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March 23rd, 2018

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

Mr. Bisaga:

File Numbers: 2017- 562A/577A

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

Between March 13th and March 15th, 2018 the Alberta Environment and Parks Ambient Air Monitoring Audit group conducted an audit of the Lakeland Industry and Community Association (Lica) ambient air monitoring stations. The following is a station by station breakdown of audit findings:

St. Lina Ambient Station:

All continuous gas analyzers and the PM2.5 monitor met audit criteria, however the following items were noted:

1. The ambient temperature sensor was found to 1.4°C above the audit temperature standard. Lica is required to verify sensor operation, correct installation within the rad shield and recalibrate the sensor as necessary.
2. The station temperature sensor was found to be outside of audit tolerance – addressing this item is considered an opportunity for improvement; no further action required by Lica.
3. The RH control set point on the 5030i Sharp was set at 42%; the US EPA PM2.5 FEM designation for this instrument has the RH control set point at 58%. Environment Canada recommends an RH control set point of 35% for Sharp PM 2.5 instruments. It is recommended that Lica adopt a consistent RH control setting for all PM2.5 Sharp units in the network following either the EPA FEM designation RH control setting or the Environment Canada recommended setting.

Cold Lake South Ambient Station:

All continuous gas analyzers, meteorological sensors, the PM2.5 monitor and the PM2.5 Partisol sampler met audit criteria, however the following items were noted:

4. The sample inlet filter holder in use for the NO/NOx analyzer is made from anodized aluminum and has brass fittings; these are incompatible materials for NOx monitoring. Lica is required to begin using the stainless steel filter holder mounted to the sample manifold support board – this is the sample filter holder intended to be used as the NOx inlet filter holder.
5. The wind sensor tower was measured using a laser height tool – the measure height was found to be 8.8m. The Alberta Air Monitoring Directive requires that wind sensors be mounted at a minimum height of 10m. Given that there are potential issues around the proximity of the tower to the overhead power lines at the site, and that this is an Alberta Environment owned station Lica is required to propose a course of action that will satisfy AMD requirements and potential safety concerns related to the overhead power lines.
6. The PM2.5 Sharp has an RH control set at 58% - this is the EPA FEM Designation RH control set point. As noted in audit finding 3 the AEP audit team is recommending Lica adopt a consistent RH control set point for PM2.5 Sharp units throughout the network.

Maskwa Ambient Station:

All continuous gas analyzers met audit criteria, however the following items were noted:

7. The ambient temperature sensor was found to be 2°C above the audit standard. Lica is required to verify sensor operation, correct installation within the rad shield and recalibrate the sensor as necessary.
8. The trees surrounding the Maskwa station are taller that the wind head; wind sensor siting does not meet AMD requirements – this was a finding that was required to be addressed in the 2016 station audit. Lica is required to submit a proposed course of action to the audit team including a firm timeline for completion of activates needed rectify this issue.

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 indicated that the most recent Quality System audit occurred June of 2017.

Please address the issues noted above and provide a written response to the Audit Team by April 23, 2018. If you have any questions or comments, please contact the undersigned at 780 554-2238.

Yours truly,

Shea Beaton
Monitoring Systems Auditor
Cell#: 780 554-2238
shea.beaton@gov.ab.ca

Attachments:

- Lica Analyzer Audit Sheets
- Lica Audit Summary

CC: Al Clark – AEP
Marty Collins – AEP
Bob Myrick – AEP
Max Mazur – AEP
Wally Qiu – AER
Lily Lin – Lica
air.reporting@gov.ab.ca

Audit Summary

Facility / Zone	Lica
Total # of parameters that passed	17
Total # of parameters audited in the network	17
Date(s) of the audit	March 13 to 15 2018
Issue Date of Audit Summary	23-Mar-18

Station Name	St. Lina		
Auditor	Shea Beaton		
Audit Date	13-Mar-18		
Critical	**Pass**	**Fail**	
H_2S	X		
SO_2	X		
TRS			
NO / NO_2 / NO_X	X		
O_3	X		
THC	X		
Sharp $PM_{2.5}$	X		
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 $PM_{2.5}$	X		
Partisol $PM_{2.5}$			
Safety	X		
Site Conditions	X		
Non-critical	**OK**	**Opportunity for Improvement**	
RH	X		
Station Temperature		**X**	+/- 1˚C
Ambient Temperature		**X**	+/- 1˚C
Barometric Pressure	X		
Tipping bucket	X		
Station Condition	X		
Station Documentation	X		

Not monitored at this location

Audit Summary

Facility / Zone	Lica
Total # of parameters that passed	17
Total # of parameters audited in the network	17
Date(s) of the audit	March 13 to 15 2018
Issue Date of Audit Summary	23-Mar-18

Station Name	Cold Lake South		
Auditor	Shea Beaton		
Audit Date	14-Mar-18		
Critical	**Pass**	**Fail**	
H_2S			
SO_2	X		
TRS	X		
NO / NO_2 / NO_X	X		
O_3	X		
THC	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		

Not monitored at this location

Audit Summary

Facility / Zone	Lica
Total # of parameters that passed	17
Total # of parameters audited in the network	17
Date(s) of the audit	March 13 to 15 2018
Issue Date of Audit Summary	23-Mar-18

Station Name	Maskwa		
Auditor	Shea Beaton		
Audit Date	15-Mar-18		
Critical	**Pass**	**Fail**	
H_2S	X		
SO_2	X		
TRS			
NO / NO_2 / NO_X	X		
O_3			
THC	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**	+/- 1˚C
Barometric Pressure	X		
Tipping bucket	X		
Station Condition	X		
Station Documentation	X		

Not monitored at this location

STATION AUDIT

File No. 2017 - 568A/573A & 583A

Date: March 14, 2018 Performed by: Shea Beaton

Station

Name: Cold Lake South Location: Cold Lake

Facility/Zone: Lica Operator: Maxxam

Temp: 23.5 Barometric Press: 712mmHg

Location

Latitude N 54°24'50"
Longitude W 110°13'55"
Elevation 530
Status of Site Documentation On-Site Complete
Status of Network Documentation Complete
Status of QAP Last Audited in June 2017

Manifold Material Glass
Manifold Condition Good

Meteorological

	Observed	Audit Value
Wind Speed Direction	6km/h @ 95deg	5-10km/h E
Station Temperature	23	21.6
Relative Humidity	36.3%	36.6%
Ambient Temperature	7.8	8
BP	NA	NA
Precipitation	NA	NA

Remarks:

-Nox inlet filter holder made of anadized aluminum withbrass fittings - incompadable material needs to be stainless. A stainless filter holder is in the station for that analyzer.

Alberta Government

SO_2 ANALYZER AUDIT

File No. 2017-568A

Date: March 14, 2018 Performed by: Shea Beaton

Station

Name: Cold Lake South Location: Cold Lake

Facility/Zone: Lica Operator: Maxxam

Temp. 23.5 Barometric Press. 712mmHg

Monitor

Make/Model: Thermo 43i Serial No: 1771

Inlet flow (sccm): 0.473 Full Scale Range ppm: 1.0

Last cal. Date: February 6, 2018 Old Correction Factor: 1.001

Zero/Bkg 8.4

Span Coef 0.981

Calibrator

Calibration Method: GAS DILUTION Make/Model: R&R MFC 201

Cylinder # : EX0012544 AMU # : 1698

CGA Date: 15-Nov-17 SO_2 Concentration PPM: 51.1

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5045	9.0	5054	0.0000	0.0000		
5105	37.8	5143	0.3756	0.3852	3%	± 10%
5075	18.2	5093	0.1826	0.1886	3%	± 10%
5076	9.4	5085	0.0945	0.0982	4%	± 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)=	1.0248	**0.90-1.10**
b (Intercept as % of full scale)=	0.0795	**± 3% F.S.**

Remarks:

Alberta Government

TRS ANALYZER AUDIT

File No. 2017-569A

Date: March 14, 2018 Performed by: Shea Beaton

Station

Name: Cold Lake South Location: Cold Lake

Facility/Zone: Lica Operator: Maxxam

Temp. 23.5 Barometric Press. 712mmHg

Monitor

Make/Model: Thermo 450i Serial No: AMU 1767

Inlet flow (sccm): 489 Full Scale Range ppm: 0.1

Last cal. Date: February 22, 2018 Old Correction Factor: 0.999

Zero/Bkg 14.7

Span Coef 0.925

Calibrator

Calibration Method: GAS DILUTION Make/Model: R&R MFC 201

Cylinder # : EX0009231 AMU # : 1698

CGA Date: 9-Aug-17 H_2S Concentration PPM: 9.99

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5054	0.0	5054	0.0000	0.0002		
5104	38.9	5143	0.0756	0.0784	3%	± 10%
5076	16.8	5093	0.0330	0.0346	4%	± 10%
5077	8.5	5085	0.0167	0.0174	3%	± 10%
				Absolute Average Percent Difference	4%	

Linear Regression Analysis:

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

		LIMITS
Correlation Coeff.=	1.0000	**≥ 0.995**
m (Slope)=	1.0355	**0.90-1.10**
b (Intercept as % of full scale)=	0.2366	**± 3% F.S.**

Remarks:

Alberta Government

HC ANALYZER AUDIT

File No. 2017-572A

Date: March 14, 2018 Performed by: Shea Beaton

Station

Name: Cold Lake South Location: Cold Lake

Facility/Zone: Lica Operator: Maxxam

Temp. 23.5 Barometric Press. 712mmHg

Monitor

Make/Model: Thermo 51iLT Serial No: 51CLT-77021-384

Inlet flow (sccm): 9.7psi Full Scale Range ppm: 50.0

Last cal. Date: February 7, 2018 Old Correction Factor: 0.998

Calibrator

Calibration Method: Gas Dilution

Make/Model: R&R MFC 201 AMU # : 1698

HC cylinder # : FF50323 HC concentration ppm: 1988.8

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
3553	0.0	3553	0.00	0.1		
3557	58.1	3615	31.96	31.6	-1%	± 10%
3556	25.9	3582	14.38	14.2	-2%	± 10%
3566	13.1	3579	7.28	7.3	-1%	± 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)=	0.9852	**0.90-1.10**
b (Intercept as % of full scale)=	0.1803	**± 3% F.S.**

Remarks:

Alberta Government

NO-NOx-NO2 Analyzer Audit

File No. 2017-570A

Date: March 14, 2018 Performed by: Shea Beaton

Station:

Name: Cold Lake South Location: Cold Lake Operator: Maxxam

Facility/Zone: Lica Temp. 23.5 BP: 712mmHg

Monitor:

Make/Model: Thermo 42i Serial No. AMU 2001

Inlet flow (sccm): 783 Range ppm: 0.5

Last cal. Date: February 6, 2018 Old CF: NO: 1.001

NOx: 1.000

NO2: 1.000

NO Bkg 4.0

NOx Bkg 4.2

NO Coef 1.005

NOx Coef 0.990

NO2 Coef 1.000

Calibration Method: Gas Dilution / GPT

Calibrator: Make/Model: Sabio 2010 AMU# 1778

NO cylinder # EX0012160 NO conc. ppm 52.4 NOx conc. ppm 52.7

CGA Date 10-Aug-17

Calibrator Flows			Calc. Conc.		Indicated Concentration		% Difference vs Audit Gas	
Air	Gas	Total	NO (ppm)	NOx (ppm)	NO (ppm)	NOx (ppm)	NO	NOx
5027	0.0	5027	0.0000	0.0000	0.000	0.001	Limit ± 10%	
5028	38.8	5067	0.4012	0.4035	0.404	0.405	1%	0%
5039	19.0	5058	0.1968	0.1980	0.202	0.203	2%	2%
5051	9.3	5060	0.0963	0.0969	0.100	0.101	3%	4%
						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.=	0.9999	0.9999	1.0000	**≥ 0.995**
m (Slope)=	1.0041	0.9996	1.0110	**0.90-1.10**
b (Intercept as % of full scale)=	0.3824	0.5840	-0.0682	**± 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	5067	0.401	0.403	0.002				%Dif Limit
0.555	5067	0.109	0.406	0.297	0.292	0.295	1%	± 10%
0.350	5067	0.234	0.404	0.171	0.167	0.169	1%	± 10%
0.175	5067	0.339	0.404	0.065	0.062	0.063	1%	± 10%
						Absolute Average Percent Difference	1%	

Converter Efficiency

Average Converter Efficiency 100.8%

Remarks:

Alberta Government

O_3 ANALYZER AUDIT

File No. 2017-571A

Date: March 14, 2018 Performed by: Shea Beaton

Station

Name: Cold Lake South Location: Cold Lake

Facility/Zone: Lica Operator: Maxxam

Temp. 23.5 Barometric Press. 712mmHg

Monitor

Make/Model: Thermo 49i Serial No: AMU 1748

Inlet flow (sccm): 713/753 Full Scale Range ppm: 0.5

Last cal. Date: February 7, 2018 Old Correction Factor: 1.000

Zero/Bkg -0.1

Span Coeff. 0.997

Calibrator

Calibration Method: Photometer

Make/Model: Thermo 49iPS AMU # : 1808

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	3500		3500	0.0000	0.0001		
400	3500		3500	0.4000	0.3921	-2%	± 10%
200	3500		3500	0.2000	0.1962	-2%	± 10%
100	3500		3500	0.1000	0.0981	-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)=	0.9800	**0.90-1.10**
b (Intercept as % of full scale)=	0.0240	**± 3% F.S.**

Remarks:

Alberta Government

SHARP 5030 ANALYZER AUDIT

File No. 2017-573A

Date: March 14, 2018 Performed by: Shea Beaton

Station

Name: Cold Lake South Location: Cold Lake

Facility/Zone: Lica Operator: Maxxam

Monitor

Make/Model: 5030 Serial No: CM-2209

Flow Audit Transfer Standard

Make/Model BGI Delta Cal Cell s/n 1858

Serial #

Met Audit Transfer Standard

Make/Model NA Probe s/n NA

Serial # NA

Sample Flow

Set Pt.(LPH)	1000	Converted to LPM	16.67	Limit(+/-10%)	
Indicated	1000		16.67		0.9%
Conv Meas Flow	1009		16.82	Measured	16.82

Leak Check

Starting value	1009	Lph	Flow	16.82	(LPM)
Leak Check	1007	Lph	Flow	16.78	(LPM)
Adapter			Flow	-0.2%	(LPM+/- 2.5% or 0.42lpm)

Sensors

	Sharp	Audit	Difference	Tolerance
T1 - Amb Tmp°C	5	5.4	0.4	(+/- 4°C)
RH (%RH)	NA	NA	NA	(+/- 2%)
Amb Press(hPa)	946	948.6	0.3%	(+/-13.33hPa)

Background Zero

	Analog	Neph(µg/m³)	Limit	Conc
With Hepa	159	0.1	(<+/- 2 µg/m³)	0

Mass Foil Audit (Sensitivity)

	Old Factor	New Factor	Difference	Limit
Span Value	7015	6968	-1%	(+/- 5%)

- RH control set at 58%

Alberta Government

Partisol 2000 PM 10/2.5 Audit

File #: 2017-583A

Station		Audit Transfer Standard	
Date:	March 14, 2018	Make/Model:	Delta Cal
Station Name:	Cold Lake South	Serial Number:	AMU 1858
Location:	Cold Lake	Cell s/n:	
Operator:	Maxxam		

Sampler		Instrument Data	
Make/Model:	Partisol	Temperature (°C)	9.3
Unit #	2000B206140102	Pressure (ATM)	0.934
Software Ver.		Set Flow (l/min)	16.70

Conversion from mm Hg or "Hg to ATM (Atmospheres)

ATM= (mm Hg) X .001316 or ATM= ("Hg) X .0334207

Note: Tolerances are noted as BOLD in Brackets

Audit

Temperature/Pressure Audit

Measured Temp **(± 2°C)**	8.6	Δ**°C**	0.7
Measured Press **(± .02 ATM)**	0.936	Δ **ATM**	-0.002

Leak Check

Unit	Flow Controller Valve	Pump Valve Closed	**VL**=1/2*V1	Leakage Calculation
Hub	23.0	23.0	11.5	0.00
S1				
S2				
S3				

Flow Audit

(Audit Screen) Indicated Flow (l/min)	16.7	± Difference from Set Flow	0.00
Measured Volumetric Flow (l/min)	16.63	Δ**% ± 7%**	-0.4%

Other Inspections

	Condition
Rubber Seals in Hub and Satellite	OK
PM Inlet Condition	OK
Large Inline Filter	OK
Air Screens Located Under Rain Hoods	OK

Comments:

Auditor/s: Shea Beaton

Alberta Government

Station Performance Audit Summary

Company: Lica Facility Name: NA

Approval No.: NA Site Name: Cold Lake South

Region: North Saskatchewan District: Cold Lake

Parameters audited:

H_2S		SO_2	X	NO_X	X	NH_3		O_3	X
CO		CH_4		NonCH4		THC	X	TRS	X
$PM_{2.5}$		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_____ 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: November 9, 2017			

COMMENTS: **- Wind Head 8.8m; too short**

AUDITOR: Shea Beaton DATE: March 14, 2018

Alberta Government

Station Site Documents Audit Checklist

Station

Name: Cold Lake South Location: Cold Lake

Facility/Zone: Lica Operator: Maxxam

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			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			X	
(iii) Greatest Angle of Elevation & Direction to Nearby Buildings	X			X	
(iv) Average Building height in the area	X			X	
(v) Distance to Nearest Trees	X			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			X	
(b) Plan View Sketch	X			X	
(c) Cross-Sectional Sketch of Area Within 500 m Radius			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: **Met Tower Height incorrect; measured at 8.8m**

AUDITOR: Shea Beaton DATE: March 14, 2018

Alberta Government

STATION AUDIT

File No. 2017-574A/577A

Date: March 15, 2018 Performed by: Shea Beaton

Station

Name: Maskwa Location: IOL Cold Lake

Facility/Zone: Lica Operator: Maxxam

Temp: 20.6 Barometric Press: 704mmHg

Location

Latitude N	54°24'50"
Longitude W	110°13'55"
Elevation	530
Status of Site Documentation	On Site - Complete
Status of Network Documentation	Complete
Status of QAP	Last Audited June 2017

Manifold Material	Glass
Manifold Condition	Good

Meteorological

	Observed	Audit Value
Wind Speed Direction	12km 160Deg	SE 10 -15km/h
Station Temperature	21.9	21
Relative Humidity	43.0%	43.0%
Ambient Temperature	**3.2**	**1.2**
BP	937mBar (703mmHg)	704mmHg
Precipitation	1.1mm	11 tips at 0.1mm/tip

Remarks:

Alberta Government

SO_2 ANALYZER AUDIT

File No. 2017-574A

Date: March 15, 2018 Performed by: Shea Beaton

Station

Name: Maskwa Location: IOL Cold Lake

Facility/Zone: Lica Operator: Maxxam

Temp. 20.6 Barometric Press. 704mmHg

Monitor

Make/Model: TAPI 100E Serial No: 508

Inlet flow (sccm): 578 Full Scale Range ppm: 1.0

Last cal. Date: February 8, 2018 Old Correction Factor: 0.999

Zero/Bkg 164.2

Span Coef 0.953

Calibrator

Calibration Method: GAS DILUTION Make/Model: R&R MFC 201

Cylinder # : EX0012544 AMU # : 1698

CGA Date: 15-Nov-17 SO_2 Concentration PPM: 51.1

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
3550	0.0	3550	0.0000	0.0040		
4082	58.5	4140	0.7221	0.7360	1%	± 10%
4054	26.6	4081	0.3331	0.3370	0%	± 10%
4060	13.5	4073	0.1694	0.1720	-1%	± 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)=	1.0151	**0.90-1.10**
b (Intercept as % of full scale)=	0.1504	**± 3% F.S.**

Remarks:

Alberta Government

TRS ANALYZER AUDIT

File No. 2017-575A

Date: March 15, 2018 Performed by: Shea Beaton

Station

Name: Maskwa Location: IOL Cold Lake

Facility/Zone: Lica Operator: Maxxam

Temp. 20.6 Barometric Press. 704mmHg

Monitor

Make/Model: TAPI 101E Serial No: 510

Inlet flow (sccm): 524 Full Scale Range ppm: 0.1

Last cal. Date: February 9, 2018 Old Correction Factor: 1.000

Zero/Bkg 33.6

Span Coef 0.970

Calibrator

Calibration Method: GAS DILUTION Make/Model: R&R MFC 201

Cylinder # : EX0009231 AMU # : 1698

CGA Date: 9-Aug-17 H_2S Concentration PPM: 10.0

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
3550	0.0	3550	0.0000	0.0004		
4107	33.4	4140	0.0806	0.0826	2%	± 10%
4066	14.8	4081	0.0362	0.0369	1%	± 10%
4065	7.6	4073	0.0186	0.0193	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)=	1.0201	**0.90-1.10**
b (Intercept as % of full scale)=	0.2533	**± 3% F.S.**

Remarks:

Alberta Government

HC ANALYZER AUDIT

File No. 2017-577A

Date: March 15, 2018 Performed by: Shea Beaton

Station

Name: Maskwa Location: IOL Cold Lake

Facility/Zone: Lica Operator: Maxxam

Temp. 20.6 Barometric Press. 704mmHg

Monitor

Make/Model: Thermo 51iLT Serial No: 436609738

Inlet flow (sccm): 9.7psi Full Scale Range ppm: 50.0

Last cal. Date: February 9, 2018 Old Correction Factor: 0.978

Calibrator

Calibration Method: Gas Dilution

Make/Model: R&R MFC 201 AMU # : 1698

HC cylinder # : FF50323 HC concentration ppm: 1988.8

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
3555	0.0	3555	0.00	-0.1		
3558	58.5	3616	32.17	31.8	-1%	± 10%
3552	26.3	3578	14.62	14.1	-3%	± 10%
3558	13.4	3571	7.46	7.1	-4%	± 10%
				Absolute Average Percent Difference	2%	

Linear Regression Analysis:

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

		LIMITS
Correlation Coeff.=	0.9999	**≥ 0.995**
m (Slope)=	0.9931	**0.90-1.10**
b (Intercept as % of full scale)=	-0.4896	**± 3% F.S.**

Remarks:

Alberta Government

NO-NOx-NO2 Analyzer Audit

File No. 2017-576A

Date: March 15, 2018 Performed by: Shea Beaton

Station:

Name: Maskwa Location: IOL Cold Lake Operator: Maxxam

Facility/Zone: Lica Temp. 20.6 BP: 704mmHg

Monitor:

Make/Model: API 200A Serial No. 2051

Inlet flow (sccm): 495 Range ppm: 1.0

Last cal. Date: February 8, 2018 Old CF: NO: 0.999

NOx: 1.000

NO2: 1.000

NO Bkg -4.0

NOx Bkg -3.5

NO Coef 1.030

NOx Coef 1.029

NO2 Coef

Calibration Method: Gas Dilution / GPT

Calibrator: Make/Model: Sabio 2010 AMU# 1778

NO cylinder # EX0012160 NO conc. ppm 52.4 NOx conc. ppm 52.7

CGA Date 10-Aug-17

Calibrator Flows			Calc. Conc.		Indicated Concentration		% Difference vs Audit Gas	
Air	Gas	Total	NO (ppm)	NOx (ppm)	NO (ppm)	NOx (ppm)	NO	NOx
5003	0.0	5003	0.0000	0.0000	0.000	0.000	Limit ± 10%	
5004	63.2	5067	0.6536	0.6573	0.655	0.657	0%	0%
5044	34.3	5078	0.3539	0.3560	0.349	0.350	-1%	-2%
5051	14.8	5066	0.1531	0.1540	0.147	0.147	-4%	-5%
						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.=	0.9999	0.9999	1.0000	**≥ 0.995**
m (Slope)=	1.0043	1.0019	1.0093	**0.90-1.10**
b (Intercept as % of full scale)=	-0.3657	-0.3867	-0.1502	**± 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	5067	0.650	0.652	0.002				%Dif Limit
0.745	5067	0.249	0.654	0.405	0.401	0.403	0%	± 10%
0.411	5067	0.449	0.654	0.204	0.201	0.202	0%	± 10%
0.240	5067	0.550	0.652	0.101	0.100	0.099	-1%	± 10%
						Absolute Average Percent Difference	0%	

Converter Efficiency

Average Converter Efficiency 100.0%

Remarks:

Alberta Government

Station Performance Audit Summary

Company: Lica Facility Name: NA

Approval No.: NA Site Name: Maskwa

Region: Lower Athabasca District: Cold Lake

Parameters audited:

H_2S	X	SO_2	X	NO_X	X	NH_3		O_3	
CO		CH_4		NonCH4		THC	X	TRS	
$PM_{2.5}$		PM_{10}		TSP		BTEX		Wind Speed	X
Wind Dir	X	Amb. Temp	X	Stn.Temp	X	RH	X	BP	X
Rainfall		Precip	X	VWS		Other			
All parameters monitored as per approval: Yes__X___ No _____ N/A_____									

	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: December 28, 2017			

COMMENTS: _____

AUDITOR: Shea Beaton DATE: March 15, 2018

Alberta Government

Station Site Documents Audit Checklist

Station

Name: Maskwa Location: IOL Cold Lake

Facility/Zone: Lica Operator: Maxxam

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			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			X	
(iii) Greatest Angle of Elevation & Direction to Nearby Buildings	X			X	
(iv) Average Building height in the area	X			X	
(v) Distance to Nearest Trees	X			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			X	
(b) Plan View Sketch	X			X	
(c) Cross-Sectional Sketch of Area Within 500 m Radius			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: Inlet/Manifold Photo of Cold Lake South Station Manifold
- Station wind speed/direction sensor does not meet AMD requirements; deficiencies of this nature must be documented in the station site docs.

AUDITOR: Shea Beaton DATE: March 15, 2018

Alberta Government

STATION AUDIT

File No. 2017-526/567A

Date: March 13, 2018 Performed by: Shea Beaton

Station

Name: St. Lina Location: St. Lina

Facility/Zone: Lica Operator: Maxxam

Temp: 24.5 Barometric Press: 702mmHg

Location

Latitude N 54°12'59"
Longitude W 111°30'9"
Elevation 690
Status of Site Documentation On-Site - Complete
Status of Network Documentation OK
Status of QAP Last Audited June 2017

Manifold Material Glass
Manifold Condition Good

Meteorological

	Observed	Audit Value
Wind Speed Direction	4.1km/h @ 98deg	Too Calm to Assess
Station Temperature	**23**	**21.4**
Relative Humidity	47%	51%
Ambient Temperature	**1.8**	**0.4**
BP	929.7mbar	931.3mBar
Precipitation	10 tips @0.1mm/tip	1.0mm

Remarks:
Stn temp 1.6 deg C high; ambient temp 1.4 Deg C high

Alberta Government

SO_2 ANALYZER AUDIT

File No. 2017-562A

Date: March 13, 2018 Performed by: Shea Beaton

Station

Name: St. Lina Location: St. Lina

Facility/Zone: Lica Operator: Maxxam

Temp. 24.5 Barometric Press. 702mmHg

Monitor

Make/Model: TAPI 100E Serial No: 468

Inlet flow (sccm): 602 Full Scale Range ppm: 1.0

Last cal. Date: March 2, 2018 Old Correction Factor: 1.000

Zero/Bkg 144.5

Span Coef 0.972

Calibrator

Calibration Method: GAS DILUTION Make/Model: R&R MFC 201

Cylinder # : EX0012544 AMU # : 1698

CGA Date: 15-Nov-17 SO_2 Concentration PPM: 51.1

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
4047	0.0	4047	0.0000	0.0020		
4131	59.1	4190	0.7208	0.7240	0%	± 10%
4060	26.4	4086	0.3302	0.3320	0%	± 10%
4064	13.5	4077	0.1692	0.1700	-1%	± 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)=	1.0024	**0.90-1.10**
b (Intercept as % of full scale)=	0.1247	**± 3% F.S.**

Remarks:

Alberta Government

H_2S ANALYZER AUDIT

File No. 2017-563A

Date: March 13, 2018 Performed by: Shea Beaton

Station

Name: St. Lina Location: St. Lina

Facility/Zone: Lica Operator: Maxxam

Temp. 24.5 Barometric Press. 702mmHg

Monitor

Make/Model: TAPI 101E Serial No: 509

Inlet flow (sccm): 522 Full Scale Range ppm: 0.1

Last cal. Date: March 5, 2018 Old Correction Factor: 1.000

Zero/Bkg 70.2

Span Coef 0.904

Calibrator

Calibration Method: GAS DILUTION Make/Model: R&R MFC 201

Cylinder # : EX0009231 AMU # : 1698

CGA Date: 9-Aug-17 H_2S Concentration PPM: 9.99

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
4047	0.0	4047	0.0000	0.0001		
4157	33.2	4190	0.0792	0.0826	4%	± 10%
4071	14.7	4086	0.0359	0.0370	3%	± 10%
4069	7.6	4077	0.0186	0.0194	4%	± 10%
				Absolute Average Percent Difference	4%	

Linear Regression Analysis:

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

		LIMITS
Correlation Coeff.=	1.0000	**≥ 0.995**
m (Slope)=	1.0423	**0.90-1.10**
b (Intercept as % of full scale)=	-0.0689	**± 3% F.S.**

Remarks:

Alberta Government

HC ANALYZER AUDIT

File No. 2017-566A

Date: March 13, 2018 Performed by: Shea Beaton

Station

Name: St. Lina Location: St. Lina

Facility/Zone: Lica Operator: Maxxam

Temp. 24.5 Barometric Press. 702mmHg

Monitor

Make/Model: Thermo 51iLT Serial No: 925436893

Inlet flow (sccm): 9.7psi Full Scale Range ppm: 50.0

Last cal. Date: March 6, 2018 Old Correction Factor: 0.998

Calibrator

Calibration Method: Gas Dilution

Make/Model: R&R MFC 201 AMU # : 1698

HC cylinder # : FF50323 HC concentration ppm: 1988.8

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
3077	0.0	3077	0.00	0.0		
3071	58.3	3129	37.05	37.6	1%	± 10%
3069	26.3	3095	16.90	17.1	1%	± 10%
3074	13.5	3087	8.70	8.7	0%	± 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)=	1.0158	**0.90-1.10**
b (Intercept as % of full scale)=	-0.1205	**± 3% F.S.**

Remarks:

Alberta Government

NO-NOx-NO2 Analyzer Audit

File No. 2017-564A

Date: March 13, 2018 Performed by: Shea Beaton

Station:

Name: St. Lina Location: St. Lina Operator: Maxxam

Facility/Zone: Lica Temp. 24.5 BP: 702

Monitor:

Make/Model: TAPI 200A Serial No. 1746

Inlet flow (sccm): 445 Range ppm: 1.0

Last cal. Date: March 1, 2018 Old CF: NO: 1.000

NOx: 1.000

NO2: 1.000

NO Bkg -0.7

NOx Bkg 0.4

NO Coef 1.134

NOx Coef 1.133

NO2 Coef

Calibration Method: Gas Dilution / GPT

Calibrator: Make/Model: Sabio 2010 AMU# 1778

NO cylinder # EX0012160 NO conc. ppm 52.4 NOx conc. ppm 52.7

CGA Date 10-Aug-17

Calibrator Flows			Calc. Conc.		Indicated Concentration		% Difference vs Audit Gas	
Air	Gas	Total	NO (ppm)	NOx (ppm)	NO (ppm)	NOx (ppm)	NO	NOx
5002	0.0	5002	0.0000	0.0000	0.000	0.002	Limit ± 10%	
5003	63.5	5066	0.6568	0.6606	0.636	0.638	-3%	-4%
5041	33.7	5075	0.3480	0.3499	0.340	0.342	-2%	-3%
5051	14.5	5065	0.1500	0.1509	0.142	0.145	-5%	-5%
						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.=	1.0000	1.0000	1.0000	**≥ 0.995**
m (Slope)=	0.9709	0.9648	0.9963	**0.90-1.10**
b (Intercept as % of full scale)=	-0.0804	0.1611	-0.0591	**± 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	5066	0.633	0.635	0.002				%Dif Limit
0.745	5066	0.247	0.633	0.386	0.386	0.384	-1%	± 10%
0.411	5066	0.437	0.635	0.197	0.196	0.195	-1%	± 10%
0.240	5066	0.535	0.634	0.099	0.098	0.097	-1%	± 10%
						Absolute Average Percent Difference	1%	

Converter Efficiency

Average Converter Efficiency 99.3%

Remarks:

Alberta Government

O_3 ANALYZER AUDIT

File No. 2017-565A

Date: March 13, 2018 Performed by: Shea Beaton

Station

Name: St. Lina Location: St. Lina

Facility/Zone: Lica Operator: Maxxam

Temp. 24.5 Barometric Press. 702

Monitor

Make/Model: Thermo 49i Serial No: 1002240371

Inlet flow (sccm): 728/764 Full Scale Range ppm: 0.5

Last cal. Date: March 1, 2018 Old Correction Factor: 1.000

Zero/Bkg -0.1

Span Coeff. 0.965

Calibrator

Calibration Method: Photometer

Make/Model: Thermo 49iPS AMU # : 1808

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	3420		3420	0.0000	0.0000		
400	3420		3420	0.4000	0.3950	-1%	± 10%
200	3420		3420	0.2000	0.1980	-1%	± 10%
100	3420		3420	0.1000	0.0990	-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)=	0.9874	**0.90-1.10**
b (Intercept as % of full scale)=	0.0400	**± 3% F.S.**

Remarks:

Alberta Government

SHARP 5030 ANALYZER AUDIT

File No. 2017-567A

Date: March 13, 2018 Performed by: Shea Beaton

Station

Name: St. Lina Location: St. Lina

Facility/Zone: Lica Operator: Maxxam

Monitor

Make/Model: 5030i Serial No: CM17091001

Flow Audit Transfer Standard

Make/Model BGI Delta Cal Cell s/n 1858

Serial #

Met Audit Transfer Standard

Make/Model Vaisala HMP 76B Probe s/n AMU 1759

Serial #

Sample Flow

Set Pt.(LPH)	1000	Converted to LPM	16.67	Limit(+/-10%)	
Indicated	999.6		16.66		0.0%
Conv Meas Flow	1000		16.67	Measured	16.7

Leak Check

Starting value	1000	Lph	Flow	16.67	(LPM)
Leak Check	996	Lph	Flow	16.60	(LPM)
Adapter			Flow	-0.4%	(LPM+/- 2.5% or 0.42lpm)

Sensors

	Sharp	Audit	Difference	Tolerance
T1 - Amb Tmp°C	0.1	1.1	1	(+/- 4°C)
RH (%RH)	48	47	-2%	(+/- 2%)
Amb Press(hPa)	697.7	699.5	1.8	(+/-13.33hPa)

Background Zero

	Analog	Neph(µg/m³)	Limit	Conc
With Hepa	NA	0.2	(<+/- 2 µg/m³)	NA

Mass Foil Audit (Sensitivity)

	Old Factor	New Factor	Difference	Limit
Span Value	7125	7010	-2%	(+/- 5%)

- RH control set at 42%

Alberta Government

Station Performance Audit Summary

Company: Lica Facility Name: NA

Approval No.: NA Site Name: St. Lina

Region: North Saskatchewan District: Cold Lake

Parameters audited:

H_2S	X	SO_2	X	NO_X	X	NH_3		O_3	X
CO		CH_4		NonCH4		THC	X	TRS	
$PM_{2.5}$	X	PM_{10}		TSP		BTEX		Wind Speed	X
Wind Dir	X	Amb. Temp	X	Stn.Temp	X	RH	X	BP	X
Rainfall		Precip	X	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: May 25, 2017			

COMMENTS: - Wind Head 11.0m; OK

AUDITOR: Shea Beaton DATE: March 13, 2018

Alberta Government

Station Site Documents Audit Checklist

Station

Name: St. Lina Location: St. Lina

Facility/Zone: Lica Operator: Maxxam

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			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			X	
(iii) Greatest Angle of Elevation & Direction to Nearby Buildings	X			X	
(iv) Average Building height in the area	X			X	
(v) Distance to Nearest Trees	X			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			X	
(b) Plan View Sketch	X			X	
(c) Cross-Sectional Sketch of Area Within 500 m Radius			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: Instrument list outdated

AUDITOR: Shea Beaton DATE: March 13, 2018

Alberta Government

LICA
ENVIRONMENTAL STEWARDS
Lakeland Industry and Community Association
Box 8237, 5107W - 50 Street, Bonnyville, AB T9N 2J5
780 812-2182 780 812-2186 www.lica.ca

May 10, 2018

Alberta Environment and Parks (AEP)
Monitoring Branch
Environmental Monitoring and Science Division
Main Floor Bldg 3 McIntyre Center
4946 – 89 street
Edmonton, AB, T6E 5K1

Mr. Beaton:

RE: Ambient Air Monitoring Station Audit Results for the LICA Network
Your File(s): 2017- 562A/577A

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

COMMON ISSUE: Temperature sensor found outside of audit temperature standard.

St. Lina / 1 *"The ambient temperature sensor was found to be 1.4°C above the audit temperature standard. LICA is required to verify sensor operation, correct installation within the rad shield and recalibrate the sensor as necessary."*

Maskwa / 7 *"The ambient temperature sensor was found to be 2°C above the audit standard. LICA is required to verify sensor operation, correct installation within the rad shield and recalibrate the sensor as necessary."*

Corrective Action: The temperature sensor at the St. Lina monitoring station was tested using a Fisher calibrated thermometer (Model # 11-661-7A, S/N 170286131); when brought indoors away from direct sunlight, the sensor was found to deviate by an amount similar to that determined during the AEP audit. The TPX/RH sensor at St. Lina was replaced with a temporary RM Young unit on May 2, 2018. An installation audit of the sensor measured 17.1°C (reference reading 16.5°C: temperature difference of 0.6°C). A new RM Young TPX/RH sensor has been ordered to replace the unit at Maskwa; replacement is expected to be completed by the end of May 2018. Both existing sensors will be sent to the manufacturer for recalibration and LICA is considering replacement radiation shields for both Maskwa and St. Lina similar to the one at the Cold Lake Station; LICA expects this task to be complete by June 29, 2018.

COMMON ISSUE: SHARP relative humidity control set point.

St. Lina / 3 *"The RH control set point on the 5030i Sharp was set at 42%; the US EPA $PM_{2.5}$ FEM designation for this instrument has the RH control set point at 58%. Environment Canada recommends an RH control set point of 35% for SHARP $PM_{2.5}$ instruments. It is recommended that LICA adopt a consistent RH control setting for all $PM_{2.5}$ SHARP units in the network following either the EPA FEM designation RH control setting or the Environment Canada recommended setting."*

Cold Lake / 6 "*The $PM_{2.5}$ Sharp has an RH control set at 58% - this is the EPA FEM Designation RH control set point. As noted in audit finding 3 the AEP audit team is recommending LICA adopt a consistent RH control set point for $PM_{2.5}$ Sharp units throughout the network."*

Corrective Action: The RH control set point on the SHARP units is being set to the Environment Canada recommendation of 35%. Changes to the RH set point were completed on April 24, 2018 at St. Lina and April 25, 2018 at Maskwa alongside monthly calibrations. The SHARP unit on the Portable Air Monitoring System will also use the same RH set point once it is redeployed.

COMMON ISSUE: Wind sensor siting criteria.

Cold Lake / 5 *"The wind sensor tower was measured using a laser height tool – the measure height was found to be 8.8m. The Alberta Air Monitoring Directive requires that wind sensors be mounted at a minimum height of 10m. Given that there are potential issues around the proximity of the tower to the overhead power lines at the site, and that this is an Alberta Environment owned station LICA is required to propose a course of action that will satisfy AMD requirements and potential safety concerns related to the overhead power lines."*

Maskwa / 8 *"The trees surrounding the Maskwa station are taller than the wind head; wind sensor siting does not meet AMD requirements – this was a finding that was required to be addressed in the 2016 station audit. LICA is required to submit a proposed course of action to the audit team including a firm timeline for completion of activates needed rectify this issue."*

Corrective Action: LICA will make note of these deficiencies in site documentation.

Regarding the AEP-owned Cold Lake station, LICA will work with Department staff to ensure the wind sensor tower is replaced in a timely manner. In addition to not meeting the AMD height requirements, the tower is nearing the end of its life-cycle and should be replaced due to safety concerns. While the Encroachment Agreement that LICA has with ATCO ensures continued operation of the station at its current location, ideally the station should be relocated, or the tower re-attached to another side of the station; this may negate the safety concerns regarding the proximity of the wind sensor tower to overhead power lines. LICA will have the site surveyed and will submit a plan to AEP by July 31, 2018. Recent orders for replacement wind towers took approximately six months to arrive once an order was placed; LICA has set a target completion date of November 30, 2018 for both the tower replacement and potential station relocation.

Regarding the LICA-owned Maskwa Station, LICA will take reasonable measures to improve the air flow around the station. Below is a draft tree removal plan for the site (Figure 1). The area surrounding the Maskwa monitoring station is an oil sands lease operated by Imperial Oil. LICA will work with Imperial to

ensure that tree removal happens within the appropriate time taking into consideration requirements regarding nesting and migratory birds and local forestry management.

Figure 1: Proposed tree removal radius around Maskwa air monitoring station

The table below (Figure 2) is published by Environment and Climate Change Canada (ECCC) and provides information regarding nesting periods to assess compliance with the Migratory Birds Convention Act, 1994 (MBCA) and the Migratory Birds Regulations, 1994 (MBR). The information contained in this table is used to support the planning of activities and reduce the risk of detrimental effects to migratory birds, their nests and eggs. The Maskwa monitoring station is in Nesting Zone B5 (Prairie Potholes BCR11, Boreal Taiga Plains BCR6 and Northwestern Interior Forest BCR4). According to the table, 100% of all possible species in the B5 sub-regions will be nesting by mid- to late-May; nesting activities will cease by the end of August.

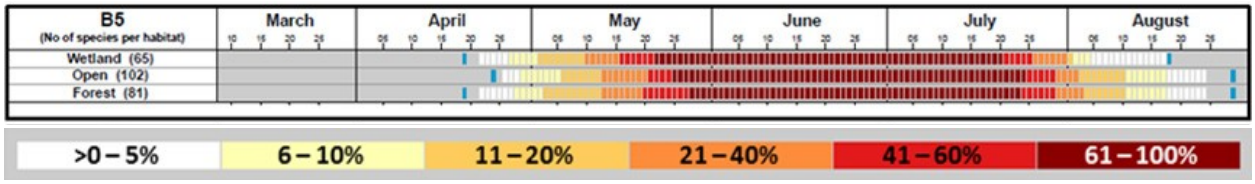

Figure 2: Nesting Calendar for Zone B5 *(Blue markers show extreme dates predicted for some atypical parts of the nesting zone where nesting could be earlier or later)*

LICA will submit a surveyed site plan and final tree removal proposal to AEP by July 31, 2018. LICA has set a target completion date for tree removal for October 31, 2018.

ISSUE: Sample inlet holder material.

Cold Lake / 4 *"The sample inlet filter holder in use for the NO/NOx analyzer is made from anodized aluminum and has brass fittings; these are incompatible materials for NOx monitoring. LICA is required to begin using the stainless-steel filter holder mounted to the sample manifold support board – this is the sample filter holder intended to be used as the NOx inlet filter holder."*

Corrective Action: The pre-existing stainless filter holder mounted to the sample manifold support board is now being used. This was completed on March 19, 2018 during the monthly calibration. LICA is considering standardizing all inlet filter holders to stainless-steel at this station and will work with AEP to implement this change.

COMMON ISSUE: Site Documentation.

Cold Lake / St. Lina / Maskwa *Network map missing from site documentation.*

LICA maintains a Google Earth-based database of its regional monitoring network and potential sources. The database is based on best available information for all sources within the Airshed Zone boundary and potential sources in a 10km buffer. An excerpt from that database is included below and will be added to the site documentation.

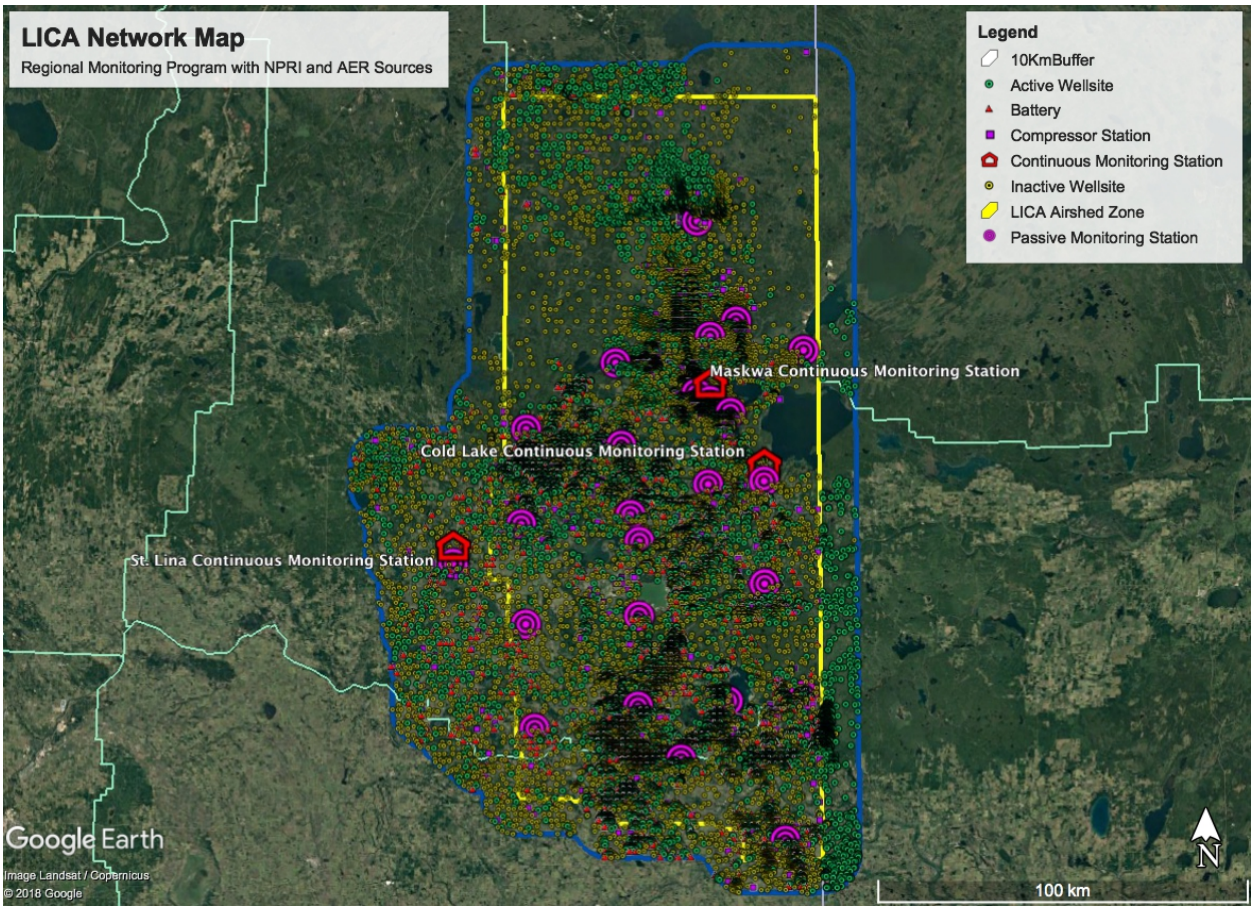

Figure 3: Network Map

Should you have any questions regarding the steps taken to address the audit finding, please don't hesitate to contact me.

Respectfully,

Michael Bisaga
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Lakeland Industry and Community Association

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May 16th, 2018

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Mr. Bisaga:

File Numbers: 2018- 561A/576A/582A

Subject: Ambient Air Monitoring Station Audit Closure Letter for the Lica Network

The AEP Ambient Air Monitoring Audit Team has received and reviewed your audit response letter dated May 10th 2018. The AEP Ambient Audit Team accepts all of the corrective actions proposed by Lica in response to the audit findings. Although the corrective actions detailed in the response letter have not been field verified, the AEP Audit Team now considers this audit closed.

If you have any questions or comments, please contact the undersigned at 780 554-2238.

Yours truly,

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Attachment:

- 2018 Lica Audit Response V4

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