

# Fukushima Daiichi: Report Details Initial Chaos at Stricken Nuclear Plant

Friday 11 November 2011, by [Asahi Shimbun](#), [WALD Matthew L.](#) (Date first published: 11 November 2011).

Fukushima Daiichi Unit 1 was stuck in darkness, and everyone on site feared that the reactor core was damaged. It was the day after a devastating earthquake and a towering tsunami had hit the plant, and the workers knew that they were the only hope for halting an unfolding nuclear disaster.

Another power company had rushed in a mobile electrical generator to power the crucial water pumps that cool the reactor, but connecting it required pulling a thick electrical cable across about 650 feet of ground strewn with debris from the tsunami.

The cable, four inches in diameter, weighed approximately one ton, and it took 40 workers to try to maneuver it into position. Manhole covers had been washed away, leaving holes for workers to stumble into, and their urgent efforts were interrupted by aftershocks and alarms about possible new tsunamis.

By 3:30 in the afternoon, the workers had managed what many consider a heroic feat: they had hooked up the cable. Six minutes later, a hydrogen explosion ripped through the reactor building, showering the area with radioactive debris and damaging the cable, rendering it useless.

The details about those first hours after the earthquake at the stricken plant are contained in a new 98-page chronology of the Fukushima accident. The account was compiled by American nuclear experts, who interviewed operators and executives from the company that runs the plant, Tokyo Electric Power Company, and had access to many of the company's documents.

The experts work for the Institute of Nuclear Power Operations, an Atlanta-based organization that is an integral part of the American nuclear industry and one that has won plaudits over the years for its audits, sometimes critical, of the industry.

The chronology does not draw any conclusions about the accident, or analyze the actions taken after the earthquake. It is intended, instead, to provide an agreed-upon set of facts that American companies, the Nuclear Regulatory Commission and others can use in identifying lessons from the disaster for the American industry.

As it turns out, the document also presents scenes worthy of any good disaster-movie plot and provides a rare window into the lives of workers who labored in the most difficult of conditions, often before knowing the fates of their families.

Among the facts American companies are likely to focus on are details about Fukushima's troubles with its venting system, meant to avert explosions, and the extreme difficulties of getting emergency equipment to the reactors where they were needed.

The report is likely to reinforce the conviction of American companies that operate reactors of the design used at Fukushima that venting an overpressurized containment early in an accident will release only small amounts of radioactive material, prevent explosions and make cooling easier. It has been known for months that Fukushima operators delayed venting for hours, but the chronology

says that part of the reason was that they believed the rules required them to wait until after evacuation of surrounding areas and a government announcement.

The report is also likely to incite more debate about how emergency equipment and material is stored and what types of contingency plans need to be made to ensure the equipment can reach reactors in a disaster. Nuclear critics in the United States have long complained that American emergency rules do not take into account that a natural phenomenon could trigger an accident at a plant and make it hard to get help from outside.

The report points out, for instance, that although the plant had three fire engines that could have pumped in vital cooling water, one was damaged in the tsunami and another was blocked by earthquake damage to roads. Inspections at some American reactors after the Japanese quake and tsunami found that they were storing emergency gear in a way that made it vulnerable to the emergency it was intended for.

Because the chronology is based mainly on Tepco and its workers' account of events, it is by nature limited. It does not, for example, relate that there was tension between Tepco and the government over when to vent as reported in the media.

Among the more vivid scenes described was when plant workers had to break through a security fence and drive a fire truck under damaged buildings to get it in position to pump water into unit 1. But as often happened during the disaster, their work only partially paid off: pressure inside the vessel was so high that they were able to force in less than 10 gallons per minute, not much more than a kitchen faucet puts out. That was far too little to cool the steam back into water, to cool the fuel and reduce pressure.

The report also takes note of the human toll of the disaster among the workers, though the prose is more industrial than dramatic.

It points out that many plant workers had lost their homes and even their families in the tsunami, and that for days after the quake, they were sleeping on the floor at the plant, and soaking up radiation doses even in the control room. Because of food shortages, they were provided with only a biscuit for breakfast and a bowl of noodles for dinner.

Working in darkness and without electricity, even simple tasks became challenging. At one point, control room operators formed themselves into teams of two, to dash into high-dose areas to try to open a crucial vent. One would hold the flashlight, monitor radiation dose and perform other support tasks, and the other would try to get a valve to move. But there was no communication once the team was in the field, so the next team could leave only after the first had returned.

Eventually, the radiation levels got too high, and they gave up. The first explosion rocked the plant soon after, belching clouds of radioactive materials and giving the world its clearest sense of the scope of the catastrophe unfolding in Japan.

## **MATTHEW L. WALD**

(Hiroko Tabuchi contributed reporting from Tokyo)

\* New York Times, November 11, 2011

<http://www.nytimes.com/2011/11/12/world/asia/report-details-initial-chaos-at-fukushima-daiichi-nuclear-plant-in-japan.html>

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## **Fukushima's No. 3 reactor likely triggered hydrogen blast**

The hydrogen explosion that spewed radioactive materials from the Fukushima No. 1 nuclear power plant's No. 4 reactor building on March 15 was likely caused by gas leaking from the neighboring No. 3 reactor.

Investigators found extensive damage on the fourth floor of the No. 4 reactor building near an air duct connected by pipe to the No. 3 reactor, the plant's operator, Tokyo Electric Power Co., said on Nov. 10.

During a Nov. 8 inspection, TEPCO also found subsidence of the floor of the fourth level and evidence that the floor above had been pushed upward. A net covering an air intake on the fifth floor appeared to have been blown outward.

TEPCO's theory is that hydrogen released by a core meltdown at the No. 3 reactor passed backward through the pipes of an emergency gas processing system into the No. 4 reactor building, causing an explosion near the fourth floor duct. Evidence consistent with such a backflow has also been found.

The theory runs counter to TEPCO's initial suspicion that the explosion at the No. 4 reactor involved hydrogen released because of damage to fuel rods in the reactor's own spent fuel storage pool.

Camera footage of the pool has shown no damage to the fuel rods, and TEPCO officials say hydrogen would have accumulated on the fifth floor or the top level if it had been generated by fuel rods in the storage pool.

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<http://ajw.asahi.com/article/0311disaster/fukushima/AJ2011111117145>

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