

Gas Measurements

Ammonia measurements May 2017

Measurement results from the Becromal factory at Akureyri



REPORT - INFORMATION SHEET

Report Title Gas Measurements		Report Type Measurement Report	
Project Ammonia measurements May 2017		Client Becromal Iceland	
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Summary <p>In May 2017 Ammonia gas was measured at Becromal Iceland Akureyri. Measurements were performed outdoor at ground level, in total at four places around the factory; in the production hall, at the tankfarm and on the roof of the main plant building. The total Ammonia concentration in the factory's exhaust on the roof measured 2.8 ppm, which is below the 10 ppm emission limit according to the operating permit.</p> <p>The maximum value of ammonia, measured at 4 common working areas on the ground, was 0.9 ppm, which is far below the threshold limit value (TWA) 20 ppm according to Icelandic regulation no. 390/2009 on pollution limits and measures to reduce pollution in workplaces. The average concentration in the production hall was 2.0 ppm and in the tankfarm 0.8 ppm which is also below the threshold limit (TWA).</p>			
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Report status		Report distribution	
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Nr.	Author		Reviewed		Approval	
	Name	Date	Name	Date	Name	Date
	Páll Höskuldsson	19.5.2017				



1 PROJECT OBJECTIVES AND DESCRIPTION

During the production process of anodized aluminium foil at the Becromal factory in Akureyri, a few gases are produced. The gases and vapours from the process are retrieved in the factory's ventilation system and released to the air through 16 exhaust units on the roof of the building, see attached drawing in Annex 1. Each exhaust unit is connected to a ventilation fan with the capacity of 29,000 m³/h. For the production, 60 machines are used for the anodization of rolled aluminium foil. These machines are divided into 4 production lines, each line interconnected to 4 exhaust units (see Air Emission Layout in Annex 1).

The exhaust contains a certain amount of ammonia, which must at all times comply with Article 2.4 of the Operating permit: *"The concentration of ammonia in the plant exhaust shall not exceed 10 ppm. The operator shall prevent odour pollution in the vicinity of the plant."*

On May 16, 2017, EFLA Consulting Engineers conducted Ammonia gas measurements at Becromal Iceland in Akureyri. Measurements were performed at workplaces; i.e. outdoors at ground level - in total at four places around the factory - and also in the production hall and at the tankfarm. Ammonia gas was also measured from exhausts units on the roof of the main plant building. Results were compared to emission limits in the operating permit.

2 METHODS

Ammonia was measured using a Crowcon NH₃ meter equipped with an amperometric 3 electrode sensor cell with measuring range 0-100 ppm. The meter measures the NH₃ concentration continuously and logs values every minute. Photos of measurement locations can be seen in Pictures 2-1 to 2-6.

Exhaust air. Gas emissions from 16 exhaust units were measured, see Photos 2-5 to 2-6. The exhaust units are located on the roof of the main plant building, as can be seen in the attached drawing in Annex 1, and listed in the following table. Measurements were carried out for 10 minutes at each measuring point and ammonia values were logged every minute, a total of 160 logged values. Assuming equal air flow from each exhaust unit, the total ammonia concentration of the exhaust from the factory is obtained by calculating the mean value of all measurements on the roof.

Table 2-1: Summary of production lines and exhaust units on the roof of the main plant building.

Production Line	Exhaust unit	Location
1	BLD-AU11, BLD-AU12, BLD-AU13, BLD-AU14	NW
2	BLD-AU21, BLD-AU22, BLD-AU23, BLD-AU24	NE
3	BLD-AU31, BLD-AU32, BLD-AU33, BLD-AU34	SW
4	BLD-AU41, BLD-AU42, BLD-AU43, BLD-AU44	SE

Working area at ground level. Measurements were carried out at 4 places on the ground around the company, in common working areas, see photos 2-1 to 2-4 and drawing in Annex 2. Measurements

were also carried out in the production hall and at the tankfarm. Measurement locations at ground level were the following:

1. Car Park Near Offices
2. Main Entrance Gate
3. Working Area of Laxá
4. Near the Containers
5. Production Hall (south)
6. Tank farm

Measurements were carried out for 10 minutes at each location.



Picture 2-1: Measurements at the car park Near Offices



Picture 2-2: Measurements at the main entrance gate



Picture 2-3: Measurements at the working area of Laxá



Picture 2-4: Measurements at the container area



Picture 2-5: Measurements of the exhaust.



Picture 2-6: Exhaust units on the roof

3 RESULTS

Ammonia emissions from the factory.

Table 3-1 presents exhaust measurement results. The total ammonia concentration in the plant exhaust is obtained by calculating the mean value of 160 measurements from the roof of the main plant building. The emission limit for ammonia according to the operating permit is 10 ppm. The mean ammonia concentration of the exhaust was 2.8 ppm according to measurements, fulfilling requirements of the operating permit.

Table 3-1: Measurement results of exhaust on the roof.

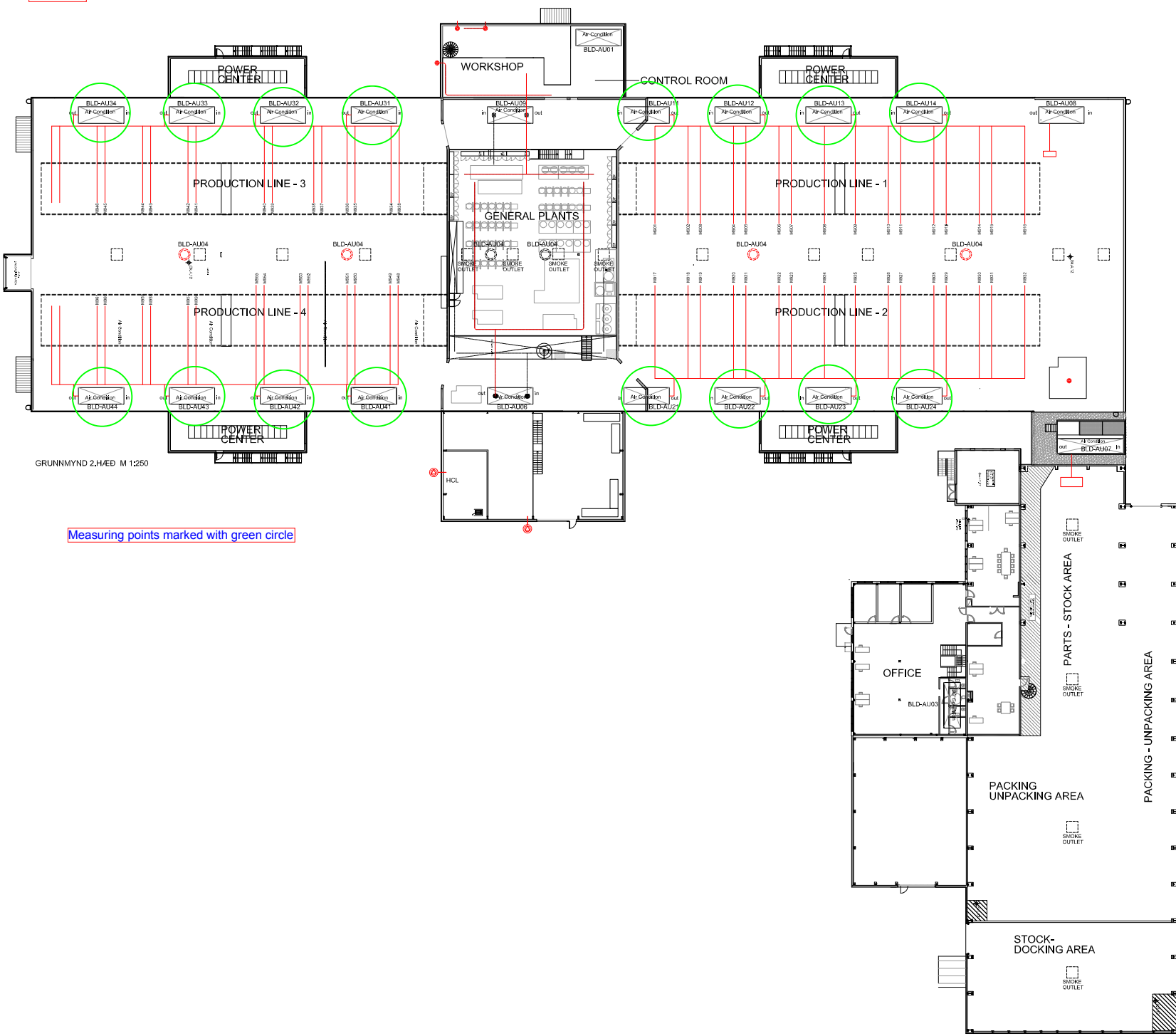
NH ₃ [ppm]
2.8

Ammonia in common working areas.

Table 3-2 presents measurement results performed at ground level in common working areas. The results from the outdoor measurements are calculated from 40 measurement values, none exceeding 0.9 ppm, which is far below the threshold limit value (TWA) 20 ppm according to Icelandic regulation no. 390/2009 on pollution limits and measures to reduce pollution in workplaces. The average concentration at the production hall was 2.0 ppm and in the tankfarm 0.8 ppm which is also under the threshold limit (TWA). Weather conditions were good, the temperature was 8.6 °C and there was a light breeze with wind 1 m/s. No ammonia odour was detected outdoors during measurements.

Table 3-2: Measurement results from working areas

Location	NH ₃ [ppm]	Temperature [°C]	Relative Humidity [%]	Windspeed [m/s]
1. Car Park Near Offices	0,4	8,6	70	↖ 1
2. Main Entrance Gate	0,7	8,6	70	↖ 1
3. Working Area of Laxá	0,9	8,6	70	↖ 1
4. Near the Containers	0,4	8,6	70	↖ 1
5. Production Hall (south)	2	19,3	38	
6. Tankfarm	0,8	12,3	31	



GRUNNMYND 2.H/ED M 1:250

Measuring points marked with green circle

SKÝRINGAR:
 AIR OUT
 AIR BLOW

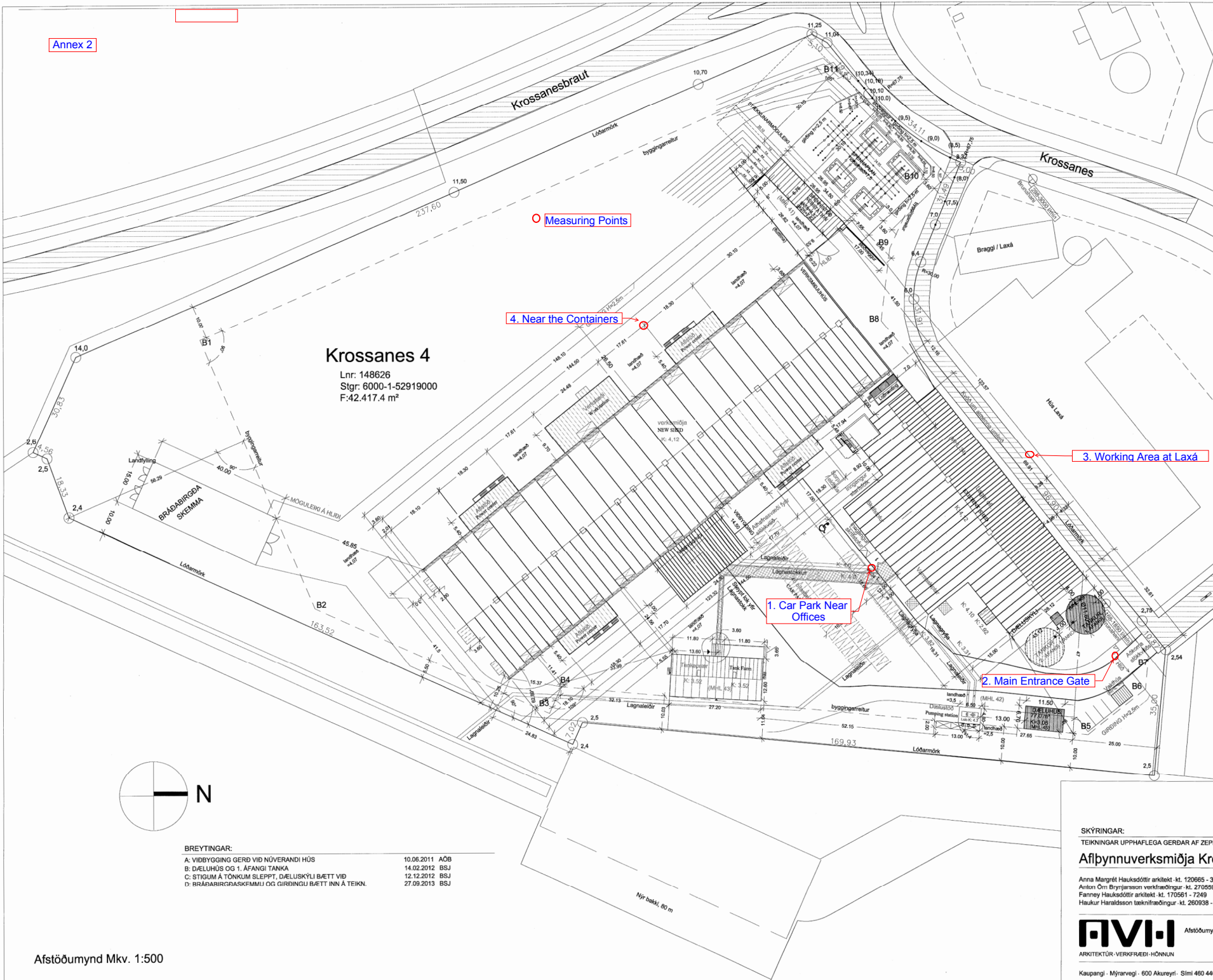
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Hönnuður:
 Hönnunarsjóri:

AVH Arkitektúr-Verkfræði-Hönnun
 Air emission layout

Dagsetning: 21.02.2014
 Málsvæði: 1:250
 Tilknað: GMJ/AOB
 Yfirfarir: AOB
 Breyting:



Krossanes 4

Lnr: 148626
Stgr: 6000-1-52919000
F:42.417.4 m²

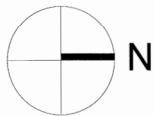
Measuring Points

4. Near the Containers

3. Working Area at Laxá

1. Car Park Near Offices

2. Main Entrance Gate



BREYTINGAR:

A: VIBBYGGING GERD VID NÜVERANDI HÖS	10.06.2011	AOB
B: DÆLUHÖS OG 1. ÁFANGI TANKA	14.02.2012	BSJ
C: STIGUM A TONKUM SLEPPT, DÆLUKÝLI BÆTT VID	12.12.2012	BSJ
D: BRÁÐARIRGASKEMMU OG GIRINGU BÆTT INN A TEKN.	27.09.2013	BSJ

Afstöðumynd Mkv. 1:500

MÖTTEKIÐ
30. sep. 2013
BYGGINGAVALLITRÍ
AKUREYRI

SKÝRINGAR:
TEIKNINGAR UPPHAFLEGA GERDAR AF ZEPPELIN ARKITEKTUM 2008

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Afstöðumynd

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