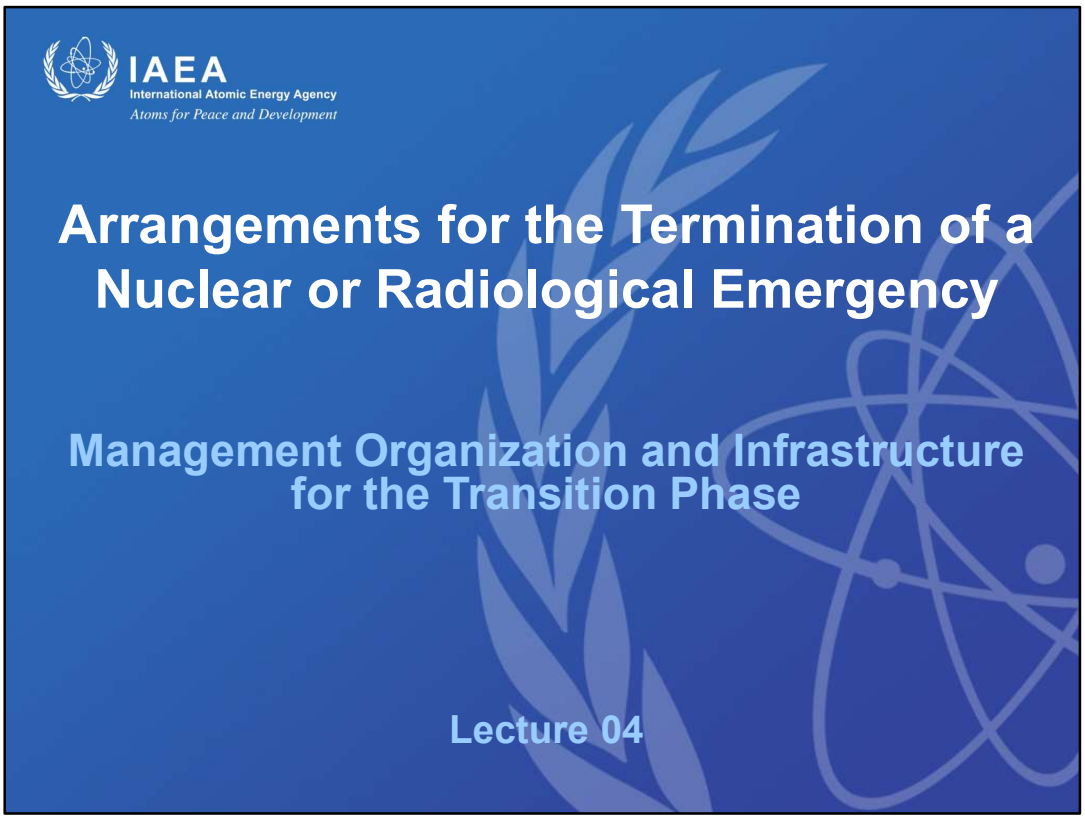
Arrangements for the Termination of a Nuclear or Radiological Emergency



Lecture: 04. Management Organization and Infrastructure for the Transition Phase

Purpose of the Presentation:

- Consider the use of the results of the hazard assessment in preparing arrangements for the transition phase
- Provide guidance on the arrangements for the administration and management of organizations during the transition phase
- Identify the elements of infrastructure necessary for the transition phase

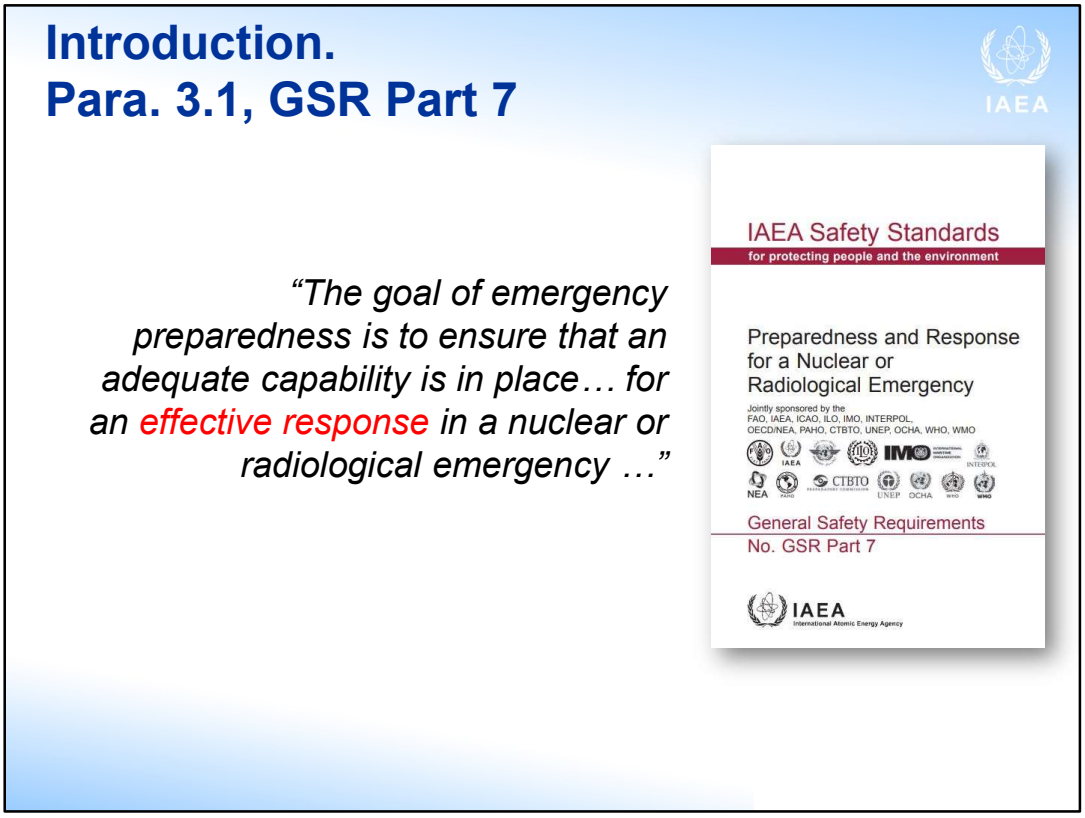
Learning objectives:

- Recognize the governing framework, coordination and management aspects of the response during the transition phase
- Consider the requirements for human, technical and financial resources, as well as the mobilization and coordination mechanisms among different organizations necessary in the transition phase
- Recognize the importance of integrated planning (all-hazards approach) for planning for the transition phase
- Consider the need for transboundary coordination of preparedness and response

Duration: 60 minutes

References:

1. International Atomic Energy Agency, Preparedness and Response for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSR Part 7, IAEA, Vienna (2015).
2. International Atomic Energy Agency, Arrangements for the Termination of a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSG-11, IAEA, Vienna (2018).
3. International Atomic Energy Agency, Arrangements for Preparedness for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GS-G-2.1, IAEA, Vienna (2007).



Lecture notes:

Para. 3.1 of GSR Part 7 defines the goal of emergency preparedness.

It applies to all levels: within the operating organization; at local, regional and national levels; and, where appropriate, at the international level.

The capability relates to an integrated set of infrastructural elements that include, but are not limited to:

- authority and responsibilities;
- organization and staffing;
- coordination;
- plans and procedures;
- tools, equipment and facilities;
- training, drills and exercises;
- a management system.

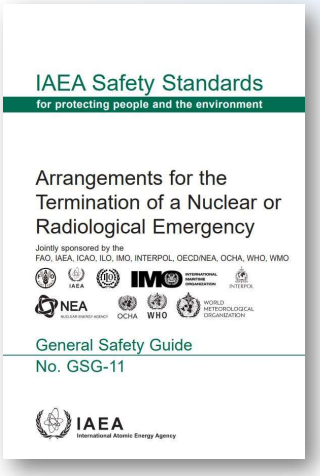
References:

1. International Atomic Energy Agency, Preparedness and Response for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSR Part 7, IAEA, Vienna (2015).

Introduction.
Section 3, GSG-11

"Before the termination of the emergency, any change or transfer of authority and responsibilities from the emergency response organization to organizations responsible for the long term recovery operations has been completed."

"The sharing of any information and data that were gathered during the emergency exposure situation and that are relevant for long term planning has been organized among the relevant organizations and authorities."



Lecture notes:

In addition to the general prerequisites and other specific prerequisites spelled out in Section 3 of GSG-11 , the two specific prerequisites mentioned here should also be met in order to be able to declare the termination of an emergency and to move to an existing exposure situation.

Reference:

1. International Atomic Energy Agency, Arrangements for the Termination of a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSG-11, IAEA, Vienna (2018).

Which goals are mainly applicable to either the Emergency Response Phase or the Transition Phase?

- Regain control of the situation and mitigate the consequences;
- Save lives;
- Avoid or minimize severe deterministic effects;
- Render first aid, provide critical medical treatment and manage the treatment of radiation injuries;
- Reduce the risk of stochastic effects;
- Keep the public informed and maintain public trust;
- Mitigate, to the extent practicable, non-radiological consequences;
- Protect, to the extent practicable, property and the environment;
- Prepare, to the extent practicable, for the resumption of normal social and economic activity.

Lecture notes:

Five mins discussion aimed at reminding participants of the change of focus from the emergency response phase to the transition phase and the corresponding change in the assumption of various responsibilities for the transition phase. This calls for the integration of additional organizations, the transfer of authorities and responsibilities and the change to other management structures. All of this needs to be pre-planned.

Purpose

- Consider the use of the results of the hazard assessment in preparing arrangements for the transition phase;
- Provide guidance on the arrangements for the administration and management of organizations during the transition phase;
- Identify the elements of infrastructure necessary for the transition phase.

Learning Objectives

- Recognize the governing framework, coordination and management aspects of the response during the transition phase;
- Consider the requirements for human, technical and financial resources, and the mobilization and coordination mechanisms among different organizations necessary in the transition phase;
- Recognize the importance of integrated planning (all-hazards approach) for planning for the transition phase;
- Consider the need for transboundary coordination of preparedness and response.

Contents

- Introduction to:
  - Use of the hazard assessment for developing adequate preparations
  - Types of organizations and modes of operation in the emergency response phase and the transition phase
- Arrangements for the transition phase:
  - Authorities, responsibilities, management
  - Information transfer
  - Ensuring continuity
- Infrastructure elements:
  - Plans and procedures
  - Training, drills and exercises
  - Logistical support and facilities
  - Quality management programme
- Compensation of victims for damage

Adequate preparations

- What constitutes adequate preparations for response to a nuclear or radiological emergency depends on the applicable postulated emergency scenarios and their associated consequences.
- Hazard assessment for EPR should be used to identify the arrangements required for all phases of the emergency.

Hazard assessment in preparedness

- GSR Part 7 requires that a hazard assessment is performed to:
  - Identify facilities/activities/sources that may lead to an emergency warranting protective or other response actions and areas/locations where such actions may be needed;
  - Provide the basis for a graded approach in EPR.
- Use the results of a hazard assessment to:
  - Anticipate what the transition phase might encompass;
  - Identify actions that may be warranted to enable the termination of an emergency;
  - Identify options and limitations of specific emergency arrangements to be made for the transition phase;
  - Assess the time frames anticipated in which different emergencies are expected to be terminated.

Lecture notes:

Hazards need to be identified and potential consequences of an emergency to be assessed to provide a basis for establishing arrangements for preparedness and response for a nuclear or radiological emergency. These arrangements shall be commensurate with the hazards identified and the potential consequences of an emergency.

In the hazard assessment, facilities and activities, on-site areas, off-site areas and locations need to be identified for which a nuclear or radiological emergency could — with account taken of the uncertainties in and limitations of the information available — warrant a range of protective actions and other response actions to mitigate the consequences.

Proper hazard assessment will provide the basis upon which the emergency arrangements for the transition phase can be established.

Expected exposure situation that is likely to apply following termination

Emergency class	Expected exposure situation following termination
General emergency at emergency preparedness (EP) Category I or II facility (with significant release) (Example: Fukushima Daiichi accident 2011)	Existing exposure situation
Site area emergency (Category I or II) or facility emergency (Category I, II or III) (Example: Paks fuel damage incident 2003)	Planned exposure situation
Alert at Category I, II or III facility (Example: Fire or explosion potentially affecting areas containing safety systems)	Planned exposure situation
Other nuclear or radiological emergency (Category IV) (Examples: Hueypoxtla radiological incident 2013 and Goiânia accident 1987)	Planned exposure situation or Existing exposure situation

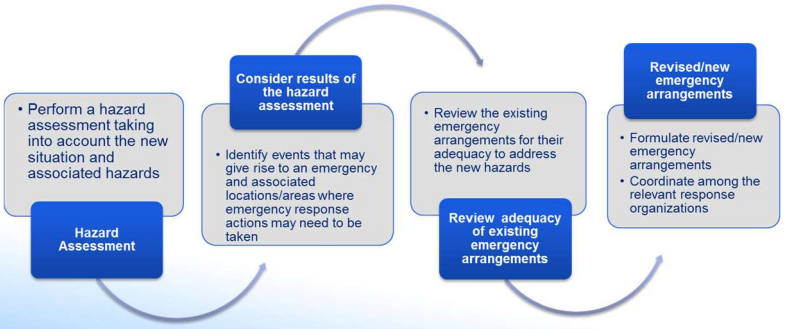
Lecture notes:

Provide an opportunity to re-check participants' understanding of the difference between transitioning to existing and planned exposure situations and when this might happen. After a thorough hazard assessment and the preparation of emergency arrangements, countries may have established an emergency classification system, as required in the Safety Standards, that make it possible to identify clearly and without further assessment the required level of emergency response.

This slide looks at suggested emergency classes in GSR Part 7 with the aim of identifying to what exposure situation the emergency exposure situation may transition. The planned exposure situation at different places in the table may denote normal operation as well as decommissioning of the accident damaged facility and clean-up or ending of the operational life of the source. All of these are subject to the requirements for a planned exposure situation established in GSR Part 3. This consideration may be helpful to States in assessing the level of response that will be warranted for the transition phase should they face an emergency in a specific emergency class; it may also be beneficial in evaluating what the associated arrangements to prepare for will be in line with GSG-11.

Hazard assessment in transition phase

- As the potential hazards may have been changed due to the emergency, one of the prerequisites for termination is to perform a hazard assessment taking into account the new situation and associated hazards.



Lecture notes:

Before any decision to terminate the emergency is made, a thorough hazard assessment should be performed in respect of the situation and its future development, consistent with Requirement 4 of GSR Part 7. The hazard assessment should provide a basis for preparedness and response for any new emergency that may occur. On the basis of the hazard assessment, those events and associated areas that may warrant protective actions and other response actions — including those that may mitigate the consequences of a future emergency — should be identified, and the existing emergency arrangements should be reviewed. The review should determine whether there is a need to revise the existing emergency arrangements and/or to establish new arrangements.

Example

- Prior to the emergency, a nuclear power plant had a set of emergency arrangements based on the hazard assessment.

Image reproduced from 'The Fukushima Daiichi Accident', IAEA, Vienna (2015)

Following the emergency, the hazards associated with the plant changed, including, for example:

- Damaged buildings;
- Evacuation of previous precautionary action zone (PAZ) and urgent protective action planning zone (UPZ);
- Access to the plant more limited due to road damage.

Lecture notes:

For example, the hazards associated with a nuclear power plant in normal operation and its associated emergency arrangements will differ from the hazards associated with an accident damaged nuclear power plant and its associated emergency arrangements.

FIG.: Example of debris removal from Unit 3 reactor building, International Atomic Energy Agency, The Fukushima Daiichi Accident, Technical Volume 5/5, Post-accident Recovery, IAEA, Vienna (2015)

Interim response capability

- New hazard assessment might highlight the need for revised emergency arrangements.
- Formal establishment of such revised arrangements may be a lengthy process:
  - Want to prevent unnecessary delay in the termination of the emergency.
- Establishment of an interim response capability should be considered (e.g. few revised procedures and training on new hazards).

Lecture notes:

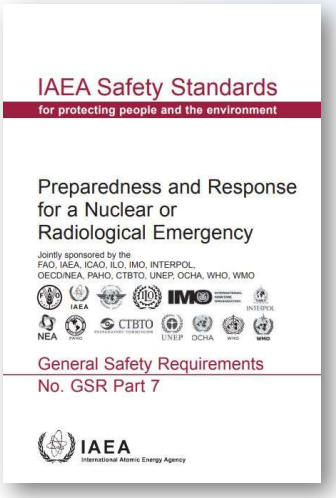
The emergency should not be terminated until revised or new emergency arrangements have been formulated and have been coordinated among the relevant response organizations. However, in some cases, the formal establishment of revised or new emergency arrangements might be a lengthy process. Therefore, the establishment of an interim response capability in the transition phase should be considered to prevent unnecessary delay in the termination of the emergency.

The purpose of such an interim response capability is to provide an improved response to any future emergency, postulated on the basis of the hazard assessment, before the full emergency arrangements are put in place. This interim capability might not be optimal and would need to make use of all available means and resources with only minimal additional arrangements (e.g. training, a few revised procedures).

IAEA Safety Standards Series No. GSR Part 7 Requirement 20

"The government shall ensure that authorities for preparedness and response for a nuclear or radiological emergency are clearly established."

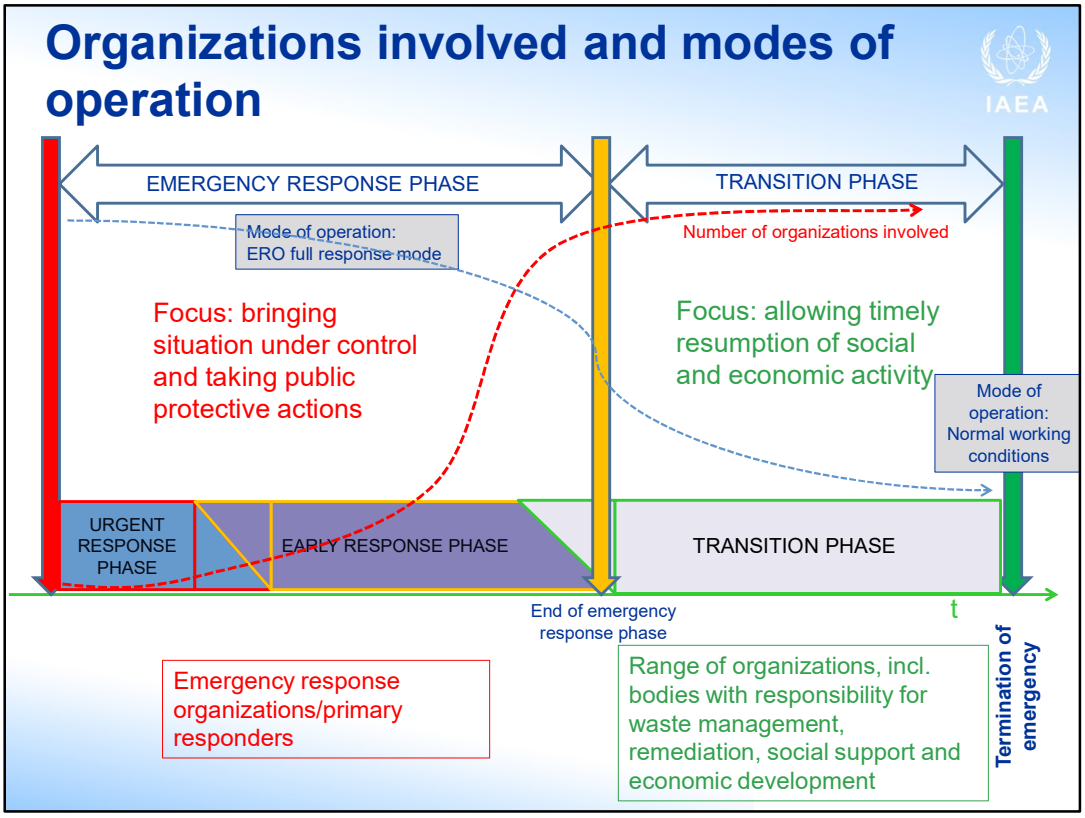
"Arrangements for delegation and/or transfer of authority specified in emergency plans, and for coordination and communication in all phases of the response."



Lecture notes:

References:

1. International Atomic Energy Agency, Preparedness and Response for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSR Part 7, IAEA, Vienna (2015).



Lecture notes:

In the urgent response phase, the discharge of authority and assumption of responsibilities in the emergency response is, to the extent possible, straightforward and based on pre-planned arrangements, allowing for effective implementation of precautionary urgent protective actions and urgent protective actions. In this phase, the input from different organizations required in the decision making on emergency response actions will be limited.

As the emergency evolves, the focus of the emergency response will shift from bringing the situation under control and taking public protective actions to allowing the timely resumption of social and economic activity. Both radiological and non-radiological considerations will be taken into account. Additional organizations, which may not necessarily have been directly engaged during the urgent phase, will be gradually involved with relevant responsibilities at different levels in response to the emergency within the emergency response organization. This should be done in a way that enables ongoing response efforts to continue on a routine basis in the longer term after the emergency response organization has been relieved of its duties.

Discussion

As the emergency moves from the urgent response phase to the early response and then the transition phase, additional organizations will become involved in the response:

- What type of arrangements need to be made at the preparedness stage to allow for their effective integration during the transition phase?

Lecture notes:

Allow for about 3 mins. of discussion.

Arrangements for the transition phase to be made at the preparedness stage

- Identification of authority, roles and responsibilities of all organizations for the transition phase:
  - Based on expected activities to fulfil prerequisites for termination;
  - Examples of additional organizations for the transition phase: waste management operators, psychological support services, compensation scheme administration, agricultural advisors.

Arrangements for the transition phase to be made at the preparedness stage (cont'd)

- Some prerequisites to be fulfilled by the operating organization in addition to responsible off-site response organizations:
  - Termination in areas off the site will be subject to confirmation by the operating organization that respective prerequisites have been fulfilled on the site:
    - This needs to be clearly understood and well coordinated.
  - Off-site organizations may include foreign organizations in the case of transboundary releases:
    - Appropriate support and coordination need to be ensured at the preparedness stage.

Lecture notes:

The responsibility for declaring the emergency on-site terminated should be with the operating organization. The responsibility for declaring the emergency terminated off-site should be with the responsible off-site authority. In the case of an emergency with transboundary release, consider the need for transboundary coordination, taking into account that terminating an emergency off-site will be subject to fulfilling some prerequisites on-site.

Arrangements for the transition phase to be made at the preparedness stage (cont'd)

- Allocation of authority and responsibility for making the decision on termination:
  - Recognizing that the authority and responsibility may be different for on-site areas and off-site areas;
  - Coordination needs.
- Implementation of provisions in legal and regulatory framework to allow for effective decision making and coordination:
  - To be identified and made at preparedness stage.

Lecture notes:

The authority, roles and responsibilities of all organizations with regard to preparation, response and recovery in the transition phase — including oversight of the implementation of provisions within the legal and regulatory framework, as well as ensuring the necessary resources (human, technical and financial) — should be identified at the preparedness stage. The identification of these elements should be based on the activities that are expected to be carried out during the transition phase to fulfil the prerequisites for termination of the emergency. As part of these arrangements, the authority and responsibility for making a formal decision on the termination of a nuclear or radiological emergency should be clearly allocated, well understood and documented in the respective emergency plans and procedures. Consideration should be given to the fact that the organization with the authority and responsibility for deciding on the transition from an emergency exposure situation to an existing exposure situation or a planned exposure situation may differ between the on-site areas and off-site areas.

Arrangements for the transition phase to be made at the preparedness stage (cont'd)

- Ensuring availability of necessary staffing and resources.
- Establishment of a mechanism for mobilizing resources and coordinating different organizations at different levels.
- Information sharing and cooperation arrangements with neighbouring countries.

Lecture notes:

The government should review and revise at the preparedness stage, as appropriate:

(a) The legal and regulatory framework governing preparedness and response in respect of the transition phase of a nuclear or radiological emergency;

(b) The framework for radiation protection and safety relating to longer term issues associated with an existing exposure situation,

to ensure a smooth transition and to avoid unnecessary delays due to legal and regulatory issues.

As part of this review, the need for the following should be identified:

(a) The positions to be staffed to implement the necessary activities in the transition phase and, over the longer term, in a planned exposure situation or an existing exposure situation, as appropriate;

(b) The provision of 'just in time' training to emergency workers and helpers;

(c) The mobilization of resources among relevant organizations.

Lecture notes:

Arrangements should be established to ensure that such positions, training and resources will be in place when they are needed.

As seen for example in the response to the Fukushima Daiichi accident, major efforts were needed to develop the adequate legal framework to deal with the consequences of the accident in long term and interim arrangements (in terms of guidance, manuals etc., before laws and regulations were enacted). The development of such provisions during the response is carried out under huge public and political pressure. As usual, this is also a time consuming process that will unnecessary delay timely preparations for the resumption of normal social and economic activity. The same applies to the allocation of resources, their mobilization, the provision of training, etc.

Arrangements for the transition phase to be made at the preparedness stage (cont'd)

- Establishment of provisions for a change in authority and responsibility during the transition phase, including:
  - Coherent and clear process for the transfer of authorities and responsibilities;
  - Prompt resolution of conflicting responsibilities or gaps;
  - Effective channelling of multi-disciplinary contributions.

Lecture notes:

In the urgent response phase, the discharge of authority and the assumption of responsibilities in the emergency response have to be, to the extent possible, straightforward and based on planned arrangements to enable the effective implementation of precautionary urgent protective actions and urgent protective actions. Thus, the input from other organizations into the decision making process regarding the emergency response actions warranted during the urgent response phase is expected to be limited.

As the emergency evolves, the focus of the emergency response will shift from bringing the situation under control and taking public protective actions, to allowing the timely resumption of social and economic activity. At this time, radiological considerations will be only one of the many factors to be evaluated in the decision making processes. Decision making at this time will require the involvement of additional organizations, with relevant responsibilities at different levels, that might not necessarily have been directly engaged during the urgent response phase.

Lecture notes:

These organizations should gradually be involved, when appropriate, in the emergency response in order to discharge their allocated roles and responsibilities. This involvement should be arranged in a way that enables ongoing response efforts to continue without interruption on a routine basis in the longer term, after the emergency response organization has been relieved of its duties.

A mechanism should be put in place at the preparedness stage that would allow for the mobilization and coordination of different organizations at different levels, provide for any necessary change in authority and discharge of responsibilities during the transition phase, and enable the prompt resolution of any conflicting responsibilities. This mechanism should take into account that, in the transition phase, there will be a need for multidisciplinary contributions, including those from the operating organization, which will need to be channeled efficiently and effectively.

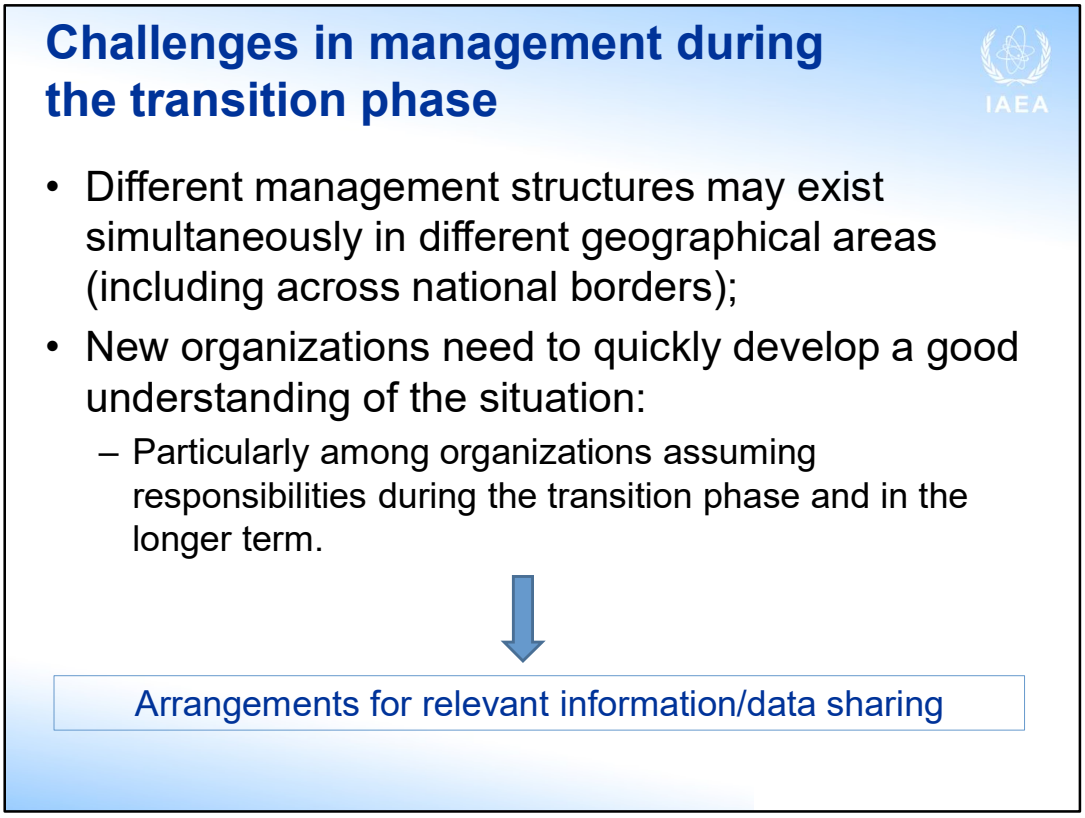
Arrangements for the transition phase to be made at the preparedness stage (cont'd)

- Transfer of authorities and responsibilities to be process that is:
  - Formal;
  - Coordinated;
  - Transparent (to other organizations and to all interested parties).
- With the formal termination, ERO deactivated:
  - Certain responsibilities may need to be additionally assigned to other organizations.

Lecture notes:

In the transition phase, the necessary transfer of responsibilities to different jurisdictions or different authorities (or to different units within an organization) should be carried out in a formal, coordinated and fully transparent manner and should be communicated to all interested parties.

With the formal termination of the emergency, the structure of the emergency response organization should be deactivated. At that stage, the management structure of the various response organizations should revert to what it had been prior to the emergency to allow for an effective response to any emergency that might occur in the future; however, some of these organizations may need to assume additional responsibilities. There may also be a need for new coordination and consultation mechanisms for those organizations dealing with the consequences of the emergency in the longer term as an existing exposure situation or a planned exposure situation.



Lecture notes:

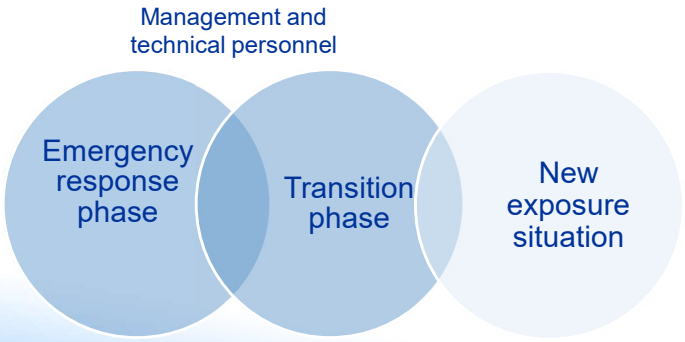
The organizations assuming responsibility for the activities in the transition phase, and in the longer term within an existing exposure situation, as appropriate, should quickly develop an understanding of the situation. Arrangements should be established that would allow for the relevant information and data on the nuclear or radiological emergency to be made available to these organizations, including, for example, the protection strategy implemented in the emergency response phase and the rationale supporting the decisions made in the emergency response phase.

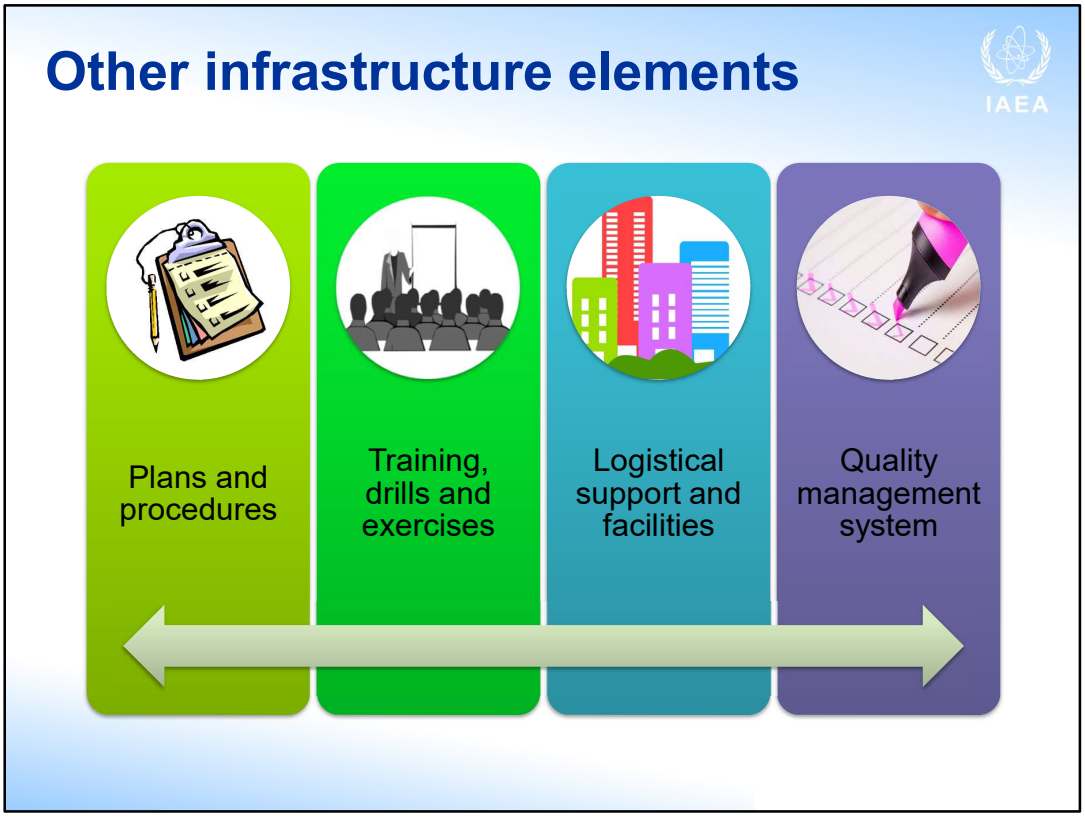
Information transfer considerations

- Sharing of relevant information and data requires arrangements for:
  - Identifying the type of information and data of relevance for the transition phase and the longer-term
  - Identifying relevant organizations that have to have access to this information and data
  - Mechanisms for recording and exchanging information and data among relevant organizations and the need for continued data collection

Ensuring continuity

- Consider an overlap of management and technical personnel involved in the emergency response phase and in the transition phase to ensure continuity

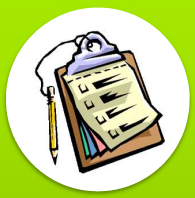




Lecture notes:

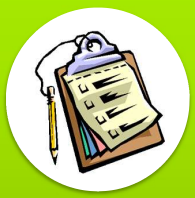
Infrastructure elements that need to be put in place to ensure that the primary objective is met and the prerequisites for terminating the emergency can be fulfilled.

Plans and procedures



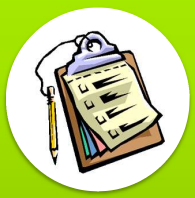
- GSR Part 7 requires that plans and procedures cover the entire period from the onset of the emergency until its termination.
- Developed by all relevant organizations to allow effective implementation of the protection strategy:
  - Taking account of the hazard assessment;
  - Considering the prerequisites for the termination of the emergency.
- Take account of the fact that more organizations will be involved in response in the transition phase.

Plans and procedures (cont'd)



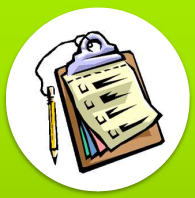
- States usually have arrangements for returning to normal social and economic activity after any type of emergency (e.g., flooding, earthquakes, chemical spills);
- May include arrangements for relocation of population, psychological support, compensation, clean-up, etc.

Plans and procedures (cont'd)



- Such arrangements can support preparations for the transition phase after a nuclear or radiological emergency.
- The arrangements necessary for nuclear/radiological emergencies need to be integrated with those for other emergencies:
  - All-Hazards Approach.

Plans and procedures (cont'd)



- An all-hazards approach:
  - Optimized resource use;
  - Capacity to deal with multiple hazards through functional planning;
  - Flexible, integrated arrangements.

Discussion

- What needs to be included in the national emergency plan for the transition phase?

Lecture notes:

Allow for about 3 mins. of discussion.

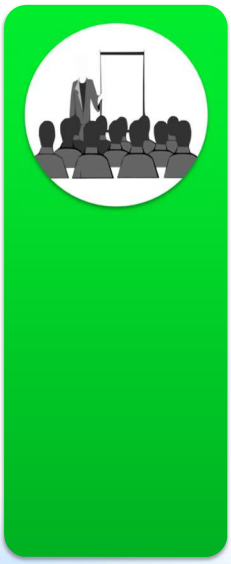
Emergency plan

- Clearly describes roles and responsibilities during the transition phase and beyond, as appropriate.
- Takes account of changes in authority and responsibilities between different phases, including:
  - Triggering mechanisms;
  - Coordination arrangements;
  - Decision making processes and criteria (in line with the protection strategy);
  - Human, technical and other resources;
  - Types of information and data that need to be transferred and the necessary supporting arrangements.

Emergency plan (cont'd)

- Elaborates arrangements for:
  - Taking various actions during the transition phase in light of the relevant prerequisites;
  - Adjusting the protection strategy to meet the actual circumstances;
  - Decision making on termination.
- Elaborates preparedness aspects that ensure effective emergency response during the transition phase;
- Is developed in a coordinated and consistent manner at different levels:
  - National, regional, local;
  - Organizational;
  - Facility;
  - International (where relevant).

Training, drills and exercises



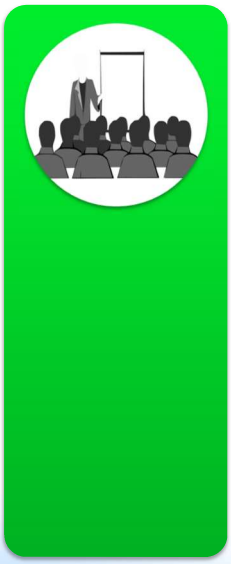
- Arrangements for selection of personnel and for training to ensure personnel selected have the requisite knowledge, skills and abilities to perform assigned response functions.
- Relevant personnel to take part in regular training, drills and exercises.
- All specified response functions and organizational interfaces tested at suitable intervals.

Applies for all phases

Lecture notes:

These are requirements of GSR Part 7 that are applicable for all phases of a nuclear or radiological emergency.

Training



- Knowledge, skills and abilities different from those necessary for the emergency response phase may apply.
- In establishing the training needs for the transition phase consider:
  - Change of focus from public protection to resumption of social and economic activity and providing for people's well-being;
  - Need to address different activities that will apply during the transition phase;
  - Additional organizations and people to be involved.

Drills and Exercises

- Overall exercise programme should cover transition phase activities and personnel:
  - More frequent small-scale exercises on specific aspects of transition phase are feasible:
    - At facility, local, regional and national levels.
  - Participation of relevant organizations (including those not involved in the urgent response phase);
  - Test arrangements to facilitate resumption of normal social/economic activity every 3-5 years.

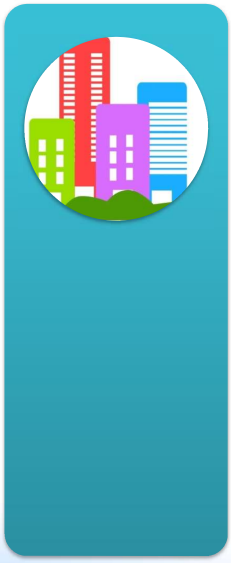
Lecture notes:

FIG.: Courtesy of International Atomic Energy Agency

Review

- Evaluation of training, drills and exercise programmes as part of the management system:
  - Areas for improvement provide the basis for review and revision of transition phase arrangements, where necessary.

Logistical support and facilities



Preparedness:

- Identification and selection of logistical support and facilities considering the prerequisites for termination of the emergency;
- Establishment of arrangements for the acquisition, deployment and mobilization of logistical support and communication to the relevant parties.

Lecture notes:

These are requirements of GSR Part 7 that are of relevance for the transition phase as well.

Example

- In response to the Goiânia accident, the necessary resources for clean-up were deployed from a distance of around 1300 km from the site:
  - At the peak, over seven hundred staff were deployed for decontamination activities.

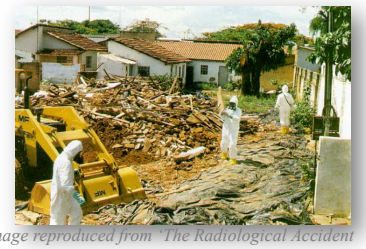


Image reproduced from "The Radiological Accident in Goiânia", IAEA, Vienna (1988)

Lecture notes:

The example is used to illustrate the need for resources (technical and human) that may be needed even in case of a radiological emergency. They may exceed those that exist at local or regional levels, and, in some cases, may call for requesting international assistance. Identifying what is available at the national level, mechanism/conditions under which the available resources can be mobilized and those resources for which international assistance may be required needs to be carried out at preparedness stage.

FIG.: Contaminated rubble from the demolition of the house where the source assembly was dismantled and the source capsule broken open., International Atomic Energy Agency, The Radiological Accident in Goiânia, IAEA, Vienna (1988)

Discussion

- Can you give some examples of logistical support and facilities that may be needed during the transition phase?

Lecture notes:

Allow for about 3 mins. of discussion.

Logistical support and facilities

Examples of emergency response facilities in the transition phase:

- Public support centres;
- Reception centres;
- Laboratories for sample analysis;
- Medical support facilities;
- Radioactive waste collection points;
- Storage facilities.

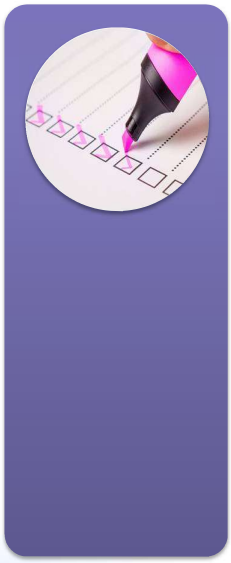
Lecture notes:

Some examples of the type of equipment and logistics that may be needed during transition phase.

Dedicated tools – communication equipment, measuring systems, computer - based support systems, availability of data etc. should be periodically checked and tested.

FIG.: Courtesy of International Atomic Energy Agency

Quality management system



- Establish a programme within an integrated management system to ensure availability and reliability of all arrangements when needed, including:
  - Periodic and independent appraisals;
  - Arrangements for incorporating lessons from research, operating experience and emergency exercises;
  - Record keeping.
- Cover all the arrangements from the emergency onset by the time the emergency is terminated.

Compensation of victims for damage

- Ensuring efficient return to normal social and economic activity likely requires the compensation of victims for damage caused by emergency or response actions;
- Provision of such a public reassurance is an important aspect for later phase of an emergency.

Emergency type	Compensation governed by
Radiological emergencies	• Exclusively by national laws (e.g., civil third party liability)
Nuclear emergencies	• Number of liability treaties that exist at international level. • National rules may also apply

Lecture notes:

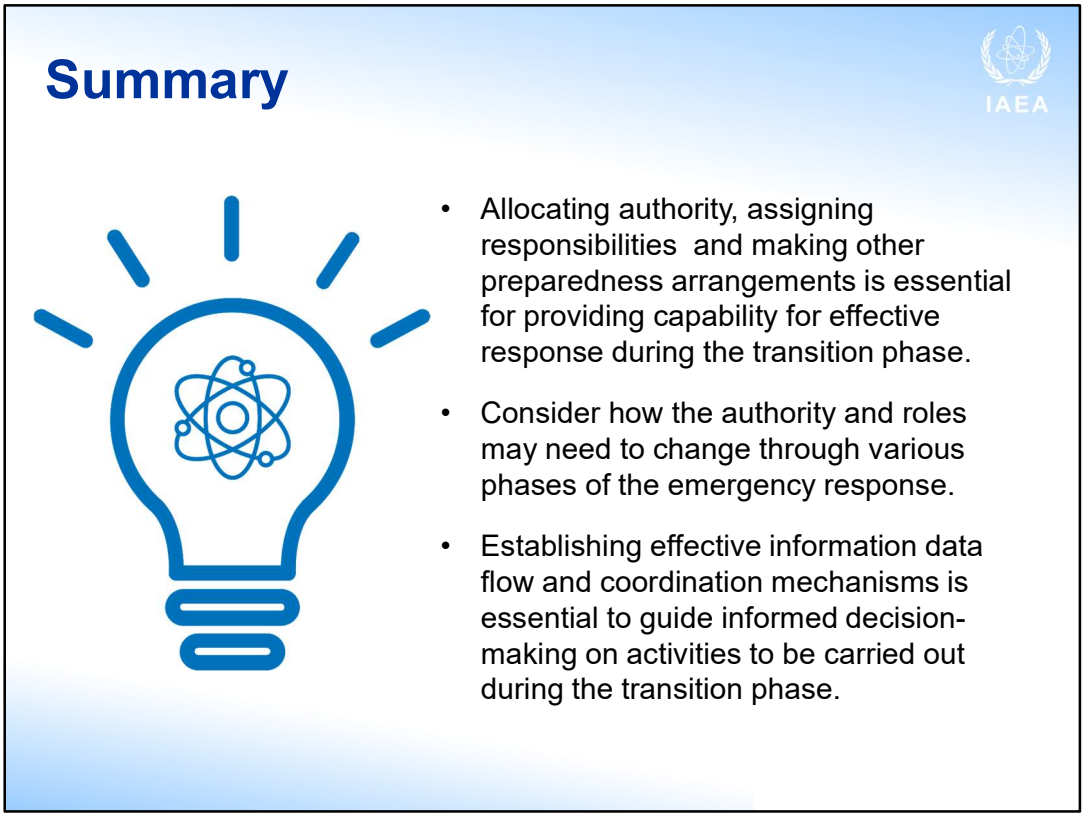
Many past nuclear or radiological emergencies resulted in loss of life, health consequences and loss of or damage to property and the environment. These consequences may have an adverse impact on industry, the economy, trade, tourism, agriculture and the quality of life of those affected. Ensuring an efficient return to normal social and economic activities following the emergency is likely to necessitate the payment of compensation for the damage caused either by the emergency or by the emergency response actions taken.

Compensation for damage caused by radiological (i.e. non-nuclear) emergencies is exclusively governed by the national laws of each State, and no international treaty has been adopted to harmonize the various national laws. Compensation is usually based on national rules relating to civil liability, in particular those relating to third party (i.e. non-contractual) liability, which are also known in some legal systems as tort law rules. Under the general rules relating to third party liability, a person causing someone else a loss or harm has to pay compensation for the damage caused. In most legal systems, specific rules have also been adopted to govern third party liability for damage caused by dangerous activities, such as those involving a potential for radiation exposure.

Lecture notes:

In the case of nuclear emergencies, a number of treaties have been adopted by States in order to harmonize national laws relating to third party liability for nuclear damage caused by emergencies at nuclear installations, as defined, and in the transport of nuclear material to and from such installations. Thus, compensation for nuclear damage in States is based either on these treaties or on national rules implementing them.

Further discussion goes beyond the scope of EPR.



Lecture notes:

Summarize the three key points of the presentation.

Lecture notes:

Thank you!