Radiological Protection
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Proceedings of the Fifth International Nuclear Emergency Exercise (INEX-5) Workshop

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NUCLEAR ENERGY AGENCY
ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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The OECD Nuclear Energy Agency (NEA) was established on 1 February 1958. Current NEA membership consists of 33 countries: Argentina, Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, Norway, Poland, Portugal, Romania, Russia, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The European Commission and the International Atomic Energy Agency also take part in the work of the Agency.

The mission of the NEA is:

- to assist its member countries in maintaining and further developing, through international co-operation, the scientific, technological and legal bases required for a safe, environmentally sound and economical use of nuclear energy for peaceful purposes;
- to provide authoritative assessments and to forge common understandings on key issues as input to government decisions on nuclear energy policy and to broader OECD analyses in areas such as energy and the sustainable development of low-carbon economies.

Specific areas of competence of the NEA include the safety and regulation of nuclear activities, radioactive waste management and decommissioning, radiological protection, nuclear science, economic and technical analyses of the nuclear fuel cycle, nuclear law and liability, and public information. The NEA Data Bank provides nuclear data and computer program services for participating countries.

Cover photos: Example of thyroid dose (infants) projections (BfS, Germany); Workshop participants (BfS, Germany).

Foreword

A total of 22 countries[1] conducted the Fifth Nuclear Energy Agency (NEA) International Nuclear Emergency Exercise (INEX-5). Each participating country performed its own assessment of the exercise using the standard INEX-5 evaluation questionnaire, with the intent to share, as appropriate, its experience internationally. During the 41st meeting of the Working Party on Nuclear Emergency Matters (WPNEM) Topical Session on INEX-5 held in January 2017, key results and lessons learnt when conducting INEX-5 were presented by 18 countries. Additionally, the NEA Secretariat presented a preliminary analysis of the questionnaires. The topical session identified several lessons and issues that would benefit from further investigation and that should be taken into account in the programme of the INEX-5 International Workshop held in October 2017. International co-ordination and communication, in particular, were identified as major focuses.

The main objectives of the INEX-5 International Workshop were:

- to allow participating countries to identify elements for improving their arrangements for notification, communication and interfaces related to catastrophic events involving radiation or radiological materials;
- to exchange experience with relevant international actors and other countries that conducted and evaluated INEX-5.

In addition to providing a valuable discussion forum for participants, the INEX-5 International Workshop concluded with a set of key needs and related suggestions that had been identified during the exercise and discussion. Participants underlined the useful contributions that the NEA could make in this regard, particularly in relation to communication and information sharing with other countries and international partners, with a focus on real-time information sharing, improving cross-border and international co-ordination of protective measures, and helping to define new approaches to exercise the medium- and long-term aspects related to a nuclear accident. Another key outcome of the workshop was the need to consider mental health impacts on populations when implementing protective measures, and the need to more closely link technical experts with decision makers at all levels.

1. Austria, Belgium, Croatia, the Czech Republic, France, Germany, Hungary, Ireland, Italy, Japan, Korea, the Netherlands, Norway, Poland, Portugal, Russia, the Slovak Republic, Slovenia, Spain, Sweden, Chinese Taipei and the United States.

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The INEX-5 International Workshop was organised by the Working Party on Nuclear Emergency Matters (WPNEM) of the Nuclear Energy Agency (NEA) Committee on Radiological Protection and Public Health (CRPPH). The workshop benefited from the substantial inputs of Mike Griffiths, workshop facilitator and former WPNEM Chair.

The NEA Secretariat would like to thank all members of the INEX-5 International Workshop Programme Committee (see Annex II), and all the participants in the INEX-5 International Workshop (see Annex III) for their valuable inputs. Particular thanks go to the German Federal Office for Radiation Protection (BfS) for having kindly provided the technical materials in preparation for conducting the regional table-top exercises on co-ordination of protective measures.

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List of abbreviations and acronyms

BSS	IAEA Basic Safety Standards
EC	European Commission
ECURIE	European Community Urgent Radiological Information Exchange
ELAN	*Elektronische Lagedarstellung* (German system for electronic situation reports concerning nuclear power plants)
EPR	Emergency preparedness and response
EU	European Union
GSR	IAEA General Safety Requirements
HERCA	Heads of the European Radiological Protection Competent Authorities
HWA	HERCA-WENRA approach
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
IEC	IAEA Incident and Emergency Centre
INEX	NEA International Nuclear Emergency Exercise
IRIX	International Radiological Information Exchange
ITB	Iodine thyroid blocking
MKSID	Slovenian National Communication Platform for Radiation Emergencies
NEA	Nuclear Energy Agency
NERIS	European Platform on Preparedness for Nuclear and Radiological Emergency Response and Recovery
RANET	IAEA Response and Assistance Network
USIE	IAEA Unified System for Information Exchange in Incidents and Emergencies
WENRA	Western European Nuclear Regulators Association
WHO	World Health Organization
WPNEM	NEA Working Party on Nuclear Emergency Matters

Introduction

The INEX-5 International Workshop was held in Paris, France, on 24-25 October 2017 and was attended by approximately 40 technical experts, representatives from 22 member countries, the International Atomic Energy Agency (IAEA) and the European Commission (EC). The analysis performed by the Nuclear Energy Agency (NEA) Secretariat of the information contained in the exercise evaluation questionnaires provided by INEX-5 participants, combined with the findings of the Working Party on Nuclear Emergency Matters WPNEM-41 Topical Session on INEX-5 held in January 2017, gave rise to an outline programme for the workshop (see Annex I). Four broad topics were identified as being of particular interest to the emergency preparedness and response (EPR) community, and warranting further investigation and discussion at the workshop. These topics were:

- communication and information sharing with other countries and international partners;
- cross-border and international co-ordination of protective actions;
- mid- and long-term aspects of recovery;
- connection to the work of other international organisations and networks.

The workshop followed up on these key issues through invited presentations and moderated discussions, devoting one session to each of the four topics. The participants were provided with the objectives that had been identified for each session in advance (see Annex IV, INEX-5 workshop preparation materials for sessions 1, 2, 3). The workshop benefited from an independent facilitator and was an interactive experience for participants with two distinct formats: plenary sessions and breakout sessions. It consisted of four sessions, including presentations on experience, a brief table-top exercise and updates from other organisations relevant to the EPR objectives identified by the Programme Committee (see Annex II).

In the fifth and final session of the workshop, the key findings, suggestions and recommendations were summarised. The workshop preceded the 42nd Meeting of the Working Party on Nuclear Emergency Matters (WPNEM) and was designed to provide suggestions and recommendations for the programme of work of the working party over the next three to five years. Each of the sessions is summarised below along with the suggestions for the programme of work.

One major feature of the workshop was the inclusion for each session of a presentation by a relevant international organisation or platform of its current work. The objective was to co-ordinate activities, to avoid duplication of efforts and to look for synergies. Additionally, in order to enhance collaboration and co-ordination with other international fora, and thereby avoid duplication of efforts, the programme also included a session on ongoing and future activities of other international organisations, platforms and networks related to the programme of the workshop.

Session 1. **Communication and information sharing with other countries and international partners: Focus on real-time communication platforms**

Summary of evaluation questionnaires

The majority of INEX-5 participants considered that the processes and procedures for the collection, provision and exchange of information with other countries were sufficiently resourced. All respondents reported having used the IAEA Unified System for Information Exchange in Incidents and Emergencies (USIE) for formal information sharing with other countries. Most of the European countries also used the European Community Urgent Radiological Information Exchange (ECURIE) (72% of respondents). Nevertheless, most of the countries reported also having other arrangements in place, primarily as a result of the establishment of bilateral arrangements with other countries, and secondly, to the development of their own national communication platforms. The use and sharing of real-time information platforms between countries was reported as very successful by the two groups of regional players. Other countries indicated that having access to national protected websites would have been useful for cross-border co-ordination purposes.

Session 1 of the workshop considered the communication and information sharing with other countries and international partners with a focus on real-time communication platforms. Issues for discussion included the eventual need for an international real-time communication platform and if this were the case, whether national real-time platforms should be compatible with international official communication channels, i.e. USIE, ECURIE. And if so, what would be the requirements to make this possible? (It was considered important not to create new platforms, but to connect existing ones at national and international levels.) Based on the description of the features of the systems tested during INEX-5 (Slovenian National Communication Platform for Radiation Emergencies [MKSID], ELAN – German central information and communication platform for nuclear emergencies) and the experience of existing similar systems in other countries (i.e. Nordic countries), the question arose in relation to the "ideal" or "best" features of a unique real-time platform system.

To foster discussions, the NEA Secretariat provided a summary of exercise outcomes regarding communications during INEX-5. In the exchanges that followed, it was noted that the notification of an emergency and subsequent data exchange is contained in all national plans. However, the co-ordination of these actions was neither universal nor was it clear to all what was meant by the term "co-ordination". It was acknowledged that both formal and informal communications arrangements exist between countries, at the state-to-state level and also at the organisation-to-organisation level. It was further acknowledged that terminology and the language used for international communications is an important issue.

Bilateral agreements between countries were felt to be particularly important, more specifically where emergency planning zones were likely to cross international borders. It was noted by the participants that bilateral agreements would be initiated prior to formal notification routes in order to allow any affected neighbours to activate their arrangements as promptly as possible. A further key finding of the exercises was that personal relationships between technical experts in different countries would likely be used in seeking or sharing information regarding an incident. It was noted that the emergency preparedness and response (EPR) community is rather small and that it was common for officials to attend the same international fora, groups or meetings, and that they may have many informal contacts across the world. It was acknowledged that these informal contacts can prove to be very useful during the response to an incident and that the role that the NEA played during the Fukushima emergency and the informal exchanges with the WPNEM members was a good example of this informal co-operation and co-ordination.

Real-time information technology platforms have been implemented in a number of member countries to support the national emergency response arrangements. Two real-time platforms were used by participants in the two regional exercises. The MKSID was used in the regional exercise between Austria, Croatia, Hungary, Italy and Slovenia. The operational sharing of the MKSID platform was considered highly successful with exercise participants able to access information and data directly. Two of the affected countries (Croatia and Slovenia) expressed their satisfaction at exchanging information in their native language rather than requiring translation to English. The common language allowed them to engage in conversations with their counterparts before posting information through the more formal exchange mechanisms.

Similarly, the German central information and communication platform for nuclear emergencies (ELAN) was used in the regional exercise between Germany and the Netherlands. The platform is a content management system to provide a unified information resource. It can be implemented in several instances and customised to specific user groups. ELAN is designed to be compatible with other systems and is accessible via the internet. In the regional INEX-5 exercise between Germany and the Netherlands, the system was used as a reporting tool and both countries expressed their satisfaction with the speed of access and the content held within the platform. Both MKSID and ELAN provide the facility to archive events for future reference and in the case of ELAN sufficient audit data for potential judicial review is maintained in the logs.

Member countries also expressed their satisfaction with the IAEA USIE protected website for formal information exchange. However, it was recognised that mechanisms for exchange of information other than formal ones could be both beneficial to member countries and useful in terms of rumour management. The IAEA is developing plain language materials for use by member countries that may assist with the definition of terms and terminology.

The IAEA USIE is a secured web-based communication system that serves the purpose of implementing the provisions of the Convention on Early Notification of a Nuclear Accident, the Convention on Assistance in the Case of a Nuclear or Radiological Emergency and the provisions of the IAEA safety standards such as General Safety Requirements (GSR) Part 7 (for which the NEA is a sponsor). The notification messages and the information shared in emergencies have to be provided by officially designated counterparts and have to be accurate. For these reasons, the communication forms on USIE are subjected to a procedural verification of the information content. This verification is described in the EPR-IEComm 2012, Chapter 4. In exercises (such as the recent INEX-5), the (simulated) verification was not always performed in an ideal way and the perception of some regional players (Austria, Croatia, Hungary, Italy and Slovenia) was that the USIE lacks a real-time capability. The IAEA noted that with practice and by strictly observing the arrangements described in the EPR-IEComm 2012, Chapter 4, the time delay introduced by the verification would not be an issue (while the advantages of

having this feature were demonstrated for a number of events, such as the 2008 Slovenia-Krsko nuclear power plant event). In fact, the existing USIE feature "direct recipients" allows emergency contact points to send emergency messages on the USIE not only to the IAEA Incident and Emergency Centre (IEC), but also directly to other emergency contact points listed in the USIE address book. Emergency contact points that are specified as direct recipients on a message will be alerted at the same time as the IAEA IEC, and will not have to wait for the message to be verified and published on the USIE by the IAEA IEC before they can access it. Work is carried out by the IAEA to enhance USIE usability with quick update messages (without prejudice to use of the current communication forms for the key moments of a developing emergency), to allow the sharing of encrypted information only available to a certain category of users and to allow the filtering and display of the various messages within an event.

The European Commission (EC) has, during the design of their urgent information exchange systems, kept this topic in mind. The Commission's WebECURIE system already has the capability to automatically "publish" to all users, information at the moment of submission by a member state. This functionality is, however, not currently implemented for an Initial Notification and remains the task of the ECURIE Duty Officer. Updates submitted to an established/ongoing event are, however, published immediately by the system without human intervention on the Commission's side. The ECURIE and USIE systems are set to exchange data and information via the International Radiological Information Exchange (IRIX) format. They are both built on the basis of a "common data set" for urgent notifications, which was agreed by both organisations in the late 2000s.

While this is a prompt and efficient exchange, full implementation of real-time data and information exchange is not at this stage possible.

The Commission actively encourages European Union (EU) member states to use the IRIX standards in the development of national systems in order to promote compatibility, which in turn can facilitate more efficient communication between systems.

There was a perception by some USIE and ECURIE counterparts that the two systems are only fit to serve events of rather high threshold (at the level of the threshold imposed by the Convention on Early Notification of a Nuclear Accident), however, both the IAEA and the EC noted that this is not the case as both USIE and ECURIE are used to share information about a large spectrum of events including rumours and events of pure media interest. To allow the sharing of environmental radioactivity monitoring data, additionally, the European Commission's European Radiological Data Exchange Platform (EURDEP) already exchanges environmental monitoring data in near real time. This platform, which was set up in 1995, is now used by 41 countries, both EU and non-EU.

For the same purpose, at a global scale, the IAEA has developed the International Radiation Monitoring Information System (IRMIS). IRMIS and EURDEP are also based on the IAEA international standard for emergency communications, IRIX. The EC has implemented an audio-conferencing system for communications between the member states and the EC. It is not intended for public information but rather for sharing updates between technical experts to allow a common understanding of the ongoing event to be established and in this way contribute to a more harmonised approach to dealing with co-ordination of information and actions. Similar to this, the IAEA has implemented a video conference capability which can bridge a large number of counterparts (member states and international organisations). The system was used for co-ordination among international organisations during the response to the Fukushima Daiichi nuclear power plant accident and in major international emergency response exercises in recent years.

Session 2. **Cross-border and international co-ordination of protective measures**

Summary of evaluation questionnaires

From the analysis of the INEX-5 evaluation questionnaires, conducted by the NEA Secretariat and jointly discussed during the WPNEM-41 Topical Session on INEX-5 in January 2017, it became clear that international co-ordination should be a major focus of the INEX-5 workshop, the experience of the two regional exercises being major inputs. In particular, approaches and mechanisms for discussing and co-ordinating protective action decisions, particularly among neighbouring countries, should be further investigated. In addition, the different results from testing the implementation of the Heads of the European Radiological Protection Competent Authorities (HERCA)-Western European Nuclear Regulators Association (WENRA) Approach[2] (HWA) should be analysed; aspects that can facilitate or obstruct successful cross-border co-ordination can thus be identified. Different countermeasure approaches reported in the INEX-5 evaluation questionnaires should also be further investigated.

Session 2 set out to explore the cross-border and international co-ordination of protective measures through the participation of the workshop participants in a short table-top exercise. The workshop participants were arranged into four breakout groups of broadly the same size and by regional geography:

- group 1: Canada, Finland, Japan, Norway, Russia and the United States;
- group 2: Belgium, France, Germany, Italy, the Netherlands and Switzerland;
- group 3: Austria, the Czech Republic, Hungary, Poland, the Slovak Republic, Slovenia and Switzerland;
- group 4: Germany, Ireland, Portugal, Spain and the United Kingdom.

Each group was provided with the same information materials (see Annex IV, preparation materials for sessions 1, 2, 3). Participants were confronted with a fictitious incident involving a nuclear power plant in relatively close proximity to an international border i.e. within 20 km. The groups were challenged to act as if they were the neighbouring country for the purposes of the exercise and to apply their own national emergency response systems to the materials provided. In particular, the approaches and mechanisms for discussing and co-ordinating protective action strategies were sought from the players. It was acknowledged that regional differences would be likely to occur between the European Union (EU) and non-EU members because of the consideration by

2. HERCA-WENRA Approach for a better cross-border co-ordination of protective actions during the early phase of a nuclear accident, www.herca.org; www.wenra.org.

European countries of both the HERCA-WENRA approach and the forthcoming transposition to the Basic Safety Standard (BSS) Directive in the EU.[3]

The groups were provided with information that represented the situation at three different stages of the emergency; an initial notification message (an IAEA standard report form), a follow-up message (an IAEA General Emergency Form [GENF]) along with a radioactivity plume model output, and finally, a further information message (the GENF with more detail) along with two dose model outputs (an effective dose over seven days and a thyroid dose to infants). Based on these materials, the groups were asked to consider four aspects: the information received from the accident country; the protective actions; the citizens in the accident country; and the assessment and prognosis tools available from the IAEA.

The workshop participants engaged fully with the challenge made to them by the Programme Committee and each group identified common themes and specific issues that they would wish to be addressed further. Regarding the information contained in the initial notification message (the IAEA standard report form) used in this table-top exercise, all the participants expressed an expectation for more information and for more technical data such as local weather conditions and the plant status. Many of the participants stated that they would employ their bilateral agreements to seek such information from the accident country. Similarly, the receipt of the notification message would trigger the activation of the neighbouring country's emergency arrangements. Once these arrangements were activated, then the assessment process regarding the potential consequences would commence alongside the actions to obtain monitoring data and meteorological forecasts.

There was considerable uncertainty expressed by the participants regarding the second batch of information provided in the table-top exercise (the GENF) and the plume model output in terms of its interpretation. While the information contained in the message helped a little in understanding the on-site incident, it was unclear what the provenance of the model output was and how it might best be used. Most participants suggested that the application of automatic countermeasures in the accident country would be followed by neighbouring countries, information gathering would continue, and modelling and assessment would be intensified. All participants stated that they would be proactive in the search for information and data on which to base their assessments through both formal and informal channels. Many participants noted that the technical experts are not the decision makers and that the decision makers would be demanding firm advice from the technical experts. In the absence of information and data, this advice would prove difficult for the technical experts to provide in the timescales required by the decision makers. It was noted that while the national level can be co-ordinated within a country, the international level (including neighbouring countries) is a different audience with different requirements.

The third and final pieces of information (the GENF with more information) and data (the two dose model outputs) provided in this table-top exercise, further elaborated the on-site situation and provided some meteorological updates. The dose model outputs ignited the discussions that highlighted the problems with the co-ordination of protective action strategies across international borders. It was noted that intervention levels are neither universal nor consistent across countries and that this lack of consistency might become a real obstacle to cross-border co-ordination. Emergency planning zones are similarly inconsistent and specific to each country. There was considerable discussion

3. Council Directive 2013/59/EURATOM of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom.

among the participants regarding urgent protective actions such as evacuation, sheltering and iodine thyroid blocking (ITB).

Many of the EU countries acknowledged that the Euratom BSS Directive [4] has addressed these issues and that in order for member states to comply with the directive they will have to adopt a consistent approach. A global reference base for the adoption of a consistent approach in emergency preparedness and response (EPR) is given by the IAEA EPR Safety Standards and Safety Guides. The implementation of these standards globally is a prerequisite of the harmonisation of response actions and other actions to be taken in response to nuclear or radiological emergencies. Given that the technical basis can be agreed and adopted, it was suggested that the problem has become a political rather than a technical issue.

All the participants were keen to receive more data, more frequently. It was recognised that data have to be accurate and have to be originated by authorised entities. It was suggested that if the existing international arrangements for the exchange of information and data can be successfully implemented into the national EPR frameworks, this might enable these exchanges to be made effectively and in a more timely fashion and would give the base for harmonisation. The early exchange of information and data was recognised as a means of stimulating trust between neighbouring countries. This was considered to be particularly valuable during the response to an emergency.

4. See footnote 3.

Session 3. **Mid- and long-term aspects of recovery: How to prepare?**

Summary of evaluation questionnaires

In the design of INEX-5, the intermediate and late phases of an emergency were specifically excluded, except for appropriate notification and communication activities within the scenario questions. Nonetheless, the evaluation questionnaire included a few questions related to those intermediate and longer-term aspects that needed to be dealt with. Respondents have reported to different extents several intermediate and long-term aspects that either were considered during the exercise or were mentioned as elements that would be considered in a real emergency. Foodstuff restriction was the most commonly considered aspect. Others included medical and psychosocial monitoring of the population, radiation monitoring, decontamination, or the impact on tourism. This session aimed at sharing experience on how to prepare for the mid- and long-term aspects of recovery.

While the INEX-5 concept had excluded specifically from its considerations the medium- to longer-term aspects of the response, the INEX-5 evaluation questionnaire had, however, sought information in this regard from the participants about their experiences on how to prepare for recovery in the medium to long term. The NEA Secretariat provided a summary of the issues raised from the questionnaires. Three presentations concerning planning for recovery, exercising the recovery planning and the real experiences of recovery were delivered to the workshop.

The US Environmental Protection Agency (EPA) described the objectives of their longer-term planning and preparedness for recovery. The recent hurricane season had focused on potential lessons that could be learnt from other emergencies. At the national level, it was considered that the longer-term recovery aspects are well established and have been tested through a number of exercises. EPA provided further details on Exercise Southern Exposure '15, which used two time "jumps" to focus the play on recovery. The lessons from this exercise, together with the INEX-5 outcomes, have identified a series of key lessons for future exercises on recovery in the United States:

- to continue to define the likely funding and legal requirements for long-term monitoring and clean-up;
- to conduct further exercises with the focus on the long-term issues;
- to fully exercise the US response, as per the new nuclear/radiological incident annex, for an overseas incident as well as domestic incidents;
- to further refine the staff/resource requirements for subject matter experts at national co-ordination points (from the limited number of experts available);
- to further develop communication channels with international partners.

The French Nuclear Safety Authority (ASN) described the framework adopted for the preparations for recovery in France, along with the experiences of several longer-term exercises. In 2005, France established the Steering Committee on Post-Accidental Management ("CODIRPA" – Comité directeur pour la gestion de la phase post-accidentelle), a steering committee created to establish the framework, and prepare and implement the recovery policy after a nuclear accident. Along with local and national authorities in France, they have included input from foreign radiological protection authorities within the policy framework. The work is aligned closely with the recommendations from the International Commission on Radiological Protection (ICRP) in Publications 103 and 111. The policy framework comprises three main objectives: to protect the population against the dangers of ionising radiation; to provide support to members of the population that have suffered the consequences of an accident; and to prepare for the social and economic recovery of the affected areas.

France had tested these CODIRPA arrangements through large-scale exercises. Exercise scenarios have included cross-border contamination arising from an accident with unfavourable weather conditions. They have performed field exercises to simulate the monitoring arrangements of their teams in realistic environments. It was noted that the simulation of longer-term impacts requires a great deal of preparation and effort in order to deliver realistic play for the participants. However, these exercises are seen as invaluable in terms of the issues that they identify and the potential improvements that may be discovered. The INEX-5 experience also highlighted that multi-risk impacts should be considered in the light of the response to more general nuclear emergencies and that these other risks could identify further improvements to the arrangements.

The Cabinet Office of Japan provided an update on the lessons learnt from the Fukushima Daiichi accident, the changes to their nuclear disaster prevention planning since 2011 and the mid- to long-term recovery of Fukushima and the surrounding areas. Japan has implemented many changes to the emergency arrangements since the accident at Fukushima Daiichi. Emergency planning zones, emergency classifications, measures for vulnerable persons and the evacuation criteria for vulnerable persons have been revised in light of experience from the Fukushima Daiichi NPP accident. Furthermore, the locations of off-site centres, the provision of emergency supplies and the interplay between other disasters and a nuclear emergency have all been reviewed.

National emergency arrangements have been revised in order to deliver a more robust and resilient response. Greater support from the national government is identified at all levels of the administration with an emphasis on delivering regional disaster prevention and evacuation plans. Financial assistance has been provided to facilitate emergency response centres, materials and equipment. Regional nuclear disaster management councils have been made responsible for ensuring that the arrangements are robust and reliable. A rolling programme of reviews of the regional plans has also been undertaken.

Updates to the emergency action areas have been made at the nuclear power plants and across 21 prefectures. The precautionary action zone (PAZ) of 5 km radius around each nuclear power plant is supplemented by an urgent protective planning zone (UPZ) of 30 km radius within which the protective actions are to be implemented promptly. Examples of the changes made to the arrangements in the Genkai prefecture were provided regarding protective actions in the PAZ and UPZ, the identification of shelters for residents around the plant, and the routes to be used for evacuation and the number of residents that would be evacuated using these routes. Japan has also undertaken reviews regarding the specific needs of vulnerable persons in the event of an emergency. They have identified that the evacuation process may be more harmful to a vulnerable individual than the potential exposure to ionising radiation. To this end, they have clearly identified the vulnerable populations around nuclear power plants and implemented arrangements for protecting them in situ rather than applying a universal

evacuation order. Where this has been planned, Japan has also made arrangements for stockpiles of food and water to be available for a period of three days for any vulnerable populations as part of these plans.

The mid- to long-term recovery from the Fukushima Daiichi NPP accident is underway. Three important elements of the recovery process were described. Firstly, the support required for the reconstruction of the environment and the livelihoods of residents. Secondly, the decontamination of the environment, and thirdly, the updates made to post-accident food science and security. The evacuation area for the Fukushima Daiichi accident has been developed over time. The area extended beyond the PAZ and UPZ for the nuclear power plant, and was originally based upon aerial monitoring results and then amended after the contamination of the environment was reviewed in 2013. Six years after the accident, areas that were evacuated and that have been under access restrictions have been released from these restrictions; reducing the number of affected persons from around 81 000 to around 24 000 as of April 2017 (the area remaining under restrictions has reduced from around 1 150 km^2 to around 370 km^2). At the end of 2016, six measures were identified to accelerate the recovery from the Fukushima Daiichi accident. More effort should be made to:

- deregulate the affected areas;
- deliver reconstruction for displaced persons;
- help affected populations to "start new lives";
- increase the means by which industry and commerce can be re-established;
- commit to the decontamination programme to ensure water supplies;
- maintain the commitment of both the state and the operator to the recovery.

Mapping of the contamination from the Fukushima Daiichi NPP accident is ongoing. Based on the initial aerial monitoring survey, the field survey teams have performed monitoring in greater detail i.e. within an 80 km radius of the plant, the area was subdivided into 2 km x 2 km squares, and for each square a dose rate at 1 m above ground level was made and 5 soil samples were taken. In the area between 80 km/100 km from the plant, the same techniques were used for 10 km x 10 km squares. Vehicle-borne surveys have also been performed along bus routes between 2013 and 2015. The operator has also performed vehicle-borne surveys in the restricted zone and evacuation zone around the nuclear power plant.

Map products showing the extent of the contamination have been produced, 11 municipalities (2 cities, 7 towns and 2 villages) have been identified from the map for decontamination activities. The Japanese government has been proactive in determining the objectives and methods for the decontamination process and has published guidance to assist contractors. It was noted that the decontamination process was not a one-off fix to the problem and that one or more methods would likely be required in repeated applications to reduce the exposure levels to the agreed levels.

The Japanese government and local authorities addressed the concerns regarding the effectiveness of control of food and food products from the Fukushima area. An international workshop, jointly organised by the Cabinet Office of Japan and the NEA, was held in 2016 to discuss the relevant food science and security approaches that were being reviewed in the light of the accident. Stakeholder involvement, including students from the local high school, was actively encouraged during the workshop, and participants were provided with food from the Fukushima agricultural production area.

Session 4. **Connection to the work of other international organisations, platforms and networks**

The NEA has a unique perspective in this area as an international organisation with no formal role in emergency preparedness and response. It is, however, able to offer a forum for member countries and other international organisations to discuss openly and without prejudice topical issues arising around the world. To that end, other international organisations were invited to present an information update to the workshop participants with a view to sharing the latest information, highlighting the benefits of co-operation and of avoiding any eventual duplication of efforts.

The IAEA Incident and Emergency Centre (IEC) was described together with an update on the latest activities. The role and responsibilities of the IAEA during the response phase following a nuclear emergency includes the facilitation of notification and official information exchange through a number of communication channels including the secured IAEA web platform, the Unified System for Information Exchange in Incidents and Emergencies (USIE), the provision of information to the public, assessment of potential consequences and prognosis of the emergency's potential progression, provision of assistance on request using the IAEA Response and Assistance Network (RANET) and co-ordination of the inter-agency response (through the Inter-Agency Committee on Radiological and Nuclear Emergencies [IACRNE], as well as maintaining the Joint Radiation Emergency Management Plan of the International Organizations [JPLAN]).

The IAEA also has clearly defined roles and responsibilities for preparedness across the world. Emergency preparedness and response (EPR) is delivered through safety standards, guidance and tools, and the IAEA supports the building of EPR capabilities in member states. The Emergency Preparedness Review (EPREV) service provides for member states to have their EPR arrangements assessed against international safety standards in EPR, namely GSR Part 7, GS-G-2.1, GSG-2 and the newly issued GSG-11. This new safety guide *Arrangements for Termination of a Nuclear or Radiological Emergency* provides guidance for the termination of the emergency and the transition phase to either an existing exposure situation or planned exposure situation as appropriate. Training materials has been developed for this new safety guide and a pilot training event has been held. The training materials are being reviewed after the pilot event, and the IAEA plans for different events, at both regional and national levels, to raise member states knowledge and awareness about this new guidance. This training will support development by member states of appropriate revision to national EPR plans based on guidance. Similarly, safety standards are under development or under revision for:

- *Arrangements for Public Communications in Preparedness and Response for a Nuclear or Radiological Emergency*;
- *Preparedness and Response for an Emergency during the Transport of Radioactive Material* (Revision of TS-G-1.2);
- *Arrangements for Preparedness and Response to a Nuclear or Radiological Emergency* (Revision of GS-G-2.1).

The IAEA continues to host workshops and webinars on topics of interest to its member states. This includes workshops on many different topics related to IAEA guidance on EPR. There are also joint activities planned, like ones to be implemented with the EC regarding discussion of EPR-related aspects of the Basic Safety Standard (BSS) Directive vs. GSR Part 7.

RANET provides a compatible and integrated system for the provision of international assistance to minimise (actual or potential) the radiological consequences of a nuclear or radiological incident or emergency on human health, the environment and property. The EPR-RANET 2013 publication is currently being revised. The updated publication will include new national assistance capabilities to address assistance and advice on mapping radiation monitoring data, geographic data collection, analysis and mapping. It will also include new capabilities to provide requested assistance in the event of a nuclear or radiological incident or emergency, irrespective of the cause. It was noted that the first RANET Joint Assistance Team (JAT) exercise was held in 2017.

The IAEA Emergency Preparedness and Response Information Management System (EPRIMS) offers an IAEA safety-standards-aligned platform for self-assessment and information sharing on the level of the implementation of IAEA EPR requirements in member states. EPRIMS also offers an online platform for country-specific information on the national EPR framework and arrangements. EPRIMS country-specific information can be particularly useful for understanding the basis for response actions and other actions taken by member states. EPRIMS also allows for the collecting/sharing of specific nuclear power reactor technical information with the view that this type of information will support the assessment and prognosis process performed in nuclear or radiological emergencies.

The European Platform on Preparedness for Nuclear and Radiological Emergency Response and Recovery (NERIS) provided an update on its multiple strands of research and development. NERIS has representation from 28 countries with 57 organisations participating in the work with 26 supporting partners. There are working groups on ICRP recommendations; contaminated goods; information, participation and communication; the Real-time On-line Decision Support System for Off-Site Nuclear Emergency Management (RODOS) users group; and a research and development committee. There are also a number of Euratom research projects that are of interest to the NERIS activities, and examples include: the Innovative Integrated Tools and Platforms for Radiological Emergency Preparedness and Post-Accident Response in Europe (PREPARE) project for innovative tools; the Open EC Project for European Radiation Research Area (OPERRA) projects – Child and Adult Thyroid Monitoring After Reactor Accident (CAThyMARA); Harmonising Modelling Strategies of European Decision Support Systems for Nuclear Emergencies (HARMONE); Nuclear Emergency Situations Improvement of Medical and Health Surveillance (SHAMISEN); the Coordination and Implementation of a Pan-European Instrument for Radioecology (COMET) project; and the European Joint Programme for the Integration of Radiation Protection Research' under Horizon 2020 (CONCERT) projects – Coping with Uncertainties for Improved Modelling and Decision Making in Nuclear Emergencies (CONFIDENCE); To Enhance Uncertainties Reduction and Stakeholders Involvement Towards Integrated and Graded Risk Management of Humans and Wildlife in Long-lasting Radiological Exposure Situations (TERRITORIES); Stakeholder Involvement in Generating Science after Nuclear Emergencies (SHAMISEN SINGS); and Enhancing Stakeholder Participation in the Governance of Radiological Risks for Improved Radiation Protection and Informed Decision-making (ENGAGE).

Lessons from the Fukushima Daiichi NPP accident have been incorporated into the NERIS work programme. They include: the importance of transparency of the decision-making process at the local, regional and national levels, including access to monitoring data at all levels; the importance of dealing with uncertainties in the assessment and management at all phases of the response, which was identified as a key lesson from the accident; the use of social media and its potential role in the exchange of information;

better addressing stakeholder involvement and the role it has to play in both the emergency and recovery phases. Similarly, a greater understanding of the societal, ethical and financial aspects of recovery would be valuable. The lessons have been captured within three challenges that will be a focus of the NERIS project in the future, more specifically the radiological impact assessments in all phases of the response, the countermeasures and countermeasure strategies in both the emergency and recovery phases and arrangements for a transdisciplinary framework for preparedness for emergency response and recovery. The goal for the NERIS project is to reinforce the joint aspects of research at the European level through interaction with other projects, consolidate the connections with other organisations involved in accident management for Chernobyl and Fukushima (notably ICRP and the Japanese authorities), engage in dialogue with other stakeholders and ensure consultation is thorough and comprehensive with an overarching aim towards harmonisation of approaches to emergencies and recovery across Europe.

The Heads of the European Radiological Competent Authorities (HERCA) Working Group on Emergencies delivered an update on their most recent work and its likely development. One of the main aims of the group is to improve cross-border co-ordination of protective actions during the early phase of a nuclear accident by reducing the likelihood of the inconsistent application of countermeasures as experienced in the regional INEX-5 exercise involving an accident in Slovenia's nuclear power plant. The co-ordination of protective action strategies between countries has been considered for uncertain circumstances where little is known about the accident at the plant. A simple question and answer matrix allows responders to estimate the potential consequences of an uncertain situation in order to develop consistent advice regarding countermeasures that may be applied in different countries. HERCA has also prepared practical proposals for further harmonisation of the reactions in European countries to any distant nuclear or radiological emergency, as well as a guidance document for embassies in countries that are at some distance from the accident and other affected countries. The objective of the guidance is to deliver more consistent decisions regarding protective actions and to engender good practices.

Similarly, HERCA has produced guidance containing general principles with regard to bilateral co-operation, listing issues or so-called "complete shopping lists" that should be exchanged in each of the various phases of an accident. Guidance is also given on co-operation in preparedness in order to increase mutual knowledge about other EPR systems and to establish operational arrangements for effectively exchanging during response, including in the case of discrepancies. The items listed in the guidance document are not to be understood as mandatory. HERCA has also investigated the different understandings of "emergency workers" and "helpers/volunteers" in a response and has discovered that they have different definitions for different national international organisations, e.g. Euratom/2013/59 provides a definition of emergency workers that differs from the one contained in IAEA GSR Part 7 and the Nordic Flag Book. Despite this diversity, they have concluded that this does not pose any bilateral problem. The findings of the investigation have been summarised in a report published by HERCA.

Another major outcome of HERCA is the production of country fact sheets. As it was noted during the regional INEX-5 exercises, these summary fact sheets can be particularly useful for decision makers during an emergency.

Session 5. Key issues in international co-ordination and communications and ways forward

Following the presentations in the four preceding sessions, participants exchanged on what the key issues were for each of the four sessions and possible ways forward under the current context.

Session 1 of the workshop considered communication and information sharing with other countries and international partners with a focus on real-time communication platforms. It sought to understand if there was a need or a desire for an international real-time communication platform.

It was noted that the validation or verification process might vary among countries when using real-time communication platforms and that this should be taken into account. It was agreed by the workshop participants that a new international communication platform/system is not desired or needed. It was agreed that the current European Community Urgent Radiological Information Exchange (ECURIE) and the IAEA Unified System for Information Exchange in Incidents and Emergencies (USIE) systems are to be used in international communications. All member countries have invested in their own national systems that deliver their emergency preparedness and response (EPR) requirements and in practice this is what is required by the decision makers under the national response arrangements. While a new universal system is not desired, it was considered to be of benefit to neighbouring states and regional partners if a common set of requirements/standard format could be derived which enables national systems to connect for exchange of materials. It was noted that the format of the IAEA International Radiological Information Exchange (IRIX) is the standard to exchange information among emergency response organisations at national and international levels during a nuclear or radiological emergency. It was noted that it would be useful to define the following terms: accident country, affected country, neighbouring country and/or other country.[5] Given that "an accident anywhere is an accident everywhere", it was noted that all countries would be seeking definitive and timely information, data, advice and guidance from the accident country. This was the motivation behind the development of the IAEA USIE platform.

There was a suggestion that the threshold for the sharing of information and data via the formal notification mechanisms would be too high for many countries to use them for this purpose. This "threshold" is established by the Convention on Early Notification of a Nuclear Accident. The IAEA noted that while the USIE has all the needed features to accommodate the reporting/sharing of information as per Article 1 of the named convention, the voluntary sharing of information as per Article 3 of the named convention can also be accommodated in the USIE. It was noted by some participants

5. Some of these terms are defined in the EPR-IEComm 2012, the IAEA "Operations Manual for Incident and Emergency Communications".

that the USIE system has become unwieldy and cluttered[6] during the 2017 ConvEx-3 exercise making it difficult to identify the key and important updates regarding the situation. The IAEA noted that a new version of the USIE is to be released soon and that this will allow filtering and sorting of messages contained in the system. The new version of the USIE will also include a new "short messaging" feature.

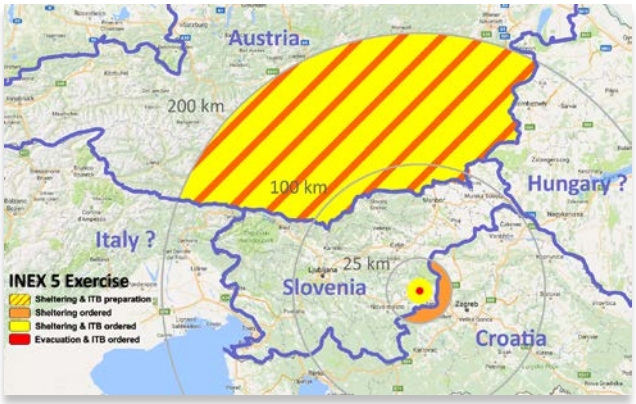
Session 2 sought to garner a greater insight into how to achieve better cross-border co-ordination of protective actions.

Information from the accident country: all the participants stated that the volume and detail of information received from the accident country was not adequate, it was not considered clear, consistent or timely. It was agreed that all countries would actively seek further information from the accident country. The key role of bilateral agreements and informal contacts when seeking additional updates was highlighted.

Protective actions: the INEX-5 regional exercises highlighted some interesting inconsistent and consistent results related to protective action strategies implementation across international borders (see Figure 1).

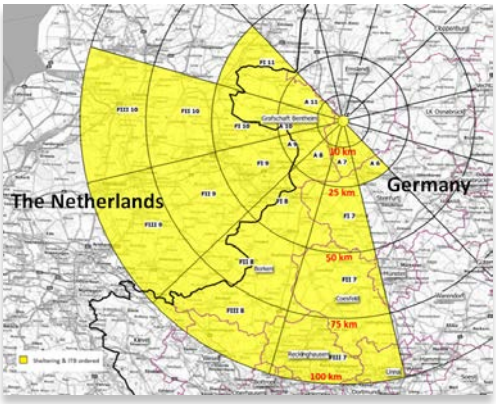
Figure 1. **Protective actions implemented/ordered in the two INEX-5 exercises played regionally**

Protective actions implemented/ordered in the regional exercise involving Austria, Croatia, Hungary, Italy and Slovenia



Source: SNSA, Slovenia.

Protective actions implemented/ordered in the regional exercise involving Germany and the Netherlands



Source: BfS, Germany.

Note: Interrogation marks next to country names indicate that those countries did not provide any information during the exercise.

The potential for the application of inconsistent advice across neighbouring countries was evident for the exercise involving the five countries. It was however unclear whether any co-ordination of protective actions had taken place in the past. It was acknowledged by the participants that the national strategies for protective actions are co-ordinated within each state and in all likelihood they are published or at least available for neighbouring states to make themselves familiar with the principles.

6. Because of the wealth of information (i.e. number of reports and documents made available) as well as the active character of the system, which generates notifications for all the reports and documents made available during an event.

Many of the participants stated that while the technical experts may provide advice regarding protective actions, it is the responsibility of the decision makers to order them to be applied. It was noted that the decision makers are somewhat separated from the technical experts and that the two groups do not routinely interact. It was suggested that this may be an area for the NEA Working Party on Nuclear Emergency Matters (WPNEM) to look into further.

The benefits of considering these issues during the planning phase or "peacetime" was acknowledged. However, the problem was considered to be twofold; both technical (in terms of the basis for "agreed" intervention levels) and political (in terms of enacting cross-border co-ordination). It was suggested that there would be benefits to be gained from protective actions being agreed in advance between neighbouring countries, but that this agreement would be likely to require political involvement. This was thought to be an area where the technical experts may require additional assistance.

Citizens in the accident country: there was common consensus that the guidance that they would give to their own citizens in the accident country would be to follow the local advice.

Assessment and prognosis: the assessment and prognosis tools offered by the IAEA were considered helpful for decision makers as the statements generated through the use of these tools are clear and are presented in an easy-to-be-understood language. This aids the technical experts to render the output understandable to decision makers. It was noted that this set of tools might be particularly useful for non-nuclear countries. However, it was further noted that each country's technical support organisation would perform their own assessment and may compare the outputs with those from the IAEA.

Session 3 brought together experiences from both exercises and "the real world". The workshop participants appreciated greatly the openness with which the issues and actions regarding the recovery processes were discussed.

The discussions regarding planning for recovery and the potential benefits to be gained from attempting to exercise the longer-term aspects of the response were wide ranging and varied. There were a number of queries regarding the real costs involved, including compensation for evacuees. It was acknowledged that the costs were substantial and that, for example, the Japanese government was addressing the costs through the issue of government bonds. Decontamination of the environment was recognised as a significant factor in the "return to normal". It was acknowledged that, following an evacuation, people would wish to return to their homes. Examples were provided where the decontamination practices had reduced the contamination and the ambient dose rates considerably. Issues remained regarding how low decontamination should be taken. It was agreed that it should not be taken to zero even if this were possible. Several perspectives were expressed in terms of decontamination level aims. The IAEA noted that some of the issues raised in the discussion are addressed in a new IAEA publication on *Arrangements for the Termination of a Nuclear or Radiological Emergency*[7].

The risk to hospital residents was also raised as an issue. It was observed that a significant number of patients in hospital/care facilities had been subject to evacuation orders and had been required to be moved from their specialist care, which had even led to fatalities in some cases. The revisions to the arrangements now reflect that the potential harm to patients from being moved should be considered and if at all possible avoided if the risk of exposure to radioactive materials is minimal.

7. IAEA (2018), *Arrangements for the Termination of a Nuclear or Radiological Emergency*, General Safety Guide No. GSG-11, IAEA Safety Standard Series, Vienna, www.pub.iaea.org/books/iaeabooks/12269/Arrangements-for-the-Termination-of-a-Nuclear-or-Radiological-Emergency.

Market products and other foodstuffs that had been potentially contaminated were discussed, as well as the actions taken by the authorities to convince people that food is safe. The scientific basis was the main argument used by the relevant authorities under a programme of monitoring and measurements in order to ensure compliance with the regulations. However, it was also noted that other factors can affect public opinion regarding the safety of food.

Session 4 sought to share and broaden the understanding of the work of other international organisations. Workshop participants were made aware of the developments and latest outputs from the IAEA, European Platform on Preparedness for Nuclear and Radiological Emergency Response and Recovery (NERIS) and HERCA. It was recognised that there are many common points of interest between the work of these organisations and the WPNEM.

The suggestions from the workshop participants reflected the desire for greater co-operation and co-ordination between national and international organisations. It was acknowledged that fora such as the WPNEM and specific workshops are valuable in terms of information sharing and exchanging of ideas. It was also noted that resources are under ever growing pressure and are unlikely to be increasing any time soon. Therefore, it is important for national authorities and international organisations to make the best use of technical support and assistance where available and to contribute to collective endeavours. The practical example of this effective and efficient approach is the recommendation by the workshop participants that they do not wish to build another new platform for international communications but would rather collaborate on improving the "connectivity" between existing systems or providing best practices from existing systems to be used by countries willing to establish new, national platforms. Participants noted and welcomed the kind offer from Germany and Slovenia to make their platform codes available. The IAEA also noted that the IAEA IRIX standard will be printed and publicly distributed this year as an IAEA publication, which is Attachment 3 to the EPR-IEComm 2018.

The mandate of the WPNEM specifically notes that the proposed programme of work for the group shall be mindful of the existing and future work by other international organisations, and it was acknowledged that workshops such as the INEX-5 international workshop contribute actively to the delivery of these requirements and promote the benefits of international collaboration.

Conclusions and ways forward

A key part of the INEX-5 International Workshop was to elicit suggestions from the participants for future projects that might be delivered by the NEA Working Party on Nuclear Emergency Matters (WPNEM), to which the international community could contribute. A total of ten suggestions were made by the workshop participants, as summarised below in no particular order of priority:

Suggestion 1: the WPNEM could prepare a report describing the concept and the use of real-time information platforms in member countries. The report would present the benefits that real-time information offers, including:

- builds and strengthens trust in the accident country;
- helps to inform decision maker(s) in the affected country or countries.

The report should underline that decision(s) are not predetermined by the report and that this report should not be shared with the press or public. Other aspects to consider include the need to differentiate between: the "accident country", "affected countries", "neighbouring countries" and "other countries".

Suggestion 2: the WPNEM could report on how member countries interact with formal information exchange systems (i.e. the IAEA Unified System for Information Exchange in Incidents and Emergencies [USIE]/European Community Urgent Radiological Information Exchange [ECURIE]). It could also examine what opportunities exist (if any) for additional information to be shared via these systems; and it could identify any barriers to the use of existing tools as far as is practicable within the context of national and international emergency preparedness and response (EPR) strategies.

Suggestion 3: the WPNEM could benchmark dose projection code outputs based on the same (or very similar accident) inputs, providing information on why the results are or may be different and defining what is considered to be good general agreement among the codes.

Suggestion 4: the WPNEM could update the WPNEM member country Protective Measures Handbook,[8] taking into account the implementation of GSR Part 7 and various post-Fukushima considerations. Consideration should also be given to the use and usefulness of the IAEA Emergency Preparedness and Response Information Management System (EPRIMS) as an implementation action for this suggestion.

This proposal suggests a deeper examination of the rationale for actions:

- Some countries may choose only to shelter as a protective measure in certain areas because of population density, and in other parts of the country the decision may be to evacuate the entire population.
- Iodine distribution methods and target populations (supplemented or stand-alone) and why?

8. International Short-term Countermeasures Survey, www.oecd-nea.org/rp/docs/2013/crpph-r2013-4.pdf.

Suggestion 5: The WPNEM could consider mental health impacts on populations when implementing protective measures (i.e. evacuation has high psychosocial impacts on individuals/families and can lead to health outcomes far more serious than the radiation exposure).

Suggestion 6: The WPNEM could work to include decision makers in the planning and implementation of protective action strategies. How might this be achieved? The OECD works at the ministerial level, however the NEA generally does not. The NEA has links with the OECD Directorate for Public Governance, and the WPNEM could thus explore means of engaging with decision makers in this way. Decision makers are seeking solutions from the experts and need end products that they can use. How can we best ensure collaboration between experts and decision makers?

Suggestion 7: The WPNEM could consider practical means of implementing cross-border co-ordination of protective actions. The WPNEM could review the feasibility of sharing information on planned cross-border actions during "peacetime"/planning and preparation. If a country can co-ordinate protective actions at the national level, what do we need to do to do this at the international level?

Suggestion 8: The WPNEM could collaborate with other experts and groups regarding recovery issues. Emergency activities may have downstream implications for later recovery actions. The WPNEM could determine what data is in existing guidance and handbooks. Resource requirements may also be affected by emergency actions. Waste management issues will be a key aspect during the recovery phase. An expert group can be established to highlight best practices regarding recovery and prepare a short report detailing the current understanding, building on existing work and potential future developments.

Suggestion 9: The WPNEM could add further to studies conducted by the Committee on Radiological Protection and Public Health (CRPPH) on the psychosocial aspects of emergencies and protective action strategies, particularly with regard to the potential effects of urgent protective actions, evacuation, sheltering and iodine thyroid blocking (ITB).

Suggestion 10: The WPNEM could review potential synergies with other NEA working groups, as well as share benefits of collaborations reported with a view to looking for synergies and avoiding any possible duplication of effort.

INEX-5 follow-up

Following the INEX-5 International Workshop, the Working Party on Nuclear Emergency Matters (WPNEM) reviewed the workshop outcomes and identified key needs in notification, communications and international interphases, namely related to international communication and co-ordination, with a view to developing a programme of work for the upcoming years.

A detailed discussion of the key needs identified by the INEX-5 workshop participants in each of the four INEX-5 objectives, including possible ideas for further work, resulted in several additional issues being identified. The original ten suggestions that arose from the workshop were restructured into five items (labelled A to E below; see Table 1) that formed part of the proposed programme of work and follow-up activities that would bring value to the international community.

A. Real-time communications

WPNEM report: review existing real-time platforms in NEA member countries to facilitate cross-border and regional information exchange and co-ordination of countermeasures.

- What already exists (state of the art).
- Identification of good practices and case studies of use for cross-border co-ordination.
- What information should be available, to whom and at which level.

The report could:

- present the “need” for real-time information);
- build and strengthen trust in the accident country;
- help to prepare decision maker(s) in the affected country;
- underline that the report would not predetermine any decision(s);
- discuss the need for not sharing the report with the press or public;
- discuss the need to differentiate between: accident country, affected countries, neighbouring countries and other countries;
- give an algorithm that determines who is “affected” and who is “neighbouring”.

This task could also include investigating and assessing how member countries interact with formal information exchange systems (i.e. the IAEA Unified System for Information Exchange in Incidents and Emergencies [USIE]/European Community Urgent Radiological Information Exchange [ECURIE]). It could also describe what opportunities exist (if any) for additional (less formal) information to be shared via these systems, and identify any barriers to the use of existing tools as far as is practicable within the context of national and international emergency preparedness and response (EPR) strategies.

B. Non-radiological public health aspects of radiation emergency planning and response including psychosocial and other societal impacts of evacuation, sheltering and relocation.

WPNEM Report: review with a view to developing practical solutions for mitigation of these aspects through:

- The development of a policy framework that adopts existing World Health Organization (WHO) guidance on mental health in emergencies to nuclear and radiological emergencies (WHO product).
- Practical solutions/tools for support of the decision-making process while planning for and responding to nuclear and radiological emergencies (WPNEM product).
- Method of work:
  - review WHO guidelines on psychosocial effects in emergencies, and adopt those for nuclear emergency scenarios (led by WHO, with WPNEM working group input);
  - derive from the above practical tools for decision makers (led by the WPNEM working group with WHO input);
  - organise a joint workshop to discuss key issues.
- Other interactions: the Committee on Radiological Protection and Public Health (CRPPH) have initiated a review of the psychosocial aspects of emergencies and protective action strategies. WPNEM may be able to add further to these studies with regard to the potential effects of urgent protective actions, evacuation, sheltering and iodine thyroid blocking (ITB).

C. Recommendations for building nationally adapted frameworks for recovery in NEA member countries.

WPNEM report: post-accident recovery actions should be planned in advance. A large range of countermeasures exist, but not all would be applicable in every country owing to national variations. In addition, emergency measures may have downstream implications for later recovery actions. The development of a recovery framework would also need to involve relevant stakeholders with collaborative deliberation on the issues at stake.

- Objective: describe best practices in developing a recovery framework adapted to national conditions.

- Working methodology:
  - Expert group to highlight best practices regarding the development of a recovery framework, based on existing tools and experience in the process of building the framework.
  - WPNEM to collaborate with other experts and groups regarding recovery issues.
  - Work to be divided (e.g. food management, drinking water management, urban and environmental decontamination, and waste management).
- Participants:
  - Participation of countries with existing, adapted recovery frameworks or post-accident experience: Austria, France, Germany, Japan, Norway, the Slovak Republic and the United Kingdom.
  - Possible participation of additional countries such as Canada and Russia

D. Dose projection code outputs benchmarking based on same (or very similar) inputs.

WPNEM report: develop and hold an exercise where member countries share dose projection code outputs based on same (or very similar accident) inputs. Understanding of why the results are or may be different. Defining what is considered to be good general agreement among the codes.

E. Update WPNEM member country Protective Measures Handbooks.

WPNEM report: collate and update changes to the WPNEM member country Protective Measures Handbook,[9] taking into account implementation of GSR Part 7 and other post-Fukushima considerations.

- The proposal is for a more in-depth examination of the rationale for actions.
- Some countries may choose only to shelter, as a protective measure in certain areas, because of population density, and in other parts of the country the decision may be to evacuate the entire population.
- Iodine distribution methods and target populations (supplemented or stand-alone) including rationale.
- Working methodology: survey, analysis of survey results and discussion during a WPNEM meeting.

The other suggestions made by the workshop were noted as contained in the mandate of the WPNEM.

9. International Short-term Countermeasures Survey, www.oecd-nea.org/rp/docs/2013/crpph-r2013-4.pdf.

Table 1. **Summarising the workshop suggestions into programme of work items**

Input from the workshop	Work item
Suggestion # 1	Proposal for work A
Suggestion # 2	Proposal for work A
Suggestion # 3	Proposal for work D
Suggestion # 4	Proposal for work E
Suggestion # 5	Proposal for work B
Suggestion # 6	Action for the Secretariat
Suggestion # 7	Proposal for work F
Suggestion # 8	Proposal for work C
Suggestion # 9	Proposal for work B
Suggestion # 10	Included in the WPNEM mandate and strategic direction

Annex I. Programme of the INEX-5 International Workshop

24 October | Day 1

Workshop opening

– OECD Nuclear Energy Agency

– NEA Working Party on Nuclear Emergency Matters Chair (*M. Zähringer*)

Workshop introduction

– INEX-5 background (*M. Griffiths, former WPNEM Chair and workshop facilitator*)

– Workshop introduction and explanation of format (*WPNEM Chair, Facilitator*)

Summary of the INEX-5 evaluation analysis

(*O. Guzmán and E. Kopeć, NEA Secretariat*)

Session 1. Communication and information sharing with other countries and international partners: Focus on real-time communication platforms

– Introduction: summary of relevant exercise outcomes (*NEA Secretariat*)

– Presentation of real-time platforms tested during INEX-5:

  – National Communication Platform for Radiation Emergencies in Slovenia (*I. Sirc*)

  – ELAN – a central information and communication platform for nuclear emergencies (*M. Zähringer*)

– Information exchanges systems under conventions and treaties: Compatibility with real-time platforms:

  – IAEA (*K. Smith*)

  – EC (*K. Jackson*)

– Moderated discussion

– Session wrap-up

Session 2. Cross-border and international co-ordination of protective measures

– Introduction to the session and format (*Facilitator*)

– Summary of relevant exercise outcomes (*NEA Secretariat*)

– Breakout sessions: simple regional table-top exercises on co-ordination of protective measures

25 October | Day 2

Session 2. Cross-border and international co-ordination of protective measures

- Presentation of outcomes by regional exercise (breakout groups)
- Moderated discussion
- Session wrap-up

Session 3. Mid- and long-term aspects of recovery: how to prepare?

- Introduction: summary of relevant exercise outcomes (*NEA Secretariat*)
- National presentations:
  - US recovery planning and exercise experience: exploring new methods (*S. deCair*)
  - France's frameworks for the preparation to the recovery phase of an accident (*F. Gallay*)
  - Japan's experience (*H. Shindo*)
- Moderated discussion
- Session wrap-up

Session 4. Connection to the work of other international organisations, platforms, networks

- Presentations by international organisations, platforms, networks
  - IAEA (*K. Smith*)
  - NERIS (*T. Schneider*)
  - HERCA WG Emergencies (*W. Rother*)
- Questions and answers
- Session wrap-up

Session 5. Key issues in international co-ordination and communications and ways forward

- Summary of sessions 1-4 (*Facilitator*)
- Moderated discussion of needs and ways forward
- Final summary

Workshop closing

Programme outline

	Tuesday 24 October	Wednesday 25 October
Morning	– Workshop opening – Summary of the INEX-5 evaluation analysis – Session 1. Communication and information sharing with other countries and international partners. Focus on real-time communication platforms	– Session 2. Cross-border and international co-ordination of protective measures (plenary session)
Afternoon	– Session 2. Cross-border and international co-ordination of protective measures (breakout sessions)	– Session 3. Long-term aspects: how to integrate them in exercises – Session 4. Connection to the work of other international organisations, platforms, networks – Session 5. Key issues in international co-ordination and communications, and ways forward – Workshop closing

Annex II. INEX-5 International Workshop Programme Committee

France	CLOS Adeline; DODEMAN Jean-François; GALLAY Florence
Germany	GERING Florian; KUHLEN Johannes; ROTHER Wolfram; ZAEHRINGER Matthias
Ireland	SMITH Veronica
Slovak Republic	DURANOVA Tatiana
Slovenia	SIRC Igor
United States	DE CAIR Sara; MILLIGAN Patricia
NEA Secretariat	GUZMAN Olvido; GUIDO Chiara; KOPEC Emilia

Note: For the first time, the Programme Committee worked and met remotely using the NEA Secretariat teleconferencing and WebEx facilities as a hub for a number of meetings and discussions. Both the Programme Committee and the NEA Secretariat recognised that resources are ever dwindling and that the mechanisms of delivering materials within the allowed resources must be as efficient and effective as possible. The Programme Committee agreed that the remote working and teleconferencing had been considered very successful in efficiently developing the workshop materials.

Annex III. List of participants

Austria	HOFER, Peter
Belgium	PERKO, Tanja; VANDECASTEELE, Christian
Canada	NSENGIYUMVA, Dominique
Czech Republic	CHUDA, Helena
Finland	KUUSI, Antero
France	CLOS, Adeline; DODEMAN, Jean-François; SCHNEIDER, Thierry
Germany	KUHLEN, Johannes; ROTHER, Wolfram; SCHLUMMER, Tobias; ZAEHRINGER, Matthias
Hungary	BALOGH, Csaba
Ireland	SMITH, Veronica; RYAN, Robert
Italy	ZEPPA, Paolo
Japan	SHINDO, Hiroaki; YAMAMOTO, Kazuya
Netherlands	MOLHOEK, Wim; DROST, Kirsten
Norway	LILAND, Astrid
Poland	LYSKAWINSKI, Karol; ZUBA, Michal
Portugal	MARTINS, João Oliveira
Russia	BOGDANOVA, Liudmila; KRASNOPEROV, Sergey
Slovak Republic	DURANOVA, Tatiana (WebEx); METKE, Eduard; SOKOLIKOVA, Adriana
Slovenia	SIRC, Igor

Spain	CALVARRO, Jose Manuel; GARCIA CADIERNO, Juan Pedro
Switzerland	FRISCHKNECHT, Annina; RAUBER, Dominique
United Kingdom	ALDERSON, Val
United States	DECAIR, Sara (WebEx); MILLIGAN, Patricia
IAEA	SMITH, Kilian
EC	JACKSON, Kevin
NEA	LAZO, Edward; GUZMAN, Olvido; GUIDO, Chiara; HENRY, Laurène; KOPEC, Emilia; TAMAI, Toshiaki
Facilitator	GRIFFITHS, Mike

Annex IV. **Preparation materials for sessions 1, 2, 3 of the INEX-5 International Workshop**

INEX-5 workshop: Session 1 issue sheet

Session 1: **Communication and information sharing with other countries and international partners: Focus on real-time communication platforms**

The majority of INEX-5 participants considered that the processes and procedures for the collection, provision and exchange of information with other countries were sufficiently resourced. All respondents reported the use of the IAEA Unified System for Information Exchange in Incidents and Emergencies (USIE) for formal information sharing with other countries. Most of the European countries also used the European Community Urgent Radiological Information Exchange (ECURIE) (72% of respondents). Nevertheless, most of the countries reported also having other arrangements in place, primarily as a result of the establishment of bilateral arrangements with other countries and secondly to the development of their own national communication platforms. The use and sharing of real-time information platforms between countries was reported as very successful by the two groups of regional players. Other countries have indicated that having access to national protected websites would have been useful for cross-border co-ordination purposes.

Main issues for discussion:

- Is there a need for an international real-time communication platform? Should national real-time platforms be compatible with international official communication channels, i.e. USIE, ECURIE? If so, what are the requirements to make this possible? (Importance of not creating new platforms but connecting existing ones at national and international level).
- Based on the description of the features of the systems tested during INEX-5 (Slovenian National Communication Platform for Radiation Emergencies [MKSID], ELAN) and the experience of existing similar systems in other countries (i.e. Nordic countries), what would be the "ideal" or "best" features of a unique real-time platform system?
- There are two different levels of real-time communication: national and international level. What are the pros and cons of using them?
- Language issue: the use of different languages when sharing information between countries in real time can be problematic. How can we address this issue? Which language should be used when sharing information with neighbour countries in real time?

- What is the process of validation/approval of the information included in real-time platform systems? (MKSID, ELAN – no validation per se). When providing access to national real-time platforms to other countries, which should be the access privileges, i.e. reading, writing?

Other issues:

- Why are there so many tools? How many platforms do we need? The issue of handling too many platforms was reported by small countries. There are many different platforms to communicate with stakeholders: how are networks connected in different countries?

INEX-5 workshop: Session 2 issue sheet

Session 2: **Cross-border and international co-ordination of protective measures**

From the analysis of the INEX-5 evaluation questionnaires conducted by the Secretariat and jointly discussed during the WPNEM-41 Topical Session on INEX-5 in January 2017, it became clear that international co-ordination should be a major focus of the INEX-5 workshop, the experience of the two regional players being major inputs. In particular, approaches and mechanisms for discussing and co-ordinating protective action decisions, particularly among neighbouring countries, should be further investigated. The different results from testing the implementation of the HERCA-WENRA approach (HWA) should also be analysed, thus identifying what aspects can facilitate and obstruct successful cross-border co-ordination. Different countermeasure approaches reported in the INEX-5 evaluation questionnaires should also be further investigated.

Participants were provided with the material to prepare for this session of the workshop (see following pages).

Breakout groups composition (proposal)

Group 1	Group 2	Group 3	Group 4
Canada	Belgium	Austria	United Kingdom
Finland	France	Hungary	Portugal
Japan (2)	Germany (2)	Slovenia	Spain (2)
Norway	Netherlands (2)	Poland (2)	Ireland (2)
Russia (2)	Switzerland (2)	Slovak Republic (2)	Germany (2)
United States	Italy	Czech Republic	Poland (1)
		Switzerland (1)	

Session 2: Information # 1

STANDARD REPORT FORM (SRF)

To : IAEA (IEC)
Neighbouring countries

MESSAGE No: 1
For authority use only

EXERCISE | EXERCISE | EMERCON

BASIC INFORMATION

1 Reporting STATE: Accident country Number of pages 1 + 0

2 Is this an official Notification under the Early Notification Convention of an actual or potential transboundary release that is or may be of radiological significance for another State? Yes

3 Competent Authority: CA of accident country

Tel: + E-mail:
Fax: + Website URL:
Contact person (official position):

4 NATURE OF EVENT

Event type: Nuclear installation event
Type of facility/activity: Nuclear power plant
Emergency class declared: Site Area Emergency
Basis for declaration: Small LOCA and SBO

5 Facility/Event Location

Name of Place/Facility: Accisite
Co-ordinates
Latitude: N
Longitude: W

Date/time of emergency declaration: 24.10.2017 08:00 UTC

6 Date and time of occurrence: 24.10.2017 06:00 UTC

7 Information VALID at: 24.10.2017 08:30 UTC

8 EVENT DESCRIPTION:

At 02:30 (UTC) a small LOCA was detected; exact location of the leak is unknown. Out of three emergency diesel generators (EDGs) trains Nr. X was out of service due to maintenance; Nr. Y started, but shut down shortly after; train Nr. W did not start. Station Blackout (SBO) occurred at 02:31 (UTC). The emergency core cooling system (ECCS) failed to start due to SBO condition.
A blowdown valve of the pressurizer opened for a short period, than closed, and is now stuck in a closed position. The valve is currently not operational, primary circuit pressure management has yet to be solved.

9 ACTIONS BEING TAKEN/PLANNED:

10 MEDIA INFORMATION Press release ☐ attached ☐ see web site
Media contact tel:+ URL of public web-site:

11 OTHER RELEVANT INFORMATION:

12 ☐ Further information in attachment ☐ Further information web:

Source: Kindly provided by the Federal Office for Radiation Protection (BfS, Germany).

Session 2: Information # 2.a

GENERAL EMERGENCY AT A NUCLEAR INSTALLATION FORM (GENF)

To: IAEA (IEC)
Neighbouring countries

MESSAGE No. 2
For authority use only

EXERCISE — EXERCISE — GENERAL EMERGENCY

BASIC INFORMATION

1 Notifying STATE: Accident country — Number of pages: 1 + 0

2 Is this an official Notification under the Early Notification Convention of an actual or potential transboundary release that is or may be of radiological significance for another State? Yes

3 Competent authority: CA of accident country
Tel: +
Fax: +
E-mail:
Website URL:
Contact person (official position):

4 Installation name/location: NPP Accisite
Type of installation: Nuclear power plant
Reactor type: PWR
Nominal power: 1485 MWthermal
Co-ordinates:
Latitude: N
Longitude: W

5 General Emergency declared at: 24.10.2017 10:00 UTC
Basis for declaration:
The core outlet temperature exceeded 1100 degrees Celsius, severe fuel damage is expected.

6 Information VALID at date / time: 24.10.2017 10:30 UTC

7 INSTALLATION CONDITIONS

CRITICALITY
Stopped a — 06:00 UTC

SEVERE DAMAGE TO FUEL
Has not occurred, likely to occur a — UTC

8 RELEASE
Has not occurred, likely to occur

Release to atmosphere:
Start date / time: yyyy/mm/dd / hh:mm UTC
End date / time: yyyy/mm/dd / hh:mm UTC
Release base height: m
Release top height: m

Description of actual or projected release conditions:
unknown

Release to water:
Water body affected:
Start date / time: yyyy/mm/dd / hh:mm (24h) UTC
End date / time: yyyy/mm/dd / hh:mm (24h) UTC

9 METEOROLOGY at date/time: 24.10.2017 10:00 UTC
Wind from: 90 °
Wind speed: 3 m/s
Wind measured at height: 10 m
Pasquill stability class: C
Local temperature: 10 °C
Precipitation: None

Observed plume direction: 270 °
Areas likely affected:
Forecast:

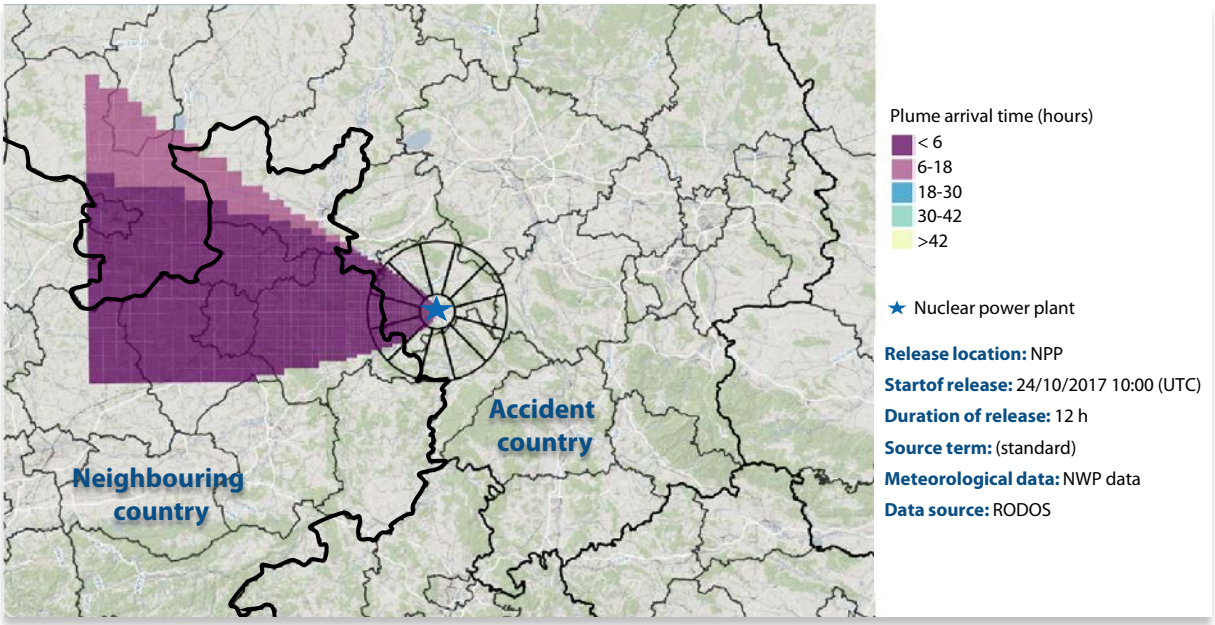
10 PROTECTIVE ACTIONS INITIATED
☐ None ☐ Stable iodine ☐ Sheltering ☐ Evacuation ☐ Food restrictions ☐ Water restrictions
☐ Traffic restrictions ☐ Other:

11 MEDIA INFORMATION Press release: ☐ attached ☐ see web site
Media contact tel: +
URL of public web-site:

12 Other relevant information:
The attachment contains a prognosis for areas which will affected if a release occurs within the next 12 hours.
☐ Further information web site:
☒ Further information in attachment

Source: Kindly provided by the Federal Office for Radiation Protection (BfS, Germany).

Session 2: Information # 2.b



Source: Kindly provided by the Federal Office for Radiation Protection (BfS, Germany).

Session 2: Information # 3.a

GENERAL EMERGENCY AT A NUCLEAR INSTALLATION FORM (GENF)

To: IAEA (IEC)
Neighbouring countries

MESSAGE No. 3
For authority use only

EXERCISE EXERCISE **GENERAL EMERGENCY**

BASIC INFORMATION

1 Notifying STATE: Accident country Number of pages: 1 + 0

2 Is this an official Notification under the Early Notification Convention of an actual or potential transboundary release that is or may be of radiological significance for another State? Yes

3 Competent authority: CA of accident country
Tel: +
E-mail:
Fax: +
Website URL:
Contact person (official position):

4 Installation name/location: NPP Accisite
Co-ordinates:
Type of installation: Nuclear power plant
Latitude: N
Reactor type: PWR
Longitude: W
Nominal power: 1485 MWthermal

5 General Emergency declared at: 24.10.2017 10:00 UTC
Basis for declaration:
The core outlet temperature exceeded 1100 degrees Celsius, severe fuel damage is expected.

6 Information VALID at date / time: 24.10.2017 12:30 UTC

7 INSTALLATION CONDITIONS

CRITICALITY
Stopped a 06:00 UTC

SEVERE DAMAGE TO FUEL
Has not occurred, likely to occur a UTC

8 RELEASE
Has not occurred, likely to occur

Description of actual or projected release conditions:
Expected amount of release:
Noble gases 7E+18 Bq, Iodines 2E+17 Bq, Aerosols 3E+16 Bq

Release to atmosphere:
Start date / time: 24.10.2017 16:00 UTC
End date / time: 24.10.2017 17:00 UTC
Release base height: 10 m
Release top height: 100 m

Release to water:
Water body affected:
Start date / time: UTC
End date / time: UTC

9 METEOROLOGY at date/time: 24.10.2017 12:00 UTC
Wind from: 90 °
Wind speed: 4 m/s
Wind measured at height: 10 m
Pasquill stability class: C
Local temperature: 10 °C
Precipitation: None

Observed plume direction: 270 °
Areas likely affected:
Forecast:

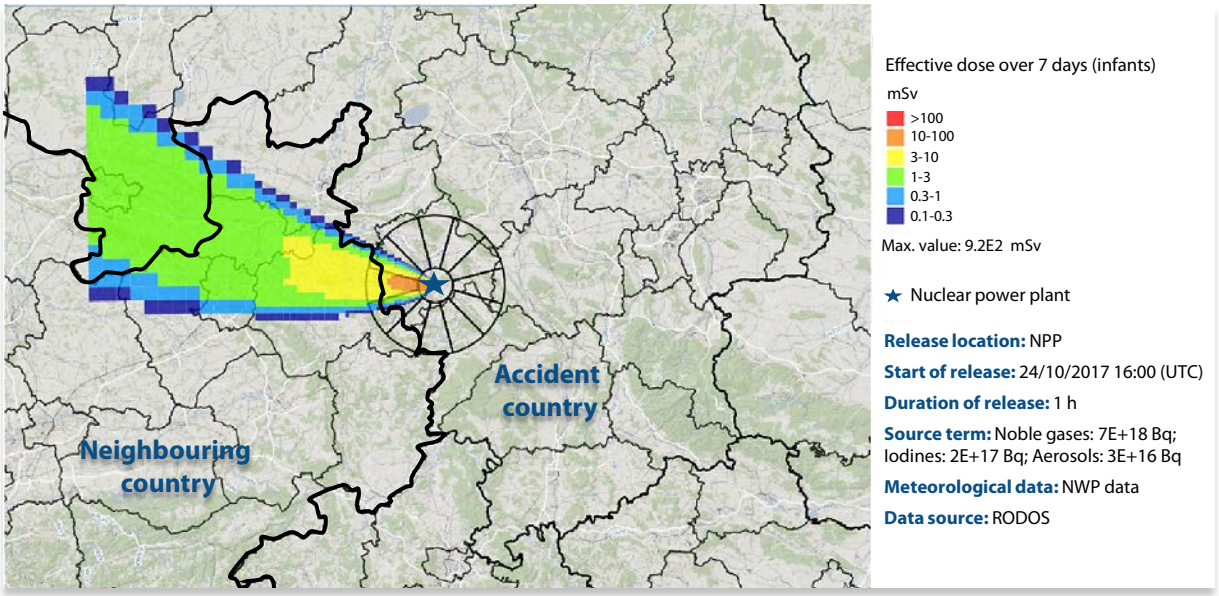
10 PROTECTIVE ACTIONS INITIATED
☐None ☐Stable iodine ☐Sheltering ☐Evacuation ☐Food restrictions ☐Water restrictions
☐Traffic restrictions ☐Other:

11 MEDIA INFORMATION Press release: ☐attached ☐see web site
Media contact tel: +
URL of public web-site:

12 Other relevant information:
The attachment contains a prognosis for the exposure of the public (effective dose over 7 days and thyroid doses, both for infants) for the expected source term (as above).
☐Further information web site:
☒Further information in attachment

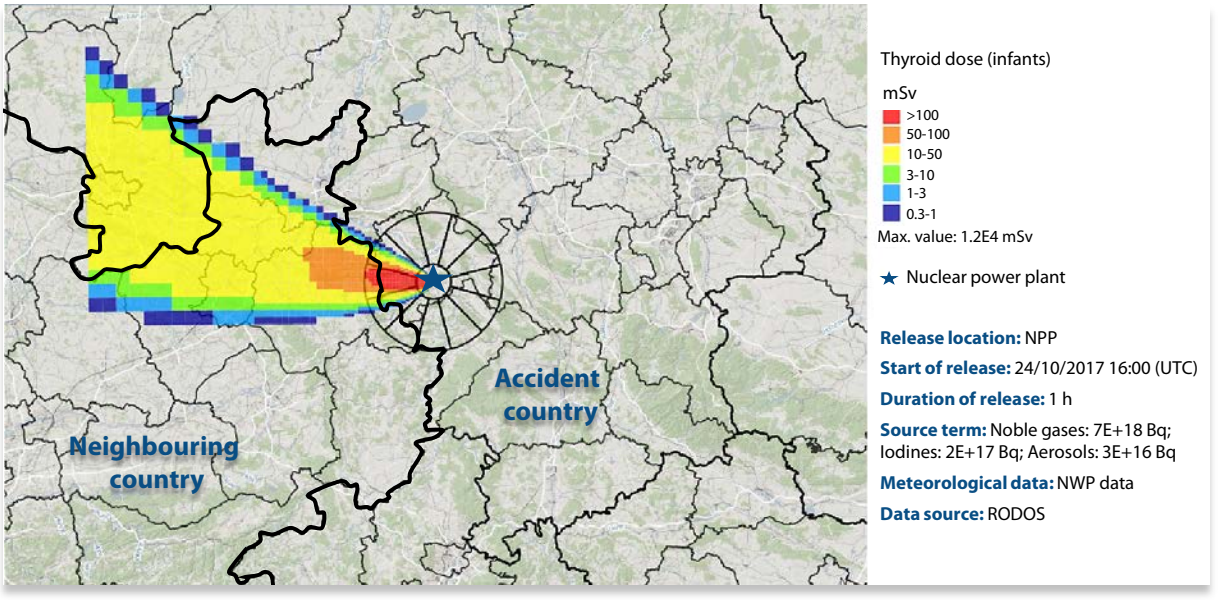
Source: Kindly provided by the Federal Office for Radiation Protection (BfS, Germany).

Session 2: Information # 3.b



Source: Kindly provided by the Federal Office for Radiation Protection (BfS, Germany).

Session 2: Information # 3.c



Source: Kindly provided by the Federal Office for Radiation Protection (BfS, Germany).

Questions to consider during the breakout groups on session 2

Factors that could support or complicate aligning your protective actions with the protective actions taken by the accident country:

1. Information received from the accident country – was this clear, consistent and timely? If not, which were the problems encountered? Could bilateral agreements support information sharing with the accident country?
2. Protective actions – were your country's protective actions aligned with those in the accident country? If not, then explain why this was the case (e.g. differences in radiological impact assessment, differences in protection strategy/triggers/default criteria, differences in emergency planning zones, lack of appropriate information on decision-making or the current status of implementation of protective actions in the accident country).
3. Citizens in the accident country – would you advise your citizens to follow the advice given by the accident country? If not, what are the obstacles or concerns? Would it be helpful to receive information on how the public in the accident country was informed?
4. Assessment and Prognosis – would an assessment and prognosis of the source term or situation in the accident facility, or an emergency classification of the event (e.g. according to the IAEA scheme) be helpful for you?

Questionnaire on possible reasons for different protective actions in a nuclear emergency

1. Pre-defined protective actions in a nuclear emergency:

Action	Yes	No	Comment
Preparation for sheltering			
Preparation for sheltering ordered for response forces			
Preparation for sheltering ordered for general public			
Sheltering as a self-standing measure			
Sheltering as an exceptional measure in case that safe evacuation is not possible			
Sheltering defined as indoor keeping in any building			
Sheltering defined as leaving home and staying in bunker buildings			
Reflex sheltering			
Ordered sheltering			
Preparation for evacuation			
Preparation for evacuation ordered for response forces			
Preparation for evacuation ordered for general public			
Reflex evacuation			
Ordered evacuation			
Preparation for iodine thyroid blocking (ITB)			
Preparation for ITB ordered for response forces			
Preparation for ITB ordered for general public			
ITB as a self-standing measure			
ITB only in combination with sheltering and /or evacuation			
Reflex ITB			
Ordered ITB			

2. Criteria for intervention levels for introducing protective actions (projected doses)

Action	Criteria
Sheltering	
Evacuation	
Iodine thyroid blocking	

3. What tools and methods do you use for dose projections and spread of release? On which models are these tools based?
4. Have you considered any possible scenarios for which your regulatory body would propose/order only evacuation in specific zone (precautionary action zone for example) and no other protection actions in further zones? If yes, what kind of scenarios would that be?

INEX-5 workshop: Session 3 issue sheet

Session 3: Mid- and long-term aspects of recovery: How to prepare?

In the design of the INEX-5 questionnaire, the intermediate and late phases of an emergency were specifically excluded, except for appropriate notification and communication activities within the scenario questions. Nonetheless, the questionnaire included a few questions related to those intermediate and longer-term aspects that needed to be dealt with. Respondents have reported to different extents several intermediate and long-term aspects that either were considered during the exercise or would be considered in a real emergency. Food restriction was the most commonly aspect considered. Others include medical and psychosocial monitoring of the population, radiation monitoring, decontamination, impact on tourism. The aim of this session was to share experience on how to prepare for the mid and long-term aspects of recovery.

Main issues for discussion:

- Do you agree that practising for long-term recovery should be a priority? Why?
- Does it seem in your country that long-term recovery is assumed to be easier since it's over longer time periods than crisis/response?
- Will long-term recovery involve organisations who have no role in crisis/response?
- Is detailed guidance lacking in your country?
- Would a modular exercise-in-a-box be useful?
- How familiar is everyone with ICRP 111?
  - "Application of the Commission's Recommendations to the Protection of People Living in Long-term Contaminated Areas after a Nuclear Accident or a Radiation Emergency".
- If further detail is needed, what organisation or process might be used to develop it?
- Regarding using non-radiation preparedness venues to discuss recovery, what ideas do you have?

NEA PUBLICATIONS AND INFORMATION

The full catalogue of publications is available online at www.oecd-nea.org/pub.

In addition to basic information on the Agency and its work programme, the NEA website offers free downloads of hundreds of technical and policy-oriented reports. The professional journal of the Agency, NEA News – featuring articles on the latest nuclear energy issues – is available online at www.oecd-nea.org/nea-news.

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Proceedings of the Fifth International Nuclear Emergency Exercise (INEX-5) Workshop

The Fifth International Nuclear Emergency Exercise (INEX-5) was developed in response to NEA member countries' desire to test and demonstrate the value of changes put in place following the Fukushima Daiichi nuclear power plant accident. INEX-5 was held during 2015 and 2016, and was followed by the Fifth International Nuclear Emergency Exercise (INEX-5) Workshop in early 2017. Representatives from 22 member countries, the International Atomic Energy Agency and the European Commission attended the workshop, where participants identified elements emerging from INEX-5 that would help improve international and national arrangements for notification, communication and interfaces related to catastrophic events involving radiation or radiological materials.

The workshop was an interactive experience structured around invited presentations, moderated discussions and breakout groups that addressed the four broad topics of communication and information sharing with other countries and international partners; cross-border and international co-ordination of protective actions; mid- and long-term aspects of recovery; and connections with the work of other international organisations and networks. These proceedings provide a summary of the proposals and recommendations for future work in emergency management.

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