

Executive Summary

1. Emergency Exposure Dose Control in the TEPCO Fukushima Daiichi Nuclear Power Plant (NPP)

1) Exemption Ordinance

At the time the accident began at the TEPCO Fukushima Daiichi NPP, emergency dose limits of 100 mSv were in effect for the workers based on the Ordinance on the Prevention of Ionizing Radiation Hazards. However, after consideration of the security of the general public and the prevention of expansion of the nuclear disaster, the emergency dose limit in the affected plant was raised to 250 mSv on 14 March 2011 (Exemption Ordinance). On 1 November 2011, the emergency dose limit for new workers was decreased to the original (100 mSv) with some exceptions designated by the Minister of Health, Labour and Welfare. The exemption ordinance was abolished on 16 December 2011 when TEPCO completed step 2 of the road map.

2) Problems that occurred after the accident and the responses by MHLW and TEPCO

The responses and actions to the following 20 cases were taken by the Ministry of Health, Labour and Welfare (MHLW) and TEPCO.

Related personal identification and exposure dose control (6 cases): 1. Insufficient exposure dose control system in the exposure dose control department, 2. Insufficient numbers of personal dosimeters, 3. Deficiencies in dosimeter-lending management, 4. Delay of radiation exposure dose notifications to workers, 5. Delay of internal exposure monitoring, 6. Unexpected occurrence of workers who could not be contacted.

Related respiratory protective equipment and protective clothing (4 cases): 1. Exceeding emergency exposure dose limit, 2. Exceeding exposure dose limit for woman, 3. Improper use of respiratory protective equipment, 4. Improper protective garments.

Related training for new workers (1 case): 1. Insufficient training hours for workers.

Related health and medical care system (5 cases): 1. Establishment of the medical care system at the affected plant, 2. Prevention of heat stroke, 3. Instruction to conduct special medical examinations, 4. Establishing patient transport systems from the affected plant, 5. Long-term health care program.

Related preliminary review of work plans (4 cases): 1. Insufficient management systems for developing work plans, 2. Deficiencies of work plans, 3. Insufficient knowledge about contract conditions, 4. Improvement of lodging and meals.

3) Health control at the TEPCO Fukushima Daiichi NPP

MHLW established “Guidelines on Maintaining and Improving Health of Emergency Workers at the TEPCO Fukushima Daiichi NPP” on 11 October 2011. The Guidelines describe “Actions for long-term health control”, “Development of a database for workers who have engaged in emergency works” and “Support

provided by the Government”. Based on the guidelines, MHLW and TEPCO are implementing long term health control such as cancer screenings etc., corresponding to the exposure dose values for the workers who had been engaged in the emergency works at the NPP.

4) Implementation status of measures against ionizing radiation hazards associated with decommissioning works

In order to ensure the working conditions as well as the industrial safety and health of workers engaged in decommissioning works at the NPP, the Fukushima Prefectural Labour Bureau provided employers with focused supervision and instruction.

5) Recommendations

On 10 August 2012, in response to the issues of 20 cases, MHLW demanded the employers who operate nuclear facilities to prepare for nuclear accidents that may necessitate emergency works and also to prepare for the actions that may need to be taken when such accidents occurred. This section shows accident preparations, and the actions to be taken at the time of an accident by the employers in response to the directions.

6) Exposure dose distribution of workers at the TEPCO Fukushima Daiichi NPP

The status of the radiation exposure dose was summarized.

2. Decontamination Works Resulting from the Accident of the TEPCO Fukushima Daiichi NPP and Necessary Radiation Protection Measures

1) Radiation protection of workers involved in decontamination works

The Japanese Government has decided to carry out decontamination works and to manage the wastes resulting from decontamination works and clean-up of unmarketable contaminated goods. Prevention of radiological contamination of the workers has required that the Government ensure sufficient radiological protection is provided to them.

The Act on Special Measures Concerning the Handling of Environmental Pollution by Radioactive Materials Discharged by the Nuclear Power Station Accident Associated with the Tohoku District off the Pacific Ocean Earthquake was fully implemented starting from 1 January 2012.

The Nuclear Emergency Response Headquarters and the National Reconstruction Agency revised the classification of the evacuation areas around the TEPCO Fukushima Daiichi NPP into 3 types of areas: 1. Area for which evacuation orders are ready to be lifted, 2. Areas in which the residents are not permitted to live, and 3. Areas where it is expected that the residents will have difficulties in returning for a long time.

Activities for accident-derived waste disposal were subject to the Ionizing Radiation Ordinance; however, this ordinance did not

contain sufficient regulations for employers involved in disposal work. Therefore the Ionizing Radiation Ordinances was amended and the new guidelines were developed that summarize relevant laws and regulations.

2) Outline of ordinances which provide radiation protection during decontamination works and restoration and reconstruction works

The Decontamination Ordinance specifies actions to be taken by the employer to prevent radiation exposure of workers engaged in decontamination of soil, collection of removed soil/waste in the areas contaminated by radioactive materials released from the accident at the NPP. Actions are largely divided into three types, namely actions to reduce exposure, actions to prevent spread of contamination, and education and health care of workers.

The MHLW published the ministerial ordinance which partially revised the Ionizing Radiation Ordinance for Decontamination. It was put into effect on 1 July 2012. The revision focuses on the following points: 1. Work involving contaminated soil with radioactivity higher than 10,000 Bq/kg (designated contaminated soil handling work) shall also be included in the decontamination operation, and 2. the Ionizing Radiation Ordinance for Decontamination shall also be applied to works other than decontamination at areas with an average ambient dose rate higher than 2.5 μ Sv/h.

The MHLW published a ministerial ordinance to revise the Ionizing Radiation Ordinance for Decontamination and it was put into effect on 1 July 2013. This revision was made in light of the fact that disposal of waste contaminated with radioactive materials discharged by the NPP accident is expected to increase in scale with the progress of decontamination projects. In parallel with the revision, “Guidelines on Prevention of Radiation Hazards for Workers Engaged in the Accident-derived Waste Disposal” were prepared.

3) Status of the implementation of radiation protection corresponding to decontamination works

The Fukushima Prefectural Labour Bureau (PLB) has conducted inspections and given instructions within the jurisdiction of the Labour Standards Inspection Offices to employers in order to ensure proper conditions of employment and safety, and the health of workers engaged in decontamination works, etc.

3. Overview of Guidelines and Notifications

The following guidelines and notifications were issued.

- “Guidelines on Maintaining and Improving Health of Emergency Workers at Nuclear Facilities”
- Ordinance on Prevention of Ionizing Radiation Hazards at Works to Decontaminate Soil and Wastes Contaminated by Radioactive Materials Resulting from the Great East Japan Earthquake and Related Works
- “Guidelines on Prevention of Radiation Hazards for Workers Engaged in Decontamination Works”
- “Guidelines on Prevention of Radiation Hazards for Workers Engaged in Works under a Designated Dose Rate”
- Improvement of the safety and health management system of radiation and emergency works at nuclear facilities
- “Guidelines on Prevention of Radiation Hazards for Workers Engaged in Accident-derived Waste Disposal”
- Radiation exposure doses registration systems for decontamination and related works
- “Guidelines on Occupational Safety and Health Management at the TEPCO Fukushima Daiichi Nuclear Power Plant”

4. Results of Epidemiological Studies on Emergency Workers

1) MHLW compiled a report of the expert meeting series held since February 2014 in which discussions were made about how to make plans for epidemiological studies targeting emergency workers concerning radiation effects on human health.

This report describes study target and method, health effect examinations, ascertaining cumulative doses, control of confounding factors, implementation system of studies, study period and evaluation and publication of study results.

2) A report was compiled regarding the Research on Thyroid Gland Examinations, etc. of Workers at the TEPCO Fukushima Daiichi Nuclear Power Plant. The aim of this research was the epidemiological analysis of radiation effects on the thyroid gland by setting an exposed group (emergency workers exposed to radiation exceeding a thyroid equivalent dose of 100 mSv) and a control group (thyroid equivalent dose of 100 mSv or less), performing ultrasonic examinations for both groups and comparing the results. The results of the analysis were to be evaluated from the viewpoint of clinical medicine in terms of radiation effects on the thyroid gland.

5. Technical Tour to the TEPCO Fukushima Daiichi NPP for Overseas Media in Japan

The Ministry of Health, Labour and Welfare (MHLW) has been implementing the *Project to Enhance the International Transmission of Radioactivity-Related Information on the Workers at TEPCO Holdings' Fukushima Daiichi Nuclear Power Plant* since the fiscal year 2013 in order to provide accurate information in a timely manner to international organizations and media abroad on the radiation exposure situation at this power plant and the related exposure countermeasures. As part of the project for the fiscal year 2017, MHLW, in cooperation with TEPCO, conducted a technical tour on 20 November 2017 to the TEPCO Fukushima Daiichi NPP for overseas media in Japan..