Acid Rock Drainage Prediction and Control

A Intent

The intent of the standard is to ensure that Acid Rock Drainage (ARD) risks for Rio Tinto projects and operations are effectively identified through all phases of a mine and managed to prevent or minimise adverse environmental impacts and to reduce long-term costs and liabilities. The emphasis is on timely and thorough analysis of the risks, early identification and implementation of control (management) strategies and thorough integration of controls with mine planning and operational activities.

B Scope

This standard is applicable to all Rio Tinto Business Units and managed Operations. The requirements of this Standard are to be followed by all Operations that indicate existing or potential ARD conditions. The Standard covers the management of ARD through the complete mineral project development timeline from exploration through project development, approval and mining, changes in the orebody mineralogy and/or process conditions, through to closure and post-closure periods.

Other relevant documents are:

- Environmental Management System Standard
- Land Use Stewardship Standard
- Mineral Waste Management Standard
- Water Use and Quality Control Standard
- Rio Tinto Closure Standard (under preparation)
- Acid Rock Drainage Prediction and Control Guidance Note
- ARD – Early Warning Protocol for Exploration

C Requirements

Rio Tinto Business Units and/or managed Operations are required to:

1.0 *Planning*

1.1 Understand the geological setting and the mineralogy of sulphide containing rocks and adjacent lithology in order to support ARD potential and predictions studies.

1.2 Assess the ARD potential of any new development as part of exploration, order of magnitude, pre-feasibility and feasibility studies, due-diligence reviews for acquisitions, and also for changes in process and/or mineralogy.

1.3 Undertake appropriate environmental baseline studies for ARD before the commencement of a development project or any significant expansions of existing operations.

1.4 Due Diligence studies as part of potential project acquisitions must include assessment of the project current and potential ARD issues.

1.5 Maintain an ARD prediction program for forecasting the short-term and long-term behaviour under local weathering conditions of

a. The mineral bodies exposed to oxidation in open pits and underground mines;
b. Ores and other materials moved; and
c. Tailings and other process wastes stored.

1.6 Ensure the ARD prediction program reduces uncertainty about potential risk and liability to a level which permits a decision to be made to either reject the project or initiative, or to put in place effective mining and waste management strategies.

1.7 Ensure that recognised ARD experts are consulted for the initial assessment to determine whether there is an ARD issue at the site, design of the prediction program, the interpretation of its results, and the development of the management plan.

1.8 Develop an ARD management plan, commensurate with the ARD potential of mineral wastes and products and in line with the ARD prediction program, addressing as a minimum:

a. The prevention or limitation of ARD primary products generation;
b. The limitation of the mobilization and dispersion of ARD primary and secondary products;
c. The Maximisation of neutralisation and buffering reactions;
d. The compliance with regulated discharge limits and achieve receiving environment objectives;
e. The minimisation of reclamation and post closure liability;
f. The risks and impacts of potential modes of failure of the strategy.

2.0 *Implementation and Operation*

2.1 Implement the ARD Management Plan and make sure that it is integrated with mine and processing design, waste scheduling, closure planning, relevant operational procedures, and the business plan.

2.2 Maintain an inventory comprising quantities, location and representative characteristics of all materials extracted from a mine or exposed to oxidation with respect to their abilities to generate or mitigate ARD.

2.3 Assign accountabilities at each affected Operation for undertaking the ARD prediction program and for developing and implementing the ARD Management Plan.

2.4 Ensure that induction, general awareness and job specific training contains additional elements relating to ARD risks and how they are managed, where ARD is a significant issue for the operation. In such operations, the management team must have an appropriate knowledge of ARD prediction and control.

3.0 *Performance Measurement*

3.1 Maintain a monitoring procedure appropriate to the potential ARD impacts, which, as a minimum, allows adequate early warning and management decisions on ARD, facilitates the ongoing prediction program and confirms assumptions used in the management plan.

3.2 Arrange for independent review of the ARD Management Plan at regular intervals (at least every 4 years, or more frequently when operational or environmental conditions so dictate). The review must be carried out by an ARD expert and produce an independent document attesting the status of the prediction program and control strategies in place and indicating any potential threats to the Operation and the Rio Tinto Group.