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CHAPTER 226

MINES AND MINERALS
(SAFETY, HEALTH AND ENVIRONMENTAL) REGULATIONS
(Section 119)

[30th April, 1994.]

Short title.

PART I
PRELIMINARY

1. These Regulations may be cited as the

Interpretation.

MINES AND MINERALS (SAFETY, HEALTH AND ENVIRONMENTAL) REGULATIONS.

2. (1) In these Regulations, unless the context otherwise requires:-

“abandoned mine” means a mine for which all permit obligations have been completed to the satisfaction of the Inspector;

“accident” means an unintended event that results in physical harm to a person, damage to property or pollution of the land and watercourses;

“approved type” means any equipment that has been approved for use in a mine by the Inspector;

“asbestos free” means containing less than 1% asbestos;

“authorized person” means a qualified person appointed or designated by the manager to perform specified duties;

“bench” means a horizontal plane above which material is excavated from a contiguous face and on which drilling, blasting and material haulage may be carried out;

“blaster” means a person who is certified to conduct blasting operations at a mine;

“blasting agent” means a relatively insensitive, ammonium nitrate explosive which includes any ammonium nitrate and fuel oil mixture, emulsion, slurry, or water gel;

“blasting machine” means a portable device used to initiate a blast by electricity;

“bootleg” means a remnant of a blast hole that remains after a blast was initiated;

“catchment berm” means a bench designed to arrest material which sloughs from a face or wall at elevations above the face being worked;

“collar” means the start of a drilled hole, adit or shaft excavation;

“confined space” means a tank, process vessel, underground vault, tunnel, or other enclosure not designed or intended for human occupancy without special protective equipment or procedures;

“dam” means a barrier on the surface preventing uncontrolled release of either water or loose, solid material, or a barrier underground to prevent the uncontrolled flow of liquid or slurry;

“detonator” means a blasting cap, or other device used to initiate detonation of an explosive;

“dump” means an accumulation of rock fragments or other unconsolidated material formed by pushing or dropping the loose material over a crest and

allowing it to come to rest without further handling;

“dump berm” means a barrier or ridge of material other than mud, acting as a guide that will indicate the limit of travel of a vehicle from which material is to be dumped over a drop off of more than 3 meters;

“dump block” means a barrier of sufficient size and strength and anchored sufficiently to prevent a vehicle from entering an opening;

“dust exposure occupation” means employment in an asbestos mine or where a person is normally required to work more than 20% of the working time in a month:-

- (a) underground in a mine;
- (b) in the surface mining activity of an open cast mine, crushing plants, assay grinding rooms, coal cleaning plants and dry processing plants;
- (c) at other locations designated by the Inspector;

“electrical grounding” means to connect with the ground to make the earth part of the circuit;

“embankment” means a dam, fill, or dump raised from the ground or lying against a hill having an exposed slope comprised of placed material;

“explosive” means any chemical compound or mixture which, when detonated, violently decomposes producing a large volume of gas at high temperatures capable of having destructive effects;

“face” means a surface of rock, ore, coal, or other material exposed by blasting or excavation which extends from a bench or floor to an upper bench or to the natural land surface;

“haulage road” means a part of a mine used for the transport of coal, minerals, or waste rock;

“height of slope” means the difference in elevation between the crest or top of the slope and the toe or base of the slope;

“impoundment” means a body of water or poorly consolidated solid matter, confined by natural and/or constructed barriers and includes those barriers and related items;

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“Inspector” means the Inspector of Mines and Minerals appointed under section 5 of the Mines and Minerals Act, 1988;

“leg wires” means the wires attached to an electric blasting cap used for initiating its detonation;

“magazine” means a building, storehouse, or structure where explosive materials are kept or stored but does not include containers used for transporting explosives or day box storage;

“manager” means the person appointed under Regulation 9 of these Regulations, by the owner, occupier, or holder of a mine to be responsible for the management and operation of the mine;

“non-electric cap” means a detonator which does not require an electric current to initiate its explosive charge;

“Occupational Health and Safety Committee” (hereinafter referred to as the “OHSC”) means the joint worker management committee established for each mine under these Regulations;

“occupier or holder” means a person having control of a mine on behalf of the owner;

“overburden” means all unconsolidated soil material overlying bedrock;

“primed cartridge” means an explosive containing a detonator;

“qualified person” means a person who, in the opinion of the manager, is

- (a) qualified to perform the duties assigned by the manager because of knowledge, training, and experience in the design, organization and supervision of the work;
- (b) familiar with the provisions of these Regulations that apply to the duties assigned;
- (c) capable of identifying any potential or actual danger to health or safety in the workplace;

“ramp” means a sloping roadway and in the case of a surface mine, connects two levels of excavation or benches;

“safety fuse assembly” means a device to convey flame to a non-electric blasting cap and consists of black powder, tightly wrapped and enclosed in a waterproof material, which burns at a constant rate;

“shaft” means a vertical or inclined opening in the ground, driven from the surface and includes a winze or incline;

“shoulder barrier” means a barrier or ridge of material, other than mud, placed along the edge or crest of a surface roadway, ramp, dump, or stockpile where vehicles operate and where there is a drop off of more than 3 meters (10 feet);

“standard guardrail” means a structure comprised of a top rail approximately 1070 mm (42') above floor level, a toe board, and a midrail midway between

the top rail and the toe board and designed to withstand a load of 900 N (200 lbs.) applied in any direction on the top rail;

“stope and stoping” means the location of underground ore extraction openings and the method of mining;

“surficial soil material” means those soils commonly contained in the upper layers of the overburden mass, which are suitable for use in reclamation as a growth medium;

“tailing” means the residue remaining from the preparation of a concentrate of minerals or coal;

“threshold limit value - time weighted average (TLV-TWA)” means the time weighted average concentration for a normal 8 hour day and a 40 hour work-week, to which nearly all workers can be repeatedly exposed without adverse effect;

“threshold limit value - short term exposure limit (TLV-STEL)” means the concentration to which workers can be exposed continuously for a short period of time, provided the daily TLV-TWA is not exceeded. TLV-STEL shall be no longer than 15 minutes, be separated by at least 60 minutes, if repeated, and occur no more than four times per day;

“threshold limit value - ceiling (TLV-C)” means the concentration that must not be exceeded during any part of the working exposure;

“toe board” means a metal or wood guard strip, approximately 100 mm (4") in height, that is part of a guardrail structure and placed along the floor to prevent tools or other material from falling off;

“wall” means a surface of rock or material exposed by the excavation of one or more faces and benches in successive layers;

“waste emplacement” means a location of deposited waste including dumps, impoundments, lagoons, piles, tips and impoundments;

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“workplace” means a place where work is carried out in, on or about a mine.

(2) The words and expressions used in these Regulations shall have the meanings respectively assigned to them in the Mines and Minerals Act.

Inspector to investigate accidents.

PART II GENERAL PROVISIONS

Manager’s responsibilities for investigation.

3. (1) Where an accident that has caused serious personal injury, loss of life or property, or environmental damage has occurred, the Inspector shall carry out an investigation and make a report thereof to the Minister.

Manager’s accident report.

(2) Where an accident causes loss of life or serious personal injury or any dangerous occurrence takes place, the manager shall inform the Inspector and the OHSC as soon as possible and ensure that, except for the purpose of saving life, that the scene of the accident or occurrence is not disturbed without the approval of the Inspector, and that an investigation is conducted that includes the OHSC.

Dangerous occurrences.

(3) Upon completion of an investigation under this Regulation, the manager shall prepare a report that, wherever possible, identifies the cause of the accident, any unsafe conditions, acts or procedures which contributed to the accident, make recommendations to prevent similar accidents and shall submit the report to the Inspector in the prescribed form.

(4) In this Regulation, “dangerous occurrence” includes the following:-

(a) unexpected groundfall or subsidence, whether on surface or underground;

- (b) cracking or subsidence of a dam or impoundment or any unexpected seepage, loss of freeboard, washout or erosion;
- (c) any accident involving the mine hoisting plant, including sheaves, ropes, conveyance, shaft, timber, or headframe;
- (d) unexpected inrush of water, mud, slurry, or debris;
- (e) a premature or unexpected explosion;
- (f) significant inflow or release of explosive or dangerous gas;
- (g) any outbreak of fire;
- (h) unplanned stoppage of the main underground ventilation system;
- (i) any other unusual accident; or

unexpected event that had the potential to result in serious personal injury or environmental damage. Monthly accident report.

(5) The manager shall, at the end of each month, forward a report in a form approved by the Inspector, on all accidents and dangerous occurrences to the Inspector. Maximum hours of employment.

4. (1) The manager shall not permit the employment of a person at a mine for a period longer than 8 hours in any 24 hours. Exceptions.

(2) Subregulation (1) does not apply:-

(a) to emergencies, where life or property is in danger;

- (b) where urgent work is essential to the continuation of the ordinary working of a mine, provided it is only on an infrequent basis; or
- Restriction. (c) where work schedules incorporate periodic shift changes within a 24 hour period.
- Variance. (3) Work performed pursuant to subregulation (2)(b) and (c) shall not exceed 16 hours in any 24 hour period.
- (4) The Inspector may, after investigating a joint request from the manager and the workers affected and after supervising a secret ballot vote at the mine, grant a variance to the work hours by prescribing hours of work for designated areas or classifications.
- Minimum age of employment.
- Approval to commence work. 5. The manager shall not employ persons under eighteen years of age at a mine unless for the purposes of training.
- CAP. 226. 6. (1) Before commencement of any work in, on, or about a mine, with respect to a licence issued for reconnaissance, non-exclusive prospecting, exclusive prospecting, mining or quarrying, the owner, occupier, or holder shall submit plans outlining the details of the proposed work and a program for the protection and reclamation of the land and watercourses affected by the mining activity as required by sections 15 (e), 24 (e), and 36 (3) (h) of the Mines and Minerals Act.
- Application to vary Regulation.
- Notification of affected parties. 7. (1) The Inspector may, on receiving a written application from the manager, the OHSC, or a local union requesting the suspension or variance of a provision of the Regulations, suspend or vary the provision if, in the opinion of the Inspector, the provision is not necessary to health, safety or environmental protection at an individual mine.
- (2) The Inspector shall ensure that the parties affected by an

- application are advised of the application and the subsequent decision respecting a variance. Inspections.
Inspection reports.
8. (1) The Inspector may inspect a mine at any time.
- (2) The Inspector shall complete an inspection report writing any infractions, any orders for remedial action and the time limits for compliance within 7 days and shall forthwith provide the manager, the OHSC and any local union with a copy thereof. Inspector's orders to comply with Regulations.
- (3) Where the Inspector is of the opinion that a delay in remedying a hazard would be dangerous to persons or property, the Inspector shall issue an order for immediate remedial action, suspending regular work until the remedial action is taken, or for closing the mine or part of it until remedial action is completed. Inspector's authority to alleviate danger or remedy pollution.
- (4) Where the Inspector is of the opinion that work may be necessary in, on, or about a closed or abandoned mine in order to avoid danger to persons or property or to abate pollution of the land and watercourses affected by the mine, the Inspector may enter on or below the surface and may cause work to be done to remove or alleviate the danger or remedy the pollution. Manager's response to inspection report.
- (5) The manager shall, within 15 days after receiving the Inspector's inspection report, submit a written report outlining the remedial steps taken and any outstanding remedial work left to be done and shall forthwith provide a copy of the report to the Inspector and the OHSC. Duty to facilitate Inspector's work.
- (6) The owner, occupier, holder, or manager and all persons in, on, or about a mine shall provide the Inspector with every facility necessary for the completion of an inspection or an investigation. Appointment of mine manager.
9. (1) Every owner, occupier, or holder shall, before any mining operation commences, appoint a manager and ensure that there is a person acting in that capacity at all times and shall immediately after each appointment,

Owner to provide facilities to manager. notify the Inspector of the name of the manager.

Manager to attend at mine. (2) The owner, occupier, or holder, shall provide the manager with every facility for conducting the operation of the mine in accordance with the requirements of these Regulations.

Manager to ensure compliance with Regulations. (3) Every manager and designate shall attend daily at an operating mine and shall familiarise himself with these Regulations.

Authorized entry. (4) Every manager shall appoint a qualified person to be responsible during the manager's absence to ensure compliance with these Regulations.

Health and safety program to be developed by manager. (5) The manager and the Inspector and persons authorized by the manager shall be the only persons to enter a mine, and notice to this effect shall be posted at all road entrances at the mine.

Duty to ensure compliance with Regulations. (6) Where required by the Inspector, the manager shall develop a mine health and safety program which includes general safety rules, safe working procedures, safe handling procedures and antidotes for hazardous materials, crew safety meetings and accident investigation procedures.

Duty if Contractor, etc., to ensure compliance with Regulations. 10. (1) The owner, occupier, holder, and manager shall take all reasonable measures to ensure compliance with these Regulations, and every supervisor and employee shall take all reasonable measures to ensure compliance with the requirements of these Regulations and orders applicable to the work they perform or over which they have supervision.

(2) Where work in, on, or about a mine is left to a contractor, the contractor and the contractor's manager, as well as the owner, occupier, holder, and the manager of the mine shall take all reasonable measures to ensure compliance with these Regulations and orders pertaining to the work over which they have control and in the case of non-compliance, the contractor and

- the contractor's manager commit an offence that is punishable in the same manner as if the contractor and the contractor's manager were the owner, occupier, holder, or manager of the mine. Supervision of workers.
11. (1) Every mine manager shall ensure that every person employed at a mine, where required by these Regulations, is under the supervision of a competent and qualified person who is knowledgeable in these Regulations and in the work being supervised. Proof of supervisor's qualifications.
- (2) Supervisors at an underground mine shall, and for surface mines when required by the Inspector, provide the Inspector with evidence of their qualifications and experience. Duty to keep mine plans.
12. (1) Every manager shall keep in the office at the mine site, accurate plans that are updated every three months, and that are prepared on a scale that accords with good engineering practice and contains particulars established by these and any other Regulations. Survey to be carried out by surveyor.
- (2) The manager shall ensure that the surveying of a mine and the preparation of plans required by these Regulations are carried out by a qualified person. Employer register.
- (3) Every manager shall maintain, in a form acceptable to the Inspector, a register of every person who is or has been employed at the mine. Duty to post inspection reports.
- (4) A manager shall post in a conspicuous place at the mine all inspection reports and orders issued by the Inspector. Elimination of hazards at workplace.
13. (1) A manager shall take all reasonable and practicable measures to ensure that the work place is free of potentially hazardous agents and conditions that could adversely affect the health or safety of the workers. Personal protective equipment.
- (2) All persons shall wear personal protective equipment of a standard acceptable to the Inspector as follows:- Hard hats.

Protective footwear.	(a)	Where there is a risk of head injury, a protective hard hat that incorporates a device preventing the hat being dislodged in a fall.
Eye protection.	(b)	Where the type of work being performed poses a risk of foot injury, protective footwear.
Hearing protection.	(c)	Where a person is engaged in any work in which there is a risk of eye injury, properly fitting goggles, face shields or safety glasses.
Dust and vapours protection.	(d)	Where noise levels exceed 84 dBA, hearing protectors.
Worker training.	(e)	Where dust or airborne contaminants exceed the threshold limit values, the appropriate equipment for the hazard (filter masks, air supplied hoods or respirators).

14. A manager shall ensure that workers receive thorough orientation to the mine, basic instruction in safe work practices and are adequately trained to do their job or are working under the guidance of someone who has competency in the job and in giving instructions.

Requirement for safety and health committees.

15. (1) Where required by the Inspector, every manager shall ensure that a joint management worker Occupational Health and Safety Committee composed of management representatives and an equal or greater number of worker representatives chosen by the workers is established, and the manager shall allow committee members to participate in inspections, investigations, and meetings of the committee.

OHSC to inspect and report.

(2) The OHSC shall inspect as many of the work sites at the mine as it considers necessary every month; meet to discuss its findings; prepare minutes describing conditions found during the inspection and without delay forward a copy to the manager and the Inspector and post a copy on a bulletin

board at the mine.

Manager to cooperate with OHSC.

(3) A manager and all persons working at the mine shall cooperate fully with the OHSC, and the manager shall ensure that all existing safety hazards are corrected by the date agreed by the OHSC.

Worker's right to refuse hazardous work.

16. (1) A worker shall not carry out any work or operate any equipment, tool, or appliance if there is reasonable cause to believe that to do so would create an undue hazard to the health or safety of himself or any other person.

Supervisor's duty.

(2) A supervisor shall not knowingly perform or permit a worker to perform work that is, or could create, an undue hazard to the health or safety of the worker or any other person.

Manager to eliminate hazard.

(3) Where a person refuses to perform work because it is hazardous, the supervisor or the manager shall develop a plan which will allow the work to proceed safely, correct the hazard or suspend the work.

Protection from discrimination.

(4) A manager shall ensure that no employee is discriminated against in any manner, including adversely affecting any term or condition of employment for complying with these or other Regulations or refusing to perform hazardous work.

PART III
ENVIRONMENTAL PROTECTION,
RECLAMATION AND ABANDONMENT

Plans and information required.
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17. (1) In addition to the plans required under section 36 of the Mines and Minerals Act with respect to a mining or quarrying licence or bulk sampling project the plan shall include:-

- (a) a map or air photo showing the location and extent of the proposed mining disturbance, the location of

all lakes, streams, and inhabited places in the vicinity;

(b) particulars of the nature and present uses of the land to be disturbed with particular reference to-

(i) geology and description of the deposit,

(ii) surface water and ground-water, including drainage, water quality, licensed water rights, hydrogeology and fisheries,

(iii) soils and surficial geology,

(iv) vegetation species and level of development,

(v) wildlife use of the area,

(vi) land capability and present uses, such as agriculture, forestry, recreation,

(vii) the projects' visual impacts, and

(viii) impacts on sensitive landscapes and bio-diverse areas;

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(c) for the purposes of section 36 (3)(h) (v) of the Mines and Minerals Act, particulars of the nature of the mine and the extent of the area to be occupied by the mine, with particular reference to-

(i) waste disposal, including waste rock,

tailings, overburden and refuse,

- (ii) prediction of acid generating potential for all strata when required by the Inspector, including static and, if necessary, kinetic tests,
- (iii) stockpiling of soils materials,
- (iv) drainage control during operation and at abandonment,
- (v) use of any water required for the mine,
- (vi) an environmental monitoring and surveillance program including surface and ground water sampling frequency and analysis, and
- (vii) a reclamation research program including methodology and schedules.

(2) In addition to the requirements stipulated under these Regulations, an Environmental Impact Assessment shall be carried out with respect to any mining or quarrying licence or bulk sampling project.

Water quality discharge criteria.

(3) The owner, occupier, holder or manager shall submit a report by a qualified hydrogeological engineer that assesses the impacts on surface and ground water of the proposed mining activity with particular reference to:-

- (a) changes to the catchment yield or water quality;
- (b) the consequences to the mine infrastructure of floods exceeding the design flood in magnitude and in

- particular the regional maximum flood and the one in one thousand year storm event;
- (c) the design of any river diversions, their long term structural integrity and the consequences of failure;
 - (d) impacts of mining activities to ground water supply to adjacent ground water users;
 - (e) a description of the regional climate including:-
 - (i) mean monthly and annual rainfall and number of days with measurable precipitation,
 - (ii) maximum rainfall intensities per month as 60 minute, 24 hour, 1 in 50 year, 1 in 100 year and 1 in 1000 year storm events,
 - (iii) mean monthly wind direction and speed,
 - (iv) mean monthly evaporation,
 - (v) incidence of extreme weather events such as drought and high winds;
 - (f) estimates of all discharges of water and the impact of these on the receiving body of water while ensuring that the discharges meet the objectives in Tables I and II below:

TABLE I
Receiving Water Control Objectives

<u>Parameter</u>	<u>Level</u>
Dissolved oxygen	Not less than 90 % of the seasonal natural value
Temperature	To be within 1 degree Celsius of the natural level
Turbidity	Not more than 5 Jackson Turbidity Units above the natural value
Floatable Solids	None
pH	No change
Toxicity (96 hr static bioassay)	Below detectable limit
Colour	No Change
Aesthetics	No Decrease
Alkalinity	Not less than 20% natural value
Chloride	Not more than 25mg/L
Fecal Coliforms	Less than 1/100 ml.

TABLE II
Objectives for the Discharge of Final Effluents
to Marine and Fresh Waters

<u>Parameter</u>	<u>Range</u>	
	Dissolved	Total
[(mg/L) is effluent unless otherwise stated]		
Suspended solids	25-75	
Toxicity	80-100%	
pH	6.5-10	
Radioactivity		
Gross Alpha picoCuries/Liter	10-100	
Radium 226 picoCuries/Liter		Below 10
Aluminium	0.5-1.0	
Ammonia	1.0-10.0	

	Antimony	0.25-1.0	
	Arsenic (as Trivalent)	0.05-0.25	0.5-1.0
	Arsenic (total desolved)	0.10-1.0	
	Cadmium	0.01-0.1	
	Chromium	0.05-0.3	
	Cobalt	0.5-1.0	
	Copper	0.05-0.3	0.3-0.6
	Cyanide (as CN)	0.1-0.5	
	Flouride	2.5-10.0	
	Iron	0.3-1.0	
	Lead	0.05-0.2	0.2-0.4
	Manganese	0.1-1.0	
	Mercury		0-0.005
	Molybdenum	0.5-5.0	
	Nickel	0.2-1.0	0.5-1.0
	Nitrite/Nitrate	10.0-25.0	
	Phosphate (Total P)		2-10.0
	Selenium	0.05-0.5	
	Silver	0.05-0.5	
Air quality criteria.	Uranyl (UO ₂)	2.0-5.0	
	Zinc	0.2-1.0	0.5-1.0
	Oil and Grease		10-15

(4) The owner, occupier, holder or manager shall assess the impact of discharges to the air from the processing plants, dumps, materials handling facilities, internal combustion engines in vehicles and equipment and from blasting with particular reference to estimating the quantity of all discharges to the air ensuring they meet the criteria in Tables III and IV below:

TABLE III
Ambient Air Control Objectives

<u>Parameter</u>	<u>Range</u>
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(All units are ug/cubic meter (ppm) unless otherwise stated)

THE SUBSIDIARY LAWS OF BELIZE

REVISED EDITION 2003

Sulphur Dioxide

Printed by the Government Printer,
No. 1 Power Lane,
Belmopan, by the authority of
the Government of Belize.

Annual Arithmetic Mean	25(0.01)-75(0.03)
24 hour conc.	160(0.06)-260(0.10)
3 hour conc.	375(0.14)-665(0.25)
1 hour conc.	450(0.17)-900(0.34)
Asbestos (fibers/cc)	less than 0.04
Dustfall mg/dm.squared/day	1.7-2.9
Antimony	0.1-0.5
Arsenic	0.1-1.0
Beryllium	0.005-0.1
Cadmium	0.5-0.3
Chromium	0.05-0.1
Copper	0.25-2.5
Fluoride	0.1-2.0
Lead	1.0-2.5
Mercury	0.1-1.0
Molybdenum	0.1-2.5
Nickel	0.01-0.1
Selenium	0.1-0.5
Uranium	0.01-6.0
Vanadium	0.05-1.0
Zinc	1.0-2.5
Suspended Particulate	
Annual geometric mean	60-70
24 hour conc.	150-200
Radon Daughter Concentration in Working Levels	less than 0.02

TABLE IV
Control Objectives for Gaseous and Particulate Emissions

<u>Parameter</u>	<u>Range</u> (mg/mole)
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	Total particulate	1-8
	Antimony as Sb	0.16-0.27
	Arsenic as As	0.16-0.27
	Asbestos meter	less than 2 fibers/cubic
	Cadmium as Cd	0.05-0.27
	Copper as Cu	0.16-0.27
	Flouride as HF	0.02-0.20
	Lead as Pb	0.16-0.27
	Mercury as Hg	0.03-0.27
Annual reclamation report.	Nitrogen Oxides as NO ₂	14-46
	Opacity	10-40 percent
	Suplhur Dioxide	16-64
	Zinc as Zn	0.003-0.005

18. It shall be the duty of every owner, occupier, holder and manager to institute, and during the life of the mine, to carry out a program of environmental protection and reclamation, and the manager shall submit an annual report to the Inspector by March 31 of the following year, and the report shall contain the results of the research work, monitoring, amount of land reclaimed and revegetated, new disturbances and any other information specified by the Inspector.

Protection of dangerous openings where operations suspended.

19. (1) Where a mine has suspended operations, the manager shall cause the entrances to underground workings and all other pits and openings that are dangerous by reason of their depth or otherwise to be protected against inadvertent access, to the satisfaction of the Inspector.

Removal of chemicals and hazardous material.

(2) Unless exempted by the Inspector, all explosives, chemicals and reagents, fuel and other hazardous material shall be returned to the supplier or disposed of in accordance with proper international standards and procedures.

Protection of dangerous openings where mine closed.

20. (1) Prior to abandonment of a mine, a manager shall ensure that covers.

Specifications for covers.

all shafts, raises, stope openings and adits opening to the surface are capped with a sufficiently engineered structure or filled so that they will not pose a future hazard to persons or animal life.

(2) The engineered caps shall be secured to solid rock and shall be capable of supporting a uniformly distributed load of 12 Kilopascals or a concentrated load of 24 Kilonewtons whichever is greater.

Reclaimed land surface.

Productivity and revegetation standards.

21. (1) The land surface shall be reclaimed to a standard that considers the previous and future potential of the area.

(2) The level of productivity of reclaimed and revegetated areas shall not be less than existed prior to mining on an average property basis unless the owner, occupier, holder, or manager can demonstrate to the satisfaction of the Inspector the impracticality of doing so.

Requirement to replace soils.

(3) All surficial soils material removed and saved during mining shall be used to provide a growth medium that allows the land to be revegetated to a self sustaining state using the appropriate plant species.

Stability of engineered structures.

22. (1) Land and watercourses shall be left in a stable condition such that engineered structures including waste dumps, major haul roads, tailings impoundments and silt check structures shall have a factor of safety which conforms to internationally acceptable standards.

Protection of receiving waters.

(2) Waste rock and overburden dumps shall be reclaimed to ensure long term erosion control and to ensure that water quality released from the dumps to the receiving environment is of a quality that is internationally acceptable.

Removal of machinery and equipment.

(3) Prior to abandonment, all machinery, equipment and building superstructures shall be removed, all foundations shall be covered and revegetated and all scrap material, chemicals, explosives and hazardous materials shall be disposed of in a manner that is of an internationally acceptable standard.

Reclamation of watercourses.

Revegetation of pit walls.

(4) Watercourses shall be reclaimed in a condition that ensures that long term water quality is maintained to a standard acceptable to the Inspector and drainage is restored either to original watercourses or to new watercourses that will sustain themselves.

Geotechnical evaluation of structure.

(5) Open-pit walls in overburden shall be revegetated, and where the pit is expected to fill with water, provision shall be made to create a safe, usable body of water.

Metal uptake in plants.

(6) Tailings ponds and other impoundment structures shall be evaluated by a qualified, independent geotechnical engineer who shall make a report assessing the post-operational state of the dams, dikes, seepage control, spillway works and outlining a program for long term monitoring, and the report shall be filed with the Inspector.

First aid requirements during exploration.

(7) Vegetation shall be monitored for metal uptake and where harmful levels are found, reclamation procedures shall ensure that levels are safe for plant and animal life.

PART IV **EXPLORATION**

Worker training for exploration work.

23. All active exploration sites shall be equipped with first aid supplies acceptable to the Inspector and if required by the Inspector a stretcher, a form of communication system for obtaining emergency assistance and a qualified first aid attendant.

24. A manager shall ensure that any person employed for the first time at an exploration site has been adequately instructed in any potential hazards in the site and instructed on how to protect himself and such instructions shall include the following:-

(a) advice on protection from attack by wild animals;

- (b) what type of clothing is appropriate to wear;
- (c) the personal protective equipment required by these Regulations;
- (d) the need for suitable equipment to avoid becoming lost; and
- (e) safety procedures when helicopters or aircraft are used.

Electrical
surveying
systems/I.P.
Geophysical
surveys and
safeguards.

25. Where an induced polarization geophysical system is being operated, all energized wires shall be sufficiently insulated to prevent an electric shock when the system is being operated at its maximum rated voltage; the electrodes shall have visible warning stickers stating "Danger - High Voltage", and the person in charge of the survey shall ensure that,

- (a) signs are posted at the entrances to the area where induced polarization surveys are being carried out to warn other persons who may enter the area;
- (b) radio communication is provided to any member of the crew whose movements are out of sight and hearing of the other crew members; and
- (c) all signs and wires used for the survey are removed upon completion of the survey.

Discovery of
uranium or
thorium.

26. (1) The owner, occupier, holder, or manager shall notify immediately whenever assays of any samples taken during exploration indicate uranium or thorium in an amount of 0.05% by weight and the manager shall also terminate further drilling or excavation at the site.

Baseline surveys.

(2) Whenever discoveries of uranium or thorium are made, a

Uranium
exploration-
environmental
protection.

manager shall conduct baseline surveys acceptable to the Inspector and such surveys shall include gamma radiation measurements on surface, and water samples that are analyzed for dissolved uranium, and gross alpha to establish the background radiation levels, and the manager shall report the results forthwith to the Inspector.

(3) The Inspector may authorize resumption of exploration activity with special conditions to ensure environmental protection that include,

(a) measures to ensure no water from any surface trench, pit, drill holes or other excavation escapes from the site until samples of the water are analyzed for dissolved uranium and do not exceed levels permitted in accordance with internationally accepted standards; and

Evaluation of
acidic drainage
potential.

(b) reclamation methods that ensure the gamma radiation measured on surface after reclamation do not exceed 10% above the background levels of the baseline survey.

Shoring of
excavations re: pits
and trenches.

27. Where it is likely that acid generating strata will be, or is encountered during exploration activities the manager shall undertake acid generation prediction tests on all strata and mineral deposits and report the findings to the Inspector.

Sloping to replace
shoring.

28. (1) No person shall enter any excavation over 1.22 meters (4 feet) in depth in unconsolidated material or consolidated material that may collapse unless the sides of the excavation are sloped to a safe angle or the sides have been shored up using a system acceptable to the Inspector.

(2) Where the excavation walls are sloped as a substitute to shoring, the walls shall provide stable faces and in no case should they exceed a slope of one horizontal to one vertical.

(3) Shoring shall be installed from the top down and removed in the reverse order. Scaling rock excavation walls.

(4) Material excavated from a pit or trench shall be kept back at a distance of 1 meter (3.3 feet) from the edge of the excavation.

(5) Where the excavation is in rock and less than 2 meters (6.6 feet) in depth, the sides shall be scaled to prevent loose material from dropping on persons working in the excavation and the width shall be such that a person is able to turn around without touching the sides of the excavation.

(6) Where the excavation is more than 2 meters (6.6 feet) deep, the sides shall be supported in a manner acceptable according to international standards. Underground work to be of acceptable standard.

Underground supervisors.

29. (1) No underground exploration shall commence without the approval of the Inspector and only then if it complies fully with these Regulations.

(2) No person shall work underground unless he is supervised by a shiftboss whose qualifications are acceptable to the Inspector.

Mine design and planning.
Supporting documentation-mining plans.
CAP. 226.

PART V **MINE DESIGN AND PLANNING**

30. (1) The statement required under section 36 (3) (h) of the Mines and Minerals Act shall include the following as appropriate to the work proposed:-

- (a) a regional map showing the location of the mine property;
- (b) a plan at a scale of 1:10,000 or less showing topographic contours, claims, leases or licences, streams, existing and proposed buildings, roads,

- railways, power transmission lines, pipelines, and the locations of all proposed mining undertakings;
- (c) descriptions, design data, and details of geology and ore reserves, surface mining, roadways, waste rock or overburden dumps, stockpiles, processing plant and facilities, tailings transport and impoundment, water storage and transport, silt check containments for runoff;
- (d) the methods to be followed in the construction of haulage roads; and
- (e) detailed plans of any proposed underground developments and workings and a plan of surface installations in relation to the proposed workings.
- Mining work system.
- (2) The report and plan of the work system shall be prepared taking into consideration the safety of the public, the health and safety of persons involved in the work, and protection of the environment, and be designed so as to make it as practicable as possible to mine possible ore zones which might be affected by the plan.
- Supervisor to examine workings.
- Record of examination.
31. (1) Whenever mines are operated on multiple shifts, all mine workings shall be examined by the shiftboss or supervisor to ascertain that they are in a safe working condition, as often as the work necessitates, but at least once during each shift.
- Review by opposite shift supervision.
- (2) The person making the examination under paragraph (1) of this Regulation shall, before going off shift, record all unusual and hazardous conditions in a daily examination and report book, and sign the report.
- Fencing of openings.
- (3) The report prepared pursuant to paragraph (2) above shall be read and countersigned by the corresponding supervisor on the oncoming

shift and any unusual and hazardous conditions discussed with the workers before they are permitted to resume operations. Water sprays to suppress dust.

32. Surface excavations or openings shall be securely fenced or otherwise protected against inadvertent access.

33. (1) Wherever practicable, water sprays or other dust suppression or collection methods shall be used at every dusty place where work is carried out, and where it is impractical to do so, personal protective equipment shall be worn by all persons working in that location. Suppression of drilling dust.

(2) A rock drill shall not be used at a mine unless it is equipped with a water jet or other device to suppress dust. Restriction in excavation of loose material.

34. (1) The excavation of clay, earth, sand, gravel or other unconsolidated material shall not be carried out within a distance from the property boundary where the excavation takes place that is equal to 1.5 times the ultimate depth of the excavation in the unconsolidated material. Restriction in rock.

(2) No one shall excavate rock within a distance of 5 meters (16.5 feet) from the property boundary. Waiving restrictions.

(3) The owners of adjoining properties may, by agreement in writing, waive the provisions of paragraphs (1) and (2) of this Regulation. Removal of unconsolidated hazards.

35. (1) All trees and other vegetation, clay, earth or other unconsolidated material lying within 3 meters (10 feet) of the rim of a working face or wall at a surface mine shall be removed, and beyond this distance all material shall be sloped to an angle less than the natural angle of repose. Supervisor to examine working faces.

(2) No work shall be carried on at, or below a face or wall of a surface mine until the face has been examined and declared safe by the shiftboss or supervisor. Clearing catchment berms and scaling pit walls.

(3) When a surface mine is worked in benches, each catchment

berm shall be designed so that its final width shall not be less than 8 meters (26.5 feet), and loose rock shall not be allowed to accumulate on a bench or catchment berm in a manner that endangers persons working on a lower bench; and where loose rock accumulates and access cannot be gained to clean the catchment berm then a safe working procedure, that is acceptable to the Inspector shall be established.

Wall height restriction.

(4) No part of the working face shall be allowed to overhang.

(5) Where unconsolidated material is being worked or removed and could collapse onto the equipment, the vertical face shall not be greater than the reach of the loading equipment.

Haulage road standards/shoulder barriers on roads.

(6) Unless a variance is granted by the Inspector, the height of the working face in consolidated material shall not be more than 2 meters (6.6 feet) above the reach of the loading equipment.

36. (1) The manager shall ensure that all haulage roads are constructed and maintained to provide a travel width where dual lane traffic exists of not less than 3 times, and where single lane traffic exists not less than 2 times the width of the widest vehicle used on the road.

Vehicle runaway lanes.

(2) The manager shall also ensure that a shoulder barrier at least 3/4 the height of the largest tire on largest vehicle using the road is located and maintained along the edge of the haul road wherever a drop-off greater than 3 meters (10 feet) exists and the shoulder barrier shall incorporate breaks to allow for drainage.

Transport of persons.

(3) On roadways where the grade exceeds 5%, the Inspector may require clearly identified runaway lanes, placed at suitable locations and designed to bring a runaway vehicle to a controlled stop.

Training of equipment operators.

37. Persons shall only be transported in vehicles acceptable to the Inspector and no person shall ride in a standing position or in the box of a haulage truck

or bucket of any mobile equipment.

38. (1) No person shall operate any equipment unless they have received the minimum training required to operate that equipment and the driver of a rubber tired vehicle shall have a licence in accordance with the laws of Belize. Equipment operator's duties.

(2) The operator of any unit of mobile equipments shall be directly responsible for its safe operation and shall wear seatbelts, drive with headlights on and where required, a flag equipped whip antenna light or flashing light. Prestart equipment inspection.

(3) The operator of any equipment shall examine and check the equipment before putting it into operation and if any unsafe condition is discovered, the operator shall report the condition to the supervisor and shall not operate the equipment until repairs have been duly completed. Operator's field of vision.

39. (1) No person shall operate a unit of mobile equipment when the field of vision is restricted unless he has inspected the area into which the equipment is to be moved or is directed by a signal person who is located in a safe position and who is in continuous contact with the equipment operator. Disabled vehicles to give warning.

(2) Where a vehicle is disabled or parked on the travelled portion of a roadway, a warning to approaching traffic shall be given by means of flashing lights, flares, lamps or reflectors. Supervisor to examine dump.

40. (1) A dump or stockpile area shall be examined by the shiftboss or supervisor before material is permitted to be dumped whenever dumping has not been carried on for more than 4 hours. Dump barrier.

(2) Where material is to be dumped from a vehicle into a bin, raise, or other opening, a barrier of sufficient size and strength and well-anchored to prevent the vehicle from entering the opening shall be provided and maintained. Barricading hazardous dumps.

(3) Wherever dumping is prohibited or hazardous, the location shall Duty to keep updated mine plans.

Surface plans. be barricaded and a sign posted to that effect to warn of the danger.

41. The manager shall keep at the mine, accurate plans that are updated every 3 months and which are on a scale that accords with good engineering practice as follows:-

- (a) a surface plan showing the claims, licences or leases on which mining is being carried out, and all lakes, watercourses, naturally unstable ground, peat bogs or sloughs, main roads, railways, transmission lines, buildings, shafts, adits, or other mine openings, surface mine workings, dumps, tailings ponds and catchment impoundments and their overflow channels and topographic contours;
- Underground plans.
- (b) a separate underground plan of each level showing all workings including shafts, tunnels, diamond drill holes, dams, bulkheads, electrical substations, explosives storage, permanent seals and stoppings;
- Cross-sections.
- (c) vertical mine sections at suitable intervals and azimuths, showing all workings, diamond drill holes and the location of the top of bedrock, ground surface, type of overburden and any body of water or watercourse;
- Ventilation plans.
- (d) a ventilation plan showing the normal direction and volume of main air currents and the location of permanent fans, ventilation doors, and connections with adjacent mines;
- Electrical plans.
- (e) a plan showing the location of all fixed electrical apparatus in the mine and the routes of all fixed power feeders, properly rated and referenced, and all electrical feeder control apparatus and
- Escape plans.

equipment; and

(f) an emergency and rescue plan of the workings showing the routes of egress from the active workings, the flow of ventilating air and underground refuge stations. Boundary pillars underground.

42. (1) A pillar of not less than 30 meters (100 feet) shall be maintained on either side of a party boundary between adjoining underground mines although the owners of the adjoining properties may, by written agreement filed with the Inspector, waive this agreement. Shaft pillars.
Secondary exit from underground.

(2) No stoping shall be done within 60 meter (200 feet) a shaft that is used to transport persons unless the plan has been authorized by the Inspector.

43. (1) Where an underground mine has been opened by means of an adit, tunnel, or shaft, a second auxiliary exit shall be provided prior to production and this second exit shall be at least 30 meters (100 feet) from the main entrance to mine and separated by solid strata. Ladders in escapeway.

(2) The main auxiliary exit shall be equipped with substantial and well maintained ladders to provide proper access from the deepest working area to the surface. Stope second exit.
Duty to provide refuge station.

(3) Before stoping is started, a second exit shall be provided to the stoping block. Standards.

44. Where a workplace in an underground mine is more than 300 meters (1000 feet) from a mine portal or shaft station, the manager shall provide and maintain a refuge station that is - Equipment.

(a) clearly identified, constructed of non-combustible materials and of sufficient size to accommodate all persons working in the vicinity,

- Approval to build underground dam.
- (b) equipped with a supply of air, a supply of water, a means of communicating with the surface, a means of sealing to prevent entry of gas, first aid equipment, emergency fighting and a plan of the mine showing all emergency exits.
- Protection of workers from underground dams.
45. (1) The manager shall ensure that no structure for impounding water, restraining saturated material or confining under pressure is constructed underground unless the plans and specifications have the written acceptance of the Inspector.
- Removal of gases from underground mines.
- (2) Notwithstanding paragraph (1) of this Regulation; structures of a temporary nature may be constructed providing no person shall be allowed to work in any part of the mine that could be affected in the event of a failure of the structure until the Inspector has inspected it and verified that it is safe.
- Permissible concentrations of contaminants.
46. (1) The manager shall ensure that the air in all parts of the mine where persons are working or travelling, or may work or travel, is free from injurious or dangerous concentrations of noxious gases and contains sufficient oxygen to obviate danger to the health of anyone in the mine.
- Exhaust airways.
- (2) Any concentration of a contaminant in excess of the permissible concentration of threshold limit values and biological exposure indices published by the American Conference of Governmental Industrial Hygienists (ACGIH) and as amended from time to time, shall not be exceeded.
- Interruption of ventilation supply.
- (3) The return air from all working places shall, as far as practicable, be routed directly to the exhaust airway.
- Auxillary ventilation.
- (4) Where the main system of ventilation for an underground mine is stopped, other than through a brief interruption of the power supply, all persons shall be withdrawn to the surface or an approved refuge station and

no one shall enter the mine until the ventilation has been restored.

(5) The manager shall ensure that every mine working that is advanced more than 20 meters (66 feet) from the main ventilation circuit, and every raise and sub-drift more than 10 meters (33 feet) from the main ventilation circuit shall be provided with auxiliary ventilation.

Prevention of recirculation of air.

(6) The manager shall ensure that every auxiliary fan is supplied with sufficient fresh air and installed in such a manner as to prevent recirculation of the air.

Major ventilation surveys.

(7) The manager shall ensure that measurements of the quantity of air flowing at the main fan, in all main airways, and at all major ventilation splits, are taken at intervals not exceeding 3 months.

Ventilation and gas measurements.

(8) In an underground mine or part of a mine where diesel equipment is operating, measurements of the quantity of gas air flowing shall be taken at intervals not exceeding one week and tests shall be made at least once a shift, in the general body of air, on the exhaust side of the operating diesel equipment, for nitrogen dioxide, carbon monoxide and any other gases specified by the Inspector.

Recording measurements.

Ventilation doors.

(9) The results of measurements and tests shall be recorded in a book kept for that purpose and made available to the Inspector.

Barricading inactive workings.

(10) All doors for regulating or controlling ventilation shall close automatically or be provided with a device for opening and closing them.

(11) The manager shall ensure that any part of the underground mine that is not being ventilated shall be effectively barricaded and posted with signs warning that entry is prohibited and before anyone is permitted to enter that part of the mine that a qualified person examine it for oxygen deficiency, the presence of toxic or noxious gases or any other dangerous condition.

Ventilation after blasting.

- Precautions for combustible dust. (12) A worker shall not return, or be permitted to return to a workplace after a blasting operation until the worker is sure that the gases produced by the explosives have been removed or diluted by the ventilation system.
- Removing workers. 47. In any underground mine where the sulphur content of the ore is high and a sulphide dust explosion has occurred, the manager shall prepare and implement a scheme, acceptable to the Inspector, for minimizing the danger from a sulphide dust explosion that includes:-
- Washing dusts off walls.
- (a) provision for ensuring that all persons are removed from the mine prior to blasting;
- Other measures.
- (b) provision for ensuring that all accessible headings, raises and other workplaces within 30 meters (100 feet) of the blast are washed down to remove dust prior to blasting; and
- Ventilation.
- (c) any other measures that could reduce the risk of a dust explosion or lessen the consequences should one occur.
- Maximum quantities of oil stored underground. 48. In an underground mine, a battery charging station shall be located in
- Removal of wastes. a well-ventilated location to prevent accumulation of flammable gases.
49. Fuel or lubricating oil shall not be stored in an underground mine in quantities greater than 500 liters.
- Waste containers. 50. (1) All waste, including waste timber, shall be removed from an underground mine on a regular basis and shall not be piled up or permitted to decay in a mine.
- Pre-shift workplace check. (2) In an underground mine and in or about the entrances to the same, flammable refuse shall be deposited in covered fire-resistant containers,

and removed at least weekly from the mine or mine entrance area.

Scaling equipment.

51. (1) Before any work is begun in an underground mine workplace, a worker shall check the workplace for hazardous or dangerous conditions and the worker shall not start work until the site has been made safe.

Protection of workers from falling objects.

(2) The manager shall provide and maintain an adequate supply of properly dressed scaling bars, chute bars, gads and other equipment necessary for scaling and barring.

Covering open holes.

(3) Where persons are working in a location which is below and open to a travel way or haulage way on the level above, the workplace shall be securely covered or otherwise closed off.

Steeply inclined raises.

(4) The top of every millhole, ladderway, sump, or other opening shall be closed off or adequately protected to prevent persons from inadvertently falling into the opening.

Two compartment raises.

52. Except where approved raise driving equipment is used, every raise inclined at more than 50 degrees from the horizontal and being driven more than 16 meters (50 feet) slope distance shall –

(a) be divided into at least two compartments, one of which shall be maintained as a ladderway and equipped with suitable ladders maintained to within 12 meters (40 feet) of the face as it is being driven; and

Waste pass in a raise.

(b) if the second compartment is used to hold material excavated from the face, it shall either be kept full, or suitable protection shall be provided to prevent a person from falling into this compartment.

Abandoned underground workings.

53. (1) No work shall be carried out within 30 meters (100 feet) of abandoned or old workings; or any accumulation of water or unconsolidated

- Breakthrough to abandoned workings. material; or any other substance that may flow when wet, unless the proposed work procedure has been submitted to and has been authorized by the Inspector in writing.
- Water in ore and waste passes prohibited. (2) Where possible, no connection between mine workings shall be made until a thorough examination of the workings toward which the active heading is advancing has been made and has shown that the work can proceed in a safe manner.
- Water in ore pass. 54. (1) No person shall introduce water into an ore or waste pass; loading pocket; hopper; or storage bin for any purpose unless, the Inspector has authorized an operating procedure.
- Ore pass controls. (2) Where any ore or waste pass is found to contain water, or saturated material which will flow, the manager shall prepare a plan for the safe removal of the water or saturated material.
- Standards for construction of ladders. (3) The controls of ore and waste passes shall be arranged to prevent the operator from being hit or buried by a run of material.
- Fastening. 55. (1) Ladders shall be constructed so that the side rails shall measure not less than 38 mm (1.5 in.) by 89 mm (3.5 in.) for ladders up to 5 meters (16.5 feet) in length and not less than 38 mm (1.5 in.) by 140 mm (5.5 in.) for ladders over 5 meters (16.5 feet) in length; the rungs shall be solid lumber not less than 21 mm (.8 in.) by 89 mm (3.5 in.) spaced not more than 300 mm (12 ins.) apart, dapped into the side rails and secured in place by at least 3 nails on each side.
- Projection above landing. (2) Ladders used underground shall be securely fastened to the timbering or wall of the shaft, raise or stope, maintained in good condition, have equally spaced rungs, be installed so that the rungs shall be more than 100 mm (4 ins.) from the wall or timbering and be erected at an inclination of not more than 80 degrees from the horizontal unless equipped with safety

hoops.

Platforms in
ladderways.

(3) Every ladder shall project at least 1 meter (3.3 feet) above its landing platform and be securely fastened to the platform.

(4) Where a shaft, raise or ladderway is inclined at over 50 degrees from the horizontal, it shall be provided with a ladderway containing platforms erected at vertical intervals not exceeding 7.5 meters (25 feet) and each platform shall have an opening which permits a person wearing self-contained breathing apparatus to pass through.

Ladders to be
offset.

(5) Where a shaft, raise or ladderway is inclined at over 70 degrees from the horizontal, the ladderway, in addition to the requirements of Regulation 54 (3), shall have the individual ladders between each platform offset so that they act as protection over the holes in the platform.

Prohibition of
flexible ladders.

(6) No person shall use, or allow to be used, a flexible ladder except in a shaft sinking operation or in an emergency rescue operation and provided the ladder is safe and secure.

Maintenance.

(7) All ladderways shall be installed and maintained to reduce the hazard of a person falling.

Protection from
skipway.

(8) Where a ladderway and a skipway occupy the same opening in a ladderway, the ladders shall be adequately protected from material being hoisted, and no person shall travel or be allowed in the ladderway while the skip is in motion and sufficient guardrails shall be installed to prevent a person using the ladderway from falling into the skipway.

Minimum clearance
for track haulage.

56. (1) Where track haulage is used, the following minimum clearances between the vehicles and the sides of the roadway shall be maintained:-

(a) 300 mm (12 ins.) on one side and 600 mm (24 ins.) on the other; and

Maximum clearance
for trackless
haulage.

(b) 300 mm (12 ins.) above the head of a person travelling on the vehicle and the roof of the roadway or any obstruction in it.

(2) Where any trackless mobile equipment is operating, the minimum clearances shall be:-

Exemption.

(a) 2 meters (6.6 feet) in excess of the maximum width of the vehicle; and

(b) 300 mm (12 ins.) above the roll over protective structure with which the vehicle shall be equipped.

Safety stations.

(3) Notwithstanding paragraphs (1) and (2) of this Regulation, the Inspector may permit a reduction of the minimum distances with a requirement to install safety stations at distances and other requirements which the Inspector prescribes.

Falling object
protective structures
on equipment.

(4) Safety stations underground shall be plainly marked, maintained free from obstructions, be cut as close to perpendicular to the roadway as is practical, and have minimum dimensions of 1 meter (3.3 feet) deep, 2 meters (6.6 feet) high and 1.5 meters (5 feet) wide.

Specifications for
installation of
grinders.

(5) When necessary, the Inspector shall mandate that falling object protective structures be installed on underground equipment and they shall have the minimum structural capacity to support elastically a dead weight of 82,000kilograms (180,000 lbs.) or 105 kilonewtons per square meter distributed over the plan area of the structure, whichever is less and shall be certified as such by a qualified professional engineer.

Maximum speed.

PART VI **MACHINERY AND EQUIPMENT**

57. (1) Grinders shall be assembled, adjusted, and operated in accordance with the manufacturer's specifications. Protective hood and exhaust required.
- (2) The maximum speed at which a grinding wheel may be operated shall be indicated on the grinding wheel.
- (3) All grinding wheels shall be enclosed by a protective hood except for the area at the tool rest, and shall be stopped when the tool rest is being adjusted, and other than portable wheels shall be equipped with an exhaust system or other means of removing dust produced during grinding. Tool rest.
Speed governor.
- (4) The tool rest on a grinder shall be mounted above the center line of the grinding wheel and shall not be more than 3 mm (1/8 ins.) from the wheel, unless specified otherwise by the manufacturer. Eye and dust protection.
- (5) An air powered grinding wheel shall have a governor to prevent it operating in excess of the rated speed and the governor shall be inspected regularly and maintained in proper operating condition. Pneumatic tools prohibition on modification of controls.
- (6) Operators of grinding wheels shall wear eye protection and dust masks when using portable grinders. Air supply.
58. (1) The operating trigger of portable pneumatic nailing and stapling tools shall not be taped or otherwise secured in the "on" position or held in the "on" position while moving between operations. Non-removal of guards while servicing machinery.
- (2) The operating air pressure specified by the manufacturer for tools, hoses and fittings shall not be exceeded and the air supply shall be disconnected before the tool is serviced or any adjustments made.
59. (1) Where machinery requires that it be serviced while in operation it shall be constructed so that the servicing may be performed without removing any protective fence or guard and if it is necessary to remove guards or fences the machinery shall be locked out in accordance with Regulation 77 of these Regulations. Procedure for servicing.

Compressed gas
cylinder safety.

(2) The manager shall establish a safe procedure for servicing running machinery, train the employees in the procedure and ensure that only qualified persons shall engage in such procedures.

Standards for lifting
devices.

60. Every compressed gas cylinder shall be stored and transported in an upright position in a well ventilated area, free from flammable material and away from electrical apparatus; it shall be adequately secured by chains or other acceptable means to prevent it from being knocked over and when not in use have a securely fastened valve protection cover.

Maximum loads.

61. (1) A lifting device shall be designed, constructed and installed in accordance with recognized standards and good engineering practice and if power-operated, shall be provided with an overwind device.

Installation
specifications for
boiler and pressure
vessels.

(2) The maximum load for a lifting device shall be that established by the designer of the device and shall be marked on the device in a location visible to the operator to ensure compliance.

Distance from shaft.

62. (1) All boilers and pressure vessels shall be installed and maintained in accordance with the manufacturer's specifications according to internationally acceptable standards..

Prohibition of
exhaust
recirculation.

(2) No part of a steam boiler or stationary internal combustion engine shall be installed within 30 meters (100 feet) of any part of the collar of a shaft or other openings to underground workings.

Installation
standards for
elevators.

(3) The exhaust from any boiler or internal combustion engine installed within a building shall be conducted to a point outside the building in such a manner that the exhaust cannot re-enter the building or enter the intake of any compressor, the underground mine workings or another building.

Overspeed control
and testing.

63. (1) All elevators shall be installed and maintained in accordance with the manufacturer's specifications or an internationally acceptable standard.

(2) Notwithstanding paragraph (1) of this Regulation, all elevator cars and counterweights shall be provided with overspeed control, and prior to initial operation and thereafter at 12 month intervals all drive components shall be subjected to non-destructive tests as prescribed by the Inspector and all maintenance and testing shall be recorded in a book kept for that purpose.

Crossing or riding conveyor belts.

64. (1) No person shall ride on a conveyor belt or cross a conveyor belt except at an established foot bridge which shall be not less than 500 mm (20 ins.) in width and equipped with guardrails.

Walkways and pullcord required.

(2) Every conveyor way shall be provided with walkway or other acceptable access for maintenance and inspection purposes and every accessible section of a conveyor shall be provided with a pull cord to stop the conveyor in an emergency and the controls shall be arranged so that they must be reset manually before the conveyor can be restarted.

Audible start up warning.

(3) Every conveyor where the operator has limited visibility of the whole conveyor, shall be equipped with an audible start up warning device which sounds when the conveyor is about to be started.

Guarding.

(4) All head, tail, drive, and tension pulleys of a conveyor shall be effectively guarded at their nip points and the guard shall extend at least one meter (3.3 feet) from the nip point.

Belt slip protection.

(5) A belt conveyor used underground, or one that is more than 15 meters (50 feet) in length and installed in a building or other closed-in structure shall be provided with a belt slip protection device to stop the drive motor in the event of belt blockage or slippage, and where chutes feed the conveyor, shall be equipped with plugged chute switches which shall stop the conveyor when a plugged chute condition arises.

Fire performance rating.

(6) Conveyor belting for use underground or in an explosive atmosphere shall meet the fire performance and antistatic requirements of an

Cleaning up around conveyors.

internationally acceptable standard.

- Standard procedures for air compressors. (7) Clean up of spillage on or around a moving conveyor shall only be carried out where the conveyor is constructed so that the work can be done safely without removing any protective fences or guards and by persons who have been fully trained to recognize the hazards and to efficiently perform the duties.
- Standards for equipment. 65. (1) The manager shall ensure that procedures for the safe operation of a steam power or air compressor plant are prepared in writing, and are communicated to and made available to the persons operating and maintaining the plant.
- (2) All steam power and air compressor plants shall conform to an internationally acceptable standard.
- Portable ladders. (3) An air compressor driven by a prime mover exceeding 30 kilowatts, that is lubricated by oil and discharges to a closed system at a pressure greater than 100 kilopascals, shall have temperature shutdown devices installed at the high pressure discharge pipe.
- Prohibition on top rungs. 66. (1) A portable single length or extension ladder shall be held, tied or otherwise secured against slipping and extend at least 1 meter (3.3 feet) above any landing to which it provides access.
- Extension ladder overlaps. (2) No person shall work from the top two rungs of a single or extension ladder or the top two steps of a step ladder.
- Standards for elevating work platforms. (3) The sections of extension ladders shall be latched securely when in the extended position and the overlap shall not be less than 1 meter (3.3 feet).
- Guardrails. 67. (1) All elevating work platforms shall be designed, fabricated, operated, inspected and maintained in accordance with internationally

acceptable standards.

Non-destructive testing.

(2) Work platforms shall have standard guardrails on all sides; guards to protect the occupants from the elevating machinery; and signs clearly indicating the safe maximum working load.

Logbook required.

(3) All vehicle-mounted aerial devices and self-propelled boom type elevating work platforms shall have critical components non-destructively tested prior to their introduction and at intervals not exceeding 12 months.

“Deadman” control and emergency stop.

(4) A logbook shall be maintained for each elevating device in which all maintenance and testing of the unit shall be recorded with dates and signed by the person responsible for the work.

(5) An elevating work platform shall have “deadman” type controls positioned or protected against inadvertent operation; an emergency stop control on the platform; and the overriding controls which enable a person at the ground lever to lower the platform shall be clearly marked.

Carrier vehicles.

(6) Carrier vehicles for elevating work platforms shall be secured against movement and levelled in accordance with the manufacturer’s instructions before the work platform is elevated.

Permission to operate diesel equipment.

Training of operators.

68. (1) The permission of the Inspector shall be obtained before each diesel engine is first operated underground in a mine.

Ventilating air.

(2) Procedures for the operation and maintenance of diesel powered equipment shall be drawn up by the manager, who shall ensure that workers are trained in these procedures.

(3) A positive flow of ventilating air shall be circulated by mechanical means through every working place where diesel powered equipment is operating.

Backup alarm required for mobile equipment.

69. (1) The manager shall ensure that every unit of rubber-tired mobile

Transmission interlock. equipment with a gross vehicle weight in excess of 7000 kilograms (15,400 lbs), and when required by the Inspector any other vehicle, is equipped with a backup alarm that is clearly audible above background noise and which automatically operates when the vehicle is in reverse.

Fire extinguisher required. (2) Every unit of mobile equipment at a mine having a fluid drive transmission shall be equipped with an interlocking system to prevent the unit from being started and put into motion unless the transmission selector is returned to the neutral position.

Wheel chocks required. (3) Every vehicle and each piece of mobile equipment at a mine shall carry at least one fire extinguisher of adequate size and proper type.

Vehicle fitments. (4) All rubber-tired equipment over 7000 kilograms (15,400 lbs) shall have a minimum of two wheel chocks to be used to block the vehicle when on an incline.

Seat, clearance lights, seat belt. (5) When required by the Inspector, mobile equipment shall have windshields, side and rear windows, and rear vision mirrors which shall be kept in proper condition as to provide clear visibility.

Personnel carrier inspection. (6) All mobile equipment shall have firmly secured seats for the operator and any passengers and such seats shall be well maintained in a comfortable, shock absorbing condition with suitable clearance lights and reflectors and if equipped with a rollover canopy, a seat belt.

Wheel spindle testing. (7) Every personnel carrier shall be inspected each day by a qualified person before being used to transport persons and if there are defects which could affect the safe operation of the unit they shall be corrected before the carrier is used.

(8) The front wheel spindles of every open pit vehicle with a gross vehicle weight in excess of 100,000 kilograms (220,000 lbs) and having a maximum speed in excess of 20kilometers (12 miles) per hour shall be

subjected to a non-destructive test at least once each year, and if a crack is found one of the following measures shall be taken:-

- (a) where the crack has a length of 25 mm (1 in) or greater, the vehicle shall be taken out of service until the spindle is replaced; and
- (b) where the crack is less than 25 mm (1 in) the vehicle may remain in service but the cracked spindle shall be tested every 3 months or 1000 operating hours, whichever is the less.

Load capacity, maximum allowable speeds.

(9) Every truck and loader shall have a nameplate securely fixed to the cab showing the serial number of the unit, the maximum rated load capacity and if in excess of 45,000 kilograms (100,000 lbs) gross vehicle weight, shall show the maximum allowable speeds at the gross vehicle weight that the retarder or braking system is designed to accommodate when travelling on the maximum downgrade on which the vehicle is designed to operate.

Rollover protection.

(10) All new loaders, graders, scrapers, tractors, compactors, rollers, rough terrain forklifts, bulldozers and off-highway haulage trucks and any other new or used equipment, when required by the Inspector shall be equipped with a rollover protective structure (ROPS) and seat belts that conform to an internationally acceptable standard.

No modification to ROPS.

Procedures for rims and tires.

(11) No modification, addition, welding or cutting of the ROPS shall be permitted unless approved or re-certified by a qualified professional engineer.

(12) The manager shall ensure that acceptable procedures are in place for the inspection and any work on tires and rims of equipment; that only qualified persons shall work on rims and tires; that a tire shall not be installed on a damaged, broken, bent, or heavily rusted rim assembly; and that mismatched parts of rims and wheels are not used.

Blocking raised equipment parts.

Brakes required.

(13) No person shall place himself beneath the raised box of a dump truck, bulldozer blade, scraper blade, loader bucket, or similar equipment unless it is securely and adequately blocked or otherwise secured independently of the normal operating controls.

Retarder.

(14) Every motor vehicle shall have a service braking system, a parking braking system and an emergency stopping system which may be provided by the service or park brake systems.

Low air warning device.

(15) When required by the Inspector, an independent means of retardation shall be provided in addition to the requirements of paragraph (14) of this Regulation.

Independent hydraulic brake lines.

(16) A vehicle using air, air over hydraulic or full power hydraulic brakes shall have a suitable warning device that will alert the operator whenever the available brake pressure drops to or below its lowest safe operating pressure.

Braking tests on haulage trucks.

(17) No motor vehicle fitted with hydraulically actuated service brakes shall be put into service unless the hydraulic system is split into two or more separate and independently operated circuits, each of which is capable of stopping and holding the vehicle under any operating condition of load, grade and speed, and an alarm device is provided in the cab to warn the operator of a failure of a hydraulic circuit.

Independent hydraulics for steering and braking.

(18) A dump truck having a rated gross vehicle weight in excess of 45,000 kilograms (100,000 lbs) shall not be put into service unless the Inspector is satisfied that an identical vehicle meets an internationally acceptable standard for downgrade braking tests.

Auxillary steering.

(19) Where the braking and steering systems are activated by hydraulic pressure and where portions of both systems use common components, no single component failure in one system shall adversely affect the other system.

- (20) Where a rubber-tired vehicle depends on power for steering and the loss of power might prevent the vehicle from being steered manually, an auxiliary steering device, conforming to the Society of Automotive Engineers Standard J53, shall be installed to enable the driver to steer the vehicle for a sufficient period of time to bring it to a safe stop. Train fitment.
70. (1) All trains shall be equipped with suitable and well-maintained tail, head and clearance lights, fire extinguishers and an audible warning system that is sounded by the operator each time the train is about to move. “Deadman” controls.
- (2) Every trolley locomotive shall be operated with the trolley pole in the trailing position. Parking unattended locomotive.
- (3) Every storage battery and trolley locomotive shall be equipped with a “deadman” control switch and a control lever so that the lever cannot be removed when the power is on. Training and operating procedures.
- (4) No person shall leave an electric haulage locomotive unattended unless the brakes have been set, the control lever placed in the parked position, and the main switch placed in a non-operating position. Electrical guarding for cranes.
- (5) The manager shall develop proper standard operating practices to govern the safe operation of the railway, and this shall include maintenance and operation of all equipment and track, and each employee operating the equipment shall be trained in the standard procedures. Level turntables.
71. (1) Electrical bridge and trolley conductors for cranes shall be located or guarded to prevent accidental contact by persons. Precautions for air powered cranes.
- (2) Mobile cranes shall be operated with their turn-tables level, except as permitted by the manufacturer. Non-destructive testing.
- (3) Air-operated cranes, hoists and winches shall be supplied with

- Repair standards. air at sufficient pressure to ensure safe operation and there shall be a suitable device to prevent inadvertent disconnection of the air supply.
- (4) When required by the Inspector, a suitable non-destructive test shall be made on all load carrying components of the crane or lifting device.
- Manual available on site. (5) Any modifications or repair of a structural element or component of a crane, derrick, or hoist shall be approved by the original manufacturer or carried out under the direction of a professional engineer who shall certify the work.
- Safe working load. (6) The manufacturer's manual shall be available at the place where the equipment is used and the manual shall show, in English, the approved method of erection, dismantling, operation, adjustment and maintenance of the component parts and the assembled equipment.
- Boom angle indicator. (7) A permanent, clearly visible and legible sign shall be affixed to each crane, derrick and hoist showing the safe working load which shall not be exceeded.
- Control identification. (8) Every crane, derrick and similar hoisting equipment with a boom that can be moved in a vertical plane shall be provided with a device to indicate the angle of the boom or the radius of the lift which should be clearly visible from the operator's location.
- Operator protection. (9) Each control for a crane, derrick or hoist shall be clearly marked to show its function.
- Qualified operators, hand signals. (10) Hoisting-equipment operators shall be protected against weather, falling objects and overhead hazards.
- Pre-operation testing. (11) The manager shall ensure that hoisting equipment is operated only by qualified persons and that a standard system of hand signals is used by the operator and any other persons involved in the lifting operation.

(12) The operator of any lifting device shall, at the start of each shift, test the limit switches, brakes, circuit breakers and all control and safety devices and the operator shall not operate the unit if any of these are defective.

Erection standards for platforms.

Guardrails.

72. (1) All scaffolding shall be erected plumb and level, with the vertical supports resting on a firm foundation or sills.

Planks.

(2) All work platforms shall have standard guardrails on all open sides and ends.

(3) Every scaffold plank shall be examined prior to installation to ensure its effectiveness and shall be supported at intervals not exceeding 3 meters (10 feet) for light work and 2.1 meters (7 feet) for heavy work and shall extend not less than 150 mm (6 ins.) beyond the supporting members.

Plank size and placement.

(4) Work platforms made of scaffold planks shall not be less than 2 planks wide, placed side by side and shall provide a minimum work surface of 500 mm (6 ins.).

Maximum spacing of components.

Ladder required.

(5) The horizontal spacing of uprights, guardrails post and bearers of wooden scaffolds shall not exceed 3 meters (10 feet) for light duty scaffolds and 2.1 (7 feet) for the heavy duty scaffolds.

Tubular scaffolds.

(6) Access to scaffolds shall be provided by end frame ladders, fixed vertical or portable ladders or stairways.

(7) All tubular metal scaffolds shall be erected in accordance with the manufacturer's instructions and specifications, and if accessories, bracing or fasteners are from different manufacturers, the manager shall ensure their suitability and compatibility.

Non-destructive testing of raise climbers.

73. (1) Before installing a raise climber, the manager shall submit to the Inspector, a certificate from the manufacturer of the raise climber, or a professional

- Manufacturer's name plate. engineer attesting that all critical, load bearing components of the assembly and accessories have been inspected and tested non-destructively by approved methods.
- Braking systems. (2) Every raise climber shall have a durable and legible identification plate showing the name of the manufacturer, date of manufacture, serial and model numbers, the maximum allowable speed and allowable load ratings.
- Brake adjustment and protection. (3) Raise climbers shall be equipped with at least 2 separate and independent braking systems, each capable of stopping and holding the conveyance under all rated load and speed, and an automatic overspeed brake that is capable of bringing the unit to a safe stop under any rated load condition from a predetermined overspeed.
- Electrically driven units. (4) Raise climber brakes shall either be designed to compensate automatically for lining wear or the means to easily manually adjust them, and all brake blocks and linings shall be protected from water, oil, grease or other substance that could adversely affect their operation.
- Modification requirements. (5) Electrically driven raise climbers and their electrical components shall be designed and installed to ensure the safety of persons working on or about the unit under any operating conditions.
- Inspection after installation. (6) Any modification to the raise climber, or the use of racks, pinions or bolts other than those supplied by the manufacturer shall be approved by the manufacturer as acceptable substitutes or certified by a professional engineer.
- Maintenance. (7) After installation by qualified persons and before the raise climber is put into service, a final inspection and test of the installation shall be conducted and the procedure and results shall be recorded in the maintenance record book for the unit.

(8) The manager shall ensure that only qualified persons maintain the raise climber according to the manufacturer’s specifications and that the work is recorded in the maintenance record book kept for that purpose.

Operating procedures.

(9) The manager shall establish safe operating procedures for the raise climber and ensure that all persons using the equipment have been trained in its use.

Installation and maintenance standards.

PART VII
ELECTRICAL APPARATUS

74. The manager shall ensure that all electrical equipment shall be installed, maintained, and operated in accordance with the manufacturers specifications and where required, in accordance with an internationally accepted standard.

Notification before installation.

75. (1) The manager shall notify the Inspector before there is any prior introduction of electrical energy at any mine and prior to increasing the capacity of an existing installation by more than 500 kva.

Schmatic drawings.

(2) The notification referred to in paragraph (1) above shall show the areas at the mine where electrical energy is to be transmitted and used on a schematic drawing approved by a professional engineer and if the energy is to be used under ground, the drawings shall show the dimensions of the mine openings and the clearances for cables in the tunnels as well as the electrical equipment in distribution stations.

Standards for explosive atmospheres.

(3) The manager shall notify the Inspector of the international approval standard required for any equipment to be installed in a location where explosive gases, vapours or dusts may be present.

Isolating switchgear.

76. Switchgear shall be provided at the surface of the mine for isolating all underground electrical circuits and a person authorized to operate the switchgear shall be available whenever the circuits are energized.

Manager to develop lockout procedure.

Requirement to
lock out.

77. (1) The manager shall develop an acceptable and proper lockout procedure and shall ensure that all persons required to lockout machinery are trained in that procedure.

Lock out procedure.

(2) Before any work is performed on electrical equipment, the main power source shall be disconnected, locked out and tagged.

Lock removal.

(3) Locks and tags shall be issued to each person who works on machinery or equipment which has to be locked out, and the lock issued to any person shall only be capable of being opened by that person's key and the tags shall contain space for recording the person's name, the type of work being performed, the date and time the work was started and the name of the supervisor.

Handling of trailing
cables.

(4) A lock shall only be removed by the person who affixed it to the lockout device and when work is completed all guards, fences and other safety devices shall be replaced before the locks are removed.

Defective cables.

78. (1) Persons handling energized trailing cables shall use suitable protective equipment supplied by the manager.

Ground fault
protection of
submersible pumps.

(2) Defective trailing cables shall be removed from service and before any damaged trailing cables are returned to service they shall be inspected by a qualified person.

Ground fault
protection for
supply system.

79. A submersible pump that is supplied with electricity by a trailing cable shall be provided with ground fault protection to limit ground fault current to a maximum of 25 amps and the protection shall automatically isolate the supply in the event of a ground fault.

80. Supply systems for mobile electrical equipment shall be tested before being put into service and at least once a year thereafter in order to prove the effectiveness of the ground fault tripping and ground conductor monitoring

circuits and a record of these tests shall be kept at the mine, available for examination by the Inspector.

Standards for buildings.

PART VIII
BUILDINGS AND STRUCTURES

Professional design.

81. (1) All buildings shall be constructed in accordance with proper standards prescribed by the Inspector.

(2) Any construction, alterations, dismantling, moving or major repair to a building shall have drawings prepared by a professional engineer which clearly show all field connections and information necessary for the safe completion of the work.

Construction standard for buildings and structures.

82. Any building, or portion of a building that is within 15 meters (50 feet) of the headframe or other entrance to a mine shall be of non-combustible construction and the remainder of the building shall be either non-combustible or separated from the non-combustible section by a firewall with a 4 hour fire resistance rating.

Escape exits.

83. (1) The manager shall ensure that all places where work is performed have safe means of access and egress and an alternate means of escape.

Marking of travelways.

(2) Aisles and passageways in work and storage areas shall, when required by the Inspector, be clearly delineated by floor markings.

Marking emergency exits.

(3) Emergency exits shall be clearly marked and designed to provide quick and unimpeded exit.

Doors and landings.

(4) All doors shall not open directly onto stairways but onto landings which have a width in excess of the swing of the door.

Double swing doors.

Glass doors.

(5) Double acting swing doors shall be designed and installed to permit an adequate view through the doors.

Entrance minimum widths.

(6) Transparent glass doors and panels shall be constructed of laminated, tempered or wire safety glass.

Power door protection.

(7) All entrance ways through which equipment is moved shall exceed the equipment dimensions by at least 500 mm (20 ins) in width and 300 mm (12 ins) in height.

Standards for stairs.

(8) Power-operated vertical doors shall have devices along the lower edge which will automatically stop movement of the door when sensing an obstruction or reaching the floor.

Guardrails.

84. (1) Every flight of stairs having more than 4 risers shall be equipped with handrails and midrails halfway between the top of the handrail and the nose of the stair tread on all open sides of the stairways and, for a closed stairwell, there shall be a handrail on one side.

Guardrails for pits, etc.

(2) Standard guardrails shall be installed where any open-sided floor, working platform, runway, walkway or balcony is more than 1 meter (3.3 feet) above grade or floor level.

Standards for walkways.

85. Openings or pits in floors, roofs, walk-ways, or any open tank or other work area accessible to persons shall be securely covered or protected by fixed or removable guardrails.

Curb required.

86. (1) Walkways shall not be less than 750 mm (30 ins) in width and shall be provided with safe access by stairways or fixed ladders.

Application required for construction.

(2) Curbs or bullrails on walkways to prevent vehicles or equipment from running off the edge shall not be less than 250 mm (10 ins) in height.

PART IX
DUMPS (TIPS), DAMS AND LAGOONS

87. (1) Prior to construction of a dump, dam or lagoon, the manager shall make an application to the Inspector for authorization to construct such dump, dam or lagoon.

Design by professional engineer.

(2) An application under paragraph (1) above shall consist of an investigation and design report by a professional engineer that includes a surveillance and instrumentation program.

“As built” report and inspection.

(3) No tailings impoundment or storage lagoon shall be operated until the Inspector is satisfied that sufficient work has been carried out and sufficient precautions taken to enable safe, continuous operation in accordance with the approved design; and in addition, the manager shall file with the Inspector an “as built” report prepared by the design engineer.

Annual report.

88. The manager shall provide the Inspector with an annual report, prepared by a professional engineer, on the operation and maintenance of the tailings disposal system and any water controlling dams, and when required by the Inspector, any waste rock or soil dump.

Engineer’s inspection and report on closure.

89. Prior to the abandonment or closure of any impoundment, dam, or waste dump, the long term structural stability and runoff control shall be demonstrated by an engineering report acceptable to the Inspector.

Permit required for explosives.

PART X
EXPLOSIVES

90. (1) The manager shall apply for and receive an explosives storage and use permit from the Inspector before a magazine is located, erected, built, put into service, or modified, or before carrying out any maintenance work on the magazine including the installation of lighting or heating.

Location.

Rules for operation of magazine.

- Qualified person in charge. (2) The manager shall select the magazine site in accordance with the British Table of Distances.
- Magazine to be locked. (3) Every magazine shall be operated and maintained in accordance with the following rules which shall be posted inside the magazine:-
- Housekeeping. (a) a qualified person shall be in charge of the magazine and shall carry out a weekly inspection and inventory;
- No steel or iron. (b) the magazine shall be kept locked at all times except when explosives are being moved;
- Rotation of stock. (c) the magazine shall be kept clean, dry, and free of broken explosives packages or spilled explosives;
- Storage of detonators. (d) the magazine shall not contain any exposed iron or steel except in fixtures, and its contents shall be arranged in a tidy and organized manner; and
- Underground storage. (e) the explosives stock shall be rotated so that the oldest stock is used first.
- (4) Detonators shall be stored in a separate building and not placed within 10 meters (33 feet) of explosives except during transport or during loading operations.
- Training and blasting qualifications. (5) In an underground mine, daily explosives storage boxes that are well marked may be maintained in each working place without the permission of the Inspector.
- Use, care and handling of explosives. 91. No person shall conduct a blasting operation unless the manager is completely satisfied that the person has been adequately trained in the safe

handling and use of explosives.

Opening nitro glycerine explosives containers.

92. (1) Only explosives acceptable to the Inspector shall be used and they shall have plainly marked on every original package, the name and place of the manufacturer and the date when they were produced.

Defective explosives.

(2) Cases containing nitro-glycerine based explosives shall only be opened with implements made of non-sparking material.

Safety fuses.

(3) When defective explosives are found they shall be immediately reported to the Inspector and removed from the worksite.

(4) Safety fuses shall be made up into fuse assemblies that have a detonator attached at one end and are of a standard length.

Transportation of explosives by authorized persons.

(5) No person shall commit any careless act with explosives or detonators.

No open flame lights.

93. (1) Only persons authorized by the manager, shall remove explosives from the magazine and transport them to the workplace.

Vehicle standards for transporting explosives.

(2) No person shall smoke or have open-flame lights within 10 meters (33 feet) of a vehicle containing explosives.

(3) A vehicle used to transport explosives,

(i) shall have a separate compartment to ensure the explosives do not contact any metal; and

(ii) shall be constructed so that the explosives cannot fall from the vehicle; and

(iii) shall have clearly visible signs marked EXPLOSIVES, with letters not less than 150 mm (6 ins) high whenever the vehicle

Refuelling vehicles.

- Transport of detonators and explosives. (4) A vehicle used for transporting explosives shall not be refuelled when carrying explosives and shall have the engine shut off when explosives are being loaded or unloaded.
- Transport in shafts. (5) Where detonators are to be transported with explosives they shall be placed in a wooden container that has sides at least 150 mm (6 ins) thick.
- Loading explosives. (6) Explosives or detonators shall not be transported in a shaft conveyance with other material or persons other than the cage tender.
- Explosives wrappers. 94. (1) Cartridge explosives shall not be loaded into a hole of insufficient size, by hitting, pounding, ramming or applying undue pressure but shall only be loaded by means of a loading tool made of wood, plastic or other material approved by the Inspector.
- Punching explosive primers. (2) Nitro-glycerine based cartridge explosives shall not be removed from their wrappers.
- Detonator strenght. (3) Primers shall be made up only as required and, when priming nitro-glycerine type explosives only a non-sparking implement shall be used to punch the hole in the cartridge.
- Pneumatic loading of explosives. (4) Every primed cartridge shall contain a properly prepared detonating device sufficient to reliably initiate the explosion and the detonator shall be inserted in such a manner that it cannot be separated or pulled out of the cartridge.
- Pneumatic loading over leg wires. (5) Pneumatic loading of explosives shall only be carried out with explosives acceptable to the Inspector and using acceptable procedures and approved equipment that will prevent dangerous build-up of static electricity or hazards from stray electric currents.
- Extracting explosives.

- (6) Pneumatic loading of explosives over the leg wires of electrical detonators is prohibited without the written permission of the Inspector. Extracting ANFO explosives.
 - (7) No person shall extract or attempt to extract nitro-glycerine based explosives from a blasthole. Marking blast area.
 - (8) Ammonium nitrate (ANFO) type explosives may only be removed by washing them from the blasthole. Vehicle distance from blast.
 - (9) A blast area on surface shall be clearly identified by posted signs to prevent inadvertent access of vehicles. Blasting time.
 - (10) No vehicle shall be allowed within 8 meters (26.5 feet) of any charged blasthole except specially fitted vehicles authorized by the Inspector. Warning before blasting.
95. (1) In an underground mine, a specific time shall be set for blasting in order to protect persons from exposure to dust, fumes and smoke.
- (2) Before blasting, the blaster shall clear the blast danger zone of all persons; ensure that all entrances to the blast danger zone are guarded by persons to prevent access; and at a surface mine, ensure that an effective audible warning is sounded by a siren or similar device. Blasting sequence.
 - (3) Every charged hole shall be fired in its proper sequence, and where any blast could affect other charged blastholes, all of the holes shall be fired in one operation. Blaster to count shots.
 - (4) A blaster shall when possible, count the number of shots exploding, report the suspicion of any shot that did not fire and identify any misfired hole by inserting a conspicuous, non-metal marker at its outer end or roping off the area. Firing from remote location.

Safety fuse lengths.
 - (5) Blasts shall be fired from a remote location during shaft sinking operations or when raising has exceeded 10 meters (33 feet).

- Blaster to leave after ignition. (6) In any blasting operation, the safety fuse shall be at least 1 meter (3.3 feet) in length, be lit by a suitably timed igniting device and if more than one device is used, they shall be activated simultaneously and the safety fuse shall have a burning time at least twice that of the igniting device.
- Blasting machine maintenance. (7) The blaster and all other persons shall leave the blasting area immediately after the ignitor cord or fuses have been lit.
- Condenser blasting machines. (8) Blasting machines shall be of type acceptable to the Inspector and they shall be kept in a cool, dry storage space and maintained in serviceable condition.
- Connecting electrical blasts. (9) Condenser discharge machines shall be examined to ensure any residual charge remaining on the capacitors after use is discharged according to the manufacturer's instructions.
- Electric power circuits for blasting. (10) The blasting machine shall not be connected to the blasting cables until immediately before firing charges and it shall be immediately disconnected after firing or attempting to fire the charges.
- Blasting cable size. (11) Electric power from lighting or power circuits shall not be used for firing charges unless the blasting circuit has an isolating transformer and a special firing device that opens the blasting circuit by gravity.
- Isolating multiple blasting sites. (12) The blasting circuit conductors shall be No. 12 AWG size cable, or shall be more readily identified as blasting cable and where expendable connecting wire is used, this shall not be less than No. 20 AWG in size.
- Testing electrical circuit. (13) Where a blasting circuit is used for more than one working place, each branch shall be isolated by means of a locked isolating switch that automatically short circuits the branch circuit.
- Electrical storm warning. (14) Where more than one shot is fired electrically, the blaster shall test the electrical circuit with an approved circuit testing device immediately

before blasting.

Radio transmitters prohibited.

(15) The manager shall ensure that persons engaged in blasting underground are warned of any electrical storm.

Blasting conductors insulated.

(16) The blaster shall ensure that signs are posted to ensure that radio transmitters shall be turned off when within 20 meters (66 feet) of the site where electric blasting is being used.

Distance of blasting conductors from power lines.

(17) All blasting circuit conductors shall be insulated cable and shall be short-circuited except when connecting the blast.

Re-entry after blasting.

(18) Blasting circuit conductors shall be kept at least 150 mm (6 ins) away from power and lighting circuits.

Minimum distances for drilling near explosives.

(19) The blaster shall ensure that no person enters the blast area until the firing cables have been disconnected from the firing device and short-circuited, and the blaster has sounded an "all clear" signal.

No drilling in blasted rock.

96. (1) Drilling shall not be carried out within 300 mm (12 ins) of a bootleg hole on surface or within 150 mm (6 ins) underground unless a safe, acceptable procedure has been developed.

(2) No person shall drill in loose rock produced by blasting unless the rock has been thoroughly examined to ensure that it does not contain explosives or an engineered pattern is utilized to prevent overlaying of new holes over previously blasted holes.

Misfired hole on surface.

Re-entry when misfire suspected.

97. (1) A misfired hole on surface shall be clearly marked off for a distance of 8 meters (26.5 feet) around the collar of the hole.

(2) No person shall be allowed to return to the location of a blast initiated by safety fuse until a time equal to seven times the number of meters (2 times number of feet) in the longest fuse used has passed, and if a misfire is

Re-entry to electrical blast area.

Abandonment
after last blast.

suspected then no sooner than 30 minutes.

(3) Where blasting is initiated electrically and a misfire is suspected, no person shall return to the blast site until 10 minutes from the time the blasting circuit is disconnected and short-circuited.

Removal of
explosives from mine
site.

(4) The manager shall ensure that an underground development heading is not abandoned or work discontinued until the broken material from the last blast has been removed and the face has been examined for misfires or holes containing explosives.

Disposal on closure.

Common blasting
time for adjacent
mines.

98. (1) No person shall take explosives, detonators or fuses away from a mine unless authorized to do so, in writing, by the manager.

(2) All explosives shall be removed or properly destroyed prior to the closure of a mine.

Examination before
breakthrough.

99. (1) Where work is conducted at adjacent surface or underground mines having connected workings, the managers shall agree to a mutually acceptable common blasting time and procedure.

(2) When an active underground working is within 8 meters (26.5 feet) of another mine opening or a drill hole, the shift supervisor shall make a thorough examination of the other opening or the drill hole collar and ensure that the workplace can be advanced in a safe manner and also ensure that access to the nearest point of intersection with the other opening or the drill hole collar is guarded during blasting.

Intoxicating
substances.

PART XI

Impairment.

PERSONNEL SAFETY AND EMERGENCY PREPAREDNESS

100. (1) No person shall possess intoxicating liquor or illegal drugs in or about a mine.

Foolhardy
behaviour.

(2) No person shall be allowed to remain in a mine if in the opinion

of the supervisor, his ability is so impaired by intoxicating beverages or drugs that the health or safety of any person is endangered.

(3) No person shall engage in any improper or fool-hardy behaviour such as horseplay, scuffling, fighting, playing practical jokes, or other conduct that might create or constitute a hazard to any person in or about a mine. Protection of safety devices.

(4) No person shall render ineffective any device, equipment or material provided for the protection of the health and safety of persons employed at a mine or provided for the safety of the public. General safety rules. Log-in/log-out procedure.

101. (1) The manager shall ensure that a proper method acceptable to the Inspector is adopted and used to account for all persons going on or off shift at the mine. Persons working alone.

(2) Whenever a worker is working alone and he may not be able to secure assistance in the event of injury or other misfortune, the manager shall ensure that there is a procedure for checking the well-being of the person at intervals not exceeding 2.5 hours. Persons working overhead.

(3) No person shall be allowed to work in a location where persons are working overhead, unless adequate protection is provided. Protection from drowning.

(4) Where persons are required to work near water or where drowning could be a risk, the manager shall provide them with approved personal floatation devices and approved lifebuoys with heaving lines of adequate length. Dangling clothing and hair prohibited.

(5) Where there is a risk of workers coming into contact with moving parts of machinery or electrically energized equipment, the workers shall wear clothing that fits closely to the body; confine any long cranial or facial hair; and refrain from wearing dangling neckwear, bracelets, wrist-watches or similar articles. Guarding moving parts.

(6) Unless situated so as to prevent a person from coming into

- Fall arresting device. accidental contact with it, every drive belt or drive chain, flywheel, sprocket, pulley, geared wheel, and every part of any wheel or other revolving part that projects unevenly from the surface shall be effectively enclosed, covered or guarded.
- Storage of fuels near shaft. (7) Where a person is exposed to the hazard of falling a distance greater than 3 meters (10 feet), a fall-arresting device shall be provided and the person shall wear the device.
- Storage tank standards. (8) Oil, grease, liquid fuels and other flammable materials shall not be stored within 30 meters (100 feet) of a shafthouse, mine portal or other mine opening; and the natural drainage from any fuel storage area shall be directed away from the mine openings.
- (9) Every fuel storage tank shall have signs which:-
- (a) identify the contents of the tank; and
- (b) identify the area as a fire hazard zone.
- First aid supplies. (10) Every fuel storage tank shall be surrounded by a containment capable of storing 110% of the storage capacity of the tank.
- Working in confined spaces. (11) The manager shall provide and maintain the first aid supplies required by the Inspector.
- Working on loose material. 102. (1) The manager shall ensure that written procedures acceptable to the Inspector are developed for work in confined spaces such as bins or tanks where irrespirable, toxic or flammable atmospheres might be encountered.
- (2) No person shall enter or be allowed to enter a bin, stockpile area or any other place where there is a danger of being trapped in loose material unless:-
- (a) a safe access has been provided by walkways,

catwalks or other means; and

- (b) the person entering is equipped with a safety belt and a secured lifeline and is attended by another person capable of making an immediate rescue. Fire fighting and mine rescue. Fire hazard warning signs.

103. (1) Fire hazard areas shall be identified by warning signs, and persons shall not smoke or use open flame lamps, matches or other means of producing heat in any designated area. Fire fighting equipment.

(2) The manager shall ensure that fire fighting equipment is provided and maintained in or about every fire hazard area; every headframe; portal house; all electrical installations; pump stations; conveyors or fuel depots underground. Mine rescue plan.

(3) The manager of an underground mine shall develop and file with the Inspector, a mine rescue emergency plan to be followed in the event of an emergency. Evacuation procedures.

(4) The manager of an underground mine shall prepare procedures for the safe evacuation of the mine in the event of a fire, and shall ensure that each worker receives instruction in the procedures and recognizes the emergency warning system. Trained rescue team required.

(5) When required by the Inspector, the manager shall ensure that at least one fully trained and equipped mine rescue team is fully maintained at all times. Training frequency.

(6) The mine rescue team members shall have first aid training to a proper standard acceptable to the Inspector and shall practice as a team for not less than 8 hours during each 3 month period.

Shaft design.

PART XII **HOISTS AND SHAFTS**

- Underwind clearance. 104. (1) A mine shaft shall be designed by a professional mining engineer and shall be equipped with a means to guide each shaft conveyance to prevent contact with another shaft conveyance; any shaft furnishing; or the shaft itself.
- Friction hoist guides. (2) The shaft shall have underwind clearances that exceed the stopping distance of any shaft conveyance when travelling at the maximum permitted speed and carrying the maximum permitted load, except during shaft sinking operations.
- Shaft lining. (3) Where a friction hoist is installed, the shaft shall be equipped with tapered guides, or other devices acceptable to the Inspector, which shall be located above and below the limits of regular travel and designed to decelerate and safely stop a conveyance in the event of overtravel.
- Shaft partitioning. (4) A shaft shall be securely lined and if necessary cased, and the lining or casing shall be maintained within 20 meters (66 feet) of the bottom of the shaft during shaft sinking operations.
- Ladderway partitioned. (5) Shaft compartments used for handling materials shall be partitioned from the other compartments at the collar, and at all level openings.
- (6) The ladderway in a shaft compartment shall be separated from the hoisting compartments by a partition that prevents:-
- (a) a falling object from entering the ladderway compartment; or
- (b) the intrusion of an object from the ladderway compartment into the hoisting compartment.
- Gates on shaft openings.
- Ladderway required. (7) Where the hoisting compartment at a shaft station is not securely closed off, a substantial gate shall be installed so as to securely close off the hoisting compartment.

(8) A suitable stairway or ladderway shall be maintained in every shaft, and during sinking operations if the ladder does not extend to the bottom of the shaft then an auxiliary ladder shall be installed which extends to the bottom of the shaft.

Transport during shaft sinking.

(9) When the vertical depth of a shaft below the collar exceeds 50 meters (165 feet), a sinking bucket shall be provided for the transport of persons; and when the distance between the head sheave and the bottom exceeds 100 meters (300 feet), a crosshead shall be used with the bucket.

Crosshead required.

(10) The crosshead shall land on at least two chairs at the bottom crosshead stop to prevent distortion; shall be attached to the rope by a safety appliance to ensure that the bucket is stopped if the crosshead should jam in the shaft and shall be of a type that encloses the bucket, unless the shaft compartment is tightly lined and the bucket is barrel shaped.

Signal lights for hoistman.

(11) Dual lights shall be installed within view of the hoist operator to indicate that the crosshead and the sinking bucket are descending the shaft together after leaving the dumping position and also to indicate whether the service doors or dump doors are in or out of the shaft compartment.

Automatic latch of dump doors.

(12) During sinking operations, service doors shall be installed at the collar, and any other place in the shaft, in order to cover the shaft compartments where the bucket is loaded or unloaded, and the doors shall automatically latch out by mechanical means whenever they are being removed from the hoisting compartment; be closed whenever a bucket is being loaded or unloaded; and be closed whenever persons are entering or leaving the bucket, except where a closed crosshead provides equivalent protection.

Dump door arrangement.

(13) During sinking operations, dump doors shall be installed at the bucket dumping position and arranged so as to prevent a bucket from being dumped when the doors are in the open position, and to prevent any material from falling down the shaft when the bucket is dumped and automatically latched

Multideck hoisting stages.

out by mechanical means whenever they are removed from the hoisting compartment.

Sinking bucket loading.

(14) Where a multi-deck stage is used for sinking a shaft, it shall be designed by a professional engineer and constructed in accordance with the design.

Persons to ride in bucket.

(15) A shaft sinking bucket shall be filled so that no piece of rock projects above the level of its rim.

Bucket control near shaft bottom.

(16) Except during shaft maintenance and inspection operations, every person being transported by a bucket shall ride in the bucket.

Bucket lowering after blasting.

(17) A bucket being lowered to the shaft bottom shall be stopped at a distance of at least 5 meters (16.5 feet) and not more than 10 meters (33 feet) above the shaft bottom; and after a separate signal has been given, it shall be lowered slowly from this point.

Hoist permit.

(18) During sinking operations, on the first trip carrying persons down the shaft after blasting, the bucket shall not be lowered beyond a point of 15 meters (50 feet) above the blasting set or bulkhead, or beyond any point in the shaft where the safety or health of persons could be endangered, until the persons riding in the bucket signal the further descent of the bucket.

105. (1) No hoist shall be put into service unless a certificate has been obtained from:-

Hoist commissioning tests.

(a) the manufacturer of the hoist; or

(b) a professional engineer competent in hoist design, certifying the maximum rope pull, the maximum suspended load, and in the case of a friction hoist, the maximum unbalanced load.

(2) Commissioning tests shall be conducted by a professional engineer on any new or reactivated mine hoist and a certificate indicating the results shall be filed with the Inspector. Maximum shaft conveyance loads.

(3) The maximum number of persons that may be carried by a shaft conveyance shall not exceed 85% of the maximum allowable weight of materials divided by 90, or the deck area in square meters divided by .19, whichever is less. Logbook to be maintained.

(4) The manager shall ensure that for each hoisting plant, a logbook to record pertinent information about the operation and maintenance of the plant is maintained on the following topics: electrical equipment; hoisting machinery; hoistman's observations; rope records; and shaft inspection. Hoistman's qualifications.

(5) No person shall operate or be permitted to operate a mine hoist unless that person has worked a minimum of three years at a mine, and has had at least one year of shaft experience, and has obtained a letter from a medical doctor stating his fitness to operate a hoist. Headframe design.

106. (1) A shaft headframe, whether on surface or underground, shall be designed by a professional engineer and shall be of sufficient height to provide an overwind distance that exceeds the greater of twice the stopping distance of the shaft conveyance travelling at the maximum speed permitted by the hoist controls or 3 meters (10 feet). Shaft rope sheave certificate.

(2) Before a shaft rope sheave is used, a certificate shall be obtained from the manufacturer or a professional engineer certifying its maximum rated load carrying capacity; the diameter of rope for which it was designed; the maximum breaking strength of the rope for which it was designed; and the maximum amount of groove wear that shall be permitted. Shaft rope sheave grooves.

(3) A shaft rope sheave shall have a groove, or inserts with a groove, which is suitable for the rope being used and it shall bear a serial number and a date of manufacture. Non-destructive testing.

Hoist ropes/factor of safety.

(4) The shaft of a sheave shall be non-destructively tested for flaws before being put into service, and shall be tested annually thereafter.

Welding of ropes prohibited.

107. (1) Each component of the suspension gear between a shaft conveyance or counterweight and a hoisting or tail rope, and any connections between conveyances, shall have a static factor of safety when new, of not less than 10.

Rope connection device.

(2) Components of a single suspension unit between a hoisting rope and a shaft conveyance shall not be welded.

Drum and rope attachment.

(3) A shaft rope shall be attached to the suspension gear of a shaft conveyance or counterweight by a closed-type device that cannot be inadvertently disconnected.

Test trips after maintenance.

(4) In a drum hoist installation, the hoisting rope of a shaft conveyance or counterweight shall be attached to the drum of the hoist and there shall be not less than 3 rounds of rope on the drum when the shaft conveyance is at the lowest point in the shaft.

Initial destructive testing of rope samples.

(5) When the attachments for a shaft hoisting rope are first installed or reinstalled after dismantling, the hoist operator shall make two test trips of the conveyance, carrying its normal load, through the working part of the shaft. The attachments shall be examined by a qualified person after the trips and a record of the test trips shall be made in the logbook.

Six month destructive test.

(6) Before a shaft rope is installed, a 2.5 meter (9 feet) representative sample of the rope shall be destructively tested at a rope testing laboratory acceptable to the Inspector and the test certificate showing the actual breaking strength, the percent elongation at failure, and the results of torsion tests performed on individual wires shall be sent to the Inspector.

(7) Six months after installation of the hoisting rope and at six

month intervals thereafter, a 2.5 meter (9 feet) length shall be cut from the lower end of the rope and destructively tested in accordance with paragraph (6) of this Regulation, and the test results shall be forwarded to the Inspector.

Electromagnetic testing of ropes.

(8) Electromagnetic testing of the entire rope shall be conducted within six months after installation of same and at six month intervals thereafter until the rope has been in service for two years when the interval for testing shall be reduced to every four months.

Rope splicing prohibited.

(9) No rope shall be used as a hoisting rope if it has been spliced, reversed, or previously used in a shaft sinking operation.

Minimum rope diameters.

(10) The minimum nominal diameter of a hoisting rope shall be 16 mm (0.64 ins) where a shaft conveyance is supported by a single rope, and 13 mm (0.5 ins) where more than one rope is used.

Factor of safety for ropes and drum hoists.

(11) The factor of safety of a hoisting rope installed on a drum hoist when the conveyance is carrying its maximum permissible load shall not be less than 8.5 at the point where the rope is attached to the conveyance; 5.0 at the point where the rope leaves the head sheave; and 7.5 at the point where the rope is attached to a skip or counterweight, and the maximum load shall be accurately determined by weighing.

Factor of safety for ropes on friction hoists.

(12) The factor of safety of a friction hoist rope shall not be less than the greater of 5.5 or the value obtained from the formula $8.0 - 0.00164d$, where 'd' is the maximum length of rope, in meters, in the shaft compartment below the head sheave or friction hoist drum.

Factor of safety for tail ropes.

(13) The factor of safety of a tail or balance rope shall not be less than 7.0; and for a guide or rubbing rope it shall not be less than 5.0.

Removal of rope from service.

(14) No rope shall remain in service when its breaking strength is found to be:-

- Removal of deteriorating ropes.
- (a) less than 90 percent in any part of the rope;
 - (b) 90 percent in any part of a multi-layer, multi-strand balance rope;
 - (c) 85 percent in any part of a single layer, stranded balance rope; or
 - (d) 75 percent in any part of a guide or rubbing rope.

Load rating certificate for hoisting conveyance.

(15) A hoist rope shall be removed where the destructive test of a piece of a hoist rope indicates that the extension has reduced to 60 % of the original extension test for that rope, and marked corrosion or a considerable loss in wire torsion has occurred; the number of broken wires in any section of the rope equal to one lay length; exceeds 5 % of the total number of wires in the rope, excluding filler wires from the calculations or the rate of stretch of a friction hoist rope shows a rapid increase in its normal rate of stretch.

Professional engineers design.

108. (1) Each conveyance shall have a certificate showing the rated load certified by the manufacturer or a professional engineer; the serial number; date of manufacture; and name of the manufacturer.

Safety factor.

(2) The maximum design stress for each component of a conveyance shall be established by a professional engineer and shall include the effects of the weight of the conveyance; the rated load; any impact load; any dynamic load; stress concentration factors; corrosion; metal fatigue; and dissimilar materials.

Securing equipment from conveyance.

(3) All parts of a shaft conveyance when carrying the rated load shall be capable of withstanding four times the maximum allowable design stress, without permanent distortion.

Slinging equipment from conveyance.

(4) Whenever equipment or supplies are being transported in a shaft conveyance, they shall be loaded and secured to prevent them from shifting.

(5) Where equipment to be transported in a shaft is slung underneath a conveyance or crosshead, it shall be suspended in such a manner as to prevent its contact with any part of the shaft interior or its furnishings.

Cage for transport of persons.

(6) Except during sinking operations, a suitable shaft conveyance or cage shall be provided for the transport of persons.

Cage construction standards.

(7) A cage for the transport of persons in a shaft shall be enclosed on all sides, (except for the side containing a door), by steel sheet at least 3 mm (1/8 ins) thick or material of equivalent strength, and

- (a) shall be adequately ventilated;
- (b) shall have a hood made of plate steel at least 5mm (0.2 ins) thick or material of equivalent strength and incorporating an escape hatch;
- (c) shall have an internal height greater than 2.1 meters (7 feet);
- (d) shall have a door opening clearance greater than 1.8 meters (4.5 feet), and if supported by a single rope, shall be equipped with safety catches and mechanism.

Cage doors.

(8) The doors of a cage shall:-

- (a) be at least 1.5 meters (5 feet) high;
- (b) be mounted and arranged so they cannot be opened outward from the cage;
- (c) have the minimum clearance at the floor to allow them to be opened and closed;

Cage safety catches.

(d) be of solid construction and adequate strength to withstand normal shock loads.

Free fall testing.

(9) The safety catches on a cage or skip shall safely stop and hold them if the hoisting rope or its attachment should fail and shall be tested by a free fall test before the cage or skip is first used for the transport of persons and also after any repairs to the safety catches or mechanisms.

Passing standard for free fall tests.

(10) The free fall test shall be conducted with the cage or skip carrying a weight equal to the maximum permitted load and at a speed equal to the normal hoisting speed when transporting persons.

(11) A free fall test shall be considered successful if:-

(a) the cage or skip is decelerated between 1g and 3g;

(b) there is no damage to the safety dogs or mechanisms; and

(c) the safety dogs engage the guides continuously during deceleration and the calculations show that the safety dogs would stop the cage or skip carrying its maximum permitted load.

Report to Inspector.

(12) The results of free fall tests shall be submitted to the Inspector.

Chairs for landing cages.

(13) Chairs used for landing a cage shall be arranged to fall clear of the shaft compartment when the cage is lifted off the chairs.

Hoist drum/rope ratios.

109. (1) The ratio of the diameter of a hoist drum to the rope diameter shall be:-

- (a) equal or greater than 60 to 1 for a drum hoist where the nominal rope diameter is 26 mm (1 in.) or less;
- (b) 80 to 1 where the nominal rope diameter is greater than 26 mm (1 in);
- (c) 48 to 1 for a shaft sinking drum hoist where the nominal rope diameter is less than 26 mm (1 in);
- (d) 60 to 1 where the rope diameter is greater than 26 mm (1 in);
- (e) 80 to 1 for stranded ropes on a friction hoist; and 100 to 1 for locked coil ropes.

Hoist brakes.

(2) A hoist shall not be used to transport persons in a shaft unless it has two sets of mechanical brakes

- (a) that are each capable of holding the drum when the conveyance is carrying its maximum permitted load;
- (b) that are so arranged that they can be independently tested and be equipped with a device to indicate tread wear or slack linkage and also prevent movement of the hoist if predetermined wear limits are exceeded.

Arrangement of hoist brakes.

(3) A hoist's mechanical braking system shall be so arranged that the brake is applied by a control lever that is pulled, unless:-

- (a) there is a common brake and power lever, where brake weights are installed;
- (b) they can be readily tested to ensure freedom of

Braking standards.

movement, and at least one set of brakes is applied automatically if there is a loss of power.

- Foot brakes prohibited.
Fall-safe electrical supply to hoists.
- (4) The brakes of a drum hoist shall be designed and arranged to decelerate the drum at between 1.5 and 3.7 meters (5 and 12 feet) per second when braking is initiated by an interrupted circuit and the hoist is operating in the normal full speed range.
- (5) No hoist shall be equipped with a foot-operated brake.
- Electrical safety circuit interruption.
- (6) All electric hoists shall be equipped with a fail-safe, protective electrical circuit operating at a nominal potential not exceeding 250 volts which, when interrupted, will cut off the power supply to the hoist and actuate the mechanical brake.
- (7) The safety circuit of an electric hoist shall be interrupted whenever:-
- (a) there is a failure of the power supply or a significant drop in voltage that would affect the hoist operation;
- (b) there is an abnormal overload on the hoist motor;
- (c) there is a short circuit in the hoist electrical system;
or
- (d) a prescribed safety device has operated.
- Emergency stop switch.
- Track limit switch.
- (8) An emergency stop switch, arranged to interrupt the safety circuit of an electric hoist, shall be located within easy reach of an operator controlling the hoist, and the switch shall be easily identified and operated by hand.

(9) A track limit switch shall be installed in each shaft hoisting compartment, above the normal upper limit of travel, and so arranged and positioned that in the event of an overwind contact with the conveyance it shall interrupt the hoist safety circuit and bring the conveyance to a safe stop.

Overwind protection.

(10) Every electric hoist shall be equipped with a device to protect the shaft conveyance against overwinding, approaching a limit of travel at an excessive speed and travelling at speeds in excess of the normal operating speed. This device shall:-

- (a) interrupt the hoist safety circuit when activated;
- (b) be driven directly by the hoist drum;
- (c) be protected against loss of motion;
- (d) prevent the paying out of excess rope during sinking operations; and
- (e) be set to bring the hoist to a safe stop before the conveyance or rope attachments can reach any permanent obstruction in the shaft or headframe.

Abnormal slip protection - friction hoist.

(11) A friction hoist shall have devices installed which are set to interrupt the hoist safety circuit if:-

- (a) abnormal slip occurs between the hoist drum and the ropes;
- (b) abnormal wear occurs on the rope treads or the permissible limit of tread wear has been reached;
- (c) an abnormal swinging or rising occurs in the loop of a balance rope at the bottom of the shaft.

Synchronizing device.

(There shall also be a device installed in the shaft that detects a conveyance approaching the shaft collar at an excessive speed.)

- (12) A device shall be installed on a friction hoist to synchronize the position of the shaft conveyance with the safety devices driven from the hoist drum.
- Ammeter on hoist.
- Audible warning device.
- Speed indicator.
- Voltage meter.
- Backout device.
- Underwind bypass device.
- Overwind protection.
- (13) Every electric hoist shall have the following:-
- (a) an ammeter within plain view of the hoist operator to indicate the hoist motor current;
 - (b) except where automatic retardation controls are installed at the limits of travel, a device to audibly warn the hoist operator when the shaft conveyance is at a point in the shaft where manual breaking must be commenced;
 - (c) a speed indicator if the normal rope speed exceeds 2.5 meters (25 feet) per second;
 - (d) a device which gives a voltage reading proportional to the speed of the hoist;
 - (e) a backout device to enable a shaft conveyance to be removed from an overwound or underwound position and the device shall only be capable of manual operation and designed to prevent the brakes from being released until sufficient torque has been developed to ensure movement in the right direction;
 - (f) underwind and overwind bypass devices arranged

so that they are only capable of manual operation and will only allow the hoist to be operated at a slow speed;

(g) overwind devices arranged so that they will only allow travel beyond the first device providing overwind protection;

Master controller.

(h) a master controller that has a neutral or brake reset position;

Brake lever arrangements.

(i) brake operating levers arranged so that, after any interruption of the hoist safety circuit, power cannot be restored to the hoist unless the brake levers are in the brake-applied position; and

Depth and other indicators.

(j) accurate and sensitive safety controllers.

(14) A hoist shall be provided with depth indicators that continuously, accurately and clearly show the hoist operator:-

(a) the position of a shaft conveyance;

(b) a change in gradient in an inclined shaft;

(c) the overwind, underwind and track limit switches;

(d) any collar doors, dump doors or crosshead landing chairs; and

Maximum layers of rope on drum.

(e) the limits of normal travel for the shaft conveyance.

(15) No drum hoist shall have:-

- Fleet angle for sheave/hoist.
- (a) more than 3 layers of rope where the drum has helical or spiral grooving or does not have grooving;
- (b) more than 4 layers of rope if the drum has parallel and half pitch grooving; and
- (c) no less than 3 turns of rope on the drum when the conveyance is at its lowest possible point in the shaft.
- Interlocking clutch and brake.

(16) A drum hoist and sheave shall be arranged so that the rope coils properly across the face of the drum and winds smoothly from one layer to another without cutting into the rope layer beneath.

Shaft conveyance signals.

(17) A clutch of a drum hoist shall be interlocked with the brake so that the clutch can be disengaged only when the brake is fully applied and so that the clutch is full before the drum can be released.

Signalling system power.

110. (1) A signalling system acceptable to the inspector shall be installed to permit the person in charge of the shaft conveyance (cage tender) and the hoist operator to exchange control signals.

Signalling system standards.

(2) The signalling system shall be supplied with power at a potential not exceeding 150 volts from a transformer that does not supply any other equipment.

Only tenders to give signals.

(3) The signal system shall enable clear, audible signals to be given that are separate and distinct for each compartment so arranged that the hoist operator can return a signal to the conveyance tender and be installed at every working level, landing deck and any other necessary locations.

Hoist only moved on signals.

(4) Only the conveyance tenders shall give any signal other than a danger signal.

Voice communication system required.

(5) A hoist shall not be moved unless the signal given by the conveyance tender has been returned by the hoistman and at least 4 seconds have elapsed. If more than 30 seconds have elapsed, a complete new set of signals shall be given and acknowledged.

Persons and ore not to be transported simultaneously.

(6) A system shall be installed and maintained for voice communication between the landing stations, the shaft collar, and the hoistroom.

Qualified conveyance tender.

111. (1) No person shall be transported in a shaft conveyance that is simultaneously being used to transport ore, rock or other material, or when the cage doors are open.

(2) There shall be a qualified person in charge of the conveyance who shall maintain discipline when persons are being transported, and who shall enforce the specified load limits and notify the hoist operator if a heavy or irregularly-shaped load is being handled.

Persons and explosives not hoisted together.
Load restrictions posted.

(3) No person shall be transported in a shaft conveyance that is carrying explosives, supplies or rolling stock.

Securing projecting materials.

(4) A notice clearly showing the load restrictions for the shaft conveyance shall be posted at the shaft collar as well as at all entrances to the shaft.

Protection for shaft workers.

(5) When any material that is being transported projects above the top of the conveyance, the projecting portion shall be securely fastened to the shaft conveyance and not to the hoist rope.

Skip door controls.

(6) No person shall work in a shaft or in that part of a headframe used by the conveyance, unless that person is adequately protected from accidental contact with a moving conveyance or falling rock.

Automatic hoisting.

(7) The skip loading box shall not be equipped with doors, gates or chains which are closed by positive compressed air pressure.

Hoistman to check brakes.

(8) Where a hoist is being operated automatically and no other means are available for removing persons from the mine quickly, a qualified hoist operator shall be available to operate the hoist, if required.

Hoistman to make test trip.

(9) After going on shift and before raising or lowering a shaft conveyance, the hoist operator shall ensure that each drum brake is capable of holding its maximum permitted load by testing it against the normal, full load starting torque of the hoist.

No talking to hoist operator at the controls.

(10) A hoist operator shall make a return trip of the shaft conveyance through the working part of the shaft after any stoppage of hoisting for more than two hours, and below any part of a shaft that has been under repair.

Leaving a stalled shaft conveyance.

(11) A hoist operator shall remain at the controls at all times that the hoist is in motion under manual control; shall not talk to anyone while the hoist is in motion; and whenever the operator leaves the controls, he shall set the brakes and the controls so that two separate and distinct actions are required to put the hoist in motion.

Hoisting procedures.

(12) No person shall leave a shaft conveyance that has inadvertently stopped at a point in the shaft other than a landing, except upon the instruction of a qualified person outside the conveyance.

Hoisting signals required.

(13) The manager shall prepare written procedures, acceptable to the Inspector, for the safe operation of the hoist, and shall ensure that the hoist operator is instructed in the procedures, which shall include operating the hoist when there is an intermediate obstruction; emergency procedures; commencing operation after an inadvertent stoppage of the hoist; and the operation of any man safety devices.

Hoist operator's entries into logbook.

(14) The hoist operator shall not move a shaft conveyance without receiving a proper signal unless the conveyance has been inadvertently stopped

at a point in the shaft other than a station from which signals can be given.

112. (1) The hoist operator shall at each shift, enter in the logbook the working condition of the hoist brakes, clutches, clutch-brake interlocks, depth indicators, hoist controls, signalling systems, overwind and underwind devices, any other safety devices; any instructions received and any unusual circumstances that occurred with the normal operation of the hoist; any inadvertent stoppages; and the results of any test trips made.

Test results in logbook.

Daily hoist rope examination.

(2) All of the test results, and other pertinent data on a hoist rope shall be entered in the logbook.

Shaft inspection.

(3) At least once in each day, an inspection shall be carried out of the exterior of each hoisting rope to detect the presence of kinks or other visible defects and to note the condition of the rope dressing, and also the cage safety catches for any visible damage or defects.

(4) At least once each week, an inspection shall be carried out of all shaft conveyance safety mechanisms for proper adjustment; freedom of movement or damage; all head, deflection and idler sheaves; shafts and their bearer and sole plates; all rope attachments, shaft conveyance attachments and suspension gear; all parts of the hoist that could affect its normal operation including the brakes, clutches, interlocks, depth indicators and safety devices; and any auxiliary brake operating weights.

Friction hoist inspection.

Inspection of drum attachments.

(5) At least once each month, an inspection shall be carried out of the shaft ropes to determine the amount of wear, distortion and corrosion; the need for lubrication; and the friction treads on a friction hoist.

Annual conveyance inspection.

(6) At least once every six (6) months, an inspection shall be carried out on the hoisting rope on a drum hoist within the attachments at the drum, and at the drum spout, and the hoisting rope of a friction hoist within the attachments at the counterweight and shaft conveyance.

Cutting and testing friction hoist ropes.

(7) At least once every twelve (12) months, an inspection shall be carried out of the foundation bolts, bolt locking devices and all other bolts and fastenings critical to hoist safety, as well as inspecting the bails, the suspension gear, and structural components of each shaft conveyance.

Shaft inspection.

(8) After every eighteen (18) months of service on a friction hoist, the portion of the hoisting rope or tail rope that is within a wedge and socket attachment shall be cut off unless a qualified person has visually examined that portion of the rope and has not found any broken wires, significant corrosion, or pitting or any deformation of the wires.

Recording inspections.

(9) A qualified person shall carry out an examination at least once each week of each mine shaft; at least once each month of the shaft guides, timbers, walls and hoisting compartments; at least once each year of the headframe, headframe foundation and back legs, sheave decks, dumps, bins, and bin supports.

Workplace contaminants.
Maximum exposure concentrations.

(10) The results of each inspection or examination of the hoisting system shall be recorded in the logbook kept for that purpose.

PART XIII **INDUSTRIAL HYGIENE**

Exposure limits for extended hours of work.

113. (1) No person shall be exposed to airborne concentrations of chemical or physical agents in excess of the concentrations specified in the Threshold Limit Values and Biological Exposure Indices published by the American Conference of Governmental Industrial Hygienists and as amended periodically.

Monitoring workplace contaminants.

(2) When shifts longer than 8 hours are being worked, the time weighted average (TWA) concentration of airborne contaminants shall be reduced to 50% of the TWA for an eight (8) hour shift.

Minimum oxygen content.

(3) The manager shall establish a written program, acceptable to

the Inspector, for a qualified person to monitor workplace contaminants to ensure compliance with the established exposure maximums.

Storage of hazardous materials.

(4) No person shall work or remain in a mine when the oxygen content is less than 18% oxygen unless they are provided with an alternate air supply.

114. The manager shall develop and implement an effective housekeeping program to ensure that all workplaces and travelways are maintained in a safe condition; that materials and equipment are stored in a safe manner so as not to endanger persons; and that appropriate action is taken whenever necessary to maintain a hazard-free environment.

Hazardous materials and waste. Spray asbestos.

115. (1) The manager shall ensure that spraying of asbestos, or material containing more than 1% asbestos is prohibited, and that protective clothing and equipment made of material containing asbestos is used in such a manner as to prevent the release of asbestos fibers.

Ventilation and notices for hazardous materials.

(2) The manager shall ensure that all dangerous or potentially hazardous materials are stored in designated storage areas acceptable to the Inspector and such materials shall be clearly identified by signs, placards, or similar devices, and shall be well-ventilated to prevent any accumulation of dangerous fumes. The hazardous materials shall be arranged so that incompatible materials which could produce a harmful reaction if combined, are adequately separated.

Hazardous materials containers.

(3) All dangerous or potentially hazardous materials shall be stored in containers that are designed, constructed and maintained in such a manner as to ensure proper containment of their contents under the environmental conditions in which they are stored, and shall be kept sealed or covered when not in use, and arranged so that they cannot be dislodged, fall, or suffer other damage.

Flammable waste storage.

(4) Waste materials which could be detrimental to a person's health, or which could cause a fire or explosion, while awaiting disposal, shall be stored in impervious containers, and labelled to clearly identify the contents and the

Cleaning up spills. nature of the hazard.

(5) Where the contents are flammable or capable of producing vapours or gases, the containers shall be covered and located in well-ventilated areas.

Protection from infrared and ultraviolet radiation.

(6) Spills or release of hazardous waste materials shall be cleaned up as soon as possible by persons trained to safely handle the waste material. Such persons shall wear any necessary protective clothing and equipment to safeguard their health and safety.

Precautions when painting.

(7) The manager shall ensure that equipment that emits harmful levels of infrared or ultraviolet radiation is shielded to protect employees from exposure to such radiation and the manager shall supply personal protective equipment to any person who could become exposed to harmful radiation levels.

Eyewash and water baths to be provided.

(8) Where paints, protective coatings, adhesives or insulating materials containing isocyanate compounds or other compounds that have similar sensitizing effects are being applied, persons shall be protected from airborne contaminants by performing the work in an isolated enclosure having sufficient exhaust ventilation and that persons exposed are supplied with and use, an air-supplied respirator.

Contaminated clothing.

116. (1) Where persons may be exposed to corrosive or other chemicals harmful to the eyes or skin, the manager shall ensure that body areas are protected from such chemicals and that eyewash equipment, emergency water baths or showers, or other suitable means are immediately available to effectively cleanse the affected body areas.

Personal hygiene when handling contaminants.

(2) Where the nature of the work causes a person's clothing or skin to be contaminated with substances which could cause injury to, or endanger the health of the person or contaminate other areas on or off the minesite, the manager shall provide shower or wash facilities to enable workers

to effectively remove all contaminants and provide separate storage areas for street and work clothing.

(3) A person exposed to contaminants shall:-

(a) cleanse the affected skin areas as soon as practicable;

(b) not consume or handle food or tobacco products until the hands and face are free of contamination; and

Maximum noise levels.

(c) ensure that contaminated clothing is not worn home.

117. Any machinery or equipment which, when operating, exposes the operator or persons in the vicinity to noise levels in excess of 85 decibels shall either be fitted with a properly maintained muffler or other noise reducing device, or persons exposed to the noise shall be supplied with adequate hearing protection.

Emergency lighting.

118. (1) The manager shall ensure that there is a separate independent emergency source of illumination at all places where a hazard could be caused by the failure of the normal lighting system. The emergency system shall turn on automatically when the normal lighting system fails, and shall provide adequate illumination to allow employees to initiate emergency shutdown procedures and leave their work areas safely.

Testing emergency lighting.

Cap lamp standards.

(2) The emergency lighting system shall be tested at least once each month to ensure that it will function when required.

(3) The manager shall provide every person entering an underground mine with an approved cap lamp capable of providing illuminance of at least 1500 lux at 1.2 meters (4 feet) from the light source, throughout the working shift.

Drinking water provided.

Lunchroom provided and standards.

119. (1) The manager shall provide a source of cool, potable drinking water which complies with drinking water standards, in locations that are reasonably accessible to workers. The locations shall be clean and in a sanitary condition and shall be designed to permit the water to be dispensed and drunk in a sanitary manner.

(2) Where seven (7) or more persons congregate to eat food, a lunchroom shall be provided which:-

(a) is lighted and ventilated

(b) is near facilities for workers to wash with running hot and cold water and dry their hands;

Lunchroom location.

(c) shall contain fire retardant receptacles with lids for the disposal of waste food and paper; and

Shower facilities.

(d) have seating facilities and tables with impervious tops that are maintained in a sanitary condition.

(3) Lunchrooms shall be located in an area away from process chemicals and contaminants.

Changehouse location and standard.

(4) The manager shall provide separate facilities for male and female workers to wash, shower and to change and dry their work clothing at a surface mine where they are subject to dusty, dirty or wet conditions, and at all underground mines.

Toilet facilities.

(5) A mine changehouse shall not be located in a headframe, boiler room, engine room, bunk house or dining room, and the changehouse shall be adequately lighted, ventilated, heated, kept clean and sanitary and have at least one shower for every seven (7) persons leaving work at the same time.

Toilet location and conveniences.

(6) The manager shall provide separate toilet facilities for male

and female workers which shall have separate entrances and signs clearly indicating for which gender they have been provided. Underground toilets.

(7) The toilet facilities shall be conveniently located and equipped with sufficient toilets and sinks that are maintained in a sanitary condition for the number of workers in the work area. Faeces underground prohibited.

(8) Toilets in an underground mine shall be conveniently located in well-ventilated areas, supplied with toilet paper and be maintained in a hygienic condition. Labelling hazardous substances.

(9) No person shall deposit faeces in any place in an underground mine other than in a toilet.

120. The manager shall ensure that no hazardous material is used, stored, or handled at a mine unless the relevant containers are properly labelled, that material safety data sheets are available on site and that workers who must handle or use the products are informed of hazards and the appropriate first aid treatment. Offence and penalty.

PART XIV **OFFENCES AND PENALTIES**

121. Every person who contravenes or fails to comply with any of the provisions of these Regulations, commits an offence and shall be liable on summary conviction to a fine of five hundred dollars or to imprisonment for a term not exceeding six months or to both such fine and imprisonment. Savings in respect of other offences.

122. Where an act or omission which constitutes an offence under these Regulations is also an offence under any other law, nothing in these Regulations shall affect the operation of such other law and the accused person may be charged and tried under such other law, notwithstanding the provisions of these Regulations.

MADE by the Minister of Natural Resources this 5th day of April, 1994.

(EDUARDO JUAN)

Minister of Natural Resources

Minister Responsible for Mines and Minerals