

# Response to Nuclear Emergency Situation

## - Viewpoints of Crisis Management -

February 2015

Nuclear Regulation Authority

# Response to nuclear disasters

## Act on Special Measures Concerning Nuclear Emergency Preparedness (The Nuclear Emergency Act)

Enacted, as a special law of the Basic Act on Disaster Control Measures, a general law concerning countermeasures against disasters, and the Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors related to nuclear regulations, to protect the lives, bodies, and properties of citizens by taking special measures including obligations of nuclear facility employers to prevent nuclear disasters and setting up the Nuclear Emergency Response Headquarters of the government.

Article 2 (omitted)

- 1 **Nuclear disasters** means **damage** caused to the **lives**, **bodies**, or **properties** of citizens due to a nuclear emergency situation.
- 2 **Nuclear emergency situation** means a situation where **radioactive materials or radiation have been released at an abnormal level** to the outside of the **nuclear site** of a nuclear facility employer due to reactor operation, etc. (omission).

### [Nuclear disaster response guideline]

The Nuclear Regulation Authority sets forth the following exclusively based on the Nuclear Emergency Act and technical matters concerning countermeasures against nuclear disasters:

- Basic concept of protective measures against exposure
- Zones important for response to nuclear disaster [Precautionary Action Zone (PAZ) and Urgent Protective Action Planning Zone (UPZ)]
- Emergency class and emergency action level (EAL), etc.

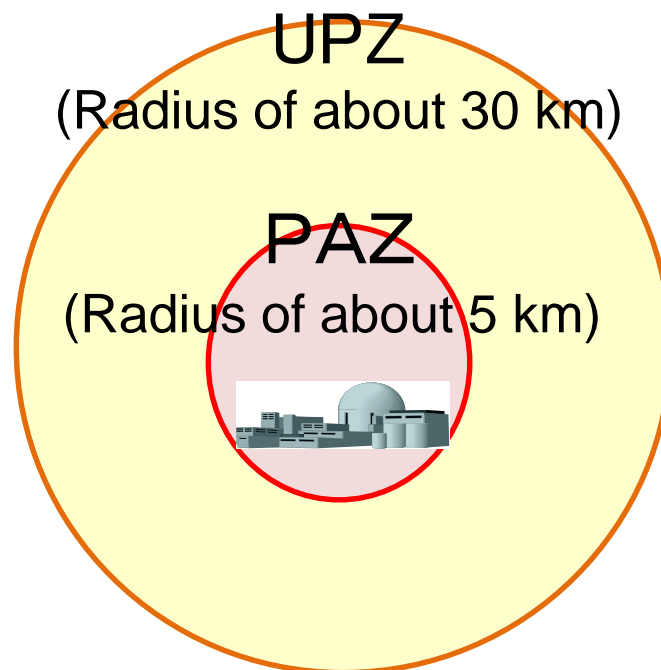
## Priority Areas for Nuclear Disaster Prevention Measures

### **○ PAZ: Precautionary Action Zone**

A zone within a radius of about 5 km from a nuclear facility.  
Evacuation from this zone is conducted preventively before radioactive materials are released from the facility.

### **○ UPZ: Urgent Protective Action Planning Zone**

A zone outside of PAZ and in a radius of about 30 km from a nuclear facility.  
Sheltering, evacuation, and/or temporary relocation, as well as preventive protective measures, are conducted.



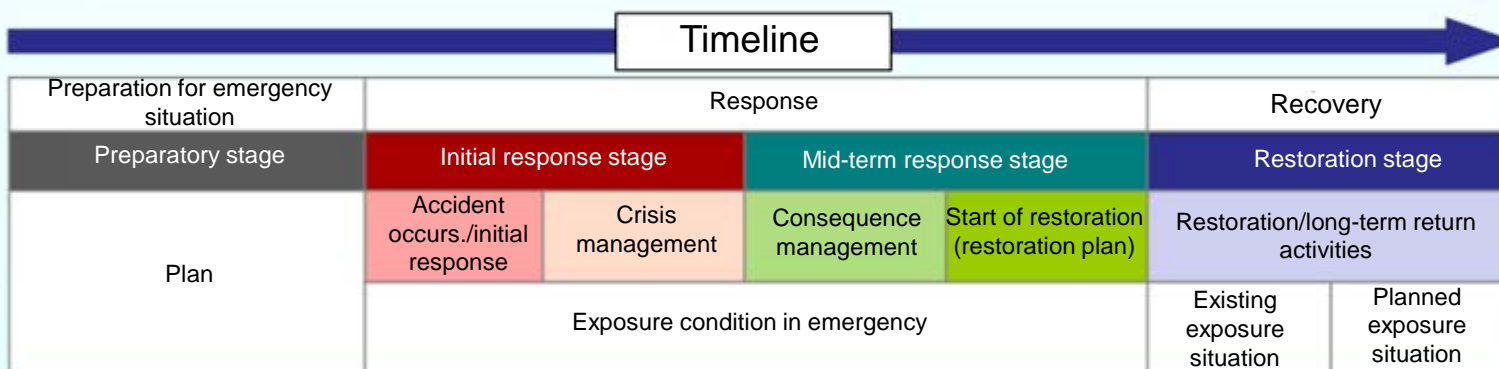
# Timeline of protective measures

Timeline has been introduced by putting protective measures in chronological order.

## Accident at Fukushima Nuclear Power Plant

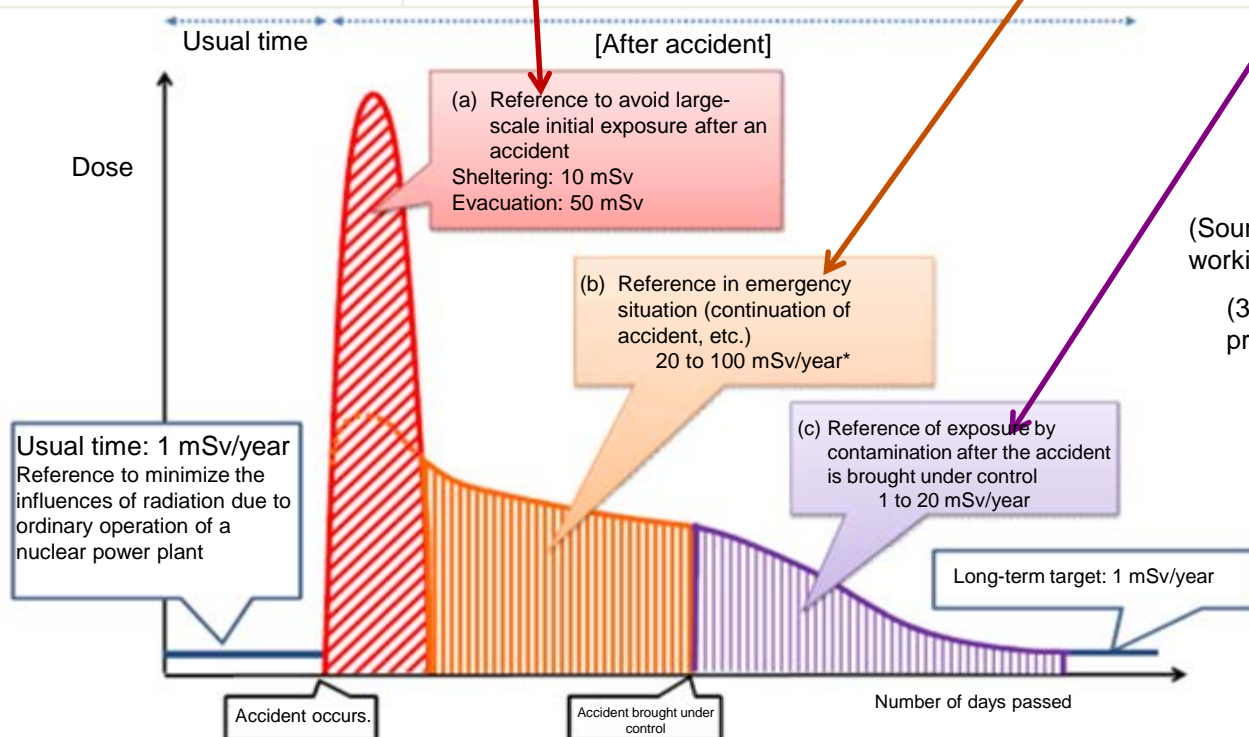
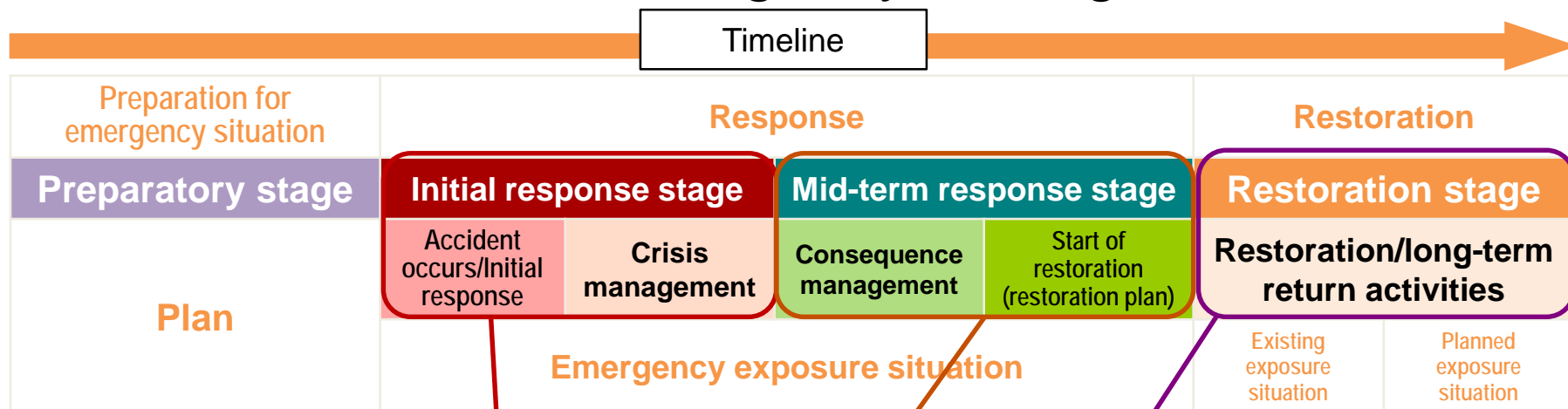
Emergency situations were not categorized (no concept of timeline) for taking protective measures. Protective measures were to be adjusted and considered at a Joint Council for Nuclear Emergency Response.

For relevant organizations to formulate a consistent, common decision-making strategy as an emergency situation progresses, a timeline of emergency situation management and stages of the emergency situation were defined.



It is necessary to create, put in place, and maintain an appropriate emergency plan and make the plan effective by exercise and training in the non-emergency period.

# Timeline of emergency management



(Source): Disaster prevention guidance study working group

(3<sup>rd</sup> meeting) Distributed document: Disaster prevention WG No. 3-5-1)

**\*Exposure dose of 100 mSv/year or less, or "a low level that can be reasonably achieved" is the aim.**

(Source: Report of Japanese Government to the IAEA Ministerial Conference on Nuclear Safety, Attachment V-20)

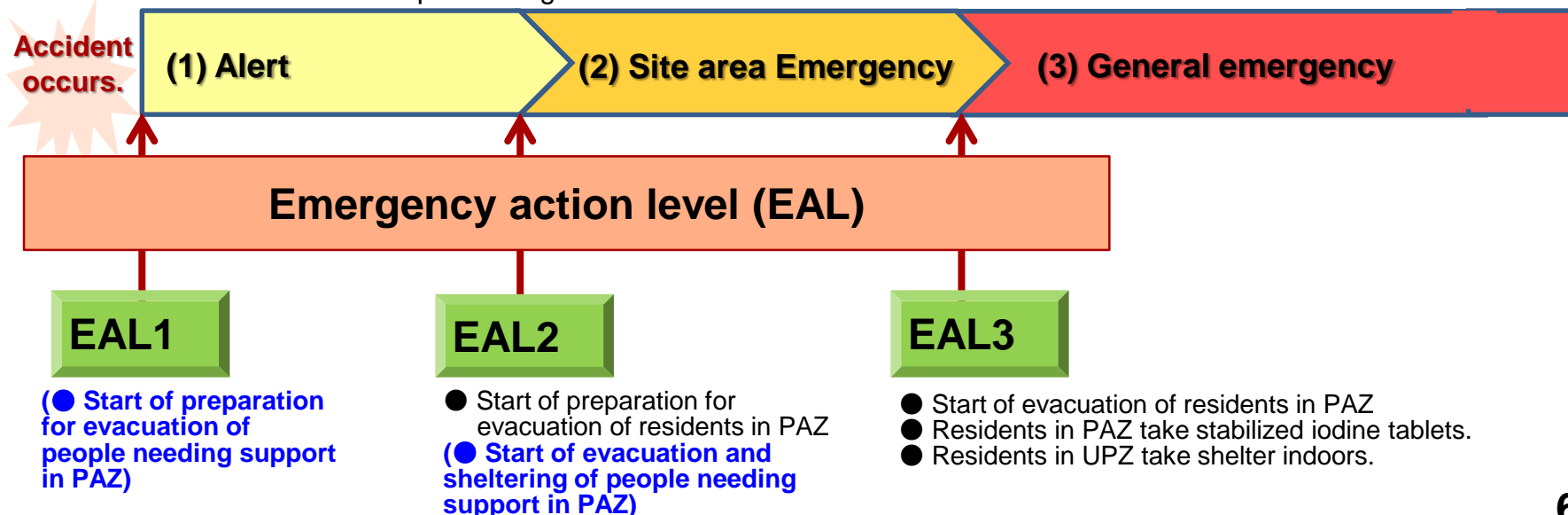
# Protective measures at initial response stage

Definition of emergency class and emergency action levels (EALs)

Preparation	Response				Restoration
Preparatory stage	Initial response stage		Mid-term response stage		Restoration stage
Plan	Accident occurs/Initial response	Crisis management	consequence management	Start of restoration	Restoration/long-term restoration activities

## Emergency Class

The following three categories were defined to take appropriate protective measures in the initial response stage:



# Features of emergency action level

Name of event	Basic concept	Example of corresponding events (*)
<b>Alert</b> [EAL1]	A situation where influences of radiation on the public is not urgent at that point but an abnormal situation has occurred or is imminent at a nuclear facility	<ul style="list-style-type: none"> <li>○ An earthquake of -6 or higher intensity in the host prefecture</li> <li>○ Major tsunami warning</li> <li>○ Event recognized by the Nuclear Regulation Authority chairman as significant, etc.</li> </ul>
<b>Site area Emergency</b> <b>( Article 10 of the Nuclear Emergency Act)</b> [EAL2]	Occurrence of an event at a nuclear facility that has a possibility of influencing the public by radiation	<ul style="list-style-type: none"> <li>○ Ambient dose of 5 <math>\mu</math>Sv/h or higher at site boundary</li> <li>○ 50 <math>\mu</math>Sv/h or higher outside the controlled area on site</li> <li>(1) Loss of all AC power (for 30 minutes or longer)</li> <li>(2) Leakage of reactor coolant which calls for activation of emergency cooling equipment</li> <li>(3) Water level of the spent fuel pool cannot be maintained, etc.</li> </ul>
<b>General emergency</b> <b>[ Article 15 of the Nuclear Emergency Act (nuclear emergency situation)]</b> [EAL3]	Occurrence of an event at a nuclear facility that is highly likely to influence the public by radiation  (Reference) Definition of nuclear emergency situation by the Nuclear Emergency Act: Situation where radioactive materials or radiation has been released as a result of operation of a nuclear reactor, etc., at an abnormal level to the outside of a nuclear site	<ul style="list-style-type: none"> <li>(1) Loss of all electric power (for 5 minutes or longer)</li> <li>(2) All emergency cooling equipment is unable to pump water.</li> <li>(3) Water level of the spent fuel pool drops to a reference value.</li> <li>○ Detection of radiation dose in containment vessel that indicates damage to the reactor core, etc.</li> </ul>

(\*) Events that fall under Articles 10 and 15 are defined by the Nuclear Emergency Act and other governmental and ministerial ordinances.

# The progress of initial stage of accident at Fukushima Daiichi Nuclear Power Plant (excerpts from reports by the Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of TEPCO)

11 March 2011

- |             |   |
|-------------|---|
| About 14:46 | Earthquake in the Pacific off Tohoku area   |
| About 15:27 | Struck by tsunami   |
| About 15:35 | Same as above   |
| About 15:42 | The plant manager notified the government agencies of the situation according to the provision of <a href="#">Article 10 of the Nuclear Emergency Act</a> (station blackout).   |
| About 16:45 | The plant manager notified the government agencies of the development according to the provision of <a href="#">Article 15 of the Nuclear Emergency Act</a> (emergency reactor cooling equipment incapable of pumping water). |
| About 17:50 | A watch returned from an area around the double door of the nuclear reactor building of Unit 1 because his/her exposure dosimeter reached 300 cpm (equivalent to 2.5 $\mu$ Sv/h of $\gamma$ ray).                             |



# Study by the Nuclear Regulation Authority

The Nuclear Regulation Authority is conducting a study of regulations concerning exposure during emergency work in response to an instruction by the Chairman at a Nuclear Regulation Authority regular meeting in July 2014 because it is impossible to completely deny the possibility of a future accident in which radiation exceeds 100 mSv.

Main points of discussion (excerpts from material for the Authority meeting on 10 December 2014)

1. Scope of emergency work
  - (1) Applicable facility and zone
  - (2) Start and end periods of emergency
  - (3) Applicants
2. Preparation for application of a dose limit during emergency work
  - (4) Range and content of response before accident (confirmation of intent, education, training)
  - (5) Range and content of response after accident (dose control, healthcare)
3. Dose limits during emergency work, etc.
  - (6) Defining dose limits
  - (7) Should the limit value be effective dose?
4. Others
  - (8) Emergency exposure and planned exposure