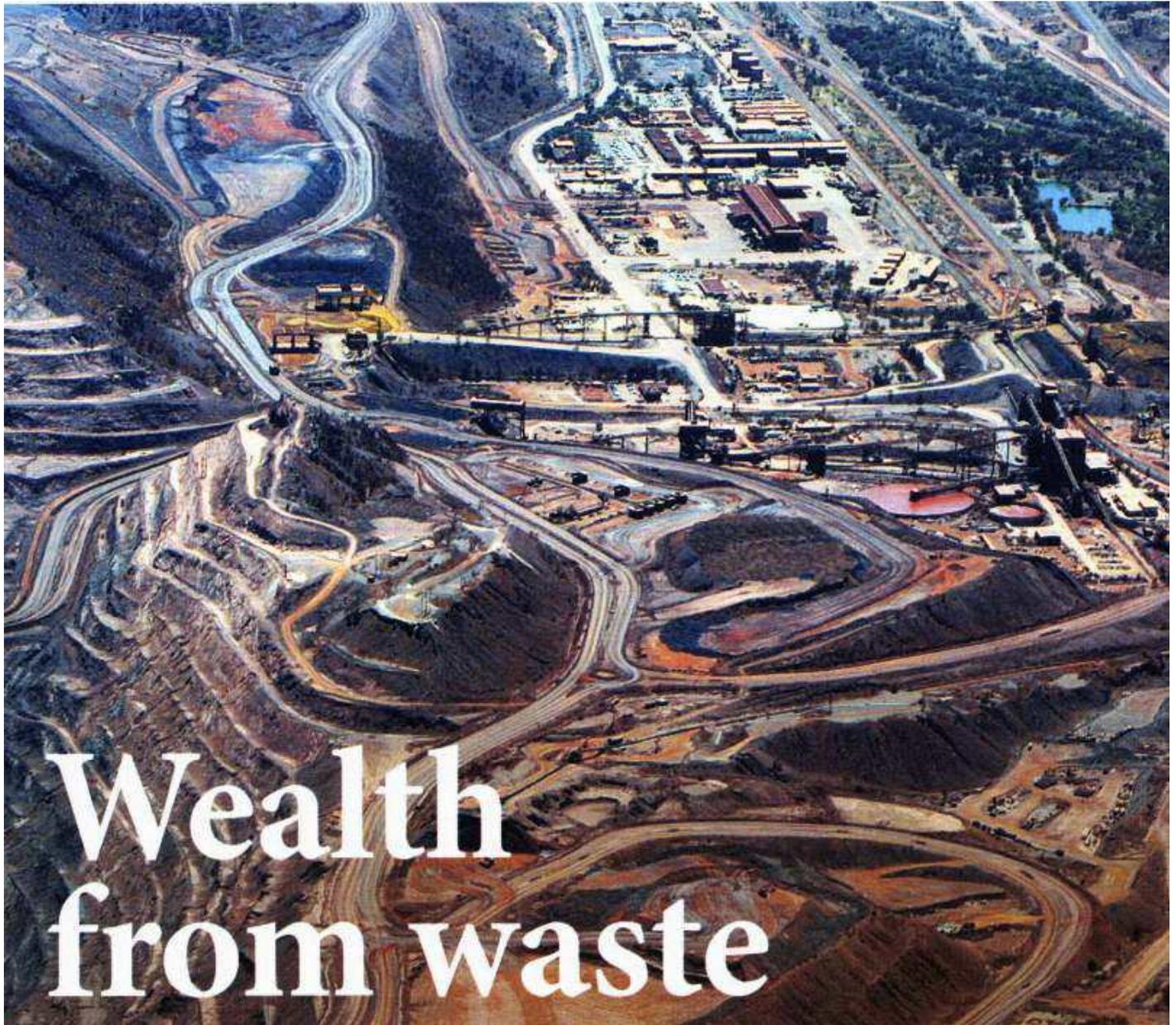




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Wealth from waste

Purifying mining wastewater is a difficult task. But a new treatment can provide 80-90% less sludge than others. By **Vetti Kakulas**

It is common for mining processes to generate wastewater that contains a variety of metals and metalloids.

These contaminants must be removed to ensure the wastewater is suitable for reuse or to be discharged into the surrounding environment.

The CSIRO has developed an innovative treatment to manage water more effectively and sustainably.

It is common today for mining companies

to purify their wastewater by adding lime, though CSIRO's new treatment uses hydrotalcites.

While lime-based methods are effective, the key issue is the volume of sludge that forms and the problems that come with it.

Initial results using the hydrotalcite treatment revealed it produced 80-90% less sludge than other lime-based treatments.

Hydrotalcites consist of aluminium and magnesium-rich layers, which ▶

Minesites such as BHP Billiton's Mt Whaleback iron ore mine in the Pilbara face an ongoing challenge in processing wastewater.





(Left) CSIRO has developed a treatment to manage mine water more effectively.
(Below) The hydrotalcite treatment clearly reduces more than 80% sludge, compared to the lime-based treatment.



simultaneously, remove a variety of contaminants in wastewater in one step.

Subsequently, handling and final disposal problems of waste are reduced.

CSIRO senior principal research scientist Grant Douglas said there was potential to use the treatment to reprocess and recover valuable commodities, while producing ore-grade material from the contaminants.

"This is a very real example of extracting 'wealth from waste', opening up the possibility of partially offsetting wastewater treatment costs for the mining industry," he said.

Douglas' team recognised hydrotalcites beginning to form when aluminium and magnesium were present at an 'ideal' ratio and during neutralisation of acidic waters.

"As hydrotalcites form, the contaminants become trapped and are easily removed from the wastewater as a solid," he said.

"Mining wastewater often contains substantial magnesium and aluminium concentrations.

"This means we can create hydrotalcites utilising common contaminants that are already present in the wastewater, by simply adjusting their concentrations and adding

alkaline compounds to rapidly increase the pH level."

Initial applications of the treatments have focused on wastewater generated from mining and extracting uranium – with promising results.

A range of contaminants including uranium, rare earth elements, transition

The hydrotalcite-treated water can be recycled back into the plant to lower the total cost of water used in mining operations, ultimately reducing water consumption from the environment.

Douglas said this was particularly valuable for mining operations in dry regions with limited water supplies, such as Australia.

There is potential to use the hydrotalcite treatment to reprocess and recover valuable commodities and produce ore-grade material from the contaminants.

metals, metalloids and negatively charged molecules have been effectively removed from the wastewater.

Douglas said: "This process purifies the wastewater from mines in a faster, more effective way that does not require large amounts of infrastructure or difficult chemistry to achieve it."

Other advantages include the fact that hydrotalcites are easily removed using centrifugation, which leaves behind a cleaner and reduced amount of sludge.

"Around the world, the minerals industry is keen to find more efficient ways to treat their wastewaters and reduce their environmental footprint," he said.

"With the inherent technical advantages and added benefits of using hydrotalcites, there's a high likelihood of the mining industry adopting this technology globally."

Commercialisation of the hydrotalcite technology has begun with Australian company Virtual Curtain.

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