

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

2nd February 2021

Dear Stephen

RE: NH₃ Monitoring Report 1st January to 31st January 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>.

January Summary

Weekly summaries of outdoor and indoor emission results from monitoring between 1 January and 31 January are presented in this report. During this period, the maximum NH₃ concentration detected by the outdoor sensor was 8.90 ppm (Figure 1 and Table 1). Maximum mean and median NH₃ concentrations during this period were 0.59 ppm and 0.50 ppm for the outdoor sensor. There were 5 exceedances of the consented maximum ammonia concentration (5.00 ppm) in January. Maximum mean, and median NH₃ concentrations for the indoor sensor during this period were 5.15 ppm, and 4.80 ppm, respectively.

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 monitoring. The correlation between air temperature and NH₃ concentration for this reporting period is displayed in Figure 1.

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

Date	1-3 Jan	4-10 Jan	11-17 Jan	18-24 Jan	25-31 Jan
Mean	0.48	0.49	0.58	0.59	0.58
Std Dev	0.38	0.49	0.60	0.60	0.48
Median	0.40	0.40	0.50	0.40	0.40
Minimum	0.20	0.20	0.20	0.20	0.20
Maximum	3.30	7.60	8.90	7.40	4.60

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

Date	1-3 Jan	4-10 Jan	11-17 Jan	18-24 Jan	25-31 Jan
Mean	3.44	3.36	5.15	3.41	3.75
Std Dev	0.55	1.47	2.05	0.88	1.15
Median	3.40	2.80	4.80	3.30	3.80
Minimum	2.20	0.70	1.50	1.60	1.30
Maximum	5.30	9.00	11.90	6.90	6.70

1 – 3 January 2021

Outdoor NH₃ concentration levels were relatively low with an increase in concentrations consistent with warmer temperatures. The maximum outdoor concentration was 3.30 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 3.44 ppm and a median of 3.40 ppm. The maximum indoor concentration was 5.30 ppm for this period.

4 – 10 January 2021

Outdoor NH₃ concentration levels were relatively low consistent with the decreasing air temperatures during this week. A few high concentrations being recorded after at the end of this week. The maximum outdoor concentration was 7.60 ppm for this period. Mean and median values were 0.49 ppm and 0.40 ppm, respectively.

Indoor NH₃ concentration levels recorded a mean of 3.36 ppm and a median of 2.80 ppm. The maximum indoor concentration was 9.00 ppm for this period.

11 – 17 January 2021

Outdoor NH₃ concentration levels were initially elevated with the increasing air temperatures. Some relatively high concentrations were recorded later this week. The maximum outdoor concentration was 8.90 ppm for this period. Mean and median values were 0.58 and 0.50 ppm, respectively.

Indoor NH₃ concentration levels recorded a mean of 5.15 ppm and a median of 4.80 ppm. The maximum indoor concentration was 11.90 ppm for this period.

18 – 24 January 2021

Outdoor NH₃ concentration levels were relatively consistent at moderate concentrations until the end of the week when values increased in response to increasing air temperatures and calmer

conditions. The maximum outdoor concentration was 7.40 ppm for this period. Mean and median values were 0.59 and 0.40 ppm, respectively.

Indoor NH₃ concentration levels recorded a mean of 3.41 ppm and a median of 3.30 ppm. The maximum indoor concentration was 6.90 ppm for this period after air temperatures climbed during the week.

25 – 31 January 2021

Outdoor NH₃ concentration levels contained some higher concentrations consistent with warmer air temperatures and light winds, but lower concentrations recorded later this week. The maximum outdoor concentration was 4.60 ppm for this period. Mean and median values were 0.58 and 0.40 ppm, respectively.

Indoor NH₃ concentration levels recorded a mean of 3.75 ppm and a median of 3.80 ppm. The maximum indoor concentration was 6.70 ppm for this period.

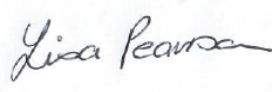
Summary

During the monitoring period (1 Jan – 31 Jan 2021) the Outdoor NH₃ concentrations reached a maximum of 8.9 ppm, while maximum mean and median concentrations were 0.59 and 0.50 ppm, respectively. The outdoor sensor exceeded the consent condition of 5.00 ppm on five occasions in January during days that experienced warm and calm conditions. 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

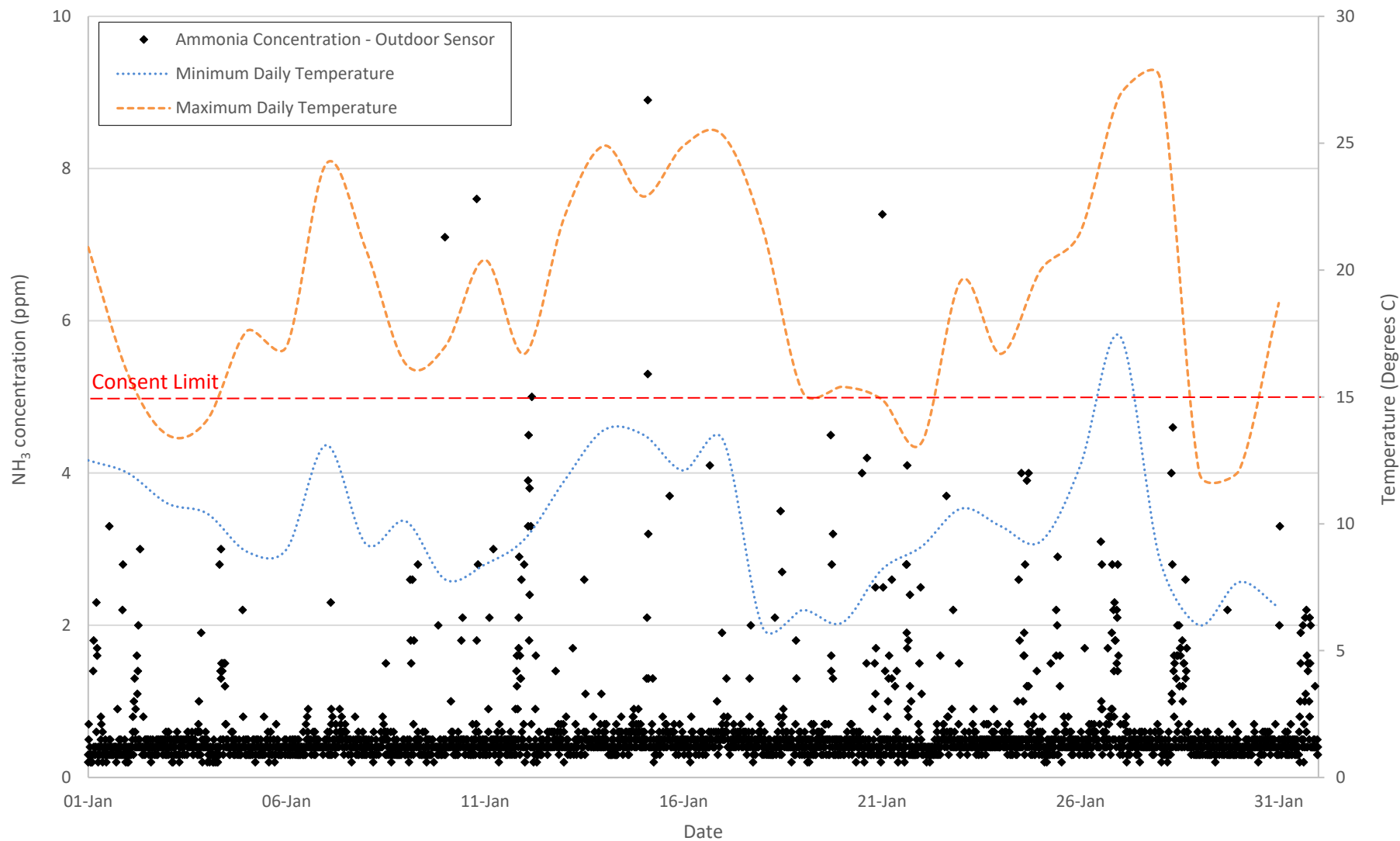


Figure 1: Continuous outdoor NH₃ concentration, minimum and maximum daily temperature. Temperature data is sourced from NIWA climate station AWS Gore 5778.

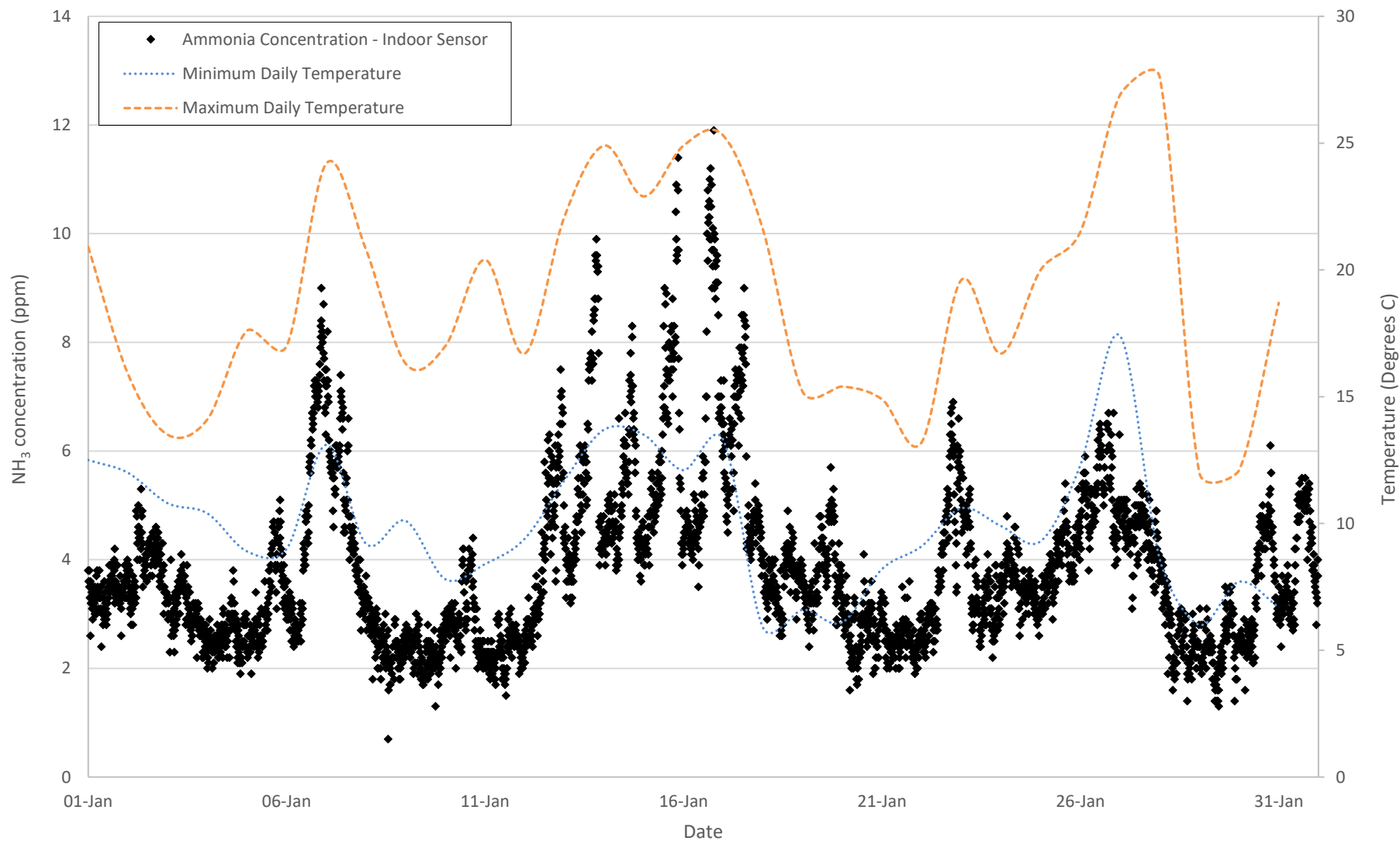


Figure 2: Continuous indoor NH₃ concentration, minimum and maximum daily temperature. Temperature data is sourced from NIWA climate station AWS Gore 5778.