IACRNE

Inter-Agency Committee on Radiological and Nuclear Emergencies

Working Group on Coordinated International Exercises

Exercise Report

ConvEx-3 (2013)

International Emergency Response Exercise

BAB AL MAGHRIB

Morocco

20–21 November 2013

LIMITED DISTRIBUTION

This report has been prepared by the:

Incident and Emergency Centre
International Atomic Energy Agency
PO Box 100, Vienna International Centre
1400 Vienna, Austria

EDITORIAL NOTE

The material in this document has been supplied by the IAEA's Incident and Emergency Centre, the participating international organizations and by some Member States, and has not been edited by the IAEA for formal publication. The views expressed remain the responsibility of the Incident and Emergency Centre and other participating organizations and do not necessarily reflect those of the government(s) of Member State(s). In particular, neither the IAEA, nor any other organization or body participating in the exercise can be held responsible for any material reproduced in this document.

CONVEX-3 (2013) EXERCISE REPORT
IAEA, VIENNA, 2014

© IAEA, 2014

Printed by the IAEA in Austria
June 2014

Foreword

The Convention on Early Notification of a Nuclear Accident (Early Notification Convention) and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (Assistance Convention) are the prime legal instruments that establish an international framework to facilitate the exchange of information and the provision of assistance in the event of a nuclear or radiological emergency.

The International Atomic Energy Agency (IAEA) has specific functions allocated to it under these Conventions. These include the responsibility to inform States Parties, Members States, and other States of a nuclear or radiological emergency. The IAEA receives reports of an emergency from a designated competent authority in a State and verifies any unconfirmed reports of an emergency. It establishes primary functional links with the reporting State and any potentially affected States as appropriate, providing direct communications with the respective official national emergency response coordinating structures. It also establishes functional links with the relevant international intergovernmental organizations, as appropriate.

The IAEA regularly convenes the Inter-Agency Committee on Radiological and Nuclear Emergencies (IACRNE)[1], whose purpose is to coordinate the arrangements of the relevant international intergovernmental organizations (international organizations) for preparing for and responding to nuclear or radiological emergencies in a coordinated way. Although the Conventions assign specific response functions and responsibilities to the IAEA and the States Parties, various international organizations have — by virtue of their statutory functions or related legal instruments — general functions and responsibilities that encompass aspects of emergency preparedness and response.

It has been recognized that good preparedness in advance of an emergency can substantially improve the response. With this in mind, the IAEA and other organizations of the IACRNE have developed and maintain the *Joint Radiation Emergency Management Plan of the International Organizations* (the Joint Plan). The Joint Plan represents a framework for inter-agency emergency preparedness and response coordination, describes common understandings of each participating organization's response mandate, provides the basis for coordinated and harmonized international response and ensures that coordinated and consistent arrangements and capabilities of relevant international organizations are developed and maintained. However, it does not replace arrangements in place in the international organizations.

The purpose of the ConvEx-3 exercises[2] is to evaluate the response to a major nuclear or radiological emergency (radiation emergency) and, in particular, the exchange of information and provision of international assistance. Thus, the ConvEx-3 exercises provide an opportunity to identify shortcomings in the national and/or international emergency response systems that might hamper the response to a radiation emergency.

The first such jointly sponsored international radiation emergency exercise took place 22–23 May 2001, and was based on a French national level nuclear emergency exercise at the French Gravelines

---

[1] Formerly the Inter-Agency Committee for the Co-ordinated Planning and Implementation of Response to Accidental Releases of Radioactive Substances, that was later renamed to the Inter-Agency Committee on Response to Nuclear Accidents, and in 2009 was renamed the Inter-Agency Committee on Radiological and Nuclear Emergencies.

[2] Exercises are prepared, conducted and evaluated in the framework of the Early Notification and the Assistance Conventions.

nuclear power plant (NPP). The second, ConvEx-3 (2005) exercise was based on the Romanian national exercise at Cernavoda NPP and was conducted 11–12 May 2005, while the thirdConvEx-3 (2008), was based on a severe nuclear accident at Laguna Verde NPP, Mexico and was conducted 9–10 July 2008.

The ConvEx-3 (2013), codenamed Bab Al Maghrib, was the fourth exercise in this series based on the Moroccan national radiological emergency exercise.

This exercise report describes the exercise, summarizes evaluation of the response of the international organisations and Member States, and presents common lessons, exercise conclusions and recommendations.

The report was prepared by R. Martincic, Lead Exercise Evaluator, IAEA's Incident and Emergency Centre, based on the Chief Evaluators' Reports and outcomes of the fifth meeting of the IACRNE Working Group on Coordinated International Exercises held at IAEA Headquarters in Vienna 11–12 February 2014.

Contents

Section 1

1 INTRODUCTION

1.1 BACKGROUND INFORMATION

Over the past decade, many international nuclear emergency exercises have taken place, and much experience has been gained in the important fields of emergency preparedness and response. In order to more efficiently plan, conduct, analyse and share the results of international nuclear emergency exercises, the Inter-Agency Committee on Radiological and Nuclear Emergencies (IACRNE), for which the International Atomic Energy Agency (IAEA) provides the Secretariat, is a coordination point for these activities. The IACRNE is composed of representatives from international intergovernmental organizations[3] involved in the preparedness for and response to radiation emergencies.

It has been recognized that coordination and joint sponsorship of international nuclear emergency exercises can reduce the total number of exercises undertaken, which would help to optimize resource utilization for both national and international organizations. Coordination can also extend the scope of the objectives addressed by such exercises, and national and international participants can profit from a broad range of proposed objectives. At the same time, exercise evaluation and lessons learned can be more effectively shared.

Large scale joint international exercises (ConvEx-3 exercises), covering the early phase of a severe radiation emergency, are organized by the IAEA once every three to five years, based on a national exercise being conducted in a Member State. The purpose of the ConvEx-3 exercises is to evaluate response to a major radiation emergency and, in particular, to evaluate the exchange of information, provision of the international assistance and coordination of public information. Thus, the ConvEx-3 exercises provide an opportunity to identify shortcomings in the national and/or international

[3] Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), the Euro-Atlantic Disaster Response Coordination Centre (EADRCC), the European Commission (EC), the European Police Office (EUROPOL), the Food and Agriculture Organization of the United Nations (FAO), the International Atomic Energy Agency (IAEA), the International Civil Aviation Organization (ICAO), the International Criminal Police Organization (INTERPOL), the International Maritime Organization (IMO), the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (OECD/NEA), the Pan American Health Organization (PAHO), the United Nations Environment Programme (UNEP), the United Nations Office for the Co-ordination of Humanitarian Affairs (OCHA), the United Nations Office for Outer Space Affairs (OOSA), the World Health Organization (WHO) and the World Meteorological Organization (WMO). In addition, the Joint Plan has been developed in cooperation with the secretariat of the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR).

emergency response systems that might hamper the response aimed at minimizing the consequences of a radiation emergency.

The IAEA invites Member States to host the ConvEx-3 exercise at least 18 months in advance and expects to receive offers in the following 6 months. The IAEA liaises with the Member States offering to host the exercise, and with the IACRNE, in order to decide which Member State will host the exercise.

The hosting State must meet the following conditions:

(a) The host State must be an IAEA Member State and apply the current IEComm arrangements;
(b) The host State must simulate an emergency involving a significant release of radioactive material into the environment requiring protective actions and having transnational impact;
(c) The National Warning Point, relevant competent authorities in the host country and the 'accident facility' (if applicable) must participate in the exercise;
(d) The exercise must last a minimum of 24 hours from the first message sent to the IAEA;
(e) The host State must guarantee its intention to establish and maintain communication links and information exchange with the IAEA's IEC throughout the exercise; and
(f) The host State must designate at least one person to work over a 12 month period with the IAEA and the IACRNE Working Group on Coordinated International Exercises to prepare the international part of the exercise, and in particular to draft exercise documents, and conduct the exercise evaluation.

The decision about the host State also takes into account available resources and the expressed objectives of international organizations intending to participate. When choosing the host State, priority is given to States in the regions that have not yet hosted the ConvEx-3 exercise. Detailed preparation begins no later than 12 months before the scheduled date of the exercise. Preparation, conduct and evaluation are coordinated through the IACRNE Working Group on Coordinated International Exercises, and also involve representatives of the neighbouring States that intend to participate in the exercise.

In July 2010, the IAEA Secretariat sent out an invitation letter for hosting the ConvEx-3 exercise in 2012. Due to the nuclear accident at the Tokyo Electric Power Company's (TEPCO's) Fukushima Daiichi NPP in 2011, a decision was made to postpone the exercise until 2013.

By July 2011 the IAEA Secretariat received an offer for hosting the exercise from the Morocco. In November 2011, the IEC sent a fax to all competent authorities and encouraged Member States with nuclear power programmes to reconsider offering to host the ConvEx-3 exercise. However, no new offers were received and the kind offer of Morocco was accepted.

The scenario for the exercise – a severe radiological emergency triggered by a nuclear security event – was prepared by the Exercise Direction Committee of the Morocco and codenamed Bab Al Maghrib.

1.2 IACRNE WORKING GROUP ON COORDINATED INTERNATIONAL EXERCISES

For the coordination of the international exercises, a standing working group – the IACRNE Working Group on Coordinated International Exercises (WG-CIE) – was established with the objectives to (a) coordinate plans for each organization's exercises, (b) review and coordinate preparation and evaluation of the ConvEx-3 exercise, and (c) coordinate sharing of exercise evaluation results and lessons identified. The IAEA's Incident and Emergency Centre (IEC) coordinates the work of the WG-CIE and provides support.

For the ConvEx-3 (2013) the IACRNE WG-CIE was comprised of the representatives of the international organizations and the Morocco as 'Accident State'. Morocco designated a representative of the National Centre for Energy Sciences and Nuclear Techniques (CNESTEN) – as a member of the WG-CIE to assist in preparation, conduct and evaluation of the international part of the exercise.

Based on the input received, the WG-CIE defined common exercise objectives and prepared the international aspects of the exercise.

1.3 EXERCISE SCOPE

The exercise was based on a severe radiological emergency triggered by nuclear security events with transnational/transboundary implications. The following issues were addressed in the exercise scenario: (a) dispersion of radioactive material into the atmosphere, (b) the interface between safety and security, (c) medical and public health, (d) impact on commerce, industry and tourism (food and products contamination, contamination of vehicles, ships), and (e) communication with the public.

1.4 EXERCISE OBJECTIVES

The overall goals of this exercise were:

1 To allow Member States and relevant international organizations to evaluate the response in a severe radiological emergency triggered by a nuclear security event;
2 To evaluate the international emergency management system e.g. current IEComm, IAEA's Response and Assistance Network (RANET) and Joint Radiation Emergency Management Plan of the International Organisations (JPLAN) arrangements, and direct bi-lateral/multi-lateral communications between countries; and
3 To identify good practices, as well as areas requiring improvement that cannot be identified in national exercises.

Additionally, at the international level, the exercise focused on different protective and other response actions in connection with the specific interests in the Accident State such as commerce, industry and tourism.

1.4.1 Common Exercise Objectives

In order to enable a harmonized exercise evaluation common objectives and specific evaluation questions[4] were developed to be addressed by participating States/international organizations. All objectives or specific evaluation questions might not have been appropriate for all participating States/international organizations, therefore, the participants could choose which objective/evaluation questions were applicable to them.

States and international organizations	
CO 1:	To investigate response management in a radiological emergency triggered by a nuclear security event.
CO 2:	To assess links and response coordination between safety and security authorities at the national and international level.
CO 3:	To assess the efficiency of emergency information exchange including security related information.
CO 4:	To analyse the level of consistency of recommended protective and other actions.

[4] For details see the Guide for Evaluators.

CO 5:	To assess the effectiveness of arrangements for the international assistance.
CO 6:	To assess public information activities – information consistency, coordination, timeliness, and security aspects.

Within these objectives the participating international organizations in particular evaluated the following:

International organizations	
CIO 1:	To evaluate inter-agency response to radiological emergency triggered by nuclear security event

1.4.2 Specific Exercise Objectives

In addition, the States and international organizations developed their own specific objectives[5] as follows.

International organizations		
IAEA	SO 1:	To evaluate the effectiveness of the IAEA's Incident and Emergency System and its Response Plan for Incidents and Emergencies (REPLIE) 2013
	SO 2:	To evaluate effectiveness of communications with Morocco, other Member States, the media and the public
	SO 3:	To test and evaluate the IAEA Secretariat's arrangements for consequence assessment and possible event progression
	SO 4:	To test arrangements for the coordination of provision of international assistance under RANET
ICAO	SO 1	To evaluate the effectiveness of the International Civil Aviation Organization (ICAO) Secretariat's arrangements for impact assessment and event progression, including roles and responsibilities within the JPLAN arrangements, emergency incident response (EIR) processes and infrastructure, and coordination between ICAO Headquarters and Regional Office(s) concerned
	SO 2	To test the activation of the IACRNE ad-hoc Working Group on Air and Maritime Transportation (WG-AMT) and to evaluate the inter-agency response
	SO 3	To assess the provision of exercise nuclear emergency messages, exercise SIGMET (Significant Meteorological Information) messages and exercise NOTAM (Notice to Airmen) messages for radioactive material in the atmosphere for Casablanca flight information region, issued in accordance with ICAO Annex 3 – Meteorological Service for International Air Navigation and Annex 15 – Aeronautical Information Services
	SO 4	To evaluate the decision-making process with respect to flight operations by concerned Member States, and the effectiveness of contingency plans, established in accordance with ICAO Annex 11 – Air Traffic Services, in addressing consequent shortcomings in the provision of air navigation services in Morocco, neighbouring States and over the high seas, with a view to identifying requirements for optimizing ICAO provisions in this regard
	SO 5	To evaluate the effectiveness of communications with Morocco, other concerned Member States, relevant United Nations agencies and international organizations, media and public
		No other international organizations reported specific exercise objectives
States		

[5] These objectives had to be communicated to the Exercise Lead Controller (Incident and Emergency Centre) in time so that adequate exercise injects could be prepared.

Morocco	SO 1:	To evaluate effectiveness of the national plan, ORSEC (Organisation des Secours) and operational protocols for response to a radiological emergency triggered by a nuclear security event
	SO 2:	To test the notification and activation mechanisms
	SO 3	To evaluate coordination among different stakeholders at the national level and at emergency response centres
	SO 4	To test the command control system
	SO 5	To test arrangements for providing technical assistance at the national level
	SO 6	To test arrangements for requesting international assistance
		No other States reported specific national exercise objectives

1.5 EXERCISE PARTICIPANTS AND LEVEL OF PARTICIPATION

States/international organizations participating in the ConvEx-3 (2013) exercise had the opportunity to choose between the following two levels of participation.

Level A Participation
The contact points under the Early Notification and Assistance Conventions received messages/information from the IAEA and/or the Accident State according to bilateral/multilateral agreements, and were expected to confirm receipt of the messages according to the IEComm. The aim of this level of participation was to test effectiveness of communications, to train/drill response personnel in using the IAEA's emergency website and to test the provision of advice to nationals and businesses potentially affected.

Level B Participation
In addition to Level A participation, States or international organizations were testing elements of their emergency response system (to include a provision of assistance upon request) to identify the strength of the response and areas requiring improvement. States and international organizations used common exercise objectives and evaluation processes in order to produce a harmonized exercise evaluation.

While the extent of participation in the exercise was the choice of each State or international organization, in order to fully "assess links and response coordination between safety and security authorities at national and international level", it was expected that the organizations at the national and international level relevant to this objective would participate in the exercise.

1.5.1 States

The following States participated in the ConvEx-3 (2013).

#	State	Level	#	State	Level
1.	Albania	A	13.	Egypt	B
2.	Algeria	A	14.	Ethiopia	A
3.	Argentina	B	15.	Finland	A
4.	Armenia	B	16.	France	B
5.	Austria	A	17.	Germany	A
6.	Azerbaijan	A	18.	Greece	A
7.	Belarus	B	19.	Honduras	A
8.	Bulgaria	B	20.	Hungary	B
9.	Chad	A	21.	Iceland	A
10.	Chile	B	22.	Italy	A
11.	Congo	A	23.	India	B
12.	Czech Republic	A	24.	Ireland	B

#	State	Level
25.	Israel	B
26.	Jamaica	A
27.	Japan	B
28.	Kenya	B
29.	Kuwait	A
30.	Latvia	A
31.	Lithuania	A
32.	Luxembourg	B
33.	Macedonia	A
34.	Mauritius	A
35.	Mexico	B
36.	Moldova	A
37.	Norway	B
38.	Pakistan	B
39.	Peru	A
40.	Poland	A
41.	Portugal	B

#	State	Level
42.	Qatar	A
43.	Russian Federation	A
44.	Saudi Arabia	A
45.	Senegal	B
46.	Singapore	A
47.	Slovakia	A
48.	Slovenia	B
49.	South Africa	A
50.	Spain	B
51.	Sri Lanka	A
52.	Thailand	A
53.	Tunisia	B
54.	Turkey	B
55.	Ukraine	A
56.	United Arab Emirates	A
57.	United Kingdom	A
58.	United States of America	B

1.5.2 International Organizations

The following international organizations participated in the ConvEx-3 (2013).

#	International Organization	Acronym	Level
1	Euro-Atlantic Disaster Response Coordination Centre	EADRCC	B
2	European Commission	EC	B
3	European Police Office	EUROPOL	B
4	Food and Agriculture Organization of the United Nations	FAO	B
5	International Civil Aviation Organization	ICAO	A
6	International Maritime Organization	IMO	A
7	INTERPOL	INTERPOL	B
8	World Health Organization	WHO	B
9	World Meteorological Organization	WMO	A

1.6 EXERCISE DATES AND DURATION

The exercise was conducted **20–21 November 2013**. The exercise started at 07:00 UTC (also Moroccan local time) and lasted for 25 hours allowing work in shifts, which also tested shift change. The exercise start time was not announced in advance, to give participating States and international organizations – playing at level B – an opportunity to test activation times.

1.7 Exercise Weather

In general, there are two options for exercise weather conditions: (1) actual weather at the time of the exercise, or (2) fictitious weather usually based on historical weather data. Both options have their advantages and disadvantages. The decision of which option to choose for the exercise depends primarily on the exercise objectives.

Following discussions at the second and fourth IACRNE WG-CIE meetings, the group decided to conduct this exercise under fictitious weather conditions, based on the historical data from 00 UTC on 28 February 2013 to 23 UTC on 1 March 2013 (without precipitation) for Tangier Med port and under actual weather conditions at the time of the exercise for Marrakesh. The Meteorological Service of Morocco, with the collaboration from Météo-France and WMO, provided the following meteorological data for Tangier:

– 48 hours (every hour) of surface weather sequence (temperature, humidity, wind direction and speed, and no precipitation); and

– Surface and 850 hPa analyses, every 6 hours covering the 48 hours.

This dataset was used during the exercise for the Tangier Med port. Météo-France provided atmospheric dispersion modelling and advisory support. In addition, the Meteorological Service of Morocco, with the collaboration from Météo-France and WMO, also provided examples of atmospheric dispersion charts for the two radiological dispersal device (RDD) explosions.

1.8 EXERCISE TIMELINE

Exercise preparation, conduct and evaluation timeline[6] is presented in Table 1.

The following exercise schedule covers the period from the first invitation to Member States for hosting the ConvEx-3 exercise in July 2010 to April 2014 when the Exercise Report was published.

TABLE 1. TIMETABLE OF KEY EVENTS CONNECTED WITH CONVEX-3 (2013) EXERCISE

#	Date	EVENT	LOCATION
	2010-07-27	**START** – Invitation to Member States for hosting the ConvEx-3 (2012)	IAEA, Vienna
	2011-02-04	A letter of encouragement to consider offering to host the ConvEx-3 (2012) exercise sent to Korea and China	IAEA, Vienna
	2011-05	Decision to postpone the exercise until 2013 made due to the accident at the TEPCO's Fukushima Daiichi NPP	IAEA, Vienna
	2011-07-05	**Morocco's** offer to host the ConvEx-3 (2012) received	IAEA, Vienna
	2011-07-19	Letter of acknowledgement sent to the Permanent Mission of Morocco in Vienna	IAEA, Vienna
	2011-11-23	Fax sent to all competent authorities inviting Member States with a nuclear power programme to reconsider offering to host the ConvEx-3 (2013) exercise	IAEA, Vienna
	2012-03-31	Deadline for additional offers – no additional offers received	IAEA, Vienna
	2012-06-11	Acceptance letter sent to Permanent Mission of Morocco in Vienna	IAEA, Vienna
	2012-06	Working contact with the National Centre for Energy Sciences and Nuclear Techniques (CNESTEN), Morocco established	Vienna, Rabat
	2012-09-05	Preparatory Meeting on ConvEx-3 (2013) exercise with Moroccan representatives	IAEA, Vienna
	2012-12-04	1st WG-CIE Meeting	DGPC Headquarters, Rabat
	2012-05	Invitation to Member States to participate in the ConvEx-3 (2013) sent out	IAEA/Vienna
	2013-05-07	2nd WG-CIE Meeting	DGPC Headquarters, Rabat
	2013-07-05	Deadline for participants' registration	
	2013-07-09	3rd WG-CIE Meeting	DGPC Headquarters, Rabat
	2013-09-05	Extended deadline for participants' registration	
	2013-09	Distribution of exercise documents	IAEA, Vienna
	2013-09	Designation of controllers/evaluators	Participating org.
	2013-10-01	4th WG-CIE Meeting	DGPC Headquarters, Rabat
	2013-10	Training of controllers/evaluators	Participating org.
	2013-11-18	Announcement of communication test	IAEA, Vienna
	2013-11-18	Briefing of controllers/evaluators	Participating org.
	2013-11-19	Communication test	IAEA, Vienna
	2013-11-19	Pre-exercise media advisory	Participating org.
	2013-11-19	Pre-exercise check	Participating org.
	2013-11-20	STARTEX	Tangier Med
	2013-11-21	ENDEX	Rabat
	2013-11-22	Post-exercise media advisory	IAEA, Vienna
	2013-11	National exercise debriefing	Participating org.
	2013-12	Chief evaluators' reports prepared	Participating org.
	2014-01	Draft Exercise Report prepared	IAEA, Vienna
	2014-02-11	5th WG-CIE Meeting	IAEA, Vienna

[6] The exercise timeline was agreed by the WG-CIE and it was used for planning purposes.

#	Date	EVENT	LOCATION
	2014-03	Exercise Report prepared	IAEA, Vienna
	2014-04	**END** – Exercise Report published	IAEA, Vienna

1.9 EXERCISE DOCUMENTS

In the exercise preparation phase the following exercise documents were prepared and distributed to all participating States and international organizations: Exercise Manual, Guide for Controllers, Guide for Evaluators and Guide for Players.

The **Exercise Manual** communicates the exercise concept and the background information needed for the preparation, control and evaluation of the ConvEx-3 (2013) exercise. The Manual was intended for the **exercise teams** in the international organizations and Member States participating in the exercise.

The **Guide for Controllers** describes control of the exercise and communicates instructions, exercise event sequence, data and injects to the exercise controllers. The Guide for Controllers was available only to the exercise controllers. It was supposed to be customized as appropriate for use at 'organizational', 'local' or 'national' levels.

The **Guide for Evaluators** describes the exercise evaluation process and communicates instructions, evaluation criteria, evaluation checklists and the Evaluator's Report template to the exercise evaluators. The Guide for Evaluators was available only to the exercise evaluators. It was supposed to be customized as appropriate.

The **Guide for Players** provides players with the basic information that is needed for effective participation in the exercise. It describes the exercise objectives, scope, evaluation process, relevant information about the Accident State, role of players/observers, role of controllers/evaluators, exercise rules, safety and feedback required from the players. The Guide for Players was supposed to be customized with additional information specific to the State/organization participating in the exercise.

Exercise Chief Controllers and Evaluators were encouraged to prepare customized 'Guides' or specific additional documents for use in their respective countries or international organizations.

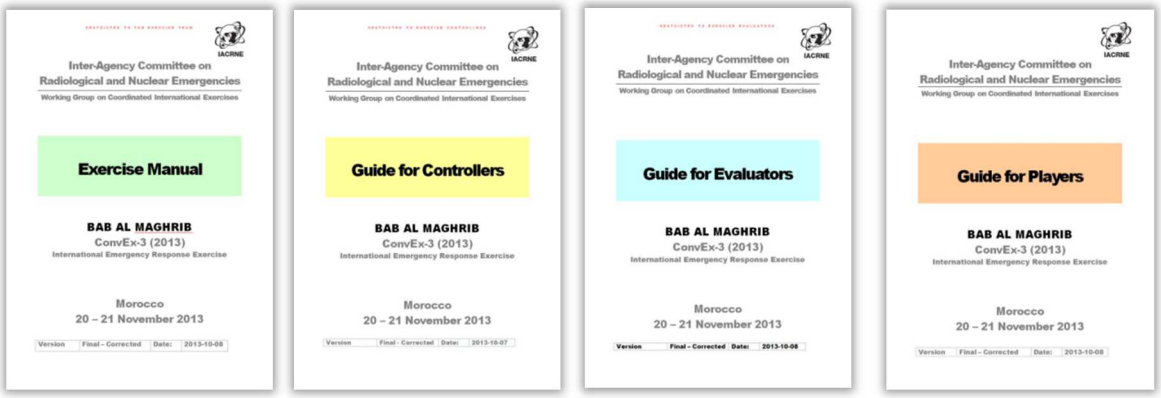


FIG 1. Cover pages of the ConvEx-3 (2013) international exercise documents.

Section 2

2 FACTUAL ANALYSIS

2.1 Technical Scenario[7]

On 20 November 2013, a large explosion took place in the port of Tangier Med. As a consequence, a fire broke out in a harbor complex of Tangier Med.

At the time of the explosion in Tangier Med there were around 16 ships, including ferry boats and boats for goods in the port, either docked or waiting to be unloaded or loaded at an anchoring area. Close to the area of the detonation, hundreds of passengers and vehicles were waiting for boarding on two ferries to Algeciras, Spain. There were around 3000 people present in the harbor complex: port staff, boat crews and passengers, including a significant number of foreigners. The explosion caused devastation in the port and numerous casualties (dead and injured). A number of buildings and vehicles were damaged to at least 200 meters distance from the point of explosion.

International media delivered 'breaking news' to the world about the event within minutes after the explosion, including photos and videos from the scene.

First responders (law enforcement teams, safety brigade, firefighters) of the port of Tangier Med were deployed immediately to the scene to secure the site, to ameliorate the explosion consequences, to make an initial damage assessment and to initiate a criminal investigation. Screening revealed dozens of dead bodies and more than one hundred injured among the passengers, tourists and employees. However, many people not injured, but in shock, were still wandering around the scene, some left the port immediately. Many ships and boats, that were waiting to be served, sailed away.

Moroccan authorities promptly responded to the explosion according to the national emergency response plan. Few first responders were wearing radiation pagers, which indicated an abnormal level of radiation. This triggered a suspicion that the explosion might have had a radiological component.

The exchange of information at the international level showed that few months ago, highly radioactive sources were stolen from a facility in a country in the Sahel region. It shows also the possible implication of an active terrorist group, named Black & White Fighters, operating in this region. Preliminary results from the ongoing criminal investigation supported a suspicion of an exploded RDD.

A few hours after the explosion, the Black & White Fighters claimed responsibility and stated their demands through a radio announcement. They threatened that the explosion in the Tangier Med port was only a warning, and that other populated areas in big cities could be strategically targeted next, if their demands were not met. Moroccan security services, in collaboration with the

[7] The exercise scenario was developed by the Moroccan Exercise Direction Committee.

International Criminal Police Organization (INTERPOL) initiated assessment of the treat credibility. Rabat and Marrakech were identified as likely future targets.

A large radiological search, investigations and preventive and protective actions were launched targeting, mainly, strategic locations in Rabat and Marrakech. In an aerial survey, abnormal radiation levels were detected over the medina of Marrakech. Security forces and monitoring teams were deployed immediately, but all intended protective actions were thwarted by a new explosion. A few people died, and many were injured in the second explosion. Moroccan authorities received numerous requests for information from possibly affected States, businesses, media as well as from citizens.

Both events caused consequences that exceeded Moroccan response capabilities and led Moroccan authorities to request international assistance through the IAEA.

FIG 2. Blast areas at Tangier Med port and Marrakech.

2.2 EXERCISE DATA

2.2.1 Source Data

Tangier Med

Explosive:	20 kg HE*
Radionuclide:	Cs-137
Activity:	37 TBq (1000 Ci)

*High Explosive – a powerful chemical explosive that produces gas at a very high rate.

Marrakech

Explosive:	10 kg HE
Radionuclide:	Se-75
Activity:	2.96 TBq (80 Ci)

2.2.2 On-scene Data

Tangier Med

Place of explosion:	Port Tangier Med
Geo coordinates:	Latitud: 35°53'5.50''N Longitud: 5°30'18.39 W
Number of vessels: *anchored or docked in the port*	16 vessels including ferry boats and cargo ships
Number of vessels: *that left the port without authorization*	6 vessels
Planned port destinations:	Chile, Egypt, Greece, Iceland, Portugal and Tunisia

Number of people present in port complex:	Around 3000 people: port staff, boat crews and passengers, including a significant number of foreigners Hundreds of passengers and numerous vehicles waiting to board onto two ferries to Algeciras, Spain
Area impacted:	600 m frag radius
Number of dead:	38
Number of injured:	420
Damage assessment:	Heavy damage within 30 to 40 m radius
Max dose rate:	> 10 mSv/hr
Max ground contamination:	Up to 2×10^4 MBq/m^2

Marrakech

Place of explosion:	Marrakech medina
Geo coordinates:	Latitud: 31°37'33''N Longitud: 7°59'21 W
Area impacted:	300 m radius
Number of dead:	6
Number of injured:	45
Damage assessment:	Heavy damage within 15–20 m radius
Max dose rate:	> 600 μSv/h
Max ground contamination:	Up to 600 MBq/m^2

Additional information:

- 250 tourists that visited Marrakech were at the Marrakech (Menara) airport waiting for their flights to Barcelona and Lisbon;
- 100 tourists that visited Marrakech were at the Casablanca airport waiting for their flights to Frankfurt, Paris and Istanbul.

2.3 EXERCISE MESSAGES AND INJECTS

Exercise messages are messages expected to be communicated by the players, to the players. The international exercise messages were:

(a) Messages sent to the IAEA, e.g. notification, situation reports, data, requests for information or international assistance/advice, etc.; and
(b) Messages sent from the IAEA to Morocco or other States and/or international organizations.

In addition to the exercise messages, the exercise injects (inputs) were used to introduce new elements in the exercise, or to keep track or direct the overall progress of the exercise.

Inject #		**Day:**		**Inject to:**	
		Time [relative]:		**Injected by:**	
		Inject time [Vienna]:		**Intended for:**	
		Means:		**Type:**	**Conditional/Unconditional**
Input – Message	Describe an event or situation.				
Instructions	*Instructions to the controller relating to the delivery of this inject*				
Expected Actions	Describe action(s) that are expected as a result of this inject				

FIG 3. An example of the exercise inject format that was used by the IEC. Other formats could be used.

2.4 ANTICIPATED KEY EVENTS

Key events, timeline and anticipated actions as planned are shown in Table 2. The key exercise events are linked to Morocco's messages to the IAEA, and to controller's injects. The timing of expected injects were approximated for planning purposes.

TABLE 2: KEY ANTICIPATED EVENTS AND RELATIVE TIME WHEN THEY WERE EXPECTED TO OCCUR, LINKED WITH THE PLANNED EXERCISE MESSAGES/INJECTS

#	Time	Event	Anticipated Actions/Messages/Injects
1.	00:00	Explosion and fire at Tangier Med port occurs	INJECT to Moroccan players
2.	00:10	Activation and initial assessment	TMPA activated the Alert Plan in case of disaster On-site security and firefighting teams deployed First aid, fire truck and ambulances deployed Local authorities and responders alerted Initial assessment of devastation initiated
3.	00:15	First responders received alarms on their radiation pagers	Security perimeter and access control initiated Evacuation of areas and registration of people within planned security perimeter initiated First aid on-going Crisis cells activated (Command Post, operational and logistical cells, communication cell) Access to the port denied to all but security and rescue services TMPA requested reinforcement in firefighting and rescue activities Port Control and Coordination Centre ensured communication with authorities
4.	00:20	Media delivered breaking news about the explosion with photos and videos from the scene that speculated that the explosion could be a RDD Moroccan media made inquiries about explosion	National authorities alerted, including CVC/NEC and national response coordination initiated Nautical traffic and boarding/landing of passengers interrupted National Meteo Service made SIGMET On-site crisis cell considered the possibility of RDD Criminal investigation initiated INJECT to Moroccan players
5.	00:30	Initial status report made available: number of dead/injured, property damage, operability of port	CVC/NEC activated TCC at CNESTEN activated Instructions on basic protective actions to first responders issued National capabilities and teams for responding to radiological emergency activated Victims assembly point established and medical triage initiated Informed and instructed passengers, crews and workers on the situation and directed them to assembly points
6.	00:40	Member State requests information from the IAEA (IAEA-INJECT#01)	IAEA requested information from MAEC
7.	00:45	TMPA identifies radioactive source as Cs-137 with radiation identifier Criminal investigation supported a suspicion of exploded RDD	First victims received at the emergency care centre Seriously injured victims transported to hospitals INJECT to Moroccan players
8.	01:00	MAEC notified the IAEA and replied to the request	MOROCCO#01
9.	01:05	Morocco declared level 3 under the International Ships and Port Security (ISPS) code	MAEC notified neighbouring States according to the Early Notification Convention First information from national intelligence services received by CVC/NEC Aerial survey deployed
10.	01:10	Cargo ships in port prepared to get underway	Specialized regional security teams (EOD) deployed to the scene Additional local and regional resources (Health and DGPC) deployed to the scene (including one decontamination unit) National response teams deployed to Tangier Med ORSEC Plan activated by the Wali/Governor
11.	01:20	MAEC requested, from the IAEA, relevant ITDB information regarding missing/stolen source	MOROCCO#02
12.	01:25	Meteorological data and forecast available Rumours about contamination were spreading	Crews of carriers and ships at the port were briefed on the situation development Instructions and assistance was given to hospitals on managing contaminated victims MAEC informed embassies and consulates in Morocco First decontamination unit established INJECT to Moroccan players

#	Time	Event	Anticipated Actions/Messages/Injects
13.	01:40	International media reports on the explosion made available Professional Export Associations (related to shipments of cars, citrus fruit, etc) expressed concerns about the situation and their cargos shipment to Europe Preliminary data on the bombing was made available	Rumour control initiated INJECT to Moroccan players
14.	01:50	MAEC requested medical advice and advice on protective actions	MOROCCO#03
15.	02:00	Crews and passengers of ferries and ships in the Gibraltar strait expressed concern about possible contamination	Based on weather conditions the CNESTEN ran initial plume/deposition modelling to assess possible impact to ships Aerial survey of port area and surrounding started Updated data on number of causalities available INJECT to Moroccan players
16.	02:15	Worried well (people who have received neither sufficient radiation exposure nor have been sufficiently contaminated to warrant medical treatment or decontamination but who are worried and wish to be assessed for radiation exposure/contamination) were rushed to hospitals IMO requested to assist in preparing adequate advice/instructions regarding maritime issues	INJECT to Moroccan players National radiological and specialized teams deployed to Tangier Med (CNRP, CNESTEN) Public call centre established; management of public phone call services set up Message from IMO or INJECT
17.	02:30	Initial aerial survey results available: Cs-137 is the radionuclide used in RDD, preliminary assessment of the extent of contamination	Initial press release with instructions to people that left the scene without monitoring and registration to come back to the assembly point Press conference conducted Informing embassies and consulates of the initial assessment of number of injured foreigners
18.	02:35	MAEC sends Situation Report, press release and local weather data to the IAEA	MOROCCO#04
19.	02:50	National specialized security, civil protection and medical teams deployed Additional local and regional (health and DGPC) resources deployed (departure from Rabat)	
20.	03:00	Aerial survey results made available	
21.	03:10	MAEC sought advice in assessment of possible consequences and proposed to have discussions and consultations between Moroccan experts and IAEA using VTC	MOROCCO#05
22.	03:15	Moroccan authorities exchange relevant intelligence information with INTERPOL	Port authorities requested to provide information on identities of all ships docked or anchored in Tangier Med and their next destination ports
23.	03:30	CNRP and CNESTEN teams performed monitoring and oversaw protective actions DGSN and GR performed crime scene management operations	Advice and assistance to hospitals rendered (contaminated victims, decontamination, worried well)
24.	03:35	Crew and passengers of ferries and ships in the Gibraltar strait expressed concern regarding possible contamination ICAO communicated with DMN	INJECT to Moroccan players
25.	03:50	Moroccan authorities issued a press release and conductd a press conference	Instructions for worried well issued Announcing that briefings to embassies and consulates will be given the following day
26.	03:55	MAEC sent results of the aerial survey and press release to the IAEA	MOROCCO#06
27.	04:00	Safety perimeter adjusted in accordance with the results of radiological survey Thorough environmental monitoring initiated Radiological survey of vessels docked in the port and parked trucks initiated	Personal contamination monitoring (radiological triage) ongoing
28.	04:15	Crews of ferries and other vessels briefed on latest situation	
29.	04:20	Association of citrus exporters requested release of its blocked 200 TIR trucks destined for Europe Spain requested information regarding Spanish ferries	INJECT to Moroccan players Message from Spain or INJECT
30.	04:30	Preliminary results of monitoring available ICAO issueed press communication regarding flights to/from Morocco	Actions regarding agriculture products on ships and trucks considered Message from ICAO or INJECT
31.	04:45	Discussion and consultation on possible consequences	VTC discussion; participants/experts: Morocco, IAEA, World Health Organization (WHO), FAO
32.	04:55	MAEC sent Situation Report and radiological survey data to the IAEA	MOROCCO#07

#	Time	Event	Anticipated Actions/Messages/Injects
33.	05:00	DGPC (PMA, decontamination units) and Military health capabilities (field hospital, decontamination units) deployed to the scene Decontamination of victims intensified Medical care and psychological support strengthened at the scene	
34.	05:15	MAEC informed the IAEA that six vessels departed the port subsequent to the explosion – vessels may have been contaminated – and requested support from IAEA to inform the destination States/ports	MOROCCO#08
35.	05:30	Moroccan authorities repeated instructions to people that left the scene without monitoring or registrations and worried well people to come to the assembly points	
36.	05:45	Association of citrus exporters protested against blocking of its 200 TIR trucks destined for Europe	INJECT to Moroccan players
37.	05:50	MAEC requested IAEA assistance in dose assessment	MOROCCO#09
38.	06:00	Attackers publicly announced that further attacks were possible in other major cities if demands were not met	INJECT to Moroccan players
39.	06:10	Media delivered breaking news National and international media pressed for information	Moroccan security service, in collaboration with INTERPOL, initiated assessment of the treat credibility INJECT to Moroccan players
40.	06:20	Moroccan authorities initiated: - Directive to maintain security and order in strategic locations - Increased national security level within the country to include all ports and entry points - Public advice - Monitoring media and rumors	
41.	06:25	MAEC informed the IAEA about the communicated threat	MOROCCO#10
42.	06:30	Preparation for wide radiological search (aerial, on-rout, on-foot) initiated Criminal investigation initiated	
43.	06:45	*Tangier Med:* Initial results of ships and trucks survey made available Questions on liability for damages raised by ships and trucks owners	Instructions issued to the crews of ships Progressive resumption of maritime traffic activities under consideration INJECT to Moroccan players
44.	06: 55	MAEC sent Situation Report and results of radiological survey of trucks and ships to the IAEA	MOROCCO#11
45.	07:00	Rabat and Marrakesh were identified as likely targets	Overall plans for radiological surveys was set-up INJECT to Moroccan players
46.	07:15	On-route monitoring in Rabat deployed Aerial radiological survey deployed to Marrakech European Commission issued instructions to European ports France offered to provide radiation monitoring and detection capabilities	Message from France to Moroccan players or INJECT Message from EC or INJECT
47.	07:20	NEC received the following requests/questions: - Embassies and consulates requested information on number of dead and injured and their nationalities - Moroccan nationals in Algeciras requested information on ferry schedule back to Morocco	INJECT to Moroccan players
48.	07:30	MAEC requested international assistance in radiological survey/source search (aerial, on-route, on-foot) from the IAEA	MOROCCO#12
49.	07:45	FAO provided advice on food safety concerns	FAO message to Moroccan players or INJECT
50.	08:00	Moroccan authorities issued third press release Moroccan authorities issued travel instructions for tourists	Subject: explosion in Tangier Med and announced threat to other cities
51.	08:10	MAEC sent press release to the IAEA and requested consultation on the media strategy regarding the communicated threat	MOROCCO#13
52.	08:15	Security in all popular and strategic locations in Rabat and Marrakech increased	

#	Time	Event	Anticipated Actions/Messages/Injects
53.	08:30	Moroccan authorities conducted third press conference	Subject: explosion in Tangier Med and announced threats to other Moroccan cities
54.	08:45	*Tangier Med:* collected, controlled, conditioned and transported evidence (contaminated/not contaminated) *Marrakech:* New elements on threat assessment made available	
55.	09:00	*Tangier Med:* Additional bodies identified *Marrakech:* Aerial survey started	Normal activities in the port started to resume (except in the cordoned off area) Embassies and consulates informed of positively identified foreigners (dead, injured)
56.	09:15	Discussion on media strategy	VTC discussion between the IAEA and Moroccan authorities
57.	09:30	*Tangier Med:* management of contaminated bodies at the morgue began *Marrakech:* aerial survey resulted in detection of a radioactive source in medina; radionuclide not positively identified	*Marrakech:* Local authorities, responders and national authorities alerted
58.	10:00	*Marrakech:* Bomb disposal units activated Medical and civil protection activated Security perimeter around medina defined Evacuation within planned security perimeter initiated	
59.	10:15	*Marrakech:* Establishment of planned security perimeter initiated On-foot radiological search initiated	CNESTEN sent aerial survey measuring data (measured spectra) to US DOE (Triage) requesting assistance in radionuclide identification
60.	10:20	MAEC sent Situation Report to the IAEA	MOROCCO#14
61.	10:30	*Marrakech:* Governor activates the ORSEC plan	
62.	10:30	Consultations and exchange of information at the international level	IAEA initiated and conducted VTC among Morocco, IAEA, EUROPOL and Interpol
63.	11:00	Some vessels from Tangier Med that were approaching their destination ports had reported cases of 'radiation sickness' and had requested immediate medical attention *Marrakech:* Security perimeter and access controls established	INJECT to Moroccan players
64.	11:30	*Tangier Med:* Port authorities provided information on identities of all ships that were docked or anchored in Tangier Med at the time of explosion and their planned destination ports	Disaster victims identification
65.	12:00	TCC received results of radionuclide identification: Se-75	Message/INJECT from US DOE
66.	12:15	MAEC requested IAEA to inform States of possible contamination of their citizens/tourists returning from Morocco	MOROCCO#15
67.	13:15	*Marrakech:* Radioactive source detected in the area at or close to the Jemaa el Fna square and market place	Bomb disposal units deployed INJECT to Moroccan players
68.	13:30	Detonation at Jemaa el Fna (Marrakech)	INJECT to Moroccan players
69.	13:40	*Marrakech:* Rescue, radiological crime scene management and other relevant response activities initiated	
70.	14:00	*Marrakech:* 1000s were in panic and worried about their families and merchandise First responders had difficulties establishing a security perimeter	INJECT to Moroccan players Citizens attempted access exclusion zone Security requested additional help Meteorological data and initial forecast for Marrakech obtained from DMN
71.	14:15	*Marrakech:* Initial status report made available: number of dead/injured, property damage, operability of medina	
72.	14:20	MAEC notified the IAEA of the second explosion accompanied with the Situation Report	MOROCCO#16
73.	14:30	*Marrakech:* Safety perimeter adjusted in accordance with the results of radiological survey Personal contamination monitoring started	Based on weather conditions the TCC ran initial plume/deposition modelling to assess possible impact

#	Time	Event	Anticipated Actions/Messages/Injects
		Environmental monitoring initiated	
74.	15:00	MAEC sent local weather data to the IAEA	MOROCCO#17
75.	15:15	MAEC requested international assistance/advice on medical support, decontamination procedures, radioactive waste management, management of contaminated bodies and nuclear forensics	MOROCCO#18
76.	16:30	Embassies and consulates in Morocco pressed Moroccan authorities for additional and clear information regarding the situation and status of their citizens	INJECT to Moroccan players
77.	16:45	*Marrakech:* DGPC (PMA, Decontamination units) and Military health capabilities (field hospital, decontamination units) deployed to Marrakech	
78.	17:00	The government anticipated severe economic impact and requested a plan to re-open public facilities and regain confidence	INJECT to Moroccan players
79.	17:15	MAEC sent Situation Report to the IAEA	MOROCCO#19
80.	17:30	Political pressure on Moroccan authorities to keep public (national, international) informed increased *Marrakech:* Moroccan NEC received the following requests: - Grocery distribution centres requested food safety tests - Public questioned potable water - Citizens requested information on family members in the area - Local officials requested information on timeline for restoration of commerce	INJECTS to Moroccan players
81.	18:00	*Marrakech:* Local officials requested 'critical stress counselling' to be provided to responders and the public	
82.	18:30	MAEC sought advice on decontamination of infrastructure	MOROCCO#20
83.	18:45	WHO offered emergency medical support for radiation exposed individuals provided through WHO's Radiation Emergency Medical Preparedness and Assistance Network (REMPAN) Ports refuses to permit vessels to dock and refuses medical attention from fear of radiation	WHO message or INJECT to Moroccan players INJECT to Moroccan players
84.	19:00	*Tangier Med:* Plans on decontamination operations of infrastructure and equipment prepared	Radioactive waste management strategy proposed
85.	20:00	Discussion held on decontamination of infrastructure	VTC discussion between Moroccan authorities and IAEA
86.	20:30	*Tangier Med:* Additional monitoring results made available *Marrakech:* Preliminary results of monitoring made available	INJECTS to Moroccan players
87.	21:00	250 tourists that visited Marrakech were at the Marrakech (Menara) airport waiting for their flights to Barcelona and Lisbon 100 tourists that visited Marrakech were at the Casablanca airport waiting for their flights to Frankfurt, Paris and Istanbul	INJECT to Moroccan players
88.	21:15	The IAEA prepared a proposal of the Assistance Action Plan	IAEA sent the Assistance Action Plan to MAEC
89.	21:30	MAEC sent Situation Report to the IAEA	MOROCCO#21
90.	21:45	Ports in Tunisia and Egypt asked advise/assistance on contamination monitoring of ships and crews requesting to dock	Messages from ports or INJECTS to the IAEA players
91.	22:00	Hospitals overwhelmed just focusing on treating contaminated victims Resources for handling these victims were limited and stretched The numbers of worried well were expected to surge above 50 000 in following several days	INJECTS to Moroccan players
92.	22:30	Consultation on requested international assistance held	VTC (organized by the IAEA); participants: IAEA, WHO, Morocco, RANET States
93.	23:00	Airports were claiming they are detecting passengers with radiation on shoes and clothing	Message from EC or INJECT to IAEA players

#	Time	Event	Anticipated Actions/Messages/Injects
94.	23:30	Moroccan authorities issued fourth press release and conducted a press conference	
95.	24:00	MAEC sent a press release to the IAEA	MOROCCO#22
96.	24:45	MAEC accepted the Assistance Action Plan	MOROCCO#23
97.	25:00	MAEC sent End of Exercise Message to the IAEA	MOROCCO#24
98.	25:30	IAEA sent End of Exercise Message to all contact points	End of Exercise Message to all players

2.5 Messages to IAEA sent by Morocco

In TABLE 3, the messages sent by Morocco to the IAEA are shown together with the times when the information was valid, when the message was received on USIE, and when the message/information was published on the USIE.[8]

TABLE 3: TIME ANALYSIS OF MESSAGES RECEIVED BY THE IAEA AND PUBLISHED ON USIE

#	Message type	Validity time (UTC)	Time submitted (UTC)	Time published (UTC)	Δt [min]	Subject
Date: 20 November 2013						**Exercise starts: 07.00**
1.	SRF	07:20	08:20	08:46	26	Explosion in the port of Tangier Med, likely presence of radioactivity.
2.	SRF	08:00	10:01	10:40	39	Monitoring data after the explosion in the port of Tangier Med (Cs-137 confirmed) and information on casualties
3.	SRF	20:15	20:39	21:00	21	Detection of Se-75 in the medina in Marrakech
4.	SRF	20:40	20:58	21:13	15	Explosion in Marrakech
Date: 21 November 2013						**Exercise ends: 08:30**

Table 4 lists information provided by Morocco to the IAEA through email correspondence, which was published on USIE by the IAEA as the original document submitted, together with the times when the information was received and the document was published on USIE.

TABLE 4: TIME ANALYSIS OF INFORMATION RECEIVED BY THE IAEA THROUGH EMAIL CORRESPONDENCE AND PUBLISHED ON USIE

#	Information received	Time received (UTC)	Time document is published on USIE (UTC)	Δt [min]
Date: 20 November 2013				**Exercise starts: 07.00**
1.	Second situation report	12:13	12:59	46
2.	Aerial measurements in the port of Tangier Med	12:13	13:00	47
3.	Update on the explosion in Tangier Med and additional measurement data	13:43	16:45	182
4.	Possible additional attacks – threat communicated by terrorist	16:16	18:29	133
5.	Situation report update (valid at 17:31)	18:45	19:05	20
6.	Data of ships in the port of Tangier Med at the time of explosion	19:04	19:24	20
Date: 21 November 2013				
7.	Moroccan consequence assessment for explosion in Marrakesh	01:43	02:10	27
8.	Radiological survey data in Marrakesh	02:25	02:37	12

[8] Time when the message/information was available to the international players.

#	Information received	Time received (UTC)	Time document is published on USIE (UTC)	Δt [min]
9.	Situation report update (valid at 22:03UTC)	00:10	02:59	169
10.	Situation report update (valid at 01:08UTC)	01:27	04:52	205
11.	Fifth press release from Moroccan Ministry of Interior (translation in English, received in French)	02:17	05:15	178
12.	Statement of the Moroccan Ministry of Interior to diplomatic missions and international organizations	02:39	05:17	158
13.	Fifth press release from Moroccan Ministry of Interior (original in French)	02:17	05:43	206
				Exercise ends: 08:30

Table 5 lists other information provided by Morocco to the IAEA through email correspondence that was not originally published on USIE by the IAEA as the original document submitted. This information was considered for use in the status summaries that were prepared by the IAEA and published on USIE, and for the direct exchange of information with relevant Member States, when appropriate.

TABLE 5: INFORMATION RECEIVED BY THE IAEA THROUGH EMAIL CORRESPONDENCE AND NOT PUBLISHED ON USIE

#	Information received	Time received (UTC)
Date: 20 November 2013		**Exercise starts: 07.00**
1.	Number of deceased people per nationality	15:35
2.	Moroccan consequence assessment and the third press release	15:41
3.	Threat communicated for possible attacks of Marrakesh, Rabat and Casablanca	16:16
4.	Actions taken in cities for which threat was made Plume modelling results for the port of Tangier Med	16:48
5.	Confirmation of detection of radiation at the medina in Marrakesh	17:24
6.	Updated information communicated with embassies in Morocco and Moroccan diplomatic representations abroad	17:30
7.	NV to foreign embassies (Portugal, Ireland, Slovakia, USA, Luxemburg, France, Norway, Spain)	19:51
8.	Confirmation of Se-75 detection Fourth press release Actions taken in Marrakesh	20:13
9.	NV sent to diplomatic missions about the threat communicated	20:53
10.	NV to all diplomatic missions and international organizations on Marrakesh explosion	21:14
11.	NV to all diplomatic missions and international organizations on injured and nationals involved	22:15
12.	NV to Belarus to inform of four nationals injured in Marrakesh explosion	22:21
13.	NV to USA to inform of US nationals injured in Marrakesh explosion	22:38
14.	NV to France to inform of their nationals injured in Marrakesh explosion	22:43
15.	NV to Spain to inform of their nationals injured in Marrakesh explosion	22:47
16.	Information provided to Moroccan Embassies abroad with regard to events in Morocco	23:09
17.	Meteorological data for Marrakesh	23:21
Date: 21 November 2013		
18.	Radiological survey data for Marrakesh	02:25
19.	Additional monitoring data for Marrakesh	02:52
20.	Updated meteorological data for Marrakesh	03:40
21.	Information about tourists waiting to leave Marrakesh and Casablanca airports and destinations	04:29
22.	Updated meteorological data	04:47
23.	Press release issued by Moroccan Ministry of Interior (valid at 05:22)	05:36

#	Information received	Time received (UTC)
24.	Sixth press release by Moroccan Ministry of Interior (valid at 05:57)	06:45
25.	Situation report (valid at 05:32, in French)	06:51
		Exercise ends: 08:30

2.6 Plume Modelling

During the exercise, high resolution, limited area atmospheric plume modelling was performed by Meteo France (Regional Specialized Meteorological Centre Toulouse) with its operational atmospheric dispersion model 'PERLE'[9], driven by meteorological input from an operational high-resolution numerical weather prediction model. In the exercise data, it was not specified what kind of radiological pollutant was released to the atmosphere (i.e. gas, aerosols or both, and the size(s) of the aerosol(s)). Therefore, the modelling was conducted in 'inert tracer' mode, meaning a passive non-reactive gas, which provided a worst case scenario to provide a basis for immediate response. Examples of PERLE modelling outputs are shown in Figures 3 and 4.

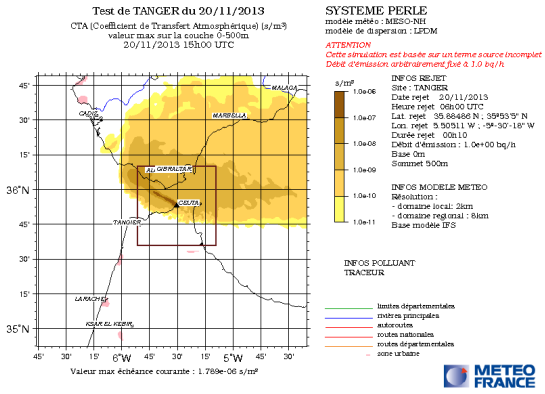


FIG 3. Example plume for RDD in Tanger-Med (canned met)

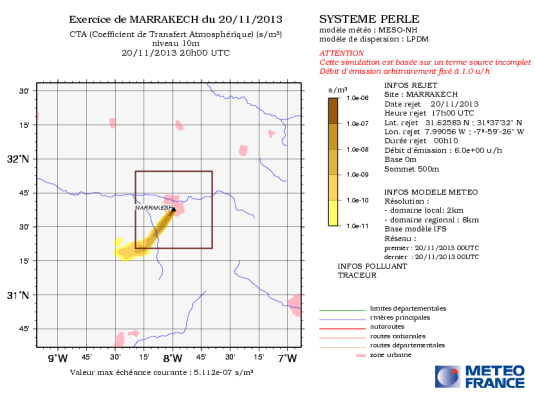


FIG 2. Example plume for RDD in Marrakech (actual weather)

Plum modelling was also performed using the International eXchange Program (IXP) website from Laurence Livermore National Laboratory, U.S. Department of Energy. Examples of total deposition for both RDD sites are shown in Figure 5.

[9] Rapport Campagne de dispersion de traceur (SF6) lors de CAPITOUL: Evaluation de PERLE. par C.Lac, F.Bonnardot, C.Camail En collaboration avec O.Connan, D.Maro, D.Hébert, M.Rozet (IRSN), 02 Octobre 2006, 41 pages.

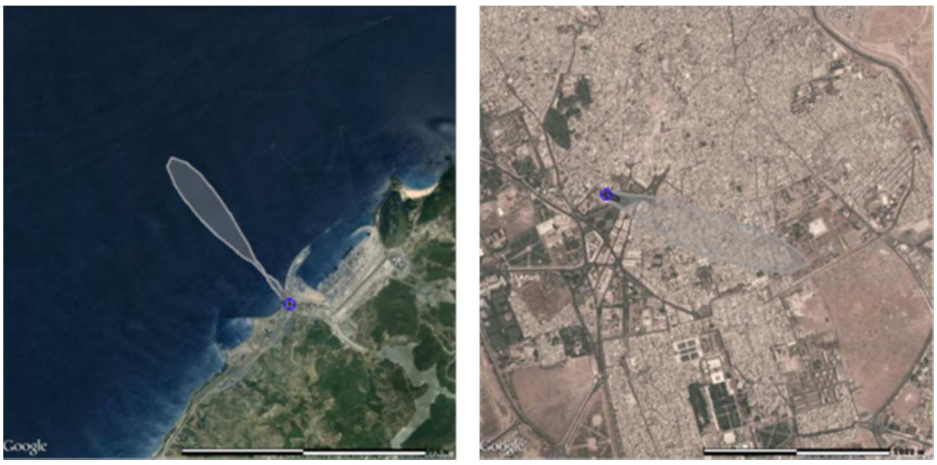


FIG 4. Example results of ground contamination modelling around the explosion areas using IXP.

2.7 INTERNATIONAL ASSISTANCE

Under the Assistance Convention, the Moroccan authorities (MAEC) requested advice or assistance in the following areas: (a) medical assistance for examination and treatment of two patients suspected of acute radiation syndrome who were admitted to the military hospital in Rabat; (b) crime scene management of contaminated evidence, including the collection of fingerprints on contaminated surfaces, DNA traces on radioactively contaminated surfaces, procedures and protocols for the transfer and the use of radioactively contaminated evidence; (c) radiological searches on the basis of aerial survey, vehicle based survey and ground based (on foot) survey; (d) dose estimation and reconstruction for exposed/potentially exposed individuals; (e) management of radioactive waste and of contaminated decedents; (f) decontamination of spaces and land; and (g) radiological controls of people in the airports of Casablanca and Marrakech. These requests were sent in total of five requests using either an RFA form on USIE, or email correspondence.

Summaries of assistance requests, as well as requests for advice to the IAEA and actions taken to provide the assistance, are shown in Tables 6 and 7.

All requests for assistance were joined and agreed to in the Assistance Action Plan prepared with the Moroccan counterpart. The Assistance Mission was to be performed by a Joint Assistance Team (JAT) comprised of Field Assistance Teams (FATs) and External Based Support (EBS) from India, Turkey and Mexico. The mission was to be led by the IAEA. The team departure was planned for 21 November 2013.

TABLE 6. SUMMARY OF ASSISTANCE REQUESTS TO THE IAEA MADE BY MOROCCAN AUTHORITIES AND OFFERS MADE FOR PROVIDING THE ASSISTANCE REQUESTED

Summary of Assistance Requests and Offers Made													
Request	**Received**			**Published on USIE**		**Outgoing request for offers sent**				**Initial offers made**			
	Date	**Time (UTC)**	**Channel**	**Date**	**Time (UTC)**	**Date**	**Time (UTC)**	**Channel**	**To**	**State**	**Date**	**Time (UTC)**	**Channel**
Medical assistance	20/11/2013	11:04	RFA	20/11/2013	11:30	20/11/2013	11:47	Fax	All contact points	Belarus	20/11/2013	12:06	e-mail
										India	20/11/2013	12:06	fax
										France	20/11/2013	12:09	e-mail
										Albania	20/11/2013	12:24	e-mail
										Israel	20/11/2013	12:50	e-mail
										Germany	20/11/2013	12:58	e-mail
										Spain	20/11/2013	13:17	e-mail
										Russia	20/11/2013	15:32	e-mail
										Hungary	20/11/2013	17:43	e-mail
										Mexico	20/11/2013	18:29	e-mail
										WHO	21/11/2013	00:28	e-mail
Radiological search	20/11/2013	16:16	e-mail	No	No	20/11/2013	17:00	Fax	All contact points	Belarus	20/11/2013	18:11	e-mail
										Spain	20/11/2013	18:14	e-mail
										Mexico	20/11/2013	18:29	e-mail
										Hungary	20/11/2013	19:08	e-mail
										Ukraine	20/11/2013	19:04	e-mail
										Turkey	20/11/2013	19:39	SRF
										India	20/11/2013	20:53	fax
										Turkey	20/11/2013	22:21	SRF
										Mexico	20/11/2013	22:32	fax
Assistance on forensics	20/11/2013	20:03	RFA	No	No	21/11/2013	01:00	Fax	DoE Interpol	-	-	-	-
Management of rad. waste, contaminated decedents and decontamination	21/11/2013	00:11	e-mail	No	No	21/11/2013	01:00	Fax	All contact points	India	21/11/2013	01:39	fax
										Ukraine	21/11/2013	01:42	e-mail
										Belarus	21/11/2013	01:42	e-mail
										Egypt	21/11/2013	03:40	SRF
										Pakistan	21/11/2013	06:35	e-mail

Dose estimation[10]	21/11/2013	00:11	e-mail	No	No	21/11/2013	01:00	Fax	All contact points	Spain	20/11/2013	18:14	e-mail
										Ukraine	20/11/2013	19:04	e-mail
										Mexico	20/11/2013	22:32	fax
Rad. controls of people at the airports	21/11/2013	04:18	e-mail	No	No	-	-	-	-	-	-	-	-

TABLE 7: SUMMARY OF REQUESTS FOR ADVICE/ INFORMATION TO THE IAEA MADE BY MOROCCAN AUTHORITIES

Advice and Information Requests Summary								
Request	**Received**			**Provided**			**Δt [min]**	**Remarks**
	Date	**Time (UTC)**	**Channel**	**Date**	**Time (UTC)**	**Channel**		
Information from the ITDB of the IAEA	20/11/2013	09:31	e-mail	20/11/2013	11:02	e-mail	91	-
Medical strategy, protective actions to be taken and general evaluation of consequences	20/11/2013	11:48	e-mail	20/11/2013		VTC		WHO technical advice on medical aspects of the response to Morocco was published on 20/11/2013 at 18:21 UTC.
Media strategy	20/11/2013	16:15	VTC	20/11/2013	16:15	VTC	-	The advice was provided during the same VTC.
Nuclear forensics - advice	20/11/2013	17:30	VTC	-	-	-	-	
Decontamination techniques and waste management	20/11/2013	03:40	VTC	21/11/2013	05:38	e-mail	118	WHO provided advice to the IAEA on management of contaminated decedents at 02:12 UTC on 21 November 2013.

[10] Although requested separately, offers made were based on the initial request for medical assistance.

2.8 Protective and Other Actions

Out of 17 countries that prepared and sent the Evaluator's Report to the Lead Exercise Evaluator (IAEA), only eight countries listed what protective and other actions they would implement if the event would have been an actual emergency.

Considered protective and other actions are shown in Table 8. Most of the countries 'issued' information/instructions to the public, the Embassies and national citizens in Morocco that focused on measures for travellers. The prevailing recommendation to national citizens was to follow advice/instructions from the Accident State.

TABLE 8: LIST OF CONSIDERED PROTECTIVE AND OTHER RESPONSE ACTIONS.

Protective and other actions	Countries
Information to	
Other States	HU, PT
IAEA	BG, EG, HU, PK, PT, ES
Other international organizations	BG, HU, ES
Information given in	
National language	
English	BG, EG, HU, PK, PT, ES
Instructions/recommendations/warnings/information to	
Public (national territories and waters)	EG, PK, PT, ES
On the event and on health risks/hazards involved	HU, PK, PT, SI, ES
On results of monitoring and/or other measures	HU, PT, ES
On personal protection	HU, PK
On sheltering	PK
On evacuation	PK, SI
On iodine prophylaxis	
On protecting food and water supplies	PK
On protecting agricultural product system	
On food consumption restrictions/prohibitions	PK
On travelling	BG, EG, HU, PK, PT, SI, ES
On border controls	EG, HU, PT, ES
On other measures/countermeasures	BG, HU, PT, ES
On counselling opportunities and where to get information	HU, PK, SI, ES
Instructions/recommendations/warnings/information given in	
National language	BG, EG, HU, PK, SI, ES
Languages of minorities	PK
Foreign Embassies in your country	PK
Same as for the public	HU, PK, ES
On organizing measures for their citizens	PK
Foreign nationals in your country	
On following advice from the authorities	HU, PK, ES
On following advice from their authorities	HU
Instructions/recommendations/warnings/information given in	
National language	ES
Foreign languages	HU, PK
Monitoring and assessment in your country	
Monitoring of ground contamination	PK
Monitoring of food and foodstuff	PK, ES
Monitoring of water supplies	PK
Monitoring of agricultural products	
Monitoring of forest products	
Monitoring of game	
Monitoring of contamination concentrators (filters, roof drip zones)	ES
Monitoring of personnel	PK, ES

Protective and other actions	Countries
Other monitoring	EG, PT
Assessing public exposures	ES
Measures for travellers	
Entering your country	BG, ES
Cancelling travel, or parts of it	BG
Providing alternative routes	
Providing iodine prophylaxis	
Establishing border control monitoring	BG, PK, ES
Counselling travellers	BG, ES
Leaving your country	PT, ES
Establishing border control monitoring	PK
Decontaminating travellers	
Counselling travellers	PT, ES
Measures regarding food and water consumption	
Restrictions/prohibitions of	
Milk	
Milk products	
Meat	
Dairy animals	
Meat products	
Fresh vegetables	
Fruits	
Grain	
Forest products	
Game	
Drinking water supplies (supplied by rain water)	
Protecting water supplies and cisterns	
Providing clean drinking water	
Restricting consumption of drinking water	
Agricultural countermeasures including livestock	
In food production, distribution and sale (pasture, harvesting, marketing)	
Restrictions on feedstuffs	
Control of contaminated livestock	
Restriction/prohibition on the use of contaminated products	
Other countermeasures	
Measures regarding import of goods from	
Accident State	PT
Restrictions/prohibitions on import of food and foodstuffs	HU
Restriction/prohibitions on import of other goods	HU
Monitoring of food and foodstuffs	HU, PK, PT
Monitoring of other goods	HU, PT
Other affected States	
Restrictions/prohibitions on import of food and foodstuffs	
Restriction/prohibitions on import of other goods	
Monitoring of food and foodstuffs	PK, PT
Monitoring of other goods	PT
Measures regarding export of goods	
Restrictions/prohibition on export of goods	
Restrictions/prohibition on trade with other countries	
Monitoring of food and foodstuffs	PK
Monitoring of other goods	PK
Decontamination of goods	PK
Measures regarding non-radiological consequences	
Consultation and counselling people affected	HU, PK
Consideration of	
Anxiety and distress	
Effects on economic conditions	

Protective and other actions	Countries
Effects on employment	
Effects on long term needs for social welfare	
Plain language explanation of	
Health risks	BG, HU
Countermeasures/actions	HU
Appropriate and inappropriate personal actions to reduce risks	BG, HU
Common language statement defining 'safe'	BG, HU
Counter misinformation and unrealistic fears	BG
Counter inappropriate actions*	BG
Establishment of a system of compensations	
Instructions/recommendations to your Embassy(ies) in:	
Accident State	BG, EG, PK, PT, SI, ES
On personal protection measures (embassy staff)	BG, EG, HU, PK
On organizing measures for national citizens	EG, HU, IN, PK, PT, ES
Other affected States	PT
On personal protection measures (embassy staff)	BG
On organizing measures for national citizens	BG, PT
Instructions/recommendations to your national citizens in	
Accident State	EG, PT, ES
On following advice from the State authorities	BG, EG, HU, IN, PK, PT, SI, ES
On taking iodine prophylaxis	
On staying home (indoor) - sheltering	BG, HU
On evacuation	HU, SI
Regarding travelling (restrictions within country)	BG, EG, HU, ES
Concerning trade and production (to your national companies)	BG, HU
On decontamination measures	HU
On dietary information/consumption, etc.	HU
On registration/census/traceability of citizens	HU, PT
On medical surveillance	HU
On modification of personal behaviour	BG, HU
Other	
Other affected States	BG, PT
On following advice from the State authorities	BG, PT
On taking iodine prophylaxis	
On staying home (indoor) - sheltering	BG
On evacuation	
Regarding travelling (restrictions within country)	BG
Concerning trade and production (to your national companies)	BG
On decontamination measures	
On dietary information/consumption, etc.	
On registration/census/traceability of citizens	
On medical surveillance	
On modification of personal behaviour	BG
Other	
Instructions/recommendations to travellers to	
Accident State	BG, EG, PT, ES,
On following advice from the State authorities	BG, EG, HU, PK, PT, ES
On cancelling travel (suspension of travel)	BG, EG, HU, PT, SI, ES
On travelling restrictions (modification of travel)	BG, EG, HU, PT, ES
On alternative routes	HU, ES
On taking iodine prophylaxis	
On personal protection measures	BG, HU
On dietary information/consumption, etc.	HU
On registration/census/traceability of citizens	HU
On medical surveillance	HU
On modification of personal behaviour	BG, HU
Other	

Protective and other actions	Countries
Other affected States	BG, PT
On following advice from the State authorities	BG, PT
On cancelling travel (suspension of travel)	BG
On travelling restrictions (modification of travel)	BG
On alternative routes	
On taking iodine prophylaxis	
On personal protection measures	BG
On dietary information/consumption, etc.	
On registration/census/traceability of citizens	
On medical surveillance	
On modification of personal behaviour	BG
Other	
Measures regarding travellers from	
Accident State	BG, EG, ES
Monitoring of travellers	BG, EG, ES
At point of departure	
At point of arrival	BG, EG, HU
Monitoring of personal belongings	BG, EG, HU, ES
Registration, questionnaire for future claims	BG, EG, HU, ES
Counselling travellers	HU, ES
Decontamination of travellers	BG, EG, ES
At point of departure	
At point of arrival	BG, EG, HU, ES
Decontamination of personal belongings	BG, EG, HU
Restricting/prohibiting travel (quarantine and medical treatment)	BG
Other affected States	BG
Monitoring of travellers	BG
At point of departure	
At point of arrival	BG, HU
Monitoring of personal belongings	BG, HU
Registration, questionnaire for future claims	BG, HU
Counselling travellers	BG, HU
Decontamination of travellers	BG
At point of departure	
At point of arrival	BG, HU
Decontamination of personal belongings	BG, HU
Restricting/prohibiting travel (quarantine and medical treatment)	BG
Measures regarding transport from	
Accident State	BG, EG, PT, ES
Monitoring of transport vehicles	BG, EG, PT, ES
Monitoring of trains	
Monitoring of vessels	BG, EG, IN, PT, ES
Monitoring of aeroplanes	BG, HU
Restricting/prohibiting transport	ES
Protection of workers, crew, etc.	BG, EG, HU
Decontamination measures	BG, EG, HU, IN
Other affected States	BG, PT
Monitoring of transport vehicles	BG, PT
Monitoring of trains	BG
Monitoring of vessels	BG
Monitoring of aeroplanes	BG, HU
Restricting/prohibiting transport	BG
Protection of workers, crew, etc.	BG, HU
Decontamination measures	BG, HU
Measures regarding transport to	
Accident State	ES
Recommending protection measures	HU

Protective and other actions	Countries
Travelling restrictions	HU
Recommending alternative routes	HU, ES
Restricting/prohibiting transport	ES
Protection of workers, crew, etc.	HU
Protection of goods exported to affected regions	HU
Other affected States	
Recommending protection measures	HU
Travelling restrictions	HU
Recommending alternative routes	HU
Restricting/prohibiting transport	
Protection of workers, crew, etc.	HU
Protection of goods exported to affected regions	HU

* e.g. spontaneous evacuation, unwarranted termination of pregnancy, etc.

Out of 17 countries. only 9 answered additional questions from the exercise evaluation template. Eight countries either did not answer the questions or they marked the answer as 'not applicable'.

Analysing the answers to additional questions one can conclude the following:

- Close to 50% of countries decided on protective and other actions based on pre-planned national emergency response criteria, and the other half decided on actions partly on an ad-hoc basis; this could indicate a lack of pre-planned emergency response criteria;
- A majority of countries would not decide on particular protective actions only because of political/public pressure;
- No consultation/exchange of information was carried out regarding protective or other response actions. Only one country initiated contacts with its neighbours to discuss/share information on protective actions. Only three countries stated that they had some information on protective actions 'taken' in other countries;
- A majority of the countries based their decisions for protective actions on the IAEA assessment of the radiological consequences of the event;
- Most of the countries are not prepared to wait longer than six hours for official information; after that they would act based on any available information;
- A majority of countries did not decided on protective actions prior to receiving official information on the situation from the Accident State or the IAEA;
- Most of the countries would be proactive in trying to obtain official information;
- Most embassies have at least some pre-defined guidelines on response to radiation incidents or emergencies;
- Most of the countries would use embassies, media and the web for distributing information to their citizens in the Accident State or in another affected country; and some would also use travel agencies.

All answers are shown in the tables below.

Q: Were decisions on protective and other actions based on the pre-planned national emergency response criteria?

States	Yes	No	PA	NA
Bulgaria			■	
Egypt	■			
Ethiopia				
France				
Germany			■	
Hungary			■	
India	■			

PA – Partly
NA – not applicable
not applicable or no information available

	Yes	No	PA	NA
Ireland				
Jamaica				
Japan				
Luxemburg				
Norway				
Pakistan				
Portugal				
Slovenia				
Spain				
Turkey				

Q: Would you implement unjustified protective actions (from the radiation protection point of view) because of political/public pressure?

	Yes	No	PA	NA
States				
Bulgaria				
Egypt				
Ethiopia				
France				
Germany				
Hungary				
India				
Ireland				
Jamaica				
Japan				
Luxemburg				
Norway				
Pakistan				
Portugal				
Slovenia				
Spain				
Turkey				

Q: When deciding on protective or other actions, were actions that were considered or implemented in other, and in particular in neighbouring, States known?

	Yes	No	PA	NA
States				
Bulgaria				
Egypt				
Ethiopia				
France				
Germany				
Hungary				
India				
Ireland				
Jamaica				
Japan				
Luxemburg				
Norway				
Pakistan				
Portugal				
Slovenia				
Spain				

	Yes	No	PA	NA
Turkey				

Q: Did the ERC (emergency response centre) initiate contacts with neighbouring countries?

	Yes	No	PA	NA
States				
Bulgaria				
Egypt				
Ethiopia				
France				
Germany				
Hungary				
India				
Ireland				
Jamaica				
Japan				
Luxemburg				
Norway				
Pakistan				
Portugal				
Slovenia				
Spain				
Turkey				

Q: Was the IAEA assessment of the radiological consequences used in protective actions decision-making?

	Yes	No	PA	NA
States				
Bulgaria				
Egypt				
Ethiopia				
France				
Germany				
Hungary				
India				
Ireland				
Jamaica				
Japan				
Luxemburg				
Norway				
Pakistan				
Portugal				
Slovenia				
Spain				
Turkey				

Q: Did you give instructions/recommendations/warnings/information before receiving official information from the Accident State, or the IAEA?

	Yes	No	PA	NA
States				

	Yes	No	PA	NA
Bulgaria				
Egypt				
Ethiopia				
France				
Germany				
Hungary				
India				
Ireland				
Jamaica				
Japan				
Luxemburg				
Norway				
Pakistan				
Portugal				
Slovenia				
Spain				
Turkey				

Q: How long are you prepared to wait for official information before you would act/not act?

	< 6 hours	< 12 hours	< 24 hours	> 24 hours
States				
Bulgaria				
Egypt				
Ethiopia				
France				
Germany				
Hungary				
India				
Ireland				
Jamaica				
Japan				
Luxemburg				
Norway				
Pakistan				
Portugal				
Slovenia				
Spain				
Turkey				

Q: Were you proactive in trying to obtain official information?

	Yes	No	PA	NA
States				
Bulgaria				
Egypt				
Ethiopia				
France				
Germany				
Hungary				
India				
Ireland				
Jamaica				
Japan				
Luxemburg				

	Yes	No	PA	NA
Norway				
Pakistan				
Portugal				
Slovenia				
Spain				
Turkey				

Q: Do embassies have pre-defined plans (emergency plans) for radiation incidents or emergencies?

	Yes	No	PA	NA
States				
Bulgaria				
Egypt				
Ethiopia				
France				
Germany				
Hungary				
India				
Ireland				
Jamaica				
Japan				
Luxemburg				
Norway				
Pakistan				
Portugal				
Slovenia				
Spain				
Turkey				

Q: How would instructions/recommendations/warnings/information be disseminated to your citizens in the Accident State or in other affected States?

	Via embassy	Via travel agents	Via media	Via web
States				
Bulgaria				
Egypt				
Ethiopia				
France				
Germany				
Hungary				
India				
Ireland				
Jamaica				
Japan				
Luxemburg				
Norway				
Pakistan				
Portugal				
Slovenia				
Spain				
Turkey				

2.9 Public Information

One of the objectives of the exercise was also to assess public information activities, in particular, the ability of relevant international organizations to coordinate and ensure consistency of public statements following arrangements in the JPLAN.

During the exercise, the IAEA received Moroccan public statements, and based on the available (and verified) information, issued six public statements of its own that were posted on the mock webpage to mimic website/Facebook/Twitter publication. This was also shared with other relevant international organizations.

In addition, two actual media advisories (prior to and following the exercise) were prepared and issued in a coordinated manner.

One can conclude that the experience gained during the response to the Fukushima Daiichi nuclear accident, and consequently the revision of the JPLAN, contributed significantly to overall improvement in coordination of public statements at the international level.

The positive outcomes of this exercise suggests that exercising the sharing of public statements and the coordination of public information should be an objective in all future exercises. In addition, the involvement of the actual media in the exercise should be seriously considered.

Section 3

3 EXERCISE EVALUATION

3.1 Exercise Evaluation Structure and Methodology

The generic exercise evaluation structure is as shown in Figure 6 below. States or international organizations could adapt this structure according to their needs.

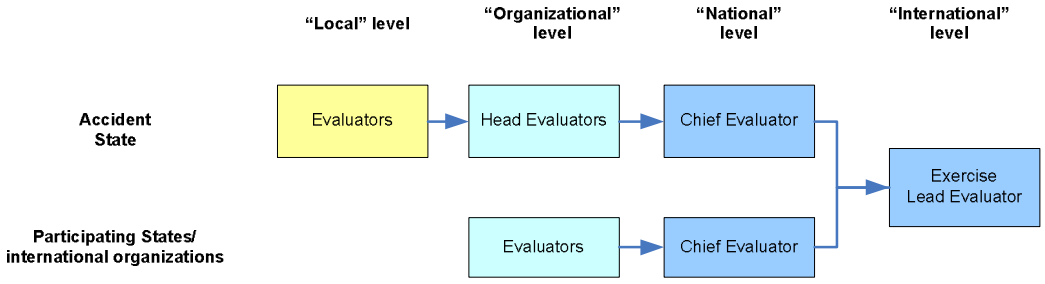


FIG 6. The generic exercise evaluation structure

Mr R. Martincic, from the IAEA Incident and Emergency Centre, was the Exercise Lead Evaluator responsible for the evaluation of the international part of the exercise, and for preparing the final Exercise Report based on the Chief Evaluators' reports.

The Accident State evaluation was made by the Exercise Direction Committee based on the feedback from the evaluators, the controllers and the key players.

Each participating international organization (level B) designated the following people as a Chief Evaluators:

International Organizations	
EADRCC	E. Somer
EC	K. Jackson
EUROPOL	M. Dmowska
IAEA	F. Baciu
ICAO	G. Brock
Interpol	A. King
WHO	M.S. Hersh

The scope of the evaluation was limited to the following areas:

(a) Response management (objective 1);
(b) Coordination of safety and security authorities at national and international level (objective 2);
(c) Emergency information exchange at national and international level (objective 3);
(d) Protective actions (objective 4);

(e) International assistance (objective 5); and
(f) Public information (objective 6).

The generic guide for evaluators was prepared during the exercise preparatory phase and defined and explained the evaluation process and provided detailed instructions and guidance on 'guide customization' and on the preparation of the evaluator's report.

After the completed evaluation, each objective was scored according to the following grading.

Grade	If
Excellent	Objective completed smoothly and with confidence; no problems encountered
Satisfactory	Objective completed, however weaknesses were observed
Unsatisfactory	Objective not completed due to deficiencies

To characterize the magnitude and type of any deficiency, the following criteria were used:

Magnitude	If
Critical	Deficiency/weakness significantly impairs the ability to perform the role or to exercise the assigned responsibilities or jeopardizes personnel safety/security
Major	Deficiency/weakness significantly reduces the response effectiveness but does not prevent it from performing the role, and does not jeopardize personnel safety/security
Minor	Deficiency/weakness reduces the response effectiveness
Problem area	**If**
Planning	Missing or not adequate/updated plans, procedures, instructions, checklists
Training	Training not performed, performed only sporadically, not adequate, or not broad enough
Resources	Resources are not available, not functioning properly or are not adequate (response could be more efficient with better/different resources)

3.2 Evaluation Summary

The Exercise Chief Evaluators of States/international organizations that were participating at level B were expected to submit to the Exercise Chief Evaluator, reports prepared using the evaluator's report template. The following international organizations and States submitted their reports[11]:

'Accident' State	Morocco
Int. organizations	EADRCC, EC, EUROPOL, IAEA, ICAO, INTERPOL, WHO and WMO
States	Bulgaria, Egypt, Ethiopia, France, Germany, Hungary, India, Ireland, Jamaica, Japan, Luxemburg, Norway, Pakistan, Portugal, Slovenia, Spain and Turkey

The evaluation summary was prepared based on these reports. Out of 26 evaluations, 18 from States and 8 from international organizations, only 17 (11 States and 6 international organizations) evaluated how the exercise objectives were met.

The common opinion of the Exercise Chief Evaluators is that the exercise objectives were essentially met and that the exercise revealed several areas at the national and/or international levels that need improvement.

[11] Some did not follow the prepared report template.

Regarding the exercise itself, the overall opinion was that it was well prepared. In particular, country specific exercise injects were warmly appreciated.

Most of the evaluation areas/exercise objectives were graded 'satisfactory' or 'excellent'.

One evaluator graded response management as unsatisfactory, three evaluators graded international assistance as unsatisfactory and one graded unsatisfactory public information activities. Reasons lay in 'planning' and/or 'resources'.

The evaluation summary of all six common exercise objectives is shown in TABLE 9.

TABLE 9. SUMMARY OF EVALUATION OF SIX COMMON EXERCISE OBJECTIVES (O1 TO O6)

	O1	O2	O3	O4	O5	O6
'Accident' State						
Morocco						
International Organizations						
EADRCC						
EC						
EUROPOL						
IAEA						
ICAO						
INTERPOL						
WHO						
WMO						
Member States						
Bulgaria						
Egypt						
Ethiopia						
France						
Germany						
Hungary						
India						
Ireland						
Jamaica						
Japan						
Luxemburg						
Norway						
Pakistan						
Portugal						
Slovenia						
Spain						
Turkey						

excellent
satisfactory
unsatisfactory
not applicable or no information available

Only five international organizations evaluated inter-agency response (objective CIO1): EADRCC and EC graded it as excellent, IAEA and INTERPOL as satisfactory and ICAO as unsatisfactory. ICAO felt that more coordination among international organizations via VTC

would be needed. It also stressed that all members of IACRNE – co-sponsors of the JPLAN – need to participate in the ConvEx-3 exercises at level B. In addition, ICAO also pointed out that dispersion products issued by RMSC Toulouse, and made available on the USIE portal during the exercise, did not conform with data available in the Exercise Manual.

The evaluation summary for common exercise objective of the international organizations is presented in Table 10.

TABLE 10. SUMMARY OF EVALUATION OF COMMON EXERCISE OBJECTIVE OF INTERNATIONAL ORGANIZATIONS (CIO1)

	CIO1
International Organizations	
EADRCC	
EC	
EUROPOL	
IAEA	
ICAO	
INTERPOL	
WHO	
WMO	

Executive summaries from available Evaluator's Reports are presented in the subsections that follow.

3.3 Accident State – Morocco

3.3.1 Exercise conduct

The **Exercise Direction Committee** (FIG. 7) led the exercise preparation, conduct and evaluation based on the feedback from the exercise evaluators, controllers and key players. The Exercise Direction Committee was composed of the staff from DGPC, CNESTEN, GR, DGSN, CNRP, MAEC, ADN including IG, ISS and CSDN, TMPA and DMN. It was tasked to develop basic exercise elements (exercise scenario, list of events, injects, exercise control and exercise evaluation).

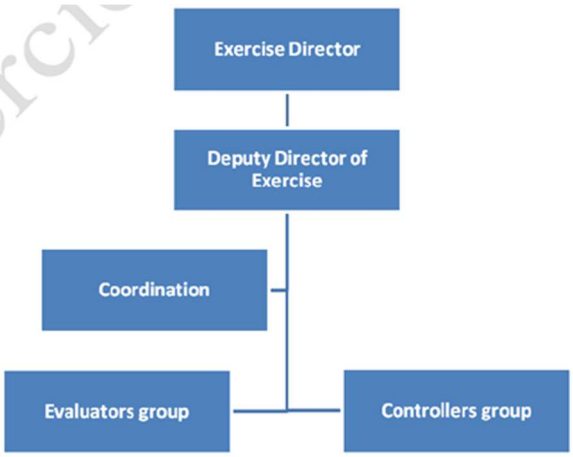


FIG. 7. The Exercise Direction Committee.

The **National Exercise Group** was composed of representatives of key departments and organizations involved in the exercise. This group was kept informed about the main exercise preparation steps and validated exercise concepts and main components, and contributed to the preparation of the exercise data and injects.

The following organizational charts show the structures of the Exercise Control Group (FIG. 8) and the Exercise Evaluation Group (FIG. 9).

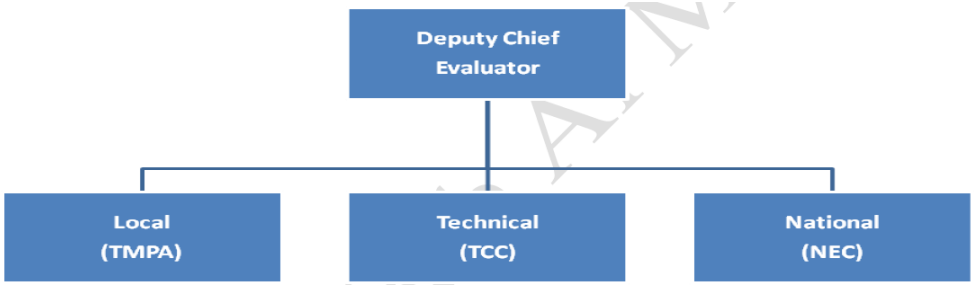


FIG. 8. The Exercise Evaluation Group

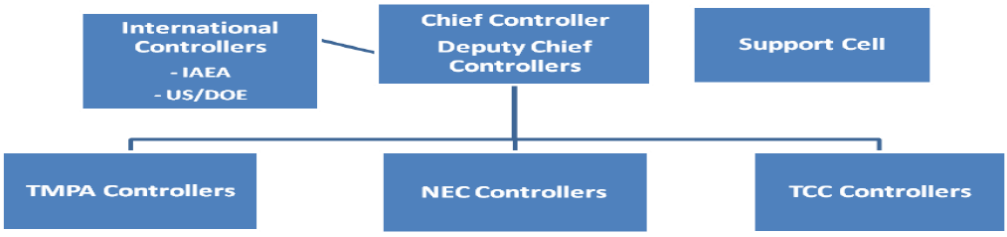


FIG. 9: The Exercise Control Group.

The response to the exercise events was led by the National Emergency Centre (NEC). The response chart is shown in Figure 10.

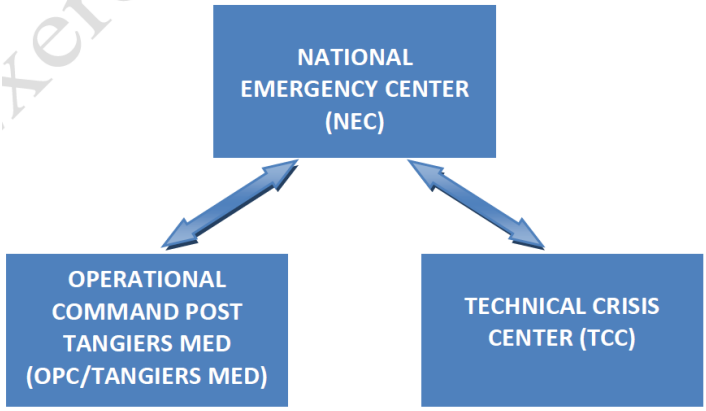


FIG. 5. Response structure in the exercise.

The **National Emergency Centre** had the following functions: (a) decision-making, coordination and resources provision at the national level; (b) coordination, assessment and follow-up of the situation at the national level (national security and investigation, public health and protection, environment protection and logistical issues); (c) communication with the public and with the

media; (d) international notification and coordination of the international assistance; and (e) returning to a normal situation.

The NEC was composed of five cells as shown in Figure 11[12].

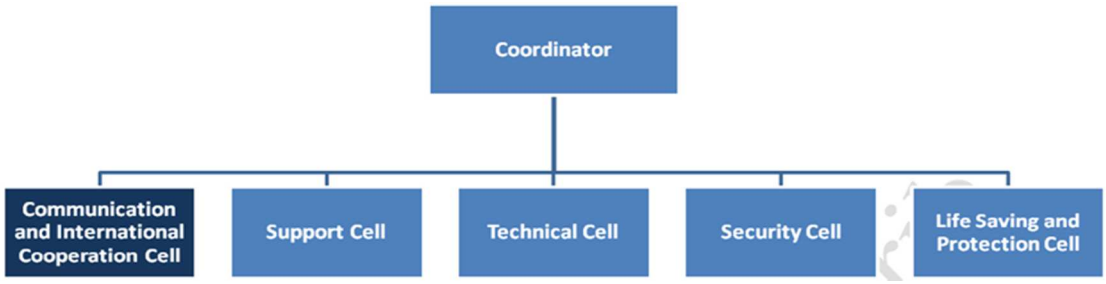


FIG. 6. Structure of the National Emergency Centre.

The main function of the **Communication and International Cooperation Cell** was to keep the IAEA and the States informed of the situation on the scene, and to request needed assistance. The cell carried out the following tasks: (a) it notified the IAEA according to the Early Notification Convention; (b) it kept the IAEA informed on the evolving situation and consequences and protective actions taken; (c) it requested international assistance deemed relevant by the NEC; (d) it responded to the IAEA's requests for information and clarification; (e) it kept the embassies and consulates accredited in Morocco informed and ensured their requests were followed-up; (f) it also kept informed the embassies of Morocco abroad; and (g) it coordinated video conference discussions with the IAEA on specific topics.

The **Tangier Med Port Authority** (TMPA) acted at the local level, deploying first responders on the scene and managing the situation at the scene (Port Tangier Med). The TMPA's main functions were: (a) assessment of the situation on the scene; (b) activation of emergency response plans based on the situation assessment; (c) first response (security, medical, radiological safety, communication, etc.); (d) decisions on port activities; (e) mobilization of necessary resources; and (f) informing and coordinating with the NEC.

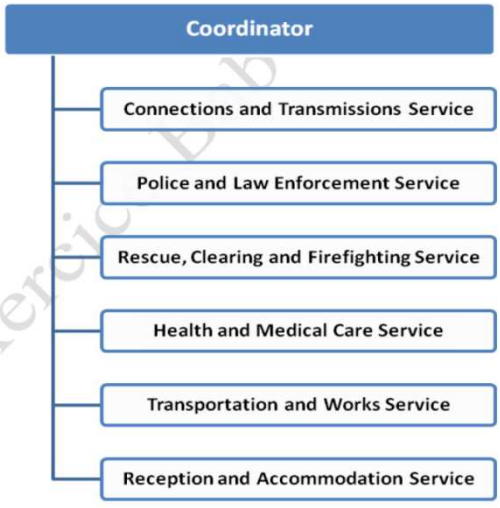


FIG. 12: Structure of the TMPA response.

[12] It has to be noted that at the tactical level, authorities at the regional/local level, were not exercised.

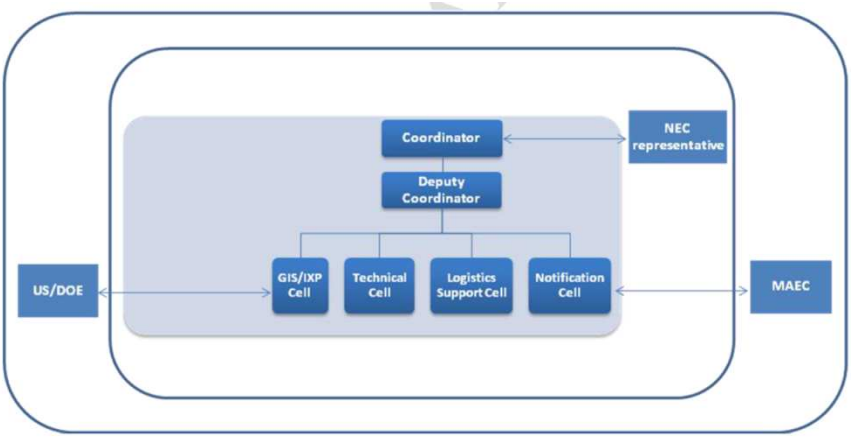


FIG. 13 The structure of the Technical Crisis Centre.

The **Technical Crisis Centre** (TCC) is an entity based at the CNESTEN Nuclear Centre in Maâmora (CENM).

The TCC is in charge of the radiological risk assessment during any radiation incident or emergency and recommends protective actions (public, emergency workers) to the NEC, based on the IAEA standards and guidelines. The TCC mainly performs: (a) plume modelling of radioactive material (IXP model, Hotspot, etc.); (b) radiological risk assessment based on dose rates, contamination levels, radioactive source identification, etc.; (c) radiological search and survey (aerial, on-route, pedestrian); (d) radiological environmental monitoring; and (e) radioactive waste management. The TCC has arrangements with the US DOE for support if needed.

3.3.2 Conclusions and recommendations

The exercise was successful, and all national objectives were addressed and achieved. The preparation and conduct of the exercise was a good opportunity for the Moroccan authorities to review, discuss and improve their response organization and protocols to face a radiological emergency triggered by a criminal or terrorist act involving radioactive materials. The exercise was also an opportunity to build the basis of the notification and assistance request mechanisms with the IAEA. In general, there was good communication and coordination between the three activated centres (national, on-the-scene, and technical). Actions conducted by each of the centres were recorded and shared in a web-based log system developed and used at the national level. This allowed an effective situational awareness to be shared by all responding organizations. In this regard, the drill conducted on 3 October 2013 was very beneficial, and had good outcomes in terms of improvement of coordination, communication, traceability and recording of actions taken. The communication cell that communicated with the IAEA faced many challenges regarding information exchange, notifications and assistance request, translation, review and approval. At certain moments, the communication cell was overwhelmed. Allocating the appropriate resources, assigning some of them to the USIE system and integrating the work of the cell in the web-based log system, will improve efficiency in exchanging information with IAEA or in arranging international assistance. Consideration might be given to more flexibility when using the USIE system and for receiving and passing on information to other Member States and international organizations. The alternate methods based on email and phone conversations proved to be useful, but might result in delays in the information sharing and distribution process and in addition might present other constraints, mainly the traceability and the security of the information.

Keeping records of the main actions and information received (tracking system) and sharing the important and relevant information in real time between the three centres were identified, during the 3 October drill. as requiring improvement. The shared web-based log system developed for this purpose turn out to be very useful for improving tracking and sharing information among

responding organizations and activated centres. The importance of prioritizing and synthesizing the key actions, information and requests and not being overwhelmed with details is also an important consideration for higher efficiency. Some other challenges identified during the exercise are related to:

- The difficulty to face multiple events, in different locations that are distant from each other and far from the capital, where most of the specialized resources for radiological safety are available;
- Supporting and advising hospitals, with no background in radiological safety, related to how to deal with potentially contaminated or overexposed people, during the rush of worried well who might be contaminated;
- Ensuring the appropriate communication with the people present on the scenes, with the public and the media, under high pressure, with not enough reliable information available and/or information related to security issues; and
- Managing the emergency under the pressure of the port users willing to come back to normal activity as soon as possible.

At the national level, safety and security interface did not reveal major concerns, but confirmed that there is a necessity to have a common understanding of the roles, responsibilities and objectives of responding organizations on the scene and establish a strong coordination and awareness, mainly at the Command and Control level on the scene. Additional considerations address the following:

- The Communication with the public during the threat phase and investigations remains a difficult issue
- Priorities between securing the scene from other threats, rescue and lifesaving, and protecting responders have to be discussed and agreed during the preparation phase
- There should be awareness among the responders on how to provide effective response while preserving as much as possible evidence for investigation.

The exercise outcomes provided the basis for updating and improving the response capabilities, organization and protocols at the national level and at the level of the different responding organizations.

The Vice Minister of Interior and senior officials from the main responding organizations (Interior, Defense, Foreign Affairs, Energy and Mines, Health, TM Port Authority) attended the exercise's opening session. This high level of participation showed a strong commitment for the enhancement of emergency preparedness and response and the importance of the exercises.

These findings, recommendations and lessons learned were presented at the ConvEx-3 (2013) Evaluation Meeting (5th IACRNE WG-CIE Meeting) in Vienna, 11-12 February 2014. Mr Farhane Azzeddine, Director of United Nations and International Organizations, MFA headed Moroccan delegation. The IAEA Deputy Director General, Department of Nuclear Safety and Security, Mr Denis Flory tolled participants that the IAEA Secretariat plans to inform the Board of Governors of the objectives, preparation, conduct and findings, conclusions and recommendations that have resulted from the exercise.

3.4 International Organizations

3.4.1 EADRCC – Euro-Atlantic Disaster Response Coordination Centre

The EADRCC performed very well, taking into consideration that this was the first ConvEx-3 exercise the EADRCC took part in. The procedures in place for the EADRCC are compatible with the response to a radiological or nuclear emergency. The EADRCC staff was very motivated to perform their duties.

In addition, the EADRCC seconded a liaison officer to the EU ERCC, which proved to be very useful.

The duration of the exercise was too short for realistic consequence management play; the time available between requesting assistance and the decision processes of offering and accepting assistance is much longer in reality than it was during this exercise.

3.4.2 EC – European Commission

The following entities in the European Commission (EC) respond to a radiological emergency: (a) DG-ENER as competent authority for the EC under the Early Notification Convention; (b) EC-CP : Commission Security office in Brussels, Belgium; and (c) EC-CA: DG ENER, Luxembourg.

Response functions aim to:

- Disseminate radiological information that is received to ECURIE Member States on an urgent basis;
- Inform and advise the services of the European Institutions on radiological emergencies;
- Contribute to the public information supplied by the EC spokesman service; and
- Activate food and feedstuff regulations where necessary to protect the population and the internal market.

Players in the exercise were all identified services of the EC that have a role in the response to radiological emergencies.

EC Civil Protection takes care of assistance requests on behalf of the EC by direct or indirect (via EC-CA) contact. All pre-arrangements and communication facilities for this exist.

The following are exercise conclusions and recommendations:

- The exercise was very useful to identify weak points in internal arrangements, and these will be examined in detail and procedures will be adapted accordingly. Many areas needing improvement were identified in the EC response system, however, none were critical;
- EC legal obligations towards ECURIE Member States were efficiently satisfied and well within the time allowed by ECURIE arrangements;
- The scenario provided for a rapidly evolving event, which tested many aspects of the EC response capability in a short time. However, if the exercise had been longer, more people could have been involved. The scenario was also useful in demonstrating the reaction of ECURIE for events outside its area, but in close proximity;
- The use of USIE and WebECURIE applications together was much easier due to the development of the common data set for urgent information exchange, but it is clear that an automatic exchange of data between the systems needs to be implemented;

- Video and audio conferencing facilities proved very useful in gaining up-to-date knowledge, but their use also demonstrated the need for clear procedures for planning and execution (resources/timing, etc);
- Changes in weather data caused confusion;
- The participation of press officers needs to be further encouraged;
- Information exchange applications still need improvement. Further automation of initial alerting (of internal services) needs to be a priority, which would allow for less strain on resources;
- IAEA reports are high quality, but grow in volume with time;
- It was good to use the EURDEP system for the exercise even though the event was outside the EURDEP area. The automatically collected and presented data was useful for both reporting and information purposes. The testing of the introduction of data from mobile monitoring stations was particularly useful;
- Information generated by IOs may not appear in USIE very quickly if at all. Clarification of procedures is perhaps needed;

3.4.3 EUROPOL – European Police Office

Europol is the European Union's law enforcement agency whose main goal is to assist the European Union's Member States in their fight against serious international crime and terrorism. Europol also is competent to deal with crime connected with nuclear and other radioactive materials.

In case of radiological or nuclear emergency with criminal or terrorist background, the Europol O4 Counter Terrorism (CT) Unit would assist EU Member States to conduct successful investigations by collecting and analysing information, and preparing intelligence reports and threat assessments. In order to carry out this task, Europol exchanges information with the competent authorities of the EU Member States, and with third parties that have cooperation agreements with Europol. In the field of radiological and nuclear crime, Europol maintains an informal relationship with the IAEA.

Europol O4 CT Unit supports EU Member States with a number of specific projects with database mechanisms, such as the:

- **Check the Web Portal,** which enables competent authorities of the Member States to share information on Islamic terrorist activities on the internet via the secure Europol network and Europol National Units. Its aim is to create synergies between the Member States in the analysis of online Islamic terrorist activities.
- **Terrorist Financing Tracking Program,** which is based on the EU-US agreement on the Terrorist Finance Tracking Programme (TFTP) of 2010. Europol created a dedicated unit to carry out TFTP related tasks and to ensure close cooperation with Member States;
- **First Response Network,** which could be activated at Europol in case of direct threat to Member States and third parties. The First Response Network is the mechanism of the EU Member States competent authorities and Europol to a major terrorist incident. Based on consultation and agreement between the competent authority of the concerned Member State and the Director of Europol, a team of experts will be called upon to assist a Member State investigation during the first weeks of the investigation and to facilitate the exchange of information and to assess other necessary measures related to the security of the EU and EU interests abroad.

The Europol O4 CT Unit runs several CBRN related projects aimed at assisting EU Member States in developing their capacity to respond to CBRN incidents.

- **EU Bomb Data System (EBDS)** is a secure platform for sharing information and intelligence. EOD and CBRN are available to EU Member States and some of the third parties. The system includes incident databases, specialized libraries and discussion forums.
- **European EOD Network (EEODN)** is a network of specialists in CBRN and explosives from all EU Member States.

The Europol O4 CT Unit took the opportunity to test its own response mechanisms to respond to radiological and nuclear emergencies and participated in the ConvEx-3 from the office. Our goals, in addition to testing the cooperation mechanisms in an emergency situation also included an analysis of the scenario involving a RDD and the complexity of international response to this kind of threat.

In the circumstances of the Moroccan case, after receiving information about the terrorist attack with the use of an RDD, the main task of Europol would be to analyse the terrorist threat to the EU Member States and their citizens. This was relevant as the incident took place in a neighbouring country to the European Union and has close relations with the EU.

Lesson learned

- It was proved during the exercise that the IAEA USIE portal is a very useful tool for law enforcement as a source of information about radiological and nuclear incidents and emergencies. Whenever Europol receives information on any radiological or nuclear incident with criminal or terrorist background, Europol forwards the information to EU Member States and partners that have a cooperation agreement;
- Europol established liaisons with its main cooperation partners participating in the exercise (EU MS and cooperation partners, European Commission, Interpol);
- Exchange of information with the IAEA was limited due legal constraints. Europol has no cooperation agreement with the IAEA, which actually precludes it from sharing non-public (operational or strategic) information with the IAEA. Europol can receive information from the IAEA, but in the current legal framework, the IAEA is not able to reciprocate.
- Europol has no cooperation agreement with Morocco; therefore Europol cannot share non-public information with Morocco. There are no obstacles for Europol to receive information from Morocco;
- The exercise showed that some additional human resources with CBRN expertise are required at Europol to ensure 24/7 operability in case of a radiological or nuclear emergency. A minor deficiency observed during the exercise, which significantly reduced Europol's response effectiveness, was a lack of an appropriate number of CBRN trained personnel to ensure three shifts during the exercise. Due to other operational commitments, Europol was able to delegate one CBRN specialist to participate in the exercise;
- Certainly, in a real terrorist attack, many human resources would be dedicated to provide response. In real emergencies, particularly those affecting EU Member States, the Europol O4 CT Unit staff can be put on standby in order to ensure the delivery of operational support services, to offer continuous data matching capability to link investigations in EU Member States, to streamline the access of Europol services, including the Liaison Bureaus Network. Additionally, in a terrorist attack, the First Response Network – a network of counter terrorism experts from Member States – can be activated and maintained.

Recommendations for future exercises

- Formalization of cooperation between Europol and the IAEA would enable a greater involvement of Europol in ConvEx exercises. Establishing some form of cooperation agreement (letter of intent) in order to identify the areas of common interest and define the forms of mutual coordination, assistance and training would be extremely useful for future real emergencies and for exercises.

Summary evaluation and conclusions
The ConvEx3 exercise was a good opportunity to test internal and international tools, mechanisms, procedures, as well as, the organizational capacity to respond to a radiological scenario.

- The exercise brought together national and international organizations that have a role in multidisciplinary response to radiological and nuclear emergencies and contribute to promotion of cooperation and trust building;
- The exercise helped to understand the complexity of international and multiagency response to a scenario involving a RDD and the potential impact of this kind of threat.

3.4.4 IAEA – International Atomic Energy Agency

Exercise preparation
The IAEA fulfils its central role to respond to incidents and emergencies by maintaining a 24/7 system consisting of two parts:

(1) An on-call system with the following six on-call officers: Emergency Response Manager (ERM), Logistics Support Officer (LSO) and four specialists with expertise in nuclear installation safety, radiation safety, nuclear security and external events; and
(2) A call-out system that allows the activation of additional IAEA staff. Upon activation to full response mode, the IEC, as the IAEA focal point for the response, can operate for extended periods in 24 hour response mode.

The IEC has developed four internal objectives, against which the exercise was evaluated, which are to:

(1) Evaluate the effectiveness of the Incident and Emergency System (as documented in the Response Plan for Incidents and Emergencies (REPLIE - internal IAEA document);
(2) Evaluate the effectiveness of the IAEA's role in the assessment and prognosis of the event;
(3) Test the IAEA's role in coordinating the provision of international assistance (EPR-RANET); and
(4) Evaluate the effectiveness of communication with Morocco, other Member States, the media and the public.

These specific objectives allowed for an evaluation of internal processes, arrangements and tools and, in particular, the newly introduced 'assessment and prognosis' process and the 'internal information management arrangements/tools'.

Conclusions and recommendation
The exercise scenario did not trigger the threshold for a notification under the Early Notification Convention. However, the Convention, as well as the IAEA standards and the IEComm manual, place expectations for the exchange of information in such emergencies. The exercise confirmed that the IAEA is essentially meeting these expectations. In addition, the Assistance Convention obligations were also met. However, there were many issues and areas identified that need to be improved.

- The IAEA internal response plan, which is the basic document describing the response of the IAEA Secretariat, is sufficient for IAEA response and all actions were taken in line with the document. The coordination of response management between safety experts and security experts needs further strengthening in order to optimize the efficient use of resources and to not create parallel channels of communications with Member States and relevant international organizations. The response management within the IEC saw some welcomed improvement such as a system for tracking response actions and event information. This internally developed tool helped most staff to stay informed about the situation. However, there is a need to further strengthen the tools and the training of staff in

its use, to achieve the best outcome possible. A new approach to shift changes was implemented, in which only a portion of a team is exchanged at one point in time. This has strengthened the active transfer of information and task monitoring between shifts;

- The assessment and prognosis process was actively tested for the first time. In general, the assessments were produced; however the distribution of those was not always timely. This was caused by several factors such as the availability of relevant data, and on which channel the information was received. In addition, the process of releasing the assessments caused additional delays and, therefore, the distribution of some assessments was somewhat delayed. New ways for their distribution have to be explored. Overall the process needs further strengthening;
- The assistance process has been well documented; however, the process has not yet been tested in a full response exercise with participation of Member States. The exercise proved to be adequate and offered the opportunity to test the arrangements, and the general flow, of actions. Some modifications need to be made for a developing situation, when priorities might change, as the assistance process is time consuming. Assistance needs to be packaged in smaller portions, in order to process them in a timely manner. The internal arrangements need to be further standardized, since an extended 24 hour mode would require staff in addition to experienced staff members to perform this function successfully.
- The communications with Member States (including Morocco as the Accident State) worked satisfactorily. However, some Member States might have experienced this differently. The reason is that the IEC made information available to all Member States, but in some cases this information was considerably delayed. Issues for improving the USIE website were identified. The system of answering questions from Member States, as well as the receipt of answers to questions that the IEC directed to Member States, was not well implemented, which resulted in some requests that were not addressed, while others were. A better tracking system and assignment method needs to be developed.
- The communication with the media/public worked well during the exercise. The IAEA's Office for Public Information and Communication (OPIC) is responsible for issuing public statements, web stories, etc. A good working relationship is maintained between the IEC and OPIC, and several exercises in the past have allowed a stable foundation to be built. The active involvement of the public information staff in the operations room is the basis for this successful cooperation. Several releases were made on the IAEA's (simulated) webpage in a regular frequency for the duration of the exercise.

Regarding the preparation, conduct and evaluation of the exercise, the following lessons were identified:

(1) All activities in the exercise need to be either agreed to by all affected counterparts, or have to be part of free play, otherwise one side will not have prepared adequate resources to accommodate such injects and, specifically in an exercise, these resources cannot be activated;
(2) Actual emergency communication channels need to be used in exercises as otherwise some players might be confused, and the emergency communication channels will not be tested;
(3) Some issues that were caused by the exercise nature, rather than by the response, were not considered in the evaluation.

3.4.5 ICAO – International Civil Aviation Organization

The International Civil Aviation Organization (ICAO) comprises 191 Member States, and serves as a forum for cooperation in all fields of civil aviation.

There are no ICAO Secretariat personnel assigned to the communication of information to aircraft in flight and at airports during a real-time radiation emergency. Instead, States are required to ensure the necessary operational response to such an emergency, in accordance with established provisions governing international civil aviation, through offices/units serving international air navigation.

The ICAO specific exercise objectives were as follows:

- To evaluate the effectiveness of the ICAO Secretariat's arrangements for impact assessment and event progression, including roles and responsibilities within the JPLAN arrangements, emergency incident response (EIR) processes and infrastructure, and coordination between ICAO Headquarters and Regional Office(s) concerned;
- To test the activation of the IACRNE ad hoc Working Group on Air and Maritime Transportation (WG-AMT) and to evaluate the inter-agency response;
- To assess the provision of exercise nuclear emergency messages, exercise SIGMET (Significant Meteorological Information) messages and exercise NOTAM (Notice to Airmen) messages for radioactive material in the atmosphere for Casablanca flight information, issued in accordance with ICAO Annex 3 – Meteorological Service for International Air Navigation and Annex 15 – Aeronautical Information Services;
- To evaluate the decision-making process with respect to flight operations by concerned Member States, and the effectiveness of contingency plans, established in accordance with ICAO Annex 11 – Air Traffic Services, related to addressing consequent shortcomings in the provision of air navigation services in Morocco, neighbouring States and over the high seas, with a view to identifying requirements for optimizing ICAO provisions in this regard; and
- To evaluate the effectiveness of communication with Morocco, other concerned Member States, relevant United Nations agencies and international organizations, media and public.

The ICAO headquarters and regional office Secretariat personnel from the following disciplines participated in the exercise: air traffic management, flight operations, airports and ground aids, aeronautical meteorology, state aviation safety tools, dangerous goods, and aviation security.

Lessons identified

WG-AMT activation:

- The activation of the IACRNE ad hoc WG-AMT during instances of a radiological emergency should be clarified within the JPLAN arrangement;
- Any organization party to the JPLAN should have the right to request activation of the ad hoc WG-AMT, and a decision on the activation should be achieved through a consensus of the IACRNE Committee within a stated timeframe.

Communications and notifications:

- Whilst the IAEA IEC first notification timed at 20/0855 UTC notified that the IEC had been activated in 'Full Response Mode', there was no indication in this or subsequent communication from the IAEA of the 'emergency class' of the event. Knowledge of the emergency class (e.g. general emergency, facility emergency, radiological emergency, etc.) is a fundamental piece of information for the international organizations party to the JPLAN, since it directs their response actions/activities. It was, therefore, assumed that ConvEx-3 was a 'Radiological Emergency';
- Large volumes of USIE notifications can make it challenging to identify the important or relevant messages from less important or less relevant messages;
- When working remotely (i.e. away from normal place of work), especially in lesser developed countries where reliable and sufficiently fast internet connection is very limited, the downloading of DOC and PDF attachments from the USIE web portal can become

particularly problematic. Websites with plain text messaging can be accessed and reviewed much more easily;

- The IAEA IEC should consider whether more frequent VTCs are required during the first 24 hours of an emergency, particularly where the situation has escalated in severity;
- A standard operating procedure with respect to the conduct of VTCs should be developed, so that all involved are aware of how the VTCs are structured, how information will be relayed, when participants will be afforded the opportunity to ask questions, etc. Following the remarks of the ERM during the first VTC of ConvEx-3 (held at 20/1300 UTC), the VTC became rather disjointed with a lack of clarity as to who was expected/invited to speak and when. The first VTC ended without a clear indication of when the next VTC would be convened.
- The RSMC Toulouse products officially posted on the USIE web portal were markedly different from those contained in the Guide for Controllers. The Tangier Med plume was expected to move north-east from Tangiers, however the product issued by RSMC Toulouse moved north-west and became diffuse. Also, the RSMC Toulouse product posted on USIE was not centred on Tangiers, it was instead centred on Ceuta which was different to expectations[13].

ERC resources:

- Internal issues related, in particular, to the resources available within the ERC are to be addressed as a matter of priority (by ICAO).

Recommendations for future exercises

- All international organizations that are party to the JPLAN should play an active role in the exercises – i.e. at Level B participation.
- A hosting or participating State or a participating international organization should not be entitled to change the scenario – before or during the exercise – from the standing exercise directives without the prior consultation and consent of all players/exercise controllers.

Summary evaluation and conclusions

Overall, ICAO's involvement in ConvEx-3 was considered to have been beneficial. The table-top exercise helped identify a number of internal issues/constraints with respect to the (ICAO) emergency and incident response process and the resources necessary to support 24/7 emergency response activities. ICAO would have welcomed the opportunity to have activated the IACRNE ad hoc WG-AMT had a request have been forthcoming far earlier in the exercise.

3.4.6 INTERPOL

Each INTERPOL member country maintains a National Central Bureau (NCB) staffed by national law enforcement officers. The NCB is the designated contact point for the INTERPOL General Secretariat, regional offices and other member countries requiring assistance with international investigations. Using I-24/7, INTERPOL's global police communication system, NCBs and some field police units can search and cross-check data with direct access to INTERPOL databases containing information on suspected terrorists, wanted persons, fingerprints, DNA profiles, lost or stolen travel documents, stolen motor vehicles, stolen works of art, etc.

[13] Correspondence with RSMC Toulouse following the exercise identified that the Moroccan authorities approached RSMC Toulouse in the days immediately prior to the exercise requesting a change to the scenario. This is the reason why the RSMC Toulouse issued products on the USIE portal that did not conform to the Exercise Manual. This is, in ICAO's view, in direct contradiction to the planning meetings that the IACRNE WG-CIE held over the past 12-18 months to prepare the scenario for the exercise, which had been designed specifically with RDDs in Tangier Med and Marrakech. The scenario used should have been entirely consistent with the exercise directives that were dispatched by the IAEA in October 2013 and should not have been changed at such a late stage without the prior consultation and consent of all players/exercise controllers.

The CBRNE Sub-Directorate is located at the General Secretariat in Lyon, France and it is responsible with countering and responding to any CBRNE terrorist threat through the provision of intelligence and threat analysis, together with a programme of awareness training and capability/capacity building to the member countries of INTERPOL. Additionally, it provides access to specialized expertise in this particular field of law enforcement. The Sub-Directorate consists of three distinct strands: the Biological Terrorism Prevention Unit (Bio TPU); the Radiological & Nuclear Terrorism, Prevention Unit (Rad Nuc TPU); and the Chemical & Explosive Terrorism Prevention Unit (Chem Ex TPU).

The **Command and Co-ordination Centre (CCC)** operates a 24/7 Operations Room, in all of INTERPOL's four official languages (English, French, Spanish and Arabic) and serves as the first point of contact for any member country faced with a crisis situation (Crisis and Major Events Room). The CCC can also assume a coordination role if an attack or disaster involves several member countries or if a member country's own ability to do so has been compromised. There are various other services the CCC provides, including the deployment of an INTERPOL Major Event Support Team, the publishing of Orange Notices, which are used to warn police, public institutions and other international organizations about potential threats posed by fugitive terrorists, disguised weapons, parcel bombs and other dangerous objects or materials.

INTERPOL supports law enforcement officials in the field through emergency support and operational activities, especially in its priority crime areas of fugitives, public safety and terrorism, drugs and organized crime, human trafficking and financial and high-tech crime. When necessary, INTERPOL can deploy an Incident Response Team (IRT) to support a country or countries with whatever tasks that are requested. The IRT is composed of officers from the General Secretariat and member countries, who can be dispatched to the scene within hours of an event.

The CBRNE Sub-Directorate, Radiological and Nuclear Terrorism Prevention Unit participated in the exercise.

Lessons identified

- The contact details of attending parties should be checked and updated before the exercise gets started in order to ensure that attendees can contact each other.

Recommendations for future exercises

- Briefing/VTC with the representatives of attending national and international organizations should be held before the exercise and a pre-exercise check of scenario and contact details should be conducted;
- INTERPOL's involvement in the exercise should be increased in the future, so participating states and international organizations can be fully aware and can utilize INTERPOL's tools and systems in place, e.g. the notice system, INTERPOL databases, coordination of exchanging criminal intelligence on an international level, the Incident Response Team (IRT), etc.

Summary evaluation and conclusions

- Despite the emerging communications issue during the exercise, the INTERPOL team successfully completed the exercise. As it is mentioned above, INTERPOL's involvement in the exercise should be increased in the future to ensure that INTERPOL tools and systems can fully support the existing emergency response procedures both on the national and international levels.

3.4.7 WHO – World Health Organization

The World Health Organization (WHO) is the directing and coordinating authority for health within the United Nations system. It is responsible for providing leadership on global health matters, shaping the health research agenda, setting norms and standards, articulating evidence-based policy options, providing technical support to countries, and monitoring and assessing health trends.

Additional to the Headquarters located in Geneva, Switzerland, WHO has six regional offices for Europe, the Americas, the Middle-East, Africa, South-East Asia, and Western-Pacific regions. There are 147 country offices in 194 Member States of WHO .

The area of work related to preparedness and response to radiation emergencies falls under the scope of the Department of Public Health and Environment (PHE), Family, Women's and Children's Health Cluster (FWC) of the WHO Headquarters in Geneva, Switzerland.

WHO is a full party to the Emergency Conventions and has a mandate for coordinating medical and public health response to radiation emergencies. In addition, WHO has an obligation to respond to public health emergencies of any origin under International Health Regulations (IHR, 2005). This legally binding agreement significantly contributes to international public health security by providing a framework for the coordination of the management of events that may constitute a public health emergency of international concern, and improve the capacity of all countries to detect, assess, notify and respond to public health threats.

WHO developed its own specific objectives and accompanying evaluation questions that fell under the purview of the ConvEx-3 (2013) scenario, to validate its internal Standard Operating Procedures (SOPs).

ConvEx-3 provided WHO with the opportunity to:

- Validate decision-making procedures at country and regional levels for notification of a radiological event under the IHR(2005);
- Identify strengths and challenges in the application of the Emergency Response Framework (ERF) in the context of a radiological event; and
- Assess WHO capability and capacity to provide international assistance in matters relating to human health in the context of a radiological event.

Despite a common set of objectives for IACRNE members to pursue when participating in the ConvEx-3(2013) exercise, there is a certain level of subjectivity in how each IACRNE member evaluates its role. The IAEA suggests that the evaluation of the response in the ConvEx-3 (2013) will be performance based, e.g. based on the exercise objectives, and consequently will focus primarily on the results and secondarily on the process itself. Due to ongoing, actual public health emergencies to which WHO had to respond to at the time of the exercise, some of the response actions needed to be simulated, which made the primary focus of WHO's evaluation the internal Standard Operating Processes (SOPs/CONOPS) with a secondary focus on staff performance. Moreover, the scope of WHO's evaluation addressed four areas that were iterative throughout the exercise. The scope of the evaluation was limited to the following areas:

(1) Response trigger: when evaluating WHO's involvement in the emergency response activities of a radiological emergency, evaluators should be mindful of the appropriateness of WHO's intervention according to internal SOPs. There will be a formal response trigger that occurs once the IAEA requests medical and public health assistance from WHO; however, there will be other times throughout the exercise where WHO may volunteer information or assistance as part of their ongoing monitoring and assessment of the event(s), and this should be noted. Also, while RAD is the only formal conduit for

contacting the IAEA, if one of the other WHO offices (e.g. RO/CO/FOS/POE) receives information from their professional networks or hears chatter, those other offices may contact RAD for further information and, thus, trigger further actions;

(2) Timely assistance: evaluators will be observing whether or not WHO responsible offices / functional offices respond to the request for assistance either from IAEA, the Affected State, i.e., Morocco, or if WHO internal networks and offices request additional information;

(3) Inter-agency coordination and information exchange: evaluators will be looking at whether or not the SOPs for communicating with the IAEA are followed. The messaging objective will not be played in this exercise by WHO, so there will be little to comment on. Evaluators may have comments with respect to the handling of multiple, ongoing disasters by WHO, and the need for additional surge capacity SOPs – these comments may go here;

(4) Internal Situation Reports (SITREPS) / Public Information: evaluators will be looking at the focal point for managing radiation emergencies to provide consistent and ongoing, relevant information to WHO responsible offices. As stated above, there will be little to comment upon with respect to outgoing public information messaging (e.g., press releases); however, WHO's responsible office for radiological emergencies will be providing information packages (see Annex 3). These can be evaluated.

Where WHO is able to provide harmonized evaluation feedback, is with respect to the use and integration of the EPR-JPLAN 2013, IECOMM, and RANET procedures in WHO's Concept of Operations (CONOPS). While the WHO was a contributor to the JPLAN and provided feedback, several matters arose during this exercise that suggest the need for further reflection and articulation of how WHO will coordinate and collaborate with the IAEA and other IACRNE members in a deliberate radiological emergency.

The synthesis of WHO's participation as part of the IACRNE and the fulfilment of its organizational mandate is embodied in the CONOPS. What is laid out here is how WHO integrates its internal SOPs for responding to a radiological emergency. According to the JPLAN, in an emergency, there are specific phases and tasks that elicit particular action items.

WHO's availability was limited due to its participation in responding to multiple, ongoing emergencies at the time of the ConvEx-3(2013) scenario. Consequently, several roles were simulated and others were removed from the exercise completely. For instance, a key player in managing and mitigating the perception of public risk with respect to a deliberate radiological emergency is the Department of Communications Office (DCO). It is presumed that had the DCO not been engaged in multiple actual emergency responses, it would have more actively participated and coordinated in joint press releases with the IACRNE members.

Lessons identified

The overall response management and response capabilities of WHO were adequate. The objectives of the exercise were met – both common and specific, with the exception of Common Objective 5, which was excluded as being not applicable.

Certain areas for improvement were identified, related to both resources and planning issues. A more complete breakdown of these areas will be followed up by an internal WHO report.

During the Notification of an Event phase of the ConvEx-3(2013) exercise, WHO responded in accordance with the guidance set out by the JPLAN (2013). Simulated events, such as time lapses between messages, responses, and the need for controller simulated responses for several key institutional players somewhat limited the ability to effectively evaluate a whole institution response. However, several areas of strengths and weaknesses as well as operating assumptions were highlighted during this phase of the exercise.

<u>IHR notification</u>

The ConvEx-3 exercise was a good testing opportunity for the functionality of the IHR system. Communication between the National IHR Focal Point (IHR NFP) and the WHO IHR contact point was maintained thought out the exercise. The IHR NFP functions were maintained as follows:

- Verification of the event: a request for verification was sent to the IHR NFP at the Ministry of Health. The IHR NFP acknowledged the receipt of the request within 24 hours and verified the event within 24 hours as well.
- Notification and reporting: the IHR NFP notified the WHO IHR contact point of the Easter-Mediterranean Regional Office and reported available information.
- 24/7 accessibility: the IHR NFP was accessible 24/7 for the duration of the exercise, particularly through phone communication. Some delay was faced in the communication related to the preparation and clearance of the EIS from the IHR NFP side due to the following:
  - As the nature of the event was not under direct management of the health sector, information was not sufficiently and rapidly communicated between the sector responsible for radiological matters and the IHR NFP. Also, public health measures taken by the competent authority at the affected point of entry – TanMed port – was not communicated to the IHR NFP.
  - The IHR NFP was equipped with basic IT equipment at the time of the exercise and was able to send and receive communications only through the web using a desktop computer. The WHO-EMRO IHR contact point had to contact the IHR NFP by phone several times to inform or confirm receipt of newly arriving communication.
  - WHO EMRO IHR Focal point performed its functions in a timely and efficient manner, according to the operating procedures. Preparing information for [simulated] posting on the EIS was rapid and efficient. This indicates that there are clear and functioning procedures and adequate communication flow among the different WHO units dealing with these matters.

For better repose to future public health events, coordination between different stakeholders needs further strengthening with clear mechanism for information sharing with the IHR NFP. Also, IHR NFP need to be equipped with a means of communication to facilitate rapid receiving and sharing of information with nationals and with WHO.

WHO's proactive engagement of its REMPAN network, to put them on standby after the initial notification was received, is most certainly a strength. Furthermore, outside of this exercise, WHO maintains a strong relationship with REMPAN members that have benefits for unofficial confirmation of incidents and possible rumours. To the extent that informal expert networks are useful for providing rapid assessments and guidance, an area that has been much discussed and debated, was in itself not a challenge during the exercise related to incident validation/confirmation of a radiological emergency. Whilst the IAEA and the WHO have seemingly dual track verification methods for the trigger point when an incident becomes a validated emergency, the independent institutional track does not seem to create an impediment to effectively manage the health of humans, livestock, and to manage food/drinking water safety.

Request for Information/Provision of Assistance

For the Request for Information /Provision of Assistance phase of the exercise, WHO stayed within the confines of its prescribed role. As mentioned above, WHO proactively put the REMPAN network on alert even prior to ARO verification of the event. The only area that warrants further consideration is to explore why the PoE trigger of the WG-AMT did not take place. And, after the trigger was sounded by WHO, IACRNE members were informed of ICAO withdrawing from the exercise due to resource limitations.

Virtual assistance was provided in all circumstances, however, the determination of how and when the WHO would deploy with IAEA led teams requires further exploration. Moreover, in situations

when States offer assistance to an affected State or (States), determining if there is a more comprehensive manner for coordinating WHO assistance with national offers of assistance could be useful.

WHO will continue efforts for improving coordination within the various departments of HQ involved in emergency response areas (e.g. disease outbreaks, crises, environmental emergencies, etc.), as well as across WHO, between HQ, RO, and CO.

Adequate resources need to be allocated by the WHO to further strengthen the response management capability, including provisions for night-shift work during prolonged periods of emergency response. Man-power should be adequate to sustain WHO emergency response operations of the ConvEx-3 (2013) scale of events over the course of several days/nights/shifts, if necessary.

The WHO internal SOP for radiation emergencies should be further detailed, kept up-to-date and its scope expanded based on this experience, so that it better specifies lines of command, focal points in other departments and organization levels, information flow, clearance procedures, etc. Support functions related to emergency operations, e.g. information triage, logistics, etc., need to be better integrated in the EMT and tested regularly.

Detailed TOR for each role of involved staff is needed to achieve maximum clarity for their functions and objectives they should achieve, while staying within the boundaries of their defined roles.

SME staff with emergency response functions across the organization should be better trained and a regular exercise regime should be established for testing their response capabilities, as well as WHO internal communications. It would also be nice to see this taken one step further – the institution of a cross-training programme for staff during crises.

Some centres of the REMPAN network expected more interaction and feedback from WHO HQ, especially in response to the REMPAN centres offers of good services. This was not always possible due to the heavy traffic of incoming and outgoing information. An interactive portal for secure communications within the REMPAN network needs to be established, where an events log could be published.

The simulated information on meteorological forecast posted on the USIE website was found useful in making assessments for public health risk and the scale of the event (national vs. trans-boundary), which affected the response strategy.

Recommendations for future exercises

- The use of an independent Chief Evaluator and controllers to assist WHO to prepare and conduct the exercise was an asset, it is recommended to use this practice.
- Resources should be allocated when planning and preparing for the exercise. The exchange of staff between international organizations, as well as between WHO offices (HQ, RO, CO) may be useful for better understanding, coordination, and integration of each party's roles.

Summary evaluation and conclusions

The four evaluation areas that were used for each phase of the exercise are summarized below:

Response Trigger:

- WHO followed JPLAN2013 SOPs;
- When WHO triggered the WG-AMT, nothing happened;
- There is a need to develop a protocol for WHO joining IAEA's field deployment with respect to existing IACRNE guidance.

Timely Assistance:

- WHO offered assistance;
- WHO provided timely assistance when requested;
- WHO's REMPAN network provided relevant and timely assistance upon request;
- WHO's RAD Team had pre-assembled information products about likely radiological agents used in deliberate incidents.

Inter-agency Coordination and Information Exchange:

- WHO provided timely responses to the IAEA and Member State requests, IEC feedback on further actions was insufficient (e.g. whether WHO's offer of assistance reached the country or not);
- Information exchange, in the form of jointly crafted press releases during the exercise did not take place based on the limited role that the WHO DCO was able to play during the exercise as a consequence of ongoing emergencies (pre- and post-exercise press statements worked well);
- WHO participation in the IAEA-led videoconference was first hampered by some technical difficulties, so WHO had to dial-in to a conference line instead. A transcript or memo/SITREP of the call by the 'secretary' of the call would have likely proved helpful.
- An attempt to convene a VTC of the Ad-Hoc WG on Transport was not successful, no explanations were provided;
- The scenario based on a nuclear security event seemingly had no effect on the course of the exercise and information exchange. It was not entirely clear what was the extent of the interface with the law-enforcement sector during the response phase.

Internal Situation Reports (SITREPS)/Public Information:

- Due to multiple, ongoing emergencies, WHO was unable to work with the DCO to craft appropriate information related to the specific radiological incident;
- WHO can improve staff training of relevant personnel in various departments, clusters on event management, SOPs, and preparation of SitReps.

3.4.8 WMO – World Meteorological Organization

The WMO participated in the exercise as a level 'A' participant. This was due to the use of non-real-time, 'canned' weather for the exercise. WMO's meteorological centres that provide support to environmental emergency response are operationally structured, and generally do not have the resources to establish non-operational support to an exercise based on historical or fictitious weather conditions.

The WMO's Regional Specialized Meteorological Centres (RSMC) with specialization in Atmospheric Transport Modelling (RSMC-ATM) are in place to provide meteorological support to environmental emergency response. The RSMC Exeter (Met Office UK) and RSMC Toulouse (Météo-France) are jointly responsible for the region of Africa (and Europe). During the planning of the exercise, both RSMCs were involved. Due to long standing working relations between Météo-France and the DNM (Météo-Maroc), and the fluency of communications, the RSMC Toulouse supported the DNM in the latter's role within the national emergency response plans for Morocco. This kind of bilateral international cooperation is encouraged by WMO Members.

Current arrangements for RSMC-ATM provide for global scale modelling estimates for the atmospheric dispersion and deposition of airborne hazards, with turnaround times for results in less than three hours from the time of request. The scenario with RDD explosions required somewhat different modelling tools, including high-resolution limited-area modelling. In operational mode, faster turnaround of calculation time is needed, due to the situation of a sudden discovery, and short lived and local nature of the atmospheric dispersion and likely in a more complex surface terrain. Météo-France supported Météo-Maroc in this regard.

In principle, and firstly, WMO provides the best available meteorological data and information as inputs to support environmental emergency response decisions. At the same time, it is expected that the assessment and prognosis of impacts, and decisions on protective actions and other operational questions would benefit from correct and effective use of this data, starting in the early emergency situation and possibly continuing in a protracted period of the emergency. For example, one should not assume that the input of surface wind to be homogeneous in an area, nor that it is steady (unchanged) over time. Using a single value of wind speed and direction for estimating potential impact for an area over a period of time is not advisable, considering the kinds of modelling tools that are available today.

WMO RSMCs are also prepared to provide atmospheric dispersion estimates under emergency response situations. This service is part of WMO technical regulations, which have been developed and implemented in cooperation with IAEA.

3.5 Member States

3.5.1 Bulgaria

The Bulgarian Nuclear Regulatory Agency (BNRA) is the responsible organization in case of a nuclear or radiological emergency.

In addition to the common exercise objectives, the BNRA had three specific exercise objectives: (1) to exercise the use of the USIE; (2) to train BNRA emergency staff; and (3) to train on shift change.

The overall assessment is that the exercise was useful and well prepared. A particularly welcomed (good practice) was the audio conference organized by the EC between the EU members participating in the exercise. However, there were also lessons to be learned: (1) BNRA needs to improve the criteria for defining shifts and needs to improve the organization for shift rotation; and (2) BNRA needs to improve the information transfer (briefings) during shift change.

3.5.2 Egypt

The national response structure as implemented in the ConvEx-3 exercise is illustrated below.

The main exercise objective was to evaluate the communication system and capabilities of national organizations to respond to radiological emergencies with an impact on Egypt.

The exercise achieved its main purpose to evaluate response to a major radiation emergency and, in particular, the exchange of information and provision of international assistance. The ConvEx-3 (2013) provided an opportunity to identify areas needing improvement in the Egyptian emergency response national plan for events that need close cooperation among safety and security authorities and international assistance.

Experience was acquired, through this exercise, related to different protective actions in connection with commerce, industry and tourism, etc. The exercise enabled the participation of national teams and concerned authorities.

The exercise helped the national authority to evaluate the consistency of the national emergency plan with international requirements. The emergency control centre (ECC) involved in the exercise provided its own intervention teams, which increased the skills and experiences of response staff.

The following are major findings and conclusions:

- Aspects of safety/security coordination should be included in the National Emergency Plan (NEP);
- Response management in a radiological emergency triggered by a nuclear security event should be covered by the NEP;
- Staff became familiar with the arrangements for provision of international assistance under RANET;
- Skills of response staff were improved;
- The national communication system at the national and international levels needs to be improved;
- Templates for communication with the media/public should be developed and included in NEP;
- Responsibilities for monitoring media and public concerns should be clearly defined.

3.5.3 Ethiopia

The Ethiopian Radiation Protection Authority (ERPA), as a National Competent Authority participated in the exercise at level A. All communication channels and emergency response staff were in place to receive and send information to the IEC, as listed below:

- The NCA (D) fax was ready, and received the EMERCON# messages throughout the exercise;
- Message on the USIE alert channel was acknowledged and responded to by contact points in due time; other messages published on the website or received by email were reviewed and noted; and
- A telephone call from the IEC was answered.

The following are exercise outcomes and lessons learned for Ethiopia:

- The Early Notification and the Assistance Conventions are the prime legal instruments that establish an international framework to facilitate the exchange of information and the prompt provision of assistance in the event of a nuclear incident or radiological emergency;
- In a radiological emergency, a State can request the IAEA for assistance if its response capabilities are overwhelmed;
- Knowledge was gained on the role of the IAEA and its IEC in providing information and coordinating assistance; how to prepare, conduct and evaluate the exercises;
- Knowledge was gained on how to use different communication channels for exchanging information (Fax, e-mail, USIE website);

- Knowledge was gained on how to use the EMERCON forms and procedures for notifying/reporting information on nuclear or radiological incidents or emergencies;
- Knowledge was gained on how to send and receive messages using the USIE website;
- Knowledge was gained on how protective and other response actions should be taken in connection with the specific interests in the Accident State, such as commerce, industry and tourism.

The exercise also showed that the Ethiopian Radiation Protection Authority (ERPA) as a response organization needs to:

- Designate and drill a sufficient number of USIE users to allow for more efficient operations;
- Train all relevant staff and conduct drills to ensure their capability to use new procedures when needed; this should include operators/local authorities who need to provide relevant information;
- Have suitable and reliable equipment and communication capabilities, e.g. facsimile, telephone and e-mail; it was observed during the exercise that the networking system was poor, facsimiles were not always working and the internet connection was interrupted at times;
- Regularly participate in different ConvEx exercises prepared by the IAEA's IEC and based on lessons identified, continuously improve emergency response capability.

Regarding the exercise preparation and conduct, the following conclusions were made:

- The exercise was well planned and prepared; the Exercise Manual supported by the Guide for Controllers, the Guide for Evaluators and the Guide for Players was well prepared and distributed in due time;
- Roles of exercise controllers and evaluators were clearly defined;
- Exercise preparation and conduct was adequately scheduled including timely invitation to Member States to consider participating in the exercise;
- The exercise conduct was well coordinated and exercise messages and injects effectively steered the exercise;
- Moroccan activities in exercise preparation and conduct, and the detailed information feed about the country before and during the exercise were well organized and effective. Morocco deserves appreciation.

3.5.4 France

France played the Convex exercise at the ASN (Nuclear safety authority) emergency centre, on the 20th November 2013. Unfortunately, France could not play the 21st November due to other constraints. In these circumstances, the conclusions provided below may not be comprehensive as some topics were not tested. Several French bodies participated in the exercise, in particular the Department of Foreign Affairs, the ASN, the IRSN, Air France and Météo-France.

Conclusions:

1. *Reception of the notification*: The exercise enabled to test the correct reception of the notification by the National Warning Point which is in France the Foreign affairs department, and its transmission to the ASN the Competent Authority.

2. *Information exchanges*: Regarding the information received, USIE has been considered as a good tool. Nevertheless, the information arrived quite lately sometimes and there were long periods without any information. The lack of technical information made difficult the adequate comprehension of the situation and, in a real situation, this would have made difficult the

information of the French citizens in Morocco and the identification of protective actions if needed. Nevertheless, it is also understandable that in the first moments after such a event some confusion regarding what is really happening may occur in a real situation, leading to delays in the information provided. The WebEcurie has been considered difficult to use. In addition, the codes given to access the Spanish measurements devices did not work. Then, when the European Commission convoked the audio conference at the end of the first day, details would have been necessary to access the connexion more easily. Then, the numerous participants to the audio-conference made the information exchanges difficult to follow. No bilateral relations took place neither with neighbouring countries nor with Morocco, probably because the scenario did not enable to do so, at least the first day. All the information exchanges were made through the USIE system.

3. *Information and protection of French citizens in Morocco*: Not tested. The first day, no information was provided regarding the protective actions taken by Morocco.

4. *Assistance:* Morocco requested, through IAEA, technical and medical international assistance. Accordingly to the convention on international assistance, ASN took care of the request. The medical assistance for a preliminary diagnosis could be made by telephone between a doctor from the specialized Percy hospital in France and an homolog in Morocco. If the reception of the request can be made through USIE, it could be also a good thing to be able to answer the request by USIE as well.

5. *Communication*: The exercise was a good opportunity to train ASN communication staff to communicate on a malevolent act. A press release has been issued after the request for assistance. The lack of information the first day made difficult an earlier communication.

3.5.5 Germany

In principle, the responsibility for decision-making about disaster control measures in German States lies with the State ministry in charge of nuclear safety, or with one of the regional governmental agencies (depending on the practice in each state). Decision-making about precautionary radiation protection measures lies with the Federal Government, here especially the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) in coordination with other federal ministries (primarily the BMVEL - Federal Ministry of Consumer Protection, Food and Agriculture). Recommendations to travellers and German residents in foreign countries are released by the Federal Ministry for Foreign Affairs (AA), which will be advised by the BMU regarding all issues of radiation protection.

The exercise objective was to test the communication system and the administrative procedures regarding RANET. The following entities were players:

- BMU – Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (precautionary radiation protection measures, support and harmonisation of disaster control measures);
- BMVg - Federal Ministry of Defence (Institute of Radioecology of BMVg); and
- BfS - Federal Office for Radiation Protection (support to BMU).

Since Germany was not directly impacted by the event, the response was focused on assistance to the Accident State with offers for medical and technical capabilities.

3.5.6 Hungary

The structure and tasks of the National Nuclear Emergency Preparedness System are outlined by Govt. Decree 167/2010 (V. 11.) Korm. Under normal circumstances, organizations of the Hungarian Nuclear Emergency Response System carry out preparatory work and training; several

organizations perform ongoing tasks related to data acquisition, planning, information or cooperation.

If a nuclear accident occurs, it is the task of the Nuclear Emergency Response Working Committee to provide professional decision-making support. Within the nuclear installation, the person responsible for implementing tasks related to the response to a nuclear emergency is the chief executive of the installation. Outside of the nuclear installation, in the counties and in the capital, it is the chairperson of the regionally competent County (Capital) Defence Committee, while at the national level it is the chairperson of the Disaster Management Co-ordination Inter-ministerial Committee.

The chairperson of the County Defence Committee is the government's commissioner, his/her deputy is, as far as response to disasters is concerned, the manager of the regional office of the professional disaster management organization. The local defence committee is a body, its chairperson is the mayor of the cities with county rights, towns and the capital, while the deputies are, as far as response to disasters is concerned, the persons designated by the manager of the regional office of the professional disaster management organization.

In a nuclear emergency, it is the task of the users of atomic energy and the atomic energy supervision organization, which is the Hungarian Atomic Energy Authority, to evaluate nuclear safety and radiation conditions. Data and information for evaluation and decision-making are provided by the Centre for Emergency Response, Training and Analysis (CERTA) of the Hungarian Atomic Energy Authority, Nuclear Emergency Information and Evaluation Centre operated by the National Directorate General for Disaster Management (BM OKF NBIÉK), Information Centre of the National Environmental Radiation Monitoring System operated within the Ministry of Human Resources (OKSER IK).

Country specific exercise objectives were as follows:

- Alert and activate the Emergency Response Organization of the Hungarian Atomic Energy Authority (HAEA ERO);
- Long-term operation and test of shift turn over;
- Provide information to Hungarian citizens, companies and foreign representation institutions staying in Morocco;
- Assess possible local consequences of the radiological emergency;
- Elaborate possible countermeasures for trade, travel and tourism; and
- Provide truthful, useful and timely information and behavioural rules to Hungarian citizens planning travel to Morocco or the nearby areas.

A major, full-scale nuclear emergency response exercise at the national level was conducted in October 2013 (around 24 hour duration). After this exhaustive exercise, only the Hungarian Atomic Energy Authority wished to take part in the ConvEx-3 (2013) exercise – no other national bodies were involved.

Lessons identified
The duty system for receiving domestic notification and from abroad operates reliably. Alert and activation procedures are regularly tested and exercised.

Although adequate human resources were available for the planned extended operation, it was identified that different positions will need to be strengthened in the future, especially in the following positions: Crisis Manager, Reporter, Radiological Expert and Military Expert.

We did not experience critical lack of information that would have hindered the ongoing assessment activities. The problem of conflicting information caused more problems. At the

beginning of the exercise, the location of measurement results was given improperly related to the Marrakesh explosion.

The HAEA ERO observed that the hotspot overestimated the height of the radioactive cloud – a German study confirmed this – so the contamination spread even more than in the IXP's results. However, this difference was negligible compared to the local effects (for example the effect of a drafty street). This difference led to more conservative results during consequence assessment.

No	*Description*	*Action for improvement*
1.	Several problems were identified during the audio conversation with the EC ENER D.3 unit.	The ENER D.3 unit shall be informed about the problems and advised to solve them.
2.	The WebECURIE system was very slow; we had to wait a long time for the requested action to be implemented.	The ENER D.3 unit shall be informed about the WebECURIE problems and advised to solve them.
3.	The ENER D.3 sent the RESPEC activation request to a wrong fax number.	Problem clarified during the exercise.
4.	It would be helpful if the basic data, which describes the event, would be available easily (e.g. projecting some important information in the ERC video wall).	The solution of the problem mainly depends on financial resources.
5.	Too long access routes in the folder system of the actual exercise in the HAEA's internal computer network.	The problem will be handled by reasonable reduction of access routes.
6.	An official document would be helpful, which summarizes the health effects of the radioactive isotopes.	The scientific publication itself is available in Hungary. The problem will be handled.
7.	An official document would be helpful, which summarizes the biological half-lives of the different chemical forms.	Long-term task. The National Research Institute for Radiobiology and Radiohygiene could be asked to make a study on it.
8.	We had several minor technical problems with our computerized reporting system STIP.	The HAEA's IT support in cooperation with the HAEA's Emergency Management Section are responsible for solving these problems.
9.	The Hungarian RANET database is not included in the HAEA's Quality Management System.	We have to consider the relevance of that problem.
10.	It wasn't clarified which member of the HAEA ERO should confirm the messages on the USIE website.	Following an internal review of USIE related functions at the different positions in ERO it should be clarified.
11.	Some documents arrived on USIE without clear marking of addressees, sender and even no text of „Exercise".	The problem shall be indicated in the evaluation report to be sent to the IAEA.
12.	The Hungarian USIE contact list should be reviewed, because the notification messages did not arrived to the emergency (CERTA) mailbox.	We need to check USIE contact settings; we might find the cause of the problem there.
13	It was recognized, in connection with some confirmation faxes, that the sender is unknown.	We should broaden our report form with some lines related to the information about the sender, so they could fill these gaps, when they send it back for the purpose of confirmation.

Recommendations for future exercises

- In order to properly assess links and response coordination between safety and security authorities, at least at the national level, the involvement of security authorities in future exercises will be necessary;
- The national RANET capabilities shall be more systematically tested and exercised with the involvement of the Hungarian RANET institutions.

Summary evaluation and conclusions

The major functions of the HAEA ERO are: assessment of the emergency at the source, assessment of the facility, local, regional and national situations and possible consequences, elaboration of proposals on protective actions for decision making, public and media information and the role of the National Competent Authority (Domestic and Abroad).

The ConvEx-3 (2013) exercise was used also as an ECURIE exercise that was initiated by the EC ENER D.3 Unit. According to the contract with EC ENER D.3 Unit, the HAEA ERO provides assessment support to the Unit in case of a radiological or nuclear emergency situation endangering the territory of the European Union.

These major functions of the HAEA were considered when objectives for the ConvEx-3 exercise were defined. The HAEA ERO operated in two shifts during the exercise with a shift turnover at about midnight from 20–21 November 2013. The controllers and evaluators were appointed

independently of the players and they conducted their shift turnover in parallel with the response organization.

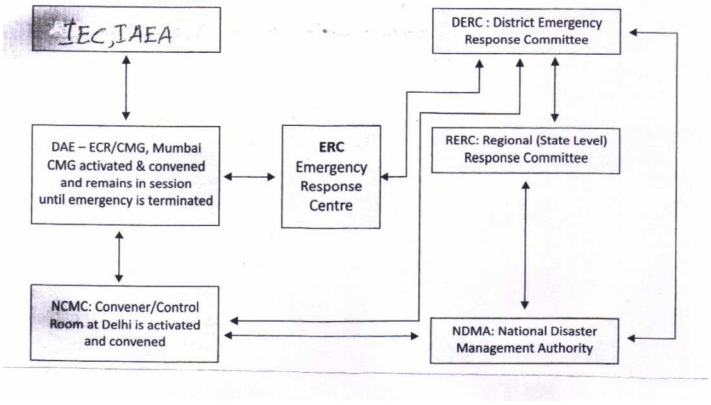
Three evaluation reports were prepared parallel:

- The internal evaluation report for the HAEA ERO;
- The international evaluation with the consideration of EC evaluation criteria; and
- The international evaluation with the consideration of IAEA evaluation criteria.

The participants played their roles and functions according to the plans and procedures. In general, the exercise was conducted smoothly and successfully. Although all major functions were implemented, several smaller problems were identified. Based on the exercise findings, an action plan was initiated to solve them.

3.5.7 India

The Indian response organization is shown in the following chart



The Crisis Management Group (CMG) has members from the Bhabha Atomic Research Centre (BARC), Atomic Energy Regulatory Board (AERB), Nuclear Power Corporation of India Limited (NPCIL) and Department of Atomic Energy (DAE).

No country specific objectives were set-up.

The exercise has provided an excellent opportunity to the professionals engaged in these activities to get involved in a real time scenario of a radiation emergency. During the exercise, safety and security organizations have once again demonstrated their commitment and expertise in close coordination during a radiation emergency.

3.5.8 Ireland

Ireland found ConvEx-3 (2013) to be a well conducted and useful exercise. Ireland used the opportunity to test their communication channels and links with the Department of Foreign Affairs and to practice using the USIE website and writing press releases. Ireland did not identify any major improvements to be made.

3.5.9 Jamaica

Jamaica was registered as a level A participant in the ConvEX-3(2013). As a level A participant, Jamaica was required to test the effectiveness of communications, to train/drill response personnel

in using the IAEA's emergency website and to test the provision of advice to nationals and businesses potentially affected.

The activity was organized and executed nationally through the Office of Disaster Preparedness and Emergency Management (ODPEM), which is the country's national coordinating agency for emergency management and response.

The following ministries, departments and agencies participated in the exercise: Office of Disaster Preparedness and Emergency Management (ODPEM), Ministry of Health (MOH), Bureau of Standards Jamaica (BSJ), Jamaica Constabulary Force (JCF), Jamaica Customs Agency (JCF), Planning Institute of Jamaica (PIOJ), Passport and Immigration Agency (PICA), Port Authority of Jamaica (PAJ), Ministry of Local Government and Community Development (MLGCD), Jamaica Fire Brigade (JFB), International Centre for Environmental and Nuclear Sciences (ICENS), Trelawney Parish Council, Jamaica Defense Force (JDF), Kingston Wharves, and Airport Authority.

The contact points in Jamaica were not able to receive the messages or have any access to the USIE. Jamaica only received one message from the exercise. This message was sent through the Permanent Mission in Geneva. Contact points were submitted prior to the exercise, however, Jamaica was still unable to utilize the website and view messages.

Despite technical difficulties, the ODPEM decided to proceed with the exercise and sent three additional messages throughout the remainder of the specified time for the simulation. All contact throughout the exercise was made through emails.

The following lessons were identified:

National level:

- The re-establishment of critical contact within the country is needed especially with immigration services;
- A lack of trained human resources to deal with detection and contamination;
- The absence of a National Emergency Plan – only agency specific documents are available;
- Notification procedures are not finalized;
- No disposal site for radioactive material exists;
- Lack of detection and contamination equipment and resources;
- Response resources concentrated in the Cooperate Area; and
- Lack of resources and knowledge in the Jamaican Fire Brigade, which is the country's chief response organization.

International level:

- Clarification is needed on the official contact point for Jamaica for response; and
- Access is needed to the communication website as this may be the medium used during an actual event.

Achievements:

- Draft National Radioactive and Nuclear Material Response Table on Roles and Responsibility of Ministries, Departments and Agencies completed;
- National Resource Listing of Detection and Response resources being complied;
- Awareness among all parties on the current response capabilities and resources required.

Way Forward:

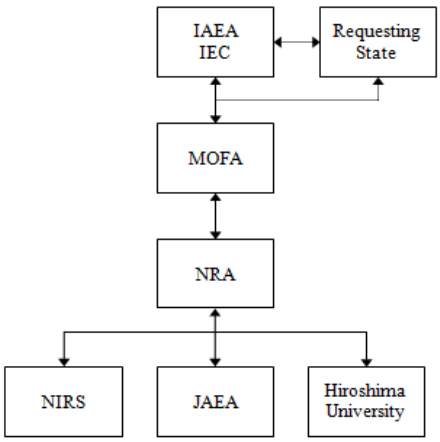
- National Radioactive and Nuclear Management and Response Plan to be drafted in the 2014-2015 calendar year;

- Solicitation of support for training and detection and containment resources required through regulatory agency; and
- Table top exercise to be conducted in 2014.

3.5.10 Japan

There are two different response arrangements for responding to a nuclear or radiological incident or emergency that could occur in Japan or abroad.

In ConvEx-3 (2013) Japan checked the effectiveness of the international assistance provided through RANET (exercise objective CO5).



The following entities participated in the exercise: Ministry of Foreign Affairs (MOFA) as NWP and NCA; Nuclear Regulation Authority (NRA) as NCA; National Institute of Radiological Sciences (NIRS) as NAC; Japan Atomic Energy Agency (JAEA) as NAC; and Hiroshima University as NAC.

Lessons identified
In the very early stage of the exercise, we suffered from lack of information to prepare appropriate actions. Through this situation, we learned that each person had to understand not only his/her role but also the whole picture of the event and things to do. We also learned that sufficient information could not be expected in the early stage of the event. Imaging the necessary actions for the event based on the knowledge and experience is the key.

Recommendations for future exercises
- In the early stage of the event, information is insufficient and inaccurate. CAs had to address the issue in such situation. For maintaining effectiveness of the exercise, creating such situation is vital;
- If a terrorist attack is included in the scope of the ConvEx, an interface between the scheme of related conventions should be established, i.e., interface between the notification scheme of Physical Protection Convention, Counter Terrorism Convention and Early Notification Convention and Assistance Convention. (In some cases, related organizations are different.);
- A cooperation mechanism with other international organizations, e.g. WHO, etc., should be disseminated to the contracting Parties. In this ConvEx, one NAC was contacted from two channels, the RANET channel and the WHO channel, and CAs didn't know which channel was the priority.

Summary evaluation and conclusions

ConvEx-3 is an opportunity to improve the procedure for overseas nuclear disasters. The procedure for such events is different from the procedure for a domestic nuclear disaster, and it is beneficial to test the system for overseas nuclear disasters.

3.5.11 Luxembourg

Luxembourg would like to express thanks to Morocco for hosting this exercise. The exercise was a very valuable experience and the provided information and documentation of the exercise were of an excellent quality. It was a pleasure to take part in this exercise. We would like to expand our thanks also to the IAEA (IEC), which made this exercise possible.

Luxembourg participated at level B. With respect to this participation level, Luxembourg could not achieve the full scope of the aims envisaged for this exercise. The NCA could not motivate the main national stakeholders to fully participate in this exercise, as Luxembourg had already participated in a large-scale nuclear emergency exercise in 2013, so the availability and interest in participation in another exercise was low.

As a general remark concerning the exercise scenario, in Luxembourg this kind of incident is not handled by the Competent Authorities under these conventions, but by the justice and law enforcement authorities. In the case of such events, radiological and rescue services are under their command and serve as assistants. Nevertheless, the Competent Authorities to the conventions (i.e. the Rescue Services Agency, and the Department of Radioprotection of the Ministry of Health) did participate and followed the exercise events very closely.

As agreed upon, the IAEA added national victims (injured and deaths) for Luxembourg in the scenario. This addition to the exercise required a more active way of playing from our part, leading to a series of questions on how to handle this particular situation:

- Where are these victims?
- What kind of injuries and radiological contamination do they suffer from?
- Is decontamination on-site foreseen by the local responders?
- How can they be brought home?
- Which security prescriptions have to be considered for the transport?
- Do we need a reception centre at our airport?
- Do we need medical staff, a RAD Team and a decontamination unit at the arrival point?
- How could a dose assessment be performed?
- Is outside assistance needed for some topics?

The procedures for such events include first, the establishment of contact with the foreign authorities, via embassies in the foreign (accident) country and then, by means of the latter, get in touch with the local authorities. The main objective was to examine how those national victims could be returned home. A similar kind of process was used during the Fukushima accident.

Some aspects of the scenario could not be fully addressed owing to the non-participation of law enforcement authorities and the Ministry of Foreign Affairs. However, all relevant actions taken by the Moroccan responders and authorities have been evaluated and compared with national procedures. The national procedures in place for malevolent acts with RN substances are mainly based on the TMT-Handbook (ref: www.tmthandbook.org).

With regard to the victims, a reception and medical centre including a RAD, as well as a mobile decontamination unit, were sent out to the national airport to be used for returning persons and victims. Furthermore, responders for psychological support were deployed.

Conclusions

Although Luxembourg participated on a very low scale, this exercise was a very valuable experience for our emergency preparedness and response in the case of malevolent acts. The small number of participants made the exercise less stressful and gave us the opportunity for broader discussions on how to organize and strengthen our response to the repatriation of nationals.

Finally, Luxembourg did not fill out any IAEA forms, as they appeared to not be suited for handling such kind of events, especially for level B participating countries. It might be wise to have another look at what type of emergency forms could be added or extended to the USIE site for such events.

3.5.12 Norway

Norway conducted the exercise basically as a level A participant. This was combined with a table-top exercise with the level of advisers and operational staff (emergency staff) exercising national objectives. In addition, Norway also used USIE to publish the implemented actions. Norway participated in the time period between 07.30 AM UTC and 14.00 PM UTC. The chart below shows the Norwegian Nuclear EPR organizational structure.

The Crisis Committee consists of the Norwegian Radiation Protection Authority, the Directorate for Civil Protection & Emergency Planning, Defence Staff, the National Police Directorate, the Directorate for Health, the Norwegian Food Safety Authority, the Norwegian Coastal Authority, and the Ministry of Foreign Affairs.

Overall experiences with the exercise

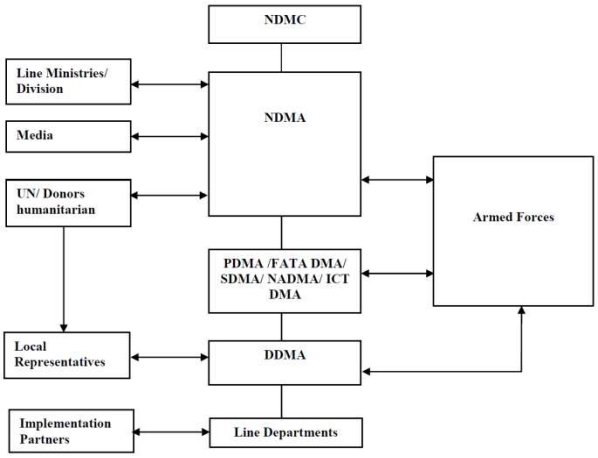
- In general, the scenario initiated important discussions concerning security issues that were not familiar to the players involved in the exercise;
- We found the scenario very relevant and interesting and felt that it provided an opportunity to exercise the complicated and challenging situations arising from malevolent acts, which may be very different from accident scenarios.
- Challenges related to international communications during a security event were highlighted. We believe that this is an issue that the international society needs to address further in order to establish a more sustainable international response. The evolution of the exercise scenario provided the players with an opportunity to identify and discuss the problems associated with international exchange of classified and non-classified information.
- The exercise emphasized the importance of safety and security measures that are closely coordinated on the national and international levels. The players consequently recognized that they had to relate to many 'new' players and that the coordination had to be conducted in a much wider perspective.

Lessons learned – national table top exercise

- Plans to be amended improving procedures on safety/security issues;
- Plans to be improved ensuring a more complete strategic approach; and
- Need to revise the procedures for identification and technical use of focus points for response.

3.5.13 Pakistan

In the aftermath of the 2005 earthquake, the Government of Pakistan established a National Disaster Management Commission (NDMC) headed by the Prime Minister through a National Disaster Management Ordinance 2007. A National Disaster Management Authority (NDMA) is also established to serve as the focal point and coordinating body to facilitate implementation of disaster management. All stakeholders, including government departments/agencies and armed forces, work through and form a part of NDMA in all stages of Disaster Risk Management.



Provincial Disaster Management Authorities (PDMAs) and District Disaster Management Authorities (DDMAs) have been established for response at the provincial and district levels of the country. The organizational structure of disaster management in Pakistan is given in the following figure. The National Disaster Management Authority has formulated a National Disaster Response Plan (NDRP) after extensive inter-ministerial consultations. NDRP seeks to upgrade the country's ability to cope with all conceivable disasters. To achieve this purpose, the complete range of disaster management activities from preparedness to response has been addressed. The figure outlines a framework for emergency response at different levels of the government; identifies roles and responsibilities of various stakeholders, and lays down a coordination mechanism for activities involving the United Nations, Non-Governmental Organizations (NGOs), civil society organizations, the public and private sector and media to harness the full national potential for efficient disaster management. Details of functions and responsibilities of NDMA/PDMAs/DDMAs and other stake holders are given in the NDRP[14].

Nuclear Emergency Management System (NEMS)

Recently, with a view to ensure effective and efficient management of nuclear or radiological emergencies, the existing system has been provided an overarching arrangement under the concept of Nuclear Emergency Management System (NEMS). This concept was built around the principles of centralized control, decentralized execution through a tiered and graded approach and comprehensive involvement of all stakeholders. Under this system, a very comprehensive view is taken of the communication arrangements, flow of information, pre-arrangement of required assistance from different organizations/agencies and designation of authority to orchestrate such emergencies. The objective of the NEMS is to coordinate all consequence management related to nuclear or radiological emergencies, to provide technical support through radiological assistance

[14] http://www.ndma.gov.pk/publications/ordinance.pdf

http://www.ndma.gov.pk/documents/NDRP/NDRP.pdf

groups, to arrange higher tiered non-radiological response from other ministries and organizations and to facilitate decision making through an Oversight Committee comprising senior decision-makers.

The following were main exercise players: Pakistan Nuclear Regulatory Authority (PNRA), Pakistan Atomic Energy Commission (PAEC), Nuclear and Radiological emergency Support Centre (NURESC), SPD, Deputy Commissioner (DC), Islamabad (Head of local government), and local police, traffic police, fire brigade, rescue services, ambulances, security agencies, Ministry of Foreign Affairs, Ministry of Interior, Revenue Department, Aviation Assets and other related organizations.

Lessons identified

- A Nuclear Emergency Management System (NEMS) is developed to provide technical and material support to NDMA/ PDMA /DDMA for managing consequence of nuclear or radiological emergencies. This exercise helped to test arrangements made under NEMS for an emergency scenario triggered by a nuclear security event. The exercise provided a good opportunity to feel and practice response to 'real' RDD situations;
- More than 30 exercise injects were provided and it was found that almost all of the responses to the injects were appropriate and well in time;
- As the exercise continued for more than 25 hours, it helped to identify issues in long-term operation and manning (shift duties) of emergency response centres;
- The response to the exercise has revealed that response personnel were enthusiastic and willing to work even after shift duties. The players were open to accept suggestions from observers and evaluators. The exercise helped to identify different areas requiring improvements in the emergency management system at the national level;
- Due to time limitation the evaluators and controllers could not be involved at an early stage of exercise preparation. They, however, should be involved at an early stage for their familiarization with emergency response procedures of different organizations. Further, in addition to external evaluators, the internal evaluators should also be appointed for the evaluation;
- Each individual should play only one role in case of an emergency. The multiple roles should not be played by a single individual;

- All the decisions made during the course of the emergency should be properly documented, along with justification, as the decision-makers may be held answerable for their decisions after the emergency phase is over.

Recommendations for future exercises

The time for exercise preparation was very short as it was less than two months left when the ConvEx-3 (2013) exercise documents were received. It would be highly appreciated if for future exercises the documents are shared with the participants well before the exercise date.

It is observed that simultaneous response to an accident scenario at the national level and the coordination with the IAEA for an accident in another state creates difficulties for the national competent authority. It is suggested that the IAEA may define a time window, e.g. 2-3 months for level B participating states for conducting their national exercises, instead of a fixing the same date for all the participating states.

Summary evaluation and conclusions

A team of evaluators was designated consisting of representatives from different organizations, and the evaluation report was prepared based on inputs of these evaluators. Along with some good points, the exercise helped to identify a number of areas requiring improvement. The areas requiring improvement include limitation of radiological assessment tools, management of radioactive waste, the need to develop a secure website for communication during an emergency, etc. By addressing the identified gaps, the national emergency preparedness and response set-up

will certainly be improved. Overall, the exercise was a very good experience to learn and test existing arrangements for response to a radiological emergency.

3.5.14 Portugal

The National Operational Coordination Centre (CCON) ensures that all the essential entities and institutions nationwide necessary for adequate management of operations for relief and protection of the population and the environment are available. This includes potential or ongoing major accidents or disasters. The CCON is coordinated by the President of the National Authority for Civil Protection (ANPC) and may be substituted by the National Commander of the National Authority for Civil Protection.

The support to the decision is coordinated by the Portuguese Environment Agency, Technical Authority for these type of accidents.

Portugal decided to adopt the common exercise objectives: C01 – fully; C02 – partially; C03 – fully; C04 – fully; C05 – partially; C06 – partially; and partially adopt a strictly based national objective, an adapted C04 with a response to a national scenario coherent with the international one.

The exercise players were the following:

- Ministry for Internal Administration, National Authority for Civil Protection (ANPC), that assured the part of international contacts and coordinated national and district level emergency response means, through its National Command for Relief Operations. NCA(A) for Assistance, NWP and NCA(D) for Notification;
- Ministry for Environment, Spatial Planning and Energy, Portuguese Environment Agency (APA); NCA(A) for notification, NWP, and the technical authority for radiological matters providing part of the international contacts and the coordination of decision-making support for the national actions and the on-site command;
- Ministry for Internal Administration, National Republican Guard (GNR), that assured security on site and monitoring teams;
- Ministry of Education and Science, Technical Institute (IST); providing decision support for the national and the on-site command;
- Ministry for Health, Directorate-General for Health (DGS), with the field health authority and providing decision-making support for the national and on-site command; and the National Institute for Emergency Medicine (INEM), with a field hospital;
- Ministry for National Defence, NBC Units of the Navy, Land Army and Air Force, that provided monitoring and decontaminations teams;
- Ministry of Foreigners Affairs, provided support for the foreigner's policies related to the exercise;
- Security Intelligence Service (SIS), provided support for the security component of the exercise;
- City Council of Santiago do Cacém;
- City Council of Sines;
- Fire Brigades of Alcácer do Sal, Santo André and Santiago do Cacém.

Lessons identified

- Enforce the need of official designation of duty officers on call 24/7 in all the national institutions with responsibilities on the ERC.
- Establish the need for a 24/7 liaison officer from the national technical authorities physically at the ERC for the duration of the emergency.
- Increase planning and training on the safety/security interface.
- Maintain the strong engagement and high motivation of both safety and security experts on these matters.

- More sectorial training should be conducted with the operational teams.
- Establish better procedures for public information and exercise all the chain of decision for public information.

Recommendations for future exercises
In view of the initial planning of 48 hours for the Convex3, and due to the need of Portugal to play the international and the national exercise, the end of the exercise came too soon and in a very abrupt manner. Future exercises should keep the scenario playing for the entire duration established, with a better closing of the scenario.

Summary Evaluation and Conclusions
The role of Portugal was satisfactory played by all the participants, increasing the awareness at national institutions of the international implications of the use of a RDD. It also allowed the recognition of the need to enforce the coordination between safety and security institutions in these matters.

The field exercise, with a national scenario linked to the international scenario, which took place in the south of Portugal out of the main urban areas, was also instructional for first responders who were less familiar with emergencies of this nature.

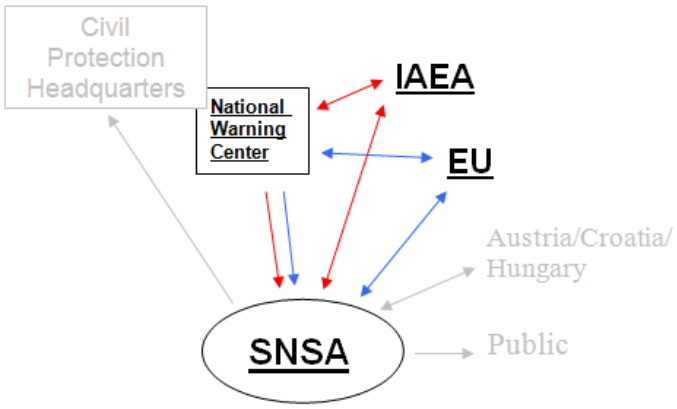
The international and the national field exercises provided valuable inputs for more detailed planning, training of procedures and possible measures to be taken for similar radiological emergencies, both on safety and security perspectives.

Both planning and playing the exercise provided a strengthening of networking among experts and between experts and first responders from national entities with legal competencies in radiological emergencies.

3.5.15 Slovenia

The Slovenian Nuclear Safety Administration (SNSA) is the National Competent Authority, providing expert support to the Civil Protection Headquarters in the case of a nuclear or radiological emergency. The National Warning Centre, part of the Civil Protection system, provides 24 hour notification. In the diagram, the ConvEx-3 participants are underlined.

For the ConvEx-3 (2013) exercise, Slovenia set the following objectives: to exercise response to an emergency abroad (far distance accident); to test updates to the emergency team procedure covering an emergency abroad; to drill the use of the IAEA USIE website, to drill the use of the EU WebECURIE website, and to gain solutions for PR procedure revision.



The SNSA Emergency Team and National Warning Point were players in the exercise.

Lessons identified
A number of lessons were identified in addition to the ones listed in this report, but they are too specific to be included - from corrections to the information and communication system to updating procedures. They are analysed in an internal SNSA report.

Recommendations for future exercises
The ConvEx-3 exercise has well established format. No major improvements are needed. A suggestion would be to maybe focus on a NPP accident for the next one.

Summary Evaluation and Conclusions
Because this was a radiological event with limited threat to Slovenia, being far away, the exercise was definitely less useful than it would have been if it had been large scale NPP accident. That said, it still provided the opportunity to exercise a far distance accident scenario.

As with every exercise, this one provided possibilities to improve national EPR as well, in particular with respect to international mechanisms.

3.5.16 Spain

Spain adopted common exercise objectives. The exercise players were as follows:

Emergency Response Organization (ERO) of Nuclear Safety Council
- Director of Emergency Operations (DEO)
- Coordination Group (COG)
    - SALEM: technical specialists in Emergency plans and Automatic Monitoring Network and Communication Officers
- Information and Communication Group (ICG) Manager
    - Technician for Operational Information
    - Technician for Public Information

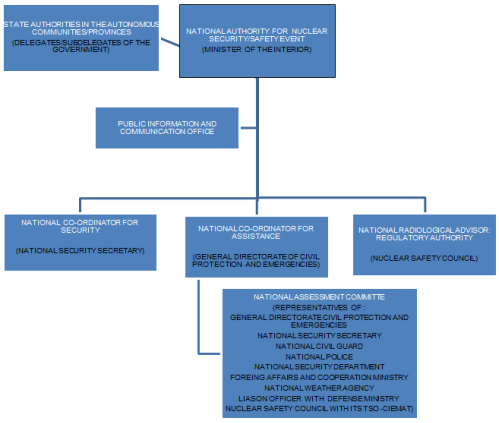
National Assessment Committee
Coordinator: General Directorate of Civil Protection and Emergencies, Home Office Ministry

- National Radiological Advisor; Regulatory Authority; Nuclear Safety Council, Emergency Coordinator with it TSO, Centre for Energy, Environment and Technology (CIEMAT), Head of Radiological Protection Department and Head of Radioactive Waste Department

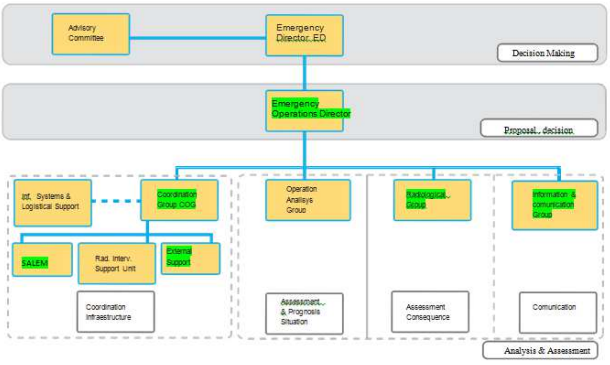
Representatives of:
- National Security Secretary: Head of Department
- National Police Department
    - Scientific Department of National Police: Head of the Central Identification Unit, Chief Technical Inspector, Identification Section Commissioner and Inspector Expert Chemical Analysis
    - General Information Department: Inspector Head of Operative Section (EOD and CBRN Unit)
- National Civil Guard: Head and experts of CBRN Unit
- National Security Department (DSN): Technical Advisor
- Foreign Affairs and Cooperation Ministry: Deputy Director of Non-Proliferation and Disarmament (Head of Department)
- National Weather Agency: Head of Production Department and Head of Forecasting Department
- General Directorate of Civil Protection and Emergencies (5 people): Deputy Director of Planning, Operations and Emergencies, Head of the Operations Area, Head of

Radiological and Nuclear Risks Service, Senior Technician on Civil Protection Planning and Senior Technician on Nuclear and Radiological Risks.

Spain's National Assessment Committee is shown in the following chart.



The structure of the Nuclear Safety Council as Emergency Response Organization (ERO) is shown in the following chart. The parts of ERO that are marked green were playing in the exercise.



Lessons identified

- Increase education and training, in particular, within teams that function as periodic relief staff

Recommendations for future exercises

- Previous analysis of training needs, performance training, drills and exercises based on the findings of these tests;
- Development, in USIE, of the necessary templates to respond to the request for assistance.

Summary evaluation and conclusions

- The established organization has satisfactorily responded to the given situation;
- There was a high degree of coordination between safety and security authorities at both national and international level;
- It is necessary to increase education and training, in particular, in the areas which involve periodic relief staff;
- Dose Assessment codes (and meteorological dispersion models) should be harmonized at the international level.

3.5.17 Turkey

Turkey tested the communication with the National Coordinating Authority, Ministry of Foreign Affairs and Turkish Embassy in Morocco, which all were uninformed before the exercise. We have reviewed our draft National Radiation Emergency Plan, which was developed in accordance with IAEA's safety documents, including GS-G-2.1 and GSG-2. It was observed that the size of the cordoned area that should be established prior to performance of monitoring was in line with the proposed values. We took OIL2 into account to decide on the equipment and configuration of the monitoring team which was offered to be deployed in Morocco.

As a result, the exercise was successful and beneficial.

Section 4

4 CONCLUSIONS AND RECOMMENDATIONS

The exercise conclusions and recommendations are based on the available evaluators' notes and reports (see References) and were reviewed and consolidated at the Fifth Coordination Meeting of the IACRNE Working Group on Coordinated International Exercises, which took place in Vienna on 11–12 February 2014. They were also reviewed and endorsed by the IACRNE.

4.1 Conclusions

4.1.1 Related to EPR

1 In the series of the ConvEx-3 exercises, the ConvEx-3 (2013) for the first time offered the opportunity to evaluate the response in a radiological emergency triggered by a nuclear security event.

2 The primary aim of the exercise was achieved. The exercise revealed strong as well as weak areas of emergency response systems for such types of events.

3 The exercise demonstrated that nuclear safety and nuclear security aspects of the response cannot be managed independently and must be the object of close cooperation between the nuclear safety and security authorities in order to effectively respond to such events.

4 The IAEA assessment and prognosis process was actively tested for the first time. In general, the exercise demonstrated that assessments can be produced; however the availability of relevant data and timely distribution of results remains a challenge. Overall, the process needs further strengthening.

5 The assistance process is well documented; however, in a full response exercise with the participation of many Member States, the process has not yet been tested. The exercise demonstrated that the assistance mechanism is adequate; however, it also showed that some modifications need to be made for a developing situation, when priorities might change while the assistance process is ongoing. It was also clear that more Member States need to register their National Assistance Capabilities in RANET.

6 Video-teleconferencing (VTC) proved a valuable tool for exchanging information, clarifying the situation and providing advice when needed. However, a more structured approach to organizing and managing the VTC discussions is needed.

7 The Unified System for Information Exchange in Incidents and Emergencies (USIE) proved a valuable tool for sharing information during an emergency, however, its functionality can be further improved.

8 The coordination of media/public information, especially at the international level, improved significantly since ConvEx-3 (2008).

9 Actual media was not involved in the exercise; involvement of actual media, as one of the exercise players, could bring additional insights and lessons to be learned.

10 Much has been done in the past on the harmonization of protective actions, but effective international coordination and harmonization remains a challenge. With few exceptions there was actually no consultation among participating countries concerning protective and other actions.

11 Participation of relevant international organizations (including INTERPOL and EUROPOL), sharing of information, coordinating response and sharing public updates among public information officers of these organizations contributed to consistent information to the public/media.

12 Comparing these conclusions with the conclusions from the ConvEx-3 (2005) and ConvEx-3 (2008) it is clear that, (1) improvement has been achieved in the way the information is exchanged/shared, (2) substantial progress has been made in coordination of public information among the international organizations, and (3) not much improvement (if any) has been achieved in consulting/sharing information on protective and other response actions particular among neighbouring Member States.

4.1.2 Related to the preparation, conduct and evaluation of the ConvEx-3 exercises

13 Preparation, conduct and evaluation of the ConvEx-3 (2013) followed a well-established process. However, more active involvement of Member States in exercise preparation and conduct could contribute to the exercise usefulness, in particular, active involvement of the Accident State's neighbouring countries.

14 Agreed canned weather as documented in the Guide for Controllers changed in the exercise and that created some confusion.

15 For the first time country specific exercise injects were prepared that required specific Member States response. They proved to be a valuable exercise element that enabled countries to evaluate specific response areas.

16 Active play of the IAEA and Moroccan senior management in the exercise contributed to a strong message conveying the importance of exercising.

4.2 Recommendations

4.2.1 Related to EPR

1 The importance of issuing coordinated press releases in a radiation emergency cannot be overestimated. Therefore, media/public information should be kept on the list of objectives of most emergency exercises and the actual media should have a more active role in these exercises.

2 More Member States should register their National Assistance Capabilities in the RANET.

3 The IAEA should develop guidelines on organizing and moderating VTC discussions during an emergency.

4 Member States should consider integrating USIE in their national information exchange arrangements.

5 Member States should consider introducing an International Radiological Information Exchange (IRIX) standard in national systems for sharing information/data during an

emergency, which will substantially improve the effectiveness of international information/data exchange.

6 Neighbouring Member States should develop protocols among response organizations on sharing information and consultations on protective and other response actions to be introduced during a radiation emergency with transnational impact.

4.2.2 Related to the preparation, conduct and evaluation of the ConvEx-3 exercises

7 The IAEA should prepare, together with the Accident State, country specific exercise injects in all future ConvEx-3 exercises.

8 Nuclear security should be included more often as an element of the ConvEx-3 exercise scenarios.

9 Actual emergency communication channels have to be used in exercises as otherwise: (1) some players might be confused, and (2) the emergency communication channels are not tested.

10 The IAEA should explore: (1) possibilities and ways to extend ConvEx-3 exercises over several days to better simulate response in actual emergencies; (2) ways for more active involvement of Member States in preparation of the ConvEx-3 exercises; and (3) possibilities for initiating a national exercise with a particular scenario that would then serve as a basis for the ConvEx-3.

11 If in the exercise preparation phase a decision is made to use historical weather, and if for any reason during the exercise weather data needs to be changed, the Lead Exercise Controller and all Chief Exercise Controllers need to be informed in due time.

12 For each ConvEx-3 exercise, the IAEA should consider establishing an ad-hoc ConvEx-3 working group consisting of representatives of Accident State, relevant international organizations, neighbouring countries and any other interested Member State.

13 Decision-makers in participating Member States and relevant international organizations should actively play their role in the ConvEx-3 exercises.

14 Member States and relevant international organizations are strongly encouraged to participate in the ConvEx-3 exercises at level B.

ACKNOWLEDGMENT

The IAEA and the IACRNE wish to express its gratitude to the Moroccan Government for providing the IAEA, its Member States, Parties to the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency and relevant international intergovernmental organizations the opportunity to evaluate the response arrangements and capabilities in case of a radiological emergency triggered by a nuclear security event. The IAEA and the IACRNE believe that efficient and effective cooperation with the Moroccan counterparts in preparing, conducting and evaluating the ConvEx-3 (2013) exercise contributed to the improvement of emergency preparedness to respond to such events worldwide.

Section 5

5 REFERENCES

[1] Evaluator's Report, Exercise Direction Committee, National Centre for Energy Sciences and Nuclear Techniques, **Kingdom of Morocco**, 31 December 2013

[2] Evaluator's Report, Evert Somer, Euro-Atlantic Disaster Response Coordination Centre (**EADRCC**), 3 December 2013

[3] Evaluator's Report, K. Jackson, European Commission (**EC**), 9 January 2014

[4] Evaluator's Report, Magdalena Dmowska, European Police Office (**EUROPOL**)

[5] Evaluator's Report, **IAEA**

[6] Evaluator's Report, Greg Brock, International Civil Aviation Organization (**ICAO**), 10 December 2013

[7] Evaluator's Report, Balazs Horvath, International Criminal Police Organization (**INTERPOL**), 21 November 2013

[8] Evaluator's Report, Marina Nizamska, Nuclear Regulatory Agency, **Bulgaria**, 16 December 2013

[9] Evaluator's Report, Abdelfatah Abdelal Hamed Osman, **Egyptian** Nuclear & Radiological Regulatory Authority, Arab Republic of Egypt, 30 December 2013

[10] Evaluator's Notes, Mengistu Balcha, **Ethiopian** Radiation Protection Authority, 25 November 2013

[11] Evaluator's Report, Caroline Caveglia, Autorite de Surete Nucleaire, **France**, 18 December 2013

[12] Evaluator's Report, Macsuga Geza, **Hungarian** Atomic Energy Authority, 14 January 2014

[13] Evaluator's Report, S.A.Hussain, **India** (AERB, BARC, NPCIL), 20-21 November 2013

[14] Evaluator's Notes, Patrick Breuskin, NCA, Health Directorate/ Department of Radiation Protection/ RN Emergency and Response, Ministry of Health, **Luxembourg**, 24 December 2013

[15] Evaluator's Report, Marie Solberg, The **Norwegian** Radiation Protection Authority, 16 January 2014

[16] Evaluator's Report, M. Nadeem Hussain, **Pakistan** Nuclear Regulatory Authority, December 2013

[17] Evaluator's Report, Joao Oliveira Martins, Agencia Potuguesa Do Ambiente, **Portugal**, 3 January 2014

[18] Evaluator's Report, M. Tkavc, **Slovenian** Nuclear Safety Administration, 9 January 2014

[19] Evaluator's Report, Juan Pedro Garcia Cadierno, Consejo De Seguridad Nuclear, **Spain**, 6 December 2013

[20] Evaluator's Notes, Halil Demirel, **Turkish** Atomic Energy Authority, 17 January 2014

[21] Evaluator's Notes, Mark Grant, RIMNET- Met Office, **UK**, 28 November 2013

[22] Evaluator's Report, J. Kuhlen, Federal Ministry of Environment, Nature Conservation and Nuclear Safety (BMU), **Germany**, 24 February 2014

5.1 Definition of Terms

Accident State	State, whose facilities or activities or those of persons or legal entities under whose jurisdiction or control, a nuclear or radiological (radiation) emergency occurs or is likely to occur.
Affected State	State other than the accident State for whom, following a nuclear accident or radiological emergency resulting in a transboundary impact, the consequences are of

	radiological safety significance.
Competent Authority	A contact point that is authorized to issue a notification, advisory, request for assistance or other emergency information as appropriate, and to reply to requests for information or assistance. A Member State may have more than one competent authority.
Contact Point	A generic term for an organization, designated by a State or an international organization that has a role to play in international exchange of information in response to a radiation emergency.
Notification	(1) A report submitted promptly to a national or international authority providing details of an emergency or a potential emergency; for example, as required by the Convention on Early Notification of a Nuclear Accident. (2) A set of actions taken upon detection of emergency conditions with the purpose of alerting all organizations with responsibility for emergency response in the event of such conditions.
Nuclear security event	An event that has potential or actual implications for nuclear security that must be addressed. Nuclear security event includes events that are criminal or intentional unauthorized act and unauthorized acts involving or directed at nuclear material, other radioactive material, associated facilities and associated activities. Examples of such events include sabotage, a radiological dispersal device or radiological exposure device etc. and threat thereof.
Verification	The process of determining whether the quality or performance of a product or service is as stated, as intended or as required. The process of confirming that the information in a message is properly understood.
Warning Point	A contact point that is staffed 24 hours for promptly responding to, or initiating a response to, an incoming notification, advisory message, request for assistance or request for verification of a message as appropriate, from the IAEA.

5.2 Abbreviations

The following acronyms are used in this report.

ADN	Administration of National Defence (Administration de la Défense Nationale)
CNESTEN	National Centre for Energy Sciences and Nuclear Techniques
CNRP	National Centre for Radiation Protection
ConvEX	International exercises prepared in the framework of the Early Notification and the Assistance Conventions
CSDN	Higher Council of National Defence
CTBTO	Comprehensive Nuclear-Test-Ban Treaty Organization
CVC	Vigil and Coordination Centre (Centre de Veille et de Coordination)
DGPC	Civil Protection General Directorate
DGSN	General Directorate of National Security
DMN	National Meteorological Directorate (Direction de la Météorologie Nationale)
EADRCC	Euro-Atlantic Disaster Response Coordination Centre
EC	European Commission
EIR	Emergency Incident Response
EMERCON	Emergency Convention
EPR	Emergency Preparedness and Response
EUROPOL	European Police Office
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product

GICNT	Global Initiative to Combat Nuclear Terrorism
GR	Gendarmerie Royal
IACRNE	Inter-Agency Committee on Radiological and Nuclear Emergencies
IAEA	International Atomic Energy Agency
ICAO	International Civil Aviation Organization
IEC	IAEA's Incident and Emergency Centre
IEComm	Operations Manual for Incident and Emergency Communication
IG	Military Engineering Services (Inspection du Génie)
INTERPOL	International Criminal Police Organization
IMO	International Maritime Organization
ISS	Military Health Inspection Service (Inspection du Service de Santé)
IXP	International eXchange Program Web site, Lawrence Livermore National Laboratory, U.S. Department of Energy
JPLAN	Joint Radiation Emergency Management Plan of the International Organizations
MAEC	Ministry of Foreign Affairs and Cooperation
MT	Metric Ton
NEC	National Emergency Centre (Centre National d'Urgence)
NOTAM	Notice to Airmen
NPP	Nuclear Power Plant
NV	Note Verbale
OECD/NEA	Nuclear Energy Agency of the Organisation for Economic Co-operation and Development
PAHO	Pan American Health Organization
PIO	Public Information Officer
OCHA	United Nations Office for the Co-ordination of Humanitarian Affairs
OOSA	United Nations Office for Outer Space Affairs (OOSA),
ORSEC	Rescue Organisation (Organisation de Secours)
RANET	IAEA's Response and Assistance Network
RDD	Radiological Dispersal Device
REMEX	Radiological Emergency Management Exercise
REPLIE	Response Plan for Incidents and Emergencies
RSMC	Specialized Meteorological Centres
SIGMET	Significant Meteorological Information
SRF	Standard Report Form
TCC	Technical Crisis Center
TEPCO	Tokyo Electric Power Company
TIR	Convention on International Transport of Goods Under Cover of TIR Carnets
TMPA	Tangier Med Port Authority
UNEP	United Nations Environment Programme
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation
USA	United States of America
US DOE	United States of America Department of Energy
USIE	Unified System for Information Exchange
UTC	Universal Time Coordinated (= Greenwich Mean Time – GMT)
VTC	Video Teleconferencing
WG-CIE	IACRNE Working Group on Coordinated International Exercises
WHO	World Health Organization
WMO	World Meteorological Organization

CONTRIBUTORS TO THE REPORT

Balcha M.	Ethiopia
Beckford-Palmer C.	Jamaica
Breuskin P.	Luxembourg
Brock G.	ICAO
Cadierno J.P. Garcia	Spain
Xicluna D.	France
Exercise Direction Committee.	Morocco
Demirel H.	Turkey
Dmowska M.	EUROPOL
Grant M.	UK
Kuhlen J.	Germany
Hersh Melissa H.	WHO
Horvath B.	INTERPOL
Hussain M.N	Pakistan
Hussain S.A	India
Jackson K.	EC
Jinguji Y.	Japan
Macsuga G.	Hungary
Martins J.O	Portugal
Marjan T.	Slovenia
Nizamska M.	Bulgaria
Osman A.A. Hamed	Egypt
Solberg M.	Norway
Somer E.	EADRCC