

Ref: 17130  
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Gore District Council



## RE: Weekly NH<sub>3</sub> Monitoring Report (Weeks 7 – 9)

In October 2017, GDC engaged e3scientific ltd to scope and assess the ammonia (NH<sub>3</sub>) 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 NH<sub>3</sub> discharged to air. In November Photonic Innovations (PI) installed two NH<sub>3</sub> Sensors for comparison of the indoor and outdoor ammonia levels. Below we present a summary of the results from weeks 7 – 9 of monitoring.

Indoor: Figures 1-3 provide a record of the weekly observations from the Mataura Mill monitoring sensors. We note that while the indoor sensor picks up a modest amount of NH<sub>3</sub> (up to 16 ppm) the mean and median concentrations for weeks 7 - 9 of monitoring are 7.6 and 7.1 ppm, respectively. There continues to be a large response from indoor NH<sub>3</sub> levels during periods of strong diurnal temperature variation (e.g. 20/12, Figure 1), where temperature change is larger than 4°C from daily minima to maxima. The maximum daily indoor NH<sub>3</sub> concentration peaks are associated with the highest temperatures recorded for each week.

Outdoor: The outdoor sensor failed to connect to the data logger a few times during this reporting period however it managed to reconnect without technical support, this is likely due to patchy radio signal in the Mataura area. There have been daily exceedances of the 5 ppm limit with maximum recorded values of 8.8 ppm, however the mean and median values for this reporting period were both 5.1 ppm. The outdoor sensor continues to show weak diurnal correlation to temperature and humidity changes; however it is proposed that atmospheric conditions (Wind velocity, Pressure) could be a controlling parameter.

The consent for discharge is due to expire on the 11<sup>th</sup> of January.

### 1 Week 7: 17 - 23 December 2017

The seventh week of monitoring shows some disturbed signals in the initial data record for the outdoor sensor, with a maximum value of 8.7 ppm but with an

average of 5.1 ppm, while the indoor sensor peaked around 14.5 ppm (Table 1) with an average of 6.8 ppm. The outdoor sensor failed to connect to the data logger intermittently. There were diurnal swings in the temperature and indoor concentrations of NH<sub>3</sub> on five of the days (Figure 1).

*Table 1. Summary statistics for Week 7 (17 - 23 December 2017). AT - Ambient Temperature; AH - Ambient Humidity; NH<sub>3</sub>\_OUT - outdoor sensor; NH<sub>3</sub>\_IND - indoor sensor. NH<sub>3</sub> measured in parts per million.*

WEEK 7	AT (°C)	AH (%)	NH <sub>3</sub> _OUT	NH <sub>3</sub> _IND
<b>Mean</b>	14.50	54.20	5.15	6.88
<b>Standard error</b>	0.05	0.22	0.03	0.08
<b>Median</b>	14.43	54.66	5.10	6.50
<b>Mode</b>	14.21	54.62	5.00	6.20
<b>Minimum</b>	11.46	37.86	2.90	2.70
<b>Maximum</b>	17.77	67.51	8.70	14.50
<b>Confidence level (95.0%)</b>	0.10	0.42	0.06	0.15

## 2 Week 8: 24 – 30 December 2017

In the eighth week of monitoring the outdoor sensor lost connectivity to the data logger intermittently. Mean and median outdoor NH<sub>3</sub> concentrations were both 5.0 ppm with a peak atmospheric concentration of 7.2 ppm. The indoor sensor showed five days of strong diurnal change in temperature and NH<sub>3</sub> concentrations (Figure 2) with peaks at 15 ppm and a mean and median of 7.7 and 7.0 ppm respectively.

*Table 2. Summary statistics for Week 8 (24 – 30 December 2017).*

WEEK 8	AT (°C)	AH (%)	NH <sub>3</sub> _OUT	NH <sub>3</sub> _IND
<b>Mean</b>	15.05	49.90	5.04	7.77
<b>Standard error</b>	0.07	0.29	0.03	0.10
<b>Median</b>	15.38	48.70	5.00	7.00
<b>Mode</b>	15.74	43.81	5.00	6.40
<b>Minimum</b>	11.08	38.76	3.00	3.70
<b>Maximum</b>	17.99	65.36	7.20	14.90
<b>Confidence level (95.0%)</b>	0.13	0.57	0.07	0.19

## 3 Week 9: 31 December 2017 – 6 January 2018

In week nine the outdoor sensor concentrations remained between 3.0 and 9.0 ppm with a mean and median of 5.3 and 5.2 ppm, respectively. The indoor sensor detected 5 days with diurnal swings in temperature and indoor NH<sub>3</sub>

concentrations (Figure 3) with a peak value of 15.7 ppm and mean and median of 8.1 and 7.7 ppm respectively.

Table 3. Summary statistics for Week 9 (31 December 2017 – 6 January 2018).

WEEK 9	AT (°C)	AH (%)	NH3_OUT	NH3_IND
Mean	15.60	54.72	5.30	8.18
Standard error	0.06	0.26	0.03	0.08
Median	15.70	55.16	5.20	7.70
Mode	16.08	54.90	5.00	7.70
Minimum	11.75	37.86	2.90	4.30
Maximum	18.52	65.89	8.80	15.70
Confidence level (95.0%)	0.11	0.51	0.07	0.16

**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](mailto:simon.bloomberg@e3scientific.co.nz)



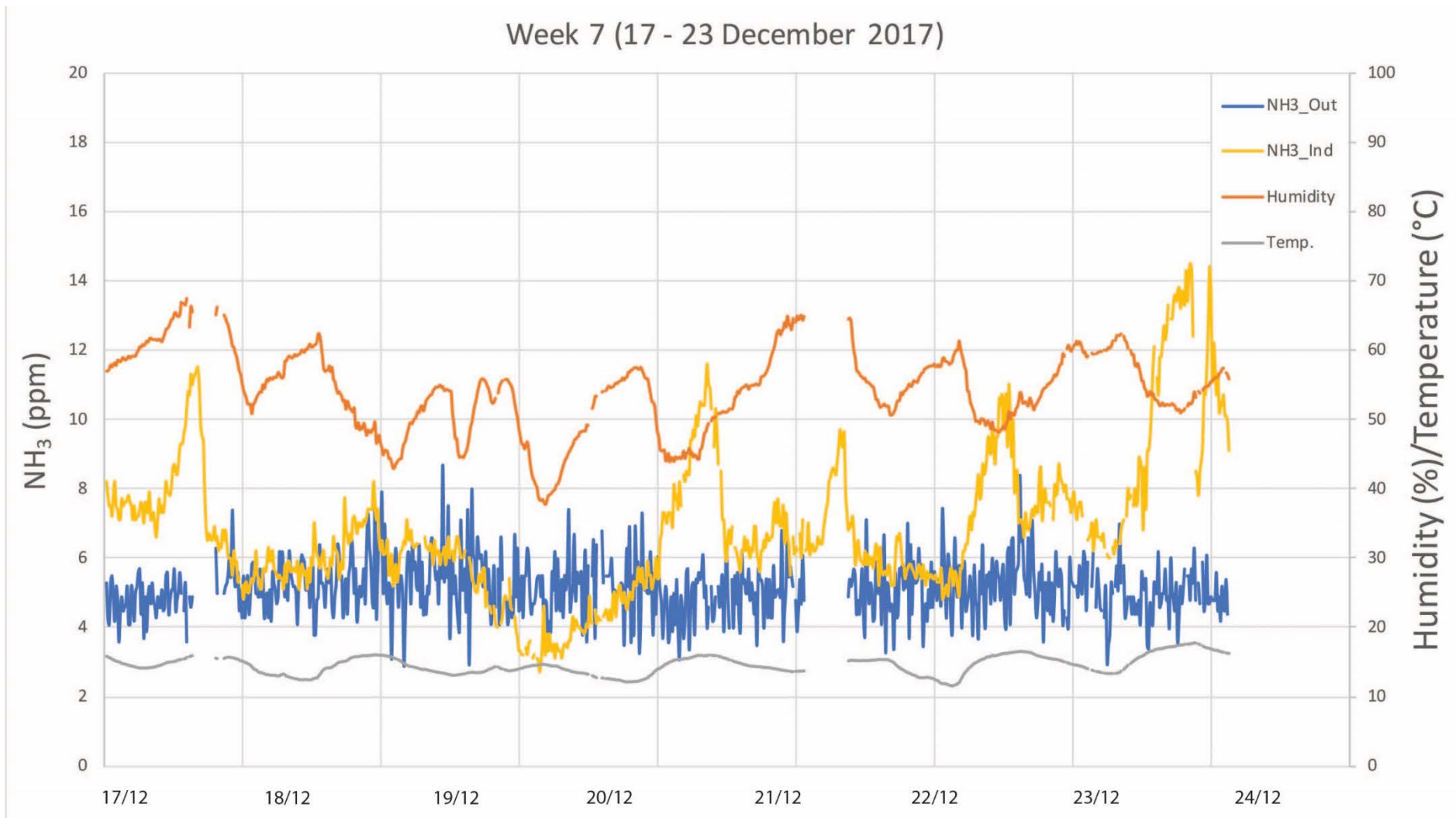


Figure 1. Week 7 of monitoring (17 - 23 December 2017). The outdoor sensors failed to connect for a few hours on the 21st.

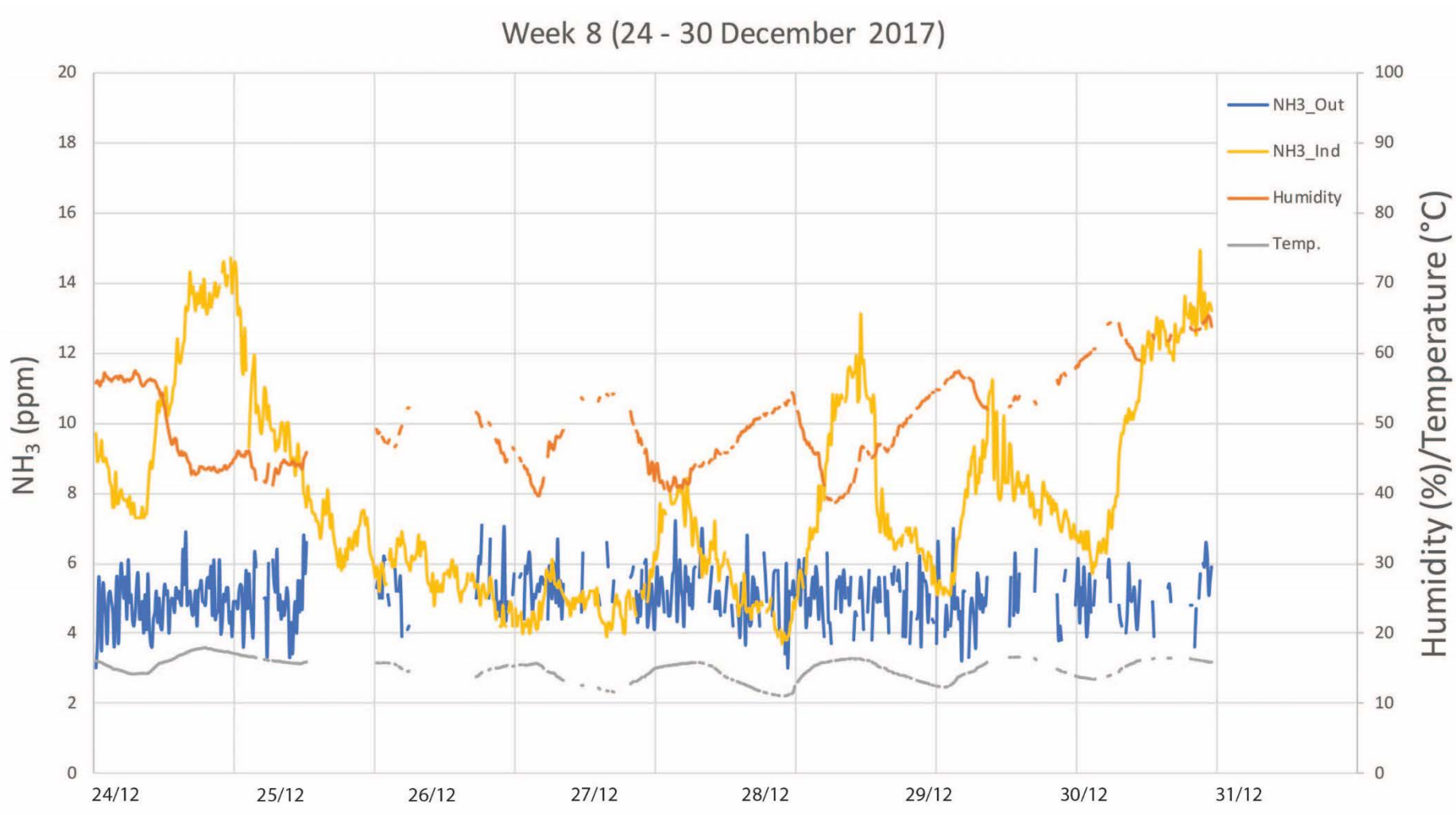


Figure 2. Week 8 of monitoring (24 - 30 December 2017). The outdoor sensors failed to connect intermittently this week.

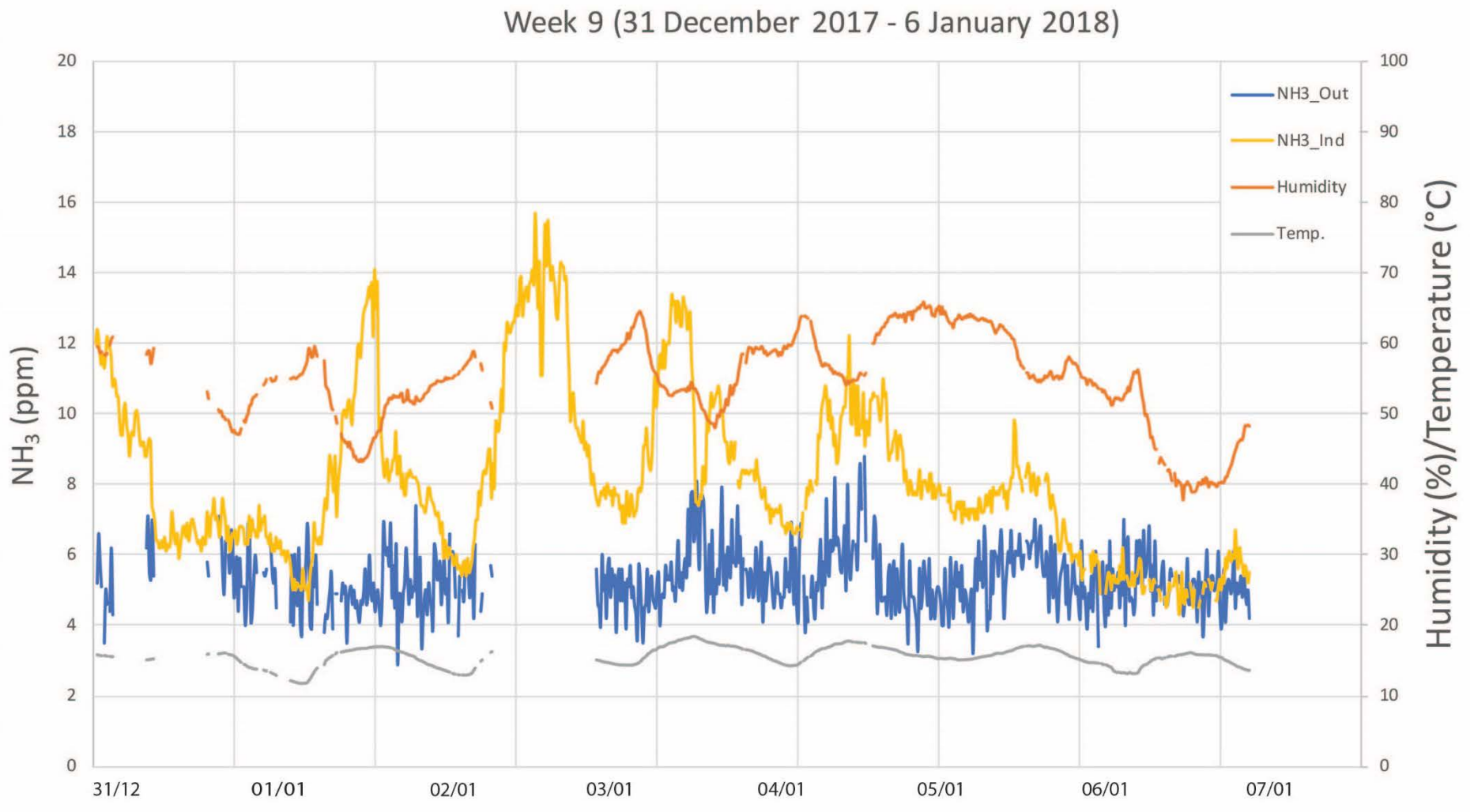


Figure 3. Week 9 of monitoring (31 December 2017 – 6 January 2018). The outdoor sensors failed to connect briefly on the 31<sup>st</sup> and on the 2<sup>nd</sup>.