

Japan nuclear emergency deepens

Chris Talbot
17 March 2011

It is clear that the situation at the Fukushima nuclear power plant is deteriorating rapidly and that reports from the government and the Tokyo Electricity Company (TEPCO) have been seriously misleading about the scale of the disaster that is unfolding. Even now, as radiation rises to harmful levels in the immediate vicinity of the plant and elevated levels are detected in Tokyo 240 kilometres away, reports are incomplete and contradictory.

Gregory Jaczko, chairman of the US Nuclear Regulatory Commission (NRC), yesterday told a hearing of a House Energy and Commerce Committee that the situation was far worse than Japanese authorities have acknowledged. He said there was now little or no water in the water pool storing spent nuclear fuel rods at Fukushima's number 4 reactor.

If this is true, disastrous radioactive fires and explosions are likely imminent. The NRC chief also said that the storage pool for spent rods above reactor 3 may be cracked, threatening to drain the water and expose the nuclear material to the atmosphere. Jaczko questioned the ability of Japanese emergency workers to remain on the site. "We believe that radiation levels are extremely high, which could possibly impact the ability to take corrective measures," he said.

Jaczko's testimony followed an earlier statement by US Energy Secretary Steven Chu that he believed there had been a "partial meltdown" at the plant. The American Embassy in Tokyo also announced yesterday that citizens ought to evacuate a radius of "approximately 50 miles" from the Fukushima plant—an area more than four times wider than the evacuation zone imposed by Japanese authorities.

Government and TEPCO officials in Tokyo rejected Jaczko's statement on the situation at reactor 4. "We can't get inside to check, but we've been carefully watching the building's environs, and there has not been any particular problem," Hajime Motojuku, a TEPCO spokesman declared. Jaczko responded by insisting that his testimony was accurate, and said that TEPCO and other officials in Japan had confirmed the crisis in reactor 4.

The US official's statements provide further damning evidence of a cover-up of the real situation in Fukushima orchestrated by TEPCO and Japanese government authorities.

European Union Energy Commissioner Guenther Oettinger told an EU parliamentary committee yesterday: "The site is effectively out of control. In the coming hours, there could be further catastrophic events, which could pose a threat to the lives of people on the island".

This warning sent US and European stock markets into decline—prompting Oettinger to issue a press release via his spokesperson that he had no "privileged information" about the situation and "just wanted to share his concern and that he was really touched by all the images of people and the victims."

When all emergency workers were temporarily evacuated from the Fukushima plant on Wednesday morning, after radiation levels had reached 1,000 microsieverts per hour, it was evident that the disaster had reached a new stage. The emergency team returned to the plant later as radiation levels fell slightly, but the situation was by then catastrophic. Smoke has been seen coming out of reactor 3 and another fire has broken out in the cooling tank in building 4 that contains spent fuel rods.

Neither the company nor the Japanese government would offer any clear statement about the source of the higher levels of radiation. The fuel rods in the tank may have caught fire or one of the steel containment vessels that house each of the reactors may have been breached. In either case, Fukushima has evolved into a nuclear disaster that could cause global contamination, comparable to that which occurred when the Chernobyl reactor ruptured and blew a column of radioactive material into the atmosphere.

Until now the risk of radioactive plumes spreading across the Pacific has been described as "remote." President Obama assured the American public that radioactivity would dissipate before it even reached Hawaii. The US Nuclear Regulatory Commission earlier said that the Japanese response was in line with what the US would do in a similar situation. But US military officials admit that they are not getting sufficient data from the Japanese government to model the potential dispersal of contaminants and are relying on their own readings from naval helicopters.

Radiation doses are measured in *sieverts*, usually *millisieverts*, which are a thousandth of a sievert, or *microsieverts*, which are a millionth of a sievert. The natural radiation to which most people are exposed in the course of a year is 2 millisieverts, or 2,000 microsieverts. In some areas where the natural level of radiation is high because of the local geology, the annual dose may be up to 4 millisieverts, but measures are taken to prevent the build-up of radioactive radon gas in homes and offices.

A worker in the nuclear industry might be exposed to 20 millisieverts per year, and the legal limit in the United States is 50 millisieverts. In Japan, it is 100 millisieverts, and the first response of the Japanese government to the Fukushima crisis was to raise the limit to 250 millisieverts. A dose of 100 millisieverts in a year is correlated with a 1 percent rise in the incidence of cancer.

The 1,000 microsieverts (1 millisievert) per hour measured Wednesday morning is enough to cause immediate radiation sickness. Workers went back into the plant as the levels fell to 600-800 microsieverts—still a highly dangerous level.

On Tuesday, when the level of emissions rose to 400 millisieverts per hour at one point, the cause was thought to be the fire in the spent-fuel tank. Chief Cabinet Secretary Yukio Edano said "now we are talking about levels that can damage human health." The workers who are struggling round the clock to contain the Fukushima disaster will already have suffered heavy doses of radiation even with protective clothing.

Radiation spreading

The immediate vicinity of the plant has been evacuated and residents in a wider area have been advised to stay indoors and turn off their air-conditioning systems. This will limit the number of people exposed immediately, but the radiation is spreading rapidly. Elevated radiation levels have been detected in the water supply for the Fukushima area.

Radiation spikes as high as 8,000 microsieverts are said to have been

detected in Tokyo on Tuesday. By comparison, a computer tomography (CT) scan might deliver a burst of 6,000 microsieverts, but not for a sustained period. For some people, such as pregnant women and infants, this level of radiation would pose a serious threat. How many more people will ultimately be contaminated is not yet known. But 500 bone marrow transplant centres in Europe have been put on standby to treat potential victims of radiation poisoning from Japan.

The French embassy in Tokyo has advised all its citizens to move further south or leave Japan entirely. Major international companies have been quietly relocating their foreign staff for some days and advising local staff to work from home. BMW, SAP, Continental and Infineon are all said to be evacuating staff.

The Chinese government has organised a mass evacuation of its nationals from the whole of northeastern Japan. Private jet companies report being overwhelmed by demand, and prices for flights to Hong Kong, Taiwan, South Korea, Australia and the US have risen dramatically. Qantas and Lufthansa have rerouted some of their flights so that cabin crew do not have to stay overnight in Tokyo.

The normally cautious *World Nuclear News*, which is the house journal of the nuclear industry and had previously written of the emergency in rather anodyne terms, shifted the tone of its reporting sharply on Monday when it warned of a “dramatic escalation in Japan.” What provoked this change were reports that “loud noises” had been heard from under the reactor at Fukushima Daiichi 2.

Japan’s Nuclear and Industrial Safety Agency (NISA) confirmed this report and said “the suppression chamber may be damaged.” The suppression chamber, or torus, is the doughnut-shaped structure below the reactor that contains a large body of water. In an emergency situation, steam can be directed to it to reduce the pressure in the containment vessel that houses the fuel rods.

After the noises were heard, the pressure in the torus fell sharply, suggesting that it had been damaged. According to TEPCO, radiation levels in the immediate vicinity spiked. There are conflicting reports about the levels reached. But it was at that point that the company began to evacuate most of their staff, leaving only 50 workers on site.

The loss of the torus may not in itself worsen the overall situation for the surrounding area, since radioactive steam was already being vented directly into atmosphere. But the failure of the torus indicates the immense strains that are being put on the entire system, which is already operating well beyond its design parameters. A catastrophic system failure is in process.

Another incident at the site, at Fukushima Daiichi 4, is still largely surrounded in mystery because of conflicting and opaque statements. This is the fire that broke out in a storage pool for spent fuel rods, following an explosion. The explosion took place in a building where the reactor was shut down for routine maintenance at the time of the earthquake.

No problems had previously been reported in building 4. TEPCO claims that lack of water in the pool caused the rods to overheat and react with steam, which then generated hydrogen and caused the blast. When outside scientists were asked for their opinion of this explanation, they said that it did not make sense.

Early Wednesday morning fire again broke out at the number 4 building. Two workers are said to be missing and presumed dead. Radiation levels spiked and the remaining workers were temporarily evacuated.

In normal operation, used fuel rods are taken out of the reactor and stored in a pool of water to cool them. Fukushima has seven such pools. Six of them are sited on top of reactor buildings, directly over the reactor container, and one is at ground level.

Neither TEPCO nor the government have explained what has happened to the pools in the three buildings that have already experienced explosions. The pool at ground level must have been adversely affected by the tsunami. In total there are thought to be 600,000 radioactive fuel rods

still on the site. They have either been exposed to the atmosphere already or are about to be.

Even TEPCO has had to admit that the water in the pool housed in building 4 was boiling and evaporating more quickly than it could be refilled, and that as a result the fuel rods were exposed to the air. The company has denied that fuel rods in building 4 caught fire. But the fact that the fire cannot be extinguished suggests that this is the case. This would mean that a nuclear reaction is taking place fully exposed to the atmosphere because the explosion has ripped a hole in the concrete structure which is all that stands between the outer environment and the nuclear fuel.

Arnie Gunderson, a nuclear engineer who is part of the public oversight panel at the Vermont Yankee nuclear plant in the US, which is built to the same design as Fukushima Daiichi 1, said that there might be 20 years’ worth of spent fuel in the tank. A fire in the fuel rods would pose a serious and widespread danger to human health. “That would be like Chernobyl on steroids,” Gunderson said.

Potentially, the unexplained fire in building 4 poses a greater health danger than a meltdown in a reactor because the pool of spent fuel rods is not contained in a steel vessel like a reactor.

TEPCO attempted to drop water on the facility yesterday from helicopters—initially targeting reactor 3—but failed because of high radiation levels. The company has said it will try again today.

The helicopters may be used to drop borated water through the shattered building directly onto the cooling pond. Alternately, police will use water cannon. The use of borated water is significant. It suggests that a nuclear chain reaction has begun in the spent fuel rods or such an eventuality is feared.

This appears to be the first time that extra equipment has been brought to the site of the disaster. It is now known that US personnel are on site at Fukushima. The USS Ronald Reagan and a number of other US military vessels are offshore and there are significant US military bases in Japan. US ships have repositioned upwind of the stricken nuclear plant to avoid fallout and US bases report elevated radiation levels.

Explosions

The explosion and fire in the spent fuel rod pool followed explosions in Daiichi units 1, 2 and 3. The reactors in these building were operational, but shut down automatically at the time of the earthquake. Even after a reactor shuts down, however, it continues to produce heat because of the accumulated fission products and must be cooled to prevent meltdown, which can begin very rapidly. This danger was recognised almost 40 years ago. The Canadian scientist Walt Patterson discussed it in a *New Scientist* article in 1972.

“If a broken pipe were to allow the cooling water to escape from the core of a light water reactor,” he wrote, “the fission product heating would cause a rapid temperature rise. Within 15 seconds the fuel cladding would begin to give way; within a minute the fuel itself would begin to melt. If this were to happen, the result would be an uncontrollable accident, with appalling consequences.”

Both Pressurized Water Reactors (PWR) and Boiling Water Reactors (BWR)—Fukushima Daiichi is of this second type—have emergency cooling systems because of this vulnerability. But, as Patterson pointed out, the reliability of these systems depends on tests and models that are far from robust. At the time he wrote his article there had never been an actual situation in which the emergency coolant system had to be brought into play.

Patterson particularly drew attention to the lack of experimental

evidence for the effect of heat on the zirconium alloy, Zircalloy, which was then beginning to be used as cladding for fuel rods. Patterson hoped that the questions he and members of the Union of Concerned Scientists were raising would lead to more stringent safety standards. It is doubtful that this has been the case. The Fukushima fuel rods are Zircalloy clad. It has been suggested that its breakdown under heat set up a catalytic reaction in the cooling water that produced the hydrogen gas, which then exploded.

Other experts are pointing to a greater level of damage to the fuel rods in the reactors than the Japanese authorities have admitted. Victor Gilinsky, the senior commissioner at the US Nuclear Regulatory Commission during the Three Mile Island disaster, pointed out that although the emergency cooling system there was only turned off for a few hours, half the fuel in the reactor melted. It was several years before investigators were able to say exactly how much of the fuel had melted at Three Mile Island.

“If it does get worse, you can have all the fuel melting. I expect a substantial fraction of the fuel melted in each of these reactors and slumped down,” Gilinsky said. “As far as they know, the water level is about half way up. If it gets worse than that and they lose all the water, then the melted fuel—and there are tens of tons, nearly a hundred tons of fuel in a large reactor—that could melt right through the bottom of the pressure vessel. The surrounding building... is not designed to hold that.”

Patterson suggests that the damage to the fuel rods at Fukushima might be enough to set up a chain reaction. In the case of the reactors, this would take place within a thick steel containment vessel. But he has raised the possibility that these may already have failed. The number 2 reactor is thought to have been compromised. Even official statements have cast doubt on its integrity. These vessels are built to stand immense pressures and are almost a foot thick.

“But they’re also under bombardment from neutrons for, in this case, about 40 years,” Patterson said, “and you really do not know what the condition of that metal is—and particularly if you then have violent shocks both of pressure and temperature, if the reactor is moving outside its normal operating conditions.”

Some of those at Fukushima have been in operation since 1971 and were due for decommissioning.

If one of these pressure vessels ruptures, Professor Patterson told the UK-based *Independent*, “all bets are off.”

While the fire in the spent fuel rod pool in building 4 poses a life-threatening danger to a wide area, it is entirely possible that the full extent of the slowly unfolding nightmare has not yet been reached at Fukushima. The rupture of one or more pressure vessels seems to be a real danger and will take the nuclear emergency to an even higher level.

The situation at Fukushima has been upgraded to six on the seven-point nuclear accident scale. The 1979 meltdown at the Three Mile Island plant in Pennsylvania was rated as a level five. Fukushima is now officially the worst nuclear accident since Chernobyl, the only disaster to reach level seven.

But at Chernobyl only one pressure vessel ruptured when it lost cooling, and there was no fire in the spent fuel rod pools. The world is already in entirely uncharted territory where nuclear safety is concerned.

The fact that the management of a crisis that threatens human health on a global scale remains in the hands of a private company speaks eloquently of the irrationality and, indeed, criminality of the capitalist system. TEPCO is still calling the shots. Even if TEPCO had an unblemished safety record, which it does not, and even if safety procedures were adequate in the first place, which they were not, the scale of this crisis is beyond the capabilities of any privately owned enterprise to control. No company, no body of shareholders, should have the power to put at risk the health of the entire population of a country, let alone the world, in the name of private profit.



To contact the WSWWS and the
Socialist Equality Party visit:

wsws.org/contact