Environment and Protected Areas
Resource Stewardship Division
Airshed & Watershed Stewardship
Air Monitoring
4946 – 89 street
Edmonton, Alberta
T6E 5K1
Telephone: 780.427.7888
http://aep.alberta.ca/

October 10, 2024 File No(s). 2024 – 318A – 339A

Michael Bisaga
Lakeland Industry and Community Association
PO Box 8237
Bonnyville, Alberta
T9N 2J5

Mr. Bisaga:

**Subject: 2024 LICA Ambient Air Monitoring Network Audit Results**

Between the dates of September 30 – October 3, 2024 Alberta Environment and Protected Areas (AEPA) conducted an audit of the Lakeland Industry and Community Association (LICA) ambient air monitoring network. During this audit period, the Thermo 5030i PM2.5 samplers were not completed as the AEPA Standard Operating Procedure is under development.

The following is a station-by-station breakdown of the audit findings/observations.

**Lac La Biche Station:**

All audit results met AMD criteria.

**Cold Lake South Station:**

All audit results met AMD criteria.

**Tamarack Station:**

All audit results met AMD criteria.

**St. Lina Station:**

All audit results met AMD criteria.

**Opportunities for improvement noted:**

The ambient temperature sensor at Lac La Biche did not meet audit tolerances. Audit tolerance for temperature sensors is +/- 1°C. Recommend cleaning the sensor, cleaning the radiation shield, and recalibrating as required.

The general housekeeping at Cold Lake South and St. Lina could be improved. Both stations were crowded with extra instrumentation, equipment, and supplies that were not currently in use.

The network site document audit did not meet AMD required elements according to Chapter 3, section 4, subsection 4-C. Recommend updating network site documentation to include all elements. See field sheets for missing elements.

LICA will be required to provide a response by November 12, 2024, that meets AMD Chapter 8 section 5.3 for all items noted in this audit cover letter. If you have any questions or comments, please contact the undersigned at 780-427-7888.

Yours truly,

Laura Tabor

Air Monitoring Technologist

Environment and Protected Areas
Resource Stewardship Division
Airshed & Watershed Stewardship Branch
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Attachments:
- Station Audit Reports
- Audit Summary Report

cc: Marty Collins - Manager, AEPA
Al Clark – Monitoring Systems Auditor, AEPA
Kristina Morris – Executive Director, LICA
Prabal Roy – Senior Air Quality Specialist, AEPA
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# Audit Summary

| | |
|---|---|
| Facility / Zone | Lakeland Industry and Community Association (LICA) |
| Total # of parameters that passed | 22 |
| Total # of parameters audited in the network | 22 |
| Date(s) of the audit | September 30 - October 3, 2024 |
| Issue Date of Audit Summary | September 30, 2024 |

| | | | |
|---|---|---|---|
| Station Name | Lac La Biche | | |
| Auditor | L. Tabor | | |
| Audit Date | September 30, 2024 | | |
| **Critical** | **Pass** | **Fail** | |
| $H_2S$ | ✓ | | |
| $SO_2$ | ✓ | | |
| TRS | | | |
| NO / $NO_2$ / $NO_X$ | ✓ | | |
| $O_3$ | ✓ | | |
| CO | | | |
| THC | | | |
| NMHC | ✓ | | |
| $NH_3$ | | | |
| Sharp / T640 $PM_{2.5}$ | | | |
| TEOM/BAM $PM_{10}$ | | | |
| Wind Speed / Wind Direction | ✓ | | |
| Wind head Orientation | ✓ | | |
| Manifold Fan | ✓ | | |
| Precipitation Sampler | | | |
| Partisol $PM_{2.5}$ | | | |
| Partisol $PM_{10}$ | | | |
| Partisol TSP | | | |
| Zero/Span Systems Operational | ✓ | | |

| **Inspection Items** | **OK** | **Need for Improvement** | |
|---|---|---|---|
| Sample pump venting/scrubbing | ✓ | | |
| Heating / Air Conditioning | ✓ | | |
| Manifold | ✓ | | |
| Sample Lines | ✓ | | |
| Sharp / T640 $PM_{2.5}$ | | | |
| TEOM/BAM $PM_{10}$ | | | |
| Partisol $PM_{2.5}$ | | | |
| Partisol $PM_{10}$ | | | |
| Partisol TSP | | | |
| Safety | ✓ | | |
| Site Conditions | ✓ | | |

| **Non-critical** | **OK** | **Opportunity for Improvement** | |
|---|---|---|---|
| RH | ✓ | | |
| Station Temperature | ✓ | | |
| Ambient Temperature | | ✓ | +/- 1˚C |
| Solar Radiation | | | |
| Barometric Pressure | | | |
| Tipping bucket | | | |
| TEOM 'Pump On' test | | | |
| Station Condition | ✓ | | |
| Station Documentation | ✓ | | |

Not monitored at this location

# Audit Summary

| | |
|---|---|
| Facility / Zone | Lakeland Industry and Community Association (LICA) |
| Total # of parameters that passed | 22 |
| Total # of parameters audited in the network | 22 |
| Date(s) of the audit | September 30 - October 3, 2024 |
| Issue Date of Audit Summary | October 1, 2024 |

| | | | |
|---|---|---|---|
| Station Name | Cold Lake South | | |
| Auditor | L. Tabor | | |
| Audit Date | October 1, 2024 | | |
| **Critical** | **Pass** | **Fail** | |
| $H_2S$ | | | |
| $SO_2$ | ✓ | | |
| TRS | ✓ | | |
| NO / $NO_2$ / $NO_X$ | ✓ | | |
| $O_3$ | ✓ | | |
| CO | | | |
| THC | | | |
| NMHC | ✓ | | |
| $NH_3$ | | | |
| Sharp / T640 $PM_{2.5}$ | ✓ | | |
| TEOM/BAM $PM_{10}$ | | | |
| Wind Speed / Wind Direction | ✓ | | |
| Wind head Orientation | ✓ | | |
| Manifold Fan | ✓ | | |
| Precipitation Sampler | | | |
| Partisol $PM_{2.5}$ | | | |
| Partisol $PM_{10}$ | | | |
| Partisol TSP | | | |
| Zero/Span Systems Operational | ✓ | | |
| **Inspection Items** | **OK** | **Need for Improvement** | |
| Sample pump venting/scrubbing | ✓ | | |
| Heating / Air Conditioning | ✓ | | |
| Manifold | ✓ | | |
| Sample Lines | ✓ | | |
| Sharp / T640 $PM_{2.5}$ | ✓ | | |
| TEOM/BAM $PM_{10}$ | | | |
| Partisol $PM_{2.5}$ | | | |
| Partisol $PM_{10}$ | | | |
| Partisol TSP | | | |
| Safety | ✓ | | |
| Site Conditions | ✓ | | |
| **Non-critical** | **OK** | **Opportunity for Improvement** | |
| RH | ✓ | | |
| Station Temperature | | | |
| Ambient Temperature | ✓ | | |
| Solar Radiation | | | |
| Barometric Pressure | | | |
| Tipping bucket | | | |
| TEOM 'Pump On' test | | | |
| Station Condition | | ✓ | General housekeeping |
| Station Documentation | ✓ | | |

Not monitored at this location

# Audit Summary

| | |
|---|---|
| Facility / Zone | Lakeland Industry and Community Association (LICA) |
| Total # of parameters that passed | 22 |
| Total # of parameters audited in the network | 22 |
| Date(s) of the audit | September 30 - October 3, 2024 |
| Issue Date of Audit Summary | October 2, 2024 |

| | | | |
|---|---|---|---|
| Station Name | Tamarack | | |
| Auditor | L. Tabor | | |
| Audit Date | October 2, 2024 | | |
| **Critical** | **Pass** | **Fail** | |
| $H_2S$ | ✓ | | |
| $SO_2$ | ✓ | | |
| TRS | | | |
| NO / $NO_2$ / $NO_X$ | ✓ | | |
| $O_3$ | ✓ | | |
| CO | | | |
| THC | | | |
| NMHC | ✓ | | |
| $NH_3$ | | | |
| Sharp / T640 $PM_{2.5}$ | ✓ | | |
| TEOM/BAM $PM_{10}$ | | | |
| Wind Speed / Wind Direction | ✓ | | |
| Wind head Orientation | ✓ | | |
| Manifold Fan | ✓ | | |
| Precipitation Sampler | | | |
| Partisol $PM_{2.5}$ | | | |
| Partisol $PM_{10}$ | | | |
| Partisol TSP | | | |
| Zero/Span Systems Operational | ✓ | | |
| **Inspection Items** | **OK** | **Need for Improvement** | |
| Sample pump venting/scrubbing | ✓ | | |
| Heating / Air Conditioning | ✓ | | |
| Manifold | ✓ | | |
| Sample Lines | ✓ | | |
| Sharp / T640 $PM_{2.5}$ | ✓ | | |
| TEOM/BAM $PM_{10}$ | | | |
| Partisol $PM_{2.5}$ | | | |
| Partisol $PM_{10}$ | | | |
| Partisol TSP | | | |
| Safety | ✓ | | |
| Site Conditions | ✓ | | |
| **Non-critical** | **OK** | **Opportunity for Improvement** | |
| RH | ✓ | | |
| Station Temperature | ✓ | | |
| Ambient Temperature | ✓ | | |
| Solar Radiation | | | |
| Barometric Pressure | | | |
| Tipping bucket | | | |
| TEOM 'Pump On' test | | | |
| Station Condition | | | |
| Station Documentation | ✓ | | |

Not monitored at this location



Alberta Government

# Audit Summary

| | |
|---|---|
| Facility / Zone | Lakeland Industry and Community Association (LICA) |
| Total # of parameters that passed | 22 |
| Total # of parameters audited in the network | 22 |
| Date(s) of the audit | September 30 - October 3, 2024 |
| Issue Date of Audit Summary | October 3, 2024 |

| | | | |
|---|---|---|---|
| Station Name | St Lina | | |
| Auditor | L. Tabor | | |
| Audit Date | October 3, 2024 | | |
| **Critical** | **Pass** | **Fail** | |
| $H_2S$ | ✓ | | |
| $SO_2$ | ✓ | | |
| TRS | | | |
| NO / $NO_2$ / $NO_X$ | ✓ | | |
| $O_3$ | ✓ | | |
| CO | | | |
| THC | | | |
| NMHC | ✓ | | |
| $NH_3$ | | | |
| Sharp / T640 $PM_{2.5}$ | | | |
| TEOM/BAM $PM_{10}$ | | | |
| Wind Speed / Wind Direction | ✓ | | |
| Wind head Orientation | ✓ | | |
| Manifold Fan | ✓ | | |
| Precipitation Sampler | | | |
| Partisol $PM_{2.5}$ | | | |
| Partisol $PM_{10}$ | | | |
| Partisol TSP | | | |
| Zero/Span Systems Operational | ✓ | | |
| **Inspection Items** | **OK** | **Need for Improvement** | |
| Sample pump venting/scrubbing | ✓ | | |
| Heating / Air Conditioning | ✓ | | |
| Manifold | | | |
| Sample Lines | ✓ | | |
| Sharp / T640 $PM_{2.5}$ | | | |
| TEOM/BAM $PM_{10}$ | | | |
| Partisol $PM_{2.5}$ | | | |
| Partisol $PM_{10}$ | | | |
| Partisol TSP | | | |
| Safety | ✓ | | |
| Site Conditions | ✓ | | |
| **Non-critical** | **OK** | **Opportunity for Improvement** | |
| RH | | | |
| Station Temperature | | | |
| Ambient Temperature | | | |
| Solar Radiation | | | |
| Barometric Pressure | | | |
| Tipping bucket | | | |
| TEOM 'Pump On' test | | | |
| Station Condition | | ✓ | General housekeeping |
| Station Documentation | ✓ | | |

Not monitored at this location

# STATION AUDIT

File No. 2024 - 323A - 328A

Date: October 1, 2024 Performed by: L. Tabor

## Station

Name: Cold Lake South Location: Cold Lake

Facility/Zone: LICA Operator: Bureau Veritas

Temp: 19.6°C Barometric Press: 711mmHg

## Location

| | |
|---|---|
| Latitude N | 54° 24' 50.45" |
| Longitude W | 110° 13' 58.89" |
| Elevation | 535m |
| Status of Site Documentation | Good |
| Status of Network Documentation | Good |
| Status of QAP | Good |

| | |
|---|---|
| Manifold Material | Glass |
| Manifold Condition | Good |

## Meteorological

| | Observed | Audit Value |
|---|---|---|
| Wind Speed Direction | 5.3kph, 236.6° | 5-10kph, SW |
| Station Temperature | 23.6°C | 22.91°C |
| Relative Humidity | 66.4% | 63.10% |
| Ambient Temperature | 7.7°C | 7.87°C |
| Solar Radiation | na | na |
| Precipitation | na | na |

**Remarks:**



Alberta Government

# $SO_2$ ANALYZER AUDIT

File No. 2024 - 323A

Date: October 1, 2024 Performed by: L. Tabor

## Station

Name: Cold Lake South Location: Cold Lake

Facility/Zone: LICA Operator: Bureau Veritas

Temp. 19.6°C Barometric Press. 711mmHg

## Monitor

Make/Model: Thermo 43i-TLE Serial No: 1180260018

Inlet flow (sccm): 444 Full Scale Range ppm: 0.500

Last cal. Date: September 11, 2024 Old Correction Factor: 0.997

Zero/Bkg 2.72

Span Coef 0.775

## Calibrator

Calibration Method: GAS DILUTION Make/Model: Sabio 2010

Cylinder # : T1XY16R AMU # : 2092

CGA Date: June 25, 2024 $SO_2$ Concentration PPM: 50.48

| Calibrator Flow (sccm) | | | Calculated Conc. (ppm) | Indicated Concentration (ppm) | % Difference | |
|---|---|---|---|---|---|---|
| Air | Gas | Total | | | vs Audit Gas | Limits |
| 4896 | 0.0 | 4896 | 0.000 | -0.001 | | |
| 4858 | 39.9 | 4898 | 0.411 | 0.412 | 0% | ± 10% |
| 4886 | 20.1 | 4907 | 0.207 | 0.210 | 2% | ± 10% |
| 4909 | 10.4 | 4920 | 0.107 | 0.109 | 3% | ± 10% |
| | | | | Absolute Average Percent Difference | 2% | |

**Linear Regression Analysis:**

*y=mx+b (where x=calculated concentration, y=indicated concentration)*

| | | LIMITS |
|---|---|---|
| Correlation Coeff.= | 1.0000 | **≥ 0.995** |
| m (Slope)= | 1.0035 | **0.90-1.10** |
| b (Intercept as % of full scale)= | 0.1017 | **± 3% F.S.** |

**Remarks:**

AMU 2238



Alberta Government

# TRS ANALYZER AUDIT

File No. 2024 - 324A

Date: October 1, 2024 Performed by: L. Tabor

## Station

Name: Cold Lake South Location: Cold Lake

Facility/Zone: LICA Operator: Bureau Veritas

Temp. 19.6°C Barometric Press. 711mmHg

## Monitor

Make/Model: Thermo 450i Serial No: 0812728560

Inlet flow (sccm): 498 Full Scale Range ppm: 0.100

Last cal. Date: September 12, 2024 Old Correction Factor: 1.000

Zero/Bkg 31.7

Span Coef 1.271

## Calibrator

Calibration Method: GAS DILUTION Make/Model: Sabio 2010

Cylinder # : T3CH4GL AMU # : 2092

CGA Date: July 9, 2024 $H_2S$ Concentration PPM: 10.14

| Calibrator Flow (sccm) | | | Calculated Conc. (ppm) | Indicated Concentration (ppm) | % Difference | |
|---|---|---|---|---|---|---|
| Air | Gas | Total | | | vs Audit Gas | Limits |
| 4896 | 0.0 | 4896 | 0.0000 | -0.0005 | | |
| 4857 | 40.9 | 4898 | 0.0847 | 0.0788 | -6% | ± 10% |
| 4886 | 20.2 | 4907 | 0.0417 | 0.0394 | -4% | ± 10% |
| 4910 | 9.9 | 4920 | 0.0204 | 0.0197 | -1% | ± 10% |
| | | | | Absolute Average Percent Difference | 4% | |

**Linear Regression Analysis:**

*y=mx+b (where x=calculated concentration, y=indicated concentration)*

| | | **LIMITS** |
|---|---|---|
| Correlation Coeff.= | 0.9999 | **≥ 0.995** |
| m (Slope)= | 0.9324 | **0.90-1.10** |
| b (Intercept as % of full scale)= | 0.1099 | **± 3% F.S.** |

**Remarks:**

AMU 1767, oxidizer AMU 1841



Alberta Government

# Non Methane Analyzer Audit

File No. 2024 - 325A

Date: October 1, 2024 Performed by: L. Tabor

**Station:**

Name: Cold Lake South Location: Cold Lake Operator: Bureau Veritas

Facility/Zone: LICA Temp. 21.9°C BP: 709mmHg

**Monitor:**

Make/Model: Thermo 55i Serial No. 1180320044

Inlet flow (sccm): na $CH_4$ Range ppm: 20.0

Last cal. Date: September 11, 2024 Non $CH_4$ Range ppm: 20.0

THC Range ppm: 40.0

Old Correction Factor: $CH_4$: 0.999

Non $CH_4$: 0.996

THC: 0.998

**Calibration Method:** Gas Dilution

**Calibrator:** Make/Model Sabio 2010 AMU# 2092

HC cylinder # T30Y8NP $CH_4$ conc. (ppm) 994.5 $CH_4$ Equiv (C3H8 only) (ppm) 827.2

CGA Date June 28, 2024 $C_3H_8$ conc. (ppm) 300.8 Total $CH_4$ Equiv. (ppm) 1821.7

| Calibrator Flows | | | Calc. Conc. | | | Indicated Concentration | | | % Difference vs Audit Gas Limit ± 10% | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Air | Gas | Total | $CH_4$ (ppm) | Non $CH_4$ (ppm) | THC (ppm) | $CH_4$ (ppm) | Non $CH_4$ (ppm) | THC (ppm) | $CH_4$ | Non $CH_4$ | THC |
| 4901 | 0.0 | 4901 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | |
| 4821 | 78.3 | 4899 | 15.89 | 13.22 | 29.11 | 15.85 | 13.37 | 29.22 | 0% | 1% | 0% |
| 4871 | 39.5 | 4910 | 8.00 | 6.66 | 14.66 | 7.99 | 6.75 | 14.74 | 0% | 1% | 1% |
| 4884 | 20.3 | 4904 | 4.12 | 3.42 | 7.54 | 4.10 | 3.43 | 7.53 | 0% | 0% | 0% |
| | | | | | Absolute Average Percent Difference | | | | 0% | 1% | 0% |

**Linear Regression Analysis:** *y=mx+b (where x=calculated concentration, y=indicated concentration)*

| | $CH_4$ | Non $CH_4$ | THC | LIMITS |
|---|---|---|---|---|
| Correlation Coeff.= | 1.0000 | 1.0000 | 1.0000 | **≥ 0.995** |
| m (Slope)= | 0.9974 | 1.0123 | 1.0042 | **0.90-1.10** |
| b (Intercept as % of FS)= | -0.0034 | -0.0493 | -0.0264 | **± 3% F.S.** |

**Remarks:**

no AMU sticker on analyzer, ZAG, or H2 generator



Alberta Government

# NO-NOx-NO2 Analyzer Audit

File No. 2024 - 326A

Date: October 1, 2024 Performed by: L. Tabor

**Station:**

Name: Cold Lake South Location: Cold Lake Operator: Bureau Veritas

Facility/Zone: LICA Temp. 20.6°C BP: 711mmHg

**Monitor:**

Make/Model: Thermo 42i Serial No. 1505664393

Inlet flow (sccm): 586 Range ppm: 0.500

Last cal. Date: September 12, 2024 Old CF: NO: 1.000

NOx: 1.002

NO2: 1.001

NO Bkg 5.5

NOx Bkg 5.6

NO Coef 1.189

NOx Coef 1.001

NO2 Coef 1.006

**Calibration Method:** Gas Dilution / GPT

**Calibrator:** Make/Model: Sabio 2010 AMU# 2270

NO cylinder # EX0015204 NO conc. ppm 52.5 NOx conc. ppm 52.6

CGA Date August 20, 2024

| Calibrator Flows | | | Calc. Conc. | | Indicated Concentration | | % Difference vs Audit Gas | |
|---|---|---|---|---|---|---|---|---|
| Air | Gas | Total | NO (ppm) | NOx (ppm) | NO (ppm) | NOx (ppm) | NO | NOx |
| 4879 | 0.0 | 4879 | 0.0000 | 0.0000 | -0.0004 | -0.0003 | Limit ± 10% | |
| 4848 | 39.9 | 4888 | 0.4282 | 0.4290 | 0.4102 | 0.4155 | -4% | -3% |
| 4873 | 19.7 | 4893 | 0.2110 | 0.2114 | 0.2038 | 0.2064 | -3% | -2% |
| 4901 | 9.7 | 4911 | 0.1041 | 0.1043 | 0.1006 | 0.1021 | -3% | -2% |
| | | | | | | Absolute Average Percent Difference | 3% | 2% |

**Linear Regression Analysis:** *y=mx+b (where x=calculated concentration, y=indicated concentration)*

| | NO | NOx | $NO_2$ | LIMITS |
|---|---|---|---|---|
| Correlation Coeff.= | 1.0000 | 1.0000 | 1.0000 | **≥ 0.995** |
| m (Slope)= | 0.9583 | 0.9685 | 1.0000 | **0.90-1.10** |
| b (Intercept as % of full scale)= | 0.0957 | 0.1242 | -0.2000 | **± 3% F.S.** |

| $O_3$ Setting | Flow Rate | Indicated Conc. (ppm) | | | NO Decrease | $NO_2$ Increase | % Difference vs Audit Gas | |
|---|---|---|---|---|---|---|---|---|
| | | NO | NOx | $NO_2$ | | | | |
| 0.000 | 4887.7 | 0.410 | 0.415 | 0.005 | | | | %Dif Limit |
| 0.300 | 4887.7 | 0.131 | 0.413 | 0.283 | 0.279 | 0.278 | 0% | ± 10% |
| 0.200 | 4887.7 | 0.224 | 0.414 | 0.190 | 0.186 | 0.185 | -1% | ± 10% |
| 0.100 | 4887.7 | 0.315 | 0.414 | 0.099 | 0.095 | 0.094 | -1% | ± 10% |
| | | | | | | Absolute Average Percent Difference | 1% | |

**Converter Efficiency**

Average Converter Efficiency 99.4%

**Remarks:** AMU 2001

# $O_3$ ANALYZER AUDIT

File No. 2024 - 327A

Date: October 1, 2024 Performed by: L. Tabor

## Station

Name: Cold Lake South Location: Cold Lake

Facility/Zone: LICA Operator: Bureau Veritas

Temp. 21.9°C Barometric Press. 709mmHg

## Monitor

Make/Model: Thermo 49i Serial No: 1002240372

Inlet flow (sccm): 747/718 Full Scale Range ppm: 0.500

Last cal. Date: September 11, 2024 Old Correction Factor: 1.000

Zero/Bkg -0.1

Span Coeff. 1.004

## Calibrator

Calibration Method: Generator

Make/Model: Thermo 49i-PS AMU # : 2247

NO cylinder # : na NO concentration ppm: na

| Ozone Setting PPB/Current | Calibrator Flow (sccm) Air | Gas | Total | Calculated Conc. (ppm) | Indicated Conc. (ppm) | % Difference vs Audit Gas | % Difference Limits |
|---|---|---|---|---|---|---|---|
| 0 | na | | na | 0.0000 | -0.0003 | | |
| 400 | na | | na | 0.4000 | 0.4068 | 2% | ± 10% |
| 200 | na | | na | 0.2000 | 0.2036 | 2% | ± 10% |
| 100 | na | | na | 0.1000 | 0.1018 | 2% | ± 10% |
| | | | | Absolute Average Percent Difference | | 2% | |

**Linear Regression Analysis:**

*y=mx+b (where x=calculated concentration, y=indicated concentration)*

| | | **LIMITS** |
|---|---|---|
| Correlation Coeff.= | 1.0000 | **≥ 0.995** |
| m (Slope)= | 1.0176 | **0.90-1.10** |
| b (Intercept as % of full scale)= | -0.0200 | **± 3% F.S.** |

**Remarks:**

no AMU sticker



Alberta Government

# Teledyne API T-640 Instrument Audit

**File No.** 2024 - 328A

**Date:** October 1, 2024 **Performed by:** L. Tabor

## Station

| | | | |
|---|---|---|---|
| Name: | Cold Lake South | Location: | Cold Lake |
| Site Name: | Cold Lake South | Operator: | Bureau Veritas |
| Station Temperature: | 21.9°C | Station Pressure: | 709mmHg |
| Last Audit: | September 12, 2024 | | |

## Calibration Flowmeter Standard

| | |
|---|---|
| Make/Model: | Delta Cal |
| Serial Number: | 1002 |

## Instrument Details

| | |
|---|---|
| Make/Model | Teledyne T640 |
| AMU # | na |
| S/N # | 575 |
| DOE # | na |

## As-found Recordings

| | |
|---|---|
| Flow (l/min) | 4.98 |
| PM2.5 (ug/m3) | 2.6 |
| Pump PMW (%) | 40 |
| Sample RH (%) | 21.6 |
| Temp (°C) | 8.7 |
| Press (mmHg) | 706.1 |

## Zero Test (Leak Check)

PM2.5 Reading (ug/m3): 0.0

Time to reach zero **(min)**: 10 seconds

**(must read 0.0 for leak check to pass)**

## Ambient Temperature

| | *(°C)* | Acceptable (°C) | Result (°C) |
|---|---|---|---|
| T640 Temp | 8.7 | | |
| Measured Temp | 9.01 | 2.0 | 0.3 |

## Ambient Pressure

| | *(mmHg)* | Acceptable | Result |
|---|---|---|---|
| T640 Pressure | 706.2 | | |
| Measured Press | 706.0 | 5% | 0% |

## Flow Audit

| | | | |
|---|---|---|---|
| T640 Flow (l/min) | 4.98 | Acceptable | |
| Measure Flow (l/min) | 4.89 | 5.0 LPM ± 0.25LPM | 0.09 |

## PMT Performance Check

| | | | |
|---|---|---|---|
| Span Dust Lot # | 100128-050-036 | Last Checked | July 12, 2024 |
| Span Dust Peak at Channel | 10.9 | Peak Channel Reading | 11.0 |
| Expiry Date | 12-28-2023 | PMT Setting (V) | As-found: 1432 / As-left: 1432 |

**(Adjust PMT if reading > ± 0.5)**

**Remarks:**

disposable filter very dirty, recommend changing more frequently

no AMU sticker

**Reviewed By:**

| Preventative Maintenance | Due |
|---|---|
| Sample Inlet Cleaning | July 12, 2024 |
| DFU Replacement | April 7, 2024 |
| Optical Chamber Cleaning | July 12, 2024 |

# Station Performance Audit Summary

Company: LICA

Facility Name: Cold Lake South

Approval No.: N/A

Site Name: Cold Lake South

Region: Lower Athabasca

District: Cold Lake

Parameters audited:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| TRS | **X** | $SO_2$ | **X** | $NO_x$ | **X** | $NH_3$ | |
| CO | | $CH_4$ | **X** | Non$CH_4$ | **X** | THC | **X** |
| PM2.5 | **X** | PM10 | | TSP | | W. Speed | **X** |
| W. Direction | **X** | Amb Tmp | **X** | Stn. Temp | **X** | RH | **X** |
| $O_3$ | **X** | Ethylene | | BTEX | | SR | |
| Rainfall | | Precip | | VWS | | Other | |
| All parameters monitored as per approval: | | | | Yes / No | | N/A | **X** |

| *GENERAL* | YES | NO | N/A |
|---|---|---|---|
| Has the location remained unchanged from previous audit? | X | | |
| Is site secure? | X | | |
| Are station operating conditions adequate? | X | | |

| *DATA ACQUISITION* | | | |
|---|---|---|---|
| Are strip charts in use? | | X | |
| Is a telemetry system for data acquisition in use? | | X | |

| *SYSTEM COMPONENTS* | | | |
|---|---|---|---|
| Is a glass sampling manifold installed? | X | | |
| Is sampling manifold clean? | X | | |
| Is a manifold trap in place? | X | | |
| Are spare manifold ports capped | X | | |
| Is manifold oriented so it is not exactly horizontal? | X | | |
| Are manifold ports situated to prevent water entering monitors? | X | | |
| Is manifold pump properly installed and operative? | X | | |
| Do sample lines extend at least 3/4"into manifold? | X | | |
| Are monitor sampling lines connected to manifold? | X | | |
| Are sampling lines clean? | X | | |
| Are monitors properly mounted and secure? | X | | |
| Are monitors properly exhausted from room or scrubbed? | X | | |
| Are zero and span systems operational? | X | | |

| *WIND EQUIPMENT* | | | |
|---|---|---|---|
| Is wind sensor properly oriented? | X | | |
| Does wind equipment appear to be functioning properly? | X | | |
| Date of last calibration. Date: August 24, 2024 | | | |

*COMMENTS:* Station used for storage, significantly more spare equipment and supplies compared to other stations. Housekeeping recommended.

AUDITOR: Laura Tabor

DATE: October 1, 2024



Alberta Government

# Station Site Documents Audit Checklist

**Station**

Name: Cold Lake South  Location: Cold Lake

Facility/Zone: LICA  Operator: Bureau Veritas

**Required Elements of AMD Chapter 3 *SS 4-B***

Do the Site Documents Contain the Following:

| | Meets AMD | | NA | Current | |
|---|---|---|---|---|---|
| | YES | NO | | YES | NO |
| (a) Name of Owner/ Approval Holder | X | | | | |
| (b) Name of Operating Agency | X | | | | |
| (c) Contact Information | X | | | | |
| (d) Date the Site or Station was Established | X | | | | |
| (e) Date the information was last updated | X | | | | |
| (f) Location including Latitude and Longitude | X | | | | |
| (g) Four Colour Photos Looking N, E, S, W From Manifold Inlet | X | | | | |
| (h) Additional Photos/Sketches of AMD Standard Site Non-Conformance | X | | | | |
| (i) List of Instruments Located at the Site | X | | | | |
| (j) Site Description Including the following: | | | | | |
| (i) Land Use By Sector | | X | | | |
| (ii) Site Elevation | | X | | | |
| (iii) Greatest Angle of Elevation & Direction to Nearby Buildings | X | | | | |
| (iv) Average Building height in the area | | X | | | |
| (v) Distance to Nearest Trees | X | | | | |

**Required Elements of AMD Chapter 3 *SS 4-D***

Do the Station Site Documents Contain the Following:

| | Meets AMD | | NA | Current | |
|---|---|---|---|---|---|
| | YES | NO | | YES | NO |
| (a) Recent Area Map Covering Approximately 1Km$^2$ | X | | | | |
| (b) Plan View Sketch | X | | | | |
| (c) Cross-Sectional Sketch of Area Within 500 m Radius | X | | | | |
| (d) Colour Photos Showing Sample Manifold/Inlet | X | | | | |
| (e) Colour Photo of the Station | X | | | | |
| (f) Additional Photos/Sketches of AMD Standard Station Non-Conformance | X | | | | |

*COMMENTS:* Land use listed, but not by sector.

AUDITOR: Laura Tabor  DATE: October 1, 2024

# Network Site Documents Audit Checklist

**Network**

Name: Cold Lake South  Location: Cold Lake

Facility/Zone: LICA  Operator: Bureau Veritas

**Required Elements of AMD Chapter 3 *SS 4-C***

Do the Network Site Documents Contain the Following:

| | Meets AMD YES | Meets AMD NO | NA | Current YES | Current NO |
|---|---|---|---|---|---|
| (a) A Recent Area Map Showing the Following: | | | | | |
| (i) Station Locations | X | | | | |
| (ii) Roadways | | X | | | |
| (iii) Railway Lines | | X | | | |
| (iv) Airports | | X | | | |
| (v) Lakes | X | | | | |
| (vi) Rivers | X | | | | |
| (vii) Human Settlements | X | | | | |
| (viii) Locations of Identified Industrial & Non-Industrial Pollutant Sources | X | | | | |
| (ix) Other Significant Landmarks | X | | | | |
| ( b) A windrose for each Continuous Ambient Air Monitoring Station | X | | | | |

*COMMENTS:* _____

AUDITOR: Laura Tabor  DATE: October 1, 2024

# Station Checklist

## Station

Name: Cold Lake South  Location: Cold Lake

Facility/Zone: LICA  Operator: Bureau Veritas

| | Yes | No | N/A |
|---|---|---|---|
| Are all Particulate Sampler Heads put back in the correct | X | | |
| Has the existing or new TEOM filter been installed? | | | X |
| Has the flow bypass line on Teom Been reinstalled? | | | X |
| Has the Sharp Filter Tape been installed back on spool? | | | X |
| Has the BAM sampler been put back into the sample mode? | | | X |
| Have all intermittent particulate samplers been returned to an as found condition? | | | X |
| Have all sample lines been reconnected as found? | X | | |
| Have all parameters that were marked down on the DAS been marked up? | X | | |
| Are all ambient gas analyzers back in sample mode? | X | | |
| Is everything left as it was at the start of the audit? | X | | |
| Is the station properly secured upon departure? | X | | |

Auditor: Laura Tabor  Date: October 1, 2024

Print

Signature

Operator: Chris Wesson  Date: October 1, 2024

Print

Signature



Alberta Government

# STATION AUDIT

File No. 2024 - 329A - 334A

Date: October 2, 2024 Performed by: L. Tabor

## Station

Name: Tamarack Location: La Corey

Facility/Zone: LICA Operator: Bureau Veritas

Temp: 21.0°C Barometric Press: 706mmHg

## Location

| | |
|---|---|
| Latitude N | 54° 36' 18.57" |
| Longitude W | 110° 27' 09.74" |
| Elevation | 618m |
| Status of Site Documentation | Good |
| Status of Network Documentation | Good |
| Status of QAP | Good |

| | |
|---|---|
| Manifold Material | Glass |
| Manifold Condition | Good |

## Meteorological

| | Observed | Audit Value |
|---|---|---|
| Wind Speed Direction | 15.5kph, 303.6° | 15-20kph, NW |
| Station Temperature | 22.2°C | 22.17°C |
| Relative Humidity | 60.7% | 52.36% |
| Ambient Temperature | 1.7°C | 2.65°C |
| Solar Radiation | na | na |
| Precipitation | na | na |

**Remarks:**



Alberta Government

# $SO_2$ ANALYZER AUDIT

File No. 2024 - 329A

Date: October 1, 2024 Performed by: L. Tabor

## Station

Name: Tamarack Location: La Corey

Facility/Zone: LICA Operator: Bureau Veritas

Temp. 21.0°C Barometric Press. 706mmHg

## Monitor

Make/Model: Thermo 43i-TLE Serial No: 1180930031

Inlet flow (sccm): 418 Full Scale Range ppm: 0.500

Last cal. Date: September 17, 2024 Old Correction Factor: 1.001

Zero/Bkg 2.89

Span Coef 1.019

## Calibrator

Calibration Method: GAS DILUTION Make/Model: Sabio 2010

Cylinder # : T1XY16R AMU # : 2092

CGA Date: June 25, 2024 $SO_2$ Concentration PPM: 50.48

| Calibrator Flow (sccm) | | | Calculated Conc. (ppm) | Indicated Concentration (ppm) | % Difference | |
|---|---|---|---|---|---|---|
| Air | Gas | Total | | | vs Audit Gas | Limits |
| 4919 | 0.0 | 4919 | 0.000 | 0.000 | | |
| 4882 | 40.0 | 4922 | 0.410 | 0.406 | -1% | ± 10% |
| 4897 | 20.5 | 4918 | 0.211 | 0.207 | -2% | ± 10% |
| 4921 | 10.7 | 4932 | 0.110 | 0.108 | -1% | ± 10% |
| | | | | Absolute Average Percent Difference | 1% | |

**Linear Regression Analysis:**

*y=mx+b (where x=calculated concentration, y=indicated concentration)*

| | | **LIMITS** |
|---|---|---|
| Correlation Coeff.= | 1.0000 | **≥ 0.995** |
| m (Slope)= | 0.9895 | **0.90-1.10** |
| b (Intercept as % of full scale)= | -0.0990 | **± 3% F.S.** |

**Remarks:**



Alberta Government

# $H_2S$ ANALYZER AUDIT

File No. 2024 - 330A

Date: October 2, 2024 Performed by: L. Tabor

## Station

Name: Tamarack Location: La Corey

Facility/Zone: LICA Operator: Bureau Veritas

Temp. 21.0°C Barometric Press. 706mmHg

## Monitor

Make/Model: Thermo 450i Serial No: CM17360005

Inlet flow (sccm): 999 Full Scale Range ppm: 0.100

Last cal. Date: September 17, 2024 Old Correction Factor: 1.000

Zero/Bkg 44.1

Span Coef 0.864

## Calibrator

Calibration Method: GAS DILUTION Make/Model: Sabio 2010

Cylinder # : T3CH4GL AMU # : 2092

CGA Date: July 9, 2024 $H_2S$ Concentration PPM: 10.14

| Calibrator Flow (sccm) | | | Calculated Conc. (ppm) | Indicated Concentration (ppm) | % Difference | |
|---|---|---|---|---|---|---|
| Air | Gas | Total | | | vs Audit Gas | Limits |
| 4919 | 0.0 | 4919 | 0.0000 | 0.0002 | | |
| 4881 | 41.0 | 4922 | 0.0844 | 0.0886 | 5% | ± 10% |
| 4897 | 20.4 | 4918 | 0.0422 | 0.0442 | 4% | ± 10% |
| 4922 | 10.0 | 4932 | 0.0206 | 0.0222 | 7% | ± 10% |
| | | | | Absolute Average Percent Difference | 5% | |

**Linear Regression Analysis:**

*y=mx+b (where x=calculated concentration, y=indicated concentration)*

| | | LIMITS |
|---|---|---|
| Correlation Coeff.= | 1.0000 | **≥ 0.995** |
| m (Slope)= | 1.0449 | **0.90-1.10** |
| b (Intercept as % of full scale)= | 0.3499 | **± 3% F.S.** |

**Remarks:**



Alberta Government

# Non Methane Analyzer Audit

File No. 2024 - 331A

Date: October 2, 2024 Performed by: L. Tabor

**Station:**

Name: Tamarack Location: La Corey Operator: Bureau Veritas

Facility/Zone: LICA Temp. 21.2°C BP: 707mmHg

**Monitor:**

Make/Model: Thermo 55i Serial No. 1505664392

Inlet flow (sccm): na $CH_4$ Range ppm: 20.0

Last cal. Date: September 18, 2024 Non $CH_4$ Range ppm: 20.0

THC Range ppm: 40.0

Old Correction Factor: $CH_4$: 1.001

Non $CH_4$: 1.001

THC: 1.001

**Calibration Method:** Gas Dilution

**Calibrator:** Make/Model Sabio 2010 AMU# 2092

HC cylinder # T30Y8NP $CH_4$ conc. (ppm) 994.5 $CH_4$ Equiv ($C_3H_8$ only) (ppm) 827.2

CGA Date June 28, 2024 $C_3H_8$ conc. (ppm) 300.8 Total $CH_4$ Equiv. (ppm) 1821.7

| Calibrator Flows | | | Calc. Conc. | | | Indicated Concentration | | | % Difference vs Audit Gas | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $CH_4$ | Non $CH_4$ | THC | $CH_4$ | Non $CH_4$ | THC | Limit ± 10% | | |
| Air | Gas | Total | (ppm) | (ppm) | (ppm) | (ppm) | (ppm) | (ppm) | $CH_4$ | Non $CH_4$ | THC |
| 4912 | 0.0 | 4912 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | |
| 4832 | 79.1 | 4911 | 16.02 | 13.32 | 29.34 | 15.69 | 13.08 | 28.78 | -2% | -2% | -2% |
| 4868 | 39.8 | 4908 | 8.07 | 6.71 | 14.78 | 7.96 | 6.61 | 14.56 | -1% | -1% | -1% |
| 4891 | 20.2 | 4911 | 4.10 | 3.41 | 7.50 | 4.08 | 3.39 | 7.47 | 0% | -1% | 0% |
| | | | | | Absolute Average Percent Difference | | | | 1% | 1% | 1% |

**Linear Regression Analysis:** *y=mx+b (where x=calculated concentration, y=indicated concentration)*

| | **$CH_4$** | **Non $CH_4$** | **THC** | **LIMITS** |
|---|---|---|---|---|
| Correlation Coeff.= | 1.0000 | 1.0000 | 1.0000 | **≥ 0.995** |
| m (Slope)= | 0.9785 | 0.9807 | 0.9798 | **0.90-1.10** |
| b (Intercept as % of FS)= | 0.1941 | 0.1136 | 0.1438 | **± 3% F.S.** |

**Remarks:**

# NO-NOx-NO2 Analyzer Audit

File No. 2024 - 332A

Date: October 2, 2024 Performed by: L. Tabor

**Station:**

Name: Tamarack Location: La Corey Operator: Bureau Veritas

Facility/Zone: LICA Temp. 21.0°C BP: 706mmHg

**Monitor:**

Make/Model: Thermo 42i Serial No. 1180930028

Inlet flow (sccm): 531 Range ppm: 0.500

Last cal. Date: September 17, 2024 Old CF: NO: 1.002

NOx: 1.002

NO2: 1.001

NO Bkg 2.7

NOx Bkg 2.9

NO Coef 1.602

NOx Coef 0.998

NO2 Coef 1.009

**Calibration Method:** Gas Dilution / GPT

**Calibrator:** Make/Model: Sabio 2010 AMU# 2270

NO cylinder # EX0015204 NO conc. ppm 52.5 NOx conc. ppm 52.6

CGA Date August 20, 2024

| Calibrator Flows | | | Calc. Conc. | | Indicated Concentration | | % Difference vs Audit Gas | |
|---|---|---|---|---|---|---|---|---|
| Air | Gas | Total | NO (ppm) | NOx (ppm) | NO (ppm) | NOx (ppm) | NO | NOx |
| 4908 | 0.0 | 4908 | 0.0000 | 0.0000 | -0.0001 | -0.0001 | Limit ± 10% | |
| 4873 | 39.9 | 4913 | 0.4264 | 0.4272 | 0.4033 | 0.4088 | -5% | -4% |
| 4891 | 19.7 | 4911 | 0.2104 | 0.2108 | 0.2001 | 0.2028 | -5% | -4% |
| 4921 | 9.8 | 4931 | 0.1042 | 0.1044 | 0.0989 | 0.1002 | -5% | -4% |
| | | | | | | Absolute Average Percent Difference | 5% | 4% |

**Linear Regression Analysis:** *y=mx+b (where x=calculated concentration, y=indicated concentration)*

| | NO | NOx | $NO_2$ | LIMITS |
|---|---|---|---|---|
| Correlation Coeff.= | 1.0000 | 1.0000 | 1.0000 | **≥ 0.995** |
| m (Slope)= | 0.9460 | 0.9571 | 1.0000 | **0.90-1.10** |
| b (Intercept as % of full scale)= | 0.0592 | 0.0551 | -0.4000 | **± 3% F.S.** |

| $O_3$ Setting | Flow Rate | Indicated Conc. (ppm) | | | NO Decrease | $NO_2$ Increase | % Difference vs Audit Gas | |
|---|---|---|---|---|---|---|---|---|
| | | NO | NOx | $NO_2$ | | | | |
| 0.000 | 4913.4 | 0.403 | 0.407 | 0.005 | | | | %Dif Limit |
| 0.300 | 4913.4 | 0.126 | 0.406 | 0.280 | 0.277 | 0.275 | -1% | ± 10% |
| 0.200 | 4913.4 | 0.219 | 0.406 | 0.187 | 0.184 | 0.182 | -1% | ± 10% |
| 0.100 | 4913.4 | 0.307 | 0.406 | 0.099 | 0.096 | 0.094 | -2% | ± 10% |
| | | | | | | Absolute Average Percent Difference | 1% | |

**Converter Efficiency**

Average Converter Efficiency 98.7%

**Remarks:**



Alberta Government

# $O_3$ ANALYZER AUDIT

File No. 2024 - 333A

Date: October 2, 2024 Performed by: L. Tabor

## Station

Name: Tamarack Location: La Corey

Facility/Zone: LICA Operator: Bureau Veritas

Temp. 21.2°C Barometric Press. 707mmHg

## Monitor

Make/Model: Thermo 49iQ Serial No: 12208316585

Inlet flow (sccm): 1300 Full Scale Range ppm: 0.500

Last cal. Date: September 18, 2024 Old Correction Factor: 1.001

Zero/Bkg 2.3

Span Coeff. 1.010

## Calibrator

Calibration Method: Generator

Make/Model: Thermo 49i-PS AMU # : 2247

NO cylinder # : na NO concentration ppm: na

| Ozone Setting PPB/Current | Calibrator Flow (sccm) Air | Gas | Total | Calculated Conc. (ppm) | Indicated Conc. (ppm) | % Difference vs Audit Gas | % Difference Limits |
|---|---|---|---|---|---|---|---|
| 0 | na | | na | 0.0000 | -0.0006 | | |
| 400 | na | | na | 0.4000 | 0.4005 | 0% | ± 10% |
| 200 | na | | na | 0.2000 | 0.2009 | 1% | ± 10% |
| 100 | na | | na | 0.1000 | 0.1006 | 1% | ± 10% |
| | | | | Absolute Average Percent Difference | | 1% | |

**Linear Regression Analysis:**

*y=mx+b (where x=calculated concentration, y=indicated concentration)*

| | | **LIMITS** |
|---|---|---|
| Correlation Coeff.= | 1.0000 | **≥ 0.995** |
| m (Slope)= | 1.0022 | **0.90-1.10** |
| b (Intercept as % of full scale)= | -0.0080 | **± 3% F.S.** |

**Remarks:**

Zero dropped to -0.0267 before climbing back up to typical zero values



Alberta Government

# SHARP 5030 ANALYZER AUDIT

File No. 2024 - 334A

Date: October 2, 2024 Performed by: L. Tabor

## Station

Name: Tamarack Location: La Corey

Facility/Zone: LICA Operator: Bureau Veritas

## Monitor

Make/Model: Sharp 5030 Serial No: CM-2209

## Flow Audit Transfer Standard

Make/Model Delta Cal Cell s/n na

Serial # 1002

## Foil Kit

Foiil Set No. CM1608 Certificate Date na

## Sample Flow

| | | | | | |
|---|---|---|---|---|---|
| Set Pt.(LPH) | 1000 | Converted to LPM | 16.7 | Limit(+/-10%) | |
| Indicated | 1000 | | 16.7 | | 1.0% |
| Conv Meas Flow | 1010 | | 16.8 | Measured | 16.8 |

## Leak Check

| | | | | | |
|---|---|---|---|---|---|
| Starting value | 1010 | Lph | Flow | 16.84 | (LPM) |
| Leak Check | 1003 | Lph | Flow | 16.71 | (LPM) |
| Adapter | | | Flow | -0.8% | (LPM+/- 5.0% or 0.8lpm) |

## Sensors

| | Sharp | Audit | Difference | Tolerance |
|---|---|---|---|---|
| T1 - Amb Tmp°C | 4 | 3.5 | -0.5 | (+/- 2°C) |
| Amb Press(hPa) | 939 | 938.6 | -0.4 | (+/-13.33hPa) |

## Background Zero

| | Analog | Neph(µg/m³) | Limit | Conc |
|---|---|---|---|---|
| With Hepa | 173 | 0.7 | (<+/- 2 µg/m³) | 0.7 |

## Mass Foil Audit (Sensitivity)

| | Old Factor | New Factor | Difference | Limit |
|---|---|---|---|---|
| Span Value | 6977 | 7092 | 2% | (+/- 5%) |

Comments



Alberta Government

# Station Performance Audit Summary

Company: LICA

Facility Name: Imperial Oil Resources

Approval No.: N/A

Site Name: Tamarack

Region: Lower Athabasca

District: Cold Lake

Parameters audited:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $H_2S$ | **X** | $SO_2$ | **X** | $NO_x$ | **X** | $NH_3$ | |
| CO | | $CH_4$ | **X** | $NonCH_4$ | **X** | THC | **X** |
| PM2.5 | **X** | PM10 | | TSP | | W. Speed | **X** |
| W. Direction | **X** | Amb Tmp | **X** | Stn. Temp | **X** | RH | **X** |
| $O_3$ | **X** | Ethylene | | BTEX | | SR | |
| Rainfall | | Precip | | VWS | | Other | |
| All parameters monitored as per approval: | | | | Yes / No | | N/A | **X** |

| *GENERAL* | YES | NO | N/A |
|---|---|---|---|
| Has the location remained unchanged from previous audit? | X | | |
| Is site secure? | X | | |
| Are station operating conditions adequate? | X | | |

| *DATA ACQUISITION* | | | |
|---|---|---|---|
| Are strip charts in use? | | X | |
| Is a telemetry system for data acquisition in use? | | X | |

| *SYSTEM COMPONENTS* | | | |
|---|---|---|---|
| Is a glass sampling manifold installed? | X | | |
| Is sampling manifold clean? | X | | |
| Is a manifold trap in place? | X | | |
| Are spare manifold ports capped | X | | |
| Is manifold oriented so it is not exactly horizontal? | X | | |
| Are manifold ports situated to prevent water entering monitors? | X | | |
| Is manifold pump properly installed and operative? | X | | |
| Do sample lines extend at least 3/4"into manifold? | X | | |
| Are monitor sampling lines connected to manifold? | X | | |
| Are sampling lines clean? | X | | |
| Are monitors properly mounted and secure? | X | | |
| Are monitors properly exhausted from room or scrubbed? | X | | |
| Are zero and span systems operational? | X | | |

| *WIND EQUIPMENT* | | | |
|---|---|---|---|
| Is wind sensor properly oriented? | X | | |
| Does wind equipment appear to be functioning properly? | X | | |
| Date of last calibration. Date: August 23, 2024 | | | |

*COMMENTS:*

AUDITOR: Laura Tabor

DATE: October 2, 2024



Alberta Government

# Station Site Documents Audit Checklist

**Station**

Name: Tamarack Location: La Corey

Facility/Zone: LICA Operator: Bureau Veritas

**Required Elements of AMD Chapter 3 *SS 4-B***

Do the Site Documents Contain the Following:

| | Meets AMD | | NA | Current | |
|---|---|---|---|---|---|
| | YES | NO | | YES | NO |
| (a) Name of Owner/ Approval Holder | X | | | | |
| (b) Name of Operating Agency | X | | | | |
| (c) Contact Information | X | | | | |
| (d) Date the Site or Station was Established | X | | | | |
| (e) Date the information was last updated | X | | | | |
| (f) Location including Latitude and Longitude | X | | | | |
| (g) Four Colour Photos Looking N, E, S, W From Manifold Inlet | X | | | | |
| (h) Additional Photos/Sketches of AMD Standard Site Non-Conformance | X | | | | |
| (i) List of Instruments Located at the Site | X | | | | |
| (j) Site Description Including the following: | | | | | |
| (i) Land Use By Sector | | X | | | |
| (ii) Site Elevation | | X | | | |
| (iii) Greatest Angle of Elevation & Direction to Nearby Buildings | X | | | | |
| (iv) Average Building height in the area | | X | | | |
| (v) Distance to Nearest Trees | X | | | | |

**Required Elements of AMD Chapter 3 *SS 4-D***

Do the Station Site Documents Contain the Following:

| | Meets AMD | | NA | Current | |
|---|---|---|---|---|---|
| | YES | NO | | YES | NO |
| (a) Recent Area Map Covering Approximately 1Km$^2$ | X | | | | |
| (b) Plan View Sketch | X | | | | |
| (c) Cross-Sectional Sketch of Area Within 500 m Radius | X | | | | |
| (d) Colour Photos Showing Sample Manifold/Inlet | X | | | | |
| (e) Colour Photo of the Station | X | | | | |
| (f) Additional Photos/Sketches of AMD Standard Station Non-Conformance | X | | | | |

*COMMENTS:* Add land use by sector.

AUDITOR: Laura Tabor DATE: October 2, 2024



Alberta Government

# Network Site Documents Audit Checklist

**Network**

Name: Tamarack Location: La Corey

Facility/Zone: LICA Operator: Bureau Veritas

**Required Elements of AMD Chapter 3 *SS 4-C***

Do the Network Site Documents Contain the Following:

| | Meets AMD YES | Meets AMD NO | NA | Current YES | Current NO |
|---|---|---|---|---|---|
| (a) A Recent Area Map Showing the Following: | | | | | |
| (i) Station Locations | X | | | | |
| (ii) Roadways | | X | | | |
| (iii) Railway Lines | | X | | | |
| (iv) Airports | | X | | | |
| (v) Lakes | X | | | | |
| (vi) Rivers | X | | | | |
| (vii) Human Settlements | X | | | | |
| (viii) Locations of Identified Industrial & Non-Industrial Pollutant Sources | X | | | | |
| (ix) Other Significant Landmarks | X | | | | |
| ( b) A windrose for each Continuous Ambient Air Monitoring Station | X | | | | |

*COMMENTS:* _____

AUDITOR: Laura Tabor DATE: October 2, 2024



Alberta Government

# Station Checklist

## Station

Name: Tamarack Location: La Corey

Facility/Zone: LICA Operator: Bureau Veritas

| | Yes | No | N/A |
|---|---|---|---|
| Are all Particulate Sampler Heads put back in the correct | X | | |
| Has the existing or new TEOM filter been installed? | | | X |
| Has the flow bypass line on Teom Been reinstalled? | | | X |
| Has the Sharp Filter Tape been installed back on spool? | X | | |
| Has the BAM sampler been put back into the sample mode? | | | X |
| Have all intermittent particulate samplers been returned to an as found condition? | | | X |
| Have all sample lines been reconnected as found? | X | | |
| Have all parameters that were marked down on the DAS been marked up? | X | | |
| Are all ambient gas analyzers back in sample mode? | X | | |
| Is everything left as it was at the start of the audit? | X | | |
| Is the station properly secured upon departure? | X | | |

Auditor: Laura Tabor Date: October 2, 2024

Print

Signature

Operator: Chris Wesson Date: October 2, 2024

Print

Signature



Alberta Government

# STATION AUDIT

File No. 2024 - 335A - 339A

Date: October 3, 2024 Performed by: L. Tabor

## Station

Name: St Lina Location: St Lina

Facility/Zone: LICA Operator: Bureau Veritas

Temp: 20.4°C Barometric Press: 704mmHg

## Location

| | |
|---|---|
| Latitude N | 54° 12' 59.36" |
| Longitude W | 111° 30' 09.45" |
| Elevation | 693m |
| Status of Site Documentation | Good |
| Status of Network Documentation | Good |
| Status of QAP | Good |

| | |
|---|---|
| Manifold Material | Glass |
| Manifold Condition | Good |

## Meteorological

| | Observed | Audit Value |
|---|---|---|
| Wind Speed Direction | 15.7kph, 282.7° | 10-15kph, W |
| Station Temperature | 24.7°C | 25.10°C |
| Relative Humidity | 68.9% | 63.88% |
| Ambient Temperature | 2.8°C | 3.01°C |
| Solar Radiation | na | na |
| Precipitation | na | na |

**Remarks:**



Alberta Government

# $SO_2$ ANALYZER AUDIT

File No. 2024 - 335A

Date: October 3, 2024 Performed by: L. Tabor

## Station

Name: St Lina Location: St Lina

Facility/Zone: LICA Operator: Bureau Veritas

Temp. 20.4°C Barometric Press. 704mmHg

## Monitor

Make/Model: Thermo 43i-TLE Serial No: 1180930030

Inlet flow (sccm): 431 Full Scale Range ppm: 0.500

Last cal. Date: September 23, 2024 Old Correction Factor: 1.006

Zero/Bkg 4.43

Span Coef 0.912

## Calibrator

Calibration Method: GAS DILUTION Make/Model: Sabio 2010

Cylinder # : T1XY16R AMU # : 2092

CGA Date: June 25, 2024 $SO_2$ Concentration PPM: 50.48

| Calibrator Flow (sccm) | | | Calculated Conc. (ppm) | Indicated Concentration (ppm) | % Difference | |
|---|---|---|---|---|---|---|
| Air | Gas | Total | | | vs Audit Gas | Limits |
| 4901 | 0.0 | 4901 | 0.000 | 0.000 | | |
| 4867 | 40.1 | 4907 | 0.413 | 0.403 | -2% | ± 10% |
| 4900 | 20.2 | 4920 | 0.207 | 0.205 | -1% | ± 10% |
| 4920 | 10.6 | 4930 | 0.108 | 0.107 | -1% | ± 10% |
| | | | | Absolute Average Percent Difference | 1% | |

**Linear Regression Analysis:**

*y=mx+b (where x=calculated concentration, y=indicated concentration)*

| | | **LIMITS** |
|---|---|---|
| Correlation Coeff.= | 1.0000 | **≥ 0.995** |
| m (Slope)= | 0.9757 | **0.90-1.10** |
| b (Intercept as % of full scale)= | 0.2305 | **± 3% F.S.** |

**Remarks:**



Alberta Government

# $H_2S$ ANALYZER AUDIT

File No. 2024 - 336A

Date: October 3, 2024 Performed by: L. Tabor

## Station

Name: St Lina Location: St Lina

Facility/Zone: LICA Operator: Bureau Veritas

Temp. 20.4°C Barometric Press. 704mmHg

## Monitor

Make/Model: Thermo 450i Serial No: CM18010058

Inlet flow (sccm): 801 Full Scale Range ppm: 0.100

Last cal. Date: September 14, 2024 Old Correction Factor: 0.999

Zero/Bkg 82.4

Span Coef 1.009

## Calibrator

Calibration Method: GAS DILUTION Make/Model: Sabio 2010

Cylinder # : T3CH4GL AMU # : 2092

CGA Date: July 9, 2024 $H_2S$ Concentration PPM: 10.14

| Calibrator Flow (sccm) | | | Calculated Conc. (ppm) | Indicated Concentration (ppm) | % Difference | |
|---|---|---|---|---|---|---|
| Air | Gas | Total | | | vs Audit Gas | Limits |
| 4901 | 0.0 | 4901 | 0.0000 | -0.0005 | | |
| 4867 | 40.1 | 4907 | 0.0828 | 0.0829 | 1% | ± 10% |
| 4900 | 20.3 | 4920 | 0.0419 | 0.0416 | 1% | ± 10% |
| 4920 | 10.0 | 4930 | 0.0205 | 0.0197 | -2% | ± 10% |
| | | | | Absolute Average Percent Difference | 0% | |

**Linear Regression Analysis:**

*y=mx+b (where x=calculated concentration, y=indicated concentration)*

| | | **LIMITS** |
|---|---|---|
| Correlation Coeff.= | 1.0000 | **≥ 0.995** |
| m (Slope)= | 1.0090 | **0.90-1.10** |
| b (Intercept as % of full scale)= | -0.7032 | **± 3% F.S.** |

**Remarks:**



Alberta Government

# Non Methane Analyzer Audit

File No. 2024 - 337A

Date: October 3, 2024 Performed by: L. Tabor

**Station:**

Name: St Lina Location: St Lina Operator: Bureau Veritas

Facility/Zone: LICA Temp. 22.9°C BP: 704mmHg

**Monitor:**

Make/Model: Thermo 55i Serial No. 1180930025

Inlet flow (sccm): na $CH_4$ Range ppm: 20.0

Last cal. Date: October 1, 2024 Non $CH_4$ Range ppm: 20.0

THC Range ppm: 40.0

Old Correction Factor: $CH_4$: 1.002

Non $CH_4$: 0.998

THC: 1.000

**Calibration Method:** Gas Dilution

**Calibrator:** Make/Model Sabio 2010 AMU# 2092

HC cylinder # T30Y8NP $CH_4$ conc. (ppm) 994.5 $CH_4$ Equiv ($C_3H_8$ only) (ppm) 827.2

CGA Date June 28, 2024 $C_3H_8$ conc. (ppm) 300.8 Total $CH_4$ Equiv. (ppm) 1821.7

| Calibrator Flows | | | Calc. Conc. | | | Indicated Concentration | | | % Difference vs Audit Gas Limit ± 10% | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Air | Gas | Total | $CH_4$ (ppm) | Non $CH_4$ (ppm) | THC (ppm) | $CH_4$ (ppm) | Non $CH_4$ (ppm) | THC (ppm) | $CH_4$ | Non $CH_4$ | THC |
| 4917 | 0.0 | 4917 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | |
| 4839 | 78.8 | 4918 | 15.94 | 13.26 | 29.20 | 15.76 | 13.55 | 29.31 | -1% | 2% | 0% |
| 4882 | 39.8 | 4922 | 8.05 | 6.69 | 14.74 | 7.88 | 6.83 | 14.71 | -2% | 2% | 0% |
| 4902 | 20.3 | 4923 | 4.11 | 3.42 | 7.52 | 3.99 | 3.47 | 7.46 | -3% | 2% | -1% |
| | | | | | Absolute Average Percent Difference | | | | 2% | 2% | 0% |

**Linear Regression Analysis:** *y=mx+b (where x=calculated concentration, y=indicated concentration)*

| | **$CH_4$** | **Non $CH_4$** | **THC** | **LIMITS** |
|---|---|---|---|---|
| Correlation Coeff.= | 1.0000 | 1.0000 | 1.0000 | **≥ 0.995** |
| m (Slope)= | 0.9895 | 1.0223 | 1.0044 | **0.90-1.10** |
| b (Intercept as % of FS)= | -0.2146 | -0.0514 | -0.1330 | **± 3% F.S.** |

**Remarks:**

Last calibrated Oct 1st due to analyzer failure/removal and new analyzer install.

# NO-NOx-NO2 Analyzer Audit

File No. 2024 - 338A

Date: October 3, 2024 Performed by: L. Tabor

**Station:**

Name: St Lina Location: St Lina Operator: Bureau Veritas

Facility/Zone: LICA Temp. 22.2°C BP: 703mmHg

**Monitor:**

Make/Model: Thermo 42i Serial No. 1180930029

Inlet flow (sccm): 667 Range ppm: 0.500

Last cal. Date: September 23, 2024 Old CF: NO: 1.001

NOx: 1.002

NO2: 0.999

NO Bkg 4.9

NOx Bkg 5.2

NO Coef 1.029

NOx Coef 1.000

NO2 Coef 1.010

**Calibration Method:** Gas Dilution / GPT

**Calibrator:** Make/Model: Sabio 2010 AMU# 2270

NO cylinder # EX0015204 NO conc. ppm 52.5 NOx conc. ppm 52.6

CGA Date August 20, 2024

| Calibrator Flows | | | Calc. Conc. | | Indicated Concentration | | % Difference vs Audit Gas | |
|---|---|---|---|---|---|---|---|---|
| Air | Gas | Total | NO (ppm) | NOx (ppm) | NO (ppm) | NOx (ppm) | NO | NOx |
| 4891 | 0.0 | 4891 | 0.0000 | 0.0000 | -0.0001 | -0.0003 | Limit ± 10% | |
| 4862 | 39.5 | 4902 | 0.4228 | 0.4236 | 0.4064 | 0.4118 | -4% | -3% |
| 4895 | 19.7 | 4915 | 0.2101 | 0.2105 | 0.1998 | 0.2031 | -5% | -3% |
| 4924 | 9.7 | 4934 | 0.1036 | 0.1038 | 0.0981 | 0.0998 | -5% | -4% |
| | | | | | | Absolute Average Percent Difference | 5% | 3% |

**Linear Regression Analysis:** *y=mx+b (where x=calculated concentration, y=indicated concentration)*

| | NO | NOx | $NO_2$ | LIMITS |
|---|---|---|---|---|
| Correlation Coeff.= | 1.0000 | 1.0000 | 1.0000 | **≥ 0.995** |
| m (Slope)= | 0.9621 | 0.9732 | 0.9947 | **0.90-1.10** |
| b (Intercept as % of full scale)= | -0.2145 | -0.1832 | 0.8613 | **± 3% F.S.** |

| $O_3$ Setting | Flow Rate | Indicated Conc. (ppm) | | | NO Decrease | $NO_2$ Increase | % Difference vs Audit Gas | |
|---|---|---|---|---|---|---|---|---|
| | | NO | NOx | $NO_2$ | | | | |
| 0.000 | 4901.7 | 0.403 | 0.410 | 0.006 | | | | %Dif Limit |
| 0.300 | 4901.7 | 0.126 | 0.412 | 0.286 | 0.277 | 0.280 | 1% | ± 10% |
| 0.200 | 4901.7 | 0.221 | 0.412 | 0.191 | 0.182 | 0.185 | 2% | ± 10% |
| 0.100 | 4901.7 | 0.313 | 0.413 | 0.100 | 0.090 | 0.094 | 4% | ± 10% |
| | | | | | | Absolute Average Percent Difference | 2% | |

**Converter Efficiency**

Average Converter Efficiency 102.4%

**Remarks:**

# $O_3$ ANALYZER AUDIT

File No. 2024 - 339A

Date: October 3, 2024 Performed by: L. Tabor

## Station

Name: St Lina Location: St Lina

Facility/Zone: LICA Operator: Bureau Veritas

Temp. 22.9°C Barometric Press. 704mmHg

## Monitor

Make/Model: Thermo 49iQ Serial No: 12208316586

Inlet flow (sccm): 1320 Full Scale Range ppm: 0.500

Last cal. Date: September 13, 2024 Old Correction Factor: 1.001

Zero/Bkg 0.0

Span Coeff. 0.990

## Calibrator

Calibration Method: Generator

Make/Model: Thermo 49i-PS AMU # : 2247

NO cylinder # : na NO concentration ppm: na

| Ozone Setting PPB/Current | Calibrator Flow (sccm) Air | Gas | Total | Calculated Conc. (ppm) | Indicated Conc. (ppm) | % Difference vs Audit Gas | % Difference Limits |
|---|---|---|---|---|---|---|---|
| 0 | na | | na | 0.0000 | -0.0005 | | |
| 400 | na | | na | 0.4000 | 0.4022 | 1% | ± 10% |
| 200 | na | | na | 0.2000 | 0.2007 | 1% | ± 10% |
| 100 | na | | na | 0.1000 | 0.1005 | 1% | ± 10% |
| | | | | Absolute Average Percent Difference | | 1% | |

**Linear Regression Analysis:**

*y=mx+b (where x=calculated concentration, y=indicated concentration)*

| | | **LIMITS** |
|---|---|---|
| Correlation Coeff.= | 1.0000 | **≥ 0.995** |
| m (Slope)= | 1.0064 | **0.90-1.10** |
| b (Intercept as % of full scale)= | -0.0800 | **± 3% F.S.** |

**Remarks:**



Alberta Government

# Station Performance Audit Summary

Company: LICA  Facility Name: St Lina

Approval No.: N/A  Site Name: St Lina

Region: North Saskatchewan  District: Cold Lake

Parameters audited:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $H_2S$ | **X** | $SO_2$ | **X** | $NO_x$ | **X** | $NH_3$ | |
| CO | | $CH_4$ | **X** | Non$CH_4$ | **X** | THC | **X** |
| PM2.5 | | PM10 | | TSP | | W. Speed | **X** |
| W. Direction | **X** | Amb Tmp | **X** | Stn. Temp | **X** | RH | **X** |
| $O_3$ | **X** | Ethylene | | BTEX | | SR | |
| Rainfall | | Precip | | VWS | | Other | |
| All parameters monitored as per approval: | | | | Yes / No | | N/A | **X** |

| | YES | NO | N/A |
|---|---|---|---|
| *GENERAL* | | | |
| Has the location remained unchanged from previous audit? | X | | |
| Is site secure? | X | | |
| Are station operating conditions adequate? | X | | |
| *DATA ACQUISITION* | | | |
| Are strip charts in use? | | X | |
| Is a telemetry system for data acquisition in use? | | X | |
| *SYSTEM COMPONENTS* | | | |
| Is a glass sampling manifold installed? | X | | |
| Is sampling manifold clean? | X | | |
| Is a manifold trap in place? | X | | |
| Are spare manifold ports capped | X | | |
| Is manifold oriented so it is not exactly horizontal? | X | | |
| Are manifold ports situated to prevent water entering monitors? | X | | |
| Is manifold pump properly installed and operative? | X | | |
| Do sample lines extend at least 3/4"into manifold? | X | | |
| Are monitor sampling lines connected to manifold? | X | | |
| Are sampling lines clean? | X | | |
| Are monitors properly mounted and secure? | X | | |
| Are monitors properly exhausted from room or scrubbed? | X | | |
| Are zero and span systems operational? | X | | |
| *WIND EQUIPMENT* | | | |
| Is wind sensor properly oriented? | X | | |
| Does wind equipment appear to be functioning properly? | X | | |
| Date of last calibration. Date: August 13, 2024 | | | |

*COMMENTS:* General housekeeping could be improved.

AUDITOR: Laura Tabor  DATE: October 3, 2024

# Station Site Documents Audit Checklist

**Station**

Name: St Lina  Location: St Lina

Facility/Zone: LICA  Operator: Bureau Veritas

**Required Elements of AMD Chapter 3 *SS 4-B***

Do the Site Documents Contain the Following:

| | Meets AMD | | NA | Current | |
|---|---|---|---|---|---|
| | YES | NO | | YES | NO |
| (a) Name of Owner/ Approval Holder | X | | | | |
| (b) Name of Operating Agency | X | | | | |
| (c) Contact Information | X | | | | |
| (d) Date the Site or Station was Established | X | | | | |
| (e) Date the information was last updated | X | | | | |
| (f) Location including Latitude and Longitude | X | | | | |
| (g) Four Colour Photos Looking N, E, S, W From Manifold Inlet | X | | | | |
| (h) Additional Photos/Sketches of AMD Standard Site Non-Conformance | X | | | | |
| (i) List of Instruments Located at the Site | X | | | | |
| (j) Site Description Including the following: | | | | | |
| (i) Land Use By Sector | | X | | | |
| (ii) Site Elevation | | X | | | |
| (iii) Greatest Angle of Elevation & Direction to Nearby Buildings | X | | | | |
| (iv) Average Building height in the area | | X | | | |
| (v) Distance to Nearest Trees | X | | | | |

**Required Elements of AMD Chapter 3 *SS 4-D***

Do the Station Site Documents Contain the Following:

| | Meets AMD | | NA | Current | |
|---|---|---|---|---|---|
| | YES | NO | | YES | NO |
| (a) Recent Area Map Covering Approximately 1Km$^2$ | X | | | | |
| (b) Plan View Sketch | X | | | | |
| (c) Cross-Sectional Sketch of Area Within 500 m Radius | X | | | | |
| (d) Colour Photos Showing Sample Manifold/Inlet | X | | | | |
| (e) Colour Photo of the Station | X | | | | |
| (f) Additional Photos/Sketches of AMD Standard Station Non-Conformance | X | | | | |

*COMMENTS:* Update land use by sector

AUDITOR: Laura Tabor  DATE: October 3, 2024



Alberta Government

# Network Site Documents Audit Checklist

**Network**

Name: St Lina Location: St Lina

Facility/Zone: LICA Operator: Bureau Veritas

**Required Elements of AMD Chapter 3 *SS 4-C***

Do the Network Site Documents Contain the Following:

| | Meets AMD YES | Meets AMD NO | NA | Current YES | Current NO |
|---|---|---|---|---|---|
| (a) A Recent Area Map Showing the Following: | | | | | |
| (i) Station Locations | X | | | | |
| (ii) Roadways | | X | | | |
| (iii) Railway Lines | | X | | | |
| (iv) Airports | | X | | | |
| (v) Lakes | X | | | | |
| (vi) Rivers | X | | | | |
| (vii) Human Settlements | X | | | | |
| (viii) Locations of Identified Industrial & Non-Industrial Pollutant Sources | X | | | | |
| (ix) Other Significant Landmarks | X | | | | |
| ( b) A windrose for each Continuous Ambient Air Monitoring Station | X | | | | |

*COMMENTS:* _____

AUDITOR: Laura Tabor DATE: October 3, 2024

# Station Checklist

## Station

Name: St Lina Location: St Lina

Facility/Zone: LICA Operator: Bureau Veritas

| | Yes | No | N/A |
|---|---|---|---|
| Are all Particulate Sampler Heads put back in the correct | | | X |
| Has the existing or new TEOM filter been installed? | | | X |
| Has the flow bypass line on Teom Been reinstalled? | | | X |
| Has the Sharp Filter Tape been installed back on spool? | | | X |
| Has the BAM sampler been put back into the sample mode? | | | X |
| Have all intermittent particulate samplers been returned to an as found condition? | | | X |
| Have all sample lines been reconnected as found? | X | | |
| Have all parameters that were marked down on the DAS been marked up? | X | | |
| Are all ambient gas analyzers back in sample mode? | X | | |
| Is everything left as it was at the start of the audit? | X | | |
| Is the station properly secured upon departure? | X | | |

Auditor: Laura Tabor Date: October 3, 2024

Print

Signature

Operator: Chris Wesson Date: October 3, 2024

Print

Signature



Alberta Government

# STATION AUDIT

File No. 2024 - 318A - 322A

Date: September 30, 2024 Performed by: L. Tabor

## Station

Name: Lac La Biche Location: Lac La Biche

Facility/Zone: LICA Operator: Bureau Veritas

Temp: 20.9°C Barometric Press: 714mmHg

## Location

| | |
|---|---|
| Latitude N | 54° 45' 54.55" |
| Longitude W | 111° 58' 17.20" |
| Elevation | 561m |
| Status of Site Documentation | Good |
| Status of Network Documentation | Good |
| Status of QAP | Good |

| | |
|---|---|
| Manifold Material | Glass |
| Manifold Condition | Good |

## Meteorological

| | Observed | Audit Value |
|---|---|---|
| Wind Speed Direction | 14.4kph, 286.4° | 15-20kph, W |
| Station Temperature | 19.4°C | 19.29°C |
| Relative Humidity | 46.7% | 42.31% |
| Ambient Temperature | 10.3°C | 11.92°C |
| Solar Radiation | na | na |
| Precipitation | na | na |

**Remarks:**



Alberta Government

# $SO_2$ ANALYZER AUDIT

File No. 2024 - 318A

Date: September 30, 2024 Performed by: L. Tabor

## Station

Name: Lac La Biche Location: Lac La Biche

Facility/Zone: LICA Operator: Bureau Veritas

Temp. 20.9°C Barometric Press. 714mmHg

## Monitor

Make/Model: Thermo 43iTLE Serial No: 1180320043

Inlet flow (sccm): 453 Full Scale Range ppm: 0.500

Last cal. Date: September 6, 2024 Old Correction Factor: 1.001

Zero/Bkg 7.44

Span Coef 1.490

## Calibrator

Calibration Method: GAS DILUTION Make/Model: Sabio 2010

Cylinder # : T1XY16R AMU # : 2092

CGA Date: June 25, 2024 $SO_2$ Concentration PPM: 50.48

| Calibrator Flow (sccm) | | | Calculated Conc. (ppm) | Indicated Concentration (ppm) | % Difference | |
|---|---|---|---|---|---|---|
| Air | Gas | Total | | | vs Audit Gas | Limits |
| 4895 | 0.0 | 4895 | 0.000 | 0.000 | | |
| 4864 | 40.2 | 4904 | 0.414 | 0.411 | -1% | ± 10% |
| 4897 | 20.1 | 4917 | 0.207 | 0.209 | 1% | ± 10% |
| 4935 | 10.4 | 4945 | 0.106 | 0.110 | 3% | ± 10% |
| | | | | Absolute Average Percent Difference | 1% | |

**Linear Regression Analysis:**

*y=mx+b (where x=calculated concentration, y=indicated concentration)*

| | | **LIMITS** |
|---|---|---|
| Correlation Coeff.= | 0.9999 | **≥ 0.995** |
| m (Slope)= | 0.9904 | **0.90-1.10** |
| b (Intercept as % of full scale)= | 0.4880 | **± 3% F.S.** |

**Remarks:**



Alberta Government

# $H_2S$ ANALYZER AUDIT

File No. 2024 - 319A

Date: September 30, 2024 Performed by: L. Tabor

## Station

Name: Lac La Biche Location: Lac La Biche

Facility/Zone: LICA Operator: Bureau Veritas

Temp. 20.9°C Barometric Press. 714mmHg

## Monitor

Make/Model: Thermo 450i Serial No: CM17360002

Inlet flow (sccm): 921 Full Scale Range ppm: 0.100

Last cal. Date: September 6, 2024 Old Correction Factor: 1.001

Zero/Bkg 88.8

Span Coef 1.051

## Calibrator

Calibration Method: GAS DILUTION Make/Model: Sabio 2010

Cylinder # : T3CH4GL AMU # : 2092

CGA Date: July 9, 2024 $H_2S$ Concentration PPM: 10.14

| Calibrator Flow (sccm) | | | Calculated Conc. (ppm) | Indicated Concentration (ppm) | % Difference | |
|---|---|---|---|---|---|---|
| Air | Gas | Total | | | vs Audit Gas | Limits |
| 4895 | 0.0 | 4895 | 0.0000 | 0.0001 | | |
| 4864 | 40.2 | 4904 | 0.0830 | 0.0849 | 2% | ± 10% |
| 4897 | 19.9 | 4917 | 0.0411 | 0.0422 | 2% | ± 10% |
| 4936 | 9.7 | 4945 | 0.0199 | 0.0204 | 2% | ± 10% |
| | | | | Absolute Average Percent Difference | 2% | |

**Linear Regression Analysis:**

*y=mx+b (where x=calculated concentration, y=indicated concentration)*

| | | LIMITS |
|---|---|---|
| Correlation Coeff.= | 1.0000 | **≥ 0.995** |
| m (Slope)= | 1.0214 | **0.90-1.10** |
| b (Intercept as % of full scale)= | 0.1121 | **± 3% F.S.** |

**Remarks:**



Alberta Government

# Non Methane Analyzer Audit

File No. 2024 - 320A

Date: September 30, 2024 Performed by: L. Tabor

**Station:**

Name: Lac La Biche Location: Lac La Biche Operator: Bureau Veritas

Facility/Zone: LICA Temp. 22.5°C BP: 714mmHg

**Monitor:**

Make/Model: Thermo 55i Serial No. 1236656107

Inlet flow (sccm): na $CH_4$ Range ppm: 20.0

Last cal. Date: September 7, 2024 Non $CH_4$ Range ppm: 20.0

THC Range ppm: 40.0

Old Correction Factor: $CH_4$: 1.000

Non $CH_4$: 0.999

THC: 1.000

**Calibration Method:** Gas Dilution

**Calibrator:** Make/Model Sabio 2010 AMU# 2092

HC cylinder # T30Y8NP $CH_4$ conc. (ppm) 994.5 $CH_4$ Equiv (C3H8 only) (ppm) 827.2

CGA Date June 28, 2024 $C_3H_8$ conc. (ppm) 300.8 Total $CH_4$ Equiv. (ppm) 1821.7

| Calibrator Flows | | | Calc. Conc. | | | Indicated Concentration | | | % Difference vs Audit Gas Limit ± 10% | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Air | Gas | Total | $CH_4$ (ppm) | Non $CH_4$ (ppm) | THC (ppm) | $CH_4$ (ppm) | Non $CH_4$ (ppm) | THC (ppm) | $CH_4$ | Non $CH_4$ | THC |
| 4919 | 0.0 | 4919 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | |
| 4843 | 78.9 | 4922 | 15.94 | 13.26 | 29.20 | 16.02 | 13.32 | 29.34 | 0% | 0% | 0% |
| 4886 | 39.8 | 4926 | 8.04 | 6.69 | 14.73 | 8.15 | 6.71 | 14.86 | 1% | 0% | 1% |
| 4913 | 20.4 | 4934 | 4.10 | 3.41 | 7.52 | 4.18 | 3.35 | 7.53 | 2% | -2% | 0% |
| | | | | | | | | Absolute Average Percent Difference | 1% | 0% | 1% |

**Linear Regression Analysis:** *y=mx+b (where x=calculated concentration, y=indicated concentration)*

| | **$CH_4$** | **Non $CH_4$** | **THC** | **LIMITS** |
|---|---|---|---|---|
| Correlation Coeff.= | 1.0000 | 1.0000 | 1.0000 | **≥ 0.995** |
| m (Slope)= | 1.0042 | 1.0064 | 1.0052 | **0.90-1.10** |
| b (Intercept as % of FS)= | 0.1807 | -0.1654 | 0.0077 | **± 3% F.S.** |

**Remarks:**

# NO-NOx-NO2 Analyzer Audit

File No. 2024 - 321A

Date: September 30, 2024 Performed by: L. Tabor

**Station:**

Name: Lac La Biche Location: Lac La Biche Operator: Bureau Veritas

Facility/Zone: LICA Temp. 21.9°C BP: 714mmHg

**Monitor:**

Make/Model: Thermo 42i Serial No. 1180930027

Inlet flow (sccm): 753 Range ppm: 0.500

Last cal. Date: September 6, 2024 Old CF: NO: 1.003

NOx: 1.002

NO2: 0.998

NO Bkg 9.2

NOx Bkg 9.4

NO Coef 0.877

NOx Coef 0.997

NO2 Coef 1.011

**Calibration Method:** Gas Dilution / GPT

**Calibrator:** Make/Model: Sabio 2010 AMU# 2270

NO cylinder # EX0015204 NO conc. ppm 52.5 NOx conc. ppm 52.6

CGA Date August 20, 2024

| Calibrator Flows | | | Calc. Conc. | | Indicated Concentration | | % Difference vs Audit Gas | |
|---|---|---|---|---|---|---|---|---|
| Air | Gas | Total | NO (ppm) | NOx (ppm) | NO (ppm) | NOx (ppm) | NO | NOx |
| 4891 | 0.0 | 4891 | 0.0000 | 0.0000 | -0.0005 | -0.0004 | Limit ± 10% | |
| 4860 | 38.9 | 4899 | 0.4167 | 0.4175 | 0.3930 | 0.4035 | -6% | -3% |
| 4903 | 19.4 | 4922 | 0.2073 | 0.2077 | 0.1931 | 0.1986 | -7% | -4% |
| 4933 | 9.5 | 4943 | 0.1011 | 0.1013 | 0.0974 | 0.0993 | -3% | -2% |
| | | | | | | Absolute Average Percent Difference | 5% | 3% |

**Linear Regression Analysis:** *y=mx+b (where x=calculated concentration, y=indicated concentration)*

| | NO | NOx | $NO_2$ | LIMITS |
|---|---|---|---|---|
| Correlation Coeff.= | 0.9999 | 1.0000 | 1.0000 | **≥ 0.995** |
| m (Slope)= | 0.9416 | 0.9654 | 1.0006 | **0.90-1.10** |
| b (Intercept as % of full scale)= | 0.0096 | -0.0195 | 0.1330 | **± 3% F.S.** |

| $O_3$ Setting | Flow Rate | Indicated Conc. (ppm) | | | NO Decrease | $NO_2$ Increase | % Difference vs Audit Gas | |
|---|---|---|---|---|---|---|---|---|
| | | NO | NOx | $NO_2$ | | | | |
| 0.000 | 4899 | 0.400 | 0.409 | 0.009 | | | | %Dif Limit |
| 0.300 | 4899 | 0.132 | 0.410 | 0.278 | 0.268 | 0.269 | 0% | ± 10% |
| 0.200 | 4899 | 0.222 | 0.409 | 0.187 | 0.178 | 0.178 | 0% | ± 10% |
| 0.100 | 4899 | 0.311 | 0.410 | 0.099 | 0.089 | 0.090 | 1% | ± 10% |
| | | | | | | Absolute Average Percent Difference | 1% | |

**Converter Efficiency**

Average Converter Efficiency 100.5%

**Remarks:**

# $O_3$ ANALYZER AUDIT

File No. 2024 - 322A

Date: September 30, 2024 Performed by: L. Tabor

## Station

Name: Lac La Biche Location: Lac La Biche

Facility/Zone: LICA Operator: Bureau Veritas

Temp. 22.5°C Barometric Press. 714mmHg

## Monitor

Make/Model: Thermo 49iQ Serial No: 1202068570

Inlet flow (sccm): 1380 Full Scale Range ppm: 0.500

Last cal. Date: September 7, 2024 Old Correction Factor: 1.002

Zero/Bkg 0.8

Span Coeff. 0.995

## Calibrator

Calibration Method: Generator

Make/Model: Thermo 49i-PS AMU # : 2247

NO cylinder # : na NO concentration ppm: na

| Ozone Setting PPB/Current | Calibrator Flow (sccm) Air | Gas | Total | Calculated Conc. (ppm) | Indicated Conc. (ppm) | % Difference vs Audit Gas | % Difference Limits |
|---|---|---|---|---|---|---|---|
| 0 | na | | na | 0.0000 | 0.0029 | | |
| 400 | na | | na | 0.4000 | 0.4132 | 3% | ± 10% |
| 200 | na | | na | 0.2000 | 0.2092 | 3% | ± 10% |
| 100 | na | | na | 0.1000 | 0.1053 | 2% | ± 10% |
| | | | | Absolute Average Percent Difference | | 3% | |

**Linear Regression Analysis:**

*y=mx+b (where x=calculated concentration, y=indicated concentration)*

| | | **LIMITS** |
|---|---|---|
| Correlation Coeff.= | 1.0000 | **≥ 0.995** |
| m (Slope)= | 1.0262 | **0.90-1.10** |
| b (Intercept as % of full scale)= | 0.6120 | **± 3% F.S.** |

**Remarks:**



Alberta Government

# Station Performance Audit Summary

Company: LICA

Facility Name: Lac La Biche

Approval No.: N/A

Site Name: Lac La Biche

Region: Lower Athabasca

District: Cold Lake

Parameters audited:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $H_2S$ | **X** | $SO_2$ | **X** | $NO_x$ | **X** | $NH_3$ | |
| CO | | $CH_4$ | **X** | $NonCH_4$ | **X** | THC | **X** |
| PM2.5 | | PM10 | | TSP | | W. Speed | **X** |
| W. Direction | **X** | Amb Tmp | **X** | Stn. Temp | **X** | RH | **X** |
| $O_3$ | **X** | Ethylene | | BTEX | | SR | |
| Rainfall | | Precip | | VWS | | Other | |
| All parameters monitored as per approval: | | | | Yes / No | | N/A | **X** |

| *GENERAL* | YES | NO | N/A |
|---|---|---|---|
| Has the location remained unchanged from previous audit? | | | X |
| Is site secure? | X | | |
| Are station operating conditions adequate? | X | | |

| *DATA ACQUISITION* | | | |
|---|---|---|---|
| Are strip charts in use? | | X | |
| Is a telemetry system for data acquisition in use? | | X | |

| *SYSTEM COMPONENTS* | | | |
|---|---|---|---|
| Is a glass sampling manifold installed? | X | | |
| Is sampling manifold clean? | X | | |
| Is a manifold trap in place? | X | | |
| Are spare manifold ports capped | X | | |
| Is manifold oriented so it is not exactly horizontal? | X | | |
| Are manifold ports situated to prevent water entering monitors? | X | | |
| Is manifold pump properly installed and operative? | X | | |
| Do sample lines extend at least 3/4"into manifold? | X | | |
| Are monitor sampling lines connected to manifold? | X | | |
| Are sampling lines clean? | X | | |
| Are monitors properly mounted and secure? | X | | |
| Are monitors properly exhausted from room or scrubbed? | X | | |
| Are zero and span systems operational? | X | | |

| *WIND EQUIPMENT* | | | |
|---|---|---|---|
| Is wind sensor properly oriented? | X | | |
| Does wind equipment appear to be functioning properly? | X | | |
| Date of last calibration. Date: August 9, 2024 | | | |

*COMMENTS:* _____

AUDITOR: Laura Tabor

DATE: September 30, 2024

# Station Site Documents Audit Checklist

**Station**

Name: Lac La Biche  Location: Lac La Biche

Facility/Zone: LICA  Operator: Bureau Veritas

**Required Elements of AMD Chapter 3 *SS 4-B***

Do the Site Documents Contain the Following:

| | Meets AMD | | NA | Current | |
|---|---|---|---|---|---|
| | YES | NO | | YES | NO |
| (a) Name of Owner/ Approval Holder | X | | | | |
| (b) Name of Operating Agency | X | | | | |
| (c) Contact Information | X | | | | |
| (d) Date the Site or Station was Established | X | | | | |
| (e) Date the information was last updated | X | | | | |
| (f) Location including Latitude and Longitude | X | | | | |
| (g) Four Colour Photos Looking N, E, S, W From Manifold Inlet | X | | | | |
| (h) Additional Photos/Sketches of AMD Standard Site Non-Conformance | X | | | | |
| (i) List of Instruments Located at the Site | X | | | | |
| (j) Site Description Including the following: | | | | | |
| (i) Land Use By Sector | | X | | | |
| (ii) Site Elevation | | X | | | |
| (iii) Greatest Angle of Elevation & Direction to Nearby Buildings | X | | | | |
| (iv) Average Building height in the area | | X | | | |
| (v) Distance to Nearest Trees | X | | | | |

**Required Elements of AMD Chapter 3 *SS 4-D***

Do the Station Site Documents Contain the Following:

| | Meets AMD | | NA | Current | |
|---|---|---|---|---|---|
| | YES | NO | | YES | NO |
| (a) Recent Area Map Covering Approximately 1Km$^2$ | X | | | | |
| (b) Plan View Sketch | X | | | | |
| (c) Cross-Sectional Sketch of Area Within 500 m Radius | X | | | | |
| (d) Colour Photos Showing Sample Manifold/Inlet | X | | | | |
| (e) Colour Photo of the Station | X | | | | |
| (f) Additional Photos/Sketches of AMD Standard Station Non-Conformance | X | | | | |

*COMMENTS:* Land use listed, but not by sector.

AUDITOR: Laura Tabor  DATE: September 30, 2024

# Network Site Documents Audit Checklist

**Network**

Name: Lac La Biche  Location: Lac La Biche

Facility/Zone: LICA  Operator: Bureau Veritas

**Required Elements of AMD Chapter 3 *SS 4-C***

Do the Network Site Documents Contain the Following:

| | Meets AMD YES | Meets AMD NO | NA | Current YES | Current NO |
|---|---|---|---|---|---|
| (a) A Recent Area Map Showing the Following: | | | | | |
| (i) Station Locations | X | | | | |
| (ii) Roadways | | X | | | |
| (iii) Railway Lines | | X | | | |
| (iv) Airports | | X | | | |
| (v) Lakes | X | | | | |
| (vi) Rivers | X | | | | |
| (vii) Human Settlements | X | | | | |
| (viii) Locations of Identified Industrial & Non-Industrial Pollutant Sources | X | | | | |
| (ix) Other Significant Landmarks | X | | | | |
| ( b) A windrose for each Continuous Ambient Air Monitoring Station | X | | | | |

*COMMENTS:* _____

AUDITOR: Laura Tabor  DATE: September 30, 2024

# Station Checklist

## Station

Name: Lac La Biche  Location: Lac La Biche

Facility/Zone: LICA  Operator: Bureau Veritas

| | Yes | No | N/A |
|---|---|---|---|
| Are all Particulate Sampler Heads put back in the correct | | | X |
| Has the existing or new TEOM filter been installed? | | | X |
| Has the flow bypass line on Teom Been reinstalled? | | | X |
| Has the Sharp Filter Tape been installed back on spool? | | | X |
| Has the BAM sampler been put back into the sample mode? | | | X |
| Have all intermittent particulate samplers been returned to an as found condition? | | | X |
| Have all sample lines been reconnected as found? | X | | |
| Have all parameters that were marked down on the DAS been marked up? | X | | |
| Are all ambient gas analyzers back in sample mode? | X | | |
| Is everything left as it was at the start of the audit? | X | | |
| Is the station properly secured upon departure? | X | | |

Auditor: Laura Tabor  Date: September 30, 2024

Print

Signature

Operator: Chris Wesson  Date: September 30, 2024

Print

Signature



Alberta Government

LICA
ENVIRONMENTAL STEWARDS
Lakeland Industry and Community Association
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November 12, 2024

Alberta Environment and Protected Areas
Resource Stewardship Division
Airshed & Watershed Stewardship Air Monitoring
4946 – 89 Street
Edmonton, Alberta T6E 5K1
Telephone: 780.427.7888

Ms. Tabor,

**RE: 2024 LICA Ambient Air Monitoring Network Audit Results**
**File No(s): 2024 - 318A - 339A**

Below, please see the responses and corrective actions either completed or proposed in response to Alberta Environmental and Protected Areas' September 30 – October 3, 2024, audit of the Lakeland Industry and Community Association's (LICA) ambient air monitoring network.

## COMMON ISSUE: Network Site Documentation

*"The network site document audit did not meet AMD required elements according to Chapter 3, section 4, subsection 4-C. Recommend updating network site documentation to include all elements. See field sheets for missing elements."*

***Corrective Action:*** LICA will update site documentation files using the Air Monitoring Directive Template available at: https://www.alberta.ca/assets/documents/amd-site- documentation-template.docx. The updates will align with the scheduled annual site documentation task and will be completed by the end of the fourth quarter (March 31, 2025).

## PORTABLE AIR MONITORING SYSTEM (PAMS) – LAC LA BICHE: Ambient Temperature

*"The ambient temperature sensor at Lac La Biche did not meet audit tolerances. Audit tolerance for temperature sensors is +/- 1°C. Recommend cleaning the sensor, cleaning the radiation shield, and recalibrating as required."*

***Corrective Action:*** Field staff completed the sensor check using a certified standard at the Portable Air Monitoring System – PAMS (Lac La Biche) on October 10, 2024. The check results met the AEPA sensor check requirements.

To enhance reliability and precision and in direct response to the AEPA audit finding, the radiation shield will be cleaned, and the existing temperature probe will be replaced by another factory-calibrated

probe. The existing probe will be sent back to the manufacturer for calibration and will then be used as a spare in the network. This task will be completed by the end of the third quarter (December 31, 2024).

**COLD LAKE SOUTH and ST. LINA: General Housekeeping**

*"The general housekeeping at Cold Lake South and St. Lina could be improved. Both stations were crowded with extra instrumentation, equipment, and supplies that were not currently in use."*

***Corrective Action:*** Currently, LICA uses the Cold Lake South station to store calibration and other network support equipment when not in use, while the St. Lina monitoring station serves as a temporary staging area for our acid deposition monitoring program equipment awaiting field deployment. LICA is actively exploring storage alternatives, including repurposing the St. Lina monitoring trailer once the shelter is replaced in 2025-26. A high-level, long-term solution—such as an office with shop arrangements—is also being considered, though it remains several years in the future.

Should you have any questions or require further clarification, please don't hesitate to contact me.

Respectfully,

Michael Bisaga
Manager, Environmental Monitoring Programs
Lakeland Industry and Community Association

Cc: Marty Collins – Manager, AEPA
Al Clark – Monitoring Systems Auditor, AEPA
Prabal Roy – Senior Air Quality Specialist, AEPA
Kristina Morris – Executive Director, LICA
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November 22, 2024 File No(s). 2024 – 318A – 339A

Michael Bisaga
Lakeland Industry and Community Association
PO Box 8237
Bonnyville, Alberta
T9N 2J5

Mr. Bisaga:

The AEPA Audit Team has reviewed the LICA audit response letter and all associated documents – the Audit Team accepts all the proposed responses from LICA.

Although the corrective actions detailed in the response letter have not been field verified, the AEPA Audit Team now considers this audit closed. If you have any questions or comments, please contact the undersigned.

Yours truly,

Laura Tabor
Air Monitoring Technologist

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