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## Chapter 4: Getting prepared for new emergencies

### 3 Nuclear emergency preparedness after the Fukushima accident

#### 3.3 Emergency preparedness training at nuclear power plants

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#### Keywords

Emergency response

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Training without scenario presentation

#### 1. Establishment of the Nuclear Emergency Preparedness Training Guideline

In August 2010, Japanese nuclear operators decided to develop a guideline for appropriate conduct and evaluation of nuclear emergency preparedness training so as to improve the effectiveness of their nuclear emergency preparedness training, and maintain and enhance their capacity to respond to nuclear emergencies in view of the discussions at the nuclear emergency preparedness committee set up by the national agency and examples in Europe and the United States.

The development of the guideline was based on the needs of nuclear operators themselves. To ensure objectivity to the extent possible and keep the details from being advantageous for themselves, the Japan Nuclear Technology Institute (hereafter referred to as “JANTI”) was requested to develop a guideline as they have actually developed guidelines of similar nature.

In response, JANTI began to gain an understanding of nuclear emergency preparedness training implement by domestic and overseas nuclear operators. Issues involved in nuclear emergency

preparedness training that has been conducted by Japanese nuclear operators were identified through comparison with examples in Europe and the United States.

In the middle of this process, an accident occurred at TEPCO's Fukushima Daiichi Nuclear Power Station due to the Great East Japan Earthquake in March 2011. In the investigation reports prepared by the accident investigation board set up by the government and the Diet, it was pointed out that no preparations had been made for severe accidents and complex disasters as part of nuclear emergency preparedness.

Prompted by this accident, the importance of making preparations in ordinary times for post-earthquake tsunami strikes, simultaneous accidents at multiple units, terrorism, and so forth was recognized. The conduct of effective nuclear emergency preparedness training was demanded more than ever.

In April 2012, JANTI (reorganized into the Japan Nuclear Safety Institute in November 2012; hereafter referred to as "JANSI") set up the Nuclear Emergency Preparedness Training Guideline Advisory Committee consisting of key figures with expertise on crisis management and nuclear emergency preparedness, and nuclear operators with hands-on experience in emergency preparedness training. After a great deal of consideration based on overseas findings and the lessons learned from the Fukushima Daiichi accident, the Guideline was developed in January 2013.

This Guideline shows the fundamentals (rules and knowhow) that should be referred to by operators for autonomous and effective conduct of training concerning emergency response. Such fundamentals were presented for each process of training activities, i.e. plan, do, check, and act (PDCA). The Guideline has also introduced training without scenario presentation, in which no training scenarios are presented to training participants in advance. This is considered effective in enhancing judgment and applied skills.

## 2. Consideration during guideline development

The ultimate purpose of conducting nuclear emergency preparedness training in ordinary times is to protect general residents from radiation in close coordination with the national and local governments in emergencies.

There is no point repeating training without a sense of purpose. Training should begin with participants becoming aware of the purpose of each training session. The key points that the guideline developers incorporated into the Guideline as a message to its users, i.e. nuclear operators, are as follows:

- Take full account of "local emergency preparedness by considering local municipalities as important stakeholders.
- Self-contained training (that takes only the operator to address the emergency) is desirable. In some emergencies, however, support from external organizations is necessary for firefighting

activities, for example. Have relevant external organizations take part in training to verify coordination with them.

- Legal requirements are minimal. Accidents have occurred even through legal compliance is maintained. Try to enhance response capabilities autonomously, rather than being content with meeting legal requirements.
- It is considered that the Fukushima Daiichi accident began with the massive tsunami strike. While the probability of such an event occurring is extremely low, operators should be prepared to address the consequences of such low-probability events (station blackout in the case of Fukushima Daiichi).
- All elements cannot be verified in single training session. Develop a medium-term training plan for well-organized verification.
- After the Fukushima Daiichi accident, the introduction of training without scenario presentation began to be called for. However, training without scenario presentation is not a universal training method. Select a training method suitable for the aim of training, i.e. what to verify through the training).
  - Tabletop exercises may sometimes useful for severe accident response training.
  - For training with the aim of verifying judgment and applied skills, training without scenario presentation is effective.
  - For initial training of inexperienced personnel, it is important to repeat training with scenario presentation to ensure that they have a good understanding of the “manners” required at the time of emergency.

### 3. Emergency preparedness and training

Operators have developed emergency action plans and prescribed the development and maintenance of emergency response organizations, procedures, facilities, and equipment with respect to those events that are extremely unlikely to occur, but has a significant impact of local resident in off-site areas once they occur.

However, few operator staff members actually experience emergency response in their careers. Opportunities are limited to use the facilities and equipment that are developed and maintained for emergency operation because they are different from those used during normal operation. Thus, training conducted in ordinary times is important. Through training, it is necessary to continuously verify that the actions included in the emergency action plan will work appropriately in emergencies.

Figure 1 shows this relationship. The PDCA cycle on the left represents the activities based on the emergency response plan (emergency action plan for a nuclear operator). The PDCA cycle on the right represents the PDCA cycle of training.

(In a broad sense, the conduct of training is included in the emergency action plan).

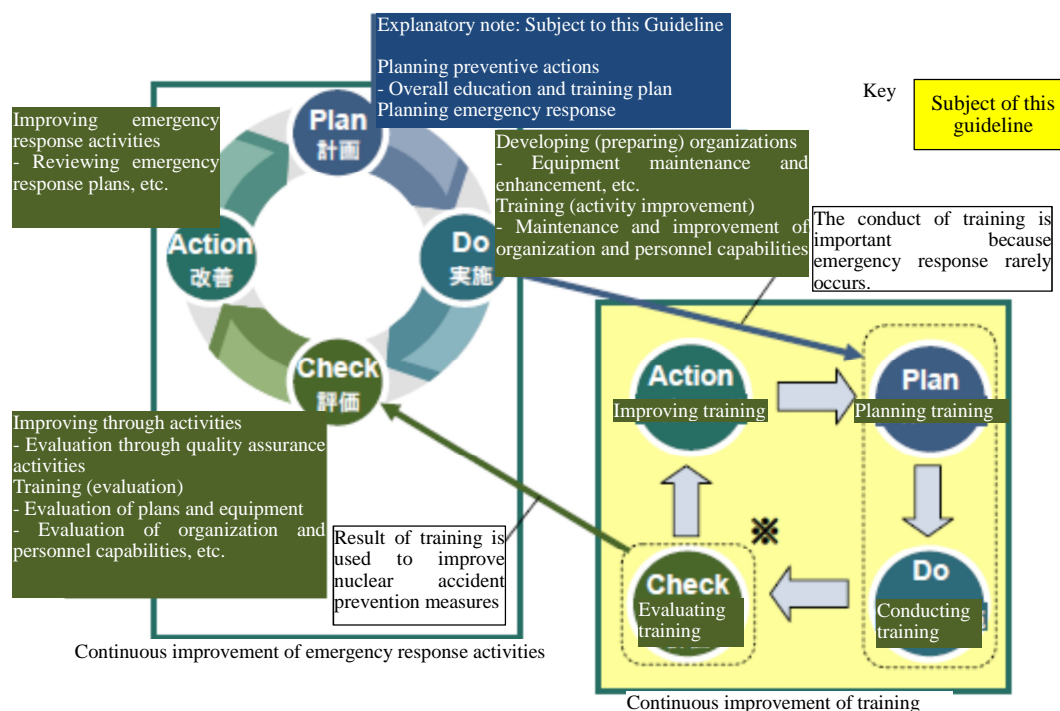


Figure 1: PDCA of Emergency Response and Training

#### 4. Training plan

It is no exaggeration to say that the success of emergency preparedness training depends on the training plan.

The purpose of training and goals to achieve will be set in the training plan.

It is desirable to set the goals to achieve clearly and specifically to avoid arbitrary training evaluation.

Select the training method and organization suitable for the verification of training objectives (aims). Develop training scenarios accordingly.

Training scenario development is the core of training planning. Scenario development requires knowhow supported by experience and expertise on plant behaviors. A “scenario development team” may be formed gathering experienced experts from relevant departments.

To ensure the accuracy of scenarios, a simulation code for severe accident analysis is used in some case.

Identify and solve the matters that should be verified systematically under a medium-term plan.

As shown in Figure 2, review the matters to verify (add or delete), and the goals to achieve (change levels or make them more difficult) in view of the actual response capabilities of emergency response organizations and personnel, regulatory requirements, and social demand (including the demand of local residents) in developing a training plan.

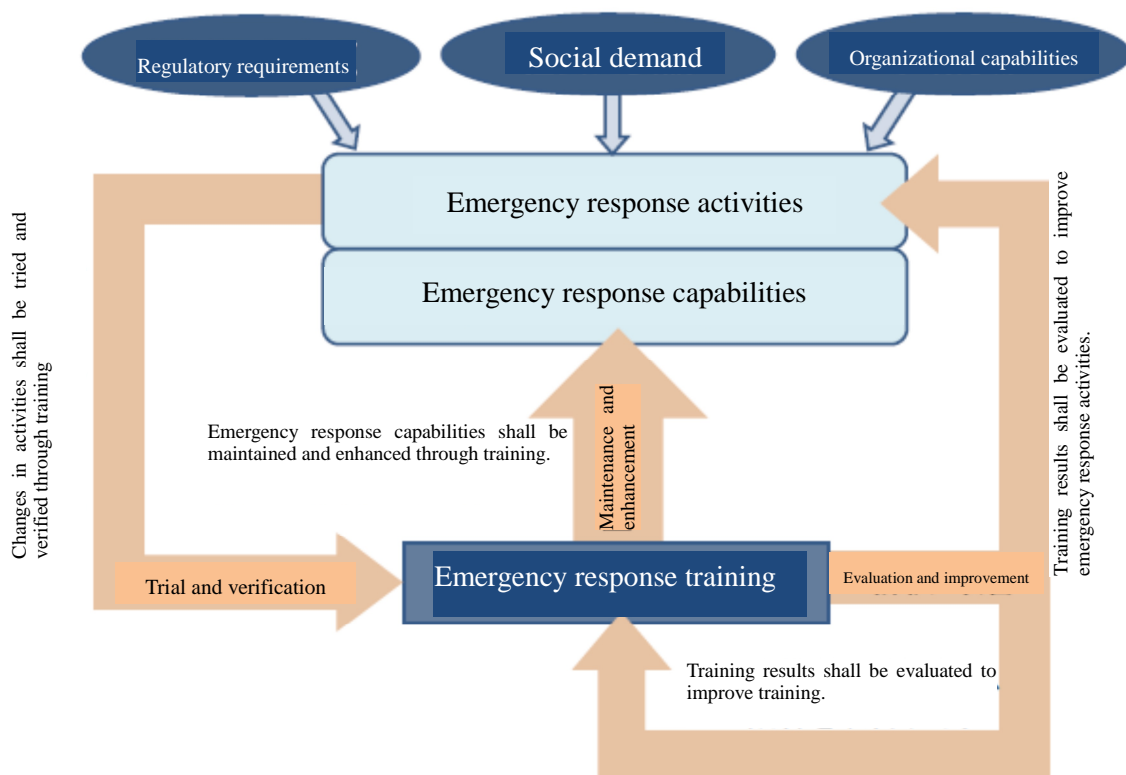


Figure 2: Feedback for Training Plan

## 5. Conducting training

“Comprehensive training” often tends to be joint training with local municipalities and national organizations, which attracts high attention from the media. It may hang heavily on the operator as they are not allowed to make any mistakes during the training. However, it is necessary to conduct such training by clearly communicating the purpose of training and the matters to verify to the media, municipalities, and the national government to gain their understanding. It is also necessary to have them understand that they will also be the parties to respond in emergencies like the operator.

It is said that “a good exercise is not necessarily one where everything goes well, but rather one where many good lessons are identified” (IAEA, EP-EXERCISE-2005, page 3). Never be afraid of making mistakes during training.

## 6. Training evaluation

Training evaluation has been sorted out in the Nuclear Emergency Preparedness Training Guideline as shown in Figure 3. In other words, the emergency preparedness training structure, plan, equipment, personnel, and training itself shall be evaluated systematically and exhaustively. Conventionally, nuclear operators conducted “critiques” immediately after training for evaluation.

However, such evaluation was not systematic and exhaustive, the areas for improvement identified were somewhat biased.

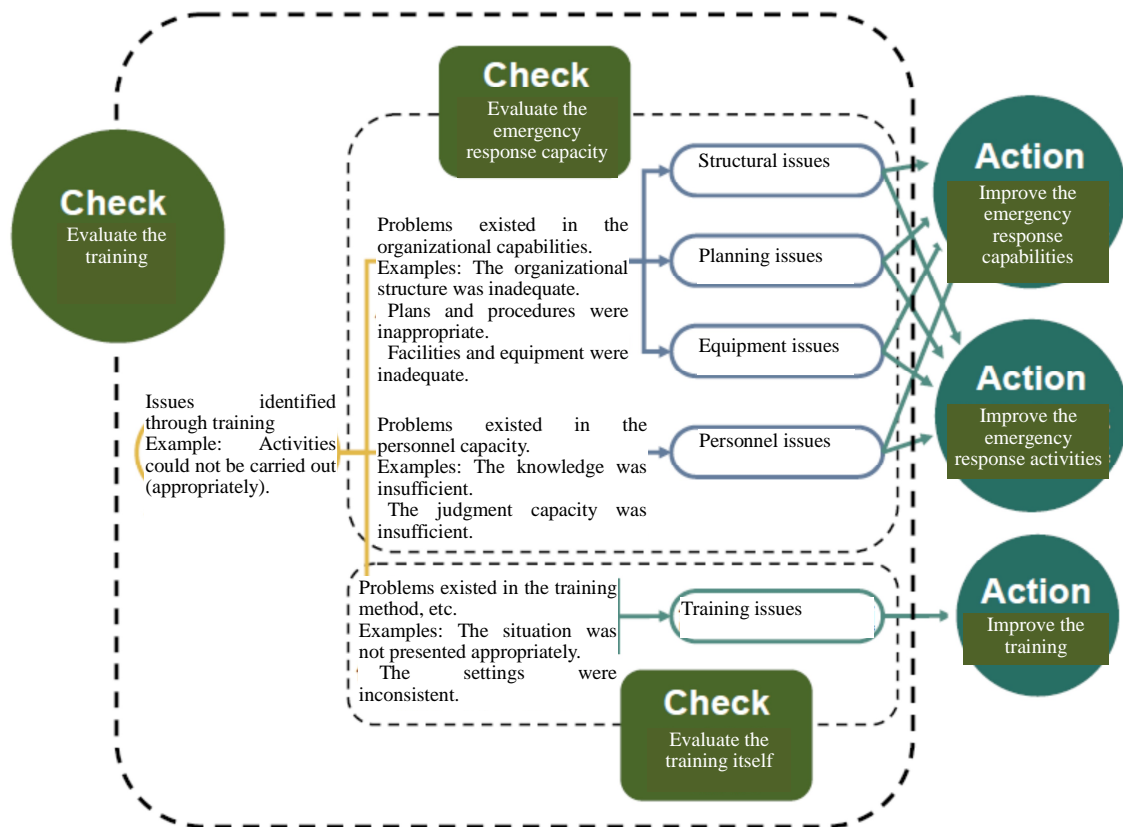


Figure 3: Flow of Training Analysis and Evaluation

## 7. Ensuring and improving training effectiveness

In view of the lessons learned from the Fukushima Daiichi accident, nuclear operators have started the activities to maintain and improve their emergency response capabilities through training, recognizing the importance of continuous conduct of emergency preparedness training. They refer to the Nuclear Emergency Preparedness Training Guideline in carrying out such activities.

JANSI will continue providing the necessary coaching and advice by grasping the current conditions by reviewing the operators' activities. We think that the Nuclear Emergency Preparedness Training Guideline should also be re-examined as necessary according to the level of response capabilities of operators who are the users of the Guideline. JANSI took the initiative in developing the first version. However, it is expected that nuclear operators themselves who have accumulated effective knowhow through training will play a leading role in revising it.

(Supplement: Terms used in this paper)

“Emergency” is a situation in which protective measures, such as evacuation, are required to

ensure the health safety of residents around the facilities as a result of release of radioactive material that is supposed to be contained in the reactor facilities under normal circumstances due to an accident at nuclear facilities, e.g. a nuclear power plant.

“Emergency preparedness training” and “emergency response training” are used express the same thing as they refer to training to minimize the impact of an “emergency” on residents.

In some cases, training to deal with an accident so that it will not develop into an “emergency” is defined as “emergency preparedness training” in a limited way. In this paper, however, the definition is extended to include emergency response in actual emergency situations.

The Nuclear Emergency Preparedness Training Guideline has been developed as a guideline for “emergency response training.”