

## Investigation Items regarding the Accident at Fukushima Nuclear Power Stations of Tokyo Electric Power Company (Draft)

### Social System Investigation Team

- Mainly covers events and items that occurred before March 11.
- Designs the process of investigation with the order of priority given to all investigation items.
- Focuses on the chain of causes and results, traces the causal relationships, and clarifies the organizational factors, institutional factors, social factors, and historical background.

#### 1. Major Investigation Items

- (1) Whether the tsunami protection measures of the Fukushima Daiichi Nuclear Power Station (NPS) were sufficient
  - a. Comparison of the tsunami protection measures taken by the Fukushima Daiichi NPS, Fukushima Daini NPS, Onagawa NPS, and Tokai Daini NPS
  - b. Whether a sufficient study on tsunami was done at the time of reviewing the Earthquake-resistant Design Examination Guideline on the Power Reactor Facilities in September 2006
  - c. Whether the results of Jogan Tsunami research conducted by academic institutions including Tohoku University and the National Institute of Advanced Industrial Science and Technology (AIST) were reflected in *Tsunami Evaluation Technology for Nuclear Power Stations* of the Tsunami Evaluation Group, Nuclear Engineering Committee, Japan Society of Civil Engineers
  - d. Whether various standards pertaining to the building examination of NPSs were made with appropriate consideration of tsunami disasters; the relation of the foregoing with the history of nuclear power introduction in Japan
- (2) Whether sufficient countermeasures against severe accidents were taken
  - a. Whether the contents of the *Report on Accident Management Examination* issued by Tokyo Electric Power Company (TEPCO) in 1994 were appropriate
  - b. Whether appropriate countermeasures were implemented against severe accidents and whether the involvement of the regulatory administrator was appropriate
- (3) Whether the regulations were fully functional
  - a. The probable reason for the inadequacies of the regulations found in (1) and (2)

#### 2. Other Investigation Items

Extracts and selections of further investigation items are to be made in the future based on the results of major investigation items.

## Accident Causes Investigation Team

- Objectively verifies the course of the accident and response.
- Investigate the technical issues of the causes of the accident and the expansion of the accident.
- Clarifies the decision-making process of organizations concerned and factors that influenced the decisions.

### 1. Clarification of Actual Damage

- (1) Core melt
- (2) Hydrogen explosion
- (3) Damage to Unit 4
- (4) Damage to Fukushima Daiichi NPS (Unit 5 and Unit 6) and Fukushima Daini NPS
- (5) Loss of function caused by tsunami (power loss, loss of residual heat removal capability, critical equipment flooding, failures in various measuring instruments, failures in central control room, loss of disaster countermeasure functions of communication, traffic, and transportation means)

### 2. Clarification of Actual Arrangements on Site

- (1) Actual condition of damage and countermeasures against tsunami warning and aftershocks
- (2) Emergency power supply arrangements (e.g., power source cars and cable connections)
- (3) Emergency cooling measures (IC and RCIC)
- (4) Vent
- (5) Alternative water injection (e.g., use of fire extinguishing system and fire-engine pumps, situation and order of fresh water and seawater injection, and water spraying from helicopter)
- (6) Arrangements with consideration of core melt, hydrogen explosion, and fuel pool cooling in addition to (2) to (5)
- (7) Restoration of external power (Fukushima Daini NPS)

### 3. Clarification of Response Mechanism and Decision-making Processes

- (1) Fukushima Daiichi NPS and Daini NPS
- (2) Head Office of TEPCO
- (3) Japanese government

### 4. Clarification of Pre-quake and Pre-tsunami Arrangements

- (1) Assumed seismic ground motion
- (2) Assumed tsunami (with height and wave power)
- (3) Seismic back-check activities (e.g., arrangements after the issuance of the latest version of Regulatory Guide for Reviewing Seismic Design of Nuclear Power Reactor Facilities in 2006 and consideration of the Jogan Earthquake)
- (4) Accident management measures (e.g., alternative water injection, vent, support systems, training, preparation for equipment and materials, and securement of communication means); Severe

accidents against which countermeasures are applied include meltdown, hydrogen explosions, and loss of all power

- (5) Cooling measures for reactor and containment building
- (6) Measures for maintaining the water-tightness of important equipment facilities
- (7) Measures for maintaining power supply
- (8) Cooling measures relating to spent fuel storage pools
- (9) Measures for maintaining functions of measuring instruments in central control room
- (10) Centralized installation of machines
- (11) Comparison in (1) through (10) with other NPSs (e.g., Onagawa NPS and Tokai Daini NPS)

#### Damage Expansion Prevention Measures Investigation Team

- Investigates various prevention countermeasures against an expansion of damage after the accident.
- Investigates provision of information to the public at home and abroad and coordination with other countries after the accident.

#### 1. Evacuation Measures before Accident

- (1) Countermeasures against nuclear disaster
  - a. Implementation of resident evacuation training and maintenance of evacuation system
  - b. Information sharing and maintenance of communication system
  - c. Arrangements to disseminate disaster prevention knowledge
- (2) Monitoring and other safety-related systems
  - a. Maintenance of various monitoring systems
  - b. Maintenance of System for Prediction of Environmental Emergency Dose Information (SPEEDI)

#### 2. Situation after Accident

- (1) Establishment of response headquarters
  - a. Summary of legislation pertaining to establishment of response headquarters
  - b. Situation of the establishment of various response headquarters after the earthquake (accident)
  - c. Situation of overall supervision (coordination between headquarters)
- (2) Use of monitoring and other safety-related systems
  - a. Use of monitoring systems
  - b. Use of SPEEDI
- (3) Countermeasures against radiation exposure
  - a. Residents' radiation exposure
  - b. Workers' radiation exposure
  - c. Self-Defense Force, riot police, and fire brigade members' radiation exposure
- (4) Evacuation Order (including Lifting of Order)
  - a. Guidelines on issuing evacuation orders
  - b. Decision on issuance of evacuation order, transmission of

- instructions, and implementation of order
    - c. Measures for returning home temporarily
    - d. Other issues related to designation of evacuation areas
  - (5) Livestock, marine product, air, soil, and water contamination
    - a. Standards established for farm products, livestock, marine products, air, soil, and water
    - b. Measures for farm products, live stock, marine products, and tap water
    - c. Measures for the air, soil, and water
  - (6) Contaminated Water in Nuclear Facilities
    - a. Sequence of events, such as generation of contaminated water, storage, and treatment
    - b. Circumstances of discharging accumulated water of low-level radioactivity to the sea on April 4
  - (7) International Nuclear Events Scale (INES) evaluation and assessment of radioactive materials released into the environment
- 3. Provision of Information Requested by Public
  - (1) Existence of information that should have been disclosed and why it was not disclosed
  - (2) Existence of important information the explanation of which changed and why the explanation changed
  - (3) Problematic provision of information from the viewpoint of understandability
  - (4) Circumstances of so-called reputational damage and countermeasures
- 4. Provision of Information Required by World and Cooperation with Foreign Countries
  - (1) Provision of information to foreign countries
    - a. Existence of information that should have been presented to foreign countries and why it was not disclosed
    - b. Existence of problems in terms of the fulfillment of international commitments
  - (2) Cooperation with foreign countries and international organizations, such as International Atomic Energy Agency (IAEA)
    - a. Support offer from foreign countries and Japan's response
    - b. Cooperation with IAEA