Government of **Western Australia**
Department of **Mines, Industry Regulation and Safety**
Resources Safety

Tailings storage facility audit – guide

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Introduction

This audit was reviewed and improvements made in June 2017. This audit was originally published in June 2003 under the title *Tailings dam HIF audit*.

Note: The Safety Regulation System (SRS) has replaced the AXTAT system and all reporting is done online through SRS.

List of abbreviations

AS Australian Standard
DER Department of Environment and Regulation
DMP Department of Mines and Petroleum
EPA Environmental Protection Authority
GP Good practice – villages would be expected to adopt and achieve industry standards
ISO International Standards Organisation
LR Legal requirement – villages are expected to have addressed these items
MSIA *Mines Safety and Inspection Act 1994*
MSIR Mines Safety and Inspection Regulations 1995
NZS New Zealand Standard
SRS The Department of Mines and Petroleum's online Safety Regulation System
r. Regulation (of the MSIR)
rr. Regulations (of the MSIR)
s. Section (of the MSIA)
ss. Sections (of the MSIA)
TSF Tailings Storage Facility

Supporting documentation

Documentation referred to in the village audits can be found via the links below:

- State Law Publisher, www.slp.wa.gov.au
  - *Mines Safety and Inspection Act 1994*
  - Mines Safety and Inspection Regulations 1995
- Department of Mines and Petroleum (DMP), mining safety publications, www.dmp.wa.gov.au/Safety/Mining-Safety-publications-16162.aspx
  - *Accident and incident reporting – guideline*
  - *Guide to Departmental requirements for the management and closure of tailings storage facilities (TSFs).*
  - *Guide to the preparation of a design report for tailings storage facilities (TSFs).*
- Safe Work Australia, Publications and resources, www.safeworkaustralia.gov.au/sites/swa/about/publications/pages/publication
- Australian and other standards, SAI Global, http://infostore.saiglobal.com/store/
  - AS 4801 *Occupational health and safety management systems – Specification with guidance for use*
  - AS/NZS ISO 9000 *Quality management systems – Fundamentals and vocabulary*
  - AS/NZS ISO 31000 *Risk management – Principles and guidelines*

1 Hazard rating

Hazard rating

Point	Standard	Guideline
1.1	A hazard rating has been assigned to the Tailings Storage Facility (TSF).	**Intent:** To verify compliance with the Department of Mines, Industry Regulation and Safety (DMIRS) Code of Practice Tailings Storage Facilities in Western Australia which requires assessment using a recognised hazard rating system. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View Department of Environment and Regulation (DER) Licence, view TSF design documentation, interview personnel. Refer to the DMIRS publication Guide to the preparation of a design report for TSFs.
1.2	The hazard rating has been derived by considering the potential environmental impact in the event of either a controlled or uncontrolled escape of material, seepage and/or abrupt failure of the storage embankment at any stage in its life.	**Intent:** To verify compliance with the DMIRS Code of Practice Tailings Storage Facilities in Western Australia which requires assessment using a recognised hazard rating system. **Personnel:** Registered Manager, senior Metallurgist or person appointed to manage the TSF. **Method:** View DER Licence application documentation, view TSF design documentation, interview personnel. Refer to the DMIRS publication Guide to the preparation of a design report for TSFs.
1.3	The hazard rating has been derived by considering the potential impact in terms of safety on any nearby community infrastructure and/or mining developments (including the tailings storage operator) in the event of either controlled or uncontrolled escape of material, seepage and/or abrupt failure of the storage embankment at any stage in its life.	**Intent:** To verify compliance with the DMIRS Code of Practice Tailings Storage Facilities in Western Australia which requires assessment using a recognised hazard rating system. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View DER Licence application documentation, view TSF design documentation, interview personnel. Refer to the DMIRS publication Guide to the preparation of a design report for TSFs.

1.4	The hazard rating has been derived by considering the potential impact in terms of economics on any nearby community infrastructure and/or mining developments (including the tailings storage operator) in the event of either a controlled or uncontrolled escape of material, seepage and/or abrupt failure of the storage embankment at any stage in its life.	**Intent:** To verify compliance with the DMIRS Code of Practice Tailings Storage Facilities in Western Australia which requires assessment using a recognised hazard rating system. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View DER Licence application documentation, view TSF design documentation, interview personnel. Refer to the DMIRS publication Guide to the preparation of a design report for TSFs.
1.5	Changes in the operation of the TSF or the surrounding infrastructure have resulted in a re-evaluation of the TSF hazard rating.	**Intent:** To verify compliance with the DMIRS Code of Practice Tailings Storage Facilities in Western Australia which requires re-assessment after changes in or around the mining operation. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View DER Licence application documentation and compare the current infrastructure and operational status with that described, interview personnel.

2 Design and construction

Design and construction

Point	Standard	Guideline
2.1	The TSF has been designed in accordance with the DMIRS publication Code of Practice Tailings Storage Facilities in Western Australia.	**Intent:** To verify compliance with the DMIRS Code of Practice Tailings Storage Facilities in Western Australia design criteria. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View Certificate of Compliance Tailings Storage Facility Design issued by certifying registered engineer. Refer to the DMIRS publication Guide to the preparation of a design report for TSFs.
2.2	The TSF has been constructed in accordance with the design.	**Intent:** To verify compliance with the DMIRS Code of Practice Tailings Storage Facilities in Western Australia construction criteria. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View Certificate of Compliance Tailings Storage Facility Construction and Operation issued by certifying registered engineer. Refer to the DMIRS publication Guide to Departmental requirements for the management and closure of TSFs.
2.3	Periodic operating audits are submitted as required by the DMIRS publication Code of Practice Tailings Storage Facilities in Western Australia.	**Intent:** To verify compliance with the DMIRS Code of Practice Tailings Storage Facilities in Western Australia periodic reporting requirement. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View selection of annual reports submitted. Refer to the DMIRS Guide to Departmental requirements for the management and closure of TSFs.

2.4	Changes from the original design were documented during construction.	**Intent:** To verify that any changes to the original design have been documented. **Personnel:** Registered Manager, Senior Metallurgist or person appointed to manage the TSF. **Method:** View construction records, inspect the TSF and interview personnel.
2.5	Records of construction quality control checks are available.	**Intent:** To verify that quality control checks during construction were documented. **Personnel:** Registered Manager, Senior Metallurgist or person appointed to manage the TSF. **Method:** View construction records, interview personnel.
2.6	The specified monitoring equipment is installed.	**Intent:** To verify that the specified monitoring equipment is installed. **Personnel:** Registered Manager, Senior Metallurgist or person appointed to manage the TSF. **Method:** View DER Licence conditions, interview personnel and inspect the installed monitoring equipment.

3 Dam Break assessment

Dam Break assessment

Point	Standard	Guideline
3.1	Category 1 TSFs have a documented 'Dam Break Risk Assessment'.	**Intent:** To verify that Category 1 TSFs have a documented 'Dam Break Risk Assessment'. **Personnel:** Registered Manager, Senior Metallurgist or person appointed to manage the TSF. **Method:** View 'Dam Break Risk Assessment' documentation, interview personnel. Refer to the DMIRS Code of Practice Tailings Storage Facilities in Western Australia.

4 Operation

Operation

Point	Standard	Guideline
4.1	There is a TSF Operating Plan.	**Intent:** To verify that there is a documented Operating Plan for the TSF to comply with the requirements of the DMIRS Code of Practice Tailings Storage Facilities in Western Australia. **Personnel:** Registered Manager, Senior Metallurgist or person appointed to manage the TSF. **Method:** View TSF Operating Plan documentation, interview personnel. Refer to the DMIRS Guide to Departmental requirements for the management and closure of TSFs.

4.2	The Operating Plan describes the deposition methodology.	**Intent:** To verify that there is a documented Operating Plan for the TSF that complies with the requirements of the DMIRS Code of Practice Tailings Storage Facilities in Western Australia. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View TSF Operating Plan documentation, interview personnel. Refer to the DMIRS Guide to Departmental requirements for the management and closure of TSFs.
4.3	The Operating Plan describes the measures for pond control and water management.	**Intent:** To verify that there is a documented Operating Plan for the TSF that complies with the requirements of the DMIRS Code of Practice Tailings Storage Facilities in Western Australia. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View TSF Operating Plan documentation, interview personnel. Refer to the DMIRS Guide to Departmental requirements for the management and closure of TSFs.
4.4	The Operating Plan specifies the method of seepage control.	**Intent:** To verify that there is a documented Operating Plan for the TSF that complies with the requirements of the DMIRS Code of Practice Tailings Storage Facilities in Western Australia. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View TSF Operating Plan documentation, interview personnel. Refer to the DMIRS Guide to Departmental requirements for the management and closure of TSFs.

4.5	The Operating Plan specifies the pipeline management system.	**Intent:** To verify that there is a documented Operating Plan for the TSF that complies with the requirements of the DMIRS Code of Practice Tailings Storage Facilities in Western Australia. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View TSF Operating Plan documentation, interview personnel. Refer to the DMIRS Guide to Departmental requirements for the management and closure of TSFs.
4.6	The Operating Plan describes the TSF geometry at all stages of its life.	**Intent:** To verify that there is a documented Operating Plan for the TSF that complies with the requirements of the DMIRS Code of Practice Tailings Storage Facilities in Western Australia **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View TSF Operating Plan documentation, interview personnel. Refer to the DMIRS Guide to Departmental requirements for the management and closure of TSFs.
4.7	The Operating Plan includes provision for dust control.	**Intent:** To verify that there is provision to control dust emissions from the TSF. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View TSF Operating Plan documentation, interview personnel.
4.8	Modifications to the Operating Plan are documented when they occur.	**Intent:** To verify that changes to the TSF Operating Plan are documented when they occur. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View TSF Operating Plan documentation, interview personnel.

4.9	The actual operating characteristics of the TSF have been assessed against the original design assumptions.	**Intent:** To verify that the actual operating characteristics of the TSF have been assessed against the original design assumptions. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View TSF Operating Plan documentation, Annual Reports etc, interview personnel.
4.10	Periodic geotechnical and engineering reports are submitted as outlined in the DMIRS publication Guide to Departmental requirements for the management and closure of TSFs.	**Intent:** To verify compliance with the DMIRS Code of Practice Tailings Storage Facilities in Western Australia reporting criteria. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View periodic Geotechnical and Engineering Reports. Refer to the DMIRS Guide to Departmental requirements for the management and closure of TSFs.
4.11	The recommendations included in the annual geotechnical and engineering reports have been acted upon.	**Intent:** To verify compliance with the DMIRS Code of Practice Tailings Storage Facilities in Western Australia reporting criteria. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View a selection of the periodic Geotechnical and Engineering Reports. Interview personnel. Refer to the DMIRS Guide to Departmental requirements for the management and closure of TSFs.
4.12	The TSF site is secured against access by unauthorised personnel.	**Intent:** To verify that there is provision to control access to the TSF. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View the TSF, interview personnel.

4.13	Roads on and around the TSF are designed for the equipment using them.	**Intent:** To verify that the roads on the TSF are suitable for the equipment using them. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View the TSF and equipment used there, interview personnel.
4.14	The TSF roads are demarcated by windrows, railings or other such indicators of safe travel limits.	**Intent:** To verify that there is provision to control traffic on the TSF. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View the TSF, interview personnel.
4.15	The TSF roads are controlled by suitable signage indicating speed limits, direction etc.	**Intent:** To verify that there is provision to control traffic on the TSF. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View the TSF, interview personnel.
4.16	Traffic control measures on the TSF are effective at night.	**Intent:** To verify that there is provision to control traffic at night on the TSF. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View the TSF, interview personnel.
4.17	Where there is deep water in a TSF, rescue equipment is provided.	**Intent:** To verify that there is provision for life-saving equipment where the TSF has deep water in it. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View the TSF, interview personnel.

5 Management

Management

Point	Standard	Guideline
5.1	A responsible person has been appointed in writing to manage the TSF.	**Intent:** To verify that a responsible person has been appointed under MSIA Section 44 to manage the TSF. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View the MSIA Section 44 appointment, interview personnel.
5.2	Individual roles and responsibilities have been documented for operators working on the TSF.	**Intent:** To verify that operators on the TSF have full job descriptions. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF, and operators. **Method:** View a selection of position descriptions and work procedures for TSF operators, interview personnel.
5.3	The TSF Operating Plan is available to the operators.	**Intent:** To verify that the documented Operating Plan for the TSF complies with the requirements of the DMIRS Code of Practice Tailings Storage Facilities in Western Australia and that this is available to persons working on the TSF. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF, and operators. **Method:** Establish that the TSF Operating Plan is available, interview personnel.
5.4	There is a training program in place for TSF operators.	**Intent:** To verify that there is a documented Training Program for TSF operators. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF and operators. **Method:** View TSF operator training program documentation, interview personnel.

5.5	There is an incident reporting procedure for the TSF.	**Intent:** To verify that there is an incident reporting system in place for the TSF that complies with the requirements of the DMIRS Code of Practice Tailings Storage Facilities in Western Australia. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF and operators. **Method:** To verify that there is an incident reporting system in place for the TSF that complies with the requirements of the DMIRS Code of Practice Tailings Storage Facilities in Western Australia.

6 Monitoring and auditing

Monitoring and auditing

Point	Standard	Guideline
6.1	Routine inspections of the TSF are carried out on each shift.	**Intent:** To verify that there is a routine inspection schedule for the TSF. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF and operators. **Method:** View TSF inspection records/shift logs etc., interview personnel.
6.2	The findings of the routine inspections are recorded.	**Intent:** To verify that the findings of the routine inspections of the TSF are recorded. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF and operators. **Method:** View TSF inspection records/shift logs etc., interview personnel.
6.3	Operating audits are conducted every year for Category 1 TSFs and every 2 years for Category 2 TSFs.	**Intent:** To verify that operating audits are conducted for the TSF in compliance with the requirements of the DMIRS Code of Practice Tailings Storage Facilities in Western Australia. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View a selection of TSF Annual Operating Audit documentation, interview personnel.
6.4	Groundwater monitoring is carried out as per the DER licence for the TSF.	**Intent:** To verify that groundwater monitoring is carried out as per the DER licence for the TSF and in compliance with the requirements of the DMIRS publication Code of Practice Tailings Storage Facilities in Western Australia. **Personnel:** Registered Manager, Senior Metallurgist or person appointed to manage the TSF. **Method:** View DER Licence and a selection of groundwater monitoring reports, interview personnel.

6.5	The monitoring equipment is kept in calibration.	**Intent:** To verify that the monitoring equipment is kept in calibration. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View calibration reports for the monitoring equipment, interview personnel.
6.6	The monitoring frequency complies with licence conditions.	**Intent:** To verify that the monitoring regime complies with DER licence. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View DER Licence conditions and monitoring schedule, interview personnel.
6.7	The monitoring results are documented, interpreted and assessed.	**Intent:** To verify that the monitoring results are documented, interpreted and assessed. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View monitoring reports, interview personnel.
6.8	The actions to be taken are specified when monitoring results fall outside tolerance limits.	**Intent:** To verify that the actions to be taken when monitoring results fall outside tolerance limits are documented. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View the monitoring documentation, interview personnel.
6.9	A permanent survey monitoring grid is in place for the TSF.	**Intent:** To verify that a permanent survey grid is in place for the TSF. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF and surveyor. **Method:** Inspect the TSF and survey plans, interview personnel.

6.10	There is a TSF stability monitoring program in place.	**Intent:** To verify that a TSF stability monitoring program is in place. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF and surveyor. **Method:** View TSF stability monitoring reports, interview personnel.
6.11	The results of the TSF stability monitoring program are documented, interpreted and assessed.	**Intent:** To verify that a TSF stability monitoring program is documented, interpreted and assessed. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF and surveyor. **Method:** View TSF stability monitoring reports, interview personnel.
6.12	The actions to be taken are specified should the TSF stability monitoring results fall outside the tolerance limits.	**Intent:** To verify that the actions to be taken are documented when monitoring results fall outside tolerance limits. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF and surveyor. **Method:** View the monitoring documentationt, interview personnel.

7 Emergency plan

Emergency plan

Point	Standard	Guideline
7.1	There is a specific Emergency Plan for incidents that may occur at the TSF.	**Intent:** To verify that there is a documented Emergency Plan for the TSF that complies with the requirements of the DMIRS Code of Practice Tailings Storage Facilities in Western Australia. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF and operators. **Method:** View TSF Emergency Plan documentation, interview personnel. Refer to the DMIRS Guide to Departmental requirements for the management and closure of TSFs.
7.2	The TSF Emergency Plan contains details of any evacuation procedure that may be required in the event of failure, or impending failure of the TSF.	**Intent:** To verify that there is a documented Emergency Plan for the TSF that complies with the requirements of the DMIRS Code of Practice Tailings Storage Facilities in Western Australia. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF and operators. **Method:** View TSF Emergency Plan documentation, interview personnel. Refer to the DMIRS Guide to Departmental requirements for the management and closure of TSFs.
7.3	The TSF Emergency Plan contains a diagram indicating the whereabouts of a muster point.	**Intent:** To verify that there is a documented Emergency Plan for the TSF that complies with the requirements of the DMIRS Code of Practice Tailings Storage Facilities in Western Australia. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF and operators. **Method:** View TSF Emergency Plan documentation, interview personnel.

7.4	The TSF Emergency Plan contains a list of names and residential addresses of all nominated emergency response personnel and their home/emergency contact telephone numbers.	**Intent:** To verify that there is a documented Emergency Plan for the TSF that complies with the requirements of the DMIRS Code of Practice Tailings Storage Facilities in Western Australia. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View TSF Emergency Plan documentation, interview personnel.
7.5	The TSF Emergency Plan contains a list of the telephone numbers of the local/regional emergency services (fire, ambulance, police etc.)	**Intent:** To verify that there is a documented Emergency Plan for the TSF that complies with the requirements of the DMIRS Code of Practice Tailings Storage Facilities in Western Australia. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View TSF Emergency Plan documentation, interview personnel.
7.6	The TSF Emergency Plan contains a list of all personnel that are associated with operation of the TSF and evidence that they have attended and understood all relevant induction/safety procedures.	**Intent:** To verify that there is a documented Emergency Plan for the TSF that complies with the requirements of the DMIRS Code of Practice Tailings Storage Facilities in Western Australia. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF and operators. **Method:** View TSF Emergency Plan training documentation and records, interview personnel.

8 Closure

Closure

Point	Standard	Guideline
8.1	A Closure Plan has been drawn up for the TSF.	**Intent:** To verify that there is a documented Closure Plan for the TSF that complies with the requirements of the DMIRS publication Code of Practice Tailings Storage Facilities in Western Australia. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View TSF Closure Plan documentation, interview personnel. Refer to the DMIRS Guide to the preparation of a design report for TSFs for closure considerations at design stage. Refer to the DMIRS Guide to Departmental requirements for the management and closure of TSFs for preparation of final closure plans. Refer to the Environmental Protective Authority (EPA) publication Guidelines for Preparing Mine Closure Plans, June 2011.
8.2	Roles and responsibilities have been documented for key personnel involved in the closure process.	**Intent:** To verify that there are documented roles and responsibilities for key personnel involved in the closure of the TSF. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View TSF Closure Plan documentation, interview personnel.
8.3	A hazard analysis has been conducted for the long term stability of the TSF structure post closure.	**Intent:** To verify that there is a documented hazard analysis for the long term stability of the TSF after closure. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View TSF Closure Plan documentation, interview personnel.

8.4	A risk assessment has been conducted for the long term stability of the TSF structure post closure.	**Intent:** To verify that there is a documented risk assessment for the long term stability of the TSF after closure. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View TSF Closure Plan documentation, interview personnel.
8.5	The Closure Plan includes decommissioning and rehabilitation aspects for the decommissioned TSF structure.	**Intent:** To verify that decommissioning and rehabilitation aspects are documented in the Closure Plan. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View TSF Closure Plan documentation, interview personnel.
8.6	Where operational changes have occurred the Closure Plan has been revised to take the changes into account.	**Intent:** To verify that where there have been any operational changes the Closure Plan has been revised to take the changes into account. **Personnel:** Registered Manager, senior metallurgist or person appointed to manage the TSF. **Method:** View TSF Closure Plan documentation, interview personnel.