

Group standard – D5 – Management of tailings and water storage facilities

HSE-B-23

Group: Standard	Function: Health, Safety, and Environment (HSE)	No. of Pages: 6
Approved: November 2020	Effective: 1 January, 2021	Auditable from: 1 July, 2021
Supersedes: Version 1		
Owner: Head of HSES	Approver: Stephen McIntosh	Target audience: All Rio Tinto staff and each Rio Tinto Group business and function

Direct linkages to other relevant policies, standards, procedures or guidance notes:

- Safety performance standards
- Environment performance standards
- Closure standard

Document purpose:

To support implementation of the Group Safety policy. This standard covers the management of risks associated with the operation of tailings storage facilities and water storage facilities.

Table of Contents

Scope and intent.....	3
Control requirements.....	4
1. Planning.....	4
2. Implementation and operation	5
3. Monitoring.....	6
Revision history	6

Scope and intent

The Safety standard *D5 - Management of tailings and water storage facilities* applies to all Rio Tinto projects, business units and managed operations, including new acquisitions, closed and legacy sites. The intent of the standard is to provide a framework for the identification, assessment and management of hazards and to minimise risks associated with tailings and water storage facilities in support of Group safety and business performance objectives. It covers all development phases from planning, design through construction, operation, closure and, post-closure where applicable.

The *Management of tailings and water storage facilities Group procedure* provides clarification and elaboration on the application of standard and its clauses and is intended to help implement the standard. The D5 Group procedure is a mandatory component of the D5 Safety standard and, together, these two documents are co-referenced as the 'D5 Standard' within this document.

Hazard assessment of all tailings and water storage facilities must be done with the Maximum Reasonable Consequence (MRC) approach as described in the D5 Group procedure. Tailings comprise residues from all mineral beneficiation, refining or smelting processes, power station ash and residues from water treatment.

Tailings storage facilities (TSFs) include surface storages, filtered stacks, thickened discharge, in-pit, below ground and co-disposal facilities, whether on land or in water. Underground backfill using tailings is not considered a TSF.

Water storage facilities (WSFs) are facilities for storage/retaining of water/liquid only and include above and below ground (dug into ground), lined and unlined facilities. Hydropower dams are considered WSFs and need to comply with all applicable clauses of the D5 Standard. Functionally associated structures of a TSF/WSF are considered part of the TSF/WSF in the application of the D5 Standard, as detailed in the D5 Group procedure. The D5 Standard does not apply to water or tailings tankage.

All Active¹ and Inactive¹ TSFs must comply with all clauses of the D5 Standard. TSFs of status Closed¹, Closed Active¹ and Closed Passive¹ with an MRC of level 5 or greater must comply with all clauses of the D5 Standard. WSFs with MRC of level 5 or higher, must be in conformance with all clauses of the D5 Standard other than clause 1.4. Other facilities and studies/projects that are at pre-feasibility or higher stage including those under construction are required to be in conformance with select clauses of the D5 Standard as described in the D5 Group procedure.

The site/asset must also comply with prevailing mining and environmental law and other applicable government legislation in the country or state in which it operates. It must also comply with relevant mining title and other regulatory approval licence conditions.

The responsibilities and accountabilities of the roles referred to in the D5 Standard are included in Appendix 2 of the D5 Group procedure.

Non-managed joint venture facilities are not directly covered by the D5 Standard. In accordance with the *Group joint venture procedure*, Rio Tinto seeks to bring a commensurate level of rigour and discipline to its joint ventures as it does to its wholly-owned and managed assets, through engagement and influence, subject to applicable laws.

¹ As defined in the accompanying D5 Group procedure

Title	Date released	Authorised by	Page
Group standard – D5 – Management of tailings and water storage facilities		Stephen McIntosh	Page 3 of 6

Control requirements

Requirements of D5 Standard apply in addition to any defined in the Rio Tinto management system standard. At all times, the minimisation of risk is the priority.

1. Planning

- 1.1 The General Manager responsible for the facility (GM Responsible) must assign a D5 Nominated Manager to be accountable for conformance with the D5 Standard and ensure the nominated manager has the availability and support resources to comply with this responsibly.
- 1.2 A Qualified Site Representative (QSR) must be appointed by the D5 Nominated Manager to be responsible for operation (including incremental construction) and monitoring of the TSF/WSF.
- 1.3 A Responsible Dam Engineer (RDE) role must be assigned by the GM Responsible or PG-SME² to provide technical support to the D5 Nominated Manager and assist with conformance to the D5 Standard. The RDE, D5 Nominated Manager and QSR could be the same person.
- 1.4 Sites must not rely upon TSFs for excess water storage functions beyond that required for clarification, storm surge and recycling of process water. Any existing dual storage of tailings and water must undergo a risk assessment and a study of potential alternatives to justify its continued operation in such a manner.
- 1.5 A Tailings Management Plan (TMP) and a Water Storage Plan (WSP) must be developed for a site to identify the risks and the resources, schedule and capital allowances required for the management of tailings/water for the life cycle of the facility including closure and post-closure.
- 1.6 The TMP/WSP must be reviewed annually and the plan(s) must be updated if and when material changes in input or operation of the plan are anticipated or encountered.
- 1.7 The site and technology selection, layout, and design of each TSF/WSF must be based on options evaluations, uncertainty assessment, and a formal risk assessment, as detailed in the D5 Group procedure. Closure and post-closure aspects must be considered in this process.
- 1.8 TSF/WSF life-of-facility designs must be prepared by a suitably qualified and experienced Design Engineer. The Design Engineer must take full responsibility for the studies completed and designs prepared by the design team and their impact on the overall life-of-facility design (including closure) and its performance.
 - 1.8.1 A dam break study is required to be completed to assess the hazard/consequence class of a facility and provide input to emergency response planning.
- 1.9 The life-of-facility design must adopt industry-accepted design criteria and design bases that are developed using leading practice design principles, studies and meet all applicable regulatory requirements.
 - 1.9.1 Hydrologic and earthquake design criteria must be developed by the Design Engineer and agreed to by the D5 Nominated Manager and PG-SME².
 - 1.9.2 Water balance studies must be completed to inform the design and need to be kept updated.
 - 1.9.3 Stability analyses must be completed using the appropriate methodology for all applicable loading cases to support the design.

² subject matter experts in dam safety and tailings management based centrally in the product group

Title	Date released	Authorised by	Page
Group standard – D5 – Management of tailings and water storage facilities		Stephen McIntosh	Page 4 of 6

- 1.10 The facility must be designed to minimise and manage risk during construction, operation, closure and post-closure.
- 1.11 The life-of-facility design and all design bases must be documented in a design report and must establish the final arrangement and technical feasibility of each facility. The design must contain the requirements for operating, monitoring and maintaining the facility with specific quantitative performance objectives.
- 1.12 The life-of-facility design must be reviewed by an independent specialist or an independent team, depending on the level of MRC and complexity of the project/facility.
- 1.13 The relevant requirements in the *Environment standards E11 (Water quality), E13 (Reactive waste), E14 (Land disturbance), D7 (Functional safety)* and the *Closure standard* must be implemented in the facility design.
- 1.14 The Operations Maintenance and Surveillance (OMS) manual must be prepared in collaboration with the Design Engineer consistent with the requirements outlined in the design report.
- 1.15 An emergency response plan (ERP) must be developed specific to the TSF/WSF and specify the roles, responsibilities, contacts and actions to be taken in the event of an actual or imminent uncontrolled release from the TSF/WSF. The site emergency response/action plan must include a section specific to the TSF/WSF.

2. Implementation and operation

- 2.1 An Independent Technical Review Board (ITRB) must be appointed by the GM responsible for the applicable facilities as described in the D5 Group procedure.
- 2.2 Each stage in the development of a TSF/WSF must have a detailed design, construction drawings and technical specifications prepared by the Design Engineer.
- 2.3 The detailed design must define the required construction performance acceptance criteria to ensure that the design objectives are practically achieved during construction.
- 2.4 The detailed design of each stage must be reviewed by an independent specialist or an independent team depending on the MRC and complexity of the facility prior to the start of construction.
- 2.5 Construction of each stage of a TSF/WSF must be reviewed and verified as conforming to the intent of the approved design by the Design Engineer or its representative.
- 2.6 Construction of each stage of TSF/WSF must be subject to appropriate Quality Control (QC) undertaken by either the builder or an independent consultant and to Quality Assurance (QA) undertaken by the D5 Nominated Manager or delegated representative.
- 2.7 Construction of each stage of the TSF/WSF must be supervised by a qualified supervisor and a construction report is required for each stage of the TSF/WSF that provides full detail of the construction, including the QA/QC results, variations from the design and as-built drawings.
- 2.8 The OMS manual, including trigger action response plan (TARP) must be kept updated and fully implemented in the operation/management of the facility.
- 2.9 A risk assessment must be completed for each TSF/WSF and summarised in a risk register and key TSF/WSF risks must be included in the site/operational risk register. Closure and post-closure management of the facility must be considered in the risk assessments.
- 2.10 Changes to the TMP/WSP, design, construction or operation (including changes to the OMS manual) of the facilities, closure/post-closure strategy or change of Design Engineer require formal Management of Change (MoC) processes that must document the risks and impacts of the proposed change, including opportunities to avoid or reduce impacts prior to implementation.
- 2.11 Personnel who carry out the day-to-day operations/management of the TSF/WSF must be trained and competent in the operation of the facilities and the recognition and identification of potential hazards associated with the facility.

Title	Date released	Authorised by	Page
Group standard – D5 – Management of tailings and water storage facilities		Stephen McIntosh	Page 5 of 6

3. Monitoring

- 3.1 Monitoring and design verification must be carried out at the frequency prescribed in the OMS manual and the data must periodically, but not less than once every year, be reviewed by the Design Engineer to ensure that the facility is operating within the design constraints.
- 3.2 All significant incidents and non-conformances in the operation of the facilities must be investigated, addressed and recorded.
- 3.3 Independent reviews of the operations must be conducted by qualified specialist(s). Frequency of independent operations reviews must not be less than once every two years. The reviewer(s) must complete and sign the record of inspection.

Revision history

Version No.	Effective Date	Prepared by	Reviewed by	Authorised by	Notes
1	August 2015	Bruce Brown	BU & T&I geotechnical practitioners	Kevin McLeish	
1.1		Imran Gillani and Tailings Working Group (TWG)	Mamie Pascoe		Adopted Consequence Category levels 1 through 8 from Rio Tinto risk management standard; Added requirement for ITRB