

Fukushima - An Under Reported Ongoing Catastrophe

by Takashi Sugimoto via marie - The Asahi Shimbun *Wednesday, Jul 25 2012, 1:18pm*
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A little more than 500 days after the accident at the Fukushima No. 1 nuclear plant threatened to force the evacuation of the entire Tokyo metropolitan area, the situation is certainly much improved.



The levels of cesium being emitted from the damaged reactors have dropped substantially, core temperatures in the pressure vessels are being kept within targeted levels, and the plant operator has started removing unused nuclear fuel assemblies as an experiment.

However, workers still must overcome a number of issues to make progress toward decommissioning the reactors at the plant, such as dealing with leaking contaminated cooling water, determining the state of the pressure vessels and removing melted nuclear fuel from the reactor cores.

RADIOACTIVE MATERIALS

According to calculations by Tokyo Electric Power Co., the operator of the Fukushima No. 1 plant, a total of about 10 million becquerels per hour of radioactive cesium was being emitted from the No. 1 to No. 3 reactors as of June. That is about one-80 millionths of the level that was being spewed immediately after the accident. Achieving a state of cold shutdown has meant a decrease in the volume of cesium emitted from the reactors.

Calculating the additional radiation exposure caused by radioactive materials that accumulated on the ground after being emitted from the No. 1 to No. 3 reactors, the combined external and internal radiation exposure level at the main gate of the plant facility about one kilometer from the nuclear plant was 0.02 millisievert over the course of a year. That was considerably below the 1-millisievert level that was used as a goal in determining if a state of cold shutdown had been achieved.

However, since February, the level of radiation emitted from the reactors has remained unchanged.

"There is the possibility that the cesium that fell on the reactor buildings was stirred up again," said Junichi Matsumoto, acting general director of TEPCO's Nuclear Power and Plant Siting Division.

The most radiation is being emitted from the No. 2 reactor, which is releasing 8 million becquerels an hour. The radiation is believed to be leaking from a hole that was made in the wall of the top floor of the reactor building.

STATE OF THE REACTOR CORES

Meltdowns occurred in the reactor pressure vessels of the No. 1 to No. 3 reactors.

According to an analysis by TEPCO, almost all of the melted fuel in the No. 1 reactor has fallen to the bottom of the containment vessel after pouring through the bottom of the pressure vessel. Some of the fuel is also believed to have dropped to the bottom of the containment vessel in the No. 2 and No. 3 reactors.

After TEPCO declared last December that a state of cold shutdown had been achieved, it established new safety standards that called for maintaining core temperatures at 80 degrees or less. Because the temperature of the water being pumped into the pressure vessel to cool the nuclear fuel has gone up since summer, the temperature within the pressure vessel has risen slightly to between 35 and 55 degrees. For that reason, equipment was installed from July to cool the water before it is pumped in.

At the same time, TEPCO workers are still unable to accurately grasp what the situation is within the pressure vessels. Due to the high temperature and high humidity, cables connected to the thermometers are on the verge of breaking. Half of the 36 thermometers on the pressure vessel of the No. 2 reactor are not displaying accurate temperatures. TEPCO workers are considering the possibility of inserting thermometers directly into the pressure vessel.

PROCESSING WATER CONTAMINATED WITH RADIATION

Cooling water continues to leak from parts damaged by the accident in the pressure vessels and containment vessels of the No. 1 to No. 3 reactors. Water that has been contaminated with radiation from the melted fuel continues to accumulate in the basements of the reactor buildings and neighboring turbine buildings. The total volume of that contaminated water, including that which has accumulated in nearby buildings, has reached 100,000 tons.

Initial plans called for processing all contaminated water by the end of last year. However, several hundreds of tons of groundwater a day is flowing into the buildings and even though about 160,000 tons have been processed, or more than double the initial plan, the processing work is still not complete.

Because groundwater continues to leak into the buildings, TEPCO has increased the capacity of the tanks to hold the processed water to a total of 228,000 tons. Plans also call for pumping out groundwater in order to lower the water level.

DECOMMISSIONING WORK

The central government and TEPCO have begun work toward decommissioning the reactors.

The first step will be removing nuclear fuel from the storage pools because that fuel will be easier to remove than the melted fuel in the reactor cores of the No. 1 to No. 3 reactors.

The first nuclear fuel will be removed from the No. 4 reactor pool. Not only does that pool have the most fuel, equivalent to what would be used in three to four reactors, but because part of the wall and column of the reactor building was destroyed by a hydrogen explosion, there are concerns about its anti-quake strength.

In response, TEPCO has reinforced the bottom of the pool against quakes.

"It can withstand a quake of the same level as that of the Great East Japan Earthquake," said TEPCO President Naomi Hirose.

However, Ikko Nakatsuka, a Cabinet Office senior vice minister who inspected the No. 4 reactor, touched upon concerns raised by local residents.

"While I sufficiently felt the efforts made by everyone involved to bring the accident under control, that has not yet led to a restoration of trust," he said at a meeting in May.

On July 18 and 19, TEPCO removed two unused nuclear fuel assemblies as an experiment. If no damage or corrosion is found on the nuclear fuel, full-fledged efforts to remove the fuel will begin in December 2013.

The biggest issue will be removing the fuel that has melted. Plans call for beginning that work from 2021 after all fuel has been removed from the storage pools at the No. 1 to No. 4 reactors.

However, no decision has yet been made on what specific steps will be taken because not only will that work be unprecedented, but the work will also have to be done in an environment of high radiation levels.

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