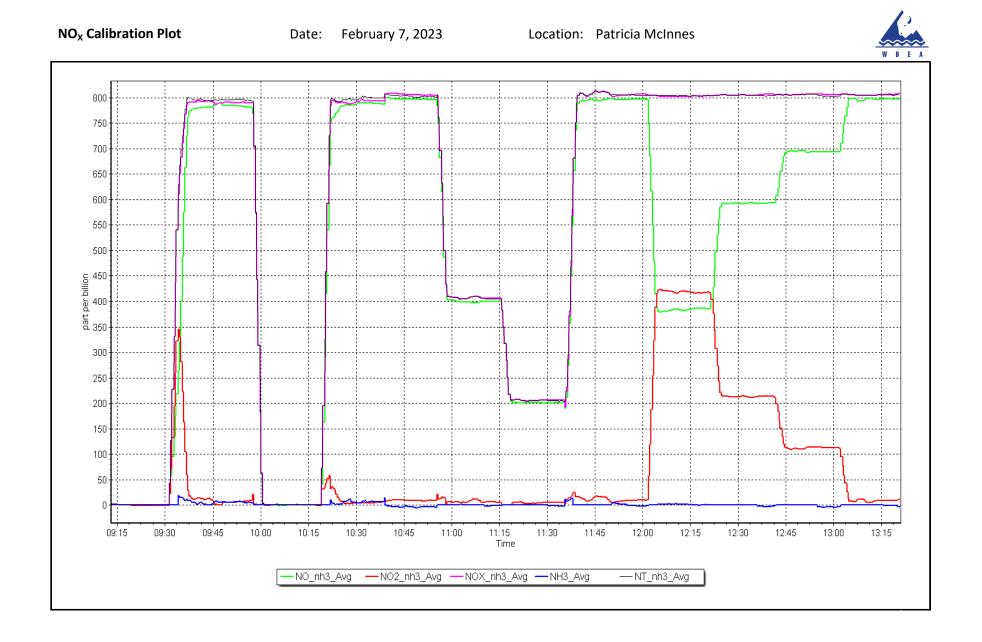


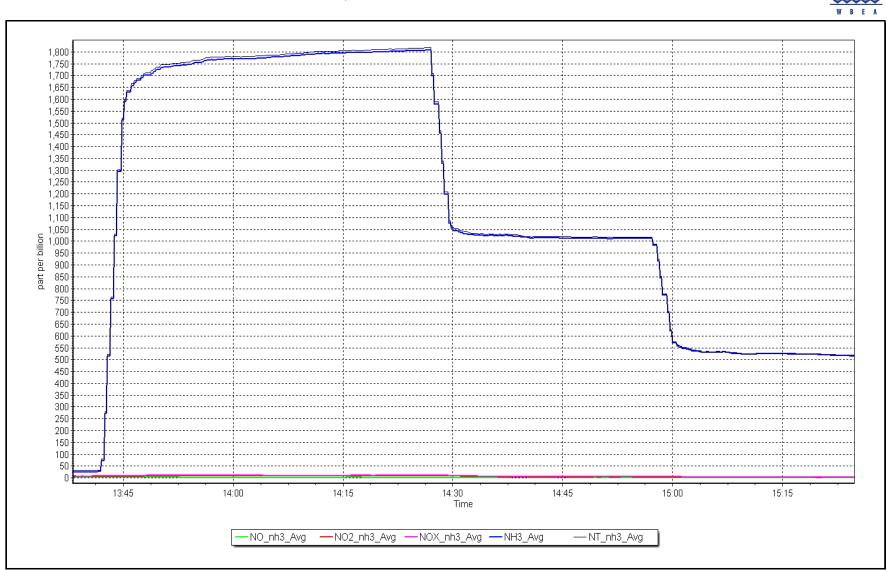


NO₂ Calibration Summary

WBEA		<u></u>			Version-11-20
		Station	Information		
Calibration Date:	February	<i>i</i> 7, 2023	Previous Calibration:	January	y 11, 2023
Station Name:	Patricia	McInnes	Station Number:	AN	/IS 06
Start Time (MST):	9:09		End Time (MST):	1	3:20
Analyzer make:	API T201		Analyzer serial #:	:	152
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999959	>0.005
419.3	416.9	1.0056	Correlation Coefficient	0.999959	≥0.995
212.5	213.5	0.9951	Slope	0.993439	0.90 - 1.10
111.6	112.7	0.9898	Slope	0.995459	0.90 - 1.10
			Intercept	1.205483	+/-20







NH₃ Calibration Plot

Location: Patricia McInnes



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS07 ATHABASCA VALLEY FEBRUARY 2023

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

March 31, 2023



SO₂ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Athabasca Valley February 1, 2023 7:20 Routine		Station number: Last Cal Date: End time (MST):	AMS07 January 16, 2023 10:22	
		Calibration St	andards		
Cal Gas Concentration:	50.52	ppm	Cal Gas Exp Date:	December 29, 2028	
Cal Gas Cylinder #:	CC282115				
Removed Cal Gas Conc:	50.52	ppm	Rem Gas Exp Date:	NA	
Removed Gas Cyl #:	NA ADI TZOO		Diff between cyl:	2005	
Calibrator Make/Model: ZAG Make/Model:	API T700 API 701H		Serial Number: Serial Number:	3805 198	
	AFI /UIN		Serial Number.	190	
		Analyzer Info	rmation		
Analyzer make Analyzer Range	: Thermo 43i-LTE e 0 - 1000 ppb		Analyzer serial #:	1507864683	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.997038	0.998179	Backgd or Offset:	2.70	2.71
Calibration intercept:	1.683589	1.983813	Coeff or Slope:	0.857	0.857
		SO ₂ Calibratio	on Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration ((ppb) (Ic)	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	802.5	0.998
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	800.3	1.001
second point	4960	39.6	400.2	403.9	0.991
third point	4980	19.8	200.1	202.4	0.988
as left zero	5000	0.0	0.0	0.1	
as left span	4921	79.2	800.2	801.8	0.998
			Averag	ge Correction Factor	0.993
	802.60	Previous response	800.51	*% change	0.3%
Baseline Corr As found:					
Baseline Corr As found: Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	

Notes:

No adjustments or maintenance done.

Calibration Performed By:

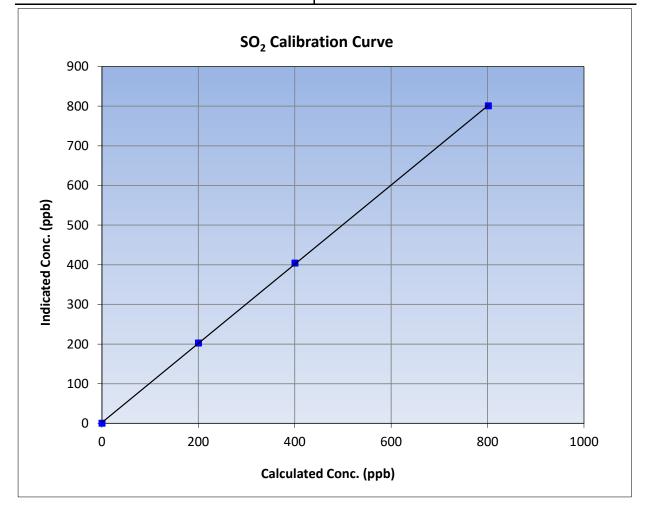


SO₂ Calibration Summary

WBEA			Version-01-2020
	Stati	on Information	
Calibration Date:	February 1, 2023	Previous Calibration:	January 16, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	7:20	End Time (MST):	10:22
Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1507864683

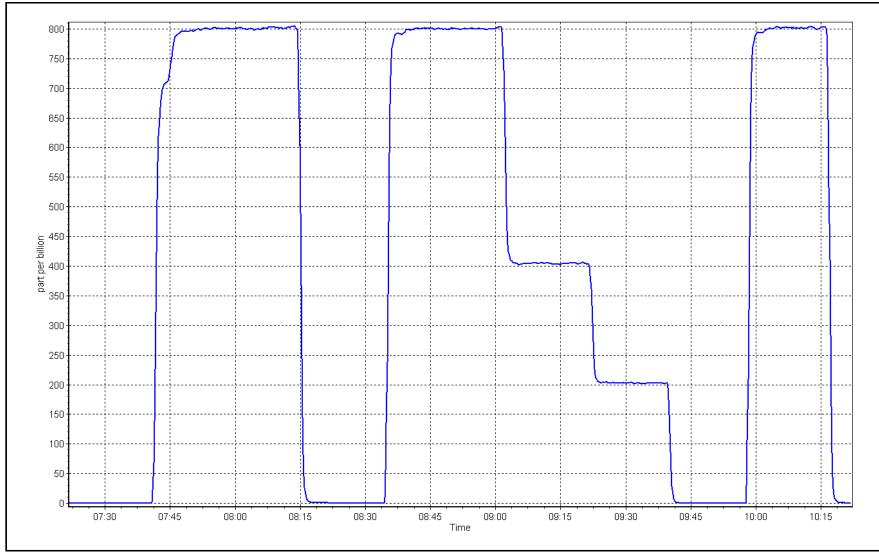
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.2		Correlation Coefficient	0.999966	≥0.995
801.2	800.3	1.0011	Correlation Coefficient	0.999900	20.335
400.2	403.9	0.9907	Slope	0.998179	0.90 - 1.10
200.1	202.4	0.9885	Slope	0.998179	0.90 - 1.10
			- Intercept	1.983813	+/-30











TRS Calibration Report

WBEA					Version-11-2021
		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Athabasca Valley February 6, 2023 8:15 Routine		Station number: Last Cal Date: End time (MST):	AMS07 January 17, 2023 14:20	
		Calibration S	tandards		
Cal Gas Concentration: Cal Gas Cylinder #:	4.94 EY0002277	ppm	Cal Gas Exp Date:	February 9, 2024	
Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model: ZAG Make/Model:	4.94 NA API T700 API T701H	ppm	Rem Gas Exp Date: Diff between cyl: Serial Number: Serial Number:	NA 3805 198	
ZAG Make/ Model.	APITIOIN		Senai Number.	190	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	Thermo 43i LTE CDN-101 0 - 100 ppb		Analyzer serial #: Converter serial #:	1180540018 551	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope: Calibration intercept:	0.987815 0.181600	0.988807 0.421592	Backgd or Offset: Coeff or Slope:		2.33 0.886
		TRS As Four	nd 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	81.6	80.6	78.6	1.026
as found 2nd point	4959	40.8	40.3	39.2	1.028
as found 3rd point	4980	20.4	20.2	19.4	1.039
new cylinder response					
		TRS Calibrat	ion Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	0.5	
high point	4918	81.6	80.6	80.2	1.005
second point	4959	40.8	40.3	40.2	1.003
third point	4980	20.4	20.2	20.3	0.993
as left zero	5000	0.0	0.0	0.4	
as left span	4918	81.6	80.6	79.5	1.014
SO2 Scrubber Check	4921	79.2	800.2	-0.4	
Date of last scrubber cha	-	25-Feb-22		Ave Corr Factor	1.000
Date of last converter eff	iciency test:	April 22, 2022		98.5%	efficiency
Baseline Corr As found: Baseline Corr 2nd AF pt: Baseline Corr 3rd AF pt:	78.6 39.2 19.4	Prev response: AF Slope: AF Correlation:	0.975767	*% change: AF Intercept:	-1.6% -0.118432
	±2.7		0.000000	* = > +/-5% change initiat	es investigation

Notes:

Sox scrubber failed and Beads replaced. Sox scrubber hydrated for 20mins. Sox scrubber passed after replacing beads. Span adjusted.

Calibration Performed By:

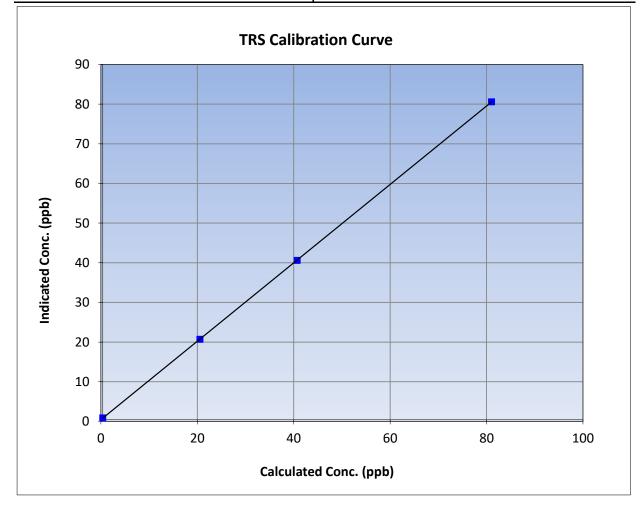


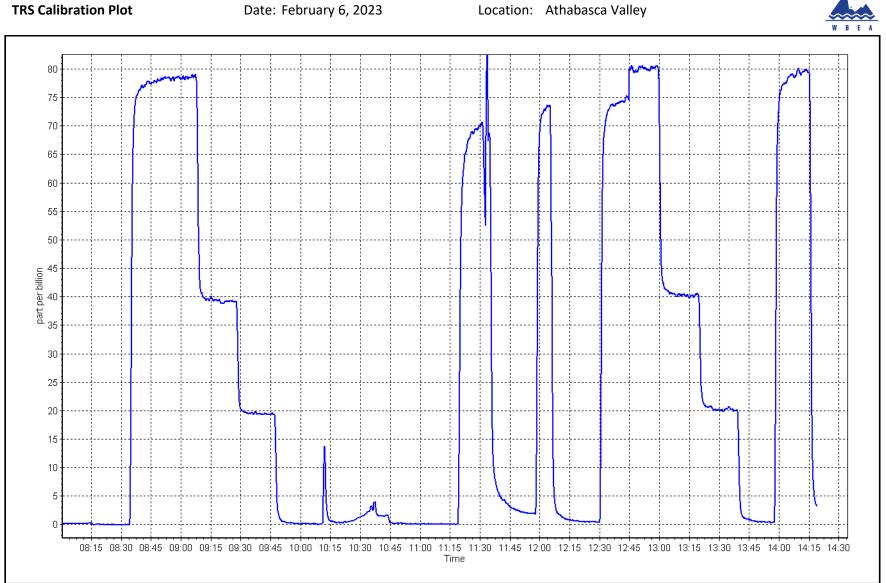
TRS Calibration Summary

	Stati	on Information	Version-11-2021
Calibration Date:	February 6, 2023	Previous Calibration:	January 17, 2023
Station Name:	Athabasca Valley	Station Number:	AMS07
Start Time (MST):	8:15	End Time (MST):	14:20
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	0.5		Correlation Coefficient	0.999995	≥0.995
80.6	80.2	1.0053	Correlation Coefficient	0.9999995	
40.3	40.2	1.0028	Slope	0.988807	0.90 - 1.10
20.2	20.3	0.9928	Slope	0.988807	0.90 - 1.10
			- Intercept	0.421592	+/-3







THC / CH₄ / NMHC Calibration Report

WBEA					Version-01-202
		Statio	n Information		
Station Name:	Athabasca Valle	Υ	Station number: AN	MS07	
Calibration Date:	February 1, 202	3	Last Cal Date: Ja	nuary 16, 2023	3
Start time (MST):	7:20		End time (MST): 10):21	
Reason:	Routine				
		Calibra	tion Standards		
Gas Cert Reference:	C	C282115	Cal Gas Expiry Date: De	ecember 29, 20)28
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: N/	Ą	
Removed CH4 Conc.	501.2	ppm	CH4 Equiv Conc.	1075.1	ppm
Removed C3H8 Conc.	208.7	ppm	Diff between cyl (THC):		
Diff between cyl (CH ₄):	:		Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number: 38	305	
ZAG make/model:	API 701H		Serial Number: 19	98	
		Analyze	er Information		
Analyzer make:	: Thermo 55i		Analyzer serial #: 13	817958219	
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:	0.000270	0.000270	NMHC SP Ratio:	4.42E-05	4.42E-05
CH4 Retention time:	: 13.4	13.4	NMHC Peak Area:	205840	205840

THC Calibration Data								
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (0	Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05			
as found zero	5000	0.0	0.00	0.00				
as found span	4921	79.3	17.05	17.08	0.998			
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	17.15	0.994			
second point	4960	39.6	8.52	8.58	0.993			
third point	4980	19.8	4.26	4.33	0.983			
as left zero	5000	0.0	0.00	0.00				
as left span	4921	79.2	17.03	17.14	0.994			
			ŀ	Average Correction Factor	0.990			
Baseline Corr AF:	17.08	Prev response	16.97	*% change	0.6%			
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:				
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initial	tes investigation			



THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data								
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05			
as found zero	5000	0	0.00	0.00				
as found span	4921	79.3	9.10	9.14	0.996			
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	9.15	0.995			
second point	4960	39.6	4.55	4.59	0.990			
third point	4980	19.8	2.27	2.32	0.980			
as left zero	5000	0.0	0.00	0.00				
as left span	4921	79.2	9.09	9.15	0.994			
			ŀ	Average Correction Factor	0.988			
Baseline Corr AF:	9.14	Prev response	9.04	*% change	1.1%			
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:				
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation			

CH4 Calibration Dat	а
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		CH4 Calibra	tion Data			
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Co	c) Ind conc (ppm) (lc)	CF Limit= 0.95-1.05	
as found zero	5000	0.0	0.00	0.00		
as found span 4921 79.3		7.95	7.94	1.001		
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	8.00	0.994	
second point	4960	39.6	3.97	3.99	0.995	
third point	4980	19.8	1.98	2.00	0.992	
as left zero	5000	0.0	0.00	0.00		
as left span	4921	79.2	7.94	8.00	0.992	
			Av	verage Correction Factor	0.994	
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 initiat	es investigation	
		Calibration	Statistics			
		<u>Start</u>		<u>Finish</u>		
THC Cal Slope:		0.994820		1.004980		
THC Cal Offset:		0.009674		0.021918		
CH4 Cal Slope:		0.998255		1.006293		
CH4 Cal Offset:		0.002012		-0.000176		
NMHC Cal Slope:		0.992058		1.004211		
NMHC Cal Offset:		0.007463		0.018094		

Notes:

Hydrogen and Nitrogen Changed. No adjustments done.

Calibration Performed By:

Melissa Lemay



THC Calibration Summary

Version-01-2020

		Station I	nformation		
Calibration Date:	February	y 1, 2023	Previous Calibration:	January	16 2023
Station Name:		ca Valley	Station Number:	AM	
Start Time (MST):		20	End Time (MST):	10	
Analyzer make:		 no 55i	Analyzer serial #:	13179	
			,, ,		
		Calibra	tion Data		
Calculated concentration (ppm) (Cc)	on Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999991	≥0.995
17.05	17.15	0.9942			
8.52 4.26	<u>8.58</u> 4.33	0.9925 0.9833	Slope	1.004980	0.90 - 1.10
4.20	7.35	0.5855	Intercept	0.021918	+/-0.5
20.0					
18.0 -					
16.0 -					
14.0 -					
ີ ພູ 12.0 -					
ן יכי 10.0 – טס					
Indicated Conc. (ppm)					
udi 6.0 –					
4.0 -					
2.0 -					
0.0) 5	.0	10.0	15.0	20.0
5.0	<u> </u>		Conc. (ppm)		_0.0



CH₄ Calibration Summary

Version-01-2020

		Station I	nformation		
Calibration Date:	Februa	ry 1, 2023	Previous Calibration:	January 2	16, 2023
Station Name:		sca Valley	Station Number:	AMS07	
Start Time (MST):		/:20	End Time (MST):	10:	21
Analyzer make:		mo 55i	Analyzer serial #:	13179	58219
			tion Data		
Calculated concentrat (ppm) (Cc)	ion Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Eval	uation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999999	≥0.995
7.95	8.00	0.9936			
3.97 1.98	3.99	0.9949 0.9924	Slope	1.006293	0.90 - 1.10
	2.00	0.3324	Intercept	-0.000176	+/-0.5
8.0 - 7.0 - 6.0 -					
(mdd) 5.0 - - 0.0 -					
uo 4.0 -					
Indicated 0					
2.0 -					
1.0 -					
0.0	0 2.0	4.0	6.0	8.0	10.0
			l Conc. (ppm)		



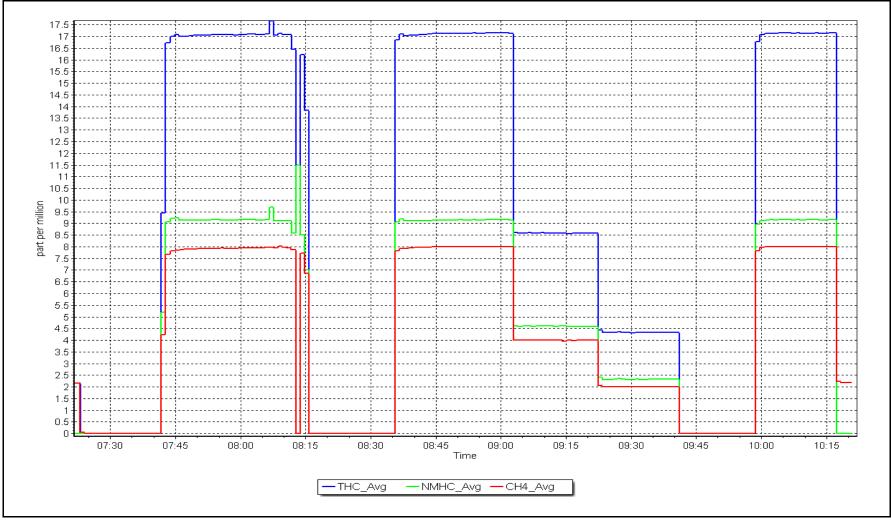
NMHC Calibration Summary

Version-01-2020

		Station I	nformation		
Calibration Date:	Februar	y 1, 2023	Previous Calibration:	January :	16, 2023
itation Name:	Athabas	ca Valley	Station Number:	AM	S07
itart Time (MST):	7:	20	End Time (MST):	10:	21
Analyzer make:	Therr	no 55i	Analyzer serial #:	13179	58219
		Calibra	tion Data		
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	c) Statistical Evaluation		<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999982	≥0.995
9.10 4.55	9.15 4.59	0.9947 0.9904			
2.27	2.32	0.9797	Slope	1.004211	0.90 - 1.10
			Intercept	0.018094	+/-0.5
9.0					•
7.0					
(bbm) 6.0 5.0 5.0					
0.4 undicated					
2.0					
2.0					
	2.0	4.0	6.0	8.0	10.0

NMHC Calibration Plot







$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

		Stat	ion Information		
Station Name: Calibration Date: Start time (MST): Reason:	Athabasca Valley February 7, 2023 7:22 Routine		Station number: Last Cal Date: End time (MST): 3	January 19, 2023	3
		Calib	ration Standards		
NO Gas Cylinder #:	T2Y1KA4		Cal Gas Expiry Date:	November 30. 20	023
NOX Cal Gas Conc:	50.92	ppm	NO Cal Gas Conc:	49.92	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date:	NA	
Removed Gas NOX Conc:	50.92	ppm	Removed Gas NO Conc:	49.92	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3805	
ZAG make/model:	API T701H		Serial Number:	198	
Analyzer make: NOX Range (ppb): NO coeff or slope NOX coeff or slope NO2 coeff or slope	0 - 1000 ppb <u>Start</u> : 1.048 : 0.995	Finish 1.048 0.995 1.000	NO bkgnd or offset: NOX bkgnd or offset:	1160120024 <u>Start</u> 7.3 7.5 197.9	<u>Finish</u> 7.3 7.5 197.9
		Calil	pration Statistics		
		<u>Start</u>		<u>Finish</u>	
NO _x Cal Slope		0.9914	45	0.991039	
NO _x Cal Offset		1.1372		1.157178	
NO Cal Slope		0.9911		0.991042	
NO Cal Offset		0.9932		0.933204	
NO ₂ Cal Slope		1.0028	06	1.000742	
NO ₂ Cal Offset	:	0.3263	00	0.457636	



$NO_X \setminus NO \setminus NO_2$ 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/lc) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/lc) 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	4920	80.2	816.7	800.7	16.0	808.6	791.4	17.1	1.0100	1.0117
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.2		
high point	4920	80.2	816.7	800.7	16.0	809.8	793.6	16.2	1.0086	1.0089
second point	4960	40.1	408.4	400.4	8.0	407.2	399.3	7.9	1.0029	1.0026
third point	4980	20.0	203.7	199.7	4.0	203.4	199.0	4.4	1.0014	1.0034
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
as left span	4920	80.2	816.7	399.5	417.2	811.5	390.9	420.6	1.0064	1.0220
							Average C	orrection Factor	1.0043	1.0050
Corrected As fo	ound NO _x =	808.6 ppb	NO =	791.5 ppb	* = > +/-5%	% change initiates i	nvestigation	*Percent Chan	ge NO _x =	-0.3%
Previous Respo	onse NO _x =	810.9 ppb	NO =	794.6 ppb				*Percent Chan	ge NO =	-0.4%
Baseline Corr 2	nd pt NO _x =	NA ppb	NO =	NA ppb	As found	d $NO_X r^2$:		Nx SI:	Nx Int:	
Baseline Corr 3	ard 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 ₂ Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Co	Indicated NO2 c) concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) Calibration Limit = 0.95-1.05 As Found Limit = 0.90-1.10	Converter Efficiency Calibration Limit = 96-104%
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	791.9	390.7	417.2	417.7	0.9989	100.1%
2nd GPT point (200 ppb O3)	791.9	595.5	212.4	213.7	0.9941	100.6%
3rd GPT point (100 ppb O3)	791.9	694.2	113.7	114.2	0.9960	100.4%
				Average Correction Factor	0.9963	100.4%

Notes:

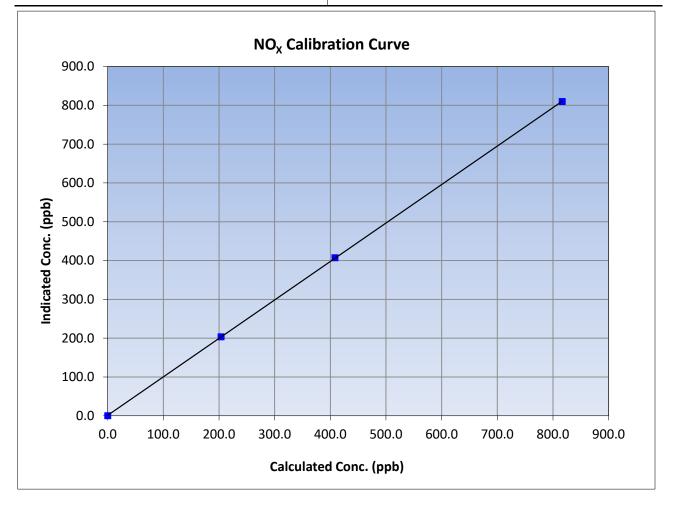
No maintenance or adjustments done.

Calibration Performed By:



$NO_{\rm X}$ Calibration Summary

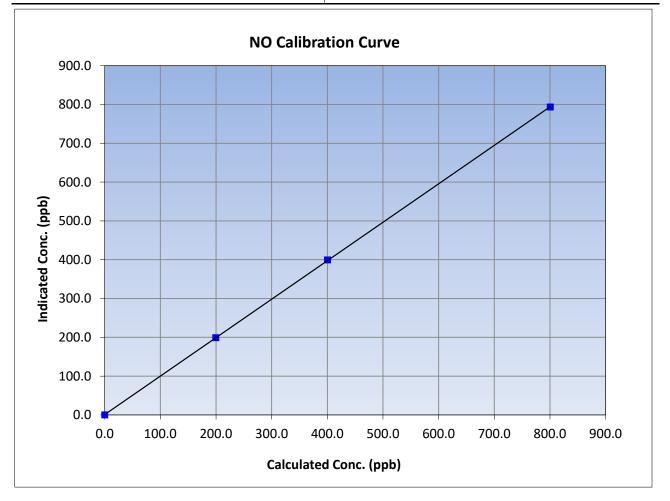
WBEA					Version-04-202
		Station	Information		
Calibration Date:	Februar	y 7, 2023	Previous Calibration:	January	19, 2023
Station Name:	Athabas	ca Valley	Station Number:	AM	S07
Start Time (MST):	7:22		End Time (MST):	11	:41
Analyzer make: Thermo 42i			Analyzer serial #: 116		20024
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.2		Correlation Coefficient	0.999990	≥0.995
816.7	809.8	1.0086	correlation coernelent	0.5555550	20.995
408.4	407.2	1.0029	Slope	0.991039	0.90 - 1.10
203.7	203.4	1.0014	Slope	0.991039	0.90 - 1.10
			Intercept	1.157178	+/-20





NO Calibration Summary

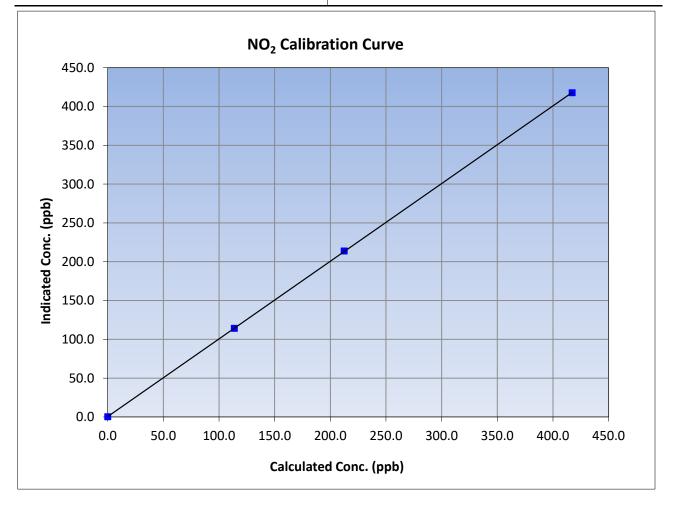
WBEA					Version-04-20	
		Station	Information			
Calibration Date:	Februar	y 7, 2023	Previous Calibration:	January	19, 2023	
Station Name:	Athabas	ca Valley	Station Number:	AM	S07	
Start Time (MST):	7:	22	End Time (MST):	11	:41	
Analyzer make: Thermo 42i			Analyzer serial #: 1160		120024	
		Calibra	ation 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	0.999988	≥0.995	
800.7	793.6	1.0089	correlation coefficient	0.999900	20.995	
400.4	399.3	1.0026	Slope	0.991042	0.00 1.10	
199.7	199.0	1.0034	Slope	0.991042	0.90 - 1.10	
			Intercept	0.933204	+/-20	

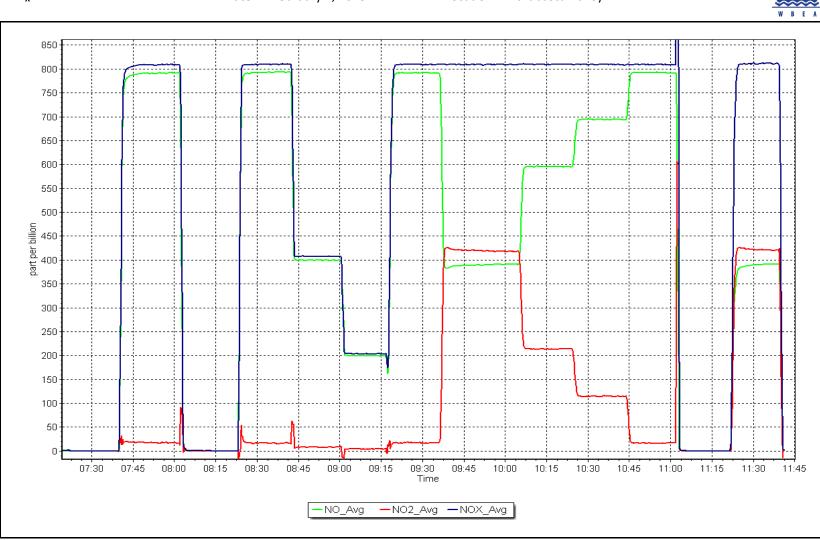




NO₂ Calibration Summary

WBEA					Version-04-202
		Station	Information		
Calibration Date:	Februar	y 7, 2023	Previous Calibration:	January	19, 2023
Station Name:	Athabasca Valley		Station Number:	AM	S07
Start Time (MST):	7:22		End Time (MST):	11	:41
Analyzer make:	Thermo 42i Analyzer serial #: 1160120024				20024
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.2		Correlation Coefficient	0.999994	≥0.995
417.2	417.7	0.9989	correlation coefficient	0.555554	20.335
212.4	213.7	0.9941	Slope	1.000742	0.90 - 1.10
113.7	114.2	0.9960	Slope	1.000742	0.90 - 1.10
			Intercept	0.457636	+/-20









O₃ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name:	Athabasca Valley		Station number:	AMS07	
Calibration Date:	, February 8, 2023		Last Cal Date:	January 20, 2023	
Start time (MST):	7:45		End time (MST):		
Reason:	Routine				
		Calibration St	andards		
		Calibration St	anuarus		
D3 generation mode:	Photometer		Cardal Number	2005	
Calibrator Make/Model:	T700		Serial Number:		
ZAG Make/Model:	T701H		Serial Number:	198	
		Analyzer Info	rmation		
Analyzer make:	Thermo 49i		Analyzer serial #:	1507964700	
Analyzer Range	0 - 500 ppb				
	<u>Start</u>	Finish		<u>Start</u>	Finish
Calibration slope:	0.995429	0.995429	Backgd or Offset:	-0.6	-0.6
Calibration intercept:	1.500000	1.600000	Coeff or Slope:	1.102	1.119
		O ₂ Calibratio	on Data		
		O ₃ Calibratio	on Data		
Set Point	Total air flow rate	O ₃ Calibratio	on Data Calculated	Indicated concentration C	orrection factor (Cc/
Set Point	Total air flow rate (sccm)	-			Correction factor (Cc/ Limit = 0.95-1.05
Set Point as found zero		Calibrator Lamp	Calculated		• •
	(sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	(ppm) (Ic)	<i>Limit = 0.95-1.05</i>
as found zero	(sccm) 5000	Calibrator Lamp Voltage Drive 0.0	Calculated concentration (ppb) (Cc) 0.0	(ppm) (Ic) -0.3	Limit = 0.95-1.05
as found zero as found span	(sccm) 5000	Calibrator Lamp Voltage Drive 0.0	Calculated concentration (ppb) (Cc) 0.0	(ppm) (Ic) -0.3	Limit = 0.95-1.05
as found zero as found span as found 2nd point	(sccm) 5000	Calibrator Lamp Voltage Drive 0.0	Calculated concentration (ppb) (Cc) 0.0	(ppm) (Ic) -0.3	Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point	(sccm) 5000 5000	Calibrator Lamp Voltage Drive 0.0 1378.0	Calculated concentration (ppb) (Cc) 0.0 400.0	(ppm) (Ic) -0.3 397.5	Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point calibrator zero	(sccm) 5000 5000 5000	Calibrator Lamp Voltage Drive 0.0 1378.0 0.0	Calculated concentration (ppb) (Cc) 0.0 400.0	(ppm) (Ic) -0.3 397.5 0.4	Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point third point	(sccm) 5000 5000 5000 5000 5000 5000 5000	Calibrator Lamp Voltage Drive 0.0 1378.0 0.0 1378.4 1022.6 844.7	Calculated concentration (ppb) (Cc) 0.0 400.0 0.0 400.0 200.0 100.0	(ppm) (Ic) -0.3 397.5 0.4 399.1	Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point	(sccm) 5000 5000 5000 5000 5000 5000	Calibrator Lamp Voltage Drive 0.0 1378.0 0.0 1378.4 1022.6	Calculated concentration (ppb) (Cc) 0.0 400.0 0.0 400.0 200.0	(ppm) (Ic) -0.3 397.5 	Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point third point	(sccm) 5000 5000 5000 5000 5000 5000 5000	Calibrator Lamp Voltage Drive 0.0 1378.0 0.0 1378.4 1022.6 844.7	Calculated concentration (ppb) (Cc) 0.0 400.0 0.0 400.0 200.0 100.0	(ppm) (Ic) -0.3 397.5 0.4 399.1 201.5 102.2	Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point third point as left zero	(sccm) 5000 5000 5000 5000 5000 5000 5000 50	Calibrator Lamp Voltage Drive 0.0 1378.0 0.0 1378.4 1022.6 844.7 0.0	Calculated concentration (ppb) (Cc) 0.0 400.0 0.0 400.0 200.0 100.0 0.0 400.0	(ppm) (Ic) -0.3 397.5 	Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point third point as left zero	(sccm) 5000 5000 5000 5000 5000 5000 5000 50	Calibrator Lamp Voltage Drive 0.0 1378.0 0.0 1378.4 1022.6 844.7 0.0	Calculated concentration (ppb) (Cc) 0.0 400.0 0.0 400.0 200.0 100.0 0.0 400.0	(ppm) (Ic) -0.3 397.5 0.4 399.1 201.5 102.2 0.4 392.6 ge Correction Factor	Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point third point as left zero as left span	(sccm) 5000 5000 5000 5000 5000 5000 5000 50	Calibrator Lamp Voltage Drive 0.0 1378.0 0.0 1378.4 1022.6 844.7 0.0 1374.5	Calculated concentration (ppb) (Cc) 0.0 400.0 0.0 400.0 200.0 100.0 0.0 400.0 200.0 Averag 399.7	(ppm) (Ic) -0.3 397.5 0.4 399.1 201.5 102.2 0.4 392.6	Limit = 0.95-1.05

Notes:

No Maintenance done. Span adjusted.

Calibration Performed By:

Melissa Lemay

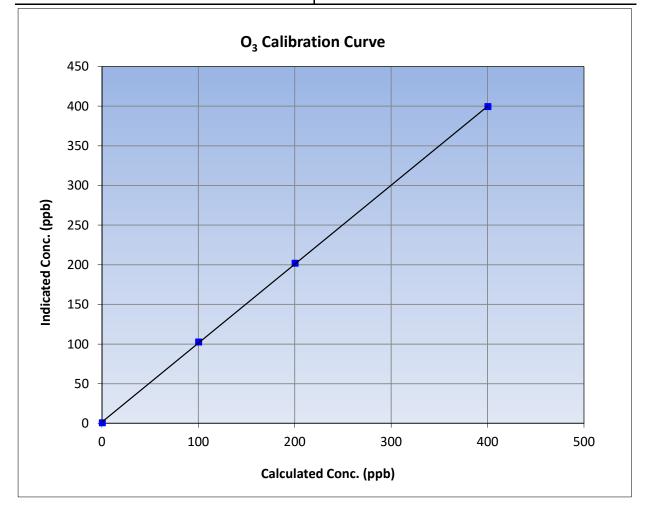


O₃ Calibration Summary

WBEA			Version-01-2020				
Station Information							
Calibration Date:	February 8, 2023	Previous Calibration:	January 20, 2023				
Station Name:	Athabasca Valley	Station Number:	AMS07				
Start Time (MST):	7:45	End Time (MST):	10:52				
Analyzer make:	Thermo 49i	Analyzer serial #:	1507964700				

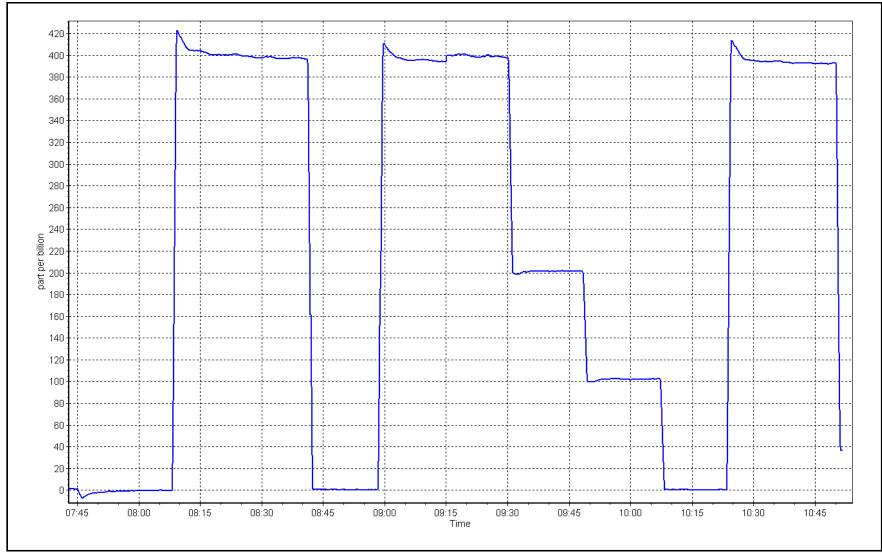
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>
0.0	0.4		Correlation Coefficient	0.999958	≥0.995
400.0	399.1	1.0023	correlation coefficient	0.999990	20.333
200.0	201.5	0.9926	Slone	0.995429	0.90 - 1.10
100.0	102.2	0.9785	Slope	0.993429	0.90 - 1.10
			Intercept	1.600000	+/- 5











T640 PM_{2.5} CALIBRATION

WBEA					Version-01-2023
		Station Informatio	n		
Station Name:	Athabasca Valley		Station number:	AMS 07	
Calibration Date:	February 1, 2023		Last Cal Date:	January 19, 2023	
Start time (MST):	10:25		End time (MST):	11:48	
Analyzar Makay			C /Ni	226	
Analyzer Make: Particulate Fraction:	API T640 PM2.5		S/N:	320	
	11112.3				
Flow Meter Make/Model:	Alicat FP-25BT		S/N:	388753	
Temp/RH standard:	Alicat FP-25BT		S/N:	388753	
		Monthly Calibration 1	ſest		
<u>Parameter</u>	<u>As found</u>	Measured	<u>As left</u>	<u>Adjusted</u>	(Limits)
Т ([°] С)	-24	-24.4	-24		+/- 2 °C
P (mmHg)	746	747.7	746		+/- 10 mmHg
flow (LPM)	5	5.1	5		+/- 0.25 LPM
Leak Test:	Date of check:	February 1, 2023	Last Cal Date:	January 19, 2023	
	PM w/o HEPA:	4.1	PM w/ HEPA:	0	<0.2 ug/m3
Note: this leak check will be	completed before the	quarterly work and will	serve as the pre mai	intenance leak check	_
Inlet cleaning :	Inlet Head	\checkmark			
		Quarterly Calibration	Test		
Parameter	<u>As found</u>	Post maintenance	<u>As left</u>	<u>Adjusted</u>	(Limits)
PMT Peak Test	10.6	N/A	10.6		10.9 +/- 0.5
D				(1155.4	
Post-maintenanc Date Optical Chan		PM w/o HEPA: December !	5 2022	w/ HEPA:	10 2 ··· a / m 2
Disposable Filte	-	December !			<0.2 ug/m3
Disposable Titte	- Changeu.	Determber	5, 2022		
		Annual Maintenand	ce		
Date Sample Tul	be Cleaned:	December !	5. 2022		
Date RH/T Sense	or Cleaned:	December !			
Notes:	Re	moval Calibration done.	Original AMU T640	being put back in.	
Calibration by:	Melissa Lemay				

by:

a Lemay



T640 PM_{2.5} CALIBRATION

W B E A					Version-01-2023
		Station Informatio	n		
Station Name: Calibration Date: Start time (MST):	Athabasca Valley February 1, 2023 10:25		Station number: Last Cal Date: End time (MST):		
Analyzer Make: Particulate Fraction:	API T640 PM2.5		S/N:	645	
Flow Meter Make/Model:	Alicat FP-25BT		S/N:	388753	
Temp/RH standard:	Alicat FP-25BT		S/N:	388753	
		Monthly Calibration	Test		
Parameter	<u>As found</u>	Measured	<u>As left</u>	<u>Adjusted</u>	(Limits)
T (°C)	-21.9	-22	-21.9		+/- 2 °C
P (mmHg)	748.9	747.7	748.9		+/- 10 mmHg
flow (LPM)	5	5.1	5		+/- 0.25 LPM
Leak Test:	Date of check:	February 1, 2023	Last Cal Date:		
Note: this leak check will be	PM w/o HEPA:	1.2	PM w/ HEPA:		<0.2 ug/m3
		Quartarly Calibration	Test		
Devenue terr	0 - (Quarterly Calibration		A -1	(11-1-1-)
Parameter	<u>As found</u>	Post maintenance	As left	Adjusted	(Limits)
PMT Peak Test	9	10.9	10.9	Ľ	10.9 +/- 0.5
Post-maintenance	e leak check:	PM w/o HEPA:		w/ HEPA:	
Date Optical Chan Disposable Filte				-	<0.2 ug/m3
		Annual Maintenan	ce		
Date Sample Tul	be Cleaned:	December	5, 2022		
Date RH/T Sense		December		-	
Notes:		Install Calibration. AM	U T640 being put ba	ack into station.	
Calibration by:	Melissa Lemay				



CO Calibration Report

Version-01-2020

		Station Infor	mation		
tation Name: Calibration Date: Start time (MST):	Athabasca Valley February 8, 2023 10:50		Station number: Last Cal Date: End time (MST):	AMS07 January 20, 2023 13:39	
leason:	Routine		, , , , , , , , , , , , , , , , , , ,		
		Calibration Sta	andards		
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 Info	rmation		
Analyzer make	: Thermo 48i-LTE		Analyzer serial #:	1408761381	
Analyzer Range	: 0 - 50 ppm				
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.999713	0.997345	Backgd or Offset:	3.600	3.651
Calibration intercept:	0.044565	0.018531	Coeff or Slope:	1.079	1.079
		CO Calibratio	n Data		
			n Data Calculated		Correction factor
Set Point	Dilution air flow rate	Source gas flow rate		Indicated concentration	Correction factor (Cc/Ic)
Set Point	Dilution air flow rate (sccm)		Calculated	Indicated concentration (ppm) (Ic)	
Set Point as found zero		Source gas flow rate	Calculated concentration (ppm)		(Cc/Ic)
	(sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	(ppm) (Ic)	(Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	(sccm) 5000	Source gas flow rate (sccm) 0.0	Calculated concentration (ppm) (Cc) 0.0	(ppm) (Ic) 0.1	(Cc/lc) <i>Limit = 0.95-1.05</i>
as found zero as found span	(sccm) 5000	Source gas flow rate (sccm) 0.0	Calculated concentration (ppm) (Cc) 0.0	(ppm) (Ic) 0.1	Limit = 0.95-1.05
as found zero as found span as found 2nd point	(sccm) 5000	Source gas flow rate (sccm) 0.0	Calculated concentration (ppm) (Cc) 0.0	(ppm) (Ic) 0.1	(Cc/Ic) Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point	(sccm) 5000	Source gas flow rate (sccm) 0.0	Calculated concentration (ppm) (Cc) 0.0	(ppm) (Ic) 0.1	(Cc/lc) <i>Limit = 0.95-1.05</i>
as found zero as found span as found 2nd point as found 3rd point new cylinder response	(sccm) 5000 4933	Source gas flow rate (sccm) 0.0 66.7	Calculated concentration (ppm) (Cc) 0.0 40.0	(ppm) (Ic) 0.1 40.1	(Cc/lc) <i>Limit = 0.95-1.05</i> 0.998
as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero	(sccm) 5000 4933 	Source gas flow rate (sccm) 0.0 66.7 0.0	Calculated concentration (ppm) (Cc) 0.0 40.0	(ppm) (Ic) 0.1 40.1 0.0	(Cc/Ic) <i>Limit = 0.95-1.05</i> 0.998
as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero high point	(sccm) 5000 4933 5000 4933	Source gas flow rate (sccm) 0.0 66.7 0.0 66.7	Calculated concentration (ppm) (Cc) 0.0 40.0 0.0 40.0	(ppm) (lc) 0.1 40.1 0.0 39.9	(Cc/lc) <i>Limit = 0.95-1.05</i> 0.998 1.003
as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero high point second point	(sccm) 5000 4933 	Source gas flow rate (sccm) 0.0 66.7 0.0 66.7 33.3	Calculated concentration (ppm) (Cc) 0.0 40.0 	(ppm) (lc) 0.1 40.1 0.0 39.9 20.0	(Cc/lc) Limit = 0.95-1.05 0.998 1.003 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	(sccm) 5000 4933 5000 4933 4967 4983	Source gas flow rate (sccm) 0.0 66.7 0.0 66.7 33.3 16.7	Calculated concentration (ppm) (Cc) 0.0 40.0 0.0 40.0 20.0 10.0	(ppm) (Ic) 0.1 40.1 0.0 39.9 20.0 10.0	(Cc/lc) Limit = 0.95-1.05 0.998 1.003 0.998 1.002
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	(sccm) 5000 4933 5000 4933 4967 4983 5000	Source gas flow rate (sccm) 0.0 66.7 0.0 66.7 33.3 16.7 0.0	Calculated concentration (ppm) (Cc) 0.0 40.0 	(ppm) (IC) 0.1 40.1 0.0 39.9 20.0 10.0 0.0	(Cc/lc) Limit = 0.95-1.05 0.998 1.003 0.998 1.002
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	(sccm) 5000 4933 5000 4933 4967 4983 5000 4933	Source gas flow rate (sccm) 0.0 66.7 0.0 66.7 33.3 16.7 0.0 66.7	Calculated concentration (ppm) (Cc) 0.0 40.0 	(ppm) (Ic) 0.1 40.1 0.0 39.9 20.0 10.0 0.0 39.9 20.0 10.0 0.0 39.9 20.0 10.0 0.0 39.9	(Cc/lc) Limit = 0.95-1.05 0.998 1.003 0.998 1.002 1.003 1.003 1.001
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	(sccm) 5000 4933 5000 4933 4967 4983 5000	Source gas flow rate (sccm) 0.0 66.7 0.0 66.7 33.3 16.7 0.0	Calculated concentration (ppm) (Cc) 0.0 40.0 	(ppm) (IC) 0.1 40.1 0.0 39.9 20.0 10.0 0.0 39.9	(Cc/lc) Limit = 0.95-1.05 0.998 1.003 0.998 1.002 1.003

Notes:

No Maintenance done. Zero adjusted.

Calibration Performed By:

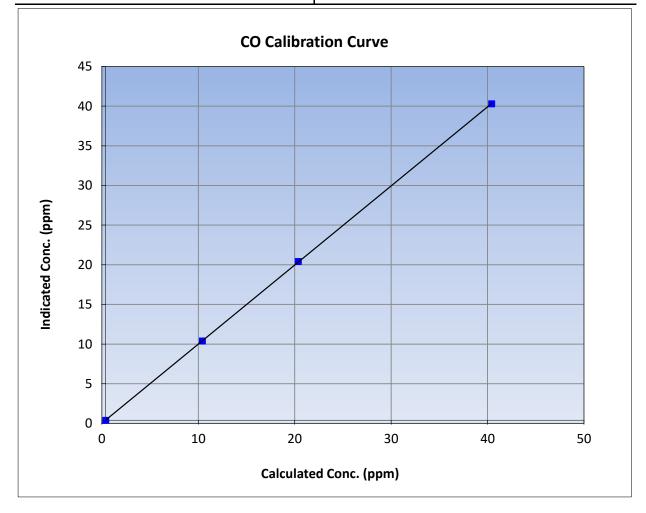


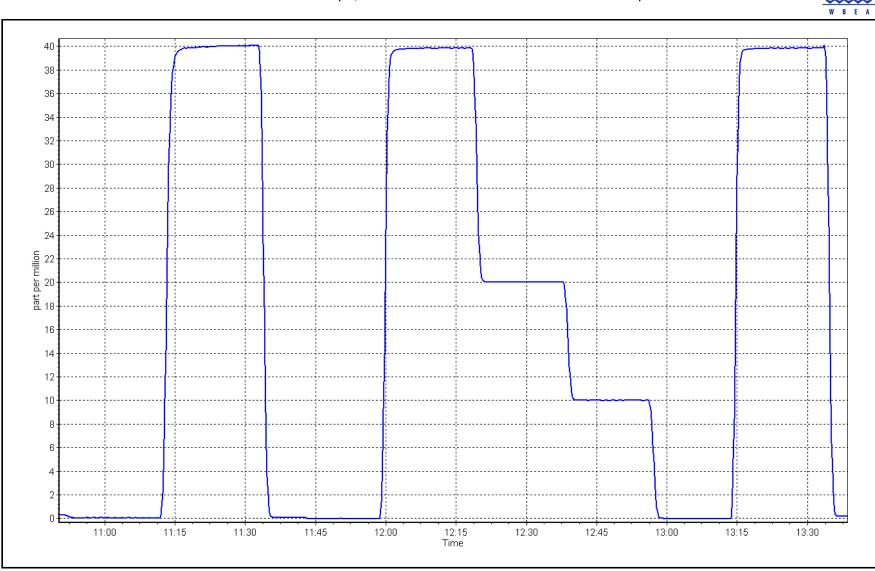
CO Calibration Summary

Version-01-2020 **Station Information** Calibration Date: February 8, 2023 **Previous Calibration:** January 20, 2023 Station Name: Athabasca Valley Station Number: AMS07 Start Time (MST): 10:50 End Time (MST): 13:39 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	0.999991	≥0.995
40.0	39.9	1.0031	Correlation Coefficient	0.999991	20.333
20.0	20.0	0.9979	Slope	0.997345	0.90 - 1.10
10.0	10.0	1.0021	Slope	0.997345	0.90 - 1.10
			Intercept	0.018531	+/-1.5





Location: Athabasca Valley



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS08 FORT CHIPEWYAN FEBRUARY 2023

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

March 31, 2023



SO₂ Calibration Report

Version-01-2020

WBEA					Version-01-2020
		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Fort Chipewyan February 10, 2023 14:06 Routine		Station number: Last Cal Date: End time (MST):	AMS08 January 11, 2023 4:42 PM	
		Calibration St	andards		
Cal Gas Concentration: Cal Gas Cylinder #: Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model: ZAG Make/Model:	49.84 CC196697 49.84 NA Teledyne API T700 Teledyne API T701	ppm ppm	Cal Gas Exp Date: Rem Gas Exp Date: Diff between cyl: Serial Number: Serial Number:	January 6, 2030 NA 3252 260	
		Analyzer Info	rmation		
Analyzer make Analyzer Range	: Thermo 43i-TLE e 0 - 1000 ppb	,	Analyzer serial #:	1136451241	
Calibration slope: Calibration intercept:	<u>Start</u> 1.000787 0.415954	<u>Finish</u> 0.996661 1.336570	Backgd or Offset: Coeff or Slope:		<u>Finish</u> 1.32 1.006
		SO ₂ Calibrati	on Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration ((ppb) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.1	
as found span	4920	80.3	800.4	795.6	1.006
as found 2nd point					
as found 3rd point					
new cylinder response	5000			0.2	
calibrator zero	5000	0.0	0.0	0.2	
high point	4920 4960	80.3 40.2	800.4 400.7	799.1 399.4	1.002 1.003
second point third point	4960	20.1	200.4	203.4	0.985
as left zero	5000	0.0	0.0	0.2	0.985
as left span	4920	80.3	800.4	800.1	1.000
				ge Correction Factor	0.997
Baseline Corr As found:	795.50	Previous response	801.43	*% change * = > +/-5% change initiat	-0.7% es investigation

Notes:

Sample inlet filter changed after as founds. No adjustments needed.

Calibration Performed By:

Morgan Voyageur & Matthew Courtoreille

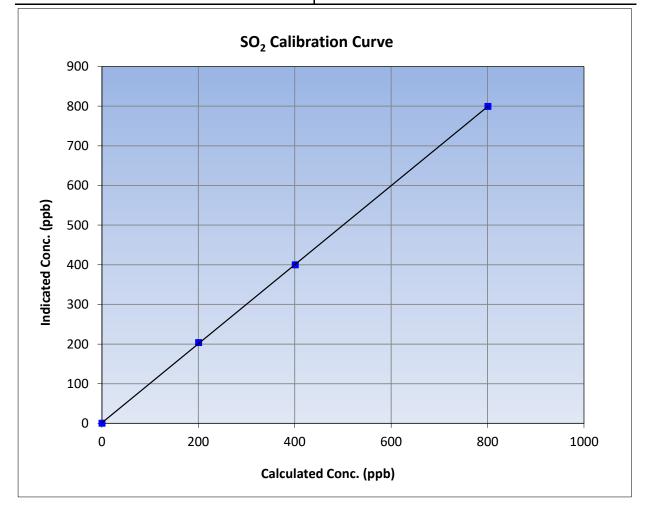


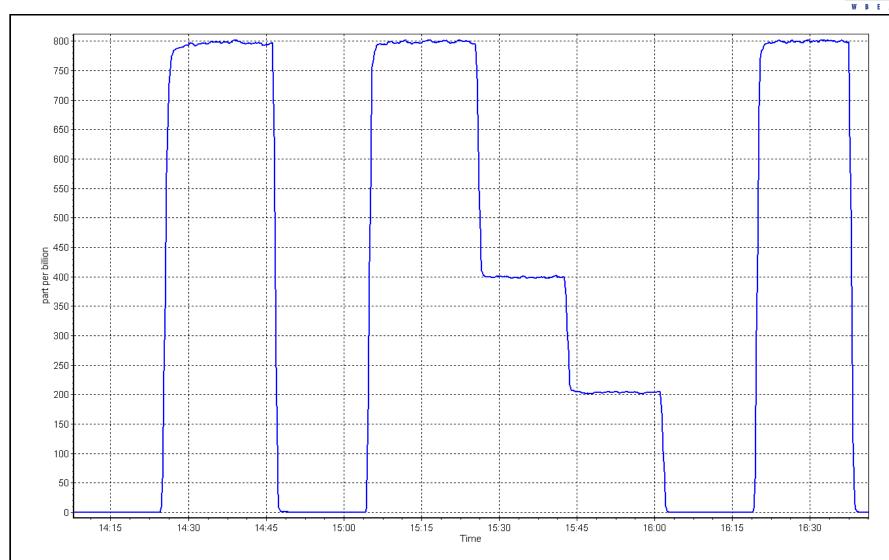
SO₂ Calibration Summary

WBEA			Version-01-2020
	Stati	on Information	
Calibration Date:	February 10, 2023	Previous Calibration:	January 11, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	14:06	End Time (MST):	16:42
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1136451241

Calibration Data

Calculated concentration Indicated concentration (ppb) (Cc) (ppb) (Ic)		Correction factor (Cc/Ic)	Statistical Evalua	<u>Limits</u>	
0.0	0.2		Correlation Coefficient	0.999975	≥0.995
800.4	799.1	1.0016	correlation coefficient	0.999975	20.995
400.7	399.4	1.0032	Slope	0.996661	0.90 - 1.10
200.4	203.4	0.9850	Slope	0.990001	0.30 - 1.10
			- Intercept	1.336570	+/-30





Location: Fort Chipewyan





TRS Calibration Report

WBEA					Version-11-202
		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Fort Chipewyan February 10, 2023 9:24 Routine		Station number: Last Cal Date: End time (MST):	AMS08 January 11, 2023 13:29	
		Calibration S	tandards		
Cal Gas Concentration:	4.97	ppm	Cal Gas Exp Date:	February 9, 2024	
Cal Gas Cylinder #: Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model: ZAG Make/Model:	EY0002276 4.97 NA Teledyne API T700 Teledyne API T701	ppm	Rem Gas Exp Date: Diff between cyl: Serial Number: Serial Number:	NA 3252 260	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	Thermo 43iQ-TL CDN-101 0 - 100 ppb		Analyzer serial #: Converter serial #:	1203169744 14639	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope: Calibration intercept:	0.999140 0.018799	1.000139 0.058837	Backgd or Offset: Coeff or Slope:		1.43 0.743
		TRS As Four	nd Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) Limit = 0.90-1.10
as found zero	5000	0.0	0.0	0.0	
as found span	4920	80.5	80.0	79.8	1.003
as found 2nd point	4960	40.2	40.0	40.1	0.996
as found 3rd point	4980	20.1	20.0	19.9	1.004
new cylinder response					
		TRS Calibrat	ion Data		
Set Point	Dilution air flow 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	80.5	80.0	80.0	1.000
second point	4960	40.2	40.0	40.2	0.994
third point	4980	20.1	20.0	20.0	0.999
as left zero	5000	0.0	0.0	0.1	
as left span	4920	80.5	80.0	80.2	0.998
SO2 Scrubber Check	4919.7	80.3	803.0	0.1	
Date of last scrubber cha	-	March 7, 2022		Ave Corr Factor	0.998
Date of last converter eff	ficiency test:	March 15, 2022		100.7%	efficiency
Baseline Corr As found:	79.8	Prev response:	79.96	*% change:	-0.2%
Baseline Corr 2nd AF pt:	40.1	AF Slope:		AF Intercept:	0.038791
Baseline Corr 3rd AF pt:	19.9	AF Correlation:	0.999986		
				* = > +/-5% change initiat	tes investigation

Notes:

Sample inlet filter changed after as founds. Scrubber check passed. No adjustments made.

Morgan Voyageur & Matthew Courtoreille

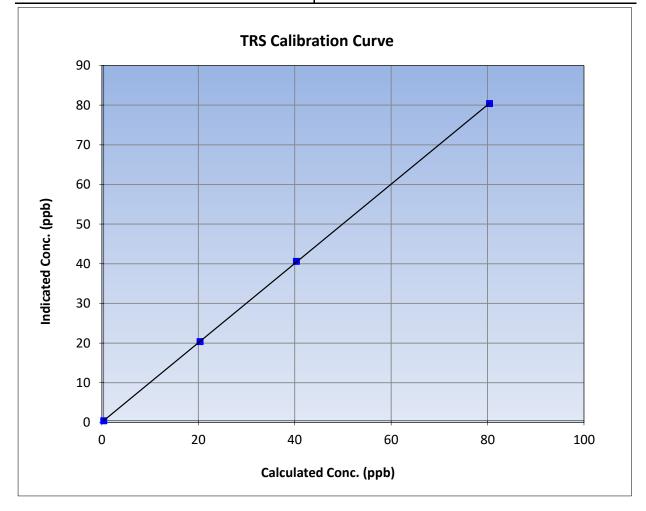


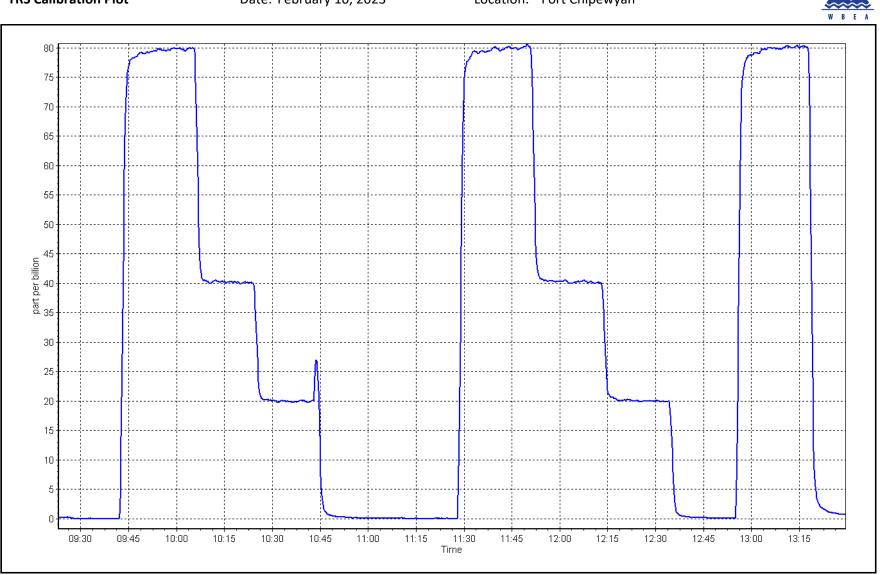
TRS Calibration Summary

WBEA			Version-11-2021
	Stati	on Information	
Calibration Date:	February 10, 2023	Previous Calibration:	January 11, 2023
Station Name:	Fort Chipewyan	Station Number:	AMS08
Start Time (MST):	9:24	End Time (MST):	13:29
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	0.0		Correlation Coefficient	0.999988	≥0.995
80.0	80.0	1.0001	Correlation Coefficient	0.999988	20.995
40.0	40.2	0.9940	Slope	1.000139	0.90 - 1.10
20.0	20.0	0.9990	Slope	1.000135	0.30 - 1.10
			Intercept	0.058837	+/-3





Location: Fort Chipewyan



Station Name:

Reason:

Calibration Date:

Start time (MST):

Fort Chipewyan

10:03

Routine

February 6, 2023

Wood Buffalo Environmental Association

$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

Station Information

Station number: AMS08 Last Cal Date: January 10, 2023 End time (MST): 14:19

		Calil	pration 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: NOX gas Diff:	48.80	ppm	Removed Gas NO Conc: NO gas Diff:	48.80	ppm
Calibrator Model:	Teledyne API T700		Serial Number:	3252	
ZAG make/model:	Teledyne API T701H	ł	Serial Number:	260	

Analyzer Inf	ormation
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Analyzer make: NOX Range (ppb):			Analyzer serial #: 1	426262592	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.844	1.844	NO bkgnd or offset:	6.9	6.9
NOX coeff or slope:	0.993	0.993	NOX bkgnd or offset:	6.9	6.9
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	252.6	252.6

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.995345	0.986463
NO _x Cal Offset:	0.840000	2.200000
NO Cal Slope:	0.998815	0.990518
NO Cal Offset:	-0.200000	1.180000
NO ₂ Cal Slope:	0.991767	0.996180
NO ₂ Cal Offset:	-0.832054	-1.402288



$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

Dilu Set Point					ition Calibratio					
	ution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) Limit = 0.95-1.05	NO Correction factor (Cc/Ic) Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.0	0.0	1.4	1.4	0.0		
as found span	4918	82.0	800.3	800.3	0.0	799.5	798.1	1.2	1.0010	1.0028
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	1.3	1.3	0.0		
high point	4918	82.0	800.3	800.3	0.0	791.6	794.4	-2.9	1.0110	1.0075
second point	4959	41.0	400.2	400.2	0.0	396.3	396.2	0.1	1.0097	1.0100
third point	4980	20.5	200.1	200.1	0.0	201.2	200.1	1.1	0.9944	0.9999
as left zero	5000	0.0	0.0	0.0	0.0	1.4	1.4	0.0		
as left span	4918	82.0	800.3	407.8	392.5	793.8	405.3	388.5	1.0082	1.0062
							Average Co	orrection Factor	1.0051	1.0058
Corrected As found	d NO _x =	798.1 ppb	NO =	796.7 ppb	* = > +/-59	% change initiates i	nvestigation	*Percent Chang	ge NO _X =	0.1%
Previous Response	e NO _x =	797.4 ppb	NO =	799.2 ppb				*Percent Chang	ge NO =	-0.3%
Baseline Corr 2nd p	pt NO _x =	NA ppb	NO =	NA ppb	As found	d $NO_X r^2$:		Nx SI:	Nx Int:	
Baseline Corr 3rd p	pt NO _x =	NA ppb	NO =	NA ppb	As found	d NO r ² :		NO SI:	NO Int:	
					As foun	d $NO_2 r^2$:		NO2 SI:	NO ₂ Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/lc) Calibration Limit = 0.95-1.05 As Found Limit = 0.90-1.10	Converter Efficiency Calibration Limit = 96-104%
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	792.2	399.7	392.5	390.0	1.0064	99.4%
2nd GPT point (200 ppb O3)	792.2	600.9	191.3	189.3	1.0106	99.0%
3rd GPT point (100 ppb O3)	792.2	697.7	94.5	90.8	1.0407	96.1%
			A	Average Correction Factor	1.0192	98.1%

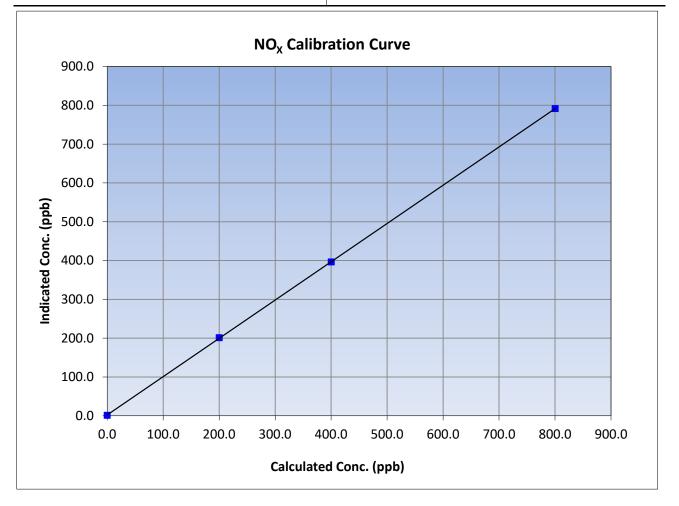
Notes:

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



NO_x Calibration Summary

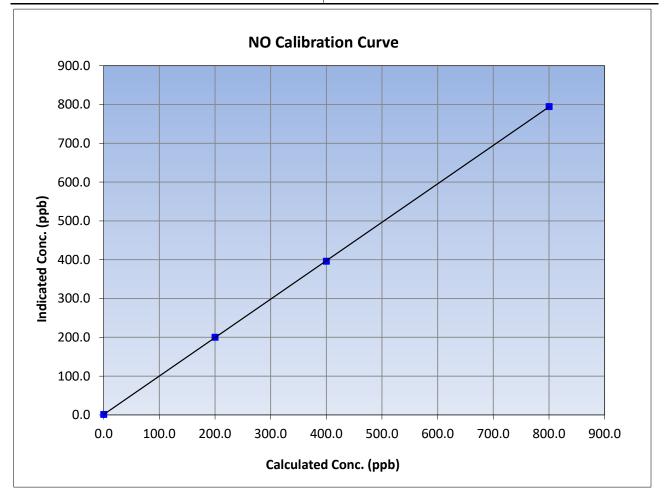
WBEA		Station	Information		Version-04-
		Station	Information		
Calibration Date:	February	y 6, 2023	Previous Calibration:	January	10, 2023
Station Name:	Fort Chi	ipewyan	Station Number:	AM	S08
Start Time (MST):	10	:03	End Time (MST):	14	:19
Analyzer make:	Thermo 42i		Analyzer serial #:	14262	62592
		Calibr	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	1.3		Correlation Coefficient	0.999989	≥0.995
800.3	791.6	1.0110	correlation coefficient	0.555565	20.333
400.2	396.3	1.0097	Slope	0.986463	0.90 - 1.10
200.1	201.2	0.9944	Siope	0.960403	0.90 - 1.10
			Intercept	2.200000	+/-20





NO Calibration Summary

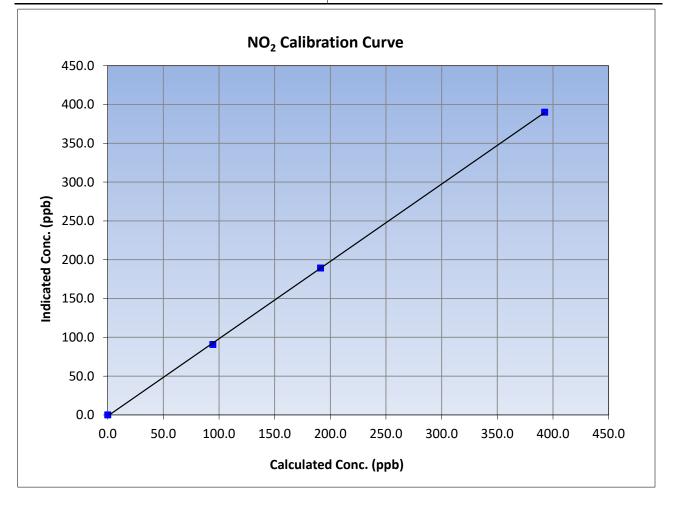
WBEA					Version-04-2	
		Station	Information			
Calibration Date:	February 6, 2023		Previous Calibration:	January	10, 2023	
Station Name:	Fort Ch	ipewyan	Station Number:	AM	S08	
Start Time (MST):	10:03		End Time (MST):	14	:19	
Analyzer make:	Thermo 42i		Analyzer serial #: 1426		5262592	
		Calibra	ation Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>	
0.0	1.3		Correlation Coefficient	0.999992	≥0.995	
800.3	794.4	1.0075	correlation coefficient	0.999992	20.995	
400.2	396.2	1.0100	Slope	0.990518	0.90 - 1.10	
200.1	200.1	0.9999	Slope	0.990518	0.90 - 1.10	
			Intercept	1.180000	+/-20	

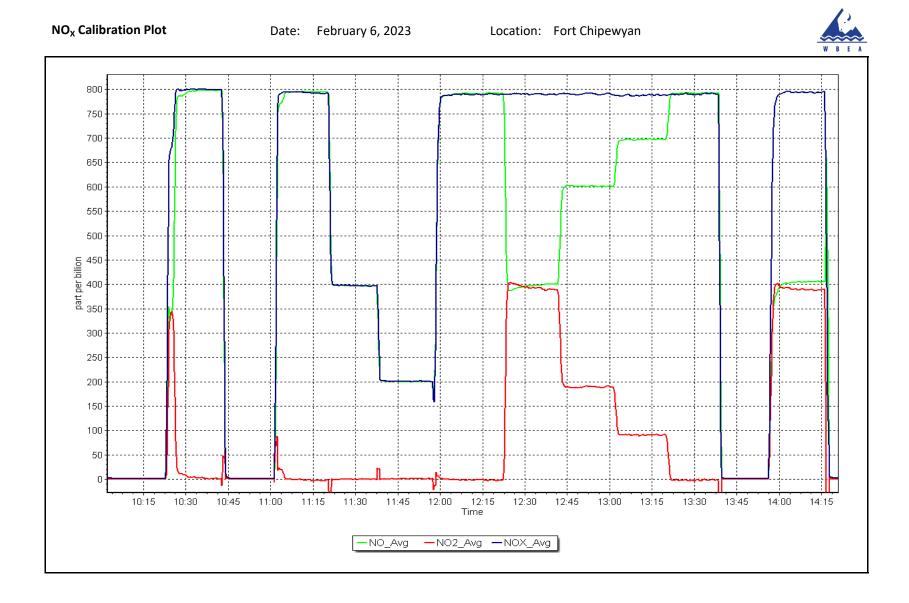




NO₂ Calibration Summary

WBEA					Version-04-202	
		Station	Information			
Calibration Date:	Date: February 6, 2023		Previous Calibration:	January 10, 2023		
Station Name:	Fort Ch	ipewyan	Station Number:	AM	S08	
Start Time (MST):	10	10:03		14	:19	
Analyzer make:	Thern	no 42i	Analyzer serial #:	14262	262592	
		Calibra	ation Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	0.0		Correlation Coefficient	0.999930	≥0.995	
392.5	390.0	1.0064	correlation coefficient	0.999930	20.333	
191.3	189.3	1.0106	Clana	0.996180	0.90 - 1.10	
94.5	90.8	1.0407	Slope	0.996180	0.90 - 1.10	
			Intercept	-1.402288	+/-20	







T640 PM_{2.5} CALIBRATION

W D E A						Version-01-2023
		Station Information	1			
Station Name:	Fort Chipewyan		Station number:	AMS 08		
Calibration Date:	February 15, 2023		Last Cal Date:	January 11, 2023		
Start time (MST):	13:07		End time (MST):	14:30		
Analyzer Make:			S/N:	216		
Particulate Fraction:	PM2.5		3,11	210		
Flow Meter Make/Model:	Delta Cal		S/N:	1212		
Temp/RH standard:	Delta Cal		S/N:			
		Monthly Calibration To	est			
Parameter	As found	Measured	As left	Adjus	sted	(Limits)
T (°C)	-21.2	-21.2	-21.2]	+/- 2 °C
P (mmHg)	743.2	733.8	743.2	Г	1	+/- 10 mmHg
flow (LPM)	5.00	4.89	5.00]	+/- 0.25 LPM
Leak Test:	Date of check:	February 15, 2023	Last Cal Date:	January 11, 202	23	
	PM w/o HEPA:	1.6	PM w/ HEPA:	0.0		<0.2 ug/m3
Note: this leak check will be	e completed before the	quarterly work and will s	erve as the pre mai	ntenance leak che	eck	
Inlet cleaning :	Inlet Head	\checkmark				
		Quarterly Calibration 1	ſest			
Parameter	<u>As found</u>	Post maintenance	<u>As left</u>	Adjus	sted	(Limits)
PMT Peak Test]	11.3 +/- 0.5
Post-maintenanc	e leak check:	PM w/o HEPA:		w/ HEPA:		
Date Optical Chan	nber Cleaned:	December 5	, 2022			<0.2 ug/m3
Disposable Filte	er Changed:	December 5	, 2022			
		Annual Maintenanc	0			
		Annual Maintenanc				
Date Sample Tu	be Cleaned:	July 14, 2	022			
Date RH/T Sens	or Cleaned:	July 14, 2	022			
Notes:		No adj	ustment needed.			
Calibration by:	Morgan Voyageur					



CO Calibration Report

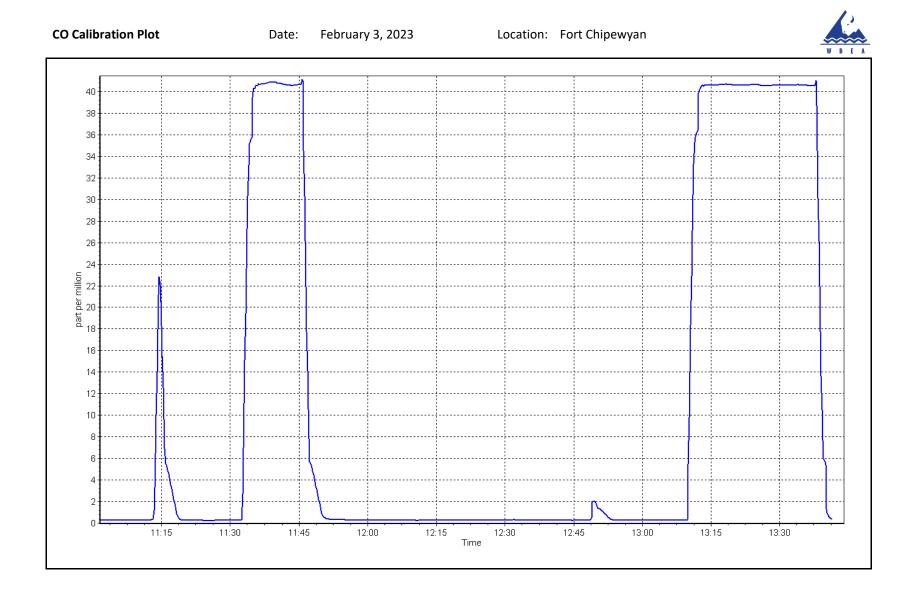
Version-01-2020

		Station Infor	mation		VEISIOII-O1-20
Station Name: Calibration Date: Start time (MST): Reason:	Fort Chipewyan February 3, 2023 11:11 Maintenance		Station number: Last Cal Date: End time (MST):	AMS08 January 13, 2023 13:45	
		Calibration St	andards		
Cal Gas Concentration: Cal Gas Cylinder #:	3,030 ALM014846	ppm	Cal Gas Exp Date:	December 1, 2028	
Removed Cal Gas Conc:	3,030	ppm	Rem Gas Exp Date:	NA	
Removed Gas Cyl #:			Diff between cyl:	5070	
Calibrator Make/Model: ZAG Make/Model:	API T700 API T701H		Serial Number: Serial Number:	5272 197	
		Analyzer Info	rmation		
Analyzer make Analyzer Range			Analyzer serial #:	3505	
Calibration slope: Calibration intercept:	<u>Start</u> 0.995217 0.070924	<u>Finish</u>	Backgd or Offset: Coeff or Slope:		<u>Finish</u> NA NA
		CO Calibratio	on 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) <i>Limit = 0.95-1.05</i>
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	0.0	0.0	0.3	
as left span	2960	40.0	40.4	40.6	0.995
			Avera	ge Correction Factor	
Baseline Corr As found:	NA	Prev response:	NA	*% change:	NA
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			
				* = > +/-5% change initiate	es investigation

Notes:

Unable to complete as founds due to pressure warnings on calibrator. Changed out the flow controller in the Nitrogen generator.

Calibration Performed By:





CO Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Fort Chipewyan February 14, 2023 9:20 Maintenance		Station number: Last Cal Date: End time (MST):	AMS08 January 13, 2023 12:49	
		Calibration St	andards		
Cal Gas Concentration:	3,030	ppm	Cal Gas Exp Date:	December 1, 2028	
Cal Gas Cylinder #: Removed Cal Gas Conc:	ALM014846 3,030	ppm	Rem Gas Exp Date:	NA	
Removed Gas Cyl #:	NA		Diff between cyl:		
Calibrator Make/Model:	API T700		Serial Number:	5272	
ZAG Make/Model:	API T701H		Serial Number:	197	
		Analyzer Info	rmation		
Analyzer make Analyzer Range			Analyzer serial #:	3505	
	Start	Finish		Start	Finish
Calibration slope:	0.995217	0.983508	Backgd or Offset:		-0.013
Calibration intercept:	0.070924	0.322926	Coeff or Slope:		0.987
		CO Calibratio	n Data		
		co calibratio	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
Set Point as found zero		Source gas flow rate	Calculated concentration (ppm)		(Cc/Ic)
	(sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	(ppm) (Ic)	(Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero as found span as found 2nd point	(sccm) 5000 4933 4967	Source gas flow rate (sccm) 0.0	Calculated concentration (ppm) (Cc) 0.0	(ppm) (Ic) 0.19	(Cc/lc) <i>Limit = 0.95-1.05</i>
as found zero as found span as found 2nd point as found 3rd point	(sccm) 5000 4933	Source gas flow rate (sccm) 0.0 66.7	Calculated concentration (ppm) (Cc) 0.0 40.4	(ppm) (Ic) 0.19 40.6	(Cc/Ic) Limit = 0.95-1.05 0.996
as found zero as found span as found 2nd point as found 3rd point new cylinder response	(sccm) 5000 4933 4967 4983	Source gas flow rate (sccm) 0.0 66.7 33.3 16.7	Calculated concentration (ppm) (Cc) 0.0 40.4 20.2 10.1	(ppm) (Ic) 0.19 40.6 20.5 10.5	(Cc/Ic) Limit = 0.95-1.05 0.996 0.983
as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero	(sccm) 5000 4933 4967 4983 	Source gas flow rate (sccm) 0.0 66.7 33.3 16.7 0.0	Calculated concentration (ppm) (Cc) 0.0 40.4 20.2 10.1 0.0	(ppm) (Ic) 0.19 40.6 20.5 10.5 0.2	(Cc/lc) Limit = 0.95-1.05 0.996 0.983 0.968
as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero high point	(sccm) 5000 4933 4967 4983 	Source gas flow rate (sccm) 0.0 66.7 33.3 16.7 0.0 66.7	Calculated concentration (ppm) (Cc) 0.0 40.4 20.2 10.1 0.0 40.4	(ppm) (lc) 0.19 40.6 20.5 10.5 0.2 40.0	(Cc/lc) Limit = 0.95-1.05 0.996 0.983 0.968 1.010
as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero high point second point	(sccm) 5000 4933 4967 4983 	Source gas flow rate (sccm) 0.0 66.7 33.3 16.7 0.0 66.7 33.3	Calculated concentration (ppm) (Cc) 0.0 40.4 20.2 10.1 0.0 40.4 20.2	(ppm) (Ic) 0.19 40.6 20.5 10.5 0.2 40.0 20.3	(Cc/Ic) Limit = 0.95-1.05 0.996 0.983 0.968 1.010 0.995
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	(sccm) 5000 4933 4967 4983 	Source gas flow rate (sccm) 0.0 66.7 33.3 16.7 0.0 66.7 33.3 16.7	Calculated concentration (ppm) (Cc) 0.0 40.4 20.2 10.1 0.0 40.4 20.2 10.1	(ppm) (IC) 0.19 40.6 20.5 10.5 0.2 40.0 20.3 10.3	(Cc/lc) Limit = 0.95-1.05 0.996 0.983 0.968 1.010 0.995 0.979
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	(sccm) 5000 4933 4967 4983 5000 4934 4967 4983 5000	Source gas flow rate (sccm) 0.0 66.7 33.3 16.7 0.0 66.7 33.3 16.7 0.0	Calculated concentration (ppm) (Cc) 0.0 40.4 20.2 10.1 0.0 40.4 20.2 10.1 20.2 10.1 0.0	(ppm) (IC) 0.19 40.6 20.5 10.5 0.2 40.0 20.3 10.3 0.2	(Cc/lc) Limit = 0.95-1.05 0.996 0.983 0.968 1.010 0.995 0.979
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	(sccm) 5000 4933 4967 4983 	Source gas flow rate (sccm) 0.0 66.7 33.3 16.7 0.0 66.7 33.3 16.7	Calculated concentration (ppm) (Cc) 0.0 40.4 20.2 10.1 0.0 40.4 20.2 10.1 20.2 10.1 0.0 40.4 20.2 10.1	(ppm) (IC) 0.19 40.6 20.5 10.5 0.2 40.0 20.3 10.3 0.2 39.8	(Cc/lc) Limit = 0.95-1.05 0.996 0.983 0.968 1.010 0.995 0.979 1.015
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	(sccm) 5000 4933 4967 4983 5000 4934 4967 4983 5000 2960	Source gas flow rate (sccm) 0.0 66.7 33.3 16.7 0.0 66.7 33.3 16.7 0.0 40.0	Calculated concentration (ppm) (Cc) 0.0 40.4 20.2 10.1 0.0 40.4 20.2 10.1 0.0 40.4 20.2 10.1 0.0 40.4 Averag	(ppm) (Ic) 0.19 40.6 20.5 10.5 0.2 40.0 20.3 10.3 0.2 39.8 ge Correction Factor	(Cc/Ic) Limit = 0.95-1.05 0.996 0.983 0.968 1.010 0.995 0.979 1.015 0.995
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 As found:	(sccm) 5000 4933 4967 4983 5000 4934 4967 4983 5000 2960 	Source gas flow rate (sccm) 0.0 66.7 33.3 16.7 0.0 66.7 33.3 16.7 0.0 40.0 Prev response:	Calculated concentration (ppm) (Cc) 0.0 40.4 20.2 10.1 0.0 40.4 20.2 10.1 0.0 40.4 20.2 10.1 0.0 40.4 40.4 40.30	(ppm) (IC) 0.19 40.6 20.5 10.5 0.2 40.0 20.3 10.3 0.2 39.8 ge Correction Factor *% change:	(Cc/lc) Limit = 0.95-1.05 0.996 0.983 0.968 1.010 0.995 0.979 1.015 0.995 0.3%
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	(sccm) 5000 4933 4967 4983 5000 4934 4967 4983 5000 2960	Source gas flow rate (sccm) 0.0 66.7 33.3 16.7 0.0 66.7 33.3 16.7 0.0 40.0	Calculated concentration (ppm) (Cc) 0.0 40.4 20.2 10.1 0.0 40.4 20.2 10.1 0.0 40.4 20.2 10.1 0.0 40.4 Averag	(ppm) (Ic) 0.19 40.6 20.5 10.5 0.2 40.0 20.3 10.3 0.2 39.8 ge Correction Factor	(Cc/Ic) Limit = 0.95-1.05 0.996 0.983 0.968 1.010 0.995 0.979 1.015 0.995

Notes:

Sample inlet filter changed after as founds. Replaced the pump. Adjusted the span only.

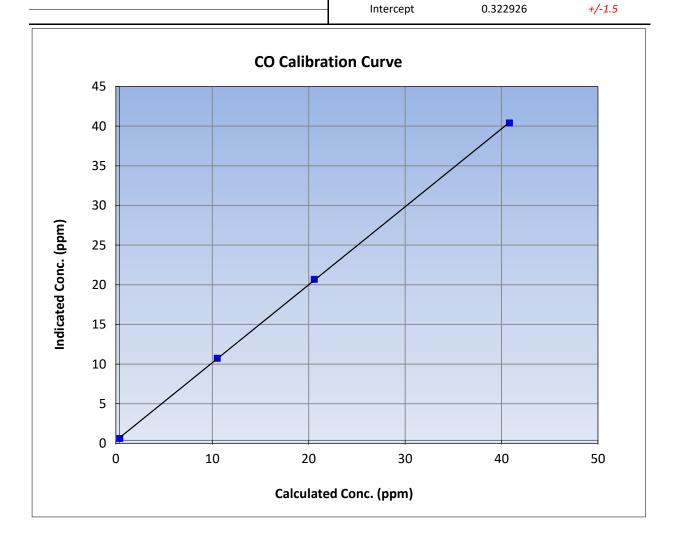
Calibration Performed By:

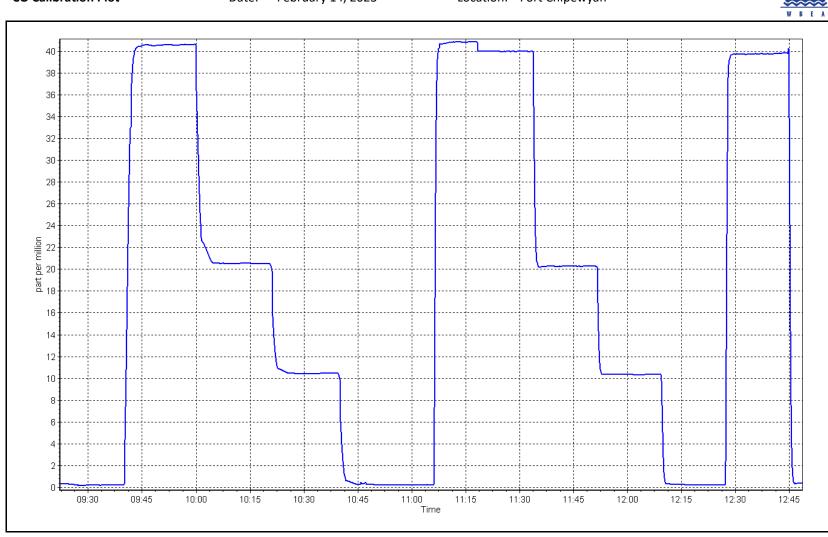
Matthew Courtoreille & Morgan V



CO Calibration Summary

WBEA					Version-01-2020
		Station	Information		
Calibration Date:	February 1	4, 2023	Previous Calibration:	January	13, 2023
Station Name:	Fort Chip	Fort Chipewyan		AN	1508
Start Time (MST):	9:20	C	End Time (MST):	12	2:49
Analyzer make:	nalyzer make: API T		Analyzer serial #:	3!	505
		Calib	ration Data		
Calculated concentration (ppm) (Cc)	Calculated concentration Indicated concentration Correction factor (ppm) (Cc) (ppm) (Ic) (Cc/Ic)		Statistical Evalua	ation	<u>Limits</u>
0.0	0.2		Correlation Coefficient	0.999963	≥0.995
40.4	40.0	1.0104	Correlation Coefficient	0.999903	20.995
20.2	20.3	0.9951	Slope	0.983508	0.90 - 1.10
	10.3	0.9787	JIOPE	0.505500	0.00-1.10





Location: Fort Chipewyan



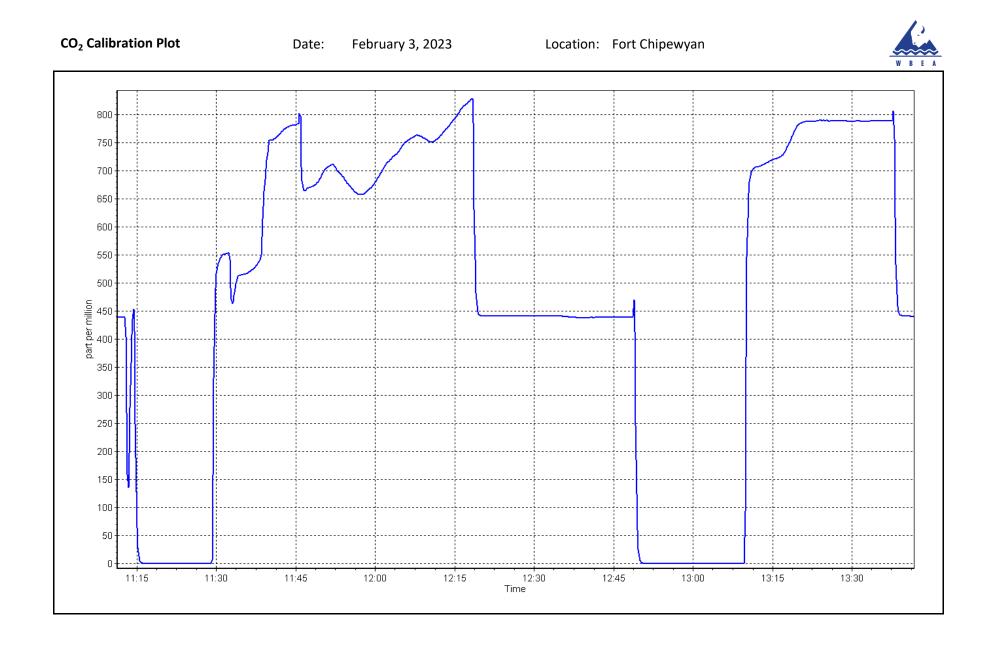
CO₂ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name:	Fort Chipewyan		Station number:	AMS08	
Calibration Date:	February 3, 2023		Last Cal Date:	January 13, 2023	
Start time (MST):	11:11		End time (MST):	13:45	
Reason:	Maintenance				
		Calibration St	andards		
Cal Gas Concentration:	60,220	ppm	Cal Gas Exp Date:	December 1, 2028	
Cal Gas Cylinder #:	ALM014846	ppin	Cal Gas Exp Date.	December 1, 2028	
Removed Cal Gas Conc:	60,220	nnm	Rem Gas Exp Date:	ΝΔ	
		ppm	•	NA	
Removed Gas Cyl #:			Diff between cyl:	5272	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	-	
N2 Gen Make/Model:	NG 5000		Serial Number:	771048318	
		Analyzer Info	rmation		
Analyzer make	: Teledyne API T360	,	Analyzer serial #:	289	
Analyzer Range				203	
	Start	Finish		Start	Finish
	<u></u>	<u></u>			NA
Calibration slope.	0 998112		Backed or Offset	0.019	
Calibration slope: Calibration intercept:	0.998112 -5.540000		Backgd or Offset: Coeff or Slope:	0.019 1.011	NA
-			•		
		CO ₂ Calibratio	Coeff or Slope:		
-		CO ₂ Calibration Source gas flow rate (sccm)	Coeff or Slope:		NA
Calibration intercept:	-5.540000 Dilution air flow rate	Source gas flow rate	Coeff or Slope: on Data Calculated concentration (ppm)	1.011 Indicated concentration	NA Correction factor (Cc/I
Calibration intercept: Set Point	-5.540000 Dilution air flow rate	Source gas flow rate	Coeff or Slope: on Data Calculated concentration (ppm)	1.011 Indicated concentration	NA Correction factor (Cc/I
Calibration intercept: Set Point as found zero	-5.540000 Dilution air flow rate	Source gas flow rate	Coeff or Slope: on Data Calculated concentration (ppm)	1.011 Indicated concentration	NA Correction factor (Cc/I
Calibration intercept: Set Point as found zero as found span	-5.540000 Dilution air flow rate	Source gas flow rate	Coeff or Slope: on Data Calculated concentration (ppm)	1.011 Indicated concentration	NA Correction factor (Cc/I
Calibration intercept: Set Point as found zero as found span as found 2nd point as found 3rd point	-5.540000 Dilution air flow rate	Source gas flow rate	Coeff or Slope: on Data Calculated concentration (ppm)	1.011 Indicated concentration	NA Correction factor (Cc/I
Calibration intercept: Set Point as found zero as found span as found 2nd point	-5.540000 Dilution air flow rate	Source gas flow rate	Coeff or Slope: on Data Calculated concentration (ppm)	1.011 Indicated concentration	NA Correction factor (Cc/I
Calibration intercept: Set Point as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero	-5.540000 Dilution air flow rate	Source gas flow rate	Coeff or Slope: on Data Calculated concentration (ppm)	1.011 Indicated concentration	NA Correction factor (Cc/I
Calibration intercept: Set Point as found zero as found span as found 2nd point as found 3rd point new cylinder response	-5.540000 Dilution air flow rate	Source gas flow rate	Coeff or Slope: on Data Calculated concentration (ppm)	1.011 Indicated concentration	NA Correction factor (Cc/
Calibration intercept: Set Point as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero high point second point	-5.540000 Dilution air flow rate	Source gas flow rate	Coeff or Slope: on Data Calculated concentration (ppm)	1.011 Indicated concentration	NA Correction factor (Cc/
Calibration intercept: Set Point 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	-5.540000 Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Coeff or Slope: Dn Data Calculated concentration (ppm) (Cc)	1.011 Indicated concentration ((ppm) (Ic)	NA Correction factor (Cc/I <i>Limit = 0.95-1.05</i>
Calibration intercept: Set Point 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	-5.540000 Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Coeff or Slope: Dn Data Calculated concentration (ppm) (Cc)	1.011 Indicated concentration ((ppm) (Ic)	NA Correction factor (Cc/I Limit = 0.95-1.05
Calibration intercept: Set Point 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	-5.540000 Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Coeff or Slope: Dn Data Calculated concentration (ppm) (Cc) 0.0 802.9	1.011 Indicated concentration ((ppm) (Ic)	NA Correction factor (Cc/ <i>Limit = 0.95-1.05</i>
Calibration intercept: Set Point 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	-5.540000 Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Coeff or Slope: Dn Data Calculated concentration (ppm) (Cc) 0.0 802.9 Average	1.011 Indicated concentration ((ppm) (Ic) 0.1 788.8 ge Correction Factor	NA Correction factor (Cc/ <i>Limit = 0.95-1.05</i>
Calibration intercept: Set Point 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 As found:	-5.540000 Dilution air flow rate (sccm) 	Source gas flow rate (sccm)	Coeff or Slope: Dn Data Calculated concentration (ppm) (Cc) 0.0 802.9 Averag NA	1.011 Indicated concentration ((ppm) (lc) 0.1 788.8 ge Correction Factor *% change:	NA Correction factor (Cc/ Limit = 0.95-1.05
Calibration intercept: Set Point 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 As found: Baseline Corr 2nd AF pt:	-5.540000 Dilution air flow rate (sccm) 	Source gas flow rate (sccm)	Coeff or Slope: Dn Data Calculated concentration (ppm) (Cc) 0.0 802.9 Averag NA	1.011 Indicated concentration ((ppm) (Ic) 0.1 788.8 ge Correction Factor	NA Correction factor (Cc/ <i>Limit = 0.95-1.05</i>
Calibration intercept: Set Point 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	-5.540000 Dilution air flow rate (sccm) 	Source gas flow rate (sccm)	Coeff or Slope: Dn Data Calculated concentration (ppm) (Cc) 0.0 802.9 Averag NA	1.011 Indicated concentration ((ppm) (lc) 0.1 788.8 ge Correction Factor *% change:	NA Correction factor (Cc/I Limit = 0.95-1.05

controller in the Nitrogen generator.

Calibration Performed By:





CO₂ Calibration Report

Version-01-2020

					Version-01-2020
		Station Infor	mation		
Station Name:	Fort Chipewyan		Station number:	AMS08	
Calibration Date:	February 15, 2023		Last Cal Date:	January 13, 2023	
Start time (MST):	9:02		End time (MST):	12:12	
Reason:	Routine			12.12	
Reason.	Noutine				
		Calibration St	andards		
Cal Gas Concentration:	60,220	ppm	Cal Gas Exp Date:	December 1, 2028	
Cal Gas Cylinder #:	ALM014846	ppin	cui dus Exp Dute.	December 1, 2020	
Removed Cal Gas Conc:	60,220	ppm	Rem Gas Exp Date:	ΝΔ	
Removed Gas Cyl #:	NA	ppin	Diff between cyl:		
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5272	
N2 Gen Make/Model:	NG 5000		Serial Number:	771048318	
		Analyzer Info	rmation		
Analvzer make	: Teledyne API T360		Analyzer serial #:	289	
,	e 0 - 2,000 ppm		, and yzer bendinn		
/ maryzer hange	2,000 ppm				
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.998112	1.006830	Backgd or Offset:	0.019	0.019
Calibration intercept:	-5.540000	-1.740000	Coeff or Slope:	1.011	1.011
		CO ₂ Calibratio	on Data		
	Dilution air flow rate	Courses and flow rate	Calculated	Indicated concentration	Correction factor (Collo
Set Point	(sccm)	Source gas flow rate (sccm)	concentration (ppm)	Indicated concentration (ppm) (Ic)	<i>Limit = 0.95-1.05</i>
	(sccm)	(seem)	(Cc)	(ppiii) (ic)	Linint - 0.95-1.05
as found zero	3000	0.0	0.0	0.6	
as found span	2920	80.0	1605.9	1617.8	0.993
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	3000	0.0	0.0	1.0	
high point	2920	80.0	1605.9	1620.1	0.991
second point	2960	40.0	802.9	794.4	1.011
third point	2980	20.0	401.5	407.0	0.986
as left zero	3000	0.0	0.0	0.8	
as left span	2960	40.0	802.9	791.8	1.014
as icit span	2300	-0.0		ge Correction Factor	0.996
	101-00				
Baseline Corr As found:	1617.20	Prev response:	1597.29	*% change:	1.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			
				* = > +/-5% change initiat	

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

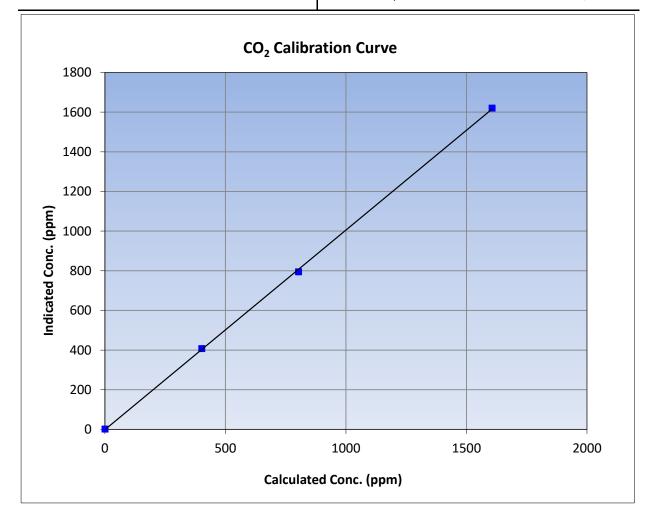
Calibration Performed By:

Matthew Courtoreille & Morgan Voyageur



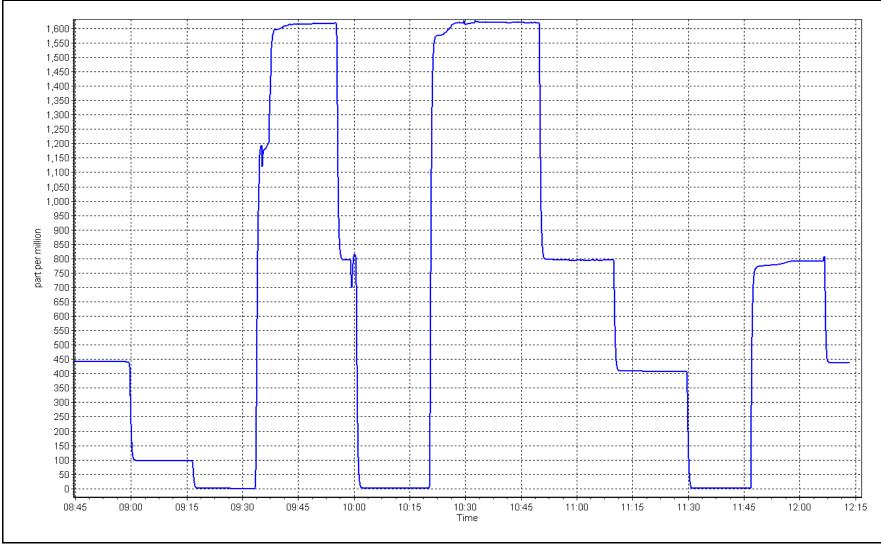
CO₂ Calibration Summary

WBEA					Version-01-20
		Station	Information		
Calibration Date	February 1	5, 2023	Previous Calibration	January	13, 2023
Station Name	Fort Chip				
Start Time (MST)	9:0				
Analyzer make	Teledyne A	VPI T360	Analyzer serial #	2	89
		Calibr	ration Data		
alculated concentration In (ppm) (Cc)	ndicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	ctor Statistical Evaluation		<u>Limits</u>
0.0	1.0		Correlation Coefficient	0.999857	≥0.995
1605.9	1620.1	0.9912	correlation coefficient	0.333637	20.333
802.9	794.4	1.0107	Slope	1.006830	0.90 - 1.10
401.5	407.0	0.9864	Siope	1.000850	0.30 - 1.10
			Intercept	-1.740000	+/-20











WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS09 BARGE LANDING FEBRUARY 2023

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

March 31, 2023



SO₂ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name:	Barge Landing		Station number:	AMS09	
Calibration Date:	February 3, 2023		Last Cal Date:	January 13, 2023	
Start time (MST):	10:20		End time (MST):	13:38	
Reason:	Routine				
		Colibuation St	en de rale		
		Calibration St			
Cal Gas Concentration:	49.96 CC151285	ppm	Cal Gas Exp Date:	January 5, 2025	
Cal Gas Cylinder #:				N1.4	
Removed Cal Gas Conc:	49.96	ppm	Rem Gas Exp Date:	NA	
Removed Gas Cyl #:	NA		Diff between cyl:		
Calibrator Make/Model:	API T700		Serial Number:	3812	
ZAG Make/Model:	API T701		Serial Number:	4888	
		Analyzer Info	rmation		
Analyzer make:	Thermo 43i	- ,	Analyzer serial #:	11181/18/08	
Analyzer Range			Andiyzer Serial #.	1110140490	
	Start	Finish		<u>Start</u>	Finish
Calibration slope:	0.994624	1.002493	Backgd or Offset:	9.8	9.8
Calibration intercept:	-0.310040	0.431711	Coeff or Slope:	0.986	0.986
		SO ₂ Calibration	on Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration ((ppb) (Ic)	Correction factor (Cc/lc Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.1	
as found span	4919	80.2	801.5	803.0	0.998
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	
high point	4919	80.2	801.5	804.0	0.997
second point	4959	40.1	400.8	401.9	0.997
third point	4980	20.0	199.8	201.0	0.994
as left zero	5000	0.0	0.0	0.3	
as left span	4919	80.2	801.5	804.0	0.997
•				ge Correction Factor	0.996
Baseline Corr As found:	802.90	Previous response	796.87	*% change	0.8%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
pti		AF Correlation:		intercepti	

Notes:

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

Calibration Performed By:

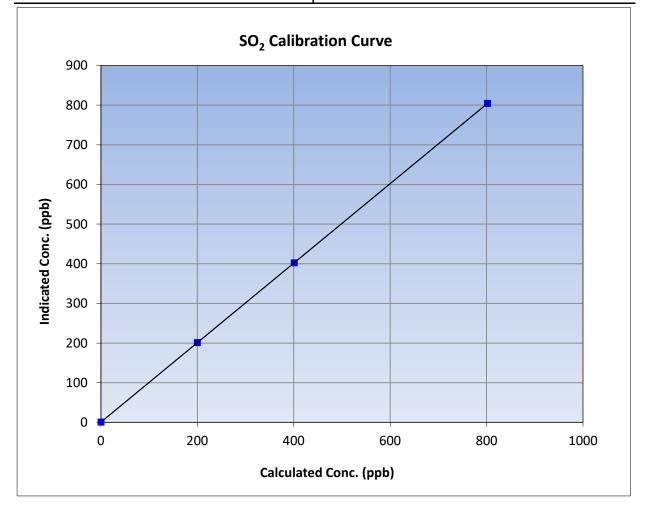


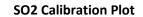
SO₂ Calibration Summary

	Stati	on Information	
Calibration Date:	February 3, 2023	Previous Calibration:	January 13, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:20	End Time (MST):	13:38
Analyzer make:	Thermo 43i	Analyzer serial #:	1118148498

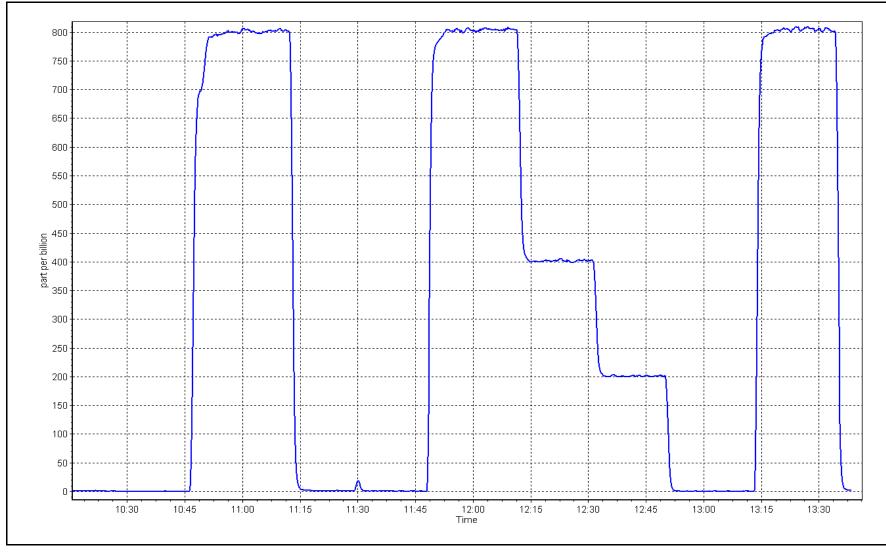
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>
0.0	0.4		Correlation Coefficient	1.000000	≥0.995
801.5	804.0	0.9969	Correlation Coefficient	1.000000	20.333
400.8	401.9	0.9971	Slope	1.002493	0.90 - 1.10
199.8	201.0	0.9942	Slope	1.002495	0.90 - 1.10
			Intercept	0.431711	+/-30











TRS Calibration Report

WBEA					Version-11-2021
		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Barge Landing February 28, 2023 10:44 Routine		Station number: Last Cal Date: End time (MST):	AMS09 January 23, 2023 19:03	
		Calibration S	tandards		
Cal Gas Concentration: Cal Gas Cylinder #:	4.87 EY0002346	ppm	Cal Gas Exp Date:	September 2, 2024	
Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model: ZAG Make/Model:	4.87 NA API T700 API T701	ppm	Rem Gas Exp Date: Diff between cyl: Serial Number: Serial Number:	NA 3812 4888	
	The sector = = =	Analyzer Info		4224252222	
Analyzer make: Converter make: Analyzer Range	Thermo 43i-TLE CDN-101 0 - 100 ppb		Analyzer serial #: Converter serial #:	1331259320 519	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope: Calibration intercept:	1.003148 -0.000990	1.003148 -0.000990	Backgd or Offset: Coeff or Slope:		2.65 1.094
		TRS As Fou	nd Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) Limit = 0.90-1.10
as found zero	5000	0.0	0.0	0.1	
as found span	4918	82.1	80.0	79.9	1.002
as found 2nd point	4959	41.1	40.0	40.1	1.001
as found 3rd point	4979	20.5	20.0	20.1	0.998
new cylinder response			-		
		TRS Calibrat	ion Data		
	Dilution air flow rate	Source gas flow rate	Calculated	Indicated	Correction factor
Set Point	(sccm)	(sccm)	concentration (ppb) (Cc)	concentration (ppb) (Ic)	(Cc/Ic) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.0	
high point	4918	82.1	80.0	80.2	0.997
second point	4959	41.1	40.0	40.2	0.996
third point	4979	20.5	20.0	20.0	0.998
as left zero	5000	0.0	0.0	0.1	
as left span	4918	82.1	80.0	80.4	0.995
SO2 Scrubber Check	4920	80.2	802.0	0.1	
Date of last scrubber cha	-	28-Feb-23		Ave Corr Factor	0.997
Date of last converter eff	ticiency test:				efficiency
Baseline Corr As found:	79.8	Prev response:	80.21	*% change:	-0.5%
Baseline Corr 2nd AF pt:	40.0	AF Slope:		AF Intercept:	0.139041
Baseline Corr 3rd AF pt:	20.0	AF Correlation:	0.999999	* = > +/-5% change initiate	es investigation

Changed sample inlet filter after as founds. Changed scrubber beads after elevated 40ppb cal point. Second scrubber check passed. Adjusted zero and span.

Calibration Performed By:

Notes:

Braiden Boutilier

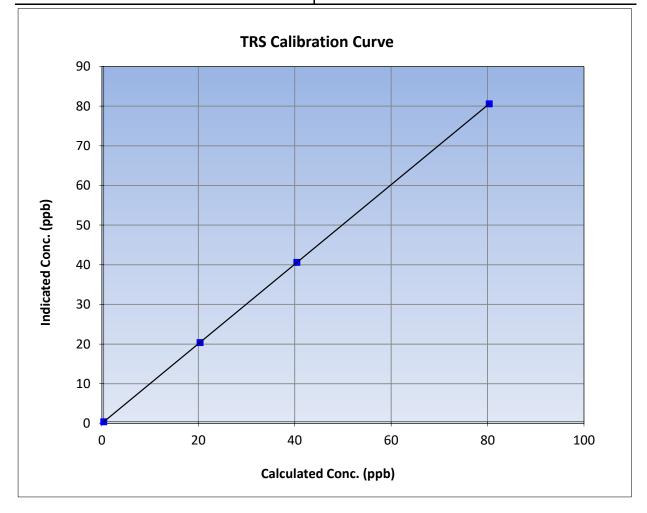


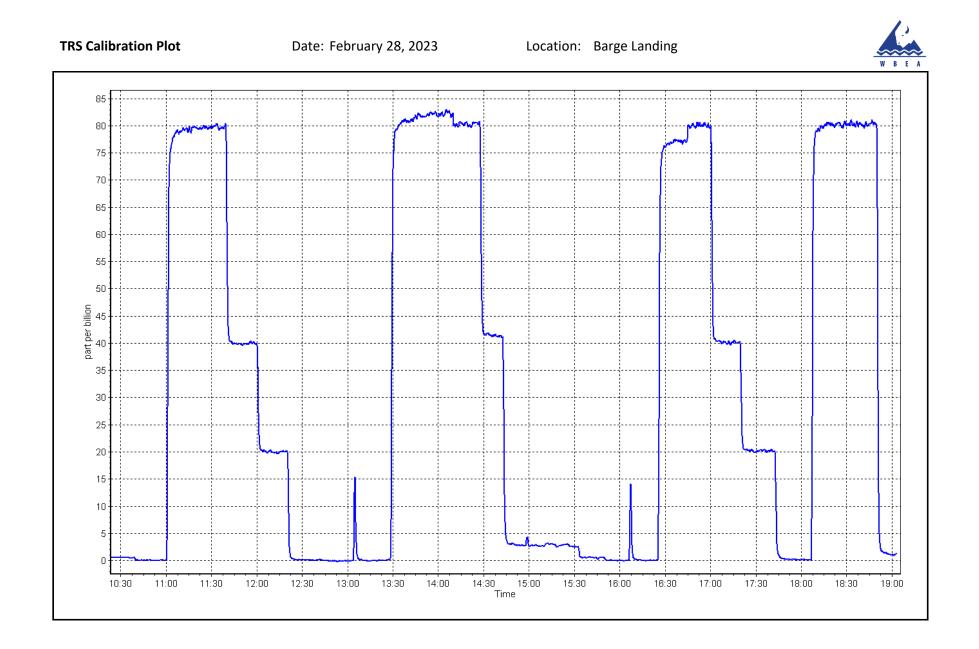
TRS Calibration Summary

WBEA			Version-11-2021
	Stati	on Information	
Calibration Date:	February 28, 2023	Previous Calibration:	January 23, 2023
Station Name:	Barge Landing	Station Number:	AMS09
Start Time (MST):	10:44	End Time (MST):	19:03
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	0.999999	≥0.995
80.0	80.2	0.9971	correlation coefficient	0.555555	20.333
40.0	40.2	0.9958	Slope	1.003148	0.90 - 1.10
20.0	20.0	0.9984	Slope	1.003148	0.90 - 1.10
			Intercept	-0.000990	+/-3







THC / CH_4 / NMHC Calibration Report

WBEA					Version-01-2020
		Statio	on Information		
Station Name:	Barge Landing		Station number: AN	VIS09	
Calibration Date:	February 3, 202	3	Last Cal Date: Ja	nuary 13, 2023	}
Start time (MST):	10:20		End time (MST): 13	:38	
Reason:	Routine				
		Calibra	ation Standards		
Gas Cert Reference:	C	C151285	Cal Gas Expiry Date: Ja	nuary 5, 2025	
CH4 Cal Gas Conc.	497.6	ppm	CH4 Equiv Conc.	1067.1	ppm
C3H8 Cal Gas Conc.	207.1	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry: NA	4	
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: 38	312	
ZAG make/model:	API T701		Serial Number: 48	888	
		Analyz	zer Information		
Analyzer make	: Thermo 55i		Analyzer serial #: 11	70050131	
THC Range (ppm)	: 0 - 100 ppm				
NMHC Range (ppm)	: 0 - 50 ppm		CH4 Range (ppm): 0 -	- 50 ppm	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
CH4 SP Ratio	: 1.99E-04	1.99E-04	NMHC SP Ratio:	4.28E-05	4.28E-05
CH4 Retention time	: 12.2	12.2	NMHC Peak Area:	213327	213327

		THC Calibra	tion 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
as found zero	5000	0.0	0.00	0.00	
as found span	4919	80.2	17.12	17.07	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4919	80.2	17.12	17.13	0.999
second point	4960	40.1	8.56	8.48	1.009
third point	4980	20.0	4.27	4.20	1.016
as left zero	5000	0.0	0.00	0.00	
as left span	4919	80.2	17.12	17.10	1.001
			A	verage Correction Factor	1.008
Baseline Corr AF:	17.07	Prev response	17.11	*% change	-0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation



THC / CH_4 / NMHC Calibration Report

Version-01-2020

		NMHC Calib	ration Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05
as found zero	5000	0.0	0.00	0.0	
as found span	4919	80.2	9.14	9.08	1.006
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4919	80.2	9.14	9.09	1.005
second point	4960	40.1	4.57	4.51	1.013
third point	4980	20	2.28	2.22	1.025
as left zero	5000	0	0.00	0.00	
as left span	4919	80.2	9.14	9.07	1.007
			ŀ	Average Correction Factor	1.014
Baseline Corr AF:	9.08	Prev response	9.15	*% change	-0.8%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation

CH4	Calib	ration	Data
	Callb	ιαιισπ	ναια

		CH4 Calibra	tion 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
as found zero	5000	0.0	0.00	0.00	
as found span	4919	80.2	7.98	7.99	0.999
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4919	80.2	7.98	8.04	0.993
second point	4960	40.1	3.99	3.97	1.006
third point	4980	20.0	1.99	1.98	1.005
as left zero	5000	0.0	0.00	0.00	
as left span	4919	80.2	7.98	8.03	0.994
			A	verage Correction Factor	1.001
Baseline Corr AF:	7.99	Prev response	7.95	*% 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:		1.002709		1.001427	
THC Cal Offset:		-0.059558		-0.043961	
CH4 Cal Slope:		1.000454		1.007423	
CH4 Cal Offset:		-0.035549		-0.020126	
NMHC Cal Slope:		1.004517		0.996127	
NMHC Cal Offset:		-0.024610		-0.024834	

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

Calibration Performed By: Braiden Boutilier



THC Calibration Summary

Version-01-2020

		Station I	nformation		
Calibration Date:	Februar	y 3, 2023	Previous Calibration:	January	13, 2023
Station Name:	Barge I	anding	Station Number:	AM	509
Start Time (MST):	10	:20	End Time (MST):	13:	38
Analyzer make:	Thermo 55i		Analyzer serial #:	11700	50131
		Calibra	tion Data		
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999964	≥0.995
17.12	17.13	0.9994			
8.56 4.27	8.48	1.0092 1.0156	Slope	1.001427	0.90 - 1.10
4.27	4.20	1.0130	Intercept	-0.043961	+/-0.5
16.0					
18.0				_	
14.0					
12.0					
Ed 10.0					
<u>a</u> 10.0					
Indicated Conc. (ppm) 0.8					
Ū 0.0 D					
ate					
dici					
4.0					
2.0					
0.0					
0.0	5	.0	10.0	15.0	20.0
		Calculated	l Conc. (ppm)		



CH₄ Calibration Summary

Version-01-2020

		Station I	nformation		
Calibration Date:	February	3, 2023	Previous Calibration:	January 2	13, 2023
Station Name:	Barge L	anding	Station Number:	AMS	S09
Start Time (MST):	10:	20	End Time (MST):	13:	38
Analyzer make:	Thern	no 55i	Analyzer serial #:	11700	50131
		Calibra	tion Data		
Calculated concentration I (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999946	≥0.995
7.98	8.04	0.9929			
3.99 1.99	3.97 1.98	1.0062 1.0047	Slope	1.007423	0.90 - 1.10
			Intercept	-0.020126	+/-0.5
8.0 7.0 6.0					
Indicated Conc. (ppm)					
O 4.0					
0.6 udicat					
2.0					
1.0					
0.0	2.0	4.0	6.0	8.0	10.0
	2.0		l Conc. (ppm)	5.0	20.0



NMHC Calibration Summary

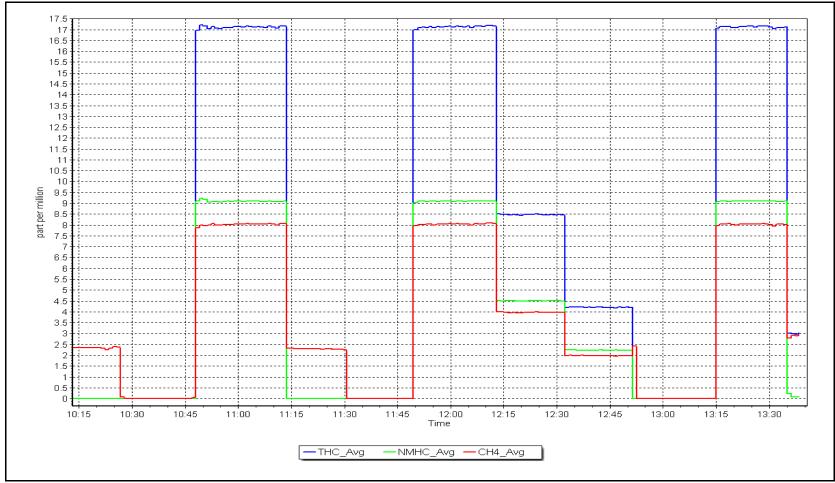
Version-01-2020

		Station I	nformation		
Calibration Date	: Febru	iary 3, 2023	Previous Calibration:	January :	13, 2023
Station Name:	Bar	ge Landing	Station Number:	AM	\$09
Start Time (MST)):	10:20	End Time (MST):	13:	38
Analyzer make:	Th	ermo 55i	Analyzer serial #:	11700	50131
		Calibra	tion Data		
Calculated concentra (ppm) (Cc)	ation Indicated concentration (ppm) (Ic)	ON Correction factor (Cc/Ic)	Statistical Eval	uation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999966	≥0.995
9.14	9.09	1.0051			
4.57	4.51	1.0130 1.0252	Slope	0.996127	0.90 - 1.10
		1.0202	Intercept	-0.024834	+/-0.5
10.0 9.0		NMHC Calibra			•
8.0					
0.0 bbm) 5.0 5.0 4.0 3.0 3.0					
0.4 d					
11 3.0					
2.0					
1.0					
0.0	0.0 2.0	4.0	6.0	8.0	10.0
	2.0		d Conc. (ppm)	0.0	10.0











Station Name:

Calibration Date:

Start time (MST):

Barge Landing

9:55

February 22, 2023

Wood Buffalo Environmental Association

NO_X \ NO \ NO₂ Calibration Report

Version-04-2020

Station Information

Station number: AMS09 Last Cal Date: January 20, 2023 End time (MST): 14:48

		Calib	ration Standards		
NO Gas Cylinder #:	DT0036634		Cal Gas Expiry Date: Jan	uary 28, 2024	4
NOX Cal Gas Conc:	50.00	ppm	NO Cal Gas Conc:	49.70	ppm
Removed Cylinder #:	NA		Removed Gas Exp Date: NA		
Removed Gas NOX Conc:	50.00	ppm	Removed Gas NO Conc:	49.70	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	API T700		Serial Number:	3812	
ZAG make/model:	API T701		Serial Number:	4888	

NOX Range (ppb): 0 ·	- 1000 ppb				
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.182	1.146	NO bkgnd or offset:	10.6	10.3
NOX coeff or slope:	0.996	0.996	NOX bkgnd or offset:	10.6	10.3
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	172.5	179.2

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.998369	0.998455
NO _x Cal Offset:	0.728922	0.648644
NO Cal Slope:	0.997899	1.000928
NO Cal Offset:	-0.272767	-0.732611
NO ₂ Cal Slope:	1.000917	1.000063
NO ₂ Cal Offset:	0.473394	-1.156786



$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

				Dilu	ution Calibratio	on Data				
Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) Limit = 0.95-1.05	NO Correction factor (Cc/Ic) Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
as found span	4919	80.5	805.1	800.3	4.8	834.7	826.6	8.2	0.965	0.968
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.3	0.1	0.1		
high point	4919	80.5	805.1	800.3	4.8	804.3	800.7	3.5	1.001	0.999
second point	4959	40.2	402.1	399.7	2.4	402.3	398.8	3.5	0.999	1.002
third point	4979	20.1	201.0	199.8	1.2	201.7	198.5	3.2	0.997	1.007
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0		
as left span	4919	80.5	805.1	444.9	360.2	796.7	440.0	356.7	1.011	1.011
							Average C	orrection Factor	0.999	1.003
Corrected As fo	ound NO _x =	834.7 ppb	NO =	826.6 ppb	* = > +/-5	% change initiates	investigation	*Percent Chang	ge NO _x =	3.6%
Previous Respo	nse NO _x =	804.5 ppb	NO =	798.3 ppb				*Percent Chang	ge NO =	3.4%
Baseline Corr 2	nd pt NO _X =	NA ppb	NO =	NA ppb	As foun	d $NO_X r^2$:		Nx SI:	Nx Int:	
Baseline Corr 3	rd pt NO _x =	NA ppb	NO =	NA ppb	As foun	d NO r ² :		NO SI:	NO Int:	
					As foun	d $NO_2 r^2$:		NO2 SI:	NO ₂ Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Cc	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) Calibration Limit = 0.95-1.05 As Found Limit = 0.90-1.10	Converter Efficiency Calibration Limit = 96-104%
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	794.9	439.5	360.2	359.5	1.002	99.8%
2nd GPT point (200 ppb O3)	794.9	662.8	136.9	135.4	1.011	98.9%
3rd GPT point (100 ppb O3)	794.9	726.9	72.8	70.4	1.035	96.7%
			A	Verage Correction Factor	1.016	98.4%

Notes:

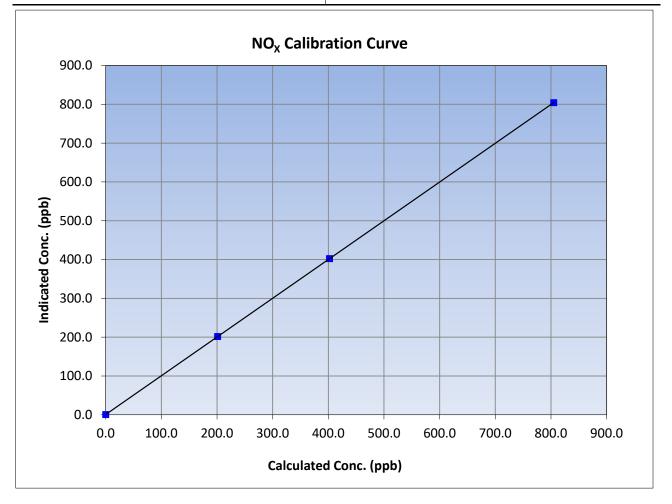
Changed the inlet filter after as founds. Adjusted the span only.

Calibration Performed By:



NO_x Calibration Summary

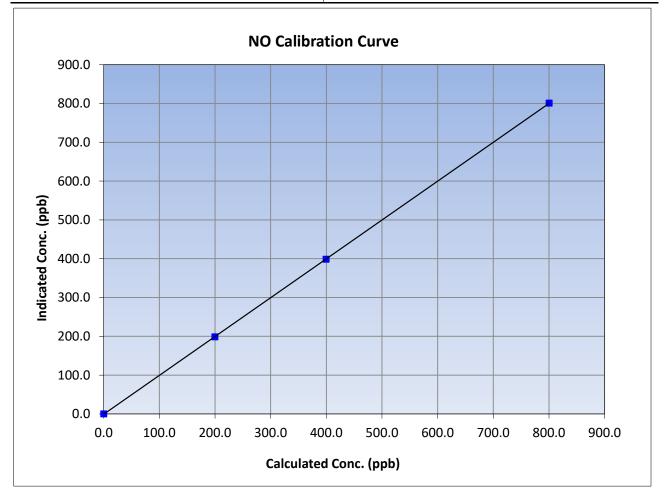
WBEA					Version-04-20	
		Station	Information			
Calibration Date:	February	22, 2023	Previous Calibration:	January	20, 2023	
Station Name:	Barge Landing		Station Number:	AM	S09	
Start Time (MST):	9:55		End Time (MST):	14	:48	
Analyzer make:	Therr	no 42i	Analyzer serial #:	1426262593		
		Calibra	ation Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	0.3		Correlation Coefficient	0.999999	≥0.995	
805.1	804.3	1.0010	correlation coefficient	0.5555555	20.995	
402.1	402.3	0.9994	Slope	0.998455	0.90 - 1.10	
201.0	201.7	0.9967	Slope	0.996455	0.90 - 1.10	
			Intercept	0.648644	+/-20	





NO Calibration Summary

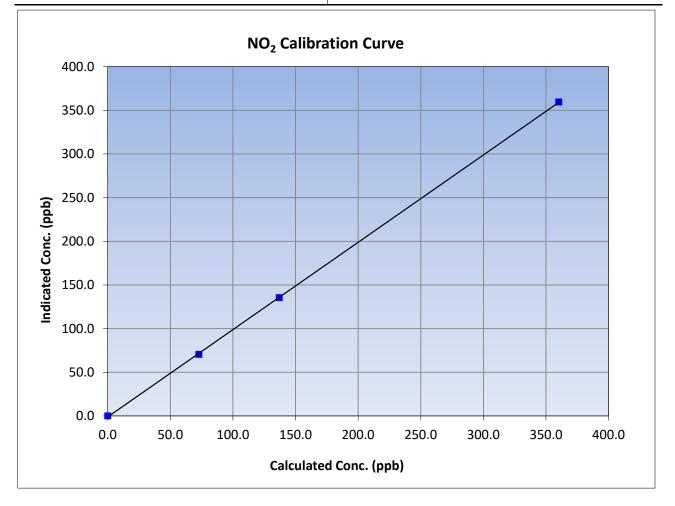
WBEA					Version-04-20	
		Station	Information			
Calibration Date:	February	22, 2023	Previous Calibration:	January	20, 2023	
Station Name:	Barge Landing		Station Number:	ion Number: AM		
Start Time (MST):			End Time (MST):	14	14:48	
Analyzer make:			Analyzer serial #:			
		Calibra	ation Data			
Calculated 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	
800.3	800.7	0.9994	correlation coefficient	0.5555555	20.335	
399.7	398.8	1.0021	Clana	1.000928	0.90 - 1.10	
199.8	198.5	1.0067	Slope	1.000928	0.90 - 1.10	
			Intercept	-0.732611	+/-20	

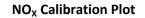




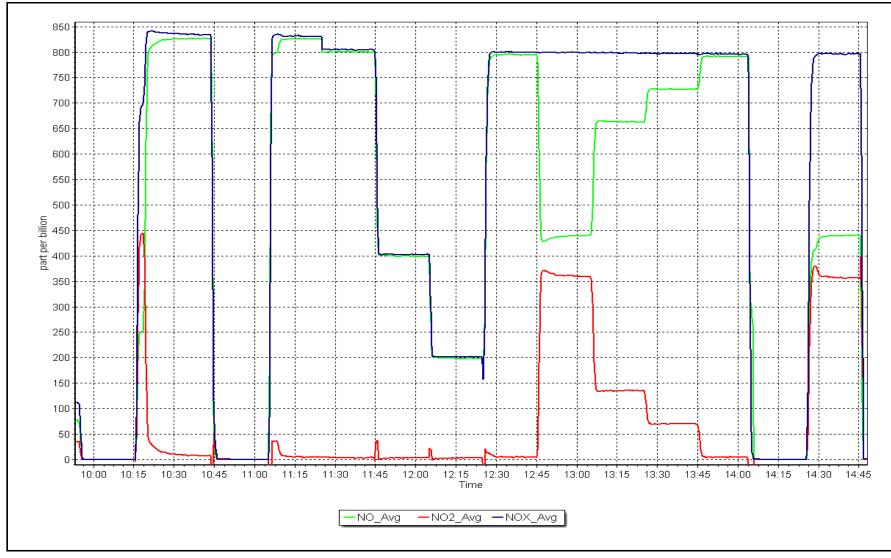
NO₂ Calibration Summary

WBEA					Version-04-20		
		Station	Information				
Calibration Date:	February	22, 2023	Previous Calibration:	January	20, 2023		
Station Name:	Barge Landing		Station Number:	AM	S09		
Start Time (MST):	9:55		End Time (MST):	14	:48		
Analyzer make:	Therr	no 42i	Analyzer serial #:	14262	1426262593		
		Calibra	ation Data				
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>		
0.0	0.1		Correlation Coefficient	0.999951	≥0.995		
360.2	359.5	1.0020	correlation coefficient	0.555551	20.333		
136.9	135.4	1.0113	1.0113		0.90 - 1.10		
72.8	70.4	1.0345	Slope	1.000063	0.90 - 1.10		
			Intercept	-1.156786	+/-20		











T640 PM_{2.5} CALIBRATION

WBEA						Version-01-2023
		Station Information				
Station Name: Calibration Date: Start time (MST):	Barge Landing February 28, 2023 10:46		Station number: Last Cal Date: End time (MST):	January 27	, 2023	
Analyzer Make: Particulate Fraction:	API T640 PM2.5		S/N:	321		
Flow Meter Make/Model:	Alicat FP-25BT		S/N:	388753		
Temp/RH standard:	Alicat FP-25BT		S/N:	388753		
		Monthly Calibration Te	est			
<u>Parameter</u> T ([°] C)	<u>As found</u> -15.7	Measured -16.3	<u>As left</u> -15.7		Adjusted	<i>(Limits)</i> +/- 2 °C
P (mmHg)	733.1	734.6	733.1			+/- 10 mmHg
flow (LPM)	4.99	5.16	4.99			+/- 0.25 LPM
Leak Test:		February 28, 2023 5.7	Last Cal Date: PM w/ HEPA:	January	27, 2023 .2	<0.2 ug/m3
_		Quarterly Calibration T				6 I
Parameter	<u>As found</u>	Post maintenance	<u>As left</u>		Adjusted	(Limits)
PMT Peak Test	6.0	11.0	11.0			11.3 +/- 0.5
Post-maintenance	e leak check:	PM w/o HEPA:	5.7	w/ HEPA:		0.0
Date Optical Chan Disposable Filte		February 28 February 28				<0.2 ug/m3
		Annual Maintenance	9			
Date Sample Tul	be Cleaned:	November 15	5, 2022			
Date RH/T Sense		November 15	,			
Notes:	Initial leak check fa	iled. PMT test was low b	-			bassed, PMT
Calibration by:	Braiden Boutilier	peak test passed after	cieaning. No adjus	tments mac	ie.	



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS11 LOWER CAMP FEBRUARY 2023

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

March 31, 2023



SO₂ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Lower Camp February 7, 2023 9:53 Routine		Station number: Last Cal Date: End time (MST):	AMS11 January 20, 2023 13:19	
		Calibration St	andards		
Cal Gas Concentration:	49.25	ppm	Cal Gas Exp Date:	February 23, 2025	
Cal Gas Cylinder #: Removed Cal Gas Conc:	CC2216 49.25	nnm	Pom Cas Exp Date:	ΝΑ	
Removed Gas Cyl #:	49.25 NA	ppm	Rem Gas Exp Date: Diff between cyl:	NA	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3807	
ZAG Make/Model:	Teledyne API T701		Serial Number:	196	
		Analyzer Info	rmation		
Analyzer make Analyzer Range			Analyzer serial #:	100841398	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.996844	0.992304	Backgd or Offset:	14.2	14.3
Calibration intercept:	-0.548951	-0.508143	Coeff or Slope:	1.051	1.051
		SO ₂ Calibratio	on Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration ((ppb) (Ic)	Correction factor (Cc/Io Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.1	
as found span	4919	81.3	800.8	795.0	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	
high point	4919	81.3	800.8	795.1	1.007
second point	4959	40.7	400.9	395.0	1.015
third point	4980	20.3	199.9	198.5	1.007
as left zero	5000	0.0	0.0	0.2	
as left span	4919	81.3	800.8	795.7	1.006
			Averag	ge Correction Factor	1.010
Baseline Corr As found:	794.90	Previous response	797.68	*% change	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

Notes:

Changed sample inlet filter and N2 cylinder after as founds. No adjustments made.

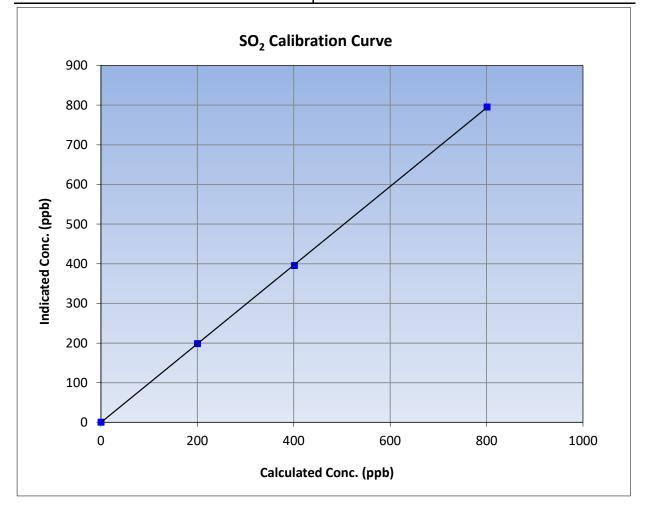


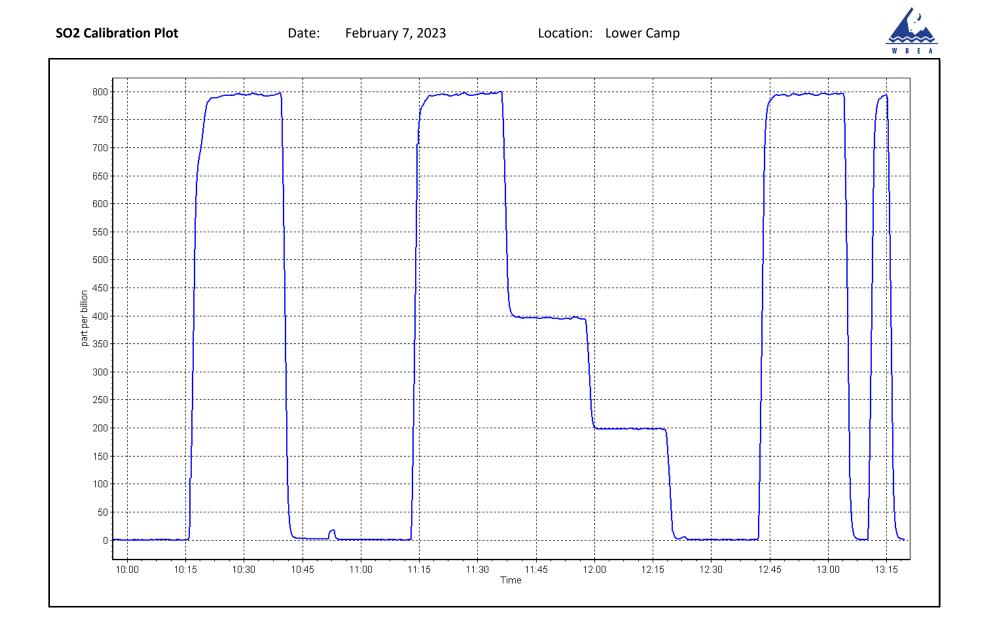
SO₂ Calibration Summary

WBEA			Version-01-2020
	Stati	on Information	
Calibration Date:	February 7, 2023	Previous Calibration:	January 20, 2023
Station Name:	Lower Camp	Station Number:	AMS11
Start Time (MST):	9:53	End Time (MST):	13:19
Analyzer make:	Thermo 43i	Analyzer serial #:	100841398

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
800.8	795.1	1.0071	correlation coefficient	0.555575	20.333
400.9	395.0	1.0150	Slope	0.992304	0.90 - 1.10
199.9	198.5	1.0073	Slope	0.992304	0.90 - 1.10
			Intercept	-0.508143	+/-30







H₂S Calibration Report

WBEA					Version-11-2
		Station Info	rmation		
itation Name: Calibration Date: tart time (MST): Reason:	Lower Camp February 8, 2023 10:06 Routine		Station number: Last Cal Date: End time (MST):	AMS11 January 19, 2023 14:47	
		Calibration S	tandards		
Cal Gas Concentration:	5.429	ppm	Cal Gas Exp Date:	January 4, 2025	
Cal Gas Cylinder #: Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model: ZAG Make/Model:	CC501097 5.429 NA API T700 API T701H	ppm	Rem Gas Exp Date: Diff between cyl: Serial Number: Serial Number:	NA 3807 196	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	Thermo 450iQ NA 0 - 100 ppb		Analyzer serial #: Converter serial #:	CM20080003 NA	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.000040	0.997193	Backgd or Offset:	13.9	14.0
Calibration intercept:	0.055163	0.454865	Coeff or Slope:	1.043	1.043
		H ₂ S As Four	nd Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjuste Correction facto (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	80.1	1.000
as found 2nd point	4963	36.8	40.0	39.9	1.007
as found 3rd point	4982	18.6	20.2	19.9	1.025
new cylinder response					
		H ₂ S Calibrati	ion Data		
			Calculated	Indicated	Correction facto
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	concentration (ppb) (Cc)	concentration (ppb) (Ic)	(Cc/Ic) <i>Limit = 0.95-1.05</i>
Set Point calibrator zero		-		concentration (ppb) (Ic) 0.1	
calibrator zero high point	(sccm)	(sccm) 0.0 73.6	(Cc)	0.1 79.9	
calibrator zero high point second point	(sccm) 5000 4926 4963	(sccm) 0.0 73.6 36.8	(Cc) 0.0	0.1	Limit = 0.95-1.05
calibrator zero high point second point third point	(sccm) 5000 4926 4963 4982	(sccm) 0.0 73.6 36.8 18.6	(Cc) 0.0 79.9 40.0 20.2	0.1 79.9 40.7 20.8	Limit = 0.95-1.05 1.000 0.982 0.971
calibrator zero high point second point third point as left zero	(sccm) 5000 4926 4963 4982 5000	(sccm) 0.0 73.6 36.8 18.6 0.0	(Cc) 0.0 79.9 40.0 20.2 0.0	0.1 79.9 40.7 20.8 0.8	Limit = 0.95-1.05 1.000 0.982 0.971
calibrator zero high point second point third point as left zero as left span	(sccm) 5000 4926 4963 4982 5000 4926	(sccm) 0.0 73.6 36.8 18.6 0.0 73.6	(Cc) 0.0 79.9 40.0 20.2 0.0 79.9	0.1 79.9 40.7 20.8 0.8 80.4	Limit = 0.95-1.05 1.000 0.982 0.971 0.994
calibrator zero high point second point third point as left zero as left span O2 Scrubber Check	(sccm) 5000 4926 4963 4982 5000 4926 4919	(sccm) 0.0 73.6 36.8 18.6 0.0	(Cc) 0.0 79.9 40.0 20.2 0.0	0.1 79.9 40.7 20.8 0.8 80.4 0.4	Limit = 0.95-1.02 1.000 0.982 0.971 0.994
calibrator zero high point second point third point as left zero as left span O2 Scrubber Check Date of last scrubber cha	(sccm) 5000 4926 4963 4982 5000 4926 4926 4919 inge:	(sccm) 0.0 73.6 36.8 18.6 0.0 73.6	(Cc) 0.0 79.9 40.0 20.2 0.0 79.9	0.1 79.9 40.7 20.8 0.8 80.4	Limit = 0.95-1.02 1.000 0.982 0.971 0.994 0.984
calibrator zero high point second point third point as left zero as left span O2 Scrubber Check Date of last scrubber cha	(sccm) 5000 4926 4963 4982 5000 4926 4926 4919 inge:	(sccm) 0.0 73.6 36.8 18.6 0.0 73.6	(Cc) 0.0 79.9 40.0 20.2 0.0 79.9	0.1 79.9 40.7 20.8 0.8 80.4 0.4	Limit = 0.95-1.05
calibrator zero high point second point third point as left zero as left span O2 Scrubber Check Date of last scrubber cha Date of last converter eff	(sccm) 5000 4926 4963 4982 5000 4926 4926 4919 inge:	(sccm) 0.0 73.6 36.8 18.6 0.0 73.6	(Cc) 0.0 79.9 40.0 20.2 0.0 79.9 811.0	0.1 79.9 40.7 20.8 0.8 80.4 0.4	Limit = 0.95-1.05 1.000 0.982 0.971 0.994 0.984
calibrator zero high point second point third point as left zero	(sccm) 5000 4926 4963 4982 5000 4926 4919 inge: ficiency test:	(sccm) 0.0 73.6 36.8 18.6 0.0 73.6 81.1	(Cc) 0.0 79.9 40.0 20.2 0.0 79.9 811.0 79.98	0.1 79.9 40.7 20.8 0.8 80.4 0.4 Ave Corr Factor	Limit = 0.95-1.05

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

Calibration Performed By:

Notes:

Mohammed Kashif

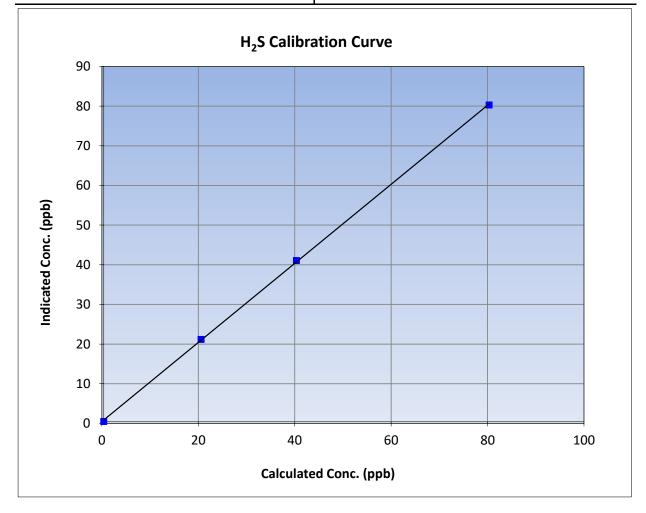


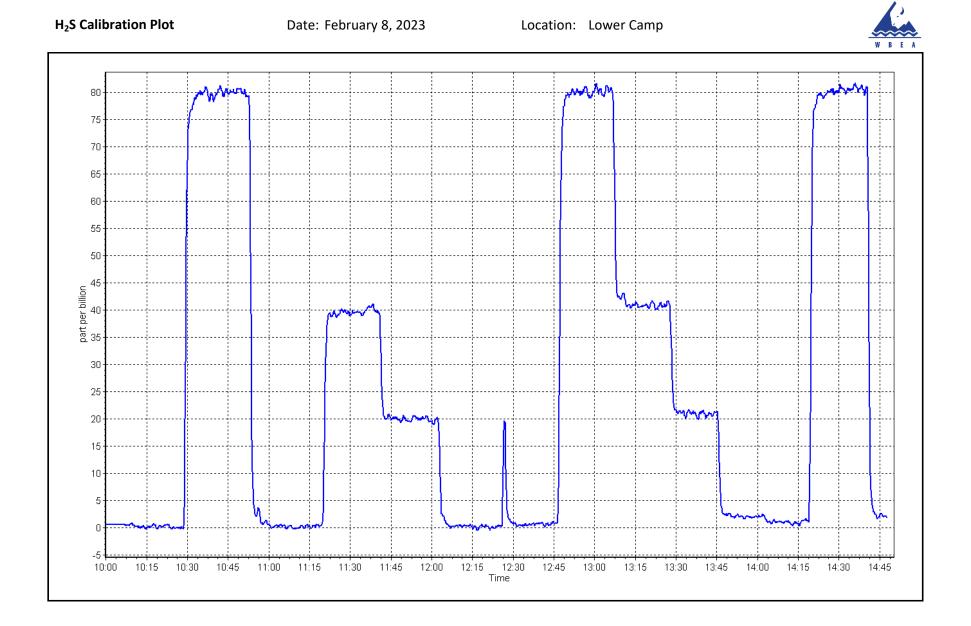
H₂S Calibration Summary

Version-11-2021 **Station Information** Calibration Date: February 8, 2023 **Previous Calibration:** January 19, 2023 Station Name: Lower Camp Station Number: AMS11 Start Time (MST): 10:06 End Time (MST): 14:47 Analyzer make: Thermo 450iQ Analyzer serial #: CM20080003

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	0.999887	≥0.995
79.9	79.9	1.0003	correlation coefficient	0.999887	20.333
40.0	40.7	0.9818	Slope	0.997193	0.90 - 1.10
20.2	20.8	0.9708	Slope	0.997193	0.30 - 1.10
			Intercept	0.454865	+/-3







THC / CH₄ / NMHC Calibration Report

WBEA					Version-01-20	
		Stati	on Information			
Station Name:	Lower Camp		Station number: Al	Station number: AMS11		
Calibration Date:	February 7, 202	bruary 7, 2023 Last Cal Date				
Start time (MST):	9:53		End time (MST): 13	8:19		
Reason:	Routine					
		Calibr	ration Standards			
Gas Cert Reference:		CC2216	Cal Gas Expiry Date: Fe	bruary 23, 202	5	
CH4 Cal Gas Conc.	502.0	ppm	CH4 Equiv Conc.	1067.1	ppm	
C3H8 Cal Gas Conc.	205.5	ppm				
Removed Gas Cert:			Removed Gas Expiry:			
Removed CH4 Conc.	502.0	ppm	CH4 Equiv Conc.	1067.1	ppm	
Removed C3H8 Conc.	205.5	ppm	Diff between cyl (THC):			
Diff between cyl (CH ₄):	:		Diff between cyl (NM):			
Calibrator Model:	API T700		Serial Number: 38	307		
ZAG make/model:	API T701		Serial Number: 19	96		
		Analy	zer Information			
Analyzer make:	Thermo 55i		Analyzer serial #: 15	05164381		
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:	3.09E-04	3.09E-04	NMHC SP Ratio:	5.97E-05	5.97E-05	
CH4 Retention time:	14.0	14.0	NMHC Peak Area:	153551	153551	

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	4919	81.3	17.35	17.40	0.997			
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	17.44	0.995			
second point	4959	40.7	8.69	8.67	1.003			
third point	4980	20.3	4.33	4.33	1.001			
as left zero	5000	0.0	0.00	0.00				
as left span	4919	81.3	17.35	17.49	0.992			
			A	Average Correction Factor	1.000			
Baseline Corr AF:	17.40	Prev response	17.40	*% change	0.0%			
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:				
Baseline Corr 3rd AF:NAAF Correlation:* = > +/-5% change initiates investigation								



THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data								
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05			
as found zero	5000	0.0	0.00	0.00				
as found span	4919	81.3	9.19	9.18	1.001			
as found 2nd point								
as found 3rd point								
new cylinder response								
calibrator zero	5000	0.0	0.00	0.00				
high point	4919	81.3	9.19	9.20	0.999			
second point	4959	40.7	4.60	4.58	1.004			
third point	4980	20.3	2.29	2.29	1.001			
as left zero	5000	0.0	0.00	0.00				
as left span	4919	81.3	9.19	9.25	0.994			
			ŀ	Average Correction Factor	1.002			
Baseline Corr AF:	9.18	Prev response	9.19	*% change	-0.1%			
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:				
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation			

CH4	Cali	ibratio	n Data
CIT	Cull	Diacio	Dutu

	CH4 Calibra	tion Data			
Dil air flow rate	Source gas flow rate	Calc conc (ppm) (C	Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05	
5000	0.0	0.00	0.00		
4919	81.3	8.16	8.23	0.992	
5000	0.0	0.00	0.00		
4919	81.3	8.16	8.23	0.992	
4959	40.7	4.09	4.09	1.000	
4980	20.3	2.04	2.04	1.000	
5000	0.0	0.00	0.00		
4919	81.3	8.16	8.24	0.990	
		A	verage Correction Factor	0.997	
8.23	Prev response	8.21	*% change	0.2%	
NA	AF Slope:		AF Intercept:		
NA	AF Correlation:		* = > +/-5% change initiat	es investigation	
	Calibration	Statistics			
	<u>Start</u>		Finish		
	1.004292		1.004951		
	-0.024989		-0.022988		
	1.007657		1.008833		
	-0.016486		-0.014688		
	1.001092		1.001278		
	-0.007903		-0.007900		
	5000 4919 5000 4919 4959 4980 5000 4919 8.23 NA	Dil air flow rate Source gas flow rate 5000 0.0 4919 81.3 5000 0.0 4919 81.3 4959 40.7 4980 20.3 5000 0.0 4919 81.3 4959 40.7 4980 20.3 5000 0.0 4919 81.3 8.23 Prev response NA AF Slope: NA AF Slope: NA AF Slope: 1.004292 -0.024989 1.007657 -0.016486 1.001092 -0.016486	5000 0.0 0.00 4919 81.3 8.16 5000 0.0 0.00 4919 81.3 8.16 4919 81.3 8.16 4959 40.7 4.09 4980 20.3 2.04 5000 0.0 0.00 4919 81.3 8.16 4959 40.7 4.09 4980 20.3 2.04 5000 0.0 0.00 4919 81.3 8.16 A 8.23 Prev response 8.21 NA AF Slope: A NA AF Correlation: A Calibration Statistics Start 1.004292 -0.024989 1.007657 -0.016486 1.001092	Dil air flow rate Source gas flow rate Calc conc (ppm) (Cc) Ind conc (ppm) (Ic) 5000 0.0 0.00 0.00 4919 81.3 8.16 8.23 5000 0.0 0.00 0.00 4919 81.3 8.16 8.23 5000 0.0 0.00 0.00 4919 81.3 8.16 8.23 4959 40.7 4.09 4.09 4980 20.3 2.04 2.04 5000 0.0 0.00 0.00 4919 81.3 8.16 8.24 Average Correction Factor Start *% change 8.23 Prev response 8.21 *% change NA AF Slope: AF Intercept: NA AF Correlation: *=> +/-5% change initiat 1.004292 1.004951 -0.022988 1.007657 1.008833 -0.016486 1.001092 1.001278 1.001278	

Notes:

Changed sample inlet filter and N2 cylinder after as founds. No adjustments made.

Calibration Performed By: Mo

Mohammed Kashif



THC Calibration Summary

		Station I	nformation		
Calibration Date:	February 7, 2023		Previous Calibration:	January 2	20, 2023
Station Name:	Lower	Camp	Station Number:	AM	S11
Start Time (MST):	9:	53	End Time (MST):	13:	19
Analyzer make:	Therr	no 55i	Analyzer serial #:	15051	64381
		Calibra	tion Data		
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999983	≥0.995
17.35	17.44 8.67	0.9951			
8.69 4.33	4.33	1.0025 1.0010	Slope	1.004951	0.90 - 1.10
			Intercept	-0.022988	+/-0.5
18.0				_	
				_	
14.0					
E 12.0					
لیہ 12.0 غنی 10.0					
0.8 ted C					
0.8 udicated					
4.0					
2.0					
0.0					
0.0	5	.0	10.0	15.0	20.0



CH₄ Calibration Summary

			Charles -	1.6			Version-01-20	
				Information				
Calibration		February 7, 2023			Calibration:	January 2		
tation Na		Lower Camp			n Number:		AMS11	
tart Time			9:53		ime (MST):	13:		
nalyzer m	nake:	Th	iermo 55i	Analyz	er serial #:	15051	64381	
			Calib	ration Data				
alculated co (ppm)		Indicated concentrati (ppm) (Ic)	ion Correction factor (Cc/Io	2)	Statistical Eval	uation	<u>Limits</u>	
0.0 8.2		0.00 8.23	0.9915	Correlation	Coefficient	0.999975	≥0.995	
4.0		4.09 2.04	1.0004 1.0005	Slop	be	1.008833	0.90 - 1.10	
				Interc	cept	-0.014688	+/-0.5	
	9.0							
	7.0							
	6.0			/				
. (ppm	5.0							
d Conc	4.0							
Indicated Conc. (ppm)	3.0							
	2.0							
	1.0							
	0.0						10.0	
	0.0	2.0			6.0	8.0	10.0	
			Calculate	ed Conc. (pp	m)			

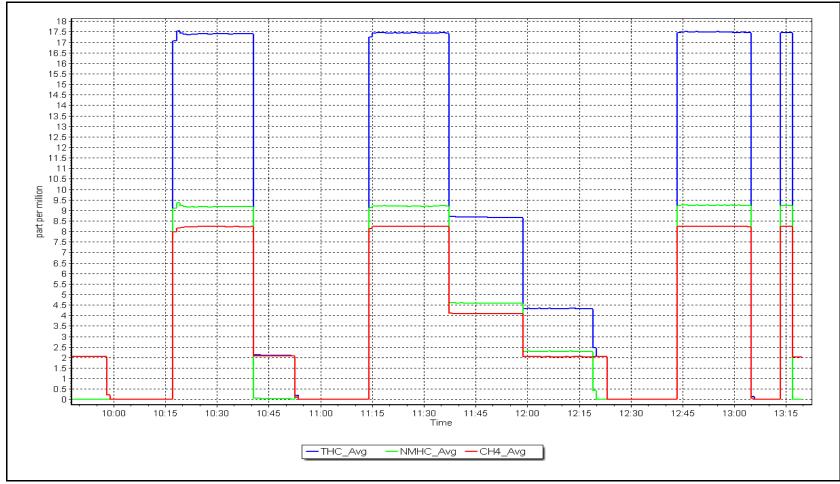


NMHC Calibration Summary

			Station	nformation			
Calibration	Date:	February 7, 2023		Previous Calibration:	January	20, 2023	
Station Nar	me:	Lower Camp		Station Number:	AM	AMS11	
Start Time	(MST):		9:53	End Time (MST):	13	:19	
Analyzer m	nake:	The	ermo 55i	Analyzer serial #:	15051	64381	
			Calibra	ation Data			
Calculated co (ppm)		n Indicated concentration (ppm) (Ic) Correction factor (Cc/Ic)		Statistical Eva	luation	<u>Limits</u>	
0.0 9.1		0.00 9.20	 0.9986	Correlation Coefficient	0.999990	≥0.995	
4.6	50	4.58	1.0045	- Slope	1.001278	0.90 - 1.10	
2.2	29	2.29	1.0014		1.001270	0.50 1.10	
				Intercept	-0.007900	+/-0.5	
1	0.0		NMHC Calibra	tion Curve			
	9.0 —					_	
	8.0						
	7.0			/			
(mq	6.0						
Conc. (ppm)	5.0 -						
ted Co	4.0 —						
Indicated	3.0 —						
	2.0						
	1.0						
l	0.0						
l	0.0	2.0	4.0	6.0	8.0	10.0	
			Calculate	d Conc. (ppm)			

NMHC Calibration Plot







WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS13 FORT MCKAY SOUTH FEBRUARY 2023

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

March 31, 2023



SO₂ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Fort McKay South February 2, 2023 9:48 Routine		Station number: Last Cal Date: End time (MST):	AMS13 January 16, 2023 12:50	
		Calibration St	andards		
Cal Gas Concentration:	50.55	ppm	Cal Gas Exp Date:	December 29, 2028	
Cal Gas Cylinder #: Removed Cal Gas Conc:	CC260812 50.55	nnm	Rem Gas Exp Date:	N/A	
Removed Gas Cyl #:	N/A	ppm	Diff between cyl:	N/A	
Calibrator Make/Model:	API T700		Serial Number:	2448	
ZAG Make/Model:	API 701		Serial Number:	1117	
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		Schull Humber.	111,	
		Analyzer Info	rmation		
Analyzer make Analyzer Range			Analyzer serial #:	599	
	Start	Finish		Start	Finish
Calibration slope:	1.003886	1.001413	Backgd or Offset:		77.5
Calibration intercept:	-3.178199	-2.738219	Coeff or Slope:		0.735
		SO ₂ Calibratio	on Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration ((ppb) (Ic)	Correction factor (Cc/ Limit = 0.95-1.05
as found zero	5000	0.0	0.0	-0.9	
as found span	4921	79.1	799.7	796.3	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	79.1	799.7	799.4	1.000
second point	4961	39.5	399.3	396.0	1.008
third point	4980	19.8	200.2	194.7	1.028
as left zero	5000	0.0	0.0	0.1	
as left span	4921	79.1	799.7	798.9	1.001
			Averag	ge Correction Factor	1.012
Baseline Corr As found:	797.20	Previous response	799.61	*% change	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
	NA	AF Correlation:			

Notes:

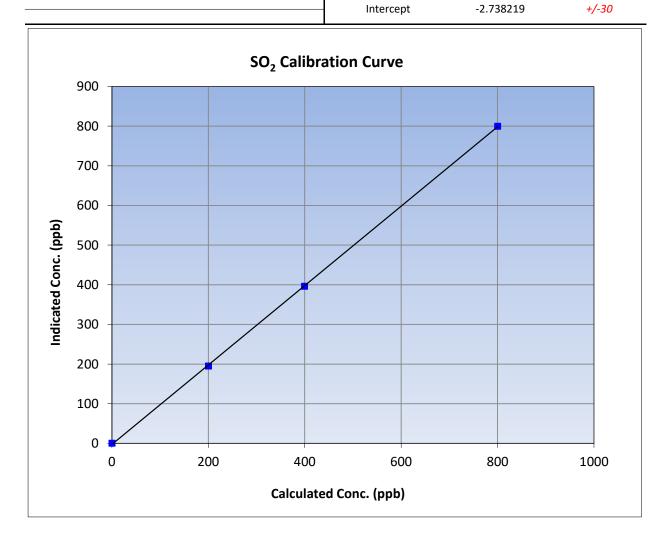
Changed the inlet filter after as founds. Adjusted zero and span.

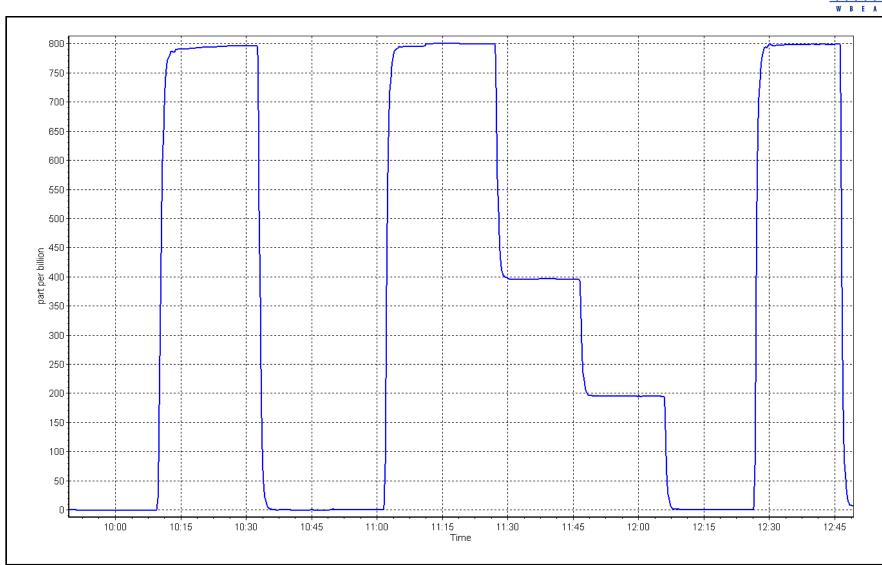
Calibration Performed By:



SO₂ Calibration Summary

WBEA					Version-01-2
		Station	Information		
Calibration Date:	February	2, 2023	Previous Calibration:	January	16, 2023
Station Name:	Fort McKay South 9:48		Station Number:	AMS13 12:50	
Start Time (MST):			End Time (MST):		
Analyzer make:	API T100		Analyzer serial #: 5		599
		Calib	ration Data		
		Calib	ration Data		
Calculated concentration Ir (ppb) (Cc)	ndicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999942	≥0.995
799.7	799.4	1.0004	- correlation coefficient	0.999942	20.995
399.3	396.0	1.0083	Slope	1.001413	0.90 - 1.10
200.2	194.7	1.0282	Jiohe	1.001415	0.30 - 1.10





Location: Fort McKay South





TRS Calibration Report

WBEA					Version-11-2
		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Fort McKay South February 7, 2023 9:31 Routine		Station number: Last Cal Date: End time (MST):	AMS13 January 17, 2023 14:05	
		Calibration St	andards		
Cal Gas Concentration:	5.34	ppm	Cal Gas Exp Date:	January 4, 2025	
Cal Gas Cylinder #: Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model: ZAG Make/Model:	CC500241 5.34 NA Teledyne API T700 Teledyne API 701	ppm	Rem Gas Exp Date: Diff between cyl: Serial Number: Serial Number:	2448 1117	
		Analyzer Info	rmation		
Analyzer make: Converter make: Analyzer Range	Thermo 43i TLE CDN-101 0 - 100 ppb		Analyzer serial #: Converter serial #:	1180540017 521	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.999228	1.002489	Backgd or Offset:	3.69	3.69
Calibration intercept:	-0.042157	-0.082182	Coeff or Slope:	1.120	1.120
		TRS As Foun	d Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjuster Correction factor (Cc/(Ic-AFzero)) Limit = 0.90-1.10
as found zero	5000	0.0	0.0	0.4	
	5000	0.0	0.0	0.1	
as found span	4925	75.5	80.6	80.6	1.002
as found span as found 2nd point					
	4925	75.5	80.6	80.6	1.002
as found 2nd point	4925 4962	75.5 37.7	80.6 40.3	80.6 40.0	1.002 1.009
as found 2nd point as found 3rd point	4925 4962	75.5 37.7	80.6 40.3 20.2	80.6 40.0	1.002 1.009
as found 2nd point as found 3rd point	4925 4962	75.5 37.7 18.9	80.6 40.3 20.2 On Data Calculated concentration (ppb)	80.6 40.0	1.002 1.009 1.035 Correction facto (Cc/lc)
as found 2nd point as found 3rd point new cylinder response Set Point	4925 4962 4981 Dilution air flow rate (sccm)	75.5 37.7 18.9 TRS Calibration Source gas flow rate (sccm)	80.6 40.3 20.2 On Data Calculated concentration (ppb) (Cc)	80.6 40.0 19.6 Indicated concentration (ppb) (Ic)	1.002 1.009 1.035 Correction facto (Cc/lc) Limit = 0.95-1.05
as found 2nd point as found 3rd point new cylinder response Set Point calibrator zero	4925 4962 4981 Dilution air flow rate (sccm) 5000	75.5 37.7 18.9 TRS Calibration Source gas flow rate (sccm) 0.0	80.6 40.3 20.2 on Data Calculated concentration (ppb) (Cc) 0.0	80.6 40.0 19.6 Indicated concentration (ppb) (Ic) 0.1	1.002 1.009 1.035 Correction facto (Cc/lc) Limit = 0.95-1.05
as found 2nd point as found 3rd point new cylinder response Set Point calibrator zero high point	4925 4962 4981 Dilution air flow rate (sccm) 5000 4925	75.5 37.7 18.9 TRS Calibration Source gas flow rate (sccm) 0.0 75.5	80.6 40.3 20.2 on Data Calculated concentration (ppb) (Cc) 0.0 80.6	80.6 40.0 19.6 Indicated concentration (ppb) (Ic) 0.1 80.8	1.002 1.009 1.035 Correction facto (Cc/lc) Limit = 0.95-1.05 0.998
as found 2nd point as found 3rd point new cylinder response Set Point calibrator zero high point second point	4925 4962 4981 Dilution air flow rate (sccm) 5000 4925 4962	75.5 37.7 18.9 TRS Calibrati Source gas flow rate (sccm) 0.0 75.5 37.7	80.6 40.3 20.2 on Data Calculated concentration (ppb) (Cc) 0.0 80.6 40.3	80.6 40.0 19.6 Indicated concentration (ppb) (Ic) 0.1 80.8 40.3	1.002 1.009 1.035 Correction facto (Cc/Ic) Limit = 0.95-1.05 0.998 0.999
as found 2nd point as found 3rd point new cylinder response Set Point calibrator zero high point second point third point	4925 4962 4981 Dilution air flow rate (sccm) 5000 4925 4962 4981	75.5 37.7 18.9 TRS Calibrations Source gas flow rate (sccm) 0.0 75.5 37.7 18.9	80.6 40.3 20.2 on Data Calculated concentration (ppb) (Cc) 0.0 80.6 40.3 20.2	80.6 40.0 19.6 Indicated concentration (ppb) (Ic) 0.1 80.8 40.3 19.9	1.002 1.009 1.035 Correction facto (Cc/lc) Limit = 0.95-1.05 0.998 0.999 1.014
as found 2nd point as found 3rd point new cylinder response Set Point calibrator zero high point second point third point as left zero	4925 4962 4981 Dilution air flow rate (sccm) 5000 4925 4962 4981 5000	75.5 37.7 18.9 TRS Calibrations Source gas flow rate (sccm) 0.0 75.5 37.7 18.9 0.0	80.6 40.3 20.2 on Data Calculated concentration (ppb) (Cc) 0.0 80.6 40.3 20.2 0.0	80.6 40.0 19.6 Indicated concentration (ppb) (Ic) 0.1 80.8 40.3 19.9 0.3	1.002 1.009 1.035 Correction factor (Cc/lc) Limit = 0.95-1.05 0.998 0.999 1.014
as found 2nd point as found 3rd point new cylinder response Set Point calibrator zero high point second point third point as left zero as left span	4925 4962 4981 Dilution air flow rate (sccm) 5000 4925 4962 4981 5000 4925	75.5 37.7 18.9 TRS Calibrations Source gas flow rate (sccm) 0.0 75.5 37.7 18.9 0.0 75.5	80.6 40.3 20.2 on Data Calculated concentration (ppb) (Cc) 0.0 80.6 40.3 20.2 0.0 80.6	80.6 40.0 19.6 0.1 0.1 80.8 40.3 19.9 0.3 80.7	1.002 1.009 1.035 Correction facto (Cc/Ic) Limit = 0.95-1.05 0.998 0.999 1.014
as found 2nd point as found 3rd point new cylinder response Set Point calibrator zero high point second point third point as left zero as left span 502 Scrubber Check	4925 4962 4981 Dilution air flow rate (sccm) 5000 4925 4962 4981 5000 4925 4925 4921	75.5 37.7 18.9 TRS Calibratio Source gas flow rate (sccm) 0.0 75.5 37.7 18.9 0.0 75.5 79.1	80.6 40.3 20.2 on Data Calculated concentration (ppb) (Cc) 0.0 80.6 40.3 20.2 0.0	80.6 40.0 19.6 Indicated concentration (ppb) (Ic) 0.1 80.8 40.3 19.9 0.3 80.7 0.0	1.002 1.009 1.035 Correction facto (Cc/lc) Limit = 0.95-1.05 0.998 0.999 1.014 0.999
as found 2nd point as found 3rd point new cylinder response Set Point calibrator zero high point second point third point as left zero	4925 4962 4981 Dilution air flow rate (sccm) 5000 4925 4962 4981 5000 4925 4925 4921 nge:	75.5 37.7 18.9 TRS Calibrations Source gas flow rate (sccm) 0.0 75.5 37.7 18.9 0.0 75.5	80.6 40.3 20.2 on Data Calculated concentration (ppb) (Cc) 0.0 80.6 40.3 20.2 0.0 80.6	80.6 40.0 19.6 0.1 0.1 80.8 40.3 19.9 0.3 80.7	1.002 1.009 1.035 Correction facto (Cc/lc) Limit = 0.95-1.05 0.998 0.999 1.014 0.999 1.014 1.004
as found 2nd point as found 3rd point new cylinder response Set Point calibrator zero high point second point third point as left zero as left span SO2 Scrubber Check Date of last scrubber char Date of last converter effi	4925 4962 4981 Dilution air flow rate (sccm) 5000 4925 4962 4981 5000 4925 4921 nge: ciency test:	75.5 37.7 18.9 TRS Calibration Source gas flow rate (sccm) 0.0 75.5 37.7 18.9 0.0 75.5 37.7 18.9 0.0 75.5 79.1 20-Mar-20 NA	80.6 40.3 20.2 on Data Calculated concentration (ppb) (Cc) 0.0 80.6 40.3 20.2 0.0 80.6 791.0	80.6 40.0 19.6 0.1 80.8 40.3 19.9 0.3 80.7 0.0 Ave Corr Factor	1.002 1.009 1.035 Correction facto (Cc/lc) Limit = 0.95-1.05 0.998 0.999 1.014 0.999 1.014 1.004 efficiency
as found 2nd point as found 3rd point new cylinder response Set Point calibrator zero high point second point third point as left zero as left span SO2 Scrubber Check Date of last scrubber char Date of last converter effi Baseline Corr As found:	4925 4962 4981 Dilution air flow rate (sccm) 5000 4925 4962 4981 5000 4925 4921 nge: ciency test: 80.5	75.5 37.7 18.9 TRS Calibration Source gas flow rate (sccm) 0.0 75.5 37.7 18.9 0.0 75.5 37.7 18.9 0.0 75.5 79.1 20-Mar-20 NA Prev response:	80.6 40.3 20.2 on Data Calculated concentration (ppb) (Cc) 0.0 80.6 40.3 20.2 0.0 80.6 791.0 80.52	80.6 40.0 19.6 0.1 80.8 40.3 19.9 0.3 80.7 0.0 Ave Corr Factor *% change:	1.002 1.009 1.035 Correction facto (Cc/lc) Limit = 0.95-1.05 0.998 0.999 1.014 0.999 1.014 1.004 efficiency 0.0%
as found 2nd point as found 3rd point new cylinder response Set Point calibrator zero high point second point third point as left zero as left span SO2 Scrubber Check Date of last scrubber char Date of last converter effi	4925 4962 4981 Dilution air flow rate (sccm) 5000 4925 4962 4981 5000 4925 4921 nge: ciency test:	75.5 37.7 18.9 TRS Calibration Source gas flow rate (sccm) 0.0 75.5 37.7 18.9 0.0 75.5 37.7 18.9 0.0 75.5 79.1 20-Mar-20 NA	80.6 40.3 20.2 on Data Calculated concentration (ppb) (Cc) 0.0 80.6 40.3 20.2 0.0 80.6 791.0 80.52 1.000788	80.6 40.0 19.6 0.1 80.8 40.3 19.9 0.3 80.7 0.0 Ave Corr Factor	1.002 1.009 1.035 Correction factor (Cc/Ic) Limit = 0.95-1.05 0.998 0.999 1.014 0.999 1.014 1.004 efficiency

Notes:

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

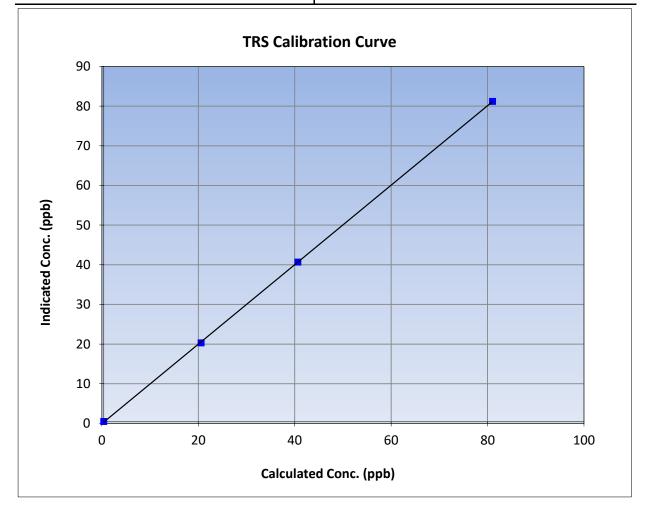


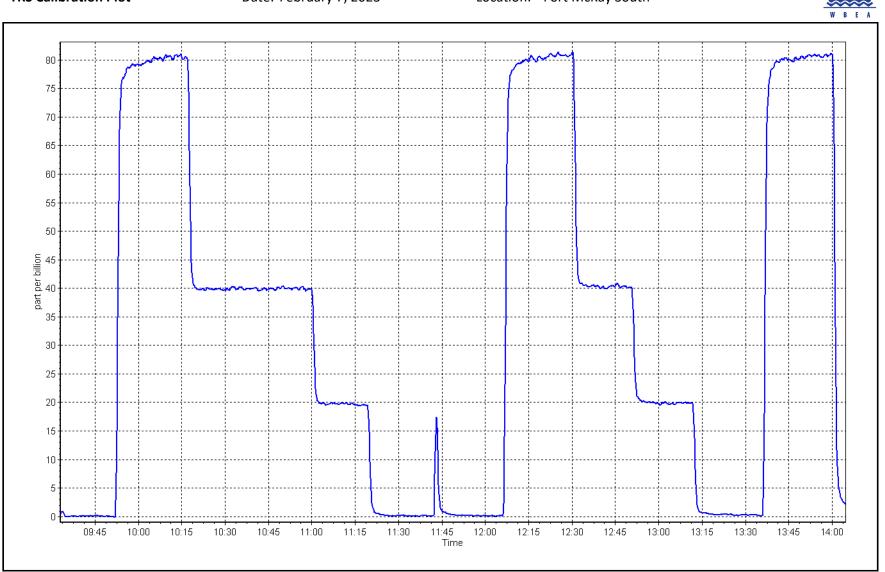
TRS Calibration Summary

WBEA			Version-11-2021						
Station Information									
Calibration Date:	February 7, 2023	Previous Calibration:	January 17, 2023						
Station Name:	Fort McKay South	Station Number:	AMS13						
Start Time (MST):	9:31	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	0.1		Correlation Coefficient	0.999972	≥0.995
80.6	80.8	0.9978	correlation coefficient	0.333372	20.333
40.3	40.3	0.9992	Slope	1.002489	0.90 - 1.10
20.2	19.9	1.0144	Slope	1.002489	0.90 - 1.10
			Intercept	-0.082182	+/-3





TRS Calibration Plot

Location: Fort McKay South



THC / CH₄ / NMHC Calibration Report

WBEA		Chatta	Information.		Version-01-202
		Station	Information		
Station Name:	Fort McKay Sou	th	Station number: Al	MS13	
Calibration Date:	February 2, 202	3	Last Cal Date: Ja	•	3
Start time (MST):	9:48		End time (MST): 12	2:50	
Reason:	Routine				
		Calibrat	ion Standards		
Gas Cert Reference:	C	C260812	Cal Gas Expiry Date: De	ecember 29, 20)28
CH4 Cal Gas Conc.	503.6	ppm	CH4 Equiv Conc.	1077.5	ppm
C3H8 Cal Gas Conc.	208.7	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry: N	A	
Removed CH4 Conc.	503.6	ppm	CH4 Equiv Conc.	1077.5	ppm
Removed C3H8 Conc.	208.7	ppm	Diff between cyl (THC):		
Diff between cyl (CH ₄):	:		Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number: 24	148	
ZAG make/model:	API 701		Serial Number: 11	117	
		Analyze	er Information		
Analyzer make:	Thermo 55i		Analyzer serial #: 11	152430012	
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:	2.38E-04	2.39E-04	NMHC SP Ratio:	4.74E-05	4.69E-05
CH4 Retention time:	12.0	12.0	NMHC Peak Area:	191456	193720

		THC Calibra	ition 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
as found zero	5000	0.0	0.00	0.00	
as found span	4921	79.1	17.05	17.14	0.994
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	17.04	1.001
second point	4961	39.5	8.51	8.35	1.019
third point	4980	19.8	4.27	4.08	1.046
as left zero	5000	0.0	0.00	0.00	
as left span	4921	79.1	17.05	17.09	0.998
			A	verage Correction Factor	1.022
Baseline Corr AF:	17.14	Prev response	17.02	*% change	0.7%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initia	tes investigation



THC / CH₄ / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05
as found zero	5000	0	0.00	0.00	
as found span	4921	79.1	9.08	9.20	0.987
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	4961	39.5	4.53	4.46	1.016
third point	4980	19.8	2.27	2.18	1.042
as left zero	5000	0	0.00	0.00	
as left span	4921	79.1	9.08	9.07	1.001
				Average Correction Factor	1.020
Baseline Corr AF:	9.20	Prev response	9.08	*% change	1.3%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	tes investigation

CH4 Calibration Data Source gas flow rate Set Point Dil air flow rate Calc conc (ppm) (Cc) Ind conc (ppm) (Ic) CF Limit= 0.95-1.05 as found zero 5000 0.0 0.00 0.00 4921 79.1 7.97 7.95 1.002 as found span as found 2nd point as found 3rd point new cylinder response calibrator zero 5000 0.0 0.00 0.00 ----7.97 4921 79.1 7.97 0.999 high point second point 4961 39.5 3.98 3.89 1.022 third point 4980 19.8 1.99 1.90 1.050 0.00 0.00 as left zero 5000 0.0 ----79.1 7.97 8.01 as left span 4921 0.995 Average Correction Factor 1.024 **Baseline Corr AF:** 7.95 Prev response 7.94 *% change 0.1% Baseline Corr 2nd AF: AF Slope: NA AF Intercept: * = > +/-5% change initiates investigation Baseline Corr 3rd AF: NA AF Correlation: **Calibration Statistics**

	<u>Start</u>	<u>Finish</u>	
THC Cal Slope:	1.000765	1.002074	
THC Cal Offset:	-0.043424	-0.104181	
CH4 Cal Slope:	1.000366	1.003774	
CH4 Cal Offset:	-0.031817	-0.056196	
NMHC Cal Slope:	1.001015	1.000594	
NMHC Cal Offset:	-0.011206	-0.047785	

Notes:

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

Calibration Performed By:

Sean Bala



THC Calibration Summary

		Station I	nformation		
Calibration Date:	Februar	y 2, 2023	Previous Calibration:	January	16 2023
Station Name:		(ay South	Station Number:	AM	
Start Time (MST):		48	End Time (MST):	12:	
Analyzer make:		no 55i	Analyzer serial #:	11524	
anaryzer make.	men		Analyzer Schurw.	11524	30012
		Calibra	tion Data		
(ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999826	≥0.995
17.05 8.51	<u> </u>	1.0006			
4.27	4.08	1.0456	Slope	1.002074	0.90 - 1.10
			Intercept	-0.104181	+/-0.5
18.0				/	
16.0 -					
14.0					
12.0					
(udd 10.0 -					
– 0.8 Conc					
10.0 (bbm) 0.8 0.0					
<u>د</u> 4.0 –					
2.0					
0.0		-			
0.0	5	.0	10.0	15.0	20.0



CH₄ Calibration Summary

		Station I	nformation		
alibration Date:	Fabruar		Previous Calibration:	January 1	16 2022
tation Name:	February	ay South	Station Number:	January 1 AMS	
		-			
tart Time (MST):		48	End Time (MST):	12:	
nalyzer make:	Inern	no 55i	Analyzer serial #:	115243	30012
		Calibra	tion Data		
alculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Eval	uation	<u>Limits</u>
0.00 7.97	0.00 7.97	0.9991	Correlation Coefficient	0.999763	≥0.995
3.98 1.99	3.89 1.90	1.0218 1.0497	Slope	1.003774	0.90 - 1.10
	1.50	1.0707	Intercept	-0.056196	+/-0.5
8.0 7.0 6.0					
Indicated Conc. (ppm) 0.5 0 0.0 0					
OD 4.0					
0.6 dicate					
2.0					
1.0					
0.0	2.0	4.0	6.0	8.0	10.0
0.0	2.0	ч.0	0.0	0.0	10.0

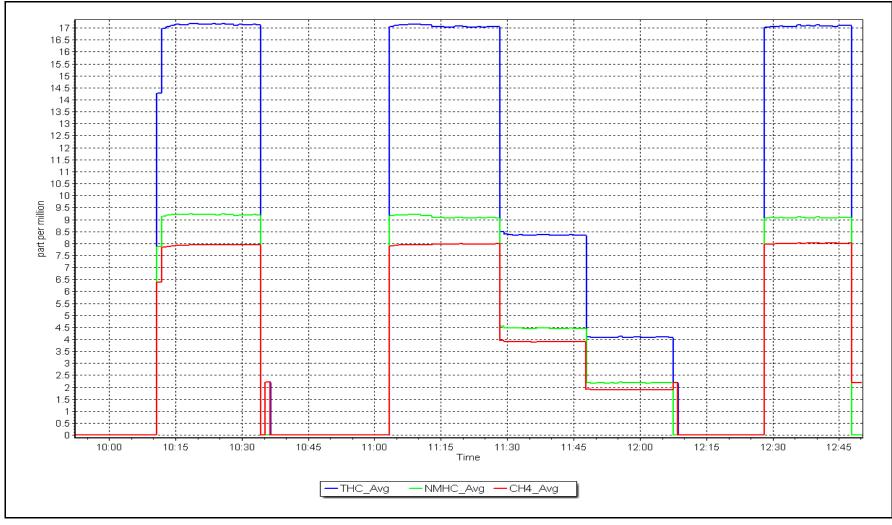


NMHC Calibration Summary

		Station I	nformation		
Calibration Date:	Februar	y 2, 2023	Previous Calibration:	January 2	16, 2023
Station Name:	Fort Mcl	Kay South	Station Number:	AMS	513
Start Time (MST):	9	:48	End Time (MST):	12:	50
Analyzer make:	Ther	mo 55i	Analyzer serial #:	11524	30012
		Calibra	tion Data		
Calculated concentratio (ppm) (Cc)	on Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999873	≥0.995
9.08 4.53	9.06 4.46	1.0019 1.0163			
2.27	2.18	1.0421	Slope	1.000594	0.90 - 1.10
			Intercept	-0.047785	+/-0.5
9.0 - 8.0 - 7.0 -					
(bbm) 5.0 – Couc					
5 .0					
+ 0.4 Indicated					
2.0					
1.0 +					
0.0 🖛					
0.0) 2.0	4.0	6.0	8.0	10.0
		Calaulata	l Conc. (ppm)		

NMHC Calibration Plot







high point

second point third point as left zero 4921

Wood Buffalo Environmental Association

THC / CH₄ / NMHC Calibration Report

WBEA					Version-01-2020
		Statio	on Information		
Station Name: Calibration Date: Start time (MST): Reason:	Fort McKay South February 2, 2023 10:10 Cylinder Change		Station number: Last Cal Date: End time (MST):	February 2, 2023	
		Calibra	ation Standards		
Gas Cert Reference:	CC	260812	Cal Gas Expiry Date:	December 29, 202	8
CH4 Cal Gas Conc.	503.6	ppm	CH4 Equiv Conc.	1077.5	ppm
C3H8 Cal Gas Conc.	208.7	ppm			
Removed Gas Cert:		NA	Removed Gas Expiry:	NA	
Removed CH4 Conc.	503.6	ppm	CH4 Equiv Conc.	1077.5	ppm
Removed C3H8 Conc.	208.7	ppm	Diff between cyl (THC):		
Diff between cyl (CH ₄):	:		Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number:	2448	
ZAG make/model:	API 701		Serial Number:	1117	
		Analy	zer Information		
Analyzer make:	: Thermo 55i		Analyzer serial #:	1152430012	
THC Range (ppm):					
NMHC Range (ppm):	: 0 - 10 ppm		CH4 Range (ppm):	0 - 10 ppm	
	<u>Start</u>	Finish		Start	Finish
CH4 SP Ratio:		2.39E-04	NMHC SP Ratio:	4.69E-05	4.69E-05
CH4 Retention time:	12.0	12.0	NMHC Peak Area:	193720	193720
		THC C	alibration 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	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	
	3000	0.0	0.00	0.00	

17.05

16.95

79.1

1.005



THC / CH₄ / NMHC Calibration Report

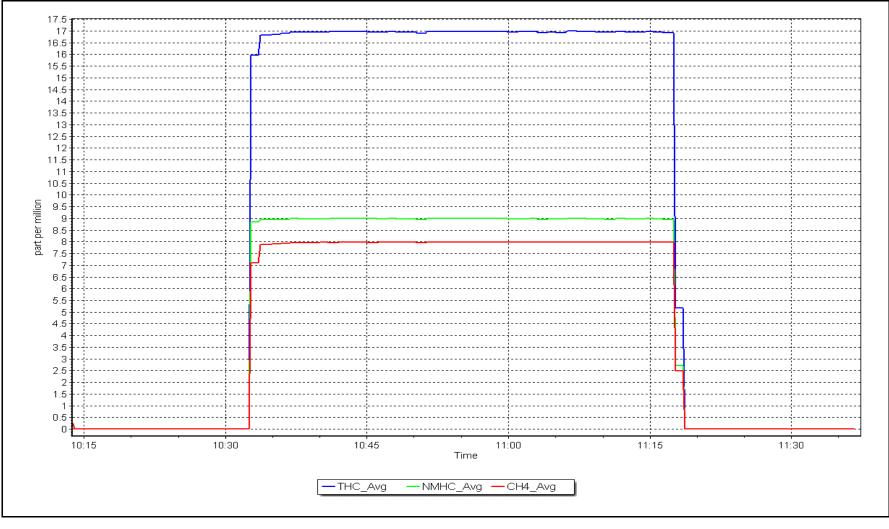
Version-01-2020

Set Point as found zero	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (C	c) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05
	5000	0	0.00	0.00	
as found span	4921	79.1	9.08	8.99	1.010
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0	0.00	0.00	
nigh point	4921	79.1	9.08	8.97	1.012
second point					
hird point					
as left zero					
as left span		79.1			
			A	verage Correction Factor	1.012
Baseline Corr AF:	8.99	Prev response	9.04	*% change	-0.5%
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) (Co	c) 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	79.1	7.97	7.98	0.999
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
nigh point	4921	79.1	7.97	7.98	0.998
second point					
third point					
as left zero					
as left span		79.1			
I			A	verage Correction Factor	0.998
Baseline Corr AF:	7.98	Prev response	7.94	*% change	0.5%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation
			o		
		Calibration	Statistics		
		<u>Start</u>		<u>Finish</u>	
THC Cal Slope:		1.002074		0.994538	
THC Cal Offset:		-0.104181		0.000000	
CH4 Cal Slope:		1.003774		1.001783	
CH4 Cal Offset:		-0.056196		0.000000	
NMHC Cal Slope:		1.000594		0.988070	
		-0.047785		0.000000	
NMHC Cal Offset:					

Sean Bala









NO Cal Offset:

NO₂ Cal Slope:

NO₂ Cal Offset:

Wood Buffalo Environmental Association

$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

		Station	Information		
Station Name: Calibration Date: Start time (MST): Reason:	Fort McKay South February 10, 2023 10:16 Routine		Station number: AN Last Cal Date: Jan End time (MST): 14	nuary 19, 2023	
		Calibrati	on Standards		
NO Gas Cylinder #:	T2Y1P76		Cal Gas Expiry Date: De	ecember 11, 20)23
NOX Cal Gas Conc:	50.98	ppm	NO Cal Gas Conc:	49.32	ppm
Removed Cylinder #:	N/A		Removed Gas Exp Date: N/	Ά	
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		10661329	
Analyzer make: NOX Range (ppb):		Analyzer	Information Analyzer serial #: 14	10661329	
•		Analyzer <u>Finish</u>		10661329 <u>Start</u>	<u>Finish</u>
•	0 - 1000 ppb <u>Start</u>				<u>Finish</u> 9.5
NOX Range (ppb):	0 - 1000 ppb <u>Start</u> 1.200	<u>Finish</u>	Analyzer serial #: 14	<u>Start</u>	
NOX Range (ppb): NO coeff or slope:	0 - 1000 ppb <u>Start</u> 1.200 0.992	<u>Finish</u> 1.204	Analyzer serial #: 14 NO bkgnd or offset:	<u>Start</u> 9.6	9.5
NOX Range (ppb): NO coeff or slope: NOX coeff or slope:	0 - 1000 ppb <u>Start</u> 1.200 0.992	<i>Finish</i> 1.204 0.992 1.000	Analyzer serial #: 14 NO bkgnd or offset: NOX bkgnd or offset: Reaction cell Press:	<u>Start</u> 9.6 9.6	9.5 9.6
NOX Range (ppb): NO coeff or slope: NOX coeff or slope:	0 - 1000 ppb <u>Start</u> 1.200 0.992	<i>Finish</i> 1.204 0.992 1.000	Analyzer serial #: 14 NO bkgnd or offset: NOX bkgnd or offset:	<u>Start</u> 9.6 9.6	9.5 9.6
NOX Range (ppb): NO coeff or slope: NOX coeff or slope:	0 - 1000 ppb <u>Start</u> 1.200 0.992	<i>Finish</i> 1.204 0.992 1.000	Analyzer serial #: 14 NO bkgnd or offset: NOX bkgnd or offset: Reaction cell Press:	<u>Start</u> 9.6 9.6	9.5 9.6
NOX Range (ppb): NO coeff or slope: NOX coeff or slope:	0 - 1000 ppb <u>Start</u> 1.200 0.992 1.000	Finish 1.204 0.992 1.000 Calibrati	Analyzer serial #: 14 NO bkgnd or offset: NOX bkgnd or offset: Reaction cell Press:	<u>Start</u> 9.6 9.6 194.1	9.5 9.6
NOX Range (ppb): NO coeff or slope: NOX coeff or slope: NO2 coeff or slope:	0 - 1000 ppb <u>Start</u> 1.200 0.992 1.000	<u>Finish</u> 1.204 0.992 1.000 Calibrati <u>Start</u>	Analyzer serial #: 14 NO bkgnd or offset: NOX bkgnd or offset: Reaction cell Press:	<u>Start</u> 9.6 9.6 194.1 <u>Finish</u>	9.5 9.6

-3.105090

1.006533

-0.433464

-3.145082

0.996233

-0.877794



$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

				Dilu	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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0		
as found span	4919	81.1	826.9	800.0	26.9	824.2	797.8	26.3	1.0033	1.0027
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0		
high point	4919	81.1	826.9	800.0	26.9	825.0	800.2	24.8	1.0023	0.9997
second point	4960	40.6	413.9	400.4	13.5	410.5	396.7	13.7	1.0083	1.0094
third point	4980	20.3	207.0	200.2	6.7	202.5	194.5	8.0	1.0221	1.0294
as left zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.0		
as left span	4919	81.1	826.9	383.2	443.7	835.9	386.1	449.7	0.9892	0.9924
							Average C	orrection Factor	1.0109	1.0128
Corrected As fo	ound NO _x =	824.4 ppb	NO =	798.0 ppb	* = > +/-59	% change initiates i	nvestigation	*Percent Chan	ge NO _x =	0.0%
Previous Respo	nse NO _x =	824.3 ppb	NO =	798.5 ppb				*Percent Chan	ge NO =	-0.1%
Baseline Corr 2	nd pt NO _x =	NA ppb	NO =	NA ppb	As found	d $NO_X r^2$:		Nx SI:	Nx Int:	
Baseline Corr 3	rd 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 ₂ Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Co	Indicated NO2 c) concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) Calibration Limit = 0.95-1.05 As Found Limit = 0.90-1.10	Converter Efficiency Calibration Limit = 96-104%
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.2	380.4	443.7	441.6	1.0048	99.5%
2nd GPT point (200 ppb O3)	797.2	587.2	236.9	235.0	1.0082	99.2%
3rd GPT point (100 ppb O3)	797.2	691.8	132.3	129.8	1.0195	98.1%
				Average Correction Factor	1.0108	98.9%

Notes:

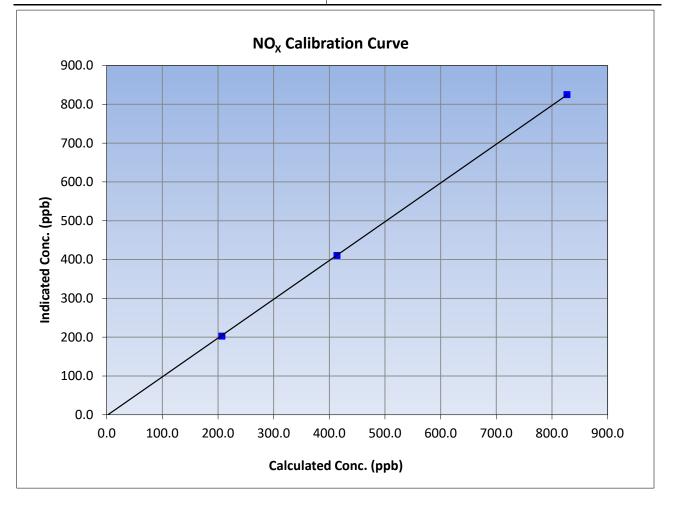
Changed the inlet filter after as founds. Adjusted span only.

Calibration Performed By:



NO_x Calibration Summary

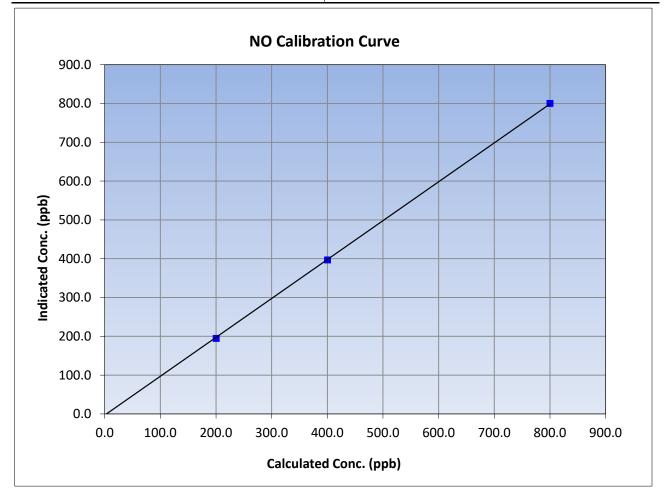
WBEA					Version-04-202
		Station	Information		
Calibration Date:	February	10, 2023	Previous Calibration: January		19, 2023
Station Name:	Fort McKay South		Station Number:	AM	S 13
Start Time (MST):	10	:16	End Time (MST):	14	:37
Analyzer make:	Therr	no 42i	Analyzer serial #:	14106	61329
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	-0.1		Correlation Coefficient	0.999972	≥0.995
826.9	825.0	1.0023	correlation coefficient	0.555572	20.333
413.9	410.5	1.0083	CI 0.000120		0.90 - 1.10
207.0	202.5	1.0221	Slope	0.999138	0.90 - 1.10
			Intercept	-2.151243	+/-20





NO Calibration Summary

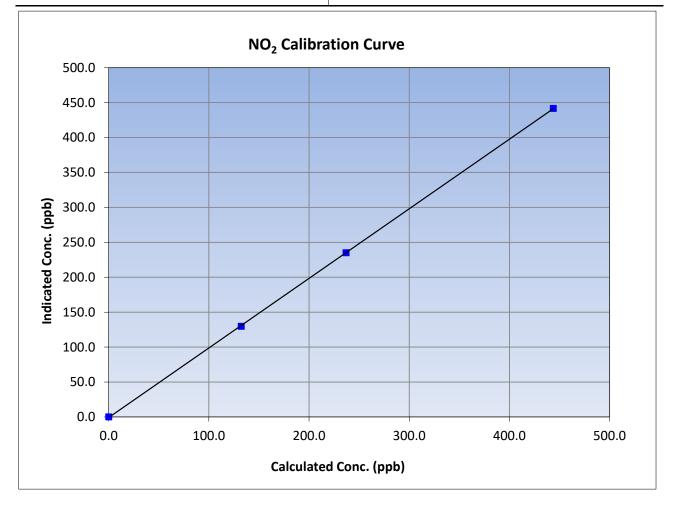
WBEA					Version-04-20
		Station	Information		
Calibration Date:	February	10, 2023	Previous Calibration:	January	19, 2023
Station Name:	Fort McKay South		Station Number: AM		S 13
Start Time (MST):	10:16		End Time (MST):	14	:37
Analyzer make:	nalyzer make: Thermo 42i Analyzer serial #: 1410661				61329
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Calibra Correction factor (Cc/lc)	ation Data Statistical Evalu	ation	<u>Limits</u>
0.0	-0.1		Correlation Coefficient	0.999934	>0.005
800.0	800.2	0.9997	correlation coefficient	0.999954	≥0.995
400.4	396.7	1.0094	Slope	1.002334	0.90 - 1.10
200.2	194.5	1.0294	Slope	1.002554	0.90 - 1.10
			Intercept	-3.145082	+/-20

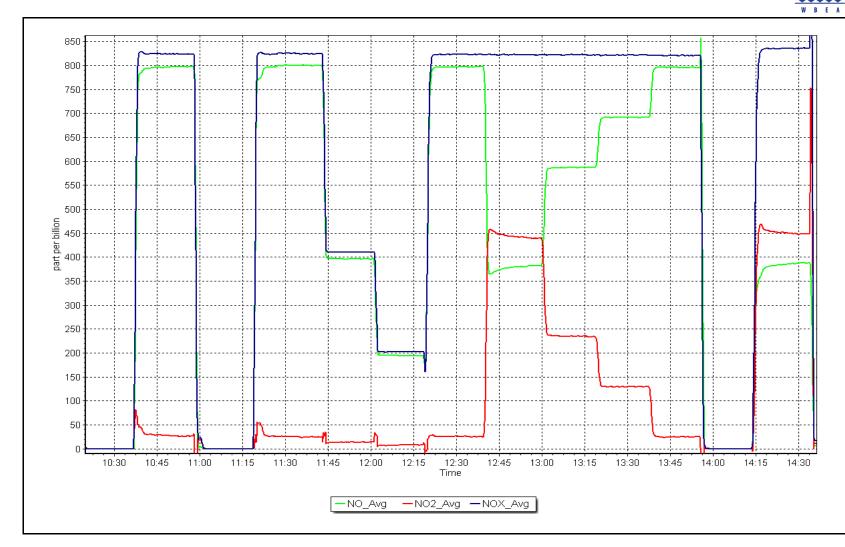




NO₂ Calibration Summary

WBEA					Version-04-2
		Station	Information		
Calibration Date:	February	10, 2023	Previous Calibration: Januar		19, 2023
Station Name:	Fort McKay South		Station Number: AN		S 13
Start Time (MST):	10:16		End Time (MST):	14	:37
Analyzer make:	Therr	hermo 42i Analyzer serial #: 141066132			61329
		Calibr	ation Data		
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/lc)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999978	>0.005
443.7	441.6	1.0048	correlation coefficient	0.999978	≥0.995
236.9	235.0	1.0082	Class 0.00C22		0.90 - 1.10
132.3	129.8	1.0195	Slope	0.996233	0.30 - 1.10
			Intercept	-0.877794	+/-20









O₃ Calibration Report

Version-01-2020

					Version-01-202
		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Fort McKay South February 3, 2023 9:56 Routine		Station number: Last Cal Date: End time (MST):	January 18, 2023	
		Calibration St	andards		
O3 generation mode: Calibrator Make/Model: ZAG Make/Model:	Photometer Teledyne API T700 Teledyne API T701		Serial Number: Serial Number:	-	
		Analyzer Info	rmation		
Analyzer make: Analyzer Range	: Teledyne API T400 9 - 500 ppb		Analyzer serial #:	3871	
Calibration slope: Calibration intercept:	<u>Start</u> 0.996143 1.300000	<u>Finish</u> 0.997629 1.040000	Backgd or Offset: Coeff or Slope:		<u>Finish</u> 2.7 0.962
		O ₃ Calibratio	on Data		
Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration ((ppm) (Ic)	Correction factor (Cc/I Limit = 0.95-1.05
as found zero	5000	0.0	0.0	-0.1	
as found span	5000	969.9	400.0	399.7	1.001
as found 2nd point as found 3rd point					
calibrator zero	5000	0.0	0.0	-0.2	
high point	5000	980.6	400.0	399.4	1.002
second point	5000	838.0	200.0	201.4	0.993
third point	5000	735.3	100.0	101.9	0.981
as left zero	5000	0.0	0.0	0.1	
as left span	5000	979.1	400.0	401.7	0.996
			Avera	ge Correction Factor	0.992
Baseline Corr As found: Baseline Corr 2nd AF pt:	399.8 NA	Previous response AF Slope:		*% change AF Intercept:	0.0%
Baseline Corr 3rd AF pt:	NA	AF Correlation:		* = > +/-5% change initiate	es investigation

Notes:

Changed inlet filter after as founds. No adjustment made.

Calibration Performed By:

Sean Bala



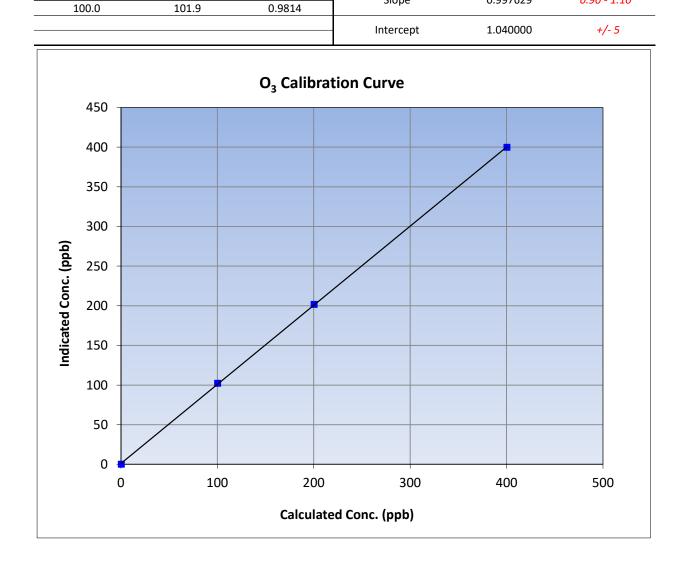
O₃ Calibration Summary

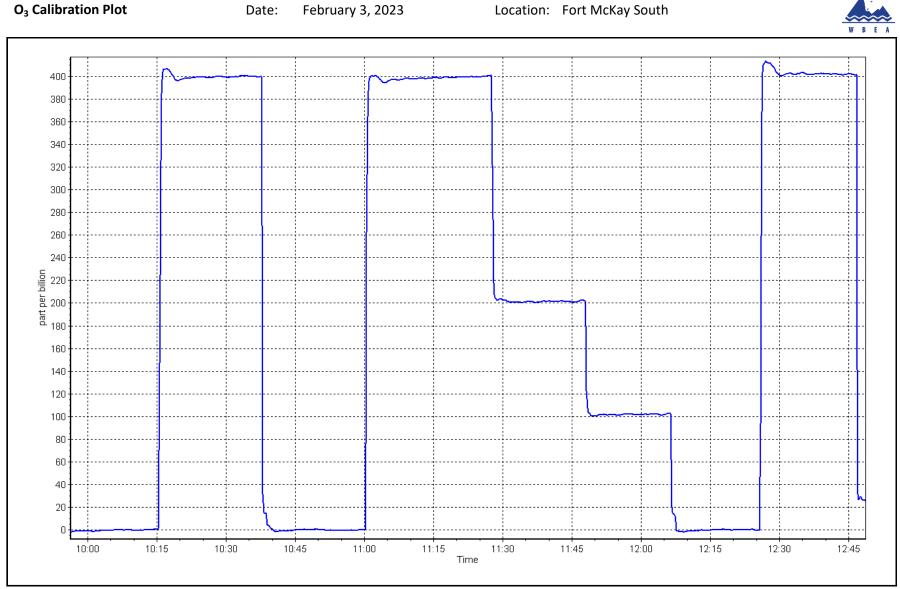
Slope

0.997629

0.90 - 1.10

WBEA					Version-01-2020	
		Station	Information			
Calibration Date:	February	3, 2023	Previous Calibration:	Januar	y 18, 2023	
Station Name:	Fort McKa	y South	Station Number:	A	MS13	
Start Time (MST):	9:5	6	End Time (MST):	1	2:50	
Analyzer make:	Teledyne A	PI T400 Analyzer serial #:			3871	
		Calib	ration Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ition	<u>Limits</u>	
0.0	-0.2		Correlation Coefficient	0.999955	≥0.995	
400.0	399.4	1.0015	correlation coefficient	0.333333	20.995	
200.0	201.4	0.9930	Slope	0 997629	0 90 - 1 10	





O₃ Calibration Plot

Location: Fort McKay South



T640 PM_{2.5} CALIBRATION

W D E A						Version-01-2023
		Station Information	n			
Station Name:	Fort McKay South		Station number:	AMS 13		
Calibration Date:	February 16, 2023		Last Cal Date:	January 19, 2	2023	
Start time (MST):	11:37		End time (MST):	11:53		
			- 6.			
Analyzer Make:	API T640		S/N:	319		
Particulate Fraction:	PM2.5					
Flow Meter Make/Model:	Delta Cal		S/N:	141229		
Temp/RH standard:	Delta Cal		S/N:	141229		
		Monthly Calibration T	est			
Parameter	<u>As found</u>	Measured	<u>As left</u>		Adjusted	(Limits)
T (°C)	-10.0	-9.4	-10.0			+/- 2 °C
P (mmHg)	726.1	725.6	726.1			+/- 10 mmHg
flow (LPM)	5.01	5.04	5.01			+/- 0.25 LPM
						+/- 0.25 LPIVI
Leak Test:	-	February 16, 2023	Last Cal Date:			
Note: this leak check will be	PM w/o HEPA:	11.0 quarterly work and wills	PM w/ HEPA:	0.0 intenance lea		<0.2 ug/m3
Inlet cleaning :	Inlet Head		serve as the pre ma			
iniet cleaning.	iniet fieau					
		Quarterly Calibration	Test			
Daramator	As found				Adjusted	(Limite)
Parameter	<u>As toutiu</u>	Post maintenance	<u>As left</u>		Adjusted	(Limits)
PMT Peak Test						10.9 +/- 0.5
Post-maintenanc	e leak check:	PM w/o HEPA:		w/ HEPA:		
Date Optical Chan		December 1	3, 2022			<0.2 ug/m3
Disposable Filte	-	December 1				<u>.</u>
	-					
		Annual Maintenanc	e			
Date Sample Tul	be Cleaned:	June 29, 2	2022			
Date RH/T Sense		June 29, 2				
	-	,				
Notes:	No adjustment	made. Leak check passe	ed. Built up of snow	on the inlet	head and c	lean it.
Calibration by:	Sean Bala					
canoration by.	Scuri Duiu					



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS14 ANZAC FEBRUARY 2023

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

March 31, 2023



SO₂ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Anzac February 21, 2023 10:28 Routine		Station number: Last Cal Date: End time (MST):	AMS 14 January 24, 2023 13:02	
		Calibration St	andards		
Cal Gas Concentration:	49.95	ppm	Cal Gas Exp Date:	January 5, 2025	
Cal Gas Cylinder #: Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model:	CC279389 49.95 NA API T700	ppm	Rem Gas Exp Date: Diff between cyl: Serial Number:	NA 5239	
ZAG Make/Model:	API T701H		Serial Number:	357	
		Analyzer Info	rmation		
Analyzer make Analyzer Range			Analyzer serial #:	0710321322	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope: Calibration intercept:	0.998268 -1.664595	0.993711 -1.045321	Backgd or Offset: Coeff or Slope:		25.1 0.795
		SO ₂ Calibratio	on Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration C (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	791.6	1.011
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.4	
high point	4920	80.1	800.2	794.8	1.007
second point	4960	40.0	399.6	<u> </u>	1.011 1.019
third point as left zero	4980 5000	20.0	<u> 199.8</u> 0.0	0.4	1.019
as left span	4920	80.1	800.2	796.8	1.004
as left spall	7320	00.1		ge Correction Factor	1.004
Baseline Corr As found:	791.30	Previous response		*% change	-0.7%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	-0.7/0
Baseline Corr 3rd AF pt:	NA	AF Correlation:		* = > +/-5% change initiate	

Notes:

No Maintenance or adjustments done.

Calibration Performed By:

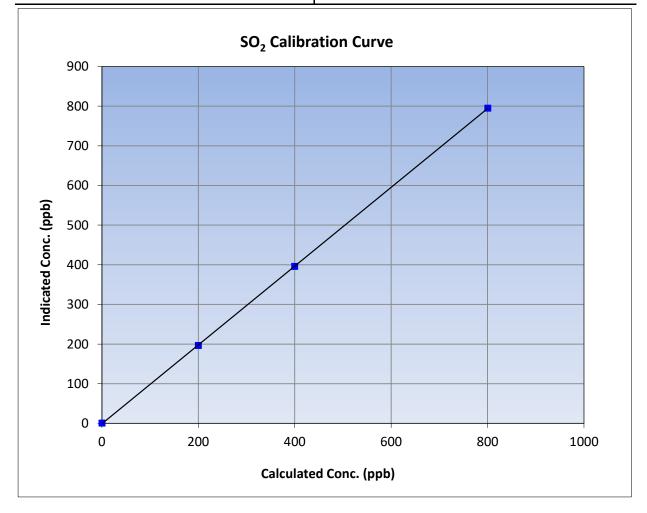


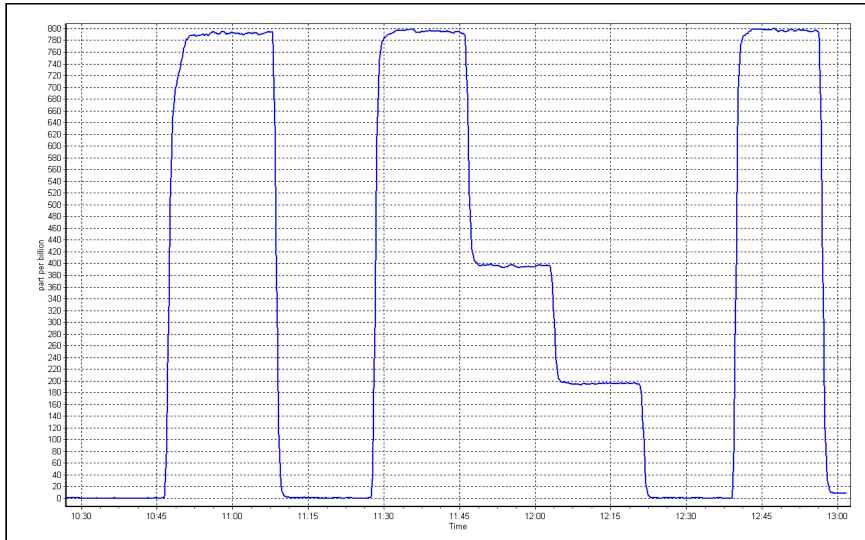
SO₂ Calibration Summary

	Stati	on Information	
Calibration Date:	February 21, 2023	Previous Calibration:	January 24, 2023
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	10:28	End Time (MST):	13:02
Analyzer make:	Thermo 43i	Analyzer serial #:	0710321322

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	0.999985	≥0.995	
800.2	794.8	1.0068	correlation coefficient	0.999985	20.333	
399.6	395.4	1.0106	Slope	0.993711	0.90 - 1.10	
199.8	196.0	1.0194	Slope	0.993711	0.30 - 1.10	
			- Intercept	-1.045321	+/-30	





SO2 Calibration Plot





TRS Calibration Report

				•	
WBEA					Version-11-202
		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Anzac February 3, 2023 7:55 Routine		Station number: Last Cal Date: End time (MST):	AMS14 January 6, 2023 12:20	
		Calibration S	tandards		
Cal Gas Concentration:	5.38	ppm	Cal Gas Exp Date:	February 3, 2023	
Cal Gas Cylinder #: Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model: ZAG Make/Model:	EY0000859 5.38 NA API T700 API 701H	ppm	Rem Gas Exp Date: Diff between cyl: Serial Number: Serial Number:	NA 5252 357	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	Thermo 43i-TLE CD Nova CDN-101 0 - 100 ppb		Analyzer serial #: Converter serial #:	1180540019 503	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.003842	1.004840	Backgd or Offset:		5.66
Calibration intercept:	0.038815	-0.021121	Coeff or Slope:	0.990	1.008
		TRS As Four	nd 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	78.3	1.024
as found 2nd point	4962	37.2	40.0	39.3	1.024
as found 3rd point	4981	18.6	20.0	19.2	1.053
new cylinder response					
		TRS Calibrat	ion Data		
Set Point	Dilution air flow 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	4925	74.3	80.0	80.5	0.993
second point	4962	37.2	40.0	40.1	0.998
third point	4981	18.6	20.0	19.6	1.021
as left zero	5000	0.0	0.0	0.4	
as left span	4925	74.3	80.0	79.9	1.001
SO2 Scrubber Check	4920	80.0	800.0	0.0	
Date of last scrubber cha				Ave Corr Factor	1.004
Date of last converter eff	ficiency test:				efficiency
Baseline Corr As found:	78.1	Prev response:	80.30	*% change:	-2.8%
Baseline Corr 2nd AF pt:	39.1	AF Slope:		AF Intercept:	-0.020730
Baseline Corr 3rd AF pt:	19.0	AF Correlation:		-	
				* = > +/-5% change initiat	es investigation

Notes:

Scrubber checked after the calibrator zero. No maintenance done. Span adjusted.

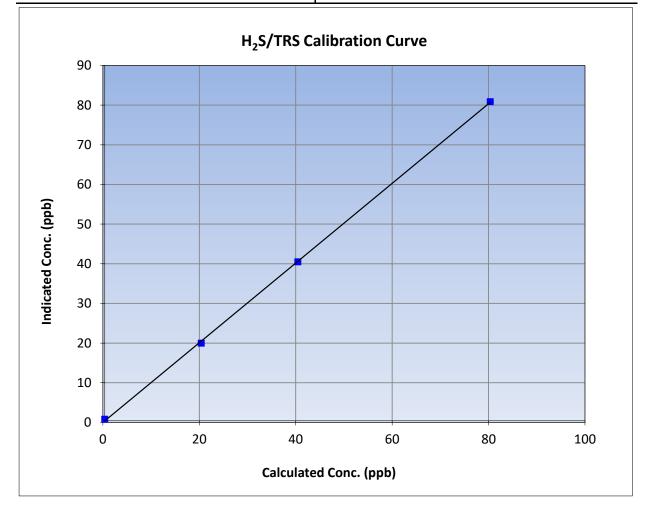


TRS Calibration Summary

WBEA			Version-11-2021				
Station Information							
Calibration Date:	February 3, 2023	Previous Calibration:	January 6, 2023				
Station Name:	Anzac	Station Number:	AMS14				
Start Time (MST):	7:55	End Time (MST):	12:20				
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1180540019				

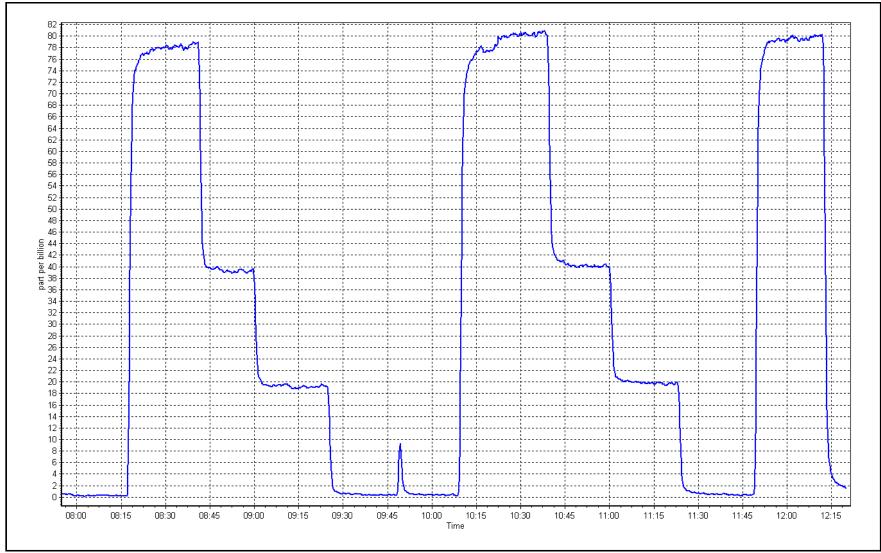
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>	
0.0	0.4		Correlation Coefficient	0.999870	≥0.995	
80.0	80.5	0.9933	correlation coefficient	0.555870	20.335	
40.0	40.1	0.9983	Slope	1.004840	0.90 - 1.10	
20.0	19.6	1.0212			0.90 - 1.10	
			Intercept	-0.021121	+/-3	











THC / CH_4 / NMHC Calibration Report

		Statio	n Information			
Station Name: Calibration Date:	Anzac February 21, 20	023	Station number: AMS 14 Last Cal Date: January 23, 2023			
Start time (MST): Reason:	10:28 Routine	End time (MST): 13:01				
		Calibra	tion Standards			
Gas Cert Reference:		CC279389	Cal Gas Expiry Date: Ja	nuary 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. Diff between cyl (CH ₄)	207.1 :	ppm	Diff between cyl (THC): Diff between cyl (NM):			
Calibrator Model:	API T700		Serial Number: 52	252		
ZAG make/model:	API 701H		Serial Number: 35	57		
		Analyz	er Information			
Analyzer make	: Thermo 55i		Analyzer serial #: 11	18148494		
THC Range (ppm)	: 0 - 20 ppm					
NMHC Range (ppm)	: 0 - 10 ppm		CH4 Range (ppm): 0 -	- 10 ppm		
	<u>Start</u>	Finish		<u>Start</u>	<u>Finish</u>	
CH4 SP Ratio	: 3.85E-04	3.85E-04	NMHC SP Ratio:	4.46E-05	4.46E-05	
CH4 Retention time	: 12.00	12.00	NMHC Peak Area:	204554	204554	

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	
as found zero	5000	0.0	0.00	0.00		
as found span	4920	80.1	17.12	16.95	1.010	
as found 2nd point						
as found 3rd point						
new cylinder response						
calibrator zero	5000	0.0	0.00	0.00		
high point	4920	80.1	17.12	16.92	1.012	
second point	4960	40.0	8.55	8.45	1.012	
third point	4980	20.0	4.28	4.19	1.020	
as left zero	5000	0.0	0.00	0.00		
as left span	4920	80.1	17.12	17.03	1.005	
			A	Average Correction Factor	1.015	
Baseline Corr AF:	16.95	Prev response	17.13	*% change	-1.1%	
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:		
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	tes investigation	



THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data							
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05		
as found zero	5000	0.0	0.00	0.00			
as found span	4920	80.1	9.12	9.04	1.009		
as found 2nd point							
as found 3rd point							
new cylinder response							
calibrator zero	5000	0.0	0.00	0.00			
high point	4920	80.1	9.12	9.02	1.011		
second point	4960	40.0	4.56	4.49	1.015		
third point	4980	20.0	2.28	2.22	1.026		
as left zero	5000	0.0	0.00	0.00			
as left span	4920	80.1	9.12	9.08	1.005		
				Average Correction Factor	1.017		
Baseline Corr AF:	9.04	Prev response	9.03	*% change	0.1%		
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:			
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation		

СЦЛ	Cal	ibration	Data
CH4	Cai	INIALIOII	Dala

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (C	c) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.1	8.00	7.91	1.011
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4920	80.1	8.00	7.99	1.001
second point	4960	40.0	3.99	3.96	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	80.1	8.00	7.95	1.006
			A	verage Correction Factor	1.008
Baseline Corr AF:	7.91	Prev response	8.10	*% change	-2.4%
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:		1.001116		0.988889	
THC Cal Offset:		-0.010387		-0.013842	
CH4 Cal Slope:		1.012466		0.999568	
CH4 Cal Offset:		0.001594		-0.016046	
NMHC Cal Slope:		0.991290		0.989676	
NMHC Cal Offset:		-0.011980		-0.015788	

Notes:

No Maintenance or adjustments done.

Calibration Performed By:

Melissa Lemay



THC Calibration Summary

		Station I	nformation		
Calibration Date:	February	21, 2023	Previous Calibration:	January	23, 2023
itation Name:	Anzac		Station Number:	AMS	5 14
itart Time (MST):	10	:28	End Time (MST):	13:	01
Analyzer make:	Therr	no 55i	Analyzer serial #:	11181	48494
		Calibra	tion Data		
alculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999995	≥0.995
17.12	16.92	1.0120			
8.55 4.28	8.45 4.19	1.0119 1.0204	Slope	0.988889	0.90 - 1.10
			Intercept	-0.013842	+/-0.5
18.0				_	
16.0					
14.0					
12.0					
ш					
dd 10.0					
0.8 G					
Indicated Conc. (ppm)					
드 4.0					
2.0					
0.0 🖌					
0.0 + 0.0	5	.0	10.0	15.0	20.0



CH₄ Calibration Summary

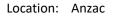
					Version-01-202
		Station	Information		
Calibration Date:	Febr	uary 21, 2023	Previous Calibration:	January 23, 2023	
Station Name:		Anzac	Station Number:	AMS	5 14
Start Time (MST):		10:28	End Time (MST):	13:	01
Analyzer make:	т	hermo 55i	Analyzer serial #:	11181	48494
		Calibr	ation Data		
		Calibra			
Calculated concentrat (ppm) (Cc)	tion Indicated concentra (ppm) (Ic)	tion Correction factor (Cc/Ic)	Statistical Eval	uation	<u>Limits</u>
0.00	0.00		- Correlation Coefficient	0.999978	≥0.995
8.00	7.99	1.0011		0.000070	
3.99	3.96	1.0087	Slope	0.999568	0.90 - 1.10
2.00	1.97	1.0138			
			- Intercept	-0.016046	+/-0.5
 9.0 8.0 7.0 0.7 0.6 0.6 0.7 0.6 0.7 0.6 0.6 0.7 0.7 0.8 0.8 0.9 0.9		CH ₄ Calibratio			
<mark>9</mark> 4.0 -					
- 0.6 dicate					
= 2.0 -					
1.0 -					
0.0					
0.	0 2.	0 4.0	6.0	8.0	10.0
		Calculate	d Conc. (ppm)		



NMHC Calibration Summary

		Station I	nformation		
Calibration Date:	February	21, 2023	Previous Calibration:	January 2	23, 2023
itation Name:	An	zac	Station Number:	AMS	5 14
itart Time (MST):	10	:28	End Time (MST):	13:	01
Analyzer make:	Thern	no 55i	Analyzer serial #:	11181	48494
		Calibra	tion Data		
Calculated concentration I (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999985	≥0.995
9.12 4.56	9.02 4.49	<u>1.0115</u> 1.0147		-	
2.28	2.22	1.0147	Slope	0.989676	0.90 - 1.10
			Intercept	-0.015788	+/-0.5
9.0 8.0 7.0 E 6.0					
6.0 (bbm) 5.0 (bbm)					
5 .0					
4.0					
2.0					
1.0					
0.0	2.0	4.0	6.0	8.0	10.0
0.0	2.11	4.0	0.0	0.0	TO'O







17.5 -17 16.5 16 -15.5 15 14.5 14 13.5 13 -12.5 12 -11.5 11 10.5 10 bart ber million 9.5 9.5 8.5 8.5 8.5 7.5 7.5 -7 6.5 6 5.5 5. 4.5 4 3.5 3. 2.5 2. 1.5 1 0.5 Т 0 10:30 10:45 11:15 11:30 11:45 12:00 12:15 12:30 13:00 11:00 12:45 Time -THC_Avg -NMHC_Avg -CH4_Avg



Station Name:

Reason:

Calibration Date:

Start time (MST):

Anzac

7:45

Routine

February 2, 2023

Wood Buffalo Environmental Association

$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

Station Information

Station number: AMS 14 Last Cal Date: January 4, 2023 End time (MST): 12:33

Calibration	Standards
-------------	-----------

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

Analyzer Information

Analyzer make: The		Analyzer serial #: 1426262592						
NOX Range (ppb): 0 -	1000 ppb							
	<u>Start</u>	<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:	164.2	163.3			

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.999876	1.011937
NO _x Cal Offset:	-0.745750	-0.743109
NO Cal Slope:	1.001401	1.013337
NO Cal Offset:	-1.789671	-1.947043
NO ₂ Cal Slope:	1.002246	1.000011
NO ₂ Cal Offset:	0.204305	0.089892



$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

				Dilu	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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	0.1		
as found span	4921	78.6	800.5	786.8	13.7	811.8	796.3	15.5	0.9861	0.9881
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1		
high point	4921	78.6	78.6 800.5 786.8 13.7 809.5		796.2	13.4	0.9889	0.9883		
second point	4961	39.3	400.2	393.4	6.8	404.5	396.1	8.4	0.9894	0.9931
third point	4980	19.6	199.6	196.2	3.4	200.1	194.8	5.3	0.9976	1.0072
as left zero	5000	0.0	0.0	0.0	0.0	0.1	-0.1	0.1		
as left span	4921	78.6	800.5	389.3	411.2	806.2	395.5	410.7	0.9930	0.9844
							Average C	orrection Factor	0.9920	0.9962
Corrected As fo	ound NO _x =	812.0 ppb	NO =	796.5 ppb	* = > +/-59	% change initiates i	nvestigation	*Percent Chang	ge NO _X =	1.5%
Previous Respo	nse NO _x =	799.7 ppb	NO =	786.2 ppb				*Percent Chang	ge NO =	1.3%
Baseline Corr 2	nd pt NO _X =	NA ppb	NO =	NA ppb	As found	d $NO_X r^2$:		Nx SI:	Nx Int:	
Baseline Corr 3	rd 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 ₂ Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (C	Indicated NO2 c) concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) Calibration Limit = 0.95-1.05 As Found Limit = 0.90-1.10	Converter Efficiency Calibration Limit = 96-104%
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	790.4	392.9	411.2	411.3	0.9997	100.0%
2nd GPT point (200 ppb O3)	790.4	584.6	219.5	219.5	0.9999	100.0%
3rd GPT point (100 ppb O3)	790.4	686.5	117.6	117.7	0.9990	100.1%
				Average Correction Factor	0.9995	100.0%

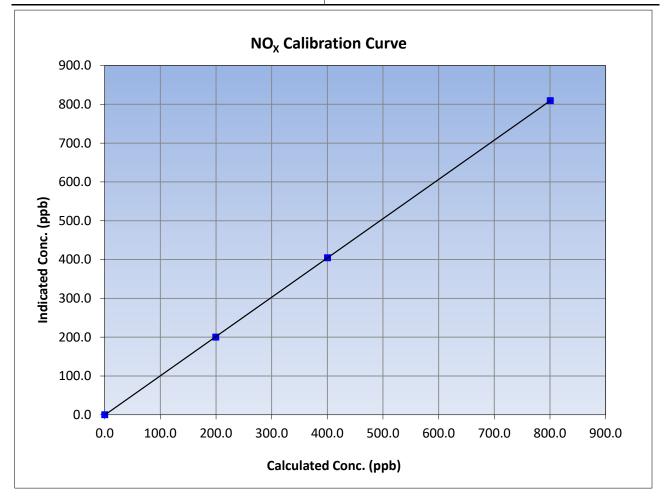
Notes:

No maintenance or adjustments done.



NO_x Calibration Summary

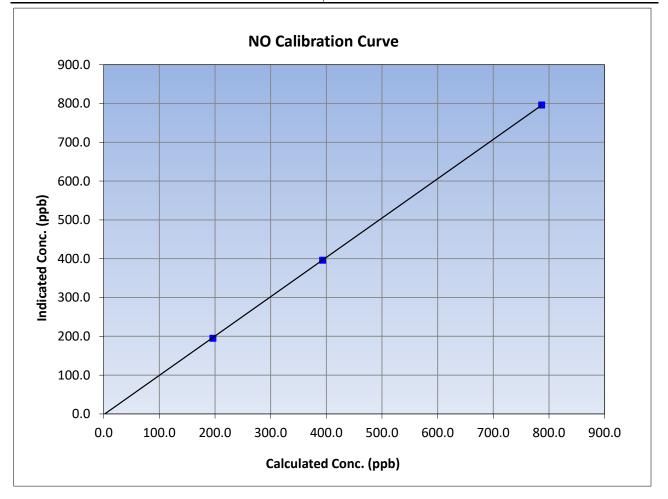
WBEA					Version-04-20
		Station	Information		
Calibration Date:	Februar	y 2, 2023	Previous Calibration:	January	4, 2023
Station Name:	An	zac	Station Number:	AM	S 14
Start Time (MST):	7:	45	End Time (MST):	12	:33
Analyzer make:	Thern	no 42i	Analyzer serial #:	14262	62592
		Calibra	ation Data		
Calculated 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
800.5	809.5	0.9889	correlation coernelent	0.555554	20.995
400.2	404.5	0.9894	Slope	1.011937	0.90 - 1.10
199.6	200.1	0.9976	Slope	1.011957	0.90 - 1.10
			Intercept	-0.743109	+/-20





NO Calibration Summary

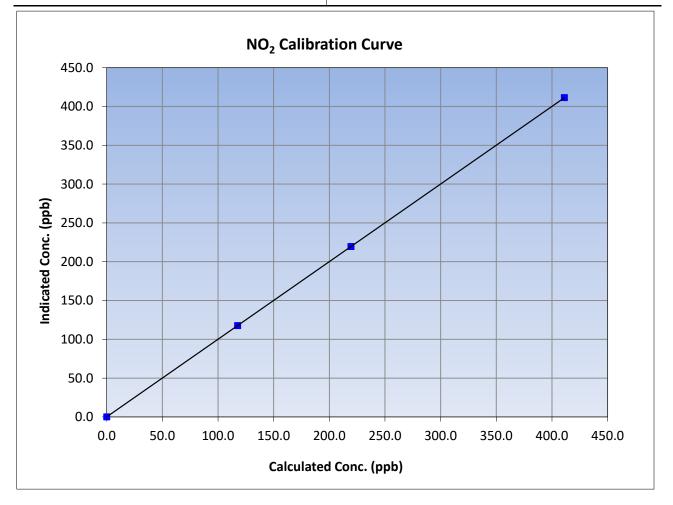
WBEA					Version-04-20		
		Station	Information				
Calibration Date:	on Date: February 2, 2023 Previous Calibration:			January	4, 2023		
Station Name:	An	zac	Station Number:	AM	S 14		
Start Time (MST):	7:	45	End Time (MST):	12	:33		
Analyzer make:	lyzer make: Thermo 42i Analyzer serial #:				1426262592		
		Calibra	ation Data				
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		
786.8	796.2	0.9883	correlation coefficient	0.555575	20.995		
393.4	396.1	0.9931	Clana	1.013337	0.90 - 1.10		
196.2	194.8	1.0072	Slope	1.013337	0.90 - 1.10		
			Intercept	-1.947043	+/-20		

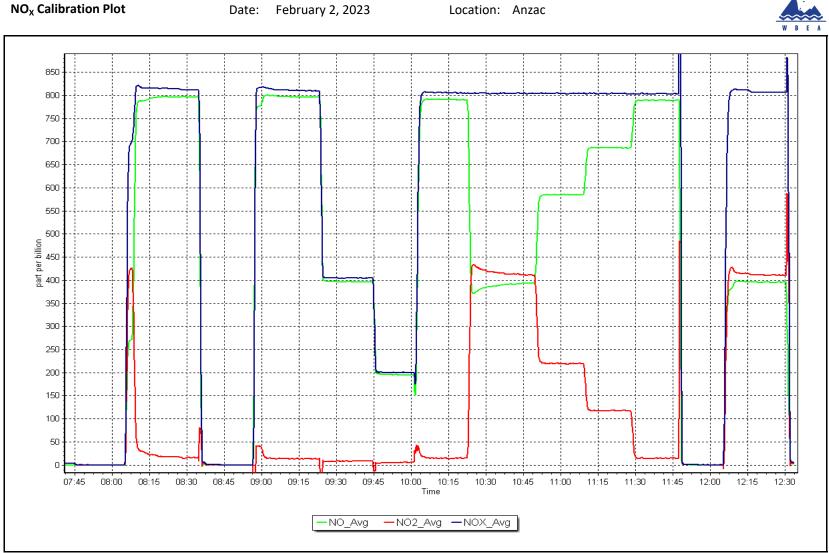




NO₂ Calibration Summary

WBEA					Version-04-202
		Station	Information		
Calibration Date:	Februar	y 2, 2023	Previous Calibration:	January	4, 2023
Station Name:	An	zac	Station Number:	AM	S 14
Start Time (MST):	7:	45	End Time (MST):	12	:33
Analyzer make:	er make: Thermo 42i Analyzer serial #: 1426262				62592
		Calibra	ation 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	1.000000	≥0.995
411.2	411.3	0.9997	correlation coernicient	1.000000	20.995
219.5	219.5	0.9999	Clana	1.000011	0.90 - 1.10
117.6	117.7	0.9990	Slope	1.000011	0.90 - 1.10
			Intercept	0.089892	+/-20









O₃ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name:	Anzac		Station number:	AMS14	
Calibration Date:	February 21, 2023			January 24, 2023	
Start time (MST):	7:44		End time (MST):		
Reason:	Routine			10.00	
	noutine				
		Calibration St	andards		
O3 generation mode:	Photometer				
Calibrator Make/Model:	API T700		Serial Number:	5239	
ZAG Make/Model:	API 701H		Serial Number:	357	
		Analyzer Info	rmation		
Analyzer make:	: Thermo 49i		Analyzer serial #:	1426262595	
Analyzer Range	e 0 - 500 ppb				
	Start	Finish		Start	Finish
Calibration slope:	1.005686	0.995743	Backgd or Offset:	2.7	0.9
Calibration intercept:	-1.420000	0.420000	Coeff or Slope:	1.499	1.499
	1.120000	01120000		1.155	1.155
		O ₃ Calibratio	on Data		
	Total air flow rate	-		Indicated concentration (Correction factor (Cc/Id
Set Point	Total air flow rate (sccm)	O ₃ Calibratic Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration ((ppm) (Ic)	Correction factor (Cc/Id Limit = 0.95-1.05
Set Point as found zero		Calibrator Lamp	Calculated		· ·
as found zero	(sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	(ppm) (lc)	Limit = 0.95-1.05
	(sccm) 5000	Calibrator Lamp Voltage Drive 0.0	Calculated concentration (ppb) (Cc) 0.0	(ppm) (Ic) -1.0	Limit = 0.95-1.05
as found zero as found span	(sccm) 5000	Calibrator Lamp Voltage Drive 0.0	Calculated concentration (ppb) (Cc) 0.0	(ppm) (Ic) -1.0	Limit = 0.95-1.05
as found zero as found span as found 2nd point	(sccm) 5000	Calibrator Lamp Voltage Drive 0.0	Calculated concentration (ppb) (Cc) 0.0	(ppm) (Ic) -1.0	Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point	(sccm) 5000 5000	Calibrator Lamp Voltage Drive 0.0 877.7	Calculated concentration (ppb) (Cc) 0.0 400.0	(ppm) (Ic) -1.0 396.9	Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point calibrator zero	(sccm) 5000 5000 5000	Calibrator Lamp Voltage Drive 0.0 877.7 0.0	Calculated concentration (ppb) (Cc) 0.0 400.0	(ppm) (Ic) -1.0 396.9 -0.2	Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point calibrator zero high point	(sccm) 5000 5000 	Calibrator Lamp Voltage Drive 0.0 877.7 0.0 877.7	Calculated concentration (ppb) (Cc) 0.0 400.0 0.0 400.0	(ppm) (Ic) -1.0 396.9 -0.2 398.3	Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point	(sccm) 5000 5000 5000 5000 5000 5000	Calibrator Lamp Voltage Drive 0.0 877.7 0.0 877.7 746.2	Calculated concentration (ppb) (Cc) 0.0 400.0 0.0 400.0 200.0	(ppm) (Ic) -1.0 396.9 -0.2 398.3 200.2	Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point third point	(sccm) 5000 5000 5000 5000 5000 5000 5000	Calibrator Lamp Voltage Drive 0.0 877.7 0.0 877.7 746.2 669.6	Calculated concentration (ppb) (Cc) 0.0 400.0 0.0 400.0 200.0 100.0	(ppm) (Ic) -1.0 396.9 -0.2 398.3 200.2 100.4	Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point third point as left zero	(sccm) 5000 5000 5000 5000 5000 5000 5000 50	Calibrator Lamp Voltage Drive 0.0 877.7 0.0 877.7 746.2 669.6 0.0	Calculated concentration (ppb) (Cc) 0.0 400.0 	(ppm) (Ic) -1.0 396.9 -0.2 398.3 200.2 100.4 -0.5	Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point third point as left zero	(sccm) 5000 5000 5000 5000 5000 5000 5000 50	Calibrator Lamp Voltage Drive 0.0 877.7 0.0 877.7 746.2 669.6 0.0	Calculated concentration (ppb) (Cc) 0.0 400.0 0.0 400.0 200.0 100.0 0.0 400.0 Averag	(ppm) (Ic) -1.0 396.9 -0.2 398.3 200.2 100.4 -0.5 397.5	Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point third point as left zero as left span	(sccm) 5000 5000 5000 5000 5000 5000 5000 50	Calibrator Lamp Voltage Drive 0.0 877.7 0.0 877.7 746.2 669.6 0.0 924.8	Calculated concentration (ppb) (Cc) 0.0 400.0 0.0 400.0 200.0 100.0 0.0 400.0 400.0 Average	(ppm) (Ic) -1.0 396.9 -0.2 398.3 200.2 100.4 -0.5 397.5 ge Correction Factor	Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point third point as left zero as left span Baseline Corr As found:	(sccm) 5000 5000 5000 5000 5000 5000 5000 50	Calibrator Lamp Voltage Drive 0.0 877.7 0.0 877.7 746.2 669.6 0.0 924.8 Previous response	Calculated concentration (ppb) (Cc) 0.0 400.0 0.0 400.0 200.0 100.0 0.0 400.0 Average 400.9	(ppm) (Ic) -1.0 396.9 -0.2 398.3 200.2 100.4 -0.5 397.5 397.5 397.5 397.5 397.5	Limit = 0.95-1.05

Notes:

No maintenance done. Zero adjusted.

Calibration Performed By:

Melissa Lemay

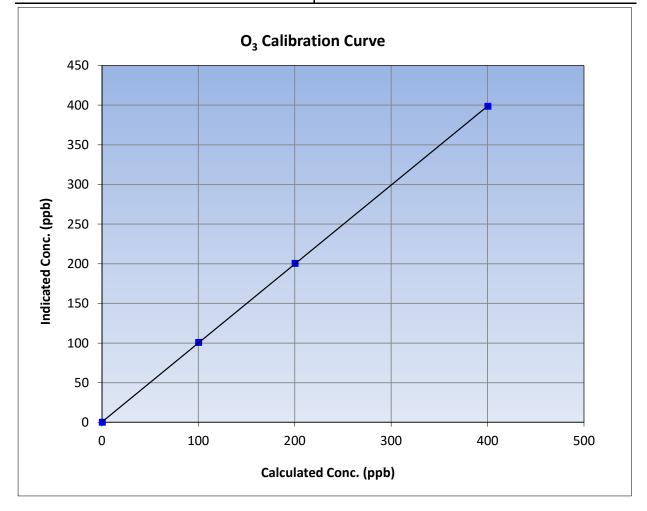


O₃ Calibration Summary

WBEA			Version-01-2020							
Station Information										
Calibration Date:	February 21, 2023	Previous Calibration:	January 24, 2023							
Station Name:	Anzac	Station Number:	AMS14							
Start Time (MST):	7:44	End Time (MST):	10:30							
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	-0.2	-0.2 Corro		0.999987	≥0.995
400.0	398.3	1.0043	Correlation Coefficient	0.999987	20.333
200.0	200.2	0.9990	Slope	0.995743	0.90 - 1.10
100.0	100.4	0.9960	Slope	0.993743	0.30 - 1.10
			- Intercept	0.420000	+/- 5







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T640 PM_{2.5} CALIBRATION

WDEA					Version-01-2023
		Station Information	ı		
Station Name:	Anzac		Station number:	AMS 14	
Calibration Date:	February 22, 2023		Last Cal Date:	January 24, 2023	
Start time (MST):	8:48				
Analyzer Make:	API T640		S/N:	825	
Particulate Fraction:	PM2.5				
Flow Meter Make/Model:	Alicat FP-25		S/N:	388753	
Temp/RH standard:	Alicat FP-25		S/N:	388753	
		Monthly Calibration T	est		
Parameter	<u>As found</u>	Measured	<u>As left</u>	Adjusted	(Limits)
T (°C)	-25.3	-25.6	-25.3		+/- 2 °C
P (mmHg)	727.7	728.7	727.7		+/- 10 mmHg
flow (LPM)	5	5.2	5		+/- 0.25 LPM
					+/- 0.23 LF W
Leak Test:	Date of check: PM w/o HEPA:	February 22, 2023 3.4	Last Cal Date: PM w/ HEPA:	January 24, 2023 0	
Note: this leak check will be		-	-	-	<0.2 ug/m3
Inlet cleaning :	Inlet Head		for ve us the pre ma		
inici cicuning .	metricuu				
		Quarterly Calibration	Test		
Parameter	As found	Post maintenance	As left	Adjusted	(Limits)
PMT Peak Test					11.3 +/- 0.5
Post-maintenance	e leak check:	PM w/o HEPA:		w/ HEPA:	
Date Optical Chan	nber Cleaned:	December 14	4, 2022		<0.2 ug/m3
Disposable Filte	r Changed:	December 14	4, 2022		
		Annual Maintenanc	e		
Date Sample Tul	be Cleaned:	June 21, 2	2022		
Date RH/T Sens		June 21, 2			
	-				
Natas		No adjustments	done. Inlet Head c	loanod	
Notes:		No aujustments	done. miet neau u	icuncu.	
Calibratian bu					
Calibration by:	Melissa Lemay				



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS17 WAPASU FEBRUARY 2023

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

March 31, 2023



SO₂ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Wapasu February 14, 2023 11:04 Routine		Station number: Last Cal Date: End time (MST):	AMS17 January 10, 2023 14:08	
		Calibration St	andards		
Cal Gas Concentration:	<u>50.38</u>	ppm	Cal Gas Exp Date:	January 12, 2029	
Cal Gas Cylinder #: Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model: ZAG Make/Model:	ALM066507 50.38 <u>n/a</u> API T700 API 701H	ppm	Rem Gas Exp Date: Diff between cyl: Serial Number: Serial Number:	n/a 2449 359	
		Analyzer Info	rmation		
Analyzer make: Analyzer Range			Analyzer serial #:	1218153459	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope: Calibration intercept:	0.999825 -1.319798	1.000068 -1.979730	Backgd or Offset: Coeff or Slope:	12.0 1.099	12.5 1.099
		SO ₂ Calibratio	on Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration C (ppb) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.5	
as found span	4921	79.4	800.0	796.7	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	799.5	1.001
second point	4960	39.7	400.0 199.5	395.8	1.011
third point as left zero	4980 5000	<u> 19.8</u> 0.0	0.0	<u> 196.3</u> 0.1	1.016
as left span	4920	79.4	800.1	800.3	1.000
as ieit spair	7320	73.4		ge Correction Factor	1.000
Baseline Corr As found:	796.20	Previous response		*% change	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	0.070
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

Notes:

Sample inlet filter changed after as founds. Adjusted the zero only.

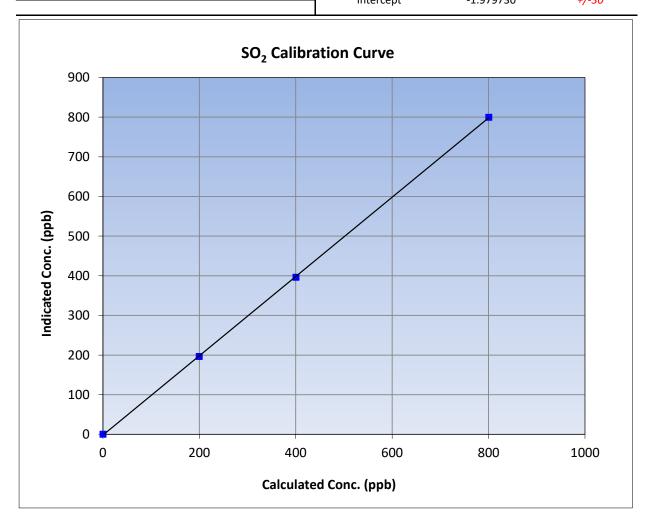
Calibration Performed By:



SO₂ Calibration Summary

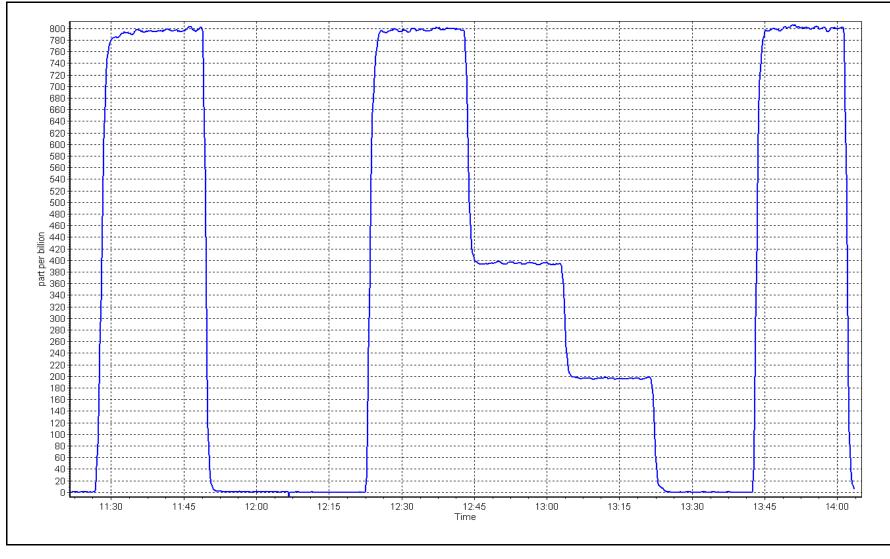
	Stati	on Information	
Calibration Date:	February 14, 2023	Previous Calibration:	January 10, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:04	End Time (MST):	14:08
Analyzer make:	Thermo 43i	Analyzer serial #:	1218153459

Calculated concentration Indicated concentration Correction factor Statistical Evaluation <u>Limits</u> (ppb) (Ic) (Cc/Ic) (ppb) (Cc) 0.0 0.1 ----**Correlation Coefficient** 0.999962 ≥0.995 800.0 799.5 1.0006 400.0 395.8 1.0107 1.000068 0.90 - 1.10 Slope 199.5 196.3 1.0164 Intercept -1.979730 +/-30











H₂S Calibration Report

Lad Gas Cylinder #:CC511852NumberLemoved Cal Gas Conc:5.076ppmRem Gas Exp Date:n/aLadibrator Make/Model:API T700Serial Number:2449AG Make/Model:API T701HSerial Number:359Analyzer make:Thermo 450iAnalyzer serial #:1218153583Converter make:n/aConverter serial #:1218153583Converter make:n/aStartFinishCalibration slope:1.0022820.995568Backgd or Offset:12.9Lalibration intercept:0.3208010.080792Coeff or Slope:1.085Set PointDilution air flow rateSource gas flow rate (scom)Calculated concentration (ppb) (ic)Correction facto (Cc/)as found zero50000.00.00.00.3as found span492178.880.079.81.003as found afd point498019.720.020.11.010new cylinder responseH2Calibration DataCorrection facto (Cc/)Correction facto (Cc/)Set PointDilution air flow rate (scom)Coulated (scom)Indicated co	Calibration Date: February 16, 2023 Attart time (MST): 10:28 Reason: Routine Cal Gas Concentration: 5.076 ppm Cal Gas Cylinder #: CC511852 Removed Cal Gas Conc: 5.076 ppm Removed Gas Cyl #: n/a Calibrator Make/Model: API T700 CAG Make/Model: API T701H Analyzer make: Thermo 450i Converter make: n/a Analyzer Range 0 - 100 ppb <u>Start</u>	Calibration S n Analyzer Info <u>Finish</u> 0.995568	Station number: Last Cal Date: End time (MST): tandards Cal Gas Exp Date: Diff between cyl: Serial Number: Serial Number: Serial Number: Diff between cyl: Serial Number: Serial Number: Backgd or Offset:	January 5, 2023 14:50 September 16, 2024 n/a 2449 359 1218153583 n/a <u>Start</u>	Finish
Allbration Date: February 16, 2023 tart time (MST): Last Cal Date: January 5, 2023 January 5, 2023 al Gas Concentration: 5.076 al Gas Concentration: ppm Cal Gas Exp Date: September 16, 2024 al Gas Concentration: 5.076 al Gas Cyl H: n/a Diff between cyl: January 5, 2023 allbrator Make/Model: API T701H Serial Number: 2449 AG Make/Model: API T701H Serial Number: 2449 allbrator Make/Model: API T701H Serial Number: 2449 allbration slope: 1/0 Opb Analyzer serial #: 1218153583 anverter make: n/a Converter serial #: 1218153583 anilibration slope: 1/0 O2282 0.995558 Backgd or Offset: 12.9 13.0 allbration slope: 1/0 O2282 0.995558 Backgd or Offset: 1.0.9 1.085 as found 2 app oint 4980 19.7 20.0 0.0 0.3 as found 2 appoint 4980 19.7 20.0 20.1 1.010 as found 3 rd poi	alibration Date: February 16, 2023 tart time (MST): 10:28 eason: Routine al Gas Concentration: 5.076 ppm al Gas Cylinder #: CC511852 emoved Cal Gas Conc: 5.076 ppm emoved Gas Cyl #: n/a alibrator Make/Model: API T700 AG Make/Model: API T701H analyzer make: Thermo 450i converter make: n/a analyzer Range 0 - 100 ppb <u>Start</u>	Analyzer Info <u>Finish</u> 0.995568	Last Cal Date: End time (MST): tandards Cal Gas Exp Date: Diff between cyl: Serial Number: Serial Number: Diff between cyl: Serial Number: Diff between cyl: Serial Number: Backgd or Offset:	January 5, 2023 14:50 September 16, 2024 n/a 2449 359 1218153583 n/a <u>Start</u>	Finish
Lail Gas Concentration: 5.076 ppm Cal Gas Exp Date: September 16, 2024 Lai Gas Cylinder #: CCS11852 ppm Rem Gas Exp Date: n/a Lai Gas Cylinder #: CCS11852 ppm Rem Gas Exp Date: n/a Lai Gas Cylinder #: CCS11852 ppm Rem Gas Exp Date: n/a Lai Gas Conc: 5.076 ppm Rem Gas Exp Date: n/a Lai Gas Conc: 5.076 ppm Rem Gas Exp Date: n/a Lai Gas Conc: 5.076 ppm Rem Gas Exp Date: n/a Lai Gas Conc: Analyzer Information Serial Number: 359 Analyzer make: n Fermo 450i Analyzer Serial #: 1218153583 Converter make: n/a Converter serial #: 12.9 13.0 Calibiration slope: 1.002282 0.995568 Backgd or Offset: 12.9 1.085 Lai Garduat zero 5000 0.0 0.0 0.3	Cal Gas Concentration: 5.076 ppm Cal Gas Cylinder #: CC511852 Removed Cal Gas Conc: 5.076 ppm Removed Gas Cyl #: n/a Calibrator Make/Model: API T700 ZAG Make/Model: API T701H Analyzer make: Thermo 450i Converter make: n/a Analyzer Range 0 - 100 ppb <u>Start</u>	Analyzer Info <u>Finish</u> 0.995568	Cal Gas Exp Date: Rem Gas Exp Date: Diff between cyl: Serial Number: Serial Number: Drmation Analyzer serial #: Converter serial #: Backgd or Offset:	n/a 2449 359 1218153583 n/a <u>Start</u>	Finish
Cal Gas Cylinder #:CC511852Permoved Gas Conc:S.076ppmRem Gas Exp Date:n/aLemoved Gas Cyl #:n/aDiff between cyl:Calibrator Make/Model:API T701Serial Number:2449Calibrator Make/Model:API T701HSerial Number:2449Converter make:Thermo 450iAnalyzer InformationAnalyzer make:Thermo 450iAnalyzer InformationConverter make:n/aAnalyzer Make:StortFinishStortFinishCoverter areial #:1218153583Coverter make:n/aAnalyzer InformationStortFinishStortFinishStortFinishCovertor for Slope:1.0851.085IndicatedCorrection factoCovertor for Slope:1.085Baseline AdjusteStortFinishStortFinishStortStortElisterStortStort <t< td=""><td>Cal Gas Cylinder #: CC511852 Removed Cal Gas Conc: 5.076 ppm Removed Gas Cyl #: n/a Calibrator Make/Model: API T700 ZAG Make/Model: API T701H Analyzer make: Thermo 450i Converter make: n/a Analyzer Range 0 - 100 ppb <u>Start</u></td><td>Analyzer Info <u>Finish</u> 0.995568</td><td>Rem Gas Exp Date: Diff between cyl: Serial Number: Serial Number: Drmation Analyzer serial #: Converter serial #: Backgd or Offset:</td><td>n/a 2449 359 1218153583 n/a <u>Start</u></td><td><u>Finish</u></td></t<>	Cal Gas Cylinder #: CC511852 Removed Cal Gas Conc: 5.076 ppm Removed Gas Cyl #: n/a Calibrator Make/Model: API T700 ZAG Make/Model: API T701H Analyzer make: Thermo 450i Converter make: n/a Analyzer Range 0 - 100 ppb <u>Start</u>	Analyzer Info <u>Finish</u> 0.995568	Rem Gas Exp Date: Diff between cyl: Serial Number: Serial Number: Drmation Analyzer serial #: Converter serial #: Backgd or Offset:	n/a 2449 359 1218153583 n/a <u>Start</u>	<u>Finish</u>
Removed Cal Gas Conc: 5.076 moved Gas Cyl #: ppm n/a Rem Gas Exp Date: n/a Calibrator Make/Model: API T700 Serial Number: 2449 ZAG Make/Model: API T701H Serial Number: 359 Analyzer make: Thermo 450i Analyzer Information Analyzer serial #: 1.218153583 Converter make: n/a Converter serial #: 1.218153583 Einish Calibrator Makey Start Finish Converter serial #: 1.218153583 Calibration slope: 1.002282 0.995568 Backgd or Offset: 12.9 13.0 Calibration intercept: 0.320801 0.080792 Coeff or Slope: 1.085 1.085 Set Point Dilution air flow rate (sccm) Source gas flow rate (sccm) Calculated concentration (ppb) (Cc) Indicated concentration (ppb) Indicated concentration (ppb) Easeline Adjuste Corection facto (Cc/(i CA-Rero)) as found zero 50000 0.0 0.0 0.3 as found 2nd point 4980 19.7 20.0 20.1 1.0010 new cyli	Removed Cal Gas Conc: 5.076 ppm Removed Gas Cyl #: n/a Calibrator Make/Model: API T700 ZAG Make/Model: API T701H Analyzer make: Thermo 450i Converter make: n/a Analyzer Range 0 - 100 ppb <u>Start</u>	Analyzer Info <u>Finish</u> 0.995568	Diff between cyl: Serial Number: Serial Number: Dormation Analyzer serial #: Converter serial #: Backgd or Offset:	2449 359 1218153583 n/a <u>Start</u>	<u>Finish</u>
Analyzer make: Converter make: Analyzer RangeThermo 450i n/aAnalyzer serial #: Converter serial #: n/a 1218153583 Converter serial #: n/a Analyzer Range0 - 100 ppbEntish Calibration slope: 0.320801Start 0.0985568Entish Backgd or Offset: Coeff or Slope:Start 1.085Finish 1.085Calibration intercept:0.3208010.0980792 0.320801Coeff or Slope: coeff or Slope:1.0851.085H2S As Found DataSet PointDilution air flow rate (scm)Source gas flow rate (scm)Calculated concentration (ppb) (Cc)Baseline Adjuste Correction facto (CC/IC-AFzero) Limit # 0.90.110as found zero50000.00.00.3 Coeff or Slope:Baseline Adjuste Correction facto (CC/IC-AFzero) Limit # 0.90.110as found zero50000.00.00.3 Coeff or Slope:Baseline Adjuste Correction facto (CC/IC-AFzero) Limit # 0.90.110New cylinder responseFinish Baseline Correction facto concentration (ppb) (Cc)Coeff or Slope: Limit # 0.92.12Coeff or Slope: Coeff or Slope:Coeff or Slope: Coeff or Slope:Baseline Adjuste Correction facto (CC/IC Limit # 0.92.12Set PointDilution air flow rate (scm)Source gas flow rate (scm)Calculated concentration (ppb) (Cc)Indicated concentration (ppb) (ICCorrection facto (CC/IC Limit # 0.92.12Coeff or Slope: Coeff or Slope:1.003Set Poin	Analyzer make: Thermo 450i Converter make: n/a Analyzer Range 0 - 100 ppb <u>Start</u>	<u>Finish</u> 0.995568	Analyzer serial #: Converter serial #: Backgd or Offset:	n/a <u>Start</u>	<u>Finish</u>
Converter make: Analyzer Rangen/aConverter serial #: n/an/aAnalyzer Range0 - 100 ppb55Finish 0.995568StartFinish 12.913.0Calibration slope: Calibration intercept:0.3208010.080792Coeff or Slope: Coeff or Slope:1.0851.085Set PointDilution air flow rate (sccm)Source gas flow rate (sccm)Calculated concentration (ppb) (Cc)Indicated concentration (ppb) (Cc)Baseline Adjuste Correction facto (Cc/(CAFterof)) Limit = 0.90-11Cas found zero50000.00.00.3 concentration (ppb) (Cc)Indicated concentration (ppb) (le)Baseline Adjuste Correction facto (Cc/(CAFterof)) Limit = 0.90-11Cas found zero50000.00.00.3 concentration (ppb) (le)Indicated (Cc/(CAFterof)) Limit = 0.90-11Cas found 3rd point496139.440.040.11.005as found 3rd point498019.720.020.11.010new cylinder responseFinish (sccm)Source gas flow rate (sccm)Calculated concentration (ppb) (lc)Correction factor (Cc/(C)as left zero50000.00.00.2 concentration (ppb) (lc)Imdicated (Cc/(C)as left zero50000.00.00.5 concentration (ppb) (lc)Imdicated (Cc/(C)as found 2rd point496139.440.039.81.005calibrator zero50000.00.0<	Converter make: n/a Analyzer Range 0 - 100 ppb <u>Start</u>	0.995568	Converter serial #: Backgd or Offset:	n/a <u>Start</u>	<u>Finish</u>
Calibration slope: 1.002282 0.995568 Backgd or Offset: 12.9 13.0 Calibration intercept: 0.320801 0.080792 Coeff or Slope: 1.085 1.085 H2S As Found Data Set Point Dilution air flow rate (sccm) Source gas flow rate (sccm) Calculated concentration (ppb) (Cc) Indicated concentration (ppb) (Cc) Indicated concentration (ppb) (IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII		0.995568			<u>Finish</u>
Calibration intercept: 0.320801 0.080792 Coeff or Slope: 1.085 1.085 Set Point Dilution air flow rate (sccm) Source gas flow rate (sccm) Calculated concentration (ppb) (Cc) Indicated concentration (ppb) (Cc) Baseline Adjuste Correction facto (Cc/It-AFzerO) Limit = 0.991.12 as found zero 5000 0.0 0.0 0.3 as found span 4921 78.8 80.0 80.4 0.999 as found 3rd point 4961 39.4 40.0 40.1 1.005 as found 3rd point 4980 19.7 20.0 20.1 1.010 new cylinder response Figs Calibration Data Correction facto (Cc/It Correction facto (Cc/It <td< td=""><td>Calibration slope: 1.002282</td><td></td><td></td><td>12 0</td><td></td></td<>	Calibration slope: 1.002282			12 0	
Set PointDilution air flow rate (sccm)Source gas flow rate (sccm)Calculated concentration (ppb) (C)Indicated concentration (ppb) (ic)Baseline Adjuste Correction facto (C/(L-AFzer)) Limit = 0.30-1100as found zero50000.00.00.3as found span492178.880.080.40.999as found 2nd point496139.440.040.11.005as found 3rd point498019.720.020.11.010new cylinder responseCalculated concentration (ppb) (CC)Indicated (CC/IC)Correction facto (CC/IC)Set PointDilution air flow rate (sccm)Source gas flow rate (sccm)Calculated concentration (ppb) (CC)Indicated concentration (ppb) (CC)Correction facto (CC/IC)calibrator zero50000.00.00.2high point492178.880.079.81.003second point496139.440.039.81.003second point496139.440.039.81.005third point492178.880.079.31.005as left zero50000.00.00.1as left span492179.4800.0-0.1Date of last converter efficiency test:n/aAve Corr Factor1.004Date of last converter efficiency test:n/aAve Corr Factor1.004Date of last converter efficiency test:	Calibration intercept: 0.320801		Coeff or Slope:		
Set PointDilution air flow rate (sccm)Source gas flow rate (sccm)Calculated concentration (ppb) (C)Indicated concentration (ppb) (C)Correction facto (CC/(Ic-AFzero)) Limit = 0.90-1.10as found zero 5000 0.0 0.0 0.3 as found span 4921 78.8 80.0 80.4 0.999 as found 2nd point 4961 39.4 40.0 40.1 1.005 as found 3rd point 4980 19.7 20.0 20.1 1.010 new cylinder responseH2S Calibration DataSet PointDilution air flow rate (sccm)Source gas flow rate (sccm)Calculated concentration (ppb) (Cc)Indicated (ccc)Correction facto (CC/(c) Limit = $0.95-1.05$ calibrator zero 5000 0.0 0.0 0.2 high point 4921 78.8 80.0 79.8 1.003 second point 4961 39.4 40.0 39.8 1.003 second point 4961 39.4 40.0 39.8 1.005 third point 4921 78.8 80.0 79.3 1.005 as left zero 5000 0.0 0.0 0.5 as left span 4921 78.8 80.0 79.3 1.005 soler das scrubber change: n/a Ave Corr Factor 1.004 Date of last scrubber change: n/a Ave Corr Factor 1.004 Date of last converter efficiency test:		H ₂ S As Four	nd Data		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Set Point	-	concentration (ppb)		Correction facto (Cc/(Ic-AFzero))
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	as found zero 5000	0.0	0.0	0.3	
as found 3rd point 4980 19.7 20.0 20.1 1.010 new cylinder response H2S Calibration Data H2S Calibration Data Indicated concentration (ppb) (ic) Correction factor (cc/(c) Limit = 0.95-1.05) Indicated concentration (ppb) (ic) Correction factor (cc/(c) Limit = 0.95-1.05) calibrator zero 5000 0.0 0.0 0.2 high point 4921 78.8 80.0 79.8 1.003 second point 4961 39.4 40.0 39.8 1.005 third point 4980 19.7 20.0 19.9 1.005 as left zero 5000 0.0 0.0 0.5 as left span 4921 78.8 80.0 79.3 1.009 302 Scrubber Check 4921 79.4 800.0 -0.1 Date of last scrubber change: n/a Ave Corr Factor 1.004 Date of last converter efficiency test: n/a Ave Corr Factor 1.004 Date of last converter efficiency test: n/a	as found span 4921	78.8	80.0	80.4	0.999
new cylinder responseH2S Calibration DataSet PointDilution air flow rate (sccm)Calculated concentration (ppb) (Cc)Indicated concentration (ppb) (IC)Correction factor (Cc/IC) Limit = 0.95-1.05calibrator zero50000.00.00.2high point492178.880.079.81.003second point496139.440.039.81.005third point498019.720.019.91.005as left zero50000.00.00.5as left span492178.880.079.31.009502 Scrubber Check492179.4800.0-0.1Date of last scrubber change:n/aAve Corr Factor1.004Date of last converter efficiency test:n/aefficiencyBaseline Corr As found:80.1Prev response:80.50*% change:-0.5%Baseline Corr 2nd AF pt:39.8AF Slope:1.001854AF Intercept:0.160796	as found 2nd point 4961	39.4	40.0	40.1	1.005
H2S Calibration DataSet PointDilution air flow rate (sccm)Source gas flow rate (sccm)Calculated concentration (ppb) (Cc)Indicated concentration (ppb) (Ic)Correction factor (CC/LC) Limit = 0.95-1.05calibrator zero50000.00.00.2high point492178.880.079.81.003second point496139.440.039.81.005third point498019.720.019.91.005as left zero50000.00.00.5as left span492178.880.079.31.009602 Scrubber Check492179.4800.0-0.1Date of last scrubber change:n/aAve Corr Factor1.004Date of last converter efficiency test:n/aefficiencyefficiencyBaseline Corr As found:80.1Prev response:80.50*% change:-0.5%Baseline Corr 2nd AF pt:39.8AF Slope:1.001854AF Intercept:0.160796	as found 3rd point 4980	19.7	20.0	20.1	1.010
Set PointDilution air flow rate (sccm)Source gas flow rate (sccm)Calculated concentration (ppb) (Cc)Indicated concentration (ppb) (Ic)Correction factor (Cc/Ic) Limit = 0.95-1.02calibrator zero50000.00.00.2high point492178.880.079.81.003second point496139.440.039.81.005third point498019.720.019.91.005as left zero50000.00.00.5as left span492178.880.079.31.009302 Scrubber Check492179.4800.0-0.1Date of last scrubber change:n/aAve Corr Factor1.004Date of last converter efficiency test:n/aefficiencyBaseline Corr As found:80.1Prev response:80.50*% change:-0.5%Baseline Corr 2nd AF pt:39.8AF Slope:1.001854AF Intercept:0.160796	new cylinder response		-		
Set PointDilution air flow rate (sccm)Source gas flow rate (sccm)concentration (ppb) (Cc)Indicated concentration (ppb) (IC)(Cc/L) Limit = 0.95-1.05calibrator zero50000.00.00.2high point492178.880.079.81.003second point496139.440.039.81.005third point498019.720.019.91.005as left zero50000.00.00.5as left span492178.880.079.31.009502 Scrubber Check492179.4800.0-0.1Date of last scrubber change:n/aAve Corr Factor1.004Date of last converter efficiency test:n/aefficiencyBaseline Corr As found:80.1Prev response:80.50*% change:-0.5%Baseline Corr 2nd AF pt:39.8AF Slope:1.001854AF Intercept:0.160796		H ₂ S Calibrat	ion Data		
high point 4921 78.8 80.0 79.8 1.003 second point 4961 39.4 40.0 39.8 1.005 third point 4980 19.7 20.0 19.9 1.005 as left zero 5000 0.0 0.0 0.5 as left zero 5000 0.0 0.0 0.5 as left span 4921 78.8 80.0 79.3 1.009 SO2 Scrubber Check 4921 79.4 800.0 -0.1 Date of last scrubber change: n/a Ave Corr Factor 1.004 Date of last converter efficiency test: n/a efficiency Baseline Corr As found: 80.1 Prev response: 80.50 *% change: -0.5% Baseline Corr 2nd AF pt: 39.8 AF Slope: 1.001854 AF Intercept: 0.160796	Set Point	-	concentration (ppb)		(Cc/Ic)
second point 4961 39.4 40.0 39.8 1.005 third point 4980 19.7 20.0 19.9 1.005 as left zero 5000 0.0 0.0 0.5 as left span 4921 78.8 80.0 79.3 1.009 502 Scrubber Check 4921 79.4 800.0 -0.1 Date of last scrubber change: n/a Ave Corr Factor 1.004 Date of last converter efficiency test: n/a efficiency Baseline Corr As found: 80.1 Prev response: 80.50 *% change: -0.5% Baseline Corr 2nd AF pt: 39.8 AF Slope: 1.001854 AF Intercept: 0.160796	calibrator zero 5000	0.0	0.0	0.2	
third point 4980 19.7 20.0 19.9 1.005 as left zero 5000 0.0 0.0 0.5 as left span 4921 78.8 80.0 79.3 1.009 GO2 Scrubber Check 4921 79.4 800.0 -0.1 Date of last scrubber change: n/a Ave Corr Factor 1.004 Date of last converter efficiency test: n/a efficiency Baseline Corr As found: 80.1 Prev response: 80.50 *% change: -0.5% Baseline Corr 2nd AF pt: 39.8 AF Slope: 1.001854 AF Intercept: 0.160796	high point 4921	78.8	80.0	79.8	1.003
as left zero 5000 0.0 0.0 0.5 as left span 4921 78.8 80.0 79.3 1.009 GO2 Scrubber Check 4921 79.4 800.0 -0.1 Date of last scrubber change: n/a Ave Corr Factor 1.004 Date of last converter efficiency test: n/a efficiency Baseline Corr As found: 80.1 Prev response: 80.50 *% change: -0.5% Baseline Corr 2nd AF pt: 39.8 AF Slope: 1.001854 AF Intercept: 0.160796	second point 4961	39.4	40.0	39.8	1.005
as left span 4921 78.8 80.0 79.3 1.009 GO2 Scrubber Check 4921 79.4 800.0 -0.1 Date of last scrubber change: n/a Ave Corr Factor 1.004 Date of last converter efficiency test: n/a efficiency Baseline Corr As found: 80.1 Prev response: 80.50 *% change: -0.5% Baseline Corr 2nd AF pt: 39.8 AF Slope: 1.001854 AF Intercept: 0.160796	•		20.0		1.005
SO2 Scrubber Check492179.4800.0-0.1Date of last scrubber change:n/aAve Corr Factor1.004Date of last converter efficiency test:n/aefficiencyBaseline Corr As found:80.1Prev response:80.50*% change:-0.5%Baseline Corr 2nd AF pt:39.8AF Slope:1.001854AF Intercept:0.160796					
Date of last scrubber change:n/aAve Corr Factor1.004Date of last converter efficiency test:n/aefficiencyBaseline Corr As found:80.1Prev response:80.50*% change:-0.5%Baseline Corr 2nd AF pt:39.8AF Slope:1.001854AF Intercept:0.160796					1.009
Date of last converter efficiency test:n/aefficiencyBaseline Corr As found:80.1Prev response:80.50*% change:-0.5%Baseline Corr 2nd AF pt:39.8AF Slope:1.001854AF Intercept:0.160796		79.4	800.0		
Baseline Corr As found:80.1Prev response:80.50*% change:-0.5%Baseline Corr 2nd AF pt:39.8AF Slope:1.001854AF Intercept:0.160796					
Baseline Corr 2nd AF pt: 39.8 AF Slope: 1.001854 AF Intercept: 0.160796	Date of last converter efficiency test: n/a				efficiency
Baseline Corr 2nd AF pt:39.8AF Slope:1.001854AF Intercept:0.160796	Baseline Corr As found: 80.1 F	Prev response:	80.50	*% change:	-0.5%
		•		0	
		•		•	

Notes:

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

Calibration Performed By:

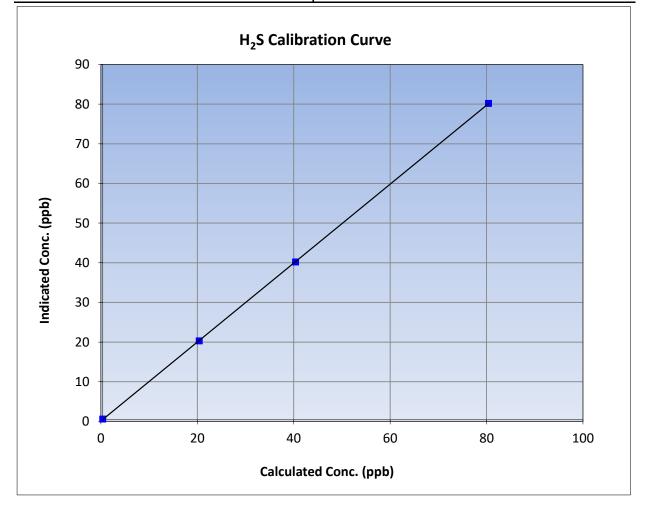
Karan Pandit



H₂S Calibration Summary

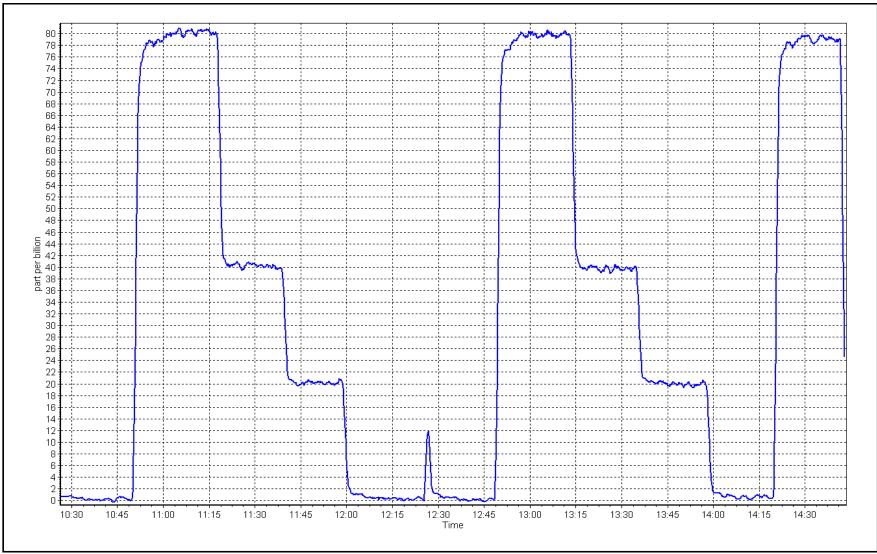
Station Information								
Calibration Date:	February 16, 2023	Previous Calibration:	January 5, 2023					
Station Name:	Wapasu	Station Number:	AMS17					
Start Time (MST):	10:28	End Time (MST):	14:50					
Analyzer make:	Thermo 450i	Analyzer serial #:	1218153583					
	Cal	ibration Data						

Calculated concentration Indicated concentration (ppb) (Cc) (ppb) (Ic)		Correction factor (Cc/Ic)	Statistical Evalua	Statistical Evaluation		
0.0	0.2		Correlation Coefficient	0.999989	≥0.995	
80.0	79.8	1.0025	correlation coefficient	0.999909	20.333	
40.0	39.8	1.0049	Slope	0.995568	0.90 - 1.10	
20.0	19.9	1.0051	Siope	0.995508	0.90 - 1.10	
			- Intercept	0.080792	+/-3	











THC Calibration Report

Version-01-2020

		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Wapasu February 14, 2023 11:04 Routine		Station number: Last Cal Date: End time (MST):	AMS17 January 10, 2023 14:08	
		Calibration S	tandards		
Gas Cert Reference: CH4 Cal Gas Conc. C3H8 Cal Gas Conc.	ALM0 <u>503.5</u> <u>208.3</u>	066507 ppm ppm	Cal Gas Expiry Date: CH4 Equiv Conc.	January 12, 2029 1076.3	ppm
Removed Gas Cert: Removed CH4 Conc. Removed C3H8 Conc. Calibrator Make/Model: ZAG Make/Model:	n <u>503.5</u> <u>208.3</u> API T700 API 701H	n/a ppm ppm	Removed Gas Expiry: CH4 Equiv Conc. Diff between cyl: Serial Number: Serial Number:	n/a 1076.3 2449 359	ppm
		Analyzer Info	ormation		
Analyzer make Analyzer Range	e: Thermo 51i-LT e: 0 - 20 ppm		Analyzer serial #:	1218153352	
Calibration slope: Calibration intercept:	<u>Start</u> 1.003975 0.033881	<u>Finish</u> 1.011424 -0.037301	Background: Coefficient:		<u>Finish</u> 3.090 4.324
		THC Calibrat	ion 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	5000	0.0	0.00	0.11	
as found span as found 2nd point as found 3rd point	4921	79.4	17.09	17.30	0.988
new cylinder response			0.00	0.01	
calibrator zero high point	5000 4921	0.0 79.4	0.00 17.09	0.01 17.29	0.989
second point	4921 4960	39.7	8.55	8.54	1.000
third point	4980	19.8	4.26	4.25	1.002
as left zero	5000	0.0	0.00	-0.01	
as left span	4920	79.4	17.09	17.36	0.985
				ge Correction Factor	0.997
Baseline Corr As found: Baseline Corr 2nd AF pt: Baseline Corr 3rd AF pt:	17.20 NA NA	Previous response AF Slope: AF Correlation:	17.19	*% change AF Intercept:	0.0%

Notes:

Sample inlet filter changed after as founds. Adjusted the zero only.

Calibration Performed By:

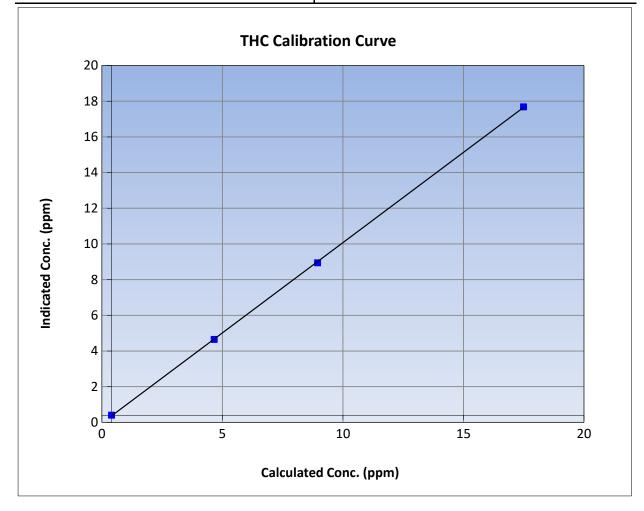


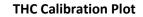
THC Calibration Summary

WBEA			Version-01-2020
	Statio	on Information	
Calibration Date:	February 14, 2023	Previous Calibration:	January 10, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:04	End Time (MST):	14:08
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1218153352

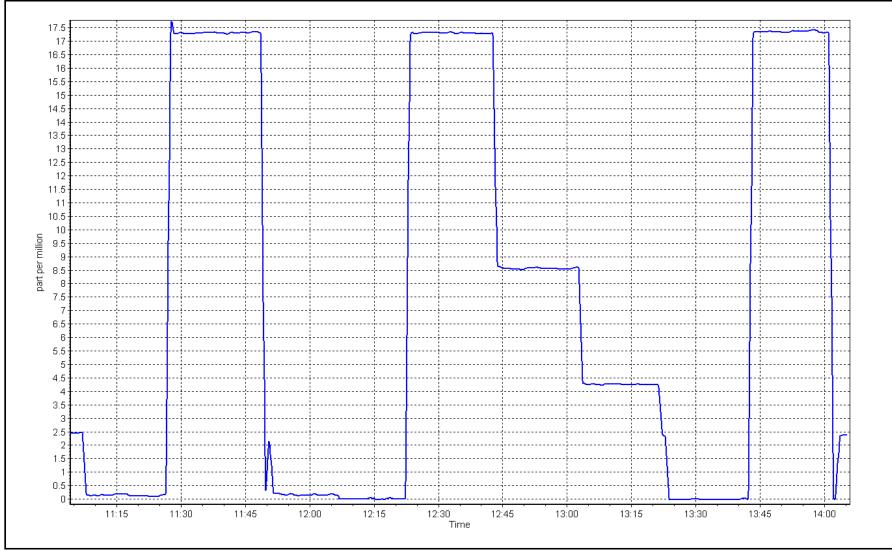
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>
0.00	0.01		Correlation Coefficient	0.999952	≥0.995
17.09	17.29	0.9888	correlation coefficient	0.999952	20.333
8.55	8.54	1.0003	Slope	1.011424	0.90 - 1.10
4.26	4.25	1.0020	Siope	1.011424	0.90 - 1.10
			Intercept	-0.037301	+/-1.5











$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

			Station Ir	formation			
Station Name: Calibration Date: Start time (MST): Reason:	Wapasu February 23, 2023 11:33 Routine	Station number: AMS17 23, 2023 Last Cal Date: January 19, 2023 End time (MST): 15:52					
			Calibratio	n Standards			
NO Gas Cylinder #:	Т3	75YK8		Cal Gas Expiry Dat	e: April 1	13, 2025	
NOX Cal Gas Conc:	<u>49.11</u>	ppm		NO Cal Gas Con	c:	48.07	ppm
Removed Cylinder #:				Removed Gas Exp Dat	e:		
Removed Gas NOX Conc:	<u>49.11</u>	ppm		Removed Gas NO Con	c:	<u>48.07</u>	ppm
NOX gas Diff:				NO gas Di			
Calibrator Model:	API T700			Serial Numbe			
ZAG make/model:	API T701H			Serial Numbe	er: 359		
			Analyzer I	nformation			
Analyzer make:	Teledyne API T200)		Analyzer serial #	: 833		
NOX Range (ppb):							
	<u>Start</u>		<u>Finish</u>			<u>Start</u>	<u>Finish</u>
NO coeff or slope:	0.820		0.820	NO bkgnd or offse	et:	0.1	0.1
NOX coeff or slope:	0.812		0.812	NOX bkgnd or offse	et:	-0.4	-0.4
NO2 coeff or slope:	1.000		1.000	Reaction cell Pres	s:	4.4	4.5
NO2 coeff or slope:	1.000		1.000	Reaction cell Pres	5:	4.4	4.5

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.999578	0.989719
NO _x Cal Offset:	-1.120000	-1.420000
NO Cal Slope:	1.000973	0.990300
NO Cal Offset:	-2.440000	-1.880000
NO ₂ Cal Slope:	0.996862	0.986936
NO ₂ Cal Offset:	-0.247483	-0.501997



$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

				Dilu	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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	0.1	-0.1	0.2		
as found span	4917	83.2	817.2	799.9	17.3	805.7	790.7	15.0	1.0143	1.0116
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.5	0.2	0.3		
high point	4917	83.2	817.2	799.9	17.3	808.6	791.4	17.3	1.0106	1.0107
second point	4958	41.6	408.6	399.9	8.7	401.2	392.8	8.5	1.0184	1.0182
third point	4979	20.8	204.3	200.0	4.3	199.4	194.3	5.1	1.0246	1.0292
as left zero	5000	0.0	0.0	0.0	0.0	0.3	0.1	0.2		
as left span	4917	83.2	817.2	403.5	413.7	797.3	389.7	407.5	1.0249	1.0354
							Average C	orrection Factor	1.0179	1.0194
Corrected As fo	ound NO _x =	805.6 ppb	NO =	790.8 ppb	* = > +/-59	% change initiates i	nvestigation	*Percent Chan	ge NO _x =	-1.3%
Previous Respo	onse NO _x =	815.7 ppb	NO =	798.2 ppb				*Percent Chan	ge NO =	-0.9%
Baseline Corr 2	nd pt NO _x =	NA ppb	NO =	NA ppb	As found	d $NO_X r^2$:		Nx SI:	Nx Int:	
Baseline Corr 3	ard 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 ₂ Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Co	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						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	790.5	394.1	413.7	408.2	1.0135	98.7%
2nd GPT point (200 ppb O3)	790.5	588.5	219.3	215.7	1.0167	98.4%
3rd GPT point (100 ppb O3)	790.5	690.0	117.8	114.8	1.0262	97.4%
				Average Correction Factor	1.0188	98.2%

Notes:

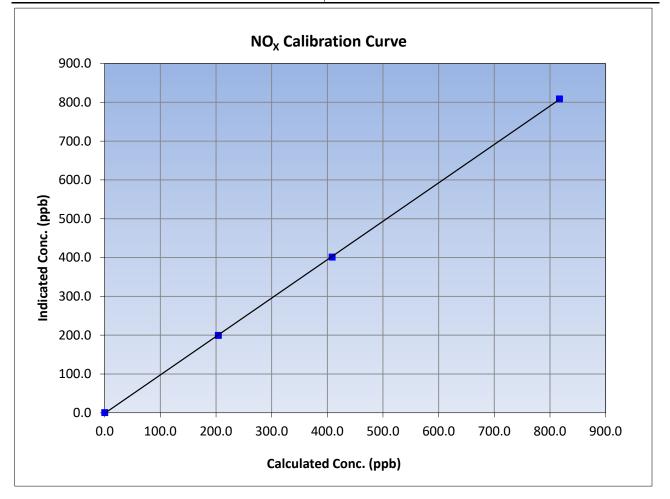
Sample inlet filter changed after as founds. No adjustments made.

Calibration Performed By:



$NO_{\rm X}$ Calibration Summary

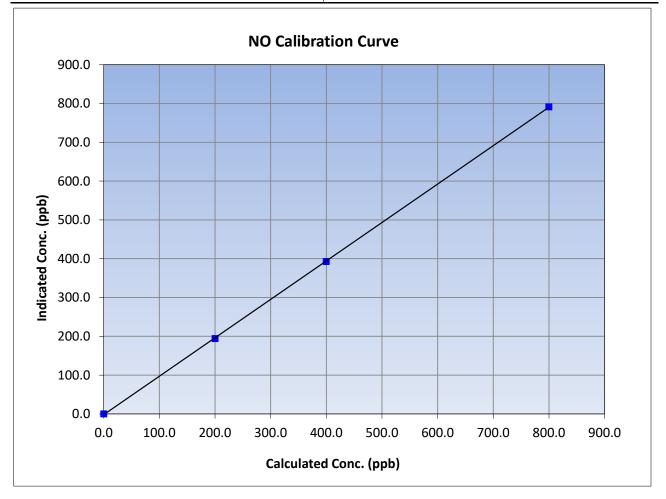
WBEA					Version-04-20
		Station	Information		
Calibration Date:	February	23, 2023	Previous Calibration:	Januar	ry 19, 2023
Station Name:	Wa	pasu	Station Number:	А	MS17
Start Time (MST):	11	:33	End Time (MST):	-	15:52
Analyzer make:	Teledyne	API T200	Analyzer serial #:		833
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.5		Correlation Coefficient	0.999971	≥0.995
817.2	808.6	1.0106	correlation coernelent	0.555571	20.000
408.6	401.2	1.0184	Slope	0.989719	0.90 - 1.10
204.3	199.4	1.0246	Slope	0.989719	0.90 - 1.10
			Intercept	-1.420000	+/-20





NO Calibration Summary

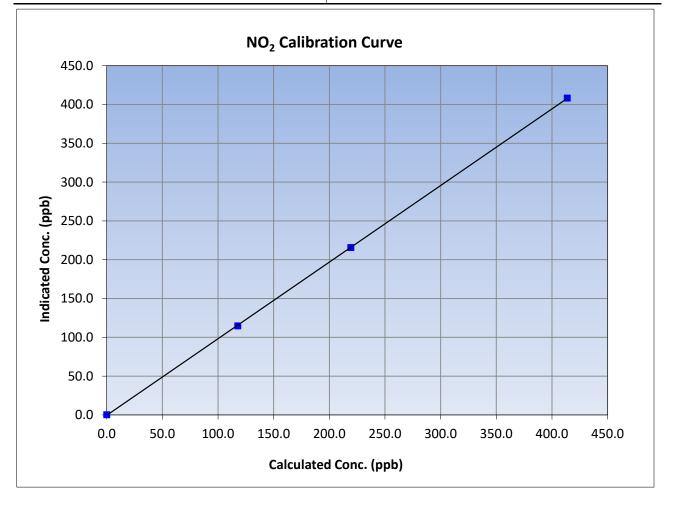
WBEA					Version-04-2
		Station	Information		
Calibration Date:	February	/ 23, 2023	Previous Calibration:	Januar	y 19, 2023
Station Name:	Wa	pasu	Station Number:	А	MS17
Start Time (MST):	11	:33	End Time (MST):	1	.5:52
Analyzer make:	Teledyne	e API T200	Analyzer serial #:		833
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.2		Correlation Coefficient	0.999968	≥0.995
799.9	791.4	1.0107	correlation coefficient	0.999908	20.333
399.9	392.8	1.0182	Slope	0.990300	0.90 - 1.10
200.0	194.3	1.0292	Slope	0.990300	0.90 - 1.10
			Intercept	-1.880000	+/-20

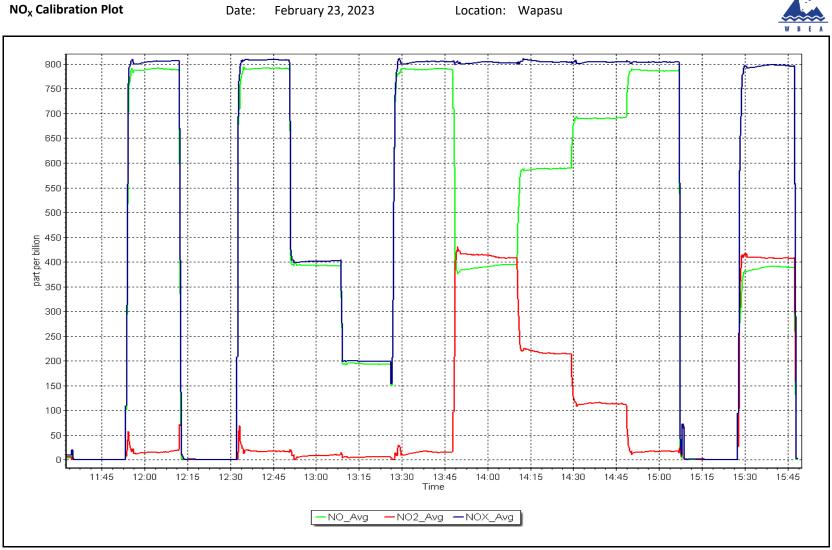




NO₂ Calibration Summary

WBEA					Version-04-20
		Station	Information		
Calibration Date:	February	23, 2023	Previous Calibration:	January	/ 19, 2023
Station Name:	Wa	pasu	Station Number:	AN	MS17
Start Time (MST):	11	11:33		1	5:52
Analyzer make:				833	
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.3		Correlation Coefficient	0.999980	≥0.995
413.7	408.2	1.0135	correlation coefficient	0.555580	20.333
219.3	215.7	1.0167	Slope	0.986936	0.90 - 1.10
117.8	114.8	1.0262	Slope	0.960950	0.90 - 1.10
			Intercept	-0.501997	+/-20





Location: Wapasu



O₃ Calibration Report

Version-01-2020

					Version-01-2020
		Station Infor	mation		
Station Name:	Wapasu		Station number:	AMS17	
Calibration Date:	February 6, 2023			January 4, 2023	
Start time (MST):	11:05		End time (MST):	=	
Reason:	Routine			13.50	
Neason.	Noutine				
		Calibration St	andards		
O3 generation mode:	Photometer				
Calibrator Make/Model:	API T700		Serial Number:	2449	
ZAG Make/Model:	API T701H		Serial Number:		
Entermane, model			Sena Humber		
		Analyzer Info	rmation		
Analyzer make:	API T400		Analyzer serial #:	3870	
Analyzer Range	0 - 500 ppb				
	Start	Finish		<u>Start</u>	Finish
Calibration slope:	1.005486	1.005686	Backgd or Offset:		-1.8
Calibration intercept:	-0.360000	-0.320000	Coeff or Slope:		1.020
Calibration intercept.	-0.300000	-0.320000	coeff of Slope.	1.020	1.020
		O ₃ Calibratio	on Data		
Set Point	Total air flow rate	Calibrator Lamp	Calculated	Indicated concentration (Correction factor (Cc/Ic)
SetFolint	(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	1077.3	400.0	403.2	0.992
as found 2nd point					
as found 3rd point					
calibrator zero	5000	0.0	0.0	0.2	
high point	5000	1077.3	400.0	402.1	0.995
second point	5000	900.3	200.0	200.9	0.996
third point	5000	789.5	100.0	99.5	1.005
as left zero	5000	0.0	0.0	-0.1	
as left span	5000	1077.3	400.0	405.9	0.985
				ge Correction Factor	0.998
Baseline Corr As found:	403.1	Previous response	401.8	*% change	0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	0.070
Baseline Corr 3rd AF pt:	NA	AF Correlation:		/ intercept.	
basenne con sia Ar pt.		Ar correlation.		* = > +/-5% change initiate	es investigation

Notes:

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

Calibration Performed By:

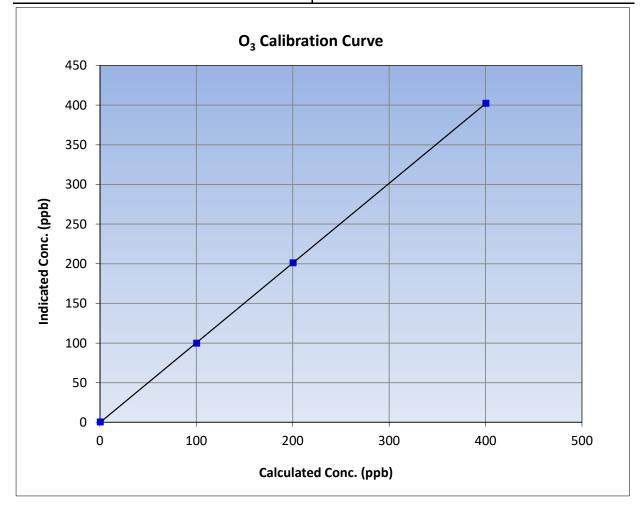
Karan Pandit

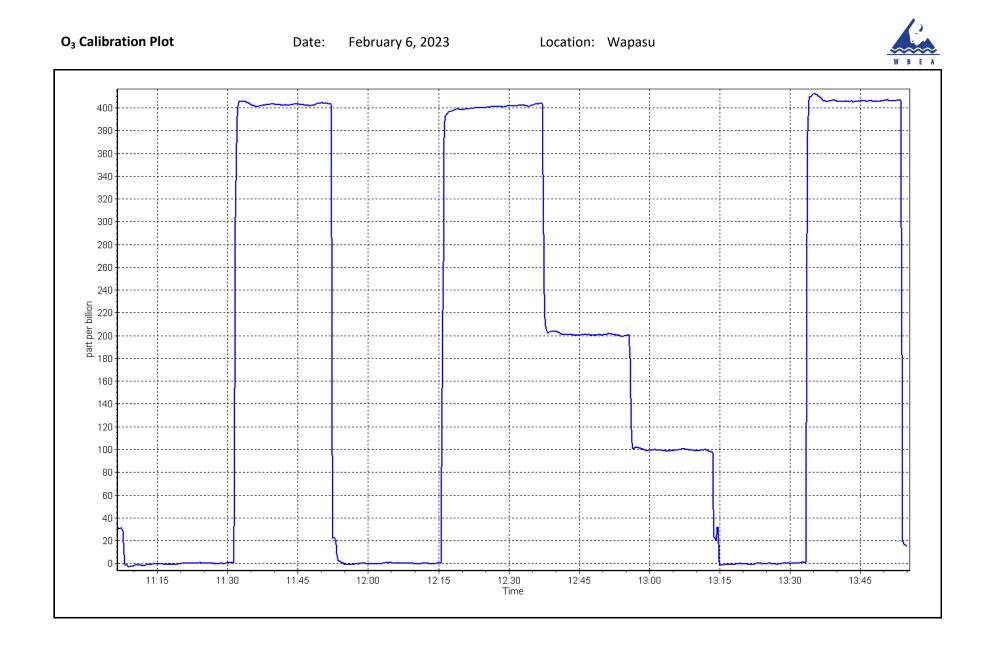


O₃ Calibration Summary

	Stati	on Information	
Calibration Date:	February 6, 2023	Previous Calibration:	January 4, 2023
Station Name:	Wapasu	Station Number:	AMS17
Start Time (MST):	11:05	End Time (MST):	13:58
Analyzer make:	API T400	Analyzer serial #:	3870
	Cal	ibration Data	

	(ppb) (Cc)	(ppb) (Ic)	(Cc/Ic)	Statistical Evaluation		Limits
	0.0	0.2		Correlation Coefficient	0.999990	≥0.995
	400.0	402.1	0.9948	correlation coefficient		20.335
	200.0	200.9	0.9955	Slope	1.005686	0.90 - 1.10
_	100.0	99.5	1.0050	Sibpe	1.005080	0.90 - 1.10
				– Intercept	-0.320000	+/- 5







T640 PM_{2.5} CALIBRATION

WBEA					Version-01-2023
		Station Information	1		
Station Name:	Wapasu		Station number:	AMS 17	
Calibration Date:	February 23, 2023		Last Cal Date:	January 19, 2023	
Start time (MST):	12:16		End time (MST):	12:47	
Analyzer Make:	API T640		s/N·	1183	
Particulate Fraction:	PM2.5		5,11	1100	
Flow Meter Make/Model:	Delta Cal		S/N:	1102	
Temp/RH standard:	Delta Cal		S/N:	1102	
		Monthly Calibration T	est		
<u>Parameter</u>	<u>As found</u>	Measured	<u>As left</u>	<u>Adjusted</u>	(Limits)
Т ([°] С)	-21.8	-22.3	-21.8		+/- 2 °C
P (mmHg)	730.2	730.9	730.2		+/- 10 mmHg
flow (LPM)	5.02	4.98	5.02		+/- 0.25 LPM
Leak Test:	Date of check:	February 23, 2023	Last Cal Date:	January 19, 2023	
	PM w/o HEPA:		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 ma	intenance leak check	
Inlet cleaning :	Inlet Head				
D		Quarterly Calibration		A 19 - 1	<i>(</i> , , , ,)
Parameter	<u>As found</u>	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:		w/ HEPA:	
Date Optical Cham	ber Cleaned:	December 1	5, 2022	·	<0.2 ug/m3
Disposable Filte	r Changed:	December 1	5, 2022		
		Annual Maintenanc	e		
Date Sample Tub	an Claanad:				
Date Sample Tu					
Notes:		No adjustments	made. Leak check	passed.	
Calibration by:	Karan Pandit				



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS18 STONY MOUNTAIN FEBRUARY 2023

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

March 31, 2023



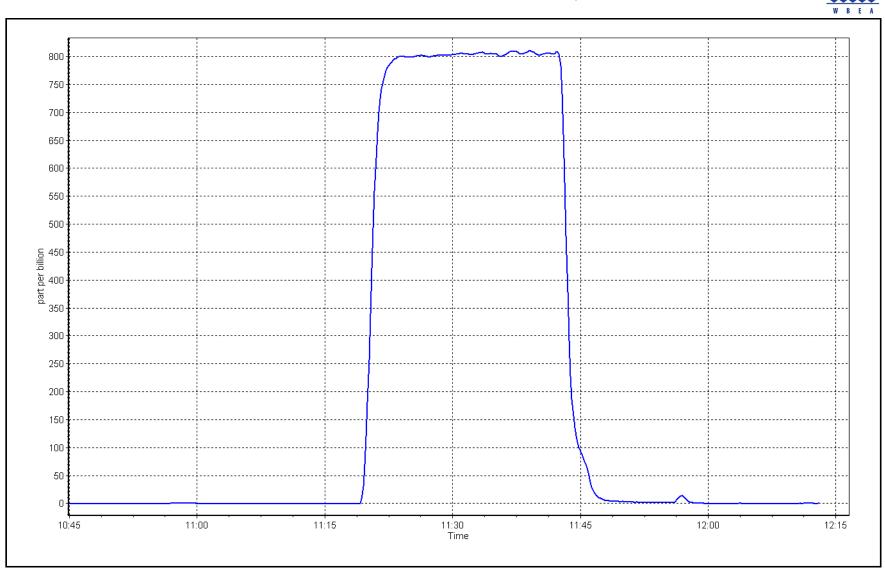
SO₂ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Stony Mountain February 3, 2023 10:55 As Found		Station number: Last Cal Date: End time (MST):	AMS 18 January 16, 2023 12:12	
		Calibration St	andards		
Cal Gas Concentration: Cal Gas Cylinder #:	49.40 CC463851	ppm	Cal Gas Exp Date:	February 23, 2025	
Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model:	49.40 NA Teledyne API T700	ppm	Rem Gas Exp Date: Diff between cyl: Serial Number:	NA 2658	
ZAG Make/Model:	Teledyne API 701H		Serial Number:	360	
		Analyzer Info	rmation		
Analyzer make: Analyzer Range			Analyzer serial #:	JC1501301453	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.003075		Backgd or Offset:	23.0	23.0
Calibration intercept:	-1.143339		Coeff or Slope:	0.817	0.817
		SO ₂ Calibratio	on Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration ((ppb) (Ic)	Correction factor (Cc/lo Limit = 0.95-1.05
as found zero	5009	0.0	0.0	-0.6	
as found span	4919	81.0	800.3	804.9	0.994
as found 2nd point					
as found 3rd point					
new cylinder response	5000	0.0		0.5	
calibrator zero	5009	0.0	0.0	-0.5	
high point second point					
third point					
as left zero					
as left span					
			Avera	ge Correction Factor	
Baseline Corr As found:	805.50	Previous response	801.60	*% change	0.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:		* = > +/-5% change initiate	es investigation
Notes:		No ch	anges/adjustments	made.	

Calibration Performed By:

Mohammed Kashif



Location: Stony Mountain



SO₂ Calibration Report

Version-01-2020

	Station Infor	mation		
Stony Mountain		Station number:	AMS 18	
February 17, 2023		Last Cal Date:	January 16, 2023	
10:55		End time (MST):	13:59	
Routine				
	Colibration St	andarde		
40.40			Fabruary 22, 2025	
	ppm	Cal Gas Exp Date:	February 23, 2025	
		Dam Cas Eve Data	NIA	
	ppm		NA	
			2650	
-				
Teledyne API 701H		Serial Number:	360	
	Analyzer Info	rmation		
Thermo 43i	-		JC1501301453	
0 - 1000 ppb			501501501 155	
<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
1.003075	1.008829	Backgd or Offset:	23.0	23.0
-1.143339	-0.882227	Coeff or Slope:	0.817	0.817
	SO ₂ Calibratio	on Data		
Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration ((ppb) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05
5009	0.0	0.0	-0.3	
4919	81.0	800.3	804.2	0.995
5000	0.0	0.0	-0.1	
4919	81.0	800.3	806.6	0.992
4959	40.5	400.2	403.2	0.993
4979	20.2	199.6	199.2	1.002
5000	0.0	0.0	-0.2	
4919	81.0	800.3	806.6	0.992
			ge Correction Factor	0.996
804.50	Previous response	801.60	*% change	0.4%
NA	AF Slope:		AF Intercept:	
1 1/ 1	/ 1 510pc.		, a intercept.	
	February 17, 2023 10:55 Routine 49.40 CC463851 49.40 NA Teledyne API T700 Teledyne API T700 Teledyne API 701H 5000 pb <u>Start</u> 1.003075 -1.143339 Dilution air flow rate (sccm) 5009 4919 5000 4919 4959 4959 4979 5000 4919	Stony Mountain February 17, 2023 10:55 Routine Calibration St 49.40 ppm 49.40 ppm CC463851 49.40 49.40 ppm NA ppm Teledyne API T700 Teledyne API 701H Thermo 43i 0 - 1000 ppb Start Finish 1.003075 1.008829 -1.143339 -0.882227 Dilution air flow rate (sccm) Source gas flow rate (sccm) Dilution air flow rate (sccm) Source gas flow rate (sccm) 5009 0.0 4919 81.0 4919 81.0 4939 40.5 4919 81.0 4919 81.0 4919 81.0	February 17, 2023 10:55 RoutineLast Cal Date: End time (MST): End time (MST): End time (MST):RoutineCal Gas Exp Date: CC463851 49.40 49.40 49.40 ppmRem Gas Exp Date: Serial Number: Serial Number:Teledyne API 7700 Teledyne API 701HSerial Number: Serial Number:Thermo 43i 0 - 1000 ppbAnalyzer Information 1.003075 1.008829 0.0 coff or Slope:Start 1.003075 -1.143339Finish 1.008829 0.882227Backgd or Offset: Coeff or Slope:Dilution air flow rate (sccm)Source gas flow rate (sccm)Calculated concentration (ppb) (Cc)S000 49190.00.0491981.0800.34959 40.5400.2199.65000 49190.00.04919 491981.0800.34959 40.5400.2199.65000 49190.00.04919 491981.0800.34959 40.5400.2199.65000 49190.00.04919 491981.0800.3405 400.2400.2199.65000 49190.00.04919 491981.0800.3405 400.2400.2199.65000 40150.00.0405 400.3400.24075 400.4400.24075 400.5400.34075 400.5400.34075 400.5400.34075 400.5400.34075 4075400.3	Stony Mountain February 17, 2023 10:55 Routine Station number: Last Cal Date: Indime (MST): AMS 18 January 16, 2023 Last Cal Date: Indime (MST): 49.40 CC463851 49.40 Ppm ppm Cal Gas Exp Date: Serial Number: February 23, 2025 A9.40 CC463851 49.40 NA ppm Rem Gas Exp Date: Serial Number: NA Teledyne API 7700 Teledyne API 701H Serial Number: Serial Number: 2658 360 Thermo 43i 0 - 1000 ppb Analyzer Information Serial Number: Start Start 1.003075 -1.143339 Finish 1.008829 0.882227 Start Solog 0.0 0.0 -0.3 May Source gas flow rate (sccm) Source gas flow rate (sccm) Indicated concentration (ppb) (Cc) (ppb) (lc) Dilution air flow rate (sccm) Source gas flow rate (sccm) Source gas flow rate (sccm) Mal.2 5000 0.0 0.0 -0.1 4919 81.0 800.3 806.6 4919 81.0 800.3 806.6 4919 81.0 800.3 806.6 4919 81.0 800.3 806.6 4919 81.0 800.3<

Sample inlet filter changed after as founds. No adjustments were made

Calibration Performed By:

Karan Pandit and Karina Fenwick

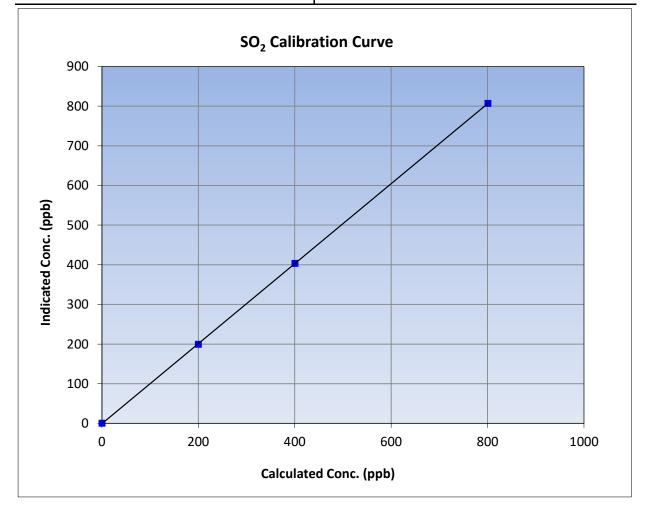


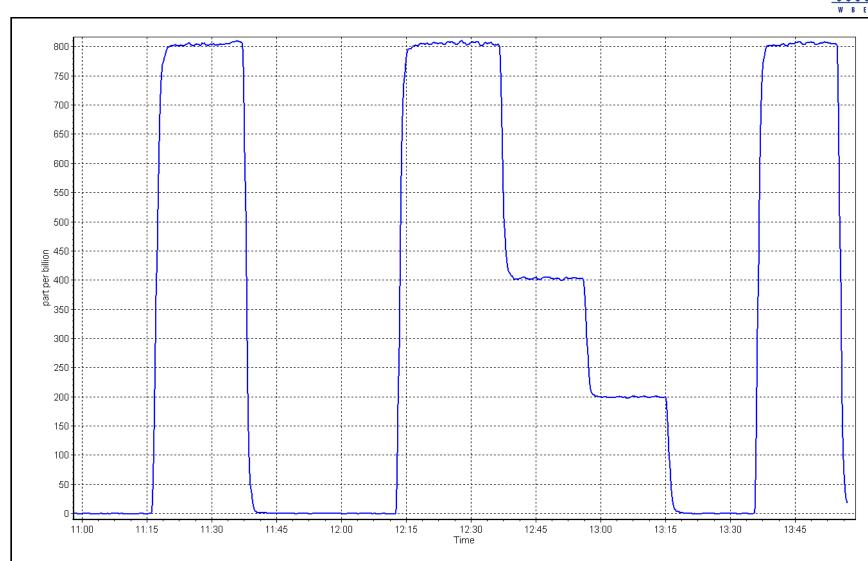
SO₂ Calibration Summary

Version-01-2020 **Station Information** Calibration Date: February 17, 2023 **Previous Calibration:** January 16, 2023 Station Name: Stony Mountain Station Number: AMS 18 Start Time (MST): 10:55 End Time (MST): 13:59 Analyzer make: Thermo 43i Analyzer serial #: JC1501301453

Calibration Data

Calculated concentration (ppb) (Cc)	Calculated concentration Indicated concentration (ppb) (Cc) (ppb) (Ic)		Statistical Evalua	<u>Limits</u>	
0.0	-0.1		Correlation Coefficient	0.999993	≥0.995
800.3	806.6	0.9922	correlation coefficient	0.999993	20.995
400.2	403.2	0.9925	Slope	1.008829	0.90 - 1.10
199.6	199.2	1.0020	Slope	1.008829	0.90 - 1.10
			Intercept	-0.882227	+/-30





SO2 Calibration Plot

Location: Stony Mountain



TRS Calibration Report

WBEA					Version-11-20
		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Stony Mountain February 13, 2023 11:14 Routine		Station number: Last Cal Date: End time (MST):	AMS18 January 18, 2023 15:35	
		Calibration S	tandards		
Cal Gas Concentration:	5.479	ppm	Cal Gas Exp Date:	January 4, 2025	
Cal Gas Cylinder #: Removed Cal Gas Conc: Removed Gas Cyl #:	CC500395 5.479 NA	ppm	Rem Gas Exp Date: Diff between cyl:	NA	
Calibrator Make/Model: ZAG Make/Model:	Teledyne API T700 Teledyne API T701		Serial Number: Serial Number:	2658 360	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	Thermo 43i-TLE CD Nova CDN-101 0 - 100 ppb		Analyzer serial #: Converter serial #:	1218153359 555	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.989724	1.000870	Backgd or Offset:	2.55	2.63
Calibration intercept:	0.201244	0.161019	Coeff or Slope:	1.129	1.151
		TRS As Four	nd 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	76.6	1.046
as found 2nd point	4964	36.5	40.0	38.1	1.052
as found 3rd point	4983	18.3	20.0	18.9	1.066
new cylinder response					
		TRS Calibrat	ion Data		
					с н с н
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05
Set Point calibrator zero		-	concentration (ppb)		(Cc/Ic)
	(sccm)	(sccm)	concentration (ppb) (Cc)	concentration (ppb) (Ic)	(Cc/Ic)
calibrator zero	(sccm) 5000	(sccm)	concentration (ppb) (Cc) 0.0	concentration (ppb) (Ic) 0.2	(Cc/Ic) <i>Limit = 0.95-1.05</i>
calibrator zero high point	(sccm) 5000 4927	(sccm) 0.0 73.0	concentration (ppb) (Cc) 0.0 80.0	concentration (ppb) (Ic) 0.2 80.2	(Cc/lc) Limit = 0.95-1.05 0.997
calibrator zero high point second point	(sccm) 5000 4927 4964	(sccm) 0.0 73.0 36.5	concentration (ppb) (Cc) 0.0 80.0 40.0	concentration (ppb) (Ic) 0.2 80.2 40.3	(Cc/Ic) <i>Limit = 0.95-1.05</i> 0.997 0.992
calibrator zero high point second point third point	(sccm) 5000 4927 4964 4983	(sccm) 0.0 73.0 36.5 18.3	concentration (ppb) (Cc) 0.0 80.0 40.0 20.0	concentration (ppb) (Ic) 0.2 80.2 40.3 20.1	(Cc/lc) Limit = 0.95-1.05 0.997 0.992 0.997
calibrator zero high point second point third point as left zero as left span	(sccm) 5000 4927 4964 4983 5000	(sccm) 0.0 73.0 36.5 18.3 0.0	concentration (ppb) (Cc) 0.0 80.0 40.0 20.0 0.0	concentration (ppb) (Ic) 0.2 80.2 40.3 20.1 0.3	(Cc/lc) Limit = 0.95-1.05 0.997 0.992 0.997
calibrator zero high point second point third point as left zero as left span O2 Scrubber Check	(sccm) 5000 4927 4964 4983 5000 4927 4923	(sccm) 0.0 73.0 36.5 18.3 0.0 73.0	concentration (ppb) (Cc) 0.0 80.0 40.0 20.0 0.0 80.0	concentration (ppb) (Ic) 0.2 80.2 40.3 20.1 0.3 79.7	(Cc/lc) Limit = 0.95-1.05 0.997 0.997 0.997 1.004
calibrator zero high point second point third point as left zero as left span 502 Scrubber Check Date of last scrubber cha	(sccm) 5000 4927 4964 4983 5000 4927 4923 ange:	(sccm) 0.0 73.0 36.5 18.3 0.0 73.0 77.1	concentration (ppb) (Cc) 0.0 80.0 40.0 20.0 0.0 80.0	concentration (ppb) (Ic) 0.2 80.2 40.3 20.1 0.3 79.7 -0.1	(Cc/lc) Limit = 0.95-1.05 0.997 0.992 0.997 1.004
calibrator zero high point second point third point as left zero as left span 502 Scrubber Check Date of last scrubber cha Date of last converter eff	(sccm) 5000 4927 4964 4983 5000 4927 4923 ange: ficiency test:	(sccm) 0.0 73.0 36.5 18.3 0.0 73.0 77.1 17-Dec-21	concentration (ppb) (Cc) 80.0 40.0 20.0 0.0 80.0 771.0	concentration (ppb) (Ic) 0.2 80.2 40.3 20.1 0.3 79.7 -0.1 Ave Corr Factor	(Cc/lc) Limit = 0.95-1.05 0.997 0.992 0.997 1.004 0.996 efficiency
calibrator zero high point second point third point as left zero as left span 302 Scrubber Check Date of last scrubber cha Date of last converter eff Baseline Corr As found:	(sccm) 5000 4927 4964 4983 5000 4927 4923 ange: ficiency test: 76.5	(sccm) 0.0 73.0 36.5 18.3 0.0 73.0 77.1 17-Dec-21 Prev response:	concentration (ppb) (Cc) 0.0 80.0 20.0 0.0 80.0 771.0 79.37	concentration (ppb) (IC) 0.2 80.2 40.3 20.1 0.3 79.7 -0.1 Ave Corr Factor *% change:	(Cc/lc) Limit = 0.95-1.05 0.997 0.992 0.997 1.004 0.996 efficiency -3.8%
calibrator zero high point second point third point as left zero	(sccm) 5000 4927 4964 4983 5000 4927 4923 ange: ficiency test:	(sccm) 0.0 73.0 36.5 18.3 0.0 73.0 77.1 17-Dec-21	concentration (ppb) (Cc) 0.0 80.0 20.0 0.0 80.0 771.0 79.37 0.957571	concentration (ppb) (Ic) 0.2 80.2 40.3 20.1 0.3 79.7 -0.1 Ave Corr Factor	(Cc/lc) Limit = 0.95-1.05 0.997 0.992 0.997 1.004 0.996 efficiency

Notes:

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

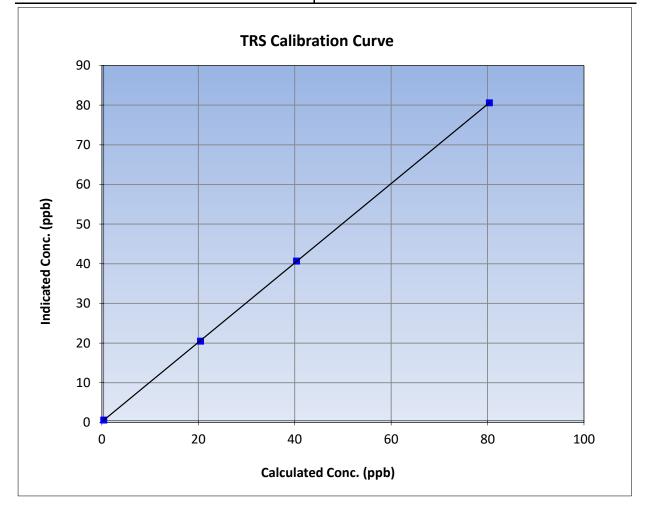


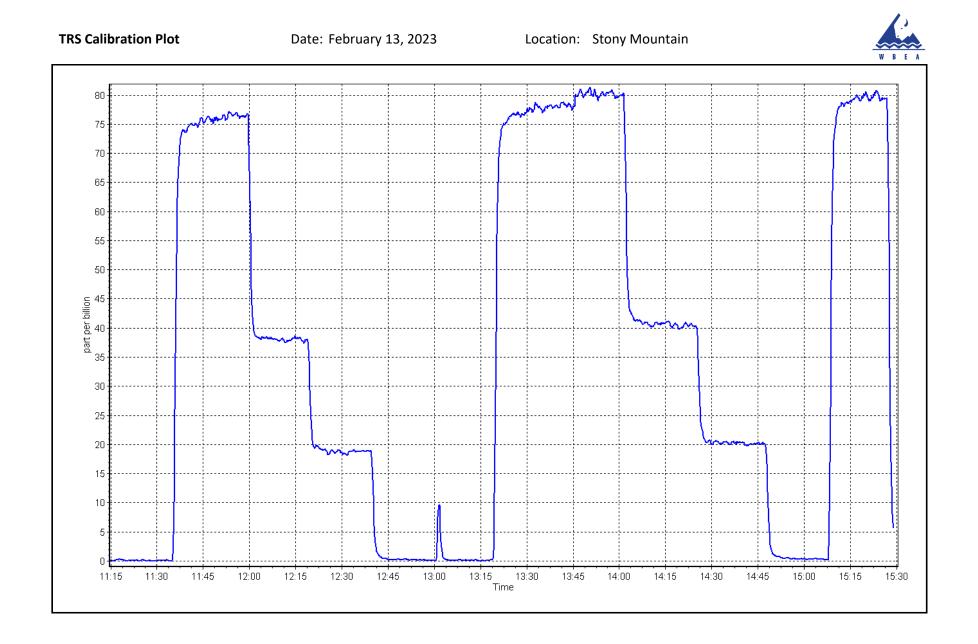
TRS Calibration Summary

WBEA			Version-11-2021
	Statio	on Information	
Calibration Date:	February 13, 2023	Previous Calibration:	January 18, 2023
Station Name:	Stony Mountain	Station Number:	AMS18
Start Time (MST):	11:14	End Time (MST):	15:35
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1218153359

Calibration Data

Calculated concentration (ppb) (Cc)	Calculated concentration Indicated concentration (ppb) (Cc) (ppb) (Ic)		Statistical Evalua	<u>Limits</u>	
0.0	0.2		Correlation Coefficient	0.999991	≥0.995
80.0	80.2	0.9974	correlation coefficient	0.999991	20.335
40.0	40.3	0.9924	Slope	1.000870	0.90 - 1.10
20.0	20.1	0.9974	Slope	1.000870	0.90 - 1.10
			- Intercept	0.161019	+/-3







THC / CH_4 / NMHC Calibration Report

WBEA						Version-01-2
			Station	Information		
Station Name:	Stony Mountair	n	Station number: AMS 18			
Calibration Date:	February 3, 202	3		Last Cal Date: Jai	nuary 16, 2023	
Start time (MST):	10:55			End time (MST): 12	:43	
Reason:	Cylinder Change	2				
			Calibrati	on Standards		
Gas Cert Reference:	C	C463851		Cal Gas Expiry Date: Fe	bruary 23, 202	5
CH4 Cal Gas Conc.	500.8	ppm		CH4 Equiv Conc.	1066.8	ppm
C3H8 Cal Gas Conc.	205.8	ppm				
Removed Gas Cert:		NA		Removed Gas Expiry: NA	4	
Removed CH4 Conc.	500.8	ppm		CH4 Equiv Conc.	1066.8	ppm
Removed C3H8 Conc.	205.8	ppm		Diff between cyl (THC):		
Diff between cyl (CH ₄):	:			Diff between cyl (NM):		
Calibrator Model:	Teledyne API T7	'00		Serial Number: 26	58	
ZAG make/model:	Teledyne API T7	'01H		Serial Number: 36	0	
			Analyzer	Information		
Analyzer make:	: Thermo 55i			Analyzer serial #: 11	80320039	
THC Range (ppm):	: 0 - 20 ppm					
NMHC Range (ppm):	: 0 - 10 ppm			CH4 Range (ppm): 0 -	10 ppm	
	<u>Start</u>	F	- inish		<u>Start</u>	<u>Finish</u>
CH4 SP Ratio:	: 3.06E-04	3.	06E-04	NMHC SP Ratio:	5.66E-05	5.66E-05
CH4 Retention time:	14.60	2	14.60	NMHC Peak Area:	162130	162130

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	17.22	1.004			
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	4919	81.0	17.28	17.23	1.003			
			Aver	age Correction Factor				
Baseline Corr AF:	17.22	Prev response	17.24	*% change	-0.2%			
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:				
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initia	tes investigation			



THC / CH_4 / 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 Limit= 0.95-1.05
as found zero	5000	0	0.00	0.00	
as found span	4919	81.0	9.17	9.10	1.007
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0	0.00	0.00	
as left span	4919	81	9.17	9.11	1.006
			Aver	age Correction Factor	
Baseline Corr AF:	9.10	Prev response	9.14	*% change	-0.4%
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 Limit= 0.95-1.05

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05
as found zero	5000	0.0	0.00	0.00	
as found span	4919	81.0	8.11	8.11	1.000
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero	5000	0.0	0.00	0.00	
as left span	4919	81.0	8.11	8.12	0.999
			Avera	age Correction Factor	
Baseline Corr AF:	8.11	Prev response	8.10	*% change	0.2%
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initia	tes investigation
		Calibration	Statistics		
		<u>Start</u>		<u>Finish</u>	
THC Cal Slope:		0.998211			
THC Cal Offset:		-0.008790			
CH4 Cal Slope:		0.999750			
CH4 Cal Offset:		-0.013212			
NMHC Cal Slope:		0.996638			
NMHC Cal Offset:		0.005021			

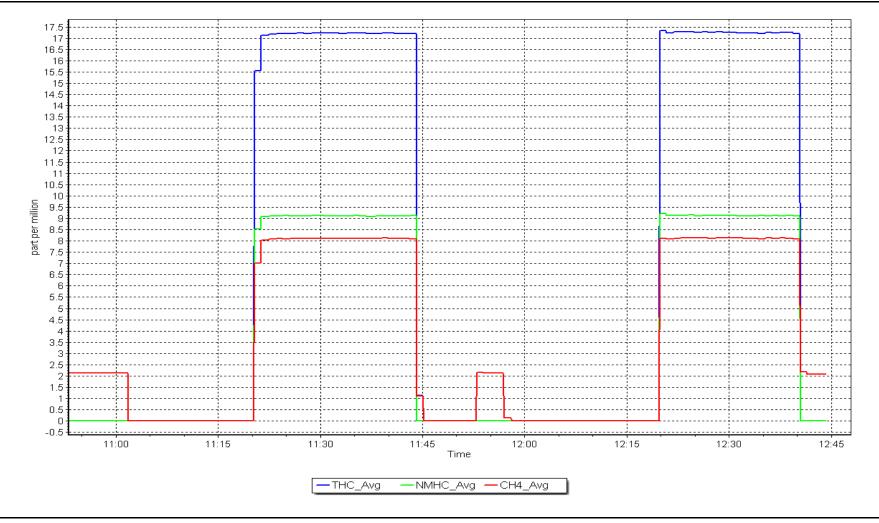
Changed the N2 cylinder after as founds.

Calibration Performed By:

Mohammed Kashif









THC / CH_4 / NMHC Calibration Report

			Station Information	
Station Name: Calibration Date: Start time (MST): Reason:	Stony Mountain February 17, 2023 11:55 Routine		Station number: AMS 18 Last Cal Date: January 16, 2023 End time (MST): 13:59	
			Calibration Standards	
Gas Cert Reference:		CC463851	Cal Gas Expiry Date: February 23, 2025	5
CH4 Cal Gas Conc.	500.8	ppm	CH4 Equiv Conc. 1066.8	ppm
C3H8 Cal Gas Conc.	205.8	ppm		
Removed Gas Cert:		NA	Removed Gas Expiry: NA	
Removed CH4 Conc.	500.8	ppm	CH4 Equiv Conc. 1066.8	ppm
Removed C3H8 Conc.	205.8	ppm	Diff between cyl (THC):	
Diff between cyl (CH ₄):			Diff between cyl (NM):	
Calibrator Model:	Teledyne API	Т700	Serial Number: 2658	
ZAG make/model:	Teledyne API	T701H	Serial Number: 360	
			Analyzer Information	

		Analyzer m	Iormation		
Analyzer make: Th	iermo 55i		Analyzer serial #: 11	80320039	
THC Range (ppm): 0 - NMHC Range (ppm): 0 -	• •		CH4 Range (ppm): 0	- 10 ppm	
	<u>Start</u>	Finish		<u>Start</u>	<u>Finish</u>
CH4 SP Ratio:	3.06E-04	3.06E-04	NMHC SP Ratio:	5.66E-05	5.66E-05
CH4 Retention time:	14.60	14.60	NMHC Peak Area:	162130	162130

THC Calibration Data								
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Co	c) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05			
as found zero	5000	0.0	0.00	0.00				
as found span	4919	81.0	17.28	17.31	0.998			
as found 2nd point								
as found 3rd point								
new cylinder response								
calibrator zero	5000	0.0	0.00	0.00				
high point	4919	81.0	17.28	17.32	0.998			
second point	4959	40.5	8.64	8.65	0.999			
third point	4979	20.2	4.31	4.30	1.002			
as left zero	5000	0.0	0.00	0.00				
as left span	4919	81.0	17.28	17.32	0.998			
			Av	verage Correction Factor	1.000			
Baseline Corr AF:	17.31	Prev response	17.24	*% change	0.4%			
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:				
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation			



THC / CH_4 / NMHC Calibration Report

Version-01-2020

		NMHC Calib	ration Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05
as found zero	5000	0	0.00	0.00	
as found span	4919	81.0	9.17	9.16	1.001
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	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	2.30	0.994
as left zero	5000	0	0.00	0.00	
as left span	4919	81	9.17	9.17	1.000
			A	Average Correction Factor	0.997
Baseline Corr AF:	9.16	Prev response	9.14	*% 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	Cal	ibration	Data
CIT	Cu	is a cion	Dutu

		CH4 Calibra	tion Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Co	c) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05
as found zero	5000	0.0	0.00	0.00	
as found span	4919	81.0	8.11	8.15	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	81.0	8.11	8.17	0.994
second point	4959	40.5	4.06	4.06	1.000
third point	4979	20.2	2.02	2.00	1.012
as left zero	5000	0.0	0.00	0.00	
as left span	4919	81.0	8.11	8.15	0.995
			A	verage Correction Factor	1.002
Baseline Corr AF:	8.15	Prev response	8.10	*% 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:		0.998211		1.002575	
THC Cal Offset:		-0.008790		-0.009777	
CH4 Cal Slope:		0.999750		1.007610	
CH4 Cal Offset:		-0.013212		-0.020602	
NMHC Cal Slope:		0.996638		0.998345	
NMHC Cal Offset:		0.005021		0.010426	

Notes:

Sample inlet filter and hydrogen cylinder changed after as founds. No adjustments were made

Calibration Performed By:

Karan Pandit and Karina Fenwick



THC Calibration Summary

		Station	eformation		
			nformation		
Calibration Date:	,	17, 2023	Previous Calibration:	January	
Station Name:		lountain	Station Number:	AMS	
Start Time (MST)		:55	End Time (MST):	13:	
Analyzer make:	Therr	no 55i	Analyzer serial #:	11803	20039
		Calibra	tion Data		
Calculated concentra (ppm) (Cc)	tion Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	lation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999998	≥0.995
17.28	17.32	0.9978			
8.64 4.31	<u>8.65</u> 4.30	0.9988	Slope	1.002575	0.90 - 1.10
		10021	Intercept	-0.009777	+/-0.5
20.0 -		THC Calibration			
18.0 -					
16.0 -					
14.0 -					
(12.0 -					
- 12.0 - 10.0 - 8.0 - 6.0 -					
- 0.8 ted					
- 0.6 - Indi					
4.0 -					
2.0 -					
0.0		-			
0	.0 5	.0		15.0	20.0
		Calculated	Conc. (ppm)		



CH₄ Calibration Summary

		Station	nformation		Version-01-20
			nformation Previous Calibration:		16 2022
Calibration Date:		February 17, 2023 F Stony Mountain		January 1	
tation Name:			Station Number:	AMS	
itart Time (MST):		:55	End Time (MST):	13:	
Analyzer make:	Therr	no 55i	Analyzer serial #:	118032	20039
		Calibra	tion Data		
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Eval	uation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999971	≥0.995
8.11 4.06	8.17 4.06	0.9936 1.0005			
2.02	2.00	1.0123	Slope	1.007610	0.90 - 1.10
			Intercept	-0.020602	+/-0.5
8.0 7.0 6.0 (mag 5.0					
Indicated Conc. (ppm)					
ndicated					
2.0					
1.0					
0.0	2.0	4.0	6.0	8.0	10.0
•••					

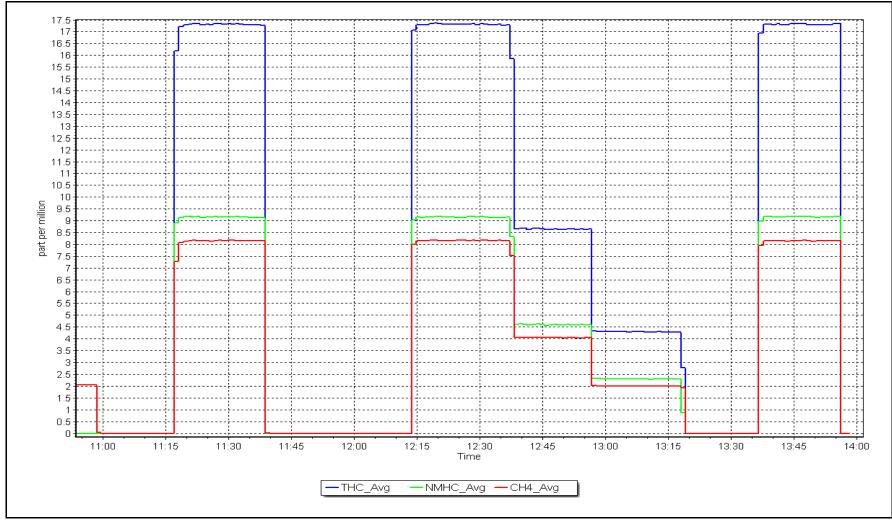


NMHC Calibration Summary

			Station I	nformation		
Calibratio	n Date:	February	17, 2023	Previous Calibration:	January :	16, 2023
station Na	ame:	Stony N	Iountain	Station Number:	AMS	5 18
start Time	e (MST):	11	:55	End Time (MST):	13:	59
nalyzer r	nake:	Therr	no 55i	Analyzer serial #:	11803	20039
			Calibra	ition Data		
	oncentration 1) (Cc)	n Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>
	00	0.00		Correlation Coefficient	0.999993	≥0.995
	17 58	9.16 4.60	1.0012 0.9973			
	29	2.30	0.9938	Slope	0.998345	0.90 - 1.10
	-			Intercept	0.010426	+/-0.5
u)	9.0 8.0 7.0 6.0					
Conc. (ppm)	5.0 -					
Con						
	4.0					
Indicated	3.0					
	2.0					
	1.0					
	0.0					
	0.0	2.0	4.0	6.0	8.0	10.0
			Calculated			

NMHC Calibration Plot







Station Name:

Reason:

Calibration Date:

Start time (MST):

Wood Buffalo Environmental Association

NO_X \ NO \ NO₂ Calibration Report

Version-04-2020

Station Information

Station number: AMS 18 Last Cal Date: January 24, 2023 End time (MST): 15:25

January 14, 2024

49.22

NA

49.22

2658

360

ppm

ppm

	Calibration Standards			
NO Gas Cylinder #:	T2XX7ME		Cal Gas Expiry Date:	
NOX Cal Gas Conc:	50.48	ppm	NO Cal Gas Conc:	
Removed Cylinder #:	NA		Removed Gas Exp Date:	
Removed Gas NOX Conc:	50.48	ppm	Removed Gas NO Conc:	
NOX gas Diff:			NO gas Diff:	
Calibrator Model:	Teledyne API T700		Serial Number:	
ZAG make/model:	Teledyne API 701H		Serial Number:	

Stony Mountain

10:55

Routine

February 22, 2023

Analyzer Information

Analyzer make: Th NOX Range (ppb): 0 -			Analyzer serial #: 13	36160088	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.043	1.043	NO bkgnd or offset:	2.9	2.9
NOX coeff or slope:	0.987	0.987	NOX bkgnd or offset:	2.9	2.9
NO2 coeff or slope:	0.999	0.999	Reaction cell Press:	218.6	222.7

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	1.000554	1.002587
NO _x Cal Offset:	0.069933	0.289742
NO Cal Slope:	1.001394	1.003123
NO Cal Offset:	-0.829546	-0.910073
NO ₂ Cal Slope:	1.001873	0.999064
NO ₂ Cal Offset:	0.315702	0.020158



$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

				Dilu	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	0.0		
as found span	4919	81.3	820.8	800.3	20.5	824.5	801.4	23.2	0.9955	0.9986
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1		
high point	4919	81.3	820.8	800.3	20.5	822.9	802.1	20.9	0.9974	0.9977
second point	4959	40.7	410.9	400.7	10.3	412.9	401.2	11.8	0.9952	0.9987
third point	4980	20.3	204.9	199.8	5.1	205.6	198.2	7.4	0.9968	1.0082
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.1		
as left span	4919	81.3	820.8	388.1	432.7	826.3	390.3	436.0	0.9933	0.9943
							Average C	orrection Factor	0.9965	1.0015
Corrected As fo	ound NO _x =	824.5 ppb	NO =	801.5 ppb	* = > +/-5%	% change initiates i	nvestigation	*Percent Chan	ge NO _x =	0.4%
Previous Respo	onse NO _x =	821.3 ppb	NO =	800.6 ppb				*Percent Chan	ge NO =	0.1%
Baseline Corr 2	nd pt NO _x =	NA ppb	NO =	NA ppb	As found	d $NO_{\chi} r^2$:		Nx SI:	Nx Int:	
Baseline Corr 3	ord pt NO _x =	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 ₂ Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Co	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						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	802.7	390.5	432.7	432.4	1.0007	99.9%
2nd GPT point (200 ppb O3)	802.7	591.0	232.2	231.8	1.0017	99.8%
3rd GPT point (100 ppb O3)	802.7	697.5	125.7	125.6	1.0007	99.9%
			ŀ	Average Correction Factor	1.0010	99.9%

Notes:

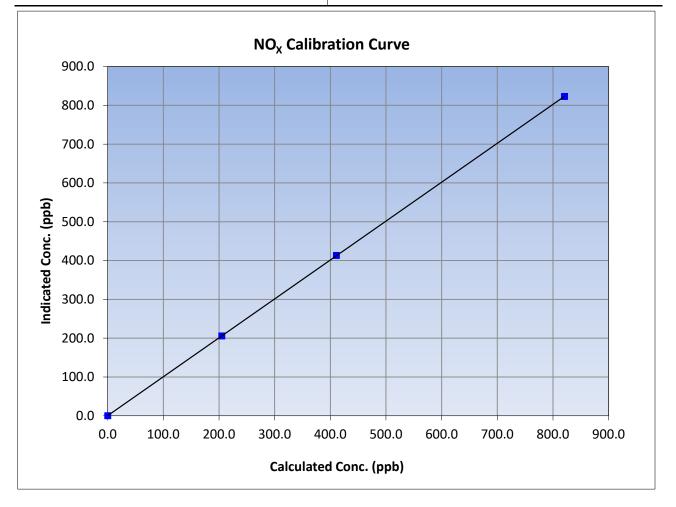
Sample inlet filter changed after as founds. No adjustments made.

Calibration Performed By:



NO_x Calibration Summary

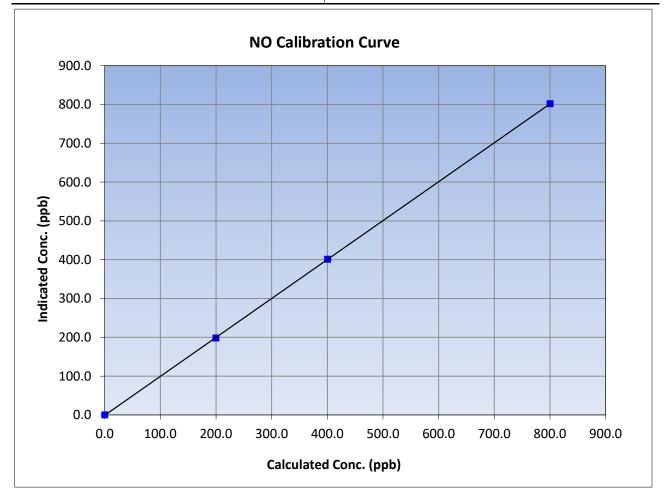
WBEA					Version-04-20
		Station	Information		
Calibration Date:	alibration Date: February 22, 2023		Previous Calibration:	January	24, 2023
Station Name:	Stony N	Iountain	Station Number:	AM	S 18
Start Time (MST):	10	:55	End Time (MST):	15	:25
Analyzer make:	Therr	no 42i	Analyzer serial #:	rial #: 1336160088	
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999999	≥0.995
820.8	822.9	0.9974	correlation coernelent	0.9999999	20.995
410.9	412.9	0.9952	Clana	1.002587	0.90 - 1.10
204.9	205.6	0.9968	Slope	1.002587	0.90 - 1.10
			Intercept	0.289742	+/-20





NO Calibration Summary

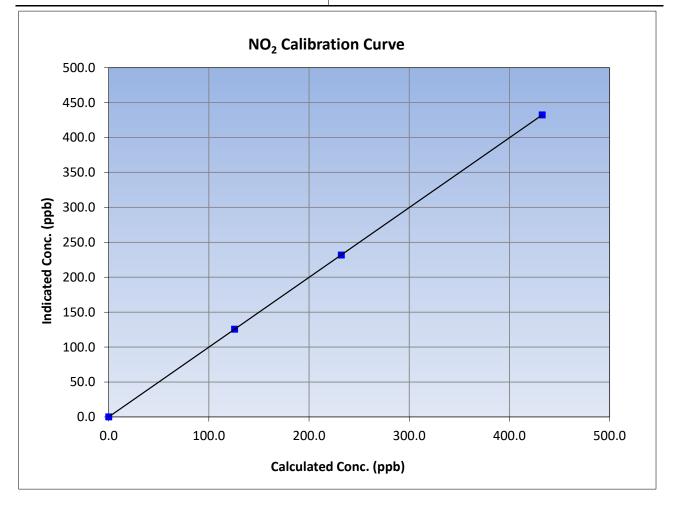
WBEA					Version-04-20
		Station	Information		
Calibration Date:	February	22, 2023	Previous Calibration:	January	24, 2023
Station Name:	Stony N	Iountain	Station Number:	AM	S 18
Start Time (MST):	10:55 IO:55		End Time (MST):	15	:25
Analyzer make:	make: Thermo 42i		Analyzer serial #:	1336160088	
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999992	≥0.995
800.3	802.1	0.9977	correlation coefficient	0.5555552	20.333
400.7	401.2	0.9987	Clana	1.003123	0.90 - 1.10
199.8	198.2	1.0082	Slope	1.003123	0.90 - 1.10
			Intercept	-0.910073	+/-20

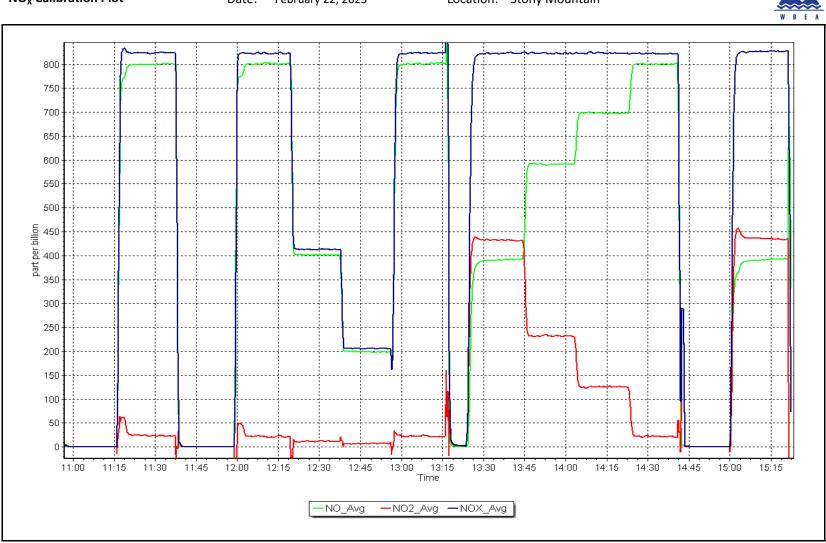




NO₂ Calibration Summary

WBEA					Version-04-2
		Station	Information		
Calibration Date:	February	22, 2023	Previous Calibration:	January	24, 2023
Station Name:	Stony N	Iountain	Station Number:	AM	S 18
Start Time (MST):	10:55		End Time (MST):	15	:25
Analyzer make:	zer make: Thermo 42i		Analyzer serial #:	1336160088	
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	lc) Statistical Evaluation		<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999999	≥0.995
432.7	432.4	1.0007	Correlation Coefficient	0.9999999	20.995
232.2	231.8	1.0017	Slope	0.999064	0.90 - 1.10
125.7	125.6	1.0007	Sibpe	0.999004	0.90 - 1.10
			Intercept	0.020158	+/-20







O₃ Calibration Report

Version-01-2020

					Version-01-20
		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Stony Mountain February 15, 2023 10:34 Routine		Station number: Last Cal Date: End time (MST):	January 9, 2023	
		Calibration St	andards		
O3 generation mode: Calibrator Make/Model: ZAG Make/Model:	Photometer Teledyne API T700 Teledyne API T701H		Serial Number: Serial Number:		
		Analyzer Info	rmation		
Analyzer make: Analyzer Range			Analyzer serial #:	825	
Calibration slope: Calibration intercept:	<u>Start</u> 0.993114 -0.320000	<u>Finish</u> 1.001514 -0.040000	Backgd or Offset: Coeff or Slope:		<u>Finish</u> 1.000 0.993
		O ₃ Calibratio	on Data		
Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration ((ppm) (Ic)	Correction factor (Cc/ Limit = 0.95-1.05
as found zero	5000	800.0	0.0	-0.3	
as found span	4888	1096.9	400.0	395.5	1.011
as found 2nd point					
as found 3rd point					
calibrator zero	5000	800.0	0.0	-0.2	
high point	4888	1101.7	400.0	400.4	0.999
second point	4888	863.9	200.0	200.6	0.997
third point	4888	741.4	100.0	100.1	0.999
as left zero	5000	800.0	0.0	0.2	
as left span	4812	1097.9	400.0	402.7	0.993
			Avera	ge Correction Factor	0.998
Baseline Corr As found:	395.8	Previous response	396.9	*% change	-0.3%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation

Notes:

Sample inlet filter changed after as founds. Adjusted the span only.

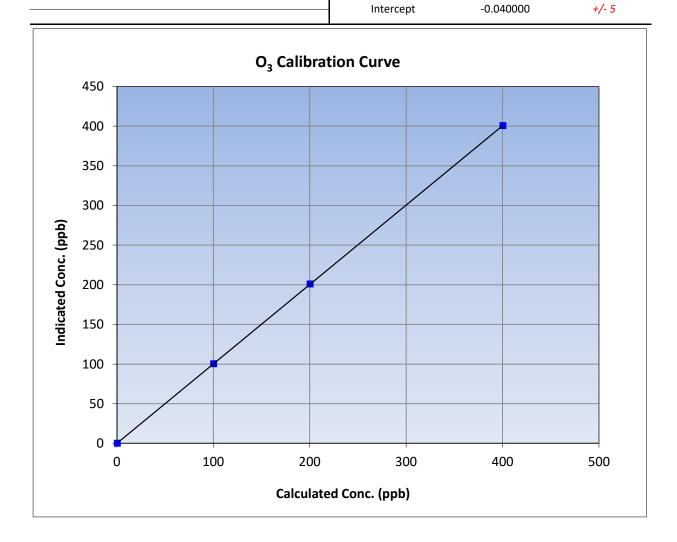
Calibration Performed By:

Karan Pandit



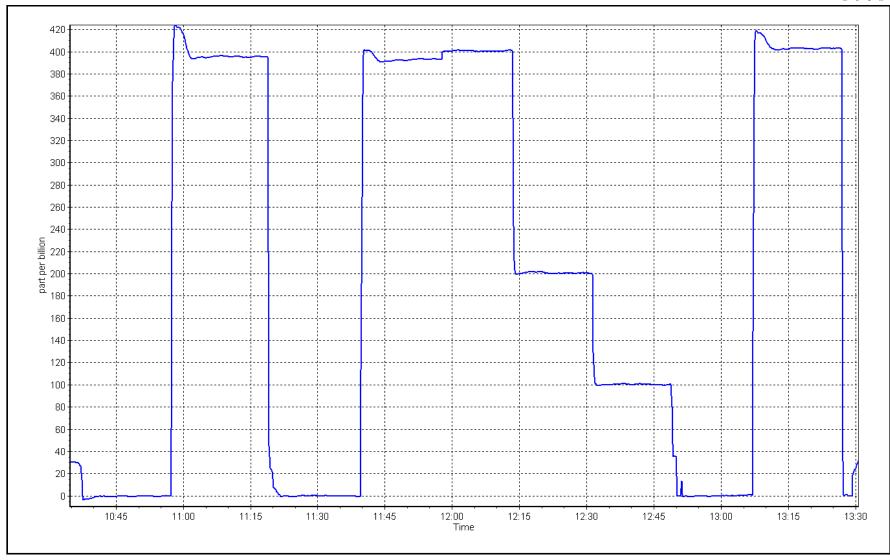
O₃ Calibration Summary

WBEA					Version-01-2020	
		Station	Information			
Calibration Date:	February 1	5, 2023	Previous Calibration:	January	y 9, 2023	
Station Name:	Stony Mo	untain	Station Number:	AM	1518	
Start Time (MST):	ne (MST): 10:34		End Time (MST):	13	3:34	
Analyzer make:	Analyzer make: API T		Analyzer serial #:	8	25	
		Calib	ration Data			
Calculated concentration (ppb) (Cc)	ted concentration Indicated concentration Correction factor (ppb) (Cc) (ppb) (Ic) (Cc/Ic) Statistical Evaluation		ation	<u>Limits</u>		
0.0	-0.2		Correlation Coefficient	0.999998	≥0.995	
400.0	400.4	0.9990		0.5555556	20.995	
200.0	200.6	0.9970	Slope	1.001514	0.90 - 1.10	
100.0	100.1	0.9990	Siope 1.001514		0.90 - 1.10	











T640 PM_{2.5} CALIBRATION

W D E A						Version-01-2023
		Station Information	n			
Station Name:	Stony Mountain		Station number:	AMS 18		
Calibration Date:	February 24, 2023		Last Cal Date:	January 24	, 2023	
Start time (MST):	12:02		End time (MST):	12:24		
Analyzer Make:	API T640		S/N:	1335		
Particulate Fraction:	PM2.5					
Flow Meter Make/Model:	Delta Cal		S/N:	1102		
Temp/RH standard:	Delta Cal		S/N:	1102		
		Monthly Calibration T	est			
<u>Parameter</u>	<u>As found</u>	Measured	<u>As left</u>		<u>Adjusted</u>	(Limits)
Т ([°] С)	-17.9	-18.3	-17.9			+/- 2 °C
P (mmHg)	698.8	699.6	698.8			+/- 10 mmHg
flow (LPM)	5.02	4.98	5.02			+/- 0.25 LPM
Leak Test:	Date of check:	February 24, 2023	Last Cal Date:	January	24, 2023	
	PM w/o HEPA:	2.2	PM w/ HEPA:	-	.0	<0.2 ug/m3
Note: this leak check will be	completed before the	quarterly work and will	serve as the pre ma	intenance l	eak check	
Inlet cleaning :	Inlet Head					
_		Quarterly Calibration				6
Parameter	<u>As found</u>	Post maintenance	<u>As left</u>		Adjusted	(Limits)
PMT Peak Test						11.3 +/- 0.5
Post-maintenance	e leak check:	PM w/o HEPA:		w/ HEPA:		
Date Optical Cham	nber Cleaned:	November 1	6, 2022			<0.2 ug/m3
Disposable Filte	r Changed:	November 1	6, 2022			
		Annual Maintenanc	e			
Date Sample Tul	-	August 30,				
Date RH/T Sense	or Cleaned:	August 30,	2022			
Notes:	No ac	ljustments made to tempe	rature, pressure or fl	ow. Leak che	eck passed.	

Karan Pandit



CO Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Stony Mountain February 24, 2023 11:05 Routine		Station number: Last Cal Date: End time (MST):	AMS 18 January 6, 2023 13:53	
		Calibration St	andards		
Cal Gas Concentration: Cal Gas Cylinder #:	3,050 ALM063503	ppm	Cal Gas Exp Date:	December 1, 2028	
Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model: ZAG Make/Model:	3,050 NA Teledyne API T700 Teledyne API T701	ppm	Rem Gas Exp Date: Diff between cyl: Serial Number: Serial Number:	NA 2658 360	
		Analyzer Info	rmation		
Analyzer make: Analyzer Range:			Analyzer serial #:	3504	
Calibration slope: Calibration intercept:	<u>Start</u> 1.018233 0.009764	Finish 0.997892 0.161801	Backgd or Offset: Coeff or Slope:	<u>Start</u> -0.009 0.916	<u>Finish</u> -0.009 0.904
		CO Calibratio	on 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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.1	
as found span	4933	66.7	40.7	41.7	0.976
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.1	
high point	4933	66.7	40.7	40.7	1.000
second point	4966	33.3	20.3	20.6	0.985
third point	4983	16.7	10.2	10.3	0.991
as left zero	3000	0.0	0.0	0.0	
as left span	2960	40.0	40.7	41.0	0.993
			Averag	ge Correction Factor	0.992
Baseline Corr As found: Baseline Corr 2nd AF pt:	41.59 NA	Prev response: AF Slope:		*% change: AF Intercept:	0.4%
Baseline Corr 3rd AF pt:	NA	AF Correlation:		* = > +/-5% change initiate	

Notes:

Sample inlet filter changed after as founds. Adjusted the span only.

Calibration Performed By:

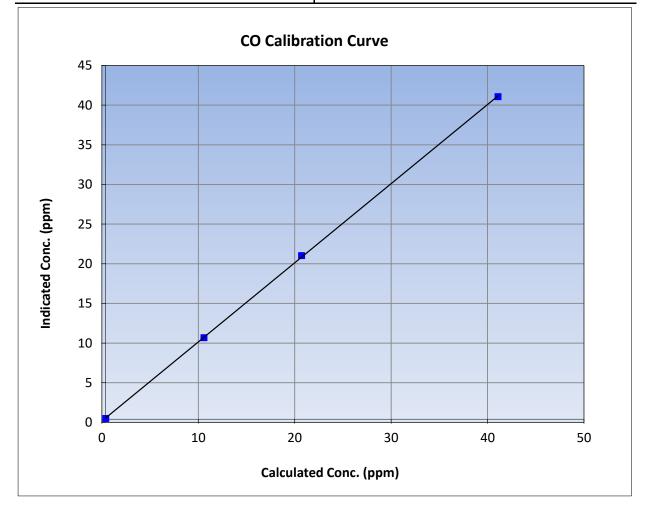


CO Calibration Summary

W B E A			Version-01-2020						
Station Information									
Calibration Date:	February 24, 2023	Previous Calibration:	January 6, 2023						
Station Name:	Stony Mountain	Station Number:	AMS 18						
Start Time (MST):	11:05	End Time (MST):	13:53						
Analyzer make:	API T300	Analyzer serial #:	3504						

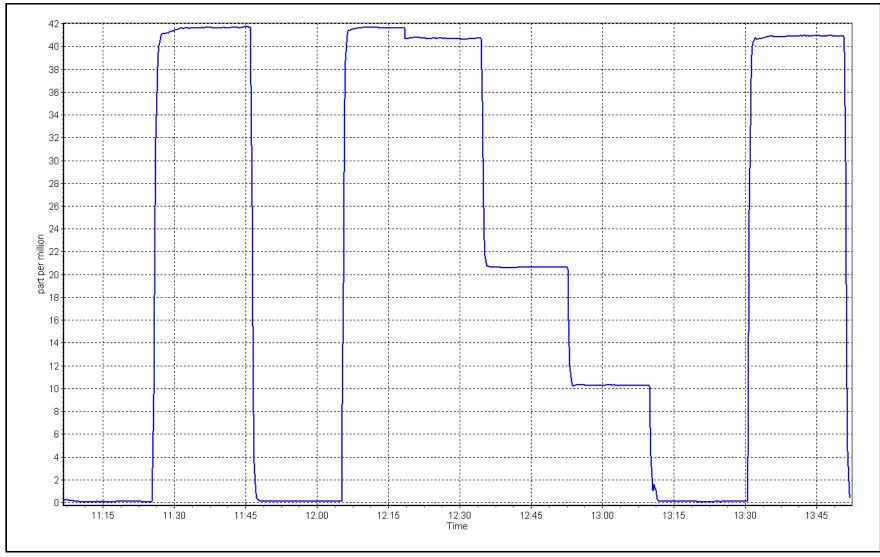
Calibration Data

Calculated concentration Indicated concentration (ppm) (Cc) (ppm) (Ic)		Correction factor (Cc/Ic)	Statistical Evalua	<u>Limits</u>	
0.0	0.1		Correlation Coefficient	0.999943	≥0.995
40.7	40.7	1.0002	Correlation Coefficient	0.333343	20.333
20.3	20.6	0.9848	Slope	0.997892	0.90 - 1.10
10.2	10.3	0.9910	Siope		0.30 - 1.10
			- Intercept	0.161801	+/-1.5











CO₂ Calibration Report

Version-01-2020

					Version-01-202
		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Stony Mountain February 8, 2023 11:15 Maintenance		Station number: Last Cal Date: End time (MST):	AMS 18 January 12, 2023 16:07	
		Calibration St	andards		
Cal Gas Concentration: Cal Gas Cylinder #:	60,220 ALM063503	ppm	Cal Gas Exp Date:	December 1, 2026	
Removed Cal Gas Conc: Removed Gas Cyl #:	60,220 NA	ppm	Rem Gas Exp Date: Diff between cyl:		
Calibrator Make/Model: N2 Gen Make/Model:	Teledyne API T700 Peak Scientific		Serial Number: Serial Number:	2658 771048317	
		Analyzer Info	rmation		
Analyzer make Analyzer Range	: API T360 e 0 - 2,000 ppm		Analyzer serial #:	283	
Calibration slope: Calibration intercept:	<u>Start</u> 1.000425 5.520000	<u>Finish</u> 0.999561 1.700000	Backgd or Offset: Coeff or Slope:		<u>Finish</u> -0.059 1.066
		CO ₂ Calibratio	on Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/I Limit = 0.95-1.05
as found zero	3000	0.0	0.0	1.7	
as found span	2930	80.0	1600.5	1583.5	1.011
as found 2nd point	2970	40.0	800.3	803.8	0.996
as found 3rd point	2990	20.0	400.1	401.8	0.996
new cylinder response					
calibrator zero	3000	0.0	0.0	-0.1	
high point	2930	80.0	1600.5	1598.4	1.001
second point	2970	40.0	800.3	809.2	0.989
third point	2990	20.0	400.1	399.0	1.003
as left zero	3000	0.0	0.0	-0.3	
as left span	2930	80.0	1600.5	1606.2	0.996
			Averag	e Correction Factor	0.998
Baseline Corr As found:	1581.80	Prev response:		*% change:	-1.6%
Baseline Corr 2nd AF pt:	802.1	AF Slope:		AF Intercept:	5.800000
Baseline Corr 3rd AF pt:	400.1	AF Correlation:	0.999938	* (====================================	
				* = > +/-5% change initiat	es investigation

Sample pump started to fail. Completed multipoint as founds. Changed the pump and sample inlet filter. Adjusted the zero only.

Calibration Performed By:

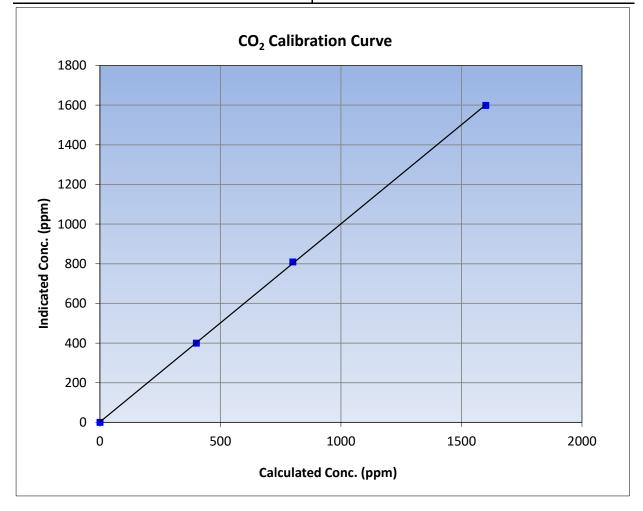
Karan Pandit and Karina Fenwick



CO₂ Calibration Summary

	Sta	tion Information	
Calibration Date	February 8, 2023	Previous Calibration	January 12, 2023
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	11:15	End Time (MST)	16:07
Analyzer make	API T360	Analyzer serial #	283
	C	alibration Data	
alculated concentration Indic	ated concentration Correction fact	tor Statistical Evaluation	<u>Limits</u>

(ppm) (Cc)	(ppm) (Ic)	(Cc/Ic)	Statistical Evaluation		<u>Linits</u>	
 0.0	-0.1		Correlation Coefficient	0.999945	≥0.995	
 1600.5	1598.4	1.0013	correlation coefficient		20.555	
 800.3	809.2	0.9890	Slope	0.999561	0 000561	0.90 - 1.10
 400.1	399.0	1.0028	- Slope		0.90 - 1.10	
			– Intercept	1.700000	+/-10	







WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS19 FIREBAG FEBRUARY 2023

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

March 31, 2023







SO₂ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Firebag February 7, 2023 11:41 Routine		Station number: Last Cal Date: End time (MST):	AMS 19 January 26, 2023 14:46	
		Calibration St	andards		
Cal Gas Concentration: Cal Gas Cylinder #:	49.29 CC716618	ppm	Cal Gas Exp Date:	February 23, 2025	
Removed Cal Gas Conc:	49.29	ppm	Rem Gas Exp Date:		
Removed Gas Cyl #:			Diff between cyl:		
Calibrator Make/Model:	API T700		Serial Number:	1607	
ZAG Make/Model:	API T701		Serial Number:	1118	
		Analyzer Info	rmation		
Analyzer make: Analyzer Range			Analyzer serial #:	1410661308	
,					
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.997774	0.998105	Backgd or Offset:		10.3
Calibration intercept:	-0.381080	-0.121714	Coeff or Slope:	0.987	0.987
		SO ₂ Calibratio	on Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration ((ppb) (Ic)	Correction factor (Cc/lc Limit = 0.95-1.05
as found zero	4999	0.0	0.0	-0.5	
as found span	4919	81.1	799.5	796.6	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	4999	0.0	0.0	-0.3	
high point	4919	81.1	799.5	797.7	1.002
second point	4959	40.6	400.3	399.6	1.002
third point	4980	20.3	200.1	199.7	1.002
as left zero	4999	0.0	0.0	-0.2	
as left span	4919	81.1	799.5	797.3	1.003
			Averag	ge Correction Factor	1.002
	797.10	Previous response	797.31	*% change	0.0%
Baseline Corr As found:					
Baseline Corr As found: Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	

Notes:

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

Calibration Performed By:

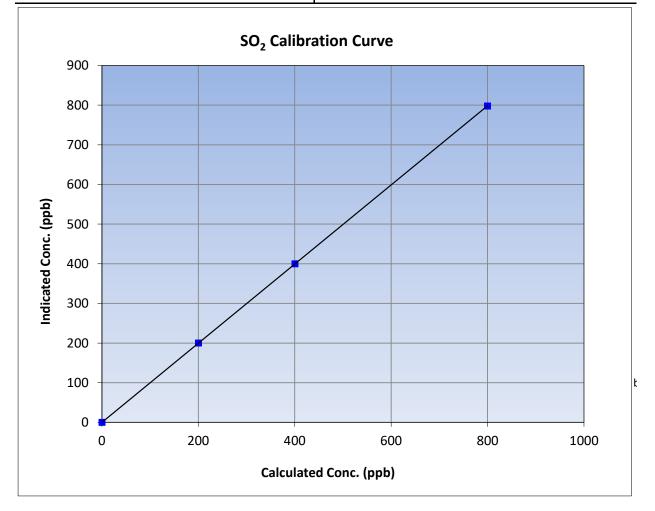


SO₂ Calibration Summary

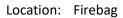
	Stati	on Information	
Calibration Date:	February 7, 2023	Previous Calibration:	January 26, 2023
Station Name:	Firebag	Station Number:	AMS 19
tart Time (MST): 11:41		End Time (MST):	14:46
Analyzer make:	Thermo 43i	Analyzer serial #:	1410661308

Calibration Data

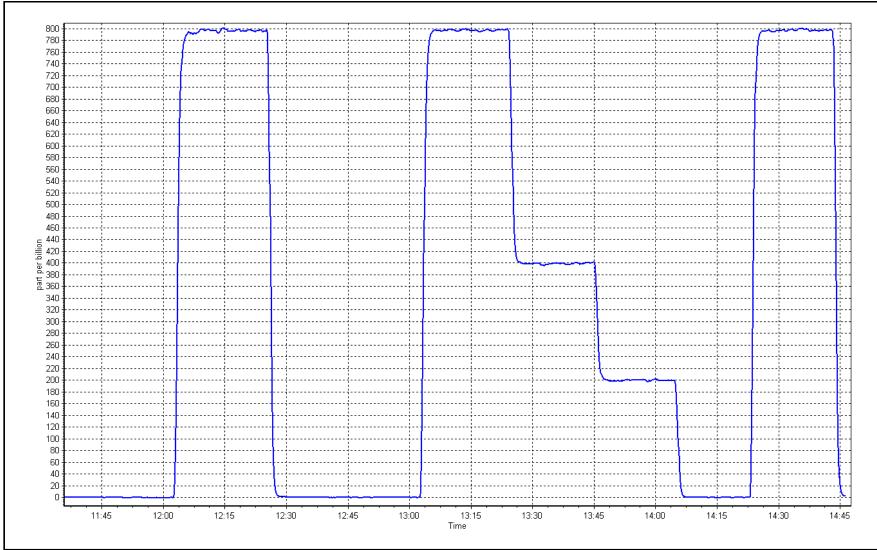
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>
0.0	-0.3		Correlation Coefficient	1.000000	≥0.995
799.5	797.7	1.0022	correlation coefficient	1.000000	20.333
400.3	399.6	1.0017	Slope	0.998105	0.90 - 1.10
200.1	199.7	1.0020	Slope	0.998105	0.90 - 1.10
			Intercept	-0.121714	+/-30













H₂S Calibration Report

WBEA					\/
		Station Info	rmation		Version-11-2
Station Name: Calibration Date: Start time (MST): Reason:	Firebag February 6, 2023 11:02 Routine	Station mo	Station number: Last Cal Date: End time (MST):	AMS19 January 18, 2023 15:18	
		Calibration S	tandards		
Cal Gas Concentration:	5.114	ppm	Cal Gas Exp Date:	February 5, 2024	
Cal Gas Cylinder #: Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model:	•	ppm	Rem Gas Exp Date: Diff between cyl: Serial Number:	1607	
ZAG Make/Model:	Teledyne API T701		Serial Number:	1118	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	Thermo 43i-TLE Global 0 - 100 ppb		Analyzer serial #: Converter serial #:	1336160090 2022-222	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope: Calibration intercept:	0.998910 0.058437	0.997909 0.118481	Backgd or Offset: Coeff or Slope:	2.88 0.955	2.96 0.979
		H ₂ S As Four	nd Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjuste Correction facto (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	78.2	1.024
as found 2nd point	4961	39.1	40.0	39.0	1.028
as found 3rd point	4980	19.6	20.0	19.5	1.033
new cylinder response					
		H ₂ S Calibrati	ion Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction facto (Cc/lc) Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	0.1	
high point	4922	78.2	80.0	79.9	1.001
second point	4961	39.1	40.0	40.1	0.997
third point	4980	19.6	20.0	20.1	0.997
as left zero	5000	0.0	0.0	0.2	
as left span	4922	78.2	80.0	79.8	1.002
SO2 Scrubber Check	4922	78.3	800.2	0.0	
Date of last scrubber cha		December 9, 2021		Ave Corr Factor	0.999
Date of last converter eff	-	n/a			efficiency
Baseline Corr As found: Baseline Corr 2nd AF pt:	78.1 38.9	Prev response: AF Slope:	0.977040	*% change: AF Intercept:	-2.4% -0.001035
Baseline Corr 3rd AF pt:	19.4	AF Correlation:	0.999992		

SOx scrubber check done after calibrator zero. Adjusted span. Changed sample inlet filter after MPAF's.

Calibration Performed By:

Notes:

Braiden Boutilier

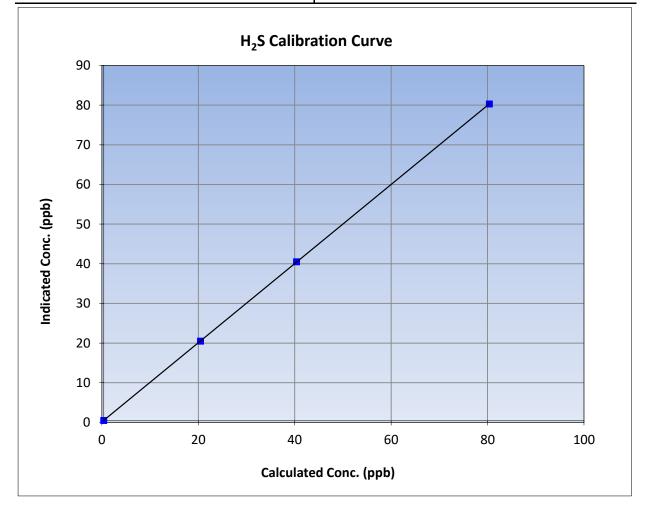


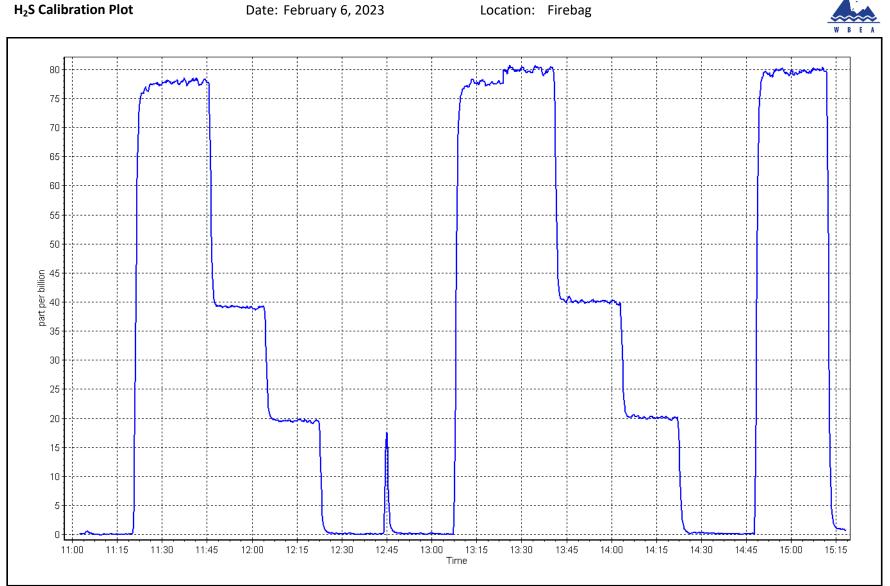
H₂S Calibration Summary

WBEA			Version-11-2021
	Stati	on Information	
Calibration Date:	February 6, 2023	Previous Calibration:	January 18, 2023
Station Name:	Firebag	Station Number:	AMS19
Start Time (MST):	11:02	End Time (MST):	15:18
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1336160090

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	0.999998	≥0.995
80.0	79.9	1.0010	correlation coefficient	0.999998	20.333
40.0	40.1	0.9973	Slope	0.997909	0.90 - 1.10
20.0	20.1	0.9974	Slope	0.997909	0.90 - 1.10
			Intercept	0.118481	+/-3







THC Calibration Report

Version-01-2020

		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Firebag February 7, 2023 11:41 Routine		Station number: Last Cal Date: End time (MST):	AMS 19 January 26, 2023 14:46	
		Calibration S	tandards		
Gas Cert Reference: CH4 Cal Gas Conc. C3H8 Cal Gas Conc.	CC7: 500.7 205.9	16618 ppm ppm	Cal Gas Expiry Date: CH4 Equiv Conc.	February 23, 2025 1066.9	ppm
Removed Gas Cert: Removed CH4 Conc. Removed C3H8 Conc. Calibrator Make/Model: ZAG Make/Model:	500.7 205.9 API T700 API T701	ppm ppm	Removed Gas Expiry: CH4 Equiv Conc. Diff between cyl: Serial Number: Serial Number:	1066.9 1607 1118	ppm
		Analyzer Info	ormation		
Analyzer make: Analyzer Range:	: Thermo 51i-LT : 0 - 20 ppm	,, <u>_</u>	Analyzer serial #:	1336160089	
Calibration slope: Calibration intercept:	<u>Start</u> 1.001270 -0.051562	<u>Finish</u> 0.986792 0.033117	Background: Coefficient:	<u>Start</u> 2.25 3.774	<u>Finish</u> 2.11 3.748
		THC Calibrat	ion 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	5000	0.0	0.00	-0.12	
as found span	4919	81.1	17.31	17.18	1.007
as found 2nd point as found 3rd point					
new cylinder response	4000	0.0	0.00	0.00	
calibrator zero	4999	0.0	0.00	0.08	
high point second point	4919 4959	81.1 40.6	<u> </u>	17.14 8.54	1.010 1.015
third point	4959 4980	20.3	4.33	4.27	1.015
as left zero	5000	0.0	0.00	0.05	
as left span	4919	81.1	17.31	17.29	1.001
		01.1		ge Correction Factor	
Baseline Corr As found: Baseline Corr 2nd AF pt: Baseline Corr 3rd AF pt:	17.30 NA NA	Previous response AF Slope: AF Correlation:	17.28	*% change AF Intercept:	0.1%
				* = > +/-5% change initia	tes investigation

Changed sample inlet filter after as founds. Adjusted zero.

Calibration Performed By:

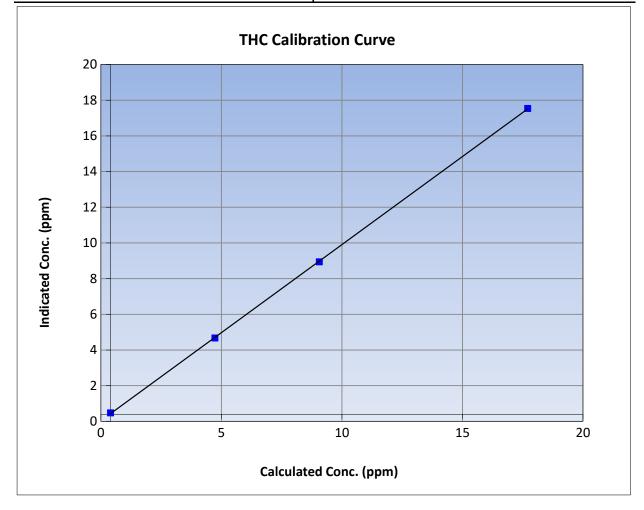


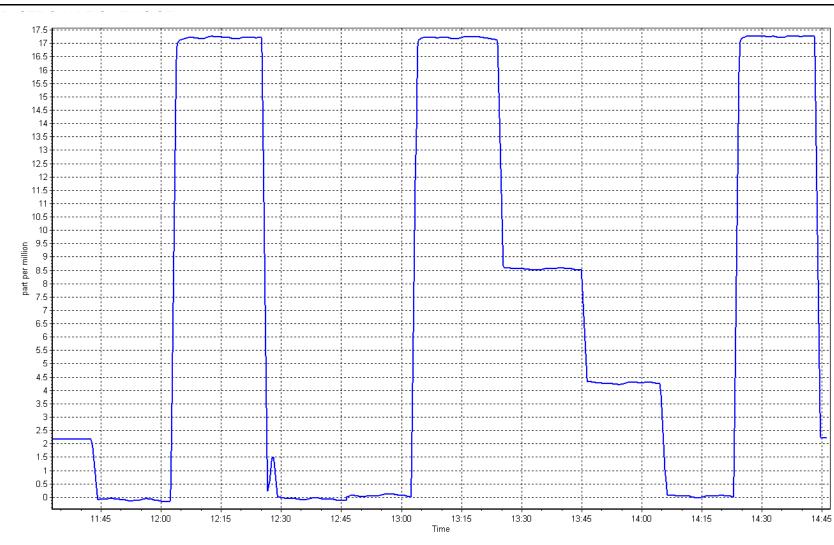
THC Calibration Summary

WBEA			Version-01-2020
	Stati	on Information	
Calibration Date:	February 7, 2023	Previous Calibration:	January 26, 2023
Station Name:	Firebag	Station Number:	AMS 19
Start Time (MST):	11:41	End Time (MST):	14:46
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	0.08		Correlation Coefficient	0.999961	≥0.995
17.31	17.14	1.0096	correlation coefficient	0.999901	20.333
8.66	8.54	1.0145	Slope	0.986792	0.90 - 1.10
4.33	4.27	1.0139	510pe	0.980792	0.90 - 1.10
			Intercept	0.033117	+/-1.5





THC Calibration Plot

Date: February 7, 2023

Location: Firebag





NO₂ Cal Slope:

NO₂ Cal Offset:

Wood Buffalo Environmental Association

$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

Removed Cylinder #:n/aRemoved Gas Exp Date:n/a	alibration Date: tart time (MST):	February 8, 2023 10:48		Last Cal Date:	AMS 19	
NO Gas Cylinder #:T2Y1K63Cal Gas Expiry Date:November 30, 2023NOX Cal Gas Conc:51.12ppmNO Cal Gas Conc:49.40pRemoved Cylinder #:n/aRemoved Gas Exp Date:n/aRemoved Gas NOX Conc:51.12ppmRemoved Gas NO Conc:49.40pNOX gas Diff:NO gas Diff:NO gas Diff:1607Calibrator Model:Teledyne API T700Serial Number:1607ZAG make/model:Teledyne API T701Serial Number:1118Analyzer InformationMalyzer make:Thermo 42iAnalyzer serial #:1410661309				End time (MST):		
NOX Cal Gas Conc:51.12ppmNO Cal Gas Conc:49.40pRemoved Cylinder #:n/aRemoved Gas Exp Date:n/aRemoved Gas NOX Conc:51.12ppmRemoved Gas NO Conc:49.40pNOX gas Diff:NO gas Diff:NO gas Diff:1607Calibrator Model:Teledyne API T700Serial Number:1607ZAG make/model:Teledyne API T701Serial Number:1118Analyzer InformationAnalyzer make:Thermo 42iAnalyzer serial #:1410661309			Calibrat	ion Standards		
Removed Cylinder #: n/a Removed Gas Exp Date: n/a Removed Gas NOX Conc: 51.12 ppm Removed Gas NO Conc: 49.40 p NOX gas Diff: NO gas Diff: NO gas Diff: 1607 Calibrator Model: Teledyne API T700 Serial Number: 1607 ZAG make/model: Teledyne API T701 Serial Number: 1118	IO Gas Cylinder #:	T2Y1K63		Cal Gas Expiry Date:	November 30, 2023	
Removed Gas NOX Conc: 51.12 ppm Removed Gas NO Conc: 49.40 p NOX gas Diff: NO gas Diff: NO gas Diff: 1607 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	=	51.12	ppm			ppm
NOX gas Diff: NO gas Diff: Calibrator Model: Teledyne API T700 ZAG make/model: Teledyne API T701 Serial Number: 1118 Analyzer Information Analyzer make: Thermo 42i	emoved Cylinder #:	n/a		Removed Gas Exp Date:	n/a	
ZAG make/model: Teledyne API T701 Serial Number: 1118 Analyzer Information Analyzer make: Thermo 42i Analyzer serial #: 1410661309		51.12	ppm		49.40	ppm
Analyzer Information Analyzer make: Thermo 42i Analyzer serial #: 1410661309	alibrator Model:	Teledyne API T700		Serial Number:	1607	
Analyzer make: Thermo 42i Analyzer serial #: 1410661309	AG make/model:	Teledyne API T701		Serial Number:	1118	
StartFinishStartNO coeff or slope:1.0411.041NO bkgnd or offset:7.2NOX coeff or slope:0.9960.996NOX bkgnd or offset:7.3NO2 coeff or slope:1.0001.000Reaction cell Press:207.8	Analyzer make:	Thermo 42i	Analyze		1410661309	
Calibration Statistics	NO coeff or slope: NOX coeff or slope:	0 - 1000 ppb <u>Start</u> 1.041 0.996	1.041 0.996	NOX bkgnd or offset:	7.2 7.3	<i>Finish</i> 7.3 7.3 210.9
	NO coeff or slope: NOX coeff or slope:	0 - 1000 ppb <u>Start</u> 1.041 0.996	1.041 0.996 1.000	NOX bkgnd or offset: Reaction cell Press:	7.2 7.3	7.3 7.3
<u>Start</u> <u>Finish</u>	NO coeff or slope: NOX coeff or slope:	0 - 1000 ppb <u>Start</u> 1.041 0.996	1.041 0.996 1.000	NOX bkgnd or offset: Reaction cell Press:	7.2 7.3	7.3 7.3
Start Finish NO _x Cal Slope: 0.990896 0.997423	NO coeff or slope: NOX coeff or slope: NO2 coeff or slope:	0 - 1000 ppb <u>Start</u> 1.041 0.996	1.041 0.996 1.000 Calibrat	NOX bkgnd or offset: Reaction cell Press:	7.2 7.3 207.8 <i>Finish</i>	7.3 7.3
	NO coeff or slope: NOX coeff or slope: NO2 coeff or slope: NO2 coeff or slope:	0 - 1000 ppb <u>Start</u> 1.041 0.996	1.041 0.996 1.000 Calibrat <u>Start</u> 0.990896	NOX bkgnd or offset: Reaction cell Press:	7.2 7.3 207.8 <u><i>Finish</i></u> 0.997423	7.3 7.3
NO _x Cal Slope: 0.990896 0.997423	NO coeff or slope: NOX coeff or slope: NO2 coeff or slope: NO ₂ Cal Slope: NO _x Cal Offset:	0 - 1000 ppb <u>Start</u> 1.041 0.996	1.041 0.996 1.000 Calibrat <u>Start</u> 0.990896 0.574492	NOX bkgnd or offset: Reaction cell Press:	7.2 7.3 207.8 <u>Finish</u> 0.997423 0.135510	7.3 7.3

1.003489

-1.311603

0.999864

-0.568980



$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

Dilution Calibration Data										
Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) Limit = 0.95-1.05	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	4999	0.0	0.0	0.0	0.0	-0.1	-0.2	0.1		
as found span	4919	81.0	828.1	800.3	27.9	830.0	799.7	30.7	0.9978	1.0007
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	826.0	798.8	27.4	1.0026	1.0019
second point	4960	40.5	414.0	400.1	13.9	413.4	399.1	14.3	1.0015	1.0025
third point	4980	20.2	206.5	199.6	6.9	206.1	198.6	7.6	1.0020	1.0049
as left zero	4999	0.0	0.0	0.0	0.0	0.0	-0.1	0.1		
as left span	4919	81.0	828.1	359.5	468.7	819.0	350.5	468.8	1.0112	1.0256
							Average C	orrection Factor	1.0020	1.0031
Corrected As fo	ound NO _x =	830.1 ppb	NO =	799.9 ppb	* = > +/-59	% change initiates i	investigation	*Percent Chang	ge NO _x =	1.1%
Previous Respo	nse NO _x =	821.2 ppb	NO =	793.3 ppb				*Percent Chang	ge NO =	0.8%
Baseline Corr 2	nd pt NO _X =	NA ppb	NO =	NA ppb	As found	d $NO_X r^2$:		Nx SI:	Nx Int:	
Baseline Corr 3	rd 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 ₂ Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Co	Indicated NO2 c) 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						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	791.4	350.6	468.7	468.4	1.0006	99.9%
2nd GPT point (200 ppb O3)	791.4	570.2	249.1	248.2	1.0035	99.7%
3rd GPT point (100 ppb O3)	791.4	680.6	138.7	137.3	1.0099	99.0%
			/	Average Correction Factor	1.0047	99.5%

Notes:

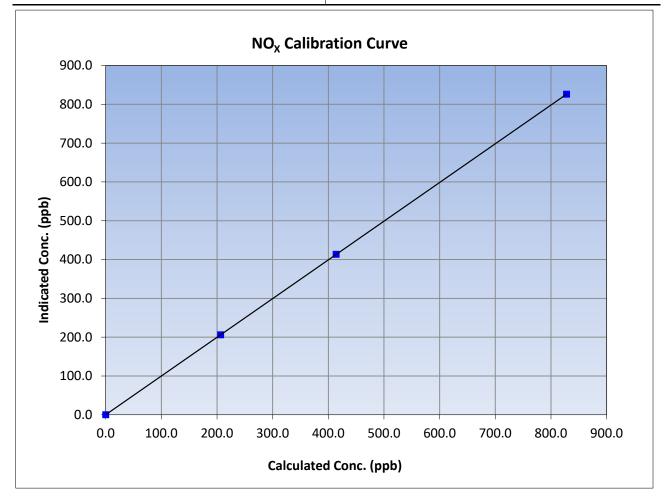
No adjustments made. Changed sample inlet filter after as founds.

Calibration Performed By:



NO_x Calibration Summary

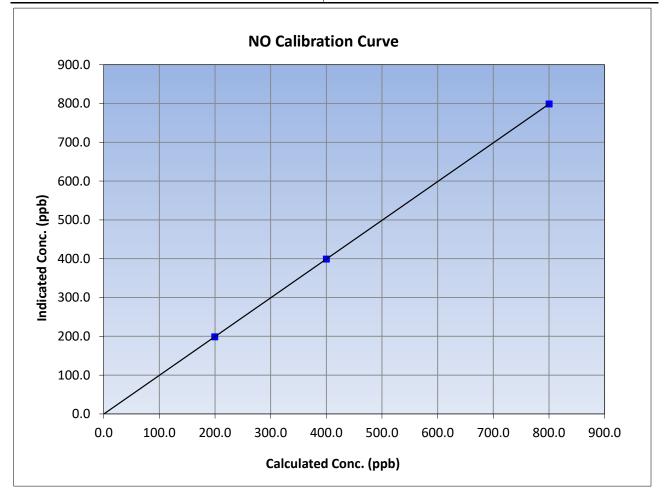
WBEA					Version-04-20	
		Station	Information			
Calibration Date:	February 8, 2023		Previous Calibration:	January	19, 2023	
Station Name:	Firebag		Station Number:	AM	S 19	
Start Time (MST):	10	:48	End Time (MST):	15:35		
Analyzer make:	Therr	no 42i	Analyzer serial #:	1410661309		
		Calibra	ation Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	0.0		Correlation Coefficient	1.000000	≥0.995	
828.1	826.0	1.0026	correlation coernelent	1.000000	20.995	
414.0	413.4	1.0015	Clana	0.997423	0.90 - 1.10	
206.5	206.1	1.0020	Slope	0.997425	0.90 - 1.10	
			Intercept	0.135510	+/-20	





NO Calibration Summary

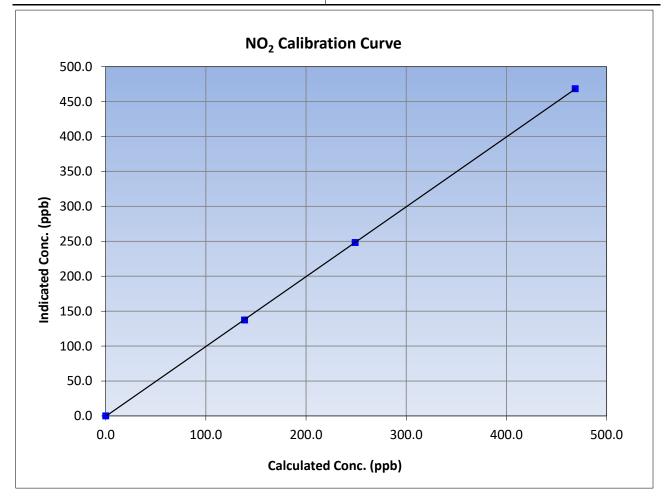
WBEA					Version-04-20	
		Station	Information			
Calibration Date:	February 8, 2023		Previous Calibration:	January 19, 2023		
Station Name:	Firebag		Station Number:	AM	S 19	
Start Time (MST):	10:48		End Time (MST):	15:35		
Analyzer make:	Therr	no 42i	Analyzer serial #:	1410661309		
		Calibra	ation Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	-0.1		Correlation Coefficient	1.000000	≥0.995	
800.3	798.8	1.0019	correlation coernelent	1.000000	20.333	
400.1	399.1	1.0025	<u>Class</u>	0.009.470	0.90 - 1.10	
199.6	198.6	1.0049	Slope	0.998470	0.90 - 1.10	
			Intercept	-0.351682	+/-20	

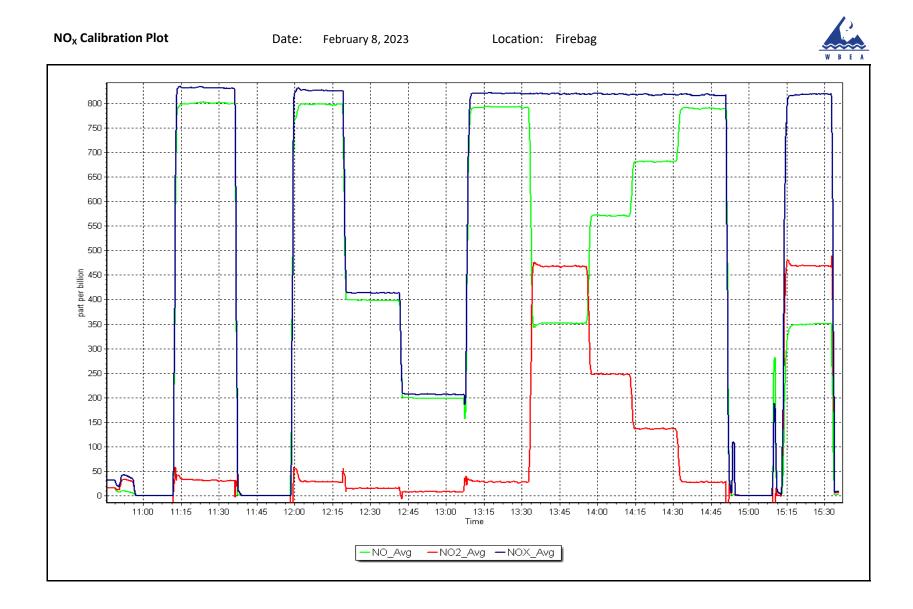




NO₂ Calibration Summary

WBEA					Version-04-2	
		Station	Information			
Calibration Date:	February 8, 2023		Previous Calibration:	January	19, 2023	
Station Name:	Firebag		Station Number:	AMS	AMS 19	
Start Time (MST):	10:48		End Time (MST):	15:	15:35	
Analyzer make:	Therr	no 42i	Analyzer serial #:	1410661309		
		Calibra	ation Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	0.1		Correlation Coefficient	0.999989	≥0.995	
468.7	468.4	1.0006	correlation coefficient	0.999989	20.995	
249.1	248.2	1.0035	Clana	0.999864	0.90 - 1.10	
138.7	137.3	1.0099	Slope	0.999804	0.90 - 1.10	
			Intercept	-0.568980	+/-20	







WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS20 MACKAY RIVER FEBRUARY 2023

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

March 31, 2023



SO₂ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	MacKay River February 1, 2023 10:09 Routine		Station number: Last Cal Date: End time (MST):	AMS20 January 17, 2023 13:52	
		Calibration St	andards		
Cal Gas Concentration:	49.22	ppm	Cal Gas Exp Date:	February 23, 2025	
Cal Gas Cylinder #:	<u>CC306868</u>				
Removed Cal Gas Conc:	<u>49.22</u>	ppm	Rem Gas Exp Date:	NA	
Removed Gas Cyl #: Calibrator Make/Model:	<u>NA</u> Teledyne API T700		Diff between cyl: Serial Number:	1220	
ZAG Make/Model:	Teledyne API 700		Serial Number:	4522	
			Schar Number.	4522	
		Analyzer Info	rmation		
Analyzer make Analyzer Range			Analyzer serial #:	1501301450	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.993569	0.999451	Backgd or Offset:	18.6	18.6
Calibration intercept:	3.910928	2.850831	Coeff or Slope:	0.974	0.974
		SO ₂ Calibratio	on Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration ((ppb) (Ic)	Correction factor (Cc/Ic Limit = 0.95-1.05
as found zero	5000	0.0	0.0	-0.4	
as found span	4919	81.3	800.3	797.8	1.003
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.2	
high point	4919	81.3	800.3	801.4	0.999
second point	4959	40.7	400.7	404.1	0.992
third point	4980	20.3	199.8	206.1	0.970
as left zero	5000	0.0	0.0	0.1	
as left span	4919	81.3	800.3	804.8	0.994
			Averag	ge Correction Factor	0.987
	798.20	Previous response	799.03	*% change	-0.1%
Baseline Corr As found:					
Baseline Corr As found: Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	

Notes:

Sample inlet filter changed after as founds. No adjustments requried.

Calibration Performed By:

Mohammed Kashif

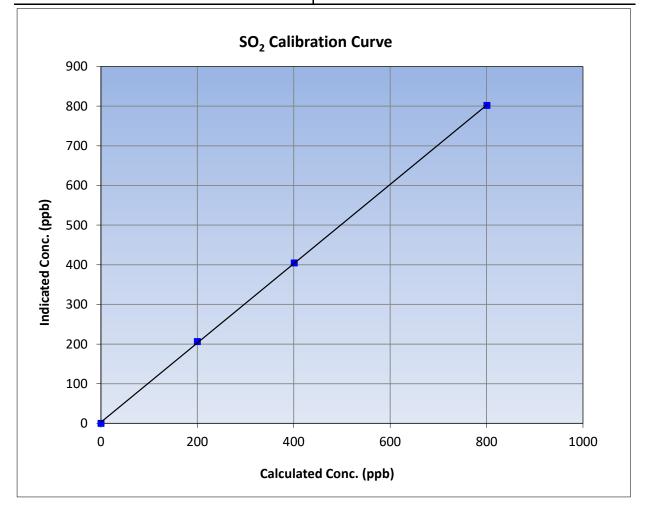


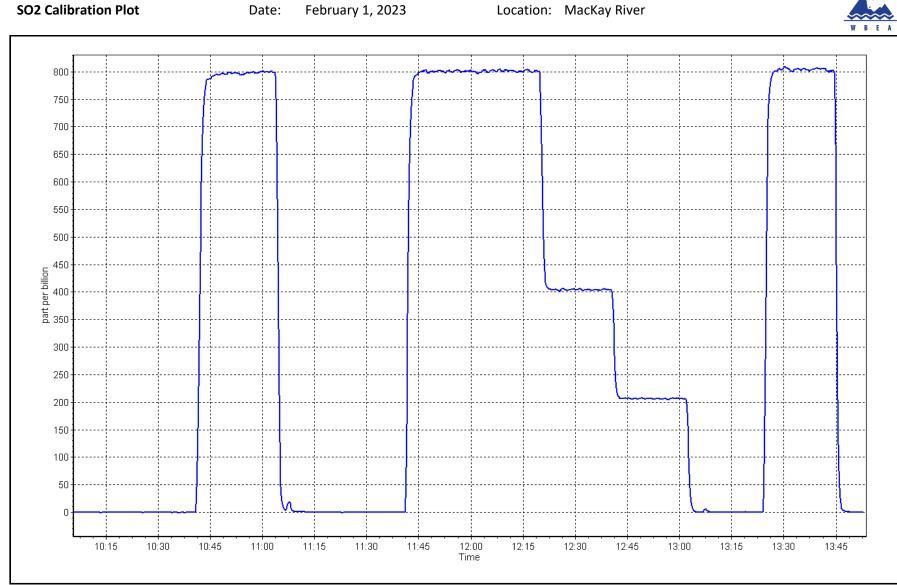
SO₂ Calibration Summary

	Stati	on Information	
Calibration Date:	February 1, 2023	Previous Calibration:	January 17, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	10:09	End Time (MST):	13:52
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	-0.2		Correlation Coefficient	0.999931	≥0.995
800.3	801.4	0.9986	correlation coefficient	0.3333331	20.333
400.7	404.1	0.9915	Slope	0.999451	0.90 - 1.10
199.8	206.1	0.9695	Slope	0.999431	0.30 - 1.10
			- Intercept	2.850831	+/-30





Location: MacKay River



H₂S Calibration Report

WBEA					Version-11-2021
		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	MacKay River February 13, 2023 10:56 Routine		Station number: Last Cal Date: End time (MST):	AMS20 January 23, 2023 16:00	
		Calibration St	andards		
Cal Gas Concentration: Cal Gas Cylinder #:	4.87 EY0001922		Cal Gas Exp Date:	May 5, 2023	
Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model:	•		Rem Gas Exp Date: Diff between cyl: Serial Number:	1220	
ZAG Make/Model:	Teledyne API 701		Serial Number:	4522	
		Analyzer Info	rmation		
Analyzer make: Converter make: Analyzer Range	Teledyne API T101 Internal 0 - 100 ppb		Analyzer serial #: Converter serial #:	196 NA	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope: Calibration intercept:	0.999429 0.379115	0.990859 0.878999	Backgd or Offset: Coeff or Slope:	46.3 0.981	46.3 0.981
		H ₂ S As Foun	d 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	81.5	0.988
as found 2nd point	4959	41.1	40.0	41.2	0.986
as found 3rd point	4979	20.5	20.0	21.2	0.969
new cylinder response			an Data		
		H ₂ S Calibrati			
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	0.5	
high point	4918	82.1	80.0	79.9	1.001
second point	4959	41.1	40.0	40.8	0.981
third point	4979	20.5	20.0	21.0	0.951
as left zero	5000	0.0	0.0	0.5	
as left span	4918	82.1	80.0	79.1	1.011
SO2 Scrubber Check	4919	80.0	800.2	0.1	
Date of last scrubber cha	-	December 15, 2020		Ave Corr Factor	0.978
Date of last converter eff	ficiency test:				efficiency
Baseline Corr As found: Baseline Corr 2nd AF pt:	80.9 40.6	Prev response: AF Slope:	80.30 1.010147	*% change: AF Intercept:	0.7% 0.779094
Baseline Corr 3rd AF pt:	20.6	AF Correlation:	0.999973	* = > +/-5% change initiate	es investigation

Notes:

Changed inlet filter after multi point as founds. Scrubber test after calibrator zero. No adjustments

made.

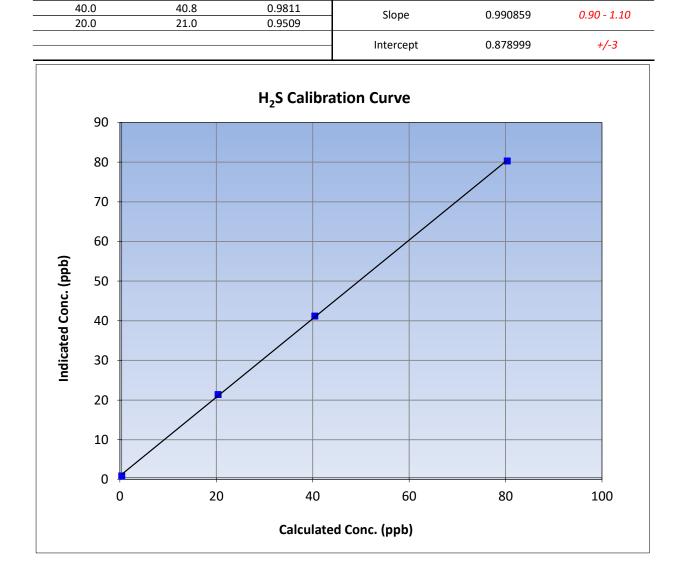
Calibration Performed By:

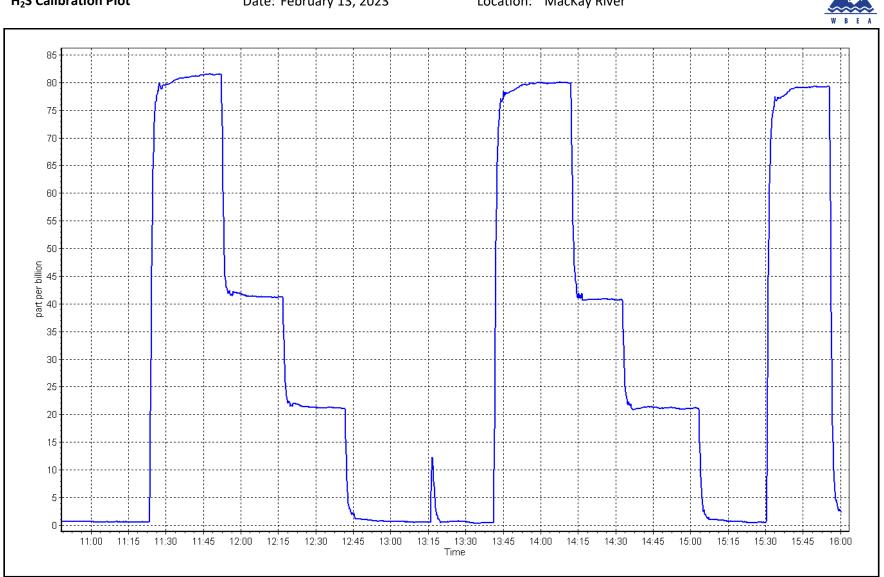
Mohammed Kashif



H₂S Calibration Summary

WBEA					Version-11-2021
		Station	Information		
Calibration Date:	February 1	3, 2023	Previous Calibration:	Januai	ry 23, 2023
Station Name:	МасКау	River	Station Number:	А	MS20
Start Time (MST):	10:5	6	End Time (MST):		16:00
Analyzer make:	nalyzer make: Teledyne API T101		Analyzer serial #:		196
		Calib	ration Data		
		Calibi	ration Data		
Calculated concentration I (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluat	ion	<u>Limits</u>
0.0	0.5		Correlation Coefficient	0.999893	≥0.995
80.0	79.9	1.0008	correlation coefficient	0.333833	20.995





Location: MacKay River



THC Calibration Report

Version-01-2020

		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	MacKay River February 1, 2023 10:09 Routine		Station number: Last Cal Date: End time (MST):	AMS20 January 17, 2023 13:52	
		Calibration S	itandards		
Gas Cert Reference: CH4 Cal Gas Conc. C3H8 Cal Gas Conc.	CC30 <u>499.40</u> <u>206.20</u>	6868 ppm ppm	Cal Gas Expiry Date: CH4 Equiv Conc.	February 23, 2025 1066.45	ppm
Removed Gas Cert: Removed CH4 Conc. Removed C3H8 Conc. Calibrator Make/Model: ZAG Make/Model:	N <u>499.40</u> <u>206.20</u> Teledyne API T700 Teledyne API 701	A ppm ppm	Removed Gas Expiry: CH4 Equiv Conc. Diff between cyl: Serial Number: Serial Number:	NA 1066.45 1220 4522	ppm
		Analyzer Info	ormation		
Analyzer make Analyzer Range	e: Thermo 51i-LT e: 0 - 20 ppm	·	Analyzer serial #:	1501663727	
Calibration slope: Calibration intercept:	<u>Start</u> 0.986110 0.143798	<u>Finish</u> 0.996170 0.044213	Background: Coefficient:	<u>Start</u> 3.180 5.471	<u>Finish</u> 3.440 5.402
		THC Calibrat	tion Data		
	Dilution air flow rate	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit</i> = 0.95-1.05
Set Point	(sccm)	(00000)			
Set Point as found zero	(sccm) 5000	0.0	0.00	0.27	
				0.27 17.75	
as found zero as found span as found 2nd point	5000	0.0	0.00	-	
as found zero as found span as found 2nd point as found 3rd point	5000	0.0	0.00	-	
as found zero as found span as found 2nd point as found 3rd point new cylinder response	5000 4919	0.0 81.3	0.00 17.34	17.75	0.977
as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero	5000 4919 5000	0.0 81.3 0.0	0.00 17.34 0.00	-0.03	0.977
as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero high point	5000 4919 5000 4919	0.0 81.3 0.0 81.3	0.00 17.34 0.00 17.34	-0.03 17.29	 0.977 1.003
as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero high point second point	5000 4919 5000 4919 4959	0.0 81.3 0.0 81.3 40.7	0.00 17.34 0.00 17.34 8.68	-0.03 17.29 8.70	 0.977 1.003 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 4919 5000 4919 4959 4980	0.0 81.3 0.0 81.3 40.7 20.3	0.00 17.34 0.00 17.34 8.68 4.33	-0.03 17.29 8.70 4.45	0.977 0.977 1.003 0.998 0.973
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 4919 5000 4919 4959 4980 5000	0.0 81.3 0.0 81.3 40.7 20.3 0.0	0.00 17.34 0.00 17.34 8.68 4.33 0.00	-0.03 -0.03 17.29 8.70 4.45 0.00	 0.977 1.003 0.998 0.973
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 4919 5000 4919 4959 4980	0.0 81.3 0.0 81.3 40.7 20.3	0.00 17.34 0.00 17.34 8.68 4.33 0.00 17.34	-0.03 -0.03 17.29 8.70 4.45 0.00 17.37	 0.977 1.003 0.998 0.973 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 as left zero	5000 4919 5000 4919 4959 4980 5000	0.0 81.3 0.0 81.3 40.7 20.3 0.0	0.00 17.34 0.00 17.34 8.68 4.33 0.00 17.34 Aver 17.24	-0.03 -0.03 17.29 8.70 4.45 0.00	 0.977 1.003 0.998 0.973 0.998 0.991 1.4%

Sample inlet filter changed after as founds. Zero and span adjusted.

Calibration Performed By:

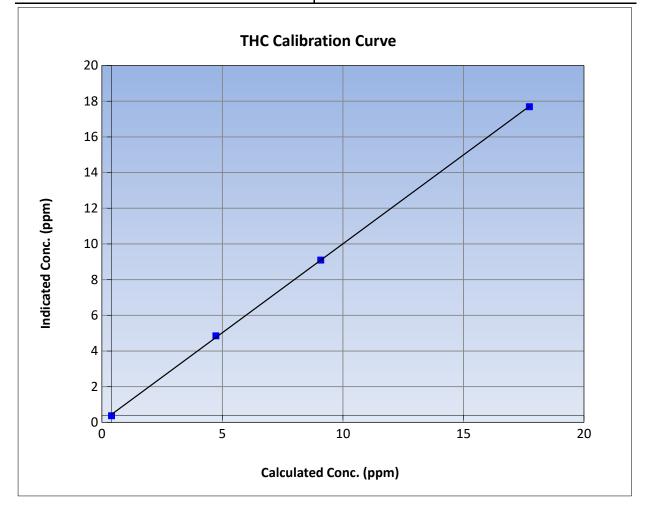


THC Calibration Summary

W B E A			Version-01-2020
	Stati	on Information	
Calibration Date:	February 1, 2023	Previous Calibration:	January 17, 2023
Station Name:	MacKay River	Station Number:	AMS20
Start Time (MST):	10:09	End Time (MST):	13:52
Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1501663727

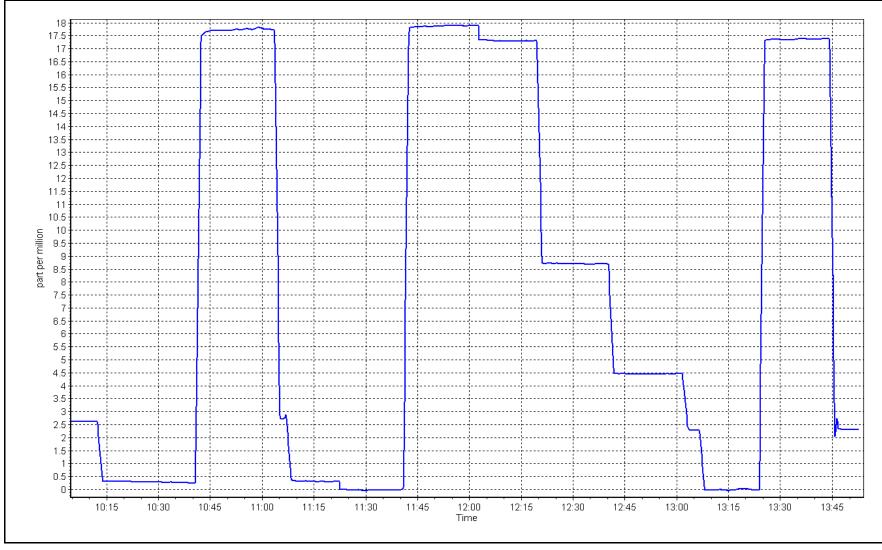
Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	-0.03		Correlation Coefficient	0.999913	≥0.995
17.34	17.29	1.0027	correlation coefficient	0.999913	20.333
8.68	8.70	0.9982	Slope	0.996170	0.90 - 1.10
4.33	4.45	0.9731	510pe	0.330170	0.50 - 1.10
			Intercept	0.044213	+/-1.5











Station Name:

Reason:

Calibration Date:

Start time (MST):

Wood Buffalo Environmental Association

$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

ppm

ppm

Station Information

Station number: AMS20 Last Cal Date: January 24, 2023 End time (MST): 15:53

			Calibration Standards
NO Gas Cylinder #:		T376265	Cal Gas Expiry Date: April 13, 2025
NOX Cal Gas Conc:	<u>49.19</u>	ppm	NO Cal Gas Conc: <u>48.04</u>
Removed Cylinder #:		NA	Removed Gas Exp Date: NA
Removed Gas NOX Conc:	<u>49.19</u>	ppm	Removed Gas NO Conc: <u>48.04</u>
NOX gas Diff:			NO gas Diff:
Calibrator Model:	Teledyne API T	700	Serial Number: 1220
ZAG make/model:	Teledyne API 70	01	Serial Number: 4766

MacKay River

10:20

Routine

February 2, 2023

Analyzer Information

Analyzer make: Th NOX Range (ppb): 0			Analyzer serial #: 1	505164379	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.409	1.364	NO bkgnd or offset:	3.9	3.8
NOX coeff or slope:	0.995	0.990	NOX bkgnd or offset:	3.9	3.8
NO2 coeff or slope:	0.995	0.995	Reaction cell Press:	175.0	176.8

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.996925	0.993580
NO _x Cal Offset:	2.570800	3.070250
NO Cal Slope:	0.998231	0.997347
NO Cal Offset:	1.372065	1.531522
NO ₂ Cal Slope:	1.007507	0.998061
NO ₂ Cal Offset:	-1.673176	-1.818500



$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

				Dilu	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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.2	0.0		
as found span	4917	83.3	819.5	800.3	19.2	854.9	831.8	23.0	0.9585	0.9621
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1		
high point	4917	83.3	819.5	800.3	19.2	816.2	799.4	16.6	1.0040	1.0011
second point	4956	41.7	410.4	400.8	9.6	411.0	400.6	10.4	0.9986	1.0006
third point	4979	20.8	204.6	199.9	4.8	210.4	203.5	6.9	0.9726	0.9821
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	458.8	360.7	811.3	451.9	359.5	1.0101	1.0153
							Average C	orrection Factor	0.9917	0.9946
Corrected As fo	ound NO _x =	855.0 ppb	NO =	832.0 ppb	* = > +/-5%	6 change initiates i	nvestigation	*Percent Chang	ge NO _x =	4.2%
Previous Respo	onse NO _x =	819.5 ppb	NO =	800.3 ppb				*Percent Chang	ge NO =	3.8%
Baseline Corr 2	nd pt NO _X =	NA ppb	NO =	NA ppb	As found	$I NO_{\chi} r^2$:		Nx SI:	Nx Int:	
Baseline Corr 3	rd pt NO _X =	NA ppb	NO =	NA ppb	As found	NO r^2 :		NO SI:	NO Int:	
					As found	$I NO_2 r^2$:		NO2 SI:	NO ₂ Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Co	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						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	791.8	450.3	360.7	359.2	1.0041	99.6%
2nd GPT point (200 ppb O3)	791.8	614.0	197.0	194.2	1.0142	98.6%
3rd GPT point (100 ppb O3)	791.8	698.4	112.6	108.1	1.0412	96.0%
			ŀ	Average Correction Factor	1.0198	98.1%

Notes:

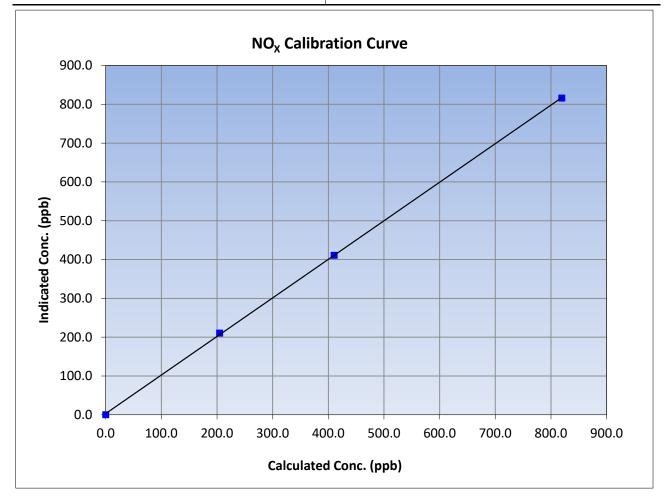
Adjusted the span only.

Calibration Performed By:



$NO_{\rm X}$ Calibration Summary

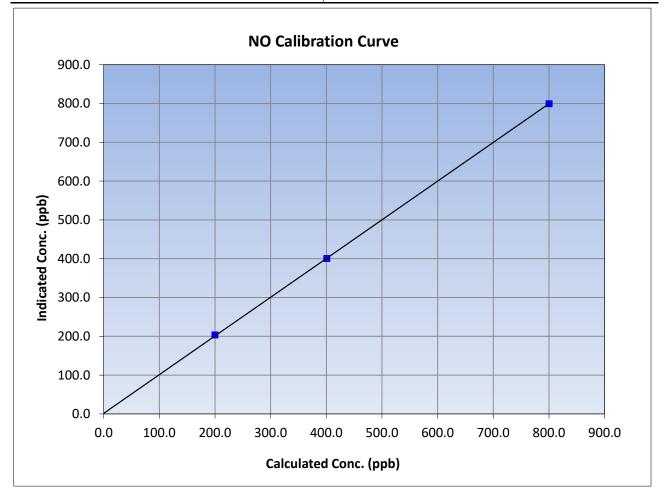
WBEA					Version-04-202	
		Station	Information			
Calibration Date:	Februar	y 2, 2023	Previous Calibration:	January	24, 2023	
Station Name:	MacKa	ny River	Station Number:	AM	S20	
Start Time (MST):	10:20		End Time (MST):	15	:53	
Analyzer make:	Thermo 42i		Analyzer serial #:			
		Calibra	ation Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	0.0		Correlation Coefficient	0.999927	≥0.995	
819.5	816.2	1.0040	correlation coernelent	0.555527	20.333	
410.4	411.0	0.9986	Clana	0.002580	0.90 - 1.10	
204.6	210.4	0.9726	Slope	0.993580	0.90 - 1.10	
			Intercept	3.070250	+/-20	





NO Calibration Summary

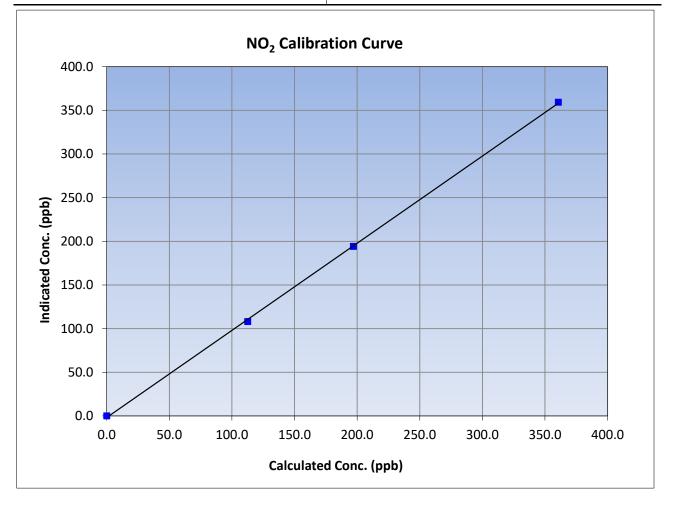
WBEA					Version-04-20
		Station	Information		
Calibration Date:	Februar	y 2, 2023	Previous Calibration:	January 24, 2023	
Station Name:	MacKa	ny River	Station Number:	AM	IS20
Start Time (MST):	10	:20	End Time (MST):	15	:53
Analyzer make:	Therr	no 42i	Analyzer serial #: 150516437		.64379
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	-0.1		Correlation Coefficient	0.999971	≥0.995
800.3	799.4	1.0011	correlation coernelent	0.555571	20.555
400.8	400.6	1.0006	Slope	0.997347	0.90 - 1.10
199.9	203.5	0.9821	Siope	0.337347	0.30 - 1.10
			Intercept	1.531522	+/-20

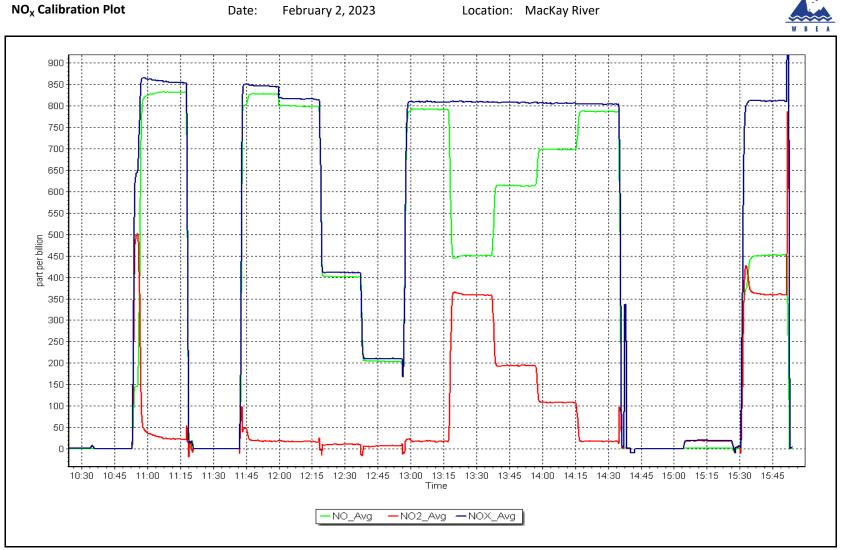




NO₂ Calibration Summary

WBEA					Version-04-20	
		Station	Information			
Calibration Date:	Februar	y 2, 2023	Previous Calibration:	January	24, 2023	
Station Name:	MacKa	ay River	Station Number:	AM	S20	
Start Time (MST):	10:20		End Time (MST):	15	:53	
Analyzer make:	Thermo 42i		Analyzer serial #:	rial #: 1505164379		
		Calibra	ation Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	c) Statistical Evaluation <u>Limit</u>			
0.0	0.1		Correlation Coefficient	0.999841	≥0.995	
360.7	359.2	1.0041	correlation coefficient	0.555641	20.333	
197.0	194.2	1.0142	Clana	0.998061	0.90 - 1.10	
112.6	108.1	1.0412	Slope	0.998061	0.90 - 1.10	
			Intercept	-1.818500	+/-20	







WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS21 CONKLIN FEBRUARY 2023

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

March 31, 2023



SO₂ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Conklin February 6, 2023 10:51 Routine		Station number: Last Cal Date: End time (MST):	AMS21 January 3, 2023 13:30	
		Calibration St	andards		
Cal Gas Concentration:	49.93	ppm	Cal Gas Exp Date:	January 5, 2025	
Cal Gas Cylinder #: Removed Cal Gas Conc: Removed Gas Cyl #:	<u>CC259455</u> 49.93	ррт	Rem Gas Exp Date: Diff between cyl:	NA	
Calibrator Make/Model: ZAG Make/Model:	Teledyne API T700 Teledyne API 701		Serial Number: Serial Number:	3810 262	
		Analyzer Info	rmation		
Analyzer make Analyzer Range			Analyzer serial #:	1428701363	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope: Calibration intercept:	1.003298 0.595998	0.999888 0.415841	Backgd or Offset: Coeff or Slope:	27.9 0.914	27.9 0.914
		SO ₂ Calibratio	on Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration C (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	800.8	801.4	0.999
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5005	0.0	0.0	0.0	
high point	4920	80.2	800.8	801.1	1.000
second point third point	<u>4960</u> 4980	40.1 20.0	400.4 200.1	400.6 201.2	1.000 0.995
as left zero	5005	0.0	0.0	0.0	0.995
as left span	4920	80.2	800.8	802.0	0.999
us icit span	7720	00.2		ge Correction Factor	0.998
Baseline Corr As found: Baseline Corr 2nd AF pt:	801.30 NA	Previous response AF Slope:	804.08	*% change AF Intercept:	-0.3%
Baseline Corr 3rd AF pt:	NA	AF Correlation:		* = > +/-5% change initiate	es investigation

Notes:

No adjustments required.

Calibration Performed By:

Denny Ray Estador

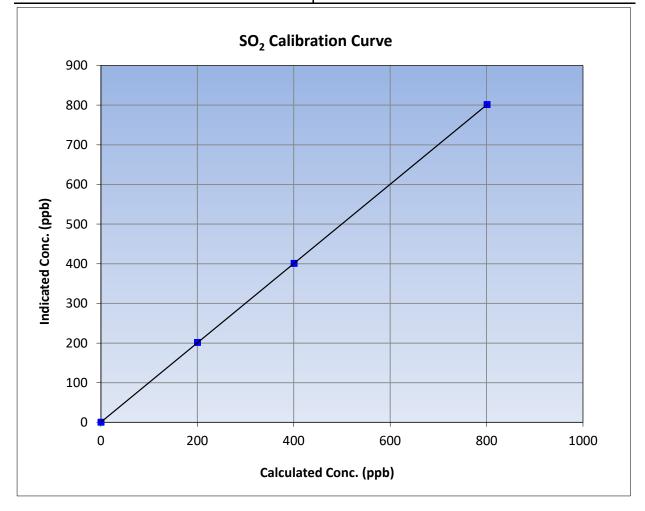


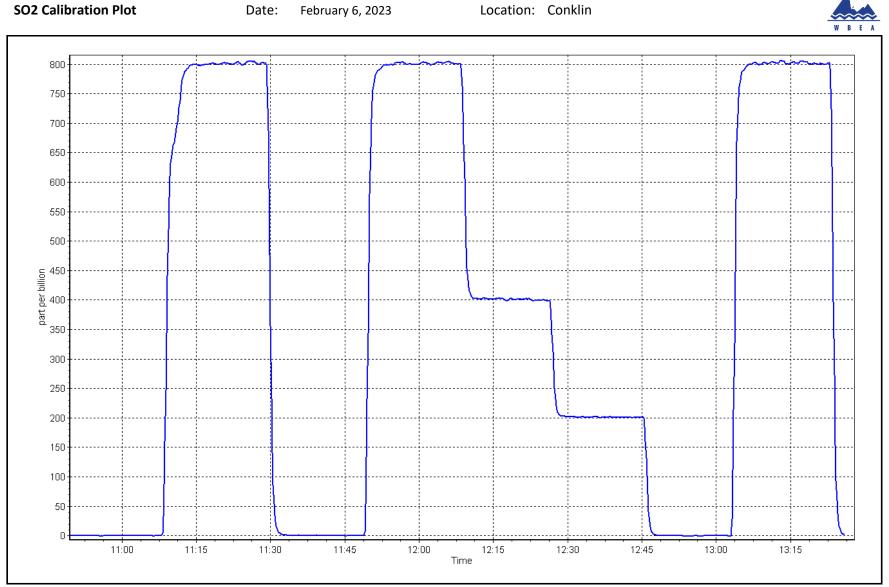
SO₂ Calibration Summary

WBEA			Version-01-2020
	Stati	on Information	
Calibration Date:	February 6, 2023	Previous Calibration:	January 3, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	10:51	End Time (MST):	13:30
Analyzer make:	Thermo 43i	Analyzer serial #:	1428701363

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	0.999998	≥0.995
800.8	801.1	0.9997	correlation coefficient	0.999996	20.333
400.4	400.6	0.9996	Slope	0.999888	0.90 - 1.10
200.1	201.2	0.9946	Slope	0.999000	0.90 - 1.10
			- Intercept	0.415841	+/-30





February 6, 2023

Location: Conklin



TRS Calibration Report

WBEA					Version-11-202
		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Conklin February 8, 2023 9:02 Routine		Station number: Last Cal Date: End time (MST):	AMS21 January 9, 2023 12:55	
		Calibration S	tandards		
Cal Gas Concentration:	5.03	ppm	Cal Gas Exp Date:	April 16, 2022	
Cal Gas Cylinder #: Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model: ZAG Make/Model:	CC505493 5.03 NA API T700 API 701	ppm	Rem Gas Exp Date: Diff between cyl: Serial Number: Serial Number:	NA 3810 263	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	Thermo 43i-TLE CD-Nova 101 0 - 100 ppb		Analyzer serial #: Converter serial #:	1236656116 NA	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope: Calibration intercept:	1.005143 -0.162334	0.983711 0.237934	Backgd or Offset: Coeff or Slope:		2.8 0.951
		TRS As Four	nd 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	78.5	1.014
as found 2nd point	4960	39.8	40.0	39.5	1.004
as found 3rd point	4980	19.9	20.0	19.8	0.991
new cylinder response					
		TRS Calibrat	ion Data		
Set Point	Dilution air flow 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	79.5	80.0	78.7	1.016
second point	4960	39.8	40.0	40.0	1.001
third point	4980	19.9	20.0	20.0	1.001
as left zero	5000	0.0	0.0	0.0	
as left span	4921	79.5	80.0	78.6	1.017
SO2 Scrubber Check	4920	80.2	802.0	-0.2	
Date of last scrubber cha	-			Ave Corr Factor	1.006
Date of last converter ef	ficiency test:				efficiency
Baseline Corr As found:	78.9	Prev response:		*% change:	-1.7%
Baseline Corr 2nd AF pt:	39.9	AF Slope:		AF Intercept:	-0.142040
Baseline Corr 3rd AF pt:	20.2	AF Correlation:	0.999949	* = > +/-5% change initiat	as investigation
				- > +/-5% change initiat	es investigation

Notes:

No adjustments made.

Calibration Performed By:

Denny Ray Estador

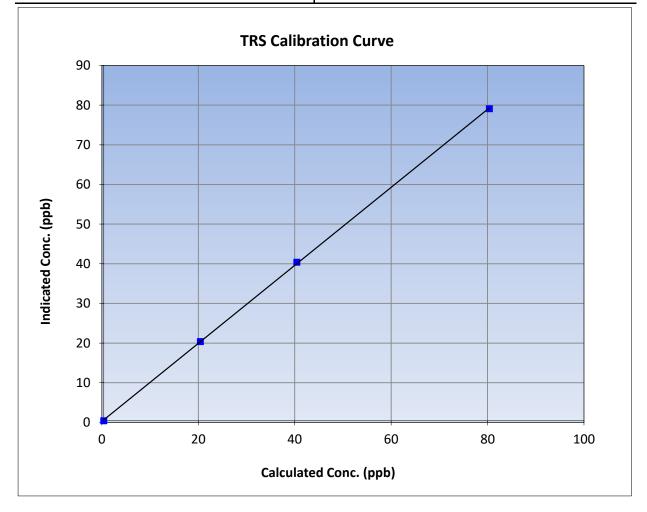


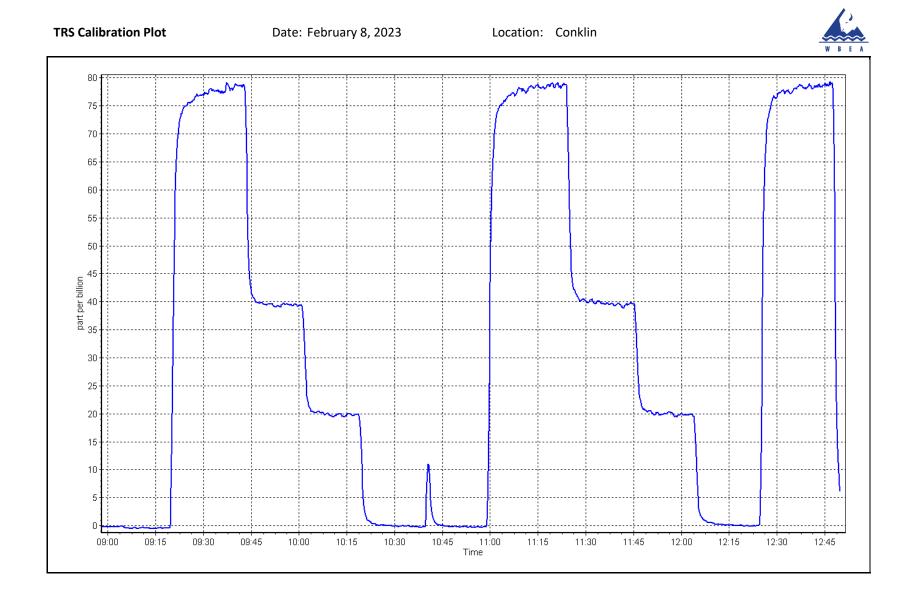
TRS Calibration Summary

WBEA			Version-11-2021
	Stati	on Information	
Calibration Date:	February 8, 2023	Previous Calibration:	January 9, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	9:02	End Time (MST):	12:55
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	0.999928	≥0.995
80.0	78.7	1.0161	correlation coefficient	0.999928	20.995
40.0	40.0	1.0010	Slope	0.983711	0.90 - 1.10
20.0	20.0	1.0010	Slope	0.985711	0.30 - 1.10
			Intercept	0.237934	+/-3







THC / CH_4 / NMHC Calibration Report

		Sta	tion Information			
Station Name:	Conklin		Station number: AMS21			
Calibration Date:	February 3, 202	3	Last Cal Date: Jar	Last Cal Date: January 4, 2023		
Start time (MST):	12:08		End time (MST): 17	:16		
Reason:	Routine					
		Calil	oration Standards			
Gas Cert Reference:	(CC259455	Cal Gas Expiry Date: Jar	nuary 5, 2025		
CH4 Cal Gas Conc.	497.9	ppm	CH4 Equiv Conc.	1067.7	ppm	
C3H8 Cal Gas Conc.	207.2	ppm				
Removed Gas Cert:		NA	Removed Gas Expiry: NA	A		
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 T	700	Serial Number: 38	10		
ZAG make/model:	Teledyne API 70)1	Serial Number: 69	1		
		Ana	lyzer Information			
Analyzer make:	: Thermo 55i		Analyzer serial #: 11	.8148495		
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:	1.85E-04	1.86E-0	04 NMHC SP Ratio:	4.66E-05	4.56E-05	
CH4 Retention time:	12.20	12.60	NMHC Peak Area:	196117	200658	

Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF Limit= 0.95-1.0
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.2	17.13	17.31	0.989
as found 2nd point	4960	40.1	8.56	8.65	0.989
as found 3rd point	4980	20.0	4.27	4.35	0.982
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4920	80.2	17.13	17.13	0.999
second point	4960	40.1	8.56	8.57	0.999
third point	4980	20.0	4.27	4.35	0.982
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.2	17.13	16.95	1.011
			Ave	erage Correction Factor	0.994
Baseline Corr AF:	17.31	Prev response	17.12	*% change	1.1%
Baseline Corr 2nd AF:	8.7	AF Slope:	1.010198	AF Intercept:	0.012422
Baseline Corr 3rd AF:	4.3	AF Correlation:	0.999996	* = > +/-5% change initiat	es investigation



THC / CH_4 / NMHC Calibration Report

Version-06-2022

NMHC Calibration Data						
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05	
as found zero	5000	0.0	0.00	0.00		
as found span	4920	80.2	9.14	9.36	0.976	
as found 2nd point	4960	40.1	4.57	4.67	0.978	
as found 3rd point	4980	20.0	2.28	2.36	0.968	
new cylinder response						
calibrator zero	5000	0.0	0.00	0.00		
high point	4920	80.2	9.14	9.13	1.001	
second point	4960	40.1	4.57	4.58	0.999	
third point	4980	20.0	2.28	2.36	0.968	
as left zero	5000	0.0	0.00	0.00		
as left span	4920	80.2	9.14	9.03	1.012	
			Aver	age Correction Factor	0.989	
Baseline Corr AF:	9.36	Prev response	9.14	*% change	2.4%	
Baseline Corr 2nd AF:	4.7	AF Slope:	1.023526	AF Intercept:	0.006684	
Baseline Corr 3rd AF:	2.4	AF Correlation:	0.999992	* = > +/-5% change initiat	es investigation	

CH4 Calibration Data

		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= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	
as found span	4920	80.2	7.99	7.95	1.005
as found 2nd point	4960	40.1	3.99	3.98	1.004
as found 3rd point	4980	20.0	1.99	1.99	0.999
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4920	80.2	7.99	8.00	0.998
second point	4960	40.1	3.99	3.99	1.001
third point	4980	20.0	1.99	1.99	0.999
as left zero	5000	0.0	0.00	0.00	
as left span	4920	80.2	7.99	7.92	1.009
			Aver	age Correction Factor	0.999
Baseline Corr AF:	7.95	Prev response	7.99	*% change	-0.6%
Baseline Corr 2nd AF:	3.98	AF Slope:	0.994544	AF Intercept:	0.006137
Baseline Corr 3rd AF:	1.99	AF Correlation:	0.999997	* = > +/-5% change initiat	es investigation
		Calibration	Statistics		
		<u>Start</u>		<u>Finish</u>	
THC Cal Slope:		0.999155		0.998993	
THC Cal Offset:		0.013380	0.030589		
CH4 Cal Slope:		1.000338	1.001541		
CH4 Cal Offset:		0.001151	-0.002053		
NMHC Cal Slope:		0.998171		0.996416	
NMHC Cal Offset:		0.013029		0.033041	

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

Calibration Performed By:

Denny Ray Estador and Mohammed Kashif



THC Calibration Summary

		Station I	nformation		
Calibration Date:	Date: February 3, 2023 Previous Calibration:		Previous Calibration:	January 4, 2023	
Station Name:	Cor	nklin	Station Number:	AMS21	
Start Time (MST):	12	:08	End Time (MST):	17	:16
Analyzer make:	Thermo 55i		Analyzer serial #:	11814	18495
		Calibra	tion Data		
Calculated concentratio (ppm) (Cc)	n Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999975	≥0.995
17.13	17.13	0.9995			
8.56 4.27	8.57 4.35	0.9994 0.9820	Slope	0.998993	0.90 - 1.10
	т.55	0.5020	Intercept	0.030589	+/-0.5
				/	
16.0 -				/	
14.0 —					
12.0 -					
و					
a 10.0 –					
Indicated Conc. (ppm)					
. 8.0					
ted					
— 0.6 <u>iei</u>					
lnd	/				
4.0					
2.0 -					
0.0 🖌					
0.0	5	.0	10.0	15.0	20.0
		Calculated	l Conc. (ppm)		



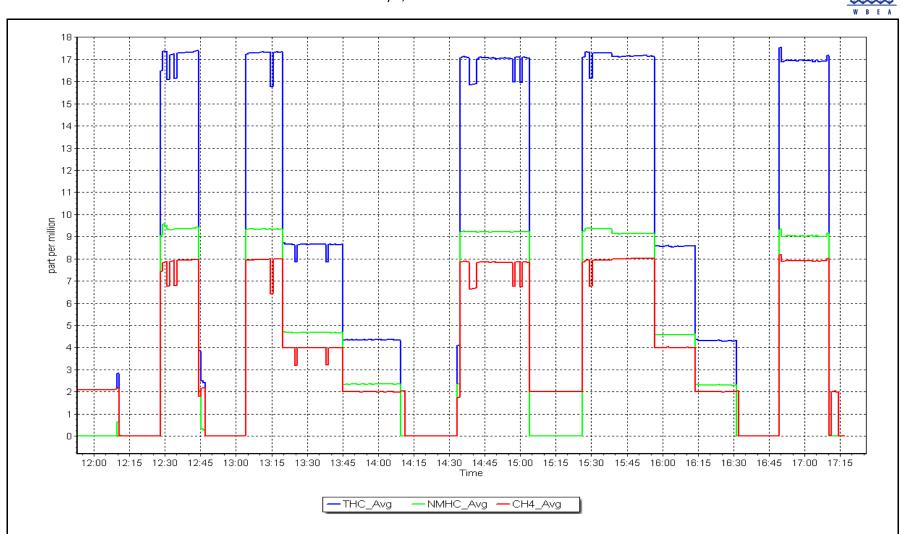
CH₄ Calibration Summary

		Station In	nformation		
Calibration Date:	Februar	February 3, 2023		January	4, 2023
Station Name:	Cor	Conklin		AM	S21
Start Time (MST):	12	:08	End Time (MST):	17:16	
Analyzer make:	Therr	no 55i	Analyzer serial #:	11814	18495
		Calibra	tion Data		
Calculated concentration (ppm) (Cc)	n Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999999	≥0.995
7.99 3.99	8.00	0.9984 1.0005			
1.99	1.99	0.9988	Slope	1.001541	0.90 - 1.10
			Intercept	-0.002053	+/-0.5
7.0					
6.0 (md 5.0					
ted Conc. (ppm)					
Indicated Conc. (ppm) 0.0 0.0 0.0					
Undicated Conc. (ppm) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	2.0	4.0	6.0	8.0	10.0



NMHC Calibration Summary

			Station I	nformation		
Calibration	Date:	February 3, 2023		Previous Calibration:	January	4, 2023
Station Nan	me:	Conklin		Station Number:	AM	S21
Start Time ((MST):	T): 12:08		End Time (MST):	17:16	
Analyzer ma	iake:	Therr	mo 55i	Analyzer serial #:	11814	18495
			Calibra	tion Data		
Calculated cor (ppm)		Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>
0.0 9.1		0.00 9.13	1.0008	Correlation Coefficient	0.999915	≥0.995
4.5	57	4.58	0.9986	Slope	0.996416	0.90 - 1.10
2.2	28	2.36	0.9678	Intercept	0.033041	+/-0.5
10	0.0		NMHC Calibrat			
	9.0					
٤	8.0					
	8.0					
-						
-	7.0					
Conc. (ppm)	7.0					
cated Conc. (ppm)	7.0 6.0 5.0					
Indicated Conc. (ppm)	7.0					
Indicated Conc. (ppm)	7.0 6.0 5.0 4.0 3.0 2.0 1.0					
Indicated Conc. (ppm)	7.0 6.0 5.0 4.0 3.0 2.0	2.0	4.0	6.0	8.0	10.0



Location: Conklin





$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

Station Information

Station Name: Calibration Date: Start time (MST): Reason: Conklin February 24, 2023 9:10 Routine

Station number: AMS21 Last Cal Date: January 17, 2023 End time (MST): 13:05

Calibration Standards

NO Gas Cylinder #:	T2Y1P1H		Cal Gas Expiry Date: Dec	ember 11, 20	023
NOX Cal Gas Conc:	51.09	ppm	NO Cal Gas Conc:	50.39	ppm
Removed Cylinder #:	n/a		Removed Gas Exp Date: n/a		
Removed Gas NOX Conc:	51.09	ppm	Removed Gas NO Conc:	50.39	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T7	50	Serial Number:	282	
ZAG make/model:	Teledyne API T70	01	Serial Number:	361	

Analyzer Information

	Analyzer make: Thermo 42i NOX Range (ppb): 0 - 1000 ppb			01663731	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.144	1.144	NO bkgnd or offset:	11.7	11.6
NOX coeff or slope:	1.001	1.001	NOX bkgnd or offset:	11.9	11.8
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	226.7	224.3

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	1.001997	1.004927
NO _x Cal Offset:	1.704503	1.765059
NO Cal Slope:	0.998723	1.004393
NO Cal Offset:	1.321276	0.961963
NO ₂ Cal Slope:	0.999769	1.001583
NO ₂ Cal Offset:	-0.317822	-0.384496



$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

				Dilu	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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1		
as found span	4921	79.4	811.2	800.1	11.1	818.3	804.8	13.5	0.9914	0.9942
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	4921	79.4	811.2	800.1	11.1	816.2	804.1	12.1	0.9939	0.9951
second point	4960	39.7	405.7	400.1	5.6	410.1	403.4	6.7	0.9892	0.9919
third point	4980	19.8	202.3	199.6	2.8	207.0	202.3	4.7	0.9774	0.9864
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
as left span	4921	79.4	811.2	381.6	429.6	814.0	388.4	425.6	0.9966	0.9826
							Average C	orrection Factor	0.9869	0.9911
Corrected As fo	ound NO _x =	818.6 ppb	NO =	805.0 ppb	* = > +/-59	% change initiates i	nvestigation	*Percent Chang	ge NO _X =	0.5%
Previous Respo	nse NO _x =	814.6 ppb	NO =	800.4 ppb				*Percent Chang	ge NO =	0.6%
Baseline Corr 2	nd pt NO _X =	NA ppb	NO =	NA ppb	As found	d $NO_X r^2$:		Nx SI:	Nx Int:	
Baseline Corr 3	rd 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 ₂ Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Co	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						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	800.8	382.3	429.6	430.0	0.9991	100.1%
2nd GPT point (200 ppb O3)	800.8	599.8	212.1	212.1	1.0001	100.0%
3rd GPT point (100 ppb O3)	800.8	700.3	111.6	111.0	1.0055	99.4%
			4	Verage Correction Factor	1.0016	99.8%

Notes:

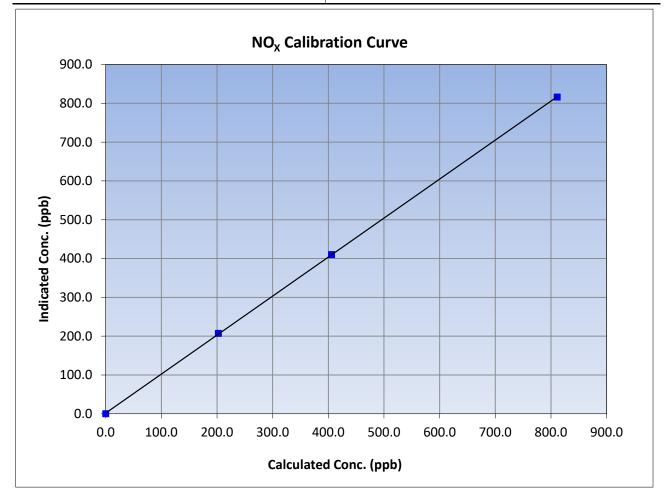
No adjustments required.

Calibration Performed By:



$NO_{\rm X}$ Calibration Summary

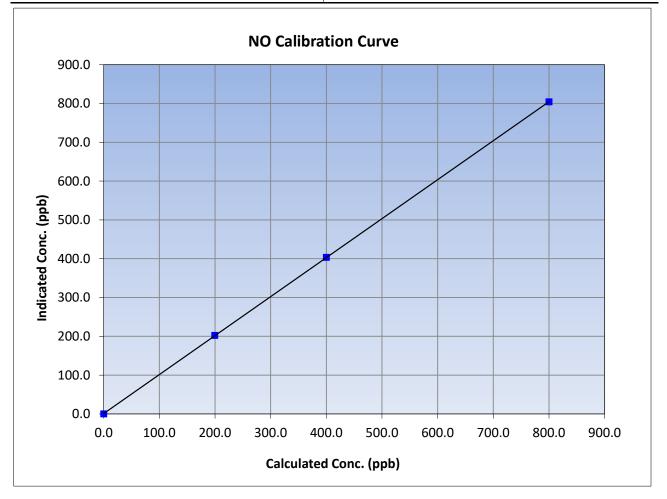
WBEA					Version-04-2
		Station	Information		
Calibration Date:	February 24, 2023		Previous Calibration:	January	17, 2023
Station Name:	Cor	nklin	Station Number:	AM	S21
Start Time (MST):	9:	10	End Time (MST):	13	:05
Analyzer make:	Thermo 42i		Analyzer serial #:	15016	63731
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999978	≥0.995
811.2	816.2	0.9939	correlation coernelent	0.555578	20.333
405.7	410.1	0.9892	Clana	1.004927	0.90 - 1.10
202.3	207.0	0.9774	Slope	1.004927	0.90 - 1.10
			Intercept	1.765059	+/-20





NO Calibration Summary

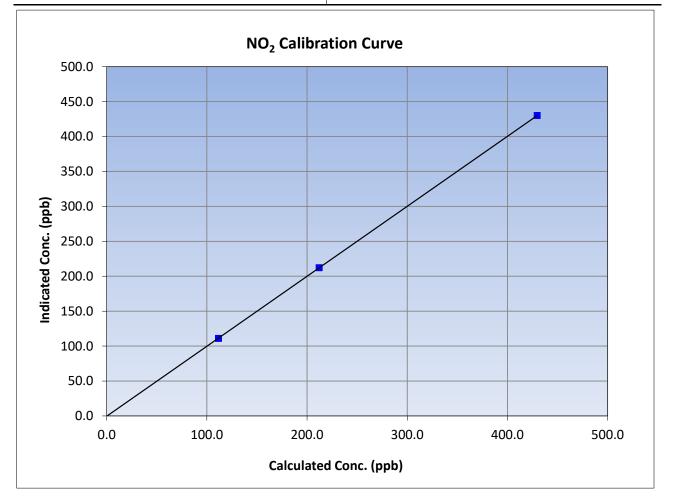
WBEA					Version-04-20
		Station	Information		
Calibration Date:	February 24, 2023		Previous Calibration:	January	17, 2023
Station Name:	Cor	nklin	Station Number:	AM	IS21
Start Time (MST):	9:	10	End Time (MST):	13	:05
Analyzer make:	Thermo 42i		Analyzer serial #:	15016	63731
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999993	≥0.995
800.1	804.1	0.9951	correlation coernicient	0.9999995	20.995
400.1	403.4	0.9919	Clana	1.004393	0.90 - 1.10
199.6	202.3	0.9864	Slope	1.004393	0.90 - 1.10
			Intercept	0.961963	+/-20

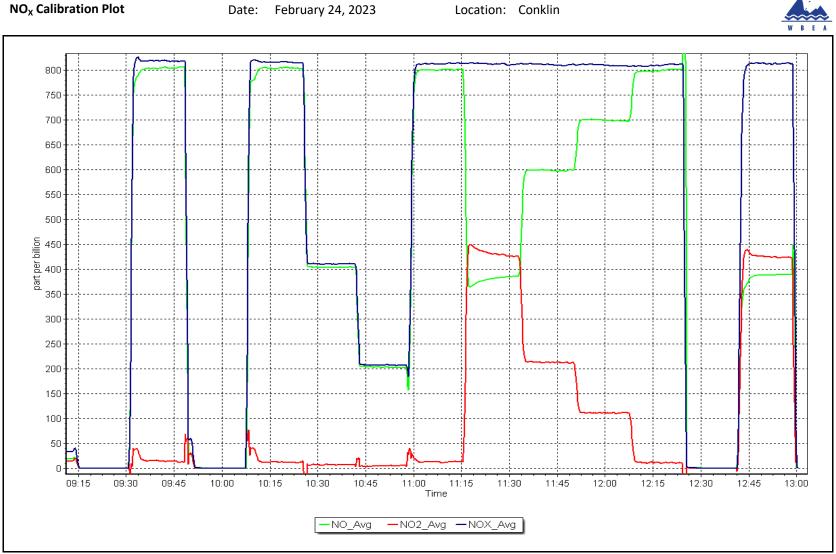




NO₂ Calibration Summary

WBEA					Version-04-2
		Station	Information		
Calibration Date:	February 24, 2023		Previous Calibration:	January	17, 2023
Station Name:	Cor	nklin	Station Number:	AM	S21
Start Time (MST):	9:	10	End Time (MST):	13	:05
Analyzer make:	Therr	no 42i	Analyzer serial #:	15016	63731
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	-0.1			0.00007	
429.6	430.0	0.9991	Correlation Coefficient	0.999997	≥0.995
212.1	212.1	1.0001	Slope	1.001583	0.90 - 1.10
111.6	111.0	1.0055	Siope	1.001383	0.50 - 1.10
			Intercept	-0.384496	+/-20







O₃ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name:	Caraldia			MC21	
Station Name:	Conklin		Station number: A		
Calibration Date:	February 3, 2023 8:56			anuary 20, 2023	
Start time (MST):			End time (MST): 1	.2.15	
Reason:	Routine				
		Calibration St	andards		
O3 generation mode:	Photometer				
Calibrator Make/Model:	Teledyne API T700		Serial Number: 3	810	
ZAG Make/Model:	Teledyne API 701		Serial Number: 2	.63	
		Analyzer Info	rmation		
Analyzer make:	: Thermo 49i		Analyzer serial #: 1	501663734	
Analyzer Range					
	Start	Finish		<u>Start</u>	Finish
Calibration slope:	0.997857	1.001543	Backgd or Offset:	-0.3	-0.7
	0.200000	0.380000	Coeff or Slope:	1.011	1.002
Calibration intercept:	0.200000		•		
Calibration Intercept:	0.200000				
Calibration Intercept:		O ₃ Calibratio			
calibration intercept:		O ₃ Calibratio	n Data		in an an in the star (Co
Set Point	Total air flow rate	O ₃ Calibratio	n Data Calculated Ir	ndicated concentration C	
Set Point	Total air flow rate (sccm)	O ₃ Calibratio Calibrator Lamp Voltage Drive	n Data Calculated In concentration (ppb) (Cc)	(ppm) (Ic)	Limit = 0.95-1.05
Set Point as found zero	Total air flow rate (sccm) 5000	O ₃ Calibratio Calibrator Lamp Voltage Drive 0.0	n Data Calculated In concentration (ppb) (Cc) 0.0	(ppm) (Ic) -0.8	Limit = 0.95-1.05
Set Point as found zero as found span	Total air flow rate (sccm) 5000 5000	O ₃ Calibratio	Calculated In concentration (ppb) (Cc) 0.0 400.0	(ppm) (Ic) -0.8 398.7	Limit = 0.95-1.05 1.003
Set Point as found zero as found span as found 2nd point	Total air flow rate (sccm) 5000 5000 5000	O ₃ Calibratio	Calculated In concentration (ppb) (Cc) 0.0 400.0 200.0	(ppm) (lc) -0.8 398.7 200.0	Limit = 0.95-1.05
Set Point as found zero as found span as found 2nd point as found 3rd point	Total air flow rate (sccm) 5000 5000 5000 5000 5000	O ₃ Calibratio	n Data Calculated In concentration (ppb) (Cc) 0.0 400.0 200.0 100.0	(ppm) (Ic) -0.8 398.7 200.0 100.2	Limit = 0.95-1.05
Set Point as found zero as found span as found 2nd point as found 3rd point calibrator zero	Total air flow rate (sccm) 5000 5000 5000 5000 5000 5000	O ₃ Calibratio	Calculated In concentration (ppb) (Cc) 0.0 400.0 200.0 100.0 0.0	(ppm) (Ic) -0.8 398.7 200.0 100.2 0.1	Limit = 0.95-1.05
Set Point as found zero as found span as found 2nd point as found 3rd point calibrator zero high point	Total air flow rate (sccm) 5000 5000 5000 5000 5000 5000 5000	O ₃ Calibratio	Calculated In concentration (ppb) (Cc) 0.0 400.0 200.0 100.0 0.0 400.0	(ppm) (lc) -0.8 398.7 200.0 100.2 0.1 400.7	Limit = 0.95-1.05
Set Point as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point	Total air flow rate (sccm) 5000 5000 5000 5000 5000 5000 5000 50	O ₃ Calibratio Calibrator Lamp Voltage Drive 0.0 935.6 799.4 701.9 0.0 933.0 799.4	n Data Calculated In concentration (ppb) (Cc) 0.0 400.0 200.0 100.0 0.0 400.0 200.0	(ppm) (lc) -0.8 398.7 200.0 100.2 0.1 400.7 201.3	Limit = 0.95-1.05
Set Point as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point third point	Total air flow rate (sccm) 5000 5000 5000 5000 5000 5000 5000	O ₃ Calibratio	Calculated In concentration (ppb) (Cc) 0.0 400.0 200.0 100.0 0.0 400.0	(ppm) (lc) -0.8 398.7 200.0 100.2 0.1 400.7	Limit = 0.95-1.05
Set Point as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point third point as left zero	Total air flow rate (sccm) 5000 5000 5000 5000 5000 5000 5000 50	O ₃ Calibratio	n Data Calculated In concentration (ppb) (Cc) 0.0 400.0 200.0 100.0 0.0 400.0 200.0	(ppm) (lc) -0.8 398.7 200.0 100.2 0.1 400.7 201.3	Limit = 0.95-1.05
Set Point as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point third point	Total air flow rate (sccm) 5000 5000 5000 5000 5000 5000 5000 50	O ₃ Calibratio	n Data Calculated In concentration (ppb) (Cc) 0.0 400.0 200.0 100.0 0.0 400.0 200.0 100.0 0.0 100.0	(ppm) (lc) -0.8 398.7 200.0 100.2 0.1 400.7 201.3 100.5	Limit = 0.95-1.05
Set Point as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point third point as left zero	Total air flow rate (sccm) 5000 5000 5000 5000 5000 5000 5000 50	O ₃ Calibratio	n Data Calculated In concentration (ppb) (Cc) 0.0 400.0 200.0 100.0 0.0 400.0 200.0 100.0 0.0 100.0	(ppm) (lc) -0.8 398.7 200.0 100.2 0.1 400.7 201.3	Limit = 0.95-1.05
Set Point as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point third point as left zero as left span Baseline Corr As found:	Total air flow rate (sccm) 5000 5000 5000 5000 5000 5000 5000 50	O ₃ Calibratio	n Data Calculated In concentration (ppb) (Cc) 0.0 400.0 200.0 100.0 0.0 400.0 200.0 100.0 0.0 100.0	(ppm) (lc) -0.8 398.7 200.0 100.2 0.1 400.7 201.3 100.5 Correction Factor *% change	Limit = 0.95-1.05
Set Point as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point third point as left zero as left span	Total air flow rate (sccm) 5000 5000 5000 5000 5000 5000 5000 50	O ₃ Calibratio Calibrator Lamp Voltage Drive 0.0 935.6 799.4 701.9 0.0 933.0 799.4 701.9	n Data Calculated In concentration (ppb) (Cc) 0.0 400.0 200.0 100.0 400.0 200.0 100.0 400.0 200.0 100.0	(ppm) (lc) -0.8 398.7 200.0 100.2 0.1 400.7 201.3 100.5 Correction Factor	Limit = 0.95-1.05

Notes:

Changed the pump after the MPAFs. Adjusted both zero and span. No as lefts.

Calibration Performed By:

Denny Ray Estador

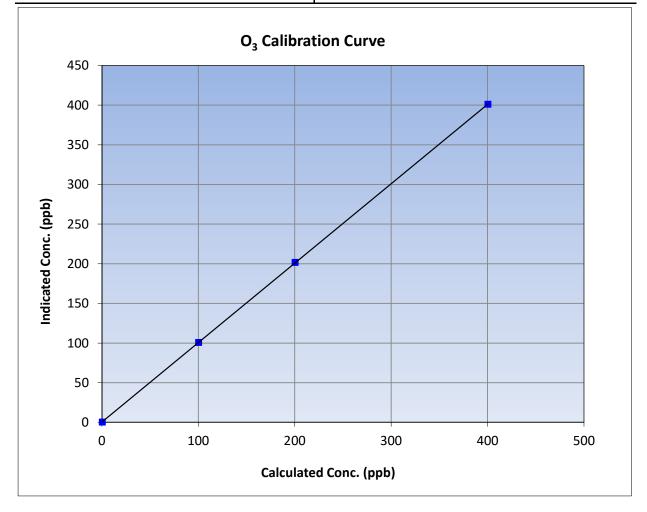


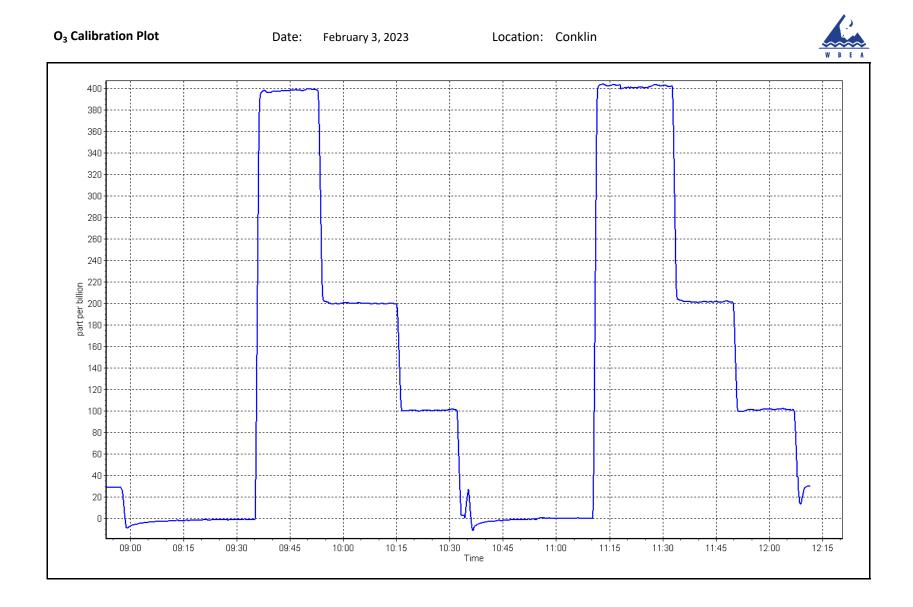
O₃ Calibration Summary

WBEA			Version-01-2020
	Stati	on Information	
Calibration Date:	February 3, 2023	Previous Calibration:	January 20, 2023
Station Name:	Conklin	Station Number:	AMS21
Start Time (MST):	8:56	End Time (MST):	12:15
Analyzer make:	Thermo 49i	Analyzer serial #:	1501663734

Calibration Data

Calculated concentration Indicated concentration (ppb) (Cc) (ppb) (Ic)		Correction factor (Cc/Ic)	Statistical Evalua	<u>Limits</u>		
0.0	0.1		Correlation Coefficient	0.999994	≥0.995	
400.0	400.7	0.9983	correlation coefficient		20.333	
200.0	201.3	0.9935	Slope	1.001543	0.90 - 1.10	
100.0	100.5	0.9950	Slope	1.001343	0.90 - 1.10	
			Intercept	0.380000	+/- 5	







T640 PM_{2.5} CALIBRATION

W D E A						Version-01-2023
		Station Information	า			
Station Name:	Conklin		Station number:	AMS 21		
Calibration Date:	February 8, 2023		Last Cal Date:	January 4, 2	2023	
Start time (MST):	10:43	End time (MST): 11:00				
Analyzer Make:	API T640		S/N:	1547		
Particulate Fraction:	PM2.5					
Flow Meter Make/Model:	DeltaCal		S/N:	954		
Temp/RH standard:	DeltaCal	S/N: 954				
		Monthly Calibration T	est			
Parameter	<u>As found</u>	Measured	<u>As left</u>		<u>Adjusted</u>	(Limits)
Т (°С)	-2.5	-2.4	-2.5			+/- 2 °C
P (mmHg)	713.7	709.5	713.7			+/- 10 mmHg
flow (LPM)	5	5.07	5			+/- 0.25 LPM
Leak Test:	Date of check:	February 8, 2023	Last Cal Date:	January	4, 2023	
	PM w/o HEPA:	2.6	PM w/ HEPA:	(-	<0.2 ug/m3
Note: this leak check will be			serve as the pre ma	ntenance le	eak check	
Inlet cleaning :	Inlet Head					
		Quarterly Calibration	Test			
Parameter	<u>As found</u>	Post maintenance	As left		<u>Adjusted</u>	(Limits)
PMT Peak Test	<u> </u>	<u>· · · · · · · · · · · · · · · · · · · </u>	<u></u>			11.3 +/- 0.5
						,
Post-maintenance		PM w/o HEPA:		w/ HEPA:		
Date Optical Chamber Cleaned:						<0.2 ug/m3
Disposable Filter	r Changed:					
		Annual Maintenanc	0			
		Annual Maintenanc				
Date Sample Tub	e Cleaned:					
Date RH/T Sensor Cleaned:						
Notes:		No adjustments made.	Inspect inlet head; r	elatively cle	ean.	
Calibration by:	Denny Ray Estador					



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS22 JANVIER FEBRUARY 2023

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

March 31, 2023



SO₂ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Janvier February 22, 2023 12:33 Routine		Station number: Last Cal Date: End time (MST):	AMS 22 January 17, 2023 16:31	
		Calibration St	andards		
Cal Gas Concentration:	50.11	ppm	Cal Gas Exp Date:	January 18, 2029	
Cal Gas Cylinder #: Removed Cal Gas Conc:	CC281519 50.11	nnm	Rem Gas Exp Date:	ΝΑ	
Removed Gas Cyl #:	NA	ppm	Diff between cyl:	NA	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3806	
ZAG Make/Model:	Teledyne API T701		Serial Number:	4890	
		Analyzer Info	rmation		
Analyzer make Analyzer Range			Analyzer serial #:	1152430006	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.000335	1.000663	Backgd or Offset:	19.2	21.4
Calibration intercept:	0.604356	0.364554	Coeff or Slope:	1.007	1.031
		SO ₂ Calibratio	on Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/lc Limit = 0.95-1.05
as found zero	5000	0.0	0.0	2.0	
as found span	4920	79.8	799.8	806.7	0.991
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	
high point	4920	79.8	799.8	800.2	0.999
second point	4960	39.9	399.9	401.8	0.995
third point	4980	20.0	200.4	200.3	1.001
as left zero	5000	0.0	0.0	0.2	
as left span	4920	79.8	799.8	802.9	0.996 0.998
			Averag	ge Correction Factor	0.998
Baseline Corr As found:	804.70	Previous response	800.66	*% change	0.5%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

Inlet filter changed after as founds. Adjusted both zero and span.

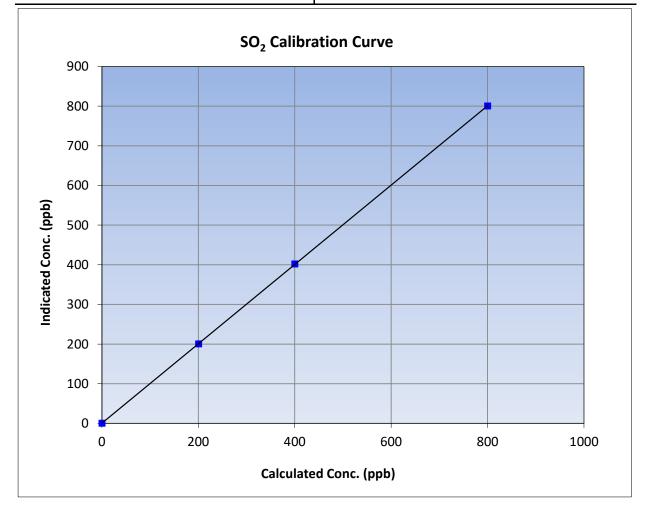
Calibration Performed By:



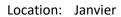
SO₂ Calibration Summary

WBEA			Version-01-2020
	Statio	on Information	
Calibration Date:	February 22, 2023	Previous Calibration:	January 17, 2023
Station Name:	Janvier	Station Number:	AMS 22
Start Time (MST):	12:33	End Time (MST):	16:31
Analyzer make:	Thermo 43i	Analyzer serial #:	1152430006

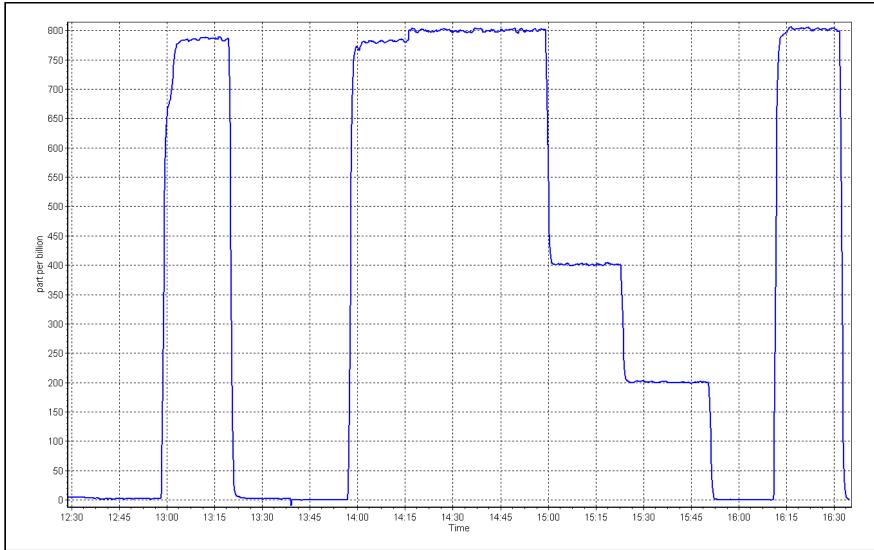
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>
0.0	0.2		Correlation Coefficient	0.999993	≥0.995
799.8	800.2	0.9995	correlation coefficient	0.999995	20.335
399.9	401.8	0.9952	Slope	1.000663	0.90 - 1.10
200.4	200.3	1.0007	Slope	1.000005	0.90 - 1.10
			- Intercept	0.364554	+/-30













TRS Calibration Report

		_			
WBEA					Version-11-20
		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Janvier February 24, 2023 12:12 Routine		Station number: Last Cal Date: End time (MST):	AMS22 January 20, 2023 17:09	
		Calibration S	tandards		
Cal Gas Concentration:	5.03	ppm	Cal Gas Exp Date:	April 16, 2022	
Cal Gas Cylinder #: Removed Cal Gas Conc: Removed Gas Cyl #:	DT0018680 5.03 NA	ppm	Rem Gas Exp Date: Diff between cyl:	NA	
Calibrator Make/Model: ZAG Make/Model:	Teledyne API T700 Teledyne API T701		Serial Number: Serial Number:	3806 4890	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	Thermo 43i-TLE CDN-101 0 - 100 ppb		Analyzer serial #: Converter serial #:	1151680031 587	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.005365	1.002650	Backgd or Offset:	3.42	3.56
Calibration intercept:	0.000881	0.120931	Coeff or Slope:	1.239	1.239
		TRS As Fou	nd 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	79.5	80.0	80.2	1.001
as found 2nd point	4960	39.8	40.0	40.3	1.001
as found 3rd point	4980	19.9	20.0	19.0	1.071
new cylinder response					
		TRS Calibrat	ion Data		
Set Point	Dilution air flow 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	79.5	80.0	80.3	0.996
second point	4960	39.8	40.0	40.4	0.991
second point third point			40.0 20.0	40.4 20.0	0.991
	4960	39.8			
third point	4960 4980	39.8 19.9	20.0	20.0	1.001
third point as left zero as left span	4960 4980 5000	39.8 19.9 0.0	20.0 0.0	20.0 0.3	1.001
third point as left zero as left span O2 Scrubber Check	4960 4980 5000 4920 4920	39.8 19.9 0.0 79.5	20.0 0.0 80.0	20.0 0.3 80.4 0.1	1.001 0.995
third point as left zero as left span O2 Scrubber Check Date of last scrubber cha	4960 4980 5000 4920 4920 inge:	39.8 19.9 0.0 79.5	20.0 0.0 80.0	20.0 0.3 80.4	1.001 0.995
third point as left zero as left span 502 Scrubber Check Date of last scrubber cha Date of last converter ef	4960 4980 5000 4920 4920 inge: ficiency test:	39.8 19.9 0.0 79.5 79.8	20.0 0.0 80.0 798.0	20.0 0.3 80.4 0.1 Ave Corr Factor	1.001 0.995 0.996 efficiency
third point as left zero as left span O2 Scrubber Check Date of last scrubber cha Date of last converter ef Baseline Corr As found:	4960 4980 5000 4920 4920 inge: ficiency test: 79.9	39.8 19.9 0.0 79.5 79.8 Prev response:	20.0 0.0 80.0 798.0 80.41	20.0 0.3 80.4 0.1 Ave Corr Factor *% change:	1.001 0.995 0.996 efficiency -0.6%
third point as left zero	4960 4980 5000 4920 4920 inge: ficiency test:	39.8 19.9 0.0 79.5 79.8	20.0 0.0 80.0 798.0 80.41 1.004505	20.0 0.3 80.4 0.1 Ave Corr Factor	1.001 0.995 0.996 efficiency

Changed out the inlet filter after as founds. Scrubber check passed. Increased the converter temperature to 860C. Adjusted zero only.

Calibration Performed By:

Notes:

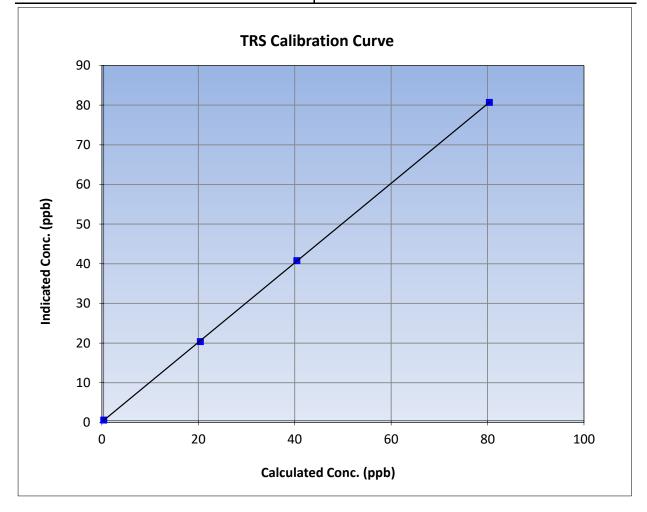
Rene Chamberland

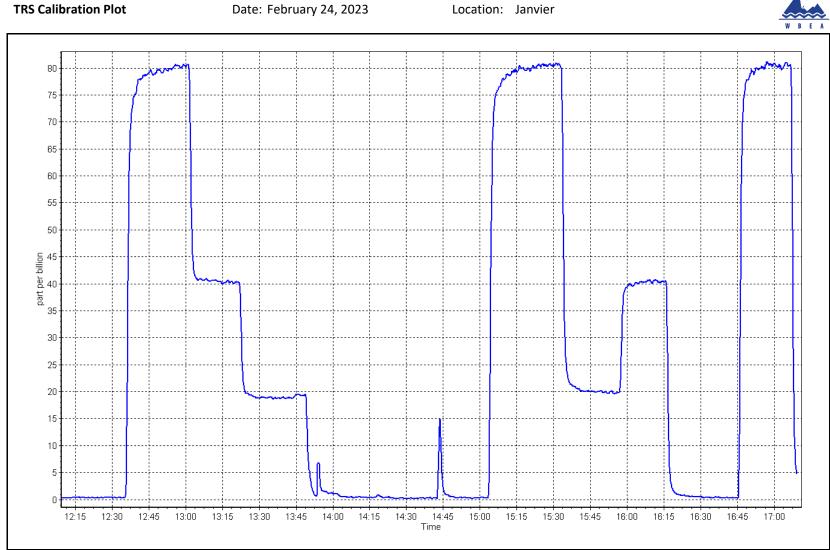


TRS Calibration Summary

WBEA			Version-11-2021
	Statio	on Information	
Calibration Date:	February 24, 2023	Previous Calibration:	January 20, 2023
Station Name:	Janvier	Station Number:	AMS22
Start Time (MST):	12:12	End Time (MST):	17:09
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1151680031

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>
0.0	0.2		Correlation Coefficient	0.999982	≥0.995
80.0	80.3	0.9961	correlation coefficient	0.999982	20.333
40.0	40.4	0.9911	Slope	1.002650	0.90 - 1.10
20.0	20.0	1.0010	Siope	1.002050	0.90 - 1.10
			Intercept	0.120931	+/-3









THC / CH_4 / NMHC Calibration Report

WBEA					Version-01-2020
		Stat	ion Information		
Station Name:	Janvier		Station number: Al	MS 22	
Calibration Date:	February 22, 20	23	Last Cal Date: Ja	nuary 17, 2023	}
Start time (MST):	12:33		End time (MST): 16	5:31	
Reason:	Routine				
		Calib	oration Standards		
Gas Cert Reference:	C	C281519	Cal Gas Expiry Date: Ja	nuary 18, 2029)
CH4 Cal Gas Conc.	502.8	ppm	CH4 Equiv Conc.	1075.9	ppm
C3H8 Cal Gas Conc.	208.4	ppm			
Removed Gas Cert:		N/A	Removed Gas Expiry: N	/A	
Removed CH4 Conc.	502.8	ppm	CH4 Equiv Conc.	1075.9	ppm
Removed C3H8 Conc.	208.4	ppm	Diff between cyl (THC):		
Diff between cyl (CH ₄)	:		Diff between cyl (NM):		
Calibrator Model:	Teledyne API 70	0	Serial Number: 38	306	
ZAG make/model:	Teledyne API 70	1	Serial Number: 48	390	
		Anal	yzer Information		
Analyzer make	: Thermo 55i		Analyzer serial #: 11	172750023	
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	: 2.180E-04	2.180E-0	04 NMHC SP Ratio:	4.69E-05	4.50E-05
CH4 Retention time	: 13.00	13.20	NMHC Peak Area:	195272	203120

THC Calibration Data						
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05	
as found zero	5000	0.0	0.00	0.00		
as found span	4920	79.8	17.17	17.43	0.985	
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	17.23	0.997	
second point	4960	39.9	8.59	8.57	1.002	
third point	4980	20.0	4.30	4.27	1.008	
as left zero	5000	0.0	0.00	0.00		
as left span	4920	79.8	17.17	17.33	0.991	
			/	Average Correction Factor	1.002	
Baseline Corr AF:	17.43	Prev response	17.12	*% change	1.8%	
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:		
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	tes investigation	



THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data							
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05		
as found zero	5000	0	0.00	0.00			
as found span	4920	79.8	9.15	9.40	0.974		
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	9.17	0.997		
second point	4960	39.9	4.57	4.58	0.999		
third point	4980	20.0	2.29	2.28	1.005		
as left zero	5000	0	0.00	0.00			
as left span	4920	79.8	9.15	9.25	0.989		
			A	Average Correction Factor	1.001		
Baseline Corr AF:	9.40	Prev response	9.10	*% change	3.1%		
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=</i> 0.95-1.05
as found zero	5000	0.0	0.00	0.00	
as found span	4920	79.8	8.03	8.04	0.999
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.00	0.00	
high point	4920	79.8	8.03	8.06	0.996
second point	4960	39.9	4.01	4.00	1.004
third point	4980	20.0	2.01	1.99	1.010
as left zero	5000	0.0	0.00	0.00	
as left span	4920	79.8	8.03	8.08	0.994
			A	verage Correction Factor	1.004
Baseline Corr AF:	8.04	Prev response	8.02	*% 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:		0.999594		1.003856	
THC Cal Offset:		-0.041578		-0.027606	
CH4 Cal Slope:		1.001935		1.004586	
CH4 Cal Offset:		-0.020955 -0.017766			
NMHC Cal Slope:		0.997466		1.003078	
NMHC Cal Offset:		-0.020822		-0.009039	

Notes:

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

Calibration Performed By:

Rene Chamberland



THC Calibration Summary

Calibration Date: February 22, 2023 Previous Calibration: January 17, 2023 Station Name: Janvier Station Number: AMS 22 Start Time (MST): 12:33 End Time (MST): 16:31 Analyzer make: Thermo 55i Analyzer serial #: 1172750023			Station I	nformation		
Start Time (MST): 12.33 End Time (MST): 16.31 Analyzer make: Thermo 55i Analyzer serial #: 1172750023 Calibration Data Calibration Coefficient 0.999988 20.995 0.00 0.00 0.00 0.0958 17.17 17.23 0.9968 0.909 0.09958 4.30 4.27 1.0079 Slope 1.003856 0.90-1.10 1 Intercept -0.027606 +/4.5 THC Calibration Curve 0.0027606 +/4.5	Calibration Date:	February	22, 2023	Previous Calibration:	January 2	17, 2023
Analyzer make: Thermo 551 Analyzer serial #: 1172750023 Calibration Data Calibration Data Control of the concentration (ppm) (c) Statistical Evaluation Control of the concentration (ppm) (c) Control of the concentration (ppm) (c) Statistical Evaluation Control of the concentration (ppm) (c) Control of the concentration (ppm)	Station Name:	Jan	vier	Station Number:	AMS	5 22
Calibration Data Calibration Data Calculated concentration (ppm) (IC) Correction factor (Cc/IC) Statistical Evaluation Limits 0.00 0.00	Start Time (MST):	12	:33	End Time (MST):	16:	31
Calculated concentration (ppm) (Cq) indicated concentration (ppm) (Cq) Correction factor (Cc/lc) Statistical Evaluation Limits 0.00 0.00	Analyzer make:	Therm	no 55i	Analyzer serial #:	11727	50023
(ppm) (cc) (ppm) (tc) Correction factor (Co/c) Statistical Evaluation Lints 0.00 0.00			Calibra	tion Data		
17.17 17.23 0.9968 Correlation Coefficient 0.99988 2095 8.59 8.57 1.0018 Slope 1.003856 0.90-1.10 4.30 4.27 1.0079 Intercept -0.027606 +/0.5 THC Calibration Curve 16.0 14.0 12.0 10.0 10.0 10.0 10.00 8.0 6.0 4.0			Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
17.17 17.23 0.9968 8.59 8.57 1.0018 4.30 4.27 1.0079 Intercept -0.027606 4/0.5 THC Calibration Curve 100 100 100 100 100 100 100 10				Correlation Coefficient	0.999988	≥0.995
4.30 4.27 1.0079 Stope 1.003856 0.90-1.10 Intercept -0.027606 +/-0.5 THC Calibration Curve 100 100 100 100 100 100 100 100 100 100						
Intercept -0.027606 -4.05				Slope	1.003856	0.90 - 1.10
$\begin{array}{c} 20.0\\ 18.0\\ 16.0\\ 14.0\\ 12.0\\ 10.0\\ 8.0\\ 6.0\\ 4.0\\ 2.0\\ 0.0 \end{array}$				Intercept	-0.027606	+/-0.5
14.0 12.0 10.0 8.0 6.0 4.0 2.0 0.0						
14.0 12.0 10.0 8.0 6.0 4.0 2.0 0.0	18.0 —					
12.0 10.0 8.0 6.0 4.0 2.0 0.0	16.0 -					
4.0 2.0 0.0	14.0 —					
4.0 2.0 0.0	E 12.0					
4.0 2.0 0.0	ق 2 10.0					
4.0 2.0 0.0	0 C					
4.0 2.0 0.0	- 0.6 udicat					
0.0						
	2.0 -					
0.0 5.0 10.0 15.0 20.0		/				
	0.0	5	.0	10.0	15.0	20.0
Calculated Conc. (ppm)			Calculated	Conc. (ppm)		



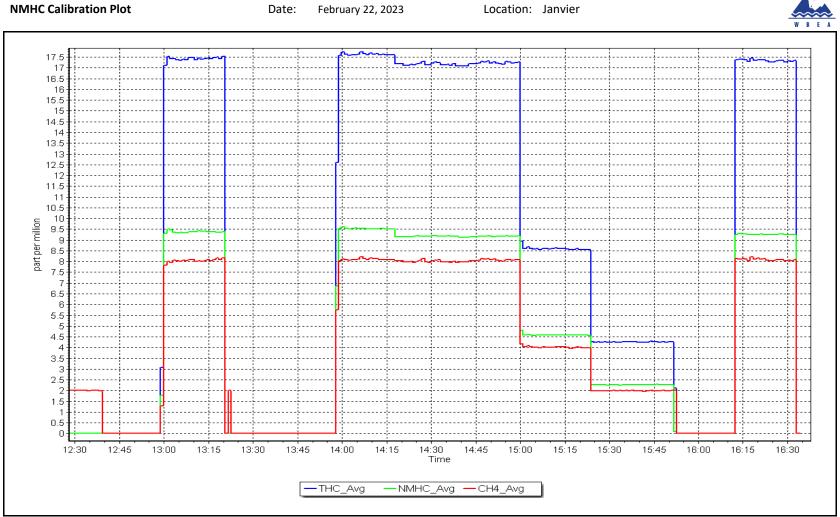
CH₄ Calibration Summary

						Version-01-20
				nformation		
Calibration			ry 22, 2023	Previous Calibration:	January 2	
tation Nar	ne:	Ja	nvier	Station Number:	AMS	5 22
tart Time ((MST):	1	.2:33	End Time (MST):	16:	31
Analyzer m	ake:	The	rmo 55i	Analyzer serial #:	11727	50023
			Calibra	tion Data		
Calculated con (ppm)		Indicated concentration (ppm) (Ic)	n Correction factor (Cc/Ic)	Statistical Eva	luation	<u>Limits</u>
0.0 8.0		0.00 8.06	0.9962	Correlation Coefficient	0.999974	≥0 <i>.995</i>
4.0 2.0		4.00 1.99	1.0044 1.0101	Slope	1.004586	0.90 - 1.10
				Intercept	-0.017766	+/-0.5
;	9.0					
	6.0					
Indicated Conc. (ppm)	5.0					
d Cone	4.0					
idicate	3.0					
	2.0					
:	1.0					
(0.0	2.0	4.0	6.0	8.0	10.0
	0.0	2.0			0.0	10.0
			Calculated	l Conc. (ppm)		



NMHC Calibration Summary

		Station I	nformation		
alibration Date:	February	22, 2023	Previous Calibration:	January 2	17, 2023
tation Name:	Janvier		Station Number:	AMS	5 22
tart Time (MST):	12	:33	End Time (MST):	16:	31
nalyzer make:	Therm	no 55i	Analyzer serial #:	11727	50023
		Calibra	ation Data		
Calculated concentration I (ppm) (Cc)	ndicated concentration (ppm) (Ic)	Correction factor (Cc/lc)	Statistical Evalu	uation	<u>Limits</u>
0.00 9.15	0.00 9.17	 0.9975	Correlation Coefficient	0.999995	≥0.995
4.57	4.58	0.9994	Slana	1.003078	0.90 - 1.10
2.29	2.28	1.0054	Slope	1.003078	0.90 - 1.10
			Intercept	-0.009039	+/-0.5
9.0 8.0 7.0 (E 6.0					
6.0 (bbm) 5.0					
0.4 dicated					
드 2.0					
1.0					
0.0					
0.0	2.0	4.0	6.0	8.0	10.0





NO_X \ NO \ NO₂ Calibration Report

Version-04-2020

Station Information

Station Name: Calibration Date: Start time (MST): Reason: Janvier February 23, 2023 12:21 Routine

Station number: AMS 22 Last Cal Date: January 26, 2023 End time (MST): 17:33

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	L	Serial Number:	4890	

Analyzer Information

Analyzer make: NOX Range (ppb):	Teledyne API T200 0 - 1000 ppb		Analyzer serial #: 71	17	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.015	1.019	NO bkgnd or offset:	-0.3	-0.3
NOX coeff or slope:	1.004	1.009	NOX bkgnd or offset:	0.4	0.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	5.1	5.1

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	1.004514	1.000016
NO _x Cal Offset:	-0.271695	0.328470
NO Cal Slope:	1.003357	0.999486
NO Cal Offset:	-0.891348	-0.011076
NO ₂ Cal Slope:	1.001018	0.999574
NO ₂ Cal Offset:	0.153243	0.324675



$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

				Dilu	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/lc) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.1	-0.3		
as found span	4918	82.3	799.9	799.9	0.0	794.3	790.8	3.5	1.0071	1.0115
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	4918	82.3	799.9	799.9	0.0	799.9	799.5	0.5	1.0000	1.0005
second point	4959	41.2	400.4	400.4	0.0	401.4	400.3	1.0	0.9976	1.0004
third point	4980	20.6	200.2	200.2	0.0	200.7	199.9	0.8	0.9975	1.0015
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	395.8	404.1	797.4	402.1	395.3	1.0031	0.9844
							Average C	orrection Factor	0.9984	1.0008
Corrected As fo	ound NO _x =	794.6 ppb	NO =	790.9 ppb	* = > +/-5%	6 change initiates i	nvestigation	*Percent Chang	ge NO _x =	-1.1%
Previous Respo	nse NO _x =	803.2 ppb	NO =	801.7 ppb				*Percent Chang	ge NO =	-1.4%
Baseline Corr 2	nd pt NO _X =	NA ppb	NO =	NA ppb	As found	$NO_{\rm X} r^2$:		Nx SI:	Nx Int:	
Baseline Corr 3	rd pt NO _X =	NA ppb	NO =	NA ppb	As found	NO r^2 :		NO SI:	NO Int:	
					As found	$1 NO_2 r^2$:		NO2 SI:	NO ₂ Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Co	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) Calibration Limit = 0.95-1.05 As Found Limit = 0.90-1.10	Converter Efficiency Calibration Limit = 96-104%
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	798.0	393.9	404.1	403.9	1.0005	100.0%
2nd GPT point (200 ppb O3)	798.0	599.3	198.7	199.5	0.9960	100.4%
3rd GPT point (100 ppb O3)	798.0	699.7	98.3	98.9	0.9939	100.6%
			ŀ	Verage Correction Factor	0.9968	100.3%

Notes:

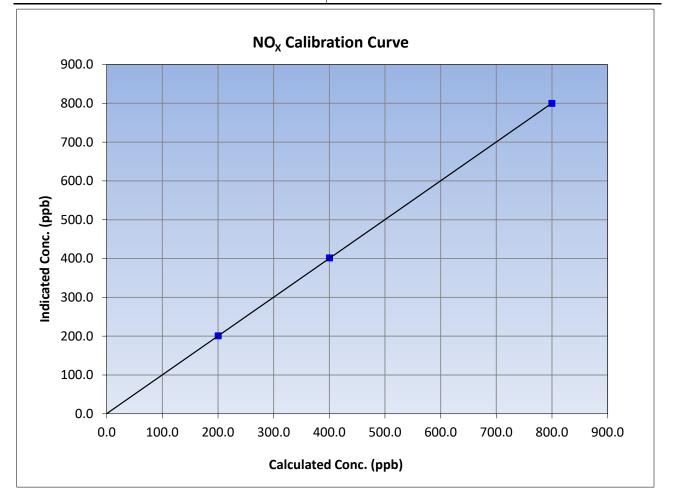
Changed the inlet filter after as founds. Adjusted span only.

Calibration Performed By:



NO_x Calibration Summary

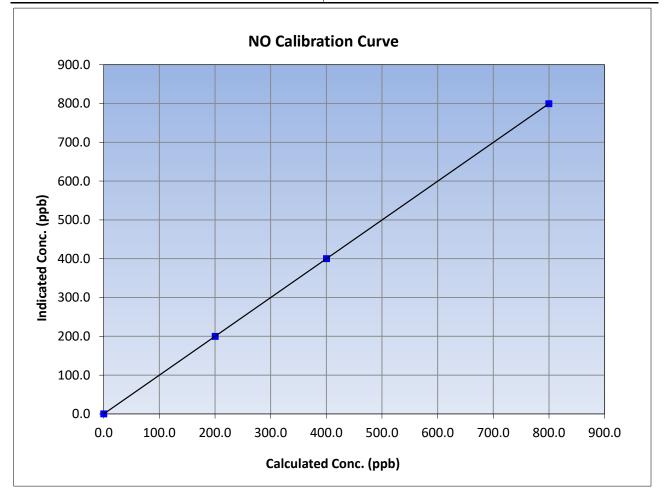
WBEA					Version-04-202
		Station	Information		
Calibration Date:	February	23, 2023	Previous Calibration:	Januar	y 26, 2023
Station Name:	Janvier		Station Number:	AMS 22	
Start Time (MST):	12	:21	End Time (MST):	1	.7:33
Analyzer make:	Teledyne	e API T200	Analyzer serial #:	7	7117
		Calibra	ation Data		
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
799.9	799.9	1.0000	correlation coernelent	0.999998	20.333
400.4	401.4	0.9976	Slopp	1.000016	0.90 - 1.10
200.2	200.7	0.9975	Slope	1.000018	0.90 - 1.10
			Intercept	0.328470	+/-20





NO Calibration Summary

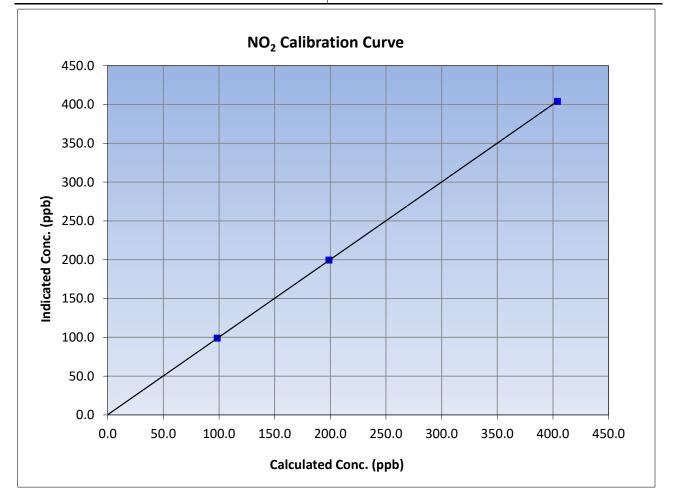
WBEA					Version-04-20
		Station	Information		
Calibration Date:	February	23, 2023	Previous Calibration:	Januai	ry 26, 2023
Station Name:	Janvier		Station Number:	AMS 22	
Start Time (MST):	MST): 12:21		End Time (MST):	:	17:33
Analyzer make:	Teledyne	API T200	Analyzer serial #:		7117
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.1		Correlation Coefficient	1.000000	≥0.995
799.9	799.5	1.0005	correlation coefficient	1.000000	20.995
400.4	400.3	1.0004	Slope	0.999486	0.90 - 1.10
200.2	199.9	1.0015	Siope	0.999480	0.90 - 1.10
			Intercept	-0.011076	+/-20

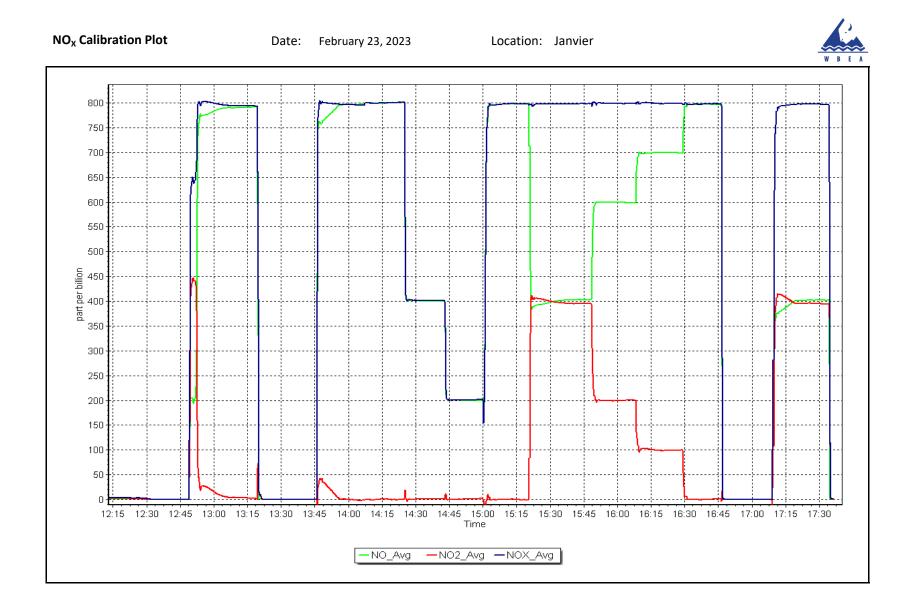




NO₂ Calibration Summary

WBEA					Version-04-202
		Station	Information		
Calibration Date:	February	/ 23, 2023	Previous Calibration:	Januar	y 26, 2023
Station Name:	Jan	ivier	Station Number:	A	VIS 22
Start Time (MST):	12	:21	End Time (MST):	1	7:33
Analyzer make:	Teledyne	e API T200	Analyzer serial #:	7	/117
		Calibra	ation Data		
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
404.1	403.9	1.0005	correlation coernicient	0.999991	20.995
198.7	199.5	0.9960	Slopp	0.999574	0.90 - 1.10
98.3	98.9	0.9939	Slope	0.999574	0.90 - 1.10
			Intercept	0.324675	+/-20







O₃ Calibration Report

Version-01-2020

		Station Infor	mation			
Station Name:	Janvier		Station number:	AMS 22		
Calibration Date:	February 14, 2023	Last Cal Date: January 25, 2023				
Start time (MST):	11:15	End time (MST): 14:07				
Reason:	Routine					
		Calibration St	andards			
O3 generation mode:	Photometer					
Calibrator Make/Model:	Teledyne API T700		Serial Number:	3806		
ZAG Make/Model:	Teledyne API T701		Serial Number:	201		
		Analyzer Info	rmation			
Analyzer make	: Teledyne API T400		Analyzer serial #:	3869		
Analyzer Range						
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>	
Calibration slope:	0.998486	1.000057	Backgd or Offset:	-2.0	-2.0	
Calibration intercept:	0.240000	0.440000	Coeff or Slope:	1.011	1.011	
		O ₃ Calibratio	on 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	
Set Point as found zero		•				
	(sccm)	Voltage Drive	concentration (ppb) (Cc)	(ppm) (Ic)	<i>Limit = 0.95-1.05</i>	
as found zero	(sccm) 5000	Voltage Drive 800.0	concentration (ppb) (Cc)	(ppm) (Ic) -0.3	Limit = 0.95-1.05	
as found zero as found span	(sccm) 5000	Voltage Drive 800.0	concentration (ppb) (Cc)	(ppm) (Ic) -0.3	Limit = 0.95-1.05	
as found zero as found span as found 2nd point	(sccm) 5000	Voltage Drive 800.0	concentration (ppb) (Cc)	(ppm) (Ic) -0.3	Limit = 0.95-1.05	
as found zero as found span as found 2nd point as found 3rd point	(sccm) 5000 4893	Voltage Drive 800.0 897.4	concentration (ppb) (Cc) 0.0 400.0	(ppm) (Ic) -0.3 400.5	Limit = 0.95-1.05	
as found zero as found span as found 2nd point as found 3rd point calibrator zero	(sccm) 5000 4893 5000	Voltage Drive 800.0 897.4 800.0	concentration (ppb) (Cc) 0.0 400.0 0.0 0.0	(ppm) (Ic) -0.3 400.5 0.2	Limit = 0.95-1.05	
as found zero as found span as found 2nd point as found 3rd point calibrator zero high point	(sccm) 5000 4893 5000 4893	Voltage Drive 800.0 897.4 800.0 897.4	concentration (ppb) (Cc) 0.0 400.0 0.0 0.0 400.0	(ppm) (Ic) -0.3 400.5 0.2 400.3	Limit = 0.95-1.05	
as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point	(sccm) 5000 4893 5000 4893 4893	Voltage Drive 800.0 897.4 800.0 897.4 752.6	concentration (ppb) (Cc) 0.0 400.0 0.0 0.0 400.0 200.0	(ppm) (Ic) -0.3 400.5 	Limit = 0.95-1.05	
as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point third point	(sccm) 5000 4893 5000 4893 4893 4893 4893	Voltage Drive 800.0 897.4 800.0 897.4 752.6 653.0	concentration (ppb) (Cc) 0.0 400.0 0.0 400.0 200.0 100.0	(ppm) (Ic) -0.3 400.5 0.2 400.3 200.7 100.6	Limit = 0.95-1.05	
as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point third point as left zero	(sccm) 5000 4893 5000 4893 4893 4893 4893 5000	Voltage Drive 800.0 897.4 800.0 897.4 752.6 653.0 800.0	concentration (ppb) (Cc) 0.0 400.0 0.0 400.0 200.0 100.0 0.0 400.0	(ppm) (Ic) -0.3 400.5 0.2 400.3 200.7 100.6 0.4	Limit = 0.95-1.05	
as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point third point as left zero	(sccm) 5000 4893 5000 4893 4893 4893 4893 5000	Voltage Drive 800.0 897.4 800.0 897.4 752.6 653.0 800.0 800.0 897.4	concentration (ppb) (Cc) 0.0 400.0 0.0 400.0 200.0 100.0 0.0 400.0 Average	(ppm) (Ic) -0.3 400.5 0.2 400.3 200.7 100.6 0.4 402.0	Limit = 0.95-1.05	
as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point third point as left zero as left span Baseline Corr As found:	(sccm) 5000 4893 5000 4893 4893 4893 4893 5000 4816	Voltage Drive 800.0 897.4 800.0 897.4 752.6 653.0 800.0 800.0 897.4 Previous response	concentration (ppb) (Cc) 0.0 400.0 0.0 400.0 200.0 100.0 0.0 400.0 Average 399.6	(ppm) (Ic) -0.3 400.5 0.2 400.3 200.7 100.6 0.4 402.0 ge Correction Factor *% change	Limit = 0.95-1.05	
as found zero as found span as found 2nd point as found 3rd point calibrator zero high point second point third point as left zero as left span	(sccm) 5000 4893 5000 4893 4893 4893 4893 5000 4816 400.8	Voltage Drive 800.0 897.4 800.0 897.4 752.6 653.0 800.0 800.0 897.4	concentration (ppb) (Cc) 0.0 400.0 0.0 400.0 200.0 100.0 0.0 400.0 Average 399.6	(ppm) (Ic) -0.3 400.5 0.2 400.3 200.7 100.6 0.4 402.0 ge Correction Factor	Limit = 0.95-1.05	

Notes:

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

Calibration Performed By:

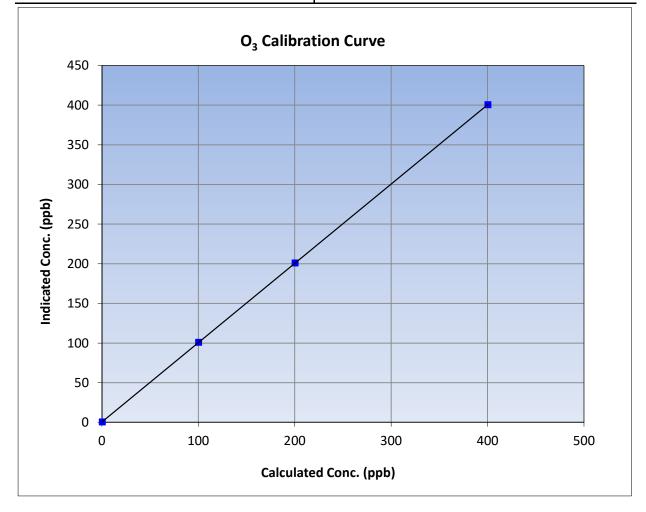
Rene Chamberland



O₃ Calibration Summary

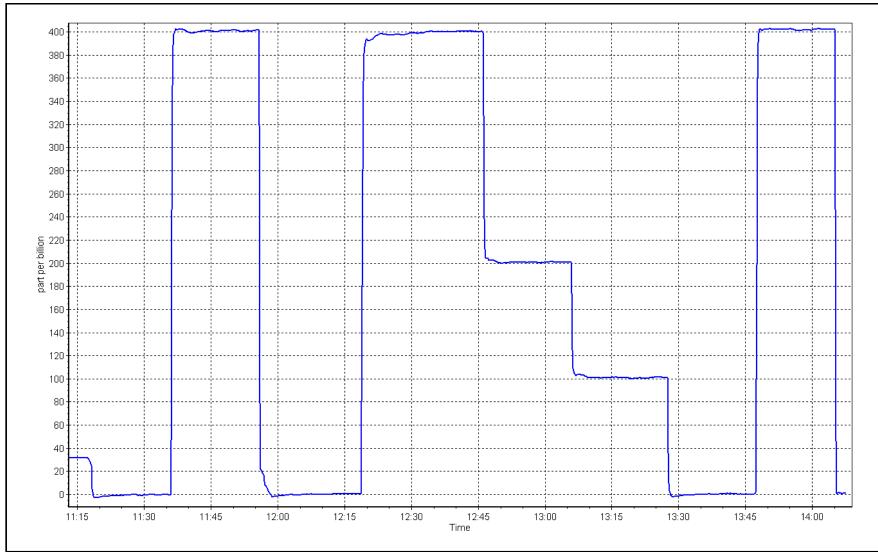
WBEA			Version-01-2020						
Station Information									
Calibration Date:	February 14, 2023	Previous Calibration:	January 25, 2023						
Station Name:	Janvier	Station Number:	AMS 22						
Start Time (MST):	11:15	End Time (MST):	14:07						
Analyzer make:	Teledyne API T400	Analyzer serial #:	3869						
· · · ·	Teledyne API T400		-						

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
400.0	400.3	0.9993	correlation coefficient	0.999996	20.333
200.0	200.7	0.9965	Slope	1.000057	0.90 - 1.10
100.0	100.6	0.9940	Slope	1.000057	0.30 - 1.10
			Intercept	0.440000	+/- 5











T640 PM_{2.5} CALIBRATION

W D E A						Version-01-2023
		Station Information	ı			
Station Name:	Janvier		Station number:	AMS 22		
Calibration Date:	February 24, 2023		Last Cal Date:	January 26,	2023	
Start time (MST):	14:17		End time (MST):	16:09		
Analyzer Make:	Teledyne API T640		S/N:	325		
Particulate Fraction:	PM2.5		5,11.	525		
Flow Meter Make/Model:	Delta Cal		S/N:	1450		
Temp/RH standard:	Delta Cal		S/N:	1450		
		Monthly Calibration T	est			
<u>Parameter</u>	<u>As found</u>	Measured	<u>As left</u>		<u>Adjusted</u>	(Limits)
T (°C)	-14.4	-14.7	-14.4			+/- 2 °C
P (mmHg)	716.4	714.2	716.4			+/- 10 mmHg
flow (LPM)	5.01	5.07	5.01			+/- 0.25 LPM
Leak Test:	Date of check:	February 24, 2023	Last Cal Date:	January 2	6, 2023	
	PM w/o HEPA:	2.6	PM w/ HEPA:	0		<0.2 ug/m3
Note: this leak check will be	e completed before the	quarterly work and will	serve as the pre mai	ntenance le	ak check	
Inlet cleaning :	Inlet Head					
D		Quarterly Calibration				<i>(</i> , , , , , , , , , , , , , , , , , , ,
Parameter	<u>As found</u>	Post maintenance	<u>As left</u>		Adjusted	(Limits)
PMT Peak Test						11.3 +/- 0.5
Post-maintenanc	e leak check:	PM w/o HEPA:		w/ HEPA:		
Date Optical Cham	nber Cleaned:	January 26,	2023	-		<0.2 ug/m3
Disposable Filte	er Changed:	January 26,	2023			
			_			
		Annual Maintenanc	e			
Date Sample Tul	-	October 6,	2022			
Date RH/T Sense	or Cleaned:	October 6,	2022			
				4 4		
Notes:		vermeu now, tempera	ture, and pressure. Leak	ιεςι μαςςευ.		
Calibration by:	Rene Chamberland					



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS23 FORT HILLS FEBRUARY 2023

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

March 31, 2023



SO₂ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Fort Hills February 1, 2023 10:42 Routine		Station number: Last Cal Date: End time (MST):	AMS23 January 4, 2023 13:41	
		Calibration St	andards		
Cal Gas Concentration:	49.76	ppm	Cal Gas Exp Date:	January 5, 2025	
Cal Gas Cylinder #:	CC281425		Dave Cas Eve Data	NI / A	
Removed Cal Gas Conc:	49.76	ppm	Rem Gas Exp Date:	N/A	
Removed Gas Cyl #:			Diff between cyl:	451	
Calibrator Make/Model: ZAG Make/Model:	API T700 API T701		Serial Number: Serial Number:	451 5611	
	APITIOI		Serial Number.	5011	
		Analyzer Info	rmation		
Analyzer make Analyzer Range			Analyzer serial #:	1160290012	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.999236	0.997162	Backgd or Offset:	18.1	18.1
Calibration intercept:	-0.603450	-0.103174	Coeff or Slope:	1.048	1.048
		SO ₂ Calibratio	on Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration ((ppb) (Ic)	Correction factor (Cc/ Limit = 0.95-1.05
as found zero	5000	0.0	0.0	-0.1	
as found span	4920	80.3	799.1	797.8	1.002
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.2	
high point	4920	80.3	799.1	796.8	1.003
second point	4960	40.2	400.1	398.9	1.003
third point	4980	20.1	200.0	198.9	1.006
as left zero	5000	0.0	0.0	0.0	
as left span	4920	80.3	799.1 Averag	800.1 ge Correction Factor	0.999
Baseline Corr As found:	797.90	Previous response		*% change	0.0%
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.

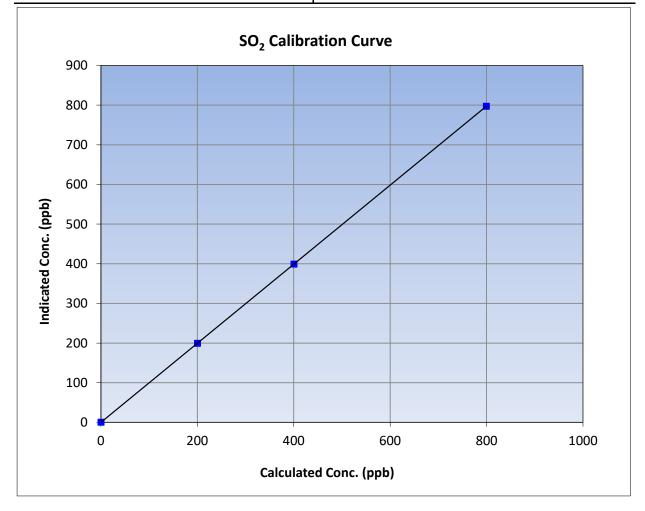
Calibration Performed By:

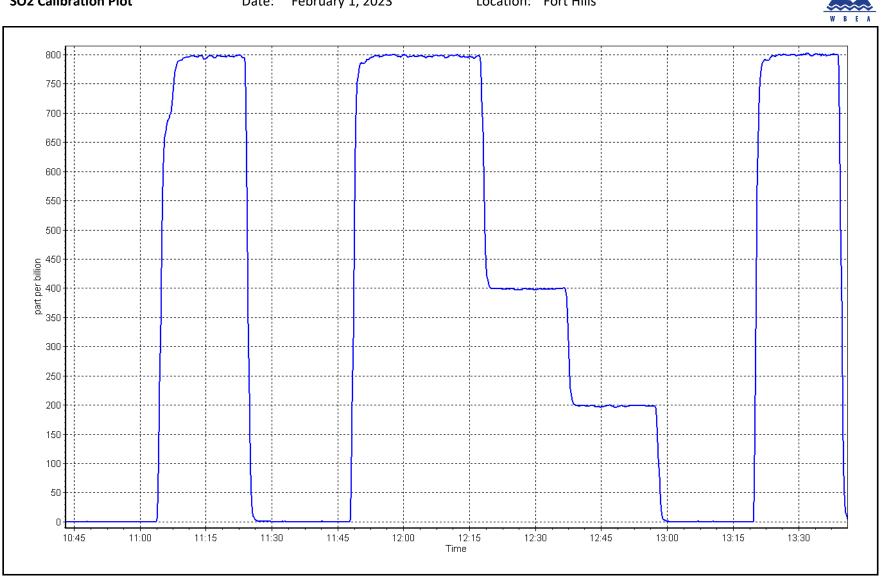


SO₂ Calibration Summary

Station Information								
Calibration Date:	February 1, 2023	Previous Calibration:	January 4, 2023					
Station Name:	Fort Hills	Station Number:	AMS23					
Start Time (MST):	10:42	End Time (MST):	13:41					
Analyzer make:	Thermo 43i	Analyzer serial #:	1160290012					

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>
0.0	0.2		Correlation Coefficient	0.999999	≥0.995
799.1	796.8	1.0029	correlation coefficient	0.9999999	20.995
400.1	398.9	1.0029	Slope	0.997162	0.90 - 1.10
200.0	198.9	1.0057	Slope	0.997102	0.90 - 1.10
			Intercept	-0.103174	+/-30







TRS Calibration Report

WBEA				•	V
		Station Info	rmation		Version-11-2
Station Name: Calibration Date: Start time (MST): Reason:	Fort Hills February 13, 2023 10:36 Routine	Station mo	Station number: Last Cal Date: End time (MST):	AMS23 January 10, 2023 14:30	
		Calibration S	tandards		
Cal Gas Concentration:	5.20	ppm	Cal Gas Exp Date:	February 5, 2024	
Cal Gas Cylinder #: Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model: ZAG Make/Model:	CC517372 5.20 N/A API T700 API T701	ppm	Rem Gas Exp Date: Diff between cyl: Serial Number: Serial Number:	N/A 451 5611	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	Thermo 43iQ TLE CDN-101 0 - 100 ppb	, mary 201 million	Analyzer serial #: Converter serial #:	12113311965 594	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope: Calibration intercept:	0.988739 0.581876	0.998176 -0.098303	Backgd or Offset: Coeff or Slope:	0.96 0.714	0.96 0.714
		TRS As Fou	nd Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjuste Correction facto (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	79.6	1.006
as found 2nd point	4962	38.5	40.0	39.6	1.013
as found 3rd point	4981	19.2	19.9	20.1	0.997
new cylinder response					
		TRS Calibrat	ion Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction facto (Cc/Ic) Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	0.1	
high point	4923	77.0	80.0	79.8	1.003
second point	4962	38.5	40.0	39.9	1.002
third point	4981	19.2	19.9	19.5	1.023
as left zero	5000	0.0	0.0	0.1	
as left span	4923	77.0	80.0	80.1	0.999
602 Scrubber Check	4922	78.3	783.0	0.0	
Date of last scrubber cha				Ave Corr Factor	1.009
Date of last converter eff	ficiency test:				efficiency
Baseline Corr As found:	79.5	Prev response:	79.68	*% change:	-0.2%
buschine con As round.		AF Slope:		AF Intercept:	0.121822

Changed the inlet filter after as founds, ran a SO2 scrubber check after calibrator zero. No Notes: adjustments made. There are random spikes that are occurring, suspecting a problem with the calibrator, the dilution reading goes up during the spikes. Max Farrell

Calibration Performed By:

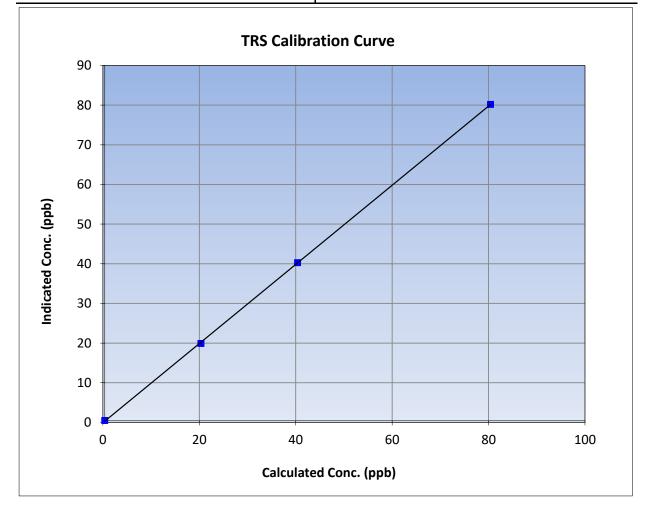
CALS 421

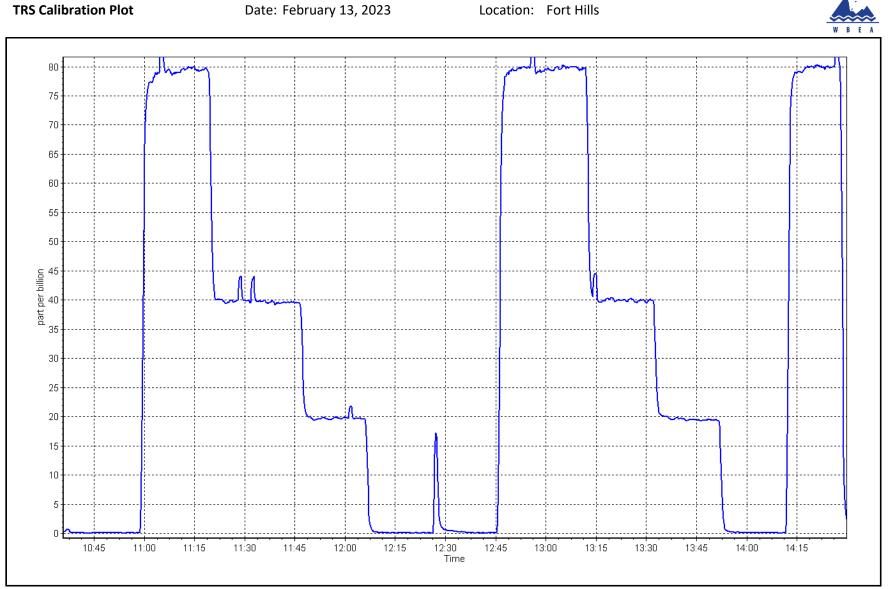


TRS Calibration Summary

WBEA			Version-11-2021
	Statio	on Information	
Calibration Date:	February 13, 2023	Previous Calibration:	January 10, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	10:36	End Time (MST):	14:30
Analyzer make:	Thermo 43iQ TLE	Analyzer serial #:	12113311965

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999959	≥0.995
80.0	79.8	1.0025	correlation coefficient	0.555555	20.333
40.0	39.9	1.0024	Slope	0.998176	0.90 - 1.10
19.9	19.5	1.0230	Slope	0.998170	0.90 - 1.10
			Intercept	-0.098303	+/-3







TRS Calibration Report

					Version-11-2
		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Fort Hills February 14, 2023 13:00 Maintenance		Station number: Last Cal Date: End time (MST):	AMS23 February 13, 2023 16:23	
		Calibration S	tandards		
Cal Gas Concentration:	5.20	ppm	Cal Gas Exp Date:	February 5, 2024	
Cal Gas Cylinder #: Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model: ZAG Make/Model:	CC517372 5.20 N/A API T700 API T701	ppm	Rem Gas Exp Date: Diff between cyl: Serial Number: Serial Number:	N/A 451 5611	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	Thermo 43iQ TLE CDN-101 0 - 100 ppb		Analyzer serial #: Converter serial #:	12113311965 594	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope: Calibration intercept:	0.998176 -0.098303	1.004890 -0.158196	Backgd or Offset: Coeff or Slope:	0.96 0.714	0.96 0.714
		TRS As Four	nd Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjuste Correction facto (Cc/(Ic-AFzero)) Limit = 0.90-1.10
as found zero	5000	0.0	0.0	0.2	
as found span	4923	77.0	80.0	80.3	0.999
as found 2nd point	4962	38.5	40.0	40.0	1.005
as found 3rd point	4981	19.2	19.9	19.6	1.028
new cylinder response					
		TRS Calibrat	ion Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction facto (Cc/Ic) Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	0.1	
high point	4923	77.0	80.0	80.3	0.996
second point	4962	38.5	40.0	40.1	0.997
third point	4981	19.2	19.9	19.5	1.023
as left zero	5000	0.0	0.0	0.1	
as left span	4923	77.0	80.0	80.0	1.000
	4922	78.3	783.0	0.0	
				Ave Corr Factor	1.006
Date of last scrubber cha	-				
SO2 Scrubber Check Date of last scrubber cha Date of last converter eff	-				efficiency
Date of last scrubber cha	-	Prev response:	79.76		
Date of last scrubber chai Date of last converter eff	iciency test:	Prev response: AF Slope:	79.76 1.003318		efficiency

 Internal pump randomly drops in flow, turned off the internal pump and hooked up an external

 Notes:
 pump after multipoint as founds. No adjustments made. More spikes detected on the third point, will monitor the instrument.

Calibration Performed By:

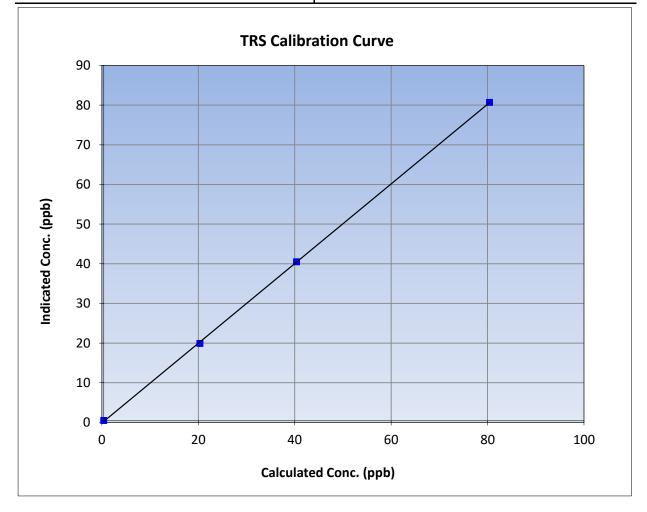
Max Farrell

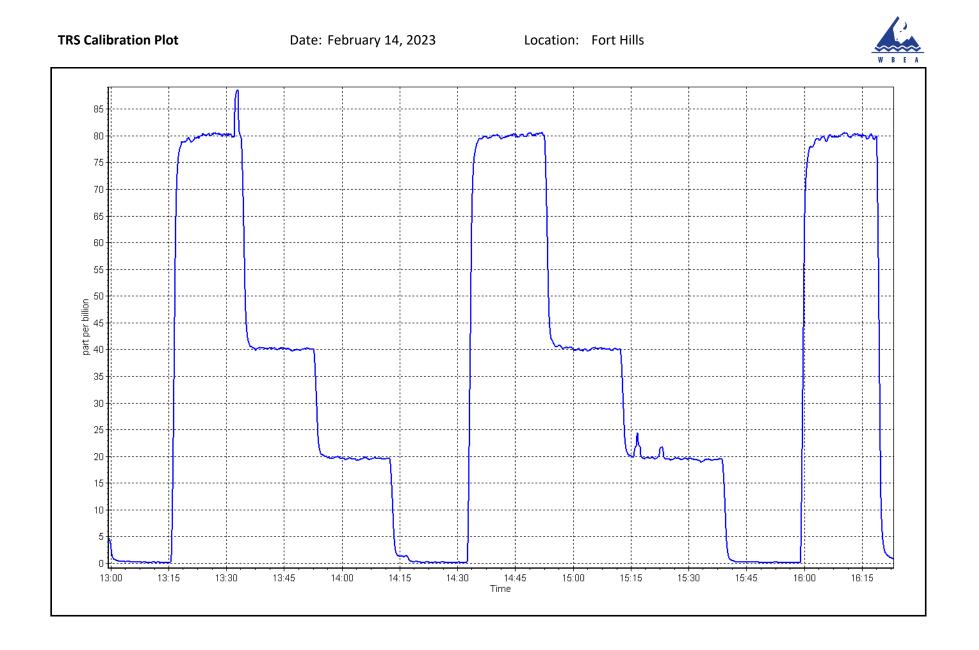


TRS Calibration Summary

WBEA			Version-11-2021
	Statio	on Information	
Calibration Date:	February 14, 2023	Previous Calibration:	February 13, 2023
Station Name:	Fort Hills	Station Number:	AMS23
Start Time (MST):	13:00	End Time (MST):	16:23
Analyzer make:	Thermo 43iQ TLE	Analyzer serial #:	12113311965

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999936	≥0.995
80.0	80.3	0.9963	correlation coefficient	0.999930	20.333
40.0	40.1	0.9974	Slope	1.004890	0.90 - 1.10
19.9	19.5	1.0230	Slope	1.004890	0.90 - 1.10
			Intercept	-0.158196	+/-3







THC / CH_4 / NMHC Calibration Report

WBEA						Ver	sion-01-202
			Station	Information			
Station Name: Calibration Date: Start time (MST): Reason:	Fort Hills February 1, 2023 10:42 Routine		Station number: AMS23 Last Cal Date: January 18, 2023 End time (MST): 13:41				
			Calibrati	on Standards			
Gas Cert Reference:		CC281425		Cal Gas Expiry Date: Ja	nuary 5, 2025		
CH4 Cal Gas Conc.	500.2	ppm		CH4 Equiv Conc.	1070.6	ppm	
C3H8 Cal Gas Conc.	207.4	ppm					
Removed Gas Cert:		N/A		Removed Gas Expiry: N	/A		
Removed CH4 Conc.	500.2	ppm		CH4 Equiv Conc.	1070.6	ppm	
Removed C3H8 Conc.	207.4	ppm		Diff between cyl (THC):			
Diff between cyl (CH ₄):	:			Diff between cyl (NM):			
Calibrator Model:	API T700			Serial Number: 45	51		
ZAG make/model:	API T701			Serial Number: 56	511		
			Analyzer	Information			
Analyzer make: THC Range (ppm):				Analyzer serial #: 12	193585648		
NMHC Range (ppm):				CH4 Range (ppm): 0	- 10 ppm		
	<u>Start</u>		<u>Finish</u>		<u>Start</u>	Fi	nish
CH4 SP Ratio	: 2.33E-04	. 2	2.28E-04	NMHC SP Ratio:	5.01E-05	5.0	1E-05
CH4 Retention time:	: 13.0		13.0	NMHC Peak Area:	180258	18	0258

THC Calibration Data								
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (C	c) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05			
as found zero	5000	0.0	0.00	0.00				
as found span	4920	80.3	17.19	17.65	0.974			
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	17.29	0.995			
second point	4960	40.2	8.61	8.60	1.000			
third point	4980	20.1	4.30	4.32	0.996			
as left zero	5000	0.0	0.00	0.00				
as left span	4920	80.3	17.19	17.33	0.992			
			A	verage Correction Factor	0.997			
Baseline Corr AF:	17.65	Prev response	17.18	*% change	2.7%			
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:				
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation			



THC / CH_4 / NMHC Calibration Report

Version-01-2020

NMHC Calibration Data							
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (0	Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05		
as found zero	5000	0.0	0.00	0.00			
as found span	4920	80.3	9.16	9.36	0.979		
as found 2nd point							
as found 3rd point							
new cylinder response							
calibrator zero	5000	0.0	0.00	0.00			
high point	4920	80.3	9.16	9.20	0.996		
second point	4960	40.2	4.59	4.62	0.993		
third point	4980	20.1	2.29	2.34	0.980		
as left zero	5000	0.0	0.00	0.00			
as left span	4920	80.3	9.16	9.18	0.998		
			A	Average Correction Factor	0.990		
Baseline Corr AF:	9.36	Prev response	9.15	*% change	2.2%		
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:			
Baseline Corr 3rd AF:	NA	AF Correlation:		<pre>* = > +/-5% change initiates investigation</pre>			

СЦЛ	Cal	ibration	Data
CH4	Cai	INIALIOII	Dala

		CIT+ Calibra	tion Data				
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (C	c) Ind conc (ppm) (lc)	CF <i>Limit=</i> 0.95-1.05		
as found zero	5000	0.0	0.00	0.00			
as found span	4920	80.3	8.03	8.29	0.969		
as found 2nd point							
as found 3rd point							
new cylinder response							
calibrator zero	5000	0.0	0.00	0.00			
high point	4920	80.3	8.03	8.08	0.994		
second point	4960	40.2	4.02	3.99	1.009		
third point	4980	20.1	2.01	1.98	1.015		
as left zero	5000	0.0	0.00	0.00			
as left span	4920	80.3	8.03	8.14	0.987		
			A	verage Correction Factor	1.006		
Baseline Corr AF:	8.29	Prev response	8.03	*% change	3.1%		
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:			
Baseline Corr 3rd AF:	NA	AF Correlation:		<pre>* = > +/-5% change initiates investigation</pre>			
		Calibration	Statistics				
		<u>Start</u>		Finish			
THC Cal Slope:		0.998822		1.005188			
THC Cal Offset:		0.006016		-0.012392			
CH4 Cal Slope:		1.001922		1.007325			
CH4 Cal Offset:		-0.016245		-0.029242			
NMHC Cal Slope:		0.996115		1.003089			
NMHC Cal Offset:		0.022460		0.017251			

Notes:

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

Calibration Performed By:

Max Farrell



THC Calibration Summary

		Station I	nformation			
alibration Date:	February 1, 2023		Previous Calibration:	January	January 18, 2023	
tation Name:	Fort Hills		Station Number:	AM	S23	
tart Time (MST):	10	:42	End Time (MST):	13:	41	
nalyzer make:	Therr	no 55i	Analyzer serial #:	11935	85648	
		Calibra	tion Data			
alculated concentratior (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	c) Statistical Evaluation		<u>Limits</u>	
0.00	0.00		Correlation Coefficient	0.999989	≥0.995	
17.19	17.29	0.9946				
8.61 4.30	<u>8.60</u> 4.32	1.0005 0.9960	Slope	1.005188	0.90 - 1.10	
4.50	7.52	0.5500	Intercept	-0.012392	+/-0.5	
20.0						
				/		
16.0						
14.0						
E 12.0						
(bbm) 12.0 bbm) 10.0 COUC						
— 0.8 dted C						
0.8 udicated						
4.0						
2.0						
0.0		.0	10.0	15.0	20.0	
0.0	5	.0	10.0	15.0	20.0	



CH₄ Calibration Summary

		Station I	nformation		Version-01-2020
Calibration Date:	Februar	ry 1, 2023	Previous Calibration:	January :	18, 2023
Station Name:		Fort Hills		AMS23	
Start Time (MST):	10):42	End Time (MST):	13:	
Analyzer make:		mo 55i	Analyzer serial #:	11935	85648
		Calibra	tion Data		
Calculated concentrat (ppm) (Cc)	ion Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999921	≥0.995
8.03	8.08	0.9937		0.000021	
4.02	<u>3.99</u> 1.98	1.0089 1.0150	Slope	1.007325	0.90 - 1.10
2.01	1.30	1.0130	Inde	0.020242	105
			Intercept	-0.029242	+/-0.5
9.0		CH ₄ Calibration	n Curve		
8.0 -					
7.0					
6.0 -					
(mdd 5.0 - couc 4.0 -					
uoj 4.0 -					
Indicated -					
2.0 -					
1.0 -					
0.0					
0.	0 2.0	4.0	6.0	8.0	10.0
		Calculated	l Conc. (ppm)		

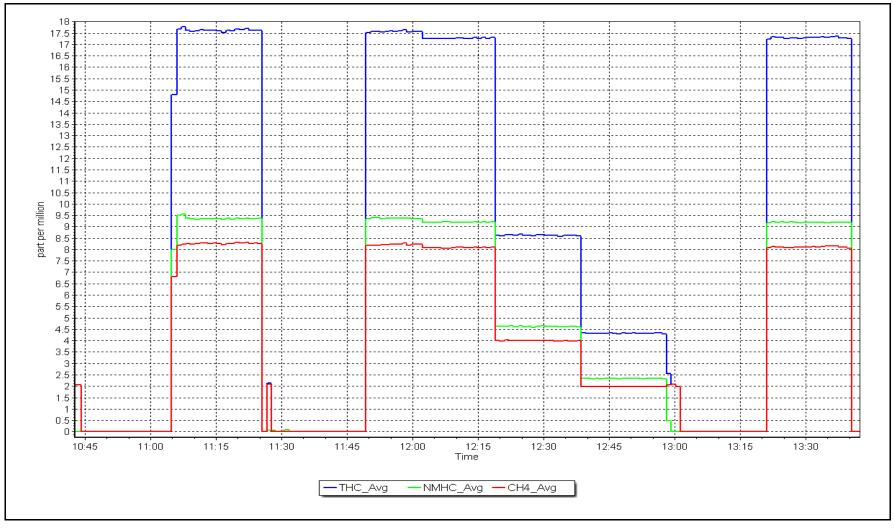


NMHC Calibration Summary

			Station I	nformation					
Calibration Da	Date: February 1, 2023		Previous Cal	ibration:	January 18, 2023				
Station Name	he: Fort Hills		Station Number:		AMS	523			
Start Time (N	1ST):	r): 10:42		End Time (MST):		13:	41		
Analyzer mak	ke:	Ther	mo 55i	Analyzei	r serial #:	119358	35648		
			Calibra	ation Data					
	Calculated concentration Indicated concentration (ppm) (Cc) (ppm) (Ic)			5	Statistical Evalu	ation	<u>Limits</u>		
0.00		0.00		Correlation Co	oefficient	0.999981	≥0.995		
9.16		9.20	0.9957						
2.29		2.34	0.9952	- Slope		1.003089	0.90 - 1.10		
		-		- Interce	pt	0.017251	+/-0.5		
9. 8. 7. 6. 5. 4. 3.	0 - 0 - 0 -								
U 4.	0 -								
.5 Indica	0 -								
2.	0 -								
1.	0 +								
0.					0				
	0.0 2.0 4.0 6.0 8.0 10.0 Calculated Conc. (ppm)								

NMHC Calibration Plot







Station Name:

Reason:

Calibration Date:

Start time (MST):

Fort Hills

10:01

Routine

February 17, 2023

Wood Buffalo Environmental Association

$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

Station Information

Station number: AMS23 Last Cal Date: January 24, 2023 End time (MST): 14:49

NO Gas Cylinder #:	CC332703		Cal Gas Expiry Date: Janua	ary 28, 202	4
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 T75	0	Serial Number:	275	
ZAG make/model:	Teledyne API T751	.H	Serial Number:	307	

Analyzer make: NOX Range (ppb):			Analyzer serial #: 1152430007					
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>			
NO coeff or slope:	1.527	1.565	NO bkgnd or offset:	4.3	4.4			
NOX coeff or slope:	0.997	0.997	NOX bkgnd or offset:	4.7	4.8			
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	225.4	230.3			

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.999637	1.000236
NO _x Cal Offset:	0.644160	0.184305
NO Cal Slope:	0.999282	0.999895
NO Cal Offset:	-0.256715	-0.496226
NO ₂ Cal Slope:	1.001046	0.995394
NO ₂ Cal Offset:	0.284247	-0.512082



$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

				Dilu	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/lc) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	0.0	-0.3		
as found span	4920	80.5	800.2	800.2	0.0	781.1	777.7	3.4	1.024	1.029
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	0.0	-0.3		
high point	4920	80.5	800.2	800.2	0.0	799.9	799.4	0.5	1.000	1.001
second point	4960	40.2	399.6	399.6	0.0	401.3	400.1	1.2	0.996	0.999
third point	4980	20.1	199.8	199.8	0.0	199.7	197.9	1.8	1.000	1.010
as left zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.2	-0.3		
as left span	4920	80.5	800.2	435.3	364.9	799.7	435.1	364.5	1.001	1.000
							Average C	orrection Factor	0.999	1.003
Corrected As fo	ound NO _x =	781.4 ppb	NO =	777.7 ppb	* = > +/-59	% change initiates i	nvestigation	*Percent Chang	ge NO _x =	-2.4%
Previous Respo	nse NO _x =	800.5 ppb	NO =	799.3 ppb				*Percent Chang	ge NO =	-2.8%
Baseline Corr 2	nd pt NO _X =	NA ppb	NO =	NA ppb	As found	d $NO_X r^2$:		Nx SI:	Nx Int:	
Baseline Corr 3	rd 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 ₂ Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Co	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) Calibration Limit = 0.95-1.05 As Found Limit = 0.90-1.10	Converter Efficiency Calibration Limit = 96-104%
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	798.3	433.4	364.9	362.7	1.006	99.4%
2nd GPT point (200 ppb O3)	798.3	616.5	181.8	180.7	1.006	99.4%
3rd GPT point (100 ppb O3)	798.3	704.2	94.1	92.7	1.015	98.5%
			A	Average Correction Factor	1.009	99.1%

Notes:

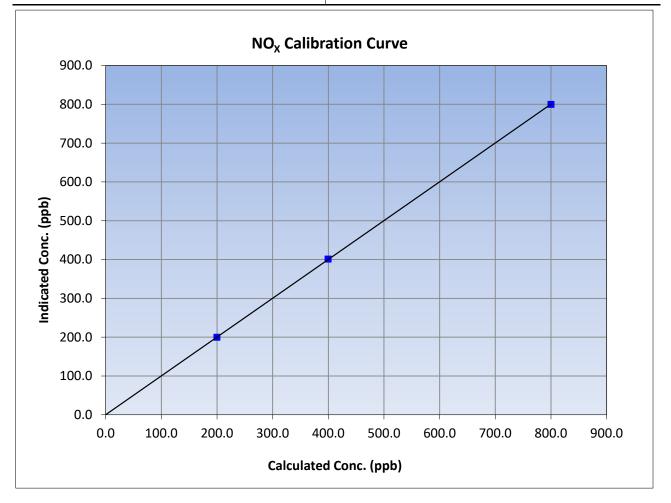
Changed the inlet filter after as founds. Adjusted the span only.

Calibration Performed By:



NO_x Calibration Summary

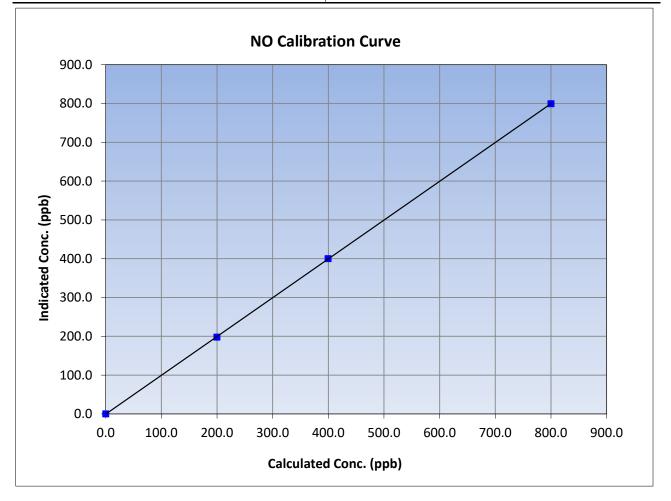
WBEA					Version-04-20	
		Station	Information			
Calibration Date:	February	17, 2023	Previous Calibration:	January	24, 2023	
Station Name:	Fort	Hills	Station Number:	AM	S23	
Start Time (MST):	10	:01	End Time (MST):	14:49		
Analyzer make:	alyzer make: Thermo 42i			Analyzer serial #: 11524		
		Calibra	ation Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	<u>Limits</u>		
0.0	-0.3		Correlation Coefficient	0.999992	≥0.995	
800.2	799.9	1.0003	correlation coernelent	0.555552	20.333	
399.6	401.3	0.9957	Slope	1.000236	0.90 - 1.10	
199.8	199.7	199.7 1.0005		1.000250	0.90 - 1.10	
			Intercept	0.184305	+/-20	





NO Calibration Summary

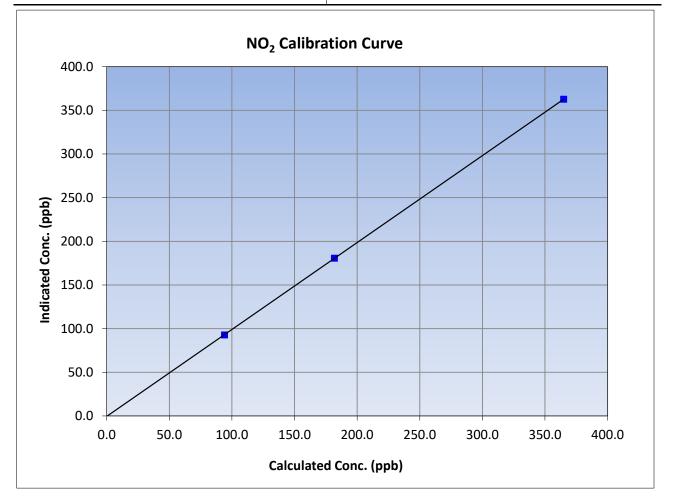
WBEA					Version-04-20	
		Station	Information			
Calibration Date:	February	17, 2023	Previous Calibration:	January	24, 2023	
Station Name:	Fort	Hills	Station Number:	AM	S23	
Start Time (MST):	10	:01	End Time (MST):	14:49		
Analyzer make:	nalyzer make: Thermo 42i			Analyzer serial #: 11524		
		Calibra	ation Data			
Calculated concentration Indicated concentration (ppb) (Cc) (ppb) (Ic) Correction factor (Cc/Ic) Statistical Evaluation				<u>Limits</u>		
0.0	0.0		Correlation Coefficient	0.999991	≥0.995	
800.2	799.4	1.0010	correlation coernelent	0.5555551	20.995	
399.6	400.1	0.9987	Slope	0.999895	0.90 - 1.10	
199.8	197.9	1.0096	Slope	0.999695	0.90 - 1.10	
			Intercept	-0.496226	+/-20	

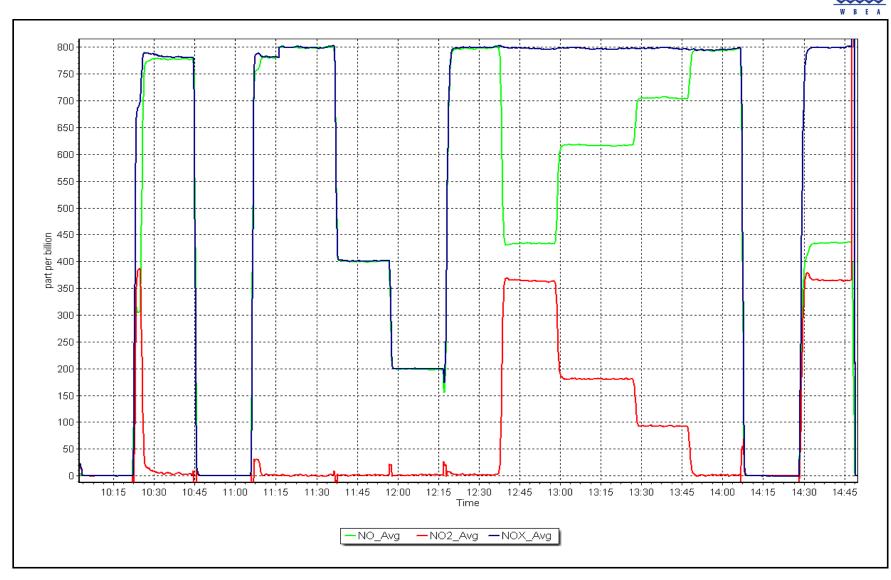




NO₂ Calibration Summary

WBEA					Version-04-202	
		Station	Information			
Calibration Date:	February	17, 2023	Previous Calibration:	January	24, 2023	
Station Name:	Fort	Hills	Station Number:	AM	S23	
Start Time (MST):	10	:01	End Time (MST):	14	:49	
Analyzer make:	Therr	no 42i	Analyzer serial #:	30007		
		Calibra	ation Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	c) Statistical Evaluation <u>Lim</u>			
0.0	-0.3		Correlation Coefficient	0.999996	≥0.995	
364.9	362.7	1.0061	correlation coernelent	0.5555550	20.999	
181.8	180.7	1.0061	Slope	0.995394	0.90 - 1.10	
94.1	92.7 1.0151		Slope	0.995594	0.30 - 1.10	
			Intercept	-0.512082	+/-20	





Location: Fort Hills



NO_x Cal Offset:

NO Cal Slope:

NO Cal Offset:

NO₂ Cal Slope:

NO₂ Cal Offset:

Wood Buffalo Environmental Association

$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

			Station Ir	nformation				
Station Name: Calibration Date: Start time (MST): Reason:	Fort Hills February 23, 2023 10:56 Maintenance	Pump o	Station number: AMS23 Last Cal Date: February 17, 2023 End time (MST): 17:40 Pump change					
			Calibratio	n 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	P P		Removed Gas Exp Date:	-	F F		
, 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	1		Serial Number:	275			
ZAG make/model:	Teledyne API T751	4		Serial Number:	307			
			Analyzer I	nformation				
Analyzer make:	Thermo 42i			Analyzer serial #:	1152430007			
NOX Range (ppb):								
0 (11)			ettk		Charact	E ta ia h		
	<u>Start</u>	-	Finish		<u>Start</u>	<u>Finish</u>		
NO coeff or slope			1.815	NO bkgnd or offset:	4.4	5.1		
NOX coeff or slope			0.996	NOX bkgnd or offset:	4.8	5.6		
NO2 coeff or slope	: 1.000		1.000	Reaction cell Press:	266.6	266.3		
			Calibratio	n Statistics				
		:	<u>Start</u>		<u>Finish</u>			
NO _x Cal Slope	:	1.	000236		1.004364			

0.184305

0.999895

-0.496226

0.995394

-0.512082

0.065025

1.005722

-0.434914

0.999767

-0.637319



$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

	Dilution Calibration Data									
Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/lc) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	0.0	-0.2		
as found span	4920	80.5	800.2	800.2	0.0	699.4	697.6	1.8	1.144	1.147
as found 2nd	4960	40.2	399.6	399.6	0.0	350.2	347.6	2.6	1.1410	1.1495
as found 3rd	4980	20.1	199.8	199.8	0.0	174.3	172.2	2.2	1.1462	1.1602
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.2	-0.2		
high point	4920	80.5	800.2	800.2	0.0	803.2	804.0	-0.9	0.996	0.995
second point	4960	40.2	399.6	399.6	0.0	402.5	402.6	-0.1	0.993	0.992
third point	4980	20.1	199.8	199.8	0.0	200.6	199.4	1.2	0.996	1.002
as left zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.3	-0.2		
as left span	4920	80.5	800.2	430.6	369.6	801.8	432.1	369.8	0.998	0.996
							Average C	orrection Factor	0.995	0.997
Corrected As fo	ound NO _x =	699.6 ppb	NO =	697.6 ppb	* = > +/-5	% change initiates	investigation	*Percent Chan	ge NO _x =	-14.4%
Previous Respo	onse NO _x =	800.5 ppb	NO =	799.6 ppb				*Percent Chan	ge NO =	-14.6%
Baseline Corr 2	nd pt NO _X =	350.4 ppb	NO =	347.6 ppb	As foun	d $NO_{\chi} r^2$:	0.999997	Nx SI: 0.8745	540 Nx Int:	-0.062
Baseline Corr 3	Brd pt NO _X =	174.5 ppb	NO =	172.2 ppb	As foun	d NO r ² :	0.999991	NO SI: 0.8725	557 NO Int:	-0.943
					As foun	d $NO_2 r^2$:	1.000000	NO2 SI: 1.0034	NO ₂ Int:	-0.200

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Co	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)	694.7	374.0	320.7	321.6	0.9972	100.3%
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	800.5	430.9	369.6	369.0	1.002	99.8%
2nd GPT point (200 ppb O3)	800.5	617.0	183.5	182.9	1.003	99.7%
3rd GPT point (100 ppb O3)	800.5	706.4	94.1	92.8	1.014	98.6%
			ŀ	Average Correction Factor	1.006	99.4%

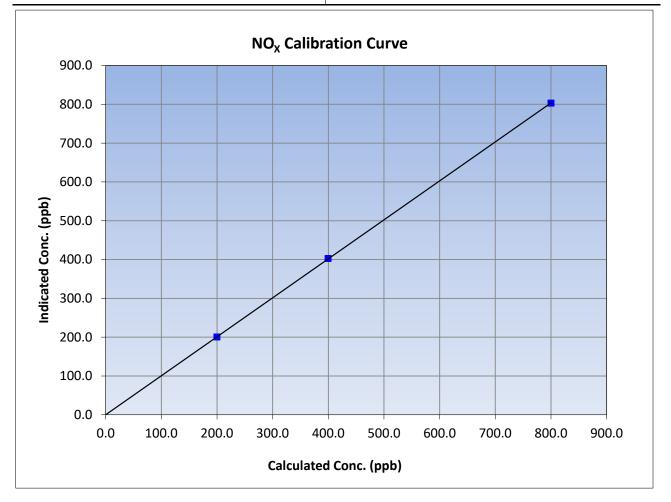
Notes: Daily span is 13% low and pump flow went down since yesterday. Swapped out the pump after multi-point as founds. Chamber pressure stayed the same with the new pump. There is possibly a leak somewhere inside the instrument. Adjusted the span only. Check Doctit for more info.

Calibration Performed By:



NO_x Calibration Summary

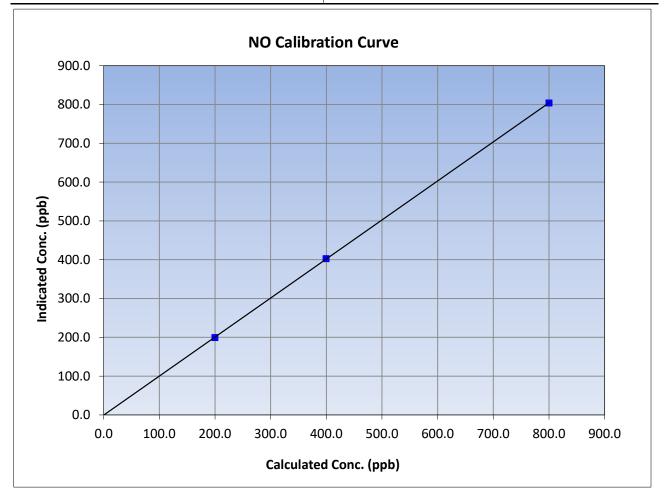
WBEA					Version-04-20
		Station	Information		
Calibration Date:	February	23, 2023	Previous Calibration:	February	17, 2023
Station Name:	Fort	Hills	Station Number:	AM	S23
Start Time (MST):	10:56		End Time (MST):	17	:40
Analyzer make: Thermo 42i			Analyzer serial #: 11524		30007
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	-0.4		Correlation Coefficient	0.999995	≥0.995
800.2	803.2	0.9962	correlation coernelent	0.999995	20.995
399.6	402.5	0.9927	Slope	1.004364	0.90 - 1.10
199.8	200.6	0.9960	Slope	1.004304	0.90 - 1.10
			Intercept	0.065025	+/-20





NO Calibration Summary

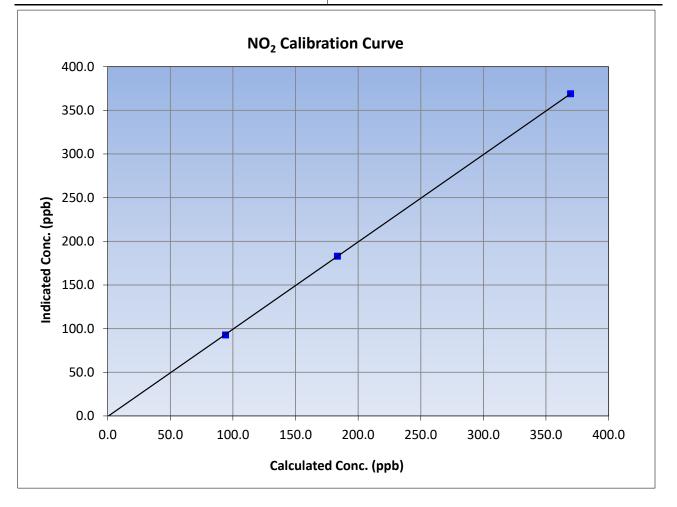
WBEA					Version-04-2
		Station	Information		
Calibration Date:	February	23, 2023	Previous Calibration:	February	17, 2023
Station Name:	Fort	Hills	Station Number:	AM	S23
Start Time (MST):	10:56		End Time (MST):	17	:40
Analyzer make: Thermo 42i			Analyzer serial #: 115243		30007
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	c) Statistical Evaluation Lim		
0.0	-0.2		Correlation Coefficient	0.999992	≥0.995
800.2	804.0	0.9952	correlation coernelent	0.555552	20.995
399.6	402.6	0.9925	Slope	1.005722	0.90 - 1.10
199.8	199.4	1.0020	Siope	1.003722	0.90 - 1.10
			Intercept	-0.434914	+/-20

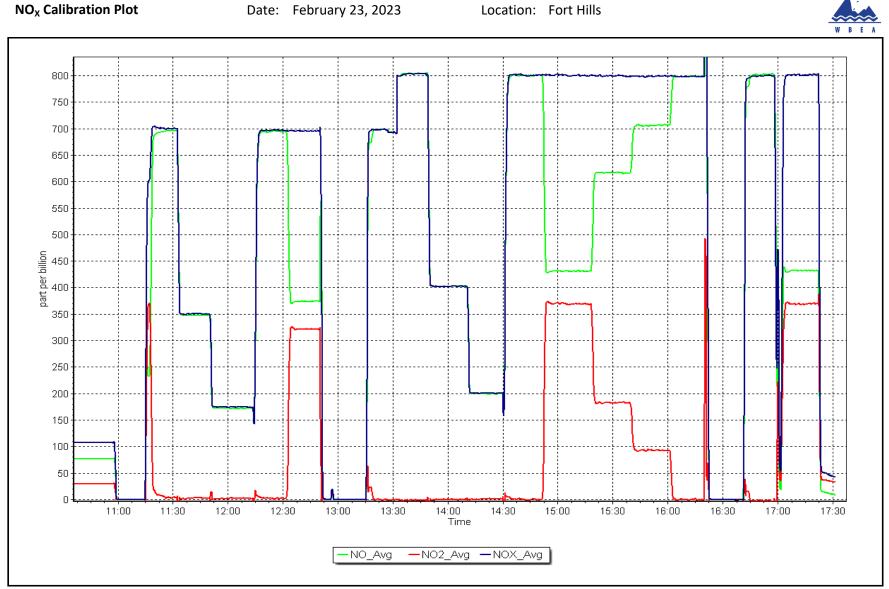




NO₂ Calibration Summary

WBEA					Version-04-202	
		Station	Information			
Calibration Date:	February	23, 2023	Previous Calibration:	February	17, 2023	
Station Name:	Fort	Hills	Station Number:	AM	S23	
Start Time (MST):	10:56		End Time (MST):	17	:40	
Analyzer make: Thermo 42i Analyzer serial #:				11524	1152430007	
		Calibra	ation Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	-0.2		Correlation Coefficient	0.999992	≥0.995	
369.6	369.0	1.0016	correlation coernelent	0.555552	20.999	
183.5	182.9	1.0033	Slope	0.999767	0.90 - 1.10	
94.1	92.8	1.0140	Slope	0.999707	0.90 - 1.10	
			Intercept	-0.637319	+/-20	







T640 PM_{2.5} CALIBRATION

WDEA						Version-01-2023
		Station Information	n			
Station Name:	Fort Hills		Station number:	AMS 23		
Calibration Date:	February 17, 2023		Last Cal Date:	January 18, 2023	3	
Start time (MST):	10:40		End time (MST):	11:14		
			c (b)	44.60		
Analyzer Make: Particulate Fraction:	API T640 PM2.5		S/N:	1162		
Particulate Fraction:	PIVIZ.5					
Flow Meter Make/Model:	DeltaCal		S/N:	141229		
Temp/RH standard:	DeltaCal		S/N:	141229		
		Monthly Calibration T	est			
<u>Parameter</u>	<u>As found</u>	Measured	<u>As left</u>	<u>Adjı</u>	usted	(Limits)
T (°C)	-17.5	-17.5	-17.5			+/- 2 °C
P (mmHg)	734.5	728.4	734.5			+/- 10 mmHg
flow (LPM)	5.02	4.95	5.02	[+/- 0.25 LPM
Leak Test:	Date of check:	February 17, 2023	Last Cal Date:	January 18, 20)23	
	PM w/o HEPA:	9.2	PM w/ HEPA:	0		<0.2 ug/m3
Note: this leak check will be	e completed before the	quarterly work and will	serve as the pre mai	ntenance leak ch	neck	
Inlet cleaning :	Inlet Head	\checkmark				
		Quarterly Calibration	Test			
Parameter	<u>As found</u>	Post maintenance	<u>As left</u>	<u>Adju</u>	usted	(Limits)
PMT Peak Test				[11.3 +/- 0.5
Post-maintenance		PM w/o HEPA:		w/ HEPA:		
Date Optical Chan	-	December 8				<0.2 ug/m3
Disposable Filte	er Changed:	December 8	3, 2022			
		Annual Maintenanc	e			
Date Sample Tul	be Cleaned:	September 2	6, 2022			
Date RH/T Sens	-	September 2	,			
Notes:	Quarterly calib	ration completed in Dec	ember. No adjustmo	ents made. Leak	check	passed.
Calibration by:	Max Farrell					



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS26 CHRISTINA LAKE FEBRUARY 2023

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

March 31, 2023



SO₂ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name:	Christina Lake		Station number:	AMS 26	
Calibration Date:	February 14, 2023		Last Cal Date:	January 25, 2023	
Start time (MST):	13:41		End time (MST):	16:38	
Reason:	Routine				
		Calibration St	andarda		
		Calibration St			
Cal Gas Concentration:	49.56	ppm	Cal Gas Exp Date:	February 23, 2025	
Cal Gas Cylinder #: Removed Cal Gas Conc:	<u>CC362134</u> 49.56		Bom Cas Eve Data	NIA	
		ppm	Rem Gas Exp Date:	NA	
Removed Gas Cyl #:			Diff between cyl:	2447	
Calibrator Make/Model:	API T700		Serial Number:	2447	
ZAG Make/Model:	API T701		Serial Number:	953	
		Analyzer Info	rmation		
Analyzer make:	· Thermo 43i	,	Analyzer serial #:	1173410001	
Analyzer Range			Analyzer serial #.	11/3410001	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.000779	0.994255	Backgd or Offset:	16.4	16.4
Calibration intercept:	-2.876133	-2.695113	Coeff or Slope:	0.929	0.929
		SO ₂ Calibratio	on Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration ((ppb) (Ic)	Correction factor (Cc/lc Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.0	
as found span	4919	80.6	799.0	789.6	1.012
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	793.1	1.007
second point	4960	40.3	399.4	393.1	1.016
third point	4980	20.2	200.2	193.4	1.035
as left zero	5000	0.0	0.0	0.2	
as left span	4919	80.6	799.0	795.9	1.004
			Averag	e Correction Factor	1.020
	789.60	Previous response	796.72	*% change	-0.9%
Baseline Corr As found:	789.00				
Baseline Corr As found: Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	

Notes:

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

Calibration Performed By:

Mohammed Kashif

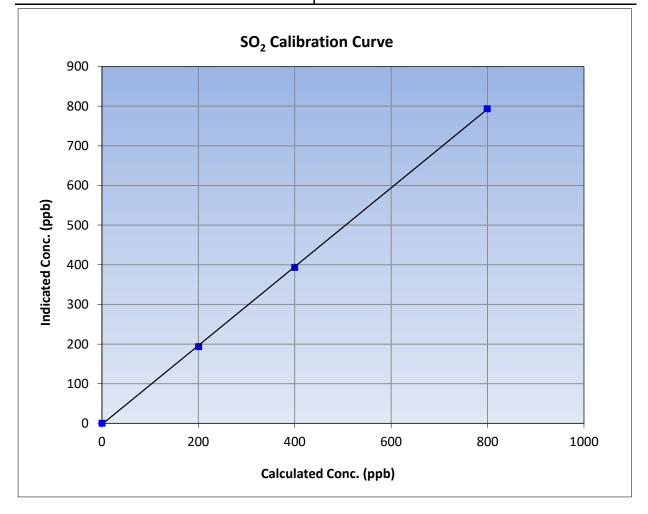


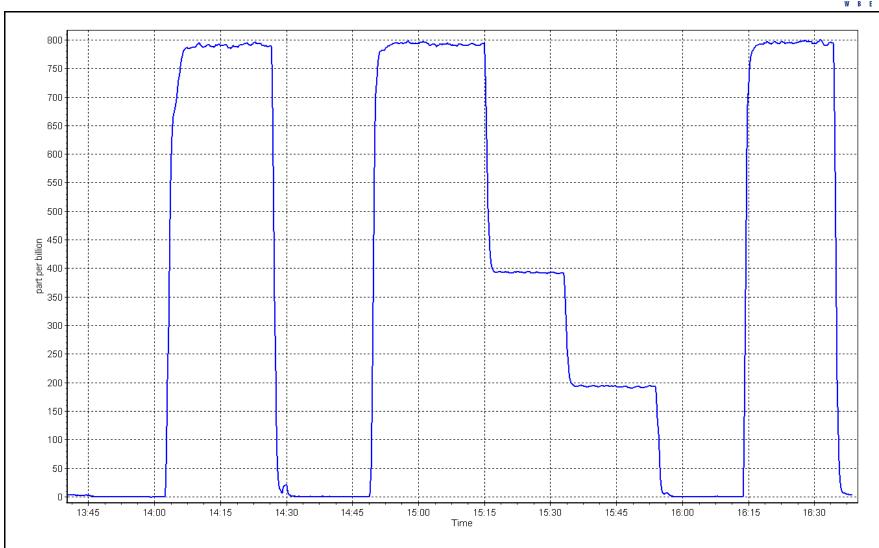
SO₂ Calibration Summary

WBEA			Version-01-2020
	Statio	on Information	
Calibration Date:	February 14, 2023	Previous Calibration:	January 25, 2023
Station Name:	Christina Lake	Station Number:	AMS 26
Start Time (MST):	13:41	End Time (MST):	16:38
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	0.999939	≥0.995	
799.0	793.1	1.0074	correlation coefficient	0.999939	20.333	
399.4	393.1	1.0161	Slope	0.994255	0.90 - 1.10	
200.2	193.4	1.0352	Slope	0.994255	0.30 - 1.10	
			- Intercept	-2.695113	+/-30	









H₂S Calibration Report

WBEA					Version-11-2021
		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Christina Lake February 15, 2023 11:04 Routine		Station number: Last Cal Date: End time (MST):	AMS26 January 25, 2023 15:50	
		Calibration S	tandards		
Cal Gas Concentration: Cal Gas Cylinder #:	4.89 <u>EY0002466</u>	ppm	Cal Gas Exp Date:	February 9, 2024	
Removed Cal Gas Conc: Removed Gas Cyl #:	4.89 NA	ppm	Rem Gas Exp Date: Diff between cyl:	NA	
Calibrator Make/Model: ZAG Make/Model:	АРІ T750 АРІ T751H		Serial Number: Serial Number:	282 322	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	Thermo 450i NA 0 - 100 ppb		Analyzer serial #: Converter serial #:	1180030032 NA	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.010037	0.996758	Backgd or Offset:	33.3	33.6
Calibration intercept:	0.159267	0.098881	Coeff or Slope:	1.113	1.125
		H ₂ S As Four	nd Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) Limit = 0.90-1.10
as found zero	5000	0.0	0.0	0.1	
as found span	4918	81.8	80.0	78.5	1.020
as found 2nd point	4959	40.9	40.0	39.6	1.013
as found 3rd point	4979	20.4	20.0	19.4	1.034
new cylinder response					
		H ₂ S Calibrati	ion Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	0.5	
high point	4918	81.8	80.0	80.1	0.999
second point	4959	40.9	40.0	39.6	1.010
third point	4979	20.4	20.0	19.7	1.013
as left zero	5000	0.0	0.0	0.6	
as left span	4918	81.8	80.0	79.9	1.001
SO2 Scrubber Check	4919	80.6	806.1	0.2	
Date of last scrubber cha	nge:	27-Feb-19		Ave Corr Factor	1.007
Date of last converter eff	ficiency test:				efficiency
Baseline Corr As found:	78.4	Prev response:	80.97	*% change:	-3.3%
Baseline Corr 2nd AF pt:	39.5	AF Slope:		AF Intercept:	0.058616
	19.3			•	
Baseline Corr 3rd AF pt:	19.5	AF Correlation:	0.999957		

Changed sample inlet filter after MAF's, ran scrubber check after calibrator span. Adjusted span only.

Calibration Performed By:

Notes:

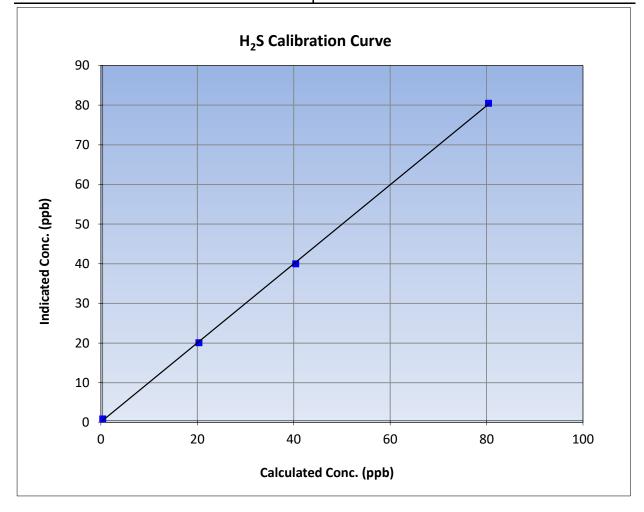
Mohammed Kashif

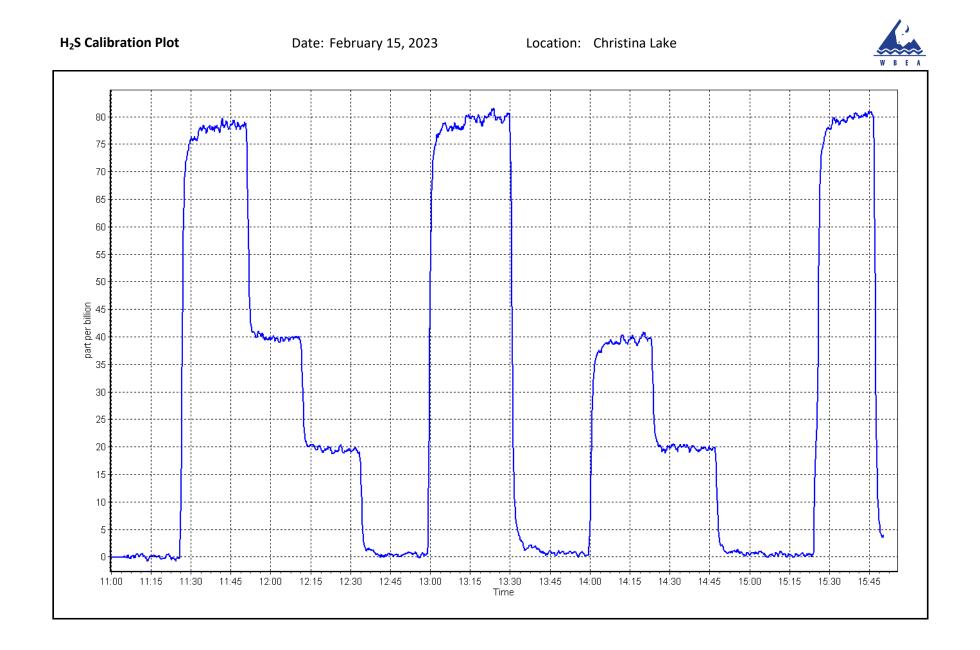


H₂S Calibration Summary

Station Information								
Calibration Date:	February 15, 2023	Previous Calibration:	January 25, 2023					
Station Name:	Christina Lake	Station Number:	AMS26					
Start Time (MST):	11:04	End Time (MST):	15:50					
Analyzer make:	Thermo 450i	Analyzer serial #:	1180030032					
	Cal	ibration Data						

Calculated concentration (ppb) (Cc)	n Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>
0.0	0.5		Correlation Coefficient	0.999872	≥0.995
80.0	80.1	0.9988	correlation coefficient	0.999072	20.333
40.0	39.6	1.0101	Slope	0.996758	0.90 - 1.10
20.0	19.7	1.0129	Slope	0.990758	0.90 - 1.10
			Intercept	0.098881	+/-3







$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

			Station	Information		
Station Name: Calibration Date: Start time (MST): Reason:	Christina Lake February 16, 2023 10:27 Routine		Station number: AMS 26 Last Cal Date: January 24, 2023 End time (MST): 14:48			3
			Calibrati	on Standards		
NO Gas Cylinder #:	T2Y1P4C			Cal Gas Expiry Date: No	vember 12, 2	023
NOX Cal Gas Conc:	50.82	ppm		NO Cal Gas Conc:	50.02	ppm
Removed Cylinder #:	NA			Removed Gas Exp Date: NA	\	
Removed Gas NOX Conc:	50.82	ppm		Removed Gas NO Conc:	50.02	ppm
NOX gas Diff:				NO gas Diff:		
Calibrator Model:	API T700			Serial Number:	2447	
ZAG make/model:	API T701			Serial Number:	953	
			Analyzei	Information		
Analyzer make:	Thermo 42i			Analyzer serial #: 11	73480006	
NOX Range (ppb):				/		
			Tininh		Chaut	r t
	<u>Start</u>	-	Finish		<u>Start</u>	<u>Finish</u>
NO coeff or slope			1.713	NO bkgnd or offset:	2.7	2.8
NOX coeff or slope:			0.996	NOX bkgnd or offset:	2.8	2.9
NO2 coeff or slope	1.000		1.000	Reaction cell Press:	190.1	191.9
			Calibrat	ion Statistics		
		:	<u>Start</u>		<u>Finish</u>	

	start	FINISH
NO _x Cal Slope:	1.000028	1.000661
NO _x Cal Offset:	-2.400000	-1.500000
NO Cal Slope:	1.000828	1.000043
NO Cal Offset:	-3.180000	-2.080000
NO ₂ Cal Slope:	0.997345	1.003073
NO ₂ Cal Offset:	-0.231843	-0.020912



$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

				Dilu	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/lc) 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	4920	80.0	813.1	800.3	12.8	782.3	768.4	13.9	1.0394	1.0415
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.4	0.2	0.2		
high point	4920	80.0	813.1	800.3	12.8	813.1	799.3	13.8	1.0000	1.0013
second point	4960	40.0	406.6	400.2	6.4	404.4	397.3	7.0	1.0053	1.0072
third point	4980	20.0	203.3	200.1	3.2	200.0	195.5	4.5	1.0164	1.0234
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.1		
as left span	4920	80.0	813.1	389.5	423.6	815.6	392.2	423.5	0.9970	0.9932
							Average C	orrection Factor	1.0073	1.0106
Corrected As fo	ound NO _x =	782.1 ppb	NO =	768.5 ppb	* = > +/-59	% change initiates i	nvestigation	*Percent Chang	ge NO _x =	-3.7%
Previous Respo	nse NO _x =	810.7 ppb	NO =	797.8 ppb				*Percent Chan	ge NO =	-3.8%
Baseline Corr 2	nd pt NO _X =	NA ppb	NO =	NA ppb	As found	d $NO_X r^2$:		Nx SI:	Nx Int:	
Baseline Corr 3	rd 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 ₂ Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Co	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						
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)	799.6	388.8	423.6	424.9	0.9969	100.3%
2nd GPT point (200 ppb O3)	799.6	600.5	211.9	212.7	0.9962	100.4%
3rd GPT point (100 ppb O3)	799.6	704.7	107.7	107.6	1.0009	99.9%
				Average Correction Factor	0.9980	100.2%

Notes:

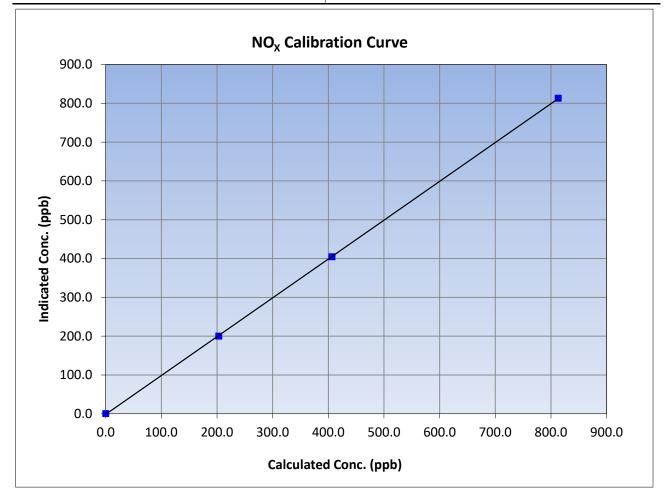
Changed sample inlet filter after as founds. Adjusted span only.

Calibration Performed By:



NO_x Calibration Summary

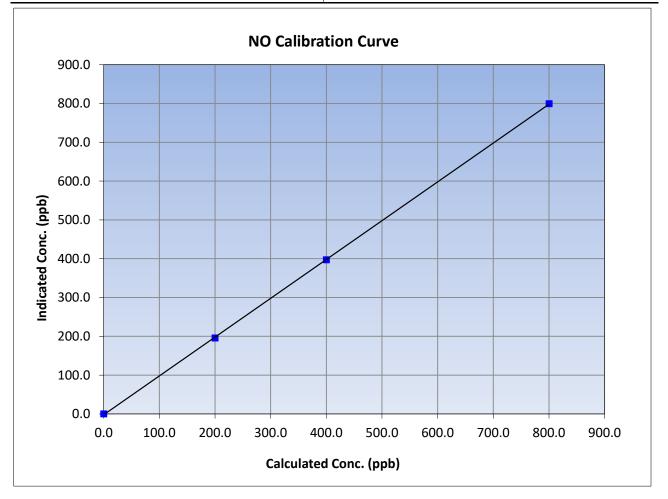
WBEA					Version-04-2	
		Station	Information			
Calibration Date:	February 16, 2023		Previous Calibration:	January	January 24, 2023	
Station Name:	Christina Lake		Station Number:	AN	1S 26	
Start Time (MST):	10:27		End Time (MST):	14	4:48	
nalyzer make: Thermo 42i		no 42i	Analyzer serial #: 1		14:00	
		Calibra	ation Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	<u>Limits</u>		
0.0	0.4		Correlation Coefficient	0.999975	≥0.995	
813.1	813.1	1.0000	correlation coefficient	0.555575	20.333	
406.6	404.4	1.0053	Slope	1.000661	0.90 - 1.10	
203.3	200.0	1.0164	Slope	1.000001	0.90 - 1.10	
			Intercept	-1.500000	+/-20	





NO Calibration Summary

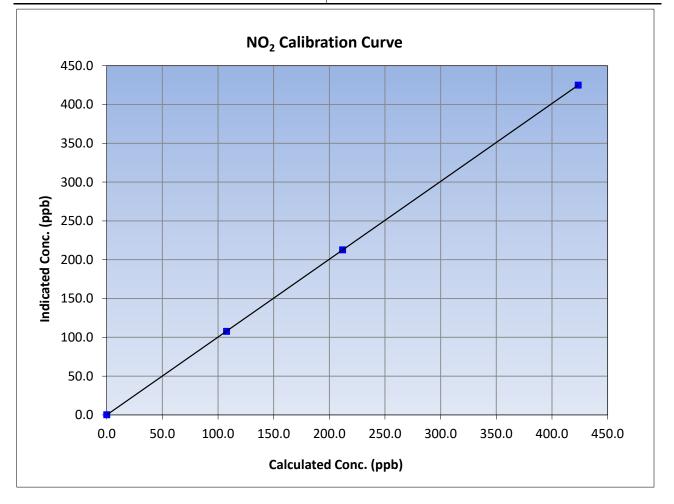
WBEA					Version-04-20	
		Station	Information			
Calibration Date:	on Date: February 16, 2023		Previous Calibration:	Januar	January 24, 2023	
Station Name:	Christina Lake		Station Number:	AN	MS 26	
Start Time (MST):	10:27		End Time (MST):	1	4:48	
Analyzer make:	alyzer make: Thermo 42i Analyzer serial #:		14:00			
		Calibra	ation Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	0.2		Correlation Coefficient	0.999962	≥0.995	
800.3	799.3	1.0013	correlation coefficient	0.555502	20.333	
400.2	397.3	1.0072	Clana	1.000043	0.90 - 1.10	
200.1	195.5	1.0234	Slope	1.000043	0.90 - 1.10	
			Intercept	-2.080000	+/-20	





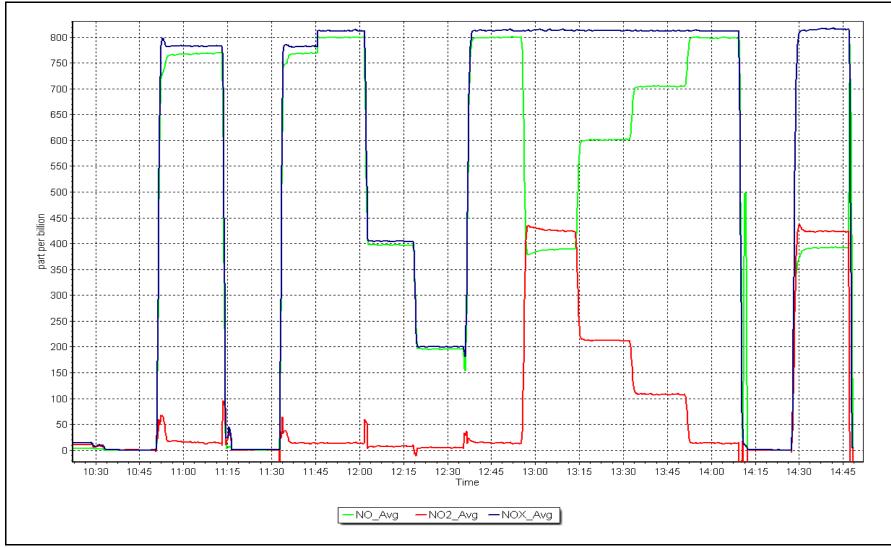
NO₂ Calibration Summary

WBEA					Version-04-2	
		Station	Information			
Calibration Date:	February 16, 2023		Previous Calibration:	Januar	January 24, 2023	
Station Name:	Christina Lake		Station Number:	AN	MS 26	
Start Time (MST):	10:27		End Time (MST):	1	4:48	
Analyzer make:	nalyzer make: Thermo 42i		Analyzer serial #: 14		14:00	
		Calibra	ation Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	c) Statistical Evaluation		<u>Limits</u>	
0.0	0.2		Correlation Coefficient	0.999998	≥0.995	
423.6	424.9	0.9969	correlation coernelent	0.999998	20.333	
211.9	212.7	0.9962	Slope	1.003073	0.90 - 1.10	
107.7	107.6	1.0009	Slope	1.003073	0.90 - 1.10	
			Intercept	-0.020912	+/-20	











WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS27 JACKFISH 2/3 FEBRUARY 2023

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

March 31, 2023



SO₂ Calibration Report

Version-01-2020

		Station Inforn	nation		
Station Name: Calibration Date: Start time (MST): Reason:	Jackfish 2/3 February 14, 2023 10:57 Routine		Station number: Last Cal Date: End time (MST):	AMS 27 January 19, 2023 13:40	
		Calibration Sta	ndards		
Cal Gas Concentration: Cal Gas Cylinder #:	50.58 <u>SG9133974BAL</u>	ppm	Cal Gas Exp Date:	December 29, 2028	
Removed Cal Gas Conc: Removed Gas Cyl #:	50.58 <u>NA</u>	ppm	Rem Gas Exp Date: Diff between cyl:	NA	
Calibrator Make/Model: ZAG Make/Model:	API T700 API 701		Serial Number: Serial Number:	3811 364	
		Analyzer Infor	mation		
Analyzer make Analyzer Range			Analyzer serial #:	12124313138	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope: Calibration intercept:	1.001858 -1.876897	1.001161 -1.757862	Backgd or Offset: Coeff or Slope:		7.4 0.979
		SO ₂ Calibratio	n Data		
Set Point	Dilution air flow rate (sccm)	SO ₂ Calibration Source gas flow rate (sccm)	n Data Calculated concentration (ppb) (Cc)	Indicated concentration C (ppb) (Ic)	orrection factor (Cc/Id Limit = 0.95-1.05
Set Point as found zero		Source gas flow rate	Calculated		• •
as found zero as found span	(sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	(ppb) (Ic)	
as found zero as found span as found 2nd point	(sccm) 5000	Source gas flow rate (sccm) 0.0	Calculated concentration (ppb) (Cc) 0.0	(ppb) (Ic) 0.0	Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point	(sccm) 5000	Source gas flow rate (sccm) 0.0	Calculated concentration (ppb) (Cc) 0.0	(ppb) (Ic) 0.0	Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point new cylinder response	(sccm) 5000 4921	Source gas flow rate (sccm) 0.0 79.1	Calculated concentration (ppb) (Cc) 0.0 800.2	(ppb) (Ic) 0.0 800.0	Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero	(sccm) 5000 4921 5000	Source gas flow rate (sccm) 0.0 79.1 0.0	Calculated concentration (ppb) (Cc) 0.0 800.2	(ppb) (ic) 0.0 800.0 0.1	Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero high point	(sccm) 5000 4921 5000 4921	Source gas flow rate (sccm) 0.0 79.1 0.0 0.0 79.1	Calculated concentration (ppb) (Cc) 0.0 800.2 0.0 800.2	(ppb) (Ic) 0.0 800.0 0.1 800.0	Limit = 0.95-1.05
as found zero as found span as found 2nd point as found 3rd point new cylinder response calibrator zero high point second point	(sccm) 5000 4921 5000 4921 4921 4961	Source gas flow rate (sccm) 0.0 79.1 0.0 79.1 39.5	Calculated concentration (ppb) (Cc) 0.0 800.2 0.0 800.2 399.5	(ppb) (lc) 0.0 800.0 0.1 800.0 398.1	Limit = 0.95-1.05
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	(sccm) 5000 4921 5000 4921 4961 4980	Source gas flow rate (sccm) 0.0 79.1 0.0 79.1 39.5 19.8	Calculated concentration (ppb) (Cc) 0.0 800.2 0.0 800.2 399.5 200.3	(ppb) (lc) 0.0 800.0 0.1 800.0 398.1 196.4	Limit = 0.95-1.05
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	(sccm) 5000 4921 5000 4921 4961 4980 5000	Source gas flow rate (sccm) 0.0 79.1 0.0 79.1 39.5 19.8 0.0	Calculated concentration (ppb) (Cc) 0.0 800.2 0.0 800.2 399.5 200.3 0.0	(ppb) (lc) 0.0 800.0 0.1 800.0 398.1 196.4 0.1	Limit = 0.95-1.05
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	(sccm) 5000 4921 5000 4921 4961 4980	Source gas flow rate (sccm) 0.0 79.1 0.0 79.1 39.5 19.8	Calculated concentration (ppb) (Cc) 0.0 800.2 0.0 800.2 399.5 200.3 0.0 800.2	(ppb) (lc) 0.0 800.0 0.1 800.0 398.1 196.4	Limit = 0.95-1.05
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	(sccm) 5000 4921 5000 4921 4961 4980 5000	Source gas flow rate (sccm) 0.0 79.1 0.0 79.1 39.5 19.8 0.0 79.1	Calculated concentration (ppb) (Cc) 0.0 800.2 0.0 800.2 399.5 200.3 0.0 800.2	(ppb) (lc) 0.0 800.0 0.1 800.0 398.1 196.4 0.1 805.0 ge Correction Factor	Limit = 0.95-1.05
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	(sccm) 5000 4921 5000 4921 4961 4980 5000 4921	Source gas flow rate (sccm) 0.0 79.1 0.0 79.1 39.5 19.8 0.0	Calculated concentration (ppb) (Cc) 0.0 800.2 0.0 800.2 399.5 200.3 0.0 800.2 0.0 800.2 Averag 799.77	(ppb) (ic) 0.0 800.0 0.1 800.0 398.1 196.4 0.1 805.0	Limit = 0.95-1.05

No adjustments have been made.

Calibration Performed By:

Denny Ray Estador

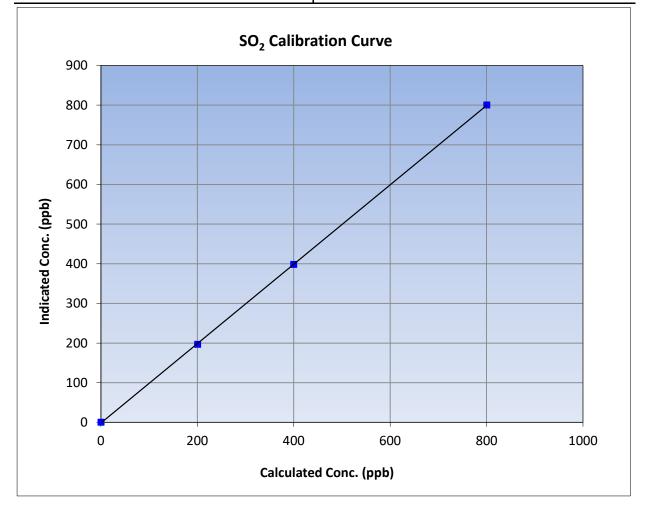


SO₂ Calibration Summary

Station Information								
Calibration Date:	February 14, 2023	Previous Calibration:	January 19, 2023					
Station Name:	Jackfish 2/3	Station Number:	AMS 27					
Start Time (MST):	10:57	End Time (MST):	13:40					
Analyzer make:	Thero 43iQ	Analyzer serial #:	12124313138					

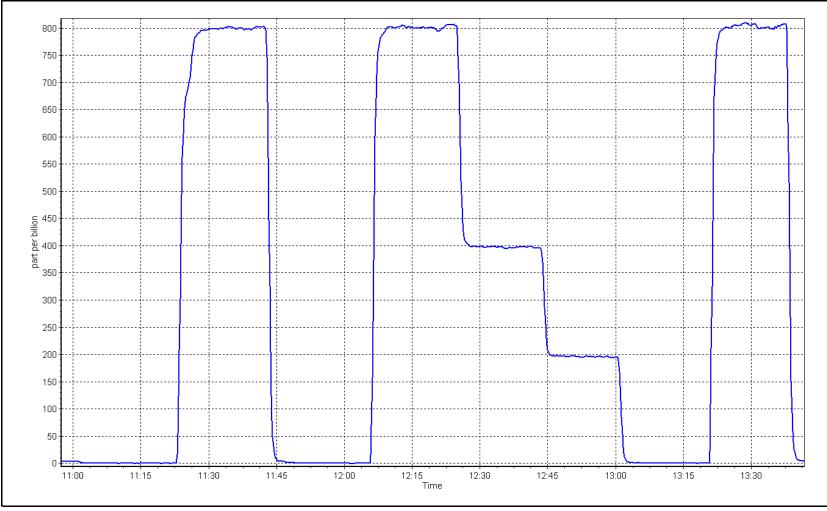
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>	
0.0	0.1		Correlation Coefficient	0.999973	≥0.995	
800.2	800.0	1.0002	correlation coefficient	0.333373	20.333	
399.5	398.1	1.0036	Slope	1.001161	0.90 - 1.10	
200.3	196.4	1.0199	Siope	1.001101	0.30 - 1.10	
			Intercept	-1.757862	+/-30	











H₂S Calibration Report

WBEA		2		•	
		Station Info			Version-11-202
Station Name: Calibration Date: Start time (MST): Reason:	Jackfish 2/3 February 7, 2023 9:20 Routine	Station info	Station number: Last Cal Date: End time (MST):	AMS27 January 11, 2023 13:50	
		Calibration S	tandards		
Cal Gas Concentration: Cal Gas Cylinder #: Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model: ZAG Make/Model:	5.41 CC345023 5.41 NA API T700 API 701	ppm ppm	Cal Gas Exp Date: Rem Gas Exp Date: Diff between cyl: Serial Number: Serial Number:	January 4, 2025 NA 3811 364	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	API T101 0 - 100 ppb		Analyzer serial #: Converter serial #:	621	
Calibration slope: Calibration intercept:	<u>Start</u> 0.997920 0.042016	<u>Finish</u> 1.000628 -0.177928	Backgd or Offset: Coeff or Slope:		<u>Finish</u> 25.4 0.949
		H ₂ S As Four	nd 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	0.5	
as found span	4926	74.1	80.2	82.0	0.984
as found 2nd point	4963	37.0	40.0	41.0	0.988
as found 3rd point	4982	18.5	20.0	20.2	1.016
new cylinder response					
		H ₂ S Calibrat	ion Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.0	
high point	4926	74.1	80.2	80.1	1.001
second point	4963	37.0	40.0	39.9	1.003
third point	4982	18.5	20.0	19.6	1.021
as left zero	5000	0.0	0.0	0.1	
as left span	4926	74.1	80.2	79.8	1.005
SO2 Scrubber Check	4921	79.1	791.0	0.1	
Date of last scrubber cha				Ave Corr Factor	1.008 efficiency
Date of last converter eff	inciency test.				eniciency
Baseline Corr As found:	81.5	Prev response:		*% change:	1.8%
Baseline Corr 2nd AF pt:	40.5	AF Slope:		AF Intercept:	0.202428
Baseline Corr 3rd AF pt:	19.7	AF Correlation:	0.999930	* = > +/-5% change initiat	es investigation

Notes:

Adjusted both zero and span.

Calibration Performed By:

Denny Ray Estador

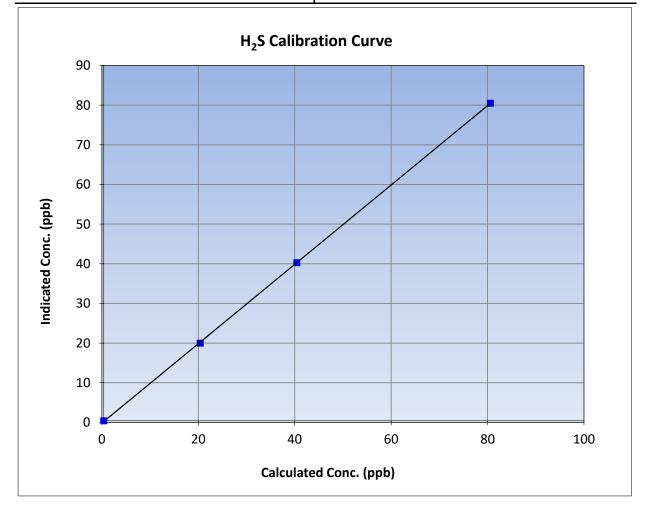


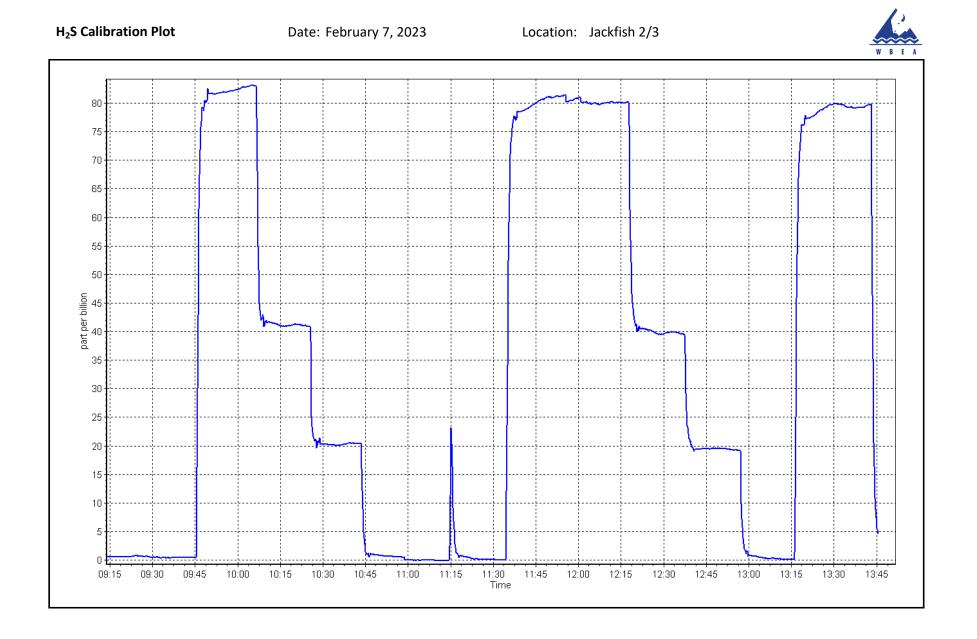
H₂S Calibration Summary

Station Information								
Calibration Date:	February 7, 2023	Previous Calibration:	January 11, 2023					
Station Name:	Jackfish 2/3	Station Number:	AMS27					
Start Time (MST):	9:20	End Time (MST):	13:50					
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	0.999972	≥0.995	
80.2	80.1	1.0009	correlation coernicient	0.333372	20.990	
40.0	39.9	1.0034	Slope	1.000628	0.90 - 1.10	
20.0	19.6	1.0212	Siope	1.000028	0.90 - 1.10	
			Intercept	-0.177928	+/-3	







NO Cal Offset:

NO₂ Cal Slope:

NO₂ Cal Offset:

Wood Buffalo Environmental Association

$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

Station Information									
Station Name: Calibration Date: Start time (MST): Reason:	Jackfish 2/3 February 22, 2023 9:27 Routine		Station number: AMS27 Last Cal Date: January 18, 2023 End time (MST): 13:20						
		Calibr	ation Standards						
NO Gas Cylinder #:	T2Y1P35		Cal Gas Expiry Date: December 11, 2023						
NOX Cal Gas Conc: Removed Cylinder #:	51.44 NA	ppm	NO Cal Gas Conc: Removed Gas Exp Date: NA	50.40	ppm				
Removed Gas NOX Conc: NOX gas Diff:	51.44	ppm	Removed Gas NO Conc: NO gas Diff:	50.40	ppm				
Calibrator Model:	API T750		Serial Number:	282					
ZAG make/model:	API 751H		Serial Number:	321					
		Analy	zer Information						
Analyzer make: NOX Range (ppb):			Analyzer serial #: 446	50					
	<u>Start</u>	Finish		<u>Start</u>	<u>Finish</u>				
NO coeff or slope:	1.241	1.241	NO bkgnd or offset:	0.9	0.9				
NOX coeff or slope:	1.228	1.228	NOX bkgnd or offset:	0.9	0.9				
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	4.3	4.4				
		Calib	ration Statistics						
		Start	Start Finish						
NO _x Cal Slope:	:	1.00160	8	0.998669					
NO _x Cal Offset:		-3.41696	7	-3.017307					
NO Cal Slope:		1.00544	4	1.000287					
			-						

-4.300508

0.998544

0.230642

-2.020303

0.990573

-1.100427



$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

Dilution Calibration Data										
Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) Limit = 0.95-1.05	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.7	-0.9	0.2		
as found span	4921	79.4	816.8	800.3	16.5	810.0	798.9	11.5	1.0084	1.0017
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1		
high point	4921	79.4	816.8	800.3	16.5	814.0	799.2	14.7	1.0034	1.0014
second point	4960	39.7	408.5	400.2	8.3	404.0	398.1	5.9	1.0110	1.0053
third point	4980	19.8	203.7	199.6	4.1	197.0	195.2	1.8	1.0341	1.0225
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0		
as left span	4921	79.4	816.8	403.7	414.2	812.1	399.0	413.1	1.0058	1.0118
							Average C	orrection Factor	1.0162	1.0097
Corrected As fo	ound NO _x =	810.7 ppb	NO =	799.8 ppb	* = > +/-59	% change initiates i	nvestigation	*Percent Chan	ge NO _x =	-0.5%
Previous Respo	onse NO _X =	814.7 ppb	NO =	800.3 ppb				*Percent Chan	ge NO =	-0.1%
Baseline Corr 2	nd pt NO _x =	NA ppb	NO =	NA ppb	As found	d $NO_X r^2$:		Nx SI:	Nx Int:	
Baseline Corr 3	rd 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 ₂ Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (C	Indicated NO2 c) 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						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	801.0	403.3	414.2	410.0	1.0103	99.0%
2nd GPT point (200 ppb O3)	801.0	611.7	205.8	201.6	1.0209	98.0%
3rd GPT point (100 ppb O3)	801.0	712.0	105.5	102.6	1.0284	97.2%
				Average Correction Factor	1.0199	98.1%

Notes:

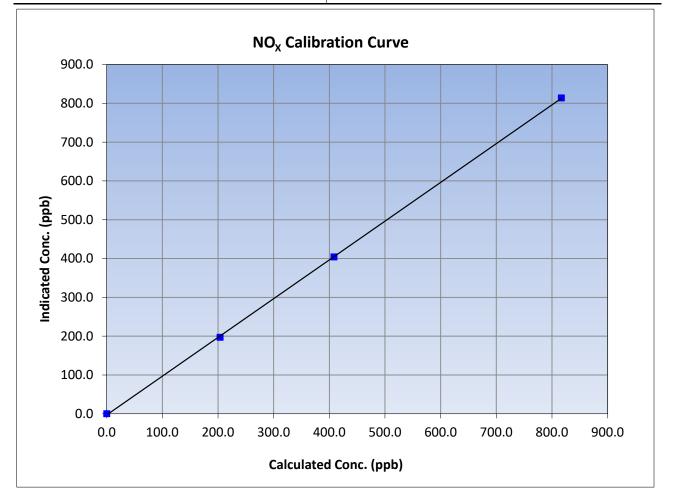
No adjustments made.

Calibration Performed By:



NO_x Calibration Summary

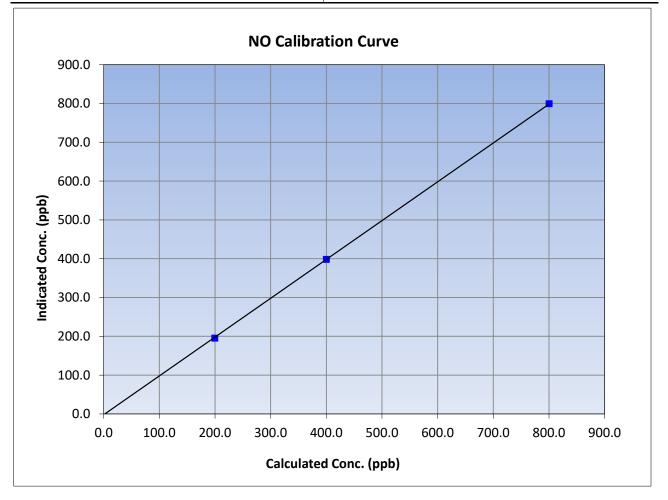
WBEA					Version-04-2
		Station	Information		
Calibration Date:	February 22, 2023		Previous Calibration:	January	/ 18, 2023
Station Name:	Jackfish 2/3		Station Number:	AN	AS27
Start Time (MST):	9:27		End Time (MST):	13:20	
Analyzer make:	nake: API T200		Analyzer serial #:	Analyzer serial #: 4	
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999936	≥0.995
816.8	814.0	1.0034	correlation coernelent	0.555550	20.995
408.5	404.0	1.0110	Slope	0.998669	0.90 - 1.10
203.7	197.0	1.0341	Slope	0.998009	0.90 - 1.10
			Intercept	-3.017307	+/-20





NO Calibration Summary

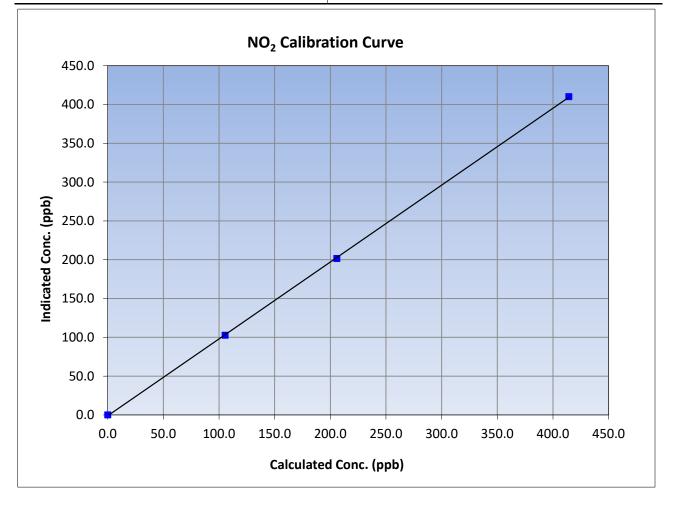
WBEA		Station	Information		Version-04-20	
		Station	intornation			
Calibration Date:	February 22, 2023		Previous Calibration:	Januar	y 18, 2023	
Station Name:	Jackfish 2/3		Station Number:	A	MS27	
Start Time (MST):	r): 9:27		End Time (MST):	13:20		
Analyzer make:	ke: API T200		Analyzer serial #: 4		4460	
		Calibra	ation 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	0.999971	≥0.995	
800.3	799.2	1.0014	correlation coefficient	0.555571	20.333	
400.2	398.1	1.0053	Slope	1.000287	0.90 - 1.10	
199.6	195.2	1.0225	Siope	1.000287	0.90 - 1.10	
			Intercept	-2.020303	+/-20	

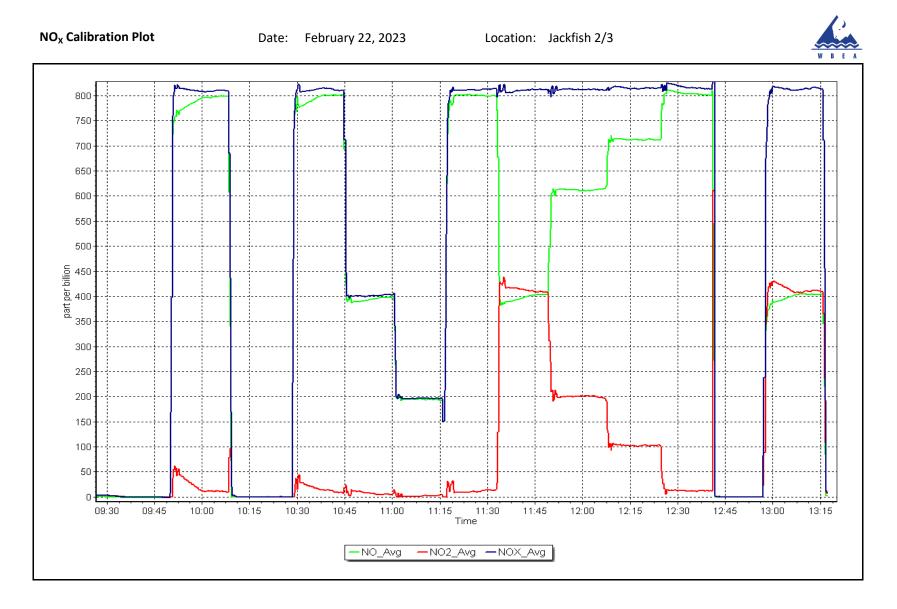




NO₂ Calibration Summary

WBEA					Version-04-2	
		Station	Information			
Calibration Date:	February 22, 2023		Previous Calibration:	January	y 18, 2023	
Station Name:	Jackfish 2/3		Station Number:	AN	MS27	
Start Time (MST):	9:27		End Time (MST):	13:20		
Analyzer make:	ke: API T200		Analyzer serial #:		4460	
		Calibra	ation Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	0.1		Correlation Coefficient	0.999955	≥0.995	
414.2	410.0	1.0103	correlation coefficient	0.5555555	20.995	
205.8	201.6	1.0209	Slope	0.990573	0.90 - 1.10	
105.5	102.6	1.0284	Siope	0.330373	0.90 - 1.10	
			Intercept	-1.100427	+/-20	







WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS29 SURMONT 2 FEBRUARY 2023

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

March 31, 2023



SO₂ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Surmont 2 February 16, 2023 13:10 Routine		Station number: Last Cal Date: End time (MST):	AMS29 January 3, 2023 17:09	
		Calibration St	andards		
Cal Gas Concentration:	<u>49.21</u>	ppm	Cal Gas Exp Date:	February 23, 2025	
Cal Gas Cylinder #: Removed Cal Gas Conc:	<u>CC356008</u> 49.21	nnm	Rem Gas Exp Date:	ΝΑ	
Removed Gas Cyl #:	<u>49.21</u> NA	ppm	Diff between cyl:	NA	
Calibrator Make/Model:	Teledyne API T700		Serial Number:	5258	
ZAG Make/Model:	Teledyne API T701		Serial Number:	4297	
	reledyne i'w i rior			1207	
		Analyzer Info	rmation		
Analyzer make Analyzer Range			Analyzer serial #:	1170050150	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.997244	0.999443	Backgd or Offset:	12.4	12.5
Calibration intercept:	-0.565207	-2.985140	Coeff or Slope:	0.966	0.934
		SO ₂ Calibratio	on Data		
Set Point	Dilution air flow 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	800.1	824.0	0.971
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	-0.2	
high point	4919	81.3	800.1	798.2	1.002
second point	4959	40.7	400.6	395.6	1.013
third point	4979	20.3	199.8	194.2	1.029
as left zero	5000	0.0	0.0	-0.1	
as left span	4919	81.3	800.1	803.0	0.996
			Averag	ge Correction Factor	1.015
Baseline Corr As found:	823.90	Previous response	797.34	*% change	3.2%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
	NA	AF Correlation:			

Notes:

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

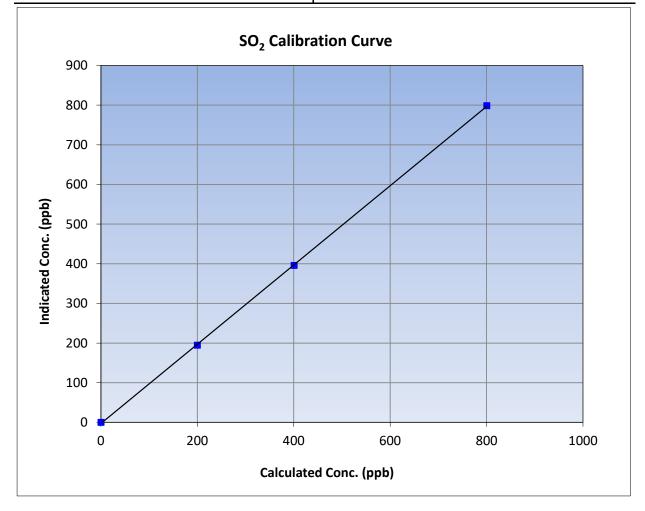
Calibration Performed By:



SO₂ Calibration Summary

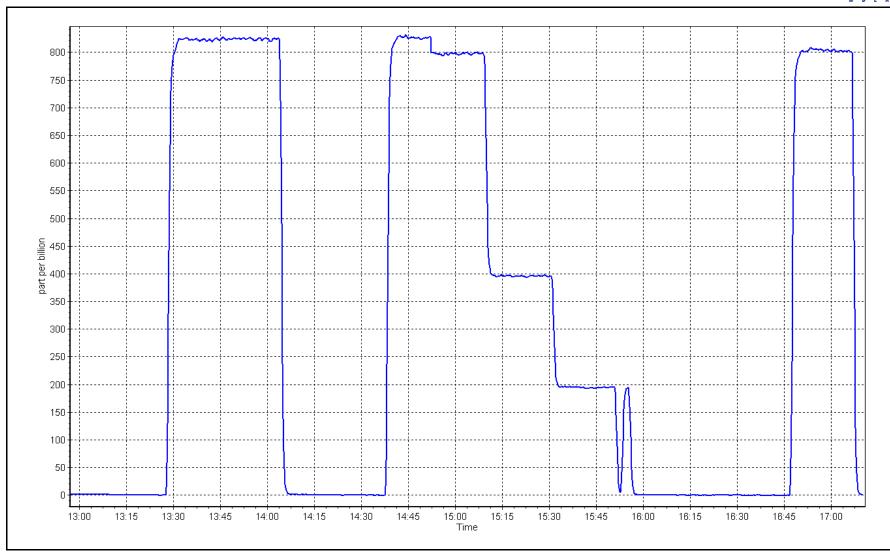
	Stati	on Information	
Calibration Date:	February 16, 2023	Previous Calibration:	January 3, 2023
Station Name:	Surmont 2	Station Number:	AMS29
Start Time (MST):	13:10	End Time (MST):	17:09
Analyzer make:	Thermo 43i	Analyzer serial #:	1170050150
-			
	Cal	ibration Data	

Calculated concentra (ppb) (Cc)	ition Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	-0.2		Correlation Coefficient	0.999944	≥0.995
800.1	798.2	1.0024	correlation coefficient	0.555544	20.333
400.6	395.6	1.0126	Slope	0.999443	0.90 - 1.10
199.8	194.2	1.0289			0.90 - 1.10
			Intercept	-2.985140	+/-30











H₂S Calibration Report

WDEA					
WBEA					Version-11-2
		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Surmont 2 February 13, 2023 11:03 Routine		Station number: Last Cal Date: End time (MST):	AMS29 January 9, 2023 15:54	
		Calibration S	tandards		
Cal Gas Concentration:	<u>5.391</u>	ppm	Cal Gas Exp Date:	January 4, 2025	
Cal Gas Cylinder #: Removed Cal Gas Conc: Removed Gas Cyl #:	<u>CC508338</u> <u>5.391</u> <u>CC508338</u>	ppm	Rem Gas Exp Date: Diff between cyl:	NA	
Calibrator Make/Model: ZAG Make/Model:	Teledyne API T700 Teledyne API T701		Serial Number: Serial Number:	3808 4297	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	Thermo 450i Internal 0 - 100 ppb		Analyzer serial #: Converter serial #:	1170050142 NA	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	0.996612	0.994905	Backgd or Offset:	16.0	17.0
Calibration intercept:	0.177532	-0.062658	Coeff or Slope:	1.024	1.024
		H ₂ S As Four	nd Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjuster Correction facto (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	81.7	0.980
as found 2nd point	4963	37.2	40.1	41.2	0.976
as found 3rd point	4982	10.0	20.1	20 5	
		18.6	20.1	20.5	0.983
new cylinder response				20.5	0.983
new cylinder response		18.6 H ₂ S Calibrat		20.5	0.983
new cylinder response Set Point	Dilution air flow rate (sccm)			Indicated concentration (ppb) (Ic)	Correction facto (Cc/lc)
· · ·	Dilution air flow rate	H ₂ S Calibrat	ion Data Calculated concentration (ppb)	Indicated	Correction facto
Set Point calibrator zero	Dilution air flow rate (sccm)	H ₂ S Calibrat Source gas flow rate (sccm)	ion Data Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction facto (Cc/Ic) Limit = 0.95-1.05
Set Point	Dilution air flow rate (sccm) 5000	H ₂ S Calibrat Source gas flow rate (sccm) 0.0	ion Data Calculated concentration (ppb) (Cc) 0.0	Indicated concentration (ppb) (Ic) -0.1	Correction facto (Cc/Ic) Limit = 0.95-1.05
Set Point calibrator zero high point	Dilution air flow rate (sccm) 5000 4926	H ₂ S Calibrat Source gas flow rate (sccm) 0.0 74.2	ion Data Calculated concentration (ppb) (Cc) 0.0 80.0	Indicated concentration (ppb) (Ic) -0.1 79.5	Correction facto (Cc/Ic) <i>Limit = 0.95-1.05</i> 1.006
Set Point calibrator zero high point second point	Dilution air flow rate (sccm) 5000 4926 4963	H ₂ S Calibrat Source gas flow rate (sccm) 0.0 74.2 37.2	ion Data Calculated concentration (ppb) (Cc) 0.0 80.0 40.1	Indicated concentration (ppb) (Ic) -0.1 79.5 39.9	Correction facto (Cc/Ic) Limit = 0.95-1.05 1.006 1.005
Set Point calibrator zero high point second point third point	Dilution air flow rate (sccm) 5000 4926 4963 4982	H ₂ S Calibrat Source gas flow rate (sccm) 0.0 74.2 37.2 18.6	ion Data Calculated concentration (ppb) (Cc) 0.0 80.0 40.1 20.1	Indicated concentration (ppb) (Ic) -0.1 79.5 39.9 19.9	Correction facto (Cc/lc) Limit = 0.95-1.05 1.006 1.005 1.008
Set Point calibrator zero high point second point third point as left zero as left span	Dilution air flow rate (sccm) 5000 4926 4963 4982 5000	H ₂ S Calibrat Source gas flow rate (sccm) 0.0 74.2 37.2 18.6 0.0	ion Data Calculated concentration (ppb) (Cc) 0.0 80.0 40.1 20.1 0.0	Indicated concentration (ppb) (Ic) -0.1 79.5 39.9 19.9 0.1	Correction facto (Cc/Ic) Limit = 0.95-1.05 1.006 1.005 1.008
Set Point calibrator zero high point second point third point as left zero as left span O2 Scrubber Check	Dilution air flow rate (sccm) 5000 4926 4963 4982 5000 4926 4919	H ₂ S Calibrat Source gas flow rate (sccm) 0.0 74.2 37.2 18.6 0.0 74.2	ion Data Calculated concentration (ppb) (Cc) 0.0 80.0 40.1 20.1 0.0 80.0 80.0	Indicated concentration (ppb) (Ic) -0.1 79.5 39.9 19.9 0.1 78.7	Correction factor (Cc/Ic) Limit = 0.95-1.02 1.006 1.005 1.008 1.017
Set Point calibrator zero high point second point third point as left zero as left span 502 Scrubber Check Date of last scrubber cha	Dilution air flow rate (sccm) 5000 4926 4963 4982 5000 4926 4919 ange:	H ₂ S Calibrat Source gas flow rate (sccm) 0.0 74.2 37.2 18.6 0.0 74.2 81.3	ion Data Calculated concentration (ppb) (Cc) 0.0 80.0 40.1 20.1 0.0 80.0 80.0	Indicated concentration (ppb) (Ic) -0.1 79.5 39.9 19.9 0.1 78.7 0.1	Correction facto (Cc/lc) Limit = 0.95-1.05 1.006 1.005 1.008 1.017
Set Point calibrator zero high point second point third point as left zero as left span SO2 Scrubber Check Date of last scrubber cha Date of last converter ef	Dilution air flow rate (sccm) 5000 4926 4963 4982 5000 4926 4919 ange: ficiency test:	H ₂ S Calibrat Source gas flow rate (sccm) 0.0 74.2 37.2 18.6 0.0 74.2 81.3 15-Apr-21	ion Data Calculated concentration (ppb) (Cc) 0.0 80.0 40.1 20.1 0.0 80.0 813.0	Indicated concentration (ppb) (Ic) -0.1 79.5 39.9 19.9 0.1 78.7 0.1 Ave Corr Factor	Correction facto (Cc/Ic) Limit = 0.95-1.05 1.006 1.005 1.008 1.017 1.006 efficiency
Set Point calibrator zero high point second point third point as left zero as left span SO2 Scrubber Check Date of last scrubber cha Date of last converter ef Baseline Corr As found:	Dilution air flow rate (sccm) 5000 4926 4963 4982 5000 4926 4919 ange: ficiency test: 81.6	H ₂ S Calibrat Source gas flow rate (sccm) 0.0 74.2 37.2 18.6 0.0 74.2 81.3 15-Apr-21 Prev response:	ion Data Calculated concentration (ppb) (Cc) 0.0 80.0 40.1 20.1 0.0 80.0 813.0 79.91	Indicated concentration (ppb) (Ic) -0.1 79.5 39.9 19.9 0.1 78.7 0.1 Ave Corr Factor *% change:	Correction facto (Cc/Ic) Limit = 0.95-1.05 1.006 1.005 1.008 1.017 1.006 efficiency 2.1%
Set Point calibrator zero high point second point third point as left zero as left span SO2 Scrubber Check Date of last scrubber cha Date of last converter ef	Dilution air flow rate (sccm) 5000 4926 4963 4982 5000 4926 4919 ange: ficiency test:	H ₂ S Calibrat Source gas flow rate (sccm) 0.0 74.2 37.2 18.6 0.0 74.2 81.3 15-Apr-21	ion Data Calculated concentration (ppb) (Cc) 0.0 80.0 40.1 20.1 0.0 80.0 813.0 79.91 1.020479	Indicated concentration (ppb) (Ic) -0.1 79.5 39.9 19.9 0.1 78.7 0.1 Ave Corr Factor	Correction facto (Cc/Ic) Limit = 0.95-1.05 1.006 1.005 1.008 1.017 1.006 efficiency

Notes:

Changed sample inlet filter after MAF's. Conducted SOx scrubber check after calibrator zero. Adjusted zero.

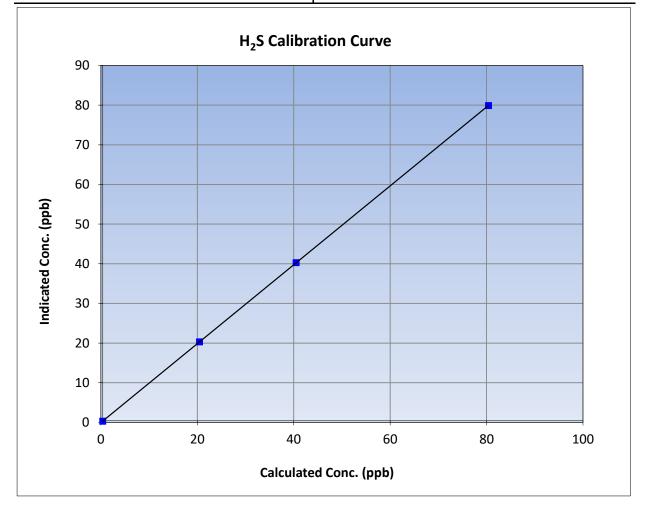


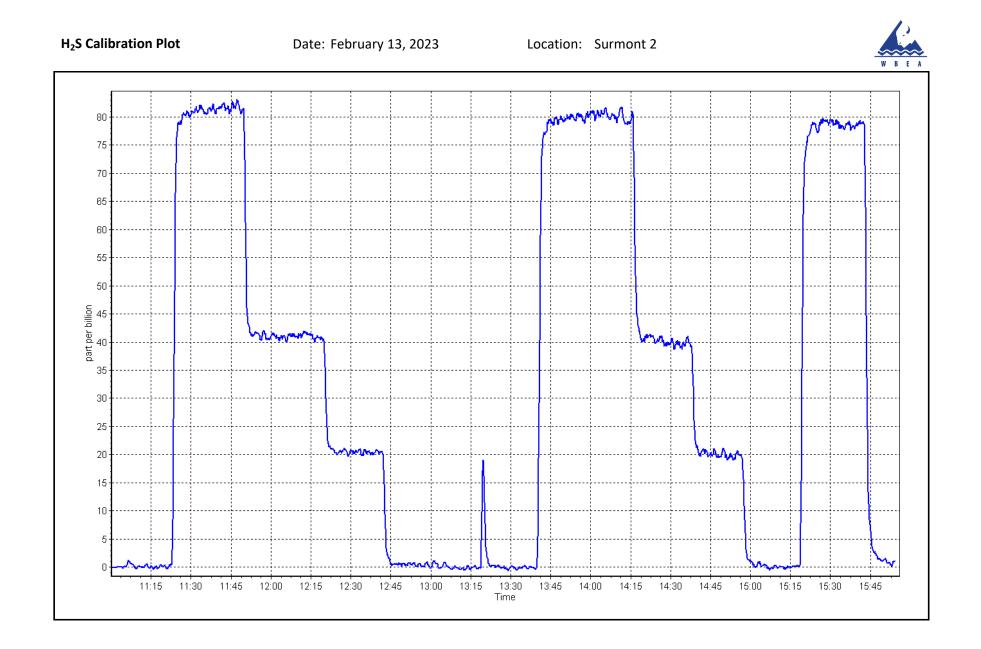
H₂S Calibration Summary

Station Information							
Calibration Date:	February 13, 2023	Previous Calibration:	January 9, 2023				
Station Name:	Surmont 2	Station Number:	AMS29				
Start Time (MST):	11:03	End Time (MST):	15:54				
Analyzer make:	Thermo 450i	Analyzer serial #:	1170050142				

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	0.999998	≥0.995
80.0	79.5	1.0063	correlation coefficient	0.999998	20.333
40.1	39.9	1.0052	Slope	0.994905	0.90 - 1.10
20.1	19.9	1.0077			0.90 - 1.10
			Intercept	-0.062658	+/-3







THC Calibration Report

Version-01-2020

		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Surmont 2 February 16, 2023 13:10 Routine		Station number: Last Cal Date: End time (MST):	AMS29 January 3, 2023 17:09	
		Calibration S	tandards		
Gas Cert Reference: CH4 Cal Gas Conc. C3H8 Cal Gas Conc.	CC35 <u>499.0</u> <u>205.7</u>	6008 ppm ppm	Cal Gas Expiry Date: CH4 Equiv Conc.	February 23, 2025 1064.7	ppm
Removed Gas Cert: Removed CH4 Conc. Removed C3H8 Conc. Calibrator Make/Model: ZAG Make/Model:	N <u>499.0</u> <u>205.7</u> Teledyne API T700 Teledyne API T701	IA ppm ppm	Removed Gas Expiry: CH4 Equiv Conc. Diff between cyl: Serial Number: Serial Number:	NA 1064.7 5258 4297	ppm
		Analyzer Info	ormation		
Analyzer make: Analyzer Range:	: Thermo 51i-LT : 0 - 20 ppm	,	Analyzer serial #:	1170050149	
Calibration slope: Calibration intercept:	<u>Start</u> 0.999326 -0.002444	<u>Finish</u> 0.995950 0.026135	Background: Coefficient:	<u>Start</u> 4.510 5.288	<u>Finish</u> 4.36 5.223
		THC Calibrat	ion 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	-0.13	
as found span	4918	81.3	17.31	17.35	0.998
as found 2nd point as found 3rd point new cylinder response					
	5000	0.0	0.00	0.09	
calibrator zero		01.2	17.31	17.30	1.001
calibrator zero high point	4918	81.3			1.001
-	4918 4959	40.7	8.67	8.63	1.004
high point second point third point	4959 4979	40.7 20.3	8.67 4.32	8.63 4.27	
high point second point third point as left zero	4959 4979 5000	40.7 20.3 0.0	8.67 4.32 0.00	4.27 0.08	1.004 1.013
high point second point third point	4959 4979	40.7 20.3	8.67 4.32 0.00 17.31	4.27 0.08 17.44	1.004 1.013 0.993
high point second point third point as left zero as left span	4959 4979 5000 4918	40.7 20.3 0.0 81.3	8.67 4.32 0.00 17.31 Averag	4.27 0.08 17.44 ge Correction Factor	1.004 1.013 0.993 1.006
high point second point third point as left zero	4959 4979 5000	40.7 20.3 0.0	8.67 4.32 0.00 17.31	4.27 0.08 17.44	1.004 1.013 0.993

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

Calibration Performed By:

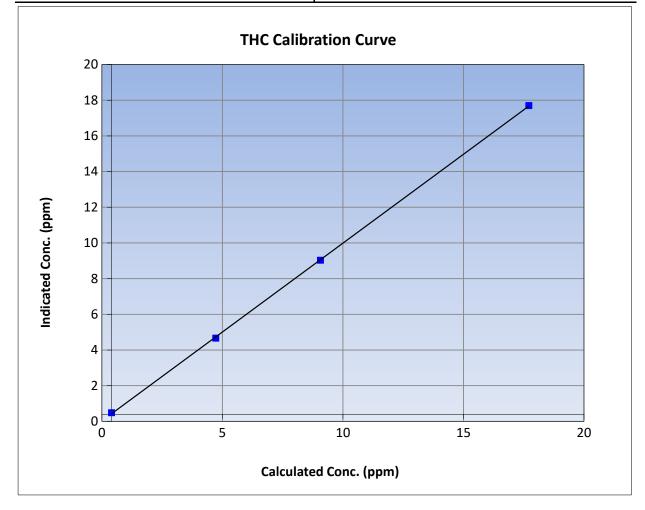


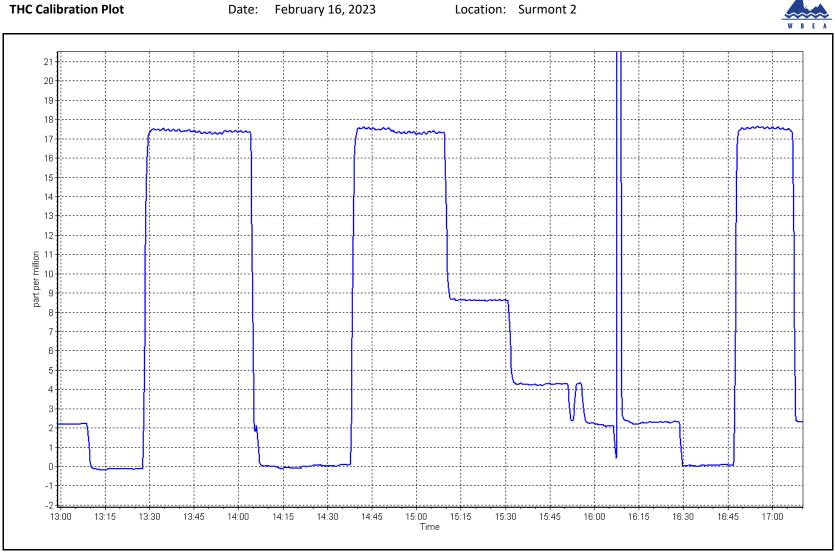
THC Calibration Summary

WBEA			Version-01-2020				
Station Information							
Calibration Date:	February 16, 2023	Previous Calibration:	January 3, 2023				
Station Name:	Surmont 2	Station Number:	AMS29				
Start Time (MST):	13:10	End Time (MST):	17:09				
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	0.09		Correlation Coefficient	0.999941	≥0.995
17.31	17.30	1.0008	correlation coefficient	0.333341	20.333
8.67	8.63	1.0043	Slope	0.995950	0.90 - 1.10
4.32	4.27	1.0129			0.30 - 1.10
			Intercept	0.026135	+/-1.5









$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

Station Information

Station Name: Calibration Date: Start time (MST): Reason: Surmont 2 February 17, 2023 10:46 As Found

Station number: AMS29 Last Cal Date: January 1, 2023 End time (MST): 13:50

Calibration	Stand	ards
-------------	-------	------

NO Gas Cylinder #:	1	T12YYFE	Cal Gas Expiry Date: Oct	ober 30, 202:	4
NOX Cal Gas Conc:	47.46	ppm	NO Cal Gas Conc:	47.46	ppm
Removed Cylinder #:		NA	Removed Gas Exp Date: NA		
Removed Gas NOX Conc:	47.46	ppm	Removed Gas NO Conc:	47.46	ppm
NOX gas Diff:			NO gas Diff:		
Calibrator Model:	Teledyne API T7	00	Serial Number: 525	58	
ZAG make/model:	Teledyne API T7	01	Serial Number: 429	97	

Analyzer Information

Analyzer make: Th NOX Range (ppb): 0 -			Analyzer serial #: 1170050148			
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>	
NO coeff or slope:	1.445	1.445	NO bkgnd or offset:	1.4	1.4	
NOX coeff or slope:	0.995	0.995	NOX bkgnd or offset:	1.5	1.5	
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	168.4	168.4	

Calibration Statistics

	<u>Start</u>
NO _x Cal Slope:	0.998337
NO _x Cal Offset:	0.787346
NO Cal Slope:	1.000325
NO Cal Offset:	-0.232760
NO ₂ Cal Slope:	0.997537
NO ₂ Cal Offset:	-0.620843

<u>Finish</u>



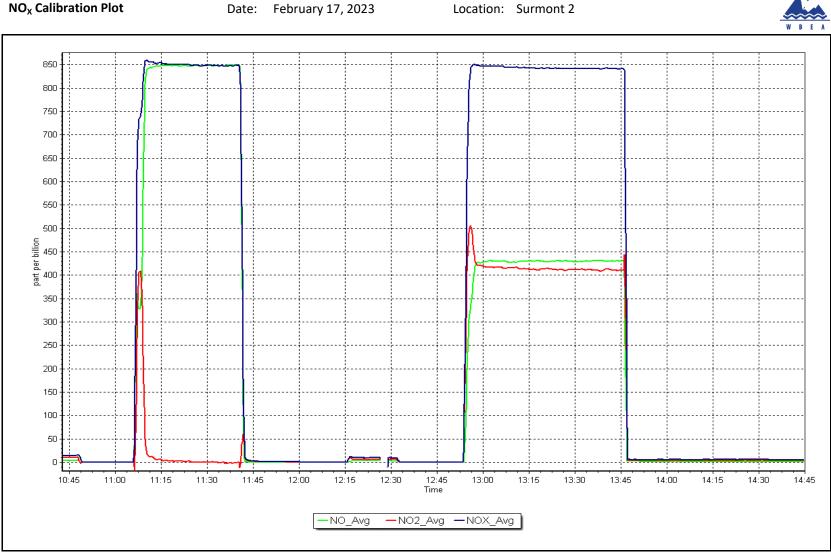
$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

				Dilu	ution Calibratio	on 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) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0		
as found span	4916	84.2	799.2	799.2	0.0	848.0	849.0	-0.6	0.9424	0.9413
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero										
high point										
second point										
third point										
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0		
as left span	4916	84.2	799.2			842.0	429.1	413.1	0.9492	
							Average C	orrection Factor		
Corrected As for	und NO _x =	848.2 ppb	NO =	849.2 ppb	* = > +/-5	% change initiates	investigation	*Percent Chang	ge NO _x =	5.8%
Previous Respor	nse NO _x =	798.7 ppb	NO =	799.2 ppb				*Percent Chang	ge NO =	5.9%
Baseline Corr 2r	nd pt NO _x =	NA ppb	NO =	NA ppb	As foun	d NO _x r ² :		Nx SI:	Nx Int:	
Baseline Corr 3r	d pt NO _x =	NA ppb	NO =	NA ppb	As foun	d NO r ² :		NO SI:	NO Int:	
					As foun	d NO ₂ r ² :		NO2 SI:	NO ₂ Int:	
				G	PT Calibration	Data				
O3 Setpoi	nt (ppb)	Indicated NO Ref concentration		cated NO Drop entration (ppb)	Calculated N concentration (pp		dicated NO2 ntration (ppb) (Ic)	NO2 Correction far Calibration Limit = As Found Limit = C	0.95-1.05	rter Efficiency n Limit = 96-104%
as found (GPT zero									
as found GPT poin	it (400 ppb NO2)									
as found GPT poin	t (200 ppb NO2)									
as found GPT poin	it (100 ppb NO2)									
1st GPT point ((400 ppb O3)									
2nd GPT point	(200 ppb O3)									
3rd GPT point	(100 ppb O3)									
						Average Co	prrection Factor			

Notes: Attempted calibration after changing the dilution calibrator. A portable calibrator will be brought to verfiy readings before making any large adjustments. Only as founds, GPTPS points and as lefts done.

Calibration Performed By:





$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

Station Information

Station Name: Calibration Date: Start time (MST): Reason: Surmont 2 February 22, 2023 11:23 Routine

Station number: AMS29 Last Cal Date: January 1, 2023 End time (MST): 16:18

NO Gas Cylinder #:	Т	12YYFE	Cal Gas Expiry Date: Octo	Cal Gas Expiry Date: October 30, 2024		
NOX Cal Gas Conc:	47.46	ppm	NO Cal Gas Conc:	47.46	ppm	
Removed Cylinder #:		NA	Removed Gas Exp Date: NA			
Removed Gas NOX Conc:	47.46	ppm	Removed Gas NO Conc:	47.46	ppm	
NOX gas Diff:			NO gas Diff:			
Calibrator Model:	Teledyne API T7	50	Serial Number: 282			
ZAG make/model:	Teledyne API T7	51	Serial Number: 321			

Analy	vzer	Inform	ation
	,		

Analyzer make: NOX Range (ppb):		,			
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.445	1.340	NO bkgnd or offset:	1.4	1.3
NOX coeff or slope:	0.995	0.998	NOX bkgnd or offset:	1.5	1.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	168.4	168.4

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.998337	1.000440
NO _x Cal Offset:	0.787346	0.326827
NO Cal Slope:	1.000325	1.000353
NO Cal Offset:	-0.232760	-0.592834
NO ₂ Cal Slope:	0.997537	1.006976
NO ₂ Cal Offset:	-0.620843	1.486191



$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

				Dilu	ition 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/lc) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0		
as found span	4916	84.2	799.2	799.2	0.0	861.0	861.0	0.3	0.9282	0.9282
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.0		
high point	4916	84.2	799.2	799.2	0.0	799.6	799.1	0.5	0.9995	1.0001
second point	4958	42.1	399.6	399.6	0.0	400.6	399.0	1.6	0.9975	1.0015
third point	4979	21.1	200.3	200.3	0.0	200.8	199.2	1.6	0.9974	1.0054
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0		
as left span	4916	84.2	799.2	414.6	384.6	797.5	395.4	402.1	1.0021	1.0485
							Average C	Correction Factor	0.9981	1.0023
Corrected As fo	ound NO _x =	861.2 ppb	NO =	861.2 ppb	* = > +/-5%	6 change initiates i	investigation	*Percent Chang	ge NO _x =	7.3%
Previous Respo	onse NO _x =	798.7 ppb	NO =	799.2 ppb				*Percent Chang	ge NO =	7.2%
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	$1 NO_2 r^2$:		NO2 SI:	NO ₂ Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Co	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) Calibration Limit = 0.95-1.05 As Found Limit = 0.90-1.10	Converter Efficiency Calibration Limit = 96-104%
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	793.3	408.7	384.6	387.8	0.9917	100.8%
2nd GPT point (200 ppb O3)	793.3	606.2	187.1	191.4	0.9775	102.3%
3rd GPT point (100 ppb O3)	793.3	697.7	95.6	98.7	0.9686	103.2%
				Average Correction Factor	0.9793	102.1%

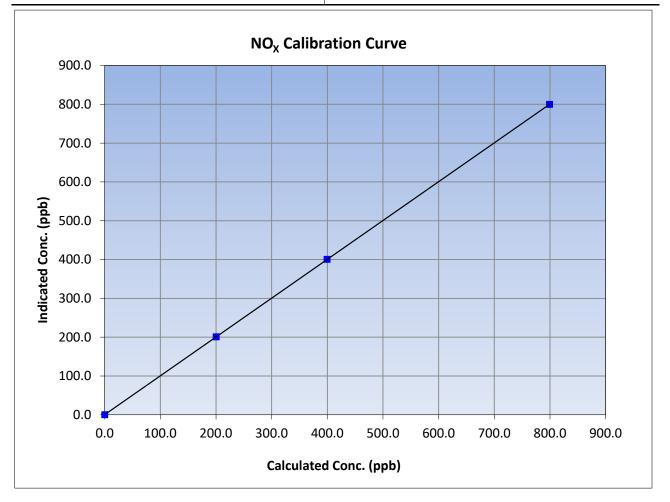
Notes: Calibration done with a portable calibrator and ZAG as the new calibrator installed this month has high readings compared to the old calibrator. Adjusted

Calibration Performed By:



$NO_{\rm X}$ Calibration Summary

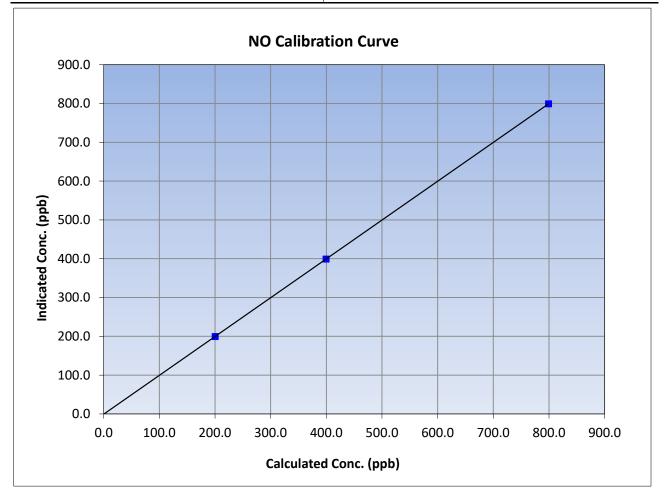
WBEA					Version-04-20
		Station	Information		
Calibration Date:	February	22, 2023	Previous Calibration:	January	1, 2023
Station Name:	Surm	iont 2	Station Number:	AM	S29
Start Time (MST):	11:23		End Time (MST):	16	:18
Analyzer make:	Thermo 42i		Analyzer serial #:	Analyzer serial #: 1170050	
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999999	≥0.995
799.2	799.6	0.9995	correlation coernelent	0.5555555	20.333
399.6	400.6	0.9975	Slope	1.000440	0.90 - 1.10
200.3	200.8	0.9974	Slope	1.000440	0.90 - 1.10
			Intercept	0.326827	+/-20





NO Calibration Summary

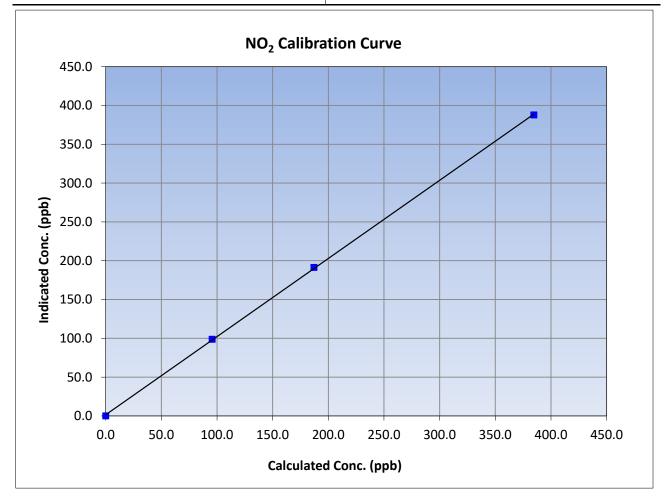
WBEA					Version-04-20
		Station	Information		
Calibration Date:	February	22, 2023	Previous Calibration:	January	1, 2023
Station Name:	Surm	nont 2	Station Number:	AM	IS29
Start Time (MST):	11:23		End Time (MST):	16	:18
Analyzer make:	ike: Thermo 42i		Analyzer serial #:	nalyzer serial #: 11700501	
		Calibra	ation Data		
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
799.2	799.1	1.0001	correlation coefficient	0.555556	20.995
399.6	399.0	1.0015	Clana	1.000353	0.90 - 1.10
200.3	199.2	1.0054	Slope	1.000353	0.90 - 1.10
			Intercept	-0.592834	+/-20

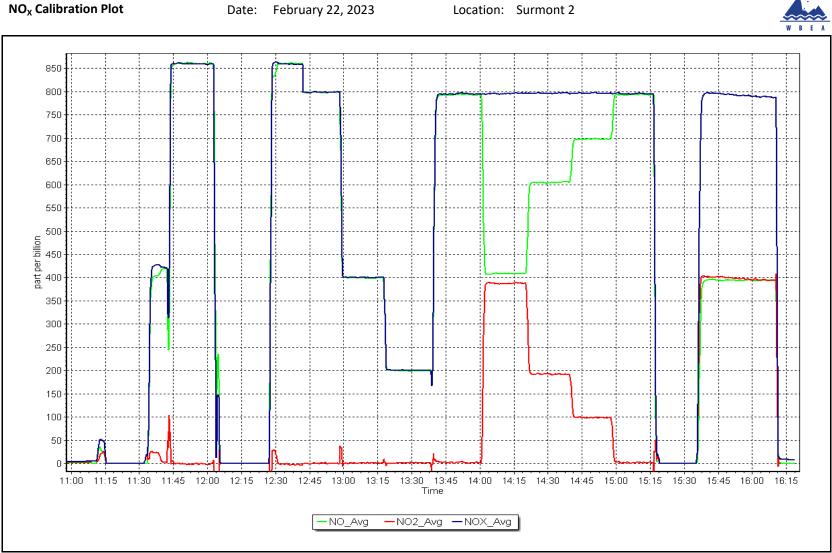




NO₂ Calibration Summary

WBEA					Version-04-202
		Station	Information		
Calibration Date:	February	22, 2023	Previous Calibration:	January	1, 2023
Station Name:	Surm	iont 2	Station Number:	AM	S29
Start Time (MST):	11:23		End Time (MST):	16	:18
Analyzer make:	Thermo 42i		Analyzer serial #:	Analyzer serial #: 11700501	
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999923	≥0.995
384.6	387.8	0.9917	correlation coernelent	0.555525	20.999
187.1	191.4	0.9775	Clana	1.006976	0.90 - 1.10
95.6	98.7	0.9686	Slope	1.000970	0.30 - 1.10
			Intercept	1.486191	+/-20









T640 PM_{2.5} CALIBRATION

WBEA					Version-01-2023
		Station Information			
Station Name: Calibration Date: Start time (MST):	Surmont 2 February 17, 2023 13:25		Station number: Last Cal Date: End time (MST):	January 12, 2023	
Analyzer Make: Particulate Fraction:	API T640 PM2.5		S/N:	253	
Flow Meter Make/Model:	Alicat FP-25BT		S/N:	388753	
Temp/RH standard:	Alicat FP-25BT		S/N:	388753	
		Monthly Calibration Te	est		
<u>Parameter</u> T ([°] C)	<u>As found</u> -10.8	Measured -10.7	<u>As left</u> -10.8	Adjusted	<u>l</u> (Limits) +/- 2 °C
P (mmHg)	706.1	707.0	706.1		+/- 10 mmHg
flow (LPM)	5.01	5.36	5.01	\checkmark	+/- 0.25 LPM
Leak Test: Note: this leak check will be	PM w/o HEPA:	February 17, 2023 3.8	Last Cal Date: PM w/ HEPA:	January 12, 2023 0	<0.2 ug/m3
Inlet cleaning :	Inlet Head				
		Quarterly Calibration T	est		
<u>Parameter</u>	<u>As found</u>	Post maintenance	<u>As left</u>	<u>Adjusted</u>	Limits)
PMT Peak Test	11.3	11.3	11.3		11.3 +/- 0.5
Post-maintenance	e leak check:	PM w/o HEPA:	3.8	w/ HEPA:	0.0
Date Optical Cham Disposable Filte	-	February 17, 2023 February 17, 2023			<0.2 ug/m3
		Annual Maintenance	2		
Date Sample Tub	pe Cleaned:	September 30	0, 2022		
Date RH/T Sense	or Cleaned:	October 6,	2022		
Notes:		Adju	sted flow only.		
Calibration by:	Braiden Boutilier				



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS30 ELLS RIVER FEBRUARY 2023

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

March 31, 2023



SO₂ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name: Calibration Date: Start time (MST): Reason:	Ells River February 15, 2023 9:56 Routine		Station number: Last Cal Date: End time (MST):	AMS 30 January 10, 2023 12:50	
		Calibration St	andards		
Cal Gas Concentration: Cal Gas Cylinder #:	50.53 CC494126	ppm	Cal Gas Exp Date:	December 29, 2028	
Removed Cal Gas Conc: Removed Gas Cyl #:	50.53	ppm	Rem Gas Exp Date: Diff between cyl:		
Calibrator Make/Model: ZAG Make/Model:	АРІ Т700 АРІ Т701Н		Serial Number: Serial Number:	3061 358	
		Analyzer Info	rmation		
Analyzer make Analyzer Range			Analyzer serial #:	1008841397	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope: Calibration intercept:	1.003501 -2.675936	1.006172 -2.436019	Backgd or Offset: Coeff or Slope:	9.3 0.988	9.2 0.988
		SO ₂ Calibratio	on Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration ((ppb) (Ic)	Correction factor (Cc/ Limit = 0.95-1.05
as found zero	5000	0.0	0.0	0.4	
as found span	4921	79.2	800.4	801.3	0.999
as found 2nd point					
as found 3rd point					
new cylinder response	F000	0.0	0.0	0.0	
calibrator zero high point	5000 4921	0.0	0.0 800.4	0.0 804.0	0.995
second point	4921	39.6	400.2	399.3	1.002
third point	4980	19.8	200.1	196.3	1.019
as left zero	5000	0.0	0.0	-0.1	
as left span	4921	79.2	800.4	808.0	0.991
•			Averag	ge Correction Factor	1.006
Baseline Corr As found:	800.90	Previous response	800.49	*% change	0.1%
Baseline Corr 2nd AF pt:	NA	AF Slope:		AF Intercept:	
Baseline Corr 3rd AF pt:	NA	AF Correlation:			

No adjustments have been made.

Calibration Performed By:

Denny Ray Estador

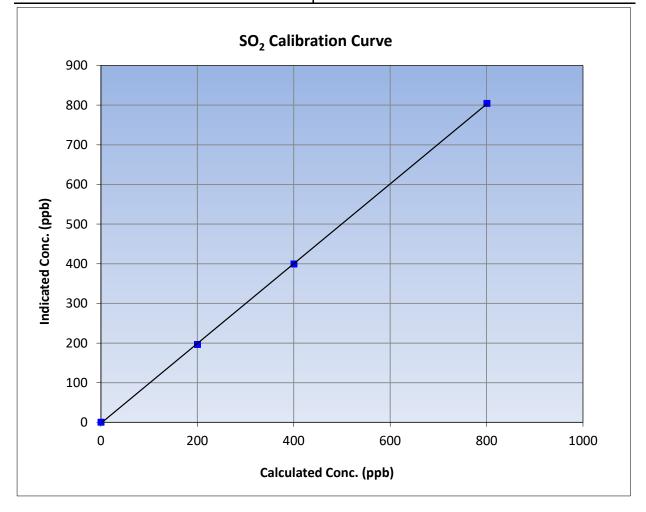


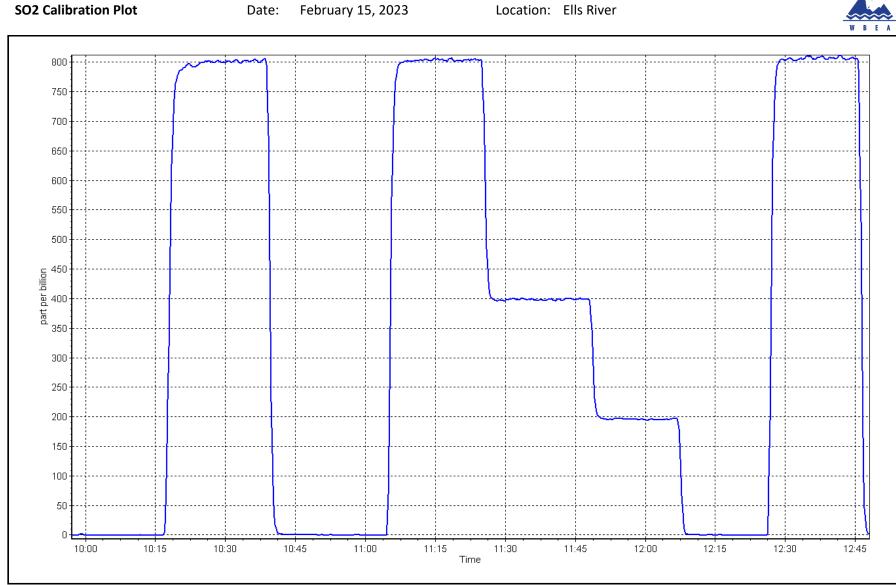
SO₂ Calibration Summary

WBEA			Version-01-2020					
Station Information								
Calibration Date:	February 15, 2023	Previous Calibration:	January 10, 2023					
Station Name:	Ells River	Station Number:	AMS 30					
Start Time (MST):	9:56	End Time (MST):	12:50					
Analyzer make:	Thermo 43i	Analyzer serial #:	1008841397					

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	0.999958	≥0.995
800.4	804.0	0.9955	correlation coefficient	0.999990	20.995
400.2	399.3	1.0023	Slope	1.006172	0.90 - 1.10
200.1	196.3	1.0194	Slope	1.000172	0.90 - 1.10
			- Intercept	-2.436019	+/-30







TRS Calibration Report

WBEA					Version-11-2021
		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Ells River February 13, 2023 10:37 Routine		Station number: Last Cal Date: End time (MST):	AMS30 January 5, 2023 14:43	
		Calibration S	tandards		
Cal Gas Concentration: Cal Gas Cylinder #:	5.08 EY0002443	ppm	Cal Gas Exp Date:	February 9, 2024	
Removed Cal Gas Conc: Removed Gas Cyl #:	5.08	ppm	Rem Gas Exp Date: Diff between cyl:		
Calibrator Make/Model: ZAG Make/Model:	API T700 API T701H		Serial Number: Serial Number:	3061 358	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	Thermo 43i TLE CDN - 101 0 - 100 ppb		Analyzer serial #: Converter serial #:	1410661331 555	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.029508	0.999493	Backgd or Offset:	1.59	1.57
Calibration intercept:	0.140267	0.040843	Coeff or Slope:	1.123	1.092
		TRS As Fou	nd 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	81.5	0.981
as found 2nd point	4961	39.4	40.0	40.6	0.986
as found 3rd point	4980	19.7	20.0	20.1	0.996
new cylinder response					
		TRS Calibrat	ion Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic) Limit = 0.95-1.05
calibrator zero	5000	0.0	0.0	0.1	
high point	4921	78.7	80.0	80.0	1.000
second point	4961	39.4	40.0	40.0	1.001
third point	4980	19.7	20.0	20.0	1.001
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 cha	inge:	N/A		Ave Corr Factor	1.000
Date of last converter ef	ficiency test:	N/A		95.1%	efficiency
Baseline Corr As found:	81.5	Prev response:	82.46	*% change:	-1.2%
Baseline Corr 2nd AF pt:	40.6	AF Slope:	1.020216	AF Intercept:	-0.159513
Baseline Corr 3rd AF pt:	20.1	AF Correlation:	0.999983	* = > +/-5% change initiat	tes investigation
				,	

Notes:

Adjusted the span only.

Calibration Performed By:

Denny Ray Estador

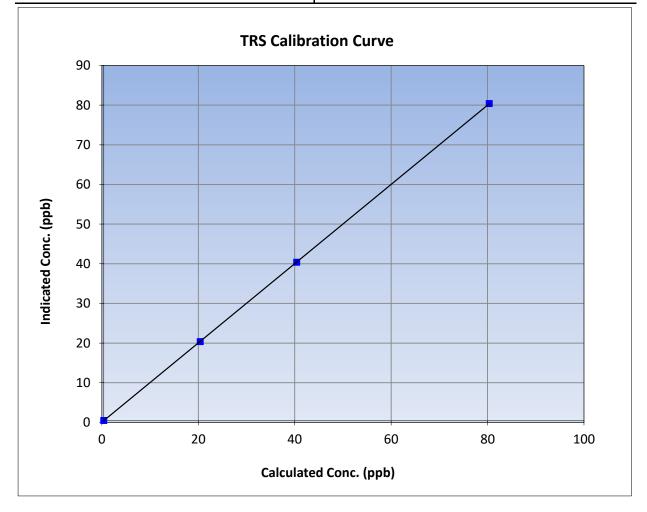


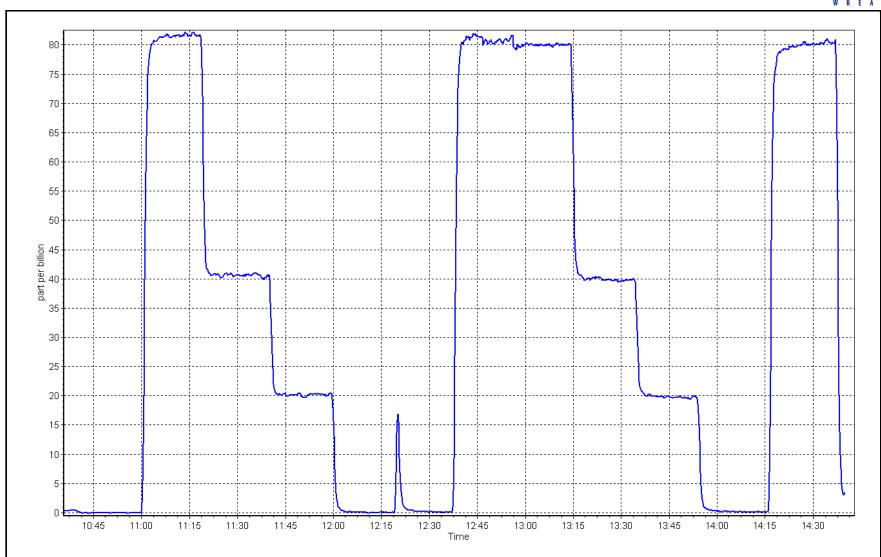
TRS Calibration Summary

WBEA			Version-11-2021					
Station Information								
Calibration Date:	February 13, 2023	Previous Calibration:	January 5, 2023					
Station Name:	Ells River	Station Number:	AMS30					
Start Time (MST):	10:37	End Time (MST):	14:43					
Analyzer make:	Thermo 43i TLE	Analyzer serial #:	1410661331					

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
80.0	80.0	0.9995	correlation coefficient	0.999997	20.333
40.0	40.0	1.0007	Slope	0.999493	0.90 - 1.10
20.0	20.0	1.0008	Slope	0.999495	0.30 - 1.10
			- Intercept	0.040843	+/-3





TRS Calibration Plot

Location: Ells River





THC / CH₄ / NMHC Calibration Report

WBEA					Version-01-2020
			Station Information		
Station Name:	Ells River		Station number: A	MS 30	
Calibration Date:	February 10, 2	2023	Last Cal Date: Ja	anuary 2, 2023	
Start time (MST):	9:56		End time (MST): 1	3:06	
Reason:	Routine				
		C	alibration Standards		
Gas Cert Reference:		CC494126	Cal Gas Expiry Date: D	ecember 29, 20	028
CH4 Cal Gas Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm
C3H8 Cal Gas Conc.	209.2	ppm			
Removed Gas Cert:			Removed Gas Expiry:		
Removed CH4 Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm
Removed C3H8 Conc.	209.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH ₄)	:		Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number: 3	061	
ZAG make/model:	API T701H		Serial Number: 3	58	
		A	nalyzer Information		
Analyzer make	: Thermo 55i		Analyzer serial #: 1	193585650	
THC Range (ppm)	: 0 - 20 ppm				
NMHC Range (ppm)	: 0 - 10 ppm		CH4 Range (ppm): 0	- 10 ppm	
	<u>Start</u>	<u>Fii</u>	<u>nish</u>	<u>Start</u>	<u>Finish</u>
CH4 SP Ratio	: 0.000234	4 0.00	NMHC SP Ratio:	5.04E-05	4.96E-05
CH4 Retention time	: 13.2	1	3.6 NMHC Peak Area:	180847	183767

THC Calibration Data							
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (0	Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05		
as found zero	5000	0.0	0.00	0.00			
as found span	4921	79.2	17.03	17.06	0.998		
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	8.35	1.020		
third point	4980	19.8	4.26	4.13	1.030		
as left zero	5000	0.0	0.00	0.00			
as left span	4921	79.2	17.03	17.03	1.000		
			ŀ	Average Correction Factor	1.017		
Baseline Corr AF:	17.06	Prev response	17.05	*% change	0.1%		
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:			
Baseline Corr 3rd AF:	NA	AF Correlation:		<pre>* = > +/-5% change initiates investigation</pre>			



THC / CH_4 / NMHC Calibration Report

Version-01-2020

		NMHC Calib	ration Data			
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05	
as found zero	5000	0	0.00	0.00		
as found span	4921	79.2	9.11	9.25	0.985	
as found 2nd point						
as found 3rd point						
new cylinder response						
calibrator zero	5000	0	0.00	0.00		
high point	4921	79.2	9.11	9.11	1.000	
second point	4960	39.6	4.56	4.51	1.011	
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	9.10	1.002	
			ŀ	Average Correction Factor	1.010	
Baseline Corr AF:	9.25	Prev response	9.15	*% change	1.1%	
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:		
Baseline Corr 3rd AF:	NA	AF Correlation:		<pre>* = > +/-5% change initiates investigation</pre>		

СН4	Cal	libra	tion	Data
CIII	Ca	I DI a	CIOIL	ναια

		CH4 Calibra	tion Data			
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (C	c) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05	
as found zero	5000	0.0	0.00	0.00		
as found span	4921	79.2	7.91	7.82	1.013	
as found 2nd point						
as found 3rd point						
new cylinder response						
calibrator zero	5000	0.0	0.00	0.00		
high point	4921	79.2	7.91	7.91	1.000	
second point	4960	39.6	3.96	3.84	1.031	
third point	4980	19.8	1.98	1.89	1.045	
as left zero	5000	0.0	0.00	0.00		
as left span	4921	79.2	7.91	7.93	0.998	
			A	verage Correction Factor	1.025	
Baseline Corr AF:	7.82	Prev response	7.90	*% change	-1.1%	
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:		
Baseline Corr 3rd AF:	NA	AF Correlation:		<pre>* = > +/-5% change initiates investigation</pre>		
		Calibration	Statistics			
		<u>Start</u>		<u>Finish</u>		
THC Cal Slope:		1.006389		1.000952		
THC Cal Offset:		-0.085138		-0.082136		
CH4 Cal Slope:		1.004928		1.001462		
CH4 Cal Offset:		-0.050756	-0.050756 -0.056755			
NMHC Cal Slope:		1.007959		1.000622		
NMHC Cal Offset:		-0.034582		-0.025581		

Notes:

Adjusted the span.

Calibration Performed By:

Denny Ray Estador



THC Calibration Summary

Version-01-2020

		Station	nformation		
	- I				2 2022
Calibration Date:	February 10, 2023 Ells River		Previous Calibration:	January	
Station Name:			Station Number:	AMS	
Start Time (MST):		56	End Time (MST):	13:	
Analyzer make:	Thern	10 55i	Analyzer serial #:	11935	85650
		Calibra	tion Data		
Calculated concentratio (ppm) (Cc)	on Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	lation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999867	≥0.995
17.03	17.02	1.0004			
<u>8.51</u> 4.26	<u>8.35</u> 4.13	1.0201 1.0303	Slope	1.000952	0.90 - 1.10
4.20	4.15	1.0505	Intercept	-0.082136	+/-0.5
18.0					
18.0					
14.0 -					
14.0					
12.0 -					
(bbu) 10.0 - 30 - 8.0 -					
Out Out					
ndicated (
<u> </u>					
2.0 -					
0.0 🖛	/				
0.0) 5	0	10.0	15.0	20.0
		Calculated	Conc. (ppm)		



CH₄ Calibration Summary

Version-01-2020

		Station I	nformation			
Calibration Date:	Februar	February 10, 2023		January	2, 2023	
Station Name:	Ells	February 10, 2023 Ells River		AMS	AMS 30	
Start Time (MST):	9	:56	End Time (MST):	13:	06	
Analyzer make:	Ther	mo 55i	Analyzer serial #:	11935	85650	
		Calibra	tion Data			
Calculated concentration (ppm) (Cc)	on Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Eval	luation	<u>Limits</u>	
0.00	0.00		Correlation Coefficient	0.999698	≥0.995	
7.91	7.91	1.0005				
3.96 1.98	3.84 1.89	1.0307 1.0448	Slope	1.001462	0.90 - 1.10	
2.00	1.05		Intercept	-0.056755	+/-0.5	
8.0 7.0						
6.0 -						
udd 5.0 -						
uo 4.0 –						
Indicated Conc. (ppm) - 0.4 Conc. (ppm) - 3.0						
2.0						
1.0 -						
0.0 -	0 2.0	4.0	6.0	8.0	10.0	
0.0	, 2.0			0.0	10.0	
		Calculated	l Conc. (ppm)			

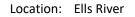


NMHC Calibration Summary

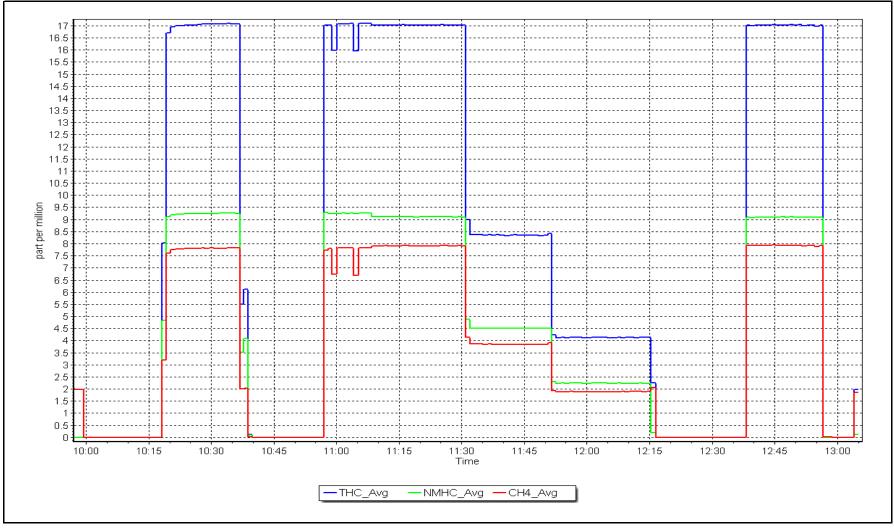
Version-01-2020

		Station I	nformation		
alibration Date:	February 10, 2023		Previous Calibration:	January	2, 2023
tation Name:	Ells River		Station Number:	AMS	5 30
tart Time (MST):	9	:56	End Time (MST):	13:	06
nalyzer make:	Ther	mo 55i	Analyzer serial #:	11935	85650
		Calibra	ition Data		
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999957	≥0.995
9.11 4.56	9.11 4.51	1.0003 1.0110			
2.28	2.24	1.0110	Slope	1.000622	0.90 - 1.10
			Intercept	-0.025581	+/-0.5
10.0 9.0 8.0					•
7.0			/		
(ud 6.0					
(bbm) 5.0 (bbm)					
4.0 +					
2.0					
1.0					
0.0					
0.0	2.0	4.0	6.0	8.0	10.0
		Calculated	d Conc. (ppm)		

NMHC Calibration Plot









THC / CH_4 / NMHC Calibration Report

WBEA					Version-01-2		
		St	ation Information				
Station Name:	Ells River		Station number: AMS 30				
Calibration Date:	February 12, 20	23	Last Cal Date: Fe	ebruary 10, 202	23		
Start time (MST):	10:00		End time (MST): 1	1:23			
Reason:	Removal						
		Cal	ibration Standards				
Gas Cert Reference:	C	C494126	Cal Gas Expiry Date: D	ecember 29, 20)28		
CH4 Cal Gas Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm		
C3H8 Cal Gas Conc.	209.2	ppm					
Removed Gas Cert:			Removed Gas Expiry:				
Removed CH4 Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm		
Removed C3H8 Conc.	209.2	ppm	Diff between cyl (THC):				
Diff between cyl (CH ₄):	:		Diff between cyl (NM):				
Calibrator Model:	API T700		Serial Number: 3	061			
ZAG make/model:	API T701H		Serial Number: 3	58			
		An	alyzer Information				
Analyzer make:	: Thermo 55i		Analyzer serial #: 1	193585650			
THC Range (ppm):	: 0 - 20 ppm						
NMHC Range (ppm):	: 0 - 10 ppm		CH4 Range (ppm): 0	- 10 ppm			
	<u>Start</u>	Finis	<u>h</u>	Start	Finish		
CH4 SP Ratio:	0.000236	NA	NMHC SP Ratio:	4.96E-05	NA		
CH4 Retention time:	: 13.6	NA	NMHC Peak Area:	183767	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	4921	79.2	17.03	16.90	1.007		
as found 2nd point	4960	39.6	8.51	8.29	1.027		
as found 3rd point	4980	19.8	4.26	4.15	1.027		
new cylinder response							
calibrator zero							
high point							
second point							
third point							
as left zero							
as left span							
			Aver	age Correction Factor			
Baseline Corr AF:	16.90	Prev response	16.96	*% change	-0.4%		
Baseline Corr 2nd AF:	8.3	AF Slope:	0.993223	AF Intercept:	-0.064347		
Baseline Corr 3rd AF:	4.1	AF Correlation:	0.999889	* = > +/-5% change initia	tes investigation		



THC / CH_4 / NMHC Calibration Report

Version-01-2020

Set Point			ation Data		
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (Cc)	Ind conc (ppm) (Ic)	CF Limit= 0.95-1.0
as found zero	5000	0	0.00 0.00		
as found span	4921	79.2	9.11	9.11	1.000
as found 2nd point	4960	39.6	4.56	4.51	1.011
as found 3rd point	4980	19.8	2.28	2.24	1.020
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
			Avera	age Correction Factor	
Baseline Corr AF:	9.11	Prev response	9.09	*% change	0.2%
Baseline Corr 2nd AF:	4.5	AF Slope:	1.000681	AF Intercept:	-0.027312
Baseline Corr 3rd AF:	2.2	AF Correlation:	0.999954	* = > +/-5% change initiat	tes investigation
Set Point as found zero	Dil air flow rate 5000	Source gas flow rate 0.0	Calc conc (ppm) (Cc) 0.00	Ind conc (ppm) (Ic) 0.00	CF Limit= 0.95-1.05
as found zero	5000	, i i i i i i i i i i i i i i i i i i i			
as found span	4921	79.2	7.91	7.79	1.016
as found 2nd point	4960	39.6	3.96	3.78	1.048
as found 3rd point	4980	19.8	1.98	1.91	1.035
new cylinder response					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
				age Correction Factor	
Baseline Corr AF:	7.79	Prev response	7.87	*% change	-1.0%
Baseline Corr 2nd AF:	3.78	AF Slope:	0.984307 AF Intercept: -0.03837		
Baseline Corr 3rd AF:	1.91	AF Correlation:	0.999713	* = > +/-5% change initial	tes investigation
		Calibration	Statistics		
THC Cal Slope: THC Cal Offset:		<u>Start</u> 1.000952 -0.082136		<u>Finish</u>	

Notes:

CH4 Cal Slope:

CH4 Cal Offset:

NMHC Cal Slope:

NMHC Cal Offset:

Removal calibration for instrument change out.

Calibration Performed By: Ka

Karan Pandit

1.001462

-0.056755

1.000622

-0.025581

NMHC Calibration Plot









THC / CH_4 / NMHC Calibration Report

WBEA					Version-01-202
		Sta	tion Information		
Station Name:	Ells River		Station number: Al	MS 30	
Calibration Date:	February 12, 2	023	Last Cal Date: N	A	
Start time (MST):	12:30		End time (MST): 14	1:50	
Reason:	Install				
		Calib	oration Standards		
Gas Cert Reference:		CC494126	Cal Gas Expiry Date: De	ecember 29, 20)28
CH4 Cal Gas Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm
C3H8 Cal Gas Conc.	209.2	ppm			
Removed Gas Cert:			Removed Gas Expiry:		
Removed CH4 Conc.	499.7	ppm	CH4 Equiv Conc.	1075.0	ppm
Removed C3H8 Conc.	209.2	ppm	Diff between cyl (THC):		
Diff between cyl (CH ₄)	:		Diff between cyl (NM):		
Calibrator Model:	API T700		Serial Number: 30	061	
ZAG make/model:	API T701H		Serial Number: 35	58	
		Ana	lyzer Information		
Analyzer make	: Thermo 55i		Analyzer serial #: 11	L81490018	
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	: NA	0.00023	NMHC SP Ratio:	NA	4.00E-05
CH4 Retention time	: NA	14.0	NMHC Peak Area:	NA	227486

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	
as found zero						
as found span						
as found 2nd point						
as found 3rd point						
new cylinder response						
calibrator zero	5000	0.0	0.00	0.00		
high point	4921	79.2	17.03	16.92	1.006	
second point	4960	39.6	8.51	8.36	1.018	
third point	4980	19.8	4.26	4.14	1.028	
as left zero	5000	0.0	0.00	0.00		
as left span	4921	79.2	17.03	16.73	1.018	
			A	verage Correction Factor	1.017	
Baseline Corr AF:	NA	Prev response	NA	*% change	NA	
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:		
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation		



THC / CH_4 / NMHC Calibration Report

Version-01-2020

		NMHC Calib	ration Data				
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (0	Cc) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05		
as found zero							
as found span							
as found 2nd point							
as found 3rd point							
new cylinder response							
calibrator zero	5000	0	0.00	0.00			
high point	4921	79.2	9.11	9.01	1.011		
second point	4960	39.6	4.56	4.47	1.020		
third point	4980	19.8	2.28	2.21	1.029		
as left zero	5000	0	0.00	0.00			
as left span	4921	79.2	9.11	8.91	1.023		
			A	verage Correction Factor	1.020		
Baseline Corr AF:	NA	Prev response	NA	*% change	NA		
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:			
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiates investigation			

CH4 Calibration Data

Chi Canoration Data							
Set Point	Dil air flow rate	Source gas flow rate	Calc conc (ppm) (C	c) Ind conc (ppm) (Ic)	CF Limit= 0.95-1.05		
as found zero							
as found span							
as found 2nd point							
as found 3rd point							
new cylinder response							
calibrator zero	5000	0.0	0.00	0.00			
high point	4921	79.2	7.91	7.91	1.001		
second point	4960	39.6	3.96	3.90	1.016		
third point	4980	19.8	1.98	1.93	1.026		
as left zero	5000	0.0	0.00	0.00			
as left span	4921	79.2	7.91	7.82	1.012		
			A	verage Correction Factor	1.014		
Baseline Corr AF:	NA	Prev response	NA	*% change	NA		
Baseline Corr 2nd AF:	NA	AF Slope:		AF Intercept:			
Baseline Corr 3rd AF:	NA	AF Correlation:		* = > +/-5% change initiat	es investigation		
		Calibration	Statistics				
		<u>Start</u>		<u>Finish</u>			
THC Cal Slope:		NA		0.994670			
THC Cal Offset:		NA		-0.054336			
CH4 Cal Slope:		NA	1.000380				
CH4 Cal Offset:		NA		-0.030757			
NMHC Cal Slope:		NA		0.989848			
NMHC Cal Offset:		NA	-0.023379				

Notes:

Install calibration for instrument change out. Adjusted the span only.

Calibration Performed By:

Karan Pandit



THC Calibration Summary

Version-01-2020

					Version-01-2020
		Station I	nformation		
Calibration Date:	February	12, 2023	Previous Calibration:	N	A
Station Name:	Ells	River	Station Number:	AMS	5 30
Start Time (MST):	12	:30	End Time (MST):	14:	50
Analyzer make:		no 55i	Analyzer serial #:	11814	
,			· · · · · · · · · · · · · · · · · · ·		
		Calibra	tion Data		
Calculated concentratio (ppm) (Cc)	on Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>
0.00	0.00		Correlation Coefficient	0.999946	≥0.995
17.03	16.92	1.0065			
8.51 4.26	8.36 4.14	1.0183 1.0276	Slope	0.994670	0.90 - 1.10
4.20	4.14	1.0276			
			Intercept	-0.054336	+/-0.5
18.0		THC Calibration	n Curve		
16.0 —					
14.0 —					
12.0 —					
u da 10.0 –					
d) 10.0					
၀ 8.0 –					
ndicated Conc. (ppm)					
4.0					
2.0 —					
0.0 🛩	/				
0.0	5	.0	10.0	15.0	20.0
		Calculated	Conc. (ppm)		



CH₄ Calibration Summary

Version-01-2020

						Version-01-2020
			Station I	nformation		
Calibration	Date:	February	12, 2023	Previous Calibration:	N	A
Station Nam	ne:	Ells	River	Station Number:	AMS	5 30
Start Time (MST):	12	:30	End Time (MST):	14:	50
Analyzer ma	ake:	Therr	no 55i	Analyzer serial #:	11814	90018
			Calibra	tion Data		
Calculated con (ppm) (Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Eval	luation	<u>Limits</u>
0.00		0.00		Correlation Coefficient	0.999919	≥0.995
7.93		7.91 3.90	1.0009 1.0156			
1.98		1.93	1.0259	Slope	1.000380	0.90 - 1.10
				Intercept	-0.030757	+/-0.5
7 6 1	3.0 7.0 5.0 5.0					
d Conc	1.0					
ndicate	3.0					
	2.0					
1	L.0 -					
C	0.0 🖌					
1	0.0	2.0	4.0	6.0	8.0	10.0
			Calculated	l Conc. (ppm)		
				,		



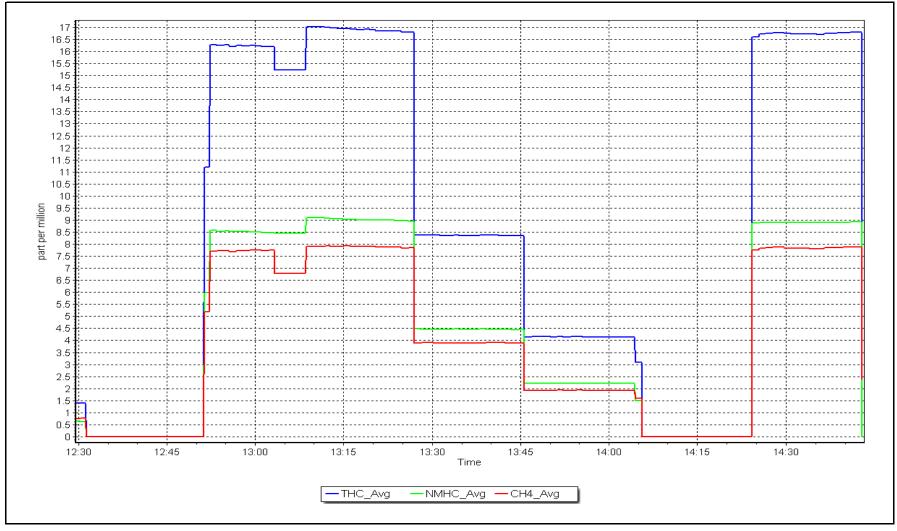
NMHC Calibration Summary

Version-01-2020

			Station I	nformation		
Calibration	Date:	February	/ 12, 2023	Previous Calibration:	Ν	A
Station Nam	ne:	Ells	River	Station Number:	AMS	5 30
Start Time (MST):	12	2:30	End Time (MST):	14:	50
Analyzer ma	ake:	Ther	mo 55i	Analyzer serial #:	11814	90018
			Calibra	tion Data		
Calculated con (ppm) (Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	uation	<u>Limits</u>
0.00 9.12		0.00 9.01	1.0113	Correlation Coefficient	0.999967	≥0.995
4.56		4.47	1.0201	Clana	0.000040	0.00 1.10
2.28		2.21	1.0290	Slope	0.989848	0.90 - 1.10
				Intercept	-0.023379	+/-0.5
10	0.0		NMHC Calibrat	tion Curve		
ç	9.0					
8	3.0					
7	7.0					
(mqc	5.0					
Conc. (ppm)	5.0					
ted C	1.0					
Indicated	3.0					
	2.0					
1	L.0 -					
С).0	-	-			
	0.0	2.0	4.0	6.0	8.0	10.0
			Calculated	l Conc. (ppm)		

NMHC Calibration Plot







$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

			Station	Information			
Station Name: Calibration Date: Start time (MST): Reason:	Ells River February 1, 2023 8:55 Routine			Last Cal Date: Jan	Station number: AMS 30 Last Cal Date: January 13, 2023 End time (MST): 13:15		
			Calibrat	ion Standards			
NO Gas Cylinder #:		T2Y1P2R		Cal Gas Expiry Date: De	cember 11, 2	023	
NOX Cal Gas Conc: Removed Cylinder #:	50.83	ppm		NO Cal Gas Conc: Removed Gas Exp Date:	49.97	ppm	
Removed Gas NOX Conc: NOX gas Diff:	50.83	ppm		Removed Gas NO Conc: NO gas Diff:	49.97	ppm	
Calibrator Model: ZAG make/model:	API T700 API T701H			Serial Number: 300 Serial Number: 350			
			Analyza	u Information			
			Analyze	r Information			
Analyzer make: NOX Range (ppb):				Analyzer serial #: 710)321429		
	<u>Start</u>		<u>Finish</u>		<u>Start</u>	<u>Finish</u>	
NO coeff or slope:	: 1.029		1.029	NO bkgnd or offset:	12.6	12.5	
NOX coeff or slope	. 0.992		0.992	NOX bkgnd or offset:	12.5	12.4	
NO2 coeff or slope	: 1.000		1.000	Reaction cell Press:	181.5	185.1	

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.998693	1.001096
NO _x Cal Offset:	-0.720000	-0.800000
NO Cal Slope:	0.997541	1.001429
NO Cal Offset:	-1.280000	-1.540000
NO ₂ Cal Slope:	1.000846	1.001609
NO ₂ Cal Offset:	0.511635	0.350570



$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

				Dilu	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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0		
as found span	4920	80.0	813.3	799.5	13.8	817.9	802.1	15.8	0.9944	0.9968
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1		
high point	4920	80.0	813.3	799.5	13.8	813.8	799.9	14.0	0.9994	0.9995
second point	4960	40.0	406.6	399.8	6.9	405.8	397.9	7.9	1.0021	1.0047
third point	4980	20.0	203.3	199.9	3.4	202.0	197.3	4.7	1.0065	1.0131
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	422.6	390.7	813.6	429.2	384.3	0.9996	0.9847
							Average C	orrection Factor	1.0027	1.0058
Corrected As fo	ound NO _x =	818.1 ppb	NO =	802.3 ppb	* = > +/-59	% change initiates i	nvestigation	*Percent Chang	ge NO _X =	0.8%
Previous Respo	nse NO _x =	811.5 ppb	NO =	796.3 ppb				*Percent Chang	ge NO =	0.8%
Baseline Corr 2	nd pt NO _X =	NA ppb	NO =	NA ppb	As found	d $NO_X r^2$:		Nx SI:	Nx Int:	
Baseline Corr 3	rd 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 ₂ Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Co	Indicated NO2 c) concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) Calibration Limit = 0.95-1.05 As Found Limit = 0.90-1.10	Converter Efficiency Calibration Limit = 96-104%
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	797.4	420.5	390.7	391.2	0.9986	100.1%
2nd GPT point (200 ppb O3)	797.4	613.2	198.0	199.7	0.9913	100.9%
3rd GPT point (100 ppb O3)	797.4	704.9	106.3	106.4	0.9987	100.1%
				Average Correction Factor	0.9962	100.4%

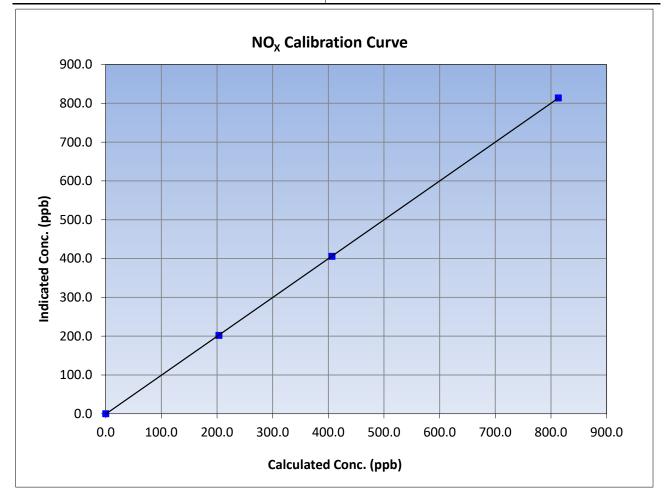
Notes:

No adjusments have been made.



$NO_{\rm X}$ Calibration Summary

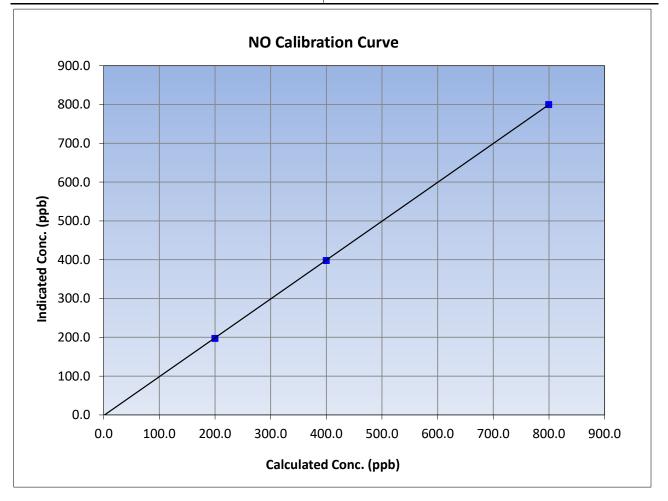
WBEA					Version-04-2	
		Station	Information			
Calibration Date:	February 1, 2023		Previous Calibration:	January	13, 2023	
Station Name:	Ells River		Station Number:	AM	S 30	
Start Time (MST):	MST): 8:55		End Time (MST):	13	13:15	
Analyzer make: Thermo 42i			Analyzer serial #: 71032		21429	
		Calibra	ation Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	0.0		Correlation Coefficient	0.999996	≥0.995	
813.3	813.8	0.9994	correlation coefficient	0.999990	20.995	
406.6	405.8	1.0021	Slope	1.001096	0.90 - 1.10	
203.3	202.0	1.0065	Slope	1.001096	0.90 - 1.10	
			Intercept	-0.800000	+/-20	





NO Calibration Summary

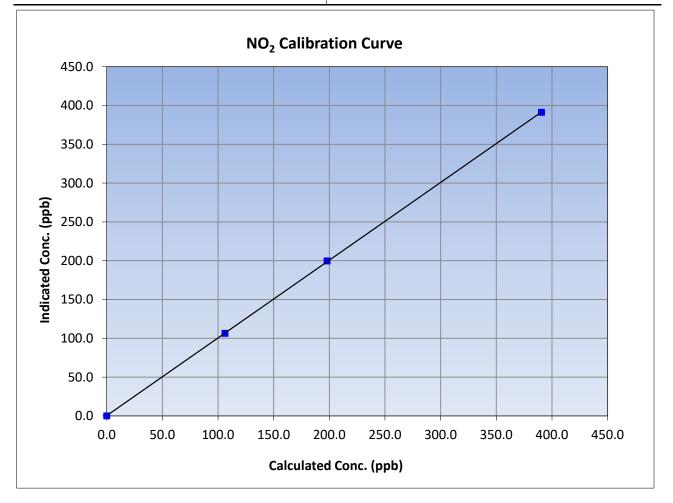
WBEA					Version-04-2	
		Station	Information			
Calibration Date:	te: February 1, 2023		Previous Calibration:	January	January 13, 2023	
Station Name:	Ells River		Station Number:	AM	S 30	
Start Time (MST):	Time (MST): 8:55		End Time (MST):	13	:15	
Analyzer make: Thermo 42i			Analyzer serial #: 710321		21429	
		Calibra	ation Data			
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>	
0.0	-0.1		Correlation Coefficient	0.999985	≥0.995	
799.5	799.9	0.9995	correlation coernelent	0.555555	20.333	
399.8	397.9	1.0047	Slope	1.001429	0.90 - 1.10	
199.9	197.3	1.0131	Slope	1.001429	0.90 - 1.10	
			Intercept	-1.540000	+/-20	





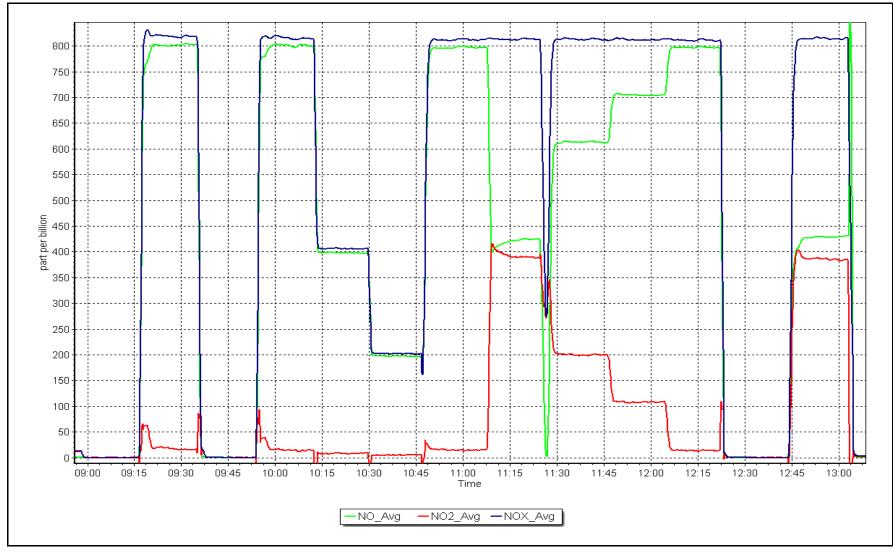
NO₂ Calibration Summary

WBEA					Version-04-20
		Station	Information		
Calibration Date:	te: February 1, 2023		Previous Calibration:	January	13, 2023
Station Name:	Ells River		Station Number:	AM	S 30
Start Time (MST):	iT): 8:55		End Time (MST):	13	:15
Analyzer make: Thermo 42i			Analyzer serial #: 710321		21429
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999981	≥0.995
390.7	391.2	0.9986	correlation coernelent	0.555561	20.995
198.0	199.7	0.9913	Slope	1.001609	0.90 - 1.10
106.3	106.4	0.9987	Slope	1.001009	0.90 - 1.10
			Intercept	0.350570	+/-20











T640 PM_{2.5} CALIBRATION

W D E A						Version-01-2023
		Station Information	ı			
Station Name:	Ells River		Station number:	AMS 30		
Calibration Date:	February 17, 2023		Last Cal Date:	January 5, 2	2023	
Start time (MST):	12:55		End time (MST):	13:08		
			c /b.	075		
Analyzer Make: Particulate Fraction:	API T640 PM2.5		S/N:	875		
	PIVIZ.5					
Flow Meter Make/Model:	Delta Cal		S/N:	954		
Temp/RH standard:	Delta Cal		S/N:	954		
		Monthly Calibration T	est			
<u>Parameter</u>	<u>As found</u>	Measured	<u>As left</u>		<u>Adjusted</u>	(Limits)
T (°C)	-16.8	-17.1	-16.8			+/- 2 °C
P (mmHg)	730.4	726.5	730.4			+/- 10 mmHg
flow (LPM)	5.01	5.07	5.01			+/- 0.25 LPM
Leak Test:	Date of check:	February 17, 2023	Last Cal Date:	January	5, 2023	
	PM w/o HEPA:	3.1	PM w/ HEPA:	(<0.2 ug/m3
Note: this leak check will be		quarterly work and will s	· -	ntenance le	eak check	
Inlet cleaning :	Inlet Head					
		Quarterly Calibration	Fest			
Parameter	<u>As found</u>	Post maintenance	<u>As left</u>		<u>Adjusted</u>	(Limits)
PMT Peak Test						11.3 +/- 0.5
Post-maintenance		PM w/o HEPA:		w/ HEPA:		
Date Optical Cham	-	December 19 December 19	·			<0.2 ug/m3
Disposable Filte	r changeu.	December 1	9, 2022			
		Annual Maintenanc	e			
Date Sample Tul	ne Cleaned:	October 17,	2022			
Date RH/T Sense	-	October 17				
			,			
Notes:		No adju	stments required.			
Calibration by:	Denny Ray Estador					



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS506 JACKFISH 1 FEBRUARY 2023

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

March 31, 2023



SO₂ Calibration Report

Version-01-2020

	Station Infor	mation		
Jackfish 1 February 14, 2023 11:36 Routine		Station number: Last Cal Date: End time (MST):	AMS 506 January 24, 2023 14:16	
	Calibration St	andards		
<u>50.52</u>	<u>2</u> ppm	Cal Gas Exp Date:	December 29, 2028	
<u>CC274266</u>				
	<u>2</u> ppm	•	NA	
			2659	
API 701		Serial Number:	4427	
	Analyzer Info	rmation		
: Thermo 43i		Analyzer serial #:	1160290011	
e 0 - 1000 ppb				
Start	Finish		Start	<u>Finish</u>
1.006642	1.004300	Backgd or Offset:	19.0	18.9
-1.856099	-1.536060	Coeff or Slope:	0.960	0.960
	SO ₂ Calibratio	on Data		
Dilution air flow rate	Source gas flow rate	Calculated	Indicated concentration (orrection factor (Cc/Ic)
(sccm)	(sccm)	concentration (ppb) (Cc)	(ppb) (Ic)	Limit = 0.95-1.05
5000	0.0	0.0	-0.7	
4921	79.2	800.2	800.4	1.000
	0.0	0.0	0.4	
5000	0.0	0.0	-0.4	
4921	79.2	800.2	802.4	0.997
4921 4960	79.2 39.6	800.2 400.2	802.4 400.6	0.997 0.999
4921 4960 4980	79.2 39.6 19.8	800.2 400.2 200.1	802.4 400.6 197.7	0.997
4921 4960 4980 5000	79.2 39.6 19.8 0.0	800.2 400.2 200.1 0.0	802.4 400.6 197.7 -0.5	0.997 0.999 1.012
4921 4960 4980	79.2 39.6 19.8	800.2 400.2 200.1 0.0 800.2	802.4 400.6 197.7	0.997 0.999 1.012
4921 4960 4980 5000 4921	79.2 39.6 19.8 0.0 79.2	800.2 400.2 200.1 0.0 800.2 Averag	802.4 400.6 197.7 -0.5 802.4 ge Correction Factor	0.997 0.999 1.012 0.997 1.003
4921 4960 4980 5000	79.2 39.6 19.8 0.0	800.2 400.2 200.1 0.0 800.2 Average 803.66	802.4 400.6 197.7 -0.5 802.4	0.997 0.999 1.012 0.997
	February 14, 2023 11:36 Routine <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.52</u> <u>50.00</u>	Jackfish 1 February 14, 2023 11:36 Routine	Jackfish 1 February 14, 2023 Last Cal Date: End time (MST): RoutineCalibration Standards End time (MST): End time (MST): End time (MST): Cal Gas Exp Date: Sonce ppmCalibration StandardsC274266 50.52 50.52 50.52 ppmRem Gas Exp Date: Diff between cyl: Serial Number: Serial Number: Serial Number:NA API 701Analyzer Information Serial Number: Serial Number:Analyzer serial #: Coeff or Slope:Start 1.006642 -1.856099Finish 1.004300 -1.536060Backgd or Offset: Coeff or Slope:Dilution air flow rate (sccm)Source gas flow rate (sccm)Calculated concentration (ppb) (Cc)50000.00.0	Jackfish 1 February 14, 2023Station number: Last Cal Date: End time (MST):AMS 506 January 24, 2023 Last Cal Date: 14:16RoutineCalibration Standards Source gas flow rate (sccm)December 29, 2028 Cal Gas Exp Date:S0.52 50.52 50.52 50.52ppmCal Gas Exp Date: Serial Number: Serial Number: 2659 2659MA API 7700 API 7700 API 701NA Serial Number: Serial Number: 2659NA 2659Statrt 1.006642 -1.856099Finish 1.004300 -1.536060Nalyzer serial #: Backgd or Offset: 19.0 Coeff or Slope:Start 0.960Dilution air flow rate (sccm)Source gas flow rate (sccm)Calculated concentration (ppb) (Cc)Indicated concentration C (ppb) (Ic)

Notes:

Changed inlet filter after as founds. Adjusted span only.

Calibration Performed By:

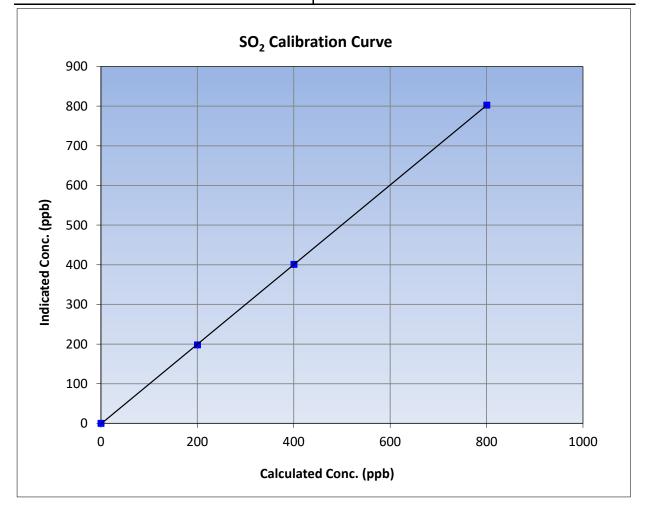


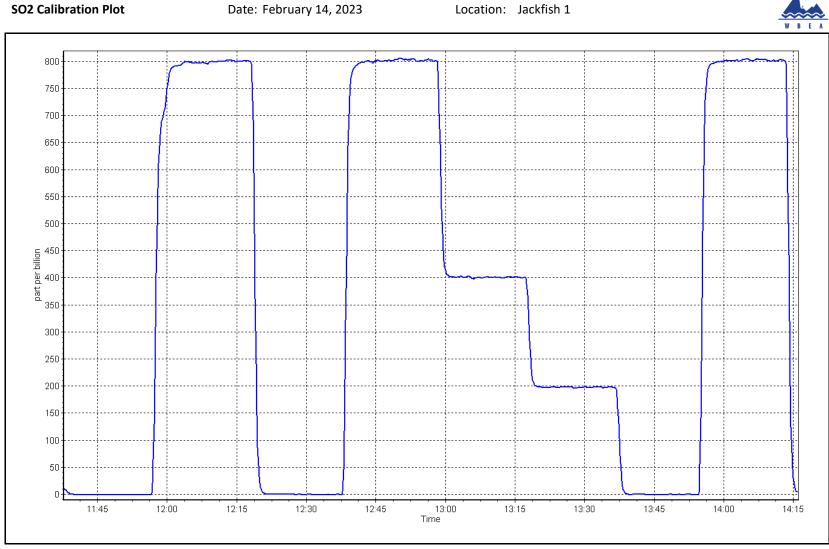
SO₂ Calibration Summary

WBEA			Version-01-2020
	Stati	on Information	
Calibration Date:	February 14, 2023	Previous Calibration:	January 24, 2023
Station Name:	Jackfish 1	Station Number:	AMS 506
Start Time (MST):	11:36	End Time (MST):	14:16
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	-0.4		Correlation Coefficient	0.999988	≥0.995
800.2	802.4	0.9973	correlation coefficient	0.999988	20.995
400.2	400.6	0.9989	Slope	1.004300	0.90 - 1.10
200.1	197.7	1.0120	Slope	1.004300	0.90 - 1.10
			Intercept	-1.536060	+/-30









H₂S Calibration Report

WBEA					Version-11-2021
		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Jackfish 1 February 1, 2023 10:12 Routine		Station number: Last Cal Date: End time (MST):	AMS506 January 20, 2023 14:10	
		Calibration S	tandards		
Cal Gas Concentration: Cal Gas Cylinder #:	5.14 CC511843	ppm	Cal Gas Exp Date:	September 16, 2024	
Removed Cal Gas Conc: Removed Gas Cyl #:	5.14 NA	ppm	Rem Gas Exp Date: Diff between cyl:		
Calibrator Make/Model: ZAG Make/Model:	API 1700 API 701		Serial Number: Serial Number:	2659 4427	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	Thermo 43iQTL Global G150 0 - 100 ppb		Analyzer serial #: Converter serial #:	12124313139 2022-200	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.008437	1.003151	Backgd or Offset:	1.04	1.04
Calibration intercept:	-0.098415	-0.038506	Coeff or Slope:	0.736	0.736
		H ₂ S As Four	nd Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) Limit = 0.90-1.10
as found zero	5000	0.0	0.0	0.2	
as found span	4922	77.8	80.0	74.6	1.075
as found 2nd point	4961	38.9	40.0	37.0	1.087
as found 3rd point new cylinder response	4981	19.4	19.9	17.8	1.133
		H ₂ S Calibrat	ion Data		
Set Point	Dilution air flow 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	4922	77.8	80.0	80.4	0.995
second point	4961	38.9	40.0	39.9	1.002
third point	4981	19.4	19.9	19.5	1.023
as left zero	5000	0.0	0.0	0.6	
as left span	4922	77.8	80.0	80.9	0.989
SO2 Scrubber Check	4921	79.2	792.0	0.1	
Date of last scrubber cha	-			Ave Corr Factor	1.007
Date of last converter ef	ficiency test:	December 1, 2022			efficiency
Baseline Corr As found:	74.4	Prev response:	80.56	*% change:	-8.3%
Baseline Corr 2nd AF pt:	36.8	AF Slope:	0.933723	AF Intercept:	-0.260061
Baseline Corr 3rd AF pt:	17.6	AF Correlation:	0.999815	* = > +/-5% change initiate	s investigation
				- × 17 570 change millidle	5 mycsugation

Noticed as found 3rd point is off the correction factor. Hydration might be required, inlet filter changed and hydrator filled after third As Found, scrubber check after calibrator zero. No adjustment made.

Notes:

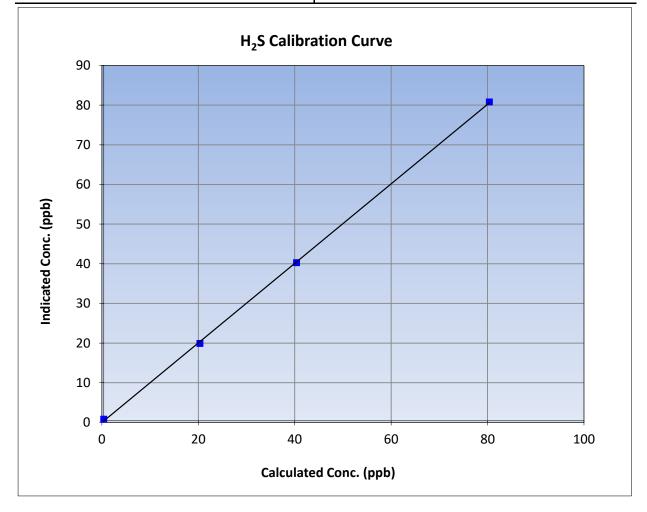


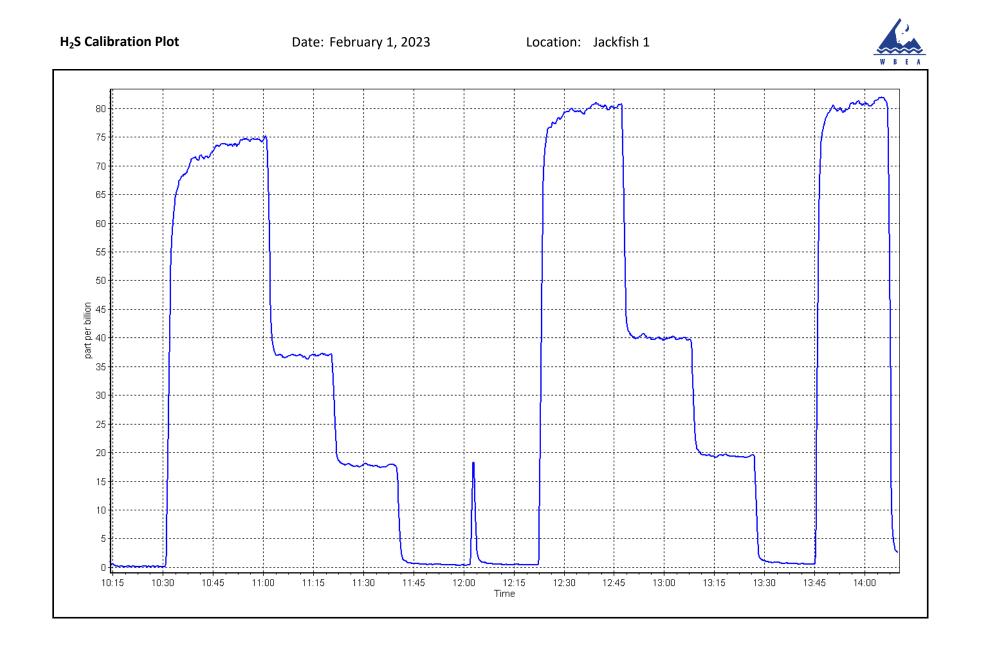
H₂S Calibration Summary

WBEA			Version-11-2021					
Station Information								
Calibration Date:	February 1, 2023	Previous Calibration:	January 20, 2023					
Station Name:	Jackfish 1	Station Number:	AMS506					
Start Time (MST):	10:12	End Time (MST):	14:10					
Analyzer make:	Thermo 43iQTL	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	0.4		Correlation Coefficient	0.999863	≥0.995	
80.0	80.4	0.9948	correlation coefficient	0.999803	20.333	
40.0	39.9	1.0023	Slope	1.003151	0.90 - 1.10	
19.9	19.5	1.0226	Slope	1.003131	0.90 - 1.10	
			Intercept	-0.038506	+/-3	







H₂S Calibration Report

WBEA					Version-11-2
		Station Info	rmation		
tation Name: Calibration Date: tart time (MST): Ceason:	Jackfish 1 February 13, 2023 10:00 Maintenance	H2S low spans	Station number: Last Cal Date: End time (MST):	AMS506 February 1, 2023 14:06	
		Calibration S	tandards		
Cal Gas Concentration:	5.14	ppm	Cal Gas Exp Date:	September 16, 2024	
Cal Gas Cylinder #: Removed Cal Gas Conc: Removed Gas Cyl #:	CC511843 5.14 NA	ppm	Rem Gas Exp Date: Diff between cyl:	NA	
Calibrator Make/Model: ZAG Make/Model:			Serial Number: Serial Number:	2659 4427	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	Thermo 43iQTL Global G150 0 - 100 ppb		Analyzer serial #: Converter serial #:	12124313139 2022-200	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	1.008437	1.002721	Backgd or Offset:	1.04	1.04
Calibration intercept:	-0.098415	0.101523	Coeff or Slope:	0.736	0.720
		H ₂ S As Four	nd Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Baseline Adjusted Correction factor (Cc/(Ic-AFzero)) Limit = 0.90-1.10
as found zero	5000	0.0	0.0	0.1	
as found span	4922	77.8	80.0	67.8	1.181
as found 2nd point	4961	38.9	40.0	33.0	1.216
as found 3rd point	4981	19.4	19.9	16.2	1.239
new cylinder response					
		H ₂ S Calibrat	ion Data		
Set Point	Dilution air flow 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	4922	77.8	80.0	80.4	0.995
second point	4961	38.9	40.0	40.2	0.995
third point	4981	19.4	19.9	19.7	1.012
as left zero	5000	0.0	0.0	0.6	
as left span	4922	77.8	80.0	81.0	0.987
O2 Scrubber Check	4921	79.2	792.0	0.0	
Date of last scrubber cha		-	-	Ave Corr Factor	1.001
Date of last converter ef	0	December 1, 2022			efficiency
Baseline Corr As found:	67.7	Prev response:	80.56	*% change:	-19.0%
Baseline Corr 2nd AF pt:	32.9	AF Slope:		AF Intercept:	-0.401783
Baseline Corr 3rd AF pt:	16.1	AF Correlation:			001,00
	••=				

Notes:

Here to address H2S low spans. Inlet filter changed and hydrator filled after third As Found, scrubber check after calibrator zero. Adjusted span.

Calibration Performed By:

Sean Bala

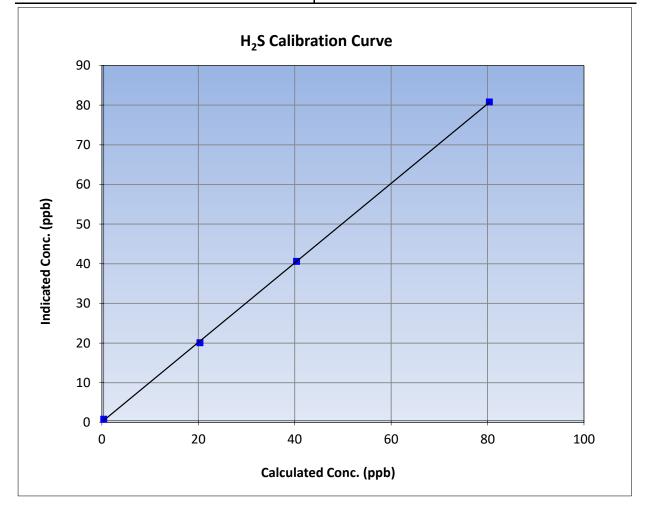


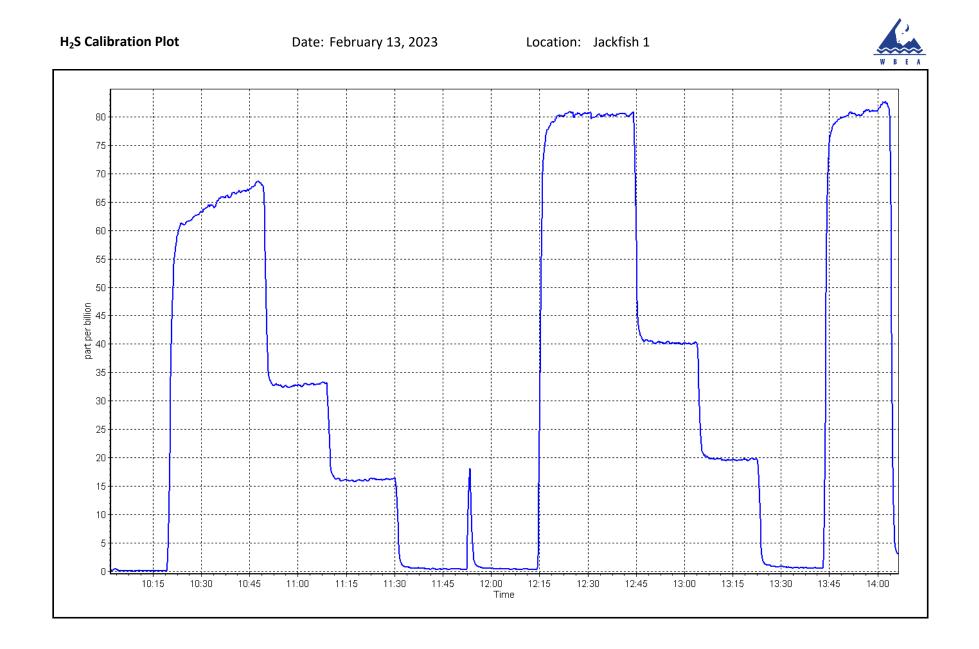
H₂S Calibration Summary

	Stati	on Information	
Calibration Date:	February 13, 2023	Previous Calibration:	February 1, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	10:00	End Time (MST):	14:06
Analyzer make:	Thermo 43iQTL	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	0.4		Correlation Coefficient	0.999927	≥0.995
80.0	80.4	0.9948	correlation coefficient	0.999927	20.995
40.0	40.2	0.9948	Slope	1.002721	0.90 - 1.10
19.9	19.7	1.0123	Slope	1.002721	0.30 - 1.10
			- Intercept	0.101523	+/-3







H₂S Calibration Report

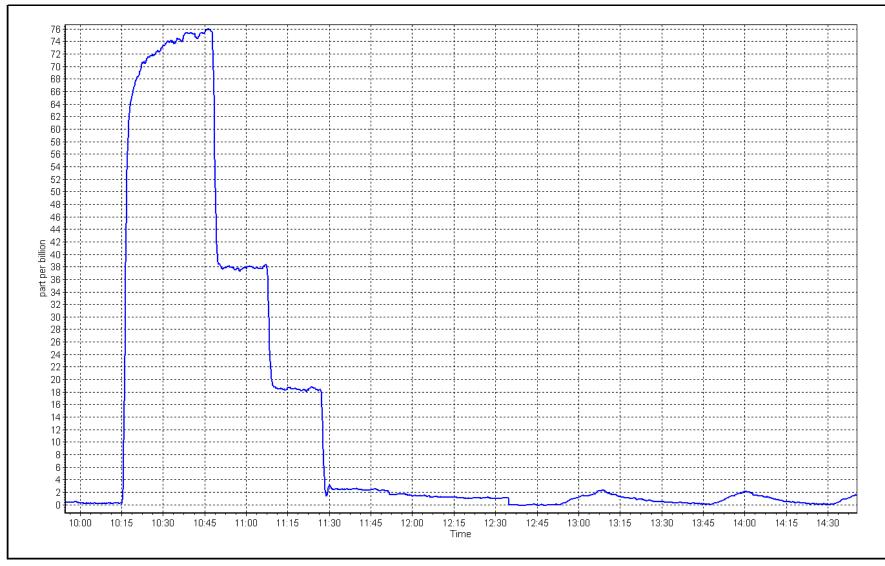
					Version-11-202
		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Jackfish 1 February 22, 2023 9:57 Maintenance		Station number: Last Cal Date: End time (MST):	AMS506 February 13, 2023 14:49	
		Calibration S	tandards		
Cal Gas Concentration: Cal Gas Cylinder #:	5.14 CC511843	ppm	Cal Gas Exp Date:	September 16, 2024	
Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model:	5.14 NA API T700	ppm	Rem Gas Exp Date: Diff between cyl: Serial Number:	NA 2659	
AG Make/Model:	API 701		Serial Number:	4427	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	Thermo 43iQ Global G150 0 - 100 ppb		Analyzer serial #: Converter serial #:	12124313139 2022-200	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope: Calibration intercept:	1.002721 0.101523		Backgd or Offset: Coeff or Slope:		1.04 0.720
		H ₂ S As Four	nd 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/ AFzero)) Limit = 0.90-1.10
as found zero	5000	0.0	0.0	0.2	
as found span	4922	77.8	80.0	75.1	1.068
as found 2nd point	4961	38.9	40.0	37.9	1.061
as found 3rd point	4981	19.4	19.9	18.4	1.096
new cylinder response			ion Data		
		H ₂ S Calibrati	ion Data		
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/ Limit = 0.95-1.05
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
O2 Scrubber Check		00 E 00			
ate of last scrubber cha		22-Feb-23		Ave Corr Factor	<i>cc</i> : :
ate of last converter eff	iciency test:	December 1, 2022			efficiency
aseline Corr As found:	74.9	Prev response:	80.30	*% change:	-7.2%
Baseline Corr 2nd AF pt:	37.7	AF Slope:	0.938864	AF Intercept:	0.060149
	10.0		0.000017		
Baseline Corr 3rd AF pt:	18.2	AF Correlation:	0.999917		

Changed inlet filter and SO2 scrubber beads after multi-point as founds. Multiple attempts to remedy SO2 scrubber failure. Discussed with the lead and decided to leave it hydrated overnight.

Notes:









H₂S Calibration Report

WBEA					Version-11-202
		Station Info	rmation		
Station Name:	Jackfish 1		Station number:	AMS506	
alibration Date:	February 24, 2023		Last Cal Date:	February 22, 2023	
tart time (MST):	9:32		End time (MST):	13:05	
leason:	Maintenance	Installing a new H2	S setup		
		Calibration S			
Cal Gas Concentration:	5.14	ppm	Cal Gas Exp Date:	September 16, 2024	
Cal Gas Cylinder #:	CC511843				
emoved Cal Gas Conc:	5.14	ppm	Rem Gas Exp Date:	NA	
emoved Gas Cyl #:	NA		Diff between cyl:		
alibrator Make/Model:			Serial Number:	2659	
AG Make/Model:	API 701		Serial Number:	4427	
		Analyzer Info	ormation		
nalyzer make:	Thermo 43i-TLE		Analyzer serial #:	1180540020	
Converter make:	Global G150		Converter serial #:	2022-218	
Analyzer Range	0 - 100 ppb				
	0 100 pps				
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Calibration slope:	NA	0.995862	Backgd or Offset:	NA	1.04
alibration intercept:	NA	0.041428	Coeff or Slope:	NA	0.720
		H ₂ S As Four	nd 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/ AFzero)) Limit = 0.90-1.10
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
		H ₂ S Calibrat	ion Data		
Set Point	Dilution air flow rate	Source gas flow rate	Calculated	Indicated concentration	Correction factor (Cc/
Serrome	(sccm)	(sccm)	concentration (ppb) (Cc)	(ppb) (Ic)	<i>Limit = 0.95-1.05</i>
calibrator zero	5000	0.0	0.0	0.2	
high point	4922	77.8	80.0	79.7	1.004
second point	4961	38.9	40.0	40.0	1.000
third point	4981	19.4	19.9	19.6	1.017
as left zero	5000	0.0	0.0	0.1	
as left span	4922	77.8	80.0	80.0	1.000
O2 Scrubber Check	4921	79.2	792.0	-0.1	
	nge:	24-Feb-23		Ave Corr Factor	1.007
ate of last scrubber cha					officionau
		December 1, 2022			efficiency
Date of last converter eff	ficiency test:		NΔ	*% change:	
Date of last converter eff Baseline Corr As found:	ficiency test: NA	Prev response:		*% change:	NA
Date of last scrubber cha Date of last converter eff Baseline Corr As found: Baseline Corr 2nd AF pt: Baseline Corr 3rd AF pt:	ficiency test:		NA	*% change: AF Intercept:	

Started maintenance on 2023-02-22. Inlet filter changed and multi-point as found was already done. H2S setup need to be change because it was not responding. Adjusted span.

Notes:

Sean Bala

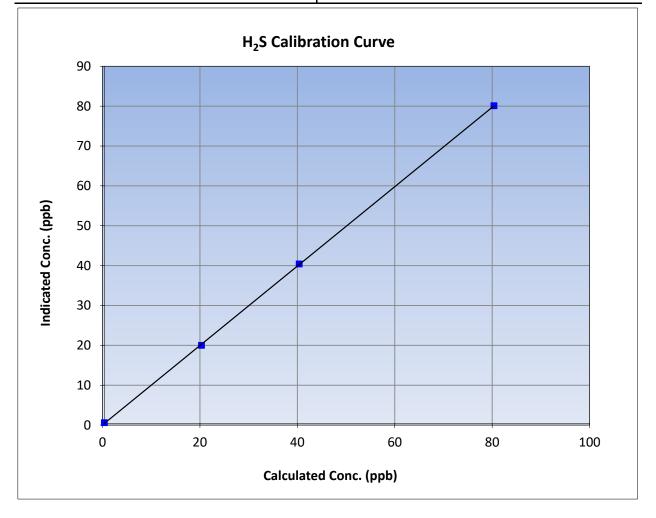


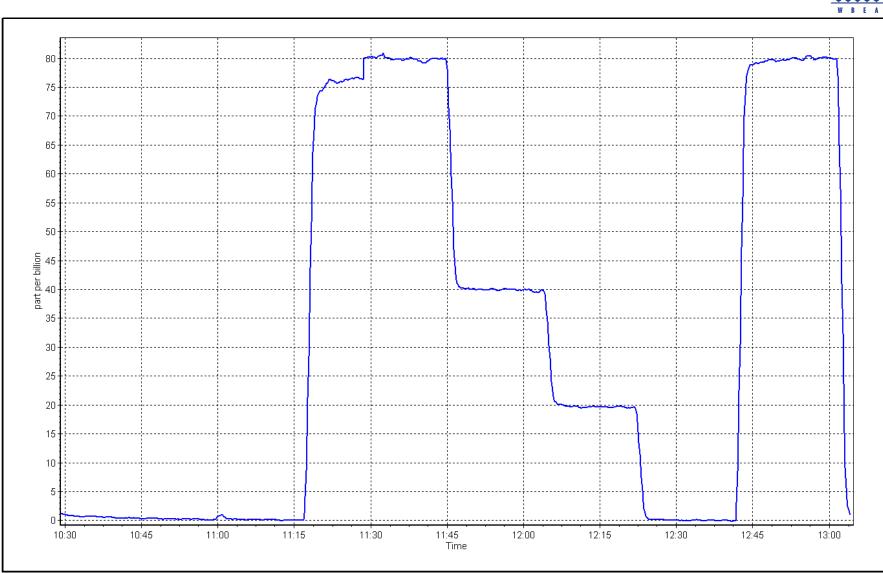
H₂S Calibration Summary

W B E A			Version-11-2021
	Statio	on Information	
Calibration Date:	February 24, 2023	Previous Calibration:	February 22, 2023
Station Name:	Jackfish 1	Station Number:	AMS506
Start Time (MST):	9:32	End Time (MST):	13:05
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1180540020

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	0.999962	≥0.995
80.0	79.7	1.0035	Correlation Coefficient	0.999902	20.995
40.0	40.0	0.9997	Slope	0.995862	0.90 - 1.10
19.9	19.6	1.0174	Slope	0.993802	0.90 - 1.10
			Intercept	0.041428	+/-3





Location: Jackfish 1





Station Name:

Reason:

Calibration Date:

Start time (MST):

Jackfish 1

10:21

Routine

February 15, 2023

Wood Buffalo Environmental Association

$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

Station Information

Station number: AMS506 Last Cal Date: January 25, 2023 End time (MST): 14:36

NOX Cal Gas Conc:47.46ppmNO Cal Gas Conc:47.39ppmRemoved Cylinder #:NARemoved Gas Exp Date:NARemoved Gas NOX Conc:47.46ppmRemoved Gas NO Conc:47.39ppmNOX gas Diff:NO gas Diff:NO gas Diff:NO gas Diff:NO gas Diff:NO gas Diff:	NO Gas Cylinder #:		T26811M	Cal Gas Expiry Date:	Octo	ber 30, 2024
Removed Cylinder #:NARemoved Gas Exp Date:NARemoved Gas NOX Conc:47.46ppmRemoved Gas NO Conc:47.39ppmNOX gas Diff:NO gas Diff:NO gas Diff:NO gas Diff:NO gas Diff:	•	47.46	ppm	• •	47.39	ppm
NOX gas Diff: NO gas Diff:	Removed Cylinder #:		NA	Removed Gas Exp Date:		NA
	Removed Gas NOX Conc:	47.46	ppm	Removed Gas NO Conc:	47.39	ppm
	NOX gas Diff:			NO gas Diff:		
Calibrator Model: API T700 Serial Number: 2659	Calibrator Model:	API T700		Serial Number: 2659		
ZAG make/model: API 701 Serial Number: 4427	ZAG make/model:	API 701		Serial Number: 4427		

Analyzer make: NOX Range (ppb):			Analyzer serial #: 12	18153356	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coeff or slope:	1.151	1.144	NO bkgnd or offset:	3.3	3.3
NOX coeff or slope:	0.991	0.992	NOX bkgnd or offset:	3.4	3.4
NO2 coeff or slope:	1.000	1.000	Reaction cell Press:	174.0	173.4

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope:	0.999577	0.999791
NO _x Cal Offset:	-0.847995	-1.047992
NO Cal Slope:	1.001211	1.001240
NO Cal Offset:	-2.027974	-2.087973
NO ₂ Cal Slope:	1.000608	0.999204
NO ₂ Cal Offset:	0.007440	-0.347850



$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

Dilution Calibration Data										
Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) Limit = 0.95-1.05	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0		
as found span	4916	84.4	801.1	799.9	1.2	806.9	804.8	2.1	0.9928	0.9939
as found 2nd										
as found 3rd										
new cyl resp										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.3	0.2	0.1		
high point	4916	84.4	801.1	799.9	1.2	800.1	799.5	0.6	1.0012	1.0005
second point	4958	42.2	400.5	400.0	0.6	400.0	398.5	1.5	1.0014	1.0037
third point	4979	21.1	200.3	200.0	0.3	197.0	195.0	2.0	1.0166	1.0255
as left zero	5000	0.0	0.0	0.0	0.0	0.3	0.2	0.1		
as left span	4916	84.4	801.1	415.9	385.2	793.9	411.3	382.6	1.0090	1.0111
							Average C	orrection Factor	1.0064	1.0099
Corrected As fo	ound NO _x =	806.8 ppb	NO =	804.7 ppb	* = > +/-5%	% change initiates i	nvestigation	*Percent Chan	ge NO _x =	0.9%
Previous Respo	onse NO _x =	799.9 ppb	NO =	798.8 ppb				*Percent Chan	ge NO =	0.7%
Baseline Corr 2	nd pt NO _x =	NA ppb	NO =	NA ppb	As found	d $NO_{\chi} r^2$:		Nx SI:	Nx Int:	
Baseline Corr 3	ord pt NO _x =	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 ₂ Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Co	Indicated NO2 c) concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) Calibration Limit = 0.95-1.05 As Found Limit = 0.90-1.10	Converter Efficiency Calibration Limit = 96-104%
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	792.8	408.8	385.2	385.0	1.0005	100.0%
2nd GPT point (200 ppb O3)	792.8	591.0	203.0	201.6	1.0069	99.3%
3rd GPT point (100 ppb O3)	792.8	687.5	106.5	106.0	1.0045	99.5%
				Average Correction Factor	1.0040	99.6%

Notes:

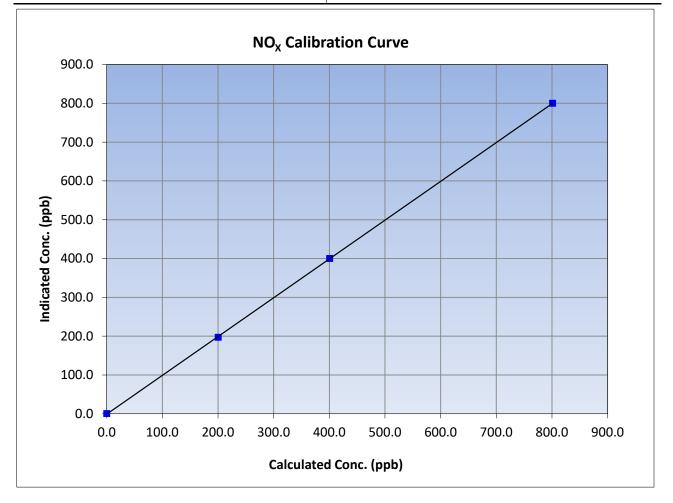
Adjusted the span only.

Calibration Performed By:



$NO_{\rm X}$ Calibration Summary

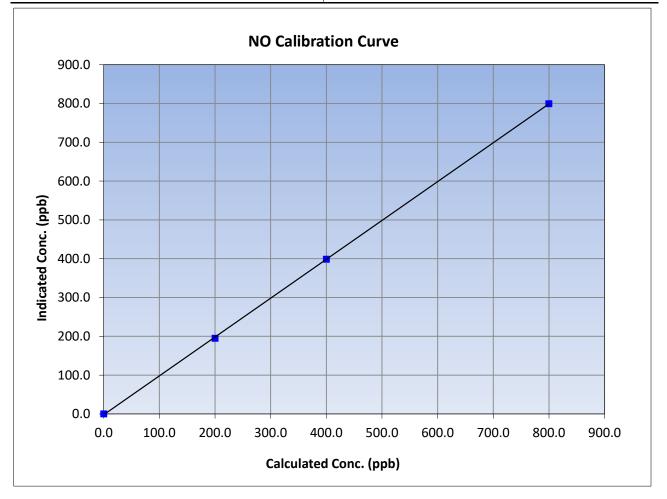
WBEA					Version-04-20
		Station	Information		
Calibration Date:	February 15, 2023		Previous Calibration:	January 25, 2023	
Station Name:	Jackfish 1		Station Number:	AMS506	
Start Time (MST):	10:21		End Time (MST):	14:36	
Analyzer make:	Thermo 42i		Analyzer serial #:	1218153356	
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.3		Correlation Coefficient	0.999980	≥0.995
801.1	800.1	1.0012			20.333
400.5	400.0	1.0014	Slope	0.999791	0.90 - 1.10
200.3	197.0	1.0166			0.90 - 1.10
			Intercept	-1.047992	+/-20





NO Calibration Summary

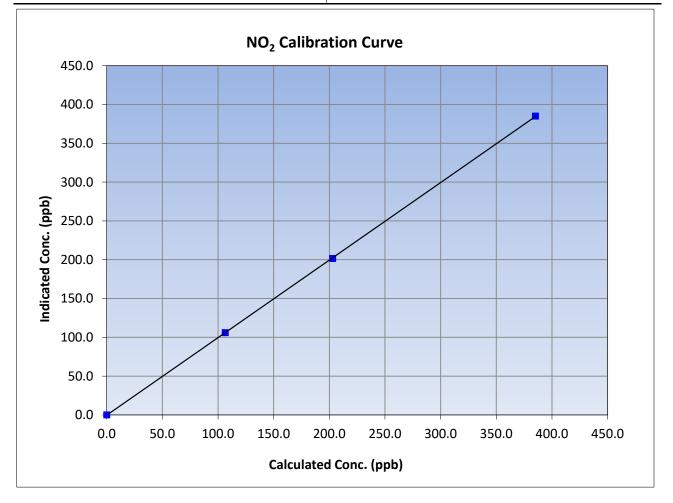
WBEA					Version-04-20
		Station	Information		
Calibration Date:	February 15, 2023		Previous Calibration:	January 25, 2023	
Station Name:	Jackfish 1		Station Number:	AMS506	
Start Time (MST):	10:21		End Time (MST):	14:36	
Analyzer make:	Thermo 42i		Analyzer serial #:	1218153356	
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.0	0.2		Correlation Coefficient	0.999955	≥0.995
799.9	799.5	1.0005			20.995
400.0	398.5	1.0037	Slope	1.001240	0.90 - 1.10
200.0	195.0	1.0255			
			Intercept	-2.087973	+/-20

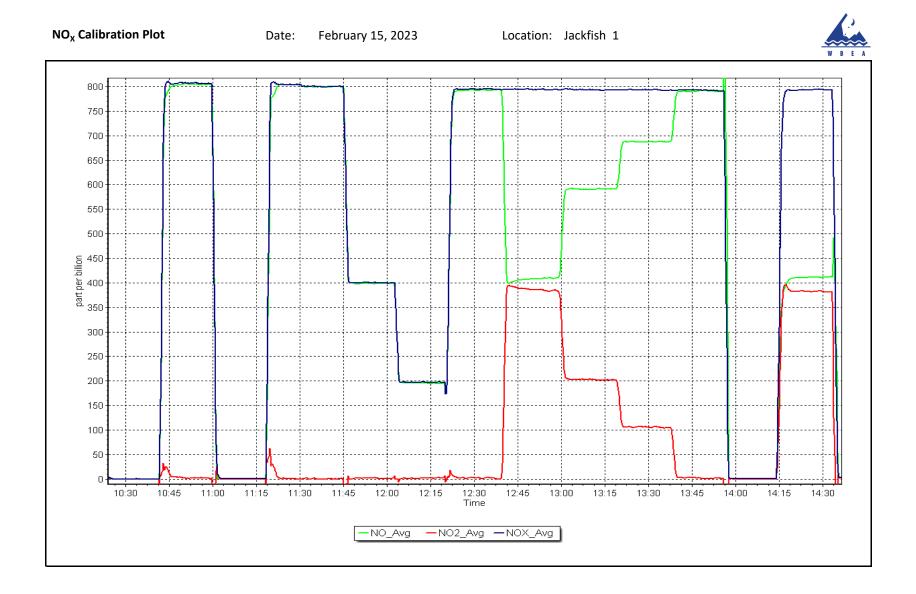




NO₂ Calibration Summary

WBEA					Version-04-20
		Station	Information		
Calibration Date:	February	15, 2023	Previous Calibration:	January	25, 2023
Station Name:	Jackfish 1		Station Number:	AMS	506
Start Time (MST):	10:21		End Time (MST):	14	:36
Analyzer make:	Therr	Thermo 42i Analyzer serial #: 12181533!		53356	
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999985	≥0.995
385.2	385.0	1.0005	correlation coefficient	0.999965	20.995
203.0	201.6	1.0069	Slope	0.999204	0.90 - 1.10
106.5	106.0	1.0045	Slope	0.999204	0.90 - 1.10
			Intercept	-0.347850	+/-20







WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM CALIBRATION REPORT

AMS508 KIRBY NORTH FEBRUARY 2023

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

March 31, 2023



SO₂ Calibration Report

Version-01-2020

		Station Infor	mation		
Station Name:	Kirby North		Station number:	AMS508	
Calibration Date:	February 2, 2023		Last Cal Date:	January 11, 2023	
Start time (MST):	8:41		End time (MST):	14:52	
Reason:	Routine				
		Calibration St			
Cal Gas Concentration:	49.18	ppm	Cal Gas Exp Date:	February 23, 2025	
Cal Gas Cylinder #:	<u>CC303554</u>		Dom Cos Eve Data	NIA	
Removed Cal Gas Conc:	49.18	ppm	Rem Gas Exp Date:	NA	
Removed Gas Cyl #:			Diff between cyl:	2004	
Calibrator Make/Model:	API T700		Serial Number:	3804	
ZAG Make/Model:	API T701H		Serial Number:	880	
		Analyzer Info	rmation		
Analyzar maka	Thormo 12i0	,,		1102240007	
Analyzer make: Analyzer Range			Analyzer serial #:	1182340007	
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	Finish
Calibration slope:	1.001350	1.001676	Backgd or Offset:	19.2	19.2
Calibration intercept:	-0.328940	-1.468267	Coeff or Slope:	1.151	1.151
		SO ₂ Calibratio	on Data		
Set Point	Dilution air flow 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	799.6	796.6	1.004
as found 2nd point					
as found 3rd point					
new cylinder response					
calibrator zero	5000	0.0	0.0	0.3	
high point	4919	81.3	799.6	801.0	0.998
second point	4959	40.7	400.3	396.8	1.009
third point	4980	20.3	199.7	198.0	1.008
as left zero	5000	0.0	0.0	0.7	
as left span	4919	81.3	799.6	800.0	1.000
•			Averag	ge Correction Factor	1.005
Baseline Corr As found:	796.30	Previous response	800.37	*% change	-0.5%
	NA	AF Slope:		AF Intercept:	
Baseline Corr 2nd AF pt:	14/ 1	7.1. 0.00001			

Notes:

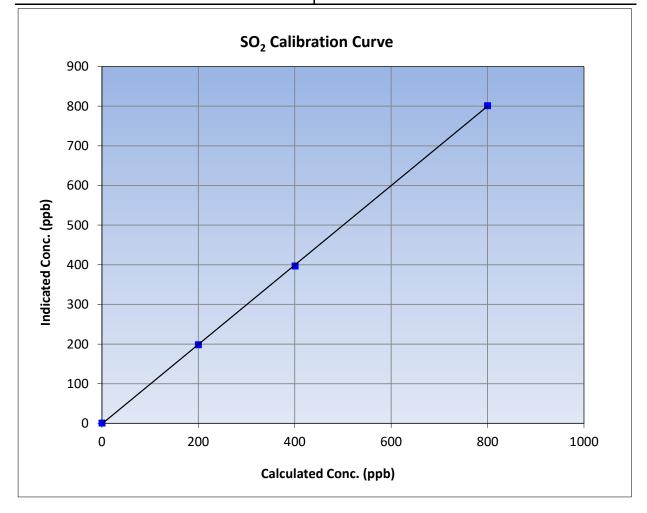
Changed sample inlet filter after as founds. No adjustments made.

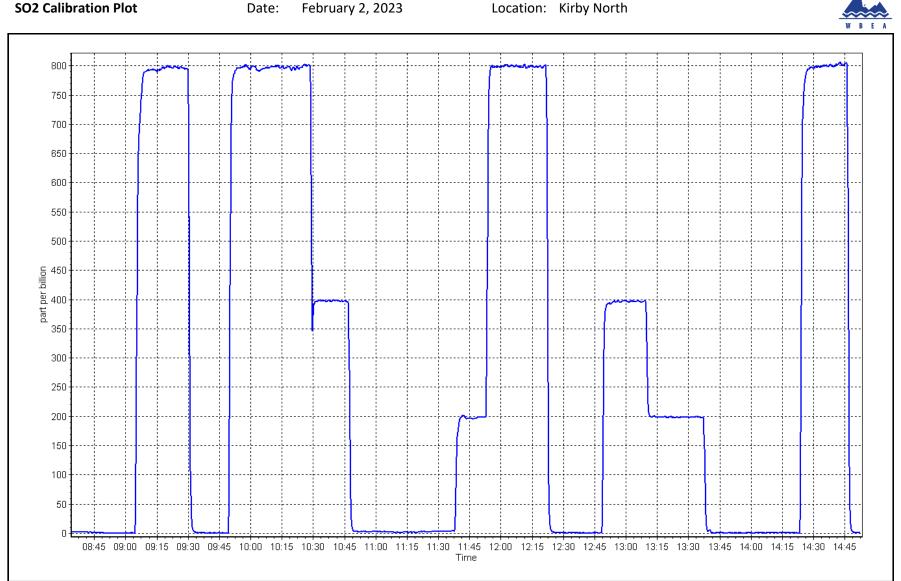


SO₂ Calibration Summary

WBEA			Version-01-2020
	Stati	on Information	
Calibration Date:	February 2, 2023	Previous Calibration:	January 11, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	8:41	End Time (MST):	14:52
Analyzer make:	Thermo 43iQ	Analyzer serial #:	1182340007

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>
0.0	0.3		Correlation Coefficient	0.999962	≥0.995
799.6	801.0	0.9983	correlation coefficient	0.999902	20.335
400.3	396.8	1.0089	Slope	1.001676	0.90 - 1.10
199.7	198.0	1.0084	Slope	1.001070	0.90 - 1.10
			Intercept	-1.468267	+/-30





Location: Kirby North



H₂S Calibration Report

WBEA					
WDLA		Chatlen Info			Version-11-202
		Station Info			
Station Name:	Kirby North		Station number:	AMS508	
Calibration Date:	February 2, 2023		Last Cal Date:	January 12, 2023	
Start time (MST):	8:41		End time (MST):	14:34	
Reason:	Routine				
		Calibration St	tandards		
Cal Gas Concentration:	5.167	ppm	Cal Gas Exp Date:	February 5, 2024	
Cal Gas Cylinder #:	CC517378	PPIII	cui cus Exp Dute.		
Removed Cal Gas Conc:	5.167	ppm	Rem Gas Exp Date:	NA	
Removed Gas Cyl #:	NA	PP	Diff between cyl:		
Calibrator Make/Model:			Serial Number:	3804	
ZAG Make/Model:	API 701H		Serial Number:	880	
ZAG Make/ Model.			Senar Number.	000	
		Analyzer Info	ormation		
Analyzer make:	Thermo 43i TLE		Analyzer serial #:	1150840012	
Converter make:	Global		Converter serial #:	2022-197	
Analyzer Range	0 - 100 ppb				
	Ctout	Einich		Start	Einich
Calibration closes	<u>Start</u> 1.007171	<u>Finish</u> 1.005874	Backad or Officate	<u>Start</u> 1.76	<u>Finish</u> 1.77
Calibration slope:			Backgd or Offset:		
Calibration intercept:	-0.280963	-0.260560	Coeff or Slope:	1.058	1.069
		H ₂ S As Four	nd Data		
					Baseline Adjusted
Set Point	Dilution air flow rate	Source gas flow rate	Calculated concentration (ppb)	Indicated	Correction factor
SetFolit	(sccm)	(sccm)	(Cc)	concentration (ppb) (Ic)	(Cc/(Ic-AFzero))
					<i>Limit = 0.90-1.10</i>
as found zero	5000	0.0	0.0	-0.2	
as found span	4923	77.4	80.0	81.8	0.975
as found 2nd point	4961	38.8	40.1	41.0	0 0 7 2
as found 3rd point					0.973
	4981	19.3	19.9	20.4	0.975
new cylinder response	4981			20.4	
	4981	19.3 H ₂ S Calibrati		20.4	
new cylinder response		H ₂ S Calibrati	on Data Calculated		0.968 Correction factor
	4981 Dilution air flow rate (sccm)		on Data Calculated concentration (ppb)	Indicated	0.968 Correction factor (Cc/Ic)
new cylinder response	Dilution air flow rate (sccm)	H ₂ S Calibrati Source gas flow rate (sccm)	On Data Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	0.968 Correction factor
new cylinder response Set Point calibrator zero	Dilution air flow rate (sccm) 5000	H ₂ S Calibrati Source gas flow rate (sccm) 0.0	Calculated concentration (ppb) (Cc) 0.0	Indicated concentration (ppb) (Ic) 0.1	0.968 Correction factor (Cc/lc) <i>Limit = 0.95-1.05</i>
new cylinder response Set Point calibrator zero high point	Dilution air flow rate (sccm) 5000 4923	H ₂ S Calibrati Source gas flow rate (sccm) 0.0 77.4	Calculated concentration (ppb) (Cc) 0.0 80.0	Indicated concentration (ppb) (Ic) 0.1 80.5	0.968 Correction factor (Cc/lc) Limit = 0.95-1.05 0.994
new cylinder response Set Point calibrator zero high point second point	Dilution air flow rate (sccm) 5000 4923 4961	H ₂ S Calibrati Source gas flow rate (sccm) 0.0 77.4 38.8	Calculated concentration (ppb) (Cc) 0.0 80.0 40.1	Indicated concentration (ppb) (Ic) 0.1 80.5 39.5	0.968 Correction factor (Cc/lc) Limit = 0.95-1.05 0.994 1.015
new cylinder response Set Point calibrator zero high point second point third point	Dilution air flow rate (sccm) 5000 4923 4961 4981	H ₂ S Calibrati Source gas flow rate (sccm) 0.0 77.4 38.8 19.3	Calculated concentration (ppb) (Cc) 0.0 80.0 40.1 19.9	Indicated concentration (ppb) (Ic) 0.1 80.5 39.5 19.7	0.968 Correction factor (Cc/lc) Limit = 0.95-1.05 0.994 1.015 1.012
new cylinder response Set Point calibrator zero high point second point third point as left zero	Dilution air flow rate (sccm) 5000 4923 4961 4981 5000	H ₂ S Calibrati Source gas flow rate (sccm) 0.0 77.4 38.8 19.3 0.0	Calculated concentration (ppb) (Cc) 0.0 80.0 40.1 19.9 0.0	Indicated concentration (ppb) (Ic) 0.1 80.5 39.5 19.7 0.0	0.968 Correction factor (Cc/Ic) Limit = 0.95-1.05 0.994 1.015 1.012
new cylinder response Set Point calibrator zero high point second point third point as left zero as left span	Dilution air flow rate (sccm) 5000 4923 4961 4981 5000 4923	H ₂ S Calibrati Source gas flow rate (sccm) 0.0 77.4 38.8 19.3 0.0 77.4	Calculated concentration (ppb) (Cc) 0.0 80.0 40.1 19.9 0.0 80.0	Indicated concentration (ppb) (Ic) 0.1 80.5 39.5 19.7 0.0 78.3	0.968 Correction factor (Cc/Ic) Limit = 0.95-1.05 0.994 1.015 1.012 1.021
new cylinder response Set Point calibrator zero high point second point third point as left zero as left zero as left span SO2 Scrubber Check	Dilution air flow rate (sccm) 5000 4923 4961 4981 5000 4923 4920	H ₂ S Calibrati Source gas flow rate (sccm) 0.0 77.4 38.8 19.3 0.0 77.4 79.8	Calculated concentration (ppb) (Cc) 0.0 80.0 40.1 19.9 0.0	Indicated concentration (ppb) (Ic) 0.1 80.5 39.5 19.7 0.0 78.3 0.1	0.968 Correction factor (Cc/lc) Limit = 0.95-1.05 0.994 1.015 1.012 1.021
new cylinder response Set Point calibrator zero high point second point third point as left zero as left span SO2 Scrubber Check Date of last scrubber cha	Dilution air flow rate (sccm) 5000 4923 4961 4981 5000 4923 4923 4920 ange:	H ₂ S Calibrati Source gas flow rate (sccm) 0.0 77.4 38.8 19.3 0.0 77.4	Calculated concentration (ppb) (Cc) 0.0 80.0 40.1 19.9 0.0 80.0	Indicated concentration (ppb) (Ic) 0.1 80.5 39.5 19.7 0.0 78.3	0.968 Correction factor (Cc/Ic) Limit = 0.95-1.05 0.994 1.015 1.012 1.021 1.007
new cylinder response Set Point calibrator zero high point second point third point as left zero as left span SO2 Scrubber Check Date of last scrubber cha	Dilution air flow rate (sccm) 5000 4923 4961 4981 5000 4923 4923 4920 ange:	H ₂ S Calibrati Source gas flow rate (sccm) 0.0 77.4 38.8 19.3 0.0 77.4 79.8	Calculated concentration (ppb) (Cc) 0.0 80.0 40.1 19.9 0.0 80.0	Indicated concentration (ppb) (Ic) 0.1 80.5 39.5 19.7 0.0 78.3 0.1	0.968 Correction factor (Cc/lc) Limit = 0.95-1.05 0.994 1.015 1.012 1.021
new cylinder response Set Point calibrator zero high point second point third point as left zero	Dilution air flow rate (sccm) 5000 4923 4961 4981 5000 4923 4920 ange: ficiency test:	H ₂ S Calibrati Source gas flow rate (sccm) 0.0 77.4 38.8 19.3 0.0 77.4 79.8 27-Nov-19	on Data Calculated concentration (ppb) (Cc) 0.0 80.0 40.1 19.9 0.0 80.0 798.0	Indicated concentration (ppb) (Ic) 0.1 80.5 39.5 19.7 0.0 78.3 0.1 Ave Corr Factor	0.968 Correction factor (Cc/lc) Limit = 0.95-1.05 0.994 1.015 1.012 1.021 1.007 efficiency
new cylinder response Set Point calibrator zero high point second point third point as left zero as left span SO2 Scrubber Check Date of last scrubber cha Date of last converter ef Baseline Corr As found:	Dilution air flow rate (sccm) 5000 4923 4961 4981 5000 4923 4920 ange: ficiency test: 82.0	H ₂ S Calibrati Source gas flow rate (sccm) 0.0 77.4 38.8 19.3 0.0 77.4 79.8 27-Nov-19 Prev response:	on Data Calculated concentration (ppb) (Cc) 0.0 80.0 40.1 19.9 0.0 80.0 798.0 80.27	Indicated concentration (ppb) (Ic) 0.1 80.5 39.5 19.7 0.0 78.3 0.1 Ave Corr Factor *% change:	0.968 Correction factor (Cc/lc) Limit = 0.95-1.05 0.994 1.015 1.012 1.021 1.007 efficiency 2.1%
new cylinder response Set Point calibrator zero high point second point third point as left zero as left span SO2 Scrubber Check Date of last scrubber cha Date of last converter ef	Dilution air flow rate (sccm) 5000 4923 4961 4981 5000 4923 4920 ange: ficiency test:	H ₂ S Calibrati Source gas flow rate (sccm) 0.0 77.4 38.8 19.3 0.0 77.4 79.8 27-Nov-19	on Data Calculated concentration (ppb) (Cc) 0.0 80.0 40.1 19.9 0.0 80.0 798.0 80.27	Indicated concentration (ppb) (Ic) 0.1 80.5 39.5 19.7 0.0 78.3 0.1 Ave Corr Factor	0.968 Correction factor (Cc/lc) Limit = 0.95-1.05 0.994 1.015 1.012 1.021 1.007 efficiency

Changed sample inlet filter after as founds. First scrubber check failed. Used DI water in a hydrator to hydrate the scrubber beads. Second test passed. Adjusted span.

Calibration Performed By:

Notes:

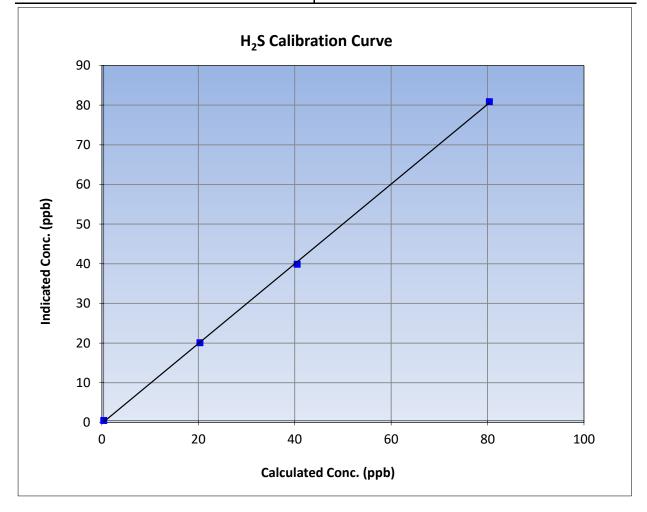
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Braiden Boutilier
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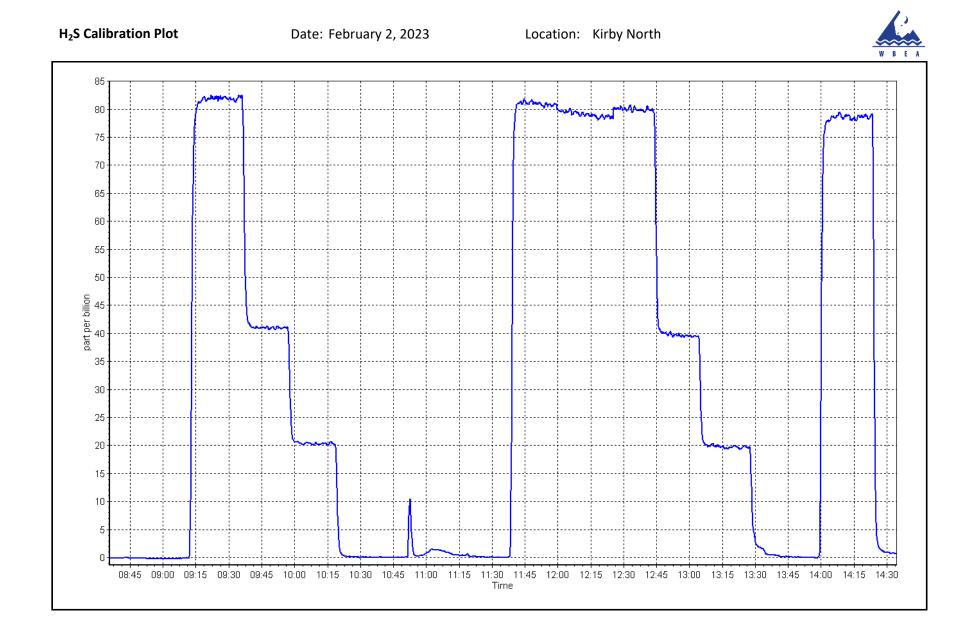


H₂S Calibration Summary

WBEA			Version-11-2021
	Stati	on Information	
Calibration Date:	February 2, 2023	Previous Calibration:	January 12, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	8:41	End Time (MST):	14:34
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1150840012

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>
0.0	0.1		Correlation Coefficient	0.999840	≥0.995
80.0	80.5	0.9935	correlation coefficient	0.999840	20.995
40.1	39.5	1.0151	Slope	1.005874	0.90 - 1.10
19.9	19.7	1.0124	Slope	1.005874	0.90 - 1.10
			Intercept	-0.260560	+/-3







H₂S Calibration Report

WBEA					Version-11-20
		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Kirby North February 14, 2023 12:51 As Found		Station number: Last Cal Date: End time (MST):	AMS508 February 2, 2023 16:45	
		Calibration S	tandards		
Cal Gas Concentration: Cal Gas Cylinder #:	5.167 <u>CC517378</u>	ppm	Cal Gas Exp Date:	February 5, 2024	
Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model: CAG Make/Model:	5.167 <u>NA</u> API T700 API 701H	ppm	Rem Gas Exp Date: Diff between cyl: Serial Number: Serial Number:	NA 3804 880	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	Thermo 43i TLE Global 0 - 100 ppb		Analyzer serial #: Converter serial #:	1150840012 2022-197	
Calibration slope: Calibration intercept:	<u>Start</u> 1.007171 -0.280963	<u>Finish</u>	Backgd or Offset: Coeff or Slope:		<u>Finish</u> 1.77 1.069
		H ₂ S As Four	nd 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	78.2	1.021
as found 2nd point	4961	38.8	40.1	38.5	1.039
as found 3rd point	4981	19.3	19.9	19.1	1.039
new cylinder response					
		H ₂ S Calibrati	ion Data		
Set Point	Dilution air flow 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					
O2 Scrubber Check		27.11.42			
Date of last scrubber cha	-	27-Nov-19		Ave Corr Factor	officionar
Date of last converter ef	inciency test:				efficiency
Baseline Corr As found:	78.3	Prev response:	80.27	*% change:	-2.5%
Baseline Corr 2nd AF pt:	38.6	AF Slope:	0.979453	AF Intercept:	-0.360689
Baseline Corr 3rd AF pt:	19.2	AF Correlation:	0.999912		

As founds done after a low nightly span. Hydrator ran dry and likely changed the conditions of the scrubber.

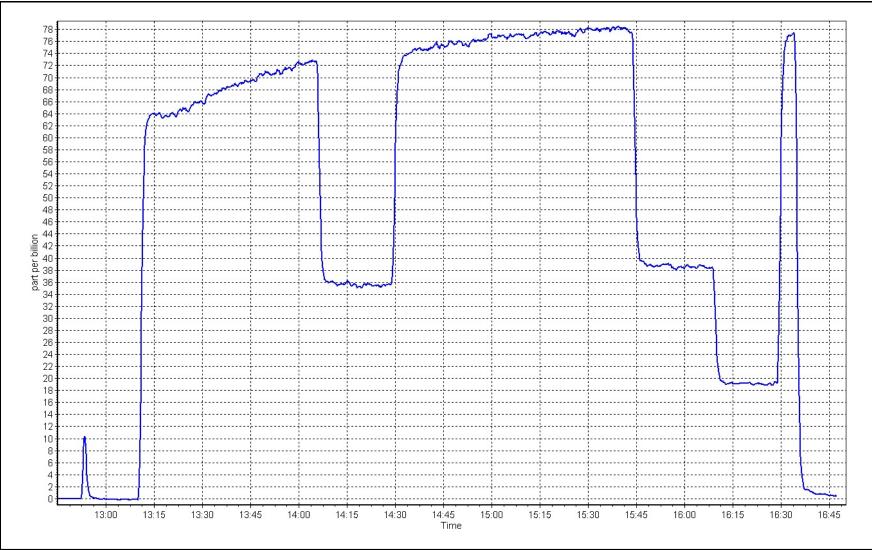
Calibration Performed By:

Notes:

Braiden Boutilier









H₂S Calibration Report

WBEA					Version-11-20
		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Kirby North February 15, 2023 11:48 Maintenance		Station number: Last Cal Date: End time (MST):	AMS508 February 14, 2023 17:04	
		Calibration S	tandards		
Cal Gas Concentration: Cal Gas Cylinder #:	5.167 <u>CC517378</u>	ppm	Cal Gas Exp Date:	February 5, 2024	
Removed Cal Gas Conc: Removed Gas Cyl #: Calibrator Make/Model: ZAG Make/Model:	5.167 <u>NA</u> API T700 API 701H	ppm	Rem Gas Exp Date: Diff between cyl: Serial Number: Serial Number:	NA 3804 880	
LAG Make/Model.	AFI70III		Senai Number.	880	
		Analyzer Info	ormation		
Analyzer make: Converter make: Analyzer Range	Thermo 43i TLE Global 0 - 100 ppb		Analyzer serial #: Converter serial #:	1150840012 2022-197	
Calibration slope: Calibration intercept:	<u>Start</u> 1.005874 -0.260560	<u>Finish</u> 0.995603 -0.101015	Backgd or Offset: Coeff or Slope:	<u>Start</u> 1.77 1.069	<u>Finish</u> 1.70 1.022
		H ₂ S As Four	rd Data Calculated		Baseline Adjusted
Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/(Ic-AFzero)) Limit = 0.90-1.10
as found zero					
as found span					
as found 2nd point					
as found 3rd point					
new cylinder response					
		H ₂ S Calibrati	ion Data		
Set Point	Dilution air flow 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	79.6	1.005
second point	4961	38.8	40.1	39.7	1.010
third point	4981	19.3	19.9	19.7	1.012
as left zero	5000	0.0	0.0	0.0	
as left span	4923	77.4	80.0	79.4	1.007
O2 Scrubber Check	4920	79.8	798.0	0.0	
		21-Sep-22		Ave Corr Factor	1.009
late of last scrubber cha	-				efficiency
	ficiency test:				
Date of last converter ef	·	Drey response:	NA		NA
Date of last converter ef Baseline Corr As found:	NA	Prev response:		*% change:	NA
Date of last scrubber cha Date of last converter ef Baseline Corr As found: Baseline Corr 2nd AF pt: Baseline Corr 3rd AF pt:	·	Prev response: AF Slope: AF Correlation:	NA		NA NA

Notes:

Followup calibration after as founds from February 14. Adjusted zero and span. Second SOx scrubber check passed.

Calibration Performed By:

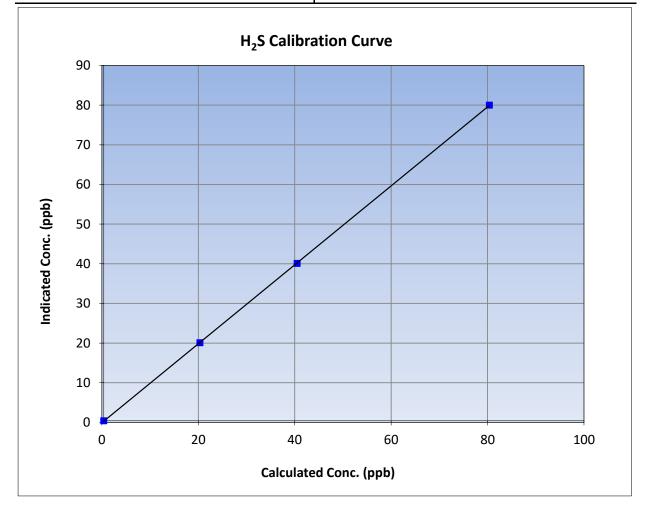
Braiden Boutilier

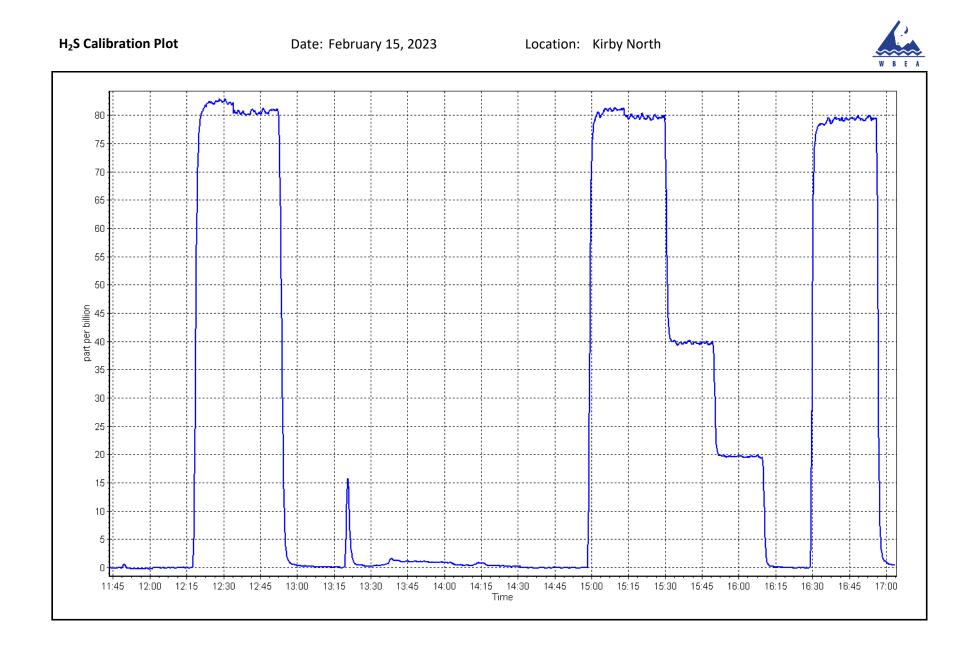


H₂S Calibration Summary

WBEA			Version-11-2021
	Statio	on Information	
Calibration Date:	February 15, 2023	Previous Calibration:	February 14, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	11:48	End Time (MST):	17:04
Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	1150840012

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalua	ation	<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999990	≥0.995
80.0	79.6	1.0048	correlation coefficient	0.555550	20.333
40.1	39.7	1.0100	Slope	0.995603	0.90 - 1.10
19.9	19.7	1.0124	Slope	0.555005	0.90 - 1.10
			Intercept	-0.101015	+/-3







THC Calibration Report

Version-01-2020

		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Kirby North February 2, 2023 8:41 Routine		Station number: Last Cal Date: End time (MST):	AMS508 January 11, 2023 14:52	
		Calibration S	tandards		
Gas Cert Reference: CH4 Cal Gas Conc. C3H8 Cal Gas Conc.	CC30 496.6 205.5)3554 ppm ppm	Cal Gas Expiry Date: CH4 Equiv Conc.	March 23, 2025 1061.7	ppm
Removed Gas Cert: Removed CH4 Conc. Removed C3H8 Conc. Calibrator Make/Model: ZAG Make/Model:	N 496.6 205.5 API T700 API T701H	IA ppm ppm	Removed Gas Expiry: CH4 Equiv Conc. Diff between cyl: Serial Number: Serial Number:	NA 1061.7 3804 880	ppm
		Analyzer Info	ormation		
Analyzer make Analyzer Range			Analyzer serial #:	1182340005	
Calibration slope: Calibration intercept:	<u>Start</u> 0.999219 -0.026583	<u>Finish</u> 0.998377 0.036779	Background: Coefficient:	<u>Start</u> 2.820 3.789	<u>Finish</u> 3.37 3.750
		THC Calibrat	ion 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	5000	0.0	0.00	-0.03	
as found zero as found span	5000 4919	0.0 81.3	0.00 17.26	-0.03 17.32	0.997
as found span as found 2nd point					
as found span as found 2nd point as found 3rd point					
as found span as found 2nd point as found 3rd point new cylinder response	4919	81.3	17.26	17.32	0.997
as found span as found 2nd point as found 3rd point new cylinder response calibrator zero	4919 5000	0.0	0.00	0.03	0.997
as found span as found 2nd point as found 3rd point new cylinder response calibrator zero high point	4919 5000 4919	81.3 0.0 81.3	17.26 0.00 17.26	17.32 0.03 17.26	0.997 1.000
as found span as found 2nd point as found 3rd point new cylinder response calibrator zero high point second point	4919 5000 4919 4959	81.3 0.0 81.3 40.7	17.26 0.00 17.26 8.64	17.32 0.03 17.26 8.69	0.997 1.000 0.995
as found span as found 2nd point as found 3rd point new cylinder response calibrator zero high point second point third point	4919 5000 4919 4959 4980	81.3 0.0 81.3 40.7 20.3	17.26 0.00 17.26 8.64 4.31	17.32 0.03 17.26 8.69 4.34	0.997 1.000
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	4919 5000 4919 4959	81.3 0.0 81.3 40.7 20.3 0.0	17.26 0.00 17.26 8.64 4.31 0.00	17.32 0.03 17.26 8.69 4.34 -0.11	0.997 1.000 0.995 0.994
as found span as found 2nd point as found 3rd point new cylinder response calibrator zero high point second point third point	4919 5000 4919 4959 4980 5000	81.3 0.0 81.3 40.7 20.3	17.26 0.00 17.26 8.64 4.31 0.00 17.26	17.32 0.03 17.26 8.69 4.34 -0.11 17.29	0.997 1.000 0.995 0.994 0.998
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	4919 5000 4919 4959 4980 5000	81.3 0.0 81.3 40.7 20.3 0.0	17.26 0.00 17.26 8.64 4.31 0.00 17.26 Averag 17.22	17.32 0.03 17.26 8.69 4.34 -0.11	0.997 1.000 0.995 0.994 0.998 0.996 0.7%

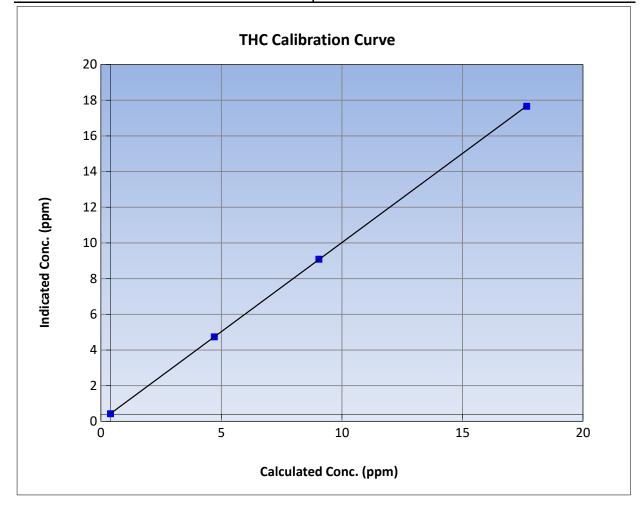
Changed sample inlet filter after as founds. Span and zero adjusted.

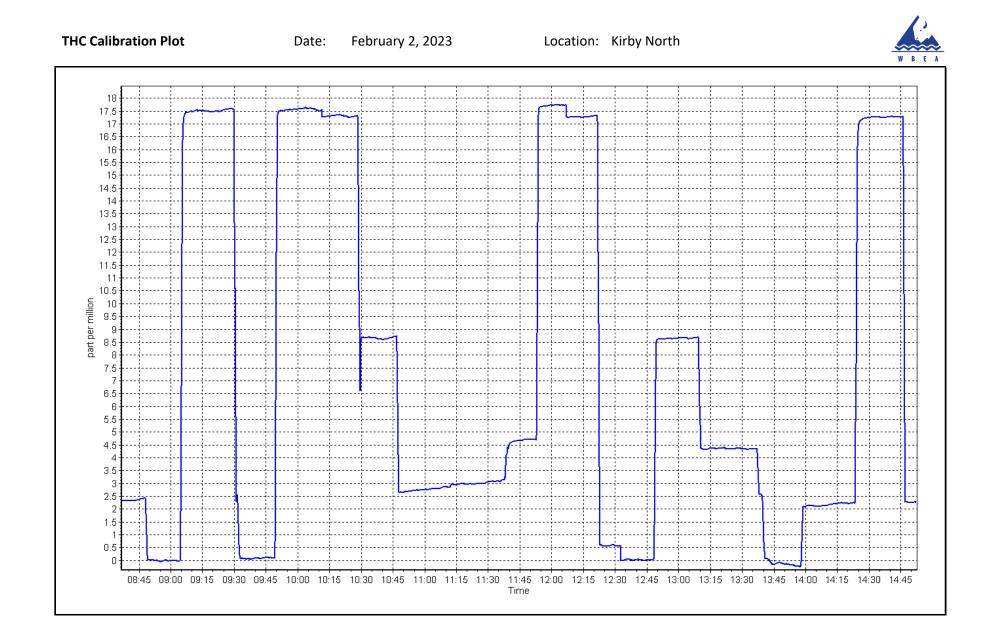


THC Calibration Summary

W B E A			Version-01-2020
	Stati	on Information	
Calibration Date:	February 2, 2023	Previous Calibration:	January 11, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	8:41	End Time (MST):	14:52
Analyzer make:	Thermo 51i	Analyzer serial #:	1182340005

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.03		Correlation Coefficient	0.999995	≥0.995
17.26	17.26	1.0002	correlation coefficient	0.999995	20.333
8.64	8.69	0.9946	Slope	0.998377	0.90 - 1.10
4.31	4.34	0.9939	Siope	0.556577	0.90 - 1.10
			Intercept	0.036779	+/-1.5







THC Calibration Report

Version-01-2020

		Station Info	rmation		
Station Name: Calibration Date: Start time (MST): Reason:	Kirby North February 4, 2023 10:50 Maintenance		Station number: Last Cal Date: End time (MST):	AMS508 February 2, 2023 14:29	
		Calibration S	tandards		
Gas Cert Reference: CH4 Cal Gas Conc. C3H8 Cal Gas Conc.	CC3 496.6 205.5	03554 ppm ppm	Cal Gas Expiry Date: CH4 Equiv Conc.	March 23, 2025 1061.7	ppm
Removed Gas Cert: Removed CH4 Conc. Removed C3H8 Conc. Calibrator Make/Model: ZAG Make/Model:	н 496.6 205.5 АРІ Т700 АРІ Т701Н	VA ppm ppm	Removed Gas Expiry: CH4 Equiv Conc. Diff between cyl: Serial Number: Serial Number:	NA 1061.7 3804 880	ppm
		Analyzer Info	ormation		
Analyzer make Analyzer Range		Analyzer into	Analyzer serial #:	1182340005	
Calibration slope: Calibration intercept:	<u>Start</u> 0.998377 0.036779	<u>Finish</u> 1.002675 -0.018187	Background: Coefficient:		<u>Finish</u> 2.70 3.796
		THC Calibrat	ion 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	-0.66	
as found span	4919	81.3	17.26	16.45	1.049
as found 2nd point	4959	40.7	8.64	7.86	1.100
as found 3rd point	4980	20.3	4.31	3.58	1.204
new cylinder response					
calibrator zero	5000	0.0	0.00	0.02	
high point	4919	81.3	17.26	17.32	0.997
second point	4959	40.7	8.64	8.60	1.005
third point	4980	20.3	4.31	4.28	1.007
as left zero	5000	0.0	0.00	0.08	
as left span	4919	81.3	17.26	17.35	0.995
	47.44	Due te u		ge Correction Factor	
Baseline Corr As found:	17.11	Previous response	17.27	*% change	
Baseline Corr 2nd AF pt: Baseline Corr 3rd AF pt:	8.51 4.24	AF Slope: AF Correlation:	0.991324 0.999987	AF Intercept: * = > +/-5% change initia	

Notes:

Linearity test from last calibration. Adjusted zero and span. Readings were shifted down from the

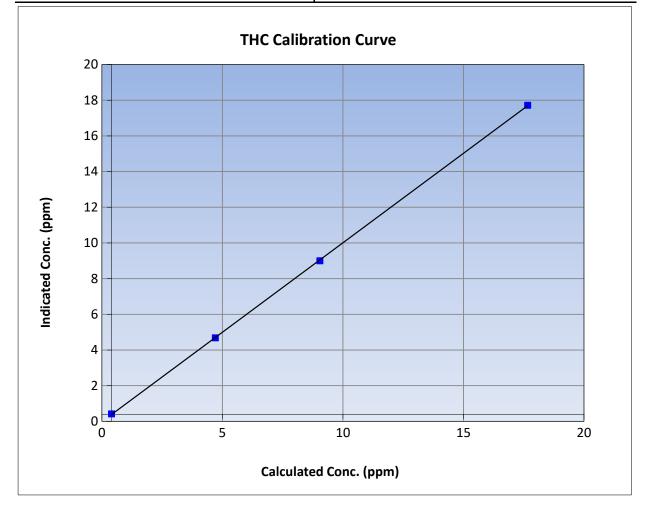
calibration on February 2.

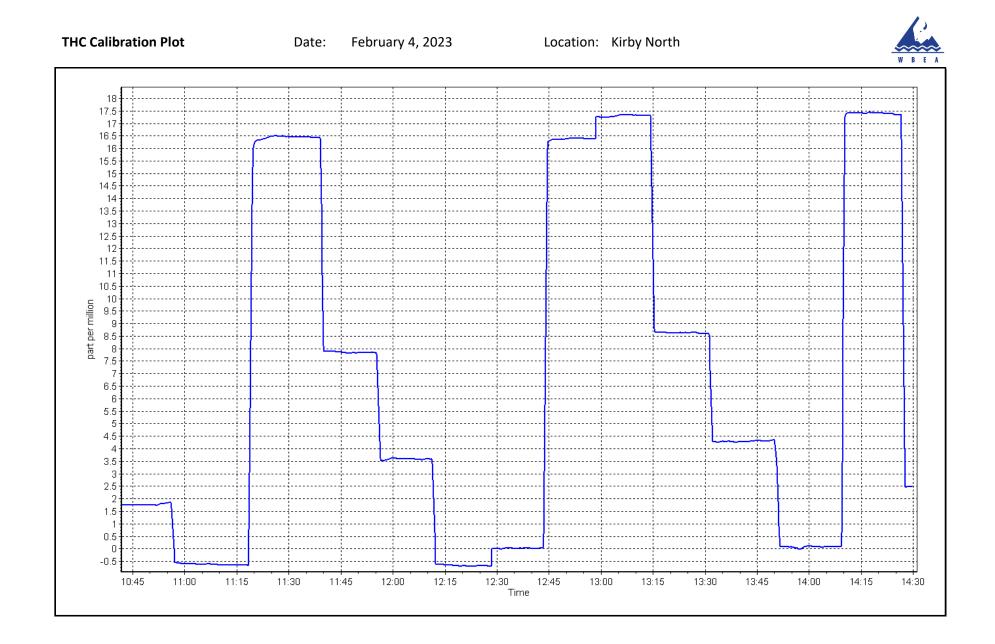


THC Calibration Summary

W B E A			Version-01-2020
	Stati	on Information	
Calibration Date:	February 4, 2023	Previous Calibration:	February 2, 2023
Station Name:	Kirby North	Station Number:	AMS508
Start Time (MST):	10:50	End Time (MST):	14:29
Analyzer make:	Thermo 51i	Analyzer serial #:	1182340005

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.02		Correlation Coefficient	0.999968	≥0.995
17.26	17.32	0.9967	correlation coefficient	0.555508	20.333
8.64	8.60	1.0050	Slope	1.002675	0.90 - 1.10
4.31	4.28	1.0066	510pe	1.002075	0.30 - 1.10
			Intercept	-0.018187	+/-1.5







NO Cal Offset:

NO₂ Cal Slope:

NO₂ Cal Offset:

Wood Buffalo Environmental Association

$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

		Station	nformation		
Station Name: Calibration Date: Start time (MST): Reason:	Kirby North February 1, 20 11:39 Routine	23	Station number: Last Cal Date: End time (MST):	AMS508 January 22, 2023 17:28	
		Calibratio	on Standards		
NO Gas Cylinder #:		T34ULGL	Cal Gas Expiry Date:	March 8 2025	
NOX Cal Gas Conc:	49.39	ppm	NO Cal Gas Conc:		ppm
Removed Cylinder #:	13.03	NA	Removed Gas Exp Date:		ppm
Removed Gas NOX Conc: NOX gas Diff:	49.39	ppm	Removed Gas NO Conc: NO gas Diff:	49.02	ppm
Calibrator Model:	API T700		Serial Number:		
ZAG make/model:	API 701H		Serial Number:	880	
		Analyzer	Information		
Analyzer make: NOX Range (ppb):		Analyzer	Information Analyzer serial #:	7029	
		Analyzer <i>Finish</i>		7029 Start	Finish
	0 - 1000 ppb <u>Start</u>			<u>Start</u>	<u>Finish</u> 0.1
NOX Range (ppb):	0 - 1000 ppb <u>Start</u> : 1.037	<u>Finish</u>	Analyzer serial #:	<u>Start</u> 0.1	
NOX Range (ppb): NO coeff or slope	0 - 1000 ppb <u>Start</u> : 1.037 : 1.032	<u>Finish</u> 1.026	Analyzer serial #: NO bkgnd or offset:	<u>Start</u> 0.1	0.1
NOX Range (ppb): NO coeff or slope NOX coeff or slope	0 - 1000 ppb <u>Start</u> : 1.037 : 1.032	<u>Finish</u> 1.026 1.023	Analyzer serial #: NO bkgnd or offset: NOX bkgnd or offset:	<u>Start</u> 0.1 0.3	0.1 0.3
NOX Range (ppb): NO coeff or slope NOX coeff or slope	0 - 1000 ppb <u>Start</u> : 1.037 : 1.032	<i>Finish</i> 1.026 1.023 1.000	Analyzer serial #: NO bkgnd or offset: NOX bkgnd or offset:	<u>Start</u> 0.1 0.3	0.1 0.3
NOX Range (ppb): NO coeff or slope NOX coeff or slope	0 - 1000 ppb <u>Start</u> : 1.037 : 1.032	<i>Finish</i> 1.026 1.023 1.000	Analyzer serial #: NO bkgnd or offset: NOX bkgnd or offset: Reaction cell Press:	<u>Start</u> 0.1 0.3	0.1 0.3
NOX Range (ppb): NO coeff or slope NOX coeff or slope	0 - 1000 ppb <u>Start</u> : 1.037 : 1.032 : 1.000	<i>Finish</i> 1.026 1.023 1.000 Calibrati	Analyzer serial #: NO bkgnd or offset: NOX bkgnd or offset: Reaction cell Press:	<u>Start</u> 0.1 0.3 4.8	0.1 0.3
NOX Range (ppb): NO coeff or slope NOX coeff or slope NO2 coeff or slope	0 - 1000 ppb <u>Start</u> : 1.037 : 1.032 : 1.000	<i>Finish</i> 1.026 1.023 1.000 Calibrati <u>Start</u>	Analyzer serial #: NO bkgnd or offset: NOX bkgnd or offset: Reaction cell Press:	<u>Start</u> 0.1 0.3 4.8	0.1 0.3

-3.293659

0.998706

0.927800

-2.093883

0.998942

-0.787844



$NO_X \setminus NO \setminus NO_2$ Calibration Report

Version-04-2020

				Dilu	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) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1		
as found span	4919	81.0	800.1	794.1	6.0	791.3	784.3	7.0	1.0111	1.0125
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	81.0	800.1	794.1	6.0	801.0	793.7	7.1	0.9989	1.0005
second point	4960	40.5	400.0	397.0	3.0	399.0	395.0	4.0	1.0026	1.0051
third point	4980	20.2	199.5	198.0	1.5	197.0	193.6	3.4	1.0128	1.0229
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
as left span	4919	81.0	800.1	413.2	386.9	799.5	420.8	378.7	1.0008	0.9820
							Average C	orrection Factor	1.0048	1.0095
Corrected As fo	ound NO _x =	791.6 ppb	NO =	784.5 ppb	* = > +/-59	% change initiates i	investigation	*Percent Chan	ge NO _x =	-1.0%
Previous Respo	nse NO _x =	799.2 ppb	NO =	793.2 ppb				*Percent Chan	ge NO =	-1.1%
Baseline Corr 2	nd pt NO _X =	NA ppb	NO =	NA ppb	As found	d $NO_X r^2$:		Nx SI:	Nx Int:	
Baseline Corr 3	rd 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 ₂ Int:	

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO Reference concentration (ppb)	Indicated NO Drop concentration (ppb)	Calculated NO2 concentration (ppb) (Co	Indicated NO2 concentration (ppb) (Ic)	NO2 Correction factor (Cc/Ic) Calibration Limit = 0.95-1.05 As Found Limit = 0.90-1.10	Converter Efficiency Calibration Limit = 96-104%
as found GPT zero						
as found GPT point (400 ppb NO2)						
as found GPT point (200 ppb NO2)						
as found GPT point (100 ppb NO2)						
1st GPT point (400 ppb O3)	793.5	412.6	386.9	385.4	1.0039	99.6%
2nd GPT point (200 ppb O3)	793.5	599.0	200.5	201.2	0.9965	100.4%
3rd GPT point (100 ppb O3)	793.5	696.1	103.4	100.3	1.0308	97.0%
			ŀ	Average Correction Factor	1.0104	99.0%

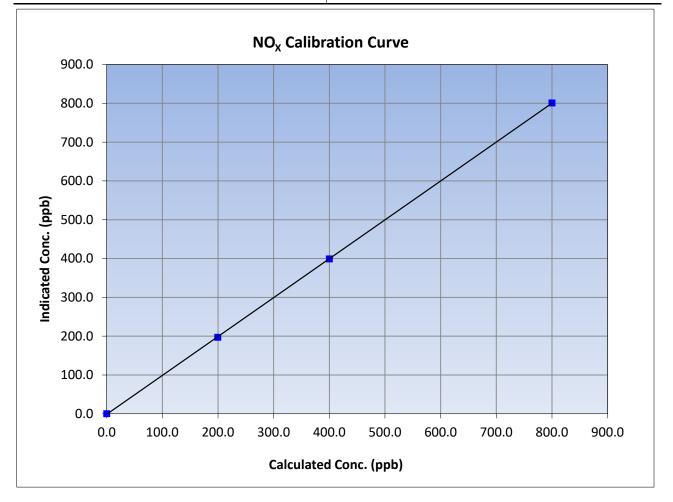
Notes:

Changed sample inlet filter after as founds. Adjusted span.



NO_x Calibration Summary

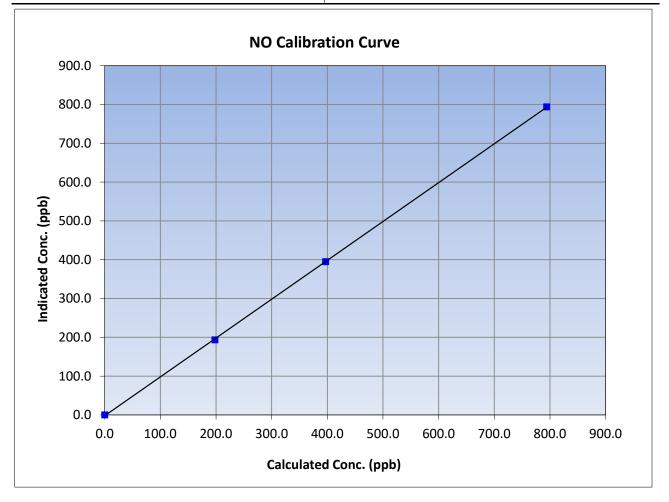
WBEA		Station	Information		Version-04-20
		Station	information		
Calibration Date:	Februar	y 1, 2023	Previous Calibration:	January	22, 2023
Station Name:	Kirby	North	Station Number:	AN	15508
Start Time (MST):	11	:39	End Time (MST):	1	7:28
Analyzer make:	API T200		Analyzer serial #:	7	029
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999986	≥0.995
800.1	801.0	0.9989	correlation coefficient	0.999980	20.333
400.0	399.0	1.0026	Slope	1.002073	0.90 - 1.10
199.5	197.0	1.0128	Slope	1.002073	0.90 - 1.10
			Intercept	-1.391610	+/-20





NO Calibration Summary

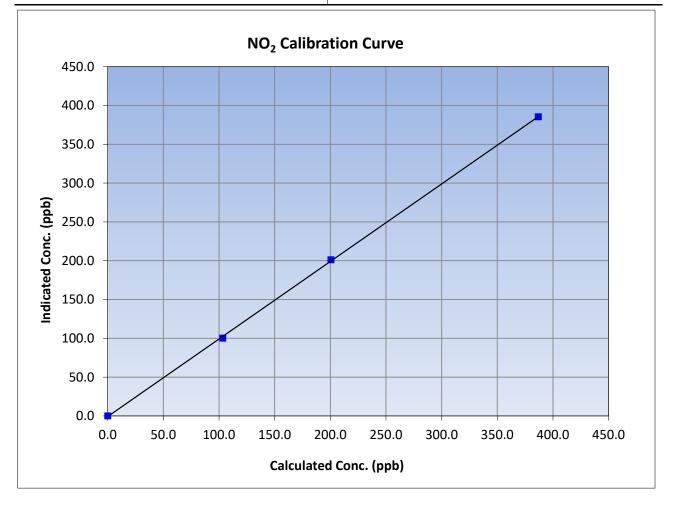
WBEA		Ctation	Information		Version-04-20
		Station	Information		
Calibration Date:	Februar	y 1, 2023	Previous Calibration:	January	/ 22, 2023
Station Name:	Kirby	North	Station Number:	AN	1S508
Start Time (MST):	11	:39	End Time (MST):	17	7:28
Analyzer make:	API T200		Analyzer serial #:	7	029
		Calibra	ation Data		
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
794.1	793.7	1.0005	correlation coefficient	0.999900	20.333
397.0	395.0	1.0051	Slope	1.001077	0.90 - 1.10
198.0	193.6	1.0229	Slope	1.001077	0.90 - 1.10
			Intercept	-2.093883	+/-20

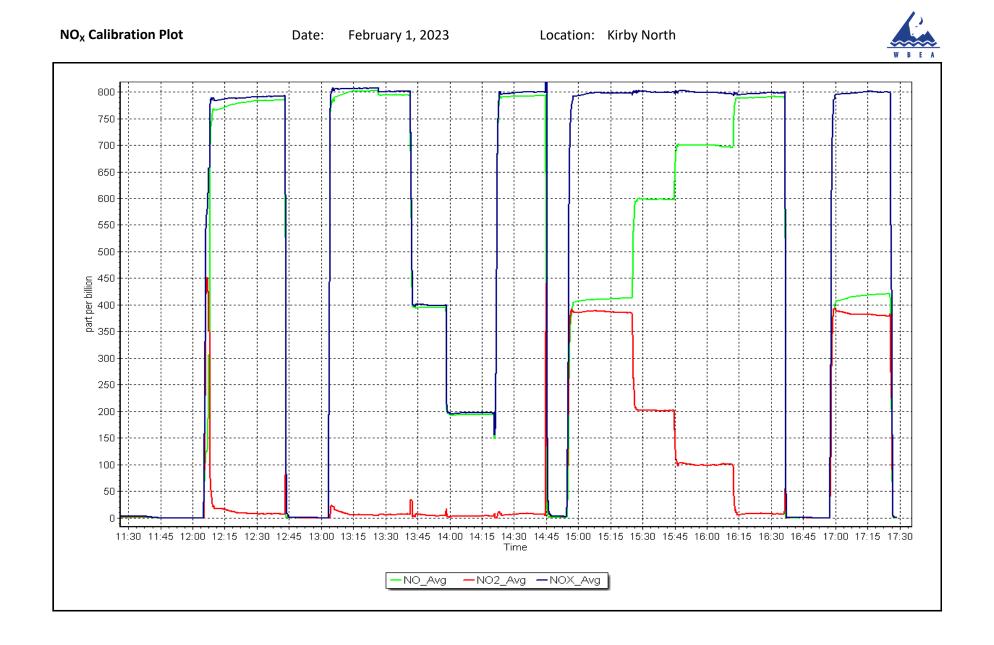




NO₂ Calibration Summary

WBEA		Station	Information		Version-04-20
		Station	information		
Calibration Date:	February	y 1, 2023	Previous Calibration:	January	22, 2023
Station Name:	Kirby	North	Station Number:	AM	S508
Start Time (MST):	11	:39	End Time (MST):	17	:28
Analyzer make:	API T200		Analyzer serial #:	70)29
		Calibra	ation Data		
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evalu	ation	<u>Limits</u>
0.0	0.0		Correlation Coefficient	0.999896	≥0.995
386.9	385.4	1.0039	correlation coefficient	0.999890	20.995
200.5	201.2	0.9965	Slope	0.998942 0.9	0.90 - 1.10
103.4	100.3	1.0308	Slope	0.996942	0.90 - 1.10
			Intercept	-0.787844	+/-20







End of Report