

INDUSTRIAL EFFLUENT AND MINE WATER

RARE WATER TREATMENT



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What effluent and mine water streams does your company specialise in treating?

HR Rare Water Treatment focuses on acidic coal mine water by applying a combination of electro-reduction and electro-coagulation technologies. The electrochemical technology utilised has much broader applications. Electro-oxidation was shown to remove high levels of COD (chemical oxygen demand) at astonishingly low power consumption. Similarly, it also removed dyes from waste streams.

What is your company's approach to waste-stream management?

Rare associates itself with various companies that render a total water solution. Rare focuses on electrochemical water treatment and our focus is on providing a unique step in total solutions. We are constantly searching for new applications for this technology, as it requires minimal or no chemical addition and is a cleaner answer to many water treatment problems. The low energy consumption of these water treatment applications is increasingly drawing the attention of potential users.

Can you tell Water&Sanitation Africa readers more about your technological innovations?

Rare will typically use

tried-and-tested laboratory scanning methods to determine the suitable electrochemical process. This is achieved by both the direct treatment of pollutants at the electrode surfaces (oxidation – reduction) and indirectly by the production of radicals and other activated redox reagents, such as Al^{3+} , Al^{7+} , Fe^{3+} , Fe^{6+} , and powerful oxidising agents, such as OH (hydroxyl radical), O_2 (superoxide anion), HO_2 (Hydro-peroxyl radical), ozone and hydrogen peroxide.

The next step will be to model a solution and get client buy-in. It is sometimes required to do a pilot trial when laboratory results are not conclusive or the client needs more proof of the solution. In more than 50 applications worldwide, the upscaling from laboratory work to full-scale applications has been done successfully.

Which types of waste streams does your company treat most often?

As mentioned, Rare focuses on acidic coal mine water in South Africa. The application of the technology is much wider though. Elsewhere in world, the following applications have been successful:

- mine water: removal of metals and superfines, reduction of acidity without neutralising agents, and recovery of minerals
- groundwater: removal of

humic acid, colloids, super fines, arsenic, clays and low levels of iron and manganese

Action of the electro-oxidation process after just four minutes



- textile, tannery and paint industries: removing colour, reactives and particulates; removal of lignin, COD and stubborn total suspended solids, and recovery of fibres
- ship industry: bilge, grey and laundry water treatment
- nuclear industry: Removal of radioactive nuclides from cooling pond water
- toxic waste streams: breakdown of polychlorinated biphenyls, herbicides and pesticides.

What processes does your company recommend for these waste streams?

Our patented and licensed process can be best described as follows:

Imagine water and waterborne contaminants as being billions of electrically charged molecules.

The Rare Water Treatment approach is to become smarter: instead of adding more and more chemicals and bacteria to treat or condition water, only clean electrons are added. Only 'useful' electrons are added and, as a result, there are no unwanted 'spectator' ions introduced. These introduced electrons reorganise the molecular network to both sieve out and destroy contaminants.

Electrochemistry has been available for a long time; but in Rare Water Treatment's application of the technology, the power consumption to supply these electrons is very low. Our intelligent and adaptive control algorithms continually optimise the water treatment performance to ensure energy efficiency even with changes in feedwater quality and flow rate.

In the field of electrochemistry, Rare Water Treatment can apply electro-oxidation,

electro-reduction, electro-coagulation and electro-flotation.

Does your company manufacture or provide specific products and components to facilitate these processes and, if so, can you describe them?

Apart from the imported power electronics and associated software, Rare offers a fully locally produced plant. The physical electrochemical plant does not have many moving parts, exotic filters or membranes. It is, therefore, easy to manufacture and requires less-sophisticated maintenance expertise. Further options for remote control and automation are available. A wide range of system configurations is also available to suit any client application.

What services does your company offer and how are these beneficial to clients?

Rare Water Treatment will, upon completion of the design stage, issue a proposal that will include:

- an assessment of the effectiveness of the technology (i.e. the percentage of treatment achieved per determinant)
- a budget price quotation for the proposed system (dependent upon scope, requirements and existing treatment processes)
- a statement of performance guarantee and warranty
- an estimate of operating costs and a cost-benefit analysis
- a process flow diagram of the proposed scheme, including integration with the existing plant where applicable
- an estimated delivery, installation, commissioning, and training period schedule. **35**