

**Technical Guidelines**  
**Guidelines and Conditions For**  
**Mine Site Reclamation and**  
**Closure for New Mines -**  
**Technical Issues**

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# Draft Technical Guidelines Reclamation & Closure for New Mines

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## 1 Purpose of the Guidelines

### 1.1 Purpose

- 1.1.1 These guidelines are intended to ensure the protection of the environment and the goals of sustainability relating to mine closures in Yukon.
- 1.1.2 These guidelines are intended to provide direction to proponents and regulators on matters that should be considered in planning mine closure, including closure plans (Appendix A) and reports (Appendix B). They are not intended to provide detailed instruction on how to develop a rehabilitation plan.

### 1.2 Not a substitute for legislation

- 1.2.1 These guidelines are not a substitute for Quartz Mining Act, the Waters Act and other applicable legislation (Appendix C) and have no legislative sanction. Their purpose is to clarify the expectations of the Yukon Government for the development of mine closure plans.

### 1.3 Global Objectives

- 1.3.1 Mining is inherently a temporary use of the land. In order to meet sustainability objectives the land must be returned to an acceptable state of productivity after the mining cycle is completed.
- 1.3.2 The protection of the health and safety of public and area fauna by the elimination of unacceptable hazards.
- 1.3.3 Reclaiming for productive future use the areas where infrastructures (e.g., buildings, chemical and fuel storage, roads, sediment ponds, solution treatment facilities, tailings facilities, waste rock storage areas, heap leach pads) are located.
- 1.3.4 Prevent significant exposure to or release of substances that could damage the receiving environment.
- 1.3.5 Minimize liability and environmental risk.
- 1.3.6 In the long-term, minimize or eliminate the need for maintenance and monitoring.
- 1.3.7 Minimize the footprint of minesite development.

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## 2 Terrain Hazards

### 2.1 Objective

2.1.1 The protection of the public health and safety through measures to prevent or otherwise protect from terrain hazards such as excavations and surface openings.

### 2.2 General Standards

2.1.2 Access to areas of unsafe drop-offs are blocked and as required, posted appropriately.

2.1.3 Internal and external waste rock storage are re-contoured to a stable configuration and left in a condition conducive to successful revegetation.

## 3 Erosion Control

### 3.1 Objective

3.1.1 Prevent erosion that significantly impacts drainage quality or impedes revegetation of reclaimed site.

### 3.2 General Standards

3.2.1 Slopes are stabilized by contouring and leveling to provide land forms which conform to the surrounding terrain and provide suitable seedbeds

3.2.2 Lack of erosion features on re-sloped surfaces such as gullies and rills

3.2.3 Diversion ditches are constructed to guide drainage away from reclaimed workings, where necessary

3.2.4 Vegetative mat is sufficient to control erosion

3.2.5 Adequate growth media (fines) is present to sustain re-vegetation

3.2.6 Appropriate pit ponds and decants are in place

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## 4 Re-vegetation

### 4.1 Objective

- 4.1.1 To restore wildlife habitat through the reestablishment of a vegetation mat (food source, cover, hide etc.) and self sustaining native vegetation.

### 4.2 General Standards

- 4.2.1 Vegetation is self sustaining and comprises native seed mixes
- 4.2.2 The vegetative cover is capable of self-regeneration without continued dependence on fertilizer or re-seeding.
- 4.2.3 The establishment of a vegetative cover with sufficient density and species diversity to stabilize the surface against the effects of long term erosion
- 4.2.4 The successive vegetation must be similar to naturally occurring habitats in the surrounding area
- 4.2.5 Plant material does not show environmentally significant uptake of metals
- 4.2.6 Vegetation is self sustaining 3 to 5 years after the last application of re-seeding, maintenance or fertilization

## 5 Watercourses

### 5.1 Objective

- 5.1.1 Restore watercourses to required standards.

### 5.2 General Standards

- 5.2.1 Restore watercourses to meet the approved closure plan.

## 6 Contaminated Soils

### 6.1 Objective

- 6.1.1 Prevent significant release of substances that could damage the receiving environment.

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## 6.2 General Standards

- 6.2.1** Any contaminated land outside of the boundaries of a designated or properly managed contaminated area must be rehabilitated. Contaminated soil must be removed from the said land for placement into a designated site, or otherwise ensure that the contaminated soil will not, in perpetuity, cause harm to public health or the environment

## 7 Roads & Trails

### 7.1 Objective

- 7.1.1** Decommissioning of access corridors when they are no longer required

### 7.2 General Standards

- 7.2.1** Removal of bridges, culverts & pipes. Streambeds re-established with appropriate stabilization of banks.
- 7.2.2** Stabilization of road cuts and fills
- 7.2.3** Installation of diversion berms on steep slopes
- 7.2.4** Remediation and revegetation of the road surfaces.
- 7.2.5** Ensure road cuts are stable and access is restricted where there is a safety hazard or where access could impact fish or wildlife population
- 7.2.6** Access to be restricted with appropriate signage for areas posing a safety risk

## 8 Infrastructure

### 8.1 Objective

- 8.1.1** Removal or stabilization of any structures remaining after closure to ensure physical stability and to remove any threat to public health and safety.
- 8.1.2** Re-establishment of vegetation mat over the disturbed areas of the minesite.
- 8.1.3** Removal of all hazardous material

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### 8.2 General Standards

- 8.2.1 All buildings and structures are to be dismantled and removed from the site to an extent that is consistent with the approved final land use of the site.
- 8.2.2 Waste from dismantling and demolition is to be removed from the site and reused or stored in an authorized waste disposal site.
- 8.2.3 All machinery, equipment, and storage tanks will be cleaned and removed from the site or disposed of on site in an approved manner.
- 8.2.4 Sites of all buildings and structures shall be reclaimed so as to blend in with surrounding topography
- 8.2.5 All concrete structures, foundations and slabs shall be removed or covered with overburden and re-vegetated.
- 8.2.6 All power transmission lines, pipelines, railways, and airstrips shall be dismantled and removed from the site to an extent that is consistent with the approved future use of the land.
- 8.2.7 All buried support infrastructures (tanks, pipes, underground services, etc.) will be removed or decommissioned in a safe, acceptable manner. All buried infrastructure remaining will be identified on site closure maps.
- 8.2.8 Contaminated soils remediation will conform to the Yukon Contaminated Sites Regulations and all other applicable requirements.
- 8.2.9 In all areas where ore, concentrate, wastes, fuel, and chemicals were stored or handled at the site, the soil will be tested for contaminants, and if contamination is found, it shall be removed or treated based on an approved management plan
- 8.2.10 After being emptied, decommissioned septic tanks will be either removed or completely filled with gravel, sand, earth or inert material
- 8.2.11 All explosives shall be removed from the site or be properly disposed of.
- 8.2.12 All non- hazardous waste materials may be disposed of in an approved non-hazardous materials landfill.
- 8.2.13 No hazardous materials shall remain on site unless they are contained in an approved hazardous materials site and consistent with the final land use for the site

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**8.2.14** All waste storage sites shall be closed and rehabilitated consistent with the approved closure plan.

**8.2.15** Reclamation plans shall consider the health and safety of the public as well as persons involved in undertaking the work

## 9 Rock Dumps

### 9.1 Objective

**9.1.1** Reclaimed rock dumps are to be physically and chemically stable in the long term

### 9.2 General Standards

**9.2.1** Major dumps shall be operated and monitored in accordance with the Interim Guidelines of the B.C. Waste Rock Pile Research Committee

**9.2.2** Dumps shall be monitored for physical stability during all phases of closure until the site is closed out

**9.2.3** Dumps shall be reclaimed to ensure long-term stability and erosion control

**9.2.4** Major dumps are to be re-contoured to be consistent with the approved final land use

**9.2.5** Follow design requirements for the dumps and conduct the work in accordance with the Guidelines for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia

**9.2.6** For water quality, meet standard included in the Metal Mine Effluent Regulations at last points of control.

## 10 Heap Leach Pads

### 10.1 Objective

**10.1.1** Prevent significant impacts to downstream terrestrial and aquatic resources

**10.1.2** Minimize liability and environmental risk both during operation and after mine closure

### 10.2 General Standards

**10.2.1** Design to standards laid out in Canadian Dam Safety Guidelines (1999)



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**10.2.2** For water quality, meet standards included in the Metal Mine Effluent Regulations at last points of control

**10.2.3** Follow design requirements and conduct the work outlined in the Guidelines for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia

### **10.3 Liner Design**

**10.3.1** Requires a Liner System (including materials; conceptual construction methods and conditions; operation and maintenance procedures) achieving a permeability at least equivalent to a synthetic liner over a 12" soil liner with permeability of  $10^{-6}$  cm/sec

**10.3.2** Including a Leak Detection and Recovery System with contingency plans

## **11 Underground Openings**

### **11.1 Objective**

**11.1.1** Prevent long-term inadvertent access to underground mine openings to the surface

### **11.2 General Standards**

**11.2.1** When a mine is left unattended for any length of time, the owner shall take suitable measures to prevent inadvertent access to all mine openings

**11.2.2** At final closure, all surface openings to underground workings must be blocked utilizing a suitable method as designed by a qualified professional engineer. This includes capping with an appropriate reinforced concrete structure or filling with material so that the backfilled opening is stable in the long-term.

**11.2.3** The plan for closing openings shall be designed so as to make it as practicable as possible for future access to the mine workings, should the mine be considered for possible mine re-commissioning, at some future date.

**11.2.4** Drainage of any mine water through a long-term drain shall be included where there is a possibility for mine water pressures to build to dangerous levels

**11.2.5** The closed openings shall be monitored for physical stability during all phases of closure until the site is closed out

## **12 Stability of Underground Workings**

### **12.1 Objective**

**12.1.1** Prevent the development of hazardous conditions due to subsidence of surface materials into underground workings and to restore the site to an approved final land use

### **12.2 General Standards**

**12.2.1** All surface and subsurface mine workings shall be assessed by a qualified professional engineer to determine their stability. Any surface areas disturbed or likely to be disturbed by such workings in the long-term shall be stabilized. The study shall include an assessment of risk and consequence of crown pillar failure and be submitted for regulatory review and approval.

**12.2.2** The areas shall be monitored for physical stability during all phases of closure until the site is closed out

## **13 Acid Mine Drainage Concerns**

### **13.1 Objective**

**13.1.1** Prevent significant impacts to downstream terrestrial and aquatic resources

### **13.2 General Standards**

**13.2.1** For water quality, meet minimum standard included in the Metal Mine Effluent Regulations at last points of control

**13.2.2** Long term active effluent treatment is not considered an acceptable rehabilitation plan.

**13.2.3** Follow design requirements and conduct the work outlined in the Guidelines for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia

## **14 Tailings Impoundment**

### **14.1 Objective**

**14.1.1** All tailings impoundments and associated components are to be reclaimed to a condition that ensure physical and chemical stability for the long term

### **14.2 General Standards**

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- 14.2.1 All impoundment structures shall be certified by a qualified professional engineer with respect to their long-term stability so as to ensure meeting the approved final land use
- 14.2.2 The procedures and requirements set out in the Canadian Dam Association's (CDA) Canadian Dam Safety Guidelines shall be utilized in the decommissioning and maintenance of tailings dams and containment structures
- 14.2.3 Exposed slopes of all major impoundments are to be stable in the long term based on criteria provided in the above guidelines
- 14.2.4 All spillways and other water control structures required for the long term shall be designed by a qualified professional engineer in accordance with the above guidelines and installed before closure of the tailings facility
- 14.2.5 All final effluents are to meet water quality criteria stipulated in the federal Metal Mine Effluent Regulations at last points of control
- 14.2.6 Long-term active effluent treatment does not constitute an acceptable closure plan for a tailings facility. Measures that allow for more rapid cessation of active treatment are encouraged
- 14.2.7 The closed tailings facility will comply with approved design requirements
- 14.2.8 Work shall be undertaken in accordance with the British Columbia Guidelines for Metal Leaching and Acid Rock Drainage at Minesites.
- 14.2.9 Tailings impoundments and their related components shall be inspected, monitored and maintained to ensure long-term physical and chemical stability

## 15 Water Control Structures

### 15.1 Objective

- 15.1.1 Stable in long term

### 15.2 General Standards

- 15.2.1 Minimal maintenance requirements
- 15.2.2 Meet Canadian Dam Safety Guidelines
- 15.2.3 For water quality, meet minimum standard included in the Metal Mine Effluent Regulations at last points of control

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## 16 Risk Assessment Methodology

### 16.1 Objective

**16.1.1** Utilize a common framework to assess risk associated with closure planning and security calculations

### 16.2 General Standards

#### 16.2.1 Risk Assessment:

A risk assessment form of analysis will be used to determine the level of risk associated with each of the primary elements of the closure plan. If the level of risk for that element is unacceptable, then further mitigations will be included in the plans until an acceptable level of risk is achieved.

Failure Modes and Effects Criticality (FMECA) is recognized as one method of risk assessment which could be used to determine risks associated with closure plans

**16.2.2** Costs associated with each element of the plan and its associated mitigations can then be calculated using standard third party rates. The sum of these costs will be the outstanding liability for closure security.

## 17 Post Closure Monitoring

### 17.1 Objective

**17.1.1** Ensure effectiveness of the reclamation and closure plan through monitoring during all phases of closure until the site is closed out.

### 17.2 General Standards

**17.2.1** Restore to approved performance standards

**17.2.2** Inspect and monitor for compliance with reclamation requirements.

**16.2.3** Implement adaptive management plans to ensure reclamation objectives are achieved.

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## Appendix A

### Contents of Closure Plan

A closure plan must include the following:

- a) the name and address of the proponent or operator of the project;
- b) the name of the project;
- c) the legal description of the project site;
- d) the name, address and telephone number of any person authorized to act on behalf of the proponent or operator in respect of the plan;
- e) the surface rights, mineral rights held by the proponent or operator in respect of the project site;
- f) the previous use of the project site;
- g) a description of any previous disturbance or other activity that has, or could have, resulted in contamination of the project site or land adjoining the site;
- h) current conditions and activities on the site and security measures employed;
- i) a plan showing the location and use of equipment, machinery, buildings and other structures on the project site or in the area in which the site is located;
- j) a plan of the project site or the area in which the site is located, drawn to scale and showing the boundaries of the proponent's surface rights and the areas within those boundaries that will or could be subject to disturbance, alteration or contamination as a result of the project;
- k) mining and milling processes to be employed in the operation of the project and the planned production levels expressed in tonnes per day;
- l) the expected life of the project expressed in months or years;
- m) the nature, location and expected size of areas for the storage of tailings, including associated structures and treatment systems;
- n) dams and other drainage control structures and details of watercourses;
- o) crown pillars and mine openings to the surface;
- p) an assessment of the effect of all mine openings on the stability of the surface areas above and adjacent to areas of mining activity to determine whether the surface areas are likely to be disturbed;
- q) a description and schedule of any development work that could cause disturbances or hazards at the project site or land adjoining the site;
- r) the nature and location of systems for the treatment, management or disposal of waste and for storage of petroleum products, chemicals, hazardous substances and toxic substances;
- s) expected conditions of and uses for the project site following permanent closure of the project and rehabilitation of the site;

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## Appendix A

### Contents of Closure Plan (continued)

- t) the stages by which the project will be temporarily or permanently closed and a schedule of the practices and procedures by which progressive rehabilitation of the project site will be carried out during the life of the project and at each stage of closure;
- u) the monitoring to be carried out at the project site during the life of the project and at each stage of closure;
- v) the procedures to be used to evaluate and verify compliance with the plan during the life of the project and at each stage of closure;
- w) the information required under the Financial Assurance Guidelines.

## Appendix B

### Annual Report

An annual report must include the following:

- a) the name, address and telephone number of the proponent or operator and the senior project manager;
- b) the name of the project;
- c) the nature and extent of the rehabilitation carried out on the project site in the 12 months ending on the anniversary date of the commencement or recommencement of the project, and to be carried out in the 12 months following the anniversary date;
- d) an evaluation of whether or not the approved closure plan is adequate to properly rehabilitate the site
- e) when the report indicates that the closure plan is not adequate to properly rehabilitate the project site,
  - a) the operator or proponent may submit a revised plan; or
  - b) a revised plan may be requested by Yukon Government