

Ref: 17130
January 2018
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Gore District Council



RE: Weekly NH₃ Monitoring Report (Weeks 10 – 12)

In October 2017, GDC engaged e3scientific ltd to scope and assess the ammonia (NH₃) gas emissions from the Mataura Mill dross storage site as they seek to comply with their consent conditions that specify a limit of 5 ppm NH₃ discharged to air. In November Photonic Innovations (PI) installed two NH₃ Sensors for comparison of the indoor and outdoor ammonia levels. Below we present a summary of the results from weeks 10 – 12 of monitoring.

Figures 1-3 provide a graphical record of the weekly observations from the Mataura Mill monitoring sensors. We note that while the maximum NH₃ concentrations detected by the indoor sensor were up to 18.9 ppm the mean and median concentrations for weeks 10 - 12 of monitoring are **9.7** and **9.1** ppm, respectively. There continues to be a large response from indoor NH₃ levels in response to strong diurnal temperature variation (e.g. 26/01, Figure 3).

The outdoor sensor detected daily exceedances of the 5 ppm limit with maximum recorded values of 10.3 ppm, however the mean and median values for this reporting period were **5.6** and **5.5**, respectively. The outdoor sensor continues to show weak diurnal correlation to temperature and humidity changes (Figure 3).

1 Week 10: 7 - 13 January 2018

The tenth week of monitoring continued to show diurnal variation in both indoor and outdoor NH₃ levels, however the indoor variation in NH₃ concentration was far more pronounced. Indoor concentrations peaked at 15 ppm with mean and median values of 8.3 and 7.8 ppm respectively. The mean and median outdoor discharge limits were 5.2 and 5.1 ppm respectively, close to the 5.0 ppm threshold specified by consent conditions. The maximum outdoor NH₃ concentration was 8.5 ppm.

Table 1. Summary statistics for Week 10 (7 - 13 January 2018). AT - Ambient Temperature; AH - Ambient Humidity; NH₃_OUT - outdoor sensor; NH₃_IND - indoor sensor. NH₃ measured in parts per million.

WEEK 10	AT (°C)	AH (%)	NH ₃ _OUT	NH ₃ _IND
Mean	15.9	53.9	5.2	8.3
Standard error	0.1	0.2	0.03	0.1
Median	15.9	54.1	5.1	7.8
Mode	15.2	53.1	5	7.6
Minimum	11.4	42.8	2.7	4.4
Maximum	18.9	64	8.5	15.1
Confidence level (95.0%)	0.1	0.3	0.1	0.2

2 Week 11: 14 – 20 January 2018

In the eleventh week of monitoring large diurnal fluctuations in NH₃ concentration were recorded by both the indoor and outdoor ammonia sensors. The outdoor sensor recorded a mean and median concentrations of 5.7 and 5.6 ppm respectively, with a peak concentration of 10.2 ppm. The indoor sensor showed five days of strong diurnal fluctuation in concentrations (Figure 2) with peaks at 19.8 ppm and a mean and median of 10.9 and 10.1 ppm respectively.

Table 2. Summary statistics for Week 11 (14 – 20 January 2018).

WEEK 11	AT (°C)	AH (%)	NH ₃ _OUT	NH ₃ _IND
Mean	18.4	52.4	5.7	10.9
Standard error	0.1	0.2	0.04	0.1
Median	18.4	52.2	5.6	10.1
Mode	17.7	56.6	5.4	9.7
Minimum	15.1	37.8	3.1	5.4
Maximum	21.5	64.9	10.2	19.8
Confidence level (95.0%)	0.1	0.5	0.1	0.2

3 Week 12: 21 – 27 January 2018

In week twelve of monitoring weaker diurnal temperatures resulted in fewer fluctuations in the indoor concentration was recorded, however the outdoor sensor showed more defined diurnal ammonia level changes. Outdoor concentrations varied between 3.3 and 10.3 ppm with a mean and median of 5.9 and 5.8 ppm respectively. The indoor sensor recorded four significant diurnal fluctuations in indoor NH₃ concentrations (Figure 3) with a peak value of 18 ppm and mean and median of 9.9 and 9.5 ppm respectively.

Table 3. Summary statistics for Week 12 (21 – 27 January 2018).

WEEK 12	AT (°C)	AH (%)	NH3_OUT	NH3_IND
Mean	17.5	56.5	5.9	9.9
Standard error	0.04	0.2	0.04	0.1
Median	17.7	57	5.7	9.5
Mode	18.2	57.7	5.8	9.3
Minimum	15	47.3	3.3	6.7
Maximum	19.6	66.2	10.3	18
Confidence level (95.0%)	0.1	0.3	0.1	0.1

N.B

If you have any questions regarding the information provided in this letter, please contact Simon Bloomberg on 0274 526 941 or via email at simon.bloomberg@e3scientific.co.nz



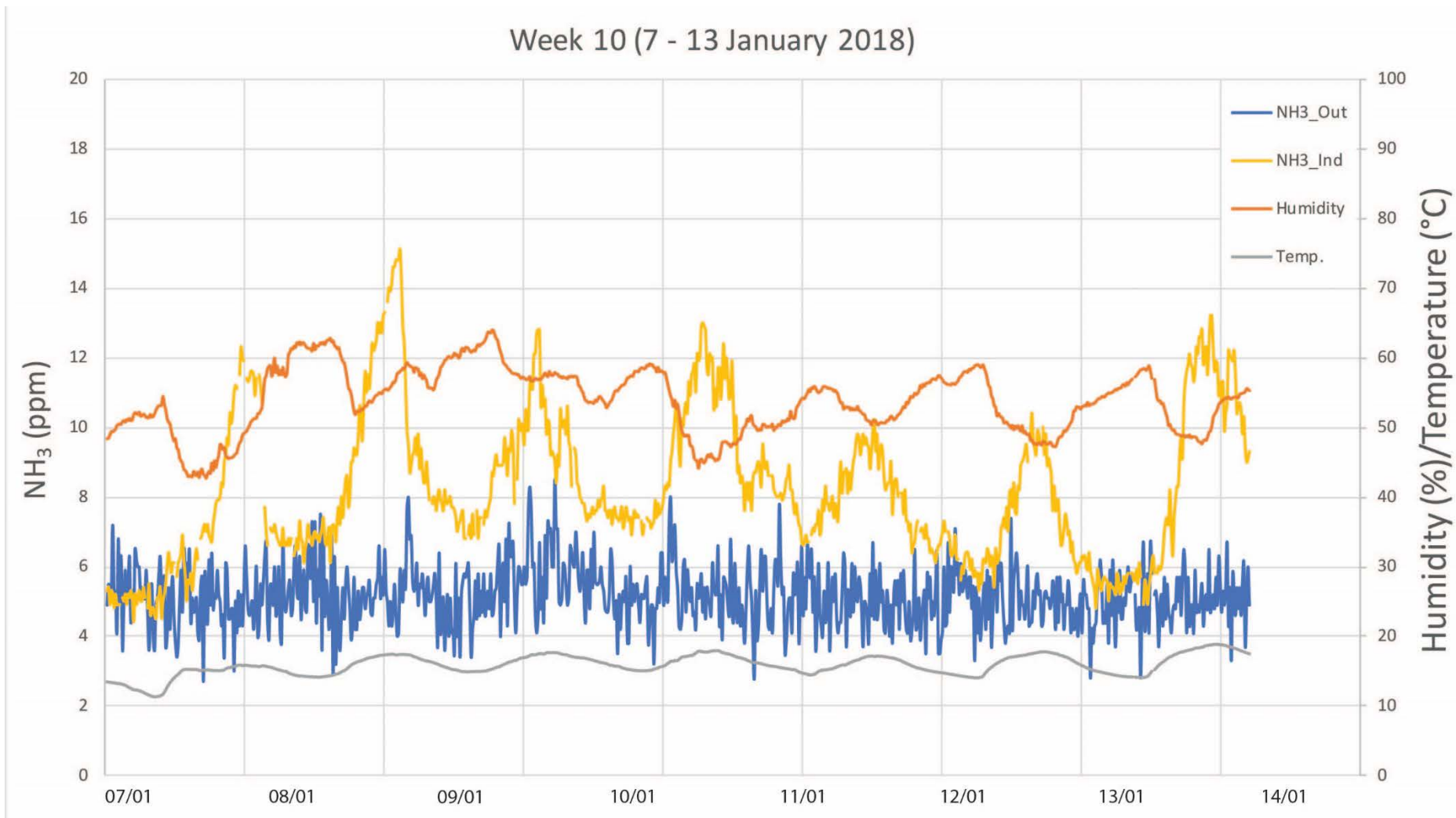


Figure 1. Week 10 of monitoring (7 – 13 January 2018). Both sensors remained connected.

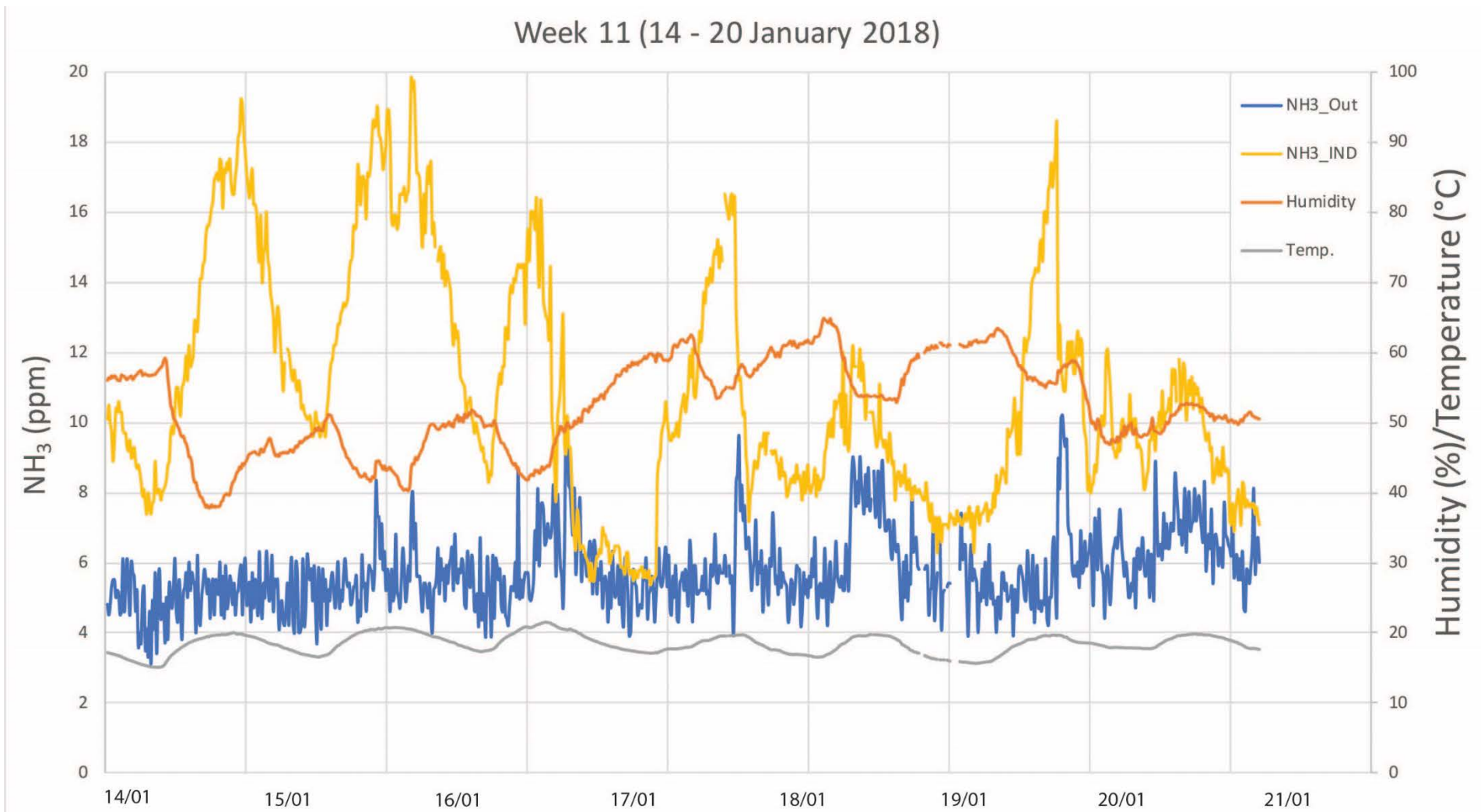


Figure 2. Week 11 of monitoring (14 – 20 January 2018). Both sensor remained connected. Large diurnal swings in indoor and outdoor NH₃ concentrations are noted this week as temperatures continued to be high.

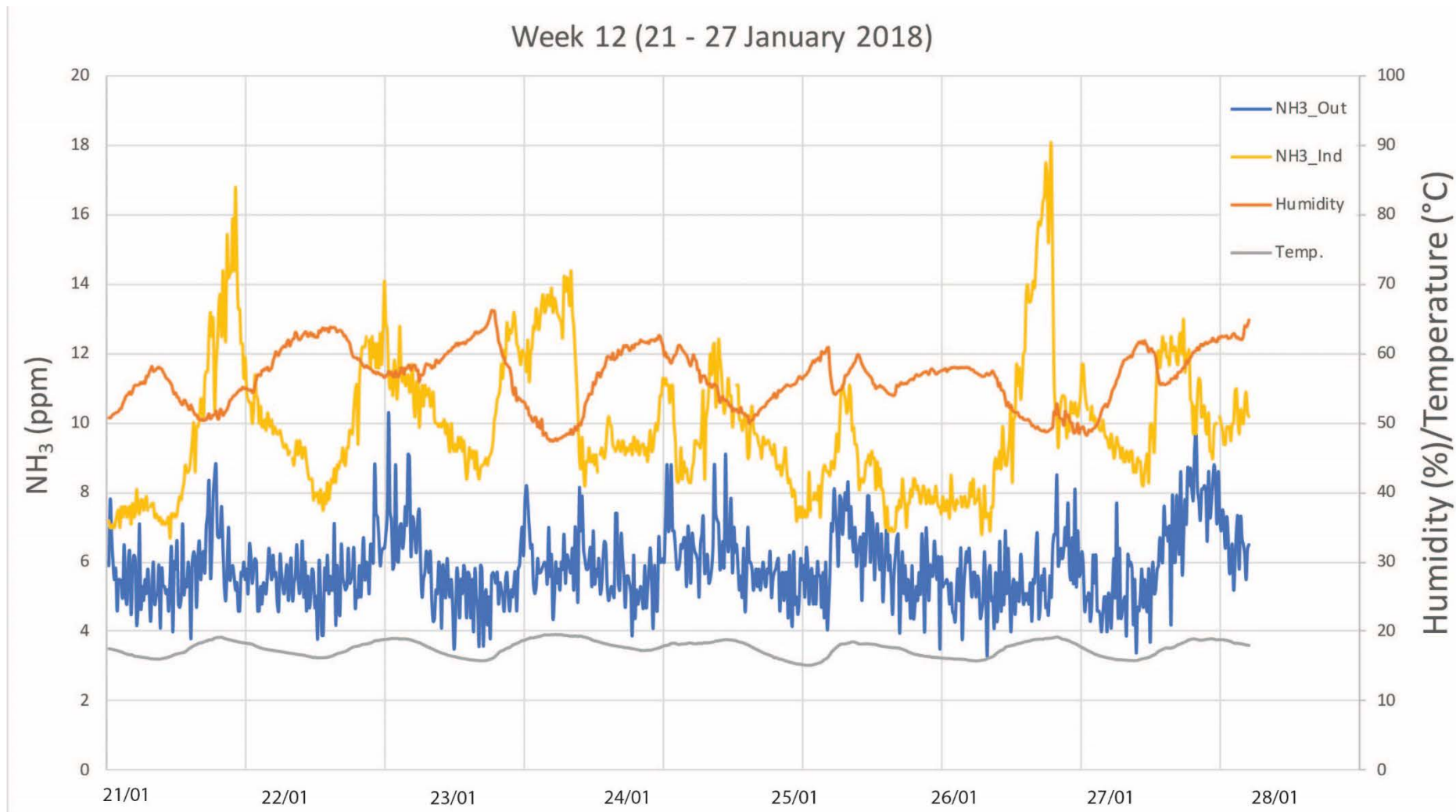


Figure 3. Week 12 of monitoring (21 – 27 January 2018). Both sensors remained connected during this week. Large diurnal swings in temperature and NH₃ levels continued to be detected by both indoor and outdoor sensors