

How is Fukushima's cleanup going five years after its meltdown? Not so well.

By Anna Fifield February 10

The No. 3 reactor building, which exploded in a hydrogen fireball during the disaster, remains a tangle of broken concrete and twisted metal. A smashed crane sits exactly where it was on March 11, 2011. To the side of the reactor units, a building that once housed boilers stands open to the shore, its rusted, warped tanks exposed.

The scene is a testament to the chaos that was unleashed when the tsunami engulfed these buildings, triggering the world's worst nuclear disaster since the one at Chernobyl, in Ukraine, in 1986. Almost 16,000 people were killed along Japan's northeastern coast in the tsunami, and 160,000 more lost their homes and livelihoods.

[Japan rates nuclear crisis at highest severity level]

Tokyo Electric Power Co. (Tepco), the utility company that runs the Fukushima plant and drew fierce criticism for its handling of the disaster, says the situation has improved greatly.

A worker leaves a room with shelves lined with helmets at the plant. The Tepco utility still faces enormous challenges in connection with the disposal of contaminated water, soil and nuclear fuel debris. (Toru Hanai/Reuters)

"In the last five years, radiation levels have been reduced substantially, and we can say that the plant is stable now," said Akira Ono, the Tepco plant superintendent.

Efforts to contain the contamination have progressed, according to Tepco, including the completion Tuesday of a subterranean "ice wall" around the plant that, once operational, is meant to freeze the ground and stop leakage. Moves to

decommission the plant — a process that could take 30 or 40 years, Ono estimated — are getting underway.

People will be allowed to return to their homes in the nearby town of Naraha next month and to Tomioka, even closer to the plant, next year. For now, Tomioka and neighboring Okuma remain ghost towns, lined with convenience stores, fast-food restaurants and gambling parlors that haven't had a customer in five years. Bicycles lean near front doors, and flowerpots sit empty on windowsills.

[After Japan nuclear disaster, a wasteland]

A sign on the road to the plant showed a radiation reading of 3.37 microsieverts per hour, at the upper end of safe. At a viewing spot overlooking the reactor buildings, it shot past 200, a level at which prolonged exposure could be dangerous. Both readings are hundreds of times lower than they were a couple of years ago.

After about 20 minutes at the viewing spot, a Tepco official hustled visiting reporters, wearing protective suits, onto a bus. "We don't want you out here too long," he said.

But one huge question remains: What is to be done with all the radioactive material?

There's the groundwater that is flowing into the reactor buildings, where it becomes contaminated. It has been treated — Tepco says it can remove 62 nuclides from the water, including strontium, which can burrow into bones and irradiate tissue. It cannot filter out tritium, a radioactive isotope of hydrogen that can be used to make nuclear bombs but is not considered especially harmful to humans.

The water initially was stored in huge bolted tanks in the aftermath of the disaster, but the tanks have leaked highly contaminated radioactive water into the sea on an alarming number of occasions.

Now Tepco is building more-secure welded tanks to hold the water, theoretically for up to 20 years. There are now about 1,000 tanks holding 750,000 tons of contaminated water, with space for 100,000 tons more. The company says it

hopes to increase capacity to 950,000 tons within a year or two, as well as halve the amount of water that needs to be stored from the current 300 tons per day.

As part of those efforts, Tepco built the 1,500-yard-long ice wall around the four reactor buildings to freeze the soil and keep groundwater from getting in and becoming radioactive. Company officials hoped to have the wall working next month; on Wednesday, however, Japan's nuclear watchdog blocked the plan, saying the risk of leakage was still too high.

The options for getting rid of the contaminated water include trying to remove the tritium from it before letting it run into the sea; evaporating it, as was done at Three Mile Island, the Pennsylvania plant that melted down in 1979; and injecting it deep into the ground, using technology like that used to extract shale gas. A government task force is considering which option to choose.

"These all have different advantages and disadvantages; they have different costs and different social acceptance," said Seiichi Suzuki, manager of tank construction at the plant.

Then there's the radioactive soil that has been collected from areas around the Fukushima Daiichi plant during cleanup efforts. More than 700 million cubic feet of soil — enough to fill 8,000 Olympic-size swimming pools — has been packed into large black plastic bags and is being stored, row upon row, in local fields.

More than 700 of the bags, which contain radioactive cesium isotopes, were swept away during floods last year, some ending up in rivers 100 miles away. The government has said that 99.8 percent of the soil can be recycled.

Finally, and most problematically, there's the nuclear fuel from the plant itself.

The fuel that melted down remains in containment vessels in its reactors, and this part of the plant is so dangerous to humans that robots are used to work there. Getting to this fuel and removing it safely is a task that will take decades.

Asked about the decommissioning process, Tepco's Ono said the work was about 10 percent done.

"The biggest challenge is going to be the removal of the nuclear fuel debris," he said. "We don't even know what state the debris is in at the moment."

Japan does not have a nuclear waste dump, and there is vehement resistance to disposing of contaminated material on land.

As a result, one of the options the government is considering is building a nuclear waste dump under the seabed, about eight miles off the Fukushima coast. It would be connected to the land by a tunnel so it would not contravene international regulations on disposing of nuclear waste into the sea. A government study group is set to report on that proposal by the end of the summer.

Many groups, from fishermen to anti-nuclear activists, staunchly oppose the idea of burying the radioactive material at sea in such a seismically active area.

“At some point it would leak and affect the environment,” said Hideyuki Ban, co-director of the Citizens’ Nuclear Information Center. “Some say it’ll be fine, as it will be diluted in the ocean, but it’s unclear whether it will be diluted well. If it gets into fish, it could end up on someone’s table.”

Aileen Mioko Smith, executive director of Green Action, a Kyoto-based anti-nuclear group, agreed.

“The seabed is just like land. It’s not flat, but has mountains and valleys,” she said. “Japan sits on multiple tectonic plates and is earthquake-prone. It’s too easy to think, ‘If not on land, how about the seabed?’ ”