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## **Regulatory Guide**

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# **Regulatory Guide for Emergency Preparedness for Nuclear Facilities (FANR-RG-035)**

## **Version I**

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## Basic Principle of Regulatory Guides

Regulatory guides are issued to describe methods and/ or criteria acceptable to the Authority for meeting and implementing specific requirements in the Authority's regulations. Regulatory guides are not substitutes for regulations, and compliance with them is not required. Methods of complying with the requirements in regulations different from the guidance set forth by the regulatory guide can be acceptable if the alternatives provide assurance that the requirements are met.

### Definitions

#### Article (1)

For purposes of this regulatory guide, the following terms shall have the meaning set forth below. Other capitalised terms used but not defined herein shall have the meaning ascribed to them in Article 1 of the Federal Law by Decree No 6 of 2009, Concerning the Peaceful Uses of Nuclear Energy (i.e. the Nuclear Law) and in Article (1) of FANR Regulation for Emergency Preparedness for Nuclear Facilities (FANR-REG-12).

#### Emergency Exposure Situation

A situation of exposure that arises as a result of an Accident, a malicious act or other unexpected event, and requires prompt action in order to avoid or to reduce adverse consequences.

#### Emergency Response Facilities

Facilities that can be used to improve Emergency Response to Accidents such as the Technical Support Centre, Operational Support Centre, and Emergency Operations Facility.

#### Plant Operator

Any member of the plant staff who is qualified by virtue of training and experience to assess the indications or reports for validity, and to compare the same to the Emergency Action Levels in the Licensee's Emergency classification scheme.

### Purpose

#### Article (2)

1. This regulatory guide provides acceptable methods and guidance to Licensee conducting activities involving the preparation, planning for and response to an Emergency at a Nuclear Facility. It complements Version 1 of FANR Regulation for Emergency Preparedness for Nuclear Facilities (FANR-REG-12).
2. This regulatory guide addresses the following requirements of FANR regulations:
  - a) Emergency Preparedness programme including:
    - i. Carrying out a Hazard Assessment, Article 5 of Version 1 of FANR-REG-12



- ii. Defining a standard Emergency classification scheme, Article 6 of Version 1 of FANR-REG-12
  - iii. Identification and notification of an Emergency, Article 7 of Version 1 of FANR-REG-12
  - iv. Conducting an Emergency assessment, Article 8 of Version 1 of FANR-REG-12
  - v. Implementing mitigating actions, Article 9 of Version 1 of FANR-REG-12
  - vi. Medical management, Article 13 of Version 1 of FANR-REG-12
  - vii. Response to non-radiological consequences, Article 14 of Version 1 of FANR-REG-12
  - viii. Arrangements for public communication, Article 15 of Version 1 of FANR-REG-12
  - ix. Arrangements for radioactive waste management, Article 17 of Version 1 of FANR-REG-12
  - x. Analysis of the Emergency and response, Article 18 of Version 1 of FANR-REG-12
  - xi. Maintaining the On-site Emergency Plan and procedures, Article 19 of Version 1 of FANR-REG-12
  - xii. Maintaining the Emergency organisation, Article 20 of Version 1 of FANR-REG-12
  - xiii. Logistics for facilities and equipment, Article 21 of Version 1 of FANR-REG-12
  - xiv. Implementing an Emergency Response data system, Article 22 of Version 1 of FANR-REG-12
  - xv. Arrangements for quality management, Article 24 of Version 1 of FANR-REG-12
3. This regulatory guide does not provide detailed guidance on Protective Actions and Emergency Termination, which are addressed in FANR Regulatory Guide on Criteria for Protection in Response to a Nuclear or Radiation Emergency (FANR-RG-024).
  4. This regulatory guide does not provide detailed guidance on the process for changes to the Emergency Plan, which is addressed in FANR Regulatory Guide on Significance Evaluations for Modifications for Nuclear Facilities during Operation (FANR-RG-029).
  5. This regulatory guide does not provide detailed guidance on Drills and Exercises, which is addressed in FANR Regulatory Guide on Preparation, Conduct and Evaluation of Drills and Exercises for Nuclear Facilities (FANR-RG-034).
  6. This regulatory guide does not address FANR Regulation on Requirements for Off-site Emergency Plans for Nuclear Facilities (FANR-REG-15).
  7. The Nuclear Energy Institute (NEI) issued guidance on how to develop Emergency Action Levels that are applicable in all modes of plant operations in Revision 6 of the Development of Emergency Action Levels for Non-Passive Reactors (NEI 99-01) document. That revision provides acceptable guidance on the requirements for Emergency Action Levels (Article 6 of Version 1 of FANR-REG-12).
  8. The following documents [the latest revisions as of the approval date of this regulatory guide] serve



as the primary sources for this regulatory guide:

- a) NUREG-0654 FEMA-REP-1, Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants
- b) NUREG-0696, Functional Criteria for Emergency Response Facilities
- c) NSIR/DRP-ISG-01, Interim Staff Guidance Emergency Planning for Nuclear Power Plants
- d) NEI-99-01, Development of Emergency Action Levels for Non-Passive Reactors
- e) NEI-99-02, Regulatory Assessment Performance Indicator Guideline
- f) IAEA GSR Part 7, Preparedness and Response for a Nuclear or Radiological Emergency
- g) IAEA GS-G-2.1, Arrangements for Preparedness for a Nuclear or Radiological Emergency
- h) US NRC Regulatory Guide 1.101, Emergency Response Planning and Preparedness for Nuclear Power Reactors
- i) OECD/ NEA, Management of Radioactive Waste after a Nuclear Power Plant Accident
- j) FEMA P-1028, Program Manual Radiological Emergency Preparedness

## Hazard Assessment

### Article (3)

A Hazard Assessment should be carried out to provide a basis for a graded approach in preparedness and response for a nuclear Emergency.

The Licensee should identify hazards and potential consequences of an Emergency. These should be assessed to provide a basis for establishing arrangements for preparedness and response for a nuclear Emergency. These arrangements should be commensurate with the hazards identified and the potential consequences of an Emergency.

1. The Hazard Assessment should take into account:

- a) Events that could affect the Nuclear Facility or activity including events of very low probability and events not considered in the plant Design as required in FANR Regulation for the Design of Nuclear Power Plants (FANR-REG-03);
- b) Events involving a combination of a nuclear Emergency with a conventional Emergency such as an Emergency following an earthquake, a volcanic eruption, a tropical cyclone, severe weather, a tsunami, an aircraft crash or civil disturbances that could affect wide areas and/ or could impair capabilities to provide support in the Emergency Response;
- c) Events that could affect several Nuclear Facilities and/ or multiple units and activities concurrently, as well as consideration of the interactions between the Nuclear Facilities and activities affected; and
- d) Events at Nuclear Facilities in other countries or events involving activities in other countries.

2. The Hazard Assessment should take into account the results of threat assessments made for nuclear



- security purposes. Nuclear security threat assessments are addressed in a separate regulatory guide.
3. In the Hazard Assessment, Nuclear Facilities and activities, On-site areas, Off-site areas and locations should be identified for which a nuclear Emergency could warrant any of the following with account taken of the uncertainties in and limitations of the information available:
    - a) Precautionary Urgent Protective Actions to avoid or to minimise severe Deterministic Effects by keeping Doses below Generic Criteria levels at which Urgent Protective Actions and other response actions are required to be undertaken under any circumstances;
    - b) Urgent Protective Actions and other response actions to avoid or to minimise severe Deterministic Effects and to reduce the risk of stochastic effects;
    - c) Early Protective Actions and other response actions;
    - d) Other Emergency Response actions such as longer term medical actions and Emergency Response actions to enable the termination of the Emergency; or
    - e) Protection of Emergency workers.
  4. The Hazard Assessment should include the exchange of information with nearby states whose territories may fall within the precautionary action zone or Urgent Protective Action planning zone of the Licensee's Facility within the territory of the State performing the Hazard Assessment.
  5. The Hazard Assessment should identify:
    - a) significant non-radiation related hazards to people On-site and Off-site that are associated with the Nuclear Facility or activity, and that may impair the effectiveness of the response actions to be taken;
    - b) additional sources of ionising radiation including:
      - i. Mobile sources
      - ii. Transport of quantities of Radioactive Material
      - iii. Non-authorised activities such as activities relating to Radiation Sources obtained illicitly; and
    - c) State jurisdiction for the hazard.
  6. The Licensee should review the Hazard Assessment periodically with the aim of:
    - a) Ensuring that all facilities and activities, On-site areas, Off-site areas and locations where events could occur that would necessitate Protective Actions and other response actions are identified; and
    - b) Taking into account any changes in the hazards within the State and beyond its borders, any changes in assessments of threats for nuclear security purposes, the experience and lessons learnt from research, operation and Emergency exercises, and technological developments. The results of this review should be used to revise the Emergency arrangements as necessary.



## **Emergency Classification Article (4)**

1. The On-site Emergency Plan should be categorized into different classes of Emergency situations. The system of classification is based on the nuclear Emergency warranting Protective Actions and other response actions to protect workers, Emergency workers, and members of the public. The Emergency classification levels in ascending order of severity are as follows:
  - a) Notification of Unusual Event
  - b) Alert
  - c) Site Area Emergency
  - d) General Emergency
2. The plan should describe the limiting scope considered for each identified class of Emergency i.e. the area and/ or persons affected by the consequences. The plan should also describe for each class the preliminary actions to be taken to cope with the situation, the authority or title of the individual responsible for initiating these actions, and the organisations that would be alerted and mobilised.
3. An Emergency Action Level should be a pre-defined, site-specific, observable threshold for an initiating condition that when met or exceeded places the plant in a given Emergency classification level. Revision 6 of the Development of Emergency Action Levels for Non-Passive Reactors (NEI 99-01) provides guidance on how to develop Emergency Action Levels that are applicable in all modes of plant operations.
4. The Emergency Action Levels should take into account malicious acts including Hostile Events

## **Identification and Notification**

### **Article (5)**

1. The Licensee should have arrangements in place for the prompt identification or detection of a nuclear Emergency and for the activation of an Emergency Response.
  - a) The Licensee should make arrangements to promptly classify (on the basis of the Hazard Assessment) a nuclear Emergency warranting Protective Actions and other response actions to protect workers, Emergency workers, members of the public, and patients and helpers in an Emergency in accordance with the On-Site Emergency Plan.
  - b) The Licensee should identify, assess and declare an Emergency Class within 15 minutes once available parameters reach an Emergency Action Level. Emergency Classification is expected to be made promptly following an indication that the conditions have reached a threshold in accordance with the Licensee's Emergency Action Level scheme. With respect to the classification



of emergencies, the 15-minute goal is a reasonable period of time for assessing and classifying an Emergency once indications are available to control room operators that an Emergency Action Level has been exceeded. Allowing up to 15 minutes to classify an Emergency will have minimal impact upon the overall Emergency Response to protect the public's health and Safety.

- c) The 15-minute period is to commence when plant instrumentation, plant alarms, computer displays or incoming verbal reports that correspond to an Emergency Action Level first become available to any Senior Reactor Operator.
  - i. A Senior Reactor Operator may be a certified operator or member of the Emergency Response organisation. Plant Operators may be located in the control room or in another Emergency Response Facility in which Emergency declarations are performed.
  - ii. A Senior Reactor Operator does not include plant staff such as chemists, Radiation Protection technicians, craft personnel, security personnel, and others whose positions require that they report (rather than assess) abnormal conditions to the control room.
- d) The 15-minute period includes all assessment, classification and declaration actions associated with making an Emergency declaration from the first instance of a plant indication or the report of an abnormal condition by Plant Operators up to and including the declaration of an Emergency. If classifications and declarations are performed away from the control room, all delays incurred in transferring information from the control room (where the alarms, indications and reports are first received) to the Emergency Response Facility (at which declarations are made) should be included within the 15-minute period.
- e) Validation or confirmation of plant indications, or reports to the Senior Reactor Operator, are to be made within the 15-minute period as part of the assessment. Since this validation or confirmation is performed to determine the veracity of an alarm, indication or report, the 15-minute period starts with the receipt of the alarm, indication, or report, and not the completion of the validation or confirmation because the former is the time that the information was first available.
- f) A small number of Emergency Action Level thresholds are related to the results of analyses (e.g. Dose assessments, chemistry sampling, and/ or Inspections) that are necessary to ascertain whether a numerical Emergency Action Level threshold has been exceeded rather than confirming or verifying an alarm or a received report. In most of these cases, the basis document of the Emergency Action Level will provide the details of the analysis necessary and its scope.
  - i. In these limited cases, the 15-minute declaration period starts with the availability of analysis results that show the threshold to be exceeded; this is the time that the information is first available.
  - ii. The Licensee are expected to establish the capability to initiate and complete these analyses with a reasonable sense of urgency. For example, if a particular skill set is necessary to assess one or more Emergency Action Level thresholds, that expertise should be available on-shift.
- g) This 15-minute period ends as soon as the Licensee of the Nuclear Power Plant determines that an Emergency Action Level has been exceeded, upon identification of the appropriate Emergency Classification Level, and the moment the Licensee makes the Emergency declaration. The Licensee should promptly declare the Emergency condition as soon as possible following the identification of the appropriate Emergency Classification Level. In this case, the word 'promptly' means the next available opportunity unimpeded by activities unrelated to the Emergency



declaration unless such activities are necessary to protect the health and Safety of individuals.

2. The Licensee should have arrangements in place for the prompt notification of a nuclear Emergency and for the activation of an Emergency Response.
  - a) The Licensee should be able to initiate immediate communication with the Authority that has been assigned the responsibility to decide on and to initiate precautionary Urgent Protective Actions and Urgent Protective Actions off the site.
  - b) Arrangements should be made to promptly and directly notify any Response Organisation within the Emergency planning zones and Emergency planning distances within which Urgent Protective Actions and early Protective Actions and other response actions could be required to be taken.
  - c) The Licensee should notify the Authority and Response Organisation within 15 minutes after the event classification. The Licensee should also notify the Authority and Response Organisation within 15 minutes of a Protective Action recommendation. The notification is considered to be initiated when contact is made with the first agency to submit the initial notification information. The Licensee should notify the Authority and Response Organisation within 15 minutes for a change in event classification. The Licensee should also notify the Authority and Response Organisation within 15 minutes for a change in the Protective Action recommendation.
  - d) The Licensee should be able to initiate the notification and activation of the Emergency Response organisation personnel upon the declaration of an Emergency.

### **Emergency Assessment Article (6)**

1. The Licensee should have adequate methods, systems and equipment to assess and monitor the actual consequences of a Nuclear Emergency, or predict potential Off-site consequences of a nuclear Emergency condition. Effective coordination and direction of all elements of the Emergency organisation require continuous assessment throughout the duration of an Emergency situation. Assessment functions should be incorporated in explicit procedures for each Emergency Classification.
2. The Licensee should identify plant system and effluent parameter values characteristic of a spectrum of abnormal conditions and Accidents, and should identify the plant parameter values or other information that correspond to initiating conditions. Such parameter values and the corresponding Emergency class should be included in the appropriate Facility's Emergency procedures. The Facility's Emergency procedures should specify the kinds of instruments being used and their capabilities.
3. The Licensee should establish On-site capability and resources to provide initial values and continuous assessment throughout the course of an Accident, which should include post-Accident sampling capability, Ionising Radiation and effluent monitors, in-plant iodine instrumentation, and containment radiation monitoring.
4. The Licensee should establish methods and techniques to be used for determining:



- a) The source term of releases of Radioactive Material within plant systems e.g. the relationship between the containment's Ionising Radiation monitor(s) reading(s) and Radioactive Material available for release from containment; and
  - b) The magnitude of the release of Radioactive Materials based on plant system parameters and effluent monitors.
5. The Licensee should establish the relationship between effluent monitor readings and On-site and Off-site exposures and contamination for various meteorological conditions.
6. The Licensee, where appropriate, should provide methods, equipment and expertise to make rapid assessments of the actual or potential magnitude and locations of any radiological hazards through liquid or gaseous release pathways.

## Mitigation

### Article (7)

1. The Licensee should promptly decide on and take actions On-site that are necessary to mitigate the consequences of a nuclear Emergency. Arrangements should be made for mitigating actions to be taken by the operations personnel in particular:
  - a) To prevent escalation of an Emergency;
  - b) To reduce the potential for (and to mitigate the consequences of) releases of Radioactive Material or exposures: and
  - c) To recover the Facility to a safe and stable state.
2. Arrangements for mitigating actions should take into account the full range of possible conditions affecting the Emergency Response including those resulting from conditions in the Facility and those resulting from the impact of postulated natural or human-induced events, or other types of events affecting regional infrastructure or several facilities simultaneously. Arrangements should include Emergency operating procedures and guidance for operations personnel on mitigating actions for a full range of Emergencies. As far as practicable, the continued functionality of Nuclear Security and safeguards (see FANR-REG-10) system(s) needs to be considered in these arrangements.
3. At the Emergency Preparedness stage, the Licensee should assess and determine when and under what conditions assistance from Off-site Emergency services may need to be provided on the site in line with the Hazard Assessment and the protection strategy.
4. The Licensee should make arrangements to provide technical assistance to the operating personnel. On-site teams for mitigating the consequences of an Emergency (e.g. damage control, firefighting) should be available and should be prepared to perform actions at the Facility.



5. The Licensee directing mitigating actions should be provided with information and technical assistance to allow them to take actions effectively to mitigate the consequences of the Emergency. Arrangements should be made to obtain support promptly from the Off-site Emergency services (e.g. law enforcement agencies, medical services and firefighting services) Off-site.. Off-site Emergency services should be given prompt access to the Facility, informed of On-site conditions, and provided with instructions and the means to protect themselves as Emergency workers.
6. The Licensee should make arrangements for the first responders in an Emergency at an unforeseen location, and those personnel at locations where there is a significant likelihood of encountering a dangerous, uncontrolled Radioactive Source to take all practicable and appropriate actions to mitigate the consequences of a nuclear Emergency as promptly as possible. These arrangements should include providing basic instructions and training in the means of mitigating the potential consequences of a nuclear Emergency.
7. The Licensee should make arrangements to provide expertise and services in Radiation Protection promptly to the Off-site Response Organisation, first responders in an Emergency at an unforeseen location, and specialised services responding to an Emergency where there is a significant likelihood of encountering a dangerous, uncontrolled Radioactive Source. This should include arrangements for on-call advice or other appropriate mechanisms and arrangements to dispatch to the site an Emergency team capable of assessing radiation hazards, mitigating radiological consequences and managing the exposure of Emergency workers. Arrangements should also be made to determine whether and when additional assistance is necessary and to determine how to obtain such assistance.

## Medical Management

### Article (8)

1. Upon presentation of clinical symptoms of radiation exposure or other indications associated with a possible nuclear Emergency, the Licensee's medical personnel or other responsible parties who identify the clinical symptoms or other indications should notify the appropriate officials and should take Emergency Response actions as appropriate. The clinical symptoms or other indications should be evaluated by the medical or clinical practitioner.
2. Arrangements should be made for medical personnel (i.e. both general practitioners and Emergency medical staff) to be notified of the clinical symptoms of radiation exposure, and of the appropriate notification procedures and other Emergency Response actions to be taken if a nuclear Emergency arises or is suspected.
3. The Licensee should make arrangements so that individuals with possible contamination can promptly be given appropriate medical attention in a nuclear Emergency. These arrangements should include ensuring that transport services are provided where needed and giving instructions to medical personnel on the precautions to take.
4. The Licensee should make arrangements to manage an adequate number of any individuals with contamination or any individuals who have been overexposed to Ionising Radiation including arrangements for first aid, estimated Doses required, medical transport and initial medical treatment in predesignated medical facilities.



5. Arrangements should be made to identify individuals with possible contamination and those who have possibly been sufficiently exposed for radiation induced health effects to provide them with appropriate medical attention including longer term medical follow-up. These approved arrangements should include but not be limited to:
  - a) Guidelines for effective diagnosis and treatment;
  - b) Designation of medical personnel trained in clinical management of radiation injuries; and
  - c) Designation of institutions to evaluate radiation exposure (both internal and external), and to provide specialised medical treatment and take longer-term medical actions.
6. Arrangements made for local and back-up hospital and medical services, and the capability for the evaluation of radiation exposure and uptake should be described. For both hospital and medical services, the plan should incorporate additional guidance with an agreement (e.g. memorandum of understanding) that the required services are available, and that the people providing them are prepared and qualified to handle a nuclear Emergency.
7. Arrangements should be made to identify individuals with possible contamination and individuals who have possibly been sufficiently exposed to have incurred radiation induced health effects, and to provide them with appropriate medical attention including long-term medical follow-up.

## **Non-radiological Consequences**

### **Article (9)**

1. The Licensee should make arrangements to mitigate non-radiological consequences of a nuclear Emergency and of an Emergency Response.
  - a) The Licensee should make arrangements to mitigate the non-radiological consequences of a nuclear Emergency and those of an Emergency Response, as well as arrangements to respond to public concern in a nuclear Emergency. These should include arrangements for providing the people affected with:
    - i. Medical and psychological counselling, as appropriate; and
    - ii. Adequate social support, as appropriate.
  - b) The Licensee should make arrangements to support the offsite to mitigate the impact on international trade of a nuclear Emergency and associated Protective Actions and other response actions. These arrangements should provide for the issuance of information to the public and interested parties (such as import states) on controls put in place in relation to traded commodities including food, and on vehicles and cargo being shipped, and on any revisions of the relevant national criteria.

## **Public Communications**

### **Article (10)**



1. The Licensee should make arrangements to support the offsite agencies to provide useful, timely, true, clear and appropriate information to the public in a nuclear Emergency with account taken of the possibility that the usual means of communication might be damaged in the Emergency or by its initiating event (e.g. by an earthquake or by flooding) or overburdened by demand for its use. These arrangements should take into account the need to protect sensitive information in circumstances where a nuclear Emergency is initiated by a Nuclear Security event.
2. The Licensee should make arrangements to ensure that information provided to the public by the Licensee, Response Organisations, international organisations and others in a nuclear Emergency is coordinated and consistent with due recognition of the evolutionary nature of an Emergency.
3. The Licensee should make arrangements so that in a nuclear Emergency information is provided to the public in plain, clear and understandable language. The information should include associated health hazards, and clear instructions on any actions to be taken during an emergency.
4. The Licensee should make arrangements to identify and address to the extent practicable misconceptions, rumors and incorrect and misleading information that might be circulating widely in a nuclear Emergency in particular those that might result in actions being taken beyond those Emergency Response actions that are warranted.
5. The Licensee should make arrangements to respond to enquiries from the public and from the media; both national and international. These arrangements should recognise the evolutionary nature of an Emergency and the need to respond in a timely manner to enquiries even when the information requested is not yet available.

## Radioactive Waste Management

### Article (11)

1. The Radioactive Waste Management organisation appointed by the UAE Cabinet or other appropriate UAE government entity should co-ordinate and oversee the planning and implementation of effective measures to manage the Radioactive Waste generated beyond the precautionary action zone (PAZ) safely and effectively after a nuclear Emergency. A Licence granted by the Authority is required prior to commencing a Regulated Activity pertaining to Radioactive Waste in accordance with Article (25) of the Law authorising such Regulated Activity.
2. The Radioactive Waste Management organisation should provide guidance on the management of Radioactive Waste generated in the PAZ and urgent Protective Action planning zone (UPZ) safely and effectively in a nuclear Emergency in accordance with the requirements of applicable regulations issued by the Authority pursuant to the Law.
3. Radioactive Waste arising in a nuclear Emergency including Radioactive Waste arising from associated Protective Actions and other response actions taken should be identified and categorised in due time, and should be managed in a manner that does not compromise the protection strategy with account taken of prevailing conditions as these evolve.
4. Based on the characterisation of the Radioactive Waste, the following steps should be considered regarding the Radioactive Waste generated during a nuclear Emergency:
  - a) Discharge or dispose of Radioactive Waste if it meets the exemption levels set forth in FANR-



REG-27;

- b) Treat, condition and/ or decontaminate prior to discharge, or dispose of the waste if it meets the clearance levels set forth in FANR-REG-27 and
  - c) Store and dispose of the waste in a Radioactive Waste Repository primarily as appropriate in a near-surface radioactive waste disposal facility for low level Radioactive Waste when available. Intermediate radioactive waste will either be disposed in an intermediate radioactive waste disposal facility or in a geological repository.
5. The appointed organisation or government entity should make arrangements for Radioactive Waste to be managed safely and effectively in accordance with the requirements of FANR-REG-27 issued by the Authority pursuant to the Law. These arrangements should include, but not be limited to:
- a) A plan to characterise waste including *in situ* measurements and analysis of samples;
  - b) Criteria for categorising waste;
  - c) Avoiding to the extent possible mixing waste of different categories;
  - d) Minimising the amount of material unduly declared as Radioactive Waste;
  - e) A method for determining appropriate options for the pre-disposal management of Radioactive Waste (including processing, Storage and transport) with account taken of the interdependences between all steps as well as the impact on the anticipated end i.e. clearance, authorised discharge, re-use, recycling or Disposal;
  - f) A method of identifying appropriate Storage options and sites; and
  - g) Consideration of non-radiological aspects of waste e.g. chemical properties such as toxicity and biological properties.
6. The appointed organisation or government entity should make arrangements to carry out radiological and environmental assessments to support the identification of priorities, identify feasible management options and select preferred options from feasible alternatives.
7. In cases where the generated Radioactive Waste from the nuclear Emergency exceeds limits for the near-surface Radioactive Waste Disposal Facility, the appointed organisation or government entity should make arrangements to appropriately store and stabilise the waste until a final Disposal solution is developed. The Radioactive Waste Management organisation is responsible for the Disposal of Radioactive Waste in accordance with Article (41)1 of the Law.
8. Any large volumes of Radioactive Waste generated as a result of Emergency Response, recovery actions such as remediation of affected areas, Decommissioning of the affected Facilities, and secondary waste arising from waste processing facilities may be managed by the Radioactive Waste Management organisation or other government entity authorised by the relevant decision of the UAE cabinet.

### Analysis of Emergency and Emergency Response



### Article (12)

1. The Licensee should analyse the nuclear Emergency and the Emergency Response in order to identify actions to be taken to avoid other Emergencies and to improve Emergency arrangements.
  - a) The Licensee should make arrangements to document, protect and preserve in an Emergency Response to the extent practicable any data and information important for an analysis of the nuclear Emergency and the Emergency Response. Arrangements should be made to undertake a timely and comprehensive analysis of the nuclear Emergency and the Emergency Response with the involvement of interested parties. The analysis should give due consideration to:
    - i. The reconstruction of the circumstances of the Emergency;
    - ii. The root causes of the Emergency;
    - iii. General implications for Safety including the possible involvement of other Radioactive Sources or devices;
    - iv. General implications for Nuclear Security, as appropriate;
    - v. Necessary improvements to Emergency arrangements; and
    - vi. Recording and documenting communications exchanged with various parties during the Emergency.
  - b) The Licensee should make arrangements to enable comprehensive interviews on the circumstances of the nuclear Emergency to be conducted with those involved.
  - c) The Licensee should make arrangements to acquire the expertise necessary to conduct an analysis of the circumstances of the nuclear Emergency.
  - d) The Licensee should make arrangements to take actions promptly on the basis of an analysis to avoid other Emergencies including the provision of information to other interested parties.

### On-site Emergency Plan and Procedures

### Article (13)

1. The Licensee should establish plans and procedures necessary for effective response to a nuclear Emergency.
  - a) Plans, procedures and other arrangements for effective Emergency Response including coordinating mechanisms, letters of agreement, or legal instruments should be made to facilitate coordination of the Emergency Response. The arrangements for a coordinated Emergency Response:
    - i. Should specify the organisation responsible for the development and maintenance of the arrangements;
    - ii. Should describe the responsibilities of the on-shift initial response organisation and other Response Organisations; and



- iii. Should describe the coordination between these arrangements and the arrangements for response to a conventional Emergency and to a Nuclear Security event.
- b) The Licensee should prepare an Emergency Plan to coordinate and perform the assigned functions and in accordance with the Hazard Assessment and the protection strategy. Emergency Plans should specify how responsibilities for managing operations in an Emergency Response are to be discharged on the site as appropriate. The Licensee should ensure that the Emergency Plan(s) do not conflict with other plans (e.g. Offsite Emergency Plan) and procedures that may be implemented in a nuclear Emergency. A liaison with the relevant parties would ensure that the simultaneous implementation of all the plans do not reduce their effectiveness or cause conflicts. Such other plans and procedures include but are not limited to:
  - i. Emergency Plans for Nuclear Facilities;
  - ii. Security plans and contingency plans;
  - iii. Evacuation plans; and
  - iv. Plans for firefighting.
- c) The Licensee's Emergency Plan should be communicated with those of other organisations that have responsibilities in a nuclear Emergency.
- d) The Licensee should develop the necessary procedures and analytical tools to be able to perform the functions for the goals of Emergency Response to be achieved and for the Emergency Response to be effective.

## Emergency Organisation

### Article (14)

1. The overall organisation for preparedness and response for a nuclear Emergency should be clearly specified and staffed with sufficient personnel who should be qualified and should be assessed for their fitness for their intended duties.
  - a) The organisational relationships for preparedness and response for a nuclear Emergency and interfaces between the Response Organisations should be established.
  - b) The positions responsible within the Response Organisation for performance of the response functions should be assigned in the Emergency Plans and procedures. The positions responsible in each Response Organisation for the performance of activities at the preparedness stage in accordance with these requirements should be assigned as part of the routine organisational structures and should be specified, as appropriate, in the Emergency Plans and procedures.
  - c) The supporting organisations and Response Organisations will make arrangements for the selection of personnel and for training to ensure that the personnel selected have the requisite skills, knowledge and abilities to perform their assigned response functions. The arrangements will include arrangements for continuing refresher training on an appropriate schedule and arrangements for ensuring that personnel assigned to positions with responsibilities in an



Emergency Response undergo the specified training.

- d) Personnel who are assigned to positions in all Response Organisations to perform the functions necessary to meet the requirements should be qualified and should be assessed for their initial fitness and continuing fitness for their intended duties.
- e) The Emergency activity should include the following functional areas:
- i. Plant systems operations.
  - ii. Radiological survey and monitoring.
  - iii. Firefighting.
  - iv. Rescue operations.
  - v. First aid.
  - vi. Decontamination.
  - vii. Security of plant and access control.
  - viii. Maintenance (repair and damage control).
  - ix. Personnel accountability.
  - x. Recordkeeping.
  - xi. Communications.
- f) Appropriate numbers of suitably qualified personnel should be available at all times (such as during 24-hour operations) so that appropriate positions can be promptly staffed as necessary following the declaration and notification of a nuclear Emergency. Appropriate numbers of suitably qualified personnel should be available in the long-term to staff the various positions necessary to take mitigating actions, Protective Actions and other response actions. Details of the required staffing levels can be found in Table 1 in this regulatory guide.
- i. The minimum number of personnel assigned Emergency Response Organisation functions (minimum staffing) is dependent on specific Licensee requirements for the site specific Emergency Plan.
  - ii. Table 1 lists the basic functions needed to implement the typical Emergency Plan. It is intended to provide a model for Licensee to consider in the development of their site-specific Emergency Plan. The minimum requirements for on-shift staffing and augmented staff for the Emergency Response Organisation should be described in the staffing plan. The Emergency Plan should have only one staffing plan.
  - iii. The actual names of the positions are as defined in the site-specific Emergency Plan.
  - iv. The locations of these positions are intended to provide a model for Licensee to consider in the development of their site-specific Emergency Plan. Licensee may choose to have these positions or functions at other facilities and/ or activated at different Emergency classification levels.



- v. Many of these functions may be assigned as additional duties, but the Licensee is required to support the position that no credible Accident scenario(s) can occur that would detract a given position from the performance of its assigned Emergency Response function(s).
- vi. The development of on-shift and Emergency Response Organisation staffing levels should be performance-based as much as possible as long as the capabilities of the listed functions are constantly maintained.
- g) For a site where multiple Nuclear Facilities are collocated, an appropriate number of suitably qualified personnel should be available to manage an Emergency Response at all facilities if each of the facilities is under Emergency conditions simultaneously.

## Logistics

### Article (15)

1. Logistical support and Emergency Response Facilities should be provided to enable Emergency Response functions to be carried out effectively in a nuclear Emergency.
2. The Emergency Operations Facility is a Licensee controlled and operated Off-site support centre.
  - a) The Emergency Operations Facility will have facilities for:
    - i. Management of the Licensee's overall Emergency Response;
    - ii. Coordination of radiological and environmental assessment;
    - iii. Decision-making on recommended public Protective Actions;
    - iv. Coordination of Emergency Response activities with local, national and federal government entities.
  - b) Facilities should be provided in the Emergency Operations Facility for the acquisition, display and evaluation of all radiological, meteorological and plant system data pertinent to determine Off-site protective measures. These facilities will be used to evaluate the magnitude and effects of actual or potential radioactive releases from the plant and to determine Off-site Dose projections. Facilities used to perform essential Emergency Operations Facility functions should be located within the Emergency Operations Facility complex. However, supplemental calculations and analytical support of Emergency Operations Facility evaluations may be provided from facilities outside the Emergency Operations Facility. The Licensee may also use the Emergency Operations Facility as the post-Accident recovery management centre.
  - c) The following factors should be taken into account for the location of the Emergency Operations Facility:
    - i. Whether the location provides optimum functional and availability characteristics to carry out the Licensee's functions specified for the Emergency Operations Facility (i.e. overall strategic



direction of the Licensee's On-site and support operations, decision-making on public Protective Actions to be recommended by the Licensee to Off-site officials, and coordination of the Licensee with local, national and federal government entities).

- ii. Whether the functions of the Emergency Operations Facility functions would be interrupted during radiation releases for which it was necessary to recommend Protective Actions for the public to Off-site officials.
- d) The habitability criteria for the Emergency Operations Facility determined by its location can be found in Table 2.
- e) The Emergency Operations Facility building or building complex should provide the following:
- i. Working space for the personnel assigned to the Emergency Operations Facility as specified in the Licensee's Emergency Plan including federal government personnel at the maximum level of occupancy without crowding (minimum size of working space provided should be approximately 75 sq-ft/ person).
  - ii. Space for Emergency Operations Facility data system equipment needed to transmit data to other locations.
  - iii. Sufficient space to carry out repair, maintenance and service of equipment, displays and instrumentation.
  - iv. Space for ready access to communications equipment by all Emergency Operations Facility' personnel who need communications capabilities to perform their functions.
  - v. Space for ready access to functional displays of Emergency Operations Facility' data.
  - vi. Space for storage of plant records and historical data or space for means to readily acquire and display those records.
- f) In order to ensure adequate radiological protection of the personnel of the Emergency Operations Facility, radiation monitoring systems should be provided in the Emergency Operations Facility. These monitoring systems may be composed of installed monitors or dedicated, portable monitoring equipment. These systems should continuously indicate radiation Dose rates and airborne radioactivity concentrations inside the Emergency Operations Facility while it is in use during an Emergency. These monitoring systems should include local alarms with trip levels set to provide early warning to Emergency Operations Facility' personnel of adverse conditions that may affect the habitability of the Emergency Operations Facility. Detectors to distinguish and detect the presence or absence of radioiodines at concentrations as low as  $3.7e-3$  Bq/cc should be provided.
- g) The Emergency Operations Facility should have reliable voice communications amenities to the Technical Support Centre, the Control Room, the Authority and Emergency operations centres. The normal communication path between the Emergency Response Facilities and the Control Room will be through the Technical Support Centre. The primary functions of Emergency Operations Facility voice communications amenities will be:
- i. Emergency Operations Facility management communications with the designated senior



- Licensee manager in charge of the Technical Support Centre.
- ii. Communications to manage the Licensee's Emergency Response resources.
  - iii. Communications to coordinate radiological monitoring.
  - iv. Communications to coordinate Off-site Emergency Response activities.
  - v. Communications to disseminate information and recommended Protective Actions to responsible government agencies.
- h) The Emergency Operations Facility voice communications amenities should include reliable primary and back-up means of communication. Voice communications may include private telephones, commercial telephones, and radio networks and intercommunications systems as appropriate to accomplish the Emergency Response Facilities' functions during Emergency conditions.
- i) The Emergency Operations Facility should have ready access to up-to-date plant records, procedures and Emergency Plans needed to exercise the overall management of the Licensee's Emergency Response resources. The Emergency Operations Facility records should include but not be limited to:
- i. Plant technical specifications.
  - ii. Plant operating procedures, Emergency operating procedures, and the final safety analysis report.
  - iii. Up-to-date records related to the Licensee and local Emergency Response plans.
  - iv. Off-site population distribution data.
  - v. Evacuation plans.
  - vi. Environs radiological monitoring records.
  - vii. Licensee's employee radiation exposure history.
- j) These records should be stored and maintained in the Emergency Operations Facility or should be available for submission electronically to the Emergency Operations Facility from another records storage location. The method of storage and presentation of the Emergency Response Facilities' records should ensure ease of access under Emergency conditions. The records available to the Emergency Operations Facility should be completely updated as necessary to ensure they are complete and up-to-date.
3. The Technical Support Centre is a Licensee controlled and operated On-site centre to provide technical support.
- a) The Technical Support Centre will provide the following functions:
- i. Provide plant management and technical support to plant operations personnel during Emergency conditions.



- ii. Relieve the Nuclear Power Plant Operators of peripheral duties and communications not directly related to Nuclear Power Plant system manipulations.
  - iii. Prevent congestion in the Control Room.
  - iv. Perform functions for the Alert class in an Emergency and for the Site Area Emergency class and General Emergency class until the Emergency Response Facility is functional.
- b) The Technical Support Centre should be the Emergency operations work area for designated technical, engineering and senior Licensee management personnel, and any other Licensee designated personnel required to provide the needed technical support. A senior Licensee official should use the resources of the Technical Support Centre to provide guidance and technical assistance to the operating supervisor in the Control Room. However, all manipulations should be performed by the Control Room's certified Operators.
- c) The Technical Support Centre should have facilities to support the plant management and technical personnel who will be assigned there during an Emergency, and will be the primary On-site communications centre for the plant during the Emergency. The Technical Support Centre personnel should use the Technical Support Centre data system to analyse the plant steady-state and dynamic behaviour prior to and throughout the course of an Accident. The results of this analysis will be used to provide guidance to the control room operating personnel in the management of abnormal conditions and in Accident mitigation. The Technical Support Centre personnel will also use the environmental and radiological information available from the Technical Support Centre data system to perform the necessary functions of the Emergency Response Facilities when the Emergency Operations Facility are not operational. The Technical Support Centre may also be used to provide technical support during recovery operations following an Emergency.
- d) The Technical Support Centre is to provide facilities near the Control Room for detailed analyses of the plant conditions during abnormal conditions or emergencies by trained and competent technical staff. The Technical Support Centre should be as close as possible to the Control Room; preferably located within the same building. The walking time from the Technical Support Centre to the Control Room should not exceed two minutes. This close location will facilitate face-to-face interaction between Control Room personnel and the senior plant manager working in the Technical Support Centre. This proximity will also provide access to information in the Control Room that is not available in the Technical Support Centre's data system.
- e) Provisions should be made for the safe and timely movement of personnel between the Technical Support Centre and the control room under Emergency conditions. These provisions should include consideration of the effects of direct radiation and airborne radioactivity from in-plant Radioactive Sources on personnel traveling between the two facilities. Anti-contamination clothing, respiratory protection, and other protective gear may be used to help protect personnel in transit. The 2-minute travel time between the Technical Support Centre and the Control Room does not include time required to put on any necessary radiological protective gear, but it does include the time required to clear any security checkpoints. There should be no major security barriers between these two facilities other than access control stations for the Technical Support Centre and Control Room.



- f) The Technical Support Centre may be housed in a complex of directly adjacent areas. It should be large enough to provide:
- Working space without crowding for the personnel assigned to the Technical Support Centre at the maximum level of occupancy (minimum size of working space provided should be approximately 75 sq-ft/ person).
  - Space for the Technical Support Centre data system equipment needed to acquire, process, and display data used in the Technical Support Centre.
  - Sufficient space to carry out repair, maintenance, and service of equipment, displays and instrumentation.
  - Space for data transmission equipment needed to submit data originating in the Technical Support Centre to other locations.
  - Space for personnel access to functional displays of Technical Support Centre data.
  - Space for unhindered access to communications equipment by all Technical Support Centre personnel who need communications capabilities to carry out their functions.
  - Space for storage of and/ or access to plant records and historical data.
- g) Since the Technical Support Centre is to provide direct management and technical support to the Control Room during an Accident, it should have the same radiological habitability requirements as the Control Room under Accident conditions. Technical Support Centre personnel should be protected from radiological hazards including direct radiation and airborne radioactivity from in-plant Radioactive Sources under Accident conditions to the same degree as Control Room personnel. In cases where the Technical Support Centre is uninhabitable, an alternate Technical Support Centre is available.
- h) The Technical Support Centre will be the primary On-site communications center for the Nuclear Facility during an Emergency. It should have reliable voice communications to the Control Room, the Operational Support Centre, the Emergency Operations Facility, and the Authority. The primary function of this voice communication system will be plant management communications and the immediate exchange of information on plant status and operations. Provisions for communications with State and local operations centres should also be provided in the Technical Support Centre to provide early notification and recommendations to Off-site Authorities prior to activation of the Emergency Operations Facility.
- i) Equipment should be provided to gather, store and display data needed in the Technical Support Centre to analyse plant conditions. The data system equipment should carry out these functions independent of actions in the control room and without degrading or interfering with control room and plant functions.
- j) The Technical Support Centre technical data system should receive, store, process and display information acquired from different areas of the plant as needed to perform the Technical Support Centre function. The data available for display in the Technical Support Centre should enable the plant management, engineering and technical personnel assigned there to aid the control room



- operators in handling Emergency conditions. The data system should provide access to accurate and reliable information sufficient to determine:
- i. Plant steady-state operating conditions prior to the Accident.
  - ii. Transient conditions producing the initiating event.
  - iii. Plant systems' dynamic behaviour throughout the course of the Accident.
- k) The Technical Support Centre data system may be used to:
- i. Review the Accident sequence.
  - ii. Determine appropriate mitigating actions.
  - iii. Evaluate the extent of any damage.
  - iv. Determine plant status during recovery operations.
- l) Data storage and recall capability should be provided for the Technical Support Centre data set. At least two hours of pre-event data and 12 hours of post-event data should be recorded. The sample frequency should be chosen to be consistent with the use of the data. Capacity to record at least two weeks of additional post-event data with reduced time resolution should be provided. Archival data storage and the capability to transfer data between active memory and archival data storage without interrupting Technical Support Centre data acquisition and displays should be provided for all Technical Support Centre data.
- m) A sufficient number of data display and printout devices should be provided in the Technical Support Centre to allow all Technical Support Centre personnel to perform their assigned tasks with unhindered access to data. The Technical Support Centre displays should include but not be limited to alphanumeric and/ or graphical representations of:
- i. Plant systems variables.
  - ii. In-plant radiological variables.
  - iii. Meteorological information.
  - iv. Off-site radiological information.
- n) The Technical Support Centre should have a complete and up-to-date repository of plant records and procedures at the disposal of Technical Support Centre personnel to aid in their technical analysis and evaluation of Emergency conditions. In particular, up-to-date as-built drawings of the plant systems are needed to diagnose sensor data, evaluate data inconsistencies, and identify and counteract faulty plant system elements.
- o) The Technical Support Centre personnel should have ready access to up-to-date records, operational specifications, and procedures that include but are not limited to:
- i. Plant technical specifications.
  - ii. Up-to-date as-built drawings, schematics and diagrams showing conditions of plant structures



- and systems down to the component level, and in-plant locations of these systems.
- iii. Plant operating procedures.
  - iv. Emergency operating procedures.
  - v. Final safety analysis report.
  - vi. Plant operating records.
  - vii. Plant operations Nuclear Reactor Safety committee records and reports.
  - viii. Records needed to carry out the functions of the Emergency Response Facility when it is not operational.
  - ix.
4. The Operational Support Centre (OSC) is an On-site area separate from the Control Room (CR) and the Technical Support Centre (TSC) where the Licensee's operational support personnel will assemble in an Emergency.
- a) The Operational Support Centre should:
    - i. Provide a location where plant logistical support can be coordinated during an Emergency.
    - ii. Restrict Control Room access to those support personnel specifically requested by the Shift Manager.
  - b) No specific habitability criteria are established for the Operational Support Centre. If the Operational Support Centre habitability is not comparable to that of the Control Room, the Licensee's Emergency Plan should include procedures for evacuation of the Operational Support Centre's personnel in the event of a large radioactive release. These procedures should also include provisions for the performance of the Operational Support Centre's functions by essential support personnel from other On-site locations.
  - c) The Operational Support Centre should have direct communications with the Control Room and with the Technical Support Centre so that the personnel reporting to the Operational Support Centre can be assigned to duties in support of Emergency operations.

## Emergency Response Data System

### Article (16)

1. The Emergency Operations Facility's technical data system should receive, store, process and display information sufficient to carry out assessments of the actual and potential On-site and Off-site environmental consequences of an Emergency condition. Data providing information on the general condition of the plant should also be available for display in the Emergency Operations Facility for utility resource management.
2. The Emergency Operations Facility data set should include radiological, meteorological, and other environmental data as needed to:
  - a) Assess environmental conditions.



- b) Coordinate radiological monitoring activities.
  - c) Recommend implementation of Off-site Emergency Plans.
3. The accuracy of data in the Emergency Operations Facilities should be consistent with the data accuracy needed to carry out the functions of the Emergency Operations Facilities'. The accuracy of data displays in the Emergency Operations Facilities should be equivalent to that for the data displayed in the Technical Support Centre. The time resolution of a data request should be sufficient to provide data without loss of information during transient conditions.
4. Data storage capability should be provided for the Emergency Operations Facility's dataset. At least two hours of pre-event data and 12 hours of post-event data should be recorded. The sample frequency should be chosen to be consistent with the use of the data. Capacity to record at least two weeks of additional post-event data with reduced time resolution should be provided. Archival data storage and the capability to transfer data between active memory and archival data storage without interrupting the Emergency Operations Facility's data acquisition and displays should be provided for all Emergency Operations Facilities' data. A sufficient number of data display devices should be provided in the Emergency Operations Facility to allow all Emergency Operations Facilities' personnel to perform their assigned tasks with unhindered access to alphanumeric and/ or graphical representations of:
- a) Plant systems variables.
  - b) In-plant radiological variables.
  - c) Meteorological information.
  - d) Off-site radiological information.

Trend information display and time history display capability is required in the Emergency Operations Facility to give Emergency Operations Facility personnel a dynamic view of plant systems, radiological status, and environmental status during an Emergency. The Emergency Operations Facilities' displays should be designed so that call-up, manipulation and presentation of data can be easily performed. The displays should be partitioned to facilitate the retrieval of information by the different functional groups in the Emergency Operations Facility. This may be accomplished with either separate display units or by logically separated information display pages available on a call-up basis at each data display unit. The Emergency Operations Facilities' data display formats should present information so that it can be easily understood by the Emergency Operations Facilities' personnel operating the system. If display capabilities for news media briefings are provided in the Emergency Operations Facilities, these displays should be separated physically from the Emergency Operations Facilities' functional displays. Human-factors engineering should be incorporated in the Design of the Emergency Operations Facility.

5. Data providing information on the general condition of the plant should be available at all times to the Authority including but not limited to the following:
- a) Nuclear Reactor shutdown.
  - b) Core cooling.



- c) Containment isolation.
- d) Containment pressure control.
- e) Primary pressure control.
- f) Heat transfer path from the Nuclear Reactor core to a heat sink.
- g) Spent Fuel

### Quality Management

#### Article (17)

1. The Licensee should establish a programme within an Integrated Management System (IMS) to ensure the availability and reliability of all supplies, equipment, communication systems and facilities, plans, procedures and other arrangements necessary for effective response in a nuclear Emergency.
  - a) The Licensee should make arrangements for inventories, re-supply, tests and calibrations to ensure that these are continuously available and are functional for use in a nuclear Emergency.
  - b) The Licensee should make arrangements to maintain, review and update Emergency Plans, procedures and other arrangements, and to incorporate lessons from research, operating experience (such as in the response to Emergencies) and Emergency exercises.
  - c) The Licensee should make arrangements to review and evaluate responses in actual events and in exercises in order to record the areas in which improvements are necessary, and to ensure that the necessary improvements are made.

**Table 1. Emergency Response Organisation Staffing Requirements**

Emergency Preparedness Function	On-shift	Technical Support Centre (TSC)	Operational Support Centre (OSC)	Emergency Operations Facility (EOF)
<b>Plant Operations and Assessment</b>	Shift Manager (1) Shift Supervisor (1) Reactor Operator (2) Shift Technical Advisor (1)	Not Applicable	Not Applicable	Not Applicable
<b>Command and Control</b> Provide overall Emergency Response Organisation command and control until relieved	Shift Manager (1)	Emergency Director (1)	Not Applicable	Emergency Director (1)
<b>Communications</b> Communicate Emergency Action Level and Protective Action Recommendation classifications to Off-site agencies including the Authority until relieved	Communicator (1)	Communicator (1)	Not Applicable	Communicator (1)
<b>Radiation Protection</b> Provide qualified health physics coverage for responders accessing potentially unknown radiological environments in Emergency conditions	HP Technician (2)	Not Applicable	Additional Radiation Protection Technician (6)	Not Applicable
<b>Supervision of Radiation Protection</b> Evaluate and assess plant and	Shift Manager (1)	Radiological Assessment Manager (1)	Not Applicable	Radiological Assessment Manager (1)



Emergency Preparedness Function	On-shift	Technical Support Centre (TSC)	Operational Support Centre (OSC)	Emergency Operations Facility (EOF)
Off-site radiological data in the development of On-site Protective Actions and Off-site Protective Action Recommendations until relieved				
<b>Dose Assessments/ Projections</b> Perform Dose assessments/ projections and provide input to applicable Protective Action Recommendation decision-makers until relieved	Dose Assessment/ Projection Staff (1)	Dose Assessment/ Projection Staff (1)	Not Applicable	Dose Assessment/ Projection Staff (1)
<b>Engineering</b> Providing engineering coverage related to the specific discipline of the assigned engineer	Not Applicable	Electrical/Instrument & Control (1) Mechanical (1) Core/ Thermal Hydraulics (1)	Not Applicable	Not Applicable
<b>Security</b>	Security staffing is per the Site Security Plan	Security Supervisor (1)	Not Applicable	Not Applicable
<b>Repair Teams</b>	Mechanical Maintenance (1) Electrical/Instrument & Control (1)	Not Applicable	Mechanical Maintenance (1) Electrical (1) Instrument Control (1)	Not Applicable
<b>Information Technology (IT)</b> Support computer based equipment	Not Applicable	IT Lead (1)	IT Lead (1)	Not Applicable
<b>Field Monitoring Teams (FMT)</b> Perform environmental radiation/ contamination	Not Applicable	Not Applicable	On-site Field Monitoring Team (1)	Off-site Field Monitoring Team (2)



Emergency Preparedness Function	On-shift	Technical Support Centre (TSC)	Operational Support Centre (OSC)	Emergency Operations Facility (EOF)
assessments				

**Table 2. Relation of Emergency Operations Facility's Location to Habitability Criteria**

Item Needed	Emergency Operations Facility's Criteria	
	Distance within 16 km of the Technical Support Centre	Distance at or beyond 16 km of the Technical Support Centre
Structure	Well engineered for Design life of the plant	Well engineered for Design life of the plant
Protection Factor	≥ 5	None
Ventilation Protection	Isolation with HEPA filters	None