

Regulations concerning maps of underground and opencast mining facilities

Translation as of 17 February 2011.

This translation is for information purposes only. Legal authenticity remains with the official Norwegian version as published in Norsk Lovtidend.

Laid down by the Ministry of Trade and Industry 20 December 2010 pursuant to sections 43 and 46 of the Act of 19 June 2009 No. 101 relating to the acquisition and extraction of mineral resources (the Minerals Act)

Section 1. Scope

These regulations apply to all extraction of minerals owned by the State and to underground mining facilities relating to minerals owned by a landowner. The Directorate of Mining may by way of individual decision provide that the rules in these regulations shall apply wholly or partly to opencast mining facilities and gravel pits relating to minerals owned by a landowner.

Section 2. General requirements relating to mine surveying and mine maps

The maps shall contain a sufficient number of cross-sections and projections to provide a geometrically and geologically accurate picture of all mine spaces.

Adjacent underground facilities and other matters that may be important for the safe operation of the underground facility in question shall be included on the mine maps.

The maps shall be kept up-to-date.

The maps shall indicate all mining operations undertaken and, to the necessary extent, geological, tectonic and rock mechanics-related conditions. The operator's copy shall be used as the basis for planning, follow-up and documentation.

Mine maps shall be stored in an adequate manner, and shall be available at the facility.

When plans of operations are approved, up-to-date maps shall be submitted to the Directorate of Mining, and copies of the maps shall be submitted to the municipality or municipalities in which the mine is located.

Section 3. *Plan-of-operation maps*

The maps shall be in a form that permits the supervisory authorities to use them in connection with the supervision of the operation, and that permits landowners and municipalities to use them to monitor their interests.

Section 4. *Back-up copy*

Any person extracting minerals owned by the State shall submit new survey measurements to the Directorate of Mining to enable the compilation of new mine maps in the event that the originals are lost or destroyed. Back-up copies shall be submitted to the Directorate of Mining in years ending in 0 and 5, or whenever the Directorate requests such copies.

Section 5. *Final maps*

An operating party shall, upon mine closure, submit final maps to the Directorate of Mining, as well as copies to the municipality or municipalities in which the mine is located. Final maps are archival copies of the parts of the mine maps which are needed to present a complete picture of the mine.

Final maps shall document matters which are important for any recommencement of operations and for the planning of other operations in or around the underground mining facility.

The final maps shall also be accompanied by a comprehensive description that supplements the information contained in the final maps.

Section 6. *Drill-hole maps in connection with exploration of minerals owned by the State*

Drill-hole maps shall be prepared in connection with the completion of exploration of possible deposits of minerals owned by the State which has been undertaken in exploration areas in which no mining operations have been initiated. Drill-hole maps shall be submitted to the Directorate of Mining when exploration ends.

Section 7. *Responsibility for the preparation of the maps*

Maps which are prepared pursuant to these regulations shall be approved by the mining engineer in charge of the extraction operation, see Chapters 3 and 4 of the Regulations of 23 December 2009 No. 1842 issued pursuant to the Minerals Act.

Section 8. *Coordinate system and units of measurement*

The coordinate system shall be right-angled with horizontal x- and y-axes and a vertical z-axis, and shall as a starting point be linked to the official national coordinate system in UTM 711 EUREF 89 (WGS 84).

Local mine map grids may also be established. A main axis should in such cases be laid parallel to the strike of the ore. For local mine map grids, the origin should be laid such that all coordinates within the mining area are positive. Heights shall be adapted to the national map grid.

Linear measurements shall be stated in metres (m), areas in square metres (m²), and volumes in cubic metres (m³). Angular measurements within the same mine shall be uniform. The centesimal system (a right angle equals 100 degrees) shall be used when taking geodesic measurements. The sexagesimal system (a right angle equals 90 degrees) may be used for drill holes and geological terms.

The Directorate of Mining may grant an exemption from the requirement to use a coordinate system for an underground mining facility that is already in operation if the requirement would impose a disproportionate amount of additional work.

North arrows shall be included on all horizontal maps.

Section 9. *Geodesic measurement*

All measurement work (traverse and detailed measurement) performed to enable a mine map to be prepared shall be carried out with a sufficient degree of accuracy. The measurement work, both above and below ground, shall be based on reference marks.

In the measurement of underground mining facilities, the accuracy of the measurements shall at least equal the accuracy achieved by modern surveying instruments offering mm accuracy.

In the surveying of opencast mines or soil extraction sites, equipment shall be used that ensures that measurements are accurate to within 10 cm or less, for example GPS-based surveying.

Section 10. *Map format*

Mine maps shall be printed on archival paper. Mine maps may also be prepared and stored in digital form.

Maps shall conform to the A-format series (A0, A1, A2 and A3). The smallest format shall be A3.

Areas of overlap between the map pages shall be clearly indicated.

Maps relating to the same underground mining facility should have the same format.

New map series shall be prepared in accordance with the standard formats.

In cases involving older underground mining facilities where having to convert the map series to a different system would involve a disproportionate amount of additional work, the Directorate of Mining may grant an exemption from the standard-format requirement.

Section 11. *Scale*

The maps shall be drawn up with the following scales:

Topographic surface maps: M 1:2,000 or M 1:5,000.

Detailed surface maps: M 1:500 or M 1:1,000.

Mine maps and opencast mine maps: M 1:500 or M 1:1,000. The Directorate of Mining may decide that larger operations may draw up maps in M 1:2,000.

Different types of maps relating to the same deposit, such as geological maps, joint maps and geochemical maps, shall have the same scale.

Cross-sections of the entire deposit or parts of the deposit shall have the same scale as the maps to which they relate. This requirement does not apply to detailed series of maps for internal use.

Section 12. *Cross-sections*

Cross-sections shall be oriented according to the longitudinal axis of the deposit or, if relevant, the axis of the deposit's ore chute, in such a manner that they provide the best possible picture of the deposit and the extraction of the ore. Vertical cross-sections should preferably follow the directions of the coordinate system.

Section 13. *Map sheet reference*

Exact reference information shall be printed on each map sheet.

The horizontal sheet shall be numbered in accordance with the coordinates of the lower right-hand corner and the level specification (floor description). The date when the map was last updated shall also be printed on the map.

Section 14. *Design of the maps*

a) *Surface maps*

A topographic surface map of the area shall, in addition to containing the normal information, indicate all matters that are of mining-related interest, such as old mine openings, dumps, tailing dams or landfills and their infrastructure, and property boundaries. The map shall also indicate existing mining rights, licence areas and regulation boundaries.

The area covered by a detailed surface map shall be marked on the index map.

A detailed surface map shall cover the deposit and its immediate surroundings. In addition to containing the information mentioned in respect of the topographic surface map, the map shall indicate local conditions, such as roads, buildings, telephone and power lines, etc.

b) *Mining maps*

Horizontal maps shall indicate opencast mines, shafts, galleries, stopes, ore limits and the most important rock-type limits.

Drill holes and diamond drill holes, along with a specification of the reference (hole number), shall be included. Moreover, everything which is relevant for understanding the operation of the mine shall be included, such as faults and zones of weakness and the related safety measures.

Details and contours which are important in relation to the overall impression of the area, but which lie above or below the reference level, shall be included, and the correct map symbols and hatching, as well as to which level (floor) they relate, shall be noted.

Whether or not a map sheet should be prepared for each floor, or whether several floors should be covered by the same sheet, shall be determined by the requirement of clarity and by the mining method. Preferably, a map sheet should be prepared for each floor.

Vertical cross-sections shall supplement and have the same content as the horizontal maps.

Cross-sections shall be spaced at regular intervals, divisible by 5, which shall take into account the regularity of the deposit and shall provide a good picture of the variation in the thickness and slope.

If required in the interests of clarity, certain types of information may be provided on separate map sheets.

Section 15. *Map symbols*

The maps shall be prepared in accordance with NS 749 and NS 4200.

The series of maps shall contain a specified legend, which shall also include any colouring.

If older maps containing older symbols are supplemented, the older symbols shall continue to be used, and their meanings shall be clearly stated in the legend.

Section 16. *Entry into force*

These regulations enter into force on 1 January 2011.