

December 9, 2011

Project
770700

Fort Ransom, North Dakota
TransCanada Pipeline

Fort Ransom Pump Station

Operational Noise Study



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.

| 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 | | |

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 57th St SE and 119th 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.

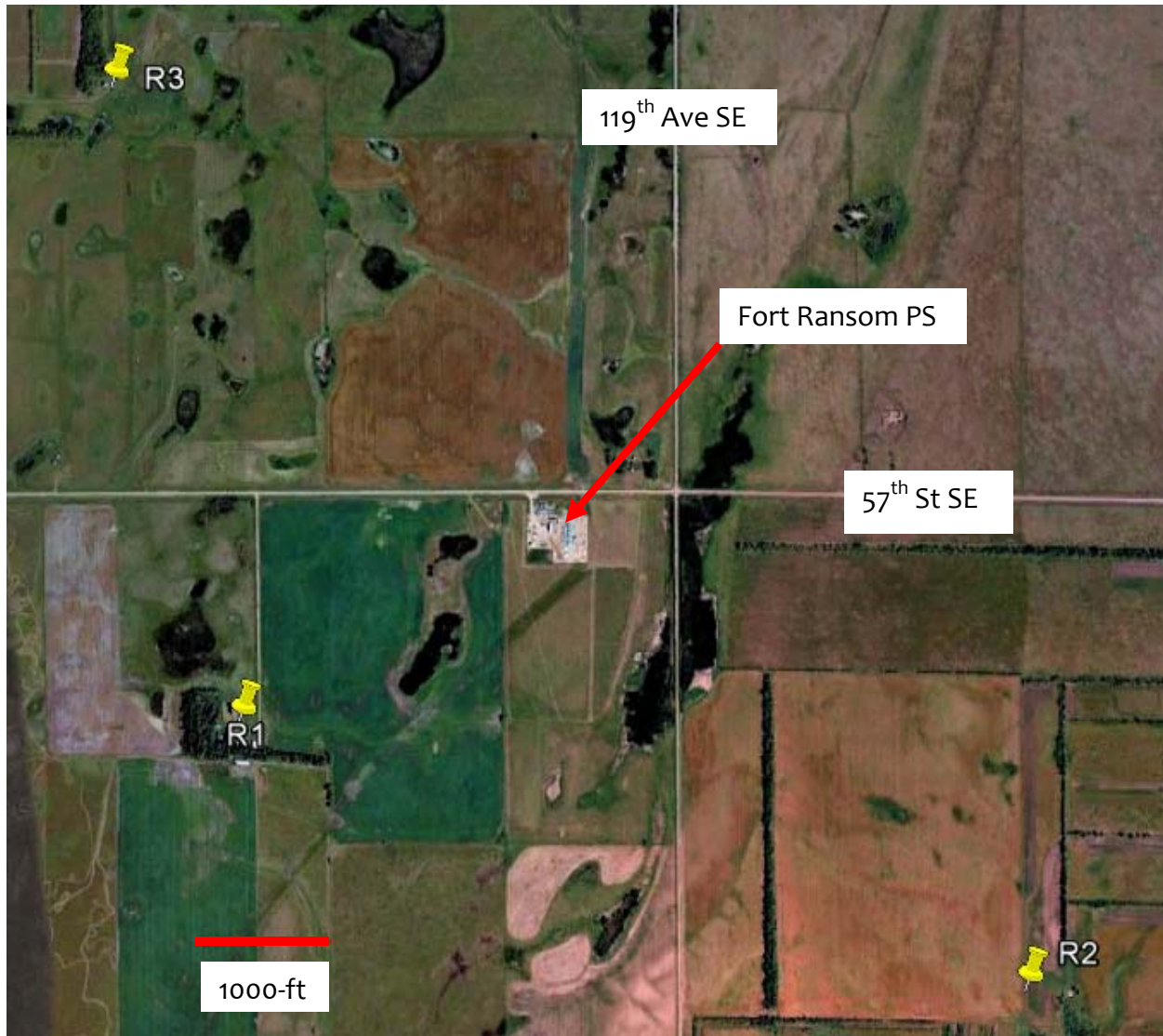


Figure 1: Aerial View of Fort Ransom Pump Station Site and Receptor Locations (R1-R3)

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*.

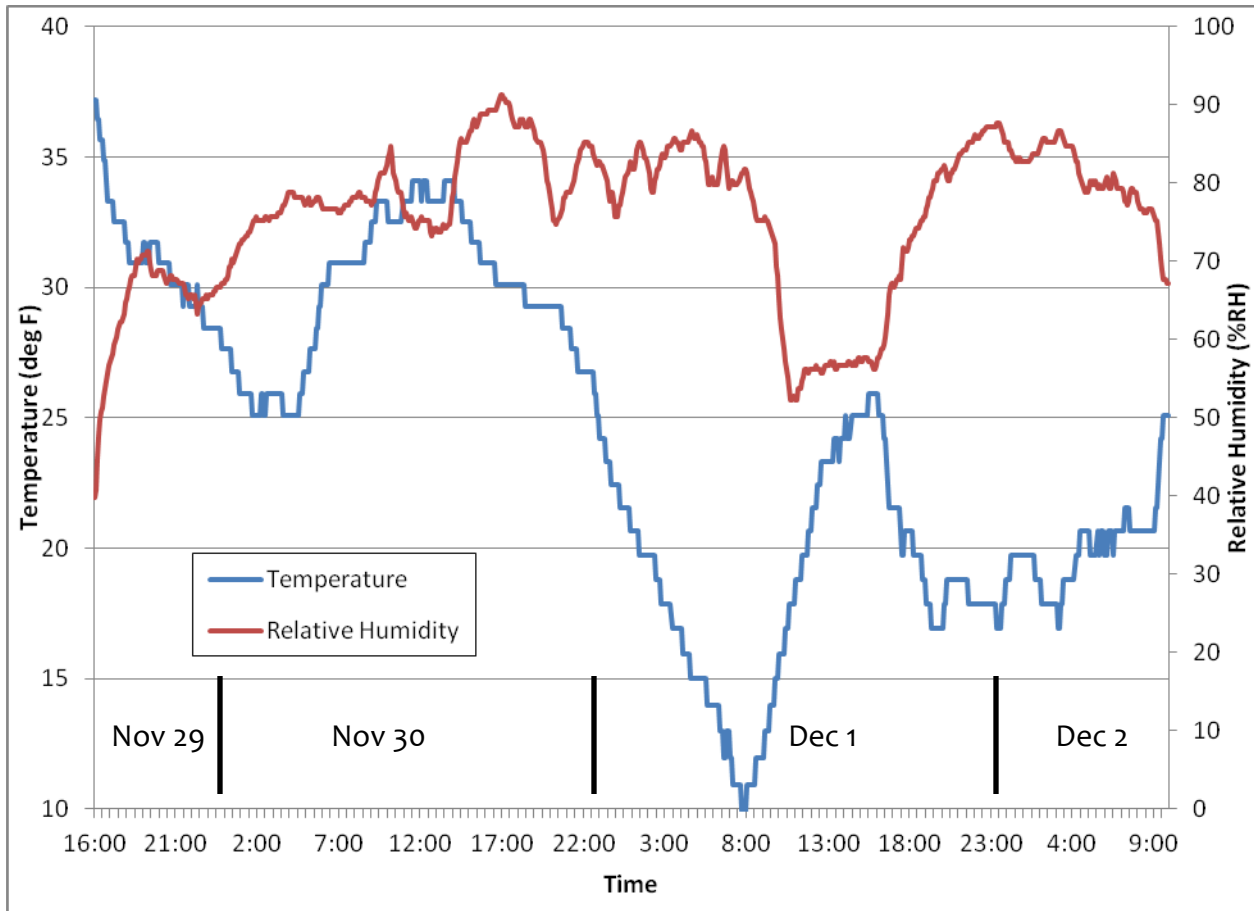


Figure 2: Temperature and RH Nov 29 – Dec 2, 2011

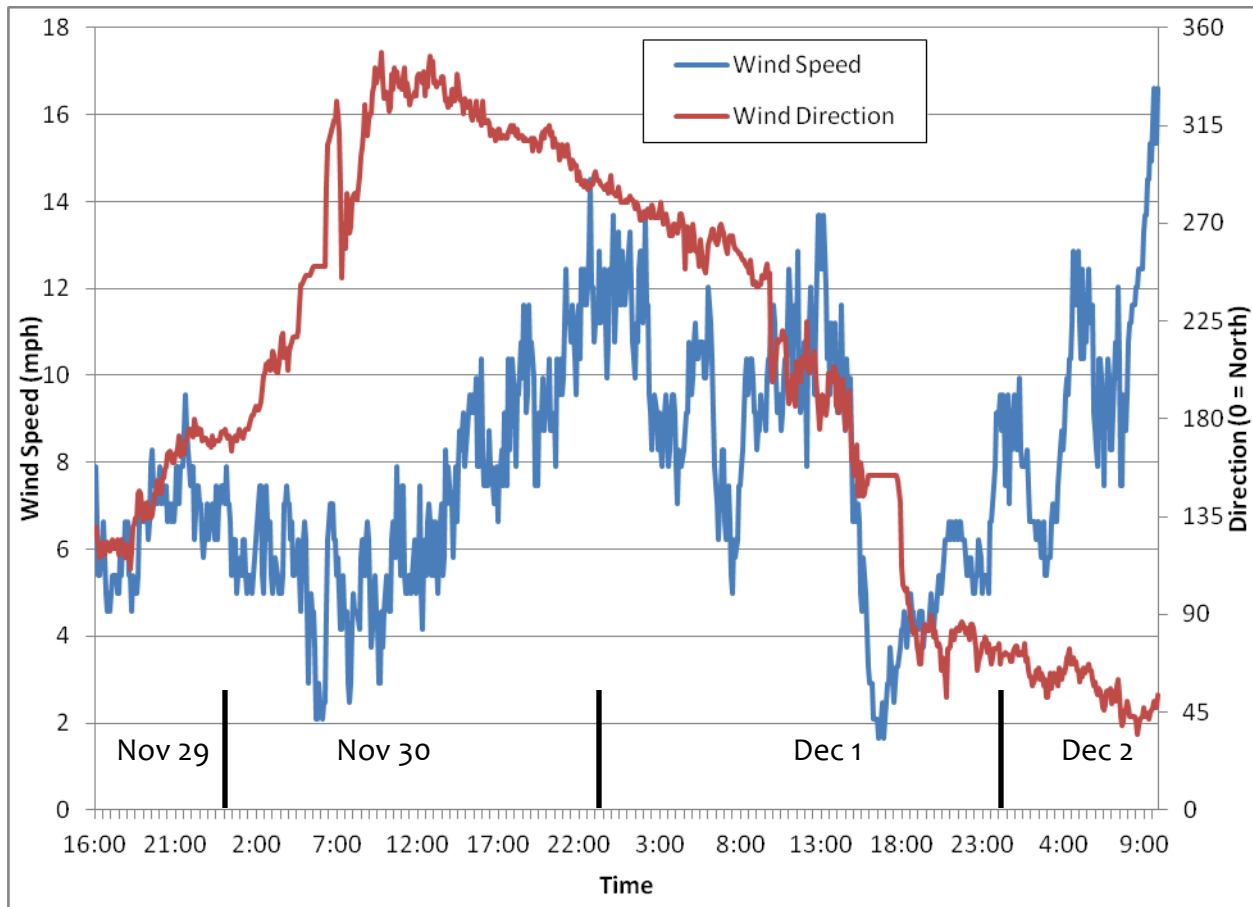


Figure 3: Wind Speed Nov 29 – Dec 2, 2011

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 30th 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 30th, 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 (ΔL) 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 .

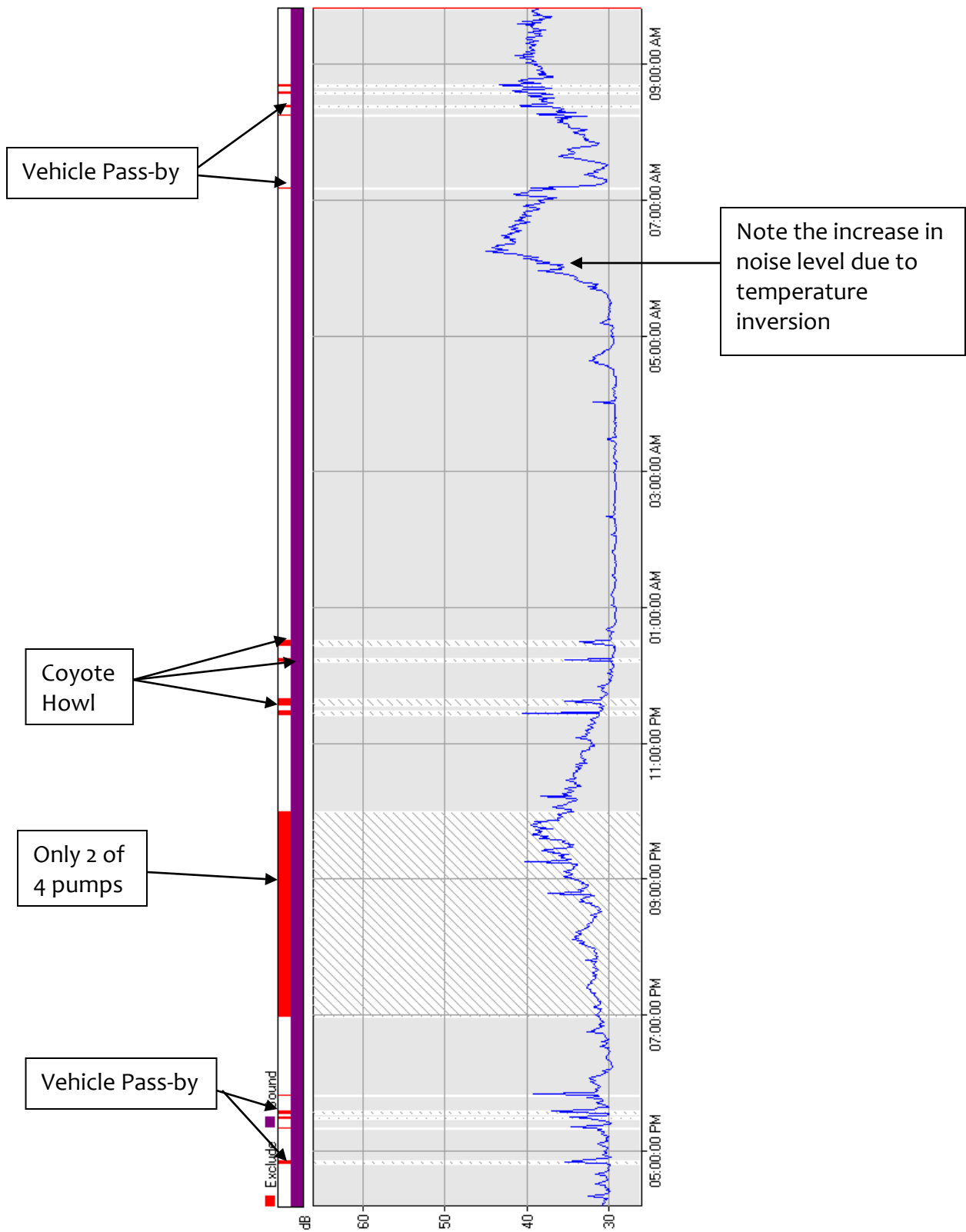


Figure 4: Time Profile ($L_{eq-1min}$, dBA) at R1 November 29-30, 2011

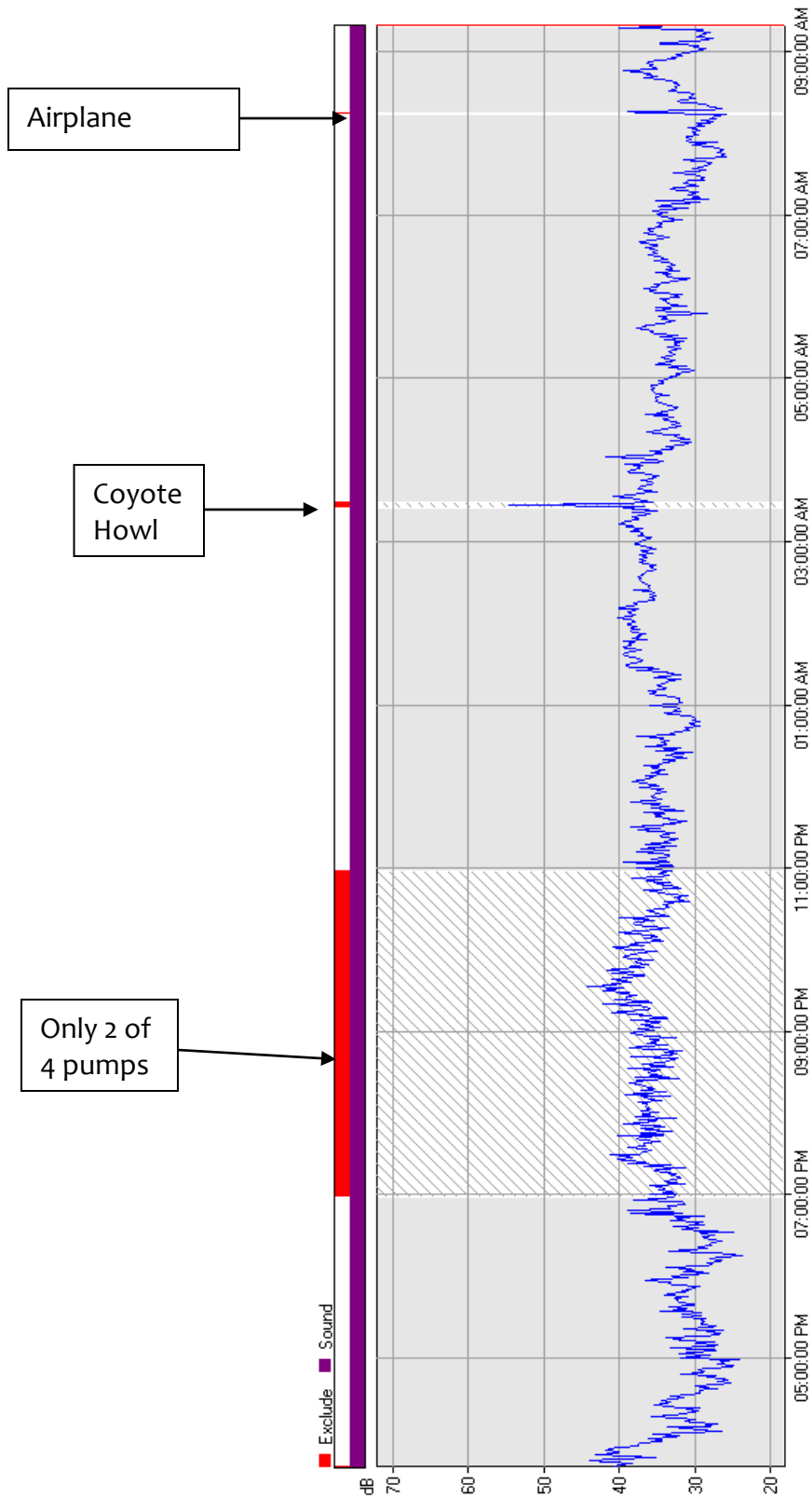


Figure 5: Time Profile ($L_{eq-1min}$, dBA) at R2 November 29-30, 2011

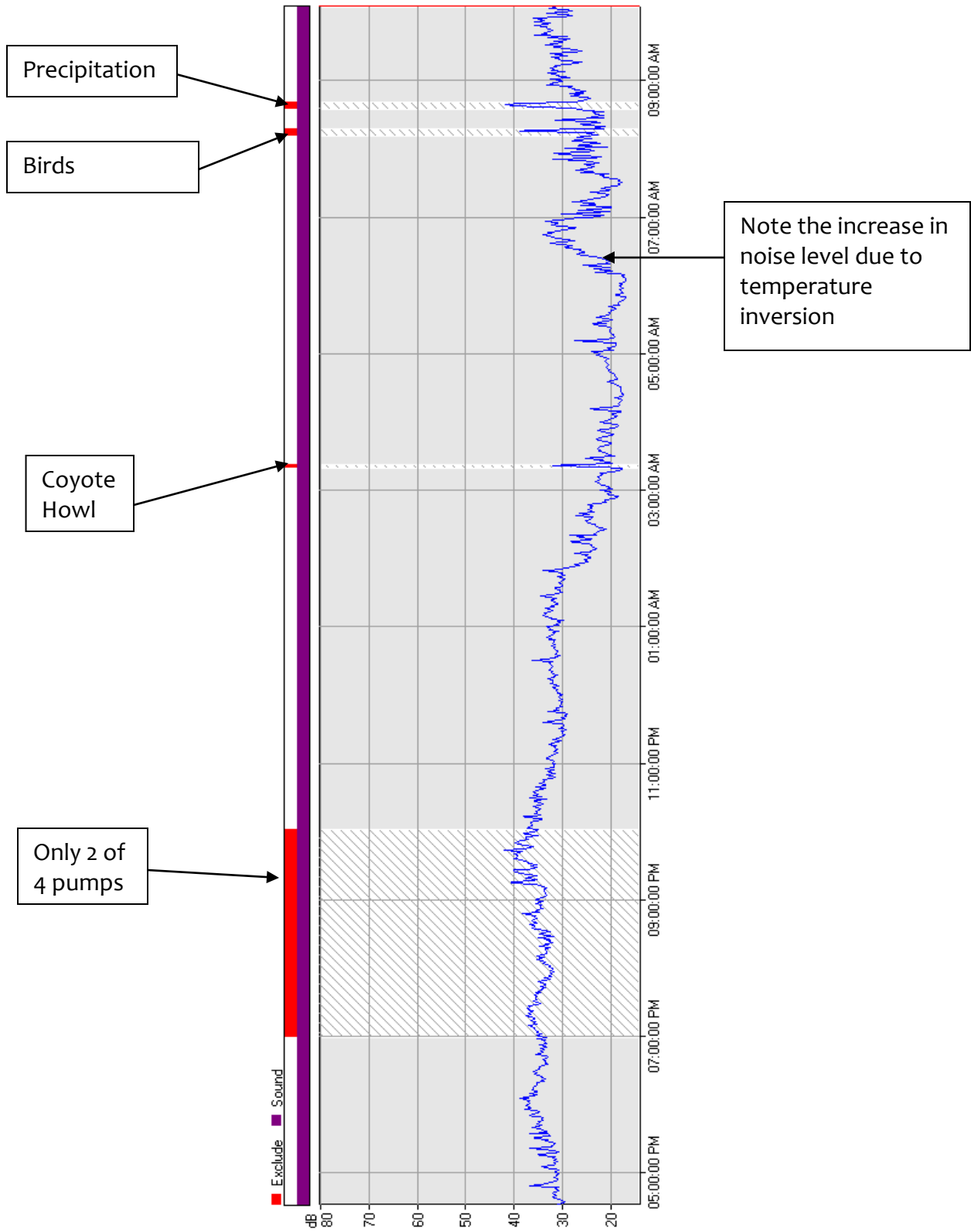


Figure 6: Time Profile ($L_{eq-1min}$, dBA) at R3 November 29-30, 2011

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:

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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 |
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| 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/NCSS 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[®]

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

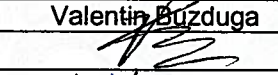
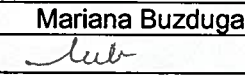
Address: 10235 West Little York Road, Suite 445
Houston, TX 77040

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)

| Calibrated by | Valentin Buzduga | Checked by | 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

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 X No
Calibration service: Basic X 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


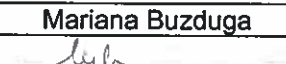
Instrumentation used for calibration: Nor-1504 Norsonic Test System:

| 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.

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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: _____
Out of tolerance: _____
See comments: _____
Contains non-accredited tests: Yes 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)

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

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