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Reactors Had High Rate of Problems

Japanese Records Show Workers Mixed Up Plant Plans, Misconnected Drains; Three Hurt by Radiation in Day's Battles

By **ANDREW MORSE** And **MITSURU OBE**

TOKYO—The crippled Japanese power plant at the heart of the world's worst nuclear crisis in a quarter-century has a history of operational and mechanical flaws, including a recent incident in which workers used the wrong plans to work on a reactor.

The findings came as the plant's operator and the Japanese government continued Thursday to attempt to gain control of the earthquake-damaged plant's reactors, as steam blasts and serious injuries to workers further delayed efforts to cool fuel rods, restart cooling pumps and stanch radiation leaks.



Associated Press

In a March 16 photo, thick white smoke billows from the No. 3 unit of the Fukushima Daiichi.

According to Japanese regulatory records, in August 2010, employees at Tokyo Electric Power Co.'s Fukushima Daiichi power plant, armed with plans for work on the complex's No. 6 reactor, instead began conducting work on the facility's No. 5 unit. They then altered work plans on their own, according to the records, leading to a mistake that rendered the unit's cooling system inoperable.

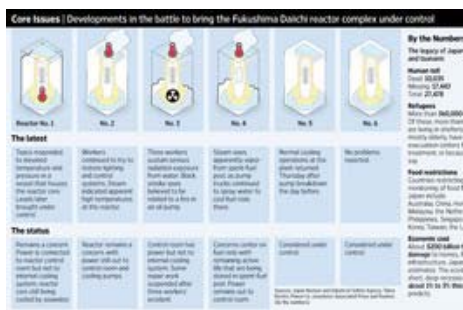
Regulators looking into the issue discovered a cable for controlling the cooling system had mistakenly been removed, an error that wasn't discovered for more than two weeks.

Such mechanical and operational problems underscore the sometimes trouble-prone nature of Fukushima Daiichi, the first nuclear-power station of Tokyo Electric, or Tepco. The plant, whose first reactor became operational in 1971, had the highest rate of accidents of any big Japanese nuclear power plant for the five years from 2005 to 2009, according to data from the Japan Nuclear Energy Safety Organization, a government-funded group that monitors plant safety.

Elevated radiation levels in milk, water and vegetables have raised concerns in Japan and abroad as the country continues to dig out from the disaster. Japan's death toll from twin disasters reached 9,811 Thursday, with 17,541 still missing as of 11 p.m. local time.

Core Issues

Thursday's small setbacks at Fukushima Daiichi underscore how hard Tepco must battle just to hold on to some level of control over the situation at the complex. Progress toward restoring power and cooling functions is slower than hoped; high levels of radiation are taking a steady toll on workers. Failure to hold the line could have dire consequences.



Three workers at the Fukushima Daiichi plant were exposed to moderately high levels of radiation Thursday while laying cables at one of the plant's six reactors, No. 3, and came into contact with radioactive water on the ground, a government spokesman said. Two were sent to a hospital for treatment on their feet or legs.

Officials from Japan's Nuclear and Industrial Safety Agency said Thursday the three were exposed to 170,000 to 180,000 microsieverts of radiation—higher than any confirmed level of exposure sustained by workers there thus far, and close to the

maximum cumulative level allowed for workers on the site.

Such delays helped slow the process of restoring electricity to plant control rooms and cooling systems. Tepco restored power to the control room of reactor No. 1 on Thursday, following restoration of power at the control center of reactor No. 3. Those reactors' cooling systems, however, remain off the grid.

"Restoring electricity to the cooling system is a first step" toward resolving the crisis, said Hiromitsu Ino, professor emeritus of the University of Tokyo and a member of a civic group opposed to nuclear-power development in Japan. "But the persistent smoke indicates that Tepco has yet to have full control over fuel in the reactor core, which is creating heat and apparently igniting the plastic covering of various cables."

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Tepco said it intended to restart the cooling system of reactor No. 3 as early as Friday. Until then, Tepco plans to continue pumping seawater to cool the reactor and the storage pool that holds spent fuel.

Tepco has used seawater as a stopgap measure to cool reactor cores and prevent a meltdown in units 1, 2 and 3 since March 12,

the day after an earthquake and tsunami knocked out the cooling systems of the nuclear complex. But concerns have emerged that salt could damage machinery, clog pipes and encrust fuel rods, complicating efforts to cool them.

"We are aware of the harmful effects of using seawater," said Hidehiko Nishiyama, a spokesman for the nuclear-safety agency. "We need to anticipate the possible consequences and take appropriate action."

The troubles at Fukushima Daiichi came as records from Japan's Ministry of Economy, Trade and Industry, or METI, showed comparatively high levels of mechanical and operational issues at the plant in years before the earthquake.

Radiation Levels in Japan



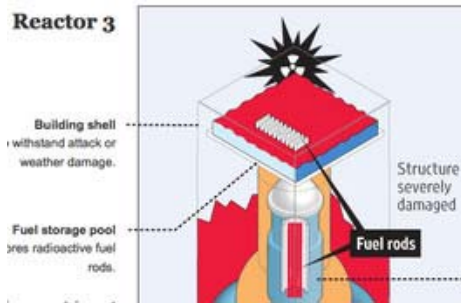
The Japanese government monitors radiation levels around the country. Track these measurements over time.

A Tepco spokesman said the company takes all required safety measures and has built-in backup systems to handle contingencies. A spokesman for the Nuclear and Industrial Safety Agency, the regulatory unit of METI, said the agency had ordered Tepco to put in place measures to prevent the recurrence of the problems and report to the agency on those measures.

In the incident involving the mixed-up plant plans, Tepco reported to regulators that its workers printed out plans for the wrong reactor before starting work. They then began altering those plans on their own, causing unnecessary and incorrect work to be done.

In another case, in 2009, drain pipes were misconnected at five different places at Fukushima Daiichi, allowing radioactive

Reactor Monitor



tritium to mix with water from storm drains, according to records, according to the METI records. It is unclear whether the tritium was released to the broader environment.

Experts say it isn't unusual for nuclear-power plants to experience more problems in their first 10 years of operation because the facilities are complex. Other Japanese facilities, though generally having a lower rate of accidents than Fukushima Daiichi, also occasionally suffer similar types of incidents.

To be sure, not all of the incidents were serious. On Nov. 26, 2008, Tepco reported that water oozed from the casing of two valves in the hydraulic system used in control rods. On April 3, 2009, irregularities were found with the control rods at the facility's No. 3 reactor. Regulators said the incidents carried a low level of risk.

Write to Andrew Morse at andrew.morse@wsj.com

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