

## **GROUND CONTROL– UNDERGROUND MINES**

### **1. Scope**

This standard applies to all underground mining operations managed by Vedanta businesses and specifies mandatory requirements for all existing operations, new acquisitions, shafts and adits including those developed for exploration or mine construction purposes. This standard applies to all contractors and subcontractors who provide works or services to Vedanta. The Sustainability Governance System Guidance Note **GN33 Fall of Ground** provides additional guidance.

The objective of the standard is to eliminate the risk of fatalities and serious incidents resulting from fall of ground in underground mines across Vedanta.

### **2. People**

- 2.1. All employees and contractors working underground must undergo training in ground awareness and in identifying and communicating rock fall hazards. The training must be approved by geotechnical engineers and delivered by personnel competent and experienced in the practical management of FOG hazards. Refresher training must be carried out on a specified basis;
- 2.2. Supervisors must undergo specific training and be competent in rock fall hazard identification and mitigation;
- 2.3. Each operation must have the resources to ensure compliance with the Ground Control Management Plan/Code of Practice;
- 2.4. Suitably qualified and experienced geotechnical engineers must be used to develop the ground control practices, including the design rationale, calculations, support systems and specification of support materials;
- 2.5. Only trained, competent and authorized persons are permitted to conduct scaling and to install ground support.

### **3. Process**

- 3.1. Each operation must establish a Ground Control Management Plan/Code of Practice that is specific to the operation and that consists of three elements: design; implementation/approach; and verification/monitoring;
- 3.2. Protocols must be developed and documented ensuring that no person shall go beyond the area of secured ground;
- 3.3. All underground excavations must be designed to specified and documented minimum stability criteria for all relevant rock types;
- 3.4. Up-to-date mine plans clearly identifying ground control hazards and pillars created for safety must be maintained in locations that are easily accessible to the workforce;
- 3.5. Appropriate geotechnical monitoring systems that allow for early warning of ground movement must be established;
- 3.6. Trigger Action Response Plans (TARPs) must be implemented for all geotechnical hazards and must

include risk assessments for non-standard operations and changes in management;

- 3.7. A ground hazard reporting system must be in place to allow the early identification of risks;
- 3.8. Standards must be developed and documented to ensure that appropriately certified personnel inspect and validate that ground support is working as intended;
- 3.9. A scaling regime must be in place to ensure both working areas and access ways are secured. The scaling regime must be transparent and formally documented;
- 3.10. Each operation must provide appropriate tools, equipment and documented work methods for scaling and ground support installation to cater for all sizes of excavation encountered in the mine without exposing people performing the work to injury. As a principle, scaling should be undertaken using a dedicated machine where possible;
- 3.11. Installed ground support must be fit for purpose with materials for all support types specified;
- 3.12. Any ineffective support must be replaced immediately, or the area must be shut down;
- 3.13. Areas where risks of rock fall are identified must be barricaded off with clear hazard warning.

### **4. Review**

- 4.1. Audits, reviews and quality assurance programs related to rock fall hazards must be carried out regularly and formally documented;
- 4.2. The Ground Control Management Plan/Code of Practice must be reviewed yearly and changes in ground conditions, support practices or mining method accounted for;
- 4.3. An annual peer review must be conducted on the ground management plan to monitor compliance;
- 4.4. An external review must be undertaken on a two-year cycle to ensure that the ground management plan is appropriate to the operation;
- 4.5. Procedures must be in place defining the frequency and responsibility for inspecting, monitoring, evaluating and reporting on ground conditions inactive work places including development ends, stopes, shafts, declines, access ramps, airways, escape ways and other key sections of the mine including workshops, stores, shaft stations, etc.;
- 4.6. Procedures must be in place defining the frequency and method of testing rock bolts, cables and other support elements including third-party testing of materials used together with the necessary record keeping;
- 4.7. Businesses must comply with all relevant laws and regulations.



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