Water, Water, Everywhere – and not a Drop to Drink

Background: ***March 26, 2014***

The following report presents a somewhat muddled picture of what is going on at the Fukushima Daiichi nuclear site re. contaminated and uncontaminated water. There are really three different issues and they are not clearly separated in the article.

Uncontaminated water becomes radioactively contaminated by coming into direct contact with radioactive materials that end up dissolved (like radioactive salt) or suspended (like radioactive mud). Such contaminated water should not be released to the environment because the radioactive contaminants will then enter the food chain.

At Fukushima Daiichi, the main sources of radioactive contamination are the three melted cores of reactors 1, 2 and 3. These melted blobs consist of a fiercely radioactive material called corium that must be actively cooled for quite a few years in order to prevent spontaneous overheating. Three years is not nearly long enough. Without cooling, the overheating of the corium -- caused by intense radioactivity -- could lead to renewed releases of radionuclides into the atmosphere.

Issue Number 1: Highly Contaminated Water Used to Cool the Cores

As already noted, heat continues to be generated in the corium because of the ongoing disintegrations of radioactive atoms. To remove that heat, TEPCO has to pump 400 tonnes of cold water every day down into these melted cores and then back up to the surface. In the process, the cooling water flushes out dozens of different varieties of radioactive materials from the corium and becomes highly contaminated itself. This cooling water ends up as the most radioactive liquid on site, by far. It is stored in over a thousand above-ground steel tanks, some of which have leaked.

Everyone agrees that this extremely contaminated water should not be released until the radioactive contaminants have been removed. But decontamination is a slow, difficult and incomplete process. The French nuclear giant Areva has supplied TEPCO with a fancy filtration unit that is able to remove 62 varieties of radionuclides, but it cannot remove tritium (radioactive hydrogen). And the equipment frequently breaks down.

Since tritium-contaminated water molecules are chemically identical to ordinary water molecules, and because it is not possible to filter water from water, the tritium cannot be removed by Areva's technology.

TEPCO's advisors argue that eventually, all the water in these above-ground tanks will have to be decontaminated and released into the Pacific

Ocean, even though the "decontaminated water" will still be heavily contaminated with tritium. The local fishermen have not agreed to this.

There is in fact a technology to remove tritium from contaminated water but TEPCO does not want to consider it. It is utilized in OPG's Tritium Removal Facility at Darlington, Ontario. But it is not cheap, and TEPCO would rather pollute the ocean than spend the money. The fishermen are right to hold their ground on this matter.

Issue Number 2: Contaminated Groundwater Flowing Out to Sea

The Fukushima Daiichi plant is situated directly above a major aquifer. Groundwater flows steadily beneath the surface from the hills behind the plant into the Pacific ocean. Due to the triple meltdown, some of this groundwater becomes contaminated as it passes under the reactors. Why? Either portions of the crippled cores have melted through the floors of the reactor buildings or highly contaminated water from inside the reactor building is leaking and mingling with the groundwater passing underneath.

The groundwater is not as highly contaminated as the water in the tanks -- at least not yet -- but some 300 to 400 tonnes of contaminated groundwater per day is flowing very slowly towards the Pacific. This is alarming. And there are signs that the contamination may be getting worse. TEPCO tried to stop the groundwater from reaching the sea by constructing an underground "chemical wall" to act as a dam, but the contaminated groundwater pooled up behind the dam and started flowing over the top.

Last year the Japanese government committed over a billion dollars to help deal with the groundwater problem. The main idea is to create an enormous "ice wall" to encircle all 4 of the badly damaged reactors at Fukushima Daiichi, diverting groundwater around the reactors to prevent it from becoming contaminated in the first place. But the project cannot be completed before 2016, and there are doubts that it will work as planned.

The Fukushima fishermen are adamant that everything possible should be done to prevent the contaminated groundwater from flowing freely into the Pacific and contaminating the fish stocks that they rely upon for their livelihood. This problem is far from resolved.

Issue Number 3: Uncontaminated Groundwater to be Diverted to the Sea

For about two years, TEPCO has been trying to get the fishermen to agree to a "bypass" mechanism to reduce the volume of contaminated groundwater flowing toward the sea. The idea is to tap into the groundwater before it gets contaminated and pump that uncontaminated water -- about 100 tonnes per day -- directly to the sea. This, it is hoped,

would relieve some of the burden of radioactivity that is currently being transported underground towards the Pacific.

But the fishermen have been wary of this proposal. TEPCO has not earned their trust because of repeated mistakes and downright lies. Is the groundwater really uncontaminated further up the hill? Not entirely. There is nothing uncontaminated in the vicinity of the Fukushima Daiichi reactors because radionuclides have settled everywhere following the extensive atmospheric emissions given off in the early days of the disaster. Moreover, some of the tanks of highly contaminated water have leaked not far from the groundwater intake proposed by TEPCO.

This week, the fishermen have finally been persuaded to go along with TEPCO's "bypass" scheme, but only on condition that a third party be brought in to confirm that the degree of contamination in the diverted groundwater is extremely low -- one becquerel per litre at most, compared with thousands of becquerels per litre in the contaminated groundwater and millions of becquerels per litre in the tank water.

Gordon Edwards.

Fukushima fishermen approve plan to release groundwater from plant

by Mari Saito in Japan, Reuters, March 26, 2014
http://tinyurl.com/laremcz

Fishermen working near Japan's destroyed Fukushima nuclear plant agreed on Tuesday to allow the release of uncontaminated groundwater around the facility into the ocean, a fisheries union official said, a rare victory for the operator.

Tokyo Electric Power Co (Tepco), the operator of the Fukushima station that suffered triple nuclear meltdowns after the March 2011 earthquake and tsunami, is trying to contain radioactive water at the site. It has lobbied local fishermen to allow a "groundwater bypass" for nearly two years.

"The final consideration was based on the fact that we cannot allow them to release contaminated water. We realized that if the situation continued as it was, the whole system will fall down," said Kenji Nakada, an official at the Fukushima fisheries federation.

"In such a case, the fisheries industry in Fukushima would be completely finished."

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Tepco has built a thousand tanks *[1200 in fact]* at the Fukushima plant that hold more than 431,000 metric tons of radioactive water. Nearly 90 percent of available capacity in the tanks are already filled with radioactive water. *[But more tanks continue to be built all the time.]*

Contaminated water accumulates at a rate of 400 metric tons a day at Fukushima as groundwater flows downhill into the destroyed basements of the reactor buildings and mixes with highly radioactive water used to cool melted fuel. Radioactive water poses a long-term risk to the shutdown *[i.e. total decommissioning]* of the Fukushima Daiichi station, a task expected to span more than three decades.

Tepco's bypass will release 100 metric tons of groundwater a day that flows downhill towards the devastated plant and funnel it to the sea before it reaches the reactor buildings.

Both Japan's Nuclear Regulation Authority and the International Atomic Energy Agency have said controlled release of low-level water should be considered to make storage space at the facility for irradiated water. *[But this is an entirely different issue having to do with the decontamination of water currently stored in the above-ground tanks.]*

Local fisheries unions had been bitterly opposed to Tepco's proposed bypass after irradiated water leaked from tanks that were just uphill of the proposed groundwater drains last year. The leaks sparked international alarm and led to a boycott of Fukushima fish by South Korea.

Last month Tepco found another leak of highly contaminated water from one of its hastily built tanks at the plant.

A Tepco spokesman said on Tuesday recent tests of groundwater at Fukushima showed little impact from past tank leaks.

As part of its approval of the bypass, local media reported that fishermen requested a third party organization to check radiation levels of groundwater before it is released and any released water to have less than 1 becquerel per liter of Cesium-134, a radioactive element that has a half life of around two years.

The legal limit of releasing Cesium-134 into the ocean is 60 becquerels per liter.

A fishing ban along the coast of Fukushima after the nuclear accident pushed most fishermen out of a job except for occasional work catching certain types of fish deemed safe.

(Reporting by Mari Saito; Editing by Jeremy Laurence)