



REGULATION

Regulation for Emergency Preparedness for Nuclear Facilities (FANR-REG-12)

Version 0

Federal Authority for Nuclear Regulation (FANR)
P.O. Box 112021, Abu Dhabi, United Arab Emirates
regulation@fanr.gov.ae

Table of Contents

Definitions	3
Article (1)	3
Objective and Scope	5
Article (2)	5
Article (3)	5
General Requirements	5
Article (4)	5
Article (5)	6
Article (6)	6
Article (7)	6
Article (8)	7
Article (9)	8
Functional Requirements	8
Article (10).....	8
Article (11).....	8
Article (12).....	8
Article (13).....	9
Requirements for Infrastructure.....	9
Article (14).....	9
Article (15).....	9
Article (16).....	10
Article (17).....	10
Article (18).....	10

Definitions

Article (1)

For purposes of this regulation, the following terms shall have the meanings set forth below:

Alert	An event involving an unknown or significant decrease in the level of protection for the public or on-site personnel. When an Alert is declared, the state of readiness of the on-site and off-site Response Organisations is increased and additional assessments are made.
Concept of Operations	A brief description of the ideal response to an Emergency.
Deterministic Effect	A health effect of radiation for which generally a threshold level of dose exists above which the severity of the effect is greater for a higher dose. Such an effect is described as a severe deterministic effect if it is fatal or life threatening or results in a permanent injury that reduces quality of life.
Emergency Action Level (EAL)	A specific, predetermined, observable criterion used to detect, recognise and determine the classification of the Emergency.
Emergency Operations Facility (EOF)	The facility that coordinates the onsite and offsite response to an Emergency which warrants offsite Protective Action.
Emergency Worker	A worker who may be exposed in excess of occupational dose limits while performing actions to mitigate the consequences of an Emergency for human health and safety, quality of life, property and the environment.
General Emergency	<p>An event resulting in an actual release, or substantial probability of a release, requiring implementation of Urgent Protective Actions off-site.</p> <p>This includes: (1) actual or projected damage to the reactor core or large amounts of spent fuel; or (2) releases off-site resulting in doses exceeding intervention levels for Urgent Protective Actions within hours. When a General Emergency is declared, Urgent Protective Actions are recommended immediately for the public near the facility.</p>
Hostile Event	An act directed toward a Facility or its personnel that include the use of violent force to destroy equipment, take hostages, and/or intimidate the Licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, projectiles, vehicles, or

other devices used to deliver destructive force.

Operational Intervention Levels (OILs)

A calculated level, measured by instruments or determined by laboratory analysis, which corresponds to an intervention level or action level.

Operational Support Centre (OSC)

The facility for operational control of personnel performing Emergency Response tasks (e.g. environmental monitoring, health physics, damage control and fire fighting) and providing health physics support for personnel responding from offsite.

Protective Action

An action, other than a remedial action, for the purposes of avoiding or reducing doses that might otherwise be received in an Emergency exposure situation.

Residual Dose

The dose expected to be received or measured/assessed after Protective Actions have been fully implemented (or a decision has been taken not to implement any Protective Actions) and any remedial actions have been terminated.

Response Organisation

An organisation responsible for managing or implementing any aspect of an Emergency Response.

Site Area Emergency

An event resulting in a major decrease in the level of protection for the public or on-site personnel.

This includes: (1) a major decrease in the level of protection provided to the reactor core or large amounts of spent fuel; or (2) conditions where any additional failures could result in damage to the reactor core or spent fuel; or (3) high doses on-site. When a Site Area Emergency is declared, preparations should be made to take Protective Actions off-site and to control the doses to on-site personnel.

Technical Support Centre (TSC)

The facility that provides technical support for the control room Licensees in mitigating the consequences of the Emergency and regaining control of the Nuclear Facility.

Urgent Protective Action	A Protective Action in the event of an Emergency which must be taken promptly (normally within hours) in order to be effective, and the effectiveness of which will be markedly reduced if it is delayed.
Optimisation	The process of determining what level of protection and safety makes exposures, that is, the magnitude of individual doses and the number of people (workers and the public) exposed, and the probability and magnitude of potential exposures, “as low as reasonably achievable, economic and social factors being taken into account” (ALARA).

Objective and Scope

Article (2)

1. This regulation specifies the Authority’s requirements for the Licensee’s preparation and planning for and response to Emergencies at Nuclear Facilities. Its purpose is to ensure that the Licensee has an organisation that is capable of coping with Emergencies and mitigating their consequences, and that the Licensee can perform assessment actions and implement notification procedures. It also requires the Licensee to demonstrate that it has adequate Emergency facilities and equipment, provides appropriate training, maintains Emergency Preparedness, and is capable of recovery after an Emergency.

Article (3)

This regulation does not apply to the plans and activities of the offsite coordinating agencies or Response Organisations.

General Requirements

Article (4)

1. The Licensee shall maintain an Emergency Plan, including plans, procedures, description of facilities, and organisational responsibilities, which demonstrates, with reasonable assurance, that adequate mitigative actions and protective measures can and will be taken in the event of an Emergency, including a Hostile Event. The Emergency Plan shall be provided to the Authority for approval prior to the Commissioning of the Nuclear Facility.
2. The Licensee shall propose a performance-based Emergency Plan that focuses the efforts of the Response Organisation on actual performance.

3. The Licensee shall ensure that its Emergency Plan takes into account abnormal events resulting from equipment malfunction, human errors or from natural phenomena (e.g., seismic events) as well as Hostile Events that may include large fires, mass casualties, and explosion damage.
4. The Licensee shall ensure that on-shift personnel assigned Emergency Plan implementation functions are not assigned any responsibilities that would prevent them from performing their assigned Emergency Plan functions when needed.
5. The Licensee will include a Concept of Operations in the Emergency Plan, which demonstrates the Licensee's Emergency Preparedness and which addresses all phases of operations including shutdown operations and refuelling.
6. The Licensee shall include in the Emergency Plan arrangements for protecting emergency responders and other plant personnel during a Hostile Event.
7. The Licensee shall indicate the principles which will be used for declaring termination of a declared Emergency and measures to be taken during post Emergency period.
8. The Licensee shall have procedures for recording communications exchanged with various parties.

Article (5)

The Licensee shall:

1. Identify and/or detect Emergencies;
2. Take immediate action to mitigate the consequences of the Emergency;
3. Take measures to minimize radiation exposure onsite and offsite (through interface with the coordinating agencies and Response Organisations); and
4. Declare the class of the Emergency as set forth in Article 9 of this regulation.

Article (6)

1. The Emergency Plan shall seek to optimise exposures below a chosen reference level of Residual Dose not to exceed 100 mSv/year.
2. The Licensee shall treat the reference level of Residual Dose as the dose above which intervention shall almost always be justifiable. The Emergency Plan shall aim to reduce doses below the reference level of Residual Dose, with Optimisation of the Emergency Plan achieving still lower doses.
3. Highest priority must be given to the avoidance of Deterministic Effects.

Article (7)

1. The Licensee shall ensure that no Emergency Worker is exposed in excess of the dose limit for exposure of workers established in FANR Regulation No. 4 (Regulation for

Radiation Dose Limits and Optimisation of Radiation Protection for Nuclear Facilities), except as set forth in paragraphs (2) and (3) of this Article .

2. In exceptional circumstances Emergency Workers, with their informed consent, and to the extent feasible, trained in the actions that may be required, may be exposed to effective Doses greater than the Dose limit for the exposure of workers established in FANR Regulation No. 4 (Regulation for Radiation Dose Limits and Optimisation of Radiation Protection for Nuclear Facilities), but the Licensee shall make all reasonable efforts to keep such Doses below the following limits:

Emergency Action	Emergency Exposure Limit (no more than)
Actions to save life or prevent serious injury	10 times maximum single-year occupational Dose limit
Actions to prevent the development of catastrophic conditions	10 times maximum single-year occupational Dose limit
Actions to avert a large collective Dose	2 times maximum single-year occupational Dose limit

3. Any exposure of Emergency Workers above the annual occupational Dose limit must be based on informed consent (from the Emergency Worker) and must be measured and recorded. Female workers who have notified the Licensee of their pregnancy must be excluded from emergency work.

Article (8)

1. The Licensee shall conduct an assessment of the potential Emergencies associated with the Nuclear Facility and shall include this assessment in its Emergency Plan. The assessment shall evaluate the probabilities of occurrence of severe damage states and the risks of major radioactive releases and shall include an assessment of the adequacy of plant Emergency procedures.
2. The Licensee shall use this assessment to predict radiation and contamination levels, and the Doses resulting from them, for all relevant Nuclear Facility conditions, and to help establish criteria for deciding when to take different Protective Actions in consultation with the coordinating agencies and Response Organisations.

Article (9)

1. The Emergency Plan shall provide for the equivalent of at least the following classes of Emergencies: (1) General Emergency; (2) Site Area Emergency; and (3) Alert.
2. The Emergency Plan shall include predefined Emergency Action Levels (EALs). These EALs will be based on the abnormal conditions for the Nuclear Facility, security related concerns, releases of Radioactive Material, environmental measurements and other observable indications and will make use of OILs as appropriate.
3. The Emergency Plan shall include EALs for all abnormal conditions that correspond to each of these classes of Emergency.
4. The Licensee shall take Hostile Events into account in defining the EALs. [Note: With regard to Hostile Events, the Licensee shall also establish preliminary actions to be taken in anticipation of such an event on the basis of advice from relevant Government agencies.]

Functional Requirements

Article (10)

The Licensee shall have the assessment capabilities to:

1. Identify and/or detect Emergencies;
2. Predict potential releases, including any plume characteristics and associated Doses, based on Nuclear Reactor conditions;
3. Conduct onsite monitoring and sampling to determine the existence and extent of any abnormal radiation levels or Radioactive Material releases; and
4. Project any plume characteristics and associated Doses based on onsite measurements.

Article (11)

The Licensee shall be capable of mitigative action to:

1. Regain control of the cause of the Emergency;
2. Minimise to the extent possible any increased radiation levels or releases of Radioactive Material resulting from the Emergency; and
3. Notify the Authority and offsite authorities.

Article (12)

The Licensee shall be capable of Protective Actions that will protect both workers and onsite Emergency responders such as fire-fighters and medical workers.

Article (13)

The Licensee shall have the plans and procedures, developed in advance, and the capabilities necessary to take actions that mitigate the non-radiological onsite consequences of the Emergency, working as necessary with the coordinating agencies and Response Organisations.

Requirements for Infrastructure

Article (14)

The Licensee shall establish organisational arrangements consistent with its Management System for coping with the Emergencies described in Article 9 of this regulation. The arrangements shall be described in the Emergency Plan, including definition of authorities, responsibilities, and duties of individuals assigned to it and the means for notification of such individuals in the event of an Emergency.

Article (15)

1. The Licensee shall provide the facilities, equipment and locations necessary to respond to an Emergency, which include:
 - a. The control room, which, in addition to being the location for operational control of the facility, is also the location where detection and classification of the Emergency and activation of the Licensee's Emergency organisation are expected to occur;
 - b. The Emergency Operations Facility;
 - c. The Technical Support Centre;
 - d. The Operational Support Centre;
 - e. An onsite Emergency medical facility with provisions for treating injuries, including contaminated victims, and staffed with competent personnel trained in Emergency treatment of radiation injuries;
 - f. Plans for and access to long term medical treatment at a hospital that is competent to treat radiation injuries;
 - g. Assembly points where non-essential onsite personnel are assembled, accounted for, and sheltered or evacuated;
 - h. A system for notification of Emergencies to the Authority and to the competent authorities; and
 - i. Equipment and supplies including communications equipment, survey meters, personnel dosimetry, protective clothing, decontamination facilities, and sample collection and testing equipment.

2. Each Emergency facility or location shall be designed to support the functions that take place within it, be usable under Emergency conditions, including Hostile Events, and be integrated into the Licensee's organisational arrangements as required by Article 14 of this regulation.

Article (16)

The Licensee shall implement an Emergency Response data system that provides for the automated transmission of timely and accurate updates of safety-critical plant parameters from the Licensee's installed onsite computer system to the Emergency Operations Facility in the event of an Emergency. The Licensee shall test the data system periodically to verify system availability and operability. The frequency of the data system testing shall be quarterly.

Article (17)

1. The Licensee shall provide training for all individuals that may be involved in an Emergency.
2. This training shall include testing to demonstrate that the individuals understand their assignments, duties, and responsibilities in the event of an Emergency.
3. The Licensee shall conduct periodic drills of its Emergency Plan to ensure that its employees are familiar with their specific Emergency Response duties.
4. The Licensee will conduct appropriate drills involving the employees who have defined roles in the Emergency organisational arrangements quarterly to assure the effectiveness of the Emergency Plan.
5. The Licensee shall review the results of these drills and any necessary retraining or corrections to the Emergency Plan will be made by the Licensee who will also communicate any relevant findings to the competent authorities.

Article (18)

1. The Licensee shall document and maintain the review and update of the Emergency Plan, procedures and other arrangements and incorporate lessons learned from research, operating experience (such as the response to Emergencies), and Emergency drills and exercises.
2. The Licensee shall ensure that its Emergency facilities, equipment, and supplies are up-to-date and properly maintained.