WORLD BANK ENVIRONMENT, HEALTH AND SAFETY GUIDELINES[1]

MINING AND MILLING - OPEN PIT

TAILINGS DISPOSAL

Tailings must be disposed of in a manner that optimizes protection of human safety and the environment. On-land tailings impoundment systems must be designed and constructed in accordance with internationally recognized engineering practices, local seismic conditions, and precipitation conditions. On-land disposal systems should be designed to isolate acid leachate-generating material from oxidation or percolating water. Marine discharges of tailings must not have a significant adverse effect on coastal resources. Riverine discharges are not acceptable unless the project sponsor provides thorough documentation regarding: 1) environmental analysis of alternatives, and 2) effects on aquatic resources and downstream users of riverine resources.

If the mining operation involves a series of open pit operations, project sponsors must evaluate the feasibility of using abandoned open pits for tailings disposal.

LIQUID EFFLUENTS

The following are guidelines for effluent discharged to receiving waters from tailings impoundments, mine drainage, sedimentation basins, sewage systems, and stormwater drainage. They do not apply to direct discharge of tailings to the marine environment.

pH	6 to 9
BOD_5	50 mg/l
Oil and Grease	20 mg/l
Total Suspended Solids	50 mg/l
Temperature - at the edge of a designated mixing zone	Max 5° C above ambient temperature of receiving waters - max 3° C if receiving waters >28° C

Residual Heavy Metals

The following are recommended target guidelines below which there is expected to be no risk for significant adverse impact on aquatic biota or human use. In cases where natural background concentrations exceed these levels, the discharge may contain concentrations up to natural background levels. Concentrations up to 110% of natural background can be accepted if no significant adverse impact can be demonstrated.

Arsenic	1.0 mg/l
Cadmium	0.1 mg/l
Chromium, Hexavalent	0.05 mg/l
Chromium, Total	1.0 mg/l
Copper	0.3 mg/l
Iron, Total	2 mg/l
Lead	0.6 mg/l
Mercury	0.002 mg/l
Nickel	0.5 mg/l
Zinc	1.0 mg/l

Cyanide

[1] Source: The World Bank policies and guidelines, supplemented with information from OECD sources and the proposed revisions to the World Bank guidelines.

The following are recommended target guidelines for discharges below which there is expected to be no risk for significant adverse impact on aquatic biota or human use. In no case should the concentration in the receiving water outside of a designated mixing zone exceed 0.022 mg/l.

Free Cyanide	0.1 mg/l
Total Cyanide	1.0 mg/l
Weak Acid Dissociable	0.5 mg/l

Measures to prevent access by wildlife and livestock are required for all open waters (examples tailings impoundments and pregnant leach ponds) where WAD cyanide is in excess of 50 mg/l.

AMBIENT AIR

Concentrations of contaminants, measured outside the project property boundary, should not exceed the following limits:

Particulate Matter (<10 μm)	
Annual Arithmetic Mean	100 $\mu g/m^3$
Maximum 24-hour Average	500 $\mu g/m^3$
Nitrogen Oxides, as NO_2	
Annual Arithmetic Mean	100 $\mu g/m^3$
Maximum 24-hour Average	200 $\mu g/m^3$
Sulfur Dioxide	
Annual Arithmetic Mean	100 $\mu g/m^3$
Maximum 24-hour Average	500 $\mu g/m^3$

OTHER GENERAL ENVIRONMENTAL REQUIREMENTS

Erosion and Sediment Control Plan

Project sponsors are required to prepare and implement an erosion and sediment control plan. The plan should include measures appropriate to the situation to intercept, divert, or otherwise reduce the stormwater runoff from exposed soil surfaces, tailings dams, and waste rock dumps. Project sponsors are encouraged to integrate vegetative and non-vegetative soil stabilization measures in the erosion control plan. Sediment control structures (e.g., detention/retention basins) should be installed to treat surface runoff prior to discharge to surface water bodies. All erosion control and sediment containment facilities must receive proper maintenance during their design life.

Mine Reclamation Plan

Project sponsors are required to prepare and implement a mine reclamation plan. The plan should include reclamation of tailings deposits, any open pit areas, sedimentation basins, and abandoned mine, mill, and camp sites. The main objectives of the mine reclamation plan are:

a) return the land to conditions capable of supporting prior land use or uses that are equal to or better than prior land use, to the extent practical and feasible
b) eliminate significant adverse effects on adjacent water resources.

Mine reclamation plans should incorporate the following components:

a) conserve, stockpile, and use topsoil for reclamation
b) slopes of more than 30% should be recontoured to minimize erosion and runoff
c) native vegetation should be planted to prevent erosion and encourage self-sustaining development of a productive ecosystem on the reclaimed land

d) budget and schedule for pre- and post-abandonment reclamation activities
e) plan views that show areas cleared, mined, refilled, and revegetated during each of the next 5 years and estimated activities at subsequent 5 year intervals

Sewage Sludge Disposal

Sewage sludge must be disposed of in an environmentally acceptable way in compliance with local laws and regulations. Project sponsors are encouraged to evaluate the environmental and health implications of using sewage sludge in reclaiming tailings deposits, waste rock dumps, and mined out areas.

Solid Wastes Disposal

Project sponsors are encouraged to recycle or reclaim materials where possible. If recycling or reclaim is not practical, these wastes must be disposed of in an environmentally acceptable way in compliance with local laws and regulations. Solvents and similar hazardous materials must not be disposed of in a manner likely to result in soil or groundwater contamination if groundwater is potentially useable for potable water or irrigation purposes. Waste rock dumps should be designed and engineered so that materials with high potential to generate acid leachate are isolated from oxidation or percolating water.

WORKPLACE AIR QUALITY

a) Periodic monitoring of workplace air quality should be conducted for air contaminants relevant to employee tasks and the plant's operations.
b) Ventilation, air contaminant control equipment, protective respiratory equipment and air quality monitoring equipment should be well maintained.
c) Protective respiratory equipment must be used by employees when the exposure levels for welding fumes, solvents and other materials present in the workplace exceed local or internationally accepted standards, or the following threshold limit values (TLVs):

Arsenic	0.5 mg/m^3
Carbon Monoxide	29 mg/m^3
Copper	1 mg/m^3
Free Silica	5.0 mg/m^3
Hydrogen Cyanide	11 mg/m^3
Hydrogen Sulfide	14 mg/m^3
Lead, Dusts & Fumes, as Pb	0.15 mg/m^3
Nitrogen Dioxide	6 mg/m^3
Particulate (Inert or Nuisance Dusts)	10 mg/m^3
Sulfur Dioxide	5 mg/m^3

WORKPLACE NOISE

a) Feasible administrative and engineering controls, including sound-insulated equipment and control rooms should be employed to reduce the average noise level in normal work areas.
b) Plant equipment should be well maintained to minimize noise levels.
c) Personnel must use hearing protection when exposed to noise levels above 85 dBA.

WORK IN CONFINED SPACES

a) Prior to entry and occupancy, all confined spaces (e.g., tanks, sumps, vessels, sewers, excavations) must be tested for the presence of toxic, flammable and explosive gases or vapors, and for the lack of oxygen.
b) Adequate ventilation must be provided before entry and during occupancy of these spaces.
c) Personnel must use air-supplied respirators when working in confined spaces which may become contaminated or deficient in oxygen during the period of occupancy.
d) Observers/assistants must be stationed outside of confined spaces to provide emergency assistance, if necessary, to personnel working inside these areas.

HAZARDOUS MATERIAL HANDLING AND STORAGE

a) All hazardous (reactive, flammable, radioactive, corrosive and toxic) materials must be stored in clearly labeled containers or vessels.
b) Storage and handling of hazardous materials must be in accordance with local regulations, and appropriate to their hazard characteristics.
c) Fire prevention systems and secondary containment should be provided for storage facilities, where necessary or required by regulation, to prevent fires or the release of hazardous materials to the environment.

HEALTH - GENERAL

a) Sanitary facilities should be well equipped with supplies (e.g., protective creams) and employees should be encouraged to wash frequently, particularly those exposed to dust, chemicals or pathogens.
b) Ventilation systems should be provided to control work area temperatures and humidity.
c) Personnel required to work in areas of high temperature and/or high humidity should be allowed to take frequent breaks away from these areas.
d) Pre-employment and periodic medical examinations should be conducted for all personnel, and specific surveillance programs instituted for personnel potentially exposed to toxic or radioactive substances.

SAFETY - GENERAL

a) Conveyors and similar machinery should be provided with a means for stopping them at any point.
b) Shield guards or guard railings should be installed at all belts, pulleys, gears and other moving parts.
c) Elevated platforms and walkways, and stairways and ramps should be equipped with handrails, toeboards and non-slip surfaces.
d) Electrical equipment should be grounded, well insulated and conform with applicable codes.
e) Employees should be provided with hard hats, safety boots, eye and ear protection, and snug fitting gloves as appropriate.
f) Masks and dust-proof clothing should be provided to personnel working in areas with high dust levels.
g) Procedures must be strictly enforced for the storage, handling, and transport of explosives.
h) All blasting operations must be carried out only by qualified and certified personnel.

TRAINING

a) Employees should be trained on the hazards, precautions and procedures for the safe storage, handling and use of all potentially harmful materials relevant to each employee's task and work area.
b) Training should incorporate information from the Material Safety Data Sheets (MSDSs) for potentially harmful materials.
c) Personnel should be trained in environmental, health and safety matters including accident prevention, safe lifting practices, the use of MSDSs, safe chemical handling practices, and proper control and maintenance of equipment and facilities.
d) Training also should include emergency response, including the location and proper use of emergency equipment, use of personal protective equipment, procedures for raising the alarm and notifying emergency response teams, and proper response actions for each foreseeable emergency situation.

RECORD KEEPING AND REPORTING

a) The sponsor should maintain records of significant environmental matters, including monitoring data, accidents and occupational illnesses, and spills, fires and other emergencies.
b) This information should be reviewed and evaluated to improve the effectiveness of the environmental, health and safety program.
c) An annual summary of the above information should be provided to IFC.