
Regulatory Guide

Regulatory Guide for Preparation, Conduct, and Evaluation of Drills and Exercises for Nuclear Facilities (FANR-RG-034)

Version 0

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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)

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 (the Law) and in Article 1 of both FANR Regulation for Emergency Preparedness for Nuclear Facilities (FANR-REG-12) and FANR Regulation for Requirements for Off-site Emergency Plans for Nuclear Facilities (FANR-REG-15). For the purpose of this regulatory guide, the following terms shall have the meanings set forth below.

Controller	An individual who is responsible for managing the scenario, providing simulated data to the participants, and responding to participant requests. The Controller ensures the continuity of the scenario and is the only person allowed to change events.
Drill	An activity that develops a skill or capability or tests a single Emergency procedure or task. The drill may test an individual's skill, the proficiency of a team, or the adequacy of procedures, equipment or facilities.
Exercise	An event conducted jointly with the Licensee and the Off-site organisation to evaluate major portions of Emergency response capabilities.
Exercise Management Committee	A group of individuals responsible for all aspects of an exercise, including exercise planning, conduct and evaluation. The committee determines exercise capabilities, tasks and objectives. It tailors the scenario to the entity's needs, and develops documents used in exercise simulation, control and evaluation.
Extended Planning Distance	The area around a facility for which Emergency arrangements are made to conduct monitoring following the declaration of a General Emergency and to identify areas warranting Emergency Response actions to be taken off-site within a period following a significant radioactive release that would allow the risk of stochastic effects among members of the public to be effectively reduced.

Extent of Play Agreement	A document that customises the default performance expectations found in the assessment area demonstration criteria. The Extent of Play Agreement may include identification of the demonstration criteria that will or will not be evaluated during the Exercise, entities responsible for demonstrating specific criteria, equipment, personnel to be deployed, facilities to be activated, etc.
Ingestion and Commodities Planning Distance	An area around a Nuclear Facility for which Emergency arrangements are made to take effective Emergency Response actions following the declaration of a General Emergency in order to reduce the risk of stochastic effects among members of the public and to mitigate non-radiological consequences as a result of the distribution, sale and consumption of food, milk, and drinking water and the use of commodities other than food that may have contamination from a significant radioactive release.
Master Scenario Events List	A chronological timeline of expected actions and scripted events that Controllers inject into Exercise play to generate or prompt player activities.
Off-site Response Organisation	An organisation responsible to protect the health and safety of the public Off-site.
Out-of-sequence Activities	Activities not conducted in conjunction with the Exercise scenario timeline.

Purpose Article (2)

1. This regulatory guide provides acceptable methods and guidance to the Licensee conducting activities involving Emergency Preparedness Drills and Exercises for a Nuclear Facility. It complements the requirements provided for in the following FANR regulations:
 - Regulation for Emergency Preparedness and Response for Nuclear Facilities (FANR-REG-12)
 - Requirements for Off-site Emergency Plans for Nuclear Facilities (FANR-REG-15)
2. This regulatory guide addresses the following requirements of FANR-REG-12 and FANR-REG-15:
 - a) Emergency Preparedness Drills and Exercises, including:
 - Conducting periodic Drills of the Licensee's On-site Emergency Plan. (FANR-REG-12 (Article 23) paragraph 6),
 - Conducting Exercises involving broad participation of On-site and Off-site Response Organisations at least once every two years. (FANR-REG-12 Article 23 paragraph 8),
 - A broad range of postulated scenarios, including malicious acts, and shall cover all functional

requirements stipulated in the regulation over a period of eight years. (FANR-REG-12 Article 23 paragraph 9),

- The Licensee's reviews of the results of Drills and Exercises and implementation of appropriate re-training on and corrections of the On-site Emergency Plan. (FANR-REG-12 Articles 23 paragraph 10)
- The Licensee's incorporation of the lessons learned from Drills and Exercises. (FANR-REG-12 Article 24 paragraph 2).

b) Off-site Emergency Plan, including:

- Arrangements for the conduct of Drills and Exercises at regular intervals for the functions to be carried out under the Off-site Emergency Plan, including the testing of organisational interfaces, (FANR-REG-15 Article 7 paragraph 2),
- An Exercise of the full Off-site Emergency Plan, together with the On-site Emergency Plan, is required prior to the receipt of Nuclear Fuel at a Nuclear Facility and then at least every two years thereafter. (FANR-REG-15 Article 7 paragraph 2).

3. The scope of this regulatory guide is limited to Emergency Preparedness Drills and Exercises. This regulatory guide does not provide detailed guidance on Hostile Events or Cyber scenarios. However, it does include guidance on the cycle of Exercises on Hostile Events and coordination with the Emergency Plan. Articles 10 and 11 of FANR Regulatory Guide on Response and Contingency Plans of Nuclear Facilities (FANR-RG-026) provide guidance on how to respond to a Nuclear Security Event as defined in FANR-RG-026. FANR Regulatory Guide on Cyber Security (FANR-RG-011) provides further guidance on a cyber-attack.

4. The following documents are the primary sources for this regulatory guide:

- a) Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, NUREG-0654 FEMA-REP-1,
- b) Interim Staff Guidance Emergency Planning for Nuclear Power Plants, NSIR/DRP-ISG-01,
- c) Preparedness and Response for a Nuclear or Radiological Emergency, IAEA GSR Part 7,
- d) Emergency Response Planning and Preparedness for Nuclear Power Reactors, NRC RG 1.101,
- e) Program Manual: Radiological Emergency Preparedness, FEMA P-1028,
- f) Preparation, Conduct and Evaluation of Exercises to Test Preparedness for a Nuclear or Radiological Emergency, IAEA EPR Exercise 2005,
- g) Conducting a Hostile Action-Based Emergency Response Drill, NEI 06-04.

Introduction **Article (3)**

1. Periodic Exercises shall be conducted to evaluate the most crucial parts of Emergency Preparedness for response to a nuclear Emergency. Periodic Drills shall be conducted to develop and maintain key

skills of the Emergency Plan and procedures. Deficiencies identified as a result of Exercises or Drills shall be corrected.

2. A full-scale Exercise of the On-site and Off-site Emergency Plans shall be conducted and evaluated at least once every two years. The Biennial Exercise shall be carried out four times over the course of eight years.
3. The eight-year cycle applies to the Off-site and On-site Emergency Plan, including all units under the On-site Emergency Plan.

Drills and Exercises Types **Article (4)**

1. Exercises are conducted jointly with the Licensee and the Off-site Response Organisations (OROs) to evaluate major portions of preparedness for response to a nuclear Emergency. The types of Exercise are as follows:
 - a) **Full-scale Exercises:** these types of exercises involve all entities in real-time with hands-on response activities, including all specified demonstration criteria. The full-scale Exercise validates the adequacy of the On-site and Off-site plans and procedures. These type of exercises may include limited Out-of-sequence activities.
 - b) **Functional Exercises:** these types of exercises engage organisations to test their abilities to respond to the scenario, but participation does not require all the entities involved in a full-scale exercise. Functional Exercises simulate some response capabilities or demonstrate them Out-of-sequence from the scenario, and the Exercise may not require participation of all Off-site Response Organisations that would respond in a real nuclear Emergency. Processes that require multiple elements in play for decision-making on and implementation of Protective Action may be demonstrated in a functional Exercise that includes full participation to the extent necessary to achieve the Exercise goal.
 - c) **Tabletop Exercises:** these types of exercises are discussion-based and may test single or multiple scenarios and outcomes. Off-site Response Organisations may use tabletop Exercises to assess key elements in decision-making, assessment, and public and media communication and implementation. Tabletop Exercises may be used as a separate training or planning event. The suitability of a tabletop Exercise might vary depending on the number of participating Off-site Response Organisations needed to meet the Exercise objectives.
 - d) **Field Exercises:** these types of exercises involve the deployment of Emergency Response teams and personnel on or around the site. Field exercises evaluate the integrated performance of survey teams, police, traffic control, rescue, medical first aid and firefighting teams.
 - e) **Remedial Exercise:** these types of exercises test the corrective actions for deficiencies from the full-scale Exercise that are considered significant enough to potentially impact public health and safety.
2. Drills are conducted periodically to develop and maintain key skills of the Emergency Plan and procedures. Drills do not require full participation or full activation of all Emergency Response facilities. Supervised instruction during Drills is permitted, and Drills may focus on specific objectives (e.g. performing dose assessment).

Drills and Exercises Scenarios **Article (5)**

1. Drills and Exercises scenarios shall encompass a wide spectrum of events and conditions to avoid anticipatory responses resulting from participant pre-conditioning. The following Exercise scenario variations shall be carried out in an exercise evaluated by the Authority during the eight-year Exercise cycle:

a) Hostile Event against a nuclear power plant

This scenario shall be used in at least one Exercise in the eight-year Exercise cycle. The exercise for a Hostile Event must be a Full-Scale Exercise that demonstrates the integrated capabilities of the On-site and Off-site Emergency Plans.

b) An initial classification of (or rapid escalation to) a Site Area Emergency or General Emergency

There are at least three classes of Emergencies that provide a basis for determining the level of response actions to a potential or actual Emergency at a nuclear power plant. The emergency classification levels are: Unusual Event, Alert, Site Area Emergency, and General Emergency. The approach to Exercise design routinely begins at an Unusual Event or Alert, and progresses gradually through each level culminating at a General Emergency. As participants of an exercise are pre-conditioned to expect this sequential and gradual escalation in the Emergency classification level over a compressed period, they may anticipate and make decisions based on the Exercise scenario and elapsed scenario time rather than focusing on the unfolding scenario Emergency conditions. In a real event, the conditions at the nuclear power plant may rapidly deteriorate and result in an initial declaration of a Site Area Emergency or skip an Emergency classification level altogether.

Skipping or rapidly escalating some Emergency classification levels could make scenarios more realistic and challenging. At least one Drill or Exercise in the eight-year Exercise cycle shall involve an initial classification at a Site Area Emergency or rapid escalation from an Unusual Event or an Alert to a Site Area Emergency. This is intended to establish a minimum demonstration frequency only. The Licensee and Off-site Response Organisations shall discuss rapid escalation or skipping of some Emergency classification levels as part of each Exercise's extent of play negotiations based on specific site needs and plan requirements. This scenario may vary depending on the On-site and Off-site plans/procedures.

c) No (or minimal) radiological release or an unplanned minimal radiological release that requires the site to declare a Site Area Emergency, but does not require the declaration of a General Emergency

The scenario for a simulated nuclear power plant Accident shall be developed jointly by the Licensee and Off-site Response Organisations. The scenario includes meteorological and radiological data such as characteristics of the release, projected Dose, Dose rates, and activity concentration in the environment. The radiological data shall be supported by and compatible

with plant conditions and the associated potential for releases or simulated releases. When preparing the scenario, account shall be taken for the fact that the Exercise scenarios may be essentially repeated without significant variation in magnitude of release. This could result in decision-makers facing essentially the same set of conditions each time. This could lead to either: (1) mechanical decisions based on the previous Exercises rather than thoughtful risk analysis, or (2) some decisions that are not being tested. Not having every Licensee's Exercise result in a radiological release would help avoid anticipatory responses. The Licensee shall use this variable in at least one Exercise per eight-year Exercise cycle. Off-site Response Organisations are encouraged (but not required) to participate in this Exercise with the Licensee. If Off-site Response Organisations elect to participate in a joint Exercise with no or minimal release, part of the planning for the Exercise shall include identifying demonstration criteria that would not be evaluated during the Exercise, and determining appropriate alternative demonstration and evaluation venues so that the Off-site Response Organisations could meet their evaluation requirements, which are to be carried out every other year.

d) Ingestion pathway and relocation/re-entry/return exercise

At least one Exercise in every eight-year Exercise cycle shall include a post-plume phase ingestion pathway requiring Protective Actions beyond the 16-km Urgent Protective Action planning zone and into the Extended Planning Distance and Ingestion and Commodities Planning Distance. Ingestion pathway strategies shall involve sample plan development, analysis of laboratory results from samples, assessment of the impact on food and agricultural products, protective decisions for relocation, trade restriction, and food/crop restriction. Decisions on controlled re-entry, relocation and return of individuals are coordinated with the relevant organisations before being implemented.

e) Multi-unit Exercise

For multi-unit sites, this scenario shall be used in at least one Exercise in the eight-year Exercise cycle. During the first eight-year cycle and prior to the loading of Nuclear Fuel for the second unit, an Exercise with this scenario shall be conducted. The multi-unit Exercise shall demonstrate the response to events occurring simultaneously at multiple units on the site, including radiological assessments carried out for radioactive releases from multiple units.

2. The following Drills and Exercises scenario variations shall be carried out during the eight-year Exercise cycle:

a) Off-hours and unannounced Drill

Provisions shall be made to start a Drill between 6 pm and 4 am at least once in every eight-year joint Exercise cycle. At least one Drill or Exercise shall be unannounced during the eight-year Exercise cycle. Drills shall be conducted at different times of the year (e.g. on weekends, public holidays, holy month of Ramadan).

b) Accident mitigation strategies Drill or Exercise

At least one Drill or Exercise during the eight-year cycle shall demonstrate the use of equipment, including mobile equipment, procedures and strategies intended to maintain or restore core cooling, containment and Spent Nuclear Fuel pool cooling capabilities under the circumstances associated with loss of large areas of the plant due to fire or explosions. The strategies shall include firefighting, operations to mitigate Nuclear Fuel damage, and actions to minimise radiological release.

c) Emergency medical Drill

An Emergency medical Drill involving a simulated contaminated individual and provisions for participation by support services (i.e. an ambulance and Off-site medical treatment facility) shall be conducted annually.

d) Health physics Drill

Post-accident sampling capabilities, including analysis of in-plant liquid samples with simulated or actual elevated radiation levels shall be conducted annually.

e) Radiological monitoring Drill

Radiological monitoring Drills (both On-site and Off-site) shall be conducted annually. These Drills shall include direct radiation measurements in the environment, collection and analysis of all sample media (e.g. water, vegetation, soil, and air), and provisions for communications and record-keeping.

f) Communication Drill

Communications with the Off-site Response Organisations within the Urgent Protective Action planning zone shall be tested monthly. Communications with the Authority and the National Emergency, Crisis and Disasters Management Authority (NCEMA) within the Extended Planning Distance shall be tested quarterly. Communications, including Notification systems between the Licensee's Emergency Response facilities and the Off-site Response Organisations Emergency operations centres and field assessment teams shall be tested annually. Communication Drills shall also include how messages content could be understood by the receiving organisation.

**Biennial Exercise
Article (6)**

1. A basic principle of Emergency Preparedness is that the Licensee and Off-site Response Organisations conduct Exercises to develop and maintain key skills in order to protect public health and safety in the unlikely event of a nuclear Emergency. The Licensee and Off-site Response Organisations shall demonstrate their ability to implement Emergency Plans and evaluate Emergency Response actions during evaluated biennial Exercises. The timeframe milestones for the biennial Exercise is outlined in Annex A.

2. The Emergency Response Organisation and Off-site Response Organisations shall demonstrate their ability in each biennial Exercise using a full-scale Exercise during the first eight-year exercise cycle. Thereafter, each eight-year exercise cycle shall require at least three full-scale Exercises with the option of a functional Exercise for the fourth Exercise. It is important to note that not all required capabilities may be carried out and evaluated during a functional Exercise. Appropriate alternative evaluation methods need to be identified and agreed upon to satisfy performance and evaluation of all biennial capability requirements. Alternative evaluation methods that could be considered include:
 - a) Additional functional Exercises,
 - b) Expansion of the Exercise scenario,
 - c) Out-of-sequence Activities, and
 - d) Approval from the Authority of other alternative evaluation methods upon consultation with NCEMA.
3. The development of the biennial Exercise scenario shall include (but not be limited to) the following:
 - a) The basic objective(s) of each Exercise and appropriate evaluation criteria,
 - b) The Exercise scope, including the date(s), period, place(s), and participating organisations,
 - c) The simulated events,
 - d) A schedule of real and simulated initiating events,
 - e) A narrative describing the conduct of the Exercise to include things such as simulated casualties, Off-site fire department assistance, rescue of personnel, use of protective clothing, deployment of radiological monitoring teams, and public information activities, and
 - f) A description of the arrangements for and advance materials to be provided to official observers.
4. Biennial Exercise scenarios shall provide the Emergency Response organisation and Off-site Response Organisations with the opportunity to demonstrate proficiency in the key skills necessary to implement the principal functional areas of Emergency Response. Key skills shall include specific response capabilities that may be assigned in a site-specific manner such as:
 - a) Timely classification of events,
 - b) Timely notification of respective Off-site Response Organisations,
 - c) Assessment of radiological releases On-site and Off-site,
 - d) Development of Protective Action recommendations,
 - e) Development of Protective Action decisions,
 - f) Dissemination of information to the public via media channels,
 - g) Engineering assessment, repair plan development, and repair of critical equipment under

- Emergency conditions,
- h) Implementation of mitigating action,
 - i) Protection of workers during Emergency Response, including medical care,
 - j) Response to operational transients while implementing the Emergency Plan, and
 - k) Coordination between the Licensee and Off-site Response Organisations.
5. A Master Scenario Event List shall be developed to provide a chronological timeline of expected actions and scripted events the Licensee and Off-site Controllers inject into Exercise play to generate or prompt player activity. The Master Scenario Event List shall include (but not be limited to) the following:
- a) Designated scenario time,
 - b) Event synopsis,
 - c) Special inject delivery instructions, if applicable,
 - d) Tasks and objectives to be demonstrated, and
 - e) Expected actions.
6. An Exercise plan (otherwise known as an ExPlan) shall be developed to provide general information that enables the Emergency Response Organisation and Off-site Response Organisation participants to understand their roles and responsibilities in exercise planning, execution and evaluation. The ExPlan is intended for use by Exercise participants, Controllers, evaluators, exercise leads/the director/manager and observers, and, therefore, does not contain detailed scenario information. The ExPlan is published and distributed to players and observers prior to the start of the Exercise. Players and observers review all elements of the ExPlan prior to Exercise participation. The ExPlan shall include (but not be limited to) the following:
- a) General summary of the Exercise (no detailed scenario information),
 - b) Exercise plan objectives and scope, and
 - c) Roles and responsibilities for participants, the Controller, evaluator, exercise leads/the director/manager and observer.
7. Exercise evaluation guides shall be developed to support the Exercise evaluation process by providing the Licensee and Off-site evaluators with consistent standards for observation, analysis and Exercise report development. The exercise evaluation guides shall include (but not be limited to) the following:
- a) Core capabilities: the distinct critical elements necessary to achieve a specific mission area, e.g. prevention,
 - b) Capability target(s): the performance threshold for each core capability stating the exact amount of capability that players aim to achieve,
 - c) Critical tasks: the distinct elements required to carry out a core capability assessment to describe how the capability would be met. Critical tasks generally include the activities, resources and

responsibilities required to fulfil capability targets,

- d) Performance ratings: the summary description of performance against target levels. Performance ratings include both target ratings describing how Exercise participants performed relative to each capability target, and core capability ratings describing overall performance relative to the entire core capability.
8. Demonstration of Emergency Response capabilities may be performed Out-of-sequence: members of the exercise management committee shall agree upon off-site Out-of-sequence Activities, and be identified in the Extent of Play Agreement. Out-of-sequence Activities shall be scheduled no more than 60 days prior to (or 30 days after) the biennial Exercise.
9. The Exercise Management Committee shall be established to support the design and development of the biennial Exercise.
- a) The Exercise Management Committee shall include representatives from the Licensee, Off-site Response Organisations, and NCEMA. As members of the Exercise Management Committee may have access to scenario-related information, these representatives on the Exercise Management Committee shall treat all information as confidential. They may participate substantially in the design of the Exercise but must agree not to divulge confidential information about the exercise to potential players or others involved in the Exercise.
- b) The Exercise Management Committee shall hold one or more planning meetings as needed to determine the Exercise scope, design, scenario and logistics.
10. The initial planning meeting lays the foundation for Exercise development and shall occur at least six months before the Exercise.
- a) The initial planning meeting includes (but is not limited to) the following:
- Demonstration criteria to be evaluated,
 - Core capability,
 - Scenario type and variables,
 - Out-of-sequence demonstrations and potential Exercise schedule,
 - Roles and responsibilities for Exercise document preparation, and
 - Schedule for upcoming planning meetings.
- b) Following the initial planning meeting and lead up to the mid-term planning meeting, the Exercise Management Committee shall develop the following:
- Final list of demonstration criteria/core capability to be evaluated,
 - Draft Master Scenario Events List,
 - Draft ExPlan,
 - Draft exercise evaluation guides, and
 - Draft Extent of Play Agreement.

11. The mid-term planning meeting shall occur three months before the Exercise.

- a) The mid-term planning meeting items to address and complete include (but are not limited to) the following:
- Negotiate and finalise the Extent of Play Agreement,
 - Review the draft ExPlan and incorporate the finalise Extent of Play Agreement,
 - Review general scenario concepts,
 - Review draft Master Scenario Events List,
 - Review draft exercise evaluation guides,
 - Prepare the Out-of-sequence Activities schedule,
 - Prepare the Exercise events schedule, and
 - Discuss and resolve planning and logistical issues.
- b) The Exercise Management Committee may decide to hold more than one meeting prior to the final planning meeting to prepare all the items typically covered in the mid-term planning meeting.
- c) The Exercise Management Committee fully reviews, finalises and distributes the following documents before the final planning meeting:
- Master Scenario Events List,
 - ExPlan,
 - Exercise evaluation guides.

12. During the final planning meeting there shall be a comprehensive review of all finalised Exercise documents; all outstanding items shall be identified and resolved. The final planning meeting shall occur no later than 35 days before the Exercise.

- a) During the final planning meeting, the Exercise Management Committee shall do the following:
- Review and approve all documentation related to the Exercise,
 - Finalise the logistics of the Exercise,
 - Finalise tasks given to the Controller and the evaluator, and
 - Resolve outstanding items.

Drills and Exercises Analysis and Assessment Article (7)

1. The Licensee and Off-site Response Organisations shall evaluate their Drills and Exercises against pre-established objectives of Emergency Response to demonstrate that identification, notification, activation and response actions could be carried out effectively. Emergency Response is analysed in order to identify actions to be taken in areas in which improvements are necessary. Arrangements shall be made to maintain, review and update Emergency Plans, procedures and

other processes to incorporate lessons learnt from the different types of Drills and Exercises.

2. The following assessment areas of the Drills and Exercises reflect the guidance on the activities the Licensee is expected to be able to perform to maintain reasonable assurance that the health and safety of the workers, public and environment could be protected in the event of an accident at a nuclear power plant:

a) Assessment area: Emergency operations management.

- Mobilisation
 - The Licensee shall have the capability to alert, notify and mobilise Emergency personnel, and activate staff Emergency Response facilities.
 - The assessment may be accomplished during a biennial Exercise, an actual event, Out-of-sequence evaluation or by means of Drills conducted at any time.
 - Responsible Emergency Response personnel shall demonstrate the capability to receive notification of an event from the Licensee, verify the notification, and contact, alert and mobilise key Emergency personnel in a timely manner, and demonstrate the ability to maintain and staff 24-hour operations. 24-hour operations could be demonstrated during the Exercise via rosters or shift changes or otherwise in an actual activation.
 - Emergency Response facilities shall be evaluated for this criterion during the first biennial Exercise after any new or substantial changes in structure, equipment, or mission that affect key capabilities, as outlined in respective Emergency Plans/procedures. A substantial change is one that has a direct effect or impact on Emergency response operations in those Emergency Response facilities. Examples of substantial changes include modifying the size or configuration of an Emergency operations centre, adding more function to a centre, or changing the equipment available for use in a centre.
- Emergency Response facilities
 - The Licensee shall have Emergency Response facilities to support Emergency Response.
 - The assessment may be accomplished during a biennial Exercise, an actual event, or an evaluation on the Out-of-sequence Activities.
 - The Licensee shall demonstrate the availability of Emergency Response facilities to support the accomplishment of Emergency operations (this includes all alternate and back-up Emergency Response facilities). Evaluations are typically carried out of Emergency Response facilities. Some of the areas evaluated within the Emergency Response facilities are adequate space, furnishings, lighting, restrooms, ventilation, access to back-up power, and/or an alternate facility if required to support operations.

- Direction and control
 - The Licensee shall have the capability to control their overall response to an Emergency.
 - The assessment may be accomplished in a biennial Exercise or in a tabletop Exercise.
 - Leadership personnel shall demonstrate the ability to carry out the essential management functions of the response effort, e.g. keeping staff informed through periodic briefings and/or other means, coordinating with Off-site Response Organisations, and ensuring the completion of requirements and requests. Leadership shall demonstrate the ability to prioritise resource tasking and replace/supplement resources, e.g. through memoranda of understanding (MOUs) or other agreements when faced with competing demands for finite resources. Any individuals identified through letters of agreement shall be on the mobilisation list so they may be contacted during an incident, if needed.
- Communications equipment
 - The Licensee shall establish and operate reliable primary and back-up communication systems to ensure communication with key Emergency personnel at the National Operations Centre, the Licensee's offices and its Emergency response facilities, the Emergency Operations Centre, and with field monitoring teams.
 - The assessment may be accomplished initially in a baseline evaluation and subsequently in periodic testing and Drills. System familiarity and use shall be demonstrated as applicable in biennial or tabletop Exercise, or if their use would be required during an actual event.
 - The Licensee shall demonstrate that a primary system and at least one back-up system for fixed facilities is fully functional at all times. Communications systems shall be maintained and tested on a recurring basis throughout the assessment period, and the system status be made available to all operators. Periodic test results and corrective actions shall be maintained on a real-time basis. If a communication system is not functional, but Exercise performance is not affected, no Exercise issue would be assessed.
 - Communications equipment and procedures for facilities and field units shall be used as needed for the transmission and receipt of Exercise messages. All facilities, field monitoring teams, and the incident command centre shall have the capability to access at least one communication system that is independent of the commercial telephone system. The responsible Licensee shall demonstrate the capability to manage the communication systems and ensure that all message traffic is handled without delay or disruption to Emergency operations. The Licensee shall ensure that a coordinated communication link for fixed and mobile medical support facilities exists. Exercise scenarios may require the failure of a communication system and use of an alternate system as negotiated in the Extent of Play Agreement.

- Equipment and supplies to support operations
 - The Licensee shall have Emergency equipment and supplies adequate to support the Emergency response.
 - The assessment may be accomplished through a baseline evaluation and subsequent periodic inspections.
 - Particular equipment and supplies of the Emergency Response facilities shall be sufficient and consistent with that facility's assigned role in the Licensee's Emergency operations plans.
 - Specific equipment and supplies demonstrated under this criterion shall include iodine thyroid blocking inventories, dosimetry and monitoring equipment.
- b) Assessment area: Protective Action decision-making
 - Emergency Worker Exposure Control
 - The Licensee shall have the capability to assess and control the radiation exposure for Emergency Workers and shall have a decision chain in place as specified in plans/procedures to authorise Emergency Worker Dose values to be exceeded for specific missions.
 - The assessment may be accomplished in a biennial Exercise or in a tabletop Exercise.
 - The Licensee authorised to send Emergency Workers into the plume exposure pathway shall demonstrate a capability to comply with Emergency Worker pre-authorised exposure levels based on their Emergency Plans/procedures.
 - The Licensee shall also demonstrate the necessary capability to make decisions concerning the authorisation of exposure levels in excess of the pre-authorised levels and the number of Emergency Workers receiving radiation Doses above pre-authorised levels.
 - The demonstration shall include the provision of dosimeters and iodine thyroid blocking pills in a timely manner to Emergency Workers dispatched On-site to support plant incident assessment and mitigating actions in accordance with respective plans/procedures.
 - Radiological assessment and Protective Action recommendations and decisions
 - The Licensee shall have the capability to independently project integrated Dose from projected or actual Dose rates and compare these estimates to the applicable generic criteria levels.
 - The assessment may be accomplished in a biennial Exercise or in a tabletop Exercise.
 - The Licensee shall demonstrate a reliable capability to independently validate Dose

projections. The types of calculations to be demonstrated depend on the data available from the scenario. The need for assessments to support the Protective Action recommendations shall be appropriate to the scenario. In all cases, the calculation of the projected Dose shall be demonstrated. Projected Doses shall be related to quantities and units of the generic criteria to which they would be compared. Protective Action recommendations shall be promptly shared with decision-makers in a pre-arranged format.

- The Licensee shall have the capability to choose the most appropriate Protective Action in a given Emergency.
- The Licensee shall have the capability to make both initial and subsequent Protective Action recommendations. The Licensee shall demonstrate the capability to make initial Protective Action recommendations in a timely manner appropriate to the incident and based on an assessment of plant status and potential radioactive release or before any actual radioactive release and other available information related to the incident. Dose assessment personnel may provide additional Protective Action recommendations based on the subsequent Dose projections, field monitoring data, or information on plant conditions.

c) Assessment area: implementation of Protective Action

- Implementation of Emergency Worker exposure control
 - The Licensee shall have the capability to provide for the following:
 - Distribution, use, collection and processing of the direct-reading dosimetry and the storage of permanent record dosimetry readings,
 - Reading of direct-reading dosimetry by Emergency Workers at appropriate frequencies,
 - Maintaining radiation Dose records for each Emergency Worker,
 - Enforcing an authorisation procedure for Emergency Workers to incur radiation exposures in excess of the Protective Action guides, and the capability to provide iodine thyroid blocking for Emergency Workers whilst applying the 'ALARA' principle, as appropriate.
 - The assessment may be accomplished in a biennial Exercise. Other means may include Drills, seminars or training activities that would fully demonstrate technical proficiency.
 - The Licensee shall demonstrate the capability to provide Emergency Workers (including support personnel) with the appropriate direct-reading and permanent record dosimetry, dosimeter chargers, iodine thyroid blocking pills, and instructions on the use of these items. For evaluation purposes, appropriate direct-reading dosimetry is defined as dosimetry that allows an individual to read the administrative reporting limits at a pre-established level. The established level is low enough to consider subsequent calculation of total effective Dose and maximum exposure

values for those Emergency Workers involved in life-saving and other Emergency activities mentioned in the Licensee's plans/procedures.

- Decision to implement iodine thyroid blocking
 - The Licensee shall have the capability to provide Emergency Workers with potassium iodide for iodine thyroid blocking purposes.
 - The assessment may be accomplished in a biennial Exercise. Other means may include Drills, seminars or training activities that would fully demonstrate technical proficiency.
 - The Licensee shall demonstrate the capability to make iodine thyroid blocking available to Emergency Workers. The Licensee shall also demonstrate the capability to distribute potassium iodide consistent with the decisions made. The Licensee shall have the capability to develop and maintain lists of Emergency Workers who have ingested potassium iodide as an iodine thyroid blocking measure, including documentation of the date(s) and time(s) they were instructed to ingest potassium iodide. Ingestion of potassium iodide recommended by the designated Licensee is voluntary. There shall be no ingestion of potassium iodide for evaluation purposes. The Licensee shall demonstrate the capability to formulate and disseminate instructions on the use of iodine thyroid blocking for those advised to have it.

d) Assessment area: field measurements and analyses

- Field measurements and analyses
 - The Licensee shall have the capability to deploy field monitoring teams with the equipment, methods and expertise necessary to determine the location of airborne radiation and particulate deposition on the ground from an airborne plume.
 - The assessment may be accomplished during an exercise carried out every other year or during other exercises that would fully demonstrate technical proficiency.
 - The Licensee shall demonstrate the capability to brief the field monitoring teams on predicted plume location and direction, plume travel speed, and exposure control procedures before deployment. Field measurements are needed to help characterise the release and support the adequacy of implemented Protective Actions, or to be a factor in modifying or issuing new Protective Action recommendations. Teams shall be directed to take measurements at locations and times deemed necessary to provide sufficient information to characterise the plume and its impacts.
- Field sampling
 - The Licensee shall have the capability to assess the actual or potential magnitude and locations of radiological hazards to determine the ingestion exposure pathway and to support relocation, re-entry and return decisions. This

area focuses on collecting environmental samples for laboratory analyses, which are essential for decision-making on protecting the public from contaminated food and water, and measuring the direct radiation from deposited materials.

- The assessment may be accomplished during an exercise carried out every other year or during other exercises that would fully demonstrate technical proficiency.
- The Licensee's field monitoring teams shall demonstrate the capability to take measurements and samples at times and locations as directed to enable an adequate assessment of the ingestion pathway, and to support re-entry, relocation and return decisions.
- The field monitoring teams and/or other sampling personnel shall secure ingestion pathway samples from agricultural products and water. Samples in support of relocation and return shall be secured from soil, vegetation and other surfaces in areas that received radioactive ground deposition.
- Laboratory operations
 - The Licensee shall have the capability to perform laboratory analyses of radioactivity in different environmental samples to support Protective Action recommendations.
 - The assessment may be accomplished during an exercise carried out every other year or during other exercises that would fully demonstrate technical proficiency.
 - The laboratory staff shall demonstrate the capability to follow appropriate procedures as applicable for receiving samples including, logging information, preventing contamination of the laboratory, preventing build-up of background radiation due to stored samples, preventing cross-contamination of samples, preserving samples that may spoil (e.g. milk), and keeping track of sample identity. The laboratory staff shall demonstrate the capability to prepare samples to conduct measurements.
 - The laboratory shall be appropriately equipped to provide (upon request) the timely analyses of media of sufficient quality and sensitivity to support assessments. The laboratory instrument calibrations shall be traceable to standards provided by the National Institute of Standards and Technology. Laboratory methods used to analyse typical radionuclides released in a reactor incident shall be as described in the plans/procedures.
- e) Assessment area: Emergency notification and public information
 - Emergency information and instructions for the public and the media
 - The Licensee shall have the capability to disseminate to the public appropriate Emergency information and instructions including, any recommended Protective Actions.

- The assessment may be accomplished during an exercise carried out every other year or during other exercises (e.g. non-graded full-scale exercise), or through the operational testing of equipment.
 - The Licensee personnel/representatives shall demonstrate actions to provide Emergency information and instructions to the public and media in a timely manner following the initial Alert and notification according to the applicable procedures.
3. Remedial exercises may be required if the Emergency Plan is not adequately tested during the exercise carried out every other year when the Authority (upon consultation with NCEMA) has no reasonable assurance that adequate protective measures could and would be taken in the event of a nuclear Emergency. A remedial exercise may be required if:
- Confidentiality is compromised to an extent that the exercise no longer affords the opportunity to assess the performance of the Emergency Response Organisation and/or the Off-site Response Organisations, and to identify the necessary corrective actions,
 - The scenario does not provide the opportunity to demonstrate key skills,
 - The scenario is not implemented in a way that provides the opportunity for the demonstration of key skills, or
 - Performance of the Emergency Response Organisation and/or the Off-site Response Organisations does not provide the Authority and NCEMA with assurances to determine maintenance of key skills.
4. For the purpose of demonstrating the corrective actions taken, remedial exercises shall be carried out within a hundred and twenty (120) days after the exercise carried out every other year.

Drills and Exercises Evaluation Article (8)

1. The Licensee shall evaluate each exercise to identify weaknesses and assess each exercise for opportunities for improvement. Identified weaknesses shall be entered into the appropriate system to initiate corrective action.
2. An evaluation shall be scheduled at the conclusion of the exercise to evaluate the ability of organisations to respond as detailed in the plan.
3. The evaluation shall be conducted after the exercise, and an official evaluation report shall be prepared.

Drills and Exercises Records and Documentation Article (9)

1. Procedures shall include requirements for recording exercise Emergency Response data and information important for the analysis of the Emergency Response.
2. The data and information shall include the implementation and completion or termination of

Emergency Response actions, logging assessment data, reports on personnel accountability, and maintenance of required records and logs.

3. The Licensee shall retain exercise records for at least ten (10) years.

Annex A – Biennial Exercise Timeframe

Calendar Days Before Exercise	Action step	Responsible Organisation*
365	Establishing or confirming next exercise date	Licensee, Abu Dhabi Police, FANR, NCEMA
200	Identifying Exercise Management Committee Members	Licensee, Abu Dhabi Police, NCEMA
180	Holding initial planning meeting	Licensee, Abu Dhabi Police, FANR, NCEMA
100	Submitting the following draft documents to the Authority and NCEMA prior to the mid-term planning meeting: <ul style="list-style-type: none"> • Master Scenario Events List • Exercise plan (otherwise known as the ExPlan) • Exercise evaluation guides • Extent of Play Agreement 	Licensee
90	Holding mid-term planning meeting	Licensee, Abu Dhabi Police, FANR, NCEMA
60	Submitting draft exercise scenario to FANR, incident commander and NCEMA for review	Licensee
45	FANR, incident commander and NCEMA providing comments to the Licensee on the draft exercise scenario	FANR, NCEMA
40	Holding meeting for discussion of the draft exercise scenario	Licensee, Abu Dhabi Police, FANR, NCEMA
40	Submitting the following finalised documents to FANR and NCEMA prior to the final planning meeting: <ul style="list-style-type: none"> • Master Scenario Events List • Exercise Plan (otherwise known as the ExPlan) • Exercise Evaluation Guides 	Licensee

Calendar Days Before Exercise	Action step	Responsible Organisation*
35	Holding final planning meeting	Licensee, Abu Dhabi Police, FANR, NCEMA
30	Submitting finalised exercise scenario to FANR and NCEMA	Licensee
Exercise Day (ED)	Conducting exercise	Licensee, Abu Dhabi Police, FANR, NCEMA
Calendar Days After Exercise	Action step	Responsible Organisation*
30	Sending the Licensee's exercise report to FANR	Licensee
30	Sending NCEMA's exercise evaluation report to FANR	NCEMA
60	Sending FANR's exercise inspection report to the Licensee	FANR

* FANR's responsibility in the exercise carried out every other year is to observe and inspect the process. FANR may provide feedback but will not participate in the development of the exercise content.