

ROPME SEA AREA REGIONAL RADIOLOGICAL/NUCLEAR EMERGENCY RESPONSE PLAN

Volume 2b

PREPAREDNESS PLAN



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Prepared by:

J.F. Lafortune, PhD., P.Eng., Mike McCall, M.Eng., P.Eng., Regional Radiological/Nuclear Response Officers, MEMAC and in cooperation with the IAEA

Annual Review Certification

I hereby certify that I reviewed the *ROPME Radiological/Nuclear Emergency Response Plan, Volume 2b, Preparedness Plan*. This plan incorporates all necessary changes. I distributed changed pages to all recorded holders of the plan.

Date	Name/Signature

Record of Changes

Change Number	Date of Change	Date Entered	Change Made By (Signature)

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1. INTRODUCTION

1.1 Preamble

Radiation emergencies (radiological, nuclear and terrorism; hereinafter referred to as RN) represent one type of emergency that could significantly affect the Regional Organization for the Protection of the Marine Environment (ROPME) sea area (RSA) – see Figure 1. Planning for, and responding to a RN emergency requires a coordinated effort at all levels: local, regional, national and international. This coordination needs to be harmonized with other existing mechanisms and processes that have been developed to manage crises in general and to ensure a clear, coordinated and effective response.

1.2 Regional emergency response plan

The documents comprising the regional plan were developed to provide the required response structure and guidance to support a regional, coordinated response to an RN emergency in international waters within the RSA.

This regional plan, championed by the ROPME and the Marine Emergency Mutual Aid Center (MEMAC), is entitled the RSA (Regional) RN Emergency Response Plan (RNERP).

1.3 Participating Member States

The RSA RNERP includes the following participating Member States (MS):

- Kingdom of Bahrain;
- Islamic Republic of Iran;
- State of Kuwait;
- Sultanate of Oman;
- State of Qatar;
- Kingdom of Saudi Arabia; and
- United Arab Emirates.

All of these MS have a vested interest in the ongoing safety within the ROPME Sea Area, the safety and health of their population and the protection of the environment.

1.4 Structure

The RNERP is comprised of three volumes as follows:

- Volume 1 – Planning Basis; and
- Volume 2 – Regional Radiological/Nuclear Emergency Response Plan (RNERP); comprising
 - Volume 2a – Operational response plan; and
 - Volume 2b – Preparedness plan; and
- Volume 3 – RNERP Procedures.

This document is Volume 2b – Preparedness Plan.

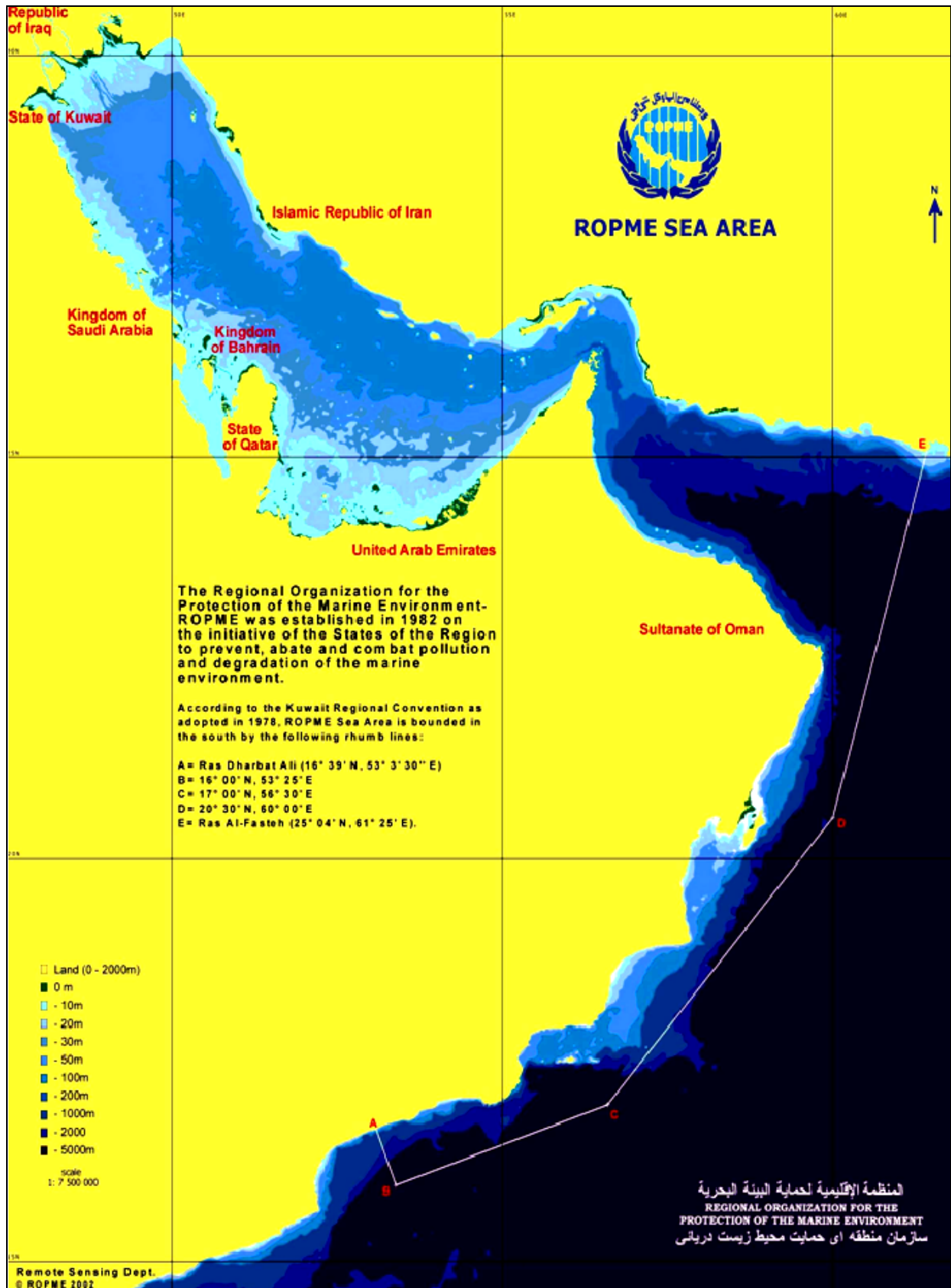


Figure 1: Regional area covered by the emergency plan

1.5 Authority and responsibility for the preparedness process

The ROPME RN Emergency Committee is responsible for the implementation and management of the RN emergency preparedness process. All ROPME MS are responsible for providing the support and resources required to execute the processes contained in the Preparedness Plan.

Table 1: Relevant Agreements and Conventions

Document	Relationship to this RN plan
The United Nations Convention of the Law of the Sea, 1982 (UNCLOS)	The principles of the nation’s sovereignty over their respective territorial sea and the jurisdictions with regards to the protection and preservation of the marine environment are inalienable principles of the current plan.
International Convention for the Prevention of Pollution from Ships (MARPOL)	Contains requirements for the packaging of hazardous substances and a ship borne, marine emergency plan.
Convention on early notification of a nuclear emergencies	Commits signatory MS to the prompt notification of nuclear and radiation emergencies having transboundary impacts. In this context, “impacts” is given the broadest meaning, and includes public interest and concern.
International Convention on assistance in the case of nuclear or radiological emergency	Provides a mechanism for the International Atomic Energy Association (IAEA) to coordinate assistance from signatory MS to requesting States. Assistance can also be provided to non-signatory States.
Bilateral agreements	TBD Regional MS are encouraged to establish bilateral agreements with other Regional MS.
Kuwait Convention	The governing agreement for the ROPME Sea Area is The Kuwait Regional Convention for Co-operation on the Protection of the Marine Environment from Pollution 1978. This, together with its Protocol, provides the legal framework for actions concerning regional co-operation in combating accidental marine pollution. These legal instruments oblige the Contracting States to initiate, both individually and jointly, the actions required in order to effectively prepare for and respond to marine pollution incidents.
Protocol Concerning Regional Cooperation in Combating Pollution by Oil and Other Harmful Substances in Cases of Emergency	The Protocol Concerning Regional Co-operation in Combating Pollution by Oil and Other Harmful Substances in Cases of Emergency also established the Marine Emergency Mutual Aid Centre (MEMAC) to implement the requirements of the protocol and also to fulfil additional functions necessary for initiating operations to combat pollution by oil and other harmful substances on a regional level, when authorized by the Council.

1.6 Relevant international, regional and bilateral agreements and conventions

The Regional RN emergency plan is intended to support and reinforce existing Agreements and Conventions. Table 1, above, summarizes the main relevant documents and how they are related to the RN emergency planning and response processes.

1.7 Aim

The aim of this Preparedness Plan is to describe the process required to maintain the capabilities needed to effectively perform the functions explained in Volume 2a – Operational Response Plan.

1.8 Scope

This Preparedness Plan is for the “steady state” management of the preparedness process. The implementation phase, which consists of establishing the basic elements of the Regional emergency response capabilities, is not included in this process.

The Regional emergency plan addresses emergencies that occur in the RSA, as shown in Figure 1, or that have an impact in that area, or that have impacts on several Member States (MS), or following a request for assistance from one of the MS.

1.9 Structure of this document

Section 2 of this document describes the organization responsible for its implementation and management. Section 3 describes the preparedness process and details about each of the process activities. Sections 4 to 6 address the aspects of information, public education and resources associated with the preparedness process. Section 7 contains the references. Annexes contain information and data that are useful for the management of the preparedness process.

1.10 Terminology

A glossary and list of abbreviations are provided at the end of this document in Annexes F and G, respectively.

2. EMERGENCY PREPAREDNESS ORGANIZATION

2.1 Organization chart

The overall preparedness organization is shown in Figure 2. The detailed roles and responsibilities are described in the following subsections. The emergency preparedness organization should not be confused with the organization of the RNCT, which activates to respond to a specific emergency. In this section, the “Regional Organization” has the meaning of “ROPME”.

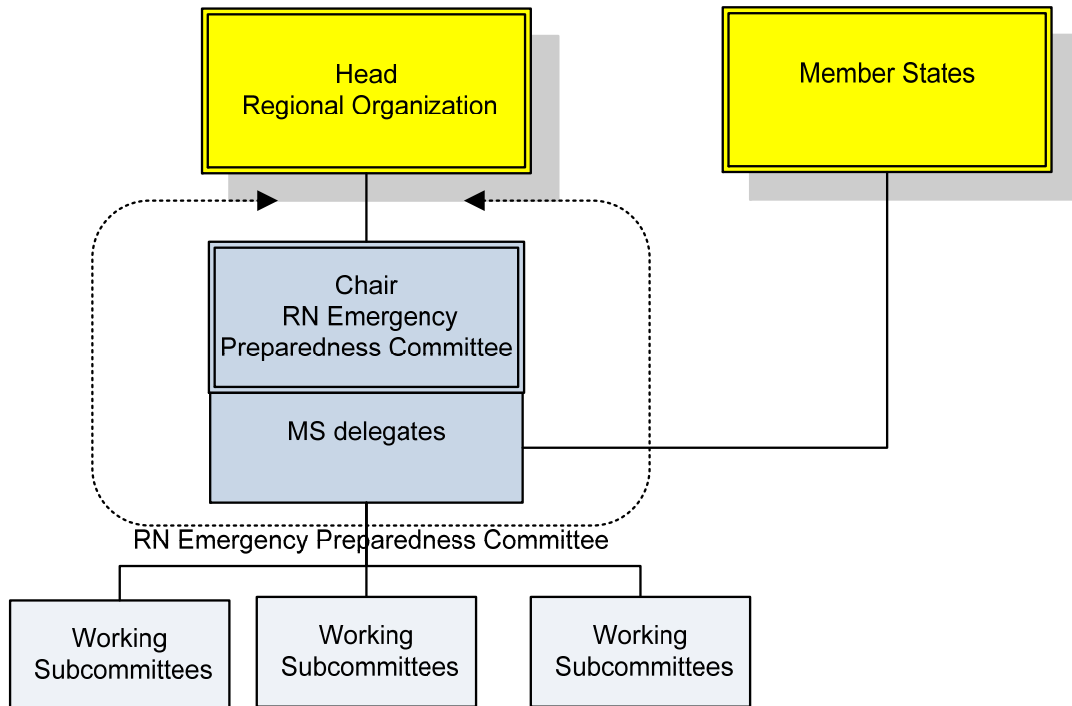


Figure 2: Regional preparedness organization

2.2 Roles and responsibilities

2.2.1 Member States

Each MS participating in this plan is responsible for:

- Developing and implementing a national RN emergency plan;
- Implementing standards and guidelines developed by the Regional organization;
- Developing response capabilities required to support the RNERP Volume 2a - RN Operations Plan;
- Committing and maintaining the human and financial resources required to implement the preparedness process described in this document; and
- Participating in training and exercises as required, in accordance with the training and exercise plan developed as part of the preparedness process.

2.2.2 Regional Organization

The head of the Regional Organization (RO) has an executive responsibility for the management of the preparedness process. In that function, the RO shall:

- Ensure that adequate resources are available for its implementation and operational management;
- Facilitate the resolution of any issue encountered as part of the preparedness process;
- Facilitate and promote the adoption of RN emergency response standards in the region;
- Conduct an annual review of the effectiveness of the preparedness process; and
- Actively promote the continuous development of the preparedness process aimed at improving, over the long term, the Regional capabilities for responding to RN emergencies.

2.2.3 RN Emergency Preparedness Committee

The RN Emergency Preparedness Committee (RNEPC) is composed of one delegate from each participating MS, supported by the secretariat of the Regional Nuclear Coordination Centre (RNCC). To be a MS delegate on the RNEPC, a person must:

- Have sufficient authority to make recommendations to the MS senior decision-makers regarding the allocation of resources and the decision-making required as part of the preparedness process;
- Have sufficient knowledge and training in RN emergency response to understand the issues and challenges presented by such emergencies; and
- Be thoroughly familiar with the respective MS capabilities and resources, and MS national and local plans for dealing with such emergencies.

The general responsibilities of the RNEPC are to:

- Manage the routine operation of the preparedness process and all its elements (which are described in detail in this document);
- Establish and manage working sub-committees (WSC) as required (see below);
- Coordinate the efforts of the MS in the context of the Regional RN emergency preparedness process;
- Propose Regional standards for response to RN emergencies; and
- Manage the implementation of Regional initiatives to improve the Regional capabilities in responding to RN emergencies.

2.2.4 Chair of the RNEPC

One of the delegates shall be designated as Chair of the Committee by ROPME. The Chair position assignment shall be for one year and renewable each year, with no limit on the number of terms. The responsibilities of the Committee Chair are as follows:

- Organize annual meetings of the Committee to review the preparedness process and to establish operational priorities;
- Prepare, or cause to be prepared, periodic action plans to address preparedness and response issues;
- Approve initiatives of the Committee;
- Make annual reports to ROPME on the effectiveness of the preparedness process; and
- Carry out annual reviews of the effectiveness of the preparedness process for ROPME.

2.3 Working sub-committees

WSC may be established from time to time to address specific preparedness issues or to manage specific initiatives in the context of the Regional RN emergency response plan. The composition and terms of reference of these WSC shall be determined by the Committee and subject to approval by the ROPME. These WSC are intended to be temporary, with a term to be clearly defined by the Committee as part of the terms of reference.

2.4 Operation

The Committee shall meet at least annually or as required. Minutes of the meetings shall be kept and distributed to all Committee members. The Committee shall also maintain a dynamic action list to track the progress of the implementation of its decisions.

3. PROCESS

3.1 Overview

The “steady state” management of the preparedness process is illustrated in

Figure 3. It is understood that, during the implementation phase, a parallel process will need to be developed. It is assumed that the following process takes place once the major elements of the Regional RN emergency response capabilities have been established.

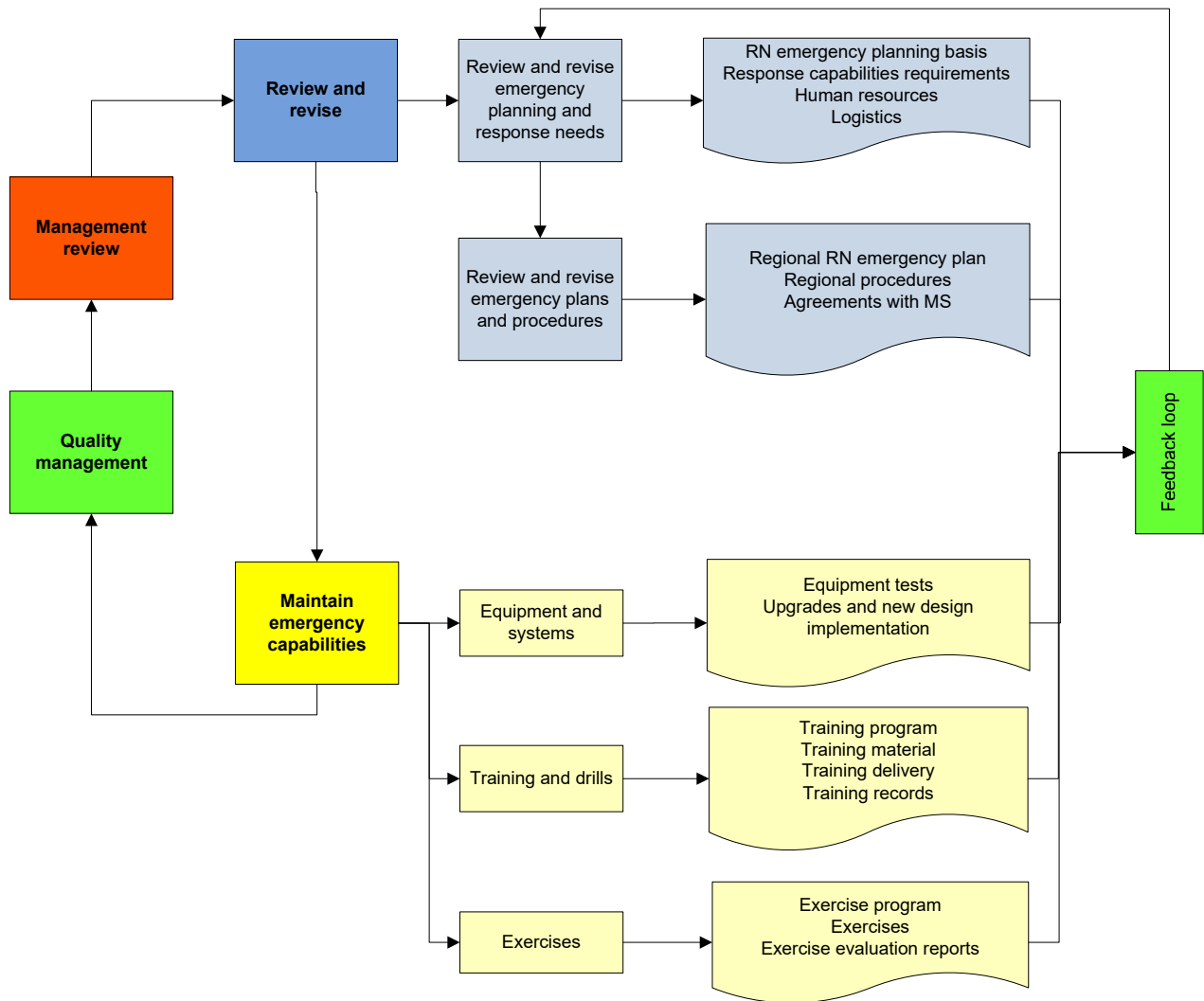


Figure 3: Regional preparedness process

3.2 Process elements

This section describes the process elements shown in

Figure 3.

3.2.1 Review and revise emergency response arrangements

This process component is divided into two activities:

1. Review of needs; and
2. Review of Regional plans and procedures.

Unless otherwise indicated below, the review of these elements shall be carried out annually by the RNEPC. A report documenting the results of the review and ensuing actions shall be part of the management review submitted to ROPME.

3.2.1.1 *Review of needs*

Emergency response requirements drive the need for the plans, procedures and equipment. These requirements will change with time, as both knowledge of the hazards and experience progress; this progression could be directly related to a growth in the nuclear industry or to new hazards that appear in the region. Therefore, the requirements need to be periodically reviewed. They include:

- The planning basis;
- The emergency response capabilities requirements;
- Human resource requirements; and
- Logistics requirements.

The planning basis is described in Volume 1 – Planning Basis and it also includes the regional emergency response capability requirements. The human resource and logistics requirements are contained in the Annexes of the present document.

3.2.1.2 *Review of the Regional plan and procedures*

Emergency response arrangements are documented in Volume 2a – Operational Plan of the RNERP. Regional RN emergency procedures are the step by step instructions required to ensure that the operational plan can be executed in a standardized manner during an emergency. Regional procedures shall include, but not necessarily be limited to, the following:

- Identifying, Notifying and Activating;
- Classification;
- General procedures for the RNCT Chair ;
- General procedures for the RNCT members;
- General procedures for the Senior Technical Advisor;
- General procedures for on-scene response;
- Casualty management;
- Protection of emergency workers;
- Dose projection;
- Situation reports;

- Radiation measurement and reporting;
- Request for assistance; and
- Interviews with the media.

The operational plan and regional procedures must be reviewed in accordance with Table 2, or whenever deficiencies are noted. The review is based, in part, on the results of the lessons learned from the tests, training, exercises and actual emergencies (including non-RN emergencies that may show insight in the Regional RN emergency response effectiveness).

Deficiencies are noted following each review and following all tests, drills and exercises. Deficiencies are classified as either:

- **Minor** - deficiencies that do not impair the fundamental capabilities of the response system;
- **Major** - deficiencies that could, under certain circumstances, impair the capability to perform critical response functions; or
- **Critical** - deficiencies that impair the ability to perform key response functions.

Deficiencies must be corrected as follows:

- **Minor** – within 12 months;
- **Major** – within 6 months; and
- **Critical** – within one month.

Table 2 details the review frequency for the RNERP volumes and supporting documentation.

Table 2: Document review frequency

Document	Periodic review
RN emergency planning basis	Every 2 years
Human resource requirements	Every year
Logistics	Every year
Regional operational response plan	Every 2 years
Regional emergency response procedures	Every year
International arrangements	Every 2 years

3.2.2 Maintain emergency response capabilities

This section describes the activities for maintaining the emergency response capabilities. These can be divided into the following elements:

- Equipment and systems;
- Training and drills; and
- Exercises.

3.2.2.1 Equipment and systems

As much as practicable, equipment and systems that could be used in joint Regional operations should be standardized. The RNEPC shall, from time to time, publish and revise such standards. These systems and equipment include, for example:

- Fixed and mobile detection and monitoring systems, including periodic environmental sampling, analysis and data storage;
- Communication systems (mainly marine);
- Survey instruments, including:
 - Portable radiation detection instruments; and
 - Portable/deployable air samplers; and
- Personal protection equipment, including:
 - Anti-contamination clothing;
 - Respiratory protection;
 - Personal contamination measurement instruments; and
 - Dosimeters.

Each MS is responsible for reviewing the effectiveness of its equipment and systems used in support of the Regional plan. The organization responsible for the operation of the RNCC must review the effectiveness of the Regional systems used by that centre. The Committee is responsible for integrating all the reviews and producing an integrated assessment report.

System tests shall be carried out in accordance with the schedule provided in Table 3. A report of the test results shall be promptly submitted to the Committee.

Table 3: Equipment and system tests

System	Test frequency
Detection and monitoring	On-going, reported monthly
Notification	Monthly
Survey instruments	Monthly
Communications systems	Monthly
Consequence assessment information sharing system	Monthly

3.2.2.2 Training and drills

The RNEPC shall establish training standards for all teams and personnel from the MS who may have an active role in the Regional Plan. These standards should be adopted by MS and incorporated into their own training and exercises. This will ensure that members responding to an emergency in international waters, while not necessarily using the same equipment, will at least be using the same units of measurement, decontamination procedures, turn-back dose limits, etc. By standardizing and harmonizing the training and drills conducted in the MS and related to the Regional Plan, actual emergency response operations will be conducted efficiently and effectively, with a minimum of unnecessary complications.

Training and drills involve the development, delivery and updating of training for all key personnel involved in the Regional RN emergency response plan and, to a lesser extent, for members of the Committee. Training and drills shall be conducted in accordance with the schedule contained in

Table 4.

Table 4: Training and drill requirements

Individuals or teams	Training required	Drills required	Training refresher required
Members of the RNEPC	<ul style="list-style-type: none"> ▪ Advanced training in RN emergency response and management 	None	Every two years
RNCC personnel	<ul style="list-style-type: none"> ▪ Basic RN emergency response ▪ Emergency classification ▪ Notification procedures 	Notification drill every month	Every year
Survey teams	<ul style="list-style-type: none"> ▪ Basis RN emergency response ▪ Radiation protection ▪ Radiation measurement ▪ Survey strategy ▪ Communication 	Survey drill every year	Every year
Medical first aid and medical transport teams	<ul style="list-style-type: none"> ▪ Basic RN emergency response ▪ Radiation protection ▪ On-scene response 	Transport of contaminated victims, once per year	Every year
Consequence assessment team	<ul style="list-style-type: none"> ▪ Regional emergency response plan ▪ Procedure for plume tracking and regional dose projection 	Dose projection drill, every year	None

The RNEPC is responsible for arranging Regional training, for developing training and drill standards for national training (provided in support of the Regional plan), and for ensuring that MS perform the training required for personnel involved in the Regional plan.

Training and drills shall be evaluated by the organization conducting them. A report of the evaluation shall be submitted to the Committee. The RNEPC shall keep a record of all training and drill evaluations for at least five years. An example of a five-year exercise schedule can be seen in Annex D.

3.2.2.3 Exercises

The purpose of exercises is to test the overall response system. Exercises are not drills; they involve multiple organizations, with the main goal of verifying coordination mechanisms between those organizations.

A regional exercise involving field teams shall be held at least every three years. Table top exercises (TTX), which do not involve the deployment of field resources, should be held every other year.

Each exercise shall be evaluated. Evaluation criteria are included in the RNEPC training and exercise manual (to be promulgated). The evaluation report shall be submitted within one month of the exercise to the Committee. The RNEPC shall keep a record of the exercise evaluation reports for at least 10 years.

3.2.3 Feedback loop

The RNEPC shall ensure that the lessons learned from training, drills and exercises are thoroughly analyzed and that actions arising from the lessons learned are recorded, tracked and implemented.

3.2.4 Management review

An annual management review shall be conducted by the RNEPC, acting on the authority of the Head of ROPME. The management review is an evaluation of the effectiveness of the overall preparedness and response processes. It shall contain, at least, the following items:

- Summary of review of plans and procedures;
- Major revisions to the planning basis (as applicable);
- Number of teams available for on-scene response;
- Number of survey teams available for joint Regional response;
- Number of medical transport teams available for Regional response;
- Number of medical facilities capable of treating contaminated casualties;
- Percent of Regional teams trained;
- Exercise results;
- Status of Regional initiatives;
- Percent preparedness tasks completed on time;
- Major issues requiring ROPME attention;
- Number of Committee meetings held; and
- Major changes in international guidance requiring changes in the Regional plan.

Every five years, approximately, an outside audit of the Regional arrangements should be conducted. This external audit can be completed by independent experts from the MS or by international experts.

3.2.5 Quality management

The management of all documentation and records related to this preparedness process shall be done in accordance with recognized international standards; e.g., ISO-9001. While it is not required for the preparedness organization to be certified to such standards, the intent of the standard should be applied.

4. LOGISTICS AND ADMINISTRATION

4.1 Documentation management

The Committee, through the actions of the delegates, shall ensure that all relevant MS organizations receive controlled copies of all Regional plans and procedures required for the performance of their functions as part of the Regional plan.

4.2 Public education

The Committee shall develop and distribute public information material on the Regional RN plan. It is the responsibility of the MS to ensure that this public education material is appropriately distributed within their jurisdiction. MEMAC is responsible for distributing public information material to shipping and platform operators.

4.3 Resources and financial aspects

Each MS is responsible for providing the financial and personnel resources required to support this preparedness plan. The ROPME is responsible for securing the financing required for the operation of the Committee and for Regional initiatives identified by the Committee and approved by ROPME.

ANNEX A – HUMAN RESOURCE REQUIREMENTS FOR THE RESPONSE

The following describes the teams and personnel required for the response. Note that in some instances teams can be combined. For example, a waterborne response team could be composed of firefighters who are also trained in surveys and in medical evacuation.

Resources for land-based response are deemed to be within each MS’s jurisdiction and should be addressed in their respective national plans. They are therefore not addressed in this Annex. Specialized land-based facilities (e.g., medical facilities) are also not addressed, as they are the full responsibility of the MS.

Table A-5: Team requirements

Team	Personnel required	Knowledge required	Skills required
Regional Nuc/Rad Coordination Team (RNCT)	One delegate per MS	<ul style="list-style-type: none"> ▪ Basic radiation protection ▪ RN emergency management principles 	<ul style="list-style-type: none"> ▪ Make decisions and recommendations for emergency measures ▪ Achieve compromise through dialogue and judgment ▪ Effective liaison with MS emergency decision-makers
	One Leader	Same as above, plus: <ul style="list-style-type: none"> ▪ Group crisis management principles ▪ Decision-making under stress situations ▪ Media relations and communications 	Same as above, plus: <ul style="list-style-type: none"> ▪ Run effective crisis management meetings ▪ Deal with complex dilemmas ▪ Give media interviews
	One Senior Technical Advisor	Advanced knowledge in: <ul style="list-style-type: none"> ▪ Emergency workers protection ▪ Intervention levels and operational intervention levels ▪ Radiation measurements ▪ Radiation effects on health and the environment ▪ Survey strategies ▪ Plume projection and limitations ▪ Crisis management briefing techniques ▪ Emergency decision-making principles ▪ Nuclear technologies of interest (based on the emergency planning basis) 	<ul style="list-style-type: none"> ▪ Assess all information ▪ Make recommendations for the protection of the public ▪ Make recommendations for the protection of the emergency workers ▪ Direct surveys ▪ Interpret dose projection results ▪ Give effective technical briefings
Regional Nuc/Rad Coordination Centre (RNCC)	Sufficient duty officers to ensure 24/7 coverage	Classification system and notification procedures	Promptly notify relevant teams and organizations
	Sufficient communications operator to ensure 24/7 coverage	Nuclear emergency response terminology and units	Communicate with on-scene commander and survey teams

Team	Personnel required	Knowledge required	Skills required
Waterborne first response teams (minimum one team per MS, each with the following personnel)	Number per team may vary. Every person must have the knowledge listed. A combination of persons may have the skills listed.	<ul style="list-style-type: none"> ▪ Basic radiation protection ▪ Personal protective equipment and dosimeters 	<ul style="list-style-type: none"> ▪ Drive the vessel ▪ Operate in a radiation environment ▪ Provide firefighting assistance ▪ Provide medical first aid ▪ Assist with the transport of contaminated patients by boat, or transfer to airborne transport.
Waterborne survey teams (minimum one team per MS, each with the following personnel)	One surveyor (minimum). Every person must have the knowledge listed. A combination of persons may have the skills listed.	<ul style="list-style-type: none"> ▪ Basic radiation protection ▪ Personal protective equipment and dosimeters 	<ul style="list-style-type: none"> ▪ Drive the boat ▪ Operate in a radiation environment ▪ Operate gamma radiation instruments ▪ Operate air sampling equipment ▪ Record and communicate data
Airborne medical evacuation teams	One pilot (minimum) and two (minimum) medical transport technicians Every person must have the knowledge listed. A combination of persons may have the skills listed.	<ul style="list-style-type: none"> ▪ Basic radiation protection ▪ Personal protective equipment and dosimeters 	<ul style="list-style-type: none"> ▪ Fly the aircraft ▪ Operate in a radiation environment ▪ Transport contaminated victims while minimizing contamination
Dose projection team	Sufficient number to ensure that at least one specialist will be available at the time of an emergency	Advanced knowledge in: <ul style="list-style-type: none"> ▪ Radiation health effects ▪ Contamination atmospheric transport ▪ Intervention levels ▪ RM emergency decision-making ▪ Environmental impact assessment 	<ul style="list-style-type: none"> ▪ Run selected dose projection software ▪ Adjust projections based on survey data and accident trend assessment ▪ Interface with meteorological centres to incorporate regional and long range weather conditions in the dose projections

ANNEX B – LOGISTICS REQUIREMENTS

The following equipment and facilities are required (as a minimum) to support the Regional RN emergency plan; normal equipment and facilities are not included in this list. These are the items that are specifically needed for RN emergencies and that may not normally be available.

Table B-6: Equipment and facilities

Equipment or facility	Comment
RNCC	
Communications system (sea)	Capable of communicating with vessels and platforms, as well as with the OSC Communication with survey teams to use independent channel
Communications systems	One line per member of the RNCT
Internet and email system	One access point per member of the RNCT
Fax	May not be required if appropriate IT systems available
Scanner	
Maps	Electronic maps and mapping software are preferred
Data sharing system for the radiation monitoring network	
Data mapping system for the survey and sampling measurements	
Others	
Gamma survey instruments	One per survey team
Low energy (60 keV) gamma detection instruments	At least five in the Region
Contamination probes and readers	One per emergency team
Personal protective equipment, including respiratory protection	One set per emergency worker
Dosimeters (electronic)	One per emergency worker
Water sampling kits	One per MS

ANNEX C – REGIONAL TRAINING COURSES OFFERED

- Basic radiation protection;
- Personal protective equipment and decontamination procedures;
- RN emergency management principles;
- Conducting surveys;
- Managing the survey strategy;
- Crisis management for senior decision makers;
- Advanced radiation health effects;
- Dose projection;
- Regional RN emergency response plan: an introduction; and
- Procedure-specific training.

ANNEX D – FIVE YEAR EXERCISE PROGRAM

Table D-7: Five year exercise program by yearly quarter

Exercise	2012				2013				2014				2015				2016							
TTX RNCT + MS contact points	■							■					■								■			
STA + survey teams			■			■					■				■								■	
Survey teams drills	■					■					■				■								■	
Full scale exercise											■													

ANNEX E – LIST OF EMERGENCY RESPONSE ORGANIZATIONS PARTICIPATING IN THE REGIONAL RN EMERGENCY PLAN

This Annex must be promulgated by the MS.

Regional level

ROPME

TBP

MEMAC

TBP

Member State organizations

State of Kuwait

TBP

Kingdom of Bahrain

TBP

State of Kuwait

TBP

Sultanate of Oman

TBP

State of Qatar

TBP

Kingdom of Saudi Arabia

TBP

ANNEX F – GLOSSARY

Action Level	The level of dose rate or activity concentration above which remedial actions or protective actions should be carried out in chronic exposure or emergency exposure situations. An action level can also be expressed in terms of any other measurable quantity as a level above which intervention should be undertaken.
Acute Exposure	An exposure to radiation received in a short period of time, i.e., seconds, minutes, or hours.
Acute Radiation Syndrome	A collection of symptoms caused by receiving a relatively high dose of radiation to the body in a short time (usually minutes). The earliest symptoms are blood cell changes, nausea, fatigue, vomiting and diarrhea. Hair loss, bleeding, swelling of the mouth and throat and general loss of energy may follow. Deterministic effects may be detectable above 0.5 Sv and severe deterministic health effects are possible above 1 to 5 Sv.
ALARA	All reasonable measures are taken to minimize radiation exposure to levels As Low As Reasonably Achievable (ALARA), social and economic factors taken into consideration. For military operations, operational considerations are also taken into consideration.
Background Radiation	Radiation associated with natural sources or any other sources in the environment that are not amenable to control.
Bioassay	Any procedure used to determine the nature, activity, location or retention of radionuclides in the body by direct (in vivo) measurement or by in vitro analysis of material excreted or otherwise removed from the body.
Chronic Exposure	Exposure persisting in time. Normally refers to exposures persisting for many years as a result of long-lived radionuclides in the environment.
Cloud Shine	External exposure from airborne radionuclides.
Controlled Access Area	An area where the dose rate may exceed the level permitted in public access areas and to which access by any person other than a worker is controlled.
Decontamination	The complete or partial removal of contamination by a deliberate physical, chemical or biological process.
Deterministic Effects	A radiation effect for which generally a threshold level of dose exists above which the severity of the effect is greater for a higher dose. Such an effect is described as a 'severe deterministic effect' if it is fatal or life-threatening or results in a permanent injury that decreases the quality of life.

Dirty Bomb	A device designed to spread radioactive material by conventional explosives when the bomb explodes. A dirty bomb kills or injures people through the initial blast of the conventional explosive and spreads radioactive contamination over possibly a large area—hence the term “dirty.” Such bombs could be miniature devices or large truck bombs. See also Radiological Dispersal Device (RDD).
Dose Averted	The dose prevented by the application of a countermeasure or set of countermeasures, i.e. the difference between the projected dose if the countermeasure(s) had not been applied and the actual projected dose.
Dosimetry	Assessment (by measurement or calculation) of radiation dose.
Downwind Sector	The sector 30° on either side of the prevailing wind direction, downwind of the emergency site.
Emergency Classification Level	A simple system that describes the severity scale of an emergency. The emergency class is directly related to risk for the workers and the public. It is used for communicating to the response organizations and the public the level of response needed.
Emergency Worker	A worker who may be exposed in excess of occupational dose limits while performing actions to mitigate the consequences of an emergency for human health and safety, quality of life, property and the environment.
Fission Products	The radioactive elements created by the fission process.
Hull Shine	The external gamma radiation hazard on the exterior of a nuclear powered vessel due to fission products released to and dispersed within the reactor compartment of the vessel.
Noble Gases	A group of gaseous elements (e.g., xenon, krypton, etc.) that do not interact with other elements (i.e., NER team). Radioactive noble gases dissipate quickly and are not retained inside the body even when inhaled, thus pose little threat to an individual (except in a closed-in area).
Nuclear Capable Vessel (NCV)	A ship or submarine that is designed for the transport, storage or deployment of nuclear weapons.
Nuclear Powered Vessel (NPV)	A ship or submarine that is powered wholly or partly by nuclear energy.
Nuclear Weapon Emergency	An unexpected event involving a fire or explosion involving a nuclear weapon.
Off-Site Emergency	A nuclear emergency involving a reactor or nuclear weapon, which has led, or may lead, to a significant release of radioactive material from the facility.

On-Scene Response	This is the portion of the response that takes place within the immediate area of the emergency. There is no fixed or firm definition of what is meant by "immediate". In general, this includes the area that is controlled by the emergency first responders and from which non-essential personnel and persons are evacuated.
On-Scene Controller (OSC)	An Officer who, through their training and experience, is capable of overseeing the on-scene non-radiological response to a nuclear emergency.
On-Scene Authority	In general, this is the Lead MS. The direct on-scene authority is the senior designated officer at or near the emergency site. A designated component of the on-scene authority is responsible for liaison with the off-site authority.
Operational Intervention Levels (OIL)	A calculated level, measured by instruments or determined by laboratory analysis, that corresponds to an intervention level or action level.
Recovery	This involves two concepts. The first one is "back to business", and the second is return to normal. In the first case, measures are taken to render the affected areas safe enough for business activities to resume, though special precautions may need to be taken to reduce the potential exposure of the public or workers. In the second case, longer term measures are taken to return the affected area to its pre-emergency state.
Regional Nuclear/Radiological Coordination Center (RNCC)	This is the centre from which the regional response is coordinated. Normally, this is the CRISIS CENTER operations centre, unless otherwise agreed to by the lead MS and CRISIS CENTER. In this concept of operations, within the context of an RN event, the CRISIS CENTER operations centre is referred to as the RNCC.
Senior Technical Advisor	A person who, through their training and experience, is qualified to advise on all radiological and technical aspects of a RN emergency. This person is normally a post-graduate qualified nuclear engineer or physicist.
Site	Area immediately surrounding the location where an emergency has taken place or can take place. For a fixed facility, this is a geographical area that contains the authorized facility, activity or source, and within which the management of the authorized facility or activity may directly initiate emergency actions. For an event that takes place in the RSA, the site refers to the area controlled by the on-scene emergency response services.
Site Emergency	Events resulting in a major decrease in the level of protection for those on or near the site. Emergency response level adopted when there is a confined nuclear emergency with no radiological threat to the public.
Surveillance	This is part of the prevention phase preceding the discovery of a RN emergency. It involves active and passive measures to detect the present of illicit RN material, or the unexpected presence of radiation in the environment.

Survey Specialist

A person who through their training and practical experience is qualified to conduct surveys of radioactive contamination.

Threat

An act of coercion wherein a negative consequence is proposed to elicit response.

ANNEX G – LIST OF ABBREVIATIONS

ACMZ	Automatic Countermeasure Zone
ACP	Access Control Point
AEZ	Automatic Evacuation Zone
ALARA	As Low As Reasonably Achievable
Bq	Becquerel
CAZ	Controlled Access Zone
CC	Crisis Center
CCP	Contamination Control Point
Ci	Curie
cpm	Counts Per Minute
cps	Counts Per Second
CPZ	Contingency Planning Zone
CVN	Nuclear Powered Aircraft Carrier
DCP	Decontamination Control Point
DM	Deputy Minister
dps	Disintegrations per Second
DPZ	Detailed Planning Zone
DRD	Direct Reading Dosimeter
ED	Electronic Dosimeter (see DRD)
EOC	Emergency Operations Center
EPZ	Emergency Planning Zone
ERBS	Environmental Radionuclide Baseline Study
ERL	Emergency Response Level
ERMP	Environmental Radiological Monitoring Program
Gy	Gray
HE	High Explosives
HF	High Frequency
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiation Protection
IEC	Incident and Emergency Center of the IAEA
IHE	Insensitive High Explosive
KI	Potassium Iodide

LPZ	Longer Term Protective Action Zone
MARPOL	International Convention for the Prevention of Pollution from Ships
MEMAC	Marine Emergency Mutual Aid Center
MS	Member State
mSv	millisievert
MS EOC	Member State Emergency Operations Center
NCV	Nuclear Capable Vessel
NER	Nuclear Emergency Response
NPP	Nuclear Power Plant
NPV	Nuclear Powered Vessel
OIL	Operational Intervention Level
OSC	On-Scene Controller
PA	Public Affairs
PAZ	Precautionary Action Zone
PB	Planning Basis
PIT	Potassium Iodide Tablet
PPE	Personal Protective Equipment
PWR	Pressurized Water Reactor
RAM	Radioactive Material
RCC	Regional Coordination Center
RN	Radiological/Nuclear
RNCC	Regional RN Coordination Center
RNEPC	Regional RN Emergency Preparedness Committee
RNCT	Regional RN Coordination Team
RNERP	RN Emergency Response Plan
RO	Regional Organization
ROPME	Regional Organization for the Protection of the Marine Environment
RSA	ROPME Sea Area
SCBA	Self Contained Breathing Apparatus
SOP	Standard Operating Procedure
SSBN	Nuclear Powered Ballistic Missile Submarine
SSGN	Nuclear Powered Guided Missile Submarine
SSN	Nuclear Powered Attack Submarine
STA	Senior Technical Advisor

Sv..... sievert
TBD.....To Be Developed
TBP To Be Promulgated
TLDThermoluminescent Dosimeter
TTXTable Top Exercise
UNCLOS.....United Nations Convention of the Law of the Sea
UPZ.....Urgent Protective Action Zone
WMOWorld Meteorological Organization
WSCWorking Sub Committee