



Republic of the Philippines  
**Department of Environment and Natural Resources**  
 Visayas Avenue, Diliman, Quezon City  
 Tel. Nos. (632) 929-66-26 to 29 \* (632) 929-62-52  
 929-66-20 \* 929-66-33 to 35  
 929-70-41 to 43



November 24, 1999

**DENR Memorandum Order No. 99-32**  
**Series of 1999**

**SUBJECT : 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:

**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:

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

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 or 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 (AMD);
- 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.

**LEGISLATIVE LIBRARY SERVICE**  
**SENATE OF THE PHILIPPINES**

**Tailings Storage**

- a. Impoundment close to the coast shall be above the maximum storm surge level;
- b. Seismic consideration in the design of impoundment shall not be less than 0.15 and 0.25 g under Operation Base Earthquake (OBE) and Maximum Credible Earthquake (MCE) respectively;
- c. Ground/impoundment foundation shall also be thoroughly analyzed to include drilling with Water Pressure Test (WPT), Rock Quality Designation (RQD), Unconfined/Uniaxial Compressive Strength (UCS), permeability (K), direct shear test, and Rock Mass Rating (RMR);
- d. Impoundment formed of earth or earth and rock materials shall be designed and constructed with a factor of safety against failure of at least 1.2 under static loading conditions and at least 0.98 - 1.2 under maximum probable earthquake loading conditions;
- e. Materials to be used for embankment shall also be analyzed as to its gradation, Atterberg limits, Unified Soil Classification System (USCS), consolidation, optimum moisture content, Unconfined/Uniaxial Compressive Strength (UCS) on remolded sample, direct shear test;
- f. Embankments shall also be compacted to no less than ninety percent (90%) of proctor density;
- g. Filter/drain zone shall always be provided along the entire length of the embankment. Provision of key (width-0.25 H), buffness, grout curtain, apron, etc. shall always be implemented whenever necessary.

**Section 16 - Guidelines on Dam Construction**

- a. Freeboard requirement during dam construction stage shall take into consideration the hydrology/flooding in the area. Decant, and/or water diversion or spillway whenever necessary, shall also be provided.
- b. A five (5) year flood cycle shall be considered during dam construction stage.
- c. Materials to be used for embankment shall be non acid and non toxic leachates generating materials;
- d. The company shall submit an "as-built report" to the Bureau after the dam construction.

**Section 17 - Guidelines on the Operation of On-land Mill Tailings Storage**

- a. Sufficient freeboard depending on the hydrological/flooding consideration shall likewise be maintained during operating life of the impoundment. A one hundred (100) year flood cycle shall be taken into account during active impoundment operation;
- b. Embankment slopes shall be maintained below its angle of repose; a maximum angle of 1.1:1 along the upstream slope and 1.5:1 along the downstream slope;
- c. Discharge of supernatant water from which tailings have settled will be permitted if it can be demonstrated that the dissolved constituents outside of a well-defined mixing zone, will conform to the existing and relevant Water Quality Criteria of the Department;
- d. In cases where discharge does not meet the above standards but the receiving stream has a large capacity for dilution, a "mixing zone" of no greater than 500-m long of the river shall be established. Within this zone, water quality is permitted to exceed the standards provided that activities within the zone will be controlled to ensure that the effects will be confined to the zone itself;
- e. Monitoring devices to include piezometers, movement hubs and survey stations shall likewise be installed/provided during construction, active operation and even impoundment abandonment;
- f. Direct and indirect disposal of mill tailings and mine waste into natural drainage systems (including rivers and tributaries) are prohibited. Flushing of tailings is also prohibited;
- g. Whenever practicable, all wastewater from tailings pond shall be recycled and utilized for mining and milling purposes. A zero wastewater discharged shall always be promoted.

**Section 18 - Guidelines on Rehabilitation/Decommissioning of On-land Mill Tailings Storage**

- a. Sufficient freeboard, decant, water diversion or spillway shall be provided before decommissioning to ensure that it can withstand the maximum probable storm event without serious damage to the surrounding environment or to the tailings structure;
- b. Outcrops of abandoned tailings storage shall be protected from progressive erosion by landscaping, the planting of self-sustaining vegetation, or by means of a covering rock (riprap);
- c. Tailings-covered areas shall be resolved, crop-covered or reforested if found unsuitable for more beneficial uses;
- d. Surfaces of tailings storage shall be rehabilitated and monitored prior to abandonment to a condition consistent with a sustainable productive use and/or acceptable to the existing community;
- e. Tailings storage shall avoid the generation of AMD.

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 piled. The maximum angle that an unsupported mound of loose or broches 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  $cm/second^2$ , divided by the acceleration of gravity ( $9.81 cm/second^2$ ). The resulting ratio 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, ground-water conditions, and joint orientation.

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

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

#### Section 11 – Guidelines on the Operation of Mine Wastes Storage

- Slopes of mine waste storage shall be maintained and managed below its angle of repose;
- 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.
- Monitoring devices such as extensometers, movement hubs and survey stations shall be installed/provided during construction, active operation and even storage decommissioning;
- Drainage system shall be provided to control siltation caused by surface-run-off;
- 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.
- 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

- The final landform of mine waste storage shall be established in conformity with the existing surrounding environment or future land use and acceptable to the local community.
- Where practicable, mine waste shall be returned to previously excavated areas;
- All completed surfaces of waste dumps shall be stable and shall resist long term erosion.
- Previously stockpiled subsoil and topsoil shall be spread on all completed surfaces where practicable and re-vegetated with suitable vegetation;
- Slopes of decommissioned mine waste storage facilities shall be protected from progressive erosion by landscaping, planting of self-sustaining vegetation, or by means of a covering rock (rip-rap) ing;
- Mine waste storage-covered areas shall be re-solved, crop-covered or re-forested if found unsuitable for more beneficial uses;
- Surfaces of mine waste storage shall be rehabilitated and monitored prior to abandonment to a condition consistent with a sustainable productive use and/or acceptable to the existing community;
- ARD generation shall be avoided or if not those storage generating ARD should be neutralized/treated before allowing to flow to existing water bodies.

### CHAPTER III MILL TAILINGS STORAGE

#### Section 13 – On-land Mill Tailings Storage Standards

On-land mill tailings storage of mining operations shall be located, designed, constructed, operated and rehabilitated/decommissioned such that they can be returned to productive long term and agreed land use;

#### Section 14 – Guidelines on the Site Selection of On-land Mill Tailings Storage

- They shall be located far from declared watershed areas and free from spillage, slides, and/or washing away of tailings by surface runoff during heavy rains into adjacent areas and natural drainage systems (tributaries, creeks and/or rivers);
- Impoundment in valleys (except cross-valley impoundment) shall be designed and constructed above the maximum flood level;
- Placement of tailings solids into mined-out areas, whether on the surface or underground shall be carried out wherever this is both proven safe and practicable.

#### Section 15 – Guidelines to Design Dam Embankment of On-land Mill

abandonment to a condition consistent with a sustainable productive use and/or acceptable to the existing community;

- Tailings storage shall avoid a generation of ARD. All generated acidic drainages from tailings ponds shall be treated and neutralized before allowing to flow to the natural water systems.

#### Section 19 – Conditions for the Use of Deep Sea Tailings Placement (DSTP)

Deep sea tailings placement systems shall be allowed only when other tailings disposal and management options are not environmentally, socially, technically and economically feasible or when deep sea tailings placement system exhibited the least environmental and social risk. Provided, further that there are significant constraints to on-land tailings storage such as but not limited to any of the following:

- Lack of flat or gently sloping land for the construction of a safe, efficient and cost effective on-land tailing disposal system.
  - Heavy land use pressure (either existing or projected), particularly cultivated land or where slash and burn agriculture is used and the local community is dependent on subsistence gardening.
  - High seismic risk.
  - High rainfall, possibly including cyclones, and water surplus.
  - Poor geotechnical conditions for on-land storage structures.
- The environmental and technical aspect of the system shall be in conformity with the acceptable international best practice. Further, tailings placement shall be within the carrying capacity of the receiving marine environment.

#### Section 20 – Guidelines for the on Site Selection of Deep Sea Tailings Placement

- The site characteristics shall be such that the seafloor continues to slope towards an intended deep sea placement area, preferably a confined oceanic basin or trench.
- Assessment of the selected site on its potential for oceanic upwelling so that there is minimal risk that tailings will be upwelled to the ocean surface.
- Assessment of existing and potential fisheries at the selected site and the predicted deep sea placement area. There shall be minimal conflict with fisheries during operations.
- Political, regulatory and local community acceptance is essential if the underwater tailings placement option is to withstand NGO & media scrutiny.

#### Section 21 – Guidelines for the Design of Deep Sea Tailings Placement

- The depth of the outfall shall be determined by in-situ measurements and modeling so that it will be located below the maximum predicted thickness of either the euphotic zone or surface mixed layer, whichever is deeper (normally >100 m water depth).
- The design shall ensure that the relative density of the tailing slurry is always greater than that of the influence of gravity and will form a bottom-attached and negatively-buoyant density current.
- The tailings shall have low leachability of potential contaminants such as process reagents and metals both in the short term (in the water column prior to settling) and in the long term (on the ocean floor after settling).
- After allowance for predischage dilution and initial mixing with seawater in a 'mixing zone' beyond the outfall terminus, the concentrations of potential contaminants and the pore water within the deposited tailings shall be non toxic to marine life;
- The dissolved constituents of the tailings beyond an immediate mixing zone shall conform to the existing and/or relevant Water Quality Criteria of the Department;
- The accuracy of the environmental impact prediction shall be tested by undertaking validation studies and monitoring the actual effects of the underwater tailings placement system both throughout operations and post closure.
- The density and flow conditions of the tailings stream at the outfall terminus shall be such that it promotes the creation of a coherent, bottom attached density current upon release. Preliminary fate of tailing modeling shall be undertaken to confirm that the tailings have every opportunity to settle in the intended placement area.
- The system shall be designed to be flexible so that plant throughout can be expanded without the need for retrofit.
- The tailings will settle in an area subject to high existing rates of sedimentation, whenever possible, the dissolved constituents of the tailings beyond an immediate mixing zone shall conform to the existing and/or relevant Water Quality Criteria of the Department;
- A by-pass stand-by system should be included in the design to manage tailings in case of pipeline failure or emergencies such as vandalism or earthquakes.

#### Section 22 – Guidelines on the Preparation/Construction of Deep Sea Tailings Placement

- A detailed bathymetry survey and geotechnical assessment of potential subsea pipeline routes shall be undertaken to optimize route selection and avoid obstacles and areas of seafloor instability.
- An assessment of nearshore wave conditions and littoral processes shall be undertaken such that designs can be prepared to protect the deaeration

RECORDS OF THE PHILIPPINE BUREAU OF ENVIRONMENTAL MANAGEMENT

- facilities and outfall pipeline in the nearshore area and in the surf zone.
- c. Estimations of wave orbital velocities and ocean currents along the outfall pipeline route must be performed in order that the appropriate pipeline ballasting and other stabilization designs can be carried out.

**Section 23 – Guidelines on the Operation of Deep Sea Tailings Placement**

- a. Adequate deaeration must be provided prior to discharge through the outfall pipeline.
- b. The outfall pipeline shall be constructed from materials proven to be suitable for the marine environment and designs shall be sufficiently conservative to reflect the hostile environment in which the pipe will be placed into service.
- c. Underwater tailings placement is not precluded in situations other than those described above. However, it is necessary to demonstrate clearly that:
1. Other disposal means are not feasible or underwater tailings placement will be less environmentally damaging than other alternatives;
  2. Adequate compensation will be paid to any persons adversely affected by the actions; and
  3. Overall benefits of the mining operation will more than offset the environmental losses that will be incurred as a result.

**Section 24 – Guidelines on Rehabilitation/Decommissioning of Deep Sea Tailings Placement**

- a. All deep sea tailings placement facilities shall be dismantled;
- b. The monitoring of the tailings placement area shall be incorporated in the Final Mine Rehabilitation/Mine Decommissioning Plan as per Section 187 of DAO 96-40;
- c. Post discharge monitoring shall be undertaken to monitor both water quality and marine ecosystem recovery until such time that the metal constituents of the tailings have been established as non-toxic to marine life and the recovery of the marine populations to a level proximate the pre-discharge populations.

**CHAPTER IV  
FRAMEWORK TO MANAGE MINE WASTE AND TAILINGS  
PLACEMENT FACILITIES**

**Section 25 – Guide to Manage Mine Wastes and Mill Tailings Storage/Placement Facilities**

To further enhance the implementation of Chapters III and IV of this Memorandum Order, the following framework to manage mine wastes and mill tailings facilities shall be strictly applied.

**Section 26 – Framework to Manage Mine Waste and Mill Tailings Storage/Placement Facilities**

A guiding principle of mine wastes and mill tailing management must be continual improvement in operational, safety and sustainable environmental performance, supported by periodical review and evaluation. The key elements of a framework to manage mine waste and mill tailings storage facilities, which is the foundation for the management action checklists stated in the attached annexes and which addresses wastes and tailings management through the full life cycle are as follows:

**A. Policy and Commitment**

Mining companies shall ensure that their policies include a commitment to:

1. Effectively safeguard the environment and protect the rights of existing communities;
2. Locate, design, construct, operate and close mine waste and mill tailings storage facilities in a manner such that:
  - 2.1 All structures are stable and in compliance with company standards, government environmental policies and regulations, acceptable environmental practices, legislative requirements and commitments to stakeholders; and
  - 2.2 All solids and water are managed within the designated areas intended in the design;
3. Take responsibility for implementing this framework through the commitments and actions of their employees; and
4. Establish an ongoing program of review and continual improvement of manage health, safety and environmental risks associated with mine waste and mill tailings storage facilities.

**B. Planning**

**1. Roles and Responsibilities**

The mine waste and mill tailings management team shall be established with clearly defined roles, responsibilities and authorities to implement the framework through all stages in the mine waste and mill tailings storage life cycle.

**2. Objectives**

- a. Mine waste and mill tailings storage shall be plan in accordance with this framework, company standards, legislative requirements, and sound engineering and sustainable environmental practices.
- b. It shall be planned to identify and assess significant environmental and safety aspects, and their associated risks.
- c. Prepare and document mine waste and mill tailings storage plans including descriptions of:
  - aspects, objectives, targets and performance measures;
  - permits and approvals;
  - roles and responsibilities of key personnel;
  - site election and characterization criteria;
  - safety, environmental and engineering design criteria;
  - as-built records;
  - communication procedures with senior management and external stakeholders;
  - construction, operation and rehabilitation/decommissioning procedures and documentation requirements;
  - monitoring, inspection, reporting and review requirements; and
  - knowledge and skills (awareness, training and competence) requirements and training records.
- d. Consult external stakeholders in the identification of appropriate community expectations for mine waste and mill tailings facilities.
- e. Design the facilities for eventual closure to protect public health and safety, to mitigate negative environmental impacts and to meet acceptable post-closure use within a feasible technical and economic framework.

**3. Managing Risk**

Conduct risk assessment, including identification and evaluation of possible failure modes. Risk management shall be plan to:

- a. Minimize the likelihood of adverse safety or environmental impacts;
- b. Detect and respond to potential failures; and
- c. Establish contingency and emergency preparedness plans to deal with significant events.

**4. Managing Change**

Prepare and document procedures to manage changes made to approve designs and plans during implementation.

- their individual roles and responsibilities in achieving conformance with the requirements.

**5. Monitoring**

- a. Put in place procedure to routinely inspect, monitor, test, record, evaluate and report on a regular basis key characteristics of the storage facility; include tracking of performance, operational controls and conformance with targets and objectives.
- b. Calibrate equipment to ensure the reliability of data from monitoring and inspections.

**6. Communications**

Establish and maintain communication procedures for all personnel who have roles and responsibilities in implementing the placement management plan, including reporting of significant information and decisions to senior management and external stakeholders.

**D. Audit and Mitigating Measures**

**1. Audit**

- a. In addition to routine monitoring and inspections, inspect and review on a periodic basis the entire storage facility to:
  - examine facility implementation and conformance to plans and regulatory requirements;
  - re-visit the facility design, construction, operation, and closure plans and programs;
  - re-evaluate downstream risks (which may change during the life of the facility);
  - update consideration of possible failure modes, risk assessment and risk management; and
  - identify items requiring corrective action.
- b. Communicate promptly the results of inspections and review to senior management.

**2. Mitigating Measure**

- a. Address items identified during inspections, reviews or audits that require mitigating measure.
- b. Develop and implement action plans for these items, and record upon completion.

**E. Management Review for Continual Improvement**

1. Implement an annual senior management review of the adequacy of policies, objectives and performance of the management framework. Ensure that the scope of this review is appropriate to the level of identified risk.
2. Address the possible need for changes to policies, objectives and other elements in light of inspection reports, changing circumstances, recommendations and the commitment to continual improvement.
3. Encourage ongoing environmental and safety research to effect continual improvement.

**Section 26 – Framework Implementation**

To properly implement the above framework, the attached checklists as Annexes "A – D" and the attached applicable Technical considerations as references shall be applied in managing through the life cycle of mine waste and mill tailings storage facilities.

**CHAPTER VI  
IMPLEMENTATION AND MONITORING**

**Section 27 – Clearance**

To fully implement compliance to this Memorandum Order, all mining applicants/permittees that will construct and/or operate mine wastes and mill tailings storage shall secure a clearance from the MGB or its Regional Offices without prejudice to applied permits from the concerned DENR agencies.

A Detailed guidelines regarding the implementation of this Section shall be formulated by MGB subject to the approval of the Secretary.

**Section 28 – Monitoring**

The MRF Committee through the Multi-Partite Monitoring Team shall include in its regular monitoring the compliance of the mining permittees to the guidelines. Permittees operating without the necessary clearance shall not be allowed to construct/operate the storage facilities. A report based on the monitoring shall be submitted to the CLRF – Steering Committee.

**Section 29 – Audit**

The report submitted by the MRF Committee shall be subject to annual audit by the CLRF, Steering Committee or its authorized representative.

That in case of DSTP, a Scientific and Technical Review Team, independent from the CLRF, composed of government and university scientists and engineers with representatives from the company and the community, shall be constituted over the life of the mine to review all scientific and technical studies prepared for and by the company during any given year and may recommend additional studies to be undertaken when warranted.

**Section 30 – Non-issuance of Clearance**

The MGB or its Regional Offices may not issue the required clearance if based on their field evaluation/assessment and the documents submitted were not in accordance with this Memorandum Order. Permittees with pending/unsettled environmental requirements shall not be given any clearance unless all environmental commitments are cleared.

**CHAPTER VII  
FEES, REPORTING REQUIREMENTS AND PENALTIES**

**Section 31 – Mine Waste and Tailings Fees, Reporting Requirements and Penalties**

The provisions specified under DAO 96-40, Series of 1996, insofar as they are not inconsistent with the provisions of this Order, shall continue to govern tailings fees, reporting requirements and penalties.

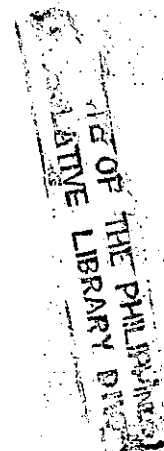
**Section 32 – Tailings Fees for Deep Sea Tailings Placement**

The basic fee that shall accrue to the MWT Reserve Fund shall be PHP 0.10 MT of mill tailings.

**Section 33 – Penalty**

Tailings Impoundment/disposal system found to have discharged and/or to be discharging solid fractions of tailings into areas other than the approved tailings storage area shall pay PHP 50.00/MT without prejudice to other penalties and liabilities the Contractor/Lessee/Permit Holder shall be subject under other existing laws, rules and regulations; Provided, that the said amount shall be deposited in a government depository bank to be used for payment for compensation for damages, rehabilitation, monitoring and decommissioning strategies of affected areas.

Withdrawal from the said fund shall be made by the Contractor/Permit Holder only with the written instruction to the bank issued by the MRF Committee authorizing the Contractor/Permit Holder to withdraw the said amount. The



- ronmental practices, legislative requirements and commitments to stakeholders; and
- 2.2 All solids and water are managed within designated areas intended in the design;
  3. Take responsibility for implementing this framework through the commitments and actions of their employees; and
  4. Establish an ongoing program of review and continual improvement of manage health, safety and environmental risks associated with mine waste and mill tailings storage facilities.

**B. Planning**

**1. Roles and Responsibilities**

The mine waste and mill tailings management team shall be established with clearly defined roles, responsibilities and authorities to implement the framework through all stages in the mine waste and mill tailings storage life cycle.

**2. Objectives**

- a. Mine waste and mill tailings storage shall be plan in accordance with this framework, company standards, legislative requirements, and sound engineering and sustainable environmental practices.
- b. It shall be planned to identify and assess significant environmental and safety aspects, and their associated risks.
- c. Prepare and document mine waste and mill tailings storage plans including descriptions of:
  - aspects, objectives, targets and performance measures;
  - permits and approvals;
  - roles and responsibilities of key personnel;
  - site election and characterization criteria;
  - safety, environmental and engineering design criteria;
  - as-built records;
  - communication procedures with senior management and external stakeholders;
  - construction, operation and rehabilitation/decommissioning procedures and documentation requirements;
  - monitoring, inspection, reporting and review requirements; and
  - knowledge and skills (awareness, training and competence) requirements and training records.
- d. Consult external stakeholders in the identification of appropriate community expectations for mine waste and mill tailings facilities.
- e. Design the facilities for eventual closure to protect public health and safety, to mitigate negative environmental impacts and to meet acceptable post-closure use within a feasible technical and economic framework.

**3. Managing Risk**

Conduct risk assessment, including identification and evaluation of possible failure modes. Risk management shall be plan to:

- a. Minimize the likelihood of adverse safety or environmental impacts;
- b. Detect and respond to potential failures; and
- c. Establish contingency and emergency preparedness plans to deal with significant events.

**4. Managing Change**

Prepare and document procedures to manage changes made to approve designs and plans during implementation.

**5. Resources and Scheduling**

Provide the essential resources and schedule for effective and efficient implementation of a mine waste and mill tailings management framework, including staffing, specialized skills development, technology and financial resources.

**C. Plan Implementation**

**1. Operational Control**

- a. Select a site, design, construct, operate, decommission and close the storage facilities in accordance with the approved design, plans, sound engineering and sustainable environmental practices, and the management framework.
- b. Identify, evaluate the impact of, and document changes made to approve designs and plans.
- c. Acquire all required permits and approvals.

**2. Financial Control**

Implement a financial control system to track capital and operating costs toward meeting the objectives of the storage management.

**3. Documentation**

Prepare, maintain, periodically review and revise the required documents, including as-built drawings. Maintain current versions of all documents at identified locations. Promptly remove from uses obsolete versions of documents.

**4. Competency**

- a. Employ qualified personnel for the storage design, construction, operation and closure.
- b. Provide appropriate training to all personnel, including contractors and suppliers, whose work may significantly affect the storage facility, on:
  - facility management plans, permits and approval requirements;
  - the importance of conformance to design;
  - potential risks;
  - significant actual and potential environmental impacts;
  - emergency preparedness and response requirements; and

storage shall secure a clearance from the MGB or its Regional Offices without prejudice to applied permits from the concerned DENR agency/ies.  
A Detailed guidelines regarding implementation of this Section shall be formulated by MGB subject to the approval of the Secretary.

**Section 28 - Monitoring**

The MRF Committee through the Multi-Partite Monitoring Team shall include in its regular monitoring the compliance of the mining permittees to the guidelines. Permittees operating without the necessary clearance shall not be allowed to construct/operate the storage facilities. A report based on the monitoring shall be submitted to the CLRF - Steering Committee.

**Section 29 - Audit**

The report submitted by the MRF Committee shall be subject to annual audit by the CLRF- Steering Committee or its authorized representative.  
That in case of DSTP, a Scientific and Technical Review Team independent from the CLRF, composed of government and university scientists and engineers with representatives from the company and the community, shall be constituted over the life of the mine to review all scientific and technical studies prepared for and by the company during any given year and may recommend additional studies to be undertaken when warranted.

**Section 30 - Non-issuance of Clearance**

The MGB or its Regional Offices may not issue the required clearance if based on their field evaluation/assessment and the documents submitted were not in accordance with this Memorandum Order. Permittees with pending/unsettled environmental requirements shall not be given any clearance unless all environmental commitments are cleared.

**CHAPTER VII  
FEES, REPORTING REQUIREMENTS AND PENALTIES**

**Section 31 - Mine Waste and Tailings Fees, Reporting Requirements and Penalties**

The provisions specified under DAO 96-40, Series of 1996, insofar as they are not inconsistent with the provisions of this Order, shall continue to govern tailings fees, reporting requirements and penalties.

**Section 32 - Tailings Fees for Deep Sea Tailings Placement**

The basic fee that shall accrue to the MWT Reserve Fund shall be PhP 0.10 MT of mill tailings.

**Section 33 - Penalty**

Tailings impoundment/disposal system found to have discharged and/or to be discharging solid fractions of tailings into areas other than the approved tailings storage area shall pay PhP 50.00/MT without prejudice to other penalties and liabilities the Contractor/Lessee/Permit Holder shall be subject under other existing laws, rules and regulations. Provided, that the said amount shall be deposited in a government depository bank to be used for payment for compensation for damages, rehabilitation, monitoring and decommissioning strategies of affected areas.

Withdrawal from the said fund shall be made by the Contractor/Permit Holder only with the written instruction to the bank issued by the MRF Committee authorizing the Contractor/Permit Holder to withdraw the said amount. The amount to be withdrawn shall be approved by the MRF Committee, copy furnished the CLRF Steering Committee.

**Section 34 - Additional Reporting Requirement for Deep Sea Tailings Placement System**

Contractor/Lessee/Permit Holder utilizing deep sea tailings placement upon issuance of the ECC, shall submit to the Bureau semiannual report on the physical, chemical and biological features of the concerned marine environment. The MGB may also require other reports deemed necessary for the smooth implementation/operationalization of this Order.

**CHAPTER VIII  
FINAL PROVISIONS**

**Section 35 - Separability Clause**

If any action or provision of these Order is declared unconstitutional or invalid by a competent court, other sections or provisions hereof which are not affected thereby, shall continue to be in full force and effect, as if the sections or provisions so annulled had never been incorporated herein.

**Section 36 - Repealing Clause**

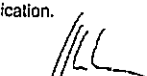
Any provision of this Order and/or parts inconsistent thereof, inconsistent with law, other policy issuances and regulations, are hereby repealed and/or modified accordingly.

**Section 37 - Amendments**

This Order shall be accordingly amended and/or modified from time to time by the Department.

**Section 38 - Effectivity**

This Order shall take effect immediately after publication.

  
**ANTONIO H. CERILLES**  
Secretary

costing taxpayers less in the past five years than what Hollywood is shared by all. It could start tomorrow or in a hundred years. It's really up to us to find the will.

**SENATE OF THE PHILIPPINES  
LEGISLATIVE LIBRARY DIV.**