

Comments on Bill C-22

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

to the Standing Committee on Natural Resources
June 6 2014

As President of the Canadian Coalition for Nuclear Responsibility I have been invited on numerous occasions over a period of 35 years to testify before House Committees on a wide variety of nuclear-related issues, ranging from the long-term management of high level radioactive waste and reactor safety, to food irradiation and the production of medical isotopes.

On November 29, 2007, I testified before this Committee on Bill C-5, an earlier version of the Nuclear Liability and Compensation Act. I have appended a copy of my testimony at that time for your information. [See Appendix B.]

This Committee is currently being asked to approve Bill C-22 for third reading. If passed in its present form, Bill C-22 would cancel the existing Nuclear Liability Act (limiting the offsite liability of nuclear facility operators to \$75 million) and replace it with the current version of the Nuclear Liability and Compensation Act (limiting the offsite liability of nuclear facility operators to \$1 billion).

Offsite liabilities caused by severe nuclear accidents can be very large indeed. Even the most conservative estimates of the financial cost of offsite damages from the Chernobyl accident are measured in the tens of billions of dollars, and some estimates of offsite costs of the Fukushima disaster are measured in the hundreds of billions of dollars. [See <http://ccnr.org/crac.html> for example.]

So for you, the members of this Committee, to approve Bill C-22 is for you to agree in advance that the taxpayers of Canada, from coast to coast to coast, be required to shoulder a potentially crushing future tax burden (in the event of a severe nuclear accident) so that some Canadians -- those living in Ontario and New Brunswick -- may continue to enjoy the benefits of nuclear-generated electricity without being burdened by the full responsibility for that choice.

The proposed Nuclear Liability and Compensation Act arbitrarily limits the financial liability of a Canadian nuclear facility operator to a maximum of one billion dollars for offsite damages resulting from any incident that results in an accidental release of radioactivity sufficient to cause personal injury and/or property damage.

While the Act limits the liability of the operator, it does not limit the liability of the Canadian taxpayer. The exposure of the Canadian taxpayer is unavoidable under this legislation and it is unlimited. No serious effort has been made by anybody in any official capacity to quantify the size of the maximum financial burden that might be shifted onto the shoulders of all Canadian taxpayers as a result of this legislation. It is financial planning with no planning whatsoever.

You, the members of this Committee, are being asked to authorize the writing of a blank cheque -- strange behaviour indeed from any government, but especially so from a government that professes to admire and strives to emulate the efficiency and discipline of the free market. It is difficult to imagine any captain of industry that would authorize such a sword of Damocles for his own company.

We urge you, as elected representatives of the Canadian population, not to approve this Act for third reading without insisting on due diligence.

First of all, why is there a need for such a limitation of liability? Shouldn't every enterprise be required to accept full responsibility for potential offsite damages? If the government has to ultimately step in to deal with a messy situation, such as that at Lac Megantic, so be it – but why should the owner or operator have his responsibilities lifted from his shoulders ahead of time?

Secondly, where did the figure of one billion dollars come from? This is even less than the cost of a reactor refurbishment. It is far less than the cost of onsite damages in the event of a severe nuclear accident, for which the owner/operator is fully liable and adequately insured. If there ought to be any limit at all, should it not be at least ten billion dollars, to bring it into line with the American legislation? and offer more protection to Canadian taxpayers from coast to coast to coast?

Thirdly, should there not be an opportunity for adequate public input and debate on the substantive pan-Canadian issues of equity that are involved? Shouldn't citizens from provinces without nuclear power reactors be given the opportunity to comment on a bill that would potentially bind their children and grandchildren?

Fourthly, should not the Canadian nuclear authorities be required to produce a definitive study laying out the maximum cost anticipated for offsite damages, taking into account the extensive and expensive decontamination efforts that are currently underway in Japan following the Fukushima Dai-ichi triple meltdown more than three years ago? [See Appendix A] We find it disturbing that the recently compiled draft report by CNSC Staff, entitled "Study of Consequences of a Hypothetical Severe Nuclear Accident and Effectiveness of Mitigation Measures", released on June 4, 2014, just one day before Mr. Binder testified before this Committee, says nothing about the financial liability associated with these offsite "consequences". Are there indeed no economic consequences?

Members of the Committee, we appeal to you to appreciate the fact that Bill C-22 is not just a house-cleaning bill to facilitate the work of parliament, but that it involves important and substantive questions that, in the wake of Fukushima, must be addressed by our elected representatives. [See Appendix C]

It was Dwight D. Eisenhower who stated decades ago that war is too important a matter to be left to the generals. We appeal to the Committee members to recognize that nuclear power is far too important a matter to be left to the Canadian pro-nuclear establishment, which unfortunately now includes the senior staff of the Canadian Nuclear Safety Commission.

Since the firing of Linda Keen, the CNSC has become an increasingly active supporter and promoter of the nuclear industry – a fact that has become clear to many dozens of citizen intervenors at CNSC hearings. Indeed, on the front cover of the CNSC 2009 Annual Report is the statement: [<http://tinyurl.com/k3643a4>]

FACT: NUCLEAR IN CANADA IS SAFE

If indeed “Nuclear in Canada is Safe”, then there would be no need for a Nuclear Liability and Compensation Act! Indeed, there would be no need for a Nuclear Safety Commission either! It is difficult for the Canadian public to have confidence in an agency that is unwilling to distinguish between opinion and fact.

In our view, elected representatives must become involved more directly in these matters concerning long-term liabilities associated with questions of widespread radioactive contamination. The time is past when a rubber-stamp, business-as-usual approach could be seen as forgivable. We’ve got to start paying attention.

Costs are mounting. Overnight, the estimated cost of the radioactive cleanup of Port Hope went from \$800 million to \$1.8 billion. Overnight, the \$7 billion cleanup of Chalk River went up by another billion dollars. No inquiry or report!

Where is our public accountability? How many billions more will it take before our parliamentarians are induced to act in the public interest -- to staunch the hemorrhaging of public money by insisting on proper accountability measures?

A good beginning would be to recommend that the Nuclear Liability and Compensation Act not be voted on in its present form until the underlying substantive issues are addressed, some of which have been outlined above.

Thank you for considering these comments.

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

A COMPARISON OF

The CNSC Study (June 4 2014):
**Consequences of a
Hypothetical Severe Nuclear Accident**

and

**The Japanese Government's On-Going
Radioactive Decontamination Efforts (Sept 2013)**

The recently released CNSC study says nothing about the actual deposition of radioactive materials on roofs, walls, gardens, trees, and soil, leading to stubborn radioactive contamination that delivers lingering radioactive exposures to citizens over a very wide area – contamination that lasts years or even decades after the accident, preventing reoccupation of evacuated areas for two years or more, and requiring extensive and expensive decontamination efforts that are only partially successful.

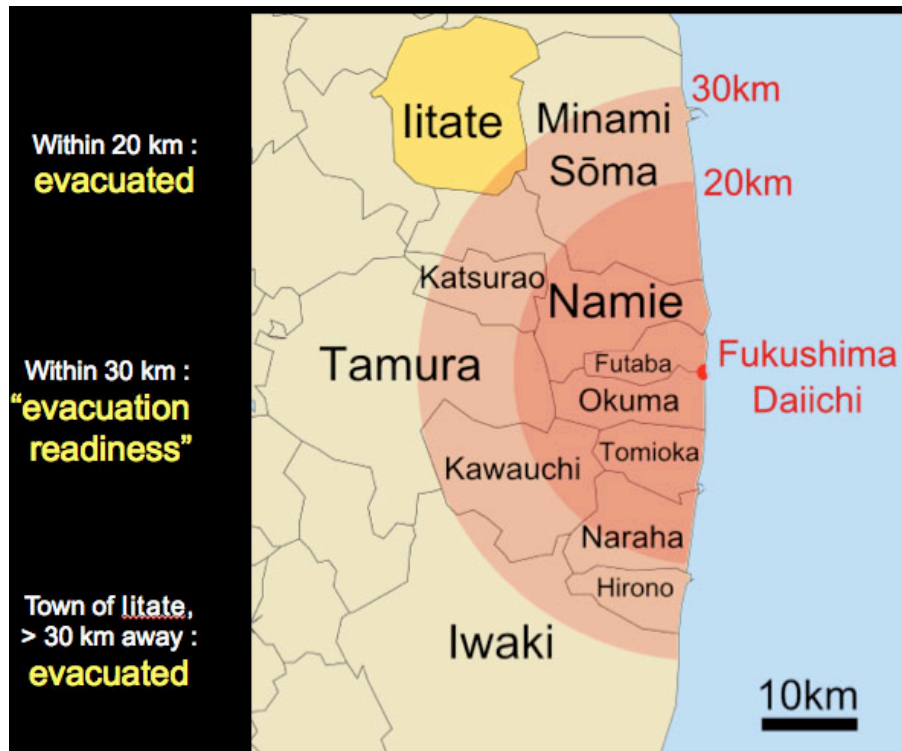
It is also important to bear in mind that every home insurance policy issued in Canada contains a "nuclear exclusion clause" which voids all coverage in the event of such radioactive contamination.

From p.19 of the CNSC Study: *"The variability in wind direction for the longer release scenarios reflects the fact that dose to any fixed location would be affected by changes in wind direction ... the dominant winds in the region blow from the northwest quarter 28 percent of the time, from the west-southwest 10 percent of the time, and 9 percent of the time from the east."*

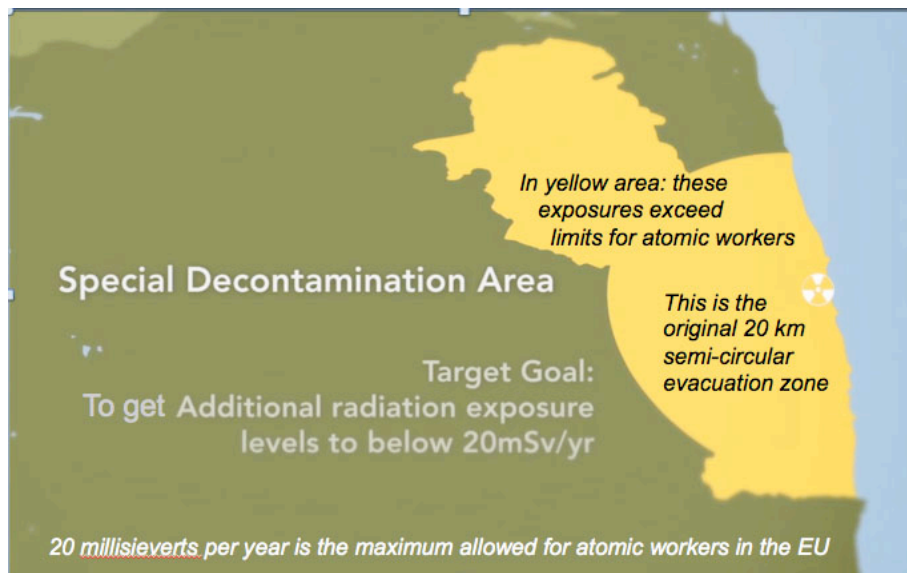
The town of Iitate in Japan, more than 30 km from the Fukushima Dai-ichi nuclear plant, was one of the most contaminated sites and is still under total evacuation three years after the accident. Bearing in mind that Scarborough is only about 40 km from Darlington, and only about 20 km from Pickering, and that the wind blows from the east about 9 percent of the time, the long-term consequences of a severe release could be severely disruptive for many years.

The images below come from a Japanese video presentation posted by the Ministry of Environment (linked below) in September 2013 -- 2 1/2 years after the Fukushima Dai-ichi atmospheric releases.

Here is a graphic showing the original evacuation zone (within 20 km of the plant) and the area between 20km and 30km where people were ordered to be "evacuation ready". However, the town of Iitate -- more than 30km away, NW -- also had to be evacuated and remains evacuated to this day.



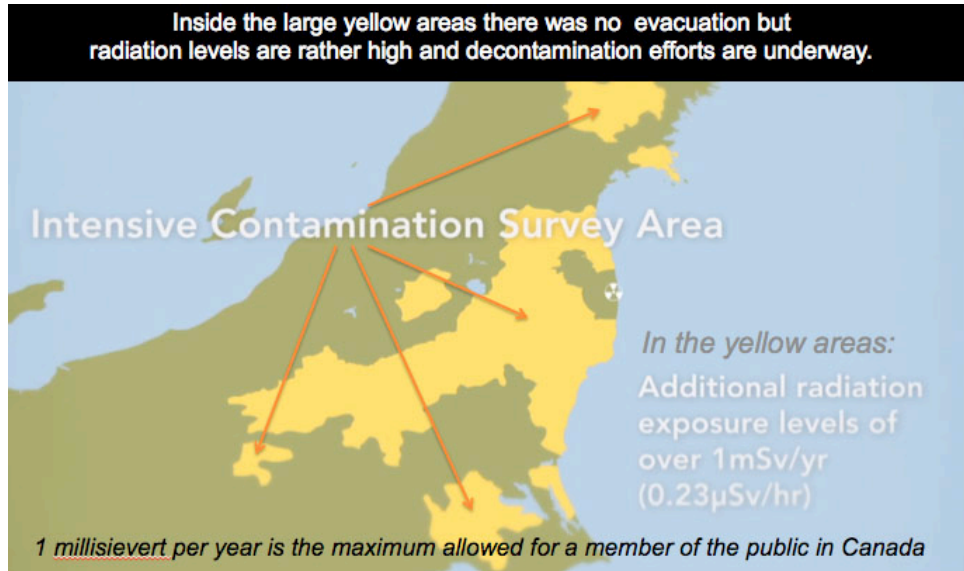
The most heavily contaminated areas include the original 20km evacuation zone and some irregular areas northwest and a bit south of that. In the yellow area, below, the radiation levels (from contamination) are HIGHER than the MAXIMUM exposure allowed for atomic workers in the EU (20 millisieverts per year). More than 2 years after the accident.



The above graphic has been modified very slightly from a September 2013 video by the Japanese Ministry of Environment -- a link to that video is given below in the post-script. Most of the other graphics are also taken from that video.

Appendix A: CNSC Study contrasted with Japanese Decontamination Efforts

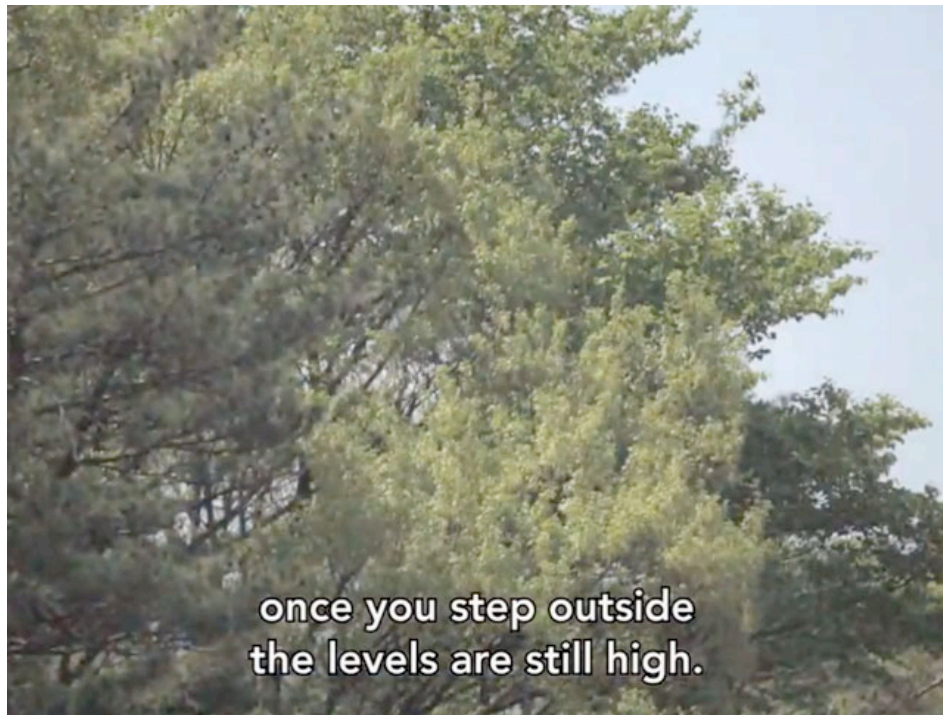
In the next graphic, the "Special Decontamination Area" appears as a green patch inside a yellow area where the radiation levels are BELOW the 20 millisievert/year limit for atomic workers but ABOVE the 1 millisievert/year limit for members of the general public. These yellow areas come right up to the outskirts of Tokyo, about 240 km to the south (SSW).



Huge volumes of contaminated soil are dug up and bagged as radioactive waste, including parts of the forest floor within 200 metres of a residence.



The following caption is taken directly from the government video:

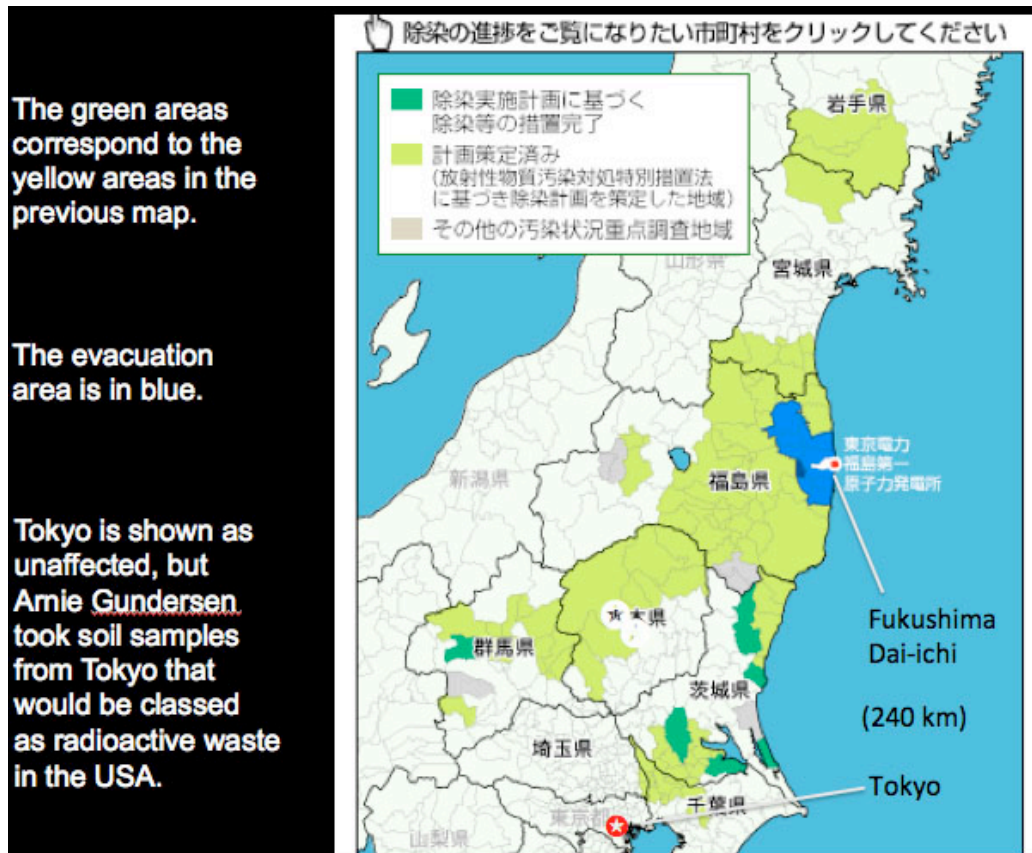


Decontaminating a home takes several days to a few weeks. Contaminated garden soil is dug up and bagged, and replaced with uncontaminated soil. House walls and even garden rocks are scrubbed to try to decontaminate these surfaces, with partial success. The radioactivity is extremely difficult to dislodge from the surfaces where it has "bonded".



Tokyo has in fact been affected by the fallout from Fukushima but the Japanese government does not want to admit this.

Gordon Edwards.



Post-Script:

The 40 minute video from which these images were taken comes from the Ministry of the Environment in Japan. It was put together in September 2013, about 9 months ago. It talks about radioactive decontamination efforts in places such as Fukushima City and the town of Koori, some 65 kilometres away from the reactors in a northwest direction.

Video: http://josen-plaza.env.go.jp/materials_links/index.html#movie131007en

Map: [In this Google map, below, Koori is located at the red marker, a little north and a bit east of Fukushima City; the crippled Fukushima Daiichi reactors are located at the purple marker, about 65 km away.]



As you can see in the video, there are extensive decontamination efforts deemed necessary on a house-by-house basis to reduce the radiation levels. It is remarkable that after 2 1/2 years, only about 1/4 of the homes in Fukushima City had been even partially decontaminated.

All of this decontamination is reasonable and helpful, but only partially effective. I know of several instances where people have been told (e.g. by US government officials or Canadian nuclear authorities) that they could safely return to live in or work in areas that had been successfully decontaminated, without any need for protective clothing or equipment, only to find out later on that the authorities had been wrong and the areas were in fact not safe for the people to re-inhabit or to work without protection. [e.g. exposure of hundreds of workers at Bruce Nuclear Station to inhalation of plutonium dust over a period of several weeks]

*The Japanese Government web site where this video was posted is entitled
"Measures for Decontamination of Radioactive Materials
Discharged by TEPCO's Fukushima Daiichi NPS Accident"*

Here is the link to the Government site:

<http://josen.env.go.jp/en/>

G.E.

Comments on Bill C-5

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

before the Standing Committee on Natural Resources
November 29 2007

1. Before it is used in a nuclear reactor, uranium fuel can be safely handled using only a pair of gloves. Inside the reactor, however, hundreds of new radioactive substances are created called “fission products”. These are the broken pieces of uranium atoms which have been split. The fission products are millions of times more radioactive than fresh uranium fuel. Immediately after being discharged from a reactor, a single CANDU fuel bundle can deliver a lethal dose of penetrating radiation in just 20 seconds to any unprotected person standing one metre away. This intense radioactivity is due to the presence of fission products. Indeed, the irradiated fuel is so radioactive that it has to be cooled under 14 feet of circulating water for at least 7 to 10 years or it will spontaneously overheat, experience self-inflicted damage, and release radioactive gases and vapours.
2. Inside the core of a reactor, even after the fission process has been completely shut down, the radioactivity of the fission products is so intense that the core continues to generate 7 percent of full power heat. That’s an awful lot of heat, and if adequate cooling is not provided – even after complete shutdown of the reactor -- the residual heat is more than enough to melt the core at a temperature of 5000 degrees Fahrenheit. When the fuel melts, large quantities of fission products are released as gases, vapours, and ashes. I have provided the Committee members with excerpts from four official Canadian documents. These excerpts confirm the fact that core melting accidents are possible and even probable if Canada chooses to build a large fleet of nuclear reactors. The official bodies that produced the documents from which these excerpts were taken are the Ontario Royal Commission on Electric Power Planning, the Atomic Energy Control Board, the federal Department of Energy, Mines and Resources, and the Select Committee on Ontario Hydro Affairs.
3. As a participant in the deliberations of both the Royal Commission on Electric Power Planning and the Select Committee on Ontario Hydro Affairs, I can assure the Committee members that the rationale for Bill C-5 is based on the potential offsite consequences of fuel melting accidents. For without fuel melting, it is not possible for a nuclear accident to have offsite property damages exceeding \$10 million. However, the consequences of core melt accidents can typically run to tens of billions of dollars, or even hundreds of billions of dollars, and can make large regions of land uninhabitable for a considerable period of time. In the case of such a catastrophe, Bill C-5 limits the liability of nuclear operators to a very modest amount (less than half the cost of retubing a reactor), it eliminates all liability for nuclear equipment suppliers – even if they supplied defective equipment which caused the accident -- yet it does not address any important measures that would limit the overall financial liability to the Canadian taxpayer or the societal liability of any of the affected populations.

4. The Canadian Coalition for Nuclear Responsibility feels that it is important for the elected representatives of the people to ensure that the nuclear industry is held publicly accountable, and to ensure that the best interests of Canadians are not compromised in order to serve the interests of the nuclear industry. We believe that the figure of \$650 million has no sound scientific or financial basis, and that this arbitrary amount serves to distract the Committee from a much more important question: Just how great might the total damage be in case a core melt accident occurs here in Canada? Have such studies been carried out? Has the Committee received copies of them? What if such an accident occurred at the Pickering site? How much of the Toronto population would have to be evacuated, and for how long? And how far would the radioactive contamination spread? It is sobering to realize that even today, 20 years after the Chernobyl accident in the Ukraine, some sheep farmers in Northern England and in Northern Wales cannot market their meat because of radioactive contamination with cesium-137 from the Chernobyl reactor, thousands of kilometres away. Will farmers in the Ottawa Valley and in Quebec have to curtail their agricultural practices following a nuclear accident near Toronto? Is the Canadian Parliament expected to pass bill C-5 to limit the liability of the nuclear industry without giving careful thought to the question of limiting the ultimate financial liability of the Crown?
5. One way of limiting public liability would be to require that any new reactors be sited far away from large population centres. Observers both inside and outside of the nuclear industry have commented that the Pickering reactors are among the worst-sited reactors in the world, because of the catastrophe potential in such close proximity with one of Canada's largest cities. Such a catastrophe could be realized not only in the event of a severe industrial accident, but also as the result of external causes such as a large earthquake causing multiple pipe breaks in the reactor core, or an act of deliberate sabotage or terrorism, which can no longer be discounted as fanciful.
6. I was one of the fortunate few to attend a 1977 Conference on the Nuclear Fuel Cycle sponsored by the International Atomic Energy Agency (IAEA) in Salzburg Austria. At that conference, one of the leading American nuclear scientists, Alvin Weinberg, spoke for an hour to an audience of about 300 nuclear scientists from every corner of the world. His message was stark. "We nuclear scientists," he said "have not faced up to the full consequences of complete success. If we succeed in building tens of thousands of nuclear reactors around the world, which we must do to make any noticeable dent in the world's use of petroleum, we can expect to have a core meltdown approximately every four years. The lesson is clear. We must stop building these reactors near large cities." I was impressed by the sincerity of Mr. Weinberg's proposal. In fact, he recommended that large tracts of land should be set aside specifically for nuclear reactors and nothing else. If the reactors are going to melt down, let them do so there, far away from the population centres.
7. Alvin Weinberg's proposals may strike some of us as extreme, but perhaps it's only because we have not taken the trouble to educate ourselves about the science behind core melting accidents and the possible consequences of such events. In 1978, one full year before the Three Mile Island Accident, the Ontario Royal Commission on Electric Power Planning spent months on this question and found that if there were 100 reactors operating in Canada at some future date, then under the worst assumptions, there could be a core

meltdown here in Canada once every 40 years. In his report, Arthur Porter – a professor of Engineering from the University of Toronto – wrote that serious consideration should be given to building any new reactors underground, so that the radioactive releases from an uncontained core meltdown could be largely trapped in subterranean caverns and prevented from spreading over vast land areas.

8. Another way of limiting the nuclear liability of the Crown and of the Canadian population is to invest in other energy technologies which can reduce greenhouse gases faster and more efficiently than nuclear power can possibly do, without posing the same risks of catastrophic impact. According to a report issued in May 2007 by the Intergovernmental Panel on Climate Change, nuclear power currently provides about 16 percent of the world's electricity (which amounts to about 2.7 percent of total energy use). In the next quarter century, the IPCC estimates that nuclear power could increase its contribution from 16% to 18% of electricity use. This is far from solving the climate change problem. Meanwhile, the same IPCC report states that renewable electricity currently accounts for 18% of electrical supply, and that in the next 25 years it could account for 35% of all electricity. That's twice as much as nuclear can provide in the same time frame. Evidently, renewables are a better bet than nuclear, at least for the next 25 years. Nuclear is not a good investment; it doesn't do the job.
9. Germany decided about 10 years ago to phase out of nuclear power. They have shut down 2 of their 17 reactors and will soon shut down a third. In that same 10-year period, Germany has installed 20,000 megawatts of wind power. That's more than the entire Canadian nuclear program. Meanwhile, Germany is leading all other European countries in reducing greenhouse gas emissions. So perhaps instead of passing Bill C-5, the Committee members should be recommending that a comprehensive inquiry into the risks and benefits of nuclear energy in comparison with other energy technologies be undertaken in the public interest. Such an inquiry is long overdue.
10. It would be a shame for this Committee to approve a piece of legislation that is so peripheral to the larger issues. While Parliament is asked to rubber-stamp legislation such as this, which merely shifts financial liability from the nuclear industry to the taxpayer, multi-billion dollar decisions are being made behind closed doors without any Parliamentary debate. I refer in particular to the recent decision by the Minister of Natural Resources to approve a 25-billion dollar proposal of the nuclear industry to centralize its inventory of irradiated nuclear fuel at some location within Canada, yet to be determined. If Parliament votes for Bill C-5 that vote will be interpreted as a green light for nuclear expansion, even though such a question is never phrased in a forthright and honest manner. Is the government afraid to ask an honest question of Parliament: "Do you approve of this government embarking on a vast expansion of nuclear power both here and abroad?"
11. CCNR believes that Bill C-5 is based on misinformation and a profound misunderstanding of the nature of the energy choices that we all must confront. We believe Bill C-5 should not be passed unless it is radically revised to include stringent measures to limit the financial liability of the Crown and to dramatically reduce the potential risks to Canadian citizens.

Exhibit: Findings on CANDU reactor accidents, prepared by Gordon Edwards in 1996.

CORE MELTDOWNS IN CANDU REACTORS – KNOWN FACTS

compiled by G. Edwards Ph.D., President, Canadian Coalition for Nuclear Responsibility

QUOTATIONS FROM:

The Safety of Ontario's Nuclear Reactors (1980)

by the Select Committee on Ontario Hydro Affairs (Ont. Legislature)

“It is not right to say that a catastrophic accident is impossible . . . The worst possible accident . . . could involve the spread of radioactive poisons over large areas, killing thousands immediately, killing others through increasing susceptibility to cancer, risking genetic defects that could affect future generations, and possibly contaminating large land areas for future habitation or cultivation.”

“The AECB should commission a study to analyze the likelihood and consequences of a catastrophic accident in a CANDU reactor . . . directed by recognized experts outside the AECB, AECL and Ontario Hydro.” [NOTE: this study has never been done]

QUOTATIONS FROM:

A Race Against Time – Report on Nuclear Power in Ontario (1978)

by the Ontario Royal Commission on Electric Power Planning

“When we talk about the safety of a nuclear reactor, we are referring essentially to how effectively the fantastic amount of radioactivity contained in the reactor core can be prevented from escaping into the ground and atmosphere in the event of major malfunctions.”

“Clearly, if a major release of this accumulated radioactivity occurred, as discussed in the previous section, the consequences would be extremely serious and could involve several thousand immediate fatalities and many more delayed fatalities.”

“Assuming, for the sake of argument, that within the next forty years Canada will have 100 operating reactors, the probability of a core meltdown might be in the order of 1 in 40 years, if the most pessimistic estimate of probability is assumed.”

CORE MELTDOWNS IN CANDU REACTORS – KNOWN FACTS

QUOTATIONS FROM:

***Submission to the Treasury Board of Canada (1989)
by the Atomic Energy Control Board (predecessor of the CNSC)***

“When modern nuclear power plants were being designed in Canada two decades ago, their complexity and potential for catastrophic consequences were recognized. . . .”

“. . . through the combination of a series of comparatively common failures which, on their own, are of little consequence, accidents can develop in a myriad of ways (as demonstrated most vividly at Three Mile Island and Chernobyl). This makes the calculation of consequences of potential accidents very difficult.”

“The consequences of a severe accident can be very high. The accident at Chernobyl has cost the Soviet economy about \$ 16 billion including replacement power costs. The accident has generated anti-nuclear sentiment in the USSR and throughout the world. Three Mile Island has cost the USA \$ 4.8 billion”

“The likelihood of serious accidents cannot be judged from statistics . . . and CANDU plants cannot be said to be either more or less safe than other types.”

QUOTATIONS FROM:

***Nuclear Policy Review Background Papers (1982, Report ER81-2E)
by the Dept of Energy Mines and Resources, Government of Canada***

“Core meltdown accidents of the type to be described here have never occurred in any commercial power reactor, although the sequence of events at Three Mile Island went partway along the path. Nor has any study on core meltdown accidents been done for the CANDU reactor. . . .”

“. . . if the ECCS [*EMERGENCY CORE COOLING SYSTEM*] failed to act, melting of metallic components of the core and eventually

CORE MELTDOWNS IN CANDU REACTORS – KNOWN FACTS

of the uranium oxide fuel itself would probably occur. . . . [or] if the reactor fails to shut down or the decay heat removal systems fail, melting of the core would ensue.”

“Much larger consequences could be associated with core meltdowns which also cause failures in the containment structure above ground. If the containment sprays malfunction or are damaged by flying debris (generated by a LOCA [*LOSS OF COOLANT ACCIDENT*] or transient) the steam being released from the reactor core would not be condensed.”

“This steam, along with various vapours and noncondensable gases, could cause failure of the containment structure due to overpressurization. Hot zircaloy from the fuel sheaths and steel would also react with water to produce large volumes of hydrogen. Detonation of this hydrogen (reacting with oxygen) might damage the containment or, if not, the heat of combustion combined with high steam pressure would at least add to the pressure loads on the structure.”

“A further contributor to containment pressurization would be the large quantities of carbon dioxide generated as the molten core melts through the concrete base slabs. Another possibility is one in which the molten fuel falls into the pool of water in the bottom of the reactor vessel with the formation of flying debris which could, in turn, damage the containment structure. All post-meltdown occurrences which threaten to damage or breach the containment structure can result in the release of substantial amounts of radioactive material to the environment.”

“The Reactor Safety Study [*by the U.S. NRC*] calculated the health effects and the probability of occurrence for many possible combinations of radioactive material release magnitude, weather conditions, and population exposure [*see the next page*]. . . . In addition to these health effects, a nuclear accident may contaminate the surrounding area and require relocation of the populace.”

CORE MELTDOWNS IN CANDU REACTORS – KNOWN FACTS

SOME BACKGROUND ON:

The Rasmussen Report (1974, "Reactor Safety Study", WASH-1400) by the U.S. Nuclear Regulatory Commission

G.A. Pon, Vice President of AECL Power Projects, said of WASH-1400:

"Although the study was prepared in the U.S. assessing the risks associated with their light water nuclear power plants, the findings should not be significantly different for the CANDU reactor." *Porter Commission, Exhibit 28 (1977), p.5*

In sworn testimony before the Cluff Lake Board of Inquiry into Uranium Mining in Saskatchewan, Dr. Norman Rasmussen -- the principal author of WASH-1400 -- commented about CANDU meltdown possibilities:

"although the Canadian design philosophy differs in some of its approaches . . . it achieves, in my judgment, about the same safety level as far as I can tell." *Transcript, Cluff Lake Inquiry, (1977)*

Worst case consequences as reported in WASH-1400 (1974):

45,000 cases of radiation sickness (requiring hospitalization)
3,300 prompt deaths (due to acute radiation sickness)
45,000 fatal cancers (over 50 years)
250,000 non-fatal cancers (over 50 years)
190 defective children born per year after the accident
\$14 billion in property damage (1974 dollars; not insurable)

FOR MORE INFORMATION SEE <http://ccnr.org>