

Fukushima: Gov't aims for 'cold shutdown' reactors, but bemoans lack of data - and other matters

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Gov't aims for 'cold shutdown' of Fukushima reactors, but bemoans lack of data

The government and Tokyo Electric Power Co. (TEPCO) are trying to achieve a stable condition called a "cold shutdown" of crippled reactors at the Fukushima No. 1 Nuclear Power Plant by the end of this year, but they have yet to come to grips with exactly what is happening inside the reactors crippled by the March 11 earthquake and ensuing tsunami.

In the latest roadmap to contain the Fukushima nuclear power plant, the government and TEPCO, the operator of the Fukushima nuclear power plant, aim for a "cold shutdown" of the reactors by the end of this year. Their definition of a cold shutdown of the Fukushima nuclear plant consists of 1) the temperatures of the bottoms of the reactor pressure vessels being held down below 100 degrees Celsius, 2) radioactive substances from the reactors being managed and controlled, and 3) stable maintenance of "circular cooling systems" designed to recycle radioactive water from the reactors as coolant.

On Oct. 14, TEPCO finished installing a covering over the No. 1 reactor in an effort to prevent radioactive substances from spreading. In addition, a ventilation system designed to remove radioactive substances from the reactor building through filters has been operating at the reactor, and the temperature of the bottom of the reactor pressure vessel has dropped below 40 degrees Celsius.

At the No. 2 reactor, a "gas control system" designed to remove radioactive substances from the reactor building has begun to be operational. But an analysis of gas using the system suggested on Nov. 2 a possibility of a sustained nuclear chain reaction known as criticality following the detection of radioactive xenon. TEPCO and the government's Nuclear and Industrial Safety Agency (NISA) eventually concluded that it was not criticality but "spontaneous fission," revealing the very fact that they were not able to come to grips with the situation inside the reactor accurately. TEPCO plans to start operating gas control systems at the No. 1 and No. 3 reactors by the end of this year to step up its efforts to monitor radioactive substances at each nuclear reactor.

At the No. 3 reactor, which suffered a hydrogen explosion shortly after a similar blast at the No. 1 reactor, debris remains scattered in the reactor building. Furthermore, levels of radiation from the debris remain high, hampering efforts to contain the reactor. Therefore, TEPCO continues to use a crane to remove debris from the upper reactor building blown off by the hydrogen explosion.

At the No. 1, 2 and 3 reactors, melted nuclear fuel seems to be penetrating the pressure vessels and even leaking out from the reactor buildings. About 10 cubic meters per hour of water has been injected into the reactors to cool nuclear fuel. TEPCO unveiled an estimate that the probability of another reactor core being further damaged would be once in 5,000 years if the nuclear plant were to be hit by a major tsunami again and lose its entire functions to inject water. The utility submitted to NISA its plans to ensure safety at the plant over the next three years or so.

At the No. 4 reactor, which has no nuclear fuel in the reactor itself, about 1,535 fuel rods — about three times the number of fuel rods at the No. 1, 2, and 3 reactors — are kept in the spent nuclear fuel pool. For this reason, TEPCO completed the work to sustain the fuel pool with steel frames in late July.

Mainichi Shimbun , November 14, 2011

<http://mdn.mainichi.jp/mdnnews/national/archive/news/2011/11/14/20111114p2a00m0na004000c.html>

N-plant cold shutdown possible this year

The government and Tokyo Electric Power Co. have released a revised timetable for containing the crisis at the Fukushima No. 1 nuclear power plant, saying cold shutdown of the reactors can be achieved by the end of the year.

The government and TEPCO on Thursday also made their first announcement of a confirmed annual radiation level at the perimeter of the plant grounds. The most recent data shows the radiation level at 0.1 millisievert per year.

Step 2 of the timetable set a target of 1 millisievert per year as a condition of cold shutdown, and this important figure has now been confirmed.

Though continual monitoring will be necessary to determine if cold reactor stability can be maintained, Goshi Hosono, state minister in charge of the nuclear crisis, said, "Achieving cold shutdown within the year is possible."

To achieve cold shutdown, two conditions need to be fulfilled: reduction of the quantity of radioactive material discharged by the reactors, and keeping the temperature at the bottom of the pressure vessels at 100 C or lower.

The quantity of discharged radioactive materials has fallen about 40 percent from last month to 60 million becquerels per hour.

Because measurement accuracy has improved, the most recent figures released are confirmed rather than interim.

The temperature target has also been reached, with Thursday's temperatures reading 37 C in the

No. 1 reactor and 68 C in the Nos. 2 and 3 reactors.

Regarding the containment vessels containing melted fuel, TEPCO said the temperature of the vessels had steadily dropped. The temperatures of the Nos. 1, 2 and 3 containment vessels were 38 C, 70 C and 58 C, respectively.

TEPCO stressed the entire reactor system, including the containment vessels, has been cooled.

However the condition of the melted nuclear fuel in the pressure and containment vessels is still unknown. Checking the condition remains a key task.

As work progressed on Step 2, three task categories—groundwater radiation measurement, containing the dispersal of radioactive material into the air and soil, and measurement and reduction of radiation levels—were achieved. Of the 10 task categories, six have now been completed.

The remaining categories are achieving cold shutdown, improving health care for plant workers and other ongoing tasks.

TEPCO aims to begin full-scale work to decommission the reactors after Step 2 is completed. TEPCO plans to formulate a technical timetable in cooperation with the government by the end of this year.

Yomiuri Shimbun , November 19, 2011

<http://www.yomiuri.co.jp/dy/national/T111118006292.htm>

N-fuel conditions unclear

The latest timetable for bringing a nuclear fuel meltdown at the Fukushima No. 1 nuclear power plant under control shows the situation is no longer in the critical condition it was immediately following the accident, but many issues remain unsolved.

The government and Tokyo Electric Power Co. have revised the timetable for the seventh time in the eight months since the crisis began. Data suggests the reactors and radioactive material are under control, and the power plant will achieve a cold shutdown once required conditions are confirmed.

However, the status of the molten nuclear fuel is unclear. It is not known how the fuel, believed to have partially melted through pressure vessels of the reactors and into containment vessels, has dispersed and how much lies in water.

It is questionable to assess the situation as nearly a cold shutdown. Usually, to achieve a cold shutdown, all fuel rods should be cooled under water, and nuclear fuel, pressure and containment vessels should be intact and in good condition.

On Nov. 2, TEPCO said a small-scale recriticality incident—in which nuclear fuel achieves a fission chain reaction—may have taken place at the No. 2 reactor of the power plant, creating a small panic. The company later said xenon discovered at the plant was the result of spontaneous fission, not a nuclear chain reaction known as recriticality as had been feared.

TEPCO should have been able to coolly handle the detection of xenon, but it failed to do so as it had

not properly prepared necessary data. These matters should not be dealt with in a hurried and sloppy manner as the end of the year, the target for achieving cold shutdown, approaches.

There are many other unsolved issues, including how to cope with contaminated water said to be accumulating at a rate of 200 to 500 tons a day in underground areas of the reactor buildings. The government and TEPCO must thoroughly solve these issues without being bound by their timetable.

Tatsuo Nakajima, Yomiuri Shimbun Staff Writer, November 19, 2011

<http://www.yomiuri.co.jp/dy/national/T111118006066.htm>

TEPCO to create new road map for scrapping Fukushima plant

TOKYO (Kyodo) — The Japanese government on Wednesday ordered Tokyo Electric Power Co. to create by around the end of the year a new work schedule for scrapping the crippled nuclear reactors at the crisis-hit Fukushima Daiichi power complex, as the plant is coming close to a stable state of cold shutdown.

It also ordered the utility to start removing spent nuclear fuel at the plant within two years, one year earlier than the initial plan so that workers can move on to the most difficult task of extracting the melted fuel from the reactors as early as possible, according to nuclear disaster minister Goshi Hosono.

The latest move came as TEPCO is expected to achieve a state of cold shutdown at the plant by the end of the year, a key goal of what is called “step 2” under the existing road map, which details the work schedule for containing the crisis.

According to a draft report presented by a government panel, workers are expected to take out the nuclear fuel stored in the spent fuel pools of the Nos. 1 to 4 units before embarking on the challenging phase of removing the melted fuel from the crippled Nos. 1 to 3 reactors.

The No. 4 unit did not have fuel rods in the reactor due to maintenance work when the March 11 earthquake and tsunami hit the plant and triggered the world’s worst nuclear crisis since the 1986 Chernobyl disaster.

The panel under the Japan Atomic Energy Commission also said in the report that removing the melted fuel should start within 10 years of step 2 being completed, and that decommissioning is likely to take 30 years or more.

Kyodo Press, November 9, 2011

<http://mdn.mainichi.jp/mdnnews/national/archive/news/2011/11/09/20111109p2g00m0dm097000c.html>

Nuclear watchdog releases stress test evaluations on website

To ensure transparency, the Nuclear and Industrial Safety Agency (NISA) on Nov. 8 began releasing on its website exchanges with utility companies over assessments of how earthquake and tsunami resistant nuclear reactors are.

“I gave instructions that the agency and utilities should communicate in written documents, and that those documents should be made public,” Yukio Edano, minister of the Ministry of Economy, Trade and Industry (METI), which oversees NISA, told a news conference on Nov. 8 after a Cabinet meeting.

The website carried NISA’s instructions on Nov. 4 to Kansai Electric Power Co., which submitted reports on its own safety evaluation of the No. 3 reactor at the Oi nuclear plant in Fukui Prefecture.

NISA called on the utility to make additional assessments that take into account the safety of facilities storing fire-fighting pumps and fuel for power source vehicles at the plant.

Nuclear reactors that have been offline for regular maintenance are required to clear before they restart what is called a “stress test,” introduced by the government after the accident at the Fukushima No. 1 nuclear power plant.

The test assesses through computer simulations how much safety cushion a nuclear reactor has against a powerful quake and tsunami at expected levels and beyond.

The NISA will also accept questions and requests from the public on the technological aspect of assessments made by utilities.

The website is at <http://www.nisa.meti.go.jp/stresstest/stresstest.html>.

Asahi Shimbun , November 10, 2011

<http://ajw.asahi.com/article/0311disaster/fukushima/AJ2011111017012>
