

Appendix C9

Report : *2008 Noise Monitoring Report for the Meadowbank Gold Project*



January 5, 2009

REPORT ON

2008 NOISE MONITORING REPORT FOR THE MEADOWBANK GOLD PROJECT

Submitted to:

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REPORT



A world of
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Report Number: 08-1428-0007/4000
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EXECUTIVE SUMMARY

Golder Associates Ltd. (Golder) was retained by Agnico-Eagle Mining Ltd. (AEM) to conduct the initial noise monitoring study 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 study is to provide existing noise levels at the following five locations:

- Worker's camp area (R1).
- Future airstrip area (R2).
- Native camping ground/possible grave area (R3).
- Future mine shop area (R4).
- Caribou migration route and exploration camp area (R5).

The monitoring program was conducted from September 04 to 09, 2008.

The daily equivalent sound level ($L_{eq, 24hr}$) measured at R1 was 52dBA while the daily L_{eq} measured at R2 was 45 dBA. The sounds measured at these locations were representative of construction activities operated continuously during the monitoring period at various locations. The daily values are based on 22 hours and 21 hours of data respectively, due to the filtering of invalid data.

The daily $L_{eq, 24hr}$ values measured at R3 and R4 were 42 dBA and 51 dBA respectively. The ambient levels at R3 and R4 were observed to be due to wind conditions and waves along the lake shore. The ambient level was higher at R4 due to long periods of wind and rain, according to the available weather information for the respective monitoring periods. The daily values are based on 22 hours and 21 hours of data respectively, due to the filtering of invalid data.

The daily $L_{eq, 24hr}$ measured at R5 (based on 24 hours) was 45 dBA. The sound level measured at this location was influenced by the construction and helicopter activities in the surrounding area as well as the all-weather private access road. The $L_{eq, 24hr}$ values were presented with all anomalous data or noise events that were not considered part of normal background for the area excluded (such as low flying helicopter noise, gusty wind, heavy rain and technician interference).



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1.0 INTRODUCTION

The Meadowbank Gold 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 conducted at five locations between September 04 and 09, 2008 and is intended to represent construction noise at Meadowbank Mine area as well as the acoustic baseline for the area.

The following provides an overview of the 2008 Noise Measurement Report organization:

- Section 2 describes the site and area.
- Section 3 outlines the methods used for the baseline study.
- Section 4 shows the results of the baseline monitoring program.
- Section 5 discusses the associated weather data.
- 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.

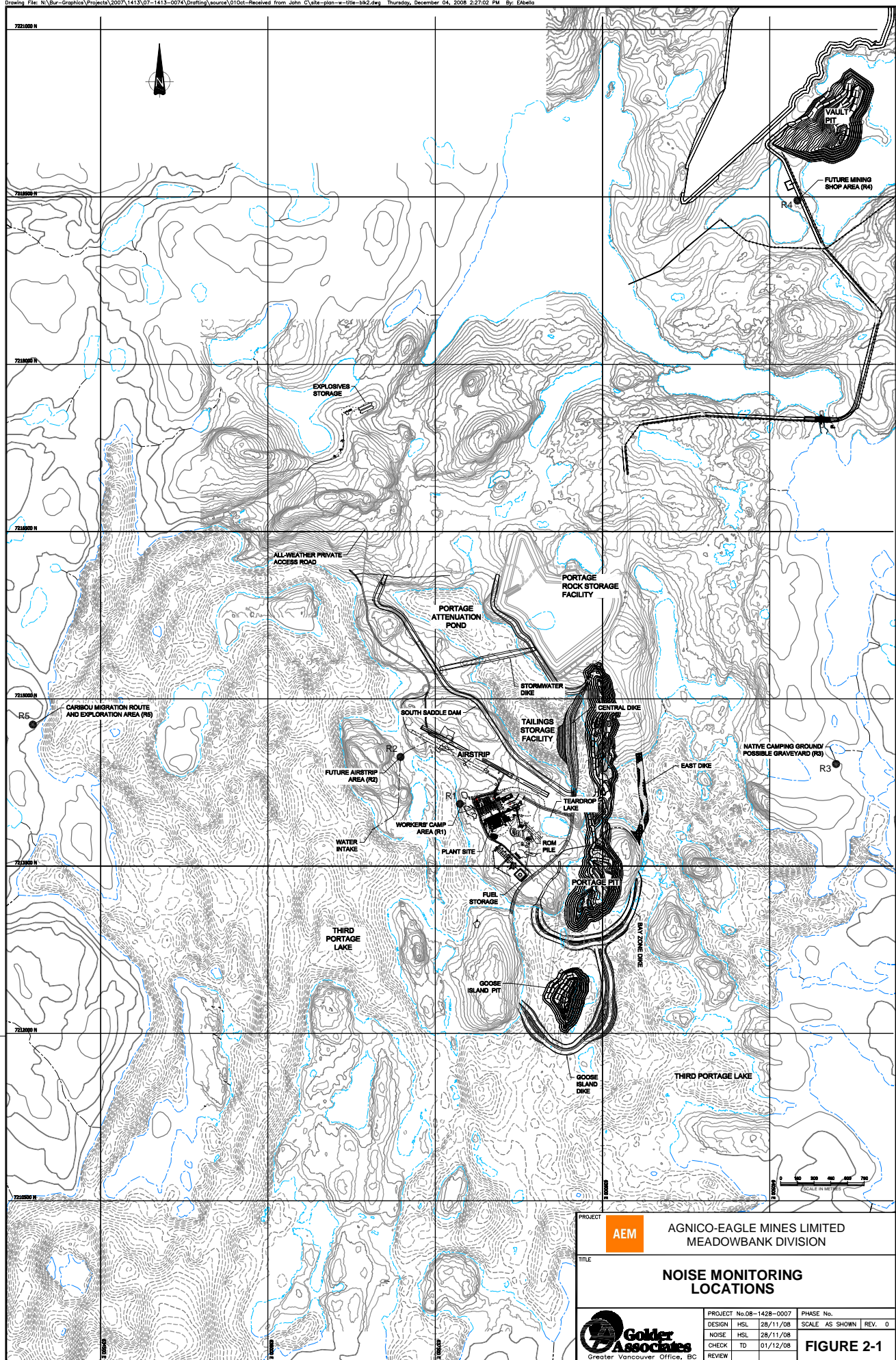




2.0 NOISE MONITORING LOCATION SELECTION

Five locations for 24-hour noise monitoring were selected based on areas potentially affected by the proposed Project. Table 2-1 summarizes the UTM coordinates of the selected monitoring locations. Figure 2-1 shows the location of the noise monitoring sites relative to the mine plan. Appendix B presents photographs taken at all monitoring locations.

Table 2-1: Selected Noise Monitoring Sites (UTM NAD 83)

Monitoring Location	Easting	Northing
Worker's Camp Area (R1)	637739	7214060
Future Airstrip Area (R2)	637200	7214500
Native Camping Ground/Possible Grave Area (R3)	641112	7214417
Future Mine Shop Area (R4)	640776	7219457
Caribou Migration Route and Exploration Camp Area (R5)	633916	7214771



PROJECT				AGNICO-EAGLE MINES LIMITED MEADOWBANK DIVISION			
TITLE		NOISE MONITORING LOCATIONS					
 Golden Associates Greater Vancouver Office, BC		PROJECT No.08-1428-0007			PHASE No.		
		DESIGN HSL 28/11/08			SCALE AS SHOWN		
		NOISE HSL 28/11/08			REV. 0		
		CHECK TD 01/12/08			FIGURE 2-1		
		REVIEW					



3.0 METHODS

One, 24-hour survey was 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 providing an expected typical or average daily 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 ($L_{eq, 1min}$) in dBA;
- 1/3 octave band values in dB;
- absolute maximum sound level (L_{max}) in dBA; and
- minimum sound level (L_{min}) values over one-minute intervals.

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.

For this survey, weather data were collected using a WeatherHawk portable weather station from Campbell Scientific or recorded hourly at 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 study 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 acceptable weather conditions were filtered from the data set prior to the calculation of any 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.



4.0 RESULTS

The 24-hour measurement data collected for the study 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, thunder, or high wind) were excluded from the calculated hourly, daytime or night-time results. All “hourly” $L_{eq, 1hr}$ values were based on at least 30 minutes of data. Daytime hours as defined by Health Canada includes the hours 7:00 AM to 11:00 PM, night-time hours range from 11:00 PM to 7:00 AM.

Measured hourly $L_{eq, 1hr}$, L_{max} , and L_{min} values for the noise monitoring locations are provided in the following sections. The grey scaled cells within the tables represent the night-time period.

4.1 Worker’s Camp Area (R1)

Filtered hourly L_{max} , L_{min} , and $L_{eq, 1hr}$ results recorded at monitoring location R1 are presented in Table 4-1. R1 is situated approximately 50 m south of the plant site (Figure 2-1). Construction activity was noted throughout the monitoring period. The landscape near this location consists of the Third Portage Lake to the south, with the surrounding terrestrial area characterized as rocky with some tundra vegetation (Photos B.1).

The lowest hourly value recorded at monitoring location R1 was 42 dBA from 7:00 PM to 8:00 PM on 4th September 2008. Peak noise sources observed at this location were predominantly helicopter fly-over, technician activity, periodical rain and wind induced interference with the microphone of the noise meter, which were filtered from the hourly calculations. The review of recordings indicated that construction activity was audible.

Unfiltered one-minute noise levels are shown graphically in Figure 4-1. The figure includes sources of isolated peaks.



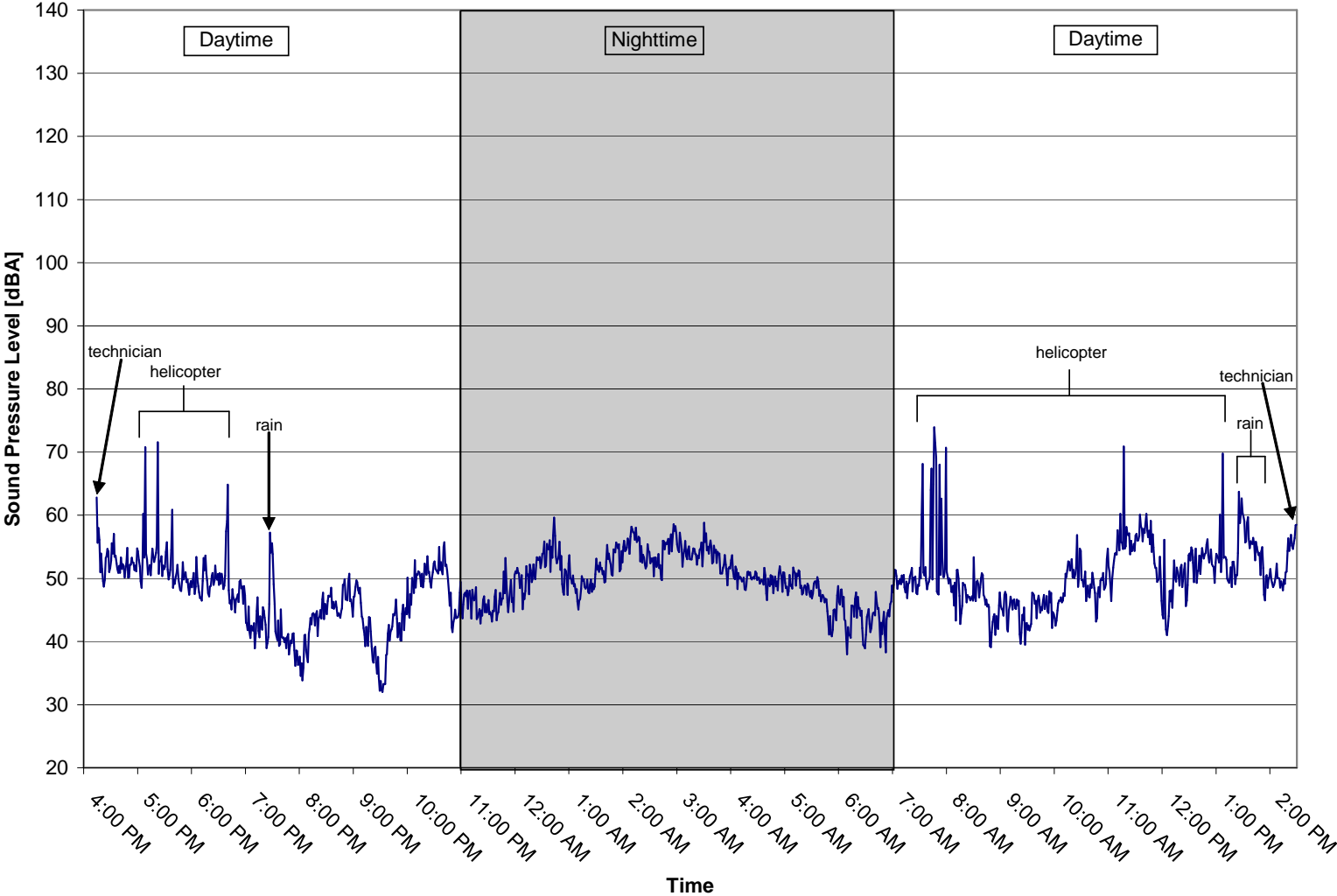
2008 NOISE MONITORING REPORT

**Table 4-1: Filtered Hourly Sound Levels, Monitoring Location R1
(September 4 to 5, 2008)**

Date	Hour ^(a)	L _{eq, 1hr} [dBA]	L _{max} [dBA]	L _{min} [dBA]
4 September 2008	4:00 PM	53 ^(b)	58 ^(b)	48 ^(b)
4 September 2008	5:00 PM	52 ^(b)	57 ^(b)	47 ^(b)
4 September 2008	6:00 PM	49 ^(b)	54 ^(b)	44 ^(b)
4 September 2008	7:00 PM	42 ^(b)	49 ^(b)	37 ^(b)
4 September 2008	8:00 PM	45	52	38
4 September 2008	9:00 PM	43	49	37
4 September 2008	10:00 PM	50	57	43
4 September 2008	11:00 PM	47	54	40
5 September 2008	12:00 AM	53	59	45
5 September 2008	1:00 AM	51	57	46
5 September 2008	2:00 AM	55	60	50
5 September 2008	3:00 AM	54	60	49
5 September 2008	4:00 AM	50	55	46
5 September 2008	5:00 AM	48	54	43
5 September 2008	6:00 AM	45	52	37
5 September 2008	7:00 AM	56 ^(b)	66 ^(b)	45 ^(b)
5 September 2008	8:00 AM	48	52	44
5 September 2008	9:00 AM	45	50	41
5 September 2008	10:00 AM	50	57	44
5 September 2008	11:00 AM	56 ^(b)	62 ^(b)	49 ^(b)
5 September 2008	12:00 PM	52	58	43
5 September 2008	1:00 PM	55	62	48

^(a) Measurement start hour.

^(b) Measurement has noise due to technician activity, helicopter fly-over, wind induced interference, or the use of machinery on site excluded, thereby creating a value based on less than 60 minutes but more than 30 minutes of recorded data.



NOTE
LABELS INDICATE DATA FILTERED FROM PERIOD AVERAGES


PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK DIVISION

TITLE

ONE MINUTE NOISE INTERVAL,
MONITORING LOCATION R1


Golder Associates
Greater Vancouver Office, BC

PROJECT		08.1428.0007	FILE No.		R1
DESIGN	RB	27/11/08	SCALE AS SHOWN	REV. 0	
NOISE	RB	27/11/08	FIGURE: 4-1		
CHECK	TD	01/12/08			
REVIEW	DW	03/12/08			



4.2 Future Airstrip Area (R2)

Filtered hourly L_{max} , L_{min} , and $L_{eq, 1hr}$ results recorded at monitoring location R2 are presented in Table 4-2. R2 is situated 1 km north of the future airstrip site (Figure 2-1). Construction activity was noted throughout the monitoring period. The landscape consists of Third Portage Lake to the west and southwest of the site, with the surrounding area consisting of soft ground with tundra vegetation (Photos B.2).

The lowest hourly value recorded at monitoring location R2 was 37 dBA from 7:00 PM to 8:00 PM on 8th September 2008. Peak noise sources observed at this location were predominantly helicopter fly-over, technician activity, periodical rain and wind induced interference with the microphone of the noise meter. The review of recordings indicated that construction activity was audible but it is not considered as a dominant noise source at R2.

Unfiltered one-minute noise levels are shown graphically in Figure 4-2. The figure includes sources of isolated peaks.

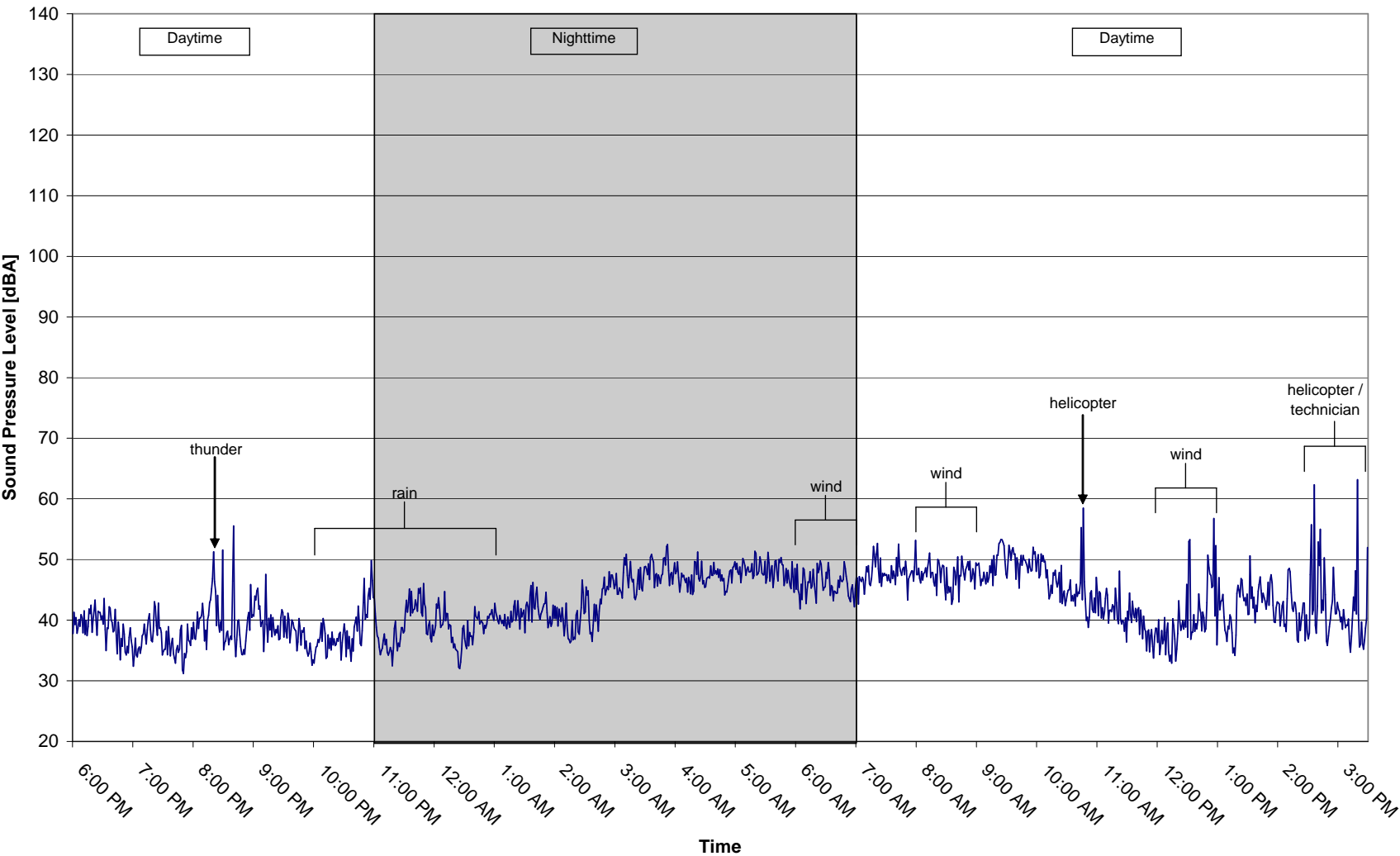
Table 4-2: Filtered Hourly Sound Levels, Monitoring Location R2 (September 8 to 9, 2008)

Date	Hour ^(a)	$L_{eq, 1hr}$ [dBA]	L_{max} [dBA]	L_{min} [dBA]
8 September 2008	6:00 PM	40	46	34
8 September 2008	7:00 PM	37	45	32
8 September 2008	8:00 PM	43 ^(b)	52 ^(b)	33 ^(b)
8 September 2008	9:00 PM	39 ^(b)	46 ^(b)	34 ^(b)
8 September 2008	10:00 PM	-- (c)	-- (c)	-- (c)
8 September 2008	11:00 PM	-- (c)	-- (c)	-- (c)
9 September 2008	12:00 AM	-- (c)	-- (c)	-- (c)
9 September 2008	1:00 AM	42	48	36
9 September 2008	2:00 AM	43	48	38
9 September 2008	3:00 AM	48	54	42
9 September 2008	4:00 AM	47	53	41
9 September 2008	5:00 AM	48	54	42
9 September 2008	6:00 AM	-- (c)	-- (c)	-- (c)
9 September 2008	7:00 AM	48	56	42
9 September 2008	8:00 AM	-- (c)	-- (c)	-- (c)
9 September 2008	9:00 AM	50	56	43
9 September 2008	10:00 AM	46 ^(b)	52 ^(b)	39 ^(b)
9 September 2008	11:00 AM	41	48	35
9 September 2008	12:00 PM	-- (c)	-- (c)	-- (c)
9 September 2008	1:00 PM	44	50	37
9 September 2008	2:00 PM	43 ^(b)	49 ^(b)	36 ^(b)

(a) Measurement start hour.

(b) Measurement has noise due to technician activity, helicopter fly-over, wind induced interference, or the use of machinery on site excluded, thereby creating a value based on less than 60 minutes but more than 30 minutes of recorded data.

(c) Data filtering resulted in less than 30 minutes of recorded data.



NOTE

LABELS INDICATE DATA FILTERED FROM PERIOD AVERAGES


PROJECT		AGNICO-EAGLE MINES LIMITED MEADOWBANK DIVISION			
AEM		TITLE			
		ONE MINUTE NOISE INTERVAL, MONITORING LOCATION R2			
		PROJECT		FILE No.	
		08.1428.0007		R4	
		DESIGN	RB	27/11/08	SCALE AS SHOWN
		NOISE	RB	27/11/08	REV. 0
		CHECK	TD	01/12/08	
		REVIEW	DW	03/12/08	

FIGURE: 4-2



4.3 Native Camping Ground / Possible Grave Area (R3)

Filtered hourly L_{\max} , L_{\min} , and $L_{\text{eq}, 1\text{hr}}$ results recorded at monitoring location R3 are presented in Table 4-3. R3 is situated approximately 30 m east of Second Portage Lake (Figure 2-1). There was no construction activity within approximately 2 km of location R3 at the time of the monitoring. The landscape surrounding the monitoring location is relatively flat and consists of the lake and some rock outcrops amongst tundra vegetation (Photos B.3).

The lowest hourly value recorded at monitoring location R3 was 34 dBA from 6:00 AM to 7:00 AM on September 7, 2008. Peak noise sources observed at this location were predominantly helicopter fly-over, technician activity, periodical rain and wind induced interference with the microphone of the noise meter. The review of recordings indicated that construction activity was not audible.

Unfiltered one-minute noise levels are shown graphically in Figure 4-3. The figure illustrates sources of isolated peaks.

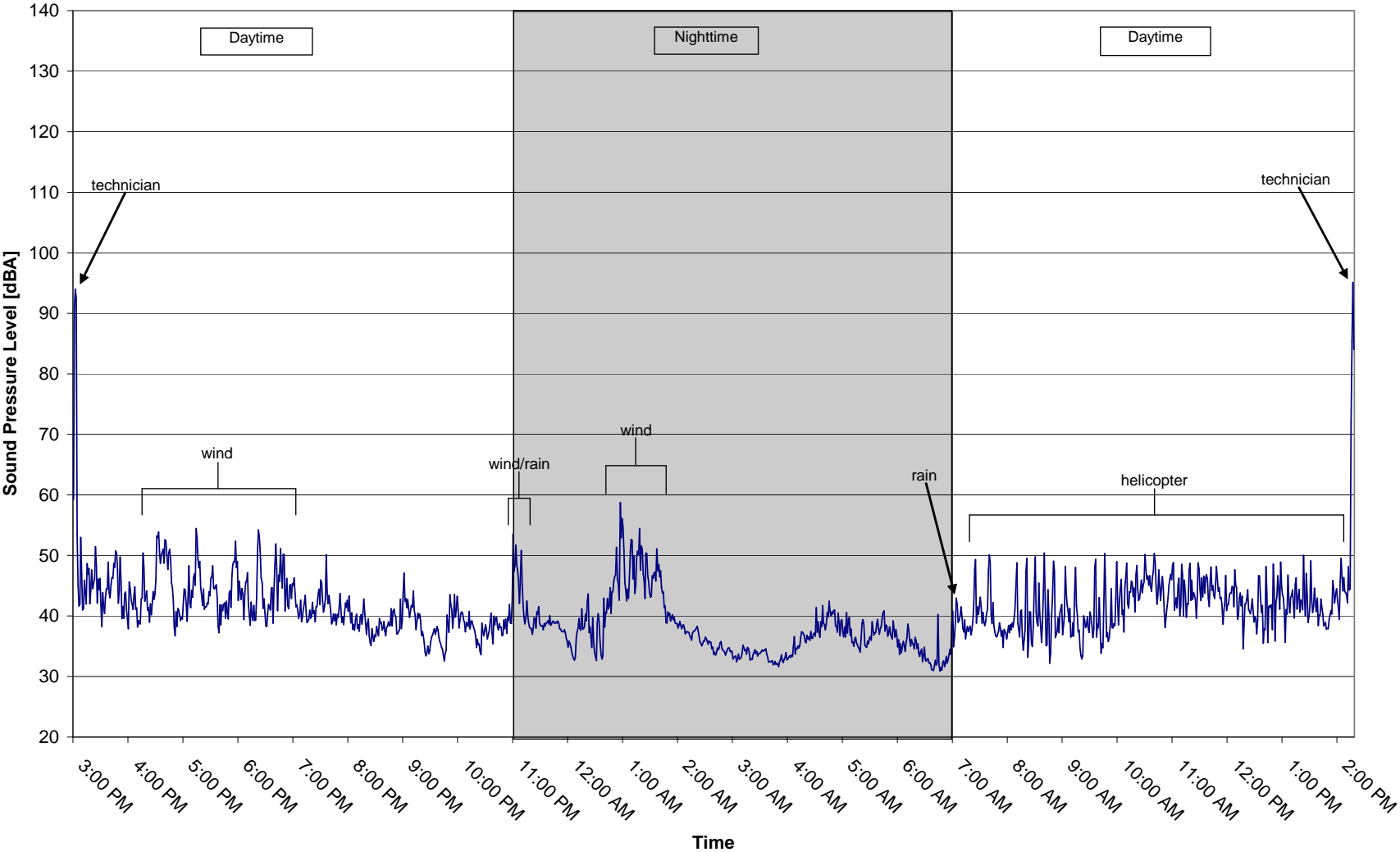
Table 4-3: Filtered Hourly Sound Levels, Monitoring Location R3 (September 6 to 7, 2008)

Date	Hour ^(a)	$L_{\text{eq}, 1\text{hr}}$ [dBA]	L_{\max} [dBA]	L_{\min} [dBA]
6 September 2008	3:00 PM	46 ^(b)	53 ^(b)	37 ^(b)
6 September 2008	4:00 PM	43 ^(b)	43 ^(b)	43 ^(b)
6 September 2008	5:00 PM	44 ^(b)	50 ^(b)	37 ^(b)
6 September 2008	6:00 PM	43 ^(b)	50 ^(b)	37 ^(b)
6 September 2008	7:00 PM	42	48	37
6 September 2008	8:00 PM	39	44	35
6 September 2008	9:00 PM	40	45	36
6 September 2008	10:00 PM	38 ^(b)	43 ^(b)	35 ^(b)
6 September 2008	11:00 PM	39 ^(b)	42 ^(b)	37 ^(b)
7 September 2008	12:00 AM	39 ^(b)	45 ^(b)	33 ^(b)
7 September 2008	1:00 AM	-- ^(c)	-- ^(c)	-- ^(c)
7 September 2008	2:00 AM	36	39	35
7 September 2008	3:00 AM	33	37	31
7 September 2008	4:00 AM	38	44	34
7 September 2008	5:00 AM	38	43	34
7 September 2008	6:00 AM	34 ^(b)	41 ^(b)	31 ^(b)
7 September 2008	7:00 AM	39 ^(b)	44 ^(b)	35 ^(b)
7 September 2008	8:00 AM	-- ^(c)	-- ^(c)	-- ^(c)
7 September 2008	9:00 AM	-- ^(c)	-- ^(c)	-- ^(c)
7 September 2008	10:00 AM	45 ^(b)	51 ^(b)	39 ^(b)
7 September 2008	11:00 AM	45	51	38
7 September 2008	12:00 PM	43 ^(b)	49 ^(b)	35 ^(b)

(a) Measurement start hour.

(b) Measurement has noise due to technician activity, helicopter fly-over, wind induced interference, or the use of machinery on site excluded, thereby creating a value based on less than 60 minutes but more than 30 minutes of recorded data.

(c) Data filtering resulted in less than 30 minutes of recorded data.



NOTE

LABELS INDICATE DATA FILTERED FROM PERIOD AVERAGES


PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK DIVISION

TITLE

ONE MINUTE NOISE INTERVAL,
MONITORING LOCATION R3


Golder Associates
Greater Vancouver Office, BC

PROJECT	08.1428.0007		FILE No.	R3
DESIGN	RB	27/11/08	SCALE AS SHOWN	REV. 0
NOISE	RB	27/11/08	FIGURE: 4-3	
CHECK	TD	01/12/08		
REVIEW	DW	03/12/08		

FIGURE: 4-3



4.4 Future Mine Shop Area (R4)

Filtered hourly L_{\max} , L_{\min} , and $L_{\text{eq}, 1\text{hr}}$ results recorded at monitoring location R4 are presented in Table 4-4. R4 is situated approximately 30 m east of Phaser Lake (Figure 2-1). There was no construction activity within 4 km of location R4 at the time of the monitoring. The landscape surrounding this location was relatively flat and consists of the lake and rock outcrops amongst tundra vegetation (Photos B.4).

The lowest hourly value recorded at monitoring location R4 was 31 dBA from 7:00 PM to 8:00 PM on September 5, 2008. Peak noise sources observed at this location were predominantly helicopter fly-over, technician activity, periodical rain and wind induced interference with the microphone of the noise meter. The review of recordings indicated that construction activity was not audible.

Unfiltered one-minute noise levels are shown graphically in Figure 4-4. The figure illustrates sources of isolated peaks.

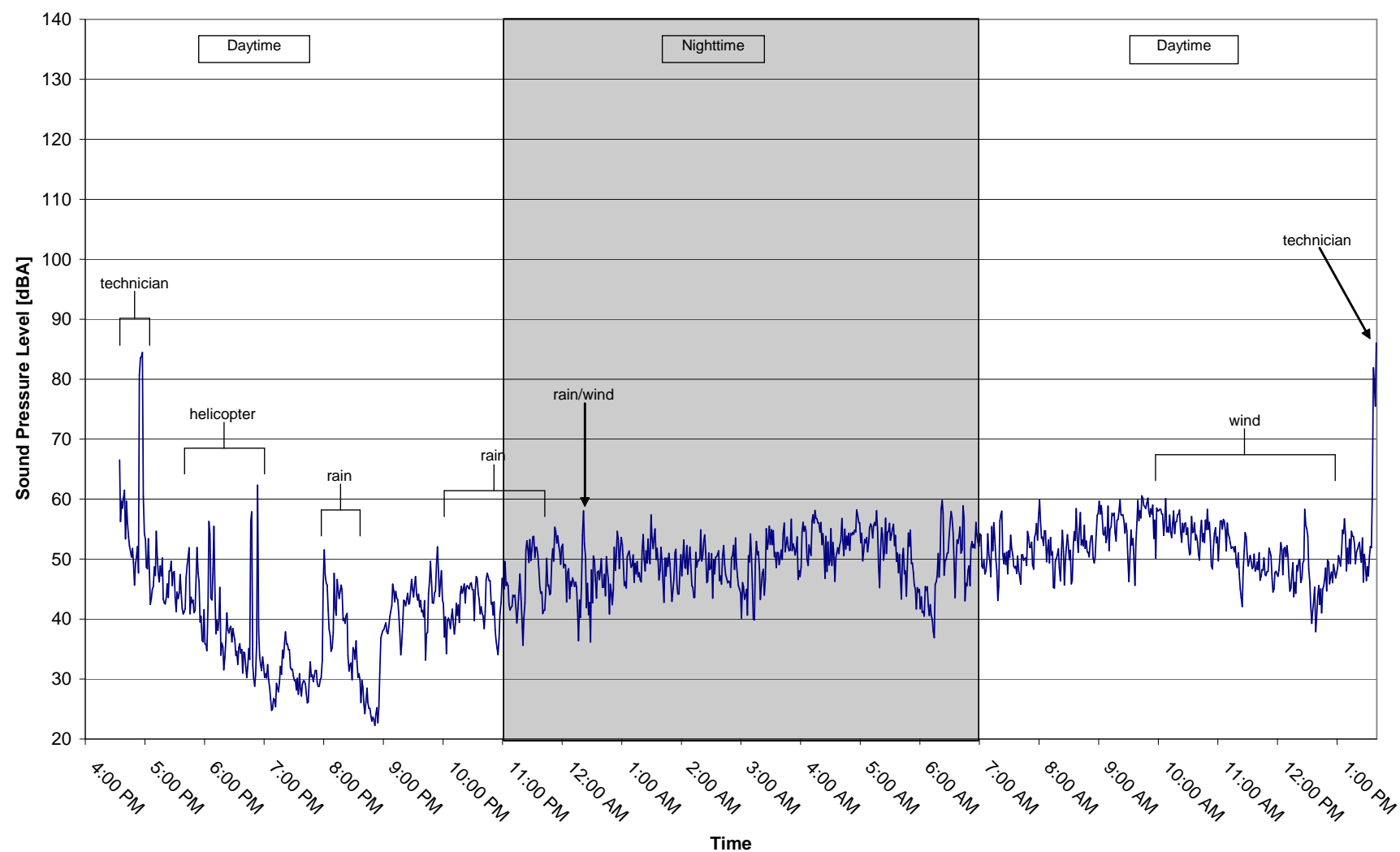
Table 4-4: Filtered Hourly Sound Levels, Monitoring Location R4 (September 5 to 6, 2008)

Date	Hour ^(a)	$L_{\text{eq}, 1\text{hr}}$ [dBA]	L_{\max} [dBA]	L_{\min} [dBA]
5 September 2008	5:00 PM	47 ^(b)	52 ^(b)	39 ^(b)
5 September 2008	6:00 PM	36 ^(b)	43 ^(b)	30 ^(b)
5 September 2008	7:00 PM	31 ^(b)	37 ^(b)	27 ^(b)
5 September 2008	8:00 PM	32 ^(b)	38 ^(b)	26 ^(b)
5 September 2008	9:00 PM	44	50	37
5 September 2008	10:00 PM	-- ^(c)	-- ^(c)	-- ^(c)
5 September 2008	11:00 PM	-- ^(c)	-- ^(c)	-- ^(c)
6 September 2008	12:00 AM	48 ^(b)	55 ^(b)	40 ^(b)
6 September 2008	1:00 AM	50	57	42
6 September 2008	2:00 AM	50	57	41
6 September 2008	3:00 AM	51	58	43
6 September 2008	4:00 AM	54	61	46
6 September 2008	5:00 AM	53	59	44
6 September 2008	6:00 AM	52	59	44
6 September 2008	7:00 AM	52	58	44
6 September 2008	8:00 AM	53	60	45
6 September 2008	9:00 AM	57	62	50
6 September 2008	10:00 AM	-- ^(c)	-- ^(c)	-- ^(c)
6 September 2008	11:00 AM	-- ^(c)	-- ^(c)	-- ^(c)
6 September 2008	12:00 PM	-- ^(c)	-- ^(c)	-- ^(c)
6 September 2008	1:00 PM	52 ^(b)	57 ^(b)	44 ^(b)


(a) Measurement start hour.

(b) Measurement has noise due to technician activity, helicopter fly-over, wind induced interference, or the use of machinery on site excluded, thereby creating a value based on less than 60 minutes but more than 30 minutes of recorded data.

(c) Data filtering resulted in less than 30 minutes of recorded data.



NOTE
LABELS INDICATE DATA FILTERED FROM PERIOD AVERAGES

PROJECT		AGNICO-EAGLE MINES LIMITED MEADOWBANK DIVISION			
AEM		TITLE			
		ONE MINUTE NOISE INTERVAL, MONITORING LOCATION R4			
		PROJECT		FILE No.	
		DESIGN		SCALE AS SHOWN	
		NOISE		REV. 0	
		CHECK		FIGURE: 4-4	
		REVIEW			



4.5 Caribou Migration Route and Exploration Camp Area (R5)

Filtered hourly L_{max} , L_{min} , and $L_{eq, 1hr}$ results recorded at monitoring location R5 are presented in Table 4-5. R5 is situated in the exploration camp area and within the proximity of the all weather private access road (Figure 2-1). During the monitoring period, construction activity was occurring during the day as well as helicopter taking-off and landing activity at the helipad located in the exploration camp area. The landscape in the vicinity of R5 consists of the Third Portage Lake to the south of the monitoring location and rock outcrops amongst tundra vegetation (Photos B.5).

The lowest hourly value recorded at monitoring location R5 was 37 dBA from 1:00 AM to 2:00 AM and 3:00 AM to 4:00 AM on 8th September 2008. Peak noise sources observed at this location were predominantly helicopter fly-over, technician activity, periodical rain and wind induced interference with the microphone of the noise meter. Construction activity was noted from the review of recordings.

Unfiltered one-minute noise levels are shown graphically in Figure 4-2. The figure illustrates sources of isolated peaks.

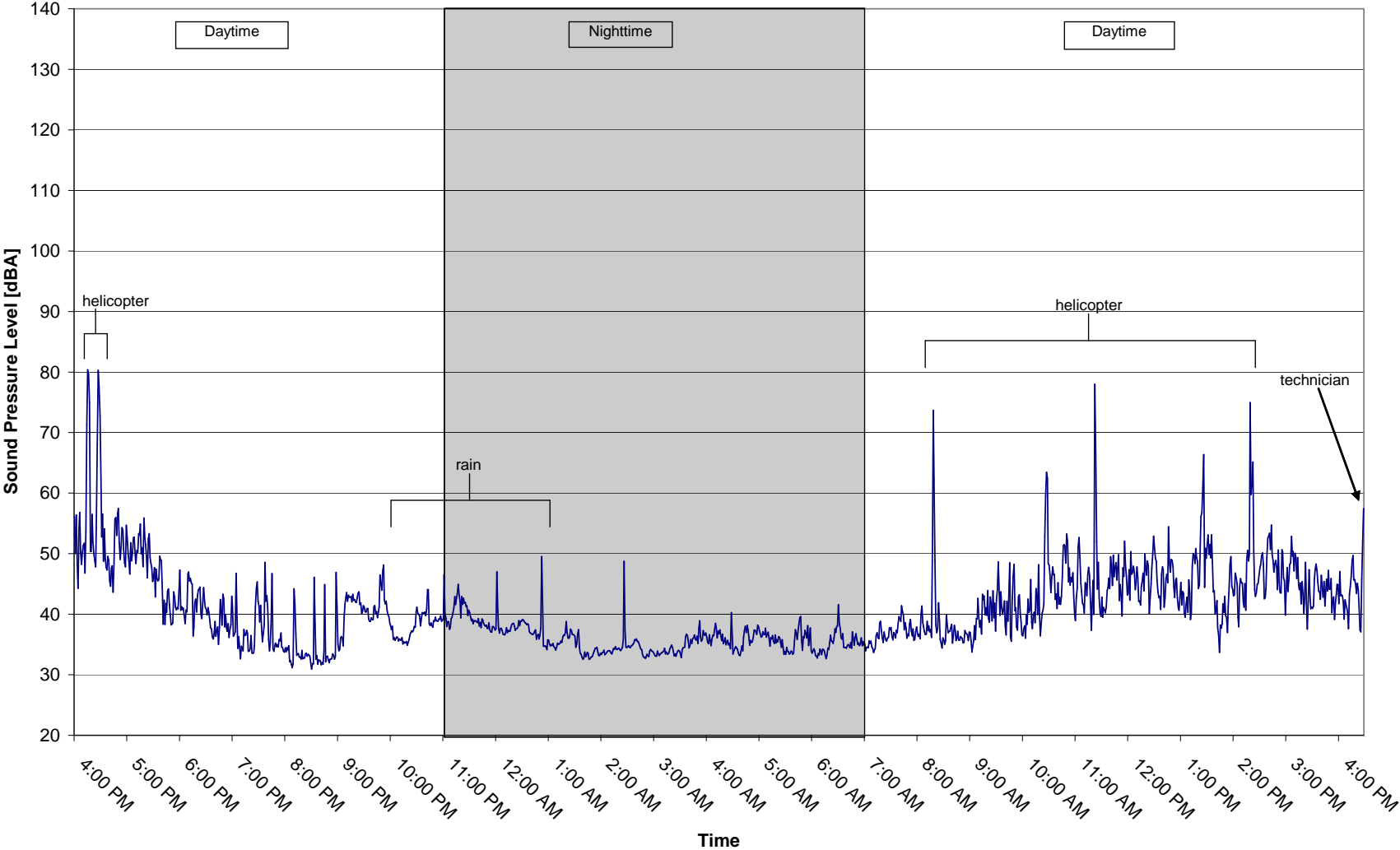
**Table 4-5: Filtered Hourly Sound Levels, Monitoring Location R5
(September 7 to 8, 2008)**

Date	Hour ^(a)	$L_{eq, 1hr}$ [dBA]	L_{max} [dBA]	L_{min} [dBA]
7 September 2008	4:00 PM	52 ^(b)	59 ^(b)	41 ^(b)
7 September 2008	5:00 PM	49	56	39
7 September 2008	6:00 PM	42	49	35
7 September 2008	7:00 PM	39 ^(b)	47 ^(b)	33 ^(b)
7 September 2008	8:00 PM	37	46	31
7 September 2008	9:00 PM	42	47	38
7 September 2008	10:00 PM	-- (c)	-- (c)	-- (c)
7 September 2008	11:00 PM	-- (c)	-- (c)	-- (c)
8 September 2008	12:00 AM	-- (c)	-- (c)	-- (c)
8 September 2008	1:00 AM	35	37	34
8 September 2008	2:00 AM	36	40	33
8 September 2008	3:00 AM	35	38	33
8 September 2008	4:00 AM	36	39	34
8 September 2008	5:00 AM	36	40	34
8 September 2008	6:00 AM	36	40	33
8 September 2008	7:00 AM	37	41	34
8 September 2008	8:00 AM	37	42	34
8 September 2008	9:00 AM	42	48	36
8 September 2008	10:00 AM	46 ^(b)	52 ^(b)	38 ^(b)
8 September 2008	11:00 AM	46 ^(b)	53 ^(b)	39 ^(b)
8 September 2008	12:00 PM	47	53	39
8 September 2008	1:00 PM	47 ^(b)	53 ^(b)	38 ^(b)
8 September 2008	2:00 PM	48 ^(b)	54 ^(b)	39 ^(b)
8 September 2008	3:00 PM	46	53	38

(a) Measurement start hour.

(b) Measurement has noise due to technician activity, helicopter fly-over, wind induced interference, or the use of machinery on site excluded, thereby creating a value based on less than 60 minutes but more than 30 minutes of recorded data.

(c) Data filtering resulted in less than 30 minutes of recorded data.



NOTE
LABELS INDICATE DATA FILTERED FROM PERIOD AVERAGES


PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK DIVISION

TITLE

ONE MINUTE NOISE INTERVAL,
MONITORING LOCATION R5


Golder Associates
Greater Vancouver Office, BC

PROJECT		08.1428.0007	FILE No.		R5
DESIGN	RB	27/11/08	SCALE AS SHOWN	REV. 0	
NOISE	RB	27/11/08	FIGURE: 4-5		
CHECK	TD	01/12/08			
REVIEW	DW	03/12/08			



5.0 WEATHER CONDITIONS

Weather information for the 24-hour surveys conducted at R1, R2, R3, R4 and R5 are presented in Tables 5.1 to 5.5 below. Air temperature, wind speed, wind direction, and humidity data were collected by a portable WeatherHawk weather station or recorded hourly at the permanent weather station onsite. As is shown in the data, periodic strong winds and precipitation were found to prevail during the noise monitoring study period. These conditions are common in the autumn season in the vicinity of the mine site.

Table 5-1: Weather Information, Monitoring Location R1

Date	Hour	Weather Information				Notes
		Mean Horizontal Wind Speed (km/h)	Unit Vector Mean Wind Direction ^(a) (10's degrees)	Average Air Temperature (° Celsius)	Humidity (%)	
4 September 2008	4:00 PM	19.5	31	7	75	mostly cloudy, periodic precipitation and strong gusty wind
4 September 2008	5:00 PM	18.9	30	6	77	
4 September 2008	6:00 PM	15.3	30	6	82	
4 September 2008	7:00 PM	13.3	28	6	88	
4 September 2008	8:00 PM	12.5	28	5	93	
4 September 2008	9:00 PM	15.6	28	5	94	
4 September 2008	10:00 PM	15.2	30	5	96	
4 September 2008	11:00 PM	17.1	29	5	95	
5 September 2008	12:00 AM	17.0	31	5	92	
5 September 2008	1:00 AM	20.0	31	4	89	
5 September 2008	2:00 AM	20.0	30	4	91	
5 September 2008	3:00 AM	15.2	30	3	94	
5 September 2008	4:00 AM	14.3	30	3	94	
5 September 2008	5:00 AM	12.2	29	3	96	
5 September 2008	6:00 AM	11.9	28	3	97	
5 September 2008	7:00 AM	9.9	29	3	96	
5 September 2008	8:00 AM	10.5	25	4	93	
5 September 2008	9:00 AM	13.4	23	5	92	
5 September 2008	10:00 AM	17.5	26	5	88	
5 September 2008	11:00 AM	15.1	28	6	85	
5 September 2008	12:00 PM	18.1	28	5	82	
5 September 2008	1:00 PM	14.4	30	4	92	



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Table 5-2: Weather Information, Monitoring Location R2

Date	Hour	Weather Information				Notes
		Mean Horizontal Wind Speed (km/h)	Unit Vector Mean Wind Direction ^(a) (10's degrees)	Average Air Temperature (° Celsius)	Humidity (%)	
8 September 2008	6:00 PM	17	26	4	89	mostly cloudy, periodic precipitation and strong gusty wind
8 September 2008	7:00 PM	13	29	3.5	91	
8 September 2008	8:00 PM	13	25	3.2	92	
8 September 2008	9:00 PM	15	27	3.3	91	
8 September 2008	10:00 PM	15	30	2.8	94	
8 September 2008	11:00 PM	13	28	2.7	94	
9 September 2008	12:00 AM	13	30	2.2	94	
9 September 2008	1:00 AM	17	29	1.9	96	
9 September 2008	2:00 AM	15	30	1.1	94	
9 September 2008	3:00 AM	20	30	0.9	96	
9 September 2008	4:00 AM	15	30	0.9	97	
9 September 2008	5:00 AM	20	32	0.8	95	
9 September 2008	6:00 AM	22	32	0.5	95	
9 September 2008	7:00 AM	17	32	0.7	95	
9 September 2008	8:00 AM	22	31	2.1	92	
9 September 2008	9:00 AM	20	31	2.3	90	
9 September 2008	10:00 AM	15	31	3	85	
9 September 2008	11:00 AM	20	29	2.5	86	
9 September 2008	12:00 PM	22	31	4.1	79	
9 September 2008	1:00 PM	17	30	5.3	72	
9 September 2008	2:00 PM	19	30	4.9	61	



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Table 5-3: Weather Information, Monitoring Location R3

Date	Hour	Weather Information				Notes
		Mean Horizontal Wind Speed (km/h)	Unit Vector Mean Wind Direction ^(a) (10's degrees)	Average Air Temperature (° Celsius)	Humidity (%)	
6 September 2008	3:00 PM	19	31	5.2	76	mostly cloudy, periodic strong gusty wind
6 September 2008	4:00 PM	19	30	5	76	
6 September 2008	5:00 PM	20	30	5.5	78	
6 September 2008	6:00 PM	15	32	4.2	84	
6 September 2008	7:00 PM	17	32	3.7	84	
6 September 2008	8:00 PM	19	32	3.3	87	
6 September 2008	9:00 PM	13	32	3.2	85	
6 September 2008	10:00 PM	17	32	3.4	85	
6 September 2008	11:00 PM	13	31	2.6	89	
7 September 2008	12:00 AM	20	32	3.6	91	
7 September 2008	1:00 AM	19	32	3	90	
7 September 2008	2:00 AM	15	31	1.5	94	
7 September 2008	3:00 AM	11	30	1.4	92	
7 September 2008	4:00 AM	15	31	0	94	
7 September 2008	5:00 AM	17	30	-0.3	95	
7 September 2008	6:00 AM	17	31	0.2	94	
7 September 2008	7:00 AM	13	30	0.9	93	
7 September 2008	8:00 AM	9	30	3.3	81	
7 September 2008	9:00 AM	15	29	4.6	73	
7 September 2008	10:00 AM	19	30	5.1	71	
7 September 2008	11:00 AM	15	30	5.8	65	
7 September 2008	12:00 PM	17	29	6.6	63	



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Table 5-4: Weather Information, Monitoring Location R4

Date	Hour	Weather Information				Notes
		Mean Horizontal Wind Speed (km/h)	Unit Vector Mean Wind Direction ^(a) (10's degrees)	Average Air Temperature (° Celsius)	Humidity (%)	
5 September 2008	5:00 PM	15	28	6.7	88	mostly cloudy, periodic precipitation and strong gusty wind
5 September 2008	6:00 PM	15	30	5.9	88	
5 September 2008	7:00 PM	9	31	5	91	
5 September 2008	8:00 PM	19	30	4.5	90	
5 September 2008	9:00 PM	15	31	3.7	94	
5 September 2008	10:00 PM	11	30	4.2	94	
5 September 2008	11:00 PM	15	32	3.9	90	
6 September 2008	12:00 AM	15	32	3.3	93	
6 September 2008	1:00 AM	17	35	2.4	92	
6 September 2008	2:00 AM	17	32	2.6	87	
6 September 2008	3:00 AM	20	32	1.9	86	
6 September 2008	4:00 AM	20	33	1.6	90	
6 September 2008	5:00 AM	17	33	1.2	85	
6 September 2008	6:00 AM	13	32	0.8	87	
6 September 2008	7:00 AM	15	31	1.4	85	
6 September 2008	8:00 AM	15	33	1.9	85	
6 September 2008	9:00 AM	15	33	2	69	
6 September 2008	10:00 AM	26	35	2.7	64	
6 September 2008	11:00 AM	28	35	3.4	66	
6 September 2008	12:00 PM	28	35	4	65	
6 September 2008	1:00 PM	19	34	4.8	60	



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Table 5-5: Weather Information, Monitoring Location R5

Date	Hour	Weather Information				Notes
		Mean Horizontal Wind Speed (km/h)	Unit Vector Mean Wind Direction ^(a) (10's degrees)	Average Air Temperature (° Celsius)	Humidity (%)	
7 September 2008	4:00 PM	15	26	7.7	60	mostly cloudy, periodic precipitation periodic strong gusty wind
7 September 2008	5:00 PM	17	25	7.3	63	
7 September 2008	6:00 PM	11	25	6.1	68	
7 September 2008	7:00 PM	9	22	5.6	79	
7 September 2008	8:00 PM	7	22	3.7	89	
7 September 2008	9:00 PM	11	22	5.3	87	
7 September 2008	10:00 PM	11	24	5.3	90	
7 September 2008	11:00 PM	9	30	5.4	91	
8 September 2008	12:00 AM	15	36	3.8	95	
8 September 2008	1:00 AM	7	33	3.5	92	
8 September 2008	2:00 AM	11	32	3	90	
8 September 2008	3:00 AM	11	31	2.8	91	
8 September 2008	4:00 AM	11	29	2.6	94	
8 September 2008	5:00 AM	11	31	1.9	91	
8 September 2008	6:00 AM	9	30	2.5	93	
8 September 2008	7:00 AM	15	29	2.9	89	
8 September 2008	8:00 AM	17	30	3	87	
8 September 2008	9:00 AM	20	30	3.3	88	
8 September 2008	10:00 AM	19	29	4.8	84	
8 September 2008	11:00 AM	17	30	5.4	75	
8 September 2008	12:00 PM	20	30	6.1	71	
8 September 2008	1:00 PM	17	28	6	67	
8 September 2008	2:00 PM	20	29	6	69	
8 September 2008	3:00 PM	19	29	5.9	69	

0 or 360 degree represents the true north direction.



6.0 DISCUSSION AND SUMMARY

Table 6.1 summarizes the L_{eq} results for the following 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. Less than 24-hours of measurements were available at some locations due to the filtering of invalid data.

Table 6-1: Summary of Ambient Sound Levels

Monitoring Location	Baseline Noise Measurements (dBA)			
	Average Daytime, $L_{eq, dav}$ 7:00 AM to 11:00 PM	Average Nighttime, $L_{eq, night}$ 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	52 ^(a)	52	52 ^(b)	50
R2	45 ^(a)	46	45 ^(b)	-- ^(c)
R3	43 ^(a)	37	42 ^(b)	38 ^(d)
R4	51 ^(a)	52	51 ^(b)	-- ^(c)
R5	46 ^(a)	36	45	-- ^(c)

(a) Less than time indicated of noise measurements due to filtering of invalid data.

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

(c) Data filtering resulted in less than 30 minutes of recorded data.

(d) Measurement has noise due to technician activity, helicopter fly-over, wind induced interference, or the use of machinery on site excluded, thereby creating a value based on less than 60 minutes but more than 30 minutes of recorded data.

The results show the potential variability in ambient noise levels depending on the type of noise sources measured. The ambient levels at the five monitoring locations are influenced by different factors. Noise levels at locations R1 and R2 are influenced by the construction activities in the surrounding area. The ambient noise level at R1 is higher than R2 which reflects the comparatively closer proximity of R1 to the construction activity on site. The ambient levels at R3 and R4 were primarily influenced by wind and waves along the shores of nearby lakes. The lowest nighttime ambient level measured was at R3 is attributed to a period of calmer winds and the station's increased distance from the construction activities relative to the other locations. The ambient level at R5 is also influenced by the construction activity, helicopter activities and the all-weather private access road. The nighttime ambient level at R5 is lower as there is less construction, no helicopter activities and less truck access on the road during the night due to the proximity of the exploration camp.



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7.0 CLOSURE

We trust the above meets your present requirements. If you have any questions or require additional details, please contact the undersigned.

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REFERENCE

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- HC (Health Canada), 2005. Noise Impact Assessment Orientation Document for Projects Triggering CEAA. Prepared by the Healthy Environments and Consumer Safety Branch. Health Canada. May 2005.
- Cowan, James P., 1994. handbook of Environmental Acoustics. Van Nostrand Reinhold New York. 1994



APPENDIX A

Noise Terminology



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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 power” is the rate of acoustic energy flow across a specified surface, or emitted by a specified sound source. The sound power in a frequency band is the energy flow rate associated with sound frequencies lying within the band.

“Sound power level” is the level of sound power, expressed in decibel (dB) relative to a stated reference value of 1 pW (dB re 10⁻¹² W).

“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:

$$L_p = 10 \log_{10}(\text{prms}/\text{pref})^2$$

Where prms is the root mean square, sound pressure and pref is the reference rms sound pressure (dB re 20 μPa).

“Equivalent noise level” ($L_{\text{eq, period}}$) 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. $L_{\text{eq, period}}$ is a common descriptor used in outdoor noise measurement (Cowan 1994).



APPENDIX B

Field Photographs



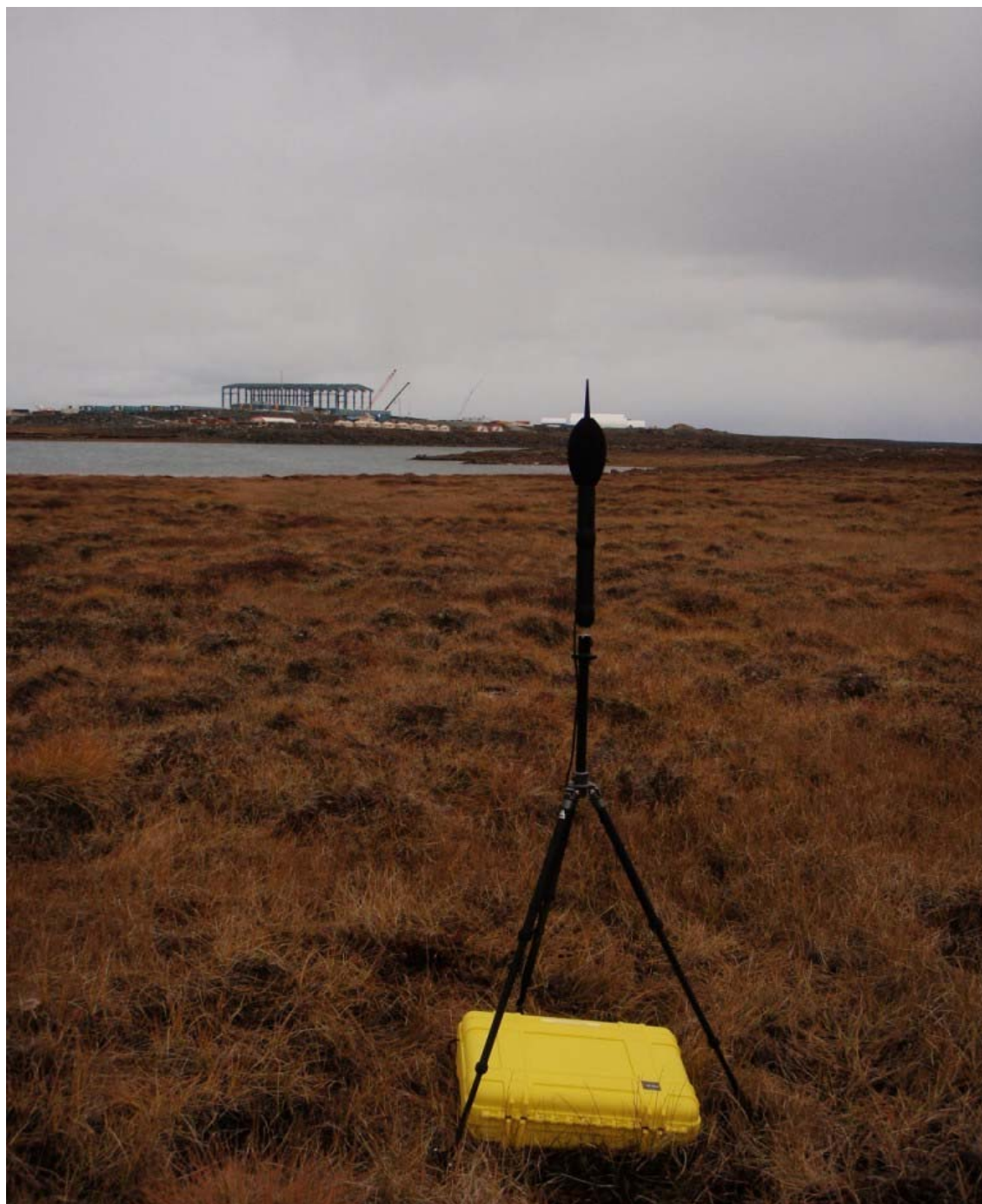
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*Photograph B.1 Worker's Camp Area (R1) Area Noise Monitoring Setup
(September 4 to 5, 2008)*



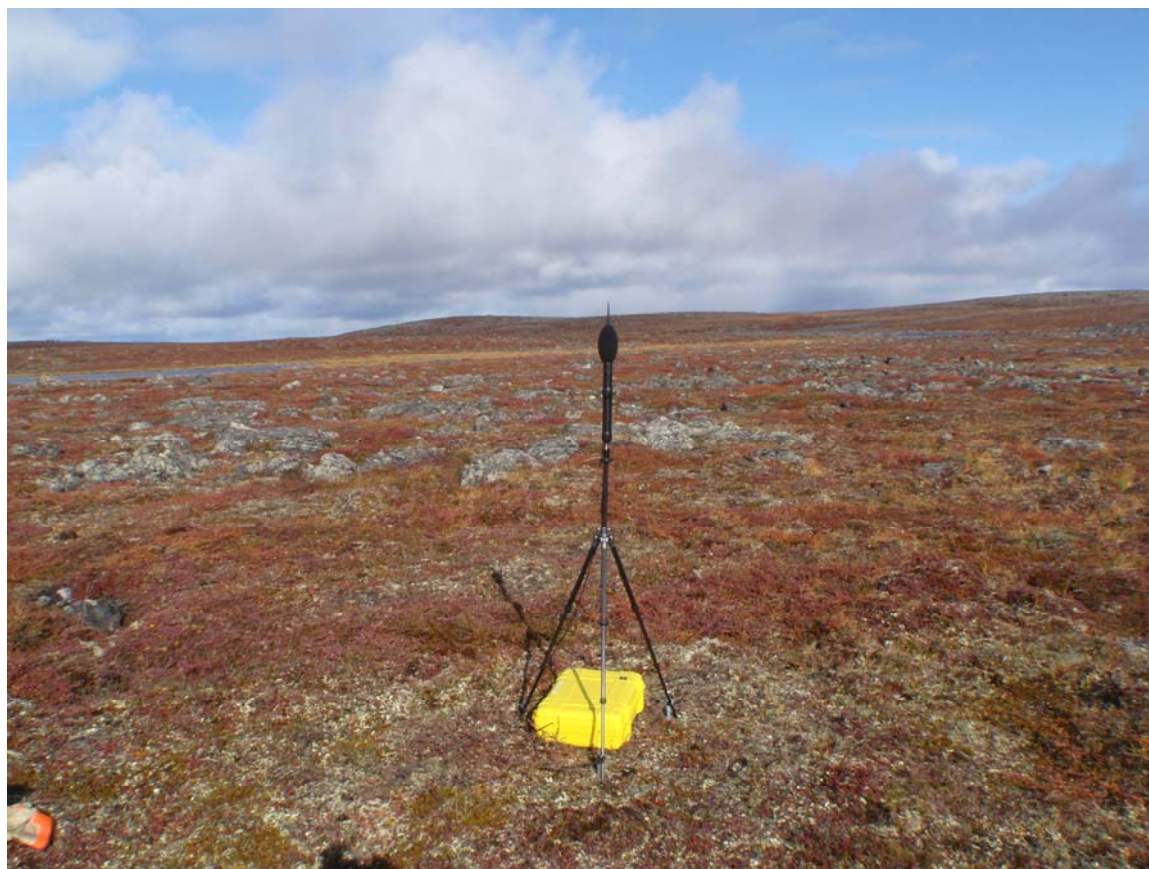
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*Photograph B.2 Future Airstrip Area (R2) Noise Monitoring Setup
(September 8 to 9, 2008)*



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*Photograph B.3 Native Camping Ground/Possible Grave Area (R3) Noise Monitoring Setup
(September 6 to 7, 2008)*



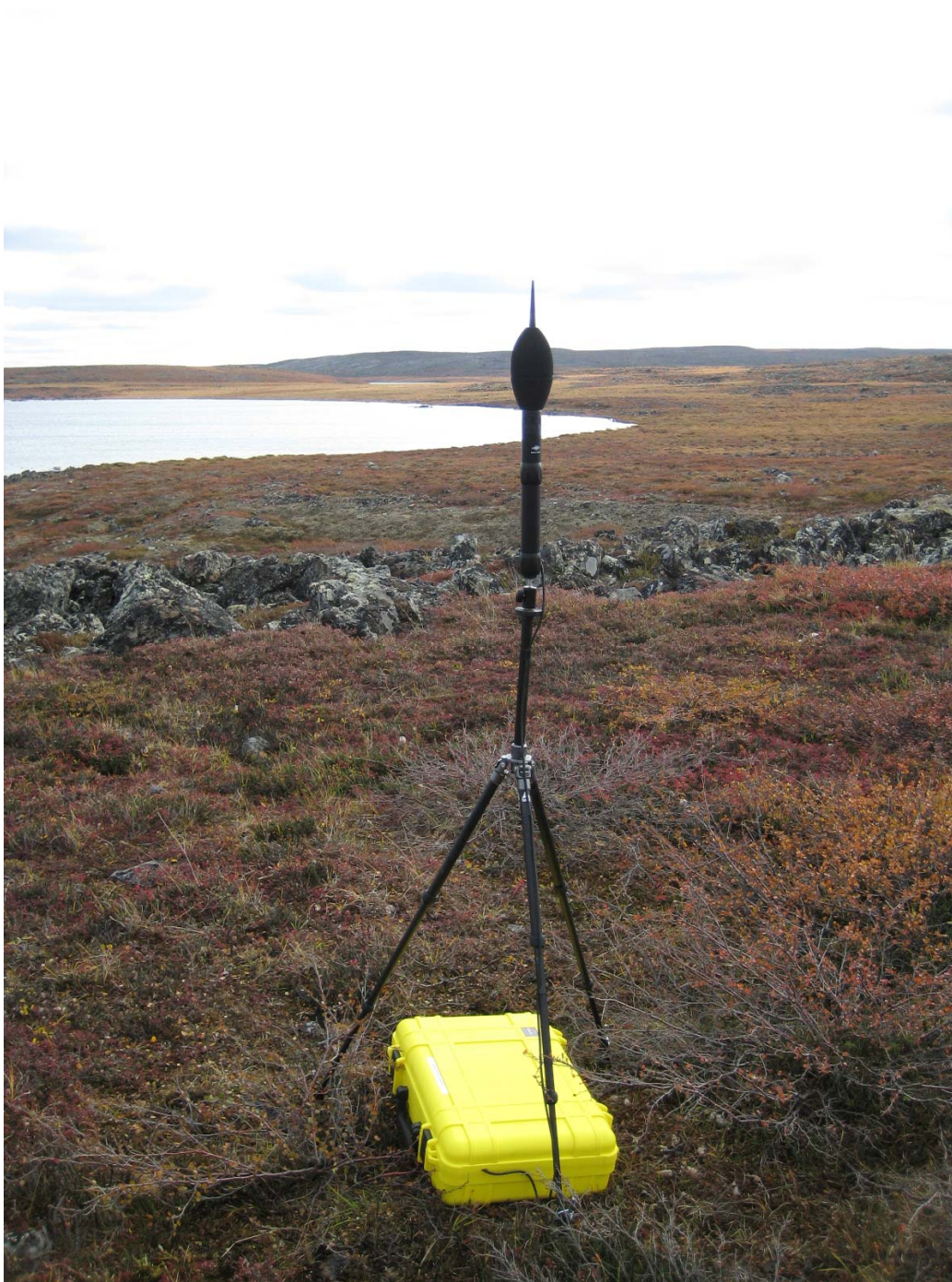
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*Photograph B.4 Future Mine Shop Area (R4) Noise Monitoring Setup
(September 5 to 6, 2008)*



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Photograph B.5 Caribou Migration Route and Exploration Camp Area (R5) Noise Monitoring Setup (September 7 to 8, 2008)

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