



Stephen Parry
Chief Executive
Gore District Council
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Land and Water Science
61 Leet Street
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4th June 2019

Dear Stephen

RE: NH₃ Monitoring Report 01 – 31 May 2019

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 April 2018. GDC require emission values to comply with consent conditions that specify a limit of 5 ppm NH₃ discharged to air. In March 2017, Photonic Innovations (PI) installed two NH₃ sensors for comparison of the indoor and outdoor ammonia levels. Measurements are recorded continuously and reported as a 5-minute average for both the outdoor and indoor sensors.

Weekly summaries of the indoor and outdoor emission results from monitoring between 01 May and 31 May are presented in this report. During this period the maximum NH₃ concentration detected by the indoor sensor was 6.1 ppm (Figure 1 and Table 1) and 9.5 ppm for the outdoor sensor (Figure 2 and Table 2). Mean and median NH₃ concentrations during this period were 4.2 and 4.1 ppm for the indoor sensor and both 0.8 ppm for the outdoor sensor. The maximum ammonia concentration for both the indoor and outdoor sensors exceeded the consented amount of 5 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 indoor NH₃ sensor, 01 May – 31 May 2019. NH₃ measured in parts per million (ppm).

Date	01-04 May	05 - 11 May	12 - 18 May	19 - 25 May	26 - 31 May
Mean	3.5	4.2	2.1	2.1	2.8
Standard deviation	0.7	0.6	1.1	0.6	0.4
Median	3.5	4.1	2.1	2.1	2.8
Minimum	2.0	2.7	0.0	0.6	1.4
Maximum	5.5	6.1	5.2	4.5	4.5

Table 2. Summary statistics for the outdoor NH₃ sensor, 01 May – 31 May 2019. NH₃ measured in parts per million (ppm).

Date	01-04 May	05 - 11 May	12 - 18 May	19 - 25 May	26 - 31 May
Mean	0.8	0.8	0.8	0.8	0.8
Standard deviation	0.6	0.4	0.6	0.4	0.5
Median	0.8	0.7	0.7	0.7	0.7
Minimum	0.4	0.3	0.3	0.3	0.3
Maximum	9.2	5.1	9.5	5.0	7.6

01 – 04 May 2019

During these four days, indoor NH₃ concentration showed consistent diurnal variation for most of the week. Maximum indoor concentration was 5.5 ppm for this period. Mean and median values were both 3.5 ppm. The outdoor NH₃ concentration levels showed consistent variation for most of the week with higher concentrations consistent with warmer temperatures. Maximum outdoor concentration was 9.2 ppm for this period. Mean and Median values were both 0.8 ppm.

05 – 11 May 2019

During this week, indoor NH₃ concentration showed consistent diurnal variation for most of the week. Maximum indoor concentration was 6.1 ppm for this period. Mean and median values were 4.2 and 4.1 ppm. The outdoor NH₃ concentration levels showed consistent variation for most of the week with higher concentrations consistent with warmer temperatures. Maximum outdoor concentration was 5.1 ppm for this period. Mean and Median values were 0.8 and 0.7 ppm.

12 – 18 May 2019

During this week, indoor NH₃ concentration showed consistent diurnal variation for most of the week. Maximum indoor concentration was 5.2 ppm for this period. Mean and median values were both 2.1 ppm. The outdoor NH₃ concentration levels showed consistent variation for most of the week with higher concentrations consistent with warmer temperatures. Maximum outdoor concentration was 9.5 ppm for this period. Mean and Median values were 0.8 and 0.7 ppm.

19 – 25 May 2019

During this week, indoor NH₃ concentration showed consistent diurnal variation for most of the week. Maximum indoor concentration was 4.5 ppm for this period. Mean and median values

were both 2.1 ppm. The outdoor NH₃ concentration levels showed consistent variation for most of the week with higher concentrations consistent with warmer temperatures. Maximum outdoor concentration was 5.0 ppm for this period. Mean and Median values were 0.8 and 0.7 ppm.

26 – 31 May 2019

During this week, indoor NH₃ concentration showed consistent diurnal variation for most of the week. Maximum indoor concentration was 4.5 ppm for this period. Mean and median values were both 2.8 ppm. The outdoor NH₃ concentration levels showed consistent variation for most of the week with higher concentrations consistent with warmer temperatures. Maximum outdoor concentration was 7.6 ppm for this period. Mean and Median values were 0.8 and 0.7 ppm.

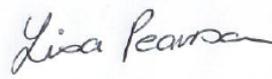
Summary

During the monitoring period (01 – 31 May) indoor NH₃ concentrations reached a maximum of 6.1 ppm, while mean and median concentrations were 4.2 and 4.1 ppm. These values are consistent with that expected of warmer weather conditions. Outdoor concentrations were a maximum of 9.5 ppm, while mean and median concentrations were both 0.8 ppm. The higher values of NH₃ concentrations were recorded on days with higher maximum temperatures. Based on this data, temperature continues to be the most dominant control over NH₃ concentration.

Kind regards



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Dr Lisa Pearson
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For public access to the real-time data go to: <http://35.189.3.224:3000/login>
Log in email: gcc@photonicinnoventions.com and use the password: Pa5%w0rd

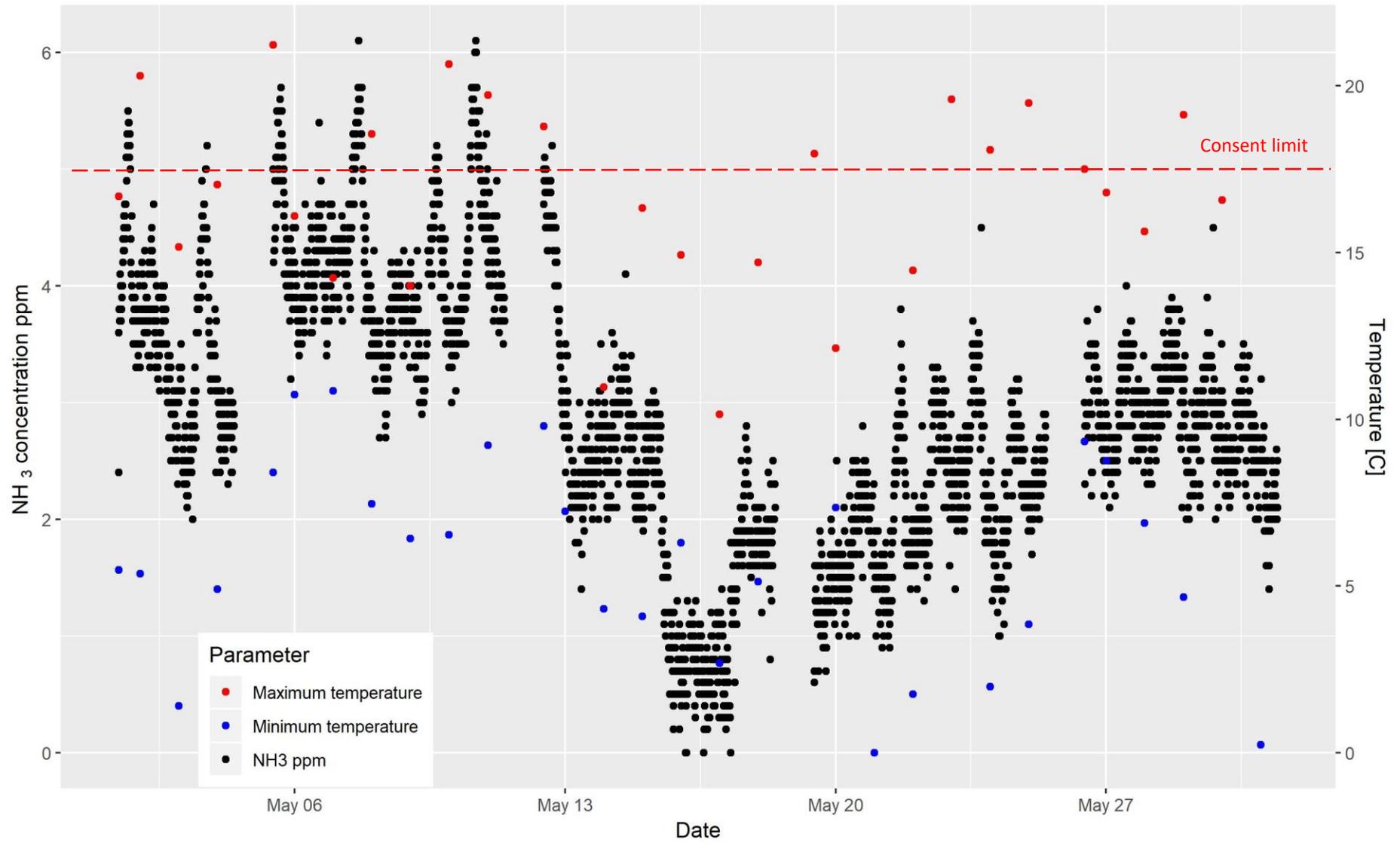


Figure 1: Continuous indoor NH₃ concentration and maximum daily temperature.

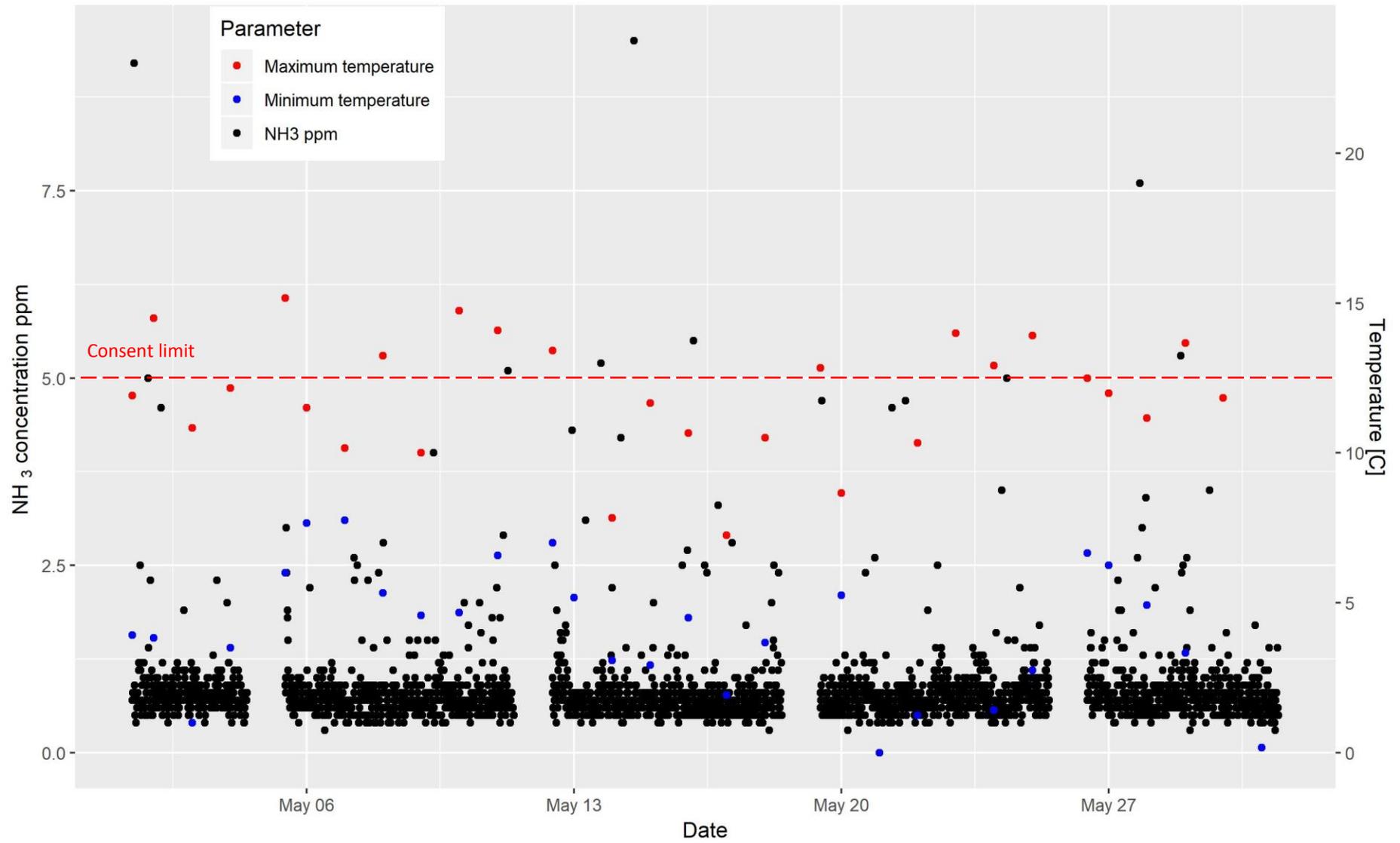


Figure 2: Continuous outdoor NH₃ concentration and maximum daily temperature.