Dose Rate Reduction by Decontamination of the Reactor Building at the Fukushima Daiichi Nuclear Power Plant Unit 2

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1. Introduction

For decommissioning of the reactor buildings at the Fukushima Daiichi Nuclear Power Plant, the reduction of dose rate for the 1st floor will be important since all works start from there. We have started activities on the 1st floor of Unit 2. In a previous workshop we presented results of our investigation of contamination conditions[1] and a remote decontamination machine that we developed based on the investigation.

In this workshop, we present the progress of the decontamination works and details of the decontamination works conducted using the remote decontamination machine, etc. and their effects.

2. Air dose rate before the decontamination work

The air dose rate before the decontamination measured on 22 March 2013 was as high as 13.3 mSv/h (a geometric mean of 26 points). This would allow workers to spend only 10 minutes in the area, even when the special control level was set as a planned daily exposure limit of 2.5 mSv/d. No complicated work could be done.

3. Details of the decontamination work

The investigation of contamination conditions identified the need for three-dimensional decontamination in order to effectively reduce the exposure dose. Therefore decontamination was conducted according to the following procedures;

(1) Removal of interfering objects from the 1st floor (materials and equipment existing from the time of the earthquake, and those transported in to carry out works after the earthquake)
(2) 3-D laser scanning using a remote handled robot
(3) Floor decontamination with a remote handled decontamination machine
(4) Decontamination of low and medium height places with the remote handled decontamination machine
(5) Installation of shielding at places where it is difficult to carry out decontamination
(6) Removal and decontamination of ducts in high places.

4. Results of decontamination

The air dose rate of 13.3 mSv/h before the decontamination was reduced significantly to 5.0 mSv/h after decontamination at floor level and low and medium level heights, installation of shielding, and removal and decontamination of ducts. This compares favorably to the air dose rate of 13.0

[1] From Commitment for Development of Decommissioning/Safety Fundamental Technology for Power Reactors (METI)

mSv/h which had been achieved after removing interfering materials only. The reduction rate was 40 % or higher even considering the radioactive decay of the radiation source.

5. Future decontamination plans

There are a variety of structural components (walls, ceilings, pipes, supports, cable trays, etc.) in high places to be decontaminated from now, and their location will make the decontamination difficult. Continued efforts will be paid to further reduce the air dose rate by utilizing a 3-D laser scanning, gamma camera, developing a remote handled decontamination machine[2], etc.

[2] Developed in the Subsidies for the Decommissioning/Contaminated Water Measures Project (Development of Remote Decontamination Technology in the Reactor Building)(FY 2013)