

ProMoss® Heavy Metal Reduction Case Study

Reducing heavy metals to meet strict discharge limits — a case study from a data-center chiller manufacturer



EXECUTIVE SUMMARY

A manufacturer of chillers for data centers needed to reduce trace heavy metals from its metal-finishing process to meet strict regulatory discharge limits. To evaluate a solution, Creative Water Solutions conducted a controlled field trial to assess ProMoss® media's ability to lower dissolved metals in the plant's wastewater.

Independent laboratory analysis by Waypoint Analytical documented substantial reductions in copper, aluminum, chromium, zinc, and nickel over approximately four hours of continuous recirculation. Manganese rose during the first hour, then declined steadily through the remainder of the evaluation.

Independent laboratory testing confirmed substantial reductions in dissolved heavy metals during a four-hour field evaluation of ProMoss® media.

INDEPENDENT LABORATORY RESULTS

Cu	Copper reduced by	85%
Al	Aluminum reduced by	81%
Cr	Chromium reduced by	>73%*
Zn	Zinc reduced by	42%
Ni	Nickel reduced by	18%

*Chromium fell below the laboratory reporting limit (<0.0050 mg/L) after one hour of treatment, so actual reduction may exceed 73.7%. Verified reductions from Waypoint Analytical Report 26-175-0005.

**No added chemicals.
No process changes.**

Results were achieved with a single ProMoss® contact chamber dropped into the plant's existing side-stream loop and run on continuous recirculation — a naturally derived Sphagnum-moss media that integrated without interrupting production.



Treatment System & Methodology

How the ProMoss® contact chamber was integrated and evaluated

SYSTEM & TRIAL PARAMETERS

Wastewater type	Rinse and process water from metal-finishing operations
System volume	Approximately 1,500 gallons
Treatment media	ProMoss® Sphagnum moss, 50 g bricks
Contact chamber	One ProMoss® CC-90-75, side-stream recirculation
Media loading	4 of a maximum 6 PM3 bricks
Operating flow	80-90 GPM (plant)
Recommended chamber flow	15-20 GPM
Sampling points	T0-T4, hourly (11:45 AM – 3:45 PM)
Laboratory analysis	Independent third-party ICP-OES
Evaluation period	Continuous recirculation (~4 hours)



ProMoss® contact chamber installed during the field trial



PROCESS DESCRIPTION

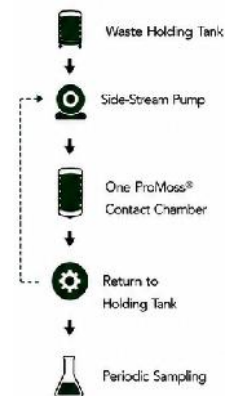
Wastewater from the equalization tank was pumped through a side-stream loop and passed through a single ProMoss® contact chamber. Treated water returned by gravity to the equalization tank, running continuously for the duration of the trial. **Recommended flow of 15-20 GPM** maximizes contact time and adsorption efficiency without disrupting plant operation.



METHODOLOGY

- 1 Collect baseline samples before adding ProMoss®.
- 2 Charge ProMoss® media into the contact chamber.
- 3 Recirculate the system through the chamber at 15-20 GPM.
- 4 Sample hourly from T0 through T4 across the four-hour evaluation.
- 5 Analyze all samples at a third-party lab by ICP-OES.

SIDE-STREAM RECIRCULATION FLOW





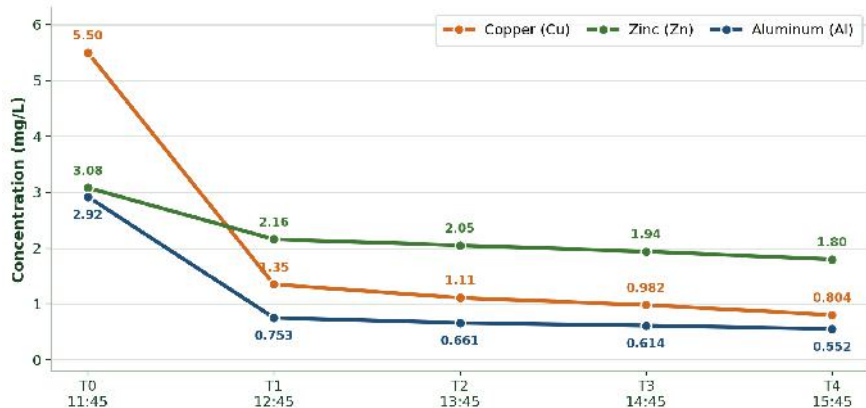
Laboratory Results & Performance

Independent third-party laboratory verification by Waypoint Analytical (all values mg/L)

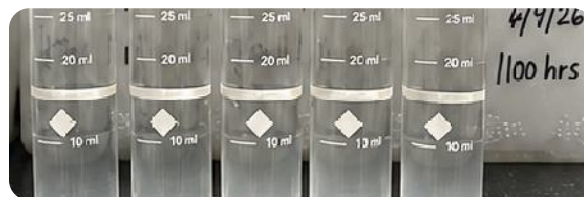
LABORATORY RESULTS SUMMARY

Metal	T0 11:45	T1 12:45	T2 13:45	T3 14:45	T4 15:45
Aluminum (Al)	2.92	0.753	0.661	0.614	0.552
Chromium (Cr)	0.0190	<0.0050	<0.0050	<0.0050	<0.0050
Copper (Cu)	5.50	1.35	1.11	0.982	0.804
Manganese (Mn)	0.136	0.195	0.192	0.188	0.180
Nickel (Ni)	0.0110	0.0100	0.0100	0.0100	0.0090
Zinc (Zn)	3.08	2.16	2.05	1.94	1.80

All concentrations in mg/L. Chromium fell below the laboratory quantitation limit (<0.0050 mg/L) after T0. Manganese increased at T1, then declined through T4.



Aluminum, copper, and zinc concentrations from T0 through T4



Independent lab samples collected through the evaluation

WHAT THE DATA SHOWS

- Aluminum, copper, and zinc fell sharply after T0 and kept declining through T4.
- Chromium dropped below the laboratory quantitation limit after T0.
- Turbidity fell from 340 to 90 NTU and TSS from 311 to 33 mg/L by T4.
- Manganese rose at T1, then declined; nickel stayed essentially stable.



ENGINEERING INTERPRETATION

Continuous recirculation increased contact time with the ProMoss® media, driving additional adsorption of dissolved and suspended metals. Because concentrations were still falling at T4, **longer recirculation times can yield further removal** where operationally practical. The brief rise in manganese at T1 reflects the media mobilizing legacy deposits from the holding tank, which are then captured as recirculation continues — not a sign of treatment failure.

✓ Findings, Conclusions & Recommendations

ProMoss® Industrial Wastewater Field Evaluation

✓ Verified heavy-metal reduction

Independent Waypoint Analytical testing documented substantial reductions in copper, aluminum, chromium, zinc, and nickel.

Improved water clarity

Visual and laboratory sampling showed progressive clarity improvement through the trial.

Stable, non-disruptive operation

The chamber dropped into the existing side-stream loop with no pressure rise, no operator adjustments, and no interruption to production.

Sustainable treatment

Renewable Sphagnum moss media reduced metals with no additional chemical feed.



Renewable ProMoss® Sphagnum moss media

★ ENGINEERING RECOMMENDATION

Evaluate ProMoss® performance over sufficient recirculation time rather than on initial readings alone. Metals were still declining at the final sample, so extended contact is likely to improve results.

Older systems with accumulated deposits may show a brief rise in dissolved metals as legacy contamination is mobilized — before the media adsorbs it during continued recirculation.

📋 RECOMMENDED BEST PRACTICES

- Maintain 15–20 GPM through each contact chamber.
- Allow adequate recirculation time before judging performance.
- Continue periodic laboratory sampling.
- Expect temporary metal increases during cleanup of older systems.
- Use lab data to optimize media replacement intervals.
- Treat ProMoss® as part of an overall wastewater strategy.

🌿 ABOUT PROMOSS®

ProMoss® is an all-natural, plant-based water treatment media made from sustainably harvested Sphagnum moss. Its natural cation-exchange chemistry reduces dissolved heavy metals, softens water, and lowers organic contamination — with no chemical feed or control systems. It is NSF-registered (G5 and G7), non-toxic, and safe to handle.

NATURALLY DERIVED • SUSTAINABLE • EFFECTIVE

SUSTAINABILITY & ESG

- Renewable, sustainably harvested moss — bogs regrow undamaged.
- Cuts water use 10–15% and supports reuse.
- No chemical drums; safe disposal; fewer transport emissions.
- Supports corporate ESG (Environmental, Social & Governance) goals.



Multiple delivery options integrate easily into existing water systems



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Creative Water Solutions — proven, sustainable ProMoss® water treatment that helps industrial facilities meet discharge limits while advancing their sustainability goals.