# Preliminary Assessment of Catch Basin Management on Odour Emissions at Rimrock Cattle Company Ltd.

NRCB Natural Resources Conservation Board

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# Introduction

Rimrock Cattle Company Ltd. (Rimrock) prepared a Southeast Catch Basin Clean-out and Management Plan[1] on January 22, 2025 in response to Natural Resources Conservation Board (NRCB) Compliance Directive CD25-04[2] that was issued on January 20, 2025. The Compliance Directive was informed by site inspections and air quality assessment work conducted by the NRCB, which concluded that the southeast catch basin is a major contributor to odours emitting from Rimrock and impacting the community of High River. The catch basin management plan was implemented by Rimrock in early 2025, and much of the clean-out was completed by the end of April 2025.

This report presents a preliminary assessment of the efficacy of Rimrock's catch basin management on reducing odour emissions from this facility. The objective of this report is to communicate initial observations of air quality conditions at the site. A more fulsome assessment of the catch basin management plan is scheduled to occur in late 2025.

# Air Quality Monitoring Methods

Air quality is being monitored at two locations along the eastern boundary of Rimrock: (i) on the northeast corner near the water supply reservoir, targeting the feedlot pens; and, (ii) on the southeast corner of the operation, targeting the catch basin (Figure 1). Air quality is being analysed using continuous air quality monitors (Scentroid CTair) instrumented to measure ammonia ($NH_3$), hydrogen sulphide ($H_2S$), volatile organic compounds (VOC) and particulate matter according to the procedures described in an odour assessment report for the region[3]. An odour index (OI) is being calculated based on measured concentrations of $NH_3$, $H_2S$ and VOC. Wind speed and direction were obtained for this assessment from an upwind monitoring station located southwest of Rimrock (Figure 1).

The air quality assessment proceeded under the following constraints:

i. The pre-management monitoring period occurred between July 15 – Oct. 17, 2024. This data was used to inform the NRCB Compliance Directive CD25-04.
ii. The post-management monitoring period was between April 29 – June 16, 2025. The CTair units were installed on April 29, 2025, immediately after being received from the manufacturer following recalibration[4]. The data used for this preliminary assessment was downloaded on June 16, 2025.
iii. The air quality dataset used in this analysis was constrained to wind directions occurring between 210° to 260°, which are deemed to be the wind directions that are representative of the target operational feature (i.e., feedlot pens, catch basin).
    a. The constrained wind directions are presented in Figure 1.

[1] Rimrock Cattle Company Ltd. Southeast catch basin clean-out and management plan. January 22, 2025.
[2] NRCB Compliance Directive CD25-04. January 20, 2025.
[3] Community-level odour monitoring in High River, Alberta. (2024). Natural Resources Conservation Board, Edmonton, Alberta. 46 pp.
[4] Different concentrations of calibration standards were used by Scentroid in 2024 and 2025. A more fulsome assessment of the effect of calibration standards will be presented in future reports.


*Figure 1 Location of the air monitoring stations at Rimrock Cattle Company Ltd. targeting the feedlot pens and catch basin features. Air quality was analyzed for wind directions ranging between 210° and 260°, shown by the coloured buffers.*

## Air Quality Assessment

The focus of the preliminary assessment is to compare concentrations of odourous compounds and odour index values prior to and following catch basin management. The assessment focuses on the high concentrations and odour index values, given that the highest concentrations of these parameters are associated with nuisance odours. Percentile values of the distribution of measured concentrations of odourous compounds and odour index values between the 2024 and 2025 monitoring years for both the catch basin and feedlot pen stations are presented in Table 1.

*Table 1 Concentrations of odourous compounds and odour indices measured at the catch basin and feedlot pen stations. Percentiles indicate that 50%, 75%, 90% or 95% of the measured values are less than the presented concentration.*

| Monitoring Location | Percentile (%) | Air Quality Parameter Concentrations | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 2024 | | | | 2025 | | | |
| | | $NH_3$ *(ppb)* | $H_2S$ *(ppb)* | VOC *(ppb)* | OI | $NH_3$ *(ppb)* | $H_2S$ *(ppb)* | VOC *(ppb)* | OI |
| Catch Basin | 50 | 1,205 | 0.9 | 22.8 | 24 | 271 | 1.8 | 0 | 7 |
| | 75 | 1,665 | 3.0 | 100 | 36 | 482 | 21 | 0 | 14 |
| | 90 | 2,170 | 4.6 | 169 | 46 | 767 | 78 | 42 | 22 |
| | 95 | 2,394 | 5.6 | 195 | 52 | 1,026 | 163 | 79 | 35 |
| | Max | 3,618 | 38 | 465 | 78 | 2,941 | 442 | 1,106 | 93 |
| Feedlot Pens | 50 | 437 | 0 | 30.7 | 20 | 831 | 0 | 0.1 | 17 |
| | 75 | 787 | 0 | 46.9 | 33 | 1,391 | 0.2 | 13.8 | 28 |
| | 90 | 1,082 | 0 | 59.6 | 42 | 1,847 | 5.4 | 33.8 | 38 |
| | 95 | 1,289 | 0.02 | 65.7 | 48 | 2,153 | 11.5 | 40.9 | 44 |
| | Max | 2,748 | 7.7 | 142 | 78 | 2,957 | 40.5 | 74.3 | 61 |

The percentiles reported in Table 1 indicate the value below which a certain percentage of data falls. For example, the 50$^{th}$ percentile (or median) is the value below which 50% of the data points lie. Higher percentiles (75$^{th}$, 90$^{th}$, 95$^{th}$) reflect increasingly extreme values, while the maximum shows the highest recorded concentration. The catch basin experienced significant decreases in $NH_3$ at all percentile levels, and VOCs were significantly less in most high percentiles. However, $H_2S$ concentrations increased across all percentile values in 2025. For the feedlot pens, concentrations of $NH_3$ and $H_2S$ were higher in 2025, and concentrations of VOC were lower in 2025 across all percentiles.

Cumulative distribution plots of the odour index (OI) values for the catch basin and feedlot pen locations are presented in Figure 2. These plots show the percentage of measurements that occur below a concentration value, helping to illustrate how often low (or high) concentrations occur at the station. The following interpretations are drawn from this comparison:

- The 90$^{th}$ percentile OI values at the catch basin reduced from 46 in 2024 to 22 in 2025
    - 90% of the OI values were below 22 in 2025, whereas approximately 40% of the odour index values were below 22 in 2024.
- Distributions of OI values were consistent between 2024 and 2025 at the feedlot pens.
    - The 90$^{th}$ percentile OI values were 42 in 2024 and 38 in 2025.
- Given the consistency in the feedlot pen OI values, the drop in OI values at the catch basin location are likely a function of the clean-out and grading that occurred in early 2025.

A comparison of cumulative distributions of odourous compounds measured at the catch basin location between 2024 and 2025 are presented in Figure 3. The following interpretations are drawn from this comparison:

- The 90$^{th}$ percentile of $NH_3$reduced from 2.17 ppm in 2024 to 0.77 ppm in 2025.
    - 90% of the $NH_3$values were below 0.77 ppm in 2025, whereas approximately 20% of the $NH_3$ values were below 0.77 ppm in 2024.
- The 90$^{th}$ percentile of VOCs reduced from 0.169 ppm in 2024 to 0.042 ppm in 2025.
    - 90% of the VOC concentrations were below 0.042 ppm in 2025, whereas approximately 61% of the VOC concentrations were below 0.042 ppm in 2024.
- The 90$^{th}$ percentile concentration of $H_2S$ was higher in 2025 at 0.064 ppm, compared with 0.005 ppm in 2024.
    - Approximately 60% of the $H_2S$ concentrations in 2025 were below 0.005 ppm whereas 90% of the $H_2S$ concentrations were below 0.005 ppm in 2024.
- The drop in OI values is likely associated with a reduction in $NH_3$ and VOC concentrations.
- Higher $H_2S$ values may be a result of residual sulphur in the soil of the catch basin area or increased sensitivity of the sensor upon recalibration.

## Summary and Next Steps

The air quality analysis demonstrates a decrease in the concentration of odourous compounds and odour index values at the catch basin site following implementation of Rimrock's catch basin management plan. Air quality assessments will continue at this site to assess:

i. Odour emissions at equivalent seasons between 2024 and 2025.
ii. The complete scope of catch basin management, including clean-out of cell #2.

iii. Odour emissions following major storm events and the efficacy of timely catch basin clean-out following these events.

Air quality analysis at the community of High River is ongoing. An assessment of community-level odours and comparison to the site-level assessment will also be conducted following the 2025 monitoring year.

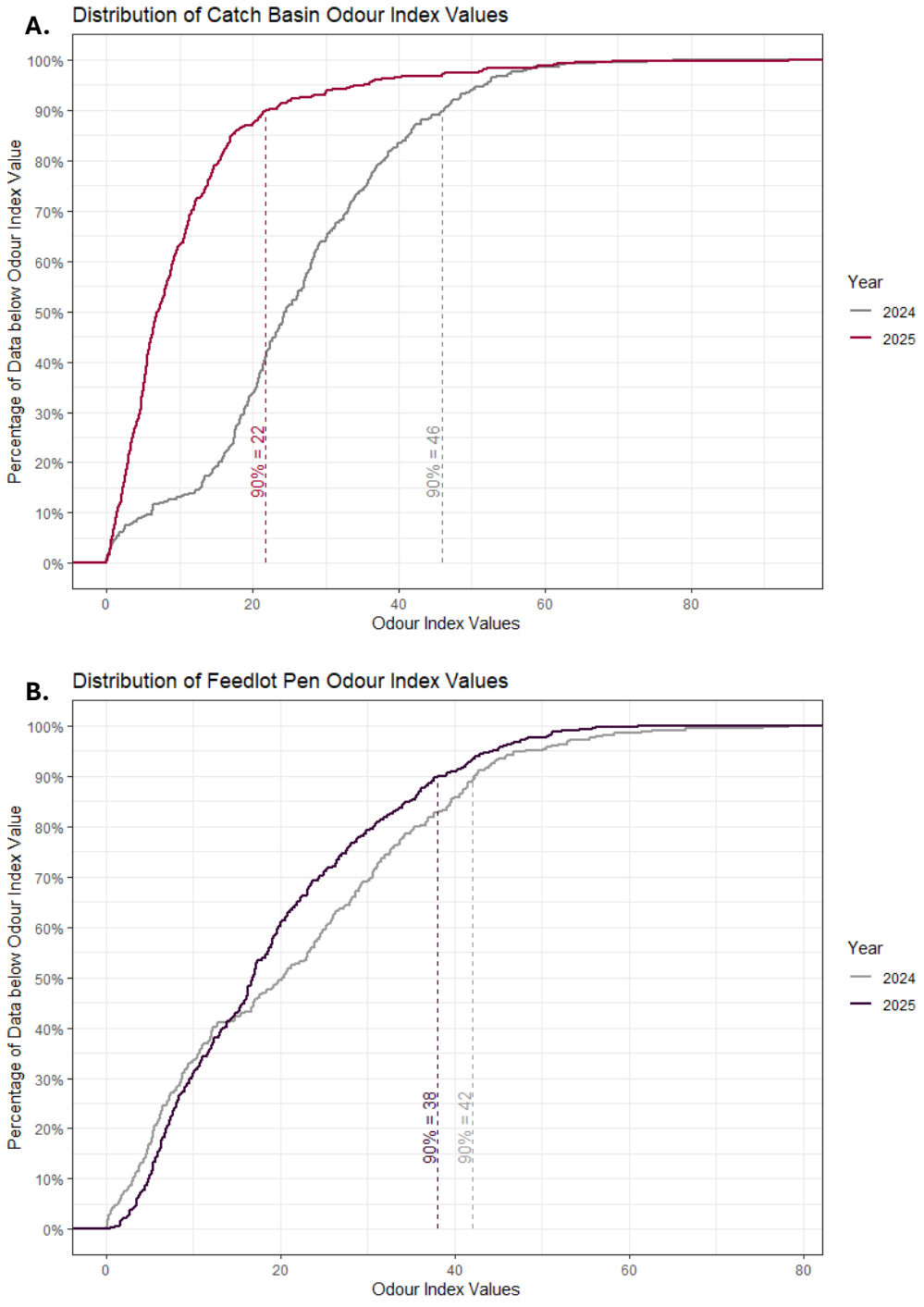


*Figure 2 Cumulative distribution plots of odour index values measured at the catch basin (A) and feedlot pen (B) monitoring stations in 2024 and 2025.*

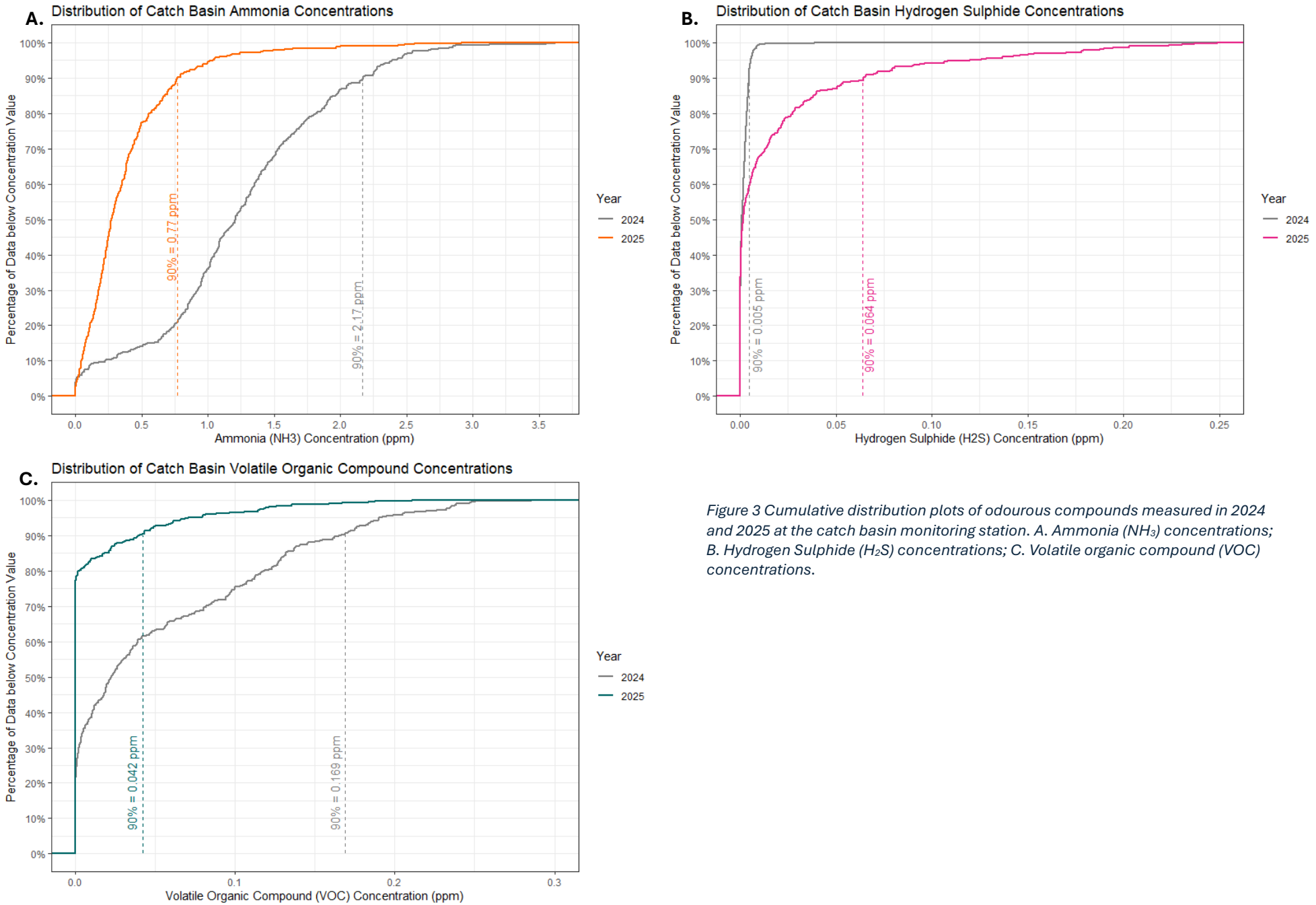


*Figure 3 Cumulative distribution plots of odourous compounds measured in 2024 and 2025 at the catch basin monitoring station. A. Ammonia ($NH_3$) concentrations; B. Hydrogen Sulphide ($H_2S$) concentrations; C. Volatile organic compound (VOC) concentrations.*