

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

7th September 2020

Dear Stephen

RE: NH₃ Monitoring Report 1 August – 29 August 2020

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. In May 2020, Photonic Innovations ceased operating, resulting in the loss of the dashboard functionality to access sensor data via the web. Land and Water Science have devised a means to retrieve the outdoor sensor data and continue to monitor and report on the ammonia emission at the site.

The data from the outdoor ammonia sensor for August is not complete with only 28 days of readings as the data was manually downloaded during the reconfiguration of the radio onsite. The data from the indoor sensor is available from the 12th of August only. The transmitting function of the radios are now operational to assist with providing a complete dataset for both sensors in the future. Backup power supplies have also been installed to cover short periods of power disruption to the site.

August Summary

Weekly summaries of outdoor emission results from monitoring between 1 August and 29 August are presented in this report. During this period, the maximum NH₃ concentration detected by the outdoor sensor was 6.32 ppm (Figure 1 and Table 1). Maximum mean and median NH₃ concentrations during this period were 0.6ppm and 0.5ppm for the outdoor sensor. The maximum ammonia concentration exceeded the consented amount of 5.0 ppm on the 24th of August. The indoor sensor was operational from the 12th of August (Figure 2 and Table 2). During this time, a mean and median of 2.3 ppm were recorded. The indoor sensor reached a maximum of 4.3 ppm.

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.

The correlation between air temperature and NH₃ concentration for this reporting period is displayed in Figure 1 and Figure 2.

Table 1. Summary statistics for the Outdoor NH₃ sensor, 1 August – 29 August 2020. NH₃ measured in parts per million (ppm).

Date	1 Aug	2-8 Aug	9-15 Aug	16-22 Aug	23-29 Aug
Mean	0.68	0.55	0.56	0.54	0.64
Std Dev	0.32	0.24	0.31	0.25	0.53
Median	0.56	0.51	0.50	0.48	0.48
Minimum	0.30	0.18	0.20	0.19	0.19
Maximum	1.90	3.04	4.77	2.84	6.32

Table 2. Summary statistics for the Indoor NH₃ sensor, 1 August – 29 August 2020. NH₃ measured in parts per million (ppm).

Date	1 Aug	2-8 Aug	9-15 Aug	16-22 Aug	23-29 Aug
Mean	-	-	-	2.53	2.35
Std Dev	-	-	-	0.60	0.57
Median	-	-	-	2.50	2.30
Minimum	-	-	-	1.00	0.90
Maximum	-	-	-	4.10	4.30

The sensor was not operational prior to August 12th.

01 August 2020

Outdoor NH₃ concentration levels showed consistent variation for most of the week with higher concentrations consistent with warmer temperatures. Maximum outdoor concentration was 1.90 ppm for this period. Outdoor mean and median values were 0.68 and 0.56 ppm respectively.

2 – 8 August 2020

Outdoor NH₃ concentration levels showed consistent variation for most of the week with higher concentrations consistent with warmer temperatures. Maximum outdoor concentration was 3.0 ppm for this period. Outdoor mean and median values were both 0.5 ppm.

9 – 15 August 2020

Outdoor NH₃ concentration levels showed consistent variation for most of the week with higher concentrations consistent with warmer temperatures. Maximum outdoor concentration was 4.8 ppm for this period. Mean and median values were 0.6 ppm and 0.5 ppm respectively.

16 – 22 August 2020

Outdoor NH₃ concentration levels showed consistent variation for most of the week with higher concentrations consistent with warmer temperatures. Maximum outdoor concentration was 2.8 ppm for this period. Mean and median values were both 0.5 ppm.

Indoor NH₃ concentration levels recorded a mean and median of 2.5 ppm. A maximum of 4.1 ppm was recorded inside the storage area.

23 – 29 August 2020

Outdoor NH₃ concentration levels showed consistent variation for most of the week with higher concentrations consistent with warmer temperatures. Maximum outdoor concentration was 6.3 ppm for this period. Mean and median values were 0.6 and 0.5 ppm respectively.

Indoor NH₃ concentration levels recorded a mean and median of 2.3 ppm. A maximum of 4.3 ppm was recorded inside the storage area.

Summary

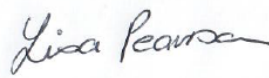
During the monitoring period (1 Aug – 29 Aug) Outdoor NH₃ concentrations reached a maximum of 6.32 ppm, while maximum mean and median concentrations were 0.6 and 0.5 ppm respectively. The outdoor sensor remained below the consent conditions of 5.0 ppm during the month of August with one exception on the 24th. These values are consistent with cooler outdoor temperatures.

The site has now been fitted with transmitting functions for both sensors to assist with providing a complete dataset in the future and dashboard functionality. This dashboard will be operational next reporting period. Backup power supplies have also been installed to cover short periods of power disruption to the site.

Kind regards



Dianne Elliotte
AquaTech Environmental Data Collection Ltd



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

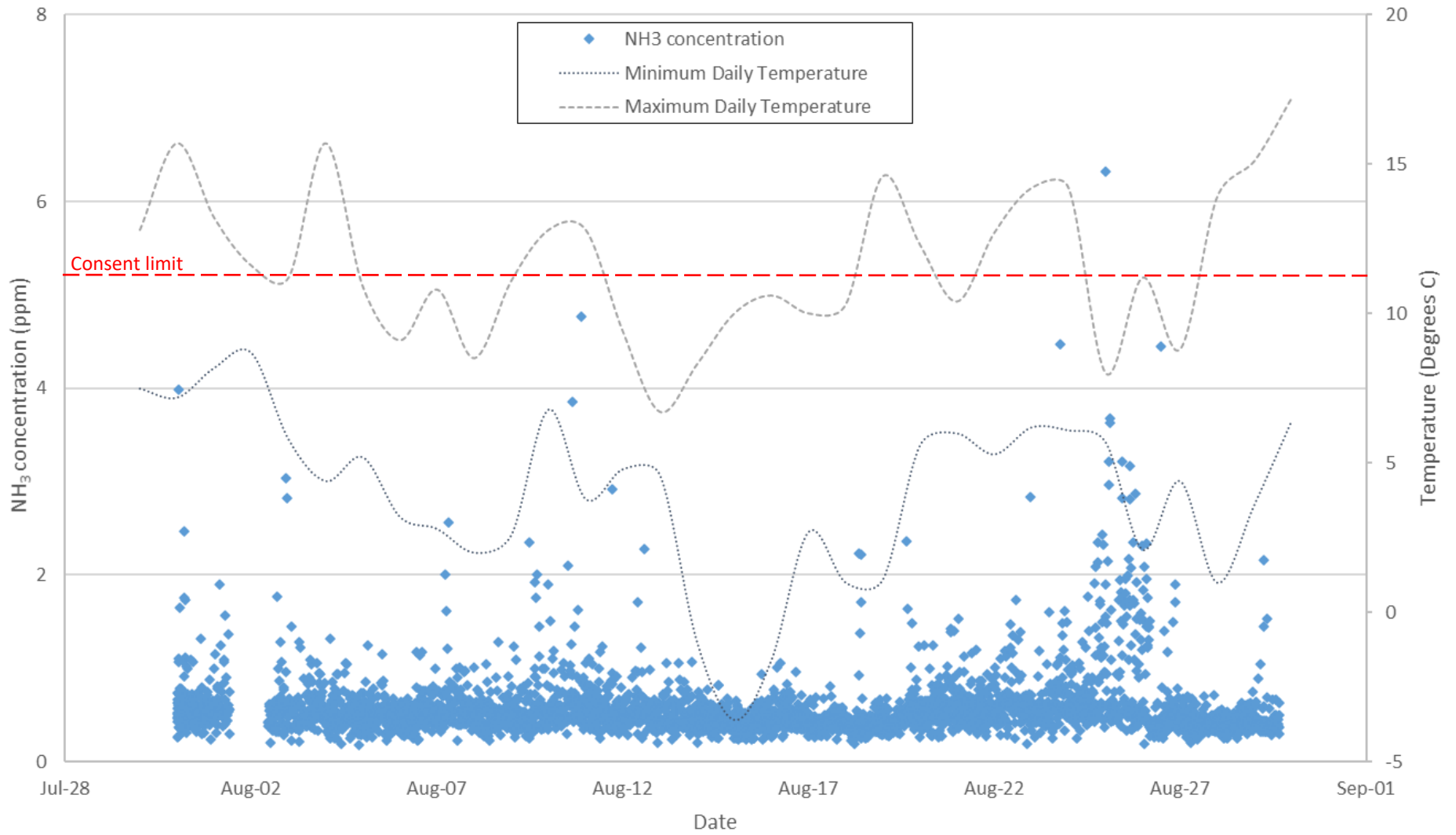


Figure 1: Continuous outdoor NH₃ concentration, minimum and maximum daily temperature. Temperature data is sourced from NIWA climate station AWS Gore 5778.

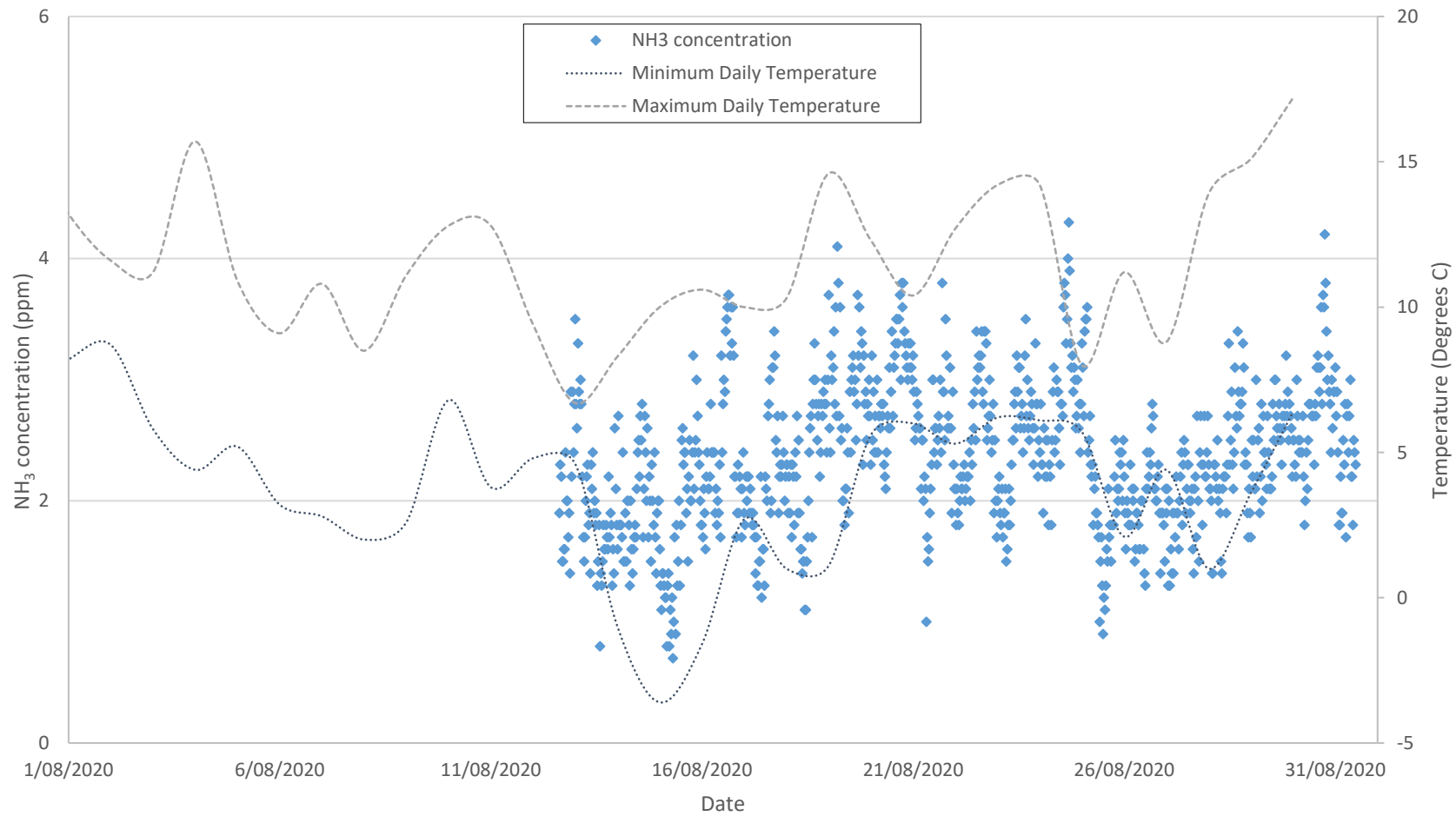


Figure 2: Continuous indoor NH₃ concentration, and minimum and maximum daily temperature. Temperature data is sourced from NIWA climate station AWS Gore 5778.