

## **GUIDE FOR THE LECTURERS FOR IMPLEMENTING THE WORKING SESSION**

### **1. INTRODUCTION TO THE WORKING SESSION**

The primary purpose of the Workshop is to familiarize participants with the new guidance and recommendations contained in IAEA Safety Standards Series No. GSG-11 on Arrangements for the Termination of a Nuclear or Radiological Emergency and to train them on:

- What needs to be ensured so that an emergency can be declared formally ended and the transition to an existing exposure situation or a planned exposure situation can take place;
- How to prepare for facilitating the timely resumption of social and economic activity after a nuclear or radiological emergency.

To achieve this purpose, the Workshop includes a Working Session in which participants can apply in practice, in the context of specific emergency scenarios, the knowledge gained throughout the Workshop.

### **2. OBJECTIVES OF THE WORKING SESSION**

The objectives of the Working Session are for the participants:

- To identify and apply the prerequisites in a postulated emergency scenario for declaring a nuclear or radiological emergency ended;
- To identify the activities that need to be carried out during the transition phase to enable the prerequisites to be met;
- To recognize the preparedness infrastructure and other arrangements necessary to provide an adequate capability for effective response during the transition phase.

### **3. DESCRIPTION OF THE WORKING SESSION**

The participants are divided into five Working Groups (WGs). Participants are seated with other members of their group to facilitate discussions, to avoid time being wasted in reorganizing the members of the working groups following the joint sessions. During the Workshop, each WG will consider the various aspects of the termination of a nuclear or radiological emergency in the context of one of five postulated emergency scenarios (provided in Appendix I). A lecturer is assigned to each group to facilitate the process (see Appendix II).

The Working Session is divided into four parts, to be held at appropriate times during the first 3 days of the Workshop. A short discussion will take place at the end of each part of the Working Session. Each WG will present its results on Day 4. The different parts of the Working Session are discussed below in detail.

The Working Session starts on Day 1 of the Workshop with a brief introduction (11:35 – 11:45 a.m.).

### *3.1. Part 1 (Day 1: 11:40 AM – 01:40 PM, including lunch break)*

The aim of the first part of the Working Session is for the members of each WG to become familiar with the details of the postulated emergency scenario assigned to their group and to begin to consider:

- **What exposure situation will likely follow the transition phase?**
- **What preparations (in terms of activities and actions) would need to be completed during the transition phase to enable the emergency to be formally terminated?**

Members of the WGs need to read the scenario descriptions (provided to them before the start of the Working Session) carefully, noting the relevant information provided on the situation inherited at the end of the emergency response phase. They should then discuss the issues raised in the questions and elaborate what the necessary preparations should be.

A short discussion of this part of the Working Session is held in the last 5 minutes of WG work. Feedback on how the discussions has progressed is sufficient; detailed presentations are not expected at this stage. This also provides an opportunity to request clarification of the scenario descriptions or the need for further information.

### *3.2. Part 2 (Day 2: 09:00 – 10:00 AM)*

The aim of the second part of the Working Session is for the participants to reconsider the results of Part 1 in light of the lectures given in the afternoon of Day 1 and to expand the discussion within their respective WGs to other areas in view of the topics covered on Day 2. In particular, the following questions should be considered during this part of the Working Session:

- **What activities and actions are necessary to allow for the nuclear or radiological emergency to be terminated and the primary objective of termination to be met?**
- **What organizations and services may be involved during the transition phase?**

Members of the WGs are expected to revisit their responses to Part 1. They need to consider the details of the postulated emergency to determine which exposure situation is likely to follow the transition phase. They also need to consider whether they have identified all the actions necessary to achieve the primary objective and all the general and specific prerequisites for termination as presented earlier. Finally, they are expected to also discuss what organizations and services might be engaged during the transition phase.

A short discussion of this Working Session is held during the last 5 minutes of WG work to provide an opportunity for the group to provide feedback on the extent to which their thoughts have changed as a consequence of the lectures on Day 1; detailed presentations are not expected at this stage.

### *3.3. Part 3 (Day 3: 09:00 – 10:00 AM)*

The aim of the third part of the Working Session is for the participants to consider the results of Part 2 in greater detail, taking account of the lectures delivered on Day 2, and to expand the discussion within their WG to other areas in light of the topics covered on Day 3. The following questions should be considered in particular:

- **What organizations are likely to assume responsibility during the transition phase for terminating the emergency on-site and off-site? What is the relationship among them?**
- **What emergency arrangements need to be made at the preparedness stage for the transition phase to facilitate the termination of a nuclear or radiological emergency?**

Members of the WGs are expected to revisit their responses to Part 2 in light of knowledge gained during Day 2. They will need to consider the different responsibilities for terminating the emergency on-site and off-site and the means for coordination. The WGs will also need to take into account the infrastructure elements that have to be in place at the preparedness stage for the transition phase as part of their plans, procedures, etc.

There should be an opportunity to discuss WG progress and thoughts about the Working Session in the last 5 minutes of WG work. It should present an occasion for the group to provide feedback on the extent to which their thoughts have changed as a consequence of the lectures on Day 1 and Day 2; detailed presentations are not expected at this stage.

### 3.4. *Part 4 (Day 3: 2:30 – 3:30 PM)*

The aim of the fourth part of the Working Session is for participants to revisit the results of Part 3 in light of the lectures given on Day 3 and to consider the following additional question:

- **Which interested parties need to be consulted during the transition phase and what are the issues on which they should be consulted?**

Members of the WGs are expected to revisit the results of Part 3 to determine whether, in light of the lectures given on Day 3, there are any additional factors and information that would need to be taken into account in decision-making on the termination of the emergency. The WGs will also need to consider who the interested parties might be that need to be consulted in relation to the transition phase, on what topics they will be consulted about and how they will be involved and consulted during the transition phase.

It is anticipated that the results of this Working Session will form the basis of the presentations on the morning of Day 4.

### 3.5. *Presentations (Day 4: 09:00 – 11:40 AM)*

The first hour of Day 4 is reserved for the preparation of WG presentations of their results, noting the progress made from Part 1 to Part 4.

As of 10:00 a.m., a representative of each WG will give a short presentation (15 mins. max) covering the following:

- **The termination considerations associated with these scenarios, e.g.:**
  - The exposure situation likely to follow the transition phase;
  - The activities and actions that need to be undertaken in order to terminate the emergency (taking account of the primary objective and prerequisites for termination) and the responsible organizations;
  - The interested parties identified that need to be consulted and when and how this consultation is expected to take place;
  - The infrastructure and other arrangements that need to be made at the preparedness stage for the transition phase.
- **How the ideas of the group have evolved over the course of the Workshop.**

Presentations should be prepared in PowerPoint and files provided to the IAEA staff before 09:50 a.m. on Day 4. Each WG presentation is followed by 5 mins. of discussion.

#### 4. FEEDBACK

The WG presentations will be followed by a discussion and feedback session with the involvement of all lecturers and participants.

WG facilitators are expected to follow the WG work and note the progress made. The Mentor Evaluation Form provided in Appendix III should be filled out throughout the Working Session.

#### 5. WORKING SESSION MATERIALS

Every participant will be provided with printouts of:

- A description of all postulated emergency scenarios and a list of the WGs with their assigned postulated emergency scenario (see Appendices I and II);
- Questions to be addressed in each part of the Working Session (see Appendix IV);
- Guidance for WG presentations (see Appendix V).

## Appendix I

### DESCRIPTION OF POSTULATED EMERGENCY SCENARIOS DERIVED ON THE BASIS OF A HAZARD ASSESSMENT PERFORMED IN A STATE

*Note: In all cases, the nuclear or radiological emergency should not be assumed to occur in isolated locations but in areas with population densities and land use, such as those in Europe, for example.*

#### **I.1. Postulated Emergency 1: General emergency at a nuclear power plant combined with a severe natural event (earthquake and tsunami), located on the coast within a State**

Scenario: A severe earthquake and tsunami cause the loss of all external power and practically the entire alternative power supply to the plant, at a site comprising six boiling water reactors (BWRs). Severe core damage occurs at three Units, which are operating at full power at the time of the accident, and a large amount of radioactive material is released into the environment over the period of one week (for example, in the range of 100-400 PBq for I-131 and 7-20 PBq for Cs-137). The infrastructure in the region is severely damaged by the earthquake and tsunami, and there are many casualties.

Expected situation at the end of the emergency response phase: People within 20 km of the site and other designated areas have been evacuated, and those within 20 – 30 km have been instructed to shelter before being advised to voluntarily evacuate. While in some areas, the people were advised to return after the immediate hazard was gone, in others they were relocated instead. People were relocated in additional areas beyond 30 km where hot spots were identified. Restrictions on the distribution and consumption of food and non-food commodities and the consumption of drinking water are in place within designated areas within a radius of over 100 km, and efforts are ongoing to identify if these restrictions are still needed. Emergency response organization is still functioning in full response mode (24/7). People are eager to know if they are safe, what the authorities will do next and when they can return to their normal life.

## **I.2. Postulated Emergency 2: General emergency at a nuclear power plant located in a neighbouring State**

Scenario: The loss of all external power and practically the entire alternative power supply occurs at the plant, as a result of sabotage, at a site comprising six boiling water reactors (BWRs). Severe core damage occurs at three Units, which are operating at full power at the time of the malicious act, and a large amount of radioactive material is released into the environment over the period of one week (for example in the range of 100 - 400 PBq for I-131 and 7-20 PBq for Cs-137). The nuclear power plant is located at a distance of 10 km from the border.

Expected situation at the end of the emergency response phase: Following agreements with the accident State, similar protective actions are instituted in the neighbouring State (see *Expected situation at the end of the emergency response phase* in the description of the Postulated Emergency 1), leading to a similar situation at the end of the emergency response phase.

## **I.3. Postulated Emergency 3: Emergency at a radiotherapy unit involving the accidental overexposure of patients**

Scenario: The misuse of a computerized treatment planning system, to allow for the non-standard use of multiple shielding blocks during radiotherapy, leads to patients being exposed for substantially longer treatment times than prescribed. A total of 28 patients suffering from prostate cancer and cancer of the cervix are overexposed over a period of 8 months before the mistake is identified, by which time 8 people have died as a consequence.

Expected situation at the end of the emergency response phase: Radiotherapy at the unit in question is halted and investigations are initiated to identify the cause for the overexposures. Arrangements are put in place to identify all those who were affected, to examine them and assess their doses and to treat the affected individuals. The government requests assistance under the terms of the Convention on Assistance in the Case of a Nuclear or Radiological Emergency regarding identification of the causes of the accident, dose assessment and medical treatment. As this is the only radiotherapy facility within the area, there is already pressure from the public and the government to re-open the radiotherapy unit so that those in need can continue with their treatment.

#### **I.4. Postulated Emergency 4: Unintentional dispersion of radioactive material in the public domain**

Scenario: Radioactive material from a radiotherapy unit (containing a dangerous radioactive source of around 50 TBq Cs-137) is widely dispersed in the public domain as a consequence of an unintentional act. Fragments are distributed among several families, and the remnants of the source assembly are sold for scrap. Severe exposure of members of the public occurs, causing medical symptoms of overexposure before the accident is recognized.

Expected situation at the end of the emergency response phase: The major quantity of the dispersed source is located and isolated. Areas where the source has been dispersed are mapped, evacuated and cordoned off. Access control is in place. Monitoring is ongoing. A holding area for members of the public who may be exposed or contaminated is designated, where a team of experts carry out medical triage and identifies people requiring hospitalization. Monitoring and bioassay are undertaken to identify those in need of intensive medical care. Other persons are monitored and found to be contaminated either internally or externally. Decontamination actions are instituted to bring all potential sources of contamination under control, and the need for further decontamination is under consideration. People are anxious to know if they are safe, what the authorities will do next and whether it will be possible at all for them to recover from what happened and go back to their property.

#### **I.5. Postulated Emergency 5: Recovery of stolen dangerous source**

Scenario: A vehicle transporting the head of a teletherapy unit with a Co-60 source (approximate activity 111 TBq) is stolen. The vehicle is stolen on its way to a radioactive waste storage facility by a group of armed individuals, who assault the driver of the vehicle and drive the vehicle and radioactive source in an unknown direction.

Expected situation at the end of the emergency response phase: Following notification of the event, the regulatory body confirms the activity of the source and prepares and distributes advice to the civil protection authorities on the potential risks of handling the radioactive source, the immediate actions to be taken by responders and the public should they come across the source and the telephone numbers to contact if the source is found. The police locate the vehicle and an empty source casing. Following monitoring, using vehicle-based monitors, unusual levels of radioactivity are measured in the field around 1 km from the abandoned vehicle. The area is evacuated and cordoned off. Investigation identifies all individuals who have handled the source, and dose assessment and medical examination are initiated.



## Appendix II

### WORKING GROUPS

GROUP A	GROUP B	GROUP C	GROUP D	GROUP E
Country/Participant 01	Country/Participant 07	Country/Participant 13	Country/Participant 19	Country/Participant 25
Country/Participant 02	Country/Participant 08	Country/Participant 14	Country/Participant 20	Country/Participant 26
Country/Participant 03	Country/Participant 09	Country/Participant 15	Country/Participant 21	Country/Participant 27
Country/Participant 04	Country/Participant 10	Country/Participant 16	Country/Participant 22	Country/Participant 28
Country/Participant 05	Country/Participant 11	Country/Participant 17	Country/Participant 23	Country/Participant 29
Country/Participant 06	Country/Participant 12	Country/Participant 18	Country/Participant 24	Country/Participant 30
<b>Facilitator: Lecturer 01</b>	<b>Facilitator: Lecturer 02</b>	<b>Facilitator: Lecturer 03</b>	<b>Facilitator: Lecturer 04</b>	<b>Facilitator: Lecturer 05</b>

### ASSIGNMENT OF A POSTULATED EMERGENCY SCENARIO TO A GROUP

- GROUP A – Postulated Emergency Scenario 1
- GROUP B – Postulated Emergency Scenario 2
- GROUP C – Postulated Emergency Scenario 3
- GROUP D – Postulated Emergency Scenario 4
- GROUP E – Postulated Emergency Scenario 5

### Appendix III

#### EVALUATION FORM FOR LECTURERS

Group Working Session – Lecturer/Mentor Criteria for Evaluation						
Working Group: _____						
Lecturer/Mentor: _____						
<p>This evaluation form is intended for use by lecturers, as they assume the role of mentor for each working group during the Workshop. Each lecturer/mentor will be assigned a group to which he/she will provide guidance as required. This form will be used for each scheduled <i>Working Session</i> during the workshop as well as the final <i>Working Session Presentations</i>. Observe<sup>1</sup> group interactions; provide guidance as required to the group and record ratings. Ratings are based on a standard 1 to 5 scale as per the descriptors noted for each indicator.</p>						
<b>Working Session Part 1</b>						
General comments:						
The group members did not identify the key features of the scenario and the exposure situation to which the emergency exposure situation will transit and could not identify any activity necessary for termination of the emergency.	1	2	3	4	5	The group members identified all of the important features of the scenario and the exposure situation to which the emergency exposure situation will transit and were able to identify a good range of activities necessary for termination of an emergency.
<b>Working Session Part 2</b>						
General comments:						
The group members were unable to identify relevant prerequisites for termination of the emergency as applicable to the scenario and the organizations and services involved during the transition phase.	1	2	3	4	5	The group members identified the relevant prerequisites for termination of the emergency as applicable to the scenario and a good range of organizations and services to be involved during the

<sup>1</sup>Note that the Workshop consists of short discussions each day (1, 2, 3 and 4), followed by the main group presentation on Day 4.

## Workshop on Arrangements for the Termination of a Nuclear or Radiological Emergency

						transition phase.
The group members did not demonstrate any significant development in their understanding of the prerequisites for termination of an emergency in their discussions compared to Part 1.	1	2	3	4	5	The group members demonstrated a significant development in their understanding of the prerequisites for termination of an emergency in their discussions compared to Part 1.
The discussion was generally dominated by a few members.	1	2	3	4	5	All members were involved in the discussion.
<b>Working Session 3</b> General comments:						
The group members were unable to identify the different responsibilities to facilitate the termination of an emergency on-site and off-site and the means for coordination.	1	2	3	4	5	The group members identified the different responsibilities to facilitate the termination of an emergency on-site and off-site and the means for coordination.
The group members did not demonstrate any significant development in their understanding of efforts needed during the transition phase and of the necessary infrastructure in their discussion compared to Part 2.	1	2	3	4	5	The group participants demonstrated a significant development in their understanding of efforts needed during the transition phase and of the necessary infrastructure in their discussion compared to Part 2.
The discussion was generally dominated by a few members.	1	2	3	4	5	All members were involved in the discussion.
<b>Working Session 4</b> General comments:						
The group members were unable to identify additional factors and information for decision-making on the termination of the emergency and the important features of consultation with interested parties.	1	2	3	4	5	The group members identified additional factors and information for decision-making the termination of the emergency, and a range of features of consultation with interested parties.

## Workshop on Arrangements for the Termination of a Nuclear or Radiological Emergency

The group members did not demonstrate any significant development in their understanding of efforts during the transition phase in their discussion compared to Part 3.	1	2	3	4	5	The group participants did not demonstrate any significant development in their understanding of efforts during the transition phase in their discussion compared to Part 3.
The discussion was generally dominated by a few members.	1	2	3	4	5	All members were involved in the discussion.
<b>Working Group Presentations</b> General comments:						
The presentation demonstrated that the participants were unable to apply GSG-11 guidance to the scenario under consideration and that there had been no development of their understanding during the course of the Workshop.	1	2	3	4	5	The presentation demonstrated that the participants were fully able to apply GSG-11 guidance to the scenario under consideration and that there had been a significant development of their understanding during the course of the Workshop.
The final presentation was prepared by a few members of the group without input from others.	1	2	3	4	5	Each group member fully participated in the preparation of the final presentation.

**Additional Mentor Comments, if any:<sup>2</sup>**

**Comments (on individual participants):<sup>3</sup>**

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<sup>2</sup>Comments can be based on observations of the group each day and then summarized at the end of the workshop. For consistent results, it is recommended that the same mentor evaluate the same group throughout the week.

<sup>3</sup>In the event of non-participation by individual group members, the mentor should retain comments reflecting this observation.

## **Appendix IV**

### **WORKING SESSION QUESTIONS**

#### **IV.1. Part 1 (Day 1)**

- What exposure situation will likely follow the transition phase?
- What preparations (in terms of activities and actions) would need to be completed during the transition phase to enable the emergency to be formally terminated?

#### **IV.2. Part 2 (Day 2)**

- What activities and actions are necessary to enable the nuclear or radiological emergency to be terminated and the primary objective of termination to be met?
- What organizations and services may be involved during the transition phase?

#### **IV.3. Part 3 (Day 3)**

- What organizations are likely to assume responsibility during the transition phase for terminating the emergency on-site and off-site? What is the relationship among them?
- What emergency arrangements need to be made at the preparedness stage for the transition phase to facilitate the termination of a nuclear or radiological emergency?

#### **IV.4. Part 4 (Day 3)**

- Which interested parties need to be consulted during the transition phase and what are the issues on which they should be consulted?

## Appendix V

### GUIDANCE FOR WORKING GROUP PRESENTATIONS

The first hour of Day 4 is reserved for the preparation of Working Groups (WG) presentations on the results from the working session from Part 1 to Part 4 noting also the progress made.

From 10:00 a.m. on Day 4, each WG is expected to give a short presentation (15 mins max) covering the following:

- **The termination considerations associated with these scenarios, e.g.:**
  - The exposure situation likely to follow the transition phase;
  - The activities and actions that need to be undertaken in order to terminate the emergency (taking account of the primary objective and prerequisites for termination) and the responsible organizations;
  - The interested parties identified that need to be consulted and when and how this consultation is expected to take place;
  - The infrastructure and other arrangements that need to be made at the preparedness stage for the transition phase.
- **How the ideas of the group have evolved over the course of the Workshop.**

Presentations should be prepared in PowerPoint and files provided to the IAEA Staff before 09:50 a.m. on Day 4.

Each WG presentation will be followed by 5 minutes discussion.