

December 9, 2011

Project  
770700

Fort Ransom, North Dakota  
TransCanada Pipeline

Fort Ransom Pump Station

# Operational Noise Study



**ATCO** Noise  
Management

## EXECUTIVE SUMMARY

ATCO Noise Management (ATCO) was retained by TransCanada Pipeline to conduct an Operational Noise Study (ONS) for the Fort Ransom Pump Station (Station), located near Fort Ransom, North Dakota in Ransom County.

Operational noise measurements were conducted at three nearby residential locations over a period of 72 consecutive hours beginning November 29, 2011. The Station was operating under full load, meaning three of four pumps were operational for only the first 24-hrs of the testing period. The daytime (7am – 10pm) and nighttime (10pm – 7am) equivalent sound levels ( $L_{eq}$ ) were used to calculate the day-night average ( $L_{dn}$ ) at the three receptors. Short-term background noises, namely vehicular and coyote activity have been digitally removed during data processing and do not contribute to the published ambient noise levels. Periods of high wind induced noise were also excluded from the analysis. The Federal Energy Regulation Commission (FERC) noise regulation limit is included for comparison.

	Receptor		
Noise Level	R1	R2	R3
Daytime ( $L_{eq}$ , dBA)	35	33	32
Nighttime ( $L_{eq}$ , dBA)	34	36	28
Day-Night ( $L_{dn}$ , dBA)	41	42	35
FERC Limit ( $L_{dn}$ , dBA)	55		

As can be seen from the above calculated day-night level ( $L_{dn}$ ), the Fort Ransom pump station noise levels are well below the FERC limit at the three residential measurement points.

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## **1. INTRODUCTION**

### **1.1 Background**

ATCO Noise Management (ATCO) was retained by TransCanada Energy to conduct an Operational Noise Study for the proposed Fort Ransom Pump Station located near Fort Ransom, North Dakota. The objective is to report the measured ambient noise levels, calculate the day-night level and compare to FERC regulations.

### **1.2 Site Description**

The Fort Ransom Pump Station site is located on the southwest corner of 57<sup>th</sup> St SE and 119<sup>th</sup> Ave SE, approximately 4.5 miles north of Fort Ransom, North Dakota. The surrounding area is predominantly flat agricultural with the closest residence located approximately 0.5 miles southwest of the facility. Operational noise levels are consistent with a quiet rural area with occasional vehicular pass-by's and wind induced vegetation noise.

An aerial view of Fort Ransom Pump Station and the nearest residential receptors (R1-R3) are shown as Figure 1.



**Figure 1: Aerial View of Fort Ransom Pump Station Site and Receptor Locations (R1-R3)**

## 2. PUMP STATION OPERATIONAL NOISE

Starting on November 29, 2011, ATCO measured the Fort Ransom Pump Station operational noise levels for 72-hrs at three residential receptors previously identified in Figure 1. The receptors' (labeled R1-R3) GPS coordinates and distance from the Fort Ransom Pump Station site are listed in Table 1.

**Table 1: Receptor Locations**

Receptor	Owner	GPS	Distance from Fort Ransom Pump Station (ft)	Direction
R1	Anderson	46°34'57.58"N 97°56'35.01"W	2700	SW
R2	Pantzke	46°34'37.69"N 97°55'9.63"W	4800	SE
R3	Kiebke	46°35'44.77"N 97°56'48.64"W	4800	NW

### 2.1 Instrumentation and Setup

Sound level measurements were taken with Brüel & Kjaer Type 2250 handheld analyzers. These are precision sound level meters that meet the ANSI S1.4, Type 1 Specification. The meters were field calibrated for sound measurement and have current laboratory certification which is attached to this report. The microphones were affixed to tripods 5 feet above level ground. Each microphone was equipped with a windscreen to reduce the effects of wind-induced noise.

### 2.2 Meteorological data

Meteorological data was obtained from a portable weather station located near R3 on the Pantzke property. Temperature, relative humidity, wind speed and direction were used for reference during data analysis. Weather conditions were assumed to be identical at all receptor locations. The meteorological data is summarized in Figure 2 and Figure 3.

Scattered precipitation was present from 09:30 November 30 to 04:00 December 1. Excessive wind induced noise was present during the hours of 10:45-14:30 on December 1 and 04:20-09:00 December 2 as wind speeds exceeded 11 mph. These segments of data were discarded during analysis per *ANSI S12.9-1993 Part 3 Quantities and Procedures for Description and Measurement of Environmental Sound*.

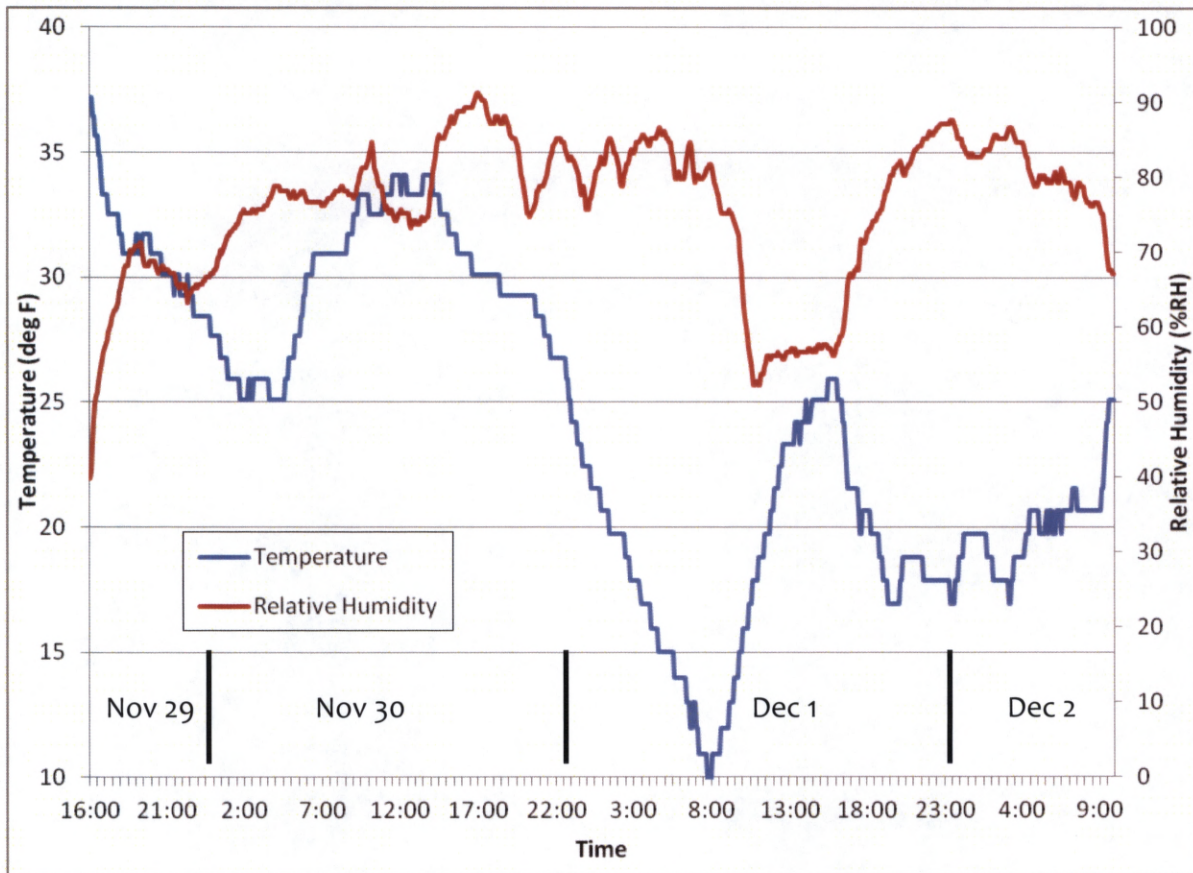
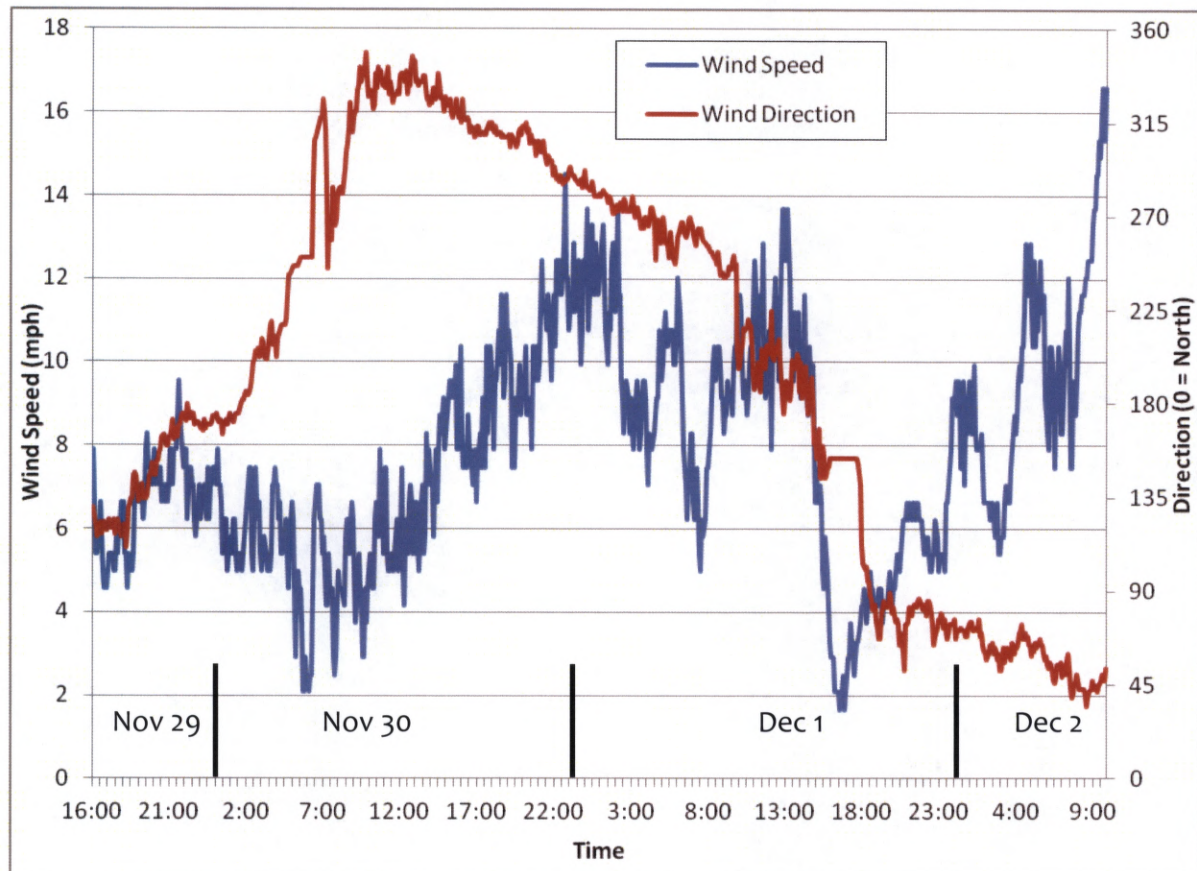


Figure 2: Temperature and RH Nov 29 – Dec 2, 2011



**Figure 3: Wind Speed Nov 29 – Dec 2, 2011**

### 2.3 Measurement Procedure

Noise measurements were recorded starting on Tuesday November 29, 2011 at 3:30pm. Equivalent continuous sound levels, full statistical data and digital recordings were captured in one minute intervals at each measurement location. The meters were removed the morning of November 30<sup>th</sup> for approximately 24-hrs due to precipitation and subsequent high winds. The total measurement duration was 42-hrs over four days. Collected data was then processed in ATCO's Denver office.

Short-term background noise sources were digitally removed during the data processing. Short-term background noises are defined as infrequent sound events that are relatively loud compared to the long-term background sound. At Fort Ransom Pump Station, the short-term background noises consisted of infrequent vehicular pass-by, cattle and avian activity.

## 2.4 Pump Station Operation Condition

The pump station consists of 4 pumps. Their operation condition is dependent on demand on the pipeline. During full load operation, 3 of 4 pumps are operating simultaneously. From a noise perspective, this condition is established as worst-case. Therefore, only noise measurements taken with 3 of 4 pumps in operation are used in data analysis.

The operation condition of each pump during the measurement period is shown in tabular format in Appendix A. Between 11:00 and 13:00 on November 30<sup>th</sup>, note all four pumps were in operation. This is a transient condition considered as an anomaly. However, even if all 4 pumps were in continuous operation over a 24-hr period, the expected noise increase ( $\Delta L$ ) would be calculated as

$$\Delta L = 10 \log \left( \frac{4 \text{ pumps}}{3 \text{ pumps}} \right) = 1.2 \text{ dB}$$

In other words, simply add 1.2 dB to the measured noise levels listed in Table 2 to conservatively calculate the impact of having all 4 pumps in continuous operation over a 24-hr period.

### 3. MEASURED NOISE LEVELS

The sound pressures levels recorded at measurement location R1-R3 are summarized in Table 2. The results are published as daytime and nighttime equivalent sound levels ( $L_{eq}$ ) with the A-frequency weighting. The equivalent sound level is an energy average of the mean square sound pressure over the measurement period. As mentioned in Section 2.4 , only the time period with 3 of 4 pumps in operation is included in the data processing. This consisted of 15:30 Nov 29 to 09:30 Nov 30, a total of 18-hrs.

Also included in the table is the day-night calculation. The day-night noise level is an environmental descriptor of noise over a 24-hr period with a 10 dBA penalty for noise emission during nighttime hours. It is calculated as

$$L_{dn} = 10 \log \left[ \frac{1}{24} \left( 15 \times 10^{L_{eq,d}/10} + 9 \times 10^{(L_{eq,n}+10)/10} \right) \right]$$

where  $L_{eq,d}$  and  $L_{eq,n}$  are the daytime and nighttime equivalent noise levels, respectively.

**Table 2: Measured Noise Level (Nov 29-Nov30, 2011)**

Noise Level	Receptor		
	R1	R2	R3
Daytime ( $L_{eq}$ , dBA)	35	33	32
Nighttime ( $L_{eq}$ , dBA)	34	36	28
Day-Night ( $L_{dn}$ , dBA)	41	42	35
FERC Limit ( $L_{dn}$ , dBA)	55		

The calculated day-night sound level is well below the FERC limit for all three receptor locations during full load pump station operation and is expected to be so under any atmospheric conditions. The day-night noise level would also be below FERC limit for the unrealistic 4 pump operation scenario described in Section 2.4 .

The time profile of the one minute  $L_{eq}$  ( $L_{eq-1min}$ ) measured at the residential receptors is included as Figure 4 through Figure 6. The hashed areas represent data exclusions due to short-term background noises, high winds, precipitation or partial pump station operation as discussed in Sections 2.2 through 2.4 .

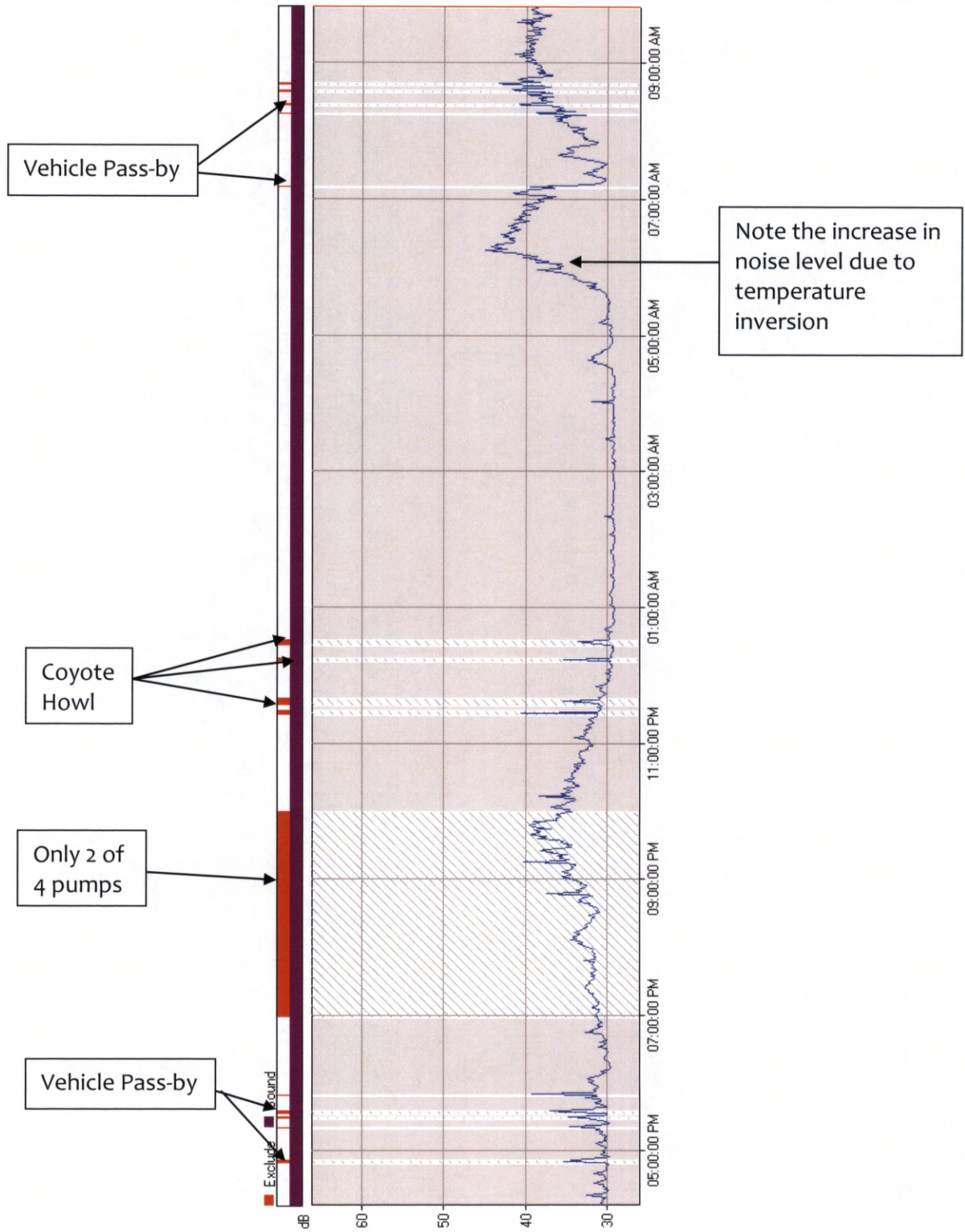


Figure 4: Time Profile ( $L_{eq-1min}$ , dBA) at R1 November 29-30, 2011

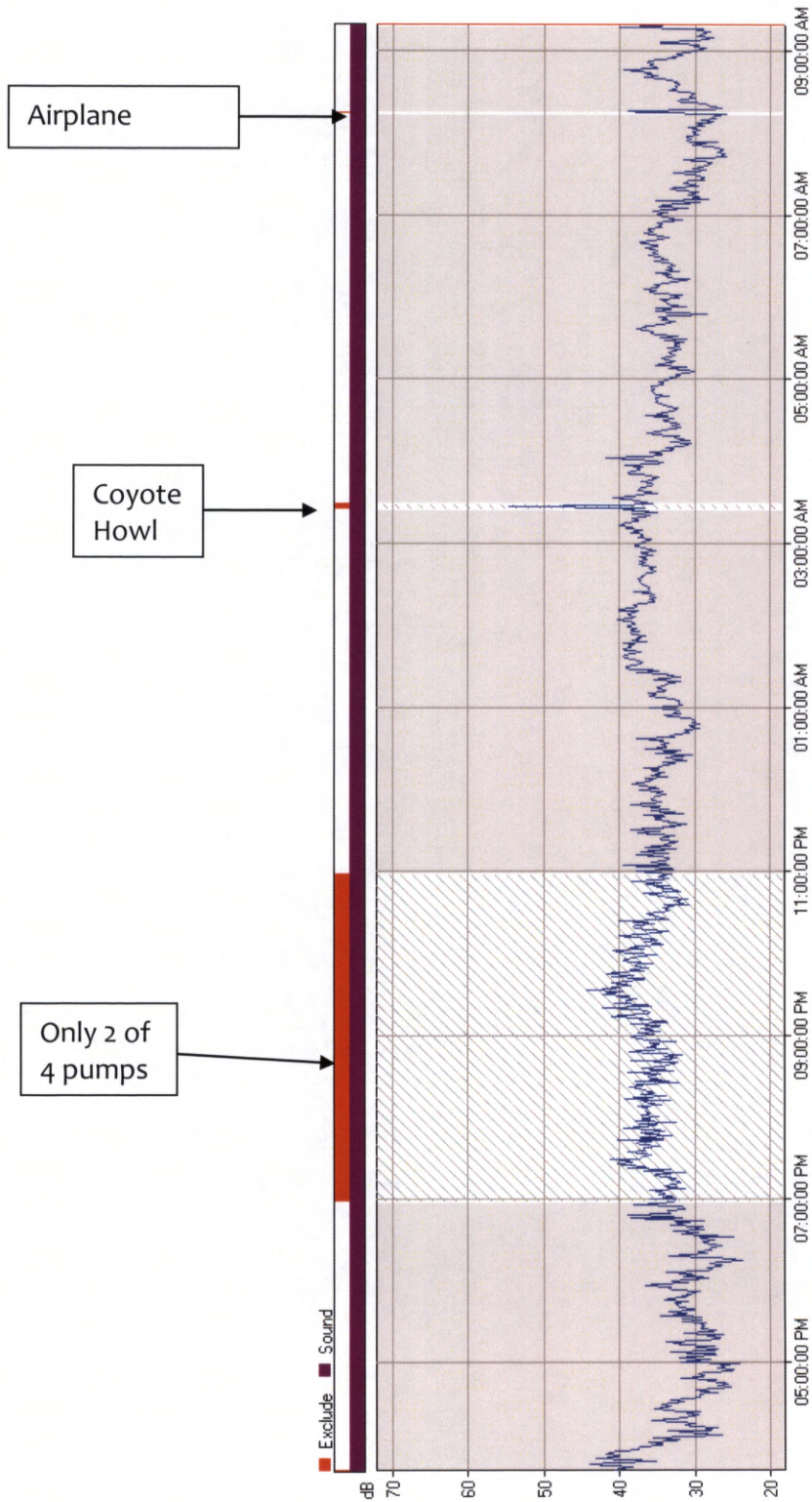


Figure 5: Time Profile ( $L_{eq-1min}$ , dBA) at R2 November 29-30, 2011

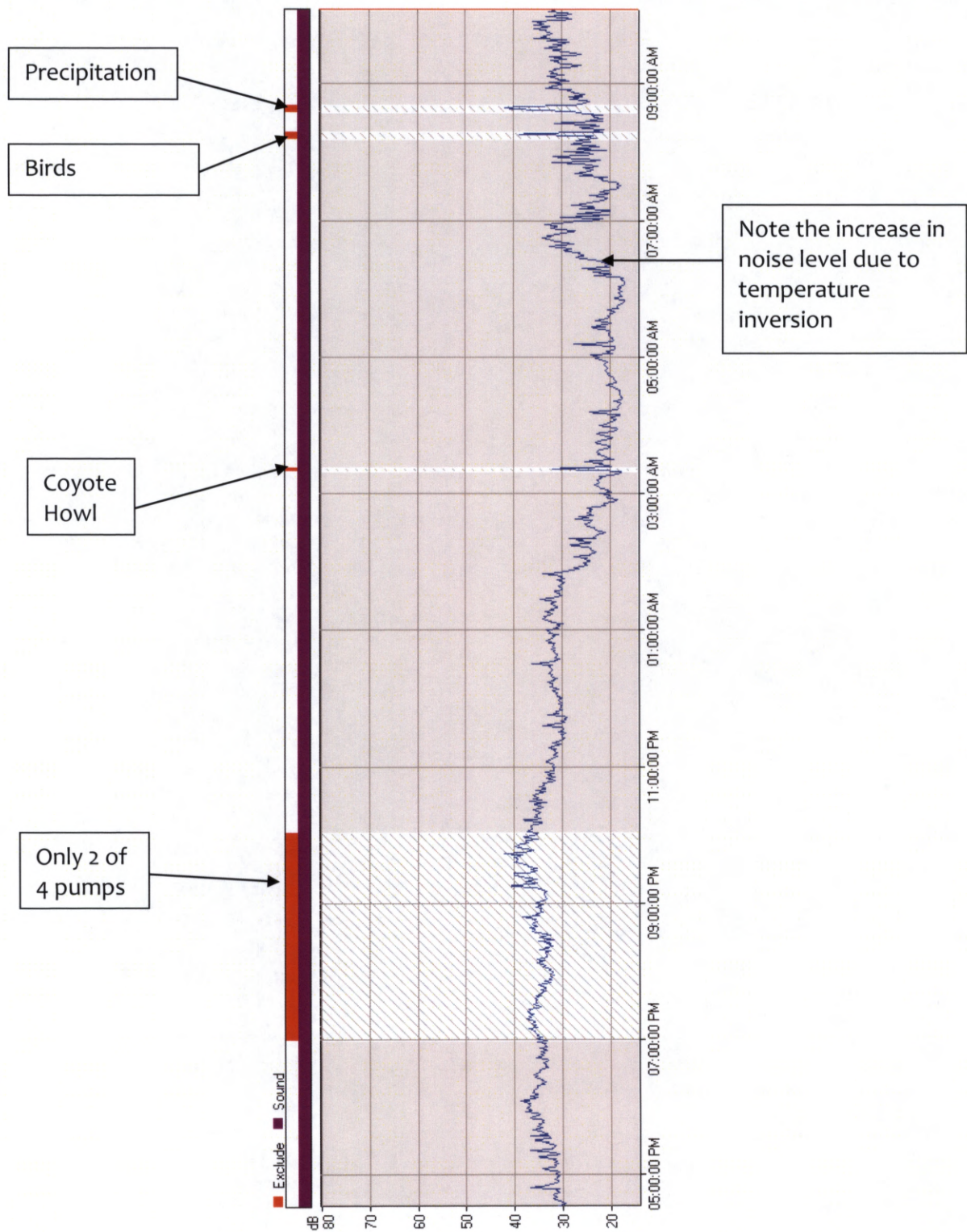


Figure 6: Time Profile ( $L_{eq-1min}$ , dBA) at R3 November 29-30, 2011

#### **4. DISCLAIMER**

This “Operational Noise Study (ONS)”, which is reported in the preceding pages, has been prepared in response to a specific request for service from the Client to whom it is addressed. The information contained in this “ONS” is not intended for the use of, nor is it intended to be relied upon, by any person, firm, or corporation other than the Client to whom it is addressed, with the exception of the applicable regulating authority to whom this document may be submitted for planning permission purposes. We deny any liability whatsoever to other parties who may obtain access to the information contained in this “ONS” for any damages or injury suffered by such third parties arising from the use of this “ONS” by them without the express prior written permission from ATCO and its Client who has commissioned this “ONS”.

#### **ATCO NOISE MANAGEMENT**

Report Prepared by:

Patrick Saussus, P.E.  
Senior Acoustical Engineer

Reviewed by:

Ankit Chadha  
Acoustician

## APPENDIX A: Fort Ransom Pump Station Operation

X = Unit running during hourly period

Date (MM/DD/YY MST)	Pump 1	Pump 2	Pump 3	Pump 4
11/29/11 12:00:00:000		X	X	X
11/29/11 13:00:00:000		X	X	X
11/29/11 14:00:00:000		X	X	X
11/29/11 15:00:00:000		X	X	X
11/29/11 16:00:00:000		X	X	X
11/29/11 17:00:00:000		X	X	X
11/29/11 18:00:00:000		X	X	X
11/29/11 19:00:00:000			X	X
11/29/11 20:00:00:000			X	X
11/29/11 21:00:00:000			X	X
11/29/11 22:00:00:000			X	X
11/29/11 23:00:00:000	X		X	X
11/30/11 00:00:00:000	X		X	X
11/30/11 01:00:00:000	X		X	X
11/30/11 02:00:00:000	X		X	X
11/30/11 03:00:00:000	X		X	X
11/30/11 04:00:00:000	X		X	X
11/30/11 05:00:00:000	X		X	X
11/30/11 06:00:00:000	X		X	X
11/30/11 07:00:00:000	X		X	X
11/30/11 08:00:00:000	X		X	X
11/30/11 09:00:00:000	X		X	X
11/30/11 10:00:00:000	X		X	X
11/30/11 11:00:00:000	X	X	X	X
11/30/11 12:00:00:000	X	X	X	X
11/30/11 13:00:00:000		X	X	X
11/30/11 14:00:00:000		X	X	X
11/30/11 15:00:00:000		X	X	X
11/30/11 16:00:00:000			X	X
11/30/11 17:00:00:000			X	X
11/30/11 18:00:00:000			X	X
11/30/11 19:00:00:000			X	X
11/30/11 20:00:00:000			X	X
11/30/11 21:00:00:000			X	X
11/30/11 22:00:00:000			X	X
11/30/11 23:00:00:000			X	X
12/01/11 00:00:00:000			X	X
12/01/11 01:00:00:000			X	X
12/01/11 02:00:00:000			X	X
12/01/11 03:00:00:000			X	X
12/01/11 04:00:00:000			X	X
12/01/11 05:00:00:000			X	X
12/01/11 06:00:00:000			X	X
12/01/11 07:00:00:000			X	X

Date (MM/DD/YY MST)	Pump 1	Pump 2	Pump 3	Pump 4
12/01/11 08:00:00:000			X	X
12/01/11 09:00:00:000			X	X
12/01/11 10:00:00:000				
12/01/11 11:00:00:000				
12/01/11 12:00:00:000				
12/01/11 13:00:00:000				X
12/01/11 14:00:00:000				X
12/01/11 15:00:00:000				X
12/01/11 16:00:00:000				X
12/01/11 17:00:00:000				X
12/01/11 18:00:00:000				X
12/01/11 19:00:00:000				X
12/01/11 20:00:00:000				X
12/01/11 21:00:00:000				X
12/01/11 22:00:00:000				X
12/01/11 23:00:00:000				X
12/02/11 00:00:00:000				X
12/02/11 01:00:00:000				X
12/02/11 02:00:00:000				X
12/02/11 03:00:00:000				X
12/02/11 04:00:00:000				X
12/02/11 05:00:00:000				X
12/02/11 06:00:00:000	X			X
12/02/11 07:00:00:000	X			X
12/02/11 08:00:00:000	X	X		X
12/02/11 09:00:00:000	X	X		X
12/02/11 10:00:00:000				
12/02/11 11:00:00:000				X
12/02/11 12:00:00:000			X	X



## Certificate of Compliance and Calibration

**Calibrated for:**

Mr. Patrick Saussus  
ATCO Structures & Logistics  
8 West Dry Creek Circle  
Suite 207  
Littleton, CO 80120

P.O.#  
Client#A-106  
EDI Job#CR-4977-1 ID# 6

**Model Number:** 2250 SOUND LEVEL ANALYZER w/Microphone 4189 SN:2509067

**Serial No.:** 2506114

**Calibration Date:** 11/08/11

**Calibration Due Date:** 11/08/12

**Calibration Conditions:**

Pre-Calibration: Initial testing found the equipment to be **IN-SPECIFICATION** at the points tested.

@94.0dB/1KHz= 93.8dB

Post-calibration: At the completion of the calibration, measured values were **IN-SPECIFICATION** at the points tested

@94.0dB/1KHz= 94.0dB

**PRESSURE:** 839.3 hPa.    **TEMPERATURE:** 21.6 deg. C    **HUMIDITY:** 14.7 %

Engineering Dynamics, Inc. does hereby certify that the above referenced SOUND LEVEL ANALYZER meets the requirements of the American National Standards Institute and/or, if applicable; OSHA, MSHA, and the Manufacturer's Specifications, and is traceable to NIST.

**Standards Used and Their Due Dates:**

Measuring Amp	B&K 2636	SN: 1943590	Cert # 1-221160117-101	06/09/12
Piston Phone	B&K 4228	SN: 1747024	Cert # 1-231468437-707	05/16/12
Calibrator	B&K 4231	SN: 2122969	Cert # 1-231468437-707	05/16/12

Certification for this instrument is valid for  
*one year from the calibration date of this certificate.*

CALIBRATED BY

Tuesday, November 08, 2011  
DATE

This certificate shall not be reproduced, except in full, without the written approval of Engineering Dynamics, Inc.

**Engineering Dynamics, Inc.**  
3925 S. Kalamath Street  
Englewood, CO 80110  
303-761-4367 ♦ 303-761-4379 Fax  
www.engdynamics.com ♦ john@engdynamics.com

**West Caldwell Calibration Laboratories Inc.**

# Certificate of Calibration

for

**HAND-HELD ANALYZER**

**Manufactured by:** BRUEL & KJAER  
**Model No:** 2250  
**Serial No:** 2630388  
**Calibration Recall No:** 21087

**Submitted By:**

**Customer:**

**Company:** ATCO Structures & Logistics Ltd.  
**Address:**

The subject instrument was calibrated to the indicated specification using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Procedure No. 2250 BRUE

Upon receipt for Calibration, the instrument was found to be:

Within ( X ) see attached Report of Calibration.

the tolerance of the indicated specification.

West Caldwell Calibration Laboratories' calibration control system meets the requirements, ISO 10012-1 MIL-STD-45662A, ANSI/NCSL Z540-1, IEC Guide 25, ISO 9001:2008 and ISO 17025.

Note: With this Certificate, Report of Calibration is included.

Approved by:

Calibration Date: 29-Jul-11

Certificate No: 21087 - 1

QA Doc. #1051 Rev. 2.0 10/1/01

Certificate Page 1 of 1

  
Felix Christopher  
Quality Manager

  
West Caldwell  
Calibration  
Laboratories, Inc.  
uncompromised calibration  
1575 State Route 96, Victor, NY 14564, U.S.A.

ISO 9001:2008  
Registered Company  
Calibration Traceable  
To N. I. S. T.

Phone: (585) 586-3900 Fax.: (585) 586-4327



**West Caldwell Calibration Laboratories Inc.**

# Certificate of Calibration

for

**MICROPHONE**

**Manufactured by:** BRUEL & KJAER  
**Model No:** 4189  
**Serial No:** 2638566  
**Calibration Recall No:** 21087

**Submitted By:**

**Customer:**

**Company:** ATCO Structures & Logistics Ltd.  
**Address:**

The subject instrument was calibrated to the indicated specification using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Procedure No. 4189 BRUE

Upon receipt for Calibration, the instrument was found to be:

Within ( X ) see attached Report of Calibration.

the tolerance of the indicated specification.

West Caldwell Calibration Laboratories' calibration control system meets the requirements, ISO 10012-1 MIL-STD-45662A, ANSI/NCSL Z540-1, IEC Guide 25, ISO 9001:2008 and ISO 17025.

Note: With this Certificate, Report of Calibration is included.

**Approved by:**

**Calibration Date:** 29-Jul-11

**Certificate No:** 21087 - 2

QA Doc. #1051 Rev. 2.0 10/1/01

Certificate Page 1 of 1

  
Felix Christopher  
Quality Manager

  
**West Caldwell  
Calibration  
Laboratories, Inc.**  
uncompromised calibration  
1575 State Route 96, Victor, NY 14564, U.S.A.

ISO 9001:2008  
Registered Company  
Calibration Traceable  
To N. I. S. T.

Phone: (585) 586-3900 Fax.: (585) 586-4327



**Scantek, Inc.**  
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1  
ACCREDITED by NVLAP (an ILAC and APLAC signatory)



NVLAP Lab Code: 200625-0

## Calibration Certificate No.23424

**Instrument:** Acoustical Calibrator  
**Model:** 4231  
**Manufacturer:** Brüel and Kjær  
**Serial number:** 2699169  
**Class (IEC 60942):** 1  
**Barometer type:**  
**Barometer s/n:**

**Date Calibrated:** 2/24/2011 **Cal Due:**  
**Status:**

Received	Sent
X	X

  
**In tolerance:**

X	X
---	---

  
**Out of tolerance:**

--	--

  
**See comments:**

X	
---	--

  
**Contains non-accredited tests:**    Yes    X No

**Customer:** ATCO Noise Management  
**Tel/Fax:** 281-741-6013 / -6014

**Address:** 10235 West Little York Road, Suite 445  
Houston, TX 77040

**Tested in accordance with the following procedures and standards:**  
Calibration of Acoustical Calibrators, Scantek Inc., 06/06/2005

**Instrumentation used for calibration:** Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
483B-Norsonic	SME Cal Unit	25747	Jan 4, 2011	Scantek, Inc./ NVLAP	Jan 4, 2012
DS-360-SRS	Function Generator	61646	Nov 13, 2009	ACR Env. / A2LA	Nov 13, 2011
34401A-Agilent Technologies	Digital Multimeter	MY41022043	Nov 17, 2010	ACR Env. / A2LA	Nov 17, 2011
DPI 141-Druck	Pressure Indicator	790/00-04	Dec 13, 2010	ACR Env. / A2LA	Dec 13, 2012
8903A-HP	Audio Analyzer	2514A05691	Dec 1, 2010	ACR Env./ A2LA	Dec 1, 2013
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	V3820001	Nov 25, 2009	ACR Env./ A2LA	May 25, 2011
PC Program 1018 Norsonic	Calibration software	v.5.0	Validated July 2009	-	
1253-Norsonic	Calibrator	28326	Dec 6, 2010	Scantek, Inc./ NVLAP	Dec 6, 2011
1203-Norsonic	Preamplifier	14059	Jan 5, 2011	Scantek, Inc./ NVLAP	Jan 5, 2012
4180-Brüel&Kjær	Microphone	2246115	Dec 14, 2009	NPL (UK) / UKAS	Dec 14, 2011

**Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK)**

<b>Calibrated by</b>	Valentin Buzduga	<b>Checked by</b>	Mariana Buzduga
Signature		Signature	
Date	2/24/2011	Date	2/24/2011

Calibration Certificates or Test Reports shall not be reproduced, except in full, without written approval of the laboratory. This Calibration Certificate or Test Reports shall not be used to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the federal government.

Document stored as: Z:\Calibration Lab\Cal 2011\BNK4231\_2699169\_M3.doc

Page 1 of 2

**Scantek, Inc.**  
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1 and  
relevant requirements of ISO 9002:1994 ACCREDITED  
by NVLAP (an ILAC and APLAC signatory)



NVLAP Lab Code: 200625-0

## Calibration Certificate No.23100

**Instrument:** Sound Level Meter  
**Model:** 2250  
**Manufacturer:** Brüel and Kjær  
**Serial number:** 2704733  
**Tested with:** Microphone 4189 s/n 2689690  
Preamplifier ZC0032 s/n 11601  
**Type (class):** 1  
**Customer:** ATCO Noise Management  
**Tel/Fax:** 518-275-0242 /

**Date Calibrated:** 12/21/2010 **Cal Due:**  
**Status:**

Received	Sent
X	X

  
**In tolerance:**

X	X
---	---

  
**Out of tolerance:**

--	--

  
**See comments:**  
**Contains non-accredited tests:**  Yes  No  
**Calibration service:**  Basic  Standard  
**Address:** 125 Wolf Road, Suite 502  
Albany, NY 12205

**Tested in accordance with the following procedures and standards:**

Calibration of Sound Level Meters, Scantek Inc., 06/07/2005  
SLM & Dosimeters – Acoustical Tests, Scantek Inc., 06/15/2005

**Instrumentation used for calibration: Nor-1504 Norsonic Test System:**

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
483B-Norsonic	SME Cal Unit	25747	Dec 24, 2009	Scantek, Inc./ NVLAP	Dec 24, 2010
DS-360-SRS	Function Generator	61646	Nov 13, 2009	ACR Env. / A2LA	Nov 13, 2011
34401A-Agilent Technologies	Digital Multimeter	MY41022043	Nov 17, 2010	ACR Env. / A2LA	Nov 17, 2011
HM30-Thommen	Meteo Station	1040170	Jun 26, 2010	ACR Env. / A2LA	Dec 26, 2011
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	V3820001	Nov 25, 2009	ACR Env. / A2LA	May 25, 2011
PC Program 1019 Norsonic	Calibration software	v.5.0	Validated July 2009	-	-
1253-Norsonic	Calibrator	25726	Dec 7, 2010	Scantek, Inc./ NVLAP	Dec 7, 2011

**Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).**

**Environmental conditions:**

Temperature (°C)	Barometric Pressure (kPa)	Relative Humidity (%)
24.4 °C	100.15 kPa	32.3 %RH

Calibrated by	Valentin Buzduga	Checked by	Mariana Buzduga
Signature		Signature	
Date	12/21/2010	Date	12/21/2010

Calibration Certificates or Test Reports shall not be reproduced, except in full, without written approval of the laboratory.  
This Calibration Certificate or Test Reports shall not be used to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the federal government.  
Document stored as: Z:\Calibration Lab\SLM 2010\BNK2250\_2704733\_M1.doc

**Scantek, Inc.**  
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NC SL Z540:1994 Part 1  
and relevant requirements of ISO 9002:1994  
ACCREDITED by NVLAP (an ILAC and APLAC  
signatory)



NVLAP Lab Code: 200625-0

## Calibration Certificate No.23101

**Instrument:** Microphone  
**Model:** 4189  
**Manufacturer:** Brüel & Kjær  
**Serial number:** 2689690

**Date Calibrated:** 12/21/2010 **Cal Due:**  
**Status:**

Received	Sent
X	X

  
**In tolerance:**

X	X
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**Out of tolerance:**

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**See comments:**

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**Contains non-accredited tests:**    Yes   X   No

**Customer:** ATCO Noise Management  
**Tel/Fax:** 518-275-0242/

**Address:** 125 Wolf Road, Suite 502  
Albany, NY 12205

**Tested in accordance with the following procedures and standards:**

Procedure for Calibration of Measurement Microphones, Scantek Inc., 06/15/2005

**Instrumentation used for calibration: N-1504 Norsonic Test System:**

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
483B-Norsonic	SME Cal Unit	25747	Dec 24, 2009	Scantek, Inc./ NVLAP	Dec 24, 2010
DS-360-SRS	Function Generator	61646	Nov 13, 2009	ACR Env. / A2LA	Nov 13, 2011
34401A-Agilent Technologies	Digital Multimeter	MY41022043	Nov 17, 2010	ACR Env. / A2LA	Nov 17, 2011
HM30-Thommen	Meteo Station	1040170	Jun 26, 2010	ACR Env. / A2LA	Dec 26, 2011
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	V3820001	Nov 25, 2009	ACR Env./ A2LA	May 25, 2011
PC Program 1017 Norsonic	Calibration software	v.5.0	Validated July 2009	-	-
1253-Norsonic	Calibrator	28326	Dec 6, 2010	Scantek, Inc./ NVLAP	Dec 6, 2011
1203-Norsonic	Preamplifier	14059	Jan 4, 2010	Scantek, Inc./ NVLAP	Jan 4, 2011
4180-Brüel&Kjær	Microphone	2246115	Dec 14, 2009	NPL (UK) / UKAS	Dec 14, 2011

**Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)**

<b>Calibrated by</b>	Valentin Buzduga	<b>Checked by</b>	Mariana Buzduga
Signature		Signature	
Date	12/21/2010	Date	12/21/2010

Calibration Certificates or Test Reports shall not be reproduced, except in full, without written approval of the laboratory.  
This Calibration Certificate or Test Reports shall not be used to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the federal government.

Document stored as: Z:\Calibration Lab\Mic 2010\B&K4189\_2689690\_M1.doc



Kiebke Receptor

ML 171

Ft. Ransom

Anderson Receptor

ML 172

Pantzke Receptor

ACCESS ROAD

Pantzke Access

Google

Imagery Date: Jun 23, 2009

46°35'07.00" N 97°55'58.27" W elev 1353 ft

Eye alt 13644 ft