

**[DENR MEMORANDUM ORDER NO. 99-32, S. 1999,
November 24, 1999]**

**POLICY GUIDELINES AND STANDARDS FOR MINE WASTES AND
MILL TAILINGS MANAGEMENT**

Pursuant to Section 63 of Republic Act No. 7942 otherwise known as the Philippine Mining Act of 1995, Section 166 (General Provision on Environmental Protection) of DENR Administrative Order No. 96-40, the Revised Implementing Rules and Regulations of RA 7942, Presidential Decree No. 3931 of 1976, the Pollution Control Law of the Philippines and Section 19, of Presidential Decree No. 1152 - the Philippine Environmental Code, these policy guidelines and standards with respect to mine wastes and mill tailings management in the Philippines are hereby promulgated.

**CHAPTER I
INTRODUCTION**

SECTION 1. Title - The title of this Memorandum Order shall be "Policy Guidelines and Standards for Mine Wastes and Mill Tailings Management".

SECTION 2. Scope. - These guidelines and standards shall govern all mine wastes and mill tailings management within the territory and exclusive economic zone of the Republic of the Philippines.

SECTION 3. Declaration of Policy. - It shall be the policy of the state that mine wastes and mill tailings produced by mining operators, permittees and contractors shall be managed in a technically, financially, socially, culturally and environmentally acceptable manner in a way that effectively safeguards the environment and protects the rights of concerned communities.

SECTION 4. Governing Principles. - Mine wastes and mill tailings shall be managed in adherence to the governing principle of sustainable development, which provides that its use shall be pro-environment and pro-people in sustaining wealth creation and improved quality of life under the following terms:

4.1 Management of mine wastes and mill tailings must be guided by current best practices committed to ensure control over its impacts and efficiently protect the environment; and

4.2 Mine wastes and mill tailings management shall be undertaken with due and equal emphasis on economic and environmental considerations, as well as safety, health, social and cultural concerns.

These principles are implemented through the specific provisions of this guidelines and standards for mine waste and mill tailings management.

SECTION 5. Objectives. - To effectively managed mine wastes and mill tailings in an environmentally sustainable manner as well as with an environmentally acceptable health, safety, social and cultural concern.

SECTION 6. Definition of Terms. - As used and for the purpose of these guidelines and standards, the following terms shall mean:

Angle of repose — the angle of steepest slope at which material will remain stable when loosely filed. The maximum angle that an unsupported mount of loose or broken materials will consistently form with the horizontal.

Camber — the crest settlement during construction and operation.

Crest of Dam — means the top of the dam generally sloped towards the reservoir to prevent water ponding.

Design Basis Earthquake (DBE) — the earthquake, which is liable to occur at least once during the expected life of the structure (also called operating basis earthquake, OBE).

Direct Shear Test — the method of determining the residual strengths of granular soils, e.g. sand, silt, gravel and of existing planes of weakness in the soil e.g. slide planes and fissures.

Deep Sea Tailing Placement — a technology whereby mill tailings are discharged through an engineered outfall at a location and depth selected to minimize environmental impacts.

Euphotic Zone — refers to the ocean's highest biological productivity zone where light allows photosynthesis and reproduction of marine plants to occur. The base of the euphotic zone is operationally defined as the depth reached by only 1% of light transmitted from the surface.

Flood Cycle — a period of time during which floods or sequence of floods occur.

Free Board — means the vertical distance between a specified reservoir water surface and the top of the dam without allowance for camber of the top of the dam.

'g' — the horizontal acceleration imparted by earthquakes, expressed in cm/second², divided by the acceleration of gravity (9.81 cm/second²). The resulting ration is dimensionless called "k" or horizontal seismic coefficient.

Maximum Credible Earthquake (MCE) — the maximum earthquake event that can be conceived to affect the dam, taking into consideration the presence of potentially active faults in the vicinity of the dam.

Mill tailings — materials whether solid, liquid or both segregated from the ores during concentration/milling operations, which have no present economic value to the generator of the same.

Mill tailings placement facilities — refers to structures and equipment used in

handling, transporting, disposing and/or impounding mill tailings.

Mine wastes — means solid and/or rock materials from the surface or underground mining operations with no present economic value to the generator of the same.

Mine Waste Dump — refers to a designated place where mine waste are accumulated or collected.

Mine Wastes Placement Facilities — refers to structures and equipment used in handling, transporting, disposing and/or impounding mine wastes.

Mixing Zone — the zone within which the concentrations of potential contaminants may exceed ambient water quality criteria. Compliance with ambient water quality criteria at the boundary of a site-specific mixing zone the dimension of which shall be established based on oceanographic and geochemical studies.

Operation Base Earthquake (OBE) — the earthquake which is liable to occur at least once during the expected life of the structure (also called Design Basis Earthquake, DBE).

Rock Mass Rating (RMR) — an empirical method developed to predict support requirements based from the sum of six properties: uniaxial compressive strength, Rock Quality Designation, joint spacing, quality of the joints, groundwater conditions, and joint orientation.

Rock Quality Designation (RQD) — a quantitative index based on core recovery procedure, which is determined by incorporation of only those pieces of core that are equal and/or more than 100 mm in length:

$$RQD = \text{length of core in pieces} > 100 \text{ mm}$$

Length of run

Only core of at least NX size (53 mm in diameter) should be used.

Secretary — means the Secretary of the Department of Environment and Natural Resources.

Static loading — a condition wherein the load applied to a body or mass is unidirectional and non-varying.

Surface mixed layer — the upper layer in the ocean, which is kept well mixed by the turbulent action of wind and waves. As a result, the surface layer tends to be of uniform temperature, salinity and density. The bottom of the surface mixed layer is generally marked by an abrupt density discontinuity which prevents tailings from rising upwards, providing the tailings is discharged below this density discontinuity.

Unconfined/Uniaxial Compressive Strength (UCS) — the ability of a material to resist longitudinal stress without being confined at its sides.

Unified Soil Classification System (USCS) — a method most commonly used in classifying soil material on the basis of grain size usually by making the soil pass through a series of sieve.

CHAPTER II MINE WASTES STORAGE

SECTION 7. Mine Wastes Storage Standards. - Mine wastes storage from mining operations creates a major visual and physical impact on the environment. Therefore, it is important to select, design, construct, operate, and rehabilitate/decommissioned mine waste storage sites such that they can be returned/converted to a productive long term and agreed land use.

SECTION 8. Guidelines on Site Selection of Mine Wastes Storage.

- a. Mine waste storage shall be located far from old growth or virgin forest, proclaimed watershed forest reserves, wilderness areas, mangrove forests, mossy forests, national parks, greenbelts, game refuge, bird sanctuaries and areas proclaimed as marine reserves/marine parks, and tourist zones. As defined by law a buffer of not less than 500 meters from the perimeter shall be maintained;
- b. Mine waste storage shall be located away from water bodies so that water flow after rehabilitation/decommissioning is reduced.
- c. Mine waste storage close to coast shall be above the maximum storm surge level and a buffer of not less than 500 meters from the mean low tide level along the coast shall be maintained;
- d. Mine waste storage shall take into consideration the expected life of the mine, the geology, hydrology, geochemistry, ecology, land use, topography, possible mineralization of the site area and climate.
- e. Mine waste storage as much as possible shall accommodate mine waste produced from the entire life of mine operation;
- f. Mine waste storage shall not be located on areas that might promote the generation of acid mine drainage (ARD);
- g. Mine waste storage shall be designed and constructed above the maximum flood level;
- h. In-pit dumping of mine waste shall be used/promoted whenever applicable.

SECTION 9. Guidelines to Design Mine Wastes Storage.

- a. The expected life of the mine, the geology, local and regional seismicities, hydrology, geochemistry, ecology, land use, topography, climate, area of land available, vegetation of the site shall be considered in the design (e.g. height, slope, area, shape, etc.) of mine waste dumps.
- b. Drainage system shall be constructed to handle heavy rainfall event. A 50-year flood (return period) shall be used for minimum design purposes.

- c. Acid rock drainage (ARD) potential of mine wastes for impoundment shall be established. Mine waste characterized with ARD potential and/or classified as hazardous or with toxic leachates shall be contained separately from materials with no or lower potential ARD or non-toxic leachates. It shall be neutralized or treated by blending with waste materials of higher neutralizing potential or less hazardous materials/toxic leachates.

SECTION 10. Guidelines on the Construction of Mine Wastes Storage.

- a. Site disturbance shall be limited and conform to the proposed design.
- b. Drainage system shall be constructed during dump build-up and shall enable rainfall run-off to be shed from the dump without causing erosion.
- c. Any pre-stripped vegetation matter shall be stockpiled separately;
- d. The company must submit an "as-built-report" to the Bureau after completion of construction.
- e. Stripped topsoil shall be contained and protected from erosion for future rehabilitation purposes.
- f. Mine waste with potential ARD and hazardous leachates should be contain not to degrade the adjacent areas and the existing underground and surface waters.

SECTION 11. Guidelines on the Operation of Mine Wastes Storage.

- a. Slopes of mine waste storage shall be maintained and managed below its angle of repose;
- b. The different characteristics of mine waste shall be established. Those of the same characteristics shall be impounded separately with those of different characteristics in preparation for progressive/future rehabilitation.
- c. Monitoring devices such as extensometers, movement hubs and survey stations shall be installed/provided during construction, active operation and even storage decommissioning;
- d. Drainage system shall be provided to control siltation caused by surface-run-off;
- e. Run-off from mine waste storage shall be collected/contained and monitored and shall be within the existing standards before allowing it to flow to existing tributaries or waterways.
- f. Mine waste storage shall be protected from generating ARD and regularly monitored from generating such occurrences.

SECTION 12. Guidelines on Rehabilitation/Decommissioning of Mine Wastes Storage.