

“Is anybody at all responsible?”

**a submission to the
Canadian Nuclear Safety Commission (CNSC)**

**from the
Canadian Coalition for Nuclear Responsibility (CCNR)**

**regarding the
Relicensing of the Bruce NPP**

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Is anybody at all responsible?

The Canadian Coalition for Nuclear responsibility (CCNR) believes that the safety culture at both Bruce Power and the Canadian Nuclear Safety Commission (CNSC) is seriously degraded.

Until the safety culture in both organizations has been assessed by an independent third party review, and reformed as a result of that review, the Canadian public has no reason to trust that their health and safety, or the integrity of the environment, will be protected by either of these organizations going forward.

No licence of more than a six-month's duration (or a year maximum) should be granted to Bruce Power by CNSC until these inadequacies in both the licensee and the regulator have been addressed and corrected.

CCNR believes that Bruce Power must not be allowed to continue for five more years with "business as usual" practices, and that CNSC must not be allowed to continue playing its usual passive role that has proven unequal to the task of providing needed protection to workers and the public.

Irresponsible radioactive contamination of workers

During the refurbishment of two Bruce A units, over 500 workers were exposed to a work environment where they inhaled plutonium-laden dust on a daily basis for about four weeks. The workers were told they did not have to wear respirators because there was no danger. The CNSC did nothing to prevent this prolonged and unnecessary exposure to alpha-emitting material although there were clear indications of unsanitary air quality, including a work stoppage at one point to protest those conditions.

To the best of our knowledge, no staff member of the CNSC was fired, fined, or demoted as a result of CNSC's failure to protect Bruce workers from unreasonable radioactive exposures. To make matters worse, the CNSC has not apologized or acknowledged culpability in spite of its failure to fulfill its primary legislative responsibility. CNSC staff has tried to cover up the incident, denying that anyone in Bruce Power or in CNSC is responsible for these preventable exposures leading to a lung burden of plutonium in hundreds of men.

A two-hour television documentary was recently aired entitled “Rickover: The Birth of Nuclear Power” in which Admiral Hyman Rickover is quoted as saying, “Unless you can point your finger at the man who is responsible when something goes wrong, you never had anybody responsible at all.” My question is this: was anybody ever responsible in this case? Was anybody held accountable? And is this what the public should expect when things go wrong? Denial of responsibility? Denial of accountability?

At the Kincardine Hearings on OPG’s proposed DGR for nuclear waste, Patsy Thompson referred to the incident in Carlsbad, New Mexico, just last year, where a barrel of radioactive waste exploded some 750 metres underground, spreading radioactive dust through the underground tunnels and contaminating 22 workers at the surface with plutonium dust.

Ms Thomson had no hesitation in attributing these exposure to a “degraded safety culture” at the US facility, yet refused to acknowledge that the plutonium exposures of twenty-two times as many workers over a period of four weeks at Bruce Power without any accidental event to trigger it, is also indicative of a seriously degraded safety culture.

Even more shocking is the failure of CNSC to thoroughly investigate this incident, having not even carried out a “root cause analysis” -- after Bruce Power refused to provide its own “root cause analysis” to CNSC staff. A proper investigation would have revealed that the presence of alpha-emitting material in the pipes was documented long before the work began, that large amounts of contaminated airborne material was being released daily as the pipes were worked on, and that overnight analysis of air samples would have quickly revealed the nature of the contamination had they been required.

Although the CNSC boasts that it will never compromise safety, these events at Bruce Power have already proven otherwise.

Failure to analyze the progression of serious accidents

Bruce Power has enormous resources at its disposal to carry out safety analyses for licencing purposes. Almost all of this effort, however, is devoted to probabilistic calculations designed to demonstrate that certain major accident scenarios do not have to be studied in detail because it is not a requirement as specified in the CNSC regulations.

Take, for example, a large loss-of-coolant accident (LOCA) coupled with a loss of emergency coolant. A few years ago, the probability of that combination was estimated to be in the neighbourhood of 1 in 100 thousand reactor years. That number was arrived at by using 1 in a 1000 reactor years for the probability of a large pipe break, and 1 in 100 reactor years for the unavailability of emergency coolant, given a product of 1 in 100,000 reactor years for the combination. Under existing CNSC regulations, this accident scenario would have to be analyzed in detail by the licensee because the probability is so high it cannot be ignored: the stated probability is $1 \times E^{-5}$ (five zeros in the denominator).

What Bruce Power has done is to have its analysts and engineers work hard to get those probability numbers down, and they now claim that such a scenario (loss of regular and emergency coolant) has a much lower probability of 1 in 10 million reactor years: $1 \text{ in } 10,000,000$ or $1 \times E^{-7}$. The practical implication of this is that they are no longer required to study this scenario in detail under CNSC regulations.

But probability has no predictive value as to WHEN a particular event will happen. It only governs the FREQUENCY with which that event will occur. History has shown us that events of very low probability can occur at any time – as at Chalk River (Ontario) in 1952, Windscale (U.K.) in 1957, Lucens (Switzerland) in 1969, Three Mile Island (Pennsylvania) in 1979, Chernobyl (Ukraine) in 1986, and Fukushima (Japan) in 2011, all accidents that completely destroyed the cores of the respective reactors.

If there were a strong safety culture at Bruce and at CNSC, the low estimated probability would not deter the staff from doing a thorough analysis of the progression of such an accident. As Sunil Nijhawan has discovered, not only will the steam-filled fuel channels react with the zirconium in the pressure tubes and fuel cladding to produce a lot of hydrogen gas, but that same steam will enter into the hundreds of feeder pipes and react with the carbon steel to produce an even greater amount of hydrogen gas – far too much for the existing hydrogen recombiners to cope with, thereby setting the stage for an hydrogen gas explosion similar to those seen at Fukushima.

The Bruce reactors have no pressure containment around the core of the reactor, so the atmospheric releases of radioactivity following a massive

hydrogen gas explosion could be much greater at Bruce than at Fukushima. It would be more akin to Chernobyl, as that reactor also lacked containment.

By analyzing the progression of such an accident scenario, regardless of the probabilities (that are only mathematically estimated), weaknesses in the overall plant design or in the existing safety equipment can be revealed, and corrective measures can be planned to minimize the offsite consequences of such a disaster.

The licensee may say, “Well, our estimate of the probability is so low that it isn’t worth our while to spend time and money on that. And besides, it is not required in the CNSC regulations.” But this is unprofessional thinking. We all understand the concept of insurance. When the consequences could be ruinous, it is worthwhile investing in insurance.

In fact, Canada’s nuclear industry often insists that catastrophic accidents are so improbable that it is foolish to worry about or plan for them, yet they themselves require the Government of Canada to pass legislation that will limit their financial liability for offsite damages in case such an improbable catastrophe does happen. And private insurance companies are likewise unpersuaded by the “vanishingly small probability” argument, as they have for many decades insisted on having a “nuclear exclusion clause” in every homeowner’s insurance policy that voids all coverage to the homeowner in the event of radioactive contamination of his or her property due to a nuclear accident. But the Canadian public deserves another kind of insurance – the insurance of a vigilant regulator who leaves no stone unturned for safety.

If the CNSC is to be perceived by the public as a valid regulatory agency instead of a rubber-stamp organization, it has to show more backbone. Safety is the CNSC’s paramount duty. Licensees should not be allowed to simply “get away” with things that might seriously jeopardize public safety in adverse circumstances simply because there is no regulation that forbids it.

The progression of a serious accident scenario needs to be analyzed very thoroughly in order to discover weakness in the design of the plant or the capabilities of the engineered safety systems. And if those weaknesses can be addressed and corrected, the CNSC should insist that it be done.

Another example may suffice to illustrate this point. Consider the accident scenario where there is a total station blackout combined with a failure of feedwater to the steam generators. Sunil Nijhawan has, for more than a decade now, pointed out to the CNSC staff that the pressure relief valves currently installed at Bruce are too small to relieve the pressure fast enough to prevent pipe ruptures in the primary cooling system. The solution is simple –install larger relief valves.

CNSC staff refused for many years to accept the validity of Mr. Nijhawan's straightforward engineering calculations. Even after they admitted that Mr. Nijhawan was correct, they denied that it was necessary for larger valves to be installed. This astounding attitude on the part of CNSC staff clearly indicates a seriously degraded safety culture; for if pipes are going to break in the primary cooling system, then the smallest and thinnest-walled pipes are those in the steam generators which will likely be the first to burst due to over-pressurization. If that happens, there is a clear pathway for radioactive gases and vapours to go directly out into the atmosphere, with incalculable consequences for the surrounding population and for the Great Lakes.

The time has come for CNSC to review and revise its safety philosophy. It is one thing to say that the licensee has the primary responsibility for safety, which is true enough. And it is all very well and good to have regulations that the licensee must meet in order to receive and operating licence. But safety is far more than rules and regulations. When a potentially unsafe practice is identified, even in the absence of a specific regulation governing that situation, the regulator has to be ready to step in and say "Stop. We will not let you do that."

The Fukushima disaster taught us to plan for the unthinkable. The collusion between regulator, government and industry -- identified by the Japanese Diet in their report on the Fukushima disaster -- must not be allowed to colour our judgment and paralyze our will. Accountability, courage, and pro-active regulation are needed, and clear lines of responsibility must be established.

Until the progression of severe accident scenarios have been analyzed to determine what improvements need to be made to these eight old reactors, and until the safety culture at Bruce and the CNSC has been improved, no operating licence should be granted beyond six months or one year maximum.