

Fukushima: some more very bad news...

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Contents

- [Accurate data destroys optimistic](#)
- [Robot finds high radiation at](#)
- [Water leaks from No. 1 reactor](#)
- [TEPCO concealed radiation data](#)
- [Radioactive ash found in \(...\)](#)
- [Worker dies after collapsing](#)
- [Radiation in soil near trouble](#)

Accurate data destroys optimistic TEPCO assessment, hampers cooling plan

Accurate data shattered the overly optimistic assessment of Tokyo Electric Power Co. concerning the crippled Fukushima No. 1 nuclear power plant and raised doubts about the company's game plan for ending the crisis.

Measurements from a recently installed water gauge provided conclusive evidence that the condition of the No. 1 reactor at the plant was much more serious than TEPCO officials have acknowledged until now.

TEPCO officials admitted on May 12 that a "meltdown" had occurred in the No. 1 reactor. Fuel rods had melted, and the molten fuel accumulated and caused small cracks at the bottom of the reactor pressure container, they said.

Until now, TEPCO officials only said that fuel rods were partially damaged and compiled a work schedule in April for restoring a stable cooling system based on that assumption.

Despite being unable to obtain accurate measurements from gauges in the reactors damaged in the March 11 Great East Japan Earthquake, TEPCO officials still made those optimistic assumptions.

From immediately after the quake, the measurements from the water gauge at the No. 1 reactor showed very little change, casting doubt on the reliability of the instruments.

After workers entered the No. 1 reactor building and adjusted the water gauge, the data obtained showed water levels so low that the gauge was unable to measure it.

TEPCO officials concluded that water had accumulated in only about 20 percent of the volume of the No. 1 reactor's pressure container.

Other specialists had long warned that the situation at the No. 1 reactor was much more serious than the scenario that TEPCO officials were presenting.

At a news conference April 1, Shunichi Tanaka, a former vice chairman of the Japan Atomic Energy Commission, said all the fuel rods in the No. 1 reactor had melted, raising the possibility of damage to the pressure container.

TEPCO's latest measurements found the temperature of the pressure container was about 100 degrees. If the fuel rods had been exposed because of the low water level, the temperature should have been much higher. The only explanation is that the fuel rods melted, accumulated at the bottom of the pressure container and the melted fuel was cooled by the small volume of water at the bottom.

The No. 1 reactor is not the only one with problems. Small cracks have probably also developed at the bottom of the pressure containers of the No. 2 and No. 3 reactors.

Evidence of that possibility is the highly contaminated water found in the basements of the turbine buildings of the three reactors as well as underground trenches.

The contamination was likely caused by water leaking from the bottoms of the pressure containers of the three reactors.

TEPCO officials now admit that the measurements from the water gauges at the pressure containers in the No. 2 and No. 3 reactors are also unreliable.

While those water gauges will have to be repaired as soon as possible, TEPCO will also have to review its work schedule for cooling the reactors.

That will likely mean rethinking the plan to submerge the containment vessel of the No. 1 reactor in water to cool the pressure container within.

About 10,000 tons of water have already been pumped into the No. 1 reactor's pressure container, but about 3,000 tons of that water are unaccounted for. That likely means the water has leaked out of the containment vessel.

Moreover, if TEPCO continues to pump in water to the reactors to cool them, water contaminated with radiation will continue to leak out from the cracks at the bottoms of the pressure containers.

TEPCO officials have also not denied the possibility that melted fuel has leaked out of the pressure container. That would mean the volume of contaminated water will likely increase, making work in the reactor buildings much more difficult.

Ccompiled from reports by Hidenori Tsuboya and Ryoma Komiyama, the *Asahi Shimbun*, May 14, 2011

* <http://www.asahi.com/english/TKY201105130192.html>

Robot finds high radiation at No. 3 reactor bldg

A robot has detected highly dangerous levels of radiation in the Fukushima No. 1 nuclear power plant's No. 3 reactor building, it has been learned, indicating further safety measures will be needed before workers can enter the structure.

According to plant operator Tokyo Electric Power Co., the remote-controlled PackBot robot on Tuesday found radiation levels in the northwestern section of the building of 49 to 120 millisieverts per hour, which would pose a threat to human workers.

Time must be spent, therefore, removing or sealing up the radiation-contaminated debris in the building, before TEPCO starts work to stabilize the damaged reactors.

When similar measurements were conducted around doors in the southern section of the building on April 17, the radiation levels were 28 to 57 millisieverts per hour.

Tuesday's measurements were conducted because most of the northwestern section had not yet been examined.

Images taken by the robot showed that debris was scattered on the floor and that the door leading to the outside was standing open.

"Until around June, we'll make it our priority to remove debris with robots. We'll then check how radiation levels change," a TEPCO employee said. The company currently has no plans to send workers into the No. 3 reactor building, the employee said.

When the PackBot examined the power plant's No. 1 reactor building in April, it found radiation levels had reached 1,000 millisieverts per hour at some pumps. Levels at the other pumps were 10 to 49 millisieverts per hour.

TEPCO therefore determined it was safe for workers to enter the building and has already finished removing radioactive substances from the building's air.

The Yomiuri Shimbun, May 14, 2011

<http://www.yomiuri.co.jp/dy/national/T110513005828.htm>

Water leaks from No. 1 reactor

Meanwhile, TEPCO has announced that water has been leaking through small openings in the bottom of the No. 1 reactor's pressure vessel.

Combined, the openings would be equivalent to a hole several centimeters in diameter, and according to TEPCO, were made when melted nuclear fuel damaged the bottom.

The melted fuel likely has accumulated in the bottom of the vessel. TEPCO has admitted the situation is a meltdown, in which melted nuclear fuel cannot maintain its shape and drops down to lower parts of a reactor core.

TEPCO had previously said fuel was just partially damaged.

As the temperature in the pressure vessel remains stable at 100 C to 120 C, the situation is unlikely to get worse, TEPCO said.

However, it is highly likely that water also has been leaking from the containment vessel, which

envelops the pressure vessel. This has affected TEPCO's ongoing water entombment operations, in which it is pouring water into the containment vessel to cool the pressure vessel.

The Yomiuri Shimbun, May 14, 2011

<http://www.yomiuri.co.jp/dy/national/T110513005828.htm>

TEPCO concealed radiation data before explosion at No. 3 reactor

Tokyo Electric Power Co. concealed data showing spikes in radiation levels at the Fukushima No. 1 nuclear power plant in March, one day before a hydrogen explosion injured seven workers.

The Asahi Shimbun obtained a 100-page internal TEPCO report containing minute-to-minute data on radiation levels at the plant as well as pressure and water levels inside the No. 3 reactor from March 11 to April 30.

The data has never been released by the company that operates the stricken plant.

The unpublished information shows that at 1:17 p.m. on March 13, 300 millisieverts of radiation per hour was detected inside a double-entry door at the No. 3 reactor building. At 2:31 p.m., the radiation level was measured at 300 millisieverts or higher per hour to the north of the door.

Both levels were well above the upper limit of 250 millisieverts for an entire year under the plant's safety standards for workers. But the workers who were trying to bring the situation under control at the plant were not informed of the levels.

When the Great East Japan Earthquake struck on March 11, the No. 1, No. 2 and No. 3 reactors all automatically shut down. But the tsunami crippled the emergency generators, leading to a total power failure that prevented the cooling systems from functioning.

The TEPCO data also showed high levels of hydrogen may be emitting from the damaged core of the No. 3 reactor on March 13, when TEPCO started injecting seawater to cool the reactor.

The following day around 11 a.m., a hydrogen explosion destroyed the upper part of the No. 3 reactor building. Seven TEPCO workers were injured in the blast.

TEPCO's public relations department said the company has informed the public that significant levels of radiation have been detected at the plant, but it disclose specific data after a thorough review of the figures is completed.

Keiji Miyazaki, professor emeritus of nuclear reactor engineering at Osaka University, criticized TEPCO's policy.

He said such important data should be immediately released to ensure the safety of the public and workers at the plant, especially in an emergency like the Fukushima nuclear accident.

Miyazaki said TEPCO's decision to conceal the data must be scrutinized.

Failure to release radiation data in the early stages of the crisis is said to have delayed the

evacuations of communities near the plant.

Kiyoshi Sakurai, another nuclear power expert, said a thorough examination is needed not only on TEPCO's unpublished data, but also verbal communications of those involved, instructions issued by the central government and TEPCO, and the communication structure between management and workers at the plant.

Kamome Fujimori, Tatsuyuki Kobori and Yo Noguchi, the *Asahi Shimbun*, May 14, 2011

<http://www.asahi.com/english/TKY201105130370.html>

Radioactive ash found in Tokyo after March 11

A sewage plant in eastern Tokyo detected a highly radioactive substance in incinerator ash shortly after the nuclear crisis began at the Fukushima No. 1 nuclear power plant, metropolitan government sources revealed Friday.

The radioactive intensity of the substance was 170,000 becquerels per kilogram, the unnamed sources said.

The ash, which has been recycled into construction materials, including cement, was collected from a sludge plant in Koto Ward in March.

At almost at the same time that month, a radioactive substance with a radioactive intensity ranging from 100,000 to 140,000 becquerels per kg was also detected in ash at two other Tokyo sewage plants in Ota and Itabashi wards, the sources said.

After a month, the radiation levels had dropped to 15,000 to 24,000 becquerels per kg at the three sewage plants, they added.

The substance has yet to be identified and researchers are looking into whether it might be radioactive cesium, the sources said without elaborating.

Meanwhile, the municipal government of Maebashi, Gunma Prefecture, said Friday it has detected radioactive cesium of 41,000 becquerels per kg from incinerator ash collected Monday at a water sanitation facility.

It also said it found cesium with an intensity of 1,844 becquerels per kg in sludge and 17,090 becquerels per kg in molten slag that was processed at a high temperature.

Kyodo, May 14, 2011

<http://search.japantimes.co.jp/cgi-bin/nn20110514a2.html>

Worker dies after collapsing at Fukushima plant

A worker at the crippled Fukushima nuclear power plant died Saturday after collapsing while carrying materials as part of crisis-fighting operations, the operator said.

It is the first time a worker has died at the plant operated by Tokyo Electric Power Co. since the March 11 earthquake and tsunami triggered a series of radiation leakage accidents there.

No radioactive substances have been detected on the man, who was in his 60s, the utility said. The man had started working at the plant on Friday and was wearing protective gear at the time of the accident. He was exposed to radiation totaling 0.17 millisievert.

The man, an employee of a subcontractor, collapsed about one hour after he began working at 6 a.m. Saturday with another worker at a waste disposal processing facility. He became unconscious when he was taken to a medical room inside the plant past 7 a.m., the utility said.

The other worker has complained of no health problem, the company added.

The accident occurred as the company continued Saturday work to install a new cooling system at the No. 1 plant, where much of the fuel in the core has melted after being fully exposed.

Kyodo, May 14, 2011

<http://search.japantimes.co.jp/cgi-bin/nn20110514x1.html>

Radiation in soil near troubled Japan nuclear plant exceeds Chernobyl evacuation level

The levels of radiation accumulated in soil near the crippled nuclear power plant in northeastern Japan far exceeded the level of radiation the then-Soviet Union had used as a criterion for urging people to evacuate at the time of the 1986 Chernobyl nuclear disaster, threatening to plague local residents for a lengthy period.

Using aircraft, the Ministry of Education, Culture, Sports, Science and Technology checked the cesium-137 (half life of about 30 years) and cesium-134 (half life of about two years) accumulated in soil in collaboration with the U.S. Department of Energy in April.

Cesium-137 that has longer effects, ranging from 3 million to 14.7 million becquerels per square meter, was detected in Namie, Futaba, Minamisoma, Iitate and Katsurao, northwest of the Fukushima No. 1 Nuclear Power Plant, in Fukushima Prefecture. The levels far exceeded 550,000 becquerels per square meter, the level the then-Soviet Union had used as a criterion for urging people to evacuate at the time of the 1986 Chernobyl nuclear disaster.

Based on recommendations from the International Commission on Radiological Protection (ICRP), the Japanese government used 20 millisieverts per year of radiation in the atmosphere as the criterion to designate evacuation areas in the wake of the nuclear accident in Fukushima. Therefore, there are areas that have not been designated as evacuation zones although they have larger amounts of accumulated radiation.

The Ministry of Education, Culture, Sports, Science and Technology says, "Radioactive substances in soil do not enter human bodies immediately." On the other hand, when authorities try to decide whether to allow local residents to return to their homes or resume farming, levels of soil contamination could be one of the hot topics of debate.

Hiromi Yamazawa, professor of environmental radiology at Nagoya University, said, "The problem with soil contamination is external exposure through gamma rays emitted from cesium adhered to soil." He said that replacing soil with non-contaminated soil is an effective way of reducing the concentration of radiation. He also said, "Replacing soil in lower layers with that from upper layers is also effective."

Mainichi Shimbun , May 11, 2011

<http://mdn.mainichi.jp/mdnnews/news/20110511p2a00m0na018000c.html>
