

May 2, 2014

File No(s): 2013 – 029A / 048A

Mr. Michael Bisaga
Program Manager
Lica Airshed
13440 – 62 street
Edmonton, AB T5A 0V7

Dear Mr. Bisaga:

Re: LICA Ambient Air Monitoring Station Audits

Please see attached audit summary for all audit findings from the audits conducted on the Lica ambient air monitoring stations.

Alberta Environment and Sustainable Resource Development (ESRD) audit of the St. Lina station was not fully complete. The weather did not allow the auditor to audit parameters that required outside assessment of equipment. These will be done on a different day.

There was only 1 failure associated with a Teom flow. This was corrected the following day.

There are 2 pictures showing a safety concern at Elk point and a pinch point on the Teom sampling inlet at St Lina, which was corrected after the audit.

There was also noted a calibration anomaly that was addressed with the contractor when detected. Compliance with AMD requirements must be followed when completing calibrations.

Please indicate what corrective action have or will take place to address the above noted issues by May 30, 2014. If you have any questions or concerns please feel free to contact the undersigned at 780-427-7888.

Yours truly,



Al Clark
Monitoring Systems Auditor
Environmental Assurance
Attachment(s): Audit Summary Report, Pictures, field data sheets

cc: Pat Marriot: District Approvals Manager
Marilyn Albert: Air Quality Data Supervisor
Shelley Morris: Acting Manager Monitoring

Audit Summary

Facility / Zone	Lica
Total # of parameters that passed	19
Total # of parameters audited in the network	20
Date(s) of the audit	April 22 - 25, 2014
Issue Date of Audit Summary	May 2, 2014

Station Name	St Lina
Auditor	Al Clark
Audit Date	April 22, 2014

Critical	Pass	Fail
H ₂ S	✓	
SO ₂	✓	
TRS		
NO / NO ₂ / NO _x	✓	
O ₃	✓	
THC	✓	
NMHC		
TEOM/BAM PM _{2.5}		X Flow
Wind Speed / Wind Direction	✓	
Wind head Orientation	✓	
Manifold Fan	✓	
Precipitation Sampler	✓	
Zero/Span Systems Operational	✓	

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

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

Not monitored at this location

Audit Summary

Facility / Zone	Lica
Total # of parameters that passed	19
Total # of parameters audited in the network	20
Date(s) of the audit	April 22 - 25, 2014
Issue Date of Audit Summary	May 2, 2014

Station Name	Elk Point Airport
Auditor	Al Clark
Audit Date	April 23, 2014

Critical	Pass	Fail
H ₂ S	√	
SO ₂	√	
TRS		
NO / NO ₂ / NO _x	√	
O ₃	√	
THC		
NMHC	√	
TEOM/BAM PM _{2.5}		
Wind Speed / Wind Direction	√	
Wind head Orientation	√	
Manifold Fan	√	
Precipitation Sampler		
Zero/Span Systems Operational	√	

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

Non-critical	OK	Opportunity for Improvement
RH		
Station Temperature	√	
Ambient Temperature		
Barometric Pressure		
Tipping bucket		
Station Condition	√	
Station Documentation	√	

Not monitored at this location

Audit Summary

Facility / Zone	Lica
Total # of parameters that passed	19
Total # of parameters audited in the network	20
Date(s) of the audit	April 22 - 25, 2014
Issue Date of Audit Summary	May 2, 2014

Station Name	Cold Lake South
Auditor	Al Clark
Audit Date	April 24, 2014

Critical	Pass	Fail
H ₂ S		
SO ₂	√	
TRS	√	
NO / NO ₂ / NO _x	√	
O ₃	√	
THC	√	
NMHC		
TEOM/BAM PM _{2.5}		
Wind Speed / Wind Direction	√	
Wind head Orientation	√	
Manifold Fan	√	
Precipitation Sampler		
Zero/Span Systems Operational	√	

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

Non-critical	OK	Opportunity for Improvement
RH		
Station Temperature	√	
Ambient Temperature		
Barometric Pressure		
Tipping bucket		
Station Condition	√	
Station Documentation	√	

Not monitored at this location

Audit Summary

Facility / Zone	Lica
Total # of parameters that passed	19
Total # of parameters audited in the network	20
Date(s) of the audit	April 22 - 25, 2014
Issue Date of Audit Summary	May 2, 2014

Station Name	Maskwa
Auditor	Al Clark
Audit Date	April 25, 2014

Critical	Pass	Fail
H ₂ S	√	
SO ₂	√	
TRS		
NO / NO ₂ / NO _x	√	
O ₃		
THC	√	
NMHC		
TEOM/BAM PM _{2.5}		
Wind Speed / Wind Direction	√	
Wind head Orientation	√	
Manifold Fan	√	
Precipitation Sampler		
Zero/Span Systems Operational	√	

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

Non-critical	OK	Opportunity for Improvement
RH		
Station Temperature	√	
Ambient Temperature		
Barometric Pressure		
Tipping bucket		
Station Condition	√	
Station Documentation	√	

Not monitored at this location

STATION AUDIT

File No. 2014 - 040A / 044A

Date: April 24, 2014

Performed by: Al Clark

Station

Name: Cold Lake South

Location: Cold Lake

Facility/Zone: Lica

Operator: Maxxam

Temp: 21.0 C

Barometric Press: 707 mmhg

Location

Latitude N 54° 24' 50.4"

Longitude W 110° 13' 58.3"

Elevation 571 m

Status of Site Documentation On site - OK

Manifold Material Glass
Manifold Condition Good

Meteorological

	Observed	Audit Value
Wind Speed Direction	<u>7 kph / 58 deg</u>	<u>5-10 kph / ENE</u>
Station Temperature	<u>23.4 C</u>	<u>23.5 C</u>
Relative Humidity	<u>N/A</u>	<u>N/A</u>
Ambient Temperature	<u>N/A</u>	<u>N/A</u>
BP	<u>N/A</u>	<u>N/A</u>
Tipping bucket	<u>N/A</u>	<u>N/A</u>

Remarks:

SO₂ ANALYZER AUDIT

File No. 2014 - 040A

Date: April 24, 2014

Performed by: Al Clark

Station

Name: Cold Lake South

Location: Cold Lake

Facility/Zone: Lica

Operator: Maxxam

Temp: 21.0 C

Barometric Press: 707 mmhg

Monitor

Make/Model: Teco 43C Serial No: 0806528242

Inlet flow (sccm): 445 Full Scale Range ppm: 0.5

Last cal. Date: April 16, 2014 Old Correction Factor: 0.998

Zero/Bkg 7.1

Span Coef 1.082

Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201

AMU #: 1690

Cylinder #: CAL9745

SO₂ Concentration PPM: 51.0

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5097	0.0	5097	0.0000	-0.0003		
5126	38.1	5164	0.3763	0.3829	2%	± 15%
5151	17.3	5168	0.1707	0.1738	2%	± 15%
5129	8.2	5137	0.0814	0.0820	1%	± 15%
Absolute Average Percent Difference					2%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000

m (Slope)= 1.0190

b (Intercept as % of full scale)= -0.0982

LIMITS

≥ **0.995**

0.85-1.15

± **3% F.S.**

Remarks:

TRS ANALYZER AUDIT

File No. 2014 - 041A

Date: April 24, 2014

Performed by: AI Clark

Station

Name: Cold Lake South

Location: Cold Lake

Facility/Zone: Lica

Operator: Maxxam

Temp: 21.0 C

Barometric Press: 707 mmhg

Monitor

Make/Model: Teco 450i Serial No: 0812728560

Inlet flow (sccm): 486 Full Scale Range ppm: 0.1

Last cal. Date: April 15, 2014 Old Correction Factor: 1.006

Zero/Bkg 12.3

Span Coef 0.902

Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201

AMU #: 1690

Cylinder #: FF15612

H₂S Concentration PPM: 10.0

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5097	0.0	5097	0.0000	0.0002		
5126	38.1	5164	0.0738	0.0732	-1%	± 15%
5150	17.7	5168	0.0342	0.0344	0%	± 15%
5128	9.0	5137	0.0175	0.0176	-1%	± 15%
Absolute Average Percent Difference					1%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000

m (Slope)= 0.9894

b (Intercept as % of full scale)= 0.2946

LIMITS

≥ **0.995**

0.85-1.15

± **3% F.S.**

Remarks:

HC ANALYZER AUDIT

File No. 2014 - 042A

Date: April 24, 2014 Performed by: Al Clark

Station

Name: Cold Lake South Location: Cold Lake
 Facility/Zone: Lica Operator: Maxxam
 Temp: 21.0 C Barometric Press: 707 mmhg

Monitor

Make/Model: Teco 51 CLT Serial No: 51CLT-77021-384
 Inlet flow (sccm): N/A Full Scale Range ppm: 50.0
 Last cal. Date: April 15, 2014 Old Correction Factor: 1.005

Calibrator

Calibration Method: Gas Dilution
 Make/Model: Sabio 2010 AMU #: 1778
 HC cylinder #: FF27932 HC concentration ppm: 1050

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
2984	0.0	2984	0.00	-0.03		
2988	81.1	3069	27.75	27.13	-2%	± 15%
2981	39.8	3021	13.83	13.53	-2%	± 15%
3004	19.9	3024	6.91	6.72	-2%	± 15%
Absolute Average Percent Difference					2%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000
 m (Slope)= 0.9791
 b (Intercept as % of full scale)= -0.0631

LIMITS
≥ 0.995
0.85-1.15
± 3% F.S.

Remarks:

NO-NOx-NO2 Analyzer Audit

File No. 2014 - 043A

Date: April 24, 2014 Performed by: Al Clark

Station: Name: Cold Lake Location: Cold Lake Operator: Maxxam
Facility/Zone: Lica Temp. 21.0 C BP: 706 mmhg

Monitor: Make/Model: Teco 42C Serial No. 0427408716
Inlet flow (sccm): 667/667/666 Range ppm: 0.5
Last cal. Date: April 16-17, 2014 Old Correction Factor: NO: 0.996
NOx: 0.998
NO2: 1.007
NO Bkg 5.6
NOx Bkg 5.9
NO Coef 1.451
NOx Coef 0.999
NO2 Coef 0.997

Calibration Method: Gas Dilution / GPT
Calibrator: Make/Model: Sabio 2010 AMU# 1749
NO cylinder # FF11878 NO conc. ppm 50.5 NOx conc. ppm 50.9

Calibrator Flows			Calc. Conc.		Indicated Concentration		% Difference vs Audit Gas	
			NO (ppm)	NOx (ppm)	NO (ppm)	NOx (ppm)	NO	NOx
Air	Gas	Total						
4976	0.0	4976	0.0000	0.0000	0.0000	-0.0004	Limit ± 15%	
4991	39.4	5030	0.3956	0.3987	0.3844	0.4032	-3%	1%
4989	19.9	5009	0.2006	0.2022	0.2018	0.1907	1%	-5%
5017	10.3	5027	0.1035	0.1043	0.0953	0.1032	-8%	-1%
Absolute Average Percent Difference							3%	2%

Linear Regression Analysis:

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

	NO	NOx	NO ₂	LIMITS
Correlation Coeff.=	<u>0.9996</u>	<u>0.9993</u>	<u>1.0000</u>	≥ 0.995
m (Slope)=	<u>0.9782</u>	<u>1.0099</u>	<u>1.0099</u>	0.85-1.15
b (Intercept as % of full scale)=	<u>-0.1474</u>	<u>-0.7729</u>	<u>-0.6645</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 V	5030	0.3845	0.4045	0.0204	0.2895	0.2891	0%	± 15%
0.600 V	5030	0.0950	0.4045	0.3095	0.2895	0.2891	0%	± 15%
0.400 V	5030	0.2168	0.4031	0.1863	0.1677	0.1659	-1%	± 15%
0.250 V	5030	0.3092	0.4027	0.0932	0.0753	0.0728	-3%	± 15%
Absolute Average Percent Difference							-2%	

Converter Efficiency

Average Converter Efficiency 98.5%

Remarks:

O₃ ANALYZER AUDIT

File No. 2014 - 044A

Date: April 24, 2014

Performed by: Al Clark

Station

Name: Cold Lake South

Location: Cold Lake

Facility/Zone: Lica

Operator: Maxxam

Temp: 21.0 C

Barometric Press: 706 mmhg

Monitor

Make/Model: Teco 49i Serial No: 0700419951

Inlet flow (sccm): 706/745 Full Scale Range ppm: 0.5

Last cal. Date: April 17, 2014 Old Correction Factor: 1.006

Zero/Bkg 0.2

Span Coeff. 1.054

Calibrator

Calibration Method: Photometer

Make/Model: Teco 49i PS

NO cylinder #: N/A

AMU #: 1808

NO concentration ppm: N/A

Ozone Setting	Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Conc. (ppm)	% Difference	
	Air	Gas	Total			vs Audit Gas	Limits
0.000	N/A	 	N/A	0.0000	0.0004		
0.400	N/A	 	N/A	0.4000	0.4077	2%	± 15%
0.200	N/A	 	N/A	0.2000	0.2032	1%	± 15%
0.100	N/A	 	N/A	0.1000	0.1015	1%	± 15%
Absolute Average Percent Difference						1%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000
 m (Slope)= 1.0186
 b (Intercept as % of full scale)= -0.0120

LIMITS
≥ 0.995
0.85-1.15
± 3% F.S.

Remarks:

Station Performance Audit Summary

Company: Lica Facility Name: Cold Lake
 Approval No.: N/A Site Name: Cold Lake South
 AENV Region: Northern AENV District: Cold Lake

Parameters audited:

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

GENERAL

Has the location remained unchanged from previous audit?
 Is site secure?
 Are station operating conditions adequate?

YES	NO	N/A
X		
X		
X		

DATA ACQUISITION

Are strip charts in use?
 Is a telemetry system for data acquisition in use?

	X	
X		

SYSTEM COMPONENTS

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

X		
X		
X		
X		
X		
X		
X		
X		
X		
X		
X		
X		

WIND EQUIPMENT

Is wind sensor properly oriented?
 Does wind equipment appear to be functioning properly?
 Date of last calibration. Date: May 2013

X		
X		

COMMENTS:

AUDITOR: Al Clark

DATE: April 24, 2014

STATION AUDIT

File No. 2014 - 045A / 048A

Date: April 25, 2014

Performed by: AI Clark

Station

Name: Maskwa

Location: Maskwa - IOL

Facility/Zone: Lica

Operator: Maxxam

Temp: 25.0 C

Barometric Press: 706 mmhg

Location

Latitude N 54° 06' 18.5"

Longitude W 110° 27' 10.1"

Elevation 610 m

Status of Site Documentation On site - OK

Manifold Material Glass / SS
Manifold Condition Good

Meteorological

	Observed	Audit Value
Wind Speed Direction	<u>16 kph / 9 deg</u>	<u>10-15 kph / N</u>
Station Temperature	<u>22.9 C</u>	<u>23.6 C</u>
Relative Humidity	<u>N/A</u>	<u>N/A</u>
Ambient Temperature	<u>N/A</u>	<u>N/A</u>
BP	<u>N/A</u>	<u>N/A</u>
Tipping bucket	<u>N/A</u>	<u>N/A</u>

Remarks:

SO₂ ANALYZER AUDIT

File No. 2014 - 045A

Date: April 25, 2014

Performed by: Al Clark

Station

Name: Maskwa

Location: Maskwa - IOL

Facility/Zone: Lica

Operator: Maxxam

Temp. 22.5 C

Barometric Press. 705 mmhg

Monitor

Make/Model: Teledyne 100E Serial No: 508

Inlet flow (sccm): 589 Full Scale Range ppm: 1.0

Last cal. Date: March 26, 2014 Old Correction Factor: 1.005

Zero/Bkg 77.0

Span Coef 1.247

Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201

AMU #: 1690

Cylinder #: CAL9745

SO₂ Concentration PPM: 51.0

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5088	0.0	5088	0.000	0.001		
5111	51.0	5162	0.504	0.502	-1%	± 15%
5140	22.1	5162	0.218	0.220	0%	± 15%
5126	10.5	5137	0.104	0.104	-1%	± 15%
Absolute Average Percent Difference					0%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000

m (Slope)= 0.9949

b (Intercept as % of full scale)= 0.1183

LIMITS

≥ **0.995**

0.85-1.15

± **3% F.S.**

Remarks:

H₂S ANALYZER AUDIT

File No. 2014 - 046A

Date: April 25, 2014

Performed by: Al Clark

Station

Name: Maskwa

Location: Maskwa - IOL

Facility/Zone: Lica

Operator: Maxxam

Temp. 22.5 C

Barometric Press. 705 mmhg

Monitor

Make/Model: Teledyne 101E Serial No: 511

Inlet flow (sccm): 659 Full Scale Range ppm: 0.1

Last cal. Date: March 26, 2014 Old Correction Factor: 1.000

Zero/Bkg 30.6

Span Coef 1.158

Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201

AMU #: 1690

Cylinder #: FF15612

H₂S Concentration PPM: 10.0

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5088	0.0	5088	0.000	0.000		
5124	38.3	5162	0.074	0.074	0%	± 15%
5145	17.2	5162	0.033	0.035	5%	± 15%
5128	9.1	5137	0.018	0.019	7%	± 15%
Absolute Average Percent Difference					4%	

Linear Regression Analysis:

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

Correlation Coeff.= 0.9996

m (Slope)= 0.9925

b (Intercept as % of full scale)= 0.9264

LIMITS

≥ **0.995**

0.85-1.15

± **3% F.S.**

Remarks:

HC ANALYZER AUDIT

File No. 2014 - 047A

Date: April 25, 2014 Performed by: Al Clark

Station

Name: Maskwa Location: Maskwa - IOL
 Facility/Zone: Lica Operator: Maxxam
 Temp. 25.0 C Barometric Press. 706 mmhg

Monitor

Make/Model: Teco 51 CLT Serial No: 0436603738
 Inlet flow (sccm): 7.51psi Full Scale Range ppm: 50.0
 Last cal. Date: March 26, 2014 Old Correction Factor: 1.009

Calibrator

Calibration Method: Gas Dilution
 Make/Model: Sabio 2010 AMU #: 1778
 HC cylinder #: FF27932 HC concentration ppm: 1050

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
3008	0.0	3008	0.00	0.02		
3004	80.0	3084	27.24	26.25	-4%	± 15%
2998	39.6	3038	13.69	13.17	-4%	± 15%
3008	20.0	3028	6.94	6.59	-5%	± 15%
Absolute Average Percent Difference					4%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000
 m (Slope)= 0.9642
 b (Intercept as % of full scale)= -0.0589

LIMITS
≥ 0.995
0.85-1.15
± 3% F.S.

Remarks:

NO-NOx-NO2 Analyzer Audit

File No. 2014 - 048A

Date: April 25, 2014 Performed by: Al Clark

Station: Name: Maskwa Location: Maskwa - IOL Operator: Maxxam
Facility/Zone: Lica Temp. 22.5 C BP: 705 mmhg

Monitor: Make/Model: Teledyne 200E Serial No. 574
Inlet flow (sccm): 449/457 Range ppm: 1.0
Last cal. Date: March 25, 2014 Old Correction Factor: NO: 1.002
NOx: 1.002
NO2: 0.982
NO Bkg 0.5
NOx Bkg 0.8
NO Coef 1.049
NOx Coef 1.053
NO2 Coef N/A

Calibration Method: Gas Dilution / GPT
Calibrator: Make/Model: Sabio 2010 AMU# 1749
NO cylinder # FF11878 NO conc. ppm 50.5 NOx conc. ppm 50.9

Calibrator Flows			Calc. Conc.		Indicated Concentration		% Difference vs Audit Gas	
Air	Gas	Total	NO (ppm)	NOx (ppm)	NO (ppm)	NOx (ppm)	NO	NOx
4957	0.0	4957	0.000	0.000	0.000	0.000	Limit ± 15%	
4957	79.1	5036	0.793	0.799	0.794	0.825	0%	3%
4959	39.2	4998	0.396	0.399	0.395	0.414	0%	4%
4974	19.8	4994	0.200	0.202	0.197	0.209	-2%	4%
Absolute Average Percent Difference							1%	3%

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>1.0023</u>	<u>1.0319</u>	<u>1.0052</u>	0.85-1.15
b (Intercept as % of full scale)=	<u>-0.1662</u>	<u>0.0710</u>	<u>-0.0426</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 V	5036	0.798	0.823	0.025	0.477	0.479	0%	± 15%
0.900 V	5036	0.321	0.826	0.504	0.477	0.479	0%	± 15%
0.500 V	5036	0.567	0.824	0.257	0.231	0.232	0%	± 15%
0.300 V	5036	0.689	0.824	0.134	0.109	0.109	0%	± 15%
Absolute Average Percent Difference							0%	

Converter Efficiency

Average Converter Efficiency 100.3%

Remarks: _____

Station Performance Audit Summary

Company: Lica Facility Name: Maskwa - IOL
 Approval No.: N/A Site Name: Maskwa
 AENV Region: Northern AENV District: Cold Lake

Parameters audited:

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

GENERAL

Has the location remained unchanged from previous audit?
 Is site secure?
 Are station operating conditions adequate?

YES	NO	N/A
X		
X		
X		

DATA ACQUISITION

Are strip charts in use?
 Is a telemetry system for data acquisition in use?

	X	
X		

SYSTEM COMPONENTS

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

X		
X		
X		
X		
X		
X		
X		
X		
X		
X		
X		
X		
X		

WIND EQUIPMENT

Is wind sensor properly oriented?
 Does wind equipment appear to be functioning properly?
 Date of last calibration. Date: Feb 2014

X		
X		

COMMENTS:

AUDITOR: Al Clark

DATE: April 25, 2014

STATION AUDIT

File No. 2014 - 029A / 034A

Date: April 22, 2014

Performed by: Al Clark

Station

Name: St Lina

Location: St Lina

Facility/Zone: Lica

Operator: Maxxam

Temp: 19.0 C

Barometric Press: 694 mmHg

Location

Latitude N 54° 12' 59.1"

Longitude W 111° 30' 09.4"

Elevation 682 m

Status of Site Documentation On site - requires updating

Manifold Material Glass / SS
Manifold Condition Good

Meteorological

	Observed	Audit Value
Wind Speed Direction	<u>26 kph / 91 deg</u>	<u>25-30 kph / E</u>
Station Temperature	<u>23.5 C</u>	<u>23.2 C</u>
Relative Humidity	<u>33.3%</u>	<u>31.4%</u>
Ambient Temperature	<u>15.7 C</u>	<u>15.6 C</u>
BP	<u>917.6</u>	<u>913.3</u>
Tipping bucket	<u>1.2 mils</u>	<u>12 tips</u>

Remarks:

SO₂ ANALYZER AUDIT

File No. 2014 - 029A

Date: April 22, 2014

Performed by: Al Clark

Station

Name: St Lina

Location: St Lina

Facility/Zone: Lica

Operator: Maxxam

Temp. 17.5 C

Barometric Press. 694 mmhg

Monitor

Make/Model: Teledyne 100E Serial No: 468

Inlet flow (sccm): 567 Full Scale Range ppm: 1.0

Last cal. Date: April 8, 2014 Old Correction Factor: 1.000

Zero/Bkg 139.2

Span Coef 1.008

Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201

AMU #: 1690

Cylinder #: CAL9745

SO₂ Concentration PPM: 51.0

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5105	0.0	5105	0.0000	0.0015		
5123	51.4	5174	0.5066	0.4968	-2%	± 15%
5115	22.1	5137	0.2194	0.2162	-2%	± 15%
5104	10.4	5114	0.1037	0.1018	-3%	± 15%
Absolute Average Percent Difference					3%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000

m (Slope)= 0.9784

b (Intercept as % of full scale)= 0.1111

LIMITS

≥ **0.995**

0.85-1.15

± **3% F.S.**

Remarks:

H₂S ANALYZER AUDIT

File No. 2014 - 030A

Date: April 22, 2014

Performed by: Al Clark

Station

Name: St Lina

Location: St Lina

Facility/Zone: Lica

Operator: Maxxam

Temp. 17.5 C

Barometric Press. 694 mmhg

Monitor

Make/Model: Teledyne 101E Serial No: 510

Inlet flow (sccm): 543 Full Scale Range ppm: 0.1

Last cal. Date: April 8, 2014 Old Correction Factor: 0.974

Zero/Bkg 124.6

Span Coef 1.041

Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201

AMU #: 1690

Cylinder #: FF15612

H₂S Concentration PPM: 10.0

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5105	0.0	5105	0.0000	0.0016		
5136	38.5	5174	0.0744	0.0716	-6%	± 15%
5119	17.9	5137	0.0348	0.0345	-6%	± 15%
5105	9.0	5114	0.0176	0.0182	-6%	± 15%
Absolute Average Percent Difference					6%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000

m (Slope)= 0.9406

b (Intercept as % of full scale)= 1.6437

LIMITS

≥ **0.995**

0.85-1.15

± **3% F.S.**

Remarks:

HC ANALYZER AUDIT

File No. 2014 - 031A

Date: April 22, 2014 Performed by: Al Clark

Station

Name: St Lina Location: St Lina
 Facility/Zone: Lica Operator: Maxxam
 Temp. 19.5 C Barometric Press. 692 mmhg

Monitor

Make/Model: Teco 51 CLT Serial No: 0436603739
 Inlet flow (sccm): 6.80 psi Full Scale Range ppm: 50.0
 Last cal. Date: Apr 9/14 Old Correction Factor: 1.012

Calibrator

Calibration Method: Gas Dilution
 Make/Model: Sabio 2010 AMU # : 1778
 HC cylinder # : FF27932 HC concentration ppm: 1050

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
2990	0.0	2990	0.00	0.00		
2982	80.7	3063	27.66	26.57	-4%	± 15%
2983	40.0	3023	13.89	13.38	-4%	± 15%
2989	20.1	3009	7.01	6.74	-4%	± 15%
Absolute Average Percent Difference					4%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000
 m (Slope)= 0.9606
 b (Intercept as % of full scale)= 0.0171

LIMITS
≥ 0.995
0.85-1.15
± 3% F.S.

Remarks:

Fitting on back side of inlet filter was loose. Tightened before audit.

NO-NOx-NO2 Analyzer Audit

File No. 2014 - 032A

Date: April 22, 2014 Performed by: Al Clark

Station: Name: St Lina Location: St Lina Operator: Maxxam
Facility/Zone: Lica Temp. 19.0 C BP: 694 mmhg

Monitor: Make/Model: API 200A Serial No. 1746
Inlet flow (sccm): 451 Range ppm: 1.0
Last cal. Date: April 16/14 Old Correction Factor: NO: 1.008
NOx: 1.007
NO2: 1.002
NO Bkg 0.1
NOx Bkg 0.2
NO Coef 1.006
NOx Coef 1.003
NO2 Coef N/A

Calibration Method: Gas Dilution / GPT
Calibrator: Make/Model: Sabio 2010 AMU# 1749
NO cylinder # FF11878 NO conc. ppm 50.5 NOx conc. ppm 50.9

Calibrator Flows			Calc. Conc.		Indicated Concentration		% Difference vs Audit Gas	
Air	Gas	Total	NO (ppm)	NOx (ppm)	NO (ppm)	NOx (ppm)	NO	NOx
4972	0.0	4972	0.0000	0.0000	-0.0006	0.0000	Limit ± 15%	
4971	79.9	5051	0.7988	0.8052	0.7815	0.8129	-2%	1%
4985	39.6	5025	0.3980	0.4011	0.3804	0.4003	-4%	0%
4977	19.7	4997	0.1991	0.2007	0.1845	0.1975	-7%	-2%
Absolute Average Percent Difference							4%	0%

Linear Regression Analysis:

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

	NO	NOx	NO ₂	LIMITS
Correlation Coeff.=	<u>0.9999</u>	<u>1.0000</u>	<u>1.0000</u>	≥ 0.995
m (Slope)=	<u>0.9820</u>	<u>1.0111</u>	<u>1.0056</u>	0.85-1.15
b (Intercept as % of full scale)=	<u>-0.6260</u>	<u>-0.2976</u>	<u>-0.2627</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 V	5051	0.7873	0.8176	0.0285	0.4571	0.4568	0%	± 15%
0.900 V	5051	0.3302	0.8175	0.4853	0.4571	0.4568	0%	± 15%
0.500 V	5051	0.5618	0.8170	0.2534	0.2255	0.2249	0%	± 15%
0.300 V	5051	0.6744	0.8168	0.1389	0.1129	0.1104	-2%	± 15%
Absolute Average Percent Difference							-1%	

Converter Efficiency

Average Converter Efficiency 99.2%

Remarks:

O₃ ANALYZER AUDIT

File No. 2014 - 033A

Date: April 22, 2014

Performed by: Al Clark

Station

Name: St Lina

Location: St Lina

Facility/Zone: Lica

Operator: Maxxam

Temp. 19.0 C

Barometric Press. 694 mmhg

Monitor

Make/Model: Teco 49i Serial No: 1002240371

Inlet flow (sccm): 735/729 Full Scale Range ppm: 0.5

Last cal. Date: April 8/14 Old Correction Factor: 1.020

Zero/Bkg -0.1

Span Coeff. 0.981

Calibrator

Calibration Method: Photometer

Make/Model: Teco 49i PS

NO cylinder #: N/A

AMU #: 1808

NO concentration ppm: N/A

Ozone Setting	Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Conc. (ppm)	% Difference	
	Air	Gas	Total			vs Audit Gas	Limits
0.000	N/A	XXXX	N/A	0.0000	0.0002		
0.400	N/A	XXXX	N/A	0.4000	0.4015	0%	± 15%
0.200	N/A	XXXX	N/A	0.2000	0.2006	0%	± 15%
0.100	N/A	XXXX	N/A	0.1000	0.1007	0%	± 15%
Absolute Average Percent Difference						0%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000
 m (Slope)= 1.0030
 b (Intercept as % of full scale)= 0.0440

LIMITS
≥ 0.995
0.85-1.15
± 3% F.S.

Remarks:

Found O3 filter holder not secured properly. Re-tightened before audit.

TEOM AUDIT

Date: April 22, 2014 File #: 2014 - 034A
 Performed by: Al Clark

Station			
Name:	<u>St Lina</u>	Location:	<u>St Lina</u>
Facility/Zone:	<u>Lica</u>	Operator:	<u>Maxxam</u>
Temperature:	<u>19.0 C</u>	Barometric Press.:	<u>694 mmhg</u>

Audit Transfer Standard			
Make/Model:	<u>DeltaCal</u>	Cell s/n:	<u>1002</u>
Serial Number:	<u>AMU 1858</u>		
Sampler Set-up and Current Readings			
Make/Model	<u>Teom 1400a</u>	F-Main Set Pt (l/min)	<u>3.00</u>
Unit #	<u>PM2.5</u>	F-Aux Set Pt (l/min)	<u>13.67</u>
Control unit s/n	<u>140AB228720001</u>	Filter Load (%)	<u>26</u>
Transducer s/n	<u>140AB228720001</u>	K _O Factor	<u>15003</u>
		Temp (°C)	<u>16.0</u>
		Press (ATM)	<u>0.916</u>

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

$ATM = (mm\ Hg) \times (1.316 \times 10^{-3})$ or $ATM = ("Hg) \times (3.34207 \times 10^{-2})$

Note: Tolerances are noted as **BOLD** in Brackets

Zero Flow		Pump On (Time to reach set points)	
Pump Off		(45-60 Sec)	
F-Main (l/min)	<u>0.02</u>		<u>43</u>
F-Aux (l/min)	<u>0.17</u>	(45-60 Sec)	<u>58</u>

Temperature/Pressure			
Measured Temp (± 2 °C)	<u>14.5</u>	Δ °C	<u>1.50</u>
Measured Press (± 1.5% ATM)	<u>0.918</u>	Δ% ATM	<u>0.22%</u>

Flow Audit		Δ% of Measured Flow from Set-point	
Indicated Main/Aux Flow (l/min)	<u>2.98</u> <u>13.61</u>	(± 2%)	<u>-0.7%</u> <u>-0.4%</u>
Total Flow = Main + Aux (l/min)	<u>16.59</u>	(± 2%)	<u>-0.5%</u>
Δ of Measured Flow from Indicated			
Measured Total Flow (l/min)	<u>17.39</u>	(± 1.00 l/min)	<u>0.80</u>
Measured Main Flow (l/min)	<u>3.21</u>	(± 0.20 l/min.)	<u>0.23</u>

Leak Check		Actual leakage = Pump On – Pump Off	
Main (< 0.15 l/min)	<u>0.07</u>		<u>0.05</u>
Aux (< 0.65 l/min)	<u>0.20</u>		<u>0.03</u>

K_O Factor	
Measured	<u>15282</u>
K _O % Difference (± 2.5%)	<u>1.86</u>

Remarks: Vac @ 10" - using 617 Thomas not 2688 Thomas double head.
Rubber connection acting as pinch point - see picture. Corrected at
the end of audit.

Station Performance Audit Summary

Company: Lica Facility Name: St Lina
 Approval No.: N/A Site Name: St Lina
 AENV Region: Northern AENV District: Cold Lake

Parameters audited:

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

GENERAL

Has the location remained unchanged from previous audit?
 Is site secure?
 Are station operating conditions adequate?

YES	NO	N/A
X		
X		
X		

DATA ACQUISITION

Are strip charts in use?
 Is a telemetry system for data acquisition in use?

	X	
X		

SYSTEM COMPONENTS

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

X		
X		
X		
X		
X		
X		
X		
X		
X		
X		
X		
X		

WIND EQUIPMENT

Is wind sensor properly oriented?
 Does wind equipment appear to be functioning properly?
 Date of last calibration. Date: Feb 2014

X		
X		

COMMENTS:

AUDITOR: Al Clark

DATE: April 22, 2014

STATION AUDIT

File No. 2014 - 035A / 039A

Date: April 23, 2014

Performed by: Al Clark

Station

Name: Elk Point

Location: Elk Point Airport

Facility/Zone: Lica

Operator: Maxxam

Temp: 19.5 C

Barometric Press: 695 mmhg

Location

Latitude N 53° 53' 28.4"

Longitude W 110° 45' 50.1"

Elevation 593 m

Status of Site Documentation On site - OK

Manifold Material Glass
Manifold Condition Good

Meteorological

	Observed	Audit Value
Wind Speed Direction	<u>39 kph / 93 deg</u>	<u>35-40 kph / E</u>
Station Temperature	<u>19.1 C</u>	<u>19.4 C</u>
Relative Humidity	<u>N/A</u>	<u>N/A</u>
Ambient Temperature	<u>N/A</u>	<u>N/A</u>
BP	<u>N/A</u>	<u>N/A</u>
Tipping bucket	<u>N/A</u>	<u>N/A</u>

Remarks:

SO₂ ANALYZER AUDIT

File No. 2014 - 035A

Date: April 23, 2014

Performed by: Al Clark

Station

Name: Elk Point

Location: Elk Point Airport

Facility/Zone: Lica

Operator: Maxxam

Temp: 19.5 C

Barometric Press: 695 mmhg

Monitor

Make/Model: Teledyne 100E Serial No: 467

Inlet flow (sccm): 567 Full Scale Range ppm: 1.0

Last cal. Date: April 10, 2014 Old Correction Factor: 1.003

Zero/Bkg 31.9

Span Coef 1.003

Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201

AMU #: 1690

Cylinder #: CAL9745

SO₂ Concentration PPM: 51.0

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5088	0.0	5088	0.000	0.001		
5109	51.0	5160	0.504	0.504	0%	± 15%
5150	22.2	5172	0.219	0.220	0%	± 15%
5122	10.5	5132	0.104	0.103	-2%	± 15%
Absolute Average Percent Difference					1%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000

m (Slope)= 0.9995

b (Intercept as % of full scale)= 0.0280

LIMITS

≥ **0.995**

0.85-1.15

± **3% F.S.**

Remarks:

H₂S ANALYZER AUDIT

File No. 2014 - 036A

Date: April 23, 2014

Performed by: Al Clark

Station

Name: Elk Point

Location: Elk Point Airport

Facility/Zone: Lica

Operator: Maxxam

Temp: 19.5 C

Barometric Press: 695 mmhg

Monitor

Make/Model: Teledyne 101E Serial No: 509

Inlet flow (sccm): 543 Full Scale Range ppm: 0.1

Last cal. Date: April 10, 2014 Old Correction Factor: 1.010

Zero/Bkg 91.2

Span Coef 1.112

Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201

AMU #: 1690

Cylinder #: FF15612

H₂S Concentration PPM: 10.0

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5088	0.0	5088	0.0000	0.0014		
5122	38.3	5160	0.0742	0.0738	-2%	± 15%
5154	17.8	5172	0.0344	0.0352	-2%	± 15%
5123	9.0	5132	0.0175	0.0182	-4%	± 15%
Absolute Average Percent Difference					3%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000

m (Slope)= 0.9771

b (Intercept as % of full scale)= 1.3294

LIMITS

≥ **0.995**

0.85-1.15

± **3% F.S.**

Remarks:

Non Methane Analyzer Audit

File No. 2014 - 037A

Date: April 23, 2014

Performed by: Al Clark

Station: Name: Elk Pt. Location: Elk Pt Airport Operator: Maxxam
 Facility/Zone: Lica Temp. 22.5 C BP: 695 mmhg

Monitor: Make/Model: Teco 55 Serial No. 1236656107
 Inlet flow (sccm): N/A CH₄ Range ppm: 20
 Last cal. Date: April 11, 2014 Non CH₄ Range ppm: 20
 THC Range ppm: 40
 Old Correction Factor: CH₄: 0.992
 Non CH₄: 1.012
 THC: 0.999

Calibration Method: Gas Dilution
Calibrator: Make/Model Sabio 2010 AMU# 1778
 HC cylinder # FF27932 CH₄ conc. (ppm) 500 CH₄ Equiv (Propane only) (ppm) 550
 Propane conc. (ppm) 200 Total CH₄ Equiv. (ppm) 1050

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 ± 15%		
Air	Gas	Total							CH ₄	Non CH ₄	THC
2979	0.0	2979	0.00	0.00	0.00	0.00	0.00	0.00	X	X	X
2986	80.5	3066	13.13	14.44	27.57	12.48	13.76	27.14	-5%	-5%	-2%
2984	40.0	3024	6.61	7.28	13.89	6.37	7.00	13.37	-4%	-4%	-4%
2986	20.0	3006	3.33	3.66	6.99	3.26	3.61	6.87	-2%	-1%	-2%
Absolute Average Percent Difference									4%	3%	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>0.9999</u>	≥ 0.995
m (Slope)=	<u>0.9489</u>	<u>0.9505</u>	<u>0.9833</u>	0.85-1.15
b (Intercept as % of FS)=	<u>0.2766</u>	<u>0.3131</u>	<u>-0.1575</u>	± 3% F.S.

Remarks:

NO-NOx-NO2 Analyzer Audit

File No. 2014 - 038A

Date: April 23, 2014 Performed by: Al Clark

Station: Name: Elk Pt Location: Elk Pt Airport Operator: Maxxam
Facility/Zone: Lica Temp. 22.0 C BP: 695 mmhg

Monitor: Make/Model: Teledyne 200E Serial No. 593
Inlet flow (sccm): 464 Range ppm: 1.0
Last cal. Date: April 11, 2014 Old Correction Factor: NO: 0.993
NOx: 0.993
NO2: 0.993
NO Bkg -0.3
NOx Bkg 1.2
NO Coef 1.109
NOx Coef 1.126
NO2 Coef N/A

Calibration Method: Gas Dilution / GPT
Calibrator: Make/Model: Sabio 2010 AMU# 1749
NO cylinder # FF11878 NO conc. ppm 50.5 NOx conc. ppm 50.9

Calibrator Flows			Calc. Conc.		Indicated Concentration		% Difference vs Audit Gas	
Air	Gas	Total	NO (ppm)	NOx (ppm)	NO (ppm)	NOx (ppm)	NO	NOx
4936	0.0	4936	0.000	0.000	0.000	-0.001	Limit ± 15%	
4944	79.4	5023	0.798	0.805	0.783	0.810	-2%	1%
4975	39.4	5014	0.397	0.400	0.392	0.407	-1%	2%
4981	19.9	5001	0.201	0.203	0.196	0.205	-2%	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>0.9817</u>	<u>1.0078</u>	<u>0.9917</u>	0.85-1.15
b (Intercept as % of full scale)=	<u>0.0117</u>	<u>0.0714</u>	<u>0.3884</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 V	5023	0.790	0.813	0.023	0.469	0.469	0%	± 15%
0.900 V	5023	0.321	0.813	0.492	0.469	0.469	0%	± 15%
0.500 V	5023	0.563	0.815	0.252	0.227	0.229	1%	± 15%
0.300 V	5023	0.683	0.816	0.133	0.107	0.110	3%	± 15%
Absolute Average Percent Difference							1%	

Converter Efficiency

Average Converter Efficiency 101.2%

Remarks:

O₃ ANALYZER AUDIT

File No. 2014 - 039A

Date: April 23, 2014

Performed by: Al Clark

Station

Name: Elk Point

Location: Elk Point Airport

Facility/Zone: Lica

Operator: Maxxam

Temp: 22.0 C

Barometric Press: 695 mmhg

Monitor

Make/Model: Teco 49i Serial No: 1002240372

Inlet flow (sccm): 735/729 Full Scale Range ppm: 0.5

Last cal. Date: April 11, 2014 Old Correction Factor: 0.999

Zero/Bkg 0.0

Span Coeff. 1.004

Calibrator

Calibration Method: Photometer

Make/Model: Teco 49i PS

NO cylinder #: N/A

AMU #: 1808

NO concentration ppm: N/A

Ozone Setting	Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Conc. (ppm)	% Difference	
	Air	Gas	Total			vs Audit Gas	Limits
0.000	N/A	XXXX	N/A	0.0000	0.0009		
0.400	N/A	XXXX	N/A	0.4000	0.4036	1%	± 15%
0.200	N/A	XXXX	N/A	0.2000	0.2013	0%	± 15%
0.100	N/A	XXXX	N/A	0.1000	0.1013	0%	± 15%
Absolute Average Percent Difference						0%	

Linear Regression Analysis:

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

Correlation Coeff.= 1.0000
 m (Slope)= 1.0067
 b (Intercept as % of full scale)= 0.1200

LIMITS
≥ 0.995
0.85-1.15
± 3% F.S.

Remarks:

Intensities A/B are low 52K Hz. Min 45K Hz. Should be ~ 100K Hz.

Station Performance Audit Summary

Company: Lica Facility Name: Elk Point Airpoint
 Approval No.: N/A Site Name: Elk Point
 AENV Region: Northern AENV 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	Ethylene	
PM _{2.5}	X	PM ₁₀		TSP		BTEX		Wind Speed	
Wind Dir	X	Amb. Temp		Stn.Temp	X	RH		Solar Radiation	
Rainfall	X	Precip		VWS		Other	BP		
All parameters monitored as per approval: Yes _____ No _____ N/A _____									

GENERAL

Has the location remained unchanged from previous audit?
 Is site secure?
 Are station operating conditions adequate?

YES NO N/A

X		
X		
X		

DATA ACQUISITION

Are strip charts in use?
 Is a telemetry system for data acquisition in use?

	X	
X		

SYSTEM COMPONENTS

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

X		
X		
X		
X		
X		
X		
X		
X		
X		
X		
X		
X		

WIND EQUIPMENT

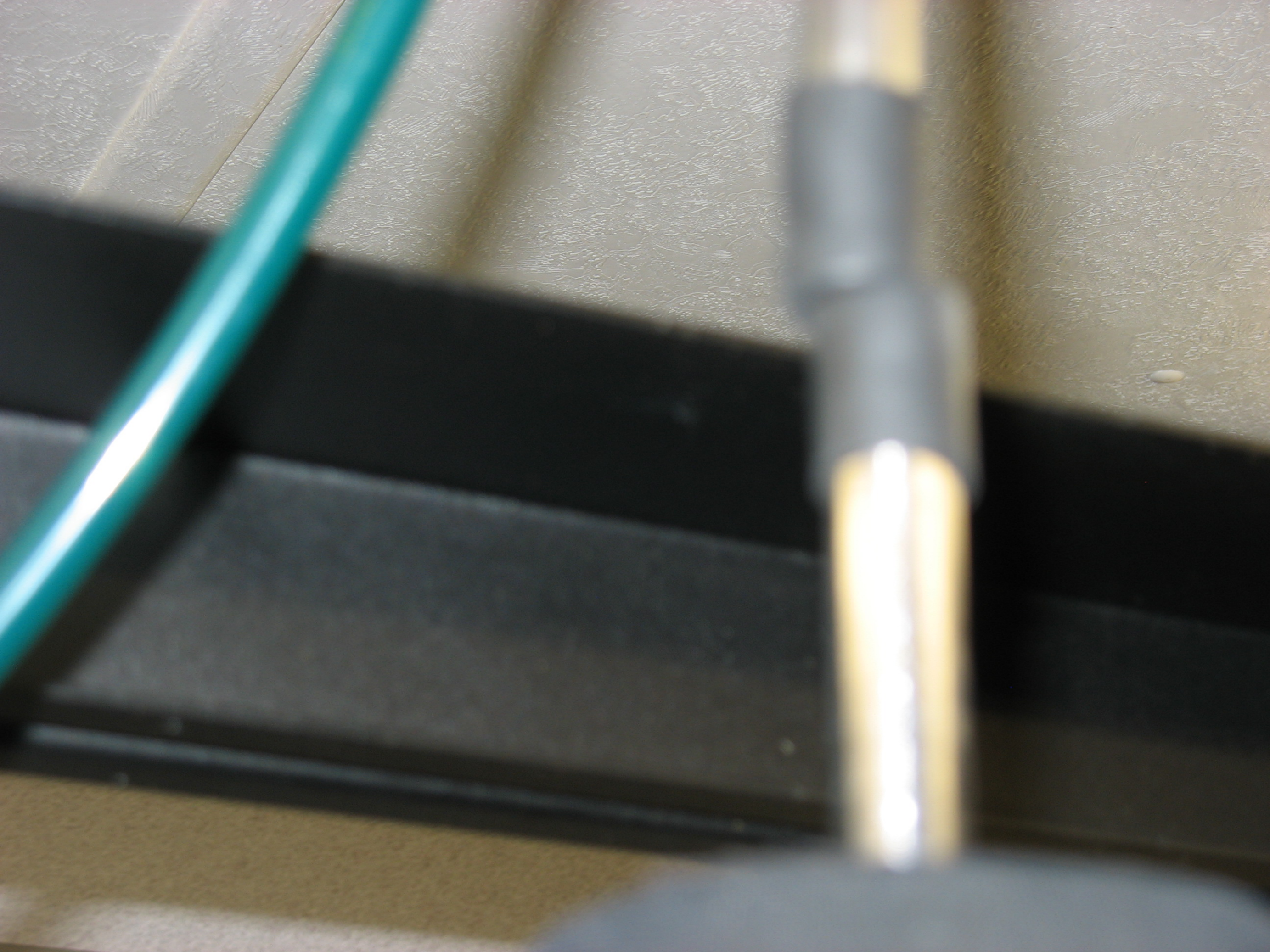
Is wind sensor properly oriented?
 Does wind equipment appear to be functioning properly?
 Date of last calibration. Date: Unknown

X		
X		

COMMENTS:

AUDITOR: Al Clark

DATE: April 23, 2014





ZERO

SAMPLE OUT

VENT

IN





Box 8237
5107W-50th Street
Bonnyville, AB T9N 2J5
Phone: (780) 812-2182
Fax: (780) 812-2186
Toll Free: 1-877-737-2182
E-Mail: lica2@lica.ca
Website: <http://www.lica.ca>

Al Clark

June 9, 2014

Monitoring Systems Auditor

Alberta Environmental Monitoring, Evaluation and Reporting Agency (AEMERA)

Re: 2014 LICA Ambient Air Monitoring Station Audits

LICA has reviewed the data and report from the audit conducted in April 2014 by AEMERA. Several items were brought to our attention:

- A. failure associated with a TEOM flow (**corrected during the audit**)
- B. sample line safety concern at Elk Point
- C. pinch point on the TEOM sampling inlet at St. Lina (**corrected during the audit**)
- D. calibration anomaly (**addressed during the audit**)
- E. site documentation at St. Lina out of date

Items A, B, D, and E will be addressed in this letter. LICA considers *item c* to be resolved.

ITEM A

The technician has been retrained and the standard operating procedure has been updated to ensure that re-zeroing of flow measurement instruments is performed at the appropriate time.

ITEM B

LICA is investigating the possibility of installing an additional shelf on the instrument rack to lift sample lines off the station floor and keep them better organized.

ITEM D

A single point calibration was being used for shut downs. The standard operating procedure will be updated to ensure that a multi-point calibration is being used in these instances instead of simply using a zero and a high point. It has been noted that data cannot be validated using a zero and a high point based on linear regression analysis.

ITEM E

Site documentation for the St. Lina station has been updated (equipment list) and is included as an electronic attachment with this response. All site documentation will be audited over the next month; wind rose diagrams will be updated as part of this process.

Should you have any questions, please do not hesitate to contact me.

Michael Bisaga

A handwritten signature in blue ink that reads 'Michael Bisaga'.

Airshed Program Manager

Lakeland Industry and Community Association

cc: LICA Office

Attachment: St. Lina site documentation

Site Documentation: St. Lina Continuous Monitoring Station

General Site Information

Item	Description
Site ID (CASA ID)	N/A
Station Name	St. Lina Continuous Monitoring Station (STL)
General Description	The STL monitoring station is located just outside the LICA airshed boundary south west of the hamlet of St. Lina.
Community	St. Lina
Station Address	LSD 4-SW30-60-10-4
Coordinates	54.215961° -111.503304°
Station Type	Regional Upwind
Area Land Use	Rural, Agricultural
Angle of elevation to nearby building in area	<15 degrees, trees surrounding knoll.
Airflow Restrictions (yes/no)	North: No East: No South: No West: No
Nearest Tree	Tree stands 10 - meters away in all directions
Sample Manifold Type	Glass
Meteorological Tower Information	Height: 10 meters Type: Crank Position: Attached to north side of monitoring shelter
Station Install Date	Original installation: June 2009
Station Origin	LICA owned and operated
Site Preparation	Grassy open area on top of treed knoll.

Site Influences

Localized Sources (within 20 meters of station)

Type	Distance	Description
Automobile	To the west	Regional highway
Industrial	To the east	Compressor pad

Road Way Sources

Name	Type	Traffic Volume	Distance (m)	Description
Highway 867	Regional highway	Unknown – Minimal	Within 20 meters	Side Street

Major Point/Area Sources

Name	Type	Major Emissions	Distance (m)	Direction
CNRL Compressor Pad	Oil and Gas	NOx, PM, HC	Approximately 20 meters	East

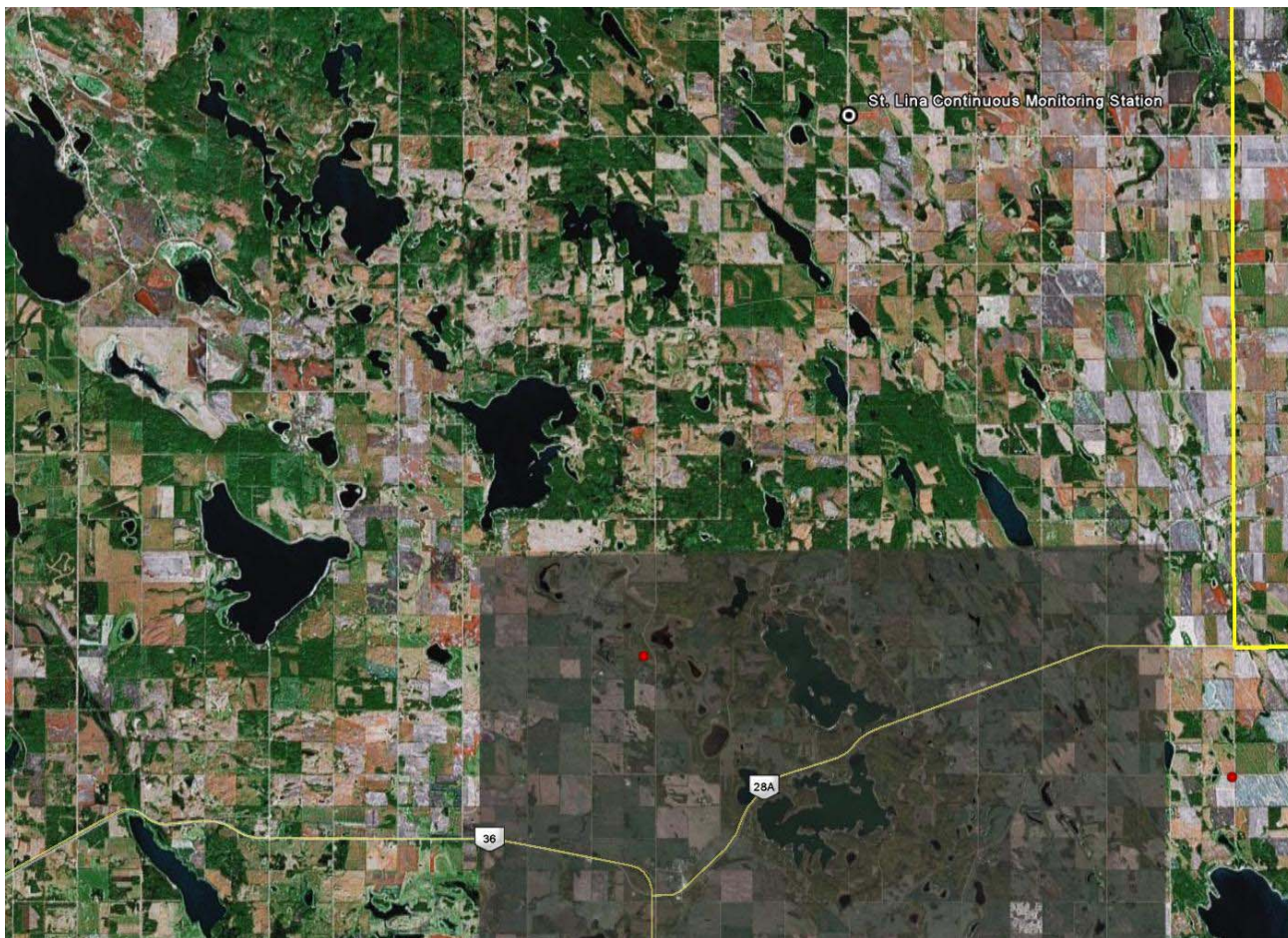


Figure 1: Satellite image showing CLS Continuous Monitoring Station Location

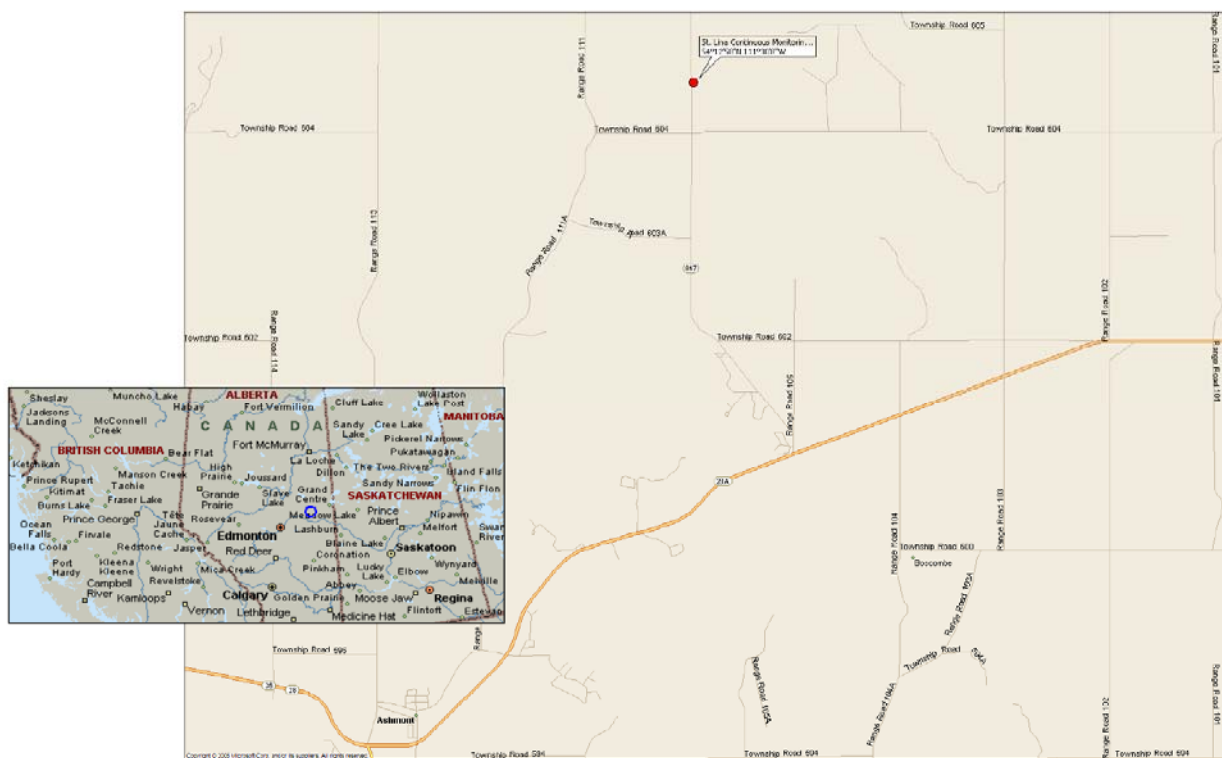


Figure 2: Road Map showing STL Continuous Monitoring Station Location

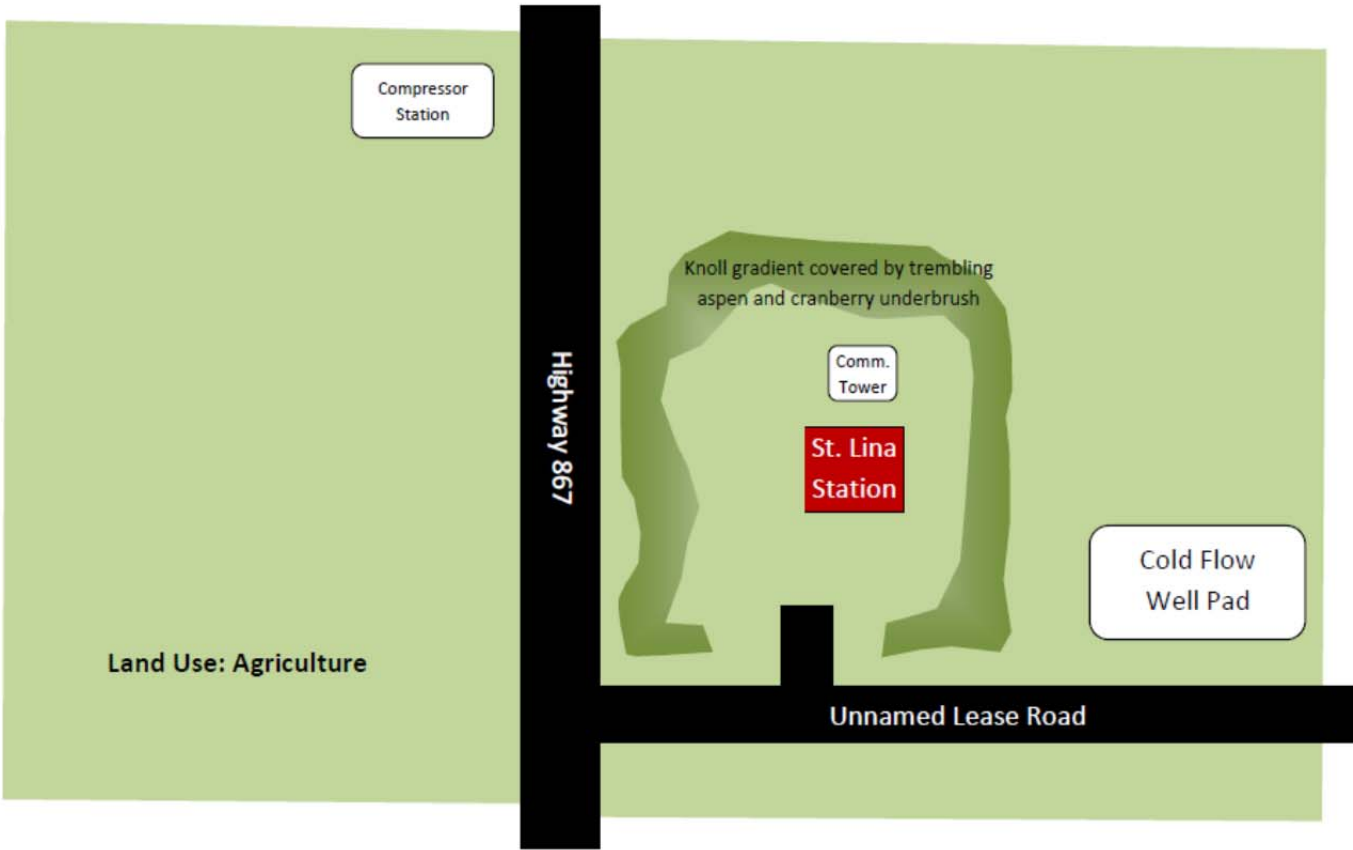
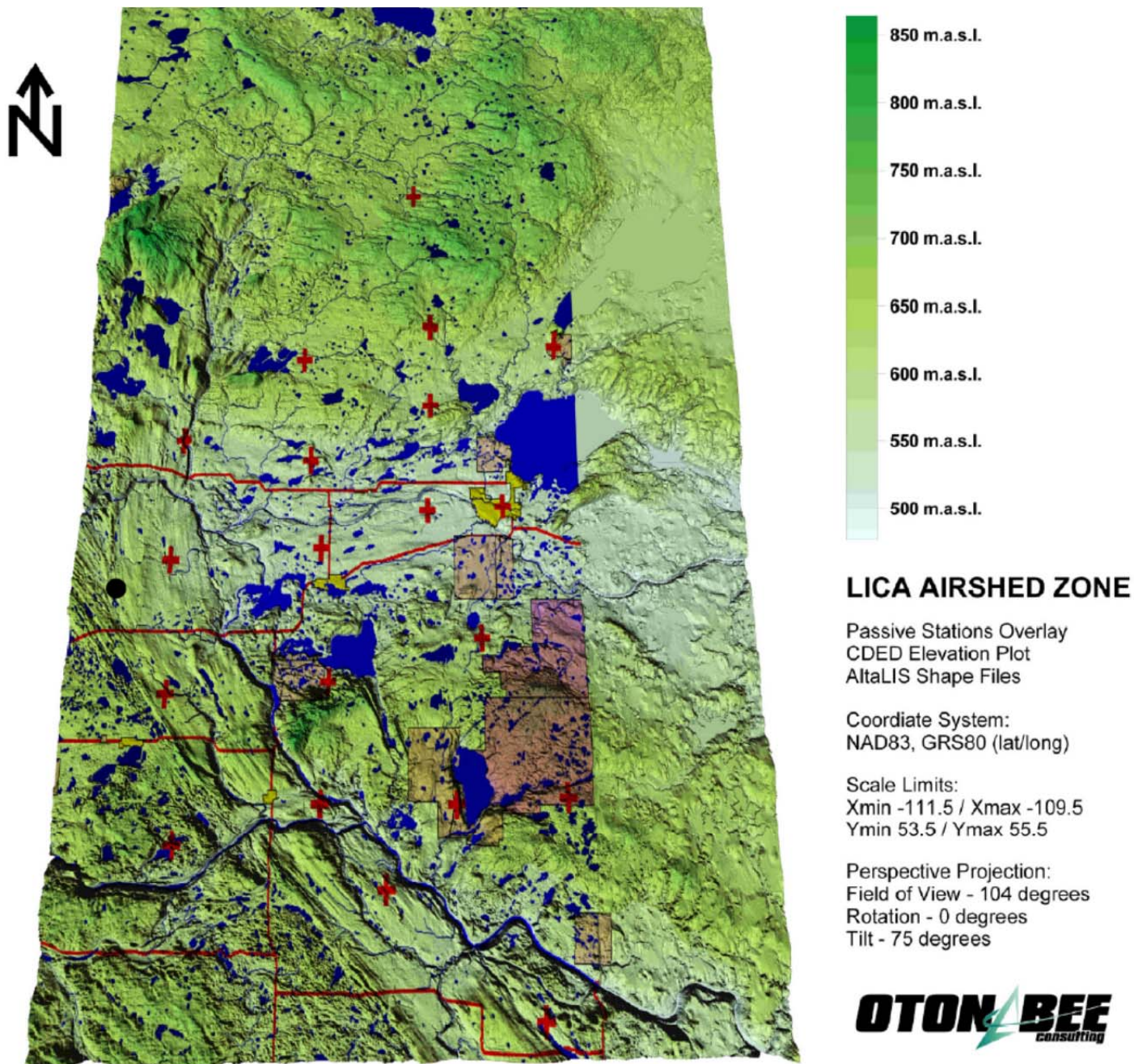






Figure 3: Schematic showing STL Continuous Monitoring Station and surrounding features.



● = St. Lina Continuous Monitoring Station

Figure 4: Elevation Plot showing location of STL Continuous Monitoring Station

Site Photographs – Cardinal Directions

North	East
 A photograph showing a tall, silver metal lattice tower standing behind a white, rectangular enclosure. The enclosure is surrounded by a chain-link fence. The site is situated in a wooded area with green trees and a clear blue sky.	 A wide-angle photograph of a grassy field in the foreground, leading to a dense line of green trees. In the distance, rolling hills are visible under a bright, slightly overcast sky.
South	West
 A photograph showing a grassy field in the foreground, with a dense line of green trees in the middle ground. The sky is clear and blue, and the horizon is visible in the distance.	 A photograph of a grassy field with a few scattered trees. The background shows a dense forest and rolling hills under a clear blue sky with some light clouds.

Site Photographs – Monitoring Station

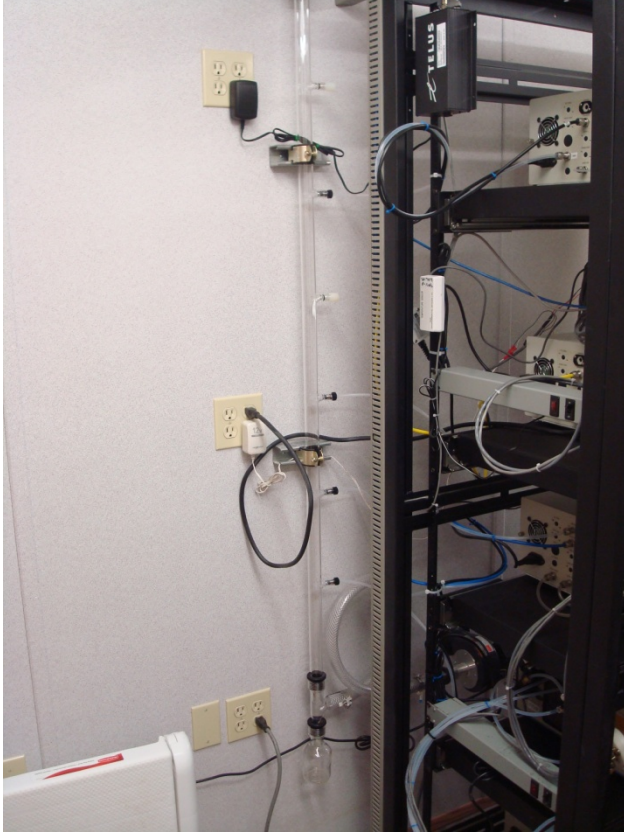
Exterior



Interior (Instrument Rack)



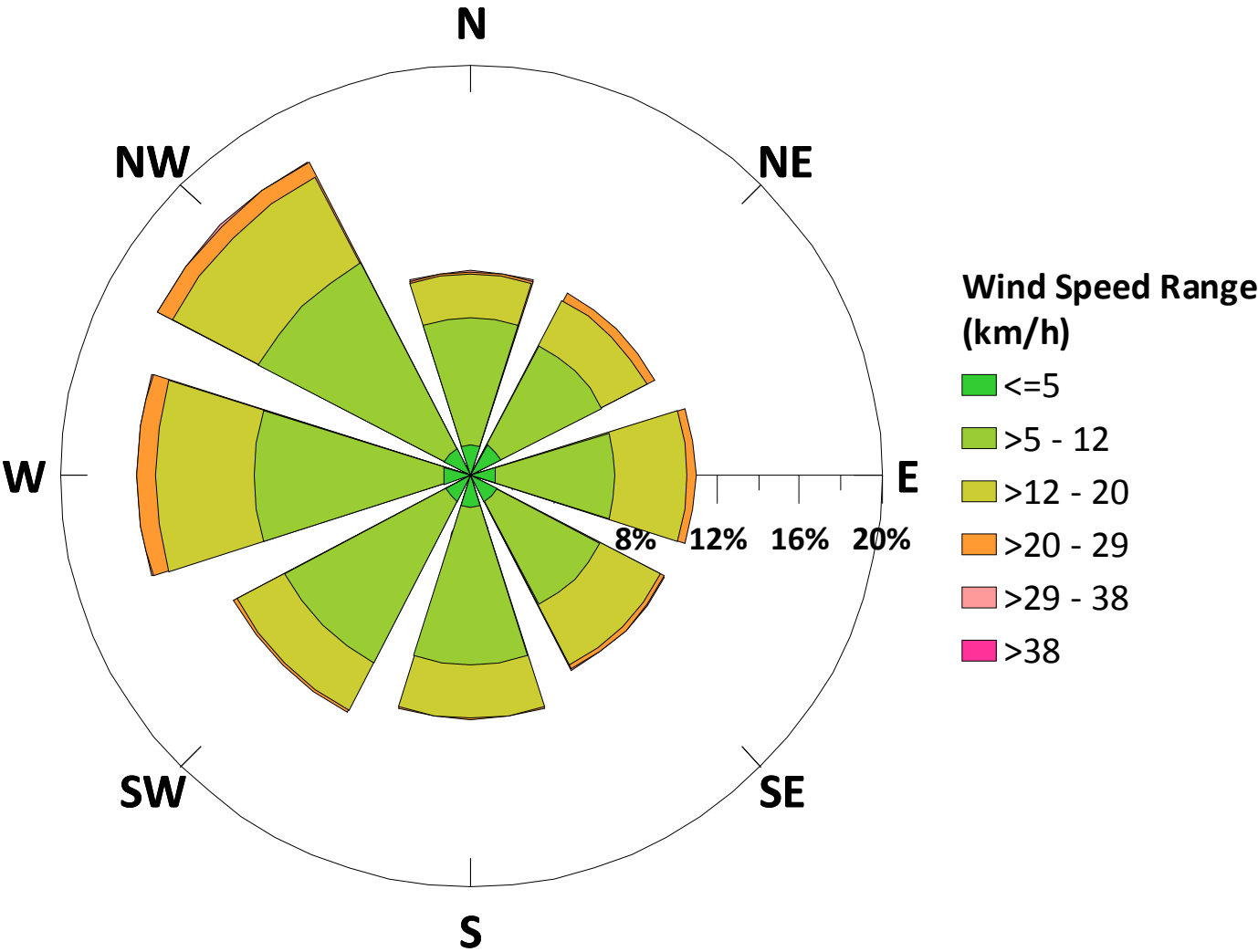
Interior (Intake Manifold)



Wind Rose Diagram

Wind Speed / Direction Frequency Distribution

STL Wind Rose 2012



Data period: January 21, 2012 – December 31, 2012

St. Lina Continuous Monitoring Station Equipment Inventory

Air Quality

Parameter	Make/Model	Serial Number	Sampling Height (m)	Equipment Owner
Analytical Systems				
Hydrogen Sulphide	Teledyne API / 101E	510	4	LICA
Sulphur Dioxide	Teledyne API / 100E	468	4	LICA
Oxides of Nitrogen	Teledyne API / 200E	592	4	LICA
PM2.5	Thermo Teom 1405F	1405A207691003	4	LICA
Hydrocarbons	Thermo 51C-LT	043669739	4	LICA
Ozone	Thermo Electron 49i	1002240371	4	LICA
Meteorological Systems				
Wind Speed	Met One 50.5	H12635	10	LICA
Wind Direction	Met One 50.5	H12635	10	LICA
Pressure	Met One 092	N/A	4	LICA
Relative Humidity	Met One 083	N/A	4	LICA
Ambient Temperature	Met One 060	N/A	4	LICA
Support Systems				
DACS	ESC 8832	AO 717	N/A	LICA
Trailer Temperature	R&R 61	N/A	N/A	LICA
Zero Air Supply	Teledyne API/701	1812	N/A	LICA

Revisions

Document Revision History

Revision No.	Date	Reason for Revision	Approved By
0	October 2009	Original Issue	M. Bisaga, Airshed Program Manager
1	June 2013	Updated equipment list, wind rose	M. Bisaga, Airshed Program Manager
2	June 2013	Corrected location details	M. Bisaga, Airshed Program Manager
3	June 2014	Updated equipment list	M. Bisaga, Manager - EMP

June 9, 2014

File No(s): 2013 – 029A / 048A

Mr. Michael Bisaga
Program Manager
Lica Airshed
13440 – 62 street
Edmonton, AB T5A 0V7

Dear Mr. Bisaga:

Re: LICA Ambient Air Monitoring Station Audits

Alberta Environment and Sustainable Resource Development (ESRD) received your letter dated June 9, 2014. Although ESRD has not yet confirmed all items have been addressed, ESRD is satisfied that the content of the letter has addressed the audit findings and considers this audit closed.

If you have any questions or concerns please feel free to contact the undersigned at 780-427-7888.

Yours truly,



Al Clark
Monitoring Systems Auditor
Environmental Assurance

Attachment(s): None