



Fukushima, Fuel Rods, and the Crisis of Divided and Distracted Governance

福島の燃料棒 分割と注意散漫がもたらすガバナンスの危機

Andrew DeWit

Japan is more fluid than it has been in years. The end of Japan's "nejire kokkai" ("divided Diet") via Abe's resounding win in the July 21 Upper House elections was hailed in many circles in Japan and internationally as heralding three years of stability in government. But perhaps this sense of stability has very weak foundations.

Geopolitics and the economy certainly could deliver significant shocks to the regime. But if there is one thing that has immense, latent potential to disrupt the confident assumptions that the next three years will be smooth sailing, so long as the swollen multitude of officers and crew is kept compliant with rum and the lash, it is the worsening Fukushima Daiichi crisis. As Aaron Sheldrick and Antoni Slodkowski detail in an excellent overview in the August 13 Reuters [dispatch](#), among other deeply unsettling risks, removing spent fuel rods from above reactor number 4 is slated to begin in November.

It is worth summarizing the sobering evidence that Sheldrick and Slodkowski present to their readers, before turning to what they inadvertently left out.

First the essential [details](#). The roughly 1300 used fuel rod assemblies in the pool weigh in the neighbourhood of 300 kilograms and contain "radiation equivalent to 14,000 times the amount released in the atomic bomb attack on Hiroshima 68 years ago." Being spent fuel, they contain cesium 137 and Strontium 90, with half-lives of about 30 years. They also contain plutonium 239, with a half-life of 24,000 years. Sheldrick and Slodkowski rightly describe the latter as "one of the most toxic substances in the universe." The assemblies are to be removed from a concrete fuel pool 10 metres by 12 metres in area, and from within water 7 metres deep. The structure's base is 18 meters above ground level. Removing fuel assemblies is delicate enough at the best of times, but the pool itself may have been "damaged by the quake, the explosion or corrosion from salt water that was poured into the pool when fresh supplies ran out during the crisis."



Tepco preparing to remove irradiated fuel

Sheldrick and Slodkowski cite respected independent consultants Mycle Schneider and Antony Froggatt, whose [World Nuclear Industry Status Report 2013](#) tells us that "Full release from the Unit-4 spent fuel pool, without any containment or control, could cause by far the most serious radiological disaster to date." The Reuters article also quotes Arnie Gundersen, former U.S. nuclear engineer who used to build fuel assemblies and is now director of Fairwinds Energy Education, who warns that Tepco is "going to have difficulty in removing a significant number of the rods."

Last year, Tepco test-ran removal by extracting two unused fuel assemblies from the pool, but Gundersen states that "To jump to the conclusion that it is going to work just fine for the rest of them is quite a leap of logic." Like Schneider and Froggatt, Gundersen and other nuclear experts caution that there is serious risk "of a large release of radiation if a fuel assembly breaks, gets stuck or gets too close to an adjacent bundle."

Gundersen points out the nature of the risk includes "an inadvertent criticality if the bundles are distorted and get too close to each other." He adds that, "The problem with fuel pool criticality is that you can't stop it. There are no control rods

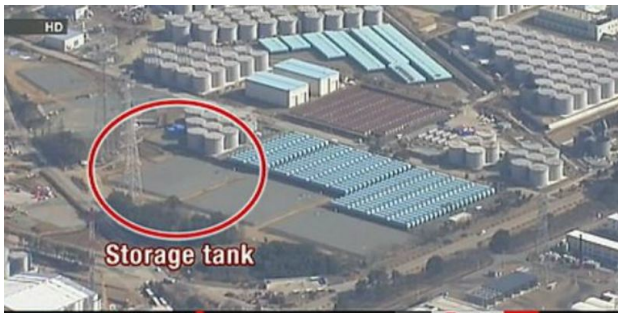
to control it...The spent fuel pool cooling system is designed only to remove decay heat, not heat from an ongoing nuclear reaction." He also notes that the rods are vulnerable to fire in the event that they are exposed to air.

Sheldrick and Slodkowski's investigation reveals that should the pool topple or be punctured during the removal - a process slated to require a year but likely to be rather more protracted - "a spent fuel fire releasing more radiation than during the initial disaster is possible." They add that this poses a threat to Tokyo only 200 kilometres away.

Tepco is of course quick to assure observers that they have shored up the building and that it can withstand a quake on the scale of the 2011 disaster. But as Sheldrick and Slodkowski point out - in what has to be the charitable understatement of the year - the company has a "credibility problem." Indeed, given the litany of mishaps at Fukushima Daiichi over the past 29 months, it would be better to hear Tepco voicing grave concern rather than bold assurances. Not only is there debris in the fuel pool, further complicating matters, but Kimura Toshio - a technician who worked at Fukushima Daiichi for 11 years, cautions that the normally "delicate task" of removing spent fuel is normally done with the aid of computers, but won't be in this case: "Previously it was a computer-controlled process that memorized the exact locations of the rods down to the millimeter and now they don't have that. It has to be done manually so there is a high risk that they will drop and break one of the fuel rods."

All of this is worrisome enough. But perhaps because there are just so many distressing forces at play in this crisis, Sheldrick and Slodkowski left out the water problem we reviewed in last week's [article](#). Expert commentary, including from the METI Nuclear Accident Response Director, has warned that the constant flow of water may lead to further structural [instability](#) of the buildings. Keep in mind that the risky fuel-rod removal is likely to take a good deal longer than the year projected by Tepco. And recall that the Abe Government's declared intent to intervene in the crisis is at present largely limited to debating the budget for a radical "freeze" of ground water. The measure will not be funded until at least the start of the next fiscal year, April 1, and is not likely to be in place before sometime in 2015. In the meantime, 1000 tonnes of water per day runs down from the surrounding hills, further softening the ground under the facilities (which sits over an aquifer), sending more contamination (including Strontium 90) out to sea, and distracting Tepco and its ostensible overseers in the Nuclear Regulation Agency.

Tepco is of course trying to pump up some of the flow of water and store it in tanks, but its capacity to handle the flow as well as construct and put it in storage tanks is not infinite. It is also trying to do this as cheaply as possible, because even though it is a nationalized entity (as of July 25 of last year), any financial assistance it receives from public coffers is deemed a loan that it has to pay back. So it is doing everything with an eye on costs, including constructing the storage tanks for contaminated water out of the cheapest materials possible. Apparently, some of these containers have already begun leaking (according to statements from former workers at the site). And it is almost certain that there will be significant leakage as the months go by due to the rusting of bolts and other parts of the tanks, which are in contact with highly contaminated and thus corrosive water.



Leaking storage tank and TEPCO attempts to contain contaminated water at Fukushima Daiichi (NHK)

What, Me Govern?

Consequently, the incredible – and inexcusably risky - crisis of governance at Fukushima Daiichi has been gaining increasing and very well-deserved attention. As the Financial Times [reported](#) on October 25 of 2012, the nationalization process allowed significant leeway for Tepco to work with its political allies and fight over "everything from the level of government ownership to salary cuts for managers and the size of a rate increase for Tepco's residential customers, which the utility said it needed to cover accident related costs." The Financial Times noted that observers regarded this as "bewildering." This was because the company was in such an obviously weak position in the wake of extraordinary irresponsibility on all fronts. The paper reported that "the process underscored the depth and resilience of Tepco's influence, and that of the "nuclear village" of utility executives, bureaucrats and lawmakers that built Japan's atomic power industry, which before Fukushima generated 30% of the country's electricity."

The company's scope to conduct operations according to its in-house priorities rather than public safety is thus considerable, even after nationalization. Prime

Minister Abe Shinzo, met with the Tepco chairman and other outside board members in April of this year and declared that the government would help the firm deal with its multiple problems. According to the [Wall Street Journal](#) of August 1 this year, Abe insisted "it is important that Tepco is reborn as a business organization." But tellingly, Abe's encouraging words came with no concrete commitments in regard to the outside board members' requests for assistance with "compensation, decommissioning and cleaning up the site" (Fukushima Daiichi and its environs)," which they regard as "beyond one company's capabilities." Abe's August 8 announcement that the government would get involved has essentially maintained the ambiguity of roles and responsibilities, even though the crisis is potentially more a threat to national security than anything the North Koreans are up to.

So, here we have a potential catastrophe unfolding in plain sight, in that the flow of water, its contamination, the constraints on storage capacity, and other factors are generally understood by the overseers. They know – or certainly should know - that they are drifting into ever more risky circumstances, as the volumes of water increasingly render the ground underneath the reactors unstable. All parties also know that Tepco is prepared to start removing fuel rods from November, in an operation made highly dangerous by the high levels of ambient contamination, the subsidence of the ground, poor coordination of human resources on the site (including multiple chains of command which prevent or at least greatly impair implementation of decisions), among other factors. And yet the multiplicity of actors (the Abe Cabinet, Tepco, METI, the NRA and others) leads to buck passing rather than responsible and decisive decision-making. Indeed, in an August 17 [editorial](#), the Asahi Shimbun outlines how even the NRA "is not showing an all-out commitment to the challenge." The Asahi declares that "It would be shameful if TEPCO, the industry ministry, which has been a champion of nuclear power generation, and the NRA, the nuclear regulator, try to shuffle off responsibility onto one another or make their responsibility vague, thereby causing delays in the implementation of necessary measures."

Given the implications of a mishap in fuel-rod removal, as well as the myriad other problem areas at the plant, the word "shameful" seems hardly strong enough. To help bolster the Abe administration's incentives, perhaps the IAEA, the global nuclear village, and others keen to promote nuclear power in the face of [Fukushima](#), might take a long, hard look at the facts and provide leadership to resolve what is unraveling on site. Each crisis at Fukushima costs them too, and a catastrophe would render all their efforts for naught.

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