Government of Alberta ■
Environment

Alberta Environment and Water
Air Monitoring and Audit Center
4946 89 Street N.W.
Edmonton, Alberta T6E-5K1
Telephone: 780-427-7888
www.alberta.ca

March 21, 2012 File No(s): 2012 – 444A / 465A

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

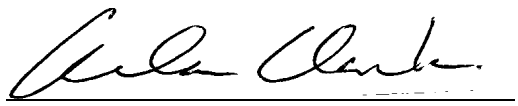
Dear Mr. Bisaga:

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. Please note that site documentation findings are repeat findings from the previous 2010 audit and must be addressed. AEW will require the site documentation for the sites noted indicating the findings have been addressed before the audit will be considered closed. Please refer to the AMD for the complete list of requirements.

Please review all documentation and address the issues noted by April 27, 2012, in writing indicating what corrective actions that will or have been taken. If you have any questions, please contact the undersigned at 780-427-7888.

Yours truly,



Al Clark
Monitoring Systems Auditor
Environmental Assurance

Attachment(s): Audit Summary Report

cc: Pat Marriot: District Approvals Manager
Jeff Toering: District Compliance Manager
Marilyn Albert: Air Quality Data Supervisor
Janine Ross: Ambient Air Specialist

Audit Summary

Facility / Zone	Lica
Total # of parameters that passed	22
Total # of parameters audited in the network	22
Date(s) of the audit	March 13-16, 2012
Issue Date of Audit Summary	March 21, 2012

Station Name	St Lina		
Auditor	Al Clark		
Audit Date	March 13, 2012		
Critical	**Pass**	**Fail**	
H_2S	√		
SO_2	√		
TRS			
NO / NO_2 / NO_X	√		
O_3	√		
THC	√		
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		**X**	Needs review / or missing

Not monitored at this location

Audit Summary

Facility / Zone	Lica
Total # of parameters that passed	22
Total # of parameters audited in the network	22
Date(s) of the audit	March 13-16, 2012
Issue Date of Audit Summary	March 21, 2012

Station Name	Elk Point Airport		
Auditor	Al Clark		
Audit Date	March 14, 2012		
Critical	**Pass**	**Fail**	
H_2S	√		
SO_2	√		
TRS			
NO / NO_2 / NO_X	√		
O_3	√		
THC	√		
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		**X**	Needs review / or missing

Not monitored at this location

Audit Summary

Facility / Zone	Lica
Total # of parameters that passed	22
Total # of parameters audited in the network	22
Date(s) of the audit	March 13-16, 2012
Issue Date of Audit Summary	March 21, 2012

Station Name	Cold Lake South		
Auditor	Al Clark		
Audit Date	March 15, 2012		
Critical	**Pass**		**Fail**
H_2S			
SO_2	√		
TRS	√		
NO / NO_2 / NO_X	√		
O_3	√		
THC	√		
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	22
Total # of parameters audited in the network	22
Date(s) of the audit	March 13-16, 2012
Issue Date of Audit Summary	March 21, 2012

Station Name	Maskwa		
Auditor	Al Clark		
Audit Date	March 16, 2012		
Critical	**Pass**	**Fail**	
H_2S	√		
SO_2	√		
TRS			
NO / NO_2 / NO_X	√		
O_3			
THC	√		
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. 2012 - 456A / 461A

Date: March 15, 2012 Performed by: Al Clark

Station

Name: Cold Lake Location: Cold Lake South

Facility/Zone: Lica Operator: Maxxam

Temp: 23.5 C Barometric Press: 706 mm/hg

Location

Latitude N 54˚ 24' 50.9"
Longitude W 110˚ 13' 58.3"
Elevation 528 m
Status of Site Documentation On site - OK

Manifold Material Glass
Manifold Condition Good

Meteorological

	Observed	Audit Value
Wind Speed Direction	7 kph / 155 deg	5-10 kph / NE
Station Temperature	23.4 C	23.6 C
Relative Humidity	40.1 %	38.4 %
Ambient Temperature	4.8 C	5.8 C
BP	N/A	N/A
Precipitation	N/A	N/A

Remarks:

There is an operational API 701 zero air supply sitting on the back bench. As a result of this placement of this unit the counter top is being damaged and there is significant amount of black stains from the unit. These stains could also contain mould due to the moisture being exhausted from the unit. This unit must be rack mounted to prevent further damage. Care must be taken to reduce vibrations so other instruments are not affected by the installation.

SO_2 ANALYZER AUDIT

File No. 2012 - 456A

Date: March 15, 2012 Performed by: Al Clark

Station

Name: Cold Lake Location: Cold Lake South

Facility/Zone: Lica Operator: Maxxam

Temp: 21.5 C Barometric Press: 706 mm/hg

Monitor

Make/Model: Teco 43i Serial No: 0806528242

Inlet flow (sccm): 350 Full Scale Range ppm: 0.5

Last cal. Date: Feb 24/12 Old C.F. 0.9975

Zero/Bkg 13.8

Span Coef 1.334

Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201 AMU # : 1691

Cylinder # : CLM004813 SO_2 Concentration PPM: 50.4

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5107	0.0	5107	0.000	0.000		
5115	38.5	5153	0.377	0.373	-1%	± 15%
5132	17.5	5149	0.171	0.165	-4%	± 15%
5095	8.3	5103	0.082	0.081	-1%	± 15%
			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)=	0.9899	**0.85-1.15**
b (Intercept as % of full scale)=	-0.2241	**± 3% F.S.**

Remarks:

TRS ANALYZER AUDIT

File No. 2012 - 457A

Date: March 15, 2012 Performed by: Al Clark

Station

Name: Cold Lake Location: Cold Lake South

Facility/Zone: Lica Operator: Maxxam

Temp: 21.5 C Barometric Press: 706 mm/hg

Monitor

Make/Model: Teco 450i Serial No: 0812728560

Inlet flow (sccm): 350 Full Scale Range ppm: 0.1

Last cal. Date: Feb 24/12 Old C.F. 0.9989

Zero/Bkg 13.8

Span Coef 1.334

Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201 AMU # : 1691

Cylinder # : CAL011014 H_2S Concentration PPM: 9.4

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5107	0.0	5107	0.000	0.000		
5115	38.4	5153	0.070	0.074	6%	± 15%
5131	17.8	5149	0.032	0.035	8%	± 15%
5094	9.0	5103	0.017	0.018	9%	± 15%
			Absolute Average Percent Difference		7%	

Linear Regression Analysis:

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

		LIMITS
Correlation Coeff.=	0.9999	**≥ 0.995**
m (Slope)=	1.0547	**0.85-1.15**
b (Intercept as % of full scale)=	0.3403	**± 3% F.S.**

Remarks:

Alberta
Freedom To Create. Spirit To Achieve.

HC ANALYZER AUDIT

File No. 2012 - 458A

Date: March 15, 2012 Performed by: Al Clark

Station

Name: Cold Lake Location: Cold Lake South

Facility/Zone: Lica Operator: Maxxam

Temp: 23.5 C Barometric Press: 706 mm/hg

Monitor

Make/Model: Teco 51CLT Serial No: 0427408718

Inlet flow (sccm): 6.50 psi Full Scale Range ppm: 50.0

Last cal. Date: Feb 24/12 Old C.F. 0.9954

Calibrator

Calibration Method: Gas Dilution

Make/Model: Sabio 2010 AMU # : 1778

HC cylinder # : SG090044A HC concentration ppm: 1057

Calibrator Flow (sccm)			Calculated Conc.	Indicated Concentration	% Difference	
Air	Gas	Total	(ppm)	(ppm)	vs Audit Gas	Limits
2976	0.0	2976	0.0	0.6		
2983	82.6	3066	28.5	26.9	-8%	± 15%
2958	40.5	2998	14.3	13.7	-8%	± 15%
2984	20.0	3004	7.0	7.2	-6%	± 15%
				Absolute Average Percent Difference	7%	

Linear Regression Analysis:

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

		LIMITS
Correlation Coeff.=	1.0000	**≥ 0.995**
m (Slope)=	0.9220	**0.85-1.15**
b (Intercept as % of full scale)=	1.2459	**± 3% F.S.**

Remarks:

NO-NOx-NO2 Analyzer Audit

File No. 2012 - 459A

Date: March 15, 2012 Performed by: Al Clark

Station: Name: Cold Lake Location: Cold Lake South Operator: Maxxam
Facility/Zone: Lica Temp. 23.5 C BP: 706 mm/hg

Monitor: Make/Model: Teco 42C Serial No. 0427408716
Inlet flow (sccm): 728/727 Range ppm: 0.5
Last cal. Date: Mar 7/12 Old C.F.'s NO: 0.999
NOx: 1.000
NO2: 1.000

NO Bkg 3.5
NOx Bkg 3.7
NO Coef 0.888
NOx Coef 1.007
NO2 Coef 0.998

Calibration Method: Gas Dilution / GPT
Calibrator: Make/Model: Sabio 2010 AMU# 1749
NO cylinder # CLM006307 NO conc. ppm 49.5 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
4938	0.0	4938	0.000	0.000	0.000	0.000	Limit ± 15%	
4942	40.0	4982	0.397	0.409	0.375	0.390	-6%	-5%
4964	19.8	4984	0.197	0.202	0.186	0.196	-5%	-3%
4945	9.9	4955	0.099	0.102	0.092	0.099	-7%	-3%
						Absolute Average Percent Difference	6%	3%

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

	NO	NOx	NO_2	LIMITS
Correlation Coeff.=	1.0000	1.0000	1.0000	**≥ 0.995**
m (Slope)=	0.9448	0.9535	1.0056	**0.85-1.15**
b (Intercept as % of full scale)=	-0.0870	0.2785	-0.2521	**± 3% F.S.**

O_3 Setting	Flow Rate	Indicated Conc. (ppm) NO	NOx	NO_2	NO Decrease	NO_2 Increase	% Difference vs Audit Gas	
0.000 V	4982	0.379	0.391	0.012				%Dif Limit
0.760 V	4982	0.124	0.391	0.267	0.255	0.255	0%	± 15%
0.444 V	4982	0.214	0.390	0.177	0.165	0.165	0%	± 15%
0.280 V	4982	0.302	0.390	0.088	0.077	0.076	-1%	± 15%
						Absolute Average Percent Difference	0%	

Converter Efficiency
Average Converter Efficiency 99.6%

Remarks:

O_3 ANALYZER AUDIT

File No. 2012 - 460A

Date: March 15, 2012 Performed by: Al Clark

Station

Name: Cold Lake Location: Cold Lake South

Facility/Zone: Lica Operator: Maxxam

Temp: 23.5 C Barometric Press: 706 mm/hg

Monitor

Make/Model: Teco 49i Serial No: 0700419951

Inlet flow (sccm): 698 / 736 Full Scale Range ppm: 0.5

Last cal. Date: Feb 24/12 Old C.F. 1.0025

Zero/Bkg -0.1

Span Coeff. 1.004

Calibrator

Calibration Method: Generator

Make/Model: Sabio 2010 AMU # : 1749

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

Ozone Setting	Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Conc. (ppm)	% Difference vs Audit Gas	% Difference Limits
	Air	Gas	Total				
0.000 V	4953		4953	0.000	0.000		
0.760 V	4953		4953	0.401	0.387	-3%	± 15%
0.444 V	4953		4953	0.201	0.195	-3%	± 15%
0.280 V	4953		4953	0.098	0.097	-1%	± 15%
				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)=	0.9633	**0.85-1.15**
b (Intercept as % of full scale)=	0.2354	**± 3% F.S.**

Remarks:

TEOM AUDIT

File #: 2012 - 461A
Date: March 15, 2012 Performed by: Al Clark

Station

Name:	Cold Lake	Location:	Cold Lake South
Facility/Zone:	Lica	Operator:	Maxxam
Temperature:	-1.6	Barometric Press.	706 mm/hg

Audit Transfer Standard

Make/Model:	DeltaCal	Cell s/n:	1002
Serial Number:	1858		

Sampler Set-up and Current Readings

Make/Model	Teom 1405-F	F-Main Set Pt (l/min)	3.00
Unit #	PM2.5	F-Aux Set Pt (l/min)	13.67
Control unit s/n	1405A2016208814	Filter Load (%)	30
Transducer s/n	1405A2016208814	K_O Factor	14578
		Temp (°C)	-1.6
		Press (ATM)	0.921

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

ATM = (mm Hg) X (1.316×10^{-3}) or ATM = ("Hg) X (3.34207×10^{-2})

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

Zero Flow

Pump Off		Pump On (Time to reach set points)	
F-Main (l/min)	N/A	**(45-60 Sec)**	N/A
F-Aux (l/min)	N/A	**(45-60 Sec)**	N/A

Temperature/Pressure

Measured Temp **(± 2 °C)**	-0.9	**Δ°C**	0.7
Measured Press **(± 1.5% ATM)**	0.929	**Δ% ATM**	0.87%

Flow Audit

			Δ% of Measured Flow from Set-point		
Indicated Main/Aux Flow (l/min)	3.00	13.66	**(± 2%)**	0.0%	-0.1%
Total Flow = Main + Aux (l/min)	16.66		**(± 2%)**	-0.1%	
			Δ of Measured Flow from Indicated		
Measured Total Flow (l/min)	17.05		**(± 1.00 l/min)**	0.39	
Measured Main Flow (l/min)	3.02		**(± 0.20 l/min.)**	0.02	

Leak Check

		Actual leakage = Pump On – Pump Off
Base **(< 0.15 l/min)**	Pass	0.07
Ref **(< 0.65 l/min)**	Pass	0.28

K_O Factor

Measured	14535
K_O % Difference **(± 2.5%)**	0.29

Remarks:

Heads clean.

Station Performance Audit Summary

Company: Lica Facility Name: Cold Lake

Approval No.: N/A Site Name: Cold Lake

AENV Region: Northern AENV District: North East

Parameters audited:

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

GENERAL	*YES*	*NO*	*N/A*
Has the location remained unchanged from previous audit?	X		
Is site secure?	X		
Are station operating conditions adequate?	X		
DATA ACQUISITION			
Are strip charts in use?		X	
Is a telemetry system for data acquisition in use?	X		
SYSTEM COMPONENTS			
Is a glass sampling manifold installed?	X		
Is sampling manifold clean?	X		
Is a manifold trap in place?	X		
Are spare manifold ports capped	X		
Is manifold oriented so it is not exactly horizontal?	X		
Are manifold ports situated to prevent water entering monitors?	X		
Is manifold pump properly installed and operative?	X		
Do sample lines extend at least 3/4"into manifold?	X		
Are monitor sampling lines connected to manifold?	X		
Are sampling lines clean?	X		
Are monitors properly mounted and secure?	X		
Are monitors properly exhausted from room or scrubbed?	X		
Are zero and span systems operational?	X		
WIND EQUIPMENT			
Is wind sensor properly oriented?	X		
Does wind equipment appear to be functioning properly?	X		
Date of last calibration. Date: Nov 23/10			

COMMENTS: Wind Head calibration is required in 2012 as per the AMD.

AUDITOR: Al Clark *DATE:* March 15, 2012

STATION AUDIT

File No. 2012 - 450A / 455A

Date: March 14, 2012 Performed by: Al Clark

Station

Name: Elk Point Location: Elk Point Airport

Facility/Zone: Lica Operator: Maxxam

Temp: 21.0 C Barometric Press: 700 mm/hg

Location

Latitude N N/A
Longitude W N/A
Elevation N/A
Status of Site Documentation Not on site

Manifold Material Glass
Manifold Condition Good

Meteorological

	Observed	Audit Value
Wind Speed Direction	25 kph / 295deg	25-30 kph / W
Station Temperature	23.6 C	24.4 C
Relative Humidity	N/A	N/A
Ambient Temperature	N/A	N/A
BP	N/A	N/A
Precipitation	N/A	N/A

Remarks:

SO_2 ANALYZER AUDIT

File No. 2012 - 450A

Date: March 14, 2012 Performed by: Al Clark

Station

Name: Elk Point Location: Elk Point Airport

Facility/Zone: Lica Operator: Maxxam

Temp. 19.5 C Barometric Press. 700 mm/hg

Monitor

Make/Model: API 100E Serial No: 467

Inlet flow (sccm): 584 Full Scale Range ppm: 1.0

Last cal. Date: Mar 8/12 Old C.F. 0.9928

Zero/Bkg 91.5

Span Coef 1.041

Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201 AMU # : 1691

Cylinder # : CLM004813 SO_2 Concentration PPM: 50.4

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5080	0.0	5080	0.000	0.002		
5092	52.4	5144	0.513	0.498	-3%	± 15%
5107	22.3	5129	0.219	0.219	-1%	± 15%
5079	8.2	5087	0.081	0.082	-2%	± 15%
				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)=	0.9654	**0.85-1.15**
b (Intercept as % of full scale)=	0.3838	**± 3% F.S.**

Remarks:

H_2S ANALYZER AUDIT

File No. 2012 - 451A

Date: March 14, 2012 Performed by: Al Clark

Station

Name: Elk Point Location: Elk Point Airport

Facility/Zone: Lica Operator: Maxxam

Temp. 19.5 C Barometric Press. 700 mm/hg

Monitor

Make/Model: API 101E Serial No: 509

Inlet flow (sccm): 516 Full Scale Range ppm: 0.1

Last cal. Date: Mar 7/12 Old C.F. 1.0000

Zero/Bkg 71.5

Span Coef 1.012

Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201 AMU # : 1691

Cylinder # : CAL011014 H_2S Concentration PPM: 9.4

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
					vs Audit Gas	
Air	Gas	Total				Limits
5080	0.0	5080	0.000	0.001		
5105	38.6	5144	0.071	0.076	6%	± 15%
5111	17.7	5129	0.032	0.037	11%	± 15%
5078	9.0	5087	0.017	0.020	14%	± 15%
				Absolute Average Percent Difference	11%	

Linear Regression Analysis:

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

		LIMITS
Correlation Coeff.=	0.9997	**≥ 0.995**
m (Slope)=	1.0583	**0.85-1.15**
b (Intercept as % of full scale)=	1.8559	**± 3% F.S.**

Remarks:

HC ANALYZER AUDIT

File No. 2012 - 452A

Date: March 14, 2012 Performed by: Al Clark

Station

Name: Elk Point Location: Elk Point Airport

Facility/Zone: Lica Operator: Maxxam

Temp. 25.0 C Barometric Press. 699 mm/hg

Monitor

Make/Model: Teco 51CLT Serial No: 0436609739

Inlet flow (sccm): 6.80 psi Full Scale Range ppm: 50.0

Last cal. Date: Mar 7/12 Old C.F. 0.9930

Calibrator

Calibration Method: Gas Dilution

Make/Model: Sabio 2010 AMU # : 1778

HC cylinder # : SG090044A HC concentration ppm: 1057

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference vs Audit Gas	% Difference Limits
Air	Gas	Total				
2960	0.0	2960	0.0	0.3		
2975	82.6	3058	28.6	25.5	-12%	± 15%
2964	41.3	3005	14.5	12.9	-13%	± 15%
2977	20.2	2997	7.1	6.6	-12%	± 15%
				Absolute Average Percent Difference	12%	

Linear Regression Analysis:

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

		LIMITS
Correlation Coeff.=	0.9999	**≥ 0.995**
m (Slope)=	0.8815	**0.85-1.15**
b (Intercept as % of full scale)=	0.5231	**± 3% F.S.**

Remarks:

NO-NOx-NO2 Analyzer Audit

File No. 2012 - 453A

Date: March 14, 2012 Performed by: Al Clark

Station: Name: Elk Point Location: Elk Point Airport Operator: Maxxam
Facility/Zone: Lica Temp. 21.0 C BP: 700 mm/hg

Monitor: Make/Model: API 200E Serial No. 593
Inlet flow (sccm): 466 Range ppm: 1.0
Last cal. Date: Mar 7/12 Old C.F.'s NO: 1.0000
NOx: 1.0000
NO2: 1.0057

NO Bkg 0.4
NOx Bkg 0.7
NO Coef 1.057
NOx Coef 1.069
NO2 Coef N/A

Calibration Method: Gas Dilution / GPT
Calibrator: Make/Model: Sabio 2010 AMU# 1749
NO cylinder # CLM006307 NO conc. ppm 49.5 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
4948	0.0	4948	0.000	0.000	0.000	0.000	Limit ± 15%	
4943	81.8	5025	0.806	0.829	0.746	0.760	-7%	-8%
4976	40.7	5017	0.402	0.413	0.376	0.382	-6%	-7%
4971	19.7	4991	0.195	0.201	0.189	0.193	-3%	-4%
						Absolute Average Percent Difference	6%	7%

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)=	0.9229	0.9140	0.9869	**0.85-1.15**
b (Intercept as % of full scale)=	0.4114	0.4163	0.7446	**± 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	5025	0.754	0.761	0.007				%Dif Limit
0.760 V	5025	0.386	0.763	0.378	0.368	0.371	1%	± 15%
0.444 V	5025	0.569	0.765	0.196	0.185	0.189	2%	± 15%
0.280 V	5025	0.669	0.768	0.099	0.085	0.092	8%	± 15%
						Absolute Average Percent Difference	4%	

Converter Efficiency

Average Converter Efficiency 103.7%

Remarks:

O_3 ANALYZER AUDIT

File No. 2012 - 454A

Date: March 14, 2012 Performed by: Al Clark

Station

Name: Elk Point Location: Elk Point Airport

Facility/Zone: Lica Operator: Maxxam

Temp. 25.0 C Barometric Press. 700 mm/hg

Monitor

Make/Model: Teco 49i Serial No: 1002240372

Inlet flow (sccm): 751 / 756 Full Scale Range ppm: 0.5

Last cal. Date: Mar 8/12 Old C.F. 1.0191

Zero/Bkg -0.0

Span Coeff. 0.974

Calibrator

Calibration Method: Generator

Make/Model: Sabio 2010 AMU # : 1749

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

Ozone Setting	Calibrator Flow (sccm) Air	Gas	Total	Calculated Conc. (ppm)	Indicated Conc. (ppm)	% Difference vs Audit Gas	% Difference Limits
0.000 V	4952		4952	0.000	0.000		
0.760 V	4952		4952	0.401	0.375	-6%	± 15%
0.444 V	4952		4952	0.201	0.188	-6%	± 15%
0.280 V	4952		4952	0.098	0.092	-6%	± 15%
				Absolute Average Percent Difference		6%	

Linear Regression Analysis:

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

		LIMITS
Correlation Coeff.=	1.0000	**≥ 0.995**
m (Slope)=	0.9349	**0.85-1.15**
b (Intercept as % of full scale)=	0.0298	**± 3% F.S.**

Remarks:

Alberta
Freedom To Create. Spirit To Achieve.

TEOM AUDIT

File #: 2012 - 455A
Date: March 14, 2012 Performed by: Al Clark

Station

Name:	Elk Point	Location:	Elk Point Airport
Facility/Zone:	Lica	Operator:	Maxxam
Temperature:	-1.0	Barometric Press.	700 mm/hg

Audit Transfer Standard

Make/Model:	DeltaCal	Cell s/n:	1002
Serial Number:	1858		

Sampler Set-up and Current Readings

		F-Main Set Pt (l/min)	3.00
Make/Model	Teom 1405-F	F-Aux Set Pt (l/min)	13.67
Unit #	PM2.5	Filter Load (%)	27.3
Control unit s/n	1405A208301003	K_O Factor	13125
Transducer s/n	1405A208301003	Temp (°C)	-0.9
		Press (ATM)	0.92

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

ATM = (mm Hg) X (1.316×10^{-3}) or ATM = ("Hg) X (3.34207×10^{-2})

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

Zero Flow

Pump Off		Pump On (Time to reach set points)	
F-Main (l/min)	N/A	**(45-60 Sec)**	N/A
F-Aux (l/min)	N/A	**(45-60 Sec)**	N/A

Temperature/Pressure

Measured Temp **(± 2 °C)**	-1.0	**Δ°C**	0.10
Measured Press **(± 1.5% ATM)**	0.921	**Δ% ATM**	0.11%

Flow Audit

			Δ% of Measured Flow from Set-point		
Indicated Main/Aux Flow (l/min)	3.00	13.66	**(± 2%)**	0.0%	-0.1%
Total Flow = Main + Aux (l/min)	16.66		**(± 2%)**	-0.1%	
			Δ of Measured Flow from Indicated		
Measured Total Flow (l/min)	17.15		**(± 1.00 l/min)**	0.49	
Measured Main Flow (l/min)	3.05		**(± 0.20 l/min.)**	0.05	

Leak Check

		Actual leakage = Pump On – Pump Off
Base **(< 0.15 l/min)**	Pass	-0.02
Ref **(< 0.65 l/min)**	Pass	-0.03

K_O Factor

Measured	12896
K_O % Difference **(± 2.5%)**	1.74

Remarks:

Heads clean.

Station Performance Audit Summary

Company: Lica Facility Name: Elk Point

Approval No.: N/A Site Name: Elk Point Airport

AENV Region: Northern AENV District: North East

Parameters audited:

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

	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: Nov 24/11			

COMMENTS: _____

AUDITOR: Al Clark *DATE:* March 14, 2012

Alberta
Freedom To Create. Spirit To Achieve.

STATION AUDIT

File No. 2012 - 462A / 465A

Date: March 16, 2012 Performed by: Al Clark

Station

Name: Maskwa Location: IOL Cold Lake

Facility/Zone: Lica Operator: Maxxam

Temp: 20.0 C Barometric Press: 692 mm/hg

Location

Latitude N 54˚ 36' 18.5"
Longitude W 110˚ 27' 10.3"
Elevation 606m
Status of Site Documentation On site - OK

Manifold Material Glass
Manifold Condition Good

Meteorological

	Observed	Audit Value
Wind Speed Direction	5.8 kph / 208 deg	5-10 kph / S
Station Temperature	21.6 C	21.3 C
Relative Humidity	42.9 %	38.5 %
Ambient Temperature	10.8 C	11.1 C
BP	0.921	0.911
Precipitation	1.1 mils	11 tips

Remarks:

SO_2 ANALYZER AUDIT

File No. 2012 - 462A

Date: March 16, 2012 Performed by: Al Clark

Station

Name: Maskwa Location: IOL Cold Lake

Facility/Zone: Lica Operator: Maxxam

Temp. 19.0 C Barometric Press. 692 mm/hg

Monitor

Make/Model: API 100E Serial No: 508

Inlet flow (sccm): 584 Full Scale Range ppm: 1.0

Last cal. Date: Feb15/12 Old C.F. 1.0046

Zero/Bkg 40.2

Span Coef 1.254

Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201 AMU # : 1691

Cylinder # : CLM004813 SO_2 Concentration PPM: 50.4

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5089	0.0	5089	0.000	0.002		
5101	52.7	5154	0.515	0.502	-3%	± 15%
5114	22.2	5136	0.218	0.219	0%	± 15%
5084	8.2	5092	0.081	0.082	-1%	± 15%
			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)=	0.9698	**0.85-1.15**
b (Intercept as % of full scale)=	0.3819	**± 3% F.S.**

Remarks:

H_2S ANALYZER AUDIT

File No. 2012 - 463A

Date: March 16, 2012 Performed by: Al Clark

Station

Name: Maskwa Location: IOL Cold Lake

Facility/Zone: Lica Operator: Maxxam

Temp. 19.0 C Barometric Press. 692 mm/hg

Monitor

Make/Model: API 101E Serial No: 511

Inlet flow (sccm): 467 Full Scale Range ppm: 0.1

Last cal. Date: Feb 15/12 Old C.F. 0.9927

Zero/Bkg 35.7

Span Coef 0.834

Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201 AMU # : 1691

Cylinder # : CAL011014 H_2S Concentration PPM: 9.4

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5089	0.0	5089	0.000	0.001		
5116	38.5	5154	0.070	0.077	8%	± 15%
5118	17.8	5136	0.033	0.036	7%	± 15%
5083	9.0	5092	0.017	0.019	8%	± 15%
				Absolute Average Percent Difference	8%	

Linear Regression Analysis:

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

		LIMITS
Correlation Coeff.=	1.0000	**≥ 0.995**
m (Slope)=	1.0820	**0.85-1.15**
b (Intercept as % of full scale)=	0.9496	**± 3% F.S.**

Remarks:

HC ANALYZER AUDIT

File No. 2012 - 464A

Date: March 16, 2012 Performed by: Al Clark

Station

Name: Maskwa Location: IOL Cold Lake

Facility/Zone: Lica Operator: Maxxam

Temp. 22.0C Barometric Press. 691 mm/hg

Monitor

Make/Model: Teco 51CLT Serial No: 0436609738

Inlet flow (sccm): 7.50 psi Full Scale Range ppm: 50.0

Last cal. Date: Feb 15/12 Old C.F. 0.9954

Calibrator

Calibration Method: Gas Dilution

Make/Model: Sabio 2010 AMU # : 1778

HC cylinder # : SG090044A HC concentration ppm: 1057

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference vs Audit Gas	% Difference Limits
Air	Gas	Total				
2986	0.0	2986	0.0	0.1		
3001	82.3	3083	28.2	26.1	-8%	± 15%
2989	41.0	3030	14.3	13.2	-8%	± 15%
3005	20.1	3025	7.0	6.6	-7%	± 15%
				Absolute Average Percent Difference	8%	

Linear Regression Analysis:

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

		LIMITS
Correlation Coeff.=	1.0000	**≥ 0.995**
m (Slope)=	0.9208	**0.85-1.15**
b (Intercept as % of full scale)=	0.1918	**± 3% F.S.**

Remarks:

NO-NOx-NO2 Analyzer Audit

File No. 2012 - 465A

Date: March 16, 2012 Performed by: Al Clark

Station: Name: Maskwa Location: IOL Cold Lake Operator: Maxxam
Facility/Zone: Lica Temp. 20.0 C BP: 692 mm/hg

Monitor: Make/Model: API 200E Serial No. 594
Inlet flow (sccm): 451 Range ppm: 1.0
Last cal. Date: Feb 15/12 Old C.F.'s NO: 0.998
NOx: 1.000
NO2: 1.001

NO Bkg 0.8
NOx Bkg 0.9
NO Coef 1.196
NOx Coef 1.205
NO2 Coef N/A

Calibration Method: Gas Dilution / GPT
Calibrator: Make/Model: Sabio 2010 AMU# 1749
NO cylinder # CLM006307 NO conc. ppm 49.5 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
4914	0.0	4914	0.000	0.000	0.001	0.001	Limit ± 15%	
4926	81.8	5008	0.809	0.831	0.757	0.768	-6%	-8%
4945	40.7	4986	0.404	0.415	0.381	0.386	-6%	-7%
4955	19.7	4975	0.196	0.202	0.191	0.195	-3%	-4%
						Absolute Average Percent Difference	5%	6%

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

	NO	NOx	NO_2	LIMITS
Correlation Coeff.=	1.0000	0.9999	1.0000	**≥ 0.995**
m (Slope)=	0.9324	0.9194	0.9953	**0.85-1.15**
b (Intercept as % of full scale)=	0.4146	0.4584	-0.0019	**± 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	5008	0.758	0.768	0.011				%Dif Limit
0.760 V	5008	0.397	0.765	0.370	0.361	0.359	-1%	± 15%
0.444 V	5008	0.577	0.768	0.192	0.181	0.181	0%	± 15%
0.280 V	5008	0.670	0.767	0.098	0.088	0.087	-1%	± 15%
						Absolute Average Percent Difference	-1%	

Converter Efficiency
Average Converter Efficiency 99.4%

Remarks:

Station Performance Audit Summary

Company: Lica Facility Name: IOL Cold Lake

Approval No.: N/A Site Name: Maskwa

AENV Region: Northern AENV District: North East

Parameters audited:

H_2S	X	SO_2	X	NO_X	X	NH_3		O_3	
CO		CH_4		NonCH4		THC	X	Ethylene	
$PM_{2.5}$		PM_{10}		TSP		BTEX		Wind Speed	X
Wind Dir	X	Amb. Temp	X	Stn.Temp	X	RH	X	Solar Radiation	
Rainfall	X	Precip		VWS		BP	X		
All parameters monitored as per approval: Yes_____ 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: Dec 20/11			

COMMENTS: _____

AUDITOR: Al Clark *DATE:* March 16, 2012

Alberta
Freedom To Create. Spirit To Achieve.

STATION AUDIT

File No. 2012 - 444A / 449A

Date: March 13, 2012 Performed by: Al Clark

Station

Name: St Lina Location: St Lina

Facility/Zone: Lica Operator: Maxxam

Temp: 21.0 C Barometric Press: 678 mm/hg

Location

Latitude N 56˚ 12' 59.3"
Longitude W 111˚ 30' 09.5"
Elevation 690 m
Status of Site Documentation On site - WR needs updating

Manifold Material Glass
Manifold Condition Good

Meteorological

	Observed	Audit Value
Wind Speed Direction	13 kph / 276 deg	10-15 kph / SW
Station Temperature	21.6	19.6
Relative Humidity	56%	57%
Ambient Temperature	7.8	7.2
BP	899	892
Precipitation	1.0 mil	10 tips

Remarks:
Site documentation finding was noted in 2010 audit. Please rectify.

SO_2 ANALYZER AUDIT

File No. 2012 - 444A

Date: March 13, 2012 Performed by: Al Clark

Station

Name: St Lina Location: St Lina

Facility/Zone: Lica Operator: Maxxam

Temp. 19.5 C Barometric Press. 679 mm/hg

Monitor

Make/Model: API 100E Serial No: 468

Inlet flow (sccm): 506 Full Scale Range ppm: 1.0

Last cal. Date: Mar 6/12 Old C.F. 1.0013

Zero/Bkg 80.6

Span Coef 1.048

Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201 AMU # : 1691

Cylinder # : CLM004813 SO_2 Concentration PPM: 50.4

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5078	0.0	5078	0.000	0.002		
5087	52.2	5139	0.512	0.505	-2%	± 15%
5107	22.1	5129	0.217	0.222	1%	± 15%
5074	8.1	5082	0.080	0.083	1%	± 15%
			Absolute Average Percent Difference		0%	

Linear Regression Analysis:

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

		LIMITS
Correlation Coeff.=	0.9999	**≥ 0.995**
m (Slope)=	0.9815	**0.85-1.15**
b (Intercept as % of full scale)=	0.4382	**± 3% F.S.**

Remarks:

H_2S ANALYZER AUDIT

File No. 2012 - 445A

Date: March 13, 2012 Performed by: Al Clark

Station

Name: St Lina Location: St Lina

Facility/Zone: Lica Operator: Maxxam

Temp. 19.5 C Barometric Press. 679 mm/hg

Monitor

Make/Model: API 101E Serial No: 510

Inlet flow (sccm): 520 Full Scale Range ppm: 0.1

Last cal. Date: Mar 5/12 Old C.F. 1.0000

Zero/Bkg 77.4

Span Coef 1.035

Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201 AMU # : 1691

Cylinder # : CAL011014 H_2S Concentration PPM: 9.4

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5078	0.0	5078	0.000	0.002		
5101	38.3	5139	0.070	0.077	7%	± 15%
5112	17.5	5129	0.032	0.037	9%	± 15%
5073	8.9	5082	0.016	0.020	9%	± 15%
			Absolute Average Percent Difference		9%	

Linear Regression Analysis:

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

		LIMITS
Correlation Coeff.=	0.9999	**≥ 0.995**
m (Slope)=	1.0693	**0.85-1.15**
b (Intercept as % of full scale)=	2.2971	**± 3% F.S.**

Remarks:

HC ANALYZER AUDIT

File No. 2012 - 446A

Date: March 13, 2012 Performed by: Al Clark

Station

Name: St Lina Location: St Lina

Facility/Zone: Lica Operator: Maxxam

Temp. 21.0 C Barometric Press. 678 mm/hg

Monitor

Make/Model: Teco 51CLT Serial No: 51CTL-77021-384

Inlet flow (sccm): 6.90 psi Full Scale Range ppm: 50.0

Last cal. Date: Mar 6/12 Old C.F. 0.9978

Calibrator

Calibration Method: Gas Dilution

Make/Model: Sabio 2010 AMU # : 1778

HC cylinder # : SG090044A HC concentration ppm: 1057

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference vs Audit Gas	% Difference Limits
Air	Gas	Total				
2985	0.0	2985	0.0	0.1		
2987	79.5	3066	27.4	26.4	-4%	± 15%
2989	40.2	3029	14.0	13.3	-6%	± 15%
2989	20.3	3009	7.1	6.7	-7%	± 15%
				Absolute Average Percent Difference	6%	

Linear Regression Analysis:

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

		LIMITS
Correlation Coeff.=	0.9999	**≥ 0.995**
m (Slope)=	0.9614	**0.85-1.15**
b (Intercept as % of full scale)=	-0.0950	**± 3% F.S.**

Remarks:

NO-NOx-NO2 Analyzer Audit

File No. 2012 - 447A

Date: March 13, 2012 Performed by: Al Clark

Station: Name: St Lina Location: St Lina Operator: Maxxam
Facility/Zone: Lica Temp. 21.0 C BP: 678 mm/hg

Monitor: Make/Model: API 200E Serial No. 592
Inlet flow (sccm): 466 Range ppm: 1.0
Last cal. Date: Mar 5/12 Old C.F.'s NO: 1.0023
NOx: 0.9977
NO2: 1.0000

NO Bkg 0.2
NOx Bkg 1.5
NO Coef 1.266
NOx Coef 1.289
NO2 Coef N/A

Calibration Method: Gas Dilution / GPT
Calibrator: Make/Model: Sabio 2010 AMU# 1749
NO cylinder # CLM006307 NO conc. ppm 49.5 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
4920	0.0	4920	0.000	0.000	0.001	0.001	Limit ± 15%	
4935	80.7	5016	0.796	0.819	0.753	0.768	-6%	-6%
4956	40.6	4997	0.402	0.414	0.377	0.388	-7%	-6%
4963	19.8	4983	0.197	0.202	0.189	0.195	-4%	-4%
						Absolute Average Percent Difference	6%	6%

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)=	0.9427	0.9346	1.0033	**0.85-1.15**
b (Intercept as % of full scale)=	0.1174	0.2771	0.4021	**± 3% F.S.**

O_3 Setting	Flow Rate	Indicated Conc. (ppm) NO	NOx	NO_2	NO Decrease	NO_2 Increase	% Difference vs Audit Gas	
0.0 V	5016	0.753	0.769	0.016				%Dif Limit
0.760 V	5016	0.417	0.774	0.357	0.336	0.341	1%	± 15%
0.444 V	5016	0.588	0.773	0.186	0.165	0.170	3%	± 15%
0.280 V	5016	0.674	0.771	0.099	0.079	0.083	5%	± 15%
						Absolute Average Percent Difference	3%	

Converter Efficiency
Average Converter Efficiency 103.2%

Remarks:

O_3 ANALYZER AUDIT

File No. 2012 - 448A

Date: March 13, 2012 Performed by: Al Clark

Station

Name: St Lina Location: St Lina

Facility/Zone: Lica Operator: Maxxam

Temp. 19.5 C Barometric Press. 678 mm/hg

Monitor

Make/Model: Teco 49 C Serial No: 49C-5492-302

Inlet flow (sccm): 821/839 Full Scale Range ppm: 0.5

Last cal. Date: Mar 5/12 Old C.F. 1.0025

Zero/Bkg 0.1

Span Coeff. 0.976

Calibrator

Calibration Method: Generator

Make/Model: Sabio 2010 AMU # : 1749

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

Ozone Setting	Calibrator Flow (sccm) Air	Gas	Total	Calculated Conc. (ppm)	Indicated Conc. (ppm)	% Difference vs Audit Gas	Limits
0.000 V	4960		4960	0.000	0.000		
0.760 V	4960		4960	0.400	0.351	-12%	± 15%
0.444 V	4960		4960	0.201	0.177	-12%	± 15%
0.280 V	4960		4960	0.098	0.088	-10%	± 15%
				Absolute Average Percent Difference		11%	

Linear Regression Analysis:

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

		LIMITS
Correlation Coeff.=	1.0000	**≥ 0.995**
m (Slope)=	0.8759	**0.85-1.15**
b (Intercept as % of full scale)=	0.1861	**± 3% F.S.**

Remarks:

Alberta
Freedom To Create. Spirit To Achieve.

TEOM AUDIT

File #: 2012 - 449A
Date: March 13, 2012 Performed by: Al Clark

Station

Name:	St Lina	Location:	St Lina
Facility/Zone:	Lica	Operator:	Maxxam
Temperature:	9.04	Barometric Press.	676 mm/hg

Audit Transfer Standard

Make/Model:	DeltaCal	Cell s/n:	1002
Serial Number:	1858		

Sampler Set-up and Current Readings

Make/Model	Teom 1405-F	F-Main Set Pt (l/min)	3.00
Unit #	PM2.5	F-Aux Set Pt (l/min)	13.67
Control unit s/n	1405A207691003	Filter Load (%)	22
Transducer s/n	1405A207691003	K_O Factor	15634
		Temp (°C)	9.04
		Press (ATM)	0.894

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

ATM = (mm Hg) X (1.316×10^{-3}) or ATM = ("Hg) X (3.34207×10^{-2})

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

Zero Flow

Pump Off		Pump On (Time to reach set points)	
F-Main (l/min)	N/A	**(45-60 Sec)**	N/A
F-Aux (l/min)	N/A	**(45-60 Sec)**	N/A

Temperature/Pressure

Measured Temp **(± 2 °C)**	7.90	**Δ°C**	1.14
Measured Press **(± 1.5% ATM)**	0.890	**Δ% ATM**	-0.45%

Flow Audit

			Δ% of Measured Flow from Set-point		
Indicated Main/Aux Flow (l/min)	3.01	13.65	**(± 2%)**	0.3%	-0.1%
Total Flow = Main + Aux (l/min)	16.66		**(± 2%)**	-0.1%	
			Δ of Measured Flow from Indicated		
Measured Total Flow (l/min)	17.00		**(± 1.00 l/min)**	0.34	
Measured Main Flow (l/min)	3.2		**(± 0.20 l/min.)**	0.19	

Leak Check

		Actual leakage = Pump On – Pump Off
Base **(< 0.15 l/min)**	Pass	0.07
Ref **(< 0.65 l/min)**	Pass	-0.2

K_O Factor

Measured	15511
K_O % Difference **(± 2.5%)**	0.79

Remarks: Heads Clean. 1 oring in SCC needs replacing - torn.

Station Performance Audit Summary

Company: Lica Facility Name: St Lina

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

AENV Region: Northern AENV District: North East

Parameters audited:

H_2S	X	SO_2	X	NO_X	X	NH_3		O_3	X
CO		CH_4		NonCH4		THC	X	Ethylene	
$PM_{2.5}$	X	PM_{10}		TSP		BTEX		Wind Speed	X
Wind Dir	X	Amb. Temp	X	Stn.Temp	X	RH	X	Solar Radiation	
Rainfall	X	Precip		VWS		BP	X		
All parameters monitored as per approval: Yes_____ 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: June 17/10			

COMMENTS: Wind head calibration due in 2012 as per AMD.

AUDITOR: Al Clark *DATE:* March 13, 2012

Lakeland Industry & Community Association

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

May 1, 2012

Alberta Environment and Water
Data, Monitoring and Validation
Monitoring and Science
4946 89 Street
Edmonton, AB T6E-5K1

Attention: Al Clark, Monitoring Systems Auditor

Dear Mr. Al Clark

RE: 2012 LICA Audits

Attached, please find the updated site documentation for the St. Lina and Portable Continuous Monitoring stations.

It appears that an older version of the site documentation was at the St. Lina station at the time of the audit. The out-of-date windrose was identified in a previous audit and the problem was corrected, however it seems that the new document was never placed in the St. Lina Station.

The site documentation for the Portable Continuous Monitoring station has been updated to reflect the conditions at the new site. In order to generate a windrose for the Elk Point Airport site, I used data from the National Climate Data and Information Archive for St. Paul which is reasonably close the station's current location.

Physical copies of these two documents will be placed in their respective stations over the next two weeks.

If you have any further questions, please don't hesitate to contact me.

Respectfully,

Michael Bisaga
Airshed Program Manager
Lakeland Industry and Community Association

Site Documentation: LICA Portable Continuous Monitoring Station

General Site Information

Item	Description
Site ID (CASA ID)	N/A
Station Name	LICA Portable Continuous Monitoring Station (LPS)
General Description	The LPS monitoring station is located east of the Town of Elk Point at the Elk Point Airport.
Community	Elk Point
Station Address	Highway 646 & Range Road 61
Coordinates	53°53'28.60"N 110°45'49.88"W
Station Type	Rural Regional, Light Industry
Area Land Use	Rural, Agricultural
Angle of elevation to nearby building in area	<15 degrees, outbuildings, quanset, security building
Airflow Restrictions (yes/no)	North: No East: No South: No West: No
Nearest Tree	Single trees near security building 50 – 100 meters away to the south west
Sample Manifold Type	Glass
Meteorological Tower Information	Height: 10 meters Type: Crank Position: Attached to south side of monitoring shelter
Station Install Date	Original installation: March 2012
Station Origin	LICA owned and operated
Site Preparation	Gravel parking area for airport clients

Site Influences

Localized Sources (within 20 meters of station)

Type	Distance	Description
Automobile	200 meters	Highway Road 646
Space heating	Immediate area	Space heating for various buildings at the airport
Aircraft	Immediate area	Intermittent use of airport

Road Way Sources

Name	Type	Traffic Volume	Distance (m)	Description
Highway 646	Highway	Unknown – High Peak Hour Volume	200 m	Paved Rural Highway
Range Road 60, 61, 62	Gravel Road	Unknown – Minimal	500 m	Gravel Road
Airport access	Gravel Road	Unknown – Minimal	Immediate area	Gravel Road

Major Point/Area Sources

Name	Type	Major Emissions	Distance (m)	Direction
Primary Production / Well Site	Industrial	NOx, HC	500-1000 m	All directions
Sand/Gravel Pit	Industrial	$PM_{2.5}$, NOx	500-1000 m	

Figure 1: Satellite image showing LPS Continuous Monitoring Station Location

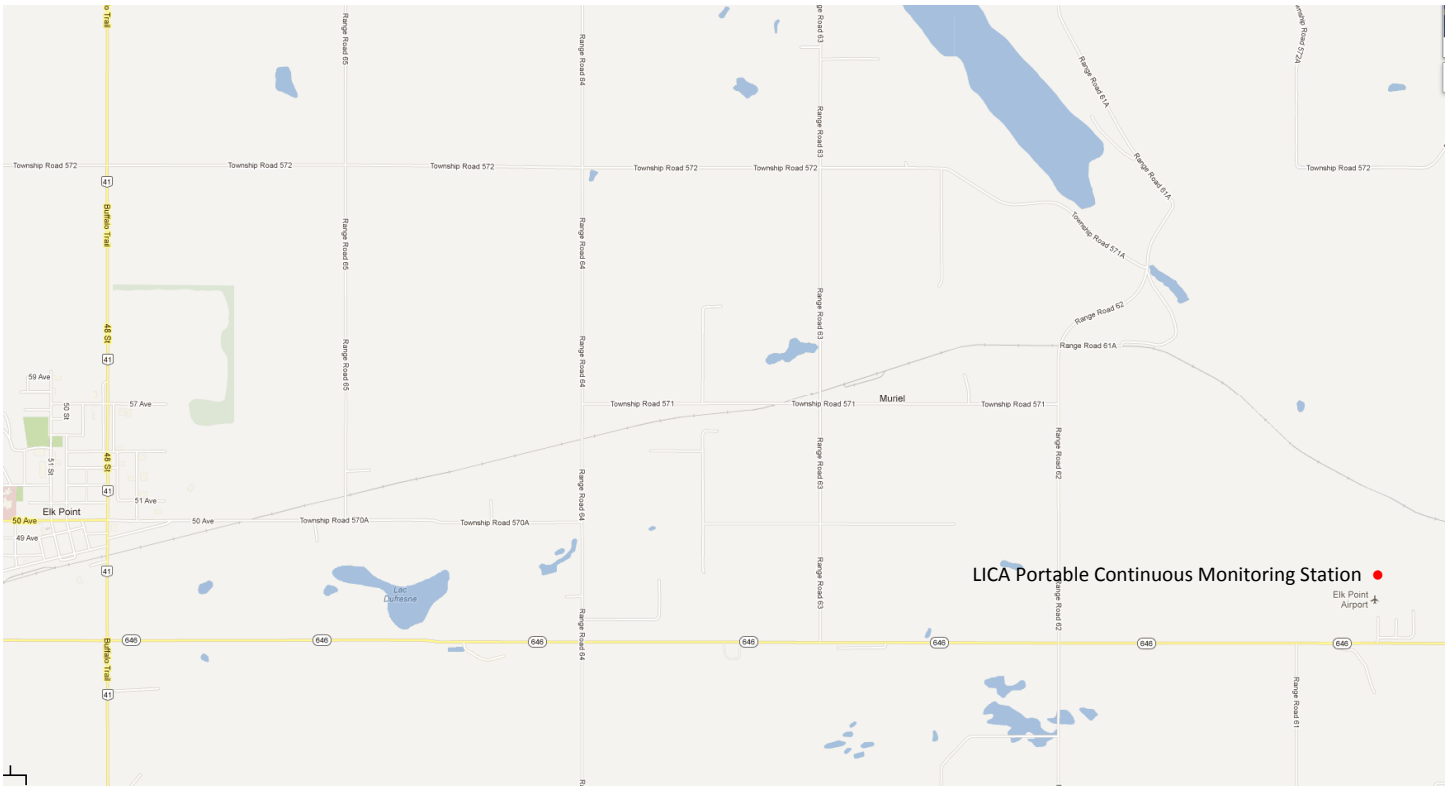


Figure 2: Road Map showing LPS Continuous Monitoring Station Location

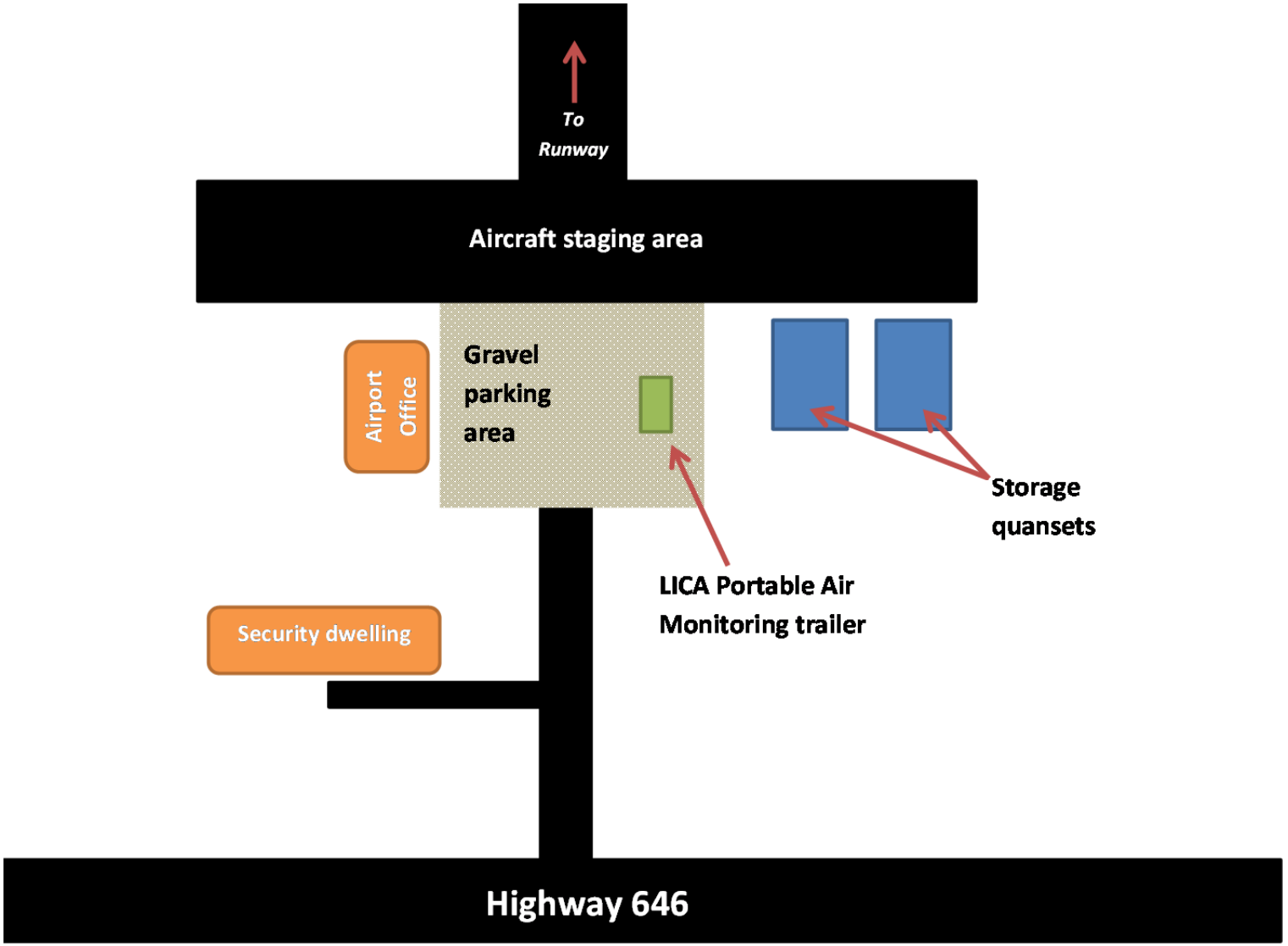


Figure 3: Schematic showing LPS Continuous Monitoring Station and surrounding features.

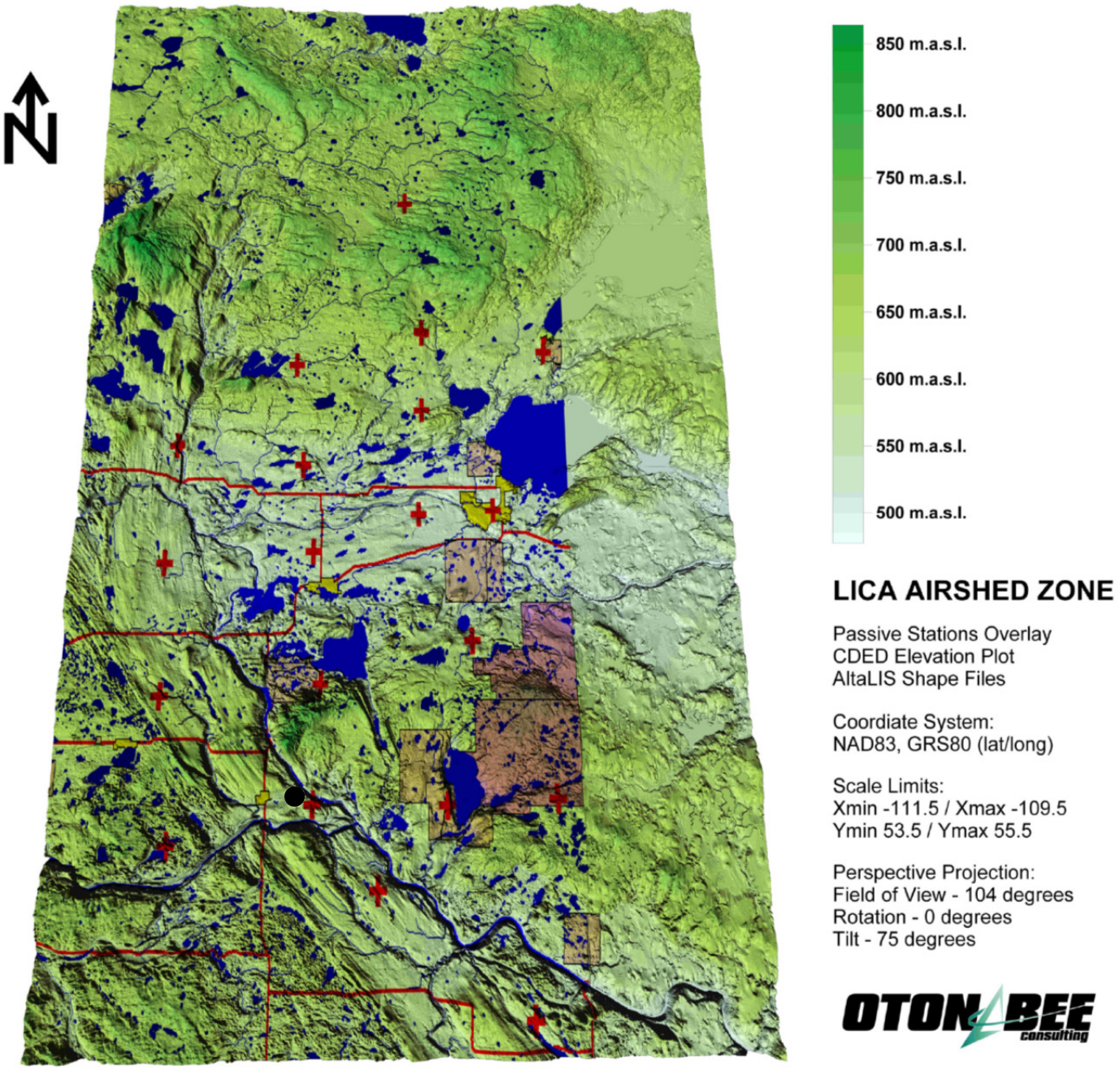


Figure 4: Elevation Plot showing location of LPS Continuous Monitoring Station

Site Photographs – Cardinal Directions

North	East
	
South	**West**
	

Site Photographs – Monitoring Station

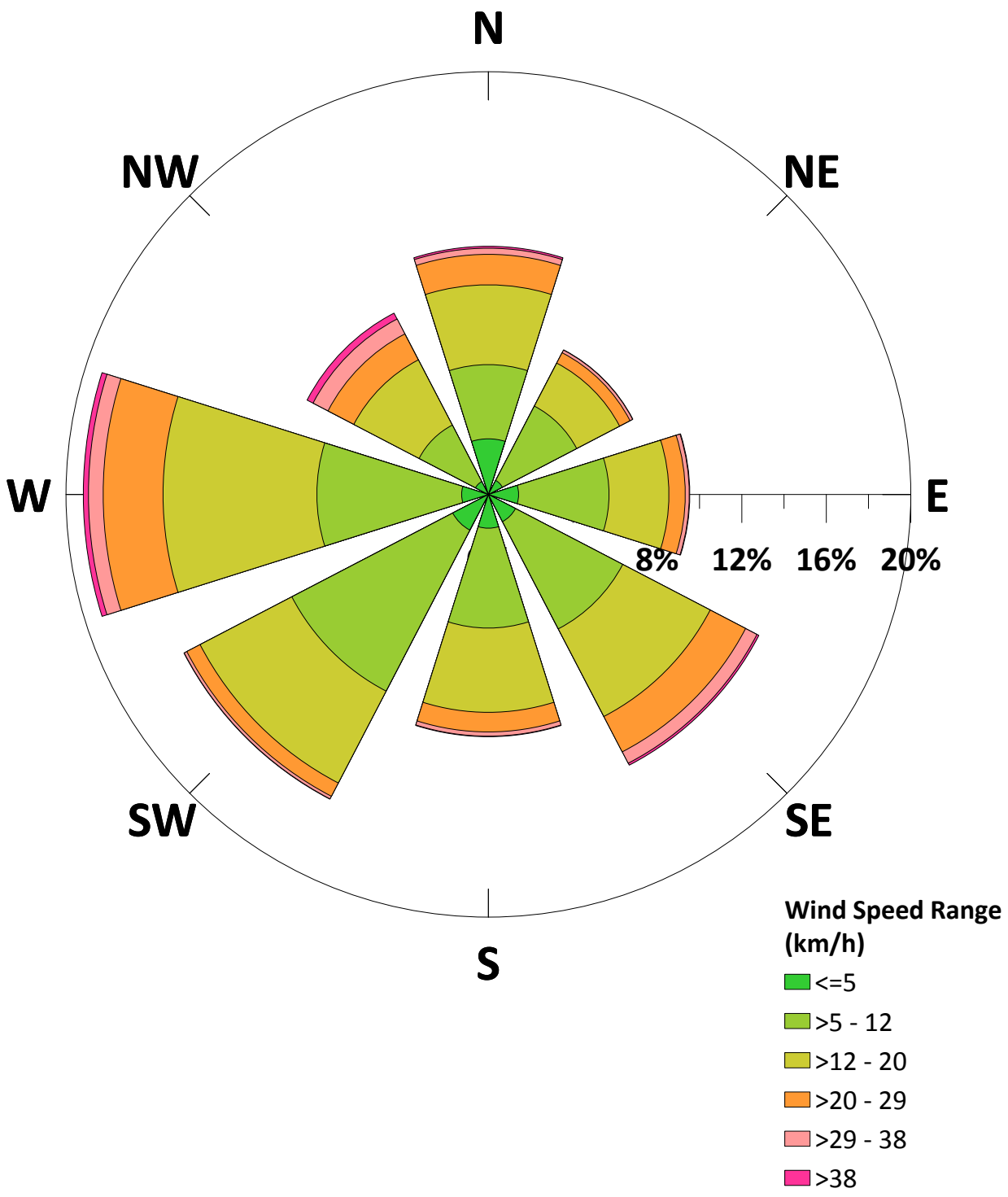
Exterior	Interior (Instrument Rack)	Interior (Intake Manifold)
		

Wind Rose Diagram

Wind Speed / Direction Frequency Distribution

St. Paul AGCM Climate Station

2011 Wind Speed/Direction



Data polled from National Climate Data and Information Archive:
http://www.climate.weatheroffice.gc.ca/advanceSearch/searchHistoricData_e.html

LICA Portable Continuous Monitoring Station Equipment Inventory

Air Quality

Parameter	Make/Model	Serial Number	Sampling Height (m)	Equipment Owner
Analytical Systems				
Hydrogen Sulphide	Teledyne API / 101E	509	4	LICA
Sulphur Dioxide	Teledyne API / 100E	467	4	LICA
Oxides of Nitrogen	Teledyne API / 200E	593	4	LICA
Total Hydrocarbons	Thermo Electron 51C	436609739	4	LICA
Ozone	API 400A	446	4	Maxxam
PM 2.5	R+P 1400a TEOM	140AB228740001	6	Maxxam
Volatile Organic Compounds	Xontech 910a	6200	6	LICA
Polycyclic Aromatic Hydrocarbons	Tisch PUF+	100-1015 (Motor SN 1139)	6	LICA
Meteorological Systems				
Wind Speed	RM Young 5103VK	41334	10	Maxxam
Wind Direction	RM Young 5103VK	41334	10	Maxxam
Ambient Temperature	R&R Environmental 61	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	1813	N/A	LICA
PM 10 Impacter	R+P	N/A		Maxxam
PM2.5 Cyclone	R+P	N/A		Maxxam

Revisions

Document Revision History

Revision No.	Date	Reason for Revision	Approved By
0	October 2009	Original Issue *(Devon Wellsite Location, North of Bonnyville)*	M. Bisaga, Airshed Program Manager
1	April 2012	Trailer moved to new location *(Elk Point Airport)*	M. Bisaga, Airshed Program Manager

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 St. Lina.
Community	Ashmont / St. Lina / McRae
Station Address	Highway 867 & Township Road 604, County of St. Paul
Coordinates	54°12'58"N 111°30'8"W
Station Type	Rural Regional
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 50 – 100 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 east	Highway 867
Industrial	500 meters	Compressor station
Industrial	500 meters	Well site

Road Way Sources

Name	Type	Traffic Volume	Distance (m)	Description
Highway 867	Highway	Unknown – Moderate	Within 400 meters	Rural Highway
Township Road 604	Township Road	Unknown – Minimal	1 km	Gravel Road

Major Point/Area Sources

Name	Type	Major Emissions	Distance (m)	Direction
Compressor Station	Industrial	NOx, PM, HC, TRS	500 meters	North west
Primary Production / Well Site	Industrial	NOx, HC	500 meters	East

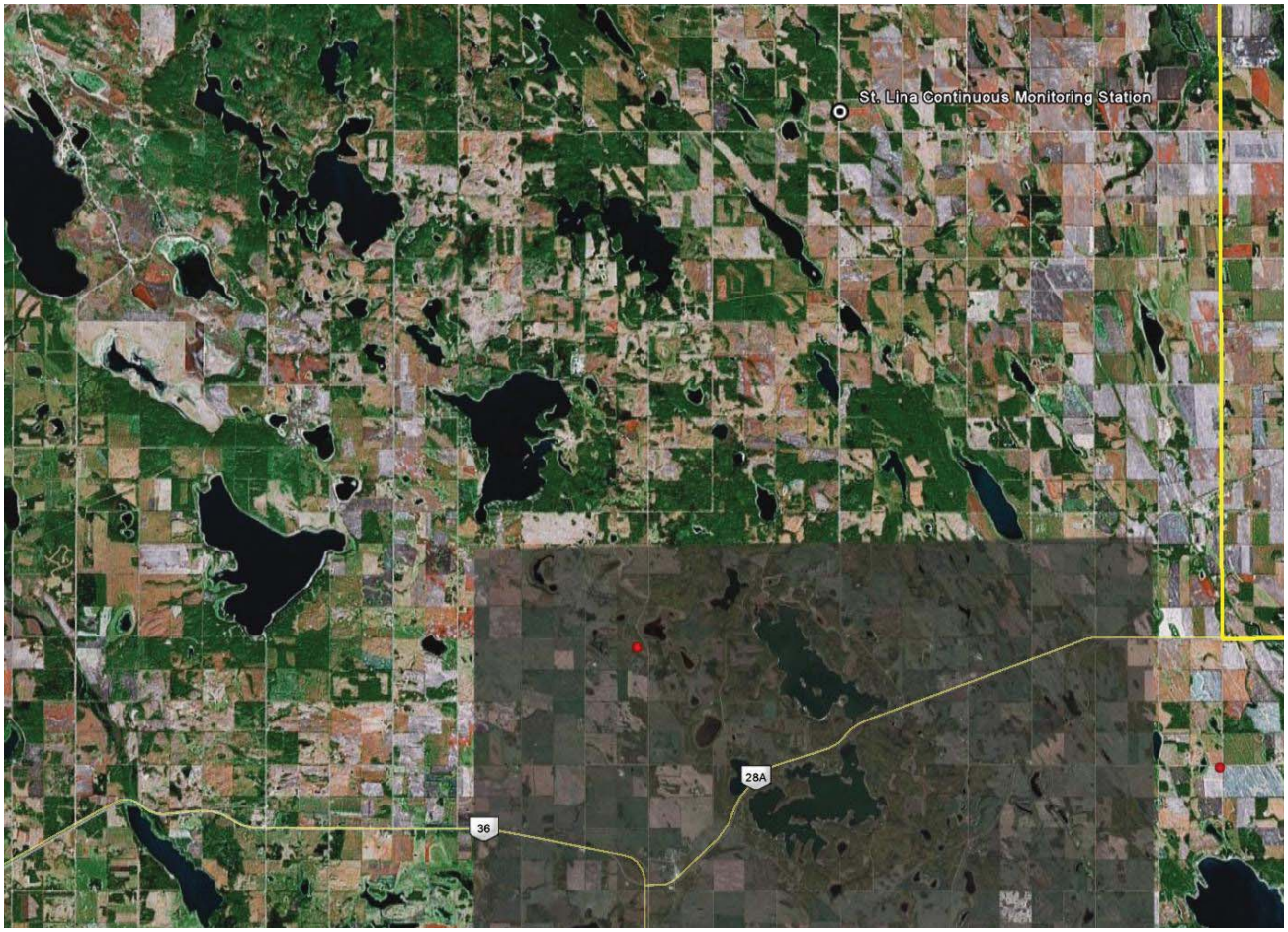


Figure 1: Satellite image showing STL Continuous Monitoring Station Location

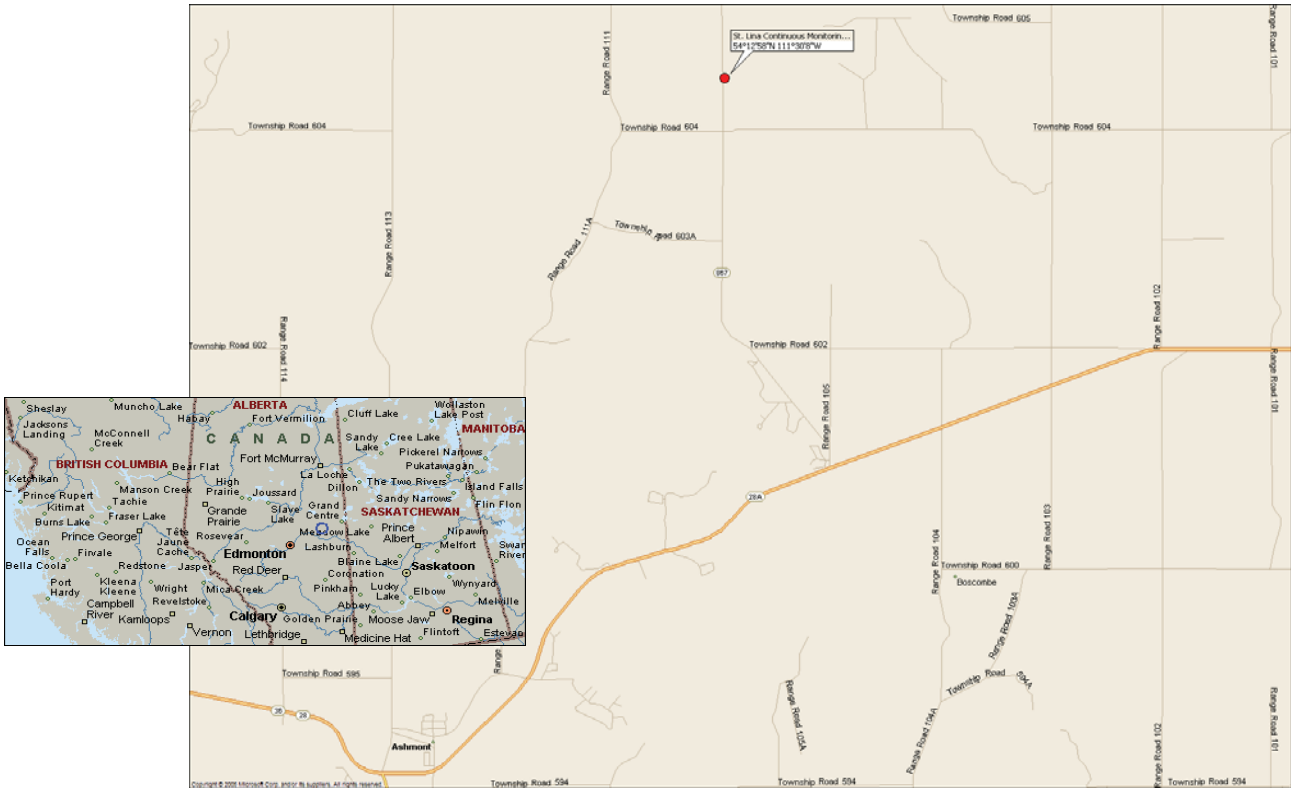


Figure 2: Road Map showing STL Continuous Monitoring Station Location

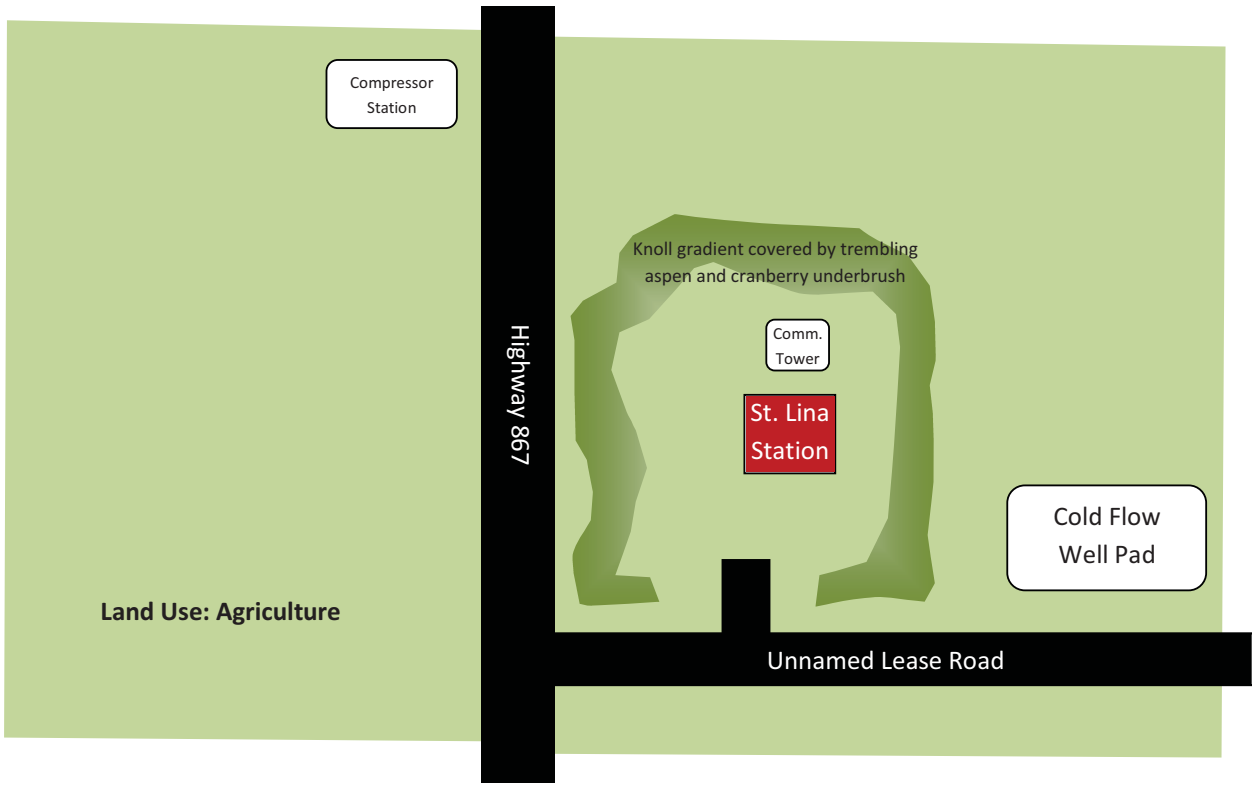


Figure 3: Schematic showing STL Continuous Monitoring Station and surrounding features.

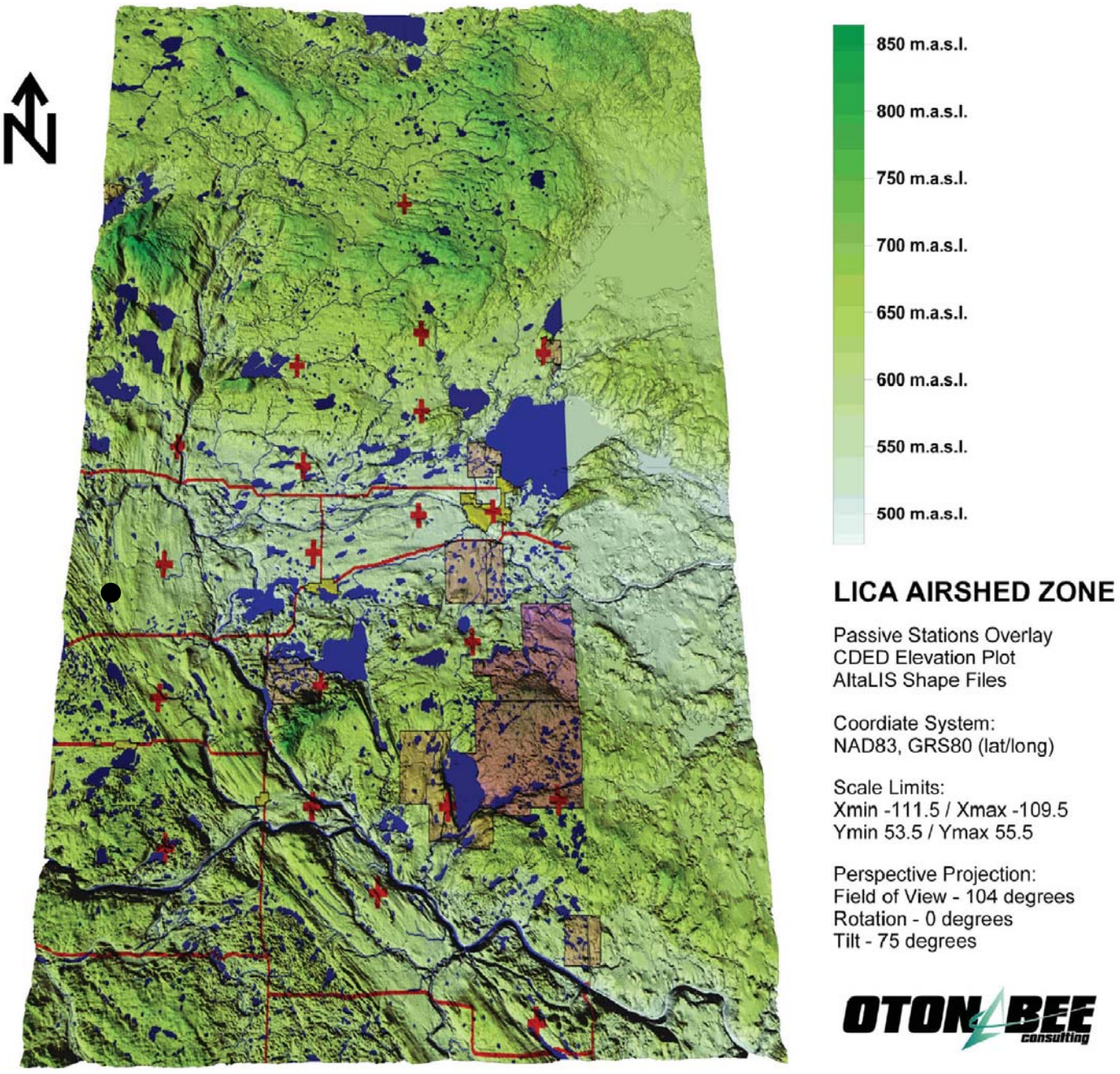


Figure 4: Elevation Plot showing location of STL Continuous Monitoring Station

Site Photographs – Cardinal Directions

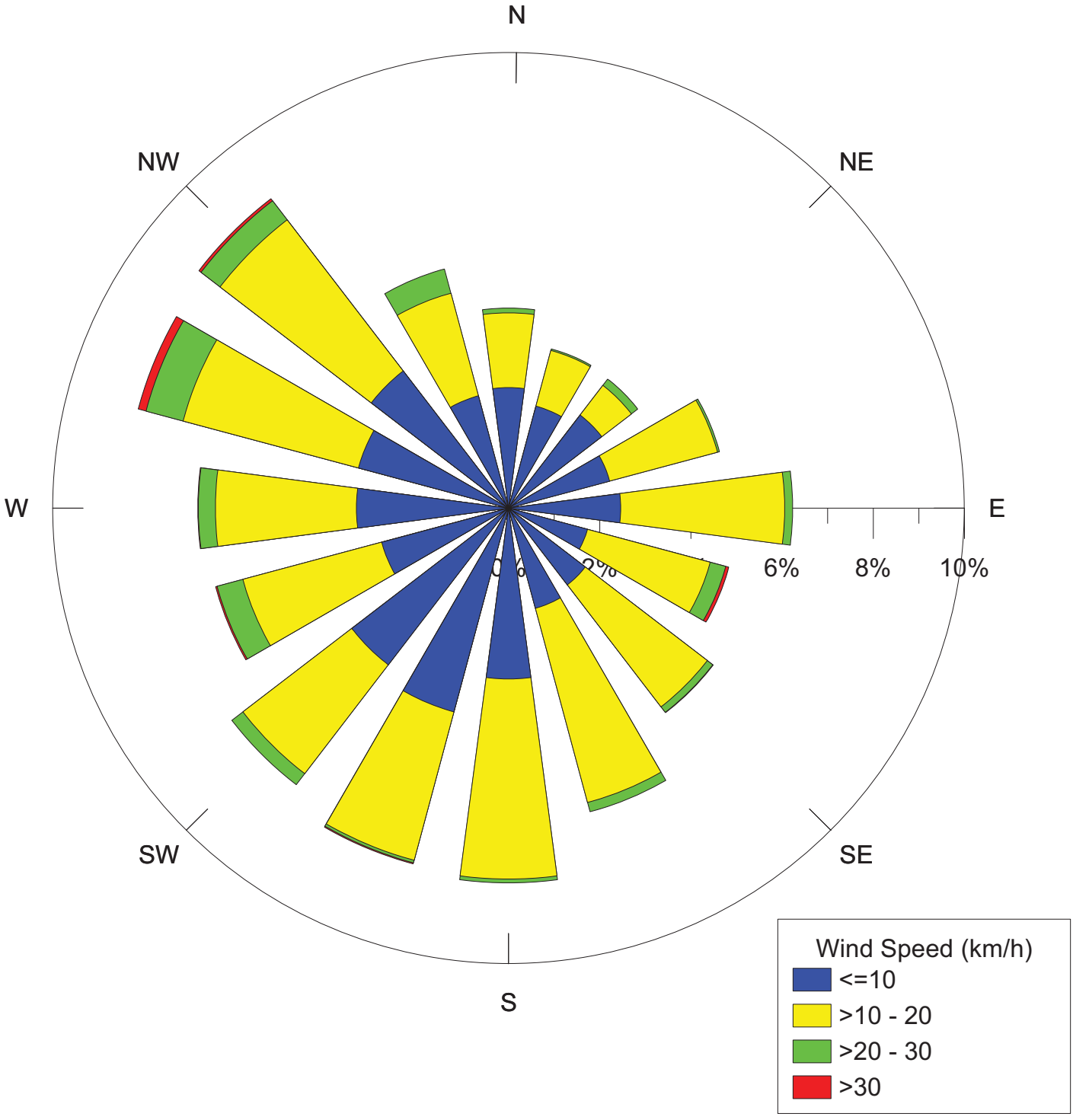
North	East
	
South	**West**
	

Site Photographs – Monitoring Station

Exterior	Interior (Instrument Rack)	Interior (Intake Manifold)
		

Wind Rose Diagram

Wind Speed / Direction Frequency Distribution



Data polled from CASA Data Warehouse (www.casadata.org)

Data Period: September 1, 2009 – August 31, 2010

Cold Lake South 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
Ozone	Thermo Electron 51C	77021-384	4	LICA
Meteorological Systems				
Wind Speed	Met One 50.5	H12635	10	LICA
Wind Direction	Met One 50.5	H12635	10	LICA
Ambient Temperature	R&R Environmental 61	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	September 2010	Updated windrose diagram	M. Bisaga, Airshed Program Manager

Government of Alberta ■
Environment

Alberta Environment and Water
Air Monitoring and Audit Center
4946 89 Street N.W.
Edmonton, Alberta T6E-5K1
Telephone: 780-427-7888
www.alberta.ca

May 1, 2012 File No(s): 2012 – 444A / 465A

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

Dear Mr. Bisaga:

Re: LICA Ambient Air Monitoring Station Audits

The Lica letter dated May 1, 2012 indicates that all actions required to address the audit findings have been taken.

Alberta Environment has verified that these actions have indeed been taken. Alberta Environment is satisfied that Lica has fulfilled the requirements of the audit findings and considers this audit closed.

Yours truly,

Al Clark
Monitoring Systems Auditor
Environmental Assurance

Attachment(s): Audit Summary Report

cc: Pat Marriot: District Approvals Manager
Jeff Toering: District Compliance Manager
Marilyn Albert: Air Quality Data Supervisor
Janine Ross: Ambient Air Specialist