

September 25, 2012

File No(s): 2012 – 220A / 241A

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

Dear Mr. Bisaga:

**Re: LICA Ambient Air Monitoring Station Audits**

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

Alberta Environment Sustainable Resource Development (AESRD) has received documentation from the contractor Maxxam Analytics and has verified that the actions to correct the audit findings at Cold Lake and Elk Point have been taken. Lica will need to verify the amount of data that is affected from the audit findings and re-adjust any data that has been affected. Please respond in writing by October 25, 2012 what corrective actions will be taken.

Yours truly,



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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  
Shelley Morris: Acting Manager Monitoring

# Audit Summary

Facility / Zone	Lica		
Total # of parameters that passed	20		
Total # of parameters audited in the network	22		
Date(s) of the audit	September 18-20, 2012		
Issue Date of Audit Summary			
Station Name	St Lina		
Auditor	Al Clark		
Audit Date	September 18, 2012		
<b>Critical</b>	<b>Pass</b>	<b>Fail</b>	
H <sub>2</sub> S	√		
SO <sub>2</sub>	√		
TRS			
NO / NO <sub>2</sub> / NO <sub>x</sub>	√		
O <sub>3</sub>	√		
THC	√		
TEOM/BAM PM <sub>2.5</sub>	√		
Wind Speed / Wind Direction	√		
Wind head Orientation	√		
Manifold Fan	√		
Precipitation Sampler	√		
Zero/Span Systems Operational	√		
<b>Inspection Items</b>	<b>OK</b>	<b>Need for Improvement</b>	
Sample pump venting/scrubbing	√		
Heating / Air Conditioning	√		
Manifold	√		
Sample Lines	√		
TEOM/BAM PM <sub>2.5</sub>	√		
Safety	√		
Site Conditions	√		
<b>Non-critical</b>	<b>OK</b>	<b>Opportunity for Improvement</b>	
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	20		
Total # of parameters audited in the network	22		
Date(s) of the audit	September 18-20, 2012		
Issue Date of Audit Summary			
Station Name	Cold Lake South		
Auditor	Al Clark		
Audit Date	September 18, 2012		
<b>Critical</b>	<b>Pass</b>	<b>Fail</b>	
H <sub>2</sub> S	√		
SO <sub>2</sub>	√		
TRS			
NO / NO <sub>2</sub> / NO <sub>x</sub>	√		
O <sub>3</sub>	√		
THC	√		
TEOM/BAM PM <sub>2.5</sub>		X	Flow Leak
Wind Speed / Wind Direction	√		
Wind head Orientation	√		
Manifold Fan	√		
Precipitation Sampler			
Zero/Span Systems Operational	√		
<b>Inspection Items</b>	<b>OK</b>	<b>Need for Improvement</b>	
Sample pump venting/scrubbing	√		
Heating / Air Conditioning	√		
Manifold	√		
Sample Lines	√		
TEOM/BAM PM <sub>2.5</sub>		X	Temperature
Safety	√		
Site Conditions	√		
<b>Non-critical</b>	<b>OK</b>	<b>Opportunity for Improvement</b>	
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	20
Total # of parameters audited in the network	22
Date(s) of the audit	September 18-20, 2012
Issue Date of Audit Summary	0

Station Name	Elk Point Airport
Auditor	Al Clark
Audit Date	September 19, 2012

Critical	Pass	Fail
H <sub>2</sub> S		
SO <sub>2</sub>	√	
TRS	√	
NO / NO <sub>2</sub> / NO <sub>x</sub>	√	
O <sub>3</sub>	√	
THC	X	Slope (0.85 - 1.15) Point >15%
TEOM/BAM PM <sub>2.5</sub>	√	
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 <sub>2.5</sub>	√	
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	20		
Total # of parameters audited in the network	22		
Date(s) of the audit	September 18-20, 2012		
Issue Date of Audit Summary	0		
Station Name	Maskwa		
Auditor	Al Clark		
Audit Date	September 20, 2012		
<b>Critical</b>	<b>Pass</b>	<b>Fail</b>	
H <sub>2</sub> S	√		
SO <sub>2</sub>	√		
TRS			
NO / NO <sub>2</sub> / NO <sub>x</sub>	√		
O <sub>3</sub>			
THC	√		
TEOM/BAM PM <sub>2.5</sub>			
Wind Speed / Wind Direction	√		
Wind head Orientation	√		
Manifold Fan	√		
Precipitation Sampler	√		
Zero/Span Systems Operational	√		
<b>Inspection Items</b>	<b>OK</b>	<b>Need for Improvement</b>	
Sample pump venting/scrubbing	√		
Heating / Air Conditioning	√		
Manifold	√		
Sample Lines	√		
TEOM/BAM PM <sub>2.5</sub>			
Safety	√		
Site Conditions	√		
<b>Non-critical</b>	<b>OK</b>	<b>Opportunity for Improvement</b>	
RH	√		
Station Temperature	√		
Ambient Temperature	√		
Barometric Pressure	√		
Tipping bucket	√		
Station Condition	√		
Station Documentation	√		

Not monitored at this location

# STATION AUDIT

File No. 2012 -226A / 231A

Date: September 18, 2012

Performed by: Al Clark

## Station

Name: Cold Lake

Location: Cold Lake South

Facility/Zone: Lica

Operator: Maxxam

Temp: 21.7 C

Barometric Press: 709 mmHg

## Location

Latitude N 54° 24' 50.9"

Longitude W 110° 13' 58.3"

Elevation 528 m

Status of Site Documentation On site - Complete

Manifold Material Glass  
Manifold Condition Good

## Meteorological

	Observed	Audit Value
Wind Speed Direction	<u>23.4 kph / 316 deg</u>	<u>20-25 kph / NNW</u>
Station Temperature	<u>23.6 C</u>	<u>23.4 C</u>
Relative Humidity	<u>41.4%</u>	<u>41.5%</u>
Ambient Temperature	<u>17.1 C</u>	<u>17.1 C</u>
BP	<u>N/A</u>	<u>N/A</u>
Precipitation	<u>N/A</u>	<u>N/A</u>

## Remarks:

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# SO<sub>2</sub> ANALYZER AUDIT

File No. 2012 -226A

Date: September 18, 2012

Performed by: Al Clark

## Station

Name: Cold Lake

Location: Cold Lake South

Facility/Zone: Lica

Operator: Maxxam

Temp: 21.7 C

Barometric Press: 709 mmHg

## Monitor

Make/Model: Teco 43i Serial No: 0806528242

Inlet flow (sccm): 447 Full Scale Range ppm: 0.5

Last cal. Date: Sep 11/12 Old C.F. 0.9952

Zero/Bkg 6.0

Span Coef 1.031

## Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201

AMU #: 1691

Cylinder #: CLM004813

SO<sub>2</sub> Concentration PPM: 50.4

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5054	0.0	5054	0.000	0.000		
5092	38.7	5131	0.380	0.371	-2%	± 15%
5072	17.3	5089	0.171	0.170	-1%	± 15%
5063	8.2	5071	0.081	0.080	-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)= 0.9760

b (Intercept as % of full scale)= 0.1617

### LIMITS

≥ **0.995**

**0.85-1.15**

± **3% F.S.**

## Remarks:

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# TRS ANALYZER AUDIT

File No. 2012 - 227A

Date: September 18, 2012

Performed by: Al Clark

## Station

Name: Cold Lake

Location: Cold Lake South

Facility/Zone: Lica

Operator: Maxxam

Temp: 21.7 C

Barometric Press: 709 mmHg

## Monitor

Make/Model: Teco 450i Serial No: 0812728560

Inlet flow (sccm): 451 Full Scale Range ppm: 0.1

Last cal. Date: Sep 11/12 Old C.F. 0.9719

Zero/Bkg 12.9

Span Coef 1.014

## Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201

AMU #: 1691

Cylinder #: FF15612

H<sub>2</sub>S Concentration PPM: 10.0

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5054	0.0	5054	0.000	0.000		
5092	38.6	5131	0.075	0.071	-6%	± 15%
5071	17.8	5089	0.035	0.033	-6%	± 15%
5062	9.1	5071	0.018	0.017	-5%	± 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)= 0.9435

b (Intercept as % of full scale)= 0.0227

### LIMITS

≥ **0.995**

**0.85-1.15**

± **3% F.S.**

## Remarks:

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# HC ANALYZER AUDIT

File No. 2012 -228A

Date: September 18, 2012 Performed by: Al Clark

## Station

Name: Cold Lake Location: Cold Lake South  
 Facility/Zone: Lica Operator: Maxxam  
 Temp: 21.7 C Barometric Press: 709 mmHg

## Monitor

Make/Model: Teco 51CLT Serial No: 0427408718  
 Inlet flow (sccm): 6.5 Full Scale Range ppm: 50.0  
 Last cal. Date: Sep 11/12 Old C.F. 0.9982

## Calibrator

Calibration Method: Gas Dilution  
 Make/Model: Sabio 2010 AMU #: 1778  
 HC cylinder #: Sg090044A HC concentration ppm: 1063.5

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
3526	0.0	3526	0.0	0.1		
3524	80.1	3604	23.6	23.0	-3%	± 15%
3524	40.2	3564	12.0	11.5	-5%	± 15%
3525	20.2	3545	6.1	5.8	-6%	± 15%
Absolute Average Percent Difference					5%	

### Linear Regression Analysis:

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

Correlation Coeff.= 0.9999  
 m (Slope)= 0.9701  
 b (Intercept as % of full scale)= -0.0237

**LIMITS**  
**≥ 0.995**  
**0.85-1.15**  
**± 3% F.S.**

### Remarks:

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# NO-NOx-NO2 Analyzer Audit

File No. 2012 - 229A

Date: September 18, 2012 Performed by: Al Clark

**Station:** Name: Cold Lake Location: Cold Lake South Operator: Maxxam  
 Facility/Zone: Lica Temp. 21.7 C BP: 709 mmHg

**Monitor:** Make/Model: Teco 42C Serial No. 0427408716  
 Inlet flow (sccm): 725 Range ppm: 0.5  
 Last cal. Date: Sep 11/12 Old C.F.'s NO: 1.000  
 NOx: 1.000  
 NO2: 0.997  
 NO Bkg 3.7  
 NOx Bkg 4.0  
 NO Coef 0.956  
 NOx Coef 1.002  
 NO2 Coef 0.998

**Calibration Method:** Gas Dilution / GPT  
**Calibrator:** Make/Model: Sabio 2010 AMU# 1749  
 NO cylinder # CLM006307 NO conc. ppm 50.0 NOx conc. ppm 50.1

Calibrator Flows			Calc. Conc.		Indicated Concentration		% Difference vs Audit Gas	
			NO (ppm)	NOx (ppm)	NO (ppm)	NOx (ppm)	NO	NOx
Air	Gas	Total						
5020	0.0	5020	0.000	0.000	0.000	0.000	Limit ± 15%	
5021	40.1	5061	0.396	0.397	0.395	0.403	0%	2%
5020	20.2	5040	0.200	0.201	0.198	0.202	-1%	1%
5021	10.2	5031	0.101	0.102	0.099	0.102	-2%	0%
Absolute Average Percent Difference							1%	1%

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

	NO	NOx	NO <sub>2</sub>	LIMITS
Correlation Coeff.=	<u>1.0000</u>	<u>1.0000</u>	<u>0.9999</u>	<b>≥ 0.995</b>
m (Slope)=	<u>0.9983</u>	<u>1.0156</u>	<u>1.0018</u>	<b>0.85-1.15</b>
b (Intercept as % of full scale)=	<u>-0.2367</u>	<u>-0.1625</u>	<u>0.1971</u>	<b>± 3% F.S.</b>

O <sub>3</sub> Setting	Flow Rate	Indicated Conc. (ppm)			NO Decrease	NO <sub>2</sub> Increase	% Difference vs Audit Gas	
		NO	NOx	NO <sub>2</sub>				
0.000 V	5061	0.395	0.399	0.005	<del>X</del>	<del>X</del>	<del>X</del>	%Dif Limit
0.600 V	5061	0.101	0.402	0.301	0.294	0.296	1%	± 15%
0.400 V	5061	0.223	0.400	0.177	0.172	0.172	0%	± 15%
0.287 V	5061	0.293	0.402	0.109	0.102	0.104	2%	± 15%
Absolute Average Percent Difference							1%	

**Converter Efficiency**  
 Average Converter Efficiency 100.9%

**Remarks:** \_\_\_\_\_  
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# O<sub>3</sub> ANALYZER AUDIT

File No. 2012 - 230A

Date: September 18, 2012

Performed by: Al Clark

## Station

Name: Cold Lake

Location: Cold Lake South

Facility/Zone: Lica

Operator: Maxxam

Temp: 19.8 C

Barometric Press: 709 mmHg

## Monitor

Make/Model: Teco 49i Serial No: 0700419951

Inlet flow (sccm): 708 / 748 Full Scale Range ppm: 0.5

Last cal. Date: Sep 11/12 Old C.F. 0.9968

Zero/Bkg -0.1

Span Coeff. 1.039

## Calibrator

Calibration Method: Generator

Make/Model: Sabio 2010

NO cylinder #: N/A

AMU #: 1778

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 V	4984	X	4984	0.000	0.001		
0.795 V	4984	X	4984	0.402	0.419	4%	± 15%
0.429 V	4984	X	4984	0.200	0.207	3%	± 15%
0.249 V	4984	X	4984	0.101	0.102	0%	± 15%
Absolute Average Percent Difference						2%	

### Linear Regression Analysis:

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

Correlation Coeff.= 0.9999  
 m (Slope)= 1.0427  
 b (Intercept as % of full scale)= -0.1998

**LIMITS**  
**≥ 0.995**  
**0.85-1.15**  
**± 3% F.S.**

### Remarks:

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# TEOM AUDIT

Date: September 18, 2012      File #: 2012 - 231A  
 Performed by: Al Clark

<b>Station</b>			
Name:	<u>Cold Lake</u>	Location:	<u>Cold Lake South</u>
Facility/Zone:	<u>Lica</u>	Operator:	<u>Maxxam</u>
Temperature:	<u>21.7 C</u>	Barometric Press.:	<u>709 mmHg</u>

<b>Audit Transfer Standard</b>			
Make/Model:	<u>DeltaCal</u>	Cell s/n:	<u>1002</u>
Serial Number:	<u>AMU 1858</u>		
<b>Sampler Set-up and Current Readings</b>			
Make/Model	<u>Teom 1405-F</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>1405A2016208814</u>	Filter Load (%)	<u>24.3</u>
Transducer s/n	<u>1405A2016208814</u>	K <sub>O</sub> Factor	<u>14578</u>
		Temp (°C)	<u>19.6</u>
		Press (ATM)	<u>0.965</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

<b>Zero Flow</b>		<b>Pump On (Time to reach set points)</b>	
<b>Pump Off</b>		<b>(45-60 Sec)</b>	
F-Main (l/min)	<u>N/A</u>		<u>N/A</u>
F-Aux (l/min)	<u>N/A</u>	<b>(45-60 Sec)</b>	<u>N/A</u>

<b>Temperature/Pressure</b>			
Measured Temp (± 2 °C)	<u>19.8</u>	Δ°C	<u>0.2</u>
Measured Press (± <b>1.5% ATM</b> )	<u>0.933</u>	Δ% ATM	<u><b>-3.32%</b></u>

<b>Flow Audit</b>		<b>Δ% of Measured Flow from Set-point</b>	
Indicated Main/Aux Flow (l/min)	<u>3.00</u> <u>13.68</u>	(± <b>2%</b> )	<u>0.0%</u> <u>0.1%</u>
Total Flow = Main + Aux (l/min)	<u>16.68</u>	(± <b>2%</b> )	<u>0.1%</u>
<b>Δ of Measured Flow from Indicated</b>			
Measured Total Flow (l/min)	<u>17.42</u>	(± <b>1.00 l/min</b> )	<u>0.74</u>
Measured Main Flow (l/min)	<u>3.27</u>	(± <b>0.20 l/min.</b> )	<u>0.27</u>

<b>Leak Check</b>		<b>Actual leakage = Pump On – Pump Off</b>	
Base (< <b>0.15 l/min</b> )	<u>0.52 / 2.57</u>	<b>Fail</b>	
Ref (< <b>0.65 l/min</b> )	<u>0.13 / 0.64</u>	<b>Fail</b>	

<b>K<sub>O</sub> Factor</b>	
Measured	<u>14544</u>
K <sub>O</sub> % Difference (± <b>2.5%</b> )	<u>0.23</u>

**Remarks:**      Heads Clean.

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Note - Leak repaired September 19, 2012, flows rechecked OK now.

Pressure adjusted after audit

### 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 <sub>2</sub> S	X	SO <sub>2</sub>	X	NO <sub>x</sub>	X	NH <sub>3</sub>		O <sub>3</sub>	X
CO		CH <sub>4</sub>		NonCH <sub>4</sub>		THC	X	Ethylene	
PM <sub>2.5</sub>	X	PM <sub>10</sub>		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*

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: Nov 2010

X		
X		

COMMENTS:

\_\_\_\_\_  
 \_\_\_\_\_  
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AUDITOR:           Al Clark          

DATE:           September 18/12

# STATION AUDIT

File No. 2012 - 238A / 241A

Date: September 20, 2012

Performed by: Al Clark

## Station

Name: Maskwa

Location: IOL Cold Lake

Facility/Zone: Lica

Operator: Maxxam

Temp: 22.8 C

Barometric Press: 708 mmHg

## Location

Latitude N 54° 36' 18.5"

Longitude W 110° 27' 10.3"

Elevation 606m

Status of Site Documentation On Site - complete

Manifold Material Glass  
Manifold Condition Good

## Meteorological

	Observed	Audit Value
Wind Speed Direction	<u>9.2 kph / 302 deg</u>	<u>5-10 kph / NW</u>
Station Temperature	<u>22.4 C</u>	<u>221.6 C</u>
Relative Humidity	<u>44.0%</u>	<u>42.8%</u>
Ambient Temperature	<u>15.8 C</u>	<u>14.8 C</u>
BP	<u>0.945</u>	<u>0.932</u>
Precipitation	<u>1.0 mil</u>	<u>10 tips</u>

## Remarks:

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# SO<sub>2</sub> ANALYZER AUDIT

File No. 2012 - 238A

Date: September 20, 2012

Performed by: Al Clark

## Station

Name: Maskwa

Location: IOL Cold Lake

Facility/Zone: Lica

Operator: Maxxam

Temp. 22.8 C

Barometric Press: 708 mmHg

## Monitor

Make/Model: API 100E Serial No: 508

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

Last cal. Date: Aug 13/12 Old C.F. 0.9993

Zero/Bkg 48.2

Span Coef 1.229

## Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201

AMU #: 1691

Cylinder #: CLM004813

SO<sub>2</sub> Concentration PPM: 50.4

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5054	0.0	5054	0.000	0.002		
5092	51.6	5144	0.506	0.496	-2%	± 15%
5072	22.2	5094	0.220	0.217	-2%	± 15%
5063	8.2	5071	0.081	0.081	-3%	± 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)= 0.9777  
b (Intercept as % of full scale)= 0.1823

**LIMITS**  
≥ **0.995**  
**0.85-1.15**  
± **3% F.S.**

## Remarks:

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# H<sub>2</sub>S ANALYZER AUDIT

File No. 2012 - 239A

Date: September 20, 2012

Performed by: Al Clark

## Station

Name: Maskwa

Location: IOL Cold Lake

Facility/Zone: Lica

Operator: Maxxam

Temp. 22.8 C

Barometric Press: 708 mmHg

## Monitor

Make/Model: API 101E Serial No: 511

Inlet flow (sccm): 475 Full Scale Range ppm: 0.1

Last cal. Date: Aug 13/12 Old C.F. 0.9911

Zero/Bkg 36.8

Span Coef 0.837

## Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201

AMU #: 1691

Cylinder #: FF15612

H<sub>2</sub>S Concentration PPM: 10.0

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5054	0.0	5054	0.000	0.001		
5105	38.6	5144	0.075	0.075	-1%	± 15%
5076	17.8	5094	0.035	0.035	-3%	± 15%
5062	9.1	5071	0.018	0.018	-5%	± 15%
Absolute Average Percent Difference					3%	

## Linear Regression Analysis:

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

Correlation Coeff.= 0.9999

m (Slope)= 0.9889

b (Intercept as % of full scale)= 0.6236

### LIMITS

≥ **0.995**

**0.85-1.15**

± **3% F.S.**

## Remarks:

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# HC ANALYZER AUDIT

File No. 2012 - 240A

Date: September 20, 2012 Performed by: Al Clark

## Station

Name: Maskwa Location: IOL Cold Lake  
 Facility/Zone: Lica Operator: Maxxam  
 Temp. 22.8 C Barometric Press: 708 mmHg

## Monitor

Make/Model: Teco 51CLT Serial No: 0436609738  
 Inlet flow (sccm): 7.50 Full Scale Range ppm: 50.0  
 Last cal. Date: Aug 13/12 Old C.F. 0.9934

## Calibrator

Calibration Method: Gas Dilution  
 Make/Model: Sabio 2010 AMU #: 1778  
 HC cylinder #: SG090044A HC concentration ppm: 1063.5

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
3524	0.0	3524	0.0	0.1		
3525	80.1	3605	23.6	23.2	-2%	± 15%
3525	40.2	3565	12.0	11.7	-3%	± 15%
3525	20.2	3545	6.1	5.9	-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)= 0.9787  
 b (Intercept as % of full scale)= 0.0525

**LIMITS**  
**≥ 0.995**  
**0.85-1.15**  
**± 3% F.S.**

### Remarks:

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# NO-NOx-NO2 Analyzer Audit

File No. 2012 - 241A

Date: September 20, 2012 Performed by: Al Clark

**Station:** Name: Maskwa Location: IOL Cold Lake Operator: Maxxam  
 Facility/Zone: Lica Temp. 22.8 C BP: 708 mmHg

**Monitor:** Make/Model: API 200E Serial No. 508  
 Inlet flow (sccm): 458 Range ppm: 1.0  
 Last cal. Date: Aug 13/12 Old C.F.'s NO: 1.0000  
 NOx: 0.9980  
 NO2: 1.0019  
 NO Bkg -0.5  
 NOx Bkg -0.3  
 NO Coef 1.217  
 NOx Coef 1.224  
 NO2 Coef N/A

**Calibration Method:** Gas Dilution / GPT  
**Calibrator:** Make/Model: Sabio 2010 AMU# 1749  
 NO cylinder # CLM006307 NO conc. ppm 50.0 NOx conc. ppm 50.1

Calibrator Flows			Calc. Conc.		Indicated Concentration		% Difference vs Audit Gas	
			NO (ppm)	NOx (ppm)	NO (ppm)	NOx (ppm)	NO	NOx
Air	Gas	Total						
5019	0.0	5019	0.000	0.000	0.001	0.002	Limit ± 15%	
5020	80.1	5100	0.785	0.787	0.776	0.785	-1%	0%
5021	40.1	5061	0.396	0.397	0.385	0.394	-3%	-1%
5021	20.2	5041	0.200	0.201	0.194	0.199	-4%	-2%
Absolute Average Percent Difference							3%	1%

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

	NO	NOx	NO <sub>2</sub>	LIMITS
Correlation Coeff.=	<u>0.9999</u>	<u>1.0000</u>	<u>1.0000</u>	<b>≥ 0.995</b>
m (Slope)=	<u>0.9879</u>	<u>0.9958</u>	<u>0.9870</u>	<b>0.85-1.15</b>
b (Intercept as % of full scale)=	<u>-0.2268</u>	<u>0.0298</u>	<u>0.4213</u>	<b>± 3% F.S.</b>

O <sub>3</sub> Setting	Flow Rate	Indicated Conc. (ppm)			NO Decrease	NO <sub>2</sub> Increase	% Difference vs Audit Gas	
		NO	NOx	NO <sub>2</sub>				
0.000 V	5100	0.770	0.780	0.010	<del>0.402</del>	<del>0.401</del>	<del>0%</del>	<del>± 15%</del>
0.800 V	5100	0.368	0.780	0.411	0.402	0.401	0%	± 15%
0.400 V	5100	0.606	0.783	0.176	0.164	0.166	1%	± 15%
0.287 V	5100	0.672	0.784	0.111	0.098	0.101	3%	± 15%
Absolute Average Percent Difference							1%	

**Converter Efficiency**  
 Average Converter Efficiency 101.3%

**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 <sub>2</sub> S	X	SO <sub>2</sub>	X	NO <sub>x</sub>	X	NH <sub>3</sub>		O <sub>3</sub>	
CO		CH <sub>4</sub>		NonCH <sub>4</sub>		THC	X	Ethylene	
PM <sub>2.5</sub>		PM <sub>10</sub>		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 _____									

*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:     April 2011    

X		
X		

COMMENTS:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

AUDITOR:     Al Clark    

DATE:     September 20, 2012

# STATION AUDIT

File No. 2012 -220A / 225A

Date: September 18, 2012

Performed by: Al Clark

## Station

Name: St Lina

Location: St Lina

Facility/Zone: Lica

Operator: Maxxam

Temp: 17.1 C

Barometric Press: 695 mmhg

## Location

Latitude N 56° 12' 59.3"

Longitude W 111° 30' 09.5"

Elevation 690 m

Status of Site Documentation On site - complete

Manifold Material Glass  
Manifold Condition Good

## Meteorological

	Observed	Audit Value
Wind Speed Direction	<u>30.2 kph / 320 deg</u>	<u>25-30 kph / NW</u>
Station Temperature	<u>22.8 C</u>	<u>22.5 C</u>
Relative Humidity	<u>38.8%</u>	<u>34.3%</u>
Ambient Temperature	<u>19.5C</u>	<u>20.0 C</u>
BP	<u>0.923</u>	<u>0.915</u>
Precipitation	<u>1.0 mil</u>	<u>10 tips</u>

## Remarks:

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# SO<sub>2</sub> ANALYZER AUDIT

File No. 2012 -220A

Date: September 18, 2012

Performed by: Al Clark

## Station

Name: St Lina

Location: St Lina

Facility/Zone: Lica

Operator: Maxxam

Temp. 17.1 C

Barometric Press. 695 mmhg

## Monitor

Make/Model: API 100E Serial No: 468

Inlet flow (sccm): 577 Full Scale Range ppm: 1.0

Last cal. Date: Sep 12/12 Old C.F. 0.9954

Zero/Bkg 93.0

Span Coef 0.997

## Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201

AMU #: 1691

Cylinder #: CLM004813

SO<sub>2</sub> Concentration PPM: 50.4

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5054	0.0	5054	0.000	0.001		
5092	51.6	5144	0.506	0.500	-1%	± 15%
5072	22.2	5094	0.220	0.218	-1%	± 15%
5063	8.2	5071	0.081	0.082	-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)= 0.9866  
b (Intercept as % of full scale)= 0.1278

**LIMITS**  
≥ **0.995**  
**0.85-1.15**  
± **3% F.S.**

## Remarks:

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# H<sub>2</sub>S ANALYZER AUDIT

File No. 2012 - 221A

Date: September 18, 2012

Performed by: Al Clark

## Station

Name: St Lina

Location: St Lina

Facility/Zone: Lica

Operator: Maxxam

Temp. 17.1 C

Barometric Press. 695 mmhg

## Monitor

Make/Model: API 101E Serial No: 510

Inlet flow (sccm): 531 Full Scale Range ppm: 0.1

Last cal. Date: Sep 12/12 Old C.F. 0.9929

Zero/Bkg 94.4

Span Coef 1.014

## Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201

AMU #: 1691

Cylinder #: FF15612

H<sub>2</sub>S Concentration PPM: 10.0

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5054	0.0	5054	0.000	0.001		
5105	38.6	5144	0.075	0.076	0%	± 15%
5076	17.8	5094	0.035	0.037	3%	± 15%
5062	9.1	5071	0.018	0.019	0%	± 15%
Absolute Average Percent Difference					1%	

## Linear Regression Analysis:

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

Correlation Coeff.= 0.9999

m (Slope)= 1.0002

b (Intercept as % of full scale)= 1.2611

### LIMITS

≥ **0.995**

**0.85-1.15**

± **3% F.S.**

## Remarks:

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# HC ANALYZER AUDIT

File No. 2012 - 222A

Date: September 18, 2012 Performed by: Al Clark

## Station

Name: St Lina Location: St Lina  
 Facility/Zone: Lica Operator: Maxxam  
 Temp. 17.1 C Barometric Press. 695 mmhg

## Monitor

Make/Model: Teco 51CLT Serial No: 5CLT-77021-384  
 Inlet flow (sccm): 6.90 Full Scale Range ppm: 50.0  
 Last cal. Date: Sep 12/12 Old C.F. 0.9982

## Calibrator

Calibration Method: Gas Dilution  
 Make/Model: Sabio 2010 AMU #: 1749  
 HC cylinder #: SG090044A HC concentration ppm: 1063.5

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
3525	0.0	3525	0.0	0.0		
3525	80.1	3605	23.6	22.8	-4%	± 15%
3525	40.2	3565	12.0	11.4	-5%	± 15%
3524	20.2	3544	6.1	5.7	-6%	± 15%
Absolute Average Percent Difference					5%	

### Linear Regression Analysis:

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

Correlation Coeff.= 1.0000  
 m (Slope)= 0.9661  
 b (Intercept as % of full scale)= -0.1859

**LIMITS**  
**≥ 0.995**  
**0.85-1.15**  
**± 3% F.S.**

### Remarks:

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# NO-NOx-NO2 Analyzer Audit

File No. 2012 - 223A

Date: September 18, 2012 Performed by: Al Clark

**Station:** Name: St Lina Location: St Lina Operator: Maxxam  
Facility/Zone: Lica Temp. 17.1 C BP: 695 mmhg

**Monitor:** Make/Model: API 200E Serial No. 592  
Inlet flow (sccm): 465 Range ppm: 1.0  
Last cal. Date: Sep 13/12 Old C.F.'s NO: 0.9989  
NOx: 1.0002  
NO2: 0.9962  
NO Bkg -1.3  
NOx Bkg -1.1  
NO Coef 1.002  
NOx Coef 1.007  
NO2 Coef N/A

**Calibration Method:** Gas Dilution / GPT  
**Calibrator:** Make/Model: Sabio 2010 AMU# 1749  
NO cylinder # CLM006307 NO conc. ppm 50.0 NOx conc. ppm 50.1

Calibrator Flows			Calc. Conc.		Indicated Concentration		% Difference vs Audit Gas	
			NO (ppm)	NOx (ppm)	NO (ppm)	NOx (ppm)	NO	NOx
Air	Gas	Total						
5020	0.0	5020	0.000	0.000	0.001	0.001	Limit ± 15%	
5020	80.1	5100	0.785	0.787	0.778	0.790	-1%	0%
5023	40.1	5063	0.396	0.397	0.388	0.397	-2%	0%
5022	20.2	5042	0.200	0.201	0.195	0.201	-3%	0%
Absolute Average Percent Difference							2%	0%

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

	NO	NOx	NO <sub>2</sub>	LIMITS
Correlation Coeff.=	<u>1.0000</u>	<u>1.0000</u>	<u>1.0000</u>	≥ <b>0.995</b>
m (Slope)=	<u>0.9905</u>	<u>1.0030</u>	<u>0.9975</u>	<b>0.85-1.15</b>
b (Intercept as % of full scale)=	<u>-0.1632</u>	<u>0.0124</u>	<u>0.1859</u>	<b>± 3% F.S.</b>

O <sub>3</sub> Setting	Flow Rate	Indicated Conc. (ppm)			NO Decrease	NO <sub>2</sub> Increase	% Difference vs Audit Gas	
		NO	NOx	NO <sub>2</sub>				
0.000 V	5100	0.781	0.792	0.011	<del>0.388</del>	<del>0.389</del>	<del>0%</del>	%Dif Limit
0.800 V	5100	0.393	0.792	0.400	0.388	0.389	0%	± 15%
0.400 V	5100	0.625	0.792	0.168	0.156	0.157	1%	± 15%
0.287 V	5100	0.686	0.792	0.108	0.095	0.097	2%	± 15%
Absolute Average Percent Difference							1%	

**Converter Efficiency**  
Average Converter Efficiency 101.0%

**Remarks:** \_\_\_\_\_  
\_\_\_\_\_



# O<sub>3</sub> ANALYZER AUDIT

File No. 2012 - 224A

Date: September 18, 2012

Performed by: Al Clark

## Station

Name: St Lina

Location: St Lina

Facility/Zone: Lica

Operator: Maxxam

Temp. 17.1 C

Barometric Press. 695 mmhg

## Monitor

Make/Model: Teco 49 C Serial No: 49C-34926-302

Inlet flow (sccm): 837 / 854 Full Scale Range ppm: 0.5

Last Cal. Date: Sep 14/12 Old C.F. 1.0000

Zero/Bkg 0.1

Span Coeff. 1.012

## Calibrator

Calibration Method: Generator

Make/Model: Sabio 2010

NO cylinder #: N/A

AMU #: 1778

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 V	4984	<del>4984</del>	4984	0.000	0.000		
0.795 V	4984	<del>4984</del>	4984	0.402	0.390	-3%	± 15%
0.429 V	4984	<del>4984</del>	4984	0.200	0.193	-4%	± 15%
0.249 V	4984	<del>4984</del>	4984	0.101	0.094	-7%	± 15%
Absolute Average Percent Difference						4%	

## Linear Regression Analysis:

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

Correlation Coeff.= 0.9999  
 m (Slope)= 0.9732  
 b (Intercept as % of full scale)= -0.3594

**LIMITS**  
**≥ 0.995**  
**0.85-1.15**  
**± 3% F.S.**

## Remarks:

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# TEOM AUDIT

Date: September 18, 2012      File #: 2012 - 225A  
 Performed by: Al Clark

<b>Station</b>			
Name:	<u>St Lina</u>	Location:	<u>St Lina</u>
Facility/Zone:	<u>Lica</u>	Operator:	<u>Maxxam</u>
Temperature:	<u>17.1 C</u>	Barometric Press.:	<u>695 mmhg</u>

<b>Audit Transfer Standard</b>			
Make/Model:	<u>DeltaCal</u>	Cell s/n:	<u>1002</u>
Serial Number:	<u>AMU 1858</u>		
<b>Sampler Set-up and Current Readings</b>			
Make/Model	<u>Teom 1405-F</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>1405A207691003</u>	Filter Load (%)	<u>17.7</u>
Transducer s/n	<u>1405A207691003</u>	K <sub>O</sub> Factor	<u>15634</u>
		Temp (°C)	<u>18.3</u>
		Press (ATM)	<u>0.918</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

<b>Zero Flow</b>			
<b>Pump Off</b>		<b>Pump On (Time to reach set points)</b>	
F-Main (l/min)	<u>N/A</u>	(45-60 Sec)	<u>N/A</u>
F-Aux (l/min)	<u>N/A</u>	(45-60 Sec)	<u>N/A</u>

<b>Temperature/Pressure</b>			
Measured Temp (± 2 °C)	<u>17.10</u>	Δ°C	<u>1.20</u>
Measured Press (± <b>1.5%</b> ATM)	<u>0.916</u>	Δ% ATM	<u>-0.22%</u>

<b>Flow Audit</b>			
Indicated Main/Aux Flow (l/min)	<u>3.00</u> <u>13.64</u>	Δ% of Measured Flow from Set-point	
Total Flow = Main + Aux (l/min)	<u>16.64</u>	(± <b>2%</b> )	<u>0.0%</u> <u>-0.2%</u>
		(± <b>2%</b> )	<u>-0.2%</u>
<b>Δ of Measured Flow from Indicated</b>			
Measured Total Flow (l/min)	<u>17.09</u>	(± <b>1.00 l/min</b> )	<u>0.45</u>
Measured Main Flow (l/min)	<u>2.99</u>	(± <b>0.20 l/min.</b> )	<u>0.01</u>

<b>Leak Check</b>			
Base (< <b>0.15 l/min</b> )	<u>0.07 / -0.20</u>	<b>Actual leakage = Pump On – Pump Off</b>	
Ref (< <b>0.65 l/min</b> )	<u>0.07 / -0.20</u>	<u>Pass</u>	
		<u>Pass</u>	

<b>K<sub>O</sub> Factor</b>			
Measured	<u>15434</u>		
K <sub>O</sub> % Difference (± <b>2.5%</b> )	<u>1.25</u>		

<b>Remarks:</b>	<u>Heads clean</u>
	_____
	_____
	_____

### 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 <sub>2</sub> S	X	SO <sub>2</sub>	X	NO <sub>x</sub>	X	NH <sub>3</sub>		O <sub>3</sub>	X
CO		CH <sub>4</sub>		NonCH <sub>4</sub>		THC	X	Ethylene	
PM <sub>2.5</sub>	X	PM <sub>10</sub>		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 _____									

*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:           June 2012          

X		
X		

*COMMENTS:*

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

AUDITOR:           Al Clark          

DATE:           September 18, 2012

# STATION AUDIT

File No. 2012 -232A / 237A

Date: September 19, 2012

Performed by: Al Clark

## Station

Name: Elk Point

Location: Elk Point Airport

Facility/Zone: Lica

Operator: Maxxam

Temp: 19.9 C

Barometric Press: 710 mmHg

## Location

Latitude N 53° 53' 28.5"

Longitude W 110° 45' 50.2"

Elevation 595m

Status of Site Documentation On site - complete

Manifold Material Glass  
Manifold Condition Good

## Meteorological

	Observed	Audit Value
Wind Speed Direction	<u>13.6 kph / 233 deg</u>	<u>10-15 kph / SW</u>
Station Temperature	<u>23.3 C</u>	<u>23.4 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>
Precipitation	<u>N/A</u>	<u>N/A</u>

## Remarks:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# SO<sub>2</sub> ANALYZER AUDIT

File No. 2012 - 232A

Date: September 19, 2012

Performed by: Al Clark

## Station

Name: Elk Point

Location: Elk Point Airport

Facility/Zone: Lica

Operator: Maxxam

Temp. 19.9 C

Barometric Press. 710 mmHg

## Monitor

Make/Model: API 100E Serial No: 4667

Inlet flow (sccm): 595 Full Scale Range ppm: 1.0

Last cal. Date: Sep 4/12 Old C.F. 0.9969

Zero/Bkg 91.4

Span Coef 1.211

## Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201

AMU #: 1691

Cylinder #: CLM004813

SO<sub>2</sub> Concentration PPM: 50.4

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5054	0.0	5054	0.000	0.001		
5092	51.6	5144	0.506	0.494	-2%	± 15%
5072	22.2	5094	0.220	0.216	-2%	± 15%
5063	8.2	5071	0.081	0.080	-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)= 0.9756

b (Intercept as % of full scale)= 0.0988

### LIMITS

≥ **0.995**

**0.85-1.15**

± **3% F.S.**

## Remarks:

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# H<sub>2</sub>S ANALYZER AUDIT

File No. 2012 - 233A

Date: September 19, 2012

Performed by: Al Clark

## Station

Name: Elk Point

Location: Elk Point Airport

Facility/Zone: Lica

Operator: Maxxam

Temp. 19.9 C

Barometric Press. 710 mmHg

## Monitor

Make/Model: API 101E Serial No: 509

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

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

Zero/Bkg 90.0

Span Coef 1.000

## Calibrator

Calibration Method: GAS DILUTION

Make/Model: R&R MFC 201

AMU #: 1691

Cylinder #: FF15612

H<sub>2</sub>S Concentration PPM: 10.0

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
5054	0.0	5054	0.000	-0.001		
5105	38.6	5144	0.075	0.075	1%	± 15%
5076	17.8	5094	0.035	0.035	3%	± 15%
5062	9.1	5071	0.018	0.018	6%	± 15%
Absolute Average Percent Difference					3%	

## Linear Regression Analysis:

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

Correlation Coeff.= 0.9999

m (Slope)= 1.0096

b (Intercept as % of full scale)= -0.5400

### LIMITS

≥ **0.995**

**0.85-1.15**

± **3% F.S.**

## Remarks:

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# HC ANALYZER AUDIT

File No. 2012 - 234A

Date: September 19, 2012 Performed by: Al Clark

## Station

Name: Elk Point Location: Elk Point Airport  
 Facility/Zone: Lica Operator: Maxxam  
 Temp. 19.9 C Barometric Press. 710 mmHg

## Monitor

Make/Model: Teco 51CLT Serial No: 0436609739  
 Inlet flow (sccm): 7.5 Full Scale Range ppm: 50.0  
 Last cal. Date: Sep 17/12 Old C.F. 1.0000

## Calibrator

Calibration Method: Gas Dilution  
 Make/Model: Sabio 2010 AMU #: 1778  
 HC cylinder #: SG090044A HC concentration ppm: 1063.5

Calibrator Flow (sccm)			Calculated Conc. (ppm)	Indicated Concentration (ppm)	% Difference	
Air	Gas	Total			vs Audit Gas	Limits
3524	0.0	3524	0.0	0.9		
3524	80.1	3604	23.6	35.9	<b>48%</b>	± 15%
3525	40.2	3565	12.0	18.3	<b>45%</b>	± 15%
3525	20.2	3545	6.1	9.6	<b>44%</b>	± 15%
Absolute Average Percent Difference					46%	

### Linear Regression Analysis:

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

Correlation Coeff.= 0.9999  
 m (Slope)= 1.4828  
 b (Intercept as % of full scale)= 1.4413

**LIMITS**  
**≥ 0.995**  
**0.85-1.15**  
**± 3% F.S.**

### Remarks:

No cooling fan in place - amb readings ~4.5 - 5.0 ppm; zero at 0.9 ppm  
Flow reg fail alarm on analyzer.  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

# NO-NOx-NO2 Analyzer Audit

File No. 2012 - 235A

Date: September 19, 2012 Performed by: Al Clark

**Station:** Name: Elk Point Location: Elk Point Airport Operator: Maxxam  
 Facility/Zone: Lica Temp. 19.9 C BP: 710 mmHg

**Monitor:** Make/Model: API 200E Serial No. 593  
 Inlet flow (sccm): 472 Range ppm: 1.0  
 Last cal. Date: Sep 5/12 Old C.F.'s NO: 0.9981  
 NOx: 0.9968  
 NO2: 1.0380  
 NO Bkg -0.9  
 NOx Bkg -0.4  
 NO Coef 0.989  
 NOx Coef 0.993  
 NO2 Coef N/A

**Calibration Method:** Gas Dilution / GPT  
**Calibrator:** Make/Model: Sabio 2010 AMU# 1749  
 NO cylinder # CLM006307 NO conc. ppm 50.0 NOx conc. ppm 50.1

Calibrator Flows			Calc. Conc.		Indicated Concentration		% Difference vs Audit Gas	
Air	Gas	Total	NO (ppm)	NOx (ppm)	NO (ppm)	NOx (ppm)	NO	NOx
5020	0.0	5020	0.000	0.000	0.000	0.000	Limit ± 15%	
5020	80.0	5100	0.784	0.786	0.780	0.781	-1%	-1%
5021	40.1	5061	0.396	0.397	0.388	0.390	-2%	-2%
5021	20.2	5041	0.200	0.201	0.195	0.196	-3%	-2%
Absolute Average Percent Difference							2%	2%

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

	NO	NOx	NO <sub>2</sub>	LIMITS
Correlation Coeff.=	<u>1.0000</u>	<u>1.0000</u>	<u>1.0000</u>	≥ <b>0.995</b>
m (Slope)=	<u>0.9954</u>	<u>0.9946</u>	<u>0.9849</u>	<b>0.85-1.15</b>
b (Intercept as % of full scale)=	<u>-0.2881</u>	<u>-0.2288</u>	<u>0.5055</u>	<b>± 3% F.S.</b>

O <sub>3</sub> Setting	Flow Rate	Indicated Conc. (ppm)			NO Decrease	NO <sub>2</sub> Increase	% Difference vs Audit Gas	
		NO	NOx	NO <sub>2</sub>				
0.000 V	5100	0.774	0.776	0.002	<del>0.410</del>	<del>0.409</del>	<del>0%</del>	%Dif Limit
0.800 V	5100	0.364	0.775	0.411	0.410	0.409	0%	± 15%
0.400 V	5100	0.608	0.779	0.170	0.166	0.168	1%	± 15%
0.287 V	5100	0.675	0.779	0.105	0.099	0.103	4%	± 15%
Absolute Average Percent Difference							2%	

**Converter Efficiency**  
 Average Converter Efficiency 101.7%

**Remarks:** \_\_\_\_\_  
 \_\_\_\_\_



# O<sub>3</sub> ANALYZER AUDIT

File No. 2012 - 236A

Date: September 19, 2012

Performed by: Al Clark

## Station

Name: Elk Point

Location: Elk Point Airport

Facility/Zone: Lica

Operator: Maxxam

Temp. 19.9 C

Barometric Press. 710 mmHg

## Monitor

Make/Model: Teco 49i Serial No: 1002240372

Inlet flow (sccm): 756 / 763 Full Scale Range ppm: 0.5

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

Zero/Bkg -0.2

Span Coeff. 0.992

## Calibrator

Calibration Method: Generator

Make/Model: Sabio 2010

NO cylinder #: N/A

AMU #: 1778

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 V	4984	X	4984	0.000	0.000		
0.795 V	4984	X	4984	0.402	0.402	0%	± 15%
0.429 V	4984	X	4984	0.200	0.195	-3%	± 15%
0.249 V	4984	X	4984	0.101	0.097	-4%	± 15%
Absolute Average Percent Difference						2%	

### Linear Regression Analysis:

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

Correlation Coeff.= 0.9999  
 m (Slope)= 1.0020  
 b (Intercept as % of full scale)= -0.5208

**LIMITS**  
**≥ 0.995**  
**0.85-1.15**  
**± 3% F.S.**

### Remarks:

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# TEOM AUDIT

Date: September 19, 2012      File #: 2012 - 237A  
 Performed by: Al Clark

<b>Station</b>			
Name:	<u>Elk Point</u>	Location:	<u>Elk Point Airport</u>
Facility/Zone:	<u>Lica</u>	Operator:	<u>Maxxam</u>
Temperature:	<u>19.9 C</u>	Barometric Press.:	<u>710 mmHg</u>

<b>Audit Transfer Standard</b>			
Make/Model:	<u>DeltaCal</u>	Cell s/n:	<u>1002</u>
Serial Number:	<u>AMU 1858</u>		
<b>Sampler Set-up and Current Readings</b>			
Make/Model	<u>Teom 1405ab</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>140AB228730001</u>	Filter Load (%)	<u>18</u>
Transducer s/n	<u>140AB228730001</u>	K <sub>O</sub> Factor	<u>14568</u>
		Temp (°C)	<u>14.1</u>
		Press (ATM)	<u>0.93</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

<b>Zero Flow</b>			
<b>Pump Off</b>		<b>Pump On (Time to reach set points)</b>	
F-Main (l/min)	<u>0.07</u>	(45-60 Sec)	<u>50</u>
F-Aux (l/min)	<u>0.18</u>	(45-60 Sec)	<u>55</u>

<b>Temperature/Pressure</b>			
Measured Temp (± 2 °C)	<u>14.4</u>	Δ°C	<u>0.30</u>
Measured Press (± <b>1.5% ATM</b> )	<u>0.934</u>	Δ% ATM	<u>0.43%</u>

<b>Flow Audit</b>			
Indicated Main/Aux Flow (l/min)	<u>2.99</u> <u>13.63</u>	Δ% of Measured Flow from Set-point	
Total Flow = Main + Aux (l/min)	<u>16.62</u>	(± <b>2%</b> )	<u>-0.3%</u> <u>-0.3%</u>
		(± <b>2%</b> )	<u>-0.3%</u>
		Δ of Measured Flow from Indicated	
Measured Total Flow (l/min)	<u>16.99</u>	(± <b>1.00 l/min</b> )	<u>0.37</u>
Measured Main Flow (l/min)	<u>3.02</u>	(± <b>0.20 l/min.</b> )	<u>0.03</u>

<b>Leak Check</b>			
Base (< <b>0.15 l/min</b> )	<u>0.04</u>	Actual leakage = Pump On – Pump Off	<u>-0.03</u>
Ref (< <b>0.65 l/min</b> )	<u>0.19</u>		<u>0.01</u>

<b>K<sub>O</sub> Factor</b>			
Measured	<u>14229</u>	KO in control unit does not match the	
K <sub>O</sub> % Difference (± <b>2.5%</b> )	<u>1.02*</u>	transducer. KO set at 15003 should be	
		14568	

**Remarks:**      KO reset after audit to match transducer unit. Need to verify how an  
incorrect KO affects data.  
% difference is based on KO in transducer.  
Unit installed Aug 16/12.

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

*GENERAL*

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 2012  

X		
X		

COMMENTS:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

AUDITOR:           Al Clark          

DATE:           September 19, 2012



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5107W-50th Street  
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October 31, 2012

Al Clark  
*Monitoring Systems Auditor*  
Alberta Environment and Sustainable Resource Development

McInyre Centre  
4946 – 89 Street  
Edmonton, Alberta T6E 5K1  
Canada

**Re: LICA Ambient Air Monitoring Station Audits**

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LICA has reviewed the data from the audit conducted in September 2012 by the Alberta Environment and Sustainable Resource Development. Two findings were brought to our attention, the Elk Point Hydrocarbon analyzer and the Cold Lake South Particulate Monitor. Both of these units were repaired and recalibrated: the Cold Lake South TEOM on Sept 19th and the Elk Point Hydrocarbon Analyzer on Sept 20th. Data collected from this equipment will be treated as below.

*Elk Point Hydrocarbon*

- Data from the last valid calibration on Sept 17<sup>th</sup> until the analyzer was repaired and recalibrated on Sept 20th will be invalidated.

*Cold Lake South TEOM*

- We have reviewed the data from the audit date back to the last valid leak check and flow audit on August 7<sup>th</sup>. No obvious change or anomaly was observed in the data which would have allowed us to pinpoint when the problem first occurred. Because we cannot with certainty establish when the unit went out of specification, we will invalidate the data back to August 7<sup>th</sup>.

New data reports will be generated and submitted to CASA.

In order to minimize potential data loss in the future from similar equipment problems, LICA will institute a more frequent leak test and flow audit on the TEOMS. Although our present schedule exceeds the requirements of the AMD, we will further increase the frequency of these tests and audits.

LICA regrets the loss of this data and is committed to take the necessary actions to minimize this in the future. If you have any questions, please don't hesitate to contact me. Please let me know if our actions are acceptable as we have made it practice to post the entire audit package on our website for the public to view.

Michael Bisaga

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

Airshed Program Manager  
Lakeland Industry and Community Association

cc: LICA Office

November 19, 2012

File No(s): 2012 – 220A / 241A

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

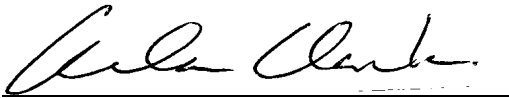
Dear Mr. Bisaga:

**Re: LICA Ambient Air Monitoring Station Audits Closure Letter**

---

Environment Sustainable Resource Development (ESRD) has received and reviewed the content of your letter dated October 31<sup>st</sup>, 2012. Although ESRD has not verified the actions, ESRD is satisfied and considers this audit closed.

Yours truly,



Al Clark  
Monitoring Systems Auditor  
Monitoring Programs & Validation

Attachment(s):

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