



## NOISE MEASUREMENTS

ON THE BECROMAL PRODUCTION SITE 2018

27.04.2018



## REPORT – INFORMATION SHEET

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Urszula Tlolka	Becromal Iceland ehf
<b>PROJECT MANAGER – EFLA</b>	<b>AUTHOR</b>
Kristín Ómarsdóttir	Kristín Ómarsdóttir
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	Measurements report					

## 1 GENERAL

EFLA hf. has performed yearly noise measurements on the Becromal production site at Krossanes 4 in Akureyri. The measurements were conducted on April 12th by Kristín Ómarsdóttir, M.Sc. civil- and environmental engineer. The results of the noise level measurements were compared to the reference limits set in the regulation on noise nr. 724/2008. When measurements were conducted, the weather was mild, with wind speed of around 2-4 m/s.

## 2 MEASUREMENT PROCEDURE

The noise measurements were conducted according to the standard „Metod för imissionsmatning av externt industribuller“, which is a joint Nordic standard.

The equipment used for the measurement:

- 2270, sound level meter from Brüel & Kjær
- microphone type 4189 from Brüel & Kjær
- Calibrator, type 4231 from Brüel & Kjær
- Software for the processing of the measurements
- Wind shield for microphone

There is a continuous production in the factory day and night, so the noise level should be similar in the day- evening- and night time. The nearest residential area is at around a 400-600 m distance to the south from the factory and is mostly shielded from the factory noise by the surrounding topography. Other neighbouring areas are industrial areas and premises. Part of the Becromal factory is built on reclaimed land, or land fill. The ground was without snow when the measurements were made. The measurements were made during the period from 8:30 – 10:00 on April 12th 2018. Weather conditions can be seen in table 1.

**TABLE 1** Meteorological data.

TIME	WIND SPEED	MAX WIND SPEED	TEMPERATURE	PRECIPITATION
8:00	4 m/s	5 m/s / 9 m/s	7,1 °C	0 mm / 1 h
9:00	2 m/s	4 m/s / 9 m/s	7,2 °C	0 mm / 1 h
10:00	2 m/s	2 m/s / 4 m/s	8,5 °C	0 mm / 1 h

The sound level meter was set up in four different places, on two locations on the south-west side of the building, one location at the south-west boundary and on one location on the north-west boundary of the Becromal production site. The noise source was very steady and the weather conditions were very good, so a measurement time of 20 min. was used in each measurement location, with the microphone placed 1,5 m above ground. Some noise events were observed that were not related to the Becromal factory operation and they have been excluded from the calculations. The measuring locations are marked with numbered blue circles in figure 1.



**FIGURE 1** Four different measurement locations on the Becromal production site.

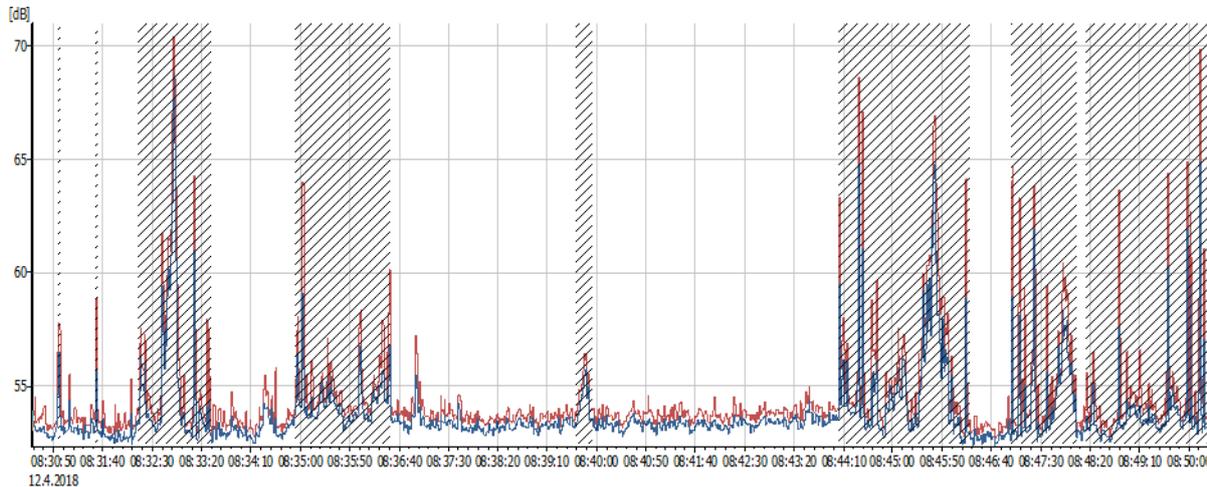
### 3 CURRENT REQUIREMENTS

According to the municipal plan for Akureyri, this area is defined as a port area. In the regulation on noise nr. 724/2008, the limit for the noise level in an industrial area is  $L_{Aeq} = 70$  dB(A), irrespective of the time of day. The limit in a residential area for the noise level from an industrial area is  $L_{Aeq} = 50$  dB(A) in the daytime and  $L_{Aeq} = 40$  dB(A) in the night time.

## 4 MEASUREMENT RESULTS

### 4.1 Location 1

The first measurement location was at the south corner of the plot. The noise from the Becromal factory was dominant, but some activity unrelated to the factory could be heard.

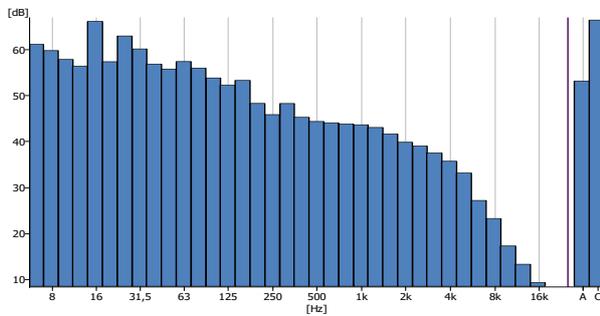


**FIGURE 2** Measurement location 1. Equivalent sound level [dB(A)] as a function of time.

The measured equivalent sound level on location 1 can be seen in figure 2, and the frequency spectrum can be seen in figure 4.



**FIGURE 3** First measurement location.

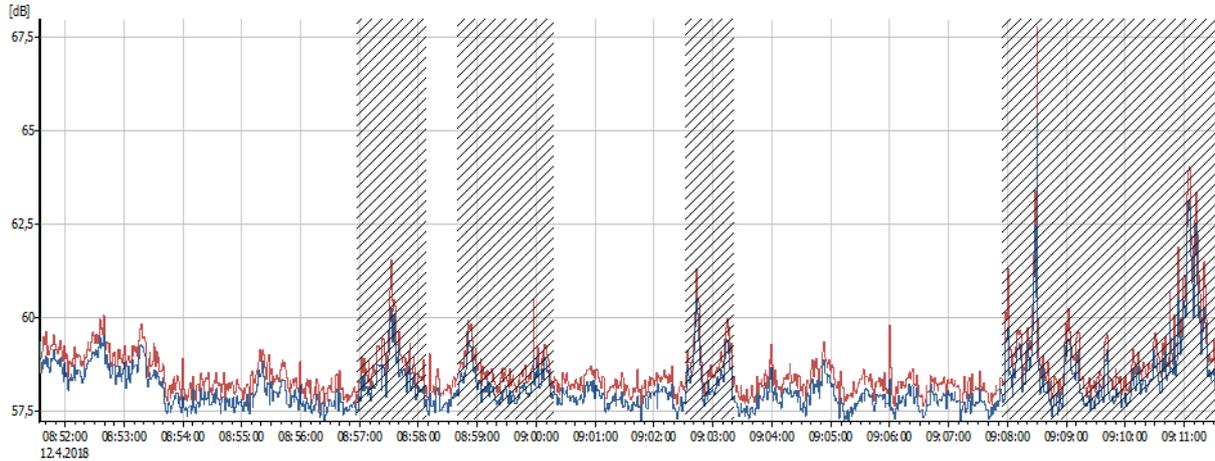


**FIGURE 4** Measurement location 1. Equivalent sound level [dB(A)] as a function of frequency.

The effect of the wind was negligible. The noise source is quite steady, but was positioned downwind from the microphone. Low frequencies are dominant in the measured noise level in this location, as can be seen in figure 4.

## 4.2 Location 2

The second location can be seen in figure 6. The noise from the Becromal factory was dominant, but some activity unrelated to the factory could be heard.

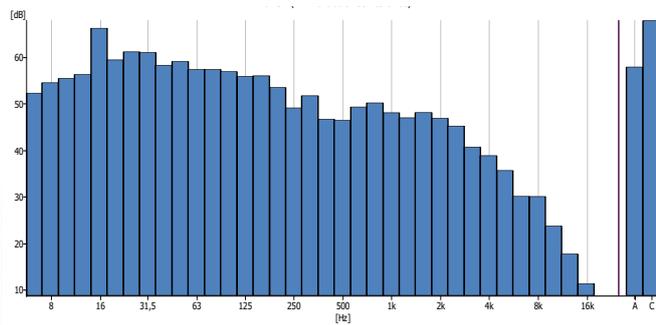


**FIGURE 5** Measurement location 2. Equivalent sound level [dB(A)] as a function of time.

The measured equivalent sound level on location 2 can be seen in figure 6 as a function of time and in figure 7 as a function of frequency.



**FIGURE 6** Second measurement location.



**FIGURE 7** Measurement location 2. Equivalent sound level [dB(A)] as a function of frequency.

The effect of the wind was negligible. The noise source is quite steady. Low to mid frequencies are dominant in the measured noise level in this location, as can be seen in figure 7.

4.3 Location 3

The third location can be seen in figure 9. The noise from the Becromal factory was dominant, but some activity unrelated to the factory could be heard.

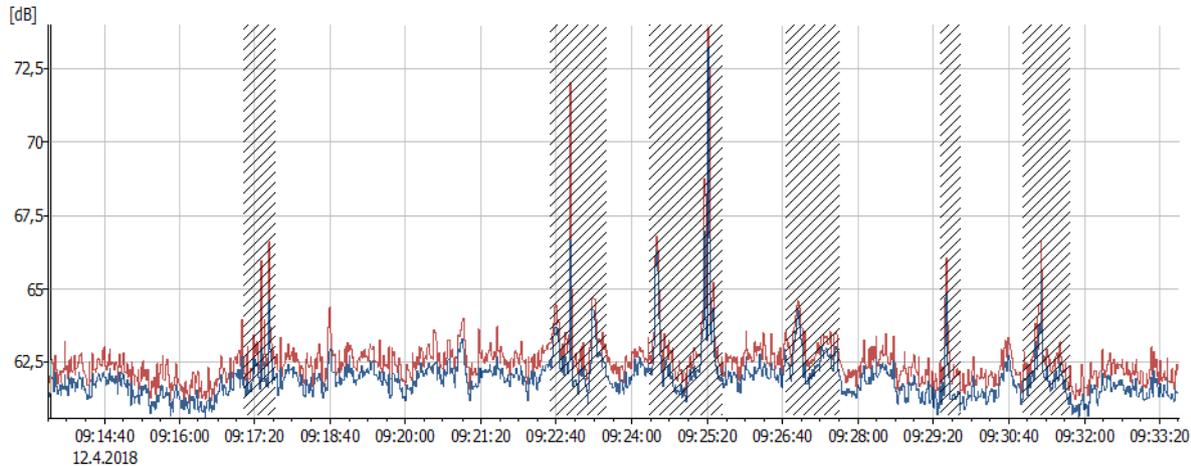


FIGURE 8 Microphone positioned in location 3. Equivalent sound level [dB(A)] as a function of time.

The measured equivalent sound level on location 3 can be seen in figure 8 as a function of time and in figure 10 as a function of frequency.



FIGURE 9 Microphone positioned in location 3.

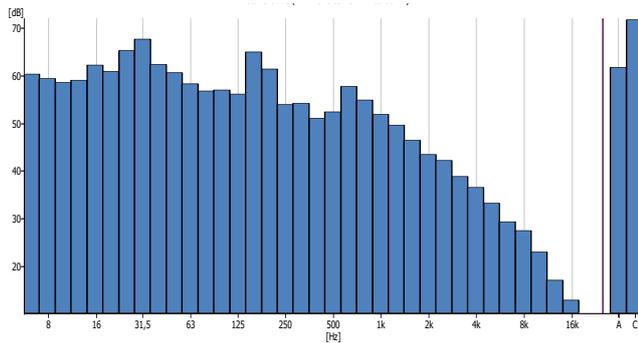
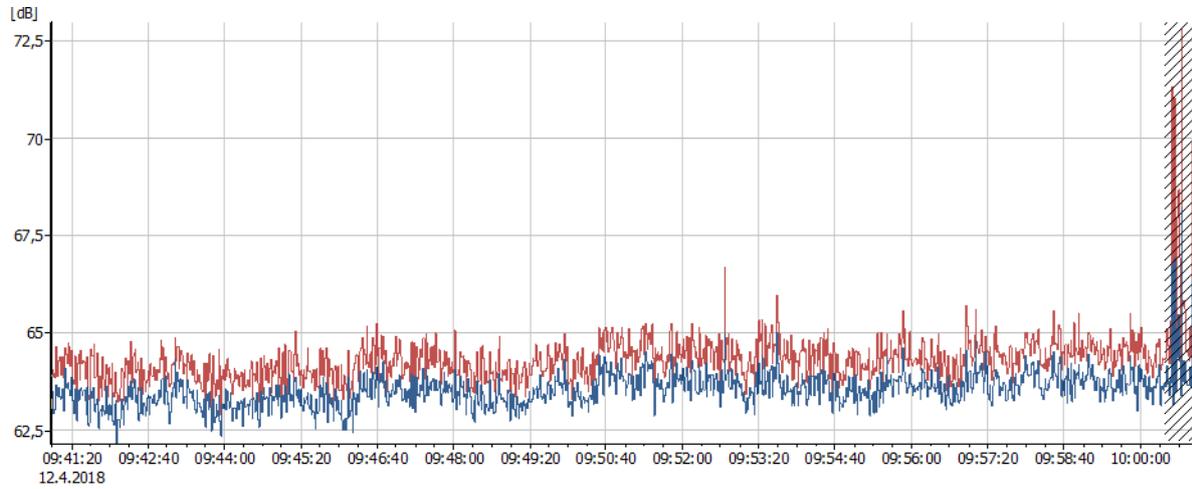


FIGURE 10 Measurement location 3. Equivalent sound level [dB(A)] as a function of frequency.

The effect of the wind was negligible. The noise source is quite steady. Low to mid frequencies are dominant in the measured noise level in this location, as can be seen in figure 10.

#### 4.4 Location 4

The fourth location was downwind from the Becromal factory. The dominating noise source was the Becromal factory and no activity unrelated to the factory could be heard.

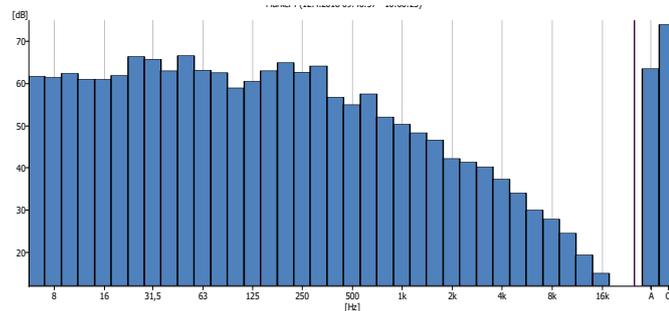


**FIGURE 11** Microphone positioned in location 4. Equivalent sound level [dB(A)] as a function of time.

The measured equivalent sound level on location 4 can be seen in figure 11 as a function of time and in figure 13 as a function of frequency.



**FIGURE 12** Microphone positioned in location 4.



**FIGURE 13** Measurement location 4. Equivalent sound level [dB(A)] as a function of frequency.

The effect of the wind was negligible. The noise source is quite steady. Low to mid frequencies are dominant in the measured noise level in this location, as can be seen in figure 13.

## 5 OVERVIEW OF MEASUREMENT RESULTS

In table 2, the results for each measurement location can be seen.

**TABLE 2** Equivalent sound level and maximum sound level of the measurements.

Location	Time [min]	Equivalent sound level	Maximum sound level
		$L_{eq}$ [dB(A)]	$L_{max}$ [dB(A)]
Location 1, south-west corner of the factory	20:00	53,2	57,2
Location 2, south-west end of the factory	20:00	58,0	60,1
Location 3, north-west side of the factory	20:00	61,8	64,4
Location 4, north end of the factory	20:00	63,5	66,7

The noise level is quite steady in all locations, as can be seen on figures 2, 5, 8 and 11. It can be assumed that noise from wind had very little effect on the measurement results. The equivalent sound level was measured below  $L_{eq} = 70$  dB(A) in all locations. The noise level of  $L_{eq} = 53$  dB(A) on the south-west corner of the production site indicates that the noise level in the residential area will also be below regulation limits.

Comparison to noise measurements from last two years, shows a variation of noise level around  $\pm 0-5$  dB, which can be explained by variations in weather conditions and snow cover.

## 6 SUMMARY

The noise level was measured below  $L_{eq} = 70$  dB(A) on the Becromal factory site. Because of the surrounding topography and the distance between the factory and the nearest residential area it is reasonable to assume that the noise level in the residential area will not exceed  $L_{eq} = 40$  dB(A) during the night as a result of the noise from the factory operations.