

## **Unit 1 reactor building cover**

### **— Efforts regarding measures to reduce exposure in work to demolish wall panels**

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At Unit 1 of the Fukushima Daiichi Nuclear Power Station, reactor building covers were installed in October 2011, soon after the disaster, to prevent scattering of radioactive dust. After that, the amount of dust released greatly declined due to continued stable cooling of the reactor and other factors, and thus removal of fuel from the spent fuel pool was planned as a step toward decommissioning, and work began on building cover demolition in April 2015. By the end of 2015, removal of roof panels was finished, and demolishing of wall panels will commence in September 2016.

After demolishing the building cover, rubble accumulated on the operation floor of the reactor building will be removed, but to prepare for the possibility of radioactive dust scattering during rubble removal work, a plan was adopted for installing mist spraying equipment to suppress dispersion of radioactive dust on the existing operation floor steel frames, and that equipment was installed in June 2016, prior to the start of wall panel demolishing.

The following items 1–3 report on measures taken to reduce radiation exposure of workers during suction of small rubble pieces that interfered with installation of mist spraying equipment, removal of obstructing steel frames, and installation of mist spraying equipment. Also, as an extension of that, it introduces (item 4) suction work for items such as roof blocks on the operation floor, carried out prior to wall panel demolition.

#### **1. Suction of small rubble pieces using rubble suction system "Karuzawa-1"**

Due to the reactor building explosions which occurred after the earthquake, many small pieces of rubble, such as pieces of concrete, were present on the existing operation floor steel frame. These interfered with the installation of mist spraying equipment (nozzle unit steel frame), but since this is an elevated work environment with a high dose, equipment was developed to suction up the small rubble pieces through remote operation, and work was done using a remote guidance system developed at the time the cover was installed.

#### **2. Removal of obstructing steel frame using obstructing steel frame removal system "Hitokuchi"**

In addition to the small rubble pieces on top of the existing operation floor steel frame, bent steel frames, pipes and other components are entangled, and present as obstacles. Therefore, an obstructing steel frame removal system with a small cutter and grippers function was developed, and work was done through remote operation, just as in the above case.

#### **3. Installation of mist spraying equipment**

Basic assembly and unit integration of the nozzle unit steel frame of the mist spraying equipment (with pre-installed vertical pipe) were carried out in an area with a comparatively low dose, and in

mounting to the existing operation floor steel frame, all work was done remotely using a remote guidance system.

However, some non-remote manned work was necessary on the roof of the lower section of the reactor building, such as installation of a horizontal pipe unit and connection of the pipe with the nozzle unit steel frame. On the pertinent rooftop, the radiation dose was high due to dispersion of small rubble pieces by the explosion after the earthquake, and thus the environment was improved by removing the small rubble pieces, roof blocks and other material. This was done as far as possible through remote operation, using the machinery developed in 1 and 2 above.

#### 4. Suction of rubble pieces such as roof blocks on the operation floor using the large rubble suction system "Karuwaza-2"

Prior to demolishing of the building cover wall panels, it was decided to suction small loose rubble pieces such as roof blocks on the operation floor in order to reduce, even a little, the risk of scattering radioactive dust. In order to efficiently remove small rubble pieces over a wide area, a large rubble suction system was developed, and all guidance and operation were performed remotely.