

Stephen Parry
Chief Executive
Gore District Council
PO Box 8
Gore, 9740

3rd June 2021

Dear Stephen

RE: NH₃ Monitoring Report 1st May to 31th May 2021

Background

Gore District Council (GDC) engaged Land and Water Science to conduct continuous monitoring of ammonia (NH₃) gas emissions from the Mataura Mill dross storage site (121 Kana Street, Mataura) from May 2018. GDC require emission values to comply with consent conditions that specify a limit of 5 ppm NH₃ discharged to air.

In May 2017, Photonic Innovations (PI) installed two NH₃ sensors for comparison of the indoor and outdoor ammonia levels. Measurements were recorded continuously and reported as a 5-minute average for both the outdoor and indoor sensors. A dashboard to access this data is available in real time at <http://35.213.230.53/d/CPQFoUvGz/gore-district-council?orgId=1&refresh=1m>.

May Summary

The outdoor sensor was offline for service between the 1 to 5 of May. Data recorded from 6 to 31 May has been used to generate this report. During this period, the maximum NH₃ concentration detected by the outdoor sensor was 6.00 ppm (Figure 1 and Table 1). Maximum mean and median NH₃ concentrations during this period were 0.50 ppm and 0.50 ppm for the outdoor sensor. There were 2 exceedances (5.50 and 6.00 ppm) over the limit of the consented maximum ammonia concentration (5.00 ppm). The weekly indoor emissions are reported for the whole month. Maximum mean and median NH₃ concentrations for the indoor sensor during this period were 2.22 ppm, and 2.10 ppm, respectively. There was no anomalous indoor concentration recorded in this period (Figure 2 and Table 2).

Daily (diurnal) variation in NH₃ concentration shows a consistent pattern in the data. Specifically, NH₃ concentration is strongly correlated with air temperature, reaching maximum values as air temperatures peak during the day and minimum values at night when air temperatures are at their lowest. Although diurnal variation is evident in the data, average air temperature is a greater control over the absolute concentration with maximum concentrations recorded during the warmest months of the year and minimum concentrations recorded during the coolest months of the year. Calm days also impact the maximum NH₃ concentrations due to the absence of air movement near the area being monitored.

Table 1. Summary statistics for the Outdoor NH₃ sensor, 6 May – 31 May 2021. NH₃ measured in parts per million (ppm).

Date	6 - 9 May	10 - 16 May	17 - 23 May	24 - 30 May	31 May
Mean	0.50	0.48	0.50	0.4	0.59
Std Dev	0.26	0.40	0.22	0.36	0.20
Median	0.50	0.40	0.50	0.40	0.50
Minimum	0.20	0.20	0.20	0.10	0.30
Maximum	4.10	6.00	2.30	5.50	1.30

Table 2. Summary statistics for the Indoor NH₃ sensor, 1 May – 31 May 2021. NH₃ measured in parts per million (ppm).

Date	1 - 2 May	3 – 9 May	10 - 16 May	17 - 23 May	24 - 30 May	31 May
Mean	1.72	2.37	1.43	1.55	1.47	2.13
Std Dev	0.45	0.80	0.86	0.79	0.76	0.69
Median	1.70	2.30	1.20	1.50	1.40	2.05
Minimum	0.20	0.00	0.00	0.00	0.00	0.70
Maximum	3.20	6.20	4.30	4.30	4.10	3.70

01 – 02 May 2021

Indoor NH₃ concentration levels recorded a mean of 1.72 ppm and a median of 1.70 ppm. The maximum indoor concentration was 3.20 ppm for these two days.

03 – 09 May 2021

The outdoor NH₃ concentration levels showed consistent variation for most of this week (6 to 9 May) with higher concentrations consistent with warmer temperatures. Maximum outdoor concentration was 4.10 ppm for this period. Outdoor mean and median values were similar at 0.50 ppm.

Indoor NH₃ concentration levels recorded a mean of 2.37 ppm and a median of 2.30 ppm. The maximum indoor concentration was 6.20 ppm for this period.

10 – 16 May 2021

Outdoor NH₃ concentration levels were relatively stable and slightly high towards the end of the week and decreased at end of the week in consistent with the decreasing air temperature. The maximum outdoor concentration was highest (6.00 ppm) during the month. Mean and median values were 0.48 and 0.40 ppm, respectively.

Indoor NH₃ concentration levels recorded a mean of 1.43 ppm and a median of 1.20 ppm. The maximum indoor concentration was 4.30 ppm for this week.

17 – 23 May 2021

Outdoor NH₃ concentration levels were relatively consistent during the week, no exceedance was detected in this period. The maximum outdoor concentration was 2.30 ppm for this period. Mean and median values were 0.50 and 0.50 ppm, respectively.

Indoor NH₃ concentration levels recorded a mean of 1.55 ppm and a median of 1.50 ppm. The maximum indoor concentration was 4.30 ppm for this period.

24 – 30 May 2021

The concentration levels of outdoor NH₃ showed relatively high in consistent with warmer temperatures with one exceedance (5.50 ppm). The maximum outdoor concentration was 5.50 ppm for this period. Outdoor mean and median values were 0.48 and 0.40 ppm, respectively.

Indoor NH₃ concentration levels recorded a mean of 1.47 ppm and a median of 1.40 ppm. The maximum indoor concentration was 4.10 ppm for this period.

31 May 2021

The maximum outdoor concentration was 1.30 ppm, outdoor mean and median values were 0.59 and 0.50 ppm, respectively for this day.

Indoor NH₃ concentration levels recorded a mean of 2.13 ppm and a median of 2.05 ppm. The maximum indoor concentration was 3.70 ppm for this period.

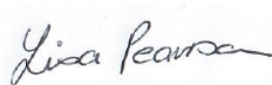
Summary

During the monitoring period (6 May – 31 May 2021) the Outdoor NH₃ concentrations reached a maximum of 6.00 ppm, while maximum mean and median concentrations were 0.50 and 0.50 ppm, respectively. The outdoor sensor exceeded the consent condition of 5.00 ppm on 2 occasions which were 6.00 and 5.50 ppm in May. Overall, temperature continues to be the most dominant control over NH₃ concentration. It is recommended to always check the indoor sensor readings prior to any personnel entering the building.

Kind regards



Mary Dang
Land and Water Science Ltd



Dr Lisa Pearson
Lead Earth and Environmental Scientist
Land and Water Science Ltd

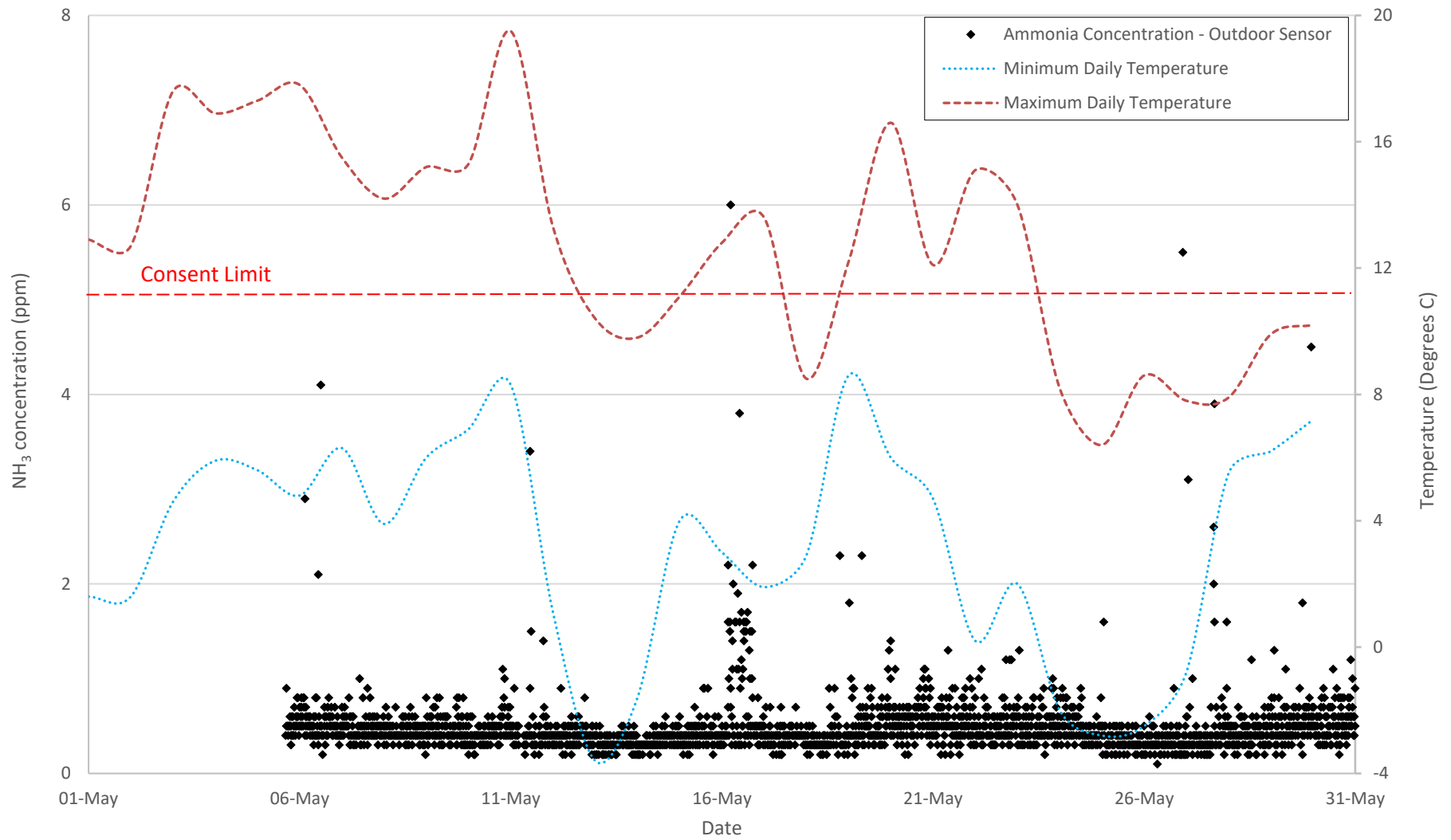


Figure 1: Continuous outdoor NH₃ concentration, minimum and maximum daily temperature. Temperature data is sourced from NIWA climate station AWS Gore 5778.

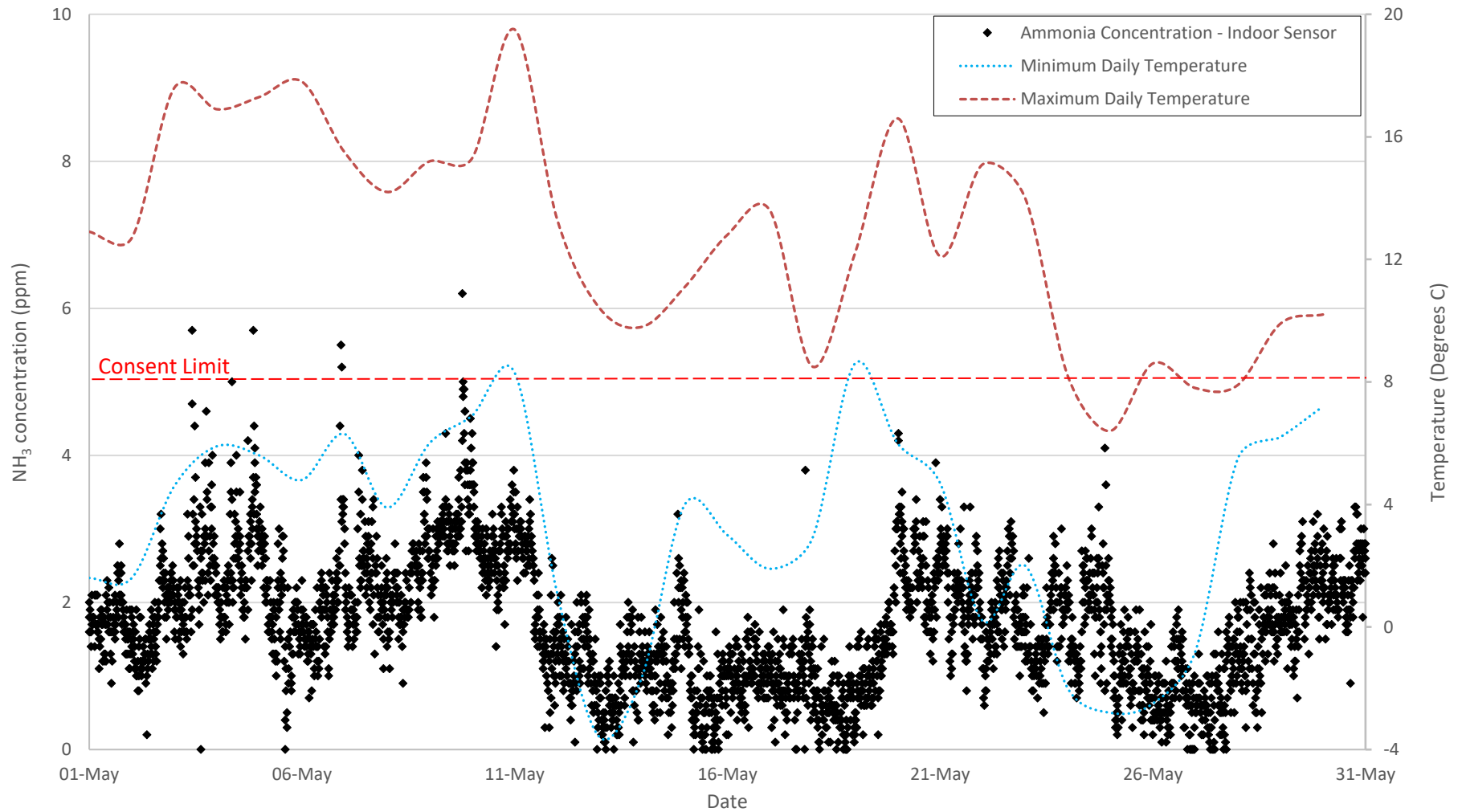


Figure 2: Continuous indoor NH₃ concentration, minimum and maximum daily temperature. Temperature data is sourced from NIWA climate station AWS Gore 5778.