==========

To Whom It May Concern:

I, Gordon Edwards, will be appearing to intervene at the Day 2 Hearing (Dec. 1 & 2 in Saint John N.B.) on the proposed relicensing of the Point Lepreau reactor.

Gordon Edwards, Ph.D., President,
Canadian Coalition for Nuclear Responsibility

P.S. Here is the CCNR written submission.

To:	The Canadian Nuclear Safety Commission
Re:	NB Power's Application to refuel and restart the Point Lepreau reactor
Date:	November 14 2011
From:	Gordon Edwards, Ph.D., President, Canadian Coalition for Nuclear Responsibility

---

Introduction

The Canadian Coalition for Nuclear Responsibility (CCNR) is a not-for-profit organization based in Montreal, Quebec. CCNR has taken a leading role in providing an independent critique and assessment of nuclear technology and nuclear policies in Canada since its inception in 1975.

With over 100 supporting groups across Canada, CCNR has long maintained that there is a need for a democratic decision-making framework in Canada to allow the citizens, whose taxes have created and supported this industry from the very beginning of the nuclear age, to have a decisive say in its future.

CCNR is strongly opposed to the "business-as-usual" attitude of the Canadian nuclear industry and the Canadian Nuclear Safety Commission, in the wake of the Fukushima disaster. It seems that one of the greatest disasters in modern history is worth little more than a few paper studies from those who own, operate and regulate nuclear reactors in Canada, to the effect that none of their presuppositions are in need of further scrutiny.

CCNR is appalled at the seeming indifference of elected officials at all levels in Canada who, it seems, have abdicated their own responsibility to the electorate by delegating all important decisions in nuclear matters to the very organizations that are dedicated to facilitate the continuation and expansion of the nuclear industry regardless of the views of intervenors who do not share their pro-nuclear dedication.

It is profoundly disturbing to many Canadians that the previous Head of the CNSC, Linda Keen, was fired for doing her job: that is, holding a licensee to account when the terms of a CNSC licence are violated. In light of the Fukushima disaster, it is particularly disturbing, in retrospect, to note that Linda Keen was merely guilty of insisting that Atomic Energy of Canada Limited (AECL) connect an earthquake-proof electrical supply

system to the primary cooling pumps of the NRU nuclear reactor in order to prevent (on a much smaller scale) the kind of events that led to the Fukushima disaster – a prolonged electrical blackout triggered by an earthquake, and a lack of emergency backup power. At Fukushima, this led to core meltdowns in 3 of the 6 reactors and catastrophic overheating in the spent fuel bay of a fourth reactor (which had no fuel at all in its core) leading to massive releases of radioactive contaminants to the environment outside the plant.

It appears to CCNR, as to many Canadians, that CNSC has essentially been emasculated by its political masters. The message seems to be, "Do your job, but only up to a point; do not interfere with the ongoing operation of the reactors you licence. Under no circumstances should you interfere with the commercially valuable output of those facilities."

During my first encounter with Ms. Keen's successor, I was shocked to hear him say that his main priority was "to streamline the approvals process." I was disturbed to think that the first priority of the CNSC is not necessarily the health and safety of citizens and the environment. And it was the first time that I had heard the licensing process described as an "approvals process", but upon reflection I realized that that's exactly what it is: a process designed to culminate in approval of what the industry has decided to do, subject to extensive consultation with colleagues in the regulatory agency.

This perception of a pro-industry orientation has been reinforced in recent years by CNSC's increasingly overt public relations activities promoting the image of nuclear power as an inherently safe activity, denying that there are any health dangers associated with chronic exposure to low levels of atomic radiation, and facilitating the industry's plans to disseminate large volumes of low-level radioactive waste into the environment -- or even into the marketplace – through the championing of "free release" regulations that allow these wastes to deliberately pass beyond regulatory control.

Nevertheless, in terms of relicensing of the Point Lepreau reactor, since the CNSC Day 2 is the only public hearing process that citizens are allowed in this country at this time, we can at least put our concerns, criticisms and reservations on the public record, in the hopes that someday our elected representatives may wake from their slumber and take a direct interest in the future of the Canadian nuclear industry from a more enlightened and comprehensive perspective. We only hope that it doesn't take another Chernobyl or a Fukushima-like event to bring this awakening about.

The Lessons of Fukushima

CCNR believes that the main lesson from Fukushima should be that the best-laid plans of men and women can and will go astray from time to time. In the public interest, CNSC and NB Power should be planning now for the worst that could happen, and this should be a prerequisite for any relicensing of the facility.

In our view, it is irresponsible to allow theoretical probability calculations to exempt catastrophic events from being considered and prepared for. Probability theory is riddled with assumptions of questionable validity. The supposed independence of mechanical

failures can be swept away by a common cause event, such as a raging fire or a tsunami that wipes out several back-up generators simultaneously. Indeed, even in the best of circumstances, probability has no predictive power when it comes to a unique individual event. Getting one particular number in roulette may be very unlikely, but it could happen on the very next spin of the wheel.

CCNR believes that neither the industry nor the regulator has taken sufficient care to deal with the fundamental features of nuclear power that make it different from other energy-supply technologies, and to plan accordingly. Such plans go far beyond the fixation that CNSC staff displays with the machinery, based on engineering and physical science considerations, for they extend also into the surrounding society and the environment of living things. After all, the legal mandate of the CNSC is to protect people and the environment; that mandate is not limited to checking the machinery to see if it is functioning well.

Two unique features of nuclear power make it a singular threat to living things – a threat that is one of the main considerations justifying the very existence of the CNSC.

The first feature is what makes nuclear power inherently dangerous: during normal operation, every nuclear reactor creates hundreds of radioactive materials that are highly dangerous – and that did not occur in the natural environment prior to the harnessing of nuclear fission. Under extremely adverse conditions, these materials can be released into the environment in large quantities, contaminating soil, water, food, and buildings, and making large land areas uninhabitable for a considerable period of time.

The second feature compounds the dangers of the first feature: an operating nuclear reactor cannot be shut down completely, in terms of heat generation, because the radioactivity in the core is so intense that it continues to generate a great deal of heat that cannot be shut off by any method known to science.

Immediately after shutdown, this "decay heat" (due to radioactivity alone) is about seven percent of full power heat. In the case of the Point Lepreau reactor, with a nominal power rating of 600 megawatts of electricity, the maximum rate of heat production is about three times the rate of electricity production – that's about 1800 megawatts of heat.

Upon shutdown, the radioactive decay heat is therefore about 125 megawatts. That's more than enough heat to melt the core of the reactor – by driving the temperature up to approximately 2800 degrees Celsius – unless the heat is removed as fast as it is being produced. And that requires the operation of pumps that are powered with electricity.

At Fukushima, the prolonged loss of off-site and on-site power meant there was no adequate cooling to the core of the reactors or to the spent fuel bays. As a result, devastating hydrogen gas explosions occurred because the zirconium cladding (Zr) of the fuel elements reacted with steam (H_2O) at a temperature of 900 to 1000 degrees Celsius to produce hydrogen gas (H_2) – given off by rapid oxidation of the zirconium metal.

In the spent fuel bay of Unit 4, after the hydrogen gas explosion blew the roof off, zirconium fires broke out in the spent fuel bay after the water boiled away or leaked away, and the fuel elements, exposed to the steam-filled air, began burning – thereby aggravating the heat loading on the irradiated nuclear fuel.

Meanwhile, large amounts of radioactive iodine, cesium, xenon, tellurium, strontium, and other radioactive fission products were escaping into the atmosphere and into the sea, causing extensive contamination of such foodstuffs as spinach, milk, green tea, beef, and fish. School playgrounds became so contaminated that the permissible radiation exposure levels for children in those locations was raised to 20 millisieverts per year – the same level that represents the maximum permissible radiation exposure for atomic workers working in European nuclear power plants.

The Japanese population was horrified by events at the Fukushima Dai-ichi plant which they had been led to believe were utterly impossible. They were perplexed and angered by a stream of inconsistent assertions from the authorities and by the lack of helpful practical advice to assist them in protecting themselves and their families. Outside observers, including the IAEA, charged that the Japanese regulatory agency was too close to the industry that it was supposed to regulate. In response, the Japanese government transferred the agency from the Ministry of Energy to the Ministry of the Environment in hopes that some degree of independence would be gained in this way.

What lessons can Canada learn from this? First and foremost, that equipment can fail in totally unanticipated ways, and safety systems are sometimes simply not available. CNSC routinely requires its licensees to assume that individual components or systems may fail, but never requires them to face the consequences of a total unforeseen failure of all relevant safety systems. In the light of Fukushima, CCNR believes this philosophy must change.

If, despite all the engineered systems and all the best intentions, the core of the Point Lepreau reactor were to melt down and massive releases of radioactivity into the environment were to take place, what is the plan? Is there a technological capacity in place to prevent huge volumes of heavily contaminated cooling water from gushing into the Bay of Fundy or into surface waterways? Is there a specialized strategy for protecting pregnant women and nursing mothers preferentially from the effects of radioactive exposures to their children? Is there a protocol in place for monitoring food and drink for contamination from various fission-related radionuclides? Is there a technique for offsite monitoring that is quick and effective for the non-penetrating radiation associated with such radionuclides as strontium-90, plutonium-239, and americium-241?

CCNR and many other Canadians will find it difficult to believe that the goal of the CNSC is to protect living things off-site from the potential dangers of nuclear power when living things are almost never even mentioned in its reports and analyses. Nor is there any mention of the potentially harmful medical effects of atomic radiation at various levels of exposure, other than blanket assurances to the effect that there is nothing to be concerned about.

In view of the Fukushima disaster, that attitude is just not sufficient – even within the limited context of machinery. After all, the CANDU pioneers designed and built expensive vacuum buildings in Ontario to "suck up" and condense the huge quantities of radioactivity-laden steam that could result from a major core accident, although such accidents were not anticipated and the vacuum buildings have in fact never been used. The current generation of engineers be required to design and build enormous reservoirs to hold the large volumes of incompressible radiation-laden water that could result from a core meltdown. If there were a regulatory agency wholly devoted to protecting the public and the environment, it would play a leadership role in this regard.

Additional Safety Concerns

At the Day 2 Hearing, CCNR will raise other safety-related aspects of the relicensing:

1. The Failure to Resolve the Problem of Positive Void Coefficient of Reactivity

2. The Failure to Require or to Analyze the Steam Generator Replacement Option

3. The Failure to Analyze the Vulnerability of the Point Lepreau Spent Fuel Pool

4. The Failure to Re-assess Decommissioning in Light of the Refurbishment Experience

5. The Lack of a Thorough Biomedical and Ecological Analysis of the Restart

6. The Failure to Address the Lack of an Adequate Safety Culture at Point Lepreau

7. The Failure to Address the Problem of "Disposal" of Refurbishment Wastes

8. The Inappropriateness of Basing Important Regulatory Decisions on Probability