Wastewater Measurements

Total wastewater (TWW) analysis

January 2016

Measurement results from the Becromal factory at Akureyri

VERKFRÆÐISTOFA

REPORT - INFORMATION SHEET

Report Title	Report Type
Wastewater Measurements	Measurement Report
Project	**Client**
Measurements of Total Wastewater (TWW) from the Becromal factory at Akureyri 2016	Becromal Iceland

Project Manager – EFLA	Project Manager / Client Representative
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Author	Report Nr.	Project Nr.	Total pages
Páll Höskuldsson	1	3848-007	9

Summary

In January 2016 TWW (total wastewater) was monitored for three days, water samples taken and analysed for chemical composition. Flow, temperature and pH were also measured. Results were compared to discharge limits in the operating permit.

Keywords

Wastewater, Chemicals, Discharge limits

Report status	Report distribution
☐ Draft	☐ Open
☐ Copy editing	☐ With client permission
☒ Final	☒ Confidential

Version history						
Nr.	**Author**		**Reviewed**		**Approval**	
	Name	Date	Name	Date	Name	Date
1	Páll Höskuldsson	14.3.2016				
2						

1 PROJECT OBJECTIVES AND DESCRIPTION

In January 2016, TWW (total wastewater) from Becromal's factory in Akureyri was monitored over 3 days. Water samples were taken and analysed for chemical concentration and the flow, temperature and pH were also measured. Results were compared to discharge limits in the operating permit.

The total wastewater (TWW) consists of two streams that mix together before being discharged to the municipal wastewater system. These streams are:

1. Production wastewater (PWW) from diverse processes at the plant, e.g. from the cleaning of filters and regeneration of deionizing resins. Before being released to the effluent pipe the PWW is equalized in an equalization tank and neutralized in a neutralization tank. The outflow can vary considerably but is on average around 600 m^3/day. The temperature is usually around 20°C.
2. PREOX, hot 80-90 °C deionised water used for the pretreatment of pure aluminium foil and is assumed to be free of chemicals when released to the effluent. The flow is stable and less than 1,000 m^3/day.

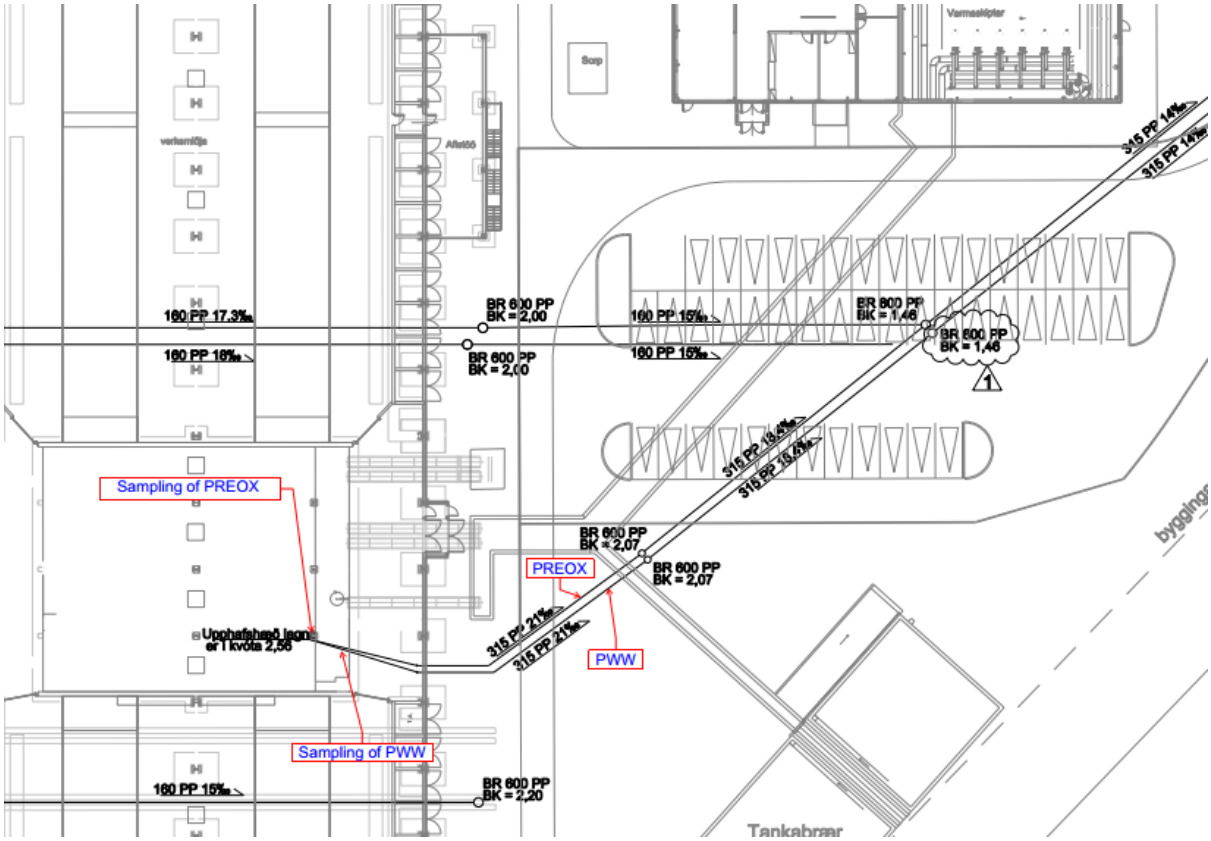
2 METHODS

Samples were collected over three days and one average sample was prepared for chemical analysis. Samples were taken from two sampling points as can be seen on picture 2-1. Photos of sampling equipment and locations can be seen in Pictures 2-2 to 2-5.

Sampling point 1 – Sampling of PWW. The sampling point is located inside the factory building where the water has just exited the neutralization tank, before being released to the effluent pipe. The samples were taken with an autosampler, taking continuous 22 mL subsamples every 8 minutes into 4 separate bottles every 24 hours. One average composite sample was made for each day, proportional to flow. Flow and pH were measured using fixed measurement instruments of the PWW-stream.

Sampling point 2 – Sampling of PREOX. The sample was taken from the PREOX-tank before being released to the effluent pipe. The tank is located inside in the basement of the factory building. A solenoid valve was installed on the PREOX-stream inlet to the tank. Every 5 minutes, the sampler collected 5 second samples into a small barrel. One sample was collected for every 24 hours, a total of 23 litres. The temperature and pH of the PREOX-stream were measured with fixed measurement instruments. The PREOX-flow was measured using a portable full-pipe flow meter inside the factory.

From the day samples of the PWW and PREOX streams, one flow proportional average composite TWW sample was prepared for chemical analysis.



Picture 2-1: *Sampling points*

Picture 2-2: *Temperature- and pH-meters for the measurement of Preox*

Picture 2-3: *Sampling of Preox*

Picture 2-4: *Flow measurement of Preox with a portable full pipe flow meter*

Picture 2-5: *Sampling of PWW with an auto sampler.*

3 RESULTS

3.1 Flow, temperature and pH measurements

Table 3-1 shows daily average values for TWW which consists of two streams:

a) PWW, i.e. process wastewater.

b) PREOX, hot 80-90 °C deionised water used for the pretreatment of pure aluminium foil.

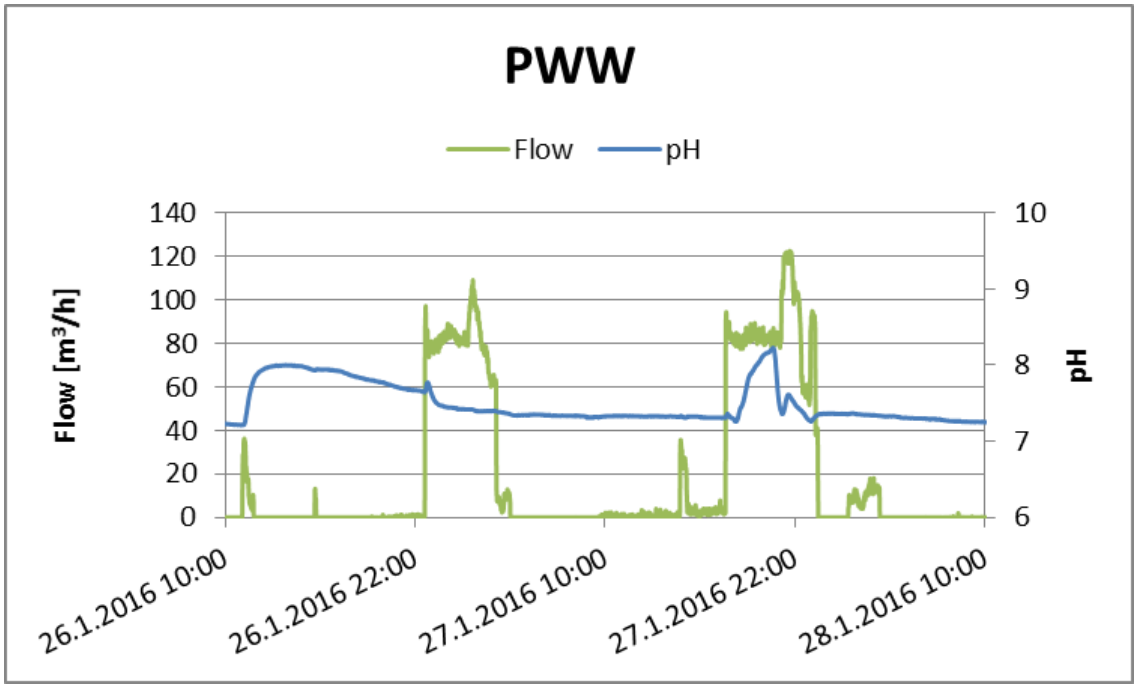
Table 3-1: *Average flow rate per day of each stream and of the TWW.*

Date and time	PREOX [m³/d]	PWW [m³/d]	TWW [m³/d]
10:00 Jan 26 – 10:00 Jan 27, 2016	699	389	1,088
10:00 Jan 27 – 10:00 Jan 28, 2016	716	540	1,256
10:00 Jan 28 – 10:00 Jan 29, 2016	729	519	1,248
Average January 26-29, 2016	715	482	1,197

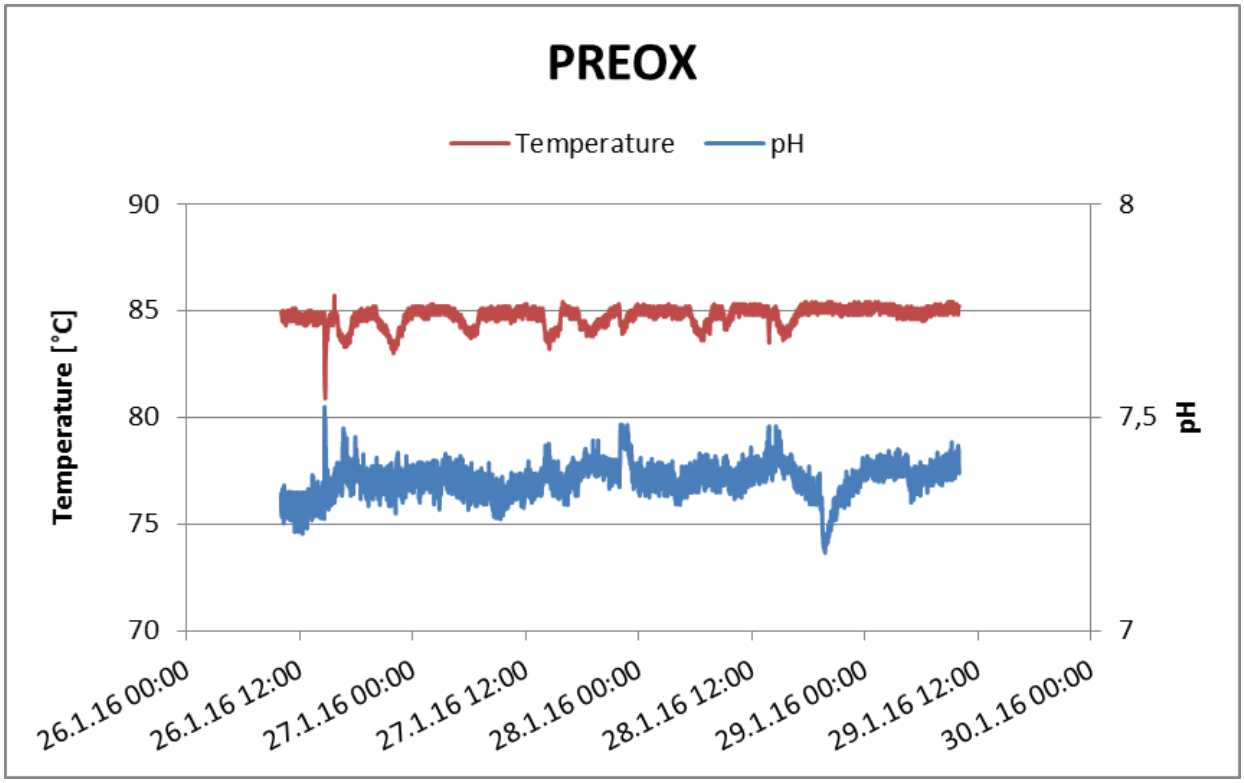
TWW = PREOX + PWW

Picture 3-1 presents the flow and pH of the PWW-stream and picture 3-2 presents the temperature and pH of the PREOX-stream.

Picture 3-2 shows rather stable pH values, between 7.2 and 7.5 in the PREOX-stream during the measurement period. The temperature is quite stable around 85 °C.



Picture 3-1: *Flow and pH of the PWW-stream, measured January 26-29, 2015.*



Picture 3-2: *Temperature and pH of the PREOX-stream, measured January 26-29, 2016.*

3.2 Chemical Analysis

Table 3-1 presents chemical concentrations in the 3-day composite sample (26-29 January 2016). Results are compared to discharge limits and estimated release values in the operating permit.

Table 3-1: *Chemical concentration in the 3-day composite sample (26-29 January 2016) compared to discharge limits and estimated release values in the operating permit.*

Element	Unit	TWW January 2016	Discharge limits*	Estimated release*
TSS	mg/L	62,5	220	
COD	mg/L	30	500	
P	mg/L	46,9		9
N	mg/L	5,25		
Al	mg/L	7,5		1
B	mg/L	0,43		7
Ca	mg/L	7,8		
Fe	mg/L	0,1		
K	mg/L	3,8		
Mg	mg/L	2,1		
Na	mg/L	78,4		210
S	mg/L	0,75		60
EDTA	mg/L	2,5		6
As	µg/L	<1		
Ba	µg/L	22,8		
Cd	µg/L	<0,05		
Co	µg/L	0,4		
Cr	µg/L	1,87		
Cu	µg/L	11,5		
Hg	µg/L	0,0306	50	
Mn	µg/L	2,13		
Mo	µg/L	15,2		
Ni	µg/L	48,8		
Pb	µg/L	4,16		
V	µg/L	8,83		
Zn	µg/L	185		

* According to operating permit

Table 3-2 presents the total chemical discharge per day based on the chemical concentration in the composite 3 day sample and average flow of TWW.

Table 3-2: *Chemical discharge per day.*

Element	Unit	TWW January 2016	Chemical discharge [kg/day]
TSS	mg/L	62,5	74,8
COD	mg/L	30	35,9
P	mg/L	46,9	56,1
N	mg/L	5,25	6,3
Al	mg/L	7,5	9,0
B	mg/L	0,43	0,5
Ca	mg/L	7,8	9,3
Fe	mg/L	0,1	0,1
K	mg/L	3,8	4,5
Mg	mg/L	2,1	2,5
Na	mg/L	78,4	93,8
S	mg/L	0,75	0,9
EDTA	mg/L	2,5	3,0
As	µg/L	<1	
Ba	µg/L	22,8	0,0273
Cd	µg/L	<0,05	
Co	µg/L	0,4	0,0005
Cr	µg/L	1,87	0,0022
Cu	µg/L	11,5	0,0138
Hg	µg/L	0,0306	0,0000
Mn	µg/L	2,13	0,0025
Mo	µg/L	15,2	0,0182
Ni	µg/L	48,8	0,0584
Pb	µg/L	4,16	0,0050
V	µg/L	8,83	0,0106
Zn	µg/L	185	0,2214

ANNEX 1

Factory layout drawing

Lóðarmörk

St 250

St 250 10 prm

Lögn tengist inná núverandi brunn í kvóta 0,18

315 PP 14‰

BR 1000 PP
BK = 2,57

BR 800 PP
BK = 0,40

200 PP 143‰

315 PP 14‰

315 PP 14‰

BR 800 PP
BK = 0,72

BR 800 PP
BK = 0,72

Skrifstofur

Varmaskiptar

Sorp

315 PP 14‰

315 PP 14‰

Dælustöð

Sjósía

Lóðarmörk

Aflstöð

verksmiðja

Aflstöð

BR 600 PP
BK = 2,90

160 PP 17,3‰

BR 600 PP
BK = 2,00

160 PP 15‰

BR 800 PP
BK = 1,46

BR 600 PP
BK = 2,90

160 PP 18‰

BR 600 PP
BK = 2,00

160 PP 15‰

BR 800 PP
BK = 1,46

1

315 PP 18,4‰

315 PP 18,4‰

byggingarreitur

Sampling of PREOX

BR 600 PP
BK = 2,07

PREOX

BR 600 PP
BK = 2,07

315 PP 21‰

315 PP 21‰

Upphafshæð lagna er í kvóta 2,56

PWW

Verkstæði

Sampling of PWW

BR 600 PP
BK = 2,95

160 PP 15‰

BR 600 PP
BK = 2,20

Tankaþrær

Aflstöð

verksmiðja

Aflstöð

N

1:250

0 5 10 15 20 25 50m

Skýringar:
Öll rör í jörðu skulu vera úr Polypropylen, hringstífleika SN8 að lámarki.

1	16. mars. Bætt við brunni. HHJ					

Til byggingarsamþykktar

Áritun hönnuðar

Áritun hönnuðar aðaluppdrátta

BECROMAL Krossnes 4

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Verkfræðistofa Norðurlands ehf
Hafnarstræti 4 600 Akureyri
Sími 460-9700 Fax 460-9701

M. A1	Hannað	Teiknað	Samþ.	Dags.	Nr.
1:250	HHJ	HHJ	KM	Mars. 2009	0951-02-0112