

**STATE OF NEW MEXICO
BEFORE THE WATER QUALITY CONTROL COMMISSION**

In the Matter of:

**PROPOSED AMENDMENT
TO 20.6.2 NMAC (Copper Rule)**

No. WQCC 12-01(R)

EXHIBIT SCOTT – D-35

OPERATION AND MONITORING OF MINE DUMPS INTERIM GUIDELINES

Prepared for the:

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OPERATIONS MANUAL

- Mines to prepare in-house operational guidelines to deal with site-specific conditions.
- Emergency preparedness plan to form part of guidelines.

6.2 General

Mine dump construction and operation are, in most cases, carried out by mining companies as part of their daily operations. Typically the mine operations department has responsibility for the day-to-day operation and depends on mine engineering for technical assistance. A competent person with appropriate geotechnical experience, usually an engineer, will review dump stability and movement monitoring data.

Larger and more complex dumping operations may benefit from periodic review by off-site personnel. This will help to maintain adherence to accepted practices and standards. External review of dumping operations most commonly takes the form of a periodic review by a geotechnical consultant, sometimes in accordance with the requirements of the Mines Act or as a prudent measure instituted by the operators.

6.3 Observational Method

It is seldom that enough detailed information is available prior to construction for a complete, engineered design of a large mine dump.

To produce an entirely safe design, the designer would have to assume the worst possible conditions, and this approach is usually too conservative. Alternatively, assumptions may be based on available data and experience. This may be dangerous due to the number of variables and the fact that stability may be sensitive to one or more unknowns. Given the normal case in mine dump construction of a design based on limited geotechnical information, the observational method (Terzaghi and Peck, 1948; and Peck, 1969) is often the only practical approach for mine dump design and operation.

Karl Terzaghi, quoted by Ralph Peck (Peck, 1969), wrote about the observational method:

'The procedure is as follows: Base the design on whatever information can be secured. Make a detailed inventory of all the possible differences between reality and the assumptions. Then compute, on the basis of the original assumptions, various quantities that can be measured in the field. For instance, if assumptions have been made regarding pressure in the water beneath a structure, compute the pressure at various easily accessible points, measure it, and compare the results with the forecast. Or, if assumptions have been made regarding stress-deformation properties, compute displacements, measure them, and make a similar comparison. On the basis of the results of such measurements, gradually close the gaps in knowledge and, if necessary, modify the design during construction.'

This method is dependent upon the ability to modify the design and construction method or rate during construction. Mine dumps are well suited to this approach.

The observational method then, relies heavily on adequate monitoring of appropriate conditions such as movement rates, material quality, piezometric conditions and development rate.

In order to avoid excessive restrictions on operational procedures while maintaining adequate safety against mine dump failures, it is recommended that the observational method be followed.

6.4 Operations Planning

Mine rock dumps constitute some of the largest man-made structures on earth and will form significant landforms in perpetuity. It should not seem unusual that adequate planning is appropriate for these structures during all phases of development.

Mine dump operations planning should begin during the design phase and carry on throughout the life of the operation. For large dumps composed of a mix of materials whose geotechnical properties vary and may control stability, dump planning may also