



RADIATION PROTECTION AUTHORITY OF ZIMBABWE

RADIATION PROTECTION ACT (CHAPTER 15:15)

REQUIREMENTS FOR EMERGENCY PREPAREDNESS IN RADIATION FACILITIES AND NUCLEAR INSTALLATIONS

1. INTRODUCTION

The Radiation Protection Act [15:15] and its regulations makes provision for the Authority to impose any condition in a nuclear installation license which is deemed necessary to ensure the protection of persons, property, and the environment against the risk of nuclear damage. The legislation *inter alia* specifically requires the Authority to make certain that provisions for emergency planning are in place to ensure preparedness and response to deal with potential nuclear accidents or radiological emergencies.

The Authority fulfils its obligation through its statutory powers, applying the principles derived from internationally accepted radiation protection guides, standards, and actions to establish requirements for common concepts and expectations, the clear allocation of responsibilities among all response organizations, and arrangements for co-coordinating an integrated an emergency response.

1. PURPOSE

This document is intended to establish the emergency preparedness and response requirements to be met by both holders of and applicants for nuclear installation licenses, to ensure adequate provision for the protection of the health and safety of the public and minimize the impact on the environment.

The requirements contained in this document will be used by the Authority in evaluating the adequacy of emergency preparedness and responses proposed by licensees and nuclear license applicants.

2. OBJECTIVES

This document establishes the minimum requirements of the Authority for an adequate level of nuclear and radiological emergency preparedness and response for the licensing of nuclear installations.

The requirements set out the different aspects that must be covered in an effective nuclear emergency preparedness and response plan, with the objective of minimizing the consequences of any nuclear or radiological emergency on people, property and the environment.

2. SCOPE

The scope of this document covers the requirements for ensuring the effective establishment and implementation of emergency preparedness and response plans for nuclear installations. The scope therefore extends over all phases of a nuclear or radiation emergency and is in accordance with Sections 40-43 of the *Radiation Protection (Safety and Security of radiation sources) Regulations, 2011 (SI 62 of 2011)*

This document also contains the requirements to maximize the effectiveness of intervening organizations in nuclear accidents.

3. DEFINITIONS OF TERMS

Arrangements (for emergency response): The integrated set of infrastructural elements necessary to provide the capability for performing a specified function or task required in response to a nuclear or radiological emergency. These elements may include authorities and responsibilities, organization, coordination, personnel, plans, procedures, facilities, equipment, or training.

Avertable Dose: A dose to be avoided by a protective action, i.e., the difference between the dose to be expected with the protective action and that to be expected without it.

Decontamination: The removal or reduction of contamination by a physical or chemical process.

Deterministic Effects: A radiation effect for which generally a threshold level of dose exists above which the severity of the effect is greater for a higher dose.

Disaster Management Infrastructure: All infrastructures and services, including transport, personnel, mass care centres and medical care, necessary for implementation of the emergency plan.

Evacuation: The rapid, temporary removal of people from the area to avoid or reduce short-term radiation exposure in the event of an emergency.

Intervening Organization: An organization designated or otherwise recognized by the government as being responsible for managing or implementing any aspect of an intervention, e.g. local authorities, police, armed forces, media, etc.

Intervention: Any action intended to reduce or avert exposure or the likelihood of exposure to a release which is not part of a controlled action, or which is out of control as a result of an accident.

Intervention Level: The level of avertable dose at which a specific protective action or remedial action is taken in an emergency exposure situation or a chronic exposure situation.

Iodine Prophylaxis: The ingestion of a compound of stable iodine (usually potassium iodate) to prevent or reduce the uptake of radioactive isotopes of iodine by the thyroid in the event of an accident involving radioactive iodine.

Longer Term Protective Action: A protective action that is not an urgent protective action. Such protective actions are likely to be prolonged over weeks, months, or years. These include measures such as relocation, agricultural countermeasures, and remedial actions.

Off-site: The area beyond that under the control of the licensee.

On-site: The area surrounding the facility under the immediate control of the licensee.

Protective Action: An intervention intended to avoid or reduce doses to members of the public.

Severe Accident: This term is used to designate accident conditions that are more severe than design basis accidents. Design basis accidents are those taken into account in the design of a facility according to established design criteria, and for which releases of radioactive material are kept within specified limits.

Stochastic Effects: A health effect, the probability of occurrence of which is greater for a higher radiation dose and the severity of which (if it occurs) is independent of dose and generally occurs without a threshold.

Sheltering: A protective action whereby members of the public are advised to stay indoors with windows and doors closed, intended to reduce their exposure in an emergency exposure situation.

Source: Anything that may cause radiation exposure, such as by emitting radiation or by releasing radioactive substances or materials and can be treated as a single entity for safety purposes.

Urgent Protective Actions: Those actions that must be taken promptly in order to be effective, and the effectiveness of which would be markedly reduced by delay. These include sheltering, evacuation, and distribution of iodine prophylaxis.

4 GENERAL REQUIREMENTS

4.1 Roles and Responsibilities

The holder of a nuclear authorization shall ensure that an emergency preparedness and response plan is prepared for any action or source that is capable of causing nuclear damage or which could give rise to an emergency requiring intervention. The emergency plan must be effective for the protection of persons from radiation exposure. The holder must submit such emergency plans to the Authority.

The holder of a nuclear authorization shall ensure that the emergency preparedness and response plans to nuclear and radiological emergency threats are coordinated with the plans for non-radiological emergencies, both on-site and off-site are established as required the **Authority**.

4.2 Safety Assessment

The holder of a nuclear authorization must periodically conduct a comprehensive safety analysis of sources of potential exposure to evaluate radiation doses that could be received by workers and the public, as well as potential effects on the environment. The safety analysis shall take into account potential accidents over a wide range of probabilities such that severe accidents are also considered.

The safety analysis shall identify potential threats, and determine the likelihood, nature and magnitude of the nuclear and radiological consequences. From this analysis, the holder of a nuclear authorization shall postulate a Reference Case Accident which in turn provides a technical basis for the emergency preparedness and response requirements and arrangements in terms of planning zones, protective action strategies and timing for protective action implementation. Assumptions made in the development of the reference case must include meteorological conditions, duration of release, source term, and attenuation/shielding factors. Conservatisms and mitigating actions must be described by the holder of a nuclear authorization and approved by the Authority.

4.3 Administrative Requirements

The holder of a nuclear authorization shall ensure that the emergency plan meets the requirements herein and that arrangements for its implementation are in place and validated through an emergency exercise prior to the commissioning and commencement of operations of a new nuclear installation as well as periodically thereafter at a frequency acceptable to the Authority.

The holder of a nuclear authorization must make sufficient resources available for the development and maintenance of the emergency plan and procedures.

5 PREPAREDNESS REQUIREMENTS

5.1 Authority

Persons or positions shall be assigned clear Authority to make prompt decisions regarding the activation of the emergency plan and the implementation of protective actions. The means of notifying such individuals must be described. The transfer of such Authority during the course of an emergency must be specified in the emergency plans.

5.2 Organizational Responsibilities

The holder a nuclear authorization must identify all intervening organizations and ensure that their roles and responsibilities are clearly defined, documented and understood.

Designated officials must be assigned to key positions in all intervening organizations, and provision must be made to ensure continuity of the key positions following the declaration of an emergency as provided for in the emergency plan.

5.3 Response Coordination

The holder of a nuclear authorization must develop and document clear response and interaction protocols with local and provincial authorities and the Authority. The emergency plans must be coordinated with other relevant plans.

5.4 Plans and Procedures

Emergency response planning must be based on a safety assessment, which includes consideration of severe accidents. Strategies for protective action and accident mitigation based on the safety assessment must be included in the plans. The emergency plan for a particular type of nuclear installation must take into account operating experience, exercises and accidents associated with similar nuclear installations.

The nuclear authorization holder must ensure that the plan defines on-site responsibilities and takes account of off-site responsibilities and provides for the implementation of appropriate protective actions.

The nuclear authorization holder must ensure that a document control/quality assurance process is in place to establish, maintain, review and update emergency plans and procedures at a frequency to be agreed with the Authority.

The emergency plans and procedures of intervening organizations must use terminology consistent with that of the nuclear authorization holder.

5.5 Emergency Classification

The emergency plan must describe the emergency conditions that would involve alerting or activating progressively larger segments of the emergency response organization.

The emergency classes to be used are:

- Unusual Event- An abnormal occurrence which indicates an unplanned deviation from normal operations, the consequences of which require a partial activation of the emergency plan.
- Alert- A situation exists that could develop into a SITE or GENERAL EMERGENCY and therefore requires notification of all emergency personnel in order to obtain a state of readiness to respond.
- Site Emergency- An emergency condition exists that poses a serious radiological hazard on-site but poses no serious hazard to the public off-site.
- General Emergency- An emergency condition exists that poses or potentially poses a serious radiological hazard off-site.

The emergency plans must identify the communication process to be followed to alert or activate emergency personnel in respect to each class of emergency.

5.6 Assessment of Facility Conditions

The emergency plans must describe the means to be used for early prediction or assessment of the extent and significance of any discharge of radioactive substances to the environment; rapid and continual assessment of the impact; and the need for protective actions due to the emergency. Cognizance must be taken of the meteorological factors, duration and nature of the release and projected doses to workers and the public, and the possible effects on the environment.

The emergency plans must establish and maintain a capability to carry out emergency monitoring of radiation fields and radioactive contamination related to an accident, both on- and off-site.

5.7 Notification and Activation

Administrative and physical means of notification and activation by intervening organizations for the prompt notification of the public and other protective measures, should they become necessary, must be described.

Plans and procedures must be developed by the nuclear authorization holder and specified in the emergency plans to ensure the prompt notification and activation of emergency functionaries, site users and other appropriate support services, during and after office hours. Resources and equipment must be available to perform the required actions.

The emergency plans must identify persons who are empowered to declare and manage an emergency.

The notification scheme must include information to identify the location of the emergency, the class, its nature, the time of occurrence, resources required, important actions taken to mitigate, manage or control the situation, and recommendations for urgent protective action. Provision must be made for the issue of additional resources and information, as it becomes available.

The nuclear authorization holder must develop plans for the prompt provision of radiation protection and other expertise, equipment and resources, on-site and off-site, to emergency functionaries and intervening organisations responding to a radiological and nuclear emergency. These must be incorporated into the emergency plans

5.8 Mitigation

The nuclear authorization holder must develop and incorporate into the emergency plans an accident management programme to ensure that there are provisions for early mitigation of the effects of nuclear and radiological accidents, and due consideration must be given to severe accident management.

The nuclear authorization holder must ensure the availability of human resources, technical assistance, equipment, instrumentation, and diagnostic aids that may be needed to influence the course and consequences of a nuclear accident.

The on-site emergency procedures must provide for the emergency response staff to access relevant sources of information, advice, and expertise.

5.9 Urgent Protective Actions

Intervention levels must be adopted for the implementation and termination of urgent protective actions. The nuclear authorization holder must demonstrate the ability to implement protective actions at the levels shown in Appendix II. Criteria for the formulation of urgent protective actions must be provided to off-site officials responsible for off-site actions in the precautionary and urgent action zones.

5.10 Protective Action Zones

Emergency planning zones must be defined in which detailed arrangements shall be developed for the implementation of protective actions. These zones must consist of:

5.11 Precautionary Action Zone (PAZ): where the risk of deterministic effects is sufficiently high to warrant the establishment of plans for the implementation of pre-emptive protective actions based on plant conditions before a release or shortly thereafter.

5.11.1 Urgent Protective Action Planning Zone (UPZ): where the risk of stochastic effects is sufficiently high to warrant the establishment of plans to implement protective actions based on environmental monitoring or on plant conditions.

5.11.2 Long Term Protective Action Planning Zone (LPZ): where preparations for effective implementation of protective actions to reduce the risk of deterministic and stochastic health effects from long term exposure to deposition and ingestion must be developed in advance.

The nuclear authorization holder must maintain the capabilities, means, resources and tools necessary to support urgent protective actions in the PAZ and UPZ, including the ability to conduct prompt environmental monitoring.

The nuclear authorization holder shall develop and incorporate into the emergency plans, procedures to ensure the safety and accounting of all persons on-site in the event of an emergency. Provision must also be made for suitable assembly points, escape routes, medical care, transportation, and security. Sufficient alarm and communication devices must be available and maintained.

Arrangements must be made for the appropriate protection of emergency workers, alerting of permanent, transient, and special population groups, and care of sheltered or evacuated populations, including decontamination, surveillance, food, registration, imposing of food restrictions, access control to the affected area by road and air, and medical and social care.

5.12 Public Education and Information

For nuclear installations presenting threats consistent with categories I and II, the nuclear authorization holder must ensure that information is provided to members of the public who could be affected by an accident.

Procedures must be developed and incorporated into the emergency plans by the nuclear authorization holder for promptly alerting and instructing the permanent,

transient and special population groups within the emergency planning zones, in the languages mainly spoken in that area.

The nuclear authorization holder, in conjunction with the relevant intervening organisations, must develop and incorporate into the emergency plans, procedures and arrangements to ensure the timely provision of information to the permanent, transient, and special population groups in the planning zones during an emergency, and to correct any false information provided, in the languages spoken in that area.

5.13 Protection of Emergency Workers

- Emergency workers must be accounted for at all times.
- Plans must be developed for protecting emergency workers, for controlling the doses they receive and for medical follow-ups.
- Emergency workers must be provided with the training and equipment necessary to restrict their potential exposure, commensurate with the likely magnitudes of exposure in an emergency situation.

5.14 Medical Assistance

The nuclear authorization holder must develop plans and procedures for medical staff that ensure the prompt availability and coordinated response of medical first aid and assistance on-site and off-site, which must be incorporated into the emergency plans.

Medical personnel must be made aware of medical symptoms of radiation exposure and trained to treat such exposure appropriately.

The medical facility must be prepared to treat over-exposed and contaminated workers and public. Arrangements must be made with other medical facilities for assistance if required. Records must be kept, and a plan must be in place for extended treatment and follow-ups.

5.15 Longer Term Protective Actions

A contingency arrangement must be in place outlining the infrastructure for the management of long-term protection actions. This contingency arrangement must include amongst other responsibilities for specific actions, such as people accounting, mass care centres, relocation, food bans, decontamination, transport, food and other emergency supplies, emergency equipment, medical and trauma care, psychological assistance, and information centres.

Intervention levels for the implementation and withdrawal of longer-term protective actions must be followed. Contingency arrangements must be in place for the implementation of these intervention levels, which include effective agricultural countermeasures, relocation, and restriction of consumption and supply of foodstuffs. It must include the means and resources identification of affected areas and include operational intervention levels for environmental surveillances. It must include the decontamination of affected areas.

Arrangements must be prepared for achieving effective relocation and temporary relocation and for assistance during this process. Communication mechanisms with affected parties must also be included.

Contingency arrangements must address the exposure of individuals and identify suitably qualified institutions that could assist in long-term health monitoring, psychological support, waste management, medical surveillance, and follow-up medical surveillance.

5.16 Logistic Support

Adequate supplies, equipment, communication systems and emergency facilities required to allow intervening organisations to fulfil their responsibilities must be identified and kept available for use during an emergency.

Emergency facilities must be suitably located to minimise the exposure of emergency workers.

The nuclear authorization holder must ensure the availability of a laboratory that is able to perform the analysis of radioactively contaminated samples.

5.17 Training

The skills and performance requirements for all positions within the emergency response organisations must be defined and documented.

The programme to provide for the training of employees and for periodic exercising must be described. This must include specialised initial training and periodic re-training programmes.

The nuclear authorization holder must make radiological orientation training available for intervening organisations.

The nuclear authorization holder must conduct an exercise under the direction of the Authority as and when required.

Plans and procedures must be up-dated in the light of experience gained in exercises, other compliance assurance activities and the experience gained at other facilities.

6 RESPONSE REQUIREMENTS

6.1 Assessment of Accident Conditions

The accident must be promptly assessed, identified and classified by the nuclear authorization holder as per Appendix I, and on-site protective actions initiated.

6.2 Notification and Activation

The nuclear authorization holder must promptly activate the on-site response teams and continuously notify the Authority and the relevant intervening organisations when a situation requiring protective actions has arisen or is expected to arise, and shall keep them informed of:

- the emergency class;
- the situation as it develops and is expected to develop further;

- the measures taken for the protection of workers and the public;
 - the exposures that have been incurred and that are expected to be incurred.
- When required, the IAEA shall be notified in accordance with an approved procedure.

6.3 Mitigation of the Consequences of the Accident

As per the Agreement, intervening organisations must take appropriate actions within the scope of their competence to limit the consequences of the accident.

All immediate and follow-up actions must be taken by the nuclear authorization holder in accordance with the emergency response plan to reduce the risk and size of any uncontrolled release of radioactive material or exposure of workers and the public.

6.4 Urgent Protective Actions

The emergency response organization must be activated. Depending on the nature of the threat, this could include decision makers, controllers, monitoring teams, analytical teams, security teams, medical and rescue teams, media centres, etc.

Decisions to take immediate protective actions and to manage the threat must be made considering the circumstances prevailing at the time of an accident and be based on the expectations of the consequences, if this is feasible, rather than delayed pending environmental measurements.

Urgent protective actions to save lives, prevent deterministic health effects and avert doses above the intervention levels must be implemented.

Strategies for implementing urgent protective actions must be adjusted to take into account new information that becomes available. A protective action must be discontinued when further assessment shows that continuation of the action is no longer justified.

6.5 Instructions to the Public

When protective actions are required, instructions to the affected public must be provided in an effective and timely manner in accordance with specific procedures using planned mechanisms. There must be no undue delay that could jeopardize the effectiveness of the protective actions. The public must be kept informed on a continuous basis.

6.6 Protection of Emergency Workers

Active measures must be taken to control emergency worker exposure in accordance with the requirements laid down.

6.7 Longer Term Protective Actions

Personal decontamination, relocation, food-bans, environmental surveillance, radioactive waste management, psychological impact and other appropriate longer-term actions must be implemented in accordance with relevant contingency arrangements for as long as required.

7 REQUIREMENTS FOR INFRASTRUCTURE

7.1 Plans and procedures

Emergency plans must include, as appropriate:

- (a) Allocation of responsibilities for performing the functions specified.
- (b) Identification of the various operating and other conditions which could lead to the need for intervention.
- (c) Intervention levels and operational intervention levels based on the relevant protective actions and the scope of their application, with account taken of the possible degrees of severity of accidents or emergencies that could occur.
- (d) Procedures, including communication arrangements, for contacting any relevant response organizations and for obtaining assistance from firefighting, medical, police and other relevant organizations;
- (e) A description of the methodology and instrumentation for assessing the nuclear or radiological emergency and its consequences on and off the site.
- (f) A description of the public information arrangements in the event of a nuclear or radiological emergency; and
- (g) The criteria for terminating each protective action.

The operating organization must prepare an emergency plan that covers all activities under its responsibility, to be adhered to in the event of an emergency. This emergency plan must be co-coordinated with those of all other bodies having responsibilities in an emergency, including public authorities, and must be submitted to the Authority body for approval.

The emergency plan of the nuclear authorization holder must include the following as appropriate:

- (a) A description of the on-site organization used to perform the functions specified in Section 4, including the designation of persons for directing on-site activities and for ensuring liaison with off-site organizations.
- (b) The conditions under which an emergency must be declared, including the criteria for classification, a list of job titles and/or functions of persons empowered to declare it, and a description of suitable arrangements for alerting response personnel and public authorities.
- (c) The arrangements for initial and subsequent assessment of the conditions at the facility and radiological conditions on and off the site.
- (d) Arrangements for minimizing the exposure of persons, on and off the site, to ionizing radiation and for ensuring medical treatment of casualties, including arrangements to take protective actions if warranted based on conditions at the facility to reduce the risk of severe deterministic health effects.
- (e) Assessment of the state of the facility or action and the actions to be taken on the site to limit the extent of any radioactive release.
- (f) The chain of command and communication, including a description of related facilities and procedures.
- (g) An inventory of the emergency equipment to be kept in readiness at specified locations.
- (h) The actions to be taken by persons and organizations involved in the implementation of the plan for each class of emergency.
- (i) Arrangements for declaring the termination of an emergency.

The operating and response organizations must develop the necessary procedures,

analytical tools and computer programs in order to be able to perform the functions specified to meet the requirements for emergency response specified.

Procedures, analytical tools and computer programs to be used in performing functions to meet the requirements for emergency response must be tested under simulated emergency conditions and must be validated as correct prior to use.

The operators must implement on-site emergency plans.

Off-site emergency plans and any transboundary plan must be implemented by the response organizations.

7.2 Logistical support and facilities

Adequate tools, instruments, supplies, equipment, communication systems, facilities, and documentation (such as procedures, checklists, telephone numbers and manuals) must be provided for performing the functions specified.

These items and facilities must be selected or designed to be operational under the postulated conditions (such as the radiological, working and environmental conditions) that may be encountered in the emergency response, and to be compatible with other procedures and equipment for the response (such as the communication frequencies of other response organizations), as appropriate. These support items must be located or provided in a manner that allows their effective use under postulated emergency conditions.

Regarding facilities in Threat Categories I or II, emergency facilities must be designated, in which the following will be performed in the different phases of the response: the co-ordination of on-site response actions; the co-ordination of local off-site response actions (radiological and conventional); the co-ordination of national response actions; co-ordination of public information; and co-ordination of off-site monitoring and assessment. Several of these activities may be performed at a single Centre, and the location may change in the different phases of the response.

These emergency facilities must be suitably located and/or protected to enable the exposure of emergency workers to be managed in accordance with international standards.

An on-site emergency control Centre (ECC), separated from the facility control room, shall be provided to serve as a meeting place for the emergency staff, who will operate from there in the event of an emergency. Information regarding important parameters and radiological conditions in the facility and its immediate surroundings should be available in the ECC. The room must provide means of communication with the control room, the supplementary control room, and other important points in the facility, and with the on-site and off-site emergency response organizations.

Appropriate measures must be taken to protect the occupants for a protracted time against hazards resulting from a severe accident.

Laboratories must be designated to make the necessary arrangements to be able to perform appropriate and reliable analyses of environmental and biological samples and measurements of internal contamination for the purposes of an emergency response. It must be ensured that these facilities would be operational under postulated

emergency conditions.

A national emergency facility or facilities must be designated for the co-ordination of response actions and public information.

Arrangements must be made to obtain appropriate support for logistics and communication, for social welfare and in other areas from the organizations responsible for providing such support in conventional emergencies.

7.3 Training, drills, and exercises

The operator and the response organizations must identify the knowledge, skills, and abilities necessary to be able to perform the functions specified in Section 3. The operator and the response organizations must make arrangements for the selection of personnel and for training to ensure that the personnel have the requisite knowledge, skills, abilities, equipment and procedures and other arrangements to perform their assigned response functions. The arrangements must include ongoing refresher training on an appropriate schedule and arrangements for ensuring that personnel assigned to positions with responsibilities for emergency response undergo the specified training.

All employees and other persons on the site must be instructed on the arrangements for them to be notified of an emergency, and on their actions when notified of such an emergency.

Exercise programmes must be conducted to ensure that all specified functions required to be performed for emergency responses and all organizational interface programmes for the different threat categories are tested at suitable intervals. These programmes must include the participation in exercises of as many of the organizations concerned as possible. The exercises must be systematically evaluated, and the Authority must evaluate exercises at its discretion. The programme must be subject to review and updating in the light of experience gained.

The staff responsible for critical response functions for a facility must participate in a training exercise or drill at least once every year.

The officials off the site responsible for making decisions on protective actions for the population within the precautionary action zone and/or the urgent protective action planning zone must be trained in the strategy for protective action and regularly participate in exercises.

The performance of exercises at facilities shall be evaluated against established response objectives that demonstrate that identification, notification, activation and other initial response actions can be performed in time to achieve the practical goals of emergency response.

7.4 Protection of emergency workers

1. Arrangements shall be made to designate as emergency workers those who may undertake an intervention to do the following:
 - (a) To save lives or to prevent serious injury, including severe deterministic

health effects.

- (b) To take actions to avert a large collective dose; or
 - (c) To take actions to prevent the development of catastrophic conditions.
2. Those called upon to respond at a facility in Threat Categories I, II or III or within the precautionary action zone or the urgent protective action planning zone, shall be designated as emergency workers. Such assisting personnel as police, fire fighters, medical personnel and drivers and crews of evacuation vehicles shall be designated as emergency workers. In addition, the radiation specialists, radiation protection officers and radiological assessors who may respond to emergencies involving actions or other hazards in Threat Category IV shall be considered emergency workers.
 3. Those persons who may be called upon as first responders shall be informed of the risks of radiation exposure and the meanings of radiation signs and placards.
 4. National guidance that is in accordance with international standards shall be adopted for managing, controlling, and recording the doses received by emergency workers. This guidance shall include default operational levels of dose for emergency workers for different types of response activities, which are set in quantities that can be directly monitored during the performance of these activities (such as the integrated dose from external penetrating radiation). In setting the default operational levels of dose for emergency workers, the contribution to doses via all exposure pathways shall be considered.
 5. For facilities in Threat Categories I, II or III, the anticipated hazardous conditions in which emergency workers may be required to perform response functions on or off the site shall be identified.
 6. Arrangements shall be made for taking all practicable measures to provide protection for emergency workers for the range of anticipated hazardous conditions in which they may have to perform response functions on or off the site. This shall include
 - arrangements to assess continually and to record the doses received by emergency workers.
 - procedures to ensure that doses received, and contamination are controlled in accordance with established guidance and international standards.
 - arrangements for the provision of appropriate specialized protective equipment, procedures, and training for emergency response in the anticipated hazardous conditions.

Once the emergency phase of an intervention has ended, workers undertaking recovery operations, such as the recovery of sources, repairs to [the facility] and buildings, waste disposal or decontamination of the site and surrounding area, shall be subject to the full system of detailed requirements for occupational exposure.

When the intervention has ended, the doses received, and the consequent health risk shall be communicated to the workers involved

The person within each response organization responsible for ensuring compliance with the Authority's requirements for the protection of workers undertaking an intervention shall be specified in emergency plans and

procedures.