

## Activities to Reduce Exposure Doses during Disassembly of Bolted Type Tanks

Taisei Corporation

Since March 2011, about 300 bolt assembled type tanks have been constructed to store contaminated water at the Fukushima Daiichi Nuclear Power Plant. Associated with the change to use of welded type tanks, disassembly of the bolt assembled tanks was started from the end of May 2015. The inner surfaces of the latter tanks are contaminated with the stored RO (reverse osmosis) concentrate. The dose rate on the surfaces after draining off the contaminated water is as high as 40- 50 mSv/h, which requires taking special measures in order to reduce the exposure dose of workers. Here we present activities to reduce the exposure dose.

### 1. Shortening of working hours by development of a balloon-type temporary roof

The tank disassembly work requires first installing a roof at the crown of each tank before carrying out the disassembly in order to prevent scattering of contaminated dust and entry of rain water. To complete one tank disassembly, 150 minutes are needed to install and remove a full-fledged steel roof with a five-block construction. However, the lightweight construction (300 kg/unit) of a balloon-type temporary roof can be put into place immediately using a crane. This significantly reduces the roof installation and removal working hours, leading to the reduction of exposure dose of workers.

### 2. Implementing an unattended disassembly task by development of a pre-painting machine

The tank disassembly requires the task of spraying an agent on the inner surface of the tank to prevent scattering of dust. Normally scaffolding must be installed in the tank or a device that can be used for work at changing heights must be brought into the tank and then workers manually spray the surface with the scatter-prevention agents. However, because of the high dose rate of 40 – 50 mSv/h ( $\beta + \gamma$ ) inside these highly contaminated tanks, we developed a pre-painting machine that can be operated unattended to reduce the exposure dose of workers. The machine is able to rotate 360 degrees, using the principle of a balancing bar by extending two beam bars, as it sprays the scatter-prevention agent on the inner tank surface. Since the machine is controlled from the top of the tank, the scatter-prevention agent is applied without workers entering the tank.

### 3. Installation of shielding materials for work inside the tank

When the basement of the tank is dismantled, workers must be inside the tank. The work is conducted after installing a rubber mat on the floor and composite panels on the wall for shielding, by which the air dose rate is cut 90% or more.

### 4. Safety measures for workers

The workers who are engaged in the disassembly work wear Tyvek clothing, an anorak and a mask. Since this places workers at high risk for heat stroke during the summer when the temperature is high,

all tasks are conducted at night when the temperature is low, by which occurrence of heat strokes is reduced significantly.

#### 5. Actions to prevent body contamination and spread of contamination

Since the inside of the tank is contaminated significantly, the disassembly work has a risk for body contamination and spreading of the contamination by the workers. Efforts are made to reduce the risk by utilizing a building for changing out of work clothes and for changing shoes well as allocating persons to act as managers for the changes of clothing and shoes.