

Nuclear Decisions

by Graham Saunders

The 9.0 (Richter scale) earthquake and tsunami on March 11 in Japan set off nuclear problems by disrupting power to cooling systems at the Fukushima plant. Since then, four of the troubled plant's six reactor units have seen fires, explosions or partial meltdowns and release of radiation.

This complex tragedy continues to inflict hardships on people in Japan. While they are trying to cope with the aftermath of the earthquake and tsunami, the nuclear crisis continues. It is important to be mindful that atomic radiation has special significance for these people with a cultural memory of nuclear weapons. Hopefully the worst of the nuclear disaster has been avoided.

The following assumes that readers have been following events in Japan and does not attempt to restate two weeks of news and developments. The attempt is to:

1. pass on a few details that were missed by Ontario and Canadian media news,
2. explore how this disaster in Japan has implications for proposals to build two new reactors at Darlington, east of Toronto and
3. provide thoughts about nuclear waste disposal and site selection.

Don't worry, it sounds a book, perhaps a trilogy. It is longer than intended but hopefully is a timely read.

Most of my sources for missed news are Australian – The Sydney Morning Herald and the Australian Broadcasting Corporation. I was surprised at the amount and quality of “news”, especially when compared to Toronto newspapers, CBC and CTV. It seemed odd because Australia does not have any reactors that generate electricity and is separated by a hemisphere from the troubles in Japan.

- Many of the 54 reactors in Japan began an automatic shut down process when the earthquake took place. This is supposed to happen and most soon resumed limited production after the quake stopped.
- However, 11 did not resume electrical generation which suggests that problems were not confined to one Fukushima plant (6 reactors) in the news.
- Reactor cores and storage pools need a constant source of cooling water. The Tokyo Electrical Power Company (TEPCO) apparently resisted use of sea water because that would end any possibility of future use of the reactor. The Japanese government, according to reports, ordered TEPCO to use sea water after a delay of 24 hours.

It is not practical here to compare media coverage but environmental investigative reporting is limited in Canada. For example, The Globe and Mail no longer has anyone in this role. There often appears to be uncritical acceptance of claims by the Canadian nuclear industry.

The crisis at Fukushima remains serious. There are increasing concerns about radiation exposure, obviously to the workers in the plants, the public in close proximity and higher radiation counts throughout the country.

Some world responses seem appropriate. Germany's policy makers are now considering closing seven reactors faster than originally planned. China is delaying approval of new nuclear reactors until the Japanese near disaster is fully assessed. Similar responses were issued in Switzerland and India.

Meanwhile in Ontario

On the first day, the Canadian nuclear industry and the Ontario government issued statements that such earthquakes and tsunamis could not happen here. Ontario's reactors are safe and according to media reports, Ontario is going "full steam ahead" to build two more reactors at Darlington.

This enthusiasm seemed out of place at the beginning of a critical situation and just prior to hearings scheduled in Darlington to consider the new reactor construction.

The original shelf-life for reactors built in 20th century was 25 years. No new reactors have been built or completed since the early 1990s in North America but new licences, retubing and other maintenance has been used to extend lifetimes up to 40 years. Dr Peter Bradford, the Nuclear Regulatory Commissioner during the partial meltdown at Three Mile Island in 1979, noted in the first days of events in Japan that attitude of regulators and operators can be more dangerous than old and brittle equipment. "The phrase 'it can't happen here' is an invitation to disaster," according to Bradford.

Tests of nuclear technology are often triggered by events and crisis. In a system blackout such as happened in August 2003, reactors in Ontario are programmed to unlink from the grid automatically and remain in standby mode. Instead, most went into full shutdown. Only two of twelve reactors behaved as expected. The Canadian Coalition for Nuclear Responsibility (CCNR) website (www.ccnr.org) details many nuclear accidents in Canada and elsewhere. Dr. Gordon Edwards, one of Environment North's AGM speakers in 2010, is the current president and founder of CCNR.

Perhaps the universe was listening. Two events took place in Ontario within days of assurances of safety standards and superior technology of the Canadian reactors and the stability of the geology.

- Ontario Power Generation notified Canada's federal nuclear regulator about the release of 73,000 litres of demineralized water into Lake Ontario at the Pickering A nuclear generating station. The leak occurred at 11:30 p.m. ET on Monday, March 14, 2011 at the plant located about 35 kilometres east of Toronto and was caused by a pump seal failure. "The radiological risk to the environment and people's health is negligible," the Canadian Nuclear Safety Commission said in a statement 48 hours later. (CBC)

- Natural Resources Canada confirmed an earthquake of 4.3 with an epicentre occurred in Hawkesbury, Ontario. The quake struck Wednesday (March 16, 2011) at 1:36 p.m. ET with no reported damage. Ironically, Earthquakes Canada's website stopped functioning again. In June 2010 an earthquake (M 5.0) in the same region also halted access to the site.

Temblors [sic] were reported in the Laurentians, across Montreal, in Cornwall and in Ottawa. An announcement was made saying the quake also didn't affect any of the major nuclear facilities in the region. (CBC)

The Canadian Nuclear Safety Commission has decided that nuclear facilities in Canada take into consideration what has occurred in Japan. On March 17 it issued requests to all nuclear power plants to review initial lessons learned from the earthquake in Japan and re-examine the safety cases focussing on hazards such as earthquakes, fire and extreme weather events, measures for prevention and mitigation

of severe accidents and also on emergency preparedness. They are also to report on implementation measures addressing any significant gaps. On March 21 this request was extended to all Class 1 nuclear facilities as well as uranium mines and mills.

The World Nuclear Association praised Japan prior to March 11 for having some of the most “stringent” standards for nuclear power plants in the world. They discussed a magnitude 7.3 earthquake in 2000 in an area of Japan where “no geological fault was known,” an event that prompted a review the industry's seismic guidelines.

While the geology in Ontario is comparatively stable, can we say for certain that the future will continue with seismic intensities of the past?

Nuclear waste disposal

A solution for nuclear waste remains elusive, especially for the highly radioactive spent fuel rods from the reactor cores, which must be kept isolated from the environment for hundreds of thousands of years. Only Sweden and Finland have decided on a disposal method – deep geological disposal. Although much of the discussion of nuclear waste disposal centres on the spent fuel rods, decommissioned reactors are another source of waste. The near disaster at the Fukushima plant has resulted in several such reactors which will be decommissioned. Eventually all nuclear generating sites will require careful deconstruction. Cores and tubing will have to be cut up by robots, which themselves will become so contaminated they will have to be disposed of by other robots. This waste would be encased and transported to a waste storage site.

The Canadian Nuclear Waste Management Organisation is in the process of finding a “willing host community”. Northern Ontario has been under consideration since the 1970's as an attractive location because of the Canadian Shield, low population and small towns often in dire economic circumstances to whom such an opportunity may be attractive.

Finding a container that will contain the radioactivity for hundreds of thousands of years seems an impossible task. At some point a container and barrier system will be deemed “safe enough”.

Building two more nuclear power plants at Darlington will add even more radioactive waste to the growing inventory.

The costs of nuclear

In 1954, Lewis Strauss, chairman of the Atomic Energy Commission in the US, predicted that nuclear power would be “too cheap to meter”. Oh well!

The “Debt Retirement Charge” on electricity bills in Ontario is because of cost overruns at the Darlington nuclear power station in the 1980s and 1990s. The Ontario government is proposing to build two more reactors at Darlington. Construction costs with “Take 2” threaten to be huge because of longer construction times, increased scale and complexity, and added regulation. The Japanese experience, no matter what happens in the coming days, would likely make nuclear cost even more economically impractical for Ontario.

Nuclear power is an “unforgiving technology”. Safety and security measures are essential for minimizing the risk of catastrophic failure, whether caused by human error, natural disaster or outside attack, or an unfortunate combination of events.

Tax payers, not insurance companies are liable for major nuclear accidents. The disaster in Japan reinforces that governments and the populace would bear most of the cost of new reactor construction and all costs in a future accident.

The billions of dollars needed to deal with waste disposal and decommissioning of sites are rarely mentioned.

Dr. Joshua Pearce is a mechanical engineering professor at Queen's University. He recently conducted a study on the merits of nuclear power in North America and stated, "Nuclear power is simply not worth [the] risk. We tried the nuclear experiment — it did not work. It is time we cut our losses and started putting all of our financial resources into a portfolio of renewable energy technologies."

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