

Fjarmaal sf

Fjarmaal Smelter Project

Noise Survey 2006

September 2006

COWI

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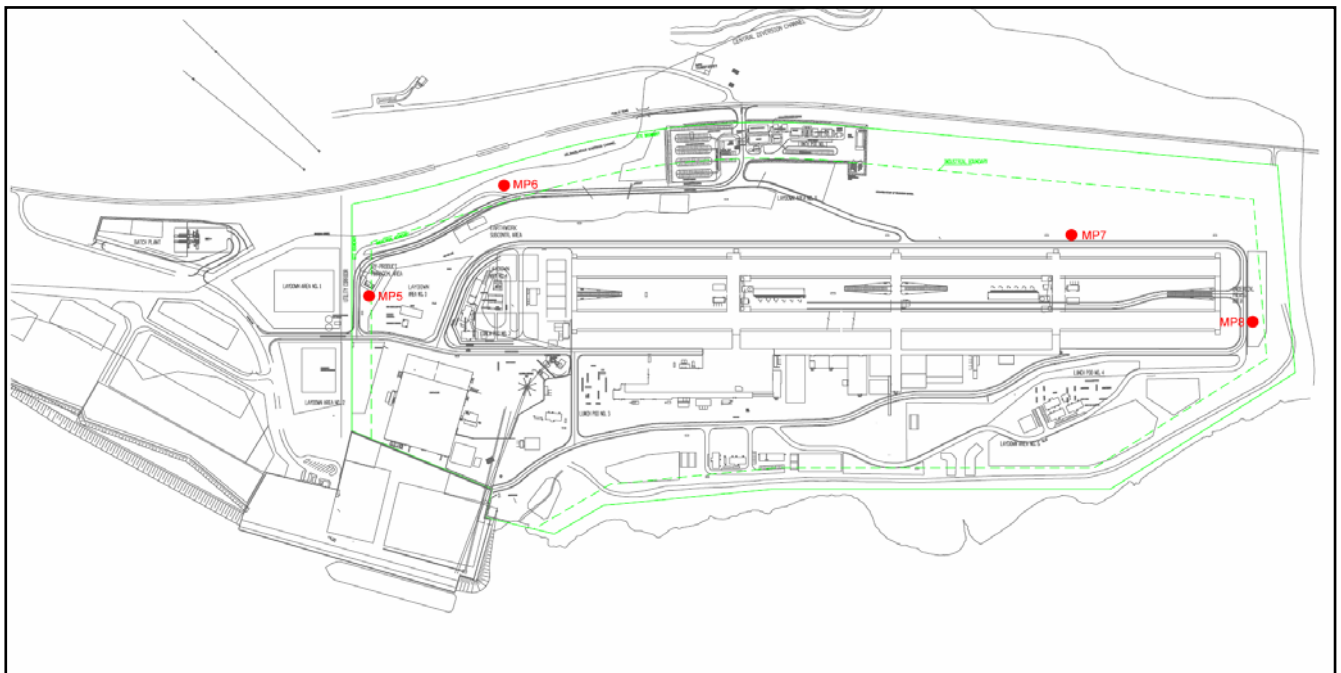
1 Preface

A baseline noise survey was carried out in June 2004 prior to the construction phase and the later operation of the Fjardaal Smelter. The first noise survey during the construction phase was carried out in September 2005. This year, the second noise survey during the construction phase has been executed in order to show the noise levels near the construction site boundary.

The survey was performed during a 3 day period; Monday August 7th to Wednesday August 9th 2006 by COWI employees, Rikke J. Lemberg and Rasmus Krogh.

2 Measurement positions

The noise measurements were carried out in 4 positions near the site boundary (same positions as last year's survey). Each position is shown on the map below with a red dot and described in the table underneath it.



A map in larger scale can be seen in appendix 1.

Measurement position	Coordinates(*)		Description
	LON / westing	LAT / northing	
5	4112.900	2038.970	Western site boundary
6	4340.330	2225.304	Northern site boundary
7	5295.060	2141.850	Northern site boundary
8	5600.150	1995.310	Eastern site boundary

(*) Local Fjardaal datum.

2.1 Specific description

2.1.1 Measurement position 5

Measurement position no. 5 (MP 5) is located near the western gate to the site. Significant noise sources during the measurement period near MP 5 are:

- trucks and cars on internal road no. 1
- maintenance area (east of MP 5)
- assembling of structural steel on the Casthouse

2.1.2 Measurement position 6

Measurement position no. 6 (MP 6) is located near the western diversion channel. Significant noise sources during the measurement period near MP 6 are:

- trucks and cars on internal road no. 1
- assembling of structural steel on the Casthouse
- workshop

2.1.3 Measurement position 7

Measurement position no. 7 (MP 7) is located near the internal road no. 8. Significant noise sources during the measurement period near MP 7 are:

- trucks and cars on internal road no. 8
- cladding of the Potline
- concrete cutting inside the Potline
- grinding inside the Potline

2.1.4 Measurement position 8

Measurement position no. 8 (MP 8) is located near the eastern end of the Potline, close to internal road no. 12. Significant noise sources during the measurement period near MP 8 are:

- cars and trucks on internal road no. 12
- cladding of the Potline

3 Conditions during the measurement

The noise measurement periods were selected to ensure the appropriate measurement conditions in compliance with the requirements in the Icelandic (and Nordic) standard¹.

3.1 Meteorological conditions

The meteorological conditions during each of the measurements are listed below. The cloudiness is defined as a fraction where 0/8 means clear sky and 8/8 means fully overcast. The wind direction is given by direction of the compass.

Meas. pos	Period	Cloudiness	Temperature	Wind speed	Wind direct.
5	Day	4/8	20 °C	3 m/s	W
	Evening	8/8	9 °C	< 1 m/s	Shifting
	Night	3/8	5 °C	< 1 m/s	Shifting
6	Day	6/8	20 °C	3 m/s	W
	Evening	8/8	9 °C	< 1 m/s	Shifting
	Night	8/8	8 °C	< 1 m/s	Shifting
7	Day	8/8	15 °C	1 m/s	E
	Evening	6/8	11 °C	1 m/s	E
	Night	8/8	8 °C	< 1 m/s	Shifting
8	Day	4/8	20 °C	4 m/s	E
	Evening	7/8	10 °C	3 m/s	E
	Night	4/8	6 °C	< 1 m/s	Shifting

The wind direction does not completely comply with the meteorological guidelines, according to the standard, in all of the measurements. The meteorological window states that measurements should be done downwind. Because of the relative short measurement distance to the sources and the very low wind speeds, it will not have any significant influence on the results.

¹ Nordtest Method NT ACOU 080 - Industrial Plants: Noise Emission

3.2 Background noise

The only background noise was noise from traffic on the road no. 92 from Reyðarfjörður to Eskifjörður. The background noise levels were not significant and the measurements need not to be adjusted.

3.3 Day and time of measurement

The noise measurements were carried out from Monday August 7th to Wednesday August 9th covering the three time periods; day (07h-18h), evening (18h-23h) and night (23h-07h).

All activities at the site during the measurements have been considered representative for a "normal" day, despite the measurements only shows a "snapshot" of the noise levels during our stay at the site.

3.4 Work in progress during the survey

Major works in progress during the survey period:

- Cladding of the Potlines
- Work on the alumina silo
- Erection of the Casthouse structural steel
- Assembling of the Gas Treatment facilities
- Erection of the Rectifier buildings

4 Measurements and analyses

The noise measurements were carried out according to the procedures as described in the Nordic standard NT ACOU 080: "Industrial plants: Noise emission".

4.1 Equipment and software

Instrument	Type	Serial number
Microphone	G.R.A.S 40AE	34349
Preamplifier	01dB-Stell Pre 12Hn	11042
Data Acquisition card	01dB Symphonie	01019
Laptop PC	HP/Compac nc6220	CNU509FTGZ
Sound Level Calibrator	Brüel & Kjær - 4230	1440808
Anemometer	Skywatch Eole	-
Acquisition software	01dB - dBTRIG	ver. 4.80
Analysis software	01dB - dBTRAIT	ver. 4.801

4.2 Procedure of the measurements and analyses

The measurements were carried out as attended measurements. The measurements were taken in a number of selected, representative one hour periods in all three time periods (day, evening and night). All measurements were recorded using a PC-based acquisition system and later analysed in our laboratory. The analyses give; L_{Aeq} , L_{10} , L_{50} , L_{90} and L_{Amax} . L_{10} , L_{50} and L_{90} show the noise level that is exceeded in 10%, 50% and 90% of the measurement time. L_{90} may be considered as the average minimum noise level (often considered as the true background level).

5 Results

5.1 Equivalent noise and fractiles

The overall results of the analyses are shown in the table below.

Measurement position no.	Day period	L _{Aeq} [dB(A)]	L ₁₀ [dB(A)]	L ₅₀ [dB(A)]	L ₉₀ [dB(A)]	L _{Amax} [dB(A)]
5	Day	58	58	53	50	80
	Evening	54	53	45	43	80
	Night	47	48	43	40	72
6	Day	57	59	48	41	81
	Evening	58	60	55	53	81
	Night	53	55	36	30	81
7	Day	61	65	53	43	80
	Evening	50	50	41	34	78
	Night	46	48	36	33	73
8	Day	64	65	53	47	89
	Evening	51	46	38	35	85
	Night	48	41	35	33	78

1/3 octave spectrums of each measurement can be seen in appendix 2.

5.2 Noise events

Significant noise events during measurements

MP 5 - Traffic on internal road no. 1, noise from maintenance area (east of MP 5) and assembling of structural steel on the Cast-house (pneumatic driven impact wrench)

MP 6 - Traffic on internal road no. 1, noise from workshop (building no. T-303) and assembling of structural steel on the Casthouse (pneumatic driven impact wrench)

- MP 7 - Traffic on internal road no. 6, cladding of the Potline, concrete cutting and grinding inside the Potline
- MP 8 - Traffic on internal road no. 12 and cladding of the Potline

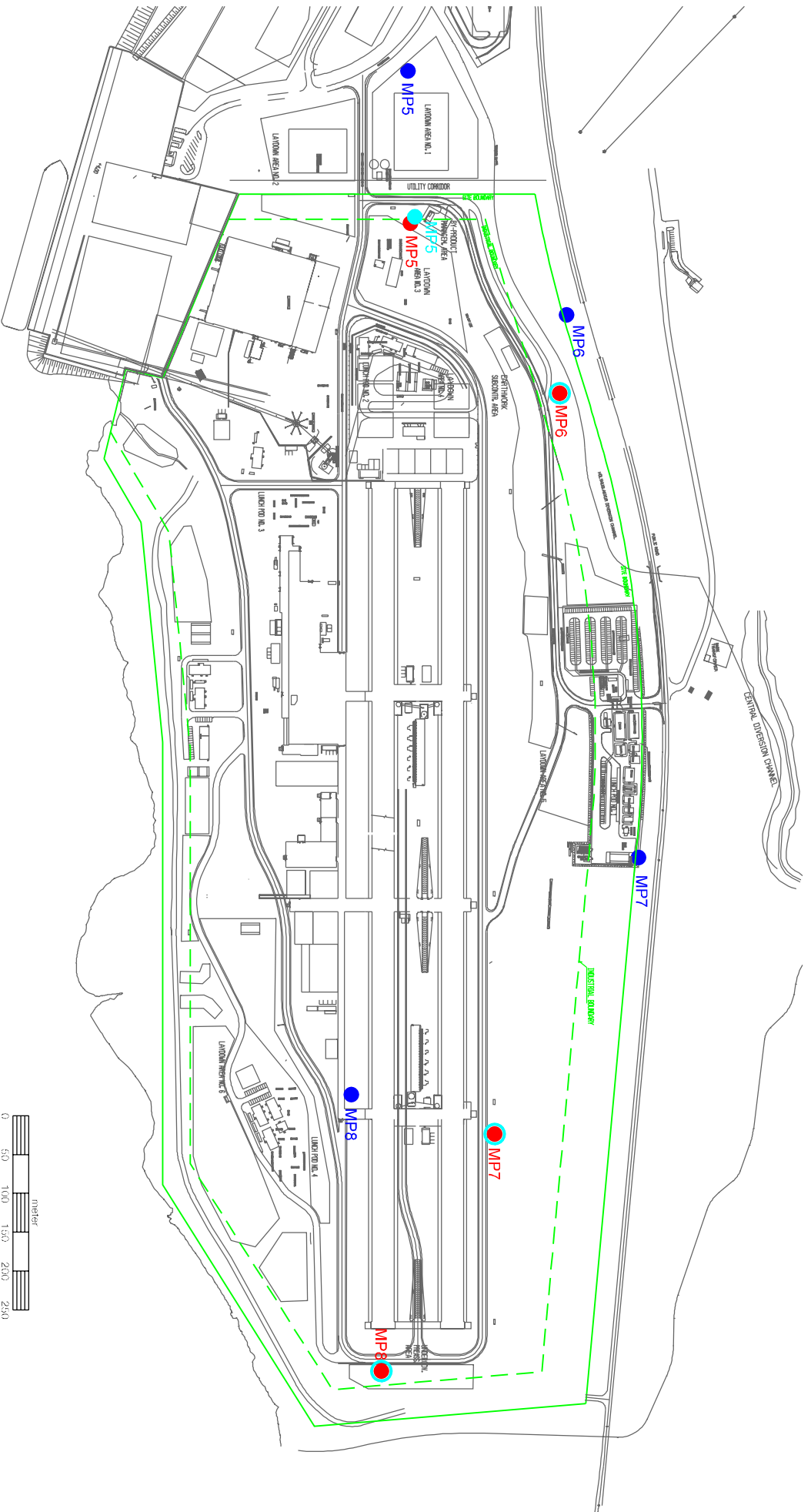
5.3 Uncertainty

The uncertainty of the analysed noise levels presented in section 5.1, depends on both the accuracy of the measuring chain ($\pm 2\text{dB}$) and the fluctuations of the noise during the three time periods (day, evening and night). The overall uncertainty of the results is estimated to be better than $\pm 4\text{dB}$.

6 Remarks

This year's noise survey shows a generally lower noise level than last year's survey. It's because most of the earth work is finished where heavy machinery and stone crushers were used. Most of the work on site this year is done manually with hand tools, or with lighter, less noisy machinery than those used last year.

Appendix 1 - Measurement positions



Measurement positions

- Survey 2004
- Survey 2005
- Survey 2006

- Site boundary
- Industrial boundary

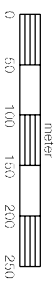
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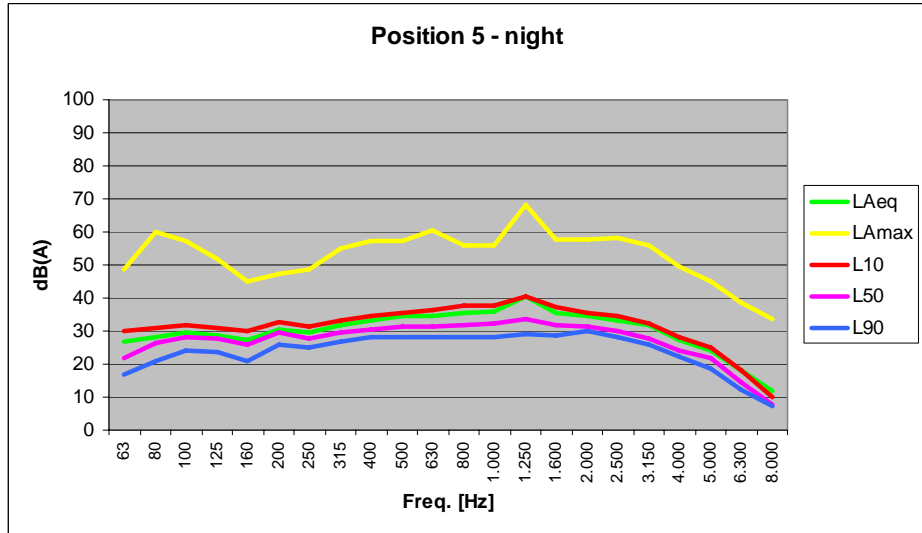
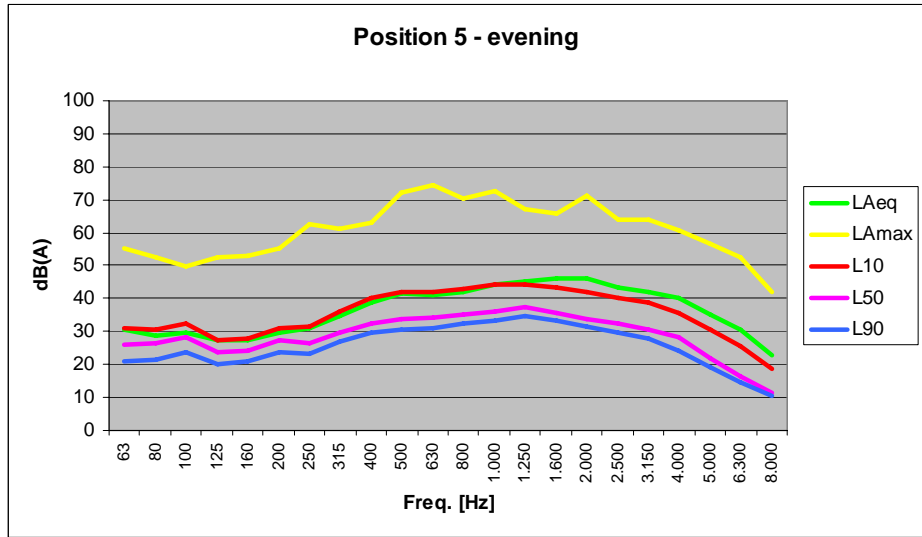
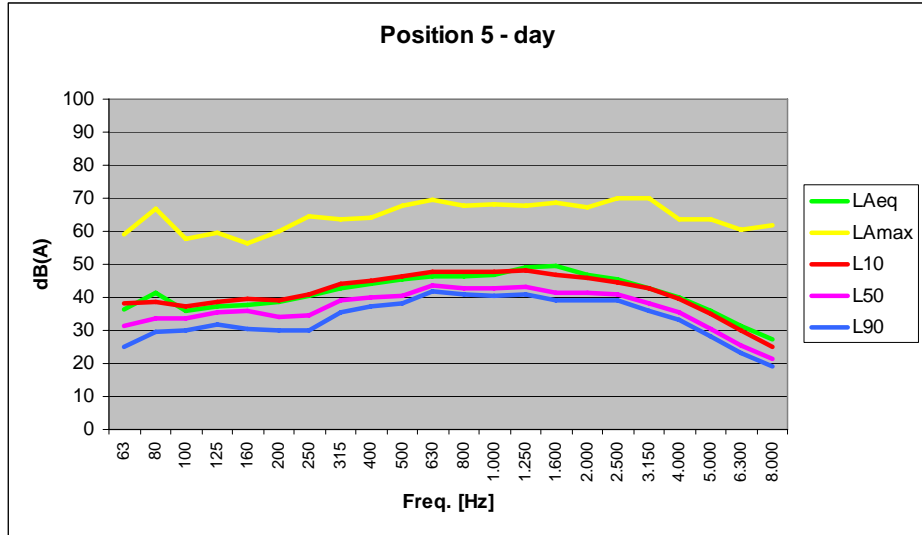
Fjardaal Smelter Project Noise Survey 2006 Measurement positions

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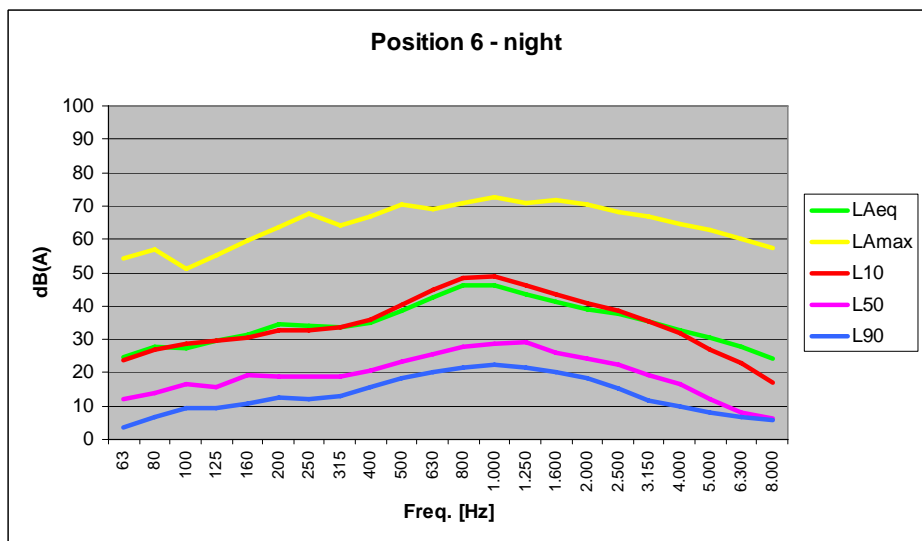
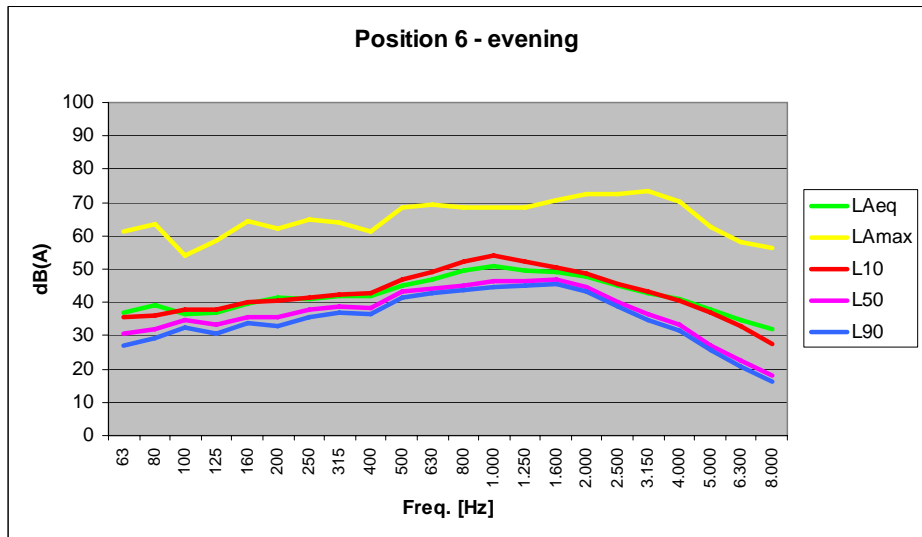
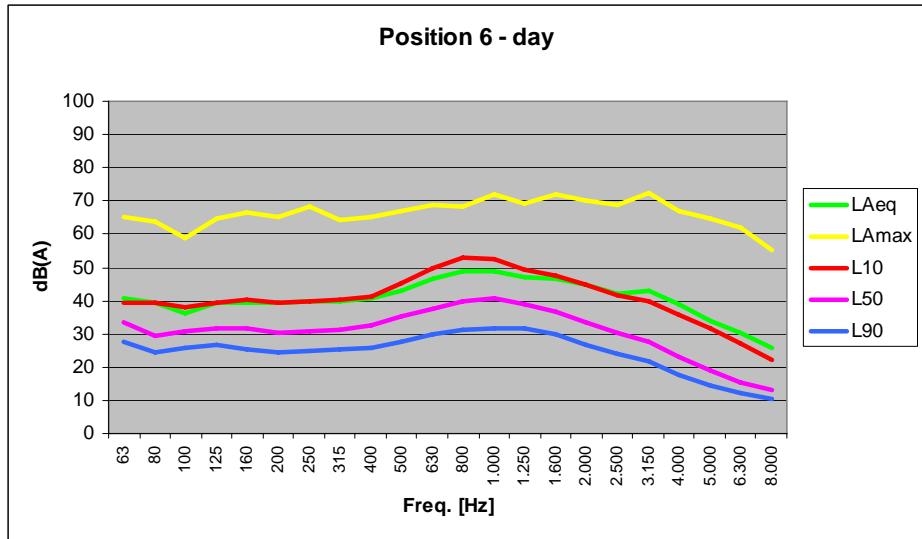


Appendix 2 - 1/3 octave spectrum

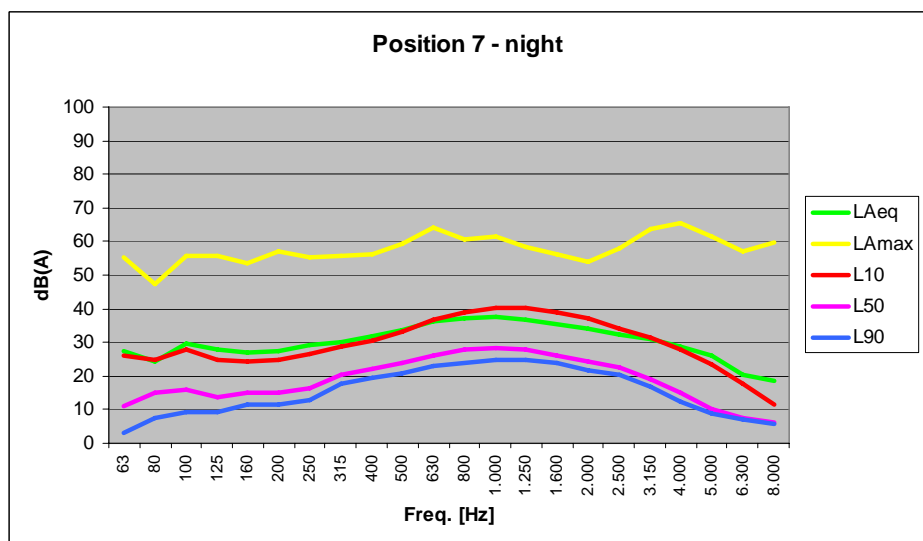
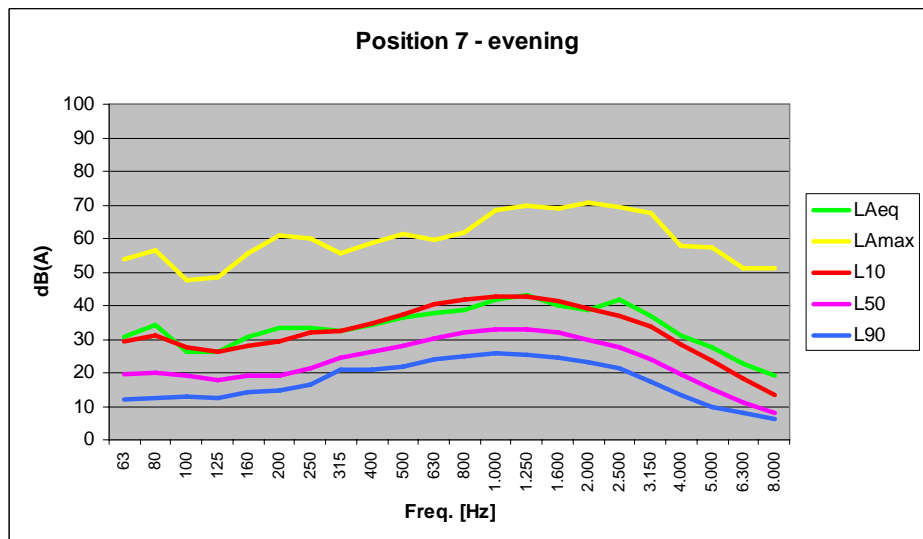
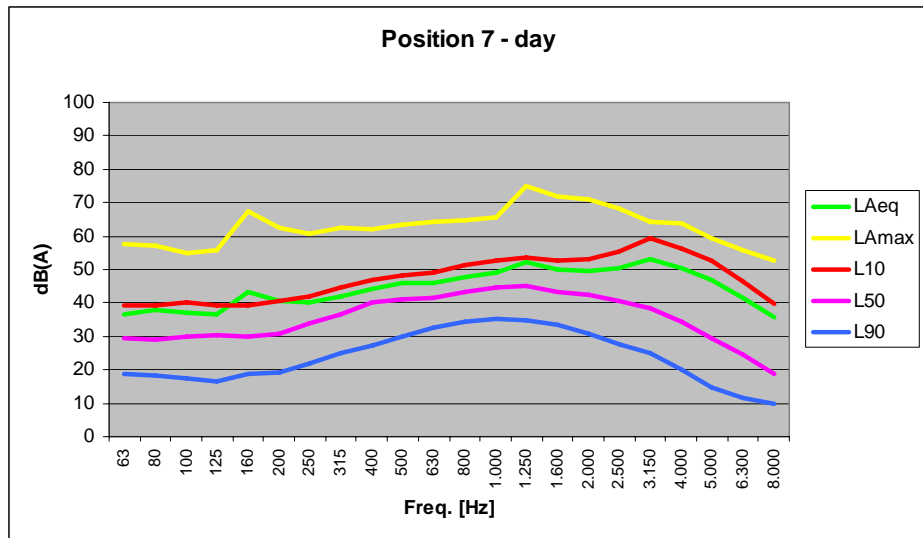
Measurement position 5



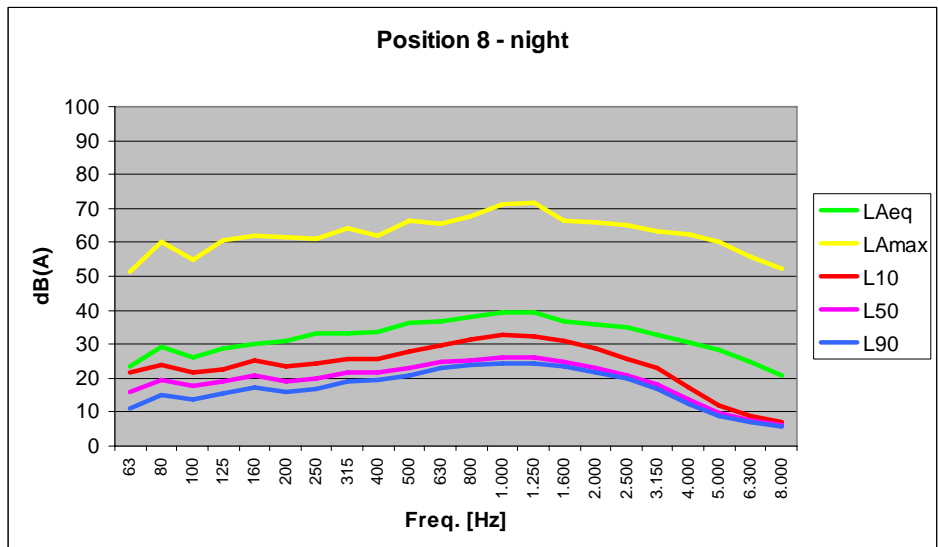
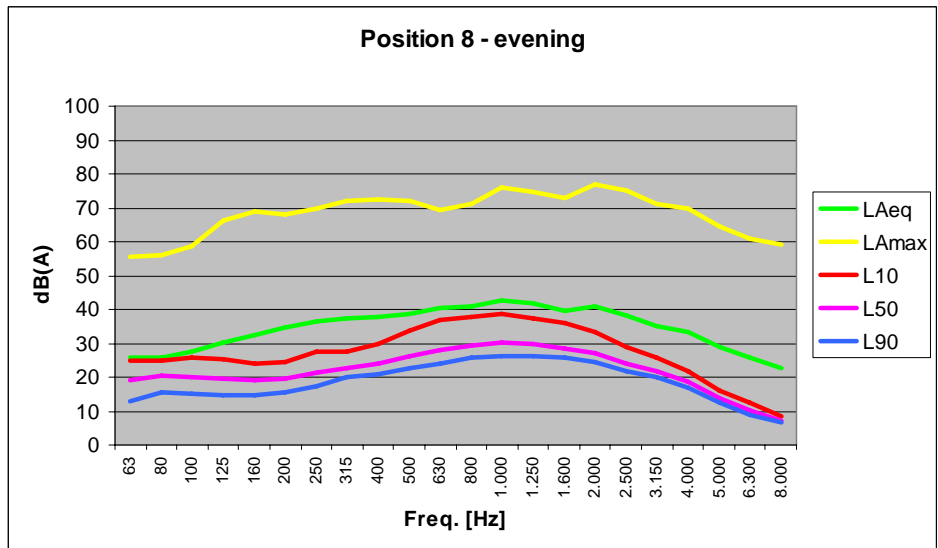
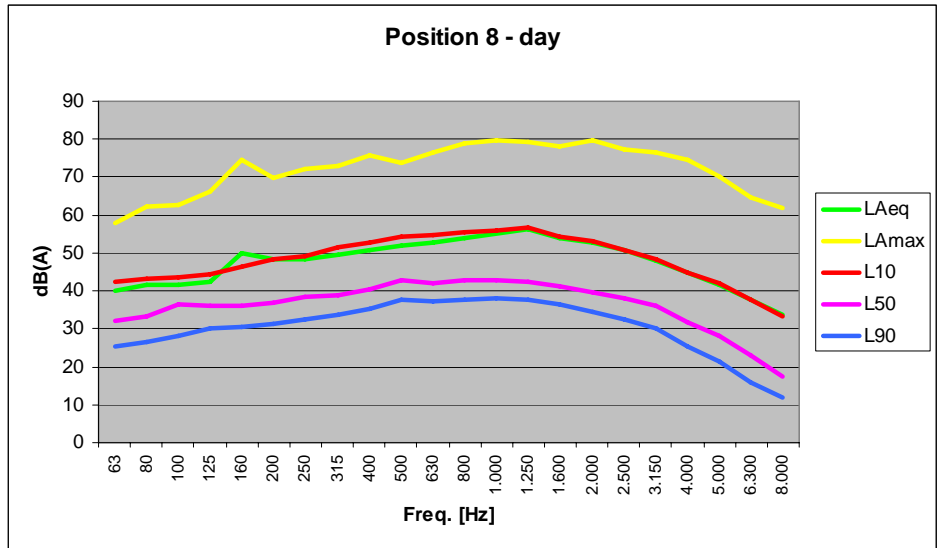
Measurement position 6



Measurement position 7



Measurement position 8





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