#### a commentary by Gordon Edwards

#### Background

March 11 2014

The age of nuclear power is winding down, but the age of nuclear waste is just beginning.

The wrong people are in charge of what to do with nuclear waste. Nuclear engineers, nuclear physicists, nuclear chemists, nuclear operators, nuclear regulators – these are not the people to be trusted to put the health and safety of people and the environment first.

These men (they are mostly men) and these women are overwhelmingly committed to ensuring that nuclear power survives as a politically acceptable energy option; all other considerations take a back seat to that.

Consider Dale Klein. He is a nuclear engineer. He was named "Nuclear Statesman" by the American Nuclear Association and the (US) Nuclear Energy Institute, in recognition of his "outstanding contributions to nuclear energy throughout the world over the past 25 years."

In accepting his award, just six weeks after the Fukushima triple meltdown, Klein said "I've tried to blunt some of the unnecessary fear that shadows the industry with a scientific approach to this important source of energy." Can you infer from this sentence what his priorities are?

Small wonder, then, that Klein advises TEPCO to pour 800,000 tonnes of radioactively contaminated water directly into the Pacific Ocean, insisting that there is "no choice" and maintaining that it is "safer" to dump the whole lot into the Pacific than to run the risk of periodic leaks.

Once it has been dumped, TEPCO can wash its hands of all further responsibility and the nuclear industry can claim that the nuclear waste has been "disposed of". This is, apparently, Dale Klein's idea of a "scientific approach".

For the sake of the planet, and ourselves, and our great-great- grandchildren, we have to stop allowing nuclear proponents to dictate the fate of the Earth by abusing the word "science" in order to justify criminal acts.

A few technical points to consider:

(1) Instead of continuing to build thousands of above-ground storage tanks to hold the ever-increasing volume of highly contaminated water (contaminated to the tune of 400 tonnes per day in order to keep cooling the three molten nuclear cores so they don't once again overheat and give off radioactivity into the atmosphere) TEPCO could buy a double-hulled supertanker to hold all the contaminated water securely.

Such an approach is faster, cheaper and more secure than the practice of hastily assembled above-ground tanks now being built by hordes of workers recruited by criminal organizations (as we have recently learned).

A floating supertanker can survive earthquakes and ride out any tsunami by going to sea before the raging waters approach land. And all the needed filtration equipment (for separating out more than 62 varieties of radionuclides from the contaminated water) can be built and operated aboard the supertanker for as long as needed.

(2) Although it is expensive, there is technology to separate tritium (radioactive hydrogen) from contaminated water. At Darlington, Ontario, there is a "Tritium Removal Facility" that is used to decontaminate the very expensive "heavy water" used as both moderator and coolant in Canadian CANDU reactors. The only contaminant that is removed is tritium.

It is impossible that Dale Klein is unaware of this technology. But part of his "scientific approach" seems to be to turn a blind eye to any scientifically based technologies when they are much more expensive than simply dumping liquid radioactive wastes into the Pacific Ocean.

Make no mistake about it. The people of the earth are going to have to be increasingly vigilant as nuclear advocates try by hook or by crook to find ways to abandon nuclear wastes – thereby abdicating responsibility and cutting costs – by dumping those wastes into the environment, by putting them in a hole in the ground and abandoning them there, or even by "recycling" them into consumer products by adopting a self-serving policy

(already in place in several countries) of "freely releasing" radioactively contaminated materials into the marketplace of recycled goods.

Gordon Edwards.

#### Post-Script:

A double-hulled supertanker can be built in a matter of months, with a capacity of at least 500,000 tonnes, with all compartments welded, at a cost of \$100 to \$200 million.

The first priority would be to purchase or build a supertanker for this purpose, and ensure that all necessary filtration equipment is on board. When all is in place, the "new" contaminated water — the 400 tonnes per day — can be pumped into the supertanker rather than into new above-ground tanks. Meanwhile, the contents of the old tanks (starting with the most fragile) can begin to be pumped into the supertanker as well.

This will gradually relieve the pressure caused by the need to manage and store on-site all the tainted water that is being pumped out of the crippled reactors – and free up space and manpower to build new water-filled spent fuel storage bays to accommodate the irradiated fuel assemblies in the Unit 4 spent fuel pool as well as the other spent fuel pools (from Units 1, 2 & 3.)

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[see	accor	npanying	article	from	The	Guardian,	below.

# Fukushima operator may have to dump contaminated water into Pacific

Senior adviser to Tokyo Electric Power says controlled release into sea is much safer than keeping contaminated water on-site

Justin McCurry, The Guardian, March 10, 2014 <a href="http://tinyurl.com/lm5glng">http://tinyurl.com/lm5glng</a>

A senior adviser to the operator of the wrecked Fukushima Daiichinuclear power plant has told the firm that it may have no choice but to eventually dump hundreds of thousands of tonnes of contaminated water into the Pacific Ocean.

Speaking to reporters who were on a rare visit to the plant on the eve of the third anniversary of the March 2011 earthquake, tsunami and nuclear disaster, Dale Klein said Tokyo Electric Power [Tepco] had yet to reassure the public over the handling of water leaks that continue to frustrate efforts to clean up the site.

"The one issue that keeps me awake at night is Tepco's long-term strategy for water management," said Klein, a former chairman of the US nuclear regulatory commission who now leads Tepco's nuclear reform committee.

"Storing massive amounts of water on-site is not sustainable. A controlled release is much safer than keeping the water on-site.

[Safer for whom, one wonders? GE]

"Tepco is making progress on water management but I'm not satisfied yet. It's frustrating that the company takes four or five steps forward, then two back. And every time you have a leakage it contributes to a lack of trust. There's room for improvement on all fronts."

[If every leak damages trust, just dump it all and get it over with? GE]

Tepco's failure to manage the buildup of contaminated water came to light last summer, when it admitted that at least 300 tonnes of tainted water were leaking into the sea every day.

That revelation was followed by a string of incidents involving spills from poorly assembled storage tanks, prompting the government to commit about \$500m (£300m) into measures to contain the water.

They include the construction of an underground frozen wall to prevent groundwater mixing with contaminated coolant water, which becomes tainted after coming into contact with melted nuclear fuel deep inside the damaged reactors.

Tepco confirmed that it would activate an experimental wall at a test site at the plant on Tuesday. If the test is successful, the firm plans to build a similar structure almost 2km in length around the four damaged reactors next year, although some experts have questioned its ability to use the technology on such a large scale.

Klein, too, voiced scepticism over the frozen wall solution, and suggested that the controlled release of treated water into the Pacific was preferable to storing huge quantities of it on site.

But Tepco, the government and nuclear regulators would have to win the support of local fishermen, and the release of even treated water would almost certainly draw a furious response from China and South Korea.

"It's a very emotional issue," Klein said. "But Tepco and the government will have to articulate their position to other people. For me, the water issue is more about policy than science."

Tepco is pinning its hopes on technology that can remove dozens of dangerous radionuclides, apart from tritium, internal exposure to which has been linked to a greater risk of developing cancer.

Klein, however, said tritium does not pose the same threat to heath as bone-settling strontium and caesium, and can be diluted to safe levels before it is released into the sea.

The Fukushima Daiichi plant's manager, Akira Ono, said the firm had no plans to release contaminated water into the Pacific, but agreed that decommissioning would remain on hold until the problem was solved.

"The most pressing issue for us is the contaminated water, rather than decommissioning," he said.

"Unless we address this issue the public will not be assured and the evacuees will not be able to return home.

"We are in a positive frame of mind over decommissioning the plant over the next 30 to 40 years, But we have to take utmost care every step of the way because errors can cause a lot of trouble for a lot of people."

Currently about 400 tonnes of groundwater is streaming into the reactor basements from the hills behind the plant each day. The plant has accumulated about 300,000 tonnes of contaminated water, which is being stored in 1,200 tanks occupying a large swath of the Fukushima Dajichi site.

Eventually Tepco hopes to have enough space to store 800,000 tonnes, but fears are rising that it will run out of space sometime next year because it can't keep up with the flow of toxic water.

#### Fukushima three years on

For visitors and workers alike, the journey to the plant begins at J-Village, a former training complex for the Japanese football team that now serves as the Fukushima cleanup's logistical base.

During the 20-minute bus ride through neighbourhoods still bearing the scars of the earthquake and tsunami, there were signs that decontamination work is making modest progress.

Atmospheric radiation levels are falling, leading the authorities to partially lift evacuation orders in neighbourhoods on the edge of the evacuation zone.

[These are gamma rays; what about alpha and beta emissions? GE]

Some of Fukushima's 100,000-plus nuclear evacuees are now permitted to return to their homes during the day, but radiation levels are still too high for them to make a permanent return.

In the town of Naraha, where atmospheric radiation hovered around 2 microsieverts an hour on Monday – the official decontamination target is 0.23 microsieverts an hour – large black bags filled with radioactive soil cover fields once used for agriculture, where they will remain until agreement can be reached on a permanent disposal site.

Part of a railway line running along the coast is due to reopen in the spring, although stretches of track that pass through the most contaminated areas are expected to remain closed for years.

Inside Fukushima Daiichi, reporters were reminded of the frantic attempts by a small group of Tepco engineers to save the plant from an even greater catastrophe in the hours after its power supply was knocked out by a towering tsunami three years ago.

In the control room for reactors 1 and 2, both of which suffered meltdowns, one worker's attempts to record water levels by scribbling them on to a disabled control panel are still visible.

None of the unnamed men, who had to work by torchlight, are still at the site: some have retired, but most had to leave because they quickly reached their lifetime radiation dose limit.

"It is difficult to describe what that time was like for those workers," said Kenichiro Matsui, a Tepco official. "They worked tirelessly to save the reactors. They had a real sense of mission."