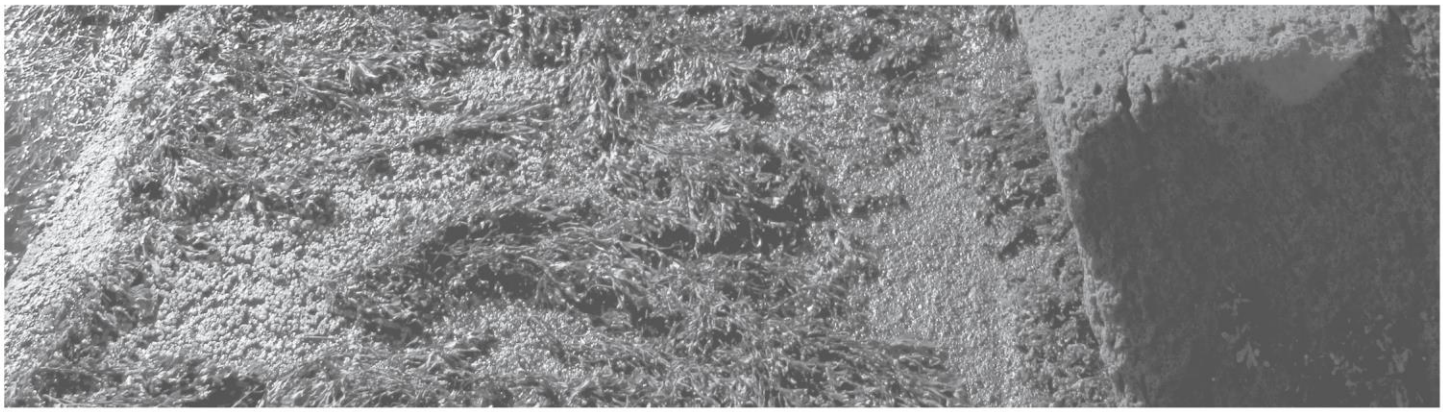
WASTEWATER MEASUREMENTS

Measurements of Total Wastewater (TWW) from the Becromal factory at Akureyri 2018

28.03.2018



REPORT – INFORMATION SHEET

DOCUMENT SYSTEM CODE

3848-007-SKY-001-V01-TWW 2018

REPORT TITLE

Wastewater Measurements

REPORT NUMBER / TOTAL PAGES

3848-007 / 15

PROJECT

Measurements of Total Wastewater (TWW) from the Becromal factory at Akureyri 2018

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KEYWORDS

Wastewater, Chemicals, Discharge limits

EXTRACT

In March 2018 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.

REPORT STATUS

☐ Draft

☐ Copy editing

☒ Final

REPORT DISTRIBUTION

☐ Open

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VERSION HISTORY

NO.	AUTHOR	DATE	REVIEWED	DATE	APPROVED	DATE
01	PH	28.03.18				

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1 PROJECT OBJECTIVES AND DESCRIPTION

In March 2018, 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 1000 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 figure 1. Photos of sampling equipment and locations can be seen in figures 2 to 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.

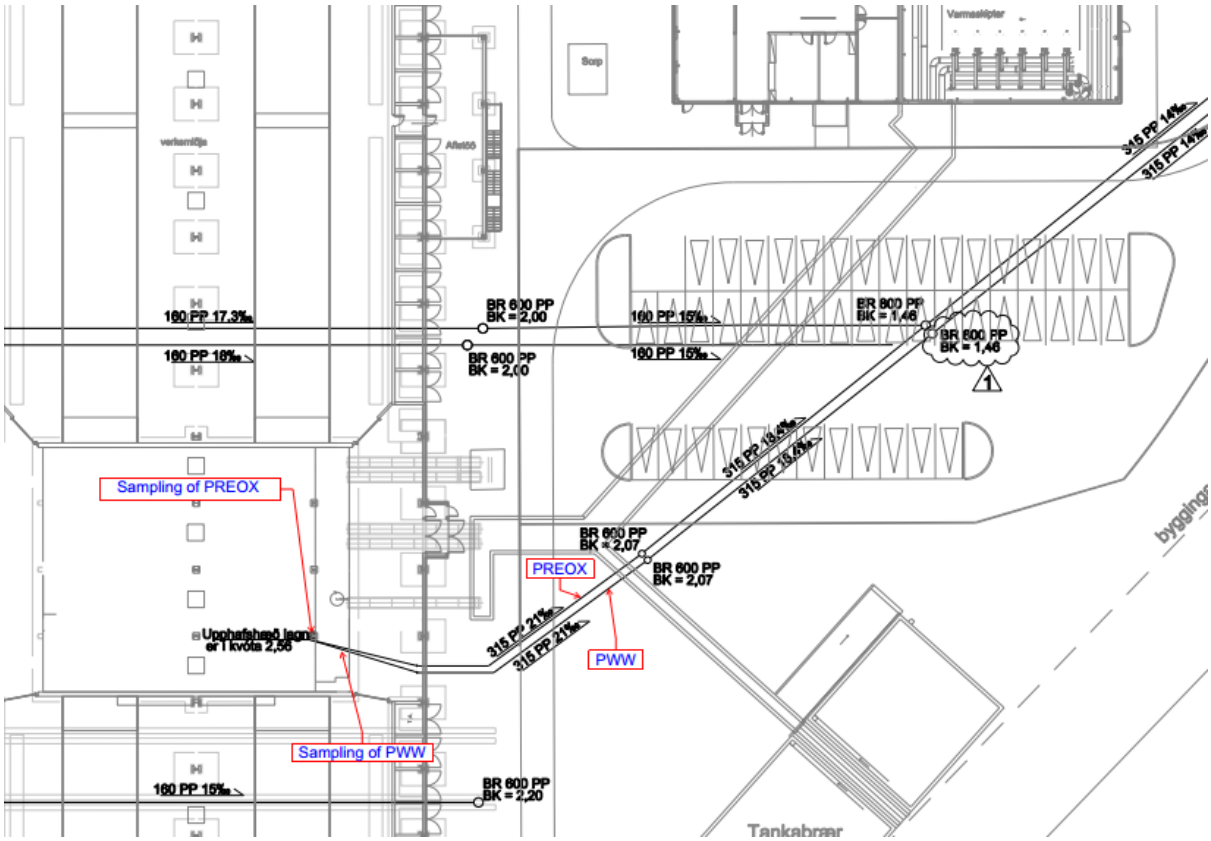

FIGURE 1 Sampling points

FIGURE 2 Temperature- and pH-meters for the measurement of Preox.

FIGURE 3 Sampling of Preox .

FIGURE 4 Flow measurement of Preox with a portable full pipe flow meter.

FIGURE 5 Sampling of PWW with an auto sampler.

3 RESULTS

3.1 Flow, temperature and pH measurements

Table 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 1 Average flow rate per day of each stream and of the TWW.

Date and time	PREOX [m^3/d]	PWW [m^3/d]	TWW [m^3/d]
2 March 2018	768	1,227	1,995
3 March 2018	776	1,096	1,872
4 March 2018	742	836	1,578
Average March 2-4, 2018	762	1,053	1,815

TWW = PREOX + PWW

Figure 6 presents the flow and pH of the PWW-stream and figure 7 presents the temperature and pH of the PREOX-stream. Figure 7 shows rather stable pH values, around 10.5 in the PREOX-stream during the measurement period. The temperature is quite stable around 83 °C.

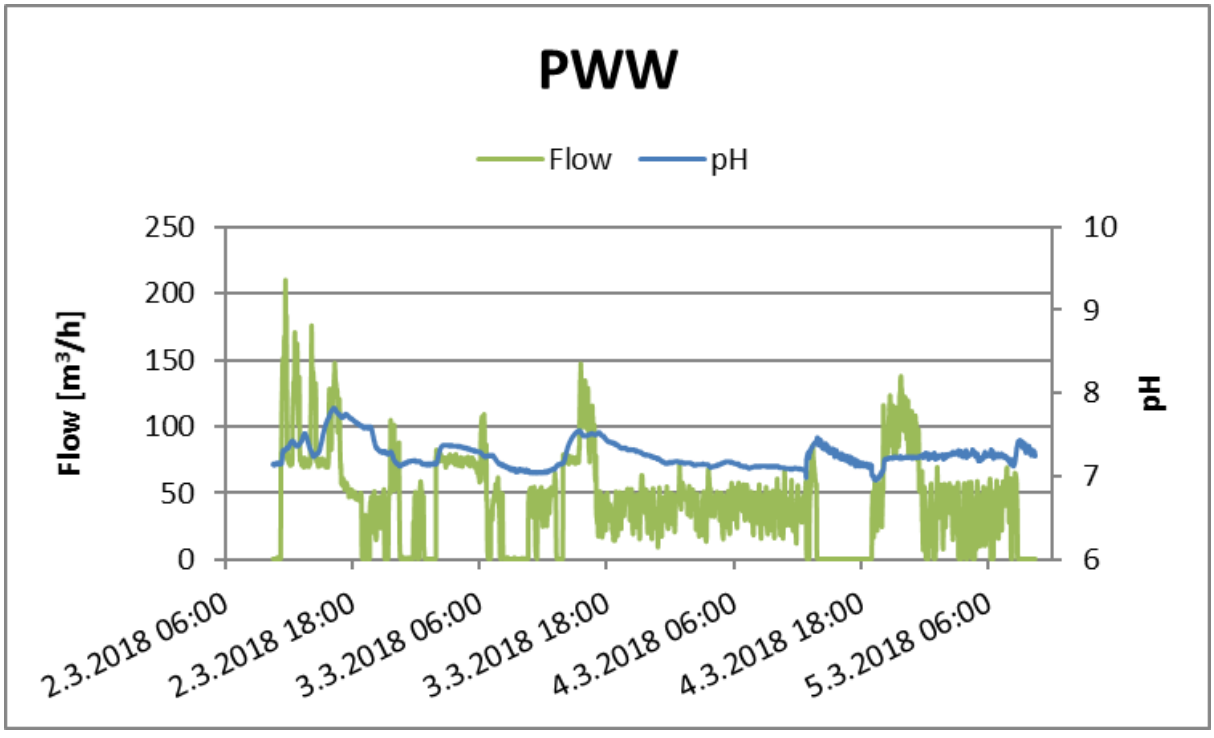

FIGURE 6 Flow and pH of the PWW-stream, measured March 2-4, 2018.

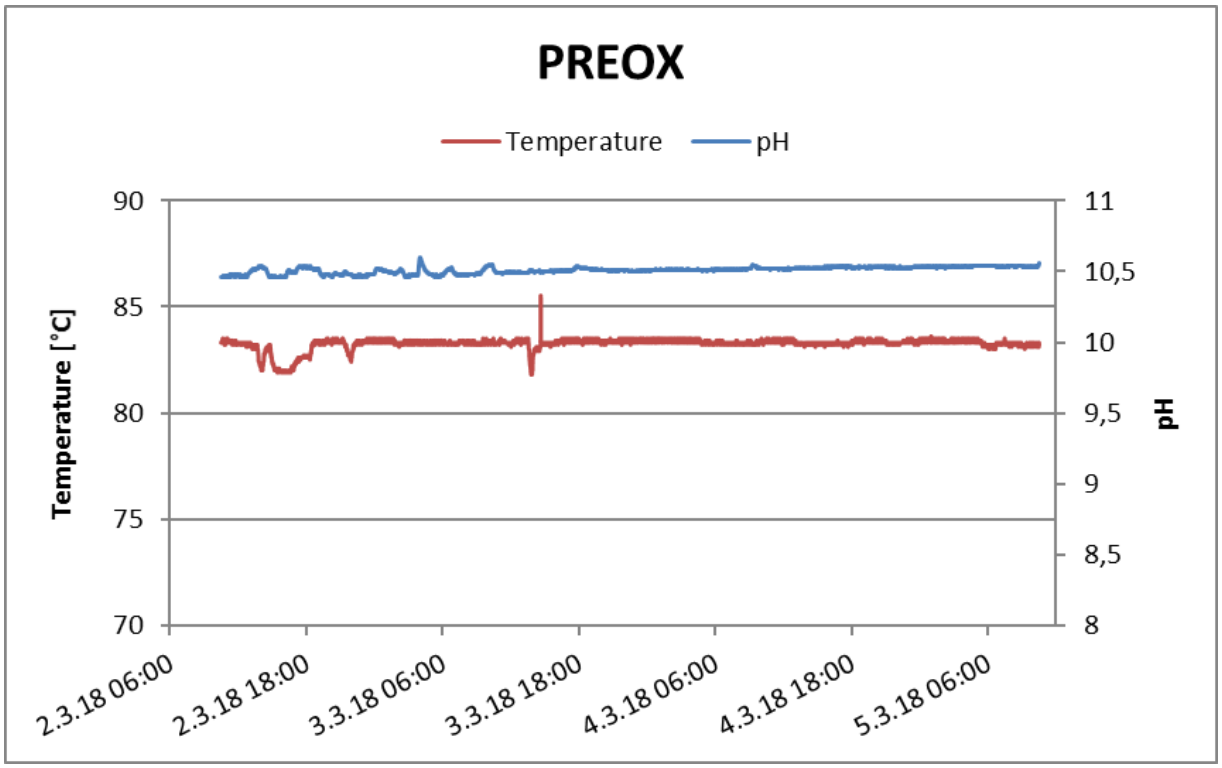

FIGURE 7 Temperature and pH of the PREOX-stream, measured March 2-4, 2018.

3.2 Chemical Analysis

Table 2 presents chemical concentrations in the 3-day composite sample (2-4 March 2018). Results are compared to discharge limits and estimated release values in the operating permit.

TABLE 2 Chemical concentration in the 3-day composite sample (2-4 March 2018) compared to discharge limits and estimated release values in the operating permit.

Element	Unit	TWW March 2018	Discharge limits*	Estimated release*
TSS	mg/L	24	220	
COD	mg/L	26	500	
P	mg/L	12.5		9
N	mg/L	3.8		
Al	mg/L	4.3		1
B	mg/L	0.3		7
Ca	mg/L	6.5		
Fe	mg/L	0.037		
K	mg/L	0.9		
Mg	mg/L	1.8		
Na	mg/L	26.5		210
S	mg/L	0.9		60
EDTA	mg/L	0.4		6
As	µg/L	<0.5		
Ba	µg/L	2.5		
Cd	µg/L	<0.05		
Co	µg/L	<0.2		
Cr	µg/L	1.9		
Cu	µg/L	8.4		
Hg	µg/L	2.4	50	
Mn	µg/L	<0.9		
Mo	µg/L	9.9		
Ni	µg/L	21.7		
Pb	µg/L	1.0		
V	µg/L	8.8		
Zn	µg/L	22.8		

* According to operating permit

TABLE 3 Chemical discharge per day.

Element	Unit	TWW March 2018	Chemical discharge [kg/day]
TSS	mg/L	24	47.2
COD	mg/L	26	40.8
P	mg/L	12.5	22.7
N	mg/L	3.8	6.8
Al	mg/L	4.3	7.8
B	mg/L	0.3	0.5
Ca	mg/L	6.5	11.8
Fe	mg/L	0.037	0.1
K	mg/L	0.9	1.7
Mg	mg/L	1.8	3.3
Na	mg/L	26.5	48.1
S	mg/L	0.9	1.6
EDTA	mg/L	0.4	0.8
As	µg/L	<0.5	
Ba	µg/L	2.5	0.0046
Cd	µg/L	<0.05	
Co	µg/L	<0.2	
Cr	µg/L	1.9	0.0034
Cu	µg/L	8.4	0.0153
Hg	µg/L	2.4	0.0043
Mn	µg/L	<0.9	
Mo	µg/L	9.9	0.0179
Ni	µg/L	21.7	0.0394
Pb	µg/L	1.0	0.0018
V	µg/L	8.8	0.0160
Zn	µg/L	22.8	0.0414