Appendix F8

Report On 2009 Noise Monitoring Meadowbank Gold Project, Nunavut, February 2010

February 4, 2010

CELEBRATING 50 YEARS in 2010

REPORT ON

2009 NOISE MONITORING - MEADOWBANK GOLD PROJECT, NUNAVUT

Submitted to:
Agnico-Eagle Mines Limited
Meadowbank Division
P.O. Box 540
Baker Lake, Nunavut
X0C 0A0

REPORT

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Executive Summary

Golder Associates Ltd. (Golder) was retained by Agnico-Eagle Mining Ltd. (AEM) to compile the results of the 2009 noise monitoring program in support of the noise management plan (Cumberland 2005) as developed and approved for the Meadowbank Gold Project under the Nunavut Impact Review Board (NIRB) review process.

The objective of the noise monitoring program is to provide a measure of existing noise levels at the following five receptor locations (Table ES-1):

Table ES-1: 2009 Meadowbank Gold Noise Monitoring Locations (UTM NAD83)

Monitoring Location	Easting	Northing
R1	636896	7216829
R2	636795	7214435
R3	641102	7214421
R4	639552	7218808
R5	633916	7214771

The monitoring program was conducted by AEM field staff and consisted of collecting two sets of noise measurements at each of the five monitoring locations. The first set of data was measured between July 21 and 27, 2009 and the second set between August 15 and 24, 2009. Table ES-2 summarizes the L_{eq} noise level results for the two measurement periods at the five monitoring locations. The results follow the Health Canada time period guidelines: daytime (7:00 AM to 11:00 PM), night-time (11:00 PM to 7:00 AM), 1-hour (10:00 PM to 11:00 PM), and a 24-hour time-average for the five monitoring locations identified for the Project.

Table ES-2: 2009 Meadowbank Gold Noise Measurement Summary

Monitoring Location	Noise Measurements (dBA)							
	$L_{eq, day}$		$L_{eq, night}$		$L_{eq, 24hr}$		$L_{eq, 1hr}$	
	21/07/09 to 27/07/09	15/08/09 to 24/08/09	21/07/09 to 27/07/09	15/08/09 to 24/08/09	21/07/09 to 27/07/09	15/08/09 to 24/08/09	21/07/09 to 27/07/09	15/08/09 to 24/08/09
R1	57	61	41	57	55	60	39	35
R2	30	46	31	39	31	45	24	38
R3	40	43	36	45	39	44	32	42
R4	41	46	35	39	40	44	29	25
R5	57	51	47	42	56	49	34	39

The results represent the potential variability in noise levels at all five monitoring locations. The variability is influenced by the project activities as well as the natural environment. Project activities such as helicopter and

aircraft traffic, construction, and blasting were noted as contributing noise sources for all receptors. The frequency and location of project activities influenced the measured levels at the receptors by different extents. In addition to the project activities, sound from the natural environment such as wind, waves (along lake shore), insects, birds, and animals also contributed to the measurements.

The measured levels provide a snapshot of the acoustic environment in this phase of project; however, noise associated with current activities such exploration and construction is not expected to occur long term. Currently, measurements at locations R2 and R3 were observed to have a minimum of influence from project related activity, and therefore could be considered representative of ambient conditions, particularly during the July measurement period. All other measurements were noted to have experienced influence from the project and are therefore are considered representative of the current combined construction/operation activity. As this is the first year of monitoring, trends cannot yet be analysed or discussed.

Study Limitations

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1.0 INTRODUCTION

The Meadowbank Gold Project (the Project) is located in the Kivalliq region approximately 70 km north of the Hamlet of Baker Lake on Inuit-owned surface lands. The Project consists of ten Crown mining leases (7,395 hectares) and three Nunavut Tunngavik Inc exploration concessions (23,126 hectares). A development permit has been granted for this area, where significant exploration and preparatory construction activity is being conducted.

This noise study was completed to establish the existing noise levels near the Project in support of the noise management plan (Cumberland 2005) as developed and approved for the Meadowbank Gold Project under the Nunavut Impact Review Board (NIRB) review process.

The noise survey was completed by AEM field staff and was conducted twice at five monitoring locations during two measurement periods. The first set of measurements were conducted between July 21 and 27, 2009, and the second set between August 15 and 24, 2009. The survey was completed with the intent to measure representative noise in the vicinity of the Project due to various Project activities, as well as the acoustic baseline for the area.

The following provides an overview of the 2009 Noise Measurement Report organization:

- Section 2 describes the site and area;
- Section 3 outlines the methods used for the monitoring program;
- Section 4 shows the results of the noise monitoring program;
- Section 5 presents weather data collected during the measurement periods; and
- Section 6 provides a discussion and summary of the results.

An introduction to the concepts and theories used in noise measurement is provided in Appendix A to aid the non-technical reader.

The reader is referred to the *Study Limitations* which precedes the text and forms an integral part of this report.

2.0 NOISE MONITORING LOCATION SELECTION

Five locations for 24-hour noise monitoring were selected based on areas potentially affected by the project. Table 1 summarizes the UTM coordinates of the selected monitoring locations. Figure 1 shows the location of the noise monitoring sites relative to the mine plan. Appendix B presents photographs taken at all monitoring locations.

Table 1: Selected Noise Monitoring Sites (UTM NAD 83)

Monitoring Location	Easting	Northing
R1	636896	7216829
R2	636795	7214435
R3	641102	7214421
R4	639552	7218808
R5	633916	7214771

3.0 METHODS

The noise monitoring surveys were conducted by AEM field staff. Two 24-hour surveys were conducted at each of the five locations described in Section 2. Surveys of this type and duration provide information on daily variability in noise levels as well as an expected typical or average daily noise level condition.

3.1 Monitoring Methods

Model 2250 Brüel and Kjaer Type I integrating sound level meters were used to collect the measurements and sound recordings. The meter logs noise levels and records audible sound over set intervals selected by the user. The logging rate was set for one minute and the monitoring period was set for 24 hours (sound recordings were saved every ten minutes).

Data parameters logged every minute for the survey periods included:

- integrated average sound level (L_{eq}) in dBA;
- the 90th percentile sound level (L_{90n}) in dBA ;
- 1/3 octave band values in dB;
- absolute maximum sound level (L_{max}) in dBA; and
- minimum sound level (L_{min}) values.

A Brüel and Kjaer Type 4231 Calibrator was used for calibrating the meters before and after each 24-hour monitoring period to ensure the noise meter variance was within 0.5 dB. The calibrator has an estimated uncertainty for sound pressure level of ±0.12 dB at a 99% confidence level. Calibration data was recorded electronically with each measurement data file.

For this survey, weather data were collected using the permanent weather station located at the mine site. The station recorded hourly wind, temperature, humidity, and precipitation data during the monitoring period. Temperature, wind speed, and wind direction were also recorded at the beginning and end point of each monitoring sequence using a Kestrel 3000 pocket weather meter.

Direct observations and field notes made by the AEM noise monitoring program team included precipitation, cloud cover, wind direction, and observed audible noise sources.

3.2 Data Analysis Approach

Measured sound levels and recorded audio sound were downloaded to a computer for analysis with the Brüel and Kjaer 7820 Evaluator® software program. The sound recordings were reviewed to identify noise sources for each survey, such as technician activities, wind, rain, construction, and helicopter noise. Data that were not part of normal site activity, or that were measured outside of acceptable weather conditions, were filtered from the data set prior to the calculation of period values. Monitoring guidance from Health Canada and ERCB requires that wind speeds be less than 15 km/h, humidity be less than 90% and there be no active

precipitation. Other indicators used to identify sources of noise were time of day and field observations. Hourly values were then calculated for the 24-hour measurements from the one-minute data.

In the case of the Project site, weather conditions trend toward elevated wind speeds compared to those considered ideal for noise measurement. Since the wind conditions noted during the survey are considered typical for the area, wind speed was not ultimately used to filter data. Nevertheless, measurements that were potentially influenced by wind are noted in the results section below.

4.0 RESULTS

The 24-hour measurement data collected for the 2009 program are summarized in this section. Noise sources that were not representative of expected, typical ambient conditions (*e.g.*, technician activity, direct animal interference, and weather conditions such as precipitation) were excluded from the calculated hourly, daytime or night-time results. Calculated $L_{eq,1hr}$ and $L_{90,1hr}$ values for the noise monitoring locations are provided. L_{90} values provide the sound level that is exceeded 90% of the time. The L_{90} value is usually regarded as the residual level, or the background level without discrete noise events. It is used to describe background noise levels and indicates the minimum sound level that is generally audible (Crocker 2007). All "hourly" values were based on at least 30 minutes of data.

Daytime hours as defined by Health Canada include the hours 7:00 AM to 11:00 PM. Night-time hours range from 11:00 PM to 7:00 AM. The *italicised* and highlighted cells within the tables represent the night-time period. The night-time period is indentified in the associated graphs as blue shaded areas.

The noise measurement survey was conducted twice at each monitoring location. The first set of measurements was conducted between July 21 and 27, 2009 while the second set of measurements was conducted between August 15 and 24, 2009. Tables for each monitoring period are presented for each location in the following sections. Figures for each period and location follow the report text.

4.1 R1

R1 is situated approximately 700 m south of the explosive storage area and 400 m east – northeast of the all-weather private access road (Figure 1). The landscape in the vicinity of this monitoring location consists of Third Portage Lake to the south, with the surrounding terrestrial area characterized as rocky with some tundra vegetation (Figure1, Photographs B.1 and B.2).

Filtered hourly $L_{eq,\ 1hr}$ and $L_{90,1hr}$ results recorded at monitoring location R1 for both survey periods are presented in Tables 2 and 3. Unfiltered one-minute noise levels are shown graphically in Figures 2 and 3. The figures include the identification of noise sources at isolated peaks.

Noise sources observed at this location include:

- technician activity;
- helicopter flyovers;
- blasting;
- wind;
- truck traffic;
- backup alarms from equipment; and
- bird interference with the sound level meter microphone.

The technician activity and the animal interference were filtered from the hourly calculations since they do not represent the acoustic environment at this location. Calibration data indicated microphone performance was within +/- 0.5 dB.

The dominant, valid noise sources measured at this location were helicopter and aircraft flyovers, truck traffic, and wind. The large difference between daytime and night-time values during the July measurement period is attributed to a change in the wind condition as well as the Project activity level (*i.e.*, helicopter). The elevated daytime and night-time sound level during the August period is due to comparatively higher wind speeds and increased audible project activities.

Table 2: Monitoring Location R1 Filtered Hourly Sound Levels, July 21 - 22, 2009

Date	Start Hour[a]	$L_{eq,\ 1hr}$ [dBA][b]	$L_{90,\ 1hr}$ [dBA]
July 21, 2009	6:00 PM	46[c]	35[c]
July 21, 2009	7:00 PM	45[c]	36[c]
July 21, 2009	8:00 PM	46	38
July 21, 2009	9:00 PM	**38**	33
July 21, 2009	10:00 PM	39	35
July 21, 2009	*11:00 PM*	*38*	*33*
July 22, 2009	*12:00 AM*	***34***	*29*
July 22, 2009	*1:00 AM*	*38*	*35*
July 22, 2009	*2:00 AM*	*37*	*34*
July 22, 2009	*3:00 AM*	*38*	*35*
July 22, 2009	*4:00 AM*	*38*	*35*
July 22, 2009	*5:00 AM*	*38*	*32*
July 22, 2009	*6:00 AM*	***48***	*33*
July 22, 2009	7:00 AM	52	40
July 22, 2009	8:00 AM	**61**	45
July 22, 2009	9:00 AM	55 [c]	43 [c]
July 22, 2009	10:00 AM	59 [c]	47 [c]
July 22, 2009	11:00 AM	59 [c]	47 [c]
July 22, 2009	12:00 PM	58 [c]	46 [c]
July 22, 2009	1:00 PM	57 [c]	45 [c]
July 22, 2009	2:00 PM	**61 [c]**	48 [c]
July 22, 2009	3:00 PM	60 [c]	50 [c]
Daytime Total	7:00 AM to 11:00 PM	57	37
Nighttime Total	11:00 PM to 7:00 AM	41	33

[a] Time specified is the beginning of the interval.

[b] Lowest and highest value in daytime (7:00 AM – 11:00 PM) and night-time (11:00 PM – 7:00 AM) indicated in bold.

[c] Measurement sound level influenced by average hourly wind speeds exceeding 15 km/hr.

Table 3: Monitoring Location R1 Filtered Hourly Sound Levels, August 21 - 22, 2009

Date	Start Hour[a]	$L_{eq,\ 1hr}$ [dBA][b]	$L_{90,\ 1hr}$ [dBA]
August 21, 2009	3:00 PM	55 [c]	45 [c]
August 21, 2009	4:00 PM	58 [c]	46 [c]
August 21, 2009	5:00 PM	60 [c]	48 [c]
August 21, 2009	6:00 PM	51 [c]	39 [c]
August 21, 2009	7:00 PM	50 [c]	41 [c]
August 21, 2009	8:00 PM	49 [c]	40 [c]
August 21, 2009	9:00 PM	40 [c]	30 [c]
August 21, 2009	10:00 PM	**35** [c]	29 [c]
August 21, 2009	*11:00 PM*	*33*	*25*
August 22, 2009	*12:00 AM*	***25***	*22*
August 22, 2009	*1:00 AM*	*35*	*24*
August 22, 2009	*2:00 AM*	*40*	*33*
August 22, 2009	*3:00 AM*	*43*	*33*
August 22, 2009	*4:00 AM*	*58* [c]	*42* [c]
August 22, 2009	*5:00 AM*	*62* [c]	*51* [c]
August 22, 2009	*6:00 AM*	***63*** [c]	*47* [c]
August 22, 2009	7:00 AM	**67** [c]	54 [c]
August 22, 2009	8:00 AM	63 [c]	52 [c]
August 22, 2009	9:00 AM	64 [c]	53 [c]
August 22, 2009	10:00 AM	61 [c]	47 [c]
August 22, 2009	11:00 AM	57 [c]	43 [c]
August 22, 2009	12:00 PM	64 [c]	52 [c]
August 22, 2009	1:00 PM	63 [c]	51 [c]
August 22, 2009	2:00 PM	64 [c]	54 [c]
Daytime Total	7:00 AM to 11:00 PM	61	38
Nighttime Total	11:00 PM to 7:00 AM	57	25

[a] Time specified is the beginning of the interval.

[b] Lowest and highest value in daytime (7:00 AM – 11:00 PM) and night-time (11:00 PM – 7:00 AM) indicated in bold.

[c] Measurement sound level influenced by average hourly wind speeds exceeding 15 km/hr.

4.2 R2

R2 is situated 600 m west of the airstrip (Figure 1). The landscape in the vicinity of this monitoring location consists of Third Portage Lake to the west and southwest of the site, with the surrounding area consisting of soft ground with rock outcrops amongst tundra vegetation (Figure 1, Photographs B.3 and B.4).

Filtered hourly $L_{eq, 1hr}$ and $L_{90, 1hr}$ results recorded at monitoring location R2 for both survey periods are presented in Tables 4 and 5. Unfiltered one-minute noise levels are shown graphically in Figures 4 and 5. The figures include the identification of noise sources at isolated peaks.

Noise sources observed at this location include:

- technician activity;
- helicopter and aircraft flyovers;
- backup alarms from equipment;
- road construction activities;
- wind;
- blasting; and
- bird and insect interference with the sound level meter microphone.

The technician activity and the animal interference were filtered from the hourly calculations since they do not represent the acoustic environment at this location. Calibration data indicated microphone performance was within +/- 0.5 dB.

In the July period survey, the average measured daytime and night-time noise values can be considered representative of a quiet rural environment as there was minimal influence from wind and project related activity. The noise peaks identified in Figure 4 are dominated by helicopter and aircraft flyovers, and road construction activities.

The audio recordings indicate that the increase in daytime and night-time sound levels at R2 during the August period was due to more frequent road construction activities and comparatively higher wind speeds. These noise sources were consistently audible in the audio recording.

Table 4: Monitoring Location R2 Filtered Hourly Sound Levels, July 23 - 24, 2009

Date	Start Hour[(a)]	$L_{eq, 1hr}$ [dBA][(b)]	$L_{90, 1hr}$ [dBA]
July 23, 2009	11:00 AM	33	24
July 23, 2009	12:00 PM	32	22
July 23, 2009	1:00 PM	30	23
July 23, 2009	2:00 PM	28	22
July 23, 2009	3:00 PM	24	21
July 23, 2009	4:00 PM	24	22
July 23, 2009	5:00 PM	25	22
July 23, 2009	6:00 PM	**22**	20
July 23, 2009	7:00 PM	24	21
July 23, 2009	8:00 PM	25	21
July 23, 2009	9:00 PM	30	20
July 23, 2009	10:00 PM	24	20
July 23, 2009	*11:00 PM*	**23**	21
July 24, 2009	*12:00 AM*	24	21
July 24, 2009	*1:00 AM*	32	28
July 24, 2009	*2:00 AM*	31	28
July 24, 2009	*3:00 AM*	32	29
July 24, 2009	*4:00 AM*	32	29
July 24, 2009	*5:00 AM*	32	28
July 24, 2009	*6:00 AM*	**34**	26
July 24, 2009	7:00 AM	33	28
July 24, 2009	8:00 AM	**35**	30
July 24, 2009	9:00 AM	32	28
July 24, 2009	10:00 AM	**35**	28
Daytime Total	7:00 AM to 11:00 PM	30	21
Nighttime Total	11:00 PM to 7:00 AM	31	22

(a) Time specified is the beginning of the interval.

(b) Lowest and highest value in daytime (7:00 AM – 11:00 PM) and night-time (11:00 PM – 7:00 AM) indicated in bold.

Table 5: Monitoring Location R2 Filtered Hourly Sound Levels, August 22 - 23, 2009

Date	Start Hour[a]	$L_{eq, 1hr}$ [dBA][b]	$L_{90, 1hr}$ [dBA]
August 22, 2009	5:00:00 PM	45 [c]	40 [c]
August 22, 2009	6:00:00 PM	48 [c]	40 [c]
August 22, 2009	7:00:00 PM	43 [c]	38 [c]
August 22, 2009	8:00:00 PM	39 [c]	37 [c]
August 22, 2009	9:00:00 PM	**38** [c]	36 [c]
August 22, 2009	10:00:00 PM	**38**	37
August 22, 2009	*11:00:00 PM*	*37*	*35*
August 23, 2009	*12:00:00 AM*	***35***	*32*
August 23, 2009	*1:00:00 AM*	*40*	*37*
August 23, 2009	*2:00:00 AM*	*38*	*36*
August 23, 2009	*3:00:00 AM*	*37*	*35*
August 23, 2009	*4:00:00 AM*	*39*	*37*
August 23, 2009	*5:00:00 AM*	***42***	*39*
August 23, 2009	*6:00:00 AM*	*41*	*39*
August 23, 2009	7:00:00 AM	46 [c]	41 [c]
August 23, 2009	8:00:00 AM	**55** [c]	44 [c]
August 23, 2009	9:00:00 AM	45 [c]	39 [c]
August 23, 2009	10:00:00 AM	46 [c]	38 [c]
August 23, 2009	11:00:00 AM	39 [c]	35 [c]
August 23, 2009	12:00:00 PM	40 [c]	34 [c]
August 23, 2009	1:00:00 PM	43 [c]	36 [c]
August 23, 2009	2:00:00 PM	39 [c]	36 [c]
August 23, 2009	3:00:00 PM	39 [c]	35 [c]
Daytime Total	7:00 AM to 11:00 PM	46	36
Nighttime Total	11:00 PM to 7:00 AM	39	35

[a] Time specified is the beginning of the interval.

[b] Lowest and highest value in daytime (7:00 AM – 11:00 PM) and night-time (11:00 PM – 7:00 AM) indicated in bold.

[c] Measurement sound level influenced by average hourly wind speeds exceeding 15 km/hr.

4.3 R3

R3 is situated approximately 1,800 m east of the East Dike (Figure 1). The landscape in the vicinity of this monitoring location consists of Second Portage Lake to the west and east of the site, with the surrounding area consisting of soft ground with rock outcrops amongst tundra vegetation (Figure 1, Photographs B.5 and B.6).

Filtered hourly $L_{eq, 1hr}$ and $L_{90,1hr}$ results recorded at monitoring location R3 for both survey periods are presented in Tables 6 and 7. Unfiltered one-minute noise levels are shown graphically in Figures 6 and 7. The figures include the identification of noise sources at isolated peaks.

Peak noise sources observed at this location include:

- technician activity;
- helicopter and aircraft flyovers;
- heavy equipment;
- wind;
- rain;
- blasting; and
- bird and insect interference with the sound level meter microphone.

The technician activity, rain and animal interference were filtered from the hourly calculations since they do not represent the acoustic environment at this location. Calibration data indicated microphone performance was within +/- 0.5 dB.

In the July period survey, the average measured night-time noise values can be considered representative of a quiet rural environment. The noise peaks identified in Figure 6 are dominated by helicopter and aircraft flyover, and mine and exploration equipment.

The increase in daytime and night-time sound level at R3 during the August period is attributed to more frequent project related activities (*i.e.* heavy equipment) and comparatively higher wind speeds. The equipment noise was consistently audible in the sound recording from 7:00 PM to 11:00 AM (end of measurement) throughout the August measurement period.

Table 6: Monitoring Location R3 Filtered Hourly Sound Levels, July 26 - 27, 2009

Date	Start Hour[a]	$L_{eq,\ 1hr}$ [dBA][b]	$L_{90,\ 1hr}$ [dBA]
July 26, 2009	2:00 PM	36	25
July 26, 2009	3:00 PM	49	26
July 26, 2009	4:00 PM	33	26
July 26, 2009	5:00 PM	37	32
July 26, 2009	6:00 PM	30 [c]	25 [c]
July 26, 2009	7:00 PM	28	23
July 26, 2009	8:00 PM	**26**	23
July 26, 2009	9:00 PM	28	24
July 26, 2009	10:00 PM	32	24
July 26, 2009	*11:00 PM*	32	27
July 27, 2009	*12:00 AM*	29	23
July 27, 2009	*1:00 AM*	**27**	24
July 27, 2009	*2:00 AM*	35	24
July 27, 2009	*3:00 AM*	36	25
July 27, 2009	*4:00 AM*	36	29
July 27, 2009	*5:00 AM*	35	28
July 27, 2009	*6:00 AM*	**41**	27
July 27, 2009	7:00 AM	38	23
July 27, 2009	8:00 AM	28	25
July 27, 2009	9:00 AM	30	25
July 27, 2009	10:00 AM	31	25
July 27, 2009	11:00 AM	**45**	27
July 27, 2009	12:00 PM	40	27
Daytime Total	7:00 AM to 11:00 PM	40	24
Nighttime Total	11:00 PM to 7:00 AM	36	24

[a] Time specified is the beginning of the interval.

[b] Lowest and highest value in daytime (7:00 AM – 11:00 PM) and night-time (11:00 PM – 7:00 AM) indicated in bold.

[c] Measurement sound level influenced by average hourly wind speeds exceeding 15 km/hr.

Table 7: Monitoring Location R3 Filtered Hourly Sound Levels, August 16 - 17, 2009

Date	Start Hour[a]	$L_{eq,\ 1hr}$ [dBA][b]	$L_{90,\ 1hr}$ [dBA]
August 16, 2009	12:00:00 PM	42 [c]	32 [c]
August 16, 2009	1:00:00 PM	44 [c]	35 [c]
August 16, 2009	2:00:00 PM	41 [c]	34 [c]
August 16, 2009	3:00:00 PM	39 [c]	32 [c]
August 16, 2009	4:00:00 PM	33 [c]	28 [c]
August 16, 2009	5:00:00 PM	35	29
August 16, 2009	6:00:00 PM	37	26
August 16, 2009	7:00:00 PM	38 [c]	30 [c]
August 16, 2009	8:00:00 PM	39	35
August 16, 2009	9:00:00 PM	39	35
August 16, 2009	10:00:00 PM	42	36
August 16, 2009	*11:00:00 PM*	39	33
August 17, 2009	*12:00:00 AM*	38	33
August 17, 2009	*1:00:00 AM*	43	39
August 17, 2009	*2:00:00 AM*	46	43
August 17, 2009	*3:00:00 AM*	46	43
August 17, 2009	*4:00:00 AM*	49 [c]	46 [c]
August 17, 2009	*5:00:00 AM*	46	43
August 17, 2009	*6:00:00 AM*	43 [c]	38 [c]
August 17, 2009	7:00:00 AM	44 [c]	40 [c]
August 17, 2009	8:00:00 AM	45	42
August 17, 2009	9:00:00 AM	45 [c]	40 [c]
August 17, 2009	10:00:00 AM	48 [c]	40 [c]
Daytime Total	7:00 AM to 11:00 PM	43	31
Nighttime Total	11:00 PM to 7:00 AM	45	36

[a] Time specified is the beginning of the interval.

[b] Lowest and highest value in daytime (7:00 AM – 11:00 PM) and night-time (11:00 PM – 7:00 AM) indicated in bold.

[c] Measurement sound level influenced by average hourly wind speeds exceeding 15 km/hr.

4.4 R4

R4 is situated approximately 1,500 m southwest of the proposed Vault Pit (Figure 1). The landscape in the vicinity of this monitoring location consists of Turn Lake to the west, with the surrounding area consisting of soft ground with rock outcrops amongst tundra vegetation (Figure 1, Photographs B.7 and B.8).

Filtered hourly $L_{eq,1hr}$ and $L_{90,1hr}$ results recorded at monitoring location R4 for both survey periods measured presented in Tables 8 and 9. Unfiltered one-minute noise levels are shown graphically in Figures 8 and 9. The figures include the identification of noise sources at isolated peaks.

Peak noise sources observed at this location include:

- technician activity;
- helicopter and aircraft flyovers;
- heavy equipment;
- wind;
- rain; and
- animal interference with the sound level meter microphone.

The technician activity, rain and animal interference were filtered from the hourly calculations since they do not represent the acoustic environment at this location. Calibration data indicated microphone performance was within +/- 0.5 dB.

In the July period survey, the average measured night-time noise values can be considered representative of a quiet rural environment. The noise peaks identified in Figure 8 are dominated by helicopter and aircraft flyover.

The increase in measured daytime and night-time sound level during the August period is due to more frequent project related activities such as exploration traffic and helicopter flyover. Helicopter and aircraft flyover were the dominant noise sources during this measurement period.

Table 8: Monitoring Location R4 Filtered Hourly Sound Levels, July 25 - 26, 2009

Date	Start Hour[a]	$L_{eq, 1hr}$ [dBA][b]	$L_{90, 1hr}$ [dBA]
July 25, 2009	3:00 PM	42	34
July 25, 2009	4:00 PM	41	32
July 25, 2009	5:00 PM	39	31
July 25, 2009	6:00 PM	36	25
July 25, 2009	7:00 PM	33	28
July 25, 2009	8:00 PM	**30**	27
July 25, 2009	9:00 PM	**30**	27
July 25, 2009	10:00 PM	29	26
July 25, 2009	*11:00 PM*	*29*	*25*
July 26, 2009	*12:00 AM*	***28***	*25*
July 26, 2009	*1:00 AM*	*32*	*27*
July 26, 2009	*2:00 AM*	*36*	*30*
July 26, 2009	*3:00 AM*	*35*	*30*
July 26, 2009	*4:00 AM*	*35*	*31*
July 26, 2009	*5:00 AM*	***38***	*33*
July 26, 2009	*6:00 AM*	***38***	*31*
July 26, 2009	7:00 AM	42 [c]	33 [c]
July 26, 2009	8:00 AM	44 [c]	37 [c]
July 26, 2009	9:00 AM	43 [c]	34 [c]
July 26, 2009	10:00 AM	42 [c]	35 [c]
July 26, 2009	11:00 AM	41 [c]	30 [c]
July 26, 2009	12:00 PM	**45** [c]	25 [c]
Daytime Total	7:00 AM to 11:00 PM	41	28
Nighttime Total	11:00 PM to 7:00 AM	35	27

[a] Time specified is the beginning of the interval.

[b] Lowest and highest value in daytime (7:00 AM – 11:00 PM) and night-time (11:00 PM – 7:00 AM) indicated in bold.

[c] Measurement sound level influenced by average hourly wind speeds exceeding 15 km/hr.

Table 9: Monitoring Location R4 Filtered Hourly Sound Levels, August 15 - 16, 2009

Date	Start Hour[a]	$L_{eq, 1hr}$ [dBA][b]	$L_{90, 1hr}$ [dBA]
August 15, 2009	3:00:00 PM	46 [c]	36 [c]
August 15, 2009	4:00:00 PM	42 [c]	35 [c]
August 15, 2009	5:00:00 PM	47 [c]	35 [c]
August 15, 2009	6:00:00 PM	46 [c]	33 [c]
August 15, 2009	7:00:00 PM	34 [c]	29 [c]
August 15, 2009	8:00:00 PM	28 [c]	21 [c]
August 15, 2009	9:00:00 PM	**24**	20
August 15, 2009	10:00:00 PM	25	23
August 15, 2009	*11:00:00 PM*	*28*	*21*
August 16, 2009	*12:00:00 AM*	***26***	*21*
August 16, 2009	*1:00:00 AM*	*28*	*25*
August 16, 2009	*2:00:00 AM*	*29*	*27*
August 16, 2009	*3:00:00 AM*	*31*	*28*
August 16, 2009	*4:00:00 AM*	*31*	*29*
August 16, 2009	*5:00:00 AM*	*44*	*26*
August 16, 2009	*6:00:00 AM*	***47***	*24*
August 16, 2009	7:00:00 AM	43	34
August 16, 2009	8:00:00 AM	**51**	38
August 16, 2009	9:00:00 AM	47	35
August 16, 2009	10:00:00 AM	48	36
August 16, 2009	11:00:00 AM	43 [c]	35 [c]
Daytime Total	7:00 AM to 11:00 PM	46	24
Nighttime Total	11:00 PM to 7:00 AM	39	22

[a] Time specified is the beginning of the interval.

[b] Lowest and highest value in daytime (7:00 AM – 11:00 PM) and night-time (11:00 PM – 7:00 AM) indicated in bold.

[c] Measurement sound level influenced by average hourly wind speeds exceeding 15 km/hr.

4.5 R5

R5 is situated in the exploration camp area and within the proximity of the all-weather private access road. It is located approximately 3500 m west of the future airstrip (Figure 1). The landscape in the vicinity of this monitoring location consists of Third Portage Lake to the east, with the surrounding area consisting of the lake shore and soft ground with rock outcrops amongst tundra vegetation (Figure 1, Photographs B.9 and B.10). This monitoring location is situated on the migration route for caribou.

Filtered hourly $L_{eq, 1hr}$ and $L_{90,1hr}$ results recorded at monitoring location R5 for both survey periods are presented in Tables 10 and 11. Unfiltered one-minute noise levels are shown graphically in Figures 10 and 11. The figures include the identification of noise sources at isolated peaks.

Peak noise sources observed at this location include:

- technician activity;
- helicopter and aircraft flyovers;
- heavy equipment;
- wind;
- rain;
- waves along lakeshore; and
- animal or bird interference with the sound level meter microphone.

The technician activity, rain and animal interference were filtered from the hourly calculations since they do not represent the acoustic environment at this location. Calibration data indicated microphone performance was within +/- 0.5 dB.

The daytime and night-time sound levels during the July period were higher than the August measurements due to the frequency of helicopter and aircraft flyovers. Another less dominant, but consistent, noise source during this measurement period was waves lapping along the shore of Third Portage Lake.

During the August survey period, there were comparatively fewer helicopter and aircraft flyover activities noted on the audio recording. Distant equipment noise (truck traffic, heavy equipment, construction) was dominant in the recording and consistent throughout this measurement period.

Table 10: Monitoring Location R5 Filtered Hourly Sound Levels, July 24 - 25, 2009

Date	Start Hour[a]	$L_{eq, 1hr}$ [dBA][b]	$L_{90, 1hr}$ [dBA]
July 24, 2009	1:00 PM	43	37
July 24, 2009	2:00 PM	41	36
July 24, 2009	3:00 PM	42	37
July 24, 2009	4:00 PM	59	39
July 24, 2009	5:00 PM	64 [c]	36 [c]
July 24, 2009	6:00 PM	56	39
July 24, 2009	7:00 PM	52	41
July 24, 2009	8:00 PM	39	33
July 24, 2009	9:00 PM	33	31
July 24, 2009	10:00 PM	34	31
July 24, 2009	*11:00 PM*	31	29
July 25, 2009	*12:00 AM*	39	35
July 25, 2009	*1:00 AM*	36	31
July 25, 2009	*2:00 AM*	32	30
July 25, 2009	*3:00 AM*	35	32
July 25, 2009	*4:00 AM*	34	30
July 25, 2009	*5:00 AM*	55	32
July 25, 2009	*6:00 AM*	50	38
July 25, 2009	7:00 AM	55	41
July 25, 2009	8:00 AM	61	48
July 25, 2009	9:00 AM	63	45
July 25, 2009	10:00 AM	59	47
July 25, 2009	11:00 AM	54 [c]	47 [c]
Daytime Total	7:00 AM to 11:00 PM	57	33
Nighttime Total	11:00 PM to 7:00 AM	47	31

[a] Time specified is the beginning of the interval.

[b] Lowest and highest value in daytime (7:00 AM – 11:00 PM) and night-time (11:00 PM – 7:00 AM) indicated in bold.

[c] Measurement sound level influenced by average hourly wind speeds exceeding 15 km/hr.

Table 11: Monitoring Location R5 Filtered Hourly Sound Levels, August 23 - 24, 2009

Date	Start Hour[a]	$L_{eq, 1hr}$ [dBA][b]	$L_{90, 1hr}$ [dBA]
August 23, 2009	4:00:00 PM	43	39
August 23, 2009	5:00:00 PM	43	39
August 23, 2009	6:00:00 PM	52	40
August 23, 2009	7:00:00 PM	41	39
August 23, 2009	8:00:00 PM	39	38
August 23, 2009	9:00:00 PM	39	37
August 23, 2009	10:00:00 PM	39	37
August 23, 2009	*11:00:00 PM*	39	36
August 24, 2009	*12:00:00 AM*	41	37
August 24, 2009	*1:00:00 AM*	40	38
August 24, 2009	*2:00:00 AM*	41	37
August 24, 2009	*3:00:00 AM*	46	38
August 24, 2009	*4:00:00 AM*	46	42
August 24, 2009	*5:00:00 AM*	40	41
August 24, 2009	*6:00:00 AM*	52	37
August 24, 2009	7:00:00 AM	40	35
August 24, 2009	8:00:00 AM	61	35
August 24, 2009	9:00:00 AM	36	35
August 24, 2009	10:00:00 AM	42	34
August 24, 2009	11:00:00 AM	36	34
August 24, 2009	12:00:00 PM	36	34
August 24, 2009	1:00:00 PM	40	34
August 24, 2009	2:00:00 PM	36 [c]	35 [c]
August 24, 2009	3:00:00 PM	43 [c]	39 [c]
Daytime Total	7:00 AM to 11:00 PM	51	35
Nighttime Total	11:00 PM to 7:00 AM	42	37

[a] Time specified is the beginning of the interval.

[b] Lowest and highest value in daytime (7:00 AM – 11:00 PM) and night-time (11:00 PM – 7:00 AM) indicated in bold.

[c] Measurement sound level influenced by average hourly wind speeds exceeding 15 km/hr.

5.0 WEATHER CONDITIONS

Weather information for the 24-hour surveys conducted at R1 to R5 are presented in Tables 12 to 21 below. The tables are arranged in chronological order according to the measurement period for each receptor location. Air temperature, wind speed, and wind direction data were collected by a permanent weather station onsite. Wind direction data may be subject to correction.

As is indicated in the data, strong winds (speeds greater than 15 km/hr) and precipitation occurred more frequently during the August noise monitoring period. It is understood that these conditions are common in the summer season in the vicinity of the mine site.

As formatted for the noise measurement results, night-time hours are shown in *italicised* and highlighted cells.

Table 12: Weather Information for Period of July 21 to 22, 2009 (R1)

Date	Start Hour	Temperature (ºC)	Wind Direction[(a)]	Wind Speed (m/s)
July 21, 2009	6:00 PM	17.1	153.6	4.5 [(b)]
July 21, 2009	7:00 PM	16.7	138.9	4.4 [(b)]
July 21, 2009	8:00 PM	16.6	141.2	4.0
July 21, 2009	9:00 PM	16.3	144.6	3.8
July 21, 2009	10:00 PM	15.3	133.0	2.6
July 21, 2009	*11:00 PM*	*14.3*	*134.7*	*2.4*
July 22, 2009	*12:00 AM*	*13.0*	*131.5*	*2.8*
July 22, 2009	*1:00 AM*	*11.8*	*127.8*	*2.6*
July 22, 2009	*2:00 AM*	*10.5*	*112.9*	*2.4*
July 22, 2009	*3:00 AM*	*9.6*	*98.6*	*3.0*
July 22, 2009	*4:00 AM*	*8.6*	*92.7*	*3.3*
July 22, 2009	*5:00 AM*	*8.0*	*95.5*	*2.8*
July 22, 2009	*6:00 AM*	*7.9*	*96.8*	*3.9*
July 22, 2009	7:00 AM	8.3	94.3	3.4
July 22, 2009	8:00 AM	9.2	97.3	4.1
July 22, 2009	9:00 AM	10.5	97.4	5.1 [(b)]
July 22, 2009	10:00 AM	11.5	96.7	5.6 [(b)]
July 22, 2009	11:00 AM	12.4	97.6	5.4 [(b)]
July 22, 2009	12:00 PM	13.8	99.7	4.8 [(b)]
July 22, 2009	1:00 PM	14.7	100.4	4.9 [(b)]
July 22, 2009	2:00 PM	16.1	97.1	5.2 [(b)]
July 22, 2009	3:00 PM	16.1	97.4	6.5 [(b)]

[(a)] 0 or 360 degrees represents the true north direction

[(b)] Average hourly wind speed exceeds monitoring guidance (15 km/hr or 4.17 m/s)

Table 13: Weather Information for Period of July 23 to 24, 2009 (R2)

Date	Start Hour	Temperature (ºC)	Wind Direction[(a)]	Wind Speed (m/s)
July 23, 2009	11:00 AM	9.2	92.1	2.8
July 23, 2009	12:00 PM	9.4	93.4	2.7
July 23, 2009	1:00 PM	10.0	90.5	2.5
July 23, 2009	2:00 PM	10.2	75.1	2.8
July 23, 2009	3:00 PM	10.8	80.2	2.4
July 23, 2009	4:00 PM	11.3	70.8	2.2
July 23, 2009	5:00 PM	11.9	72.2	1.8
July 23, 2009	6:00 PM	12.7	92.8	1.6
July 23, 2009	7:00 PM	13.1	77.4	2.1
July 23, 2009	8:00 PM	13.9	73.5	1.2
July 23, 2009	9:00 PM	14.3	85.6	1.1
July 23, 2009	10:00 PM	14.5	124.9	0.8
July 23, 2009	*11:00 PM*	*14.0*	*45.1*	*0.9*
July 24, 2009	*12:00 AM*	*13.2*	*24.4*	*1.2*
July 24, 2009	*1:00 AM*	*12.8*	*39.8*	*1.1*
July 24, 2009	*2:00 AM*	*12.0*	*54.6*	*1.8*
July 24, 2009	*3:00 AM*	*12.0*	*70.4*	*1.9*
July 24, 2009	*4:00 AM*	*11.8*	*78.5*	*2.4*
July 24, 2009	*5:00 AM*	*11.3*	*79.2*	*2.7*
July 24, 2009	*6:00 AM*	*11.3*	*76.0*	*2.7*
July 24, 2009	7:00 AM	11.3	87.4	2.8
July 24, 2009	8:00 AM	10.4	91.5	3.0
July 24, 2009	9:00 AM	10.5	98.3	3.3
July 24, 2009	10:00 AM	10.7	108.1	2.8

(a) 0 or 360 degrees represents the true north direction

(b) Average hourly wind speed exceeds monitoring guidance (15 km/hr or 4.17 m/s)

Table 14: Weather Information for Period of July 24 to 25, 2009 (R5)

Date	Start Hour	Temperature (ºC)	Wind Direction[(a)]	Wind Speed (m/s)
July 24, 2009	1:00 PM	12.2	116.0	3.3
July 24, 2009	2:00 PM	14.7	124.1	3.7
July 24, 2009	3:00 PM	16.9	124.1	3.9
July 24, 2009	4:00 PM	18.8	129.2	4.0
July 24, 2009	5:00 PM	19.5	144.6	4.5 [(b)]
July 24, 2009	6:00 PM	19.7	139.5	3.7
July 24, 2009	7:00 PM	20.2	136.8	4.1
July 24, 2009	8:00 PM	19.3	132.5	4.1
July 24, 2009	9:00 PM	18.4	129.4	3.0
July 24, 2009	10:00 PM	17.8	128.7	3.4
July 24, 2009	*11:00 PM*	*16.8*	*114.1*	*2.2*
July 25, 2009	*12:00 AM*	*15.9*	*119.0*	*3.2*
July 25, 2009	*1:00 AM*	*15.3*	*126.9*	*3.7*
July 25, 2009	*2:00 AM*	*14.8*	*114.1*	*2.8*
July 25, 2009	*3:00 AM*	*13.6*	*99.6*	*3.0*
July 25, 2009	*4:00 AM*	*13.5*	*114.8*	*3.0*
July 25, 2009	*5:00 AM*	*12.9*	*111.1*	*2.6*
July 25, 2009	*6:00 AM*	*12.5*	*118.7*	*3.1*
July 25, 2009	7:00 AM	12.1	108.4	2.3
July 25, 2009	8:00 AM	12.2	107.4	3.4
July 25, 2009	9:00 AM	12.2	108.0	3.1
July 25, 2009	10:00 AM	12.6	115.7	3.8
July 25, 2009	11:00 AM	13.4	113.4	4.2 [(b)]
July 25, 2009	12:00 PM	13.1	114.0	3.9

(a) 0 or 360 degrees represents the true north direction

(b) Average hourly wind speed exceeds monitoring guidance (15 km/hr or 4.17 m/s)

Table 15: Weather Information for Period of July 25 to 26, 2009 (R4)

Date	Start Hour	Temperature (ºC)	Wind Direction[(a)]	Wind Speed (m/s)
July 25, 2009	2:00 PM	14.9	103.2	3.8
July 25, 2009	3:00 PM	14.8	115.3	3.2
July 25, 2009	4:00 PM	15.5	115.4	3.5
July 25, 2009	5:00 PM	16.8	117.9	3.0
July 25, 2009	6:00 PM	17.3	104.8	2.6
July 25, 2009	7:00 PM	18.4	123.1	3.0
July 25, 2009	8:00 PM	19.0	125.8	2.9
July 25, 2009	9:00 PM	19.1	131.7	2.7
July 25, 2009	10:00 PM	18.3	136.3	2.9
July 25, 2009	*11:00 PM*	*16.9*	*129.4*	*2.8*
July 26, 2009	*12:00 AM*	*15.2*	*101.6*	*2.2*
July 26, 2009	*1:00 AM*	*13.9*	*91.1*	*2.8*
July 26, 2009	*2:00 AM*	*12.9*	*95.3*	*2.8*
July 26, 2009	*3:00 AM*	*12.9*	*100.2*	*3.5*
July 26, 2009	*4:00 AM*	*12.1*	*100.8*	*3.0*
July 26, 2009	*5:00 AM*	*11.4*	*91.9*	*3.8*
July 26, 2009	*6:00 AM*	*10.8*	*90.1*	*3.9*
July 26, 2009	7:00 AM	10.5	96.6	4.2 [(b)]
July 26, 2009	8:00 AM	10.4	95.2	4.3 [(b)]
July 26, 2009	9:00 AM	11.0	96.6	4.5 [(b)]
July 26, 2009	10:00 AM	11.4	97.4	4.3 [(b)]
July 26, 2009	11:00 AM	12.3	98.5	4.7 [(b)]
July 26, 2009	12:00 PM	13.1	97.4	4.9 [(b)]
July 26, 2009	1:00 PM	13.7	96.5	3.4

[(a)] 0 or 360 degrees represents the true north direction

[(b)] Average hourly wind speed exceeds monitoring guidance (15 km/hr or 4.17 m/s)

Table 16: Weather Information for Period of July 26 to 27, 2009 (R3)

Date	Start Hour	Temperature (ºC)	Wind Direction[(a)]	Wind Speed (m/s)
July 26, 2009	2:00 PM	14.7	96.9	3.5
July 26, 2009	3:00 PM	15.7	93.9	3.0
July 26, 2009	4:00 PM	17.1	103.3	2.8
July 26, 2009	5:00 PM	17.0	96.5	4.0
July 26, 2009	6:00 PM	15.7	93.8	4.2 [(b)]
July 26, 2009	7:00 PM	14.7	97.4	3.7
July 26, 2009	8:00 PM	15.6	96.1	2.7
July 26, 2009	9:00 PM	15.5	92.0	2.6
July 26, 2009	10:00 PM	14.9	98.6	3.3
July 26, 2009	*11:00 PM*	*14.5*	*81.9*	*1.0*
July 27, 2009	*12:00 AM*	*14.2*	*348.1*	*1.7*
July 27, 2009	*1:00 AM*	*13.6*	*21.9*	*2.1*
July 27, 2009	*2:00 AM*	*13.3*	*60.5*	*2.4*
July 27, 2009	*3:00 AM*	*12.8*	*74.6*	*1.8*
July 27, 2009	*4:00 AM*	*12.0*	*42.4*	*1.8*
July 27, 2009	*5:00 AM*	*11.6*	*83.0*	*1.0*
July 27, 2009	*6:00 AM*	*10.8*	*286.3*	*0.7*
July 27, 2009	7:00 AM	11.7	302.2	1.7
July 27, 2009	8:00 AM	12.5	342.8	2.6
July 27, 2009	9:00 AM	12.8	3.2	2.8
July 27, 2009	10:00 AM	12.9	337.6	3.0
July 27, 2009	11:00 AM	13.5	326.8	3.3
July 27, 2009	12:00 PM	14.3	312.1	3.5

(a) 0 or 360 degrees represents the true north direction

(b) Average hourly wind speed exceeds monitoring guidance (15 km/hr or 4.17 m/s)

Table 17: Weather Information for Period of August 15 to 16, 2009 (R4)

Date	Start Hour	Temperature (ºC)	Wind Direction[a]	Wind Speed (m/s)
August 15, 2009	2:00:00 PM	15.5	217.9	5.8 [b]
August 15, 2009	3:00:00 PM	15.8	227.2	6.6 [b]
August 15, 2009	4:00:00 PM	15.8	222.3	5.8 [b]
August 15, 2009	5:00:00 PM	15.7	213.2	5.2 [b]
August 15, 2009	6:00:00 PM	15.8	209.3	5.2 [b]
August 15, 2009	7:00:00 PM	14.8	201.7	5.4 [b]
August 15, 2009	8:00:00 PM	14.0	196.1	4.5 [b]
August 15, 2009	9:00:00 PM	13.8	187.2	3.5
August 15, 2009	10:00:00 PM	12.5	172.5	2.9
August 15, 2009	*11:00:00 PM*	*10.7*	*176.2*	*2.1*
August 16, 2009	*12:00:00 AM*	*9.6*	*176.7*	*1.5*
August 16, 2009	*1:00:00 AM*	*9.3*	*179.5*	*1.9*
August 16, 2009	*2:00:00 AM*	*8.5*	*176.7*	*2.0*
August 16, 2009	*3:00:00 AM*	*7.9*	*166.3*	*2.4*
August 16, 2009	*4:00:00 AM*	*8.5*	*158.8*	*2.2*
August 16, 2009	*5:00:00 AM*	*7.4*	*170.6*	*1.0*
August 16, 2009	*6:00:00 AM*	*7.9*	*156.3*	*1.5*
August 16, 2009	7:00:00 AM	8.7	150.7	2.7
August 16, 2009	8:00:00 AM	9.5	147.6	3.3
August 16, 2009	9:00:00 AM	10.5	164.7	3.4
August 16, 2009	10:00:00 AM	12.3	162.9	3.4
August 16, 2009	11:00:00 AM	13.9	156.7	4.5 [b]

[a] 0 or 360 degrees represents the true north direction

[b] Average hourly wind speed exceeds monitoring guidance (15 km/hr or 4.17 m/s)

Table 18: Weather Information for Period of August 16 to 17, 2009 (R3)

Date	Start Hour	Temperature (ºC)	Wind Direction[(a)]	Wind Speed (m/s)
August 16, 2009	11:00:00 AM	13.9	156.7	4.5 [(b)]
August 16, 2009	12:00:00 PM	15.2	153.5	4.7 [(b)]
August 16, 2009	1:00:00 PM	16.4	163.9	4.9 [(b)]
August 16, 2009	2:00:00 PM	16.9	167.5	4.8 [(b)]
August 16, 2009	3:00:00 PM	16.7	185	5.5 [(b)]
August 16, 2009	4:00:00 PM	18.0	179.6	4.5 [(b)]
August 16, 2009	5:00:00 PM	18.5	182.8	3.8
August 16, 2009	6:00:00 PM	18.3	194.3	3.9
August 16, 2009	7:00:00 PM	17.7	208.6	4.2 [(b)]
August 16, 2009	8:00:00 PM	17.0	221.9	4.1
August 16, 2009	9:00:00 PM	16.5	186.5	2.4
August 16, 2009	10:00:00 PM	15.3	171.6	2.7
August 16, 2009	*11:00:00 PM*	*13.6*	*165.9*	*1.8*
August 17, 2009	*12:00:00 AM*	*13.4*	*165.9*	*2.4*
August 17, 2009	*1:00:00 AM*	*11.7*	*179.5*	*1.9*
August 17, 2009	*2:00:00 AM*	*11.6*	*168.1*	*2.1*
August 17, 2009	*3:00:00 AM*	*12.2*	*163*	*2.4*
August 17, 2009	*4:00:00 AM*	*11.9*	*171.4*	*4.4* [(b)]
August 17, 2009	*5:00:00 AM*	*11.7*	*165.3*	*3.9*
August 17, 2009	*6:00:00 AM*	*11.7*	*171.2*	*4.9* [(b)]
August 17, 2009	7:00:00 AM	11.7	179.3	5.4 [(b)]
August 17, 2009	8:00:00 AM	12.6	174.7	4.1
August 17, 2009	9:00:00 AM	13.3	173.5	5.2 [(b)]
August 17, 2009	10:00:00 AM	14.5	172.4	4.7 [(b)]
August 17, 2009	11:00:00 AM	15.7	164.4	5.4 [(b)]

[(a)] 0 or 360 degrees represents the true north direction

[(b)] Average hourly wind speed exceeds monitoring guidance (15 km/hr or 4.17 m/s)

Table 19: Weather Information for Period of August 21 to 22, 2009 (R1)

Date	Start Hour	Temperature (ºC)	Wind Direction[a]	Wind Speed (m/s)
August 21, 2009	2:00:00 PM	10.1	284.4	4.8 [b]
August 21, 2009	3:00:00 PM	10.5	301.2	4.8 [b]
August 21, 2009	4:00:00 PM	9.5	324.7	5.8 [b]
August 21, 2009	5:00:00 PM	8.0	333.6	5.9 [b]
August 21, 2009	6:00:00 PM	6.7	328.1	6.1 [b]
August 21, 2009	7:00:00 PM	6.2	332	4.9 [b]
August 21, 2009	8:00:00 PM	6.3	338.7	4.8 [b]
August 21, 2009	9:00:00 PM	6.1	347.6	5.6 [b]
August 21, 2009	10:00:00 PM	5.6	355.5	5.1 [b]
August 21, 2009	*11:00:00 PM*	*4.4*	*340*	*3.1*
August 22, 2009	*12:00:00 AM*	*4.0*	*326.2*	*2.6*
August 22, 2009	*1:00:00 AM*	*4.4*	*317.8*	*2.2*
August 22, 2009	*2:00:00 AM*	*4.1*	*295.8*	*2.5*
August 22, 2009	*3:00:00 AM*	*3.9*	*293.8*	*3.4*
August 22, 2009	*4:00:00 AM*	*4.3*	*297.1*	*4.2* [b]
August 22, 2009	*5:00:00 AM*	*4.6*	*311.9*	*5.8* [b]
August 22, 2009	*6:00:00 AM*	*3.4*	*330*	*6.2* [b]
August 22, 2009	7:00:00 AM	2.8	330.5	6.8 [b]
August 22, 2009	8:00:00 AM	2.2	331.9	6.6 [b]
August 22, 2009	9:00:00 AM	1.8	330.6	6.7 [b]
August 22, 2009	10:00:00 AM	2.0	326.5	6.5 [b]
August 22, 2009	11:00:00 AM	2.4	326.9	6.7 [b]
August 22, 2009	12:00:00 PM	3.5	326.3	7.1 [b]
August 22, 2009	1:00:00 PM	4.0	323.8	7.3 [b]
August 22, 2009	2:00:00 PM	4.4	321.3	6.6 [b]

[a] 0 or 360 degrees represents the true north direction

[b] Average hourly wind speed exceeds monitoring guidance (15 km/hr or 4.17 m/s)

Table 20: Weather Information for Period of August 22 to 23, 2009 (R2)

Date	Start Hour	Temperature (ºC)	Wind Direction[a]	Wind Speed (m/s)
August 22, 2009	4:00:00 PM	5.5	323.8	6.4 [b]
August 22, 2009	5:00:00 PM	6.1	323.9	6.3 [b]
August 22, 2009	6:00:00 PM	6.3	326	6.2 [b]
August 22, 2009	7:00:00 PM	6.2	321.1	6.0 [b]
August 22, 2009	8:00:00 PM	5.9	318.7	5.4 [b]
August 22, 2009	9:00:00 PM	5.5	312.7	4.5 [b]
August 22, 2009	10:00:00 PM	5.1	296.8	3.9
August 22, 2009	*11:00:00 PM*	*4.7*	*289.9*	*3.8*
August 23, 2009	*12:00:00 AM*	*4.3*	*295.3*	*3.1*
August 23, 2009	*1:00:00 AM*	*3.7*	*320.9*	*3.8*
August 23, 2009	*2:00:00 AM*	*3.1*	*317*	*3.9*
August 23, 2009	*3:00:00 AM*	*2.7*	*314.4*	*2.9*
August 23, 2009	*4:00:00 AM*	*2.6*	*294.7*	*3.9*
August 23, 2009	*5:00:00 AM*	*2.3*	*297.7*	*4.3* [b]
August 23, 2009	*6:00:00 AM*	*2.0*	*310.4*	*3.6*
August 23, 2009	7:00:00 AM	2.3	302.4	5.1 [b]
August 23, 2009	8:00:00 AM	2.8	304.8	5.4 [b]
August 23, 2009	9:00:00 AM	3.2	321.1	6.9 [b]
August 23, 2009	10:00:00 AM	3.1	344.5	6.1 [b]
August 23, 2009	11:00:00 AM	3.6	335.9	5.4 [b]
August 23, 2009	12:00:00 PM	4.2	329.5	4.9 [b]
August 23, 2009	1:00:00 PM	5.0	315.7	4.9 [b]
August 23, 2009	2:00:00 PM	6.0	312.9	4.7 [b]
August 23, 2009	3:00:00 PM	6.9	311.5	5.0 [b]

[a] 0 or 360 degrees represents the true north direction

[b] Average hourly wind speed exceeds monitoring guidance (15 km/hr or 4.17 m/s)

Table 21: Weather Information for Period of August 23 to 24, 2009 (R5)

Date	Start Hour	Temperature (ºC)	Wind Direction[(a)]	Wind Speed (m/s)
August 23, 2009	4:00:00 PM	12.2	280.2	1.8
August 23, 2009	5:00:00 PM	12.5	297.2	1.8
August 23, 2009	6:00:00 PM	12.6	328.2	2.1
August 23, 2009	7:00:00 PM	12.8	279.5	1.8
August 23, 2009	8:00:00 PM	12.6	272.2	1.6
August 23, 2009	9:00:00 PM	12.0	298.9	1.4
August 23, 2009	10:00:00 PM	10.2	281.4	1.0
August 23, 2009	*11:00:00 PM*	*8.9*	*274*	*0.9*
August 24, 2009	*12:00:00 AM*	*8.2*	*330.2*	*1.8*
August 24, 2009	*1:00:00 AM*	*7.4*	*33.35*	*2.1*
August 24, 2009	*2:00:00 AM*	*6.9*	*44.5*	*1.6*
August 24, 2009	*3:00:00 AM*	*5.9*	*34.77*	*0.7*
August 24, 2009	*4:00:00 AM*	*5.1*	*7.3*	*0.6*
August 24, 2009	*5:00:00 AM*	*4.9*	*6.3*	*0.3*
August 24, 2009	*6:00:00 AM*	*4.1*	*354.8*	*0.5*
August 24, 2009	7:00:00 AM	4.9	309.9	0.5
August 24, 2009	8:00:00 AM	6.0	342.4	0.8
August 24, 2009	9:00:00 AM	7.3	327.2	1.1
August 24, 2009	10:00:00 AM	8.6	346.2	1.3
August 24, 2009	11:00:00 AM	9.6	356.1	2.5
August 24, 2009	12:00:00 PM	10.5	352.7	3.5
August 24, 2009	1:00:00 PM	11.1	326.2	3.5
August 24, 2009	2:00:00 PM	11.7	336.1	4.3 [(b)]
August 24, 2009	3:00:00 PM	12.3	329.2	4.4 [(b)]

[(a)] 0 or 360 degrees represents the true north direction

[(b)] Average hourly wind speed exceeds monitoring guidance (15 km/hr or 4.17 m/s)

6.0 DISCUSSION AND SUMMARY

Tables 22 and 23 summarize the L_{eq} results for the five receptor locations. The summary follows the Health Canada time period guidelines: daytime (7:00 AM to 11:00 PM), night-time (11:00 PM to 7:00 AM), 1-hour (10:00 PM to 11:00 PM), and a 24-hour time-average. Less than 24-hours of measurement were available at some locations due to access schedules or the filtering of noise from technician activity while setting up or dismantling the sound level meters; however, more than 20 hours of valid measurements were collected at each location for each 24-hr period.

Table 22: Summary of Noise Measurements, July 21 to 27, 2009

Monitoring Location	Noise Measurements (dBA)			
	Daytime, $L_{eq, day}$ 7:00 AM to 11:00 PM	Night-time, $L_{eq, night}$ 11:00 PM to 7:00 AM	24-hour, $L_{eq, 24hr}$ Measurement	1-hour, $L_{eq, 1hr}$ 10:00 PM to 11:00 PM
R1	57 (a)	41	55 (a)	39
R2	30	31	31	24
R3	40 (a)	36	39 (a)	32
R4	41 (a)	35	40 (a)	29
R5	57	47	56	34

(a) Less than 24-hours of valid noise measurements but more than 20 hours total.

Table 23: Summary of Noise Measurements, August 15 to 24, 2009

Monitoring Location	Noise Measurements (dBA)			
	Daytime, $L_{eq, day}$ 7:00 AM to 11:00 PM	Night-time, $L_{eq, night}$ 11:00 PM to 7:00 AM	24-hour, $L_{eq, 24hr}$ Measurement	1-hour, $L_{eq, 1hr}$ 10:00 PM to 11:00 PM
R1	61	57	60	35
R2	46 (a)	39	45 (a)	38
R3	43 (a)	45	44 (a)	42
R4	46 (a)	39	44 (a)	25
R5	51 (a)	42	49 (a)	39

(a) Less than 24-hours of noise measurements but more than 20 hours total.

Noise levels at location R1 were dominated by wind, helicopter and aircraft flyovers, and truck traffic. The comparatively higher wind during the August period elevated the measured noise levels. In general, as wind speed increases, the associated noise level would increase.

The July noise level measurements at location at R2 are considered to represent baseline conditions as the levels observed were similar to those expected from a quiet rural environment. The noise influence from project

activities is present; however, the occurrences are not considered dominant or of sufficient intensity to influence the overall measurements. In the August measurement period, the measured levels at R2 were higher than during the July measurement due to more frequent helicopter and aircraft flyovers, truck traffic, road construction activities, and wind.

Noise levels at location R3 and R4 were influenced to varying degrees by helicopter and aircraft flyovers, and heavy equipment. The August period daytime and night-time sound levels were higher than the July period due to more frequent project related activities and comparatively higher wind conditions. July period night-time noise levels at R3 are considered to represent baseline conditions as the levels observed were not notably influenced or dominated by Project sources.

At R5, the July period daytime and night-time sound levels were generally higher than the August period due to more frequent Project related activities such as site traffic and helicopter flyovers. Helicopter and aircraft flyovers were the dominant noise sources during this measurement period. During the July monitoring period, there were two helicopters working 8 to 9 hours a day. However, the helicopters are only onsite for 4 to 5 months and are considered as transient activities. This is clearly shown in the August monitoring period when only one helicopter was present, travelling fewer trips per day.

The results indicate the potential variability in noise levels at all five monitoring locations. As would be expected, the variability is influenced by the both Project activities, as well as the natural environment. Project activities such as helicopter and aircraft traffic, construction (heavy equipment), and blasting are the dominant project noise sources observed on the audio recordings. The frequency and location of Project activities influenced the measured levels at each receptor to a varying extent. In addition to the project activities, sound from the natural environment such as wind, waves (along lake shore), insects, birds, and animals also contributed as dominant noise sources in the measurements.

The measured levels provide a snapshot of the acoustic environment in this phase of the Project; however, noise associated with Project activities such as exploration and construction is not expected to be permanent. The annual noise monitoring program will provide information as the project progress into future phases. For future annual noise monitoring, it is recommended that the field surveys be conducted in summer (July or August), and either spring or autumn (May or September) in order to better document varying levels of project activity (*e.g.,* potential variability in helicopter activity). Conducting the noise monitoring program in different seasons may also enable correlation between seasonal weather changes and recorded noise levels.

7.0 CLOSURE

We trust the information provided herein meets your present requirements. If you have any questions or require further detail, please do not hesitate to contact the undersigned.

Yours very truly,

GOLDER ASSOCIATES LTD.

ORIGINAL SIGNED

Huay Seen Lee, B.A.Sc.
Acoustic Scientist

ORIGINAL SIGNED

Teresa Drew, B.Sc
Associate, Senior Acoustic Specialist

ORIGINAL SIGNED

Jonathon Chui, P.Eng. INCE
Acoustic Engineer

ORIGINAL SIGNED

Dan Walker, Ph.D., P.Eng. (BC, NWT/NU)
Associate, Project Manager

HSL/TD/JC/DRW/km/lw/ja

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7219500 N
7218000 N
7216500 N
7215000 N
7213500 N
7212000 N
7210500 N
7209000 N
639000 E
640500 E
642000 E
643500 E

N

VAULT PIT

R4

EXPLOSIVES STORAGE

R1

SD6

ALL-WEATHER PRIVATE ACCESS ROAD

SD1

PORTAGE ATTENUATION POND

PORTAGE ROCK STORAGE FACILITY

SD2

SD3

STORMWATER DIKE

CENTRAL DIKE

TAILINGS STORAGE FACILITY

AIRSTRIP QUARRY

R5

R2

AIRSTRIP

SD4

SD5

TEARDROP LAKE

EAST DIKE

R3

WATER INTAKE

PLANT SITE

ROM PILE

PORTAGE PIT

FUEL STORAGE

THIRD PORTAGE LAKE

GOOSE ISLAND PIT

BAY-GOOSE DIKE

THIRD PORTAGE LAKE

0 150 300 450 600 750
SCALE IN METRES

LEGEND

R2 2009 NOISE MONITORING LOCATION

PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK DIVISION

TITLE

NOISE MONITORING LOCATIONS

Golder Associates
Greater Vancouver Office, BC

PROJECT No. 08-1428-0007			PHASE No.	
DESIGN	HSL	28/11/08	SCALE AS SHOWN	REV. 0
NOISE	HSL	28/11/08		
CHECK				
REVIEW				

FIGURE 1

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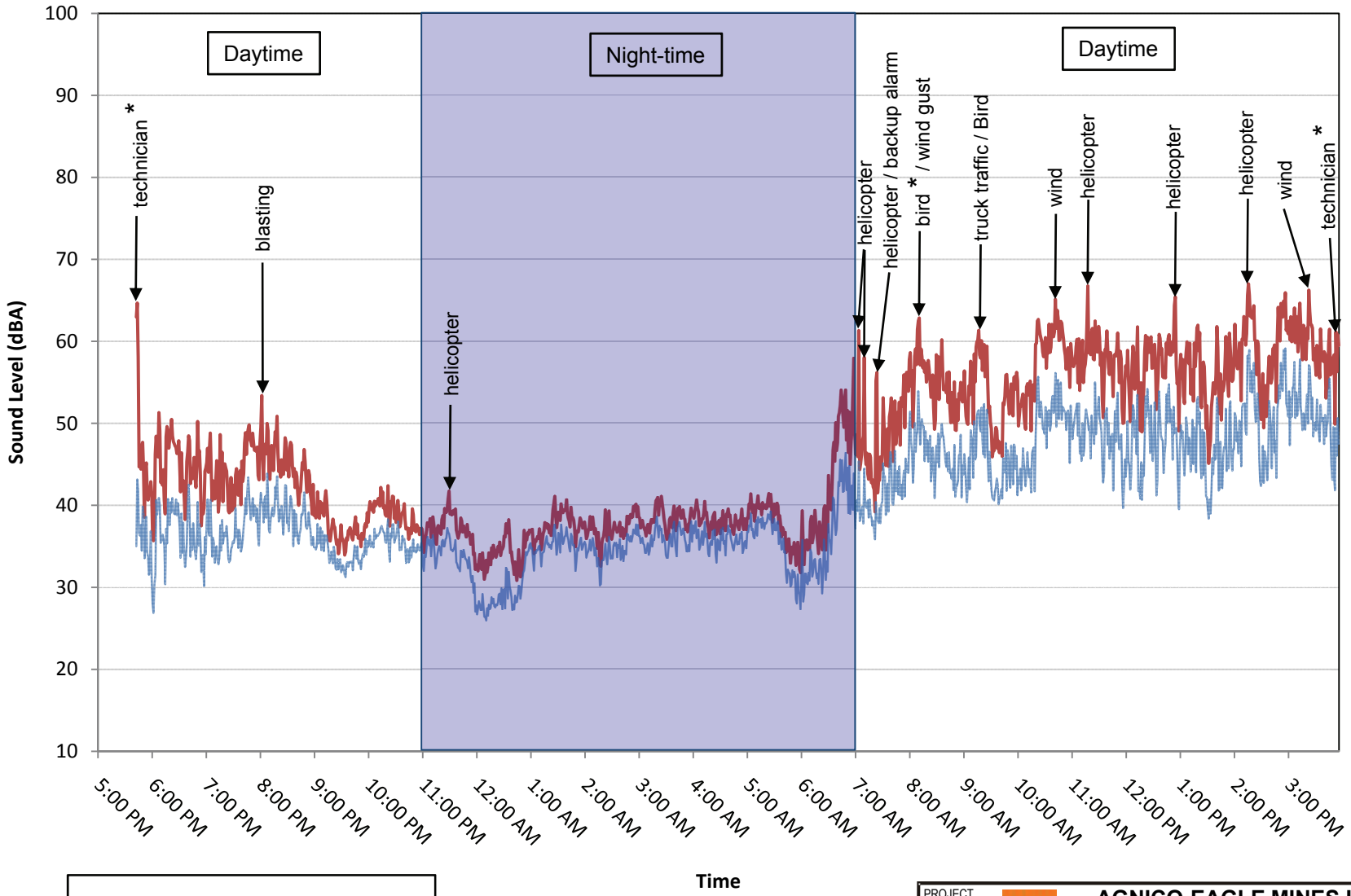


PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

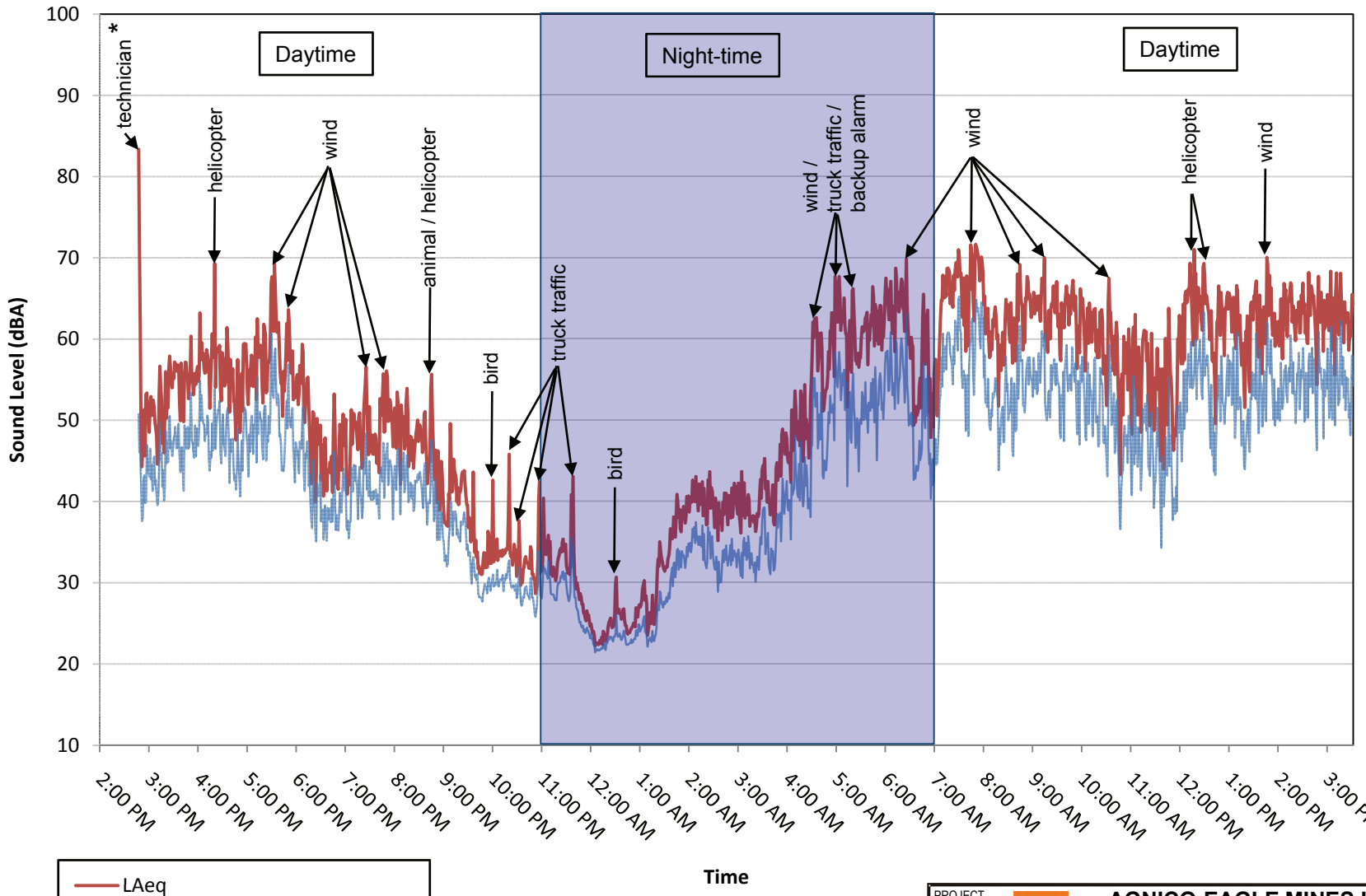
TITLE

ONE MINUTE NOISE INTERVALS MONITORING LOCATION, R1 JULY 21 – 22, 2009

Golder Associates

PROJECT No. 09-1428-5005			FILE No. fig-5		
DESIGN	HSL	22/12/09	SCALE NTS	REV.	
NOISE	HSL	22/12/09	**FIGURE 2**		
CHECK					
REVIEW					

REVISION DATE: BY: FILE: \\Cal1-s-filesrv1\data\Active_2009\1428\09-1428-5005 AE Meadowbank\Report\



PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

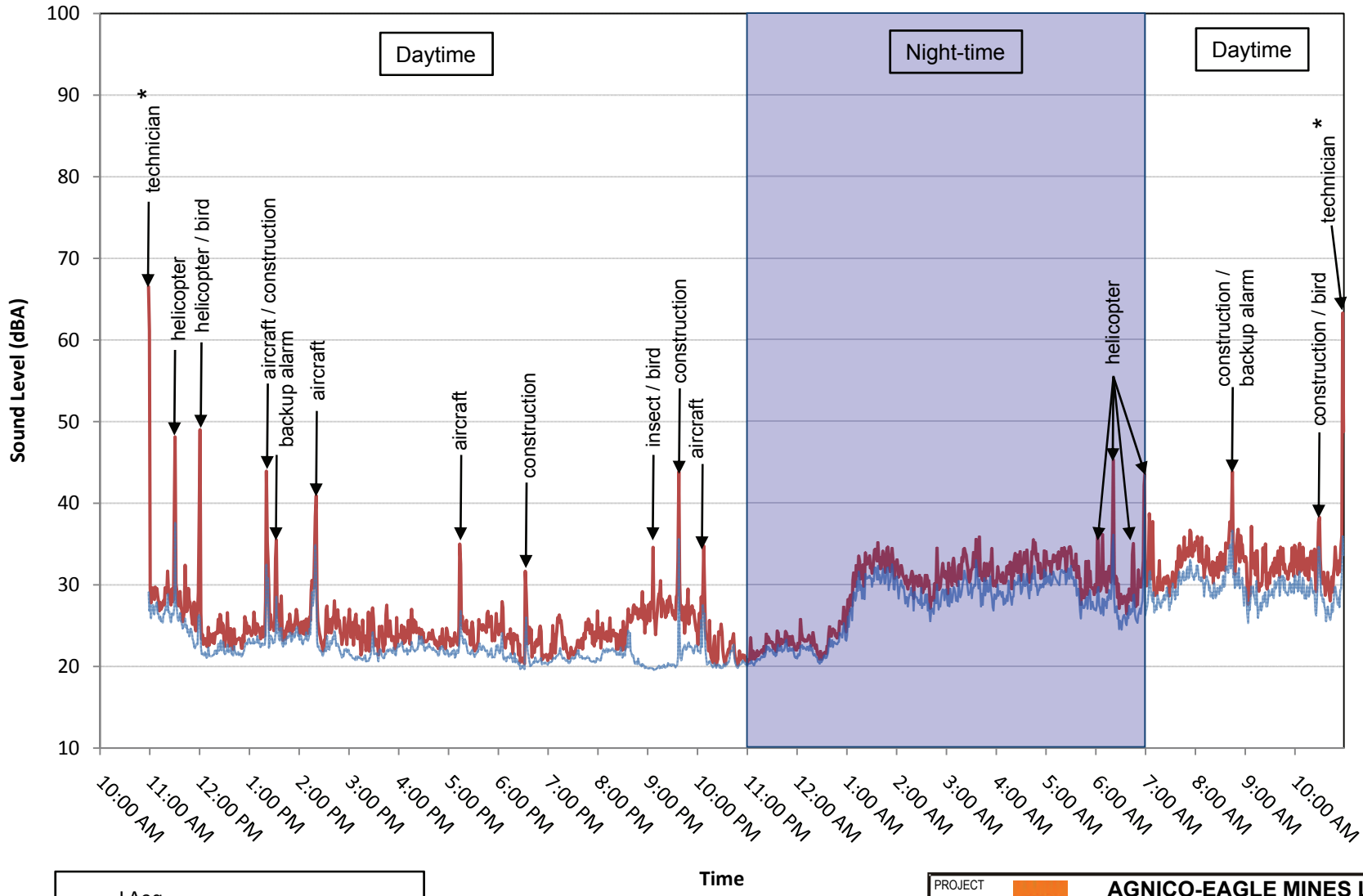
TITLE

ONE MINUTE NOISE INTERVALS
MONITORING LOCATION, R1
AUGUST 21 – 22, 2009

Golder Associates

PROJECT No. 09-1428-5005			FILE No. fig-5	
DESIGN	HSL	22/12/09	SCALE NTS	REV.
NOISE	HSL	22/12/09		
CHECK			**FIGURE 3**	
REVIEW				

REVISION DATE: BY: FILE: \\Cal1-s-filesrv1\data\Active_2009\1428\09-1428-5005 AE Meadowbank\Report\



PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

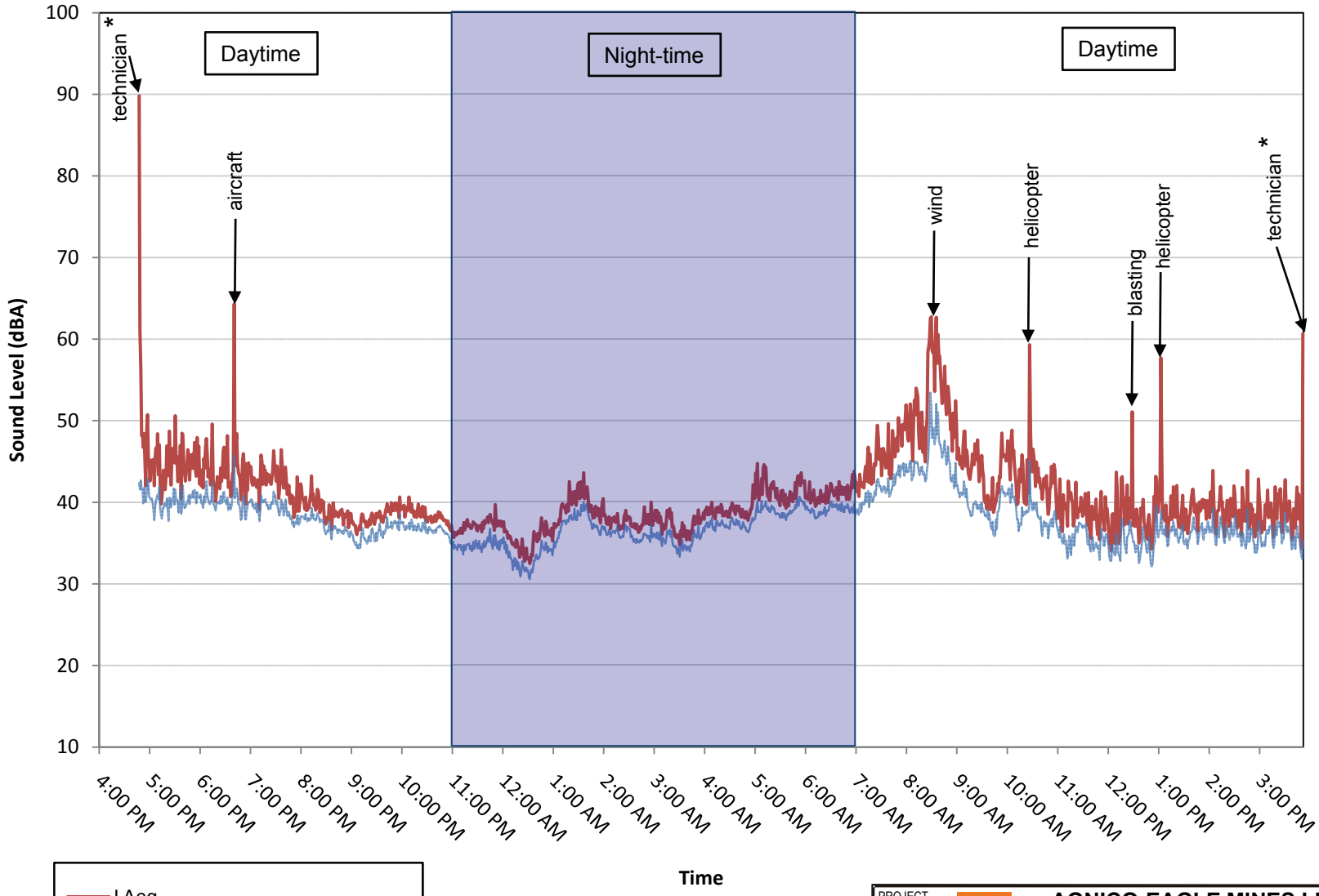
ONE MINUTE NOISE INTERVALS MONITORING LOCATION, R2 JULY 23 – 24, 2009

Golder Associates

PROJECT No. 09-1428-5005			FILE No. fig-5		
DESIGN	HSL	22/12/09	SCALE NTS		REV.
NOISE	HSL	22/12/09			
CHECK					
REVIEW					

FIGURE 4

REVISION DATE: BY: FILE: \\Cal1-s-filesrv1\data\Active_2009\1428\09-1428-5005 AE Meadowbank\Report\



PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

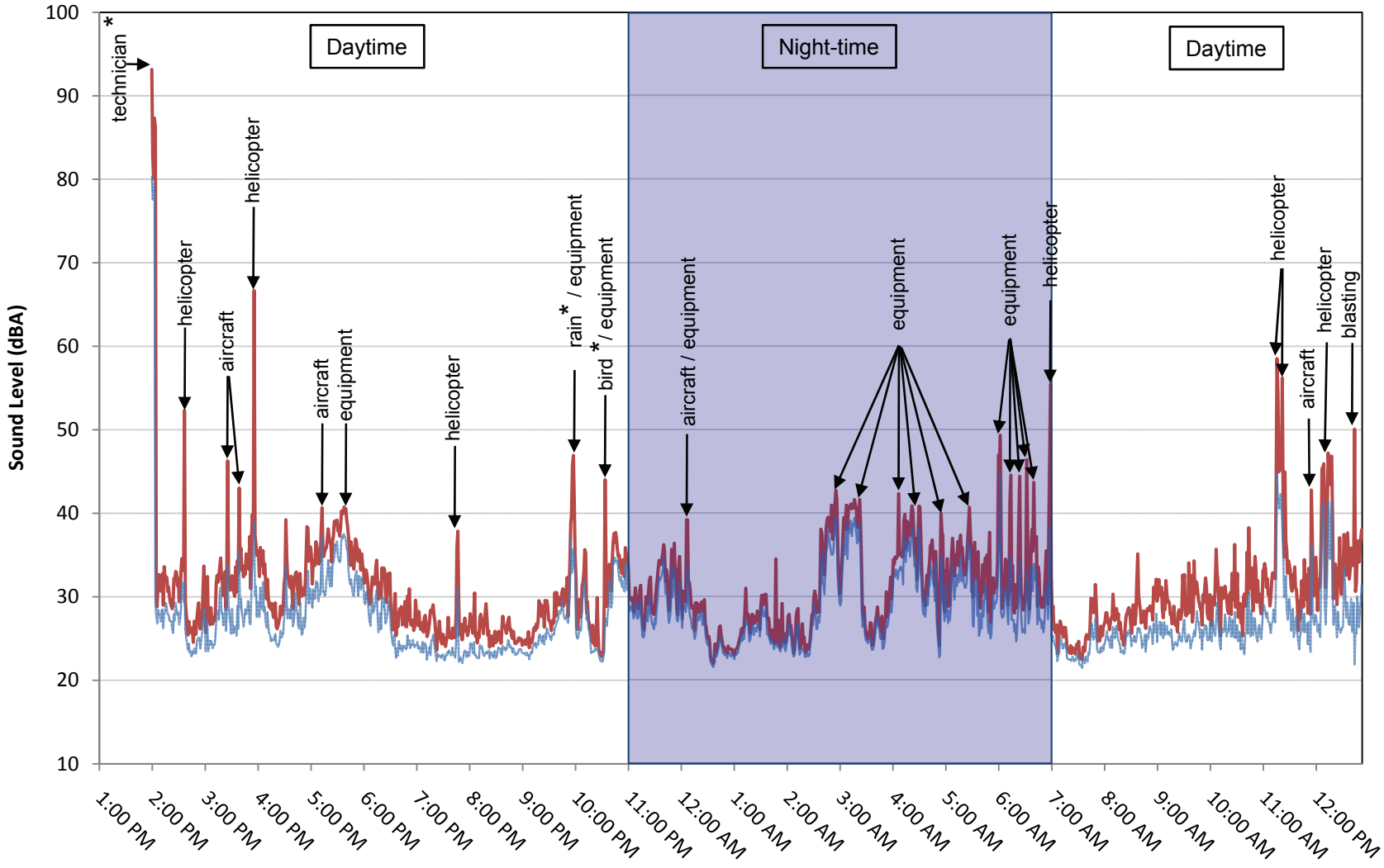
ONE MINUTE NOISE INTERVALS MONITORING LOCATION, R2 AUGUST 22 – 23, 2009

Golder Associates

PROJECT No. 09-1428-5005			FILE No. fig-5		
DESIGN	HSL	22/12/09	SCALE NTS		REV.
NOISE	HSL	22/12/09			
CHECK					
REVIEW					

FIGURE 5

REVISION DATE: BY: FILE: \\Cal1-s-filesrv1\data\Active_2009\1428\09-1428-5005 AE Meadowbank\Report\



PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

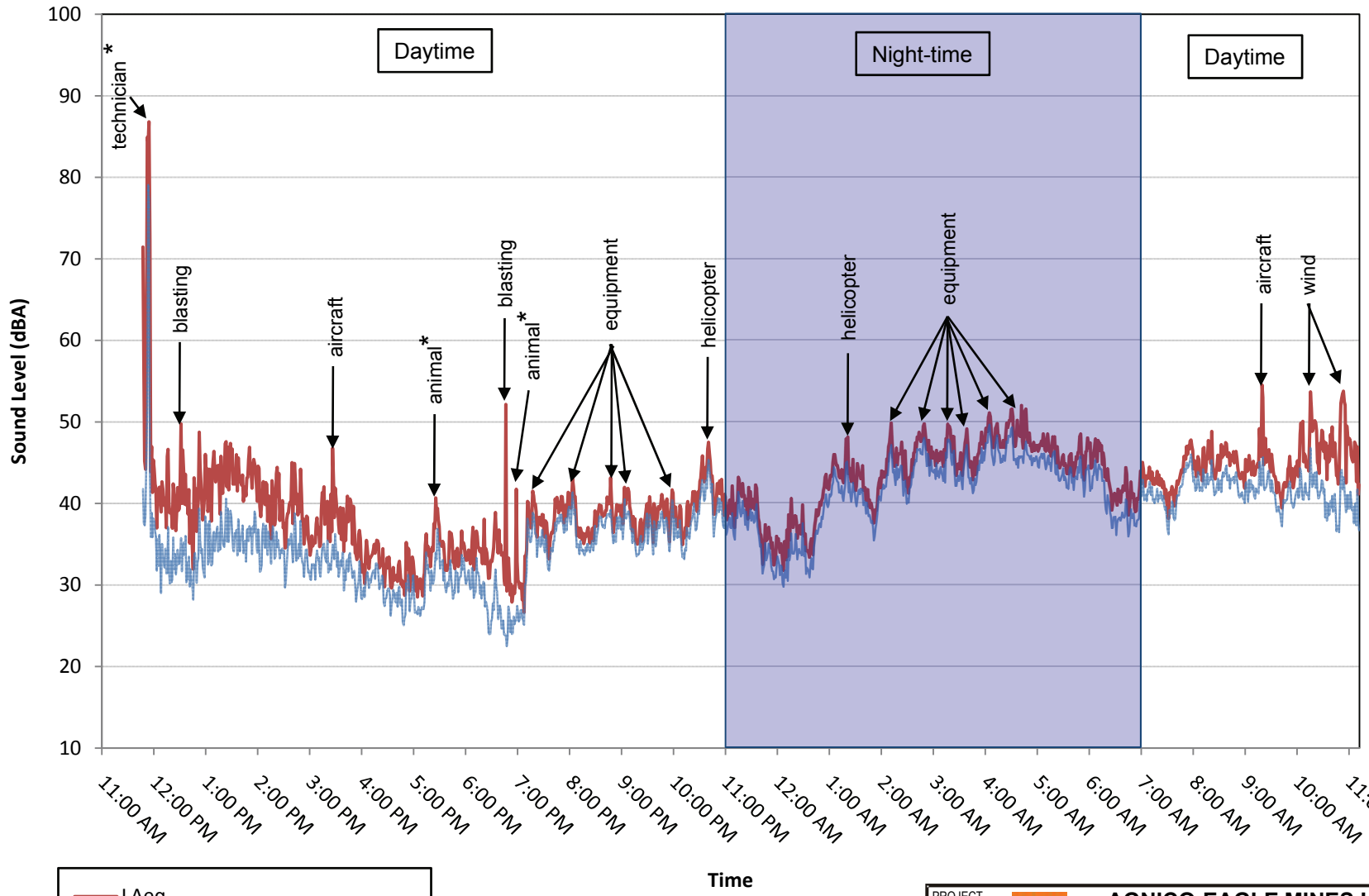
ONE MINUTE NOISE INTERVALS MONITORING LOCATION, R3 JULY 26 – 27, 2009

Golder Associates

PROJECT No. 09-1428-5005			FILE No. fig-5		
DESIGN	HSL	22/12/09	SCALE NTS	REV.	
NOISE	HSL	22/12/09			
CHECK					
REVIEW					

FIGURE 6

REVISION DATE: BY: FILE: \\Cal1-s-filesrv1\data\Active_2009\1428\09-1428-5005 AE Meadowbank\Report\



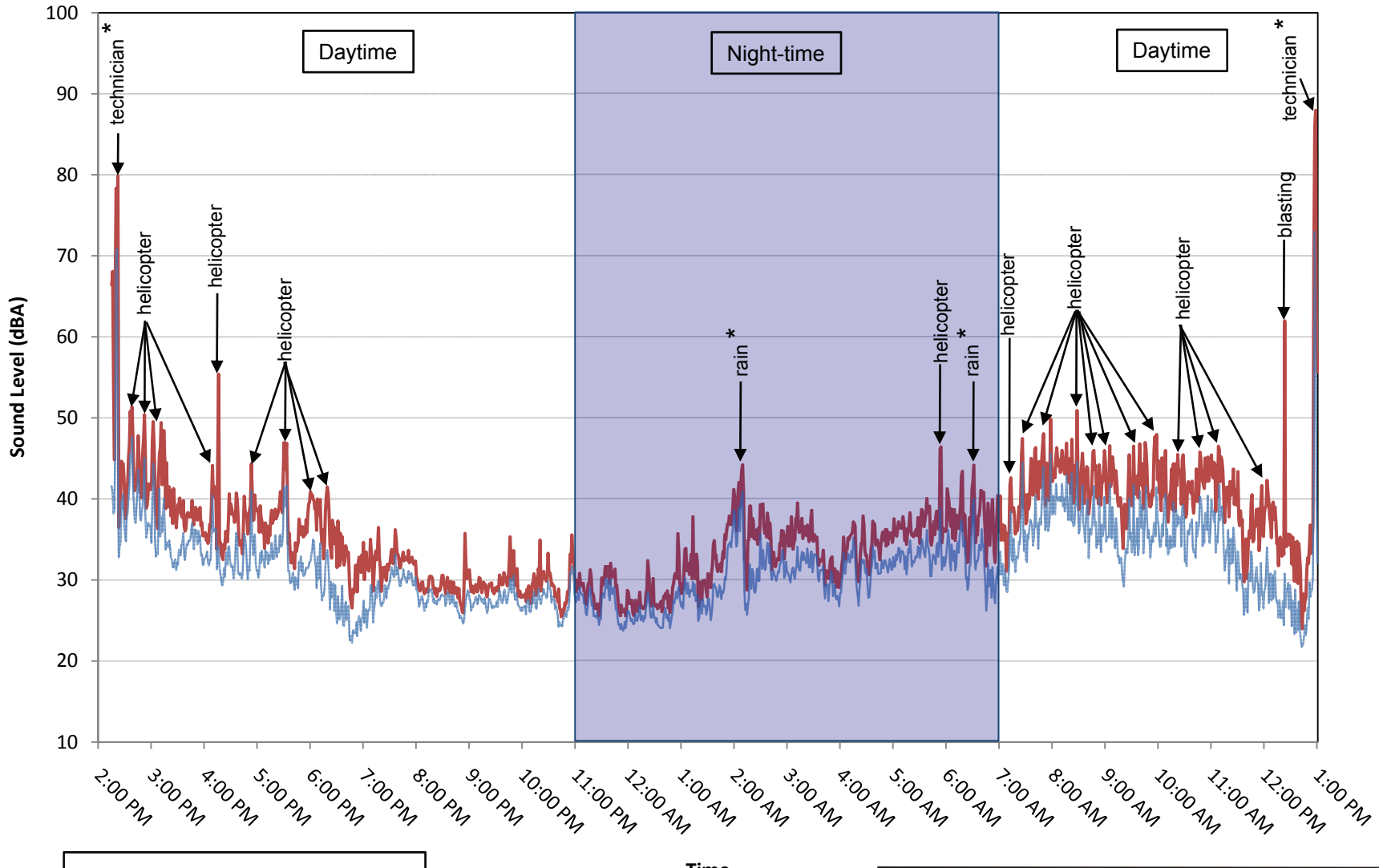
PROJECT: AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE: ONE MINUTE NOISE INTERVALS
MONITORING LOCATION, R3
AUGUST 16 – 17, 2009

Golder Associates

PROJECT No. 09-1428-5005			FILE No. fig-5	
DESIGN	HSL	22/12/09	SCALE NTS	REV.
NOISE	HSL	22/12/09	FIGURE 7	
CHECK				
REVIEW				

REVISION DATE: BY: FILE: \\Cal1-s-filesrv1\data\Active_2009\1428\09-1428-5005 AE Meadowbank\Report\



PROJECT

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AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

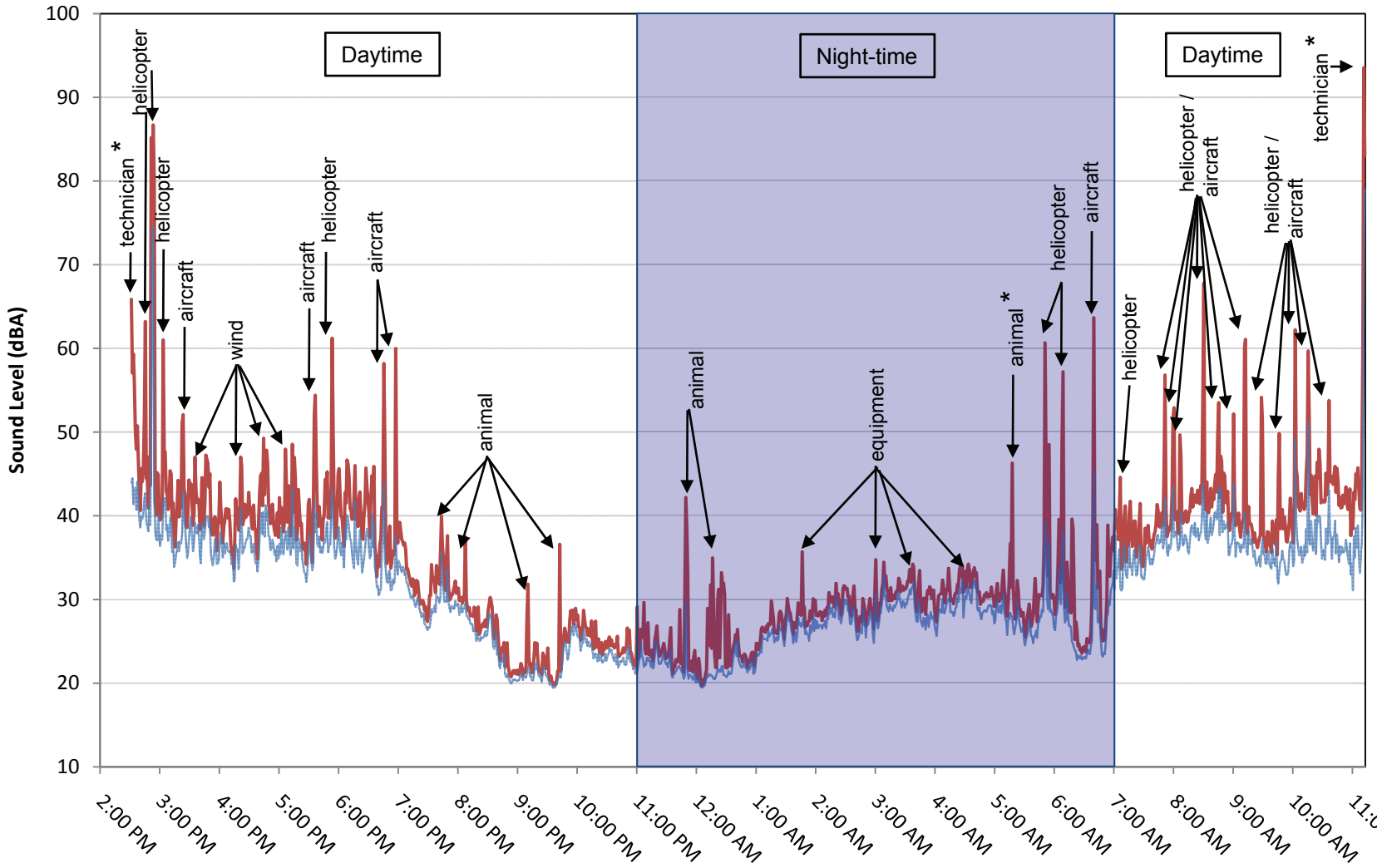
ONE MINUTE NOISE INTERVALS MONITORING LOCATION, R4 JULY 25 – 26, 2009

Golder Associates

PROJECT No. 09-1428-5005			FILE No. fig-5	
DESIGN	HSL	22/12/09	SCALE NTS	REV.
NOISE	HSL	22/12/09		
CHECK				
REVIEW				

FIGURE 8

REVISION DATE: BY: FILE: \\Cal1-s-filesrv1\data\Active_2009\1428\09-1428-5005 AE Meadowbank\Report\



PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

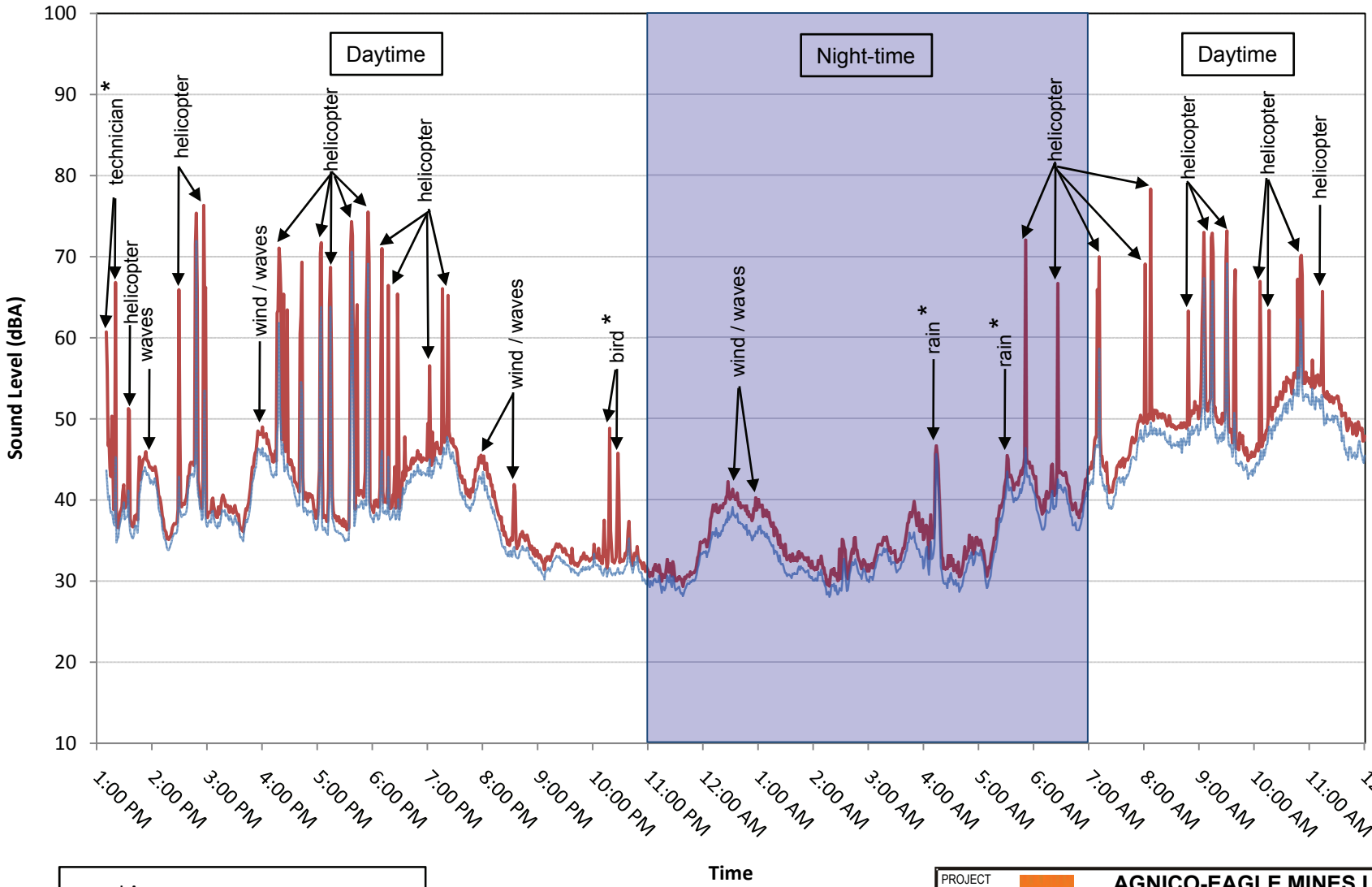
ONE MINUTE NOISE INTERVALS MONITORING LOCATION, R4 AUGUST 15 – 16, 2009

Golder Associates

PROJECT No. 09-1428-5005			FILE No. fig-5	
DESIGN	HSL	22/12/09	SCALE NTS	REV.
NOISE	HSL	22/12/09		
CHECK				
REVIEW				

FIGURE 9

REVISION DATE: BY: FILE: \\Cal1-s-filesrv1\data\Active_2009\1428\09-1428-5005 AE Meadowbank\Report\



PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

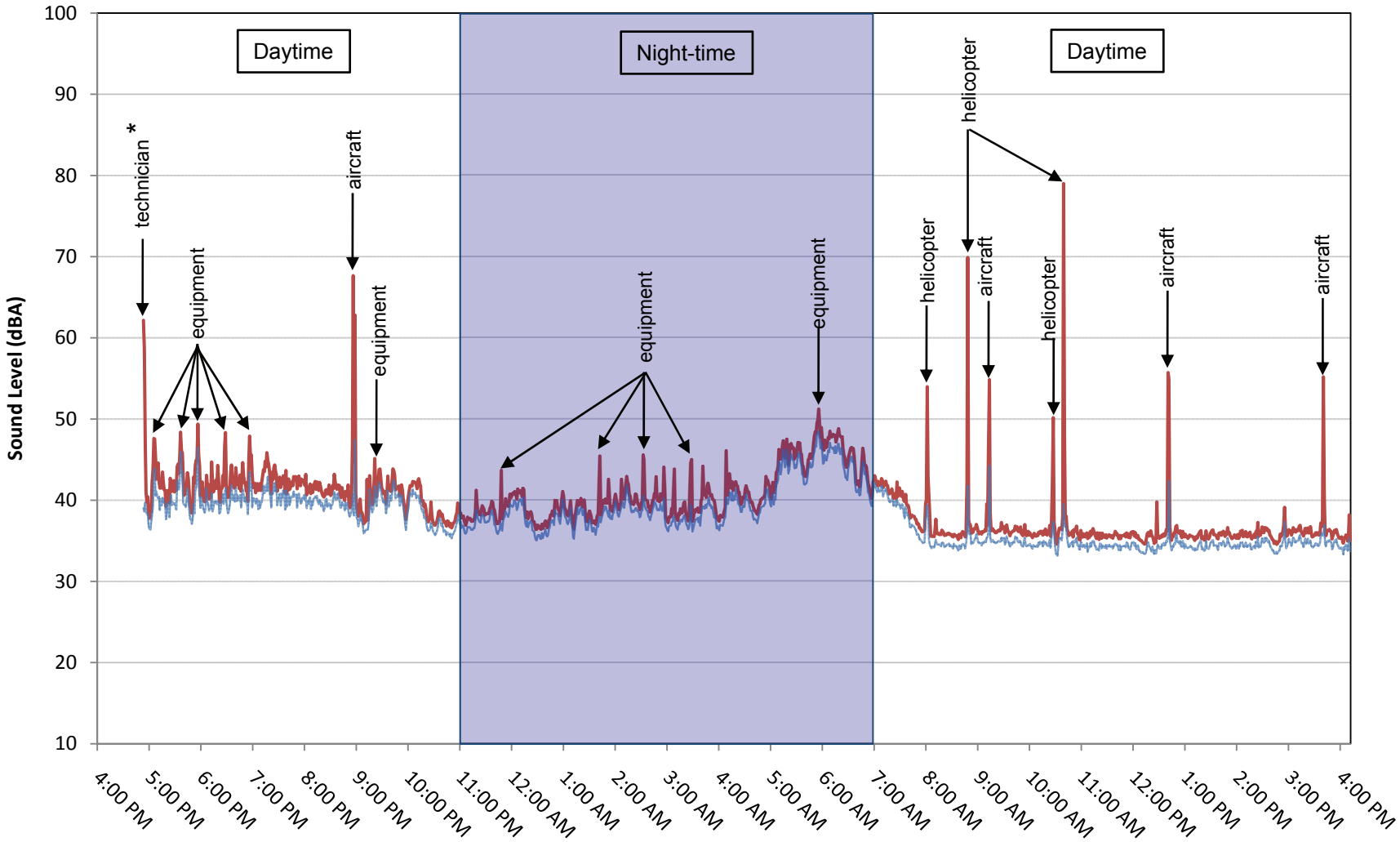
ONE MINUTE NOISE INTERVALS MONITORING LOCATION, R5 JULY 24 – 25, 2009

Golder Associates

PROJECT No. 09-1428-5005			FILE No. fig-5		
DESIGN	HSL	22/12/09	SCALE NTS	REV.	
NOISE	HSL	22/12/09			
CHECK					
REVIEW					

FIGURE 10

REVISION DATE: BY: FILE: \\Cal1-s-filesrv1\data\Active_2009\1428\09-1428-5005 AE Meadowbank\Report\



PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

ONE MINUTE NOISE INTERVALS MONITORING LOCATION, R5 AUGUST 23 – 24, 2009

Golder Associates

PROJECT No. 09-1428-5005			FILE No. fig-5		
DESIGN	HSL	22/12/09	SCALE NTS		REV.
NOISE	HSL	22/12/09			
CHECK					
REVIEW					

FIGURE 11

APPENDIX A

Noise Terminology

APPENDIX A
Noise Terminology

Since the concepts and theories used in the assessment of outdoor acoustics are not intuitive, the following descriptions of key concepts and definitions used in this evaluation are provided to guide the reader:

- "Sound" or "sound emissions" refers to the acoustic energy generated by natural or man-made sources, including the Project activities.
- "Noise" or "noise levels" refers to the levels that can be heard or measured at a receiver.
- A noise "receiver" is a location where measurements or predictions of noise levels are made.
- The "volume" of a sound or noise is expressed on a logarithmic scale, in units called decibels (dB). Since the scale is logarithmic, a sound or noise that is twice as loud as another will only be three decibels (3 dB) higher. A sound or noise with double the number of decibels is much more than twice as loud. A change of three decibels is also the general threshold at which a person can notice a change in sound volume.
- Sound emissions and noise levels also have a "frequency". The human ear does not respond to all frequencies in the same way. Mid-range frequencies are most readily detected by the human ear, while low and high frequencies are harder to hear. Environmental noise levels are usually presented as "A weighted" decibels (or dBA), which incorporates the frequency response of the human ear. While low frequency noise may not be "heard", it can often be felt.
- "Sound pressure" is the difference between the instantaneous pressure at a fixed point in a sound field, and the pressure at the same point with the sound absent.

"Sound pressure level" is the sound pressure at a given point quantified by:

- $Lp = 10 \log10(p_{rms}/p_{ref})^2$
- Where p_{rms} is the root mean square, sound pressure and p_{ref} is the reference rms sound pressure (dB re 20µPa).
- "Equivalent noise level" ($L_{eq,\ period}$) is the continuous equivalent sound level, defined as the sound pressure level that, if constant over the stated measurement period, would contain the same sound energy as the actual monitored sound that is fluctuating in level over the measurement period. This type of average takes into account the natural variability of sound. $L_{eq,\ period}$ is a common descriptor used in outdoor noise measurement (Cowan 1994).
- 90^{th} percentile sound level ($L_{90,\ period}$) is the sound pressure level that has been exceeded 90% of the measurement period of time. $L_{90,\ period}$ is representative of nearly the lowest levels of sound occurring during quiet interludes and is often referred to as background or residual sound level. (Crocker 2007)
- Noise levels from common sources are provided in Table 1 to provide the reader a reference when comparing the noise levels predicted from the Project. The noise levels listed in the table represent average values and could vary from one situation to the next.

Table 1: Summary of Noise Associated with Common Activities

Activity	Noise Level [dBA]
Lawnmower	95
Loud shout	90
Motorcycle passing 15 m away	85
Car travelling 100 km/hr passing 15 m away	80
Vacuum cleaner	75
Faucet	62
Normal conversation	60
Moderate rainfall	50
Bird singing	50
Quiet living room	40
Whispered speech	40
Average rural sound level at night	35

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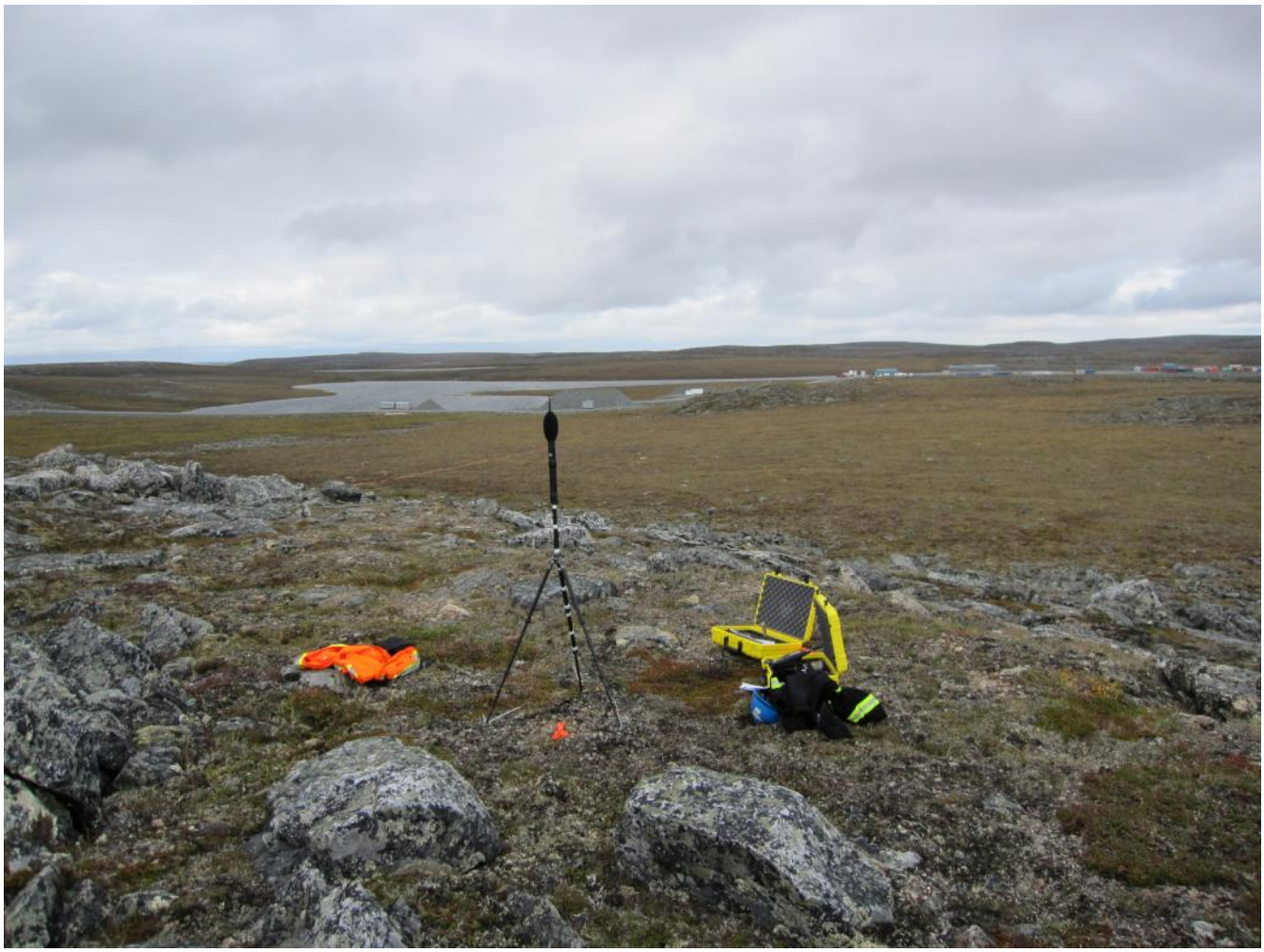
APPENDIX B

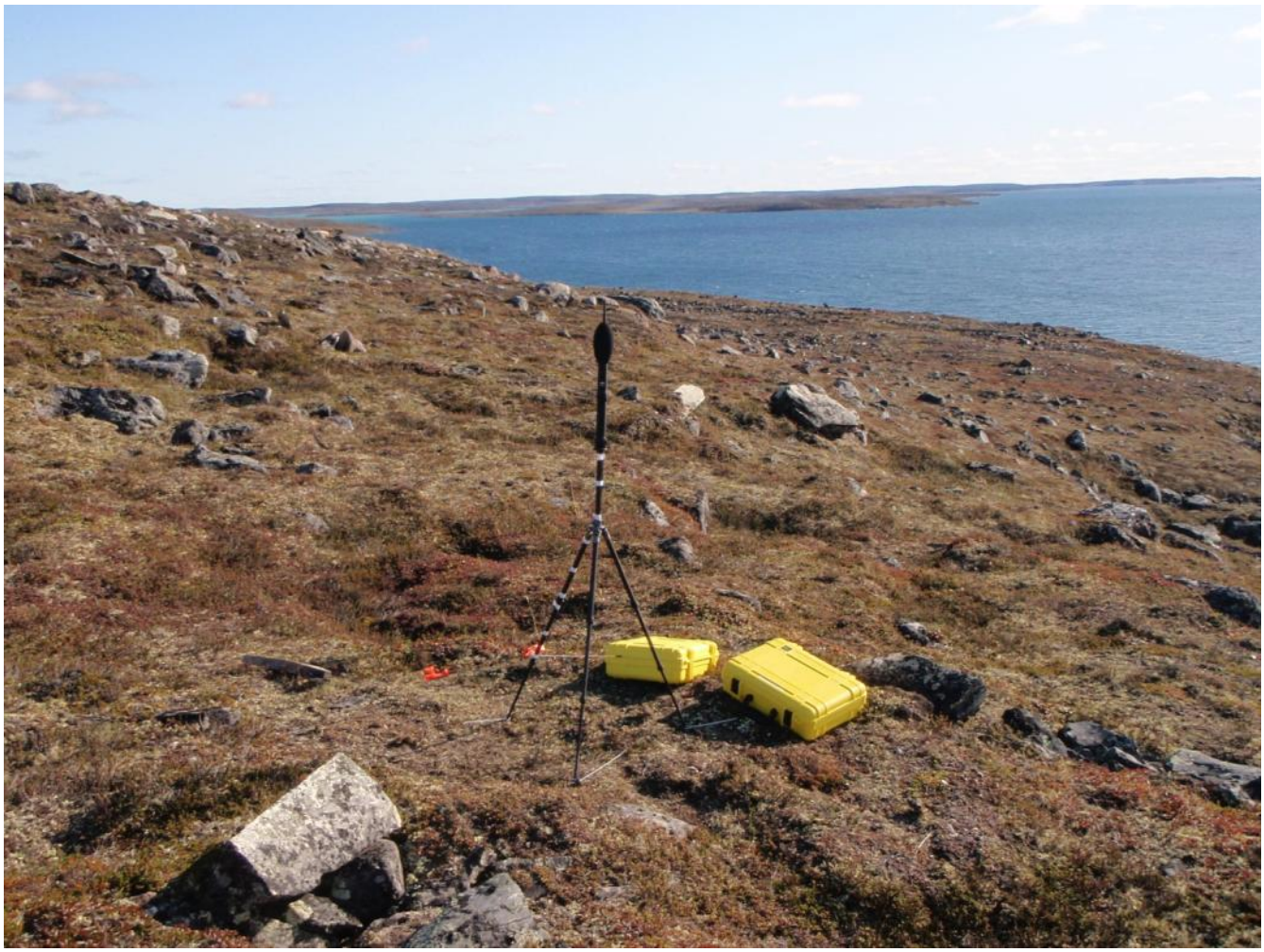
Field Photographs

Photograph B.1: R1 Noise Monitoring Setup (21 to 22 July 2009)



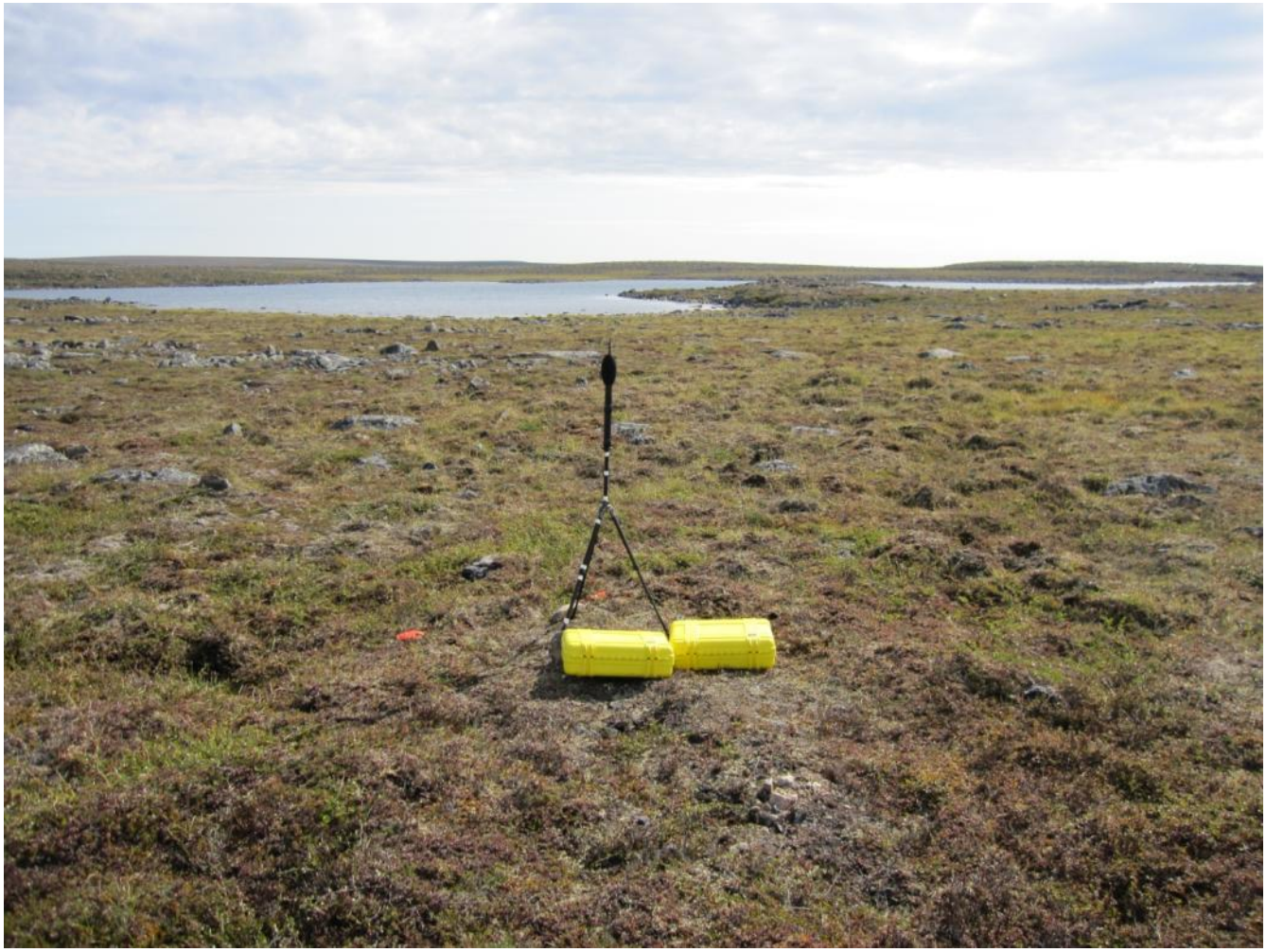
Photograph B.2: R1 Noise Monitoring Setup (21 to 22 August 2009)

Photograph B.3: R2 Noise Monitoring Setup (23 to 24 July 2009)

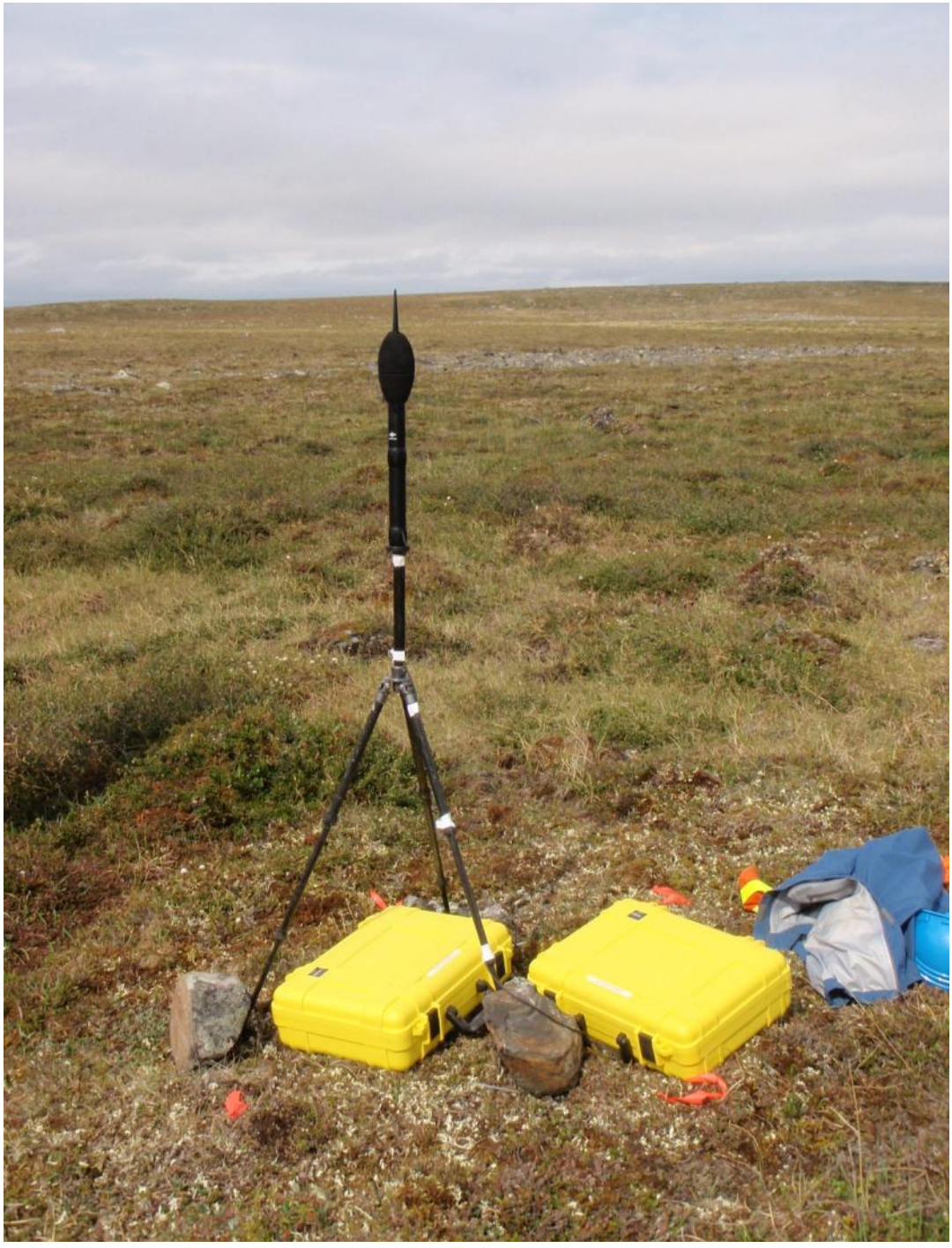


Photograph B.4: R2 Noise Monitoring Setup (22 to 23 August 2009)

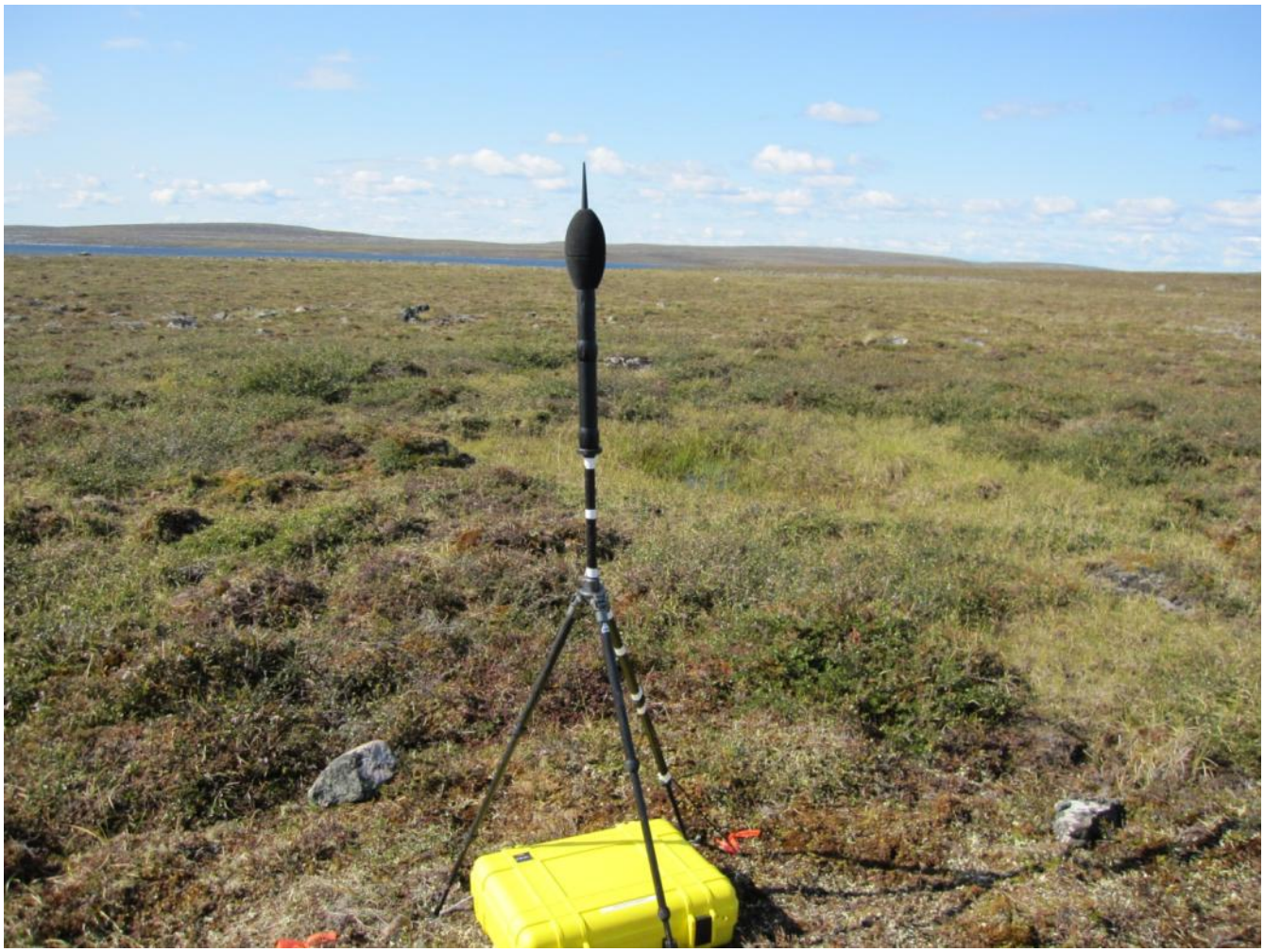
Photograph B.5: R3 Noise Monitoring Setup (26 to 27 July 2009)



Photograph B.6: R3 Noise Monitoring Setup (16 to 17 August 2009)

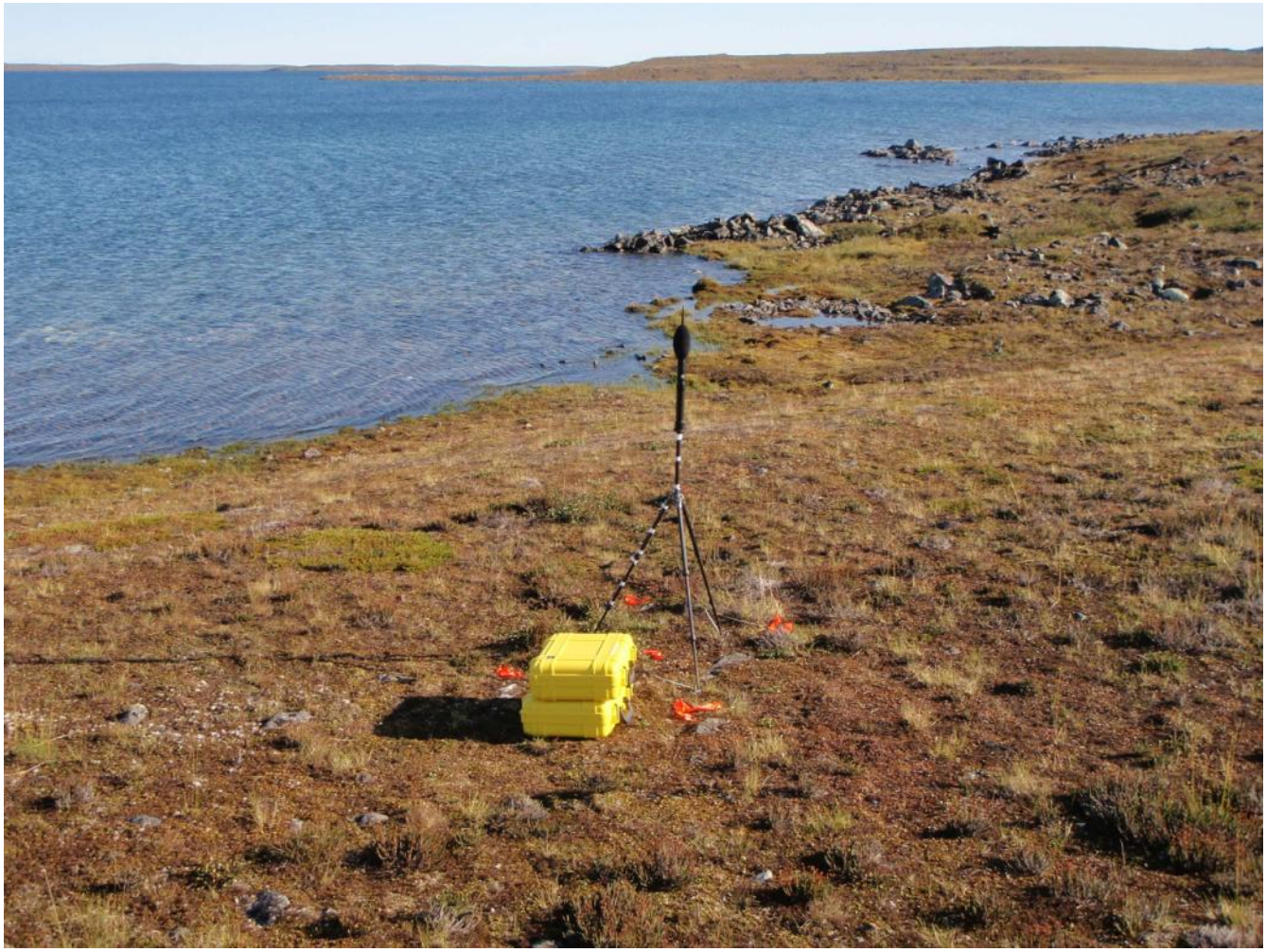


Photograph B.7: R4 Noise Monitoring Setup (25 to 26 July 2009)



Photograph B.8: R4 Noise Monitoring Setup (15 to 16 August 2009)

Photograph B.9: R5 Noise Monitoring Setup (24 to 25 July 2009)



Photograph B.10: R5 Noise Monitoring Setup (23 to 24 August 2009)

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Africa	+ 27 11 254 4800
Asia	+ 852 2562 3658
Australasia	+ 61 3 8862 3500
Europe	+ 356 21 42 30 20
North America	+ 1 800 275 3281
South America	+ 55 21 3095 9500

solutions@golder.com
www.golder.com

Golder Associates Ltd.
500 - 4260 Still Creek Drive
Burnaby, British Columbia, V5C 6C6
Canada
T: +1 (604) 296 4200

Golder Associates