Peace River Area Monitoring Program

DECEMBER 2023

Monthly Ambient Air Quality Monitoring Report

PRAMP-202312

Operation and Maintenance:
Bureau Veritas Canada

Data Validation and Report:
Peace River Area Monitoring Program

January 12, 2024

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Table of Contents

LIST OF ACRONYMS

AAAQOs	Alberta Ambient Air Quality Objectives
AEP	Alberta Environment and Parks
AMD	Air Monitoring Directive
AT	Ambient Temperature
BP	Barometric Pressure
CH4	Methane
EPEA	Environmental Protection and Enhancement Act
H2S	Hydrogen Sulphide
kph	kilometers per hour
mb	millibar
mm	millimeter
NMHC	Non-Methane Hydrocarbons
ppb	parts per billion
ppm	parts per million
PRAMP	Peace River Area Monitoring Program
RH	Relative Humidity
SO2	Sulphur Dioxide
ST	Station Temperature
THC	Total Hydrocarbons
TRS	Total Reduced Sulphur
VWD	Vector Wind Direction
VWS	Vector Wind Speed
WD	Wind Direction
WS	Wind Speed
°C	Degrees Celsius

Peace River Area Monitoring Program
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9820 106 Street
Edmonton, AB, T5K 2J6

January 12, 2024

RE: PRAMP – December 2023 Monthly Ambient Air Quality Monitoring Report

Enclosed is the December 2023 Monthly Ambient Air Quality Monitoring Report for the continuous ambient air quality monitoring stations of the Peace River Area Monitoring Program (PRAMP) regional air quality monitoring network.

The representative of the Person Responsible for this monitoring program is

PRAMP Airshed
Michael Bisaga / Lily Lin, Technical Program Managers
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This report has been prepared, review and submitted by Michael Bisaga & Lily Lin of the PRAMP Airshed. This report is also submitted on behalf of the industrial member companies to satisfy the requirements of the facility operating approvals.

PRAMP Airshed has retained the services of Bureau Veritas Canada to conduct continuous ambient monitoring on its behalf.

NETWORK STATION SUMMARY

Listing of Continuous Monitoring Stations

The PRAMP continuous ambient air quality monitoring network stations are:

- 986-C Station
- 842-B Station
- Reno-B Station
- AQHI Grimshaw
- Peace River Complex (PRC) Station

Station ID	Station Name	Latitude	Longitude
1562	986-C	56.36980	-116.92500
1561	842-B	56.27406	-116.98129
1563	Reno-B	55.890868	-117.137080
1689	AQHI-Grimshaw	56.18657	-117.604994
1698	PRC	56.38257	-116.769283

Listing of Intermittent Monitoring Stations

- VOC Canister Sampling Station
    - 986-C Station
    - 842-B Station
    - Reno-B Station

Listing of PRAMP member with EPEA Facility Operating Approval

Company	Facility	Approval No.
Canadian Natural Upgrading Limited	Peace River Complex	1642-03-00

Calibration and Data Submission

Hourly data and calibration reports for December 2023 were submitted to Alberta's Ambient Air Data Warehouse through ETS for the 986-C station, 842-B station, Reno-B station, PRC station and AQHI-Grimshaw station.

Monitoring Notes during the Month of December 2023

986-C Station

- Measured parameters were below Alberta Ambient Air Quality Objectives (AAAQOs) where applicable.
- All data collected this month were compliant with the requirements outlined in the AMD 2016.
- All parameters met the 90% operational uptime requirement.
- No major operational issues were recorded this month.

842-B Station

- Measured parameters were below Alberta Ambient Air Quality Objectives (AAAQOs) where applicable.
- All data collected this month were compliant with the requirements outlined in the AMD 2016.
- All parameters met the 90% operational uptime requirement.
- No major operational issues were recorded this month.

Reno-B Station

- Measured parameters were below Alberta Ambient Air Quality Objectives (AAAQOs) where applicable.
- All data collected this month were compliant with the requirements outlined in the AMD 2016.
- All parameters met the 90% operational uptime requirement.
- No major operational issues were recorded this month.

PRC Station

- Measured parameters were below Alberta Ambient Air Quality Objectives (AAAQOs) where applicable.
- All data collected this month were compliant with the requirements outlined in the AMD 2016.
- All parameters met the 90% operational uptime requirement.
- No major operational issues were recorded this month.

AQHI – Grimshaw Station

- All data collected this month were compliant with the requirements outlined in the AMD 2016.
- All parameters met the 90% operational uptime requirement.
- Measured parameters were below Alberta Ambient Air Quality Objectives (AAAQOs) and /or Alberta Ambient Air Quality Guidelines (AAAQGs) where applicable, except PM2.5. One 1-hour PM2.5 exceedance was recorded this month. The recorded exceedances were believed to be the result of local buildup of emissions.

Date	Time (MST)	Parameter	Average Period	Concentration (µg/m3)	Wind speed (km/hr)	Wind Direction	Reference #
9-Dec	0	PM2.5	1-Hour	200	14.0	278°(W)	EDGE00422947

- PM2.5: A firmware update and an alignment factor was activated on the T640 PM analyzer was completed on December 20 hour 13.

VOCs Canister Sampling Program

- The canister sampling program collects a 1-hour sample of air when the continuously measured non-methane hydrocarbon (NMHC) concentration reaches a specified trigger point. The current trigger point is 0.3 ppm for non-methane hydrocarbons. The trigger point is based on real-time monitoring data that are averaged over a 5-minute period.
- The canister sample collection systems are in place at Station 986-C, 842-B, and the Reno-B Station; a canister sample collection system is not part of the suite of instruments currently deployed at both the PRC station and the AQHI-Grimshaw station.
- Sample analysis and analytical results were prepared and provided by InnoTech Alberta.
- There were no canister events recorded this month. The canister system was triggered at the 986-C station on December 26 at 03:35 due to an analyzer issue. The event is not valid.

Revisions to Alberta's Ambient Air Quality Data Warehouse

No revisions to historical data previously submitted to the Alberta's Ambient Air Quality Data Warehouse were made this month.

Deviations from Authorized Monitoring Methods

No deviations from authorized monitoring methods were recorded this month.

Disclaimer

Baseline corrections were performed on the 1-minute data. 5-minute and hourly data were calculated based on the post-baseline correction 1-minute data set. Data verification/validation were then performed on the 5-minute and hourly data. Hourly data that are included in this report are the post-validation hourly data set.

Equipment calibration / maintenance records were provided by Bureau Veritas.

Certification

This report was prepared and submitted by Lily Lin in accordance with Chapter 9 of the Air Monitoring Directive (AMD 2016).

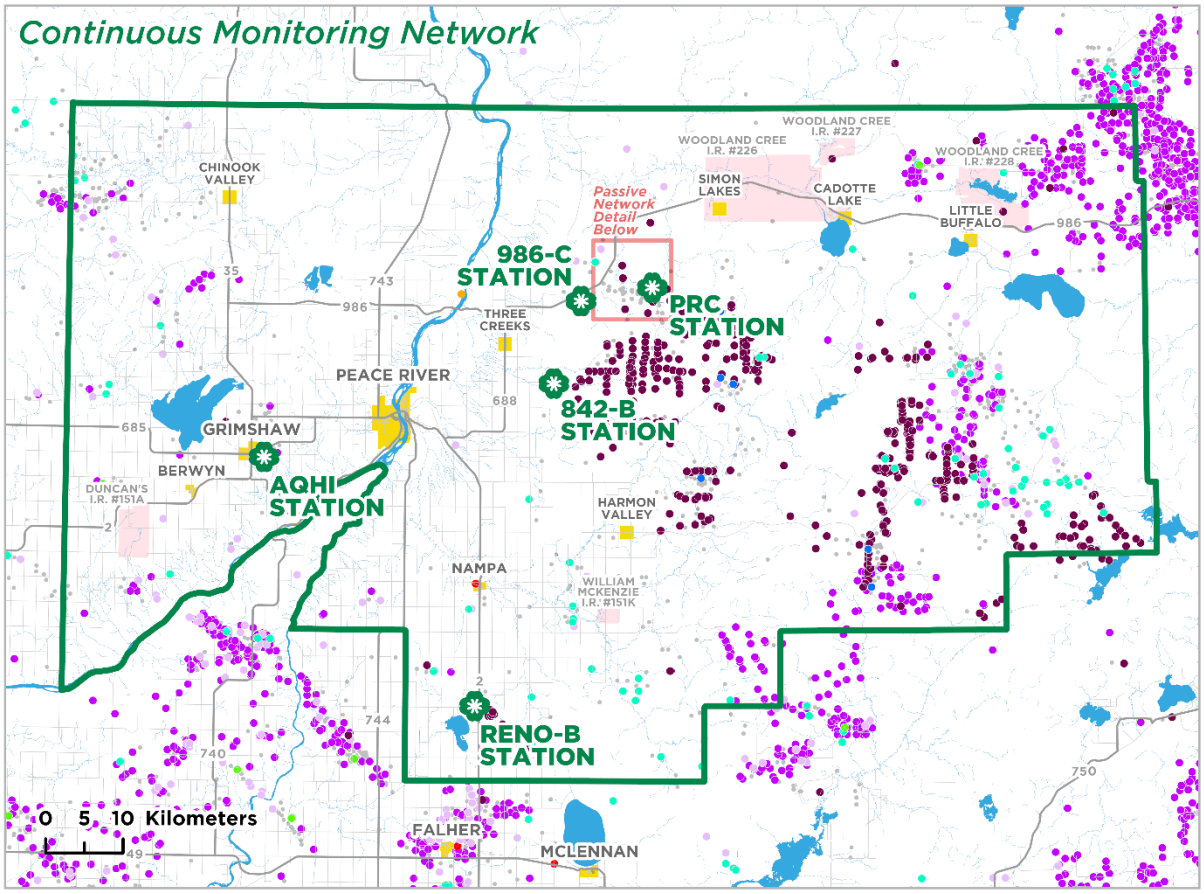
Lily Lin, Technical Program Manager, PRAMP Airshed

This report was reviewed by Michael Bisaga in accordance with Chapter 9 of the Air Monitoring Directive (AMD 2016).

I certify that I have reviewed and verified this report and that the information is complete, accurate and representative of the monitoring results, reporting timeframe and the specified analysis, summarization and reporting requirements. I also certify that at the time of this report's submission, all air data have been electronically uploaded to Alberta's Ambient Air Quality Data Warehouse as required by the AMD. Uploading of VOC data from the canister sampling program was not required at the time of completing this report.

Michael Bisaga, Technical Program Manager, PRAMP Airshed

Map of PRAMP Continuous Monitoring Network

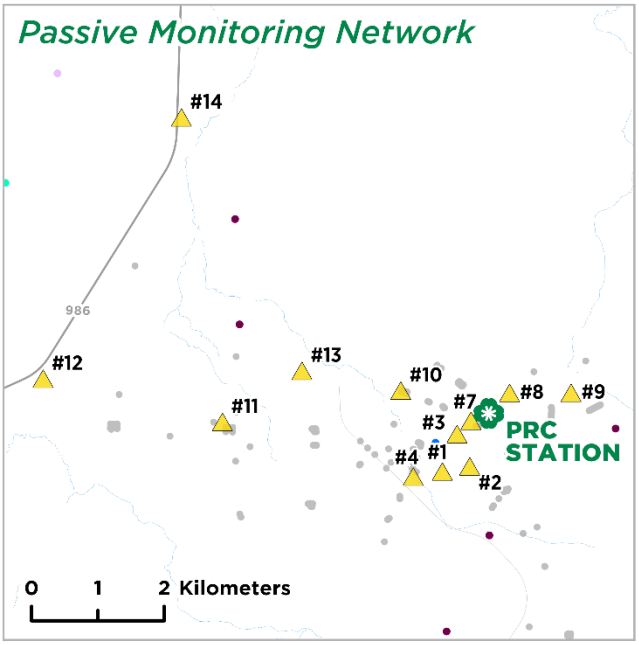


Legend

- PRAMP Boundary
- Populated Place
- First Nation
- Continuous Monitoring Station
- Passive Monitoring Station

Industrial Facilities

- In-Situ Oil Sands
- Heavy Oil/Bitumen Well or Battery
- Conventional Oil Well or Battery
- Natural Gas Well or Battery
- Gas Plant or Gas Processing
- Compressor Station or Pipeline
- Agricultural Storage and Transfer
- Pulp and Paper
- Well (Not Associated with Batteries)



Service Layer Credits: Esri, CGIAR, USGS, Esri, USGS

CONTINUOUS NETWORK EQUIPMENT AND MONITORING RESULTS SUMMARY

986 -C Station

Equipment Operation Summary

Parameter	Equipment Operational Summary
SO2 Thermo 43iQTL #1193585646	• A successful monthly calibration was performed on December 7. • No operational issues were identified this month.
TRS Thermo 43iQTL #1191833341 TRS convertor CD Nova CDN-101 #530 (BV-supplied)	• A successful monthly calibration was performed on December 7. • No operational issues were identified this month.
THC/CH4/NMHC Thermo 55i #12208316589 H2 Generator HG300 #191267063	• A successful monthly calibration was performed on December 7. • Few NMHC concentration spikes were recorded on December 26. As the spikes were very short duration (2-minutes) and high concentrations, the validity of these events is questionable. Data were invalidated as a result. • The canister system was triggered by a spike event at 03:35 on December 26. As the data were not believed to be real, the canister event is considered invalid.
RH Rotronic HC2-S3 #20626912	• The RH probe was checked on December 7. The probe passed the check requirements. • No operational issues were identified this month.
BP MetOne 092 #Y23358	• The BP sensor was checked on December 7. The sensor passed the check requirements. • No operational issues were identified this month.
AT Rotronic HC2-S3 #20626912	• The AT probe was checked on December 7. The probe passed the check requirements. • No operational issues were identified this month.

Parameter	Equipment Operational Summary
ST COMET #18961918	• No operational issues were identified this month.
Precipitation RM Young 52202 #TB 16325	• The precipitation gauge was checked on December 7. The gauge's functionality passed the check requirements. • No operational issues were identified this month.
WS/ WD RM Young 05305AQ #180340	• Wind direction data contained in this report represents where the wind is coming from. • The annual wind system calibration was completed on August 3, 2023. • The anemometer sensors were check on December 7. The wind system passed the check requirements. • No operational issues were identified this month.

Monitored Data Summary

842-B Station

Equipment Operation Summary

Parameter	Equipment Operational Summary
SO2 Thermo 43iQTL #1200736629	• A successful monthly calibration was performed on December 5. • Data collected between December 19 hour 13 and December 20 hour 5 were lost due to a power failure. Seventeen hours of downtime were recorded due to this event.
TRS Thermo 43iQTL #1200736630 TRS Convertor CD Nova CDN-101 #583	• A successful monthly calibration was performed on December 5. • As marked change in response was noticed on the December 5's calibration, an as-found points check was completed on December 6 to confirm the December 5's calibration result. No issues were identified. Two hours of downtime were recorded due to the additional quality check. • Data collected between December 19 hour 13 and December 20 hour 5 were lost due to a power failure. Seventeen hours of downtime were recorded due to this event.
THC/CH4/NMHC Thermo 55i #1501663728 H2 Generator HG300 #190567058	• A successful monthly calibration was performed on December 5. • Multiple flame out events began after the December 5's calibration due to a problem with the H2 generator. A successful additional zero-span check was completed On December 6. The issue improved after the zero-span check. The H2 desiccant was changed following by a successful post-repair calibration on December 6. Data were invalidated back to the time the additional zero-span check was completed. Twenty-two hours of downtime were recorded due to this event. • Data collected between December 19 hour 13 and December 20 hour 5 were lost due to a power failure. Seventeen hours of downtime were recorded due to this event.
RH Rotronic HC2-S3 #20370767	• The RH probe was checked on December 5. The probe passed the check requirements. • Data collected between December 19 hour 13 and December 20 hour 5 were lost due to a power failure. Seventeen hours of downtime were recorded due to this event.

Parameter	Equipment Operational Summary
AT Rotronic HC2-S3 #20370767	• The AT probe was checked on December 5. The probe passed the check requirements. • Data collected between December 19 hour 13 and December 20 hour 5 were lost due to a power failure. Seventeen hours of downtime were recorded due to this event.
BP MetOne 092 #Y23362	• The BP sensor was checked on December 5. The sensor passed the check requirements. • One hour of downtime was recorded on December 17 due to Data collected between December 19 hour 13 and December 20 hour 5 were lost due to a power failure. Seventeen hours of downtime were recorded due to this event.
ST COMET #20790297	• Data collected between December 19 hour 13 and December 20 hour 5 were lost due to a power failure. Seventeen hours of downtime were recorded due to this event.
Precipitation RM Young 52202 #TB 15878	• The precipitation gauge was checked on December 5. The sensor passed the check requirements. • Data collected between December 19 hour 13 and December 20 hour 5 were lost due to a power failure. Seventeen hours of downtime were recorded due to this event.
WS/ WD RM Young 05305AQ #174802	• Wind direction data contained in this report represents where the wind is coming from. • The annual wind system calibration was completed on August 3, 2023. • The anemometer sensors were check on December 5. Both the wind speed sensor and wind direction sensor passed the check requirements. • Data collected between December 19 hour 13 and December 20 hour 5 were lost due to a power failure. Seventeen hours of downtime were recorded due to this event.

Monitored Data Summary

Reno-B Station

Equipment Operation Summary

Parameter	Equipment Operational Summary
SO2 Thermo 43iQTL #12101910505	• A successful monthly calibration was performed on December 1. • No operational issues were identified this month.
TRS Thermo 43iQTL #12101910504 **TRS Convertor** CD Nova CDN-101 #590	• A successful monthly calibration was performed on December 1. • No operational issues were identified this month.
THC/CH4/NMHC Thermo 55i #12101910497 H2 Generator HG300 #210467069	• A successful monthly calibration was performed on December 1. • No operational issues were identified this month.
RH Rotronic HC2-S3 #20467597	• The RH probe was checked on December 1. The probe passed the check requirements. • Due to datalogger polling errors, one hour of downtime was recorded as the hourly data completeness requirement did not meet.
BP MetOne 092 #A17940	• The BP sensor was checked on December 1. The sensor passed the check requirements. • Due to datalogger polling errors, one hour of downtime was recorded as the hourly data completeness requirement did not meet.

Parameter	Equipment Operational Summary
AT Rotronic HC2-S3 #20467597	• The AT probe was checked on December 1. The probe passed the check requirements. • Due to datalogger polling errors, one hour of downtime was recorded as the hourly data completeness requirement did not meet.
ST COMET #NA	• No operational issues were identified this month.
Precipitation RM Young 52202 #TB 15877	• The precipitation gauge was checked and tested on December 1. The unit passed the check requirements. • Due to datalogger polling errors, one hour of downtime was recorded as the hourly data completeness requirement did not meet.
WS/ WD RM Young 05305AQ #174795	• Wind direction data contained in this report represents where the wind is coming from. • The annual wind system calibration was completed on August 1, 2023. • The anemometer sensors were check on December 1. The wind sensors passed the check requirements. • Due to datalogger polling errors, one hour of downtime was recorded as the hourly data completeness requirement did not meet.

Monitored Data Summary

PRC Station

Equipment Operation Summary

Parameter	Equipment Operational Summary
SO2 Thermo 43i #1034746225	• A successful monthly calibration was performed on December 6. • The scheduled zero-span check was interrupted by Windows update on December 18. A repeat zero-span check was completed later the day to confirm the analyzer's functionality. The check results met the calibration check requirements. One hour of downtime was recorded as a result.
H2S Thermo 450i #1308857354	• A successful monthly calibration was performed on December 6. • The scheduled zero-span check was interrupted by Windows update on December 18. A repeat zero-span check was completed later the day to confirm the analyzer's functionality. The check results met the calibration check requirements. One hour of downtime was recorded as a result.
TRS Thermo 450i #1034746224 TRS Convertor CD Nova CDN-101 #516	• A successful monthly calibration was performed on December 6. • The scheduled zero-span check was interrupted by Windows update on December 18. A repeat zero-span check was completed later the day to confirm the analyzer's functionality. The check results met the calibration check requirements. One hour of downtime was recorded as a result.
THC/CH4/NMHC Thermo 55i #1034745845 H2 Generator HG300 #211067076	• The H2 desiccant was changed after the successful as-found points check on December 6. A successful monthly calibration was completed afterwards. • The span gas cylinder was installed on December 6. • The scheduled zero-span check was interrupted by Windows update on December 18. A repeat zero-span check was completed later the day to confirm the analyzer's functionality. The check results met the calibration check requirements. One hour of downtime was recorded as a result.
RH Rotronic HC2-S3 #20558318	• The RH sensor was checked on December 6. The sensor passed the check requirements. • No operational issues were identified.
BP MetOne 092 #B19577	• The BP sensor was checked on December 6. The sensor passed the check requirements. • No operational issues were identified.

Parameter	Equipment Operational Summary
AT Rotronic HC2-S3 #20558318	• The AT sensor was checked on December 6. The sensor passed the check requirements. • No operational issues were identified.
ST Canadian Natural #NA	• No operational issues were identified.
WS/ WD RM Young 05305VK #129612	• Wind direction data contained in this report represents where the wind is coming from. • The annual wind system calibration was completed on August 3, 2023. • The anemometer sensors were checked on December 6. The sensors passed the check requirements. • No operational issues were identified.

Monitored Data Summary

AQHI – Grimshaw Station

Equipment Operation Summary

Parameter	Equipment Operational Summary
SO2 Teledyne T100 #722	• A successful monthly calibration was performed on December 12. • Due to datalogger polling errors, three hours of downtime were recorded as the hourly data completeness requirement did not meet.
TRS Teledyne T100U #132 TRS Convertor CD Nova CDN-101 #576	• A successful monthly calibration was performed on December 12. • Due to datalogger polling errors, three hours of downtime were recorded as the hourly data completeness requirement did not meet.
NOx/NO/NO2 API 200E #594 Teledyne T200 #837	• A successful monthly calibration was performed on December 12. • Due to datalogger polling errors, five hours of downtime were recorded as the hourly data completeness requirement did not meet.
O3 Teledyne T400 #824	• A successful monthly calibration was performed on December 12. • Due to datalogger polling errors, five hours of downtime were recorded as the hourly data completeness requirement did not meet.
THC/CH4/NMHC Thermo 55i #1191032505 H2 Generator AMA HG300 #190567059	• A successful monthly calibration was performed on December 12. • Due to datalogger polling errors, five hours of downtime were recorded as the hourly data completeness requirement did not meet.
PM2.5 Teledyne T640 #318	• A successful monthly audit was performed on December 12. • A firmware update and an alignment factor activation were completed on the T640 PM analyzer on December 20 hour 13. One hour of downtime was recorded as a result. • Due to datalogger polling errors, five hours of downtime were recorded as the hourly data completeness requirement did not meet.

Parameter	Equipment Operational Summary
RH Vaisala HMP155 #N2910506	• The RH probe was checked on December 12. The Probe passed the check requirements. • Due to datalogger polling errors, seven hours of downtime were recorded as the hourly data completeness requirement did not meet.
BP MetOne 092 #A2397	• The BP sensor was checked on December 12. The sensor passed the check requirements. • Due to datalogger polling errors, seven hours of downtime were recorded as the hourly data completeness requirement did not meet.
AT Vaisala HMP155 #N2910506	• The AT prober was checked on December 12. The probe passed the check requirements. • Due to datalogger polling errors, seven hours of downtime were recorded as the hourly data completeness requirement did not meet.
ST COMET #NA	• Due to datalogger polling errors, three hours of downtime were recorded as the hourly data completeness requirement did not meet.
WS/ WD RM Young 05305AQ #174801	• Wind direction data contained in this report represents where the wind is coming from. • The last annual wind system calibration was completed on August 2, 2023. • The anemometer sensors were check on December 12. Both the wind speed sensor and wind direction sensor passed the check requirements. • Due to datalogger polling errors, seven hours of downtime were recorded as the hourly data completeness requirement did not meet.

Monitored Data Summary

TABLES, CHARTS AND WIND ROSES

986-C STATION

842-B STATION

RENO -B STATION

PRC STATION

AQHI GRIMSHAW STATION

END OF REPORT

This page, 146 of 146, ends the December 2023 Monthly Ambient Air Quality Monitoring Report.

Peace River Area Monitoring Program

DECEMBER 2023

Ambient Air Monitoring Calibration Report

- 842-B STATION-

CAL-PRAMP-202312-01561

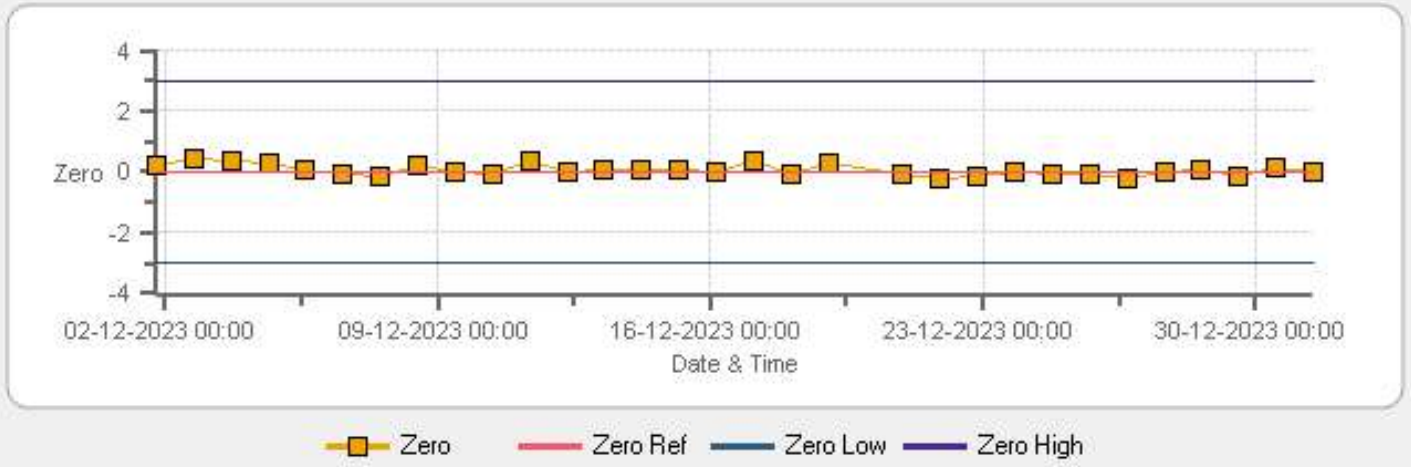
Operation and Maintenance:
Bureau Veritas Canada

Data Validation and Report:
Bureau Veritas Canada

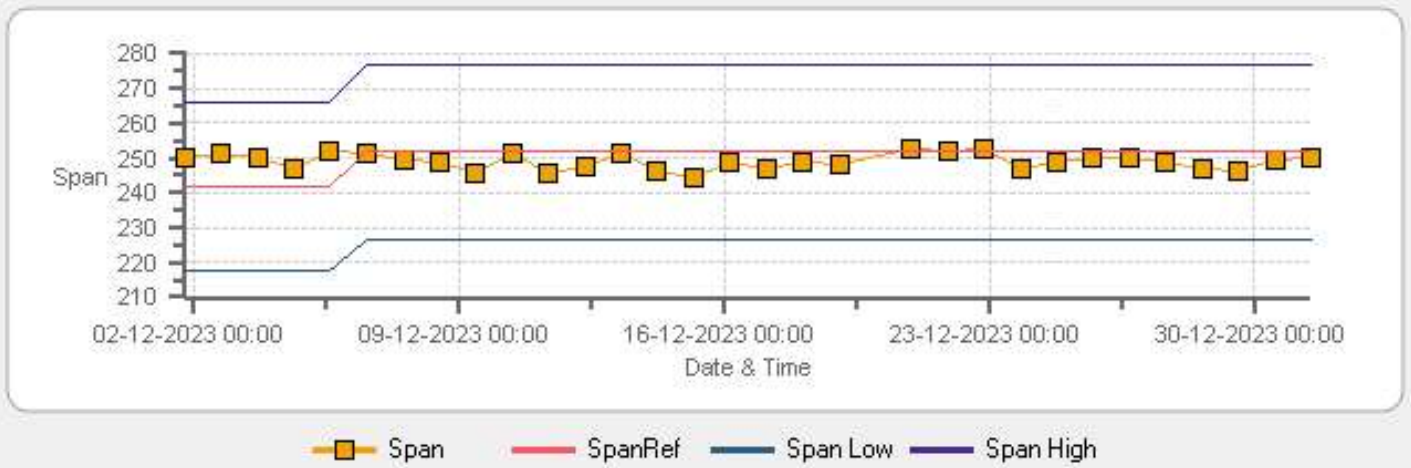
January 6, 2024

DAILY INTERNAL ZERO-SPAN CALIBRATION RECORDS

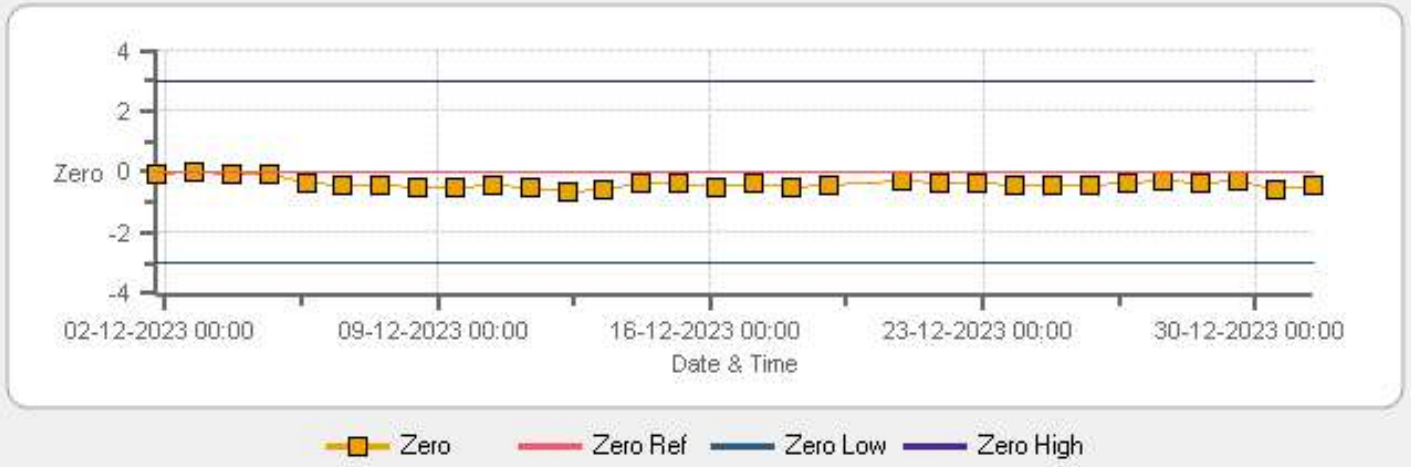
SO2[ppb] Calibration: PRAMP 842-B Monthly: 12-2023 Type: SpanAndZero - Zero



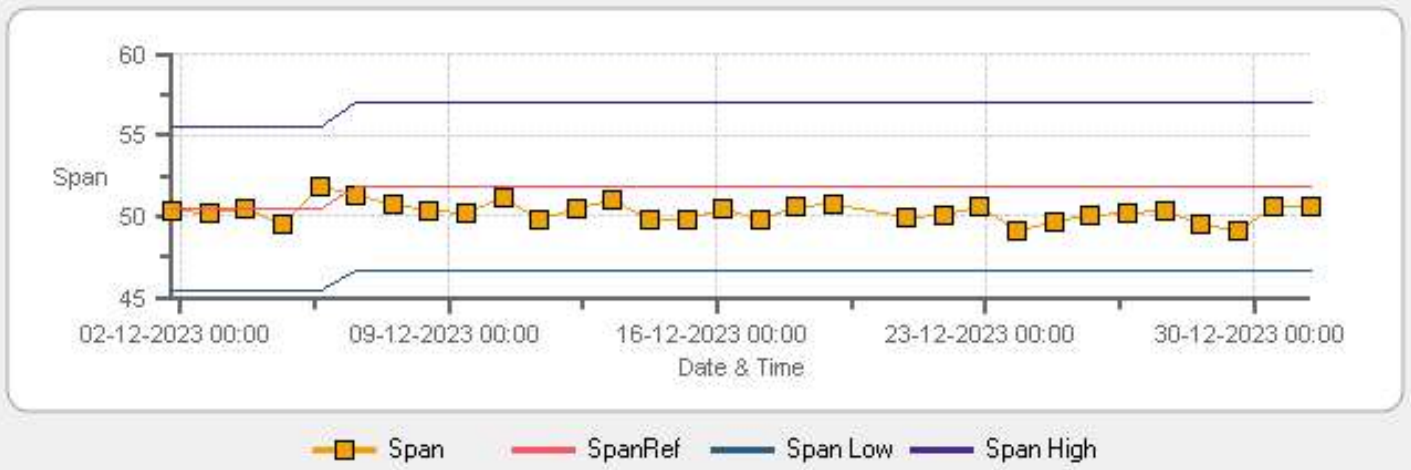
SO2[ppb] Calibration: PRAMP 842-B Monthly: 12-2023 Type: SpanAndZero - Span

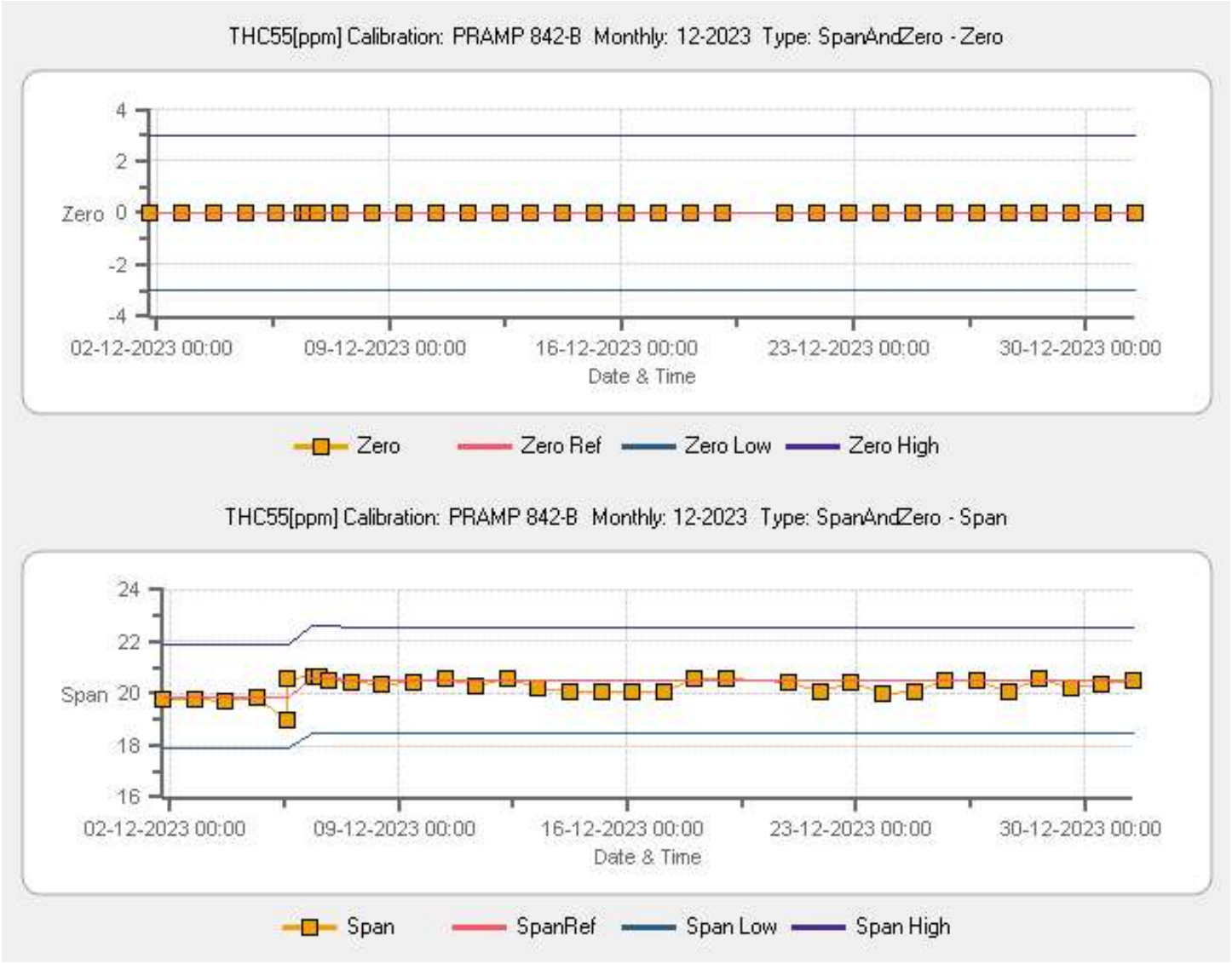


TRS[ppb] Calibration: PRAMP 842-B Monthly: 12-2023 Type: SpanAndZero - Zero

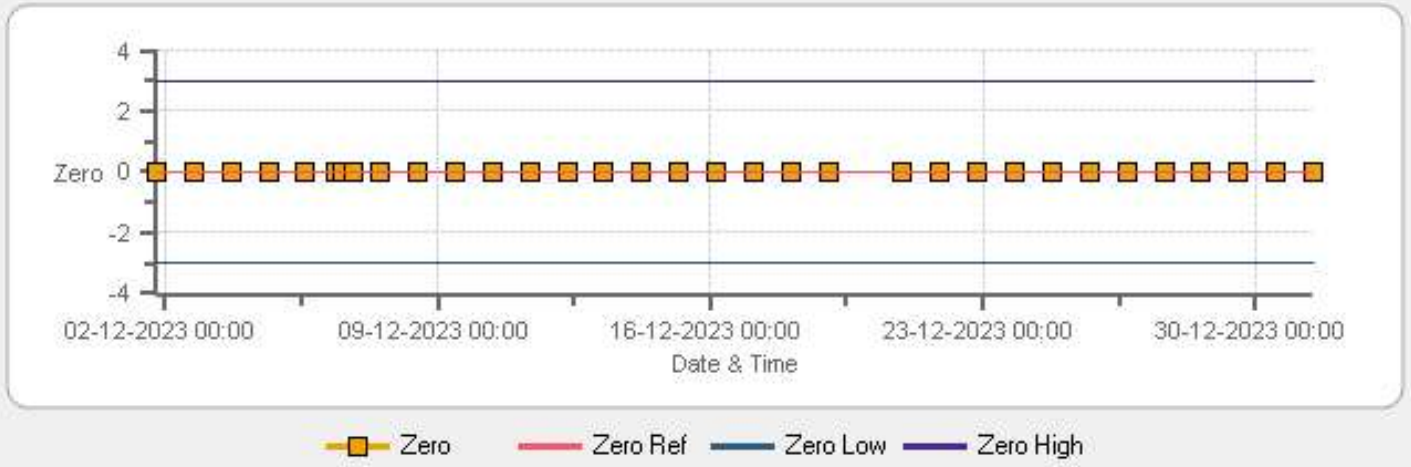


TRS[ppb] Calibration: PRAMP 842-B Monthly: 12-2023 Type: SpanAndZero - Span

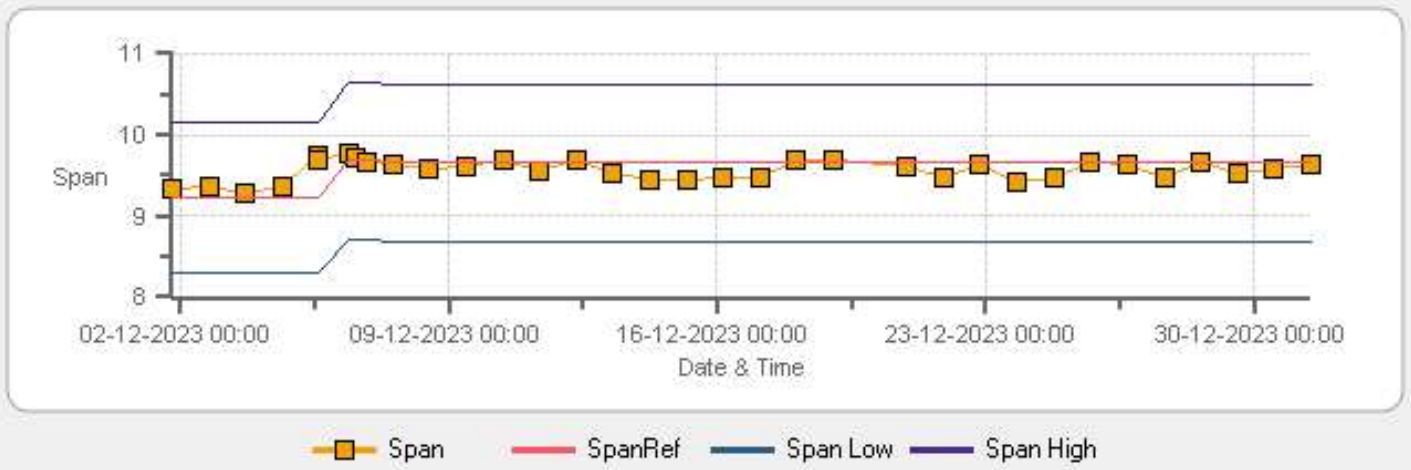



THC55[ppm] Calibration: PRAMP 842-B Monthly: 12-2023 Type: SpanAndZero - Zero
4
2
Zero 0
-2
-4
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Zero
Zero Ref
Zero Low
Zero High
THC55[ppm] Calibration: PRAMP 842-B Monthly: 12-2023 Type: SpanAndZero - Span
24
22
Span 20
18
16
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Span
SpanRef
Span Low
Span High

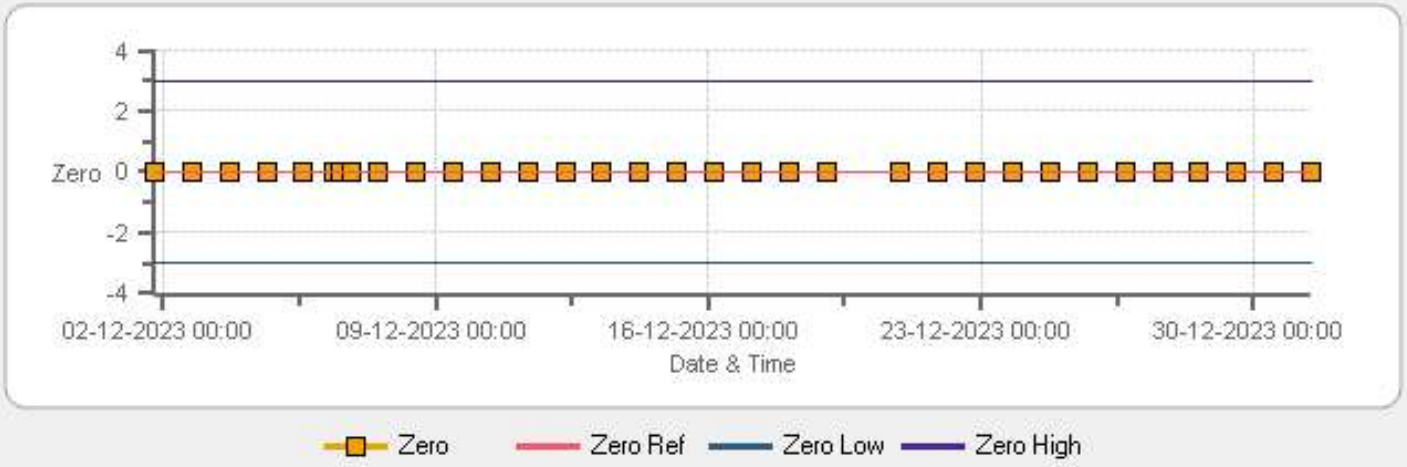
CH4[ppm] Calibration: PRAMP 842-B Monthly: 12-2023 Type: SpanAndZero - Zero



CH4[ppm] Calibration: PRAMP 842-B Monthly: 12-2023 Type: SpanAndZero - Span



NMHC[ppm] Calibration: PRAMP 842-B Monthly: 12-2023 Type: SpanAndZero - Zero



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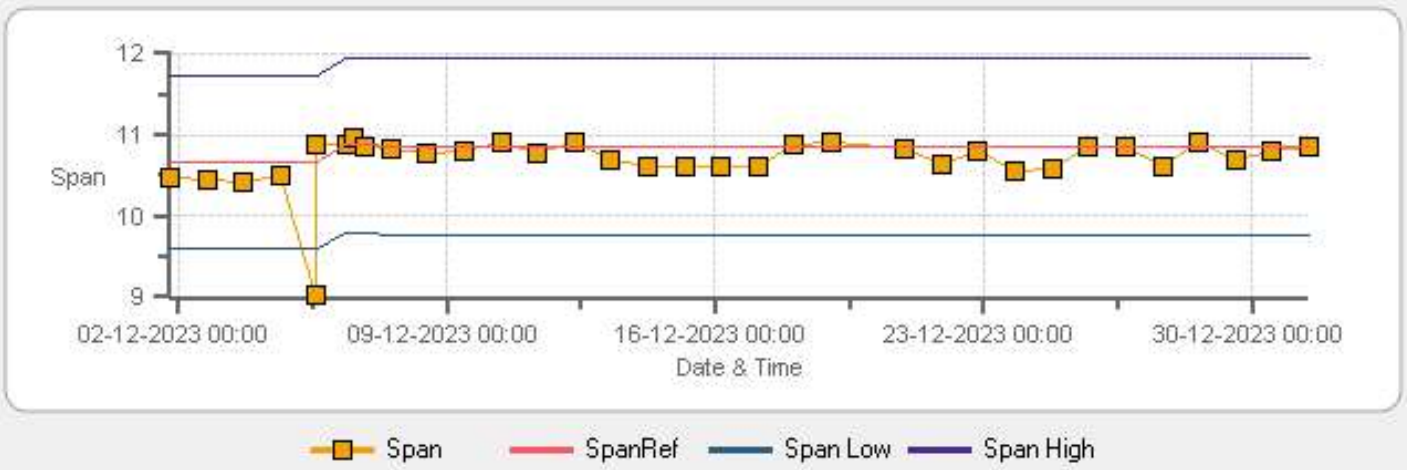


MULTI-POINT CALIBRATION RECORDS

SO2 Analyzer Calibration by Dilution

DATE:	05-Dec-2023	PREVIOUS CALIBRATION DATE:	08-Nov-2023
PARAMETER:	SO2	PREVIOUS CORRECTION FACTOR:	1.002
CLIENT:	PRAMP	TEMPERATURE (°C):	22.6
LOCATION:	842b	BAROMETRIC (mBar):	927
PURPOSE	Routine	START TIME (MST):	09:16
PERFORMED BY:	Kevin Sebastian	END TIME (MST):	14:09

ANALYZER:

MAKE/MODEL	Thermo 43iQTL	RANGE	500 ppb
SERIAL #	1200736629	FLOW (mL/min)	421
INITIAL		FINAL	
BKG/OFFSET	8.6	BKG/OFFSET	9.1
COEF/SLOPE	1.126	COEF/SLOPE	1.145
Expected (reference) Value	241.8	Expected (reference) Value	251.9

CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	Sabio	MAKE:	Teledyne
MODEL:	2010	MODEL:	T701
ID:	75401122	ID:	4568
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	LL109693	HIGH ID	n/a
CONC (ppm):	25.00	EXPIRY DATE	n/a
CYLINDER (psi):	1500	LOW ID	n/a
EXPIRY DATE	02-Nov-2025	EXPIRY DATE	n/a

CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	390	190	95
RANGE	300 - 400	150 - 200	50 - 100

SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
			ACTUAL	INDICATED		Initial	Final
DILUENT	GAS	TOTAL		Initial	Final		
3999		3999	0.00	0.16	0		
3938	60.80	3999	380.10	371.7	380.7	1.023	0.998
3971	28.80	4000	180.00	n/a	181.8	n/a	0.990
3986	14.40	4000	90.00	n/a	90.8	n/a	0.991

LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.001	0.1%

COMMENTS:

Sample filter changed.


SO2[ppb] Station: PRAMP 842-B Daily: 05-12-2023 Type: AVG 1 Min. [1 Min.]
400
350
300
250
200
150
100
50
0
-50
SO2 [ppb]
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Date & Time
SO2 [ppb]

TRS Analyzer Calibration by Dilution

DATE:	05-Dec-2023	PREVIOUS CALIBRATION DATE:	09-Nov-2023
PARAMETER:	TRS	PREVIOUS CORRECTION FACTOR:	0.999
CLIENT:	PRAMP	TEMPERATURE (°C):	22.6
LOCATION:	842b	BAROMETRIC (mBar):	927
PURPOSE	Install/Post-Repair	START TIME (MST):	09:16
PERFORMED BY:	Kevin Sebastian	END TIME (MST):	16:00

ANALYZER:

MAKE/MODEL	Thermo 43iQTL	RANGE	100 ppb
SERIAL #	1200736630	FLOW (mL/min)	373
INITIAL		FINAL	
BKG/OFFSET	14	BKG/OFFSET	15.2
COEF/SLOPE	0.898	COEF/SLOPE	0.946
Expected (reference) Value	50.46	Expected (reference) Value	51.87

CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	Sabio	MAKE:	Teledyne
MODEL:	2010	MODEL:	T701
ID:	75401122	ID:	4568
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	LL131374	HIGH ID	n/a
CONC (ppm):	10.09	EXPIRY DATE	n/a
CYLINDER (psi):	1800	LOW ID	n/a
EXPIRY DATE	03-Jan-2026	EXPIRY DATE	n/a

CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	78	38	19
RANGE	60 - 80	30 - 40	10 - 20

SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
			ACTUAL	INDICATED		Initial	Final
DILUENT	GAS	TOTAL		Initial	Final		
3999		3999	0.00	0.2	0		
3968	30.90	3999	77.96	73.65	78.7	1.061	0.991
3984	15.10	3999	38.10	n/a	38.63	n/a	0.986
3993	7.50	4000	18.92	n/a	19.31	n/a	0.980

LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.009	0.1%

COMMENTS:

TRS Converter CDNOVA CDN #583. Sample filter changed.
Initial calibration failed at low point. Repeated from adjusted high.
14:00 = Daily ZS, adjusted high restarted

TRS[ppb] Station: PRAMP 842-B Daily: 05-12-2023 Type: AVG 1 Min. [1 Min.]

TRS Analyzer Calibration by Dilution

DATE:	06-Dec-2023	PREVIOUS CALIBRATION DATE:	05-Dec-2023
PARAMETER:	TRS	PREVIOUS CORRECTION FACTOR:	0.991
CLIENT:	PRAMP	TEMPERATURE (°C):	23.7
LOCATION:	842b	BAROMETRIC (mBar):	928
PURPOSE	As-Found	START TIME (MST):	17:01
PERFORMED BY:	Kevin Sebastian	END TIME (MST):	18:55

ANALYZER:

MAKE/MODEL	Thermo 43iQTL	RANGE	100 ppb
SERIAL #	1200736630	FLOW (mL/min)	374
INITIAL		FINAL	
BKG/OFFSET	15.2	BKG/OFFSET	n/a
COEF/SLOPE	0.946	COEF/SLOPE	n/a
Expected (reference) Value	51.87	Expected (reference) Value	n/a

CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	Sabio	MAKE:	Teledyne
MODEL:	2010	MODEL:	T701
ID:	75401122	ID:	4568
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	LL131374	HIGH ID	n/a
CONC (ppm):	10.09	EXPIRY DATE	n/a
CYLINDER (psi):	1800	LOW ID	n/a
EXPIRY DATE	03-Jan-2026	EXPIRY DATE	n/a

CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	78	38	19
RANGE	60 - 80	30 - 40	10 - 20

SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
			ACTUAL	INDICATED		Initial	Final
DILUENT	GAS	TOTAL		Initial	Final		
3999		3999	0.00	-0.35	n/a		
3968	30.90	3999	77.96	78.51	n/a	0.989	n/a
3984	15.10	3999	38.10	37.42	n/a	1.009	n/a
3993	7.50	4000	18.92	18.5	n/a	1.004	n/a

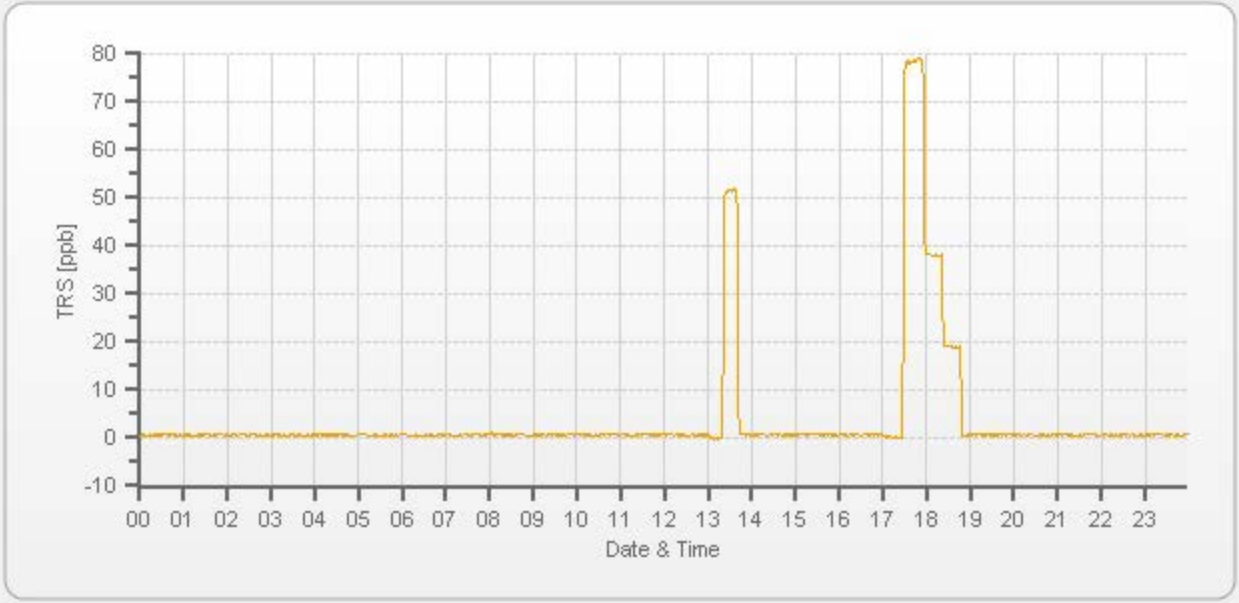
LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	n/a	**n/a**	**n/a**

COMMENTS:

TRS Converter CDNOVA CDN #583.
As-found to confirm marked change at monthly calibration

TRS[ppb] Station: PRAMP 842-B Daily: 06-12-2023 Type: AVG 1 Min. [1 Min.]



Methane/Non-Methane Analyzer Calibration by Dilution

CALIBRATION:

DATE:	05-Dec-2023	PREVIOUS CALIBRATION DATE:	09-Nov-2023
CLIENT:	PRAMP	TEMPERATURE (°C):	22.6
LOCATION:	842b	BAROMETRIC (mBar):	927
PURPOSE	Routine	START TIME (MST):	09:16
PERFORMED BY:	Kevin Sebastian	END TIME (MST):	13:43

ANALYZER:

VALUE	MAKE/MODEL	SERIAL	FLOW (mL/min)
	Thermo 55i	1501663728	1094
PARAMETER:	CH4	NMHC	THC
RANGE (ppm):	20	20	40
PREVIOUS CF:	1.000	1.001	1.000

CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:			FLOWMETERS (if applicable):	
MAKE:	SABIO	MAKE:	API	CYLINDER ID:	LL68768		HIGH ID:	n/a
MODEL:	2010	MODEL:	T701	CH_4/C_3H_8 (ppm):	897.0	301.0	HIGH EXPIRY:	n/a
ID:	26801218	ID:	4568	CYLINDER (psi):	1600		LOW ID:	n/a
MFC CALIBRATION DATE:	12-Sep-2023	OXIDIZER ID:	Internal	EXPIRY DATE	08-Nov-2029		LOW EXPIRY:	n/a

CALIBRATION PARAMETERS:

POINT (CH4/NMHC)	HIGH	MID	LOW	CH4 EQUIVILANCE	
TARGET	14	7	3.5	C_3H_8 as CH_4	827.8
RANGE	12 - 16	6 - 8	2 - 4	THC as CH_4	1724.8

EXPECTED (REFERENCE) VALUE:

INITIAL	CH4	NMHC	THC	FINAL	CH4	NMHC	THC
	9.22	10.67	19.89		9.69	10.87	20.56

CALIBRATION:

FLOW RATE (mL/min)			CONCENTRATION (PPM)									CORRECTION FACTOR (CF.)					
			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	CH4	NMHC	THC	CH4	NMHC	THC	CH4	NMHC	THC	CH4	NMHC	THC	CH4	NMHC	THC
3099		3099	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
3049	50.30	3099	14.56	13.44	27.99	13.99	12.88	26.87	14.56	13.43	27.99	1.041	1.043	1.042	1.000	1.000	1.000
3075	25.20	3100	7.29	6.73	14.02	n/a	n/a	n/a	7.17	6.69	13.87	n/a	n/a	n/a	1.017	1.006	1.011
3085	12.60	3098	3.65	3.37	7.01	n/a	n/a	n/a	3.58	3.32	6.90	n/a	n/a	n/a	1.019	1.014	1.017

LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
CH4	1.000	1.001	-0.3%
NMHC	1.000	1.000	-0.1%
THC	1.000	1.001	-0.2%

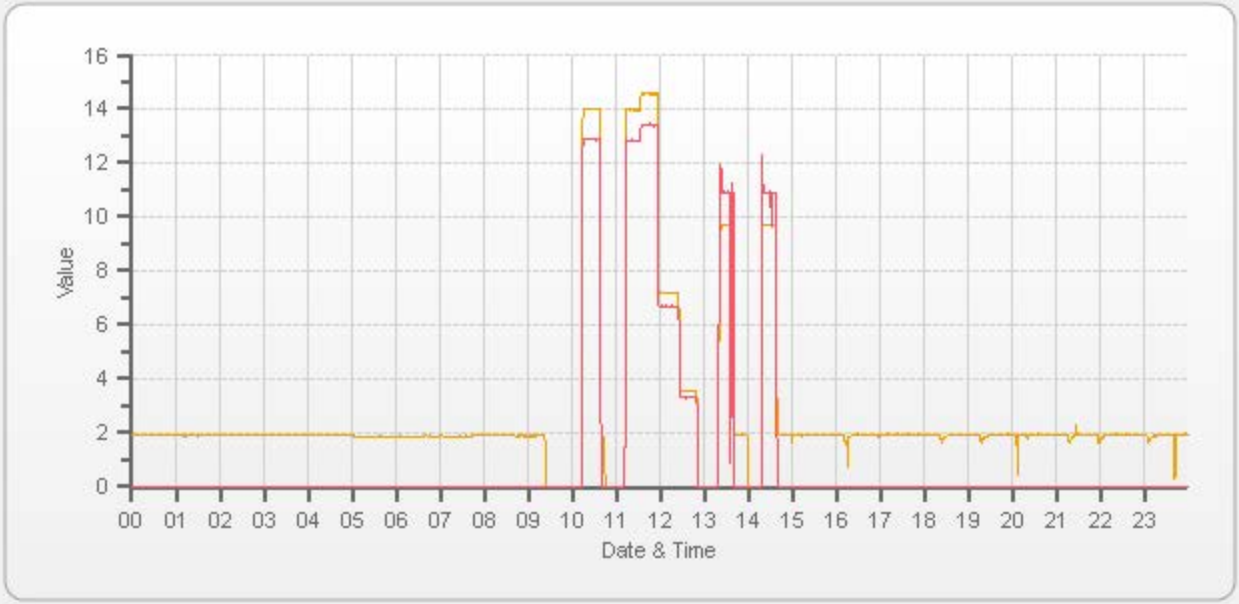
Comments:

H2 = AMA HG300 #190567058

Sample filter changed.

Use Zero Chrom? **No**

Station: PRAMP 842-B Daily: 05-12-2023 Type: AVG 1 Min. [1 Min.]



Methane/Non-Methane Analyzer Calibration by Dilution

CALIBRATION:

DATE:	06-Dec-2023	PREVIOUS CALIBRATION DATE:	n/a
CLIENT:	PRAMP	TEMPERATURE (°C):	23.7
LOCATION:	842b	BAROMETRIC (mBar):	929
PURPOSE	Install/Post-Repair	START TIME (MST):	17:01
PERFORMED BY:	Kevin Sebastian	END TIME (MST):	19:53

ANALYZER:

VALUE	MAKE/MODEL	SERIAL	FLOW (mL/min)
	Thermo 55i	1501663728	1116
PARAMETER:	CH4	NMHC	THC
RANGE (ppm):	20	20	40
PREVIOUS CF:	n/a	n/a	n/a

CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:			FLOWMETERS (if applicable):	
MAKE:	SABIO	MAKE:	API	CYLINDER ID:	LL68768		HIGH ID:	n/a
MODEL:	2010	MODEL:	T701	CH_4/C_3H_8 (ppm):	897.0	301.0	HIGH EXPIRY:	n/a
ID:	26801218	ID:	4568	CYLINDER (psi):	1600		LOW ID:	n/a
MFC CALIBRATION DATE:	12-Sep-2023	OXIDIZER ID:	Internal	EXPIRY DATE	08-Nov-2029		LOW EXPIRY:	n/a

CALIBRATION PARAMETERS:

POINT (CH4/NMHC)	HIGH	MID	LOW	CH4 EQUIVILANCE	
TARGET	14	7	3.5	C_3H_8 as CH_4	827.8
RANGE	12 - 16	6 - 8	2 - 4	THC as CH_4	1724.8

EXPECTED (REFERENCE) VALUE:

INITIAL	CH4	NMHC	THC	FINAL	CH4	NMHC	THC
	n/a	n/a	n/a		9.66	10.85	20.51

CALIBRATION:

FLOW RATE (mL/min)			CONCENTRATION (PPM)									CORRECTION FACTOR (CF.)					
			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	CH4	NMHC	THC	CH4	NMHC	THC	CH4	NMHC	THC	CH4	NMHC	THC	CH4	NMHC	THC
3099		3099	0.00	0.00	0.00	n/a	n/a	n/a	0.00	0.00	0.00						
3049	50.30	3099	14.56	13.44	27.99	n/a	n/a	n/a	14.52	13.40	27.92	n/a	n/a	n/a	1.003	1.003	1.003
3075	25.20	3100	7.29	6.73	14.02	n/a	n/a	n/a	7.18	6.68	13.86	n/a	n/a	n/a	1.016	1.007	1.012
3085	12.60	3098	3.65	3.37	7.01	n/a	n/a	n/a	3.57	3.34	6.91	n/a	n/a	n/a	1.022	1.008	1.015

LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
CH4	1.000	0.998	-0.2%
NMHC	1.000	0.998	-0.1%
THC	1.000	0.998	-0.1%

Comments:

H2 = AMA HG300 #190567058

H2 Dessicant changed prior to thos post-repair

Use Zero Chrom? **No**

Station: PRAMP 842-B Daily: 06-12-2023 Type: AVG 1 Min. [1 Min.]

Meteorological System Checklist

Date:	December 5, 2023		
Technician:	Kevin Sebastian		
Station:	PRAMP 842b		
Unit:	**Make:**	**Model:**	**Serial #:**
Precipitation Sampler:	RM Young	52202	TB 15878
Temperature Sensor:	Rotronic	HC2A-S3	20370767
Barometric Pressure Sensor:	MetOne	92	Y23362
Relative Humidity Sensor:	Rotronic	HC2A-S3	20370767
Anemometer:	RM Young	05305AQ	174802

PRECIPITATION SENSOR CHECK

Checklist:	**Reply:**	**Comments:**
Previous check date:	November 9, 2023	
Is the sensor Level?	yes	
Is the heater operating properly?	yes	
Are the bucket drain holes clean?	yes	test time: 10:24-10:31
Is the screen on the housing? (screen should be on between July and September	yes	
Is the housing clean?	yes	
Is the area around the housing clean and free from obstacles?	yes	

TIP TEST - Slowly pour water until 10 tips are heard. (10 tips = 1 mm)

# of Tips	**Data Logger Response (mm):**	**Manual Specification = +/- 0.1 mm**
10	1.0	0.00

AMBIENT TEMPERATURE SENSOR CHECK

Previous check date:	November 9, 2023	
Parameter:	Temperature @ 2 metres	
Reference Thermometer ID:	F.S. 181341226 expires July 17, 2024	
Reference Temperature (^{o}C):	5.5	
Station - Ambient Temperature (^{o}C):	5.8	
Temperature Difference (^{o}C):	0.3	

BAROMETRIC PRESSURE SENSOR CHECK

Previous check date:	November 9, 2023	
Reference Barometer ID:	Brunton 05535 Expires July 17, 2024	
Reference Pressure - Units/Reading:	millibar	927
Station Pressure - Units/Reading:	millibar	927.2
Pressure Tolerance +/- 15% of error:	788 - 1066	-0.02%

RELATIVE HUMIDITY (HYGROMETER) SENSOR CHECK

Previous check date:	November 9, 2023	
Reference Hygrometer ID:	F.S. 181341226 expires July 17, 2024	
Reference Hygrometer % RH- Reading:	76.50	
Station Hygrometer % RH- Reading:	80.70	
RH Tolerance +/- 15% of difference:	65.03 - 87.98	-5.5%

ANEMOMETER - WIND SPEED & WIND DIRECTION SENSOR CHECK

WIND SPEED		WIND DIRECTION	
Previous check date:	November 9, 2023	Previous check date:	November 9, 2023
Wind Speed Observed (kph):	10~20	Wind Direction Observed:	SW
Wind speed on Data Logger (kph):	19	Wind Direction on Data Logger:	SW
		Wind Direction Pass/Fail?:	Pass

Comments

Meteorological Sensor Audit/Calibration

Location Information

Company:	PRAMP	**Performed By:**	Chris Wesson
Audit Location:	842b	**Reviewed By:**	Limin Li
Audit Date:	August 3, 2023	**Start/End Time (mst):**	15:57 / 17:00
Calibration Purpose:	routine annual	**Weather Conditions:**	Mix of sun and clouds with rain showers

Wind Sensor Information

Sensor ID Data:		**Sensor Outputs:**	
Sensor Make:	RM Young	**Velocity Voltage Output Range:**	n/a
Sensor Model:	05305AQ	**Velocity Unit Output Range:**	0-200
Serial #:	174802	**Direction Voltage Output Range:**	n/a
Previous Cal/Audit Date:	August 3, 2022	**Direction Unit Output Range:**	0-360

Wind Calibrator Information

Calibrator I.D. and Expiry Date: RM Young 18802 id# R9133 expires Oct 18, 2024

Wind Speed Audit Data **+/- 2% of the average correction factor is the limit**

RPM	Wind Speed Generated kph	Clockwise Wind Speed kph	Counter Clockwise Wind Speed kph	Correction Factor
0	0	0.0	0.0	-
1000	18.4	18.3	18.3	1.007
2000	36.9	36.7	36.7	1.004
3000	55.3	55.1	55.1	1.003
4000	73.7	73.6	73.6	1.002
5000	92.2	92.0	92.0	1.002
6000	110.6	110.5	110.5	1.001
7000	129.0	128.9	128.9	1.001
8000	147.4	147.3	147.3	1.001
9000	165.9	165.8	165.8	1.000
10000	184.3	184.2	184.2	1.001
		The audit meets AMD requirements.	**Average Correction Factor=**	**1.002**

Wind Direction Audit Data **+/- 3° of the absolute average degrees difference for all points is the limit**

Generated Wind Direction 0-360 (Up)	Generated Wind Direction 360-0 (Down)	Indicated Wind Direction 0-360 (Up)	Indicated Wind Direction 360-0 (Down)	Degrees Difference 0-360 (Up)	Degrees Difference 360-0 (Down)	Average Absolute Degrees Difference
0	355	2	354	2.0	1.0	1.5
30	330	23	332	7.0	-2.0	4.5
60	300	59	303	1.0	-3.0	2.0
90	270	88	274	2.0	-4.0	3.0
120	240	118	242	2.0	-2.0	2.0
150	210	149	209	1.0	1.0	1.0
180	180	179	178	1.0	2.0	1.5
210	150	210	146	0.0	4.0	2.0
240	120	243	117	-3.0	3.0	3.0
270	90	274	89	-4.0	1.0	2.5
300	60	304	57	-4.0	3.0	3.5
330	30	334	29	-4.0	1.0	2.5
355	0	354	2	1.0	2.0	1.5
The audit meets AMD requirements.			**Average Absolute Degrees Difference=**			**2.3**

Comments:

Declination = 15 deg East
Physical inspection completed, no issues
Potentiometer noisy. Replacement required.

END OF REPORT

Peace River Area Monitoring Program

DECEMBER 2023

Ambient Air Monitoring Calibration Report

- 986-C STATION-

CAL-PRAMP-202312-01562

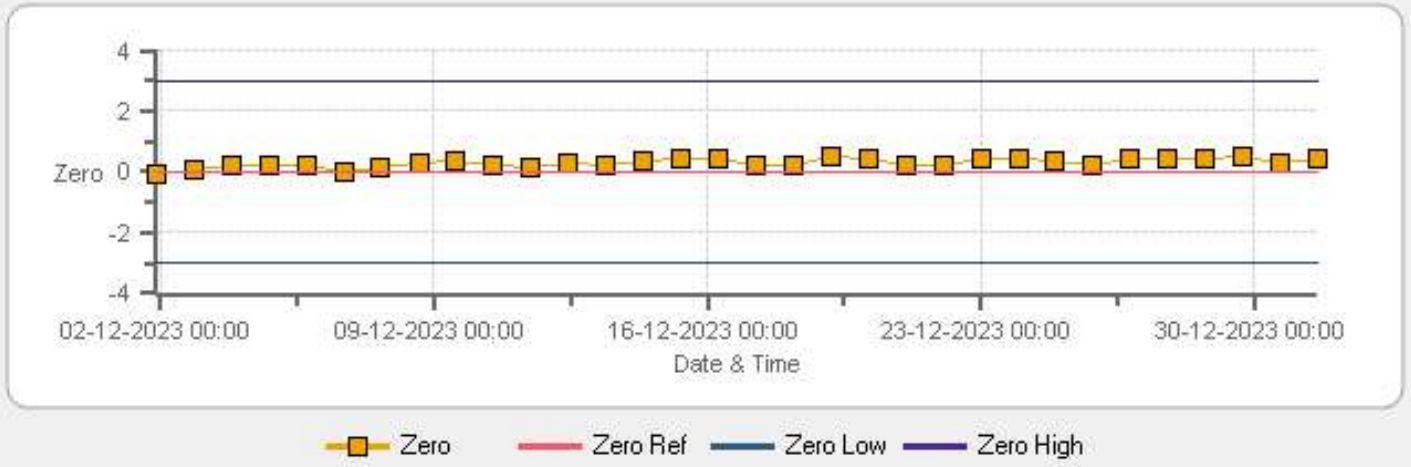
Operation and Maintenance:
Bureau Veritas Canada

Data Validation and Report:
Bureau Veritas Canada

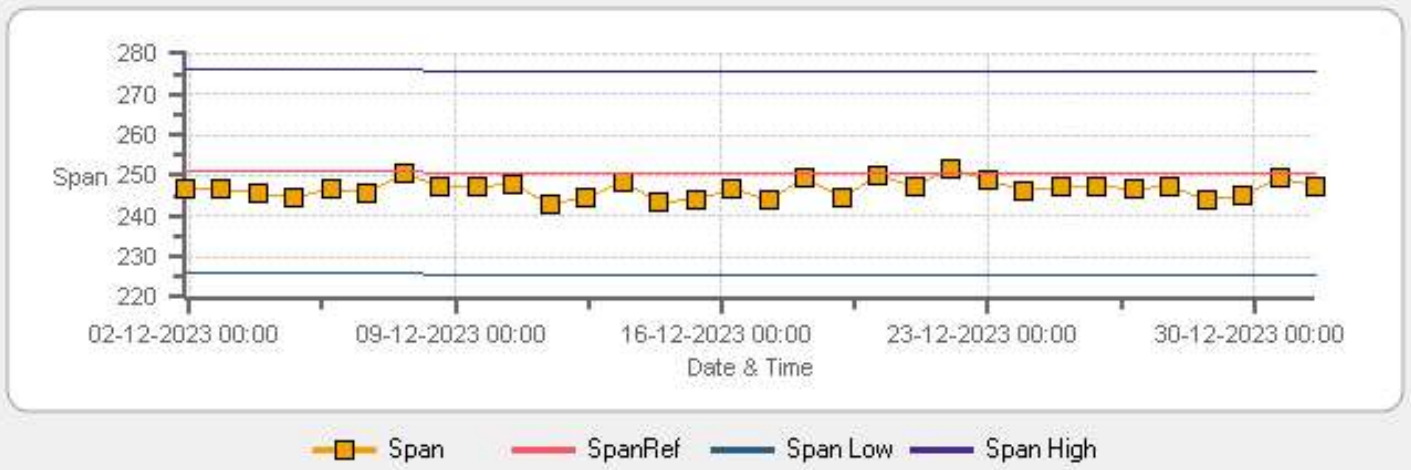
January 6, 2024

DAILY INTERNAL ZERO-SPAN CALIBRATION RECORDS

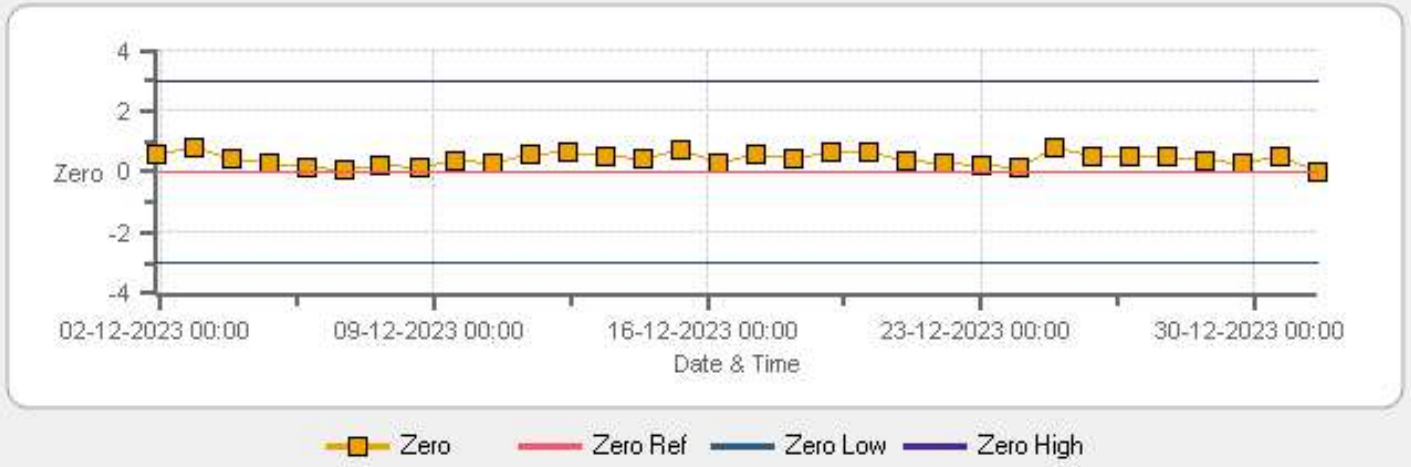
SO2[ppb] Calibration: PRAMP 986-C Monthly: 12-2023 Type: SpanAndZero - Zero



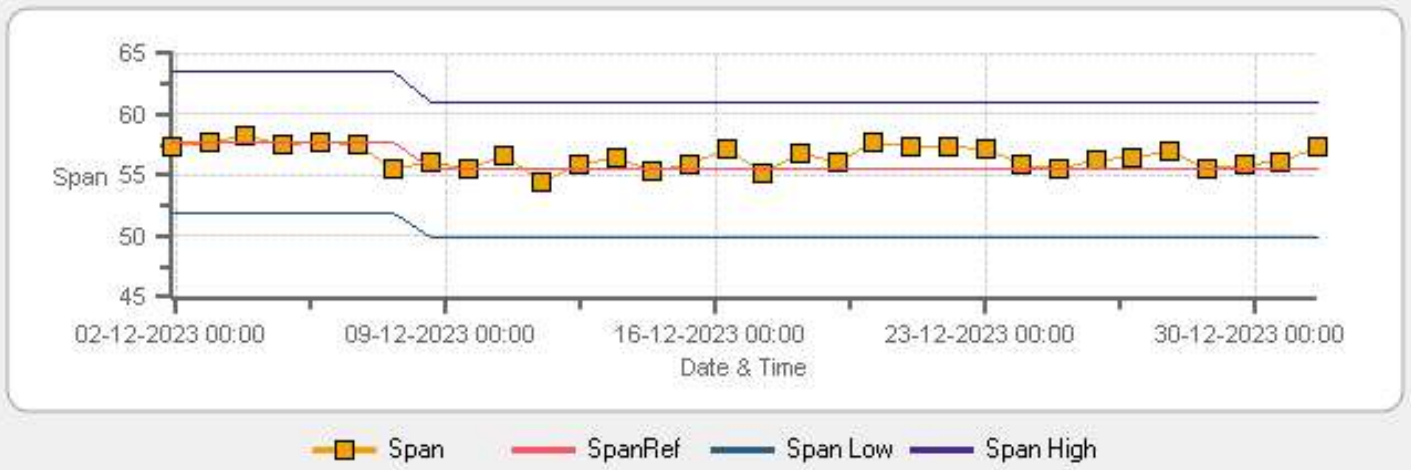
SO2[ppb] Calibration: PRAMP 986-C Monthly: 12-2023 Type: SpanAndZero - Span

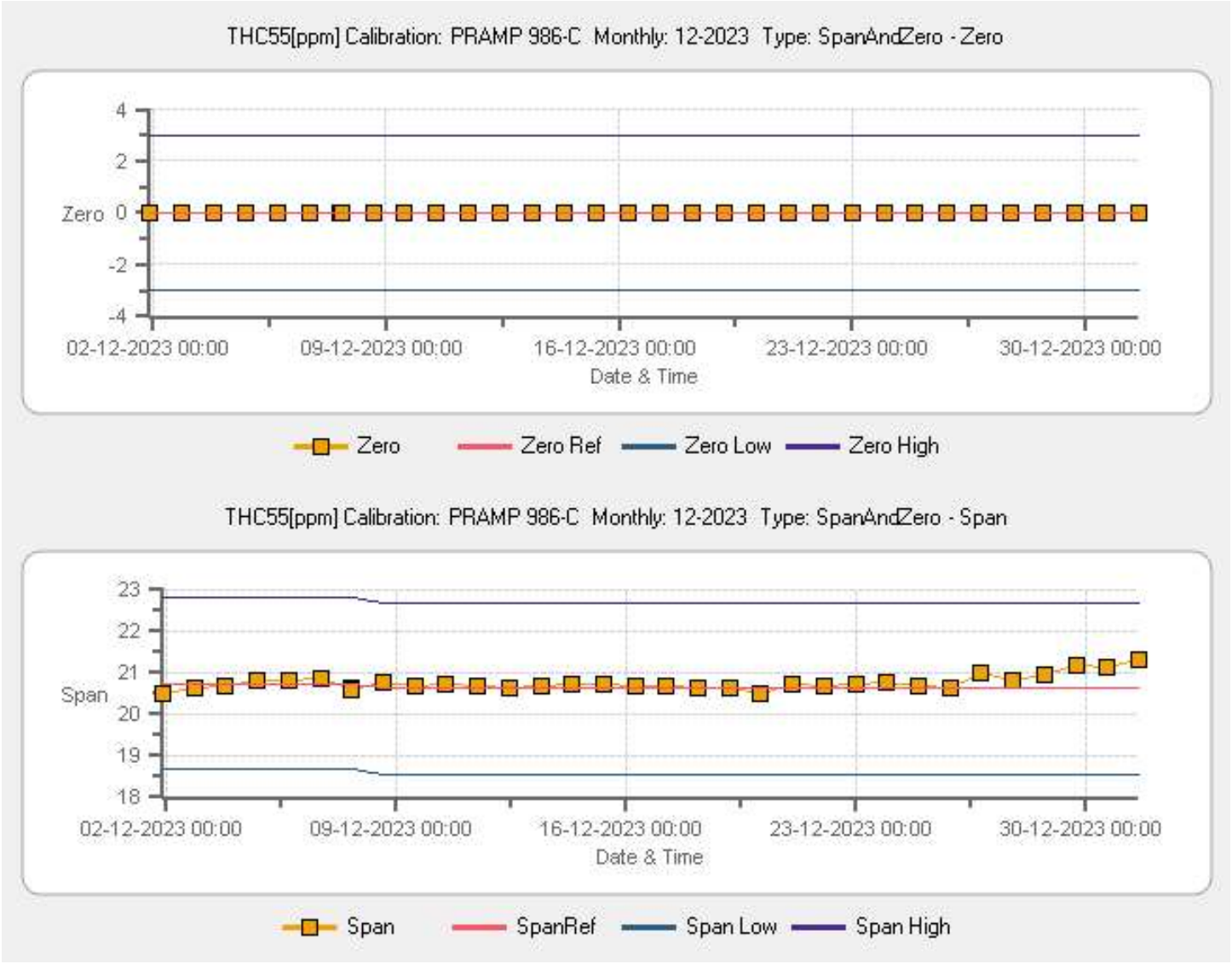


TRS[ppb] Calibration: PRAMP 986-C Monthly: 12-2023 Type: SpanAndZero - Zero

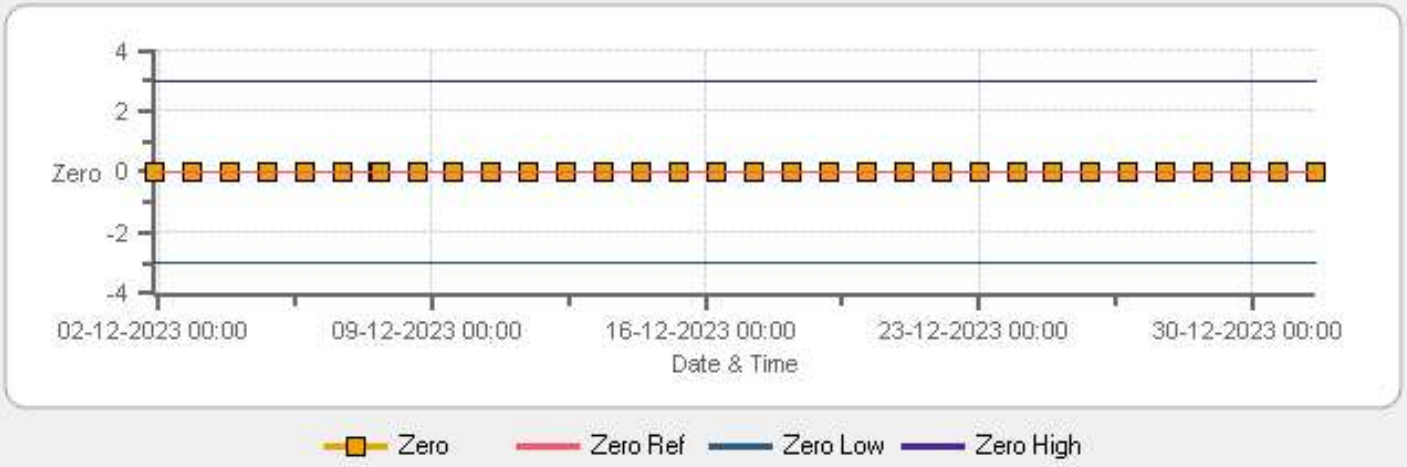


TRS[ppb] Calibration: PRAMP 986-C Monthly: 12-2023 Type: SpanAndZero - Span

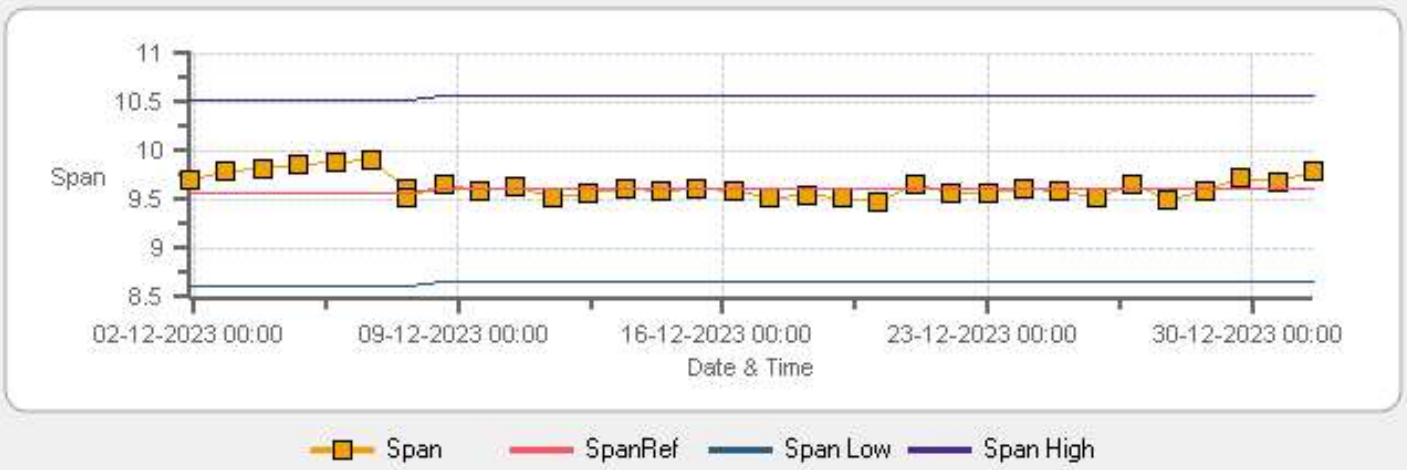



THC55[ppm] Calibration: PRAMP 986-C Monthly: 12-2023 Type: SpanAndZero - Zero
4
2
Zero 0
-2
-4
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Zero
Zero Ref
Zero Low
Zero High
THC55[ppm] Calibration: PRAMP 986-C Monthly: 12-2023 Type: SpanAndZero - Span
23
22
21
Span
20
19
18
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Span
SpanRef
Span Low
Span High

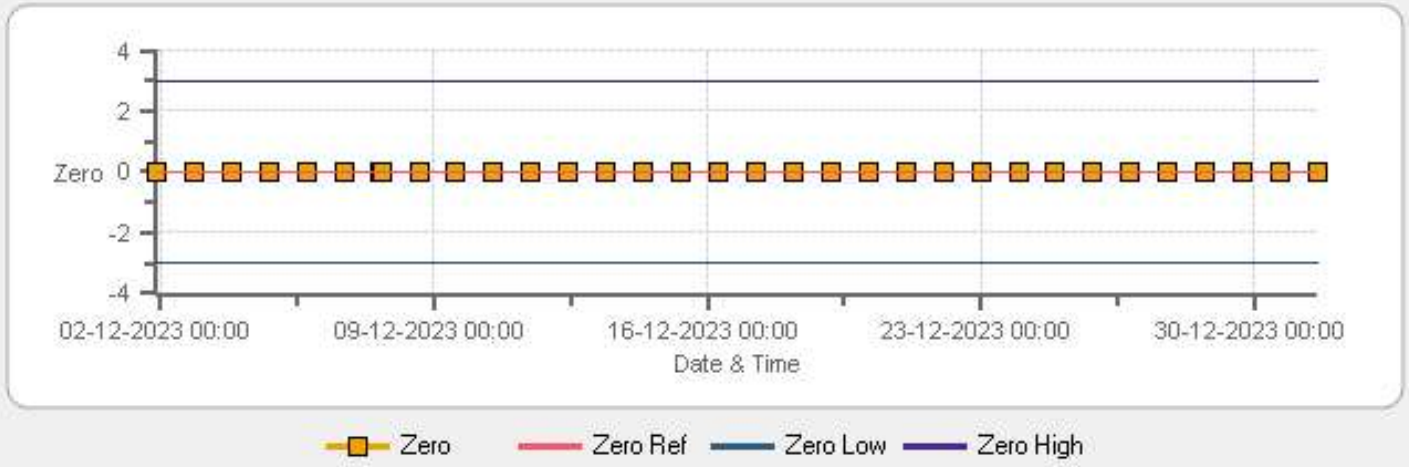
CH4[ppm] Calibration: PRAMP 986-C Monthly: 12-2023 Type: SpanAndZero - Zero



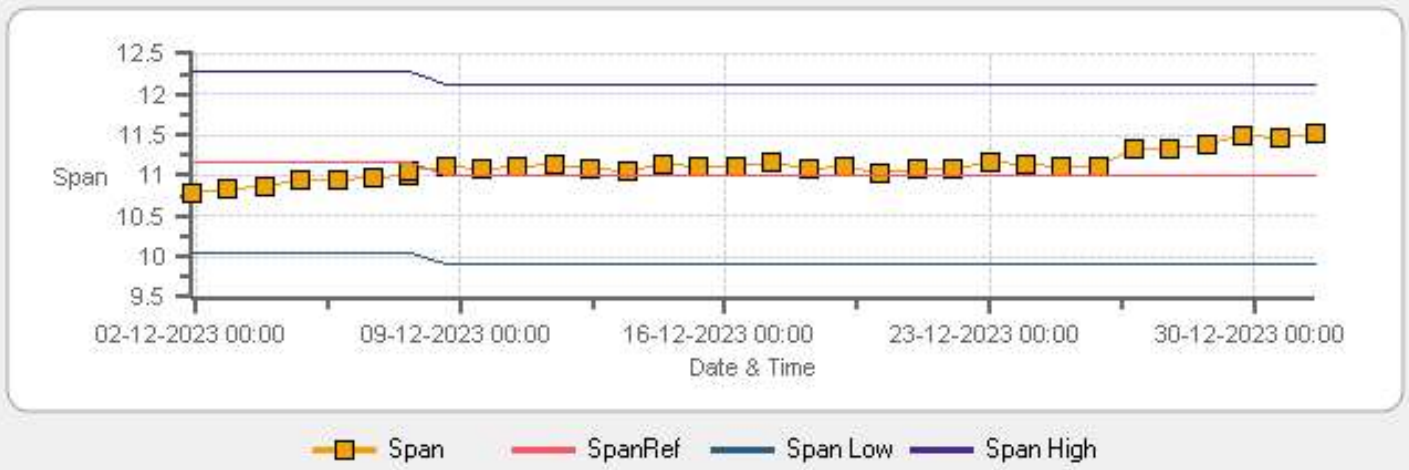
CH4[ppm] Calibration: PRAMP 986-C Monthly: 12-2023 Type: SpanAndZero - Span



NMHC[ppm] Calibration: PRAMP 986-C Monthly: 12-2023 Type: SpanAndZero - Zero



NMHC[ppm] Calibration: PRAMP 986-C Monthly: 12-2023 Type: SpanAndZero - Span



MULTI-POINT CALIBRATION RECORDS

SO2 Analyzer Calibration by Dilution

DATE:	07-Dec-2023	PREVIOUS CALIBRATION DATE:	08-Nov-2023
PARAMETER:	SO2	PREVIOUS CORRECTION FACTOR:	1.004
CLIENT:	PRAMP	TEMPERATURE (°C):	21.8
LOCATION:	986c	BAROMETRIC (mBar):	932
PURPOSE	Routine	START TIME (MST):	10:10
PERFORMED BY:	Kevin Sebastian	END TIME (MST):	15:32

ANALYZER:

MAKE/MODEL	Thermo 43iQTL	RANGE	500 ppb
SERIAL #	1193585646	FLOW (mL/min)	424
INITIAL		FINAL	
BKG/OFFSET	17.9	BKG/OFFSET	18.1
COEF/SLOPE	1.037	COEF/SLOPE	1.052
Expected (reference) Value	251.1	Expected (reference) Value	250.7

CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	Sabio	MAKE:	Teledyne
MODEL:	2010	MODEL:	M701
ID:	75401122	ID:	4568
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	LL109693	HIGH ID	n/a
CONC (ppm):	25.00	EXPIRY DATE	n/a
CYLINDER (psi):	1600	LOW ID	n/a
EXPIRY DATE	02-Nov-2025	EXPIRY DATE	n/a

CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	390	190	95
RANGE	300 - 400	150 - 200	50 - 100

SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
			ACTUAL	INDICATED		Initial	Final
DILUENT	GAS	TOTAL		Initial	Final		
3999		3999	0.00	0.2	0		
3939	60.80	4000	380.00	374.7	380.7	1.015	0.998
3971	28.80	4000	180.00	n/a	181.8	n/a	0.990
3987	14.40	4001	89.98	n/a	90.4	n/a	0.995

LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.002	0.1%

COMMENTS:

Sample filter changed.


SO2[ppb] Station: PRAMP 986-C Daily: 07-12-2023 Type: AVG 1 Min. [1 Min.]
400
350
300
250
200
150
100
50
0
-50
SO2 [ppb]
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Date & Time
SO2 [ppb]

TRS Analyzer Calibration by Dilution

DATE:	07-Dec-2023	PREVIOUS CALIBRATION DATE:	08-Nov-2023
PARAMETER:	TRS	PREVIOUS CORRECTION FACTOR:	0.997
CLIENT:	PRAMP	TEMPERATURE (°C):	21.8
LOCATION:	986C	BAROMETRIC (mBar):	932
PURPOSE	Routine	START TIME (MST):	10:10
PERFORMED BY:	Kevin Sebastian	END TIME (MST):	15:33

ANALYZER:

MAKE/MODEL	Thermo 43iQTL	RANGE	100 ppb
SERIAL #	1191833341	FLOW (mL/min)	419
INITIAL		FINAL	
BKG/OFFSET	15.9	BKG/OFFSET	15.8
COEF/SLOPE	0.948	COEF/SLOPE	0.963
Expected (reference) Value	57.72	Expected (reference) Value	55.52

CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	Sabio	MAKE:	Teledyne
MODEL:	2010	MODEL:	M701
ID:	75401122	ID:	4568
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	LL131374	HIGH ID	n/a
CONC (ppm):	10.09	EXPIRY DATE	n/a
CYLINDER (psi):	1800	LOW ID	n/a
EXPIRY DATE	03-Jan-2026	EXPIRY DATE	n/a

CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	78	38	19
RANGE	60 - 80	30 - 40	10 - 20

SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
			ACTUAL	INDICATED		Initial	Final
DILUENT	GAS	TOTAL		Initial	Final		
3999		3999	0.00	0.14	0		
3970	30.90	4001	77.93	77.67	78.93	1.005	0.987
3987	15.10	4002	38.07	n/a	39.36	n/a	0.967
3992	7.50	3999	18.92	n/a	19.62	n/a	0.964

LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.012	0.3%

COMMENTS:

TRS Converter CDNOVA CDN101 #530


TRS[ppb] Station: PRAMP 986-C Daily: 07-12-2023 Type: AVG 1 Min. [1 Min.]
TRS [ppb]
80
70
60
50
40
30
20
10
0
-10
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Date & Time
TRS [ppb]

Methane/Non-Methane Analyzer Calibration by Dilution

CALIBRATION:

DATE:	07-Dec-2023	PREVIOUS CALIBRATION DATE:	08-Nov-2023
CLIENT:	PRAMP	TEMPERATURE (°C):	21.8
LOCATION:	986C	BAROMETRIC (mBar):	932
PURPOSE	Routine	START TIME (MST):	10:10
PERFORMED BY:	Kevin Sebastian	END TIME (MST):	14:50

ANALYZER:

VALUE	MAKE/MODEL	SERIAL	FLOW (mL/min)
	Thermo 55i	12208316589	1123
PARAMETER:	CH4	NMHC	THC
RANGE (ppm):	20	20	40
PREVIOUS CF:	1.002	0.995	0.999

CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:			FLOWMETERS (if applicable):	
MAKE:	Sabio	MAKE:	Teledyne	CYLINDER ID:	LL68768		HIGH ID:	n/a
MODEL:	2010	MODEL:	M701	CH_4/C_3H_8 (ppm):	897.0	301.0	HIGH EXPIRY:	n/a
ID:	26801218	ID:	4568	CYLINDER (psi):	1600		LOW ID:	n/a
MFC CALIBRATION DATE:	12-Sep-2023	OXIDIZER ID:	Internal	EXPIRY DATE	08-Nov-2029		LOW EXPIRY:	n/a

CALIBRATION PARAMETERS:

POINT (CH4/NMHC)	HIGH	MID	LOW	CH4 EQUIVILANCE	
TARGET	14	7	3.5	C_3H_8 as CH_4	827.8
RANGE	12 - 16	6 - 8	2 - 4	THC as CH_4	1724.8

EXPECTED (REFERENCE) VALUE:

INITIAL	CH4	NMHC	THC	FINAL	CH4	NMHC	THC
	9.57	11.17	20.74		9.61	11.01	20.62

CALIBRATION:

FLOW RATE (mL/min)			CONCENTRATION (PPM)									CORRECTION FACTOR (CF.)					
			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	CH4	NMHC	THC	CH4	NMHC	THC	CH4	NMHC	THC	CH4	NMHC	THC	CH4	NMHC	THC
3099		3099	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
3048	50.30	3098	14.56	13.44	28.00	14.72	13.33	28.04	14.56	13.32	27.89	0.989	1.008	0.999	1.000	1.009	1.004
3073	25.20	3098	7.30	6.73	14.03	n/a	n/a	n/a	7.35	6.66	14.01	n/a	n/a	n/a	0.993	1.011	1.001
3085	12.60	3098	3.65	3.37	7.01	n/a	n/a	n/a	3.66	3.32	6.98	n/a	n/a	n/a	0.997	1.014	1.005

LINEAR REGRESSION ANALYSIS:

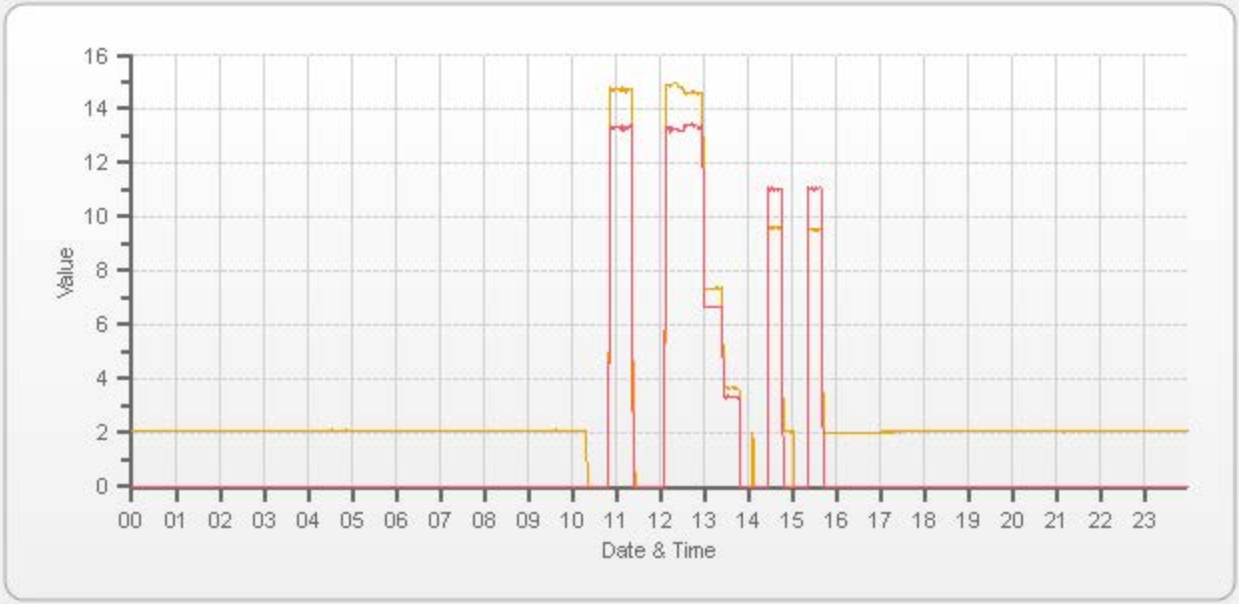
	CORRELATION	SLOPE	INTERCEPT
CH4	1.000	1.000	0.1%
NMHC	1.000	0.991	0.0%
THC	1.000	0.996	0.0%

Comments:

H2 = AMA HG300 #191267063 **Sample filter changed**

Use Zero Chrom? **Yes**

Station: PRAMP 986-C Daily: 07-12-2023 Type: AVG 1 Min. [1 Min.]



Meteorological System Checklist

Date:	December 7, 2023
Technician:	Kevin Sebastian
Station:	PRAMP 986c

Unit:	Make:	Model:	Serial #:
Precipitation Sampler:	RM Young	52202	TB 16325
Temperature Sensor:	Rotronic	HC2-32	20626912
Barometric Pressure Sensor:	MetOne	092	Y23358
Relative Humidity Sensor:	Rotronic	HC2-S3	20626912
Anemometer:	RM Young	05305AQ	180340

PRECIPITATION SENSOR CHECK

Checklist:	Reply:	Comments:
Previous check date:	November 7, 2023	
Is the sensor Level?	yes	
Is the heater operating properly?	yes	
Are the bucket drain holes clean?	yes	Tested 15:28-15:35
Is the screen on the housing? (screen should be on between July and September	yes	
Is the housing clean?	yes	
Is the area around the housing clean and free from obstacles?	yes	

TIP TEST - Slowly pour water until 10 tips are heard. (10 tips = 1 mm)

# of Tips	Data Logger Response (mm):	Manual Specification = +/- 0.1 mm
10	1.0	0.00

AMBIENT TEMPERATURE SENSOR CHECK

Previous check date:	November 7, 2023
Parameter:	Temperature @ 2 metres
Reference Thermometer ID:	FS 181341226 expires July 17, 2024
Reference Temperature (^{o}C):	-2.6
Station - Ambient Temperature (^{o}C):	-2.8
Temperature Difference (^{o}C):	0.2

BAROMETRIC PRESSURE SENSOR CHECK

Previous check date:	November 7, 2023	
Reference Barometer ID:	Brunton 05535 expires July 17, 2024	
Reference Pressure - Units/Reading:	millibar	934
Station Pressure - Units/Reading:	millibar	933
Pressure Tolerance +/- 15% of error:	794 - 1074	0.11%

RELATIVE HUMIDITY (HYGROMETER) SENSOR CHECK

Previous check date:	November 7, 2023	
Reference Hygrometer ID:	FS 181341226 expires July 17, 2024	
Reference Hygrometer % RH- Reading:	81.30	
Station Hygrometer % RH- Reading:	83.70	
RH Tolerance +/- 15% of difference:	69.11 - 93.50	-3.0%

ANEMOMETER - WIND SPEED & WIND DIRECTION SENSOR CHECK

WIND SPEED		WIND DIRECTION	
Previous check date:	November 7, 2023	Previous check date:	November 7, 2023
Wind Speed Observed (kph):	5~10	Wind Direction Observed:	E
Wind speed on Data Logger (kph):	8.8	Wind Direction on Data Logger:	E
		Wind Direction Pass/Fail?:	Pass

Comments

Meteorological Sensor Audit/Calibration

Location Information

Company:	PRAMP	**Performed By:**	Chris Wesson
Audit Location:	986C	**Reviewed By:**	Limin Li
Audit Date:	August 3, 2023	**Start/End Time (mst):**	14:01 / 15:03
Calibration Purpose:	routine annual	**Weather Conditions:**	Rain fall heavy at times

Wind Sensor Information

Sensor ID Data:		**Sensor Outputs:**	
Sensor Make:	RM Young	**Velocity Voltage Output Range:**	n/a
Sensor Model:	05305AQ	**Velocity Unit Output Range:**	0-200
Serial #:	180340	**Direction Voltage Output Range:**	n/a
Previous Cal/Audit Date:	August 5, 2022	**Direction Unit Output Range:**	0-360

Wind Calibrator Information

Calibrator I.D. and Expiry Date: RM Young 18802 id# R9133 expires Oct 18, 2024

Wind Speed Audit Data **+/- 2% of the average correction factor is the limit**

RPM	Wind Speed Generated kph	Clockwise Wind Speed kph	Counter Clockwise Wind Speed kph	Correction Factor
0	0	0.0	0.0	-
1000	18.4	18.3	18.3	1.007
2000	36.9	36.7	36.7	1.004
3000	55.3	55.1	55.1	1.003
4000	73.7	73.6	73.6	1.002
5000	92.2	92.0	92.0	1.002
6000	110.6	110.5	110.1	1.003
7000	129.0	128.9	129.3	0.999
8000	147.4	147.3	147.3	1.001
9000	165.9	165.8	165.8	1.000
10000	184.3	184.2	184.2	1.001
		The audit meets AMD requirements.	**Average Correction Factor=**	**1.002**

Wind Direction Audit Data **+/- 3° of the absolute average degrees difference for all points is the limit**

Generated Wind Direction 0-360 (Up)	Generated Wind Direction 360-0 (Down)	Indicated Wind Direction 0-360 (Up)	Indicated Wind Direction 360-0 (Down)	Degrees Difference 0-360 (Up)	Degrees Difference 360-0 (Down)	Average Absolute Degrees Difference
0	355	2	354	2.0	1.0	1.5
30	330	31	331	-1.0	-1.0	1.0
60	300	60	301	0.0	-1.0	0.5
90	270	90	271	0.0	-1.0	0.5
120	240	119	240	1.0	0.0	0.5
150	210	148	207	2.0	3.0	2.5
180	180	178	178	2.0	2.0	2.0
210	150	208	148	2.0	2.0	2.0
240	120	240	122	0.0	-2.0	1.0
270	90	272	90	-2.0	0.0	1.0
300	60	301	60	-1.0	0.0	0.5
330	30	331	32	-1.0	-2.0	1.5
355	0	354	2	1.0	2.0	1.5
The audit meets AMD requirements.			**Average Absolute Degrees Difference=**			**1.2**

Comments:

Declination = 15 deg East
Physical inspection completed, no issues

END OF REPORT

Peace River Area Monitoring Program

DECEMBER 2023

Ambient Air Monitoring Calibration Report

- RENO-B STATION-

CAL-PRAMP-202312-01563

Operation and Maintenance:
Bureau Veritas Canada

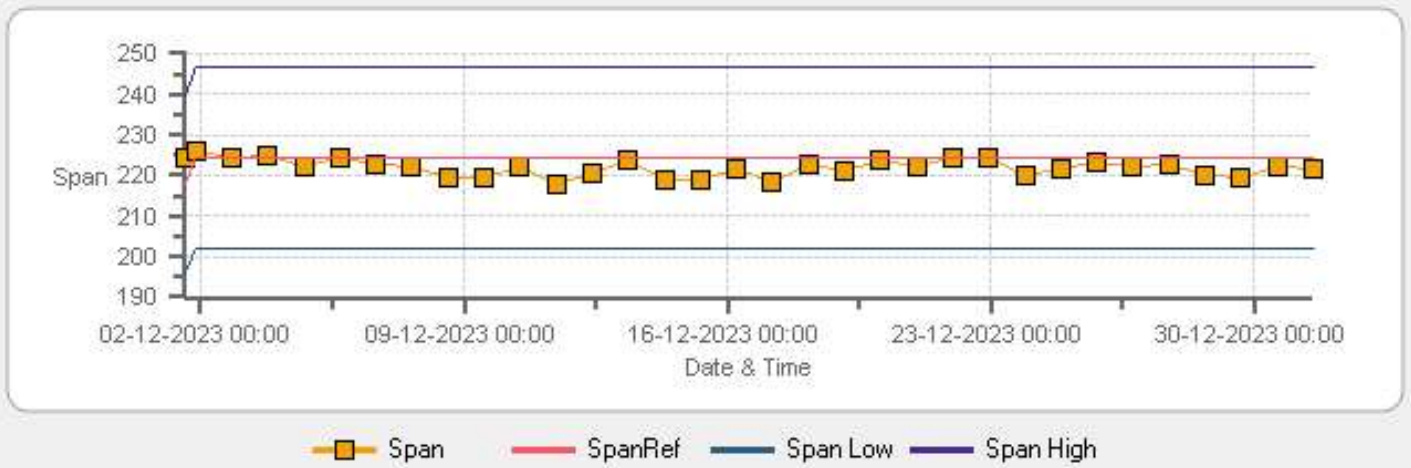
Data Validation and Report:
Bureau Veritas Canada

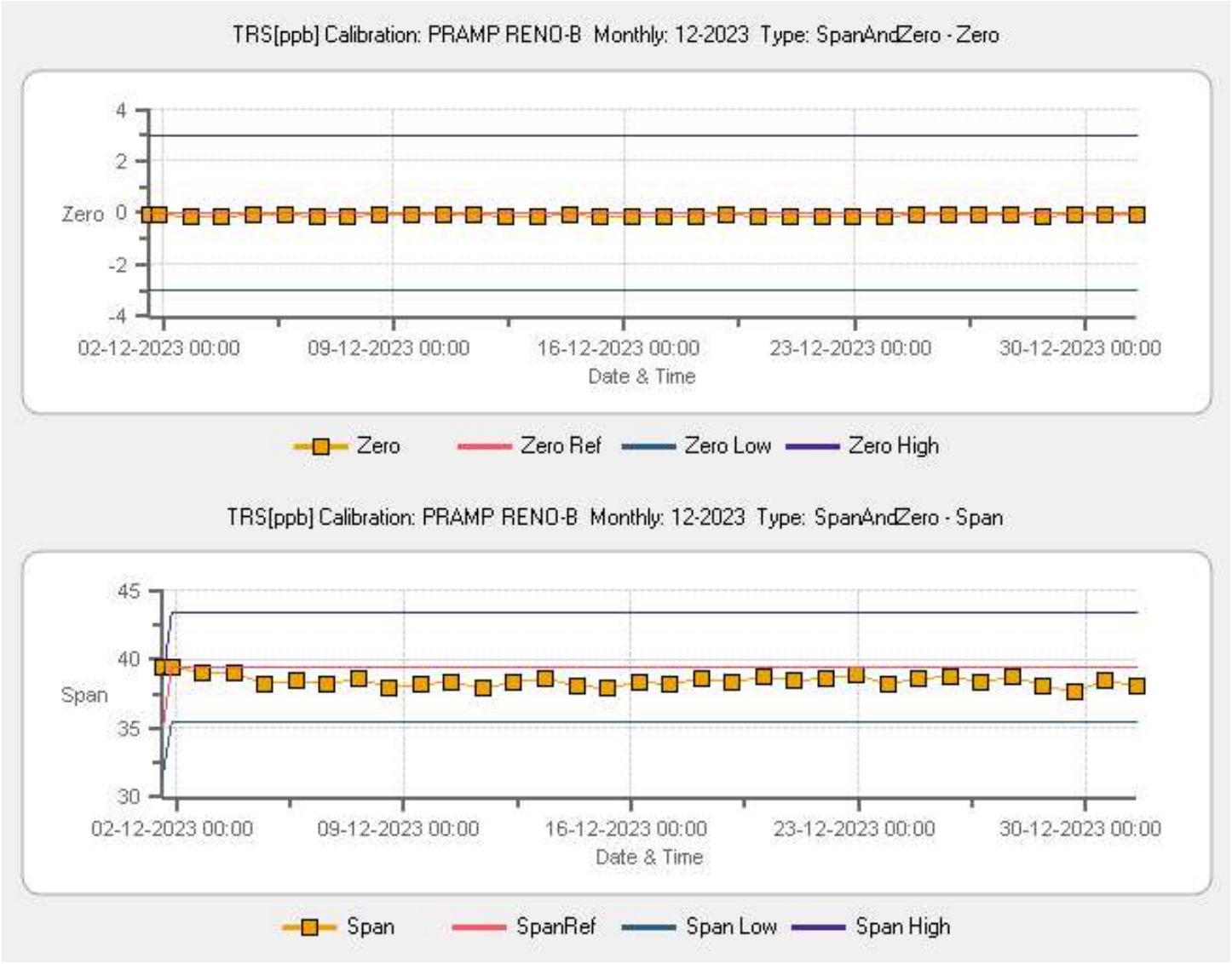
January 6, 2024

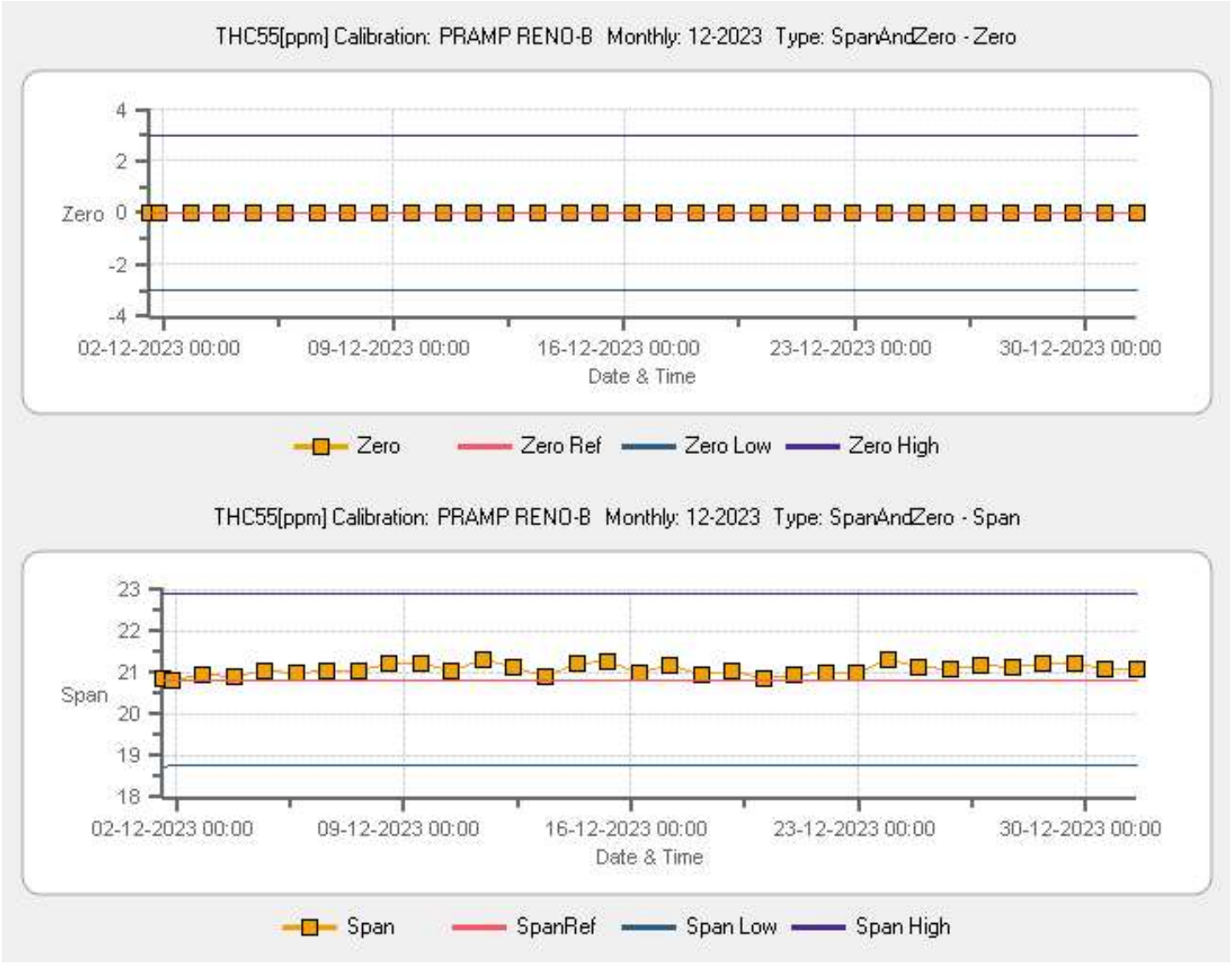
DAILY INTERNAL ZERO-SPAN CALIBRATION RECORDS

SO2[ppb] Calibration: PRAMP RENO-B Monthly: 12-2023 Type: SpanAndZero - Zero

SO2[ppb] Calibration: PRAMP RENO-B Monthly: 12-2023 Type: SpanAndZero - Span

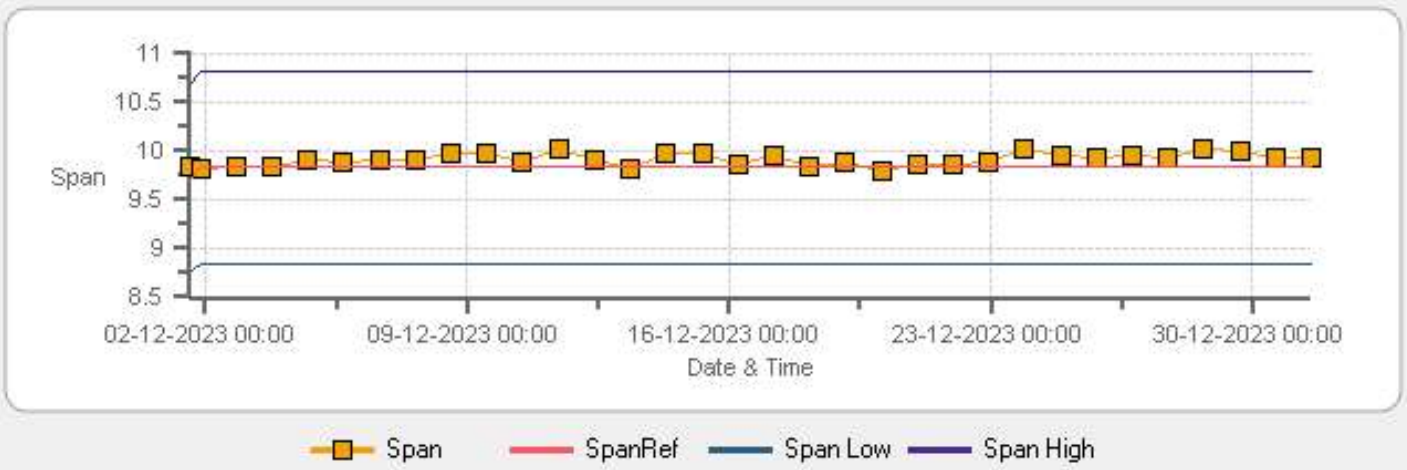


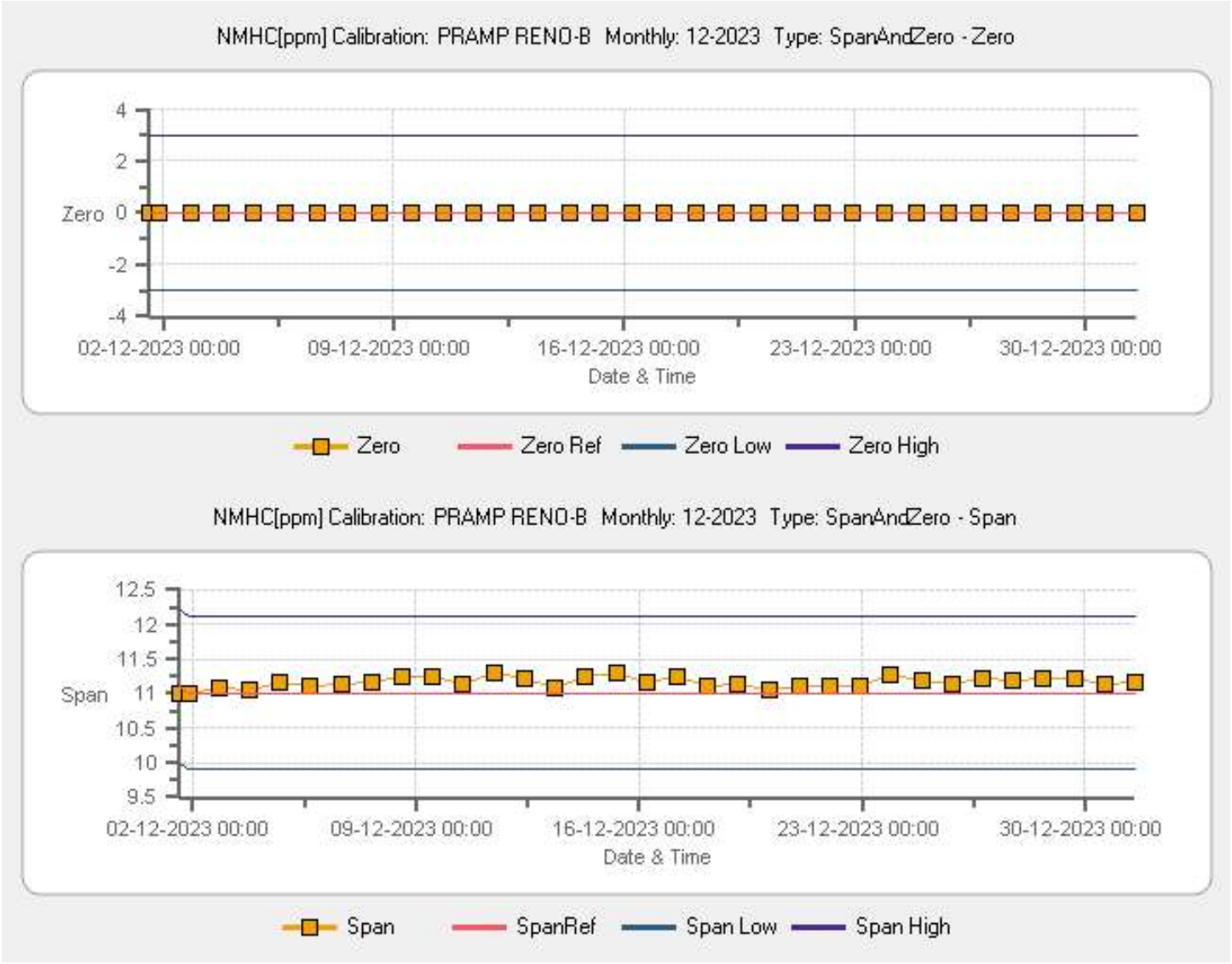

TRS[ppb] Calibration: PRAMP RENO-B Monthly: 12-2023 Type: SpanAndZero - Zero
4
2
Zero 0
-2
-4
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Zero
Zero Ref
Zero Low
Zero High
TRS[ppb] Calibration: PRAMP RENO-B Monthly: 12-2023 Type: SpanAndZero - Span
45
40
Span
35
30
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Span
SpanRef
Span Low
Span High


THC55[ppm] Calibration: PRAMP RENO-B Monthly: 12-2023 Type: SpanAndZero - Zero
4
2
Zero 0
-2
-4
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Zero
Zero Ref
Zero Low
Zero High
THC55[ppm] Calibration: PRAMP RENO-B Monthly: 12-2023 Type: SpanAndZero - Span
23
22
21
Span
20
19
18
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Span
SpanRef
Span Low
Span High

CH4[ppm] Calibration: PRAMP RENO-B Monthly: 12-2023 Type: SpanAndZero - Zero

CH4[ppm] Calibration: PRAMP RENO-B Monthly: 12-2023 Type: SpanAndZero - Span




NMHC[ppm] Calibration: PRAMP RENO-B Monthly: 12-2023 Type: SpanAndZero - Zero
4
2
Zero 0
-2
-4
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Zero
Zero Ref
Zero Low
Zero High
NMHC[ppm] Calibration: PRAMP RENO-B Monthly: 12-2023 Type: SpanAndZero - Span
12.5
12
11.5
Span 11
10.5
10
9.5
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Span
SpanRef
Span Low
Span High

MULTI-POINT CALIBRATION RECORDS

SO2 Analyzer Calibration by Dilution

DATE:	01-Dec-2023	PREVIOUS CALIBRATION DATE:	01-Nov-2023
PARAMETER:	SO2	PREVIOUS CORRECTION FACTOR:	0.998
CLIENT:	PRAMP	TEMPERATURE (°C):	23.2
LOCATION:	Reno-B	BAROMETRIC (mBar):	926
PURPOSE	Routine	START TIME (MST):	09:24
PERFORMED BY:	Kevin Sebastian	END TIME (MST):	14:18

ANALYZER:

MAKE/MODEL	Thermo 43iQTL	RANGE	500 ppb
SERIAL #	12101910505	FLOW (mL/min)	431
INITIAL		FINAL	
BKG/OFFSET	1.4	BKG/OFFSET	1.39
COEF/SLOPE	0.949	COEF/SLOPE	0.955
Expected (reference) Value	217.8	Expected (reference) Value	224.4

CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	Sabio	MAKE:	Teledyne
MODEL:	2010	MODEL:	M701
ID:	75401122	ID:	4568
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	LL109693	HIGH ID	n/a
CONC (ppm):	25.00	EXPIRY DATE	n/a
CYLINDER (psi):	1400	LOW ID	n/a
EXPIRY DATE	02-Nov-2025	EXPIRY DATE	n/a

CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	390	190	95
RANGE	300 - 400	150 - 200	50 - 100

SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
			ACTUAL	INDICATED		Initial	Final
DILUENT	GAS	TOTAL		Initial	Final		
3999		3999	0.00	-0.2	0		
3938	60.80	3999	380.10	374.7	380.7	1.014	0.998
3971	28.80	4000	180.00	n/a	180.6	n/a	0.997
3986	14.40	4000	90.00	n/a	89.6	n/a	1.004

LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.002	0.0%

COMMENTS:

Sample filter changed

SO2[ppb] Station: PRAMP RENO-B Daily: 01-12-2023 Type: AVG 1 Min. [1 Min.]

TRS Analyzer Calibration by Dilution

DATE:	01-Dec-2023	PREVIOUS CALIBRATION DATE:	02-Nov-2023
PARAMETER:	TRS	PREVIOUS CORRECTION FACTOR:	1.002
CLIENT:	PRAMP	TEMPERATURE (°C):	23.2
LOCATION:	Reno-B	BAROMETRIC (mBar):	926
PURPOSE	Routine	START TIME (MST):	09:24
PERFORMED BY:	Kevin Sebastian	END TIME (MST):	14:18

ANALYZER:

MAKE/MODEL	Thermo 43iQTL	RANGE	100 ppb
SERIAL #	12101910504	FLOW (mL/min)	392
INITIAL		FINAL	
BKG/OFFSET	1.05	BKG/OFFSET	1.14
COEF/SLOPE	0.859	COEF/SLOPE	0.932
Expected (reference) Value	35.1	Expected (reference) Value	39.46

CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	Sabio	MAKE:	Teledyne
MODEL:	2010	MODEL:	M701
ID:	75401122	ID:	4568
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	LL131374	HIGH ID	n/a
CONC (ppm):	10.09	EXPIRY DATE	n/a
CYLINDER (psi):	1800	LOW ID	n/a
EXPIRY DATE	03-Jan-2026	EXPIRY DATE	n/a

CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	78	38	19
RANGE	60 - 80	30 - 40	10 - 20

SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
			ACTUAL	INDICATED		Initial	Final
DILUENT	GAS	TOTAL		Initial	Final		
3999		3999	0.00	0.06	0		
3968	30.90	3999	77.96	71.75	78.16	1.088	0.998
3985	15.10	4000	38.09	n/a	38.02	n/a	1.002
3993	7.50	4000	18.92	n/a	18.84	n/a	1.004

LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.003	-0.1%

COMMENTS:

TRS Converter CDNOVA CDN-101 #590.
Sample Filter Changed 10:12-
10:15- Regulator flushed due to low response

TRS[ppb] Station: PRAMP RENO-B Daily: 01-12-2023 Type: AVG 1 Min. [1 Min.]

Methane/Non-Methane Analyzer Calibration by Dilution

CALIBRATION:

DATE:	01-Dec-2023	PREVIOUS CALIBRATION DATE:	02-Nov-2023
CLIENT:	PRAMP	TEMPERATURE (°C):	23.2
LOCATION:	Reno-B	BAROMETRIC (mBar):	926
PURPOSE	Routine	START TIME (MST):	09:24
PERFORMED BY:	Kevin Sebastian	END TIME (MST):	14:18

ANALYZER:

VALUE	MAKE/MODEL	SERIAL	FLOW (mL/min)
	Thermo 55i	12101910497	1058
PARAMETER:	CH4	NMHC	THC
RANGE (ppm):	20	20	40
PREVIOUS CF:	0.998	0.999	0.998

CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:			FLOWMETERS (if applicable):	
MAKE:	Sabio	MAKE:	Teledyne	CYLINDER ID:	LL68768		HIGH ID:	n/a
MODEL:	2010	MODEL:	M701	CH_4/C_3H_8 (ppm):	897.0	301.0	HIGH EXPIRY:	n/a
ID:	26701218	ID:	4568	CYLINDER (psi):	1600		LOW ID:	n/a
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	Internal	EXPIRY DATE	11-Aug-2029		LOW EXPIRY:	n/a

CALIBRATION PARAMETERS:

POINT (CH4/NMHC)	HIGH	MID	LOW	CH4 EQUIVILANCE	
TARGET	14	7	3.5	C_3H_8 as CH_4	827.8
RANGE	12 - 16	6 - 8	2 - 4	THC as CH_4	1724.8

EXPECTED (REFERENCE) VALUE:

INITIAL	CH4	NMHC	THC	FINAL	CH4	NMHC	THC
	9.71	11.11	20.83		9.83	11.01	20.84

CALIBRATION:

FLOW RATE (mL/min)			CONCENTRATION (PPM)									CORRECTION FACTOR (CF.)					
			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	CH4	NMHC	THC	CH4	NMHC	THC	CH4	NMHC	THC	CH4	NMHC	THC	CH4	NMHC	THC
3099		3099	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
3049	50.30	3099	14.56	13.44	27.99	14.12	12.83	26.95	14.55	13.43	27.98	1.031	1.047	1.039	1.001	1.000	1.001
3075	25.20	3100	7.29	6.73	14.02	n/a	n/a	n/a	7.26	6.73	14.00	n/a	n/a	n/a	1.004	1.000	1.001
3085	12.60	3098	3.65	3.37	7.01	n/a	n/a	n/a	3.65	3.41	7.06	n/a	n/a	n/a	1.000	0.987	0.994

LINEAR REGRESSION ANALYSIS:

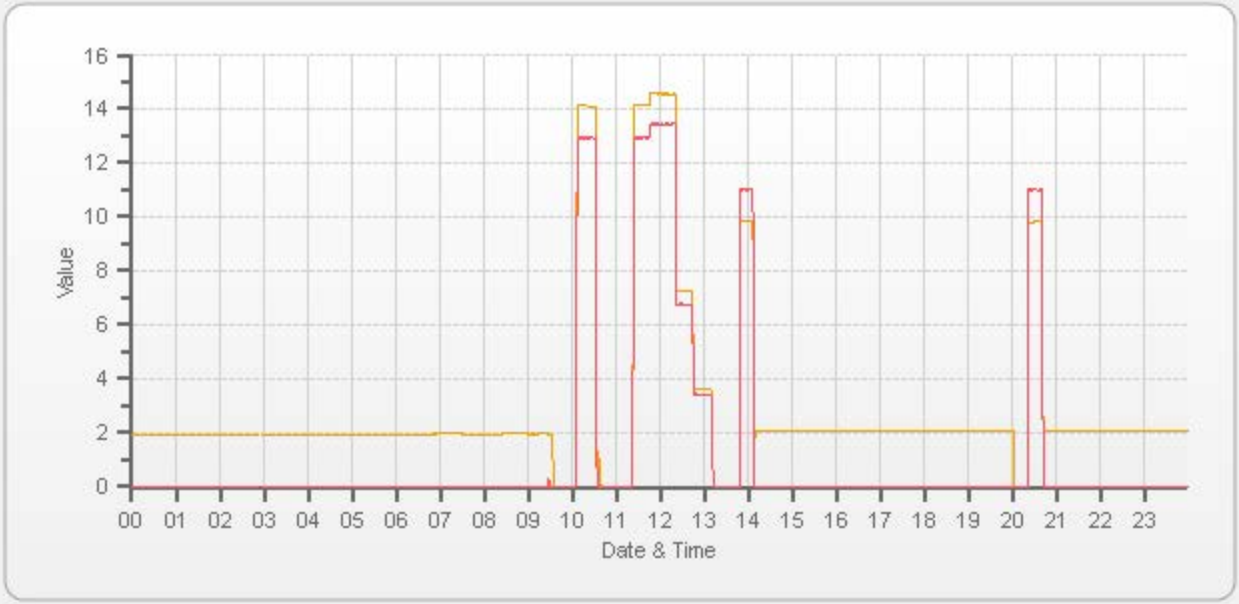
	CORRELATION	SLOPE	INTERCEPT
CH4	1.000	0.999	0.0%
NMHC	1.000	0.999	0.1%
THC	1.000	0.999	0.0%

Comments:

Sample filter changed

Use Zero Chrom? **No**

Station: PRAMP RENO-B Daily: 01-12-2023 Type: AVG 1 Min. [1 Min.]



Meteorological System Checklist

Date:	December 1, 2023
Technician:	Kevin Sebastian
Station:	PRAMP Reno

Unit:	Make:	Model:	Serial #:
Precipitation Sampler:	RM Young	52202	TB 15877
Temperature Sensor:	Rotronic	HC2-S3	20467597
Barometric Pressure Sensor:	MetOne	92	A17940
Relative Humidity Sensor:	Rotronic	HC2-S3	20467597
Anemometer:	RM Young	05305AQ	174795

PRECIPITATION SENSOR CHECK

Checklist:	Reply:	Comments:
Previous check date:	October 5, 2023	Audit: 12:53-13:02
Is the sensor Level?	yes	
Is the heater operating properly?	yes	
Are the bucket drain holes clean?	yes	
Is the screen on the housing? (screen should be on between July and September	yes	
Is the housing clean?	yes	
Is the area around the housing clean and free from obstacles?	yes	

TIP TEST - Slowly pour water until 10 tip are heard. (10 tips = 1 ml)

# of Tips	Data Logger Response (ml):	Manual Specification = +/- 0.1 ml
10	1.00	0.00

AMBIENT TEMPERATURE SENSOR CHECK

Previous check date:	November 2, 2023
Parameter:	Temperature @ 2 metres
Reference Thermometer ID:	FS 181341226 expires July 17, 2024
Reference Temperature (^{o}C):	-11.4
Station - Ambient Temperature (^{o}C):	-10.8
Temperature Difference (^{o}C):	-0.6

BAROMETRIC PRESSURE SENSOR CHECK

Previous check date:	November 2, 2023	
Reference Barometer ID:	Equipment ID - 05535 Brunton Expiry - July 17 2024	
Reference Pressure - Units/Reading:	millibar	924.3
Station Pressure - Units/Reading:	millibar	924.1
Pressure Tolerance +/- 15% of error:	786 - 1063	0.02%

RELATIVE HUMIDITY (HYGROMETER) SENSOR CHECK

Previous check date:	November 2, 2023	
Reference Hygrometer ID:	FS 181341226 expires July 17, 2024	
Reference Hygrometer % RH- Reading:	82.70	
Station Hygrometer % RH- Reading:	84.20	
RH Tolerance +/- 15% of difference:	70.30 - 95.11	-1.8%

ANEMOMETER - WIND SPEED & WIND DIRECTION SENSOR CHECK

WIND SPEED		WIND DIRECTION	
Previous check date:	November 2, 2023	Previous check date:	November 2, 2023
Wind Speed Observed (kph):	5~10	Wind Direction Observed:	N
Wind speed on Data Logger (kph):	9.8	Wind Direction on Data Logger:	N
		Wind Direction Pass/Fail?:	Pass

Comments

Meteorological Sensor Audit/Calibration

Location Information

Company:	PRAMP	**Performed By:**	Chris Wesson
Audit Location:	Reno-B	**Reviewed By:**	Limin Li
Audit Date:	August 1, 2023	**Start/End Time (mst):**	09:54 / 11:18
Calibration Purpose:	routine annual	**Weather Conditions:**	Mainly cloudy with drizzle

Wind Sensor Information

Sensor ID Data:		**Sensor Outputs:**	
Sensor Make:	RM Young	**Velocity Voltage Output Range:**	n/a
Sensor Model:	05305AQ	**Velocity Unit Output Range:**	0-200
Serial #:	174795	**Direction Voltage Output Range:**	n/a
Previous Cal/Audit Date:	November 23, 2022	**Direction Unit Output Range:**	0-360

Wind Calibrator Information

Calibrator I.D. and Expiry Date: RM Young 18802 id# R9133 expires Oct 18, 2024

Wind Speed Audit Data **+/- 2% of the average correction factor is the limit**

RPM	Wind Speed Generated kph	Clockwise Wind Speed kph	Counter Clockwise Wind Speed kph	Correction Factor
0	0	0.0	0.0	-
1000	18.4	18.3	18.3	1.007
2000	36.9	36.7	36.7	1.004
3000	55.3	55.1	55.1	1.003
4000	73.7	73.6	73.6	1.002
5000	92.2	92.0	92.0	1.002
6000	110.6	110.5	110.5	1.001
7000	129.0	128.9	128.9	1.001
8000	147.4	147.3	147.3	1.001
9000	165.9	165.8	165.8	1.000
10000	184.3	184.2	184.6	0.999
		The audit meets AMD requirements.	**Average Correction Factor=**	**1.002**

Wind Direction Audit Data **+/- 3° of the absolute average degrees difference for all points is the limit**

Generated Wind Direction 0-360 (Up)	Generated Wind Direction 360-0 (Down)	Indicated Wind Direction 0-360 (Up)	Indicated Wind Direction 360-0 (Down)	Degrees Difference 0-360 (Up)	Degrees Difference 360-0 (Down)	Average Absolute Degrees Difference
0	355	1	354	1.0	1.0	1.0
30	330	30	332	0.0	-2.0	1.0
60	300	60	302	0.0	-2.0	1.0
90	270	89	272	1.0	-2.0	1.5
120	240	120	241	0.0	-1.0	0.5
150	210	149	211	1.0	-1.0	1.0
180	180	181	182	-1.0	-2.0	1.5
210	150	211	150	-1.0	0.0	0.5
240	120	241	120	-1.0	0.0	0.5
270	90	271	90	-1.0	0.0	0.5
300	60	301	60	-1.0	0.0	0.5
330	30	331	29	-1.0	1.0	1.0
355	0	354	1	1.0	1.0	1.0
The audit meets AMD requirements.			**Average Absolute Degrees Difference=**			**0.9**

Comments:

Declination = 15 deg East
Physical inspection completed, no issues

END OF REPORT

Peace River Area Monitoring Program

DECEMBER 2023

Ambient Air Monitoring Calibration Report

- AQHI - GRIMSHAW STATION-

CAL-PRAMP-202312-01689

Operation and Maintenance:
Bureau Veritas Canada

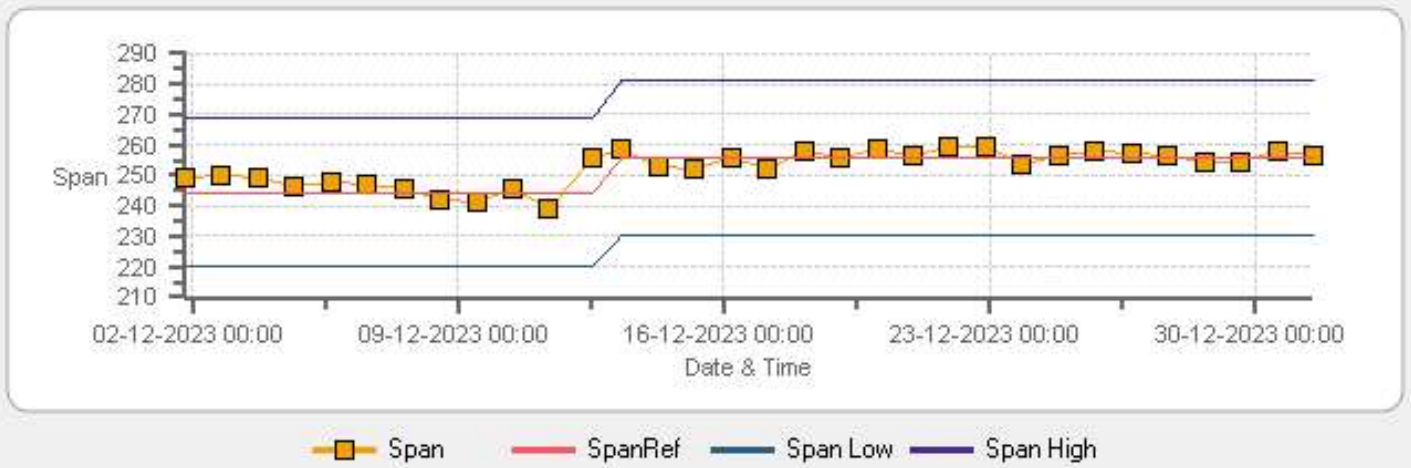
Data Validation and Report:
Bureau Veritas Canada

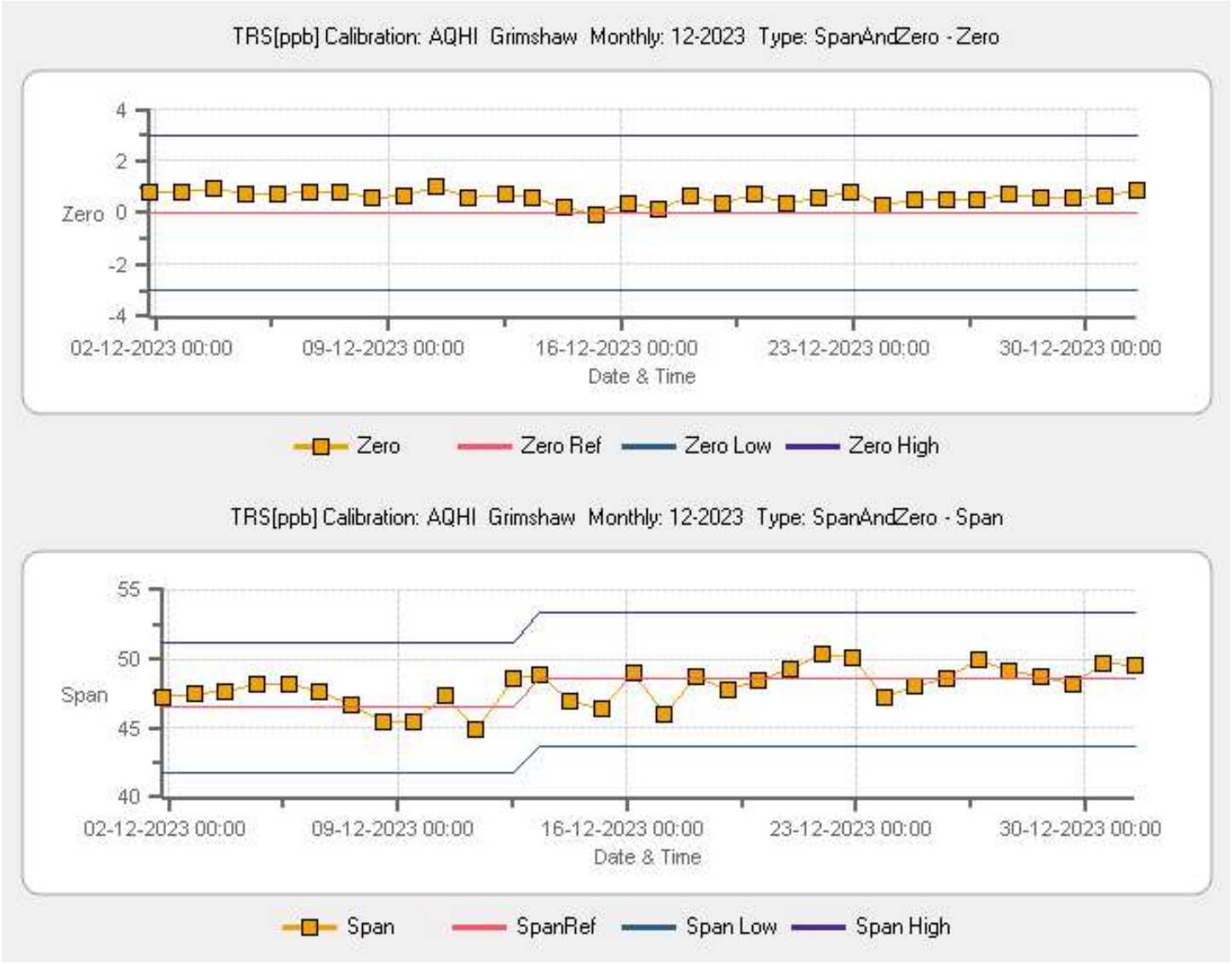
January 6, 2024

DAILY INTERNAL ZERO-SPAN CALIBRATION RECORDS

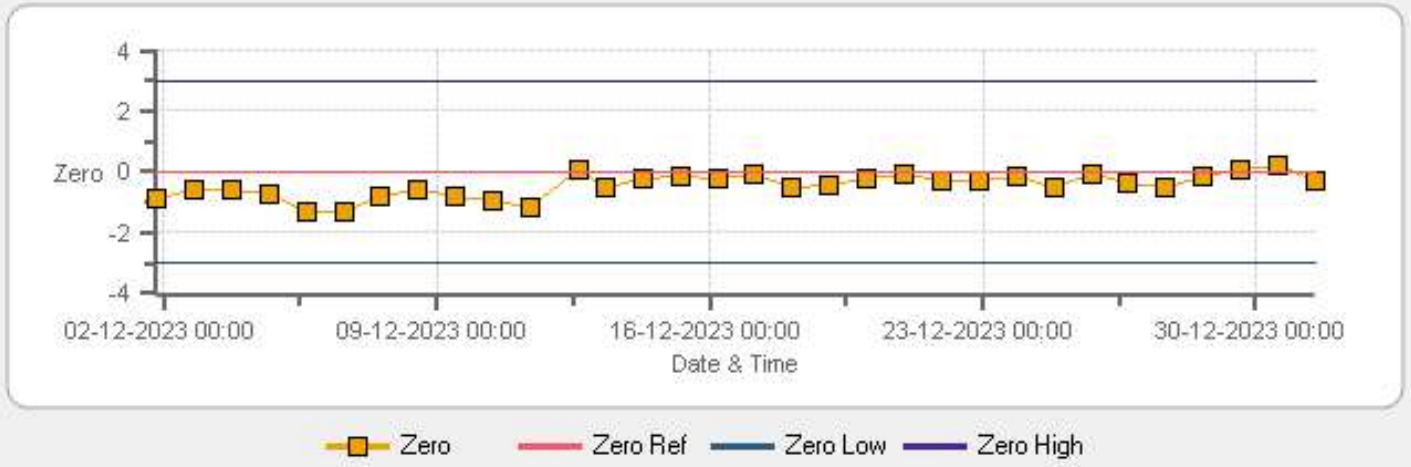
SO2[ppb] Calibration: AQHI Grimshaw Monthly: 12-2023 Type: SpanAndZero - Zero

SO2[ppb] Calibration: AQHI Grimshaw Monthly: 12-2023 Type: SpanAndZero - Span

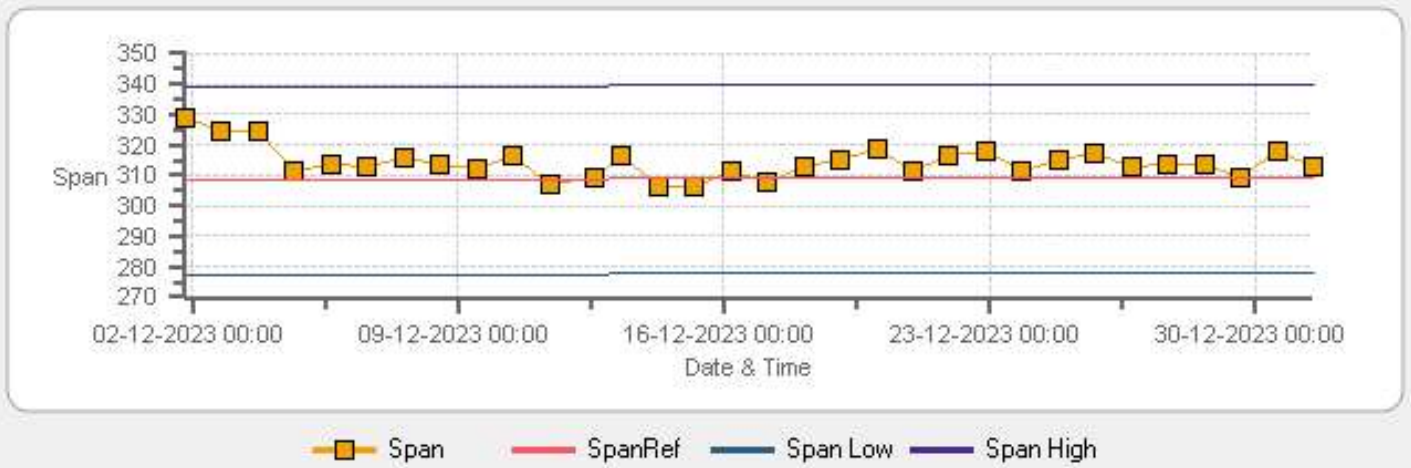


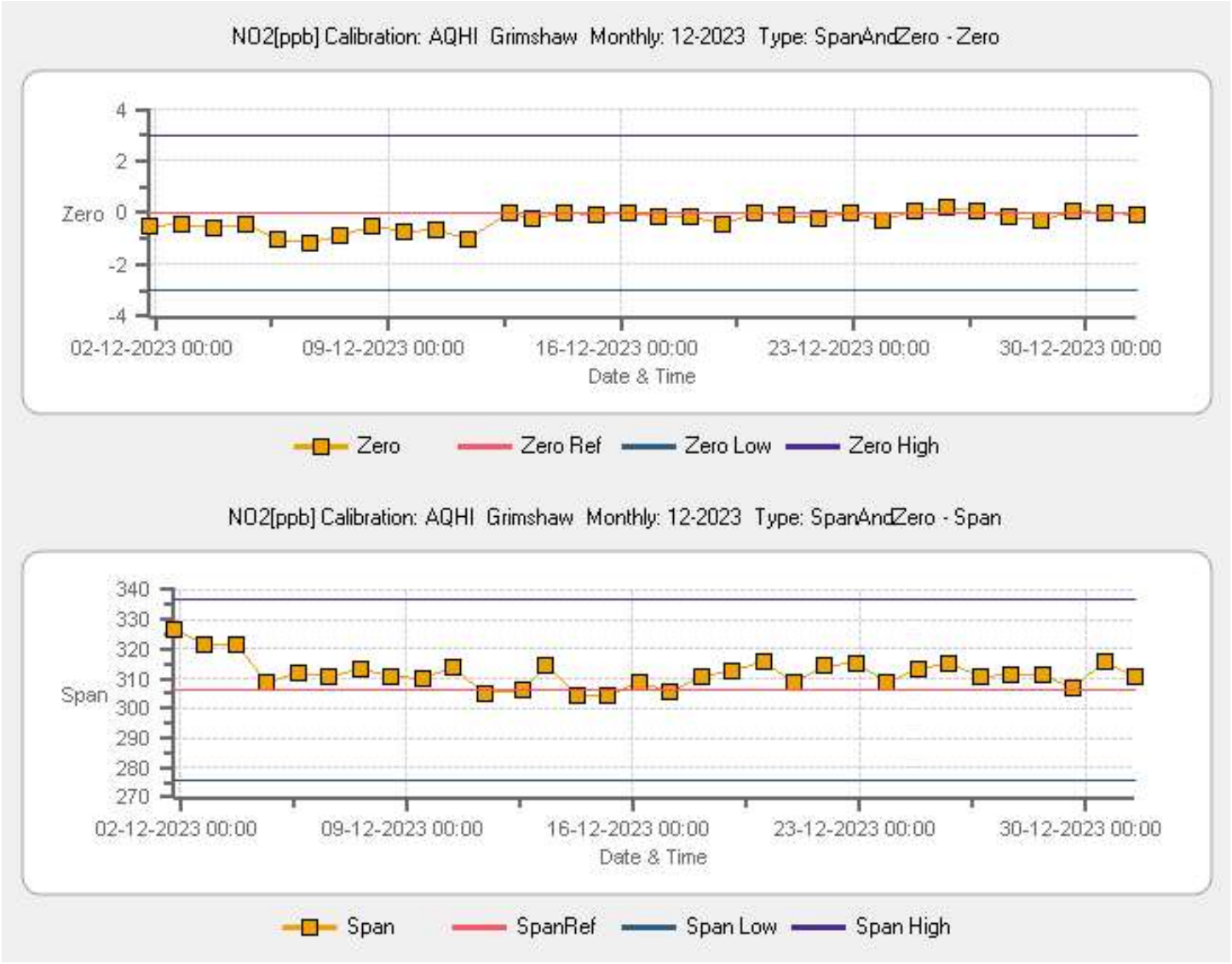

TRS[ppb] Calibration: AQHI Grimshaw Monthly: 12-2023 Type: SpanAndZero - Zero
4
2
Zero 0
-2
-4
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Zero
Zero Ref
Zero Low
Zero High
TRS[ppb] Calibration: AQHI Grimshaw Monthly: 12-2023 Type: SpanAndZero - Span
55
50
Span
45
40
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Span
SpanRef
Span Low
Span High

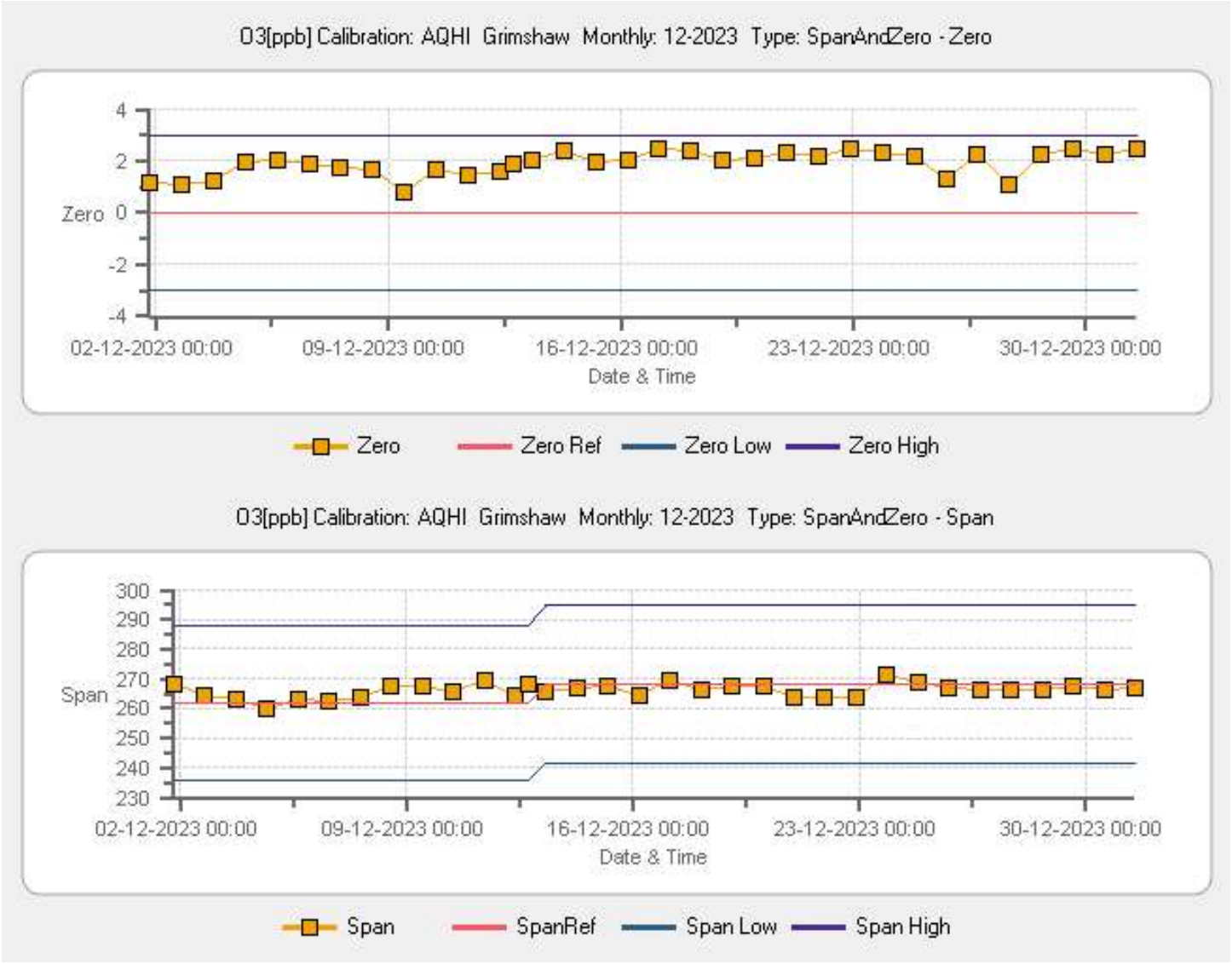
NOX[ppb] Calibration: AQHI Grimshaw Monthly: 12-2023 Type: SpanAndZero - Zero

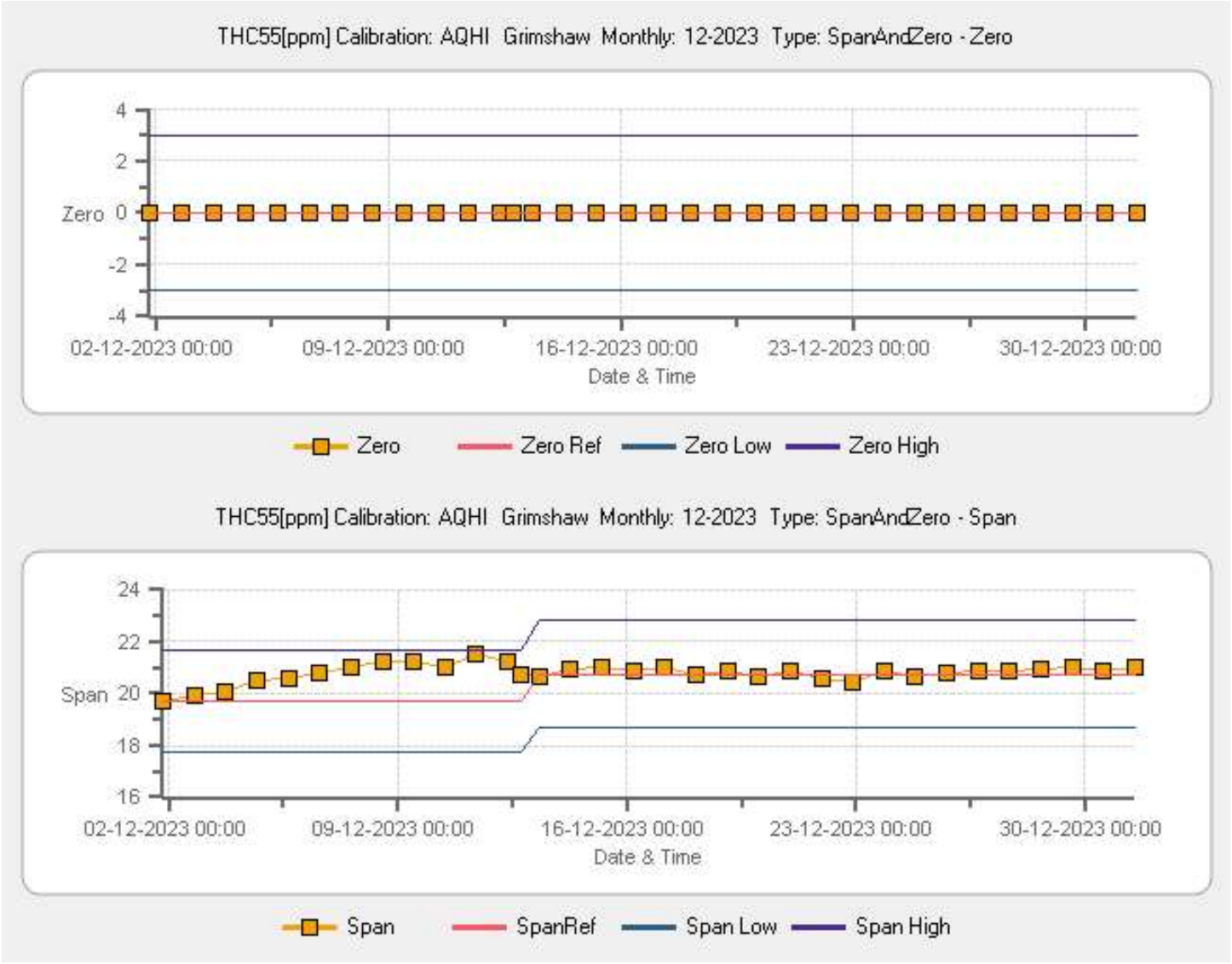


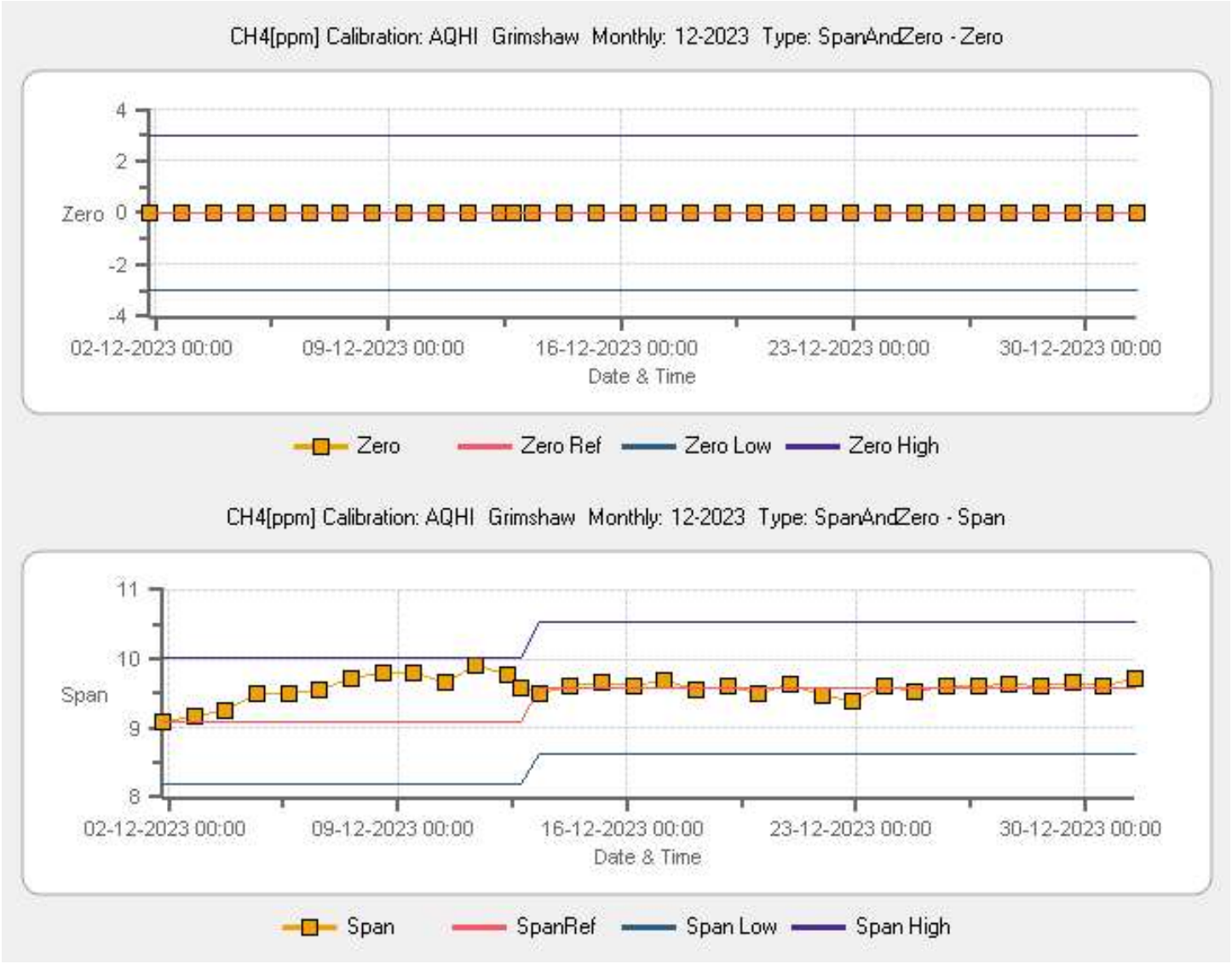
NOX[ppb] Calibration: AQHI Grimshaw Monthly: 12-2023 Type: SpanAndZero - Span

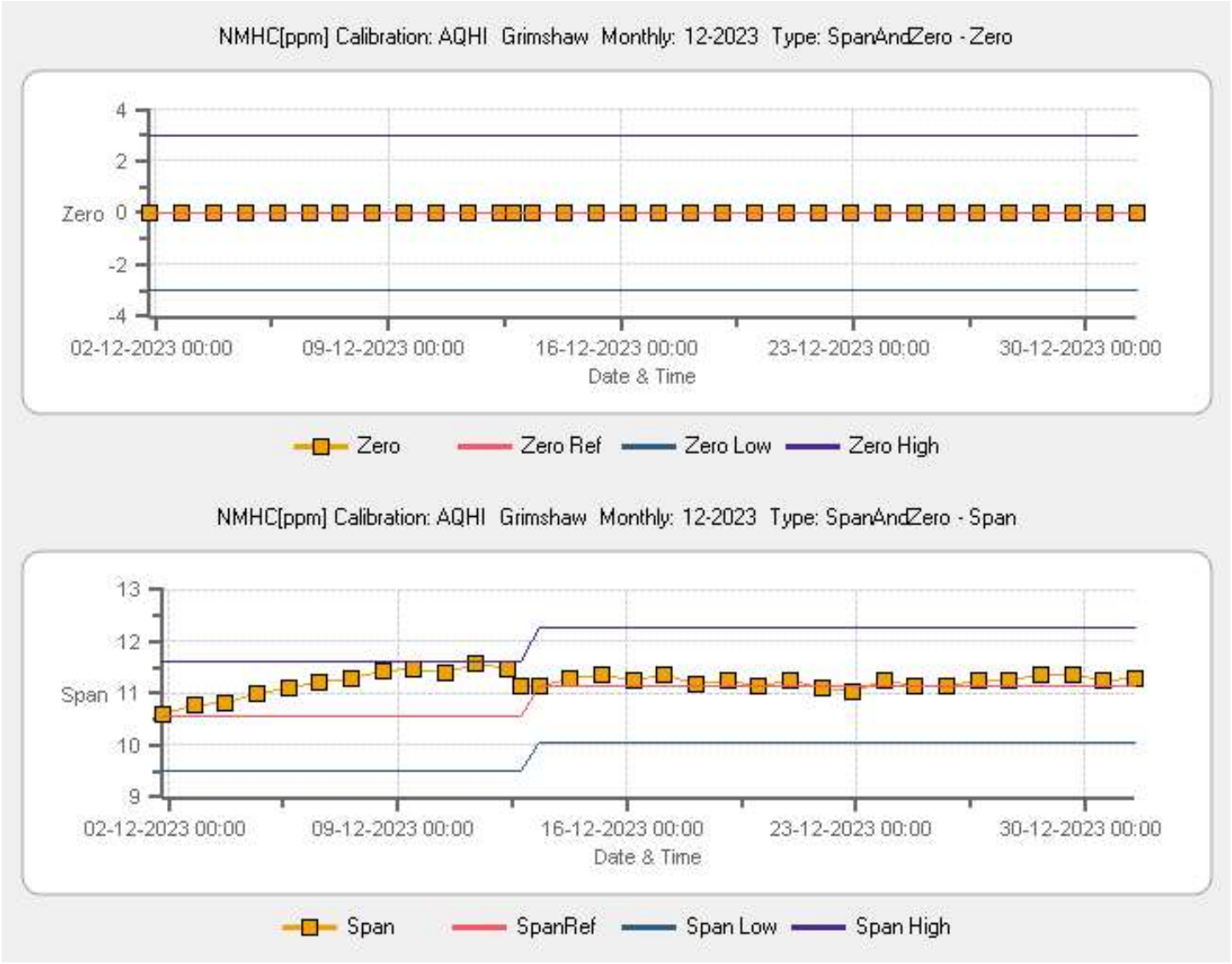



NO2[ppb] Calibration: AQHI Grimshaw Monthly: 12-2023 Type: SpanAndZero - Zero
4
2
Zero 0
-2
-4
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Zero
Zero Ref
Zero Low
Zero High
NO2[ppb] Calibration: AQHI Grimshaw Monthly: 12-2023 Type: SpanAndZero - Span
340
330
320
Span 310
300
290
280
270
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Span
SpanRef
Span Low
Span High


O3[ppb] Calibration: AQHI Grimshaw Monthly: 12-2023 Type: SpanAndZero - Zero
4
2
Zero 0
-2
-4
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Zero
Zero Ref
Zero Low
Zero High
O3[ppb] Calibration: AQHI Grimshaw Monthly: 12-2023 Type: SpanAndZero - Span
300
290
280
Span 270
260
250
240
230
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Span
SpanRef
Span Low
Span High


THC55[ppm] Calibration: AQHI Grimshaw Monthly: 12-2023 Type: SpanAndZero - Zero
4
2
Zero 0
-2
-4
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Zero
Zero Ref
Zero Low
Zero High
THC55[ppm] Calibration: AQHI Grimshaw Monthly: 12-2023 Type: SpanAndZero - Span
24
22
Span 20
18
16
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Span
SpanRef
Span Low
Span High


CH4[ppm] Calibration: AQHI Grimshaw Monthly: 12-2023 Type: SpanAndZero - Zero
4
2
Zero 0
-2
-4
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Zero
Zero Ref
Zero Low
Zero High
CH4[ppm] Calibration: AQHI Grimshaw Monthly: 12-2023 Type: SpanAndZero - Span
11
10
Span
9
8
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Span
SpanRef
Span Low
Span High


NMHC[ppm] Calibration: AQHI Grimshaw Monthly: 12-2023 Type: SpanAndZero - Zero
4
2
Zero 0
-2
-4
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Zero
Zero Ref
Zero Low
Zero High
NMHC[ppm] Calibration: AQHI Grimshaw Monthly: 12-2023 Type: SpanAndZero - Span
13
12
Span 11
10
9
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Span
SpanRef
Span Low
Span High

MULTI-POINT CALIBRATION RECORDS

SO2 Analyzer Calibration by Dilution

DATE:	12-Dec-2023	PREVIOUS CALIBRATION DATE:	15-Nov-2023
PARAMETER:	SO2	PREVIOUS CORRECTION FACTOR:	1.000
CLIENT:	PRAMP	TEMPERATURE (°C):	22.2
LOCATION:	Grimshaw	BAROMETRIC (mBar):	940
PURPOSE	Routine	START TIME (MST):	07:46
PERFORMED BY:	Kevin Sebastian	END TIME (MST):	13:17

ANALYZER:

MAKE/MODEL	Teledyne T100	RANGE	500 ppb
SERIAL #	722	FLOW (mL/min)	483
INITIAL		FINAL	
BKG/OFFSET	32.2	BKG/OFFSET	32.8
COEF/SLOPE	0.894	COEF/SLOPE	0.94
Expected (reference) Value	244.4	Expected (reference) Value	255.6

CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	Sabio	MAKE:	Teledyne
MODEL:	2010	MODEL:	M701
ID:	75401122	ID:	5004
MFC CALIBRATION DATE:	09-Sep-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	LL109693	HIGH ID	n/a
CONC (ppm):	25.00	EXPIRY DATE	n/a
CYLINDER (psi):	1400	LOW ID	n/a
EXPIRY DATE	02-Nov-2025	EXPIRY DATE	n/a

CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	390	190	95
RANGE	300 - 400	150 - 200	50 - 100

SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
			ACTUAL	INDICATED		Initial	Final
DILUENT	GAS	TOTAL		Initial	Final		
4000		4000	0.00	0.1	0		
3939	60.80	4000	380.00	361	379.9	1.053	1.000
3971	28.80	4000	180.00	n/a	179.7	n/a	1.002
3985	14.40	3999	90.02	n/a	90.1	n/a	0.999

LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.000	0.0%

COMMENTS:

Sample filter changed.
08:46-08:48 Flushed out regulator to check response

SO2[ppb] Station: AQHI Grimshaw Daily: 12-12-2023 Type: AVG 1 Min. [1 Min.]

TRS Analyzer Calibration by Dilution

DATE:	12-Dec-2023	PREVIOUS CALIBRATION DATE:	15-Nov-2023
PARAMETER:	TRS	PREVIOUS CORRECTION FACTOR:	1.005
CLIENT:	PRAMP	TEMPERATURE (°C):	22.2
LOCATION:	Grimshaw	BAROMETRIC (mBar):	940
PURPOSE	Routine	START TIME (MST):	07:46
PERFORMED BY:	Kevin Sebastian	END TIME (MST):	13:17

ANALYZER:

MAKE/MODEL	Teledyne T100U	RANGE	100 ppb
SERIAL #	132	FLOW (mL/min)	535
INITIAL		FINAL	
BKG/OFFSET	58.6	BKG/OFFSET	60.1
COEF/SLOPE	0.708	COEF/SLOPE	0.726
Expected (reference) Value	46.48	Expected (reference) Value	48.54

CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	Sabio	MAKE:	Teledyne
MODEL:	2010	MODEL:	M701
ID:	75401122	ID:	4568
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	LL131374	HIGH ID	LOW
CONC (ppm):	10.09	EXPIRY DATE	n/a
CYLINDER (psi):	1800	LOW ID	n/a
EXPIRY DATE	03-Jan-2026	EXPIRY DATE	n/a

CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	78	38	19
RANGE	60 - 80	30 - 40	10 - 20

SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
			ACTUAL	INDICATED		Initial	Final
DILUENT	GAS	TOTAL		Initial	Final		
4000		4000	0.00	0.57	0		
3969	30.90	4000	77.95	76.3	78.12	1.029	0.998
3985	15.10	4000	38.09	n/a	37.32	n/a	1.021
3992	7.50	3999	18.92	n/a	18.23	n/a	1.038

LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.004	-0.5%

COMMENTS:

Converter, CDNova CDN-101 #576.


TRS[ppb] Station: AQHI Grimshaw Daily: 12-12-2023 Type: AVG 1 Min. [1 Min.]
TRS [ppb]
80
70
60
50
40
30
20
10
0
-10
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Date & Time
TRS [ppb]

NOx Calibration by Dilution/Gas-Phase Titration

CALIBRATION:

				ANALYZER:			
DATE:	12-Dec-2023	PREVIOUS CALIBRATION DATE:	16-Nov-2023	MAKE/MODEL:	Teledyne T200	PREVIOUS CF.	
CLIENT:	PRAMP	TEMPERATURE (°C):	22.2	SERIAL #:	837	NOx	0.997
LOCATION:	Grimshaw	BAROMETRIC (mBar):	940	FLOW (mL/min)	443	NO	0.998
PURPOSE	Routine	START TIME (MST):	07:46	RANGE (ppb)	500	NO2	1.001
PERFORMED BY:	Kevin Sebastian	END TIME (MST):	14:59	GPT FOR O3?		Yes	

CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:			FLOWMETERS (if applicable):	
MAKE:	Sabio	MAKE:	Teledyne	CYLINDER ID:	EY0001716		HIGH ID:	n/a
MODEL:	2010	MODEL:	M701	NO/NOx (PPM):	49.2	49.4	HIGH EXPIRY:	n/a
ID:	26801218	ID:	4568	CYLINDER (psi):	1000		LOW ID:	n/a
MFC CALIBRATION DATE:	12-Sep-2023	OXIDIZER ID:	n/a	EXPIRY DATE	11-Nov-2029		LOW EXPIRY:	n/a

CALIBRATION SETTINGS:

INITIAL	NOx	NO	NO2	FINAL	NOx	NO	NO2
BKG/OFFSET:	2	-0.5	n/a	BKG/OFFSET:	0.6	-0.4	n/a
SLOPE/COEF/CE:	1	1	0.996	SLOPE/COEF/CE:	0.996	0.994	0.996

EXPECTED (REFERENCE) VALUE:

INITIAL	NOx	NO	NO2	FINAL	NOx	NO	NO2
	308.4	2.3	306.1		309.1	2.8	306.3

CALIBRATION PARAMETERS:

POINT	NO TARGET (PPB)	NO2 TARGET (PPB)	NO2 RANGE	O3 POINT
HIGH	395	250	240-275	n/a
MID	180	154	150-157	Mid
LOW	90	54	50-58	Low
EXTRA 1	n/a	340	300-370	High

NO/NOx CALIBRATION:

FLOW RATE (mL/min)			CONCENTRATION (ppb)									CORRECTION FACTOR (CF.)					
			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2
5000		5000	0.0	0.0	0.0	0.2	-0.7	-0.9	0.0	0.0	0.0						
4960	40.20	5000	395.6	397.2	1.6	396.0	395.5	-0.6	395.3	398.2	2.9	0.999	1.002		1.001	0.997	
4982	18.30	5000	180.1	180.8	0.7	n/a	n/a	n/a	180.8	180.6	-0.2	n/a	n/a		0.996	1.001	
4991	9.20	5000	90.5	90.9	0.4	n/a	n/a	n/a	89.6	90.1	0.4	n/a	n/a		1.010	1.009	

GPT CALIBRATION:

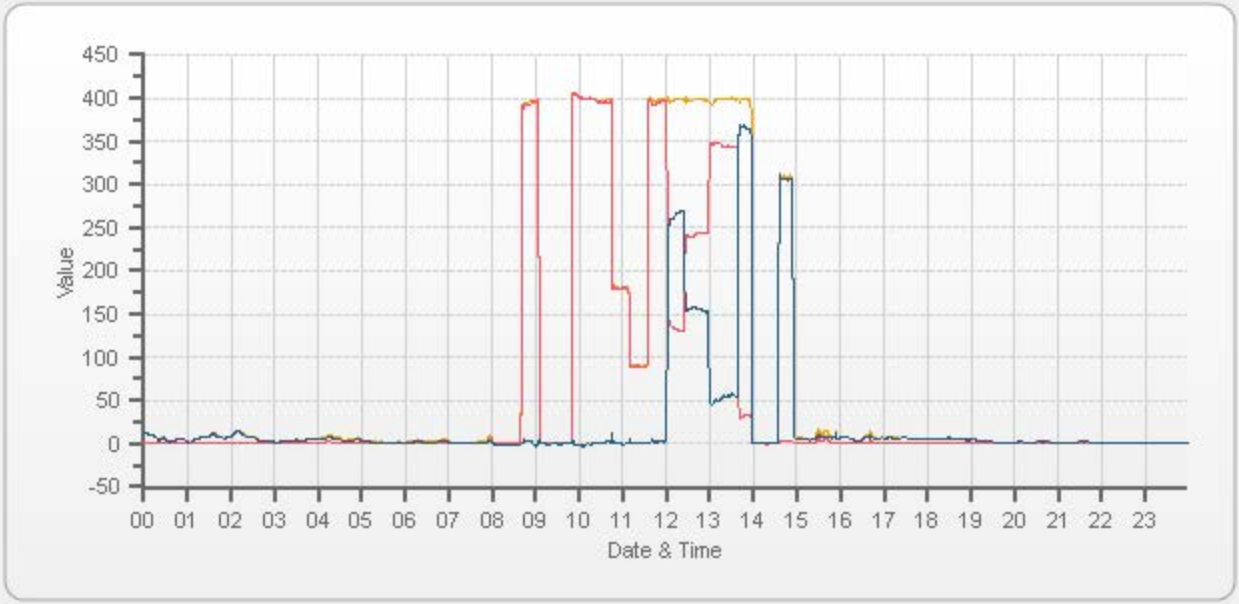
Point	CALIBRATOR			INDICATED (ppb)			NO DROP / O3 Conc (ppb)	NO2 GAIN (ppb)	NO2 Corr. FACTOR	CONV. EFFICIENCY
	GAS	TOTAL	O3 SETPOINT	NO	NOx	NO2				
REFERENCE	40.10	5000	0	395.8	399.1	3.3				
AS-FOUND HIGH	40.10	5000	260	131.1	398.9	267.7	264.7	264.4	1.001	99.89%
ADJUSTED HIGH	n/a	n/a	n/a	n/a	n/a	n/a	n/a	**n/a**	**n/a**	n/a
MID	40.10	5000	150	244.5	397.7	153.3	151.3	150	1.009	99.14%
LOW	40.10	5000	55	343.3	400.1	56.8	52.5	53.5	0.981	101.90%
NO2 adjustment not required.									AVERAGE:	100.31%

LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
NO	1.000	1.000	-0.03%
NOx	1.000	1.003	-0.11%
NO2	1.000	0.994	0.14%

COMMENTS:

Sample filter changed
Additional point for O3: Setpoint = 350, O3 conc = 362.3


Station: AQHI Grimshaw Daily: 12-12-2023 Type: AVG 1 Min. [1 Min.]
Value
450
400
350
300
250
200
150
100
50
0
-50
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Date & Time
NOX [ppb]
NO [ppb]
NO2 [ppb]

Ozone Calibration by Direct GPT

DATE:	12-Dec-2023	PREVIOUS CALIBRATION DATE:	16-Nov-2023
PARAMETER:	O3	PREVIOUS CORRECTION FACTOR:	0.998
CLIENT:	PRAMP	TEMPERATURE (°C):	22.5
LOCATION:	Grimshaw	BAROMETRIC (mBar):	938
PURPOSE	Routine	START TIME (MST):	14:15
PERFORMED BY:	Kevin Sebastian	END TIME (MST):	18:36

ANALYZER:

MAKE/MODEL	Teledyne T400	RANGE	500 ppb
SERIAL #	824	FLOW (mL/min)	758
INITIAL		FINAL	
BKG/OFFSET	-1.8	BKG/OFFSET	-2.1
COEF/SLOPE	0.987	COEF/SLOPE	0.988
Expected (reference) Value	262	Expected (reference) Value	268

CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	Sabio	MAKE:	Teledyne
MODEL:	2010	MODEL:	M701
ID:	26801218	ID:	4568
MFC CALIBRATION DATE:	12-Sep-2023	OXIDIZER ID:	n/a
	CALIBRATION METHOD:	Direct GPT	
GPT DATE:	12-Dec-2023	GPT END TIME:	14:00

CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
RANGE	300 - 400	150 - 200	50 - 100

CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED Initial	INDICATED Final	Initial	Final
5000		5000	0.0	-1.4	0.0		
5000		5000	362.3	360.9	361.2	1.000	1.003
5000		5000	151.3	n/a	152.2	n/a	0.994
5000		5000	52.5	n/a	52.2	n/a	1.006

LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	0.997	0.1%

COMMENTS:

Sample filter changed


O3[ppb] Station: AQHI Grimshaw Daily: 12-12-2023 Type: AVG 1 Min. [1 Min.]
400
350
300
250
200
150
100
50
0
-50
O3 [ppb]
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Date & Time
O3 [ppb]

Methane/Non-Methane Analyzer Calibration by Dilution

CALIBRATION:

DATE:	12-Dec-2023	PREVIOUS CALIBRATION DATE:	15-Nov-2023
CLIENT:	PRAMP	TEMPERATURE (°C):	22.2
LOCATION:	Grimshaw	BAROMETRIC (mBar):	939
PURPOSE	Routine	START TIME (MST):	12:47
PERFORMED BY:	Kevin Sebastian	END TIME (MST):	18:25

ANALYZER:

VALUE	MAKE/MODEL	SERIAL	FLOW (mL/min)
	Thermo 55i	1191032505	1071
PARAMETER:	CH4	NMHC	THC
RANGE (ppm):	20	20	40
PREVIOUS CF:	1.001	1.001	1.001

CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:			FLOWMETERS (if applicable):	
MAKE:	Sabio	MAKE:	Teledyne	CYLINDER ID:	LL68768		HIGH ID:	n/a
MODEL:	2010	MODEL:	M701	CH_4/C_3H_8 (ppm):	897.0	301.0	HIGH EXPIRY:	n/a
ID:	75401122	ID:	4568	CYLINDER (psi):	1900		LOW ID:	n/a
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	Internal	EXPIRY DATE	08-Nov-2029		LOW EXPIRY:	n/a

CALIBRATION PARAMETERS:

POINT (CH4/NMHC)	HIGH	MID	LOW	CH4 EQUIVILANCE	
TARGET	14	7	3.5	C_3H_8 as CH_4	827.8
RANGE	12 - 16	6 - 8	2 - 4	THC as CH_4	1724.8

EXPECTED (REFERENCE) VALUE:

INITIAL	CH4	NMHC	THC	FINAL	CH4	NMHC	THC
	9.10	10.57	19.68		9.59	11.16	20.75

CALIBRATION:

FLOW RATE (mL/min)			CONCENTRATION (PPM)									CORRECTION FACTOR (CF.)					
			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	CH4	NMHC	THC	CH4	NMHC	THC	CH4	NMHC	THC	CH4	NMHC	THC	CH4	NMHC	THC
3250		3250	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00						
3196	52.80	3249	14.58	13.45	28.03	14.83	13.77	28.61	14.58	13.45	28.03	0.983	0.977	0.980	1.000	1.000	1.000
3223	26.40	3249	7.29	6.73	14.01	n/a	n/a	n/a	7.28	6.75	14.03	n/a	n/a	n/a	1.001	0.996	0.999
3237	13.20	3250	3.64	3.36	7.01	n/a	n/a	n/a	3.67	3.40	7.07	n/a	n/a	n/a	0.993	0.989	0.991

LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
CH4	1.000	0.999	0.0%
NMHC	1.000	0.999	0.1%
THC	1.000	0.999	0.1%

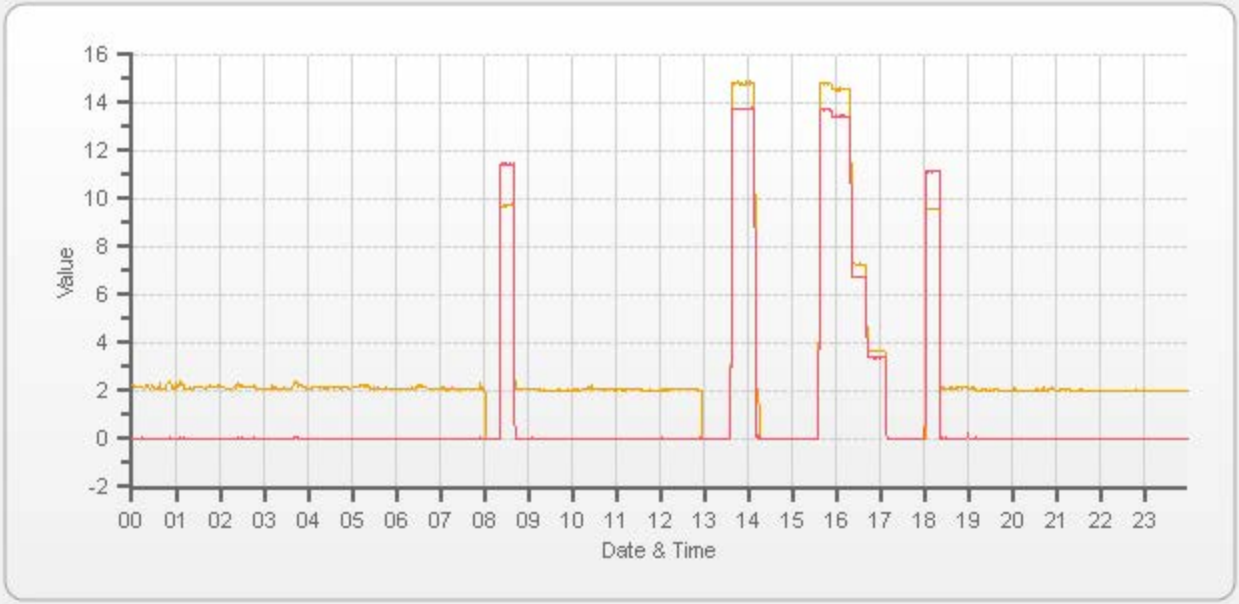
Comments:

H2 = AMA HG300 #190567059

Sample Filter Changed

Use Zero Chrom? **Yes**

Station: AQHI Grimshaw Daily: 12-12-2023 Type: AVG 1 Min. [1 Min.]



Teledyne T640 Audit/Calibration

Date/Previous Audit Date:	December 12, 2023	November 16, 2023	**Weather Conditions:**	Mix of sun and clouds	
Company:	PRAMP		**Start Time (mst):**	15:09	
Station:	Grimshaw		**End Time (mst):**	15:32	
Parameter:	PM 2.5		**Performed By/Reviewer:**	Kevin Sebastian	Limin Li
Instrument Data:					
Make/Model:	Teledyne T640		**Serial Number:**	318	
Owner:	PRAMP		**Alarms (detail in comments):**	Yes	
Reference Standards/I.D./Expiry Date:					

Flow Standard: DeltaCal DC1 #206578, expires Nov 27, 2024 **Temperature:** DeltaCal DC1 #206578, expires Nov 27, 2024

Digital Manometer: DeltaCal DC1 #206578, expires Nov 27, 2024 **Pressure:** DeltaCal DC1 #206578, expires Nov 27, 2024

DIAGNOSTICS:

Ambient Pressure (mmHg)	703.4	Ambient Temp (°C)	-2.3	ASC Heater Duty (%)	0.0
Box Temp (°C)	26.5	Current PMT HV (V)	1527	LED Temp (°C)	34.88
P3 Value	47	PMT Setting (V)	1532	Pump PWM (%)	66
Sample Flow (L/min)	4.91	Sample RH (%RH)	11.8	Sample Temp (°C)	24.3

Item:	As-found		As-left		Tolerance
	Reference	T640x	Reference	T640x	
Zero Test (Leak Check)	PM10	0.0	0	0.0	0.0 to 0.2
	PM2.5	0.0	0	0.0	
Ambient Pressure (mmHg)	702.0	708.4	n/a	n/a	+/- 10 mm Hg
Ambient Temperature (°C)	-2.30	-2.3	n/a		+/- 2°C
Sample Flow (L/min)	5.03	4.98	n/a	n/a	+/-5% of T640x (e.g., 4.75 – 5.25 lpm)
Additional Monthly Maintenance :					***Completed***
				Inlet cleaned?	Yes
				Sample tubing inspected (inner and outer)?	Yes

Quarterly Audit/Calibration:

SpanDust™ Standard	Peak at Channel	Lot No:	Expiry:
	10.9	100128-050-046	1-31-2025

Item:	Verification:		Calibration (if needed):		Tolerance
	Reference	T640x	Reference	T640x	
Peak Channel	10.9	11	10.9	n/a	± 0.5
PMT Setting (V)	n/a	1546	n/a	n/a	n/a
Peak Channel Counts:	n/a	1014	n/a	n/a	n/a

Comments:

Alert: 11/16/2023: System Reset
No issues

Meteorological System Checklist

Date:	December 12, 2023		
Technician:	Kevin Sebastian		
Station:	PRAMP Grimshaw		
Unit:	**Make:**	**Model:**	**Serial #:**
Temperature Sensor:	Vaisala	HMP155	N2910506
Barometric Pressure Sensor:	MetOne	92	A2397
Relative Humidity Sensor:	Vaisala	HMP155	N2910506
Anemometer:	RM Young	05305AQ	174801
AMBIENT TEMPERATURE SENSOR CHECK			
Previous check date:	November 15, 2023		
Parameter:	Temperature @ 2 metres		
Reference Thermometer ID:	F.S. 181341226 expires July 17, 2024		
Reference Temperature (^{o}C):	-2.5		
Station - Ambient Temperature (^{o}C):	-2.3		
Temperature Difference (^{o}C):	-0.2		
BAROMETRIC PRESSURE SENSOR CHECK			
Previous check date:	November 15, 2023		
Reference Barometer ID:	Brunton 05535 Expires July 17, 2024		
Reference Pressure - Units/Reading:	millibar	937.7	
Station Pressure - Units/Reading:	millibar	936	
Pressure Tolerance +/- 15% of error:	797 - 1078	0.18%	
RELATIVE HUMIDITY (HYGROMETER) SENSOR CHECK			
Previous check date:	November 15, 2023		
Reference Hygrometer ID:	F.S. 181341226 expires July 17, 2024		
Reference Hygrometer % RH- Reading:	66.70		
Station Hygrometer % RH- Reading:	64.80		
RH Tolerance +/- 15% of difference:	56.70 - 76.71	2.8%	

ANEMOMETER - WIND SPEED & WIND DIRECTION SENSOR CHECK			
WIND SPEED		WIND DIRECTION	
Previous check date:	November 15, 2023	Previous check date:	November 15, 2023
Wind Speed Observed (kph):	5~10	Wind Direction Observed:	W
Wind speed on Data Logger (kph):	9.6	Wind Direction on Data Logger:	W
		Wind Direction Pass/Fail?:	Pass

Comments

No issues

Meteorological Sensor Audit/Calibration

Location Information

Company:	PRAMP	**Performed By:**	Chris Wesson
Audit Location:	Grimshaw	**Reviewed By:**	Limin Li
Audit Date:	August 2, 2023	**Start/End Time (mst):**	14:55 / 16:16
Calibration Purpose:	routine annual	**Weather Conditions:**	Mainly cloudy with sunny breaks

Wind Sensor Information

Sensor ID Data:		**Sensor Outputs:**	
Sensor Make:	RM Young	**Velocity Voltage Output Range:**	n/a
Sensor Model:	05305AQ	**Velocity Unit Output Range:**	0-200
Serial #:	174801	**Direction Voltage Output Range:**	n/a
Previous Cal/Audit Date:	July 12, 2022	**Direction Unit Output Range:**	0-360

Wind Calibrator Information

Calibrator I.D. and Expiry Date: RM Young 18802 id# R9133 expires Oct 18, 2024

Wind Speed Audit Data **+/- 2% of the average correction factor is the limit**

RPM	Wind Speed Generated kph	Clockwise Wind Speed kph	Counter Clockwise Wind Speed kph	Correction Factor
0	0	0.0	0.0	-
1000	18.4	18.3	18.3	1.007
2000	36.9	36.7	36.7	1.004
3000	55.3	55.1	55.1	1.003
4000	73.7	73.6	73.6	1.002
5000	92.2	92.0	92.0	1.002
6000	110.6	110.5	110.5	1.001
7000	129.0	128.9	128.9	1.001
8000	147.4	147.3	147.3	1.001
9000	165.9	165.8	165.8	1.000
10000	184.3	184.2	184.2	1.001
		The audit meets AMD requirements.	**Average Correction Factor=**	**1.002**

Wind Direction Audit Data **+/- 3° of the absolute average degrees difference for all points is the limit**

Generated Wind Direction 0-360 (Up)	Generated Wind Direction 360-0 (Down)	Indicated Wind Direction 0-360 (Up)	Indicated Wind Direction 360-0 (Down)	Degrees Difference 0-360 (Up)	Degrees Difference 360-0 (Down)	Average Absolute Degrees Difference
0	355	2	354	2.0	1.0	1.5
30	330	29	333	1.0	-3.0	2.0
60	300	58	300	2.0	0.0	1.0
90	270	88	271	2.0	-1.0	1.5
120	240	119	237	1.0	3.0	2.0
150	210	149	206	1.0	4.0	2.5
180	180	178	177	2.0	3.0	2.5
210	150	206	148	4.0	2.0	3.0
240	120	238	119	2.0	1.0	1.5
270	90	272	87	-2.0	3.0	2.5
300	60	304	57	-4.0	3.0	3.5
330	30	333	30	-3.0	0.0	1.5
355	0	354	1	1.0	1.0	1.0
The audit meets AMD requirements.			**Average Absolute Degrees Difference=**			**2.0**

Comments:

Declination = 15 deg East
Horizontal bearings replaced.
Potentiometer noisy. Replacement required.

END OF REPORT

Peace River Area Monitoring Program

DECEMBER 2023

Ambient Air Monitoring Calibration Report

- PEACE RIVER COMPLEX (PRC) STATION-

CAL-PRAMP-202312-01698

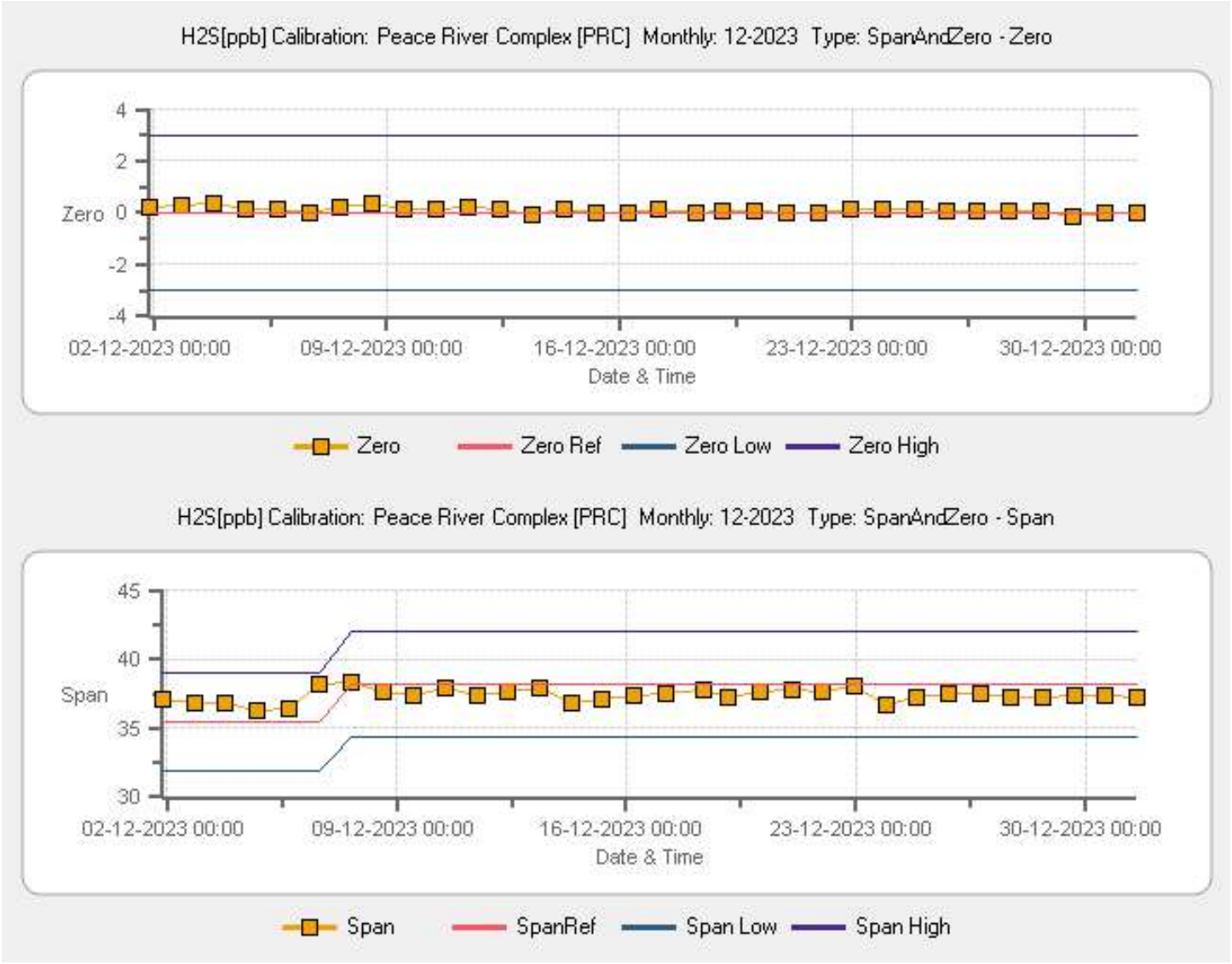
Operation and Maintenance:
Bureau Veritas Canada

Data Validation and Report:
Bureau Veritas Canada

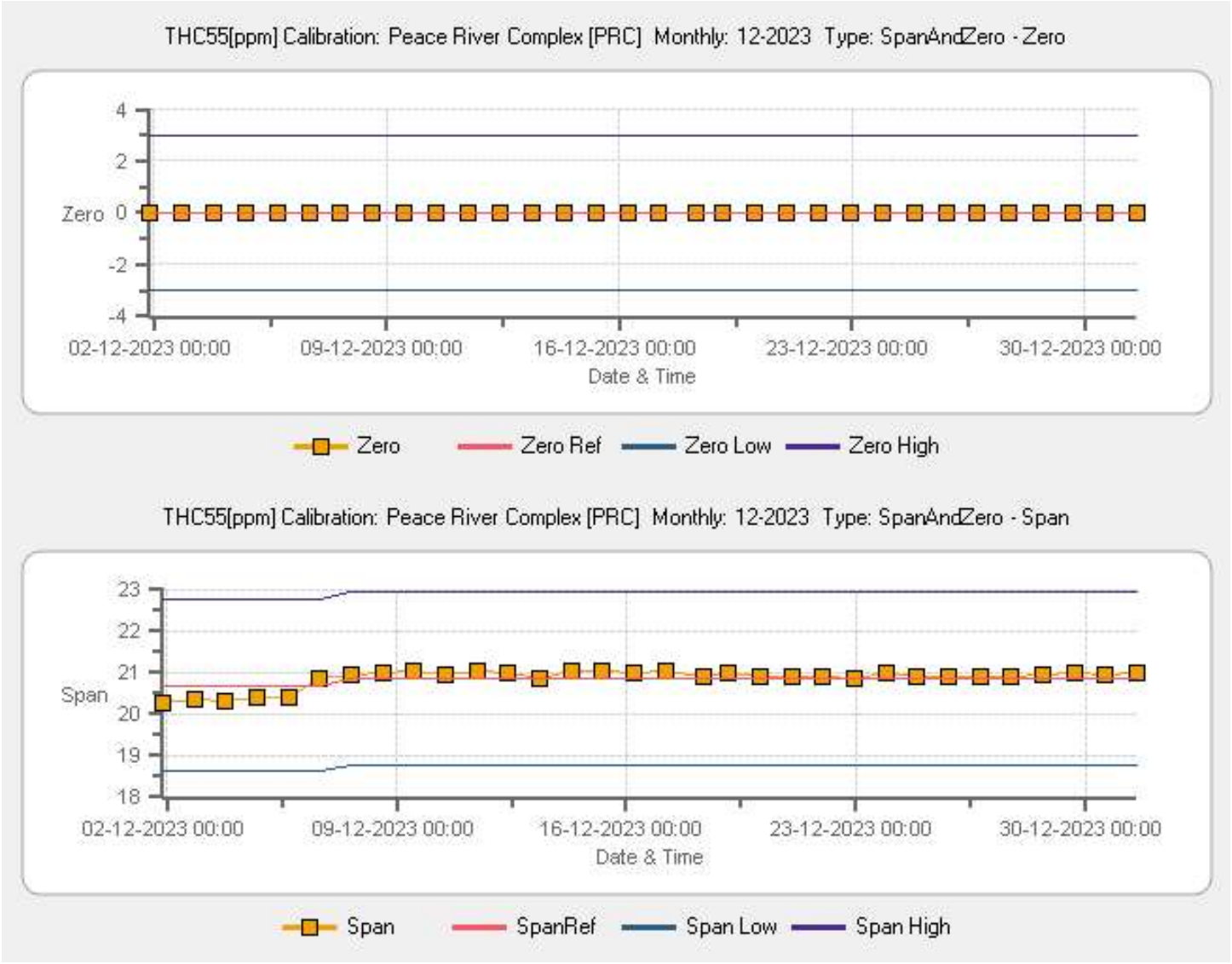
January 6, 2024

DAILY INTERNAL ZERO-SPAN CALIBRATION RECORDS

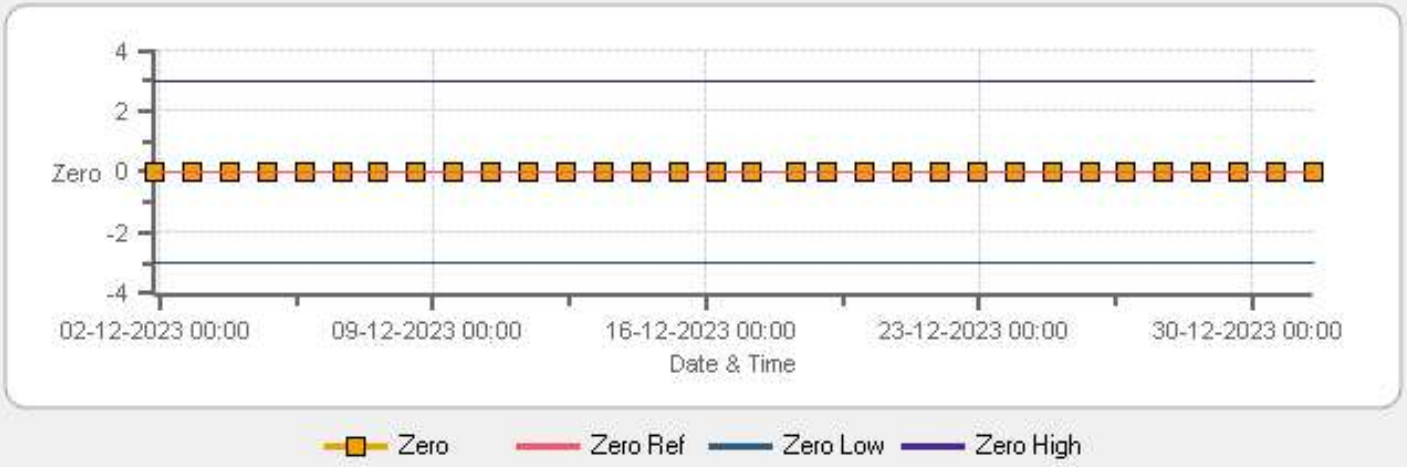

SO2[ppb] Calibration: Peace River Complex [PRC] Monthly: 12-2023 Type: SpanAndZero - Zero
4
2
Zero 0
-2
-4
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Zero
Zero Ref
Zero Low
Zero High
SO2[ppb] Calibration: Peace River Complex [PRC] Monthly: 12-2023 Type: SpanAndZero - Span
300
290
280
Span 270
260
250
240
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Span
SpanRef
Span Low
Span High


H2S[ppb] Calibration: Peace River Complex [PRC] Monthly: 12-2023 Type: SpanAndZero - Zero
4
2
Zero 0
-2
-4
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Zero
Zero Ref
Zero Low
Zero High
H2S[ppb] Calibration: Peace River Complex [PRC] Monthly: 12-2023 Type: SpanAndZero - Span
45
40
Span
35
30
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Span
SpanRef
Span Low
Span High

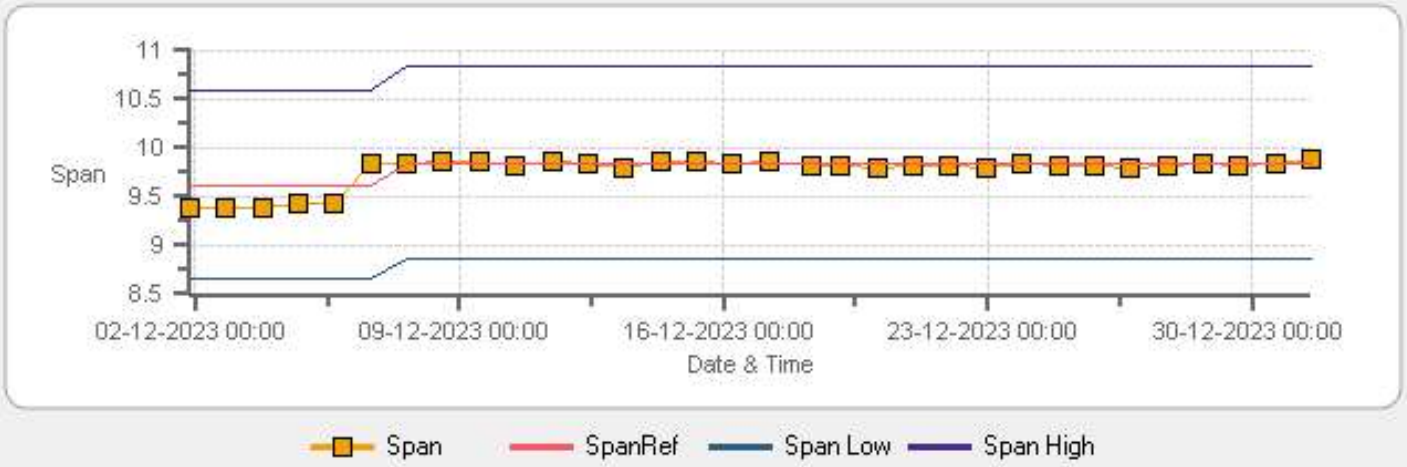

TRS[ppb] Calibration: Peace River Complex [PRC] Monthly: 12-2023 Type: SpanAndZero - Zero
4
2
Zero 0
-2
-4
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Zero
Zero Ref
Zero Low
Zero High
TRS[ppb] Calibration: Peace River Complex [PRC] Monthly: 12-2023 Type: SpanAndZero - Span
65
60
Span 55
50
45
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Span
SpanRef
Span Low
Span High

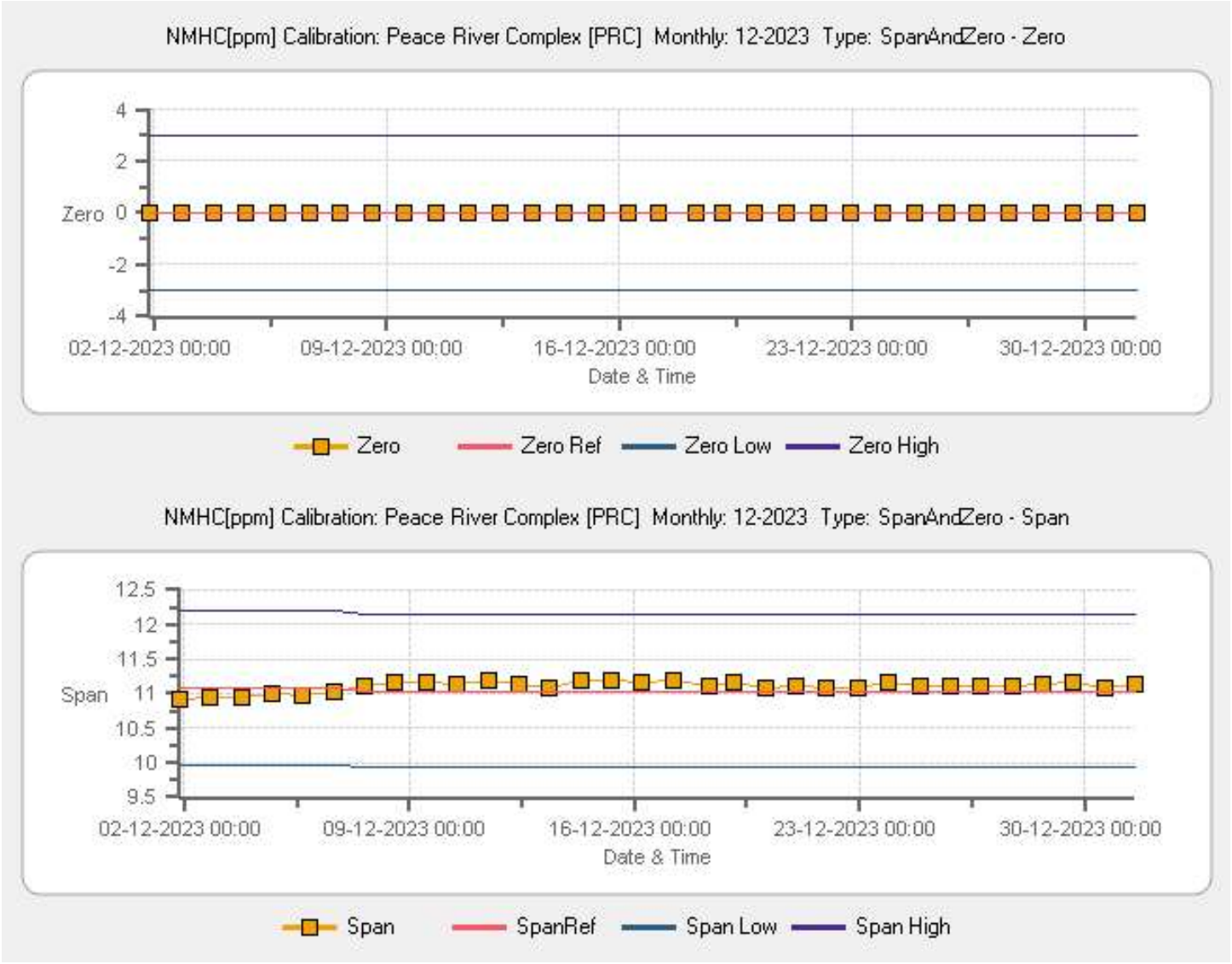

THC55[ppm] Calibration: Peace River Complex [PRC] Monthly: 12-2023 Type: SpanAndZero - Zero
Zero
4
2
0
-2
-4
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Zero
Zero Ref
Zero Low
Zero High
THC55[ppm] Calibration: Peace River Complex [PRC] Monthly: 12-2023 Type: SpanAndZero - Span
Span
23
22
21
20
19
18
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Span
SpanRef
Span Low
Span High

CH4[ppm] Calibration: Peace River Complex [PRC] Monthly: 12-2023 Type: SpanAndZero - Zero



CH4[ppm] Calibration: Peace River Complex [PRC] Monthly: 12-2023 Type: SpanAndZero - Span




NMHC[ppm] Calibration: Peace River Complex [PRC] Monthly: 12-2023 Type: SpanAndZero - Zero
4
2
Zero 0
-2
-4
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Zero
Zero Ref
Zero Low
Zero High
NMHC[ppm] Calibration: Peace River Complex [PRC] Monthly: 12-2023 Type: SpanAndZero - Span
12.5
12
11.5
Span 11
10.5
10
9.5
02-12-2023 00:00
09-12-2023 00:00
16-12-2023 00:00
23-12-2023 00:00
30-12-2023 00:00
Date & Time
Span
SpanRef
Span Low
Span High

MULTI-POINT CALIBRATION RECORDS

SO2 Analyzer Calibration by Dilution

DATE:	06-Dec-2023	PREVIOUS CALIBRATION DATE:	01-Nov-2023
PARAMETER:	SO2	PREVIOUS CORRECTION FACTOR:	0.999
CLIENT:	PRAMP	TEMPERATURE (°C):	21.4
LOCATION:	Peace River Compliance	BAROMETRIC (mBar):	932
PURPOSE	Routine	START TIME (MST):	10:36
PERFORMED BY:	Kevin Sebastian	END TIME (MST):	15:44

ANALYZER:

MAKE/MODEL	Thermo 43i	RANGE	500 ppb
SERIAL #	1034746225	FLOW (mL/min)	436
INITIAL		FINAL	
BKG/OFFSET	19.9	BKG/OFFSET	20.2
COEF/SLOPE	1.147	COEF/SLOPE	1.151
Expected (reference) Value	269.6	Expected (reference) Value	272

CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	Sabio	MAKE:	Teledyne
MODEL:	2010	MODEL:	M701
ID:	75401122	ID:	5004
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	LL109693	HIGH ID	n/a
CONC (ppm):	25.00	EXPIRY DATE	n/a
CYLINDER (psi):	1600	LOW ID	n/a
EXPIRY DATE	02-Nov-2025	EXPIRY DATE	n/a

CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	390	190	95
RANGE	300 - 400	150 - 200	50 - 100

SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
			ACTUAL	INDICATED		Initial	Final
DILUENT	GAS	TOTAL		Initial	Final		
3999		3999	0.00	0	0		
3939	60.80	4000	380.00	381.7	382.1	0.996	0.995
3970	28.80	3999	180.05	n/a	181.5	n/a	0.992
3985	14.40	3999	90.02	n/a	90.4	n/a	0.996

LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.006	0.0%

COMMENTS:

Sample filter changed.


SO2[ppb] Station: Peace River Complex [PRC] Daily: 06-12-2023 Type: AVG 1 Min. [1 Min.]
400
350
300
250
200
150
100
50
0
SO2 [ppb]
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Date & Time
SO2 [ppb]

H2S Analyzer Calibration by Dilution

DATE:	06-Dec-2023	PREVIOUS CALIBRATION DATE:	01-Nov-2023
PARAMETER:	H2S	PREVIOUS CORRECTION FACTOR:	0.999
CLIENT:	PRAMP	TEMPERATURE (°C):	21.4
LOCATION:	Peace River Compliance	BAROMETRIC (mBar):	932
PURPOSE	Routine	START TIME (MST):	10:36
PERFORMED BY:	Kevin Sebastian	END TIME (MST):	15:44

ANALYZER:

MAKE/MODEL	Thermo 450i	RANGE	100 ppb
SERIAL #	1308857354	FLOW (mL/min)	931
INITIAL		FINAL	
BKG/OFFSET	14.9	BKG/OFFSET	15.7
COEF/SLOPE	1.045	COEF/SLOPE	1.091
Expected (reference) Value	35.4	Expected (reference) Value	38.2

CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	Sabio	MAKE:	Teledyne
MODEL:	2010	MODEL:	M701
ID:	75401122	ID:	4568
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	LL131374	HIGH ID	n/a
CONC (ppm):	10.09	EXPIRY DATE	n/a
CYLINDER (psi):	1800	LOW ID	n/a
EXPIRY DATE	03-Jan-2026	EXPIRY DATE	n/a

CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	78	38	19
RANGE	60 - 80	30 - 40	10 - 20

SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

CALIBRATION:

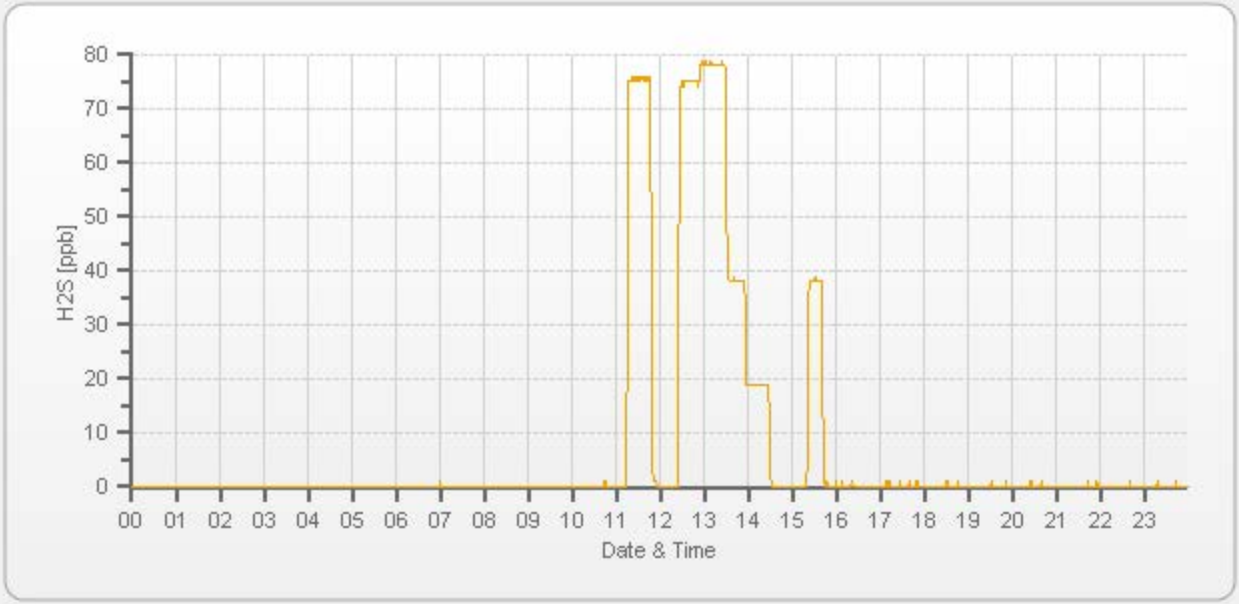
FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
			ACTUAL	INDICATED		Initial	Final
DILUENT	GAS	TOTAL		Initial	Final		
3999		3999	0.00	0.2	0		
3969	30.90	4000	77.95	75.7	78.1	1.032	0.998
3984	15.10	3999	38.10	n/a	38.1	n/a	1.000
3992	7.50	3999	18.92	n/a	19.1	n/a	0.991

LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.001	0.0%

COMMENTS:

Sample filter changed


H2S[ppb] Station: Peace River Complex [PRC] Daily: 06-12-2023 Type: AVG 1 Min. [1 Min.]
H2S [ppb]
80
70
60
50
40
30
20
10
0
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Date & Time
H2S [ppb]

TRS Analyzer Calibration by Dilution

DATE:	06-Dec-2023	PREVIOUS CALIBRATION DATE:	02-Nov-2023
PARAMETER:	TRS	PREVIOUS CORRECTION FACTOR:	0.996
CLIENT:	PRAMP	TEMPERATURE (°C):	21.4
LOCATION:	Peace River Compliance	BAROMETRIC (mBar):	932
PURPOSE	Routine	START TIME (MST):	10:36
PERFORMED BY:	Kevin Sebastian	END TIME (MST):	15:44

ANALYZER:

MAKE/MODEL	Thermo 450i	RANGE	100 ppb
SERIAL #	1034746224	FLOW (mL/min)	700
INITIAL		FINAL	
BKG/OFFSET	26.4	BKG/OFFSET	28.2
COEF/SLOPE	1.023	COEF/SLOPE	1.083
Expected (reference) Value	51.25	Expected (reference) Value	55.14

CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	Sabio	MAKE:	Teledyne
MODEL:	2010	MODEL:	M701
ID:	75401122	ID:	4568
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	LL131374	HIGH ID	n/a
CONC (ppm):	10.09	EXPIRY DATE	n/a
CYLINDER (psi):	1800	LOW ID	n/a
EXPIRY DATE	03-Jan-2026	EXPIRY DATE	n/a

CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	78	38	19
RANGE	60 - 80	30 - 40	10 - 20

SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

CALIBRATION:

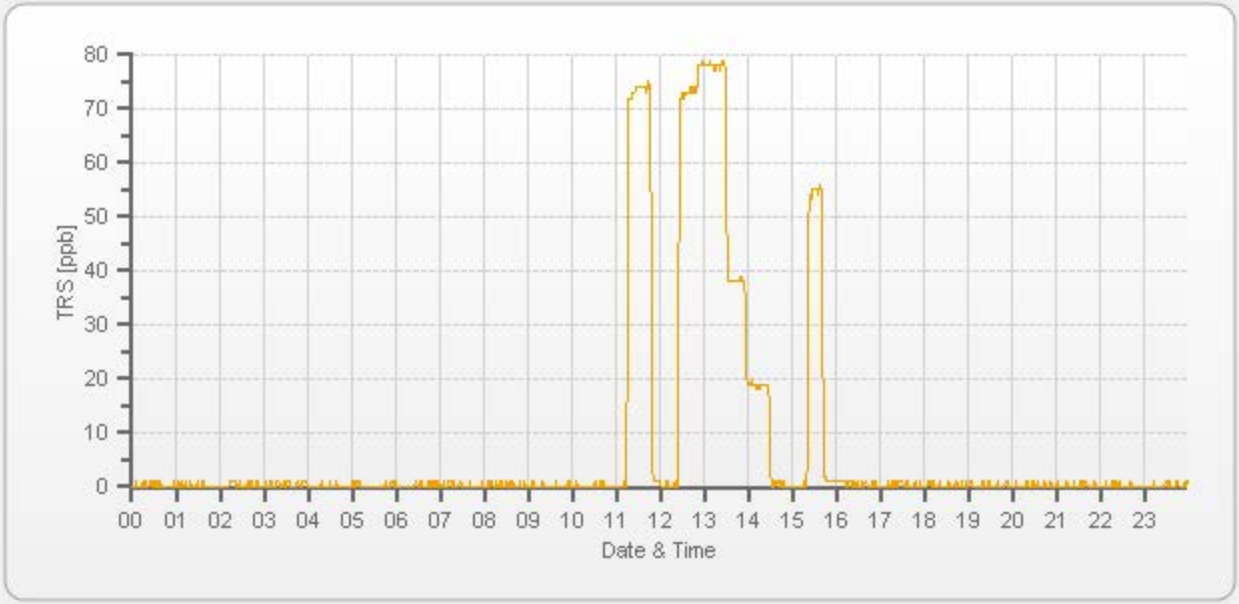
FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
			ACTUAL	INDICATED		Initial	Final
DILUENT	GAS	TOTAL		Initial	Final		
3999		3999	0.00	0.02	0		
3969	30.90	4000	77.95	74.06	77.97	1.053	1.000
3984	15.10	3999	38.10	n/a	38.1	n/a	1.000
3992	7.50	3999	18.92	n/a	18.82	n/a	1.005

LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.001	0.0%

COMMENTS:

TRS Converter CDNOVA CDN-101 #516


TRS[ppb] Station: Peace River Complex [PRC] Daily: 06-12-2023 Type: AVG 1 Min. [1 Min.]
TRS [ppb]
80
70
60
50
40
30
20
10
0
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Date & Time
TRS [ppb]

Methane/Non-Methane Analyzer Calibration by Dilution

CALIBRATION:

DATE:	06-Dec-2023	PREVIOUS CALIBRATION DATE:	01-Nov-2023
CLIENT:	PRAMP	TEMPERATURE (°C):	21.4
LOCATION:	Peace River Compliance	BAROMETRIC (mBar):	932
PURPOSE	Routine	START TIME (MST):	10:36
PERFORMED BY:	Kevin Sebastian	END TIME (MST):	15:44

ANALYZER:

VALUE	MAKE/MODEL	SERIAL	FLOW (mL/min)
	Thermo 55i	1034745845	1088
PARAMETER:	CH4	NMHC	THC
RANGE (ppm):	20	20	40
PREVIOUS CF:	1.001	1.001	1.001

CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:			FLOWMETERS (if applicable):	
MAKE:	Sabio	MAKE:	Teledyne	CYLINDER ID:	LL68768		HIGH ID:	n/a
MODEL:	2010	MODEL:	M701	CH_4/C_3H_8 (ppm):	897.0	301.0	HIGH EXPIRY:	n/a
ID:	26801218	ID:	4568	CYLINDER (psi):	1600		LOW ID:	n/a
MFC CALIBRATION DATE:	12-Sep-2023	OXIDIZER ID:	Internal	EXPIRY DATE	08-Nov-2029		LOW EXPIRY:	n/a

CALIBRATION PARAMETERS:

POINT (CH4/NMHC)	HIGH	MID	LOW	CH4 EQUIVILANCE	
TARGET	14	7	3.5	C_3H_8 as CH_4	827.8
RANGE	12 - 16	6 - 8	2 - 4	THC as CH_4	1724.8

EXPECTED (REFERENCE) VALUE:

INITIAL	CH4	NMHC	THC	FINAL	CH4	NMHC	THC
	9.62	11.08	20.70		9.85	11.03	20.88

CALIBRATION:

FLOW RATE (mL/min)			CONCENTRATION (PPM)									CORRECTION FACTOR (CF.)					
			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	CH4	NMHC	THC	CH4	NMHC	THC	CH4	NMHC	THC	CH4	NMHC	THC	CH4	NMHC	THC
3099		3099	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
3049	50.30	3099	14.56	13.44	27.99	14.27	13.44	27.72	14.61	13.47	28.08	1.020	1.000	1.010	0.997	0.997	0.997
3074	25.10	3099	7.27	6.70	13.97	n/a	n/a	n/a	7.31	6.74	14.05	n/a	n/a	n/a	0.994	0.995	0.994
3085	12.60	3098	3.65	3.37	7.01	n/a	n/a	n/a	3.67	3.39	7.06	n/a	n/a	n/a	0.994	0.993	0.994

LINEAR REGRESSION ANALYSIS:

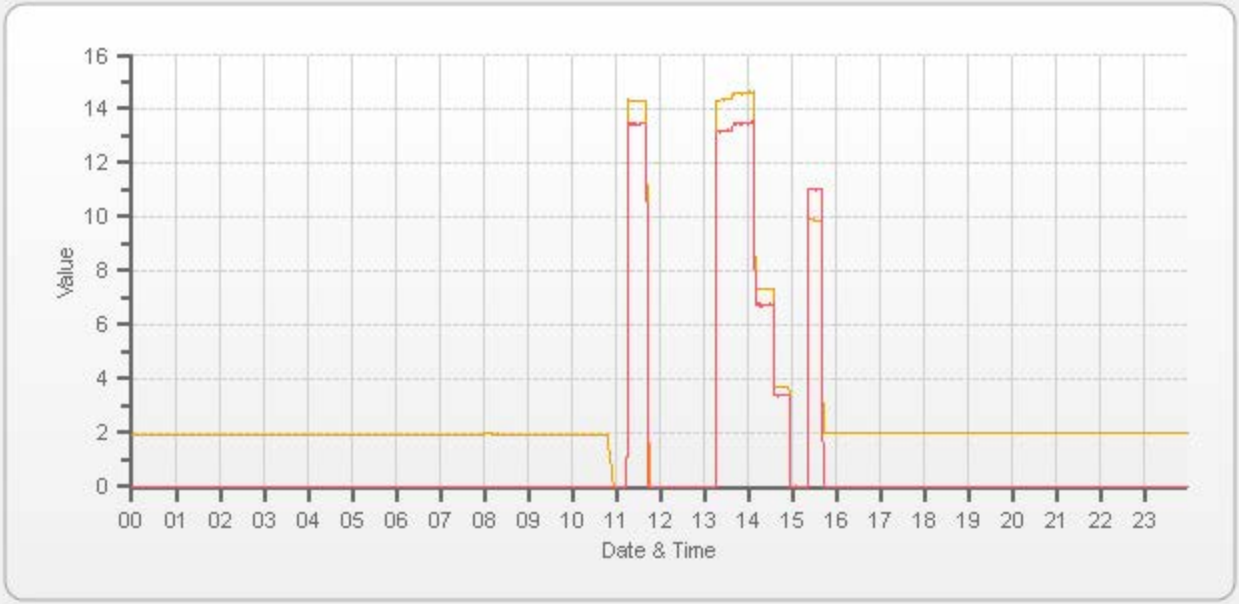
	CORRELATION	SLOPE	INTERCEPT
CH4	1.000	1.003	0.0%
NMHC	1.000	1.002	0.0%
THC	1.000	1.003	0.0%

Comments:

H2 Dessicant changed after AF high.
H2 = AMA HG300 #211067076

Use Zero Chrom? **No**

Station: Peace River Complex [PRC] Daily: 06-12-2023 Type: AVG 1 Min. [1 Min.]



Meteorological System Checklist

Date:	December 6, 2023		
Technician:	Kevin Sebastian		
Station:	Peace River Compliance		
Unit:	**Make:**	**Model:**	**Serial #:**
Precipitation Sampler:	RM Young	52202	TB 16325
Temperature Sensor:	Rotronic	HC2-S3	20558318
Barometric Pressure Sensor:	MetOne	092	B19577
Relative Humidity Sensor:	Rotronic	HC2-S3	20558318
Anemometer:	RM Young	05305VK	129612
AMBIENT TEMPERATURE SENSOR CHECK			
Previous check date:	November 1, 2023		
Parameter:	Temperature @ 2 metres		
Reference Thermometer ID:	F.S. 181341226 expires July 17, 2024		
Reference Temperature (°C):	3.2		
Station - Ambient Temperature (°C):	3.0		
Temperature Difference (°C):	0.2		
BAROMETRIC PRESSURE SENSOR CHECK			
Previous check date:	November 1, 2023		
Reference Barometer ID:	Brunton 05535 Expires July 17, 2024		
Reference Pressure - Units/Reading:	millibar	928.3	
Station Pressure - Units/Reading:	millibar	931	
Pressure Tolerance +/- 15% of error:	789 - 1068	-0.29%	
RELATIVE HUMIDITY (HYGROMETER) SENSOR CHECK			
Previous check date:	November 1, 2023		
Reference Hygrometer ID:	F.S. 181341226 expires July 17, 2024		
Reference Hygrometer % RH- Reading:	60.70		
Station Hygrometer % RH- Reading:	65.70		
RH Tolerance +/- 15% of difference:	51.60 - 69.81	-8.2%	

ANEMOMETER - WIND SPEED & WIND DIRECTION SENSOR CHECK			
WIND SPEED		WIND DIRECTION	
Previous check date:	November 1, 2023	Previous check date:	November 1, 2023
Wind Speed Observed (kph):	10~20	Wind Direction Observed:	W
Wind speed on Data Logger (kph):	12	Wind Direction on Data Logger:	W
		Wind Direction Pass/Fail?:	Pass

Comments

No issues.

Meteorological Sensor Audit/Calibration

Location Information

Company:	PRAMP	**Performed By:**	Chris Wesson
Audit Location:	PRC Compliance	**Reviewed By:**	Limin Li
Audit Date:	August 3, 2023	**Start/End Time (mst):**	10:40 / 11:32
Calibration Purpose:	routine annual	**Weather Conditions:**	Mainly cloudy with drizzle

Wind Sensor Information

Sensor ID Data:		**Sensor Outputs:**	
Sensor Make:	RM Young	**Velocity Voltage Output Range:**	0-1
Sensor Model:	05305VK	**Velocity Unit Output Range:**	0-200
Serial #:	129612	**Direction Voltage Output Range:**	0-1
Previous Cal/Audit Date:	August 17, 2022	**Direction Unit Output Range:**	0-360

Wind Calibrator Information

Calibrator I.D. and Expiry Date: RM Young 18802 id# R9133 expires Oct 18, 2024

Wind Speed Audit Data **+/- 2% of the average correction factor is the limit**

RPM	Wind Speed Generated kph	Clockwise Wind Speed kph	Counter Clockwise Wind Speed kph	Correction Factor
0	0	0.1	0.1	-
1000	18.4	18.6	18.5	0.994
2000	36.9	37.1	37.0	0.995
3000	55.3	55.5	55.4	0.997
4000	73.7	74.0	73.8	0.998
5000	92.2	92.5	92.4	0.997
6000	110.6	111.0	111.0	0.996
7000	129.0	129.6	129.6	0.995
8000	147.4	148.0	148.3	0.995
9000	165.9	166.7	166.6	0.995
10000	184.3	185.3	185.3	0.995
		The audit meets AMD requirements.	**Average Correction Factor=**	**0.996**

Wind Direction Audit Data **+/- 3° of the absolute average degrees difference for all points is the limit**

Generated Wind Direction 0-360 (Up)	Generated Wind Direction 360-0 (Down)	Indicated Wind Direction 0-360 (Up)	Indicated Wind Direction 360-0 (Down)	Degrees Difference 0-360 (Up)	Degrees Difference 360-0 (Down)	Average Absolute Degrees Difference
0	355	0	352	0.0	3.0	1.5
30	330	31	328	-1.0	2.0	1.5
60	300	59	298	1.0	2.0	1.5
90	270	90	270	0.0	0.0	0.0
120	240	120	240	0.0	0.0	0.0
150	210	151	210	-1.0	0.0	0.5
180	180	180	180	0.0	0.0	0.0
210	150	211	150	-1.0	0.0	0.5
240	120	241	120	-1.0	0.0	0.5
270	90	271	91	-1.0	-1.0	1.0
300	60	299	59	1.0	1.0	1.0
330	30	328	29	2.0	1.0	1.5
355	0	353	1	2.0	1.0	1.5
The audit meets AMD requirements.			**Average Absolute Degrees Difference=**			**0.8**

Comments:

Declination = 15 deg East
Physical inspection completed, bearings replaced

END OF REPORT

List of SOPs

MONITOR	SOP
SULPHUR DIOXIDE (SO_2)	Bureau Veritas EMS SOP-00209: Ambient Sulphur Monitoring
HYDROGEN SULPHIDE (H_2S)	Bureau Veritas EMS SOP-00209: Ambient Sulphur Monitoring
TOTAL REDUCED SULPHUR (TRS)	Bureau Veritas EMS SOP-00209: Ambient Sulphur Monitoring
TOTAL HYDROCARBONS (THC), METHANE (CH4), NON-METHANE(NMHC)	Bureau Veritas EMS SOP-00001: Methane, Non-Methane Hydrocarbon Analyzer Monitoring
OXIDES OF NITROGEN (NOx), NITRIC OXIDE (NO) & NITROGEN DIOXIDE (NO_2)	Bureau Veritas EMS SOP-00213: Ambient NO/NO_2/NOx Monitoring
OZONE (O3)	Bureau Veritas EMS SOP-00212: Ambient O3 Monitoring
PARTICULATE MATTER < 2.5 MICRONS ($PM_{2.5}$)	Bureau Veritas EMS SOP-00015: Teledyne API PM Monitor Model T640
WIND SPEED (WS) & WIND DIRECTION (WD)	Bureau Veritas EMS SOP-00013: RM Young Wind Monitor Calibration

Peace River Area Monitoring Program

DECEMBER 2023

Monthly Ambient Air Quality Monitoring Integrated Sampling Report

PRAMP-202312-INTEGRATED

January 12, 2024

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Peace River Area Monitoring Program
Suite 91, 305 – 4625 Varity Drive NW
Calgary, AB, T3A 0Z9
Phone #: 780-226-7068 / 587-225-2248
E-mail: pramptech@prampairshed.ca
www.prampairshed.ca

January 12, 2024

Alberta Environment and Protected Areas (EPA)
11th Floor, Oxbridge Place
9820 106 Street
Edmonton, AB, T5K 2J6

RE: PRAMP –December 2023 Monthly Ambient Air Quality Monitoring Integrated Sampling Report

Enclosed is the December 2023 Monthly Ambient Air Quality Monitoring Integrated Sampling Report for the Peace River Area Monitoring Program's (PRAMP) regional air quality monitoring network. This report summarizes monitoring data for samples collected using integrated methods, including volatile organic compounds (NMHC canister sampling program), hydrogen sulphide, and sulphur dioxide (passive sampling program).

The representative of the Person Responsible for this monitoring program is

PRAMP Airshed
Michael Bisaga / Lily Lin, Technical Program Managers
Suite 91, 305 – 4625 Varsity Drive NW
Calgary, AB, T3A 0Z9
Phone #: 780-226-7068 / 587-225-2248
E-mail: pramptech@prampairshed.ca

This report has been prepared, reviewed and submitted by Michael Bisaga & Lily Lin of the PRAMP Airshed. This report is also submitted on behalf of the industrial member companies to satisfy the requirements of the facility Operating Approvals.

NETWORK STATION SUMMARY

Listing of Integrated Sampling Stations

- 986-C Station
- 842-B Station
- Reno-B Station
- Peace River Complex (PRC) Station

Station Name	986-C	842-B	Reno-B	PRC
Station ID	1562	1561	1563	1698
Coordinates	56.36980, -116.92500	56.27406, -116.98129	55.86936, -117.05739	56.38257, -116.769283
NMHC Canister (VOCs)	√	√	√	
Passives: 2-Month exposure (PACs)	√			
Passives: 1-Month Exposure (H_2S, SO_2)				√

Listing of Passives: 1-Month Exposure Sampling Sites

Site ID	Latitude	Longitude
1	56.377841	-116.787142
2	56.378638	-116.780496
3	56.382958	-116.783813
4	56.377044	-116.794220
7	56.384796	-116.780488
8	56.388710	-116.771234
9	56.388943	-116.756205
10	56.388642	-116.797817
11	56.383771	-116.841165
12	56.388962	-116.885263
13	56.390972	-116.822083
14	56.424825	-116.853181

List of Contractors who performed the air monitoring activities

Sampling Program	Monitoring Activities Conducted By	Sample Analysis Conducted By	Data/Report Prepared By	Electronic Submission Conducted By
NMHC Canister (VOCs)	Bureau Veritas	InnoTech Alberta Inc	PRAMP	PRAMP
Passives: PACs	PRAMP	ECCC	AEP	AEP
Passives: H_2S, SO_2	PRAMP	Bureau Veritas	PRAMP	PRAMP

Monitoring Notes during the Month of December 2023

- **NMHC Canister Sampling Program - Volatile Organic Compounds (VOCs)**
  - The canister sampling program collects a 1-hour sample of air when the continuously measured non-methane hydrocarbon (NMHC) concentration reaches a specified trigger point. The current trigger point is 0.3 ppm for non-methane hydrocarbons. The trigger point is based on real-time monitoring data that are averaged over a 5-minute period.
  - There were no valid canister events recorded this month. The canister system was triggered at the 986-C station on December 26 at 03:35due to an analyzer issue. The event is not valid.

- **Passive Polycyclic Aromatic Compounds (PACs) Sampling Program**
  - The PAC sampling program began in December 2019, and is designed to collect a 2-month integrated sample.
  - The sample media for sampling period of November and December were installed on October 31. They were removed on December 31.
  - The sample media for sampling period of January and February 2024 were installed on December 31. They are scheduled to be removed by the end February.

- **Passives H_2S and SO_2 Sampling Program**
  - The passive sample filters were installed at the stations on December 1 and were removed on December 29.

Revisions to Alberta's Ambient Air Quality Data Warehouse

No revisions to historical data previously submitted to the Alberta's Ambient Air Quality Data Warehouse were made this month.

Deviations from Authorized Monitoring Methods

There were no deviations from authorized monitoring methods.

Certification

The report was prepared and submitted by Lily Lin in accordance with Chapter 9 of the Air Monitoring Directive (AMD 2016).

Lily Lin, Technical Program Manager, PRAMP Airshed

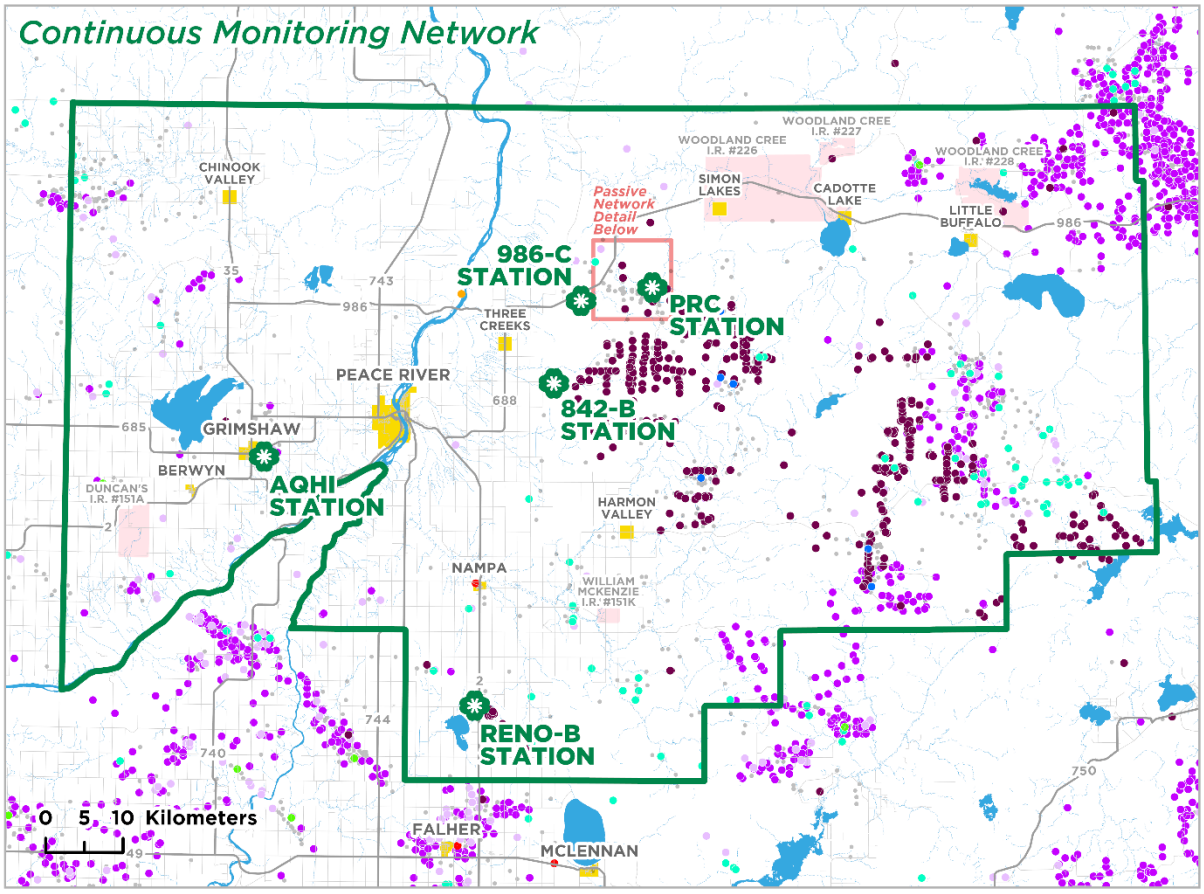
The report was reviewed by Mike Bisaga in accordance with Chapter 9 of the Air Monitoring Directive (AMD 2016).

I certify that I have reviewed and verified this report and that the information is complete, accurate and representative of the monitoring results, reporting timeframe and the specified analysis, summarization and reporting requirements. I also certify that at the time of this report's submission, all air data have been electronically uploaded to Alberta ETS as required by the AMD.

Michael Bisaga, Technical Program Manager, PRAMP Airshed

January 12, 2024

Map of PRAMP Continuous Monitoring and Integrated Sampling Network

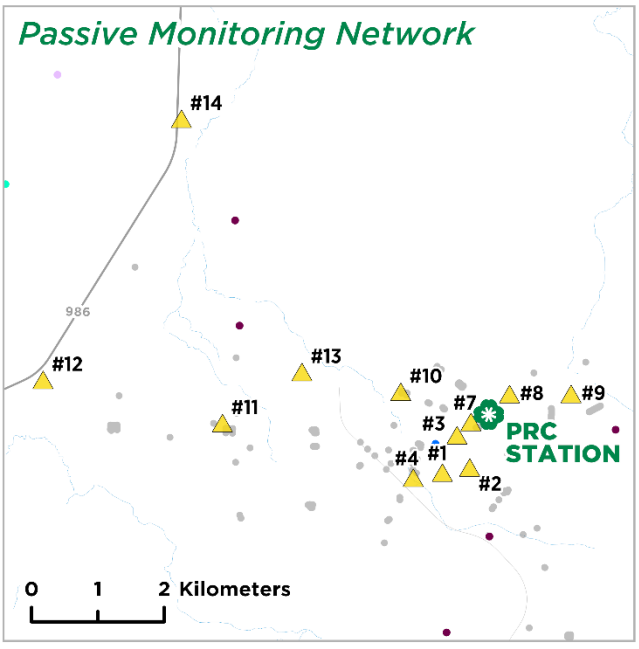


Legend

- PRAMP Boundary
- Populated Place
- First Nation
- Continuous Monitoring Station
- Passive Monitoring Station

Industrial Facilities

- In-Situ Oil Sands
- Heavy Oil/Bitumen Well or Battery
- Conventional Oil Well or Battery
- Natural Gas Well or Battery
- Gas Plant or Gas Processing
- Compressor Station or Pipeline
- Agricultural Storage and Transfer
- Pulp and Paper
- Well (Not Associated with Batteries)



Service Layer Credits: Esri, CGIAR, USGS, Esri, USGS

INTEGRATED SAMPLING RESULTS SUMMARY

- **NMHC analytical results**
  No analytical results are attached as there were canister events recorded this month**.**

- **Passive analytical results**

	H_2S		SO_2	
Minimum (ppb)	0.10	#1	0.2	#1
Maximum (ppb)	0.23	#14	0.5	#2
Average (ppb)	0.15	-	0.31	-

ANALYTICAL SAMPLING RESULTS

NMHC Canisters – VOCs

Passives

End of Report

Peace River Area Monitoring Program

DECEMBER 2023

Ambient Air Monitoring

Certified Laboratory Analysis Report

LAB-PRAMP-202312

Operation and Maintenance:
Bureau Veritas Canada

Data Validation and Report:
Peace River Area Monitoring Program

January 6, 2024

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NMHC Canister Analytical Results

Passive Sampling Analytical Results

End of Report