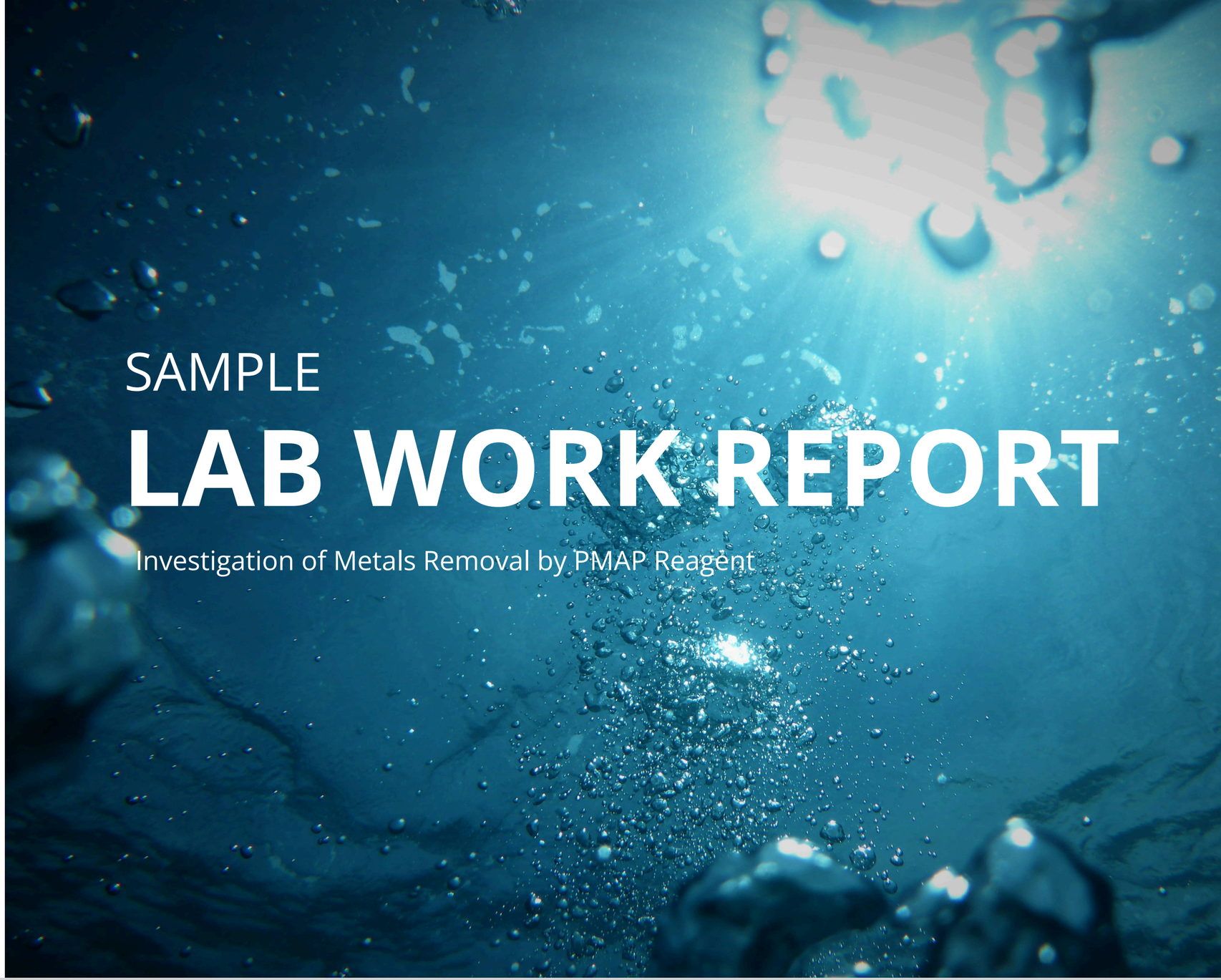
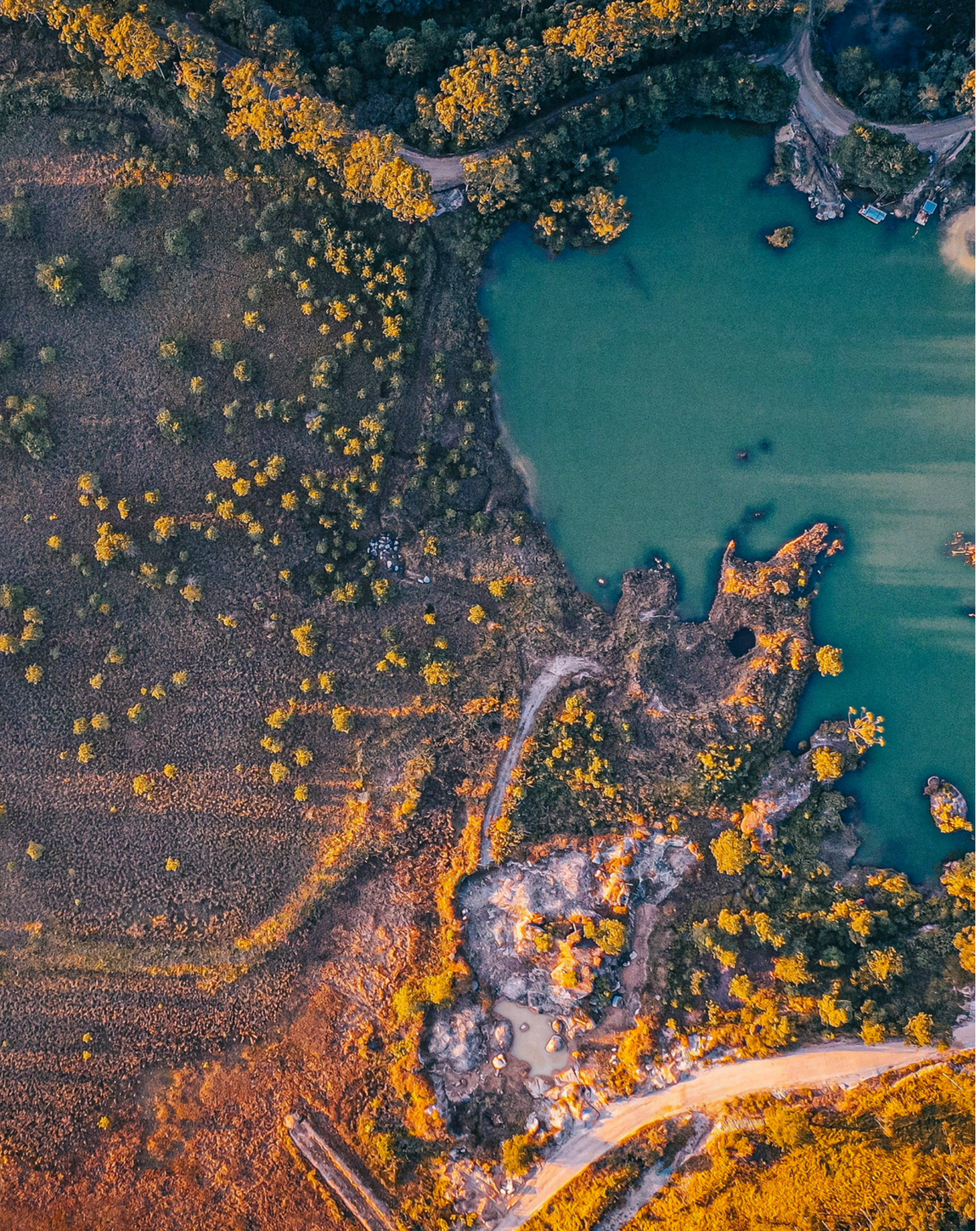


SAMPLE

LAB WORK REPORT

Investigation of Metals Removal by PMAP Reagent

PREPARED BY **PMAP Mine Water**



Executive Summary

The objective of this study was to assess PMAP and the similar Lime technology process for treating pond water from tailings facilities.

- **Feed Water Analysis:**
  - Highly acidic pH of 2.
  - Notable variations in dissolved and total metal concentrations.
  - Contaminants of Concern: Iron, Cobalt, Nickel, Copper, Manganese and Zinc

- **Customized PMAP Reagent:**
  - Developed based on specific water quality parameters for optimized treatment.

- **Experimental Results:**
  - 10 g/L dosage achieved near-total contaminant removal:
  - pH increased from 2 to 10.18, approaching dischargeable levels.

Contaminant of Concern	Initial Concentration (mg/L)	Final Concentration (mg/L)	Removal Efficiency
Cobalt	72.4	0.002	100%
Copper	189	0.05	99.97%
Iron	132	0.05	99.96%
Manganese	96	1.1	98.86%
Nickel	479	0.022	100%
Zinc	153	0.02	100%

PMAP technology is efficient, requiring minimal reagent dosage, and effectively reduces heavy metals while improving water quality to meet environmental standards.

Comparative Analysis

PMAP Treatment pH Results

Time	Dosage 1	Dosage 2	Dosage 3	Dosage 4	Dosage 5
1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Summary of PMAP Treatment pH Results

- 2 g/L dosage → pH increased to 5.22 after six days, showing a controlled rise.
- 10 g/L dosage → pH reached 10.81, exceeding the discharge limit of 9.0, emphasizing the need for precise dosage control.

Lime Treatment pH Results

Test	Retention Time	Initial pH	Target pH	Lime Consumption	Sludge Generation
1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Summary of Lime Treatment pH Results

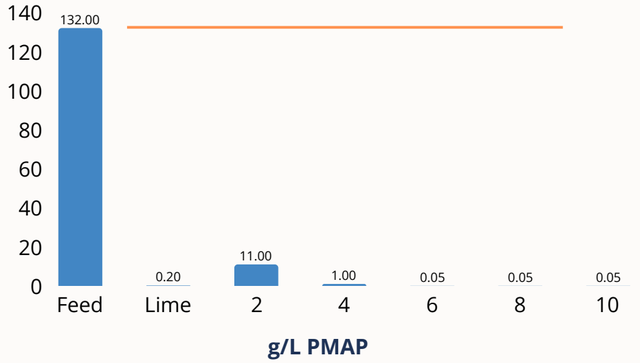
- Lime was tested as an alternative for pH adjustment.
- 2.18 g/L of lime was added over 60 minutes to stabilize pH at ~9.0.
- Initial pH: 9.12, with a slight decrease before stabilizing with additional lime.
- Small increments (0.3 ml) effectively maintained pH within the target range, ensuring stability.

Contaminants of Concern

Contaminants of Concern were effectively removed at a rate of between 98.86% and 100%

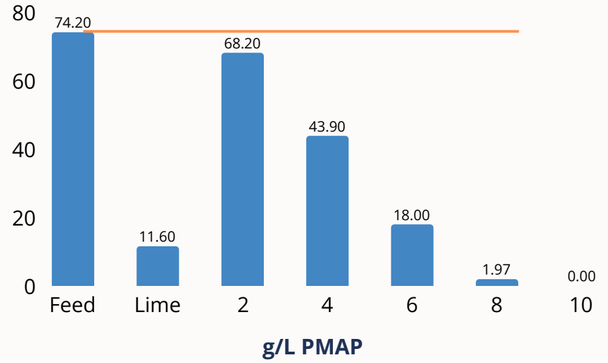
Iron

99.96%



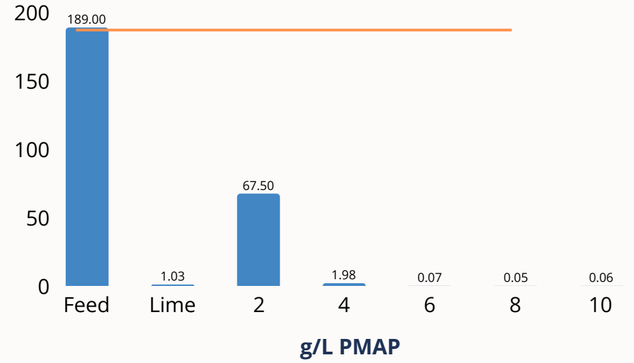
Cobalt

100%



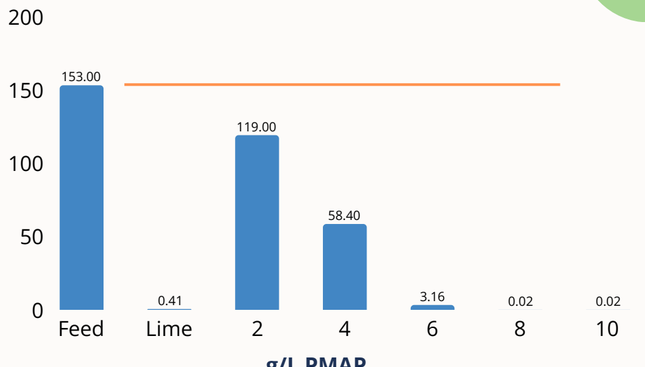
Copper

99.97%



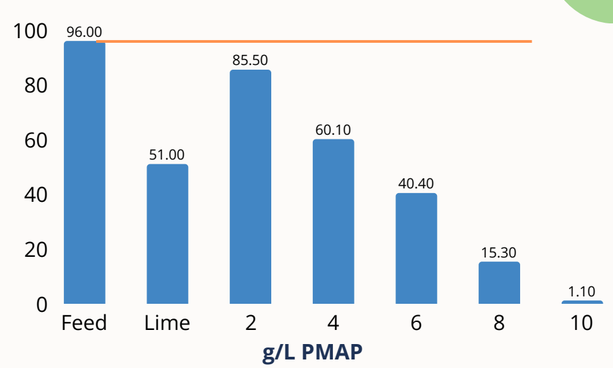
Zinc

100%



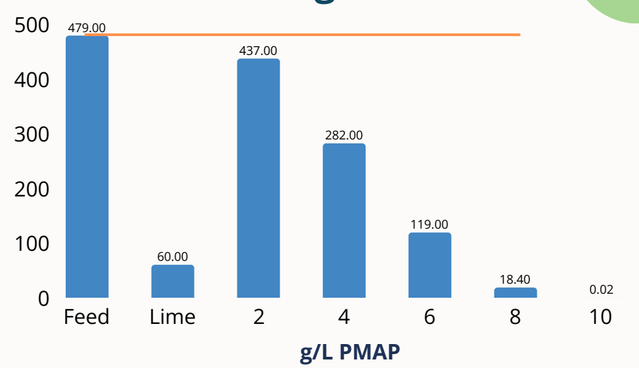
Nickel

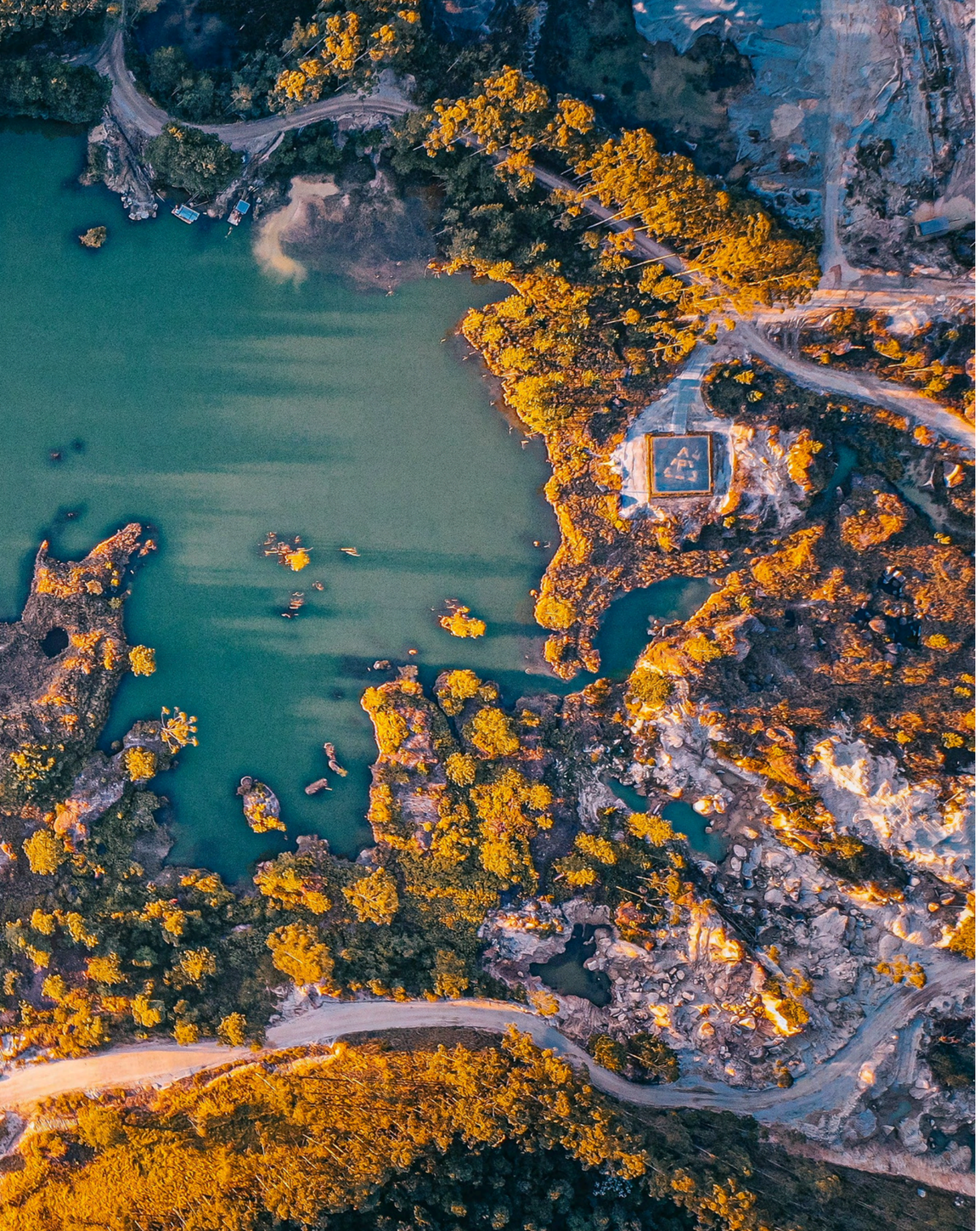
100%



Manganese

98.86%





Key Takeaways

PMAP Reagent Performance

- It achieved **near-complete heavy metal removal** (close to 100% for Cobalt, Zinc, Nickel at 8–10 g/L).
- High efficiency for Iron, Copper, and Manganese (**up to 99.96%**), outperforming Lime treatment.

Comparison with Lime Treatment

- Lime achieved **87.47% (Nickel)** and **84.37% (Cobalt)** removal.
- It required **higher dosages** and lacked the **adaptability & efficiency of PMAP.**
- Sludge generation for PMAP was [redacted] g/L and was **lower than the Lime** process which was [redacted] g/L
- pH for treated water with PMAP was [redacted], **below the dischargeable limit**, while the Lime was [redacted] which was above the discharge limit.

VERIFY SUITABILITY

Find out more at pmap.ca