



Stephen Parry
Chief Executive
Gore District Council
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Land and Water Science
61 Leet Street
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1st June 2019

Dear Stephen

RE: NH₃ Monitoring Report 01 – 30 June 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 June and 30 June are presented in this report. During this period the maximum NH₃ concentration detected by the indoor sensor was 4.7 ppm (Figure 1 and Table 1) and 9.4 ppm for the outdoor sensor (Figure 2 and Table 2). Mean and median NH₃ concentrations during this period were both 1.5 ppm for the indoor sensor and 1.0 and 0.7 ppm for the outdoor sensor. The maximum ammonia concentration for the outdoor sensor 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 June – 30 June 2019. NH₃ measured in parts per million (ppm).

Date	01 June	02 - 08 June	09 - 15 June	16 - 22 June	23 - 29 June	30 June
Mean	1.4	1.1	1.5	0.7	1.3	1.2
Standard deviation	0.3	0.5	0.6	0.4	0.6	0.5
Median	1.5	1.0	1.4	0.6	1.2	1.2
Minimum	0.8	0.0	0.2	0.0	0.0	0.0
Maximum	2.1	3.0	4.7	2.2	4.2	1.9

Table 2. Summary statistics for the outdoor NH₃ sensor, 01 June – 30 June 2019. NH₃ measured in parts per million (ppm).

Date	01 June	02 - 08 Jun	09 - 15 June	16 - 22 June	23 - 29 June	30 June
Mean	0.7	0.7	0.7	0.7	0.7	1.0
Standard deviation	0.3	0.5	0.4	0.5	0.3	0.8
Median	0.6	0.7	0.6	0.6	0.7	0.7
Minimum	0.4	0.3	0.2	0.3	0.3	0.4
Maximum	2.6	9.4	4.7	8.4	3.5	4.5

01 June 2019

During this day, indoor NH₃ concentration showed consistent diurnal variation for most of the week. Maximum indoor concentration was 2.1 ppm for this period. Mean and median values were 1.4 and 1.5 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 2.6 ppm for this period. Mean and median values were 0.7 and 0.6 ppm.

02 – 08 June 2019

During this week, indoor NH₃ concentration showed consistent diurnal variation for most of the week. Maximum indoor concentration was 3.0 ppm for this period. Mean and median values were 1.1 and 1.0 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 9.4 ppm for this period. Mean and Median values were both 0.7 ppm.

09 – 15 June 2019

During this week, indoor NH₃ concentration showed consistent diurnal variation for most of the week. Maximum indoor concentration was 4.7 ppm for this period. Mean and median values were 1.5 and 1.4 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 4.7 ppm for this period. Mean and Median values were 0.7 and 0.6 ppm.

16 – 22 June 2019

During this week, indoor NH₃ concentration showed consistent diurnal variation for most of the week. Maximum indoor concentration was 2.2 ppm for this period. Mean and median values were 0.7 and 0.6 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 8.4 ppm for this period. Mean and Median values were 0.7 and 0.6 ppm.

23 – 29 June 2019

During this week, indoor NH₃ concentration showed consistent diurnal variation for most of the week. Maximum indoor concentration was 4.2 ppm for this period. Mean and median values were 1.3 and 1.2 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 3.5 ppm for this period. Mean and Median values were both 0.7 ppm.

30 June 2019

During this day, indoor NH₃ concentration showed consistent diurnal variation for most of the week. Maximum indoor concentration was 1.9 ppm for this period. Mean and median values were both 1.2 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 4.5 ppm for this period. Mean and Median values were 1.0 and 0.7 ppm.

Summary

During the monitoring period (01 – 30 June) indoor NH₃ concentrations reached a maximum of 4.7 ppm, while mean and median concentrations were both 1.5 ppm. Outdoor concentrations were a maximum of 9.4 ppm, while mean and median concentrations were 1.0 and 0.7 ppm. These values are significantly lower than reported for the summer months and consistent with cooler, winter time temperatures. Overall, temperature continues to be the most dominant control over NH₃ concentration.

Kind regards



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Environmental and GIS Scientist
Land and Water Science Ltd



Dr Clint Rissmann
Director
Land and Water Science Ltd

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

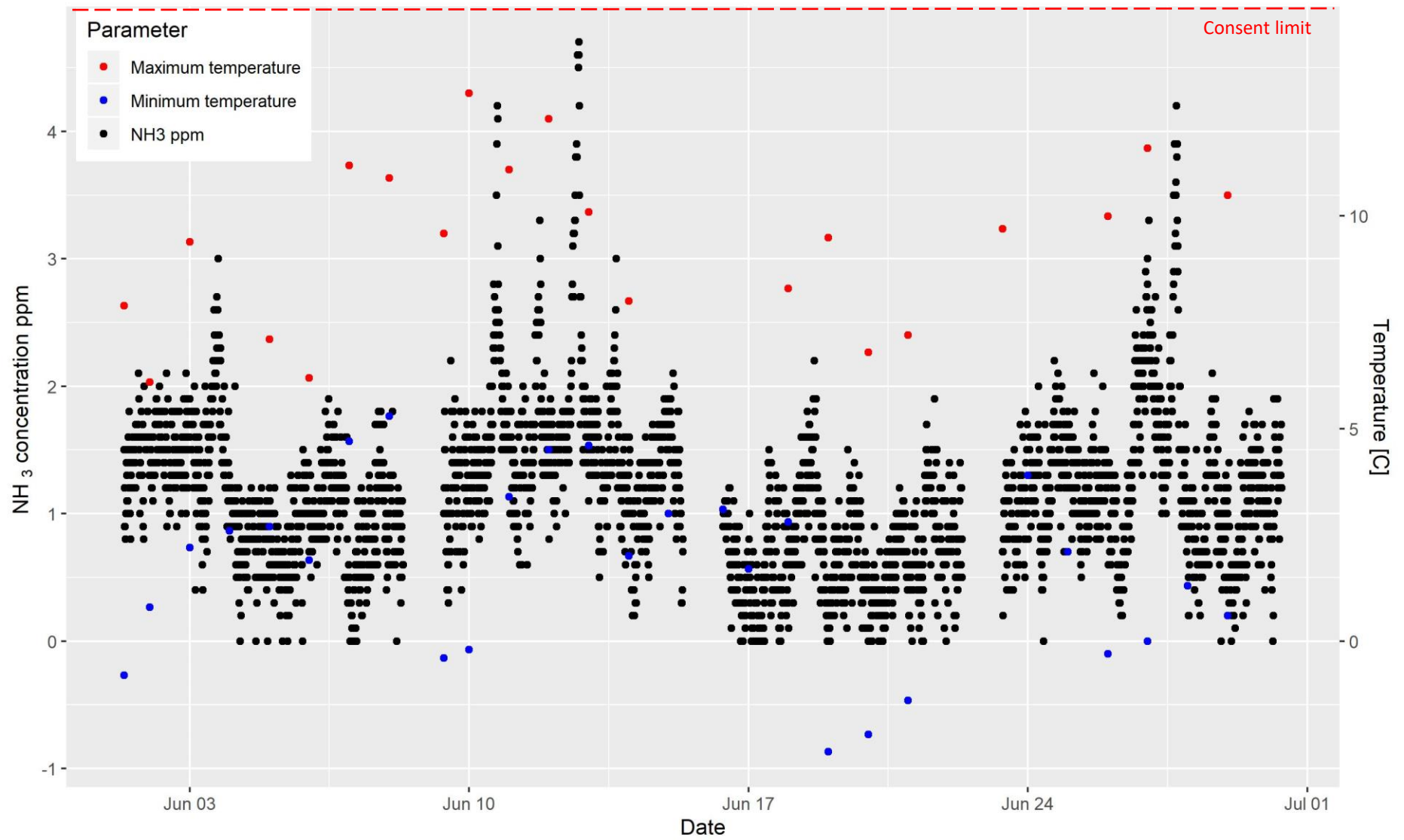


Figure 1: Continuous indoor NH₃ concentration and maximum daily temperature.

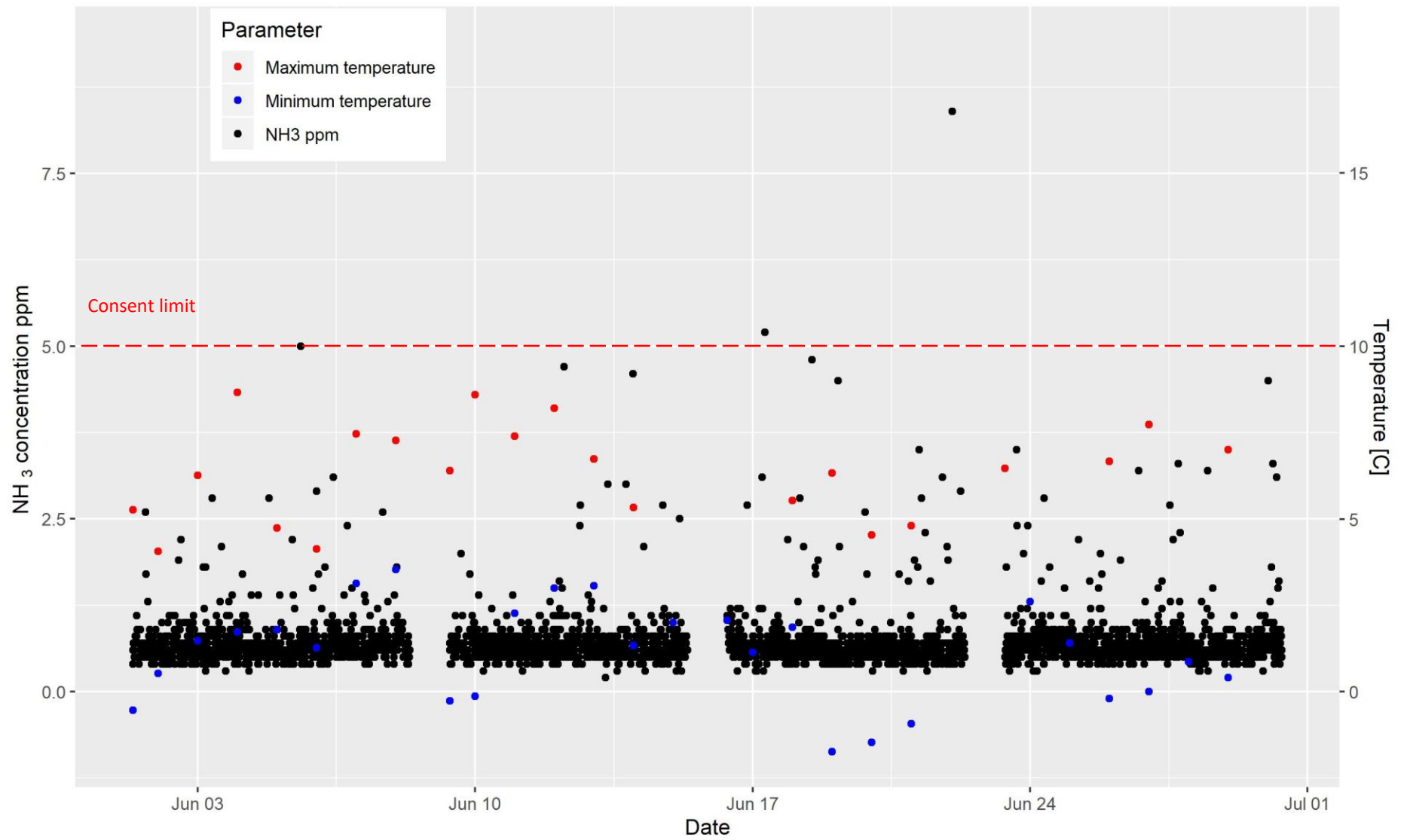


Figure 2: Continuous outdoor NH₃ concentration and maximum daily temperature.