

GOVERNMENT OF ZAMBIA

STATUTORY INSTRUMENT NO. 85 OF 2008

The Mines and Minerals Development Act
(Act No. 7 of 2008)

**The Mines and Minerals Development
(Prospecting, Mining and Milling of Uranium Ores
and Other Radioactive Mineral Ores) Regulations, 2008**

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IN EXERCISE of the powers contained in section *one hundred and sixty-one* of the Mines and Minerals Development Act, 2008, the following Regulations are hereby made:

PART 1
PRELIMINARY

Title	1. These Regulations may be cited as the Mines and Minerals Development (Prospecting, Mining and Mining of Uranium Ores and Other Radioactive Mineral Ores) Regulations, 2008.
Interpretation Act No. 7 of 2008	2. In these Regulation, unless the context otherwise requires— “Act” means the Mines and Mineral Development Act, 2008; “background” radiation” means radiation of man=s natural environment originating primarily from the naturally radioactive elements of the earth and from the cosmic rays; “Becquerel (Bq)” means the Systeme Internationale (SI) unit of measurement of radioactivity defined as one radioactive disintegration per second; “competent authority” means any national or international regulatory body or authority designed or otherwise recognised as such for purposes of the Regulations; Act No. 16 of 2005 “concentrate” means an extracted product that contains uranium and that results from the physical or chemical separation of uranium from ore; “contamination” means radioactive material deposited or dispersed in material or places where it should not be; “curie (Ci)” means the basic unit used to describe the intensity of radioactivity in a sample of material and equals thirty seven billion disintegration per second, or appropriately the radioactivity of one gram of radium; “Director” means the Director of Mines appointed under section <i>one hundred and forty-four</i> of the Act; “dose means a general term denoting the quantity of radiation or energy absorbed in a specific mass; “effective dose” has the meaning assigned to it in the Ionizing Radiation Protection Act, 2005; “Emergency Preparedness Plan” means a plan formulated by a holder to enable the holder to deal with unexpected occurrences and circumstances during operations;
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- “Environmental Council of Zambia” has the meaning assigned to it in the Environmental Protection and Pollution Control Act; Cap. 204
- “holder” means the person in whose name a mining right is registered;
- “ionizing radiation” means electromagnetic or corpuscular emission from radioactive material capable place of, other applicable laws and regulations.
- “manager: means a person appointed by the holder and approved by the Director of Mines Safety to manage the exploration, mining or milling operations in accordance with the Act;
- “mill” means a mineral processing facility at which ore is processed and treated for the recovery of uranium concentrate, including any tailings-handling and water treatment system associated with the facility;
- “mineral processing” has the meaning assigned to it under the Act;
- “mining right” has the meaning assigned to it in the Act;
- “Quantitative Radiological Hazard and Safety Assessment” means the identification and determination of the dangers of radioactive emission relating to safety, health and the environment;
- “Radiation Hazard Assessment” means the identification of health, safety and environment dangers arising out of radioactive emissions and the proposed intervention measures;
- “Radiation Operation Management Protection Plan” means a plan that set out measures to safeguard employees, the public and the environment against exposure to radiation during operations;
- “Radiation Protection Authority” has the meaning assigned to it in the Ionising Radiation Protection Act, 2005; Act No. 16 of 2005
- “radioactive material” has the meaning assigned to it in the Ionising Radiation Protection Act , 2005; Act No. 16 of 2005
- “radioactive waste” means material which are radioactive and for which there is no further use; and
- “Waste Management Plan” is a plan to manage all unwanted materials generated during prospecting, mining and milling operation.

- Scope
3. (1) These Regulations shall regulate the mining industry in the exploration, mining, processing, storage transportation, acquisition and exportation of uranium and other radioactive minerals in accordance with the Act and shall enhance radiological safety, security and environment protection.
- (2) Nothing in these Regulations shall be construed as relieving any employer or other person from complying with any applicable law governing safety, health and the protection of the environment.
- (3) The requirements of these Regulations are in addition to, and not in place of, other applicable laws and regulations.

PART II

PROSPECTING FOR, MINING AND MILLING OF URANIUM AND OTHER RADIOACTIVE MINERALS

- Prohibition of prospecting etc for uranium or other radioactive mineral without authorisation
4. (1) Subject to the other provisions of these Regulations, a person shall not prospect, mine, mill or engage in any related activities for the exploitation of uranium or any other radioactive mineral unless that person is authorised to do so in accordance with these Regulations.
- (2) A person shall not be authorised to prospect, mine, mill or engage in any related activities for the exploitation of uranium or any other radioactive mineral unless that person—
- (a) is in possession of the appropriate mining right obtained under the Act;
 - (b) conforms to standards for the management of the environment as provided for in the Act, the Ionising Radiation Protection Act, 2005, the Environmental Protection and Pollution Control Act and any other law relating to prospecting, mining, milling, transporting or storage of uranium and other radioactive mineral; and
 - (c) undertakes in writing not to directly or indirectly contribute to the production of nuclear weapons or nuclear weapons device in accordance with the provisions of the Seventh Schedule to these Regulations. Application for licence to prospect for, mine or process uranium and other radioactive minerals.
- Application for licence to prospect for, mine or process uranium and other radioactive minerals
5. (1) An application for a licence to prospect for, mine or process uranium or other radioactive minerals shall be made in accordance with the provisions of the Mines and Minerals

Development (General) Regulations, 2008.

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2008

(2) An application for a permit to acquire, store, transport or export radioactive minerals shall be made in accordance with the provision of the Mines and Minerals Development (General) Regulations, 2008.

6. A holder of a prospecting licence or prospecting permit for uranium or other radioactive mineral shall not conduct any prospecting work or other related activity unless the holder submits to the Minister and the Radiation Protection Authority, for approval, the following plans:

Prospecting
for uranium
or other
radioactive
mineral

- (a) a Radiation Operation Management Protection Plan in accordance with the First Schedule to these Regulations;
- (b) a Radioactive Waster Management Plan in accordance with the Second Schedule to these Regulations; and
- (c) a Plan to Transport and Store Radioactive Ores and Products in accordance with Third Schedule to these Regulations.

7. (1) A holder of a mining right shall not conduct any mining operation for uranium or other radioactive minerals unless the holder—

Mining
uranium or
other
radioactive
minerals

- (a) submits to the Minister, for approval, the following plan;
 - (i) a Radiation Operation Management Protection Plan in accordance with the First Schedule to these Regulations;
 - (ii) a Waste Management Plan in accordance with the Second Schedule to these Regulations;
 - (iii) a plan to transport and store radioactive ores and products in accordance with the Third Schedule to these Regulations;
 - (iv) a Quantitative Radiological Hazard and Safety Assessment in accordance with the guidelines set out in the Fourth Schedule to these Regulations; and
 - (v) a detailed mine water management plan for both natural and mine water on-and off-site;
- (b) submits to the Minister for approval, project description which shall include, but not be limited to the following:
 - (i) a scope of activities;
 - (ii) a site plan with coordinates;
 - (iii) a physical security plan; and

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(iv) an occurrence and incident reporting plan; and

(c) obtains the necessary authorisation under the Ionising Radiation Protection Act, 2005, the Environmental Protection and Pollution Control Act, and any other relevant law.

(2) The Director of Mines Safety shall, in consultation with the Environmental Council of Zambia, review annually the mine water management plan submitted in accordance with sub-paragraph (v) of paragraph (a) of sub-regulation (1).

Construction
of mill and
conduct of
milling
operations

8. (1) A holder of a mining right of mineral processing licence shall not construct a mill unless the holder submits to the Minister, for approval, a description of the mill and concentrate recovery.

(2) The description of the mill and concentrate recovery referred to under sub-regulation (1) shall include—

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(a) a description of the proposed design of the mill;

(b) the proposed construction schedule and the contingency plans for construction;

(c) a description of the components, systems and equipment proposed to be installed at the mill, including their design operating conditions;

(d) the results of the process-hazard analysis and a description of how the results have been taken into account;

(e) the proposed milling methods and programs;

(f) a description of all proposed laboratory facilities and programs;

(g) the proposed commissioning plan for the components, system and equipment to be installed at the mill; and

(h) a detailed mill water management plan for both natural and mill water on-and off-site.

(3) A holder of a mining right or mineral processing licence shall, before conducting any milling operation for uranium or other radioactive minerals, prepare and submit for approval to the Minister, the following plans:

(a) a Radiation Operation Management Protection Plan in accordance with the First Schedule to these Regulations;

(b) a Waste Management Plan in accordance with the Second Schedule to these Regulation; and

(c) a Quantitative Radiological Hazard and Safety Assessment in accordance with the Fourth Schedule to these Regulations.

(4) A holder to whom this regulation applies shall—

- (a) develop a Waste Management Plan in accordance with the appropriate technology in order to manage the following:
- (i) radioactive waste;
 - (ii) mill tailings;
 - (iii) sub-economic materials;
 - (iv) non-radioactive waste; and
 - (v) waster water;

to minimise environmental pollution and degradation;

- (b) demonstrate to the Radiation Protection Authority, the Mines Safety Department and the Environmental Council of Zambia that the radioactive waster management facilities are constructed in accordance with approved designs and the operational procedures are in place prior to commissioning the facilities; and
- (c) operate the facilities referred to in paragraph (b) for such period as the Radiation Protection Authority, the Mines Safety Department and the Environmental Council of Zambia shall determine for purposes of assessing the performance of the facilities.

(5) The institutions referred to in paragraph (b) of sub-regulation (4) shall, where the institutions are satisfied with the performance of the radioactive waste management facilities, approve the facilities to be used for routine mine or mill operations based on an approved monitoring and surveillance program.

(6) A holder shall inform the Radiation Protection Authority, the Mines Safety Department and the Environmental Council of Zambia of—

- (a) any changes to be operation which may alter the nature or quantity of radioactive waste;
- (b) any proposal to change the waste containment system; and
- (c) any unanticipated circumstances that may affect the performance of the Waste Management Plan.

(7) A holder shall ensure that the Waste Management Plan has a monitoring program to—

- (a) verify the effectiveness of the engineering design;
- (b) validate models and predictions; and
- (c) demonstrate compliance with discharge limits, operational discharge limits and operational discharge procedures.

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of 2005

(8) The Control of occupational health and public safety shall be done in accordance with the First and Second Schedule to these Regulations and the provisions of the Ionizing Radiation Protection Act, 2005.

(9) The Director of Mines Safety shall, in consultation with the Environmental Council of Zambia, review annually the mill water management plans submitted under paragraph (i) of sub—

Radioactive
mine waste
and tailings
impounded
S.I. No. 28 of
1997
S.I. No. 29
of 1997
S.I. No. 104
of 1997

9. A holder shall develop and implement an environmental management plan in accordance with the provisions of the Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations, 1997, Mines and Minerals, (Environmental) Regulations, 1997 and the Mines and Minerals (Environmental Protection Fund), 1998.

Prospect,
mine and mill
de-
commissioning,
closure and
abandonment

10. A holder shall store all contaminated equipment and materials in a secured and fenced area and shall ensure that at all times the area has appropriate warning indicating the levels of radioactive hazards present in the area and displayed in conspicuous locations.

11. (1) A holder who intends to abandon a mine or mill site shall apply to the Director in accordance with the Sixth Schedule to these Regulations and shall submit to the Minister, for approval, a closure environmental impact assessment, an update mine decommissioning plan, a closure environmental impact assessment and an updated environmental management plan.

(2) A holder shall, where the holder anticipates the closure of a mine or mill, prepare and submit to the Minister, for approval, a

Quantitative Radiological Hazard Analysis in accordance with the Fifth Schedule to these Regulations.

(3) The requirement of the Ionizing Radiation Protection Act, 2005, apply to this regulation. Act o. 16 of 2005

(4) The Director shall, where satisfied that all abandonment requirements have been complied with, issue an abandonment certificate.

12. A holder shall transport and store any uranium ores, concentrates and other radioactive materials in accordance with the provisions of the Third Schedule to these Regulations. Transportation and storage of uranium and other radioactive minerals

13. (1) A person shall not acquire, sell or export uranium or any radioactive mineral except under and in accordance with the terms and conditions of an approval granted by the Minister under the Act. Marketing of uranium and other radioactive minerals

(2) A holder who acquires, sells or exports any uranium concentrate or any other radioactive minerals shall—

- (a) provide documentation to the Radiation Protection Authority on the source of the uranium concentrate or radioactive minerals and to prove the authenticity of the receiving agent and end-user in order to satisfy the provision of the Nuclear Non-Proliferation Treaty set out in the Seventh Schedule to these Regulations; and
- (b) report to the Radiation Protection Authority and Mines Safety Department any internal movements of the substances in order to safeguard public health and safety.

14. (1) A holder shall monitor the implementation of the approved Radiation Operation Management Protection Plan and make available all records on demand by an authorised inspector from the Mines Safety Department, the Radiation Protection Authority, the Environmental Council of Zambia and any other authorised agency. Inspections and monitoring

- (2) A holder shall formulate and implement a quality management system to cover all operations at the mine or mill site.
- Appointment of radiation protection officer
15. (1) A manager shall appoint a competent person as a radiation protection officer whose qualifications and experience shall be subject to the approval of the Director of Mines Safety and the Radiation Protection Authority.
- (2) Any appointment made under sub-regulation (1) shall not relieve a manager of the manager's responsibilities under these Regulations.
- Penalty
- Act No. 7 of 2008
16. A person who contravenes any provision of these Regulations is liable to the penalties specified in the Act.

FIRST SCHEDULE

(Regulation 6, 7 (1) and (8))

RADIATION OPERATION MANAGEMENT PROTECTION PLAN AND RADIATION HAZARD ASSESSMENT

PART I

RADIATION OPERATION MANAGEMENT PROTECTION PLAN

- Radiation Operation Management Protection Plan
1. A holder shall develop and implement a Radiation Operation Management Protection Plan with periodic reviews, evaluations and modifications necessary to ensure adequacy of resources and effectiveness.
- Development of Plan
2. A Radiation Operation Management Protection Plan shall include—
- (a) the sources of exposures;
 - (b) the control measures;
 - (c) a record of monitoring;
 - (d) estimates of costs to implement the management plan;
 - (e) education and training; and
 - (f) reporting and record keeping.
- Sources of exposure
3. A Radiation Operation Management Protection Plan shall—
- (a) identify all significant exposure sources and pathways and
 - (b) include plans of the mine or mill, descriptions of the equipment to be used and processes involved and estimates of the radionuclide concentrations in the process stream.

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| <p>4. A Radiation Operation Management Protection Plan shall—</p> <p>(a) describe the measures to be implemented to control radiation exposures; and</p> <p>(b) include provision of engineering design for ventilation, dust or fume control for approval and shielding .</p> | Control measures |
| <p>5. (1) A holder shall submit for approval a monitoring plan to the Radiation Protection Authority, the Mines Safety Department and the Environmental Council of Zambia.</p> <p>(2) The monitoring plan referred to under sub-paragraph (1) shall—</p> <p>(a) comply with regulatory limits such as radiation doses received by individuals or groups; and</p> <p>(b) provide information on the effectiveness of the engineering and procedural control measures.</p> | Monitoring |
| <p>6. A holder shall provide estimates of radiation exposures or doses that arise from the operation in order to determine the adequacy of the proposed control measure.</p> | Dose estimates |
| <p>7. A holder shall provide appropriate education and training of staff on a continuous basis in the radiation protection aspects of the operations, first aid and general safety.</p> | Education and training |
| <p>8. (1) A Radiation Operation Management Protection Plan shall include provisions for reporting the results of the monitoring program and related information.</p> <p>(2) A holder shall provide monthly reports to the Radiation Protection Authority, the Mines Safety Department and other relevant regulatory authorities.</p> | Reporting and record keeping |
| <p>9. (1) A holder shall retain records of monitoring results, dose assessments, calculation methods and related information in a manner that shall allow them to be retrieved. These records shall be available for inspection by relevant regulatory authorities.</p> <p>(2) The records referred to under sub-paragraph (1) shall be submitted to the Radiation Protection Authority and the Mines Safety Department annually.</p> <p>(3) A holder shall develop and maintain appropriate measures to preserve the records at the close of a project in accordance with the requirements of the Act and other relevant laws.</p> | Record of monitoring |
| <p>10. A Radiation Operation Management Protection Plan shall include a commitment to provide adequate resources and staff with appropriate qualifications and experience.</p> | Personnel and resources |
| <p>11. A Radiation Operation Management Protection Plan shall be integrated into occupational health and safety programs and the operation as a whole.</p> | Integration into operations and programs |

- Quality assurance 12. A holder shall implement a quality assurance program which is in compliance with national and international standards.
- Calibration 13. A Radiation Operation Management Protection Plan shall include schedule and measures for calibration of equipment used in monitoring which shall conform with national and international standards.
- Auditing 14. A system of auditing to check the performance of a Radiation Operation Management Protection Plan shall be implemented and shall include both internal and external auditing.
- Auditing 15. (1) A Radiation Operation Management Protection Plan shall be reviewed and assessed periodically to achieve continual improvement in radiation protection.
- (2) The review referred to under sub-paragraph (1) shall include review of—
- (a) the doses;
 - (b) trends over time for both the operation as a whole and smaller areas or working groups;
 - (c) the monitoring plan to ensure that frequencies and techniques remain appropriate; and
 - (d) administrative procedure and work practices.
- Accidents 16. A holder shall report any radiological accidents within twelve hours of the incident to the Radiation Protection Authority and the Mines Safety Department and take appropriate steps to remedy the situation and prevent the recurrence of the accident.

PART II

RADIATION HAZARD ASSESSMENT

- General requirements 17. (1) A mining right or licence shall be granted on condition that the holder conducts a radiation hazard assessment of the operation and activities involving radioactive material.
- (2) The assessment referred to under sub-paragraph (1) shall identify the following:
- (a) potential radiological hazards associated with prospecting mining and milling radioactive materials;
 - (b) the effectiveness of the engineered and operational controls; and
 - (c) determination of the magnitude of the radiological hazards from both normal operations and potential accidents to workers and the public.

18. (1) A holder shall make a radiological safety assessment of the prospecting, mining, milling, storage and transportation operation of radioactive materials. Radiological safety assessment

(2) The main elements of the assessment referred to under subparagraph (1) shall be the following—

- (a) identification and qualification of the prevailing levels of different radiological hazards;
- (b) identification of areas where the potential for radiation exposure of workers may result in an effective dose exceeding 1mSv per year;
- (c) identification of individuals who may be occupationally exposed to ionizing radiation and receive an annual effective dose in excess of 1mSv;
- (d) determination of the effective dose received by occupationally exposed individuals;
- (e) determination of the potential for radiation exposure of members of the public due to airborne and liquid effluent releases from the site and arising from the disposal of radioactive waste.
- (f) assessment of the efficiency and effectiveness of the engineered and operational controls; and
- (g) estimation of the magnitude of the risks resulting from accidents whether on-site or off-site;

19. (1) As a minimum, a radiological hazard assessment shall— Radiological hazard assessment

- (a) identify the various types of radioactive material present in the complete process and determine their physical and chemical form, nuclide composition, activity concentrations, and estimate total quantities to be mined and milled per annum;
- (b) identify local concentrations of radioactive material in the mining and milling operations;
- (c) identify and quantify the radioactive doses to workers and members of the public who may have been exposed to radiation;
- (d) qualify the mean levels and variations of the radiological hazards during full working shifts and determine the magnitude of longer term fluctuations;
- (e) identify individuals occupationally exposed to radiological hazards;
- (f) quantify the degree of individual occupational exposure in terms of the annual dose equivalent received from all radiation exposure pathways, for routine, maintenance and repair operations;

- (g) qualify the impact of radioactive emissions from the site in terms of the annual effective dose received by the public;
- (h) collect appropriate data on parameters which impact on the extent and magnitude of radiological hazards, such as ventilation flow rate and patterns underground, the efficiency of ventilation and dust control practices, working practices and their impact on levels of radiological hazard;
- (i) assess the transportation of final products and by-products in terms of the potential occupational radiation exposure of workers and the public;
- (j) assess the effectiveness of the cleaning up of spillage;
- (k) qualify the amount of radiation from materials and equipment released from mining and milling facilities; and
- (l) the effectiveness of personal protection equipment.

(2) The following exposure pathway shall be quantitatively assessed at specified locations—

- (a) exposure to short lived Rn-222 (radon) and Th-220 (thorium) daughter products in air;
- (b) exposure to external radiation (beta-gamma dose rate);
- (c) exposure to long live alpha emitting nuclides in air;
- (d) surface contamination levels (alpha and beta emitters) in surface work;
- (e) contaminated scrap; and
- (f) radon gas concentrations under ground

20. (1) A holder shall submit an Emergency Preparedness Plan to the Director of Mines Safety and the Radiation Protection Authority for approval which will be reviewed annually.

(2) An Emergency Preparedness Plan shall be prepared according to the following guidelines.

- (a) emergency plans shall be prepared for any practice or source which could give rise to a need for emergency intervention;
- (b) regulatory authorities shall be involved in the preparation of emergency plan, as appropriate;
- (c) the content, features and extent of emergency plan shall take into account the results of any accident analysis and any lesson learned from operating experience and from accidents that have occurred with sources of a similar type;

- (d) emergency plans shall be annually reviewed and updated;
 - (e) provision shall be made for training personnel involved in implementing emergency plan and the plan shall be rehearsed at suitable intervals in conjunction with designated authorities; and
 - (f) prior information shall be provided to members of the public who could reasonably be expected to be affected by an accident.
- (3) An Emergency Preparedness Plan shall include—
- (a) the allocation of responsibilities for notifying the relevant authorities and for initiating intervention;
 - (b) the identification of the various operation and other conditions of the source which would lead to the need for intervention;
 - (c) intervention levels for the relevant protection actions and the scope of their application, with account taken of the possible degree of severity of accidents or emergencies that could occur;
 - (d) procedures, including communication arrangements, for contacting any relevant intervening organisation and for obtaining assistance from fire-fighting, medical, police and other relevant organisations;
 - (e) a description of the methodology and instrumentation for assessing the accident and its consequences on-and off-side;
 - (f) a description of the public information arrangements in the event of an accident;
 - (g) the criteria for terminating each protective action; and
 - (h) the holder=s plans to contain any radiation arising from incidents or accidents in transit and to receive back the holder=s consignment.
- (4) A holder shall ensure that adequate provision is made for generating sufficient information promptly and communicating it to responsible authorities with regard to—
- (a) the early prediction or assessment of the extent and significance of any accidental discharge of radioactive substances to the environment;

(b) rapid and continuous assessment of the accident as it proceeds; and

(c) determining the need for protective actions.

(5) A holder shall ensure that sufficient financial arrangements are made, including appropriate levels of insurance, to contain any emergency situation.

SECOND SCHEDULE

(Regulation 6, 7 (1), 8(6) and 8(8))

WASTE MANAGEMENT PLAN

General
requirements

1. A holder shall develop a Waste Management Plan which includes proposals for radioactive waste management in relation to—

(a) a description of the mine and mill facilities and resources;

(b) a description of the baseline environmental conditions;

(c) operating, environment, geo-technical and radiation dose assessment procedures;

(d) a description of the operation and the processes generating waste;

(e) the chemical and physical characterisation of radioactive waste, include the quantities and rate of production;

(f) the heritage, social and cultural matters and the proposed present and future land use;

(g) the waste management facilities and practices, waste conditioning and containment including siting, design construction and operation;

(h) the discharge whether in liquid, solid or gaseous form, and the receiving environment;

(i) the discharge criteria;

(j) the contingency plans to deal with natural events, incidents, equipment and operational failure;

(k) a program of assessment and review of the integrity of the waste disposal and containment facilities;

(l) a de-commissioning and closure plan with regard to the final disposal of waste; and

(m) any other relevant information.

Development
of Plan

2. (1) A Waste Management Plan shall be integrated with the Radiation Operation Management Plan and with the overall project environmental management plan.

(2) A holder shall submit an updated Waste Management Plan annually.

(3) A holder shall, where there is a significant change of circumstances, submit for approval an updated Waste Management Plan within thirty days of the changed circumstances.

(4) A holder shall, where there is any significant change in operational procedures, submit an updated de-commissioning proposal within thirty days of such change.

(5) A holder shall prepare a quality assurance program in the Waste Management Plan which shall include—

- (a) civil engineering and geo-technical aspects of the containment system;
- (b) the mode of operation of the system;
- (c) the scope and frequency of the monitoring programs; and
- (d) any traceability to national or international standards.

THIRD SCHEDULE

(Regulations 6, 7 (1) and (10))

PLAN TO TRANSPORT AND STORE RADIOACTIVE ORES AND PRODUCTS

1. In this Schedule, unless the context otherwise requires— Interpretation

“A₁” means the activity value of special form radioactive material and is used to determine the activity limits for the purposes of these Regulations’

“A₂” means the activity value of radioactive material, other than special form radioactive material and is used to determine the activity limits for the purposes of these Regulations;

“special form radioactive material” means at least one dimension not less than 5mm;

“Type A packages” means packages that shall not contain activities greater than—

- (a) for special form radioactive material, A₁; and
- (b) for all other radioactive material, A₂;

“Type B (M) packages” means packages that shall not contain—

- (a) activities greater than those authorised for the package design;
- (b) radionuclides different from those authorised for the package design; and
- (c) contents in a form, or a physical or chemical state, different from those authorised for the package design; as specified in their certificates of approval;

“Type C packages” means packages that shall not contain—

- (a) activities greater than those authorised for the package design;
- (b) radionuclides different from those authorised for the package design; and
- (c) contents in a form, or a physical or chemical state, different from those authorised for the package design; as specified in their certificate of approval;

Scope Act No. 16 of 2005	<p>2. (1) The Ionising Radiation Protection Act, 2005, and other relevant laws apply to this Schedule.</p> <p>(2) Before transporting, storing, acquiring or exporting radioactive mineral substances, a person shall obtain a permit from the Minister as provided for under section <i>one hundred and eight</i> of the Mines and Minerals Development Act.</p>
Act No. 7 of 2008	<p>(2) Before transporting, storing, acquiring or exporting radioactive mineral substances, a person shall obtain a permit from the Minister as provided for under section <i>one hundred and eight</i> of the Mines and Minerals Development Act.</p>
Packaging requirements before shipment	<p>3. (1) A holder shall, before shipment, submit to the Minister for approval the design and technical specifications of any package or drum.</p> <p>(2) A holder shall, for any system with a gauge pressure exceeding 35kPa, ensure that the containment system of a package conforms to the approved design requirements relating to the capacity of the system to maintain its integrity under pressure.</p> <p>(3) Where neutron poisons are included as components of any package containing fissile material, a holder shall confirm the pressure and distribution of the neutron poisons.</p>
General requirements for packages	<p>4. The design of a package shall conform to the following:</p> <p>(a) the mass, volume and shape of the package shall render it easy and safe to transport;</p> <p>(b) the exposure levels from the package shall be within legally prescribed limits</p> <p>(c) lifting attachment on the package shall not fail when used in the intended manner and the design shall take account of appropriate safety factors to cover snatch lifting;</p> <p>(d) lifting attachments of the package shall be removable or otherwise rendered incapable of being used during transportation;</p> <p>(e) as far as practicable, the outer layer of the package shall be designed so as to prevent the collection and the retention of water;</p> <p>(f) any features added to the package at the time of transportation which are not part of the package shall not reduce its safety;</p> <p>(g) the package shall be capable of withstanding the effects of any acceleration, vibration or vibration resonance which may arise under the routine conditions of the United Nations Recommendations on the Transport of Dangerous Goods, for Packing Group I or II, and if they were subjected to the tests conducted in the most damaging orientation, they would prevent—</p> <p style="margin-left: 40px;">(i) loss or dispersal of the radioactive contents; and</p> <p style="margin-left: 40px;">(ii) loss of shielding integrity which would result in more than a twenty per cent increase in the</p>

radiation level at any external surface of the intermediate bulk container.

5. (1) A consignor shall, where it is not necessary to obtain an approval certificate for package designs, on request, make available for inspection by the relevant competent authority, documentary evidence of the compliance of the package design with all the applicable requirements.

Approval
and
administrative
requirements

(2) An application for approval shall include—

- (a) a detailed description of the proposed radioactive contents with reference to their physical and chemical states and the nature of the radiation.
- (b) a detailed statement of the design, including complete engineering drawings and schedules of materials and methods of manufacture;
- (c) a statement of the tests which have been done and their results, or evidence based on calculative methods or other evidence that the design is adequate to meet the applicable requirements;
- (d) the proposed operating and maintenance instructions for the use of the packaging;
- (e) if the package is designed to have a maximum normal operating pressure in excess of one hundred kPa gauge, a specification of the material of manufacture of the containment system, the samples to be taken, and the test to be made;
- (f) any special stowage provisions necessary to ensure the safe dissipation of heat from the package considering the various modes of transport to be used and type of conveyance or freight container;
- (g) a reproducible illustration, not larger than 21 cm by 30 cm showing the make-up of the package; and
- (h) a specification of the application quality assurance programme as required.

(3) The competent authority shall establish whether an approved design meets the requirements for Type B (U) or Type C packages and shall attribute an identification mark to the design.

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- Notification and registration of serial numbers
6. (1) A holder shall inform the competent authority of the serial number of each packaging manufactured to an approved design.
- (2) A holder and the competent authority shall maintain a register of the serial numbers referred to under sub-paragraph (1).
- Approval of shipments
7. (1) Multilateral approval shall be required for—
- (a) the shipment of Type B(M) packages not conforming with the requirements designed to allow controlled intermittent venting;
- (b) the shipment of Type B (M) packages containing radioactive material with an activity greater than 3000 A1 or 3000 A2, as appropriate, or 1000Tbq, whichever is the lower ; and
- (c) radiation protection programmes for shipments by special use vessels according to requirements.
- (2) A competent authority may authorise transport into or through its country without shipment approval, by a specific provision in its design approval.
- (3) An application for shipment approval shall include—
- (a) in relation to the shipment, the period of time for which the approval is sought;
- (b) the actual radioactive contents, the expected modes or transport, the type of conveyance and the probable or proposed route; and
- (c) the details of how the precautions and administrative or operational controls referred to in the package design approval certificate issued are to be put into effect.
- Transportation of radioactive material
8. (1) A holder shall be liable for the radioactive mineral commodity in transit until the consignee receives it.
- (2) A holder shall—
- (a) establish a radiation protection programme for the transportation of radioactive materials which shall be made available for inspection by the relevant competent authority;
- (b) ensure that the nature and extent of the measures to be employed in the radiation protection programs are related to the magnitude and likelihood of radiation exposures;
- (c) ensure that the protection and safety measures are optimized in order that the magnitude of individual doses, the number of persons exposed and the likelihood of incurring exposure are kept as low as reasonably achievable; and

- (d) ensure that workers receive appropriate training in radiation hazards and the precaution to be observed in order to ensure restriction of their exposure and other persons who might be affected by their action.

(2) The holder shall, as a minimum, ensure the following during the transportation of radioactive material:

- (a) correct labeling, packaging and loading of the mineral commodity;
- (b) regular contact with transporter until the mineral commodity is delivered to the consignee;
- (c) any vehicle transporting any uranium or other radioactive material shall not be parked in any public place;
- (d) where an accident occurs during transport, a radiation protection officer appointed in accordance with regulation 15 shall—
 - (i) ensure that the scene of the accident is cordoned off;
 - (ii) immediately inform the Radiation Protection Authority, the Environmental Council of Zambia and the Mines Safety Department; and
 - (iii) take necessary steps and measures to prevent the exposure of the public to ionizing radiation and to minimise contamination of the surrounding environment;
- (e) a transporting vehicle shall have the emergency contact telephone numbers of the Radiation Protection Authority, the Mines Safety Department and the Environmental Council of Zambia on either side of the vehicle; and
- (f) in the case of air transportation within Zambia, the Aviation Act shall apply in addition to the provisions of these Regulations.

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9. (1) A holder shall conduct periodic assessments of the radiation doses to persons arising from the transportation of radioactive material, to ensure that the system of protection and safety complies with the basic safety standards.

Occupational
health and
safety in
transportation

(2) Where the Radiation Protection Authority, in the case of occupational exposures arising from transportation activities, assesses that the effective dose—

- (a) is unlikely to exceed 1mSv in a year, it shall not require any special work patterns, detailed monitoring, does assessment programmes or individual record keeping;
- (b) is likely to be between 1 and 6mSv in a year, it shall conduct a dose assessment programme through work place monitoring or individual monitoring; and
- (c) is likely to exceed 6mSv in a year, it shall conduct individual monitoring.

(3) A holder shall, where the Radiation Protection Authority conducts individual monitoring or work place monitoring, keep appropriate records.

Emergency
response
during
transportation

10. (1) A holder shall, in the event of an accident or incident during transportation of any radioactive material, observe and implement emergency provisions to protect persons, property and the environment.

(2) Emergency procedures taken under sub-paragraph (1) shall take into account the formation of other dangerous substances that may result from the reaction between the contents of a consignment and the environment in the event of an accident.

Special
arrangements
or
exemptions

11. (1) Consignments for which conformity with other provisions of these Regulations is impracticable shall not be transported except under special arrangements approved by the regulatory authorities.

(2) The Director may approve special arrangement transport operations for single or a planned series of multiple consigners where the competent authority is satisfied that conformity with other provisions of these Regulations is impracticable and that the requisite standards of safety established by these Regulations have been demonstrated by a holder.

(3) The overall level of safety in transport shall be equivalent to that which would be provided if all the applicable requirement has been met and in the case of international consignments, multilateral approval shall be required in accordance with paragraph 6.

Storage of
radioactive
materials

12. (1) Radioactive materials shall be segregated sufficiently from workers and from members of the public.

(2) The following values for dose rates shall be used for the purpose of calculating segregation distances or radiation levels:

- (a) in the case of workers in regularly working areas, a dose of 5mSv in a year; and
 - (b) in the case of members of the public, in areas where the public has regular access, a dose of 1mSv in a year to the critical group.
- (3) Radioactive materials shall be sufficiently segregated from undeveloped photographic film.
- (4) The basis for determining segregation distances for any purpose under sub-paragraph (3) shall be that the radiation exposure of undeveloped photograph film due to the transportation of radioactive material be limited to 0.1 mSv per consignment of the film.

FOURTH SCHEDULE
(Regulations 7(1) and 8 (3))

QUANTITATIVE RADIOLOGICAL HAZARD AND SAFETY ASSESSMENT
FOR PROSPECTING, MINING AND MILLING OPERATION

1. (1) A holder shall conduct a quantitative radiological hazard and safety assessment of the operations and activities involving radioactive material. General requirements
- (2) A radiological hazard and safety assessment shall—
- (a) identify all potential radiological associated with prospecting, mining and milling of uranium and other radioactive minerals;
 - (b) assess the effectiveness of engineering and operational controls; and
 - (c) determine the magnitude of radiological hazards from both normal operations and accidents to workers and the members of the public.
2. (1) A holder shall assess all the aspect involving any radioactive material from the prospecting, mining and milling of ores, to the storage and transportation of final products and waste. Radiological safety assessment
- (2) A holder shall, in an assessment—
- (a) identify and qualify the prevailing levels of the different radiological hazards;
 - (b) identify the areas where the potential for radiation exposure of workers may result in an effective dose exceeding 1mSv per year;

Radiological
hazard
assessment

- (c) identify any individuals who may be occupationally exposed to ionizing radiation and receive an annual effective dose in excess of 20mSv;
 - (d) determine the potential for radiation exposure of the members of the public due to airborne and liquid effluent releases from the site and the disposal of radioactive waste;
 - (e) assess the efficiency and effectiveness of the engineered and operational controls; and
 - (f) estimate the magnitude of the risks resulting from accidents whether on-site or off-site.
3. (1) A radiological hazard assessment shall, as a minimum—
- (a) identify the various types of radioactive materials present in the whole process and determine their physical and chemical form, nuclide composition, activity concentration and estimate total quantities to be mined and milled per annum;
 - (b) identify and qualify the radiological doses to workers and members of the public associated with the activities involving radioactive materials;
 - (c) qualify the mean levels and variations of the radiological hazard during full working shifts and determine the magnitude of longer term fluctuations;
 - (d) identify individual occupationally exposed to radiological hazards;
 - (e) quantify the degree of individual occupational exposure in terms of the annual dose equivalent received from all radiation exposure pathways for routine, maintenance and repair operations;
 - (f) quantify the impact of radioactive emission from the site in terms of the annual effective dose received by the public in all potentially affected areas; and
 - (g) qualify and control the hazard associated with equipment leaving the site.
- (2) The following exposure pathways shall be quantitatively assessed at specified locations:

- (a) exposure to short lived Rn-222(radon) and Th-220 (thorium) daughter products in air;
- (b) exposure to external radiation (beta-gamma dose rate);
- (c) exposure to long-lived alpha emitting nuclides in air;
- (d) surface contamination levels (alpha and beta emitters) in surface works;
- (e) contamination scrap; and
- (f) radon gas concentration underground.

FIFTH SCHEDULE
(Regulation 11(2))

QUANTITATIVE RADIOLOGY HAZARD ANALYSIS AT MINE AND
MILL DE-COMMISSIONING AND CLOSURE

1. Part IX of the Act, the Mines and Minerals (Environmental) regulations, 1997, and the Ionizing Radiation Protection Act, 2005 apply to this Schedule.

Title
Act No.
7 of 2008
S.I. No.
29 of 1997
Act No.
16 of 2005

2. (1) A holder shall determine—

Obligations
of holder

- (a) the amount of airborne radioactivity and terrestrial radiation emitted by the following facilities:
 - (i) tailing dumps;
 - (ii) waste rock dumps;
 - (iii) open pits or underground mine workings;
 - (iv) mill infrastructure;
 - (v) workshop infrastructure;
 - (vi) office infrastructure;
 - (vii) any other infrastructure;
- (b) the amount of radiation emitted from water ponds;
- (c) the amount of radiation emitted from contaminated equipment and waste materials;
- (d) the amount of radon emissions from tailings dumps and waste rock dumps;
- (e) the amount and distribution pattern for the dust dispersed from tailings dumps and waste rock dumps, with particular attention to nearby human settlements;
- (f) the amount of radioactive contamination in seepage and run-off water from tailings dumps and waste rock dumps;

(g) the structure, geo-technical and seismic stability of tailings dumps and waste rock dumps; and

(h) the amount of radiation emitted from any other source that is part of a mine or mill infrastructure;

(2) A holder shall, before the termination of any obligations relating to any closed waste management facility, submit to the Radiation Protection Authority, the Mines Safety Department and the Environmental Council of Zambia the results of the final radiological and environmental survey and a closure completion report in order to document compliance with the regulatory requirement for managing the waste.

(3) The information required under sub-paragraph (2) shall be determined as accurately as is practicable and shall be included in the decommissioning and closure plan.

(4) The objectives of a de-commissioning and closure plan shall include, but shall not be limited to—

(a) achieving long-term radiation protection by reducing the effective equivalent dose to the individual in the critical group to below 0.1 mSv/year;

(b) achieving background water quality in the long-term by controlling groundwater contamination;

(c) reducing the residual concentration of radioactive elements by undertaking soil clean-up operations;

(d) reducing the radon flux over the surface of the final tailings dumps to an internationally acceptable rate of 20pCi/m²;

(e) rehabilitating tailings dumps to make them stable for at least two hundred years;

(f) minimizing hazards to the public and the environment;

(g) preventing inadvertent human intrusion and dispersion of contaminated materials by wind and water erosion.

(h) complying with other applicable and relevant regulations governing air and water quality in non-radiological aspects; and

(i) de-contaminating and safely disposing of equipment and waste materials.

SIXTH SCHEDULE

(Regulation 11(1))

URANIUM MINES AND MILLS ABANDONMENT

- | | |
|---|--|
| 1. The provisions of the Act, the Environmental Protection and Pollution Control Act, the Ionizing Radiation Protection Act, 2005, and other relevant law shall apply to the abandonment of uranium mines and mills. | Scope
Act No. 7
of 2008
Cap. 204
Act No.
16 of 2005 |
| 2. A holder of a mining right or mineral processing licence for uranium ores and any other radioactive mineral ores shall, in an application for abandonment of a mine or mill, submit—

(a) a report on the status of the environment at abandonment stage;
(b) the rehabilitation objectives and performance indicators for all components and phases;
(c) the methods of monitoring the remediation work program objectives;
(d) the methods to de-contaminate equipment to be removed from the project site;
(e) the proposed methods of disposing of unsold equipment which is not de-contaminated;
(f) the plan and sections of the entire mine or mill site showing the location of major infrastructure such as mill tailing, storage facilities and mine waste rock dumps;
(g) the estimated time periods between project closure and abandonment;
(h) a comprehensive statement accompanied by plans, assessment of alternative rehabilitation methods with cost and levels of radioactivity after rehabilitation and the proposed post closure land uses;
(i) the plans to manage and monitor chronic and acute releases of radioactivity between closure and abandonment;
(j) the proposed methods aimed at rehabilitating the site to other beneficial land uses; and
(k) a closure certificate granted by the Director of Mines Safety. | Application |

SEVENTH SCHEDULE
(Regulation 4 (2) and 13(2))

SELECTED PROVISIONS OF NUCLEAR NON-PROLIFERATION TREATY

Compliance
with Treaty
provisions

1. (1) A holder shall, in an application for a mining or mineral processing licence, outline in the program of mining and milling operations how the holder proposes to comply with the articles of the Nuclear Non-Proliferation Treaty.

(2) A holder shall develop and employ appropriate safeguards in accordance with the International Atomic Energy Agency (IAEA) to ensure the fulfillment of obligations assumed under the Nuclear Non-Proliferation Treaty to prevent diversion of nuclear energy material from peaceful uses to nuclear weapons or other intermediate nuclear weapons devices.

Obligations
of holder

2. A holder shall communicate the safeguards referred to under paragraph 1 before commencement of operation and report on compliance at every shipment.

(2) A holder shall, in addition to the requirements stipulated under sub-paragraph (1)—

(a) outline the implementation procedures for safeguards with respect to source or special fissionable material at their mine, storage or processing facility;

(b) undertake to prevent provision of nuclear energy material or other fissionable material or equipment or material special designed for the processing, use or production of special fissionable material, to any Nuclear Non-Nuclear Weapons State or individuals or institutions whether in a Nuclear Weapons State or not; and

(c) outline how the proposed safeguards shall assist the holder to comply with Article IV of the Nuclear Non-Proliferation Treaty and encourage peaceful technological and economic use and exchange of nuclear energy material.

(3) A holder shall outline the holder=s marketing proposals and principles for mine production of radioactive material within or outside Zambia so as to comply with all aspects of the Nuclear Non-Proliferation Treaty.

(4) A holder shall comply with the marketing plan submitted in an application for authority to acquire, sell or export radioactive material and the holder shall report on the marketing activities to the relevant authorities.

K. T. MWANSA,
*Minister of Mines and
Minerals Development*

Lusaka

18th August, 2008

