

Why TEPCO is Risking the Removal of Fukushima Fuel Rods. The Dangers of Uncontrolled Global Nuclear Radiation

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After repeated delays since the summer of 2011, the Tokyo Electric Power Company has launched a high-risk operation to empty the spent-fuel pool atop Reactor 4 at the Dai-ichi (No.1) Fukushima Nuclear Power Plant.

The urgency attached to this particular site, as compared with reactors damaged in meltdowns, arises from several factors:

- over 400 tons of nuclear material in the pool could reignite
- the fire-damaged tank is tilting badly and may topple over sooner than later
- collapse of the structure could trigger a chain reaction and nuclear blast, and
- consequent radioactive releases would heavily contaminate much of the world.

The potential for disaster at the Unit 4 SFP is probably of a higher magnitude than suspected due to the presence of fresh fuel rods, which were delivered during the technical upgrade of Reactor 4 under completion at the time of the March 11, 2011 earthquake and tsunami. The details of that reactor overhaul by GE and Hitachi have yet to be disclosed by TEPCO and the Economy Ministry and continue to be treated as a national-security matter. Here, the few clues from whistleblowers will be pieced together to decipher the nature of the clandestine activity at Fukushima No.1.

Accidents happen

The delicate rod-removal procedure requires the lowering of a steel cylinder, called a transfer cask, into a corner of the pool and then using the crane to lift the 300-kilogram fuel assemblies (4.5-meter-tall bundle of fuel rods held inside a metal cage) one at a time from the vertical array of rods up and then down into the cask. The container can hold 22 assemblies for transfer to a temporary cooling unit built next to Reactor 4 before these are moved to a storage building.(1)

Lifting the 1,533 fuel bundles out of the pool is fraught with danger. If an assembly breaks away and falls, the impact could shatter other rods below, triggering an uncontrolled nuclear reaction. Compounding the threat, many rods are not intact but were fragmented into loose shards by a collapsing crane. In addition, many of the rods likely lost their protective cladding during the two fires that engulfed the spent-fuel pool on March 14 and 15, 2011.

The urgency of this transfer operation is prompted by the warping of the supporting steel frame by the twin fires that followed the March 11 quake. The pool is also tilting. If the unbalanced structure topples, the collapse would trigger nuclear reactions. A cascade of neutrons could then ignite the nearby common fuel pool for Reactors 1 through 6. The common pool contains 6,735 used assemblies.(2)

The Reactor 4 spent fuel pool contains an estimated 400 tons of uranium and plutonium oxide, compared with just 6.2 kilograms of plutonium inside Fat Man, the hydrogen bomb that obliterated Nagasaki in 1945. (While predictions are bandied about by experts and bloggers, there exists no reliable method for calculating the potential sum or flow rate of radiation releases, measured in becquerel or sievert units, after an accident. The tonnage involved, however, indicates only that a large-scale event is likely and a cataclysm cannot be ruled out.)

More than 1,700 tons of nuclear materials are reported to be on site inside Fukushima No.1 plant. (My investigative visits into the exclusion zone indicate the existence of undocumented and illegal large-scale storage sites in the Fukushima nuclear complex of undetermined tonnage.) By comparison Chernobyl 's reactors contained 180 tons of fuel not all of which melted down.

Despite the looming threat to residents in Fukushima , surrounding provinces and the capital Tokyo , the office of Prime Minister Shinzo Abe along with TEPCO hews to the tradition of risk denial and blackout of vital information. No contingency plan has been issued to Fukushima residents or to the municipalities of the Tohoku and Kanto region in event of a nuclear disaster during the SFP clearance effort. A concurrent drive to impose a draconian law against whistleblowers on grounds of national security is reinforcing the cover-up of data and testimony related to nuclear power plants, including the Fukushima complex.

Mystery of MOX super-fuel

A Mainichi Shimbun editorial mentions in passing that the Reactor 4 pool contains 202 fresh fuel assemblies.(3) The presence of new fuel rods was confirmed in the TEPCO press release, which described the first assembly lifted into the transfer cask as an “un-irradiated fuel rod.” Why were new rods being stored inside a spent-fuel pool, which is designed to hold expended rods? What threat of criticality do these fresh rods pose if the steel frame collapses or if crane operators drop one by accident onto other assemblies, as opposed to a spent rod?

Against the official silence and disinformation, a few whistleblowers have come forward with clues to answer these questions. Former GE nuclear worker Kei Sugaoka disclosed in a video interview that a joint team from Hitachi and General Electric was inside Reactor 4 at the time of the March 11, 2011 earthquake. By that fateful afternoon, the GE contractors were finishing the job of installing a new shroud, the heat-resistant metal shield lining the reactor interior.(4)

TEPCO inadvertently admitted to the presence of foreign contractors at Fukushima No.1 up until March 12, 2012, when the management ordered their evacuation in event of a massive explosion during the rapid meltdown of Reactor 2. So far, leaks indicate the presence of the GE team and of a Israeli nuclear security team with Magna BSP, a company based in

Dimona.(5)

Another break came in April 2012, when a Japanese humor magazine published a brief interview of a Fukushima worker who disclosed that radioactive pieces of a broken shroud were left inside a device-storage pool at rooftop level behind the Reactor 4 spent-fuel pool.(6) This undoubtedly is the used shroud removed by the GE-H workers in February-March 2011.

A curious point here is that the previous shroud had been in use for only 15 months. Why would TEPCO and the Japanese government expend an enormous sum on a new lining when the existing one was still good for many years of service?

Obviously, the installation of a new shroud was not a mere replacement of a worn predecessor. It was an upgrade. The refit of Reactor 4 was, therefore, similar to the 2010 conversion of Reactor 3 to pluthermal or MOX fuel. The same model of GE Mark 1 reactor was being revamped to burn MOX fuel (mixed oxide of uranium and plutonium).

The un-irradiated rods inside the Unit 4 spent-fuel pool are, in all probability, made of a new type of MOX fuel containing highly enriched plutonium. If the frame collapses, triggering fire or explosion inside the spent-fuel pool, the plutonium would pulse powerful neutron bursts that may well possibly ignite distant nuclear power plants, starting with the Fukushima No.2 plant, 10 kilometers to the south.

The scenario of a serial chain reaction blasting apart nuclear plants along the Pacific Coast, is what compelled Naoto Kan, prime minister at the time of the 311 disaster, to contemplate the mass evacuation of 50 million residents (a third of the national population) from the Tohoku region and the Greater Tokyo metropolitan region to distant points southwest.(7) Evacuation would be impeded by the scale and intensity of multiple reactor explosions, which would shut down all transport systems, telecommunications and trap most residents. Tens of millions would die horribly in numbers topping all disasters of history combined.

Fires last time

The rod-transfer operation from Unit 4 is scheduled for completion by the end of 2014. That estimate is optimistic since it does not take into account the obstruction posed by fragments of shattered fuel rods that were overheated in the two fires that swept through Unit 4 spent-fuel pool on March 13 and 15, 2011, according to NHK television news.(8) Another factor for uncertainty is the impact of the explosion that rocked the roofline of the reactor building.

Basing its analysis on corporate information releases thus far, the Simply Info website states:

“TEPCO has changed their story on Unit 4 multiple times but eventually admitted to a very obvious explosion occurring at Unit 4 (on March 15). No video of Unit 4 exploding exists to date and it is assumed the explosion took place before dawn. One of TEPCO’s later admissions regarding unit 4 is that they think hydrogen leaked into unit 4 from unit 3 via the venting pipes and a faulty valve. No reason was given as to why unit 4 did not then ignite when Unit 3 exploded.”(9)

Soon after the Reactor 3 blast, an explosion occurred on the roofline of Reactor 4, blowing

two 8-meter-wide holes through the outer wall. Although tattered, the spent-fuel pool survived the nearby explosion along with the device-storage pool containing the shroud. Photos of the building show holes and damage to a large section of walls and roof slabs on the northeast side of the upper structure (opposite the spent-fuel pool). Hydrogen gas, despite its high combustive energy per kilogram, lacks sufficient density to inflict such damage to reinforced concrete, as would a carbon-bonded gas like acetylene. A logical deduction then is that a cask of new fuel rods left on the roof during the GE-H refit was ignited by neutrons emitted from the SPF fire.

As for the spent-fuel pool, the first blaze broke out on March 14 and died down after several hours. On the following day, the pool reignited and had to be extinguished by firefighters. The nagging question is why the raging fires burned so long, since much of the hydrogen was dissolved in the remaining water at the bottom of the pool or would have burned off within a few seconds. While TEPCO conjectured that hydrogen gas pumped from Reactor 3 to 4, that scenario is a long stretch since most of the volatile gas would dissipated before arrival or ignited along the way.

An alternative possibility is of a tritium-plutonium reaction creating gas plasma inside the spent fuel pool. The condition of the cladding on the rods, which would have been melted by plasma, can indicate the heat source during those two fires. None dare mention are tritium-plutonium inter-reaction because that is the formula for a thermonuclear bomb, that is, the H-bomb. MOX fuel does have the potential to generate sufficient tritium for a thermonuclear, and that is what so rattled Naoto Kan by March 12, 2011.

A Puzzled Civil Engineer

In July 2012, inside the exclusion zone about 14 kilometers south of Fukushima No.1 plant, I had a discussion with a manager with a major construction contractor, whose large team was working at the damaged nuclear facilities. The civil engineer said that the Reactor 4 building was of serious concern because the structure was split, with the halves leaning onto each other. He added that the tilt indicates “structural damage” to the ferroconcrete foundation. Even a 9.0 earthquake could not cleave the strong footing, he stressed.

When asked about what then could crack the foundation, the manager responded: “I am a civil engineer, not a nuclear expert.” Nudged a bit more, he implied that a meltdown of nuclear fuel may have seared through the concrete. The intense heat can reconvert concrete into loose hydrated lime powder and sand, while cutting through rebar steel like a hot knife through butter.

The upgrade of the Reactor 4 shroud may well have involved the test-fitting of some MOX rods, which abandoned on the floor next to the reactor when the tsunami reached shore. In other words, in early March 2011 crane operators completely filled space inside the spent-fuel pool with new MOX rods and then simply left casks of assemblies on the roof and lowered more into the basement. That is the simplest explanation for the damage to the structural integrity of the reactor building. GE is not about to disclose its role in this disaster.

Yoichi Shimatsu, former editor of the *Japan Times Weekly* in Tokyo, conducts independent radiation measurements and dispenses herbal therapy to local residents on his 10 journeys since May 2011 into the 20-kilometer Fukushima exclusion zone.

Notes

1. Tokyo Electric Power Company, press release, 18 November 2013
2. Former Ambassador Mitsuhei Murata, quoted by the Asahi Shimbun, "Doomsday scenarios spread about No.4 Reactor at Fukushima plant" 10 May 2012.
3. The Mainichi Shimbun, editorial "TEPCO must put safety above all else in Fukushima atomic fuel removal project."
4. "GE Nuclear Plant Inspector/Whistleblower Kei Sugaoko Speaks" youtube.com, 40 minutes
5. Israeli surveillance at Fukushima plant, Sarah Press, Israel21c, March 20, 2011
<http://israel21c.org/news/israeli-surveillance-at-fukushima-plant/>
6. Datsutte-miru magazine, Interview of a Fukushima worker by Oshidori Mako, April 15, 2012.

7. This writer attended the June 2013 seminar at the San Diego Board of Supervisors and issued the most detailed news report on Naoto Kan's remarks, "Japan's leader during Fukushima meltdown opposes nuclear power", posted at
<http://rense.com/general96/jpleader.html>

8. NHK World news broadcast, 15 March 2011, reported by Platts (Sydney)

9. SimplyInfo, "Reactor 4", www.fukuleaks.org

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