



Power & Water

Purification through Innovation



FACT SHEET

Mining & Groundwater

Safe pH neutralisation of Acid Mine Drainage



Removal of Iron, Lead, Zinc & Cadmium

powerandwater.com

Introduction

A prerequisite of sustainable development must be to ensure uncontaminated streams, rivers, lakes and oceans. There is growing awareness of the environmental legacy of mining activities that have been undertaken with little concern for the environment. While there have been improvements to mining practices in recent years, significant environmental risks remain.



Background

Ranked among the top 50 most-polluting mines in UK, the Cwm Rheidol mine complex comprises the combined workings of four separate metal mines, each connected underground and discharging at the two adits situated on the steep banks above Afon Rheidol.

The heavily contaminated and highly acidic water from these extensive workings drains into the River Rheidol via a passive filter bed, but this has proved to be an inadequate method of removing the heavy metals, which include lead, iron, cadmium and zinc.

Solution

Soneco[®] is an innovative combination of Electrolysis and Ultrasound in a highly effective package plant which efficiently generates water treatment reagents directly into the process stream, ensuring maximum precipitation of contaminants.

The treatment system uses advanced, in-house designed Power Control System (PSU) to ensure fine-control of the system and its ancillaries. Its rugged design, small footprint and an optional online operating facility make Soneco the ideal choice for remote sites where access may be limited.

In-line monitoring equipment controls the levels of reactive reagents that produce "staggering" removal rates, as recorded during the projects at Cwm Rheidol.

During the investigations the pH of the untreated acid mine drainage averaged at around 2.0. This was rapidly corrected and the high levels of heavy metals were efficiently removed using specially selected electrode materials.

Results

Independent laboratory results confirmed the Soneco® system's success at treating this problematic minewater:

Contaminant	Untreated	Treated	% Removal
pH	3.82	6.55	-
Cadmium	35.88	0.193	99.46
Zinc	17,080	15.85	99.90
Lead	499.2	2	99.59
Iron	7,978	40.2	99.48
Magnesium	11.45	29.32	-154.82

NRW Filtered Results (average)

Average Sludge Concentration = 5-10% Treated Water

"Preliminary results are very encouraging, and we are excited at the prospect of adding this Sono-electrochemical method as another tool.

Its spatial footprint is small and therefore particularly suitable to rugged upland locations where large passive pond systems require flatter land that is often in short supply."

Peter Stanley, Water and Contaminated Land Technical Specialist - **Natural Resources Wales**

Benefits

- Safer Method of Neutralising Acidic Waste Streams;
- Removes H&S and Environmental Concerns;
- Low Operation & Maintenance Requirements;
- Small footprint, yet capable of high flow rates;
- Robust design tolerates rugged upland locations;
- Remote Access allows Performance Monitoring, Control and Automation;
- Low voltage, Low Carbon Systems can be operated using Renewable Energy Sources.



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“Power & Water is a UK water technology company specialising in sono-electro chemistry. We aim to deliver Circular Economy solutions allowing recovery of waste products, and to produce clean, safe water for drinking, re-use or discharge back into the environment.”



The company knowledge and expertise is founded on more than 35 years' experience in the Water and Environmental industries. Our in-house expertise includes engineering, power electronics, software and MEICA.

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