

Refurbishing Gentilly-2 Will Not Make It Safe. Shutting it down will.

by Gordon Edwards, October 18 2011

Why does Hydro-Quebec want to spend 2 billion dollars to rebuild the core of the Gentilly-2 nuclear reactor?

In a word, the answer is “safety”.

The Nature of a Nuclear Catastrophe

When a nuclear reactor operates, a fantastic inventory of radioactive poisons is created inside the reactor core. There are hundreds of these newly-made radioactive materials -- and most of them do not occur in nature. If these materials escape into the environment in large amounts, the consequences can be catastrophic. The air, the food, the soil and the water become radioactively contaminated. Large land areas may remain unfit for cultivation or human habitation for centuries.

As the Fukushima disaster shows, if the core of a nuclear reactor cannot be cooled, it will overheat and melt -- releasing radioactive gases, vapors and ashes into the air, and contaminating huge volumes of water. This overheating will occur even if the reactor is immediately shut off, because the radioactivity of the fuel in the reactor's core is so great that it continues to drive the temperature upwards to the melting point of 2800 degrees Celsius. Water needs to be continuously pumped through the primary cooling system to keep this overheating from happening.

If the pumps are not working, or if the pipes in the primary cooling system are broken, it is difficult or impossible to cool the core of the reactor. Massive releases of radioactive materials may take place. This is what happened at Chernobyl and at Fukushima.

Refurbishment Wastes

In the Gentilly-2 reactor, thousands of individual pipes that make up the primary cooling circuit have become damaged – embrittled, corroded, distorted, and suffering from “wall thinning”. The main purpose for the “refurbishment” of the G-2 reactor is to replace these damaged pipes. Hydro Quebec is replacing all the pressure tubes, the calandria tubes, and the feeder pipes -- more than 1500 pipes in all.

These pipes have become radioactive wastes, as the water flowing through them carried radioactive material from the core of the reactor that contaminated the pipes. So they will have to be isolated from the environment of living things for many centuries. And if Hydro-Quebec goes ahead with refurbishment of G-2, these “refurbishment wastes” will be the sole responsibility of Quebec. Ottawa accepts no responsibility for them.

It was recently discovered that New Brunswick Power has been overwhelmed by the amount of radioactive waste produced by the refurbishment of the Point Lepreau reactor. They have accumulated five times more radioactive waste than they ever expected, and they have had to ship some of these wastes to the USA for incineration (to reduce the volume) because they cannot manage them all on-site. The radioactive ashes will be returned to New Brunswick. Something similar is likely to happen in the case of G-2, which may lead to transporting nuclear wastes over Quebec highways.

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Hydro-Quebec and the Government of Quebec should be asked to produce a detailed plan, complete with technical details and financial resources, to cover the long-term management of these refurbishment wastes. All this radioactive rubble will have to be stored and guarded for centuries after the G-2 reactor is gone. Without such a detailed financial plan, the true cost of refurbishment cannot be known to any degree of accuracy.

Steam Generator Replacement

In Ontario, when refurbishing two nuclear reactors on the shores of Lake Huron, Bruce Power replaced the sixteen large boilers (called steam generators) with brand new ones. These steam generators are a part of the primary cooling circuit, so Bruce Power reasoned that they had to be replaced for safety reasons. Why renovate just some parts of the primary cooling circuit and leave other deteriorating parts unchanged?

Each steam generator weighs about 100 tonnes, and is about the size of a school bus. Inside each steam generator are several thousand narrow tubes that have become weakened and contaminated. In fact, these tubes are part of the primary cooling circuit; that's why they have been replaced.

Like NB Power, Bruce Power is worried about the large volume of radioactive waste accumulating from the refurbishment of these old reactors. So it came up with a bright idea to reduce the volume of radioactive wastes and save itself some money.

Why not ship these 16 steam generators -- 1600 tonnes of radioactively contaminated metal -- through the Great Lakes, along the St. Lawrence River, and across the Atlantic Ocean to Sweden, where a company called "Studsvik" will take the steam generators apart, melt down the metal, and send the most radioactive portion (about 10 percent of the original volume) back to Bruce Power? The return shipment of radioactive residues would land at Halifax and travel by truck over public roads through the Maritimes, Quebec and Ontario.

Meanwhile, Studsvik would mix the less heavily contaminated metal (the remaining 90 percent) with non-radioactive metal from other sources, and sell the resulting mixture as scrap metal -- without ever labeling it as radioactive. The contaminated scrap metal would then be released into the marketplace where it would be used to manufacture all kinds of metal objects that might be sold anywhere. Most of it would end up in stores, factories, and homes around the world -- even in common household objects.

The nuclear industry calls it, "recycling contaminated metal". Others call it "contaminating recycled metal". Both the Steel Manufacturers' Association and the International Bureau of Recycling think the practice is pernicious and should be outlawed.

Opposition to Radioactive Waste Shipments

Environmental groups, aboriginal communities and municipalities along the proposed transportation route mobilized to prevent the shipment of the radioactive steam generators. They forced the Canadian Nuclear Safety Commission to hold public hearings in Ottawa. Hundreds of Quebec municipalities passed resolutions through their

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municipal councils opposing the proposed shipments. The Canadian Environmental Law Association, with the Sierra Club of Canada, launched a lawsuit on this matter in the federal court of Canada. The Mohawks declared that this shipment will not take place through their territory -- which means it will not take place at all.

It has been learned that the total amount of radioactivity in Bruce Power's proposed shipment is 6 times greater than the maximum amount allowed for ocean transport under IAEA regulations, and 60 times greater than the maximum allowed for transport through inland waterways. It has also been learned that Ontario Power Generation -- the provincial corporation that owns the Bruce reactors -- is prepared to store the steam generators on site in perpetuity as radioactive waste, and promised to do so in 2005.

Last spring, Bruce Power abruptly withdrew its application to the US authorities for permission to ship the steam generators through the Great Lakes, after being asked by them to provide additional information on the potential environmental consequences of a shipping accident. Bruce Power has so far not re-activated its request. Clearly the steam generators will not be shipped this year (2011), and there are some indications that Bruce Power may reconsider its plans altogether and store the steam generators on site, as was originally promised during a 2005 Environmental Assessment Hearing.

But there is a more sinister possibility. The nuclear industry may be taking this time to ensure that the regulations are changed in their favor, so that in future such shipments of radioactive wastes can take place without requiring public notification or approval.

Policy Questions

Opposition to the shipment of the steam generators has raised important questions regarding the transport and the dissemination of nuclear wastes into the environment. In March 2011, the House of Commons Committee on Natural Resources held hearings into the steam generator shipments, in the larger context of the policy vacuum that exists on the subject of the import, export, and transport of radioactive wastes through the Great Lakes and St. Lawrence River.

American authorities are also being pressured to hold Environmental Assessment Hearings into the transport of radioactive wastes through the Great Lakes. In October 2011, the members of the International Joint Commission were urged to advise the governments of Canada and the USA to forbid the shipment of radioactive wastes through the Great Lakes and the St. Lawrence River. There were over 125 Quebec municipalities who joined this appeal to the IJC, as well as Nature Quebec.

Much more work needs to be done to challenge the nuclear industry's determined efforts to allow radioactive wastes below a certain prescribed level of contamination to be "freely released" into landfills or into the marketplace, without any need to label or monitor or track these radioactive waste materials. This is a global problem; nuclear proponents in many countries are working hard to allow large volumes of radioactive waste materials to be dumped so that they will not have to pay for their safe storage.

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The so-called “Nuclear Renaissance” is simply not happening, especially after the Fukushima disaster -- new reactors are not being built in the numbers that the industry was hoping for. Now the nuclear industry, worldwide, is turning its attention to radioactive waste management, decommissioning of nuclear facilities, environmental restoration, and long-term stewardship of nuclear wastes. Nuclear proponents are beginning to realize that there is big money involved in dealing with nuclear wastes, and jobs for them for centuries to come.

At a four-day conference in Toronto (September 11-14) sponsored by the Canadian Nuclear Society (CNS), entitled “*Waste Management, Decommissioning, and Environmental Restoration at Canada’s Nuclear Facilities*”, one of the main speakers -- from the UK Nuclear Decommissioning Authority -- said “It is time to put away the toys and clean up the mess.” He revealed that the total cost of managing “historic” nuclear wastes in Britain will probably be about \$80 billion -- up 20% from the estimate of just five years ago. He also made it clear that dealing with the radioactive legacy of the nuclear age will be difficult, costly, and only partially successful.

Here in Canada, the Nuclear Waste Management Organization (NWMO) estimates a cost of about \$25 billion for high-level waste management -- but that does not include the cost of decommissioning (dismantling) all the radioactive structures and dealing with the large volumes of radioactive waste generated by regular nuclear operations, as well as refurbishment and dismantling activities. In addition, the Government of Canada has launched the Nuclear Legacy Liabilities Program, which estimates the cost of cleaning up the “historic” nuclear waste problems generated by Atomic Energy of Canada Limited (AECL) -- mainly at Chalk River Ontario -- at about 7 billion dollars.

It is clear that we are now entering a new phase of the Nuclear Age. Instead of being called the Age of Nuclear Power, it should now be called the Age of Nuclear Waste.

But the nuclear establishment still displays an inappropriate attitude towards the nuclear waste problem. Their first priority seems to be to protect the PR image of nuclear power as clean and non-polluting -- thus leading them to deny or minimize the dangers of radioactivity, while at the same time quietly dumping large volumes of radioactive wastes into the environment or the marketplace. Their ultimate goal seems to be to secure the public subsidies needed to expand the industry by convincing people that nuclear waste is no longer a problem.

What About Gentilly-2 ?

Why has Hydro-Quebec decided not to replace the four steam generators in the Gentilly-2 reactor? After all, they are an important part of the primary cooling circuit -- and that circuit is being rebuilt for safety reasons.

When asked about this at the BAPE Hearings in 2005, Hydro-Quebec spokesmen said that they would replace the steam generators at some later date, but they don’t need to be replaced yet. They also said that if they had to replace the steam generators now, the refurbishment project would probably not get the go-ahead....

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But there are thousands of old, contaminated tubes inside each steam generator, and they are packed so closely together and are so radioactive it is impossible to examine them directly. For example, only four tubes out of the more than four thousand tubes inside one of the decommissioned Bruce steam generators were actually studied in the laboratory. It is impossible to know the exact state of deterioration of these tubes.

So the decision to postpone the replacement of the steam generators makes little sense. A chain is only as strong as its weakest link; if the steam generators are not replaced they will become the weakest link in the primary cooling system of the nuclear reactor. Hydro-Quebec's nuclear team is gambling with safety just to keep the reactor going.

Since the steam generators will need to be replaced at some future time, Hydro-Quebec should be required to give a full cost accounting of the steam generator replacement, and add it to the total cost of refurbishment. The additional cost will be high, because replacing the steam generators is a major operation. It will require another lengthy shutdown. A hole will have to be cut in the wall of the containment building in order to get the old steam generators out and the new ones in. Such an operation will add hundreds of millions of dollars to the cost of the refurbishment, and will greatly increase the volume of radioactive waste resulting from refurbishment.

If the refurbishment goes ahead, and if the goal is to protect the health and safety of people and the environment, those steam generators should be replaced now.

Shutting Down G-2

But surely a better way to ensure safety and meet the energy needs of Quebecers in a cost-effective way, is to shut the reactor down permanently -- and not to refurbish it. The money now allocated by Hydro-Quebec for refurbishment -- \$2 billion -- can be diverted into community-based energy conservation and energy efficiency projects throughout Quebec. Such an investment will create a great many jobs throughout the province, and save more energy than a refurbished G-2 would ever produce.

Jobs in the nuclear field can still be guaranteed for many years to come. The Gentilly-1 reactor is the property of the federal government, not Hydro-Quebec. The core and the primary cooling circuit of the G-1 reactor has never been dismantled. The Government of Quebec should require the Government of Canada to finance the complete demolition of the Gentilly-1 reactor, drawing on the \$7 billion budget that has been established for dealing with Canada's "historic nuclear wastes" -- the Nuclear Legacy Liabilities program -- which includes the three federally-owned prototype nuclear reactors: Douglas Point, the NPD reactor, and Gentilly-1.

By gaining expertise in dismantling radioactive structures at federal expense, Quebecers will have a head-start on a multibillion dollar global industry -- decommissioning nuclear reactors at more than a billion dollars each. It is a much better international opportunity than the building of new nuclear reactors because the market is assured and will last for many decades into the future.

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The most useful thing that we can do, as citizens, is to see that this dreadful problem of radioactive wastes is not made any worse than it already is. Quebec can close the door on nuclear power once and for all by not refurbishing the Gentilly-2 reactor. Instead, it can concentrate on dealing in a responsible way with the long term management of all the existing nuclear wastes, while fostering a sustainable society based on energy efficiency and renewable energy sources.