



Redefining Mine Water Treatment  
for a **Greener** Future

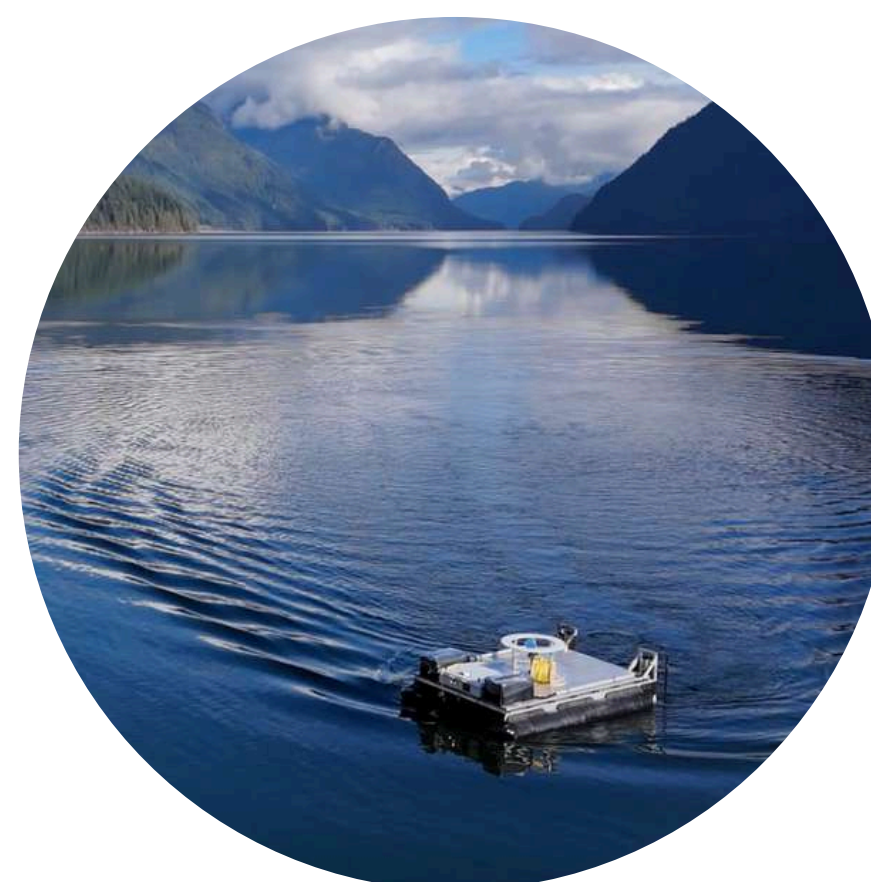




# Redefining Mine Water Treatment for a Greener Future

PMAP integrates cutting-edge technology with extensive industry expertise to deliver superior mine water treatment solutions. Our proprietary approach utilizes environmentally friendly reagents and AI-driven processes to ensure efficient, safe, and cost-effective water management across mining operations.

We transform mining sustainability by converting wastewater challenges into valuable resource opportunities. Our mission centers on enhancing mine productivity, reducing operational costs, and driving ESG excellence through innovative metal recovery and water optimization technologies that create a more sustainable and efficient future for the mining industry.



## Advantages & Benefits

- Green Reagents
- High Energy Efficiency
- Significant Capital Savings
- Operational Savings
- Waste Management Cost Reduction
- Selective Metal Precipitation
- Eliminate Gypsum Scaling
- Smart Reagent Consumption
- Dischargeable pH

## Our Technology



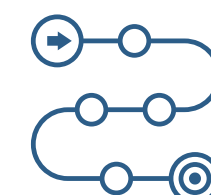
**PMAP Reagent  
& Chemical  
Technology**



**In-situ Smart  
Dispensing**



**Monitoring and  
Bathymetry**



**Process  
Design**

## Our Services



**Water  
Treatment**



**Water Quality  
Monitoring**



**Engineering  
Solutions**



**Metals  
Recovery**



## Get Your Free Mine Water Assessment

Request our complimentary, no-obligation water assessment to identify opportunities that enhance efficiency, reduce costs, and improve environmental compliance. Transform your operational challenges into strategic advantages today.



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## Reagent & Chemical Technology

Our patented non-hazardous reagent features inherent buffering properties that prevent high-pH conditions when dissolved in water. By replacing conventional neutralization agents, PMAP's solution eliminates operational, transportation, and storage risks typically associated with water treatment processes.

PMAP's innovative reagent technology transforms mining wastewater treatment by providing a superior alternative to traditional lime-based methods. Our chemical solutions deliver improved efficiency, cost reduction, and environmental advantages.

The PMAP treatment process involves creating a specialized slurry by combining a small volume of tailing pond water with our proprietary chemicals, ensuring consistent performance across diverse mining operations.



## Advantages & Benefits



### Cost Reductions

Our reagent technology can reduce fixed wastewater treatment costs by 65–85% and operational costs by 25–35%.



### Metal Recovery

The innovative approach also facilitates the recovery of valuable metals from the wastewater, adding an additional stream of revenue for mining operations.



### Environmental Impact

PMAP's formula significantly minimizes the environmental footprint of wastewater treatment by reducing reliance on harmful chemicals and enhancing safety and flexibility in operations.







# PMAP Dispensing Technology

Our excellence in mine water monitoring and treatment relies on our unmanned technologies for operations on small and large bodies of water. By leveraging Artificial Intelligence capabilities in monitoring, controlling, and adapting to chemical reactions, PMAP transforms tailing ponds into a network of reaction columns, accessible by a fleet of unmanned vessels. PMAP's capabilities in electromechanical design and optimization are utilized for developing innovative devices for precision dispensing, liquid dredging, emission capture technology solutions.

## Our Water Treatment Process

PMAP delivers mine water treatment through a proven four-step process: comprehensive water assessment to identify specific contaminants, custom reagent formulation tailored to your site chemistry, controlled implementation with performance monitoring, and continuous optimization to maximize economic and environmental benefits.



### Step 1:



**Creating a  
Digital Map**

### Step 2:



**Custom  
Planning**

### Step 3:



**Slurry  
Injection**

### Step 4:



**Slurry  
Preparation**

## Advantages & Benefits



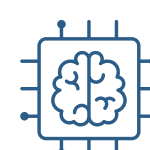
### Precision and Efficiency

Our technology allows for precise reagent dosing and distribution, maximizing treatment efficiency and minimizing waste.



### Environmental Compliance

Designed to meet stringent environmental standards, our dispensing technology ensures that treated water complies with regulatory requirements.



### AI Integration

Leveraging AI, our system optimizes the dispensing process based on real-time data, enhancing accuracy and adaptability.







# PMAP Dispensing Technology

Monitoring water quality and bathymetric features in mine tailings ponds, pit lakes, and oil & gas settling basins is essential for environmental compliance, risk assessment, and operational planning. Conventional methods can be labor-intensive, hazardous, and inconsistent. Our autonomous unmanned surface vessels revolutionize monitoring by offering safe, precise, and scalable solutions. Equipped with advanced sensors, samplers, and AI-driven automation, our technology ensures high-resolution data collection across multiple depths, supporting resource management, remediation strategies, and regulatory compliance.



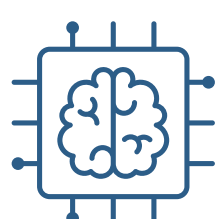
**Bathymetry  
Surveys**



**Water Quality  
Monitoring**



**Sediment and  
Floor Mapping**



**Autonomous  
Sampling  
Capabilities**



## Advantages & Benefits



### **Safety**

Eliminates human exposure to hazardous environments, reducing risks in contaminated or unstable waters.



### **Scalability**

Adaptable for small or large ponds, pit lakes, and tailings facilities.



### **Reliability**

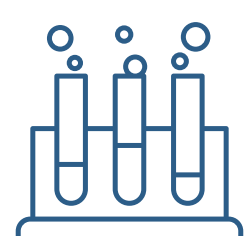
Uses advanced sensors and GPS tracking to improve data accuracy.





# Mine Wastewater Treatment

We deliver comprehensive mine wastewater treatment solutions by combining extensive experience in conventional methods with proprietary technology specifically engineered for mining industry challenges. Our approach leverages deep knowledge of established treatment processes and their constraints to develop innovative systems that consistently deliver superior environmental compliance and operational efficiency.



**Lime  
Precipitation**



**Reverse  
Osmosis (RO)**



**Ion  
Exchange**



**PMAP  
Process**



## Advantages of PMAP Process



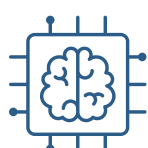
### **In-Pond Neutralization**

Directly treats contaminants within the water body, eliminating transfer and handling risks.



### **Eco-Friendly Reagents**

Employs biocompatible, non hazardous chemicals.



### **Automation and AI Integration**

Unmanned vehicle ensures precise reagent distribution, optimizing treatment efficiency and consistency.





# Metals Recovery

PMAP transforms mine wastewater management through innovative metal extraction processes that recover valuable resources including nickel, copper, and cobalt from contaminated water. This approach converts environmental challenges into revenue-generating opportunities while simultaneously addressing contamination issues. By implementing this resource recovery strategy, mining operations can enhance their sustainability profile while supporting circular economy principles through the reclamation of critical metals.

## Turning Potential Liability into an Economic Opportunity

The PMAP process transforms the liability of storing wastewater, into a revenue generating opportunity. The ability to selectively precipitate key metals at a sufficiently high concentration can generate revenues that exceed the cost of wastewater treatment process itself.



### Advantages of PMAP Process



#### Selective Precipitation

PMAP's proprietary technology excels in this process, achieving superior separation efficiency with minimal reagent consumption.



#### Reduced Sludge Volume

PMAP's innovative treatment process substantially reduces sludge volume compared to conventional methods, minimizing disposal costs while creating a more concentrated, easily manageable waste product



#### High Metals Concentration

PMAP's technology efficiently processes mine water with extremely high metals concentration, maintaining superior performance where conventional systems falter. Our proprietary process ensures consistent regulatory compliance while dramatically reducing treatment costs.



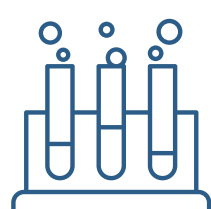


# Engineering Solutions

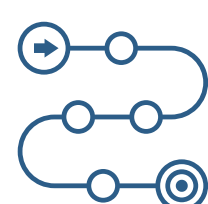
Process engineering plays a pivotal role in the mining sector's water treatment landscape, driving the development of tailored solutions, identifying the best available technologies, and designing efficient treatment facilities. PMAP Mine Water is your trusted advisor in this critical process, leveraging decades of expertise and innovative thinking to deliver superior water management solutions.



**Technology  
Evaluation**



**Bench-Scale  
and Lab Testing**



**Process  
Design**



**Facility Design  
and Optimization**



## Advantages & Benefits



**Enhancing Mine Productivity**



**Advancing ESG Goals**



**Optimizing Water Recovery**

## Process Design

With extensive expertise in mine water treatment and environmental technologies, we deliver comprehensive solutions across all project phases—from pilot testing to full-scale implementation. Our specialists excel in process development and innovative treatment methodologies that address contamination challenges while optimizing resource recovery.

We implement advanced technologies specifically for the mining industry to create sustainable water management solutions that ensure regulatory compliance. Our innovation-driven approach transforms complex mining water challenges into practical, efficient systems designed for long-term environmental and operational success.

## Trusted Engineering Consulting

At PMAP our clients gain access to the vast expertise of the PMAP team that deliver innovative solutions, realizable accurate and unbiased analyses. Mohsen Barkh leads the team and bring exceptional hands-on expertise and translates bench-scale results into scalable real world solutions.







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