

VIROMINE TECHNOLOGY

Mining Waste Treatment and Site Remediation



Tailings Treatment • Wastewater Treatment •
Waste Rock Treatment • Acid Mine Drainage •
Mine Remediation and Revegetation

VIROMINE TECHNOLOGY CAPABILITY STATEMENT

ViroMine Technology provides a total solution to the management and treatment of all forms of liquid and solid waste generated by the mining industry.

Most mining liabilities arise from the chemical reactivity of tailings and waste rock and their long-term effects upon water and the environment. The incorporation of ViroMine Technology into the treatment of mining waste produces non-reactive liquid and solid waste streams that revolutionise mining by transforming environmental and social liabilities into benign products. In some cases, waste streams may even be transformed into assets, as

in the case of contaminated wastewater which can be treated to aquatic ecosystem or stock drinking water standards.

The primary contaminants generated by mining are acid and heavy metals. ViroMine Technology neutralises the total actual and potential acidity of tailings and waste rock, thereby preventing acid mine drainage, and binding heavy metals into non-bioavailable forms. Unlike the application of lime, which is soluble and short-lived, reagents used in ViroMine Technology are insoluble and continue to neutralise acidity long after application.

When applied to tailings dams, process water and stormwater run-off, ViroMine Technology treats liquid wastes to within regulatory limits and allows for their safe discharge to the environment or re-use in processing. ViroMine Technology can also be applied to remediate sulphidic waste rock. In almost every case treated solids can be used to create a rich substrate for plant growth safe in the knowledge that immobilised metals cannot be translocated to adjoining non-polluted environments or taken up by plants. Therefore, ViroMine Technology is an ideal “go to” option for environmental protection because it promotes revegetation, lowers the timeframe

of rehabilitation, and facilitates closure of tailings and waste rock dumps. Whether it is the treatment of tailings, waste rock, tailings dam wastewater, contaminated process water, stormwater run-off or any other form of mining waste, the application of ViroMine Technology provides a roadmap to the long-term sustainability of mining practices.

Our team of professionals can be contacted by anyone wishing to address historic or current issues associated with mining, and together we can translate corporate sustainability objectives into on-ground reality.

VIROMINE TECHNOLOGY

ViroMine Technology is a world-first technology, with a proven record of economically treating all forms of mining waste, including acid mine drainage (also referred to as acid rock drainage), tailings dam water, sulphidic mine tailings, acid sulphate soils and waste rock dumps.

ViroMine Technology will:

- > Permanently neutralise acid;
- > Bind heavy metals and prevent leaching; and,
- > Enhance nutrient retention capacity and promote vigorous plant growth.

Virotec's proprietary reagents are applied in a single-stage, *in-situ* treatment capable of treating large volumes of tailings dam water and converting toxic dams into reservoirs of clean water, which meet stringent environmental standards.

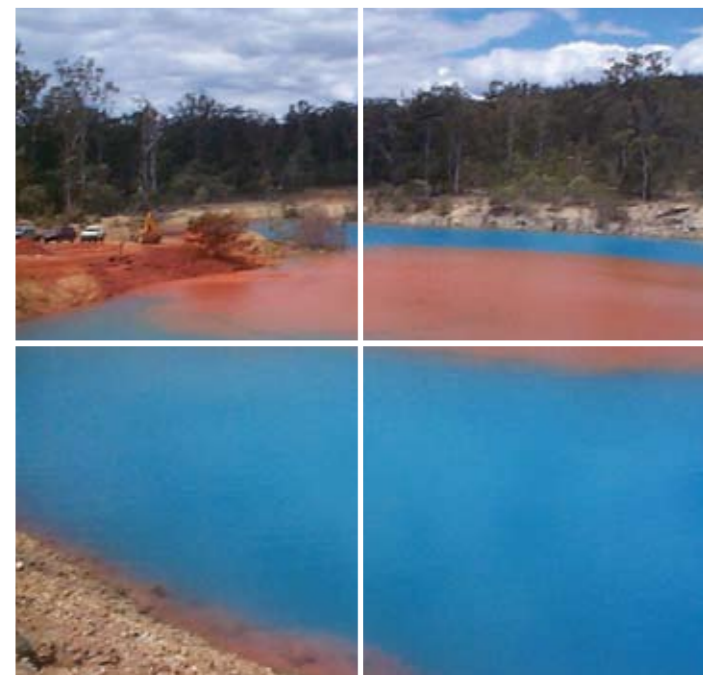
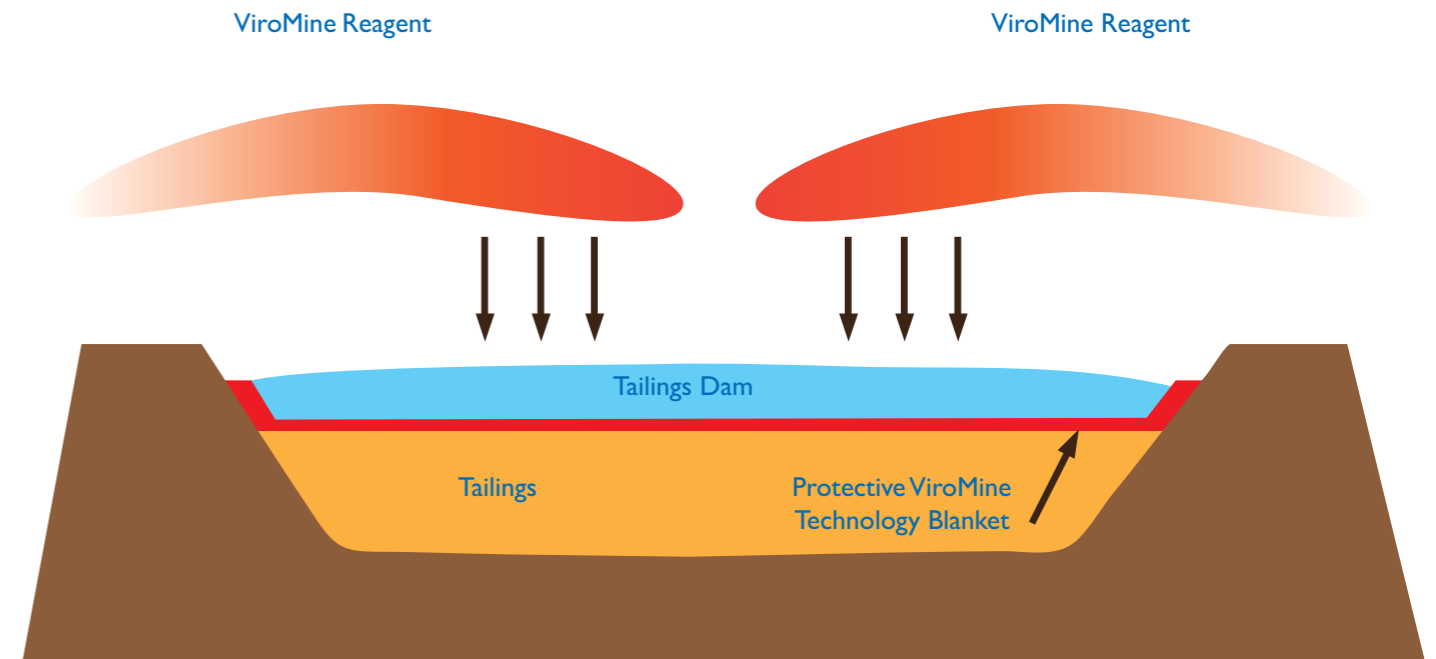
- > **Alka B reagent:** designed to treat alkaline (pH >7.0) water contaminated with heavy metals;
- > **Neutra B reagent:** designed to treat mildly acidic (pH 6.0-8.0) water contaminated with heavy metals;
- > **Acid B reagent:** designed to treat acidic (pH 4.5-6.0) water contaminated with heavy metals;
- > **Acid B Extra reagent:** designed to treat highly acidic (pH <4.5) water contaminated with heavy metals;
- > **Terra B reagent:** designed to treat sulphidic waste rock, tailings and contaminated soil, and to revegetate mine sites.

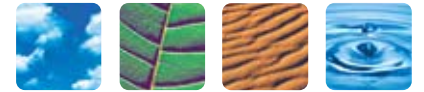
ViroMine Technology reagents are environmentally safe and the exhausted material may be disposed as non-leachable solid residue.

When treating acidic wastewater, ViroMine Technology reagents settle through ten metres of water within 48 hours, permanently binding heavy metals in the process. Unlike lime, the treatment does not leave behind a hazardous and unstable sludge. Rather, it generates a thin, non-toxic, stable sediment – typically less than 5.0mm (1/4”) thick.

The application of ViroMine Technology reagents can prevent the formation of acid mine drainage in the first place by stabilising exposed waste rock, mining overburden and tailings. In most cases treated soils and wastes can be used to create a rich substrate for plant growth safe in the knowledge that immobilised metals cannot be translocated into adjoining non-polluted environments or taken up by plants.

Treated water can be reused for process water





CASE STUDIES

- > TAILINGS TREATMENT: Mt Carrington Mines and Rossarden, Australia
- > MINE WASTEWATER TREATMENT: Fox Resources, Lady Annie Mine (Parsons Brinkerhoff) and Lloyd's North Water, Australia and Vatukoula Gold Mines, Fiji
- > WASTE ROCK TREATMENT: Thalanga Copper Mine, Australia, Gilt Edge Mine, USA and Baia Mare, Romania
- > ACID MINE DRAINAGE: Aqua Forte, Portugal and MMG LXML Sepon, Laos
- > REVEGETATION: King River Delta and Cobar Copper Mine, Australia
- > MINE REMEDIATION: Ulsan Gold Mine, South Korea



ViroMine™, Alka B™, Neutra B™, Acid B™, Acid B Extra™ and Terra B™ are all registered trademarks of Virotec Global Solutions Pty Ltd.

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