How dangerous is the Fukushima nuke plant today?

March 11 2021, by Mari Yamaguchi

This photo shows tanks (in gray, beige and blue) of storing water that was treated but still radioactive after it was used to cool down spent fuel at the Fukushima Daiichi nuclear power plant in Okuma town, Fukushima prefecture, northeastern Japan, Saturday, Feb. 27, 2021. The reactors of the Unit 3, lower left, and 4 are seen by the ocean. (AP Photo/Hiro Komae)

A decade ago, a massive tsunami crashed into the Fukushima Daiichi

nuclear power plant. Three of its reactors melted down, leaving it looking like a bombed-out factory. Emergency workers risked their lives trying to keep one of history's worst nuclear crises from spiraling out of control.

Proper equipment has now replaced ragged plastic hoses held together with tape and an outdoor power switchboard infested by rats, which caused blackouts. Radiation levels have declined, allowing workers and visitors to wear regular clothes and surgical masks in most areas.

But deep inside the plant, danger still lurks. Officials don't know exactly how long the cleanup will take, whether it will be successful and what might become of the land where the plant sits.

Journalists from The Associated Press recently visited the plant to document progress in its cleanup on the 10th anniversary of the meltdowns and the challenges that lie ahead.

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WHAT HAPPENED 10 YEARS AGO?

After a magnitude 9.0 earthquake on March 11, 2011, a tsunami 17 meters (56 feet) high slammed into the coastal plant, destroying its power supply and cooling systems and causing meltdowns at reactors No. 1, 2 and 3.

The plant's three other reactors were offline and survived, though a fourth building, along with two of the three melted reactors, had hydrogen explosions, spewing massive radiation and causing long-term contamination in the area.

A worker for Tokyo Electric Power Co. stands by a gate at the Fukushima Daiichi nuclear power plant in Okuma town, Fukushima prefecture, northeastern Japan, Saturday, Feb. 27, 2021. (AP Photo/Hiro Komae)

The plant's operator, Tokyo Electric Power Co., says the tsunami couldn't have been anticipated, but reports from government and independent investigations and recent court decisions described the disaster at the plant as human-made and a result of safety negligence, lax oversight by regulators and collusion.

WHAT'S INSIDE THE MELTED REACTORS?

About 900 tons of melted nuclear fuel remain inside the three damaged reactors, and its removal is a daunting task that officials say will take 30-40 years. Critics say that's overly optimistic.

Separate efforts to remove spent fuel from cooling pools inside the reactor buildings were hampered by high radiation and debris and have been delayed for up to five years. If the plant's pools lose their cooling water in another major quake, exposed fuel rods could quickly overheat and cause an even worse meltdown.

In this Nov. 12, 2011 file photo, the crippled Fukushima Daiichi nuclear power station is seen through a bus window in Okuma, Japan, as the media were allowed into Japan's tsunami-damaged nuclear power plant for the first time since the March 11 disaster. A decade ago, the Fukushima Daiichi nuclear power plant melted down. It looked like a bombed-out factory in a war zone.

Emergency workers risked their lives as they battled to keep the crisis in check. Eeriness is no longer there. The feeble-looking plastic hoses mended with tape and the outdoor power switchboard that rats got into, causing blackouts, were replaced with proper equipment. (AP Photo/David Guttenfelder, Pool, File)

The melted cores in Units 1, 2 and 3 mostly fell to the bottom of their primary containment vessels, some penetrating and mixing with the concrete foundation, making removal extremely difficult.

Remote-controlled robots with cameras have provided only a limited view of the melted fuel in areas still too dangerous for humans to go.

Plant chief Akira Ono says the inability to see what's happening inside the reactors means that details about the melted fuel are still largely unknown.

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ARE THERE UNDERGROUND LEAKS?

Since the disaster, contaminated cooling water has constantly escaped from the damaged primary containment vessels into the reactor building basements, where it mixes with groundwater that seeps in. The water is pumped up and treated. Part is recycled as cooling water, with the remainder stored in 1,000 huge tanks crowding the plant.

This file image made available from Tokyo Electric Power Co. via Kyodo News shows the damaged No. 4 unit of the Fukushima Daiichi nuclear complex in Okuma town, northeastern Japan, on Tuesday, March 15, 2011. White smoke billows from the No. 3 unit. A decade ago, the Fukushima Daiichi nuclear power plant melted down. It looked like a bombed-out factory in a war zone. Emergency workers risked their lives as they battled to keep the crisis in check. Eeriness is no longer there. The feeble-looking plastic hoses mended with tape and the outdoor power switchboard that rats got into, causing blackouts, were replaced with proper equipment. (Tokyo Electric Power Co/Kyodo News via AP, File)

Early in the crisis, highly contaminated water that leaked from damaged basements and maintenance ditches escaped into the ocean, but the main leakage points have been closed, TEPCO says. Tons of contaminated

sandbags used to block the leaks early in the disaster remain in two basements.

Tiny amounts of radiation have continued leaking into the sea and elsewhere through underground passages, though the amount today is small and fish caught off the coast are safe to eat, scientists say.

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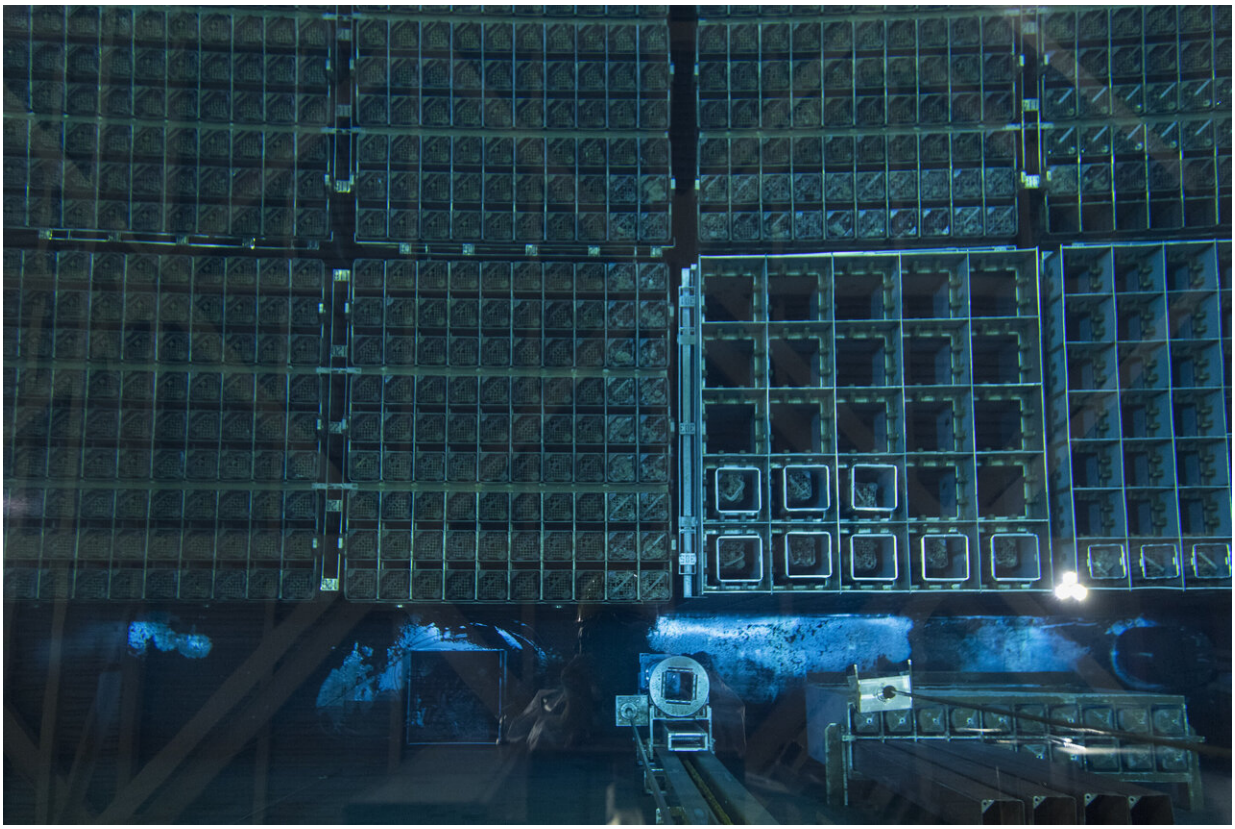
WHAT WILL HAPPEN TO THE STORED RADIOACTIVE WATER?

The 1,000 tanks filled with treated but still radioactive water tower over workers and visitors at the plant.

TEPCO says the tanks' 1.37 million ton storage capacity will be full in 2022. A government panel's recommendation that the water be released into the sea is facing fierce opposition from local residents, especially fishermen concerned about further damage to the area's reputation. A decision on that recommendation is pending.



This photo shows part of an extra cooling pool storing spent fuel units from reactors at the Fukushima Daiichi nuclear power plant in Okuma town, Fukushima prefecture, northeastern Japan, Saturday, Feb. 27, 2021. Several units, seen at lower right, were removed from the No. 3 reactor at the power plant. (AP Photo/Hiro Komae)

TEPCO and government officials say tritium, which is not harmful in small amounts, cannot be removed from the water, but all other isotopes selected for treatment can be reduced to safe levels for release.

TEPCO has managed to cut the amount of contaminated water to one-third of what it used to be through a series of measures.

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WHAT'S IT LIKE TO VISIT THE PLANT?

The first thing visitors see is a stylish office building that holds the TEPCO decommissioning unit.

In another building, plant workers—about 4,000 per day now—go through automated security checkpoints and radiation measurements.

Because radiation levels have fallen significantly following decontamination, full protection gear is only needed in a few places in the plant, including in and around the melted reactor buildings.

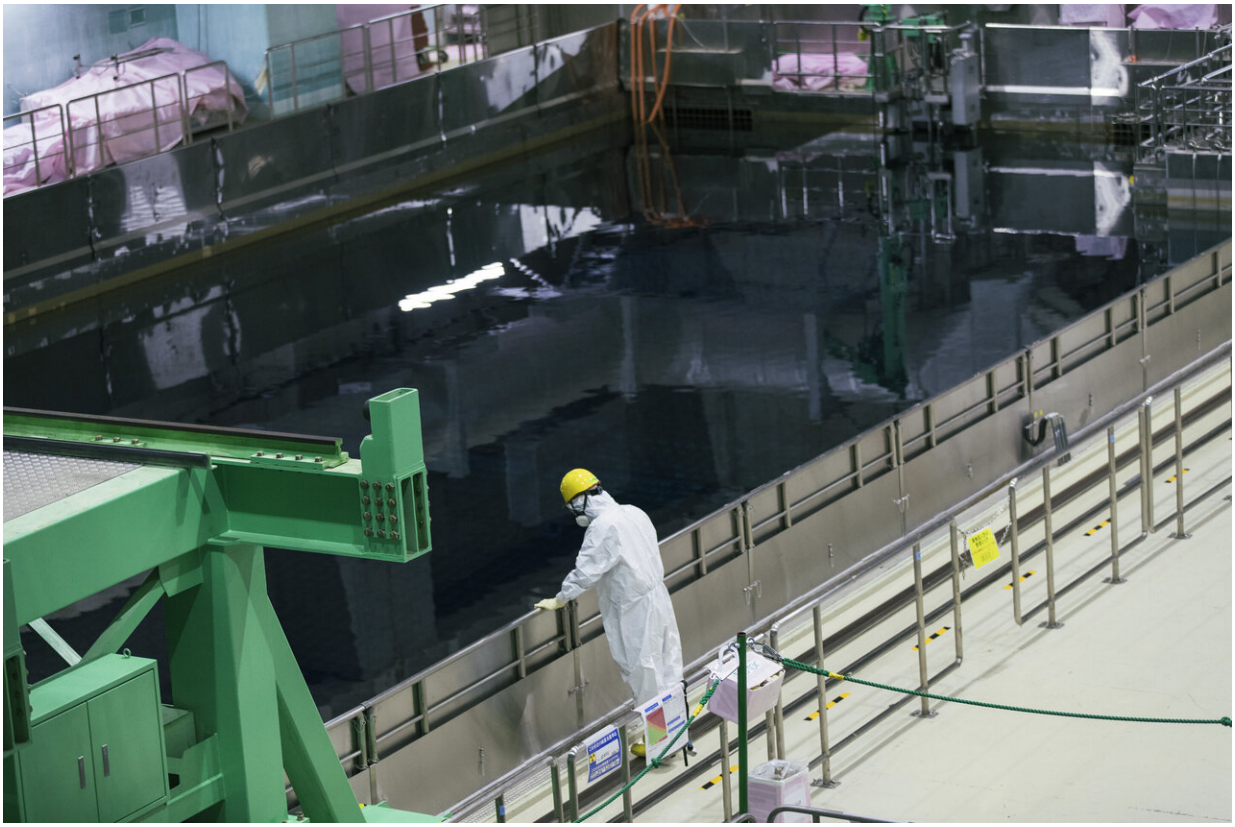
On a recent visit, AP journalists donned partial protective gear to tour a low-radiation area: a helmet, double socks, cotton gloves, surgical masks, goggles and a vest with a personal dosimeter.

In this March 24, 2011 file photo, a young evacuee is screened at a shelter for leaked radiation from the tsunami-ravaged Fukushima Daiichi nuclear power plant in Fukushima, northeast of Tokyo. A decade ago, the Fukushima Daiichi nuclear power plant melted down. It looked like a bombed-out factory in a war zone. Emergency workers risked their lives as they battled to keep the crisis in check. Eeriness is no longer there. The feeble-looking plastic hoses mended with tape and the outdoor power switchboard that rats got into, causing blackouts, were replaced with proper equipment. (AP Photo/Wally Santana, File)

This photo shows the damaged Unit 1 reactor, back, and the exhaust stack shared with the Unit 1 and 2 reactors at the Fukushima Daiichi nuclear power plant in Okuma town, Fukushima prefecture, northeastern Japan, Saturday, Feb. 27, 2021. (AP Photo/Hiro Komae)

This photo shows the damaged Unit 1 reactor, back, and the exhaust stack shared with the Unit 1 and 2 reactors at the Fukushima Daiichi nuclear power plant in Okuma town, Fukushima prefecture, northeastern Japan, Saturday, Feb. 27, 2021. The exhaust stack has gotten its upper half cut off due to safety concerns. (AP Photo/Hiro Komae)

Nuclear reactors of No. 1, from left, 2, 3 and 4 look over tanks storing water that was treated but still radioactive, at the Fukushima Daiichi nuclear power plant in Okuma town, Fukushima prefecture, northeastern Japan, Saturday, Feb. 27, 2021. (AP Photo/Hiro Komae)



A worker for Tokyo Electric Power Co. looks at an extra cooling pool containing spent fuel from reactors at the Fukushima Daiichi nuclear power plant in Okuma town, Fukushima prefecture, northeastern Japan, Saturday, Feb. 27, 2021. (AP Photo/Hiro Komae)

This photo shows tanks (in gray, beige and blue) storing water that was treated but still radioactive after it was used to cool down spent fuel at the Fukushima Daiichi nuclear power plant in Okuma town, Fukushima prefecture, northeastern Japan, Saturday, Feb. 27, 2021. (AP Photo/Hiro Komae)

In this Nov. 12, 2011, file photo, officials from the Tokyo Electric Power Co. and Japanese journalists look at the crippled Fukushima Daiichi nuclear power station from bus windows in Okuma, Japan. A decade ago, the Fukushima Daiichi nuclear power plant melted down. It looked like a bombed-out factory in a war zone. Emergency workers risked their lives as they battled to keep the crisis in check. Eeriness is no longer there. The feeble-looking plastic hoses mended with tape and the outdoor power switchboard that rats got into, causing blackouts, were replaced with proper equipment.(AP Photo/David Guttenfelder, File)

The Pacific Ocean looks over nuclear reactor units of No. 3, left, and 4 at the Fukushima Daiichi nuclear power plant in Okuma town, Fukushima prefecture, northeastern Japan, Saturday, Feb. 27, 2021. (AP Photo/Hiro Komae)

This photo shows the exhaust stack shared with the Unit 1 and 2 reactors at the Fukushima Daiichi nuclear power plant in Okuma town, Fukushima prefecture, northeastern Japan, Saturday, Feb. 27, 2021. The exhaust stack has gotten its upper half cut off due to safety concerns. (AP Photo/Hiro Komae)

In this Nov. 12, 2011, file photo, the Unit 4 reactor building of the crippled Fukushima Daiichi nuclear power station is seen through a bus window in Okuma town, north of Tokyo, when the media was allowed into Japan's tsunami-damaged nuclear power plant for the first time. A decade ago, the Fukushima Daiichi nuclear power plant melted down. It looked like a bombed-out factory in a war zone. Emergency workers risked their lives as they battled to keep the crisis in check. Eeriness is no longer there. The feeble-looking plastic hoses mended with tape and the outdoor power switchboard that rats got into, causing blackouts, were replaced with proper equipment. (AP Photo/David Guttenfelder, Pool, File)

A security guard stops vehicles at a security checkpoint as they enter an area that requires a special permit to enter in Okuma town, Fukushima prefecture, northeastern Japan, Thursday, Feb. 25, 2021. Part of the buildings at the Fukushima Daiichi nuclear power plant is seen in the background. (AP Photo/Hiro Komae)

This photo shows a device to freeze dirt to make an underground retention wall to surround nuclear reactors in an attempt to avoid leakage of radioactive water at the Fukushima Daiichi nuclear power plant in Okuma town, Fukushima prefecture, northeastern Japan, Saturday, Feb. 27, 2021. (AP Photo/Hiro Komae)

This photo shows the damaged Unit 1 reactor, back, and part of the exhaust stack shared with the Unit 1 and 2 reactors at the Fukushima Daiichi nuclear power plant in Okuma town, Fukushima prefecture, northeastern Japan, Saturday, Feb. 27, 2021. The exhaust stack has gotten its upper half cut off due to safety concerns. (AP Photo/Hiro Komae)

Employees of Tokyo Electric Power Co. look at old tanks which used to store radioactive water at the Fukushima Daiichi nuclear power plant in Okuma town, Fukushima prefecture, northeastern Japan, Saturday, Feb. 27, 2021. (AP Photo/Hiro Komae)

Full protection gear, which means hazmat coveralls, a full-face mask, a head cover, triple socks and double rubber gloves, was required at a shared storage pool where fuel relocation from the No. 3 reactor pool was recently completed.

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WHAT'S THE ENDGAME?

A decade after the accident, Japan doesn't yet have a plan to dispose of the highly radioactive melted fuel, debris and waste at the plant. Technology also isn't advanced enough yet to manage the waste by reducing its toxicity.

TEPCO says it needs to get rid of the water storage tanks to free up space at the plant so workers can build facilities that will be used to study and store melted fuel and other debris.

There are about 500,000 tons of solid radioactive waste, including contaminated debris and soil, sludge from water treatment, scrapped tanks and other waste.

It's unclear what the plant will look like when the work there is done. Local officials and residents say they expect the complex to one day be open space where they can walk freely. But there's no clear idea if or when that might happen.