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## Mine closure and reclamation planning —

### Part 1: Requirements

*Planification de la fermeture et de la restauration des mines —*

*Partie 1: Exigences*

ICS: 73.020

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CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents shall be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. [www.iso.org/directives](http://www.iso.org/directives)

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 82, *Mining, SC 7, Mine Closure and Reclamation Management*.

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## Introduction

This standard provides requirements and recommendations for mine closure and reclamation planning applicable to both new and operating mines. The overarching objective is to promote consistency and quality in planning for mine closure and reclamation internationally. A second document provides additional guidance.

The intended audience are those with responsibility for, or an interest in, planning for mine closure and reclamation. This includes mine planners and designers, mine operators, regulators, environmental assessors, communities, Indigenous Peoples, and financial stakeholders, amongst others.

Early, continual and comprehensive mine closure and reclamation planning is essential for all new and operating mines because it:

- Leads to the highest degree of environmental and social success, usually at a lower cost than if mine closure and reclamation planning is not done from the beginning of the mining project;
- Reduces risks and liabilities throughout the mine's operational life and on closure;
- Allows for stakeholder involvement throughout, so that relevant knowledge and understanding are brought into the planning process;
- Allows for devoting more attention to sustainable development activities identifying socio-economic opportunities for the various closure phases;
- Helps build trust with governments, stakeholders and international communities;
- Provides additional planning time to understand the complexity of the biophysical characteristics and socio-economic context of each mine site;
- Provides for continual improvement and updating of closure and reclamation plans;
- Allows companies to better integrate closure and reclamation activities with operations;
- Provides time to identify, research and develop new technologies for mine closure strategies and mine closure treatments that increase robustness and resilience of mine closure and reclamation; and
- Allows companies to better provision for and schedule closure and reclamation funding.

There are many leading practices and guidance documents related to mine closure and reclamation planning available in various jurisdictions and used by many mining companies and stakeholders. This document captures the intent of such guidance documents so that it can be applied globally.

# Mine closure and reclamation planning —

## Part 1: Requirements

### 1 Scope

This document specifies a framework and processes involved in mine closure and reclamation planning for new and operating mines.

Requirements and recommendations are provided on:

- Mine closure and reclamation plan objectives and commitments
- Technical procedures and techniques, including
  - o Mine site characterization
  - o Physical and chemical stability
  - o Contaminated media
  - o Infrastructure decommissioning and disposal
  - o Post-closure land use plan
  - o Alternatives and opportunities analyses
  - o Reclamation
  - o Progressive mine closure and reclamation
  - o Mine closure and reclamation schedule
  - o Mine closure and reclamation cost estimate
  - o Management of risks and opportunities
- Mitigating socio-economic impacts
- Financial assurance and associated planning
- Mine closure and reclamation planning for unplanned closure
- Post-closure management plan
- Mine closure and reclamation plan documentation

This document does not provide detailed survey, testing or monitoring methods, detailed engineering procedures, detailed product requirements, or detailed construction and operational procedures. Occupational health and safety management related to closure and reclamation, construction and exploration activities is excluded from this document.

This document is not intended to be applied to closure and reclamation of abandoned mines.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/DIS 20305, *Mine Closure and Reclamation - Vocabulary*

ISO 31000:2018, *Risk management — Guidelines*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO DIS 20305 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

## 4 Mine closure and reclamation planning framework

Six framework elements, shown in [Figure 1](#) and detailed in [clause 5](#), form the foundation for establishing and maintaining effective mine closure and reclamation planning. Meanwhile, details are also provided on the processes, activities and steps necessary to implement the framework (see [clause 6](#)).

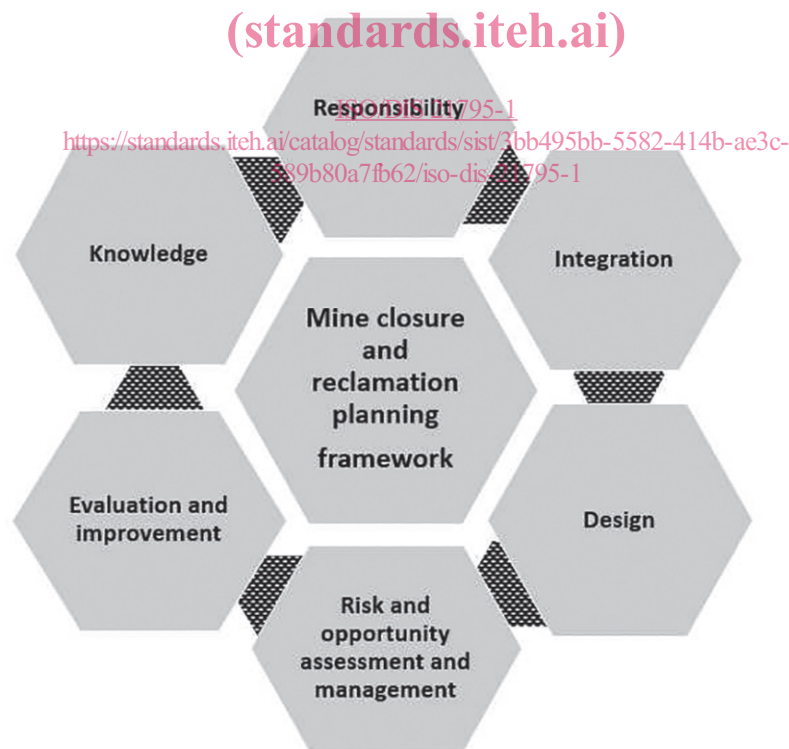


Figure 1 — Mine closure and reclamation planning framework

Each framework element is further explained below.

**Responsibility;** inherent to the entire mine closure and reclamation planning process is company responsibility (see [clause 5.1.1](#)), including stakeholder engagement (see [clause 5.1.2](#)) and that



local jurisdictional requirements can exist (see [clause 5.1.3](#)). Critical to responsibility is financial management and provisioning for closure (see Clause 5.14).

**Integration;** mine closure and reclamation planning is an integral part of the mining life cycle, including with respect to physical and chemical controls for sustainable land and water use (see [clause 5.2.1](#)), that mine closure and reclamation treatments are required to be resilient (see [clauses 5.2.2](#) and [5.2.3](#)), and socio-economic considerations in the transition to closure are considered (see [clause 5.2.4](#)), Engagement with stakeholders on mine closure and reclamation (see [clause 5.1.2](#)) is also a critical element.

**Design;** developed in the context of meeting closure and rehabilitation objectives which in turn are developed in consultation with stakeholders (see [clauses 5.3/1](#) and [5.1.2](#)). Robust lifecycle design and management should reflect this so as to facilitate successful mine closure and reclamation (see [clause 5.3.3](#)).

**Risk and opportunity assessment and management;** the process to assess and manage mine closure and reclamation risks, and to identify and act on opportunities throughout the life of mine (see [clause 5.4](#)).

**Evaluation and improvement;** quality assurance provides the maintenance of the mine closure and reclamation planning standard at the corporate and operational level (see [clause 5.5.1](#)), while the process of adaptive management facilitates continuous improvement through the life of mine (see [clause 5.5.2](#)).

**Knowledge;** identifying uncertainty through knowledge gaps, building knowledge, managing, disseminating and retaining knowledge and data that support mine closure and reclamation planning throughout the life of mine and beyond (see [clause 5.6](#)).

## 5 Framework elements for mine closure and reclamation planning

### 5.1 Responsibility

#### 5.1.1 Company responsibility

Mine closure and reclamation are company responsibilities, and the associated planning shall be incorporated in company policies and procedures and be endorsed by company executives with enough authority to allocate the necessary financial and human resources. Companies shall demonstrate that they have internal procedures and standards emanating from the company's policies to conduct mine closure and reclamation planning that is embedded within organizational systems.

The respective roles and responsibilities for mine closure and reclamation for any given mine site shall be established and clearly documented in relevant corporate and operating policies, plans and procedures. Individuals responsible for mine closure and reclamation planning shall have the necessary competencies, including education, training and experience to meet regulatory and other requirements.

#### 5.1.2 Stakeholder engagement

Planning shall ensure stakeholders are engaged at all stages of the life-of-mine planning process. Outcomes of engagement shall be addressed in mine closure and reclamation plans and in their implementation. Stakeholders shall be identified early and updated progressively and include, the host and downstream communities, regulators, non-government organizations, investors, community groups, as well as future land and water users.

#### 5.1.3 Regulations

Mine closure and reclamation planning and design can be covered in local, national and regional regulations.

#### 5.1.4 Financial plan

The company shall develop a financial plan, that details the financial provision required at different stages of the mine's life, cash flow, including unplanned closure, as well as for the life of mine, which ensures funding to fulfill the commitments of the mine closure and reclamation plan.

### 5.2 Integration

#### 5.2.1 Physical and chemical control for sustainable land and water use

Mine closure and reclamation planning and design shall meet the required obligations and leave the mine site in a stable and safe condition and provide for ongoing post-mining land use. Mine features shall not release chemicals into the air, water or surrounding soils that result in significant impacts to human health or the environment as determined by site-specific risk assessments.

To meet these requirements the company shall establish mine closure and reclamation objectives and measurable completion criteria. The company also shall provide for monitoring of the success of mine closure and reclamation activities.

#### 5.2.2 Mine closure and reclamation treatment resilience

Mine closure and reclamation treatments shall be resilient so that they monitor, detect and respond to risks in a dynamic environment. The treatments provide stability of focus on commitments prior to, during, or following changes and disturbances, so that objectives are met and sustained under both expected and unexpected conditions.

Mine closure, reclamation planning and design shall provide sufficient resilience to reduce the risk of catastrophic and/or chronic failure and to enhance the potential for post closure facilities and landforms to adapt to changed conditions and to self-heal as necessary following damaging natural events with minimal active management. Well established stakeholder engagement shall build resilience by providing engagement during dynamic processes of mine closure and reclamation planning. The mine closure and reclamation plan shall also demonstrate that post closure facilities and landforms have been designed for closure in a manner sufficiently resilient to cope with the effects of climate change.

#### 5.2.3 Long-term post-closure, reclamation and relinquishment

The post-closure phase toward relinquishment, shall provide for adaptive management, and for ongoing environmental protection until completion criteria and post mining land use requirements are met, and shall include site management that provides necessary monitoring, inspections, reporting, maintenance, and repairs, as well as regular certifications of the integrity of mine waste containment structures to the point of long term closure and relinquishment. Secure long-term funding shall be available to support these activities.

The mine closure and reclamation plan shall consider options for potential access controls to protect human health and safety and the integrity of the post closure environment and post mining landforms. Access controls can include physical controls that are compatible with the land use objectives and/or include legal land use restrictions or covenants on the property.

Mine site relinquishment plans shall be established which provide a management, financial and administrative structure to support the necessary activities discussed above and which describe which of these responsibilities the mining company will transfer to other entities, including other companies, governmental agencies and landowners, amongst others.

#### 5.2.4 Social transition to closure

Stakeholder engagement is integral to developing plans for social transition. Planning for social transition shall include provision for social transition costs and for potential social investment projects that will support communities when mining ends.

## 5.3 Design

### 5.3.1 Mine closure and reclamation objectives

Mine closure and reclamation objectives shall be established as a basis for mine closure and reclamation planning. With equal priorities, these objectives shall include the management of human health and environmental risks, providing for the sustainability of the mine closure and reclamation works and resulting land uses, and reducing long-term maintenance requirements and liabilities.

Objectives shall also address socio-economic aspects of mine closure and reclamation. This shall include managing the transition of the workforce and communities through to and beyond closure. It shall also consider future post-closure opportunities provided by the closed and reclaimed site for the local communities, and Indigenous Peoples where relevant.

Closure criteria will be developed which can measure the success of the mine closure and reclamation objectives.

### 5.3.2 Timely mine closure and reclamation planning

For new mines, mine closure and reclamation planning, including the associated post mining land use planning, shall commence with the initial mine development planning, be included in the environmental assessment and permitting of the mining project and be continually refined and updated thereafter as necessary. For operating mines, mine closure and reclamation planning shall be undertaken as soon as possible in accordance with the requirements in this document. Stakeholder engagement shall be undertaken to share knowledge and reach agreement on mine closure and reclamation objectives and post-mining land uses and timing of works.

### 5.3.3 Mine design and operation for mine closure and reclamation

Mine closure and reclamation objectives, risks and opportunities shall be identified within the planning, design and operation of post closure facilities and post mining landforms. Scheduling of progressive reclamation shall be included for mine features and domains such as tailings and mine rock management, mine pits, underground workings, heap leach management facilities, processing facilities, water management infrastructure, and all forms of supporting and service infrastructure to optimise mine closure and reclamation outcomes.

## 5.4 Risk and opportunity assessment and management

Risks of failure of the mine closure and reclamation plan elements and risks to achieving the post-closure and reclamation objectives shall be assessed and managed by implementing appropriate risk management plans. These risks include those to human health and safety, the environment and communities. These plans shall be regularly updated during the operating phase of the mine to ensure they reflect current knowledge and stakeholder expectations.

Mine closure and reclamation opportunities shall be identified and managed throughout the lifecycle of the mine and shall be included in the mine closure and reclamation plan.

## 5.5 Evaluation and improvement

### 5.5.1 Quality assurance

Quality assurance shall be provided by competent and qualified professionals. It shall include, as a minimum, the peer review of the mine closure and reclamation plan, the design during its various stages of development, and inspections and certifications of the integrity of post closure facilities and post mining landforms that are to remain in place. The company shall have policies in place that require quality assurance be performed based on a quality assurance plan that is part of the mine closure and reclamation plan implementation.