Our approach to managing mineral waste and acid rock drainage

During our mining and processing operations, we generate both mineral and non-mineral waste. We put controls in place to limit the negative environmental impact of all of our waste.

One of our main focuses is chemically reactive waste, which requires careful planning and management to avoid creating long-term liabilities and minimise existing liabilities.

The management of mineral waste is covered by our environmental performance standard on “Chemically reactive mineral waste control”.

Mineral waste management:

Mineral wastes include waste rock, tailings and slag:

- Waste rock is composed of rock that has uneconomic mineral content and must be removed to access ore during mining.
- Tailings are finely ground rock mixed with process water. This is what remains after the minerals of economic interest have been removed from the ore.
- Slag is generated by smelting operations and is a glassy material that remains after metals, such as copper, have been separated during the smelting process.

Mineral wastes are typically produced in large volumes. Handling and storing these wastes impacts the land and can lead to long-term impacts and liabilities if not managed effectively. Mineral wastes are generally stored permanently on site where they can be used as in-pit backfill or placed in engineered repositories. Most wastes are chemically inert, but some are chemically reactive and must be thoughtfully managed to avoid impacts on water quality or rehabilitation success.

We manage potential environmental impacts of mineral waste by:

- comprehensively characterising the wastes
- segregating reactive from non-reactive mineral wastes
- designing the repositories to minimise environmental impacts
- monitoring groundwater and other media to verify performance and identify failures in design or practice at the outset
- undertaking progressive rehabilitation
- implementing risk assessment programmes

- networking externally and internally to share best practices and develop best practice control technologies

All operations that generate mineral waste are required to develop a mineral waste management plan. These are designed to ensure appropriate management that minimises environmental impacts and controls all chemical and physical hazards posed by the waste.

Acid rock drainage:

Acid rock drainage (ARD) from reactive mineral waste is one of the most significant environmental risks for the mining industry. ARD is created when rocks that contain naturally-occurring sulphide minerals are disturbed and exposed to air and water. This accelerates the natural weathering process and may lead to the release of low pH (acidic) or neutral drainage water with elevated salinity and metals concentrations. If not responsibly managed, ARD can impact the revegetation of mining wastes, and degrade the quality of surface water and groundwater.

Rio Tinto is a founding and active member of The International Network for Acid Prevention (INAP). Through INAP, we promote important research on ARD prediction and control. We promote knowledge-sharing within the mining industry on ARD management strategies, and support our commitment to responsible mineral waste management.

Acid rock drainage management:
To prevent or minimise potential environmental impacts of ARD, we have adopted leading practice in mine planning, operation and waste management. New projects are designed to ensure that the risk is minimised and that any low-quality drainage will be captured and treated or retained on site. We actively seek solutions for minimising long-term ARD management requirements and potential impacts at sites where reactive waste piles were created decades ago, when not as much forethought was given to long-term mineral waste management challenges.

We use a number of techniques to prevent or control ARD. These include selective handling and encapsulation, sub-aqueous (under water cover) blending of waste materials, and using either synthetic or engineered earth covers.

We have developed an ARD hazard screening tool to identify high-risk projects, operations, mine expansions and acquisitions. All operations where ARD could occur must maintain a management plan that has to be reviewed every four years by an external expert. Our internal ARD risk reviews have been undertaken for all of our higher-risk operations. They are regarded as the industry benchmark in this important risk area, and include reviews by leading external and independent experts, notably in the field of geochemistry.

Marine tailings disposal:
Rio Tinto's performance standard contains a specific clause on the disposal of tailings into water bodies. The standard states:

"Riverine and shallow marine disposal of mining and processing mineral waste must be avoided at new operations and projects. Any existing operations which already practice riverine or shallow marine disposal must continuously seek to reduce the environmental impacts.