To: Canadian Nuclear Safety Commission (CNSC)
From: Canadian Coalition for Nuclear Responsibility (CCNR)
Re: Licence Application of SRB Technologies (SRBT)
Date: April 13, 20165

SRBT buys radioactive tritium from OPG's Tritium Removal Facility, and makes self-illuminating lights such as exit signs and airport runway lights. These devices involve glass tubes filled with tritium gas that glow in the dark. Tritium is radioactive hydrogen. It is quite difficult to control, and inevitably some of it escapes into the environment.

SRBT is now seeking a 10-year licence. In the past they have never received more than a 5-year licence. In the early years the SRBT licences were only for 2 years at a time.

The fundamental fact is this: tritium is an occupational hazard and an environmental pollutant produced in abundance by all CANDU nuclear reactors. The use of heavy water as a moderator and coolant guarantees that enormous quantities of tritium will be produced routinely as an unwanted and dangerous byproduct. Far more tritium is produced by CANDUs than is produced by other reactor types.

Tritium is created when the hydrogen atoms that go to make up heavy water molecules absorb stray neutrons and become activated – that is, transmuted into radioactive hydrogen atoms. Radioactive hydrogen is called tritium. Since tritium is continuously created in the heavy water moderator and coolant, exterior to the fuel bundles, and since tritium has a relatively long half-life of 12.3 years, the concentration of tritium builds up to higher and higher levels year after year, tending to result in higher worker exposures and greater environmental emissions into the surrounding atmosphere and waterways.

In an attempt to ameliorate this unfortunate situation, and in accordance with the ALARA principle, Ontario Hydro built a Tritium Removal Facility at Darlington 25 years ago to periodically clean the heavy water by removing much of the tritium contaminating it.

As stated on the OPG web site:

> "To help keep workers safe, and to minimize the amount of tritium going into the environment, a tritium removal facility was opened at the Darlington site in 1990. This plant extracts tritium from heavy water used in OPG's nuclear reactors. The tritium is safety stored in stainless steel containers within a concrete vault."
>
> (http://tinyurl.com/mcylhrm)

It all sounds good. Reducing exposures, reducing pollution, removing a danger. The tritium is separated out and safely stored away, sequestered from the environment, where it can no longer endanger the workers onsite, the people living nearby, or the other biota in the vicinity of the nuclear power plants.

But then, also 25 years ago, Canada's nuclear regulator – which was at that time the Atomic Energy Control Board (AECB) – issued a licence to a private company, SRB Technologies, to begin transporting, handling and marketing significant quantities of this radioactive waste byproduct – tritium – that had been so carefully taken out of harm's way by the reactor owners.

Through incompetence or corruption the regulators at that time did not require any monitoring and maintained almost no regulatory oversight over the SRBT facility in Pembroke. Releases of tritium there were astronomical. The SRBT facility also began receiving tritium wastes from the USA and the UK, in effect becoming a radioactive waste dump in violation of its licence, an activity that added dramatically to the plant's atmospheric tritium emissions.

As a result, the entire community of Pembroke has become unnecessarily contaminated with the very same tritium that was painstakingly sequestered by the publicly owned electrical utility so that the residents of Pickering and Kincardine and Clarington could have some degree of relief from the unsanitary condition of living in a tritiated environment.

The utility did the right thing in removing tritium. The regulator did the wrong thing by allowing an entirely new community to become radioactively contaminated by a polluting industry that was improperly regulated.

AECB staff was complicit in allowing this situation to fester for many years. CNSC staff has also shown itself to be either incompetent or corrupt in allowing SRBT's sister plant, the SSI facility in Peterborough, to under-report its tritium emissions by a factor of at least five or ten over a period of 18 years. Similar under-reporting has occurred at SRBT

You, the CNSC Commissioners now sitting to judge this licence application, are not responsible for these past mistakes. Nevertheless you must be cognizant of those mistakes, and of the legacy of soil and groundwater contamination that is a sad fact of life in Pembroke today as a result of those mistakes.

As Commissioners, you should be aware that there are many on the CNSC staff who are in fact responsible for some of those past errors, as none of the delinquent parties were ever fired or fined or even disciplined for allowing such things to happen. Are those staff members still making errors today either through carelessness or as a way of covering up past errors?

As Commissioners, you should ask yourselves why the CNSC staff has not been forthright in providing the 2014 groundwater contamination figures – figures which flatly contradict the soothing assurances from the CNSC staff that all's well. All is not well. The situation is getting worse. Why is CNSC staff withholding disturbing data?

CNSC staff is also withholding from you, the Commissioners, scientific information that is fundamentally important in understanding the health hazards of tritium. The staff is

well aware that the best scientific evidence worldwide indicates that tritium is at least 2 to 3 times more hazardous than is currently calculated, because the RBE factor for tritium (Relative Biological Effectiveness) is known to be at least 2 or 3. In practice, this means that the Sieverts calculated by staff should be at least doubled or tripled if one wishes to have a reasonably accurate idea of the doses people are getting as a result of tritium exposures. Apart from the ultimate significance of the doses in terms of human health, one has to ask – why is the staff choosing to ignore the best scientific evidence when it comes to estimating public harm? Why are they not being frank with Commissioners?

Then there is the fact that two – not just one, but two – independent scientific bodies appointed by the Ontario government have quite separately and on different occasions come up with the same numerical recommendation – that the drinking water standard for tritium should be 20 Becquerels per litre if one objectively compares tritium with other carcinogenic substances that are regulated. The bodies in question are ACES (Advisory Committee on Environmental Standards) and ODWAC (Ontario Drinking Water Advisory Council). Incidentally, neither of these two bodies took into account the RBE factor of 2 to 3 mentioned above. Presumably, their recommendation would have been 10 Becquerels per litre or 7 Becquerels per litre if they had taken RBE into account. Why is staff not recommending to you, the Commissioners, to adopt such limits as targets?

Then, there is the surprising fact, only recently discovered, that OBT (organically bound tritium) in living things is very much higher than would have been expected on the basis of previous assumptions – assumptions that were, in retrospect, little more than guesswork. It was believed, for no particular reason, that tritium gas could not be incorporated into organic molecules as OBT without first becoming tritiated water HTO. Based on careful measurements, this assumption seems to be clearly false. There is a lot more OBT than could have possibly resulted from tritiated water.

Given such unsettling facts and so many uncertainties, you, the Commissioners, must ask yourselves what message would you be sending about the industry, about the regulatory body, and about yourselves as professionals, if you simply grant SRBT a 10-year licence and let everybody more or less go back to sleep – except for that small handful of people in Pembroke who suspect the truth and may have to endure many sleepless nights.

The Canadian Coalition for Nuclear Responsibility believes that this facility has no business taking a radioactive pollutant that has been meticulously segregated from the environment of living things by the utility, and spreading that pollutant around, exposing workers, an innocent community, and the local environment to a radioactive hazard that was supposedly already dealt with to prevent it from being a hazard.

Moreover, since most of these tritium-filled lights end up radioactively contaminating landfills in other countries, this once-segregated nuclear waste material is now being dispersed to the four corners of the world. All with the blessing of the CNSC? All so that a private company can make money in an enterprise that is by no means tied to the welfare of Canadians at large? Why should a responsible regulator allow such a thing? Is this what Canadians are to expect from our regulator with regard to nuclear wastes?

Even if there were a legitimate justification for such a facility, why should it be located in a community where people live and raise their children and grow their vegetable gardens? CCNR argues that the SRBT facility should be either shut down altogether unless they can reduce radioactive emissions to zero, or they should be forced to relocate to an industrial or research site with an enforced exclusion zone such as Chalk River Labs or the Darlington NPP. CCNR believe that the CNSC should be doing everything possible to protect the citizens, not to accommodate a polluting private enterprise in the business of marketing nuclear waste.

Back in 1980, the Select Committee on Ontario Hydro Affairs – after fifteen weeks of public hearings – published a report entitled "The Safety of Ontario's Nuclear Reactors" in which they reported as follows:

> Carbon-14 and tritium are of comparable and special concern for similar reasons.
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> First, they each have long half-lives: 5 730 years for carbon-14 and 12.3 years for tritium. Long half-lives allow them to accumulate in the environment around a reactor and in the global biosphere.
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> Second, they are easily incorporated into human tissue. Carbon-14 is incorporated into the carbon that comprises about 18 percent of total body weight, including the fatty tissue, proteins and DNA [molecules]. Tritium is incorporated into all parts of the body that contain water.

Because of the relatively long half-life of tritium, it does accumulate in the environment. This year's emissions are added to last year's emissions, minus the small amount that has undergone radioactive disintegration during that time period, about 5.5 percent. So to grant SRBT a 10-year licence is to guarantee that the pollution levels in Pembroke will continue to increase, even if the operation is more carefully managed than in the past. Such a decision would allow SRBT to add to the pollution that has already occurred, and so would in effect seem to condone all the errors of the past. We urge the Commissioners not to allow themselves to be tarnished by acting in such a fashion.

Canadians are increasingly suspicious that the CNSC is more interested in enabling the industry to do what it wants than in protecting the workers, the public or the environment. "We will never compromise safety." "Safety – it's in our DNA." "All exposures are kept As Low As Reasonably Achievable." Do these words mean anything? Or are they just empty slogans?

There is no doubt that the largest and by far the most significant market for tritium is the nuclear weapons industry. By using compressed tritium gas in a fission weapon, the explosive yield can be more than doubled – the explosive power is often increased by a factor of 3 to 5 times. For this reason tritium is essential to the miniaturization of fission warheads, making those warhead much easier to deliver to their targets. Moreover,

tritium gas is absolutely essential to allow for a transition from fission-based A-Bombs to fusion-based H-Bombs. That's because the tritium "sparkplug" contained in the plutonium "trigger" not only multiplies the number of neutrons needed to ignite the fusion reaction, but also guarantees an abundance of much more powerful neutrons – 14 MeV rather than 4 MeV – without which the fusion ignition will simply not occur.

For this reason tritium is regarded as a controlled substance by the IAEA. However the tritium gas devices sold by the tens of thousands by SRBT and exported all over the world, including to such countries as Iran, are not carefully tracked or accounted for. In fact the policy of "free release" by which these devices can be sent to landfills at the discretion of the purchaser, implies that neither the CNSC or anyone else actually knows where these devises might end up. And now CNSC staff is even recommending to delete the one clause in the SRBT licence that specifically refers to non-proliferation objectives.

CCNR recommends that SRBT not be given a licence to export tritium gas in any form whatsoever until a thorough study is done to determine how best to track this controlled substance in order to ensure that it does not end up in some nation's nuclear weapons program halfway around the world.

CCNR Recommends:

(1) No licence extension for SRBT for more than 2 years maximum.

(2) No licence for SRBT to export tritium without a proper tracking system in place.

(3) No removal of existing non-proliferation clauses from the SRBT licence.

(4) A public hearing before the Commissioners on assessment of tritium hazards.

(5) A formal risk-benefit analysis to see if exposures from SRBT are justifiable.

(6) A revocation of the CNSC free release policy for hazardous radioactive wastes.

On behalf of the CCNR Board of Directors,

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Canadian Coalition for Nuclear Responsibility.