

May 16th, 2019

File Numbers: 2019 – 062A / 082A

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

Mr. Bisaga:

Subject: Ambient Air Monitoring Station Audit Results for the Lica Network

Alberta Environment and Parks Ambient Air Monitoring Audit team conducted an audit of the Lakeland Industry and Community Association (Lica) ambient air monitoring stations May 6th to 9th, 2019.

All pollutant gas analyzers met AMD criteria. However the Oxides of Nitrogen analyzer at Cold Lake South initially was failing 24% low. When doing cursory checks it was discovered the stainless steel sample inlet filter holder had a compressed internal oring. When bypassed and eventually replaced with an inert Teflon Thermo style filter holder, the analyzer passed the audit. The S.S. sample inlet filter was removed from service and retained by AEP. Please review the attached picture.

It would appear the compressed oring likely occurred during the April 24th monthly calibration when a new inlet particulate filter was installed. From the review of the calibration documents on site there was no significant as found change in calculated analyzer response before or during the calibration.

Data from April 24th 2019 to May 8th 2019 needs to be flagged as invalid due to the initial 24% low response found in accordance with AMD Chapter 8 Section 4.1, Aud 4-E (a)(b). An uptime contravention must be reported for the months of April and May 2019.

AEP suggests that the current inventory of sample inlet filter holders in use at the Cold Lake South station be updated to the newer Teflon Thermo style inlet filter holders in place throughout the rest of the Lica network.

Review of the calibration documents shows that the SO₂ and NO_x analyzer were calibrated and adjusted at the lower end of the high point (60-80% of the analyzer fullscale) calibration range in the month of April 2019. This may account for the responses being lower than anticipated for audit responses. Maxxam indicated the same cylinder of gas is used at all locations. Cold Lake South SO₂ and NO_x analyzers did not see a similar audit response as they were calibrated at a higher calculated response based on analyzer range. AEP recommends that the SO₂ and NO_x

analyzers be calibrated at a higher calculated high point response (closer to the 80% value) to ensure all the error possible is removed from the analyzers.

The Thermo 5030i series PM2.5 samplers at St Lina and Bonnyville East were not audited this cycle.

All meteorological equipment met AMD criteria with the exception of the Relative Humidity sensor at St Lina. It was reading 23% high compared to our audit standard.

All site and network documentation that were reviewed on line, showed that they require updating as elements in both documents are missing or incorrect. Please review the attached audit findings.

AEP was asked to review a proposed new Maskwa location approximately 2000m west of the current location. Initial assessment indicates it is a suitable location for an ambient air monitoring station based on siting criteria. However please note the proposed location puts it closer to a major emission source, the Imperial Oil Resources Maskwa facility. This facility may cause an increase in concentration levels of some or all of the pollutants being measured at the current location.

Upon receiving notification of this performance audit Lica was asked to provide the date of the most recent quality system audit as required by AMD Chapter 5 QS 4-A and QS 4-B(b). Lica has indicated June 2017 was the last 3rd party audit of the QAP.

Please address the issues noted above and provide a written response to the Audit Team by June 21st, 2019. If you have any questions or comments, please contact the undersigned at 780-427-7888.

Yours truly,



Al Clark
Monitoring Systems Auditor

Attachments:

- Lica Analyzer Audit Sheets
- Lica Audit Summary
- SS inlet sample picture

CC: Shea Beaton – AEP
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Audit Summary

Form No. F-AA-018

Version 1.2

Page 1 of 4

Facility / Zone	Lica
Total # of parameters that passed	21
Total # of parameters audited in the network	21
Date(s) of the audit	May 6-9, 2019
Issue Date of Audit Summary	May 16, 2019

Station Name	St. Lina
Auditor	Al Clark
Audit Date	May 6, 2019

Critical	Pass	Fail
H ₂ S	X	
SO ₂	X	
TRS		
NO / NO ₂ / NO _x	X	
O ₃	X	
HC	X	
Sharp PM _{2.5}		
Wind Speed / Wind Direction	X	
Wind head Orientation	X	
Manifold Fan	X	
Partisol PM _{2.5}		
Zero/Span Systems Operational	X	

Inspection Items	OK	Need for Improvement
Sample pump venting/scrubbing	X	
Heating / Air Conditioning	X	
Manifold	X	
Sample Lines	X	
Sharp PM _{2.5}		
Partisol PM _{2.5}		
Safety	X	
Site Conditions	X	

Non-critical	OK	Opportunity for Improvement
RH		X +/- 15%
Station Temperature	X	
Ambient Temperature	X	
Barometric Pressure	X	
Tipping bucket	X	
Station Condition	X	
Station Documentation		X Needs review / or missing

Not monitored or audited at this location

* Initial response was 24% low

Audit Summary

Form No. F-AA-018

Version 1.2

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Facility / Zone	Lica
Total # of parameters that passed	21
Total # of parameters audited in the network	21
Date(s) of the audit	May 6-9, 2019
Issue Date of Audit Summary	May 16, 2019

Station Name	Bonnyville East
Auditor	Al Clark
Audit Date	May 7, 2019

Critical	Pass	Fail
H ₂ S	X	
SO ₂	X	
TRS		
NO / NO ₂ / NO _x	X	
O ₃	X	
HC	X	
Sharp PM _{2.5}		
Wind Speed / Wind Direction	X	
Wind head Orientation	X	
Manifold Fan	X	
Partisol PM _{2.5}		
Zero/Span Systems Operational	X	

Inspection Items	OK	Need for Improvement
Sample pump venting/scrubbing	X	
Heating / Air Conditioning	X	
Manifold	X	
Sample Lines	X	
Sharp PM _{2.5}		
Partisol PM _{2.5}		
Safety	X	
Site Conditions	X	

Non-critical	OK	Opportunity for Improvement
RH	X	
Station Temperature	X	
Ambient Temperature	X	
Barometric Pressure		
Tipping bucket		
Station Condition	X	
Station Documentation		X Needs review / or missing

Not monitored or audited at this location

* Initial response was 24% low

Audit Summary

Form No. F-AA-018

Version 1.2

Page 3 of 4

Facility / Zone	Lica
Total # of parameters that passed	21
Total # of parameters audited in the network	21
Date(s) of the audit	May 6-9, 2019
Issue Date of Audit Summary	May 16, 2019

Station Name	Cold Lake South
Auditor	Al Clark
Audit Date	May 8, 2019

Critical	Pass	Fail
H ₂ S		
SO ₂	X	
TRS	X	
NO / NO ₂ / NO _x	*X	
O ₃	X	
HC	X	
Sharp PM _{2.5}	X	
Wind Speed / Wind Direction	X	
Wind head Orientation	X	
Manifold Fan	X	
Partisol PM _{2.5}	X	
Zero/Span Systems Operational	X	

Inspection Items	OK	Need for Improvement
Sample pump venting/scrubbing	X	
Heating / Air Conditioning	X	
Manifold	X	
Sample Lines	X	
Sharp PM _{2.5}	X	
Partisol PM _{2.5}	X	
Safety	X	
Site Conditions	X	

Non-critical	OK	Opportunity for Improvement
RH	X	
Station Temperature	X	
Ambient Temperature	X	
Barometric Pressure		
Tipping bucket		
Station Condition	X	
Station Documentation		X Needs review / or missing

Not monitored or audited at this location

* Initial response was 24% low

Audit Summary

Form No. F-AA-018

Version 1.2

Page 4 of 4

Facility / Zone	Lica		
Total # of parameters that passed	21		
Total # of parameters audited in the network	21		
Date(s) of the audit	May 6-9, 2019		
Issue Date of Audit Summary	May 16, 2019		
Station Name	Maskwa		
Auditor	Al Clark		
Audit Date	May 9, 2019		
Critical	Pass	Fail	
H ₂ S	X		
SO ₂	X		
TRS			
NO / NO ₂ / NO _x	X		
O ₃			
HC	X		
Sharp PM _{2.5}			
Wind Speed / Wind Direction	X		
Wind head Orientation	X		
Manifold Fan	X		
Partisol PM _{2.5}			
Zero/Span Systems Operational	X		
Inspection Items	OK	Need for Improvement	
Sample pump venting/scrubbing	X		
Heating / Air Conditioning	X		
Manifold	X		
Sample Lines	X		
Sharp PM _{2.5}			
Partisol PM _{2.5}			
Safety	X		
Site Conditions	X		
Non-critical	OK	Opportunity for Improvement	
RH	X		
Station Temperature	X		
Ambient Temperature	X		
Barometric Pressure	X		
Tipping bucket	X		
Station Condition	X		
Station Documentation		X	Needs review / or missing

Not monitored or audited at this location

* Initial response was 24% low

STATION AUDIT

File No. 2019 - 072A - 079A

Date: May 8, 2019

Performed by: Al Clark

Station

Name: Cold Lake South

Location: Cold Lake

Facility/Zone: Lica

Operator: Maxxam

Temp. 21.6 C

Barometric Press. 724 mmHg

Location

Latitude N 54° 24' 50.7"

Longitude W 110° 13' 58.4"

Elevation 527m

Status of Site Documentation On Line Incomplete

Status of Network Documentation On Line Incomplete

Status of QAP Audited June 2017

Manifold Material Glass

Manifold Condition Good

Meteorological

	Observed	Audit Value
Wind Speed Direction	<u>10.3 kph / 131 deg</u>	<u>5-10 kph / SSE</u>
Station Temperature	<u>17.9 C</u>	<u>18.1 C</u>
Relative Humidity	<u>23.9%</u>	<u>23.7 %</u>
Ambient Temperature	<u>11.9 C</u>	<u>12.5 C</u>
Solar Radiation	<u>N/A</u>	<u>N/A</u>
Precipitation	<u>N/A</u>	<u>N/A</u>

Remarks:

SO₂ ANALYZER AUDIT

File No. 2019 - 072A

Date: May 8, 2019

Performed by: Al Clark

Station

Name: Cold Lake South

Location: Cold Lake

Facility/Zone: Lica

Operator: Maxxam

Temp. 21.8 C

Barometric Press. 724 mmHg

Monitor

Make/Model: Teco 43i TLE Serial No: 1180260018

Inlet flow (sccm): 454 Full Scale Range ppm: 0.5

Last cal. Date: Apr 24/19 Old Correction Factor: 1.0210

Zero/Bkg 1.96

Span Coef 1.019

Calibrator

Calibration Method: GAS DILUTION Make/Model: Sabio 2010

Cylinder #: FF23250 AMU #: 2092

CGA Date: April 2019 SO₂ Concentration PPM: 49.5

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
4966	0.0	4966	0.0000	0.0000		
4940	39.2	4979	0.3897	0.3956	2%	± 10%
4951	20.1	4971	0.2002	0.2024	1%	± 10%
4984	10.5	4994	0.1041	0.1046	1%	± 10%
Absolute Average Percent Difference					1%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000

m (Slope)= 1.0157

b (Intercept as % of full scale)= -0.1128

LIMITS

≥ **0.995**

0.90-1.10

± **3% F.S.**

Remarks:

TRS ANALYZER AUDIT

File No. 2019 - 073A

Date: May 8, 2019

Performed by: AI Clark

Station

Name: Cold Lake South

Location: Cold Lake

Facility/Zone: Lica

Operator: Maxxam

Temp. 21.8 C

Barometric Press. 724 mmHg

Monitor

Make/Model: Teco 450i Serial No: 0812728560

Inlet flow (sccm): 495 Full Scale Range ppm: 0.1

Last cal. Date: Apr 24/19 Old Correction Factor: 0.9990

Zero/Bkg 15.7

Span Coef 0.910

Calibrator

Calibration Method: GAS DILUTION Make/Model: Sabio 2010

Cylinder #: EX0011882 AMU #: 2092

CGA Date: May 2019 H₂S Concentration PPM: 10.8

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
4966	0.0	4966	0.0000	0.0001		
4942	37.0	4979	0.0803	0.0775	-4%	± 10%
4951	20.1	4971	0.0437	0.0421	-4%	± 10%
4984	9.9	4994	0.0214	0.0209	-3%	± 10%
Absolute Average Percent Difference					3%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000

m (Slope)= 0.9635

b (Intercept as % of full scale)= 0.1416

LIMITS

≥ **0.995**

0.90-1.10

± **3% F.S.**

Remarks:

Non Methane Analyzer Audit

File No. 2019 - 074A

Date: May 8, 2019

Performed by: Al Clark

Station:

Name: Cold Lake South Location: Cold Lake Operator: Maxxam
 Facility/Zone: Lica Temp. 21.6 C BP: 724 mmHg

Monitor:

Make/Model: Teco 55i Serial No. 1236656188
 Inlet flow (scm): N/A CH₄ Range ppm: 20
 Last cal. Date: Apr 24/19 Non CH₄ Range ppm: 20
 Old Correction Factor: CH₄: 0.989 THC Range ppm: 40
 Non CH₄: 1.002
 THC: 0.994

Calibration Method:

Gas Dilution

Calibrator: Make/Model Sabio 2010 AMU# 2270
 HC cylinder # EA0004003 CH₄ conc. (ppm) 1010 CH₄ Equiv (C3H8 only) (ppm) 872
 CGA Date April 2019 C₃H₈ conc. (ppm) 317 Total CH₄ Equiv. (ppm) 1882

Calibrator Flows			Calc. Conc.			Indicated Concentration			% Difference vs Audit Gas		
			CH ₄ (ppm)	Non CH ₄ (ppm)	THC (ppm)	CH ₄ (ppm)	Non CH ₄ (ppm)	THC (ppm)	Limit ± 10%		
Air	Gas	Total							CH ₄	Non CH ₄	THC
5045	0.0	5045	0.00	0.00	0.00	0.00	0.00	0.00	4%	0%	3%
4963	80.3	5043	16.08	13.88	29.96	16.80	13.93	30.74	4%	0%	3%
5027	40.0	5067	7.97	6.88	14.85	8.40	6.90	15.30	5%	0%	3%
5046	20.1	5066	4.01	3.46	7.47	4.18	3.37	7.55	4%	-3%	1%
Absolute Average Percent Difference									5%	1%	2%

Linear Regression Analysis:

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

	<u>CH₄</u>	<u>Non CH₄</u>	<u>THC</u>	<u>LIMITS</u>
Correlation Coeff.=	<u>1.0000</u>	<u>1.0000</u>	<u>1.0000</u>	≥ 0.995
m (Slope)=	<u>1.0452</u>	<u>1.0060</u>	<u>1.0274</u>	0.90-1.10
b (Intercept as % of FS)=	<u>0.0597</u>	<u>-0.2078</u>	<u>-0.0791</u>	± 3% F.S.

Remarks:

NO-NOx-NO2 Analyzer Audit

File No. 2019 - 075A

Date: May 8, 2019 Performed by: Al Clark

Station:

Name: Cold Lake South Location: Cold Lake Operator: Maxxam
Facility/Zone: Lica Temp. 22.7 C BP: 722 mmHg

Monitor:

Make/Model: Teco 42i Serial No. 1505664393
Inlet flow (scm): 716 Range ppm: 0.5
Last cal. Date: Apr 24/19 Old CF: NO: 1.017
NOx: 1.018
NO2: 1.000
NO Bkg 7.0
NOx Bkg 7.2
NO Coef 0.852
NOx Coef 1.002
NO2 Coef 0.999

Calibration Method: Gas Dilution / GPT

Calibrator: Make/Model: Sabio 2010 AMU# 2270
NO cylinder # FF23222 NO conc. ppm 50.8 NOx conc. ppm 51.4
CGA Date April 2019

Calibrator Flows			Calc. Conc.		Indicated Concentration		% Difference vs Audit Gas	
Air	Gas	Total	NO (ppm)	NOx (ppm)	NO (ppm)	NOx (ppm)	NO	NOx
5051	0.0	5051	0.0000	0.0000	0.0001	0.0001	Limit ± 10%	
5020	40.2	5060	0.4036	0.4084	0.4096	0.4193	1%	3%
5040	19.9	5060	0.1998	0.2021	0.2047	0.2082	2%	3%
5054	10.0	5064	0.1003	0.1015	0.1012	0.1033	1%	2%
Absolute Average Percent Difference							2%	2%

Linear Regression Analysis:

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

	NO	NOx	NO ₂	LIMITS
Correlation Coeff.=	<u>1.0000</u>	<u>1.0000</u>	<u>1.0000</u>	≥ 0.995
m (Slope)=	<u>1.0157</u>	<u>1.0275</u>	<u>0.9986</u>	0.90-1.10
b (Intercept as % of full scale)=	<u>0.0418</u>	<u>-0.0358</u>	<u>-0.0477</u>	± 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	5060	0.4145	0.4197	0.0051	0.3193	0.3185	0%	%Dif Limit
0.850	5060	0.0952	0.4189	0.3236	0.3193	0.3185	0%	± 10%
0.600	5060	0.1999	0.4194	0.2194	0.2146	0.2143	0%	± 10%
0.360	5060	0.3088	0.4192	0.1103	0.1057	0.1052	0%	± 10%
Absolute Average Percent Difference							0%	

Converter Efficiency

Average Converter Efficiency 99.7%

Remarks: Inlet filter replaced. Had a faulty oring caused >450 sccm leak. A new Teflon holder installed. Initial response 24% low. Appears to be since last monthly cal. Power blip at start of mid pt 1040 MST.

O₃ ANALYZER AUDIT

File No. 2019 - 076A

Date: May 8, 2019

Performed by: Al Clark

Station

Name: Cold Lake South

Location: Cold Lake

Facility/Zone: Lica

Operator: Maxxam

Temp. 21.6 C

Barometric Press. 724 mmHg

Monitor

Make/Model: Teco 49i Serial No: 0700419951

Inlet flow (sccm): 710 / 752 Full Scale Range ppm: 0.5

Last cal. Date: Apr 24/19 Old Correction Factor: 1.0000

Zero/Bkg 0.0

Span Coeff. 1.036

Calibrator

Calibration Method: Photometer

Make/Model: Teco 49i PS AMU #: 1808

NO cylinder #: N/A NO concentration ppm: N/A

Ozone Setting PPB/Current	Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Conc. (ppm)	% Difference	
	Air	Gas	Total			vs Audit Gas	Limits
0.0000	0	0	0	0.0000	0.0010		
0.4000	0	0	0	0.4000	0.4053	1%	± 10%
0.2000	0	0	0	0.2000	0.2030	1%	± 10%
0.1000	0	0	0	0.1000	0.1017	1%	± 10%
Absolute Average Percent Difference						1%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000

m (Slope)= 1.0110

b (Intercept as % of full scale)= 0.1640

LIMITS

≥ **0.995**

0.90-1.10

± **3% F.S.**

Remarks:

SHARP 5030 ANALYZER AUDIT

File No. 2019 - 077A

Date: May 8, 2019

Performed by: Al Clark

Station

Name: Cold Lake South
Facility/Zone: Lica

Location: Cold Lake
Operator: Maxxam

Monitor

Make/Model: Sharp 5030 Serial No: CM2209

Flow Audit Transfer Standard

Make/Model DeltaCal Cell s/n 1002
Serial # AMU 1858

Foil Kit

Foil Set No. CM1608 Certificate Date November 2017

Sample Flow

Set Pt.(LPH)	<u>1000</u>	Converted to LPM	<u>16.7</u>	Limit(+/-10%)	
Indicated	<u>1000</u>		<u>16.7</u>		<u>0.2%</u>
Conv Meas Flow	<u>1002</u>		<u>16.7</u>	Measured	<u>16.7</u>

Leak Check

Starting value	<u>1002</u>	Lph	Flow	<u>16.7</u>	(LPM)
Leak Check	<u>990</u>	Lph	Flow	<u>16.5</u>	(LPM)
Adapter			Flow	<u>-1.2%</u>	(LPM+/- 5.0% or 0.8lpm)

Sensors

	Sharp	Audit	Difference	Tolerance
T1 - Amb Tmp°C	<u>11</u>	<u>12.5</u>	<u>1.5</u>	(+/- 4°C)
Amb Press(hPa)	<u>957</u>	<u>965</u>	<u>8</u>	(+/-13.33hPa)

Background Zero

	Analog	Neph(µg/m³)	Limit	Conc
With Hepa	<u>160</u>	<u>0.2</u>	(<+/- 2 µg/m³)	<u>0.3</u>

Mass Foil Audit (Sensitivity)

	Old Factor	New Factor	Difference	Limit
Span Value	<u>7082</u>	<u>7020</u>	<u>-1%</u>	(+/- 5%)

R&P 2000D Partsiol Audit

File #: 2019 - 078A

Date: May 8, 2019

Performed by: Al clark

Location: Cold Lake

Temperature: 11.9 C

Barometric Pressure: 718 mmHg

Sampler

Make/Model 2000iD
Last Calibration Date: Not reviewed

Serial # 200D1W20244

Audit Transfer Standard

Make/Model DeltaCal
Serial # 1002

AMU # 1852

Ambient temperature

Current Reading 11.9 °C
Actual Reading 12.3 °C

Difference -0.4 <2°C

Ambient pressure

Current Reading 718 mmHg
Actual Reading 720 mmHg

Difference -2.0 ± 10mmHg

Filters temperature

Current Reading 13.4 °C
Actual Reading 13.2 °C

Difference 0.2 <2°C

Leak check

Pass with: 10.0 < 128 mmHg

or

Fail with: > 128 mmHg

Audit Flows

Coarse Set Pt	Current Rdg.	Actual Rdg.	% err.	Limits
<u>1.67</u>	<u>1.68</u>	<u>1.65</u>	<u>-1.82</u>	± 4%

Fine Set Pt	Current Rdg.	Actual Rdg.	% err.	Limits
<u>15.00</u>	<u>15.02</u>	<u>15.14</u>	<u>0.79</u>	± 4%

Other Inspections

	Condition
Rubber Seals in Hub and Satellite	<u>All OK</u>
PM Inlet Condition	<u>OK</u>
Large Inline Filter	<u>OK</u>
Air Screens Located Under Rain Hoods	<u>OK</u>

Comments: _____

Station Performance Audit Summary

Company: Lica

Facility Name: Cold Lake

Approval No.: N/A

Site Name: Cold Lake south

Region: North Saskatchewan

District: Cold Lake

Parameters audited:

H ₂ S		SO ₂	X	NO _x	X	NH ₃		O ₃	X
CO		CH ₄	X	NonCH ₄	X	THC	X	TRS	X
PM _{2.5}	X	PM ₁₀		TSP		BTEX		Wind Speed	X
Wind Dir	X	Amb. Temp	X	Stn. Temp	X	RH	X	Solar Radiation	
Rainfall		Precip		VWS		Other			
All parameters monitored as per approval: Yes <u> </u> No <u> </u> N/A <u> </u>									

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: <u> November 2017 </u>		

COMMENTS:

AUDITOR: Al Clark

DATE: May 8, 2019

Station Site Documents Audit Checklist

Station	
Name: <u> Cold Lake South </u>	Location: <u> Cold Lake </u>
Facility/Zone: <u> Lica </u>	Operator: <u> Maxxam </u>

Required Elements of AMD Chapter 3 SS 4-B	Meets AMD		NA	Current	
	YES	NO		YES	NO
Do the Site Documents Contain the Following:					
(a) Name of Owner/ Approval Holder	X			X	
(b) Name of Operating Agency	X			X	
(c) Contact Information	X			X	
(d) Date the Site or Station was Established	X			X	
(e) Date the information was last updated	X			X	
(f) Location including Latitude and Longitude	X			X	
(g) Four Colour Photos Looking N, E, S, W From Manifold Inlet	X			X	
(h) Additional Photos/Sketches of AMD Standard Site Non-Conformance			X		
(i) List of Instruments Located at the Site	X			X	
(j) Site Description Including the following:					
(i) Land Use By Sector	X			X	
(ii) Site Elevation		X			
(iii) Greatest Angle of Elevation & Direction to Nearby Buildings	X			X	
(iv) Average Building height in the area		X			
(v) Distance to Nearest Trees	X			X	

Required Elements of AMD Chapter 3 SS 4-D	Meets AMD		NA	Current	
	YES	NO		YES	NO
Do the Station Site Documents Contain the Following:					
(a) Recent Area Map Covering Approximately 1Km ²	X			X	
(b) Plan View Sketch	X			X	
(d) Colour Photos Showing Sample Manifold/Inlet	X			X	
(e) Colour Photo of the Station	X			X	
(f) Additional Photos/Sketches of AMD Standard Station Non-Conformance			X		

COMMENTS: List Aemera as owner should AEP now. Missing site elevation and average building height in area. Exterior picture does not show manifold intake clearly.

AUDITOR: Al Clark DATE: May 15, 2019

STATION AUDIT

File No. 2019 - 079A - 082A

Date: May 9, 2019

Performed by: AI Clark

Station

Name: Maskwa

Location: IOL Maskwa

Facility/Zone: Lica

Operator: Maxxam

Temp. 20.1 C

Barometric Press. 712 mmHg

Location

Latitude N 54° 36' 18.4"

Longitude W 110° 27' 09.7"

Elevation 614 m

Status of Site Documentation On line Incomplete

Status of Network Documentation On line Incomplete

Status of QAP Audited June 2017

Manifold Material Glass

Manifold Condition Good

Meteorological

	Observed	Audit Value
Wind Speed Direction	<u>12.5 kph / 215 deg</u>	<u>10-15 kph / SW</u>
Station Temperature	<u>23.0 C</u>	<u>22.6 C</u>
Relative Humidity	<u>39.5%</u>	<u>38.3%</u>
Ambient Temperature	<u>13.1 C</u>	<u>13.9 C</u>
BP	<u>942.5 mb</u>	<u>947.9 mb</u>
Precipitation	<u>1.0 mil</u>	<u>10 tips</u>

Remarks:

SO₂ ANALYZER AUDIT

File No. 2019 - 079A

Date: May 9, 2019

Performed by: AI Clark

Station

Name: Maskwa

Location: IOL Maskwa

Facility/Zone: Lica

Operator: Maxxam

Temp. 20.1 C

Barometric Press. 712 mmHg

Monitor

Make/Model: Teco 43i TLE Serial No: 1180930031

Inlet flow (sccm): 459 Full Scale Range ppm: 1.0

Last cal. Date: Apr 17/19 Old Correction Factor: 0.9990

Zero/Bkg 2.20

Span Coef 0.911 Audited June 2017

Calibrator

Calibration Method: GAS DILUTION Make/Model: Sabio 2010

Cylinder #: FF23250 AMU #: 2092

CGA Date: April 2019 SO₂ Concentration PPM: 49.5

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
4953	0.0	4953	0.0000	0.0004		
4890	78.2	4968	0.7792	0.7409	-5%	± 10%
4930	39.4	4969	0.3925	0.3731	-5%	± 10%
4978	20.1	4998	0.1991	0.1890	-5%	± 10%
Absolute Average Percent Difference					5%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000

m (Slope)= 0.9506

b (Intercept as % of full scale)= 0.0102

LIMITS

≥ **0.995**

0.90-1.10

± **3% F.S.**

Remarks:

H₂S ANALYZER AUDIT

File No. 2019 - 080A

Date: May 9, 2019

Performed by: AI Clark

Station

Name: Maskwa

Location: IOL Maskwa

Facility/Zone: Lica

Operator: Maxxam

Temp. 20.1 C

Barometric Press. 712 mmHg

Monitor

Make/Model: Teco 450i Serial No: CM17360005

Inlet flow (sccm): 947 Full Scale Range ppm: 0.1

Last cal. Date: Apr 17/19 Old Correction Factor: 1.0040

Zero/Bkg 20.1

Span Coef 0.803 Audited June 2017

Calibrator

Calibration Method: GAS DILUTION Make/Model: Sabio 2010

Cylinder #: EX0011882 AMU #: 2092

CGA Date: May 2019 H₂S Concentration PPM: 10.8

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
4953	0.0	4953	0.0000	-0.0001		
4930	37.6	4968	0.0817	0.0815	0%	± 10%
4949	20.4	4969	0.0443	0.0440	-1%	± 10%
4988	10.2	4998	0.0220	0.0221	1%	± 10%
Absolute Average Percent Difference					0%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000

m (Slope)= 0.9972

b (Intercept as % of full scale)= -0.0496

LIMITS

≥ **0.995**

0.90-1.10

± **3% F.S.**

Remarks:

Non Methane Analyzer Audit

File No. 2019 - 081A

Date: May 9, 2019

Performed by: Al Clark

Station:

Name: Maskwa Location: IOL Maskwa Operator: Maxxam
Facility/Zone: Lica Temp. 21.1 C BP: 711 mmHg

Monitor:

Make/Model: Teco 55i Serial No. 1180930026
Inlet flow (sccm): N/A CH₄ Range ppm: 20
Last cal. Date: Apr 17/19 Non CH₄ Range ppm: 20
Old Correction Factor: CH₄: 1.001 THC Range ppm: 40
Non CH₄: 1.001
THC: 1.001

Calibration Method:

Gas Dilution

Calibrator:

Make/Model Sabio 2010 AMU# 2092

HC cylinder # EA0004003 CH₄ conc. (ppm) 1010 CH₄ Equiv (C3H8 only) (ppm) 872
CGA Date April 2019 C₃H₈ conc. (ppm) 317 Total CH₄ Equiv. (ppm) 1882

Calibrator Flows			Calc. Conc.			Indicated Concentration			% Difference vs Audit Gas		
			CH ₄ (ppm)	Non CH ₄ (ppm)	THC (ppm)	CH ₄ (ppm)	Non CH ₄ (ppm)	THC (ppm)	Limit ± 10%		
Air	Gas	Total							CH ₄	Non CH ₄	THC
4998	0.0	4998	0.00	0.00	0.00	0.00	0.00	0.00	2%	0%	1%
4895	77.7	4973	15.78	13.62	29.40	16.11	13.68	29.79	2%	0%	1%
4922	39.2	4961	7.98	6.89	14.87	8.20	6.93	15.00	3%	1%	1%
4971	19.9	4991	4.03	3.48	7.50	4.16	3.53	7.69	3%	2%	2%
Absolute Average Percent Difference									3%	1%	2%

Linear Regression Analysis:

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

	CH₄	Non CH₄	THC	LIMITS
Correlation Coeff.=	<u>1.0000</u>	<u>1.0000</u>	<u>1.0000</u>	≥ 0.995
m (Slope)=	<u>1.0202</u>	<u>1.0035</u>	<u>1.0119</u>	0.90-1.10
b (Intercept as % of FS)=	<u>0.1496</u>	<u>0.0894</u>	<u>0.0554</u>	± 3% F.S.

Remarks:

NO-NOx-NO2 Analyzer Audit

File No. 2019 - 082A

Date: May 9, 2019 Performed by: Al Clark

Station:

Name: Maskwa Location: IOL Maskwa Operator: Maxxam
Facility/Zone: Lica Temp. 22.7 C BP: 716 mmHg

Monitor:

Make/Model: Teco 42i Serial No. 1180930028
Inlet flow (sccm): 541 Range ppm: 1.0
Last cal. Date: Apr 17/19 Old CF: NO: 0.994
NOx: 0.992
NO2: 0.995

NO Bkg 2.6
NOx Bkg 2.7
NO Coef 0.930
NOx Coef 1.001
NO2 Coef 1.000

Calibration Method: Gas Dilution / GPT

Calibrator: Make/Model: Sabio 2010 AMU# 2270
NO cylinder # FF23222 NO conc. ppm 50.8 NOx conc. ppm 51.4
CGA Date April 2019

Calibrator Flows			Calc. Conc.		Indicated Concentration		% Difference vs Audit Gas	
Air	Gas	Total	NO (ppm)	NOx (ppm)	NO (ppm)	NOx (ppm)	NO	NOx
5055	0.0	5055	0.0000	0.0000	-0.0001	-0.0001	Limit ± 10%	
4989	80.7	5070	0.8086	0.8181	0.7783	0.7843	-4%	-4%
5039	40.2	5079	0.4021	0.4068	0.3869	0.3906	-4%	-4%
5071	20.1	5091	0.2006	0.2029	0.1914	0.1938	-5%	-4%
Absolute Average Percent Difference							4%	4%

Linear Regression Analysis:

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

	NO	NOx	NO ₂	LIMITS
Correlation Coeff.=	<u>1.0000</u>	<u>1.0000</u>	<u>1.0000</u>	≥ 0.995
m (Slope)=	<u>0.9633</u>	<u>0.9591</u>	<u>0.9963</u>	0.90-1.10
b (Intercept as % of full scale)=	<u>-0.0744</u>	<u>-0.0235</u>	<u>0.1547</u>	± 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	5070	0.7741	0.7787	0.0046	0.4708	0.4706	0%	± 10%
1.300	5070	0.3033	0.7785	0.4752	0.4708	0.4706	0%	± 10%
0.600	5070	0.5779	0.7794	0.2016	0.1962	0.1970	0%	± 10%
0.360	5070	0.6775	0.7800	0.1024	0.0966	0.0978	1%	± 10%
Absolute Average Percent Difference							1%	

Converter Efficiency

Average Converter Efficiency 100.5%

Remarks:

Station Performance Audit Summary

Company: Lica

Facility Name: IOL Maskwa

Approval No.: N/A

Site Name: Maskwa

Region: North Saskatchewan

District: Cold Lake

Parameters audited:

H ₂ S	X	SO ₂	X	NO _x	X	NH ₃		O ₃	
CO		CH ₄	X	NonCH ₄	X	THC	X	TRS	
PM _{2.5}		PM ₁₀		TSP		BTEX		Wind Speed	
Wind Dir	X	Amb. Temp	X	Stn.Temp	X	RH	X	Solar Radiation	
Rainfall		Precip		VWS		BP	X		
All parameters monitored as per approval: Yes _____ No _____ N/A _____									

GENERAL

Audited June 2017

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:	September 2018	

COMMENTS:

AUDITOR: Al Clark

DATE: May 9, 2019

Station Site Documents Audit Checklist

Station	
Name: <u>Maskwa</u>	Location: <u>IOL Maskwa</u>
Facility/Zone: <u>Lica</u>	Operator: <u>Maxxam</u>

Required Elements of AMD Chapter 3 SS 4-B	Meets AMD		NA	Current	
	YES	NO		YES	NO
Do the Site Documents Contain the Following:					
(a) Name of Owner/ Approval Holder	X			X	
(b) Name of Operating Agency	X			X	
(c) Contact Information	X			X	
(d) Date the Site or Station was Established	X			X	
(e) Date the information was last updated	X			X	
(f) Location including Latitude and Longitude	X			X	
(g) Four Colour Photos Looking N, E, S, W From Manifold Inlet	X			X	
(h) Additional Photos/Sketches of AMD Standard Site Non-Conformance			X		
(i) List of Instruments Located at the Site	X			X	
(j) Site Description Including the following:					
(i) Land Use By Sector	X			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			X	

Required Elements of AMD Chapter 3 SS 4-D	Meets AMD		NA	Current	
	YES	NO		YES	NO
Do the Station Site Documents Contain the Following:					
(a) Recent Area Map Covering Approximately 1Km ²	X			X	
(b) Plan View Sketch	X			X	
(d) Colour Photos Showing Sample Manifold/Inlet	X			X	
(e) Colour Photo of the Station	X			X	
(f) Additional Photos/Sketches of AMD Standard Station Non-Conformance			X		

COMMENTS: Missing site elevation. Shows tree elevation not building. Exterior manifold obscured by the railing on the roof of the station.

AUDITOR: Al Clark DATE: May 15, 2019



Network Site Documents Audit Checklist

Network	
Name: <u>Maskwa</u>	Location: <u>IOL Maskwa</u>
Facility/Zone: <u>Lica</u>	Operator: <u>Maxxam</u>

<p>Required Elements of AMD Chapter 3 SS 4-C Do the Network Site Documents Contain the Following:</p> <p>(a) A Recent Area Map Showing the Following:</p> <ul style="list-style-type: none"> (i) Station Locations <li style="background-color: yellow;">(ii) Roadways <li style="background-color: yellow;">(iii) Railway Lines <li style="background-color: yellow;">(iv) Airports (v) Lakes (vi) Rivers (vii) Human Settlements (viii) Locations of Identified Industrial & Non-Industrial Pollutant Sources (ix) Other Significant Landmarks <p>(b) A windrose for each Continuous Ambient Air Monitoring Station</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Meets AMD</th> <th rowspan="2">NA</th> <th colspan="2">Current</th> </tr> <tr> <th>YES</th> <th>NO</th> <th>YES</th> <th>NO</th> </tr> </thead> <tbody> <tr style="background-color: #cccccc;"> <td colspan="5"></td> </tr> <tr> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">X</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">X</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">X</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> <tr> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> <tr> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> </tbody> </table>	Meets AMD		NA	Current		YES	NO	YES	NO						X			X			X					X					X				X			X		X			X		X			X				X			X			X	
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COMMENTS: Missing elements in the Network Map.

AUDITOR: Al Clark DATE: May 15, 2019



STATION AUDIT

File No. 2019 - 062A - 066A

Date: May 6, 2019

Performed by: Al Clark

Station

Name: St Lina

Location: St Lina

Facility/Zone: Lica

Operator: Maxxam

Temp. 20.3 C

Barometric Press. 704 mmHg

Location

Latitude N 54° 12' 59.2"

Longitude W 111° 30' 09.1"

Elevation 676m

Status of Site Documentation On Line Incomplete

Status of Network Documentation On Line Incomplete

Status of QAP Audited June 2017

Manifold Material Glass

Manifold Condition Good

Meteorological

	Observed	Audit Value
Wind Speed Direction	<u>6.2 kph / 13.5 deg</u>	<u>5-10 kph / N</u>
Station Temperature	<u>22.2 C</u>	<u>21.8 C</u>
Relative Humidity	<u>80.0%</u>	<u>65.2%</u>
Ambient Temperature	<u>6.7 C</u>	<u>6.9 C</u>
Solar Radiation	<u>699 mmHg</u>	<u>702 mmHg</u>
Precipitation	<u>1.0 mil</u>	<u>10 tips</u>

Remarks:

SO₂ ANALYZER AUDIT

File No. 2019 - 062A

Date: May 6, 2019

Performed by: Al Clark

Station

Name: St Lina

Location: St Lina

Facility/Zone: Lica

Operator: Maxxam

Temp. 20.3 C

Barometric Press. 704 mmHg

Monitor

Make/Model: Teco 43i TLE Serial No: 1180930030

Inlet flow (sccm): 437 Full Scale Range ppm: 1.0

Last cal. Date: Apr 12/19 Old Correction Factor: 1.0030

Zero/Bkg 3.9

Span Coef 1.042

Calibrator

Calibration Method: GAS DILUTION Make/Model: Sabio 2010

Cylinder #: FF23250 AMU #: 2092

CGA Date: April 2019 SO₂ Concentration PPM: 49.5

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
4945	0.0	4945	0.0000	-0.0001		
4882	77.9	4960	0.7774	0.7252	-7%	± 10%
4918	39.0	4957	0.3894	0.3638	-7%	± 10%
4954	20.0	4974	0.1990	0.1822	-8%	± 10%
Absolute Average Percent Difference					7%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000

m (Slope)= 0.9345

b (Intercept as % of full scale)= -0.1335

LIMITS

≥ **0.995**

0.90-1.10

± **3% F.S.**

Remarks:

Calibration documentation shows analyzer calibrated at a lower value than the audit values.

H₂S ANALYZER AUDIT

File No. 2019 - 063A

Date: May 6, 2019

Performed by: Al Clark

Station

Name: St Lina

Location: St Lina

Facility/Zone: Lica

Operator: Maxxam

Temp. 20.3 C

Barometric Press. 704 mmHg

Monitor

Make/Model: Teco 450i Serial No: CM18010058

Inlet flow (sccm): 822 Full Scale Range ppm: 0.1

Last cal. Date: Apr 12/19 Old Correction Factor: 1.0130

Zero/Bkg 35.8

Span Coef 0.834

Calibrator

Calibration Method: GAS DILUTION Make/Model: Sabio 2010

Cylinder #: EX0011882 AMU #: 2092

CGA Date: May 2019 H₂S Concentration PPM: 10.8

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
4945	0.0	4945	0.0000	0.0011		
4923	37.2	4960	0.0810	0.0810	-1%	± 10%
4937	20.1	4957	0.0438	0.0444	-1%	± 10%
4964	10.0	4974	0.0217	0.0222	-3%	± 10%
Absolute Average Percent Difference					2%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000

m (Slope)= 0.9879

b (Intercept as % of full scale)= 0.9901

LIMITS

≥ **0.995**

0.90-1.10

± **3% F.S.**

Remarks:

Non Methane Analyzer Audit

File No. 2019 - 064A

Date: May 6, 2019

Performed by: Al Clark

Station:

Name: St Lina Location: St Lina Operator: Maxxam
 Facility/Zone: Lica Temp. 22.5 C BP: 702 mmHg

Monitor:

Make/Model: Teco 55i Serial No. 1180930025
 Inlet flow (sccm): N/A CH₄ Range ppm: 20
 Last cal. Date: Apr 12/19 Non CH₄ Range ppm: 20
 THC Range ppm: 40
 Old Correction Factor: CH₄: 0.996
 Non CH₄: 0.980
 THC: 0.989

Calibration Method:

Gas Dilution

Calibrator:

Make/Model Sabio 2010 AMU# 2092

HC cylinder # EA0004003 CH₄ conc. (ppm) 1010 CH₄ Equiv (C3H8 only) (ppm) 872

CGA Date April 2019 C₃H₈ conc. (ppm) 317 Total CH₄ Equiv. (ppm) 1882

Calibrator Flows			Calc. Conc.			Indicated Concentration			% Difference vs Audit Gas		
			CH ₄ (ppm)	Non CH ₄ (ppm)	THC (ppm)	CH ₄ (ppm)	Non CH ₄ (ppm)	THC (ppm)	Limit ± 10%		
Air	Gas	Total							CH ₄	Non CH ₄	THC
4960	0.0	4960	0.00	0.00	0.00	0.00	0.00	0.00	1%	0%	0%
4884	77.2	4961	15.72	13.57	29.28	15.87	13.52	29.39	1%	0%	0%
4930	39.1	4969	7.95	6.86	14.81	7.99	6.88	14.87	1%	0%	0%
4962	19.9	4982	4.03	3.48	7.52	4.06	3.57	7.63	1%	3%	2%
Absolute Average Percent Difference									1%	1%	1%

Linear Regression Analysis:

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

	CH₄	Non CH₄	THC	LIMITS
Correlation Coeff.=	<u>1.0000</u>	<u>1.0000</u>	<u>1.0000</u>	≥ 0.995
m (Slope)=	<u>1.0098</u>	<u>0.9945</u>	<u>1.0027</u>	0.90-1.10
b (Intercept as % of FS)=	<u>-0.0615</u>	<u>0.2414</u>	<u>0.0900</u>	± 3% F.S.

Remarks:

Calibration form indicates Bonnyville East not St. Lina.

NO-NOx-NO2 Analyzer Audit

File No. 2019 - 065A

Date: May 6, 2019 Performed by: Al Clark

Station:

Name: St Lina Location: St Lina Operator: Maxxam
Facility/Zone: Lica Temp. 21.1 C BP: 702 mmHg

Monitor:

Make/Model: Teco 42i Serial No. 1180930029
Inlet flow (sccm): 521 Range ppm: 1.0
Last cal. Date: Apr 8/19 Old CF: NO: 0.998
NOx: 0.996
NO2: 1.005

NO Bkg 5.4
NOx Bkg 5.6
NO Coef 1.167
NOx Coef 1.004
NO2 Coef 0.999

Calibration Method: Gas Dilution / GPT

Calibrator: Make/Model: Sabio 2010 AMU# 2270
NO cylinder # FF23222 NO conc. ppm 50.8 NOx conc. ppm 51.4
CGA Date April 2019

Calibrator Flows			Calc. Conc.		Indicated Concentration		% Difference vs Audit Gas	
Air	Gas	Total	NO (ppm)	NOx (ppm)	NO (ppm)	NOx (ppm)	NO	NOx
5045	0.0	5045	0.0000	0.0000	0.0000	0.0000	Limit ± 10%	
4964	80.4	5044	0.8097	0.8193	0.7701	0.7809	-5%	-5%
5011	40.1	5051	0.4033	0.4081	0.3836	0.3890	-5%	-5%
5043	20.1	5063	0.2017	0.2041	0.1890	0.1928	-6%	-6%
Absolute Average Percent Difference							5%	5%

Linear Regression Analysis:

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

	NO	NOx	NO ₂	LIMITS
Correlation Coeff.=	<u>1.0000</u>	<u>1.0000</u>	<u>1.0000</u>	≥ 0.995
m (Slope)=	<u>0.9522</u>	<u>0.9538</u>	<u>0.9993</u>	0.90-1.10
b (Intercept as % of full scale)=	<u>-0.1113</u>	<u>-0.0665</u>	<u>0.1062</u>	± 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	5044	0.7726	0.7794	0.0068	0.0000	0.0000	0.0000	%Dif Limit
1.300	5044	0.3209	0.7802	0.4593	0.4517	0.4525	0%	± 10%
0.600	5044	0.5830	0.7802	0.1972	0.1896	0.1904	0%	± 10%
0.360	5044	0.6785	0.7804	0.1020	0.0941	0.0952	1%	± 10%
Absolute Average Percent Difference							1%	

Converter Efficiency

Average Converter Efficiency 100.6%

Remarks: Calibration form indicates Bonnyville East not St. Lina.
Calibration document shows the analyzer was calibrated at lower values than audit.

O₃ ANALYZER AUDIT

File No. 2019 - 066A

Date: May 6, 2019

Performed by: Al Clark

Station

Name: St Lina

Location: St Lina

Facility/Zone: Lica

Operator: Maxxam

Temp. 20.3 C

Barometric Press. 704 mmHg

Monitor

Make/Model: Teco 49i Serial No: 1002240371

Inlet flow (sccm): 727 / 767 Full Scale Range ppm: 0.5

Last cal. Date: Apr 12/19 Old Correction Factor: 1.0030

Zero/Bkg -0.8

Span Coeff. 0.992

Calibrator

Calibration Method: Photometer

Make/Model: Teco 49i PS AMU #: 1808

NO cylinder #: N/A NO concentration ppm: N/A

Ozone Setting PPB/Current	Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Conc. (ppm)	% Difference	
	Air	Gas	Total			vs Audit Gas	Limits
0.0000	0	X	0	0.0000	0.0037		
0.4000	0	X	0	0.4000	0.4059	1%	± 10%
0.2000	0	X	0	0.2000	0.2043	0%	± 10%
0.1000	0	X	0	0.1000	0.1037	0%	± 10%
Absolute Average Percent Difference						0%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000

m (Slope)= 1.0058

b (Intercept as % of full scale)= 0.6760

LIMITS

≥ **0.995**

0.90-1.10

± **3% F.S.**

Remarks:

Calibration form indicates Bonnyville East not St. Lina.

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 ₂ S	X	SO ₂	X	NO _x	X	NH ₃	X	O ₃	X
CO		CH ₄	X	NonCH ₄	X	THC	X	TRS	
PM _{2.5}		PM ₁₀		TSP		BTEX		Wind Speed	
Wind Dir	X	Amb. Temp	X	Stn.Temp	X	RH	X	Solar Radiation	
Rainfall		Precip	X	VWS		BP	X		
All parameters monitored as per approval: Yes _____ No _____ N/A _____									

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:	May 2019	

COMMENTS:

AUDITOR: Al Clark

DATE: May 6, 2019

Station Site Documents Audit Checklist

Station	
Name: <u> St Lina </u>	Location: <u> St Lina </u>
Facility/Zone: <u> Lica </u>	Operator: <u> Maxxam </u>

Required Elements of AMD Chapter 3 SS 4-B																																																																																
Do the Site Documents Contain the Following:																																																																																
(a) Name of Owner/ Approval Holder	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th colspan="2">Meets AMD</th> <th rowspan="2">NA</th> <th colspan="2">Current</th> </tr> <tr> <th>YES</th> <th>NO</th> <th>YES</th> <th>NO</th> </tr> <tr> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> <tr> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> <tr> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> <tr> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> <tr> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> <tr> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> <tr style="background-color: #cccccc;"> <td colspan="5"></td> </tr> <tr> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">X</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">X</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">X</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> </table>	Meets AMD		NA	Current		YES	NO	YES	NO	X			X		X			X		X			X		X			X		X			X		X			X				X			X			X							X			X			X					X					X				X			X	
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(c) Contact Information																																																																																
(d) Date the Site or Station was Established																																																																																
(e) Date the information was last updated																																																																																
(f) Location including Latitude and Longitude																																																																																
(g) Four Colour Photos Looking N, E, S, W From Manifold Inlet																																																																																
(h) Additional Photos/Sketches of AMD Standard Site Non-Conformance																																																																																
(i) List of Instruments Located at the Site																																																																																
(j) Site Description Including the following:																																																																																
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(ii) Site Elevation																																																																																
(iii) Greatest Angle of Elevation & Direction to Nearby Buildings																																																																																
(iv) Average Building height in the area																																																																																
(v) Distance to Nearest Trees																																																																																

Required Elements of AMD Chapter 3 SS 4-D																																			
Do the Station Site Documents Contain the Following:																																			
(a) Recent Area Map Covering Approximately 1Km ²	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th colspan="2">Meets AMD</th> <th rowspan="2">NA</th> <th colspan="2">Current</th> </tr> <tr> <th>YES</th> <th>NO</th> <th>YES</th> <th>NO</th> </tr> <tr> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> <tr style="background-color: #ffff00;"> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> <tr style="background-color: #ffff00;"> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> <tr> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> <td></td> </tr> </table>	Meets AMD		NA	Current		YES	NO	YES	NO	X			X		X			X		X			X		X			X				X		
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(b) Plan View Sketch - Lablled a Schematic.																																			
(d) Colour Photos Showing Sample Manifold/Inlet																																			
(e) Colour Photo of the Station																																			
(f) Additional Photos/Sketches of AMD Standard Station Non-Conformance																																			

COMMENTS: Does not include site elevation or the communication tower building height and distance north of station. Station picture doesn't show PM2.5 inlet. Roadway labelled as side street should be secondary highway. Compressor pad ~250 m east of station not 20m.
Page Satellite image labelled CLS not St Lina. Missing all sector quadrant descriptions.

AUDITOR: Al Clark DATE: May 15, 2019

Network Site Documents Audit Checklist

Network	
Name: <u> St Lina </u>	Location: <u> St Lina </u>
Facility/Zone: <u> Lica </u>	Operator: <u> Maxxam </u>

<p>Required Elements of AMD Chapter 3 SS 4-C Do the Network Site Documents Contain the Following:</p> <p>(a) A Recent Area Map Showing the Following:</p> <ul style="list-style-type: none"> (i) Station Locations <li style="background-color: yellow;">(ii) Roadways <li style="background-color: yellow;">(iii) Railway Lines <li style="background-color: yellow;">(iv) Airports (v) Lakes (vi) Rivers (vii) Human Settlements (viii) Locations of Identified Industrial & Non-Industrial Pollutant Sources (ix) Other Significant Landmarks <p>(b) A windrose for each Continuous Ambient Air Monitoring Station</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Meets AMD</th> <th rowspan="2">NA</th> <th colspan="2">Current</th> </tr> <tr> <th>YES</th> <th>NO</th> <th>YES</th> <th>NO</th> </tr> </thead> <tbody> <tr style="background-color: #cccccc;"> <td colspan="5"></td> </tr> <tr> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">X</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">X</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">X</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> <tr> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> <tr> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">X</td> <td></td> <td></td> <td style="text-align: center;">X</td> <td></td> </tr> </tbody> </table>	Meets AMD		NA	Current		YES	NO	YES	NO						X			X			X					X					X				X			X		X			X		X			X				X			X			X	
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COMMENTS: Missing elements of the network map.

AUDITOR: Al Clark DATE: May 15, 2019

STATION AUDIT

File No. 2019 - 067A - 071A

Date: May 7, 2019

Performed by: Al Clark

Station

Name: Bonnyville East

Location: Bonnyville

Facility/Zone: Lica

Operator: Maxxam

Temp. 22.7 C

Barometric Press. 716 mmHg

Location

Latitude N 54° 15' 09.9"

Longitude W 110° 41' 26.6"

Elevation 550m

Status of Site Documentation On Line - incomplete

Status of Network Documentation On Line - incomplete

Status of QAP Audited June 2017

Manifold Material Glass

Manifold Condition Good

Meteorological

	Observed	Audit Value
Wind Speed Direction	<u>11.1 kph / 92 deg</u>	<u>10-15 kph / E</u>
Station Temperature	<u>22.2 C</u>	<u>21.4 C</u>
Relative Humidity	<u>N/A</u>	<u>N/A</u>
Ambient Temperature	<u>N/A</u>	<u>N/A</u>
Solar Radiation	<u>N/A</u>	<u>N/A</u>
Precipitation	<u>N/A</u>	<u>N/A</u>

Remarks:

SO₂ ANALYZER AUDIT

File No. 2019 - 067A

Date: May 7, 2019

Performed by: Al Clark

Station

Name: Bonnyville East

Location: Bonnyville

Facility/Zone: Lica

Operator: Maxxam

Temp. 22.9 C

Barometric Press. 719 mmHg

Monitor

Make/Model: Teco 43i TLE Serial No: 1180320043

Inlet flow (sccm): 459 Full Scale Range ppm: 1.0

Last cal. Date: Apr 8/19 Old Correction Factor: 1.0050

Zero/Bkg 4.54

Span Coef 0.928

Calibrator

Calibration Method: GAS DILUTION Make/Model: Sabio 2010

Cylinder #: FF23250 AMU #: 2092

CGA Date: April 2019 SO₂ Concentration PPM: 49.5

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
4948	0.0	4948	0.0000	0.0004		
4886	77.1	4963	0.7690	0.7438	-3%	± 10%
4921	38.6	4960	0.3852	0.3764	-2%	± 10%
4952	20.1	4972	0.2001	0.1909	-5%	± 10%
Absolute Average Percent Difference					4%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000

m (Slope)= 0.9685

b (Intercept as % of full scale)= -0.0048

LIMITS

≥ **0.995**

0.90-1.10

± **3% F.S.**

Remarks:

H₂S ANALYZER AUDIT

File No. 2019 - 068A

Date: May 7, 2019

Performed by: AI Clark

Station

Name: Bonnyville East

Location: Bonnyville

Facility/Zone: Lica

Operator: Maxxam

Temp. 22.9 C

Barometric Press. 719 mmHg

Monitor

Make/Model: Teco 450i Serial No: CM17360002

Inlet flow (sccm): 952 Full Scale Range ppm: 0.1

Last cal. Date: Apr 8/19 Old Correction Factor: 1.0000

Zero/Bkg 21.3

Span Coef 1.151

Calibrator

Calibration Method: GAS DILUTION Make/Model: Sabio 2010

Cylinder #: EX0011882 AMU #: 2092

CGA Date: May 2019 H₂S Concentration PPM: 10.8

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
4948	0.0	4948	0.0000	0.0012		
4926	36.8	4963	0.0801	0.0814	0%	± 10%
4940	20.0	4960	0.0435	0.0453	1%	± 10%
4962	9.9	4972	0.0215	0.0229	1%	± 10%
Absolute Average Percent Difference					1%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000

m (Slope)= 1.0018

b (Intercept as % of full scale)= 1.3510

LIMITS

≥ **0.995**

0.90-1.10

± **3% F.S.**

Remarks:

Non Methane Analyzer Audit

File No. 2019 - 069A

Date: May 7, 2019

Performed by: Al Clark

Station:

Name: Bonnyville East Location: Bonnyville Operator: Maxxam
Facility/Zone: Lica Temp. 23.7 C BP: 719 mmHg

Monitor:

Make/Model: Teco 55i Serial No. 1180320044
Inlet flow (scm): N/A CH₄ Range ppm: 20
Last cal. Date: Apr 9/19 Non CH₄ Range ppm: 20
Old Correction Factor: CH₄: 1.003 THC Range ppm: 40
Non CH₄: 0.995
THC: 0.999

Calibration Method:

Gas Dilution

Calibrator:

Make/Model Sabio 2010 AMU# 2092

HC cylinder # EA0004003 CH₄ conc. (ppm) 1010 CH₄ Equiv (C3H8 only) (ppm) 872
CGA Date April 2019 C₃H₈ conc. (ppm) 317 Total CH₄ Equiv. (ppm) 1882

Calibrator Flows			Calc. Conc.			Indicated Concentration			% Difference vs Audit Gas		
Air	Gas	Total	CH ₄ (ppm)	Non CH ₄ (ppm)	THC (ppm)	CH ₄ (ppm)	Non CH ₄ (ppm)	THC (ppm)	Limit ± 10%		
									CH ₄	Non CH ₄	THC
4942	0.0	4942	0.00	0.00	0.00	0.00	0.00	0.00	0%	0%	0%
4865	77.4	4942	15.82	13.65	29.47	15.82	13.63	29.45	0%	0%	0%
4902	39.0	4941	7.97	6.88	14.85	8.01	6.92	14.93	0%	1%	1%
4941	19.9	4961	4.05	3.50	7.55	4.09	3.57	7.66	1%	2%	1%
Absolute Average Percent Difference									0%	1%	1%

Linear Regression Analysis:

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

	CH₄	Non CH₄	THC	LIMITS
Correlation Coeff.=	<u>1.0000</u>	<u>1.0000</u>	<u>1.0000</u>	≥ 0.995
m (Slope)=	<u>0.9996</u>	<u>0.9968</u>	<u>0.9983</u>	0.90-1.10
b (Intercept as % of FS)=	<u>0.1128</u>	<u>0.2079</u>	<u>0.1603</u>	± 3% F.S.

Remarks:

NO-NOx-NO2 Analyzer Audit

File No. 2019 - 070A

Date: May 7, 2019 Performed by: Al Clark

Station:

Name: Bonnyville East Location: Bonnyville Operator: Maxxam
Facility/Zone: Lica Temp. 22.7 C BP: 716 mmHg

Monitor:

Make/Model: Teco 42i Serial No. 1180930027
Inlet flow (sccm): 702 Range ppm: 1.0
Last cal. Date: Apr 8/19 Old CF: NO: 1.001
NOx: 0.999
NO2: 0.998

NO Bkg 7.0
NOx Bkg 7.2
NO Coef 0.852
NOx Coef 1.002
NO2 Coef 0.999

Calibration Method: Gas Dilution / GPT

Calibrator: Make/Model: Sabio 2010 AMU# 2270
NO cylinder # FF23222 NO conc. ppm 50.8 NOx conc. ppm 51.4
CGA Date April 2019

Calibrator Flows			Calc. Conc.		Indicated Concentration		% Difference vs Audit Gas	
Air	Gas	Total	NO (ppm)	NOx (ppm)	NO (ppm)	NOx (ppm)	NO	NOx
5049	0.0	5049	0.0000	0.0000	-0.0001	0.0000	Limit ± 10%	
4967	80.2	5047	0.8072	0.8168	0.7656	0.7877	-5%	-4%
5009	40.0	5049	0.4025	0.4072	0.3818	0.3917	-5%	-4%
5025	19.8	5045	0.1994	0.2017	0.1894	0.1946	-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.=	<u>1.0000</u>	<u>1.0000</u>	<u>1.0000</u>	≥ 0.995
m (Slope)=	<u>0.9484</u>	<u>0.9642</u>	<u>0.9979</u>	0.90-1.10
b (Intercept as % of full scale)=	<u>0.0086</u>	<u>-0.0182</u>	<u>0.1798</u>	± 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	5047	0.7780	0.7876	0.0096	0.4682	0.4689	0%	± 10%
1.300	5047	0.3098	0.7883	0.4785	0.4682	0.4689	0%	± 10%
0.600	5047	0.5851	0.7894	0.2043	0.1929	0.1947	1%	± 10%
0.360	5047	0.6845	0.7889	0.1044	0.0935	0.0948	1%	± 10%
Absolute Average Percent Difference							1%	

Converter Efficiency

Average Converter Efficiency 100.8%

Remarks:

O₃ ANALYZER AUDIT

File No. 2019 - 071A

Date: May 7, 2019

Performed by: Al Clark

Station

Name: Bonnyville East

Location: Bonnyville

Facility/Zone: Lica

Operator: Maxxam

Temp. 22.7 C

Barometric Press. 716 mmHg

Monitor

Make/Model: Teco 49i Serial No: 1002240372

Inlet flow (sccm): 759 / 764 Full Scale Range ppm: 0.5

Last cal. Date: Apr 9/19 Old Correction Factor: 1.0070

Zero/Bkg 0.0

Span Coeff. 1.015

Calibrator

Calibration Method: Photometer

Make/Model: Teco 49i PS AMU #: 1808

NO cylinder #: N/A NO concentration ppm: N/A

Ozone Setting PPB/Current	Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Conc. (ppm)	% Difference	
	Air	Gas	Total			vs Audit Gas	Limits
0.0000	0	0	0	0.0000	0.0016		
0.4000	0	0	0	0.4000	0.3966	-1%	± 10%
0.2000	0	0	0	0.2000	0.1991	-1%	± 10%
0.1000	0	0	0	0.1000	0.1004	-1%	± 10%
Absolute Average Percent Difference						1%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000
m (Slope)= 0.9875
b (Intercept as % of full scale)= 0.3240

LIMITS

≥ **0.995**
0.90-1.10
± **3% F.S.**

Remarks:

Station Performance Audit Summary

Company: Lica Facility Name: Bonnyville
 Approval No.: N/A Site Name: Bonnyville East
 Region: North Saskatchewan District: Cold Lake

Parameters audited:

H ₂ S	X	SO ₂	X	NO _x	X	NH ₃		O ₃	X
CO		CH ₄	X	NonCH ₄	X	THC	X	TRS	
PM _{2.5}		PM ₁₀		TSP		BTEX		Wind Speed	X
Wind Dir	X	Amb. Temp		Stn.Temp	X	RH		Solar Radiation	
Rainfall		Precip		VWS		Other			
All parameters monitored as per approval: Yes _____ No _____ N/A _____									

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:	<u>October 2018</u>	

COMMENTS:

AUDITOR: Al Clark DATE: May 7, 2019

Station Site Documents Audit Checklist

Station	
Name: <u>Bonnyville East</u>	Location: <u>Bonnyville</u>
Facility/Zone: <u>Lica</u>	Operator: <u>Maxxam</u>

<p>Required Elements of AMD Chapter 3 SS 4-B Do the Site Documents Contain the Following:</p> <p>(a) Name of Owner/ Approval Holder</p> <p>(b) Name of Operating Agency</p> <p>(c) Contact Information</p> <p>(d) Date the Site or Station was Established</p> <p>(e) Date the information was last updated</p> <p>(f) Location including Latitude and Longitude</p> <p>(g) Four Colour Photos Looking N, E, S, W From Manifold Inlet</p> <p>(h) Additional Photos/Sketches of AMD Standard Site Non-Conformance</p> <p>(i) List of Instruments Located at the Site</p> <p>(j) Site Description Including the following:</p> <p style="background-color: yellow;">(i) Land Use By Sector not all quadrants identified</p> <p style="background-color: yellow;">(ii) Site Elevation</p> <p>(iii) Greatest Angle of Elevation & Direction to Nearby Buildings</p> <p>(iv) Average Building height in the area</p> <p>(v) Distance to Nearest Trees</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Meets AMD</th> <th rowspan="2">NA</th> <th colspan="2">Current</th> </tr> <tr> <th>YES</th> <th>NO</th> <th>YES</th> <th>NO</th> </tr> </thead> <tbody> <tr><td>X</td><td></td><td></td><td>X</td><td></td></tr> <tr><td>X</td><td></td><td></td><td>X</td><td></td></tr> <tr><td>X</td><td></td><td></td><td>X</td><td></td></tr> <tr><td>X</td><td></td><td></td><td>X</td><td></td></tr> <tr><td>X</td><td></td><td></td><td>X</td><td></td></tr> <tr><td>X</td><td></td><td></td><td>X</td><td></td></tr> <tr><td>X</td><td></td><td></td><td>X</td><td></td></tr> <tr><td></td><td></td><td>X</td><td></td><td></td></tr> <tr><td>X</td><td></td><td></td><td>X</td><td></td></tr> <tr style="background-color: #cccccc;"><td colspan="5"></td></tr> <tr><td>X</td><td></td><td></td><td>X</td><td></td></tr> <tr><td></td><td>X</td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td>X</td><td></td><td></td></tr> <tr><td></td><td></td><td>X</td><td></td><td></td></tr> <tr><td>X</td><td></td><td></td><td>X</td><td></td></tr> </tbody> </table>	Meets AMD		NA	Current		YES	NO	YES	NO	X			X		X			X		X			X		X			X		X			X		X			X		X			X				X			X			X							X			X			X						X					X			X			X	
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<p>Required Elements of AMD Chapter 3 SS 4-D Do the Station Site Documents Contain the Following:</p> <p>(a) Recent Area Map Covering Approximately 1Km²</p> <p style="background-color: yellow;">(b) Plan View Sketch (Labelled Schematic)</p> <p style="background-color: yellow;">(d) Colour Photos Showing Sample Manifold/Inlet - Shown at a distance.</p> <p>(e) Colour Photo of the Station</p> <p>(f) Additional Photos/Sketches of AMD Standard Station Non-Conformance</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Meets AMD</th> <th rowspan="2">NA</th> <th colspan="2">Current</th> </tr> <tr> <th>YES</th> <th>NO</th> <th>YES</th> <th>NO</th> </tr> </thead> <tbody> <tr><td>X</td><td></td><td></td><td></td><td></td></tr> <tr><td>X</td><td></td><td></td><td></td><td></td></tr> <tr><td>X</td><td></td><td></td><td></td><td></td></tr> <tr><td>X</td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td>X</td><td></td><td></td></tr> </tbody> </table>	Meets AMD		NA	Current		YES	NO	YES	NO	X					X					X					X							X		
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COMMENTS: Need to specify all quadrants in land use by sector. Site elevation missing. Need to relabel Schematic map as Plan View. Exterior view of sample manifold inlet hard to see in picture.

AUDITOR: Al Clark DATE: May 15, 2019



Network Site Documents Audit Checklist

Network	
Name: <u>Bonnyville East</u>	Location: <u>Bonnyville</u>
Facility/Zone: <u>Lica</u>	Operator: <u>Maxxam</u>

<p>Required Elements of AMD Chapter 3 SS 4-C Do the Network Site Documents Contain the Following:</p> <p>(a) A Recent Area Map Showing the Following:</p> <ul style="list-style-type: none"> (i) Station Locations <li style="background-color: yellow;">(ii) Roadways <li style="background-color: yellow;">(iii) Railway Lines <li style="background-color: yellow;">(iv) Airports (v) Lakes (vi) Rivers (vii) Human Settlements (viii) Locations of Identified Industrial & Non-Industrial Pollutant Sources (ix) Other Significant Landmarks <p style="background-color: yellow;">(b) A windrose for each Continuous Ambient Air Monitoring Station</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Meets AMD</th> <th rowspan="2">NA</th> <th colspan="2">Current</th> </tr> <tr> <th>YES</th> <th>NO</th> <th>YES</th> <th>NO</th> </tr> </thead> <tbody> <tr style="background-color: #cccccc;"> <td colspan="5"></td> </tr> <tr> <td>X</td> <td></td> <td></td> <td>X</td> <td></td> </tr> <tr> <td></td> <td>X</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>X</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>X</td> <td></td> <td></td> <td></td> </tr> <tr> <td>X</td> <td></td> <td></td> <td>X</td> <td></td> </tr> <tr> <td>X</td> <td></td> <td></td> <td>X</td> <td></td> </tr> <tr> <td>X</td> <td></td> <td></td> <td>X</td> <td></td> </tr> <tr> <td>X</td> <td></td> <td></td> <td>X</td> <td></td> </tr> <tr> <td></td> <td></td> <td>X</td> <td></td> <td></td> </tr> <tr> <td>X</td> <td></td> <td></td> <td>X</td> <td></td> </tr> </tbody> </table>	Meets AMD		NA	Current		YES	NO	YES	NO						X			X			X					X					X				X			X		X			X		X			X		X			X				X			X			X	
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COMMENTS: Network Map is missing elements as describe above. Windrose is only 1 month.

AUDITOR: Al Clark DATE: May 15, 2019



Lakeland Industry and Community Association

Box 8237, 5107W - 50 Street, Bonnyville, AB T9N 2J5

780 812-2182 780 812-2186 www.lica.ca

June 28, 2019

Monitoring Branch
Environmental Monitoring and Science Division
Main Floor Bldg 3 McIntyre Center
4946 – 89 street
Edmonton, AB, T6E 5K1
Telephone: 780.427.7888

Mr. Al Clark,

**RE: Ambient Air Monitoring Station Audit Results for the LICA Network
File Numbers 2019 - 062A / 082A**

Below, please see the responses and corrective actions either completed or proposed in response to Alberta Environment and Park's May 2019 audit of the Lakeland Industry and Community Association's ambient air monitoring network.

COMMON ISSUE: Site Documentation

"All site and network documentation that were reviewed on line, showed that they require updating as elements in both documents are missing or incorrect. Please review the attached audit findings."

Corrective Action: LICA has begun updating site documentation files using the Air Monitoring Directive Template available at: <https://www.alberta.ca/assets/documents/amd-site-documentation-template.docx>. Completion of all site documentation updates will be complete by the end of Q2 2019 (September 30, 2019).

COLD LAKE: Oxides of Nitrogen (initial failure, o-ring material)

"Oxides of Nitrogen analyzer at Cold Lake South initially was failing 24% low. When doing cursory checks it was discovered the stainless steel sample inlet filter holder had a compressed internal oring. When bypassed and eventually replaced with an inert Teflon Thermo style filter holder, the analyzer passed the audit."

Corrective Action: In accordance with AMD Chapter 8 Section 4.1, Aud 4-E (a)(b), data from April 24th, 2019 (the date of the last valid calibration) to May 8th, 2019 will be flagged as invalid due to the initial 24% low response. An uptime contravention was reported (Reference 354247) for the months of April and May 2019 and will be noted in the applicable monthly reports. Based on

Alberta Environment and Park's advice, Teflon Thermo style inlet file holders will be phased-in at the Cold Lake station and across the regional air monitoring network. Completion of this task will be completed by Q3 2019 (December 31, 2019).

COMMON ISSUE: SO₂ and NO_x Calibrated and Adjusted At Lower End Of The High Point

“Review of the calibration documents shows that the SO₂ and NO_x analyzer were calibrated and adjusted at the lower end of the high point (60-80% of the analyzer fullscale) calibration range in the month of April 2019. This may account for the responses being lower than anticipated for audit responses.”

Corrective Action: LICA hasn't resolved this issue with the network operator yet however we will discuss AEP's recommendation that the SO₂ and NO_x analyzers be calibrated at the higher calculated high point response (closer to the 80% value) at our next Technical Working Group Meeting.

ST. LICA: Relative Humidity Sensor

“All meteorological equipment met AMD criteria with the exception of the Relative Humidity sensor at St Lina. It was reading 23% high compared to our audit standard.”

Corrective Action: LICA was not able to replicate the problem at the St. Lina monitoring station after the AEP audit. Field staff completed extended testing of the Temperature & Relative Humidity probe using a certified standard. On June 6th, 2019 observations were as follows (co-located measurements were recorded every 30 min):

Station RH	Certified
47.0	48.6
50.3	49.4
48.2	47.9
45.1	44.6
40.9	40.8
30.5	29.9
34.0	33.7
31.8	31.3
33.8	34.3
31.6	32.4
31.8	31.7
30.7	30.4
29.4	29.0

Staff noted that during windy conditions, sudden gusts caused the RH probe to “jump” about 3-4% (up and down), but the station probe was much more stable. Generally, both probes were correctly following the trend during gusts: both up or both down.

Despite this, LICA has ordered a spare relative humidity gauge. This new factory-calibrated probe will replace the unit at St. Lina. The existing probe at St. Lina will be sent back to the

manufacturer for calibration and will be used as a rotating spare in the network for future calibration work.

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

Respectfully,

A handwritten signature in blue ink that reads "Michael Bisaga". The signature is written in a cursive style with a large, stylized 'M' and 'B'.

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