

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

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**In the Matter of:** )  
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**PROPOSED AMENDMENT** )  
**TO 20.6.2 NMAC (Copper Rule)** )  
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**No. WQCC 12-01(R)**

**EXHIBIT SCOTT – D-14**

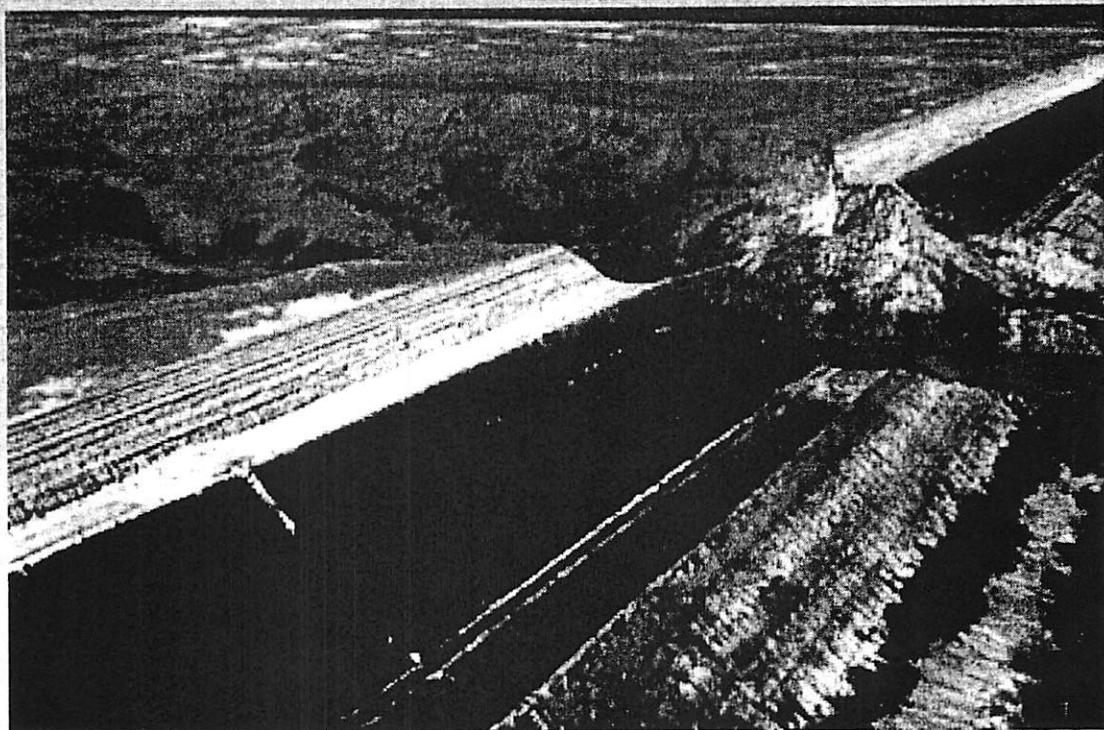
# IMPROVING TAILINGS DAM SAFETY

*Critical Aspects of Management, Design,  
Operation and Closure*

# AMÉLIORER LA SÉCURITÉ DES BARRAGES DE STÉRILES MINIERS

*Aspects critiques de leur gestion, conception,  
exploitation et fermeture*

**Bulletin 139**



IMPROVING TAILINGS DAM SAFETY  
AMÉLIORER LA SÉCURITÉ DES BARRAGES DE STÉRILES MINIERS

- overall water balance of the facility ;
- surveillance performed according to applicable standards ;
- risk assessment, dam break, uncontrolled seepage ;
  
- hazard rating, including loss of lives, environmental and economical (or corporate) aspects ;
- emergency preparedness plans, evacuation procedure, list of all details for safety personnel and emergency services ;
  
- closure plan including hazard analysis, long term stability, safe containment of toxic material, land productivity and aesthetics. See Chapter 7: Critical Closure Aspects ;
  
- compilation, storage and accessibility of reliable records on everything regarding the tailings dam and dam safety on site.

Qualifications to perform an external audit might vary depending on the hazard rating of the facility. If the audit incorporates several fields of expertise, a team of specialists should be appointed. For tailings dams the geotechnical science is, in general, of main major interest and the geotechnical specialist may be the most appropriate leader of an audit team.

Other sciences required for the audit, depending on local site conditions, might include geology, hydraulics, hydrology, hydrogeology and geochemistry.

Persons performing an external audit should be specialists with documented experience in the particular sciences, and direct experience with tailings disposal projects. In many cases it might be wise to use specialists with international experience to bring in new broader knowledge and views.

#### **9.4. CURRENT REQUIREMENTS IN DIFFERENT COUNTRIES**

External audits should commence with a review of the design and operation of the facility against the standards, guidelines etc. of the country in question as well as documented undertakings by the facility owner. In this respect, typical standards of a few countries, which appear to have increasing requirements, are presented below:

##### *Australia*

The Australian guidelines define standards for routine inspections and operational audits. (See 9.5)

### *Canada*

Canadian guidelines, produced by the Mining Association of Canada (MAC), suggest that periodic inspections and reviews, audits, external checks and comprehensive external reviews be carried out as part of the surveillance program. (See 9.5) MAC is currently (2006) preparing a Guideline for Audit of Tailings Facilities.

### *South Africa*

The primary document controlling mining companies tailings disposal activities in South Africa is the Department of Mineral and Energy Mandatory Code of Practice for Mine Residue Deposits (MRU's). This code requires each and every mine to set out in writing its intended standards and procedures for the protection of the health and safety of workers, and for the reduction of the risk of damage to persons and property.

Environmental aspects pertaining to the MRD are addressed in each mining companies' Environmental Management Program Report (EMPR), which is also required in terms of South Africa's Minerals Act.

The National Water Act and a series of six Guideline Documents control water quality aspects, M1 to M6.

The design of MRDs in South Africa is guided by SABS 0286: Code of Practice for Mine Residue Deposits.

### *Sweden*

Generally all mining companies have programs for daily, monthly and yearly inspections. In addition, thorough external inspection is required at intervals depending on the hazard rating and rate of raise for the tailings facility in question.

### *USA*

The guidelines or requirements for audits of tailings disposal operations in the US depend primarily on the laws of the state where the impoundment is located. There are no specific requirements that apply throughout the US. The licensing of a tailings disposal operation varies from state to state, either under conventional water-storage dam safety requirements, safety requirements specifically for tailings impoundments, or under related environmental requirements (such as groundwater protection or radiological materials licensing). Furthermore, some mining companies have internal review and reporting requirements for their operations.

### *Brazil*

The criteria for external audit was established for tailings dams, as a function of the hazard potential namely: annual for high hazard, every two years for medium hazard and every three years for low hazard dams.

<b>Term</b>	<b>Meaning/Definition</b>
<b>Remediation</b>	Measures required to secure the long-term stability and to ensure environmental safety of structures such as tailings dams and disturbed ground. Often includes measures to encapsulate the tailings in order to restrict the potential for toxic materials entering the wider environment.
<b>Rehabilitation</b>	Restoration of land affected by mining activities to its original land use or an agreed land use.
<b>Reclamation</b>	Conversion of severely damaged land into useful land use, not necessarily to its original use. The physical aspects of earth moving, regrading and revegetation.
<b>Risk</b>	The combination or product of the Probability of an event occurring and the consequences of that event.
<b>Seepage point</b>	The point where the hydraulic gradient exits the downstream slope.
<b>Surveillance</b>	Activities relating to detailed inspections/measurements and records of the TSF.
<b>Tailings</b>	The fine-grained waste material remaining after the economically recoverable metals and minerals have been extracted. The material is rejected at the "tail end" of the process with a particle size normally ranging from 10 µm to 1.0 mm.
<b>Tailings beach</b>	The area of tailings between the edge of the water pond and the edge of the exposed tailings where they meet the slope of the dam.
<b>Tailings dam (Tailings embankment or Tailings Disposal Dam)</b>	An embankment, dam wall or other impounding structure, designed to enable the tailings to settle and to retain tailings and process water, constructed in a controlled manner.
<b>Tailings impoundment</b>	The storage space/volume created by the tailings dam/dams where tailings is deposited and stored. The extent of the impoundment is to the bounds of the tailings dams and/or natural boundaries.
<b>Tailings management facility (TMF)</b>	The whole set of structures required for the handling of tailings. Starting at the point where the tailings leave the plant to the point for final settling, including TSF, decants, spillways, clarification ponds, delivery pipelines etc.
<b>Tailings pond or supernatant pond</b>	The free water contained within the tailings impoundment.

<b>Term</b>	<b>Meaning/Definition</b>
Tailings sand	The sand obtained from the total tailings for use in construction of the tailings dam. Often produced by natural segregation on the beach or by cycloning the total tailings.
Tailings slimes	The fine portion of the total tailings. Slimes generally range from a maximum particle size of about 75 µm to clay size.
Tailings slurry	A fluid suspension comprising liquids (water) and solids (tailings).
Tailings storage facility (TSF)	A facility used to contain tailings including the tailings dam (impoundment and pond), decant structures and spillways. A TSF can also constitute open pits, dry stacking, lakes or underground storages.
Weathering	Processes by which particles, rocks and minerals, are altered on exposure, including changes due to and atmospheric agents such as air, water and biological activity.

### **12.3. DOCUMENTS DEFINING TERMS RELATED TO THE SUBJECT OF THIS BULLETIN**

Most definitions given here are not directly taken from another document, but reworked from several documents and/or influenced by the ICOLD Committee on Tailings Dams and Waste Lagoons. Many definitions above have been quoted from one or several of the following documents:

AUSTRALIAN AND NEW ZEALAND MINERALS AND ENERGY COUNCIL (ANZMEC) AND MINERALS COUNCIL OF AUSTRALIA (MCA) (2000). *Strategic Framework for Mine Closure*. National Library of Australia Catalogue Data.

EUROPEAN COMMISSION (2004). *Draft Reference Document on Best Available Techniques for management of Tailings and Waste-Rock in Mining Activities (BAT)* European IPPC Bureau July 2004 (December 2004).

ICOLD (1989). INTERNATIONAL COMMISSION ON LARGE DAMS. *Tailings Dam Safety – Guidelines*. Bulletin 74. Published by International Commission on Large Dams. Imprimerie de Montligeon, 61400 La Chapelle Montligeon.

ICOLD (1996). INTERNATIONAL COMMISSION ON LARGE DAMS. A *Guide to Tailings Dams and Impoundments – Design, Construction, Use and Rehabilitation*. Bulletin 106. Published by International Commission on Large Dams together with UNEP, United Nations Environmental Program. Imprimerie Louis-jean 05003 Gap, France. (July 2004).