

sq. km of the facility is paved, it would reduce the amount of water reaching the reactor building basements to 160 tons a days.

Additional measures, such as the frozen underground barrier and pumping out the groundwater before it gets to the basements, could bring the total down to 30 tons.

"It is important to divert the upstream groundwater and rainwater to discharge it into the sea" before they get contaminated, Marui said.

ing could occur in one of the layers where the groundwater flows relatively fast.

While the buildup of tainted water into the sea is another issue.

Tepco has been injecting liquid glass into the ground to create barriers near the coastline and pumping groundwater up before it can get into the sea, but it has not been able to fully stop the problem.

Tepco believes the source of

ings by freezing cracks between trenches and the buildings. It intends to pump the water out of the trenches in May.

Takeda said that if Tepco can clean up the trenches, the groundwater will be much less contaminated.

Takeda also said the underground frozen wall will be a key measure as it is imperative to keep the water in the turbine buildings from escaping and contaminating the groundwater.

ings showed irregular movements following the alarm and because people on patrol were not able to find any trace of a leak near the tank in the two hours or so after the warning sounded, the utility judged that the water-level gauge had malfunctioned.

But Ono admitted that workers could have noticed the leak sooner had they gone up on the 10-meter-tall tank to check how much water it contained or if

PROFESSOR AKIRA WATANABE, WHO MONITORS SAFETY AT FUKUSHIMA NO. 1

exception of tritium.

While Tepco plans to boost the processing capacity of the facility, called ALPS, an acronym standing for advanced liquid processing system, another official admitted that scrubbing the water by the end of fiscal 2014 is "an extremely lofty goal" that won't be met unless the system can achieve a high operating rate.

reactors 1 through 4.

The barrier of ice, which Tepco aims to start operating by the end of March 2015, is intended to block groundwater from seeping into the reactor buildings' basement areas and mixing with highly toxic water used to cool the plant's three crippled reactors.

Should the project be successful, it will represent major progress.

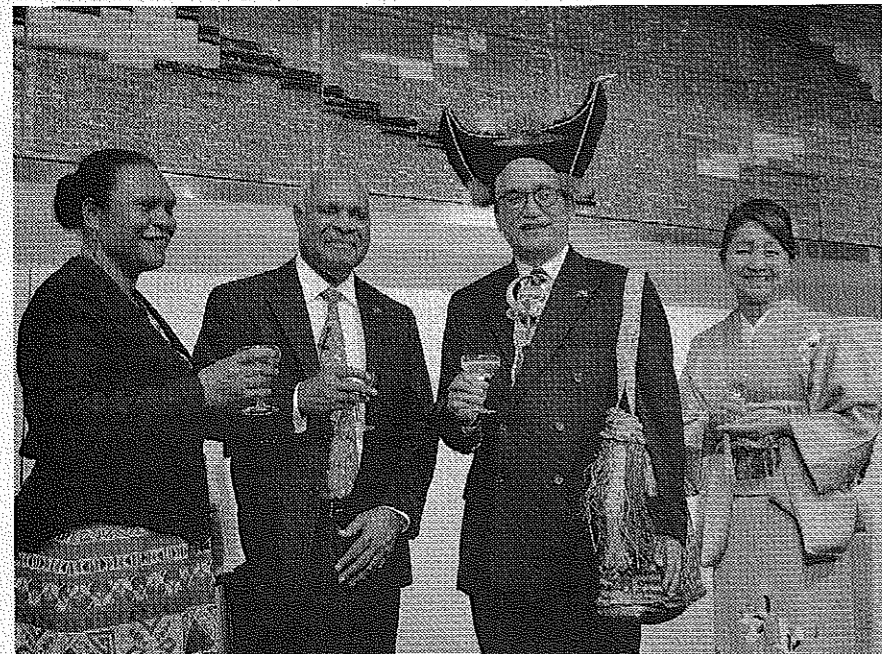
operated for more than a decade, two years.

Last year, as concerns grew over leaving the huge workload of cleaning up and decommissioning Fukushima No. 1 to Tepco alone, the Abe administration decided to directly fund technically challenging projects that will help contain the toxic water buildup, including the frozen barrier, and the government is moving ahead to strengthen its monitoring of the plant's decommissioning process.

Fukushima No. 1, is skeptical that government support alone will bring a change to the overall situation.

"I believe one of the major reasons behind the poor safety management is that Tepco has no option but to rely on massive numbers of subcontractor workers, six or seven layers in some cases," Watanabe said. "I wonder whether safety can be managed by a company out of touch with workers involved in various operations at the plant."

TIMES GALLERY



Nobuchika Ihara (second from right), Papua New Guinea's Honorary Consul for the Kanto Region, wears a ceremonial headpiece, necklace and holds a traditional bag during a commissioning ceremony at the Hotel New Otani in Tokyo on Feb. 28, with, from left, the Papua New Guinean Ambassador's wife, Anna Dusava, Ambassador Gabriel Dusava, and Ihara's wife, Yasuko.

YOSHIKI MIURA



Uzbekistan Minister of Foreign Economic Relations, Investments and Trade Elyor Ganiev shakes hands with Deputy Prime Minister Taro Aso during a reception following the Uzbekistan-Japan Forum, which featured various presentations on areas of cooperation between Uzbekistan and Japan, at the Hotel Okura in Tokyo on March 3.

YOSHIKI MIURA



Left: Etienne Sonntag (center), chef at the Spanish Embassy, encourages children making original tapas for the "5th Children's International Speech Contest." Right: Speech contest winner 7-year-old Ideshita Mai Sophia has her photo taken with chef judges at the Spanish ambassador's residence and embassy in Tokyo on March 1.



Right: Speech contest winner 7-year-old Ideshita Mai Sophia has her photo taken with chef judges at the Spanish ambassador's residence and embassy in Tokyo on March 1.

Robots make progress in probing leaky reactors

JJI

Research robots of various types are playing significant roles in understanding the situation with crippled reactors 1 to 3 at the Fukushima No. 1 nuclear plant.

The reactors at the quake- and tsunami-damaged plant run by Tokyo Electric Power Co. are inaccessible because of the high radiation produced by the multiple core meltdowns they suffered in March 2011.

In June 2011, the Quince, a robot developed by a group led by Chiba Institute of Technology, became the first Japanese robot to enter the reactor 2 building.

Tomoaki Yoshida, 39, a senior researcher at the institute, said the group contacted Tepco in late March that year to prepare the way for using the robot for research at the crippled plant.

The group conducted repeated tests to make sure the robot can safely climb stairs and be used to shoot images and measure radiation inside the reactors.

Images shot by the Quince were published in July 2011.

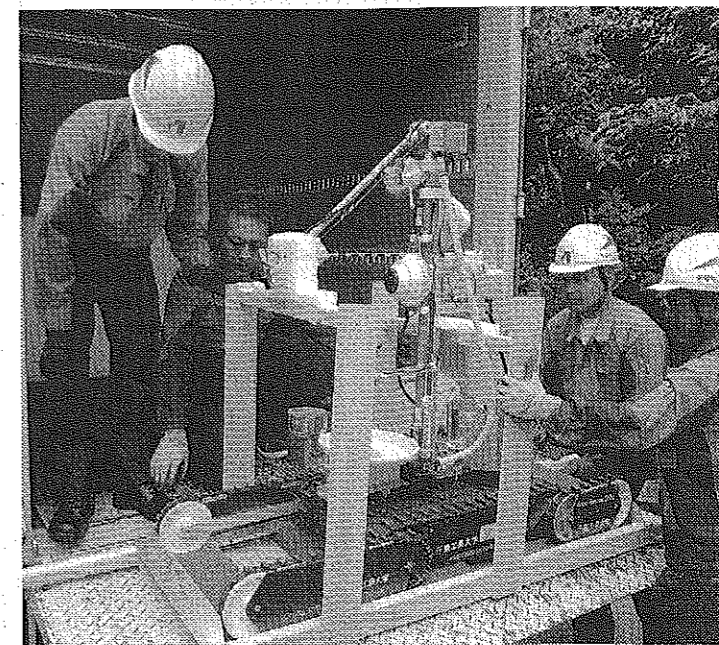
"The robot could collect information inside the building to a certain extent, although it was unable to get into narrow spaces or open doors," Yoshida said.

In April 2012, Topy Industries Ltd. put its Survey Runner research robot into the basement of the reactor 2 building. The robot, just 51 cm wide, can easily approach the lower part of the reactor's containment vessel.

Shingo Tsukui, 43, who was involved in developing the robot, said it had been built to climb even narrow stairs built at a 45-degree angle.

In the containment vessel of reactor 1, meanwhile, water leaks and pipe damage were found last November by a small boat equipped with a camera developed in a government project.

Yosuke Takatori, 35, an engineer from Hitachi-GE Nuclear Energy Ltd., a joint venture between Hitachi Ltd. and General Electric Co. of the United States, said he devised ways to prevent



Quince, a robot developed by a group led by Chiba Institute of Technology, is loaded on a truck for delivery to the crippled Fukushima No. 1 nuclear plant in June 2011.

KYODO

the boat's cable from getting tangled up when it is rewound. He added that it was very hard to shrink the equipment to a small enough size.

If the broken sections of the reactors' containment vessels can be pinpointed and repaired, it should be possible to cool the melted nuclear fuel inside and

curb the buildup of radioactive water. The fuel must be submerged at all times.

Even if research robots are used, however, collecting information will still be difficult because their paths may be blocked by contaminated water and there may be multiple sections damaged in each reactor.

Spending on Fukushima ballooning three years on

JJI

The government is expected to use a substantial amount of money to develop advanced technology aimed at mitigating the ongoing effects of the crisis at the Fukushima No. 1 nuclear power plant.

The government has budgeted more than ¥166 billion for technological development at the crippled Tokyo Electric Power Co. plant, where decommissioning work is expected to

take 30 to 40 years, according to the Agency for Natural Resources and Energy.

Prime Minister Shinzo Abe's administration has previously said that it would take a leadership role in post-disaster work at the plant, and not leave the work entirely to Tepco.

The state funds have been earmarked for the development of robots to investigate deeper inside the plant, and a center for radioactive materials analysis that would help prepare for the

removal of molten nuclear fuel.

To prevent further accumulation of radioactive water caused by groundwater flowing into the reactor building basements, the government plans to construct underground barriers of frozen soil around the buildings, and develop an improved version of the advanced liquid processing system, or ALPS, which substantially reduces levels of radioactive substances other than tritium in already contaminated water.

The agency explained that the

development of technology for practical use in decontamination work is the government's first priority, while decommissioning of the reactors is set to follow.

The agency also insists development of such technology is in the national interests, since it may help to deal with future disasters.

Despite the potential benefits, the government's financial burden looks certain to grow because no limits have yet been set on expenditures related to post-disaster cleanup operations.