



# GROUP ENVIRONMENTAL STANDARD 3 MINERAL WASTE MANAGEMENT

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## 1. INTENT

IGO is committed to best practice management of mineral waste to minimise environmental impacts, protect the community and reduce long-term post-closure liabilities. Mineral waste includes all rock and tailings generated through mining and processing.

## 2. APPLICATION

This standard outlines the requirements for the management of mineral waste at all IGO operations in line with IGO's Environmental Policy. All IGO operations and projects shall comply with the provisions of this standard, and all legislative requirements relevant to each project jurisdiction.

## 3. OBJECTIVES

The objectives of this standard are to:

- Minimise the risk of unacceptable environmental impacts associated with the disposal of mineral waste;
- Promote mineral waste management as a normal and integral part of mine planning;
- Incorporate mineral waste generation modelling into both storage facility planning and design, and mine closure planning, for the purpose of reducing long-term post-closure environmental liabilities; and
- Ensure rehabilitated mines and exploration areas are physically safe to humans and animals, geo-technically stable, geo-chemically non-polluting and non-contaminating, and are capable of sustaining an agreed post-mining land use.

## 4. RISK ASSESSMENT

Mineral waste management must be risk assessed at each stage of the project life including prefeasibility, feasibility, during operations, and as part of rehabilitation and closure planning. A risk assessment must be completed each a time new facility is developed or significantly modified from current design during operations. Risk assessments must:

- Consider statutory obligations;
- Identify and address 'loss of containment' scenarios which result in facilities failing to contain mineral waste. Scenario evaluation must include both catastrophic failure and long-term erosion;
- Address the potential risks arising from the physical and geochemical properties of mineral waste in relation to both environmental impacts and threat to public health; and
- Define the mitigation measures to reduce or mitigate the identified risks.

For further information on the risk assessment methodology refer to *Common Management System Standard 3 – Risk Management*.

## 5. MINERAL WASTE MANAGEMENT PLAN

A Mineral Waste Management Plan (MWMP) shall be developed for any operation that generates waste rock and/or tailings. The MWMP shall be integrated with mine design, waste rock and tailings scheduling and closure planning. As a minimum, the MWMP must include:

- Risk assessment (Section 4);
- Mineral waste scheduling and inventory management;
- Mineral waste characterisation (Section 6);
- Facility planning and site selection (Section 7);
- Facility design and construction (Section 8);
- Reference to the site's operating procedures for mineral waste management (Section 9);
- Reference to relevant regulatory and legislative requirements;
- A summary of the baseline environmental studies and characteristics relevant to the site; and
- An overview of monitoring and inspection procedures relating to waste rock management (Section 10).

The MWMP shall be reviewed every three years or upon significant changes to the design, risk or management measures associated with the mineral waste storage facilities, by a suitably qualified engineering specialist.

**Note:** A MWMP may also be appropriate where exploration is likely to require bulk sampling methodologies.

## 6. MINERAL WASTE CHARACTERISATION

Physical and geochemical characterisation of mineral waste shall be completed to:

- determine the presence or otherwise of minerals that have the potential to cause unacceptable environmental impacts, or pose a threat to public health (*refer IGO Group Environmental Standard 2 – Social & Environmental Impact Assessment*); and
- identify materials that be useful during mine rehabilitation works;

Third-party expert advice shall be sought to determine sampling methodology and the set of the physical and geochemical characteristics to be assessed. Analysis of samples shall be completed by an accredited and suitably experienced third-party laboratory in accordance with relevant Australian and International Standards;

- Waste characterisation must occur:
- during feasibility studies using drill core;
- prior to design of any new mineral waste storage facilities; and
- at least annually during mining operations.

## 7. FACILITY PLANNING AND SITE SELECTION

Baseline environmental conditions must be considered as part of the planning and site selection process for all mineral waste storage facilities. Specifically, consideration must be given to:

- life of mine planning and the potential for resource sterilisation;
- foundation geotechnical properties, landscape topography, surface and ground water hydrology, geochemical properties of the foundation materials, climate, seismicity, the flora and fauna of the area to be cleared for the structure, and the downstream environmental receptors and land users; and
- the approved Mine Closure Plan, and specifically requirements related to progressive and final rehabilitation requirements, visual amenity and the end land use (refer *IGO Group Environmental Standard 1 – Rehabilitation & Mine Closure*).

IGO will not approve riverine disposal mineral wastes (including dredging spoil), nor near-shore marine disposal of mineral wastes. CEO approval is required for deep sea disposal of mineral wastes.

## 8. FACILITY DESIGN AND CONSTRUCTION

Mineral waste storage facilities shall be designed to:

- encapsulate potentially problematic waste types;
- achieve a design geometry (specifically including footprint, height and batter angles);
- with consideration of long-term erosion modelling;
- incorporate engineered drainage structures; and
- achieve the approved rehabilitation and mine closure planning outcomes.

During construction, a mineral waste tracking system shall be implemented such that the volumes and nature of the waste placed in any given facility is known. A process must be in place to both drive construction of facilities to design and examine and respond to design variance.

## 9. OPERATING PROCEDURES

Operating procedures must be developed and implemented for mineral waste storage facilities. At a minimum, operating procedures shall cover:

- Facility operation and management to design;
- Monitoring and inspections; and
- Progressive rehabilitation.

## 10. INSPECTION, MONITORING AND REPORTING

Mineral waste storage facilities must be monitored and inspected in accordance with all relevant regulatory and legal requirements, and the site's MWMP through the facilities life cycle. These inspections shall involve:

- Annual geotechnical monitoring, carried out by suitably qualified specialists to ensure the safety and stability of the facility.
- Periodic monitoring and reporting of geochemical behaviour of mineral waste, groundwater and runoff waters.

Significant non-conformities and corrective actions shall be recorded in INX.

## 11. RESPONSIBILITIES

It is the responsibility of the:

- General Manager/Resident Manager to ensure that their site has a current MWMP.
- Mine Manager to ensure the implementation of the MWMP.
- Senior Site Environmental Advisor to ensure geochemical characterisation is undertaken, monitoring and inspections are conducted and rehabilitation plans are developed.

## 12. DATA MANAGEMENT

IGO's operations shall capture and retain all data relevant to the management and storage of mineral waste. Information may include, but not be limited to, mineral waste characteristics, volumes, technical studies and reports, spatial datasets, design and construction information, operation and monitoring information and other relevant information (e.g. maps, area statistics and modelled environmental impacts, etc).

## 13. RELATED DOCUMENTS

- *IGO Group Environmental Standard 1 – Rehabilitation & Mine Closure*
- *IGO Group Environmental Standard 2 – Social & Environmental Impact Assessment.*

## 14. DEFINITIONS

**Mineral waste** refers to all mining and mineral processing waste, including waste rock, tailings, backfill material and other mineral residues, such as drill core. The material can be in liquid or solid form, as a slurry or paste and excludes domestic, medical, industrial and hazardous substances.

**Mineral waste storage facility** refers to both temporary or long-term surface dump or stockpile of mineral wastes that may contain very low grades of ore at levels that cannot be processed profitably.