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High radiation bars decommissioning of Fukushima plant

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By HISASHI HATTORI/ Senior Staff Writer

Preparations for the mammoth task of decommissioning crippled reactors at the Fukushima No. 1 nuclear power plant are being stymied by continued high levels of radiation from the triple meltdowns there two years ago.

Tokyo Electric Power Co., operator of the plant, has had to install more tanks to store radioactive water, which continues to swell by several hundreds of tons daily.

Asahi Shimbun reporters entered the No. 4 reactor building on Feb. 20, accompanied by inspectors from the secretariat of the Nuclear Regulation Authority, to assess the situation.

The reactor was offline for regular inspections when the magnitude-9.0 Great East Japan Earthquake struck on March 11, 2011, generating towering tsunami that swamped the plant.

In the days that followed, a hydrogen explosion tore through the No. 4 reactor building. It raised alarm worldwide that the storage pool for spent nuclear fuel in the building might lose its water through evaporation, resulting in the discharge of voluminous amounts of radioactive substances.

That was narrowly averted.

Most of the debris, such as steel frames mangled in the explosion, have been removed from the roofless top floor of the reactor building, but radiation levels remain high.

"Here, the reading is 200 microsieverts per hour," an inspector said. "But it is 1,000 microsieverts on the north side close to the No. 3 reactor building. Keep your distance."

A shroud has been placed over the spent fuel storage pool on the top floor. The water temperature was about 20 degrees. The water, seen through an opening, was muddy and brown. The fuel inside the pool was not visible.

Workers were installing a shroud for the No. 4 reactor building on the south side of the building. It will be equipped with a crane to remove spent fuel from the storage pool.

The foundation work was already completed, and steel frames were being assembled.

TEPCO intends to mount a determined effort to remove spent fuel from the storage pool in November. Two fuel assemblies were removed on a trial basis in July.

An elevator leading to the top floor was erected on the side of the No. 4 reactor building after the disaster. Blocks of concrete blown off in the explosion are still visible.

Similarly, trucks and cars swept up by the tsunami lay overturned and rusting in coastal areas east of turbine buildings.

From the top floor of the No. 4 reactor building, the No. 3 reactor building resembled a bird's nest made of twisted steel frames.

No workers were visible around the No. 3 reactor building. An unmanned crane was removing debris on the roof.

It is hazardous to human health to work in the reactor building where radiation levels range from 20 to 100 millisieverts per hour.

The No. 1 and No. 2 reactors also went in meltdown. Asahi Shimbun reporters got close to the two reactor buildings by taking routes where radiation levels are relatively low.

Still, the dosimeter reading was 700 microsieverts per hour east of the No. 2 reactor turbine building.

The cumulative radiation dose was 0.111 millisievert after the approximately four-hour tour of the Fukushima No. 1 plant.

The figure is roughly one-10th of the annual radiation limit that the International Commission on Radiological Protection sets as a benchmark for public safety in ordinary circumstances.

Atsuhiko Kosaka, chief of the Nuclear Regulation Office responsible for the Fukushima No. 1 plant, says the watchdog body is paying particular attention to minimizing radiation exposure among workers at the site.

"We have yet to identify all hotspots, where radiation levels are locally high," Kosaka said.

Ever-increasing radioactive water has become a key challenge for TEPCO.

Groundwater is flowing into reactor buildings, where it mixes with water used to cool melted fuel inside the No. 1, No. 2 and No. 3 reactors.

The amount of radioactive water stored in tanks and other facilities rose to 230,000 tons this month, up from 10,000 tons in July 2011.

In addition, an estimated 100,000 tons of water have accumulated in the basements of buildings.

Currently, there are nearly 500 storage tanks on the plant premises, many as tall as three-story buildings. TEPCO plans to add more by 2015 when it expects to have to store 700,000 tons of radioactive water.

Inside a radioactive water decontamination facility called Sarry, cylindrical cesium adsorption towers were lined up.

Cesium concentrations in radioactive water have recently fallen, but an inspector kept reporters from approaching the towers, saying radiation levels are high.

The Asahi Shimbun was the first media outlet to enter Sarry, which has been operating since August 2011. The name stands for simplified active water retrieve and recovery system.

The start-up of another decontamination system called Alps, scheduled by the end of 2012, has been delayed because the durability of waste containers was called into question.

The multi-nuclide removal system, short for advanced liquid processing system, is capable of removing almost all types of radioactive substances other than cesium.

Preparations for decommissioning have only recently begun. Decommissioning will not be completed for the next 30 to 40 years under a plan drawn up by the government and TEPCO.

Trial and error is the only way available because the triple meltdowns are unprecedented.

Prime Minister Shinzo Abe has said he intends to accelerate the process.

The government's nuclear emergency response headquarters set up a council for decommissioning at the Fukushima No. 1 plant on Feb. 8, scrapping a similar unit under the previous Democratic Party of Japan government.

Currently, workers cannot easily approach the three reactor buildings where the meltdowns occurred due to high radiation levels. They have been removing debris, such as concrete blocks, on the plant premises.

Work to remove melted fuel from the three reactors is expected to begin by around 2022. Fuel is believed to be scattered within the pressure vessels, containment vessels or piping systems, but exact locations remain unclear.

In addition, TEPCO has yet to identify where radioactive water has been leaking from the damaged containment vessels. The containment vessels must be filled with water before melted fuel is removed.

In December, TEPCO sent a remote-controlled robot near the pressure suppression chamber in the No. 2 reactor building to find out where water was leaking. But the mission failed when the robot lost its balance and got stuck.

New technologies must be developed for decommissioning, but manufacturers and general contractors have shown little enthusiasm.

The companies fear they will not be able to recover their investments because the technologies would have little practical application other than for the Fukushima plant.

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