



# Emergency Preparedness and Response

Prepared to Respond



**IAEA**

International Atomic Energy Agency

## MESSAGE FROM THE DIRECTOR GENERAL



“ To protect the public and the environment in the event of a nuclear or radiological emergency, we must build effective national and international response arrangements.

The IAEA's Incident and Emergency Centre is the global focal point for international preparedness and response to such an emergency, whether it arises from an accident, natural disaster, negligence or a security event. ”

**Rafael Mariano Grossi**

IAEA DIRECTOR GENERAL

## How does the IAEA assist Member States in emergency preparedness and response?

The IAEA's vision is that all Member States build comprehensive and internationally harmonized capabilities to respond efficiently and timely to any nuclear or radiological emergency, consistent with IAEA safety standards.

Through the IEC, the IAEA fulfils its EPR roles and responsibilities by:

- Developing and maintaining the international emergency preparedness and response (EPR) framework;
- Developing EPR-related safety standards, guides and tools to support Member States and international organizations;
- Offering appraisal services and assisting Member States in strengthening their EPR capabilities and arrangements;
- Developing, implementing and sustaining EPR resources and tools for use by the Secretariat and the Member States; and
- Providing 24/7 focal point for emergency response and emergency assistance.



Irrespective of the cause, the IAEA prepares for and responds to nuclear or radiological emergencies.

## International EPR Framework

The international EPR framework facilitates the exchange of information and, upon request, the prompt provision of assistance in the event of a nuclear or radiological emergency to mitigate any consequences. This framework is based on three elements:

- Legal instruments: the legal foundations provided by the Convention on Early Notification of a Nuclear Accident (Early Notification Convention) and the Convention on Assistance in the Case of a Nuclear Accident (Assistance Convention).
- IAEA safety standards: the IAEA establishes and provides for the application of internationally agreed safety standards.
- Agreements and arrangements: practical means by which the IAEA, its Member States and relevant international organizations maintain preparedness to respond to nuclear or radiological emergencies.

## Inter-Agency Coordination

In September 1986, in the aftermath of the Chernobyl accident, the IAEA, together with international partner organizations, established the Inter-Agency Committee on Radiological and Nuclear Emergencies (IACRNE), whose purpose is to coordinate the response of the relevant international organizations to nuclear or radiological emergencies and to develop common preparedness and response arrangements. Currently, IACRNE comprises 18 international intergovernmental organizations.

IACRNE members develop, maintain and co-sponsor the Joint Radiation Emergency Management Plan of the International Organizations — the Joint Plan. The IAEA is the main coordinating body for the development and maintenance of the Joint Plan. The Joint Plan describes a common understanding of how each organization prepares for and response to an emergency.

# International Assistance

## RESPONSE AND ASSISTANCE NETWORK (RANET)

The IAEA's RANET offers a compatible and integrated system to provide international assistance, upon request, during a nuclear or radiological emergency. The assistance aims to minimize actual or potential radiological consequences for health, environment and property.

State Parties to the Assistance Convention are expected, within the limits of their capabilities and resources, to identify national assistance capabilities consisting of qualified experts, equipment and materials that could be made available to assist another State. This obligation is fulfilled through registration to RANET, which comprises more than 30 Member States.

A State facing a nuclear or radiological emergency may request assistance by or through the IAEA, which then facilitates assistance using its resources and the national assistance capabilities registered in RANET.





## Supporting Member States' preparedness to respond

The IAEA regularly prepares and conducts exercises and training courses to evaluate and improve its own and its Member States' response arrangements and capabilities with regard to nuclear and radiological emergencies.

The IAEA holds roughly 10 Convention Exercises (ConvEx) each year at three levels of complexity, involving the participation of Member States and International Organizations. Large-scale ConvEx-3 are conducted every three to five years. The largest ever 2017 ConvEx-3 involved the participation of 83 Member States and 11 International Organizations. The IEC also runs four IAEA-internal full response exercises every year.

## Building Capacities

The IAEA works to help Member States enhance their own preparedness for emergencies. The IAEA supports the development of Member States' on-site, local, regional and national response capabilities in line with IAEA safety standards through:

- The Emergency Preparedness Review (EPREV) Service (see page 6);
- Technical support to national and regional technical cooperation projects;
- Education and training activities (see page 11).

## Emergency Preparedness Review (EPREV) Service

The EPREV Service assesses the level of preparedness for a nuclear or radiological emergency in Member States. The service, conducted upon request, facilitates the development of national emergency response capabilities consistent with the IAEA safety standards.

A team of IAEA Secretariat and international experts assess national capabilities by comparing their arrangements with IAEA safety standards and worldwide good practices. The service was launched in 1999. More than 40 missions have been conducted worldwide.

## School of Radiation Emergency Management

The School of Radiation Emergency Management, established in 2015, focuses on the basic principles of preparedness and response to nuclear and radiological emergencies, based on safety standards and guidelines, including emergency management systems, protective actions, public communications and international EPR arrangements.

The curriculum includes lectures, practical sessions, field and tabletop exercises, site visits and discussions involving participants and lecturers. The school offers a platform for participants to share their experience of working in a variety of response organizations.



# IAEA EPR Resources and Tools

## UNIFIED SYSTEM FOR INFORMATION EXCHANGE IN INCIDENTS AND EMERGENCIES (USIE)

During any nuclear or radiological emergency, countries will need quick, authoritative and verified information about the situation and its potential consequences. The IAEA's Unified System for Information Exchange in Incidents and Emergencies (USIE), which supports secure information transfer and storage on a 24/7 basis, enables countries to exchange urgent notifications and follow-up information during an emergency irrespective of its cause. Its features support all of the IAEA's response roles and makes all relevant information available to designated contact points in State Parties, Member States and relevant international organizations. The System not only facilitates the exchange of notifications and information between countries during an emergency, it also allows them to request information or international assistance.

Over 1,400 users from more than 150 Member States are registered in USIE.

## INTERNATIONAL NUCLEAR AND RADIOLOGICAL EVENT SCALE (INES)

INES is a tool for communicating the safety significance of events associated with sources of ionizing radiation to the public. It covers activities at nuclear facilities, transport of radioactive material and a wide spectrum of practices in industry and medicine.

The IAEA Nuclear Events Web-based System (NEWS) is a communication channel, accessible to the public, for reporting events using the INES. Information on NEWS is reported by participating INES National Officers worldwide. Over 90 designated INES National Officers from more than 70 countries are authorized to post reports and updates to NEWS.

 [HTTPS://WWW-NEWS.IAEA.ORG](https://www-news.iaea.org)



## **EPR INFORMATION MANAGEMENT SYSTEM (EPRIMS)**

EPRIMS is an interactive, web-based tool for Member States to share information on their EPR capabilities for nuclear and radiological emergencies at the preparedness stage.

The system enables Member States to record information about EPR arrangements, perform a self-assessment of their status with reference to the recommendations outlined in the IAEA safety standards and, at their discretion, share information and knowledge with the IAEA and other Member States.

EPRIMS features a database of nuclear power plants in Member States and associated technical data. It is linked to the IAEA's Power Reactor Information System, and plays a key role for the assessment and prognosis process in case of a nuclear or radiological emergency.

## **INTERNATIONAL RADIATION MONITORING INFORMATION SYSTEM (IRMIS)**

IRMIS supports the implementation of the Early Notification Convention by providing a mechanism for the reporting and visualisation of large quantities of environmental radiation monitoring data during nuclear or radiological emergencies. The data is made available to Member States, international organizations and the IAEA through the Unified System for Information Exchange in Incidents and Emergencies (USIE, see next page). This shared data can assist the Member States in deciding on public protective actions and other response actions during a nuclear or radiological emergency.

All data reported in IRMIS remain the ownership of the reporting Member State. It is reported in one of two categories: routine data in the form of radiation dose rates from fixed monitoring stations; or event data during a nuclear or radiological emergency.

IRMIS is not an early warning system that automatically reports when there are significant deviations in values or when values are detected above certain levels.

## **ASSESSMENT & PROGNOSIS TOOLS**

In close cooperation with the Member States, the IAEA has developed customized assessment tools in order to implement its assessment and prognosis response role. These tools are for the use of experts at the IAEA and designated national experts in Member States through implementation of a specific process of development and clearance. The tools are available to the IAEA Member States' emergency contact points.



# EPR Publications Series

The IAEA EPR publication series is available online and in hard copy.

<https://www-pub.iaea.org/books/IAEABooks/SERIES/124/EMERGENCY-PREPAREDNESS-AND-RESPONSE>

## NUCLEAR POWER PLANT

**Actions to Protect the Public in an Emergency due to Severe Conditions at a Light Water Reactor**

EN | RU | ES

EPR-NPP Public Protective Actions 2013

**Operational Intervention Levels for Reactor Emergencies and Methodology for Their Derivation**

EN

EPR-NPP-OILs 2017

## OPERATIONAL ARRANGEMENTS

**Operations Manual for Incident and Emergency Communication**

AR | ZH | EN | FR | RU | ES

EPR-IEComm 2012

**Joint Radiation Emergency Management Plan**

EN

EPR-JPLAN 2017

**IAEA Response and Assistance Network**

EN

EPR-RANET 2018

## RADIOLOGICAL EMERGENCIES <sup>TM</sup>

**Manual for First Responders to a Radiological Emergency**

AR | EN | FR | RU | ES

EPR-First Responders 2006

## PUBLIC COMMUNICATION <sup>TM</sup>

**Communication with the Public during a Nuclear or Radiological Emergency**

AR | ZH | EN | FR | RU | ES

EPR-Public Communications 2012

**Method for Developing a Communication Strategy and Plan for a Nuclear or Radiological Emergency**

EN | ES

EPR-Public Communication Plan 2013

## PLANNING AND FUNDAMENTALS <sup>TM</sup>

**Method for Developing Arrangements for Response to a Nuclear or Radiological Emergency**

AR | EN | FR | RU | ES

EPR-Method 2003

**Lessons Learned from the Response to Radiation Emergencies (1945 – 2010)**

AR | EN | FR | RU | ES

EPR-Lessons Learned 2012

**Dangerous quantities of radioactive material (D-values)**

AR | EN | FR | RU | ES

EPR-D Values 2006

**Preparation, Conduct and Evaluation of Exercises to test Preparedness for a Nuclear or Radiological Emergency**

AR | EN | FR | RU | ES

EPR-Exercise 2005

**Considerations in Emergency Preparedness and Response for a State Embarking on a Nuclear Power Programme**

AR | EN | FR | RU | ES

EPR-Embarking 2012

## MONITORING

**Guidelines on the Harmonization of Response and Assistance Capabilities for a Nuclear or Radiological Emergency**

EN

EPR-Harmonized Assistance Capabilities 2017

## RESEARCH REACTORS <sup>TM</sup>

**Generic Procedures for Response to a Nuclear or Radiological Emergency at Research Reactors**

EN | ES

EPR-Research Reactor 2011

**Generic Procedures for Response to a Nuclear or Radiological Emergency at Triga Research Reactors**

EN

EPR- Triga Research Reactor 2011

## MEDICAL <sup>TM</sup>

**Generic Procedures for Medical Response During a Nuclear or Radiological Emergency**

EN | RU

EPR-Medical 2005

**Cytogenetic Dosimetry: Applications in Preparedness for and Response to Radiation Emergencies**

AR | ZH | EN | FR | RU | ES

EPR-Biodosimetry 2011

# EPR training available

## GENERAL

### Notification, Reporting and Requesting Assistance in the Case of a Nuclear or Radiological Emergency 5 DAYS

Targeting staff responsible for notification, reporting and requesting assistance at entities that have been officially designated as the IAEA's emergency contact points.

### Evaluating Preparedness for a Nuclear or Radiological Emergency 5 DAYS

Targeting emergency preparedness coordinators who have a key role in the organization of exercises to test preparedness for nuclear or radiological emergencies; technical and scientific support personnel who lead the development of exercise scenarios and simulated radiological data; emergency planners; and specialists in associated training.

### First Response to a Radiological Emergency 4 DAYS

Targeting first responders to a radiological emergency, such as: law enforcement teams; fire brigades; emergency medical services; public information officers; resource coordinators; first responder monitors; forensic evidence management teams; national officials; and emergency services personnel and managers.

### Preparedness and Response for an Emergency at a Research Reactor 5 DAYS

Targeting emergency planners at facility and local levels, emergency response coordinators and emergency managers.

## MEDICAL

### Cytogenetic Dosimetry: Applications in a Nuclear or Radiological Emergency 4-5 DAYS

Targeting biologists, medical technologists, and laboratory staff performing biological dosimetry and medical specialists such as physicians, radiopathologists and haematologists.

### Medical Response to a Nuclear or Radiological Emergency 9 DAYS

Targeting professionals in charge of response at the scene, response at the hospital, and advanced medical care.

## SAFETY STANDARDS

### IAEA Safety Standard: Preparedness and Response for a Nuclear or Radiological Emergency, GSR Part 7 5 DAYS

Targeting professionals at national, regional, local or facility levels who have responsibility for preparing for and responding to a nuclear or radiological emergency.

### IAEA Regional Workshop on Arrangements for the Termination of a Nuclear or Radiological Emergency 4 DAYS

Targeting participants from organizations with responsibilities in preparing for, and responding to, a nuclear or radiological emergency at the national, regional, or local level, as well as at the facility level, with regard to the transition phase of a nuclear or radiological emergency.

## NUCLEAR POWER PLANT

### Considerations in Emergency Preparedness and Response for a State Embarking on a Nuclear Power Programme 5 DAYS

Targeting national nuclear power programmes managers and national EPR professionals.

### Development and Use of Operational Intervention Levels for Reactor Emergencies 4 DAYS

Targeting professionals involved in the development of national criteria for the implementation of protective actions and other response actions during a nuclear or radiological emergency.

### Protecting the Public During a Nuclear Power Reactor Emergency 5 DAYS

Targeting decision-makers and their support staff, emergency planners at facility and local levels, emergency response coordinators and emergency manager.

## COMMUNICATION

### Communicating with the Public in a Nuclear or Radiological Emergency 5 DAYS

Targeting public information officers at facility, local and national levels, emergency managers and emergency coordinators.

# IAEA's Incident and Emergency System (IES)

Through the IES, the IAEA fulfils its emergency response roles 24 hours a day, seven days a week, which encompass:

- Notification and official information exchange
- Provision of public information
- Assessment of potential emergency consequences and prognosis of potential emergency progression
- Provision of assistance on request
- Coordination of inter-agency response

The IES comprises over 200 trained IAEA Secretariat staff to respond in case of an activation of the Incident and Emergency Centre.



## IAEA'S EPR IMPORTANT DATES

- 1963** ● IAEA issues publication WP.35 based on information from Member States on the type of radiological assistance they might make available in the event of a radiation emergency in another country, at the request of the State
- 1979** ● Three Mile Island Nuclear Power Plant accident
- 1980** ● Mutual Emergency Assistance for Radiation Accidents document published
- 1986** ● Chernobyl Nuclear Power Plant Accident
  - Establishment of Inter-Agency Committee on Response to Nuclear Accidents (IACRNA)
  - Convention on Early Notification of a Nuclear Accident
  - Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency
- 1987** ● Goiânia accident
- 1988** ● IAEA Emergency Assistance Services and Emergency Response System established
- 1989** ● First Emergency Notification and Assistance Technical Operations manual published
- 1990** ● The IAEA and OECD develops the International Nuclear Event Scale (INES)
- 1999** ● The IAEA launches the Emergency Preparedness Review (EPREV) service
- 2000** ● Emergency Response Centre (ERC) established as 24-hour warning point and IAEA's operational focal point
  - The Emergency Notification and Assistance Convention Website (ENAC) launched
- 2004** ● International Action Plan for Strengthening the International Preparedness and Response System for Nuclear and Radiological Emergencies approved by the IAEA Board of Governors
- 2005** ● Incident and Emergency Centre (IEC) established
- 2011** ● Fukushima Daiichi Nuclear Power Plant accident
  - Unified System for Information Exchange in Incidents and Emergencies (USIE) website launched
- 2013** ● Designation of the IAEA RANET Capacity Building Centre (CBC) in Fukushima Prefecture, Japan
- 2015** ● First International Conference on Global Emergency Preparedness and Response held in Vienna
  - Preparedness and Response for a Nuclear or Radiological Emergency (IAEA Safety Standards Series No. GSR Part 7) published
  - Emergency Preparedness and Response Information Management System (EPRIMS) launched
- 2016** ● International Radiation Monitoring Information System (IRMIS) launched
- 2017** ● Largest-ever international exercise (ConvEx-3) simulating the global emergency response to a nuclear accident held in cooperation with Hungary for over 36 hours
- 2018** ● First International Symposium on Communicating Nuclear and Radiological Emergencies to the Public held in Vienna

## Establishment of the IEC

In 1959, shortly after the IAEA was created, the Agency established EPR capabilities. These were gradually enhanced after the accident at the Chernobyl Nuclear Power Plant in 1986.

In 2005, the IAEA established the IEC, taking into account the anticipated increase in the use of nuclear applications as well as heightened concern over the malicious use of nuclear or radioactive materials.

## The IEC in numbers



*Established in 2005, the IAEA  
Incident and Emergency Centre  
is the world's focal point for  
coordination of emergency  
preparedness and response to  
nuclear or radiological incidents  
and emergencies — regardless  
of their cause or severity.*

## **How to obtain IAEA EPR and other publications**

The IAEA is a leading publisher in the nuclear field. Its scientific and technical publications include international safety standards, technical guides, conference proceedings and scientific reports. Publications of a more general interest include the IAEA Bulletin, factsheets and topical booklets.

Publications can be downloaded and hard copies ordered from <https://www-pub.iaea.org/books/>

