GROUND CONTROL

CRITICAL RISK CONTROL STANDARD

TNCL-OHS-STD-0011

APPROVALS:

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1. PURPOSE

The purpose of this Ground Control Critical Risk Control Standard is to eliminate or minimise the risk of fatalities, injuries and incidents arising from uncontrolled ground movement (falls of ground, slope failure and seismic events) in all open-pit and underground workings. The Standard defines the minimum critical controls required to ensure that no person works above or below unsecured ground.

These Standard supplements, and does not replace, applicable laws, regulations and other TNCL policies and standards. Where this Standard and any applicable rule, regulation or other standard differ, the most stringent requirement shall apply, while always maintaining compliance with legal obligations. The Mining department shall develop more detailed procedures to give effect to the requirements of this Standard.

2. SCOPE AND APPLICATION

This Standard applies to all activities related to the planning, design, construction, implementation, monitoring, training and control of ground at TNCL operations. Fundamental to this Standard is that each operation maintains a current Ground Control Management Plan (GCMP).

It applies to all TNCL-controlled sites and activities, and to all TNCL employees, business partners, contractors and visitors involved in those activities. The critical controls in this Standard must be verified as being in place at all times when persons are in a mining environment.

3. REASONS FOR INCLUSION

An uncontrolled fall of ground is a major hazard that can cause single or multiple fatalities. The main risks addressed by this Standard are rockfall, slope collapse and seismic ejection. Uncontrolled ground movement occurs because of instability in the rock mass and the failure to identify and manage that instability. Common contributing factors include:

a. Poor or incorrectly installed ground support;
b. Poor operational control during excavation;
c. Slow response to changing ground conditions;
d. Unexpected adverse geological conditions;
e. Excavations compromised by unidentified geohazards;
f. Inadequate ground-support standards;
g. Inadequate excavation monitoring;
h. Inadequate training or competence; and
i. Persons working under unsupported or unsecured ground.

4. DEFINITIONS

For the purposes of this Standard, the following definitions apply:

Term	Definition
Fall of Ground (FOG)	Any uncontrolled release and fall of soil or rock from the excavation perimeter that causes, or has the potential to cause, harm to people or damage to equipment. This excludes the controlled release of material during scaling.
Geotechnically Competent Person	A person with graduate-level training in rock or geotechnical engineering (or an equivalent government certificate) and suitable experience in the relevant field of application, who is a member of a recognised professional body and whose continuing professional development is current.
Ground Control Management Plan (GCMP)	The plan that defines roles and responsibilities and provides the basis for ongoing communication between the technical functions, operations management, contractors and operators. It sets out the criteria and improvement options for each adopted risk-benefit design and defines strategies for design, excavation monitoring, operational implementation, QA/QC, and related procedures, standards and protocols.
Domain (GBI) Mapping	A rapid mapping system for recording general geotechnical conditions throughout the workings, providing continuous coverage and context for more detailed mapping. Domain classes are customised for each site so that they are simple to identify while still describing the variability in rock-mass conditions.
Unsupported Ground	A workplace where not all of the ground-support activities required by the ground-support standard for that area have been completed. This excludes the controlled release of material during scaling.
Secure Ground	Ground that is supported in accordance with the ground control plan, or unsupported ground that has been formally assessed by a geotechnically competent person as not requiring support in accordance with the ground control plan and authorised for entry by the most senior manager.
Trigger Action Response Plan (TARP)	A predefined set of trigger levels and corresponding response actions for changing ground conditions or for monitoring/evacuation alarms.

Scaling / Barring	The controlled removal of loose rock from an excavation surface, carried out from a position of safety/support.
Surface Support	Areal support is installed over the excavation surface (for example, wire mesh, shotcrete or thin spray-on liners) following reinforcement, to retain broken rock between reinforcement units.

5. LEGAL AND OTHER REQUIREMENTS

This Standard is designed to align with applicable Tanzanian legislation and with international good practice. Where requirements differ, the most stringent applicable requirement shall apply.

5.1 Tanzanian Legal Requirements

- The Mining Act, Cap. 123, and its subsidiary legislation, in particular the Mining (Safety, Occupational Health and Environmental Protection) Regulations, 2010 (GN No. 408 of 2010), which require, among other things, the safe support of ground and excavations, the appointment and duties of competent persons, the systematic examination of working places, and the reporting of accidents and dangerous occurrences to the Chief Inspector of Mines / Mining Commission;
- The Occupational Health and Safety Act, No. 5 of 2003, administered by the Occupational Safety and Health Authority (OSHA), which places general duties on the employer to provide and maintain a safe working environment and safe systems of work;
- The Workers Compensation Act, Cap. 263, and the Employment and Labour Relations Act, 2004; and
- The Environmental Management Act, 2004, where ground- and water-related hazards interface with environmental management.

5.2 International Standards and Good Practice

- The IFC Performance Standards on Environmental and Social Sustainability (2012), in particular Performance Standard 1 (Assessment and Management of Environmental and Social Risks and Impacts), Performance Standard 2 (Labour and Working Conditions, including occupational health and safety) and Performance Standard 4 (Community Health, Safety and Security); and
- The World Bank Group / IFC Environmental, Health, and Safety (EHS) Guidelines — the General EHS Guidelines (2007, Section 2: Occupational Health and Safety) and the EHS Guidelines for Mining (2007) - which address ground stability and geotechnical hazards across the mine life cycle for both underground and open-pit operations and represent Good International Industry Practice (GIIP).

6. ROLE AND RESPONSIBILITIES

Role	Responsibilities
General Manager (NM)	Accountable for implementation of this Standard on site; approves and signs the GCMP; authorises any entry into secure-but-unsupported ground and approves exceptions in writing.
Mining Manager	Ensures excavations are planned, scheduled and constructed to the geotechnical design, that ground-support standards are applied, and that procedures required by this Standard are developed, resourced and followed.
Geotechnically Competent Person	Develops and maintains the geotechnical design and ground-support standards, selects appropriate analysis techniques, signs off operative work plans for their area, and provides written assurance on local ground conditions and risk-mitigation measures.
Line Managers	Verify each critical control at its specified frequency, take immediate action on any deficiency, and communicate outcomes to supervisors and operators.
Supervisors	On a shift-by-shift basis, confirm it is safe to perform the task; stop or prevent work where any control cannot be verified; ensure scaling, making safe and hazard demarcation are completed; and report deficiencies to the line manager.
Employees, Operators, Contractors and Visitors	Enter only authorised areas for which they are trained and competent; continuously inspect their work area (look up, down, left and right); and stop work and report whenever a critical control cannot be verified.

7. CRITICAL CONTROLS

The following six critical controls are mandatory and must be verifiable at all times. Where a critical control cannot be verified, work must not start or must stop until a suitable temporary or permanent solution is implemented.

7.1 Critical Control – Training and Competence

All employees and contractors shall be trained and tested in ground-control hazard awareness, with emphasis on every person's responsibility to continuously inspect their work area. A competency-based training programme shall be in place and cascaded to all mine-operating employees and contractors, including (but not limited to):

- The content and requirements of the GCMP as applicable to the individual;
- Identification of geological anomalies that contribute to weaker ground conditions;

- Barring and scaling;
- Basic ground-support design principles;
- Placement and removal of ground-support units, including rehabilitation and re-establishment;
- Ground-support standards and associated triggers (the TARP for the individual's ability to deal with changing conditions);
- On-the-job training and assessment specific to the individual's skill set; and
- Emergency escape and evacuation plans.

7.2 Critical Control – Surface Support

For underground operations, surface support is required in all work areas. Following blasting and cleaning, the specified ground support shall be installed as soon as possible so that the rock layers are clamped together as a stabilised beam, preventing deterioration of ground conditions. Reinforcement is installed first; surface support (wire mesh, shotcrete or thin spray-on liners designed for underground use) is then installed to provide comprehensive areal support.

7.3 Critical Control – Geotechnical Design

All excavations shall be planned, scheduled and constructed according to the geotechnical design. The Life-of-Mine plan shall consider the criticality of planned excavations and their potential impacts over their life span when determining an acceptable level of risk. All planned excavations (slopes and underground, including shafts) shall have a geotechnical design that uses an appropriate level of geotechnical data to account for uncertainties and variability in structural, hydrological and ground conditions, and shall consider interactions with other mining activities, public infrastructure and natural geohazards. The geotechnically competent person shall select industry-accepted analysis techniques appropriate to the complexity of the design. All instabilities and falls of ground shall be reported, investigated and recorded to optimise the design and prevent repeat incidents.

7.4 Critical Control – No Entry to Unsupported or Unsecured Ground

No person shall enter an area of unsupported or unsecured ground. Under normal operating conditions, unsupported ground is exposed after each blast (for example stope brows and development ends) and must not be entered. Support installation and scaling/barring shall be carried out from an area of safety/support. Entry into unsecured ground is prohibited except in the following situations:

- Inspection of "old workings" by a competent person; and
- Emergency rescue situations,

and only where appropriate risk-reduction measures have been applied and approved in writing by a geotechnically competent person and, where required, the General Manager.

7.5 Critical Control – Authorisation and Awareness of Ground-Control Hazards

No person shall enter an area unless they are authorised to do so and are aware of the ground-control hazards. No employee or contractor may travel into an area unless they are: (1) trained and competent to identify and mitigate ground-control hazards; (2) duly authorised; and (3) entering an area that has been examined by a competent person

(for example the shift boss) and declared safe to enter. In open pits, slope-movement monitoring provides early warning of potential instability and triggers an evacuation alarm; everyone entering the pit must be familiar with the TARP for such an alarm.

7.6 Critical Control – Continuous Inspection (Look Up, Down, Left and Right)

It is every person's responsibility to continuously inspect their work area for ground-control hazards — look up, down, left and right. No person shall travel in a mining environment without first confirming that the area is safe, and shall keep all excavation surfaces under observation while in the area.

8. DEPLOYMENT REQUIREMENTS

8.1 Plant and Equipment Requirements

- Equipment design shall remove or separate the operator from unsecured ground, or provide a physical barrier to protect the operator in the event of uncontrolled ground movement from walls or backs;
- Materials used in the ground-support system shall be selected and routinely tested to confirm they meet the specifications of the ground control plan;
- Equipment for installing and testing ground support shall be: designed for the task; used in accordance with a standard operating procedure for correct installation; subject to a pre-operation check; calibrated per OEM requirements; and included in a preventive-maintenance schedule.

8.2 Procedural Requirements

- Maintain a GCMP that is approved and signed by the General Manager and updated at least annually;
- Maintain a geological model reconciled and updated through continuous geological mapping and core logging, and a hydrogeological model considered as part of the mine design, supported by a surface- and groundwater management programme;
- Maintain mine planning and design standards that consider mining methods, pit-wall and slope designs (including slope life expectancy and pit phasing), rock support and reinforcement design, backfill design, and the life expectancy of ground support;
- Undertake a geotechnical risk assessment whenever a ground-control system is developed, implemented or altered, and a documented risk assessment (including change management) before any remedial work to regain stability;
- Ensure all ground-support standards are formally approved by technical and operational managers.

Documented procedure shall be established for at least the following practices:

- Assessing that the ground is secure, and preventing people from going beyond secure ground;
- Retrieval of equipment from under unsecured ground;
- Installation, quality control and performance testing of ground support, and installation and quality control of backfill;
- Regular monitoring of ground support and ground conditions, and corrective action;
- Re-entry into areas not subject to regular monitoring;
- Reporting and investigation of falls of ground and other geotechnical events;

- Scaling and check-scaling; and
- Drilling and blasting, including identification of over-break and under-break.

8.3 People Requirements

A training and awareness programme shall ensure competence in ground-control matters, including hazard recognition relating to ground conditions; ground-support installation, inspection and monitoring; backfill installation and inspection; ground-support design principles; and ground-condition monitoring. Training shall be refreshed periodically and competence verified through planned task observations.

9. VERIFICATION OF CRITICAL CONTROLS

Critical controls shall be verified at the frequencies below using the checklists in the appendices. A "No" response requires immediate action: line-manager verification triggers a temporary or permanent fix; supervisor or operator verification requires that work stops or does not start until a suitable solution is implemented and, where relevant, the line manager is informed.

- Line Manager — reviews each critical control's effectiveness at its specified frequency (Appendix 1);
- Supervisor — verifies on a shift-by-shift basis before the activity proceeds (Appendix 2); and
- Operator — verifies on a task-by-task basis before starting work (Appendix 3).

10. SYSTEM EVALUATION

This standard shall be reviewed at least after two years by members of the OHS department and presented to the Standard Committee for approval, or when organizational changes take place or are required as part of internal and external audits. The TNCL Document Controller will monitor compliance with the document control system on an ongoing basis.

11. DISTRIBUTION

List physical locations which require a controlled copy of this document.

Table 1: Distribution

Copy	Controlled Document Folder Location
Master	Controlled Documents Central Filing System

12. CONTRAVENTION

Any breach of this standard shall be regarded as a refusal/failure to carry out a lawful instruction and will be dealt with as per the disciplinary procedure.

13. DOCUMENT CHANGE PROCESS

The process of document change starts when the document custodian identifies there is a need to make changes within the document. The document custodian/ owner shall complete the document change request form, sign it off and submit it to the Document Controller.

The Document controller shall issue the controlled word copy of the document to the respective document custodian/owner so that changes may be made. The document custodian/owner shall resubmit the updated document to the document controller so that the document can be controlled and updated within the Filing system ready for use by the end users.

13.1 Reason for Change

Table 2: Reason for Change

A	As a result of incidents	F	Change in training requirements
B	As a result of the audit findings	G	Results of risk assessments
C	New / changes in governance documents	H	Change due to spelling or grammatical error
D	Changes in legislation	I	New document format
E	Changes in technology	J	To integrate special instruction into the document control system

13.2 History of Change

Table 3: History of Change

Date of Change	Revision No	Revised Item (paragraph Number reference if required)	Reason Code	Name of Reviewer
03 06 2026	02	All sections — content development; definitions, legal/IFC alignment, roles, critical controls and verification appendices added	C, D, G	

14. RECORD CONTROL

Table 4: Record Control

Document Title:	Document ID:	Responsible for Maintenance:	Responsible for Filling:	Location of Storage:	Retention Period:	Method of Disposal:
Ground Control standard	TNCL-OHSS-STD-0011	Document Controller	Document Controller	OHS Department	Hard Copy two Years	Hard copy shared file electronic

15. DECLARATION

I hereby declare that I have taken part in the discussion of this standard, and I understand its contents and do commit that I shall ensure compliance hereto:

	Name and Surname	Company Number	Designation / Role	Signature	Date Signed
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